TEST REPORT

Report Number: 14982489-E25V2

Applicant	:	APPLE, INC 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	:	A3082
Brand	:	APPLE
FCC ID	:	BCG-E8692A
IC	:	579C-E8692A
EUT Description	:	SMARTPHONE
Test Standard(s)	:	FCC 47 CFR Part 2, Part 25 ISED RSS-GEN ISSUE 5, RSS-170 Issue 4

Date Of Issue:
2024-08-16

Prepared by:
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CERT #0751.05

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-07-25	Initial Review	Mengistu Mekuria
V2	2024-08-16	Addressed TCB feedback and updated section 1, 3, 4, 6, 8, 9 & 10	Binod Sitaula

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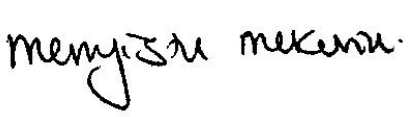
1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	APPLE, INC 1 APPLE PARK WAY CUPERTINO, CA 95014, U.S.A.
Model	A3082
Brand	APPLE
FCC ID	BCG-E8692A
IC	579C-E8692A
EUT Description	SMARTPHONE
Serial Number	RADIATED: HJWN3127DQ, THVY70QKM3 CONDUCTED: C7HH28000240000HBR, C7HH57000DM0000HBU, 7HH6000590000HBR
Sample Receipt Date	2024-02-02
Date Tested	2024-02-02 to 2024-07-23
Applicable Standards	FCC 47 CFR Part 2, Part 25 ISED RSS-GEN ISSUE 5, RSS-170 Issue 4
Test Results	COMPLIES

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document.

Approved & Released By:	Reviewed By:	Prepared By:
		
Mengistu Mekuria Operations Leader UL Verification Services Inc.	Tewodros Woldemichael Laboratory Engineer UL Verification Services Inc.	Matthew Wu Laboratory Engineer UL Verification Services Inc.

2. SUMMARY OF TEST RESULTS

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for correctly integrating customer-provided data with measurements performed by UL Verification Services Inc.

Below is a list of the data provided by the customer:

1. Antenna gain (see section 6.4.)

Requirement Description	Band	Requirement Clause Number (FCC)	Requirement Clause Number (ISED)	Result	Remarks
RF Conducted Output Power	53	25.149 (c)(4)(iii)	RSS-170 5.4; SMSE-009-20 Annex A 9.d	Complies	
Equivalent Isotropic Radiated	53	25.149 (c)(4)(iii)	RSS-170 5.4; SMSE-009-20 Annex A 9.e	Complies	
Maximum Power Spectral Density	53	25.149 (c)(4)(iv)	SMSE-009-20 Annex A 9.f	Complies	
Duty Cycle	53	Reporting purpose	Reporting purpose	Complies	
Occupied Bandwidth		2.1049	Reporting purpose	Complies	
6 dB Bandwidth	53	25.149 (c)(4) (ii)	SMSE-009-20 Annex A 9.c	Complies	
Band Edge and Emission Mask	53	2.1051, 25.149 (c) (4) (v), (vi)	RSS-170 5.7.3; SMSE-009-20 Annex A 9.g and h	Complies	
Out of Band Emissions	53	2.1051, 25.149 (c) (4) (v), (vi)	RSS-170 5.7.3; SMSE-009-20 Annex A 9.g, h, and i	Complies	
Frequency Stability	53	25.202 (d)	RSS-170 5.3	Complies	
Field Strength of Spurious Radiation	53	2.1053, 25.149 (c) (4) (v), (vi)	RSS-170 5.7.3; SMSE-009-20 Annex A 9.g, h, and i	Complies	
Carrier-Off-State Emissions Radiation	53	25.216 (i)	RSS-170 5.10	Complies	

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3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with the following:

- ANSI C63.26:2015
- FCC 47 CFR Part 2, Part 25
- FCC KDB 971168 D01 v03r01: Power Meas License Digital Systems
- FCC KDB 971168 D02 v02r01: Misc Rev Approv License Devices
- FCC KDB 412172 D01 v01r01. Determining ERP and EIRP
- ISED RSS-GEN ISSUE 5, RSS-170 Issue 4 SMSE-009-20

4. FACILITIES AND ACCREDITATION

UL Verification Services Inc. is accredited by A2LA, certification #0751.05, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	Building 1: 47173 Benicia Street, Fremont, CA 94538, USA	US0104	2324A	550739
☒	Building 2: 47266 Benicia Street, Fremont, CA 94538, USA			
☐	Building 3: 843 Auburn Court, Fremont, CA 94538, USA			
☒	Building 4: 47658 Kato Rd, Fremont, CA 94538, USA			
☒	Building 5: 47670 Kato Rd, Fremont, CA 94538, USA			

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5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	U_{Lab}
Conducted Antenna Port Emission Measurement	1.940 db
Power Spectral Density	2.466 db
Time Domain Measurements Using SA	3.39 %
RF Power Measurement Direct Method Using Power Meter	0.450 db Peak 1.300 db Ave.
Radio Frequency (Spectrum Analyzer)	141.16 Hz
Occupied Bandwidth	1.22%
Worst Case Conducted Disturbance, 9KHz to 0.15 MHz	3.78 db
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 db
Worst Case Radiated Disturbance, 9KHz to 30 MHz	2.87 db
Worst Case Radiated Disturbance, 30 to 1000 MHz	6.01 db
Worst Case Radiated Disturbance, 1000 to 18000 MHz	4.73 db
Worst Case Radiated Disturbance, 18000 to 26000 MHz	4.51 db
Worst Case Radiated Disturbance, 26000 to 40000 MHz	5.29 db

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The Apple iPhone is a smartphone with multimedia functions (music, application support, and video), cellular GSM, GPRS, EGPRS, UMTS, LTE, 5G FR1, IEEE 802.11a/b/g/n/ac/ax, Bluetooth, Ultra-Wideband, GPS, NFC, and MSS. All models except reference model support at least one UICC based SIM. The second SIM is either an UICC based p-SIM (physical SIM) or e-SIM (electronic SIM). The device supports a built-in inductive charging transmitter and receiver. The rechargeable battery is not user accessible.

6.2. MAXIMUM OUTPUT POWER

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015
KDB 971168 D01 Section 5.6

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average conducted and peak EIRP output powers as follows:

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LTE BAND 53

FCC: §25.149 (c)(4) (iii): The maximum transmit power is no more than 1 W with a peak EIRP of no more than 6 dBW (36dBm or 3.98W).

ISED: SMSE-009-20 Annex A 9.e: The maximum equivalent isotropically radiated power (e.i.r.p.) shall not exceed 6 dBW (36dBm or 3.98W).

FCC Part 25/ RSS-170	
Peak EIRP Limit (W)	3.98
Conducted Average Limit (W)	1.00
Antenna Gain (dBi)_Ant(2)	-1.20

Bandwidth (MHz)	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
1.4	QPSK	2484.2	2494.3	20.70	19.50	0.089	1089	1M09G7W
	16QAM			20.70	19.50	0.089	1091	1M09D7W
3.0	QPSK	2485.0	2493.5	20.70	19.50	0.089	2696	2M70G7W
	16QAM			20.70	19.50	0.089	2701	2M70D7W
5.0	QPSK	2486.0	2492.5	20.70	19.50	0.089	4481	4M48G7W
	16QAM			20.70	19.50	0.089	4495	4M50D7W
10.0	QPSK	2488.5	2490.0	20.70	19.50	0.089	8976	8M98G7W
	16QAM			20.70	19.50	0.089	8983	8M98D7W

5G NR n53

FCC Part 25 / RSS-170	
Peak EIRP Limit (W)	3.98
Conducted Average Limit (W)	1.00
Antenna Gain (dBi)_Ant(2)	-1.20

2	Modulation	Low Frequency (MHz)	Upper Frequency (MHz)	Conducted Average (dBm)	EIRP Average (dBm)	EIRP Average (W)	99% BW (kHz)	Emission Designator
10.0	BPSK	2488.5	2490.0	20.70	19.50	0.089	8660	8M66G7W
	QPSK			20.70	19.50	0.089	8744	8M74G7W
	16QAM			20.70	19.50	0.089	8671	8M67D7W

6.3. SOFTWARE AND FIRMWARE

The EUT firmware installed during testing was version: 0.02.01.

6.4. MAXIMUM ANTENNA GAIN

The antenna(s) gain and type, as provided by the manufacturer' are as follows:

LTE Bands	Frequency Range (MHz)	ANT 1 Antenna Gain (dBi)	ANT 2 Antenna Gain (dBi)
LTE BAND 53, 5G NR n53	2483.5 – 2495 MHz	-3.3	-1.2

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6.5. WORST-CASE CONFIGURATION AND MODE

The EUT supports the following LTE and 5G NR Bands:
Band 53, and 5G NR n53

BPSK modulation applied only for 5G NR frequencies and has the same tune up power as QPSK modulations.

The DFT-s-OFDM and CP-OFDM waveforms were investigated, and DFT-s-OFDM was found to be the worst case.

The worst-case scenario for all measurements is based on an engineering evaluation made on different modulations. All modulations had the same target power for the worst-case antenna, so QPSK and BPSK were used to represent the worst mode for LTE bands and 5G NR bands respectively and were set for all conducted and radiated tests. Output power measurements were measured on BPSK, QPSK, 16QAM, 64QAM, and 256QAM modulations. For testing purposes emissions on sections 8 and 9 were measured while QPSK/BPSK was set at or above target power for all bands. Conducted tests were performed on the worst-case antenna because it has the highest conducted power. The worst-case antenna is shown in the table below.

LTE and 5G NR Bands	Worst case Antenna Port For Conducted Power
LTE BAND 53, and 5G NR n53	Ant 1

The EUT was investigated in three orthogonal orientations X/Y/Z on both ANT 1 and ANT2 antennas to determine the worst case orientation. The full tests of the EUT have made upon the orientations that shown in the table below.

Frequency Bands	ANT1	ANT2
2300 – 2700 MHz	X	Y

Radiated spurious emissions were investigated from 9kHz to 30MHz, 30MHz-1GHz and above 1GHz. There were no emissions found with less than 20dB of margin from 9kHz to 1GHz.

For simultaneous transmission of multiple channels in the 2.4GHz/5GHz WLAN, UWB, and Cellular bands, tests were conducted for various configurations having the highest power, least separation in frequencies and widest operation bandwidths. No noticeable new emission was found.

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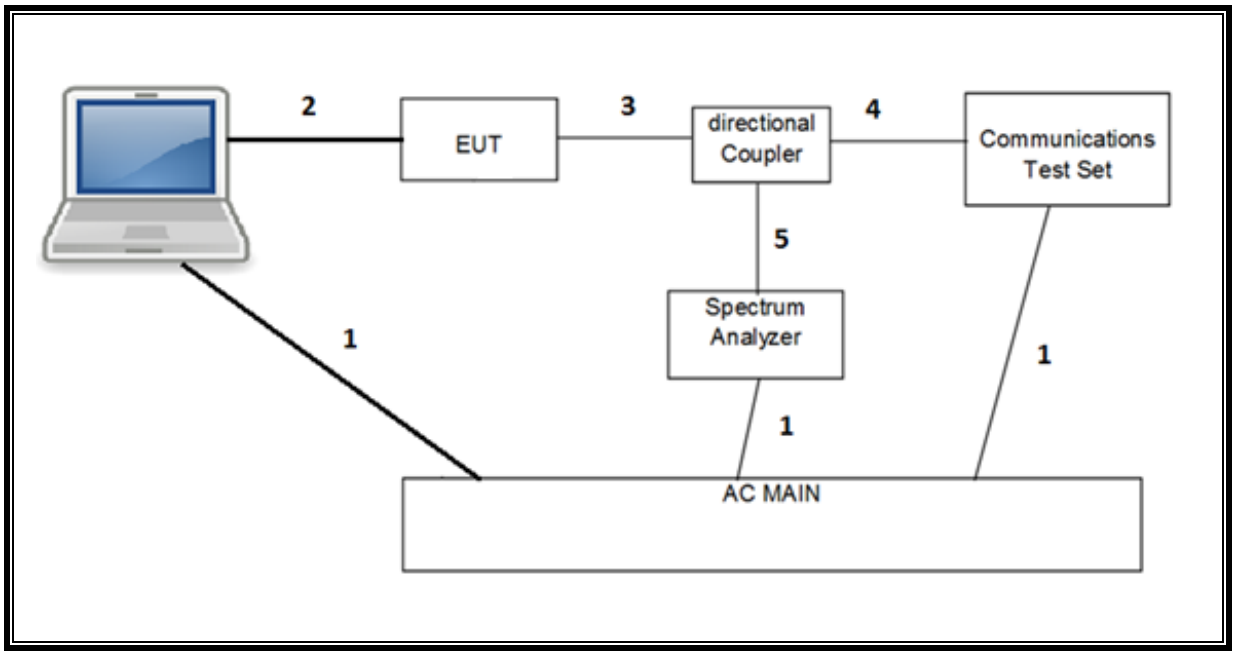
6.6. DESCRIPTION OF TEST SETUP

SUPPORT TEST EQUIPMENT				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID/ DoC**
Laptop	Apple	MacBook Pro	HRP082673	BCGA1708
AC/DC adapter	Apple	A1718	C4H64450HH3GN8RA6	--

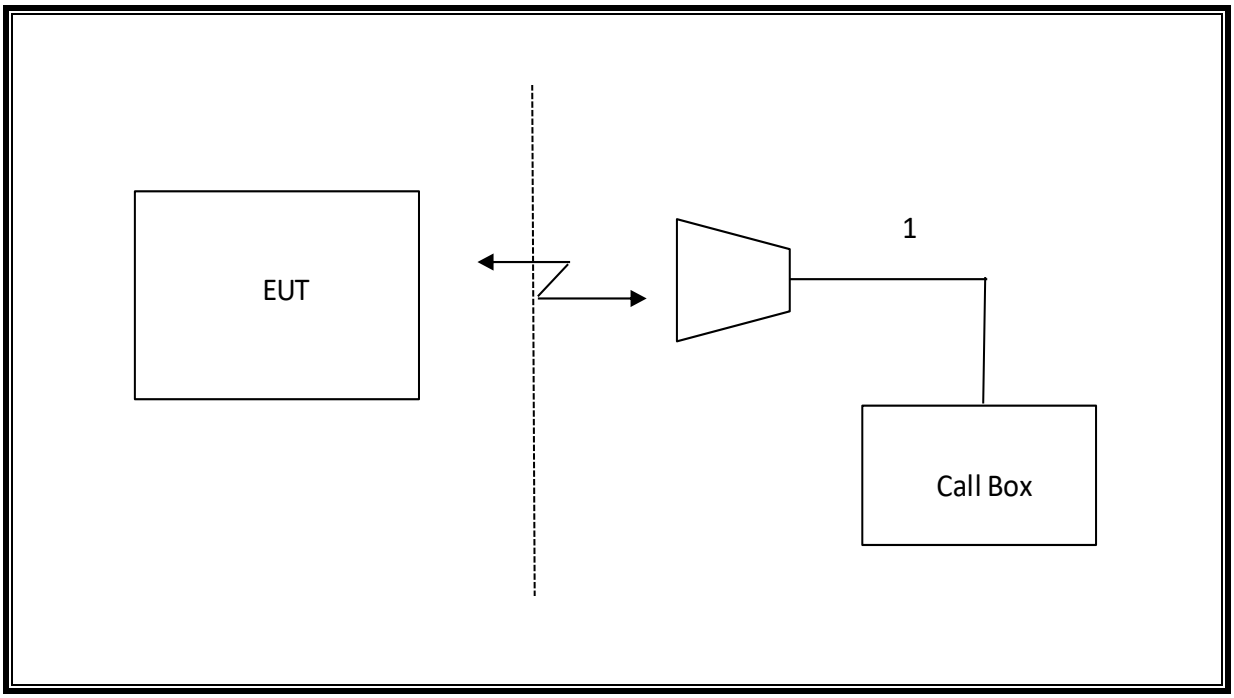
I/O CABLES (RF CONDUCTED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	AC	3	US 115V	Un-shielded	2.0	N/A
2	USB	1	DC	Un-shielded	1.0	N/A
3	RF In/Out	1	EUT	Un-shielded	0.6	N/A
4	RF In/Out	1	Communication Test Set	Un-shielded	1.2	N/A
5	RF In/Out	1	Barrel	N/A	N/A	N/A

