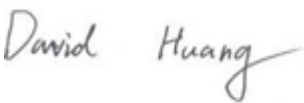


RF TEST REPORT



Report No.: Q181023S005-FCC-R1

Supersede Report No.: N/A

Applicant	TP-LINK Technologies Co., Ltd.	
Product Name	C5 Plus smartphone	
Model No.	TP7031C	
Serial No.	TP7031CXYZZ	
Test Standard	FCC Part 22(H) ;FCC Part 24(E); ANSI/TIA-603-D: 2010	
Test Date	Nov. 06 to Nov. 20, 2018	
Issue Date	Nov. 22, 2018	
Test Result	☒ Pass ☐ Fail	
Equipment complied with the specification ☒		
Equipment did not comply with the specification ☐		
		
Aaron Liang Test Engineer	David Huang Checked By	
This test report may be reproduced in full only Test result presented in this test report is applicable to the tested sample only		

Issued by:

SIEMIC (SHENZHEN-CHINA) LABORATORIES

Zone A, Floor 1, Building 2 Wan Ye Long Technology Park

South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108

Phone: +86 0755 2601 4629801 Email: China@siemic.com.cn

Laboratories Introduction

SIEMIC, headquartered in the heart of Silicon Valley, with superior facilities in US and Asia, is one of the leading independent testing and certification facilities providing customers with one-stop shop services for Compliance Testing and Global Certifications.



In addition to testing and certification, SIEMIC provides initial design reviews and compliance management throughout a project. Our extensive experience with China, Asia Pacific, North America, European, and International compliance requirements, assures the fastest, most cost effective way to attain regulatory compliance for the global markets.

Accreditations for Conformity Assessment

Country/Region	Scope
USA	EMC, RF/Wireless, SAR, Telecom
Canada	EMC, RF/Wireless, SAR, Telecom
Taiwan	EMC, RF, Telecom, SAR, Safety
Hong Kong	RF/Wireless, SAR, Telecom
Australia	EMC, RF, Telecom, SAR, Safety
Korea	EMI, EMS, RF, SAR, Telecom, Safety
Japan	EMI, RF/Wireless, SAR, Telecom
Singapore	EMC, RF, SAR, Telecom
Europe	EMC, RF, SAR, Telecom, Safety

Test Report	Q181023S005-FCC-R1
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1. Report Revision History

Report No.	Report Version	Description	Issue Date
Q181023S005-FCC-R1	NONE	Original	Nov. 22, 2018

2. Customer information

Applicant Name	TP-LINK Technologies Co., Ltd.
Applicant Add	Building 24-1F/3F/4F/5F, 28-1F/2F/3F/4F Science and Technology Park, Shennan Road, Nanshan District, Shenzhen City, Guangdong Province, P.R. China
Manufacturer	TP-LINK Technologies Co.,Ltd
Manufacturer Add	Building 24-1F/3F/4F/5F, 28-1F/2F/3F/4F Science and Technology Park, Shennan Road, Nanshan District, Shenzhen City, Guangdong Province, P.R. China

3. Test site information

Test Lab A:

Lab performing tests	SIEMIC (Shenzhen-China) LABORATORIES
Lab Address	Zone A, Floor 1, Building 2 Wan Ye Long Technology Park South Side of Zhoushi Road, Bao' an District, Shenzhen, Guangdong China 518108
FCC Test Site No.	535293
IC Test Site No.	4842E-1
Test Software	Radiated Emission Program-To Shenzhen v2.0

Test Lab B:

Lab performing tests	SIEMIC (Nanjing-China) Laboratories
Lab Address	2-1 Longcang Avenue Yuhua Economic and Technology Development Park, Nanjing, China
FCC Test Site No.	694825
IC Test Site No.	4842B-1
Test Software	EZ_EMG(ver.lcp-03A1)

Note: We just perform Radiated Spurious Emission above 18GHz in the test Lab. B.

4. Equipment under Test (EUT) Information

Description of EUT:	C5 Plus smartphone
Main Model:	TP7031C
	TP7031CXYZZ
	(Model Difference
	Description of Model Name Differentiation:
	X=2 , indicates Grey ; X=4 , indicates Gold ; X=7 , indicates Blue ;
	X=8 , indicates Red ;
Serial Model:	Y=0 , indicates the memory is 512MB RAM + 8GB Flash; Y=1 , indicates the memory is 1GB RAM + 8GB Flash; Y=2 , indicates the memory is 1GB RAM + 16GB Flash;
	Z=' A' to ' Z' , ZZ indicates different regions or customers.
	All models are same with electrical parameters and internal circuit structure.)
Date EUT received:	Nov. 05, 2018
Test Date(s):	Nov. 06 to Nov. 20, 2018
Equipment Category :	PCE
Antenna Gain:	GSM850: 0dBi PCS1900: -0.5dBi UMTS-FDD Band V: 0dBi UMTS-FDD Band II: -0.5dBi
Antenna Type:	PIFA antenna
Type of Modulation:	GSM / GPRS: GMSK UMTS-FDD: QPSK
RF Operating Frequency (ies):	GSM850 TX: 824.2 ~ 848.8 MHz; RX: 869.2 ~ 893.8 MHz PCS1900 TX: 1850.2 ~ 1909.8 MHz; RX: 1930.2 ~ 1989.8 MHz

UMTS-FDD Band V TX: 826.4 ~ 846.6 MHz; RX: 871.4 ~ 891.6 MHz
UMTS-FDD Band II TX: 1852.4 ~ 1907.6 MHz;
RX: 1932.4 ~ 1987.6 MHz

GSM Voice: GSM850: 31.68 dBm

PCS1900: 28.85 dBm

GPRS: GSM850: 31.78 dBm

PCS1900: 28.98 dBm

Maximum Conducted

RMC: UMTS-FDD Band V: 21.14 dBm

AV Power to Antenna:

UMTS-FDD Band II: 20.22 dBm

HSUPA: UMTS-FDD Band V: 20.49 dBm

UMTS-FDD Band II: 20.13 dBm

HSDPA: UMTS-FDD Band V: 20.44 dBm

UMTS-FDD Band II: 20.04 dBm

GSM Voice: GSM850: 29.30 dBm / ERP

PCS1900: 28.56 dBm / EIRP

GPRS: GSM850: 29.38 dBm / ERP

PCS1900: 28.77 dBm / EIRP

ERP/EIRP:

RMC: UMTS-FDD Band V: 18.30 dBm / ERP

UMTS-FDD Band II: 19.83 dBm / EIRP

HSDPA: UMTS-FDD Band V: 18.24 dBm / ERP

UMTS-FDD Band II: 19.51 dBm / EIRP

HSUPA: UMTS-FDD Band V: 18.29 dBm / ERP

UMTS-FDD Band II: 19.50 dBm / EIRP

GSM 850: 124CH

PCS1900: 299CH

Number of Channels:

UMTS-FDD Band V: 102CH

UMTS-FDD Band II: 277CH

Port:

Please refer to the user's manual

Adapter :

Model: A8-501000

Input: AC100-240V~50/60Hz,0.2A Max

Output: DC 5.0V, 1.0A

Battery :

Model: NBL-40A2150

Spec: 3.8V, 2150mAh from Li-ion

Limited charge voltage: 4.35V

Rating:3.8V/2150mAh/8.17Wh

Typical3.8V/2200mAh/8.36Wh

Input Power:

Trade Name :

neffos

GPRS Multi-slot class

8/10/11/12

FCC ID:

TE7C5PLUSV1

5. Test Summary

The product was tested in accordance with the following specifications.

All testing has been performed according to below product classification:

FCC Rules	Description of Test	Result
§ 1.1307; § 2.1093	RF Exposure (SAR)	Compliance
§2.1046; § 22.913(a); § 24.232(c); § 27.50(c.10) ;	RF Output Power	Compliance
§ 24.232 (d) ;	Peak-Average Ratio	Compliance
§ 2.1049; § 22.905; § 22.917; § 24.238;	99% & -26 dB Occupied Bandwidth	Compliance
§ 2.1051; § 22.917(a); § 24.238(a);	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917(a); § 24.238(a);	Field Strength of Spurious Radiation	Compliance
§ 22.917(a); § 24.238(a);	Out of band emission, Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235;	Frequency stability vs. temperature Frequency stability vs. voltage	Compliance

Note: Testing was performed by configuring EUT to maximum output power status, the declared output power class for different

Measurement Uncertainty

Emissions		
Test Item	Description	Uncertainty
Band Edge and Radiated Spurious Emissions	Confidence level of approximately 95% (in the case where distributions are normal), with a coverage factor of 2 (for EUTs < 0.5m X 0.5m X 0.5m)	+5.6dB/-4.5dB
-	-	-

6. MEASUREMENTS, EXAMINATION AND DERIVED RESULTS

6.1 RF Exposure (SAR)

Test Result: Pass

The EUT is a portable device, thus requires SAR evaluation;

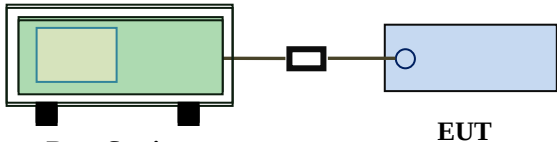
Please refer to RF Exposure Evaluation Report:Q181023S005-FCC-H.

6.2 RF Output Power

Temperature	25 °C
Relative Humidity	53%
Atmospheric Pressure	1020mbar
Test date :	Nov. 20, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§22.913 (a)	a)	ERP:38.45dBm	☒
§24.232 (c)	b)	EIRP:33dBm	☒

Test Setup	 Base Station EUT
------------	--

Test Procedure	For Conducted Power: - The transmitter output port was connected to base station. - Set EUT at maximum power through base station. - Select lowest, middle, and highest channels for each band and different test mode. For ERP/EIRP: According with KDB 971168 v02r02 - The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. - The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. - The frequency range up to tenth harmonic of the fundamental frequency was investigated.
----------------	---

	- Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. - Spurious emissions in dB = $10 \log (\text{TX power in Watts}/0.001)$ – the absolute level - Spurious attenuation limit in dB = $43 + 10 \text{ Log}_{10} (\text{power out in Watts})$.
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

Conducted Power

GSM Mode:

Burst Average Power (dBm);								
Band	GSM850				PCS1900			
Channel	128	190	251	Tune up Power tolerant	512	661	810	Tune up Power tolerant
Frequency (MHz)	824.2	836.6	848.8	/	1850.2	1880	1909.8	/
GSM Voice (1 uplink),GMSK	31.68	31.65	31.63	31±1	28.85	28.65	28.51	29±1
GPRS Multi-Slot Class 8 (1 uplink),GMSK	31.72	31.78	31.76	31±1	28.98	28.78	28.61	29±1
GPRS Multi-Slot Class 10 (2 uplink) GMSK	31.03	30.96	30.92	31±1	28.32	27.93	27.6	28±1
GPRS Multi-Slot Class 11 (3 uplink) GMSK	29.02	28.78	28.51	29±1	26.28	25.56	25.01	25.6±1
GPRS Multi-Slot Class 12 (4 uplink) GMSK	27.76	27.49	27.14	27±1	25.05	24.31	24.03	24.5±1

Remark :

GPRS, CS1 coding scheme.

Multi-Slot Class 8 , Support Max 4 downlink, 1 uplink , 5 working link

Multi-Slot Class 10 , Support Max 4 downlink, 2 uplink , 5 working link

Multi-Slot Class 11 , Support Max 4 downlink, 2 uplink , 5 working link

Multi-Slot Class 12 , Support Max 4 downlink, 4 uplink , 5 working link

UMTS Mode:

UMTS-FDD Band V

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	4132	826.4	21.14	21±1
	4175	835	20.85	20±1
	4233	846.6	20.84	20±1
HSDPA Subtest1	4132	826.4	20.43	20±1
	4175	835	20.32	20±1
	4233	846.6	20.38	20±1
HSDPA Subtest2	4132	826.4	20.46	20±1
	4175	835	20.39	20±1
	4233	846.6	20.34	20±1
HSDPA Subtest3	4132	826.4	20.36	20±1
	4175	835	20.33	20±1
	4233	846.6	20.34	20±1
HSDPA Subtest4	4132	826.4	20.49	20±1
	4175	835	20.38	20±1
	4233	846.6	20.34	20±1
HSUPA Subtest1	4132	826.4	20.43	20±1
	4175	835	20.30	20±1
	4233	846.6	20.31	20±1
HSUPA Subtest2	4132	826.4	20.34	20±1
	4175	835	20.36	20±1
	4233	846.6	20.34	20±1
HSUPA Subtest3	4132	826.4	20.44	20±1
	4175	835	20.36	20±1
	4233	846.6	20.39	20±1
HSUPA Subtest4	4132	826.4	20.31	20±1
	4175	835	20.36	20±1
	4233	846.6	20.33	20±1
HSUPA Subtest5	4132	826.4	20.41	20±1
	4175	835	20.31	20±1
	4233	846.6	20.34	20±1

UMTS-FDD Band II

Band/ Time Slot configuration	Channel	Frequency	Average power (dBm)	Tune up Power tolerant
RMC 12.2kbps	9262	1852.4	20.22	20±1
	9400	1880	20.05	20±1
	9538	1907.6	19.79	20±1
HSDPA Subtest1	9262	1852.4	20.05	20±1
	9400	1880	19.88	20±1
	9538	1907.6	19.62	20±1
HSDPA Subtest2	9262	1852.4	20.13	20±1
	9400	1880	19.96	20±1
	9538	1907.6	19.70	20±1
HSDPA Subtest3	9262	1852.4	20.07	19.5±1
	9400	1880	19.90	19.5±1
	9538	1907.6	19.64	19.5±1
HSDPA Subtest4	9262	1852.4	20.02	19.5±1
	9400	1880	19.85	19.5±1
	9538	1907.6	19.59	19.5±1
HSUPA Subtest1	9262	1852.4	20.04	19.5±1
	9400	1880	19.87	19.5±1
	9538	1907.6	19.61	19.5±1
HSUPA Subtest2	9262	1852.4	19.45	19±1
	9400	1880	19.28	19±1
	9538	1907.6	19.02	19±1
HSUPA Subtest3	9262	1852.4	19.65	19±1
	9400	1880	19.48	19±1
	9538	1907.6	19.22	19±1
HSUPA Subtest4	9262	1852.4	19.44	19±1
	9400	1880	19.27	19±1
	9538	1907.6	19.01	19±1
HSUPA Subtest5	9262	1852.4	20.01	19.5±1
	9400	1880	19.84	19.5±1
	9538	1907.6	19.58	19.5±1

ERP & EIRP

GSM Voice

ERP for Cellular Band (Part 22H)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
824.2	V	29.30	38.45	-9.15
824.2	H	28.12	38.45	-10.33
836.6	V	28.90	38.45	-9.55
836.6	H	27.98	38.45	-10.47
848.8	V	28.95	38.45	-9.50
848.8	H	27.50	38.45	-10.95

EIRP for PCS Band (Part 24E)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1850.2	V	28.56	33	-4.44
1850.2	H	26.96	33	-6.04
1880	V	28.12	33	-4.88
1880	H	26.82	33	-6.18
1909.8	V	28.14	33	-4.86
1909.8	H	27.35	33	-5.65

GPRS:

ERP for Cellular Band (Part 22H)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
824.2	V	29.19	38.45	-9.26
824.2	H	28.47	38.45	-9.98
836.6	V	29.38	38.45	-9.07
836.6	H	27.85	38.45	-10.6
848.8	V	29.34	38.45	-9.11
848.8	H	27.75	38.45	-10.7

EIRP for PCS Band (Part 24E)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1850.2	V	28.77	33	-4.23
1850.2	H	26.91	33	-6.09
1880	V	28.17	33	-4.83
1880	H	27.40	33	-5.6
1909.8	V	28.03	33	-4.97
1909.8	H	27.32	33	-5.68

RMC

ERP for UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
826.4	V	18.30	38.45	-20.15
826.4	H	16.91	38.45	-21.54
835	V	18.28	38.45	-20.17
835	H	17.27	38.45	-21.18
846.6	V	18.03	38.45	-20.42
846.6	H	16.28	38.45	-22.17

EIRP for UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1852.4	V	19.83	33	-13.17
1852.4	H	18.97	33	-14.03
1880	V	19.51	33	-13.49
1880	H	17.98	33	-15.02
1907.6	V	19.26	33	-13.74
1907.6	H	18.19	33	-14.81

HSDPA

ERP for UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
826.4	V	18.23	38.45	-20.22
826.4	H	17.25	38.45	-21.2
835	V	18.24	38.45	-20.21
835	H	16.47	38.45	-21.98
846.6	V	18.21	38.45	-20.24
846.6	H	17.46	38.45	-20.99

EIRP for UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1852.4	V	19.31	33	-13.69
1852.4	H	18.31	33	-14.69
1880	V	19.37	33	-13.63
1880	H	18.39	33	-14.61
1907.6	V	19.51	33	-13.49
1907.6	H	18.24	33	-14.76

HSUPA

ERP for UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
826.4	V	18.16	38.45	-20.29
826.4	H	16.55	38.45	-21.9
835	V	18.21	38.45	-20.24
835	H	16.48	38.45	-21.97
846.6	V	18.29	38.45	-20.16
846.6	H	17.56	38.45	-20.89

EIRP for UMTS-FDD Band II (Part 24E)

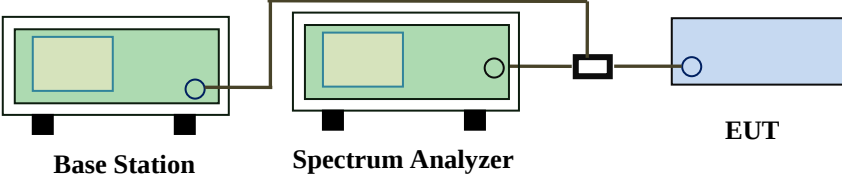
Frequency (MHz)	Antenna Polarization (H/V)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
1852.4	V	19.36	33	-13.64
1852.4	H	17.94	33	-15.06
1880	V	19.50	33	-13.5
1880	H	18.42	33	-14.58
1907.6	V	19.34	33	-13.66
1907.6	H	17.40	33	-15.6

6.3 Peak-Average Ratio

Temperature	25 °C
Relative Humidity	53%
Atmospheric Pressure	1020mbar
Test date :	Nov. 20, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§24.232(d)	a)	The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.	☒

Test Setup	 Base Station Spectrum Analyzer EUT
------------	---

Test Procedure	According with KDB 971168 v02r02 5.7.2 Alternate procedure for PAPR 5.1.2 Peak power measurements with a peak power meter The total peak output power may be measured using a broadband peak RF power meter. The power meter must have a video bandwidth that is greater than or equal to the emission bandwidth and utilize a fast-responding diode detector. 5.2.3 Average power measurement with average power meter As an alternative to the use of a spectrum/signal analyzer or EMI receiver to perform a measurement of the total in-band average output power, a wideband RF average power meter with a thermocouple detector or equivalent can be used under certain conditions If the EUT can be configured to transmit continuously (i.e., the burst duty cycle $\geq 98\%$) and at all times the EUT is transmitting at its maximum output
----------------	---

	power level, then a conventional wide-band RF power meter can be used. If the EUT cannot be configured to transmit continuously (i.e., the burst duty cycle < 98%), then there are two options for the use of an average power meter. First, a gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only over active transmission bursts at maximum output power levels. A conventional average power meter can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than ± 2 percent) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to $10\log(1/\text{duty cycle})$
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A
 Test Plot ☐ Yes (See below) ☒ N/A

