



FCC PART 27
FCC PART 22H, PART 24E
MEASUREMENT AND TEST REPORT

For

BLU Products, Inc.

10814 NW 33rd St # 100 Doral, FL 33172, United States

FCC ID: YHLBLUGRANDM2

Report Type: Original Report	Product Type: Mobile phone
Report Number: RSZ170901004-00D	
Report Date: 2017-09-18	
Rocky Kang	
Reviewed By: RF Engineer	<i>Rocky Kang</i>
Prepared By: Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008 www.baclcorp.com.cn	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. This report must not be used by the customer to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. This report may contain data that are not covered by the NVLAP accreditation and shall be marked with an asterisk "★". This report may contain data were produced under the subcontractor and shall be marked with an asterisk "△".

TABLE OF CONTENTS

GENERAL INFORMATION.....	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	4
OBJECTIVE	4
RELATED SUBMITTAL(S)/GRANT(S).....	4
TEST METHODOLOGY	4
MEASUREMENT UNCERTAINTY.....	5
TEST FACILITY	5
SYSTEM TEST CONFIGURATION.....	6
DESCRIPTION OF TEST CONFIGURATION	6
EQUIPMENT MODIFICATIONS	6
SUPPORT EQUIPMENT LIST AND DETAILS	6
BLOCK DIAGRAM OF TEST SETUP	6
SUMMARY OF TEST RESULTS	7
TEST EQUIPMENT LIST	8
FCC §1.1307(B) & §2.1093 - RF EXPOSURE INFORMATION.....	10
APPLICABLE STANDARD	10
TEST RESULT	10
FCC §2.1047 - MODULATION CHARACTERISTIC	11
FCC § 2.1046, § 22.913 (A) & § 24.232 (C); §27.50 (D) - RF OUTPUT POWER.....	12
APPLICABLE STANDARD	12
TEST PROCEDURE	12
TEST DATA	12
FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53 - OCCUPIED BANDWIDTH.....	19
APPLICABLE STANDARD	19
TEST PROCEDURE	19
TEST DATA	19
FCC §2.1051, §22.917(A) & §24.238(A); §27.53 (H) (M) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	27
APPLICABLE STANDARD	27
TEST PROCEDURE	27
TEST DATA	27
FCC § 2.1053; § 22.917 (A);§ 24.238 (A); §27.53 (H)(M) SPURIOUS RADIATED EMISSIONS.....	35
APPLICABLE STANDARD	35
TEST PROCEDURE	35
TEST DATA	35
FCC § 22.917 (A); § 24.238 (A); §27.53 (H)(M) - BAND EDGES	38
APPLICABLE STANDARD	38
TEST PROCEDURE	38
TEST DATA	38

FCC § 2.1055; § 22.355; § 24.235; §27.54; - FREQUENCY STABILITY50
 APPLICABLE STANDARD50
 TEST PROCEDURE50
 TEST DATA51

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The *BLU Products, Inc.*'s product, model number: *GRAND M2 (FCC ID: YHLBLUGRANDM2)* or the "EUT" in this report was a *Mobile phone*, which was measured approximately: 15.01 cm (L) × 7.48 cm (W) × 0.96 cm (H), rated with input voltage: DC 3.8 V battery or DC 5.0V from adapter.

Adapter Information:

Model: US-ZC-1000

Input: AC 100-240V, 50/60Hz, 0.4A

Output: DC 5.0V, 1.0 A

**All measurement and test data in this report was gathered from production sample serial number: 1702011 (Assigned by BACL(Shenzhen)). The EUT supplied by the applicant was received on 2017-09-01.*

Objective

This type approval report is prepared on behalf of *BLU Products, Inc.* in accordance with Part 2, Part 22-Subpart H, Part 24-Subpart E and Part 27 of the Federal Communication Commission's rules.

The objective is to determine the compliance of EUT with FCC rules for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability, and band edge.

Related Submittal(s)/Grant(s)

FCC Part 15B JBP, Part 15.247 DSS & DTS submissions with FCC ID: YHLBLUGRANDM2.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2, Sub-Part J as well as the following parts:

Part 22 Subpart H - Public Mobile Services

Part 24 Subpart E - Personal Communication Services

Part 27 – Miscellaneous wireless communications services

Applicable Standards: TIA/EIA 603-D.

All emissions measurement was performed at Bay Area Compliance Laboratories Corp. (Shenzhen). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		uncertainty
Occupied Channel Bandwidth		±5%
RF output power, conducted		±1.5dB
Unwanted Emission, conducted		±1.5dB
Emissions, radiated	Below 1GHz	±4.70dB
	Above 1GHz	±4.80dB
Temperature		±1 °C
Supply voltages		±0.4%

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Shenzhen) to collect test data is located on the 6/F., West Wing, Third Phase of Wanli Industrial Building, Shihua Road, Futian Free Trade Zone, Shenzhen, Guangdong, China.

Bay Area Compliance Laboratories Corp. (Shenzhen) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L2408). And accredited to ISO/IEC 17025 by NVLAP(Lab code: 200707-0), the FCC Designation No. CN5001 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 382179. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Bay Area Compliance Laboratories Corp. (Shenzhen) was registered with ISED Canada under ISED Canada Registration Number 3062B.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The EUT was configured for testing according to TIA/EIA-603-D.

The final qualification test was performed with the EUT operating at normal mode.

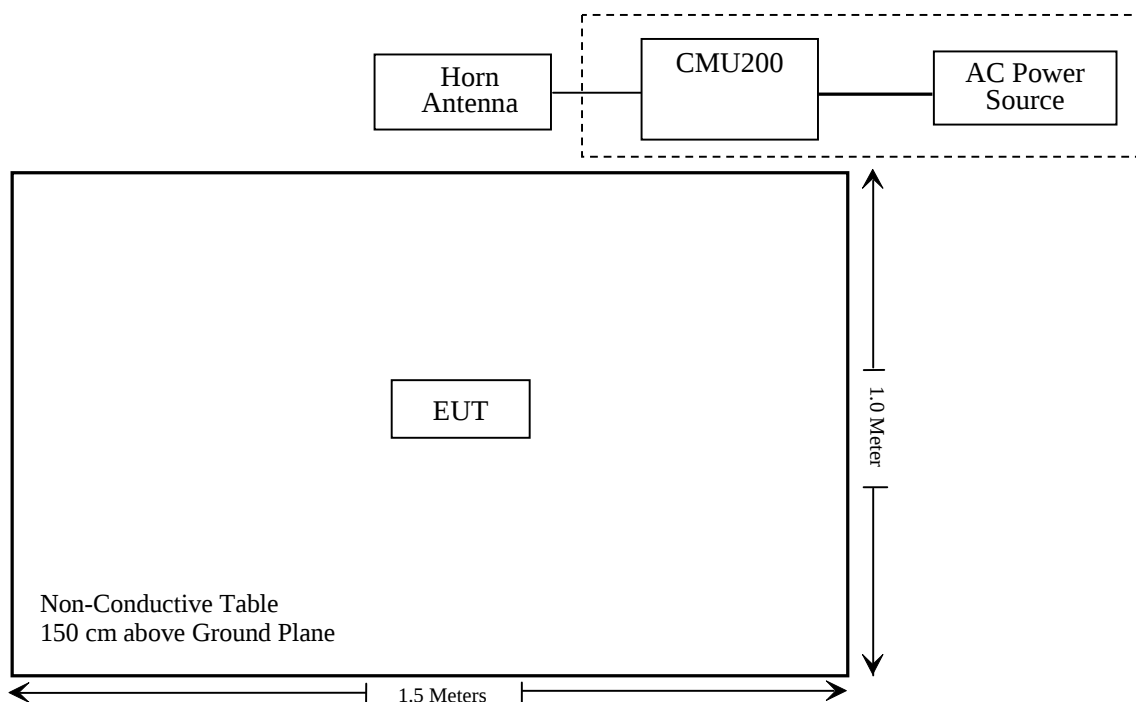
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	106891

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307, §2.1093	RF Exposure (SAR)	Compliance*
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d)	RF Output Power	Compliance
§ 2.1047	Modulation Characteristics	Not Applicable
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	Occupied Bandwidth	Compliance
§ 2.1051; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Field Strength of Spurious Radiation	Compliance
§ 22.917 (a); § 24.238 (a); §27.53 (h)(m)	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliance

Compliance*: Please refer to SAR report released by BACL, report number: RSZ170901004-20.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sunol Sciences	Horn Antenna	DRH-118	A052604	2014-12-29	2017-12-28
Rohde & Schwarz	Signal Generator	FSIQ26	8386001028	2017-04-24	2018-04-24
Sunol Sciences	Bi-log Antenna	JB1	A040904-2	2014-12-17	2017-12-16
Mini	Pre-amplifier	ZVA-183-S+	5969001149	2017-02-14	2018-02-14
HP	Amplifier	HP8447E	1937A01046	2017-05-21	2017-11-19
Anritsu	Signal Generator	68369B	004114	2016-12-05	2017-12-05
Rohde & Schwarz	EMI Test Receiver	ESCI	101120	2016-12-07	2017-12-07
COM POWER	Dipole Antenna	AD-100	041000	NCR	NCR
A.H. System	Horn Antenna	SAS-200/571	135	2015-08-18	2018-08-17
Ducommun technologies	RF Cable	UFA210A-1-4724-30050U	MFR64369 223410-001	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	104PEA	218124002	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	1	2017-05-21	2017-11-19
Ducommun technologies	RF Cable	RG-214	2	2017-05-22	2017-11-22
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726-04	2014-12-29	2017-12-28
Ducommun technologies	Horn Antenna	ARH-4223-02	1007726-03	2014-12-29	2017-12-28
Ducommun technologies	Pre-amplifier	ALN-22093530-01	991373-01	2017-08-03	2018-08-03

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	SPECTRUM ANALYZER	FSU26	200120	2016-12-05	2017-12-05
ESPEC	Temperature & Humidity Chamber	EL-10KA	09107726	2016-11-22	2017-11-22
Long Wei	DC Power Supply	TPR-6420D	398363	NCR	NCR
Aglient	ESG Vector Signal Generator	E4438C	MY42080875	2017-05-09	2018-05-09
Rohde & Schwarz	Wideband Radio Communication Tester	CMU200	106891	2016-10-18	2017-10-18
Ducommun technologies	RF Cable	RG-214	3	2017-05-22	2017-11-22
WEINSCHTEL	3dB Attenuator	N/A	N/A	2017-05-23	2017-11-22
N/A	Power Splitter	N/A	N/A	2017-05-21	2018-05-21

* Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1307(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ170901004-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H, 24E & Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC § 2.1046, § 22.913 (a) & § 24.232 (c); §27.50 (d) - RF OUTPUT POWER**Applicable Standard**

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §24.232 (C), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

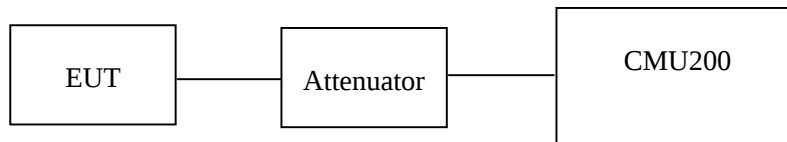
According to §27.50(d), the maximum EIRP must not exceed 1Watts (30dBm) for 1710-1755MHz.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the CMU200 through sufficient attenuation.



Radiated method:

TIA 603-D section 2.2.17

Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-09-08.

Conducted Power**Cellular Band (Part 22H)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	31.84	38.45
	190	836.6	31.96	38.45
	251	848.8	31.54	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.21	31.49	29.75	28.65	38.45
	190	836.6	31.95	31.23	29.48	28.40	38.45
	251	848.8	31.79	31.04	29.30	28.25	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	RMC		21.16	21.49	21.36
		HSDPA	1	20.36	20.58	20.43
			2	20.36	20.49	20.36
			3	20.35	20.50	20.61
			4	20.40	20.55	20.49
		HSUPA	1	20.51	20.57	20.86
			2	20.62	20.69	20.60
			3	20.52	20.52	20.72
			4	20.64	20.70	20.65
			5	20.57	20.71	20.90
		HSPA+	1	20.64	20.72	20.68

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.56	33
	661	1880.0	28.73	33
	810	1909.8	28.57	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.49	27.72	26.05	24.88	33
	661	1880.0	28.58	27.81	26.11	24.98	33
	810	1909.8	28.46	27.73	26.06	24.96	33

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	RMC		22.12	21.41	21.36
		HSDPA	1	21.31	21.11	21.12
			2	21.22	21.28	21.08
			3	21.15	21.07	20.91
			4	21.41	21.27	21.31
		HSUPA	1	20.68	20.85	20.76
			2	20.85	20.57	20.78
			3	20.53	20.98	20.56
			4	20.66	20.87	20.51
			5	20.80	21.05	20.57
		HSPA+	1	21.02	20.98	20.95

AWS Band (Part 27)

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band IV)	Normal	RMC		21.74	21.92	21.54
		HSDPA	1	20.62	20.67	20.72
			2	20.80	20.86	20.72
			3	20.51	20.73	20.57
			4	20.62	20.47	20.90
		HSUPA	1	20.56	20.63	20.77
			2	20.65	20.53	20.74
			3	20.54	20.44	20.89
			4	20.52	20.54	20.87
			5	20.26	20.65	20.78
		HSPA+	1	20.75	20.67	20.68

