



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

For

COTO C.I.C.S.A.

PAYSANDU 1842, BUENOS AIRES - ARGENTINA

FCC ID: 2AJP4W5509

Report Type: Original Report	Product Type: 4G Smart Phone
Report Number: RSZ170626006-00D	
Report Date: 2017-08-22	
Oscar Ye	
Reviewed By:	Engineer
Prepared By: Bay Area Compliance Laboratories Corp. (Kunshan) No.248 Chenghu Road, Kunshan, Jiangsu province, China Tel: +86-0512-86175000 Fax: +86-0512-88934268 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.

TABLE OF CONTENTS

GENERAL INFORMATION.....	3
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	3
OBJECTIVE	3
RELATED SUBMITTAL(S)/GRANT(S).....	3
TEST METHODOLOGY	3
MEASUREMENT UNCERTAINTY	4
TEST FACILITY	4
SYSTEM TEST CONFIGURATION.....	5
DESCRIPTION OF TEST CONFIGURATION	5
EQUIPMENT MODIFICATIONS	5
SUPPORT EQUIPMENT LIST AND DETAILS	5
BLOCK DIAGRAM OF TEST SETUP	5
SUMMARY OF TEST RESULTS	6
TEST EQUIPMENT LIST	7
FCC §1.1307 & §2.1093 - RF EXPOSURE.....	8
APPLICABLE STANDARD	8
TEST RESULT	8
FCC §2.1047 - MODULATION CHARACTERISTIC	9
FCC § 2.1046, § 22.913 (A) & § 24.232 (C); §27.50(D) - RF OUTPUT POWER.....	10
APPLICABLE STANDARD	10
TEST PROCEDURE	10
TEST DATA	10
FCC §2.1049, §22.917, §22.905 & §24.238 & §27.53 - OCCUPIED BANDWIDTH.....	21
APPLICABLE STANDARD	21
TEST PROCEDURE	21
TEST DATA	21
FCC §2.1051, §22.917(A) & §24.238(A); §27.53 (H) (M) - SPURIOUS EMISSIONS AT ANTENNA TERMINALS.....	35
APPLICABLE STANDARD	35
TEST PROCEDURE	35
TEST DATA	35
FCC § 2.1053; § 22.917 (A);§ 24.238 (A); §27.53 (H)(M) SPURIOUS RADIATED EMISSIONS.....	50
APPLICABLE STANDARD	50
TEST PROCEDURE	50
TEST DATA	50
FCC § 22.917 (A);§ 24.238 (A); §27.53 (H)(M) - BAND EDGES	53
APPLICABLE STANDARD	53
TEST PROCEDURE	53
TEST DATA	53
FCC § 2.1055; § 22.355; § 24.235; §27.54; - FREQUENCY STABILITY.....	76
APPLICABLE STANDARD	76
TEST PROCEDURE	76
TEST DATA	77

GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

The COTO C.I.C.S.A.'s product, model number: W5509 (FCC ID: 2AJP4W5509) in this report is a 4G Smart Phone which was measured approximately: 15.1 cm (L) * 7.6 cm (W) * 0.7 cm (H), rated with input voltage: DC 3.8 V battery or DC 5.0V from adapter.

Adapter Information:

Model: HJ-050100-AR

Input: AC 100-240V, 50/60Hz, 0.15A

Output: DC 5.0V, 1A

** All measurement and test data in this report was gathered from production sample serial number: 1701496 (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2017-06-26.*

Objective

This test report is prepared on behalf of COTO C.I.C.S.A. in accordance with Part 2-Subpart J, Part 22-Subpart H and Part 24-Subpart E and Part 27 of the Federal Communication Commissions rules.

The objective is to determine the compliance of the 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 15.247 DTS & DSS and Part 15B JBP submissions with FCC ID: 2AJP4W5509.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the Code of Federal Regulations Title 47 Part 2-Subpart 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 radiated and conducted emissions measurements were performed at Bay Area Compliance Laboratories Corp. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Item		Uncertainty
AC Power Lines Conducted Emissions		± 3.26 dB
RF conducted test with spectrum		± 0.9 dB
RF Output Power with Power meter		± 0.5 dB
Radiated emission	30MHz~1GHz	± 5.91 dB
	Above 1G	± 4.92 dB
Occupied Bandwidth		± 0.5 kHz
Temperature		± 1.0 °C
Humidity		$\pm 6\%$

Test Facility

The Test site used by Bay Area Compliance Laboratories Corp. (Kunshan) to collect test data is located on the No.248 Chenghu Road, Kunshan, Jiangsu province, China

Bay Area Compliance Laboratories Corp. (Kunshan) has been accredited to ISO/IEC 17025 by CNAS(Lab code: L9963). And accredited to ISO/IEC 17025 by A2LA(Lab code: 4323.01), the FCC Designation No. CN1185 under the KDB 974614 D01.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 815570. 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. (Kunshan) was registered with ISED Canada under ISED Canada Registration Number 3062E.

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.

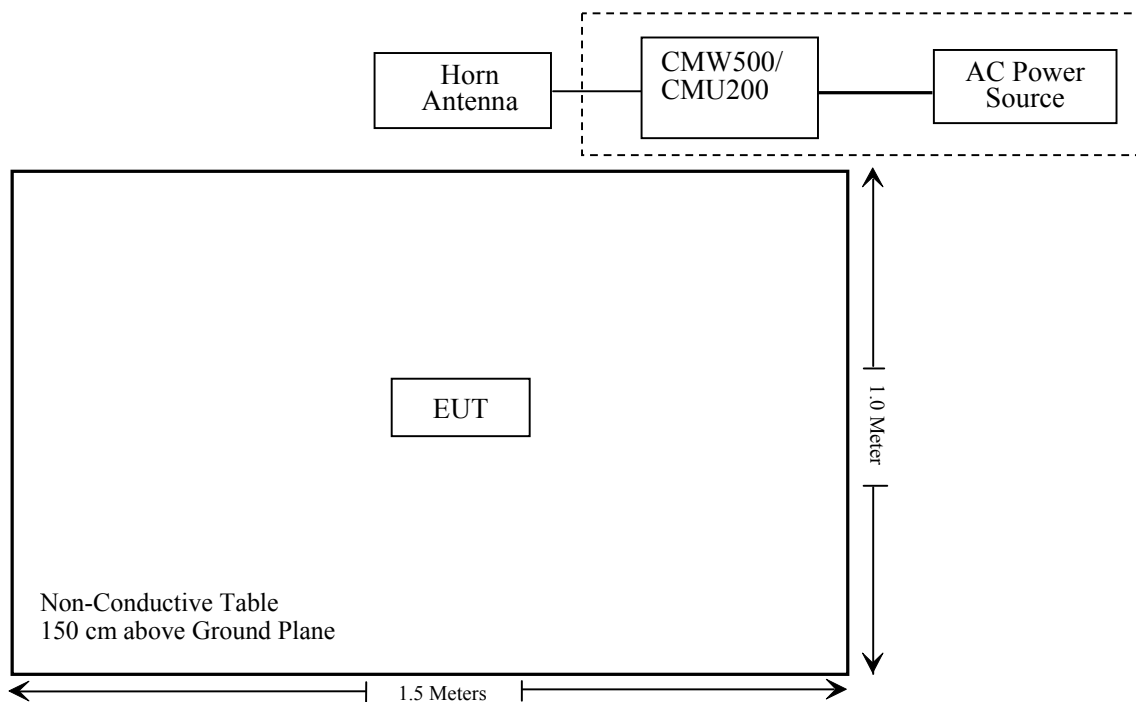
Equipment Modifications

No modification was made to the EUT.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	1201.002K50-116218-UY
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605

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

Note: * Please refer to SAR report released by BACL, report number: RSZ170626006-20.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Sonoma Instrument	Amplifier	330	171377	2016-12-12	2017-12-12
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-25
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2016-01-09	2019-01-08
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-09-08	2017-09-08
EMCO	Horn Antenna	3116	00084159	2016-10-18	2019-10-17
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-25
ETS	Horn Antenna	3115	6229	2016-12-12	2019-12-12
ETS	Horn Antenna	3115	9311-4159	2016-01-11	2019-01-10
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-12
haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-12
MICRO-COAX	Coaxial Cable	Cable-7	007	2016-12-12	2017-12-12
HP	Signal Generator	8341B	2624A00116	2016-08-29	2017-08-29
RF Conducted test					
BACL	TS 8997 Cable-01	T-KS-EMC086	T-KS-EMC086	2016-12-09	2017-12-08
BACL	RF cable	KS-LAB-012	KS-LAB-012	2016-12-15	2017-12-14
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-21
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2016-11-25	2017-11-25
Rohde & Schwarz	WIDEBAND RADIO COMMUNICATION TESTER	CMW500	116218	2016-10-08	2017-10-08
HONOVA	Power Splitter	ZFRSC-14-S+	019411452	2017-06-12	2018-06-12
WEINSCHL	3dB Attenuator	5326	N/A	2017-06-18	2018-06-18

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Kunshan) 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 & §2.1093 - RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RSZ170626006-20.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 22H & 24E & 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**

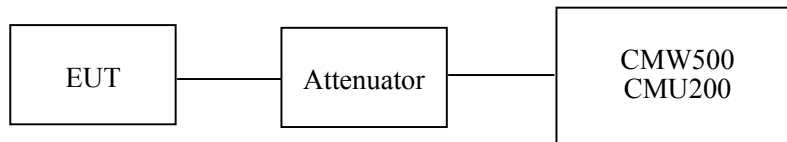
According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

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 CMW500/CMU200 through sufficient attenuation.

*Radiated method:*

TIA 603-D section 2.2.17

Test Data**Environmental Conditions**

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Echo Wu on 2017-07-06.

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

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	33.67	38.45
	190	836.6	33.68	38.45
	251	848.8	33.65	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	33.69	32.92	31.17	30.00	38.45
	190	836.6	33.67	32.91	31.15	30.02	38.45
	251	848.8	33.66	32.90	31.19	30.05	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	27.97	27.07	24.96	23.82	38.45
	190	836.6	27.94	26.95	24.89	23.72	38.45
	251	848.8	27.99	26.93	24.86	23.69	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band V)	Normal	RMC12.2k		22.78	22.62	22.72
		HSDPA	1	21.67	21.57	21.61
			2	21.61	21.53	21.49
			3	21.76	21.64	21.65
			4	21.56	21.50	21.51
		HSUPA	1	21.67	21.56	21.66
			2	21.61	21.50	21.57
			3	21.73	21.67	21.77
			4	21.58	21.53	21.59
			5	21.70	21.66	21.76
		HSPA+	1	21.34	21.45	21.32

PCS Band (Part 24E)

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	29.58	33
	661	1880.0	29.53	33
	810	1909.8	29.54	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.63	28.89	27.18	26.10	33
	661	1880.0	29.61	28.84	27.14	26.04	33
	810	1909.8	29.58	28.81	27.08	25.98	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	25.99	25.12	23.24	22.24	33
	661	1880.0	25.85	24.94	23.17	22.09	33
	810	1909.8	25.88	25.01	23.25	22.11	33

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	RMC12.2k		22.72	22.70	22.45
		HSDPA	1	21.59	21.58	21.41
			2	21.59	21.51	21.33
			3	21.68	21.68	21.52
			4	21.49	21.47	21.34
		HSUPA	1	21.53	21.55	21.42
			2	21.54	21.51	21.39
			3	21.58	21.62	21.52
			4	21.50	21.49	21.37
			5	21.57	21.68	21.53
		HSPA+	1	21.12	21.27	21.19

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

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.21	13
	Middle	0.18	13
	High	0.15	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	0.17	13
	Middle	0.11	13
	High	0.15	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.34	13
	Middle	2.45	13
	High	2.56	13
HSDPA (16QAM)	Low	2.56	13
	Middle	2.23	13
	High	3.23	13
HSUPA (BPSK)	Low	2.43	13
	Middle	2.34	13
	High	3.06	13
HSPA+	Low	3.24	13
	Middle	3.15	13
	High	3.18	13

PCS Band

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.17	13
	Middle	0.11	13
	High	0.22	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	0.23	13
	Middle	0.18	13
	High	0.25	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.23	13
	Middle	2.45	13
	High	3.34	13
HSDPA (16QAM)	Low	2.36	13
	Middle	2.22	13
	High	2.87	13
HSUPA (BPSK)	Low	2.34	13
	Middle	2.14	13
	High	3.34	13
HSPA+	Low	3.18	13
	Middle	3.02	13
	High	3.11	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	82.91	171	1.9	H	13.2	0.26	4.75	17.69	38.45	20.76
836.6	98.13	326	1.3	V	24.4	0.26	4.75	28.89	38.45	9.56
EIRP for PCS Band (Part 24E), Middle Channel										
1880.00	73.49	8	1.5	H	12.0	0.45	8.84	20.39	33	12.61
1880.00	82.72	127	1.4	V	19.0	0.45	8.84	27.39	33	5.61

EDGE Mode:

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)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	77.81	33	1.3	H	8.1	0.26	4.75	12.59	38.45	25.86
836.6	94.73	156	1.9	V	21.0	0.26	4.75	25.49	38.45	12.96
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	75.49	87	2.0	H	14.0	0.45	8.84	22.39	33	10.61
1880.00	79.92	196	1.1	V	16.2	0.45	8.84	24.59	33	8.41

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	75.71	225	1.6	H	6.0	0.26	4.75	10.49	38.45	27.96
836.6	90.53	120	2.2	V	16.8	0.26	4.75	21.29	38.45	17.16
EIRP for WCDMA Band II (Part 24E), Middle Channel										
1880.00	69.29	137	2.3	H	7.8	0.45	8.84	16.19	33	16.81
1880.00	78.02	87	1.9	V	14.3	0.45	8.84	22.69	33	10.31

Note:

Absolute Level = Substituted Level - Cable loss + Antenna Gain

Margin = Limit - Absolute Level

LTE Band 4:**Maximum Output Power**

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
1.4	QPSK	RB Size=1, RB Offset=0	22.84	22.89	22.46
		RB Size=1, RB Offset=2	22.47	22.54	22.43
		RB Size=1, RB Offset=5	22.64	22.77	22.68
		RB Size=3, RB Offset=0	22.35	22.38	22.21
		RB Size=3, RB Offset=1	22.41	22.19	22.16
		RB Size=3, RB Offset=2	22.73	22.49	22.48
		RB Size=6, RB Offset=0	22.12	22.15	22.19
	16QAM	RB Size=1, RB Offset=0	21.57	21.59	21.51
		RB Size=1, RB Offset=2	21.23	21.54	21.31
		RB Size=1, RB Offset=5	21.28	21.40	21.29
		RB Size=3, RB Offset=0	21.54	21.64	21.43
		RB Size=3, RB Offset=1	21.86	21.55	21.88
		RB Size=3, RB Offset=2	21.60	21.40	21.85
		RB Size=6, RB Offset=0	21.15	21.24	21.23
3.0	QPSK	RB Size=1, RB Offset=0	22.42	22.46	22.51
		RB Size=1, RB Offset=7	22.45	22.68	22.45
		RB Size=1, RB Offset=14	22.29	22.72	22.38
		RB Size=8, RB Offset=0	22.59	22.84	22.68
		RB Size=8, RB Offset=4	22.71	22.84	22.35
		RB Size=8, RB Offset=7	22.36	22.52	22.46
		RB Size=15, RB Offset=0	22.15	22.13	22.18
	16QAM	RB Size=1, RB Offset=0	21.27	21.69	21.43
		RB Size=1, RB Offset=7	21.66	21.56	21.82
		RB Size=1, RB Offset=14	21.93	21.39	21.38
		RB Size=8, RB Offset=0	21.48	21.44	21.54
		RB Size=8, RB Offset=4	21.33	21.24	21.64
		RB Size=8, RB Offset=7	21.90	21.47	21.62
		RB Size=15, RB Offset=0	21.16	21.25	21.08

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
5.0	QPSK	RB Size=1, RB Offset=0	22.77	22.43	22.94
		RB Size=1, RB Offset=12	22.56	22.67	22.46
		RB Size=1, RB Offset=24	22.59	22.37	22.72
		RB Size=12, RB Offset=0	22.52	22.64	22.50
		RB Size=12, RB Offset=6	22.51	22.76	22.60
		RB Size=12, RB Offset=11	22.21	22.16	22.19
		RB Size=25, RB Offset=0	21.59	21.87	21.91
	16QAM	RB Size=1, RB Offset=0	21.34	21.55	21.67
		RB Size=1, RB Offset=12	21.42	21.30	21.52
		RB Size=1, RB Offset=24	21.37	21.20	21.54
		RB Size=12, RB Offset=0	21.42	21.39	21.85
		RB Size=12, RB Offset=6	21.62	21.34	21.38
		RB Size=12, RB Offset=11	21.17	21.05	21.13
		RB Size=25, RB Offset=0	22.77	22.43	22.94
10.0	QPSK	RB Size=1, RB Offset=0	22.47	22.57	22.46
		RB Size=1, RB Offset=24	22.54	22.84	22.41
		RB Size=1, RB Offset=49	22.61	22.69	22.45
		RB Size=25, RB Offset=0	22.21	22.88	22.91
		RB Size=25, RB Offset=12	22.62	22.75	22.76
		RB Size=25, RB Offset=24	22.37	22.40	22.18
		RB Size=50, RB Offset=0	22.14	22.15	22.16
	16QAM	RB Size=1, RB Offset=0	21.40	21.44	21.56
		RB Size=1, RB Offset=24	21.73	21.58	21.70
		RB Size=1, RB Offset=49	21.57	21.63	21.47
		RB Size=25, RB Offset=0	21.33	21.70	21.78
		RB Size=25, RB Offset=12	21.68	21.33	21.75
		RB Size=25, RB Offset=24	21.83	21.48	21.18
		RB Size=50, RB Offset=0	21.05	21.13	21.09

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15.0	QPSK	RB Size=1, RB Offset=0	22.77	22.48	22.71
		RB Size=1, RB Offset=37	22.35	22.50	22.49
		RB Size=1, RB Offset=74	22.57	22.43	22.47
		RB Size=36, RB Offset=0	22.15	22.58	22.66
		RB Size=36, RB Offset=18	22.56	22.31	22.58
		RB Size=36, RB Offset=37	22.73	22.30	22.26
		RB Size=75, RB Offset=0	22.21	22.17	22.13
	16QAM	RB Size=1, RB Offset=0	21.68	21.97	21.56
		RB Size=1, RB Offset=37	21.33	21.73	21.47
		RB Size=1, RB Offset=74	21.51	21.37	21.57
		RB Size=36, RB Offset=0	21.47	21.74	21.42
		RB Size=36, RB Offset=18	21.58	21.36	21.43
		RB Size=36, RB Offset=37	21.25	21.71	21.82
		RB Size=75, RB Offset=0	21.08	21.09	21.06
20.0	QPSK	RB Size=1, RB Offset=0	22.59	22.68	22.94
		RB Size=1, RB Offset=49	22.70	22.59	22.54
		RB Size=1, RB Offset=99	22.28	22.38	22.35
		RB Size=50, RB Offset=0	22.62	22.64	22.75
		RB Size=50, RB Offset=24	22.93	22.90	22.65
		RB Size=50, RB Offset=49	22.86	22.43	22.64
		RB Size=100, RB Offset=0	22.014	22.24	22.19
	16QAM	RB Size=1, RB Offset=0	21.52	21.40	21.29
		RB Size=1, RB Offset=49	21.68	21.31	21.61
		RB Size=1, RB Offset=99	21.51	21.33	21.39
		RB Size=50, RB Offset=0	21.67	21.57	21.65
		RB Size=50, RB Offset=24	21.70	21.74	21.87
		RB Size=50, RB Offset=49	21.92	21.64	21.17
		RB Size=100, RB Offset=0	21.15	21.19	21.21

Peak-to-average ratio (PAR)

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
16QAM (1RB Size)	7.45	13	Pass
16QAM (100%RB Size)	8.16	13	Pass

QPSK:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	77.97	168	1.8	H	14.4	0.40	8.52	22.52	30
1732.50	80.64	135	2.0	V	15.1	0.40	8.52	23.22	30
3 MHz Bandwidth									
1732.50	75.67	98	2.1	H	12.1	0.40	8.52	20.22	30
1732.50	75.74	246	1.1	V	10.2	0.40	8.52	18.32	30
5 MHz Bandwidth									
1732.50	75.47	109	1.4	H	11.9	0.40	8.52	20.02	30
1732.50	74.24	19	1.9	V	8.7	0.40	8.52	16.82	30
10 MHz Bandwidth									
1732.50	74.57	55	1.3	H	11.0	0.40	8.52	19.12	30
1732.50	73.74	49	1.8	V	8.2	0.40	8.52	16.32	30
15 MHz Bandwidth									
1732.50	74.17	160	2.0	H	10.6	0.40	8.52	18.72	30
1732.50	73.24	213	2.2	V	7.7	0.40	8.52	15.82	30
20 MHz Bandwidth									
1732.50	72.27	64	1.0	H	8.7	0.40	8.52	16.82	30
1732.50	71.74	269	1.2	V	6.2	0.40	8.52	14.32	30

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	77.47	35	1.4	H	13.9	0.40	8.52	22.02	30
1732.50	79.24	24	1.4	V	13.7	0.40	8.52	21.82	30
3 MHz Bandwidth									
1732.50	76.77	1	1.6	H	13.2	0.40	8.52	21.32	30
1732.50	77.14	58	1.4	V	11.6	0.40	8.52	19.72	30
5 MHz Bandwidth									
1732.50	75.27	230	2.1	H	11.7	0.40	8.52	19.82	30
1732.50	74.04	177	2.0	V	8.5	0.40	8.52	16.62	30
10 MHz Bandwidth									
1732.50	74.67	153	1.6	H	11.1	0.40	8.52	19.22	30
1732.50	73.94	17	1.8	V	8.4	0.40	8.52	16.52	30
15 MHz Bandwidth									
1732.50	73.27	23	1.4	H	9.7	0.40	8.52	17.82	30
1732.50	72.74	126	1.1	V	7.2	0.40	8.52	15.32	30
20 MHz Bandwidth									
1732.50	72.77	178	2.4	H	9.2	0.40	8.52	17.32	30
1732.50	71.84	307	1.0	V	6.3	0.40	8.52	14.42	30

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

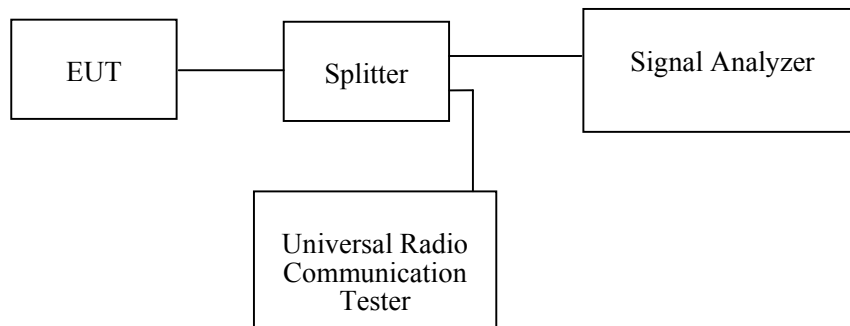
Applicable Standard

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 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	25 °C
Relative Humidity:	50 %
ATM Pressure:	101.0 kPa

The testing was performed by Echo Wu on 2017-07-08.