I/O CABLES (RF RADIATED TEST)						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	RF In/Out	1	Antenna	Un-shielded	5.0	N/A

CONDUCTED SETUP



RADIATED SETUP



7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Antenna, Horn 1-18GHz	ETS-Lindgren	3117	80430	2024-08-31
Antenna, Horn 1-18GHz	ETS Lindgren	3117	79834	2024-06-30
Antenna, Broadband Hybrid, 30MHz to 3000MHz	SUNAR	JB3	222009	2024-10-31
Antenna, Passive Loop 30Hz - 1MHz	ELECTRO-METRICS	EM-6871	170014	2024-08-31
Antenna, Passive Loop 100KHz - 30MHz	ELECTRO-METRICS	EM-6872	170016	2024-08-31
RF Filter Box, 1-18GHz	UL-FR1	NA	217255	2024-10-31
RF Filter Box, 1-18GHz	UL-FR1	RATS 2	226781	2024-09-30
Amplifier, 10KHz to 1GHz, 32dB	Sonoma	310N	430250	2024-09-30
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169936	2025-02-28
EMI TEST RECEIVER	Rohde & Schwarz	ESW44	169935	2025-02-28
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	85943	2025-02-28
Directional Coupler	KRYTAR	152610	198816	2024-10-31
Directional Coupler	KRYTAR	152610	231664	2025-01-22
Power Meter, P-series single channel	Keysight	N1912A	90719	2025-01-31
Power Sensor, P - series, 50MHz to 18GHz, Wideband	Keysight	N1921A	81319	2025-01-31
Filter, HPF 1.2GHz	Wainwright Instruments GmbH	WHKX6-948-1.2/15G-40ST	99	2024-10-31
Spectrum Analyzer, PXA, 2Hz to 44GHz	Keysight	N9030B	231739	2025-01-31
Spectrum Analyzer, PXA, 2Hz to 44GHz	Keysight	N9030B	245120	2025-02-28
Spectrum Analyzer, PXA, 3Hz to 44GHz	Keysight	N9030A	85212	2025-02-28
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	222793	2025-02-28
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	222797	2025-02-28
Chamber, Environmental	Thermotron Corp.	SM-16C Mini-Max	179936	2024-06-30
Transmitting Antenna, Horn Antenna	TEKBOX Digital Solutions	TBMA4	226709	C.N.R.
Antenna, Horn 18 to 26.5GHz	A.R.A.	MWH-1826/B	199659	2024-12-31
*Amplifier 18-26.5GHz, +5Vdc, -54dBm P1dB	AMPLICAL	AMP18G26.5-60	234683	2024-03-29
DC Power Supply	GWINSTEK	GPS18500	N/A	C.N.R.
UL AUTOMATION SOFTWARE				
CLT Software	UL	UL RF	V2023.11.21.0	
Power Measurement Software	UL	UL RF	V2023.08.14.0	
Radiated test software	UL	UL RF	Ver 9.5 2023-05-01	

NOTES:

1. * Testing is completed before equipment expiration date.

8. RF OUTPUT POWER VERIFICATION

CONDUCTED OUTPUT POWER MEASUREMENT PROCEDURE

All LTE bands conducted average power is obtained from the CMW500 telecommunication test set.

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 36.101 specification.

UE Power Class: 3 (23 +/- 2dBm). The allowed Maximum Power Reduction (MPR) for the maximum output power due to higher order modulation and transmit bandwidth configuration (resource blocks) is specified in Table 6.2.3-1 of the 3GPP TS 36.101.

Table 6.2.3-1: Maximum Power Reduction (MPR) for Power Class 1, 2 and 3

Modulation	Channel bandwidth / Transmission bandwidth (N_{RB})						MPR (dB)
	1.4 MHz	3.0 MHz	5 MHz	10 MHz	15 MHz	20 MHz	
QPSK	> 5	> 4	> 8	> 12	> 16	> 18	≤ 1
16 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 1
16 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 2
64 QAM	≤ 5	≤ 4	≤ 8	≤ 12	≤ 16	≤ 18	≤ 2
64 QAM	> 5	> 4	> 8	> 12	> 16	> 18	≤ 3
256 QAM	≥ 1						≤ 5

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP TS 38.521-1 specification.

The allowed MPR for SRS, PUCCH formats 0, 1, 3 and 4, and PRACH shall be as specified for QPSK modulated DFTs-OFDM of equivalent RB allocation. The allowed MPR for PUCCH format 2 shall be as specified for QPSK modulated CP-OFDM of equivalent RB allocation.

Table 6.2.2.3-1: Maximum power reduction (MPR) for power class 3

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5[1]	≤ 1.2[1]	≤ 0.2[1]
		≤ 0.5[2]		0[2]
	Pi/2 BPSK w Pi/2 BPSK DMRS	≤ 0.5[2]		0[2]
	QPSK	≤ 1		0
	16 QAM	≤ 2		≤ 1
	64 QAM	≤ 2.5		
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3		≤ 1.5
	16 QAM	≤ 3		≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

NOTE 1: Applicable for UE operating in TDD mode with Pi/2 BPSK modulation and UE indicates support for UE capability *powerBoosting-pi2BPSK* and if the IE *powerBoostPi2BPSK* is set to 1 and 40 % or less slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79. The reference power of 0dB MPR is 26dBm.

NOTE 2: Applicable for UE operating in FDD mode, or in TDD mode in bands other than n40, n41, n77, n78 and n79 with Pi/2 BPSK modulation and if the IE *powerBoostPi2BPSK* is set to 0 and if more than 40% of slots in radio frame are used for UL transmission for bands n40, n41, n77, n78 and n79.

Table 6.2.2.3-2: Maximum power reduction (MPR) for power class 2

Modulation		MPR (dB)		
		Edge RB allocations	Outer RB allocations	Inner RB allocations
DFT-s-OFDM	Pi/2 BPSK	≤ 3.5	≤ 0.5	0
	QPSK	≤ 3.5	≤ 1	0
	16 QAM	≤ 3.5	≤ 2	≤ 1
	64 QAM	≤ 3.5	≤ 2.5	
	256 QAM	≤ 4.5		
CP-OFDM	QPSK	≤ 3.5	≤ 3	≤ 1.5
	16 QAM	≤ 3.5	≤ 3	≤ 2
	64 QAM	≤ 3.5		
	256 QAM	≤ 6.5		

The allowed A-MPR values specified below in Table 6.2.4.-1 of 3GPP TS 36.101 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.4-1: Additional Maximum Power Reduction (A-MPR)

Network Signalling value	Requirements (subclause)	E-UTRA Band	Channel bandwidth (MHz)	Resources Blocks (N_{RB})	A-MPR (dB)
NS_01	6.6.2.1.1	Table 5.5-1	1.4, 3, 5, 10, 15, 20	Table 5.6-1	N/A
NS_03	6.6.2.2.1	2, 4,10, 23, 25, 35, 36, 66, 70	3	>5	≤ 1
			5	>6	≤ 1
			10	>6	≤ 1
			15	>8	≤ 1
			20	>10	≤ 1
NS_04	6.6.2.2.2, 6.6.3.3.19	41	5, 10, 15, 20	Table 6.2.4-4, Table 6.2.4-4a	

The allowed A-MPR values specified below in Table 6.2.3.3.1-1 of 3GPP TS 38.521-1 are in addition to the allowed MPR requirements. All the measurements below were performed with A-MPR disabled, by using Network Signaling Value of "NS_01".

Table 6.2.3.3.1-1: Additional maximum power reduction (A-MPR)

Network signalling label	Requirements (subclause)	NR Band	Channel bandwidth (MHz)	Resources blocks (N_{RB})	A-MPR (dB)
NS_01		Table 5.2-1	5, 10, 15, 20, 25, 30, 40, 50, 60, 80, 90, 100	Table 5.3.2-1	N/A
NS_03	6.5.2.3.3.3	n2, n25, n66, n70, n86			Clause 6.2.3.3.7
NS_03U	6.5.2.3.3.3, 6.5.2.4.2.3	n2, n25, n66, n86			Clause 6.2.3.3.7
NS_04	6.5.2.3.3.2, 6.5.3.3.3.1	n41	10, 15, 20, 40, 50, 60, 80, 90, 100		Clause 6.2.3.3.2

AVERAGE OUTPUT POWER TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with directional coupler connected to a power meter via wideband average power sensor. Gated average output power was read directly from power meter.

PEAK OUTPUT POWER TEST PROCEDURE

The transmitter output is connected to a power meter.

The power output was measured on the EUT antenna port using SMA cable with directional coupler connected to a power meter via wideband peak power sensor. Peak output power was read directly from power meter.

RESULTS

EUT includes different power levels for head use configuration and body use configuration and the below tables contain the highest of all configurations average and peak conducted output powers as follows:

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47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 319-4000 FAX: (510) 661-0888

8.1. LTE BAND 53

RULE PART(S) AND LIMITS

FCC: §25.149 (c)(4) (iii): The maximum transmit power is no more than 1 W (30dBm) with a peak EIRP of no more than 6 dBW.

ISED: SMSE-009-20 Annex A 9.d: Transmitter output power shall not exceed 0 dBW (30dBm).

UL VERIFICATION SERVICES INC.
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Test Engineer ID:	25780	Test Date:	3/12/2024

OUTPUT POWER FOR LTE BAND 53 (1.4 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1			Ant 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				60147	60195	60248	60147	60195	60248
				2484.2 MHz	2489.0 MHz	2494.3 MHz	2484.2 MHz	2489.0 MHz	2494.3 MHz
1.4	QPSK	1	0	20.66	20.63	20.69	20.62	20.62	20.63
		1	2	**20.70**	**20.70**	**20.70**	20.69	20.65	20.68
		1	5	20.66	20.67	20.68	20.64	20.60	20.61
		3	0	20.68	20.69	20.69	20.66	20.63	20.66
		3	1	20.69	20.68	20.68	20.68	20.65	20.68
		3	2	20.67	**20.70**	20.69	**20.70**	**20.70**	**20.70**
		6	0	20.26	20.21	20.31	19.69	19.66	19.65
	16QAM	1	0	20.68	20.63	20.69	20.64	**20.70**	20.60
		1	2	20.66	20.66	**20.70**	**20.70**	20.69	**20.70**
		1	5	**20.70**	**20.70**	20.65	20.67	20.63	20.63
		3	0	20.58	20.62	20.65	20.57	20.62	20.58
		3	1	20.62	20.65	20.66	20.60	20.63	20.58
		3	2	20.64	20.66	20.64	20.62	20.65	20.59
		6	0	20.05	20.01	20.20	20.11	20.13	20.22
	64QAM	1	0	20.61	20.62	20.63	20.65	20.61	20.66
		1	2	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	5	20.61	20.63	20.65	20.63	20.64	20.65
		3	0	20.56	20.56	20.57	20.60	20.63	20.58
		3	1	20.54	20.63	20.61	20.65	20.65	20.53
		3	2	20.55	20.66	20.59	20.65	20.62	20.55
		6	0	20.10	20.04	20.11	20.11	20.10	20.12
	256QAM	1	0	20.64	20.57	20.69	20.65	20.59	20.65
		1	2	20.67	**20.70**	**20.70**	**20.70**	20.68	**20.70**
		1	5	**20.70**	20.68	20.67	20.66	**20.70**	20.64
		3	0	20.54	20.49	20.49	20.51	20.69	20.47
		3	1	20.56	20.48	20.53	20.47	**20.70**	20.50
		3	2	20.54	20.59	20.56	20.49	20.69	20.52
		6	0	20.56	20.45	20.53	20.53	20.60	20.63

OUTPUT POWER FOR LTE BAND 53 (3.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1			Ant 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				60155	60195	60240	60155	60195	60240
				2485.0 MHz	2489.0 MHz	2493.5 MHz	2485.0 MHz	2489.0 MHz	2493.5 MHz
3.0	QPSK	1	0	20.54	20.56	20.63	20.53	20.55	20.60
		1	7	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	14	20.61	20.58	20.54	20.58	20.56	20.53
		8	0	20.25	20.25	20.38	19.60	19.64	19.68
		8	4	20.30	20.28	20.40	19.71	19.77	19.73
		8	7	20.31	20.29	20.41	19.71	19.77	19.69
		15	0	20.24	20.22	20.33	19.66	19.71	19.64
	16QAM	1	0	20.63	20.57	20.61	20.59	20.54	20.62
		1	7	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	14	20.58	20.50	20.53	20.67	20.54	20.52
		8	0	20.11	20.04	20.09	20.01	20.03	20.10
		8	4	20.14	20.09	20.11	20.16	20.13	20.12
		8	7	20.15	20.06	20.11	20.18	20.11	20.12
		15	0	20.07	19.98	20.07	20.07	20.07	20.11
	64QAM	1	0	20.59	20.58	20.59	20.47	20.61	20.60
		1	7	20.70	20.70	20.70	**20.70**	**20.70**	**20.70**
		1	14	20.61	20.57	20.59	20.56	20.53	20.56
		8	0	20.66	20.59	20.64	20.56	20.58	20.65
		8	4	20.69	20.64	20.66	20.68	20.68	20.67
		8	7	**20.70**	20.61	20.66	**20.70**	20.66	20.67
		15	0	20.62	20.53	20.62	20.62	20.62	20.66
	256QAM	1	0	20.55	20.50	20.66	20.57	20.50	20.63
		1	7	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	14	20.63	20.55	20.53	20.65	20.57	20.55
		8	0	20.53	20.50	20.55	20.45	20.43	20.56
		8	4	20.57	20.50	20.59	20.58	20.54	20.62
		8	7	20.57	20.51	20.58	20.58	20.55	20.58
		15	0	20.55	20.44	20.55	20.52	20.52	20.56

OUTPUT POWER FOR LTE BAND 53 (5.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1 Conducted Average (dBm)			Ant 2 Conducted Average (dBm)		
				60165	60195	60230	60165	60195	60230
				2486.0 MHz	2489.0 MHz	2492.5 MHz	2486.0 MHz	2489.0 MHz	2492.5 MHz
5.0	QPSK	1	0	20.53	20.54	20.59	20.47	20.54	20.60
		1	12	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	24	20.58	20.56	20.56	20.57	20.58	20.51
		12	0	20.20	20.19	20.27	19.48	19.58	19.64
		12	6	20.25	20.20	20.31	19.60	19.71	19.67
		12	11	20.22	20.17	20.21	19.60	19.69	19.55
		25	0	20.20	20.17	20.27	19.58	19.59	19.64
	16QAM	1	0	20.55	20.60	20.61	20.56	20.54	20.62
		1	12	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	24	20.63	20.61	20.55	20.63	20.57	20.59
		12	0	20.10	20.08	20.23	20.11	20.11	20.28
		12	6	20.18	20.14	20.34	20.23	20.21	20.28
		12	11	20.14	20.10	20.15	20.22	20.19	20.15
		25	0	20.10	20.16	20.23	20.10	20.12	20.18
	64QAM	1	0	20.61	20.55	20.61	20.54	20.54	20.64
		1	12	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	24	20.64	20.59	20.60	20.60	20.54	20.55
		12	0	20.14	20.00	20.13	20.01	19.99	20.11
		12	6	20.17	20.04	20.15	20.12	20.11	20.11
		12	11	20.15	20.03	20.03	20.11	20.09	20.02
		25	0	20.13	19.99	20.12	20.08	20.00	20.09
	256QAM	1	0	20.56	20.56	**20.70**	20.52	20.49	20.66
		1	12	**20.70**	**20.70**	20.69	**20.70**	**20.70**	**20.70**
		1	24	20.65	20.56	20.58	20.59	20.54	20.50
		12	0	20.49	20.44	20.49	20.34	20.38	20.50
		12	6	20.55	20.47	20.53	20.47	20.52	20.54
		12	11	20.51	20.44	20.44	20.49	20.50	20.42
		25	0	20.53	20.42	20.50	20.46	20.43	20.48

OUTPUT POWER FOR LTE BAND 53 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1 Conducted Average (dBm)			Ant 2 Conducted Average (dBm)		
				60190	60195	60205	60190	60195	60205
				2488.5 MHz	2489.0 MHz	2490.0 MHz	2488.5 MHz	2489.0 MHz	2490.0 MHz
10.0	QPSK	1	0	20.53	20.54	20.59	20.47	20.54	20.60
		1	12	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	24	20.58	20.56	20.56	20.57	20.58	20.51
		12	0	20.20	20.19	20.27	19.48	19.58	19.64
		12	6	20.25	20.20	20.31	19.60	19.71	19.67
		12	11	20.22	20.17	20.21	19.60	19.69	19.55
		25	0	20.20	20.17	20.27	19.58	19.59	19.64
	16QAM	1	0	20.55	20.60	20.61	20.56	20.54	20.62
		1	12	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	24	20.63	20.61	20.55	20.63	20.57	20.59
		12	0	20.05	20.03	20.18	20.06	20.06	20.23
		12	6	20.13	20.09	20.29	20.18	20.16	20.23
		12	11	20.09	20.05	20.10	20.17	20.14	20.10
		25	0	20.05	20.11	20.18	20.05	20.07	20.13
	64QAM	1	0	20.61	20.55	20.61	20.54	20.54	20.64
		1	12	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**	**20.70**
		1	24	20.64	20.59	20.60	20.60	20.54	20.55
		12	0	20.09	19.95	20.08	19.96	19.94	20.06
		12	6	20.12	19.99	20.10	20.07	20.06	20.06
		12	11	20.10	19.98	19.98	20.06	20.04	19.97
		25	0	20.08	19.94	20.07	20.03	19.95	20.04
	256QAM	1	0	20.56	20.56	**20.70**	20.52	20.49	20.66
		1	12	**20.70**	**20.70**	20.69	**20.70**	**20.70**	**20.70**
		1	24	20.65	20.56	20.58	20.59	20.54	20.50
		12	0	20.49	20.44	20.49	20.34	20.38	20.50
		12	6	20.55	20.47	20.53	20.47	20.52	20.54
		12	11	20.51	20.44	20.44	20.49	20.50	20.42
		25	0	20.53	20.42	20.50	20.46	20.43	20.48

8.2. 5G NR n53

RULE PART(S) AND LIMITS

FCC: §25.149 (c)(4) (iii): The maximum transmit power is no more than 1 W (30dBm) with a peak EIRP of no more than 6 dBW.