Peak-to-average ratio (PAR)**Cellular Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.25	13
	Middle	0.17	13
	High	0.19	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.54	13
	Middle	2.62	13
	High	2.56	13
HSDPA (16QAM)	Low	2.47	13
	Middle	2.46	13
	High	2.41	13
HSUPA (BPSK)	Low	2.59	13
	Middle	2.61	13
	High	2.63	13
HSPA+	Low	2.75	13
	Middle	2.86	13
	High	2.67	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.23	13
	Middle	0.25	13
	High	0.24	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.47	13
	Middle	2.51	13
	High	2.46	13
HSDPA (16QAM)	Low	2.38	13
	Middle	2.36	13
	High	2.37	13
HSUPA (BPSK)	Low	2.35	13
	Middle	2.39	13
	High	3.11	13
HSPA+	Low	2.77	13
	Middle	2.78	13
	High	2.68	13

AWS Band

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (BPSK)	Low	2.25	13
	Middle	2.31	13
	High	2.39	13
HSDPA (16QAM)	Low	2.41	13
	Middle	2.49	13
	High	2.44	13
HSUPA (BPSK)	Low	2.22	13
	Middle	2.27	13
	High	2.34	13
HSPA+	Low	2.66	13
	Middle	2.72	13
	High	2.86	13

Radiated Power**GSM Mode:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H/24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
ERP for Cellular Band (Part 22H), Middle Channel										
836.6	76.47	71	1.0	H	16.4	0.6	0.0	15.8	38.45	22.65
836.6	88.92	183	2.3	V	29.7	0.6	0.0	29.1	38.45	9.35
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	90.17	191	1.4	H	20.1	1.30	8.50	27.30	33	5.7
1880.00	86.35	175	2.3	V	16.1	1.30	8.50	23.30	33	9.7

WCDMA Mode:

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 22H/24E/27	
			Height (m)	Polar (H/V)	Level (dBm)	Cable loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
ERP for WCDMA Band V (Part 22H), Middle Channel										
836.6	74.26	253	1.0	H	14.2	0.6	0.0	13.6	38.45	24.85
836.6	80.14	141	1.5	V	20.9	0.6	0.0	20.3	38.45	18.15
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	83.62	336	2.0	H	13.6	1.30	8.50	20.80	33	12.2
1880.00	84.35	110	2.2	V	14.1	1.30	8.50	21.30	33	11.7
EIRP for WCDMA Band IV (Part 27), Middle Channel										
1732.60	80.59	236	1.3	H	10.5	1.30	8.50	17.70	30	12.30
1732.60	83.97	217	2.1	V	13.7	1.30	8.50	20.90	30	9.10

Note:

All above data were tested with no amplifier.

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53 - OCCUPIED BANDWIDTH

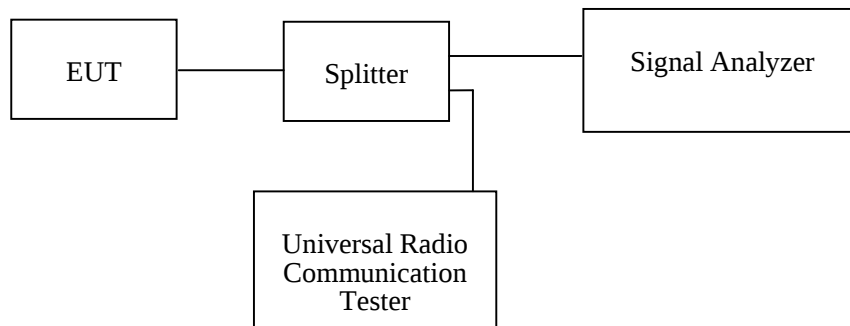
Applicable Standard

FCC 47 §2.1049, §22.917, §22.905, §24.238 and §27.53.

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 5 kHz (GSM) & 100 kHz (WCDMA) and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-09-06.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables and plots.

Cellular Band (Part 22H)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	246.79	323.72

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.151	4.696
HSUPA (BPSK)	836.6	4.167	4.679
HSDPA (16QAM)	836.6	4.151	4.696

PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	243.59	320.51

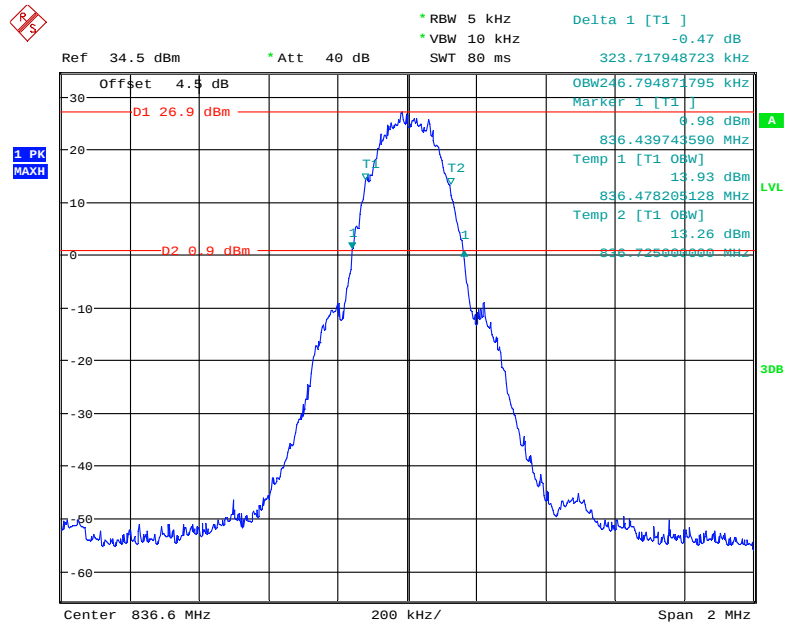
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.167	4.696
HSUPA (BPSK)	1880.0	4.167	4.679
HSDPA (16QAM)	1880.0	4.151	4.696

AWS Band (Part 27)

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1732.6	4.151	4.696
HSUPA (BPSK)	1732.6	4.167	4.679
HSDPA (16QAM)	1732.6	4.167	4.696

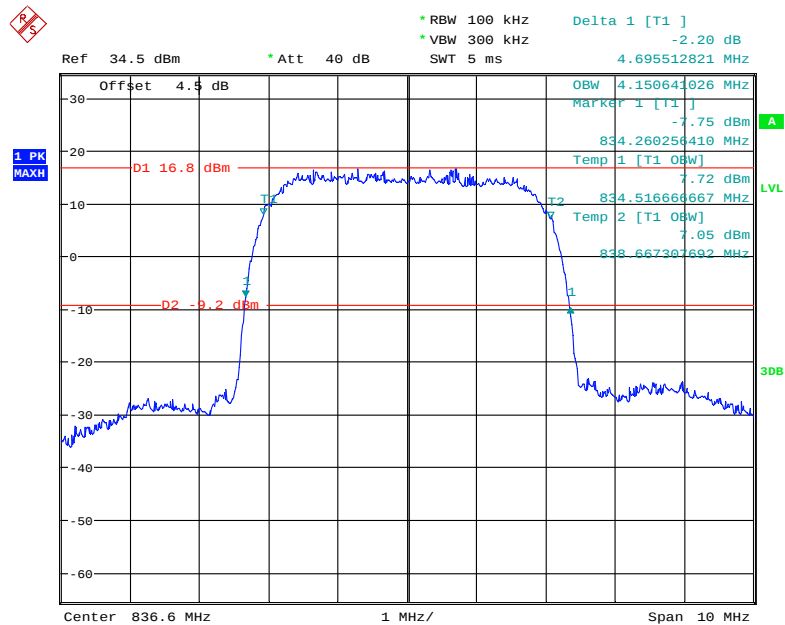
Cellular Band (Part 22H)

26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode

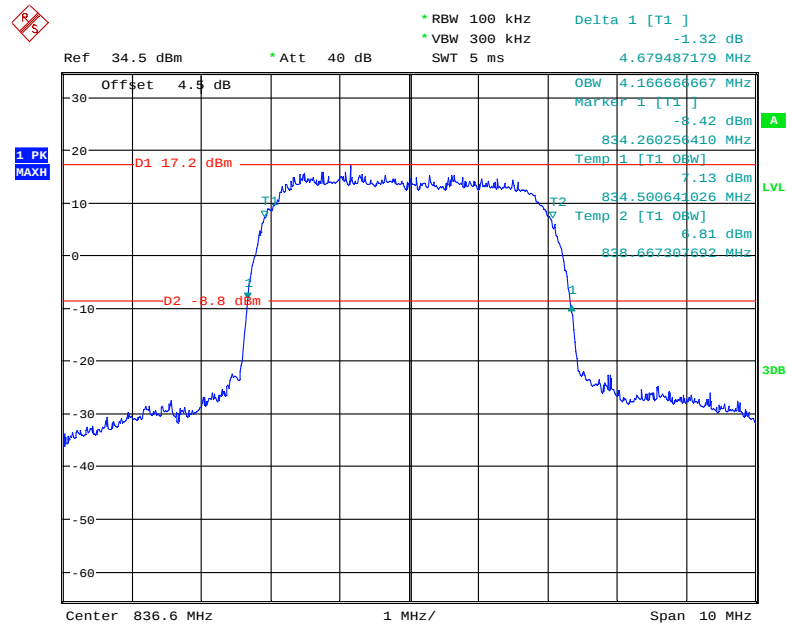


Date: 6.SEP.2017 19:12:40

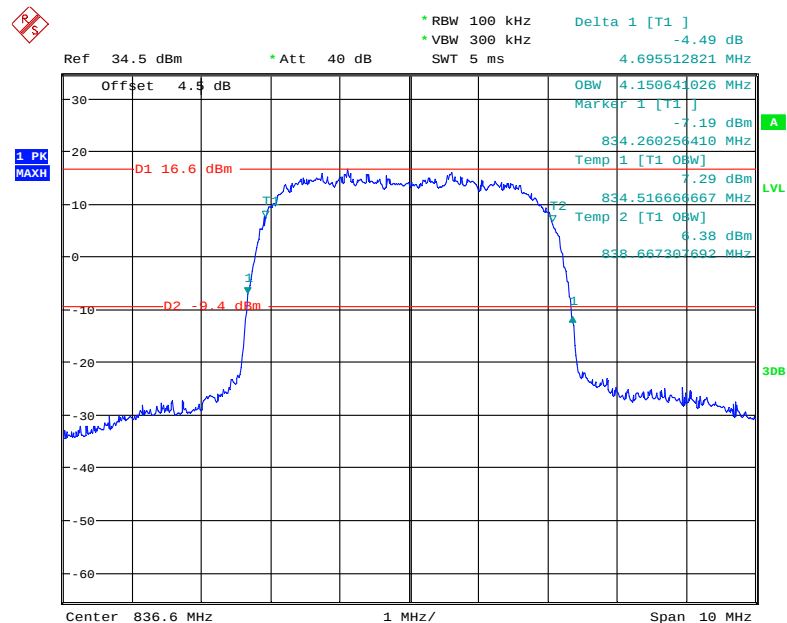
26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode



Date: 6.SEP.2017 21:28:32

26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode

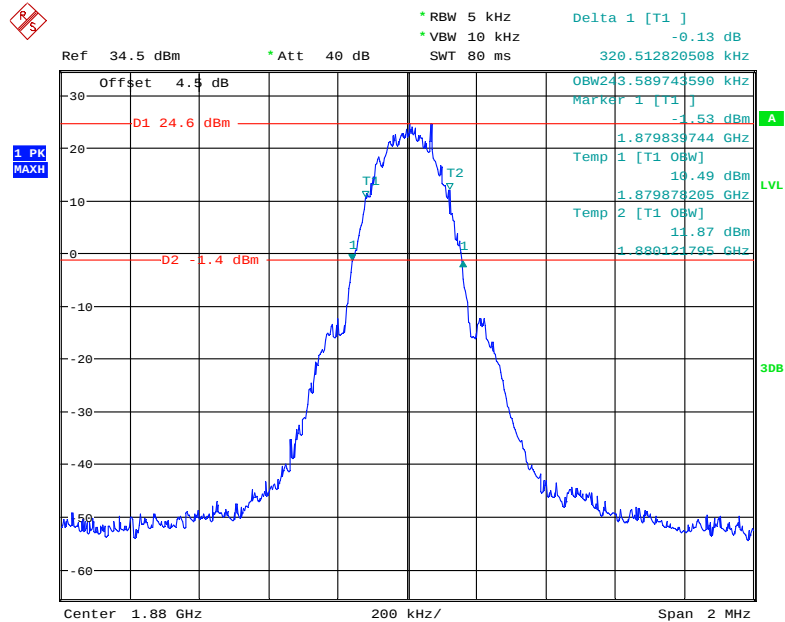
Date: 6.SEP.2017 21:35:43

26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode

Date: 6.SEP.2017 21:40:33

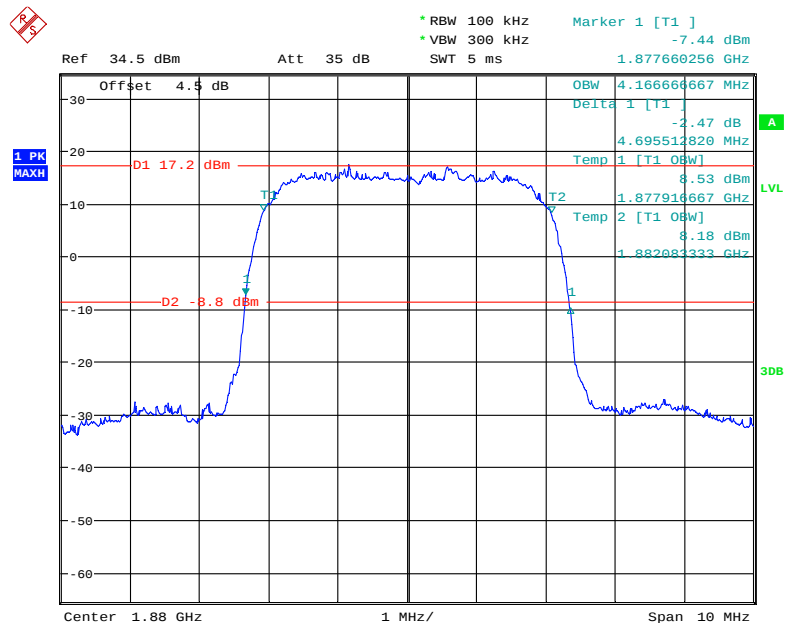
PCS Band (Part 24E)