EUT operation mode: Transmitting

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

Cellular Band (Part 22H)

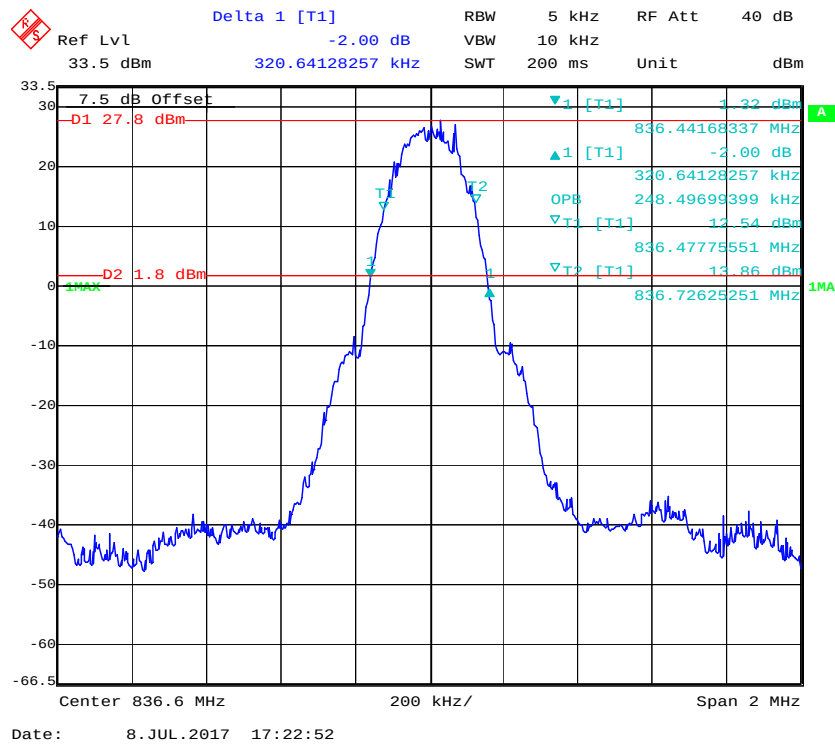
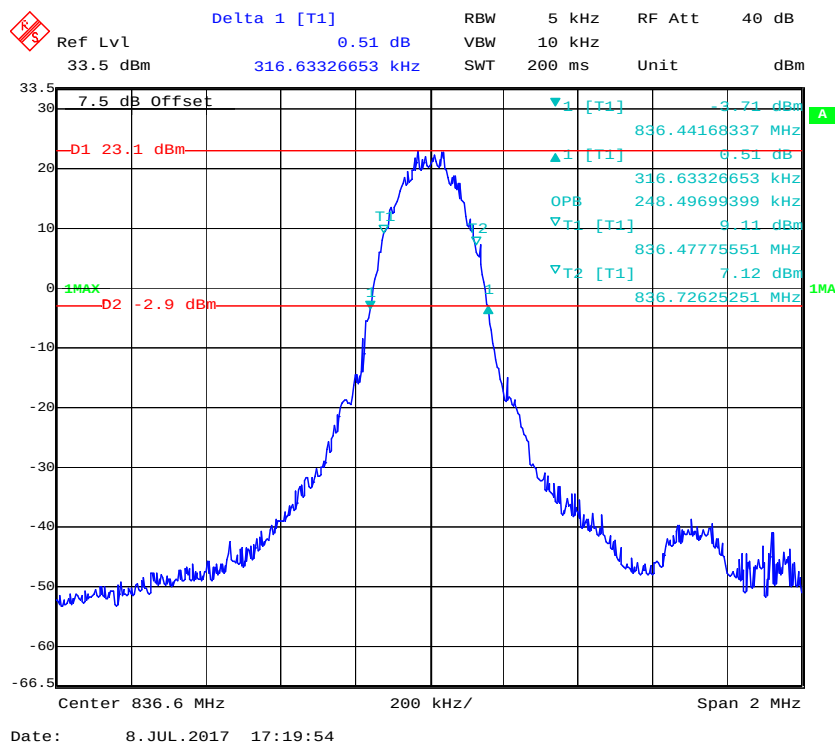
Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	248.5	320.6
EGPRS(8PSK)	836.6	248.5	316.6

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.21	4.93
HSUPA (BPSK)	836.6	4.21	4.87
HSDPA (16QAM)	836.6	4.21	4.87

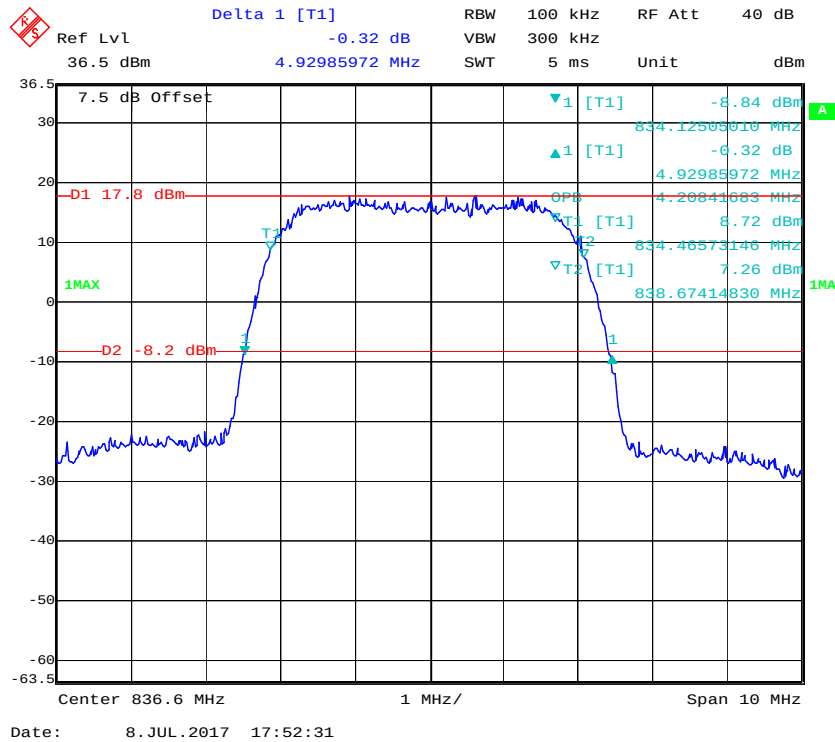
PCS Band (Part 24E)

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	244.5	320.6
EGPRS(8PSK)	1880.0	252.5	328.7

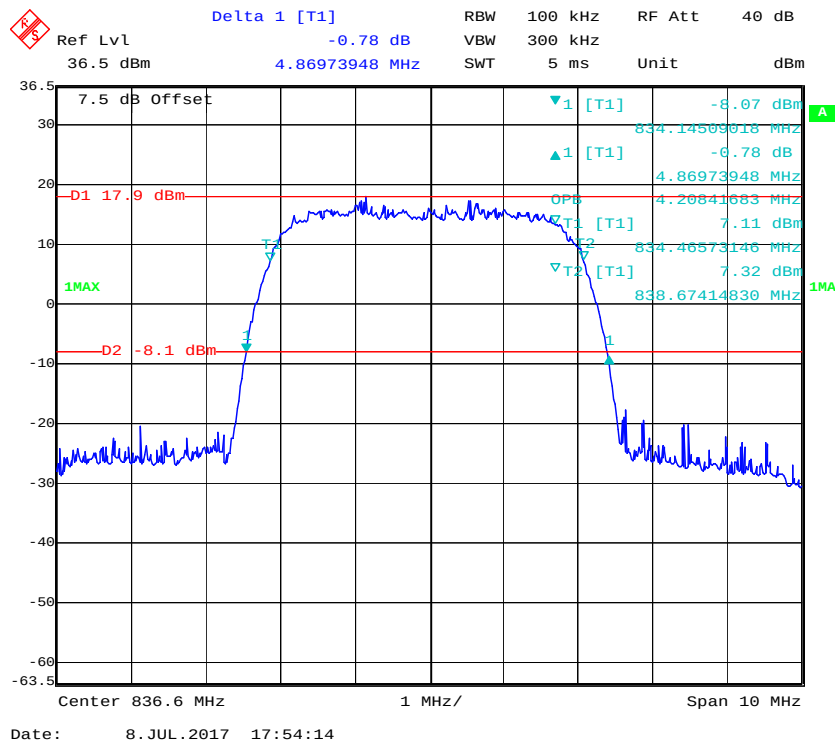
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.23	4.87
HSUPA (BPSK)	1880.0	4.19	4.87
HSDPA (16QAM)	1880.0	4.21	4.89

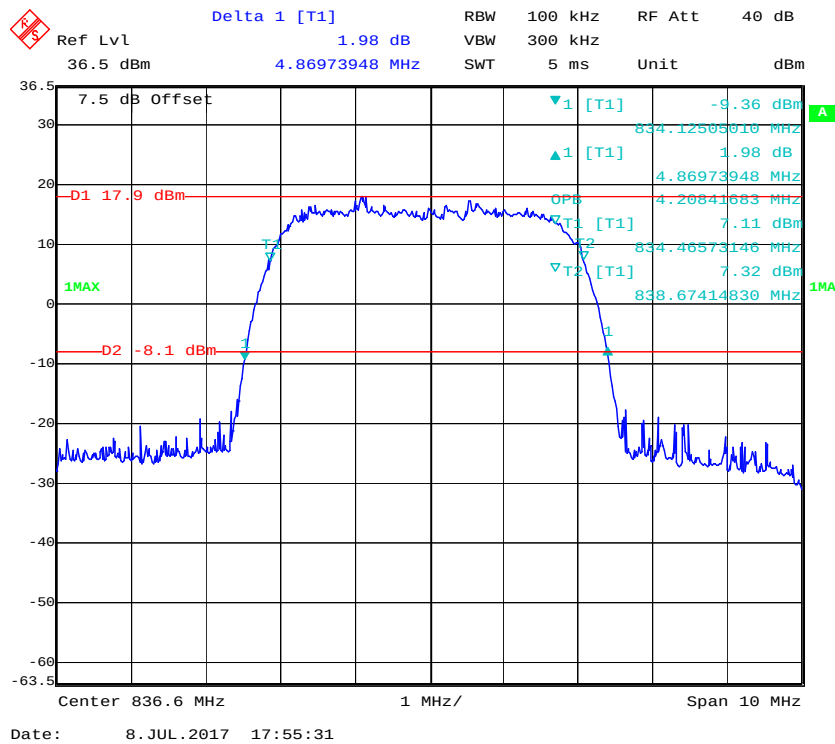
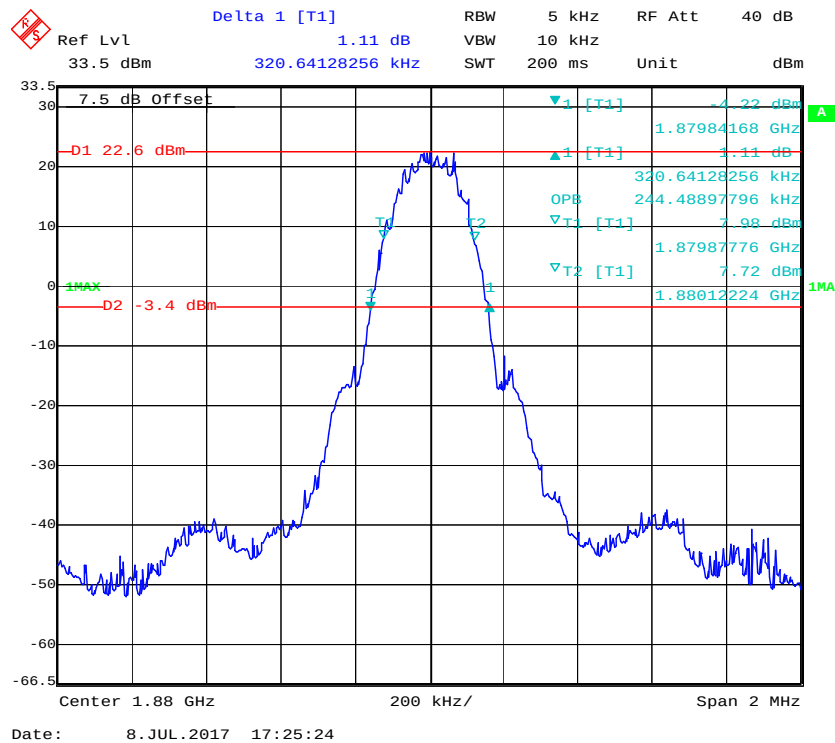
Cellular Band (Part 22H)**26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode****26 dB Emissions & 99% Occupied Bandwidth for EDGE Mode**

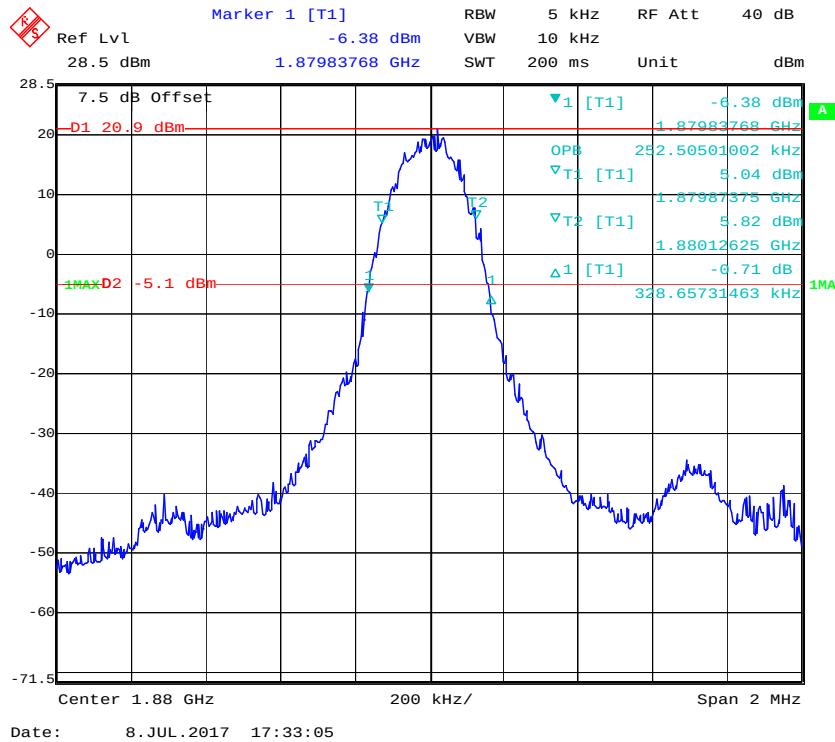
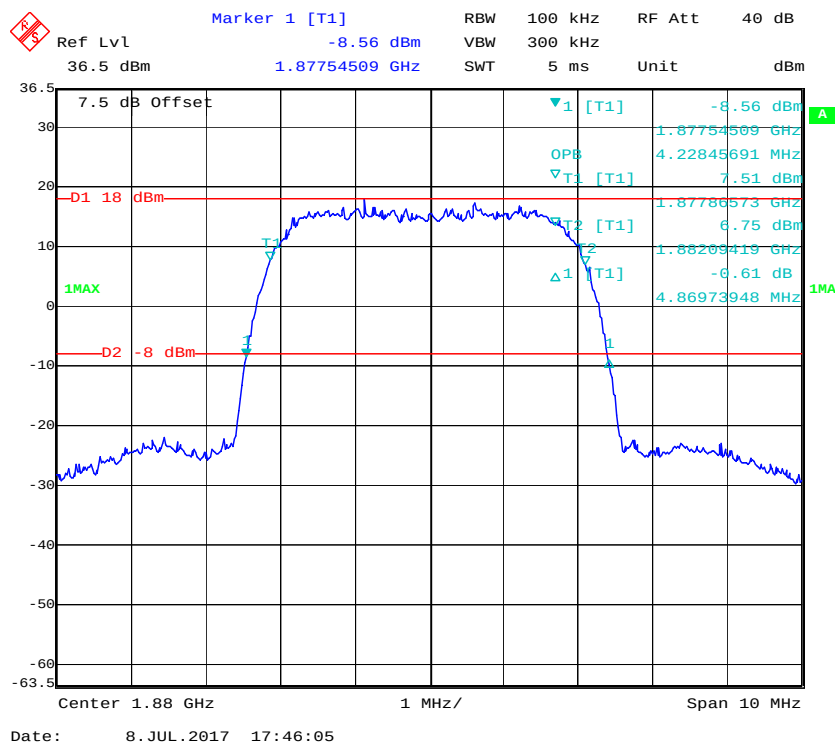
26 dB Emissions & 99% Occupied Bandwidth for RMC (BPSK) Mode



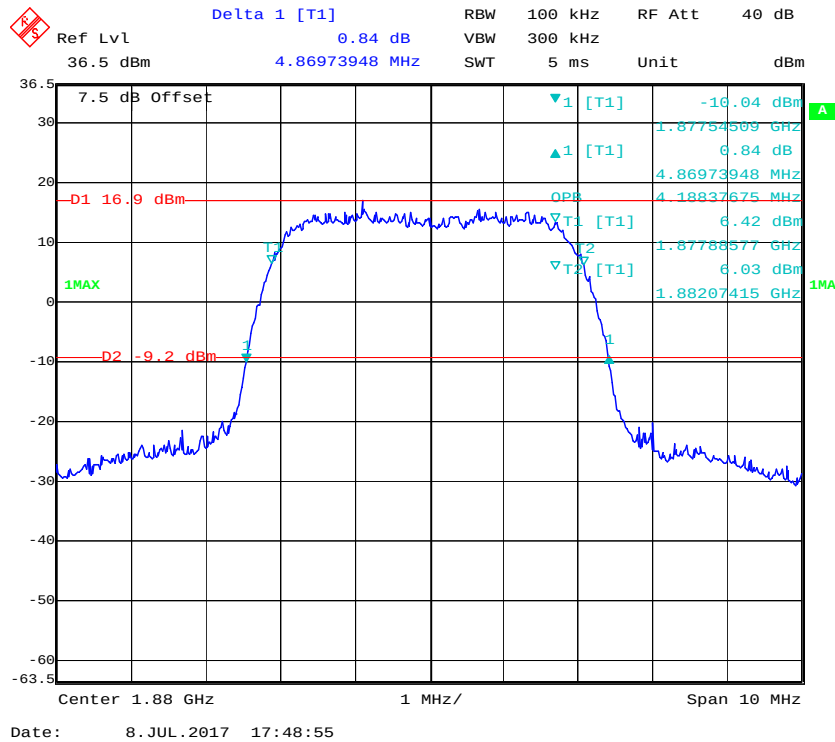
26 dB Emissions & 99% Occupied Bandwidth for HSUPA (BPSK) Mode



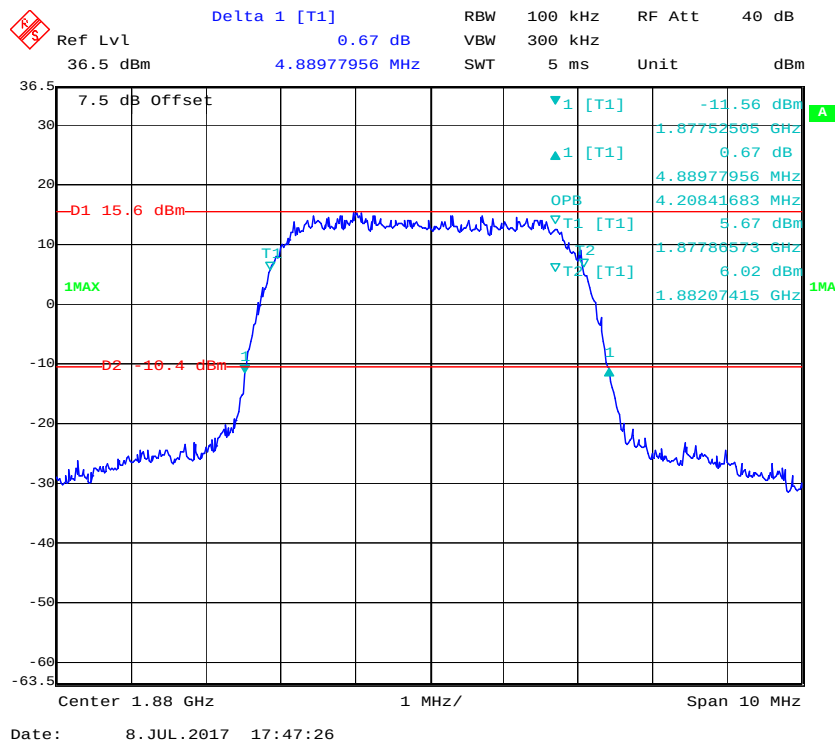
26 dB Emissions & 99% Occupied Bandwidth for HSDPA (16QAM) Mode**PCS Band (Part 24E)****26 dB Emissions & 99% Occupied Bandwidth for GSM (GMSK) Mode**

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

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



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



LTE Band 4: (Middle Channel)

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
1.4	QPSK	1.105	1.291
	16QAM	1.111	1.285
3.0	QPSK	2.693	2.952
	16QAM	2.693	2.952
5.0	QPSK	4.549	5.100
	16QAM	4.529	5.080
10.0	QPSK	8.938	9.679
	16QAM	8.938	9.840
15.0	QPSK	13.527	14.970
	16QAM	13.527	15.090
20.0	QPSK	17.956	19.479
	16QAM	18.036	19.479

[illegible]

Ref Lvl 33.5 dBm Delta 1 [T1] -1.34 dB RBW 30 kHz RF Att 40 dB
 33.5 dBm 1.28496994 MHz SWT 8 ms Unit dBm

7.5 dB Offset

D1 15.3 dBm

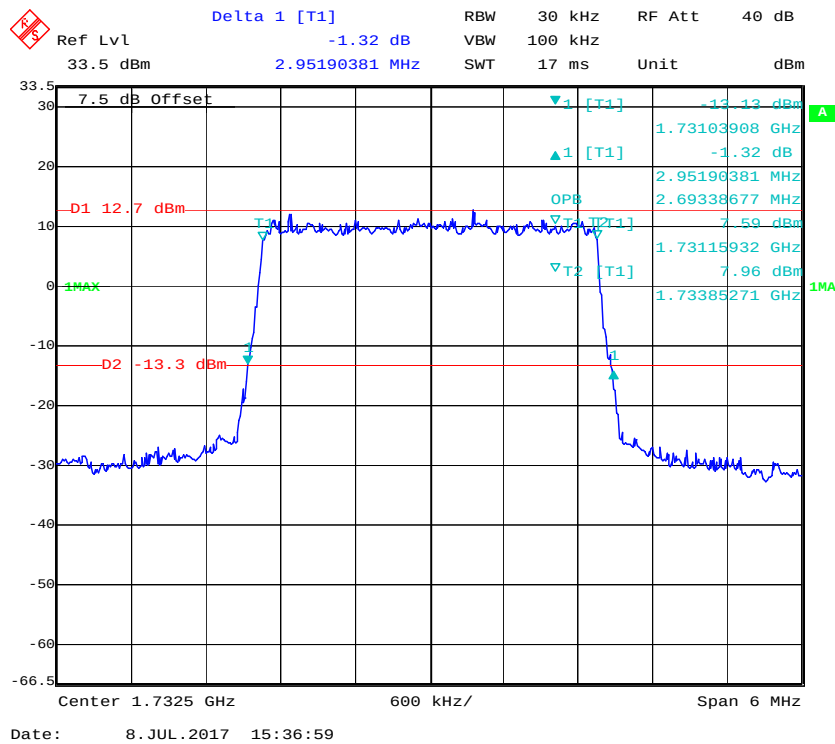
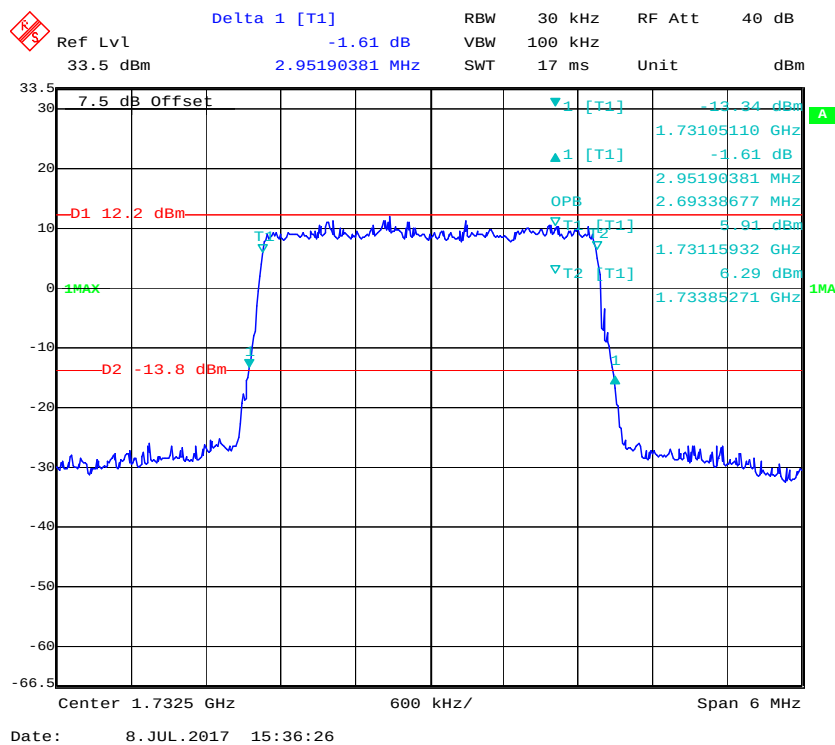
D2 -10.7 dBm

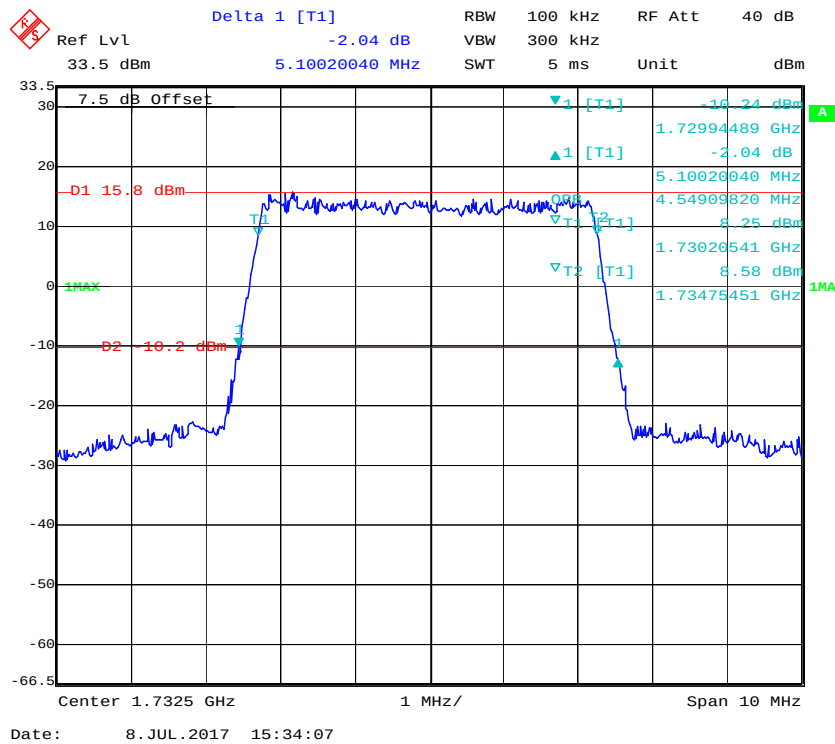
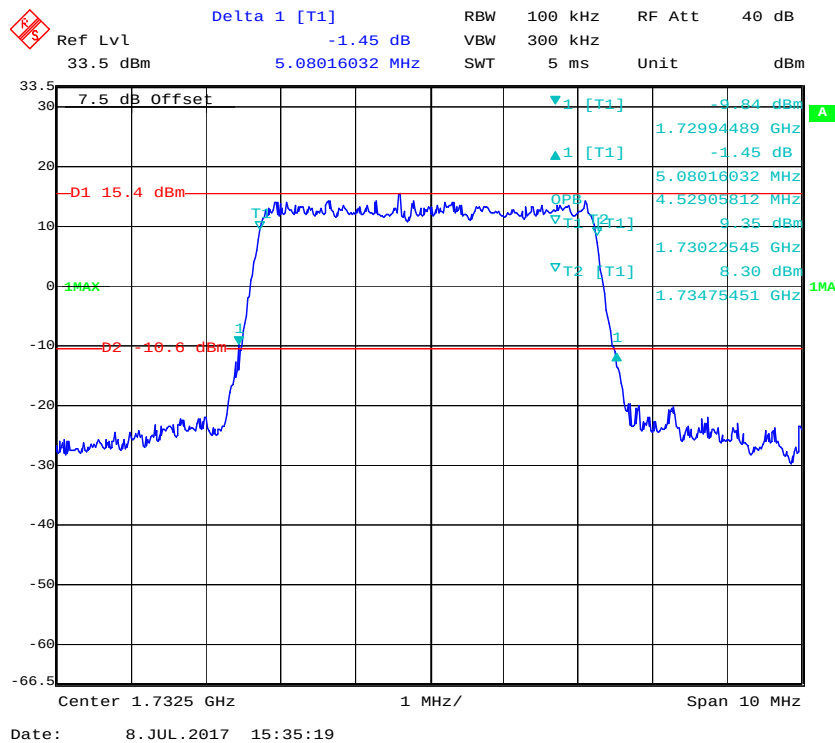
1 MAX

