



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

For

**COTO C.I.C.S.A.**

PAYSANDU 1842, BUENOS AIRES, Argentina

**FCC ID: 2AJP4L400**

<b>Report Type:</b> Original Report	<b>Product Type:</b> 4G Smart Phone
<b>Report Number:</b> RSZ160905007-00D	
<b>Report Date:</b> 2016-11-07	
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**Note:** This test report is prepared for the customer shown above and for the equipment described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp.

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## GENERAL INFORMATION

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### Product Description for Equipment under Test (EUT)

The *COTO C.I.C.S.A.*'s product, model number: *L400 (FCC ID: 2AJP4L400)* or the "EUT" in this report was a *4G Smart Phone*, which was measured approximately: 12.5 cm (L) × 6.5 cm (W) × 1.1 cm (H), rated with input voltage: DC 3.7 V battery or DC 5V from adapter.

Adapter Information:

Model: HJ-0500500B2-AR

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

Output: DC 5V, 500mA

*\*All measurement and test data in this report was gathered from production sample serial number: 1603208. (Assigned by BACL, Kunshan). The EUT supplied by the applicant was received on 2016-09-05.*

### Objective

This type approval report is prepared on behalf of *COTO C.I.C.S.A.* 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: 2AJP4L400.

### 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. (Kunshan). The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

**Measurement Uncertainty**

Item		Uncertainty
AC Power Lines Conducted Emissions		$\pm 3.26$ dB
RF conducted test with spectrum		$\pm 0.9$ dB
RF Output Power with Power meter		$\pm 0.5$ dB
Radiated emission	30MHz~1GHz	$\pm 5.91$ dB
	Above 1G	$\pm 4.92$ dB
Occupied Bandwidth		$\pm 0.5$ kHz
Temperature		$\pm 1.0$ °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 Chenghu Lake Road, Kunshan Development Zone No.248, Kunshan, Jiangsu, China

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on November 06, 2014. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4.

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.

SYSTEM TEST CONFIGURATION

Justification

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.

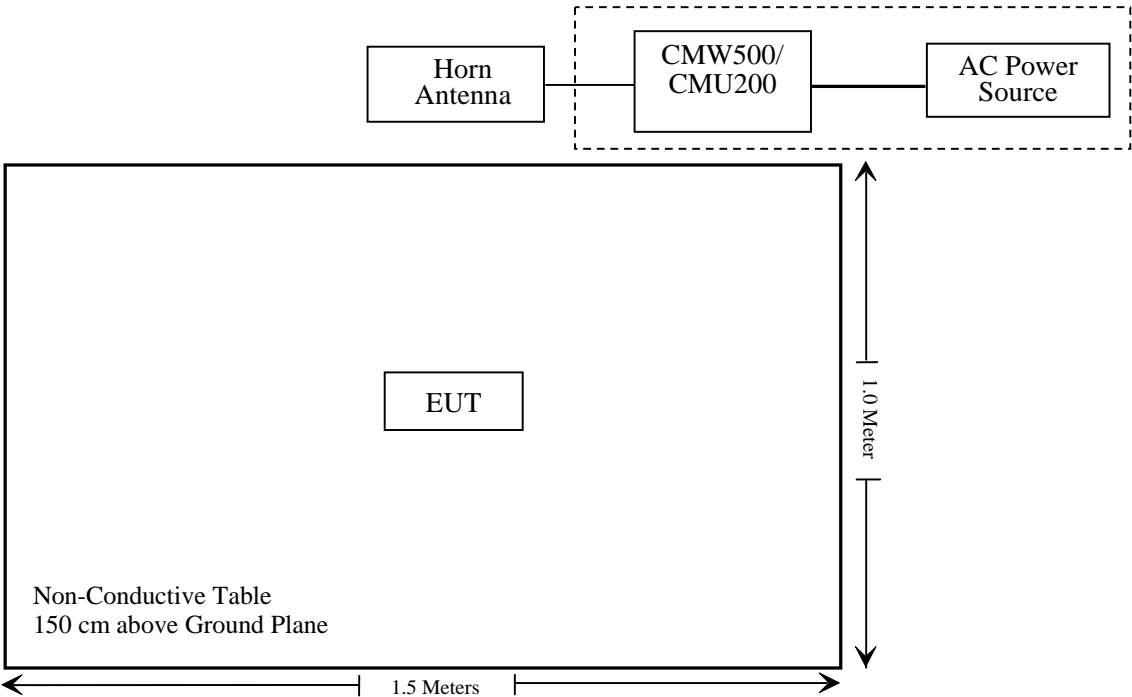
Equipment Modifications

No modifications were 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 (b)(1), §2.1093	RF Exposure Information	Compliance*
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d) (h)	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)	Spurious Radiated Emissions	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: RSZ160905007-20.