26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode



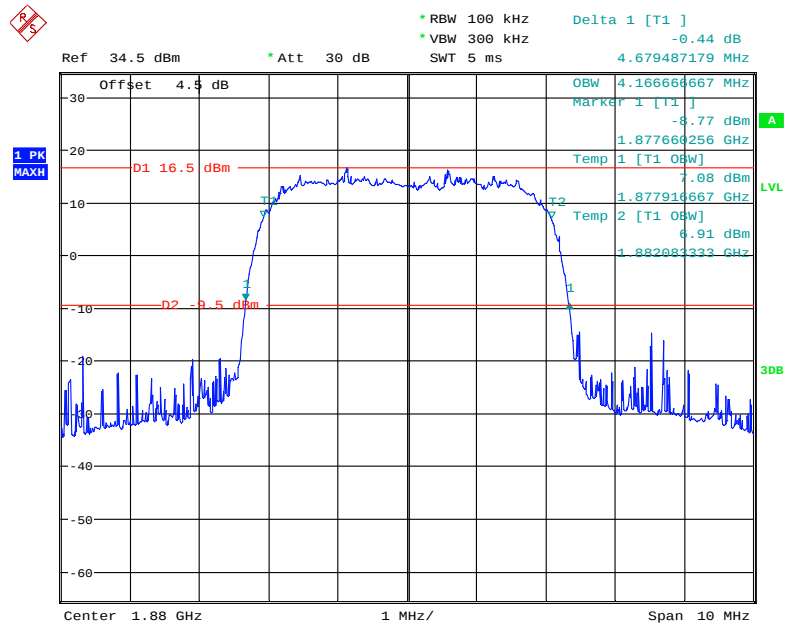
Date: 6.SEP.2017 19:37:05

26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode



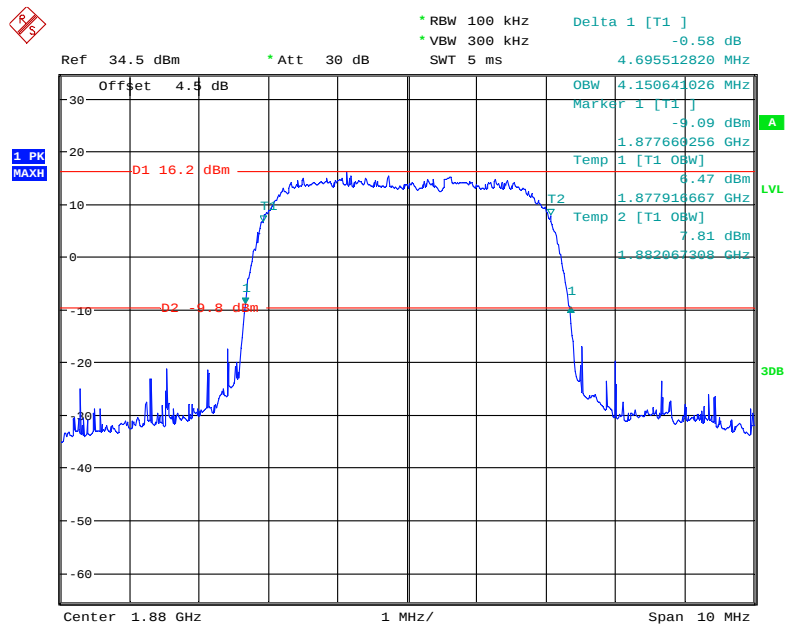
Date: 6.SEP.2017 20:55:04

26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode

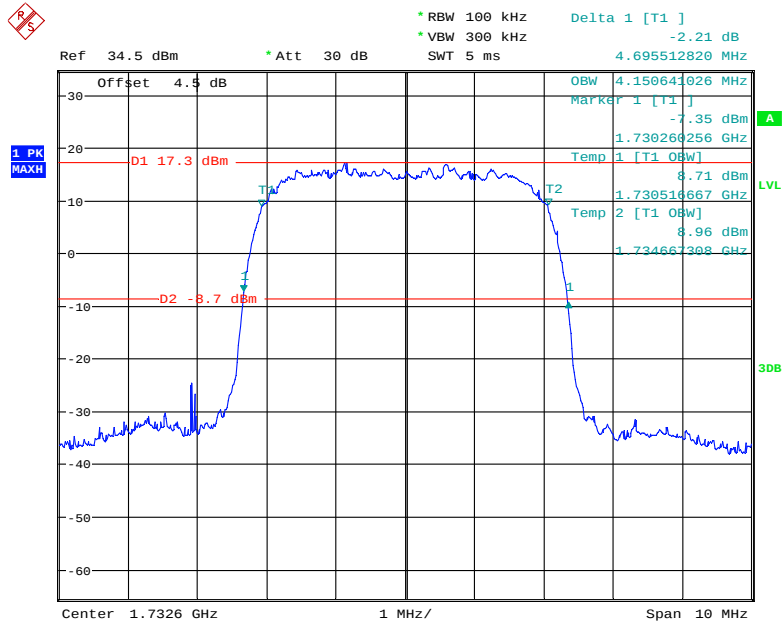


Date: 6.SEP.2017 21:02:06

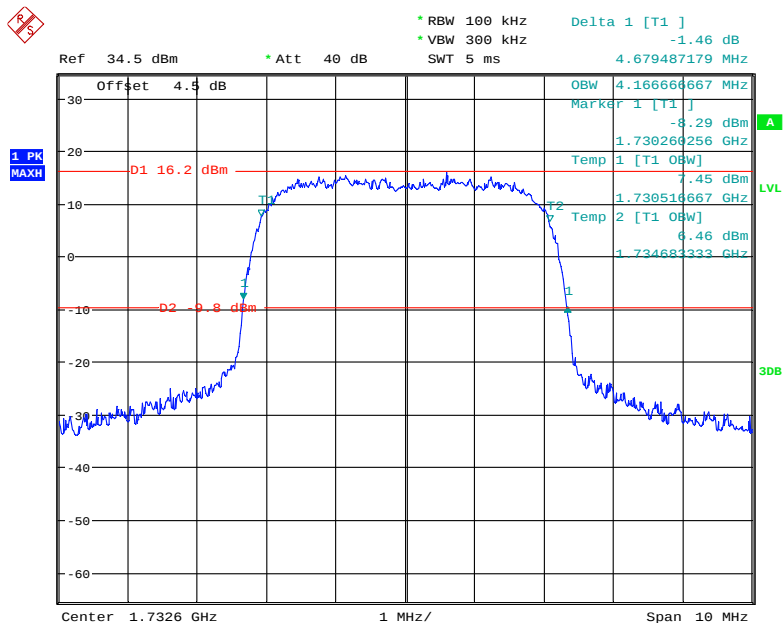
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



Date: 6.SEP.2017 21:05:57

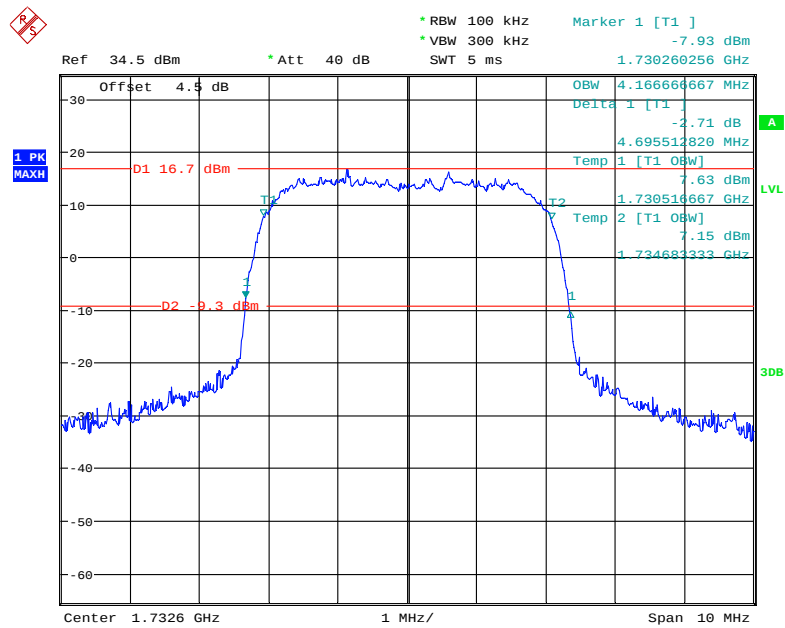
AWS Band (Part 27)**26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode**

Date: 6.SEP.2017 21:13:15

26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode

Date: 6.SEP.2017 21:43:36

26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



Date: 6.SEP.2017 21:21:01

FCC §2.1051, §22.917(a) & §24.238(a); §27.53 (h) (m) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

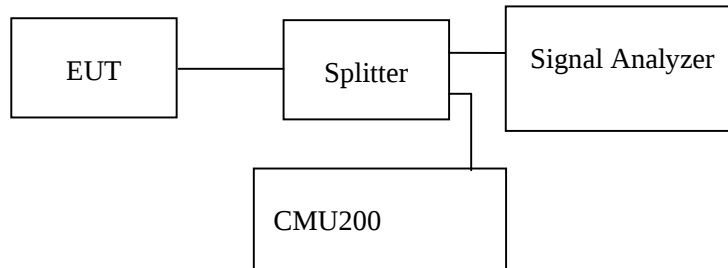
Applicable Standard

FCC §2.1051, §22.917(a) and §24.238(a) and §27.53(h) (m).

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 100kHz for below 1GHz and 1MHz for above 1GHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

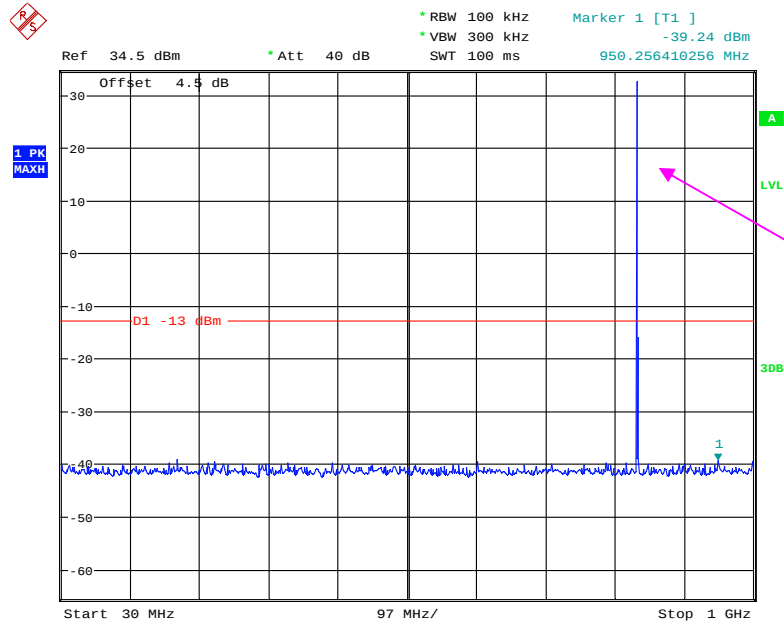
The testing was performed by Dylan Li on 2017-09-06

EUT operation mode: Transmitting

Test result: Compliance, please refer to the following plots.