GSM : GSM 1900 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	29.72	28.85	0.87
1880	29.56	28.65	0.91
1909.8	29.48	28.51	0.97

GPRS 1900 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1850.2	29.82	28.98	0.84
1880	29.64	28.78	0.86
1909.8	29.53	28.61	0.92

RMC : UMTS-FDD Band 2 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	22.02	21.22	0.8
1880	21.82	21.05	0.77
1907.6	21.51	20.79	0.72

HSDPA : UMTS-FDD Band 2 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	21.22	20.46	0.76
1880	21.15	20.32	0.83
1907.6	21.18	20.31	0.87

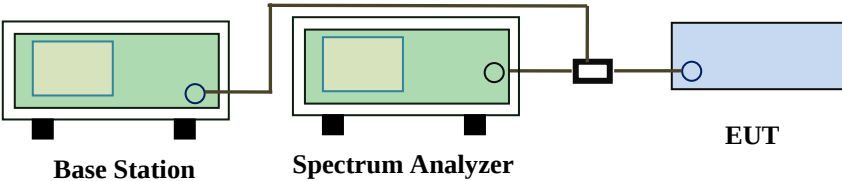
HSUPA : UMTS-FDD Band 2 PK-AV POWER (PART 24E)

Frequency (MHz)	Conducted power(dBm)		Peak-Average Ratio(PAR)
	Peak	Average	
1852.4	21.36	20.54	0.82
1880	21.22	20.38	0.84
1907.6	21.19	20.35	0.84

6.4 Occupied Bandwidth

Temperature	23 °C
Relative Humidity	55%
Atmospheric Pressure	1022mbar
Test date :	Nov. 22, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1049, §22.917, §22.905 §24.238	a)	99% Occupied Bandwidth(kHz)	☒
	b)	26 dB Bandwidth(kHz)	☒
Test Setup			
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The 99% and 26 dB occupied bandwidth (BW) of the middle channel for the highest RF powers.		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

GSM Voice:

Cellular Band (Part 22H) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	246.34	316.96
190	836.6	247.69	320.00
251	848.8	244.24	309.51

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850	245.58	319.29
661	1880	242.81	312.57
810	1910	243.92	313.80

GPRS:

Cellular Band (Part 22H) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
128	824.2	244.62	320.97
190	836.6	243.67	320.95
251	848.8	246.16	324.62

PCS Band (Part 24E) result

Channel	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Bandwidth (kHz)
512	1850	244.22	324.67
661	1880	254.92	323.80
810	1910	250.82	306.80

RMC:

UMTS-FDD Band V (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.6	4.1690	4.703
4175	835.0	4.1610	4.719
4233	846.4	4.1559	4.708

UMTS-FDD Band II (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1853	4.1643	4.721
9400	1880	4.1556	4.707
9538	1907	4.1522	4.711

HSDPA:

UMTS-FDD Band V (Part 22H)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.6	4.1719	4.721
4175	835.0	4.1677	4.712
4233	846.4	4.1447	4.694

UMTS-FDD Band II (Part 24E)

Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1853	4.1637	4.728
9400	1880	4.1614	4.698
9538	1907	4.1524	4.702

HSUPA:

UMTS-FDD Band V (Part 22H)

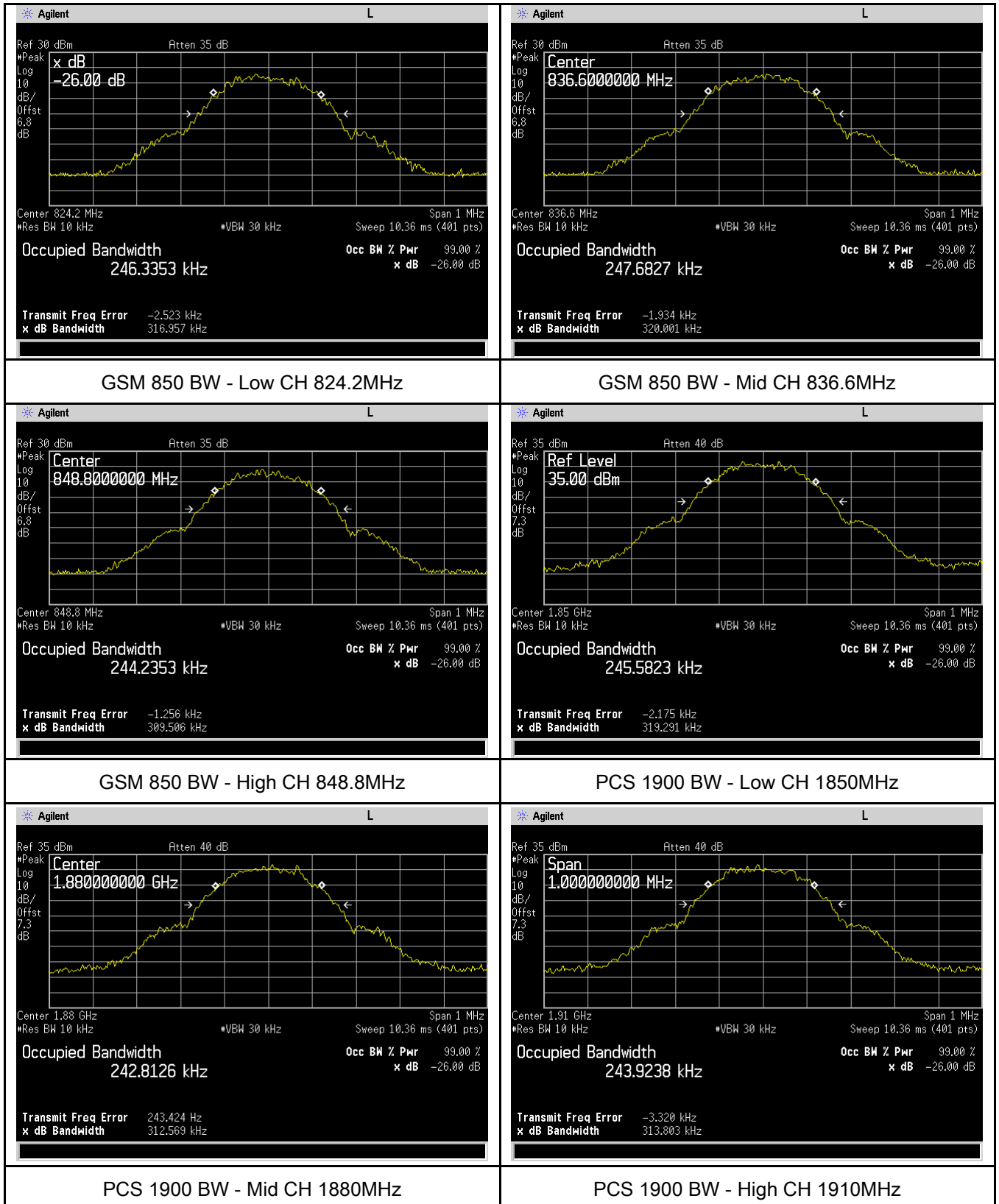
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
4132	826.6	4.1647	4.716
4175	835.0	4.1556	4.724
4233	846.4	4.1609	4.712

UMTS-FDD Band II (Part 24E)

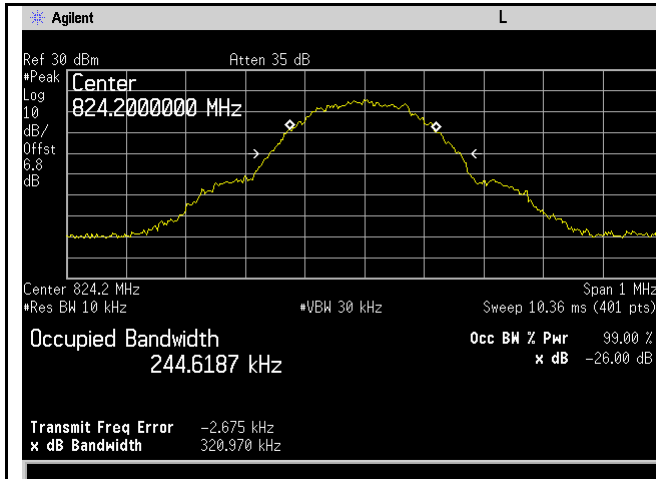
Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Bandwidth (MHz)
9262	1853	4.1647	4.723
9400	1880	4.1618	4.715
9538	1907	4.1690	4.706

Test Plots

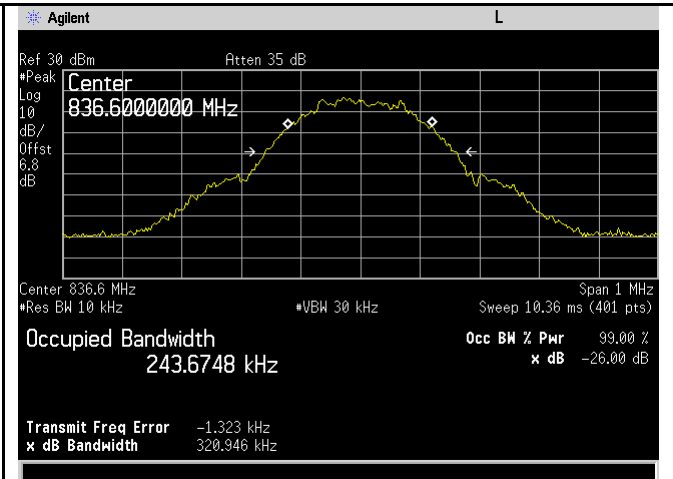
GSM Voice:



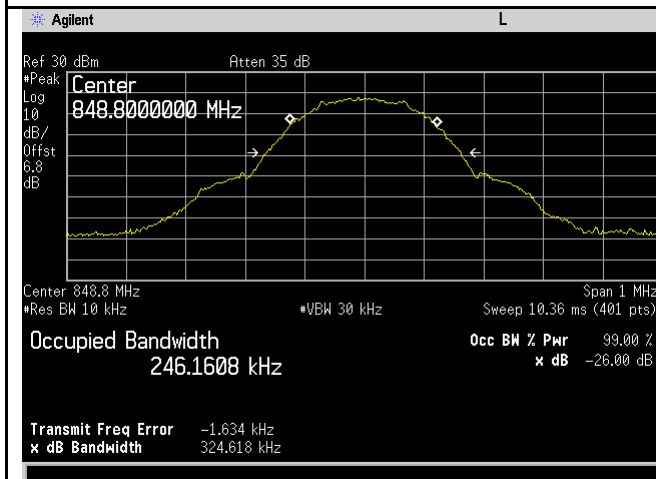
GPRS:



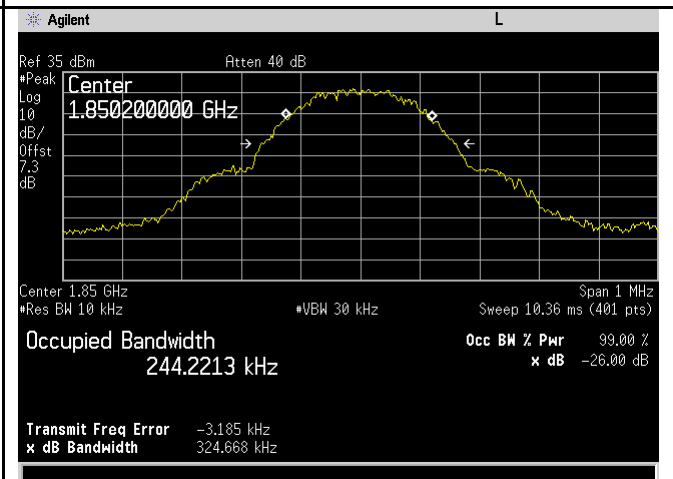
GSM 850 BW - Low CH 824.2MHz



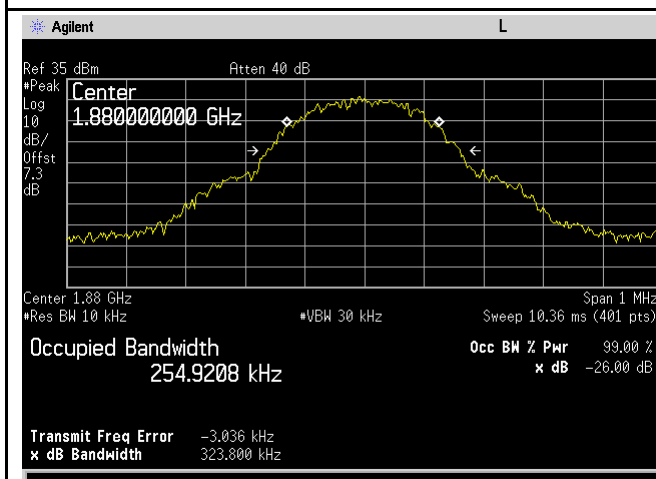
GSM 850 BW - Mid CH 836.6MHz



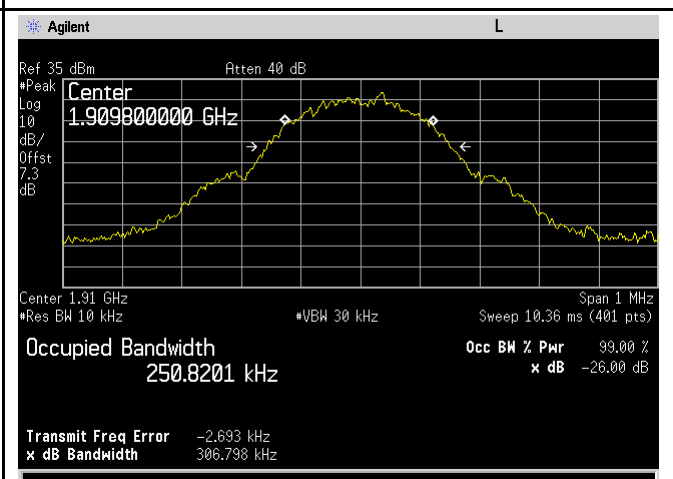
GSM 850 BW - High CH 848.8MHz



PCS 1900 BW - Low CH 1850MHz

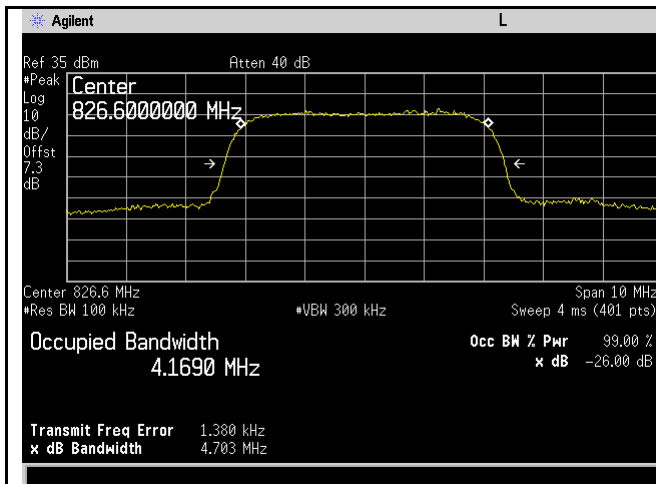


PCS 1900 BW - Mid CH 1880MHz

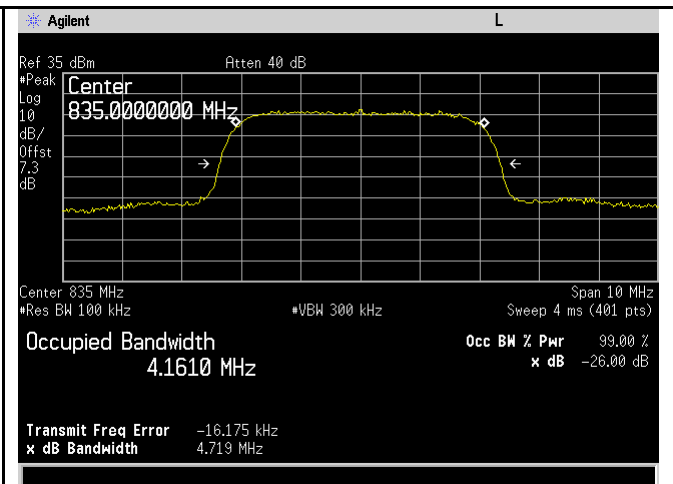


PCS 1900 BW - High CH 1910MHz

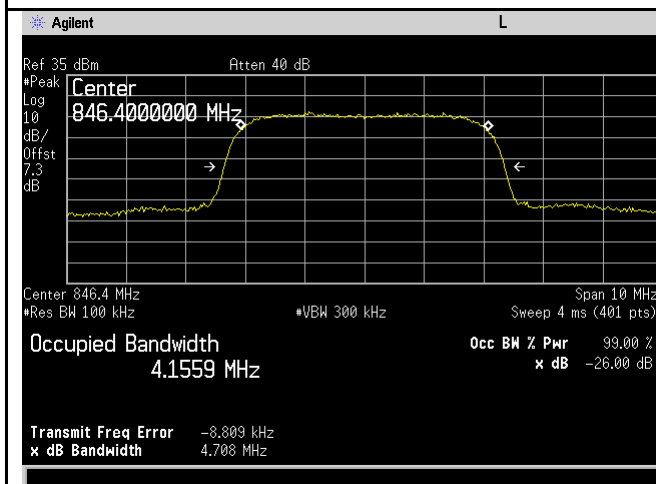
RMC:



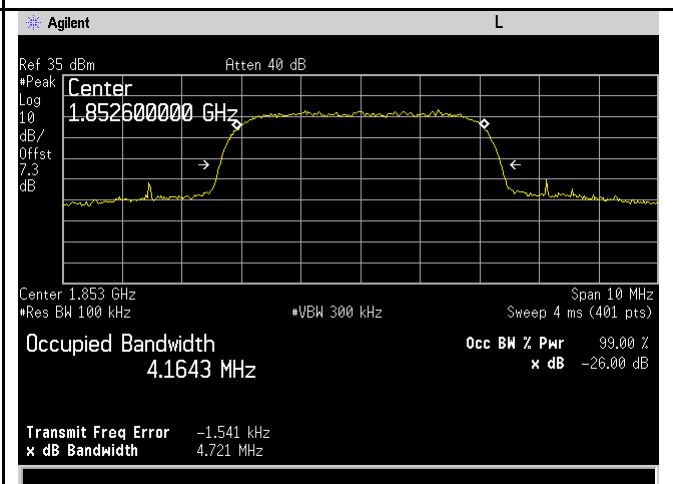
Band V BW - Low CH 826.6 MHz



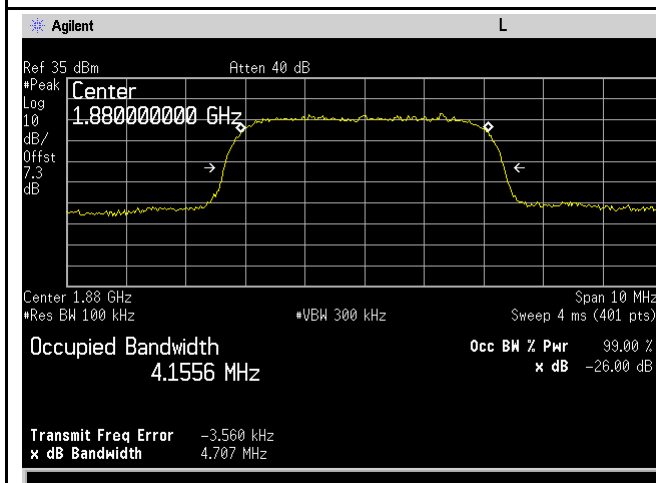
Band V BW - Mid CH 835.0 MHz



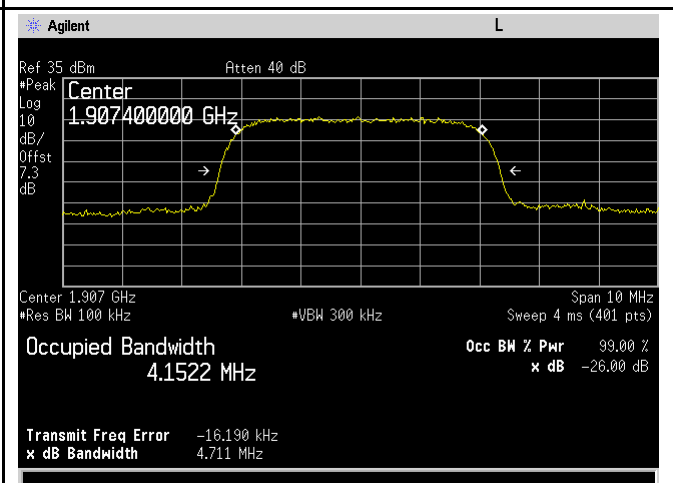
Band V BW - High CH 846.4 MHz



Band II BW - Low CH 1853MHz

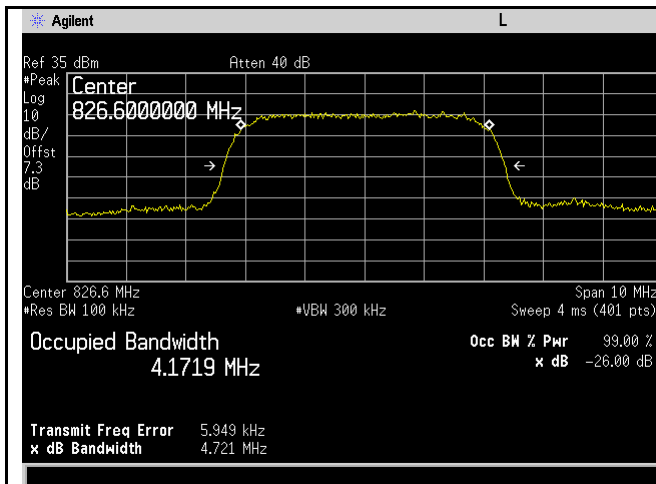


Band II BW - Mid CH 1880MHz

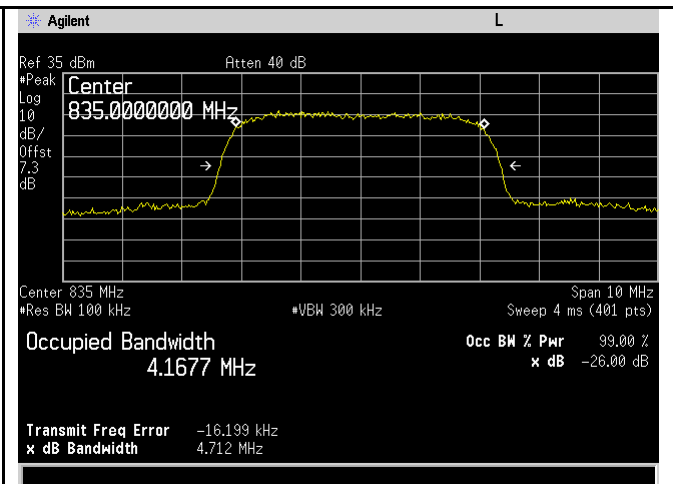


Band II BW - High CH 1907MHz

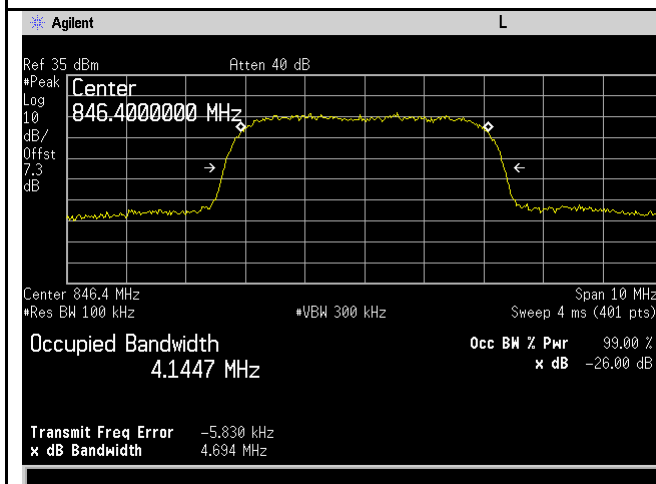
HSDPA:



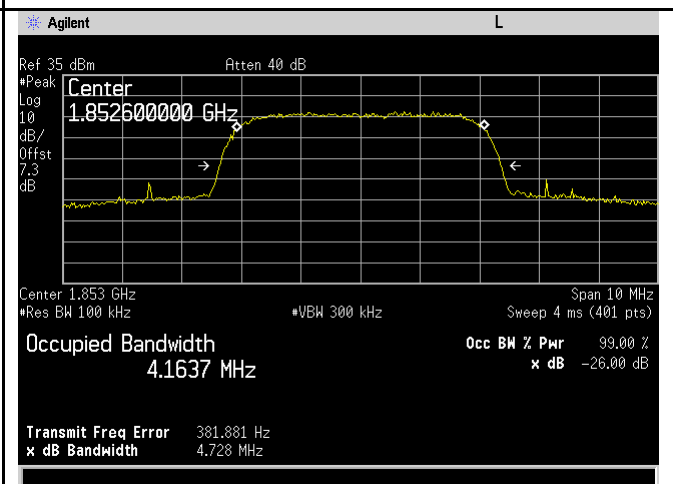
Band V BW - Low CH 826.6 MHz



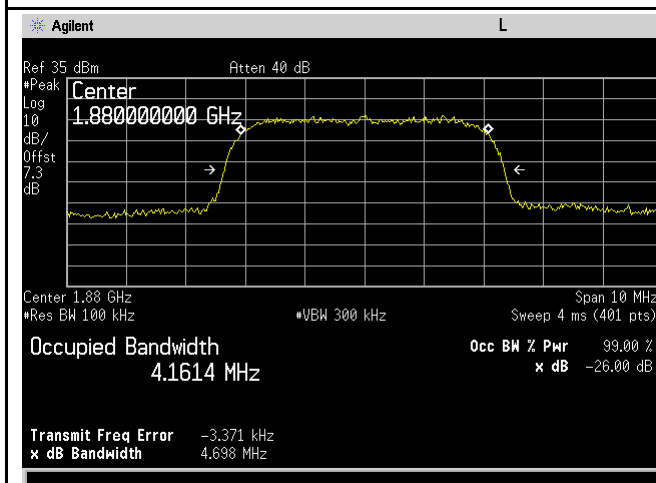
Band V BW - Mid CH 835.0 MHz



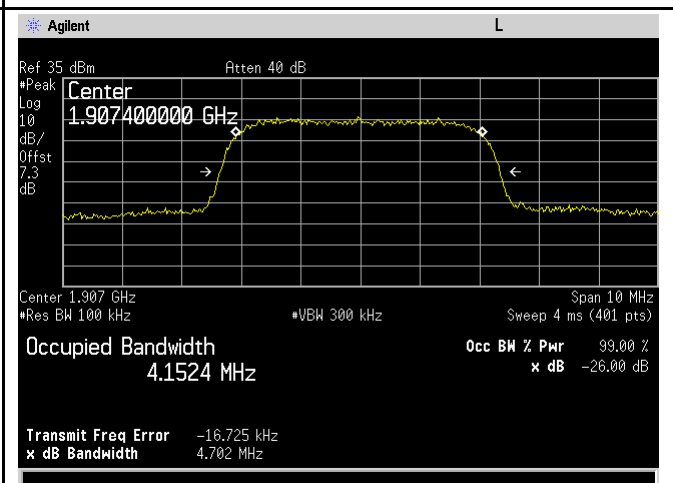
Band V BW - High CH 846.4 MHz



Band II BW - Low CH 1853MHz

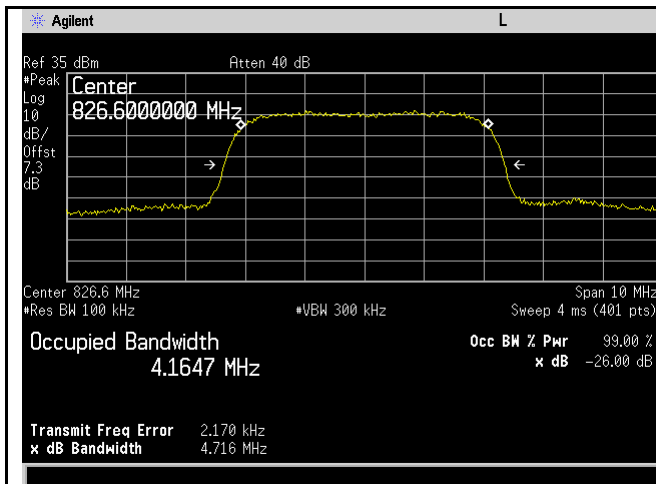


Band II BW - Mid CH 1880MHz

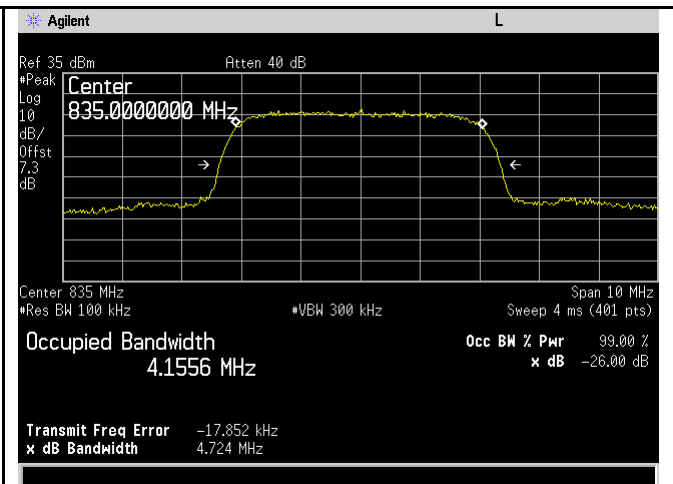


Band II BW - High CH 1907MHz

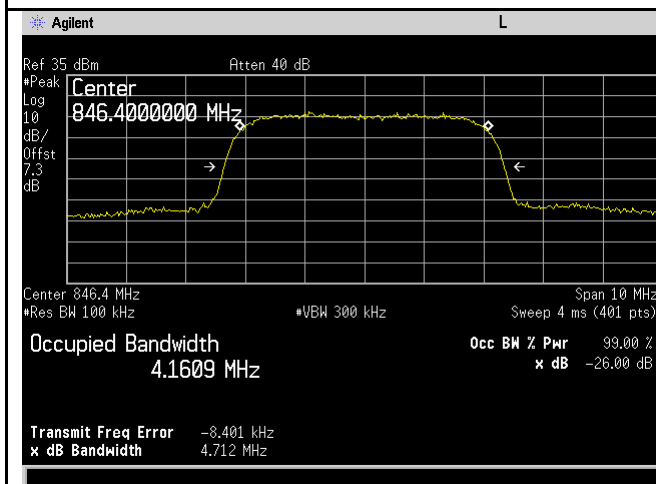
HSUPA:



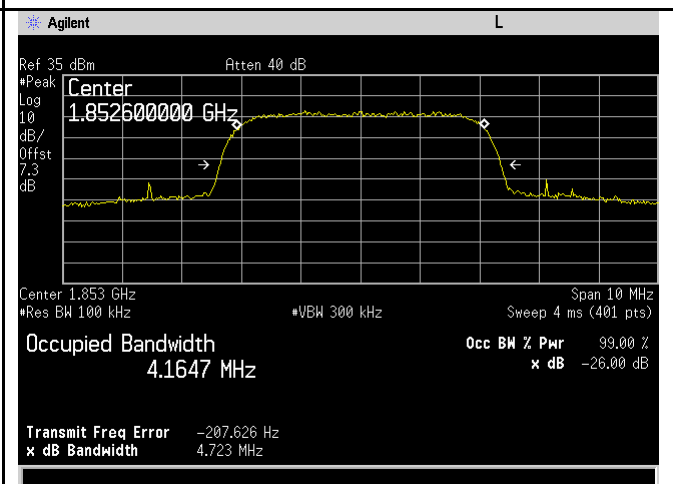
Band V BW - Low CH 826.6 MHz



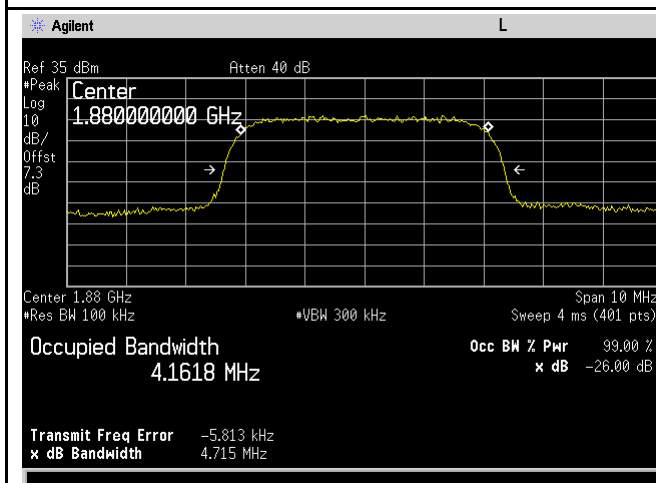
Band V BW - Mid CH 835.0 MHz



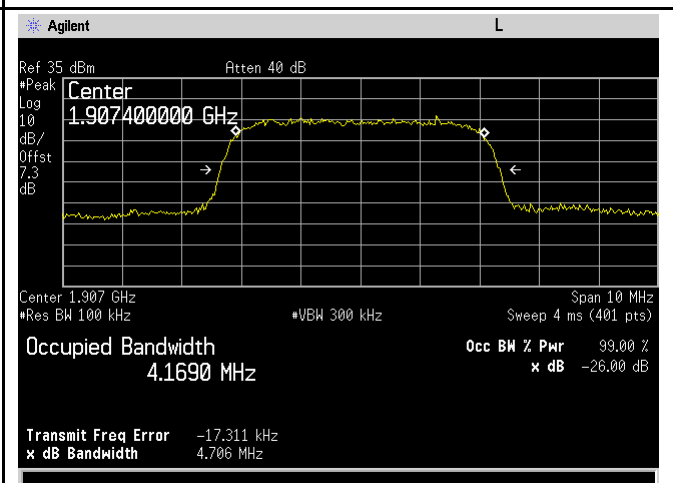
Band V BW - High CH 846.4 MHz



Band II BW - Low CH 1853MHz



Band II BW - Mid CH 1880MHz

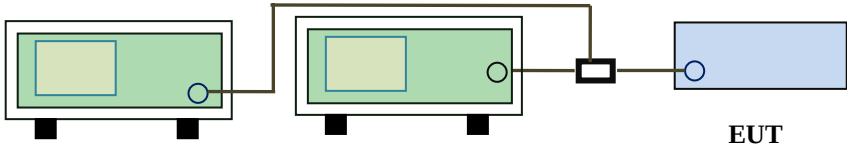


Band II BW - High CH 1907MHz

6.5 Spurious Emissions at Antenna Terminals

Temperature	22 °C
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	Nov. 21, 2018
Tested By :	Aaron Liang

Requirement(s):

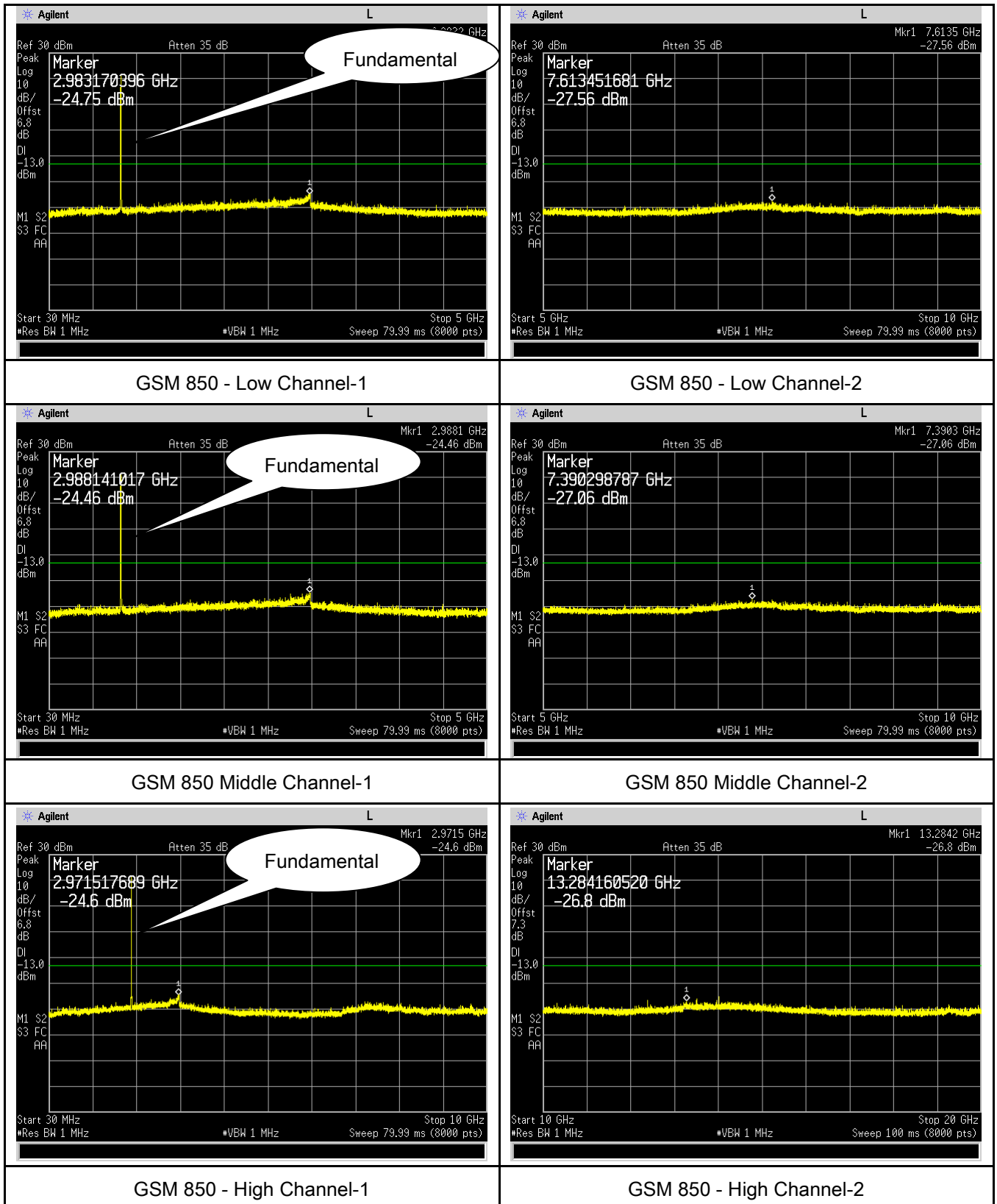
Spec	Item	Requirement	Applicable
§2.1051, §22.917(a)& §24.238(a)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB	☒
Test Setup	 Base Station Spectrum Analyzer EUT		
Test Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. - Setting RBW as roughly BW/100.		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A
 Test Plot ☒ Yes (See below) ☐ N/A