**TEST EQUIPMENT LIST**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
<b>Radiated Emission Test</b>					
Sonoma Instrument	Amplifier	330	171377	2016-09-16	2017-09-16
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2015-11-12	2016-11-11
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2015-11-07	2016-11-06
Sunol Sciences	Broadband Antenna	JB3	A090314-1	2015-11-07	2016-11-06
Mini	Pre-amplifier	ZVA-183-S+	857001418	2016-09-16	2017-09-15
DUCOMMUN	Pre-amplifier	ALN-22093530-01	990147	2016-09-16	2017-09-15
EMCO	Horn Antenna	3116	9510-2384	2015-11-07	2016-11-06
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2015-11-12	2016-11-11
Rohde & Schwarz	Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
ETS	Horn Antenna	3115	6229	2015-11-07	2016-11-06
ETS	Horn Antenna	3115	9311-4159	2015-11-07	2016-11-06
R&S	Auto test Software	EMC32	V 09.10.0	NCR	NCR
HP	Signal Generator	E4421B	3426A01336	2015-11-04	2016-11-03
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
BACL	RF cable	KS-LAB-010	KS-LAB-010	2015-12-16	2016-12-15
<b>RF Conducted test</b>					
BACL	TS 8997 Cable-01	T-KS-EMC086	T-KS-EMC086	2015-12-10	2016-12-09
BACL	RF cable	KS-LAB-012	KS-LAB-012	2015-12-16	2016-12-15
WEINSCHL	3dB Attenuator	5326	N/A	2016-06-18	2017-06-18
Rohde & Schwarz	OSP120 BASE UNIT	OSP120	101247	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131	2016-09-21	2017-09-21
Rohde & Schwarz	Universal Radio Communication Tester	CMU200	110605	2015-11-11	2016-11-11
R&S	Wideband Radio Communication tester	CMW500	1201.002K50-116218-UY	2016-09-08	2017-09-07
HONOVA	Power Splitter	ZFRSC-14-S+	019411452	2016-06-12	2017-06-12
WEINSCHL	10dB Attenuator	5328	N/A	2016-06-18	2017-06-18

\* **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).

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

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### **Applicable Standard**

FCC§1.1307, §2.1093.

### **Test Result**

Compliance, please refer to the SAR report: RSZ160905007-20.



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## **FCC §2.1047 - MODULATION CHARACTERISTIC**

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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.

**§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (d) (h) - RF OUTPUT POWER****Applicable Standards**

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

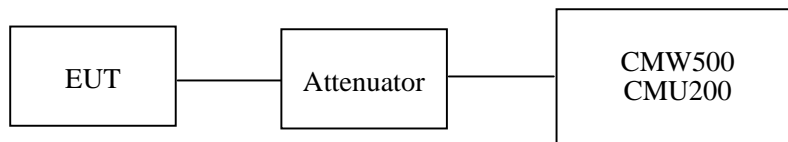
According to FCC §2.1046 and §24.232 (c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications..

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.

According to §27.50(h), the maximum EIRP must not exceed 2Watts (33dBm) for 2500-2570MHz.

**Test Procedure***Conducted method:*

The RF output of the transmitter was connected to the CMW500/CMU200 through sufficient attenuation.