Cellular Band (Part 22H)

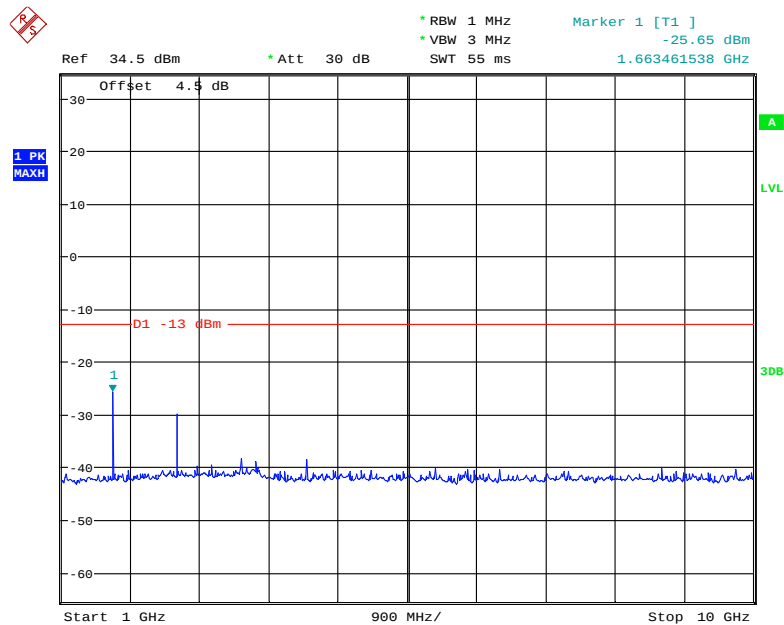
30 MHz – 1 GHz (GSM Mode)



Fundamental test

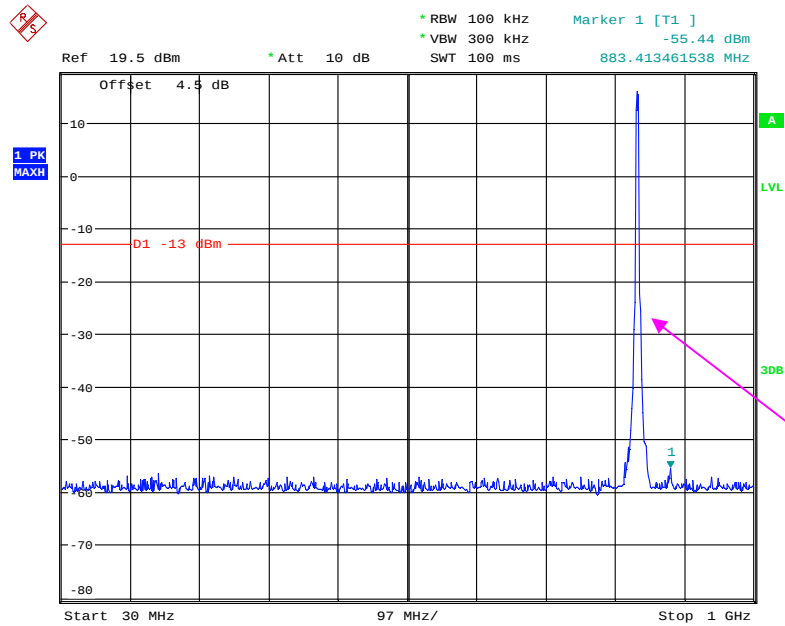
Date: 6.SEP.2017 19:18:18

1 GHz – 10 GHz (GSM Mode)



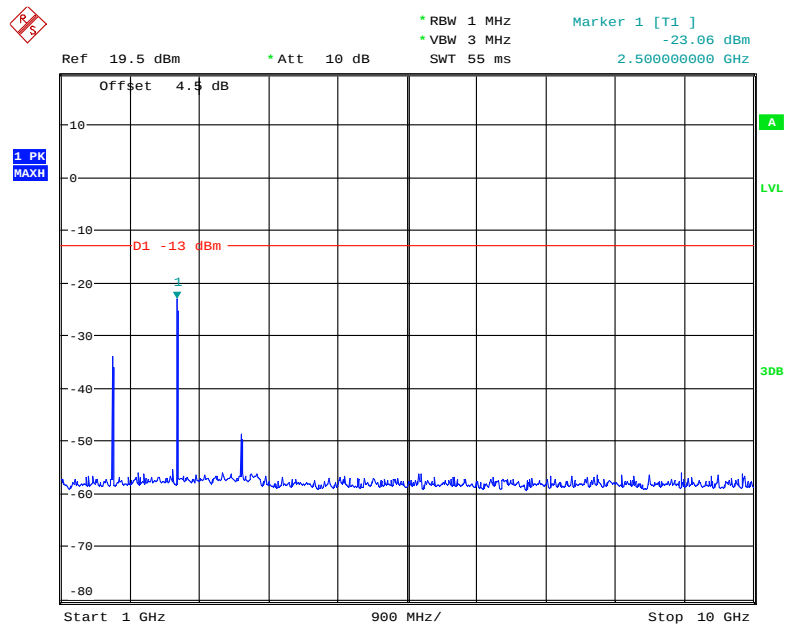
Date: 6.SEP.2017 19:19:00

30 MHz – 1 GHz (WCDMA Mode)



Date: 6.SEP.2017 21:31:28

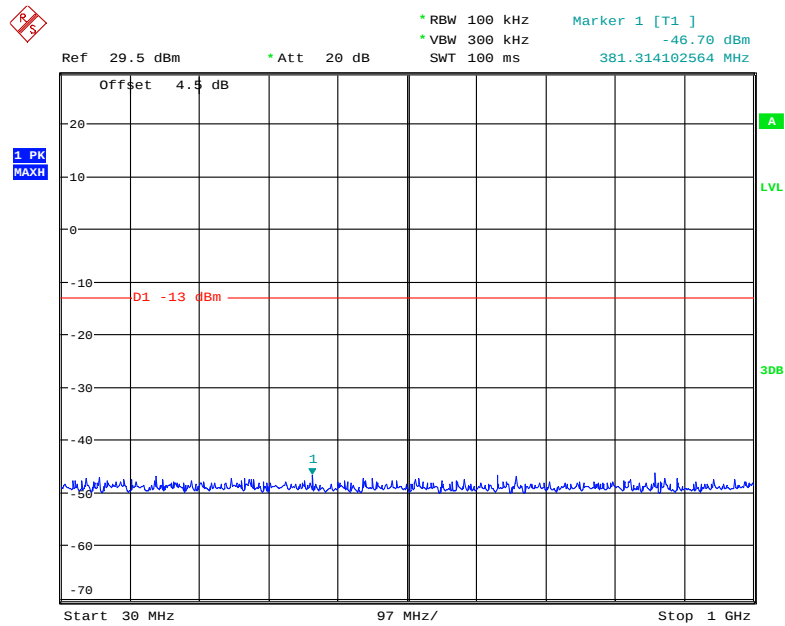
1 GHz – 10 GHz (WCDMA Mode)



Date: 6.SEP.2017 21:31:54

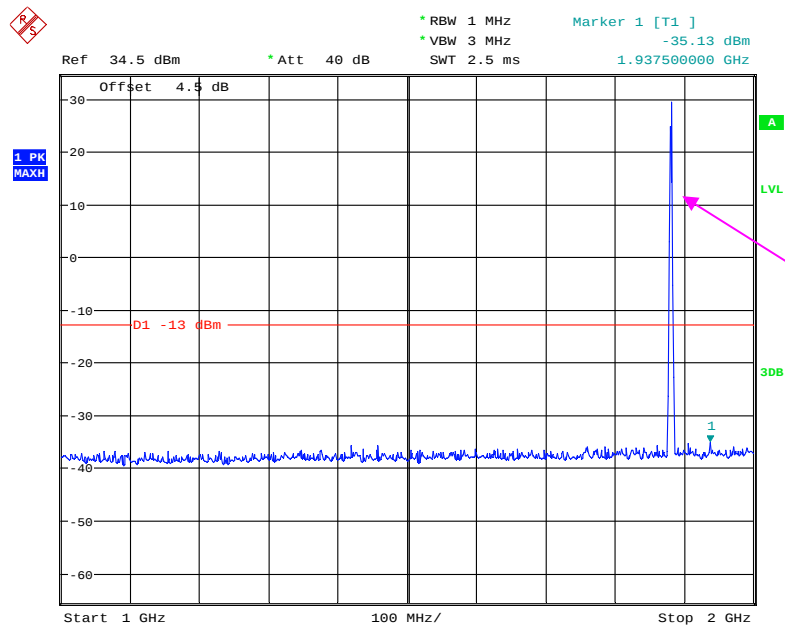
PCS Band (Part 24E)

30 MHz – 1 GHz (GSM Mode)



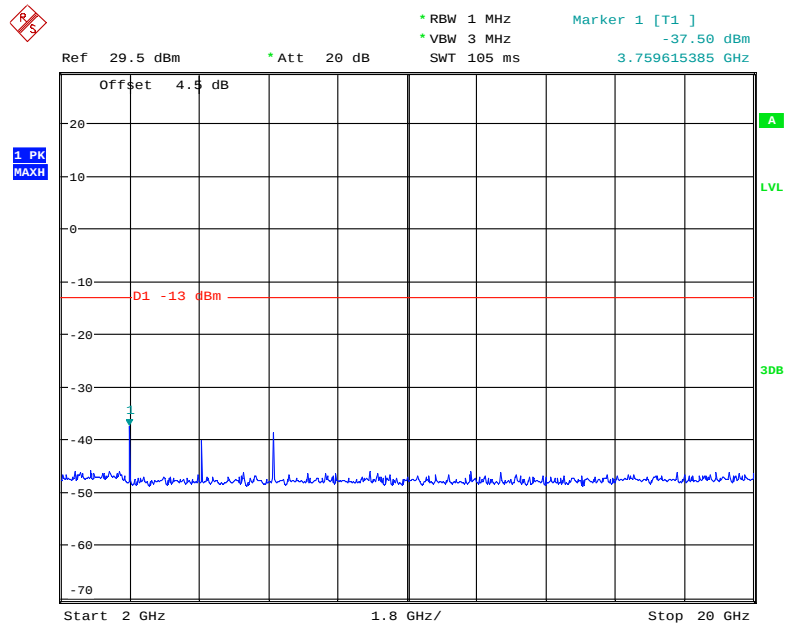
Date: 6.SEP.2017 19:33:59

1 GHz – 2 GHz (GSM Mode)

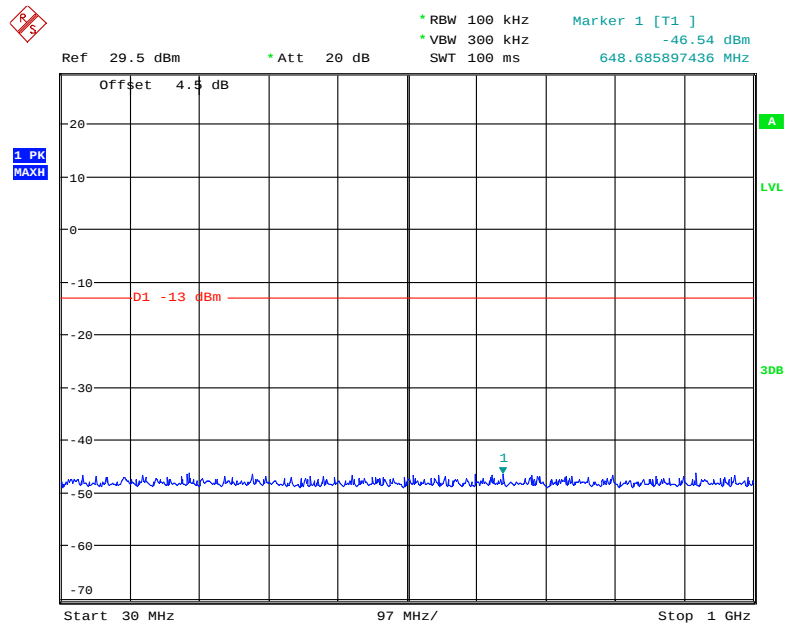


Fundamental test

Date: 6.SEP.2017 19:33:15

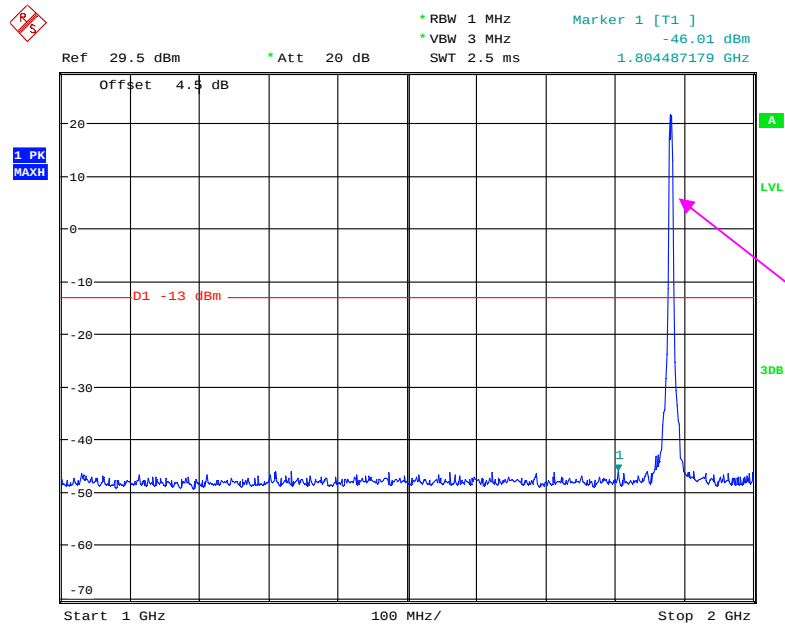
2 GHz – 20 GHz (GSM Mode)