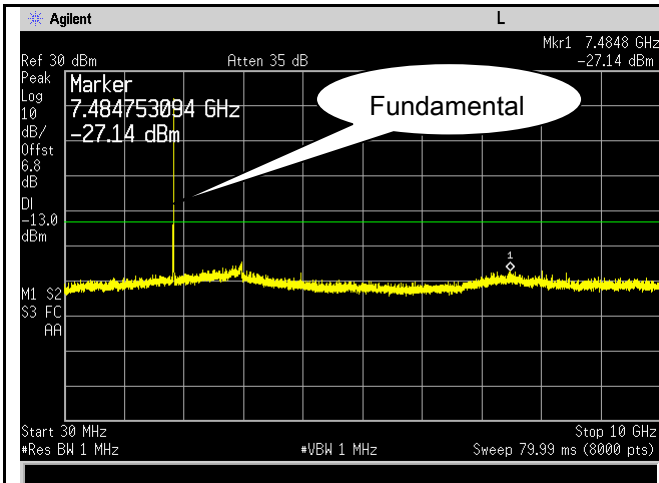
Test Plots

GSM Voice:

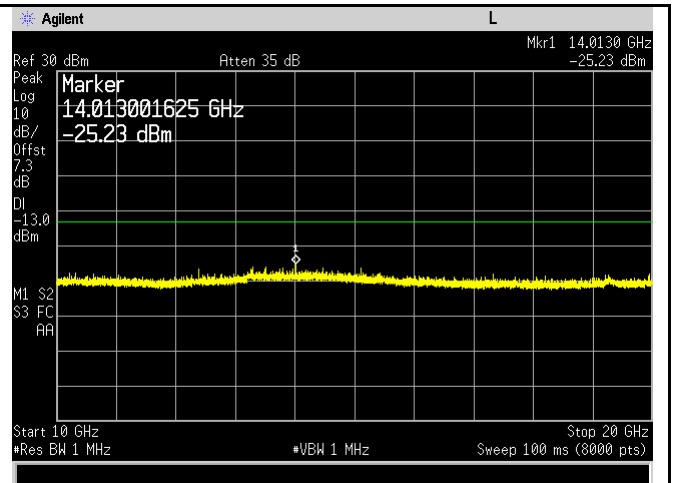
Cellular Band (Part 22H) result



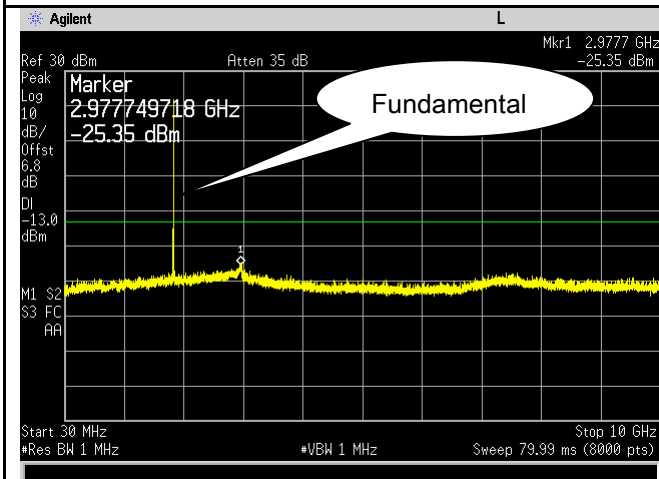
PCS Band (Part24E) result



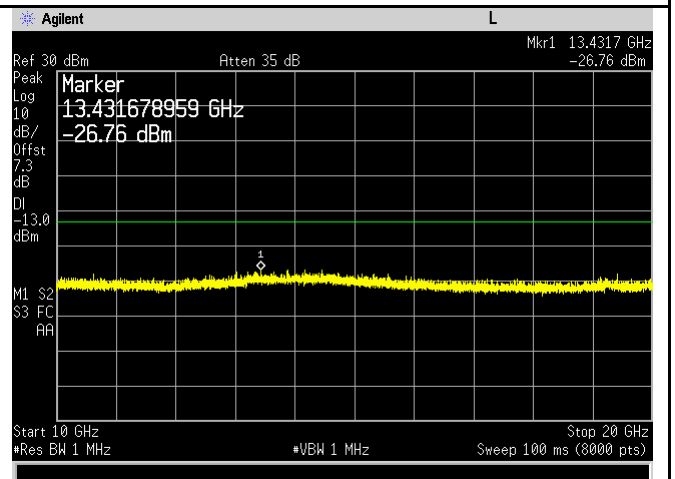
PCS1900 - Low Channel-1



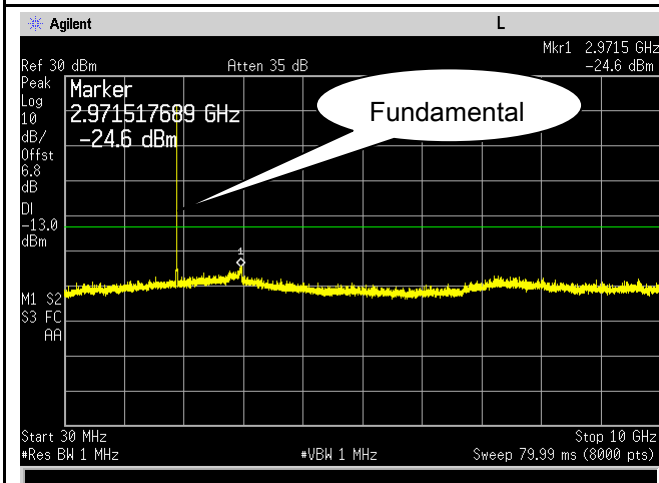
PCS 1900 - Low Channel-2



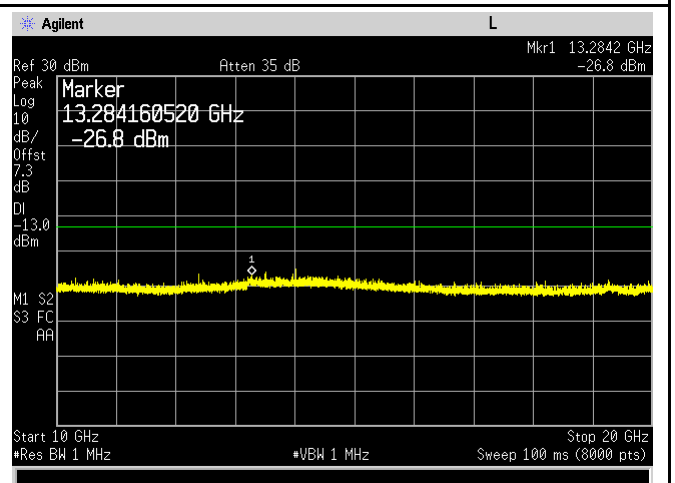
PCS1900 - Middle Channel-1



PCS 1900 - Middle Channel-2



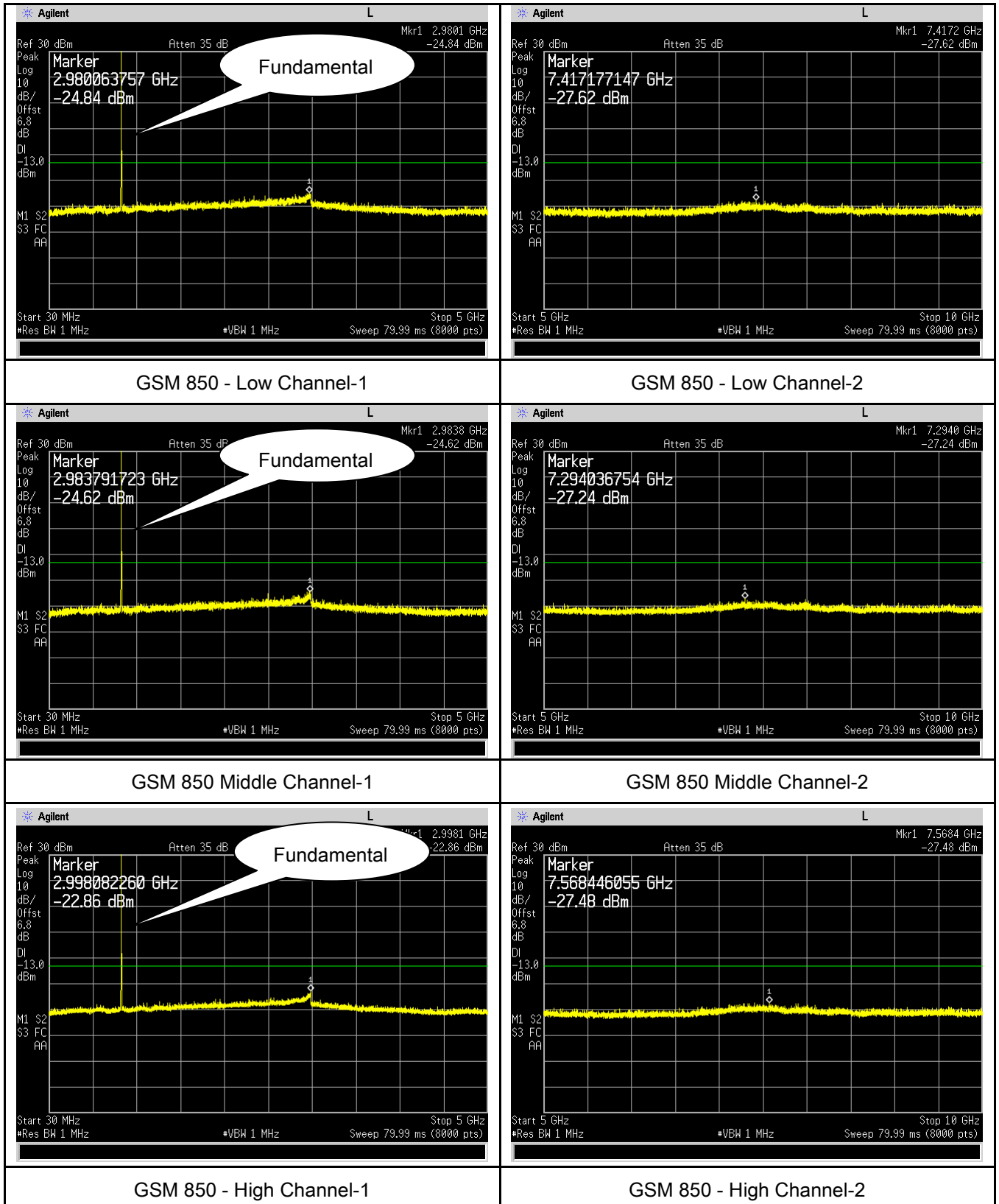
PCS1900 - High Channel-1



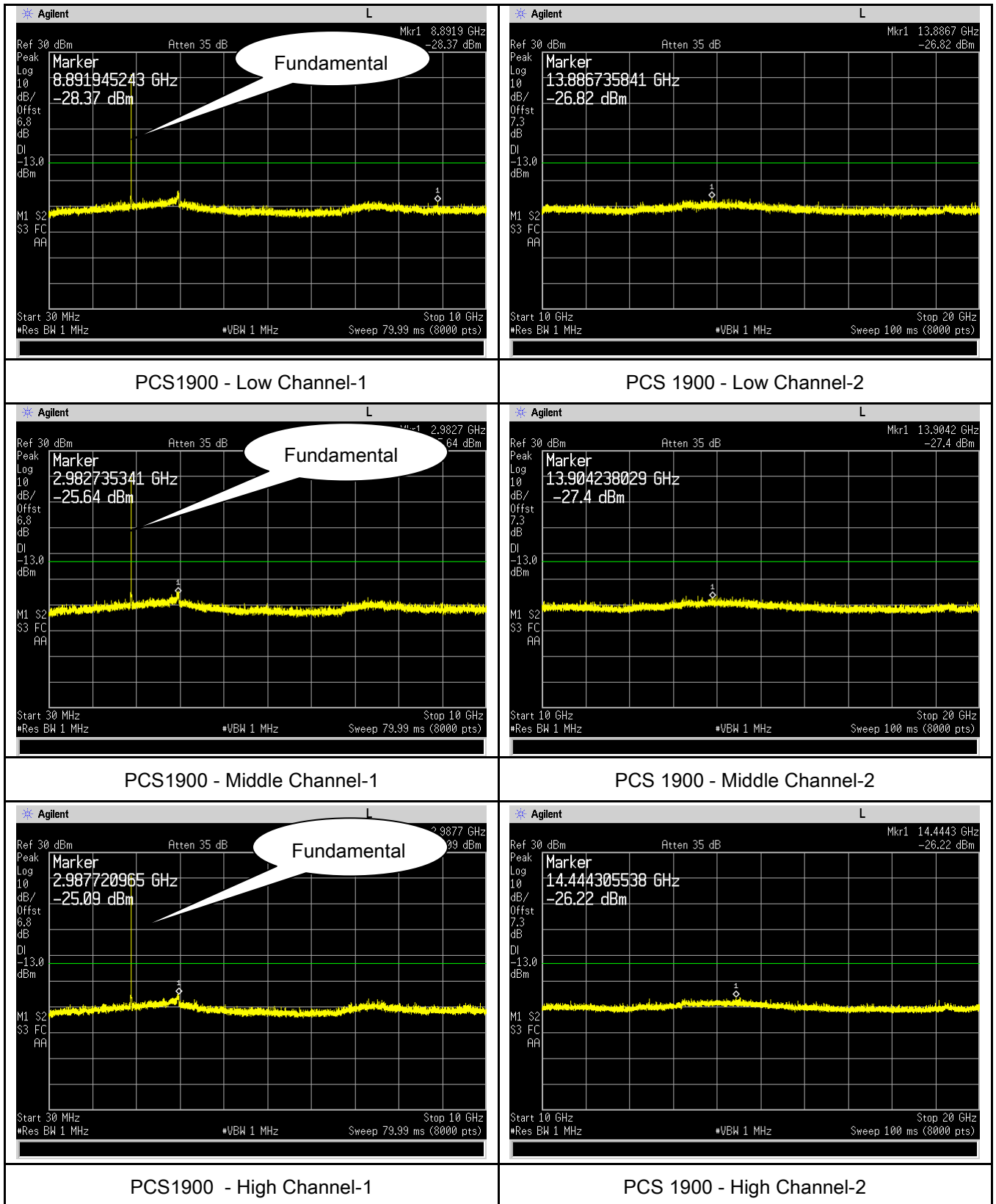
PCS 1900 - High Channel-2

GPRS:

Cellular Band (Part 22H) result

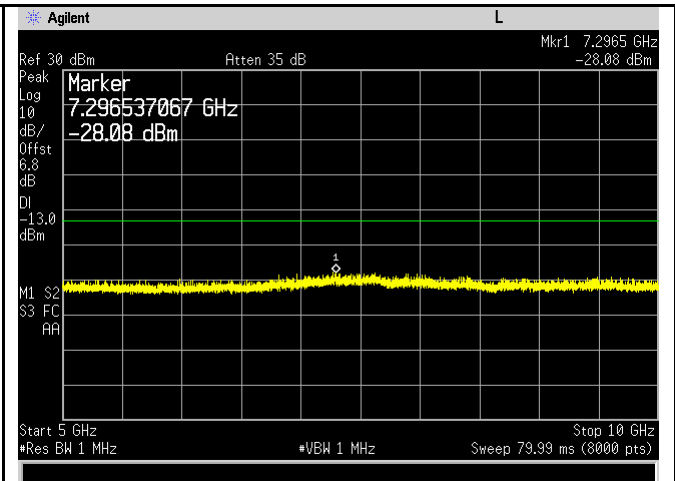
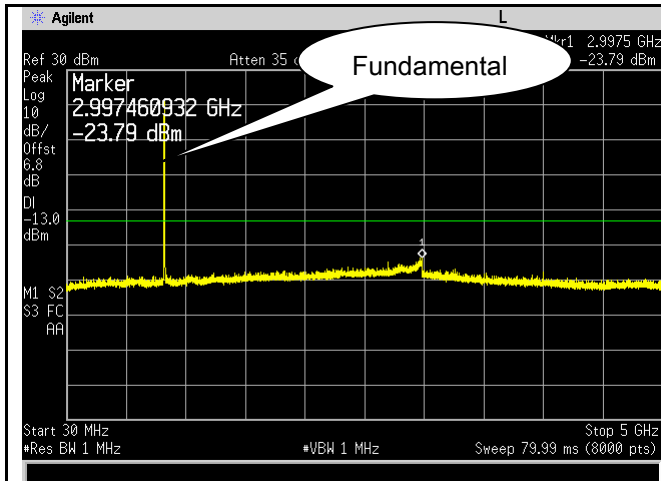


PCS Band (Part24E) result



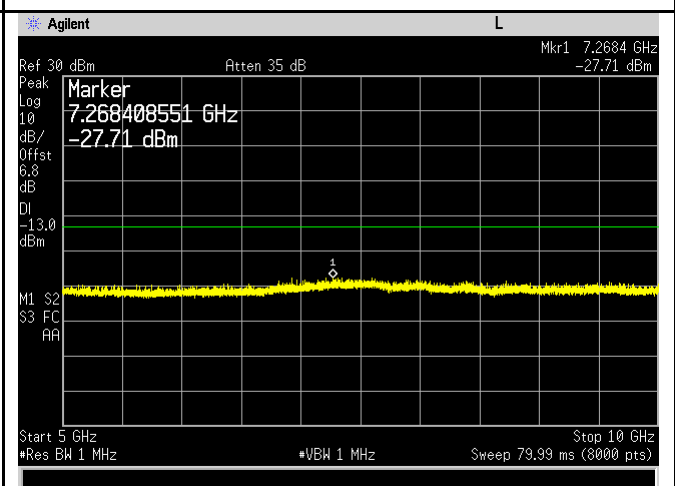
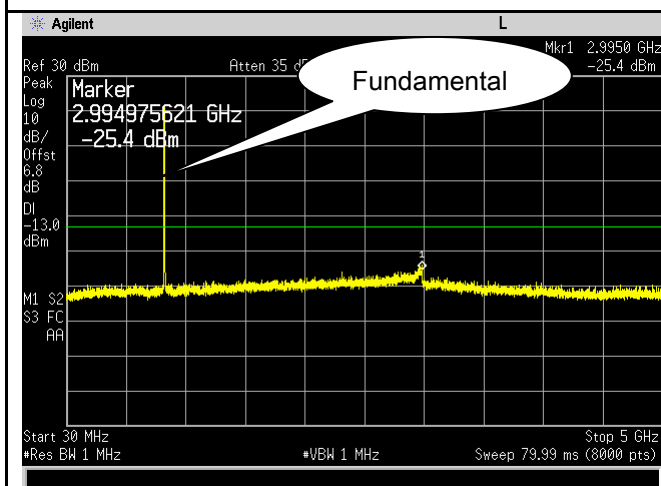
RMC

UMTS-FDD Band V (Part 22H)