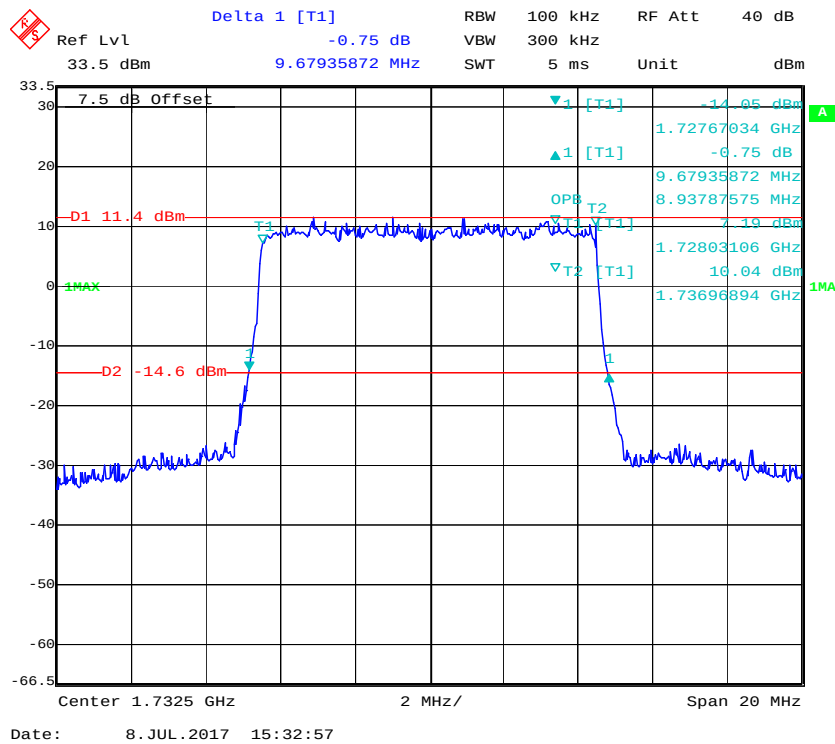
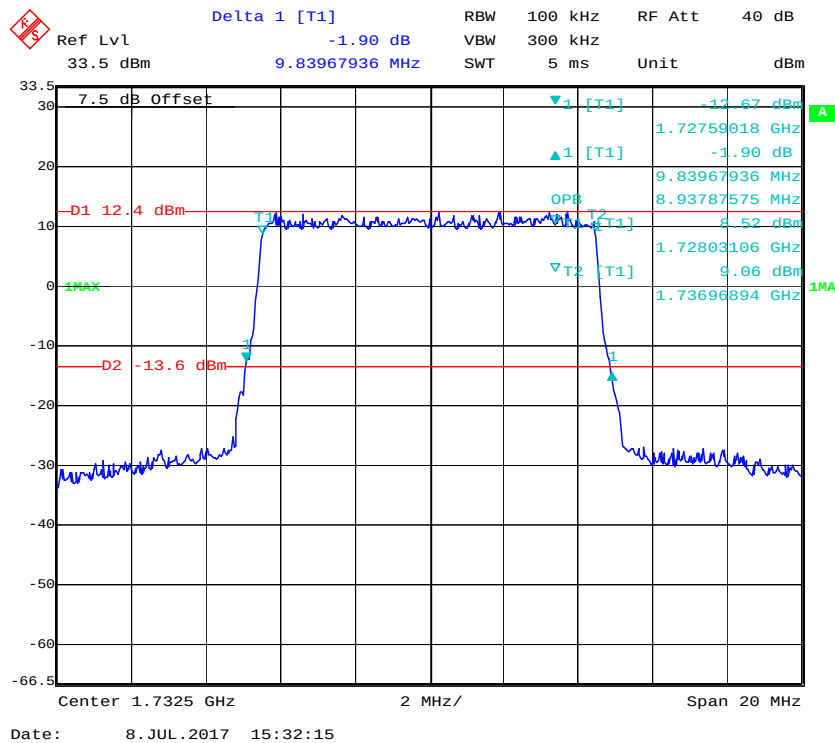
1 [T1] 1.73186874 GHz -1.34 dB
 1.28496994 MHz
 1.11102204 MHz
 5.69 dBm
 1.73194729 GHz
 7.22 dBm
 1.73305832 GHz

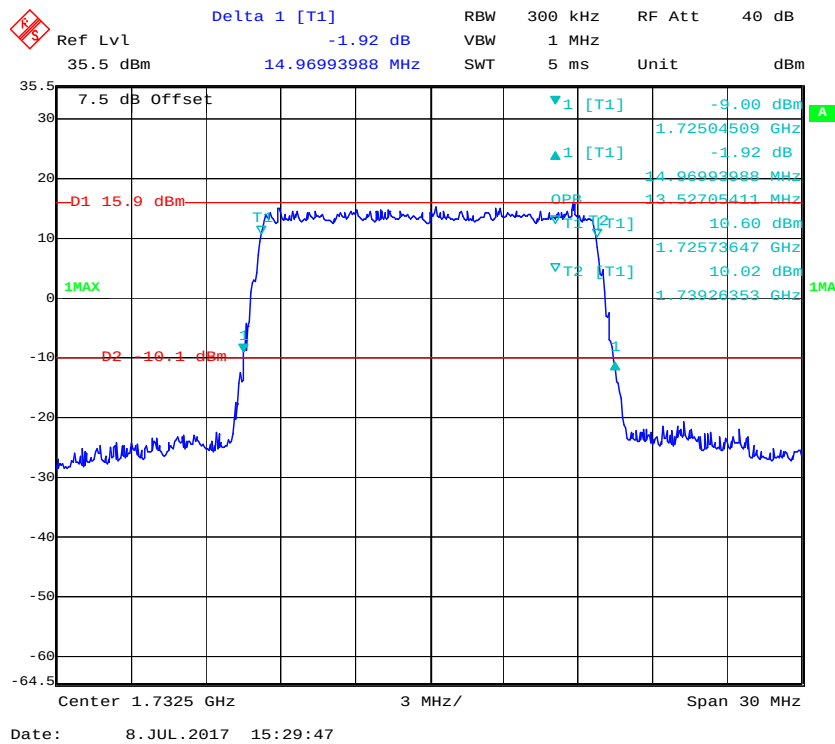
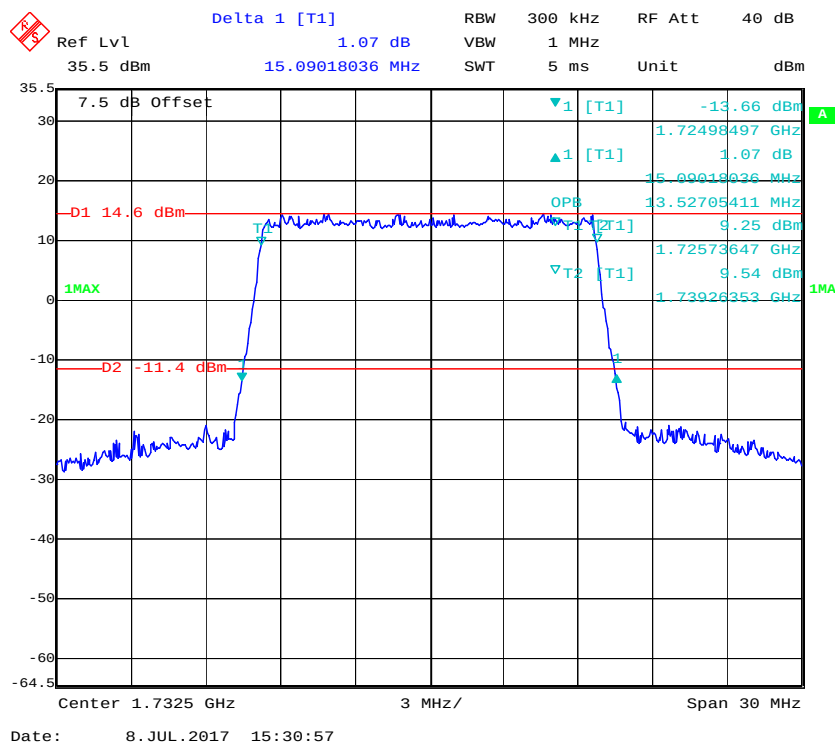
Center 1.7325 GHz 280 kHz/ Span 2.8 MHz

Date: 8. JUL. 2017 15:38:51

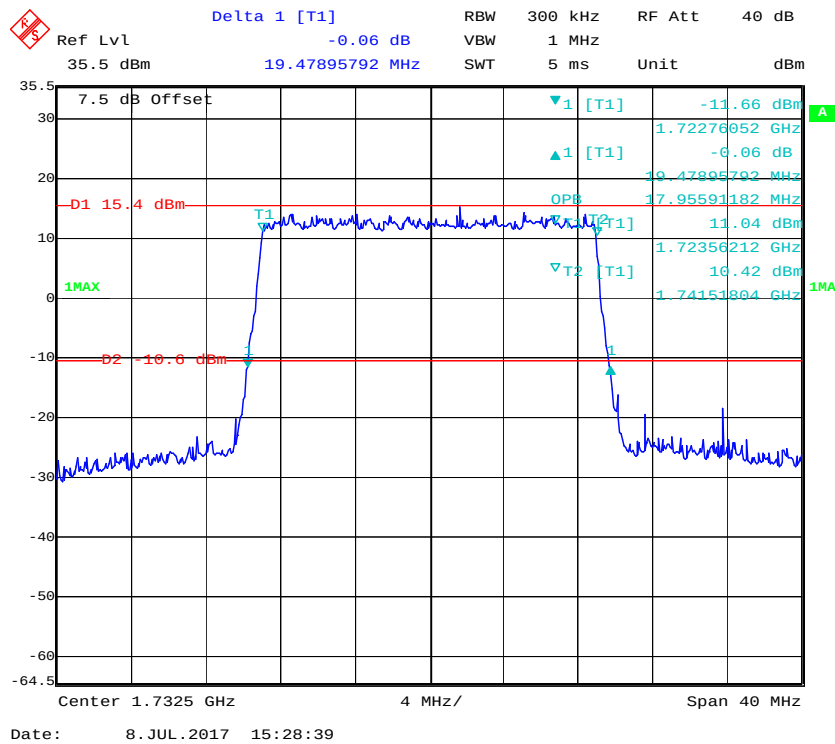
QPSK (3.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**16-QAM (3.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**

QPSK (5.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**16-QAM (5.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**

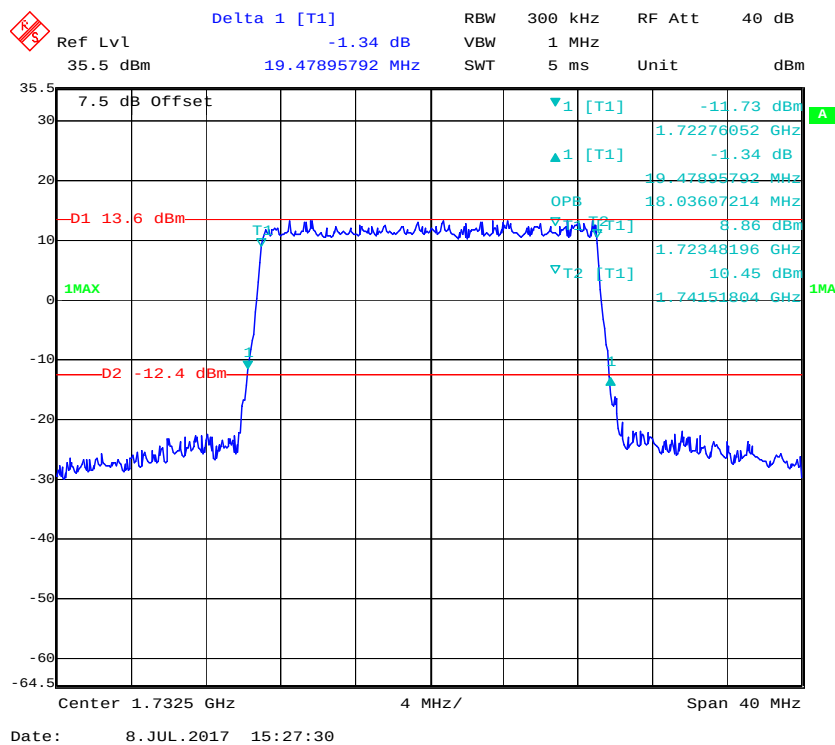
QPSK (10.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**16-QAM (10.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**

QPSK (15.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**16-QAM (15.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel**

QPSK (20.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel



16-QAM (20.0 MHz) - 99% Occupied Bandwidth&26 dB Bandwidth, Middle channel



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

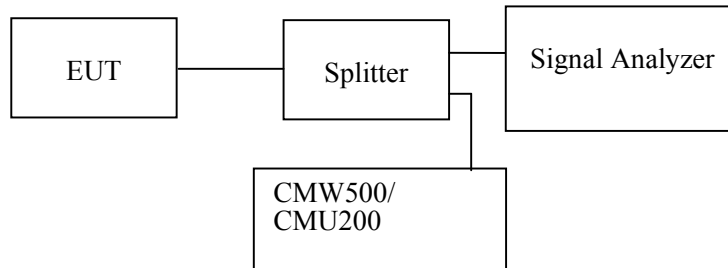
Applicable Standard

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 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

Temperature:	24~26 °C
Relative Humidity:	48~50 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by Echo Wu from 2017-07-08 to 2017-07-20.

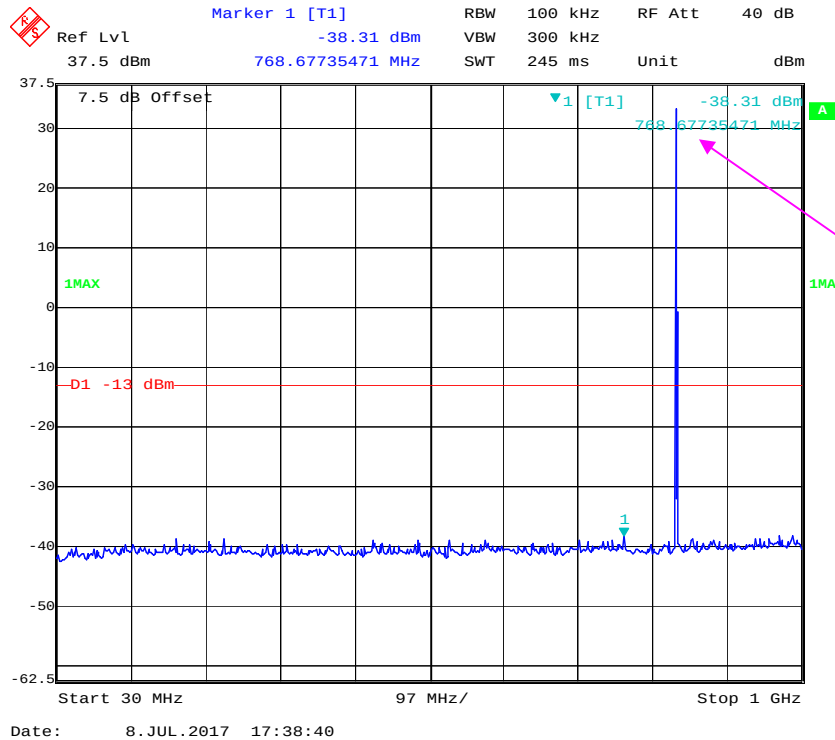
Test result: Compliance,

EUT operation mode: transmitting

Please refer to the following plots.

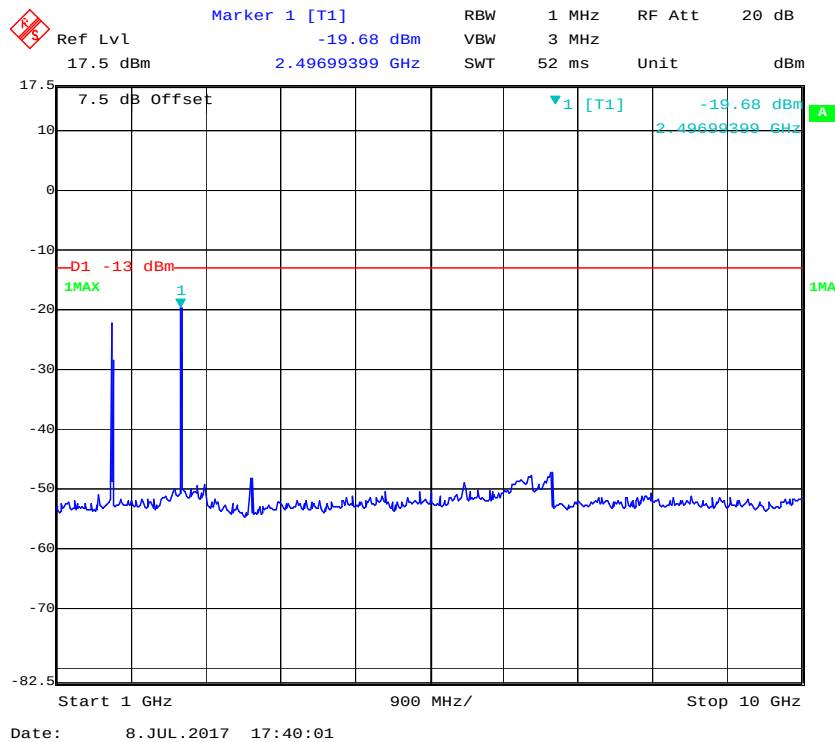
Cellular Band (Part 22H)

30 MHz – 1 GHz (GSM Mode)

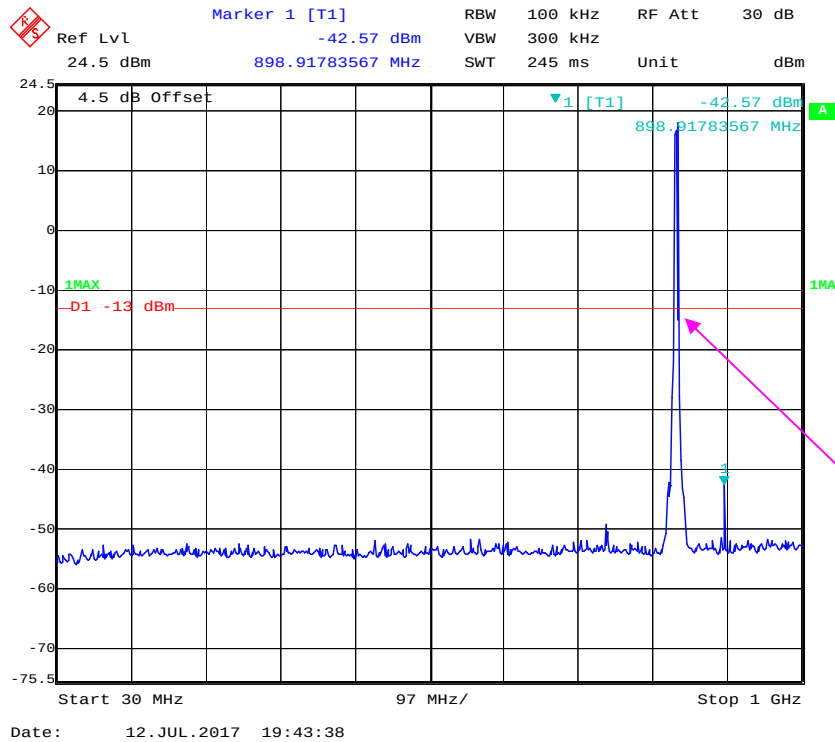


Fundamental test

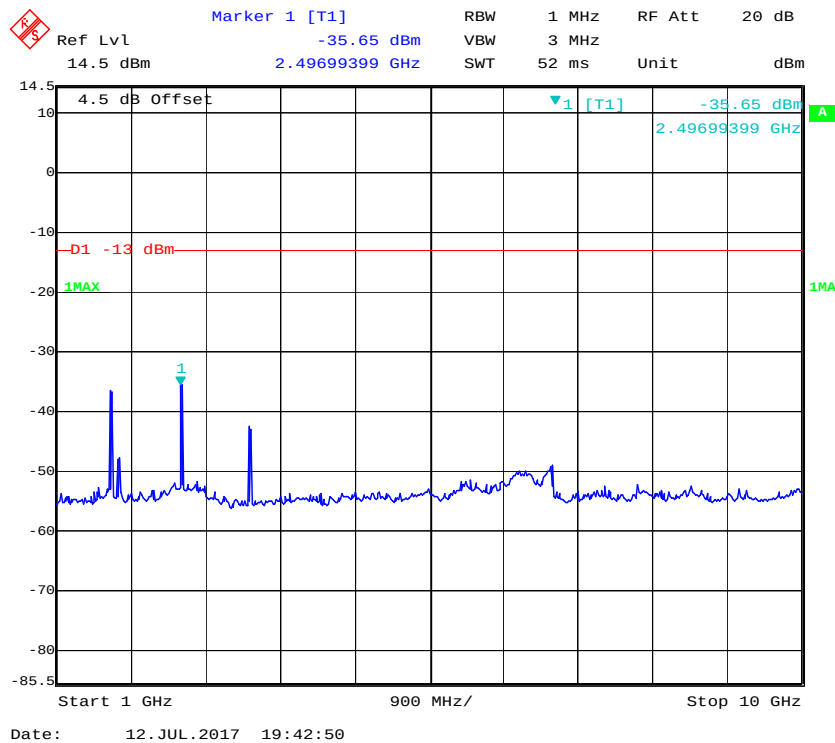
1 GHz – 10 GHz (GSM Mode)



30 MHz – 1 GHz (WCDMA Mode)

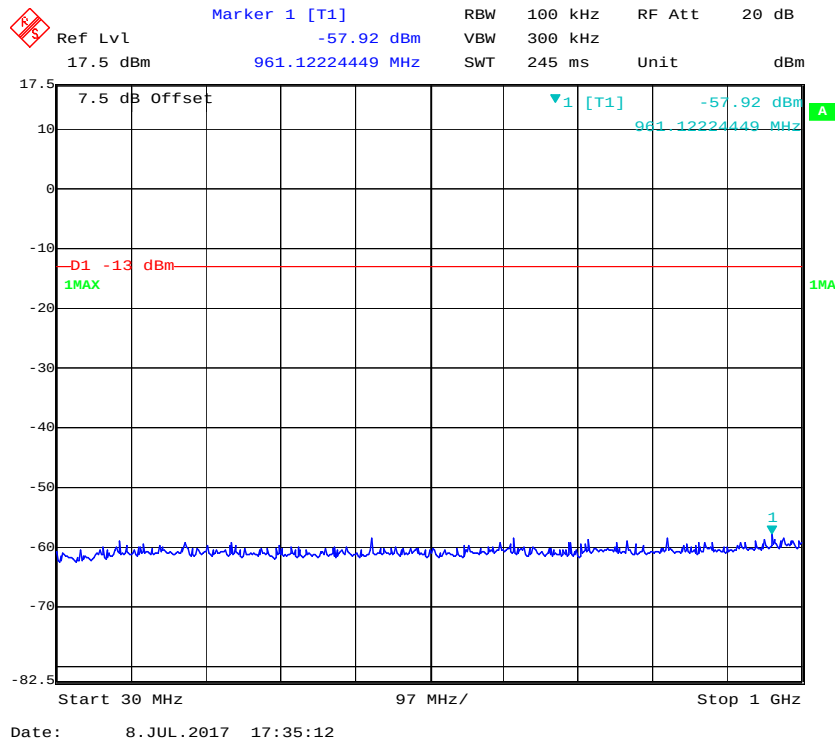


1 GHz – 10 GHz (WCDMA Mode)

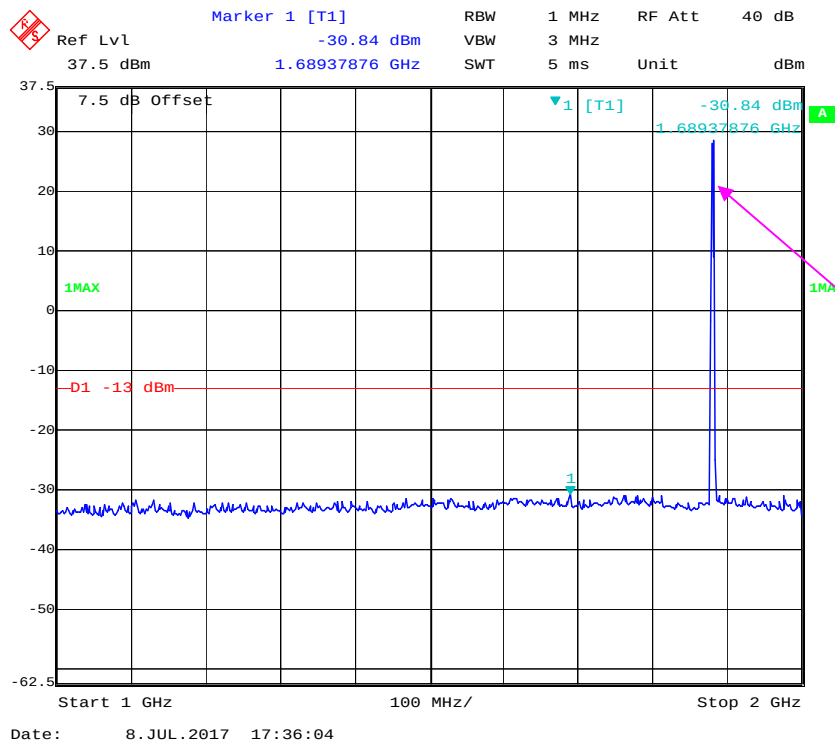


PCS Band (Part 24E)

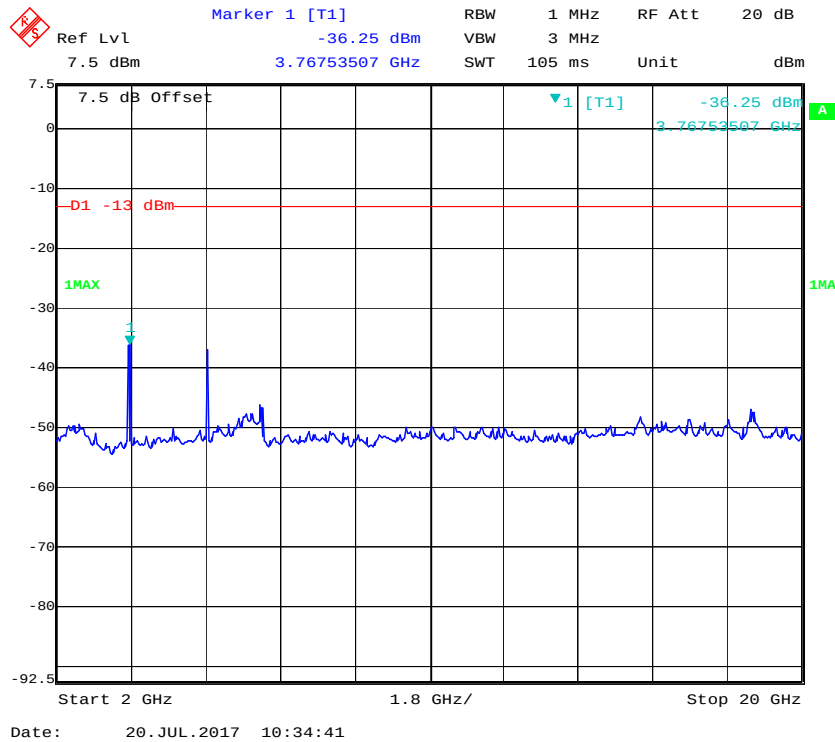
30 MHz – 1 GHz (GSM Mode)