*Radiated method:*

TIA603-D section 2.2.17

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

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Peter Jiang on 2016-11-06.*

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

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	33.08	38.45
	190	836.6	33.05	38.45
	251	848.8	32.96	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	33.12	32.41	30.71	29.57	38.45
	190	836.6	33.11	32.47	30.78	29.67	38.45
	251	848.8	33.04	32.40	30.76	29.66	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	24.54	23.25	22.12	20.95	38.45
	190	836.6	24.38	23.11	21.98	20.81	38.45
	251	848.8	24.20	22.96	21.80	20.71	38.45

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band 5)	Normal	RMC		22.03	22.14	22.19
		HSDPA	1	21.40	21.54	21.63
			2	21.38	21.57	21.63
			3	21.36	21.46	21.50
			4	21.38	21.51	21.63
		HSUPA	1	21.38	21.55	21.58
			2	21.37	21.53	21.58
			3	21.40	21.42	21.49
			4	21.42	21.56	21.59
			5	21.39	21.54	21.53
		HSPA+	1	20.24	20.47	20.45

**PCS Band (Part 24E)**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	29.65	33
	661	1880.0	30.25	33
	810	1909.8	30.55	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	29.70	28.77	26.83	25.70	33
	661	1880.0	30.32	29.47	27.68	26.55	33
	810	1909.8	30.57	29.92	28.37	27.28	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	23.31	22.00	20.76	19.30	33
	661	1880.0	23.29	21.95	20.69	19.31	33
	810	1909.8	23.37	21.94	20.74	19.30	33

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band 2)	Normal	RMC		21.48	21.36	21.44
		HSDPA	1	20.99	20.83	20.93
			2	20.94	20.76	20.82
			3	20.88	20.75	20.75
			4	21.00	20.88	21.00
		HSUPA	1	20.78	20.86	20.95
			2	20.94	20.83	20.85
			3	20.94	20.82	20.85
			4	20.85	20.75	20.67
			5	20.99	20.87	20.87
		HSPA+	1	20.12	20.14	20.21

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

Mode	Channel	PAR (dB)	Limit (dB)
GSM (GMSK)	Low	0.12	13
	Middle	0.15	13
	High	0.18	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	0.21	13
	Middle	0.24	13
	High	0.25	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	3.48	13
	Middle	3.44	13
	High	3.47	13
HSDPA (16QAM)	Low	3.33	13
	Middle	3.37	13
	High	3.39	13
HSUPA (BPSK)	Low	3.40	13
	Middle	3.36	13
	High	3.41	13

**PCS Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM (GMSK)	Low	0.16	13
	Middle	0.17	13
	High	0.13	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	0.35	13
	Middle	0.26	13
	High	0.17	13

Mode	Channel	PAR (dB)	Limit (dB)
RMC (BPSK)	Low	2.23	13
	Middle	2.25	13
	High	2.42	13
HSDPA (16QAM)	Low	2.37	13
	Middle	2.30	13
	High	2.35	13
HSUPA (BPSK)	Low	2.40	13
	Middle	2.37	13
	High	2.43	13

**Radiated Power****GSM Mode:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	S.G. Level (dBm)	Cable loss (dB)	Antenna Gain (dB)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	98.09	50	1.4	H	27.1	0.46	4.75	31.39	38.45	7.06
836.6	91.32	348	1.3	V	20.3	0.46	4.75	24.59	38.45	13.86
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	80.44	360	1.1	H	19.6	0.31	10.4	29.69	33	3.31
1880.00	77.07	224	1.2	V	12.8	0.31	10.4	22.89	33	10.11

**EGPRS Mode:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	S.G. Level (dBm)	Cable loss (dB)	Antenna Gain (dB)			
ERP, Cellular Band (Part 22H), Middle Channel										
836.6	92.22	278	2.5	H	21.2	0.46	4.75	25.49	38.45	12.96
836.6	87.76	196	1.4	V	16.7	0.46	4.75	20.99	38.45	17.46
EIRP, PCS Band (Part 24E), Middle Channel										
1880.00	75.44	333	2.2	H	14.6	0.31	10.4	24.69	33	8.31
1880.00	74.97	263	1.1	V	10.7	0.31	10.4	20.79	33	12.21

**WCDMA Mode:**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	S.G. Level (dBm)	Cable loss (dB)	Antenna Gain (dB)			
ERP, WCDMA Band V (Part 22H), Middle Channel										
836.6	88.81	270	1.4	H	17.8	0.46	4.75	22.09	38.45	16.36
836.6	85.70	207	2.2	V	14.7	0.46	4.75	18.99	38.45	19.46
EIRP, WCDMA Band II (Part 24E), Middle Channel										
1880.00	72.24	205	1.3	H	11.4	0.31	10.4	21.49	33	11.51
1880.00	72.17	23	1.0	V	7.9	0.31	10.4	17.99	33	15.01