Date: 6.SEP.2017 19:32:28

30 MHz – 1 GHz (WCDMA Mode)

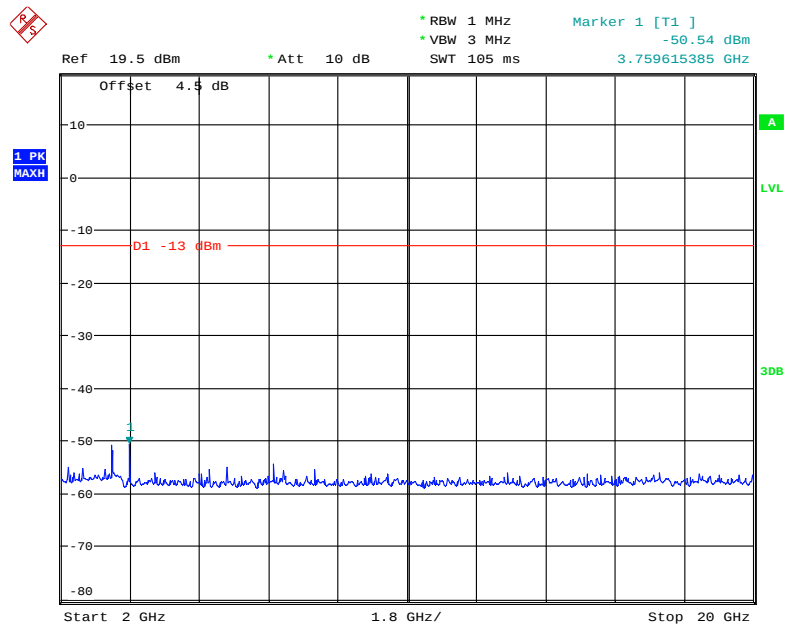
Date: 6.SEP.2017 20:58:07

1 GHz – 2 GHz (WCDMA Mode)



Date: 6.SEP.2017 20:59:38

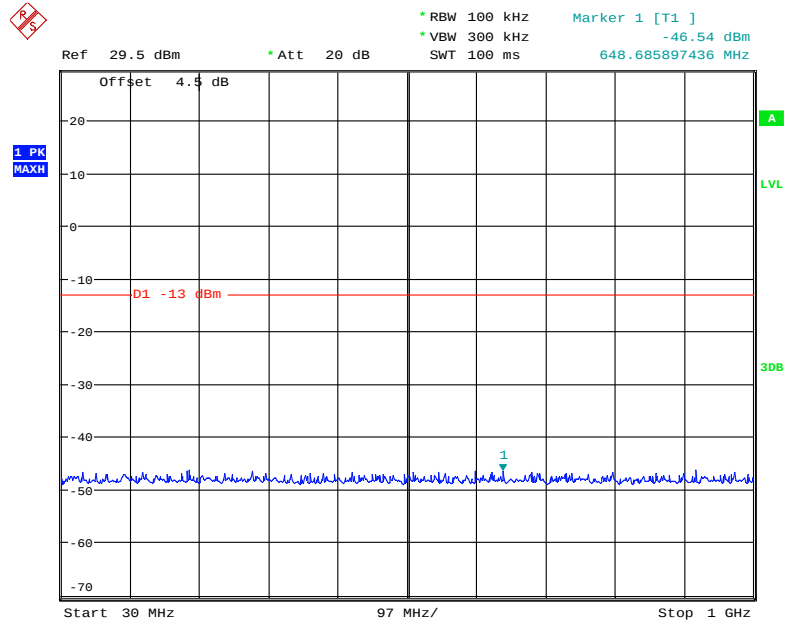
2 GHz – 20 GHz (WCDMA Mode)



Date: 6.SEP.2017 21:00:12

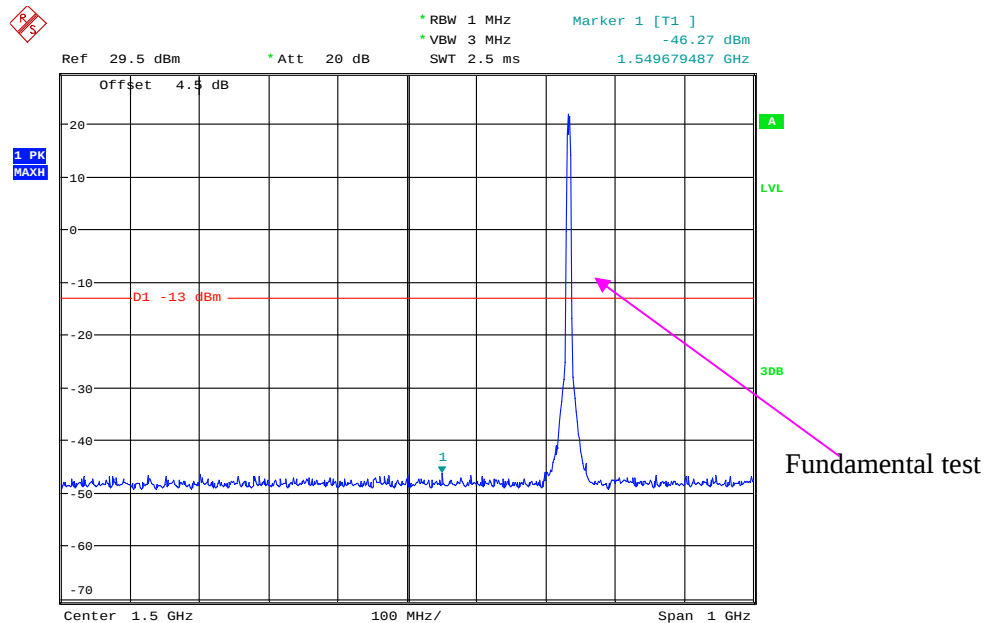
AWS Band (Part 27)

30 MHz – 1 GHz (WCDMA Mode)



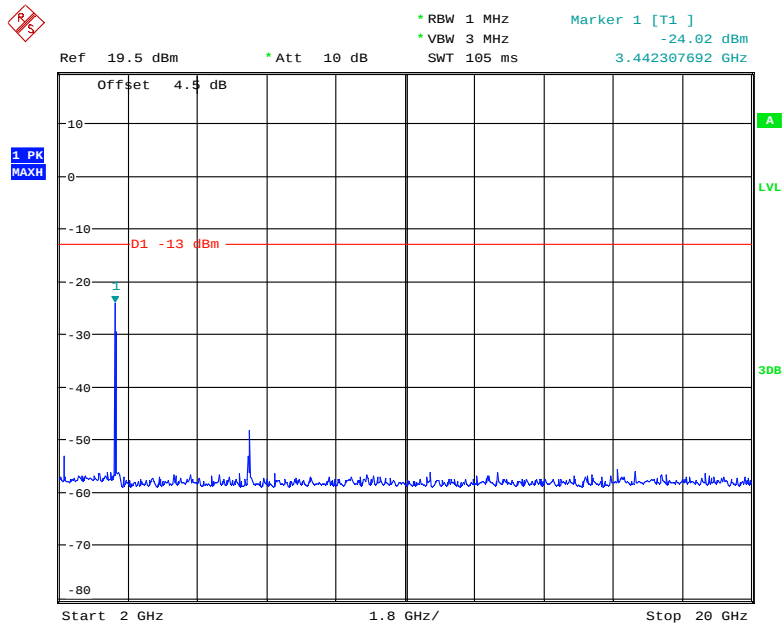
Date: 6.SEP.2017 20:58:07

1 GHz – 2 GHz (WCDMA Mode)



Date: 6.SEP.2017 21:17:17

2 GHz – 20 GHz (WCDMA Mode)



Date: 6.SEP.2017 21:18:02

FCC § 2.1053; § 22.917 (a); § 24.238 (a); § 27.53 (h)(m) SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, § 22.917(a) and § 24.238(a) and § 27.53(h)(m)

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 receiving 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 = $10 \lg (\text{TX pwr in Watts}/0.001)$ – the absolute level

Spurious attenuation limit in dB = $43 + 10 \log_{10} (\text{power out in Watts})$

Spurious attenuation limit in dB = $55 + 10 \log_{10} (\text{power out in Watts})$

Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-09-06.

EUT operation mode: Transmitting

Pre-scan with Low, Middle and High channel, the worst case as below:

30 MHz ~ 10 GHz:

Cellular Band (Part 22H)

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
GSM Mode, middle channel										
328.56	35.64	299	1.9	V	-59.4	0.38	0.0	-59.78	-13	46.78
328.56	33.89	111	2.4	H	-61.1	0.38	0.0	-61.48	-13	48.48
1673.20	80.10	146	1.4	H	-27.0	1.30	9.10	-19.20	-13	6.20
1673.20	80.31	50	1.9	V	-26.2	1.30	9.10	-18.40	-13	5.40
2509.80	75.45	299	2.1	H	-28.1	2.60	9.30	-21.40	-13	8.40
2509.80	73.89	176	1.9	V	-29.0	2.60	9.30	-22.30	-13	9.30
3346.40	61.86	257	2.0	H	-38.5	1.50	9.60	-30.40	-13	17.40
3346.40	62.44	226	1.7	V	-37.9	1.50	9.60	-29.80	-13	16.80
WCDMA Mode, middle channel										
331.25	34.85	327	1.7	V	-60.2	0.38	0.0	-60.58	-13	47.58
331.25	33.47	101	2.3	H	-61.5	0.38	0.0	-61.88	-13	48.88
1673.20	70.10	357	1.2	H	-37.0	1.30	9.10	-29.20	-13	16.20
1673.20	68.20	280	2.1	V	-38.3	1.30	9.10	-30.50	-13	17.50
2509.80	59.14	247	1.2	H	-44.4	2.60	9.30	-37.70	-13	24.70
2509.80	55.33	161	1.2	V	-47.6	2.60	9.30	-40.90	-13	27.90
3346.40	58.76	284	1.1	H	-41.6	1.50	9.60	-33.50	-13	20.50
3346.40	53.77	209	1.5	V	-46.6	1.50	9.60	-38.50	-13	25.50

30 MHz ~ 20 GHz:**PCS Band (Part 24E)**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
GSM Mode, middle channel										
328.56	35.14	241	1.8	V	-59.9	0.38	0.0	-60.28	-13	47.28
328.56	33.47	215	2.1	H	-61.5	0.38	0.0	-61.88	-13	48.88
3760.00	78.32	125	1.4	H	-22.9	1.50	9.70	-14.70	-13	1.70
3760.00	74.25	101	1.0	V	-26.5	1.50	9.70	-18.30	-13	5.30
WCDMA Mode, Middle channel										
331.25	34.56	143	2.2	V	-60.4	0.38	0.0	-60.78	-13	47.78
331.25	32.85	189	1.9	H	-62.2	0.38	0.0	-62.58	-13	49.58
3760.00	56.13	360	1.9	H	-45.1	1.50	9.70	-36.90	-13	23.90
3760.00	55.13	135	2.0	V	-45.6	1.50	9.70	-37.40	-13	24.40

30 MHz ~ 18 GHz:**AWS Band (Part 27)**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
WCDMA Mode										
331.25	35.19	157	1.7	V	-59.8	0.38	0.0	-60.18	-13	47.18
331.25	33.78	27	2.2	H	-61.2	0.38	0.0	-61.58	-13	48.58
3465.20	61.72	212	1.8	H	-38.7	1.50	9.70	-30.50	-13	17.50
3465.20	60.69	258	1.1	V	-40.5	1.50	9.70	-32.30	-13	19.30

Note:

1) Absolute Level = Substituted Level - Cable loss + Antenna Gain

2) Margin = Limit- Absolute Level

FCC § 22.917 (a); § 24.238 (a); §27.53 (h)(m) - BAND EDGES**Applicable Standard**

According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

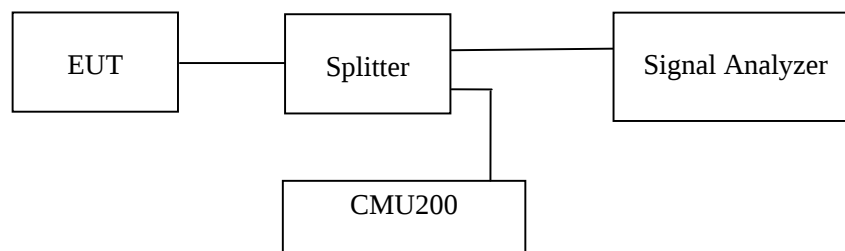
According to §24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to FCC §27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency

**Test Data****Environmental Conditions**

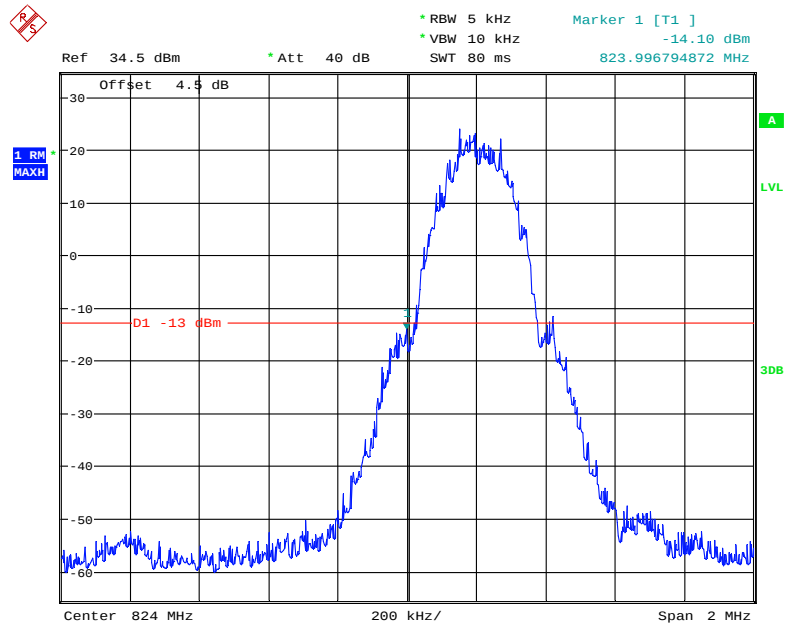
Temperature:	25 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-09-06.