ISED: SMSE-009-20 Annex A 9.d: Transmitter output power shall not exceed 0 dBW (30dBm).

Test Engineer ID:	12482	**Test Date:**	2024-07-18

OUTPUT POWER FOR 5G NR n53 (10.0 MHz)

Bandwidth (MHz)	Modulation	RB Allocation	RB Offset	Ant 1			Ant 2		
				Conducted Average (dBm)			Conducted Average (dBm)		
				497700	497800	498000	497700	497800	498000
				2488.5 MHz	2489.0 MHz	2490.0 MHz	2488.5 MHz	2489.0 MHz	2490.0 MHz
10.0	BPSK	1	0	20.39	20.56	20.62	20.53	**20.70**	20.55
		1	1	20.44	20.63	20.52	20.45	20.66	20.67
		1	22	20.56	20.69	20.64	20.57	20.66	20.65
		1	23	20.49	20.65	20.60	20.57	20.60	20.65
		12	6	20.45	20.64	20.55	20.65	20.67	20.65
		24	0	20.41	**20.70**	20.65	20.58	20.67	20.61
	QPSK	1	0	20.56	20.56	20.47	20.62	20.63	20.59
		1	1	20.61	20.64	20.45	20.60	20.63	20.57
		1	22	**20.70**	20.69	20.45	20.60	20.64	**20.70**
		1	23	20.64	20.57	20.45	20.60	20.58	**20.70**
		12	6	20.65	20.66	20.52	20.67	20.65	20.63
		24	0	20.69	**20.70**	20.43	20.58	20.64	20.66
	16QAM	1	0	**20.70**	20.17	20.08	20.49	20.52	20.47
		1	1	20.40	20.34	19.59	20.00	20.41	**20.70**
		1	22	20.29	20.19	20.14	20.55	20.46	20.42
		1	23	20.12	20.58	19.75	20.16	20.36	20.44
		12	6	20.44	20.35	20.06	20.47	20.52	20.50
		24	0	20.38	20.37	20.04	20.45	20.57	20.56
	64QAM	1	0	20.28	20.17	20.22	20.52	20.23	20.12
		1	1	20.35	20.48	20.56	20.16	20.36	20.27
		1	22	20.37	20.39	20.54	20.25	20.39	20.27
		1	23	20.34	20.36	**20.70**	20.26	20.39	20.27
		12	6	20.34	20.39	20.32	20.58	**20.70**	20.62
		24	0	20.36	20.30	20.33	20.65	20.56	20.51
	256QAM	1	0	20.43	20.64	19.31	20.39	20.49	**20.70**
		1	1	20.51	20.37	19.32	20.40	20.60	20.45
		1	22	20.55	20.69	19.44	20.52	20.69	20.35
		1	23	20.36	20.60	19.38	20.46	20.52	20.55
		12	6	20.53	**20.70**	19.57	20.65	20.59	20.55
		24	0	20.63	20.66	19.53	20.61	20.58	20.56

9. CONDUCTED TEST RESULTS

9.1. ON TIME AND DUTY CYCLE

LIMITS

None; for reporting purposes only.

PROCEDURE

Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Band	RB Allocation / Offset	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
LTE Band 53	1 / 0	0.996	5.004	0.20	19.90	7.01
LTE Band 53	50 / 0	0.996	5.004	0.20	19.90	7.01
5G NR n53	1 / 1	2.96	2.96	1.00	100.00	0.00
5G NR n53	24 / 0	2.96	2.96	1.00	100.00	0.00

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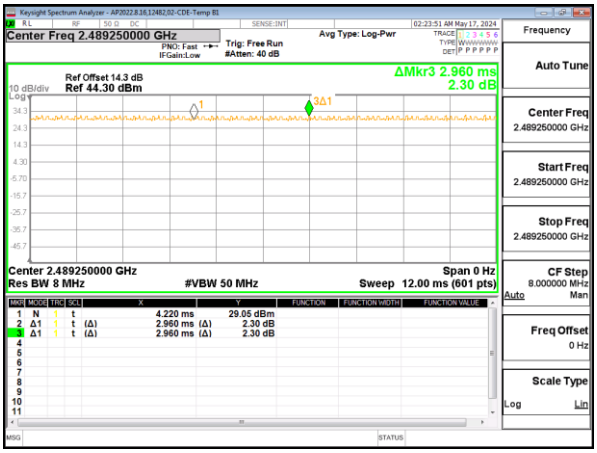
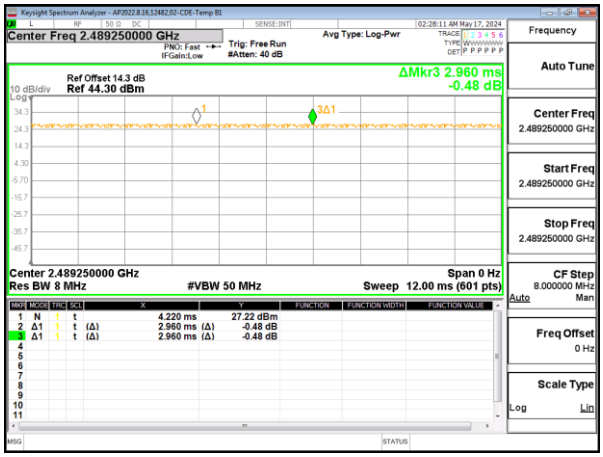
LTE Band 53 RB1-0

LTE Band 53 RB50-0



5G NR n53 RB24-0



5G NR n53 RB1-1

9.2. OCCUPIED BANDWIDTH

RULE PART(S)

FCC: §2.1049

LIMITS

For reporting purposes only.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at the middle channel in each band. The 99% and -26dB bandwidths was also measured and recorded.

RESULTS

There is no limit required and power is the same for low, middle and high channel; therefore, only middle channel was tested. Worst-case plots (highest bandwidth) are reported only.

LTE BAND 53

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
LTE BAND 53	1.4MHz, QPSK	6/0	2489.0	1.089	1.339
	1.4MHz,16QAM			1.091	1.323
	3MHz, QPSK	15/0		2.696	3.053
	3MHz, 16QAM			2.701	2.974
	5MHz, QPSK	25/0		4.481	5.043
	5MHz, 16QAM			4.495	5.052
	10MHz, QPSK	50/0		8.976	9.916
	10MHz, 16QAM			8.983	9.824
	10MHz, QPSK	1/0		0.533	0.80

5G NR n53

Band	Mode	RB Allocation/RB Offset	f(MHz)	99% BW (MHz)	-26dB BW (MHz)
5G NR n53	10MHz, BPSK	24/0	2489.0	8.660	9.899
	10MHz, QPSK			8.744	10.17
	10MHz, 16QAM			8.671	10.17
	10MHz, QPSK	1/0		0.450	0.62

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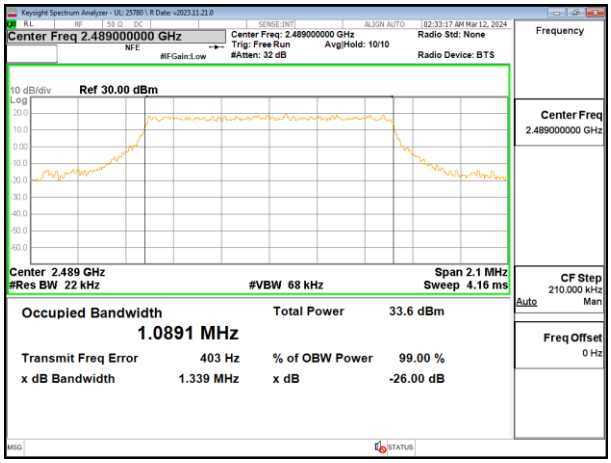
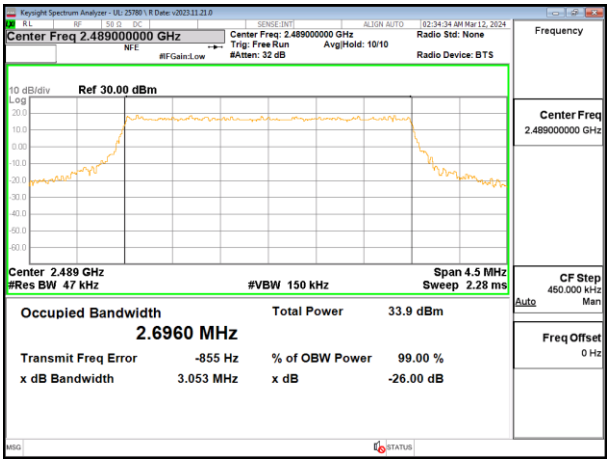
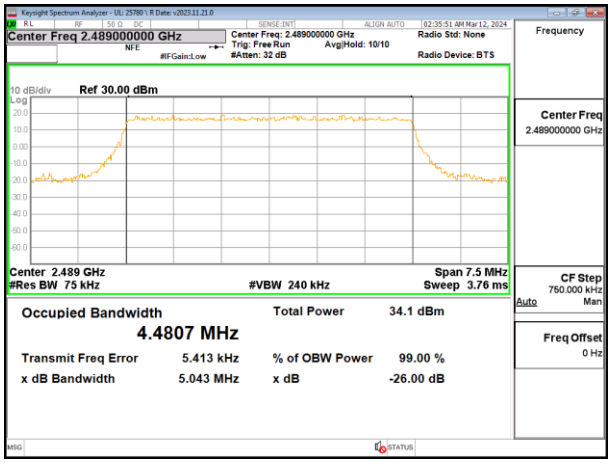
9.2.1. LTE BAND 53



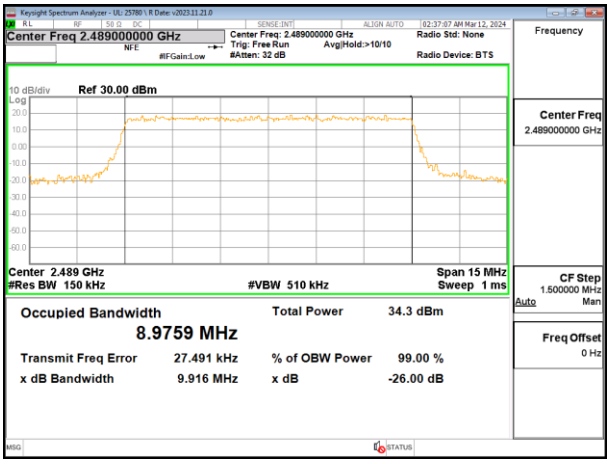
LTE B53 1.4MHz QPSK Middle Channel RB6-0



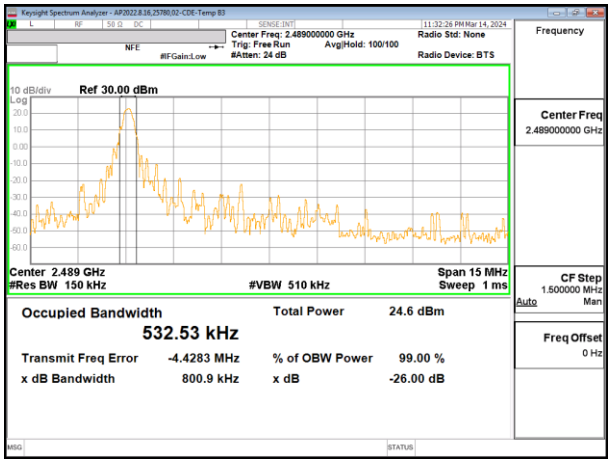
LTE B53 3MHz QPSK Middle Channel RB15-0



LTE B53 5MHz QPSK Middle Channel RB25-0



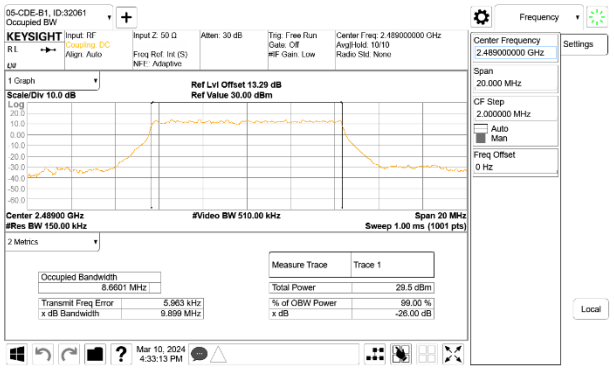
LTE B53 10MHz QPSK Middle Channel RB50-0



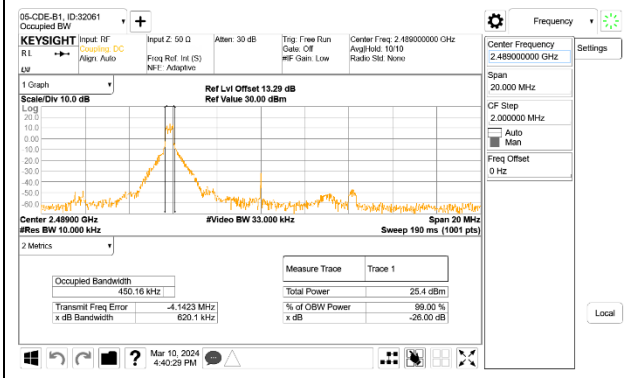
LTE B53 10MHz QPSK Middle Channel RB1-0

Intentionally Blank

9.2.2. 5G NR n53



5G NR n53 10MHz BPSK Middle Channel RB24-0



5G NR n53 10MHz BPSK Middle Channel RB1-0

9.3. MAXIMUM POWER SPECTRAL DENSITY

RULE PART(S)

FCC: §25.149 (c)(4) (iv)
ISED: SMSE-009-20 Annex A 9.f

LIMITS

FCC: The maximum power spectral density conducted to the antenna is not greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission;

ISED: The equipment's maximum power spectral density conducted to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The PSD was measured with the spectrum analyzer at the low/ middle/high channel in each band where RBW=3kHz, VBW ≥ 3 * RBW, detector= RMS (power averaging).