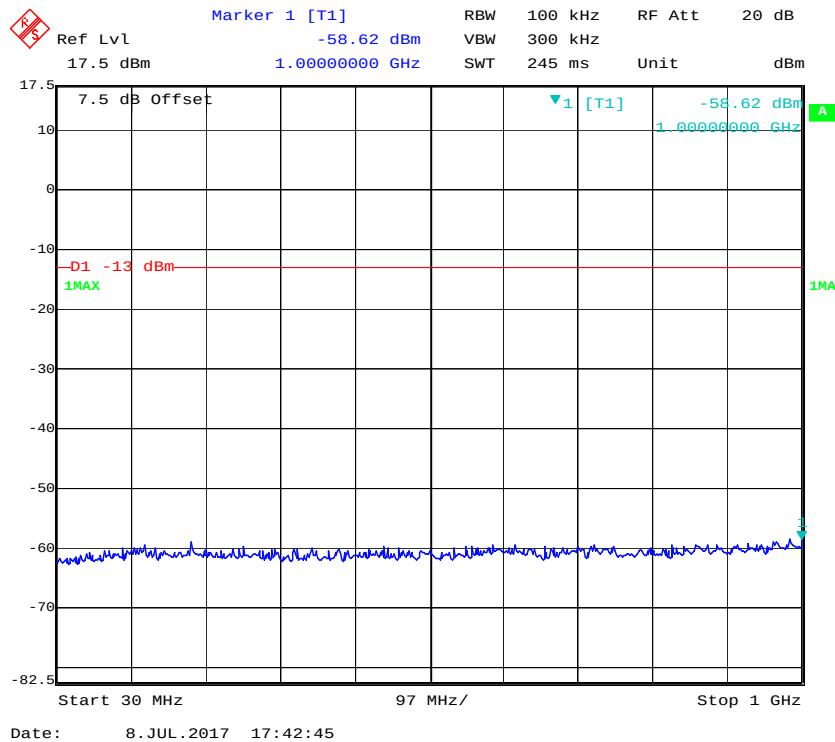
1 GHz – 2 GHz (GSM Mode)



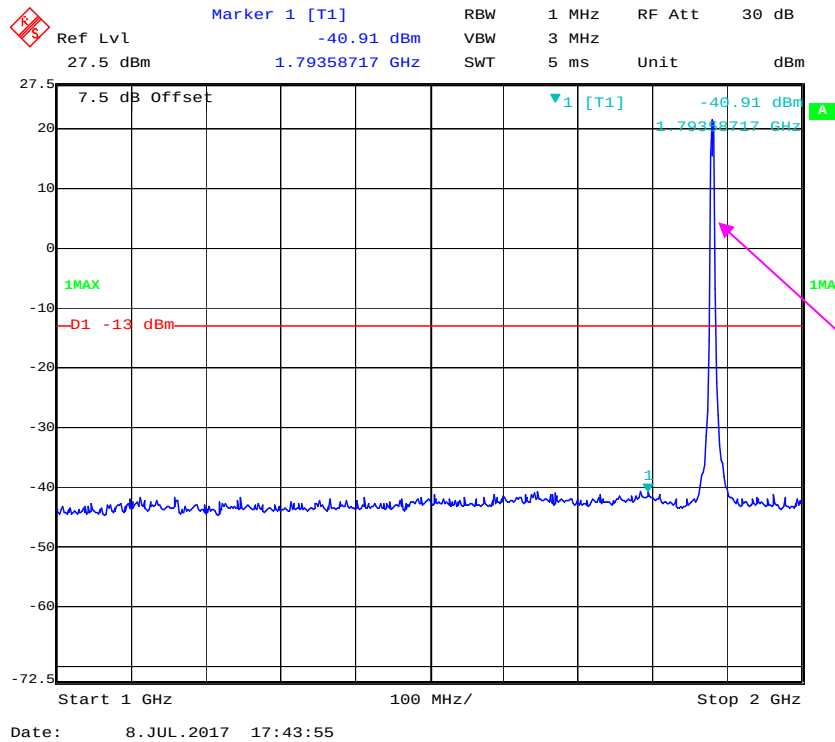
2 GHz – 20 GHz (GSM Mode)



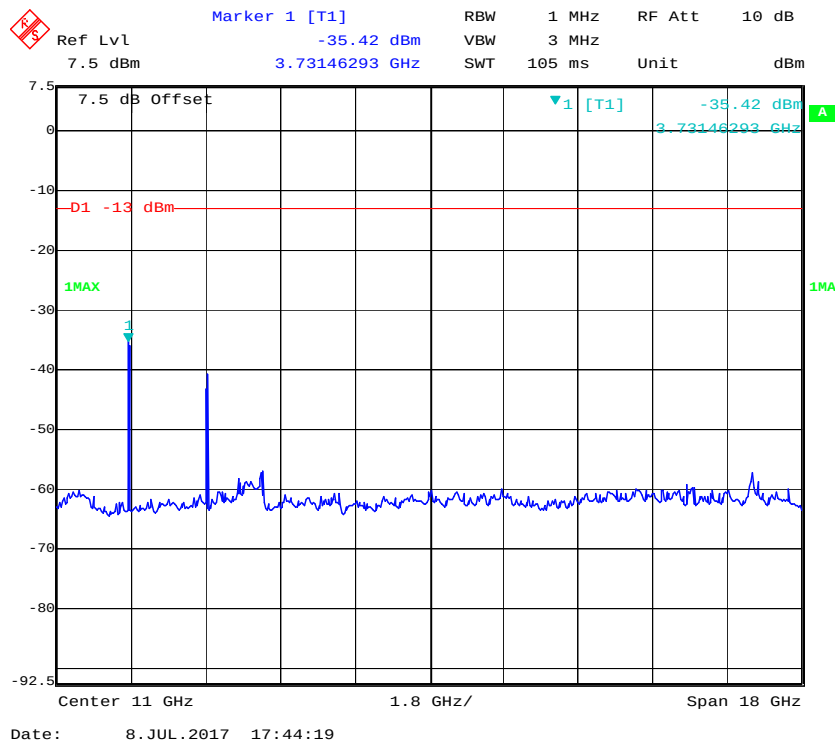
30 MHz – 1 GHz (WCDMA Mode)



1 GHz – 2 GHz (WCDMA Mode)

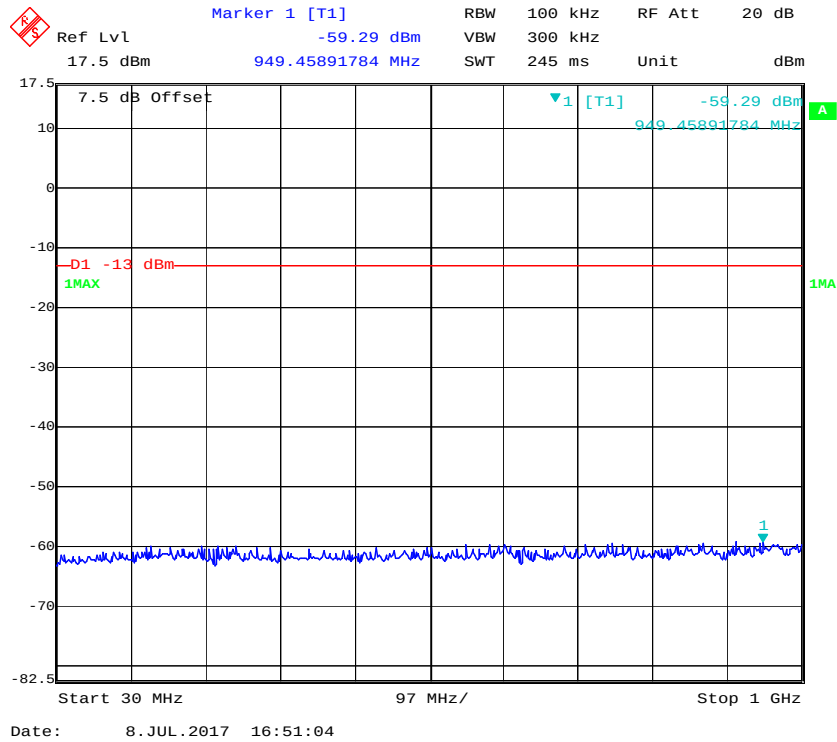


2 GHz – 20 GHz (WCDMA Mode)

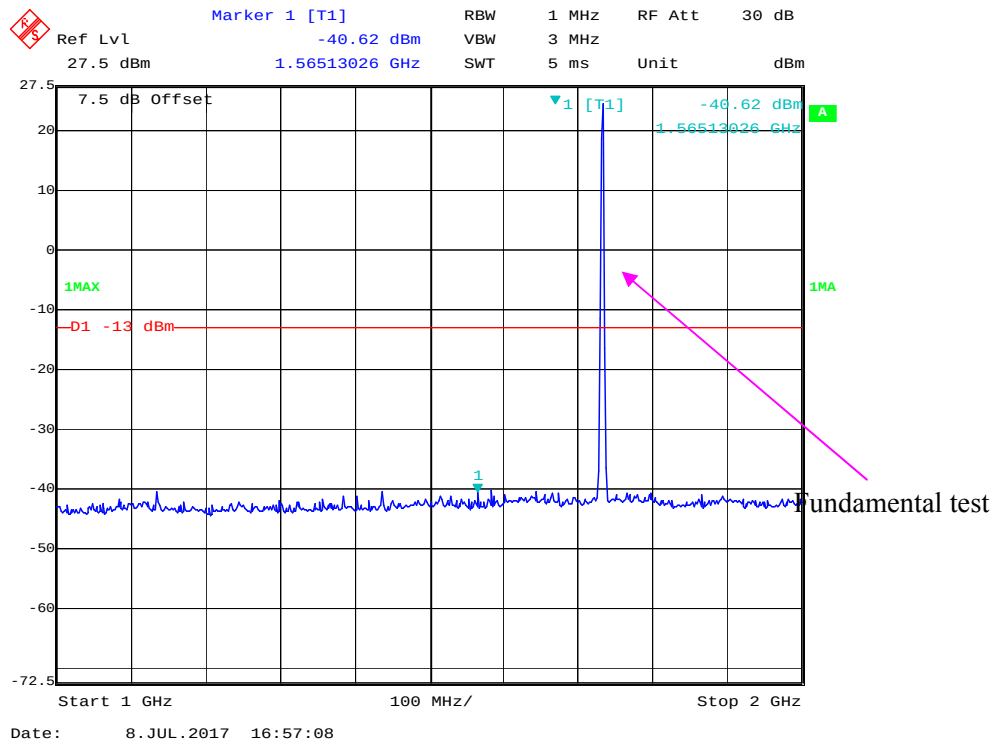


LTE Band 4:

30 MHz - 1 GHz (1.4 MHz, Middle Channel)



1 GHz - 2 GHz (1.4 MHz, Middle Channel)



Marker 1 [T1] -36.56 dBm

RBW 1 MHz RF Att 10 dB

VBW 3 MHz

SWT 105 ms Unit dBm

Ref Lvl 7.5 dBm 3.44288577 GHz

7.5 dB Offset

1 [T1] -36.56 dBm

3.44288577 GHz

D1 -13 dBm

1MAX

1MAX

Start 2 GHz 1.8 GHz/ Stop 20 GHz

Date: 8. JUL. 2017 16:57:50

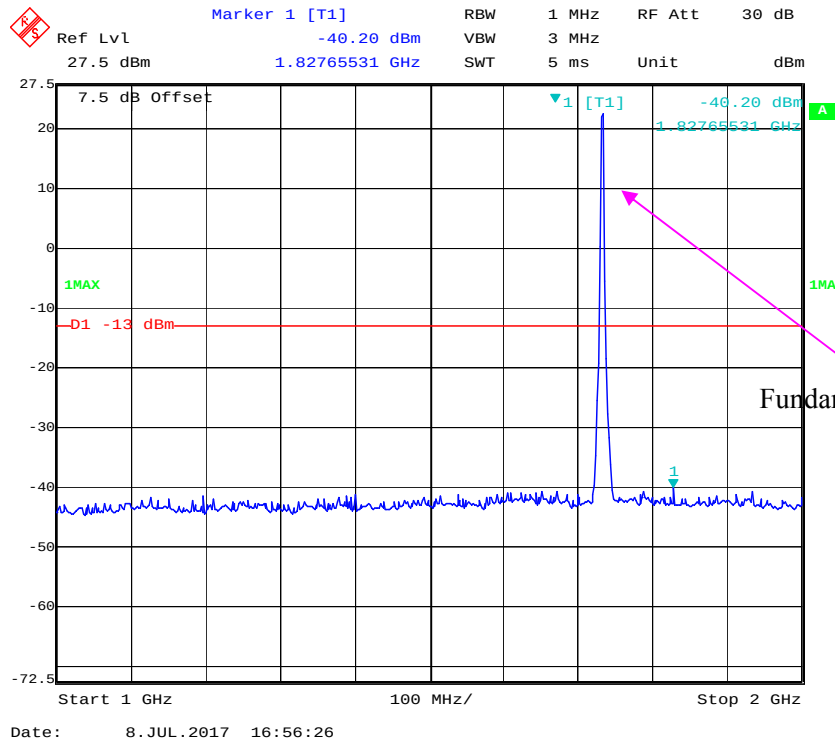
Ref Lvl 17.5 dBm
 Marker 1 [T1] -59.16 dBm
 RBW 100 kHz
 VBW 300 kHz
 RF Att 20 dB
 Unit dBm
 SWT 245 ms

7.5 dB Offset
 D1 -13 dBm
 1MAX
 1 [T1] -59.16 dBm
 150.52104208 MHz

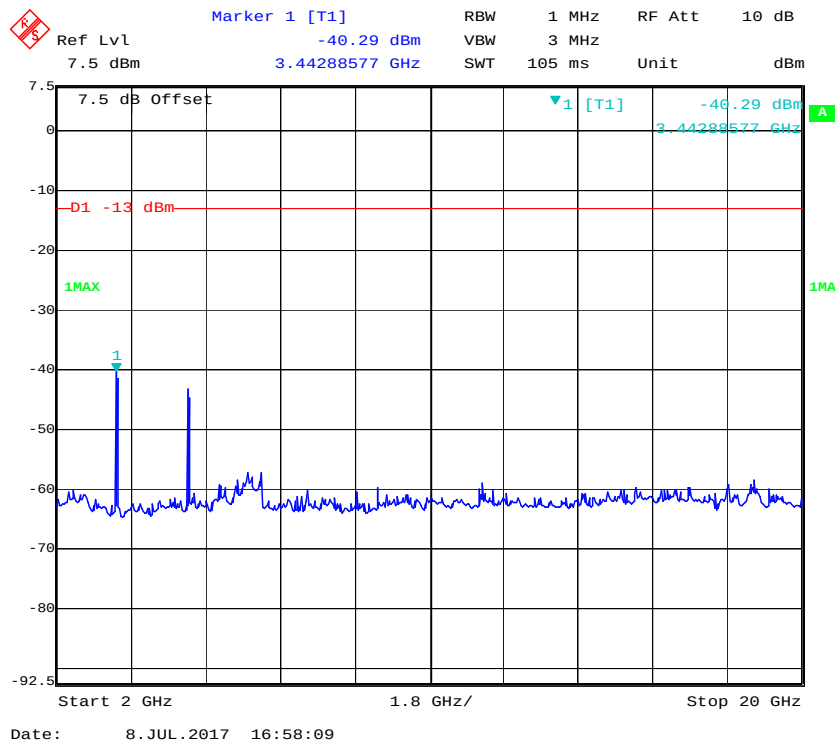
Start 30 MHz
 97 MHz/
 Stop 1 GHz

Date: 8.JUL.2017 16:51:16

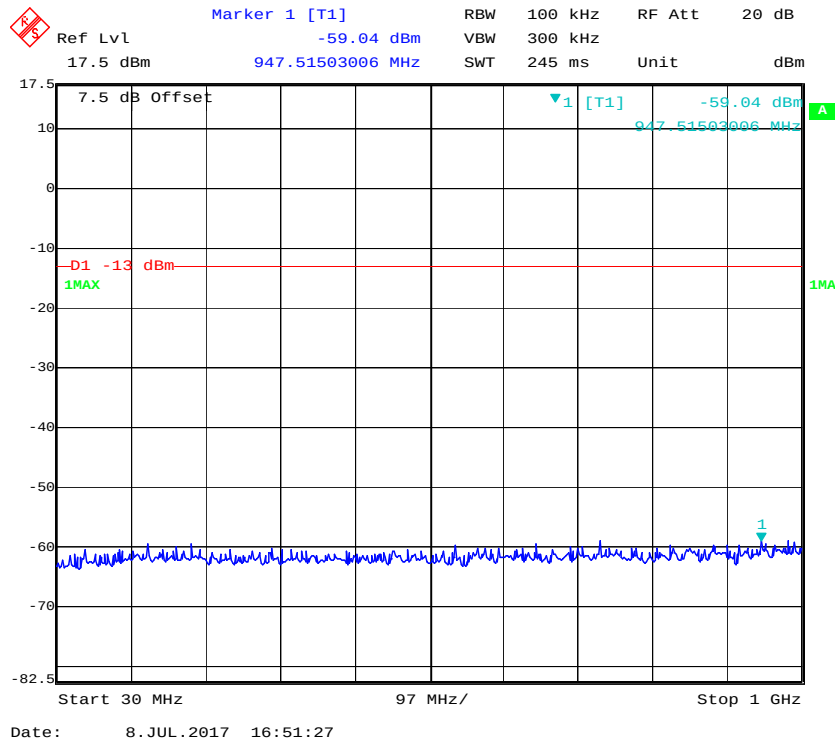
1 GHz – 2 GHz (3.0 MHz, Middle Channel)



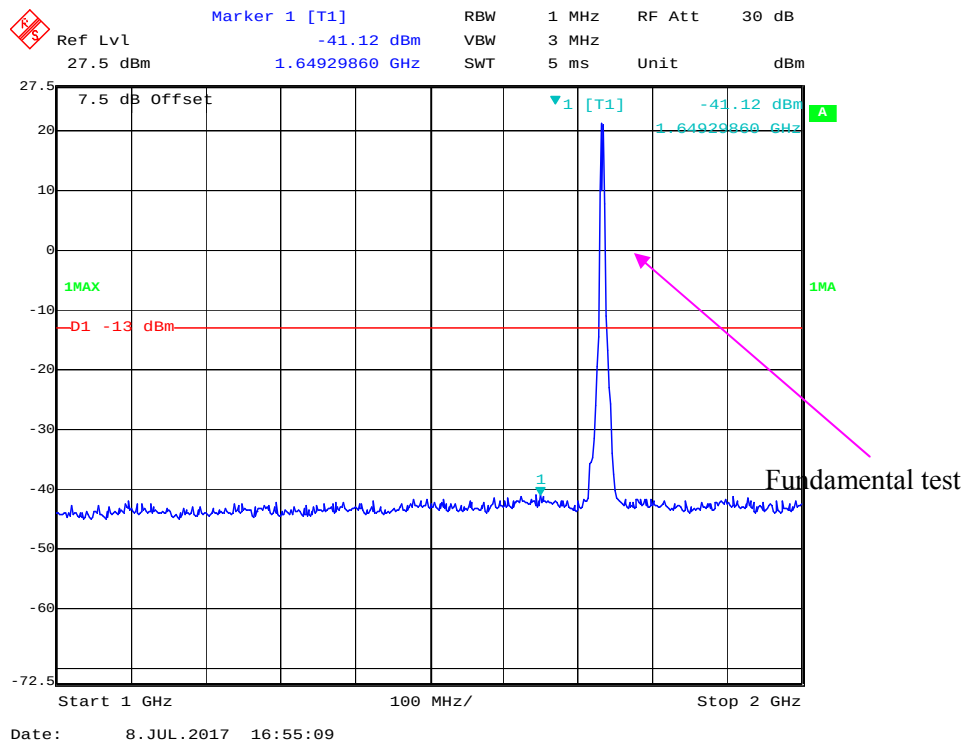
2 GHz – 20 GHz (3.0 MHz, Middle Channel)



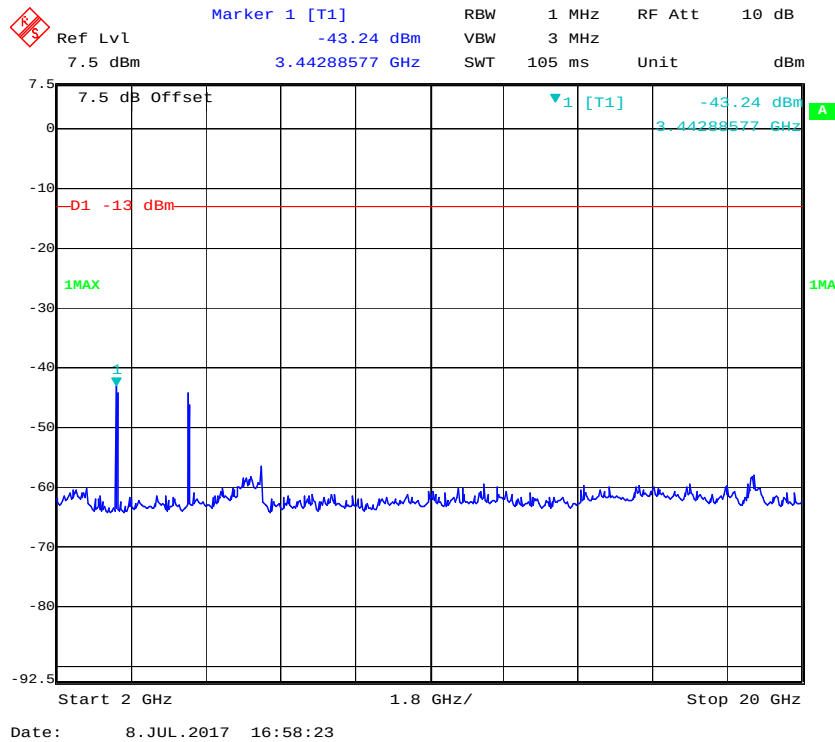
30 MHz - 1 GHz (5.0 MHz, Middle Channel)



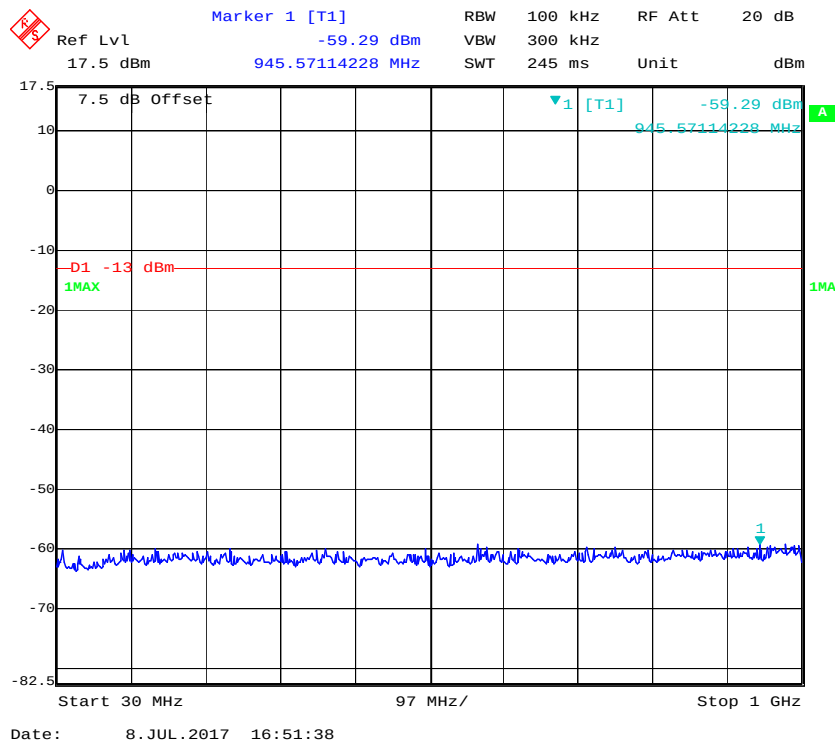
1 GHz - 2 GHz (5.0 MHz, Middle Channel)



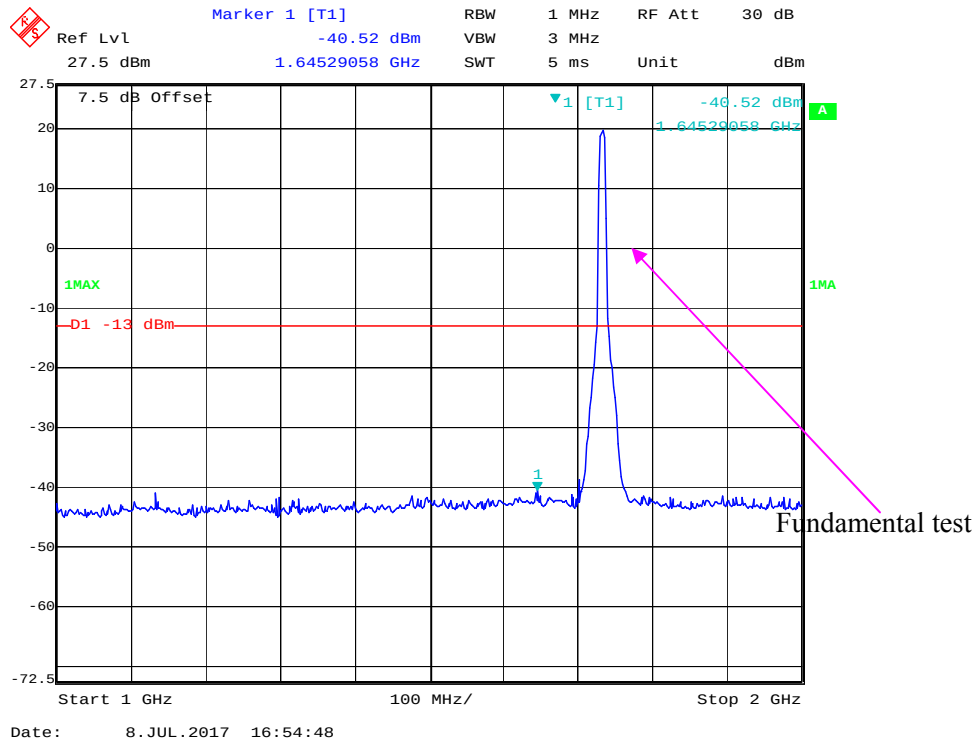
2 GHz – 20 GHz (5.0 MHz, Middle Channel)



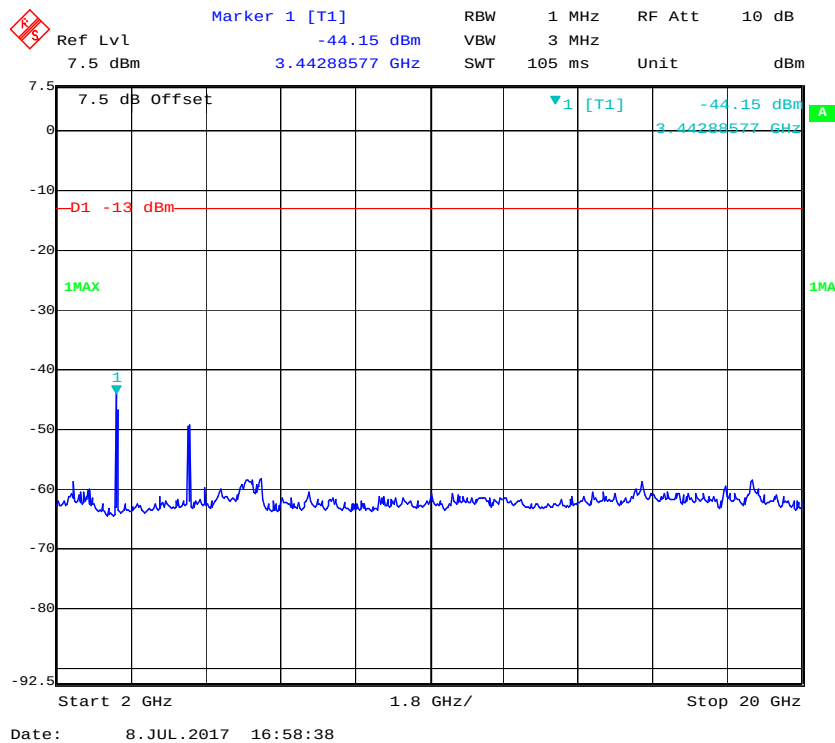
30 MHz - 1 GHz (10.0 MHz, Middle Channel)