**LTE Band 4:****Maximum Output Power**

<b>Bandwidth (MHz)</b>	<b>Modulation</b>	<b>RB size/RB Offset</b>	<b>Low Channel (dBm)</b>	<b>Middle Channel (dBm)</b>	<b>High Channel (dBm)</b>
1.4	QPSK	RB Size=1, RB Offset=0	22.21	21.25	21.75
		RB Size=1, RB Offset=2	21.67	21.23	21.72
		RB Size=1, RB Offset=5	21.74	21.33	21.25
		RB Size=3, RB Offset=0	21.67	21.37	21.25
		RB Size=3, RB Offset=1	21.68	21.38	21.27
		RB Size=3, RB Offset=2	21.72	21.37	21.23
		RB Size=6, RB Offset=0	20.68	20.77	20.15
	16QAM	RB Size=1, RB Offset=0	21.63	21.21	21.13
		RB Size=1, RB Offset=2	21.57	21.22	21.13
		RB Size=1, RB Offset=5	21.61	21.23	21.03
		RB Size=3, RB Offset=0	21.67	21.31	21.12
		RB Size=3, RB Offset=1	21.68	21.31	21.15
		RB Size=3, RB Offset=2	21.63	21.30	21.10
		RB Size=6, RB Offset=0	20.62	20.18	20.34
3.0	QPSK	RB Size=1, RB Offset=0	22.18	21.19	21.02
		RB Size=1, RB Offset=7	21.78	21.20	21.02
		RB Size=1, RB Offset=14	21.52	21.15	20.92
		RB Size=8, RB Offset=0	20.67	20.27	20.13
		RB Size=8, RB Offset=4	20.64	20.22	20.12
		RB Size=8, RB Offset=7	20.66	20.26	20.12
		RB Size=15, RB Offset=0	20.66	20.24	20.10
	16QAM	RB Size=1, RB Offset=0	20.78	20.42	21.27
		RB Size=1, RB Offset=7	20.77	20.49	21.26
		RB Size=1, RB Offset=14	20.76	20.40	21.23
		RB Size=8, RB Offset=0	19.72	19.26	19.20
		RB Size=8, RB Offset=4	19.68	19.21	19.18
		RB Size=8, RB Offset=7	19.70	19.25	19.16
		RB Size=15, RB Offset=0	19.65	19.26	19.14



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	22.08	21.21	21.14
		RB Size=1, RB Offset=12	21.50	21.14	21.05
		RB Size=1, RB Offset=24	21.45	21.11	21.01
		RB Size=12, RB Offset=0	20.64	20.29	20.21
		RB Size=12, RB Offset=6	21.62	20.24	20.17
		RB Size=12, RB Offset=11	20.61	20.26	20.14
		RB Size=25, RB Offset=0	20.59	20.23	20.10
	16QAM	RB Size=1, RB Offset=0	20.65	20.61	20.18
		RB Size=1, RB Offset=12	20.59	20.59	20.11
		RB Size=1, RB Offset=24	20.26	20.53	20.06
		RB Size=12, RB Offset=0	19.69	19.31	19.20
		RB Size=12, RB Offset=6	19.66	19.28	19.15
		RB Size=12, RB Offset=11	19.64	19.28	19.24
		RB Size=25, RB Offset=0	19.63	19.31	19.17
10.0	QPSK	RB Size=1, RB Offset=0	21.91	21.42	21.15
		RB Size=1, RB Offset=24	21.71	21.42	21.21
		RB Size=1, RB Offset=49	21.61	21.22	21.22
		RB Size=25, RB Offset=0	20.74	20.41	21.31
		RB Size=25, RB Offset=12	20.71	20.42	21.31
		RB Size=25, RB Offset=24	20.81	20.32	21.35
		RB Size=50, RB Offset=0	20.78	20.42	20.82
	16QAM	RB Size=1, RB Offset=0	21.22	21.12	20.71
		RB Size=1, RB Offset=24	21.54	20.82	20.82
		RB Size=1, RB Offset=49	20.91	20.73	20.72
		RB Size=25, RB Offset=0	19.80	19.64	19.70
		RB Size=25, RB Offset=12	19.78	19.51	19.42
		RB Size=25, RB Offset=24	19.80	19.45	19.32
		RB Size=50, RB Offset=0	19.66	19.42	19.34