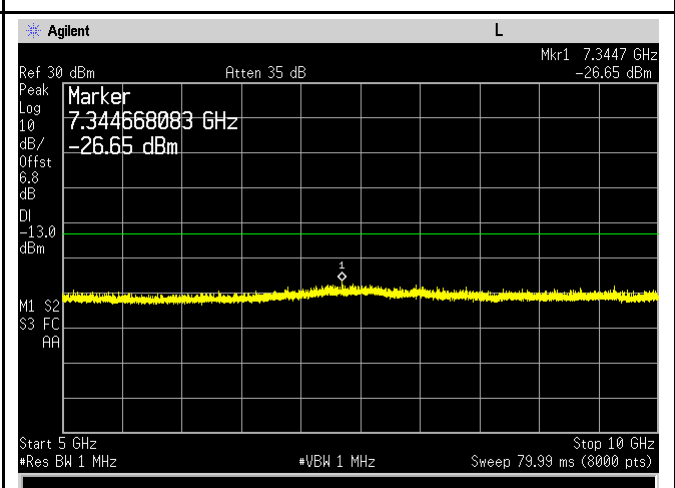
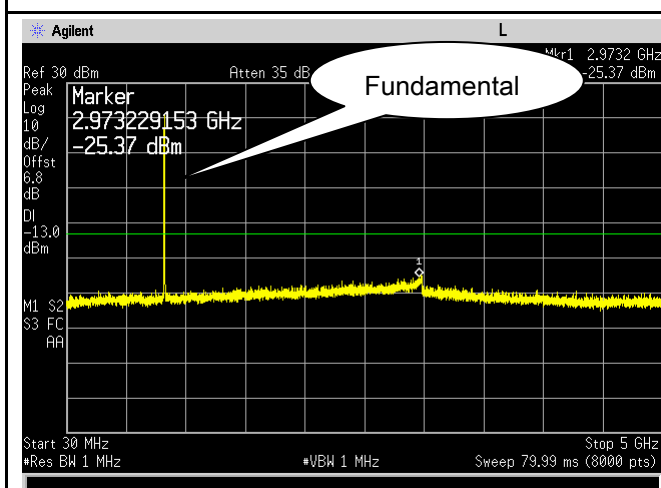
Band V - Low Channel-1

Band V - Low Channel-2



Band V - Middle Channel-1

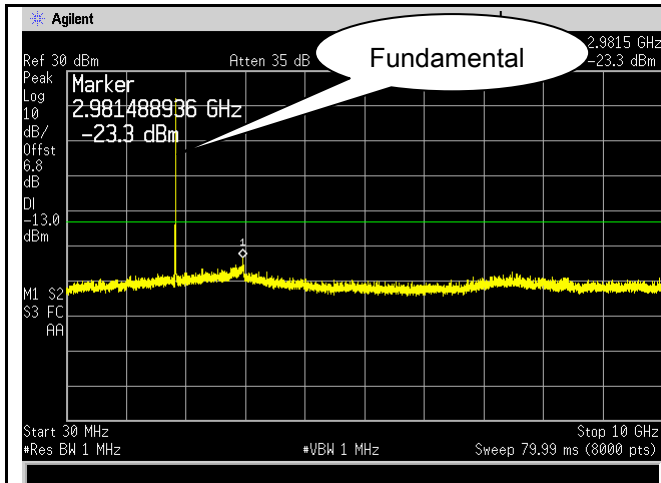
Band V - Middle Channel-2



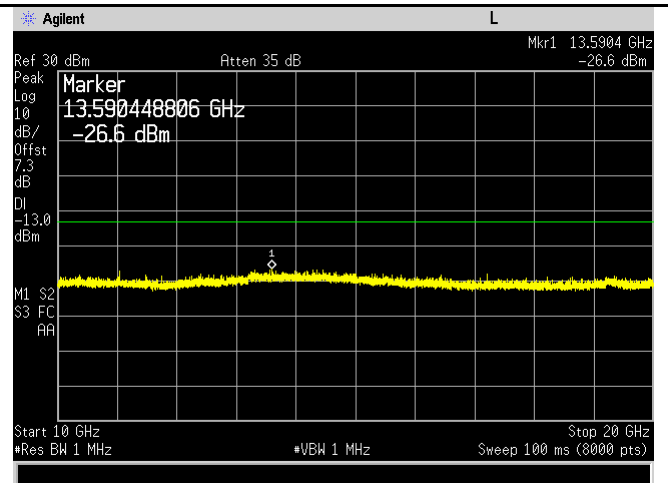
Band V - High Channel-1

Band V - High Channel-2

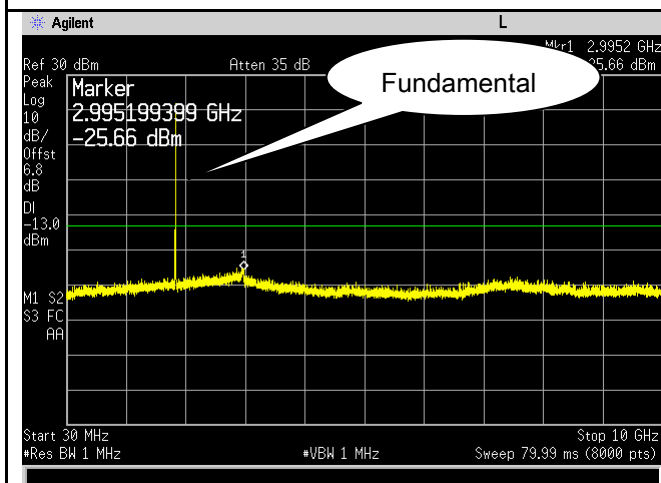
UMTS-FDD Band II (Part 24E)



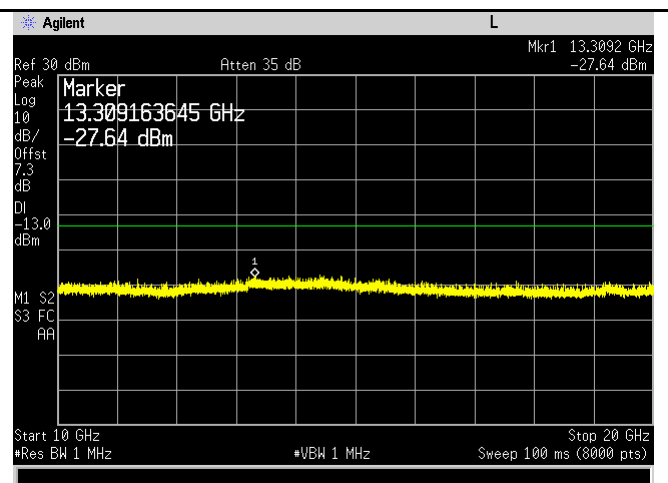
Band II - Low Channel-1



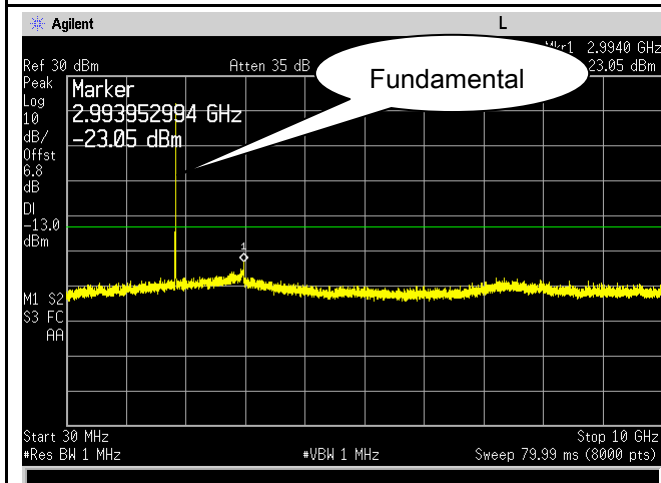
Band II - Low Channel-2



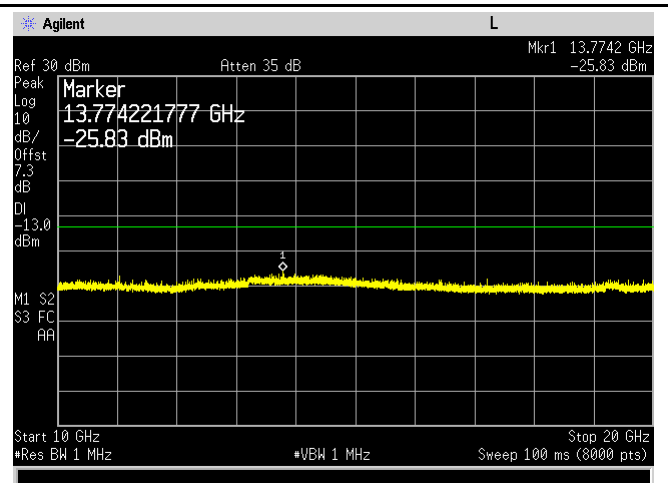
Band II - Middle Channel-1



Band II - Middle Channel-2



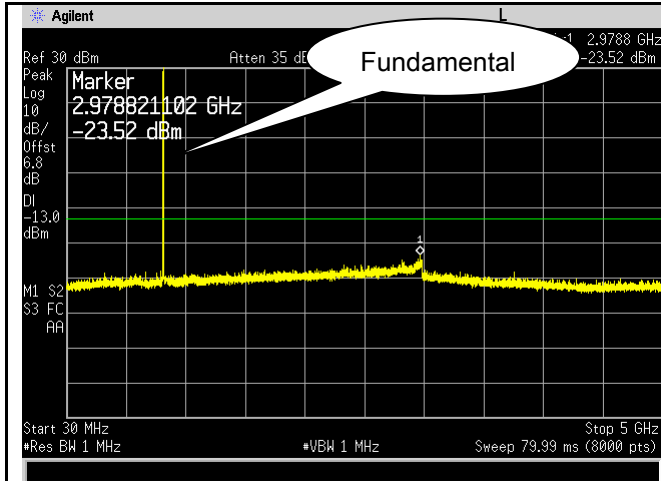
Band II - High Channel-1



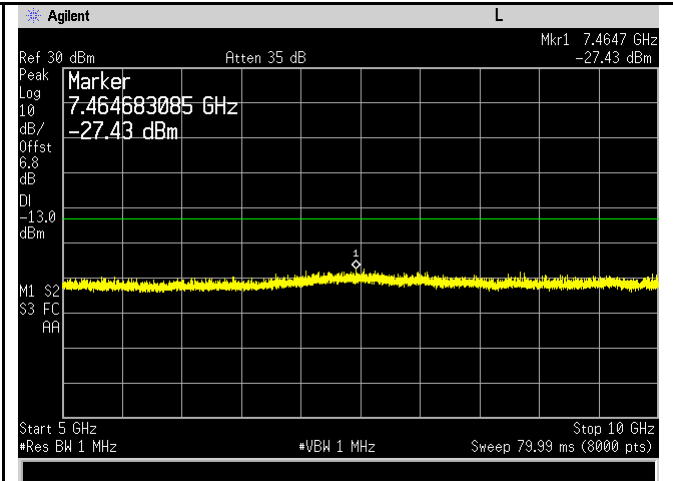
Band II - High Channel-2

HSDPA:

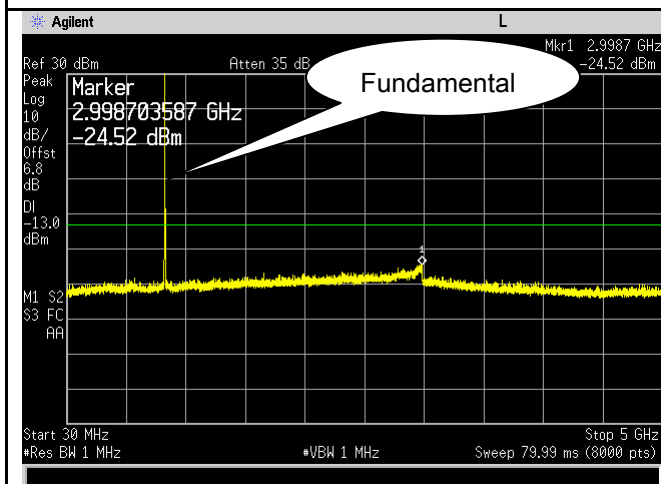
UMTS-FDD Band V (Part 22H)



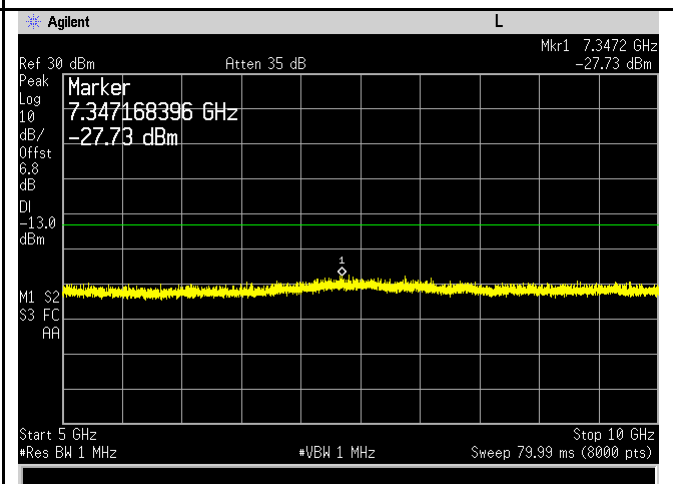
Band V - Low Channel-1



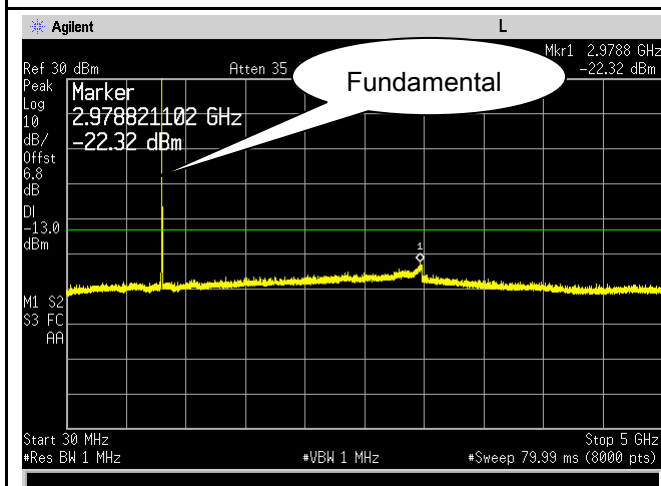
Band V - Low Channel-2



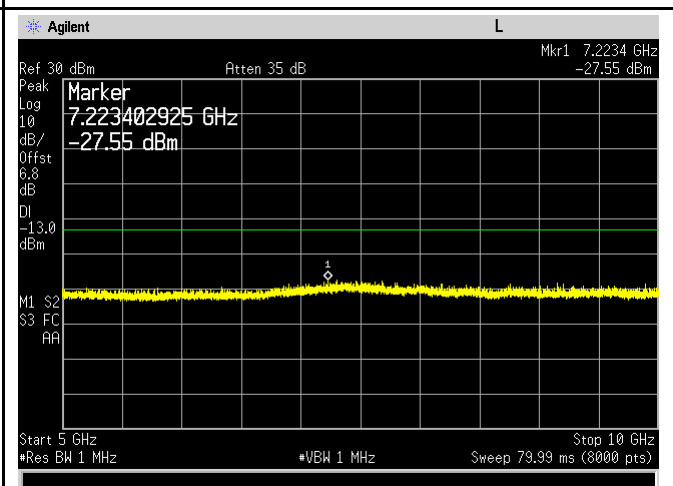
Band V - Middle Channel-1



Band V - Middle Channel-2

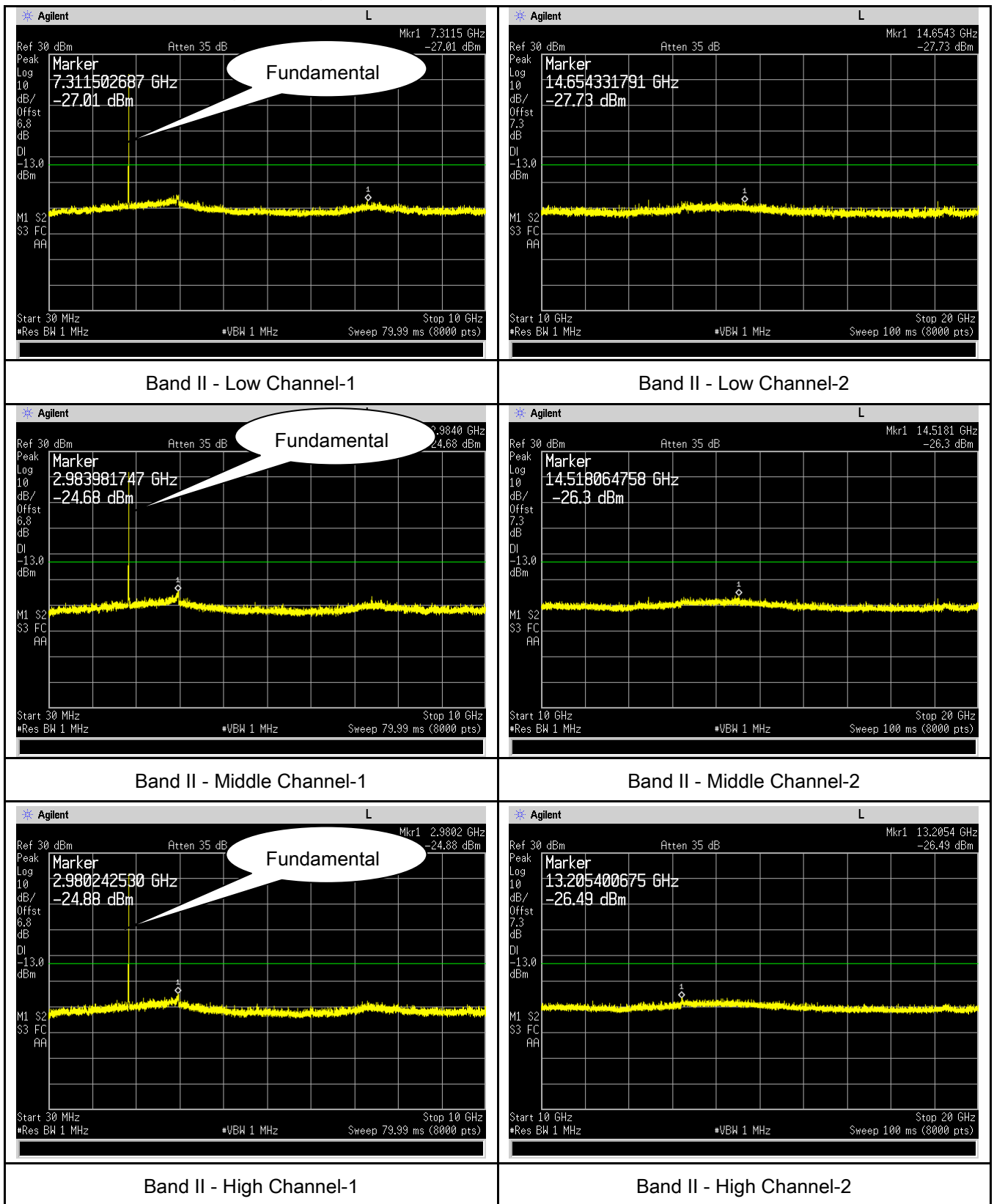


Band V - High Channel-1



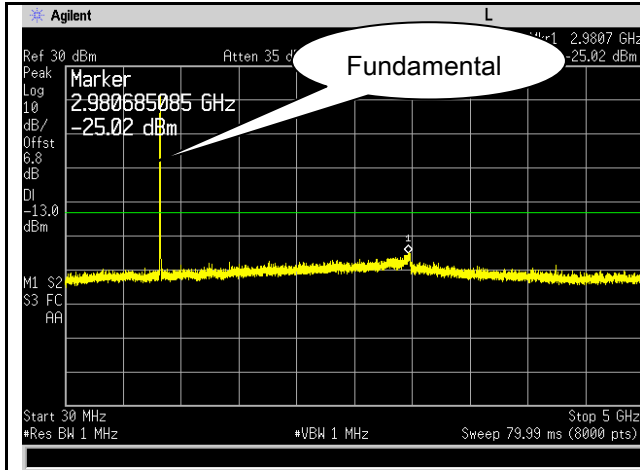
Band V - High Channel-2

UMTS-FDD Band II (Part 24E)

