REPORT

issued by an Accredited Testing Laboratory

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Radio measurements on Radio 4490HP 44B5 44B13 C with FCC ID TA8AKRC161985 and IC 287AB-AS161985

Product name: Radio 4490HP 44B5 44B13 C
Product number: KRC 161 985/3

RISE Research Institutes of Sweden AB
Vehicles and Automation – EMC-IKT

Performed by	Examined by
Signed by: Tomas Lennhager Reason: I am the author of this document Date & Time: 2023-05-25 14:31:47 +02:00	Signed by: Daniel Lundgren Reason: I have reviewed this document Date & Time: 2023-05-25 15:13:50 +02:00
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Summary

Standard Listed part of		Compliant
FCC CFR 47 part 22 and part 27/ RSS-132/ RSS-130 and RSS-Gen		
2.1046/ RSS-132 5.4/ RSS-130 4.6	RF power output	Yes
2.1049/ RSS-Gen 6.7	Occupied bandwidth	Yes
2.1051/ RSS-132 5.5/ RSS-130 4.7	Band edge	Yes
2.1051/ RSS-132 5.5/ RSS-130 4.7	Spurious emission at antenna terminals	Yes
2.1053/ RSS-132 5.5/ RSS-130 4.7	Field strength of spurious radiation	Yes
2.1055/ RSS-132 5.3/ RSS130 4.5	Frequency stability	Yes

Description of the test object

Equipment:	Radio 4490HP 44B5 44B13 C Product number KRC 161 985/3 and KRC 161 985/31* FCC ID: TA8AKRC161985 IC: 287AB-AS161985 * The hardware and software (except for the security software) are identical for both types of Radios, KRC 161 985/3 (Security unlocked) and KRC 161 985/31 (Security locked). The tests were performed on KRC 161 985/3 with un-security software for testing purpose.
HVIN:	AS161985
FVIN:	-
Hardware revision state:	R1B
Radio Access Technology, RAT and Frequency range:	Band 5 (B5): Single RAT: LTE, NR, NB IoT (IB, GB) Multi RAT: NR, LTE, ESS, NB IoT (IB, GB) TX: 869 – 894 MHz RX: 824 – 849 MHz Band 13 (B13): Single RAT: LTE, NR, NB IoT (IB, GB) Multi RAT: NR, LTE, ESS, NB IoT (IB, GB) TX: 746 – 756 MHz RX: 777 – 787 MHz
IBW:	B5: 25 MHz B13: 10 MHz
Output power:	Maximum nominal output power per band, carrier and port B5 LTE: 5, 10 MHz: 60 W B5 NR: 5, 10, 15, 20, 25 MHz: 60 W B5 ESS 10 MHz: 60 W B13 LTE: 5, 10 MHz: 60 W B13 NR: 5, 10 MHz: 60 W B13 ESS 10 MHz: 60 W Maximum total output power per port(both bands): 120W Maximum total output power per Radio Unit: 480W
Antenna ports B5:	A-D: 4 TX / 4 RX ports
Antenna ports B13:	A-D: 4 TX / 4 RX ports
Antenna:	50 Ohm Impedance, No dedicated antenna, handled during licensing.

RF configuration B5:	Single and multi-carrier, 5 carriers per port, Non-Contiguous Spectrum (NCS), Contiguous Spectrum (CS) TX Diversity, 2x2 MIMO, 4x4 MIMO, Carrier Aggregation (CA) intra-band and inter-band supported. LTE with NB IoT IB/GB: 1 Anchor PRB + 1 Non-Anchor PRB NR with NB IoT IB: Max 2 Boosted PRB for 5 and 10 MHz BW Max 4 Boosted for 15MHz BW Max 6 Boosted PRB for 20 MHz BW Max 2 Boosted PRB for 25MHz BW
RF configuration B13:	Single and multi-carrier, 2 carriers per port, Non-Contiguous Spectrum (NCS), Contiguous Spectrum (CS) TX Diversity, 2x2 MIMO, 4x4 MIMO, Carrier Aggregation (CA) intra-band and inter-band supported. LTE with NB IoT IB/GB: 1 Anchor PRB + 1 Non-Anchor PRB NR with NB IoT IB: Max 2 Boosted PRB for 5 and 10 MHz BW
Channel bandwidths:	B5 LTE: 5 MHz and 10 MHz NR: 5 MHz, 10 MHz 15 MHz, 20 MHz and 25 MHz B13 LTE: 5 MHz and 10 MHz NR: 5 MHz and 10 MHz
Sub-carrier spacing:	LTE: 15 kHz NR: 15 kHz and 30 kHz (30 kHz for 10 MHz BW and wider)
Modulations:	LTE: QPSK, 16QAM, 64QAM and 256QAM NR: QPSK, 16QAM, 64QAM and 256QAM NB IoT GB/ IB: QPSK

Emission designators:

B5:
LTE with and without NB IoT IB
5 MHz, BW: 4M49W7D
10 MHz, BW: 8M96W7D
20MHz, BW: 18M8W7D (10+10 MHz, Carrier aggregation)

LTE with NB IoT GB:
10 MHz,BW: 9M33W7D

NR with and without NB IoT IB: SCS 15kHz :
5 MHz, BW: 4M51W7D
10 MHz, BW: 9M40W7D
15 MHz, BW: 14M4W7D
20 MHz, BW: 19M2W7D
25 MHz BW: 24M0W7D
20 MHz, BW: 19M2W7D (10+10, 15+5 MHz, Carrier aggregation)
25 MHz, BW 24M1W7D (5+20, Carrier aggregation)

NR SCS 30kHz :
10 MHz, BW: 8M64W7D
15 MHz, BW: 13M6W7D
20 MHz, BW: 18M3W7D
25 MHz BW: 23M2W7D

B13:
LTE with and without NB IoT IB
5 MHz, BW: 4M48W7D
10 MHz, BW: 8M96W7D

LTE with NB IoT GB:
10 MHz, BW: 9M34W7D

NR with and without NB IoT IB: SCS 15kHz :
5 MHz, BW: 4M51W7D
10 MHz, BW: 9M41W7D

NR SCS 30kHz:
10 MHz, BW: 8M63W7D

RF power Tolerance:	+0.6/ -2.5 dB
CPRI Speed	Up to 25.8 Gbps
Nominal supply voltage:	-48VDC

The information above is supplied by the manufacturer.

Purpose of test

The purpose of the tests is to verify compliance to the performance characteristics specified in applicable items of FCC CFR 47, RSS-132, RSS-130 and RSS-Gen.

No modifications of the test object was made during the testing.

Operation modes during measurements

LTE measurements were performed with the test object transmitting test models as defined in 3GPP TS 36.141. Test model E-TM1.1 was used to represent QPSK, test model E-TM3.2 to represent 16QAM, test model E-TM3.1 to represent 64QAM modulation and E-TM3.1A to represent 256QAM modulation. Test model E-TM1.1 was used for all measurements representing worst case if not otherwise stated.

NR measurements were performed with the test object transmitting test models as defined in 3GPP TS 38.141-1. Test model NR: FR1-TM1.1 is used to represent QPSK, test model NR: FR1-TM3.2 to represent 16QAM, test model NR: FR1-TM3.1 to represent 64QAM modulation and test model NR: FR1-TM3.1a to represent 256QAM modulation. Test model NR: FR1-TM1.1 was used for all measurements representing worst case.

NB IoT GB/ IB measurements were performed with the test object transmitting test model N-TM representing QPSK as defined in 3GPP TS 36.141.

The test object was simultaneously transmitting in both bands at maximum output power settings during all measurements.

Conducted measurements

The test object was supplied with -48 VDC by an external power supply. Additional connections are documented in the set-up drawings for conducted measurements.

The signal path of the measurement chain was calibrated with a network analyzer and the correction stored as a transducer factor in the measurement equipment.

Radiated measurements

The test object was powered with -48 VDC by an external power supply. Additional connections are documented in the set-up drawings for radiated measurements.

EUT Emission= SA reading + (CableLosses – Antenna gain(dBi) + TheoreticalPathloss + FilterLoss – LNAgain)

The correction factors are stored in R&S EMC 32 software as separate files and activated as applicable in the Hardware setup, for each measurement configuration. Emissions close or above the limit is verified with the substitution method where the EUT is replaced by a signal generator and an Antenna with known gain.

Test facility

The used semi-anechoic chamber is compliant with ANSI C63.4. RISE is an ISO 17025 accredited test facility for Electromagnetic Compatibility (EMC) and Radio testing. RISE is a Recognized Lab under FCC (Designation number: SE0001) and ISED (CAB identifier: SE0002) rules for the scope of standards used in this test report.

References

Measurements were done according to relevant parts of the following standards:
ANSI C63.4-2014+ C63.4a-2017
ANSI C63.5-2017
ANSI C63.26-2015
CFR 47 part 2, April 2023
CFR 47 part 27, April 2023
CFR 47 part 22, April 2023
KDB 662911 D01 Multiple Transmitter Output v02r02
KDB 971168 D01 Power Meas License Digital Systems v03r01
KDB 971168 D03 IM Emission Repeater Amp v01
3GPP TS 36.141, version 15.3.0
3GPP TS 38.141-1, version 15.4.0
RSS-130 Issue 2
RSS-132 Issue 4
RSS-Gen Issue 5

Measurement equipment

Measurement equipment

Item	Name	Inv.no	Cal. due date
Semi Anechoic Chamber	TDK	503881	-
	NSA	BX90699	2025-11-04
	SVSWR	BX90702	2024-09-20
Spectrum Analyzer	Rohde & Schwarz ESU40	901385	2023-07-20
Software	Rohde & Schwarz EMC32	BX62351	-
RF cable	Huber & Suhner Eacon 4C	BX91490	2023-06-30
RF Cable	Rosenberger UFB311A	503508	2023-09-08
RF Cable	Rosenberger UFB311A	503509	2023-09-08
Antenna, Bilog	Teseq CBL6143A	BX92331	2025-09-16
Preamplifier	MicroComp Nordic MCN-JS42-00101800-28-10P	901545	2024-01-25
HP filter	Wainwright WHKX1.0/18G-10SS	901373	2023-07-08
Antenna, Horn	Emco 3115	502175	2024-07-02
Spectrum analyzer	R&S FSQ 40	504143	2023-07-21
Spectrum analyzer	R&S FSW 43	902073	2023-07-21
RF attenuator	Weinschel 40dB	902282	2023-09-09
HP filter	Wainwright WHKY1.0/15G-12SS	504199	2023-06-08
RF cable	Sucoflex 102EA	BX50236	2023-09-09
RF Cable	Sucoflex 102EA	BX50237	2023-09-09
Thermohygrometer	Testo 635	504203	2023-06-30
Thermohygrometer	Testo 625	504117	2023-06-30

Uncertainties

Measurement and test instrument uncertainties are described in the quality assurance documentation ”RISE – 3936”. The uncertainties are calculated with a coverage factor k=2 (95% level of confidence).

Reservation

The test results in this report apply only to the particular test object as declared in the report.

Delivery of test object

The test object was delivered: 2023-03-08.

Manufacturer's representative

Patrik Hellström, Ericsson AB.

Test engineers

Tomas Lennhager and Björn Skönvall, RISE.

Test participant(-s)

None.

Test frequencies used for conducted and radiated measurements

B5 LTE:

Frequency [MHz]	Symbolic name	Comment
871.5	B_{5LTE}	TX bottom frequency in 5 MHz BW configuration
874.0	B_{10LTE}	TX bottom frequency in 10 MHz BW configuration
881.5	M_{5LTE}	TX middle frequency in 5 MHz BW configuration
881.5	M_{10LTE}	TX middle frequency in 10 MHz BW configuration
891.5	T_{5LTE}	TX top frequency in 5 MHz BW configuration.
889.0	T_{10LTE}	TX top frequency in 10 MHz BW configuration
871.5 876.5 891.5	Bim_{LTE}	TX constellation for Bim with 5 MHz BW
871.5 886.5 891.5	Tim_{LTE}	TX constellation for Tim with 5 MHz BW
874.0 884.0	$CA2_{10+10LTE}$	Carrier Aggregation TX middle 10+10 MHz BW configuration
871.5 876.5 881.5 886.5 891.5	$M5_{5LTE}$	TX constellation for maximum number of carriers with 5 MHz bandwidth configuration.

The RX frequency was configured 45 MHz below the corresponding TX frequency according to the applicable duplex offset for the operating band.

B5 LTE with NB IoT IB/ GB

Frequency [MHz]	Symbolic name	Comment
IoT1=PRB-1 IoT2=PRB50 LTE=874.0	B_{GB+10L}	TX constellation for Bottom LTE carrier with 10 MHz carrier bandwidth. IoT1 Boosted 6 dB
IoT1=PRB-1 IoT2=PRB50 LTE=889.0	T_{GB+10L}	TX constellation for Top LTE carrier with 10 MHz carrier bandwidth. IoT2 Boosted 6 dB
IoT=PRB2 LTE=871.5	B_{IB+5L}	TX constellation for Bottom NB IoT IB. LTE carrier with 5 MHz carrier bandwidth. IoT IB was boosted with 6 dB
IoT=PRB22 LTE=891.5	T_{IB+5L}	TX constellation for Bottom NB IoT IB. LTE carrier with 5 MHz carrier bandwidth. IoT IB was boosted with 6 dB

The RX frequency was configured 45 MHz below the corresponding TX frequency according to the applicable duplex offset for the operating band.

B5 NR:

Frequency [MHz]	Symbolic name	Comment
871.5	B_{5NR}	TX bottom frequency in 5 MHz BW configuration
874.0	B_{10NR}	TX bottom frequency in 10 MHz BW configuration
876.5	B_{15NR}	TX bottom frequency in 15 MHz BW configuration
879.0	B_{20NR}	TX bottom frequency in 20 MHz BW configuration
881.5	M_{5NR}	TX middle frequency in 5 MHz BW configuration
881.5	M_{10NR}	TX middle frequency in 10 MHz BW configuration
881.5	M_{15NR}	TX middle frequency in 15 MHz BW configuration
881.5	M_{20NR}	TX middle frequency in 20 MHz BW configuration
881.5	M_{25NR}	TX middle frequency in 25 MHz BW configuration
891.5	T_{5NR}	TX top frequency in 5 MHz BW configuration.
889.0	T_{10NR}	TX top frequency in 10 MHz BW configuration
886.5	T_{15NR}	TX top frequency in 15 MHz BW configuration
884.0	T_{20NR}	TX top frequency in 20 MHz BW configuration
871.5 876.5 891.5	Bim_{NR}	TX constellation for Bim with 5 MHz BW
871.5 886.5 891.5	Tim_{NR}	TX constellation for Tim with 5 MHz BW
874.0 884.0	$CA2_{10+10NR}$	Carrier Aggregation TX middle 10+10 MHz BW configuration
879.0 889.0	$CA2_{15+5NR}$	Carrier Aggregation TX middle 15+5 MHz BW configuration
871.5 884.0	$CA2_{5+20NR}$	Carrier Aggregation TX middle 5+20 MHz BW configuration
871.5 876.5 881.5 886.5 891.5	$M5_{5NR}$	TX constellation for maximum number of carriers with 5 MHz bandwidth configuration.

The RX frequency was configured 45 MHz below the corresponding TX frequency according to the applicable duplex offset for the operating band.

B5 NR with NB IoT IB

Frequency [MHz]	Symbolic name	Comment
IoT=PRB0 NR=871.5	B_{IB+5NR}	TX constellation for Bottom NB IoT IB. NR carrier with 5 MHz carrier bandwidth. IoT IB PRB was boosted with 6 dB
IoT=PRB24 NR=891.5	T_{IB+5NR}	TX constellation for Top NB IoT IB. NR carrier with 5 MHz carrier bandwidth. IoT IB PRB was boosted with 6 dB
IoT1=PRB-1 IoT2=PRB50 NR=874.0	$B_{IB+10NR}$	TX constellation for Bottom NB IoT IB. NR carrier with 10 MHz carrier bandwidth. 2 IoT IB PRBs was boosted with 6 dB
IoT1=PRB-2 IoT2=PRB-1 IoT3=PRB75 IoT4=PRB76 NR=876.5	$B_{IB+15NR}$	TX constellation for Bottom NB IoT IB. NR carrier with 15 MHz carrier bandwidth. 4 IoT IB PRBs was boosted with 6 dB
IoT1=PRB-3 IoT2=PRB-2 IoT3=PRB-1 IoT4=PRB100 IoT5=PRB101 IoT6=PRB102 NR=879.0	$B_{IB+20NR}$	TX constellation for Bottom NB IoT IB. NR carrier with 20 MHz carrier bandwidth. 6 IoT IB PRBs was boosted with 6 dB
IoT1=PRB0 IoT2=PRB132 NR=881.5	$M_{IB+25NR}$	TX constellation for Middel NB IoT IB. NR carrier with 25 MHz carrier bandwidth. 2 IoT IB PRBs was boosted with 6 dB

The RX frequency was configured 45 MHz below the corresponding TX frequency according to the applicable duplex offset for the operating band.

B13 LTE:

Frequency [MHz]	Symbolic name	Comment
748.5	B_{5LTE}	TX bottom frequency in 5 MHz BW configuration
751.0	M_{5LTE}	TX middle frequency in 5 MHz BW configuration
751.0	M_{10LTE}	TX middle frequency in 10 MHz BW configuration
753.5	T_{5LTE}	TX top frequency in 5 MHz BW configuration.
748.5 753.5	$M2_{5+5LTE}$	2 carrier TX middle frequency 5+5 MHz BW configuration

B13 LTE with NB IoT IB/ GB

Frequency [MHz]	Symbolic name	Comment
IoT1=PRB-1 IoT2=PRB50 LTE=751.0	B_{GB+10L}	LTE carrier with 10 MHz carrier bandwidth. IoT1 Boosted 6 dB
IoT1=PRB-1 IoT2=PRB50 LTE=751.0	T_{GB+10L}	LTE carrier with 10 MHz carrier bandwidth. IoT2 Boosted 6 dB
IoT=PRB2 LTE=748.5	B_{IB+5L}	TX constellation for Bottom NB IoT IB. LTE carrier with 5 MHz carrier bandwidth. IoT IB PRB was boosted with 6 dB
IoT=PRB22 LTE=753.5	T_{IB+5L}	TX constellation for Bottom NB IoT IB. LTE carrier with 5 MHz carrier bandwidth. IoT IB PRB was boosted with 6 dB

B13 NR:

Frequency [MHz]	Symbolic name	Comment
748.5	B_{5NR}	TX bottom frequency in 5 MHz BW configuration
751.0	M_{5NR}	TX middle frequency in 5 MHz BW configuration
751.0	M_{10NR}	TX middle frequency in 10 MHz BW configuration
753.5	T_{5NR}	TX top frequency in 5 MHz BW configuration.
748.5 753.5	$M2_{5+5NR}$	2 carrier TX middle frequency 5+5 MHz BW configuration

B13 NR with NB IoT IB

Frequency [MHz]	Symbolic name	Comment
IoT=PRB0 NR=748.5	B_{IB+5NR}	TX constellation for Bottom NB IoT IB. NR carrier with 5 MHz carrier bandwidth. IoT IB PRB was boosted with 6 dB
IoT=PRB24 NR=753.5	T_{IB+5NR}	TX constellation for Bottom NB IoT IB. NR carrier with 5 MHz carrier bandwidth. IoT IB PRB was boosted with 6 dB
IoT=PRB-1 IoT=PRB50 NR=751.0	$M_{IB+10NR}$	TX constellation for Middle NB IoT IB. NR carrier with 10 MHz carrier bandwidth. 2 IoT IB PRBs was boosted with 6 dB

The RX frequency was configured 31 MHz above the corresponding TX frequency according to the applicable duplex offset for the operating band.

B5 B13 Multi RAT

Frequency [MHz]	Symbolic name	Comment
B5: NR1=871.5 NR2=881.5 NR3=891.5 LTE1=876.5 LTE2=886.5 B13: NR4=748.5 LTE3=753.5	Max_{4NR+3L}	TX constellation for Max carrier with 5 MHz carrier bandwidth.
B5 NR1=871.5 LTE1=889.0 IoT1=PRB-1 IoT2=PRB50 B13: NR2=748.5 LTE2=753.5 IoT3=PRB24	$B_{5NR}+T_{GB+10LTE}$ + $B_{5NR}+T_{IB+5L}$	TX constellation B5: NR1, Bottom 5MHz LTE1, Top 10MHz, IoT2 Boosted 6 dB B13: NR2 Bottom 5MHz, LTE2 Top 5 MHz, IoT3 Boosted 6 dB

B5 ESS RAT

874.0	$BESS_{NR+LTE}$	TX constellation for Bottom NR/LTE carrier with 10 MHz carrier bandwidth.NR 90% LTE 10%
889.0	$TESS_{NR+LTE}$	TX constellation for Top NR/LTE carrier with 10 MHz carrier bandwidth.NR 90% LTE 10%

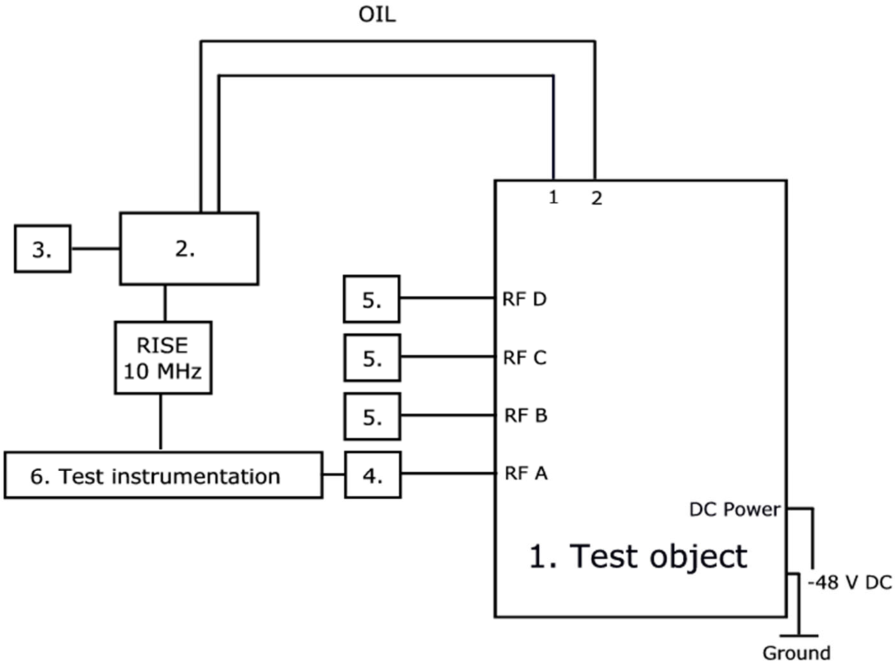
B13 ESS RAT

751.0	$MESS_{NR+LTE}$	TX constellation for Middle NR/LTE carrier with 10 MHz carrier bandwidth.NR 90% LTE 10%

B5
The RX frequency was configured 45 MHz below the corresponding TX frequency according to the applicable duplex offset for the operating band B5.

B13
The RX frequency was configured 31 MHz above the corresponding TX frequency according to the applicable duplex offset for the operating band B13.

Test setup: conducted measurements



Test object:

1.	Radio 4490HP 44B5 44B13 C, KRC 161 985/1, rev. R1B, s/n: E23E499389 With Radio Software: CXP 202 1113/1, rev. R24D69. FCC ID: TA8AKRC161985, IC: 287AB-AS161985

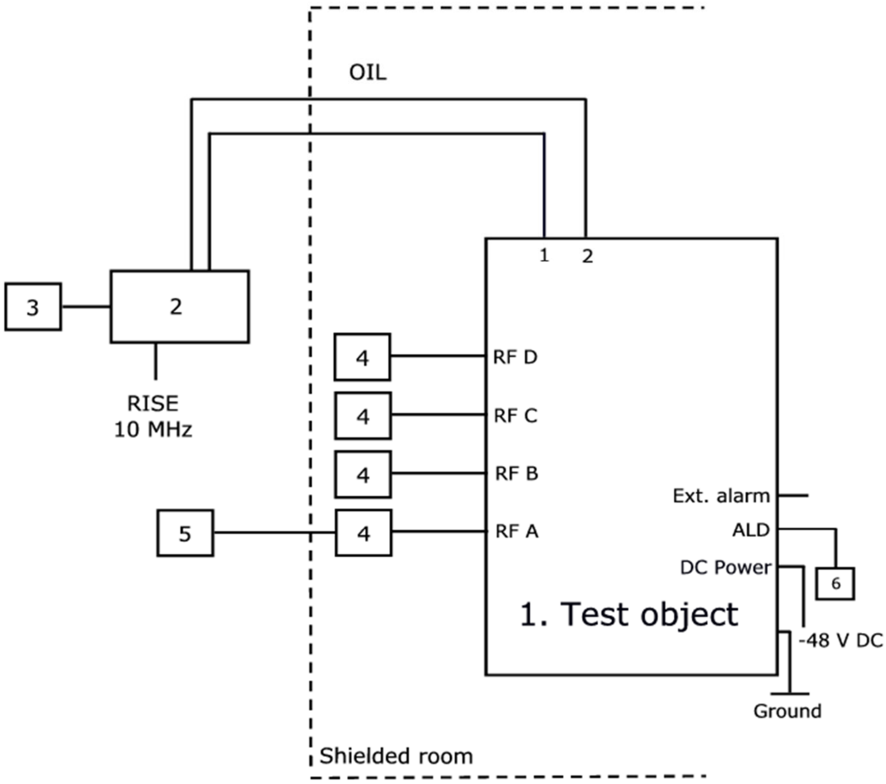
Associated equipment:

2.	Testing Equipment: CT-DU25, LPC 102 500/1, rev. R3B, s/n: T010522534 with software Ruma R99S01

Functional test equipment:

3.	Computer, Mac book pro, BAMS – 1002122807
4.	RF Attenuator: RISE number: 902 282
5.	Terminator, 50 ohm
6.	RISE Test Instrumentation according to measurement equipment list for each test. The signal analyzer was connected to the RISE 10 MHz reference standard during all measurements.

Test setup: radiated measurements



1.	Radio 4490HP 44B5 44B13 C, KRC 161 985/1, rev. R1B, s/n: E23E499389 With Radio Software: CXP 202 1113/1, rev. R24D69. FCC ID: TA8AKRC161985, IC: 287AB-AS161985

Associated equipment:

2.	Testing Equipment: CT-DU25, LPC 102 500/1, rev. R3B, s/n: T010522534 with software Ruma R99S01

Functional test equipment:

3.	Computer, Mac book pro, BAMS – 1002122807
4.	Attenuator/ Terminator
5.	R&S ESIB 26, SP no: 503 885 for supervision purpose only
6.	Remote Control Unit, ANDREW Model: ATM200-A20, Serial: DESA101412073

Interfaces:

Power input configuration DC: -48 VDC	Power
RF A-D, 4.3-10 connector, combined TX/RX	Antenna
1, Optical Interface Link, single mode opto fibre	Signal
2, Optical Interface Link, single mode opto fibre	Signal
ALD Control, shielded multi-wire	Signal
EXT Alarm, shielded multi-wire	Signal
Ground wire	Ground

RF power output measurements according to CFR 47 §27.50 § 22.913/ RSS-130 4.6 RSS-132 5.4, conducted

Date	Temperature	Humidity
2023-03-24	23 °C ± 3 °C	20 % ± 5 %
2023-03-28	23 °C ± 3 °C	18 % ± 5 %
2023-04-06	23 °C ± 3 °C	22 % ± 5 %
2023-04-11	23 °C ± 3 °C	25 % ± 5 %
2023-04-13	23 °C ± 3 °C	24 % ± 5 %
2023-04-14	23 °C ± 3 °C	20 % ± 5 %
2023-04-18	23 °C ± 3 °C	21 % ± 5 %
2023-04-19	23 °C ± 3 °C	20 % ± 5 %
2023-04-20	23 °C ± 3 °C	18 % ± 5 %
2023-04-21	23 °C ± 3 °C	22 % ± 5 %
2023-04-24	23 °C ± 3 °C	23 % ± 5 %
2023-04-26	23 °C ± 3 °C	25 % ± 5 %
2023-04-27	23 °C ± 3 °C	24 % ± 5 %
2023-04-28	23 °C ± 3 °C	22 % ± 5 %
2023-05-08	23 °C ± 3 °C	20 % ± 5 %
2023-05-09	23 °C ± 3 °C	21 % ± 5 %
2023-05-17	23 °C ± 3 °C	22 % ± 5 %
2023-05-22	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The measurements were made per definition in ANSI C63.26, 5.2.3.4. The test object was connected to a signal analyser measuring peak and RMS output power in CDF mode. A resolution bandwidth of 80 MHz was used if not otherwise specified.

Measurement equipment	RISE number
R&S FSW 43	902 073
RF attenuator	902 282
Coaxial cable Sucoflex 102EA	BX50236
Coaxial cable Sucoflex 102EA	BX50237
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 1.1 dB

Results LTE B5 Single carrier

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
B_{5LTE}	47.47/7.24	47.47/7.28	47.28/7.30	47.34/7.30	53.41
B_{10LTE}	47.47/7.38	47.45/7.38	47.38/7.38	47.42/7.38	53.45
M_{5LTE}	47.38/7.28	47.37/7.26	47.22/7.26	47.30/7.26	53.34
M_{10LTE}	47.40/7.26	47.33/7.26	47.22/7.26	47.24/7.26	53.32
T_{5LTE}	47.31/7.32	47.28/7.30	47.33/7.30	47.34/7.30	53.34
T_{10LTE}	47.50/7.38	47.41/7.40	47.33/7.38	47.39/7.38	53.43

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Single carrier Test model TM3.2

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5LTE}	47.49/7.28

Single carrier Test model TM3.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5LTE}	47.45/7.28

Single carrier Test model TM3.1a

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5LTE}	47.42/7.28

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power2)	Maximum Antenna gain3) [dBd]/ ERP Limit [dBm]
B_{5LTE}	41.50	41.45	41.30	41.32	47.50	15.50/ 63.0
B_{10LTE}	38.56	38.54	38.49	38.51	44.56	18.44/ 63.0

2): 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
3): The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC 22.913(a)(4)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power2)/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 5 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power2)	Maximum Antenna gain3) [dBi]/ EIRP Limit [dBm]
B_{5LTE}	46.75	46.70	46.55	46.64	52.75	9.40/ 62.15
B_{10LTE}	45.10	45.05	44.97	45.00	51.1	11.05/ 62.15

2): 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
3): The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-503. Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBi) = EIRP limit (dBm) - Measured Total power2)/ 5 MHz (dBm) + feeder loss (dB).
Please note that the maximum EIRP limit for a specific site may be lower due to various site conditions.

Results LTE B13 Single carrier

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power1)
B_{5LTE}	47.45/7.26	47.32/7.26	47.39/7.26	47.40/7.26	53.41
M_{5LTE}	47.22/7.26	47.33/7.26	47.39/7.24	47.29/7.26	53.33
M_{10LTE}	47.28/7.26	47.29/7.26	47.37/7.28	47.21/7.26	53.31
T_{5LTE}	47.24/7.26	47.25/7.26	47.39/7.26	47.30/7.26	53.32

1): summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Single carrier Test model TM3.2

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5LTE}	47.40/7.24

Single carrier Test model TM3.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5LTE}	47.40/7.26

Single carrier Test model TM3.1a

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5LTE}	47.39/7.28

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]						
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBd]/ ERP Limit [dBm]	Maximum Antenna gain[4)] [dBi]/ EIRP Limit [dBm]
B_{5LTE}	41.41	41.38	41.32	41.34	47.41	15.59/ 63.0	17.75/ 65.16
M_{10LTE}	38.29	38.26	38.33	38.28	44.33	18.67/ 63.0	20.83/ 65.16

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC §27.50 (b) (5)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.
[4)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-518
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Results NR B5 SCS 15kHz Single carrier

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
B_{5NR}	47.52/7.26	47.66/7.26	47.52/7.28	47.46/7.28	53.56
B_{10NR}	47.42/7.34	47.55/7.42	47.43/7.42	47.49/7.42	53.49
B_{15NR}	47.43/7.40	47.45/7.50	47.49/7.52	47.43/7.5	53.47
B_{20NR}	47.41/7.40	47.49/7.50	47.37/7.50	47.43/7.5	53.45
M_{5NR}	47.40/7.26	47.41/7.26	47.35/7.26	47.35/7.26	53.40
M_{10NR}	47.34/7.26	47.42/7.28	47.28/7.28	47.40/7.28	53.38
M_{15NR}	47.28/7.28	47.36/7.32	47.33/7.32	47.35/7.32	53.35
M_{20NR}	47.32/7.26	47.42/7.32	47.32/7.34	47.36/7.32	53.38
M_{25NR}	47.32/7.48	47.33/7.52	47.24/7.50	47.26/7.50	53.31
T_{5NR}	47.26/7.28	47.33/7.32	47.36/7.30	47.40/7.32	53.36
T_{10NR}	47.31/7.40	47.42/7.40	47.32/7.38	47.50/7.40	53.41
T_{15NR}	47.35/7.46	47.42/7.48	47.40/7.46	47.43/7.48	53.42
T_{20NR}	47.38/7.38	47.46/7.40	47.38/7.38	47.42/7.40	53.43

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Single carrier Test model TM3.2

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5NR}	47.37/7.22

Single carrier Test model TM3.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5NR}	47.37/7.28

Single carrier Test model TM3.1a

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5NR}	47.37/7.28

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBd]/ ERP Limit [dBm]
B_{5NR}	41.58	41.68	41.57	41.44	47.68	15.32/ 63.0
B_{10NR}	38.44	38.44	38.30	38.39	44.44	18.56/ 63.0
B_{15NR}	36.57	36.63	36.59	36.53	42.63	20.37/ 63.0
B_{20NR}	35.22	35.29	35.11	35.22	41.29	21.71/ 63.0
M_{25NR}	34.06	34.19	34.04	34.05	40.19	22.81/ 63.0

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC 22.913(a)(4)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 5 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBi]/ EIRP Limit [dBm]
B_{5NR}	46.85	46.98	46.83	46.77	52.98	9.17/ 62.15
B_{10NR}	45.04	45.06	44.91	44.99	51.06	11.09/ 62.15
B_{15NR}	43.27	43.34	43.33	43.29	49.34	12.81/ 62.15
B_{20NR}	42.09	42.14	41.93	42.04	48.14	14.01/ 62.15
M_{25NR}	40.93	40.94	40.87	40.84	46.94	15.21/ 62.15

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-503. Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBi) = EIRP limit (dBm) - Measured Total power[2)]/ 5 MHz (dBm) + feeder loss (dB).
Please note that the maximum EIRP limit for a specific site may be lower due to various site conditions.

Results NR B13 SCS 15kHz Single carrier

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
B_{5NR}	47.39/7.26	47.56/7.26	47.61/7.26	47.50/7.26	53.54
M_{5NR}	47.40/7.26	47.35/7.26	47.47/7.26	47.36/7.26	53.42
M_{10NR}	47.28/7.28	47.34/7.28	47.46/7.28	47.32/7.28	53.37
T_{5NR}	47.17/7.26	47.27/7.32	47.45/7.28	47.38/7.26	53.34

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Single carrier Test model TM3.2

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5NR}	47.41/7.26

Single carrier Test model TM3.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5NR}	47.44/7.26

Single carrier Test model TM3.1a

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]
Symbolic name	Port RF A
B_{5NR}	47.43/7.26

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]						
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBd]/ ERP Limit [dBm]	Maximum Antenna gain[4)] [dBi]/ EIRP Limit [dBm]
B_{5NR}	41.55	41.57	41.61	41.48	47.61	15.39/ 63.0	17.55/ 65.16
M_{10NR}	38.11	38.17	38.30	38.19	44.3	18.70/ 63.0	20.86/ 65.16

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC §27.50 (b) (5)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.
[4)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-518
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Results NR B5 SCS 30kHz Single carrier

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
B_{10NR}	47.44/7.36	47.42/7.38	47.33/7.38	47.42/7.38	53.42
B_{15NR}	47.37/7.46	47.34/7.48	47.26/7.50	47.36/7.48	53.35
B_{20NR}	47.34/7.46	47.31/7.46	47.23/7.48	47.32/7.48	53.32
M_{25NR}	47.23/7.46	47.20/7.48	47.09/7.48	47.19/7.48	53.20

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power2)	Maximum Antenna gain3) [dBd]/ ERP Limit [dBm]
B_{10NR}	38.56	38.59	38.51	38.64	44.64	18.36/ 63.0
B_{15NR}	36.62	36.55	36.41	36.56	42.62	20.38/ 63.0
B_{20NR}	35.21	35.20	35.19	35.19	41.21	21.79/ 63.0
M_{25NR}	34.12	34.08	33.94	34.08	40.12	22.88/ 63.0

2): 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
3): The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC 22.913(a)(4)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power2)/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 5 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power2)	Maximum Antenna gain3) [dBi]/ EIRP Limit [dBm]
B_{10NR}	45.18	45.15	45.08	45.17	51.18	10.97/ 62.15
B_{15NR}	43.35	43.35	43.26	43.31	49.35	12.80/ 62.15
B_{20NR}	42.06	42.05	41.96	52.05	48.06	14.09/ 62.15
M_{25NR}	40.89	40.89	40.77	40.87	46.89	15.26/ 62.15

2): 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
3): The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-503.
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBi) = EIRP limit (dBm) - Measured Total power2)/ 5 MHz (dBm) + feeder loss (dB).
Please note that the maximum EIRP limit for a specific site may be lower due to various site conditions.

Results NR B13 SCS 30kHz Single carrier

Single carrier Test model TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
M_{10NR}	47.21/7.26	47.21/7.26	47.28/7.28	47.23/7.26	53.25

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]						
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBd]/ ERP Limit [dBm]	Maximum Antenna gain[4)] [dBi]/ EIRP Limit [dBm]
M_{10NR}	38.29	38.29	38.36	38.34	44.36	18.64/ 63.0	20.80/ 65.16

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC §27.50 (b) (5)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.
[4)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-518
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Results LTE B5 Multi carrier

Multi carrier, Carrier aggregation TM1.1

Rated output power level at each RF port 2x 44.8 dBm/ port.

	Output power CCDF [RMS dBm]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
$CA2_{10+10LTE}$	46.97	47.11	47.03	47.06	53.06

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Results LTE B13 Multi carrier

Multi carrier, TM1.1

Rated output power level at each RF port 2x 44.8 dBm/ port.

	Output power CCDF [RMS dBm]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
$M2_{5+5LTE}$	46.97	47.32	47.42	47.33	53.28

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Results NR B5 SCS 15kHz Multi carrier

Multi carrier, Carrier aggregation TM1.1

Rated output power level at each RF port 2x 44.8 dBm/ port.

	Output power CCDF [RMS dBm]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
$CA2_{10+10NR}$	47.08	47.13	47.06	47.08	53.11
$CA2_{15+5NR}$	46.86	46.98	46.93	46.97	52.96
$CA2_{5+20NR}$	47.03	47.09	47.06	47.03	53.07

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Results NR B13 SCS 15kHz Multi carrier

Multi carrier, TM1.1

Rated output power level at each RF port 2x 44.8 dBm/ port.

	Output power CCDF [RMS dBm]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
$M2_{5+5NR}$	47.06	47.17	47.13	47.08	53.13

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Results LTE with NB IoT GB and IB B5

Single carrier: LTE: TM1.1, NB IoT: N-TM

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
B_{IB+5L}	46.99/7.62	47.12/7.70	46.99/7.62	46.98/7.70	53.04
B_{GB+10L}	47.06/7.66	47.18/7.74	47.09/7.66	47.12/7.74	53.13

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBd]/ ERP Limit [dBm]
B_{IB+5L}	41.55	41.61	41.43	41.59	47.61	15.39/ 63.0
B_{GB+10L}	37.92	38.04	38.05	38.09	44.09	18.91/ 63.0

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC 22.913(a)(4)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 5 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBi]/ EIRP Limit [dBm]
B_{IB+5L}	46.20	46.34	46.23	46.23	52.34	9.81/ 62.15
B_{GB+10L}	44.29	44.37	44.28	44.33	50.37	11.78/ 62.15

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-503. Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBi) = EIRP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum EIRP limit for a specific site may be lower due to various site conditions.

Results LTE with NB IoT GB and IB B13

Single carrier: LTE: TM1.1, NB IoT: N-TM

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
B_{IB+5L}	46.96/7.68	47.04/7.64	47.01/7.70	46.95/7.68	53.01
M_{GB+10L}	46.88/7.70	46.96/7.62	47.02/7.68	46.90/7.70	52.96

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]						
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power2)	Maximum Antenna gain3) [dBd]/ ERP Limit [dBm]	Maximum Antenna gain4) [dBi]/ EIRP Limit [dBm]
B_{IB+5L}	41.59	41.63	41.61	41.56	47.63	15.37/ 63.0	17.53/ 65.16
B_{GB+10L}	38.04	38.24	38.23	37.99	44.24	18.76/ 63.0	20.92/ 65.16

2): 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
3): The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC §27.50 (b) (5)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power2)/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.
4): The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-518
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power2)/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Results NR with NB IoT IB B5 SCS 15kHz

Single carrier: NR: TM1.1, NB IoT: N-TM

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power1)
B_{IB+5NR}	47.43/7.32	47.55/7.32	47.47/7.32	47.49/7.32	53.51
$B_{IB+10NR}$	47.30/7.36	47.43/7.46	47.39/7.40	47.34/7.48	53.39
$B_{IB+15NR}$	47.52/7.40	47.58/7.52	47.46/7.42	47.50/7.50	53.54
$B_{IB+20NR}$	47.22/7.52	47.29/7.64	47.24/7.58	47.23/7.62	53.27
$M_{IB+25NR}$	47.31/7.46	47.32/7.56	47.21/7.58	47.28/7.56	53.30

1): summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBd]/ ERP Limit [dBm]
B_{IB+5NR}	41.54	41.55	41.51	41.61	47.61	15.39/ 63.0
$B_{IB+10NR}$	38.50	38.66	38.53	38.58	44.66	18.34/ 63.0
$B_{IB+15NR}$	38.58	38.71	38.55	38.40	44.71	18.29/ 63.0
$B_{IB+20NR}$	37.81	37.98	37.86	37.86	43.98	19.02/ 63.0
$M_{IB+25NR}$	34.17	34.13	34.03	34.06	40.17	22.83/ 63.0

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC 22.913(a)(4)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 5 MHz [RMS dBm]					
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBi]/ EIRP Limit [dBm]
B_{IB+5NR}	46.59	46.72	46.63	46.69	52.72	9.43/ 62.15
$B_{IB+10NR}$	44.37	44.51	44.44	44.43	50.51	11.64/ 62.15
$B_{IB+15NR}$	42.65	42.75	42.66	42.69	48.75	13.40/ 62.15
$B_{IB+20NR}$	41.27	41.43	41.31	41.35	47.43	14.72/ 62.15
$M_{IB+25NR}$	40.65	40.74	40.60	40.68	46.74	15.41/ 62.15

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.
[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-503. Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBi) = EIRP limit (dBm) - Measured Total power[2)]/ 5 MHz (dBm) + feeder loss (dB).
Please note that the maximum EIRP limit for a specific site may be lower due to various site conditions.

Results NR with NB IoT IB B13 SCS 15kHz

Single carrier: NR: TM1.1, NB IoT: N-TM

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
B_{IB+5NR}	47.43/7.32	47.48/7.28	47.52/7.30	47.43/7.28	53.49
$M_{IB+10NR}$	47.16/7.34	47.19/7.30	47.27/7.36	47.03/7.30	53.18

[1)]: summed output power according to ANSI C63.26 section 6.4.3.1
Note: The PAR value is the 0.1 % Peak to Average Ratio.

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power per 1 MHz [RMS dBm]						
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[2)]	Maximum Antenna gain[3)] [dBd]/ ERP Limit [dBm]	Maximum Antenna gain[4)] [dBi]/ EIRP Limit [dBm]
B_{IB+5NR}	41.61	41.62	41.57	41.71	47.71	15.29/ 63.0	17.45/ 65.16
$M_{IB+10NR}$	38.30	38.32	38.36	38.09	44.36	18.64/ 63.0	18.99/ 65.16

[2)]: 6 dB (10 $\log_{10}$ (N_{out})) was added to the highest measured power among the measured ports, according to the procedure described in ANSI C63.26 section 6.4.3.2.4.

[3)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum ERP limit as defined in FCC §27.50 (b) (5)
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

[4)]: The gain value is the maximum antenna gain that can be used with the tested device for the configuration tested, and still comply with the maximum EIRP limit as defined in SRSP-518
Feeder loss is assumed to be 0 dB in the antenna gain calculation.
The used formula is: Maximum antenna gain (dBd) = ERP limit (dBm) - Measured Total power[2)]/ 1 MHz (dBm) + feeder loss (dB).
Please note that the maximum ERP limit for a specific site may be lower due to various site conditions.

Results Multi RAT LTE and NR B5 SCS 15kHz

Multi carrier, TM1.1

Rated output power level at each RF port 5x 40.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
Max_{4NR+3L}	47.48/7.34	47.37/7.38	41.33/7.28	47.34/7.36	53.40

Results Multi RAT LTE and NR B13 SCS 15kHz

Multi carrier, TM1.1

Rated output power level at each RF port 2x 44.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
Max_{4NR+3L}	47.09/7.40	47.13/7.40	47.15/7.40	47.09/7.40	43.14

Results Multi RAT ESS NR and LTE B5 SCS 15kHz

ESS NR 90% and LTE 10% TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
$BESS_{NR+LTE}$	47.35/7.52	47.26/7.54	47.20/7.50	47.19/7.51	53.27
$TESS_{NR+LTE}$	47.12/7.54	47.18/7.54	47.09/7.54	47.20/7.54	53.17

Results Multi RAT NR and LTE B13 SCS 15kHz

ESS NR 90% and LTE 10% TM1.1

Rated output power level at each RF port 1x 47.8 dBm/ port.

	Output power CCDF [RMS dBm/ PAR dB]				
Symbolic name	Port RF A	Port RF B	Port RF C	Port RF D	Total power[1)]
$MESS_{NR+LTE}$	47.07/7.48	47.07/7.42	47.13/7.46	47.00/7.46	53.09

Example of CCDF measurement: B5 B5LTE, Port A

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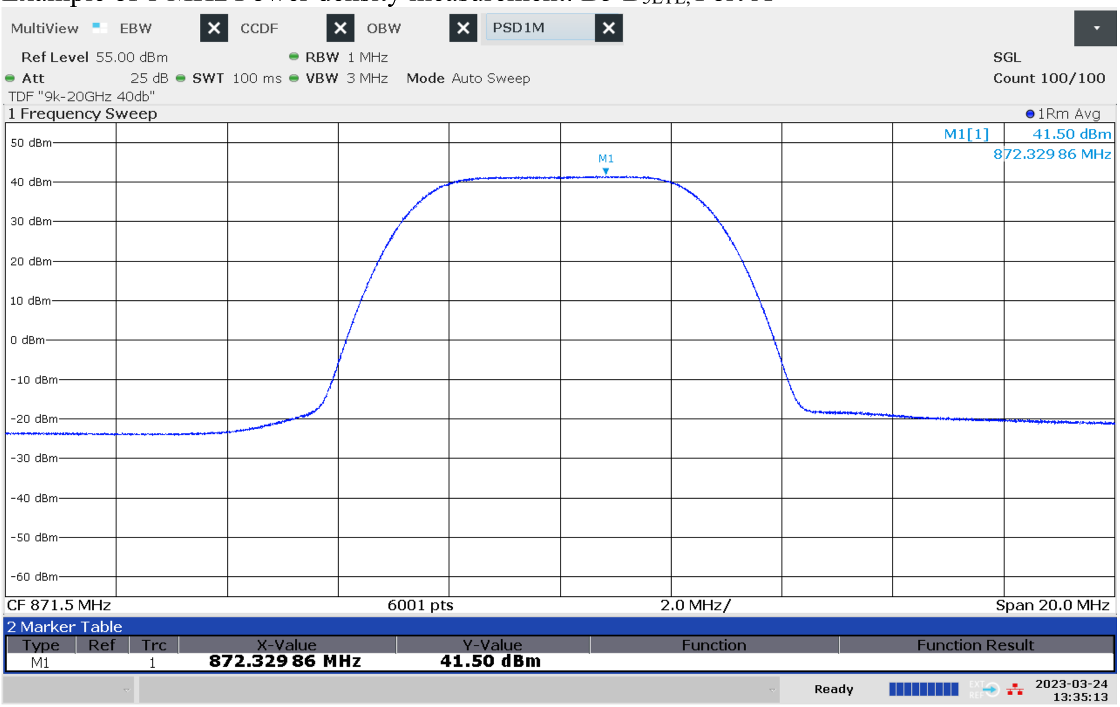
Example of 1 MHz Power density measurement: B5 B5LTE, Port A



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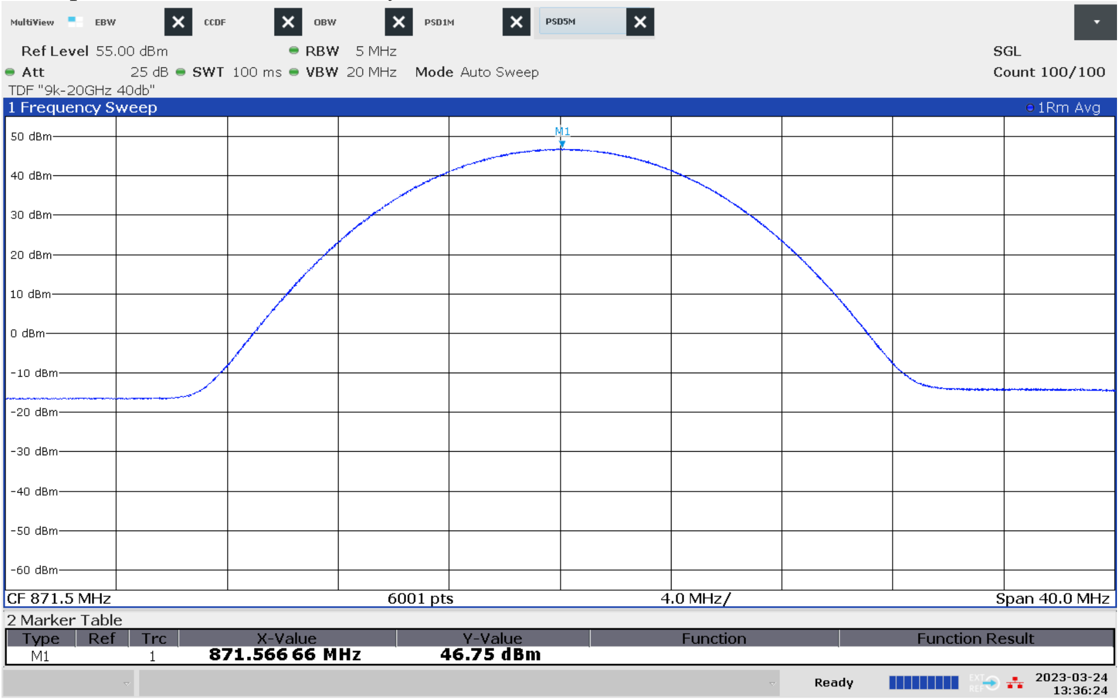
Example of 5 MHz Power density measurement: B5 B_{5LTE}, Port A



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Remark

ERP/EIRP compliance is addressed at the time of licensing, as required by the responsible FCC/ISED Bureau(s). Licensee's are required to take into account maximum antenna gain used in combination with above power settings to prevent the radiated output power to exceed the limits.

Limits

§22.913:

(a) (4ii) Extend coverage into Unserved Area on a secondary basis (see § 22.949), are permitted to operate base transmitters and repeaters with an ERP greater than 800 watts/MHz (PSD) per sector, up to a maximum of 2000 watts/MHz (PSD) per sector.

(d) The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

RSS-132 section 5.4/ SRSP-503

The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB

Base stations located in geographical areas at a distance greater than 26 km from large or medium population centres and transmitting in accordance with paragraphs 14 and15 within the frequency range 869-894 MHz, may increase their e.i.r.p. up to a maximum of 1640 watts/5 MHz (i.e. no more than 1640 watts e.i.r.p. in any 5 MHz band segment), with an antenna HAAT up to 150 metres.

§27.50:
(b) (5) Fixed and base stations located in a county with population density of 100 or fewer persons per square mile, based upon the most recently available population statistics from the Bureau of the Census, and transmitting a signal with an emission bandwidth greater than 1 MHz must not exceed an ERP of 2000 watts/MHz and an antenna height of 305 m HAAT, except that antenna heights greater than 305 m HAAT are permitted if power levels are reduced below 2000 watts/MHz ERP in accordance with Table 4 of this section;

RSS-130 section 4.6/ SRSP-518

The transmitter output power shall be measured in terms of average power. In addition, the peak-to-average power ratio (PAPR) of the transmitter shall not exceed 13 dB for more than 0.1% of the time and shall use a signal corresponding to the highest PAPR during periods of continuous transmission.

Fixed and base stations located in geographical areas at a distance greater than 26 km from large or medium population centresFootnote 3 and transmitting in accordance with section 4, may increase their e.i.r.p. up to a maximum of 3280 watts/MHz (i.e. no more than 3280 watts e.i.r.p. in any 1 MHz band segment), with an antenna HAAT up to 305 metres.

Complies?	Yes

Occupied bandwidth measurements according to CFR47 §2.1049/ RSS-Gen 6.7

Date	Temperature	Humidity
2023-03-24	23 °C ± 3 °C	20 % ± 5 %
2023-03-28	23 °C ± 3 °C	18 % ± 5 %
2023-04-06	23 °C ± 3 °C	22 % ± 5 %
2023-04-11	23 °C ± 3 °C	25 % ± 5 %
2023-04-13	23 °C ± 3 °C	24 % ± 5 %
2023-04-14	23 °C ± 3 °C	20 % ± 5 %
2023-04-18	23 °C ± 3 °C	21 % ± 5 %
2023-04-19	23 °C ± 3 °C	20 % ± 5 %
2023-04-20	23 °C ± 3 °C	18 % ± 5 %
2023-04-21	23 °C ± 3 °C	22 % ± 5 %
2023-04-26	23 °C ± 3 °C	25 % ± 5 %
2023-04-27	23 °C ± 3 °C	24 % ± 5 %
2023-05-08	23 °C ± 3 °C	20 % ± 5 %
2023-05-09	23 °C ± 3 °C	21 % ± 5 %
2023-05-10	23 °C ± 3 °C	21 % ± 5 %
2023-05-17	23 °C ± 3 °C	22 % ± 5 %
2023-05-22	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The measurements were made per definition in ANSI C63.26, 5.4.4. The output was connected to a signal analyzer using the built in OBW function with the Peak detector activated in max hold.

Measurement equipment	RISE number
R&S FSW 43	902 073
RF attenuator	902 282
Coaxial cable Sucoflex 102EA	BX50236
Coaxial cable Sucoflex 102EA	BX50237
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 3.7 dB

Results LTE B5

Single carrier: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
1.1	B_{5LTE}	RF A	4478
1.2	B_{10LTE}	RF A	8953
	M_{5LTE}	RF A	4477
	M_{5LTE}	RF B	4477
	M_{5LTE}	RF C	4479
	M_{5LTE}	RF D	4478
	M_{10LTE}	RF D	8962
	T_{5LTE}	RF C	4478
	T_{10LTE}	RF D	8950

Single carrier: TM3.2

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5LTE}	RF A	4470

Single carrier: TM3.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5LTE}	RF A	4486

Single carrier: TM3.1a

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5LTE}	RF A	4484

Carrier aggregation: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
1.3	$CA2_{10+10LTE}$	RF A	18846

Results LTE B13

Single carrier: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5LTE}	RF A	4479
	M_{5LTE}	RF A	4479
	M_{5LTE}	RF B	4478
	M_{5LTE}	RF C	4479
	M_{5LTE}	RF D	4476
	M_{10LTE}	RF B	8957
	T_{5LTE}	RF B	4479

Single carrier: TM3.2

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5LTE}	RF A	4471

Single carrier: TM3.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5LTE}	RF A	4483

Single carrier: TM3.1a

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5LTE}	RF A	4484

Results NR B5 SCS 15kHz

Single carrier: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5NR}	RF B	4477
1.4	M_{5NR}	RF A	4476
	M_{5NR}	RF B	4472
	M_{5NR}	RF C	4475
	M_{5NR}	RF D	4474
1.5	M_{10NR}	RF B	9264
1.6	M_{15NR}	RF C	14134
1.7	M_{20NR}	RF A	18919
1.8	M_{25NR}	RF C	23709
	T_{5NR}	RF C	4474

Single carrier: TM3.2

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	M_{5NR}	RF A	4475

Single carrier: TM3.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	M_{5NR}	RF A	4469

Single carrier: TM3.1a

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	M_{5NR}	RF A	4461

Carrier aggregation: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	$CA2_{10+10NR}$	RF A	19156
	$CA2_{15+5NR}$	RF A	19218
	$CA2_{5+20NR}$	RF B	24074

Results NR B13 SCS 15kHz

Single carrier: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{5NR}	RF A	4477
	M_{5NR}	RF A	4474
	M_{5NR}	RF B	4476
	M_{5NR}	RF C	4476
	M_{5NR}	RF D	4479
	M_{10NR}	RF A	9264
	T_{5NR}	RF C	4477

Single carrier: TM3.2

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	M_{5NR}	RF A	4475

Single carrier: TM3.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	M_{5NR}	RF A	4474

Single carrier: TM3.1a

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	M_{5NR}	RF A	4461

Results NR B5 SCS 30kHz

Single carrier: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	B_{10NR}	RF C	8635
	B_{15NR}	RF A	13608
	B_{20NR}	RF A	18329
	M_{25NR}	RF B	23199

Results NR B13 SCS 30kHz

Single carrier: TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [kHz]
	M_{10NR}	RF D	8630

Results LTE with NB IoT GB B5

Single carrier: LTE: TM1.1, NB IoT: N-TM,

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
	B_{GB+10L}	RF B	9.332
	B_{IB+5L}	RF B	4.472

Results LTE with NB IoT GB B13

Single carrier: LTE: TM1.1, NB IoT: N-TM,

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
	B_{GB+10L}	RF B	9.338

Results NR with NB IoT IB B5 SCS 15kHz

Single carrier: NR: TM1.1, NB IoT: N-TM,

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
	B_{IB+5NR}	RF B	4509
	$B_{IB+10NR}$	RF B	9403
	$B_{IB+15NR}$	RF B	14400
	$B_{IB+20NR}$	RF B	19194
	$M_{IB+25NR}$	RF B	24001

Results NR with NB IoT IB B13 SCS 15kHz

Single carrier: NR: TM1.1, NB IoT: N-TM,

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
	B_{IB+5NR}	RF B	4507
	$M_{IB+10NR}$	RF B	9406

Results Multi RAT ESS NR and LTE B5 SCS 15kHz

ESS NR 90% and LTE 10% TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
	$BESS_{NR+LTE}$	RF A	9120

Results Multi RAT ESS NR and LTE B13 SCS 15kHz

ESS NR 90% and LTE 10% TM1.1

Diagram	Symbolic name	Tested Port	Occupied BW (99%) [MHz]
	$MESS_{NR+LTE}$	RF B	9124

Diagram 1.1 LTE: TM1.1, B5LTE, Port A:

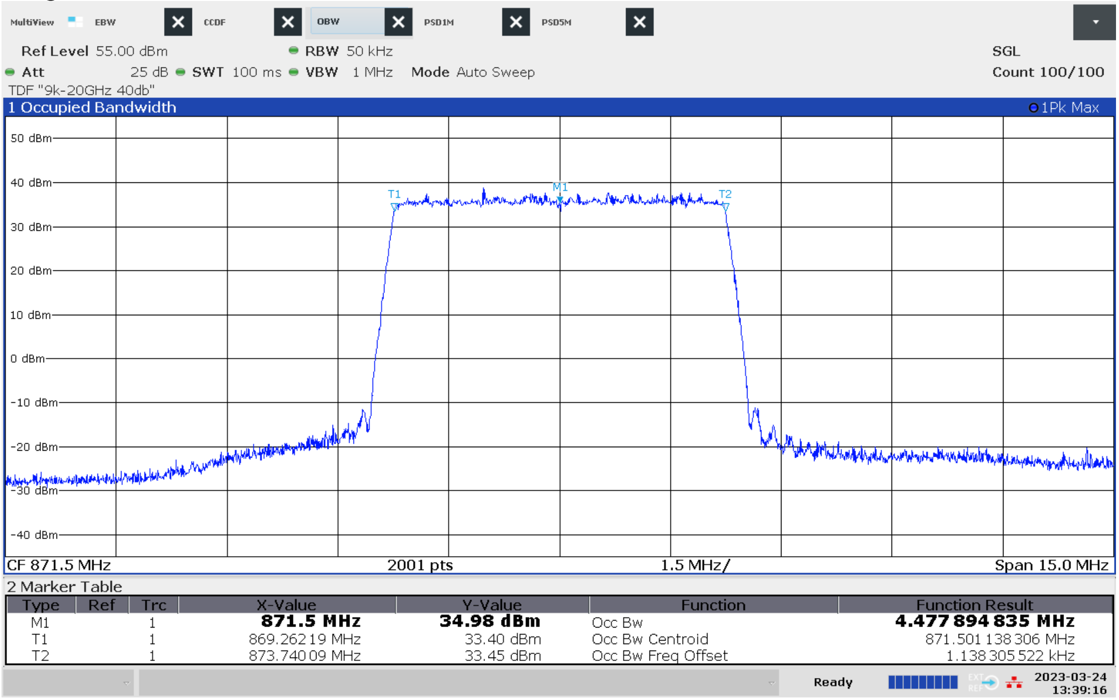

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Diagram 1.2 LTE: TM1.1, B10LTE, Port A:

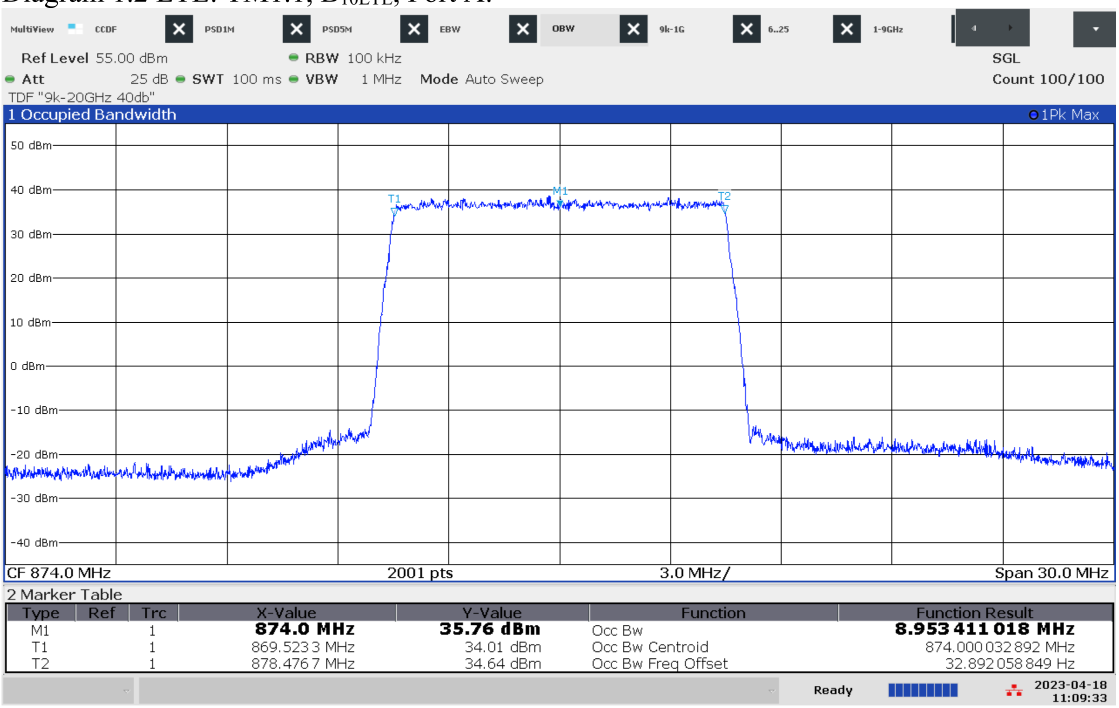

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Diagram 1.3 LTE: TM1.1, CA2$_{10+10LTE}$, Port A:

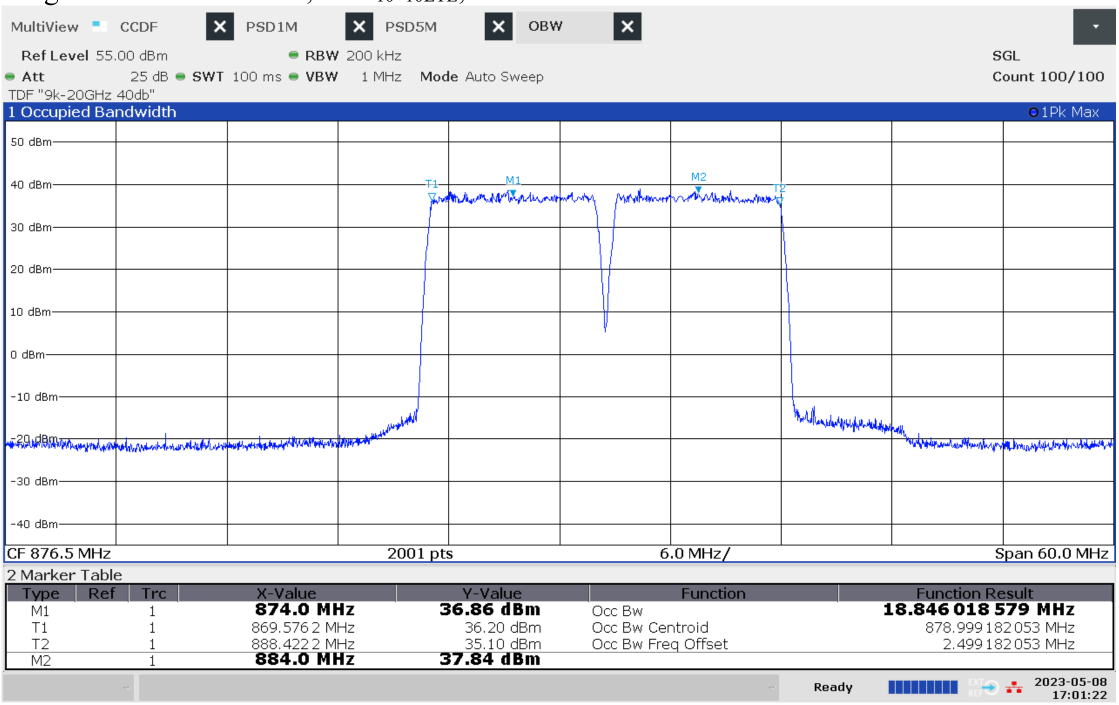

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Diagram 1.4 NR: TM1.1, M$_{5NR}$, Port A:

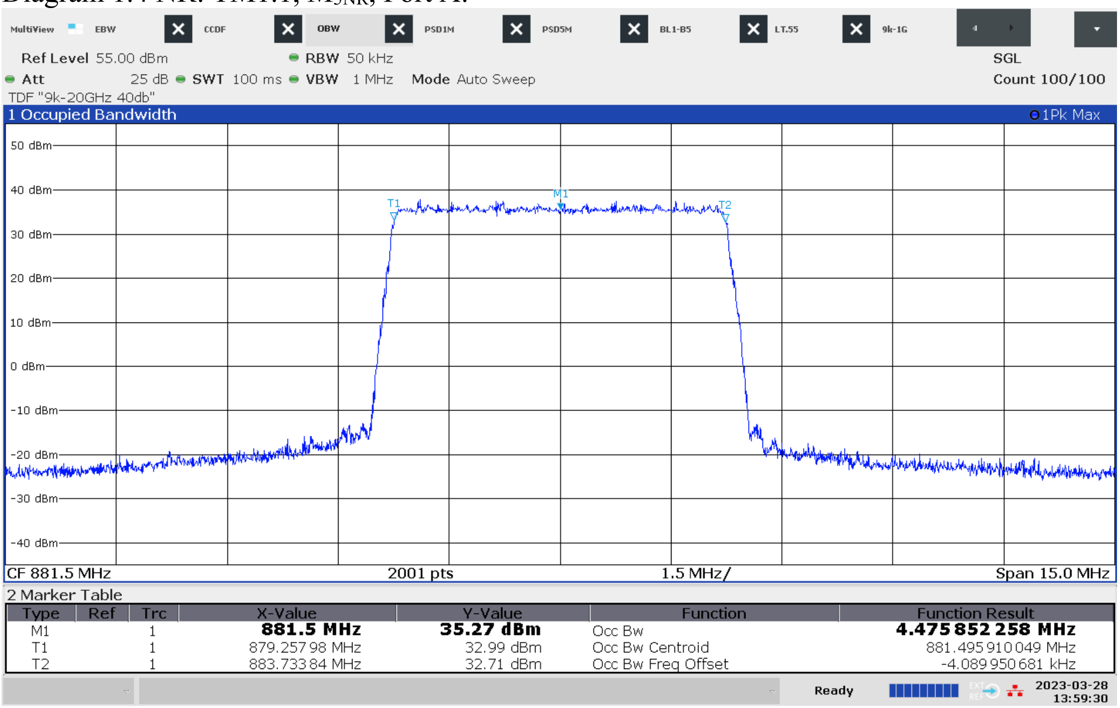

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Diagram 1.5 NR: TM1.1, M_{10NR}, Port B:

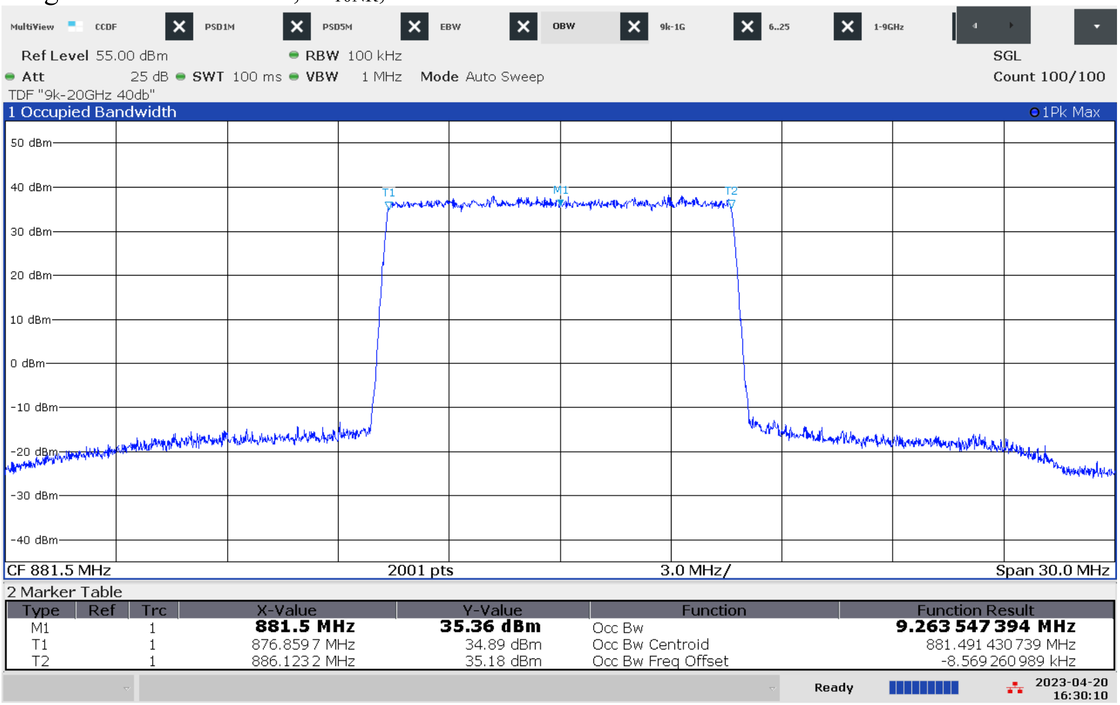

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Diagram 1.6 NR: TM1.1, M_{15NR}, Port C:

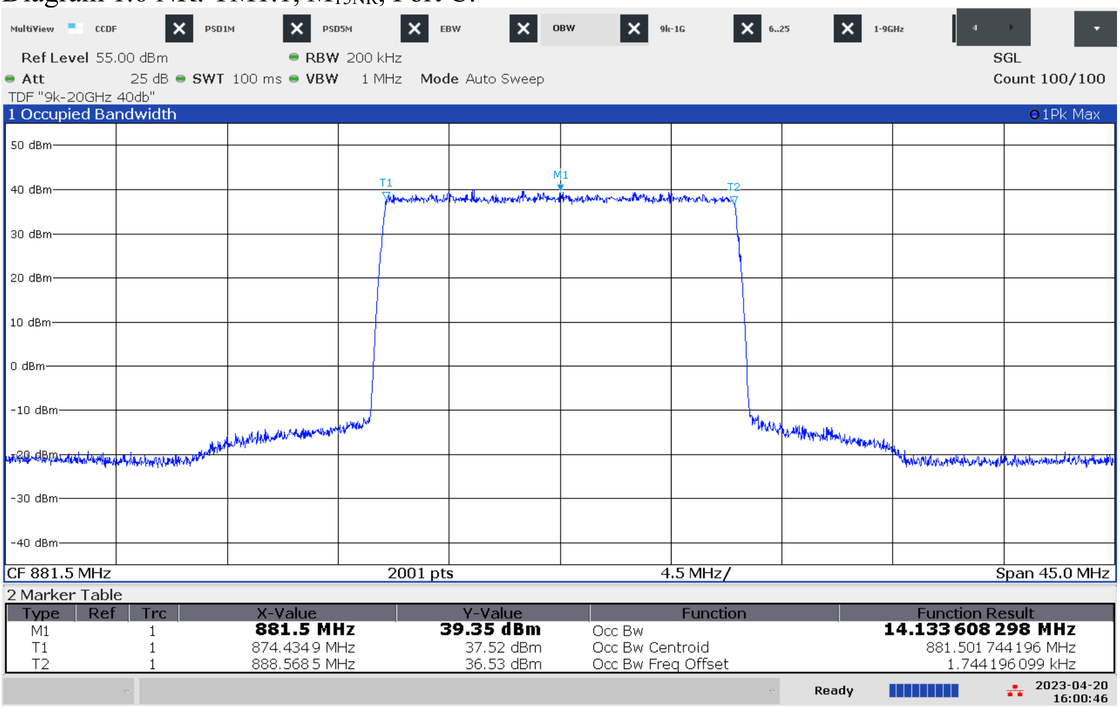

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Diagram 1.7 NR: TM1.1, M_{20NR}, Port A:

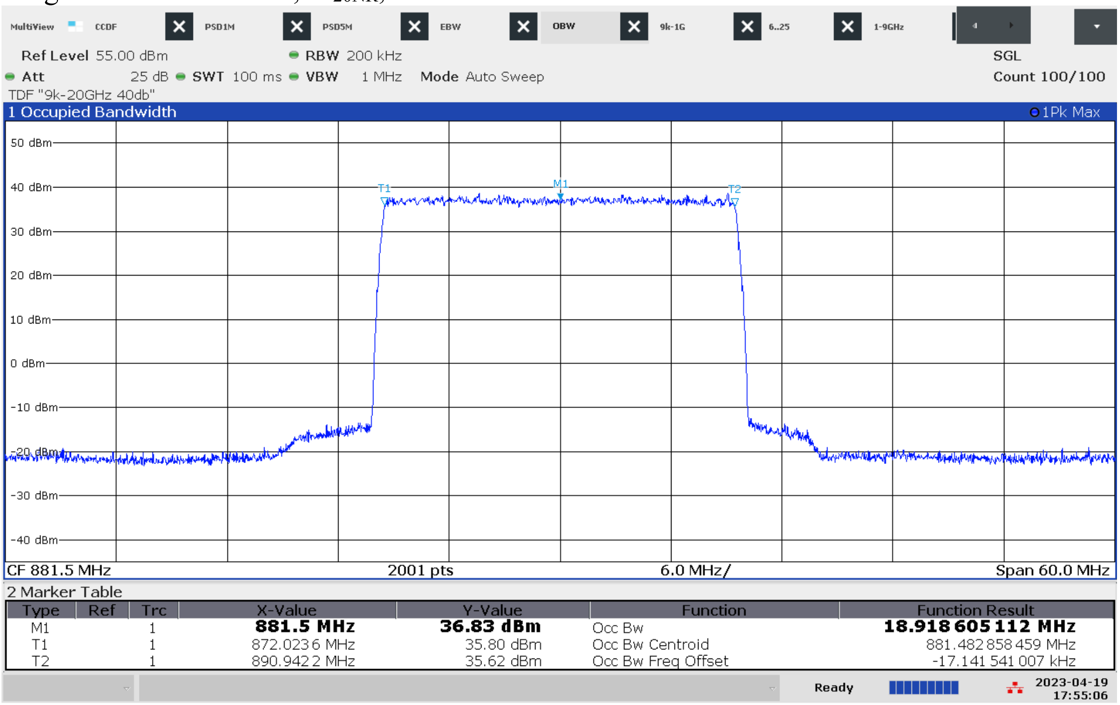

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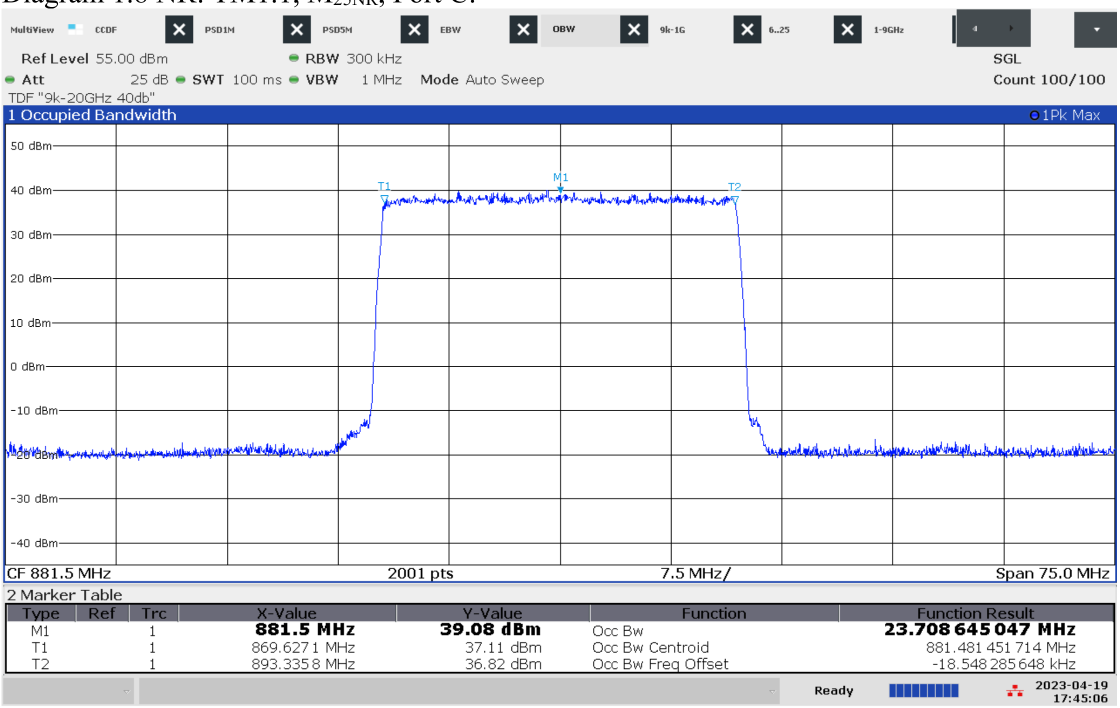
Diagram 1.8 NR: TM1.1, M_{25NR}, Port C:



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Band edge measurements according to CFR 47 §27.53 §22.917/ RSS-130 4.7 RSS-132 5.5

Date	Temperature	Humidity
2021-03-24	23 °C ± 3 °C	20 % ± 5 %
2021-04-12	23 °C ± 3 °C	21 % ± 5 %
2021-04-13	23 °C ± 3 °C	24 % ± 5 %
2021-04-14	23 °C ± 3 °C	20 % ± 5 %
2021-04-18	23 °C ± 3 °C	21 % ± 5 %
2024-04-21	23 °C ± 3 °C	22 % ± 5 %
2024-04-24	23 °C ± 3 °C	23 % ± 5 %
2023-04-25	23 °C ± 3 °C	21 % ± 5 %
2023-04-26	23 °C ± 3 °C	25 % ± 5 %
2023-04-27	23 °C ± 3 °C	24 % ± 5 %
2023-05-10	23 °C ± 3 °C	21 % ± 5 %
2023-05-17	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The measurements were made per definition in ANSI C63.26, 5.7.3. The test object was connected to a spectrum analyzer with the RMS detector activated.

Band 5
A RBW of at least 1% of the EBW is to be used up to 1 MHz away from the band edges and for measurements more than 1 MHz from the band edges a RBW of 100 kHz is to be used.

Band 13
The transmitter unwanted emissions shall be measured with a resolution bandwidth of at least 100 kHz. However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

An offset of 6 dB has been used to cover 4x4 MIMO according to ANSI C63.26 6.4.4.1 c "measure and add 10 $\log_{10}$ (N_{ANT})".

Measurement equipment	RISE number
R&S FSW 43	902 073
RF attenuator	902 282
Coaxial cable Sucoflex 102EA	BX50236
Coaxial cable Sucoflex 102EA	BX50237
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 2.6 dB

Results LTE B5

Single carrier LTE: TM1.1

Diagram	Symbolic name	Tested Port
2.1 a-b	B_{5LTE}	RF B
2.2 a-b	B_{10LTE}	RF B
2.3 a-b	T_{5LTE}	RF A
2.4 a-b	T_{10LTE}	RF C

Multi carrier LTE: TM1.1

Diagram	Symbolic name	Tested Port
2.5 a-b	Bim_{LTE}	RF A
2.6 a-b	Tim_{LTE}	RF A

Results LTE B13

Single carrier TM1.1

Diagram	Symbolic name	Tested Port
2.7 a-b	B_{5LTE}	RF C
2.8 a-d	M_{10LTE}	RF C
2.9 a-b	T_{5LTE}	RF B

Multi carrier TM1.1

Diagram	Symbolic name	Tested Port
2.10 a-d	$M2_{5+5LTE}$	RF A

Results NR B5 SCS 15kHz

Single carrier NR: TM1.1

Diagram	Symbolic name	Tested Port
2.11 a-b	B_{5NR}	RF B
2.12 a-b	B_{10NR}	RF B
2.13 a-b	B_{15NR}	RF B
2.14 a-b	B_{20NR}	RF B
2.15 a-d	M_{25NR}	RF B
2.16 a-b	T_{5NR}	RF B
2.17 a-b	T_{10NR}	RF B
2.18 a-b	T_{15NR}	RF B
2.19 a-b	T_{20NR}	RF B

Multi carrier NR: TM1.1

Diagram	Symbolic name	Tested Port
2.20 a-b	Bim_{NR}	RF A
2.21 a-b	Tim_{NR}	RF A

Results NR B13 SCS 15kHz

Single carrier NR:TM1.1

Diagram	Symbolic name	Tested Port
2.22 a-b	B_{5NR}	RF C
2.23 a-d	M_{10NR}	RF C
2.24 a-b	T_{5NR}	RF C

Multi carrier NR: TM1.1

Diagram	Symbolic name	Tested Port
2.25 a-d	$M2_{5+5NR}$	RF A

Results LTE with NB IoT GB B5

Single carrier NR: TM1.1, NB IoT: N-TM

Diagram	Symbolic name	Tested Port
2.26 a-d	$B_{GB+10LTE}$	RF A
2.27 a-d	$T_{GB+10LTE}$	RF A

Results LTE with NB IoT GB B13

Single carrier NR: TM1.1, NB IoT: N-TM

Diagram	Symbolic name	Tested Port
2.28 a-b	$B_{GB+10LTE}$	RF A
2.29 a-b	$T_{GB+10LTE}$	RF A

Results NR with NB IoT IB B5 SCS 15kHz

Single carrier NR: TM1.1, NB IoT: N-TM

Diagram	Symbolic name	Tested Port
2.30 a-b	B_{IB+5NR}	RF A
2.31 a-b	T_{IB+5NR}	RF B

Results NR with NB IoT IB B13 SCS 15kHz

Single carrier: NB IoT: N-TM, NR: TM1.1

Diagram	Symbolic name	Tested Port
2.32 a-d	B_{IB+5NR}	RF A
2.33 a-d	T_{IB+5NR}	RF B

Results NR B5 SCS 30kHz

Single carrier NR: TM1.1

Diagram	Symbolic name	Tested Port
2.34 a-b	B_{10NR}	RF C
2.35 a-b	B_{15NR}	RF A
2.36 a-b	B_{20NR}	RF A
2.37 a-b	M_{25NR}	RF A
2.38 a-b	T_{10NR}	RF C
2.39 a-b	T_{15NR}	RF A
2.40 a-b	T_{20NR}	RF A

Results NR B13 SCS 30kHz

Single carrier NR:TM1.1

Diagram	Symbolic name	Tested Port
2.41 a-d	M_{10NR}	RF C

Results LTE and NR B5 SCS 15kHz

Multi RAT: LTE and NR: TM1.1

Diagram	Symbolic name	Tested Port
2.42 a-d	Max_{4NR+3L}	RF A

Results LTE and NR B13 SCS 15kHz

Multi RAT: LTE and NR: TM1.1

Diagram	Symbolic name	Tested Port
2.43 a-d	Max_{4NR+3L}	RF A

Results Multi RAT ESS NR and LTE B5 SCS 15kHz

ESS NR 90% and LTE 10% TM1.1

Diagram	Symbolic name	Tested Port
2.44 a-b	$BESS_{NR+LTE}$	RF A
2.45 a-b	$TESS_{NR+LTE}$	RF A

Results Multi RAT ESS NR and LTE B13 SCS 15kHz

ESS NR 90% and LTE 10% TM1.1

Diagram	Symbolic name	Tested Port
2.46 a-d	$MESS_{NR+LTE}$	RF A

Limits

CFR 47 §27.53 (c)
For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
- On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
- On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
- Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

CFR 47§27.53 (f)
For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

CFR 47 § 22.917 (a)
Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

CFR 47 § 22.917 (b)
Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

- In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
- In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz.

RSS-130 4.7.1

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB (-13 dBm). However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

RSS-130 4.7.2 Additional unwanted emissions limits

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
76 + 10 log10 p (watts), dB, for base and fixed equipment

b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed −70 dBW(-40 dBm)/MHz for wideband signal and −80 dBW(-50 dBm) for discrete emission with bandwidth less than 700 Hz.