RESULTS

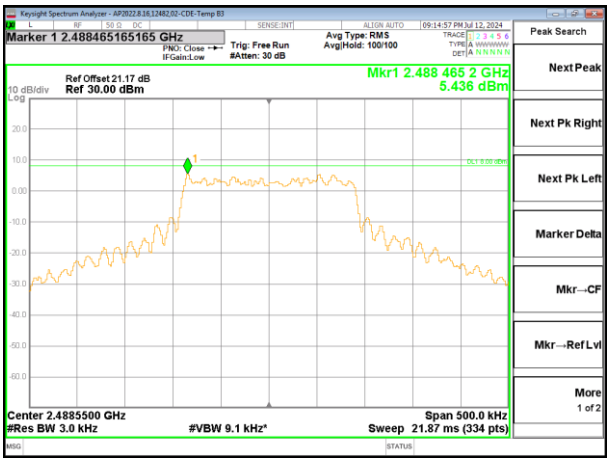
LTE BAND 53

Band	Mode	RB Allocation/RB Offset	f(MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)
LTE BAND 53	1.4MHz, QPSK	1/0	2484.2	6.010	8.0
			2489.0	5.436	
			2494.3	6.271	
	3MHz, QPSK	1/0	2485.0	6.028	
			2489.0	5.456	
			2493.5	6.433	
	5MHz, QPSK	1/0	2486.0	6.617	
			2489.0	6.010	
			2492.5	6.238	
	10MHz, QPSK	1/0	2488.5	6.046	
			2489.0	6.056	
			2490.0	6.763	
		50/0	2488.5	-11.316	
			2489.0	-11.343	
			2490.0	-11.066	

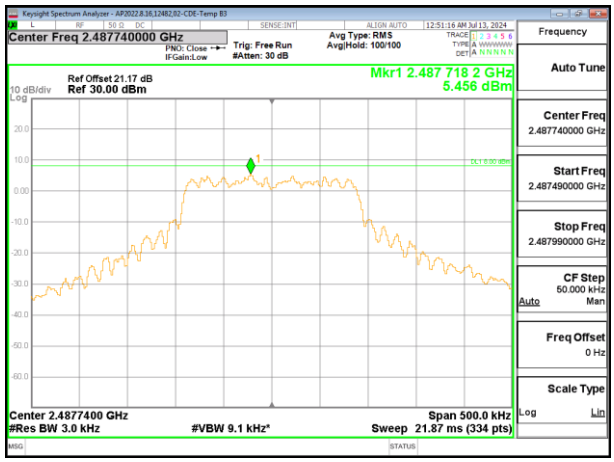
5G NR n53

Band	Mode	RB Allocation/RB Offset	f(MHz)	PSD (dBm/3kHz)	PSD Limit (dBm/3kHz)
5G NR n53	10MHz, BPSK	1/1	2488.5	7.979	8.0
			2489.0	7.599	
			2490.0	7.797	
		24/0	2488.5	-5.255	
			2489.0	-4.770	
			2490.0	-4.667	

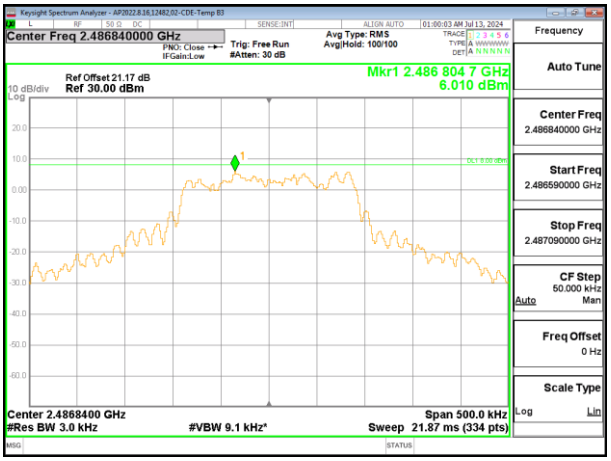
9.3.1. LTE BAND 53



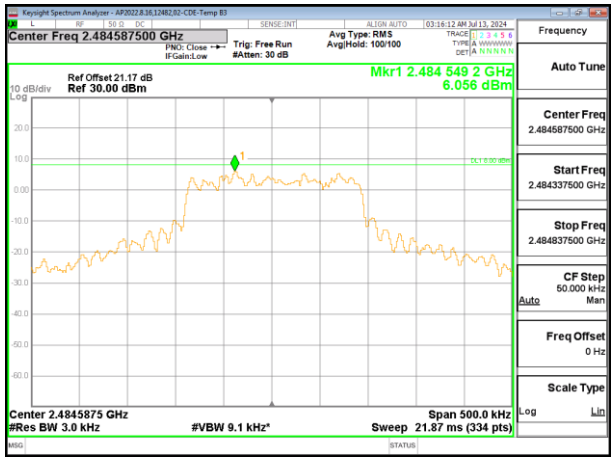
LTE B53 1.4MHz QPSK Middle Channel RB1-0



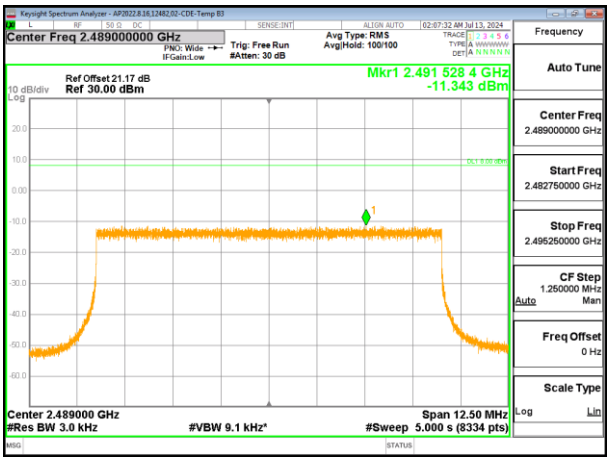
LTE B53 3MHz QPSK Middle Channel RB1-0



LTE B53 5MHz QPSK Middle Channel RB1-0



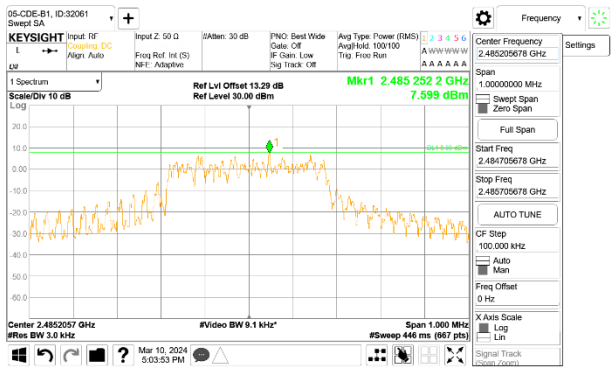
LTE B53 10MHz QPSK Middle Channel RB1-0



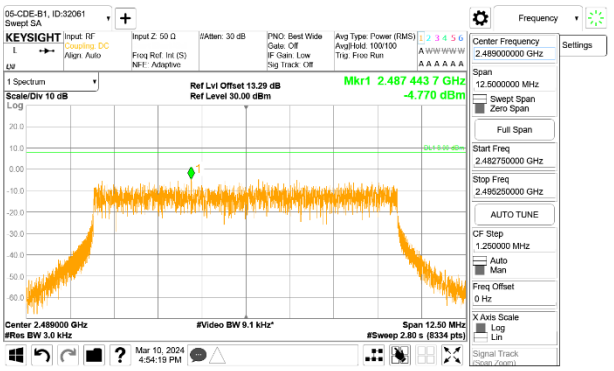
LTE B53 10MHz QPSK Middle Channel RB50-0

Intentionally Blank

9.3.2. 5G NR n53



5G NR n53 10MHz BPSK Middle Channel RB1-1



5G NR n53 10MHz BPSK Middle Channel RB24-0

9.4. 6dB BANDWIDTH

RULE PART(S)

FCC: §25.149 (c)(4) (ii)
ISED: SMSE-009-20 Annex A 9.c

LIMITS

The 6 dB bandwidth shall be at least 500 kHz.

TEST PROCEDURE

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The 6dB bandwidth was measured with the spectrum analyzer at the low/ middle/high channel in each band where RBW is 1%-5% of EBW, VBW ≥ 3 * RBW, Peak detector and max hold.

RESULTS

LTE BAND 53

Band	Mode	RB Allocation/RB Offset	f(MHz)	6dB BW (MHz)	6dB BW Limit (MHz)
LTE BAND 53	1.4MHz, QPSK	6/0	2489	1.085	0.5
	1.4MHz,16QAM			1.074	
	3MHz, QPSK	15/0		2.703	
	3MHz, 16QAM			2.701	
	5MHz, QPSK	25/0		4.506	
	5MHz, 16QAM			4.506	
	10MHz, QPSK	50/0		9.008	
	10MHz, 16QAM			9.016	

5G NR n53

Band	Mode	RB Allocation/RB Offset	f(MHz)	6dB BW (MHz)	6dB BW Limit (MHz)
5G NR n53	10MHz, BPSK	24/0	2489	8.642	0.5
	10MHz, QPSK	24/0		8.638	
	10MHz, 16QAM	24/0		8.666	

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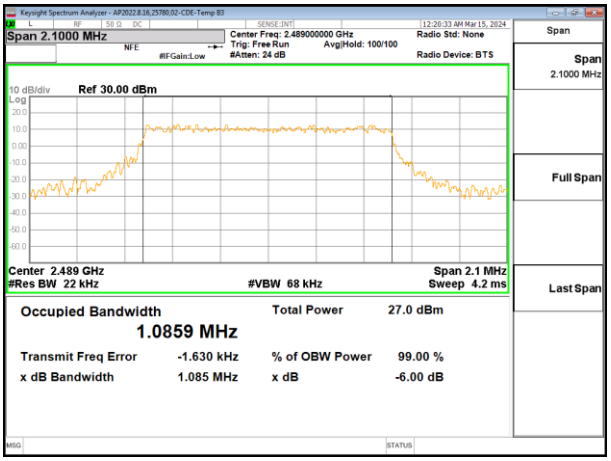
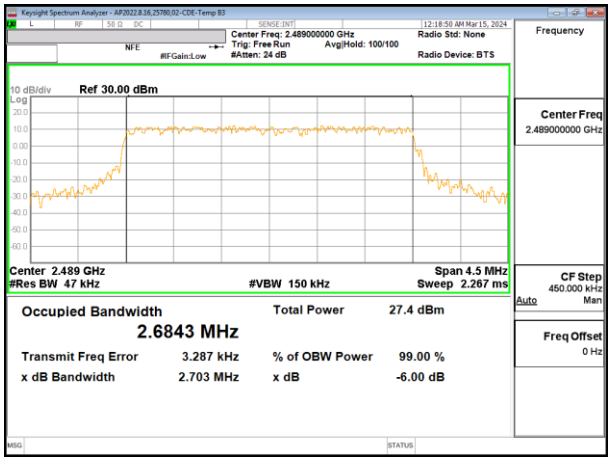
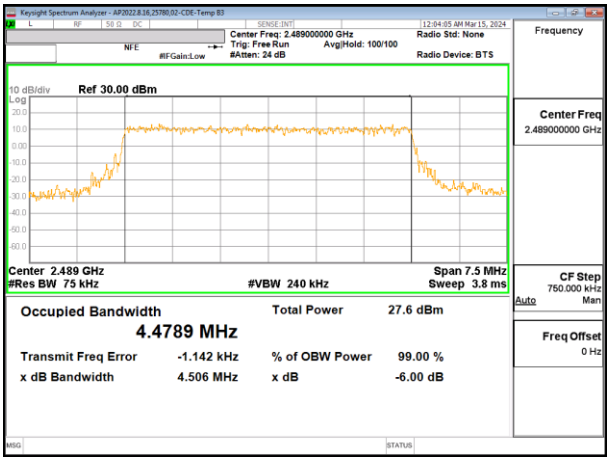
9.4.1. LTE BAND 53



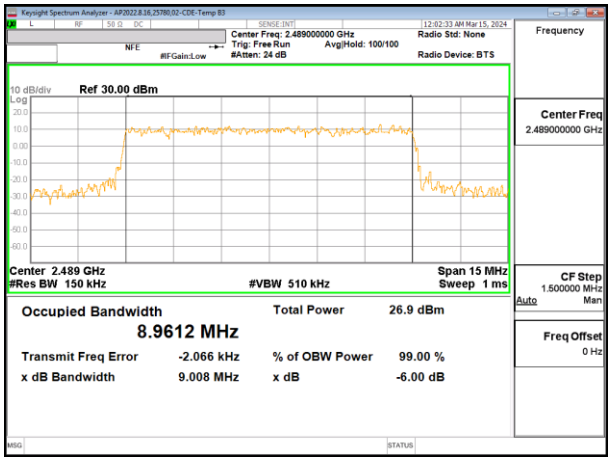
LTE B53 1.4MHz QPSK Middle Channel RB6-0



LTE B53 3MHz QPSK Middle Channel RB15-0

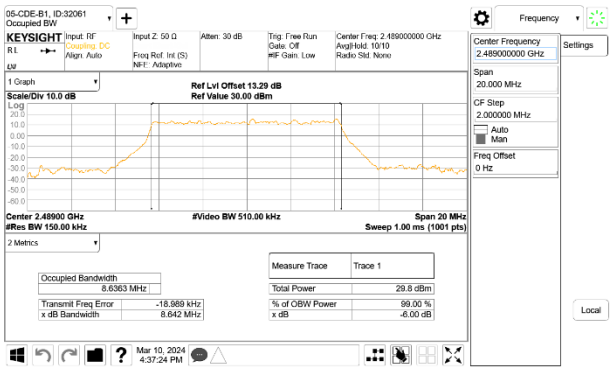


LTE B53 5MHz QPSK Middle Channel RB25-0



LTE B53 10MHz QPSK Middle Channel RB50-0

9.4.2. 5G NR n53



5G NR n53 10MHz BPSK Middle Channel RB24-0

Intentionally Blank

9.5. EMISSION MASK AND BANDEDGE

RULE PART(S)

FCC: §25.149 (c)(4)

ISED: SMSE-009-20 Annex A 9

LIMITS

FCC: §25.149

(c) Equipment certification. (4) Applications for equipment authorization of terrestrial low-power system equipment that will operate in the 2483.5-2495 MHz band shall demonstrate the following:

(v) Emissions below 2483.5 MHz are attenuated below the transmitter power (P) measured in watts by a factor of at least 40 + 10 log (P) dB at the channel edge at 2483.5 MHz, 43 + 10 log (P) dB at 5 MHz from the channel edge, and 55 + 10 log (P) dB at X MHz from the channel edge where X is the greater of 6 MHz or the actual emission bandwidth.

(vi) Emissions above 2495 MHz are attenuated below the transmitter power (P) measured in watts by a factor of at least 43 + 10 log (P) dB on all frequencies between the channel edge at 2495 MHz and X MHz from this channel edge and 55 + 10 log (P) dB on all frequencies more than X MHz from this channel edge, where X is the greater of 6 MHz or the actual emission bandwidth;

ISED: SMSE-900-20 Annex A 9:

(g) For the unwanted emission below 2483.5 MHz, the ATC system's transmitter power, P (Watt), shall be attenuated by at least:

i. 40 + 10 log(P) dB at the channel edge at 2483.5 MHz
ii. 43 + 10 log(P) dB at 5 MHz from the channel edge
iii. 55 + 10 log(P) dB at X MHz from the channel edge

where X is the greater of 6 MHz or the actual emission bandwidth.

(h) For the unwanted emission above 2495 MHz, the ATC system's transmitter power, P (Watt), shall be attenuated by at least:

i. 43 + 10 log(P) dB on all frequencies between the channel edge at 2495 MHz and X MHz from this channel edge
ii. 55 + 10 log(P) dB on all frequencies more than X MHz from this channel edge

where X is the greater of 6 MHz or the actual emission bandwidth.

Notwithstanding the above requirements, the e.i.r.p. density of the ATC system's unwanted emission shall not exceed:

i. -44.1 dBW/30 kHz measured from the edge of the equipment channel bandwidth.
ii. -70 dBW/MHz for broadband emissions and -80 dBW/kHz for discrete emissions in the band 1559-1610 MHz

TEST PROCEDURE FOR UNWANTED EMISSIONS

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

For each Emission Mask measurement:

1. Set the spectrum analyzer span to include the block edge frequency.
2. Set the Spectrum Emission Mask to cover all frequencies at their respective limits
3. Set the Spectrum Emission Mask to use the required Measurement Bandwidth
4. Set resolution bandwidth to at least 1% of emission bandwidth.