EUT operation mode: Transmitting

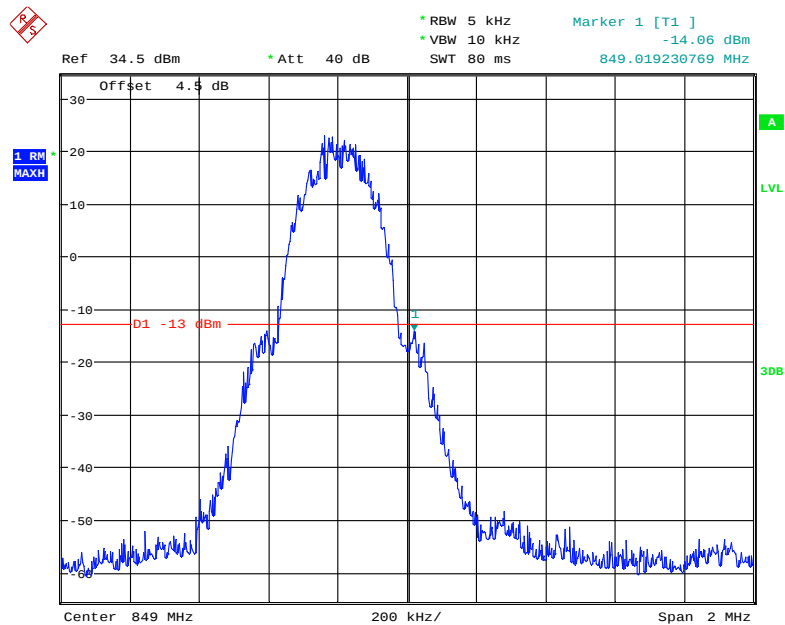
Test Result: Compliance. Please refer to the following plots.