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	21.93	21.49	21.30
		RB Size=1, RB Offset=37	21.79	21.46	21.29
		RB Size=1, RB Offset=74	21.60	21.29	21.23
		RB Size=36, RB Offset=0	20.79	20.40	21.38
		RB Size=36, RB Offset=18	20.77	20.40	21.38
		RB Size=36, RB Offset=37	20.82	20.37	21.30
		RB Size=75, RB Offset=0	20.77	20.43	20.85
	16QAM	RB Size=1, RB Offset=0	21.08	20.33	20.66
		RB Size=1, RB Offset=37	21.93	21.36	20.65
		RB Size=1, RB Offset=74	21.93	20.23	20.51
		RB Size=36, RB Offset=0	19.93	19.42	19.30
		RB Size=36, RB Offset=18	19.83	19.42	19.30
		RB Size=36, RB Offset=37	19.79	19.38	19.26
		RB Size=75, RB Offset=0	19.73	19.43	19.27
20.0	QPSK	RB Size=1, RB Offset=0	21.82	21.26	21.36
		RB Size=1, RB Offset=49	21.67	21.52	21.34
		RB Size=1, RB Offset=99	21.45	21.34	21.27
		RB Size=50, RB Offset=0	20.78	20.64	20.46
		RB Size=50, RB Offset=24	21.72	20.50	20.37
		RB Size=50, RB Offset=49	20.67	21.52	21.34
		RB Size=100, RB Offset=0	20.54	20.41	20.30
	16QAM	RB Size=1, RB Offset=0	21.22	21.11	20.78
		RB Size=1, RB Offset=49	21.23	20.83	20.87
		RB Size=1, RB Offset=99	20.90	20.74	20.76
		RB Size=50, RB Offset=0	19.81	19.67	19.76
		RB Size=50, RB Offset=24	19.79	19.51	19.45
		RB Size=50, RB Offset=49	19.81	19.46	19.36
		RB Size=100, RB Offset=0	19.67	19.47	19.36

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

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	4.32	$\leq 13$	Pass
QPSK (100%RB Size)	6.41	$\leq 13$	Pass
16QAM (1RB Size)	4.23	$\leq 13$	Pass
16QAM (100%RB Size)	6.31	$\leq 13$	Pass

**QPSK:**

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	74.78	249	1.5	H	12.4	0.30	9.90	22.00	30
1732.50	73.34	264	2.1	V	8.5	0.30	9.90	18.10	30
3 MHz Bandwidth									
1732.50	74.37	48	2.2	H	12.0	0.30	9.90	21.60	30
1732.50	72.91	240	1.7	V	8.1	0.30	9.90	17.70	30
5 MHz Bandwidth									
1732.50	73.88	47	1.3	H	11.5	0.30	9.90	21.10	30
1732.50	72.49	178	1.1	V	7.6	0.30	9.90	17.20	30
10 MHz Bandwidth									
1732.50	73.47	67	1.8	H	11.1	0.30	9.90	20.70	30
1732.50	72.02	353	1.3	V	7.2	0.30	9.90	16.80	30
15 MHz Bandwidth									
1732.50	72.99	129	2.2	H	10.6	0.30	9.90	20.20	30
1732.50	71.57	225	2.1	V	6.7	0.30	9.90	16.30	30
20 MHz Bandwidth									
1732.50	72.62	39	1.6	H	10.3	0.30	9.90	19.90	30
1732.50	71.03	283	1.4	V	6.2	0.30	9.90	15.80	30

**16QAM:**

Frequency (MHz)	Receiver Reading (dBμV)	Turn table Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)		
Middle Channel									
1.4 MHz Bandwidth									
1732.50	74.87	14	1.1	H	12.5	0.30	9.90	22.10	30
1732.50	74.91	225	1.0	V	10.1	0.30	9.90	19.70	30
3 MHz Bandwidth									
1732.50	74.29	112	2.2	H	11.9	0.30	9.90	21.50	30
1732.50	74.15	15	2.2	V	9.3	0.30	9.90	18.90	30
5 MHz Bandwidth									
1732.50	73.66	174	1.6	H	11.3	0.30	9.90	20.90	30
1732.50	73.29	255	2.1	V	8.4	0.30	9.90	18.00	30
10 MHz Bandwidth									
1732.50	72.97	78	1.4	H	10.6	0.30	9.90	20.20	30
1732.50	72.51	21	2.5	V	7.7	0.30	9.90	17.30	30
15 MHz Bandwidth									
1732.50	72.31	235	1.3	H	10.0	0.30	9.90	19.60	30
1732.50	71.43	122	2.1	V	6.6	0.30	9.90	16.20	30
20 MHz Bandwidth									
1732.50	71.56	322	1.3	H	9.2	0.30	9.90	18.80	30
1732.50	70.91	282	1.3	V	6.1	0.30	9.90	15.70	30