TEST PROCEDURE For EIRP DENSITY LIMIT

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

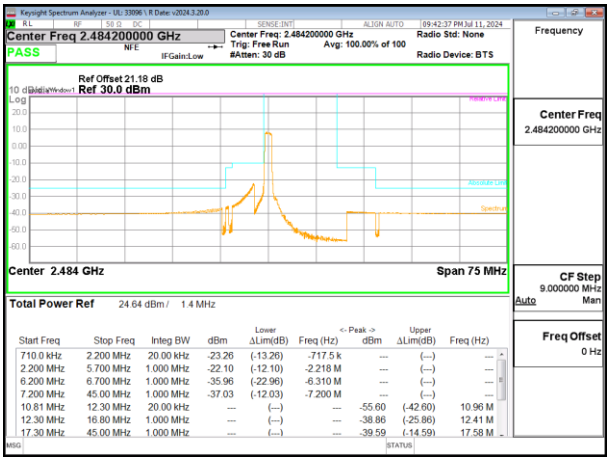
For each Emission Mask measurement:

1. Set the Spectrum analyzer span to include the block edge frequency.
2. Set the Spectrum Emission Mask to cover all frequencies at their respective limits
3. Set the Spectrum Emission Mask to use the Measurement Bandwidth of 30kHz

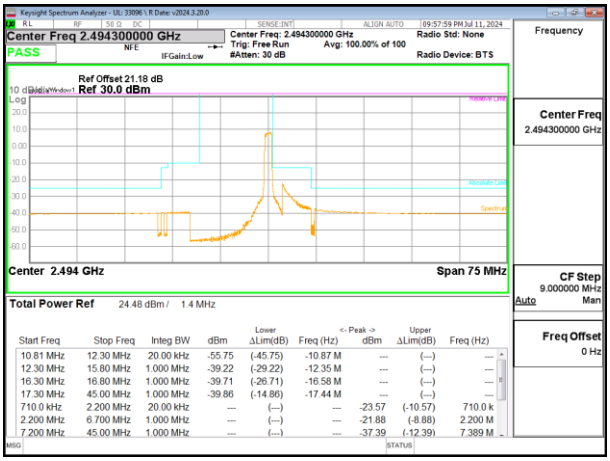
RESULTS

9.5.1. LTE BAND 53

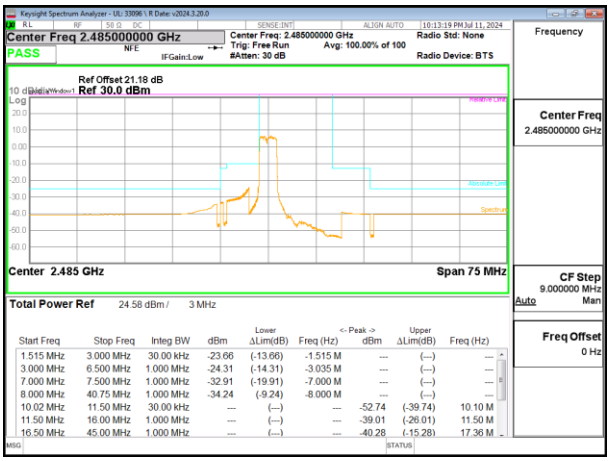
LTE BAND 53 BANDEGE



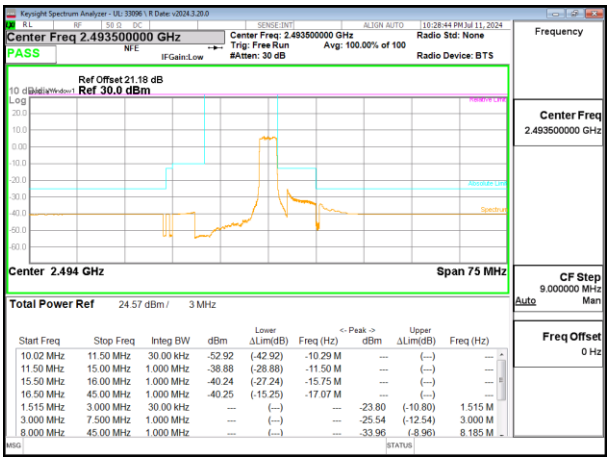
LTE B53 1.4MHz QPSK Low Channel RB6-0



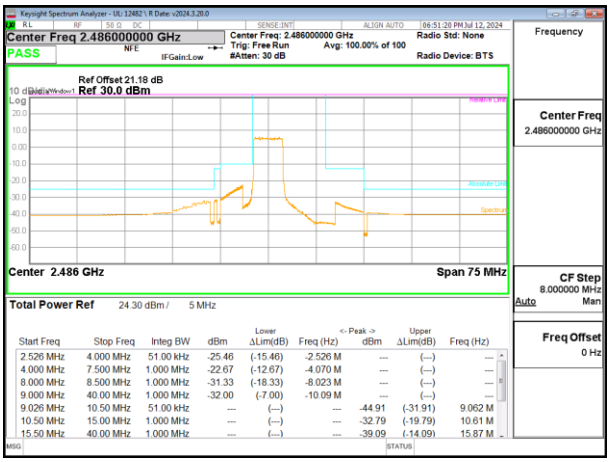
LTE B53 1.4MHz QPSK High Channel RB6-0



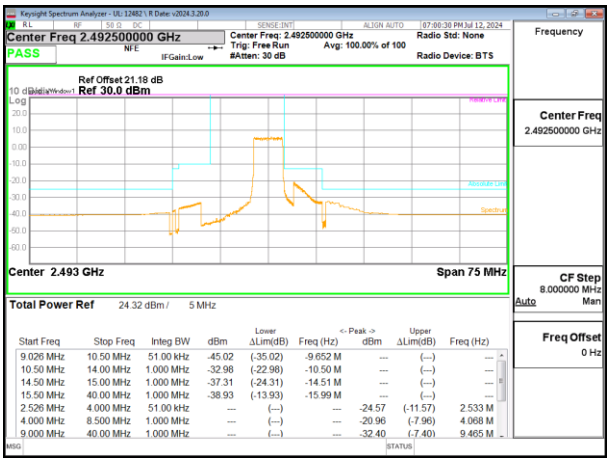
LTE B53 3MHz QPSK Low Channel RB15-0



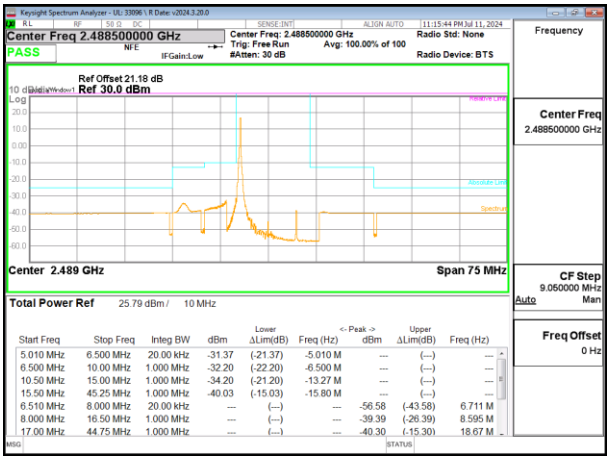
LTE B53 3MHz QPSK High Channel RB15-0



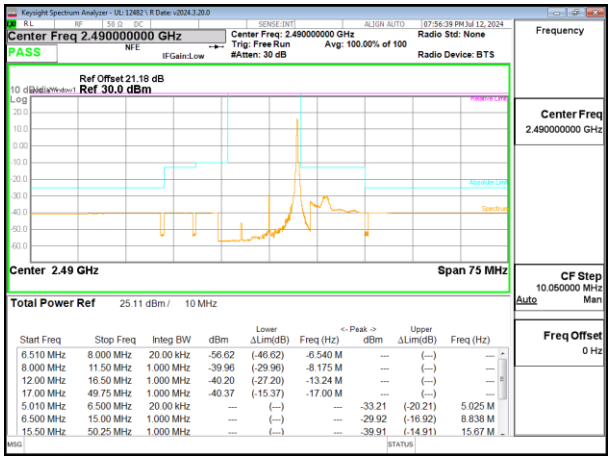
LTE B53 5MHz QPSK Low Channel RB25-0



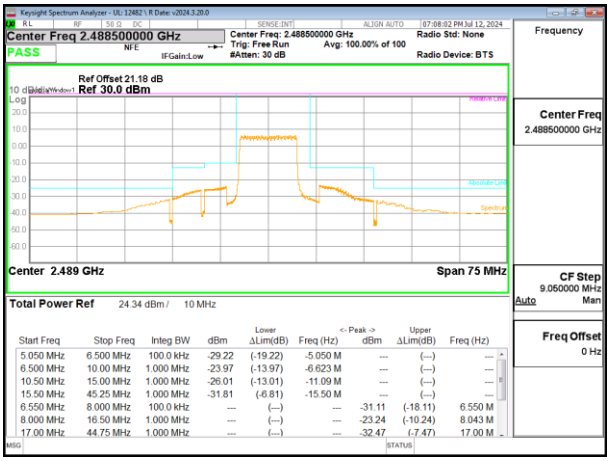
LTE B53 5MHz QPSK High Channel RB25-0



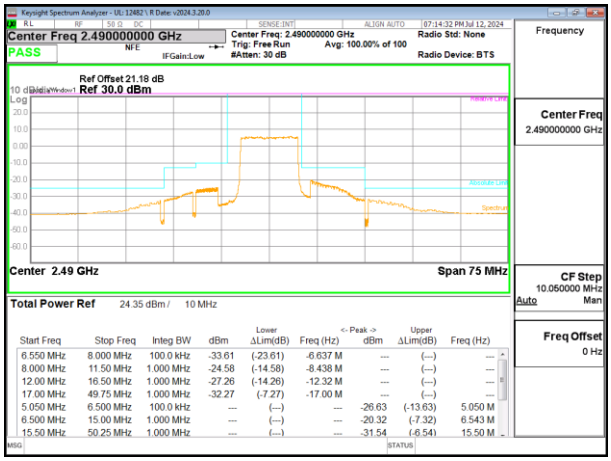
LTE B53 10MHz QPSK Low Channel RB1-0



LTE B53 10MHz QPSK High Channel RB1-49



LTE B53 10MHz QPSK Low Channel RB50-0



LTE B53 10MHz QPSK High Channel RB50-0

LTE BAND 53 EIRP DENSITY

Band	Mode	RB Allocation/ RB Offset	Frequency (MHz)	Highest Cond Power Density (dBm/30kHz)	Highest Antenna Gain (dBi)	Highest EIRP Density (dBm/30kHz)	EIRP Density Limit (dBm/30kHz)
LTE BAND 53	1.4MHz, QPSK	1/0	2484.2	-14.80	-1.2	-16.00	-14.1
		6/0	2484.2	-20.65		-21.85	
		1/5	2494.3	-15.72		-16.92	
		6/0	2494.3	-21.24		-22.44	
	3MHz, QPSK	1/0	2485.0	-18.37		-19.57	
		15/0	2485.0	-22.31		-23.51	
		1/14	2493.5	-18.49		-19.69	
		15/0	2493.5	-23.14		-24.34	
	5MHz, QPSK	1/0	2486.0	-20.41		-21.61	
		25/0	2486.0	-26.76		-27.96	
		1/24	2492.5	-20.98		-22.18	
		25/0	2492.5	-25.36		-26.56	
	10MHz, QPSK	1/0	2488.5	-28.77		-29.97	
		50/0	2488.5	-33.25		-34.45	
		1/49	2490.0	-30.28		-31.48	
		50/0	2490.0	-30.74		-31.94	

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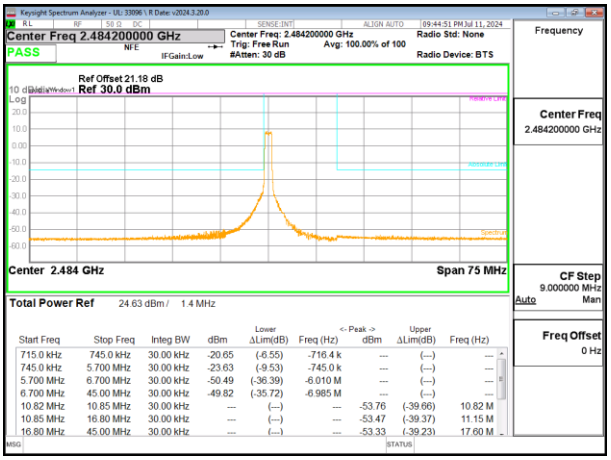
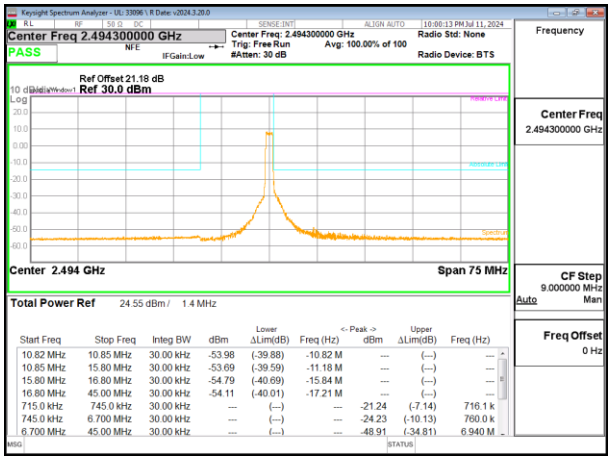
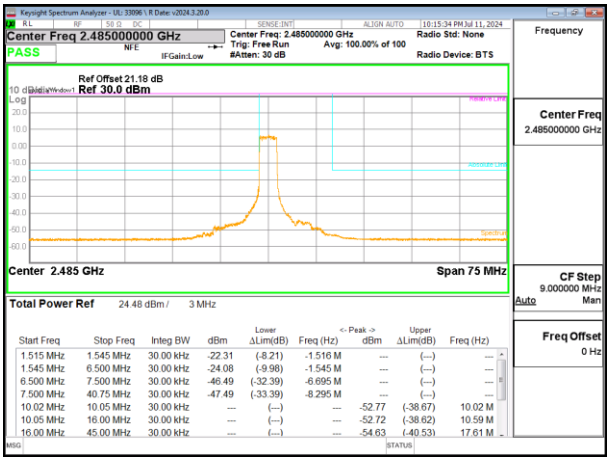