Cellular Band, Left Band Edge for GSM (GMSK) Mode



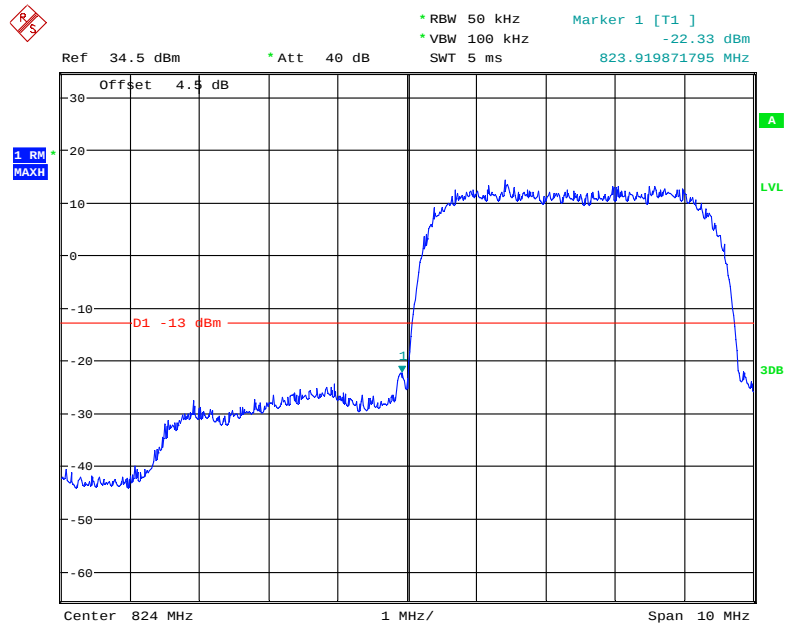
Date: 6.SEP.2017 19:15:50

Cellular Band, Right Band Edge for GSM (GMSK) Mode



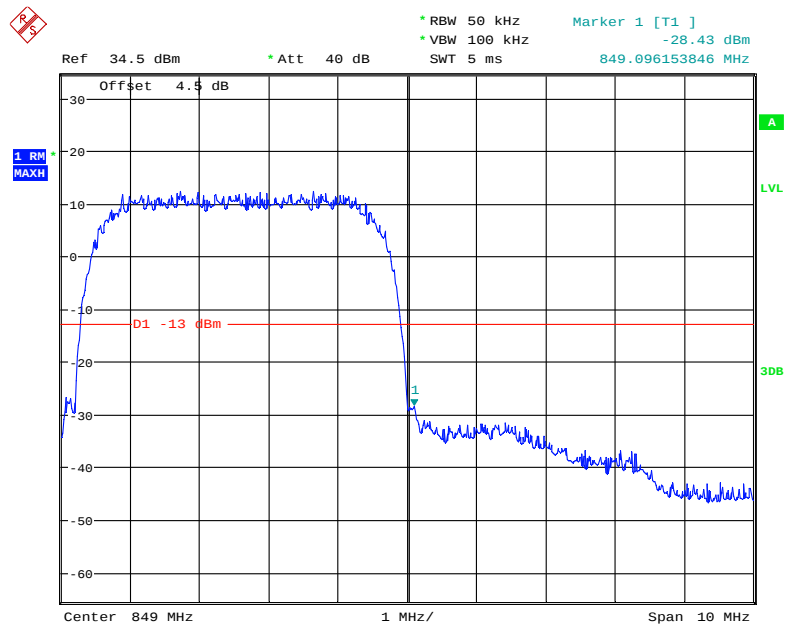
Date: 6.SEP.2017 19:16:43

Cellular Band, Left Band Edge for WCDMA (BPSK) Mode



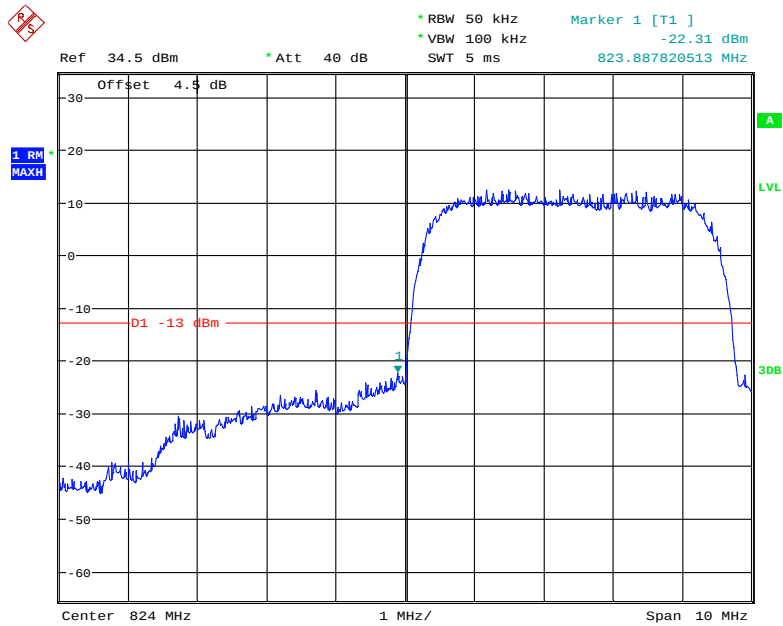
Date: 6.SEP.2017 21:29:52

Cellular Band, Right Band Edge for WCDMA (BPSK) Mode



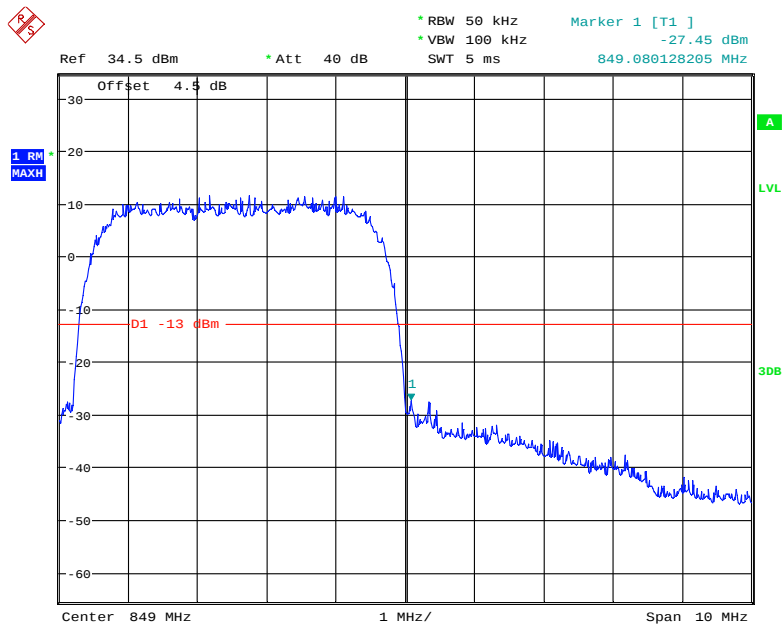
Date: 6.SEP.2017 21:30:27

Cellular Band, Left Band Edge for HSDPA (16QAM) Mode



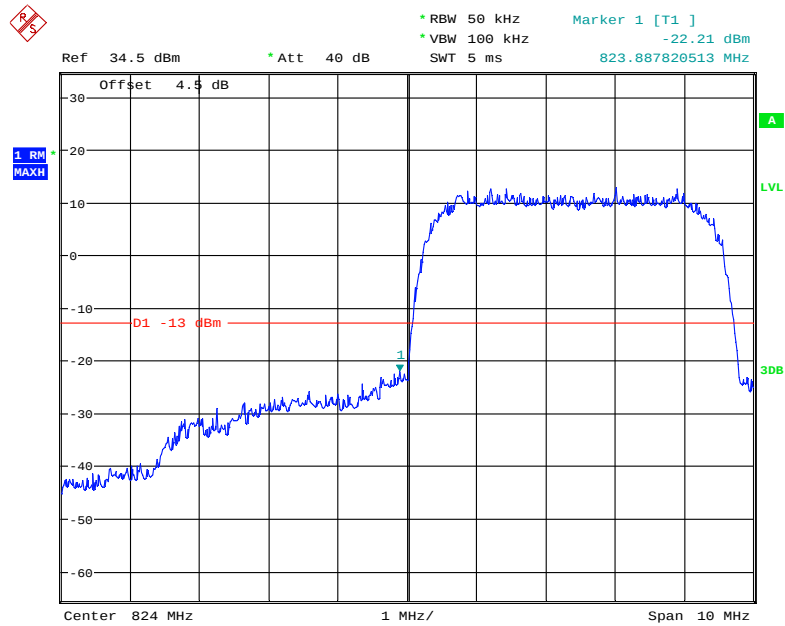
Date: 6.SEP.2017 21:38:25

Cellular Band, Right Band Edge for HSDPA (16QAM) Mode



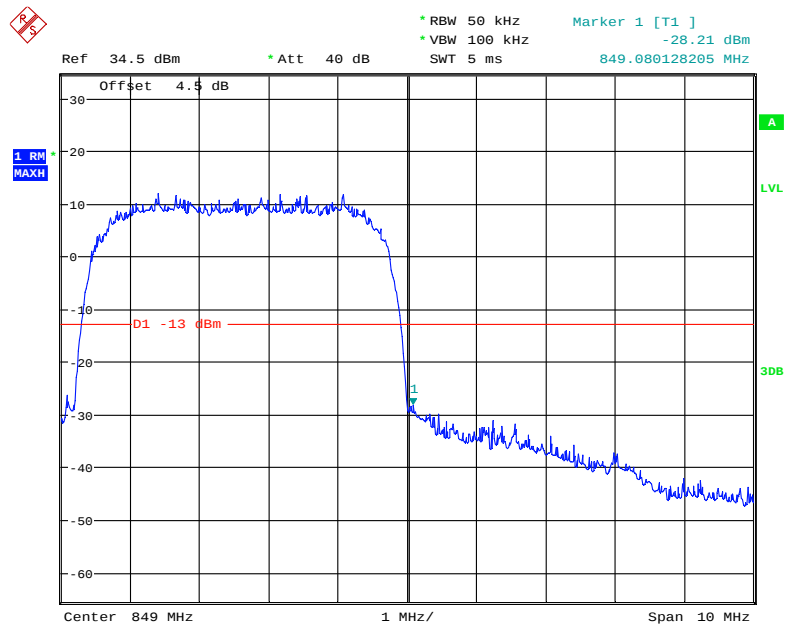
Date: 6.SEP.2017 21:37:52

Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



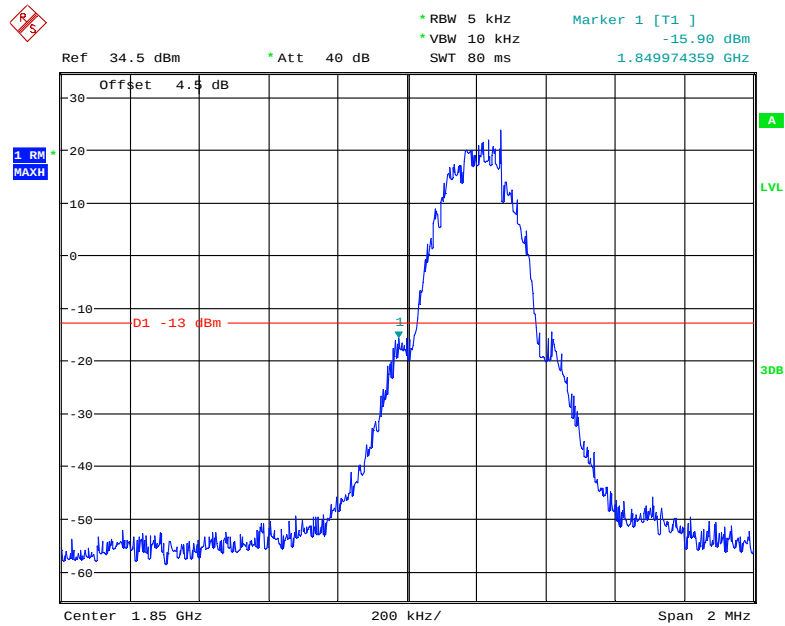
Date: 6.SEP.2017 21:36:33

Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



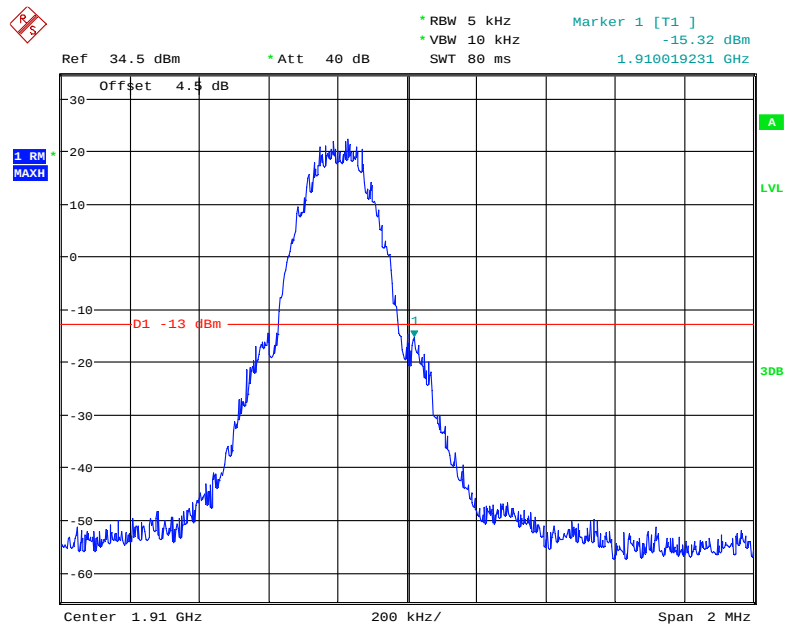
Date: 6.SEP.2017 21:37:03

PCS Band, Left Band Edge for GSM (GMSK) Mode



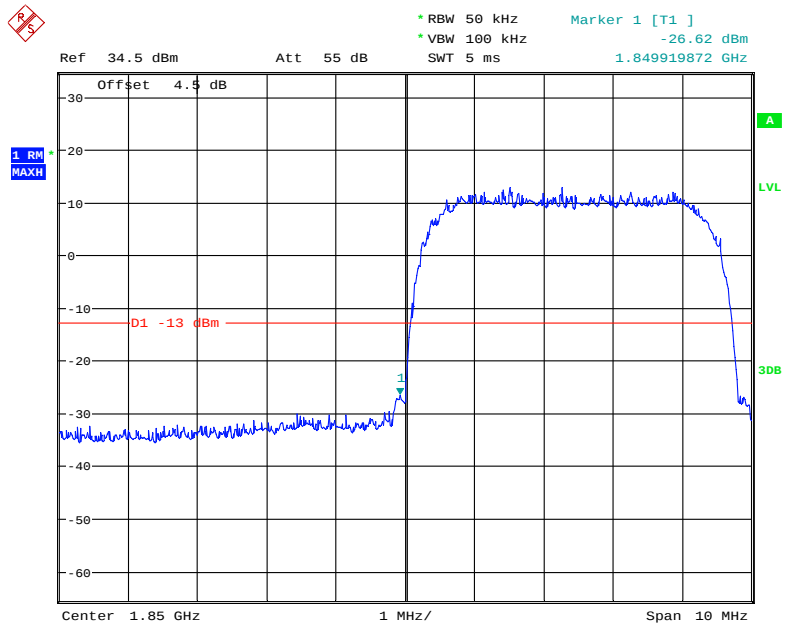
Date: 6.SEP.2017 19:38:56

PCS Band, Right Band Edge for GSM (GMSK) Mode



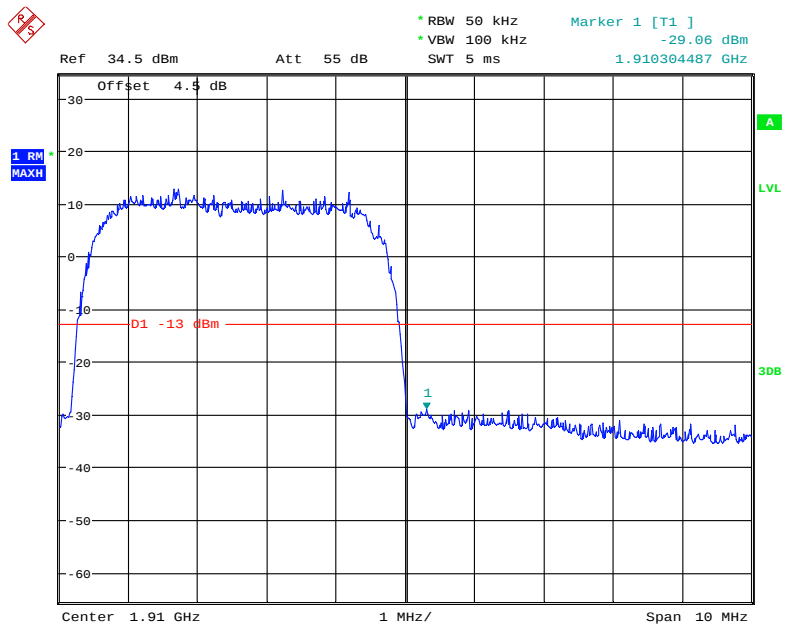
Date: 6.SEP.2017 19:39:32

PCS Band, Left Band Edge for WCDMA (BPSK) Mode



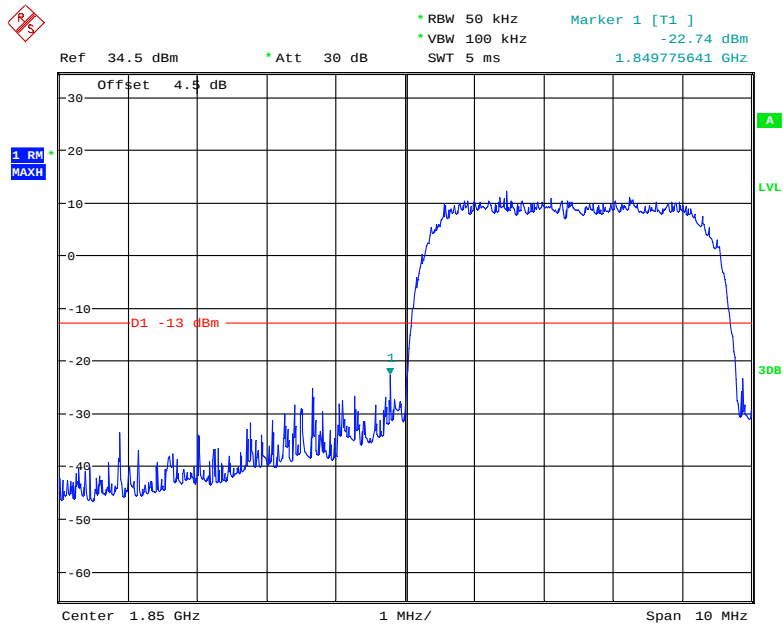
Date: 6.SEP.2017 20:56:12

PCS Band, Right Band Edge for WCDMA (BPSK) Mode



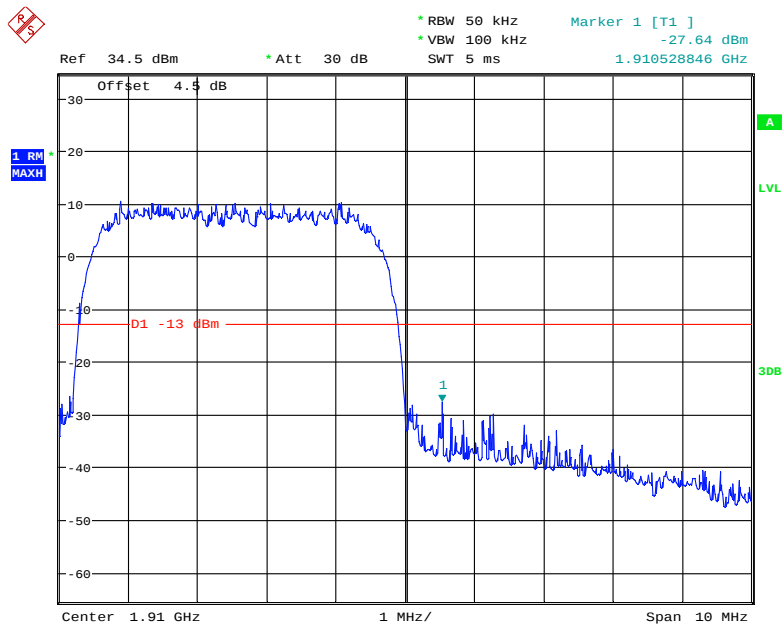
Date: 6.SEP.2017 20:56:45

PCS Band, Left Band Edge for HSDPA (16QAM) Mode



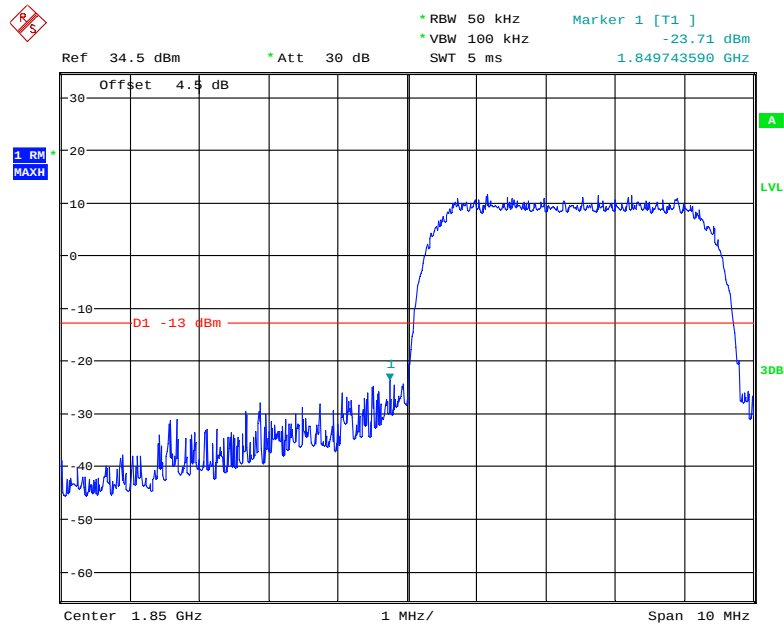
Date: 6.SEP.2017 21:04:45

PCS Band, Right Band Edge for HSDPA (16QAM) Mode



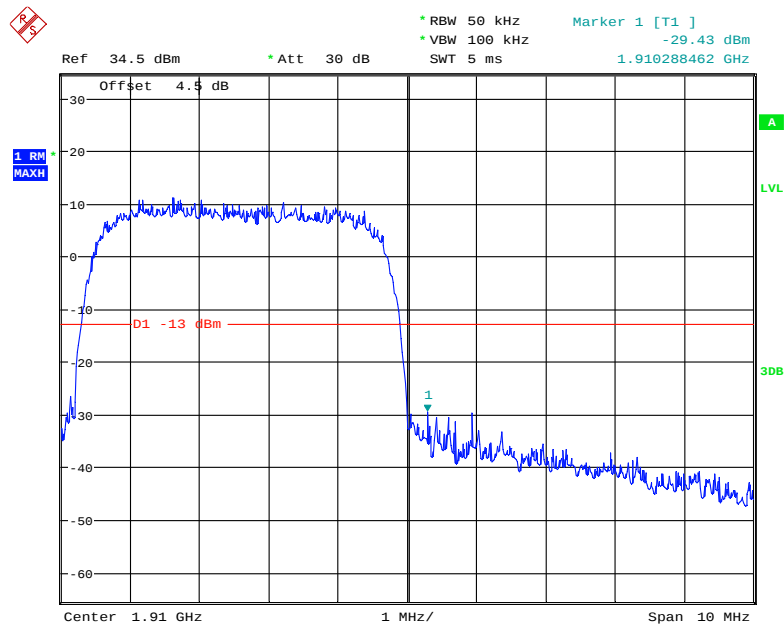
Date: 6.SEP.2017 21:04:15

PCS Band, Left Band Edge for HSUPA (BPSK) Mode



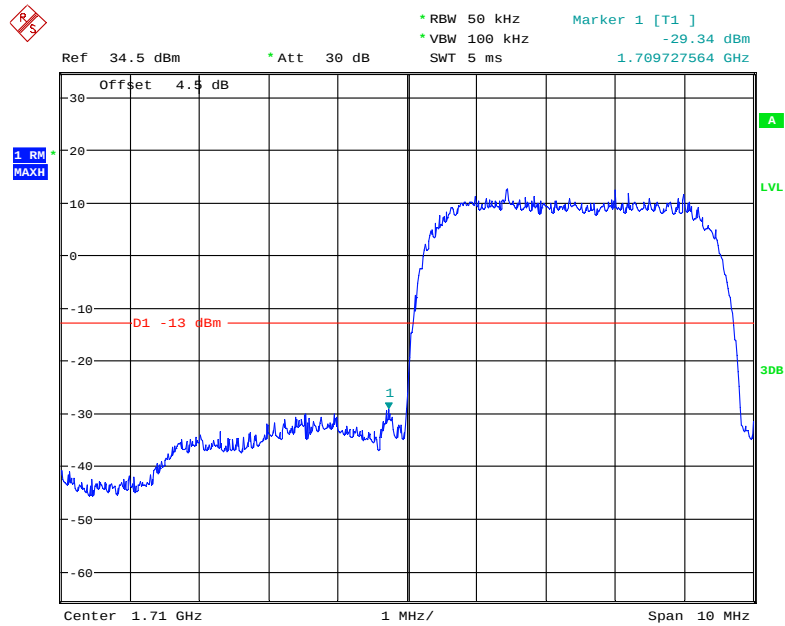
Date: 6.SEP.2017 21:03:08

PCS Band, Right Band Edge for HSUPA (BPSK) Mode



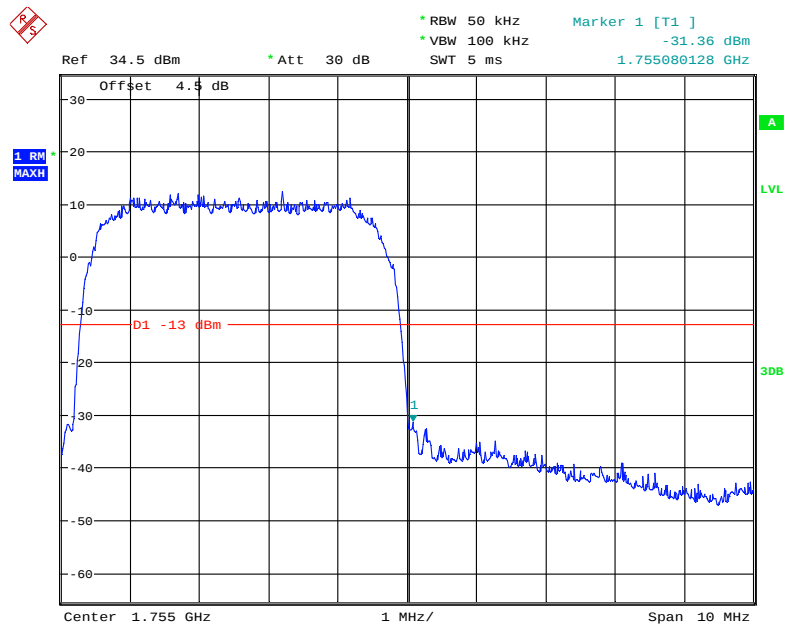
Date: 6.SEP.2017 21:03:33

AWS Band, Left Band Edge for RMC (BPSK) Mode



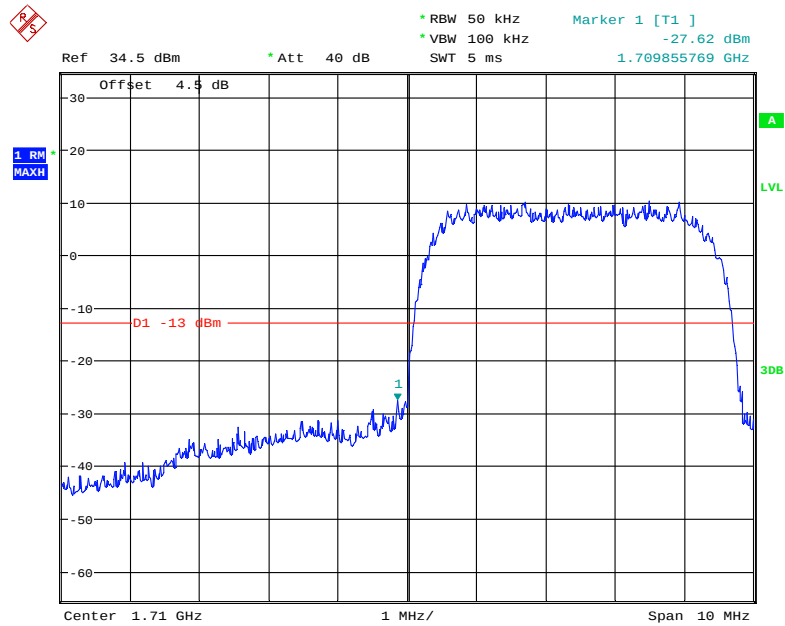
Date: 6.SEP.2017 21:14:38

AWS Band, Right Band Edge for RMC (BPSK) Mode



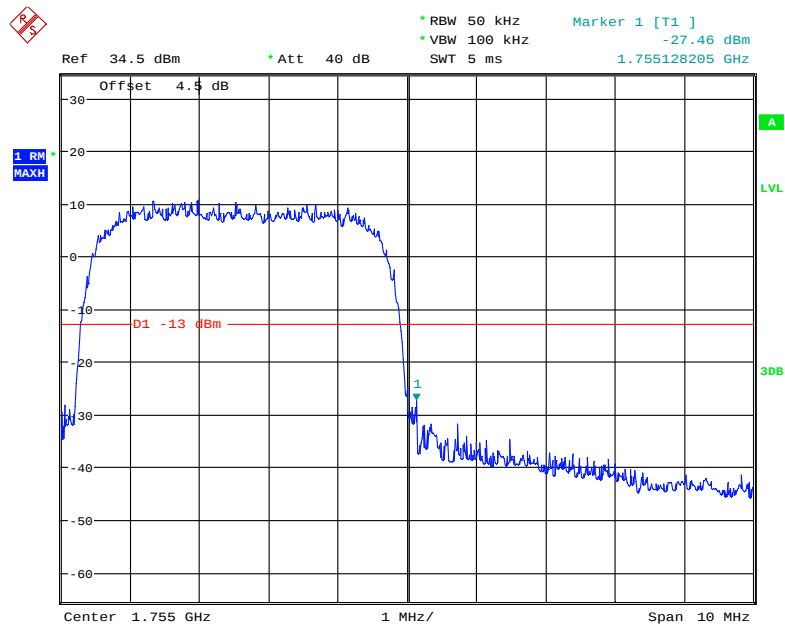
Date: 6.SEP.2017 21:15:17

AWS Band, Left Band Edge for HSDPA (16QAM) Mode



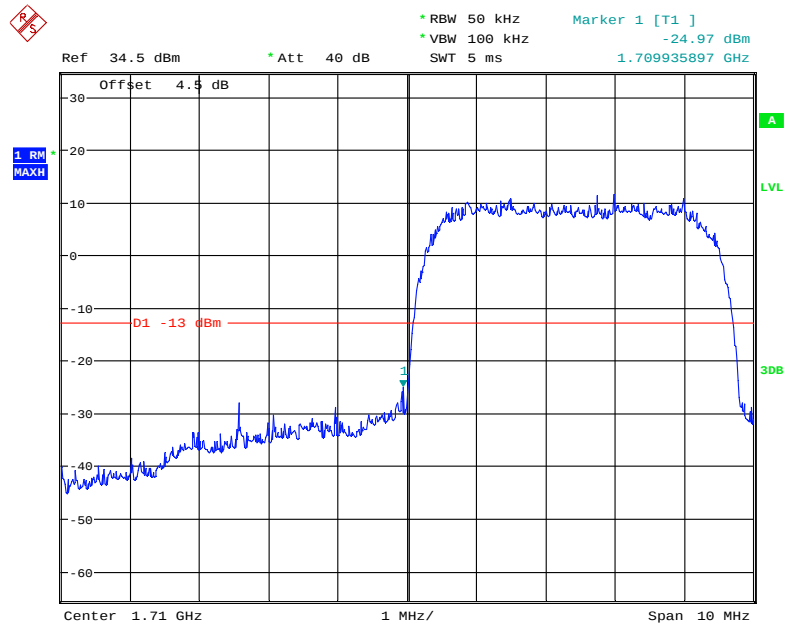
Date: 6.SEP.2017 21:21:48

AWS Band, Right Band Edge for HSDPA (16QAM) Mode



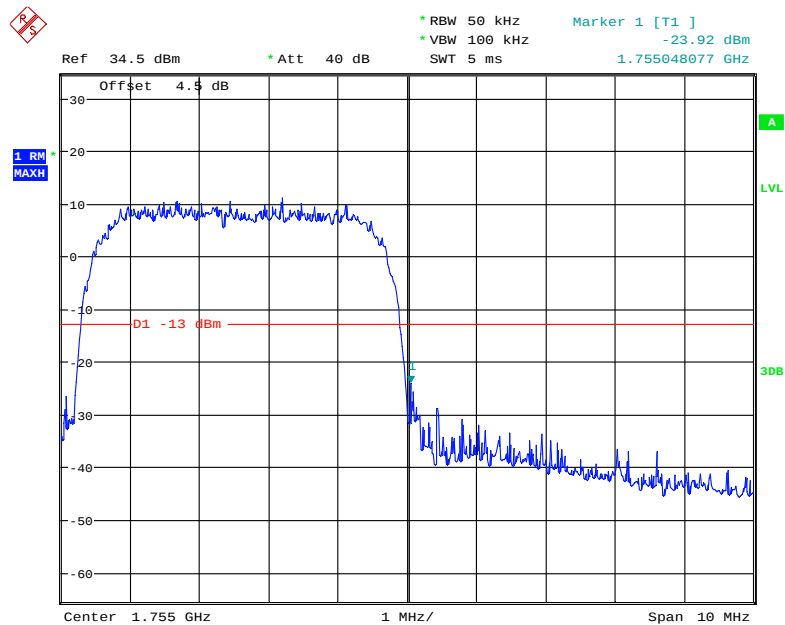
Date: 6.SEP.2017 21:22:25

AWS Band, Left Band Edge for HSUPA (BPSK) Mode



Date: 6.SEP.2017 21:23:36

AWS Band, Right Band Edge for HSUPA (BPSK) Mode



Date: 6.SEP.2017 21:23:02