**Note:**

All above data were tested with no amplifier

Absolute Level = SG Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

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

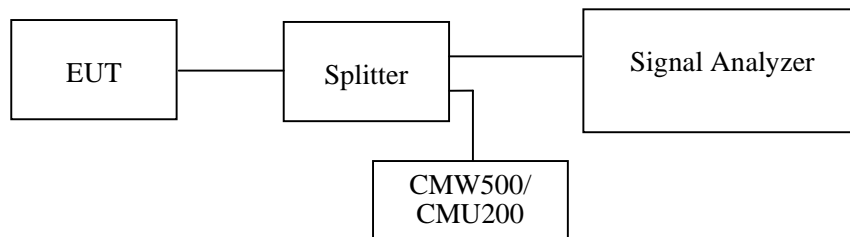
### Applicable Standards

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 (Cellular /PCS) & 100 kHz (WCDMA) and the 26 dB & 99% bandwidth was recorded.



### Test Data

#### Environmental Conditions

Temperature:	23~25℃
Relative Humidity:	53~56%
ATM Pressure:	100.0~101.0 kPa

*The testing was performed by Peter Jiang from 2016-10-26 to 2016-10-30.*

*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	246.5	316.6
EGPRS(8PSK)	836.6	248.5	322.6

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	836.6	4.23	4.85
HSUPA (BPSK)	836.6	4.21	4.89
HSDPA (16QAM)	836.6	4.21	4.89

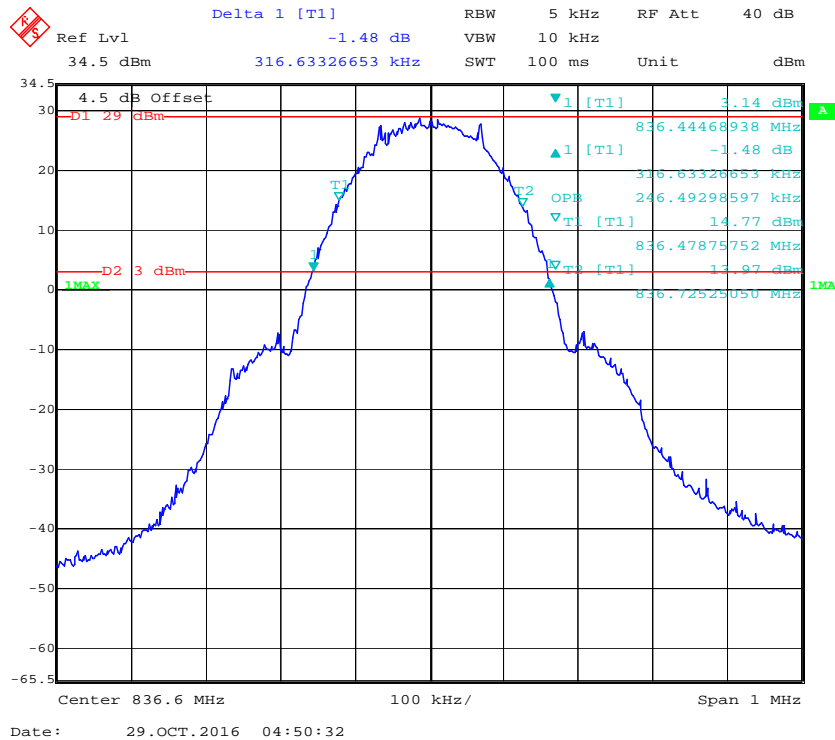
**PCS Band (Part 24E)**

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	244.5	318.6
EGPRS(8PSK)	1880.0	250.5	326.6