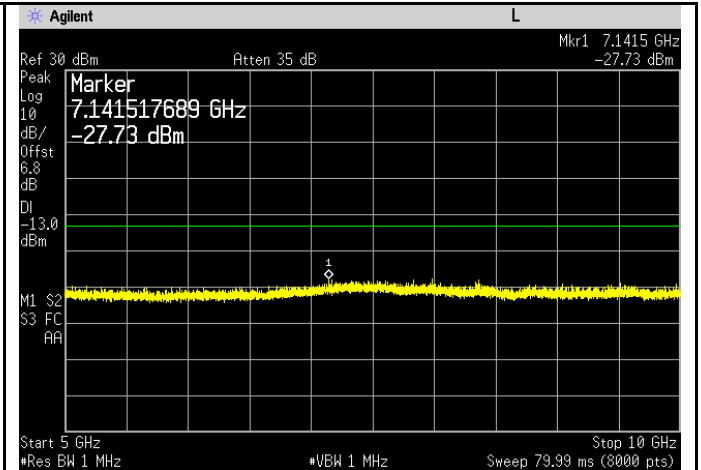


HSUPA:

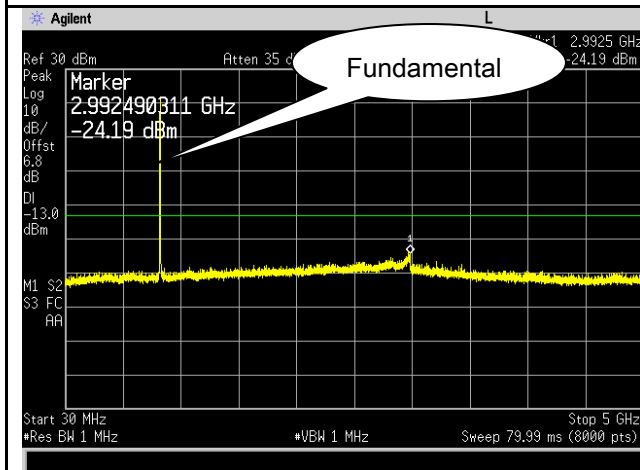
UMTS-FDD Band V (Part 22H)



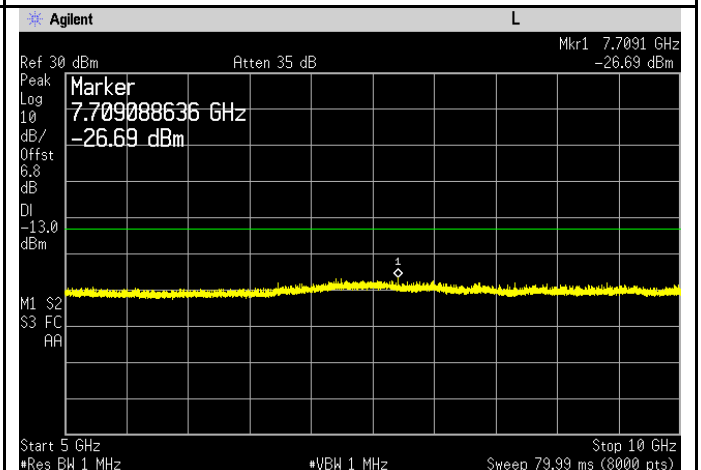
Band V - Low Channel-1



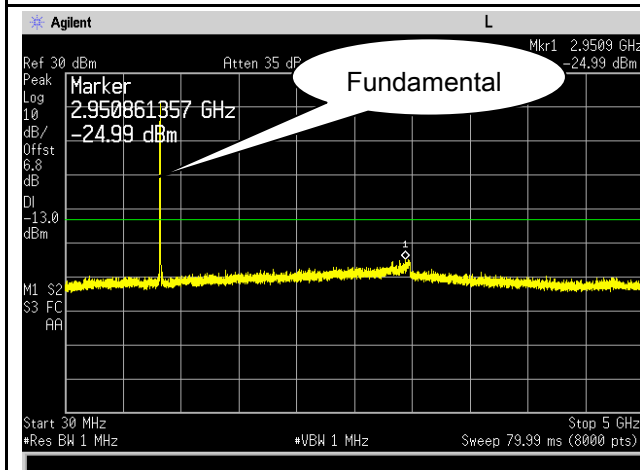
Band V - Low Channel-2



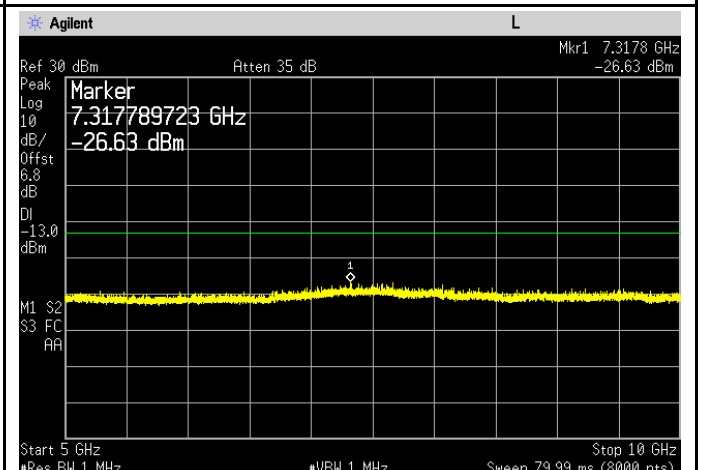
Band V - Middle Channel-1



Band V - Middle Channel-2

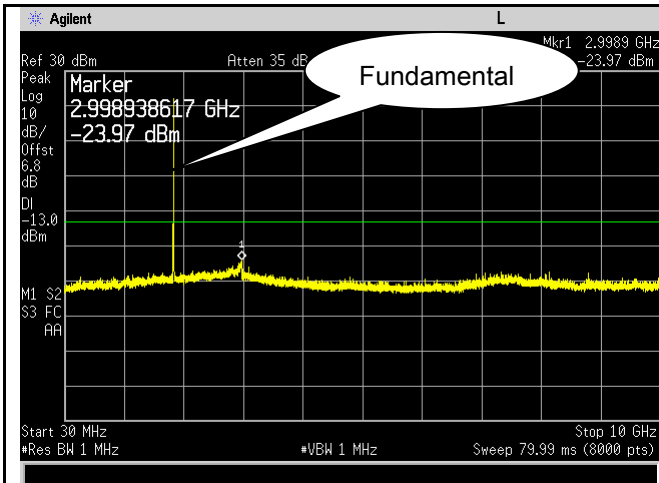


Band V - High Channel-1

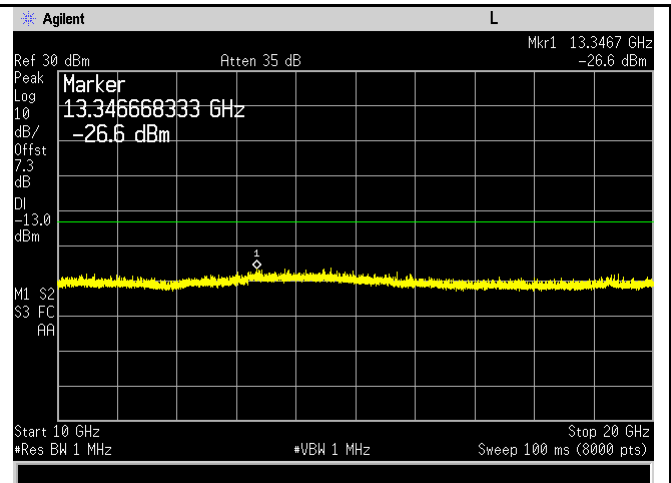


Band V - High Channel-2

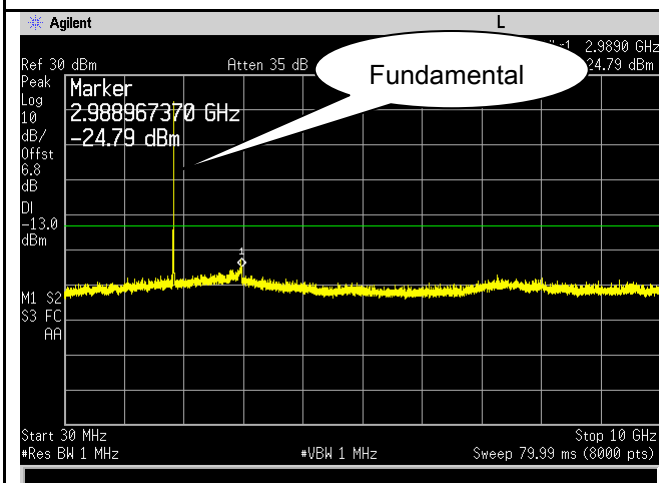
UMTS-FDD Band II (Part 24E)



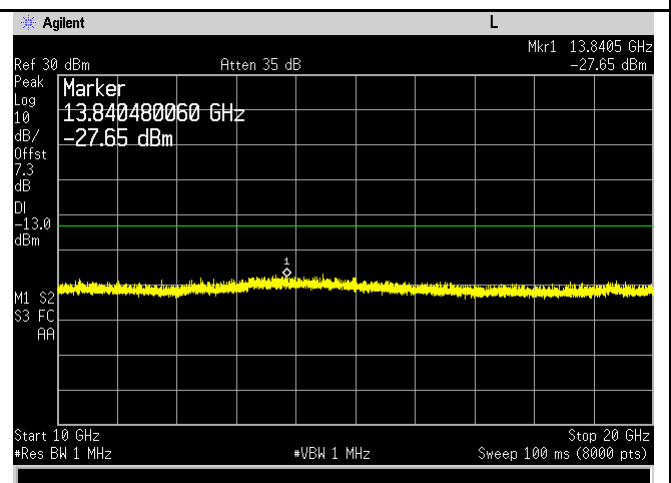
Band II - Low Channel-1



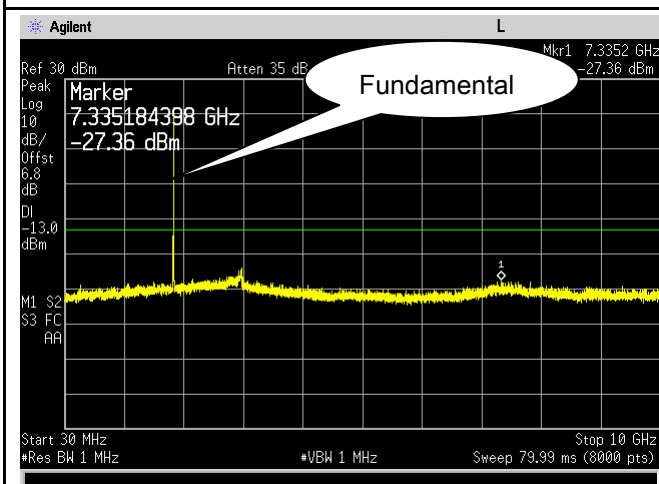
Band II - Low Channel-2



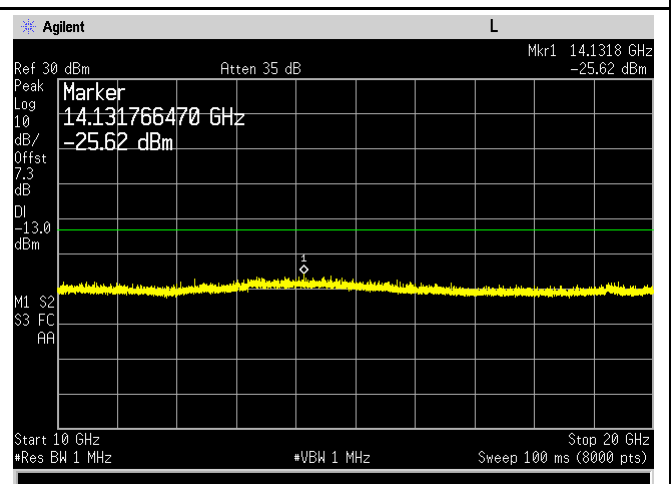
Band II - Middle Channel-1



Band II - Middle Channel-2



Band II - High Channel-1



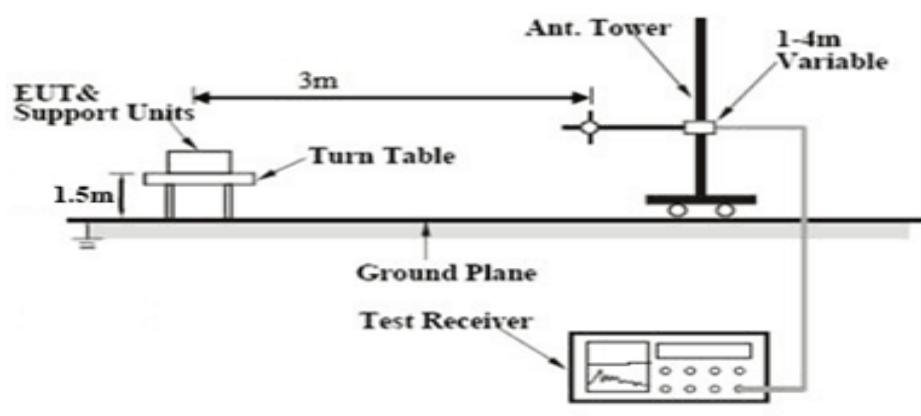
Band II - High Channel-2

6.6 Spurious Radiated Emissions

Temperature	22 °C
Relative Humidity	54%
Atmospheric Pressure	1021mbar
Test date :	Nov. 21, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§2.1053, §22.917 & §24.238	a)	The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB. The spectrum is scanned from 30 MHz up to a frequency including its 10th harmonic.	☒

Test setup	
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Test Procedure	- The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable. - The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis. - Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution. Sample Calculation: EUT Field Strength = Raw Amplitude (dBμV/m) – Amplifier Gain (dB) + Antenna Factor (dB) + Cable Loss (dB) + Filter Attenuation (dB, if used)
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Test Report	Q181023S005-FCC-R1
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Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A
 Test Plot ☐ Yes (See below) ☒ N/A

Cellular Band (Part 22H) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1648.4	V	-23.52	-13	-10.52
1648.4	H	-26.95	-13	-13.95
823.08	V	-37.86	-13	-24.86
666.8	H	-40.97	-13	-27.97

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1673.2	V	-28.12	-13	-15.12
1673.2	H	-32.15	-13	-19.15
395.18	V	-38.51	-13	-25.51
211.09	H	-34.23	-13	-21.23

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1697.6	V	-30.98	-13	-17.98
1697.6	H	-31.71	-13	-18.71
540.89	V	-37.9	-13	-24.9
297.11	H	-35.23	-13	-22.23

Note:

1, The testing has been conformed to $10 \times 848.8 \text{ MHz} = 8,488 \text{ MHz}$

2, All other emissions more than 30 dB below the limit

3, GSM voice and GPRS mode were investigated. The results above show only the worse cases

4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.

5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

PCS Band (Part24E) result

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3700.4	V	-29.04	-13	-16.04
3700.4	H	-35.36	-13	-22.36
583.27	V	-33.69	-13	-20.69
271.85	H	-40.19	-13	-27.19

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	V	-37.63	-13	-24.63
3760	H	-38.56	-13	-25.56
495.21	V	-37.77	-13	-24.77
389.79	H	-35.69	-13	-22.69

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3819.6	V	-31.26	-13	-18.26
3819.6	H	-30.58	-13	-17.58
692.96	V	-42.3	-13	-29.3
835.5	H	-36.59	-13	-23.59

Note:

- 1, The testing has been conformed to $10 \times 1909.8 \text{ MHz} = 19,098 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, GSM voice and GPRS mode were investigated. The results above show only the worse cases
- 4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

UMTS-FDD Band V (Part 22H)

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1652.8	V	-27.48	-13	-14.48
1652.8	H	-35.03	-13	-22.03
532.4	V	-38.06	-13	-25.06
447.27	H	-37.76	-13	-24.76

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1670	V	-31.22	-13	-18.22
1670	H	-28.79	-13	-15.79
211.4	V	-33.89	-13	-20.89
695.7	H	-33.93	-13	-20.93

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
1693.2	V	-27.95	-13	-14.95
1693.2	H	-31.33	-13	-18.33
259.3	V	-39.83	-13	-26.83
233.88	H	-35.83	-13	-22.83

Note:

- 1, The testing has been conformed to $10 \times 846.6 \text{ MHz} = 8,466 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, RMC, HSUPA and HSDPA mode were investigated. The results above show only the worse cases
- 4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case.
- 5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

UMTS-FDD Band II (Part 24E)

Low channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3704.8	V	-33.57	-13	-20.57
3704.8	H	-31.09	-13	-18.09
706.35	V	-33.54	-13	-20.54
427.01	H	-33.65	-13	-20.65

Middle channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3760	V	-37.99	-13	-24.99
3760	H	-39.31	-13	-26.31
370.07	V	-35.41	-13	-22.41
572.32	H	-36.01	-13	-23.01

High channel

Frequency (MHz)	Antenna Polarization (H/V)	Corrected Reading (dBm)	Limit (dBm)	Margin (dB)
3815.2	V	-30.46	-13	-17.46
3815.2	H	-33.84	-13	-20.84
265.19	V	-40.05	-13	-27.05
505.49	H	-42.58	-13	-29.58

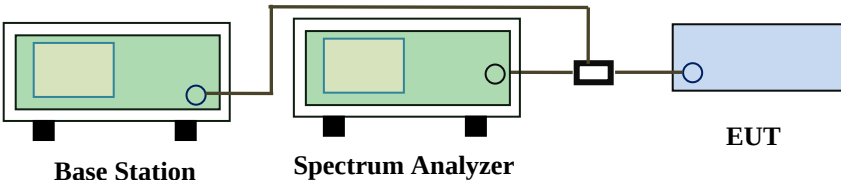
Note:

- 1, The testing has been conformed to $10 \times 1907.6 \text{ MHz} = 19,076 \text{ MHz}$
- 2, All other emissions more than 30 dB below the limit
- 3, RMC, HSUPA and HSDPA mode were investigated. The results above show only the worse cases
- 4, X-Axis, Y-Axis and Z-Axis were investigated. The results above show only the worst case
- 5, The radiated spurious test above 18GHz is subcontracted to SIEMIC (Nanjing-China) Laboratories. and found 30dB below the limit at least.