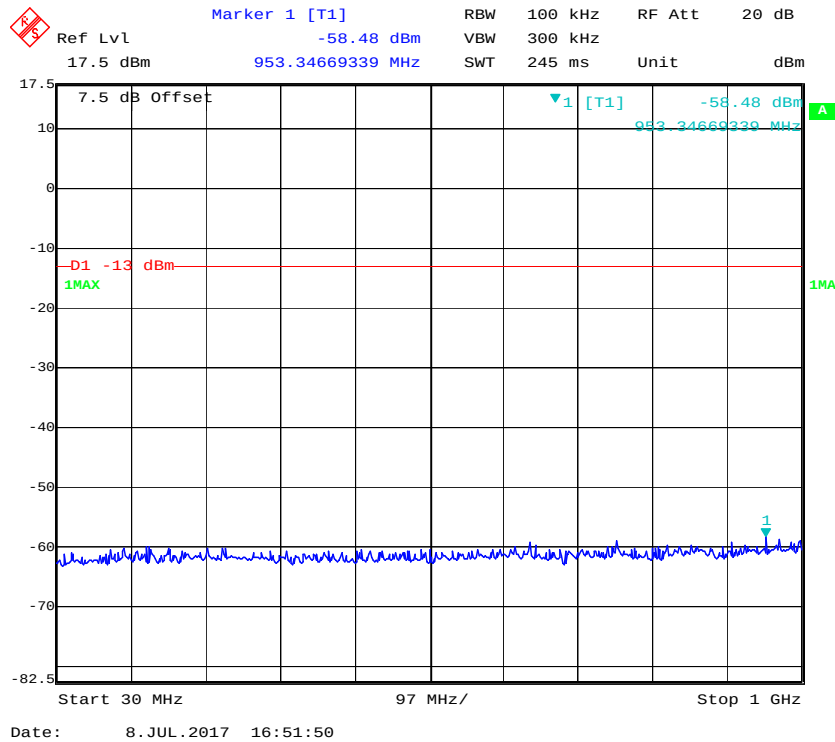
1 GHz – 2 GHz (10.0 MHz, Middle Channel)



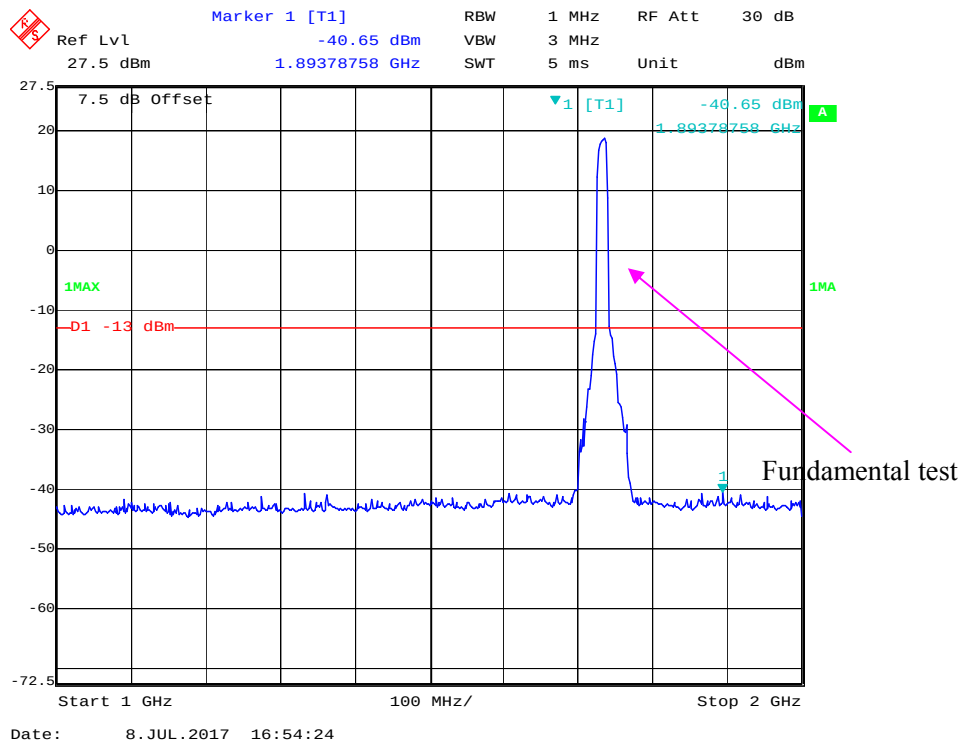
2 GHz – 20 GHz (10.0 MHz, Middle Channel)



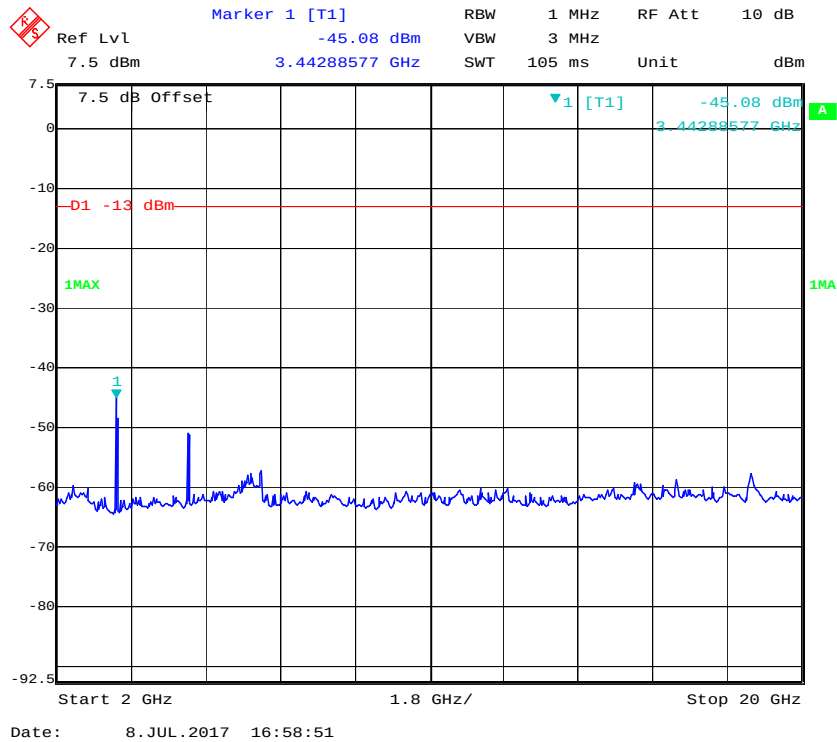
30 MHz - 1 GHz (15.0 MHz, Middle Channel)



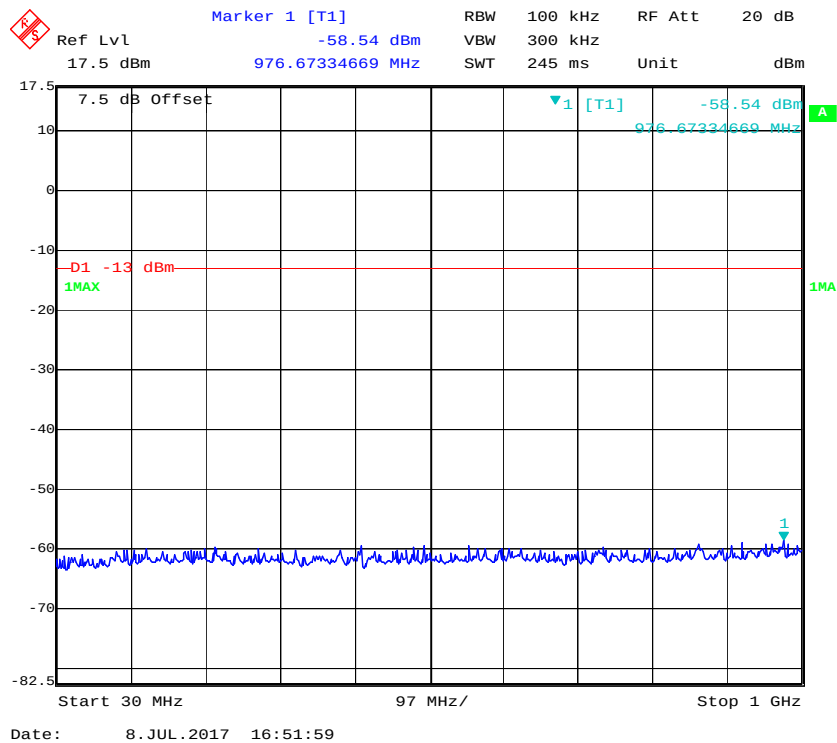
1 GHz - 2 GHz (15.0 MHz, Middle Channel)



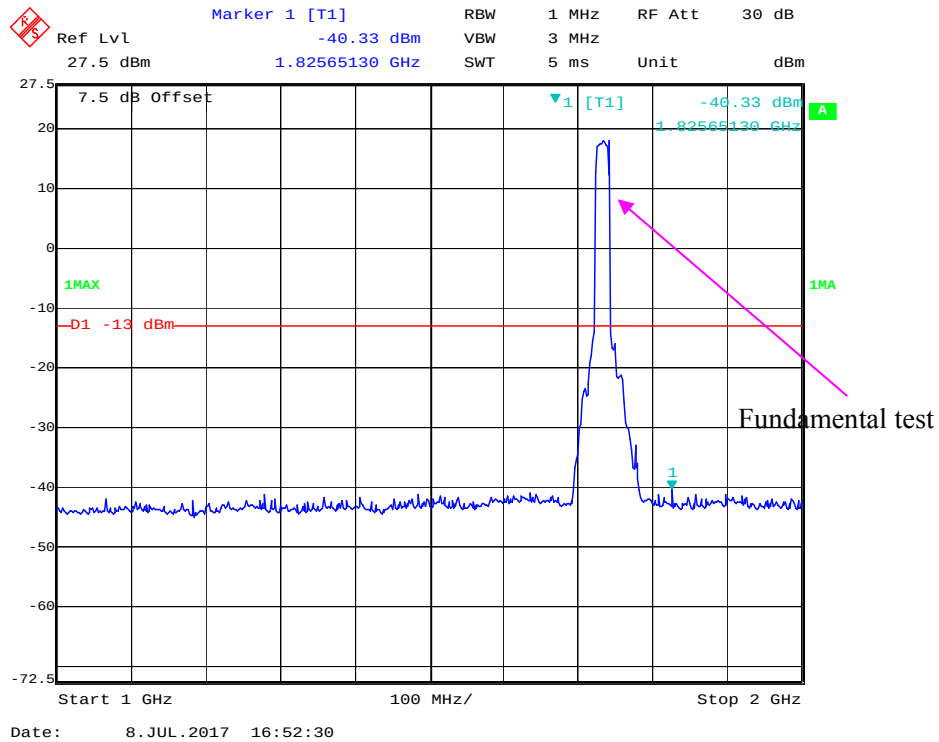
2 GHz – 20 GHz (15.0 MHz, Middle Channel)



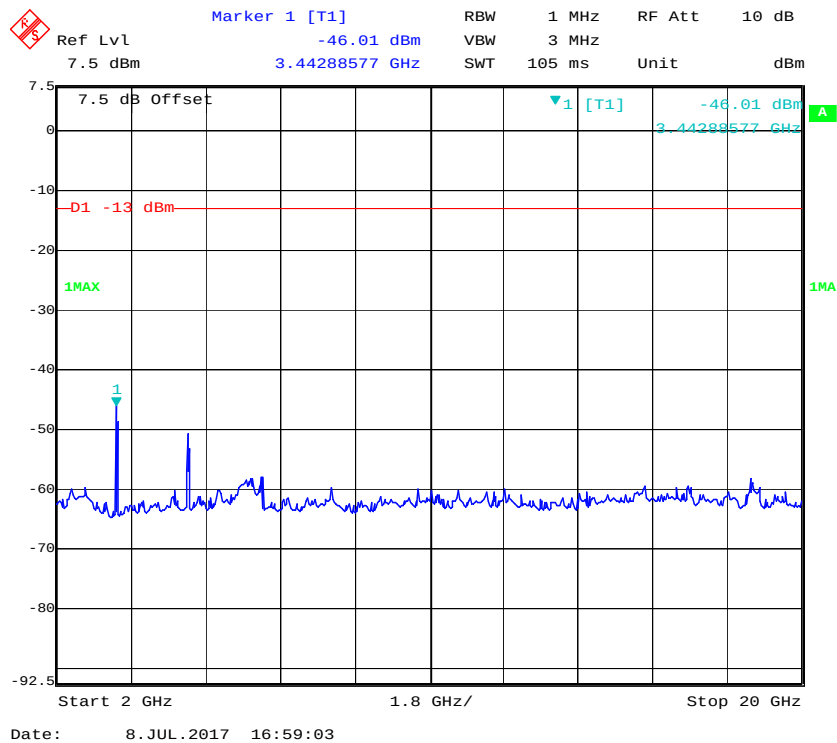
30 MHz - 1 GHz (20.0 MHz, Middle Channel)



1 GHz – 2 GHz (20.0 MHz, Middle Channel)



2 GHz –20 GHz (20.0 MHz, Middle Channel)



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:	22 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Layne Li on 2017-07-08.

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)	FCC Part 22H	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
GSM Mode, Middle channel										
161.24	42.27	224	1.7	H	-62.7	0.14	2.05	-60.79	-13	47.79
161.24	41.91	234	2.0	V	-63.5	0.14	2.05	-61.59	-13	48.59
1673.20	51.50	53	1.3	H	-50.3	0.40	8.52	-42.18	-13	29.18
1673.20	53.07	164	1.3	V	-50.7	0.40	8.52	-42.58	-13	29.58
WCDMA Mode, Middle channel										
161.24	39.87	45	2.2	H	-65.1	0.14	2.05	-63.19	-13	50.19
161.24	39.81	209	1.9	V	-65.6	0.14	2.05	-63.69	-13	50.69
1673.20	39.60	193	2.4	H	-62.2	0.40	8.52	-54.08	-13	41.08
1673.20	41.37	95	1.8	V	-62.4	0.40	8.52	-54.28	-13	41.28

30 MHz ~ 20 GHz:**PCS Band**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	FCC Part 24E	
			Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		Limit (dBm)	Margin (dB)
GSM Mode, Middle channel										
161.24	42.67	350	1.7	H	-62.3	0.14	2.05	-60.39	-13	47.39
161.24	42.21	57	2.2	V	-63.2	0.14	2.05	-61.29	-13	48.29
3760.00	44.12	275	1.0	H	-51.9	0.59	9.72	-42.77	-13	29.77
3760.00	45.61	109	1.4	V	-51.5	0.59	9.72	-42.37	-13	29.37
WCDMA Mode, Middle channel										
161.24	40.77	201	2.5	H	-64.2	0.14	2.05	-62.29	-13	49.29
161.24	40.31	45	2.0	V	-65.1	0.14	2.05	-63.19	-13	50.19
3760.00	47.22	159	2.0	H	-48.8	0.59	9.72	-39.67	-13	26.67
3760.00	45.21	170	1.5	V	-51.9	0.59	9.72	-42.77	-13	29.77

LTE Band:

Test mode: Transmitting (Pre-scan with all the bandwidth, and worse case as below)

Frequency	Receiver	Turntable	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
(MHz)	Reading (dBμV)	Angle Degree	Height (m)	Polar (H/V)	Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
Band 4										
Test frequency range:30 MHz ~ 18 GHz										
161.24	41.37	244	2.1	H	-63.6	0.14	2.05	-61.69	-13	48.69
161.24	40.91	23	2.0	V	-64.5	0.14	2.05	-62.59	-13	49.59
3465.00	38.43	228	2.5	H	-58.6	0.54	9.90	-49.24	-13	36.24
3465.00	39.33	335	1.6	V	-59.0	0.54	9.90	-49.64	-13	36.64

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.

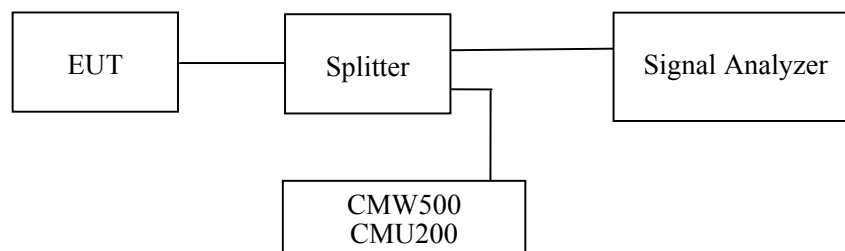
According to § 24.238(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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**

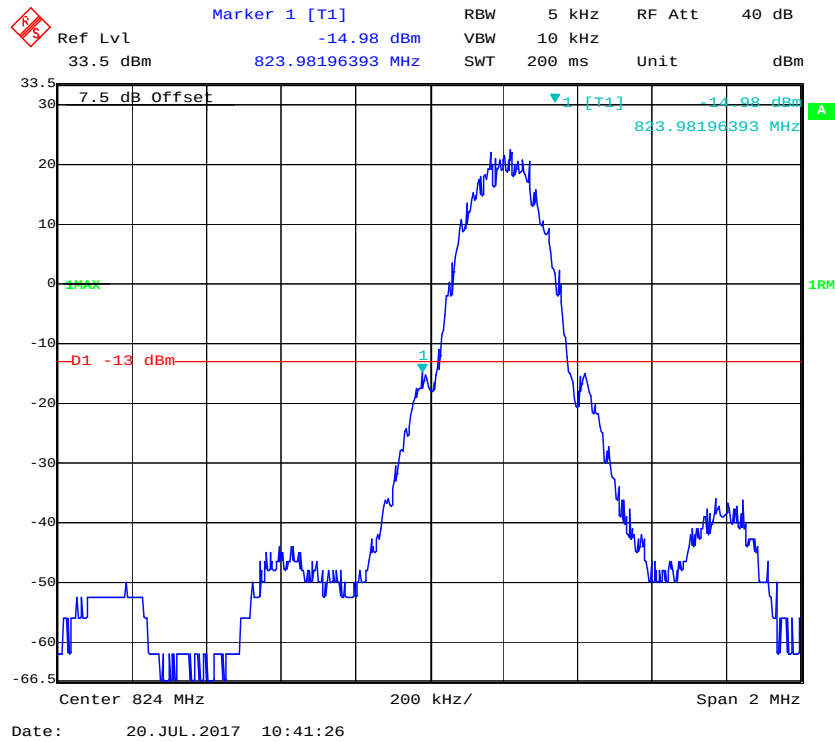
Temperature:	24~26 °C
Relative Humidity:	48~50 %
ATM Pressure:	100.9~101.0 kPa

The testing was performed by Echo Wu from 2017-07-08 to 2017-08-22.

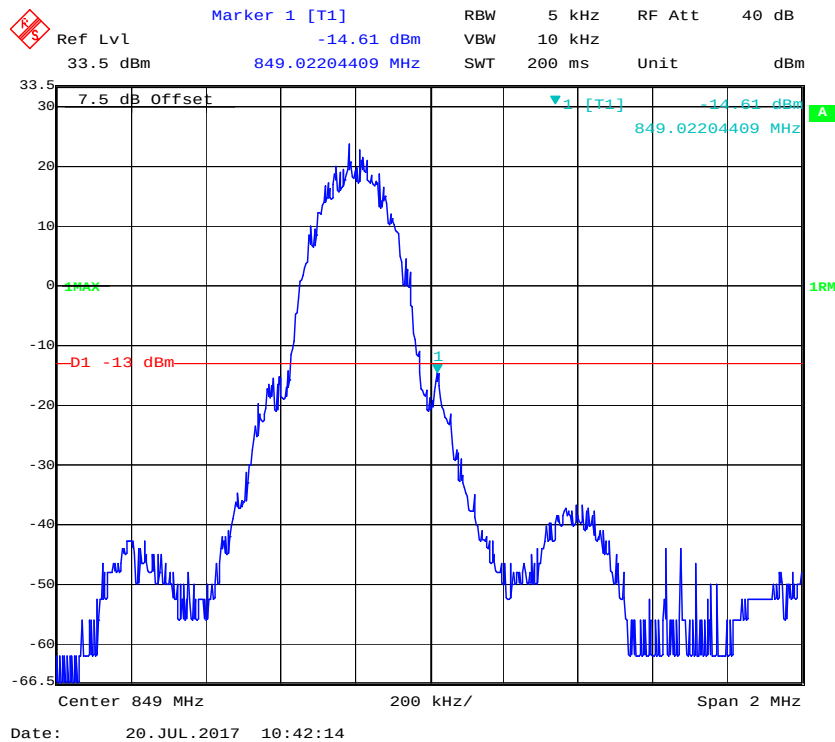
EUT operation mode: Transmitting

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

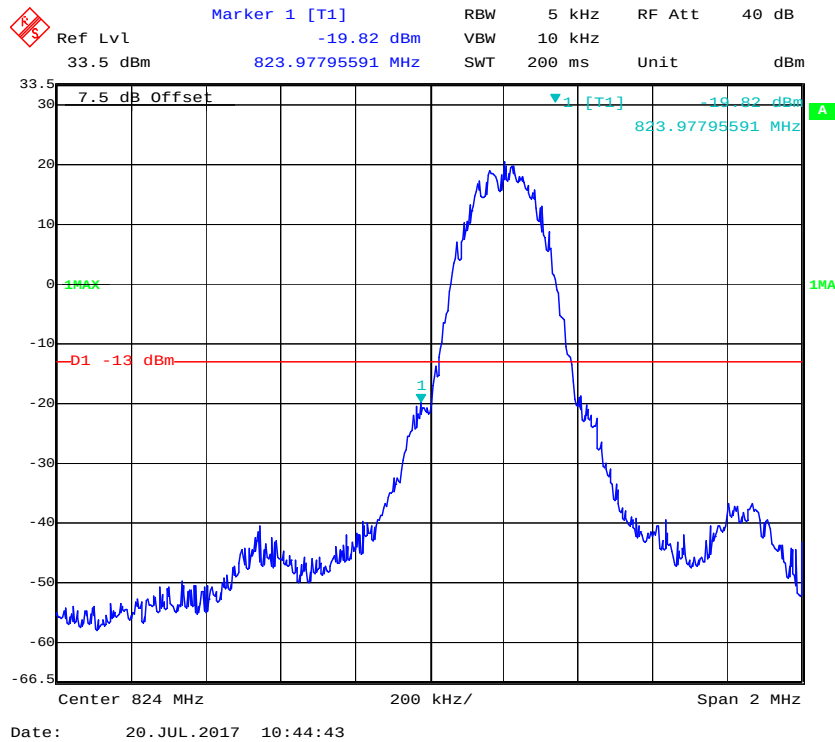
Cellular Band, Left Band Edge for GSM (GMSK) Mode



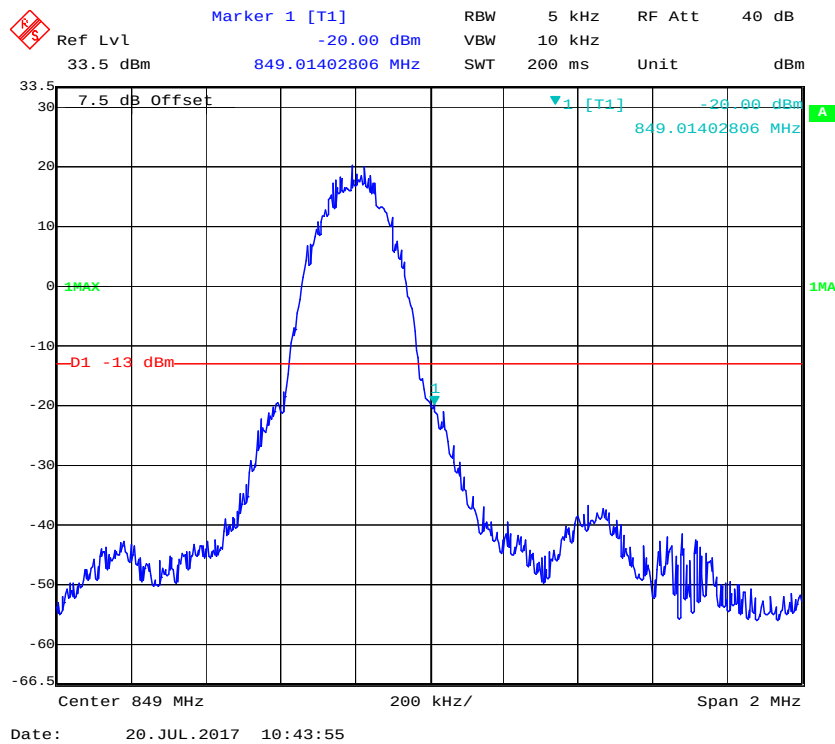
Cellular Band, Right Band Edge for GSM (GMSK) Mode



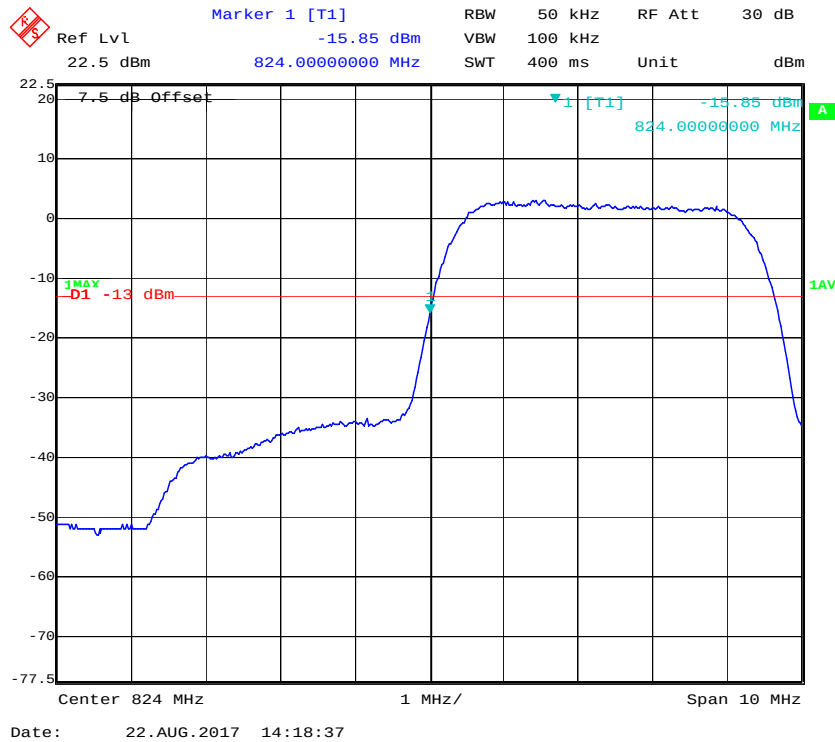
Cellular Band, Left Band Edge for EDGE Mode