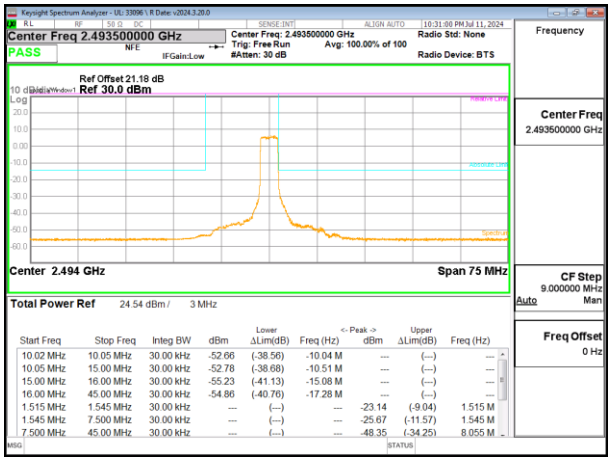
LTE B53 1.4MHz QPSK Low Channel RB6-0



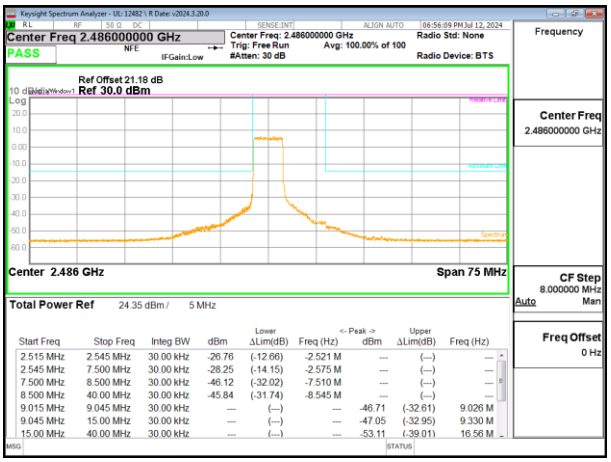
LTE B53 1.4MHz QPSK High Channel RB6-0



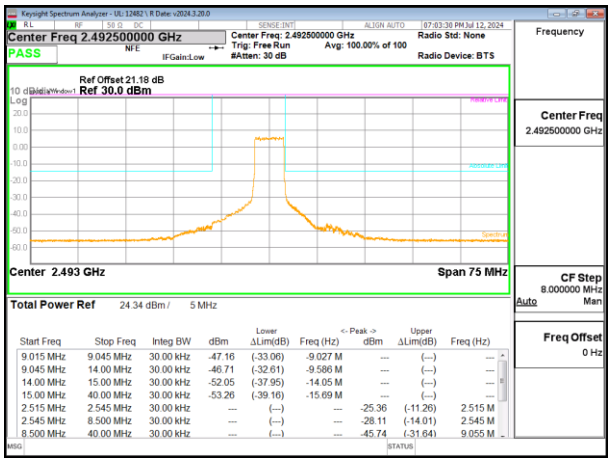
LTE B53 3MHz QPSK Low Channel RB15-0



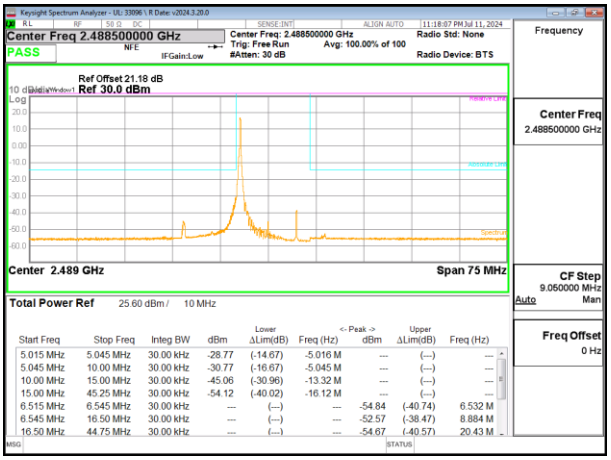
LTE B53 3MHz QPSK High Channel RB15-0



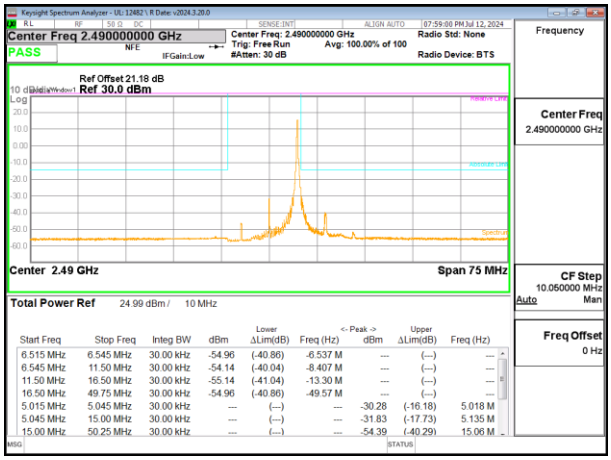
LTE B53 5MHz QPSK Low Channel RB25-0



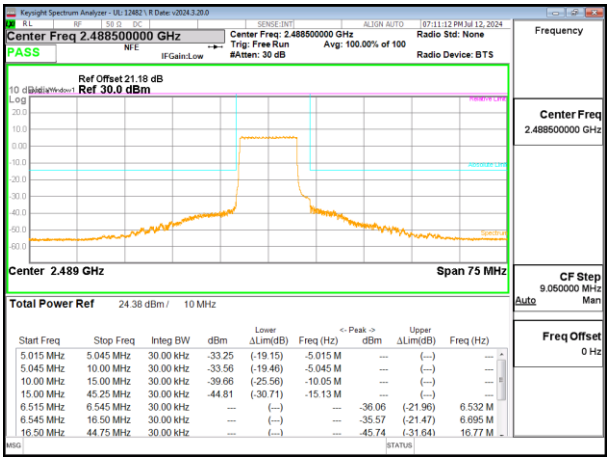
LTE B53 5MHz QPSK High Channel RB25-0



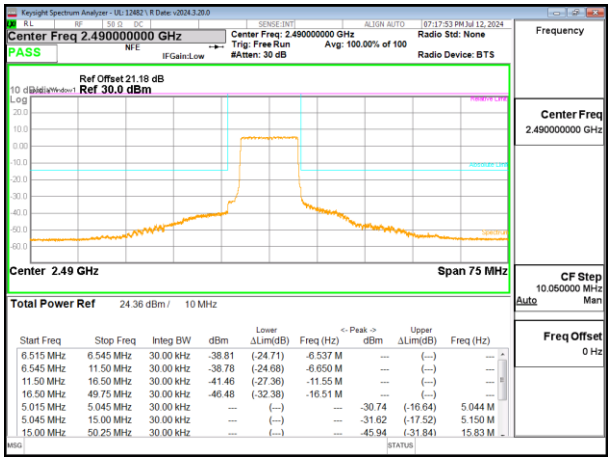
LTE B53 10MHz QPSK Low Channel RB1-0



LTE B53 10MHz QPSK High Channel RB1-49



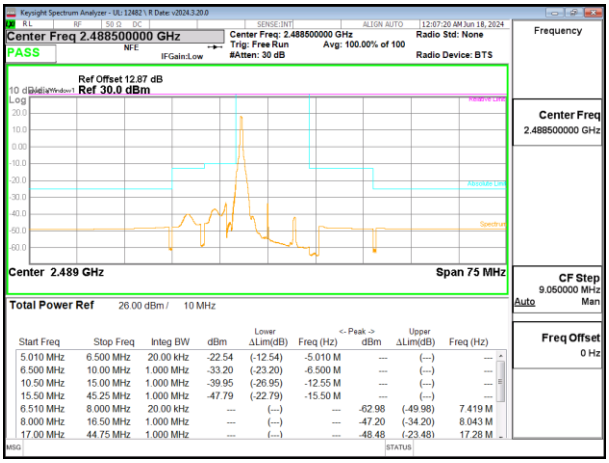
LTE B53 10MHz QPSK Low Channel RB50-0



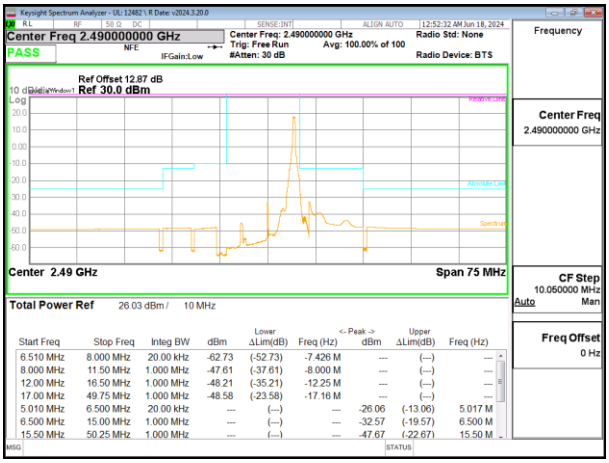
LTE B53 10MHz QPSK High Channel RB50-0

9.5.2 5G NR n53

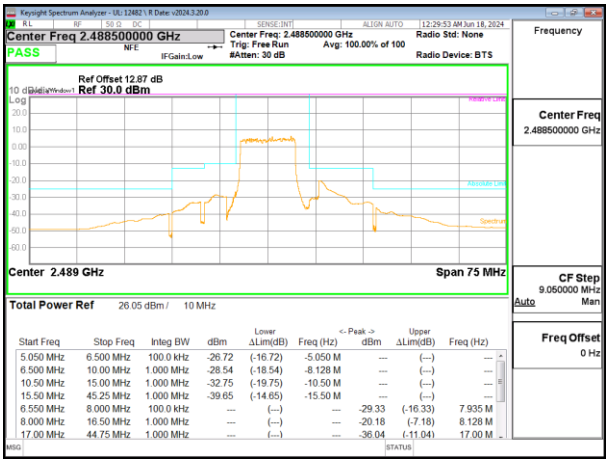
5G NR n53 BANDEDGE



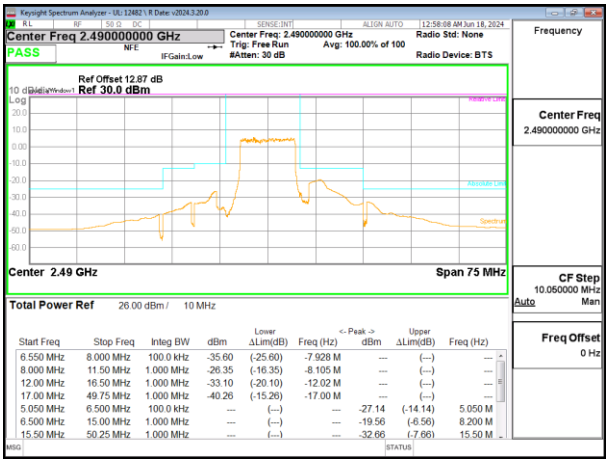
5G NR n53 10MHz BPSK Low Channel RB1-0



5G NR n53 10MHz BPSK High Channel RB1-23



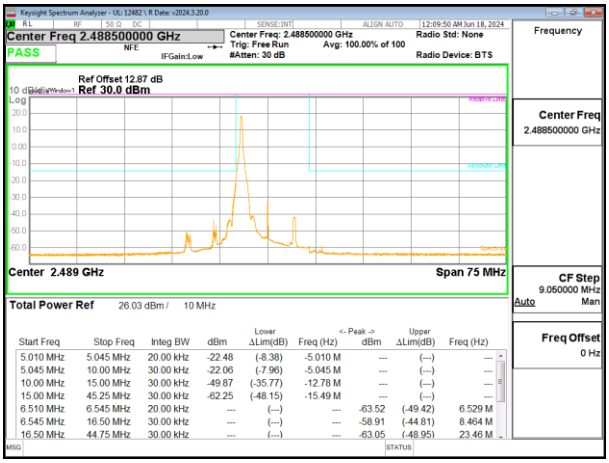
5G NR n53 10MHz BPSK Low Channel RB24-0



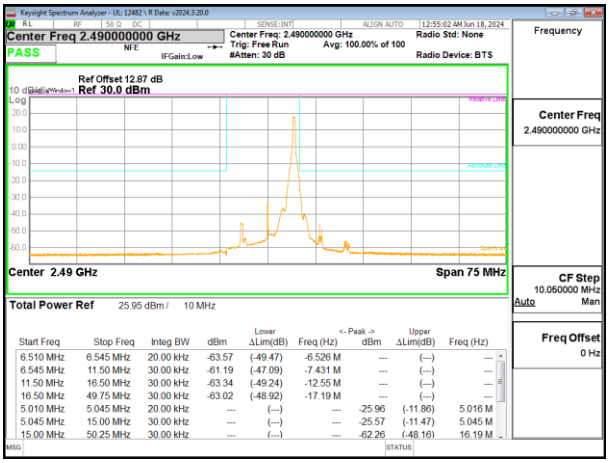
5G NR n53 10MHz BPSK High Channel RB24-0

5G NR n53 EIRP DENSITY

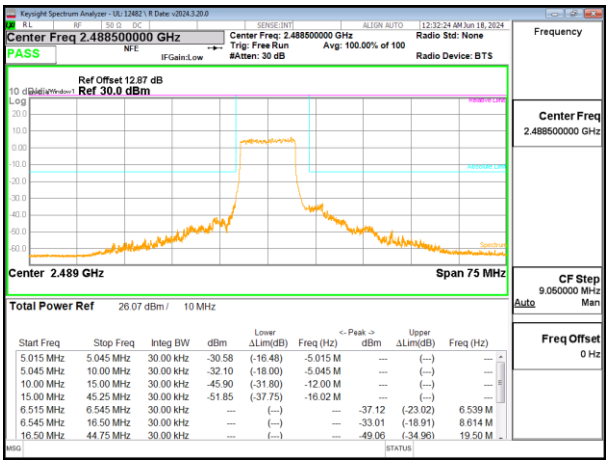
Band	Mode	RB Allocation/ RB Offset	f (MHz)	Highest Cond Power Density (dBm/30kHz)	Highest Antenna Gain (dBi)	Highest EIRP Density (dBm/30kHz)	EIRP Density Limit (dBm/30kHz)
5G NR n53	10MHz, BPSK	1/0	2488.5	-22.06	-1.2	-23.26	-14.1
		24/0	2488.5	-30.58		-31.78	
		1/23	2490.0	-25.57		-26.77	
		24/0	2490.0	-30.91		-32.11	



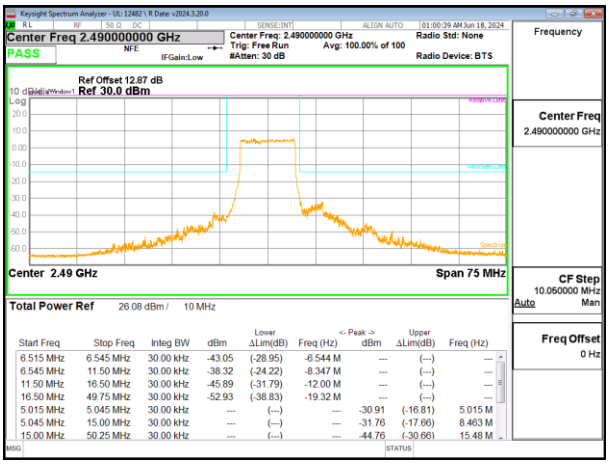
5G NR n53 10MHz BPSK Low Channel RB1-0



5G NR n53 10MHz BPSK High Channel RB1-23



5G NR n53 10MHz BPSK Low Channel RB24-0



5G NR n53 10MHz BPSK High Channel RB24-0

9.6. OUT OF BAND EMISSIONS

TEST PROCEDURE

The RF output of the transmitter was connected to a spectrum analyzer through a calibrated coaxial cable. Sufficient scans were taken to show the out-of-band Emissions, if any, up to 10th harmonic. Multiple sweeps were recorded in maximum hold mode using a peak detector to ensure that the worst-case emissions were caught.

For each out of band emissions measurement:

- Set display line at -25dBm according to the band Limit
- Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz. (NOTE: Worst case set RBW/VBW to 1MHz/3MHz)

RESULTS

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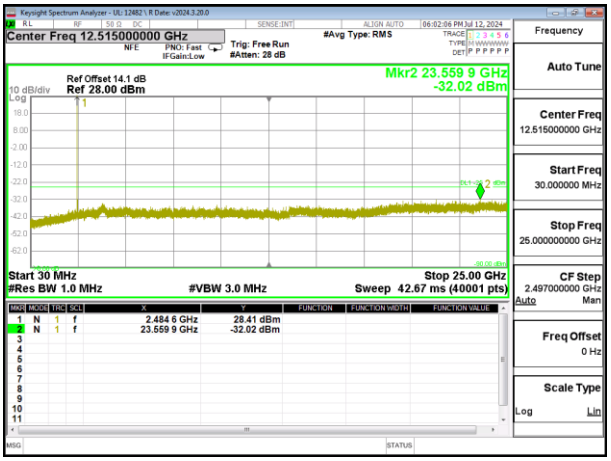
9.6.1. LTE BAND 53

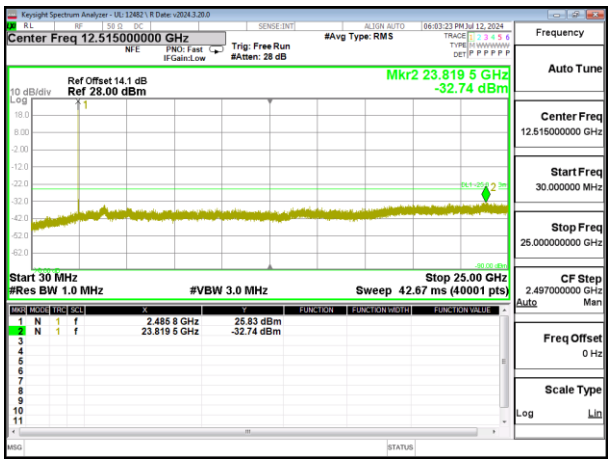
LIMITS

FCC: §25.149 (c)(4)
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.