6.7 Band Edge

Temperature	22 °C
Relative Humidity	55%
Atmospheric Pressure	1013mbar
Test date :	Nov. 13, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable
§22.917(a) §24.238(a)	a)	The power of any emission outside of the authorized operating frequency ranges must be lower than the transmitter power (P) by a factor of at least $43 + 10 \log (P)$ dB.	☒
Test setup	 Base Station Spectrum Analyzer EUT		
Procedure	- The EUT was connected to Spectrum Analyzer and Base Station via power divider. - The Band Edges of low and high channels for the highest RF powers were measured. Setting RBW as roughly BW/100.		
Remark			
Result	☒ Pass ☐ Fail		

Test Data ☒ Yes ☐ N/A

Test Plot ☒ Yes (See below) ☐ N/A

GSM Voice:

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9800	-26.27	-13
849.0175	-26.48	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.9825	-30.33	-13
1910.0200	-29.28	-13

GPRS:

Cellular Band (Part 22H) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.9800	-25.99	-13
849.0200	-24.76	-13

PCS Band (Part24E) result

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.9800	-30.11	-13
1910.0200	-29.01	-13

RMC:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.925	-41.82	-13
849.125	-40.34	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.925	-34.63	-13
1910.075	-37.63	-13

HSDPA:

UMTS-FDD Band V (Part 22H)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.90	-41.95	-13
849.10	-39.73	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.95	-34.63	-13
1910.05	-38.74	-13

HSUPA:

UMTS-FDD Band V (Part 22H)

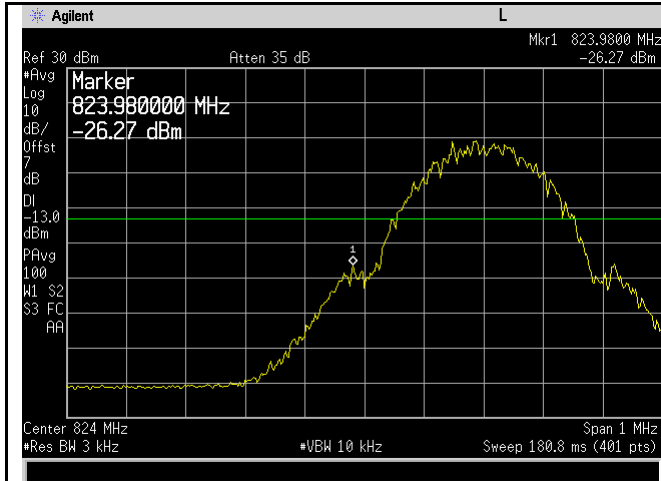
Frequency (MHz)	Emission (dBm)	Limit (dBm)
823.90	-42.18	-13
849.08	-40.31	-13

UMTS-FDD Band II (Part 24E)

Frequency (MHz)	Emission (dBm)	Limit (dBm)
1849.975	-34.61	-13
1910.050	-37.42	-13

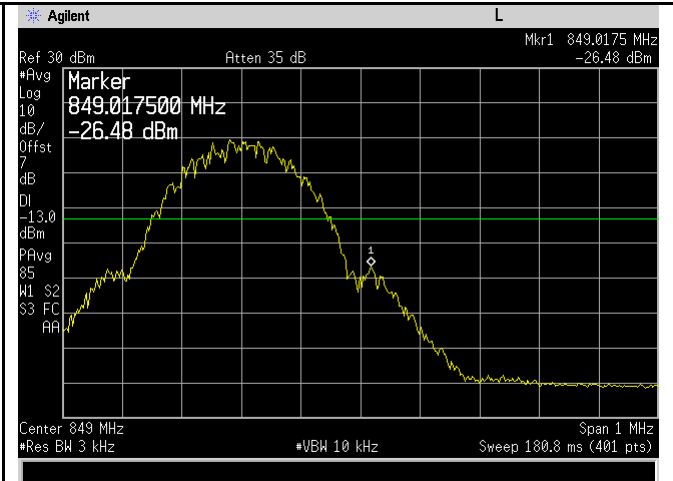
GSM Voice:

Test Plots



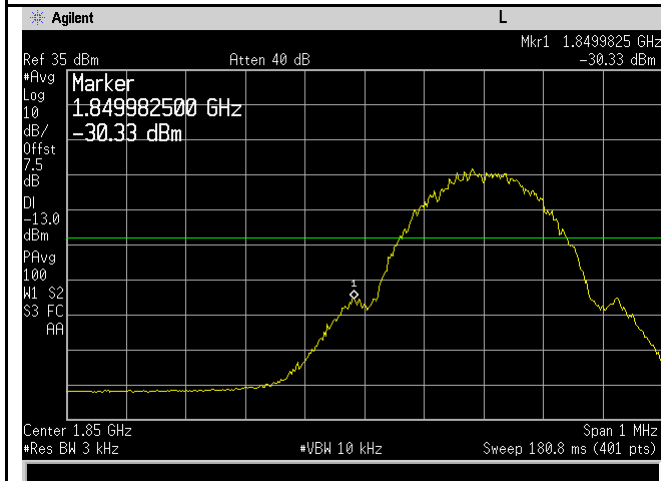
Cellular Band - Low Channel

Note: Offset=Cable loss (6.8 + 10log
(3.16/3)=6.8+0.2=7dB



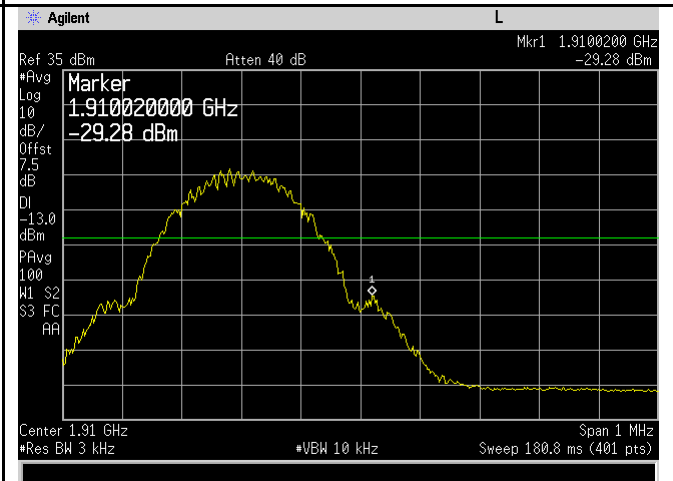
Cellular Band - High Channel

Note: Offset=Cable loss (6.8) + 10log
(3.09/3)=6.8+0.2=7dB



PCS Band - Low Channel

Note: Offset=Cable loss (7.3) + 10log
(3.19/3)=7.3+0.2=7.5dB

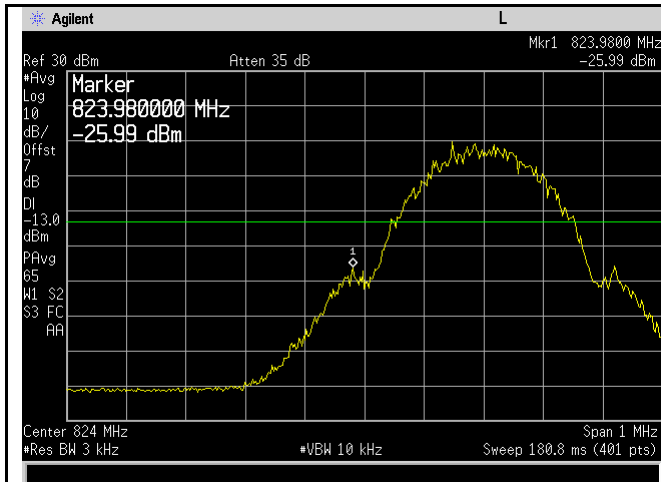


PCS Band - High Channel

Note: Offset=Cable loss (7.3) + 10log
(3.13/3)=7.3+0.2=7.5dB

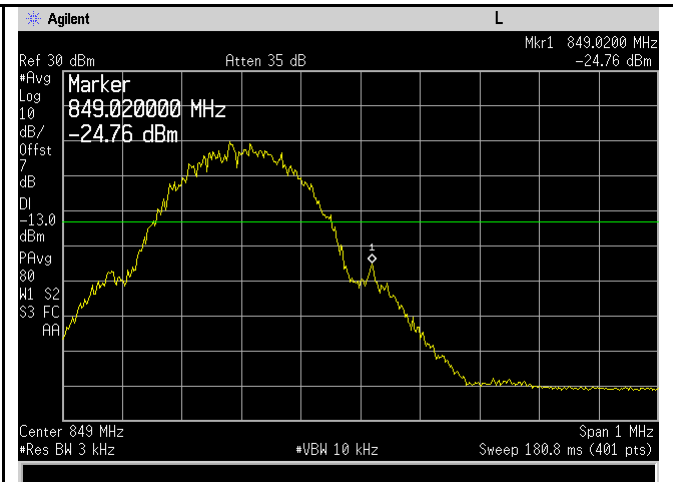
GPRS:

Test Plots



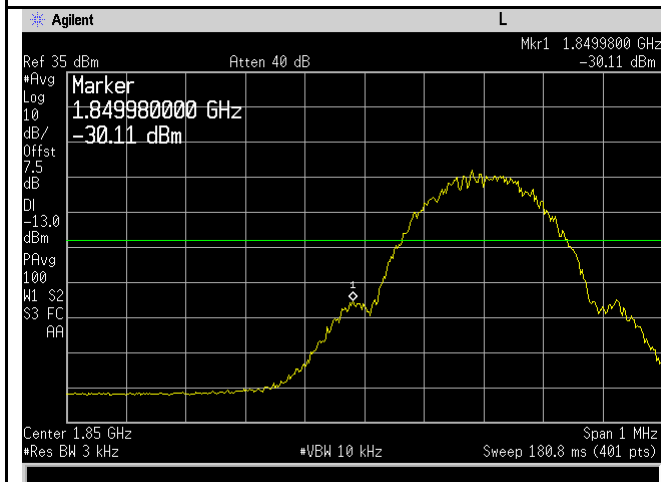
Cellular Band - Low Channel

Note: Offset=Cable loss (6.8) + 10log
(3.20/3)=6.8+0.2=7dB



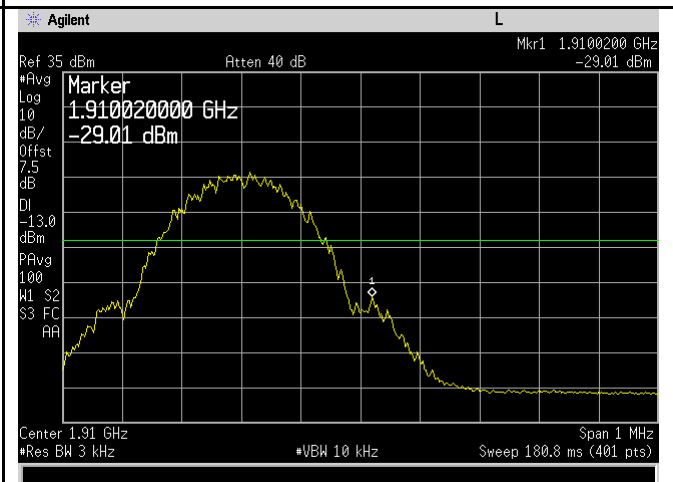
Cellular Band - High Channel

Note: Offset=Cable loss (6.8) + 10log
(3.24/3)=6.8+0.2=7dB



PCS Band - Low Channel

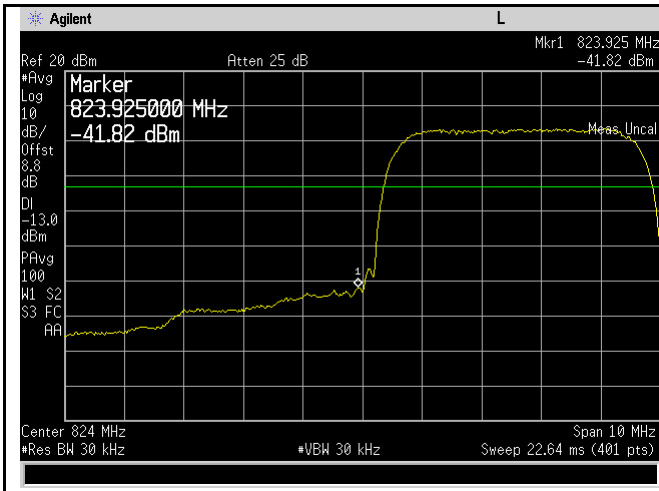
Note: Offset=Cable loss (7.3) + 10log
(3.24/3)=7.3+0.2=7.5dB



PCS Band - High Channel

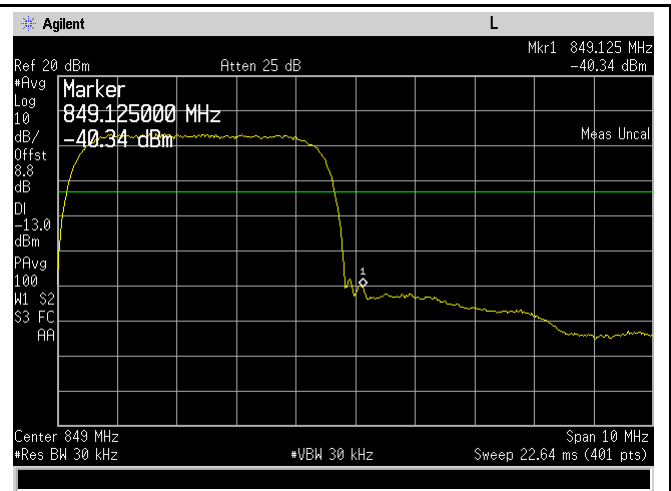
Note: Offset=Cable loss (7.3) + 10log
(3.06/3)=7.3+0.2=7.5dB

RMC:



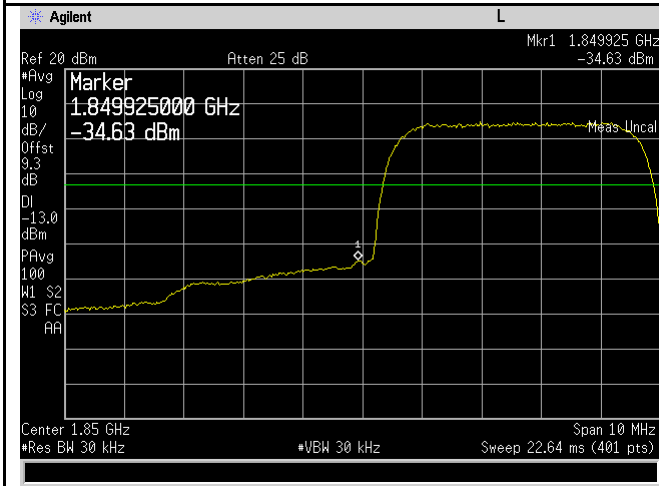
UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (6.8) + 10log
(47.03/30)=6.8+2.0=8.8 dB



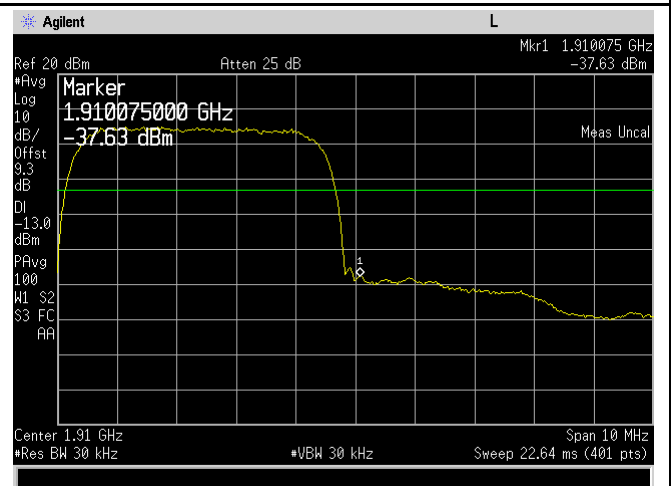
UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (6.8) + 10log
(47.08/30)=6.8+2.0=8.8dB



UMTS-FDD Band II - Low Channel

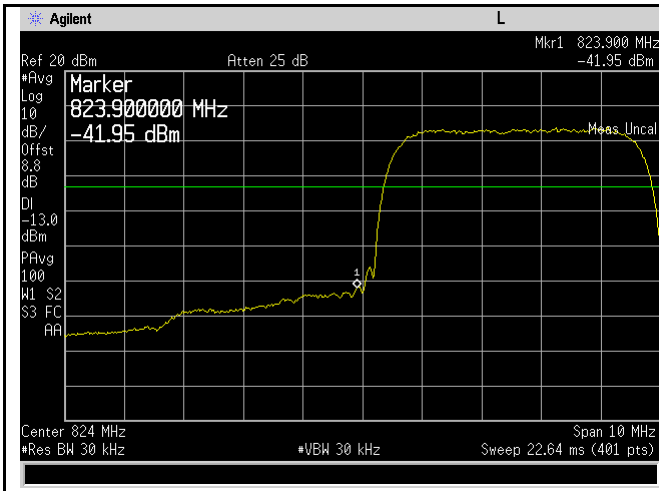
Note: Offset=Cable loss (7.3) + 10log
(47.21/30)=7.3+2.0=9.3dB



UMTS-FDD Band II - High Channel

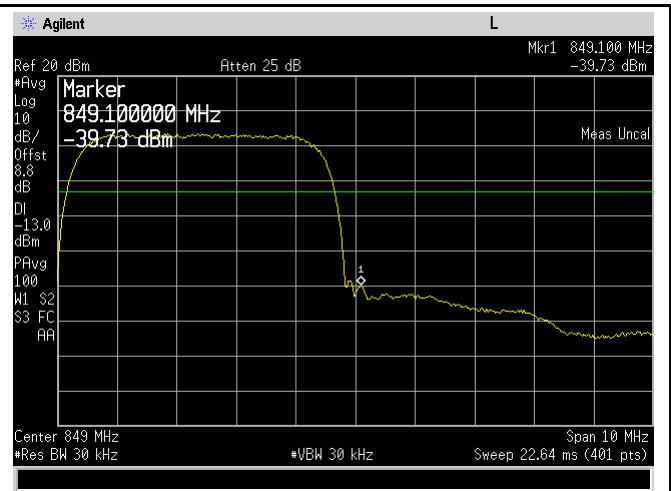
Note: Offset=Cable loss (7.3) + 10log
(47.17/30)=7.3+2.0=9.3dB

HSDPA:



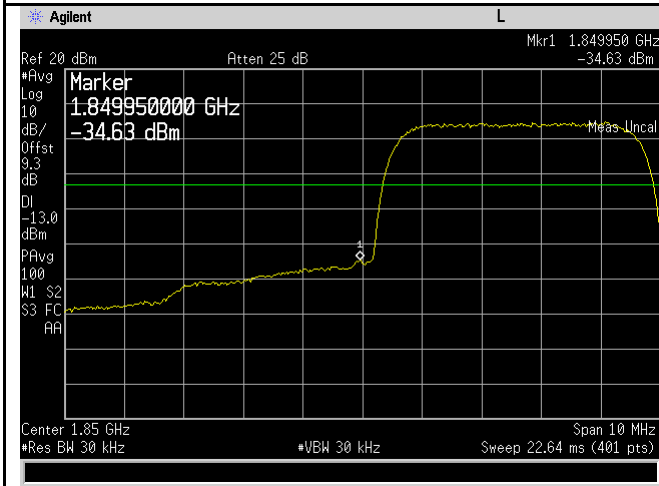
UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (6.8) + 10log
(47.21/30)=6.8+2.0=8.8dB