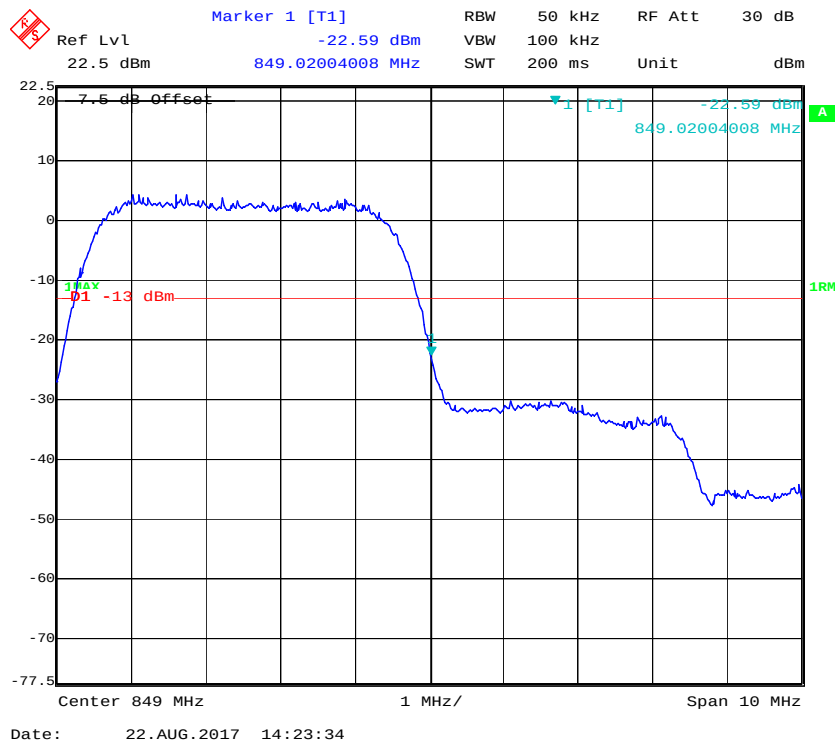
Cellular Band, Right Band Edge for EDGE Mode

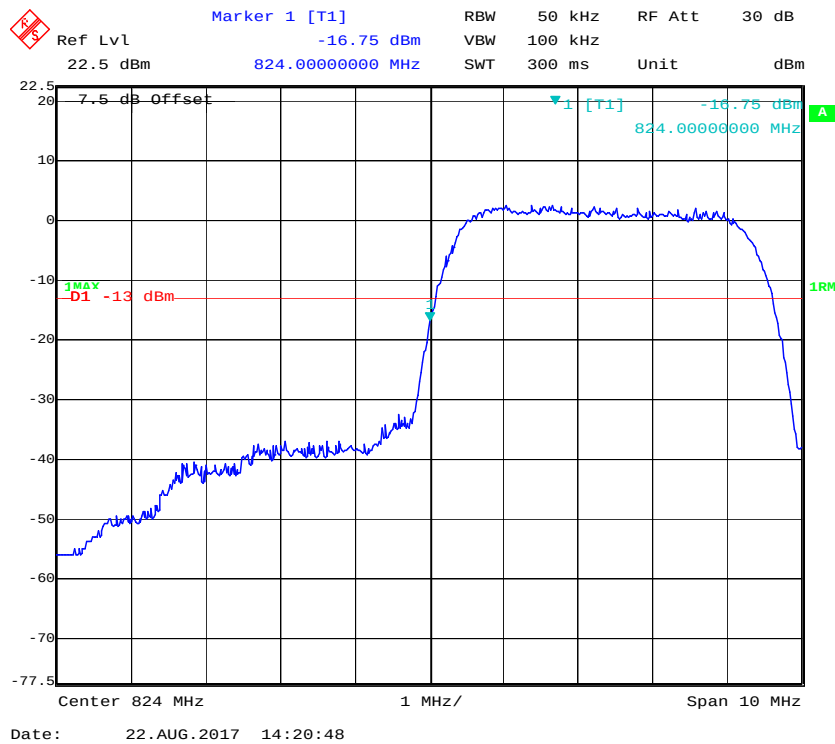
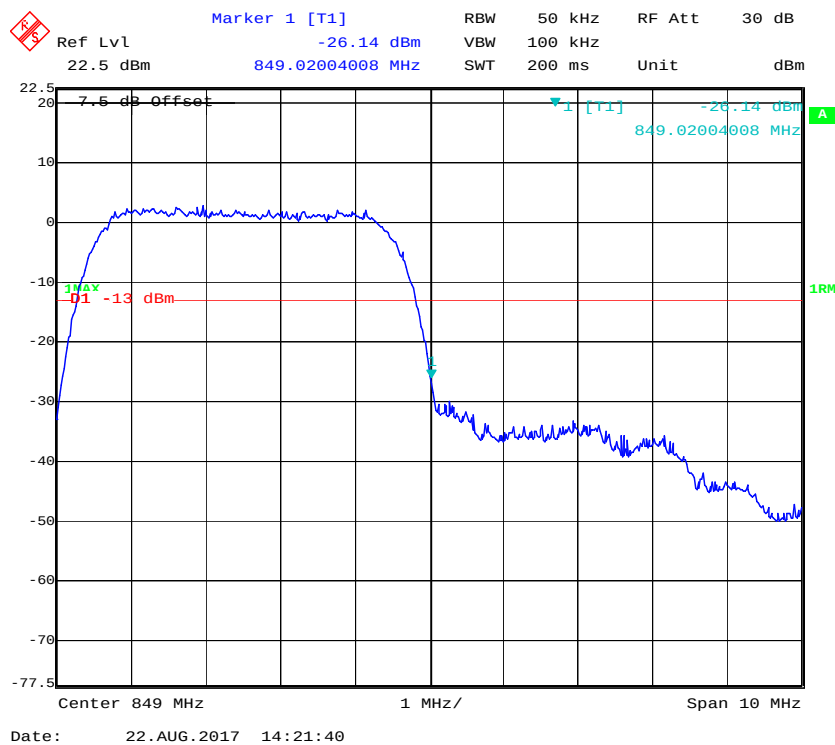


Cellular Band, Left Band Edge for WCDMA (BPSK) Mode

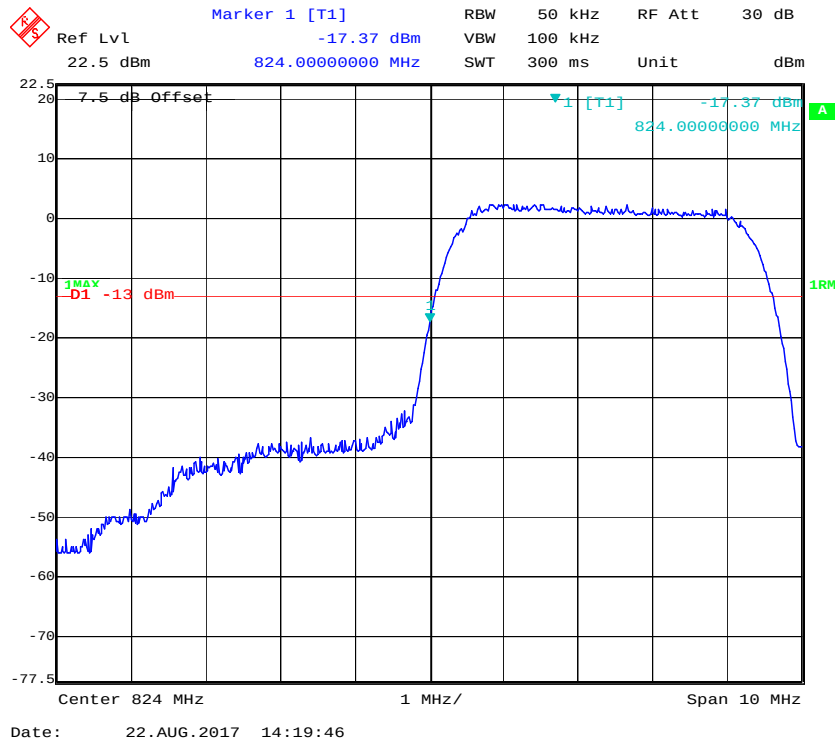


Cellular Band, Right Band Edge for WCDMA (BPSK) Mode

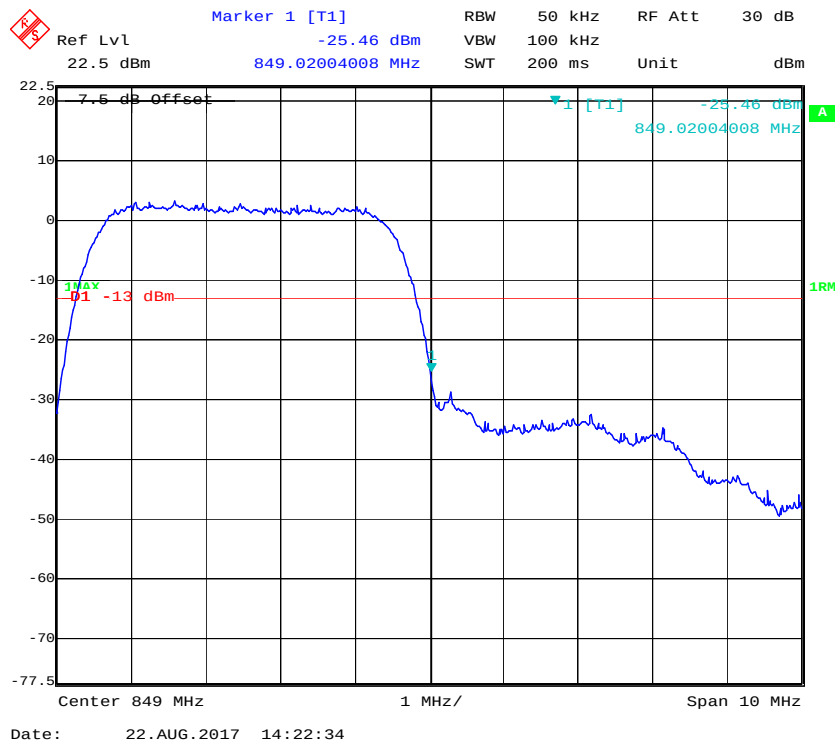


Cellular Band, Left Band Edge for HSDPA (16QAM) Mode**Cellular Band, Right Band Edge for HSDPA (16QAM) Mode**

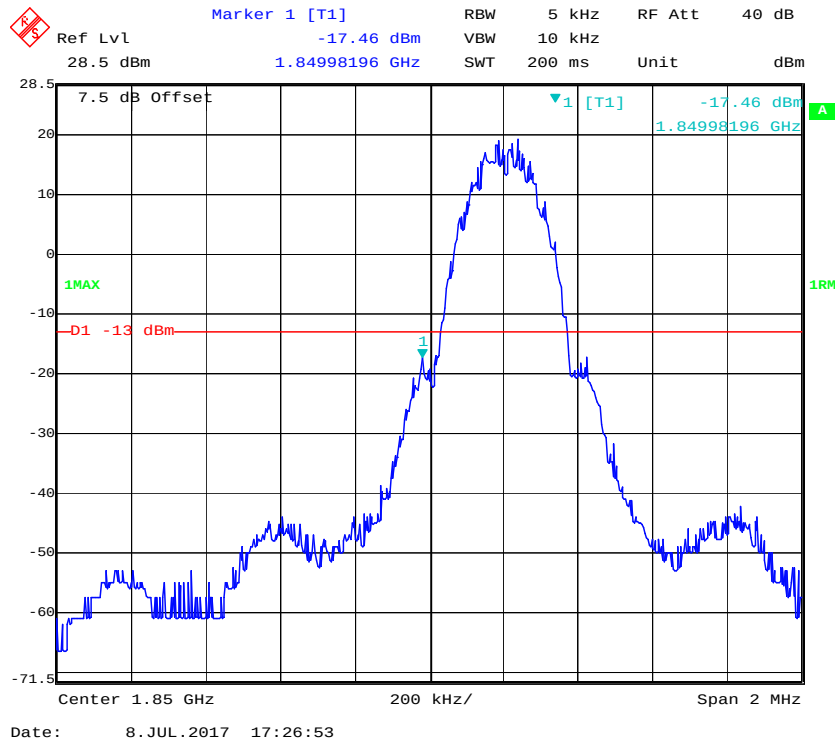
Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



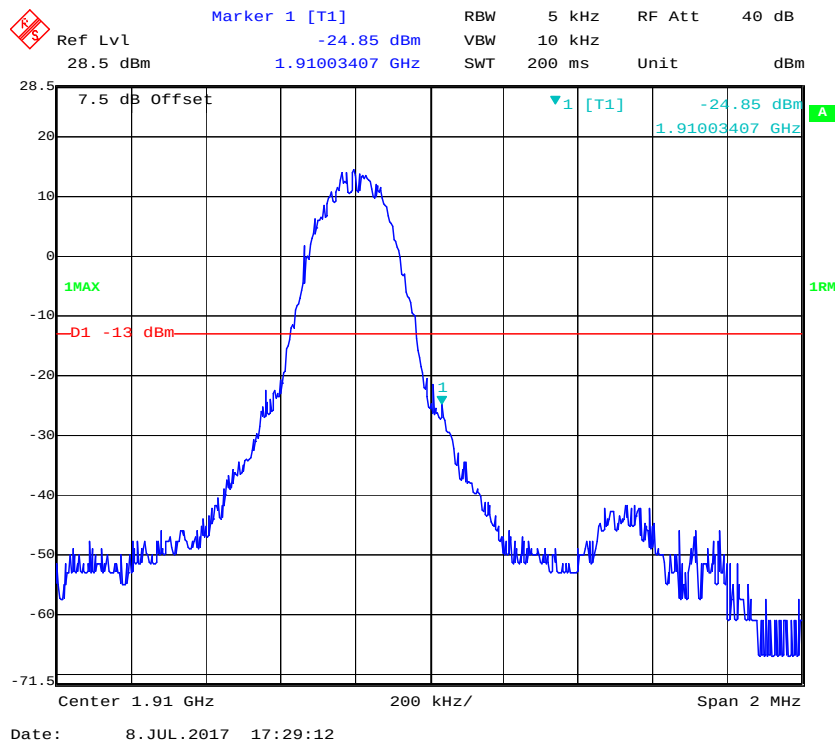
Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



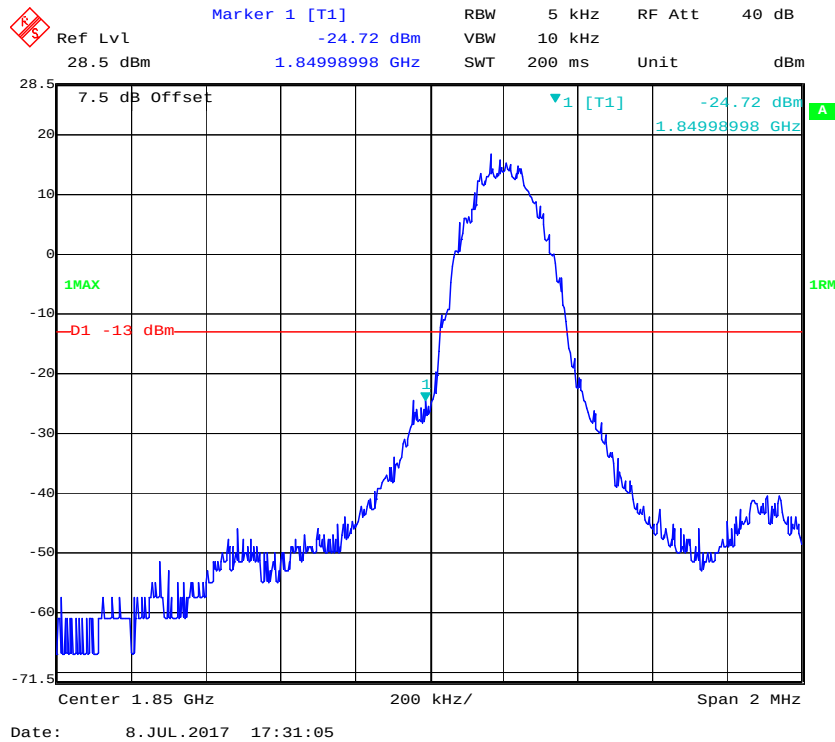
PCS Band, Left Band Edge for GSM (GMSK) Mode



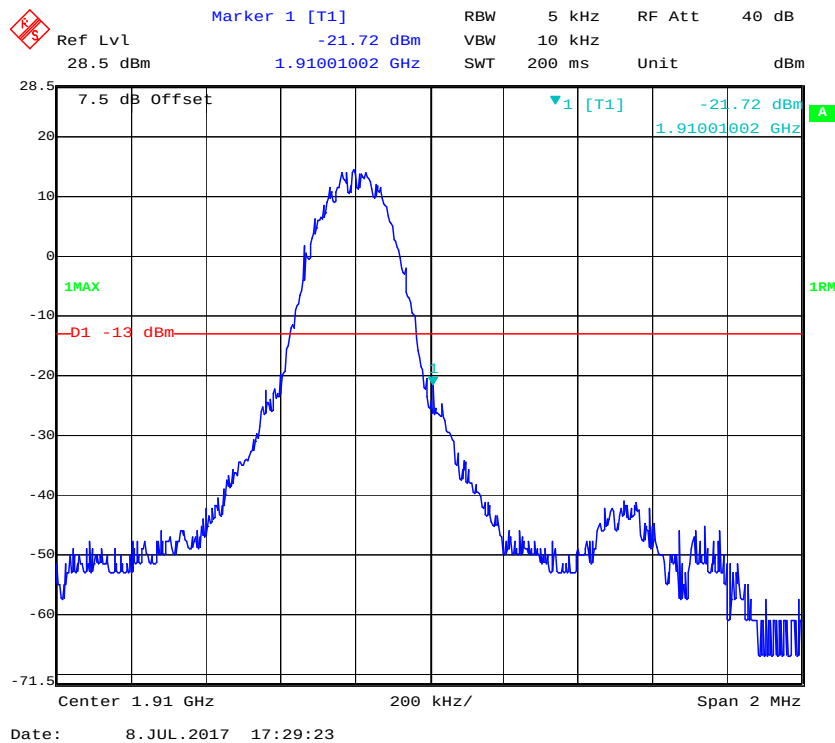
PCS Band, Right Band Edge for GSM (GMSK) Mode



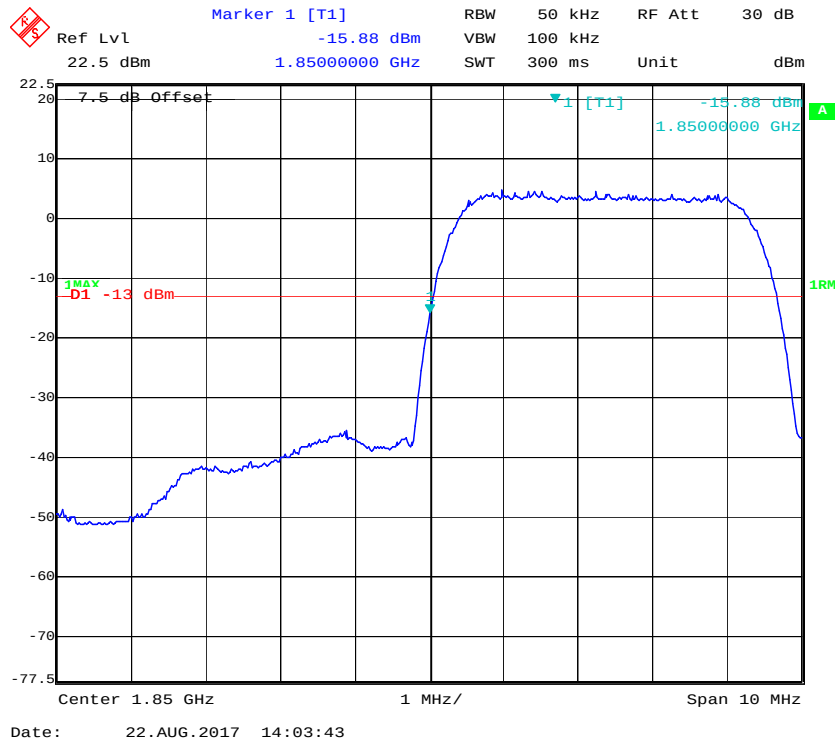
PCS Band, Left Band Edge for EDGE Mode



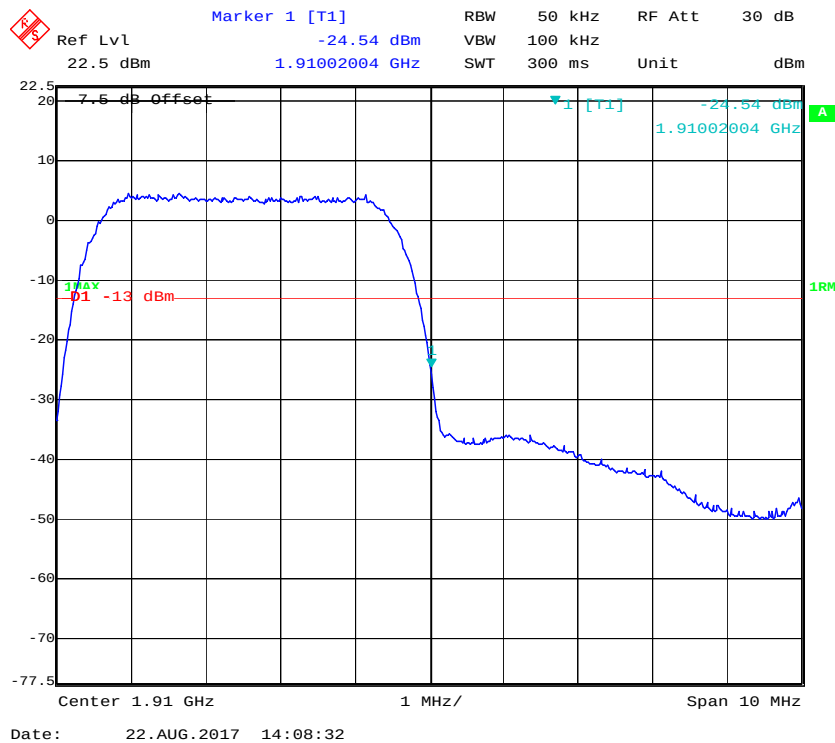
PCS Band, Right Band Edge for EDGE Mode



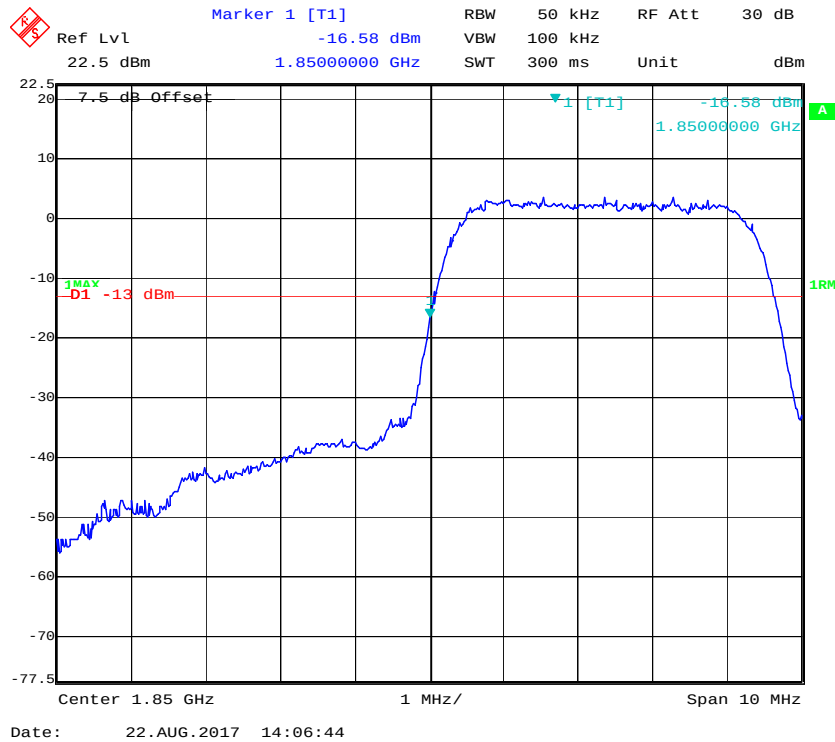
PCS Band, Left Band Edge for WCDMA (BPSK) Mode



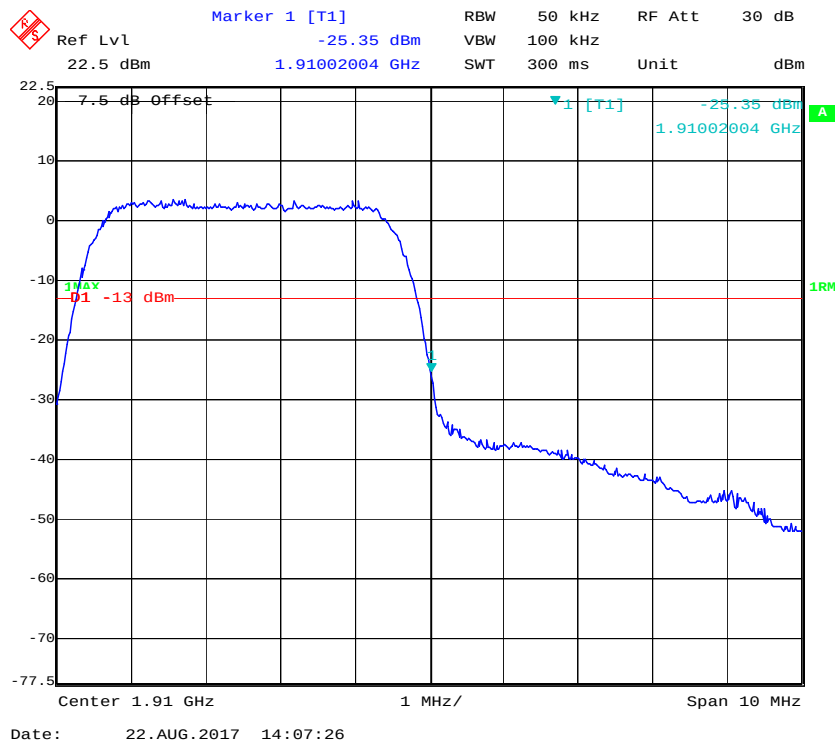
PCS Band, Right Band Edge for WCDMA (BPSK) Mode



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



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



Ref Lvl 22.5 dBm
 Center 1.85 GHz
 Span 10 MHz
 RBW 50 kHz
 VBW 100 kHz
 SWT 300 ms
 RF Att 30 dB
 Unit dBm

Marker 1 [T1]
 -16.74 dBm
 1.85000000 GHz

7.5 dB Offset
 -13 dBm
 1.85000000 GHz

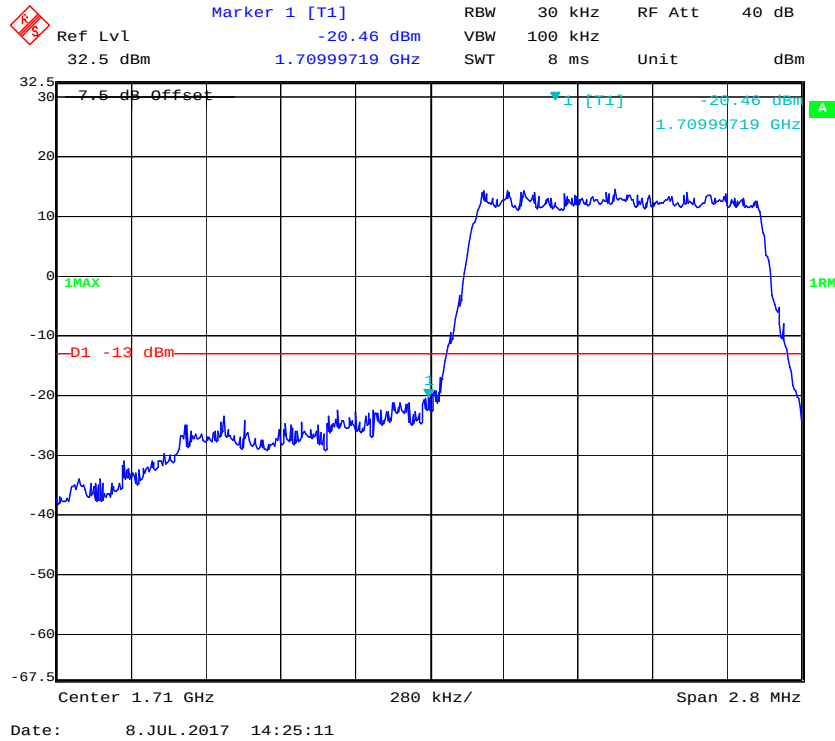
Date: 22.AUG.2017 14:05:42

The screenshot displays a spectrum analyzer interface. At the top, a red diamond icon with 'A' and 'S' is visible. The main display area shows a blue trace of a signal. A red horizontal line is drawn across the plot at -13 dBm, labeled '13 MAX' and '-13 dBm'. A green vertical line is positioned at the peak of the signal, labeled '1 [T1]' and '-25.64 dBm'. The frequency is set to 1.91002004 GHz. The span is 10 MHz, and the center frequency is 1.91 GHz. The resolution bandwidth (RBW) is 50 kHz, and the video bandwidth (VBW) is 100 kHz. The reference level (Ref Lvl) is 22.5 dBm. The unit is dBm. The date and time are 22.AUG.2017 14:07:58.