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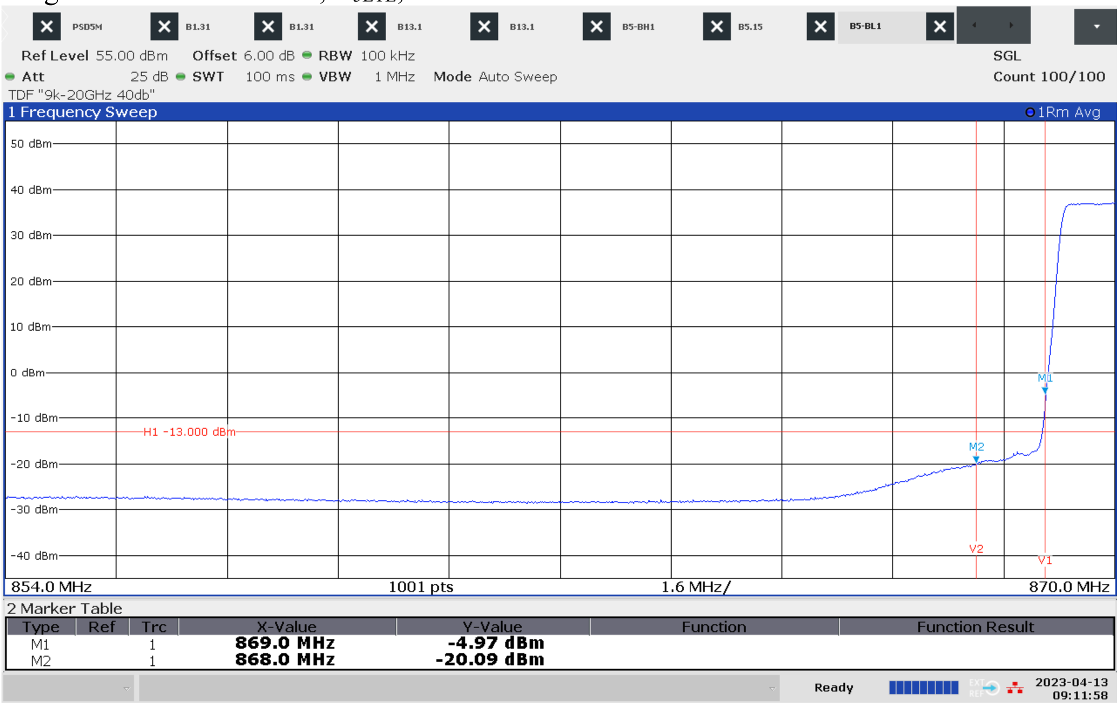
i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB.
ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB. If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

Complies?	Yes

Diagram 2.1a LTE: TM1.1, B_{5LTE}, Port B:



09:11:58 AM 04/13/2023

Diagram 2.1b LTE: TM1.1, B_{5LTE}, Port B:

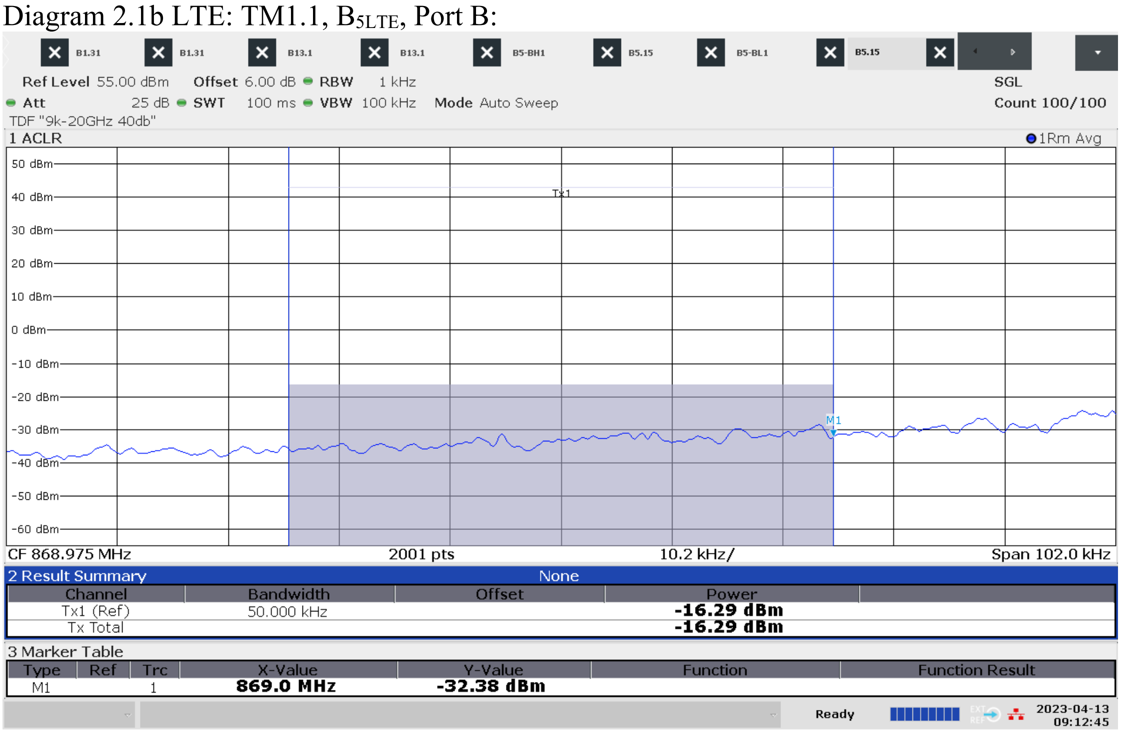


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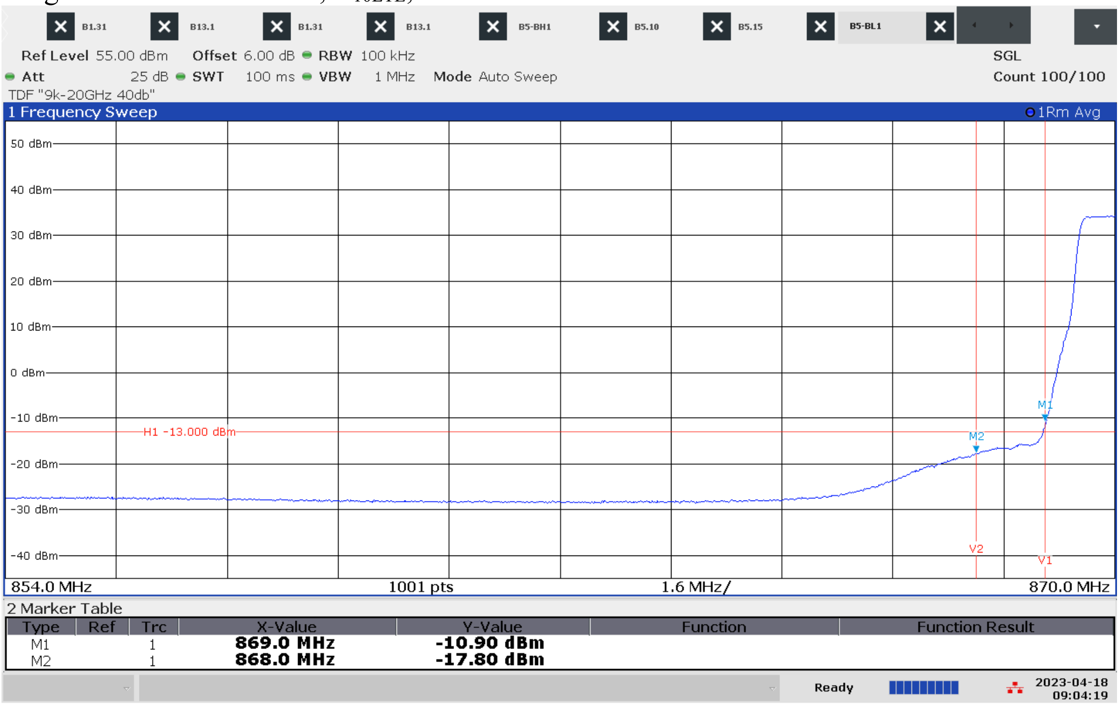
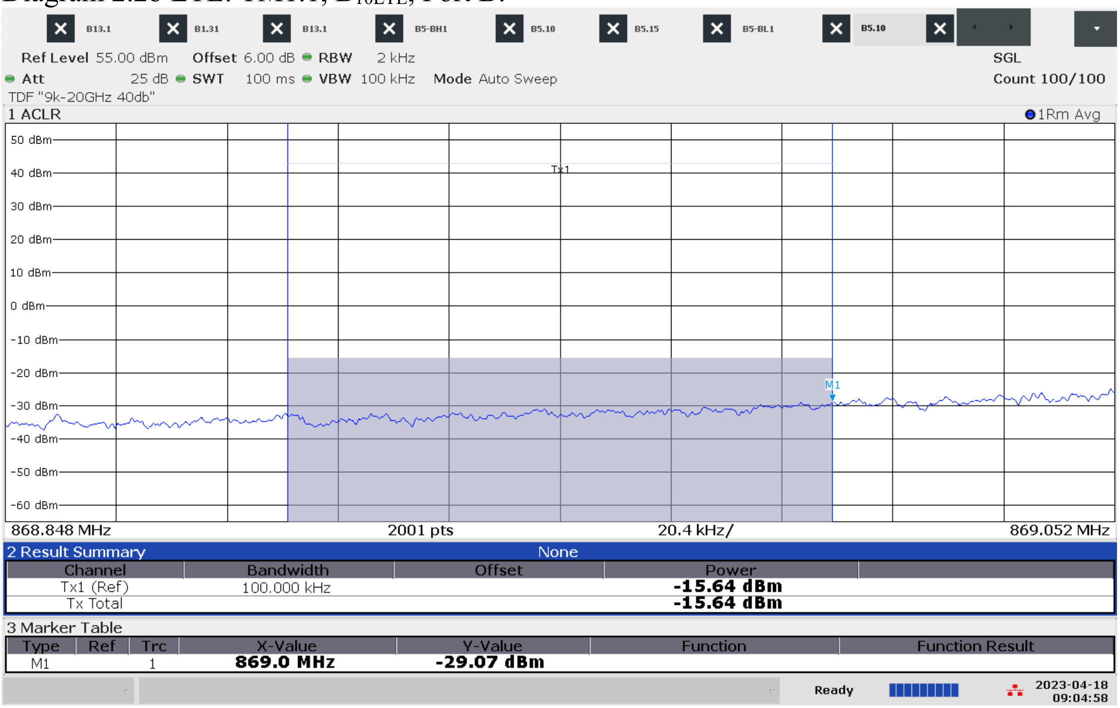
Diagram 2.2a LTE: TM1.1, B_{10LTE}, Port B:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**869.0 MHz**	**-10.90 dBm**		
M2		1	**868.0 MHz**	**-17.80 dBm**		

09:04:20 AM 04/18/2023

Diagram 2.2b LTE: TM1.1, B_{10LTE}, Port B:

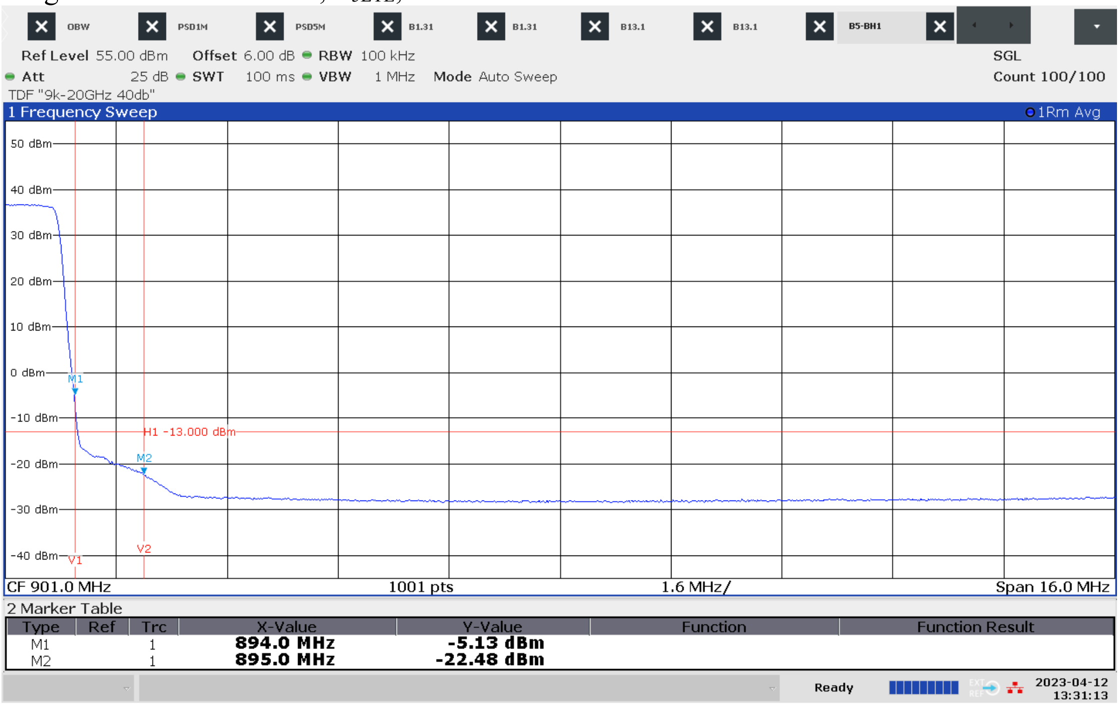


Channel	Bandwidth	Offset	Power
Tx1 (Ref)	100.000 kHz		**-15.64 dBm**
Tx Total			**-15.64 dBm**

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**869.0 MHz**	**-29.07 dBm**		

09:04:58 AM 04/18/2023

Diagram 2.3a LTE: TM1.1, T_{5LTE}, Port A:

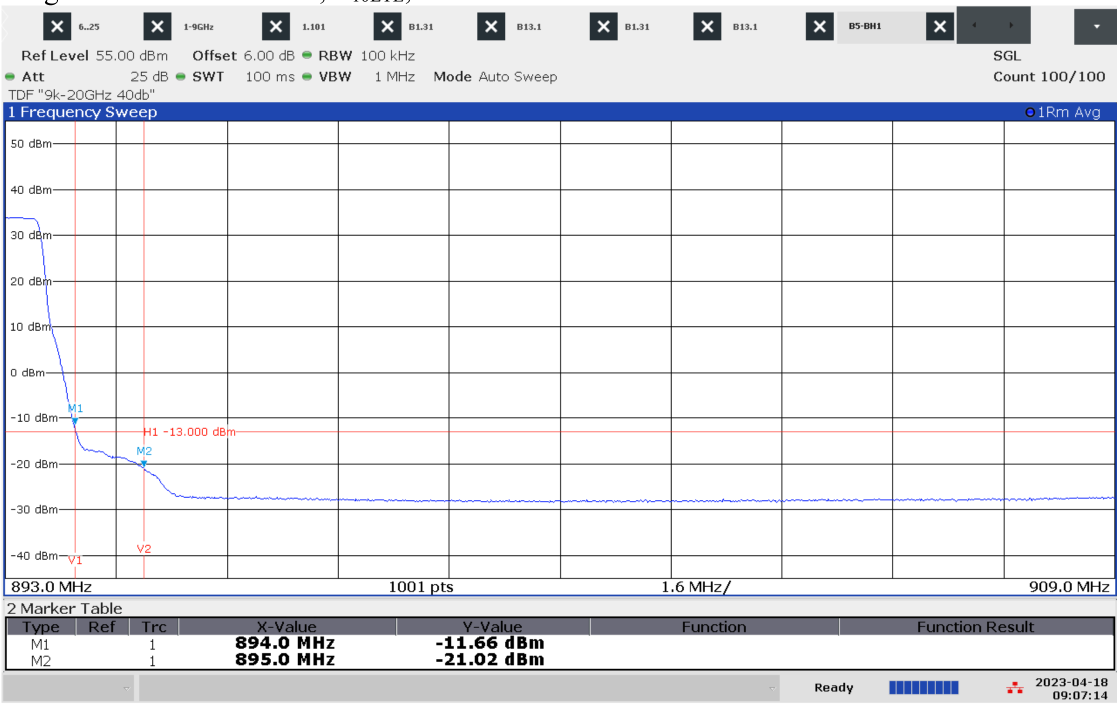


01:31:13 PM 04/12/2023

Diagram 2.3b LTE: TM1.1, T_{5LTE}, Port A:

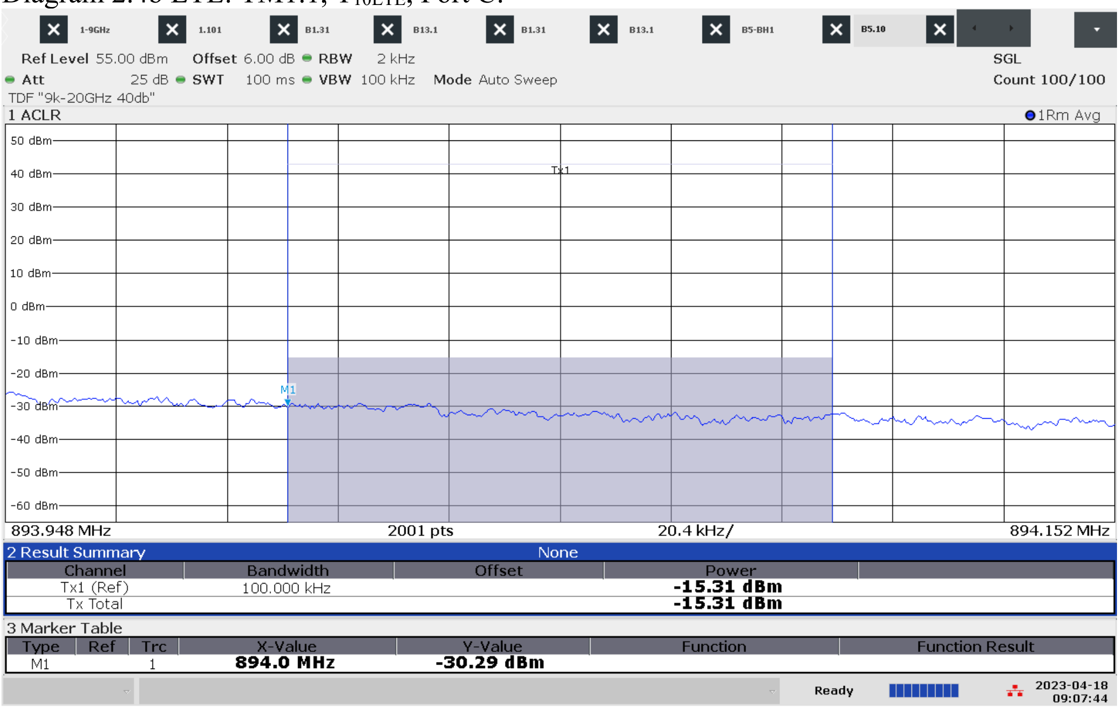
01:32:10 PM 04/12/2023

Diagram 2.4a LTE: TM1.1, T_{10LTE}, Port C:



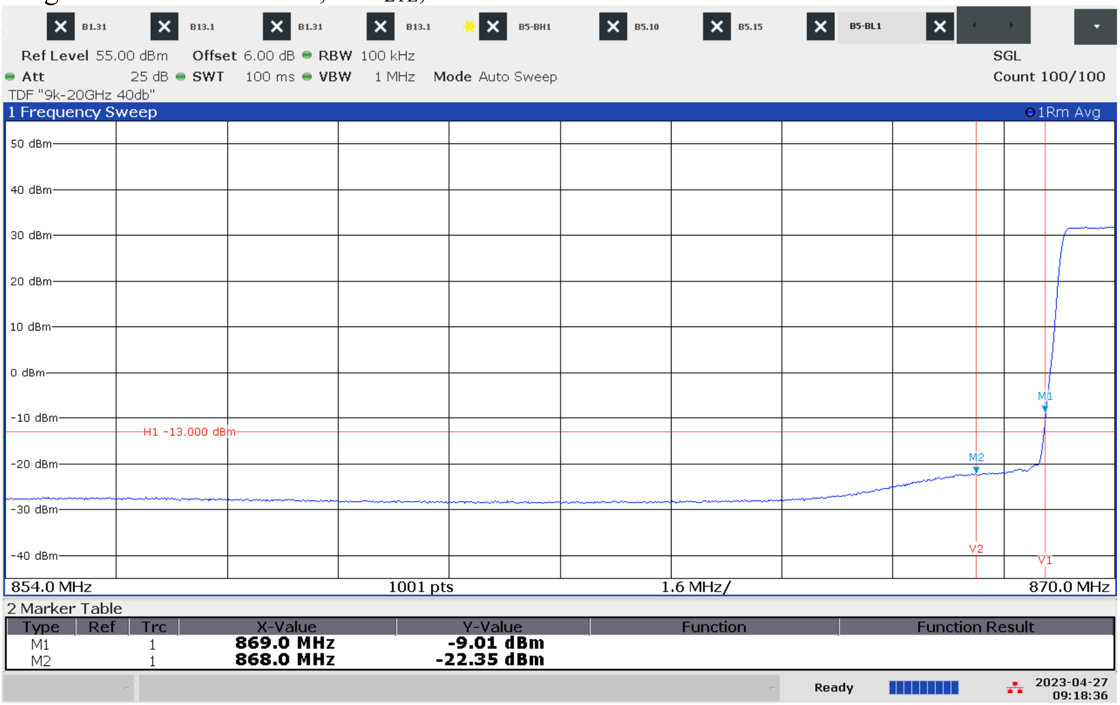
09:07:15 AM 04/18/2023

Diagram 2.4b LTE: TM1.1, T_{10LTE}, Port C:



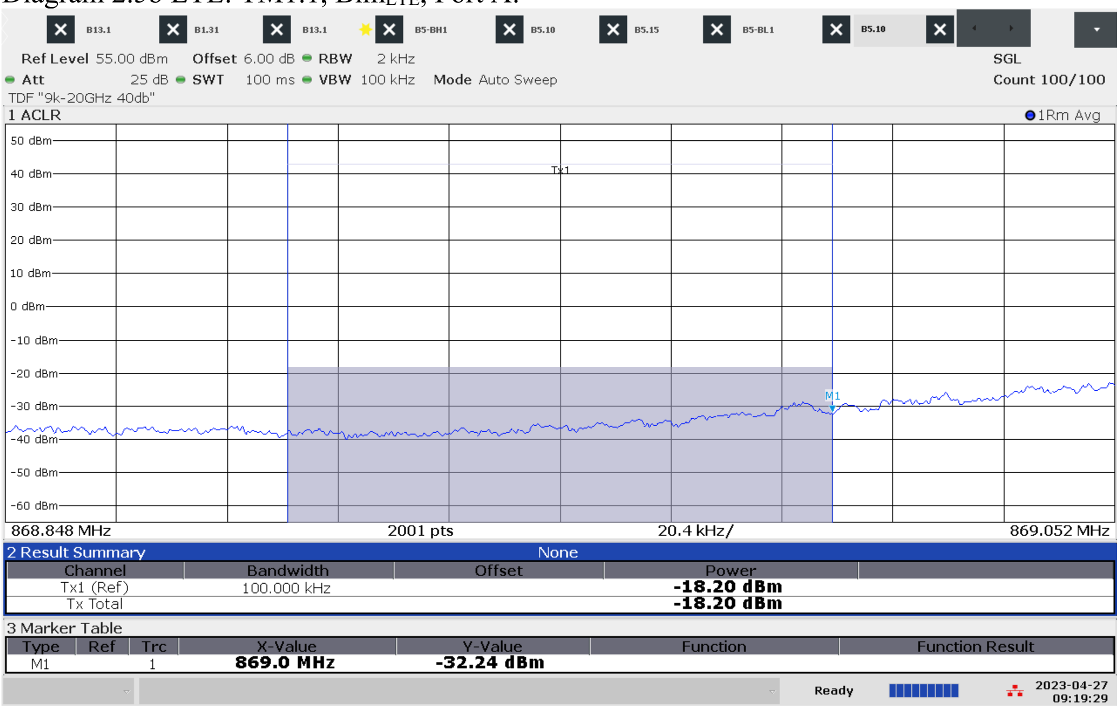
09:07:44 AM 04/18/2023

Diagram 2.5a LTE: TM1.1, Bim$_{LTE}$, Port A:



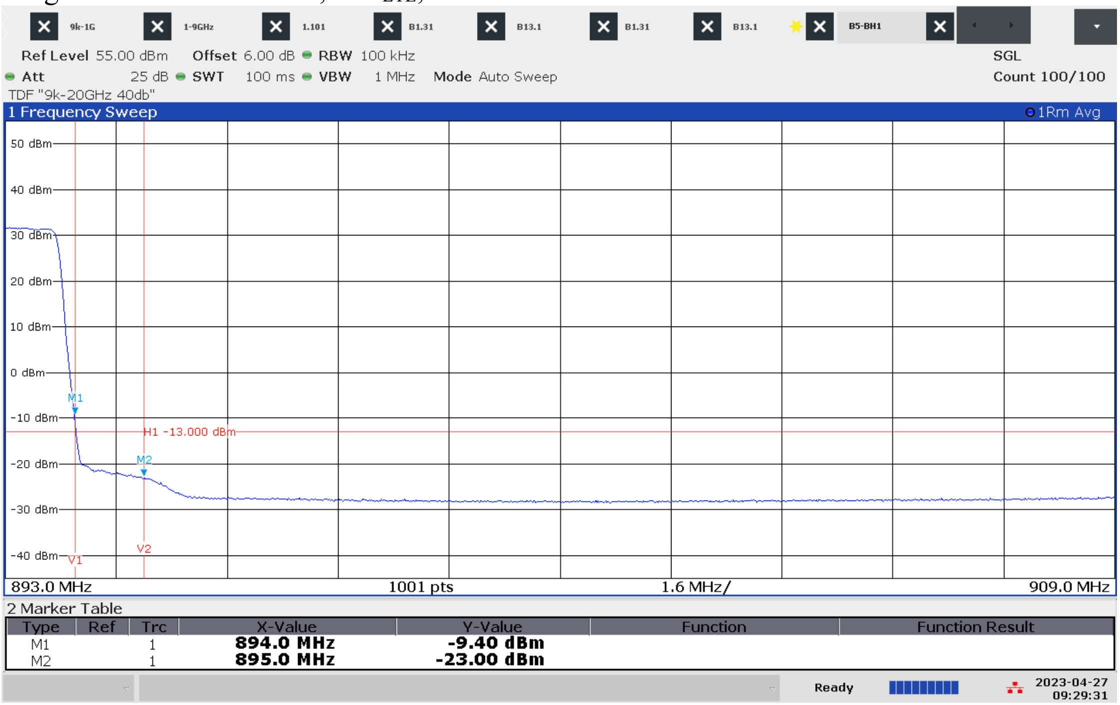
09:18:36 AM 04/27/2023

Diagram 2.5b LTE: TM1.1, Bim$_{LTE}$, Port A:



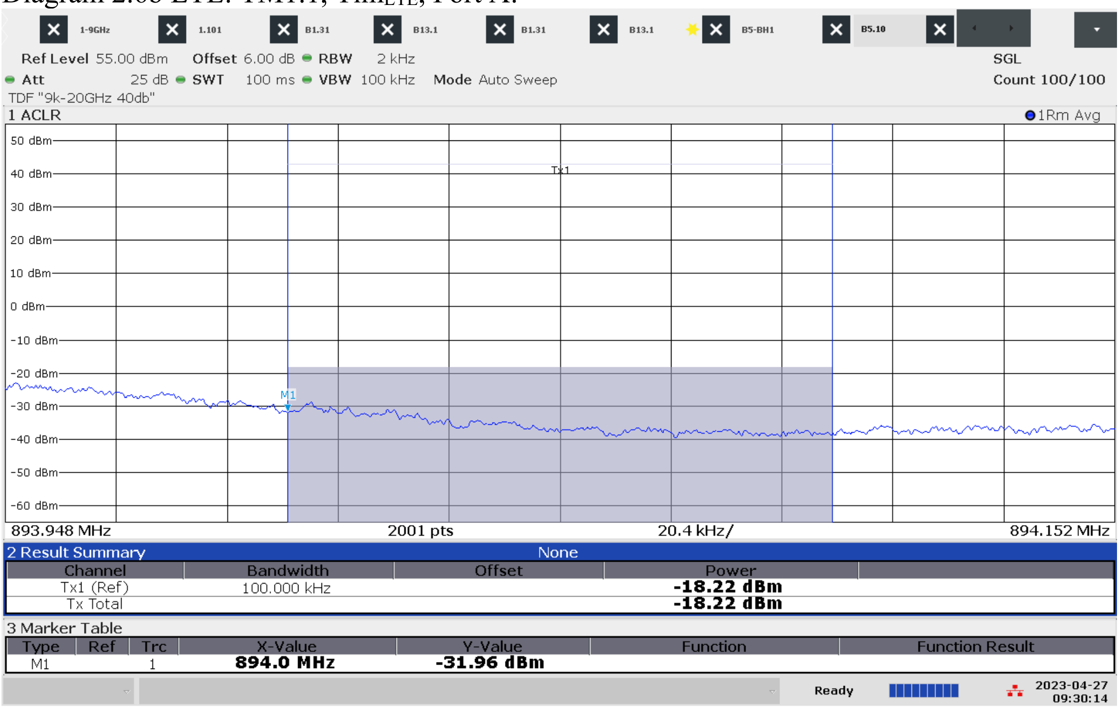
09:19:30 AM 04/27/2023

Diagram 2.6a LTE: TM1.1, Tim$_{LTE}$, Port A:



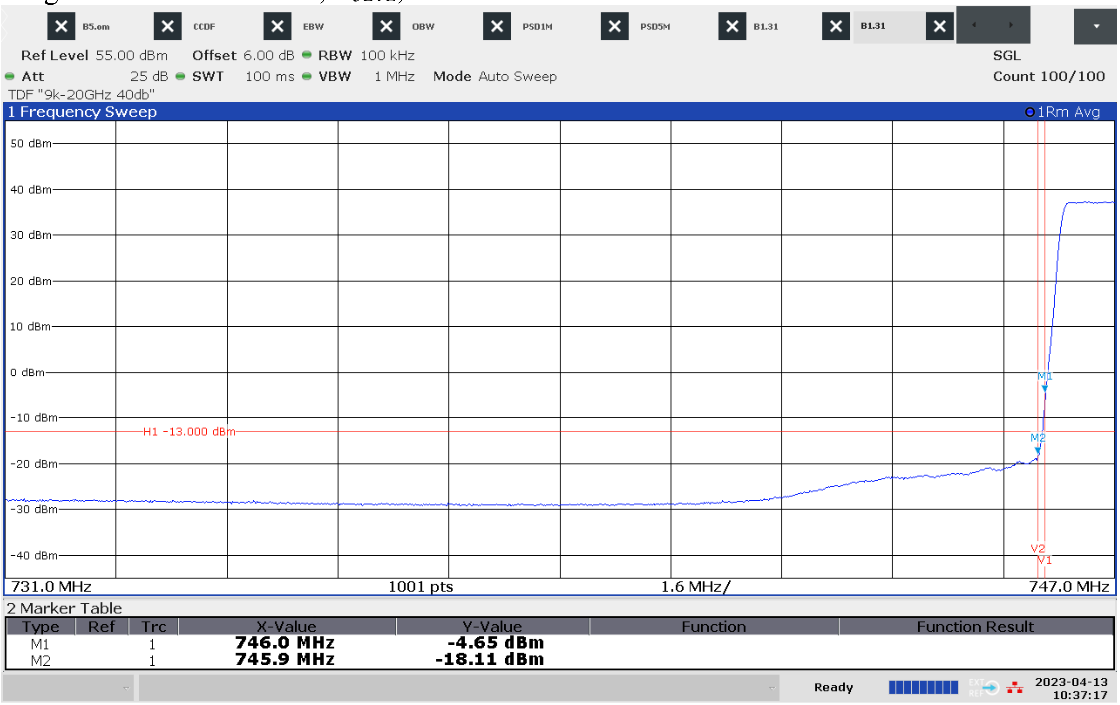
09:29:31 AM 04/27/2023

Diagram 2.6b LTE: TM1.1, Tim$_{LTE}$, Port A:



09:30:14 AM 04/27/2023

Diagram 2.7a LTE: TM1.1, B5LTE, Port C:

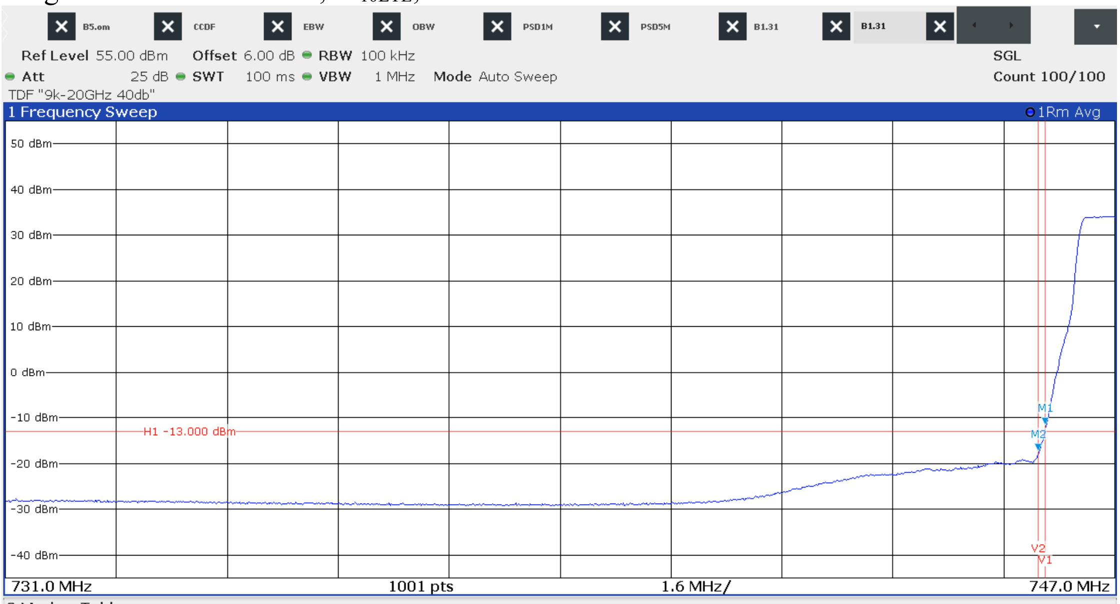


10:37:17 AM 04/13/2023

Diagram 2.7b LTE: TM1.1, B5LTE, Port C:

10:37:56 AM 04/13/2023

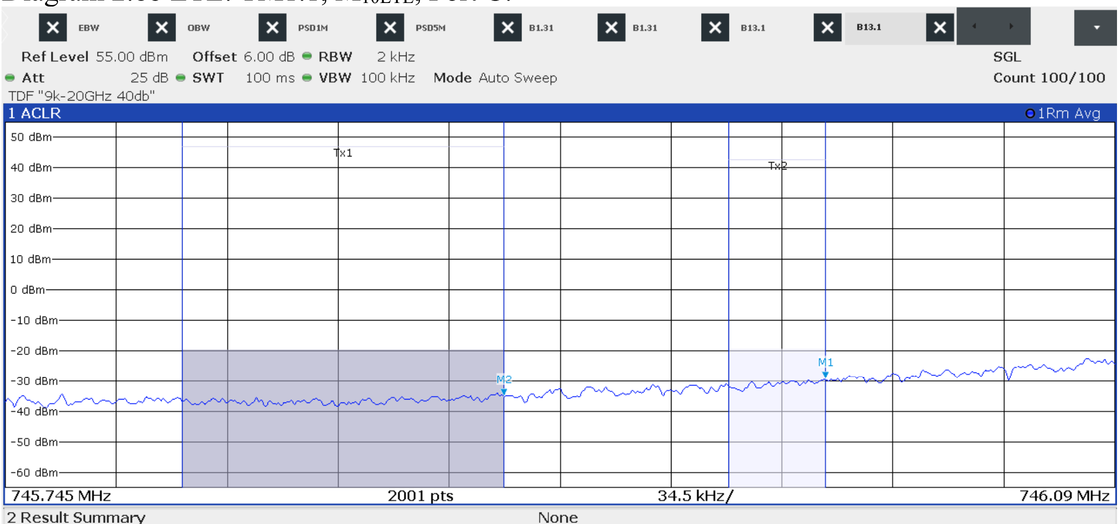
Diagram 2.8a LTE: TM1.1, M_{10LTE}, Port C:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	746.0 MHz	-11.64 dBm		
M2		1	745.9 MHz	-17.30 dBm		

12:26:37 PM 04/14/2023

Diagram 2.8b LTE: TM1.1, M_{10LTE}, Port C:



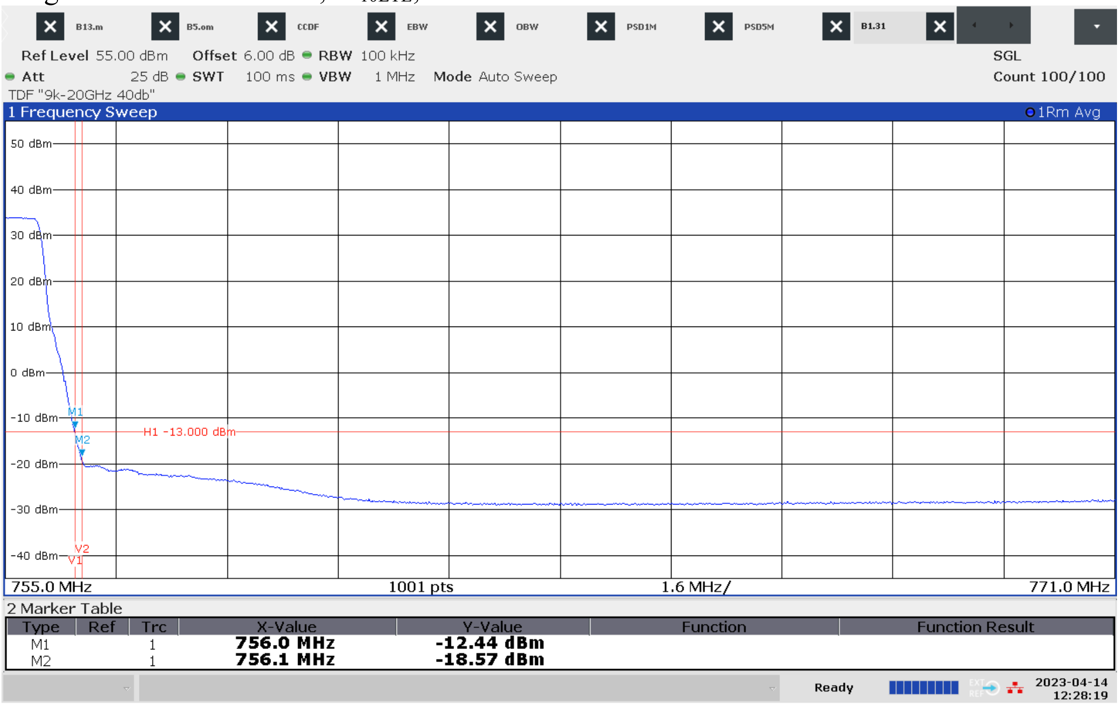
Channel	Bandwidth	Offset	Power
Tx1	100.000 kHz		-19.75 dBm
Tx2 (Ref)	30.000 kHz	135.000 kHz	-19.52 dBm
Tx Total			-16.62 dBm

3 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	746.0 MHz	-29.62 dBm		
M2		1	745.9 MHz	-35.16 dBm		

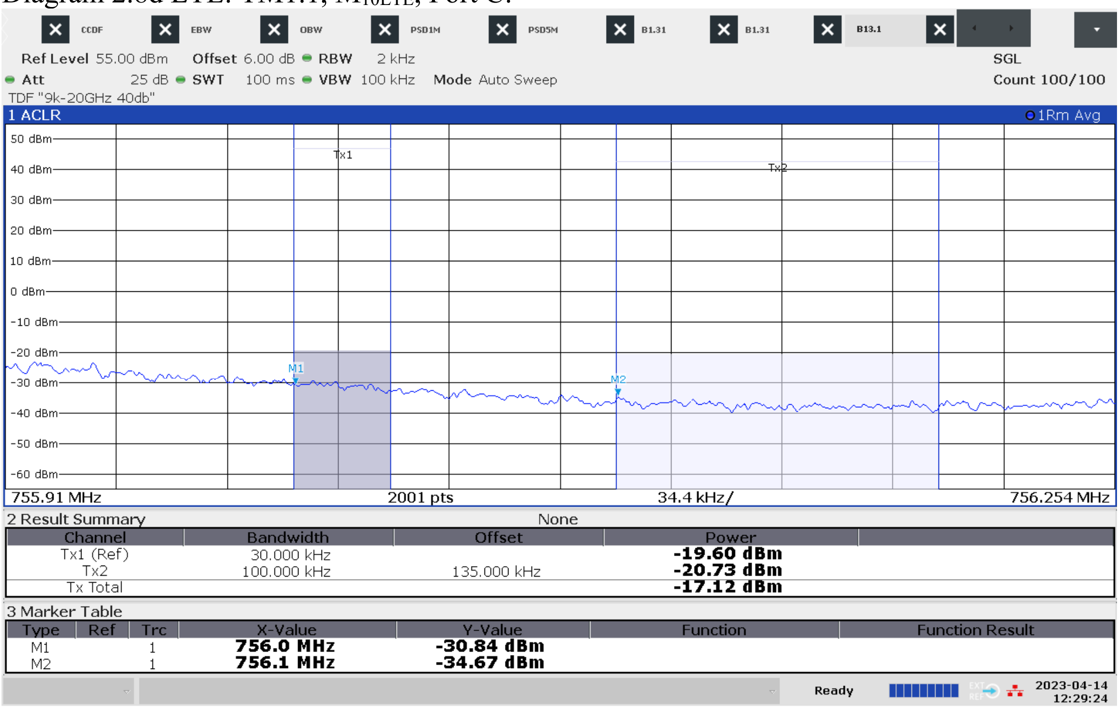
12:27:20 PM 04/14/2023

Diagram 2.8c LTE: TM1.1, M_{10LTE}, Port C:



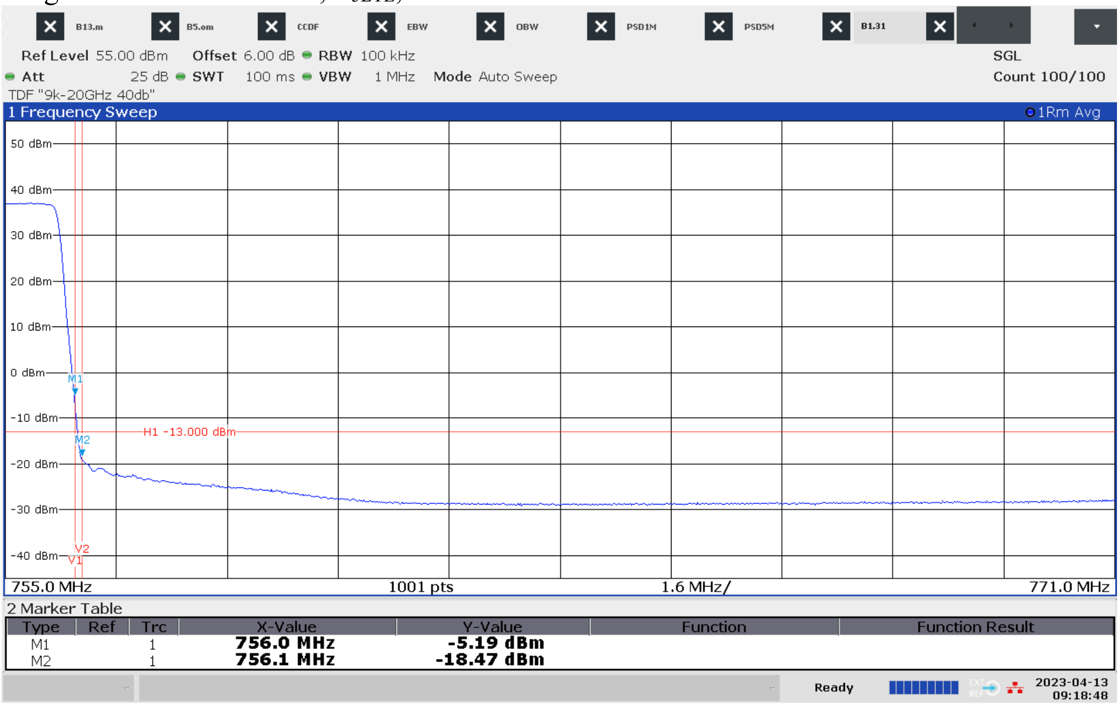
12:28:20 PM 04/14/2023

Diagram 2.8d LTE: TM1.1, M_{10LTE}, Port C:



12:29:24 PM 04/14/2023

Diagram 2.9a LTE: TM1.1, T_{5LTE}, Port B:

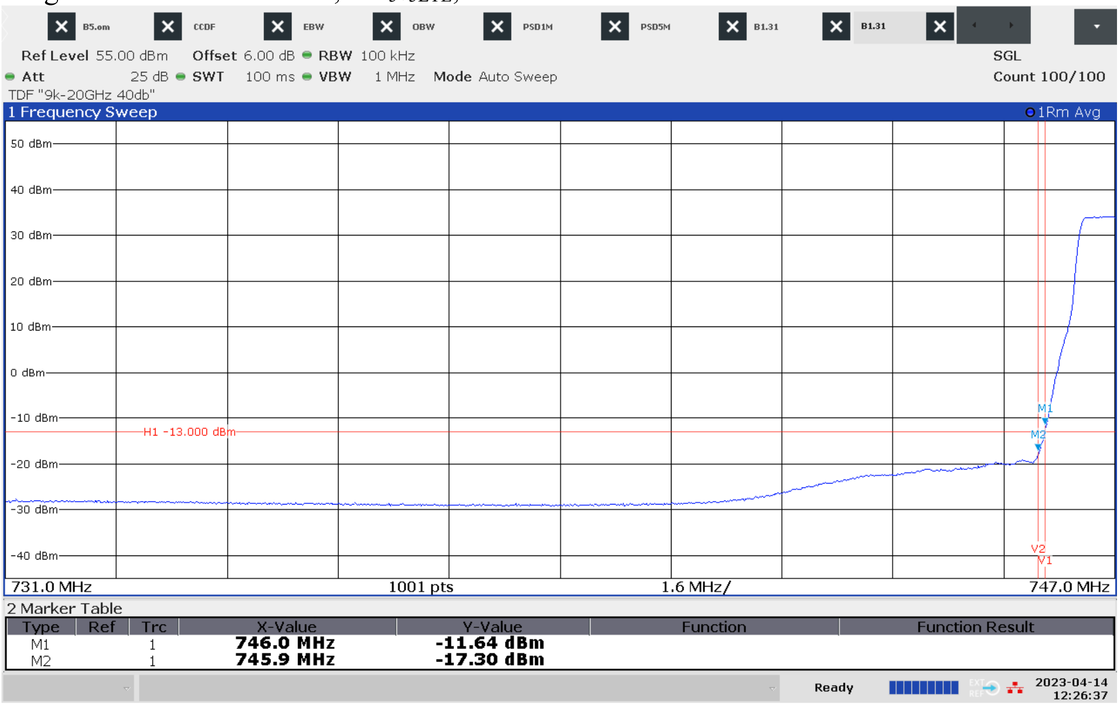


09:18:48 AM 04/13/2023

Diagram 2.9b LTE: TM1.1, T_{5LTE}, Port B:

09:20:18 AM 04/13/2023

Diagram 2.10a LTE: TM1.1, M2$_{5+5LTE}$, Port A:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	746.0 MHz	-11.64 dBm		
M2		1	745.9 MHz	-17.30 dBm		

12:26:37 PM 04/14/2023

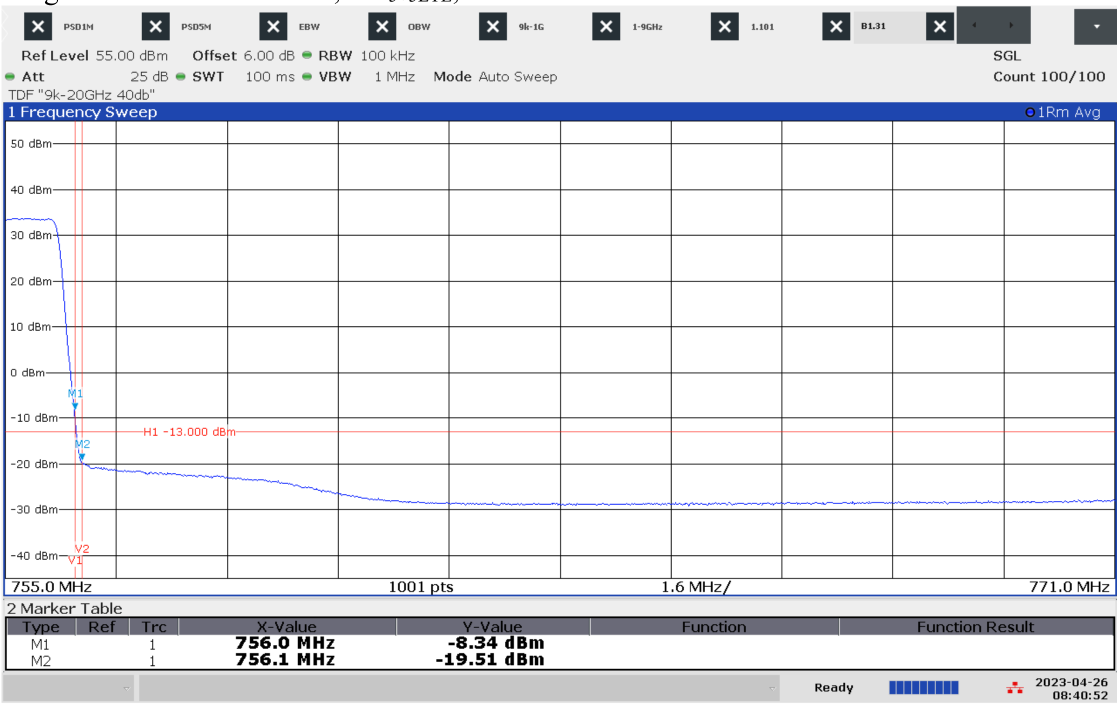
Diagram 2.10b LTE: TM1.1, M2$_{5+5LTE}$, Port A:

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	100.000 kHz		-20.51 dBm
Tx2	30.000 kHz	135.000 kHz	-20.76 dBm
Tx Total			-17.62 dBm

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	746.0 MHz	-31.45 dBm		
M2		1	745.9 MHz	-38.49 dBm		

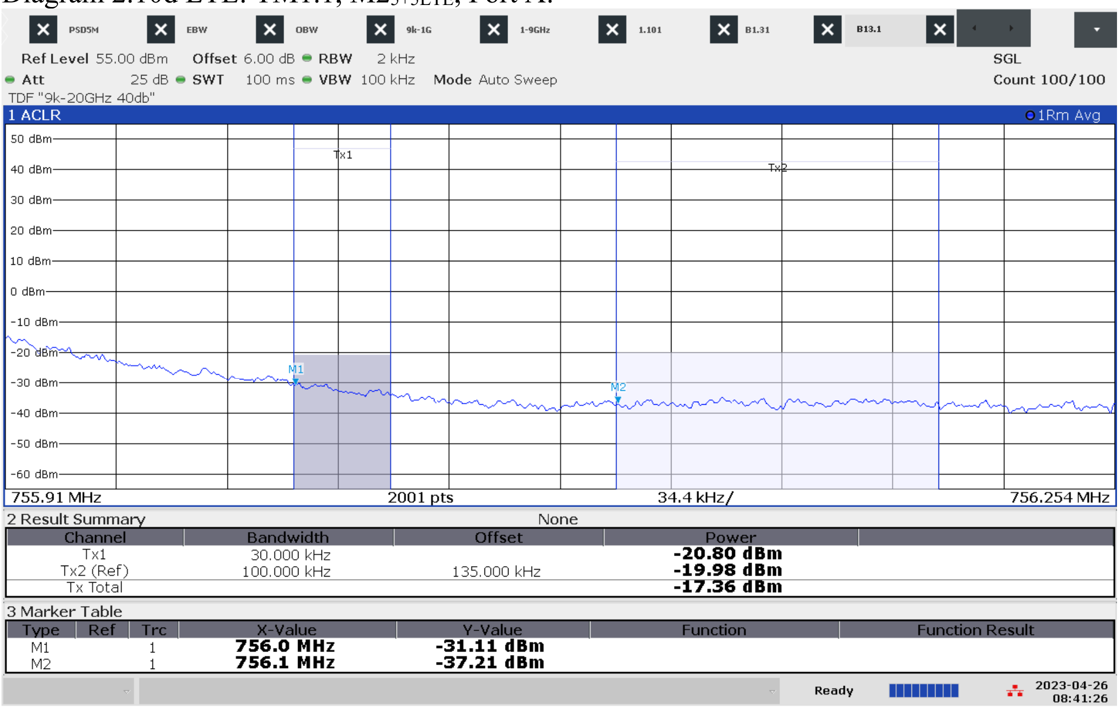
08:37:04 AM 04/26/2023

Diagram 2.10c LTE: TM1.1, $M2_{5+5LTE}$, Port A:



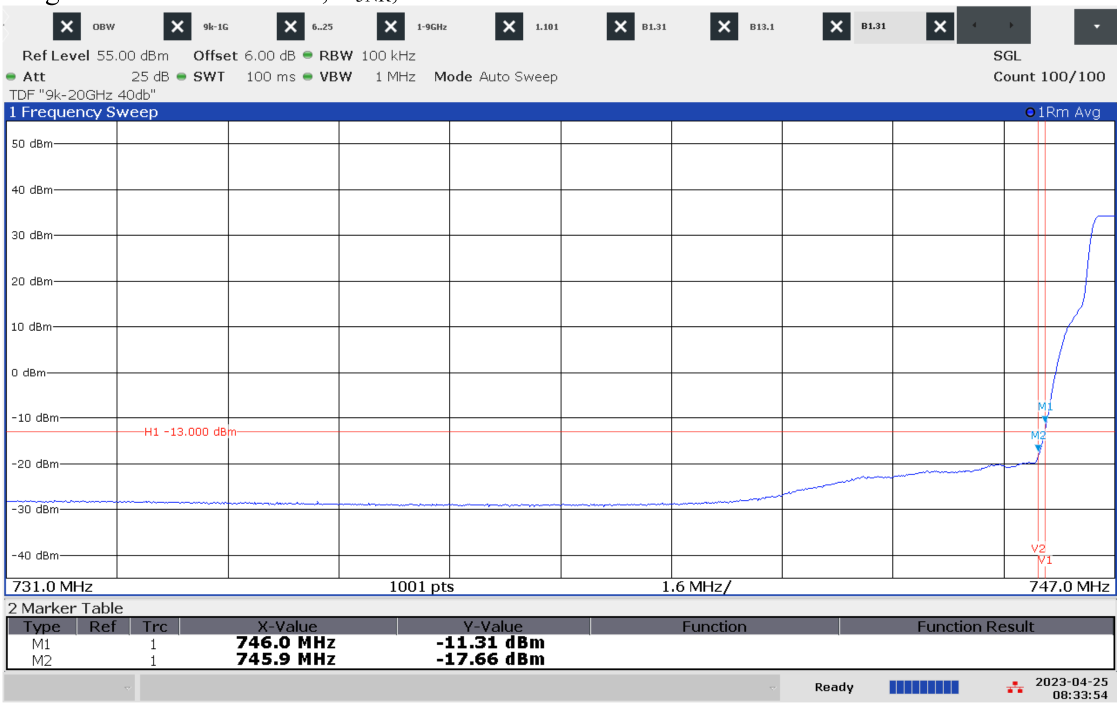
08:40:53 AM 04/26/2023

Diagram 2.10d LTE: TM1.1, $M2_{5+5LTE}$, Port A:



08:41:26 AM 04/26/2023

Diagram 2.11a NR: TM1.1, B5NR, Port B:

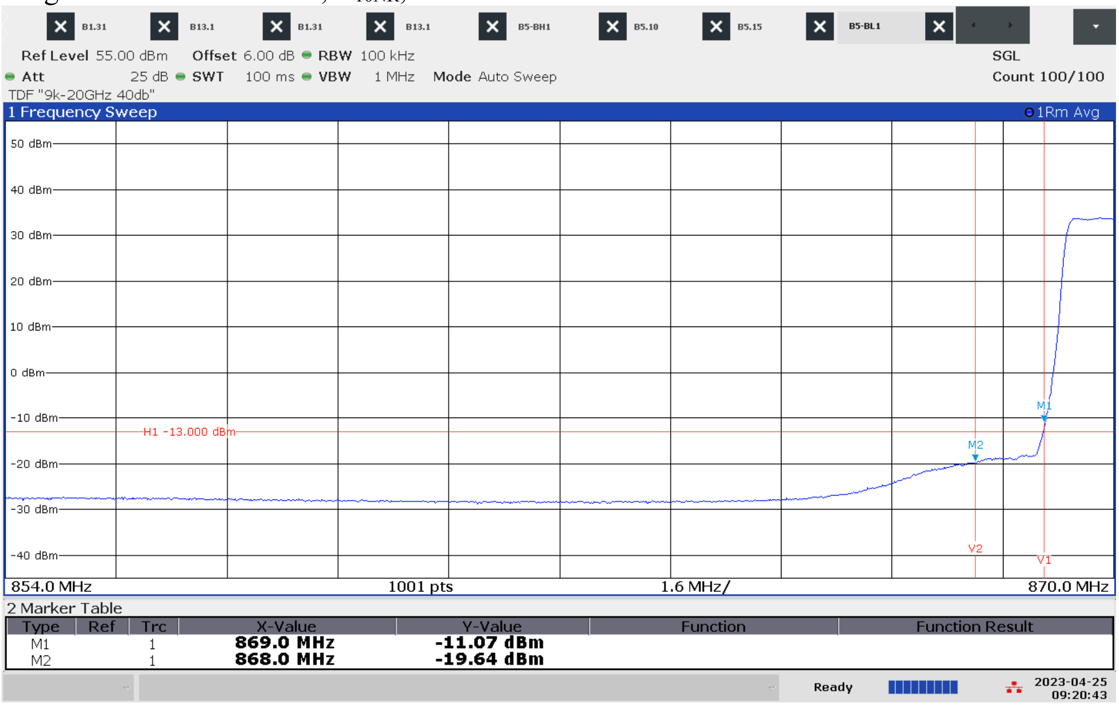


08:33:54 AM 04/25/2023

Diagram 2.11b NR: TM1.1, B5NR, Port B:

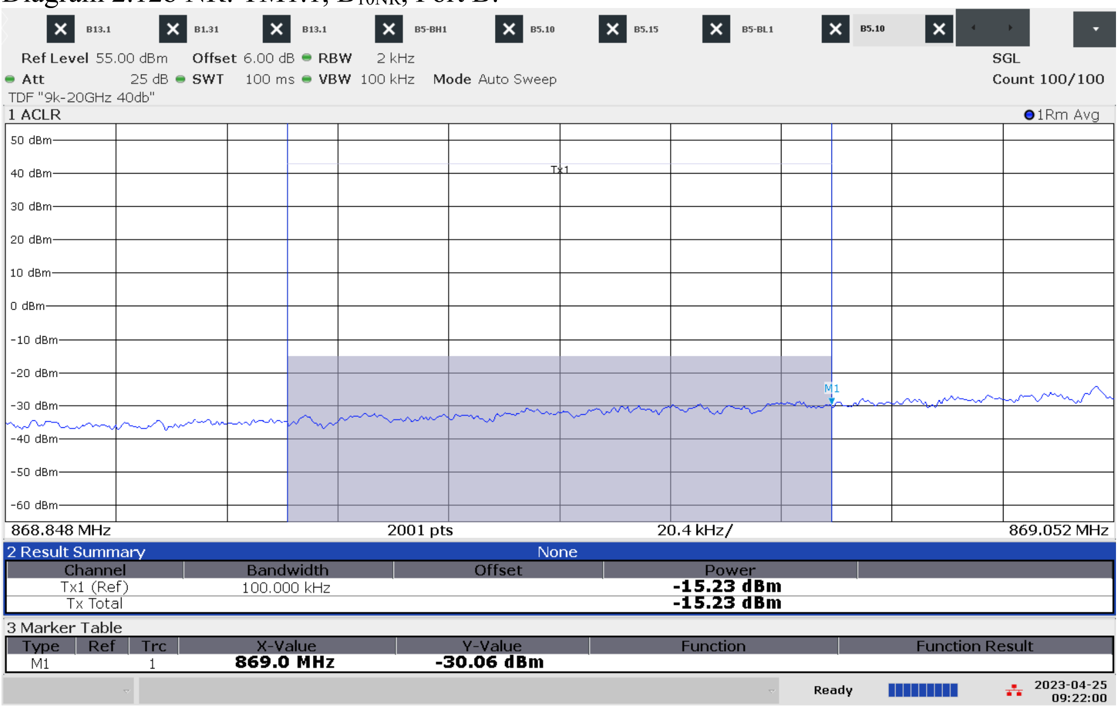
08:35:23 AM 04/25/2023

Diagram 2.12a NR: TM1.1, B_{10NR}, Port B:



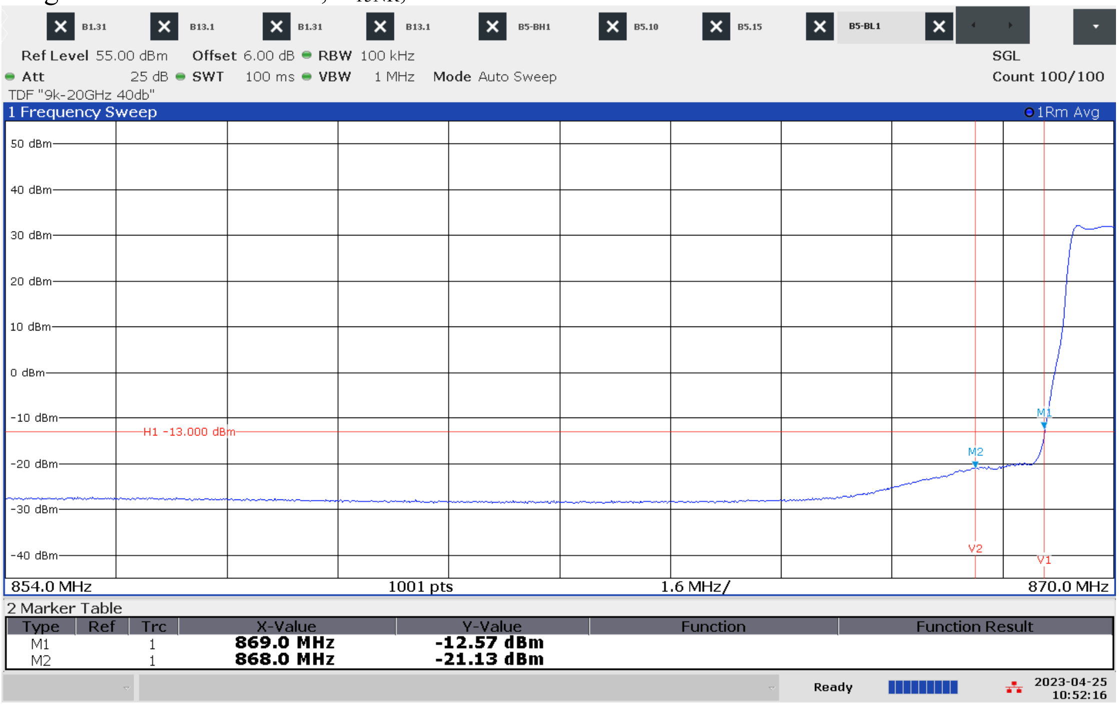
09:20:43 AM 04/25/2023

Diagram 2.12b NR: TM1.1, B_{10NR}, Port B:



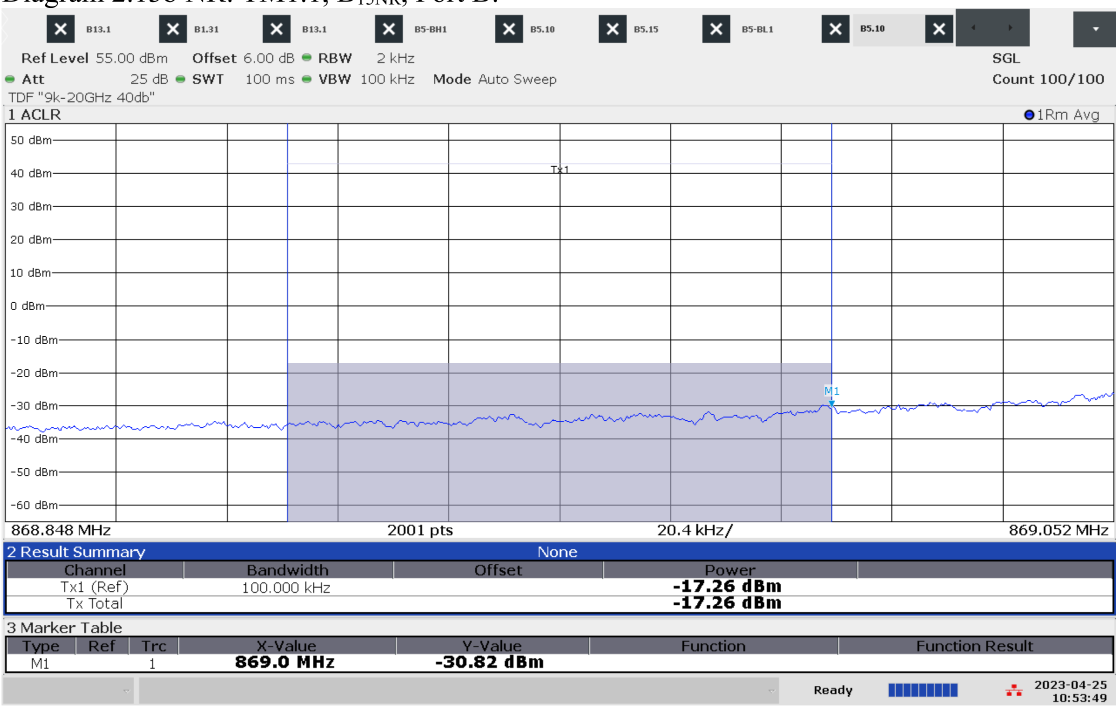
09:22:00 AM 04/25/2023

Diagram 2.13a NR: TM1.1, B_{15NR}, Port B:



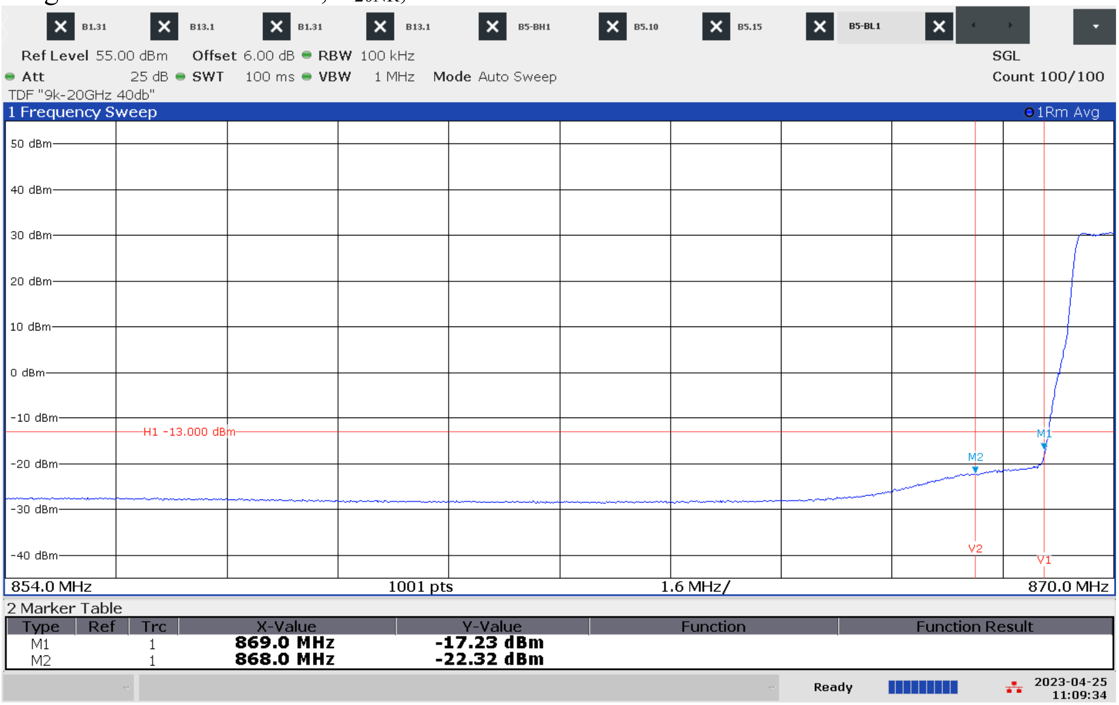
10:52:16 AM 04/25/2023

Diagram 2.13b NR: TM1.1, B_{15NR}, Port B:



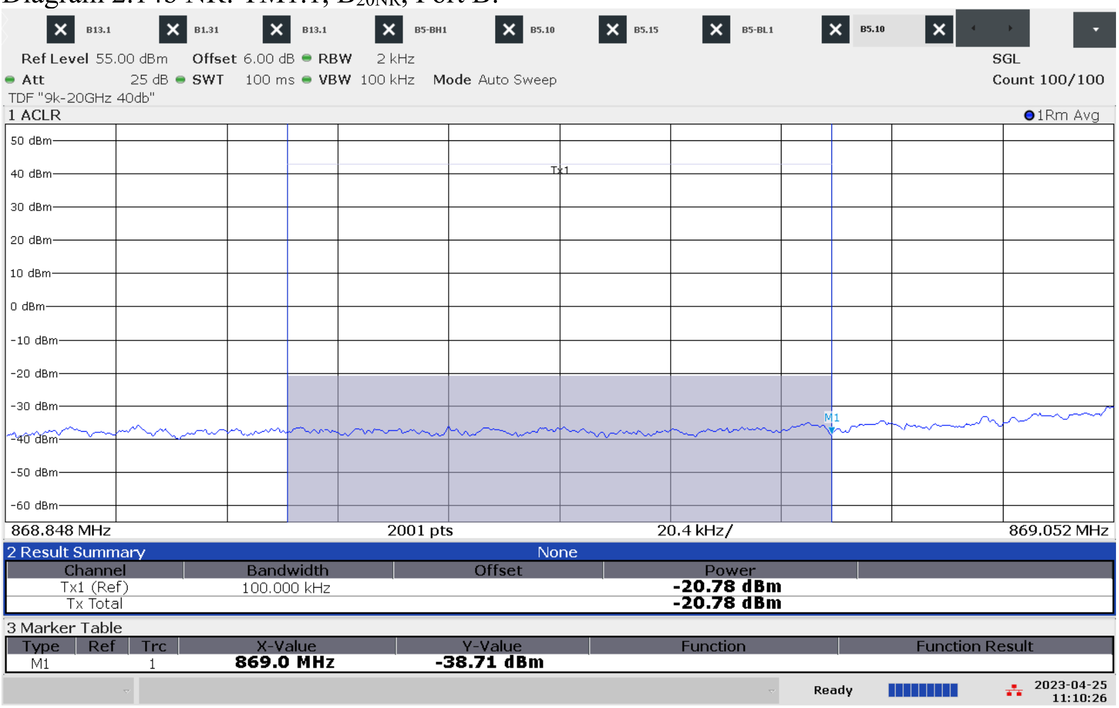
10:53:49 AM 04/25/2023

Diagram 2.14a NR: TM1.1, B_{20NR}, Port B:



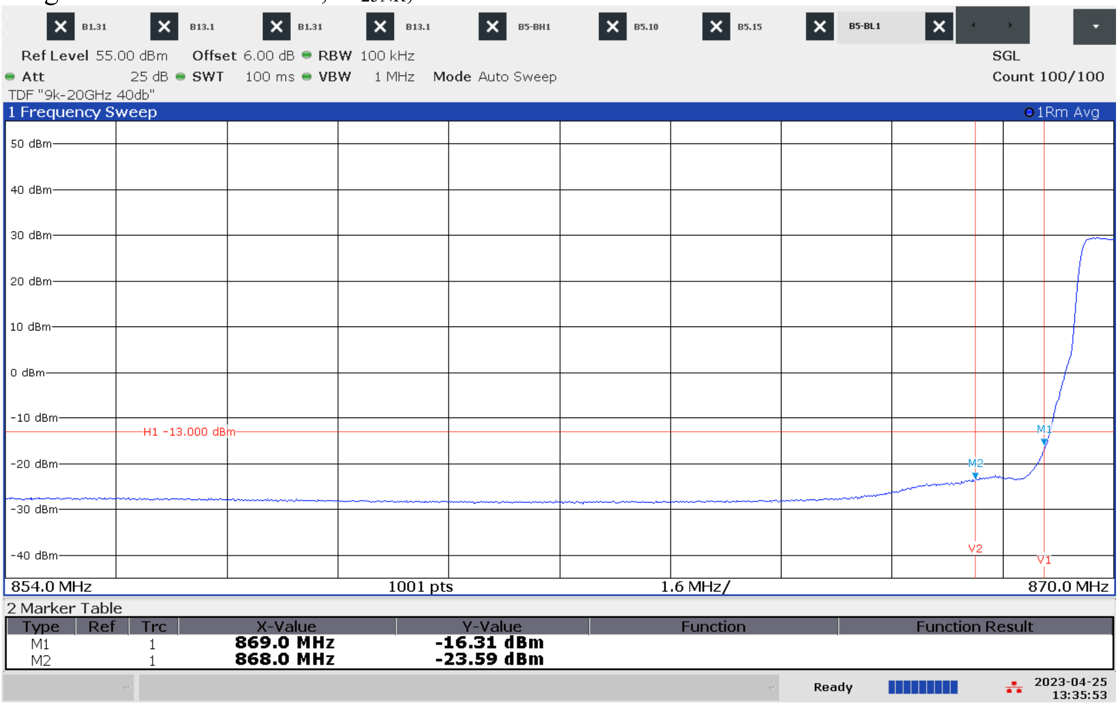
11:09:35 AM 04/25/2023

Diagram 2.14b NR: TM1.1, B_{20NR}, Port B:



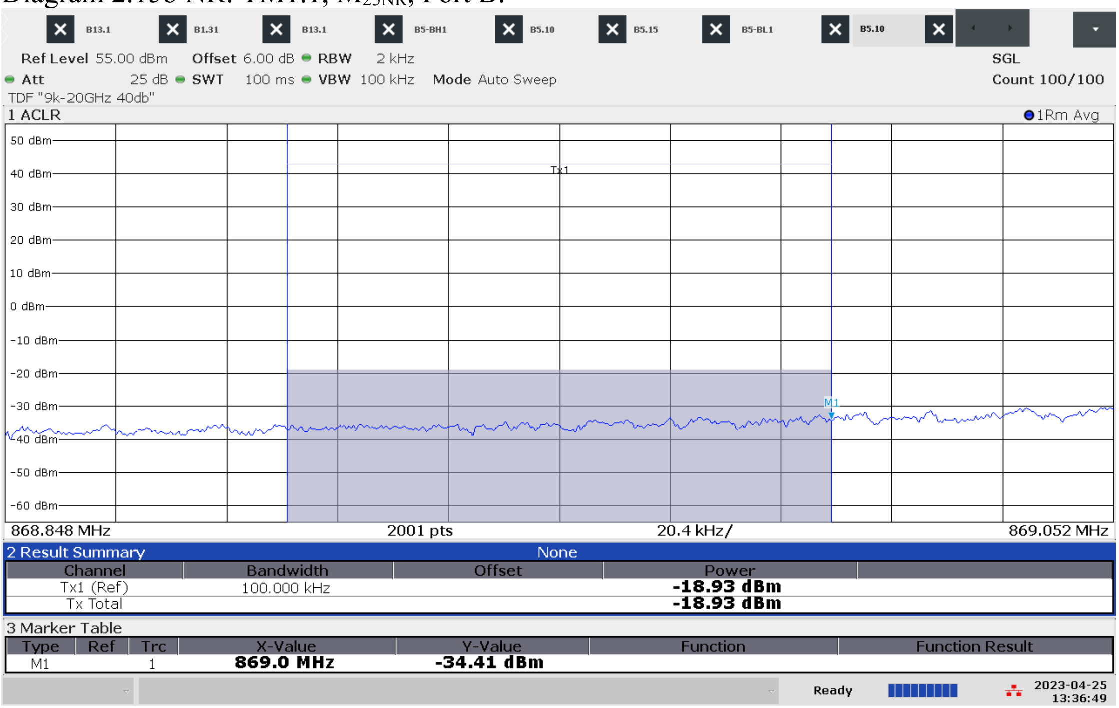
11:10:27 AM 04/25/2023

Diagram 2.15a NR: TM1.1, M_{25NR}, Port B:



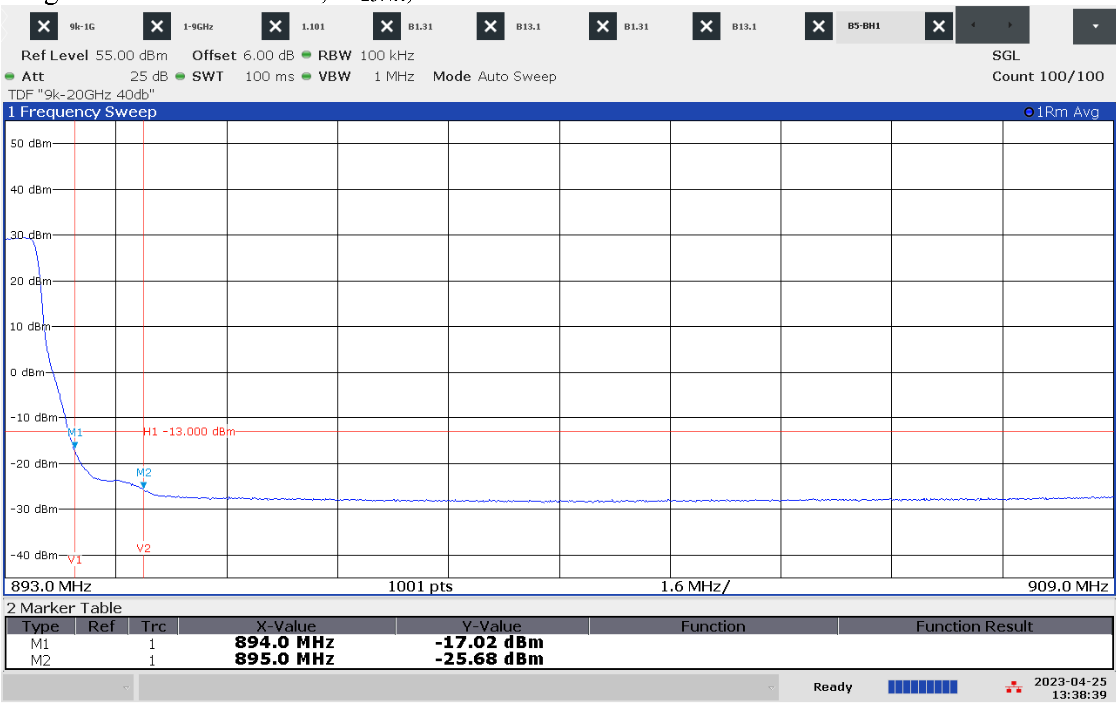
01:35:54 PM 04/25/2023

Diagram 2.15b NR: TM1.1, M_{25NR}, Port B:



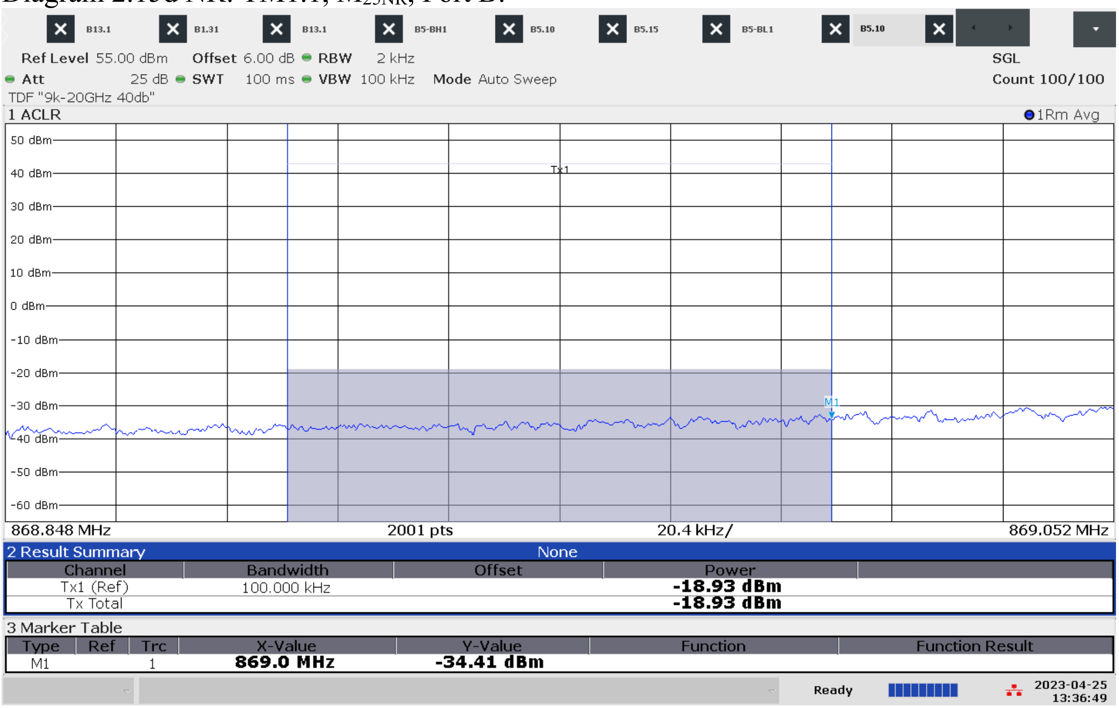
01:36:50 PM 04/25/2023

Diagram 2.15c NR: TM1.1, M_{25NR}, Port B:



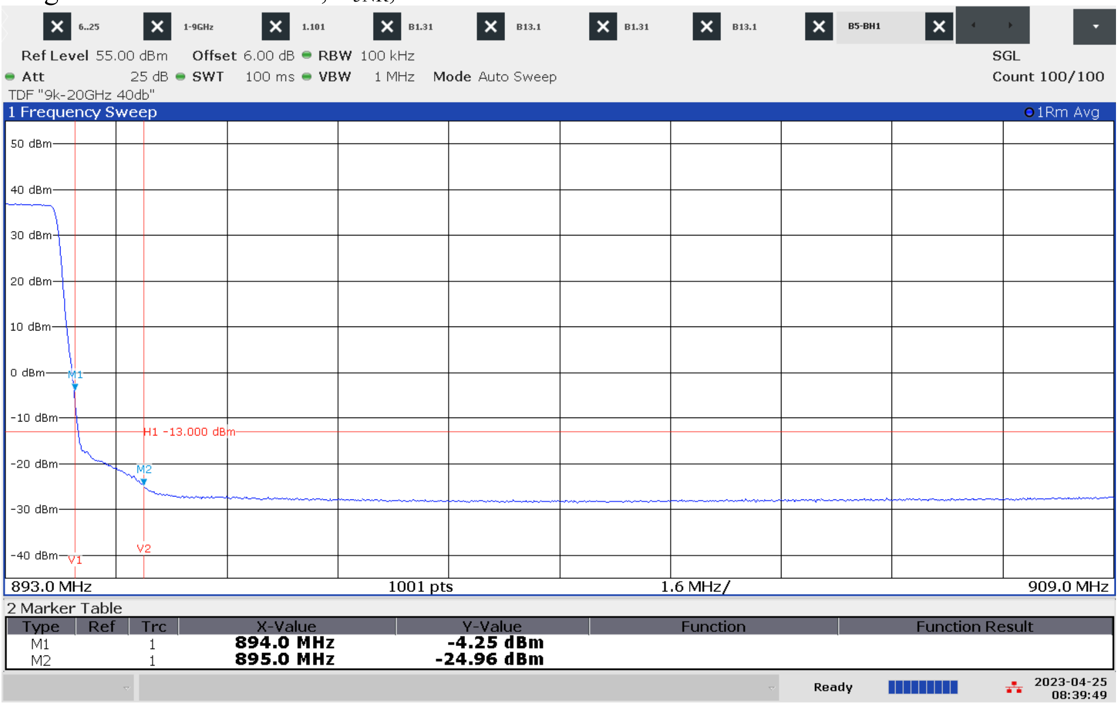
01:38:39 PM 04/25/2023

Diagram 2.15d NR: TM1.1, M_{25NR}, Port B:



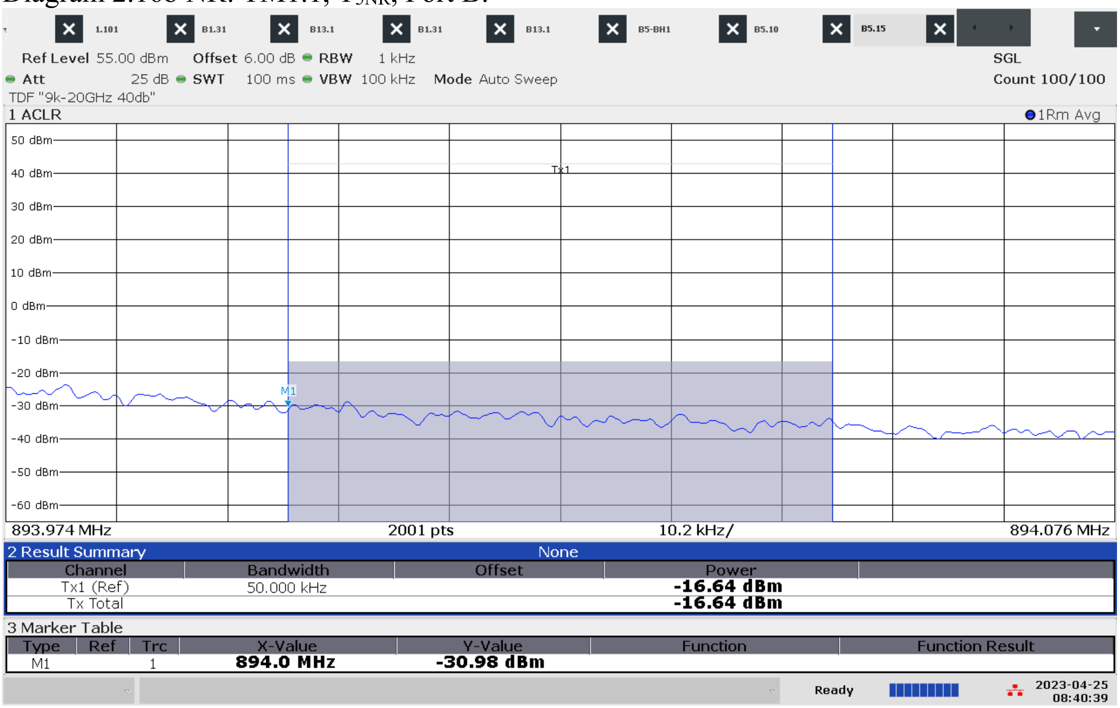
01:36:50 PM 04/25/2023

Diagram 2.16a NR: TM1.1, T_{5NR}, Port B:



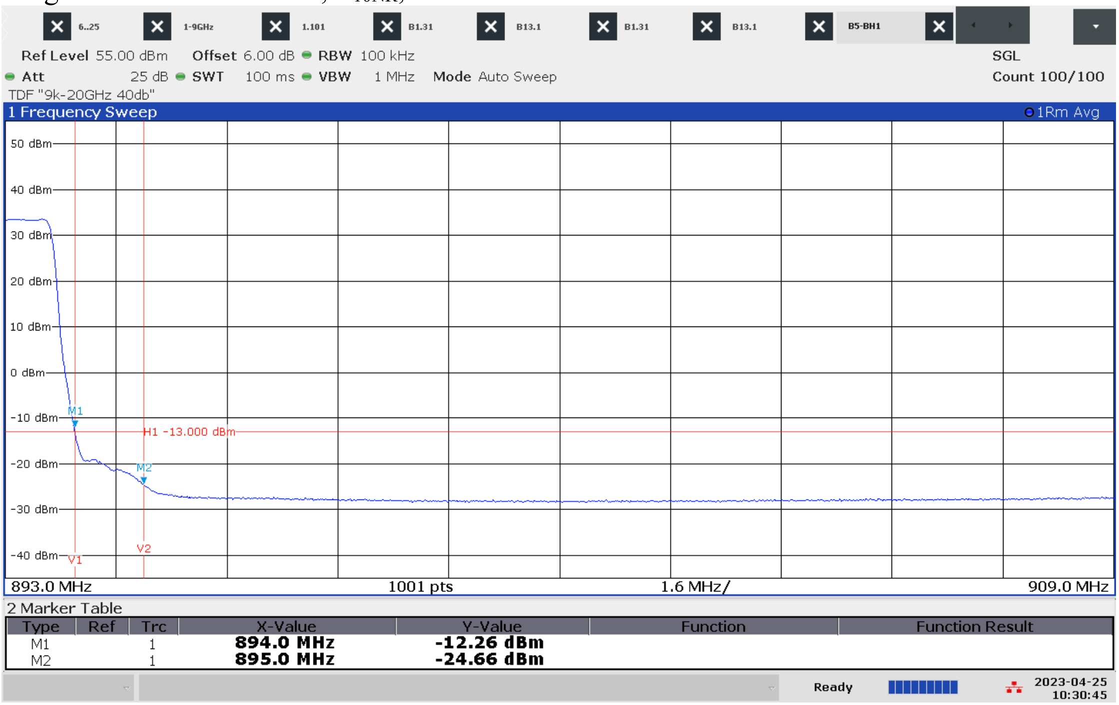
08:39:49 AM 04/25/2023

Diagram 2.16b NR: TM1.1, T_{5NR}, Port B:



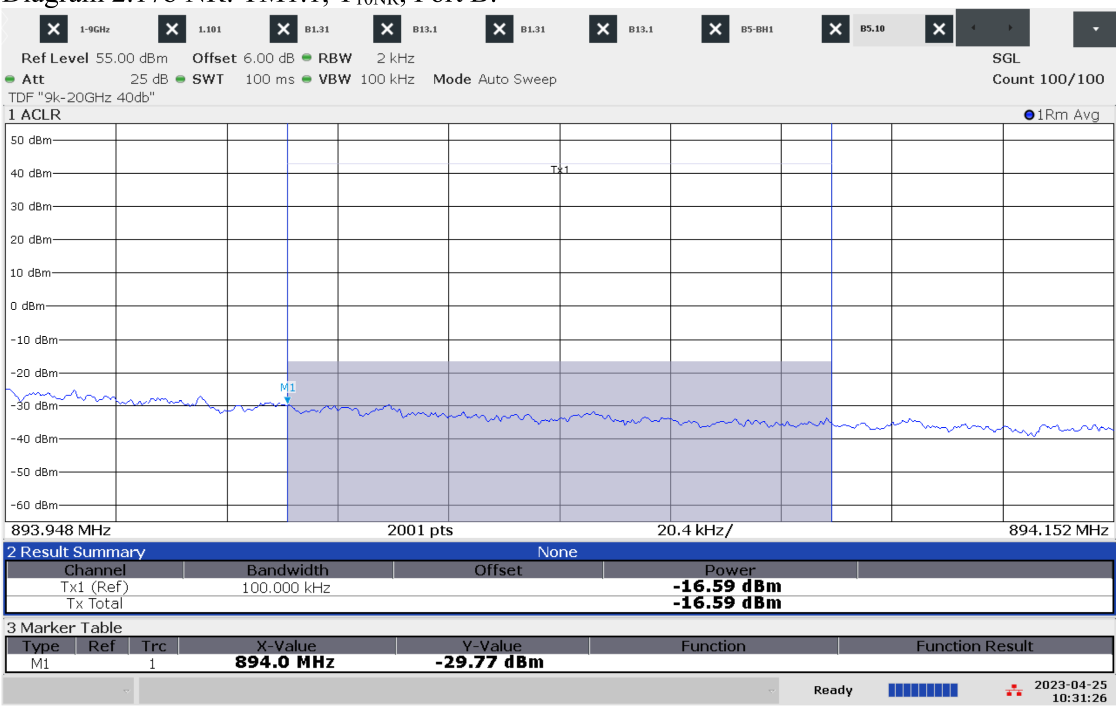
08:40:39 AM 04/25/2023

Diagram 2.17a NR: TM1.1, T_{10NR}, Port B:



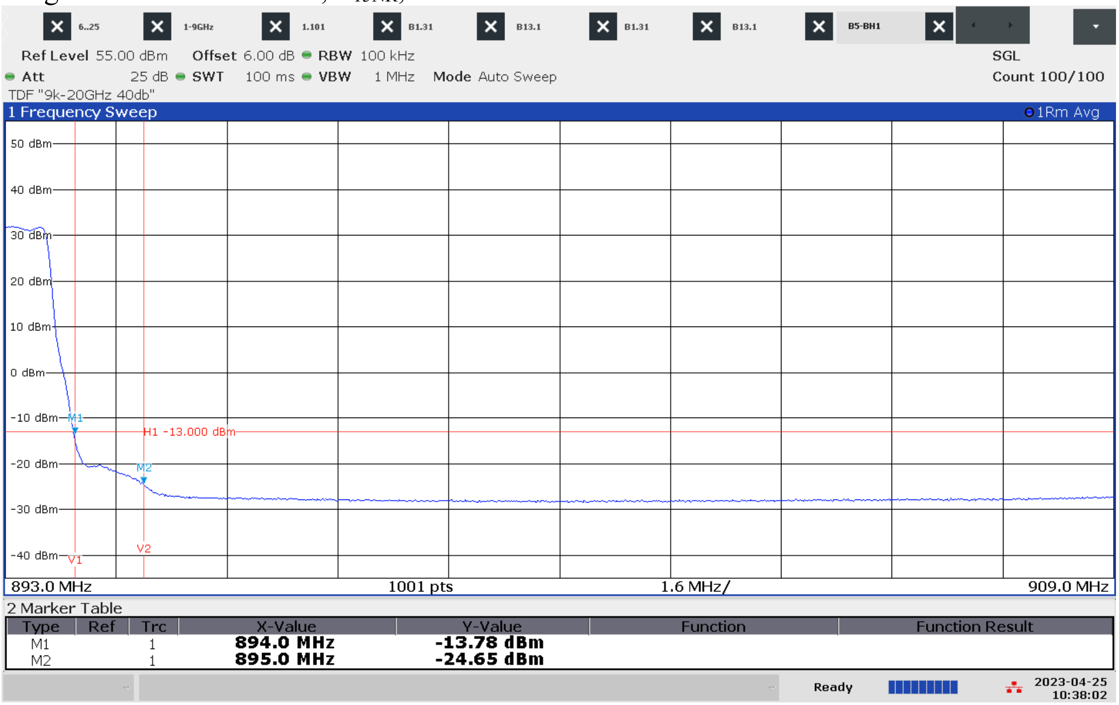
10:30:46 AM 04/25/2023

Diagram 2.17b NR: TM1.1, T_{10NR}, Port B:



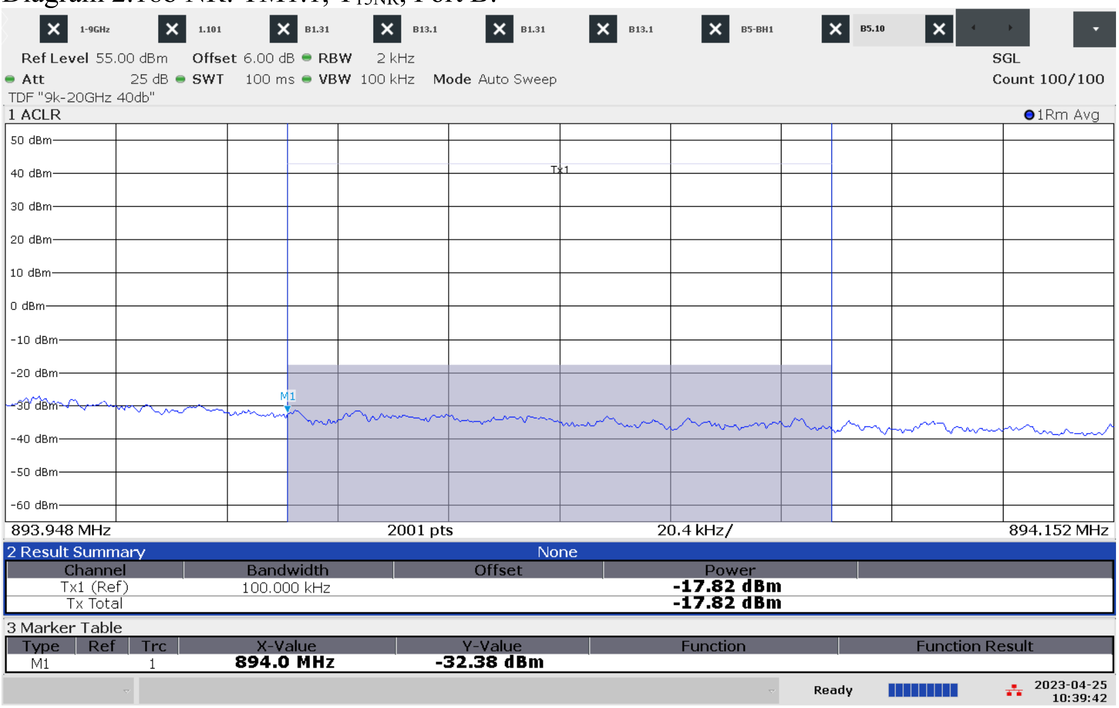
10:31:26 AM 04/25/2023

Diagram 2.18a NR: TM1.1, T_{15NR}, Port B:



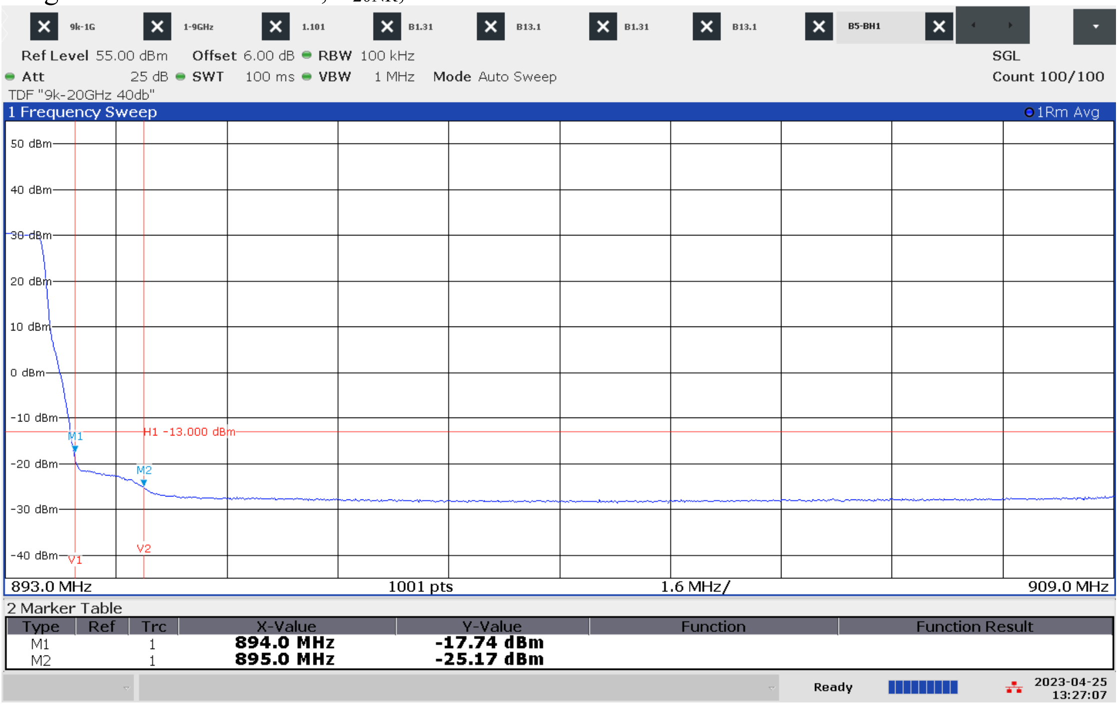
10:38:03 AM 04/25/2023

Diagram 2.18b NR: TM1.1, T_{15NR}, Port B:



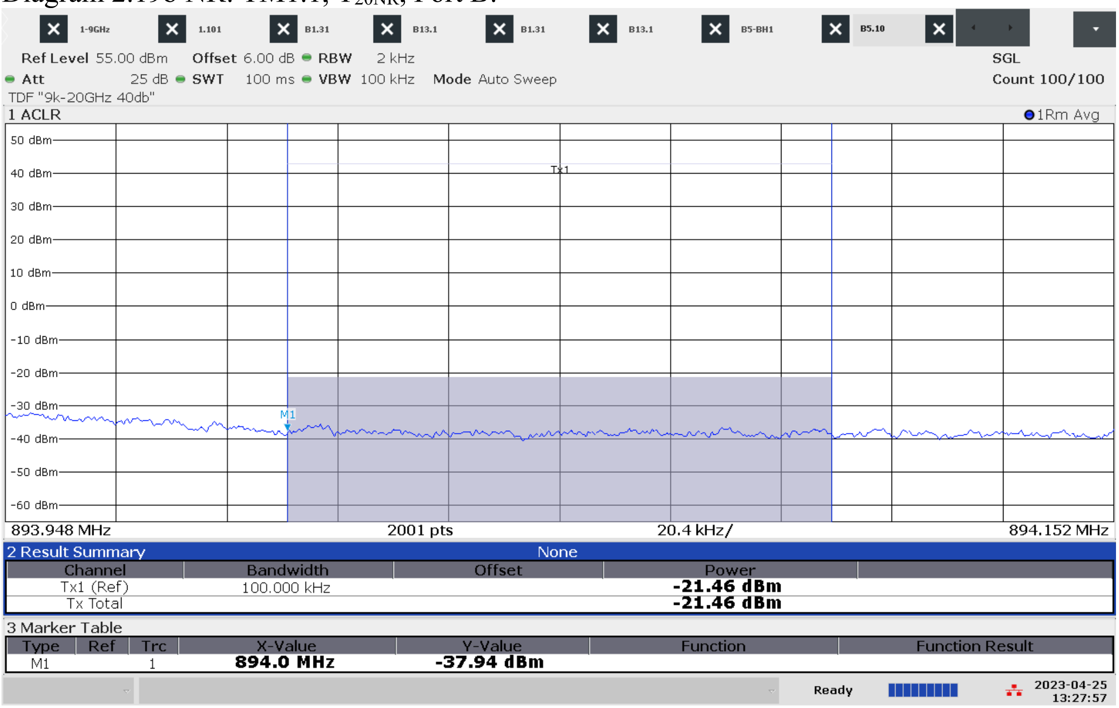
10:39:42 AM 04/25/2023

Diagram 2.19a NR: TM1.1, T_{20NR}, Port B:



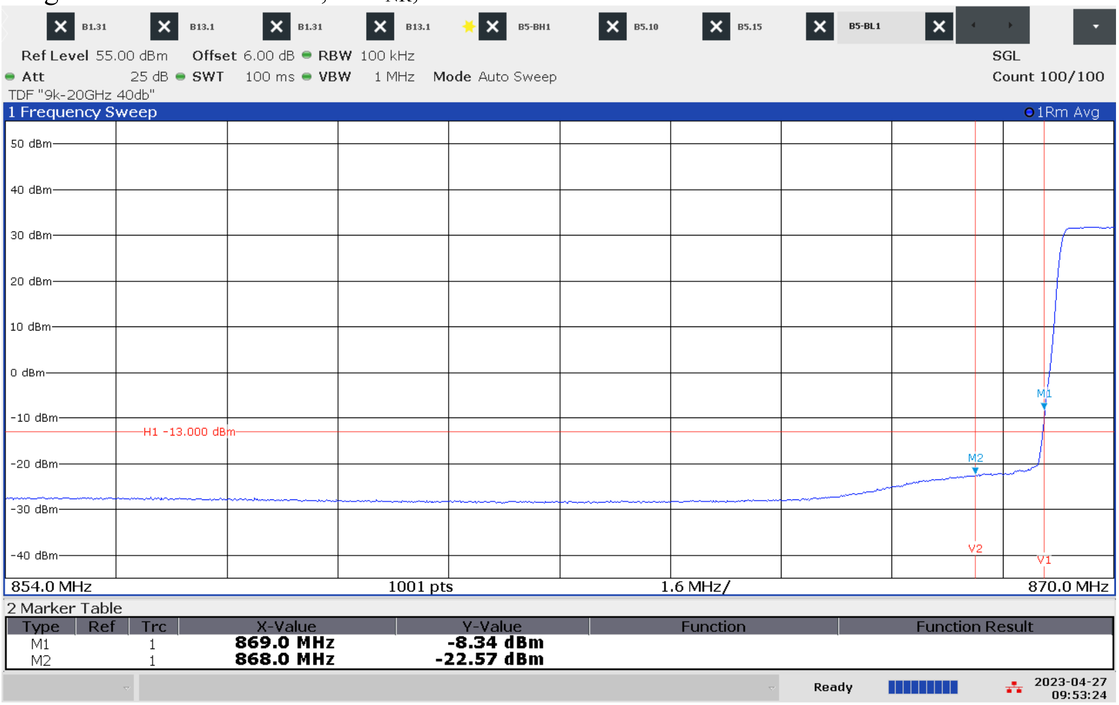
01:27:07 PM 04/25/2023

Diagram 2.19b NR: TM1.1, T_{20NR}, Port B:



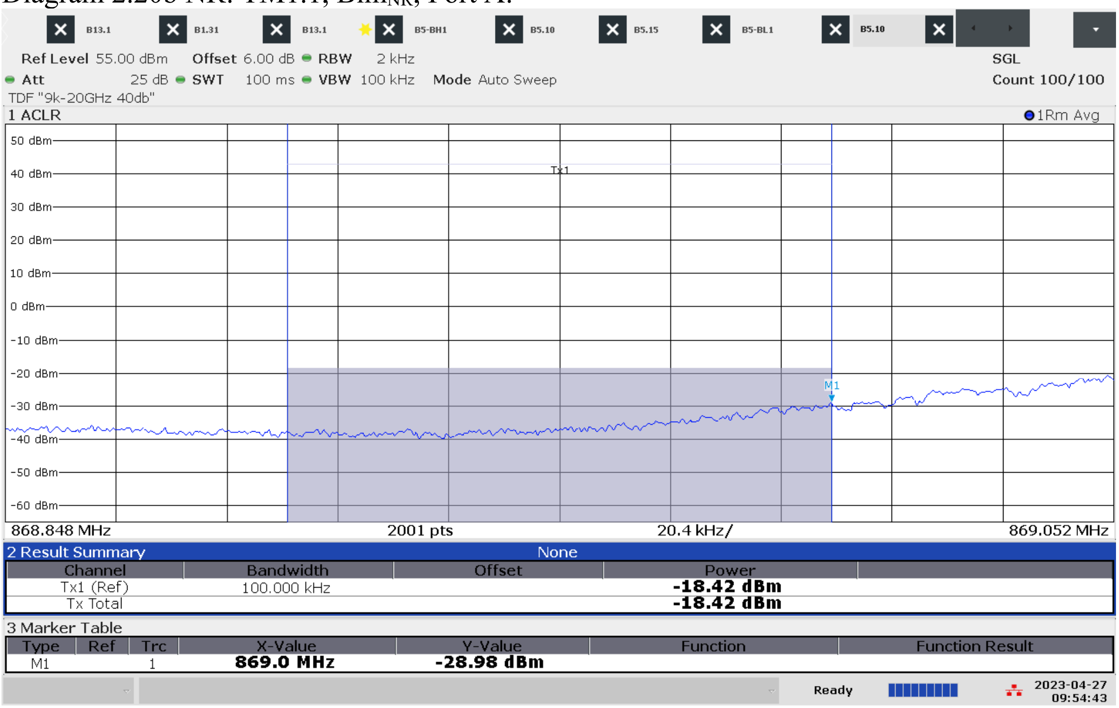
01:27:58 PM 04/25/2023

Diagram 2.20a NR: TM1.1, Bim$_{NR}$, Port A:



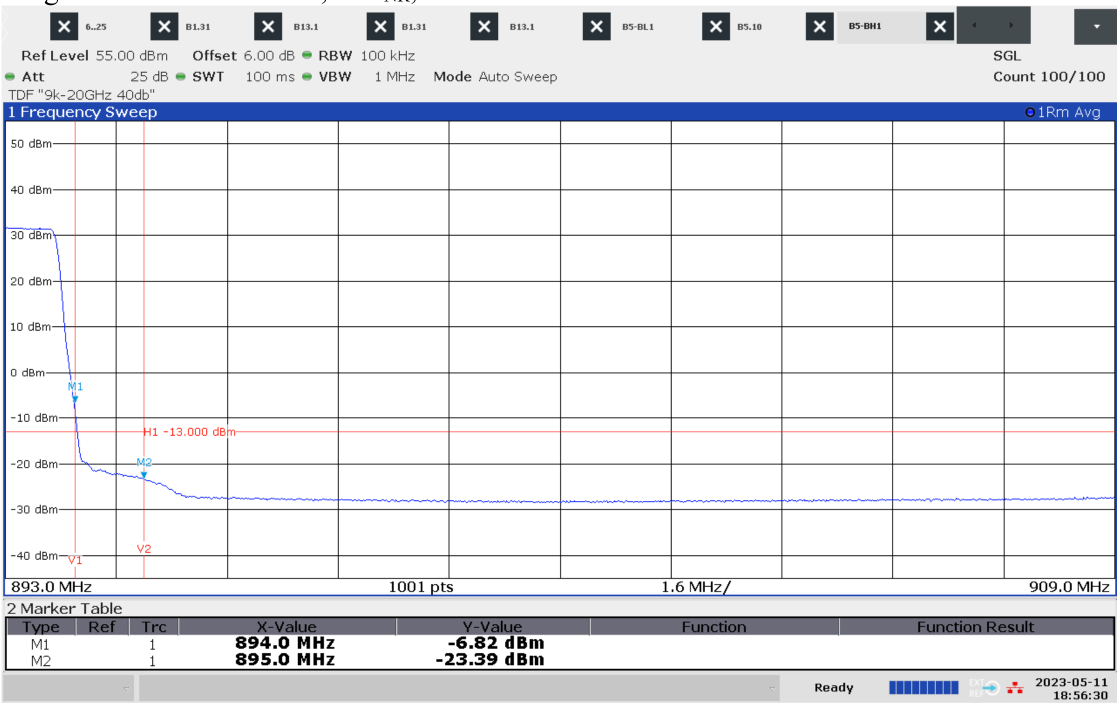
09:53:24 AM 04/27/2023

Diagram 2.20b NR: TM1.1, Bim$_{NR}$, Port A:



09:54:43 AM 04/27/2023

Diagram 2.21a NR: TM1.1, Tim$_{NR}$, Port A:

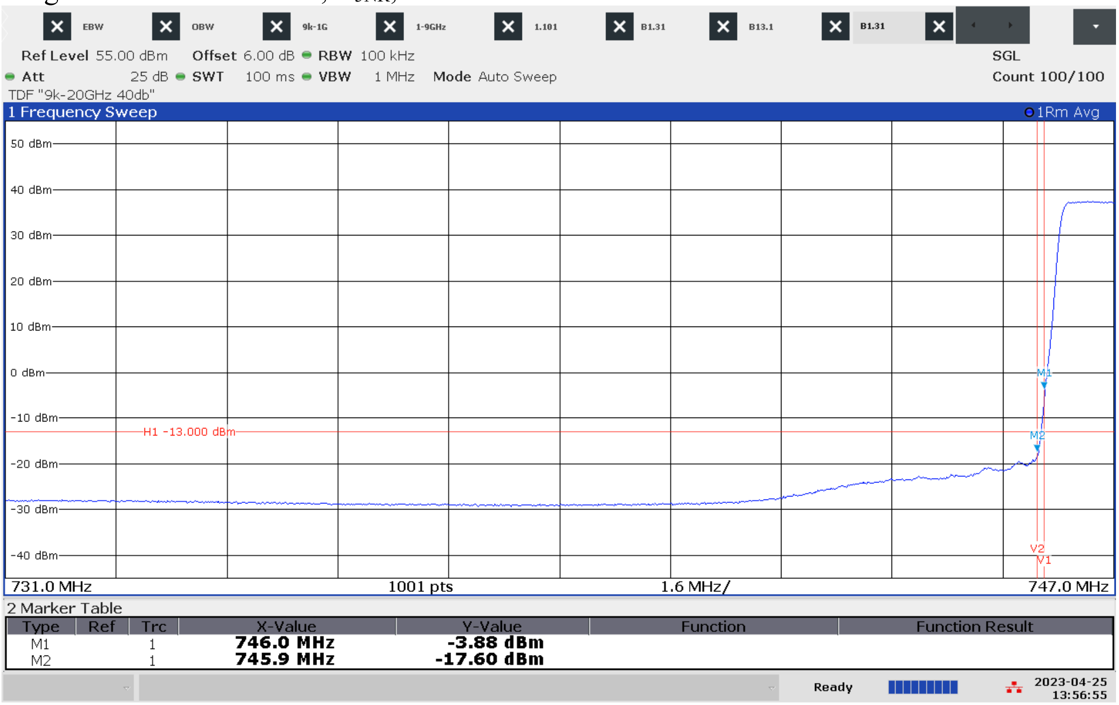


06:56:30 PM 05/11/2023

Diagram 2.21b NR: TM1.1, Tim$_{NR}$, Port A:

06:59:00 PM 05/11/2023

Diagram 2.22a NR: TM1.1, B_{5NR}, Port C:

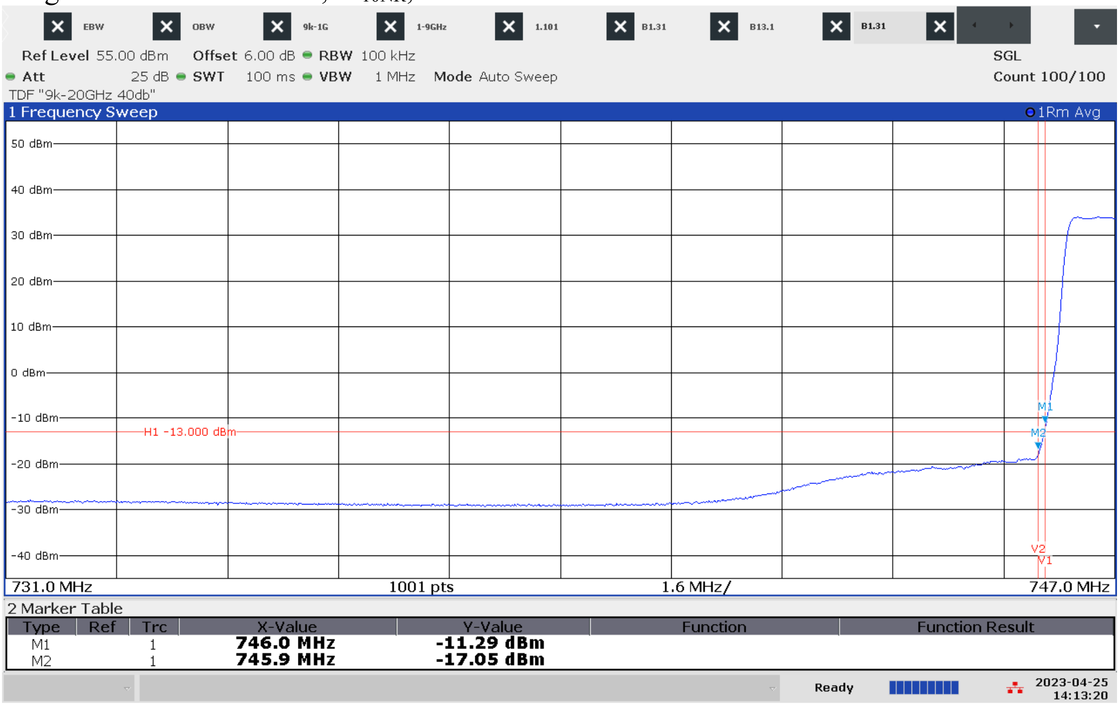


01:56:56 PM 04/25/2023

Diagram 2.22b NR: TM1.1, B_{5NR}, Port C:

01:59:51 PM 04/25/2023

Diagram 2.23a NR: TM1.1, M_{10NR}, Port C:

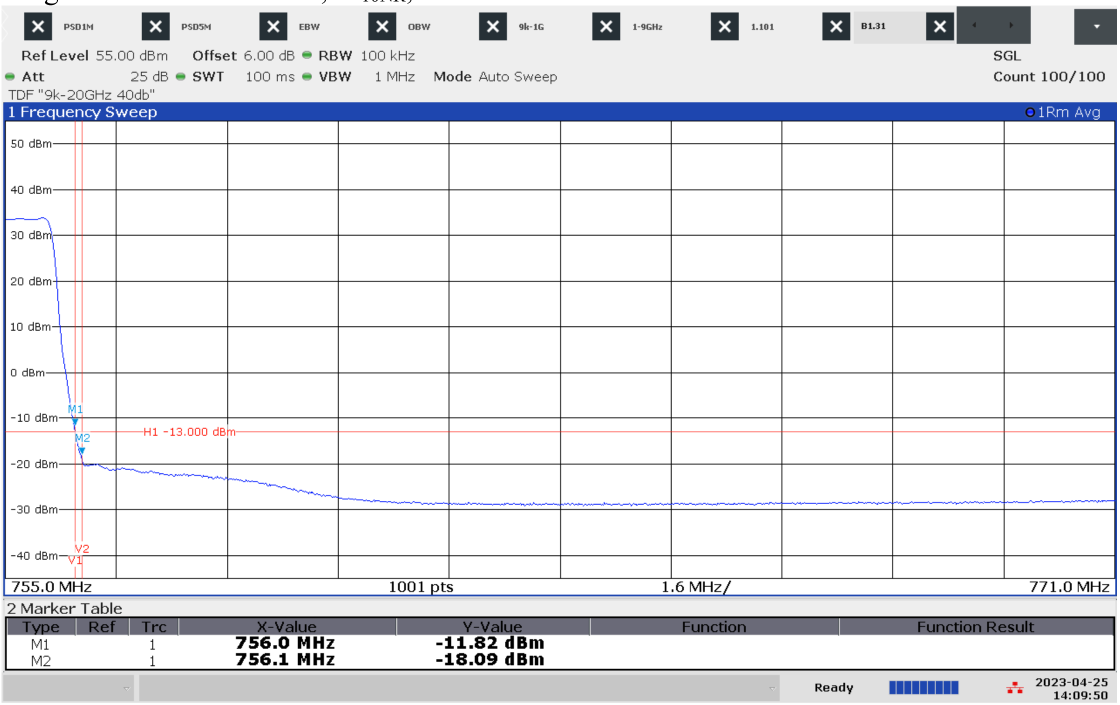


02:13:20 PM 04/25/2023

Diagram 2.23b NR: TM1.1, M_{10NR}, Port C:

02:14:39 PM 04/25/2023

Diagram 2.23c NR: TM1.1, M_{10NR}, Port C:

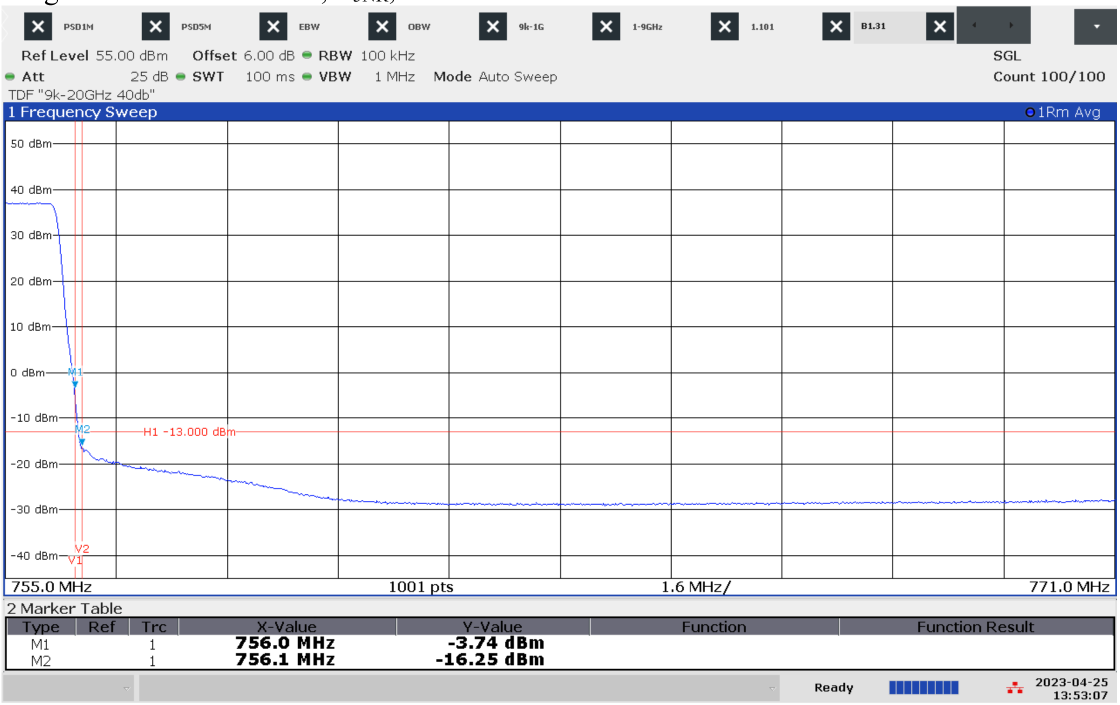


02:09:50 PM 04/25/2023

Diagram 2.23d NR: TM1.1, M_{10NR}, Port C:

02:12:25 PM 04/25/2023

Diagram 2.24a NR: TM1.1, T_{5NR}, Port C:

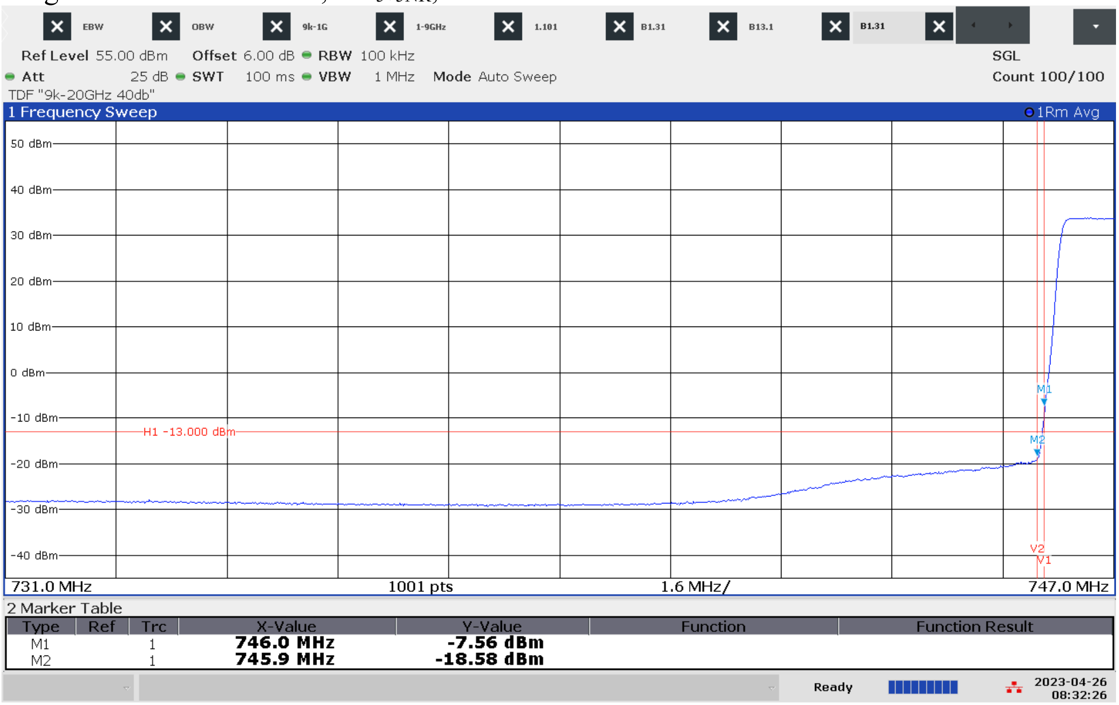


01:53:07 PM 04/25/2023

Diagram 2.24a NR: TM1.1, T_{5NR}, Port C:

01:53:57 PM 04/25/2023

Diagram 2.25a NR: TM1.1, $M2_{5+5NR}$, Port A:

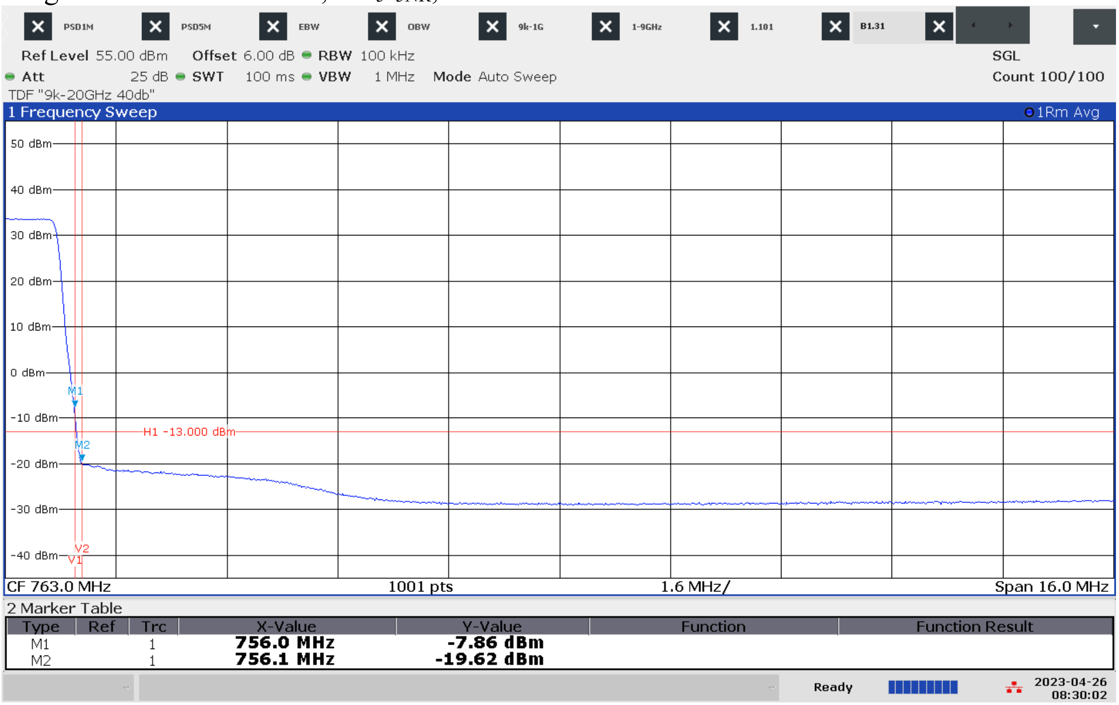


08:32:26 AM 04/26/2023

Diagram 2.25b NR: TM1.1, $M2_{5+5NR}$, Port A:

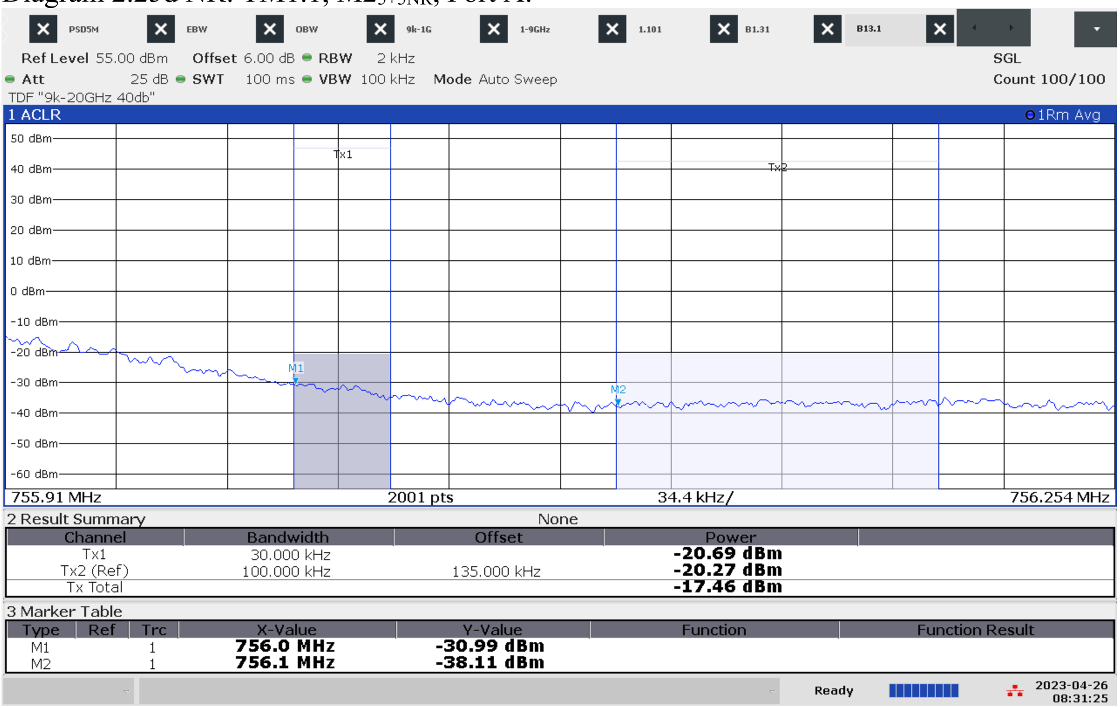
08:33:21 AM 04/26/2023

Diagram 2.25c NR: TM1.1, M2$_{5+5NR}$, Port A:



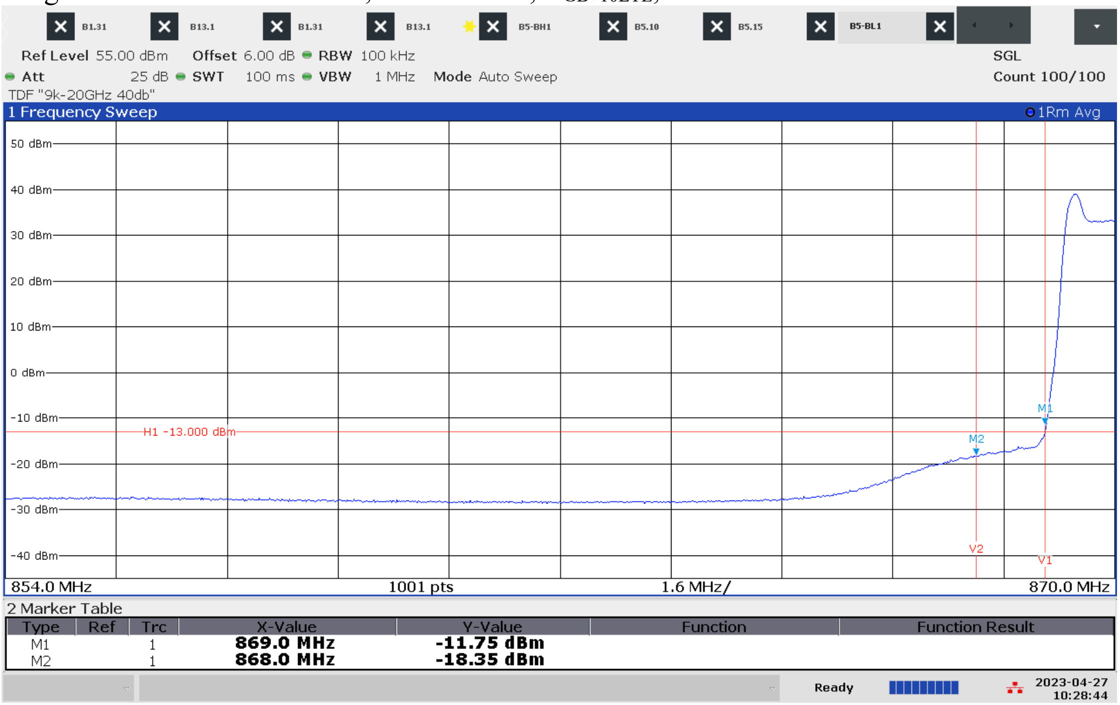
08:30:02 AM 04/26/2023

Diagram 2.25d NR: TM1.1, M2$_{5+5NR}$, Port A:



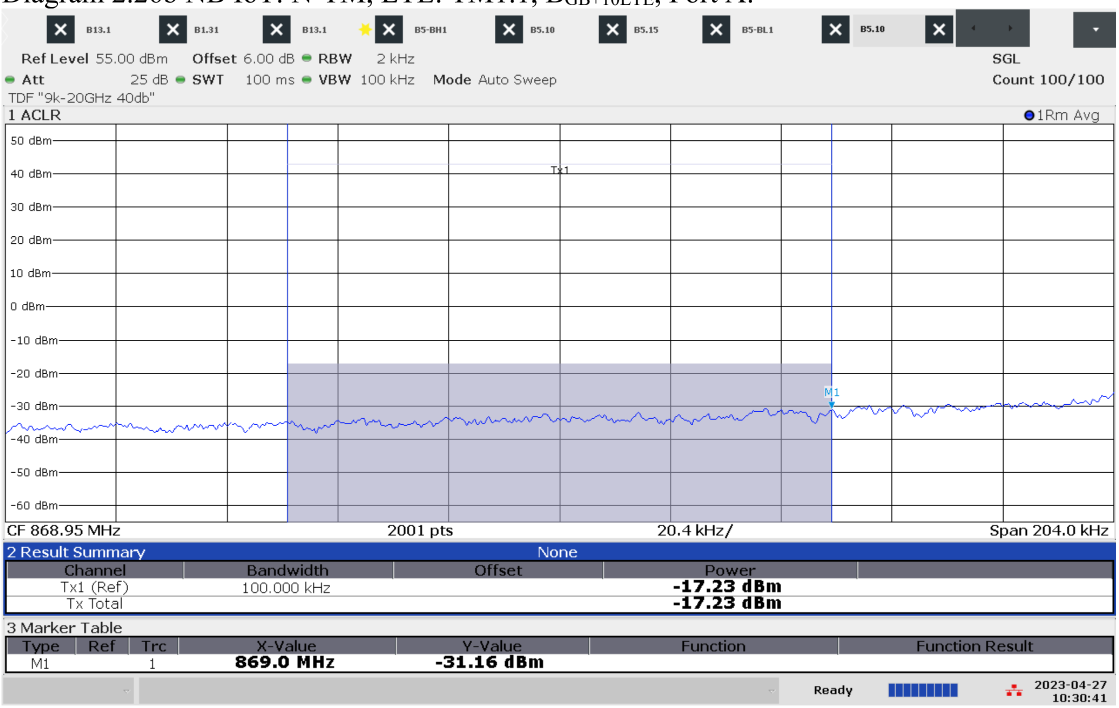
08:31:25 AM 04/26/2023

Diagram 2.26a NB IoT: N-TM, LTE: TM1.1, $B_{GB+10LTE}$, Port A:



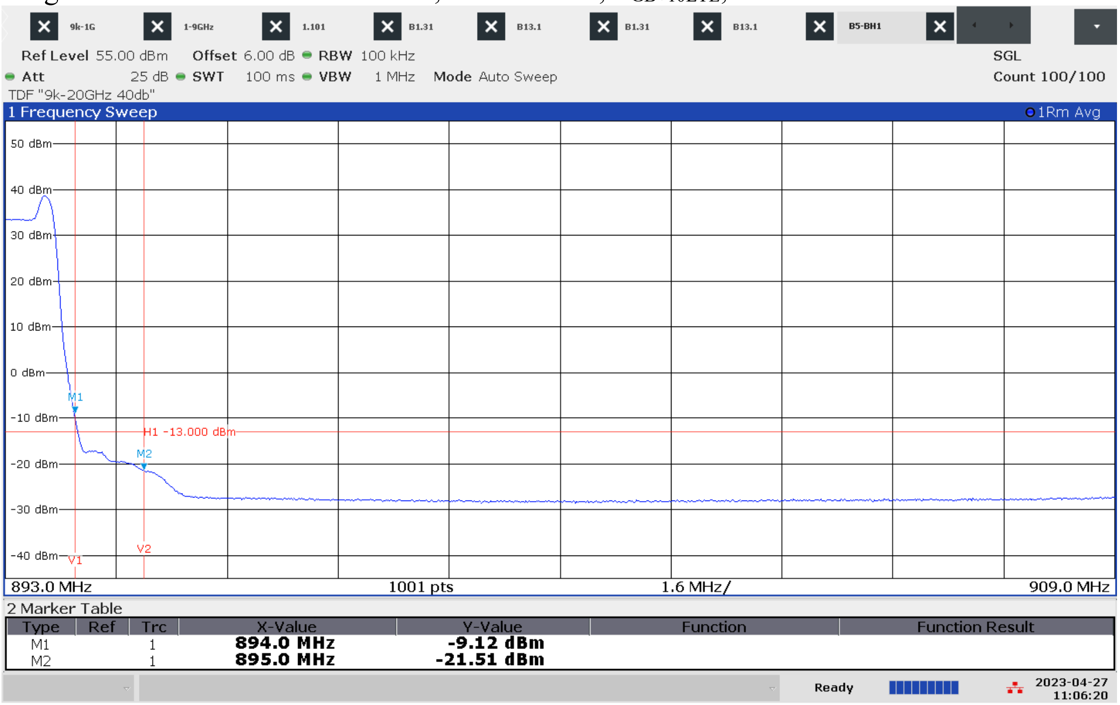
10:28:45 AM 04/27/2023

Diagram 2.26b NB IoT: N-TM, LTE: TM1.1, $B_{GB+10LTE}$, Port A:



10:30:41 AM 04/27/2023

Diagram 2.27a LTE: NB IoT: N-TM, LTE: TM1.1, $T_{GB+10LTE}$, Port A:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	894.0 MHz	-9.12 dBm		
M2		1	895.0 MHz	-21.51 dBm		

11:06:20 AM 04/27/2023

Diagram 2.27b LTE: NB IoT: N-TM, LTE: TM1.1, $T_{GB+10LTE}$, Port A:

Channel	Bandwidth	Offset	Power
Tx1 (Ref)	100.000 kHz		-13.84 dBm
Tx Total			-13.84 dBm

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	894.0 MHz	-26.53 dBm		

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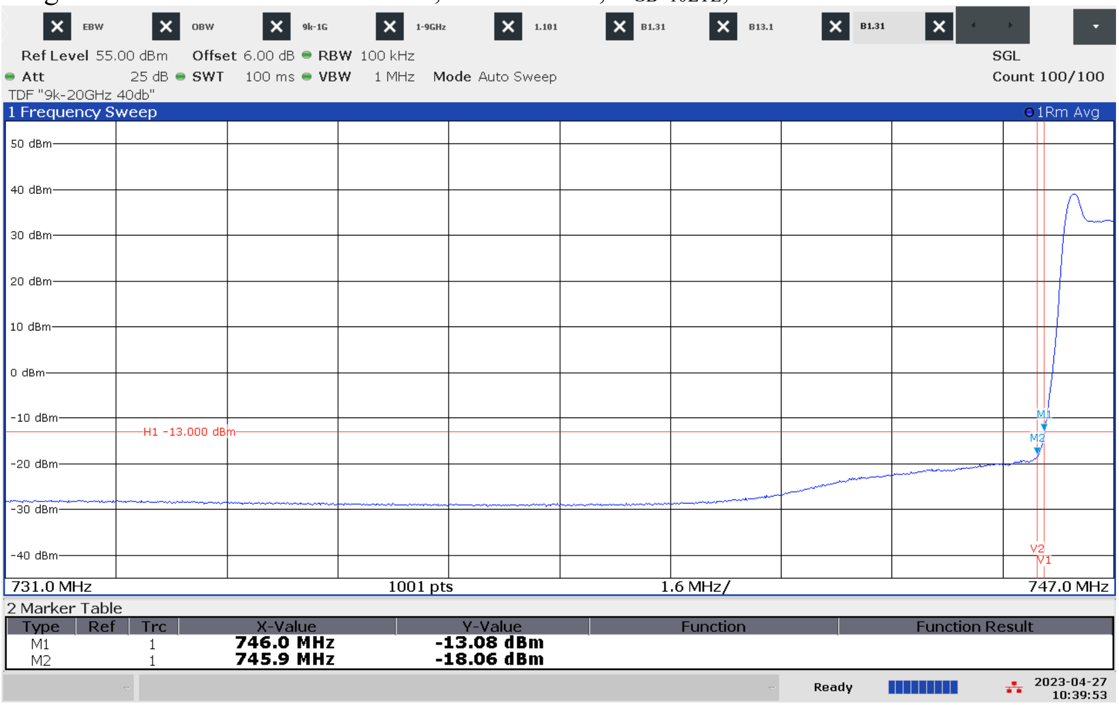
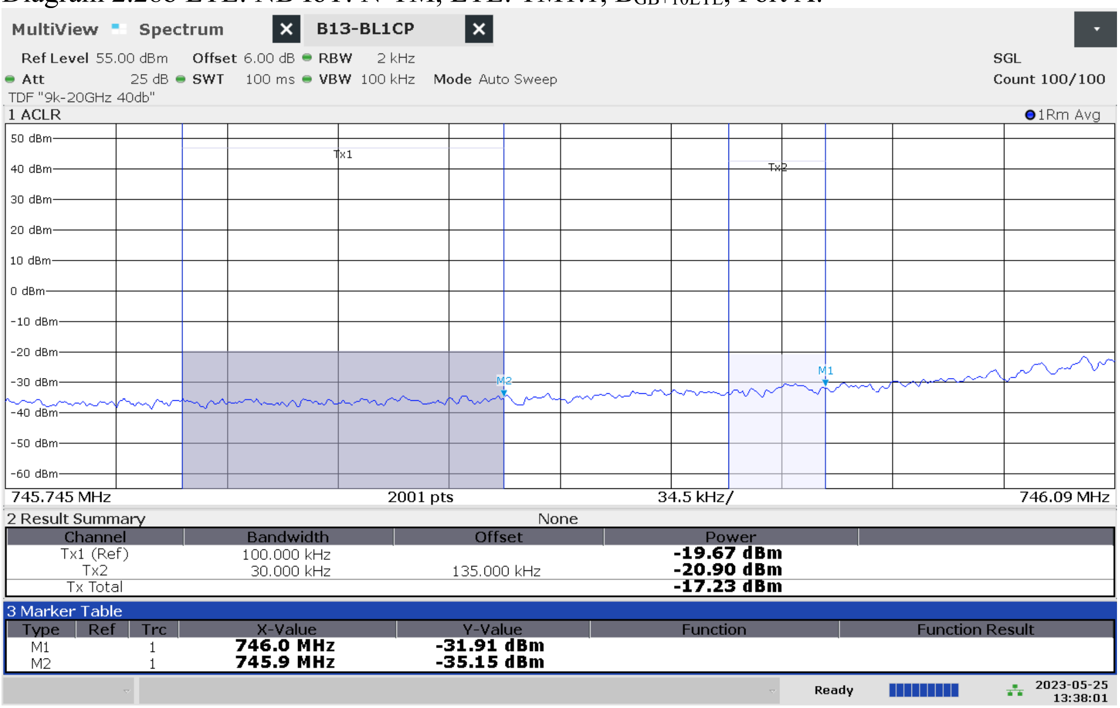
Diagram 2.28a LTE: NB IoT: N-TM, LTE: TM1.1, $B_{GB+10LTE}$, Port A:



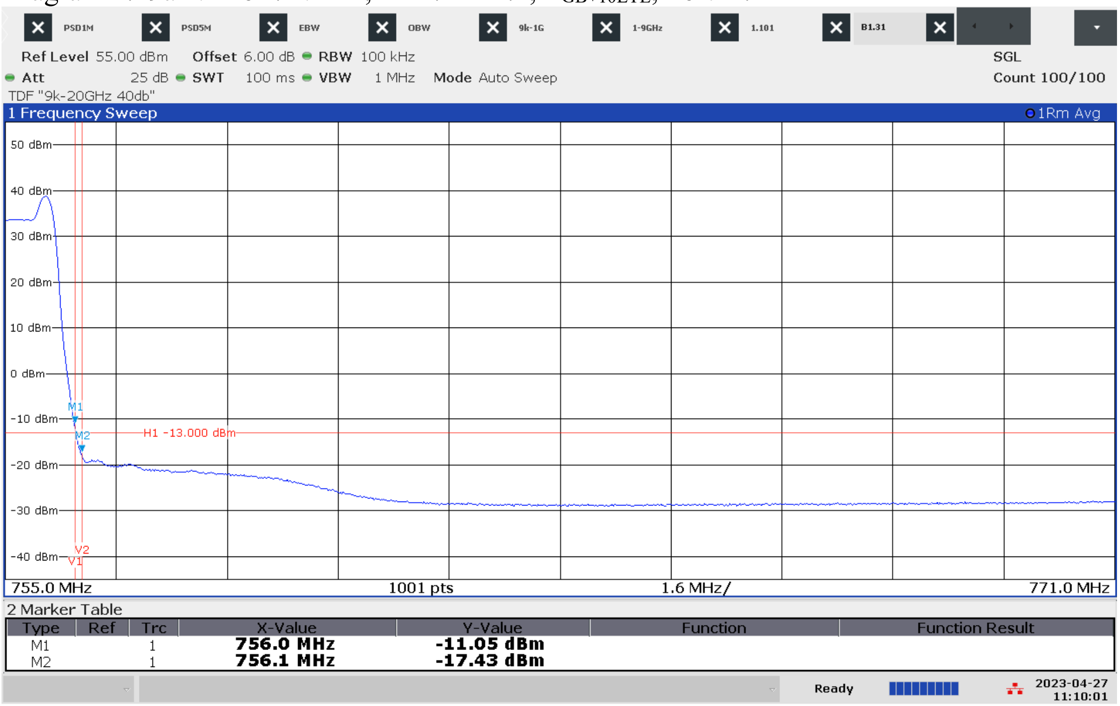
10:39:53 AM 04/27/2023

Diagram 2.28b LTE: NB IoT: N-TM, LTE: TM1.1, $B_{GB+10LTE}$, Port A:



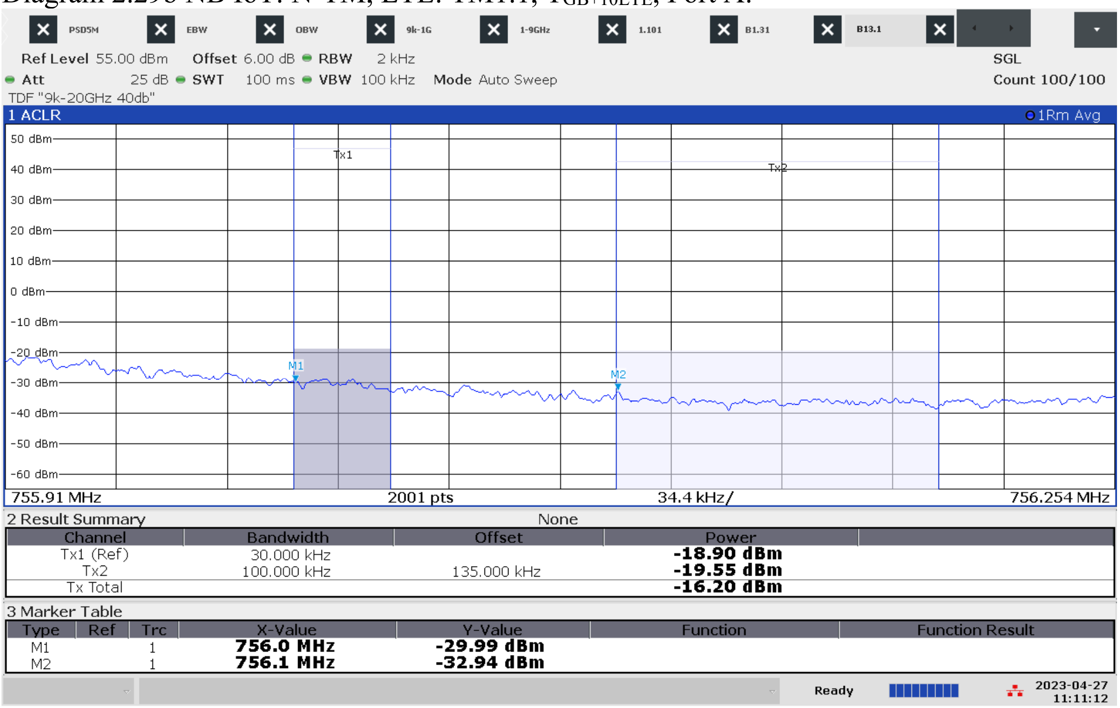
01:38:02 PM 05/25/2023

Diagram 2.29a NB IoT: N-TM, LTE: TM1.1, $T_{GB+10LTE}$, Port A:



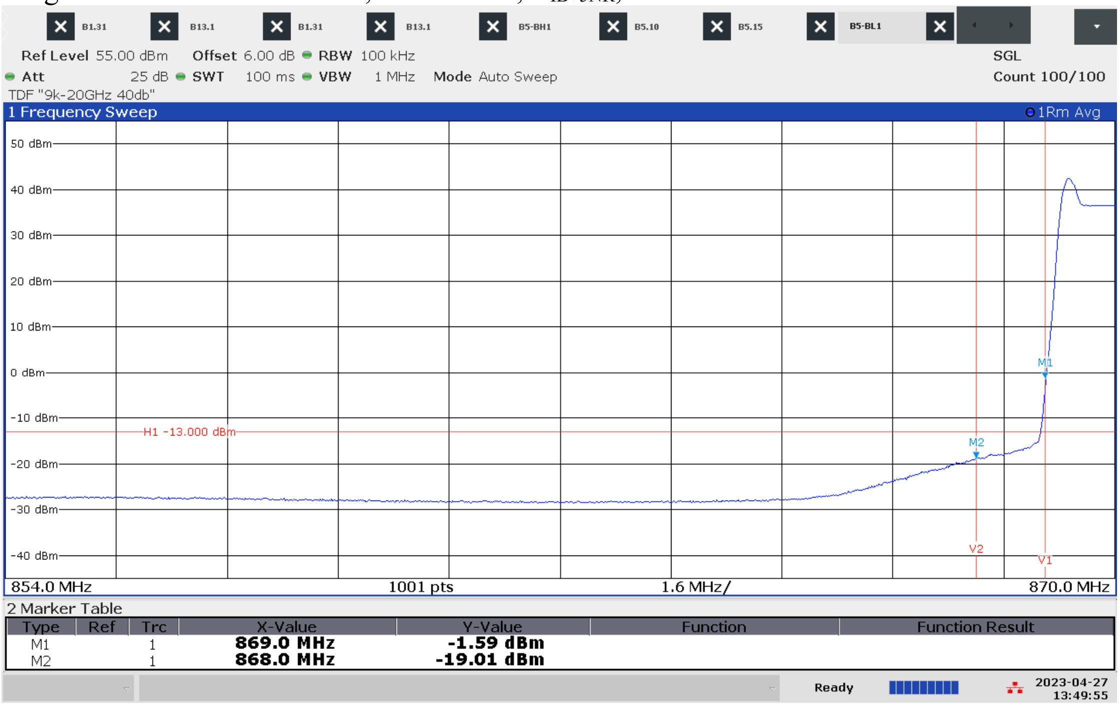
11:10:01 AM 04/27/2023

Diagram 2.29b NB IoT: N-TM, LTE: TM1.1, $T_{GB+10LTE}$, Port A:



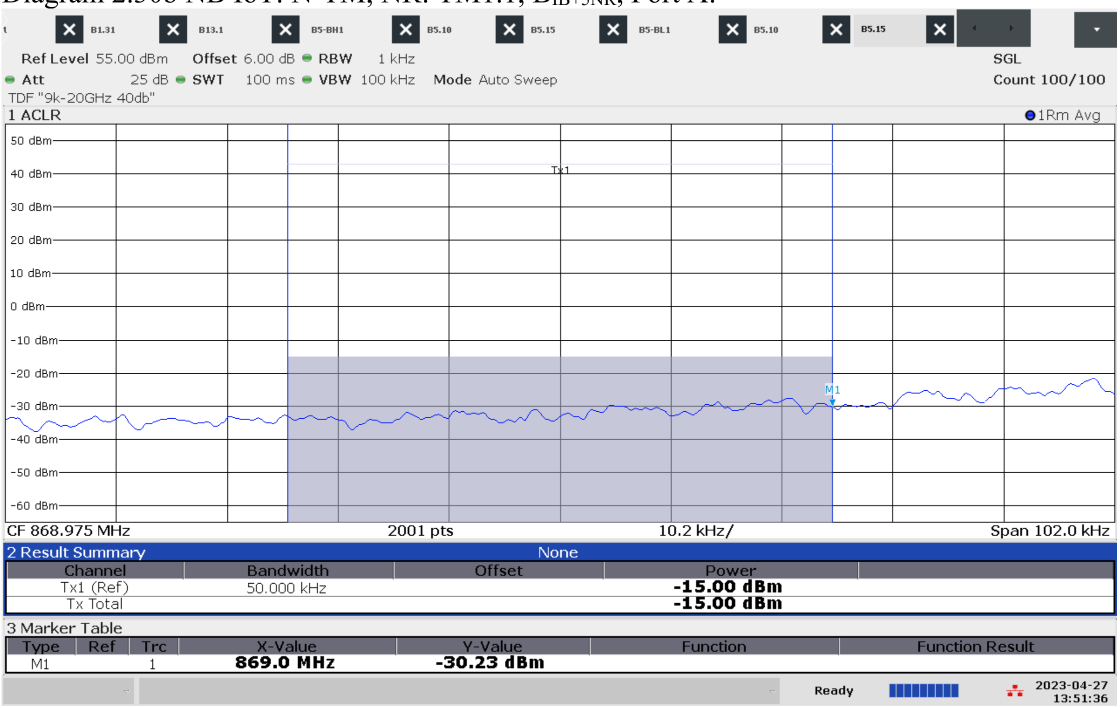
11:11:12 AM 04/27/2023

Diagram 2.30a NB IoT: N-TM, NR: TM1.1, B_{IB+5NR}, Port A:



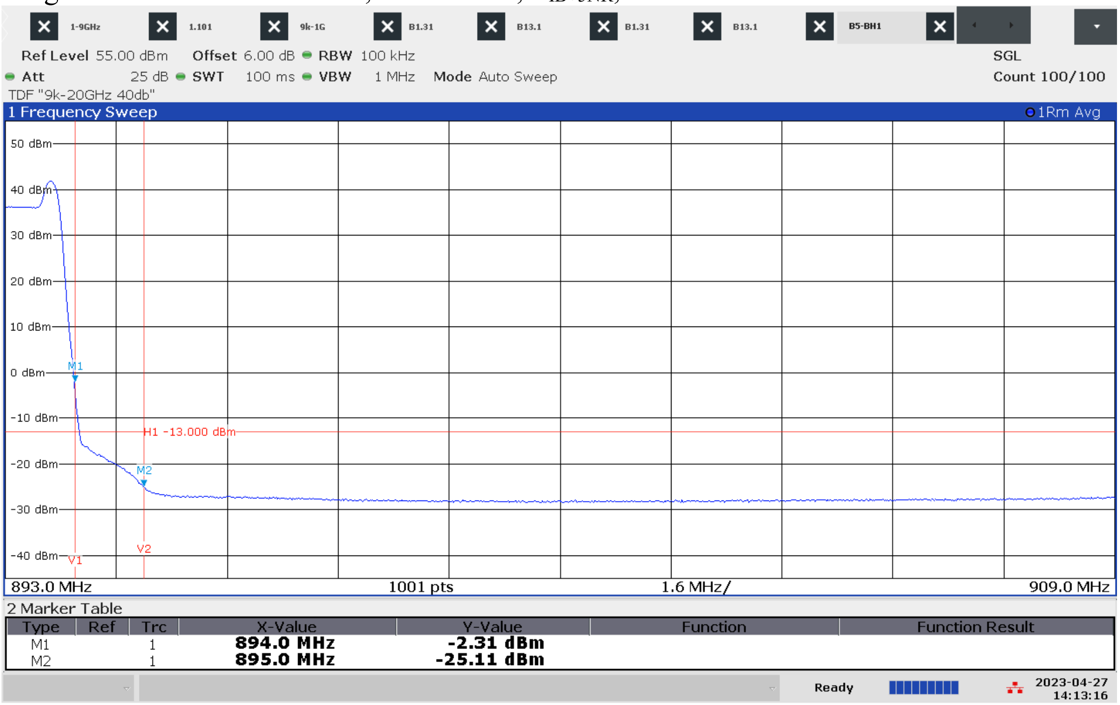
01:49:55 PM 04/27/2023

Diagram 2.30b NB IoT: N-TM, NR: TM1.1, B_{IB+5NR}, Port A:



01:51:36 PM 04/27/2023

Diagram 2.31a NB IoT: N-TM, NR: TM1.1, T_{IB+5NR}, Port B:



02:13:16 PM 04/27/2023

Diagram 2.31b NB IoT: N-TM, NR: TM1.1, T_{IB+5NR}, Port B:

02:14:56 PM 04/27/2023

Diagram 2.32a NB IoT: N-TM, NR: TM1.1, B_{IB+5NR}, Port A:

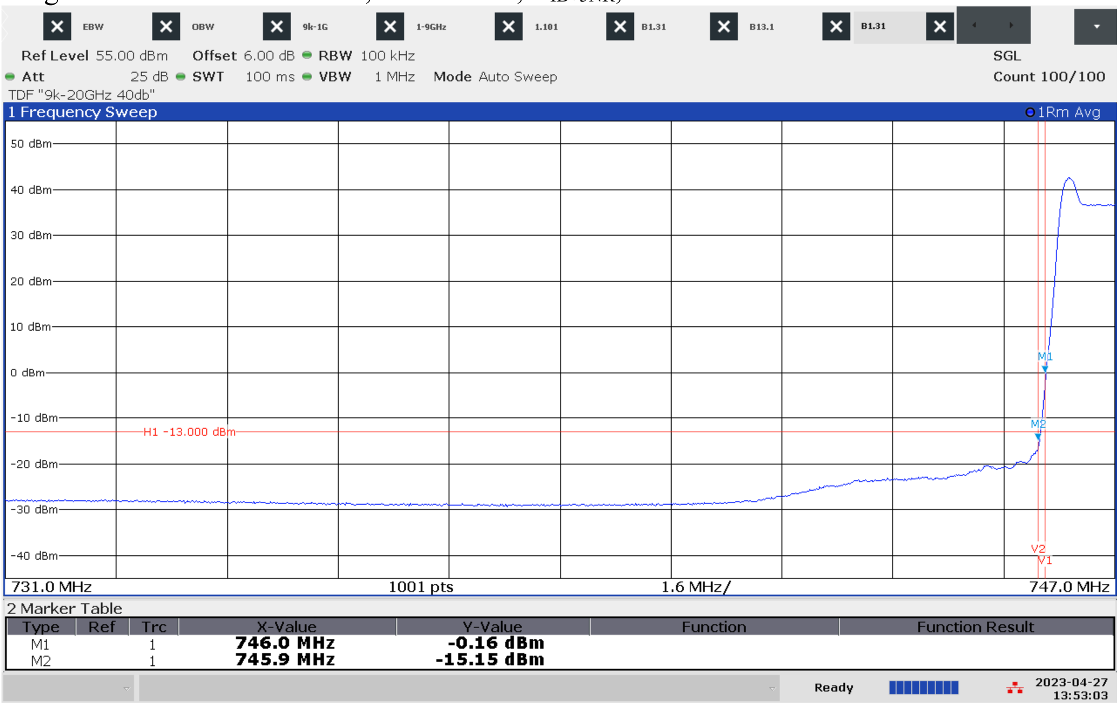


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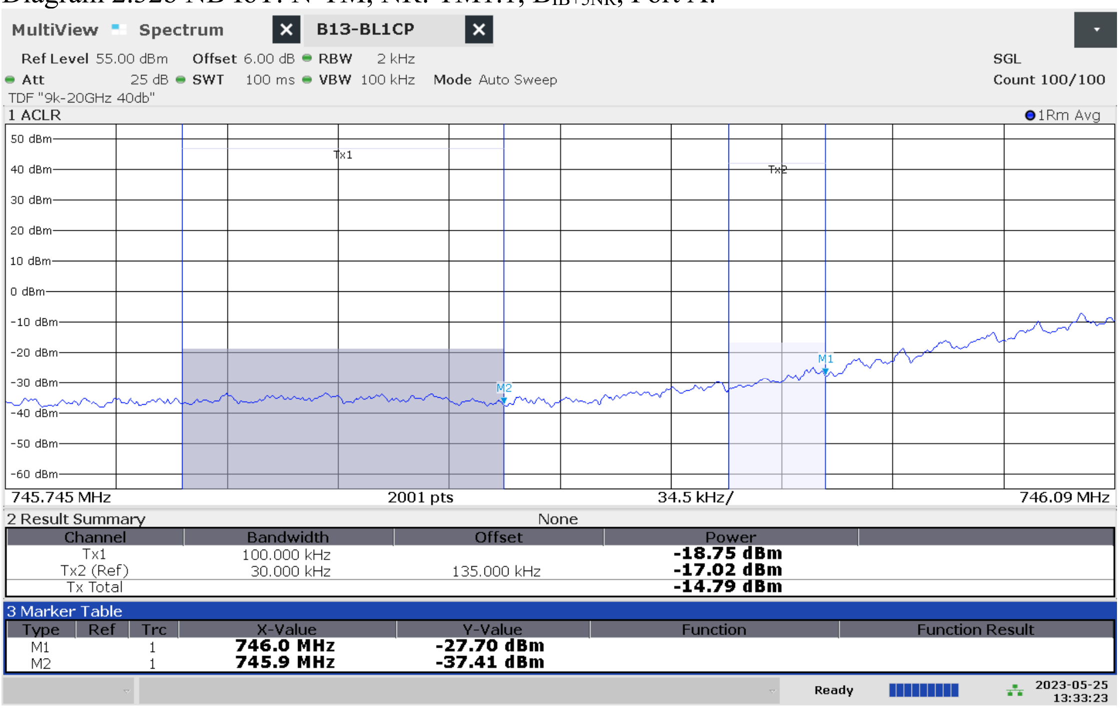
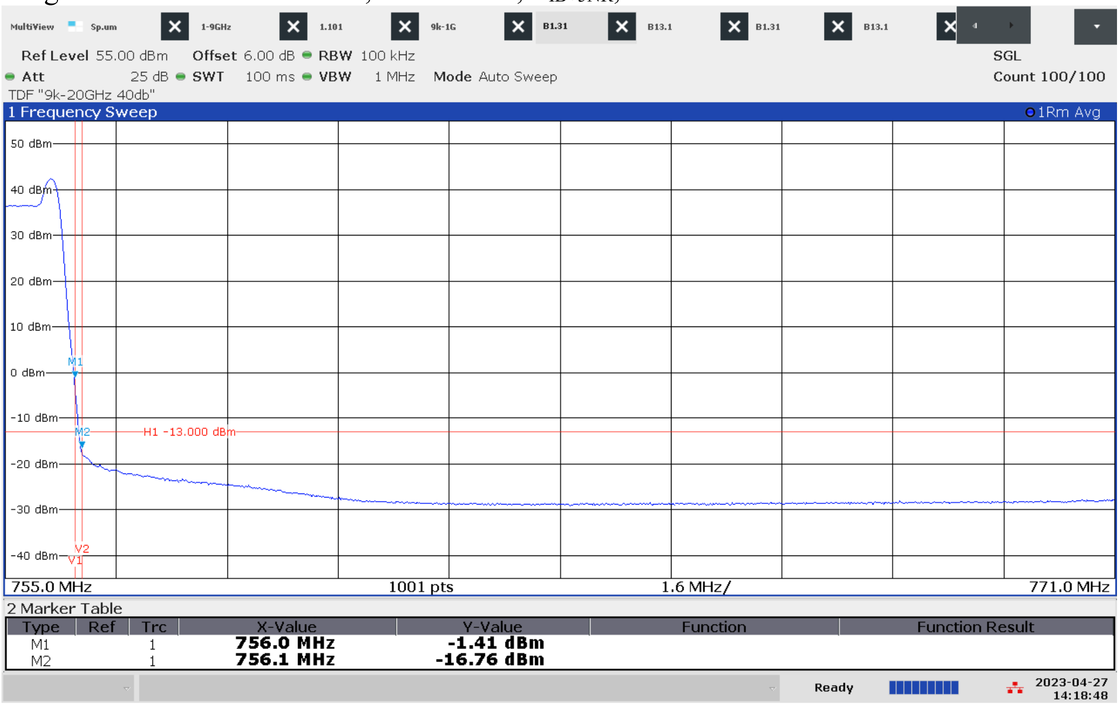
Diagram 2.32b NB IoT: N-TM, NR: TM1.1, B_{IB+5NR}, Port A:



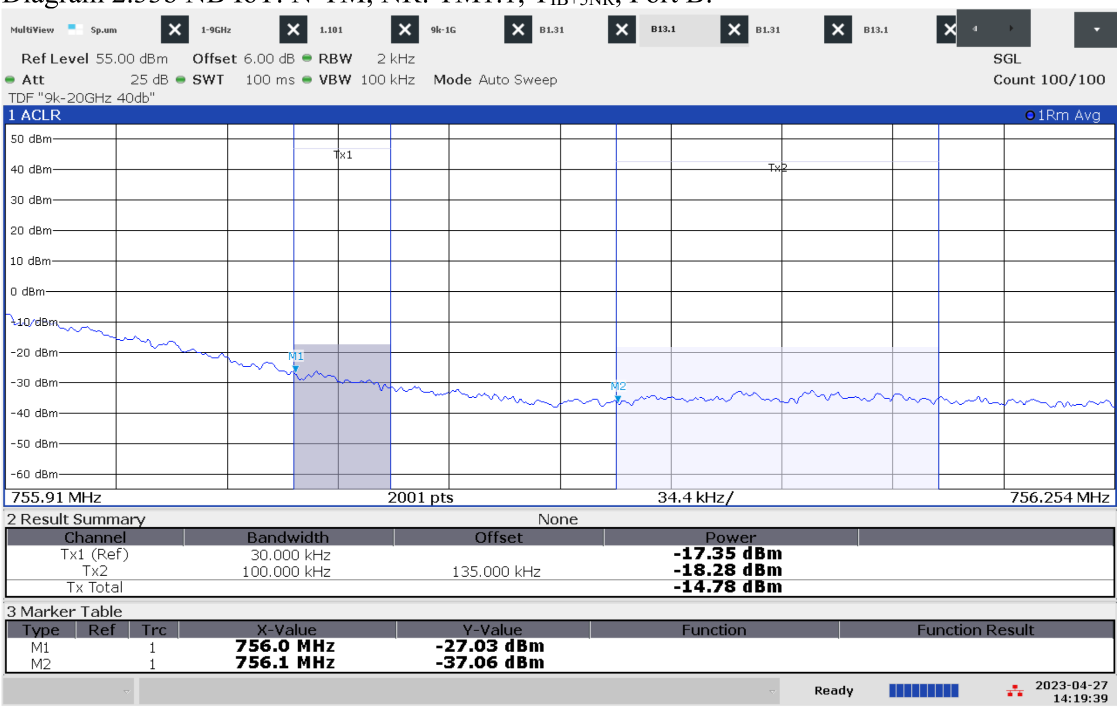
01:33:23 PM 05/25/2023

Diagram 2.33a NB IoT: N-TM, NR: TM1.1, T_{IB+5NR}, Port B:



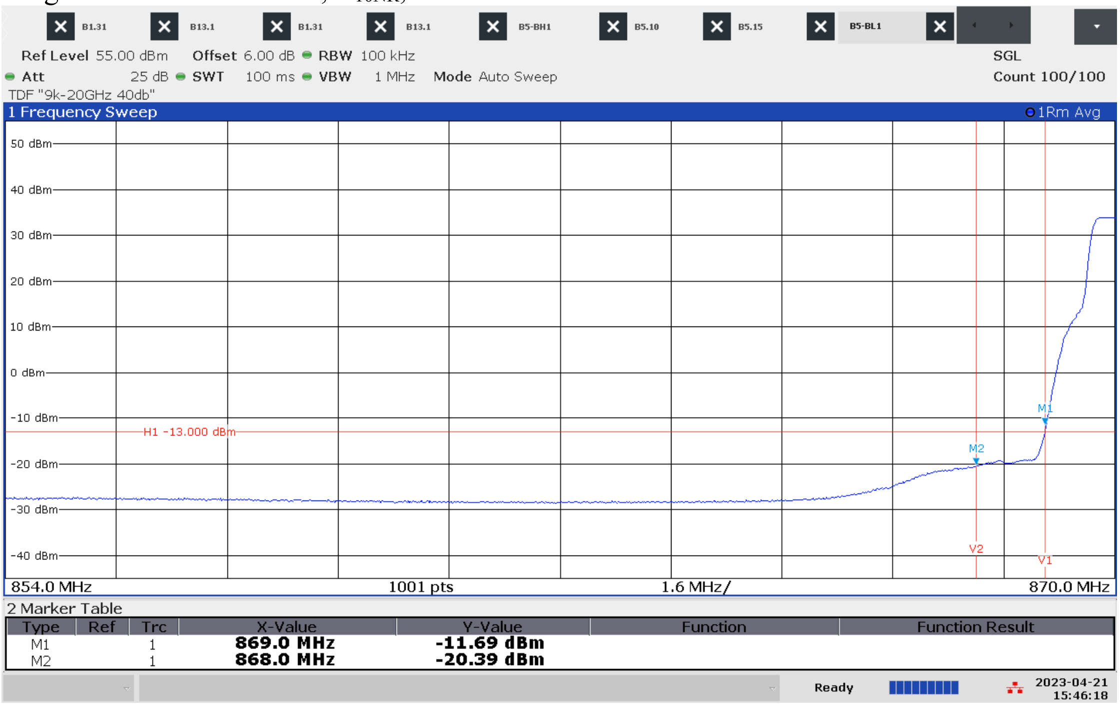
02:18:48 PM 04/27/2023

Diagram 2.33b NB IoT: N-TM, NR: TM1.1, T_{IB+5NR}, Port B:



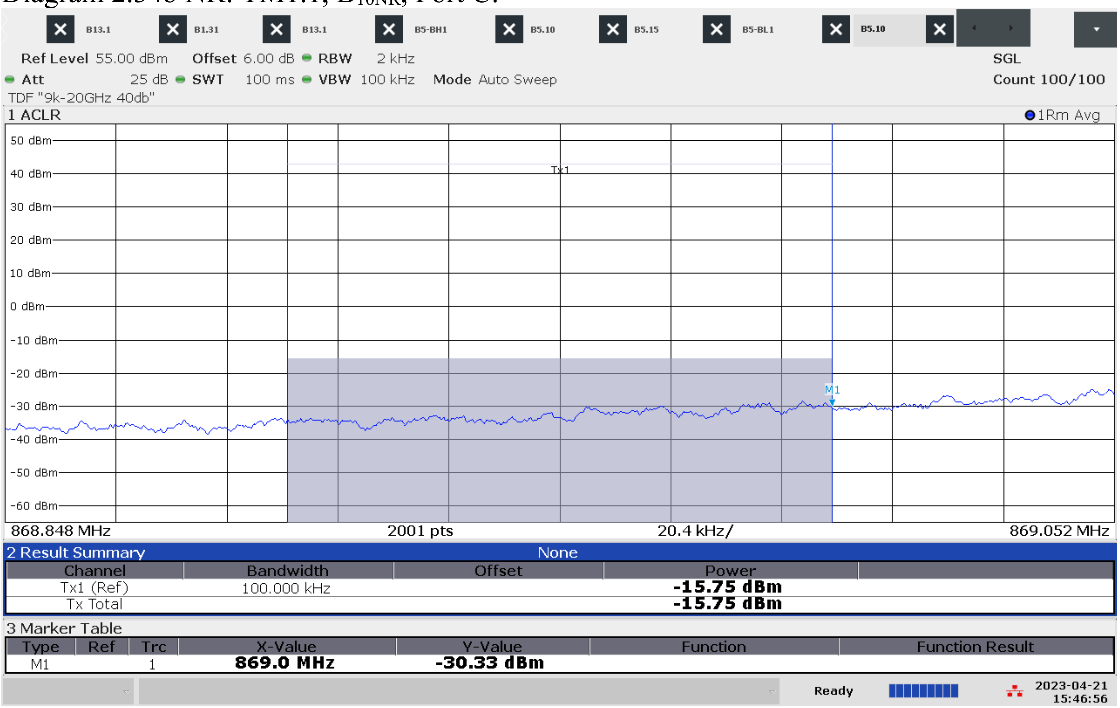
02:19:39 PM 04/27/2023

Diagram 2.34a NR: TM1.1, B_{10NR}, Port C:



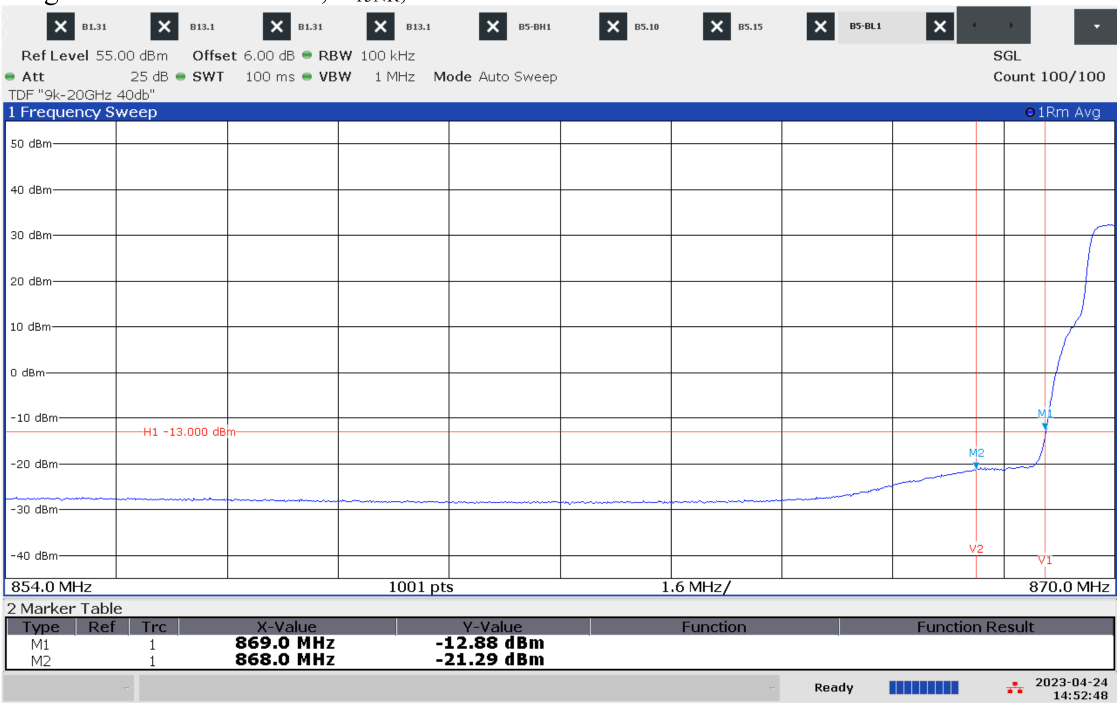
03:46:18 PM 04/21/2023

Diagram 2.34b NR: TM1.1, B_{10NR}, Port C:



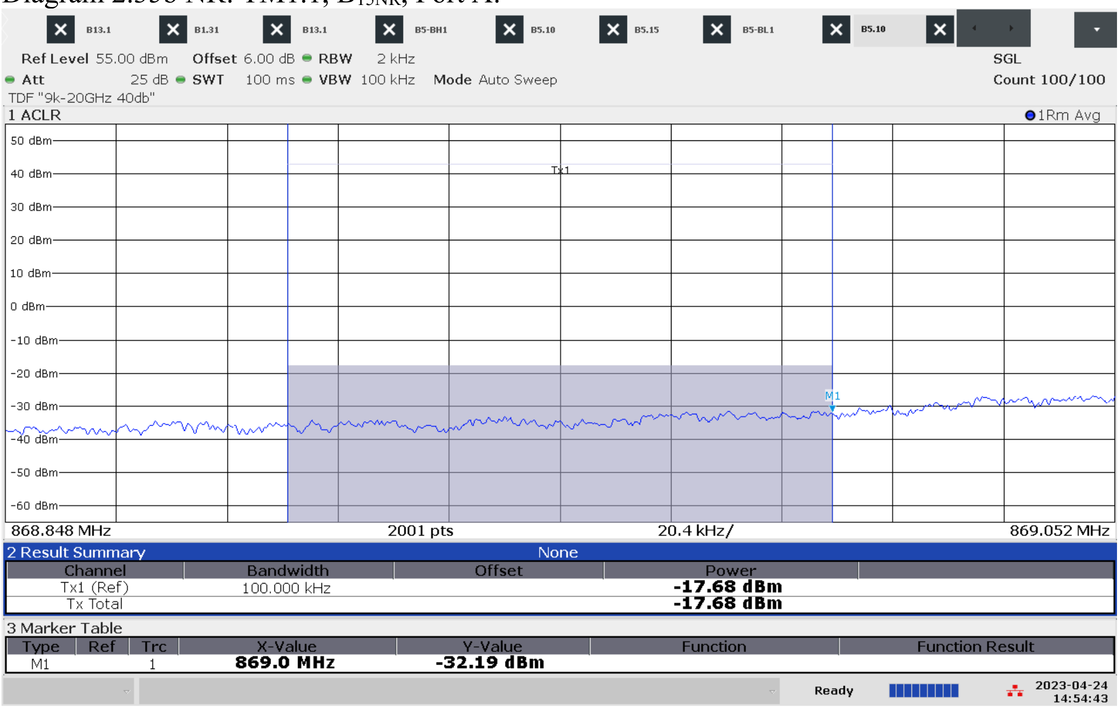
03:46:57 PM 04/21/2023

Diagram 2.35a NR: TM1.1, B_{15NR}, Port A:



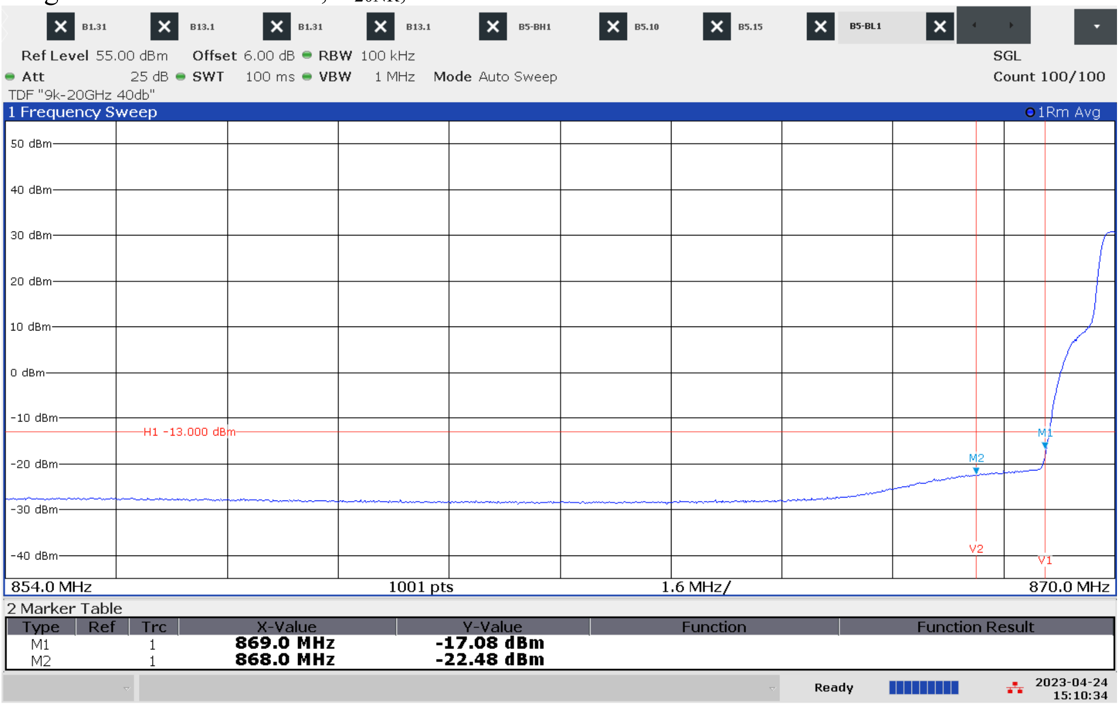
02:52:48 PM 04/24/2023

Diagram 2.35b NR: TM1.1, B_{15NR}, Port A:



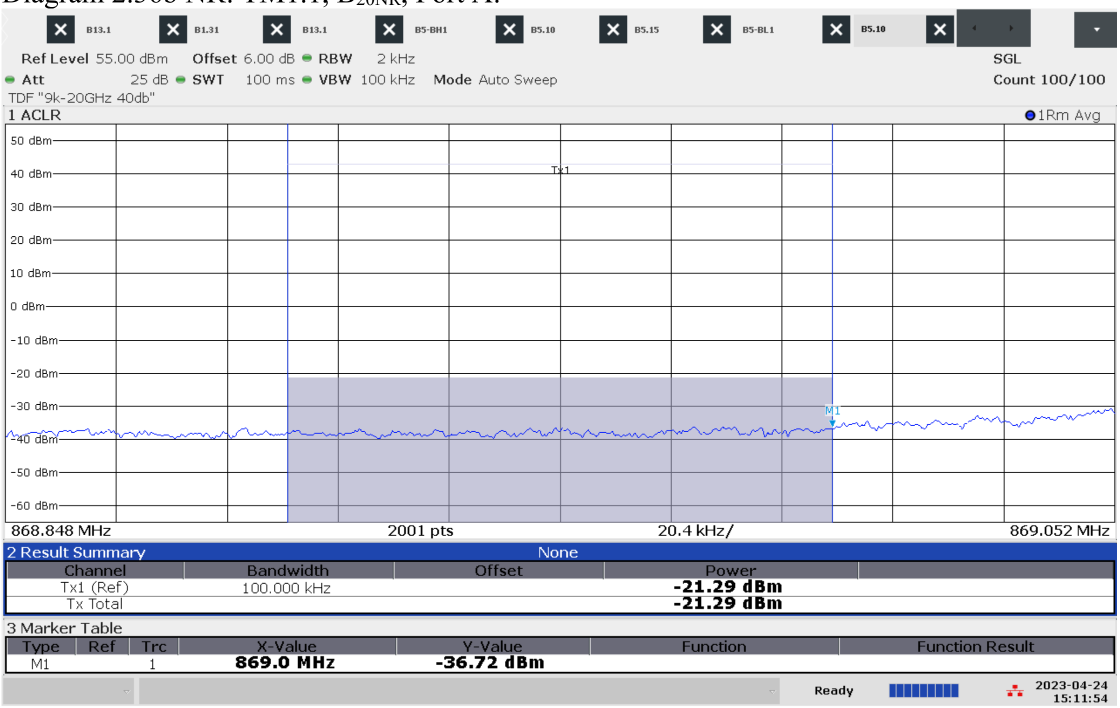
02:54:43 PM 04/24/2023

Diagram 2.36a NR: TM1.1, B_{20NR}, Port A:



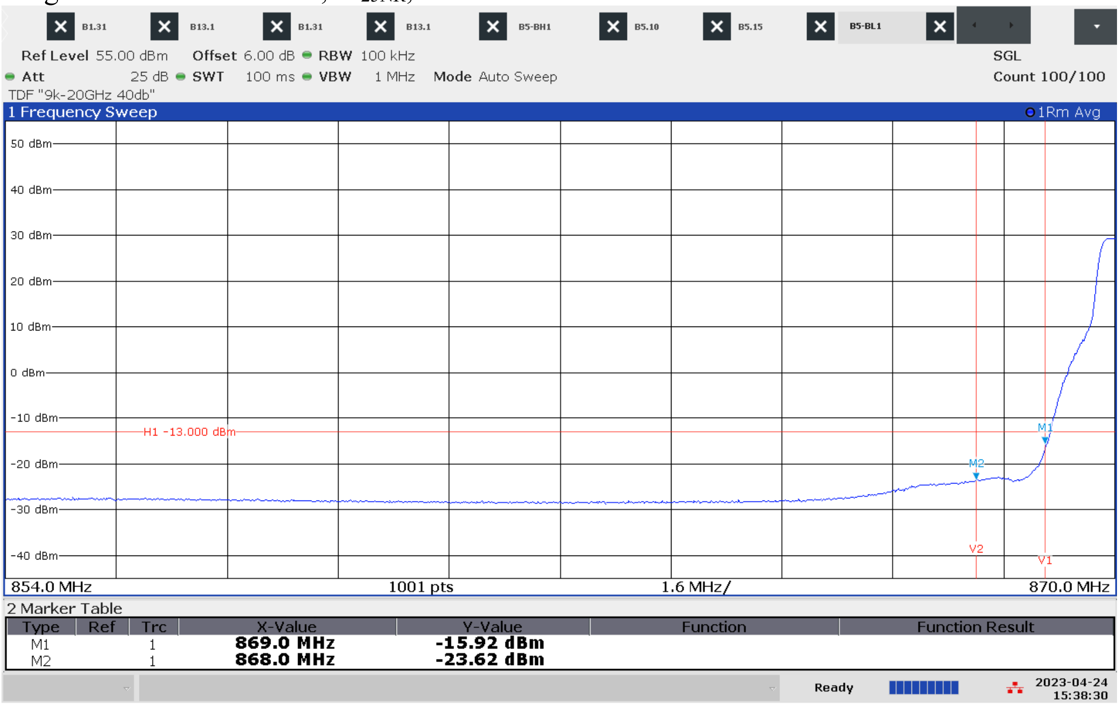
03:10:35 PM 04/24/2023

Diagram 2.36b NR: TM1.1, B_{20NR}, Port A:



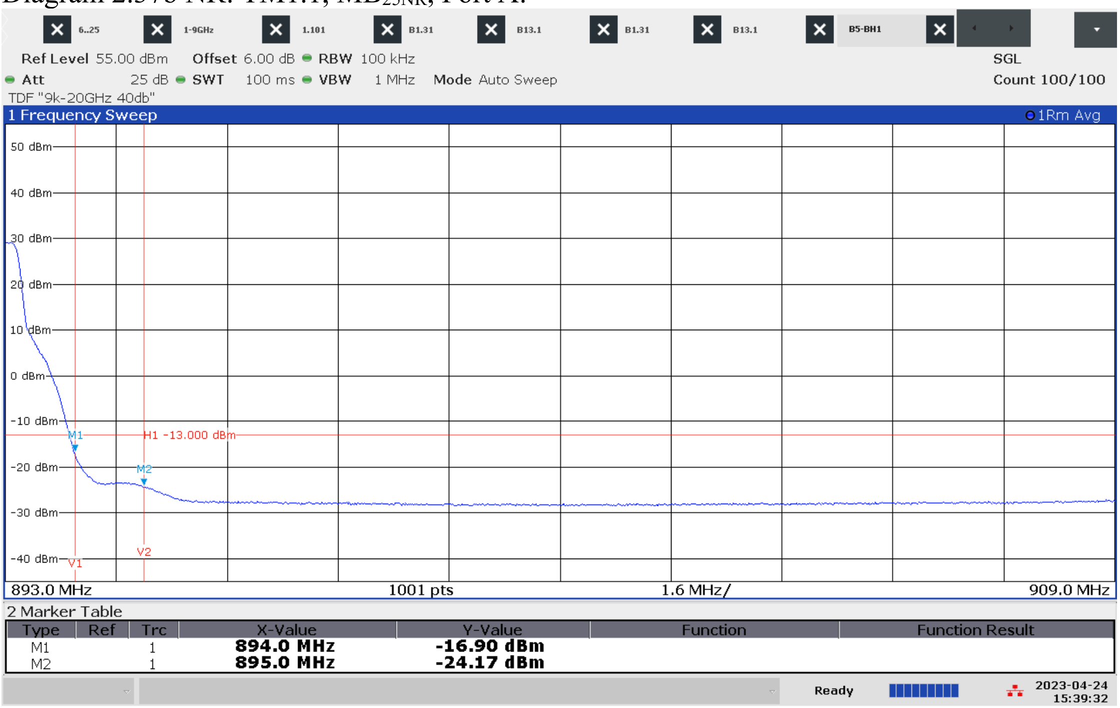
03:11:54 PM 04/24/2023

Diagram 2.37a NR: TM1.1, M_{25NR}, Port A:



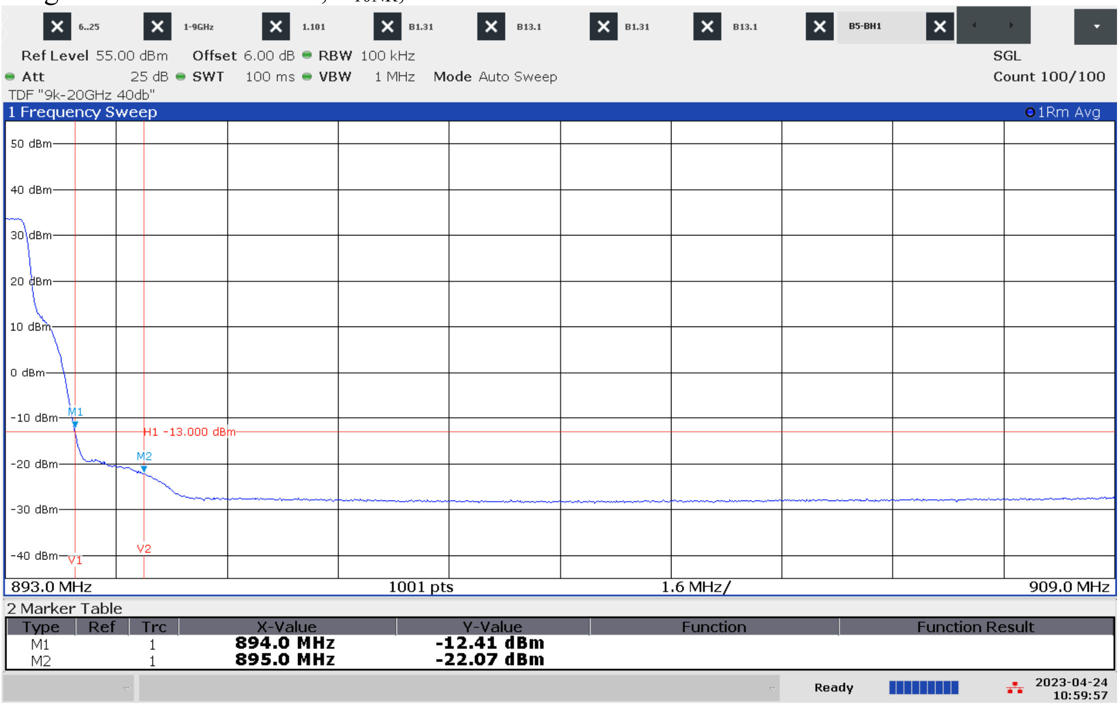
03:38:30 PM 04/24/2023

Diagram 2.37b NR: TM1.1, MB_{25NR}, Port A:



03:39:32 PM 04/24/2023

Diagram 2.38a NR: TM1.1, T_{10NR}, Port C:

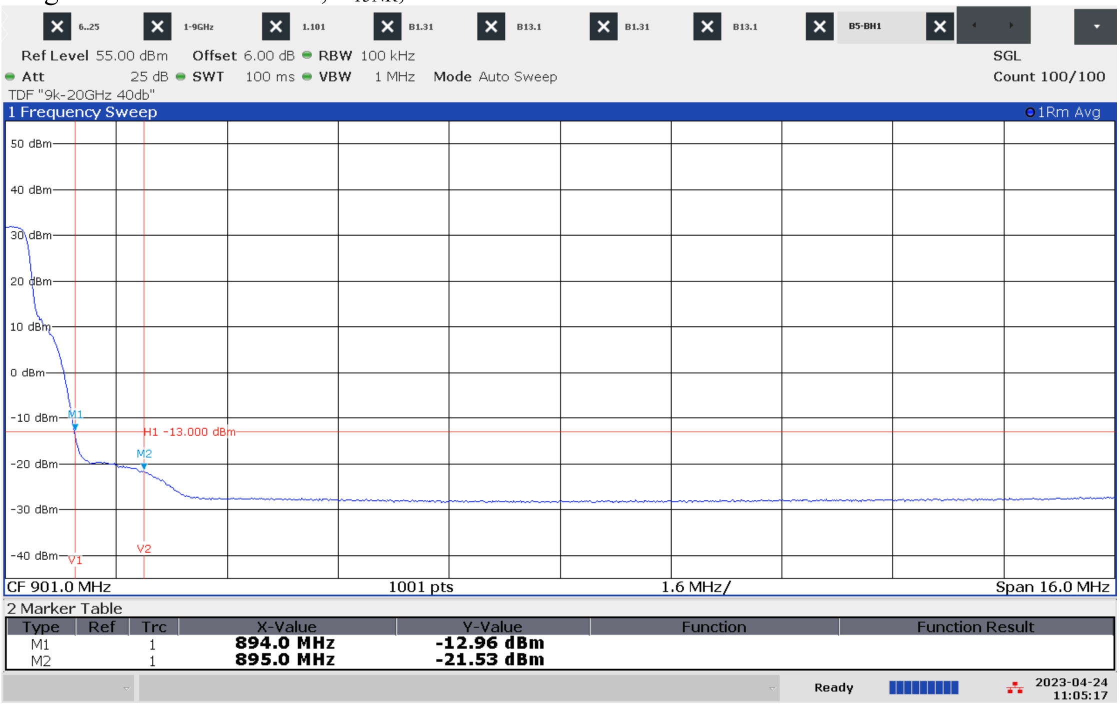


10:59:57 AM 04/24/2023

Diagram 2.38b NR: TM1.1, T_{10NR}, Port C:

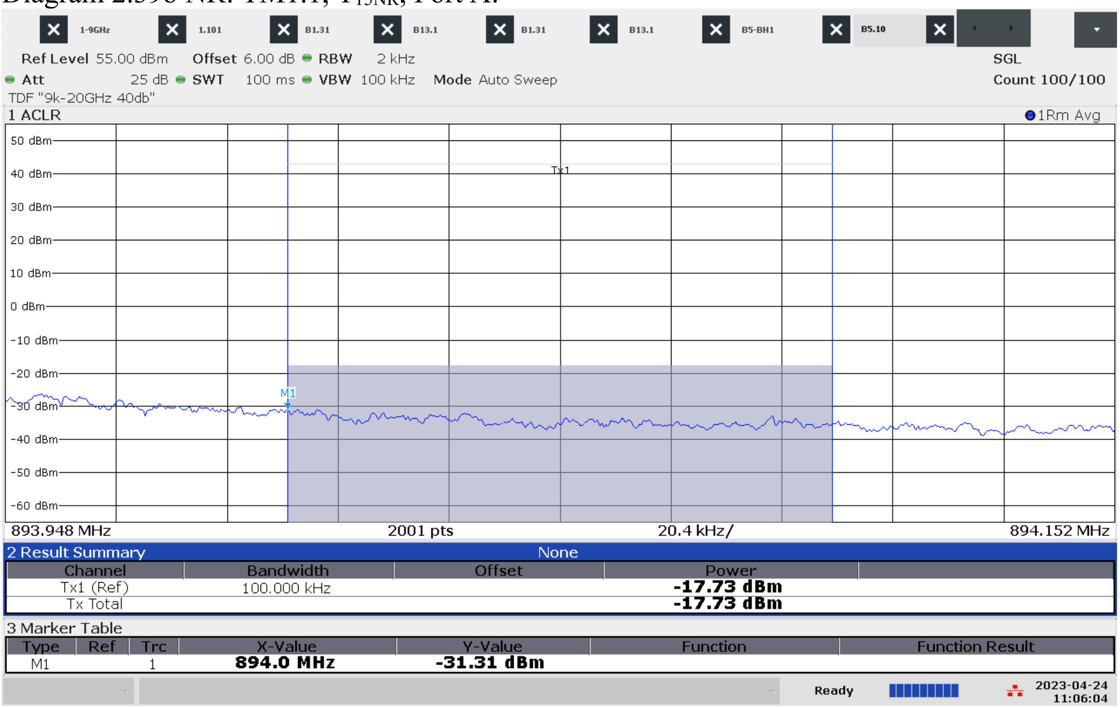
11:00:33 AM 04/24/2023

Diagram 2.39a NR: TM1.1, T_{15NR}, Port A:



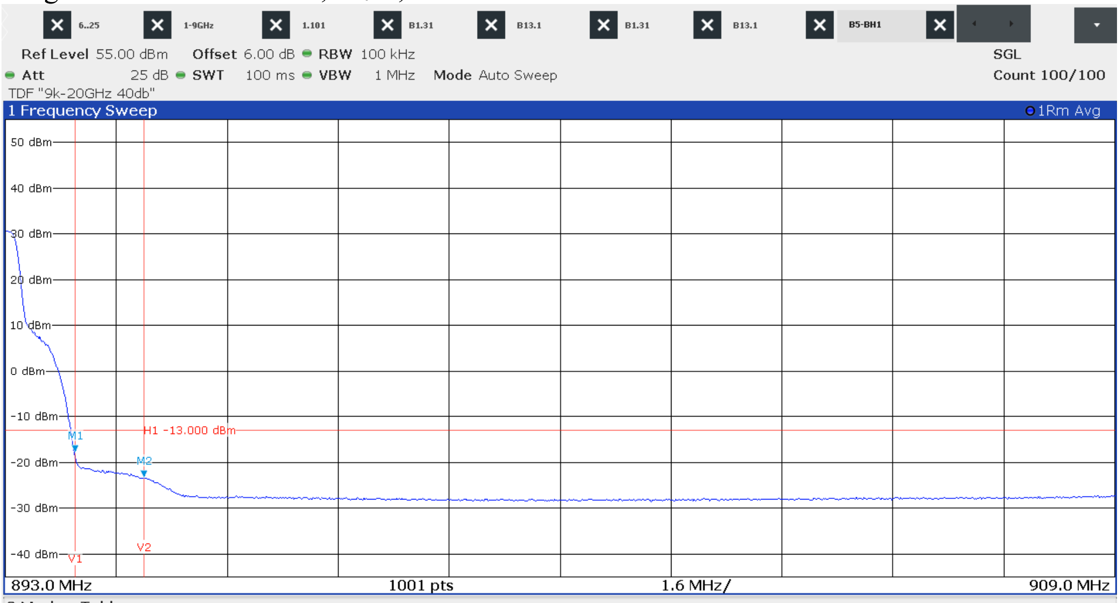
11:05:17 AM 04/24/2023

Diagram 2.39b NR: TM1.1, T_{15NR}, Port A:



11:06:04 AM 04/24/2023

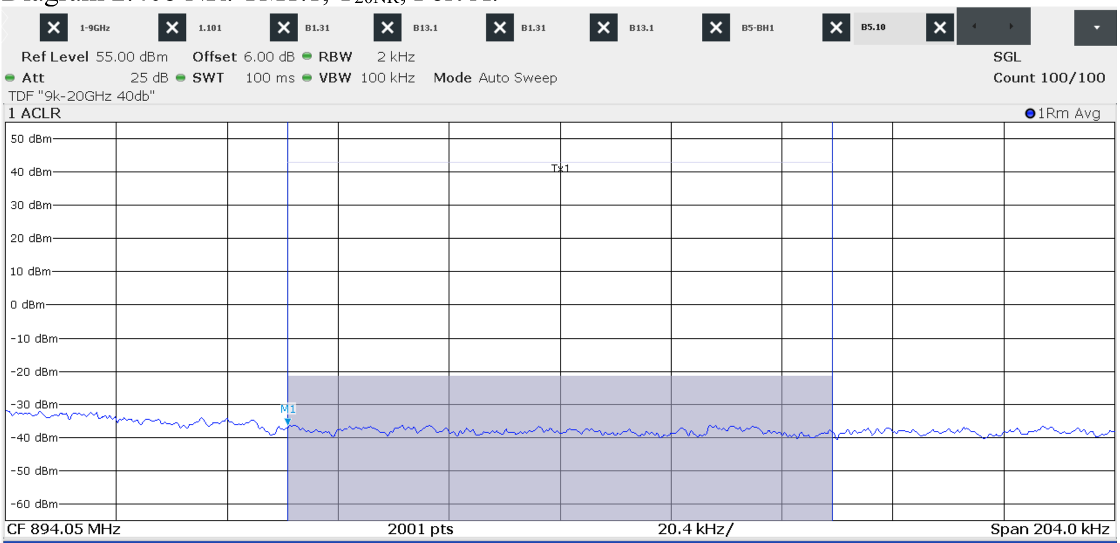
Diagram 2.40a NR: TM1.1, T_{20NR}, Port A:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	894.0 MHz	-17.92 dBm		
M2		1	895.0 MHz	-23.45 dBm		

03:26:07 PM 04/24/2023

Diagram 2.40b NR: TM1.1, T_{20NR}, Port A:

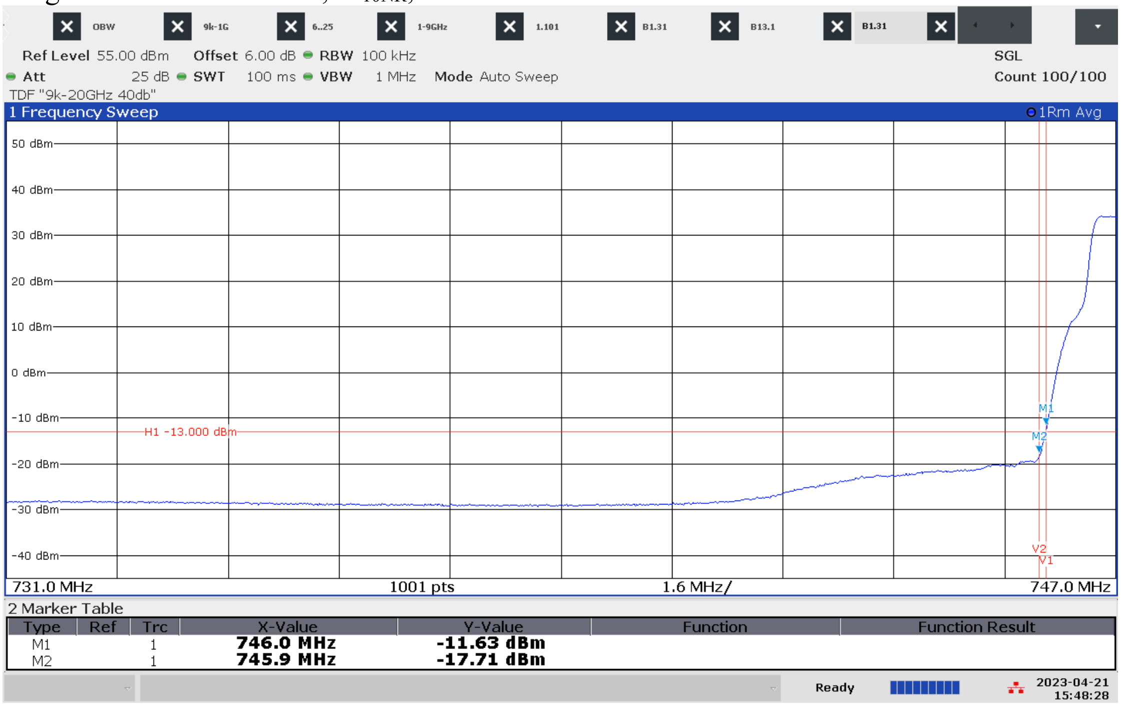


Channel	Bandwidth	Offset	Power
Tx1 (Ref)	100.000 kHz		-21.34 dBm
Tx Total			-21.34 dBm

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	894.0 MHz	-36.76 dBm		

03:26:58 PM 04/24/2023

Diagram 2.41a NR: TM1.1, M_{10NR}, Port C:



03:48:28 PM 04/21/2023

Diagram 2.41b NR: TM1.1, M_{10NR}, Port C:

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Diagram 2.41c NR: TM1.1, M_{10NR}, Port C:

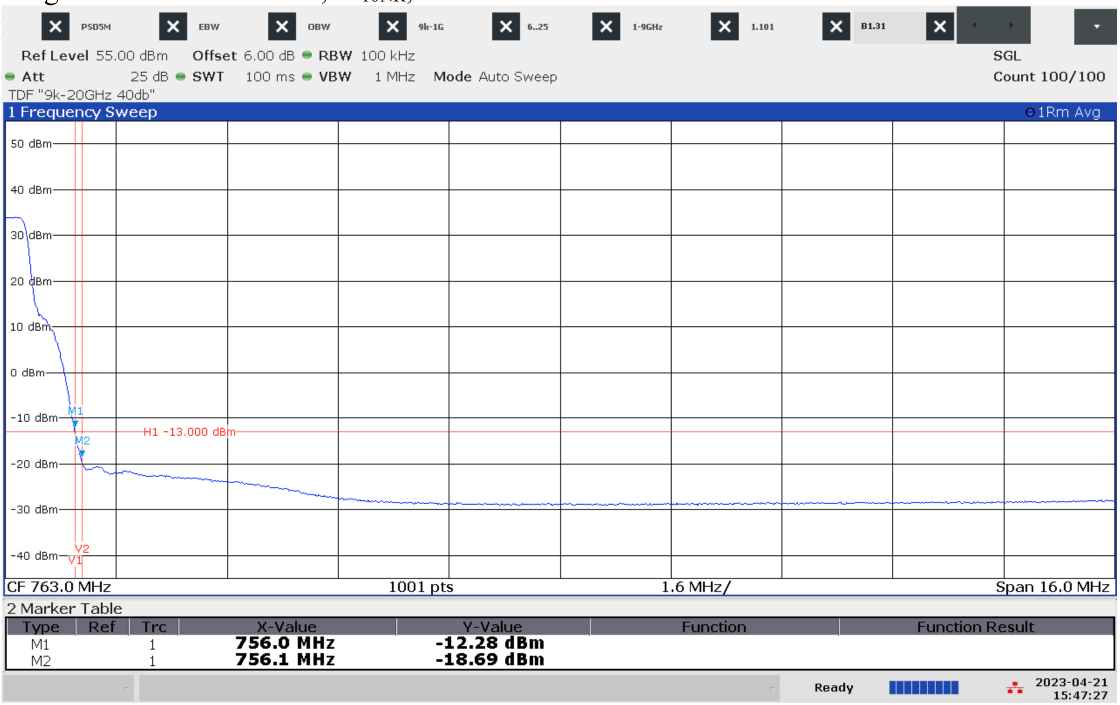

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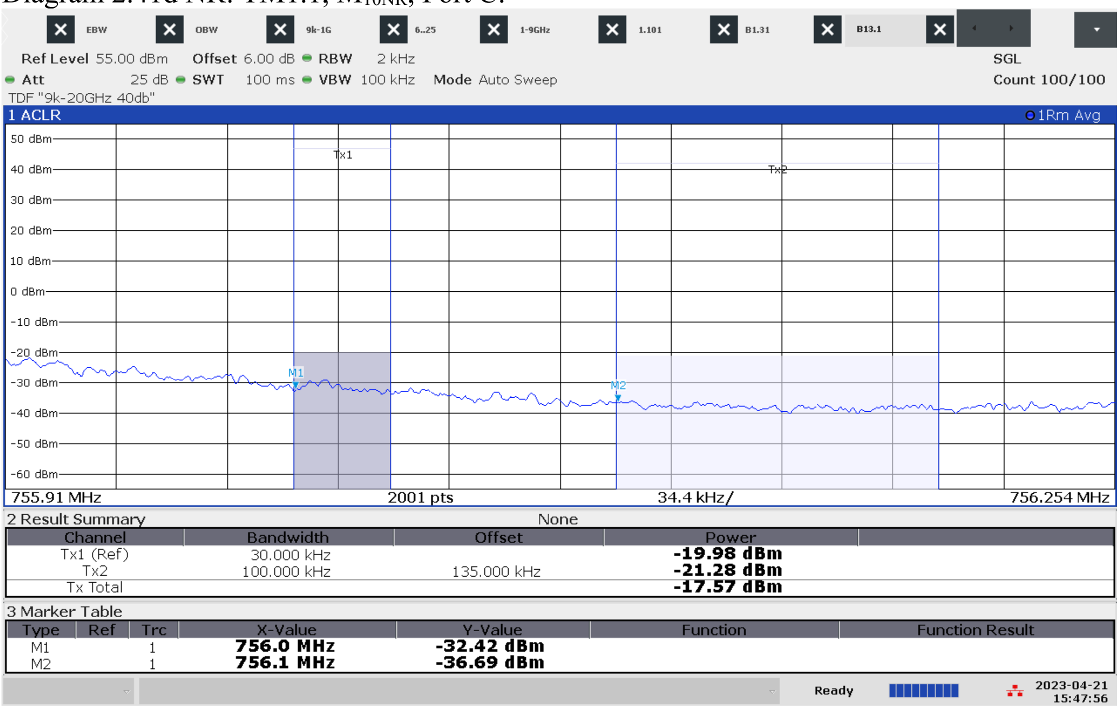
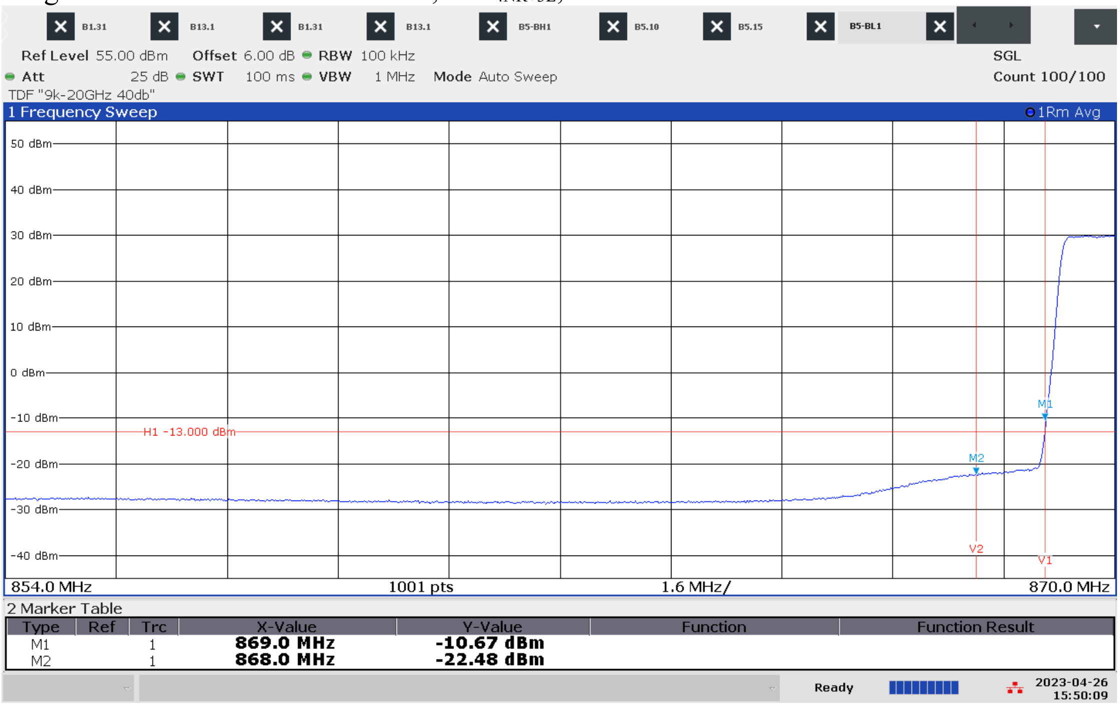
Diagram 2.41d NR: TM1.1, M_{10NR}, Port C:



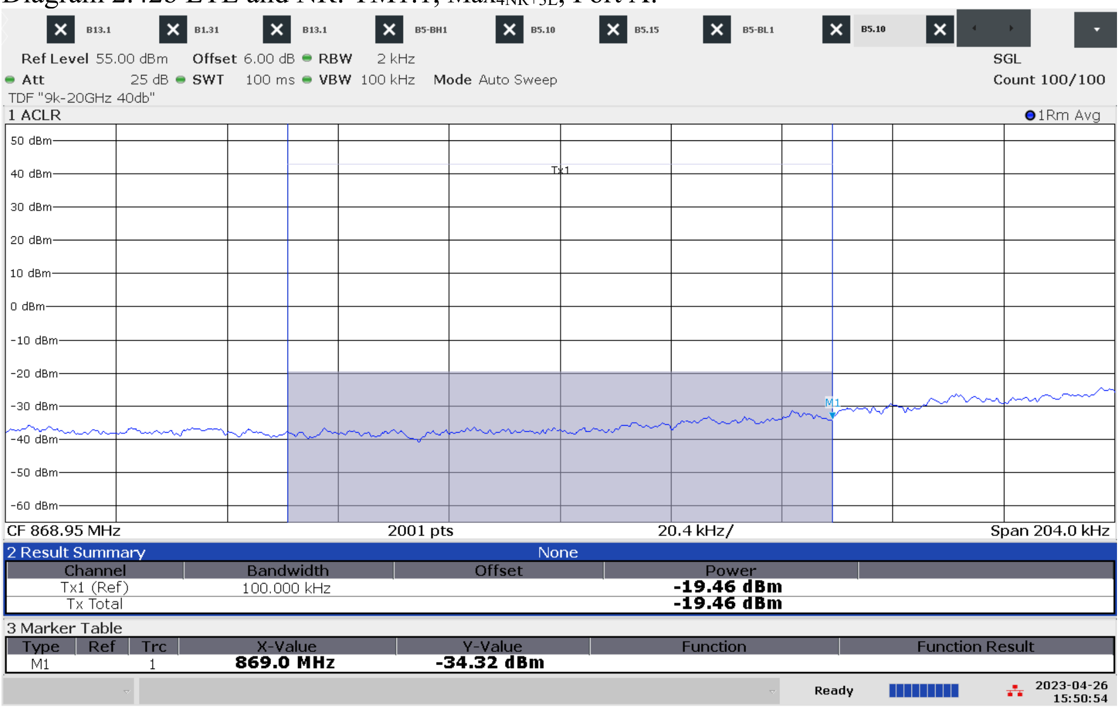
03:47:56 PM 04/21/2023

Diagram 2.42a LTE and NR: TM1.1, Max$_{4NR+3L}$, Port A:



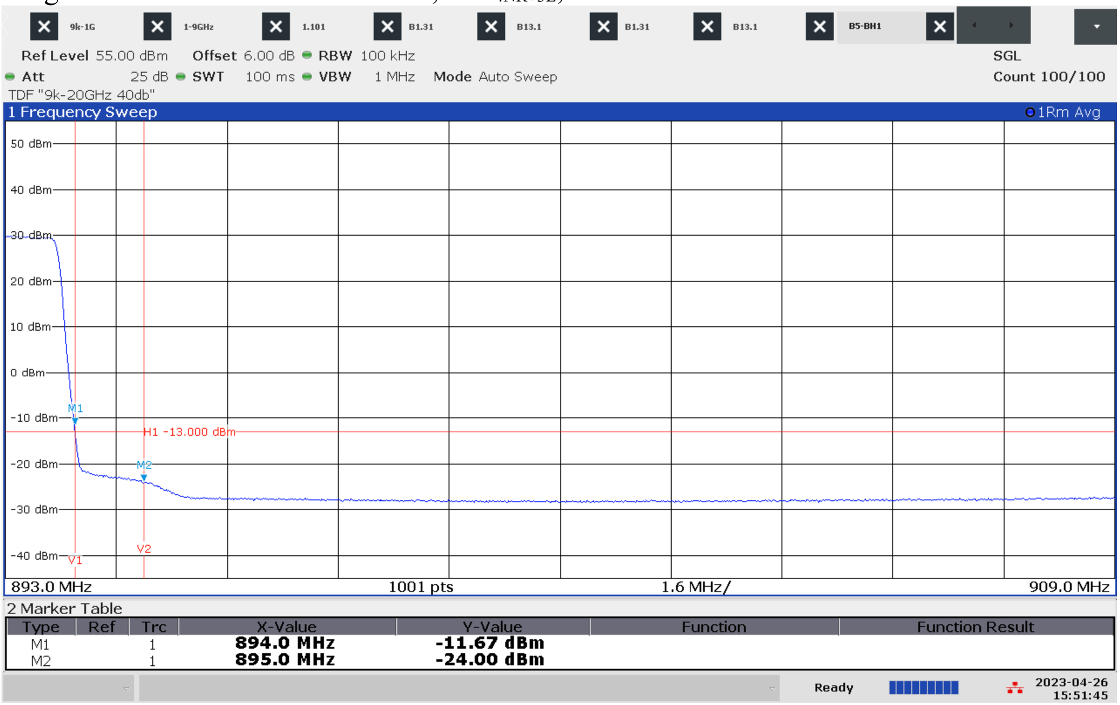
03:50:09 PM 04/26/2023

Diagram 2.42b LTE and NR: TM1.1, Max$_{4NR+3L}$, Port A:



03:50:54 PM 04/26/2023

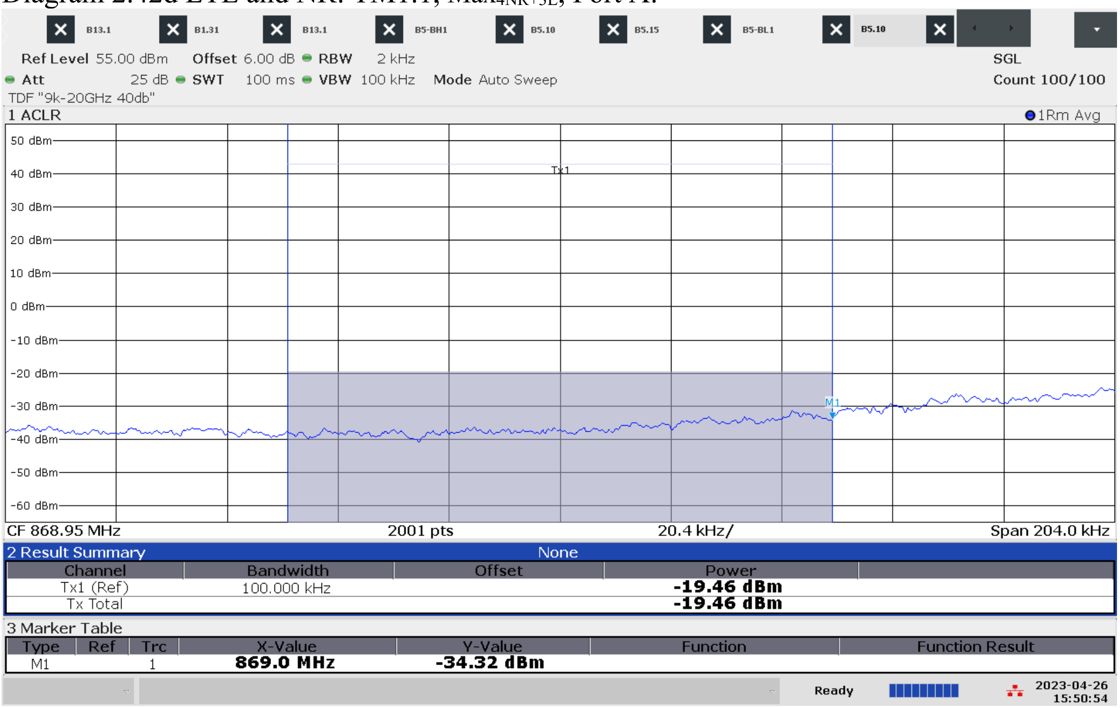
Diagram 2.42c LTE and NR: TM1.1, Max_{4NR+3L}, Port A:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	894.0 MHz	-11.67 dBm		
M2		1	895.0 MHz	-24.00 dBm		

03:51:45 PM 04/26/2023

Diagram 2.42d LTE and NR: TM1.1, Max_{4NR+3L}, Port A:

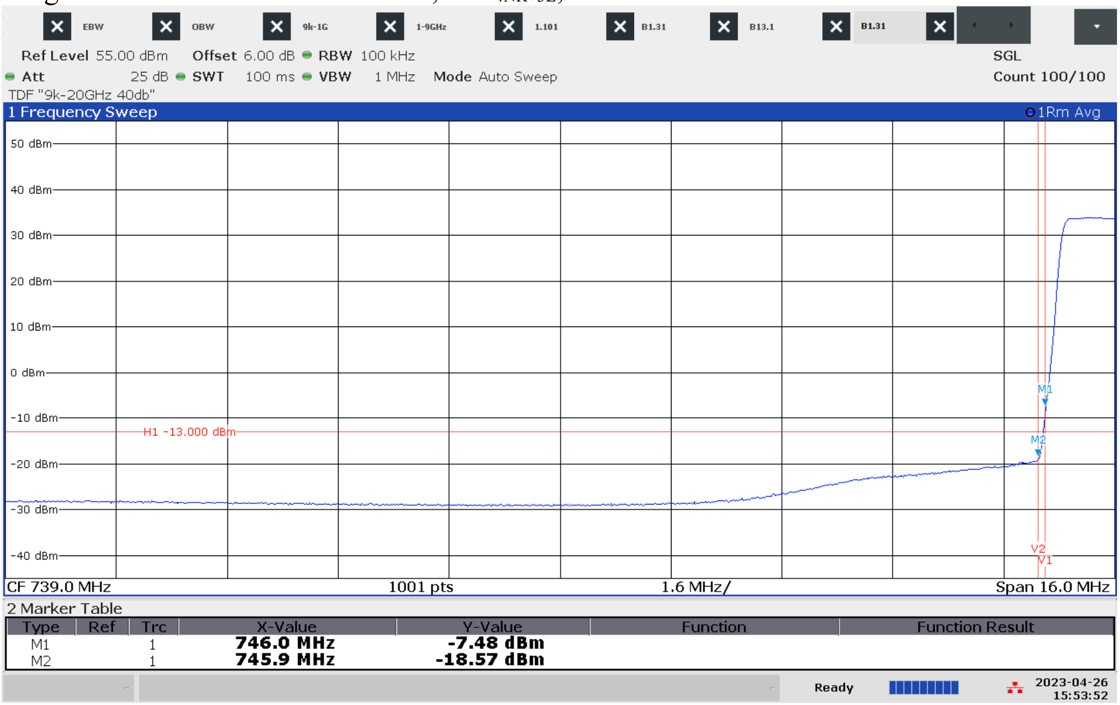


Channel	Bandwidth	Offset	Power
Tx1 (Ref)	100.000 kHz		-19.46 dBm
Tx Total			-19.46 dBm

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	869.0 MHz	-34.32 dBm		

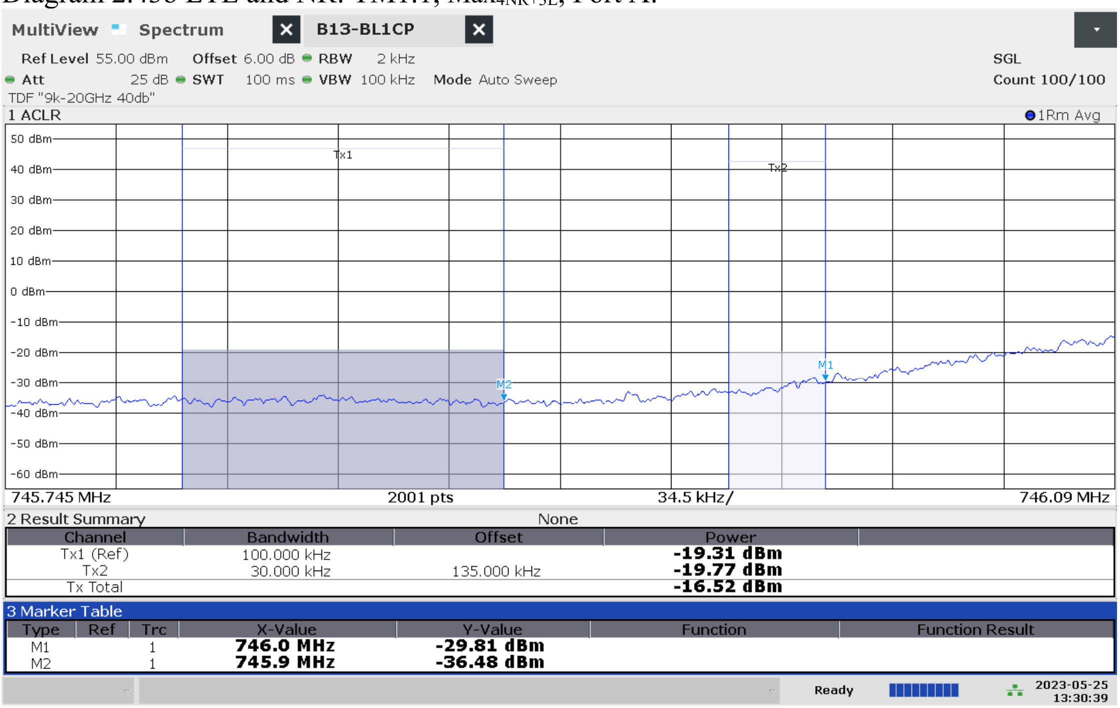
03:50:54 PM 04/26/2023

Diagram 2.43a LTE and NR: TM1.1, Max$_{4NR+3L}$, Port A:



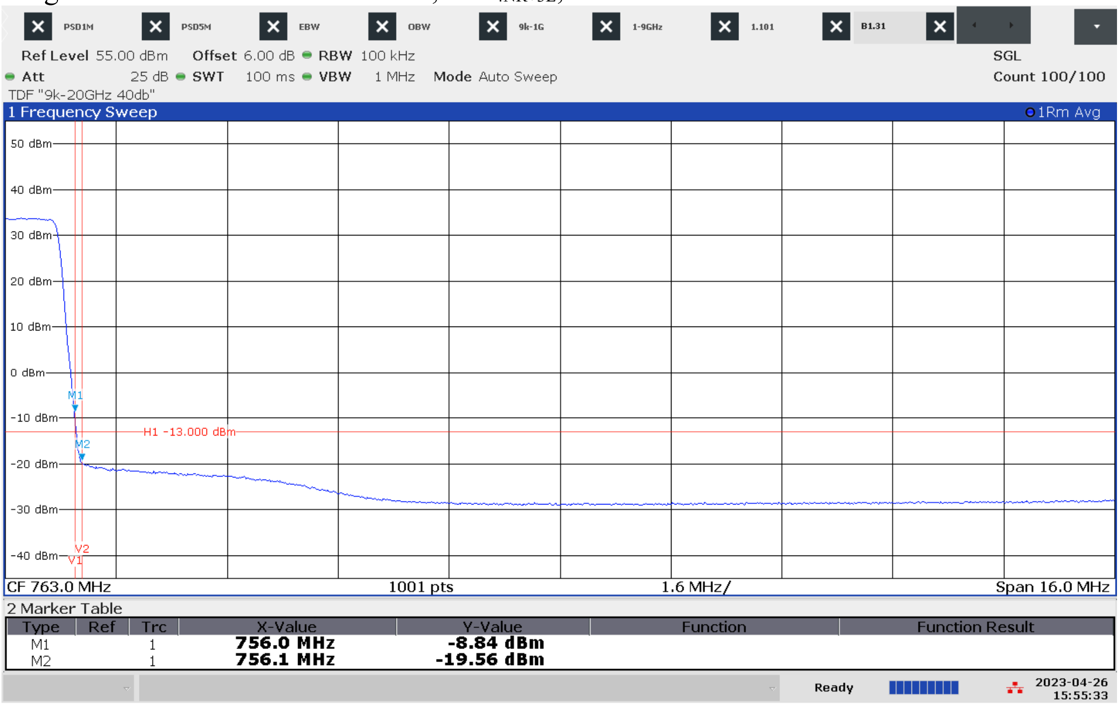
03:53:52 PM 04/26/2023

Diagram 2.43b LTE and NR: TM1.1, Max$_{4NR+3L}$, Port A:



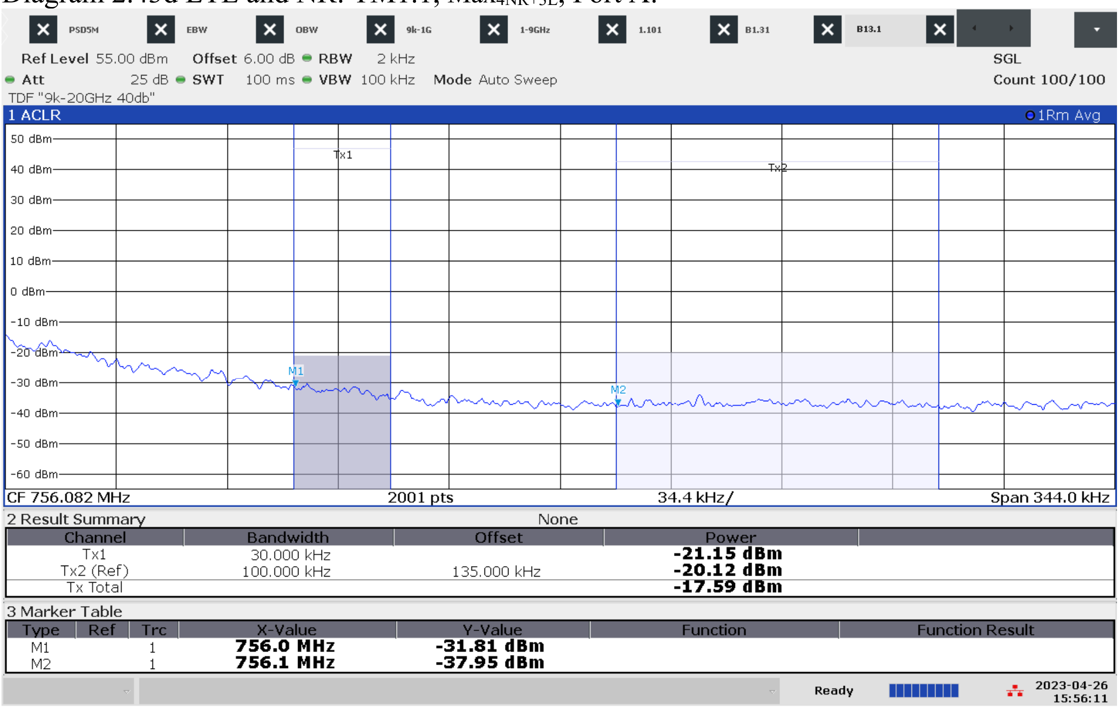
01:30:39 PM 05/25/2023

Diagram 2.43c LTE and NR: TM1.1, Max_{4NR+3L}, Port A:



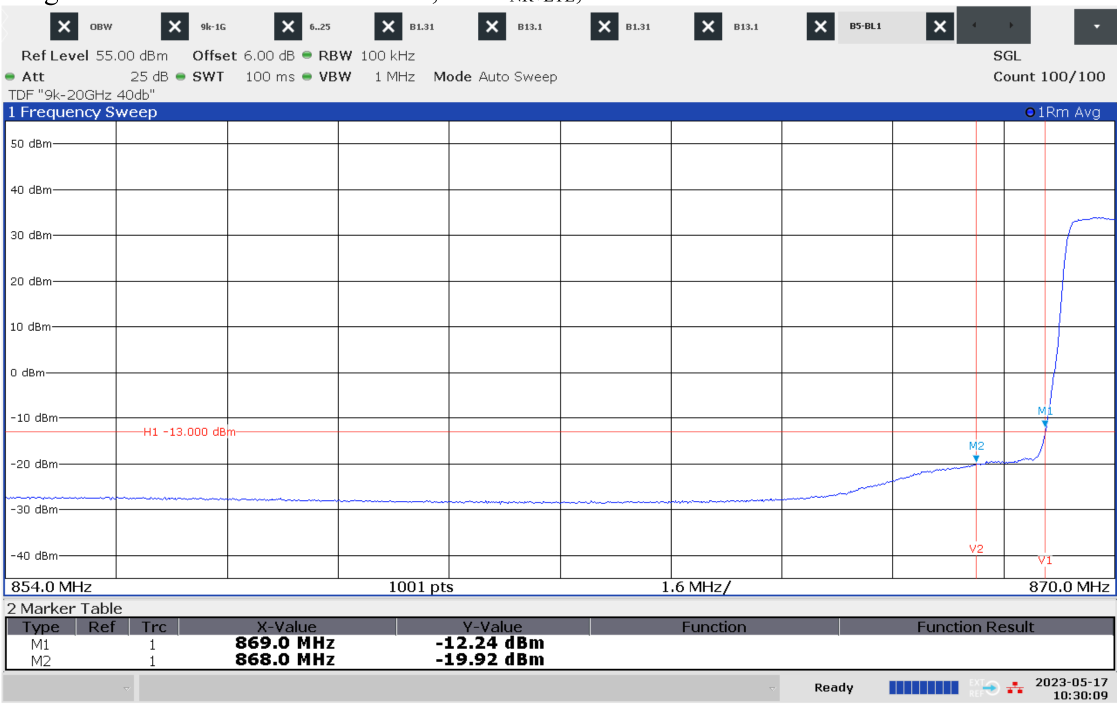
03:55:33 PM 04/26/2023

Diagram 2.43d LTE and NR: TM1.1, Max_{4NR+3L}, Port A:



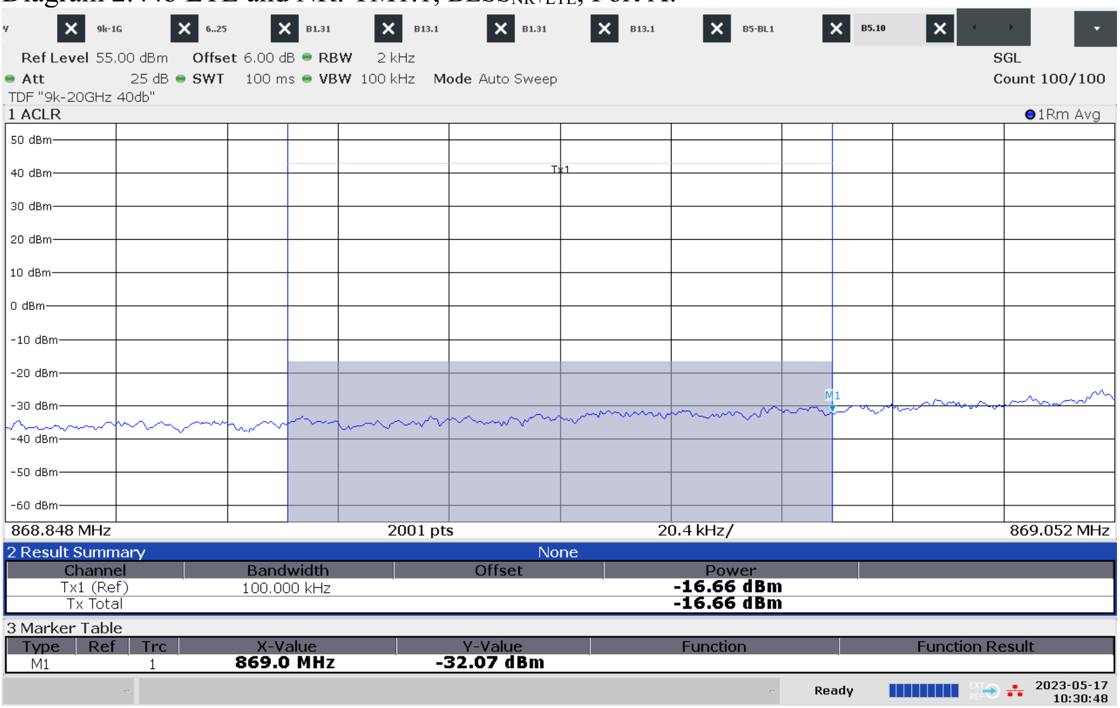
03:56:11 PM 04/26/2023

Diagram 2.44a LTE and NR: TM1.1, BESS$_{NR+LTE}$, Port A:



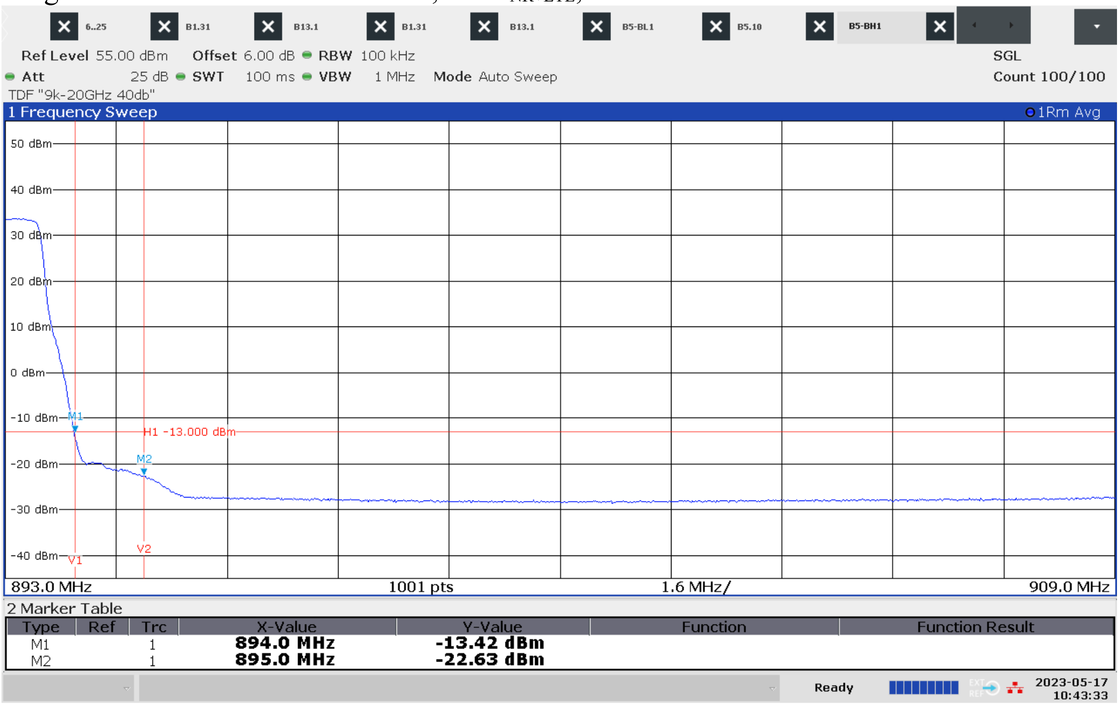
10:30:09 AM 05/17/2023

Diagram 2.44b LTE and NR: TM1.1, BESS$_{NR+LTE}$, Port A:



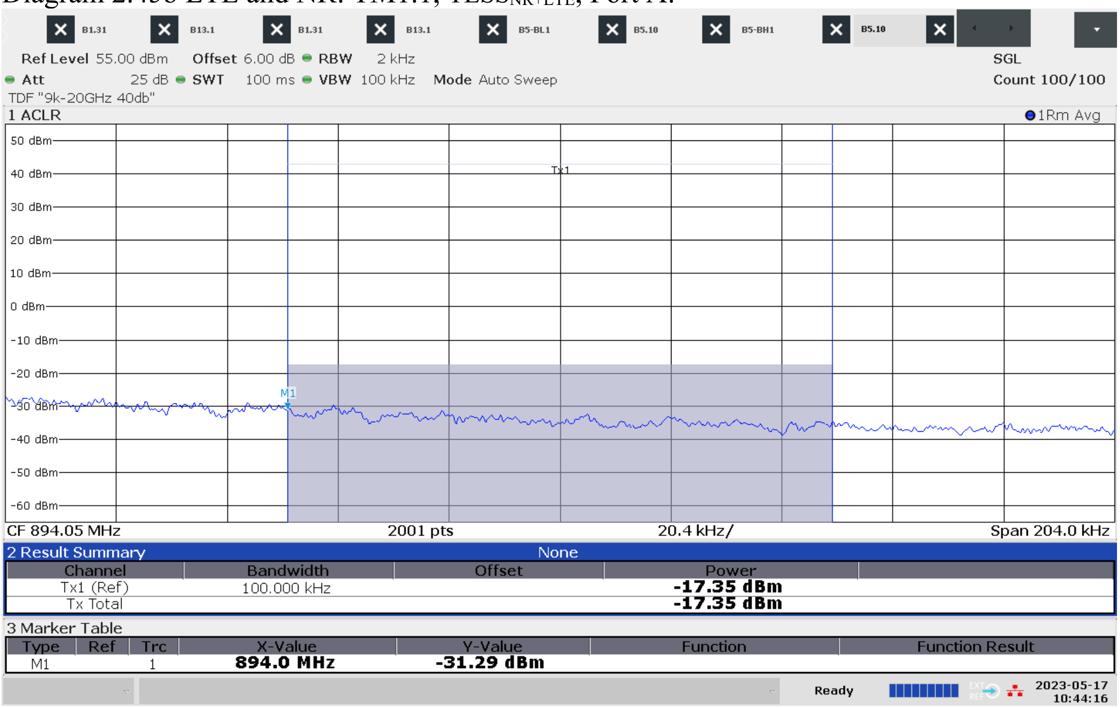
10:30:48 AM 05/17/2023

Diagram 2.45a LTE and NR: TM1.1, TESS$_{NR+LTE}$, Port A:



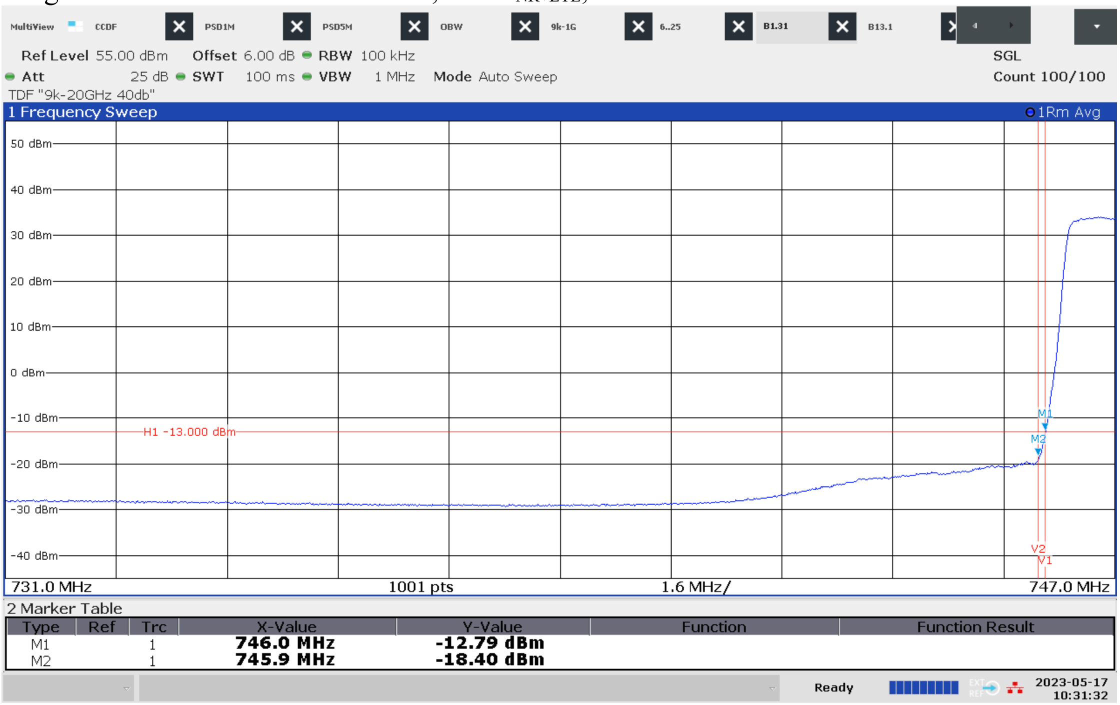
10:43:33 AM 05/17/2023

Diagram 2.45b LTE and NR: TM1.1, TESS$_{NR+LTE}$, Port A:



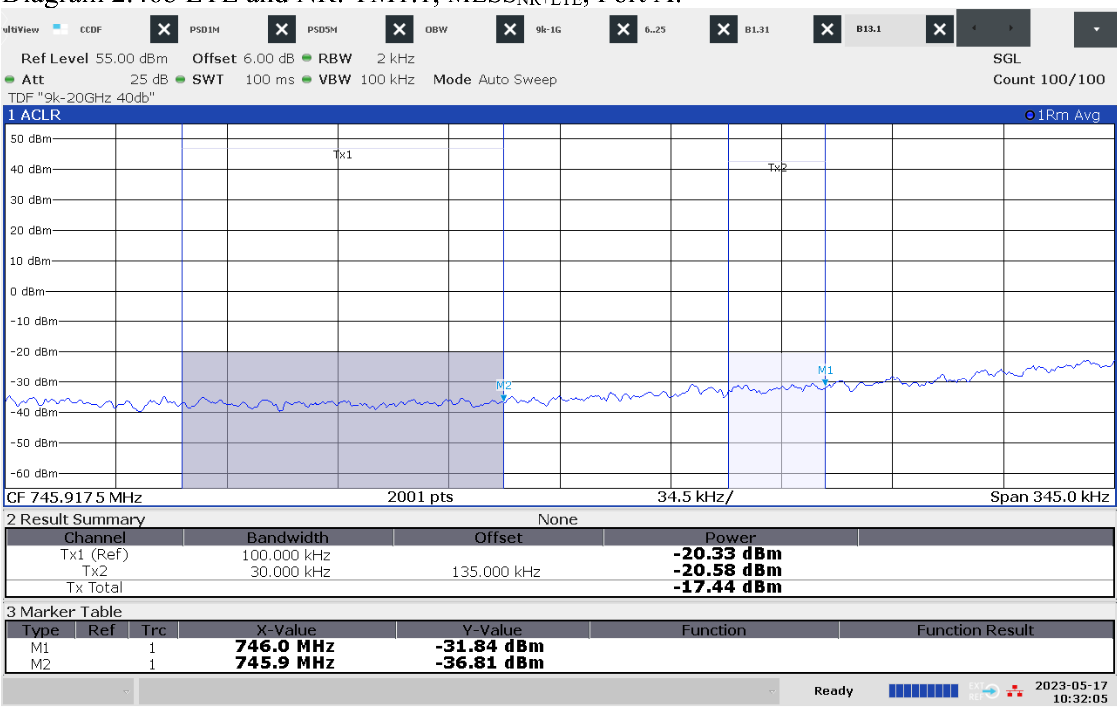
10:44:16 AM 05/17/2023

Diagram 2.46a LTE and NR: TM1.1, MESS$_{NR+LTE}$, Port A:



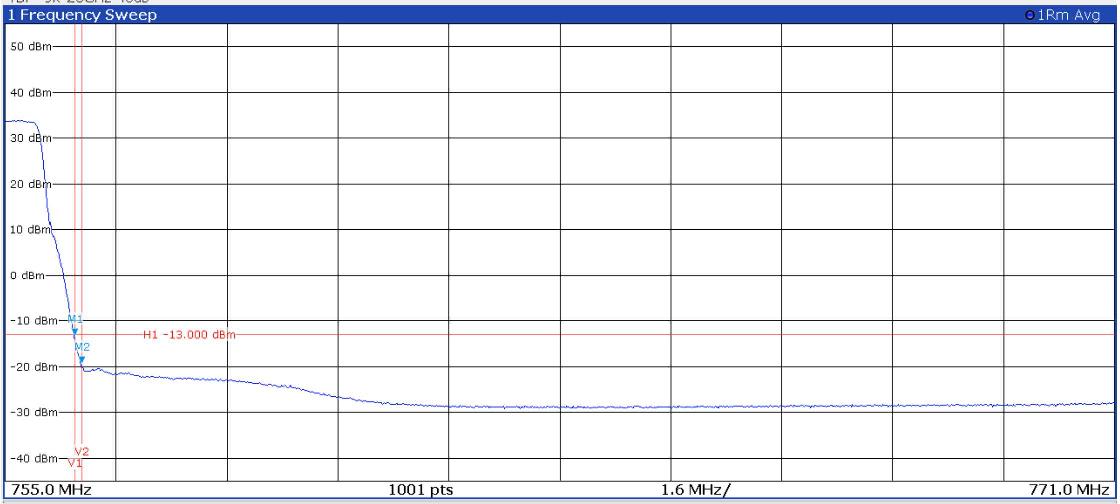
10:31:32 AM 05/17/2023

Diagram 2.46b LTE and NR: TM1.1, MESS$_{NR+LTE}$, Port A:



10:32:05 AM 05/17/2023

Diagram 2.46c LTE and NR: TM1.1, $MESS_{NR+LTE}$, Port A:

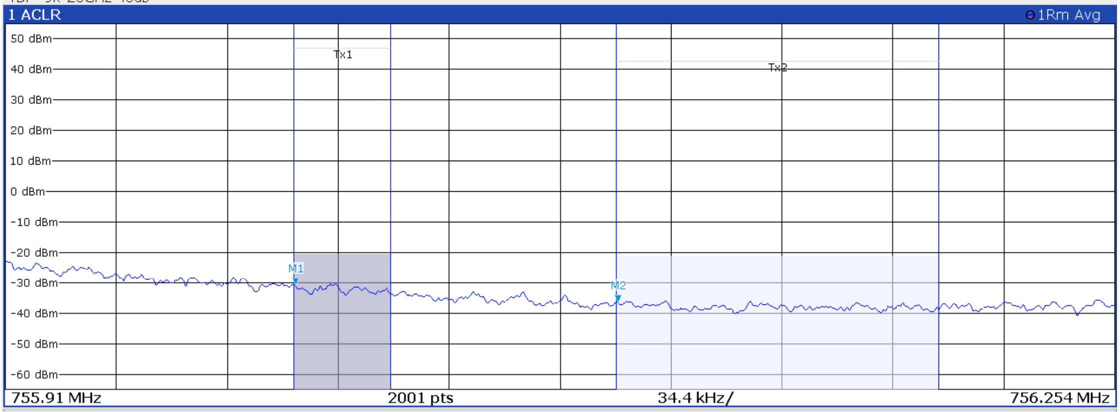


Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**756.0 MHz**	**-13.29 dBm**		
M2		1	**756.1 MHz**	**-19.51 dBm**		

Ready 2023-05-17 10:32:45

10:32:45 AM 05/17/2023

Diagram 2.46d LTE and NR: TM1.1, $MESS_{NR+LTE}$, Port A:



Channel	Bandwidth	Offset	Power
Tx1 (Ref)	30.000 kHz		**-20.70 dBm**
Tx2	100.000 kHz	135.000 kHz	**-21.23 dBm**
Tx Total			**-17.95 dBm**

3 Marker Table

Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	**756.0 MHz**	**-31.06 dBm**		
M2		1	**756.1 MHz**	**-36.61 dBm**		

Ready 2023-05-17 10:33:29

10:33:30 AM 05/17/2023

Conducted spurious emission measurements according to CFR 47 §27.53 §22.917/ RSS-130 4.7 RSS-132 5.5

Date	Temperature	Humidity
2023-03-24	23 °C ± 3 °C	20 % ± 5 %
2023-04-12	23 °C ± 3 °C	21 % ± 5 %
2023-04-13	23 °C ± 3 °C	24 % ± 5 %
2023-04-14	23 °C ± 3 °C	20 % ± 5 %
2023-04-18	23 °C ± 3 °C	21 % ± 5 %
2023-04-21	23 °C ± 3 °C	22 % ± 5 %
2023-04-24	23 °C ± 3 °C	23 % ± 5 %
2023-04-25	23 °C ± 3 °C	21 % ± 5 %
2023-04-26	23 °C ± 3 °C	25 % ± 5 %
2023-04-27	23 °C ± 3 °C	24 % ± 5 %
2023-05-10	23 °C ± 3 °C	21 % ± 5 %
2023-05-11	23 °C ± 3 °C	20 % ± 5 %
2023-05-17	23 °C ± 3 °C	22 % ± 5 %

Test set-up and procedure

The measurements were made per definition in ANSI C63.26, 5.7.4. The output was connected to a spectrum analyzer with the RMS detector activated.

An offset of 6 dB has been used to cover 4x4 MIMO according to ANSI C63.26 6.4.4.1 c "measure and add 10 $\log_{10}$ (N_{ANT})" in the frequency range 9k – 1GHz, for 1–9GHz an offset of 6.62 was used to compensate for the high pass filter

The vertical lines V1 and V2 in the plots 9k to 1 GHz represent the band edges of the operating band 13.
The vertical lines V3 and V4 in the plots 9k to 1 GHz represent the band edges of the operating band 5

Measurement equipment	RISE number
R&S FSW 43	902 073
RF attenuator	902 282
High pass filter 1-20 GHz	504 199
Coaxial cable Sucoflex 102EA	BX50236
Coaxial cable Sucoflex 102EA	BX50237
Testo 635, temperature and humidity meter	504 203

Measurement uncertainty: 2.6 dB

Results LTE B5 and B13

Single carrier LTE: TM1.1

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.1 a-d	B_{5LTE}	B_{5LTE}	RF B
3.2 a-d	M_{5LTE}	M_{5LTE}	RF A
3.3 a-d	M_{5LTE}	M_{5LTE}	RF B
3.4 a-d	M_{5LTE}	M_{5LTE}	RF C
3.5 a-d	M_{5LTE}	M_{5LTE}	RF D
3.6 a-d	M_{10LTE}	M_{10LTE}	RF B
3.7 a-d	T_{5LTE}	T_{5LTE}	RF B

Multi carrier LTE: TM1.1

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.8 a-d	Bim_{LTE}	B_{5LTE}	RF A
3.9 a-d	Tim_{LTE}	B_{5LTE}	RF A
3.10 a-d	$M5_{5LTE}$	$M2_{5+5LTE}$	RF A

Note: Measurements were mainly limited to port RF B due to the measurement result in single carrier mode that shows that the ports are electrical identical as declared by the client.

Results NR B5 and B13 SCS 15kHz

Single carrier NR: TM1.1

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.11 a-d	B_{5NR}	B_{5NR}	RF B
3.12 a-d	M_{5NR}	M_{5NR}	RF B
3.13 a-d	M_{10NR}	M_{10NR}	RF B
3.14 a-d	M_{15NR}	M_{10NR}	RF B
3.15 a-d	M_{20NR}	M_{10NR}	RF B
3.16 a-d	M_{25NR}	M_{10NR}	RF B
3.17 a-b	T_{5NR}	T_{5NR}	RF B

Multi carrier NR: TM1.1

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.18 a-d	Bim_{NR}	B_{5NR}	RF A
3.19 a-d	Tim_{NR}	B_{5NR}	RF A
3.20 a-d	$M5_{5NR}$	$M2_{5+5NR}$	RF A

Results LTE with NB IoT GB B5 B13

Single carrier: LTE: TM1.1,NB IoT : N-TM

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.21 a-d	B_{GB+10L}	B_{GB+10L}	RF A
3.22 a-d	T_{GB+10L}	T_{BR+10L}	RF A

Results NR with NB IoT IB B5 B13 SCS 15kHz

Single carrier: LTE: TM1.1,NB IoT: N-TM

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.23 a-d	B_{IB+5NR}	B_{IB+5NR}	RF B
3.24 a-d	T_{IB+5NR}	T_{IB+5NR}	RF B

Results NR B5 and B13 SCS 30kHz

Single carrier NR: TM1.1

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.25 a-d	B_{10NR}	M_{10NR}	RF A
3.26 a-d	M_{10NR}	M_{10NR}	RF A
3.27 a-d	M_{15NR}	M_{10NR}	RF A
3.28 a-d	M_{20NR}	M_{10NR}	RF A
3.29 a-d	M_{25NR}	M_{10NR}	RF A
3.30 a-b	T_{10NR}	M_{10NR}	RF A

Results NR with NB IoT IB B5 B13 SCS 15kHz

Single carrier: NR: TM1.1,NB IoT: N-TM

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.31 a-d	B_{IB+5NR}	B_{IB+5NR}	RF B
3.32 a-d	T_{IB+5NR}	T_{IB+5NR}	RF B

Results LTE and NR B5 B13 SCS 15kHz

Multi RAT: LTE and NR: TM1.1,

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.33 a-d	Max_{4NR+3L}	Max_{4NR+3L}	RF A

Results Multi RAT ESS NR and LTE B5 B13 SCS 15kHz

ESS NR 90% and LTE 10% TM1.1

Diagram	Symbolic name B5	Symbolic name B13	Tested Port
3.34 a-d	$BESS_{NR+LTE}$	$MESS_{NR+LTE}$	RF A
3.35 a-d	$TESS_{NR+LTE}$	$MESS_{NR+LTE}$	RF A

Remark

The emission at 9 kHz on the plots was not generated by the test object. A complementary measurement with a smaller RBW showed that it was related to the LO feed-through.

The highest fundamental frequency is 894 MHz. The measurements were made up to 9 GHz (10x894 MHz = 8.94 GHz).

Limits

CFR 47 §27.53 (c)
For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
- On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
- On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
- Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

CFR 47§27.53 (f)
For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

CFR 47 § 22.917 (a)
Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

CFR 47 § 22.917 (b)
Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

- In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
- In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz.

RSS-130 4.7.1

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB (-13 dBm). However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

RSS-130 4.7.2 Additional unwanted emissions limits

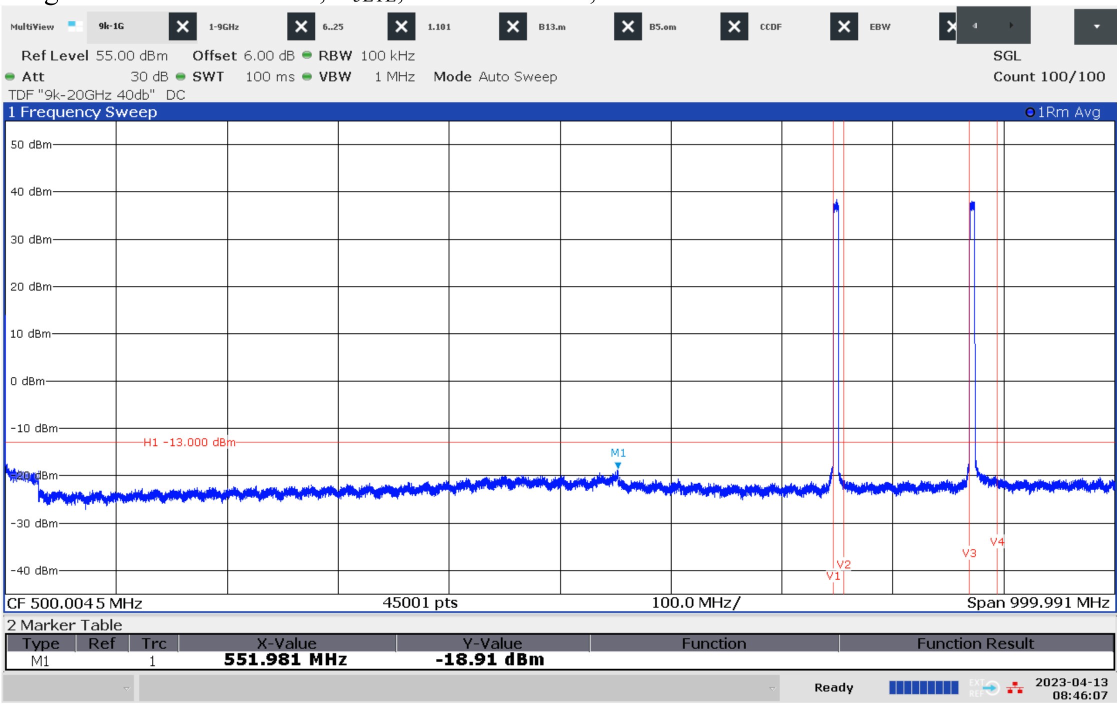
In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
76 + 10 log10 p (watts), dB, for base and fixed equipment

b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed −70 dBW(-40 dBm)/MHz for wideband signal and −80 dBW(-50 dBm) for discrete emission with bandwidth less than 700 Hz.

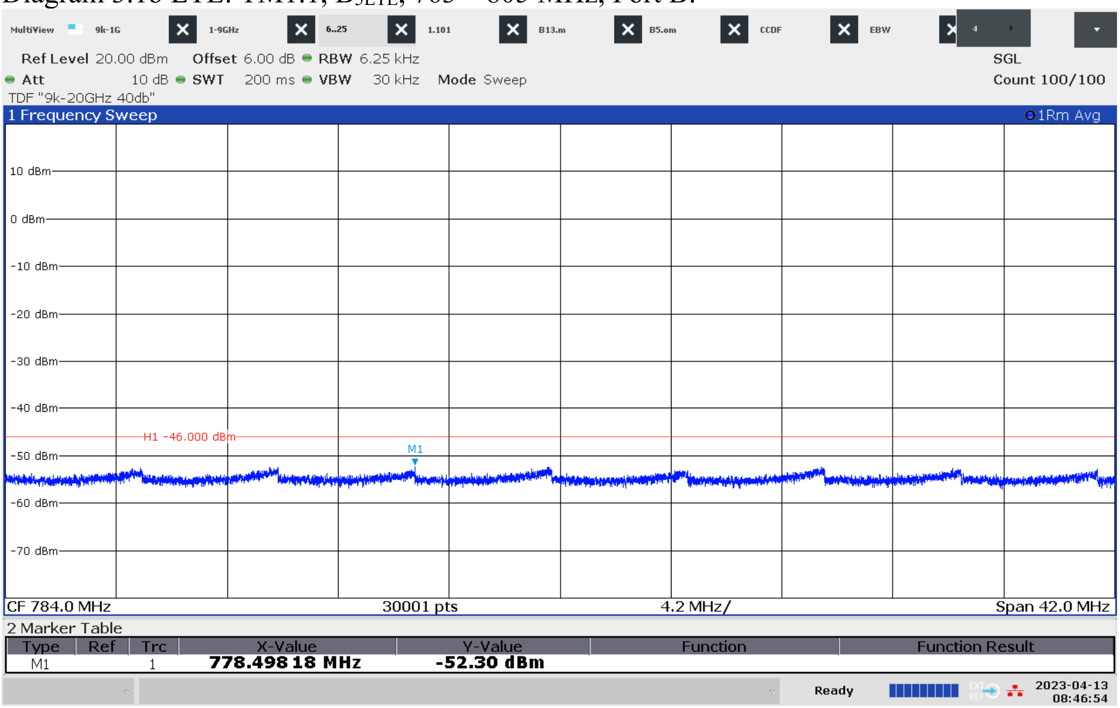
Complies?	Yes

Diagram 3.1a LTE: TM1.1, B5LTE, 9 kHz – 1 GHz, Port B:



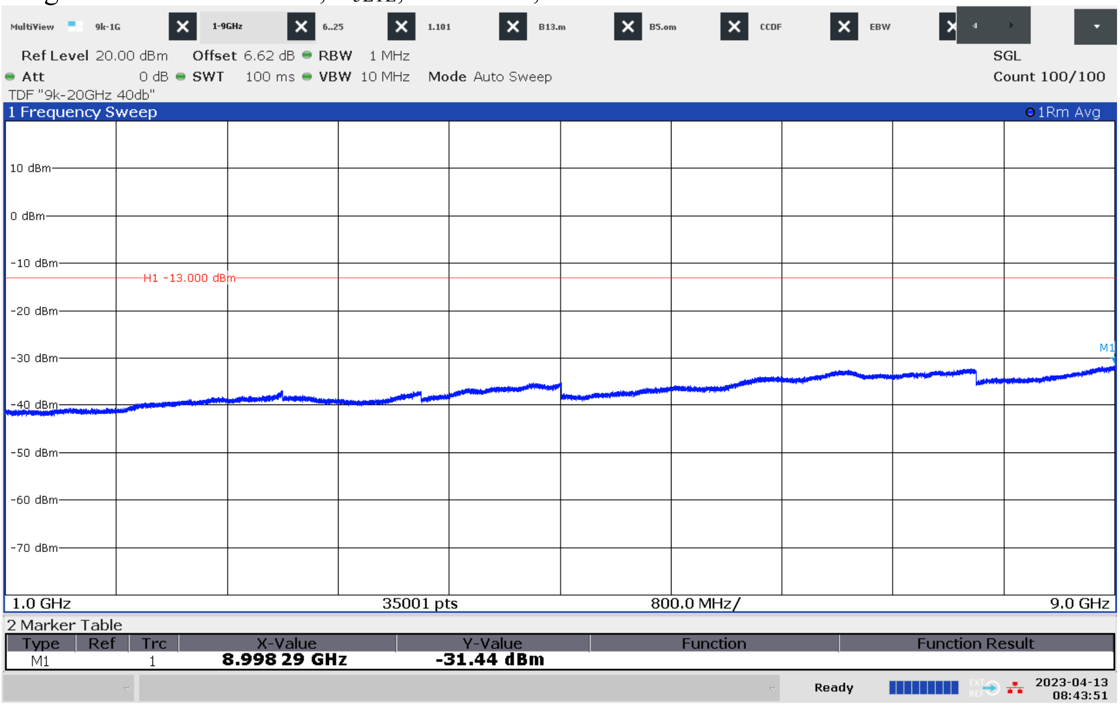
08:46:07 AM 04/13/2023

Diagram 3.1b LTE: TM1.1, B5LTE, 763 – 805 MHz, Port B:



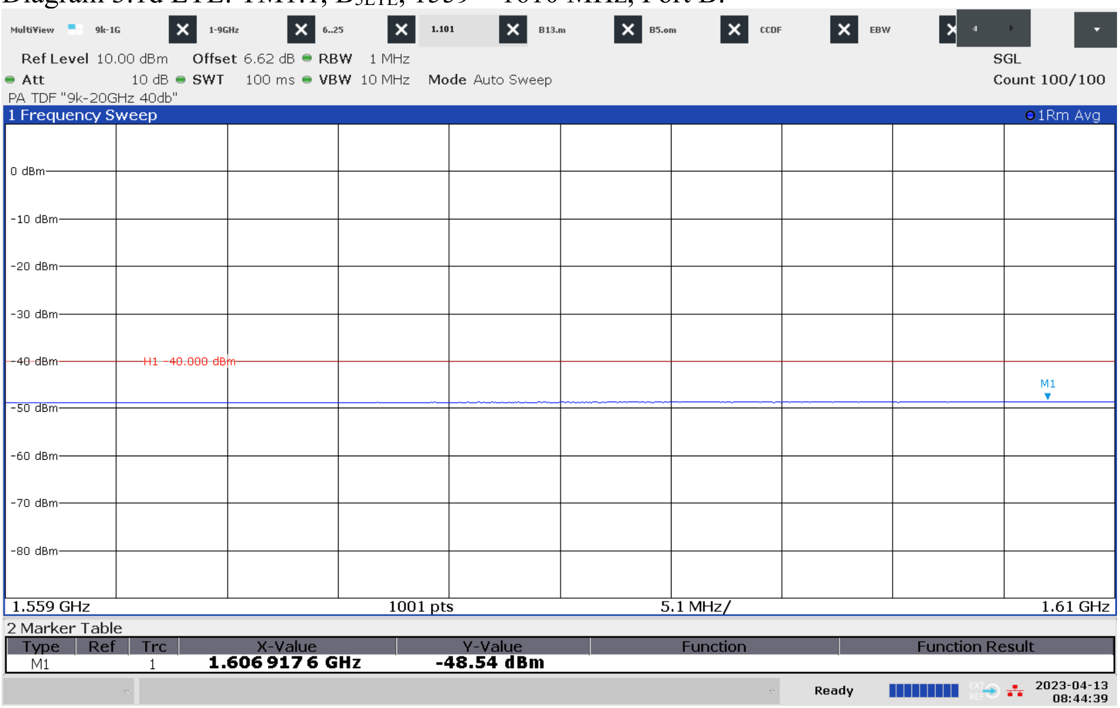
08:46:55 AM 04/13/2023

Diagram 3.1c LTE: TM1.1, B_{5LTE}, 1 – 9 GHz, Port B:



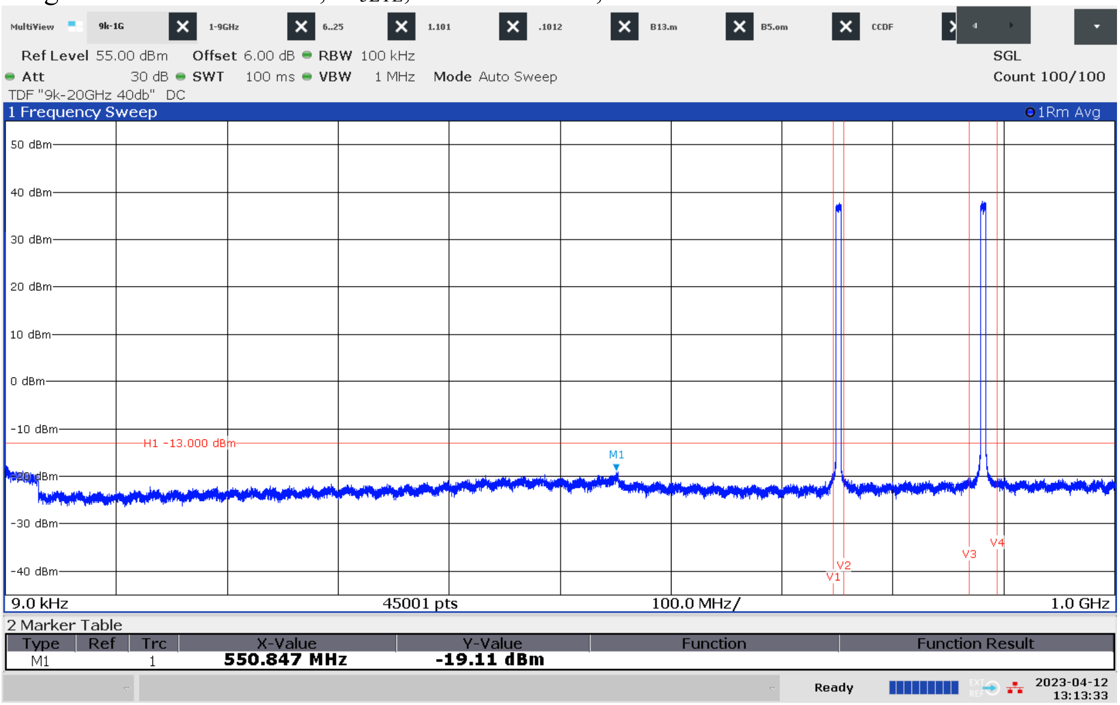
08:43:51 AM 04/13/2023

Diagram 3.1d LTE: TM1.1, B_{5LTE}, 1559 – 1610 MHz, Port B:



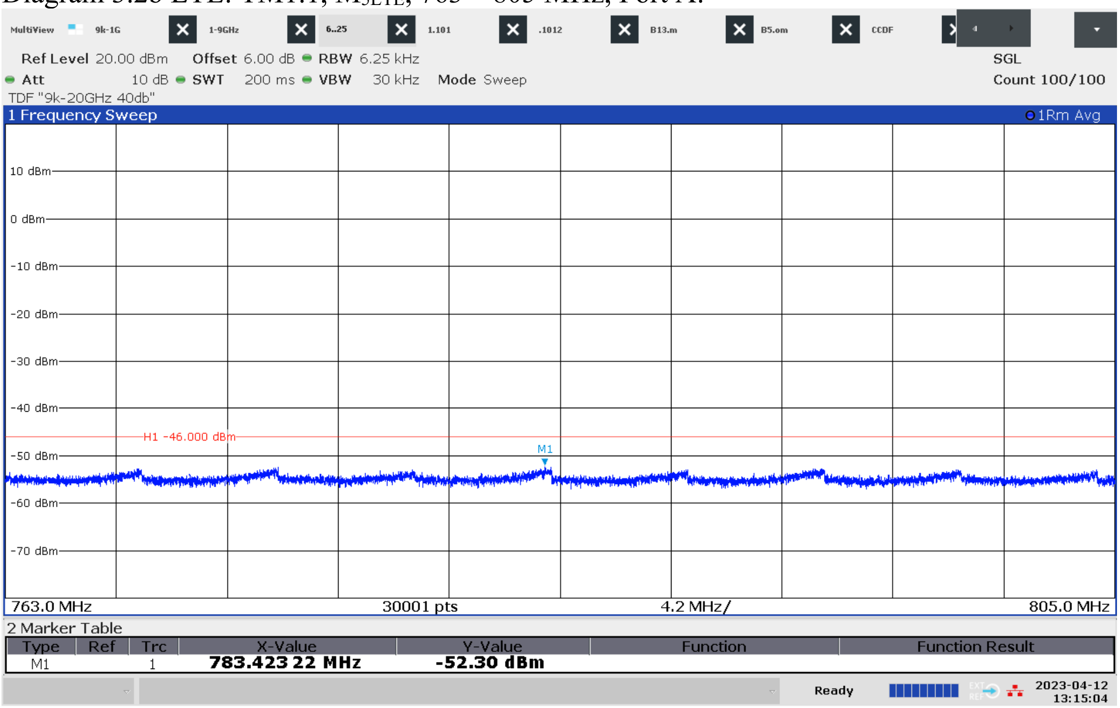
08:44:39 AM 04/13/2023

Diagram 3.2a LTE: TM1.1, M_{5LTE}, 9 kHz – 1 GHz, Port A:



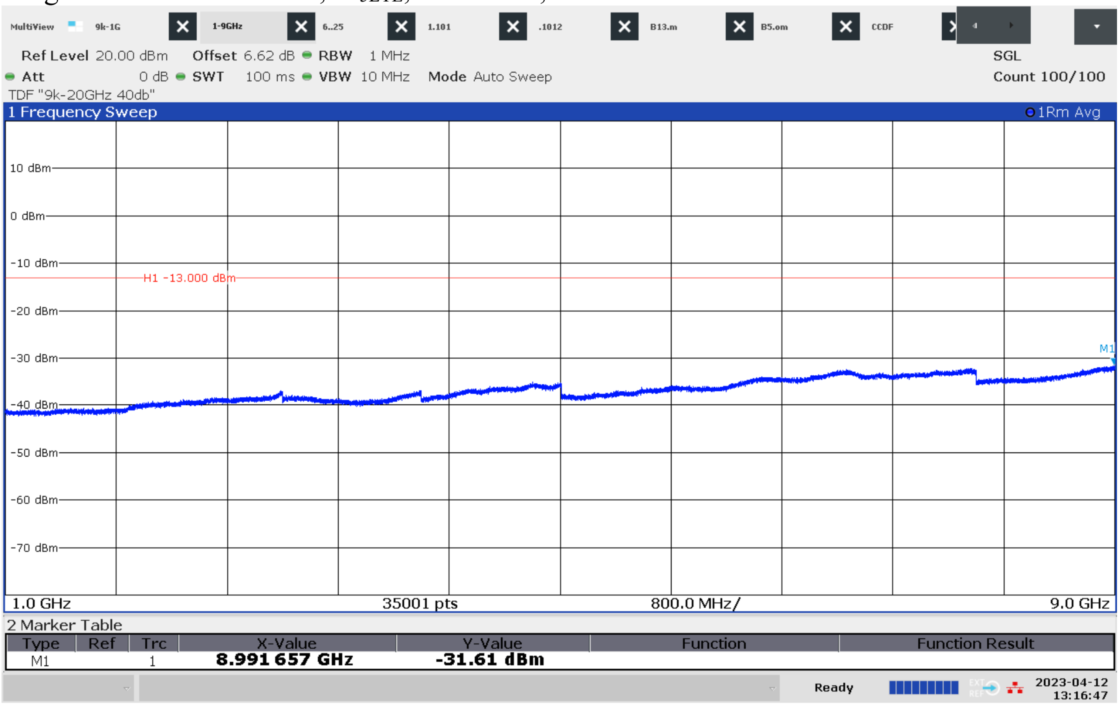
01:13:33 PM 04/12/2023

Diagram 3.2b LTE: TM1.1, M_{5LTE}, 763 – 805 MHz, Port A:



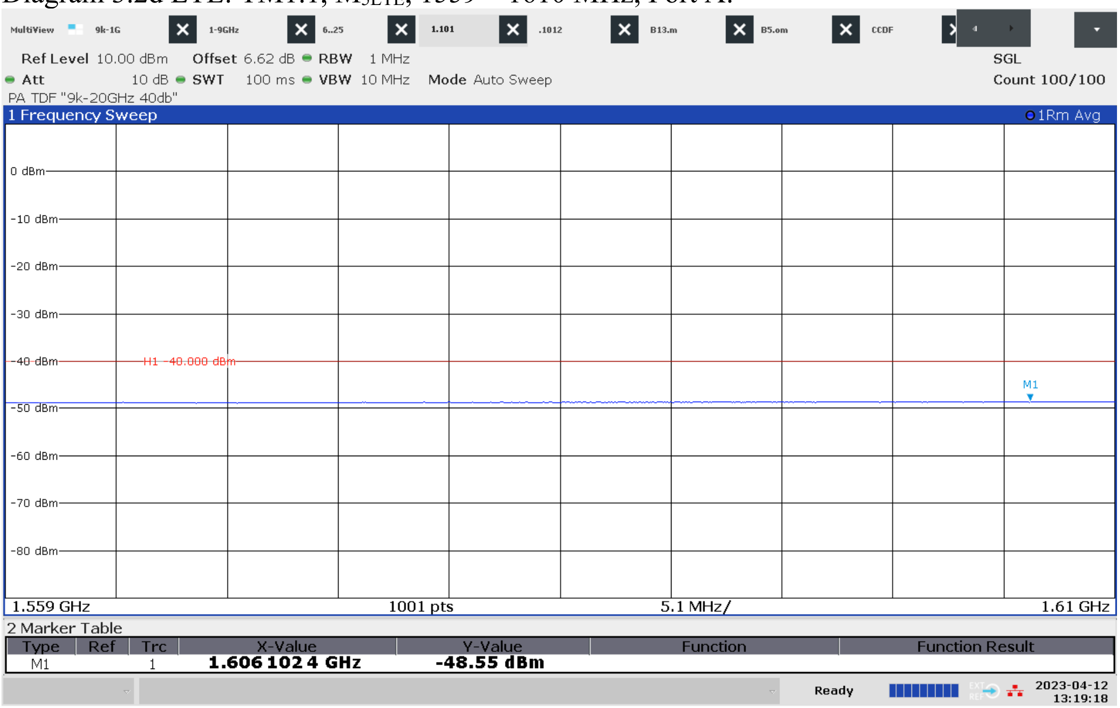
01:15:04 PM 04/12/2023

Diagram 3.2c LTE: TM1.1, M_{5LTE}, 1 – 9 GHz, Port A:



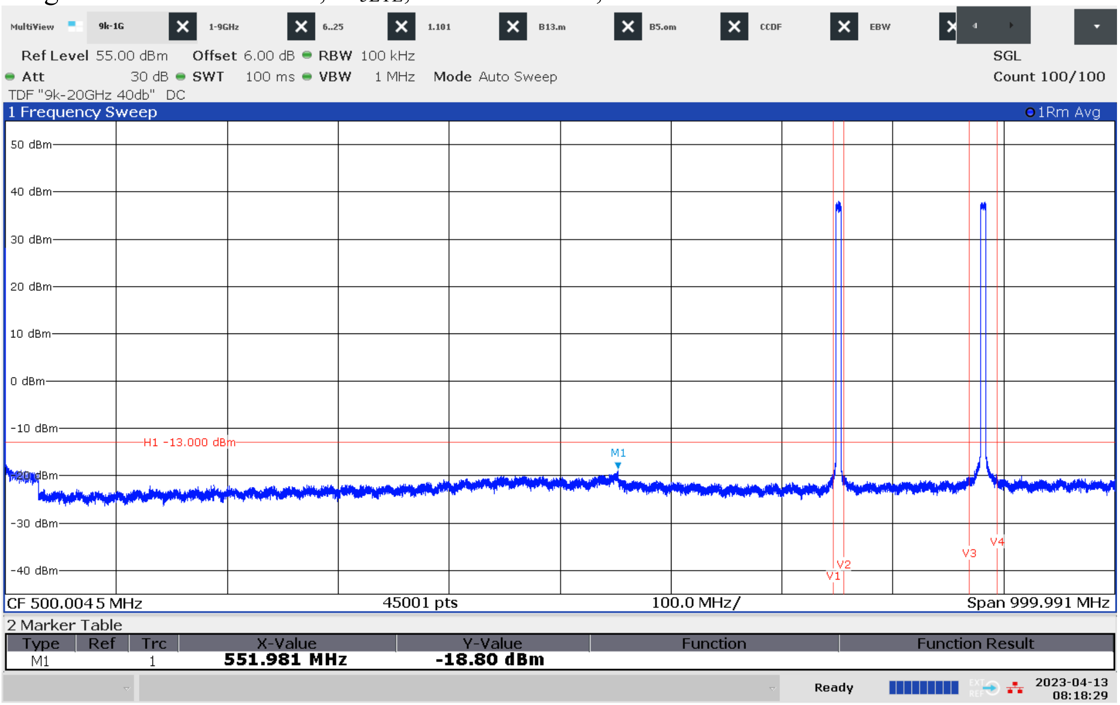
01:16:47 PM 04/12/2023

Diagram 3.2d LTE: TM1.1, M_{5LTE}, 1559 – 1610 MHz, Port A:



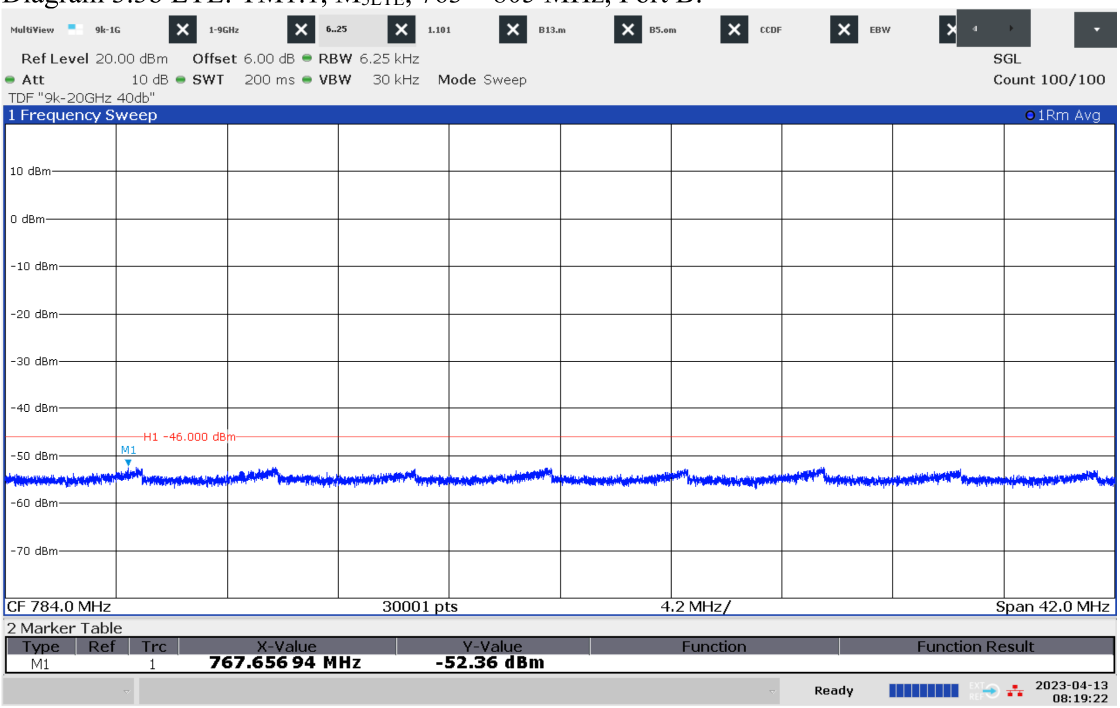
01:19:18 PM 04/12/2023

Diagram 3.3a LTE: TM1.1, M_{5LTE}, 9 kHz – 1 GHz, Port B:



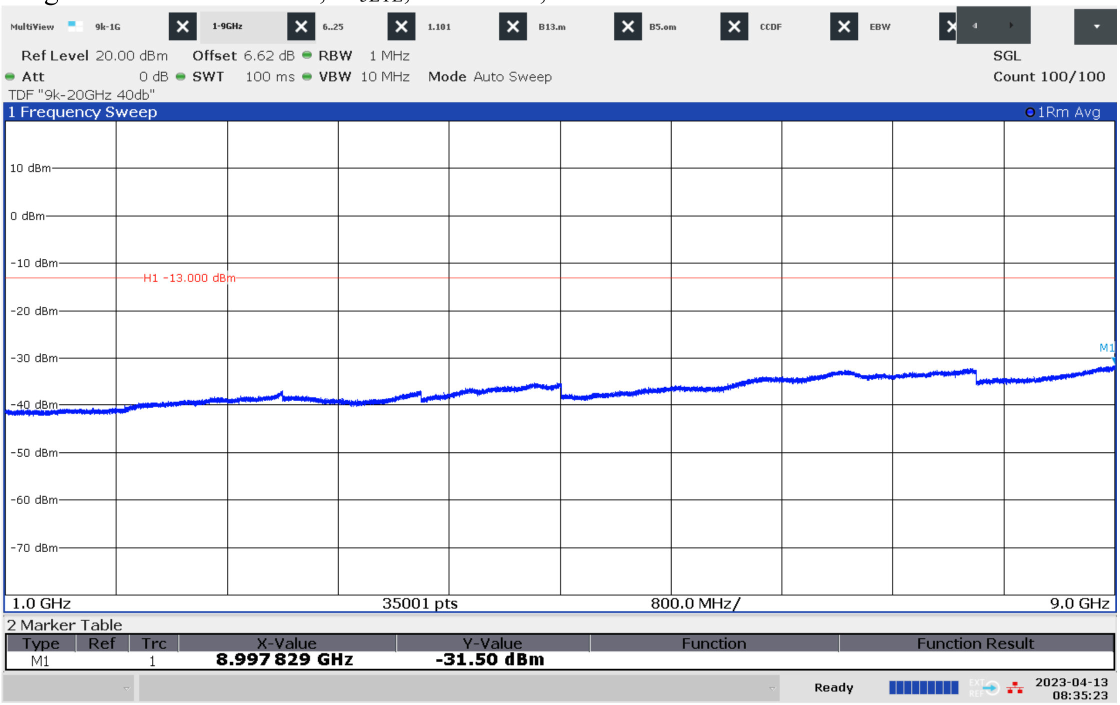
08:18:29 AM 04/13/2023

Diagram 3.3b LTE: TM1.1, M_{5LTE}, 763 – 805 MHz, Port B:



08:19:22 AM 04/13/2023

Diagram 3.3c LTE: TM1.1, M_{5LTE}, 1 – 9 GHz, Port B:



08:35:23 AM 04/13/2023

Diagram 3.3d LTE: TM1.1, M_{5LTE}, 1559 – 1610 MHz, Port B:

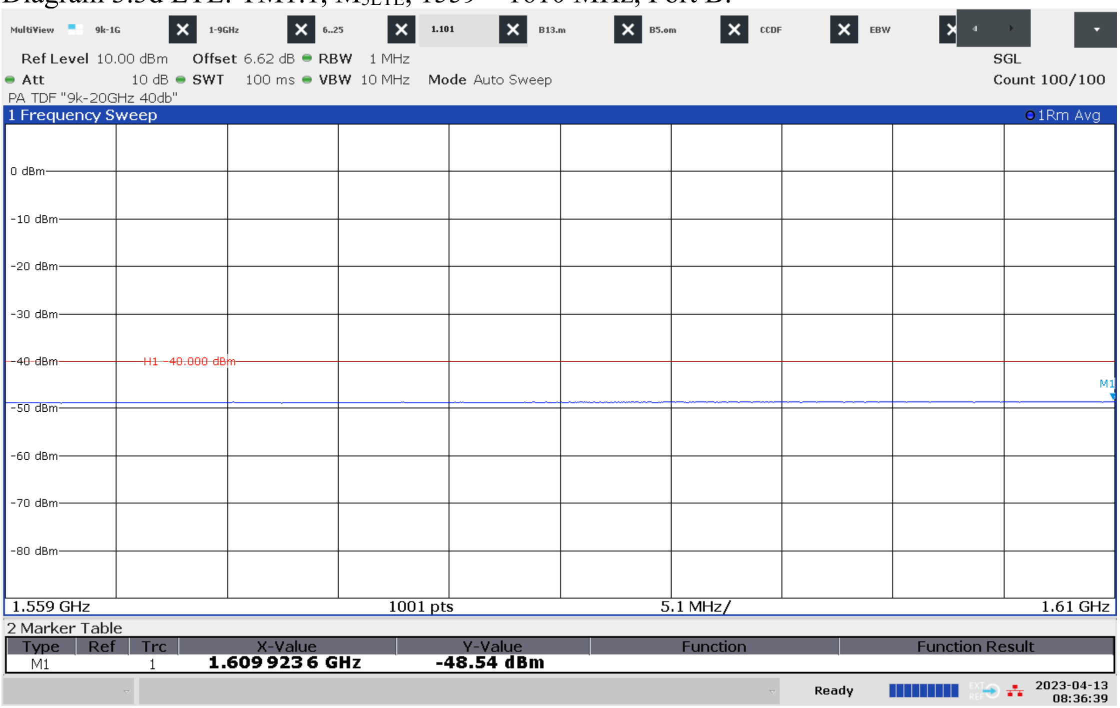


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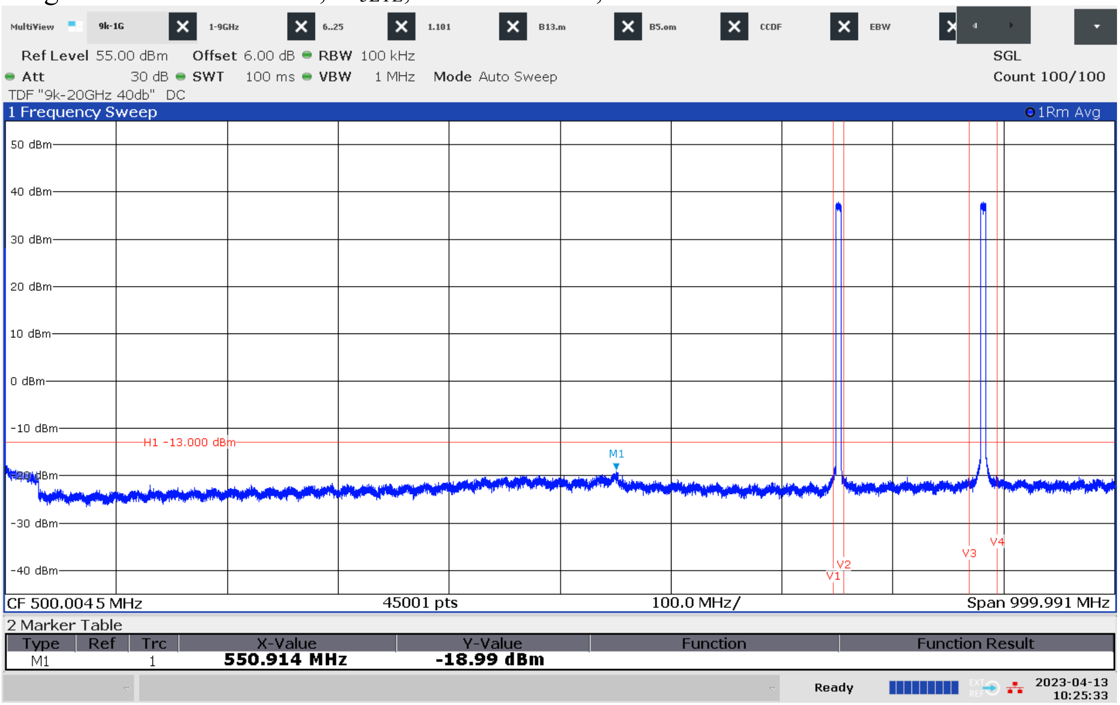
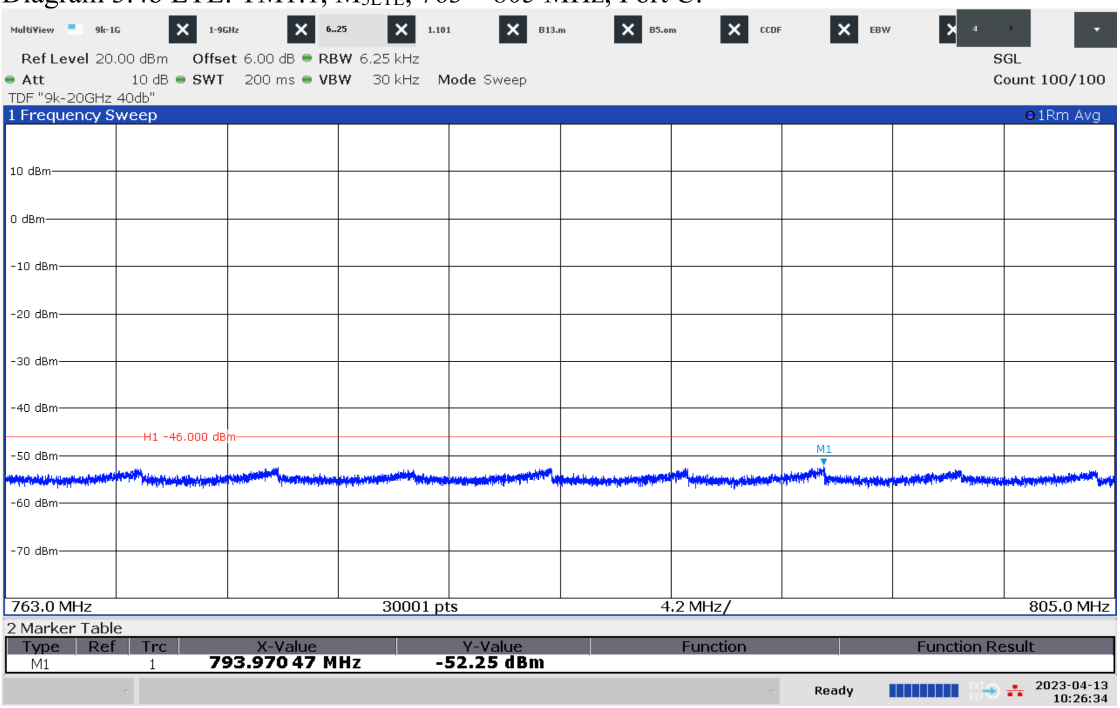
Diagram 3.4a LTE: TM1.1, M_{5LTE}, 9 kHz – 1 GHz, Port C:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	550.914 MHz	-18.99 dBm		

10:25:33 AM 04/13/2023

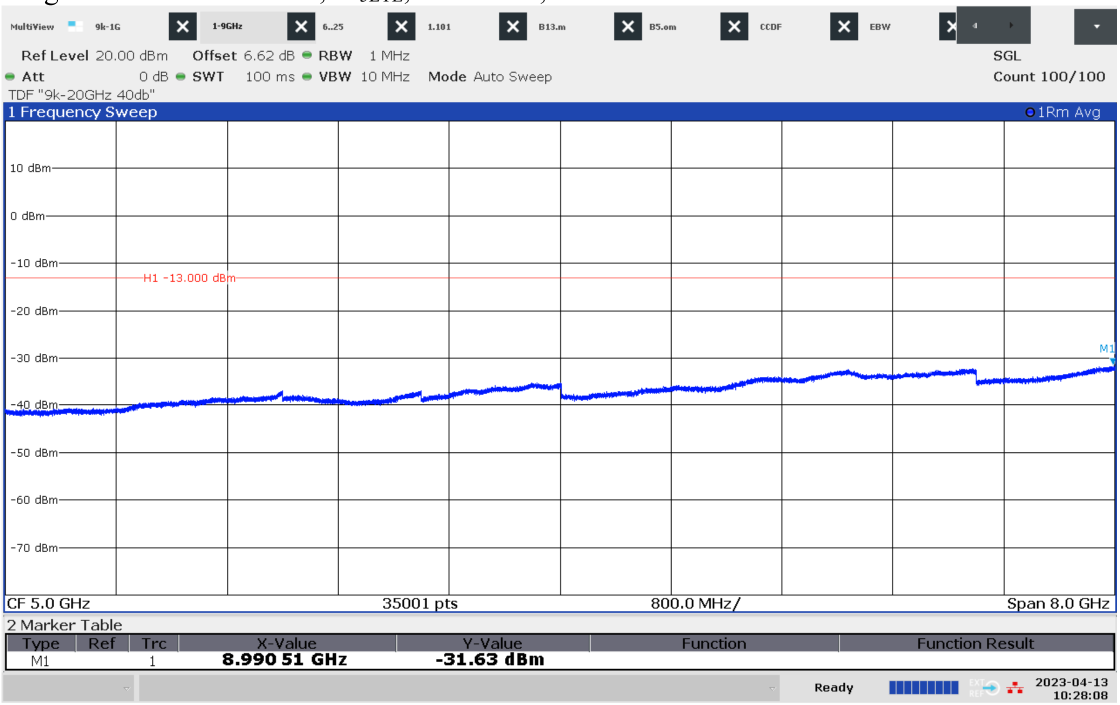
Diagram 3.4b LTE: TM1.1, M_{5LTE}, 763 – 805 MHz, Port C:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	793.970 47 MHz	-52.25 dBm		

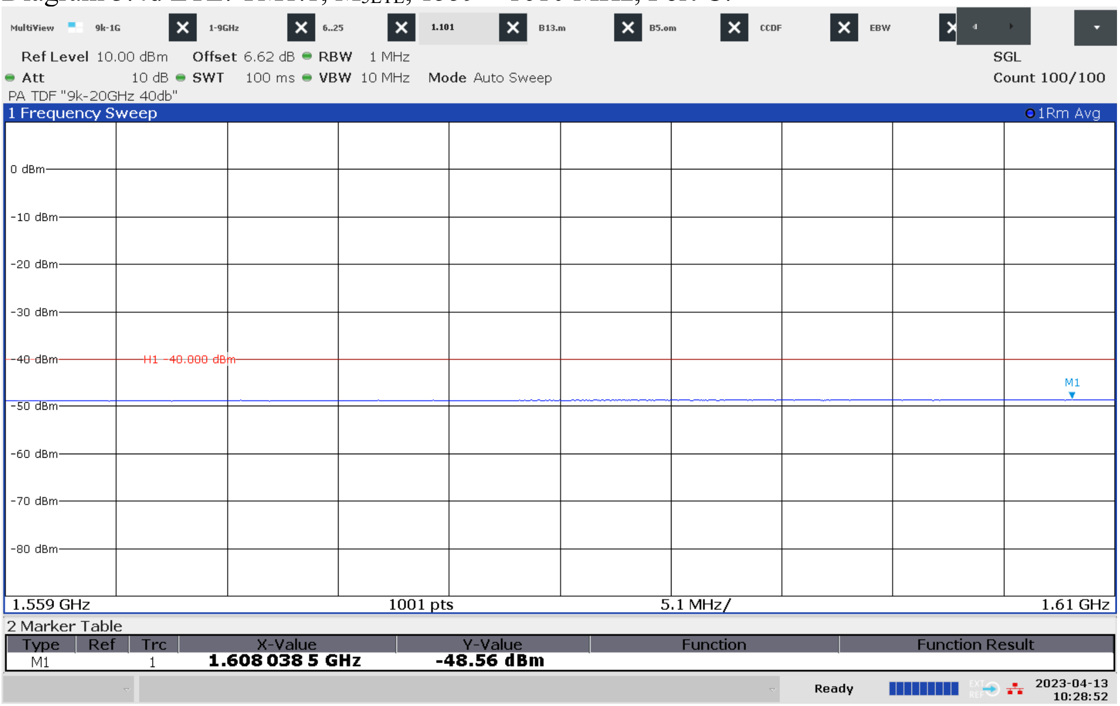
10:26:34 AM 04/13/2023

Diagram 3.4c LTE: TM1.1, M_{5LTE}, 1 – 9 GHz, Port C:



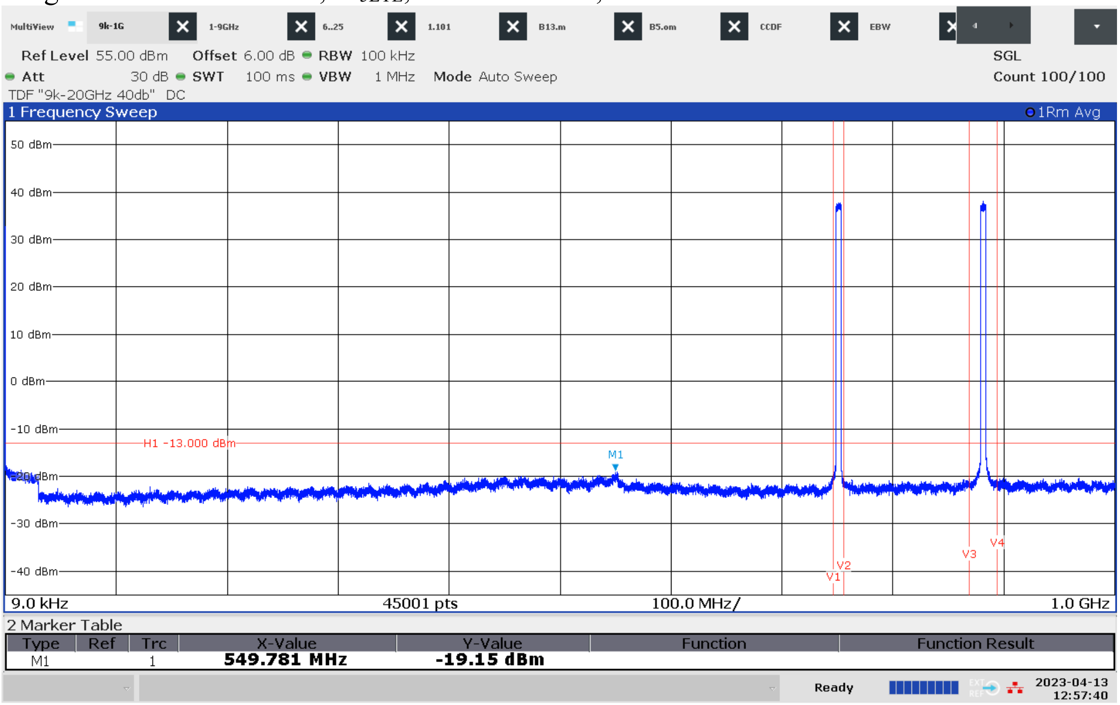
10:28:08 AM 04/13/2023

Diagram 3.4d LTE: TM1.1, M_{5LTE}, 1559 – 1610 MHz, Port C:



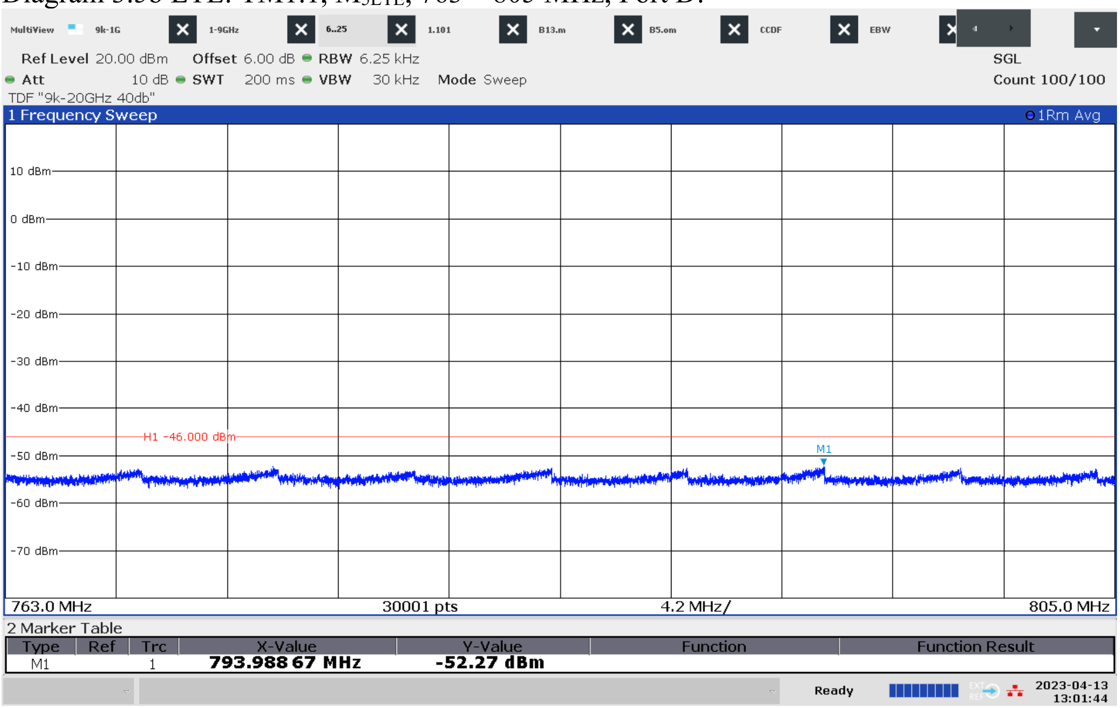
10:28:52 AM 04/13/2023

Diagram 3.5a LTE: TM1.1, M_{5LTE}, 9 kHz – 1 GHz, Port D:



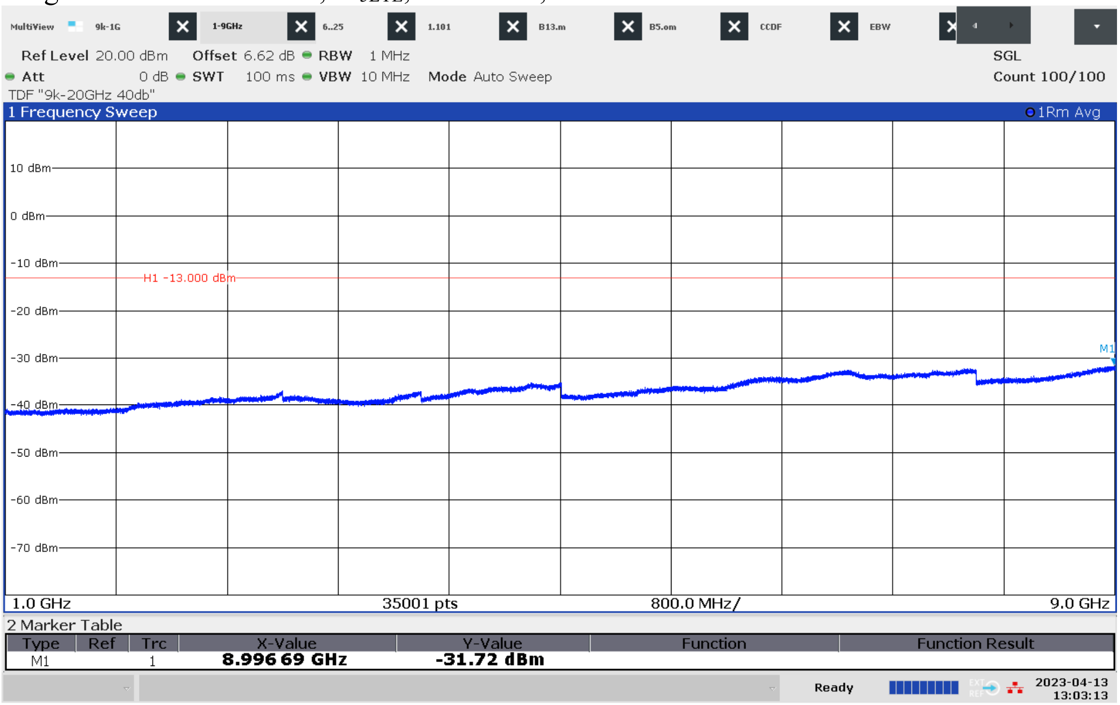
12:57:40 PM 04/13/2023

Diagram 3.5b LTE: TM1.1, M_{5LTE}, 763 – 805 MHz, Port D:



01:01:44 PM 04/13/2023

Diagram 3.5c LTE: TM1.1, M_{5LTE}, 1 – 9 GHz, Port D:



01:03:13 PM 04/13/2023

Diagram 3.5d LTE: TM1.1, M_{5LTE}, 1559 – 1610 MHz, Port D:

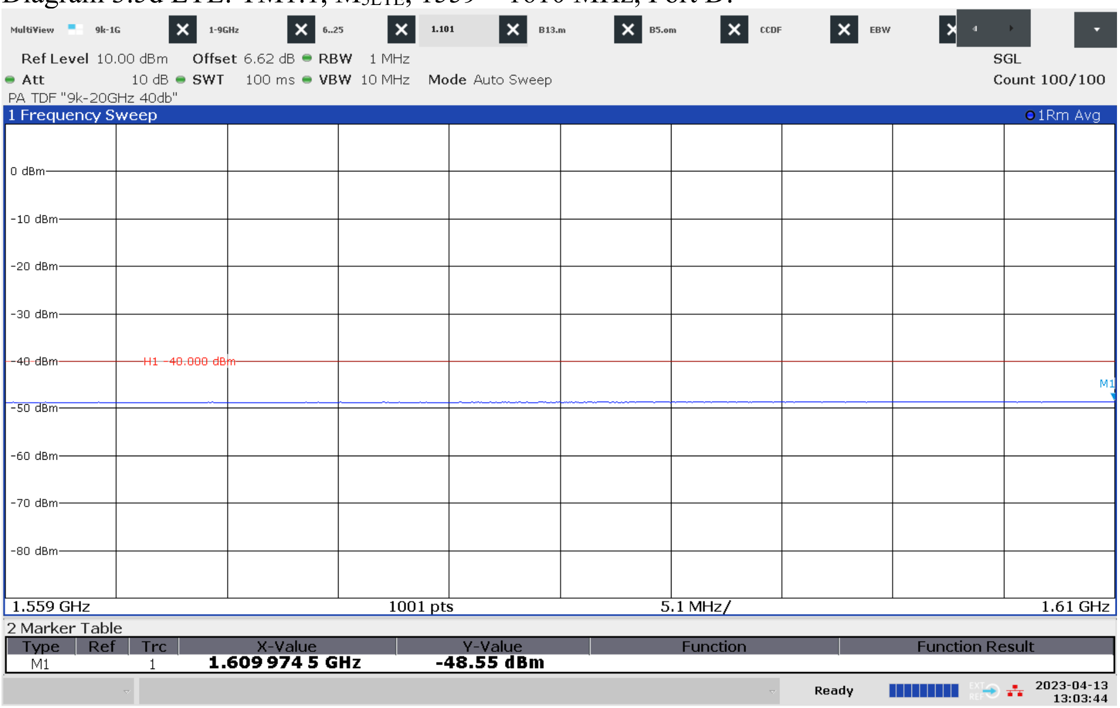


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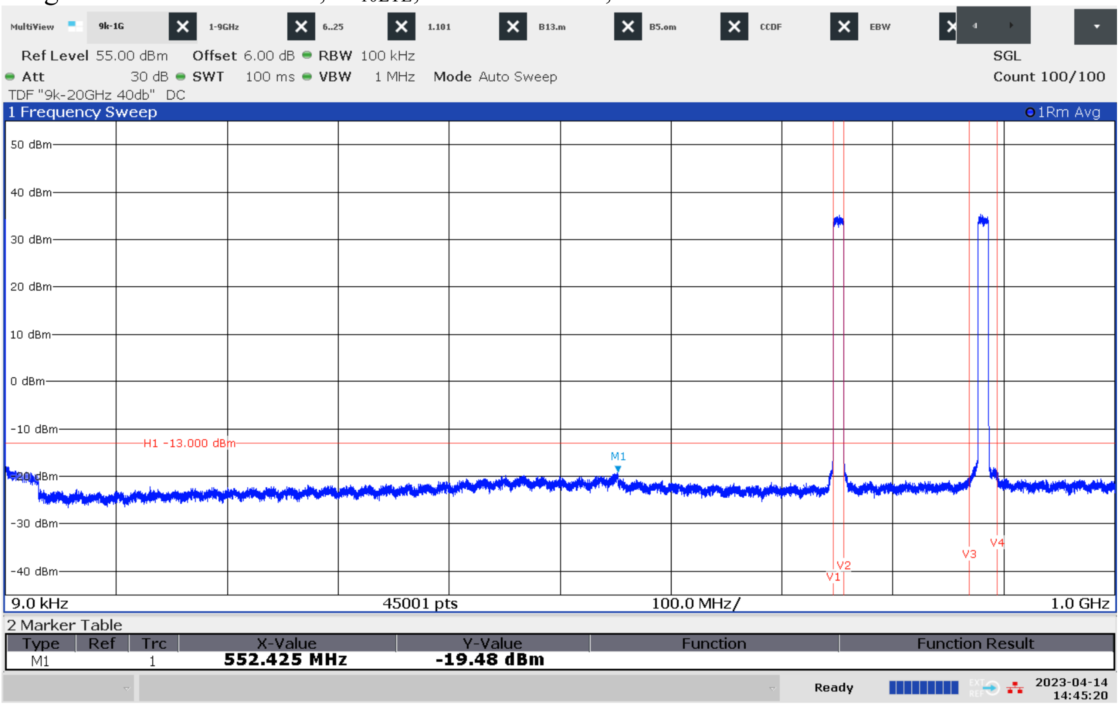
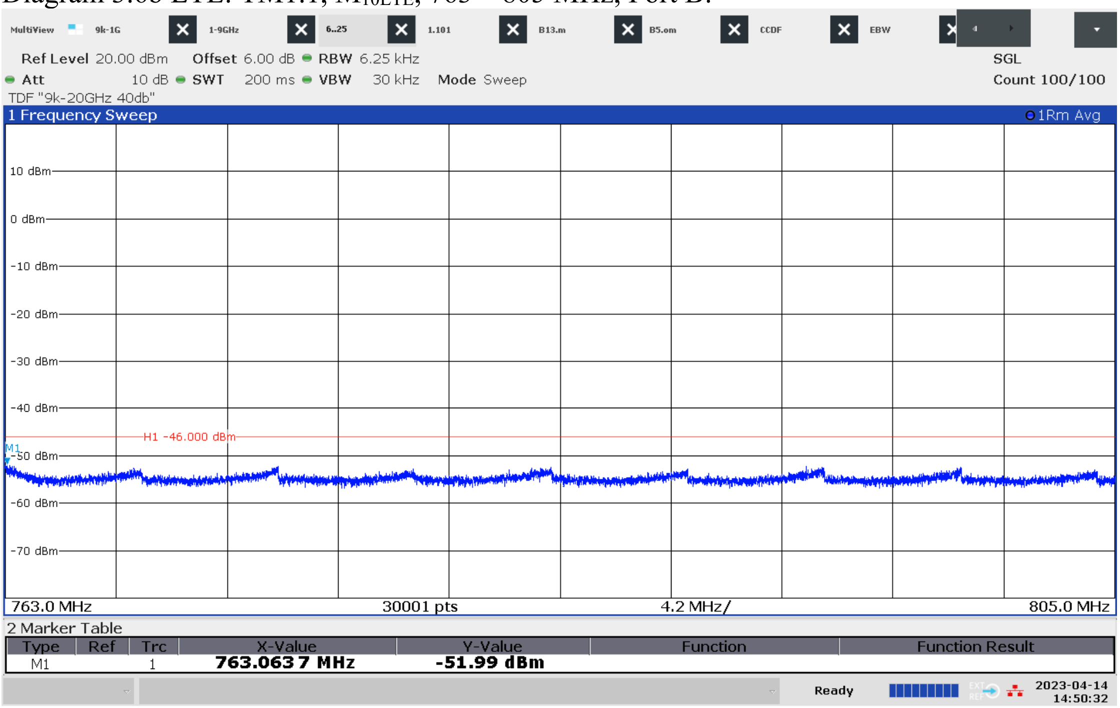
Diagram 3.6a LTE: TM1.1, M_{10LTE}, 9 kHz – 1 GHz, Port B:



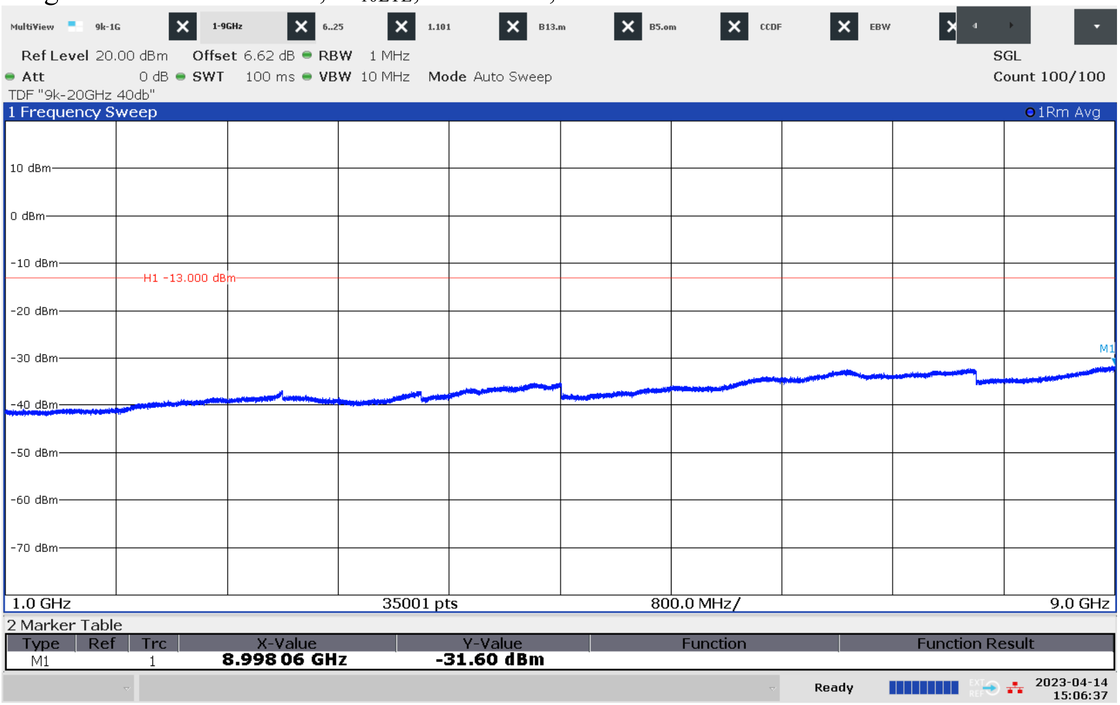
02:45:21 PM 04/14/2023

Diagram 3.6b LTE: TM1.1, M_{10LTE}, 763 – 805 MHz, Port B:



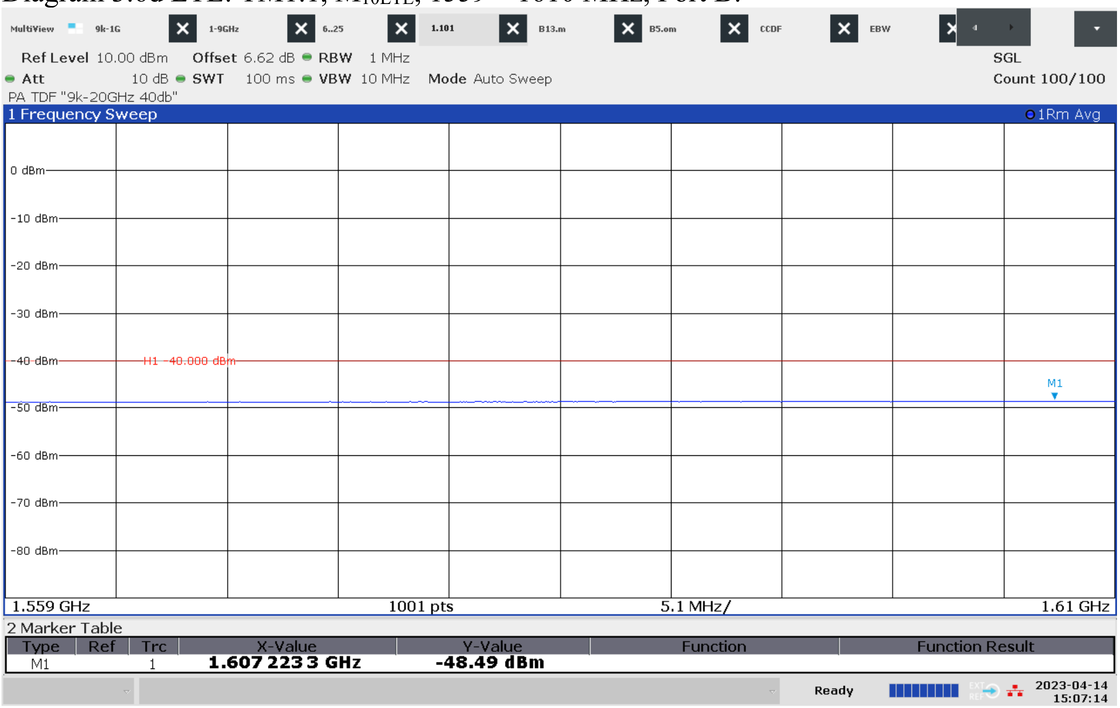
02:50:32 PM 04/14/2023

Diagram 3.6c LTE: TM1.1, M_{10LTE}, 1 – 9 GHz, Port B:



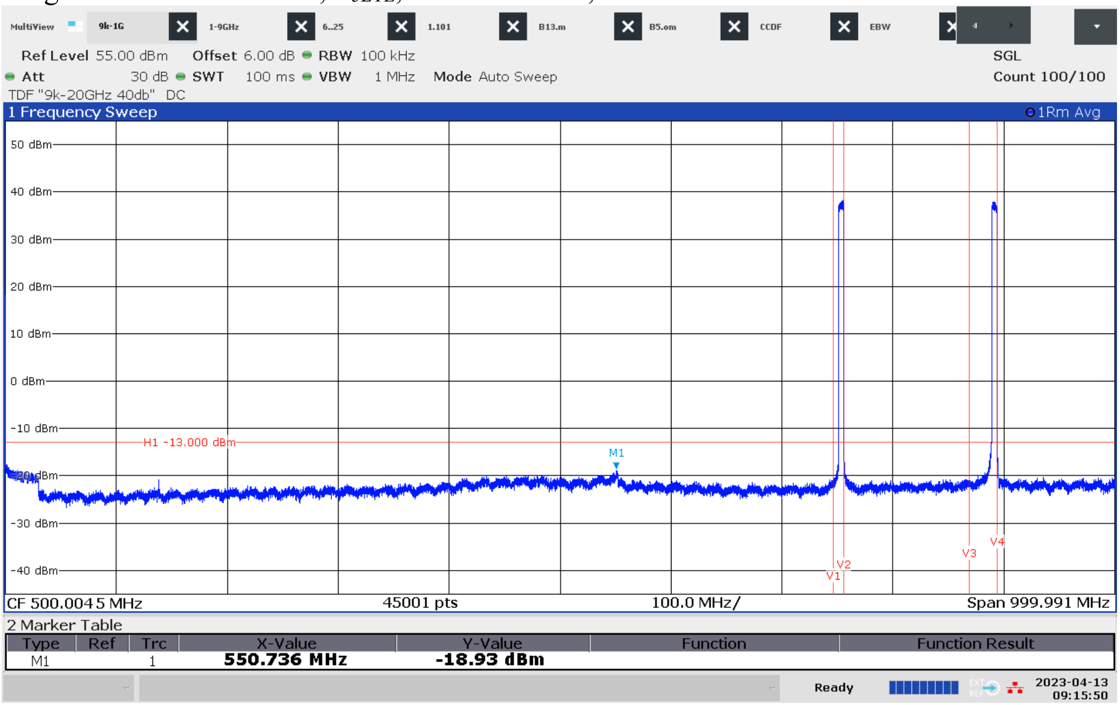
03:06:38 PM 04/14/2023

Diagram 3.6d LTE: TM1.1, M_{10LTE}, 1559 – 1610 MHz, Port B:



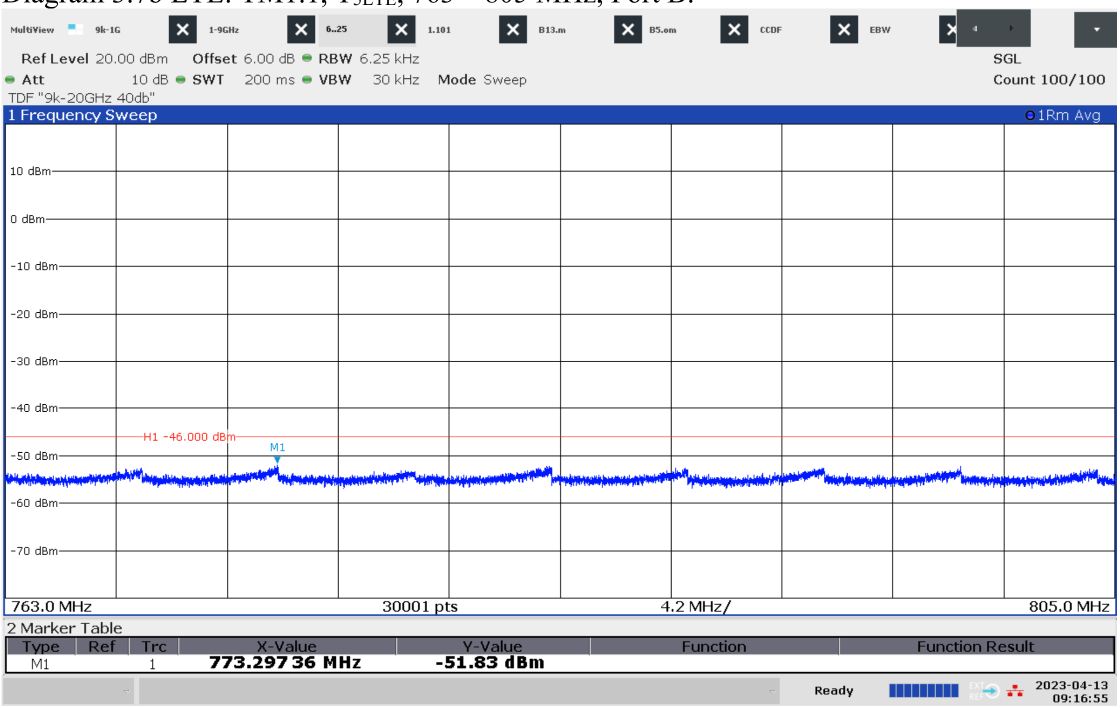
03:07:15 PM 04/14/2023

Diagram 3.7a LTE: TM1.1, T_{5LTE}, 9 kHz – 1 GHz, Port B:



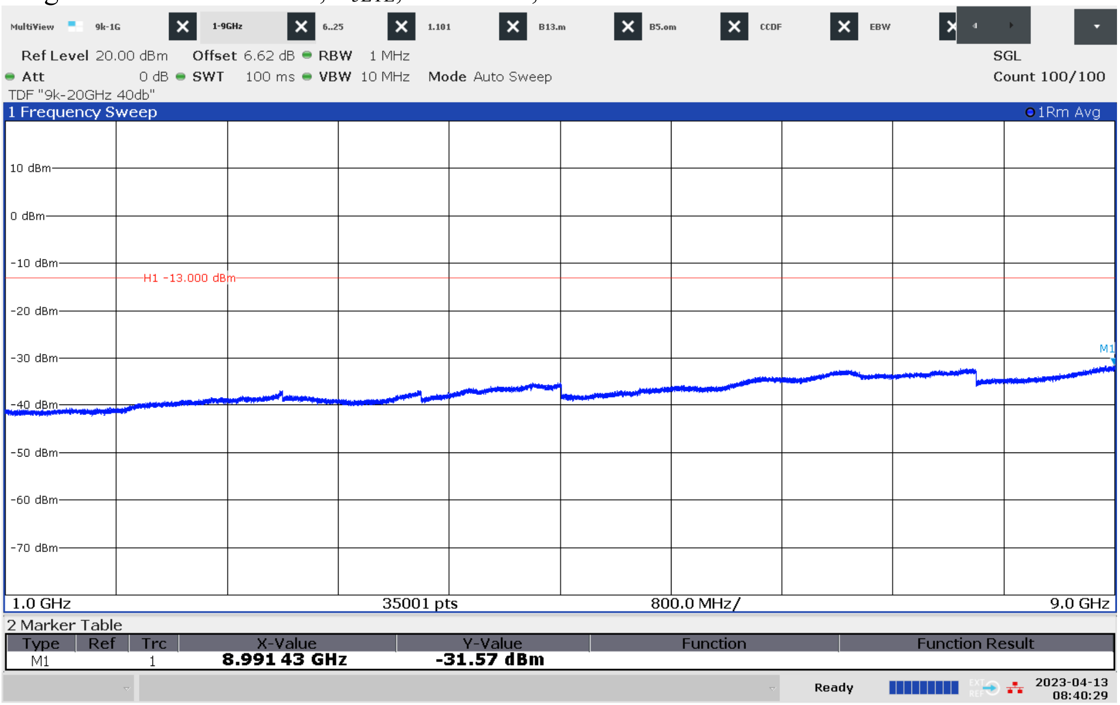
09:15:50 AM 04/13/2023

Diagram 3.7b LTE: TM1.1, T_{5LTE}, 763 – 805 MHz, Port B:



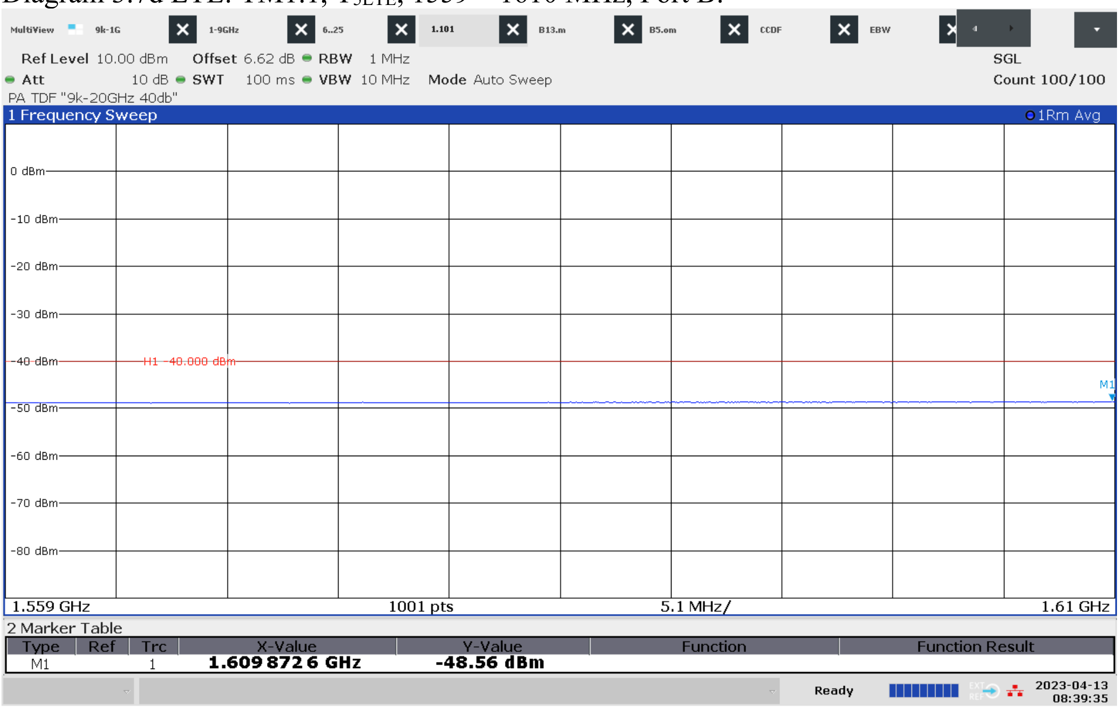
09:16:56 AM 04/13/2023

Diagram 3.7c LTE: TM1.1, T_{5LTE}, 1 – 9 GHz, Port B:



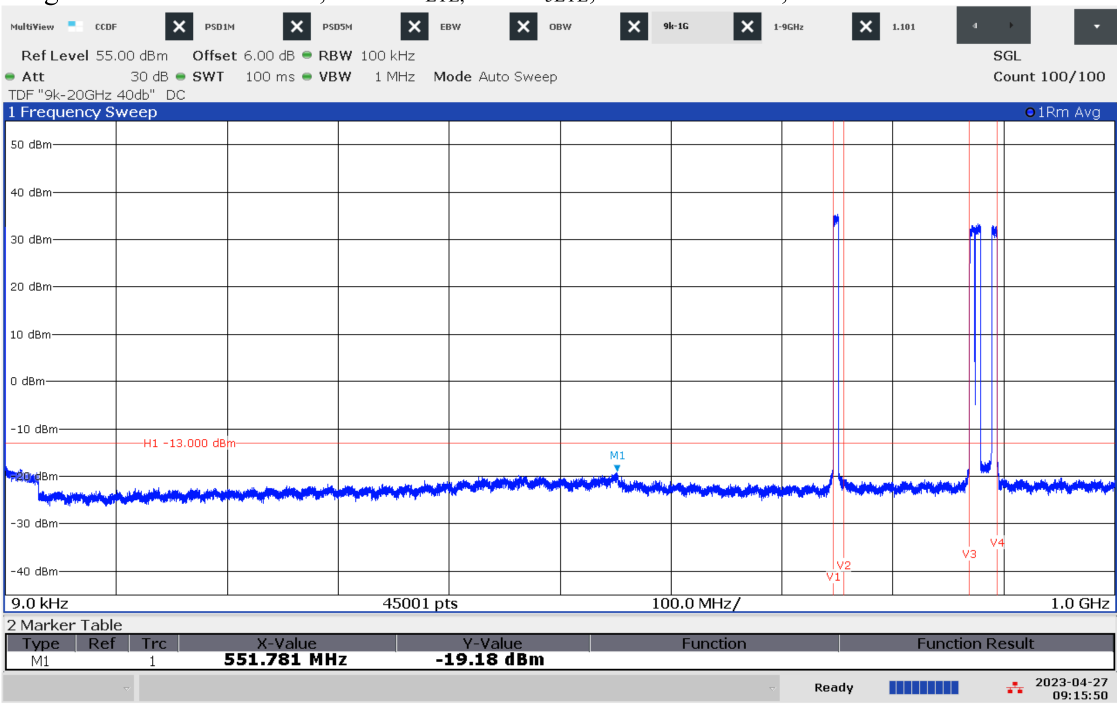
08:40:29 AM 04/13/2023

Diagram 3.7d LTE: TM1.1, T_{5LTE}, 1559 – 1610 MHz, Port B:



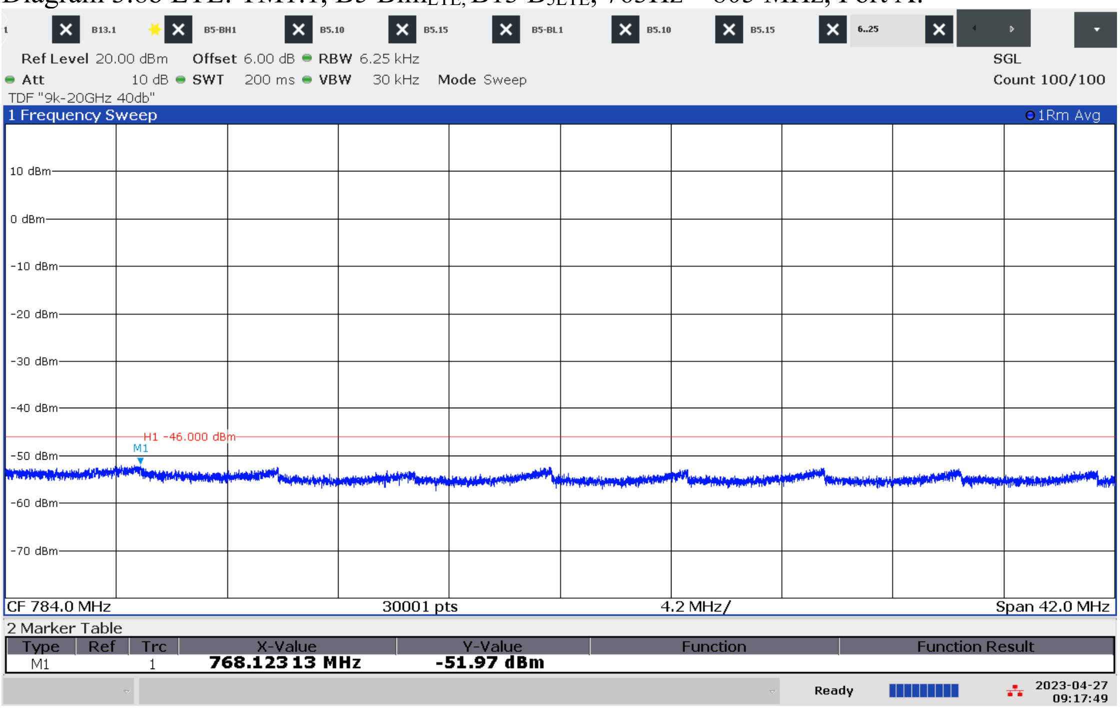
08:39:36 AM 04/13/2023

Diagram 3.8a LTE: TM1.1, B5 Bim$_{LTE}$, B13 B5$_{LTE}$, 9 kHz – 1 GHz, Port A:



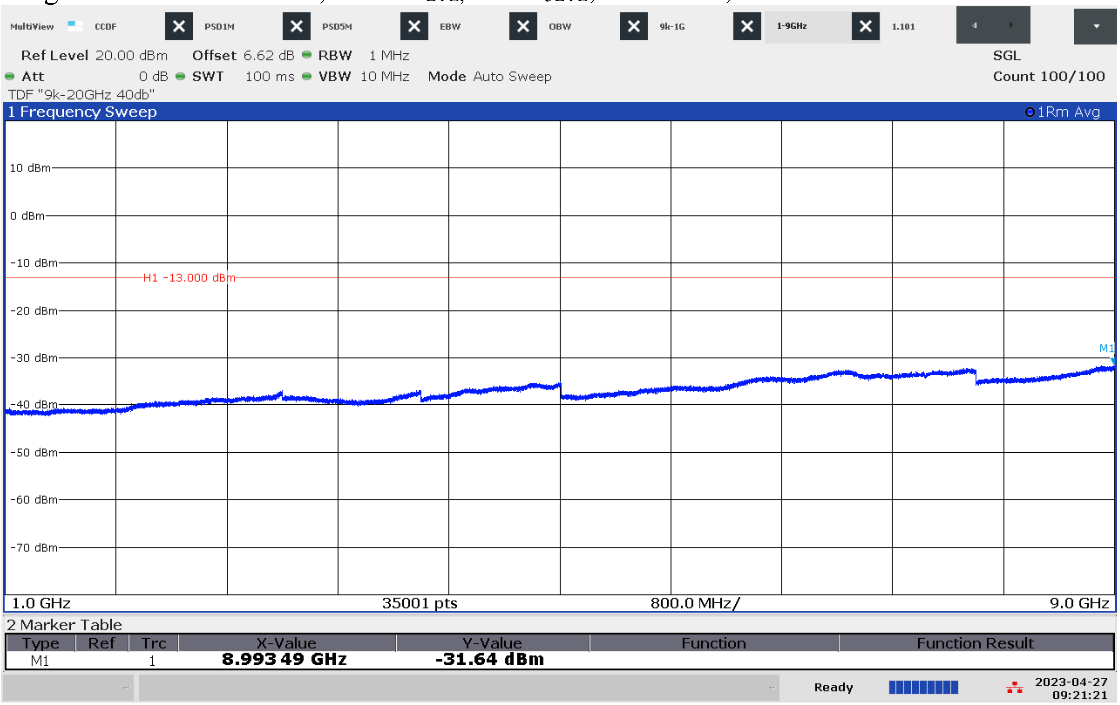
09:15:50 AM 04/27/2023

Diagram 3.8b LTE: TM1.1, B5 Bim$_{LTE}$, B13 B5$_{LTE}$, 763Hz – 805 MHz, Port A:



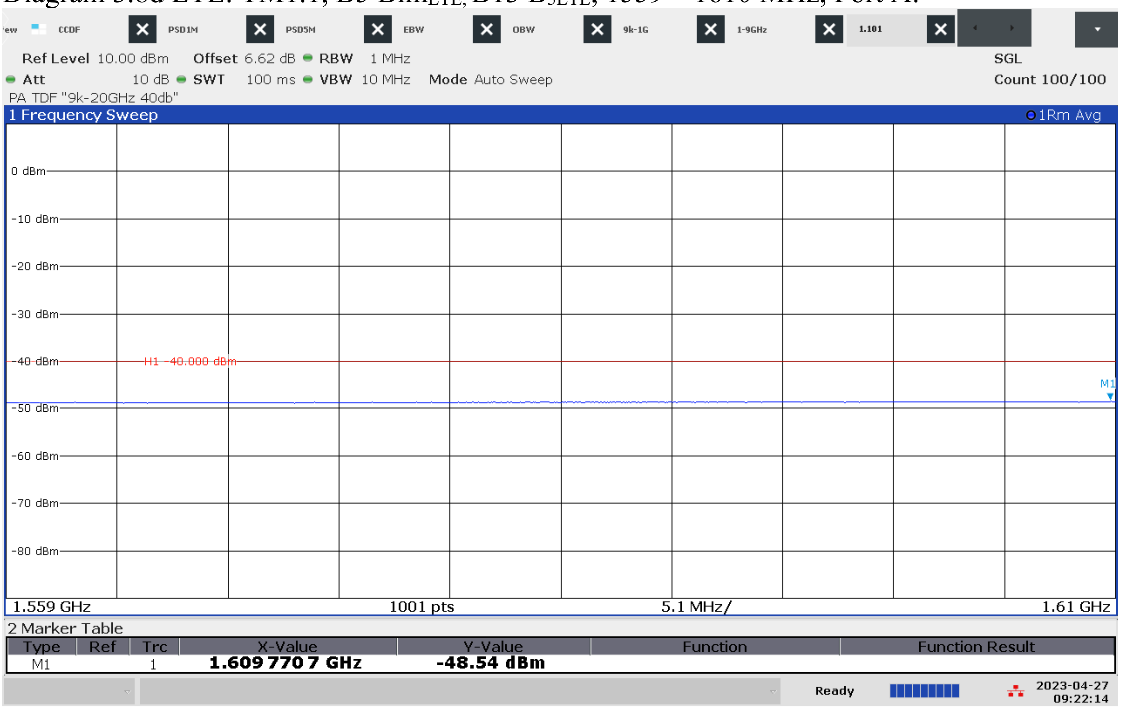
09:17:50 AM 04/27/2023

Diagram 3.8c LTE: TM1.1, B5 Bim$_{LTE}$, B13 B5$_{LTE}$, 1 – 9 GHz, Port A:



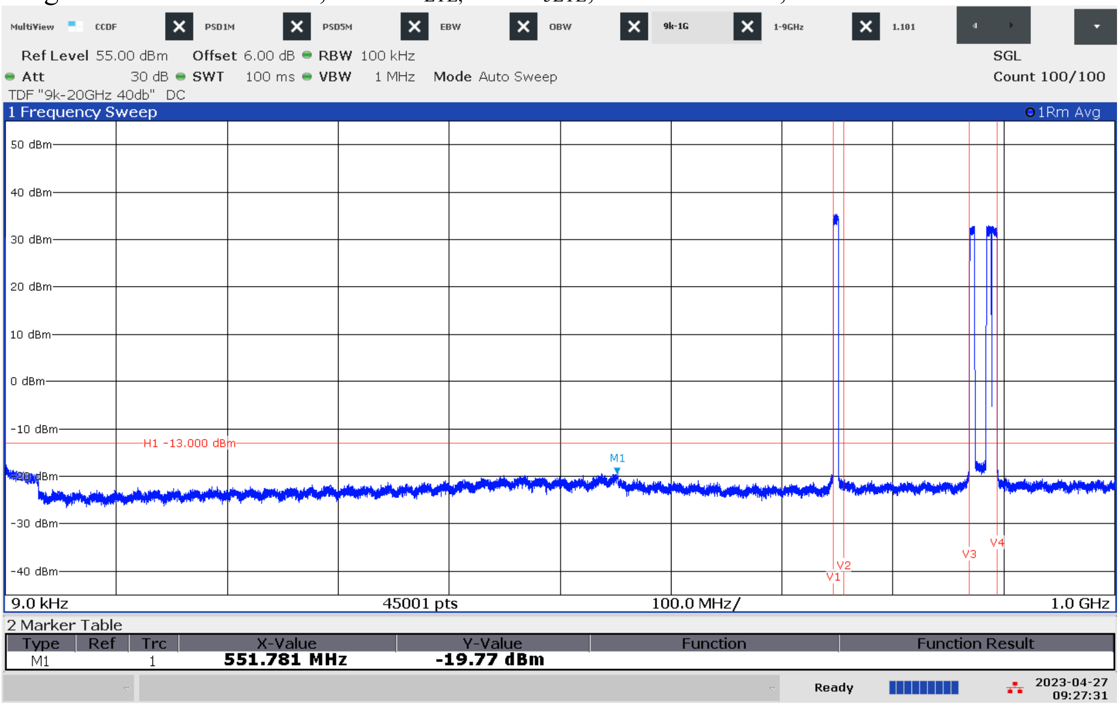
09:21:21 AM 04/27/2023

Diagram 3.8d LTE: TM1.1, B5 Bim$_{LTE}$, B13 B5$_{LTE}$, 1559 – 1610 MHz, Port A:



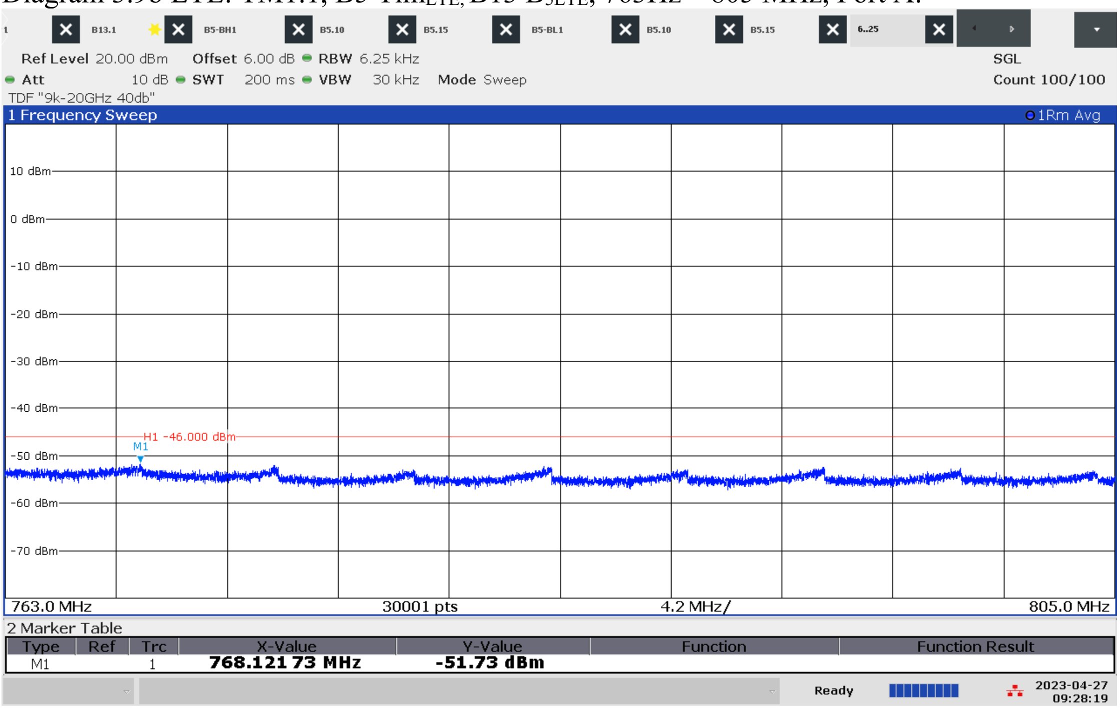
09:22:14 AM 04/27/2023

Diagram 3.9a LTE: TM1.1, B5 Tim$_{LTE}$, B13 B5$_{LTE}$, 9 kHz – 1 GHz, Port A:



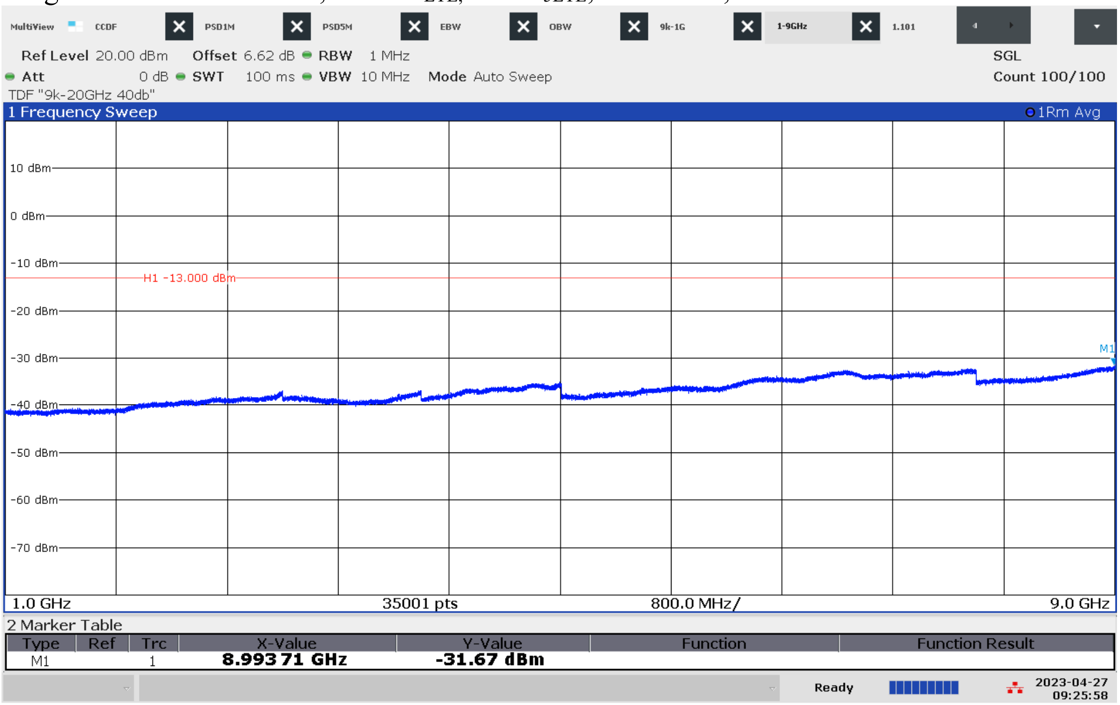
09:27:31 AM 04/27/2023

Diagram 3.9b LTE: TM1.1, B5 Tim$_{LTE}$, B13 B5$_{LTE}$, 763Hz – 805 MHz, Port A:



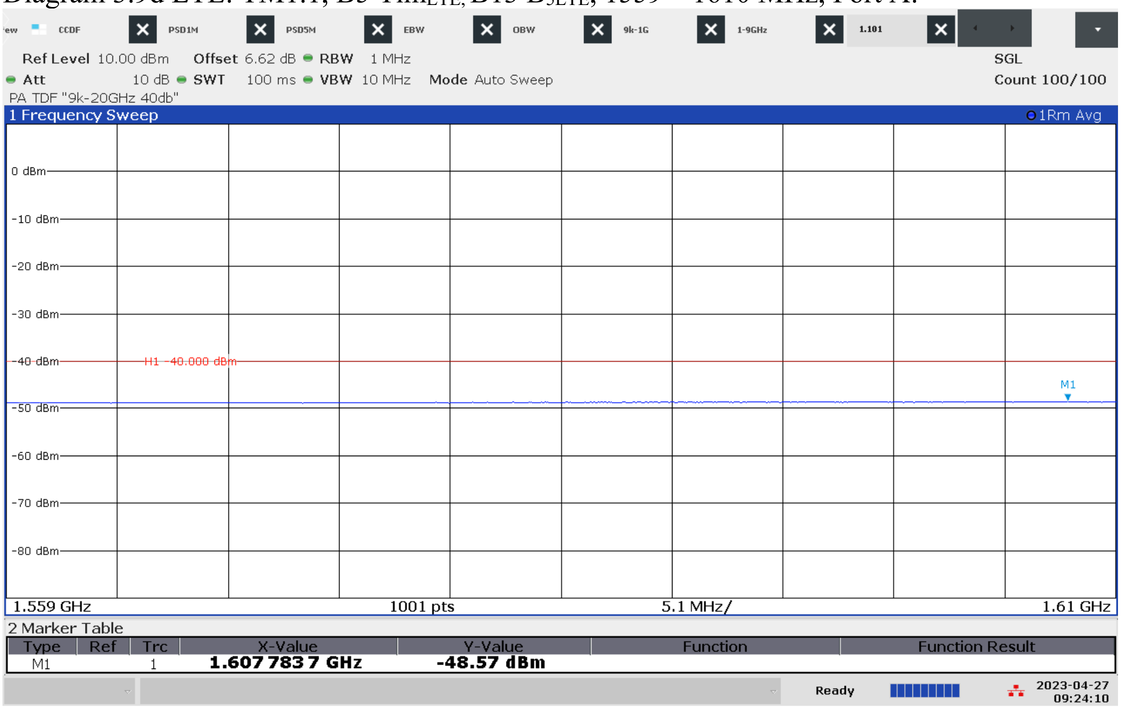
09:28:19 AM 04/27/2023

Diagram 3.9c LTE: TM1.1, B5 Tim$_{LTE}$, B13 B$_{5LTE}$, 1 – 9 GHz, Port A:



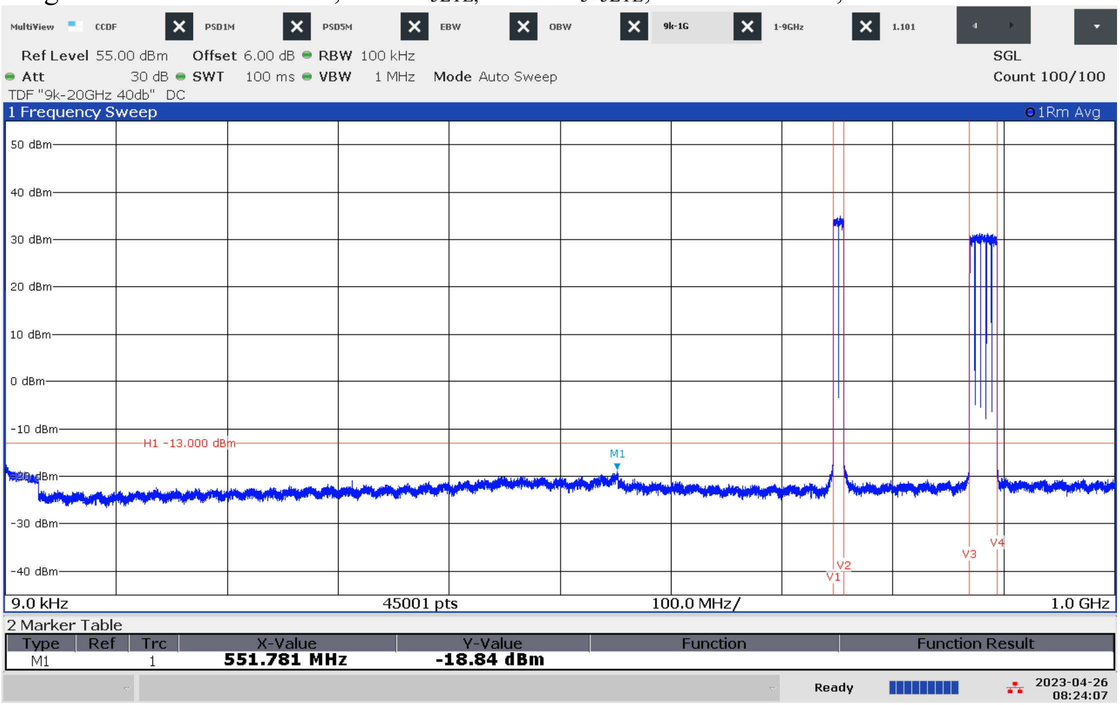
09:25:58 AM 04/27/2023

Diagram 3.9d LTE: TM1.1, B5 Tim$_{LTE}$, B13 B$_{5LTE}$, 1559 – 1610 MHz, Port A:



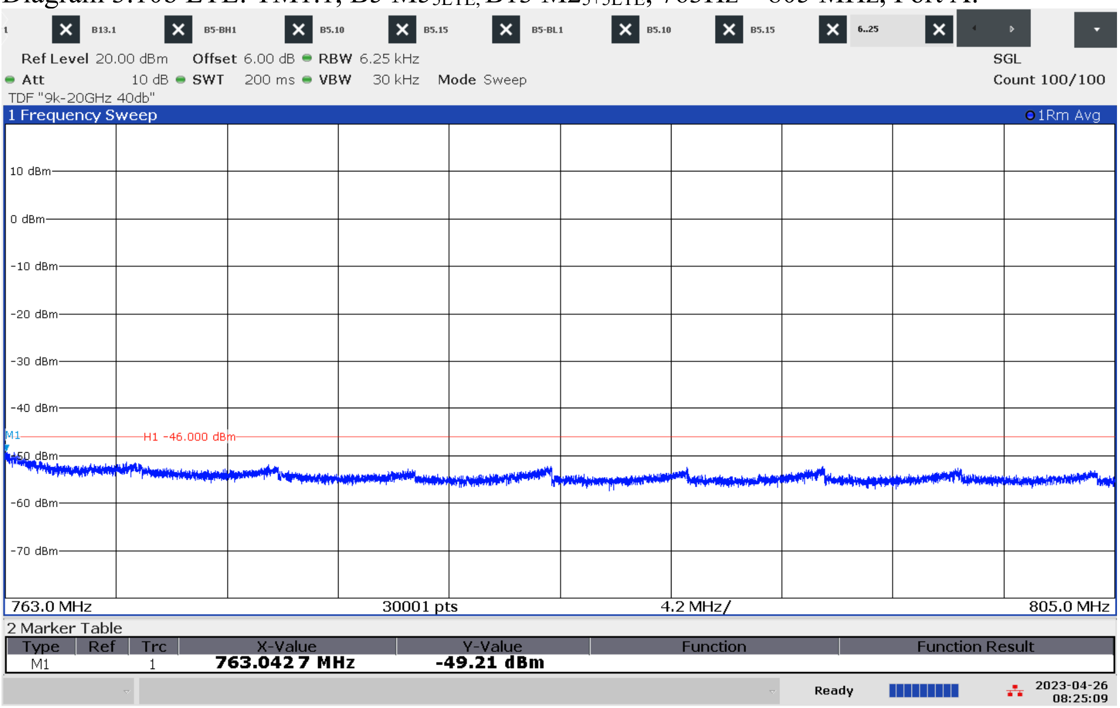
09:24:10 AM 04/27/2023

Diagram 3.10a LTE: TM1.1, B5 M5$_{5LTE}$, B13 M2$_{5+5LTE}$, 9 kHz – 1 GHz, Port A:



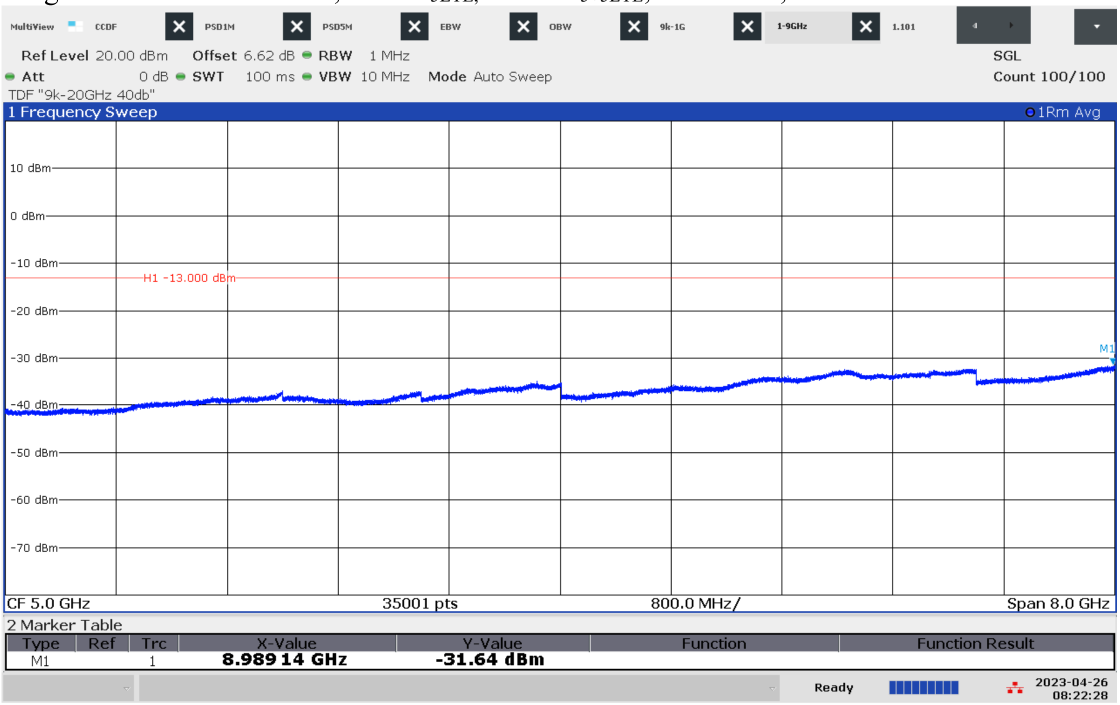
08:24:07 AM 04/26/2023

Diagram 3.10b LTE: TM1.1, B5 M5$_{5LTE}$, B13 M2$_{5+5LTE}$, 763Hz – 805 MHz, Port A:



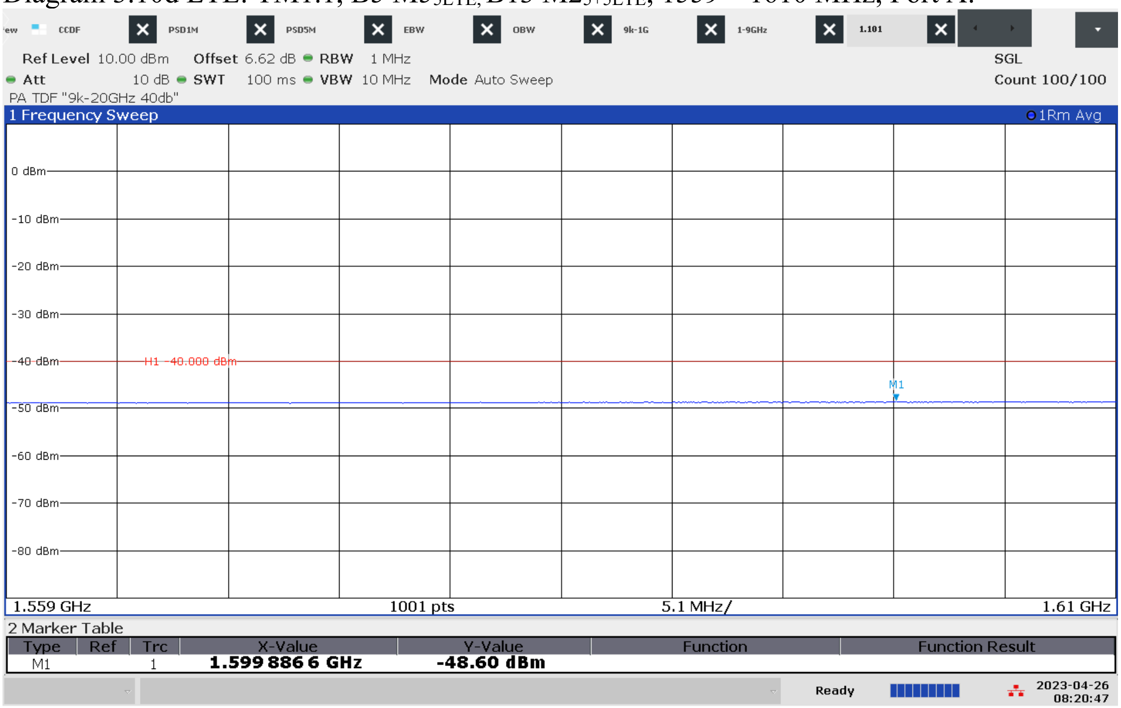
08:25:09 AM 04/26/2023

Diagram 3.10c LTE: TM1.1, B5 M5$_{5LTE}$, B13 M2$_{5+5LTE}$, 1 – 9 GHz, Port A:



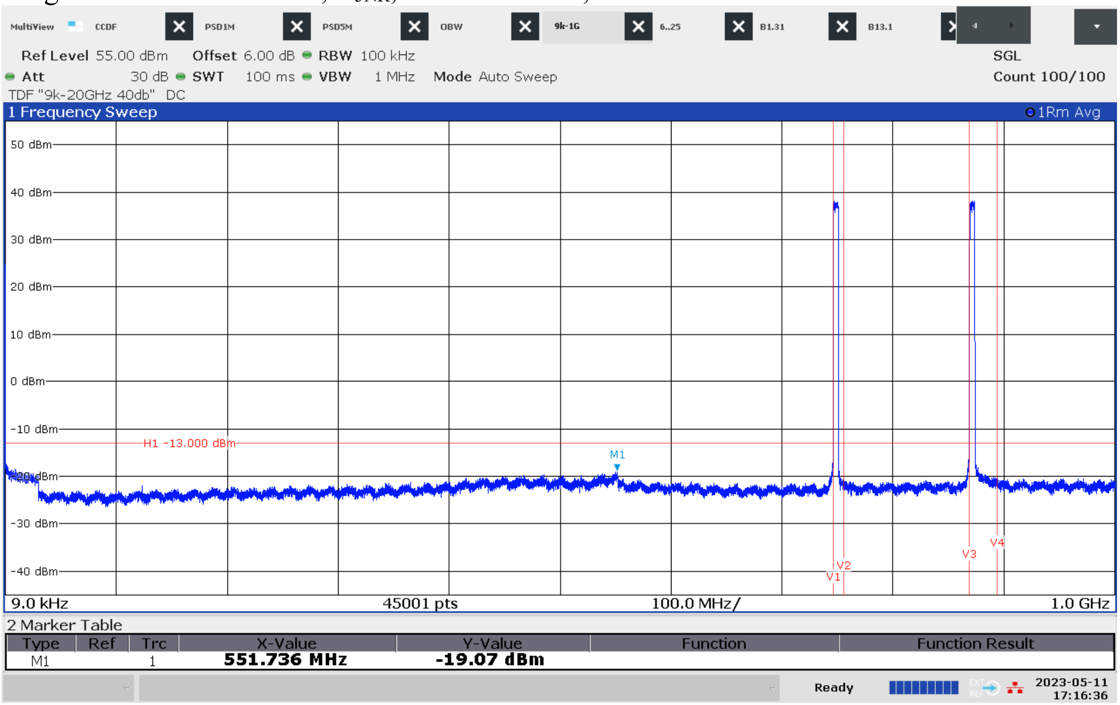
08:22:28 AM 04/26/2023

Diagram 3.10d LTE: TM1.1, B5 M5$_{5LTE}$, B13 M2$_{5+5LTE}$, 1559 – 1610 MHz, Port A:



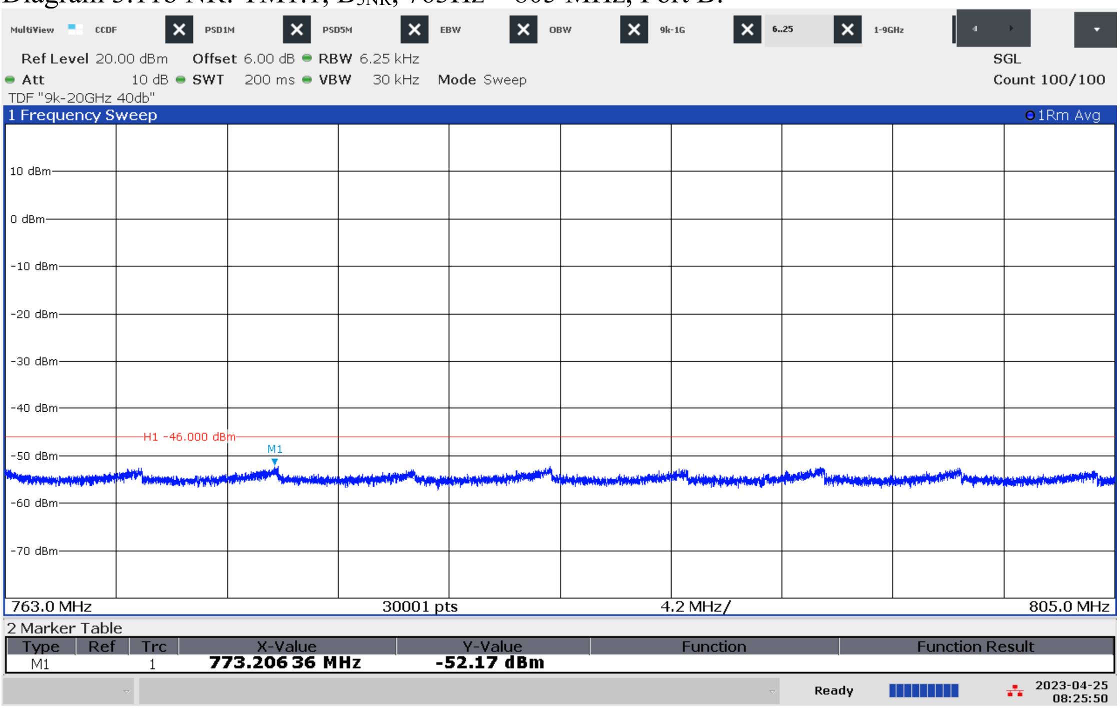
08:20:47 AM 04/26/2023

Diagram 3.11a NR: TM1.1, B$_{5NR}$, 9 kHz – 1 GHz, Port B:



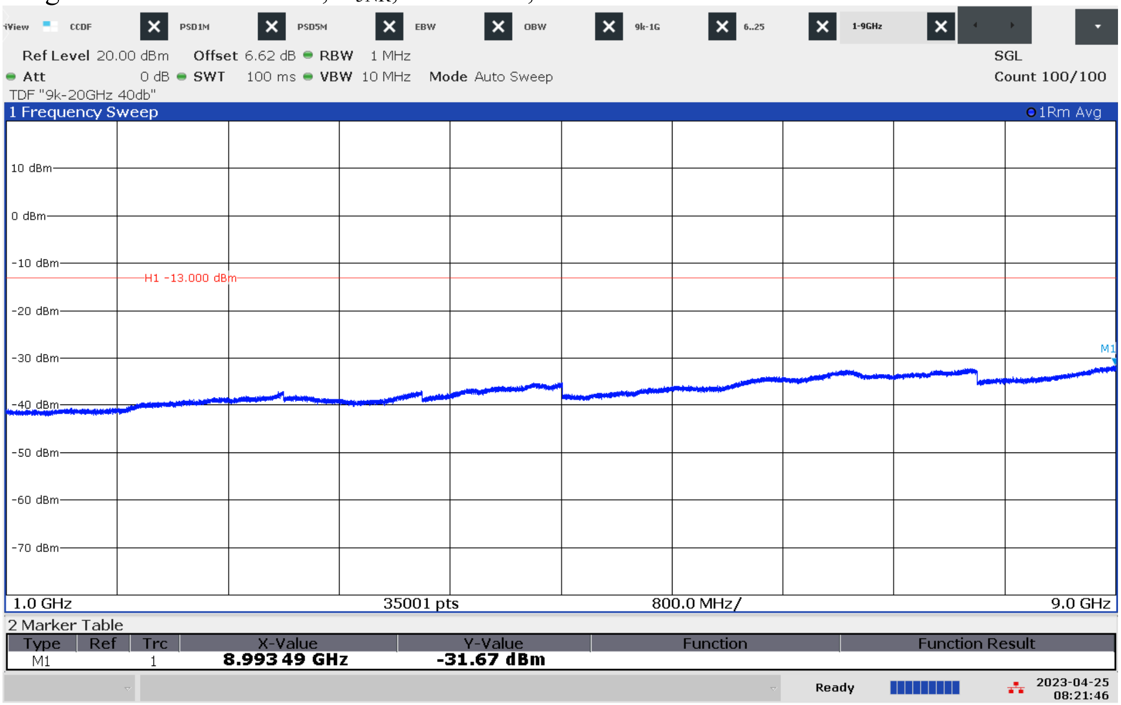
05:16:37 PM 05/11/2023

Diagram 3.11b NR: TM1.1, B$_{5NR}$, 763Hz – 805 MHz, Port B:



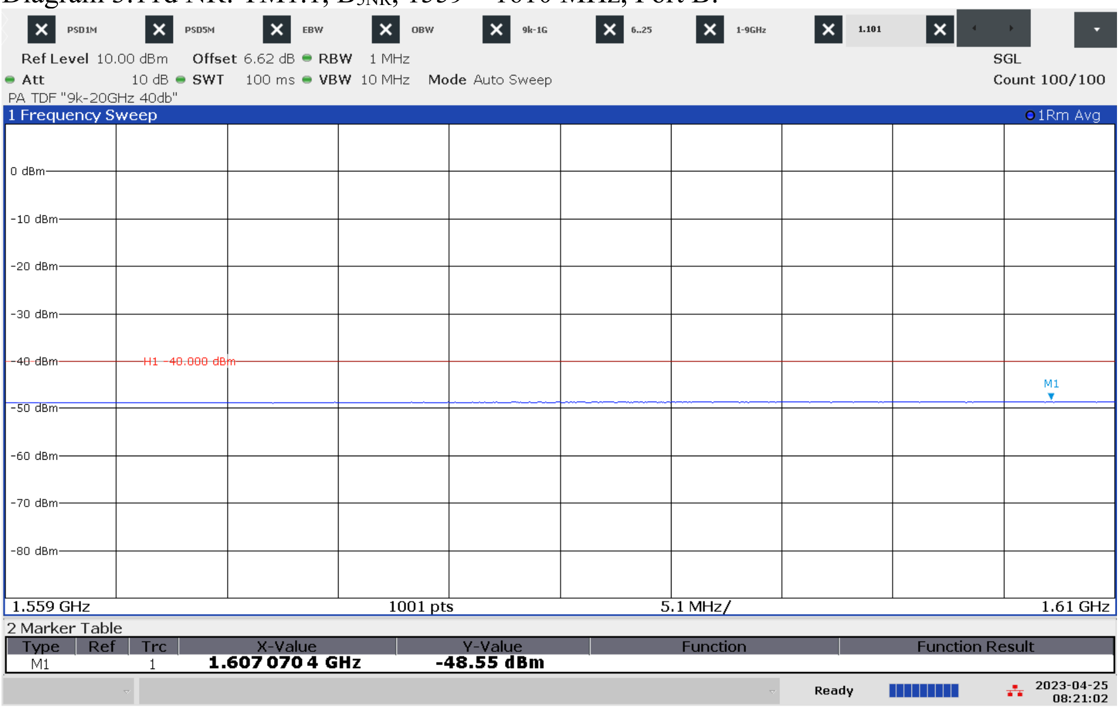
08:25:50 AM 04/25/2023

Diagram 3.11c NR: TM1.1, B_{5NR}, 1 – 9 GHz, Port B:



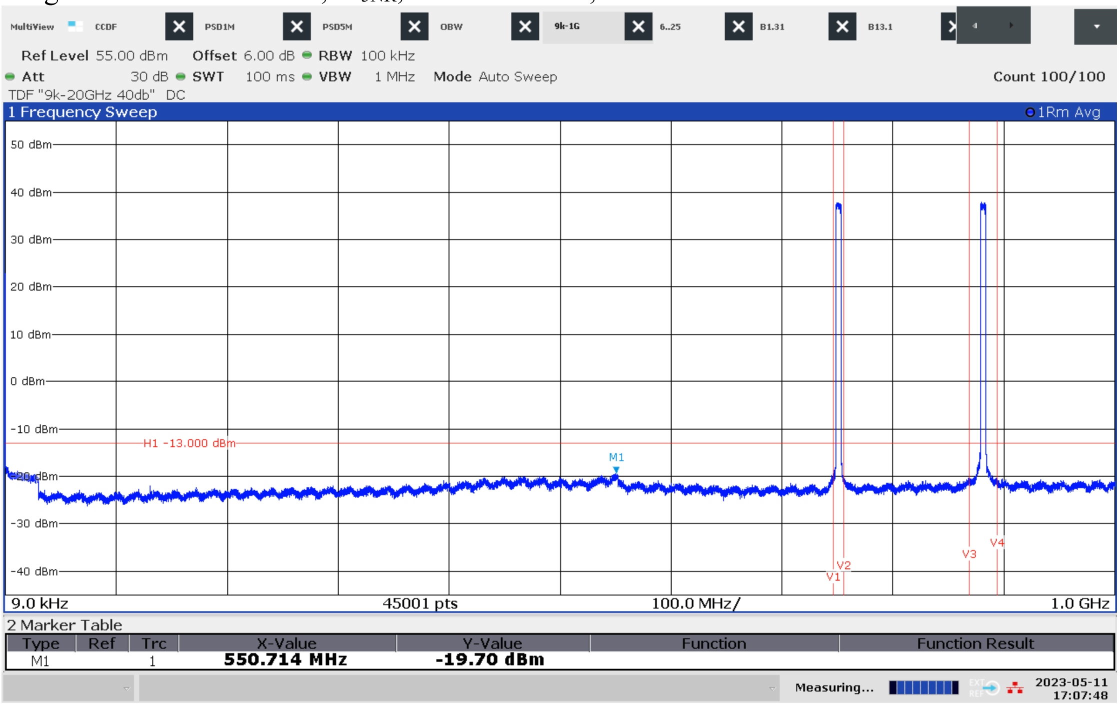
08:21:46 AM 04/25/2023

Diagram 3.11d NR: TM1.1, B_{5NR}, 1559 – 1610 MHz, Port B:



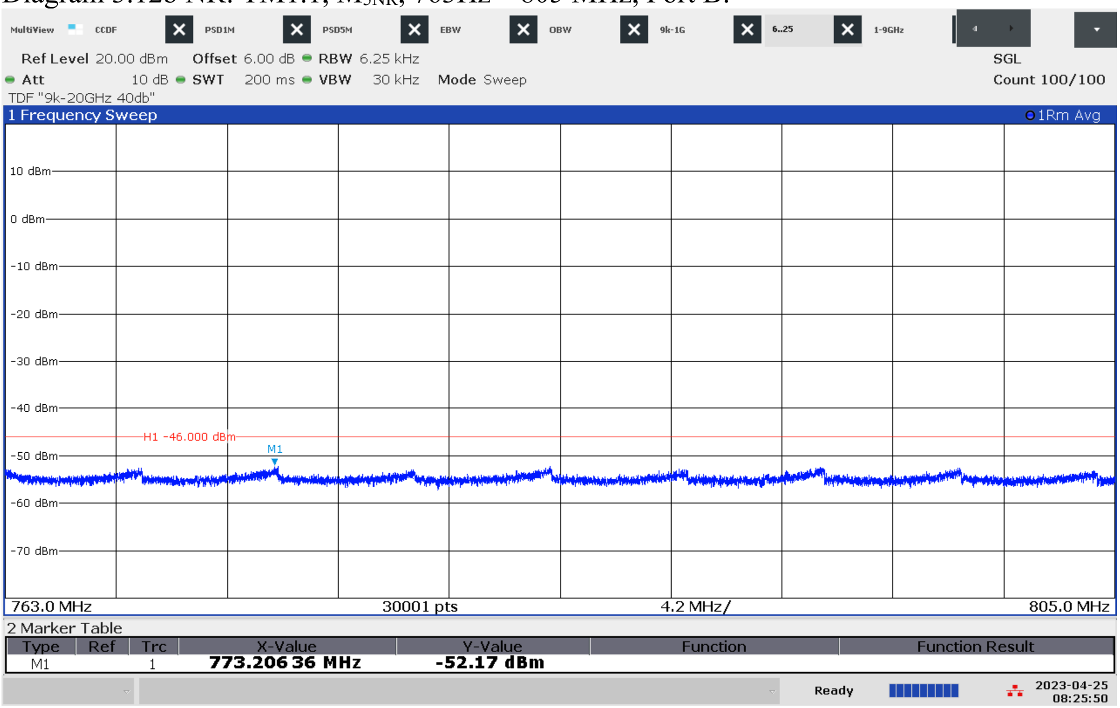
08:21:02 AM 04/25/2023

Diagram 3.12a NR: TM1.1, M_{5NR}, 9 kHz – 1 GHz, Port B:



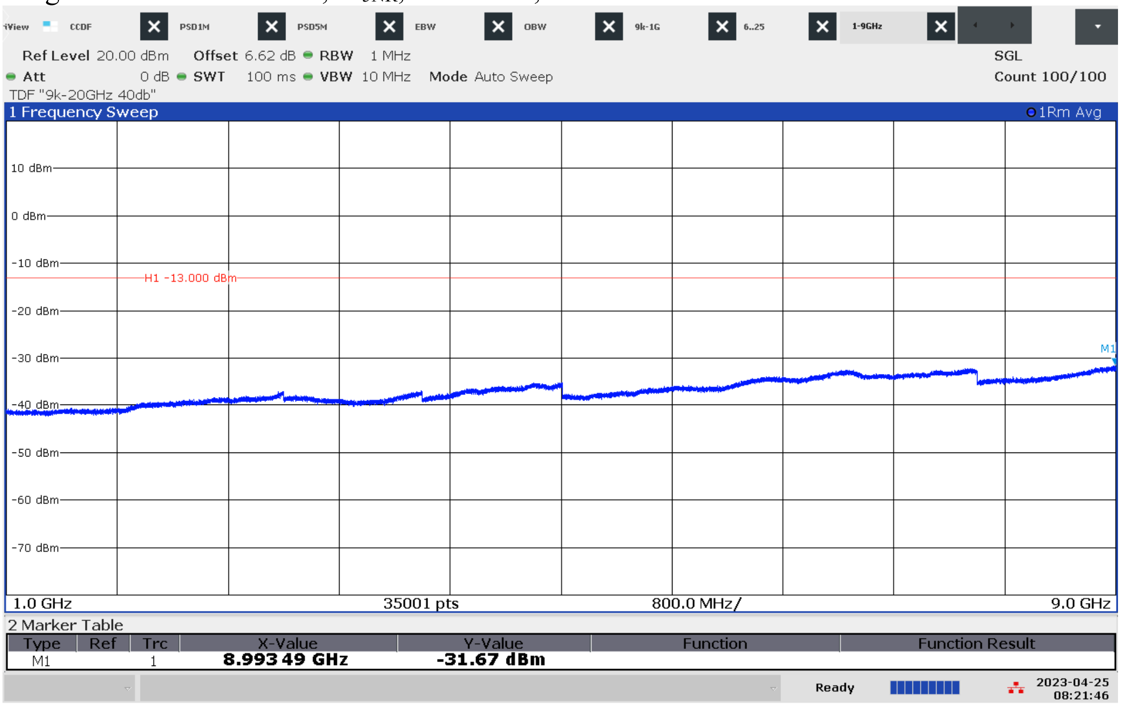
05:07:49 PM 05/11/2023

Diagram 3.12b NR: TM1.1, M_{5NR}, 763Hz – 805 MHz, Port B:



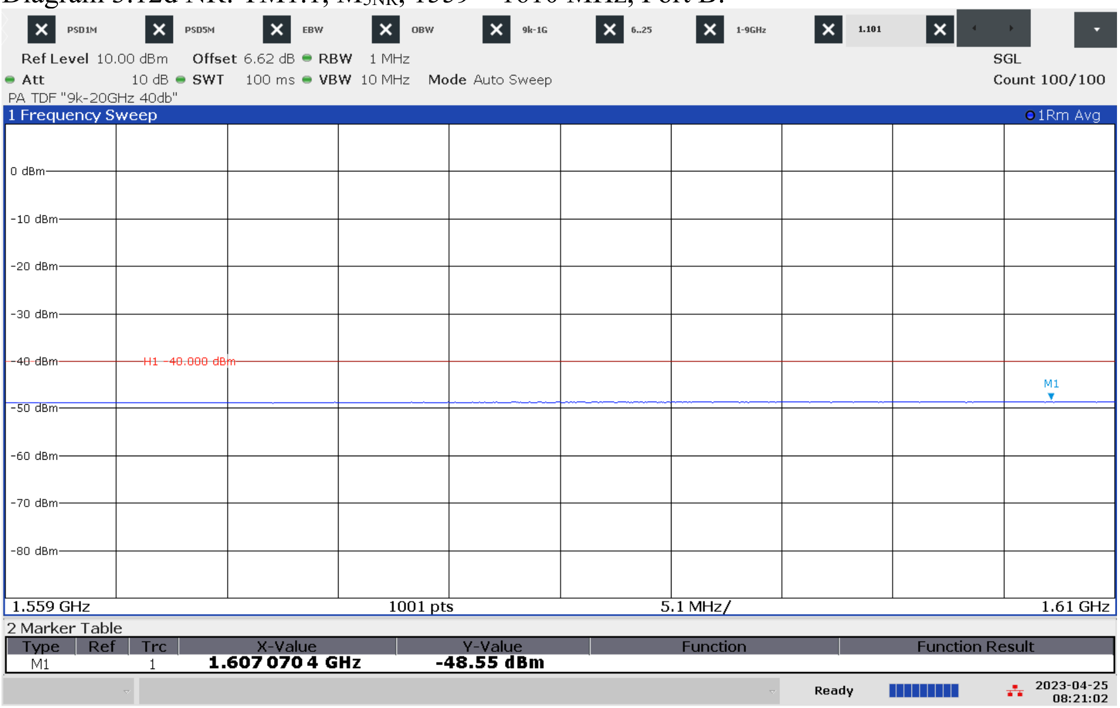
08:25:50 AM 04/25/2023

Diagram 3.12c NR: TM1.1, M_{5NR}, 1 – 9 GHz, Port B:



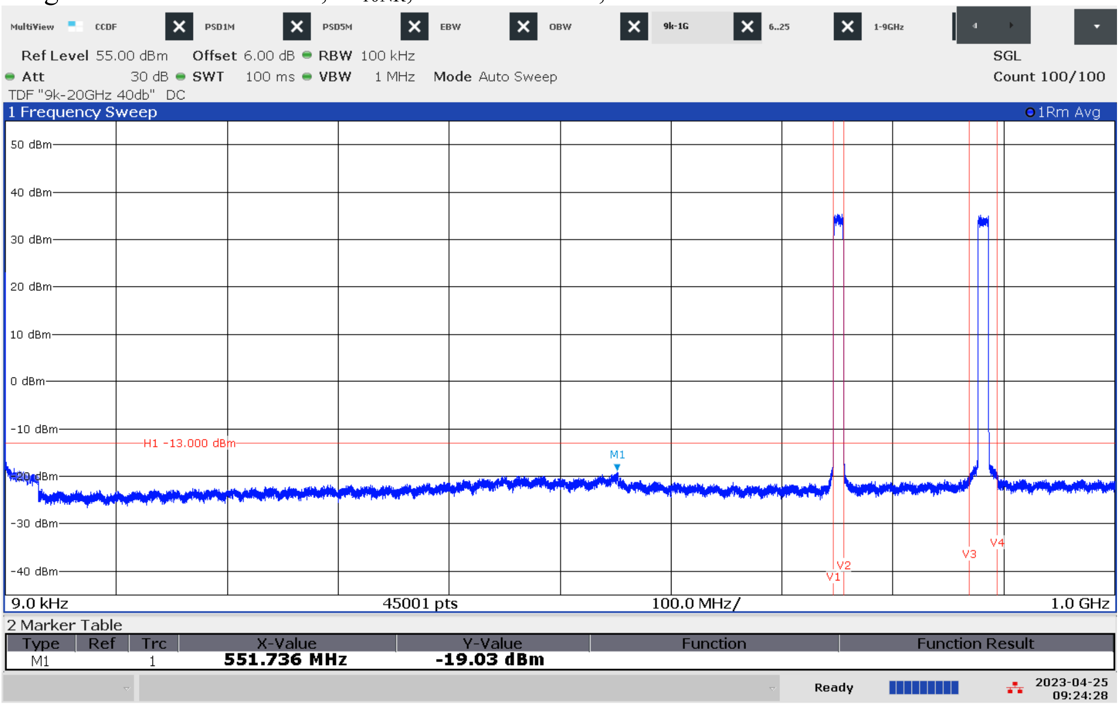
08:21:46 AM 04/25/2023

Diagram 3.12d NR: TM1.1, M_{5NR}, 1559 – 1610 MHz, Port B:



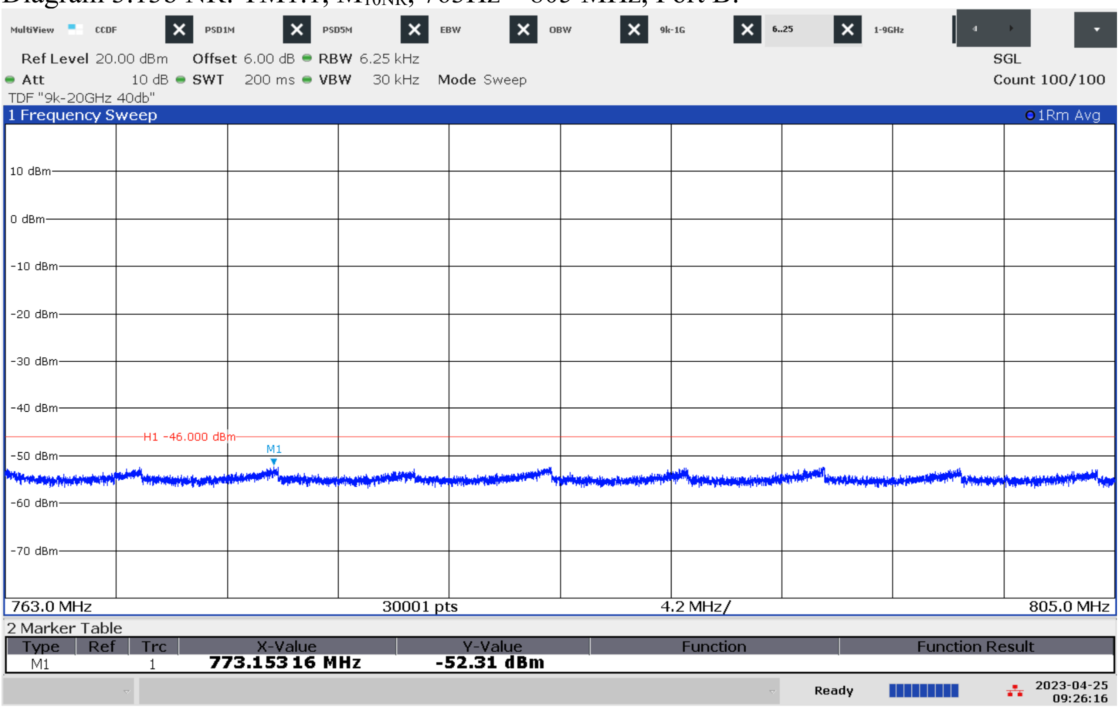
08:21:02 AM 04/25/2023

Diagram 3.13a NR: TM1.1, M_{10NR}, 9 kHz – 1 GHz, Port B:



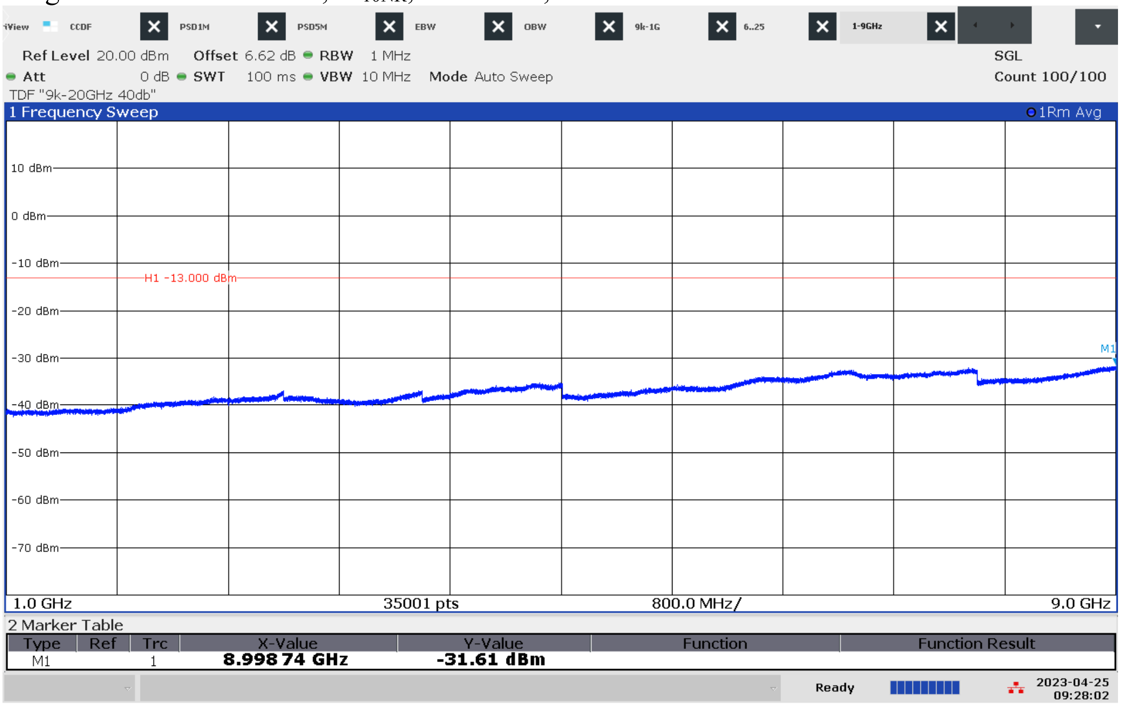
09:24:29 AM 04/25/2023

Diagram 3.13b NR: TM1.1, M_{10NR}, 763Hz – 805 MHz, Port B:



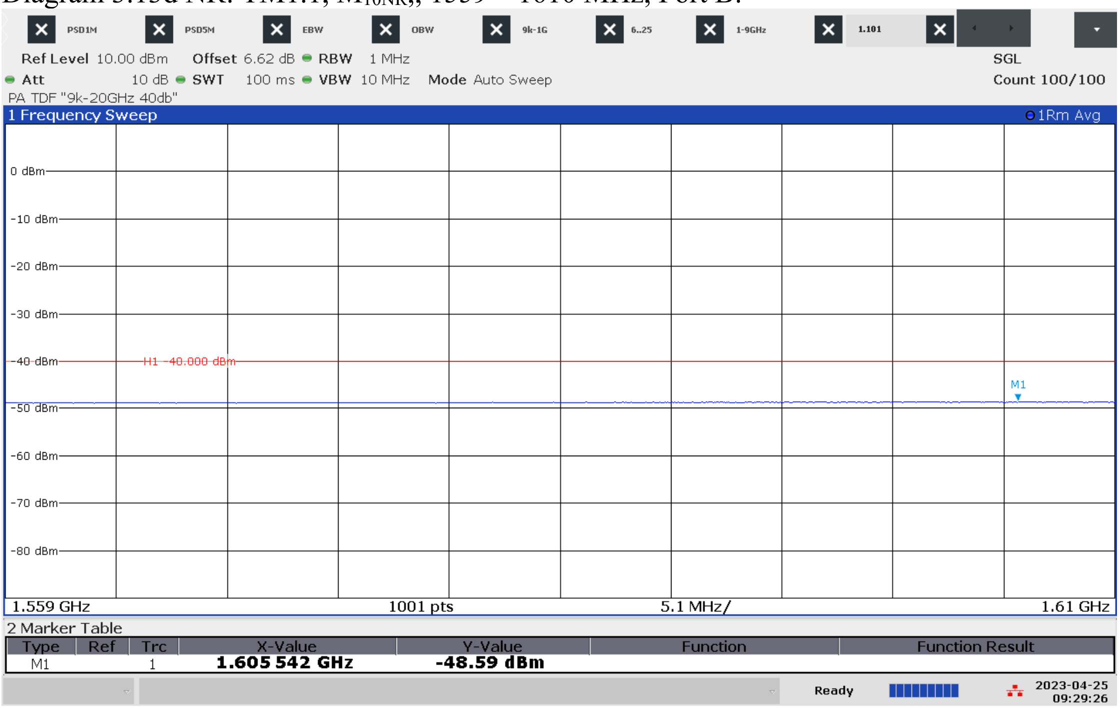
09:26:16 AM 04/25/2023

Diagram 3.13c NR: TM1.1, M_{10NR}, 1 – 9 GHz, Port B:



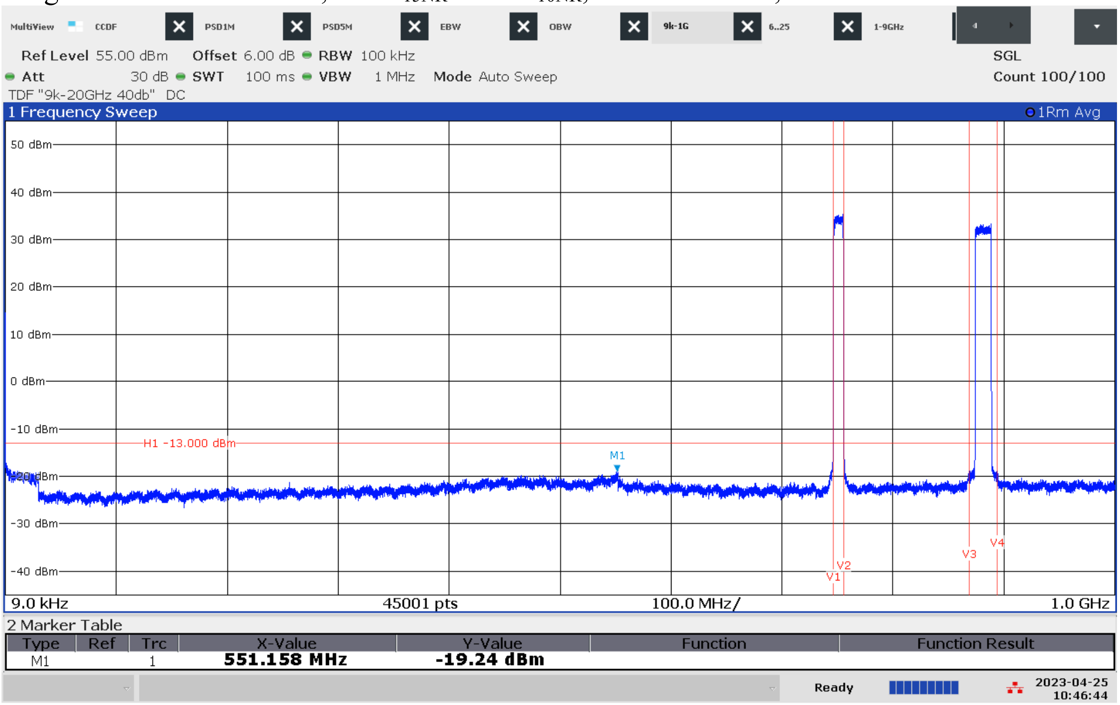
09:28:03 AM 04/25/2023

Diagram 3.13d NR: TM1.1, M_{10NR},, 1559 – 1610 MHz, Port B:



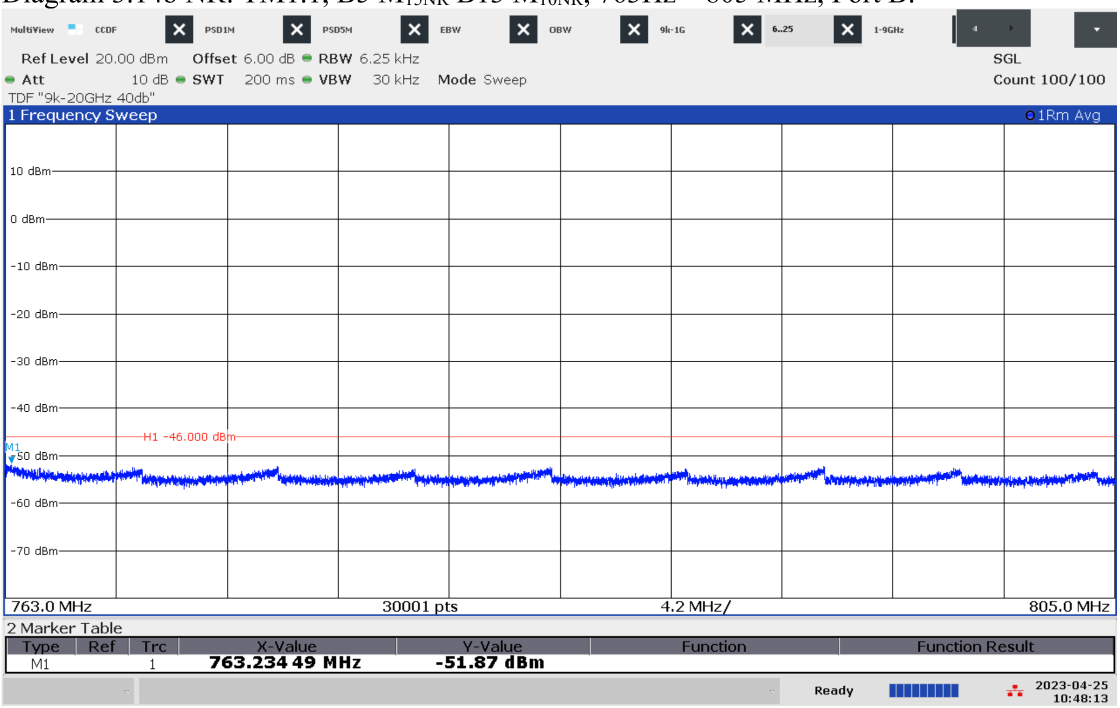
09:29:26 AM 04/25/2023

Diagram 3.14a NR: TM1.1, B5 M_{15NR} B13 M_{10NR}, 9 kHz – 1 GHz, Port B:



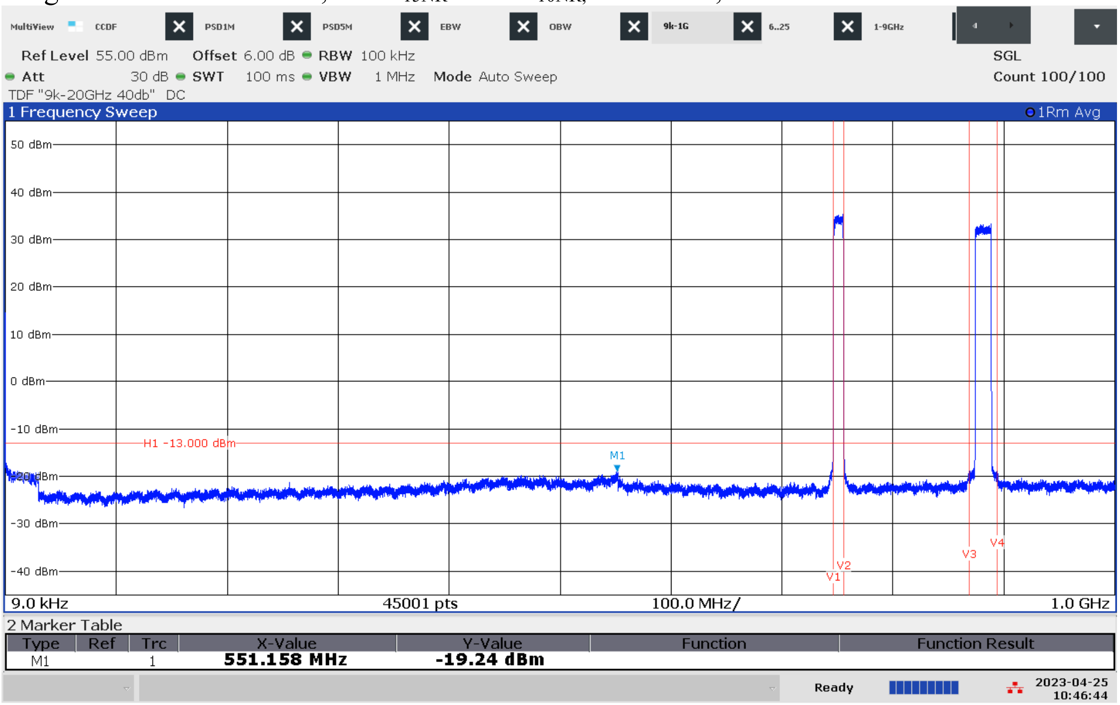
10:46:44 AM 04/25/2023

Diagram 3.14b NR: TM1.1, B5 M_{15NR} B13 M_{10NR}, 763Hz – 805 MHz, Port B:



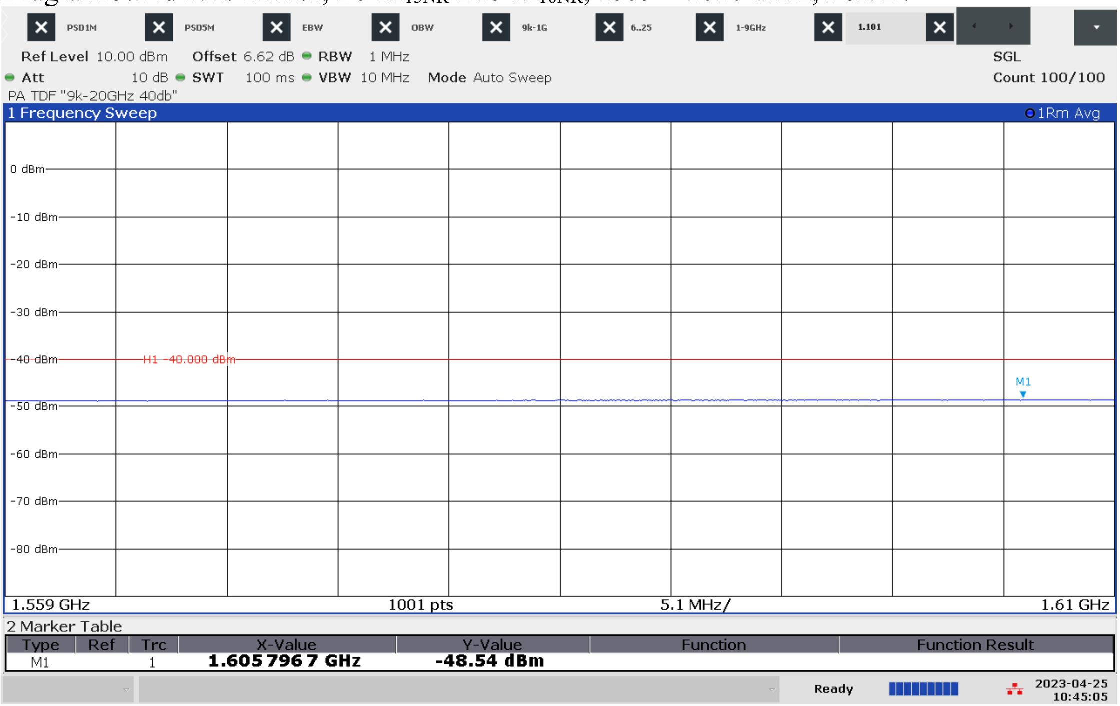
10:48:13 AM 04/25/2023

Diagram 3.14c NR: TM1.1, B5 M_{15NR} B13 M_{10NR}, 1 – 9 GHz, Port B:



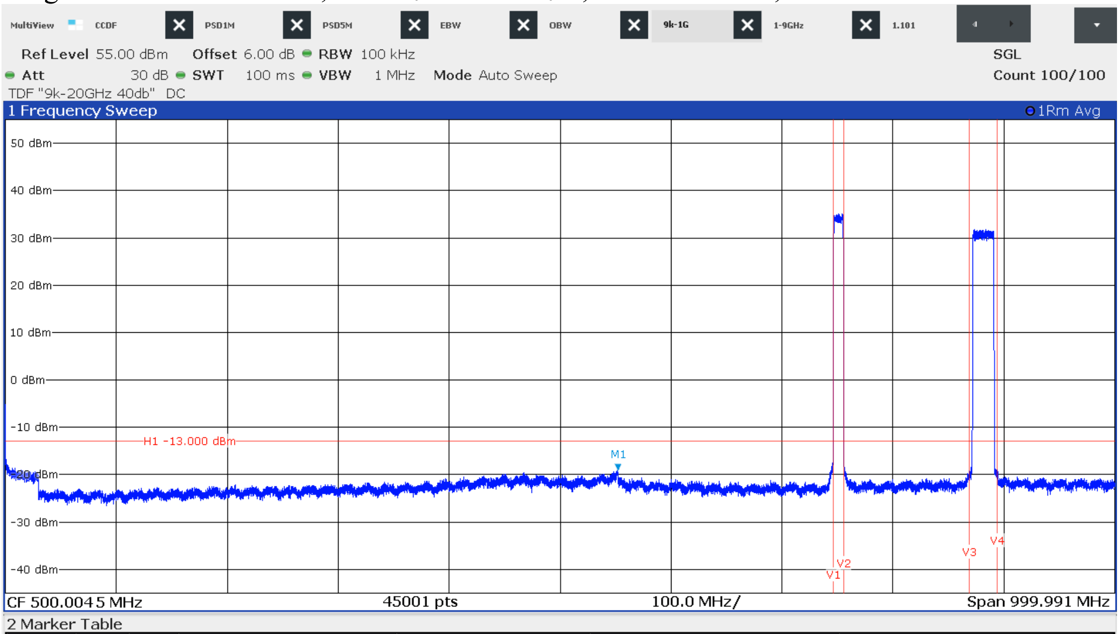
10:46:44 AM 04/25/2023

Diagram 3.14d NR: TM1.1, B5 M_{15NR} B13 M_{10NR}, 1559 – 1610 MHz, Port B:



10:45:05 AM 04/25/2023

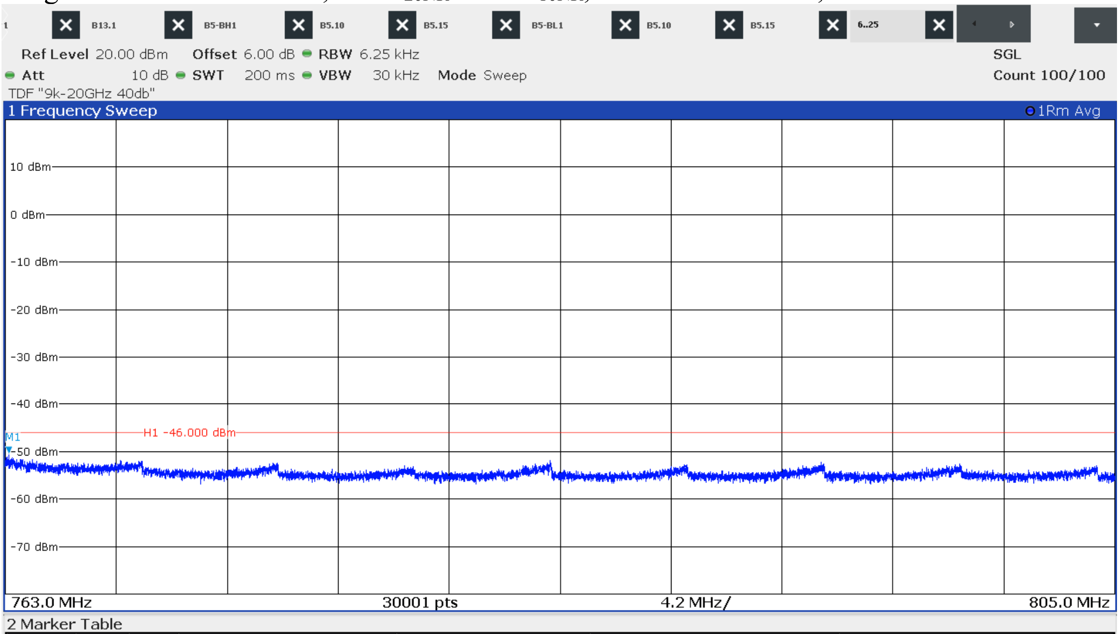
Diagram 3.15a NR: TM1.1, B5 M_{20NR} B13 M_{10NR}, 9 kHz – 1 GHz, Port B:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	551.958 MHz	-19.41 dBm		

01:14:31 PM 04/25/2023

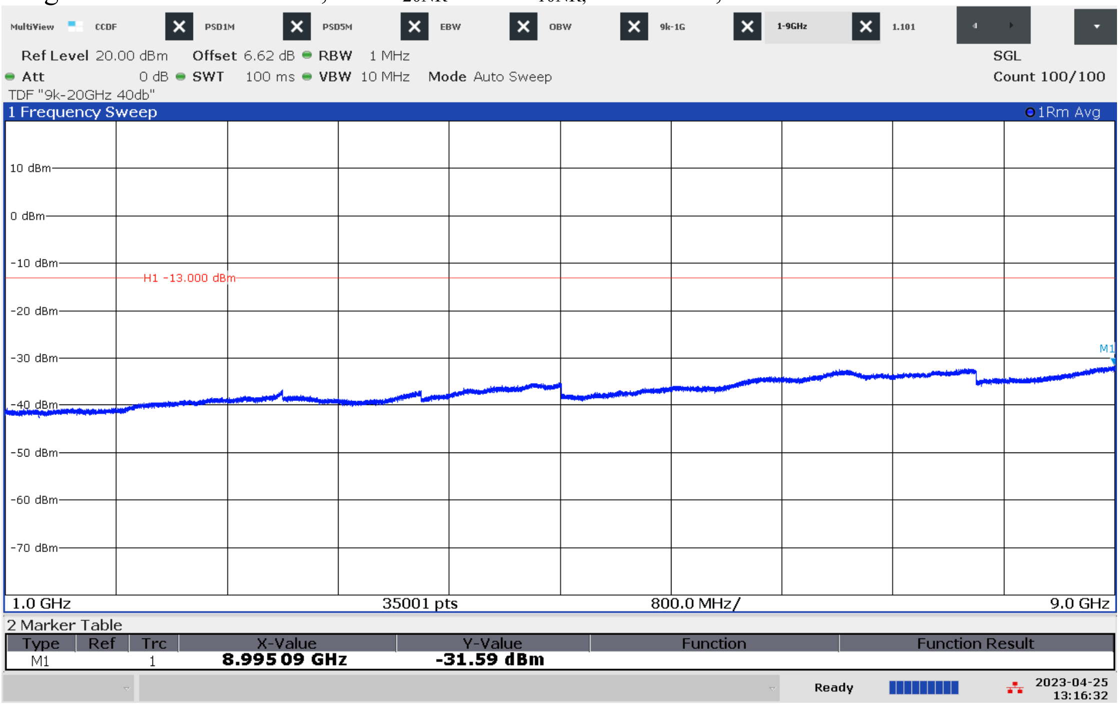
Diagram 3.15b NR: TM1.1, B5 M_{20NR} B13 M_{10NR}, 763Hz – 805 MHz, Port B:



Type	Ref	Trc	X-Value	Y-Value	Function	Function Result
M1		1	763.1379 MHz	-50.58 dBm		

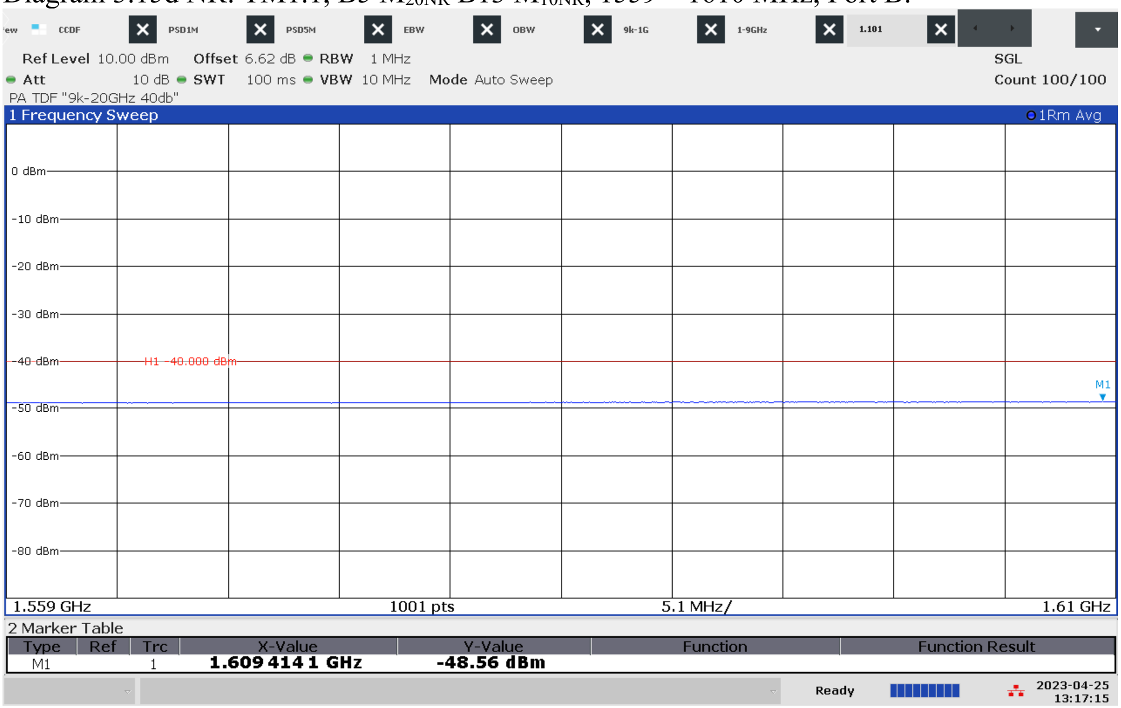
01:15:27 PM 04/25/2023

Diagram 3.15c NR: TM1.1, B5 M_{20NR} B13 M_{10NR}, 1 – 9 GHz, Port B:



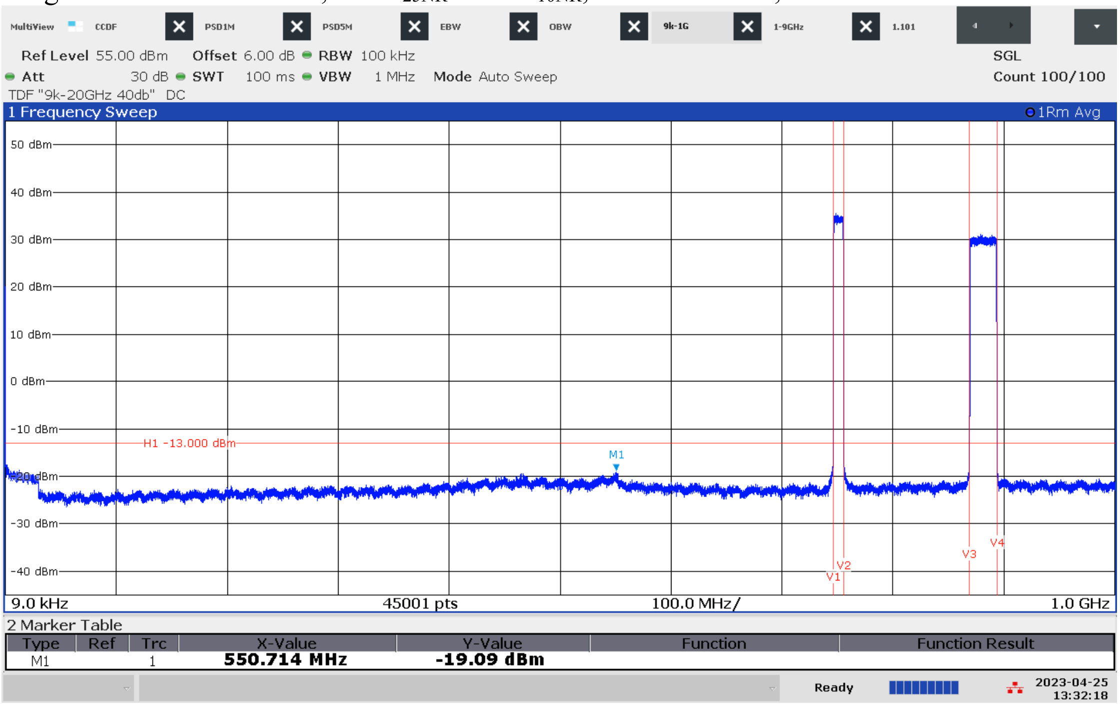
01:16:32 PM 04/25/2023

Diagram 3.15d NR: TM1.1, B5 M_{20NR} B13 M_{10NR}, 1559 – 1610 MHz, Port B:



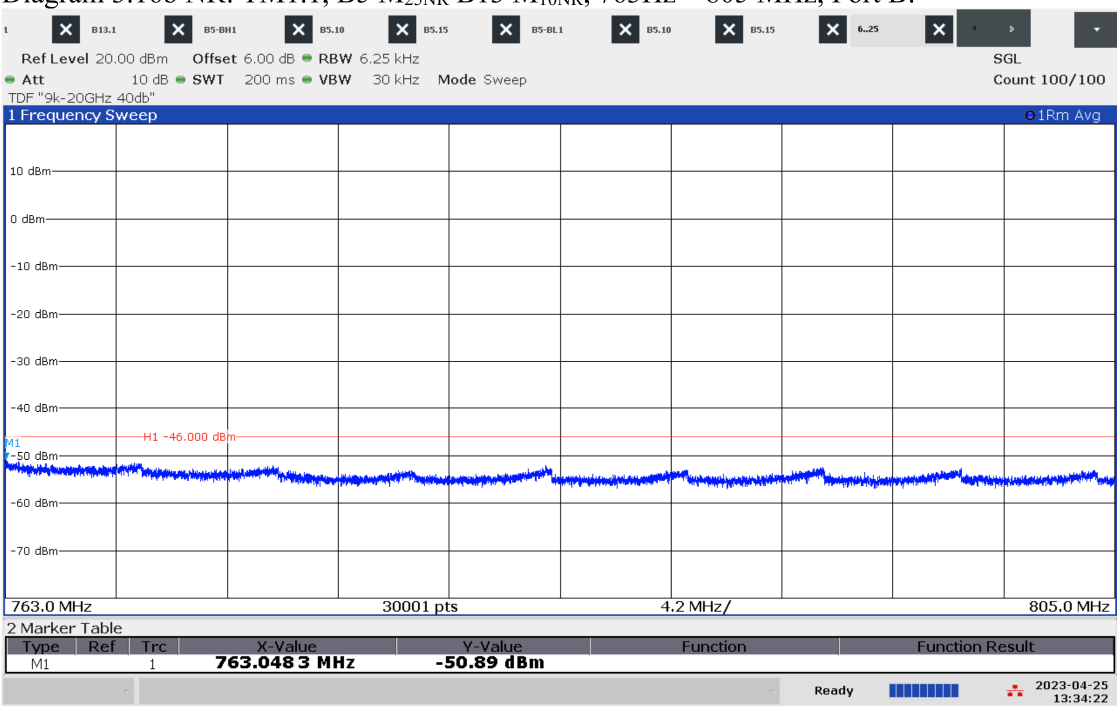
01:17:15 PM 04/25/2023

Diagram 3.16a NR: TM1.1, B5 M_{25NR} B13 M_{10NR}, 9 kHz – 1 GHz, Port B:



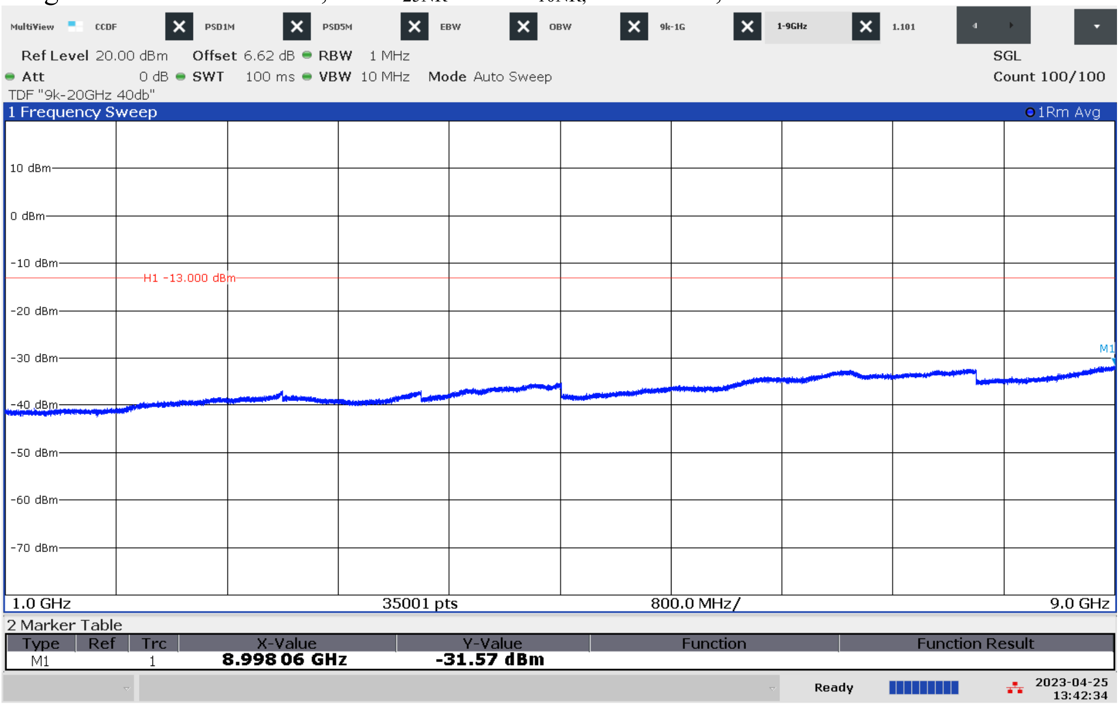
01:32:18 PM 04/25/2023

Diagram 3.16b NR: TM1.1, B5 M_{25NR} B13 M_{10NR}, 763Hz – 805 MHz, Port B:



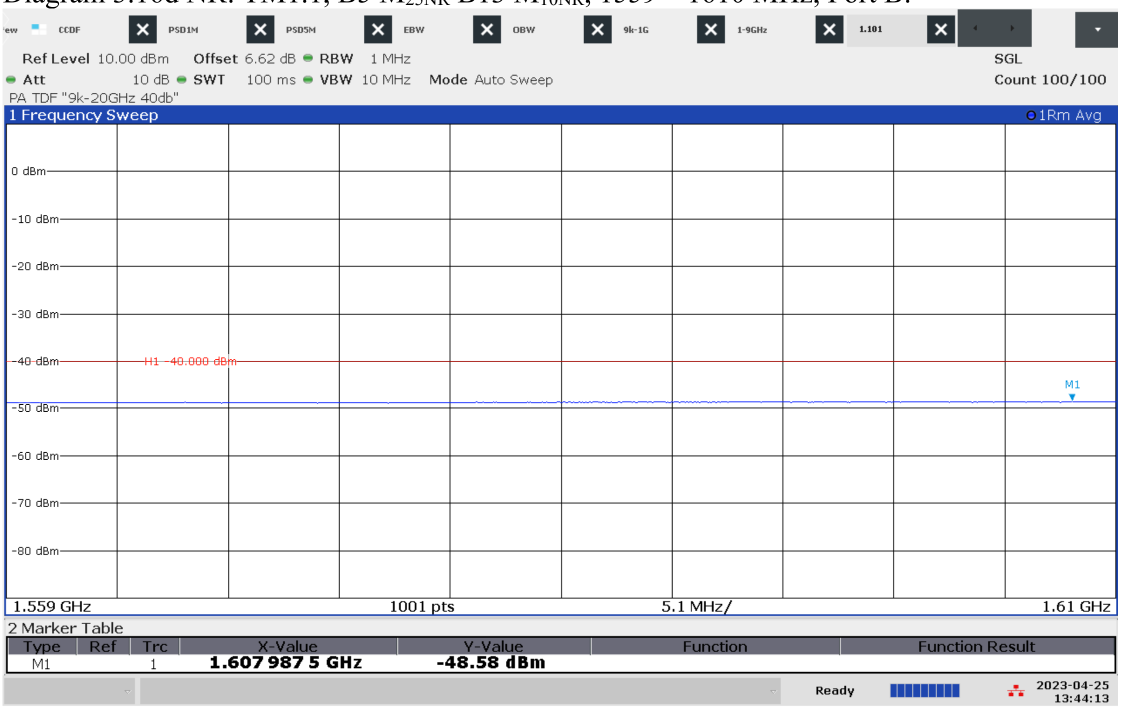
01:34:22 PM 04/25/2023

Diagram 3.16c NR: TM1.1, B5 M25NR B13 M10NR, 1 – 9 GHz, Port B:



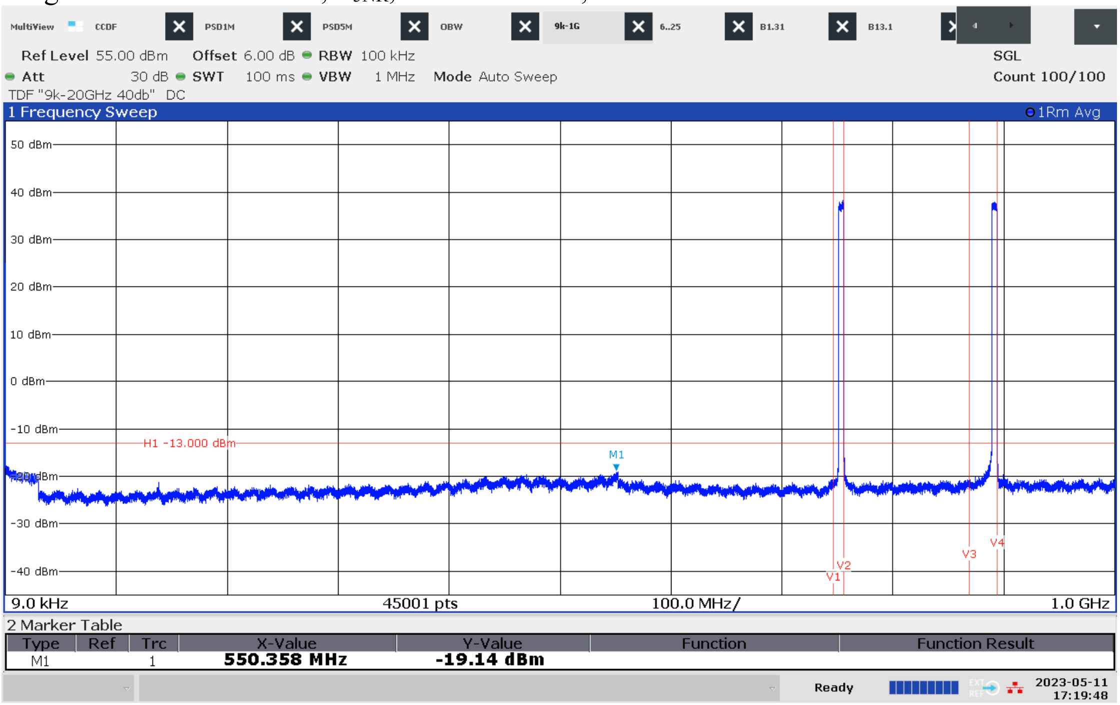
01:42:34 PM 04/25/2023

Diagram 3.16d NR: TM1.1, B5 M25NR B13 M10NR, 1559 – 1610 MHz, Port B:



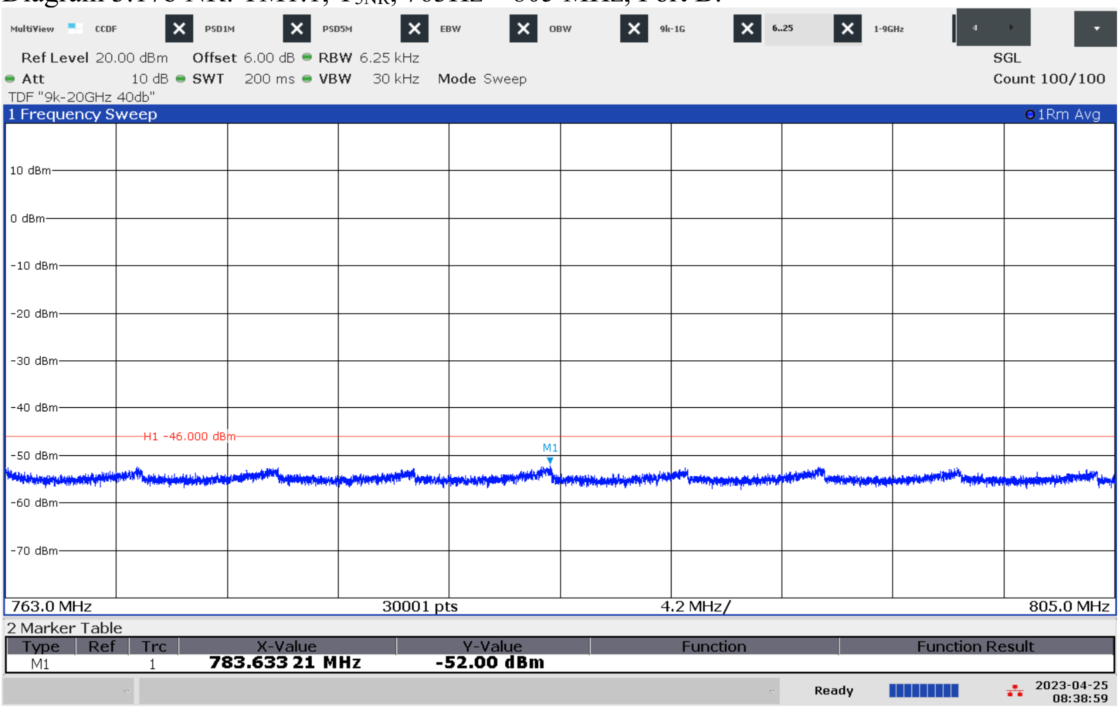
01:44:13 PM 04/25/2023

Diagram 3.17a NR: TM1.1, T_{5NR}, 9 kHz – 1 GHz, Port B:



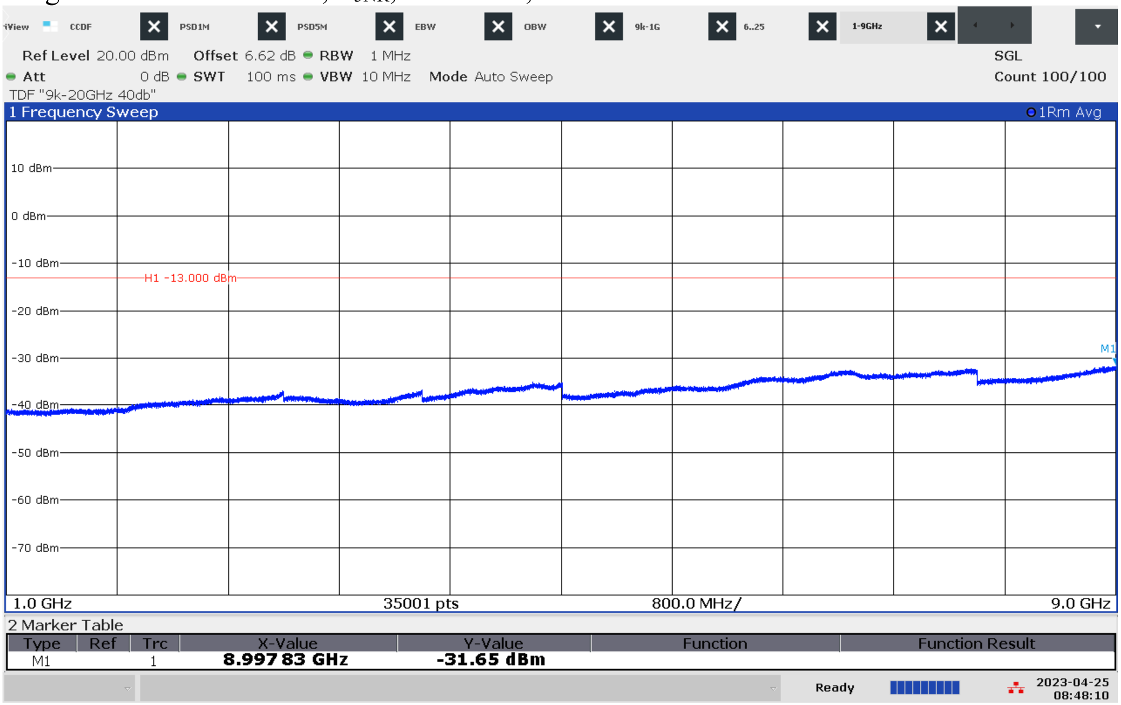
05:19:48 PM 05/11/2023

Diagram 3.17b NR: TM1.1, T_{5NR}, 763Hz – 805 MHz, Port B:



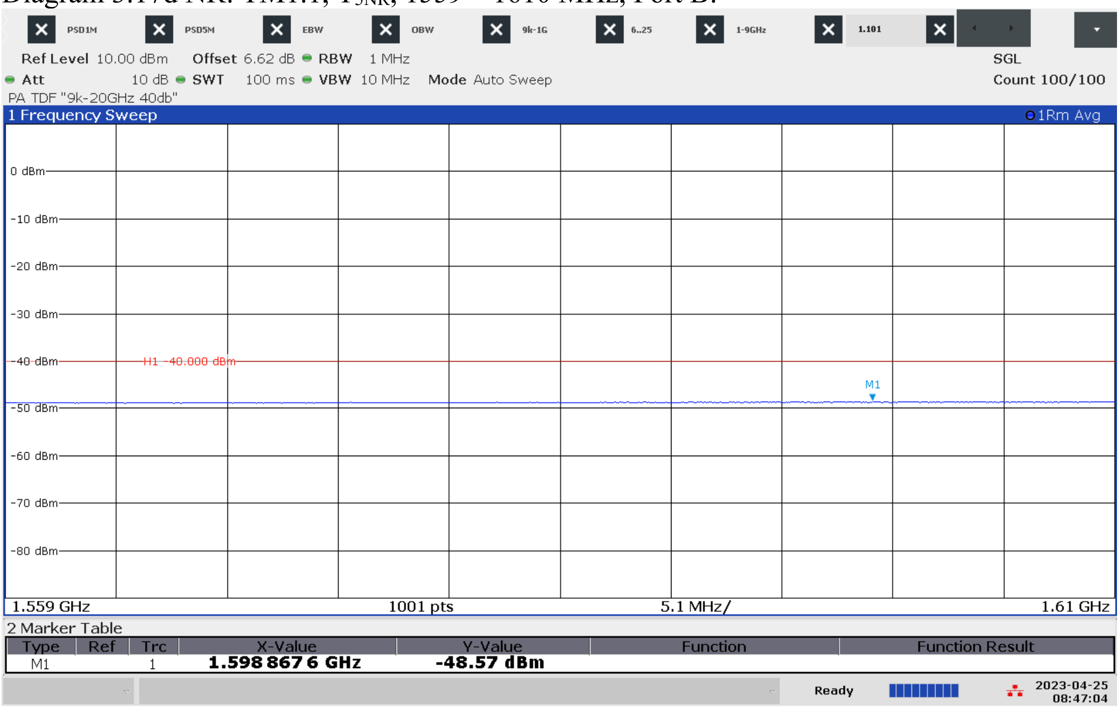
08:38:59 AM 04/25/2023

Diagram 3.17c NR: TM1.1, T_{5NR}, 1 – 9 GHz, Port B:



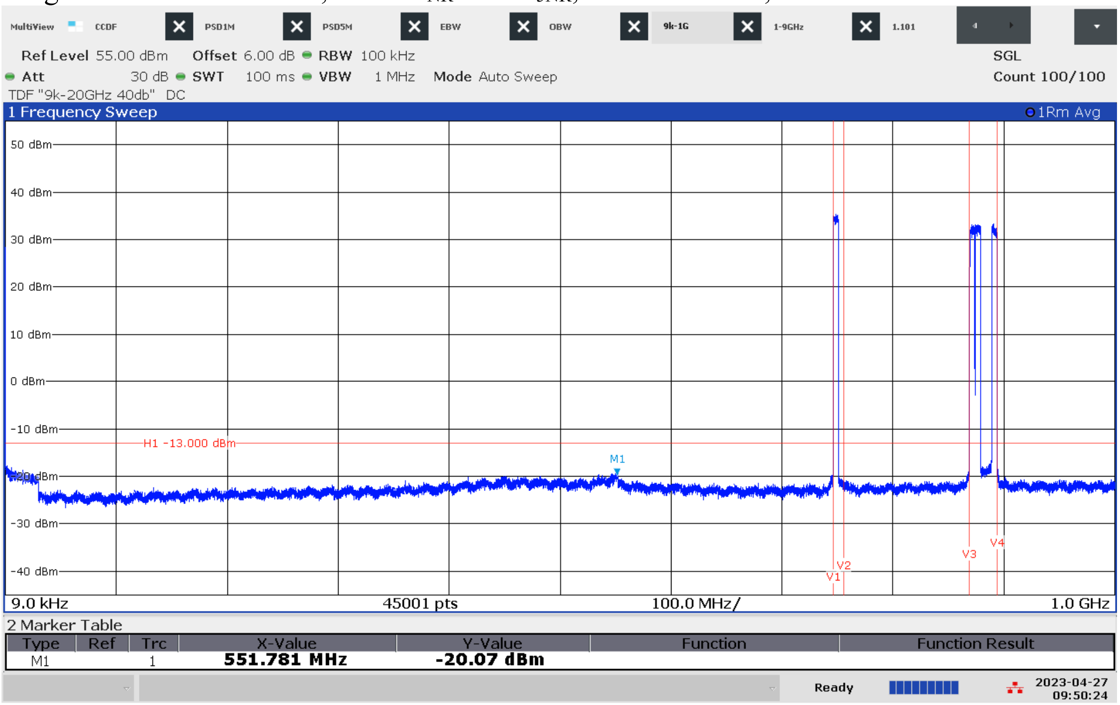
08:48:10 AM 04/25/2023

Diagram 3.17d NR: TM1.1, T_{5NR}, 1559 – 1610 MHz, Port B:



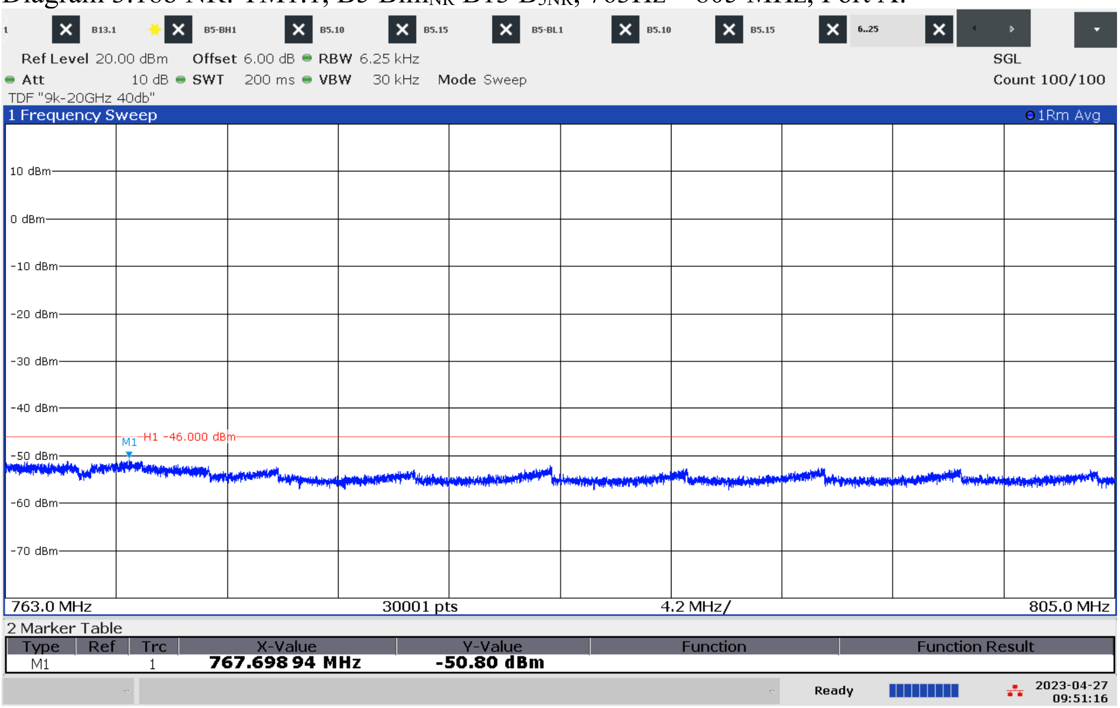
08:47:04 AM 04/25/2023

Diagram 3.18a NR: TM1.1, B5 Bim$_{NR}$ B13 B5$_{NR}$, 9 kHz – 1 GHz, Port A:



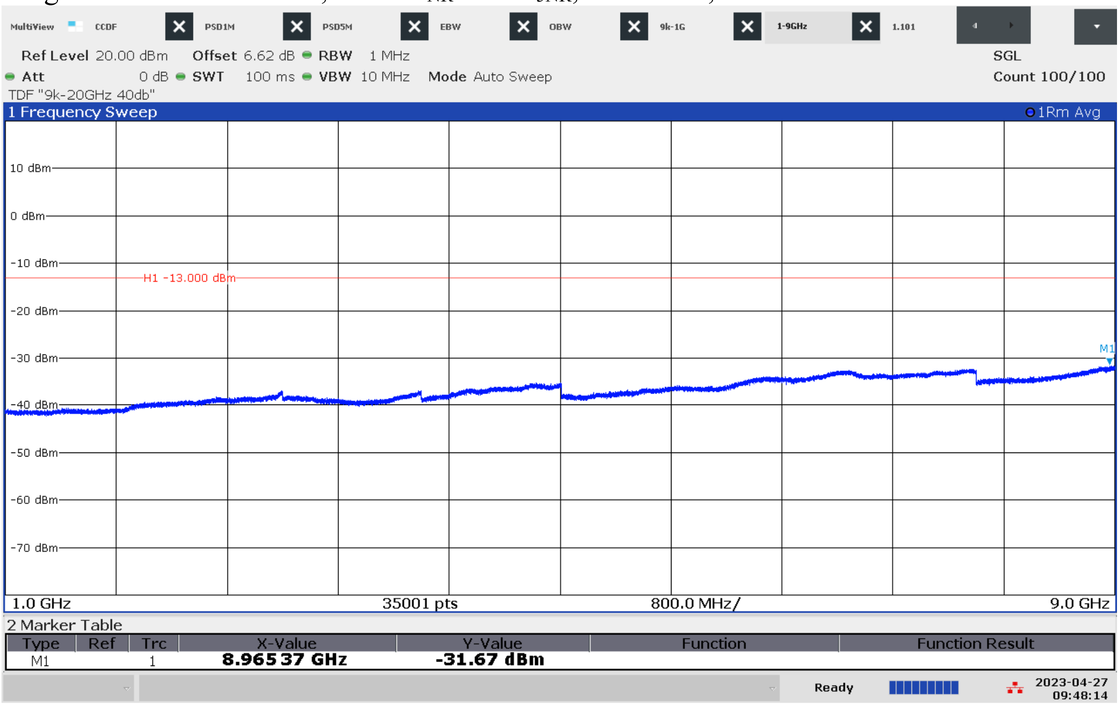
09:50:24 AM 04/27/2023

Diagram 3.18b NR: TM1.1, B5 Bim$_{NR}$ B13 B5$_{NR}$, 763Hz – 805 MHz, Port A:



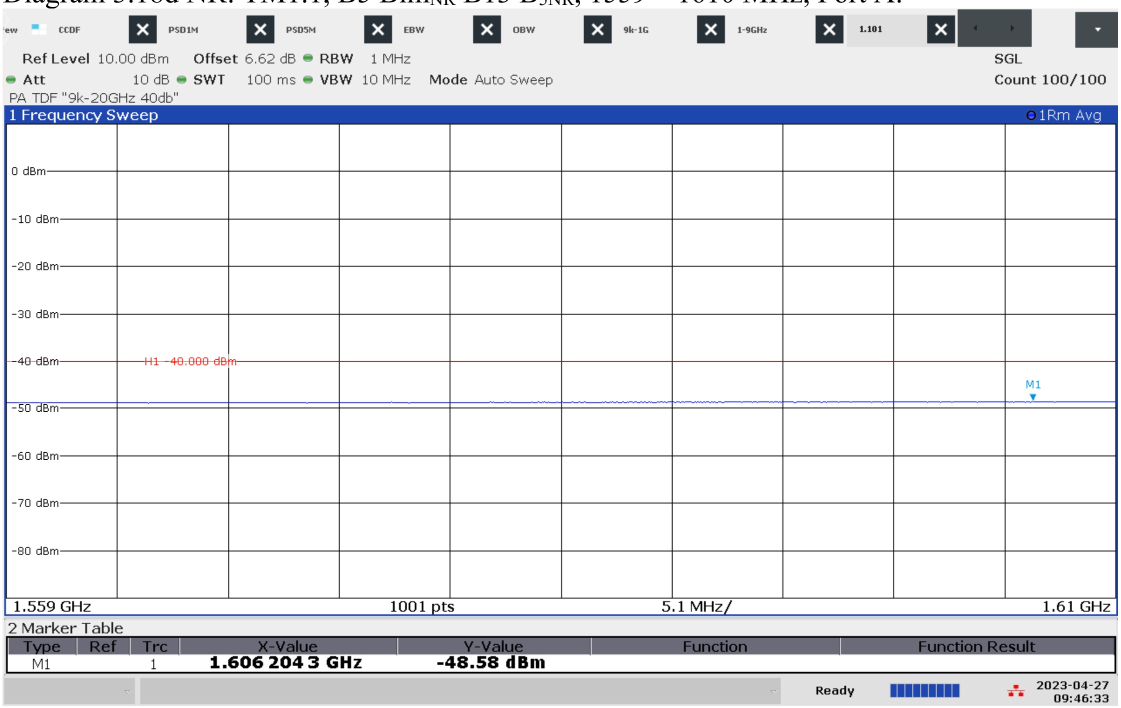
09:51:16 AM 04/27/2023

Diagram 3.18c NR: TM1.1, B5 Bim$_{NR}$ B13 B$_{5NR}$, 1 – 9 GHz, Port A:



09:48:14 AM 04/27/2023

Diagram 3.18d NR: TM1.1, B5 Bim$_{NR}$ B13 B$_{5NR}$, 1559 – 1610 MHz, Port A:



09:46:33 AM 04/27/2023

Diagram 3.19a NR: TM1.1, B5 Tim$_{NR}$ B13 B$_{5NR}$, 9 kHz – 1 GHz, Port A:

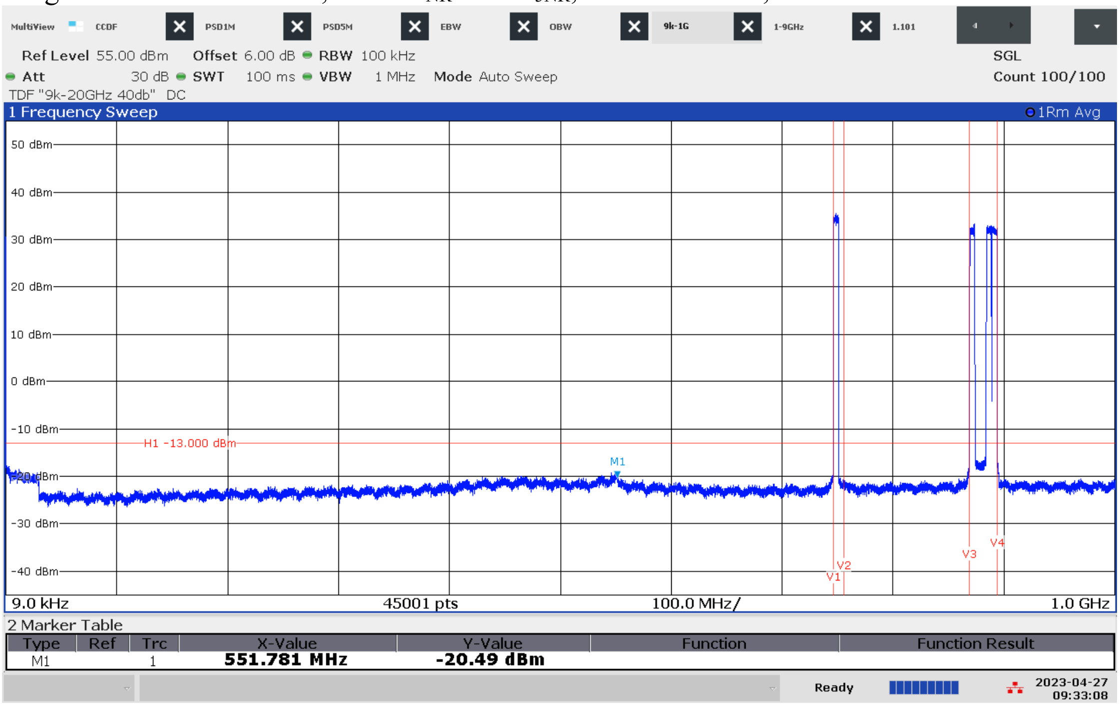


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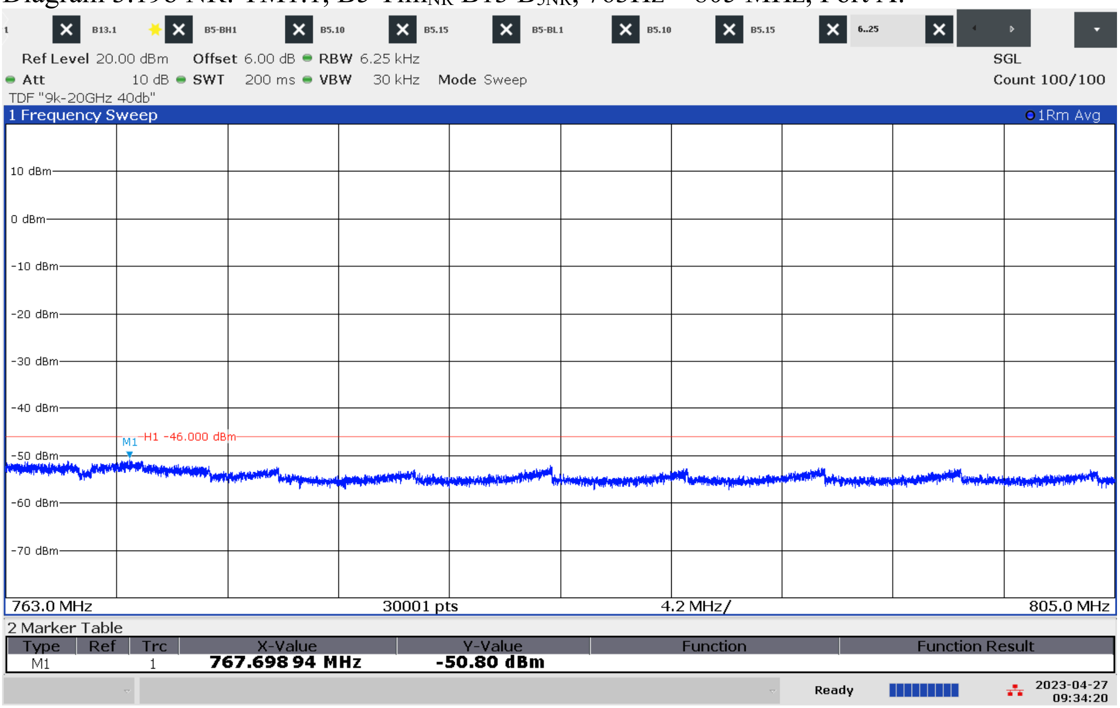
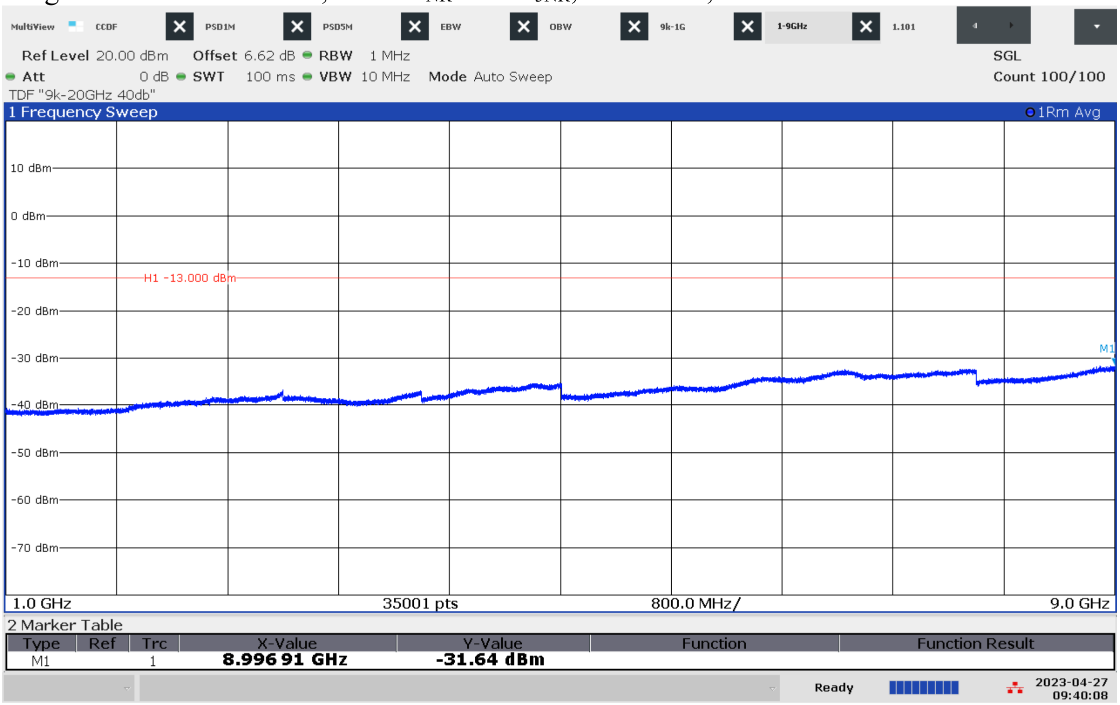
Diagram 3.19b NR: TM1.1, B5 Tim$_{NR}$ B13 B$_{5NR}$, 763Hz – 805 MHz, Port A:



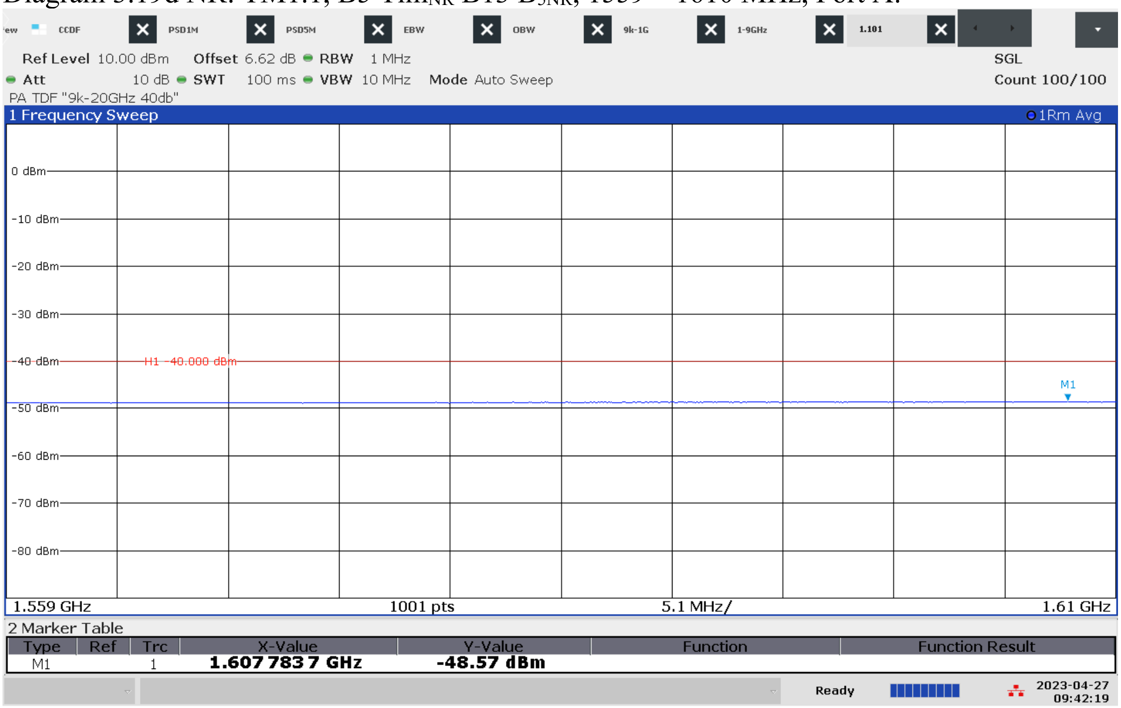
09:34:20 AM 04/27/2023

Diagram 3.19c NR: TM1.1, B5 Tim$_{NR}$ B13 B$_{5NR}$, 1 – 9 GHz, Port A:



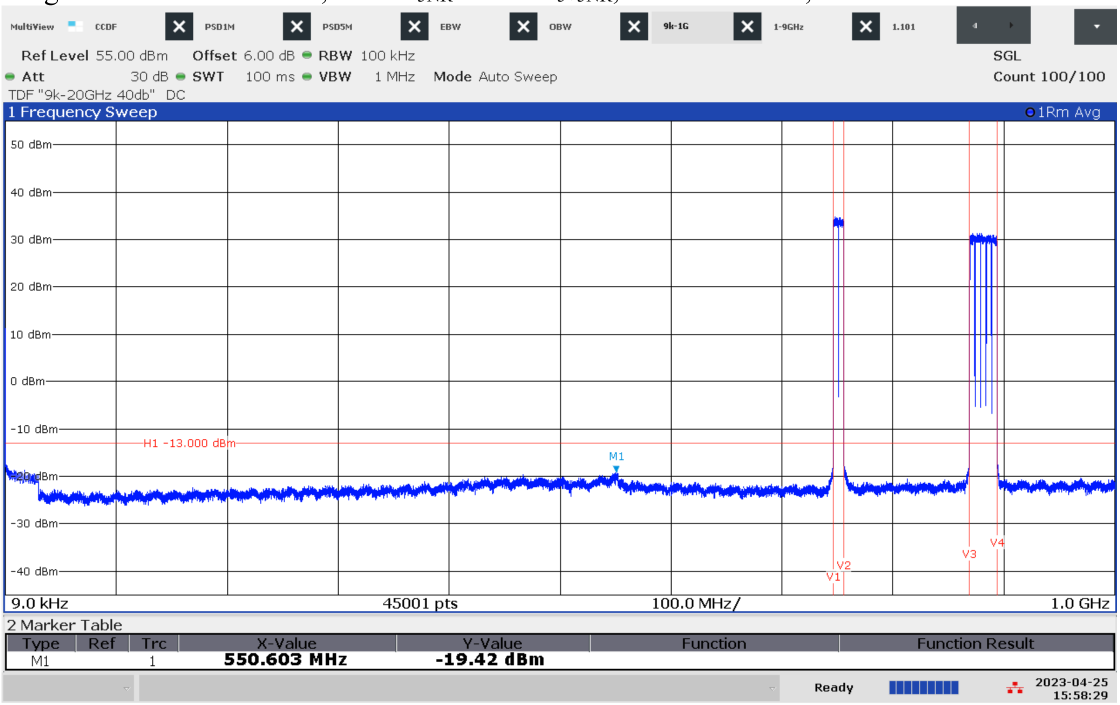
09:40:08 AM 04/27/2023

Diagram 3.19d NR: TM1.1, B5 Tim$_{NR}$ B13 B$_{5NR}$, 1559 – 1610 MHz, Port A:



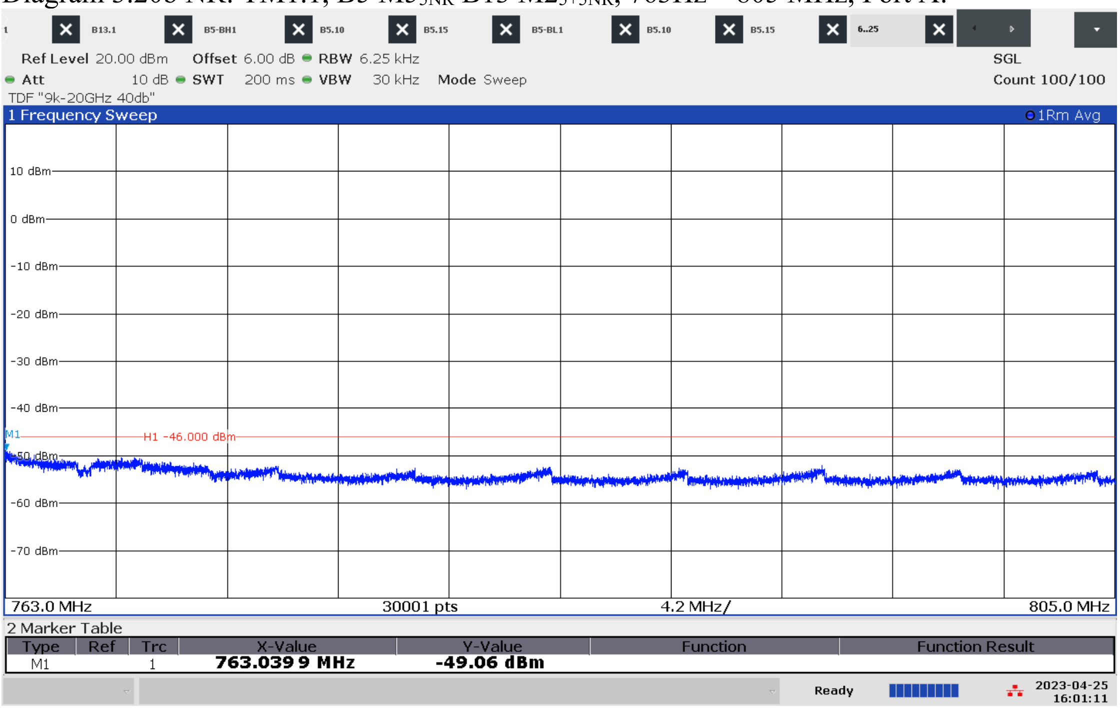
09:42:19 AM 04/27/2023

Diagram 3.20a NR: TM1.1, B5 M5_{5NR} B13 M2_{5+5NR}, 9 kHz – 1 GHz, Port A:



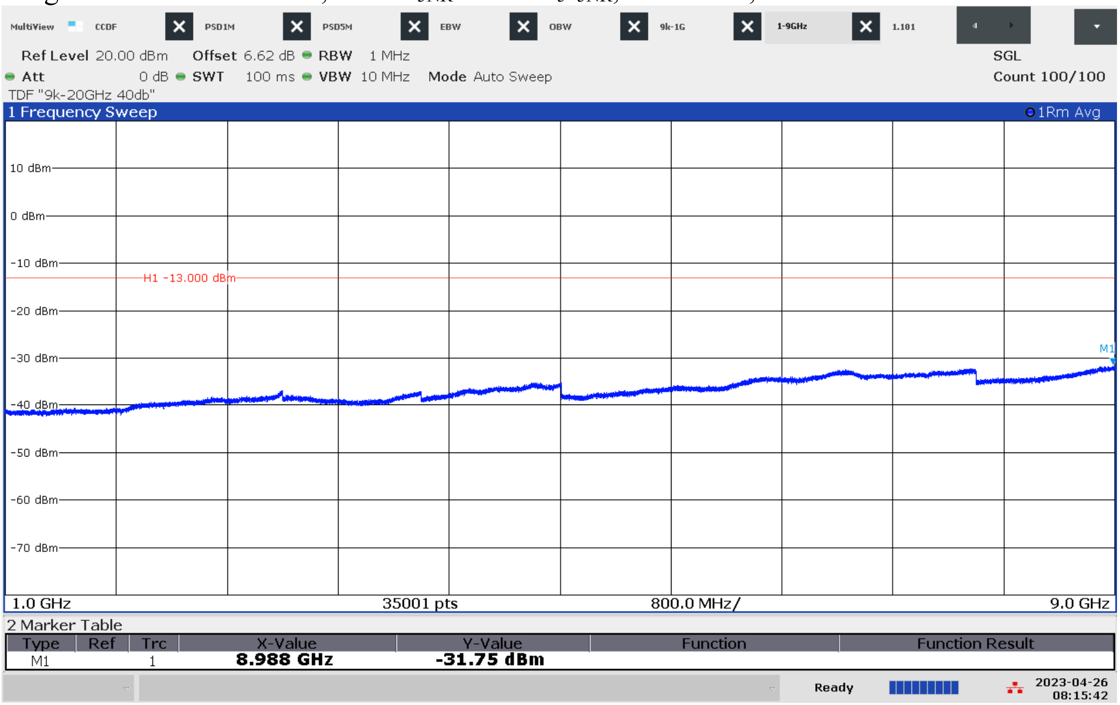
03:58:29 PM 04/25/2023

Diagram 3.20b NR: TM1.1, B5 M5_{5NR} B13 M2_{5+5NR}, 763Hz – 805 MHz, Port A:



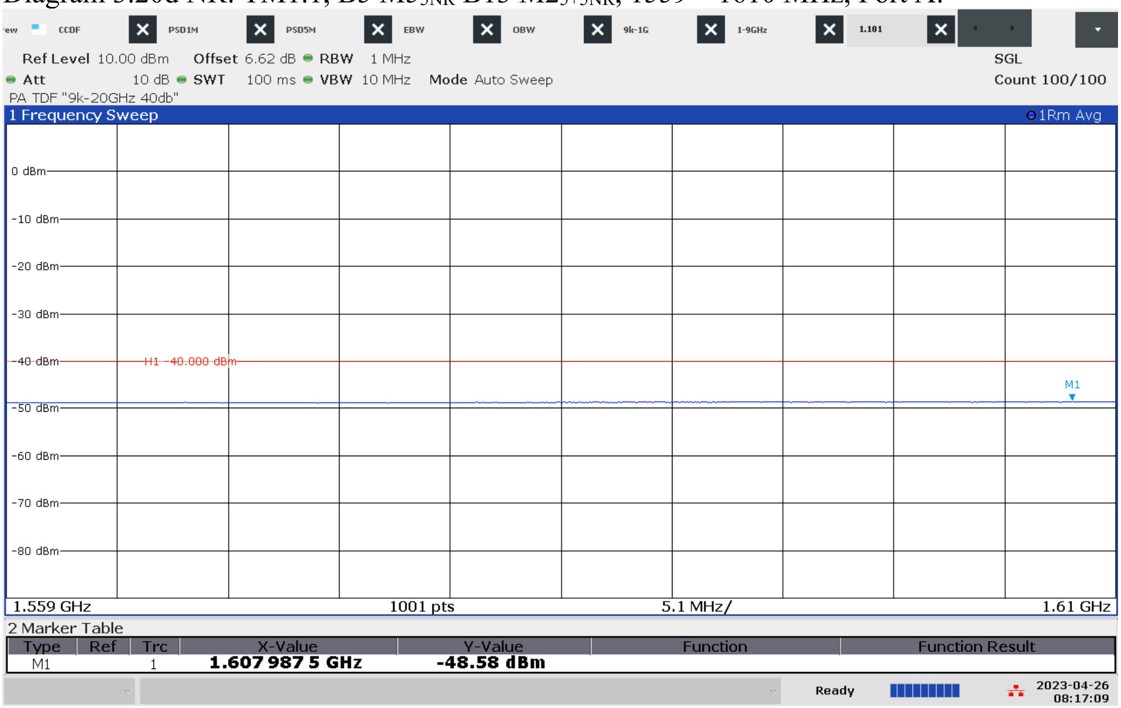
04:01:12 PM 04/25/2023

Diagram 3.20c NR: TM1.1, B5 M5$_{5NR}$ B13 M2$_{5+5NR}$, 1 – 9 GHz, Port A:



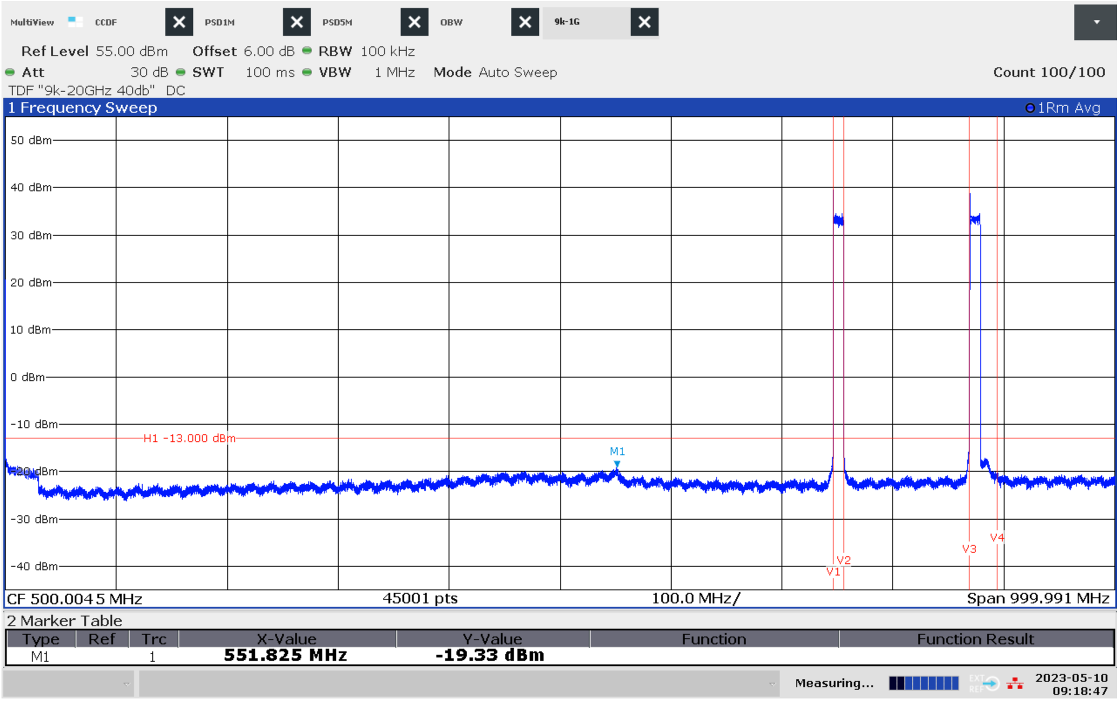
08:15:42 AM 04/26/2023

Diagram 3.20d NR: TM1.1, B5 M5$_{5NR}$ B13 M2$_{5+5NR}$, 1559 – 1610 MHz, Port A:



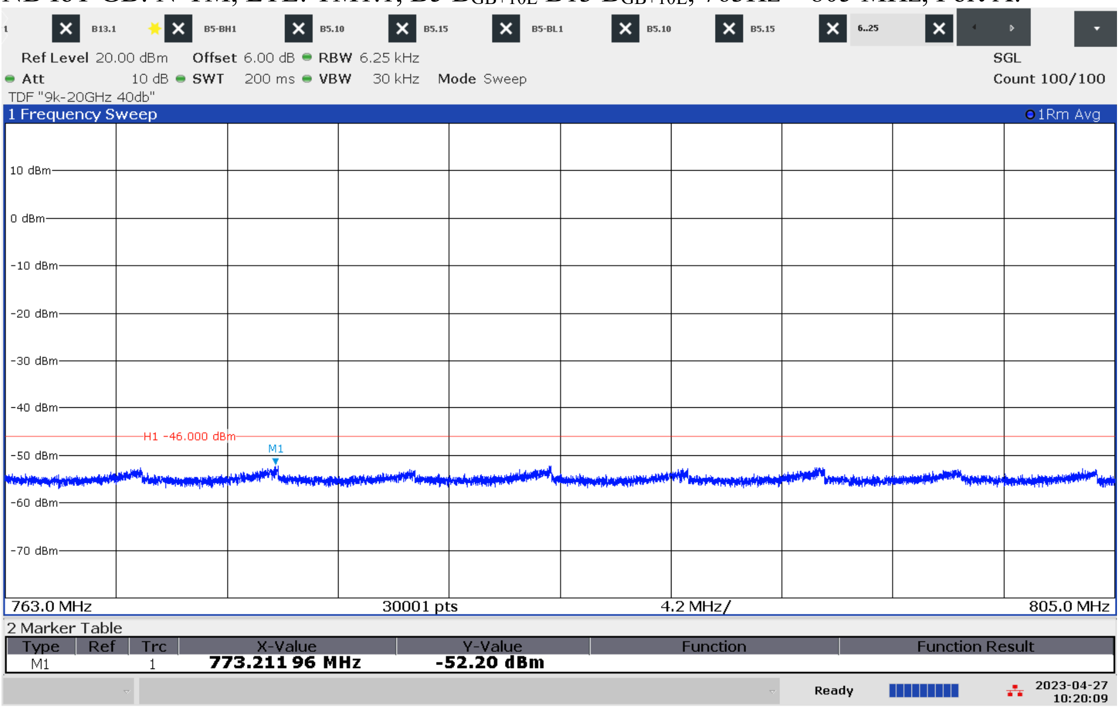
08:17:09 AM 04/26/2023

Diagram 3.21a
NB IoT GB: N-TM, LTE: TM1.1, B5 B_{GB+10L} B13 B_{GB+10L}, 9 kHz – 1 GHz, Port A:



09:18:47 AM 05/10/2023

Diagram 3.21b
NB IoT GB: N-TM, LTE: TM1.1, B5 B_{GB+10L} B13 B_{GB+10L}, 763Hz – 805 MHz, Port A:



10:20:09 AM 04/27/2023

Diagram 3.21c
NB IoT GB: N-TM, LTE: TM1.1, B5 B_{GB+10L} B13 B_{GB+10L}, 1 – 9 GHz, Port A:

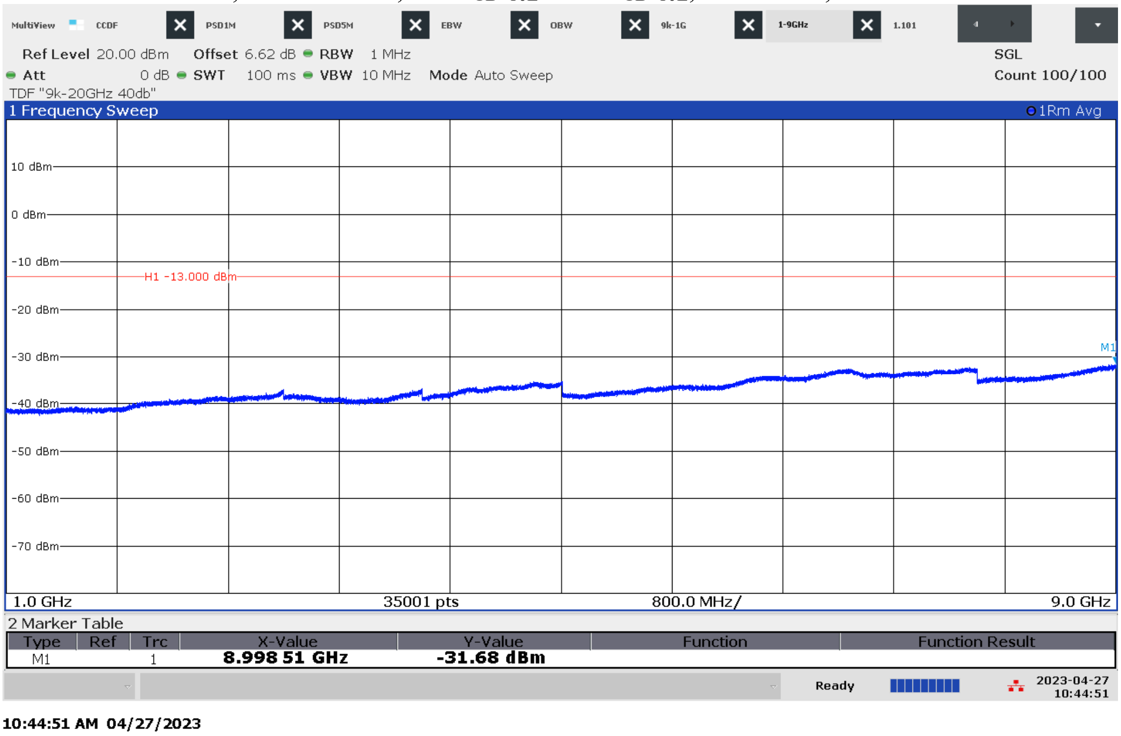


Diagram 3.21d
NB IoT GB: N-TM, LTE: TM1.1, B5 B_{GB+10L} B13 B_{GB+10L}, 1559 – 1610 MHz, Port A:

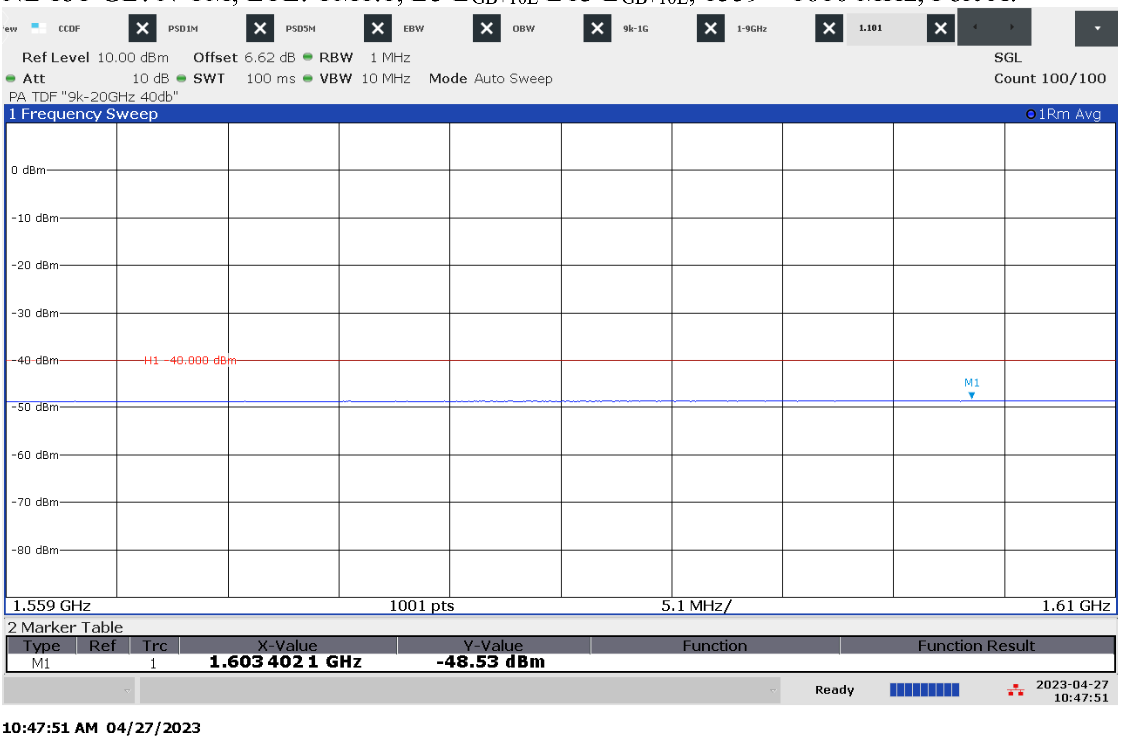
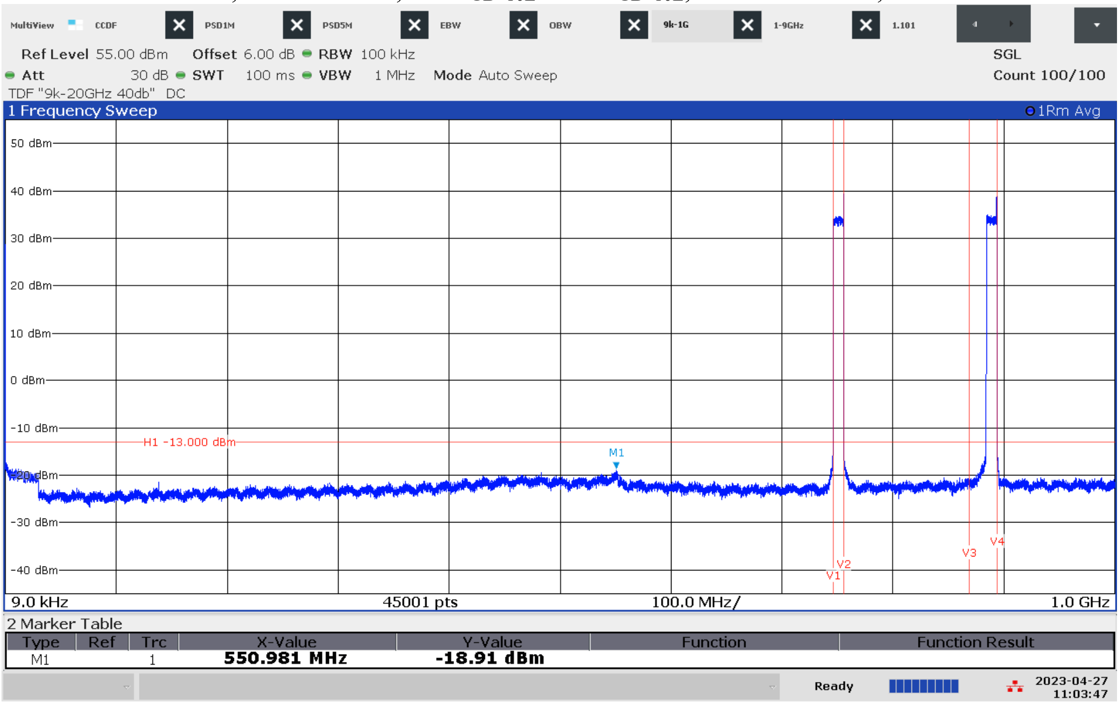
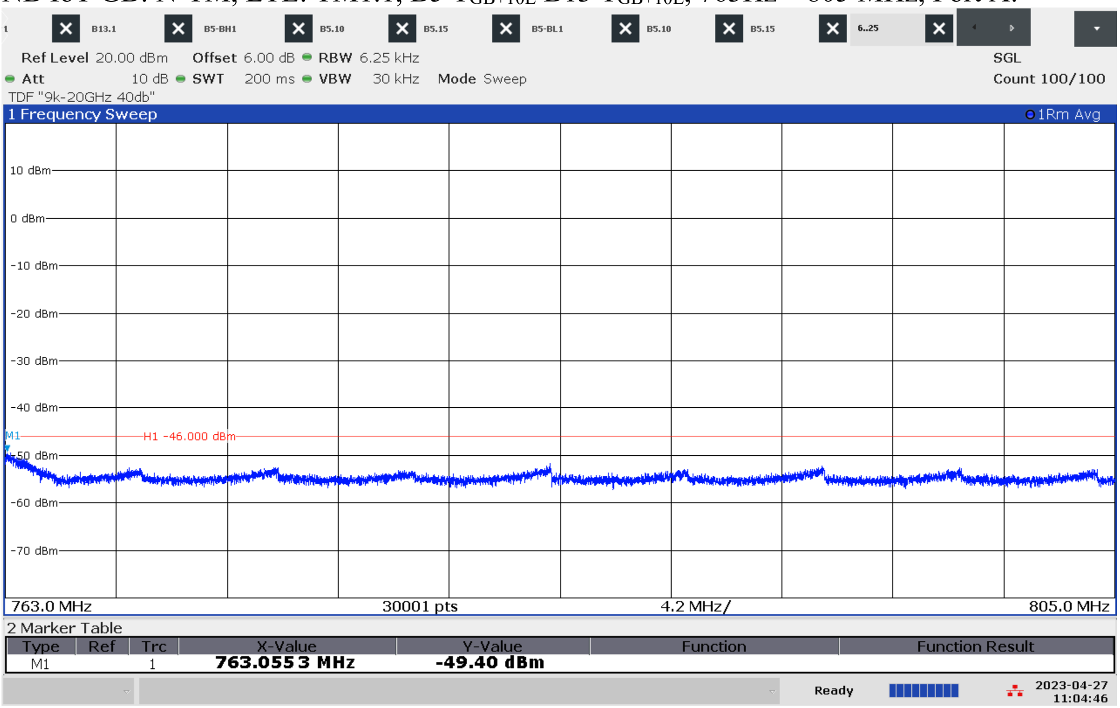


Diagram 3.22a
NB IoT GB: N-TM, LTE: TM1.1, B5 T_{GB+10L} B13 T_{GB+10L}, 9 kHz – 1 GHz, Port A:



11:03:47 AM 04/27/2023

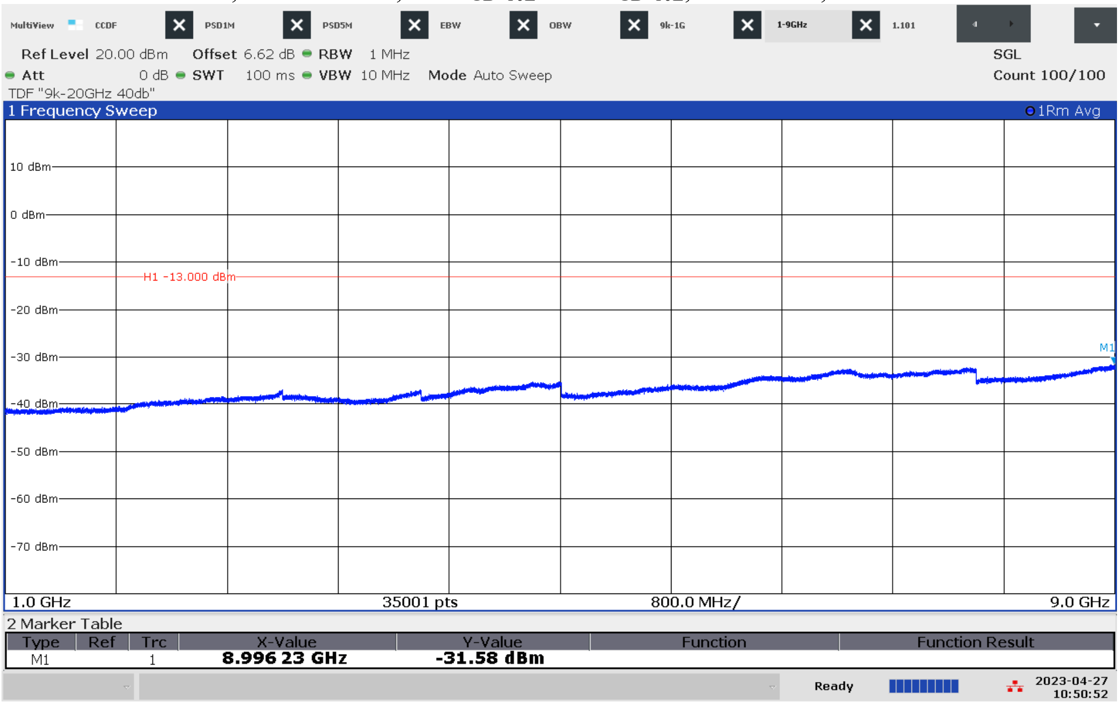
Diagram 3.22b
NB IoT GB: N-TM, LTE: TM1.1, B5 T_{GB+10L} B13 T_{GB+10L}, 763Hz – 805 MHz, Port A:



11:04:46 AM 04/27/2023

Diagram 3.22c

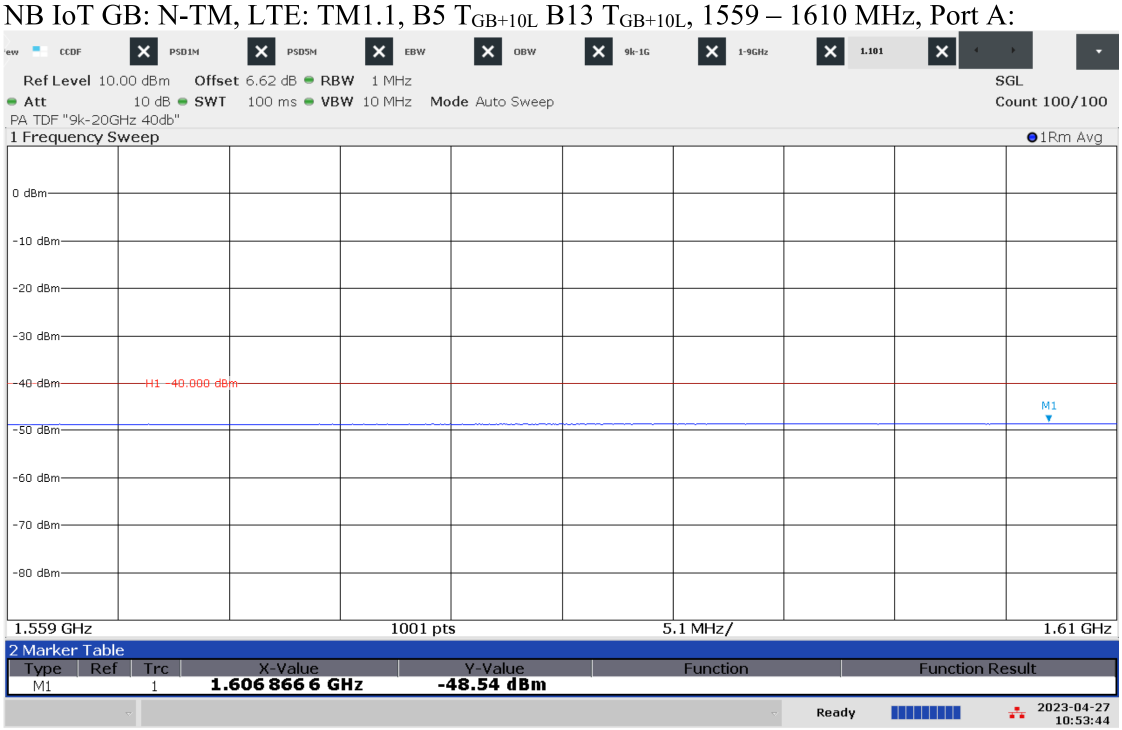
NB IoT GB: N-TM, LTE: TM1.1, B5 T_{GB+10L} B13 T_{GB+10L}, 1 – 9 GHz, Port A:



10:50:52 AM 04/27/2023

Diagram 3.22d

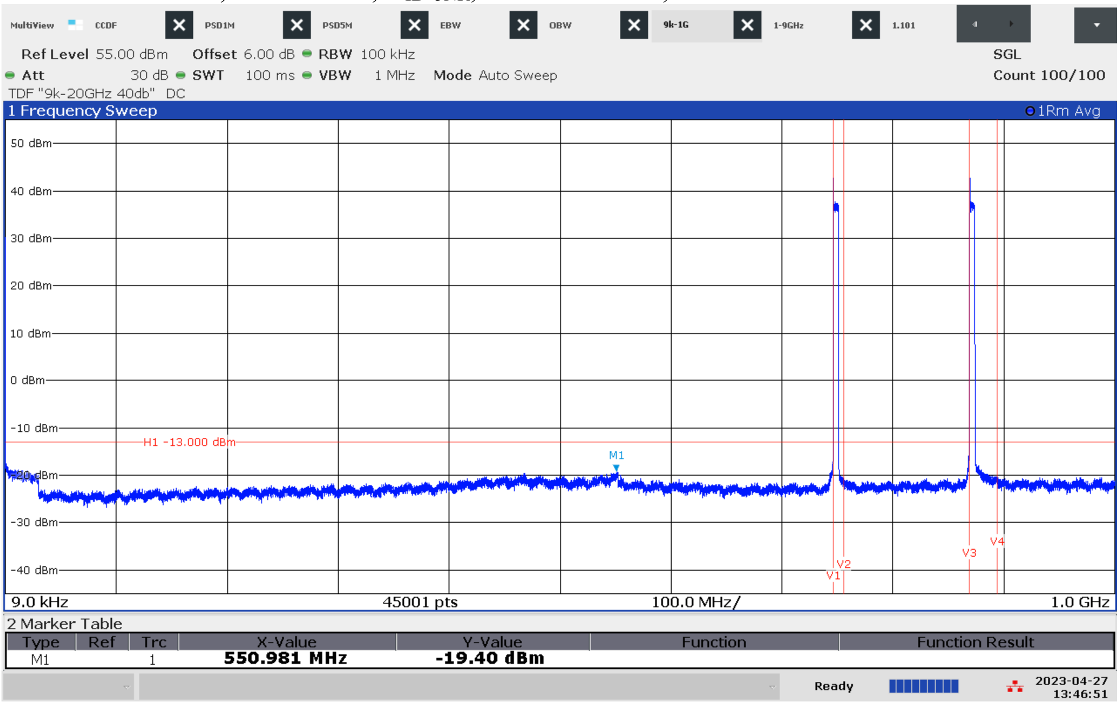
NB IoT GB: N-TM, LTE: TM1.1, B5 T_{GB+10L} B13 T_{GB+10L}, 1559 – 1610 MHz, Port A:



10:53:44 AM 04/27/2023

Diagram 3.23a

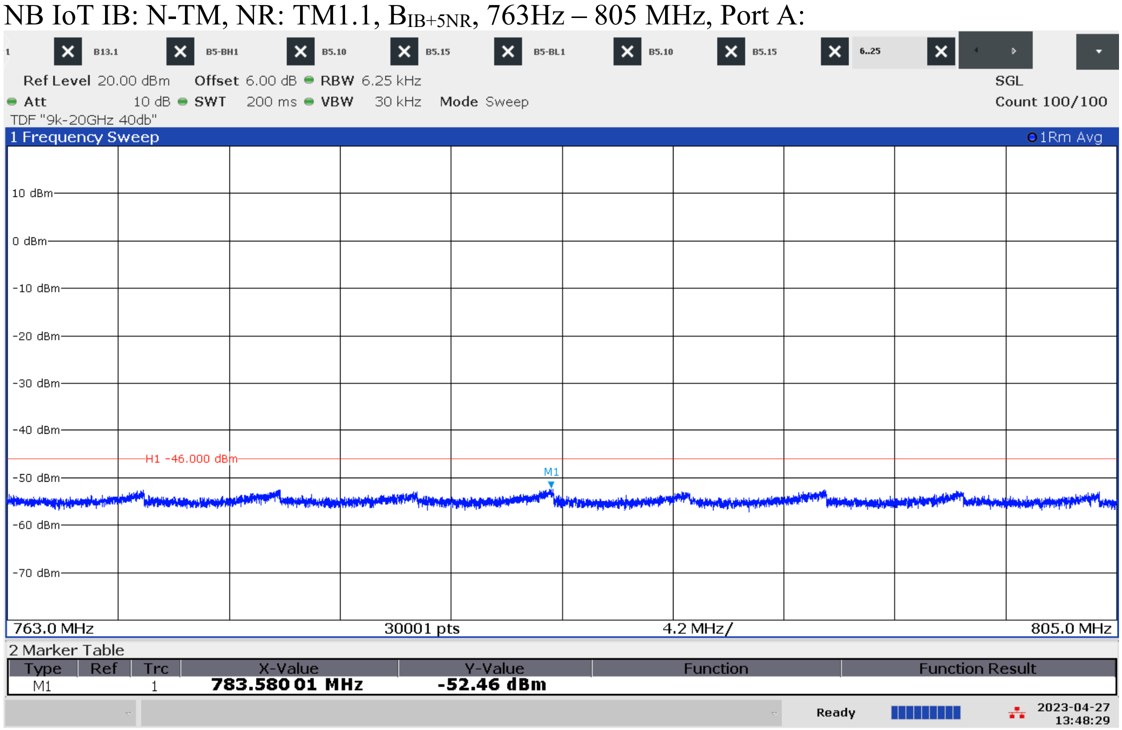
NB IoT IB: N-TM, NR: TM1.1, B_{IB+5NR}, 9 kHz – 1 GHz, Port A:



01:46:52 PM 04/27/2023

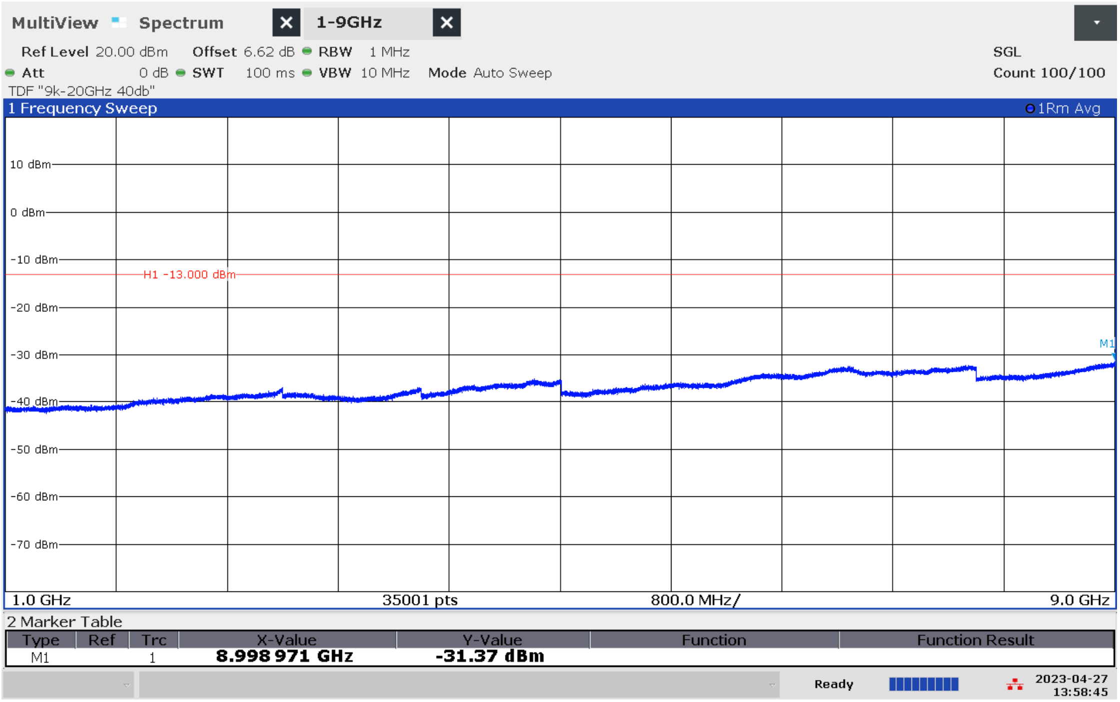
Diagram 3.23b

NB IoT IB: N-TM, NR: TM1.1, B_{IB+5NR}, 763Hz – 805 MHz, Port A:



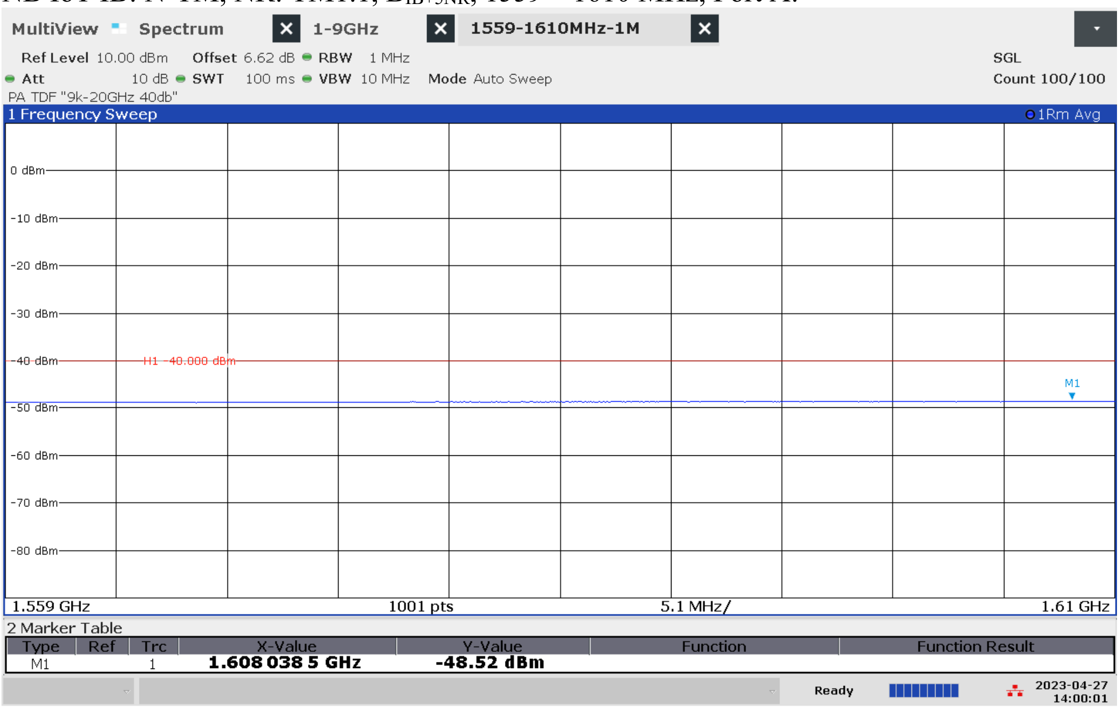
01:48:29 PM 04/27/2023

Diagram 3.23c
NB IoT IB: N-TM, NR: TM1.1, B_{IB+5NR}, 1 – 9 GHz, Port A:



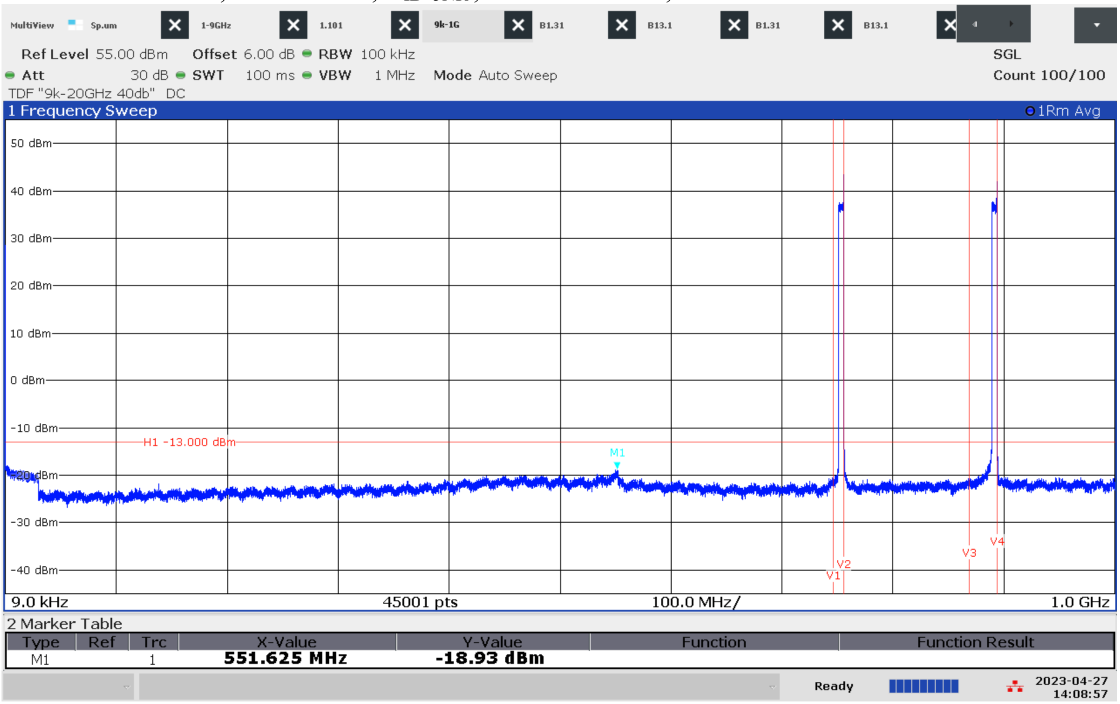
01:58:45 PM 04/27/2023

Diagram 3.23d
NB IoT IB: N-TM, NR: TM1.1, B_{IB+5NR}, 1559 – 1610 MHz, Port A:



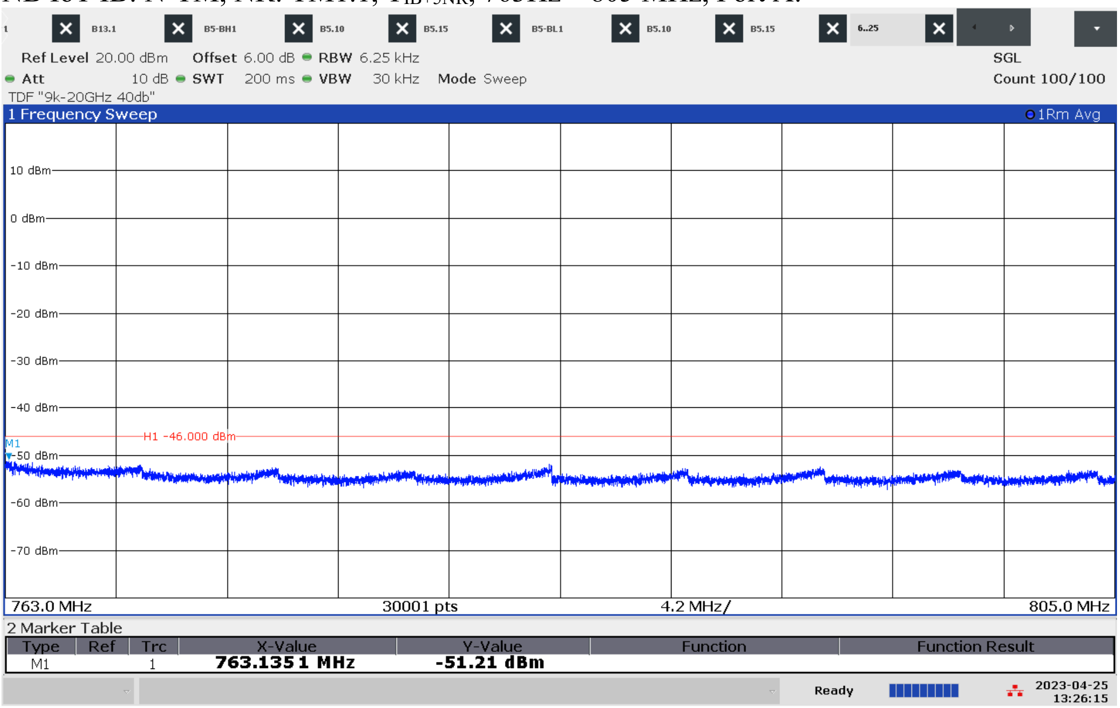
02:00:01 PM 04/27/2023

Diagram 3.24a
NB IoT IB: N-TM, NR: TM1.1, T_{IB+5NR} , 9 kHz – 1 GHz, Port A:



02:08:58 PM 04/27/2023

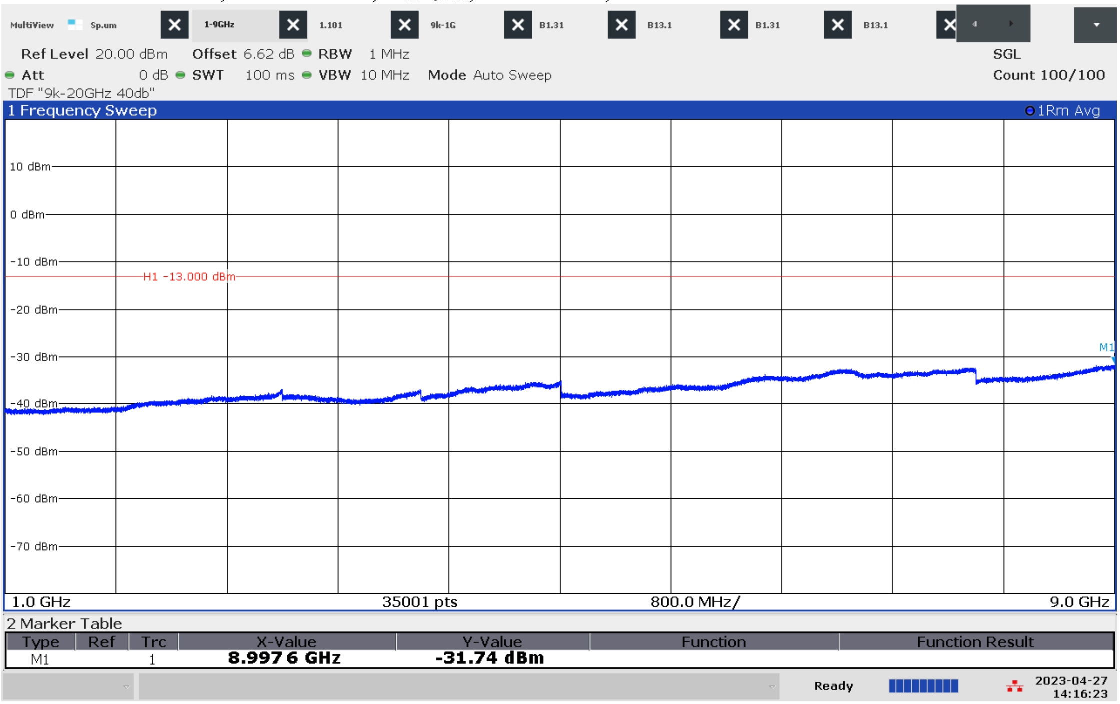
Diagram 3.24b
NB IoT IB: N-TM, NR: TM1.1, T_{IB+5NR}, 763Hz – 805 MHz, Port A:



01:26:15 PM 04/25/2023

Diagram 3.24c

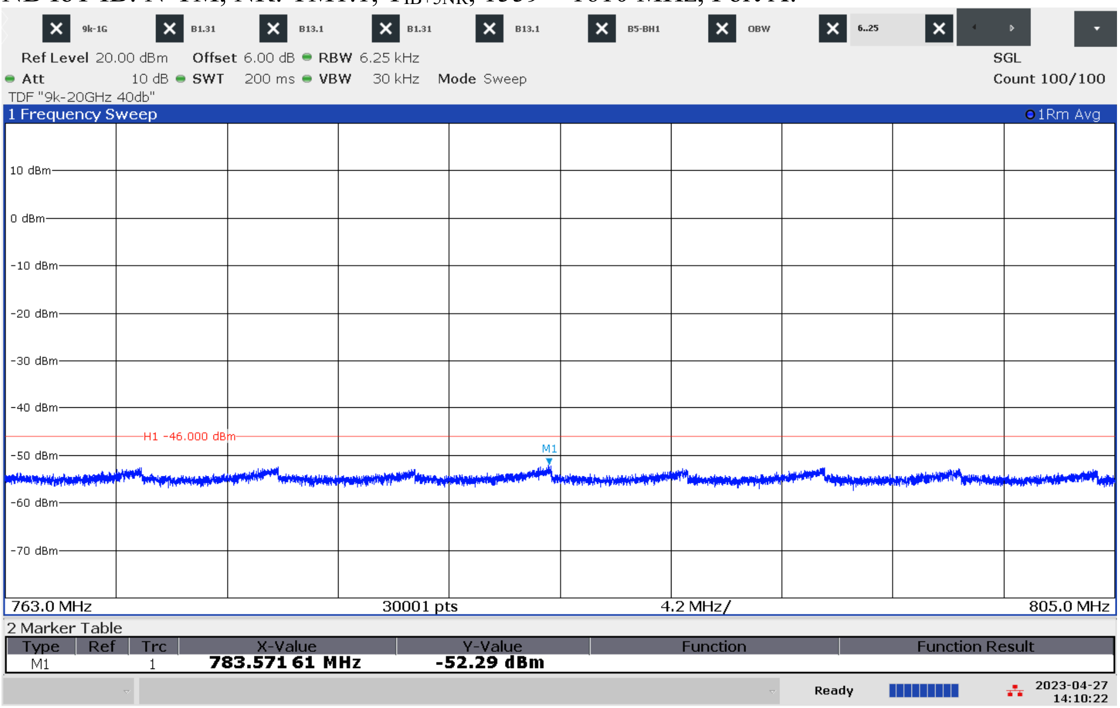
NB IoT IB: N-TM, NR: TM1.1, T_{IB+5NR}, 1 – 9 GHz, Port A:



02:16:23 PM 04/27/2023

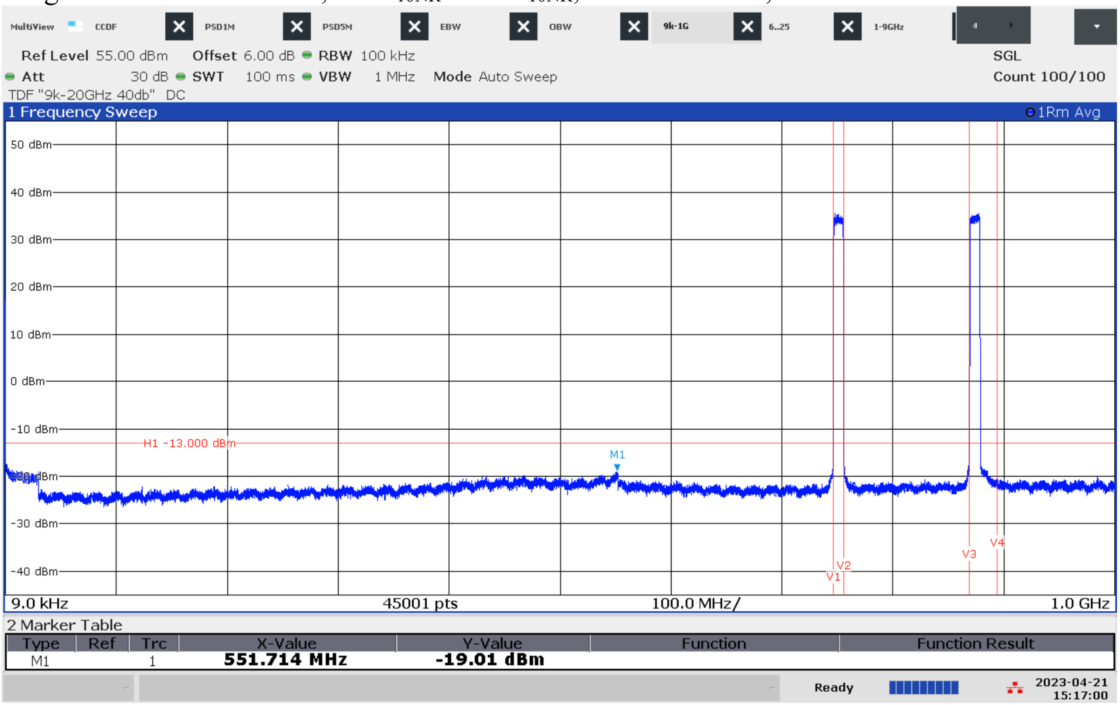
Diagram 3.24d

NB IoT IB: N-TM, NR: TM1.1, T_{IB+5NR}, 1559 – 1610 MHz, Port A:



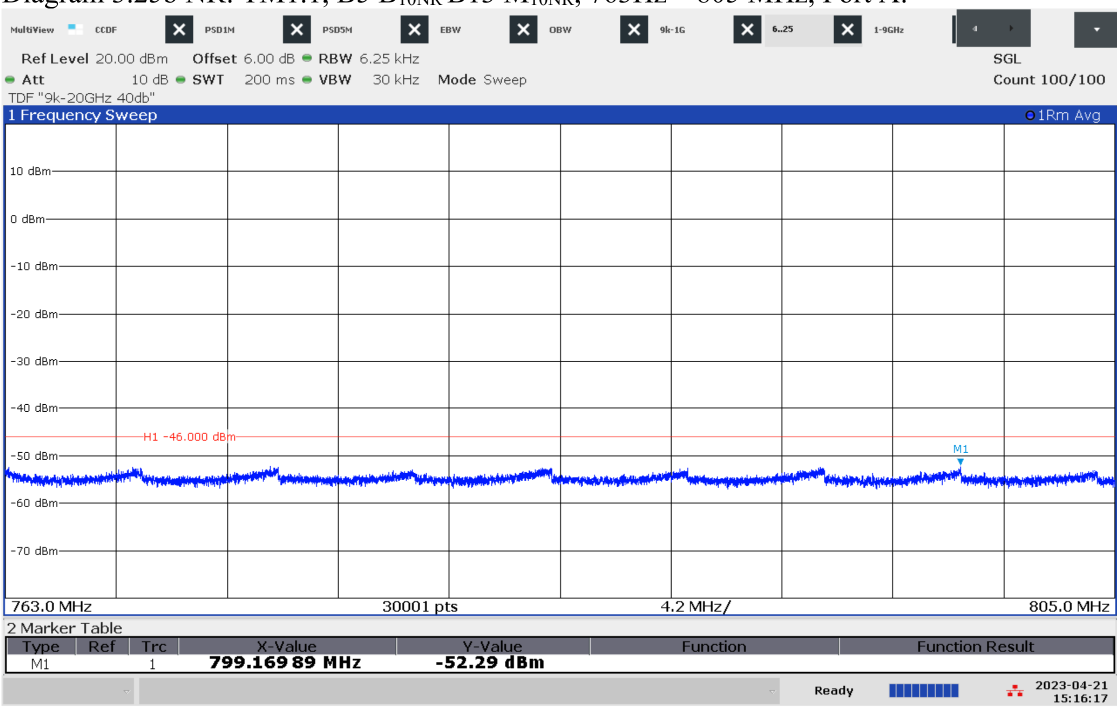
02:10:22 PM 04/27/2023

Diagram 3.25a NR: TM1.1, B5 B_{10NR} B13 M_{10NR}, 9 kHz – 1 GHz, Port A:



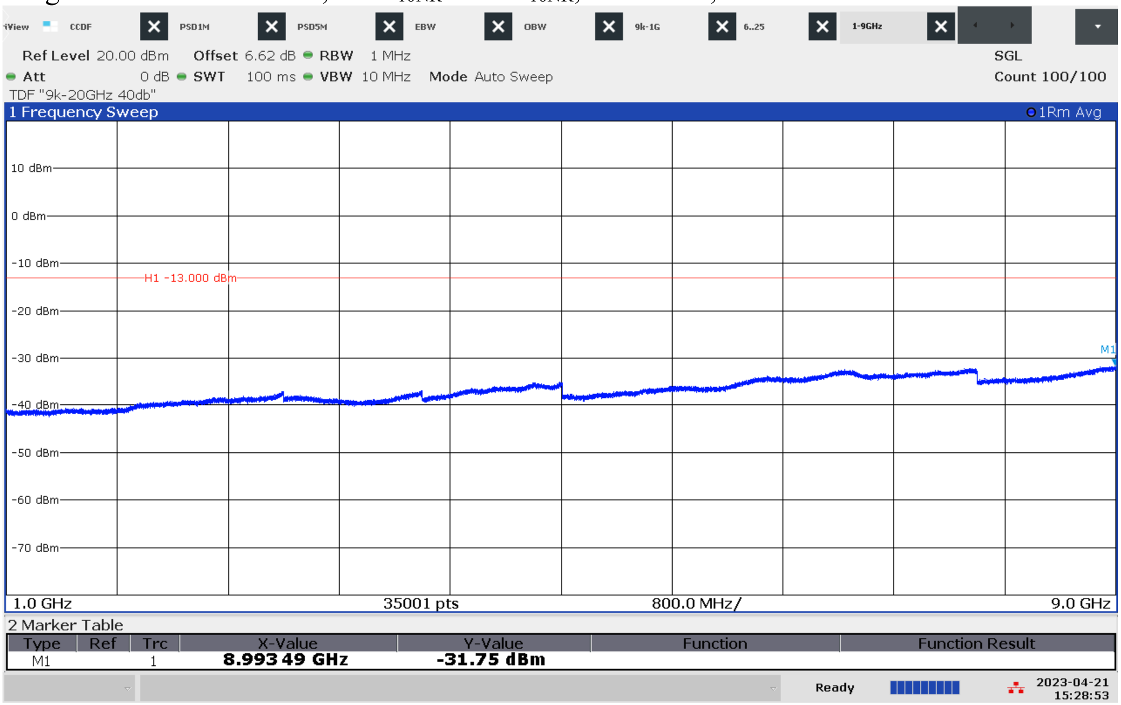
03:17:00 PM 04/21/2023

Diagram 3.25b NR: TM1.1, B5 B_{10NR} B13 M_{10NR}, 763Hz – 805 MHz, Port A:



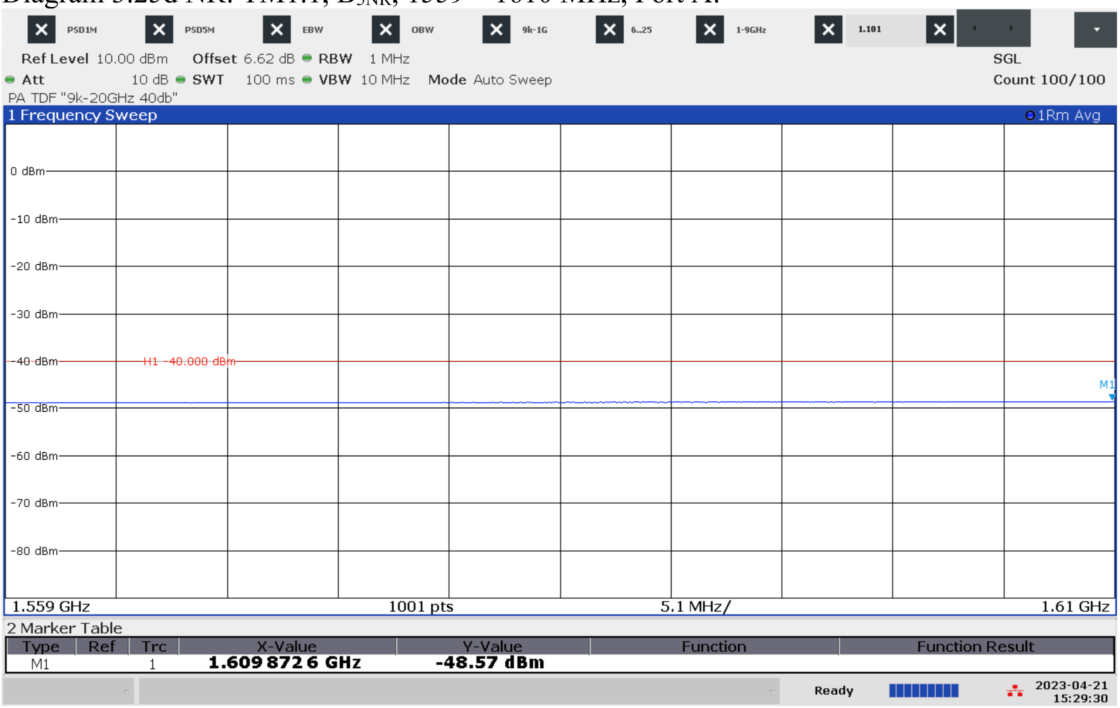
03:16:17 PM 04/21/2023

Diagram 3.25c NR: TM1.1, B5 B_{10NR} B13 M_{10NR}, 1 – 9 GHz, Port A:



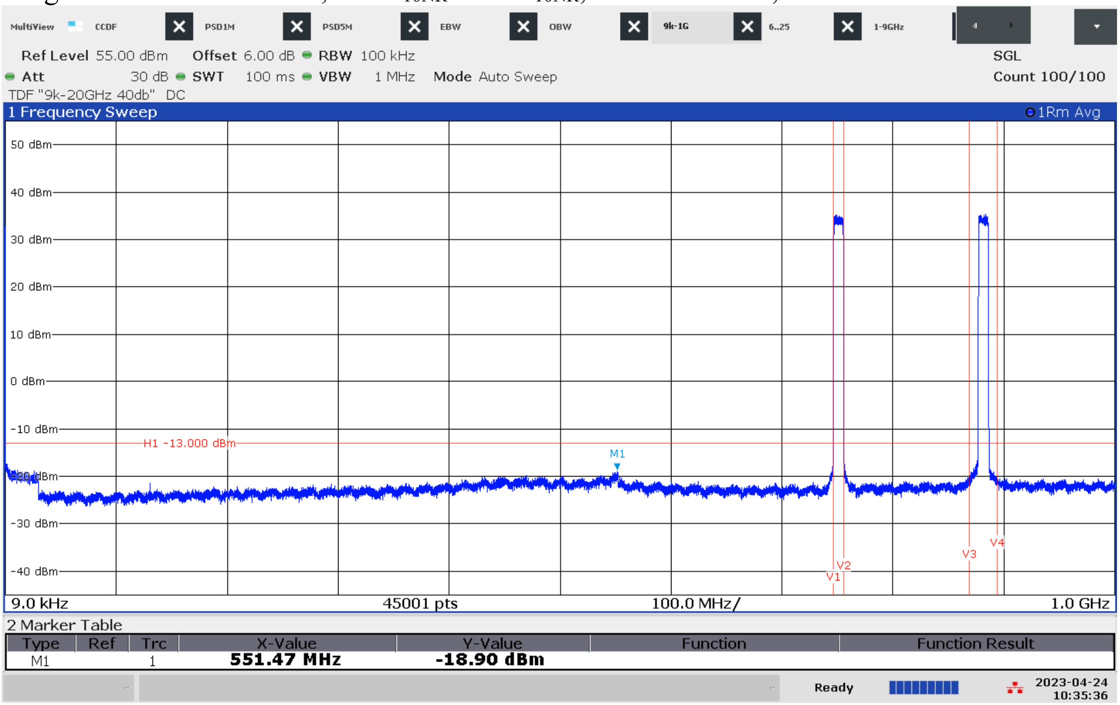
03:28:53 PM 04/21/2023

Diagram 3.25d NR: TM1.1, B_{5NR}, 1559 – 1610 MHz, Port A:



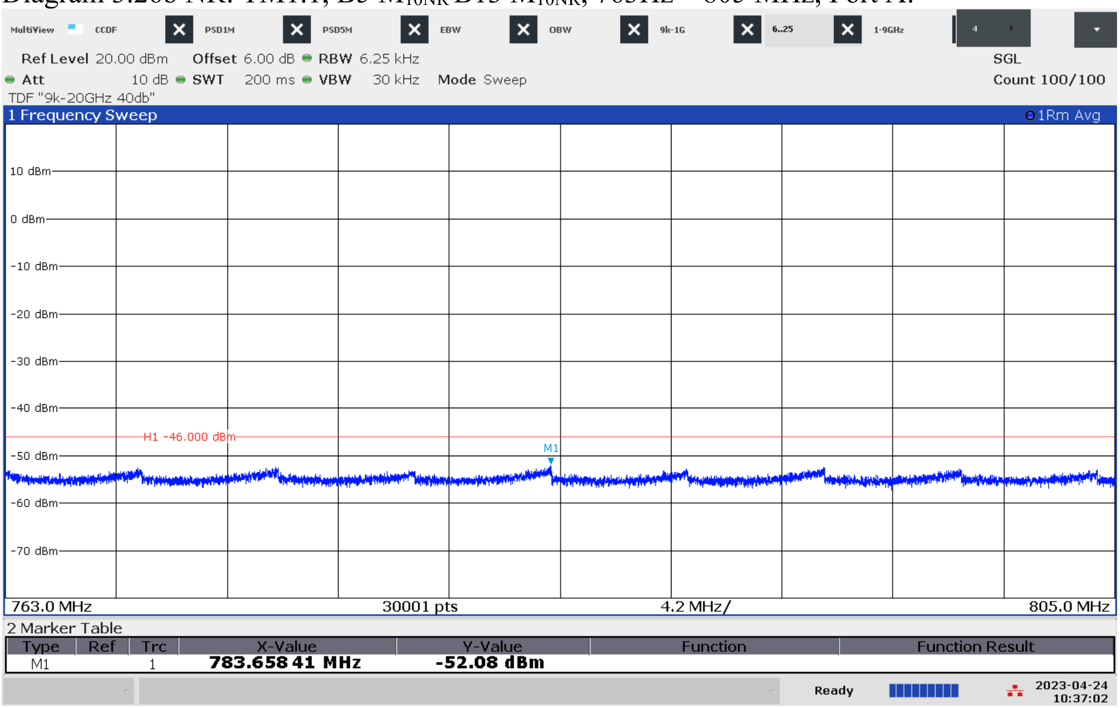
03:29:30 PM 04/21/2023

Diagram 3.26a NR: TM1.1, B5 M_{10NR} B13 M_{10NR}, 9 kHz – 1 GHz, Port A



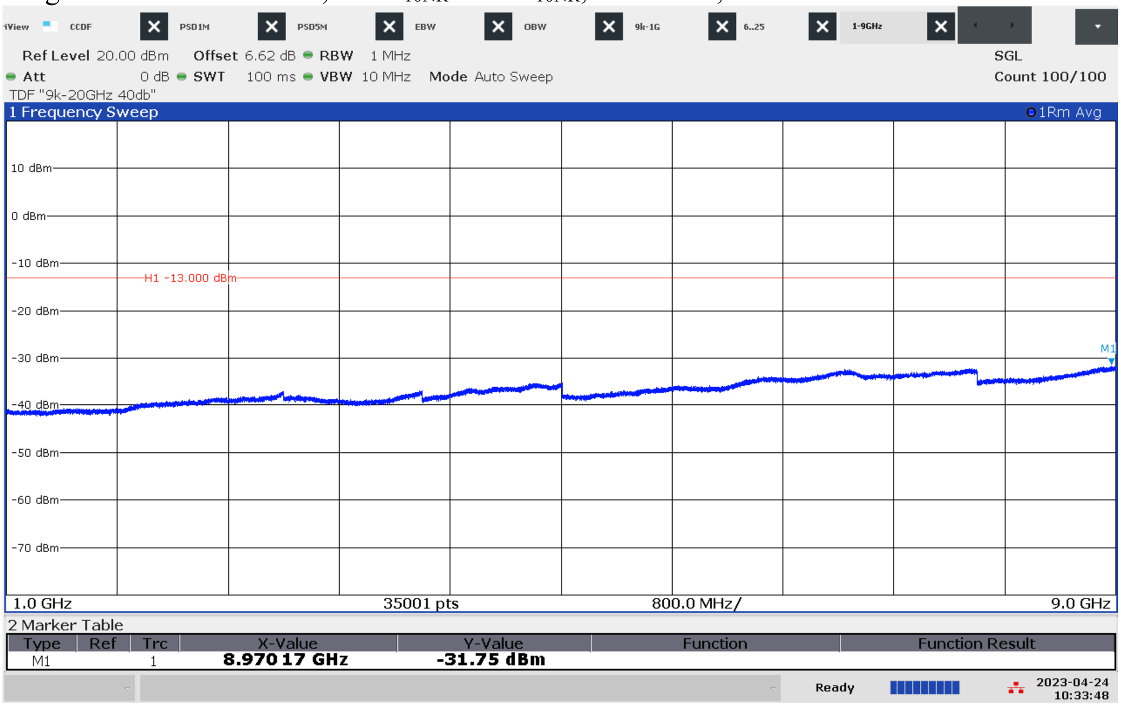
10:35:36 AM 04/24/2023

Diagram 3.26b NR: TM1.1, B5 M_{10NR} B13 M_{10NR}, 763Hz – 805 MHz, Port A:



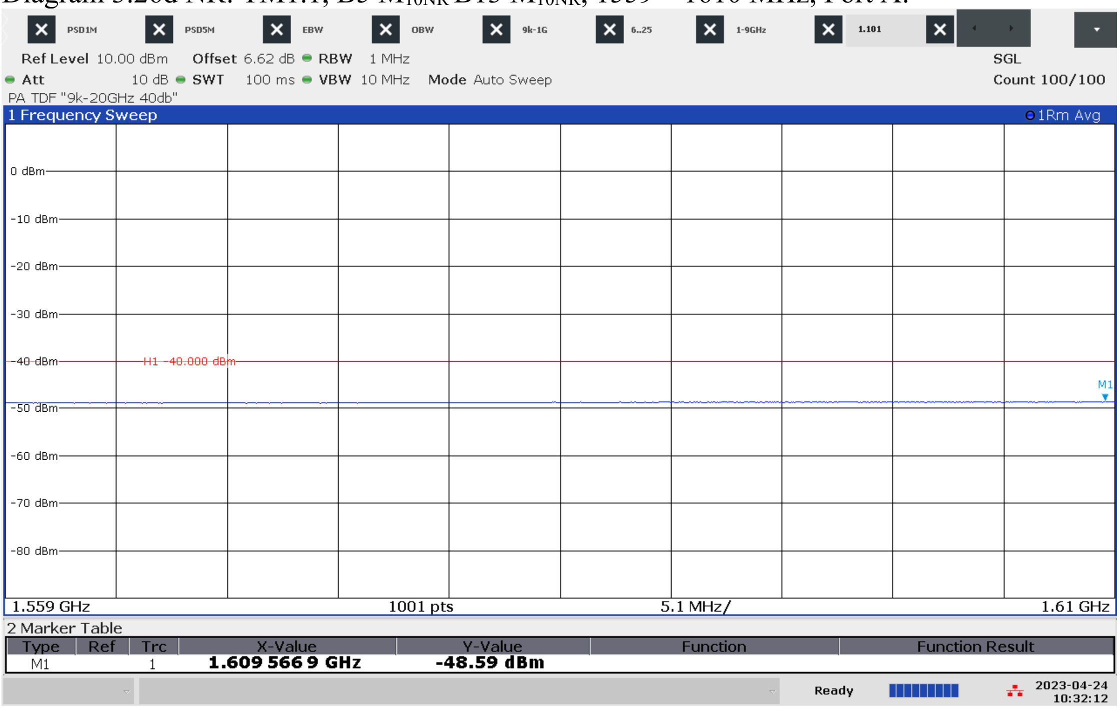
10:37:02 AM 04/24/2023

Diagram 3.26c NR: TM1.1, B5 M_{10NR} B13 M_{10NR}, 1 – 9 GHz, Port A:



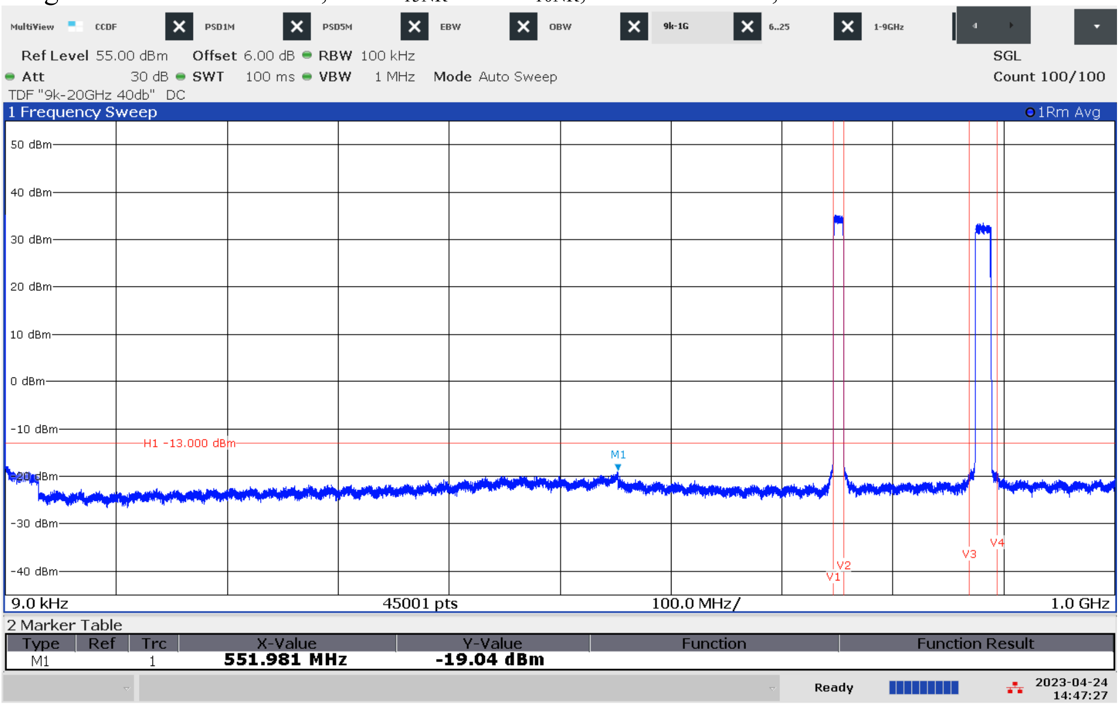
10:33:49 AM 04/24/2023

Diagram 3.26d NR: TM1.1, B5 M_{10NR} B13 M_{10NR}, 1559 – 1610 MHz, Port A:



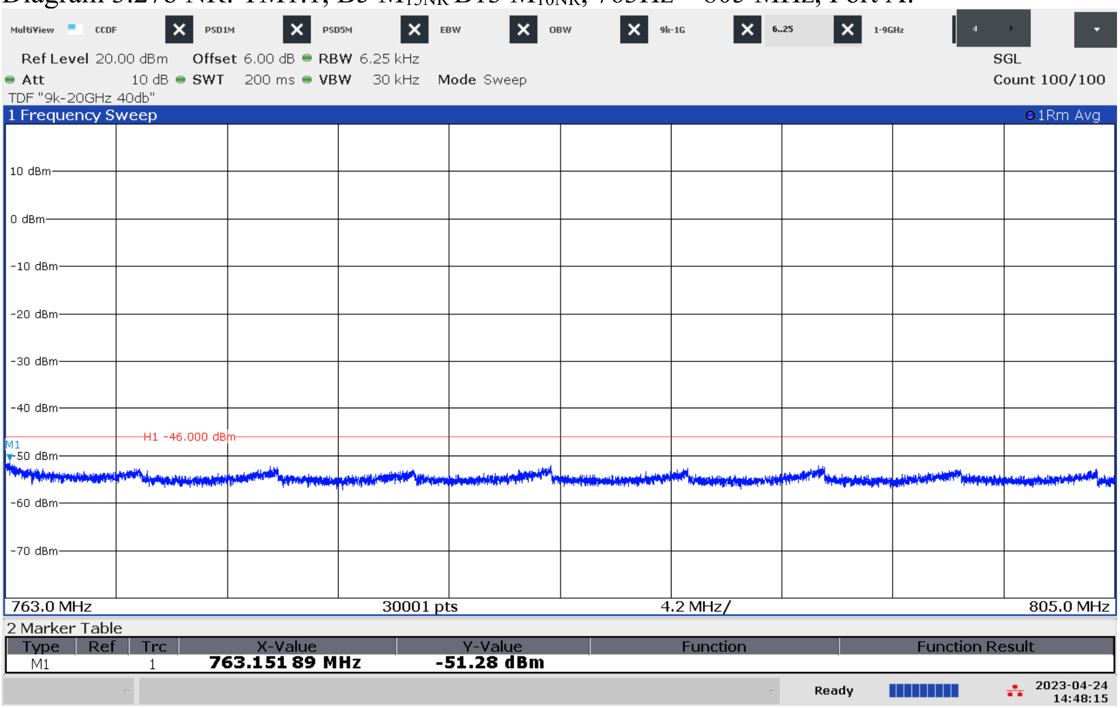
10:32:12 AM 04/24/2023

Diagram 3.27a NR: TM1.1, B5 M$_{15NR}$ B13 M$_{10NR}$, 9 kHz – 1 GHz, Port A:



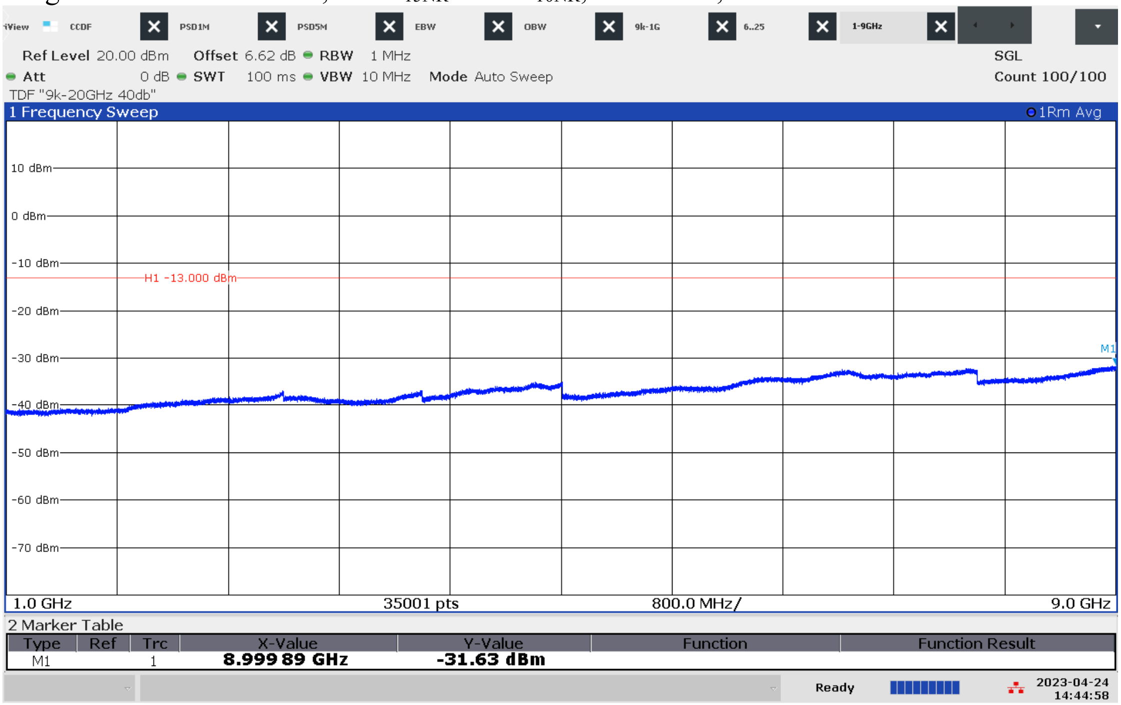
02:47:27 PM 04/24/2023

Diagram 3.27b NR: TM1.1, B5 M$_{15NR}$ B13 M$_{10NR}$, 763Hz – 805 MHz, Port A:



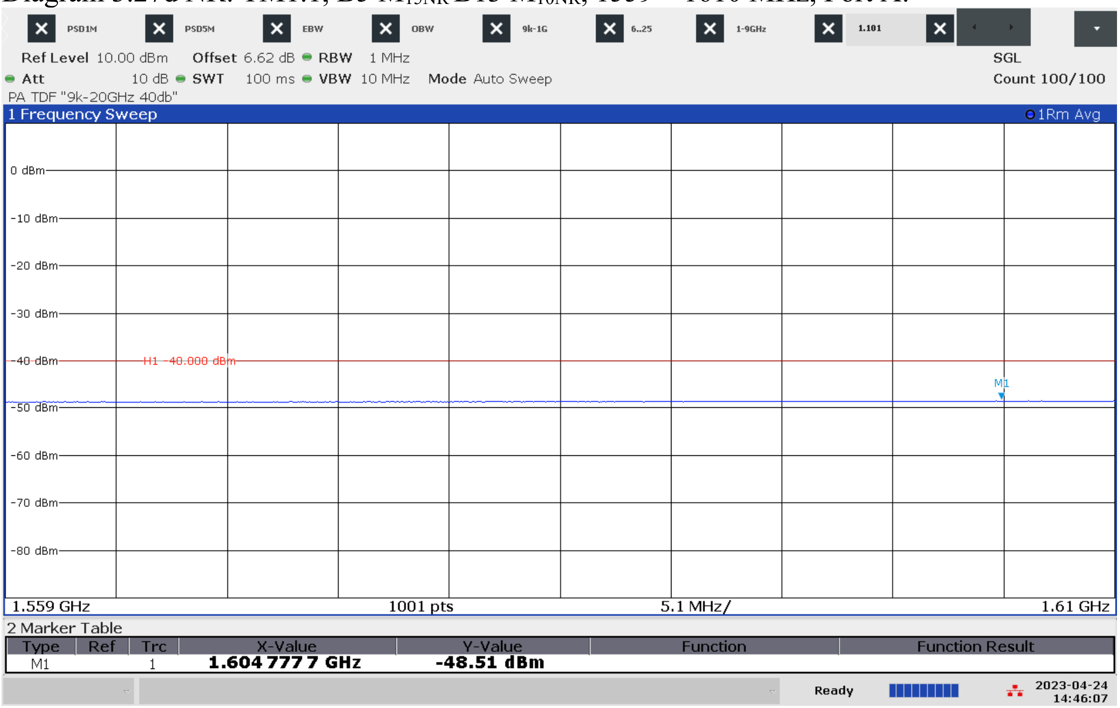
02:48:15 PM 04/24/2023

Diagram 3.27c NR: TM1.1, B5 M_{15NR} B13 M_{10NR}, 1 – 9 GHz, Port A:



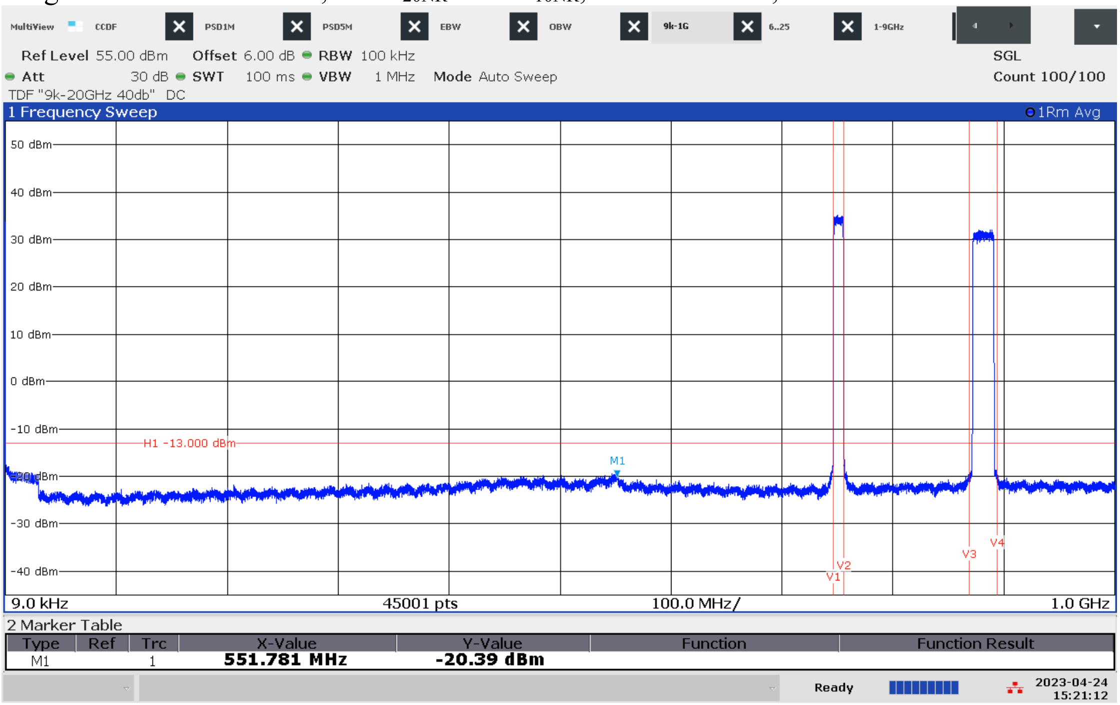
02:44:58 PM 04/24/2023

Diagram 3.27d NR: TM1.1, B5 M_{15NR} B13 M_{10NR}, 1559 – 1610 MHz, Port A:



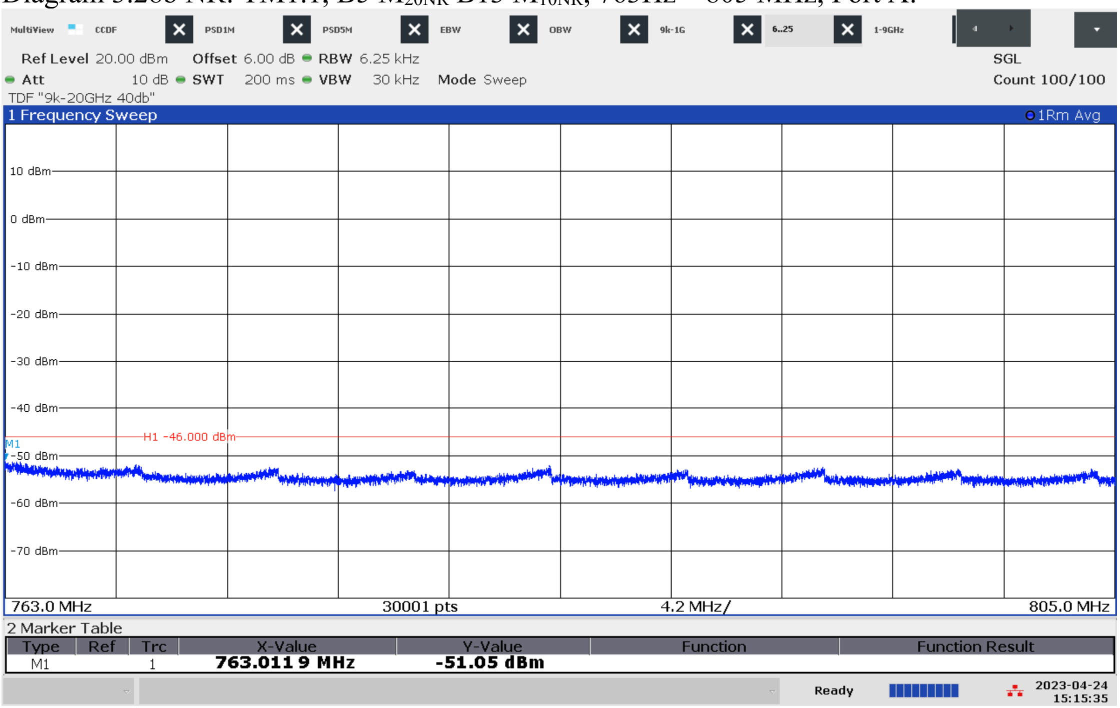
02:46:07 PM 04/24/2023

Diagram 3.28a NR: TM1.1, B5 M$_{20NR}$ B13 M$_{10NR}$, 9 kHz – 1 GHz, Port A:



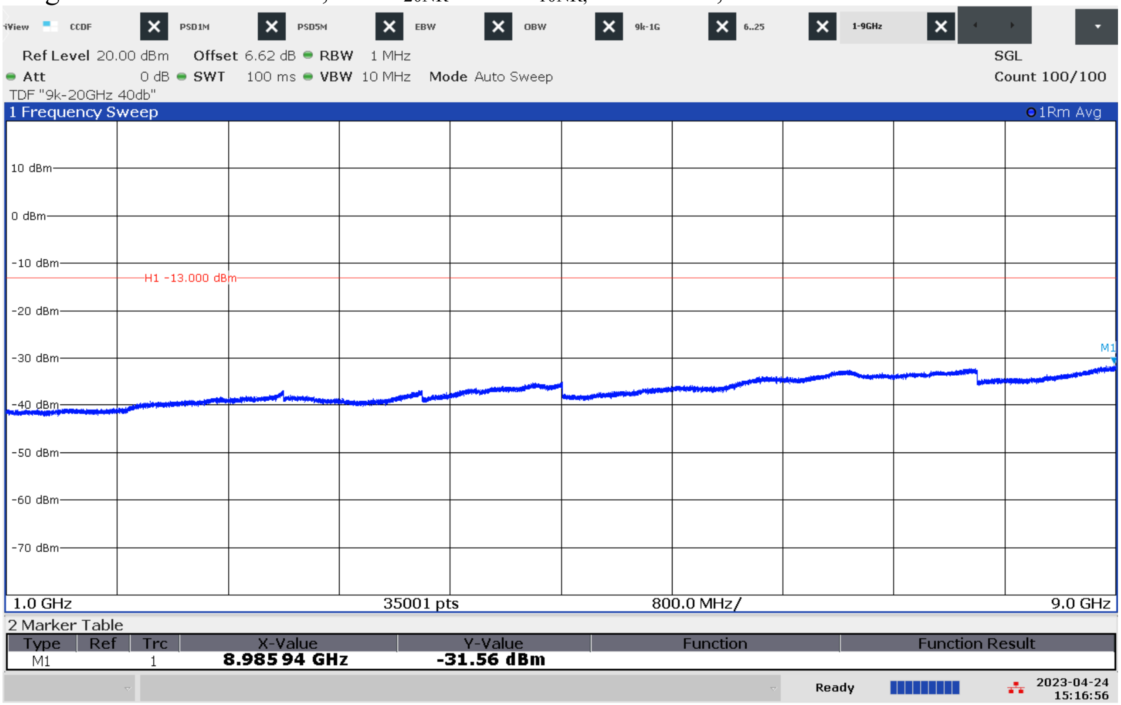
03:21:12 PM 04/24/2023

Diagram 3.28b NR: TM1.1, B5 M$_{20NR}$ B13 M$_{10NR}$, 763Hz – 805 MHz, Port A:



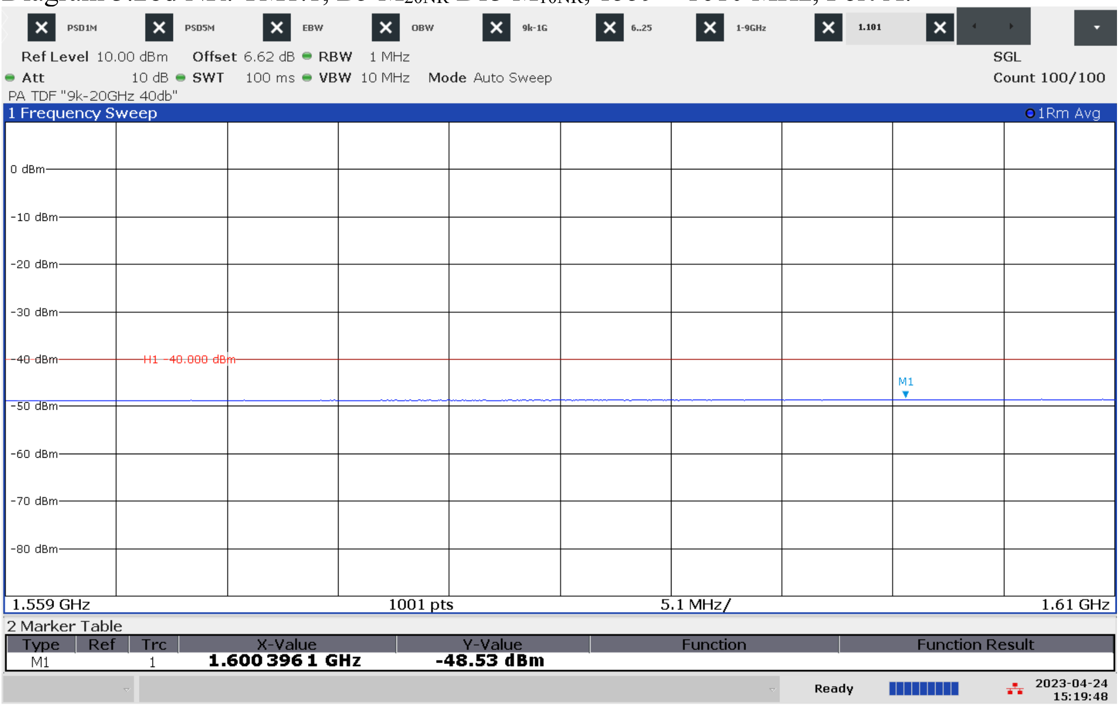
03:15:35 PM 04/24/2023

Diagram 3.28c NR: TM1.1, B5 M_{20NR} B13 M_{10NR}, 1 – 9 GHz, Port A:



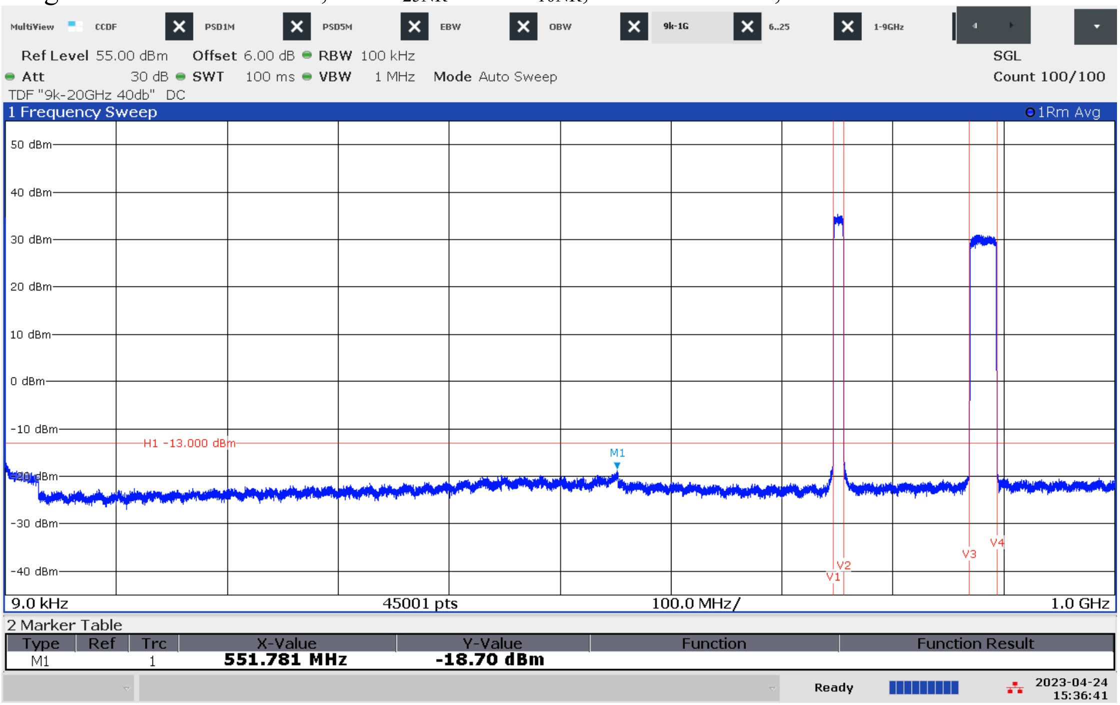
03:16:56 PM 04/24/2023

Diagram 3.28d NR: TM1.1, B5 M_{20NR} B13 M_{10NR}, 1559 – 1610 MHz, Port A:



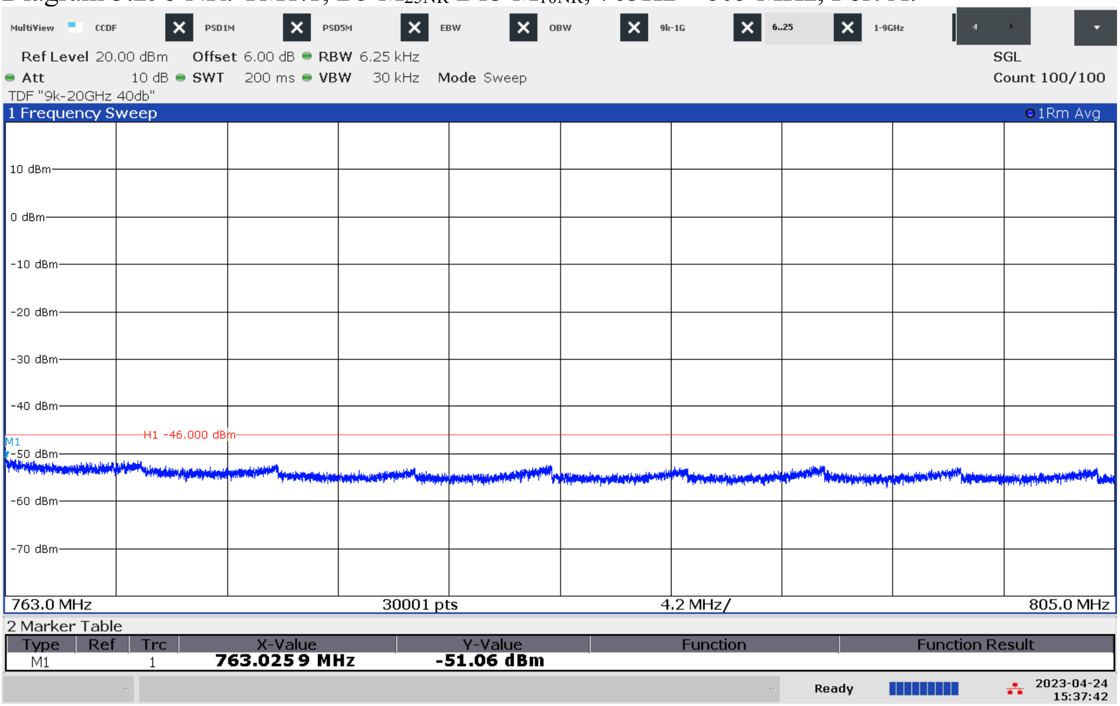
03:19:49 PM 04/24/2023

Diagram 3.29a NR: TM1.1, B5 M_{25NR} B13 M_{10NR}, 9 kHz – 1 GHz, Port A:



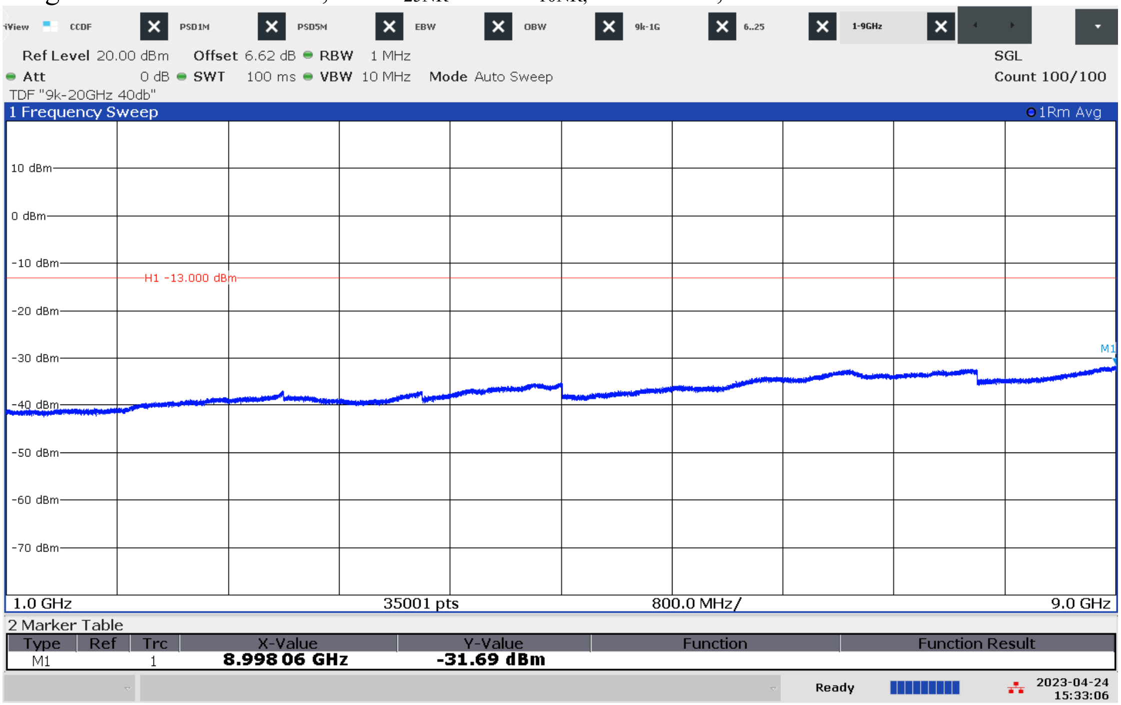
03:36:41 PM 04/24/2023

Diagram 3.29b NR: TM1.1, B5 M_{25NR} B13 M_{10NR}, 763Hz – 805 MHz, Port A:



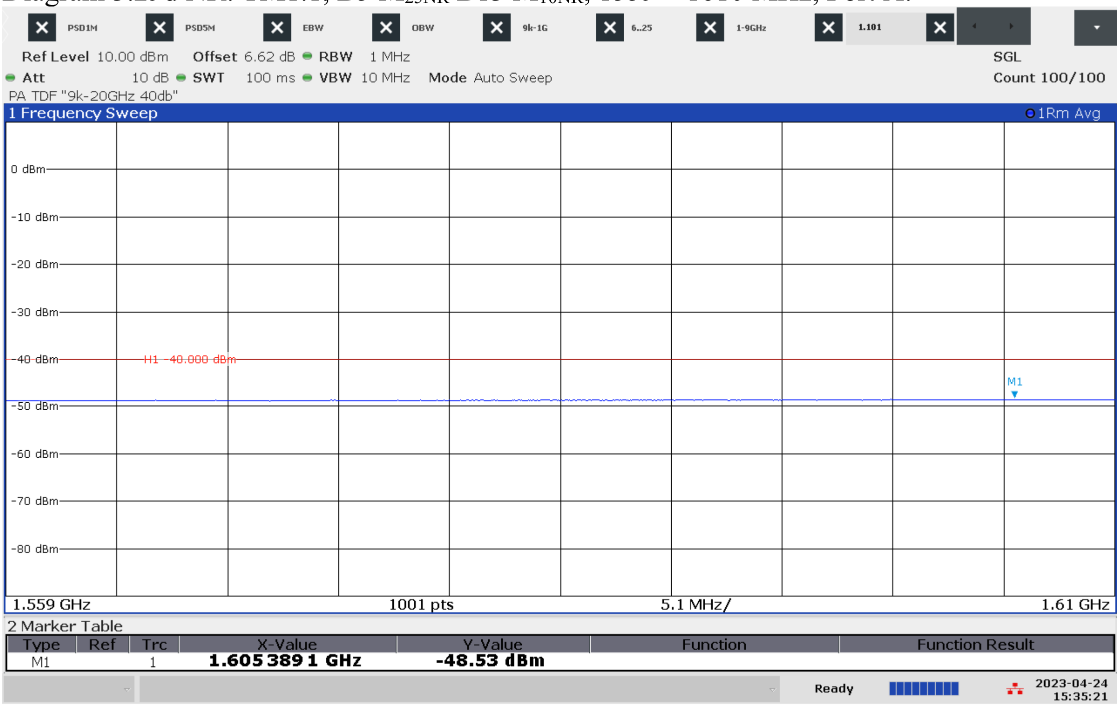
03:37:43 PM 04/24/2023

Diagram 3.29c NR: TM1.1, B5 M_{25NR} B13 M_{10NR}, 1 – 9 GHz, Port A:



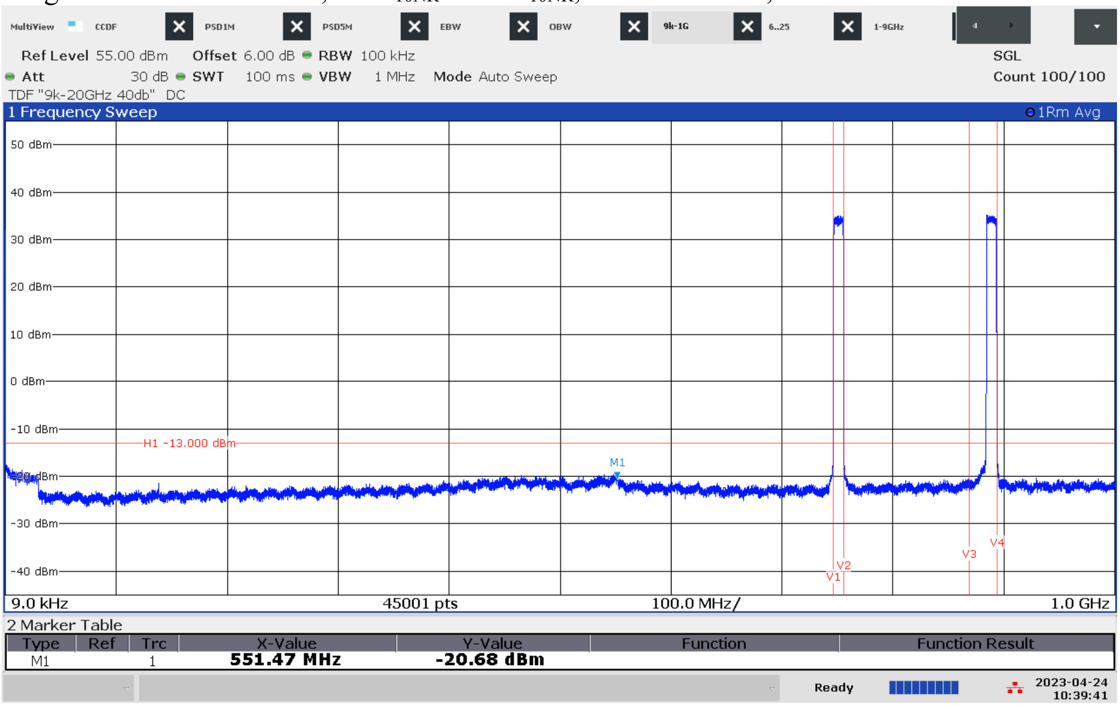
03:33:06 PM 04/24/2023

Diagram 3.29d NR: TM1.1, B5 M_{25NR} B13 M_{10NR}, 1559 – 1610 MHz, Port A:



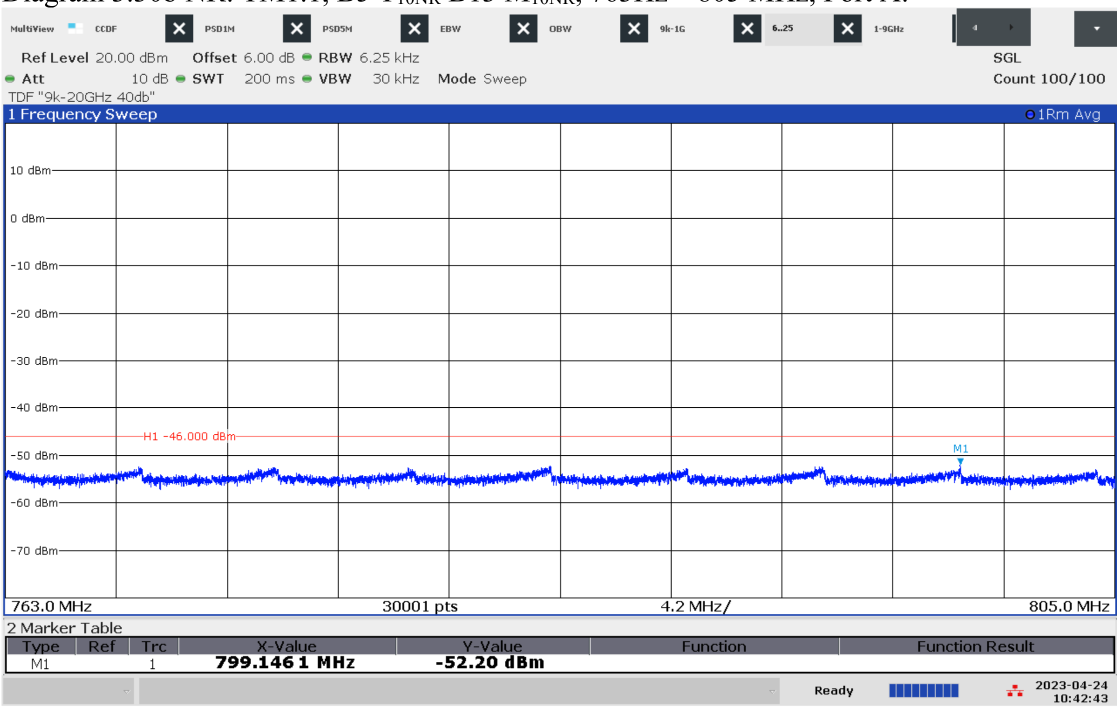
03:35:21 PM 04/24/2023

Diagram 3.30a NR: TM1.1, B5 T_{10NR} B13 M_{10NR}, 9 kHz – 1 GHz, Port A:



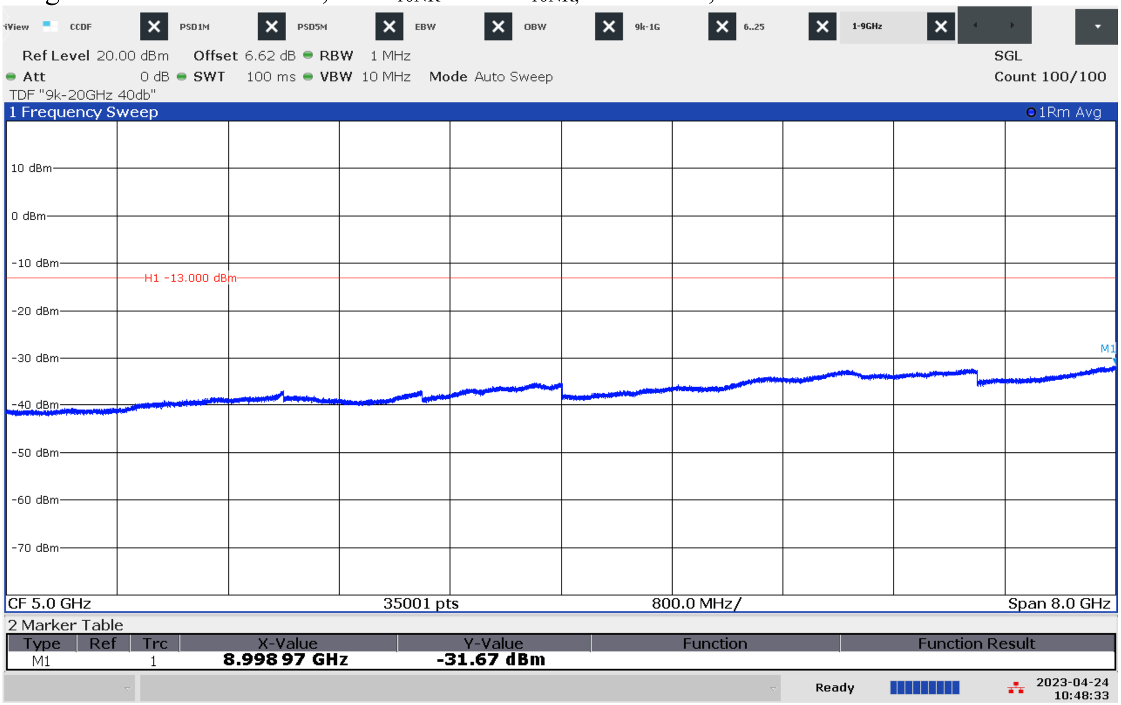
10:39:41 AM 04/24/2023

Diagram 3.30b NR: TM1.1, B5 T_{10NR} B13 M_{10NR}, 763Hz – 805 MHz, Port A:



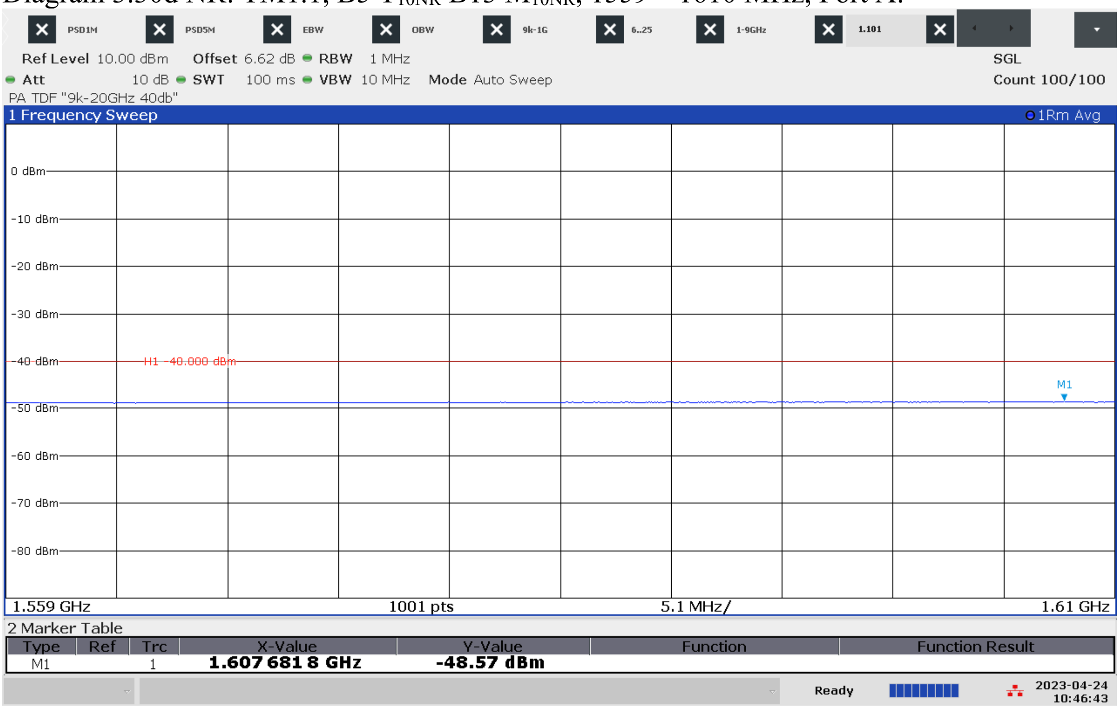
10:42:43 AM 04/24/2023

Diagram 3.30c NR: TM1.1, B5 T_{10NR} B13 M_{10NR}, 1 – 9 GHz, Port A:



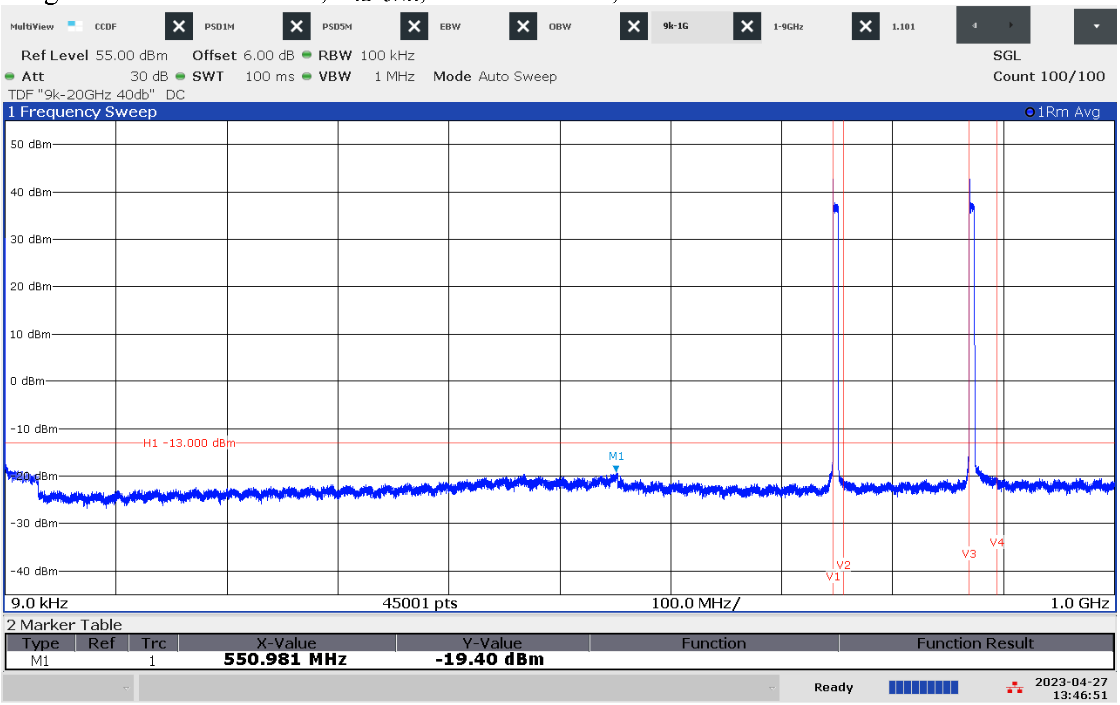
10:48:33 AM 04/24/2023

Diagram 3.30d NR: TM1.1, B5 T_{10NR} B13 M_{10NR}, 1559 – 1610 MHz, Port A:



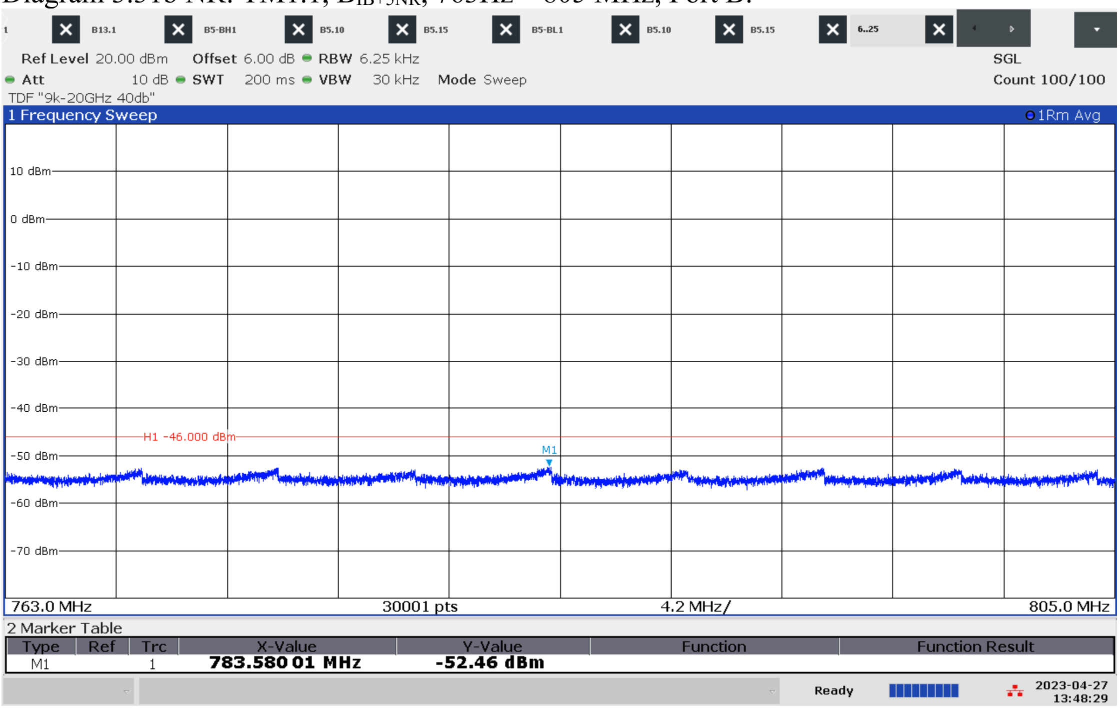
10:46:43 AM 04/24/2023

Diagram 3.31a NR: TM1.1, B_{IB+5NR}, 9 kHz – 1 GHz, Port B:



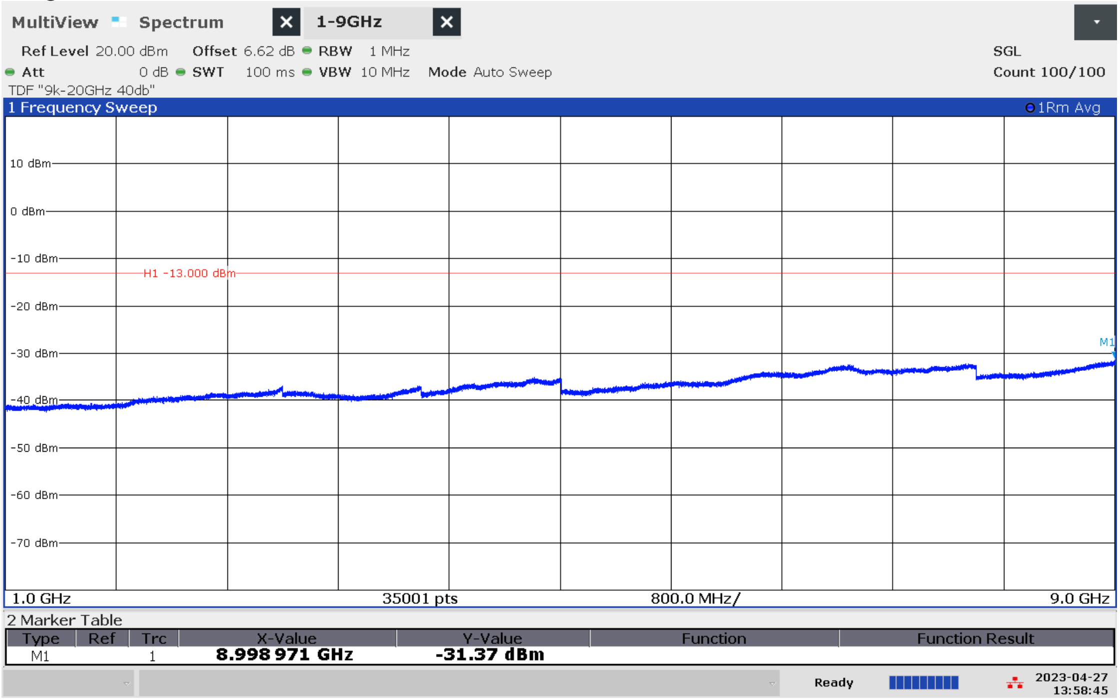
01:46:52 PM 04/27/2023

Diagram 3.31b NR: TM1.1, B_{IB+5NR}, 763Hz – 805 MHz, Port B:



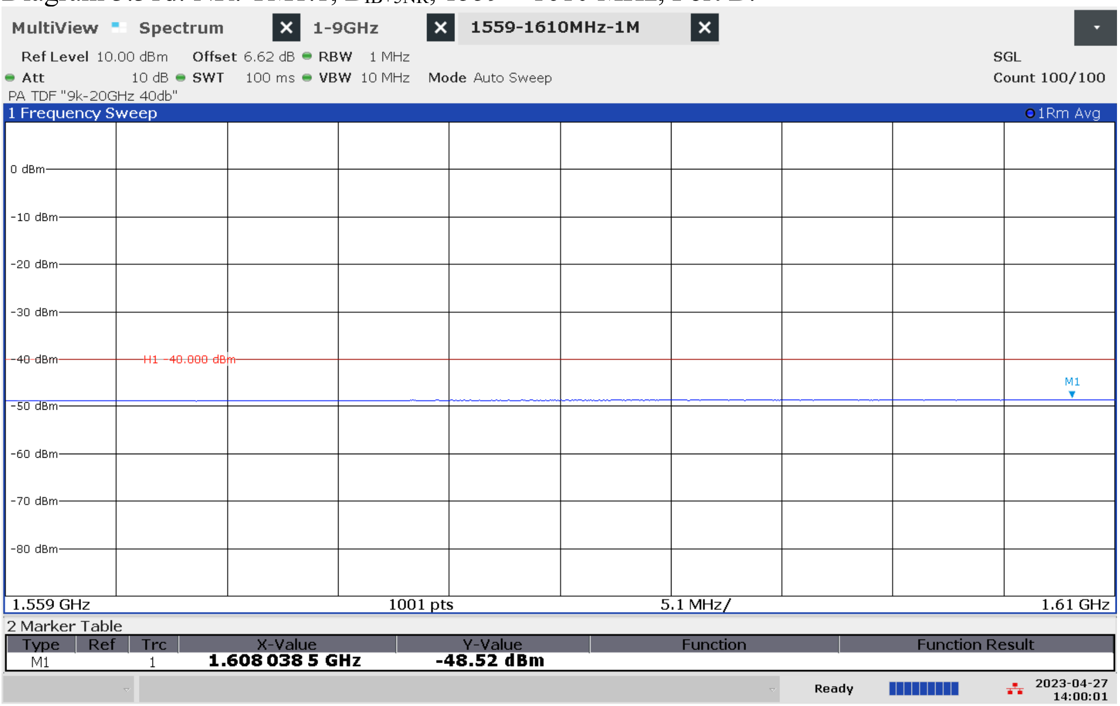
01:48:29 PM 04/27/2023

Diagram 3.31c: NR: TM1.1, B_{IB+5NR}, 1 – 9 GHz, Port B:



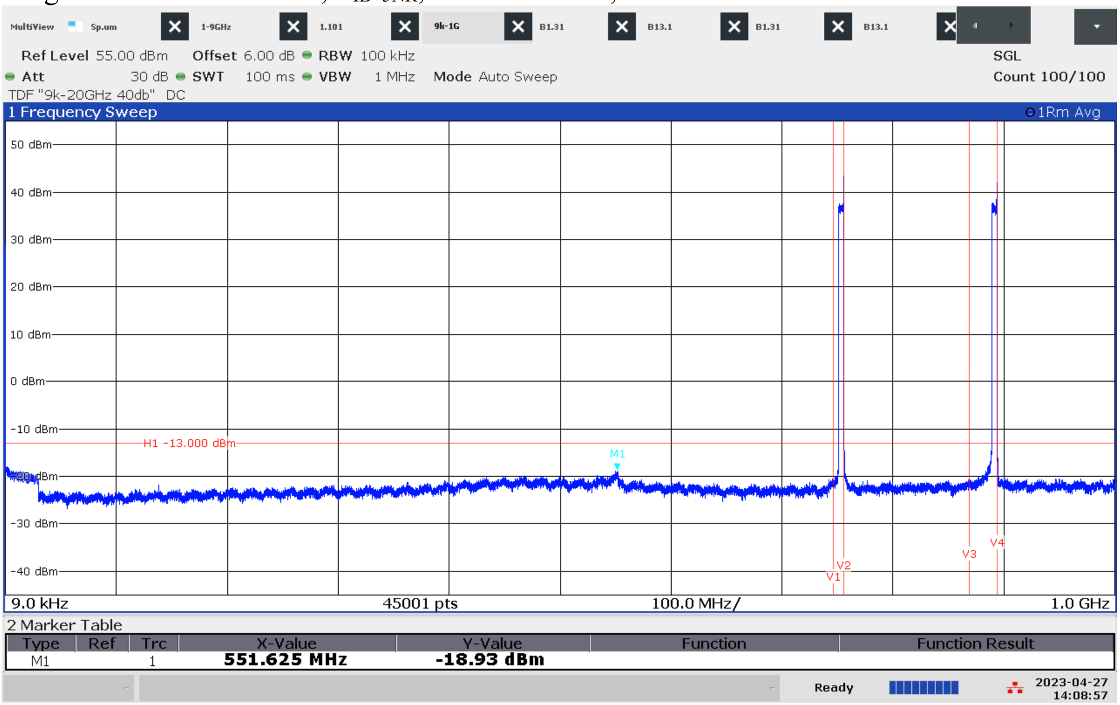
01:58:45 PM 04/27/2023

Diagram 3.31d: NR: TM1.1, B_{IB+5NR}, 1559 – 1610 MHz, Port B:



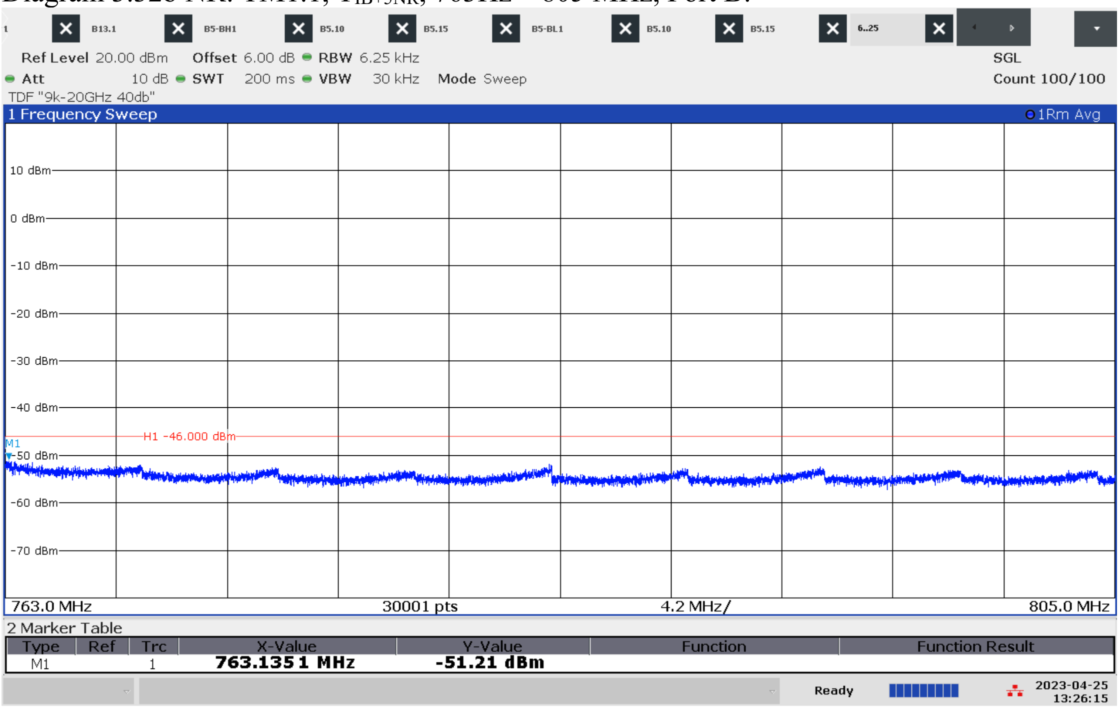
02:00:01 PM 04/27/2023

Diagram 3.32a NR: TM1.1, T_{IB+5NR}, 9 kHz – 1 GHz, Port B:



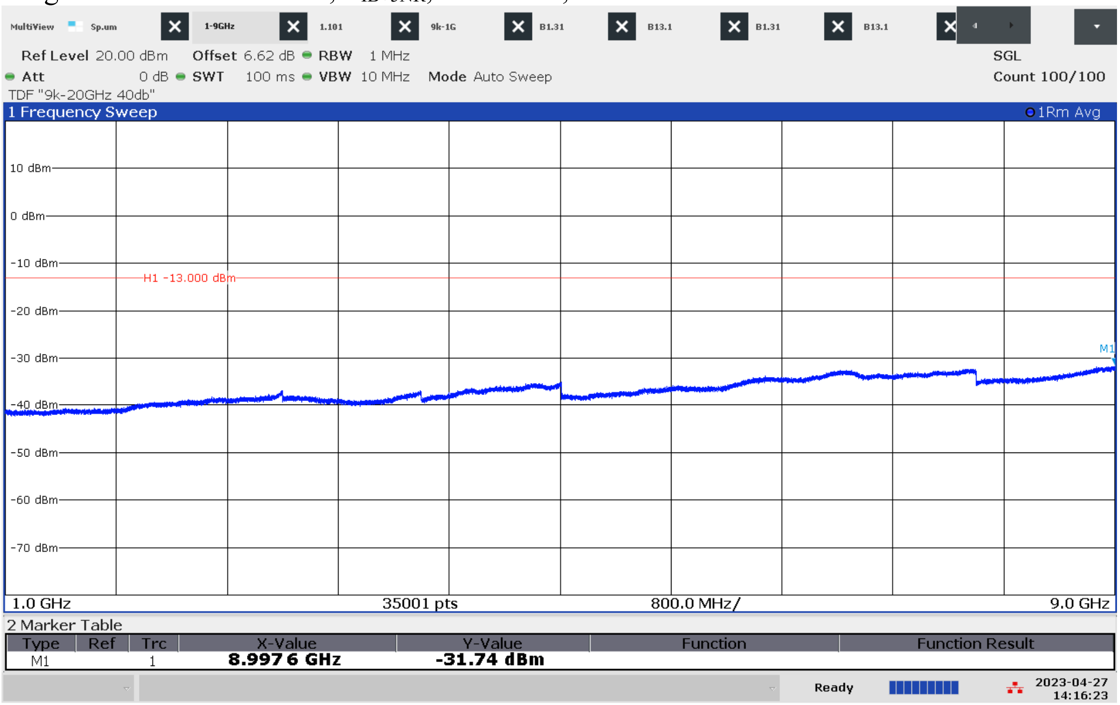
02:08:58 PM 04/27/2023

Diagram 3.32b NR: TM1.1, T_{IB+5NR}, 763Hz – 805 MHz, Port B:



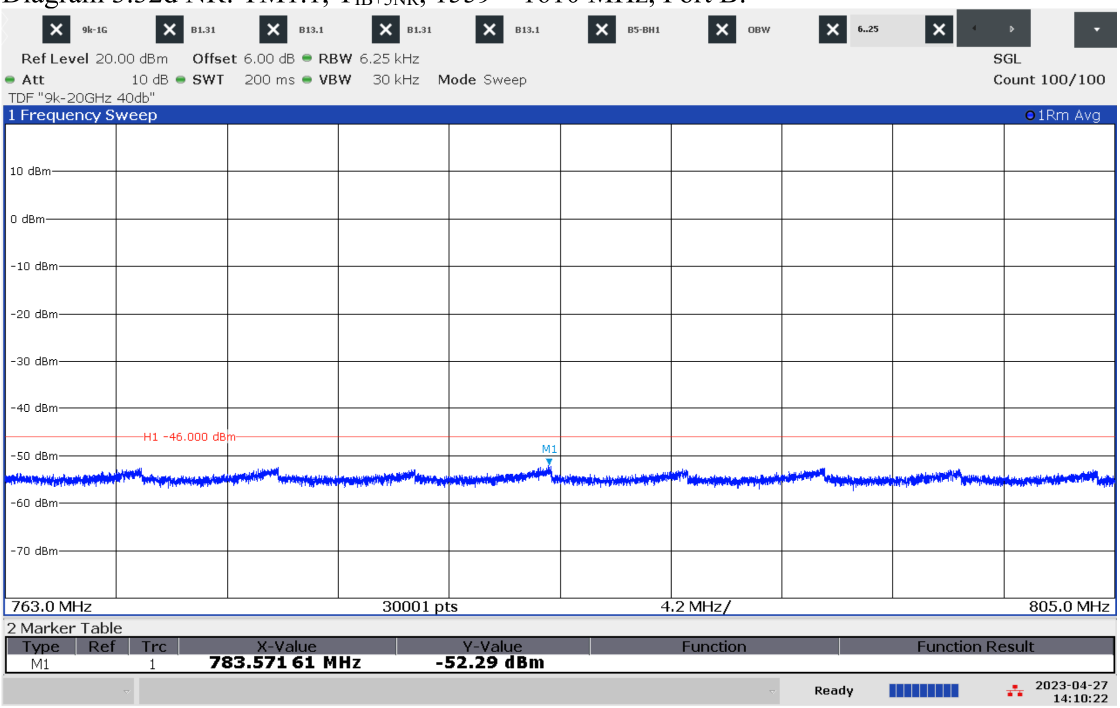
01:26:15 PM 04/25/2023

Diagram 3.32c: NR: TM1.1, T_{IB+5NR}, 1 – 9 GHz, Port B:



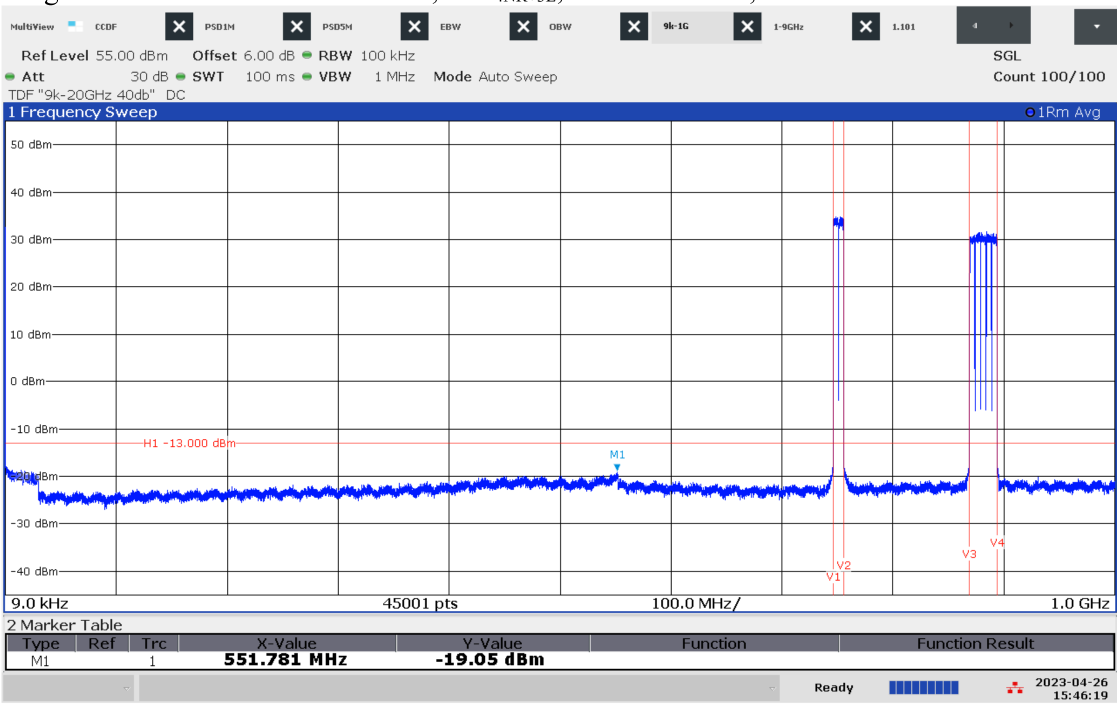
02:16:23 PM 04/27/2023

Diagram 3.32d NR: TM1.1, T_{IB+5NR}, 1559 – 1610 MHz, Port B:



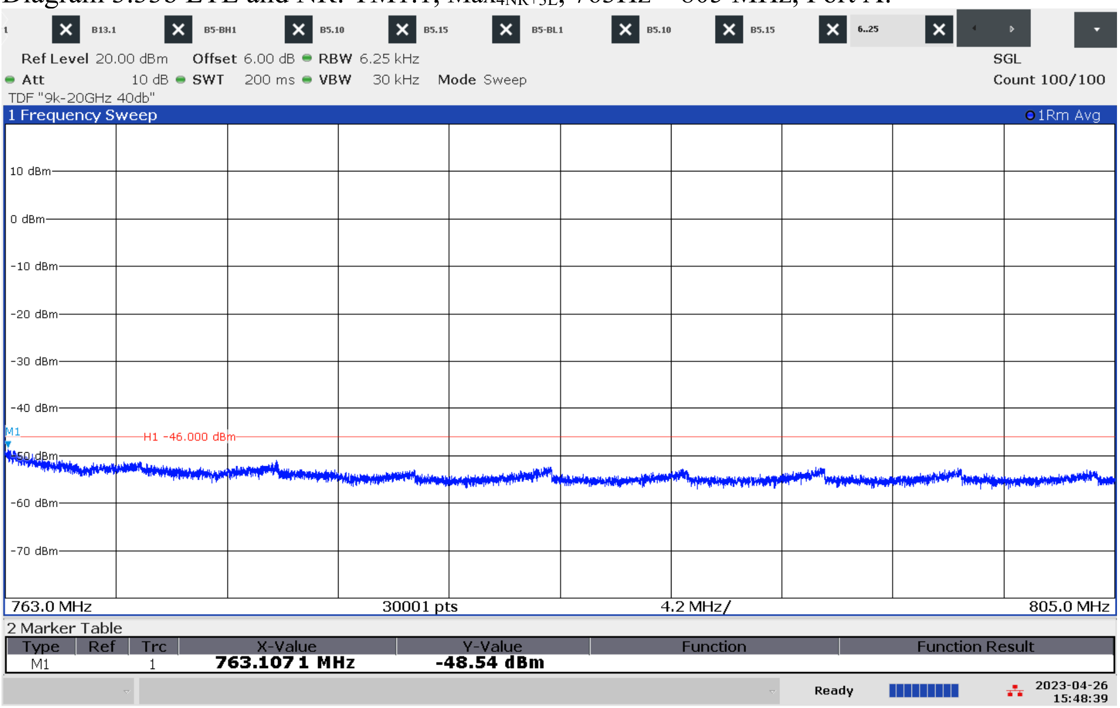
02:10:22 PM 04/27/2023

Diagram 3.33a LTE and NR: TM1.1, Max$_{4NR+3L}$, 9 kHz – 1 GHz, Port A:



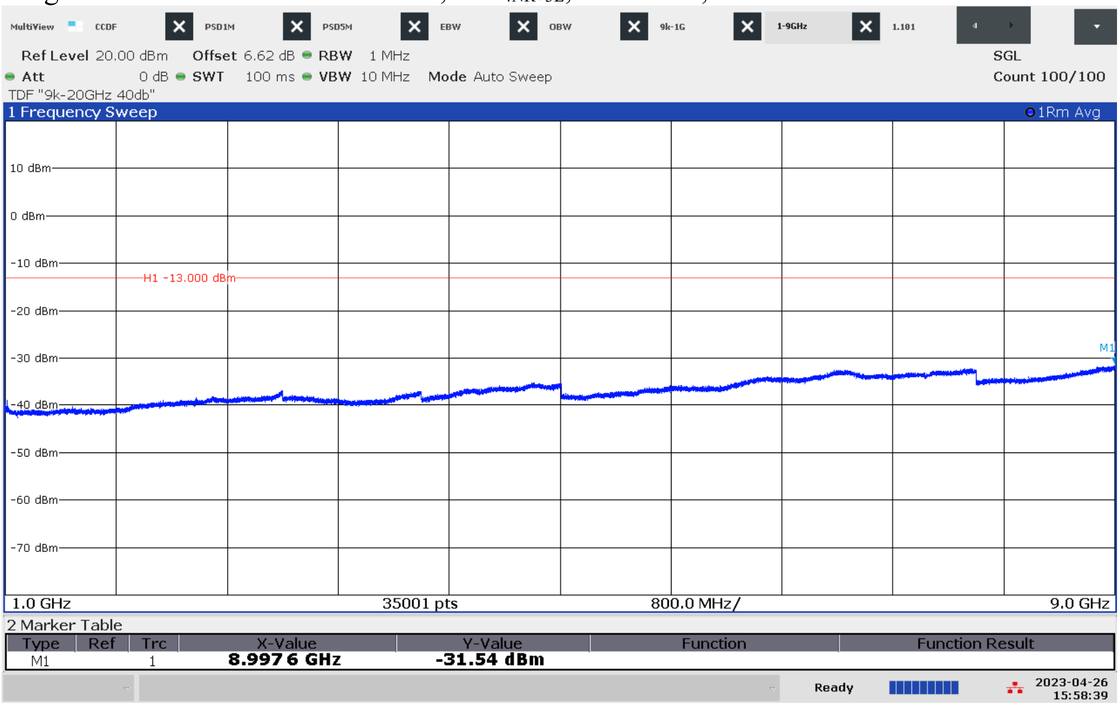
03:46:19 PM 04/26/2023

Diagram 3.33b LTE and NR: TM1.1, Max$_{4NR+3L}$, 763Hz – 805 MHz, Port A:



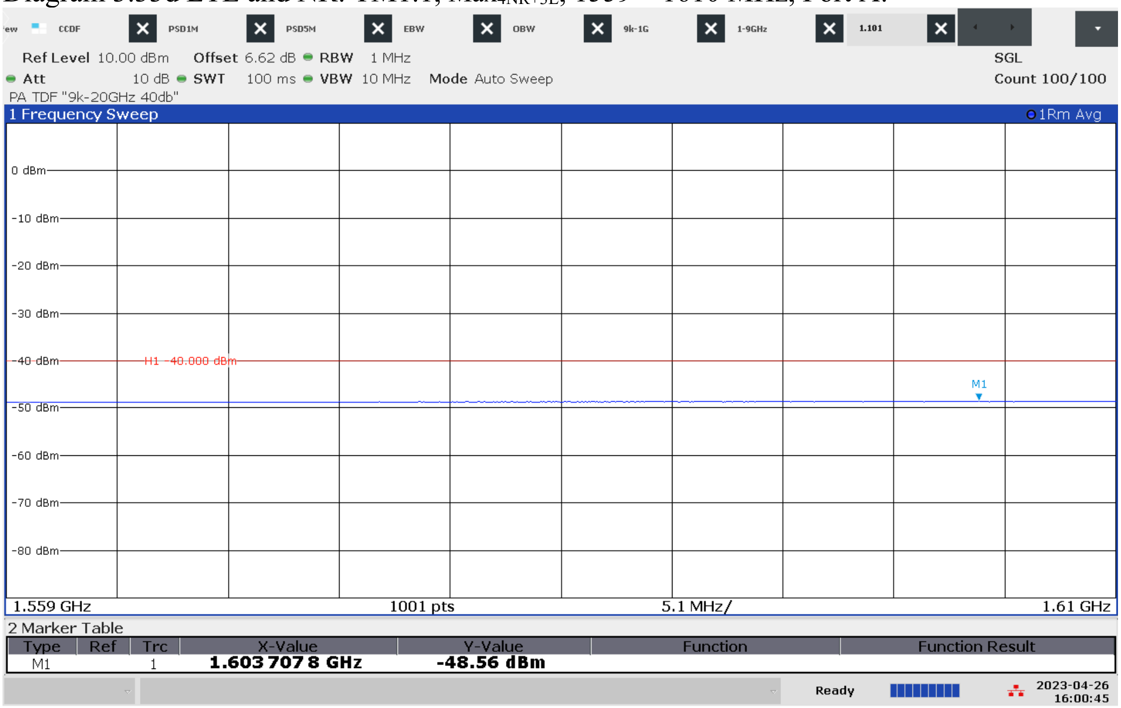
03:48:39 PM 04/26/2023

Diagram 3.33c: LTE and NR: TM1.1, Max_{4NR+3L}, 1 – 9 GHz, Port A:



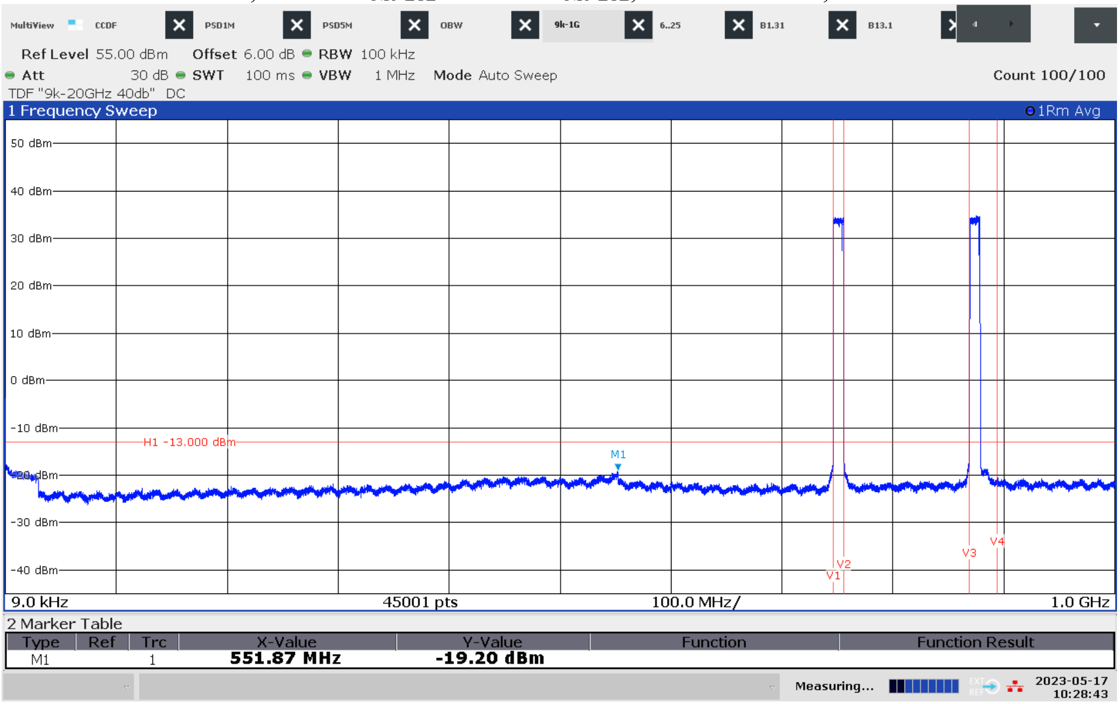
03:58:39 PM 04/26/2023

Diagram 3.33d LTE and NR: TM1.1, Max_{4NR+3L}, 1559 – 1610 MHz, Port A:



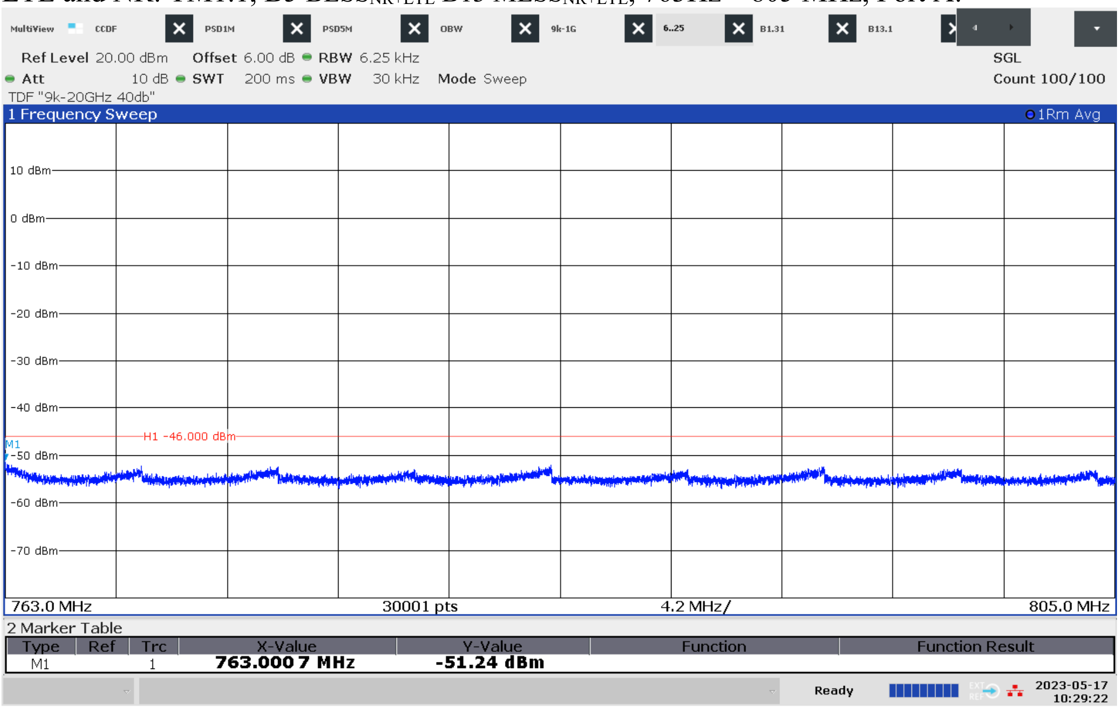
04:00:46 PM 04/26/2023

Diagram 3.34a:
LTE and NR: TM1.1, B5 BESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 9 kHz – 1 GHz, Port A:



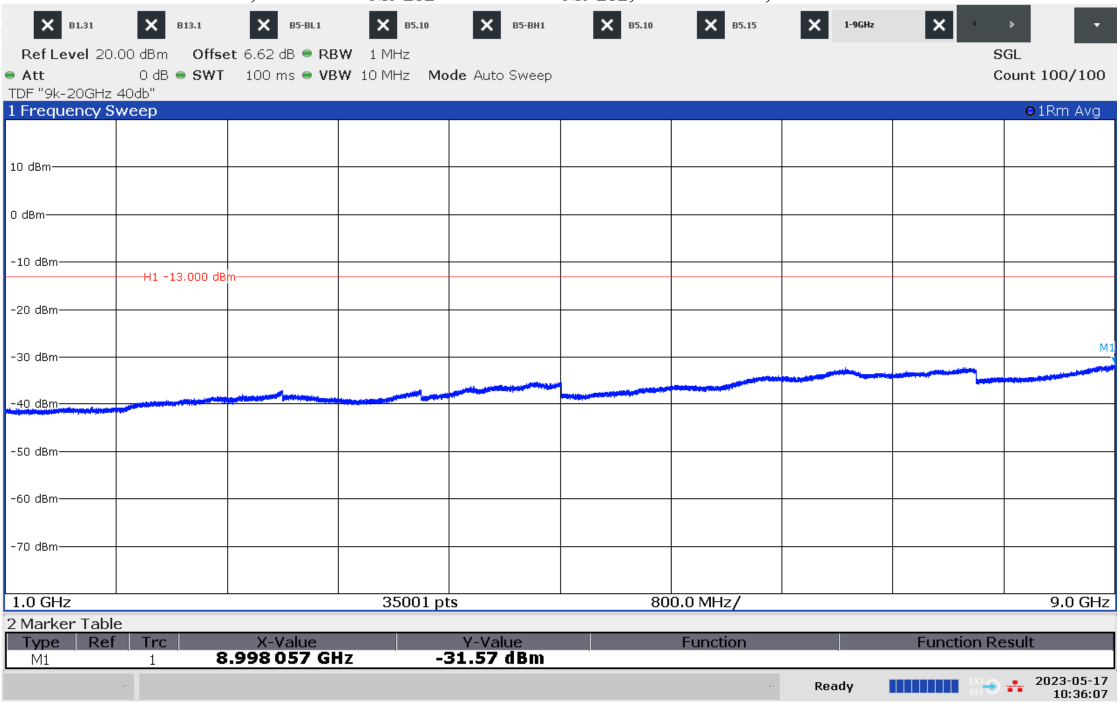
10:28:43 AM 05/17/2023

Diagram 3.34b:
LTE and NR: TM1.1, B5 BESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 763Hz – 805 MHz, Port A:



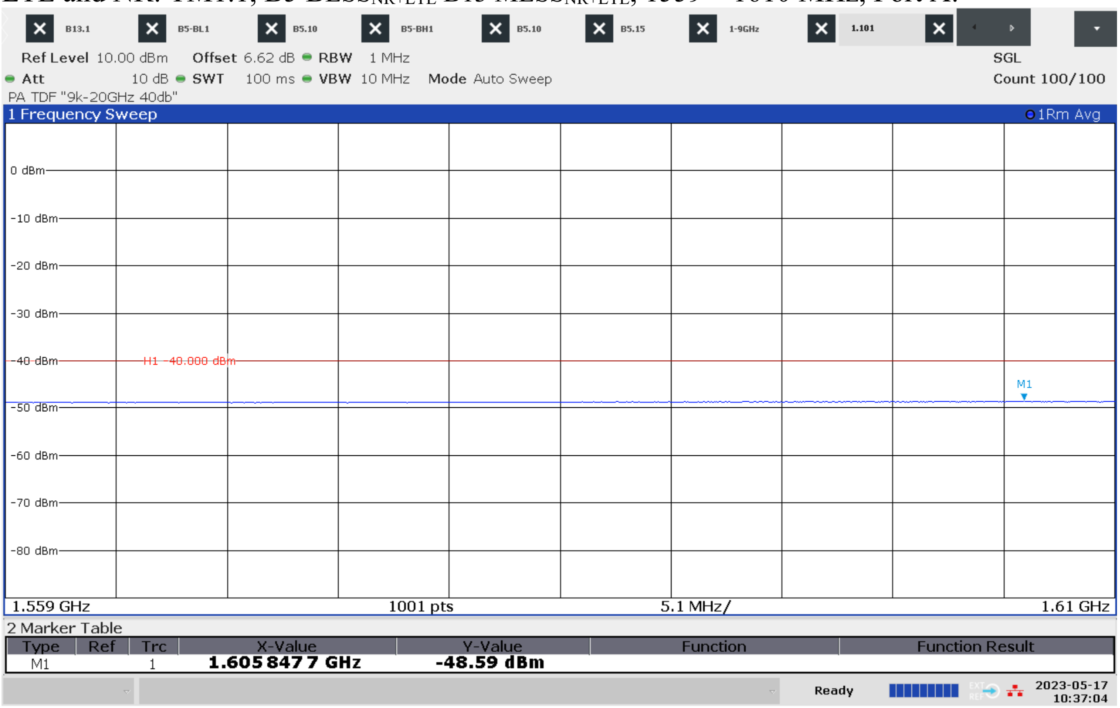
10:29:22 AM 05/17/2023

Diagram 3.34c:
LTE and NR: TM1.1, B5 BESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 1 – 9 GHz, Port A:



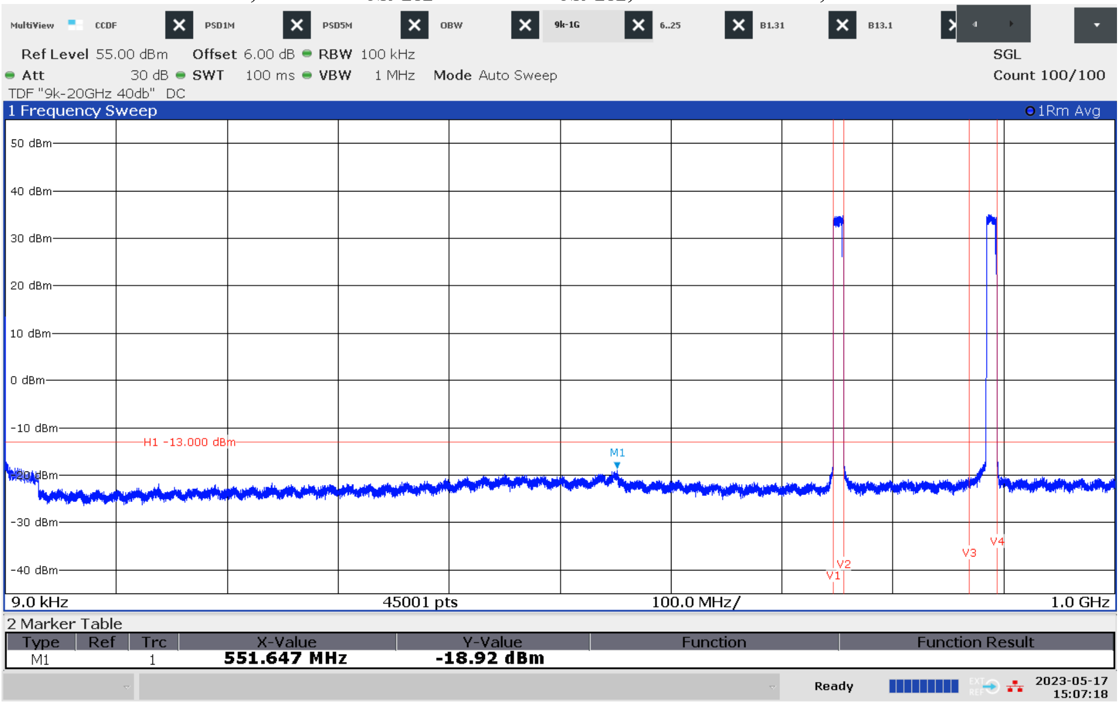
10:36:07 AM 05/17/2023

Diagram 3.34d:
LTE and NR: TM1.1, B5 BESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 1559 – 1610 MHz, Port A:



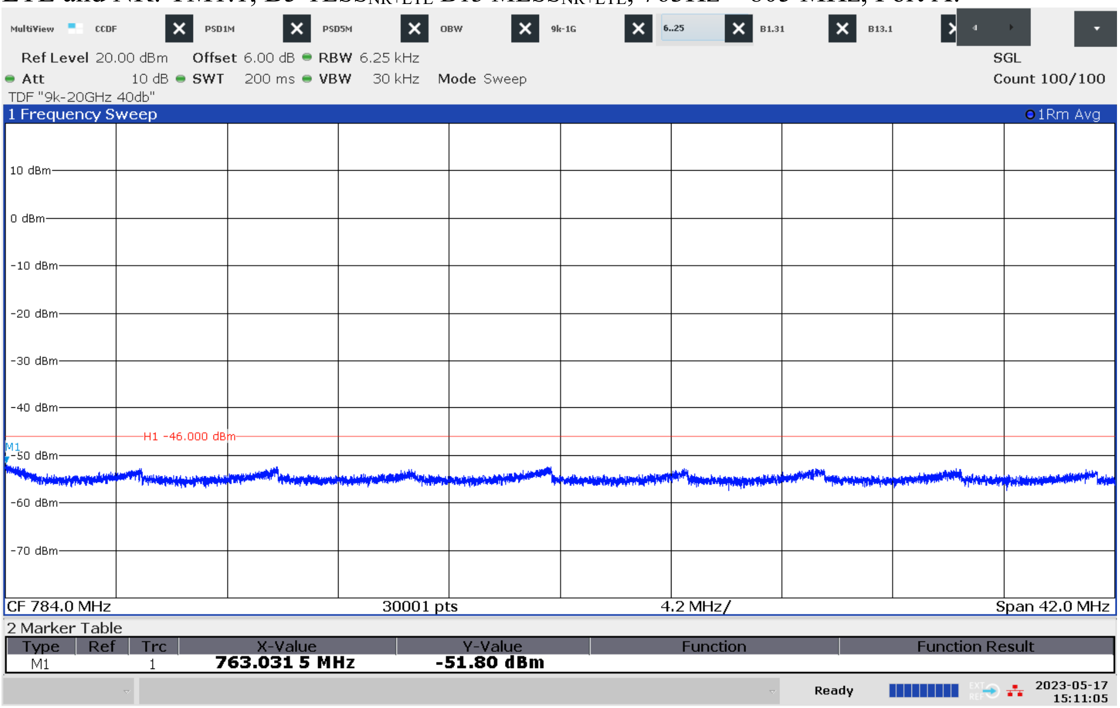
10:37:05 AM 05/17/2023

Diagram 3.35a:
LTE and NR: TM1.1, B5 TESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 9 kHz – 1 GHz, Port A:



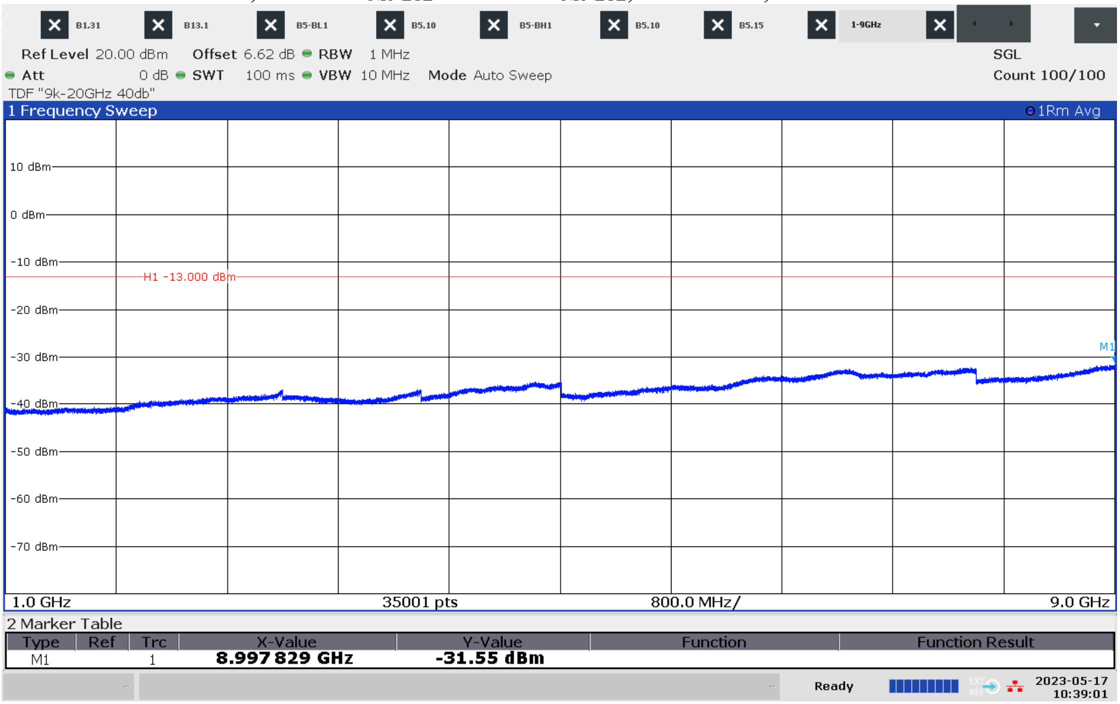
03:07:18 PM 05/17/2023

Diagram 3.35b:
LTE and NR: TM1.1, B5 TESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 763Hz – 805 MHz, Port A:



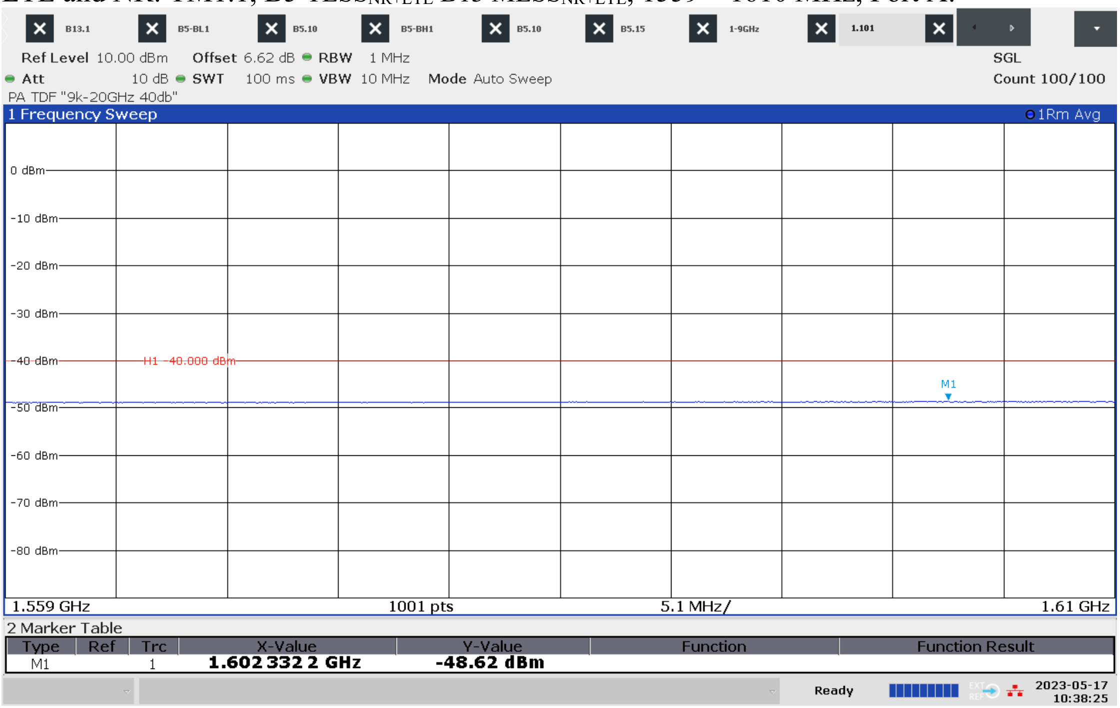
03:11:05 PM 05/17/2023

Diagram 3.35c:
LTE and NR: TM1.1, B5 TESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 1 – 9 GHz, Port A:



10:39:01 AM 05/17/2023

Diagram 3.35d:
LTE and NR: TM1.1, B5 TESS$_{NR+LTE}$ B13 MESS$_{NR+LTE}$, 1559 – 1610 MHz, Port A:



10:38:25 AM 05/17/2023

Field strength of spurious radiation measurements according to CFR 47 §27.53 and 22.917/ RSS-130 4.7 and RSS132 5.5

Date	Temperature	Humidity
2023-04-04	23 °C ± 3 °C	27 % ± 5 %
2023-04-05	23 °C ± 3 °C	26 % ± 5 %

The test site conforms to the site validation criterion specified in ANSI C63.4.

The measurements were performed with both horizontal and vertical polarization of the antenna.

The antenna distance was 3 m in the frequency range 30 MHz – 9 GHz.

The EUT was placed 0.8 m above reference ground plane in frequency range 30 MHz – 1 GHz and 1.5 m above reference ground plane in frequency range 1 GHz – 9 GHz.

The measurement was performed with an RBW of 1 MHz.

A propagation loss in free space was calculated. The used formula was
$\gamma = 20\log\left(\frac{4\pi D}{\lambda}\right)$, γ is the propagation loss and D is the antenna distance.

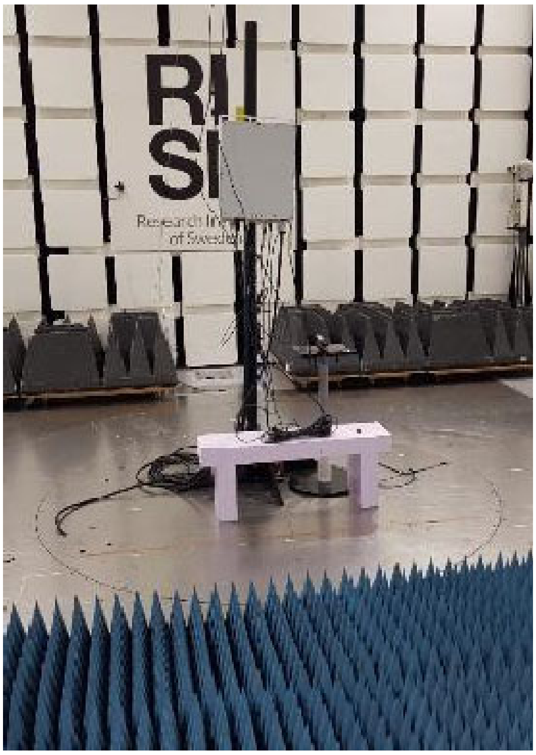
The measurement procedure was as the following:

1. A pre-measurement is performed with peak detector. For measurement < 1 GHz the test object was measured in eight directions with the antenna at three heights, 1.0 m, 1.5 m and 2.0 m. For measurements > 1 GHz the test object was measured in seventeen directions with the antenna height 1.5 m, 2.0 m and 2.5 m with elevation angle.
2. Spurious radiation on frequencies closer than 20 dB to the limit in the pre-measurement is scanned 0-360 degrees and the antenna is scanned 1- 4 m for maximum response. The emission is then measured with the RMS detector and the RMS value is reported. Frequencies closer than 10 dB to the limit when measured with the RMS detector were measured with the substitution method according to ANSI 63.26.

The test set-up during the spurious radiation measurements is shown in the pictures below:

Test setup 30-1000 MHz:

Test setup 1-9 GHz:



Measurement equipment

Item	Name	Inv.no
Semi Anechoic Chamber	TDK	503881
	NSA	BX90699
	SVSWR	BX90702
Spectrum Analyzer	Rohde & Schwarz ESU40	901385
Software	Rohde & Schwarz EMC32	BX62351
RF cable	Huber & Suhner Eacon 4C	BX91490
RF Cable	Rosenberger UFB311A	503508
RF Cable	Rosenberger UFB311A	503509
Antenna, Bilog	Teseq CBL6143A	BX92331
Preamplifier	MicroComp Nordic MCN-JS42-00101800-28-10P	901545
HP filter	Wainwright WHKX1.0/18G-10SS	901373
Antenna, Horn	Emco 3115	502175
Thermohygrometer	Testo 625	504188

Tested frequencies

Symbolic name:

Symbolic name: B5 and B13
B_{5L}
B_{5NR}
M_{5L}
T_{5NR}
T_{10NR}
T_{15NR}
T_{20NR}
T_{25NR}
B_{GB+10L}
T_{GB+10L}
B_{IB+5NR}
T_{IB+5NR}
$B_{5NR}+T_{GB+10LTE}$ + $B_{5NR}+T_{IB+5L}$

Results

Representing worst case:
LTE:
Symbolic name: $T_{5LTE,}$ Diagram 4.1a-b

NR:
Symbolic name: $T_{5NR,}$ Diagram 4.2a-b

Multi RAT:
Symbolic name: $B_{5NR}+T_{GB+10LTE}+B_{5NR}+T_{IB+5L}$, Diagram 4.3a-b

Frequency (MHz)	Spurious emission level (dBm)	
	Vertical	Horizontal
30-9000	All emission > 20 dB below limit	All emission > 20 dB below limit

Measurement uncertainty: 3.1 dB

Limits

CFR 47 §27.53 (c)
For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB;
- On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
- On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
- Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;

CFR 47§27.53 (f)
For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to −70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and −80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

CFR 47 § 22.917 (a)
Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB.

CFR 47 § 22.917 (b)
Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a reference bandwidth as follows:

- In the spectrum below 1 GHz, instrumentation should employ a reference bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy, provided that the measured power is integrated over the full required reference bandwidth (i.e., 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.
- In the spectrum above 1 GHz, instrumentation should employ a reference bandwidth of 1 MHz.

RSS-130 4.7.1

The unwanted emissions in any 100 kHz bandwidth on any frequency outside the low frequency edge and the high frequency edge of each frequency block range(s), shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB (-13 dBm). However, in the 100 kHz band immediately outside of the equipment's frequency block range, a resolution bandwidth of 30 kHz may be employed.

RSS-130 4.7.2 Additional unwanted emissions limits

In addition to the limit outlined in section 4.7.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions:

a. the power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least:
76 + 10 log10 p (watts), dB, for base and fixed equipment

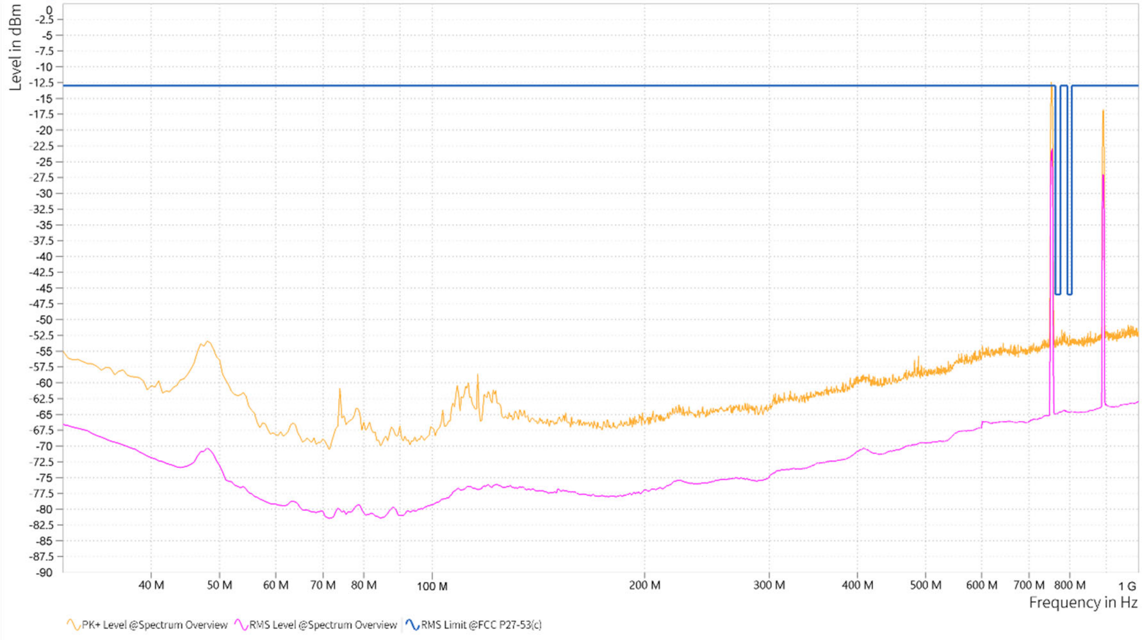
b. the e.i.r.p. in the band 1559-1610 MHz shall not exceed −70 dBW(-40 dBm)/MHz for wideband signal and −80 dBW(-50 dBm) for discrete emission with bandwidth less than 700 Hz.

RSS-132 5.5

i. In the first 1.0 MHz band immediately outside and adjacent to each of the sub-bands specified in Section 5.1, the power of emissions per any 1% of the occupied bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB.
ii. After the first 1.0 MHz immediately outside and adjacent to each of the sub-bands, the power of emissions in any 100 kHz bandwidth shall be attenuated below the transmitter output power P (dBW) by at least 43 + 10 log(p) dB. If the measurement is performed using 1% of the occupied bandwidth, power integration over 100 kHz is required.

Complies?	Yes

Diagram 4.1a: LTE T_{5LTE}, 30-1000 MHz



Note: The emissions in frequency range 746-756 MHz and 869-894 MHz are the carrier frequencies and shall be ignored in the context.

Diagram 4.1b: LTE T_{5LTE}, 1 - 9 GHz

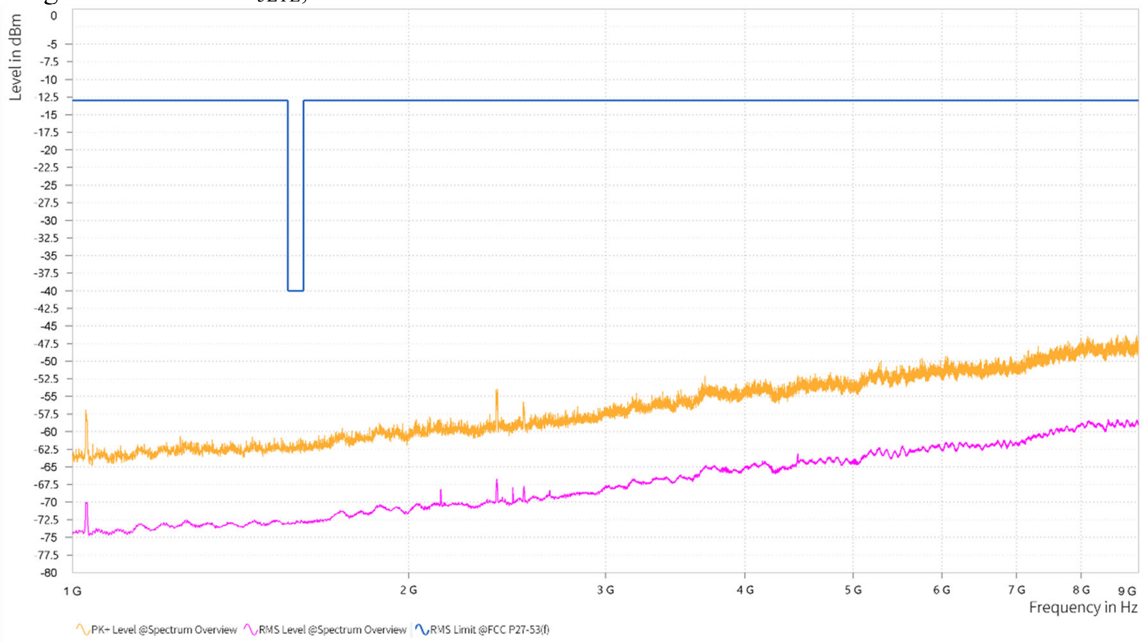
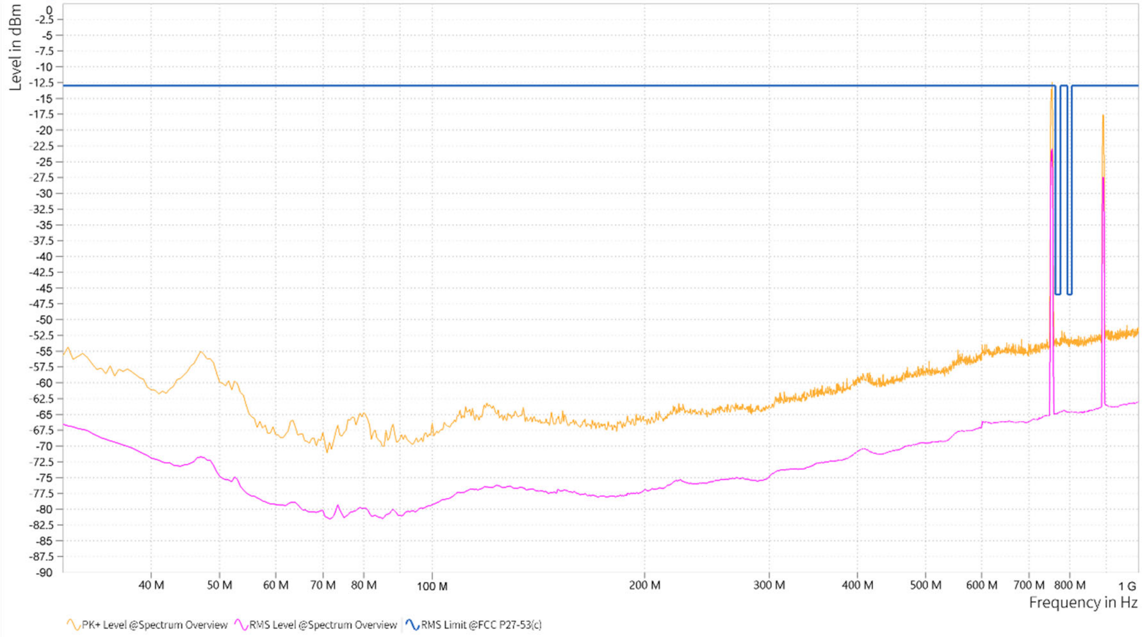


Diagram 4.2a: NR T_{5NR}, 30-1000 MHz



Note: The emissions in frequency range 746-756 MHz and 869-894 MHz are the carrier frequencies and shall be ignored in the context.

Diagram 4.2b: NR T_{5NR}, 1 - 9 GHz

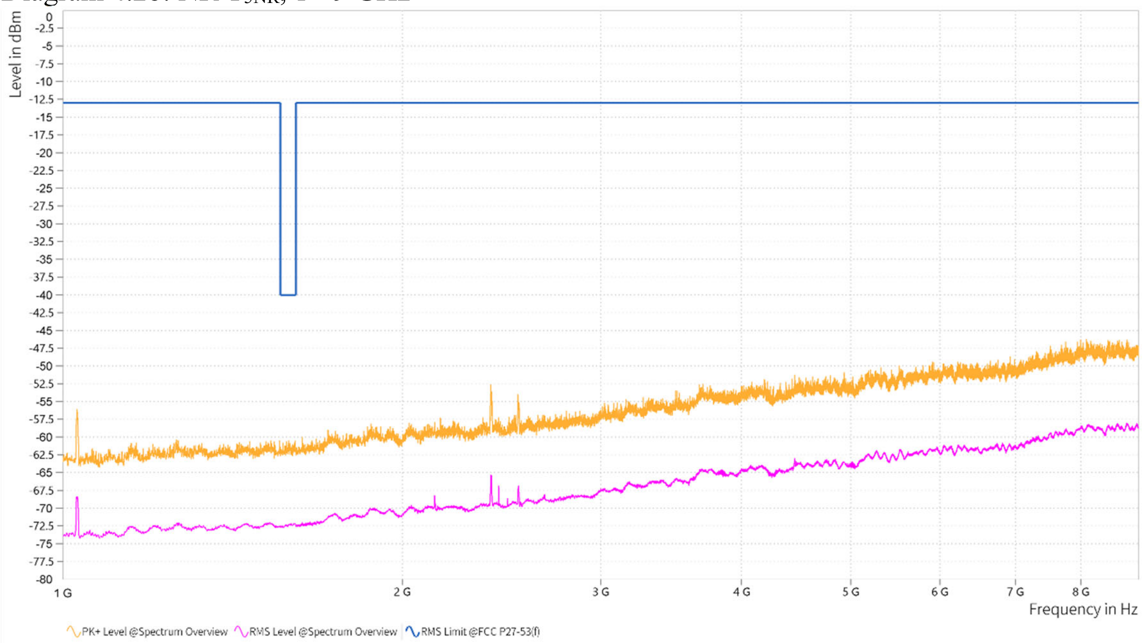
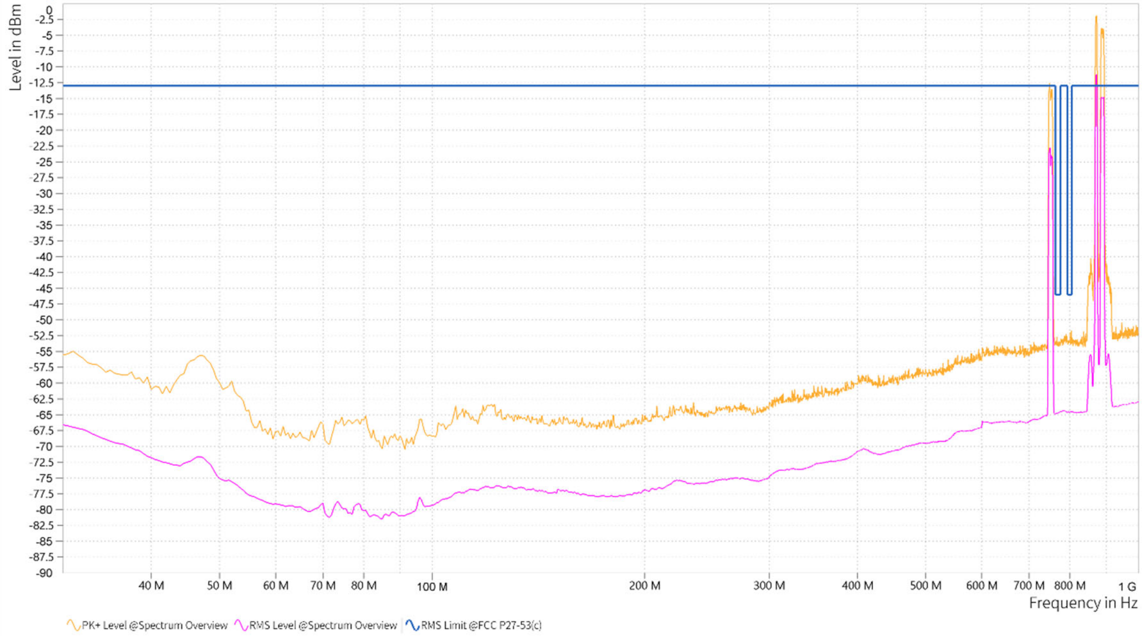
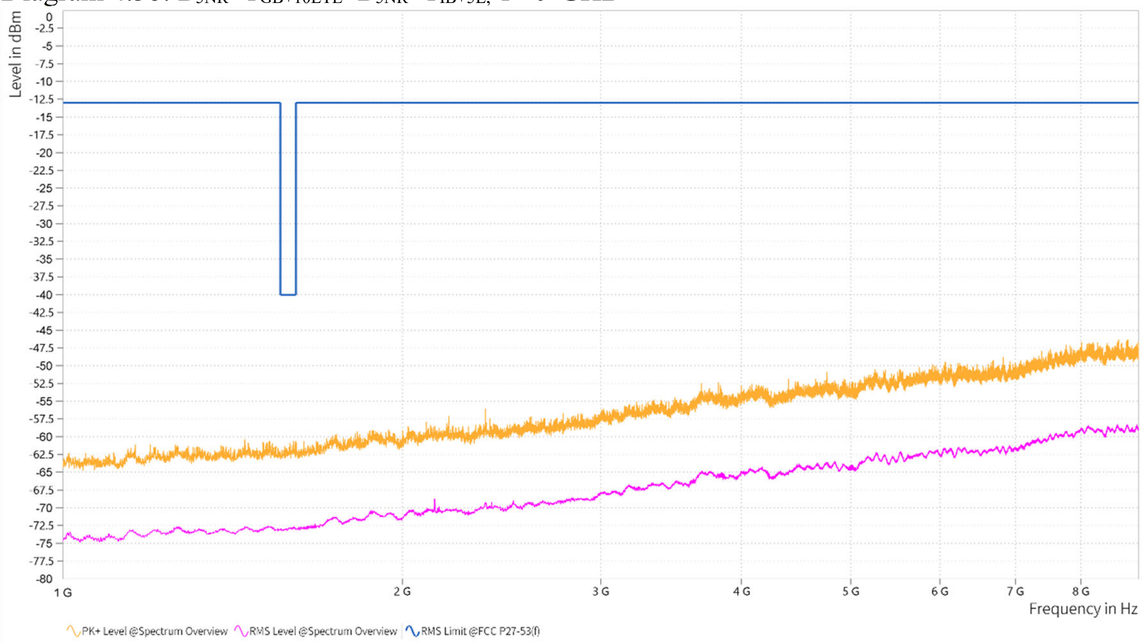


Diagram 4.3a: $B_{5NR}+T_{GB+10LTE}+B_{5NR}+T_{IB+5L}$, 30-1000 MHz



Note: The emissions in frequency range 746-756 MHz and 869-894 MHz are the carrier frequencies and shall be ignored in the context.

Diagram 4.3b: $B_{5NR}+T_{GB+10LTE}+B_{5NR}+T_{IB+5L}$, 1 - 9 GHz



Frequency stability measurements according to CFR 47 §27.54 and § 2.1055/ RSS-130 4.5 and RDD-132 5.3

Date	Temperature (test equipment)	Humidity (test equipment)
2023-05-04	23 °C ± 3 °C	20 % ± 5 %
2023-05-05	23 °C ± 3 °C	25 % ± 5 %
2023-05-08	23 °C ± 3 °C	20 % ± 5 %

Test set-up and procedure

The measurements were made per definition in ANSI C63.26, 5.7.3. The test object was connected to a spectrum analyzer with the RMS detector activated.

Measurement equipment	RISE number
R&S FSQ40	504 143
R&S FSW 43	902 073
RF attenuator	902 282
Coaxial cable Sucoflex 102EA	BX50236
Coaxial cable Sucoflex 102EA	BX50237
Temperature Chamber	503 360
Testo 635, temperature and humidity meter	504 203
Multimeter Fluke 87	502 190

Results LTE B5

Nominal transmitter frequency was 881.5 MHz (M) with a bandwidth of 5 MHz. Rated output power level at connector RF A (maximum): 47.8 dBm.

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	Temp. (°C)	
40.8	+20	3
55.2	+20	4
48	+20	4
48	+30	-2
48	+40	3
48	+50	-3
48	+10	-3
48	0	-3
48	-10	-4
48	-20	-4
48	-30	-2
Maximum freq. error (Hz)		4
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Results LTE B13

Nominal transmitter frequency was 881.5 MHz (M) with a bandwidth of 5 MHz. Rated output power level at connector RF A (maximum): 47.8 dBm.

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	Temp. (°C)	
40.8	+20	4
55.2	+20	3
48	+20	-3
48	+30	-3
48	+40	2
48	+50	-3
48	+10	-4
48	0	-3
48	-10	-5
48	-20	5
48	-30	-3
Maximum freq. error (Hz)		5
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Results NR B5

Nominal transmitter frequency was 881.5 MHz (M) with a bandwidth of 5 MHz. Rated output power level at connector RF A (maximum): 47.8 dBm.

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	Temp. (°C)	
40.8	+20	-4
55.2	+20	3
48	+20	-4
48	+30	-4
48	+40	3
48	+50	-4
48	+10	-4
48	0	-4
48	-10	-4
48	-20	5
48	-30	3
Maximum freq. error (Hz)		5
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

Results NR B13

Nominal transmitter frequency was 881.5 MHz (M) with a bandwidth of 5 MHz. Rated output power level at connector RF A (maximum): 47.8 dBm.

Test conditions		Frequency error (Hz)
Supply voltage DC (V)	Temp. (°C)	
40.8	+20	-2
55.2	+20	3
48	+20	-3
48	+30	3
48	+40	-2
48	+50	4
48	+10	4
48	0	-4
48	-10	4
48	-20	6
48	-30	2
Maximum freq. error (Hz)		6
Measurement uncertainty		$< \pm 1 \times 10^{-7}$

The frequency error results shows that the frequency stability is good enough to ensure that the transmitted carrier stay within the operating band.

Remark

It was deemed sufficient to test one combination of TX frequency, channel bandwidth configuration and test model (modulation), as all combinations share a common internal reference to derive the TX frequency from.

Limits

§27.54
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

RSS-130 4.5
The frequency stability shall be sufficient to ensure that the occupied bandwidth remains within each frequency block range when tested at the temperature and supply voltage variations specified in RSS-Gen.

§2.1055
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

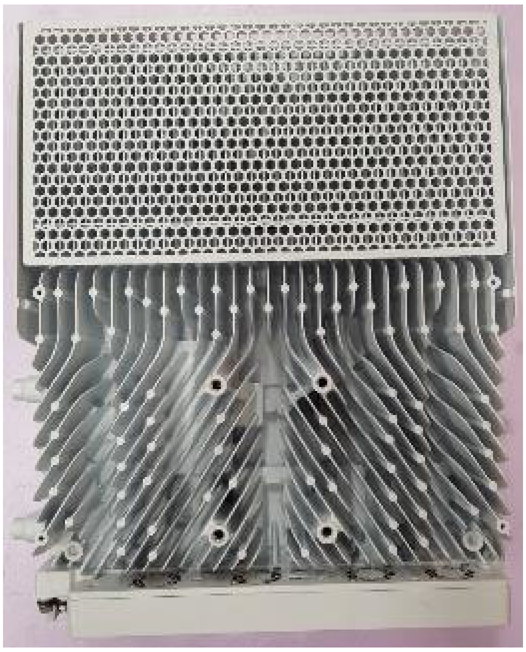
RSS-132 5.3
The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within each of the sub-bands when tested at the temperature and supply voltage variations specified in RSS-Gen.

Complies?	Yes

Photos of test object

Front side

Rear side



Left side

Right side

Bottom side

Top side

Test object label:

End of report.