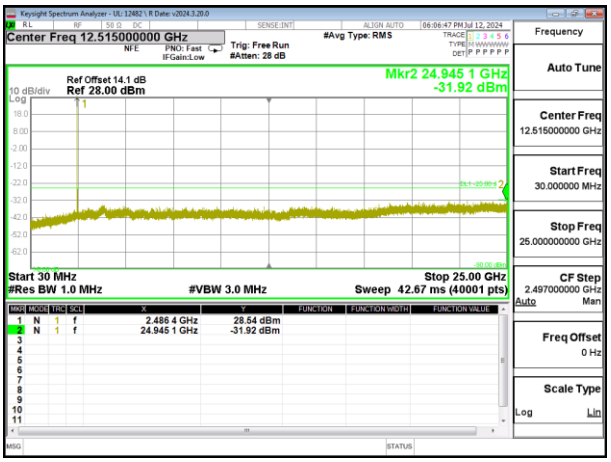
ISED: SMSE-900-20 Annex A 9.g
The minimum permissible attenuation level of any spurious emissions is 55 + 10 log (P) dB where transmitting power (P) in Watts.



LTE B53 10MHz QPSK Low Channel RB1-0



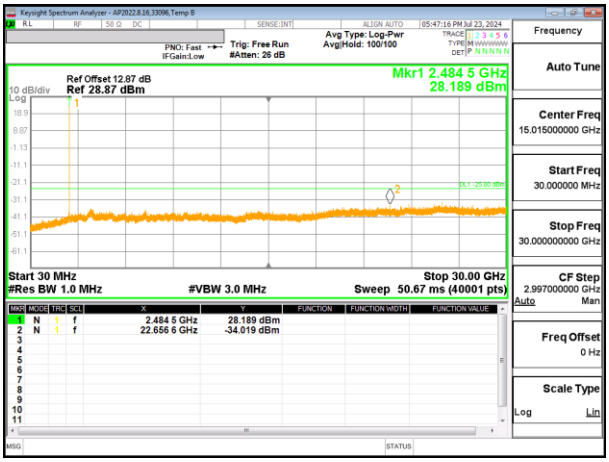
LTE B53 10MHz QPSK Middle Channel RB1-0



LTE B53 10MHz QPSK High Channel RB1-0

Intentionally Blank

9.6.2. 5G NR 53



5G NR n53 10MHz BPSK Low Channel RB1-0

5G NR n53 10MHz BPSK Mid Channel RB1-1

5G NR n53 10MHz BPSK High Channel RB1-23

Intentionally Blank

9.7. FREQUENCY STABILITY

TEST PROCEDURE

Use CMW 500 with Frequency Error measurement capability.

- Temp. = −30°C to +50°C
- Voltage = (85% - 115%)

  Low voltage, 3.23VDC, Normal, 3.8VDC and High voltage, 4.37VDC.
  End Voltage, 2.90VDC.

Frequency Stability vs Temperature:
The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

Frequency Stability vs Voltage:
The peak frequency error is recorded (worst-case).

RESULTS

See the following pages.

LIMITS

FCC: §25.202 (d)
(d) Frequency tolerance, Earth stations. The carrier frequency of each earth station transmitter authorized in these services shall be maintained within 0.001 percent of the reference frequency.

Test Engineer ID:	28774	Test Date:	4/6/2024

9.7.1. LTE BAND 53 QPSK (10MHz BANDWIDTH)

Band	53	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		2483.5	2495		10	
		Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Temperature	Voltage					
Normal (20°C)	Normal	2483.8978	2494.5240			
Extreme (50°C)		2483.8977	2494.5240	-9.2	-0.004	Yes
Extreme (40°C)		2483.8977	2494.5240	-8.3	-0.003	Yes
Extreme (30°C)		2483.8977	2494.5240	-8.2	-0.003	Yes
Extreme (10°C)		2483.8978	2494.5240	7.2	0.003	Yes
Extreme (0°C)		2483.8978	2494.5240	7.0	0.003	Yes
Extreme (-10°C)		2483.8977	2494.5240	-7.1	-0.003	Yes
Extreme (-20°C)		2483.8977	2494.5240	-8.0	-0.003	Yes
Extreme (-30°C)		2483.8977	2494.5240	-9.0	-0.004	Yes
20°C	15%	2483.8977	2494.5240	-12.6	-0.005	Yes
	-15%	2483.8977	2494.5240	-13.1	-0.005	Yes
	End Point Voltage	2483.8977	2494.5240	-13.0	-0.005	Yes

9.7.2. 5G NR n53 BPSK (10MHz BANDWIDTH)

Band	53	Frequency Range		Frequency Error Reading (Hz)	Limit	
Condition		2483.5	2495		10	
Temperature	Voltage	Freq Reading @ Low End (MHz)	Freq Reading @ High End (MHz)		Frequency Stability (ppm)	Within Authorized Frequency Block (Hz)
Normal (20°C)	Normal	2484.1507	2494.3102			
Extreme (50°C)		2484.1507	2494.3102	-7.8	-0.003	Yes
Extreme (40°C)		2484.1508	2494.3102	8.4	0.003	Yes
Extreme (30°C)		2484.1507	2494.3102	-8.4	-0.003	Yes
Extreme (10°C)		2484.1507	2494.3102	-8.2	-0.003	Yes
Extreme (0°C)		2484.1508	2494.3102	8.4	0.003	Yes
Extreme (-10°C)		2484.1507	2494.3102	-8.1	-0.003	Yes
Extreme (-20°C)		2484.1507	2494.3102	-8.3	-0.003	Yes
Extreme (-30°C)		2484.1507	2494.3102	-8.5	-0.003	Yes
20°C	15%	2484.1507	2494.3102	-14.3	-0.006	Yes
	-15%	2484.1507	2494.3102	-10.2	-0.004	Yes
	End Point Voltage	2484.1507	2494.3102	-12.4	-0.005	Yes

10. RADIATED TEST RESULTS

Radiated measurement using the Field Strength Method

Using the test configuration shown in Figure 6 below, We measure the radiated emissions directly from the EUT and convert the measured field strength or received power to ERP or EIRP, as required, for comparison to the applicable limits. As stated in 5.5.1 of ANSI C63.26-2015, the field strength measurement method using a test site validated to the requirements of ANSI C63.4 is an alternative to the substitution measurement method.

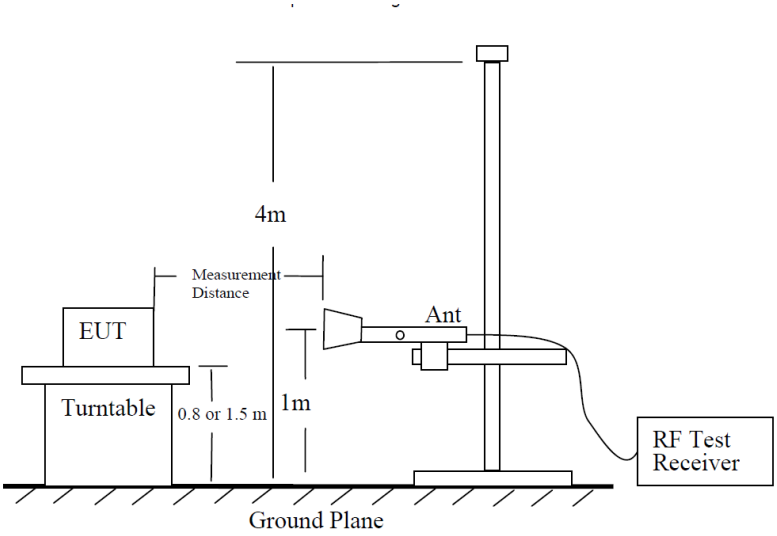


Figure 6—Test site-up for radiated ERP and/or EIRP measurements

Radiated Power Measurement Calculation According to ANSI C63.26-2015

a) E (dBμV/m) = Measured amplitude level (dBμV) + Cable Loss (dB) + Antenna Factor (dB/m).

b) E (dBμV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m).

c) E (dBμV/m) = EIRP (dBm) − 20log(D) + 104.8; where D is the measurement distance (in the far field region) in m.

d) EIRP (dBm) = E (dBμV/m) + 20log(D) − 104.8; where D is the measurement distance (in the far field region) in m.

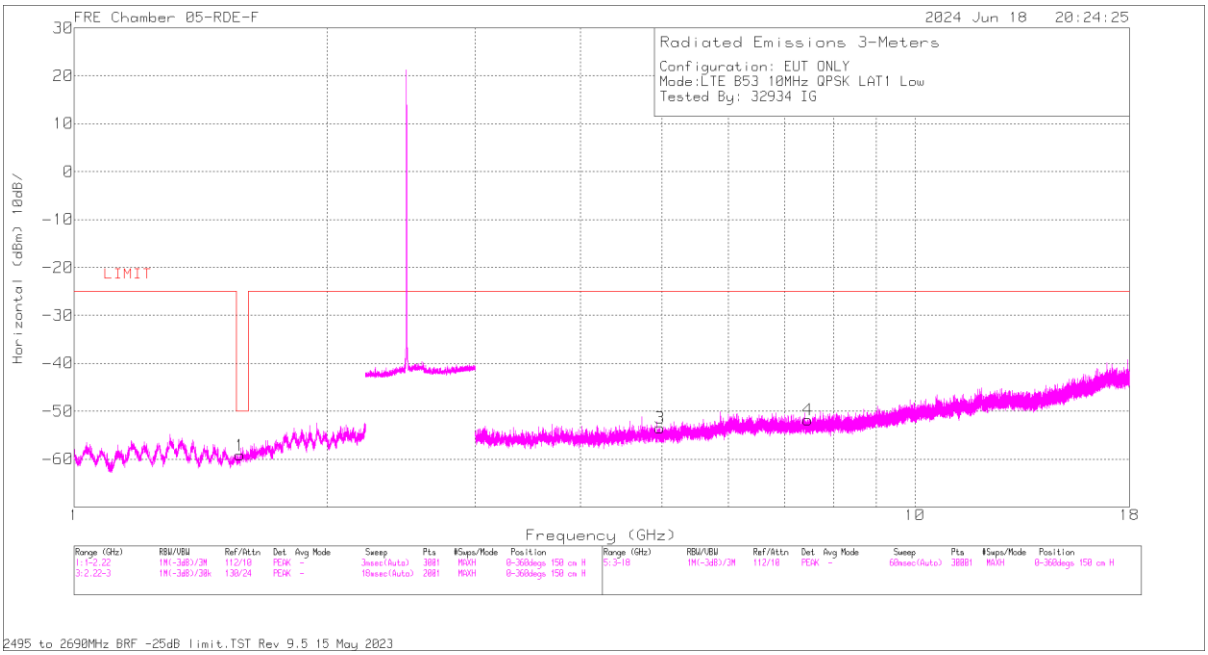
So, from d)

The measuring distance is usually at 3m, then 20*Log(3)=9.5424

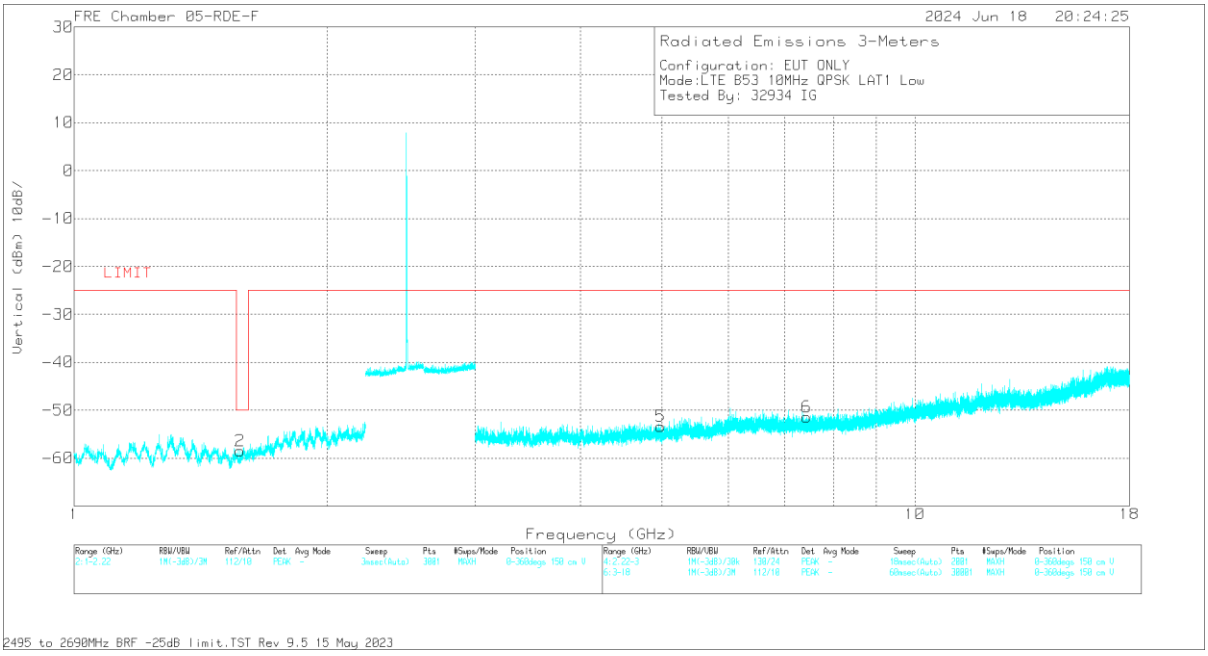
Then, EIRP (dBm) = E (dBμV/m) + 9.5424 − 104.8 = E (dBμV/m) – 95.2576

Note: Confidence check of each chamber is performed daily to see if any degradation from expected/normal reading reference data. Ambient check of each chamber is performed monthly.

Example Plot Above 1GHz



Horizontal Polarity



Vertical Polarity

Trace Markers

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
1.576247	57.54	Pk	27.7	-95.2	-49.25	-59.21	-50	-9.21	H
1.575434	58.22	Pk	27.7	-95.2	-49.25	-58.53	-50	-8.53	V
4.979000	56.01	Pk	34.0	-95.2	-48.35	-53.54	-25	-28.54	H
7.460500	54.65	Pk	35.7	-95.2	-46.94	-51.79	-25	-26.79	H
4.987500	56.28	Pk	34.0	-95.2	-48.43	-53.35	-25	-28.35	V
7.439500	55.14	Pk	35.7	-95.2	-47.01	-51.37	-25	-26.37	V

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10.1. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 1

TEST PROCEDURE

KDB 971168 D01 v03r01/D02 v02r01

All tests above 1GHz were done with a Resolution Bandwidth of 1MHz, and a Video Bandwidth of 3MHz.

The transmitter output was connected to a CMW500Test Set and configured to operate at maximum power. The band edge emissions were measured at the required operating frequencies in each band on the Spectrum Analyzer.

FCC: §25.149 (c)(4)
(vii) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately above and adjacent to the 2495 MHz a resolution bandwidth of at least 1 percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. If 1 percent of the emission bandwidth of the fundamental emission is less than 1 MHz, the power measured must be integrated over the required measurement bandwidth of 1 MHz. A resolution bandwidth narrower than 1 MHz is permitted to improve measurement accuracy, provided the measured power is integrated over the full required measurement bandwidth (*i.e.,* 1 MHz). The emission bandwidth of the fundamental emission of a transmitter 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. When an emission outside of the authorized bandwidth causes harmful interference, the Commission may, at its discretion, require greater attenuation than specified in this section.