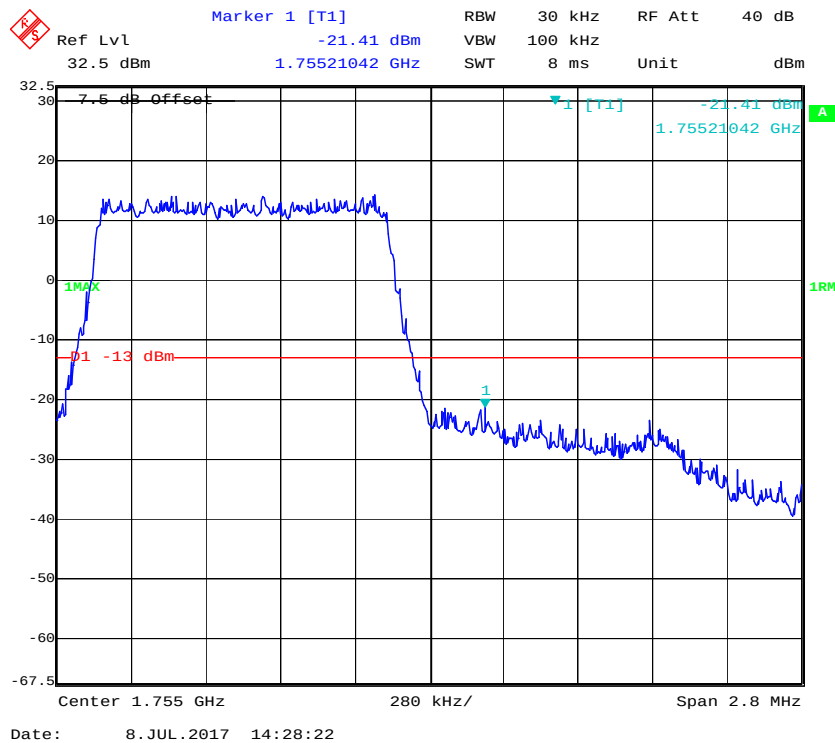
Parameter	Value
Ref Lvl	22.5 dBm
Marker 1 [T1]	-25.64 dBm
Frequency	1.91002004 GHz
RBW	50 kHz
VBW	100 kHz
SWT	300 ms
Unit	dBm
Span	10 MHz
Center	1.91 GHz
Scale	1 MHz/

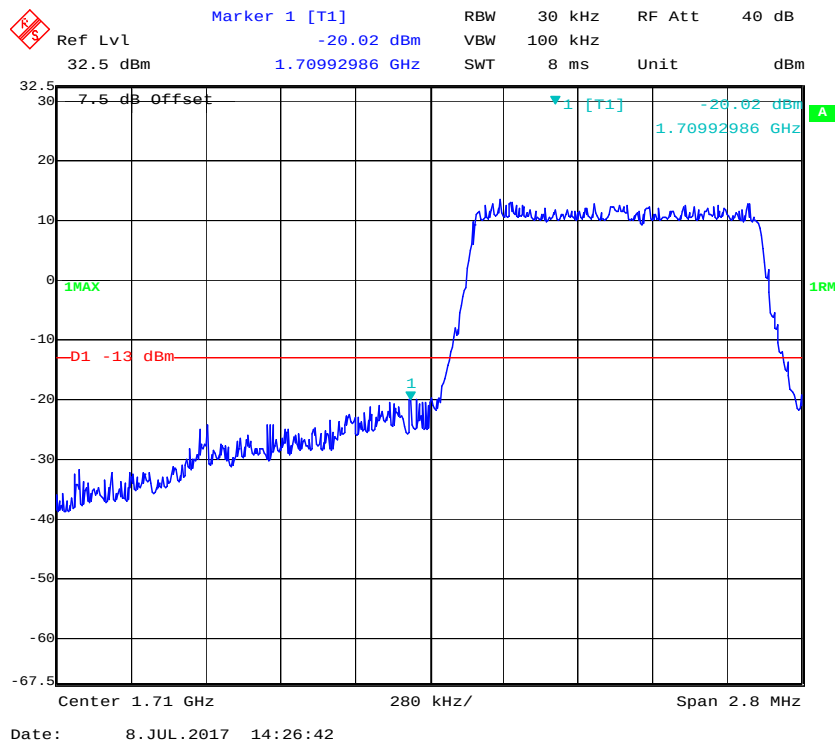
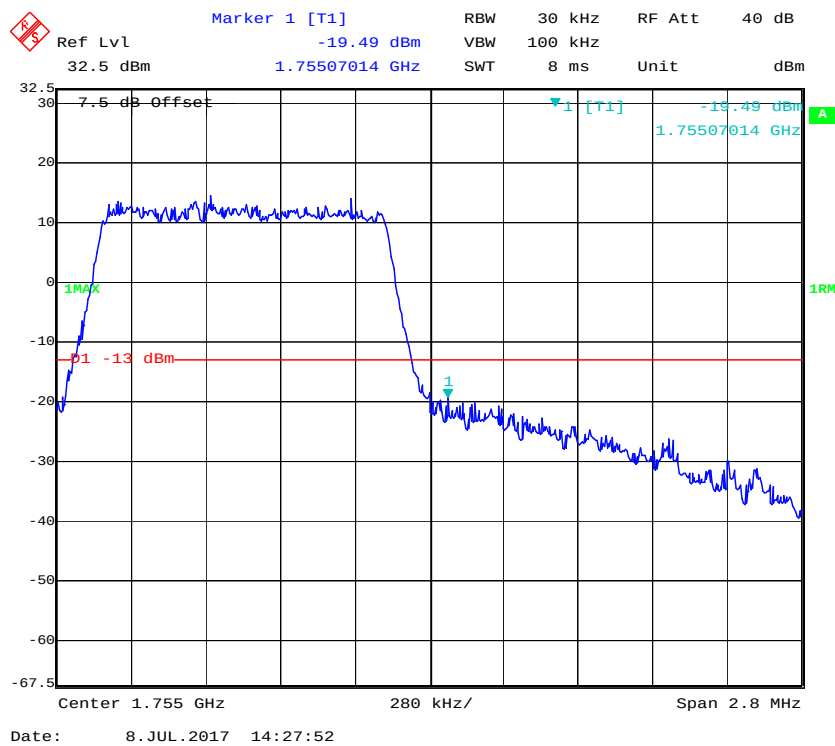
Band 4:

QPSK (1.4 MHz, FULL RB) - Left Band Edge

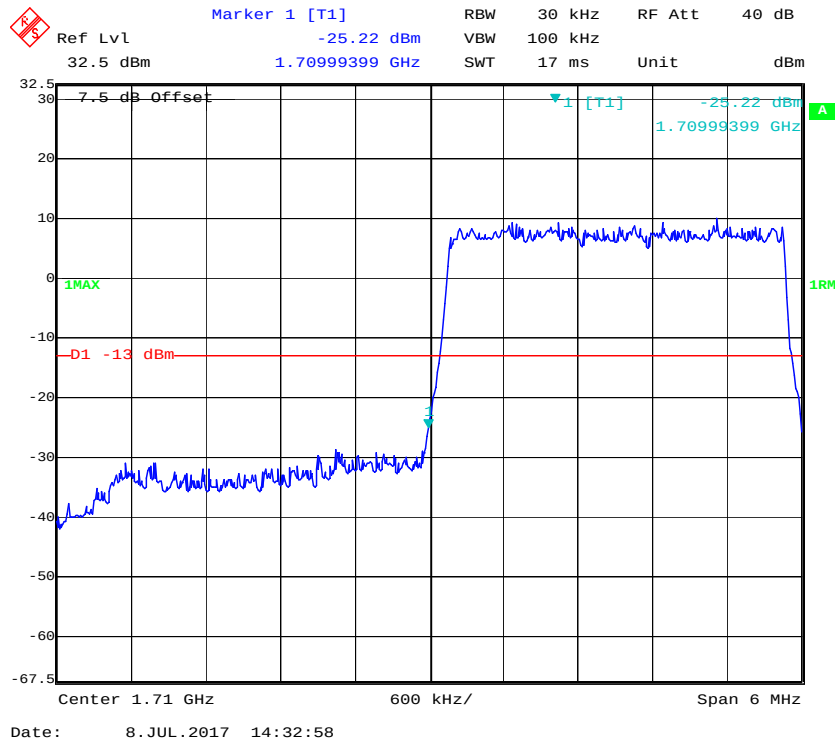


QPSK (1.4 MHz, FULL RB) - Right Band Edge

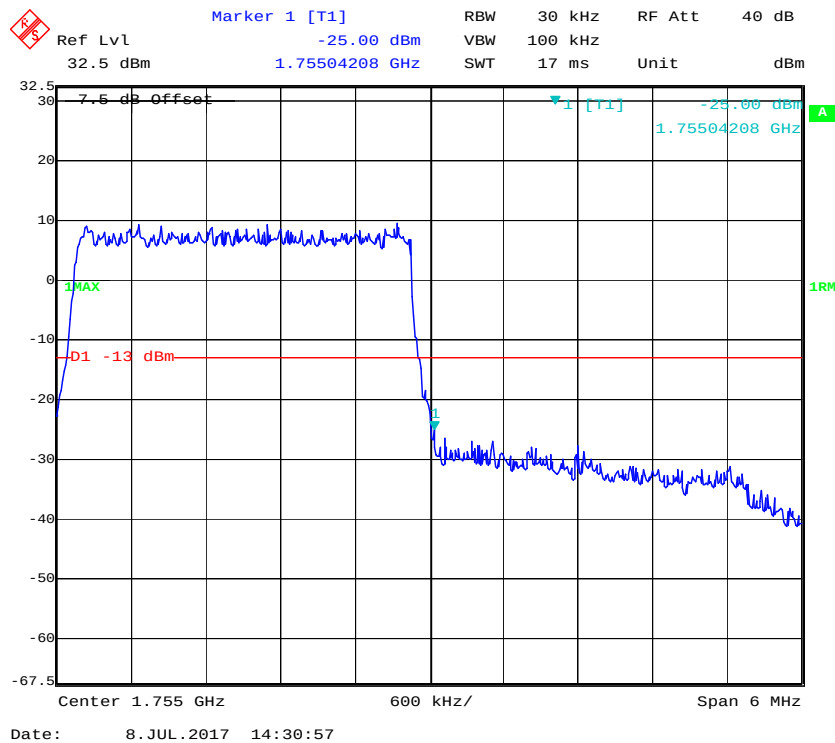


16-QAM (1.4 MHz, FULL RB) - Left Band Edge**16-QAM (1.4 MHz, FULL RB) - Right Band Edge**

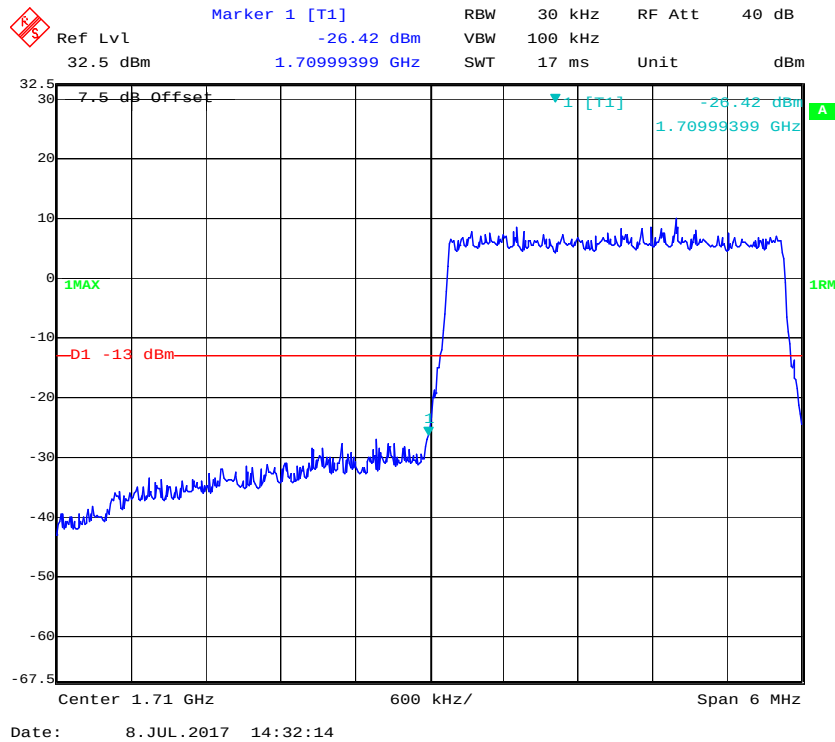
QPSK (3.0 MHz, FULL RB) - Left Band Edge



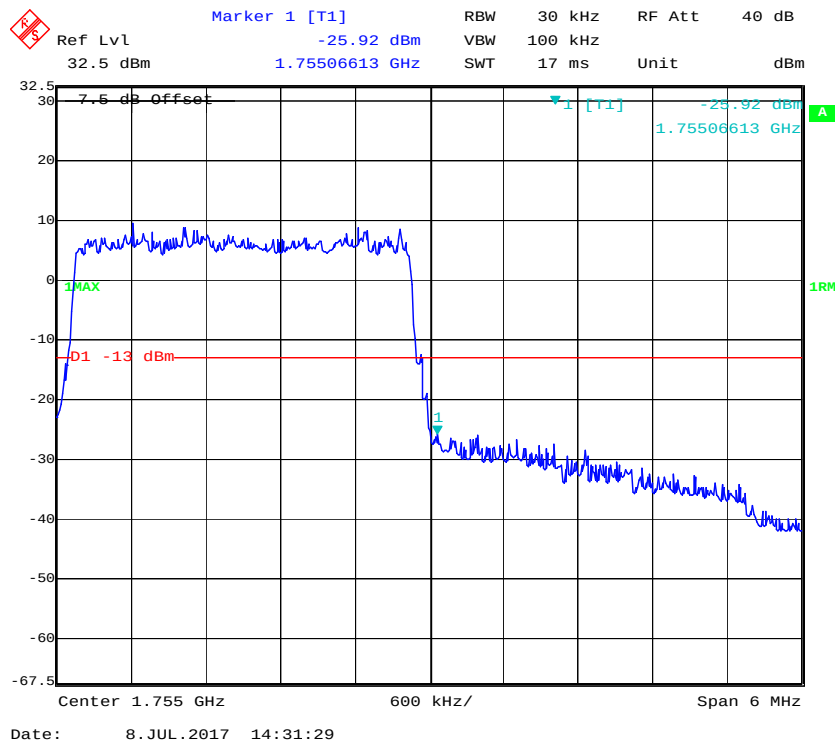
QPSK (3.0 MHz, FULL RB) - Right Band Edge



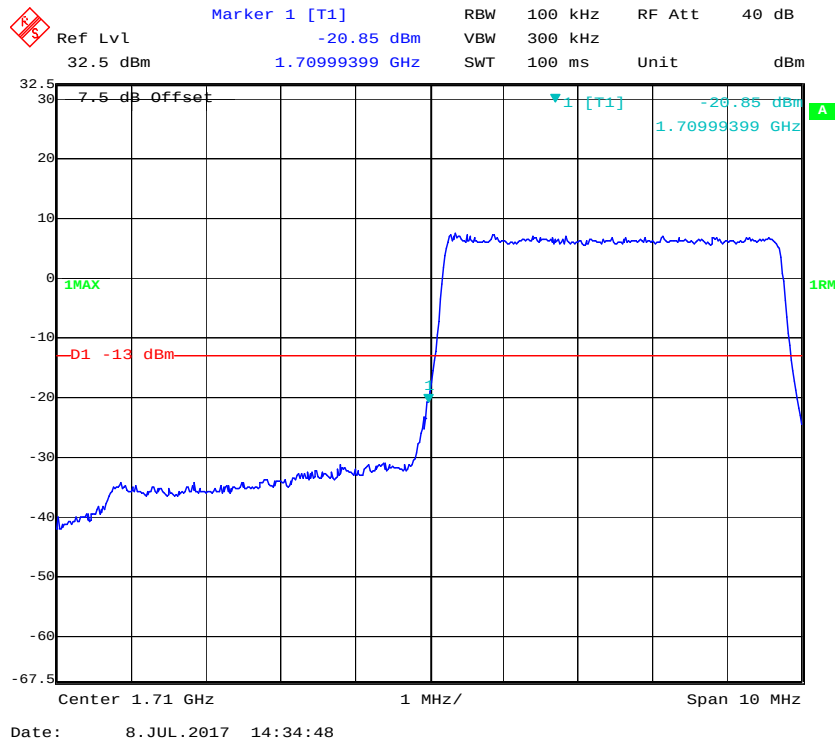
16-QAM (3.0 MHz, FULL RB) - Left Band Edge



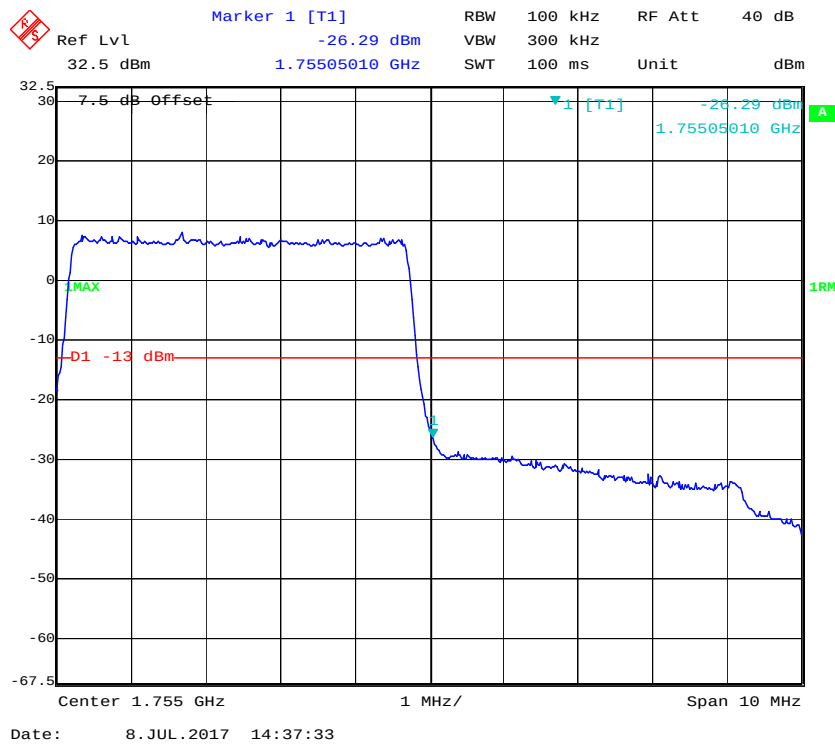
16-QAM (3.0 MHz, FULL RB) - Right Band Edge



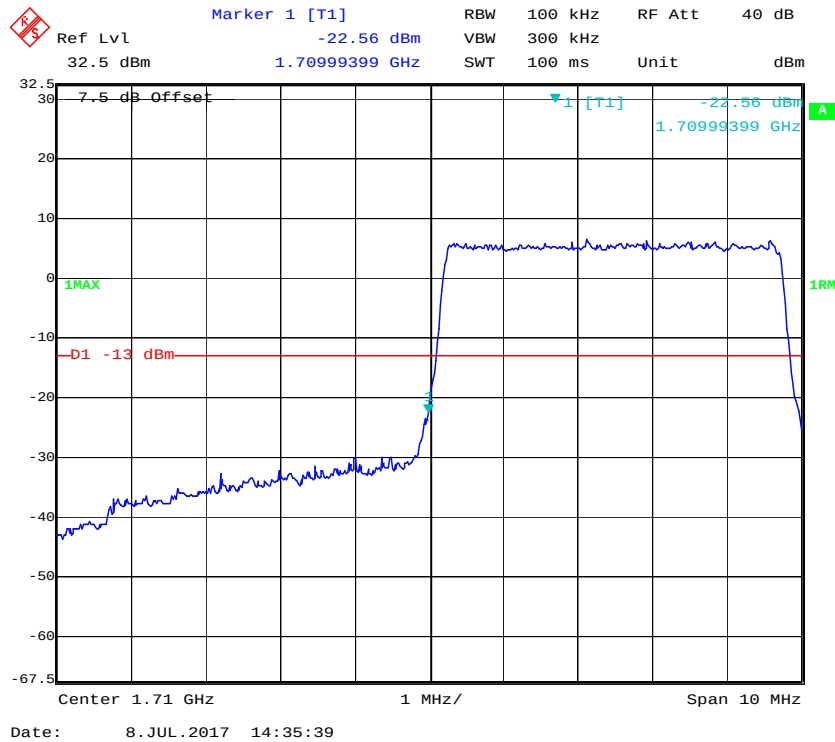
QPSK (5.0 MHz, FULL RB) - Left Band Edge



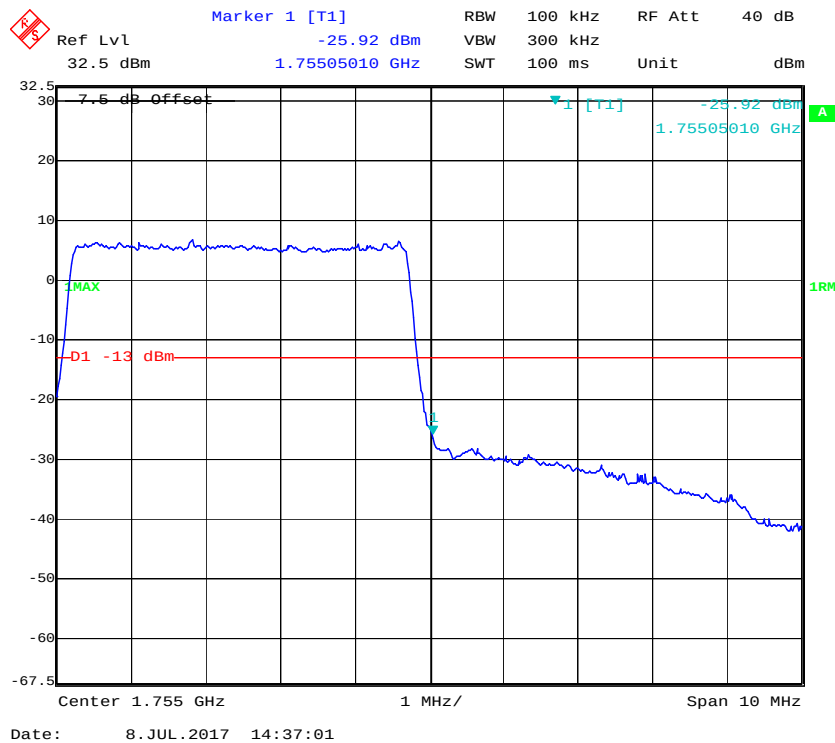
QPSK (5.0 MHz, FULL RB) - Right Band Edge



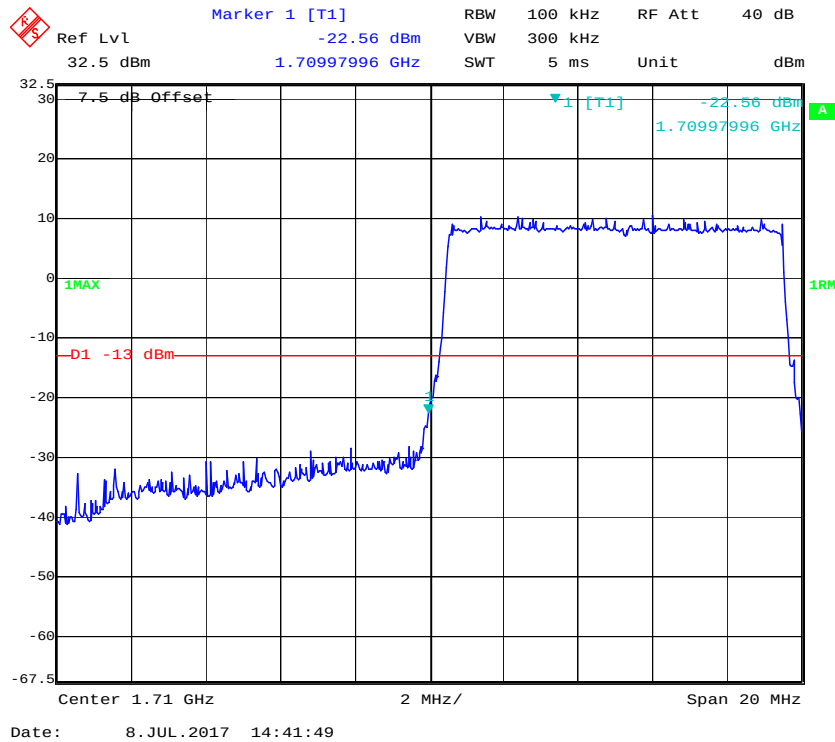
16-QAM (5.0 MHz, FULL RB) - Left Band Edge