FCC § 2.1055; § 22.355; § 24.235; §27.54; - FREQUENCY STABILITY**Applicable Standard**

FCC § 2.1055, §22.355, §24.235 and §27.54.

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

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

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

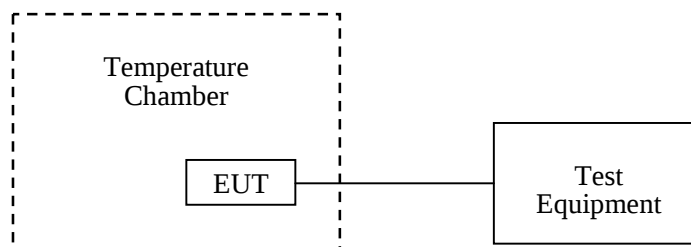
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external DC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The DC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



Test Data**Environmental Conditions**

Temperature:	26 °C
Relative Humidity:	56 %
ATM Pressure:	101.0 kPa

The testing was performed by Dylan Li on 2017-09-06.

EUT operation mode: Transmitting

Test Result: Compliance. Please refer to the following tables.

Cellular Band (Part 22H)**GSM Mode**

Middle Channel, $f_0=836.6\text{MHz}$				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-6	-0.007172	2.5
-20		5	0.005977	2.5
-10		6	0.007172	2.5
0		3	0.003586	2.5
10		1	0.001195	2.5
20		-1	-0.001195	2.5
30		11	0.013148	2.5
40		4	0.004781	2.5
50		3	0.003586	2.5
25	V min.= 3.6	-2	-0.002391	2.5
25	V max.= 4.35	-8	-0.009563	2.5

WCDMA Mode

Middle Channel, $f_0 = 836.6\text{MHz}$				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	9	0.010758	2.5
-20		-2	-0.002391	2.5
-10		7	0.008367	2.5
0		-7	-0.008367	2.5
10		5	0.005977	2.5
20		4	0.004781	2.5
30		-2	-0.002391	2.5
40		11	0.013148	2.5
50		-6	-0.007172	2.5
25	V min.= 3.6	8	0.009563	2.5
25	V max.= 4.35	13	0.015539	2.5

PCS Band (Part 24E)**GSM Mode**

Middle Channel, $f_0 = 1880.0\text{ MHz}$				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	5	0.002660	pass
-20		12	0.006383	pass
-10		1	0.000532	pass
0		7	0.003723	pass
10		6	0.003191	pass
20		8	0.004255	pass
30		9	0.004787	pass
40		4	0.002128	pass
50		14	0.007447	pass
25	V min.= 3.6	4	0.002128	pass
25	V max.= 4.35	-2	-0.001064	pass

WCDMA Mode

Middle Channel, f_0 = 1880.0 MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-6	-0.003191	pass
-20		-2	-0.001064	pass
-10		-6	-0.003191	pass
0		12	0.006383	pass
10		2	0.001064	pass
20		6	0.003191	pass
30		-3	-0.001596	pass
40		3	0.001596	pass
50		5	0.002660	pass
25	V min.= 3.6	-2	-0.001064	pass
25	V max.= 4.35	12	0.006383	pass

AWS Band (Part 27)**WCDMA Mode**

Middle Channel, f_0 = 1732.6 MHz				
Temperature (°C)	Voltage Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	3	0.00173	pass
-20		-6	-0.00346	pass
-10		13	0.00750	pass
0		2	0.00115	pass
10		10	0.00577	pass
20		1	0.00058	pass
30		-1	-0.00058	pass
40		5	0.00289	pass
50		2	0.00115	pass
25	V min.= 3.6	3	0.00173	pass
25	V max.= 4.35	2	0.00115	pass

******* END OF REPORT *******