ISED: SMSE-009-20 Annex A 9
j. Compliance with this limit may be based on the use of a measurement resolution bandwidth of at least 1% of the occupied bandwidth. If 1% of the occupied bandwidth is less than 1 MHz, the power measured shall be integrated over the required measurement bandwidth of 1 MHz

RESULTS

10.1.1. LTE BAND 53

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	14982484
Date:	2024-06-18
Test Engineer:	32934
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.576247	57.54	Pk	27.7	-95.2	-49.25	-59.21	-50	-9.21	H
1.575434	58.22	Pk	27.7	-95.2	-49.25	-58.53	-50	-8.53	V
4.979000	56.01	Pk	34.0	-95.2	-48.35	-53.54	-25	-28.54	H
7.460500	54.65	Pk	35.7	-95.2	-46.94	-51.79	-25	-26.79	H
4.987500	56.28	Pk	34.0	-95.2	-48.43	-53.35	-25	-28.35	V
7.439500	55.14	Pk	35.7	-95.2	-47.01	-51.37	-25	-26.37	V
Mid Channel, 2489MHz									
1.588447	57.91	Pk	27.7	-95.2	-49.37	-58.96	-50	-8.96	H
1.594954	57.89	Pk	27.8	-95.2	-49.30	-58.81	-50	-8.81	V
4.967500	55.83	Pk	34.0	-95.2	-48.20	-53.57	-25	-28.57	H
7.453500	56.08	Pk	35.7	-95.2	-46.98	-50.40	-25	-25.40	H
4.978000	56.97	Pk	34.0	-95.2	-48.36	-52.59	-25	-27.59	V
7.448500	54.76	Pk	35.7	-95.2	-47.06	-51.80	-25	-26.80	V
High Channel, 2490MHz									
1.585194	59.37	Pk	27.7	-95.2	-49.37	-57.50	-50	-7.50	H
1.596580	58.59	Pk	27.8	-95.2	-49.29	-58.10	-50	-8.10	V
4.963500	55.61	Pk	34	-95.2	-48.28	-53.87	-25	-28.87	H
7.468000	54.93	Pk	35.7	-95.2	-46.91	-51.48	-25	-26.48	H
4.970500	55.75	Pk	34	-95.2	-48.23	-53.68	-25	-28.68	V
7.450500	55.2	Pk	35.7	-95.2	-47.02	-51.32	-25	-26.32	V

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 50 RB

Project #:	14982484
Date:	2024-06-18
Test Engineer:	32934
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.581127	58.22	Pk	27.7	-95.2	-49.32	-58.60	-50	-8.60	H
1.593734	58.99	Pk	27.8	-95.2	-49.31	-57.72	-50	-7.72	V
4.980500	55.81	Pk	34.0	-95.2	-48.32	-53.71	-25	-28.71	H
7.452500	54.49	Pk	35.7	-95.2	-47.00	-52.01	-25	-27.01	H
4.957500	56.07	Pk	34.0	-95.2	-48.34	-53.47	-25	-28.47	V
7.474000	54.97	Pk	35.7	-95.2	-46.91	-51.44	-25	-26.44	V
Mid Channel, 2489MHz									
1.588854	59.66	Pk	27.7	-95.2	-49.38	-57.22	-50	-7.22	H
1.586820	58.89	Pk	27.7	-95.2	-49.38	-57.99	-50	-7.99	V
4.981000	56.40	Pk	34.0	-95.2	-48.32	-53.12	-25	-28.12	H
7.462000	55.01	Pk	35.7	-95.2	-46.90	-51.39	-25	-26.39	H
4.981500	55.58	Pk	34.0	-95.2	-48.33	-53.95	-25	-28.95	V
7.436000	56.57	Pk	35.7	-95.2	-47.05	-49.98	-25	-24.98	V
High Channel, 2490MHz									
1.588447	57.83	Pk	27.7	-95.2	-49.37	-59.04	-50	-9.04	H
1.594140	58.26	Pk	27.8	-95.2	-49.31	-58.45	-50	-8.45	V
4.984000	56.41	Pk	34.0	-95.2	-48.33	-53.12	-25	-28.12	H
7.479000	54.96	Pk	35.7	-95.2	-46.99	-51.53	-25	-26.53	H
4.997000	56.43	Pk	34.0	-95.2	-48.41	-53.18	-25	-28.18	V
7.462500	54.93	Pk	35.7	-95.2	-46.9	-51.47	-25	-26.47	V

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10.1.2. 5G NR n53

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	14982484
Date:	2024-07-12
Test Engineer:	32145
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF 3m (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.587634	58.31	Pk	27.7	-95.2	-49.37	-58.56	-50	-8.56	H
1.590887	57.98	Pk	27.7	-95.2	-49.34	-58.86	-50	-8.86	V
5.341000	56.65	Pk	34.4	-95.2	-48.16	-52.31	-25	-27.31	H
8.363500	53.19	Pk	35.7	-95.2	-45.69	-52.00	-25	-27.00	H
5.384500	56.26	Pk	34.5	-95.2	-48.00	-52.44	-25	-27.44	V
8.442000	52.39	Pk	35.8	-95.2	-44.96	-51.97	-25	-26.97	V
Mid Channel, 2489MHz									
1.581534	57.79	Pk	27.7	-95.2	-49.33	-59.04	-50	-9.04	H
1.590074	57.78	Pk	27.7	-95.2	-49.35	-59.07	-50	-9.07	V
5.472500	55.36	Pk	34.5	-95.2	-47.76	-53.10	-25	-28.10	H
8.438500	54.85	Pk	35.8	-95.2	-45.14	-49.69	-25	-24.69	H
5.434000	55.60	Pk	34.5	-95.2	-47.83	-52.93	-25	-27.93	V
8.417500	54.33	Pk	35.8	-95.2	-45.22	-50.29	-25	-25.29	V
High Channel, 2490MHz									
1.584787	58.75	Pk	27.7	-95.2	-49.37	-58.12	-50	-8.12	H
1.586820	58.61	Pk	27.7	-95.2	-49.38	-58.27	-50	-8.27	V
6.060000	55.00	Pk	35.4	-95.2	-46.09	-50.89	-25	-25.89	H
9.331500	55.04	Pk	36.3	-95.2	-45.89	-49.75	-25	-24.75	H
6.022500	54.54	Pk	35.3	-95.2	-46.40	-51.76	-25	-26.76	V
9.218000	54.27	Pk	36.3	-95.2	-45.37	-50.00	-25	-25.00	V

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 24 RB

Project #:	14982484
Date:	2024-07-12
Test Engineer:	32934
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.570554	57.39	Pk	27.6	-95.2	-49.18	-59.39	-50	-9.39	H
1.571367	57.28	Pk	27.6	-95.2	-49.18	-59.50	-50	-9.50	V
5.410500	56.23	Pk	34.5	-95.2	-47.94	-52.41	-25	-27.41	H
8.290000	54.37	Pk	35.7	-95.2	-45.70	-50.83	-25	-25.83	H
5.422500	56.04	Pk	34.5	-95.2	-47.88	-52.54	-25	-27.54	V
8.224000	53.44	Pk	35.7	-95.2	-45.76	-51.82	-25	-26.82	V
Mid Channel, 2489MHz									
1.589667	58.26	Pk	27.7	-95.2	-49.36	-58.60	-50	-8.60	H
1.598614	58.92	Pk	27.8	-95.2	-49.28	-57.76	-50	-7.76	V
4.786000	56.66	Pk	34.0	-95.2	-48.85	-53.39	-25	-28.39	H
7.774500	54.73	Pk	35.8	-95.2	-46.29	-50.96	-25	-25.96	H
4.791000	56.52	Pk	34.0	-95.2	-48.93	-53.61	-25	-28.61	V
7.816500	54.95	Pk	35.8	-95.2	-46.22	-50.67	-25	-25.67	V
High Channel, 2490MHz									
1.590887	59.30	Pk	27.7	-95.2	-49.34	-57.54	-50	-7.54	H
1.581534	57.58	Pk	27.7	-95.2	-49.33	-59.25	-50	-9.25	V
4.706000	56.45	Pk	34.0	-95.2	-48.75	-53.50	-25	-28.50	H
7.388500	54.98	Pk	35.6	-95.2	-46.87	-51.49	-25	-26.49	H
4.696500	56.92	Pk	34.0	-95.2	-48.75	-53.03	-25	-28.03	V
7.421000	55.76	Pk	35.6	-95.2	-46.91	-50.75	-25	-25.75	V

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10.2. FIELD STRENGTH OF SPURIOUS RADIATION, ANT 2

10.2.1. LTE BAND 53

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	14982484
Date:	2024-06-18
Test Engineer:	32934
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.601867	58.30	Pk	27.8	-95.2	-49.28	-58.38	-50	-8.38	H
1.585600	58.75	Pk	27.7	-95.2	-49.36	-58.11	-50	-8.11	V
4.974000	56.84	Pk	34.0	-95.2	-48.35	-52.71	-25	-27.71	H
7.461000	54.62	Pk	35.7	-95.2	-46.94	-51.82	-25	-26.82	H
4.977500	56.62	Pk	34.0	-95.2	-48.37	-52.95	-25	-27.95	V
7.440000	54.79	Pk	35.7	-95.2	-47.02	-51.73	-25	-26.73	V
Mid Channel, 2489MHz									
1.580314	58.75	Pk	27.7	-95.2	-49.31	-58.06	-50	-8.06	H
1.590887	58.92	Pk	27.7	-95.2	-49.34	-57.92	-50	-7.92	V
4.972500	56.07	Pk	34	-95.2	-48.32	-53.45	-25	-28.45	H
7.456000	55.48	Pk	35.7	-95.2	-46.94	-50.96	-25	-25.96	H
4.979500	56.22	Pk	34	-95.2	-48.34	-53.32	-25	-28.32	V
7.472000	54.31	Pk	35.7	-95.2	-46.87	-52.06	-25	-27.06	V
High Channel, 2490MHz									
1.586007	57.88	Pk	27.7	-95.2	-49.36	-58.98	-50	-8.98	H
1.586820	59.19	Pk	27.7	-95.2	-49.38	-57.69	-50	-7.69	V
5.002500	56.61	Pk	34.0	-95.2	-48.53	-53.12	-25	-28.12	H
7.473000	54.09	Pk	35.7	-95.2	-46.90	-52.31	-25	-27.31	H
4.992500	55.94	Pk	34	-95.2	-48.47	-53.73	-25	-28.73	V
7.494000	54.74	Pk	35.7	-95.2	-47.00	-51.76	-25	-26.76	V

QPSK LTE BAND 53 (10.0MHZ BANDWIDTH), 50 RB

Project #:	14982484
Date:	2024-07-13
Test Engineer:	32145
Configuration:	EUT Only
Mode	LTE B53 QPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.594954	57.72	Pk	27.8	-95.2	-49.30	-58.98	-50	-8.98	H
1.581534	58.43	Pk	27.7	-95.2	-49.33	-58.40	-50	-8.40	V
4.980500	55.70	Pk	34.0	-95.2	-48.32	-53.82	-25	-28.82	H
7.448500	54.73	Pk	35.7	-95.2	-47.06	-51.83	-25	-26.83	H
4.961500	55.98	Pk	34.0	-95.2	-48.32	-53.54	-25	-28.54	V
7.454500	55.51	Pk	35.7	-95.2	-46.97	-50.96	-25	-25.96	V
Mid Channel, 2489MHz									
1.589667	58.13	Pk	27.7	-95.2	-49.36	-58.73	-50	-8.73	H
1.588854	58.30	Pk	27.7	-95.2	-49.38	-58.58	-50	-8.58	V
4.993500	56.33	Pk	34	-95.2	-48.46	-53.33	-25	-28.33	H
7.471500	54.91	Pk	35.7	-95.2	-46.88	-51.47	-25	-26.47	H
4.991000	57.34	Pk	34	-95.2	-48.47	-52.33	-25	-27.33	V
7.456000	54.97	Pk	35.7	-95.2	-46.94	-51.47	-25	-26.47	V
High Channel, 2490MHz									
1.576654	58.37	Pk	27.7	-95.2	-49.26	-58.39	-50	-8.39	H
1.582754	57.50	Pk	27.7	-95.2	-49.35	-59.35	-50	-9.35	V
4.997000	56.00	Pk	34.0	-95.2	-48.41	-53.61	-25	-28.61	H
7.468500	54.54	Pk	35.7	-95.2	-46.90	-51.86	-25	-26.86	H
4.972500	56.76	Pk	34.0	-95.2	-48.32	-52.76	-25	-27.76	V
7.457500	55.16	Pk	35.7	-95.2	-46.95	-51.29	-25	-26.29	V

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10.2.2. 5G NR n53

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 1 RB

Project #:	14982484
Date:	2024-07-12
Test Engineer:	32145
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	200897 ACF 3m (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.585194	58.51	Pk	27.7	-95.2	-49.37	-58.36	-50	-8.36	H
1.581127	57.61	Pk	27.7	-95.2	-49.32	-59.21	-50	-9.21	V
5.464500	56.11	Pk	34.5	-95.2	-47.76	-52.35	-25	-27.35	H
8.283000	54.90	Pk	35.7	-95.2	-45.76	-50.36	-25	-25.36	H
5.487500	56.04	Pk	34.5	-95.2	-47.67	-52.33	-25	-27.33	V
8.299000	54.48	Pk	35.7	-95.2	-45.75	-50.77	-25	-25.77	V
Mid Channel, 2489MHz									
1.599427	58.05	Pk	27.8	-95.2	-49.28	-58.63	-50	-8.63	H
1.627081	57.59	Pk	28.0	-95.2	-49.32	-58.93	-25	-33.93	V
5.340000	56.93	Pk	34.4	-95.2	-48.14	-52.01	-25	-27.01	H
7.951000	54.05	Pk	35.8	-95.2	-46.24	-51.59	-25	-26.59	H
5.347500	56.19	Pk	34.4	-95.2	-48.17	-52.78	-25	-27.78	V
7.944000	54.52	Pk	35.8	-95.2	-46.21	-51.09	-25	-26.09	V
High Channel, 2490MHz									
1.570554	57.55	Pk	27.6	-95.2	-49.18	-59.23	-50	-9.23	H
1.555914	57.54	Pk	27.6	-95.2	-49.10	-59.16	-25	-34.16	V
5.372000	55.56	Pk	34.4	-95.2	-48.01	-53.25	-25	-28.25	H
8.261000	54.80	Pk	35.7	-95.2	-45.81	-50.51	-25	-25.51	H
5.345000	55.97	Pk	34.4	-95.2	-48.15	-52.98	-25	-27.98	V
8.206500	54.47	Pk	35.7	-95.2	-45.85	-50.88	-25	-25.88	V

BPSK 5G NR n53 (10.0MHZ BANDWIDTH), 24 RB

Project #:	14982484
Date:	2024-07-13
Test Engineer:	32145
Configuration:	EUT Only
Mode	5G NR n53 BPSK 10MHz
Chamber #:	05-RDE-F

Frequency (GHz)	Meter Reading (dBuV)	Det	226674 ACF 3m (dB/m)	EIRP CF	Gain/Loss (dB)	Corrected Reading (dBm)	LIMIT	Margin (dB)	Polarity
Low Channel, 2488.5MHz									
1.592920	58.73	Pk	27.7	-95.2	-49.32	-58.09	-50	-8.09	H
1.605934	58.44	Pk	27.8	-95.2	-49.29	-58.25	-50	-8.25	V
5.800000	55.82	Pk	34.8	-95.2	-47.14	-51.72	-25	-26.72	H
9.225000	54.05	Pk	36.3	-95.2	-45.33	-50.18	-25	-25.18	H
5.789000	55.81	Pk	34.8	-95.2	-47.21	-51.80	-25	-26.80	V
9.359000	55.53	Pk	36.4	-95.2	-45.81	-49.08	-25	-24.08	V
Mid Channel, 2489MHz									
1.58438	58.29	Pk	27.7	-95.2	-49.36	-58.57	-50	-8.57	H
1.573807	56.81	Pk	27.6	-95.2	-49.22	-60.01	-50	-10.01	V
5.536500	55.82	Pk	34.5	-95.2	-47.58	-52.46	-25	-27.46	H
8.357000	53.83	Pk	35.7	-95.2	-45.75	-51.42	-25	-26.42	H
5.536500	55.99	Pk	34.5	-95.2	-47.58	-52.29	-25	-27.29	V
8.355000	55.22	Pk	35.7	-95.2	-45.69	-49.97	-25	-24.97	V
High Channel, 2490MHz									
1.606747	58.92	Pk	27.8	-95.2	-49.29	-57.77	-50	-7.77	H
1.592920	57.81	Pk	27.7	-95.2	-49.32	-59.01	-50	-9.01	V
5.399500	55.66	Pk	34.5	-95.2	-47.96	-53	-25	-28	H
8.802500	53.38	Pk	35.9	-95.2	-45.07	-50.99	-25	-25.99	H
5.424500	56.06	Pk	34.5	-95.2	-47.91	-52.55	-25	-27.55	V
8.814500	54.14	Pk	35.9	-95.2	-45.08	-50.24	-25	-25.24	V

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11. SETUP PHOTOS

Please refer to 14982489-EP1V1 for setup photos.

END OF REPORT

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