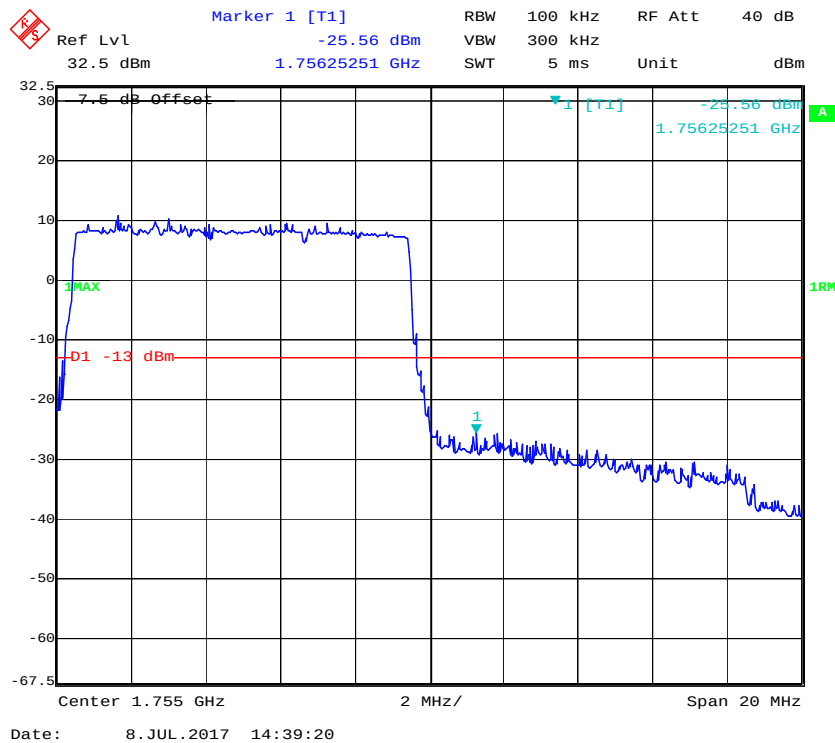
16-QAM (5.0 MHz, FULL RB) - Right Band Edge



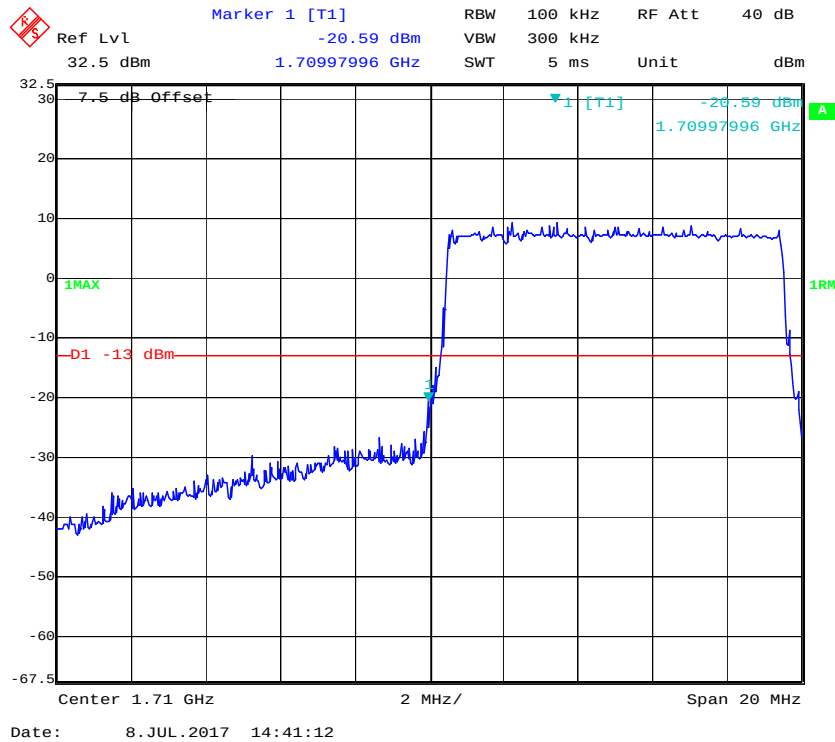
QPSK (10.0 MHz, FULL RB) - Left Band Edge



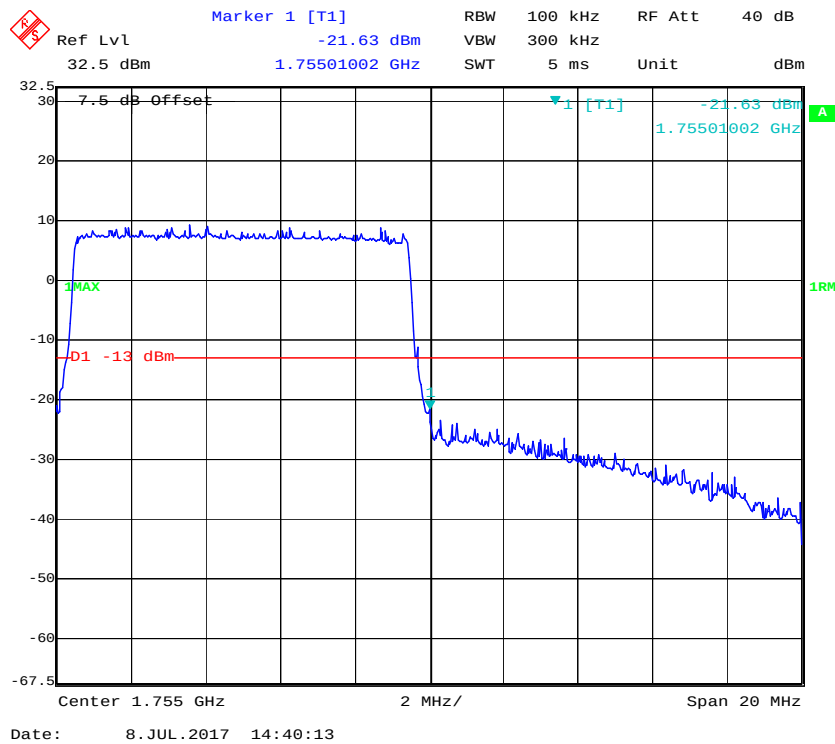
QPSK (10.0 MHz, FULL RB) - Right Band Edge



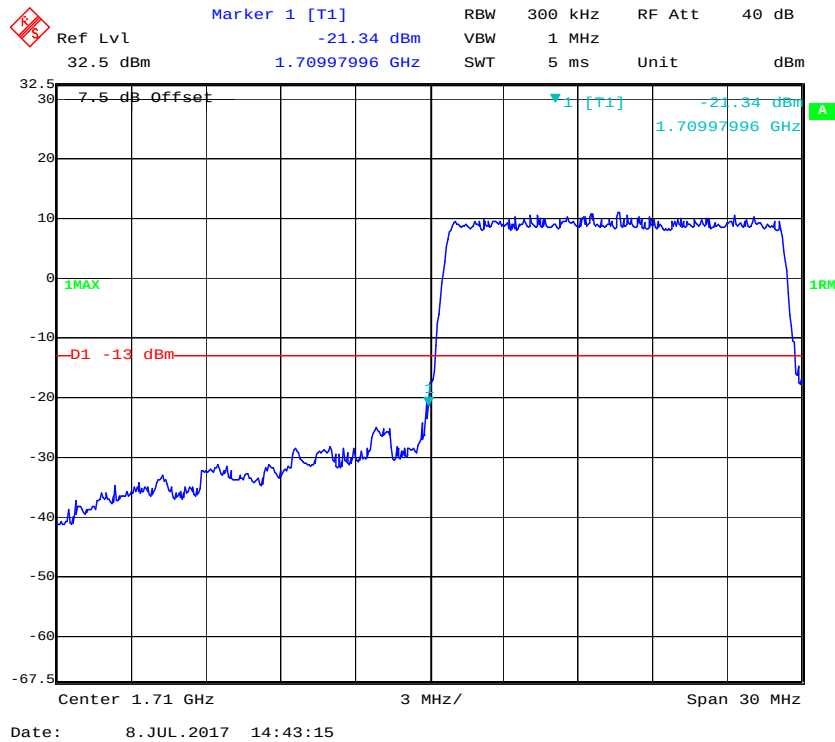
16-QAM (10.0 MHz, FULL RB) - Left Band Edge



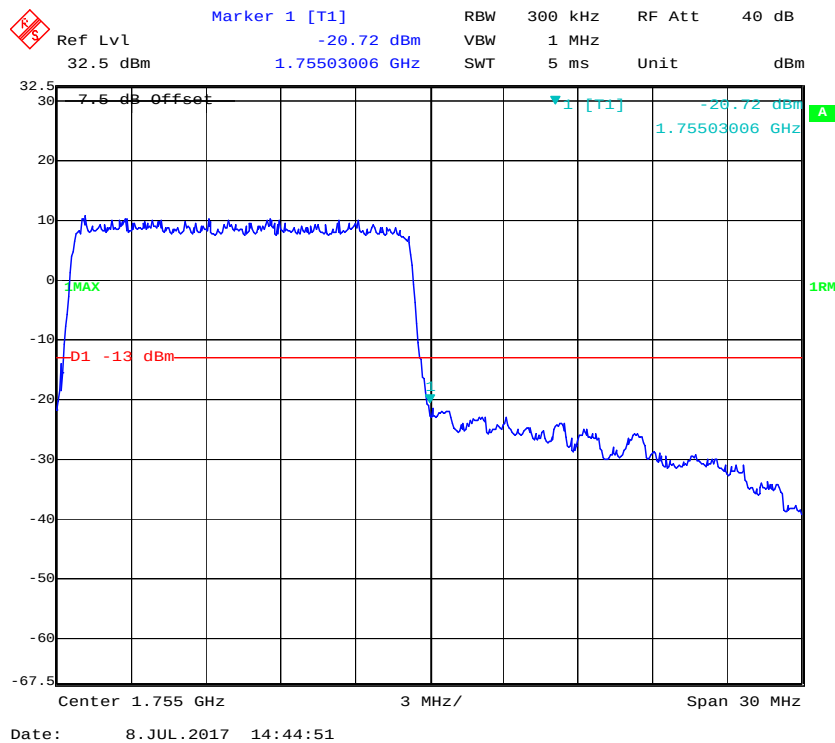
16-QAM (10.0 MHz, FULL RB) - Right Band Edge



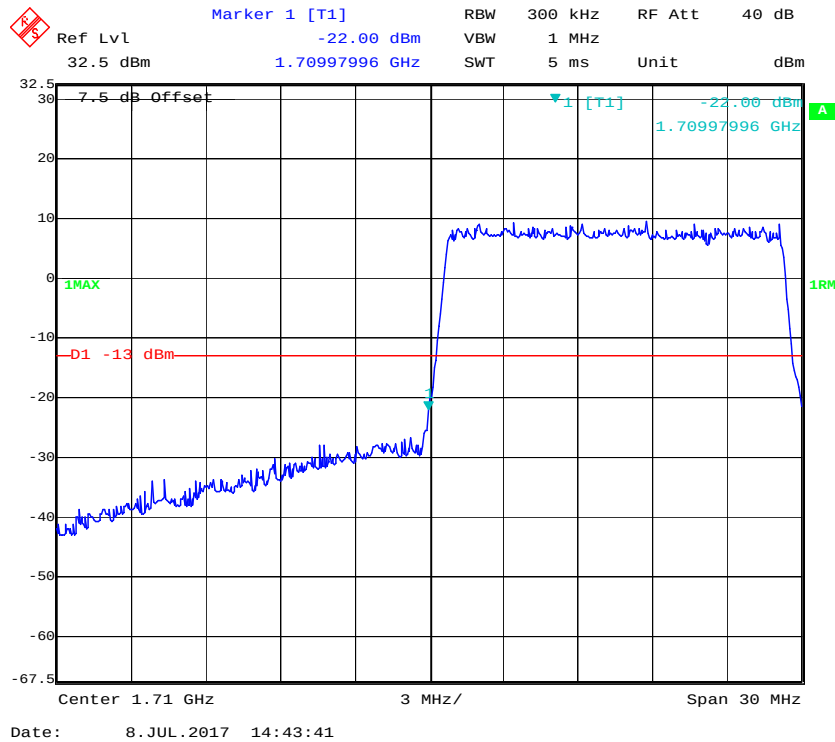
QPSK (15.0 MHz, FULL RB) - Left Band Edge



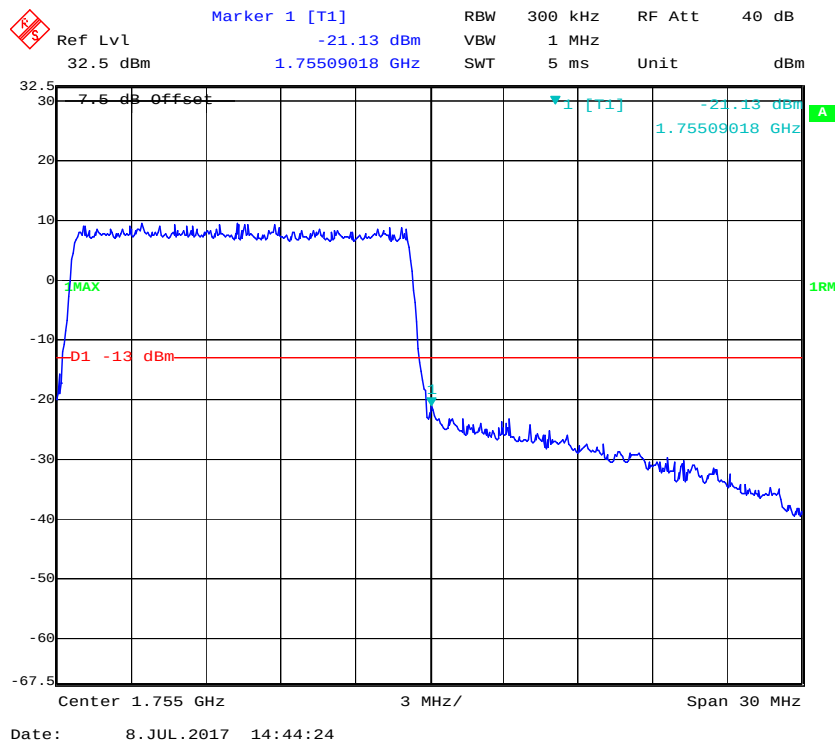
QPSK (15.0 MHz, FULL RB) - Right Band Edge



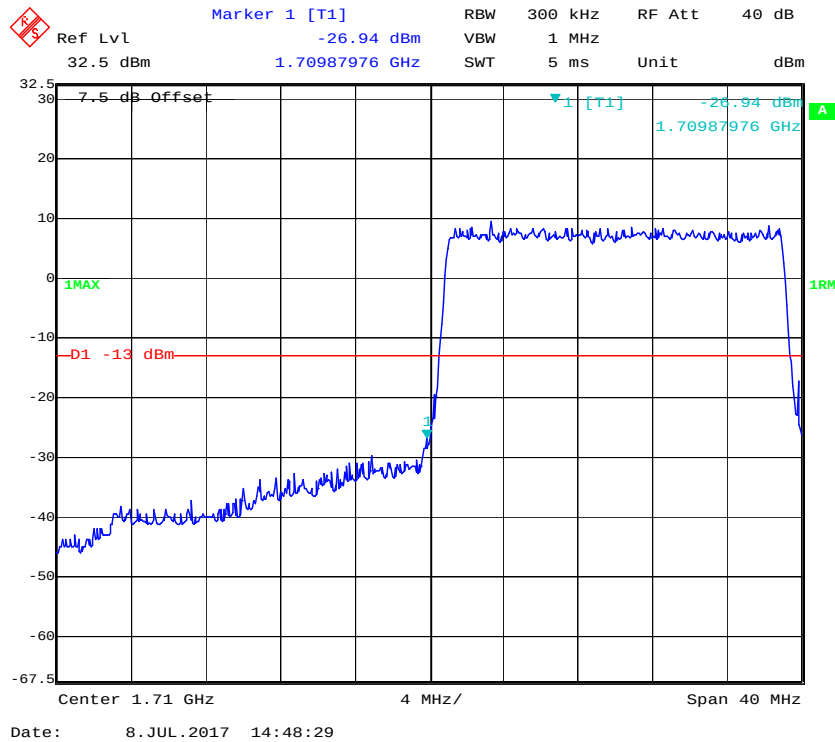
16-QAM (15.0 MHz, FULL RB) - Left Band Edge



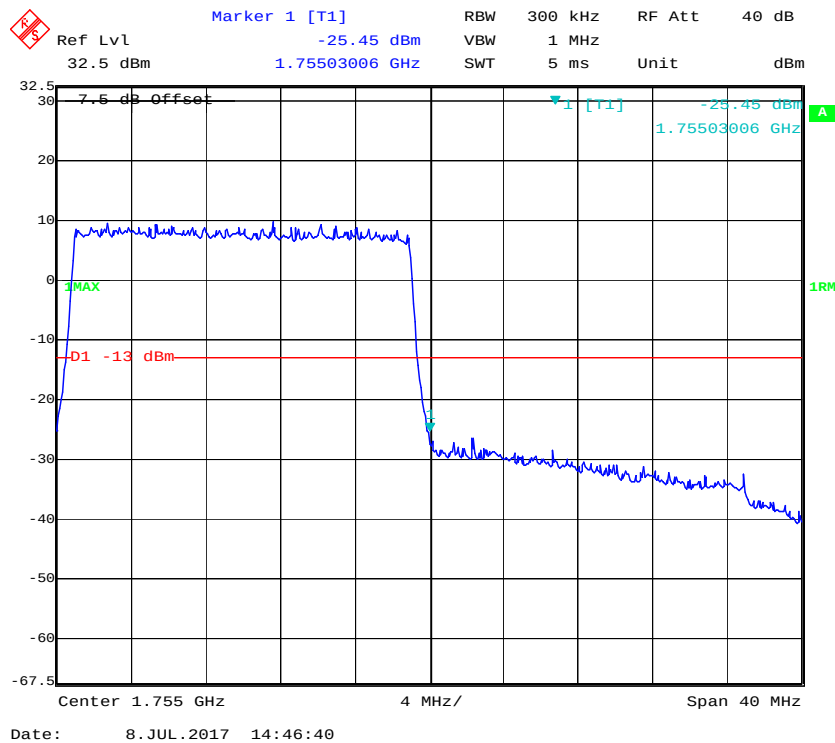
16-QAM (15.0 MHz, FULL RB) - Right Band Edge



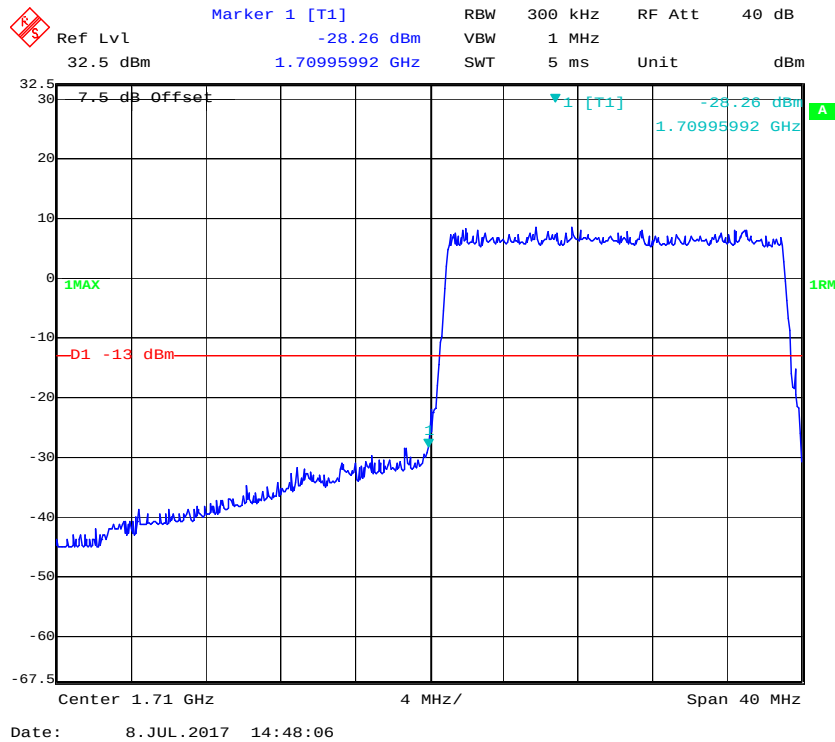
QPSK (20.0 MHz, FULL RB) - Left Band Edge



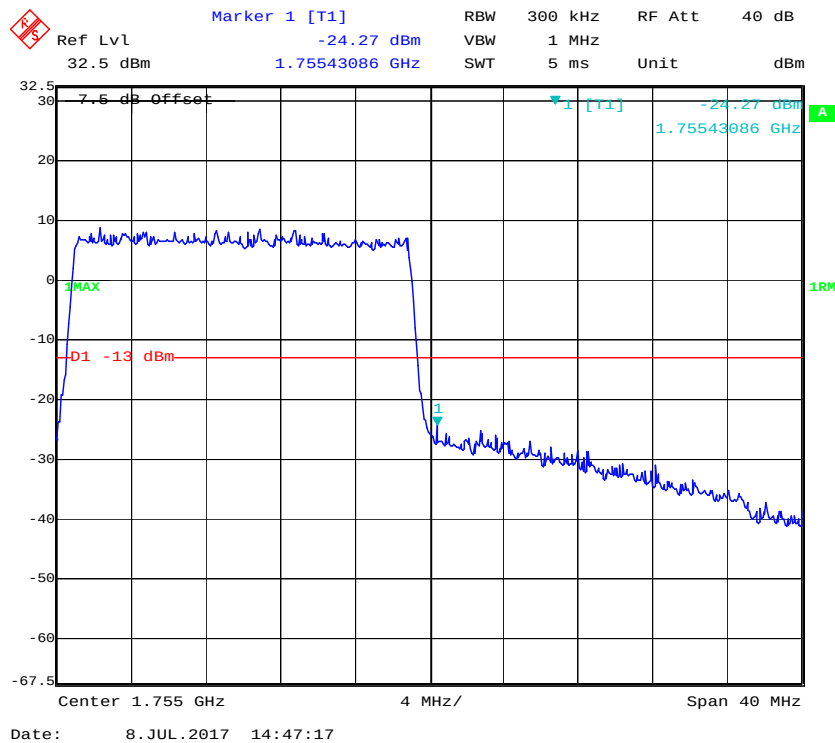
QPSK (20.0 MHz, FULL RB) - Right Band Edge



16-QAM (20.0 MHz, FULL RB) - Left Band Edge



16-QAM (20.0 MHz, FULL RB) - Right Band Edge



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

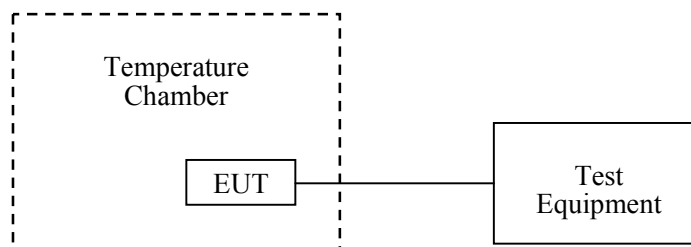
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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:	22 °C
Relative Humidity:	48 %
ATM Pressure:	101.0 kPa

The testing was performed by Echo Wu on 2017-07-08.

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	3	0.003586	2.5
-20		11	0.013148	2.5
-10		9	0.010758	2.5
0		5	0.005977	2.5
10		2	0.002391	2.5
20		14	0.016734	2.5
30		4	0.004781	2.5
40		8	0.009563	2.5
50		3	0.003586	2.5
25	V min.= 3.6	13	0.015539	2.5
25	V max.= 4.3	11	0.013148	2.5

EDGE 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	3	0.003586	2.5
-20		-1	-0.001195	2.5
-10		7	0.008367	2.5
0		3	0.003586	2.5
10		6	0.007172	2.5
20		15	0.017930	2.5
30		6	0.007172	2.5
40		5	0.005977	2.5
50		2	0.002391	2.5
25	V min.= 3.6	7	0.008367	2.5
25	V max.= 4.3	2	0.002391	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	-11	-0.013148	2.5
-20		-8	-0.009563	2.5
-10		-26	-0.031078	2.5
0		-12	-0.014344	2.5
10		-15	-0.017930	2.5
20		-24	-0.028688	2.5
30		-21	-0.025102	2.5
40		-13	-0.015539	2.5
50		-18	-0.021516	2.5
25	V min.= 3.6	-7	-0.008367	2.5
25	V max.= 4.3	-11	-0.013148	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	3	0.001596	pass
-20		8	0.004255	pass
-10		6	0.003191	pass
0		11	0.005851	pass
10		15	0.007979	pass
20		20	0.010638	pass
30		14	0.007447	pass
40		12	0.006383	pass
50		18	0.009574	pass
25	V min.= 3.6	14	0.007447	pass
25	V max.= 4.3	10	0.005319	pass

EDGE Mode

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	9	0.004787	pass
-20		8	0.004255	pass
-10		14	0.007447	pass
0		13	0.006915	pass
10		21	0.011170	pass
20		25	0.013298	pass
30		11	0.005851	pass
40		9	0.004787	pass
50		7	0.003723	pass
25	V min.= 3.6	5	0.002660	pass
25	V max.= 4.3	8	0.004255	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	-2	-0.001064	pass
-20		-1	-0.000532	pass
-10		-2	-0.001064	pass
0		1	0.000532	pass
10		2	0.001064	pass
20		-5	-0.002660	pass
30		-1	-0.000532	pass
40		2	0.001064	pass
50		-4	-0.002128	pass
25	V min.= 3.6	2	0.001064	pass
25	V max.= 4.3	6	0.003191	pass

LTE:

Band 4(QPSK):

10.0 MHz Middle Channel, $f_0 = 1732.5$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	2	0.0011544	pass
-20		-2	-0.0011544	pass
-10		-1	-0.0005772	pass
0		1	0.0005772	pass
10		2	0.0011544	pass
20		-1	-0.0005772	pass
30		-1	-0.0005772	pass
40		-2	-0.0011544	pass
50		1	0.0005772	pass
25	V min.= 3.6	-2	-0.0011544	pass
	V max.= 4.3	2	0.0011544	pass

Band 4(16QAM):

10.0 MHz Middle Channel, $f_0 = 1732.5$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-2	-0.0011544	pass
-20		1	0.0005772	pass
-10		-1	-0.0005772	pass
0		3	0.0017316	pass
10		2	0.0011544	pass
20		1	0.0005772	pass
30		-2	-0.0011544	pass
40		1	0.0005772	pass
50		-1	-0.0005772	pass
25	V min.= 3.6	1	0.0005772	pass
	V max.= 4.3	-1	-0.0005772	pass

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