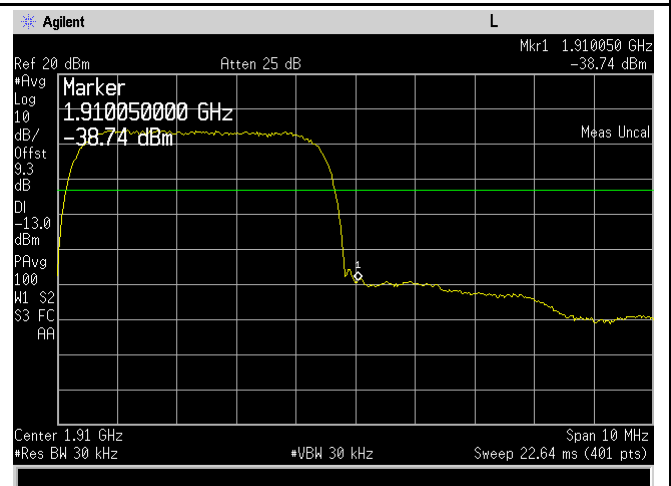
UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (6.8) + 10log
(46.94/30)=6.8+2.0=8.8dB



UMTS-FDD Band II - Low Channel

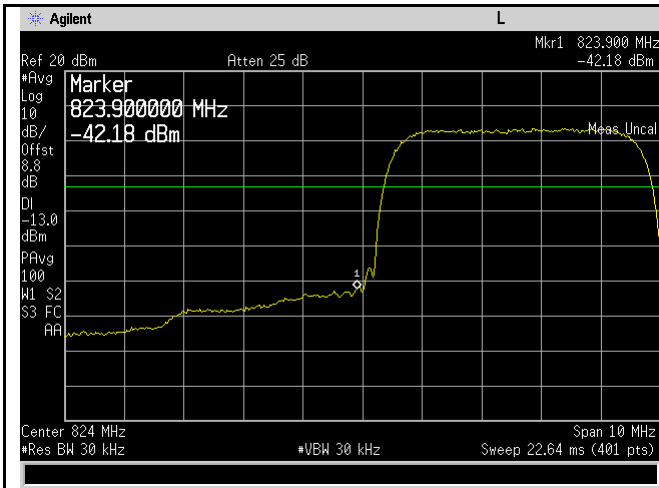
Note: Offset=Cable loss (7.3) + 10log
(47.28/30)=7.3+2.0=9.3dB



UMTS-FDD Band II - High Channel

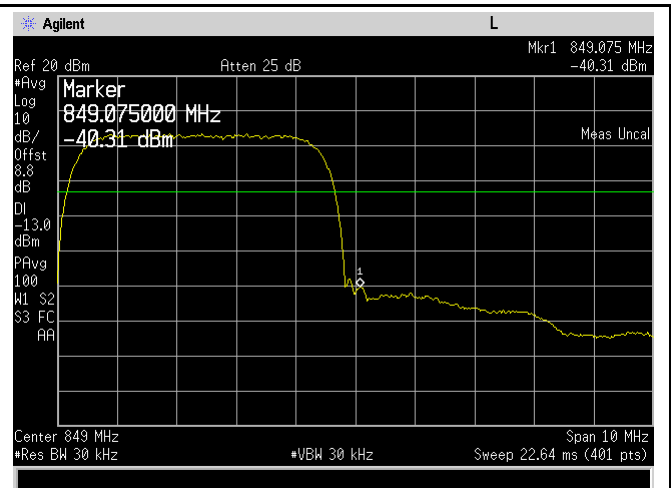
Note: Offset=Cable loss (7.3) + 10log
(47.02/30)=7.3+2.0=9.3dB

HSUPA:



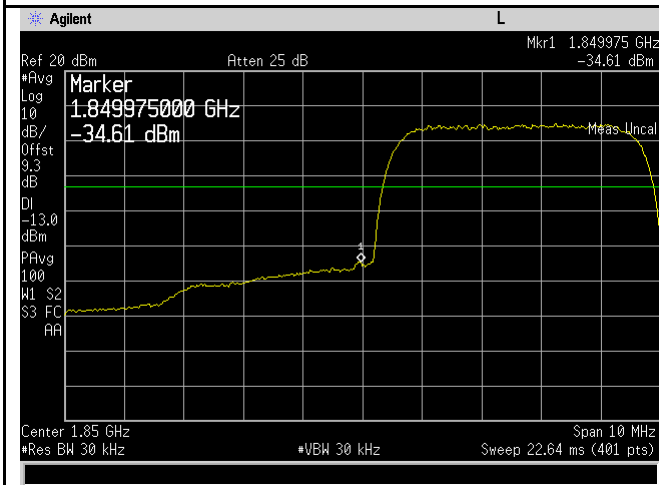
UMTS-FDD Band V - Low Channel

Note: Offset=Cable loss (6.8) + 10log
(47.16/30)=6.8+2.0=8.8dB



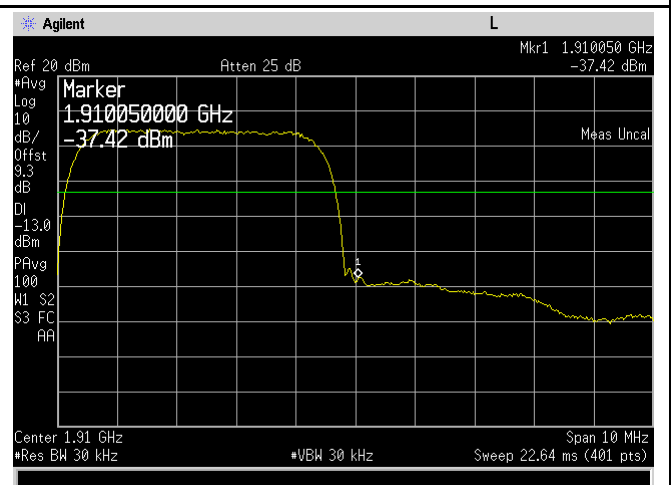
UMTS-FDD Band V - High Channel

Note: Offset=Cable loss (6.8) + 10log
(47.12/30)=6.8+2.0=8.8dB



UMTS-FDD Band II - Low Channel

Note: Offset=Cable loss (7.3) + 10log
(47.23/30)=7.3+2.0=9.3dB



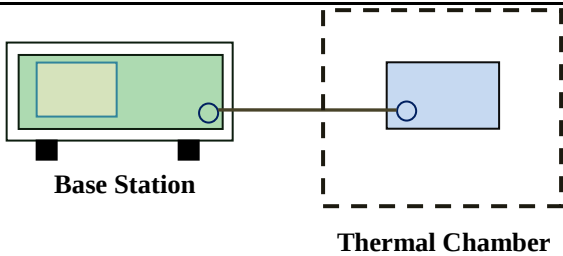
UMTS-FDD Band II - High Channel

Note: Offset=Cable loss (7.3) + 10log
(47.06/30)=7.3+2.0=9.3dB

6.8 Frequency Stability

Temperature	25 °C
Relative Humidity	53%
Atmospheric Pressure	1020mbar
Test date :	Nov. 20, 2018
Tested By :	Aaron Liang

Requirement(s):

Spec	Item	Requirement	Applicable																																
§2.1055, §22.355 & §24.235	a)	According to §22.355, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances given in Table below: Frequency Tolerance for Transmitters in the Public Mobile Services <table border="1"> <thead> <tr> <th>Frequency Range (MHz)</th><th>Base, fixed (ppm)</th><th>Mobile ≥ 3 watts (ppm)</th><th>Mobile ≤ 3 watts (ppm)</th></tr> </thead> <tbody> <tr> <td>25 to 50</td><td>20.0</td><td>20.0</td><td>50.0</td></tr> <tr> <td>50 to 450</td><td>5.0</td><td>5.0</td><td>50.0</td></tr> <tr> <td>450 to 512</td><td>2.5</td><td>5.0</td><td>5.0</td></tr> <tr> <td>821 to 896</td><td>1.5</td><td>2.5</td><td>2.5</td></tr> <tr> <td>928 to 929</td><td>5.0</td><td>N/A</td><td>N/A</td></tr> <tr> <td>929 to 960.</td><td>1.5</td><td>N/A</td><td>N/A</td></tr> <tr> <td>2110 to 2220</td><td>10.0</td><td>N/A</td><td>N/A</td></tr> </tbody> </table> According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized frequency block.	Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≥ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)	25 to 50	20.0	20.0	50.0	50 to 450	5.0	5.0	50.0	450 to 512	2.5	5.0	5.0	821 to 896	1.5	2.5	2.5	928 to 929	5.0	N/A	N/A	929 to 960.	1.5	N/A	N/A	2110 to 2220	10.0	N/A	N/A	☒
Frequency Range (MHz)	Base, fixed (ppm)	Mobile ≥ 3 watts (ppm)	Mobile ≤ 3 watts (ppm)																																
25 to 50	20.0	20.0	50.0																																
50 to 450	5.0	5.0	50.0																																
450 to 512	2.5	5.0	5.0																																
821 to 896	1.5	2.5	2.5																																
928 to 929	5.0	N/A	N/A																																
929 to 960.	1.5	N/A	N/A																																
2110 to 2220	10.0	N/A	N/A																																
Test setup	 The diagram illustrates the test setup. On the left, a green rectangular box represents the 'Base Station'. A line connects a port on the Base Station to a port on a blue rectangular box inside a dashed-line rectangle, which represents the 'Thermal Chamber'.																																		

Procedure	A communication link was established between EUT and base station. The frequency error was monitored and measured by base station under variation of ambient temperature and variation of primary supply voltage. Limit: The frequency stability of the transmitter shall be maintained within $\pm 0.00025\%$ ($\pm 2.5\text{ppm}$) of the center frequency.
Remark	
Result	☒ Pass ☐ Fail

Test Data ☒ Yes ☐ N/A

Test Plot ☐ Yes (See below) ☒ N/A

GSM Voice:

Cellular Band (Part 22H) result

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.8	19	0.0227	2.5
0		17	0.0203	2.5
10		17	0.0203	2.5
20		13	0.0155	2.5
30		16	0.0191	2.5
40		17	0.0203	2.5
50		22	0.0263	2.5
55		18	0.0215	2.5
25	4.35	20	0.0239	2.5
	3.6	17	0.0203	2.5

PCS Band (Part 24E) result

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.8	12	0.0064	2.5
0		15	0.0080	2.5
10		13	0.0069	2.5
20		13	0.0069	2.5
30		15	0.0080	2.5
40		15	0.0080	2.5
50		18	0.0096	2.5
55		17	0.0090	2.5
25	4.35	18	0.0096	2.5
	3.6	19	0.0101	2.5

RMC:

UMTS-FDD Band V (Part 22H)

Middle Channel, $f_0 = 835$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.8	15	0.0180	2.5
0		15	0.0180	2.5
10		18	0.0216	2.5
20		14	0.0168	2.5
30		12	0.0144	2.5
40		8	0.0096	2.5
50		19	0.0228	2.5
55		13	0.0156	2.5
25	4.35	18	0.0216	2.5
	3.6	16	0.0192	2.5

UMTS-FDD Band II (Part 24E)

Middle Channel, $f_0 = 1880$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-10	3.8	18	0.0096	2.5
0		18	0.0096	2.5
10		17	0.0090	2.5
20		16	0.0085	2.5
30		15	0.0080	2.5
40		17	0.0090	2.5
50		21	0.0112	2.5
55		19	0.0101	2.5
25	4.35	18	0.0096	2.5
	3.6	16	0.0085	2.5

Annex A. TEST INSTRUMENT

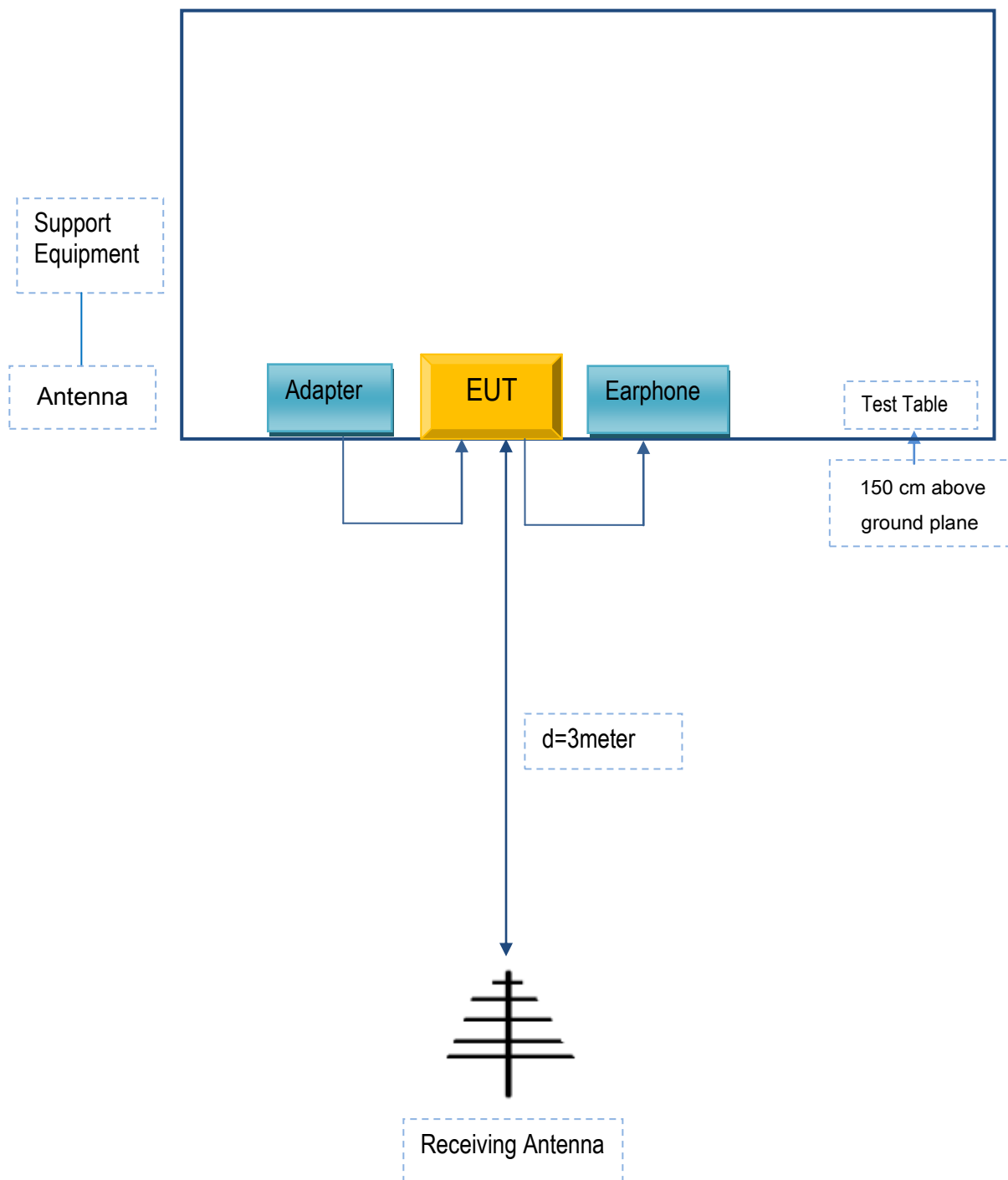
Instrument	Model	Serial #	Cal Date	Cal Due
EMI test receiver	ESL6	100262	01/05/2018	01/04/2019
Active Antenna	AL-130	121031	02/08/2018	02/07/2019
3m Semi-anechoic Chamber	9m*6m*6m	N/A	10/18/2018	10/17/2019
Signal Amplifier	8447E	443008	01/25/2018	01/24/2019
MXA signal analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
Horn Antenna	HAH-118	71259	01/26/2018	01/25/2019
Horn Antenna	HAH-118	71283	02/02/2018	02/01/2019
AMPLIFIER	EM01G26G	60613	01/25/2018	01/24/2019
AMPLIFIER	Emc012645	980077	01/05/2018	01/04/2019
Bilog Antenna (30MHz~6GHz)	JB6	A110712	02/08/2018	02/07/2019
DC Power Supply	E3640A	MY40004013	01/05/2018	01/04/2019
MXA Signal Analyzer	N9020A	MY49100060	01/05/2018	01/04/2019
MXG Vector Signal Generator	N5182A	MY50140530	01/05/2018	01/04/2019
Series Signal Generator	E4421B	US40051152	05/12/2018	05/11/2019
RF control unit	JS0806-0806-2	188060112	04/25/2018	04/24/2019
Wireless Connectivity Tester	CMW270	1201.0002K75-101601-PE	04/25/2018	04/24/2019

Universal Radio Communication Tester	CMU200	121393	01/05/2018	01/04/2019
Programmable Temperature & Humidity Chamber	HYL-TH- 225DH	DG-180746	07/16/2018	07/15/2019

Annex B. TEST SETUP AND SUPPORTING EQUIPMENT

Annex B.i. TEST SET UP BLOCK

Block Configuration Diagram for Radiated Emissions



Annex C. SUPPORTING EQUIPMENT DESCRIPTION

The following is a description of supporting equipment and details of cables used with the EUT.

Supporting Equipment:

Manufacturer	Equipment Description	Model	Serial No
Dongguan Aohai Power Technology Co.,Ltd.	Adapter	A8-501000	N/A
Dong guan Tenji Technology Industrial Co., Ltd.	Earphone	TJ101891E	N/A
Agilent	Wireless Connectivity Test Set	N4010A	N/A
OEM	omnidirectional antenna	AntSuck	N/A

Supporting Cable:

Cable type	Shield Type	Ferrite Core	Length	Serial No
USB Cable	Un-shielding	No	1m	N/A

Annex C. User Manual / Block Diagram / Schematics / Partlist/ DECLARATION OF SIMILARITY

TP-LINK TECHNOLOGIES CO., LTD.

Building 24 (floors 1,3,4,5) and 28 (floors1-4)
Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

Product Change Description

We, TP-LINK TECHNOLOGIES CO., LTD. ,declare on our sole responsibility that the product,

[TP7031CXYZZ]

is the variant of the initial certified product,

[TP7031C]

Except the following changes on the latest MODEL: [TP7031CXYZZ]

Series Name TP7031CXYZZ

Model Difference

Description of Model Name Differentiation:

X=2, indicates Grey; X=4, indicates Gold; X=7, indicates Blue;

X=8, indicates Red;

Y=0, indicates the memory is 512MB RAM + 8GB Flash; Y=1, indicates the memory is 1GB RAM + 8GB Flash; Y=2, indicates the memory is 1GB RAM + 16GB Flash;

Z='A' to 'Z', ZZ indicates different regions or customers.

All models are same with electrical parameters and internal circuit structure.

HARDWARE MODIFICATION:

Power Amplifier changes: NO

Antenna changes: NO

PCB Layout changes: NO

LCD changes: NO

Speaker changes: NO

Camera changes: NO

Vibrator changes: NO Bluetooth

changes: NO

FM changes: NO

Other changes: NO

MECHANICAL MODIFICATIONS:

Use new metal front/back cover or keypad: NO

Mechanical shell changes: NO

Other changes detailed: NO

Signature:



Name: Huang Jing

Designation: Regulatory Compliance Manager

Date: 2018-11-29