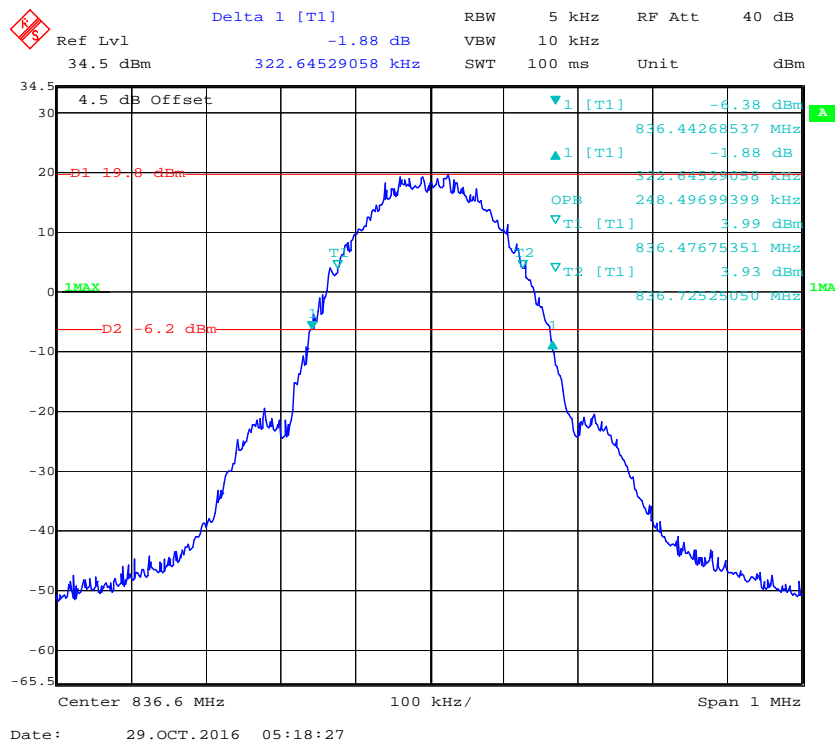
Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
RMC (BPSK)	1880.0	4.23	4.91
HSUPA (BPSK)	1880.0	4.21	4.95
HSDPA (16QAM)	1880.0	4.21	4.95

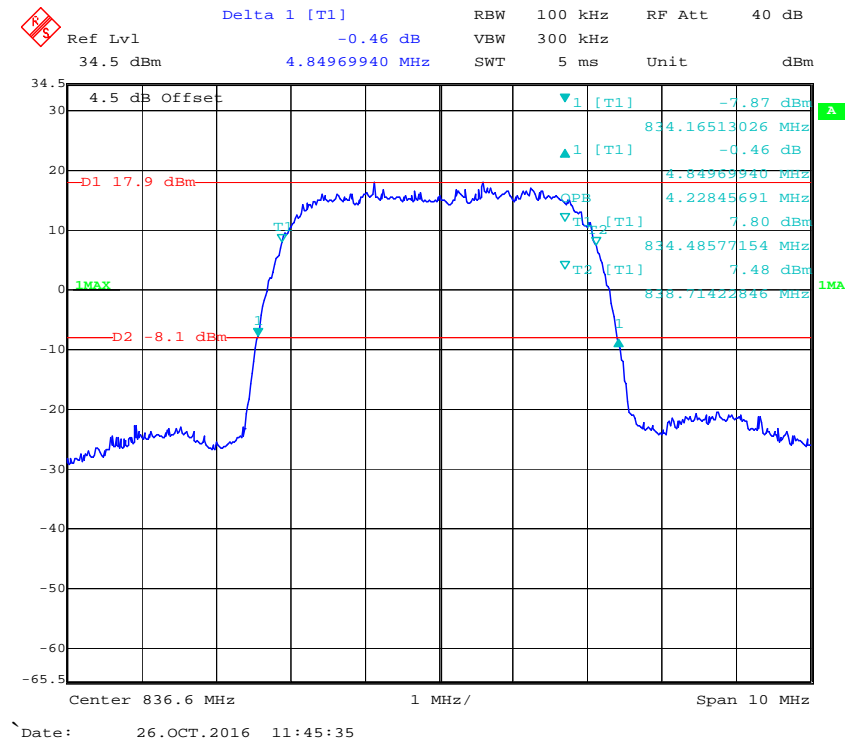
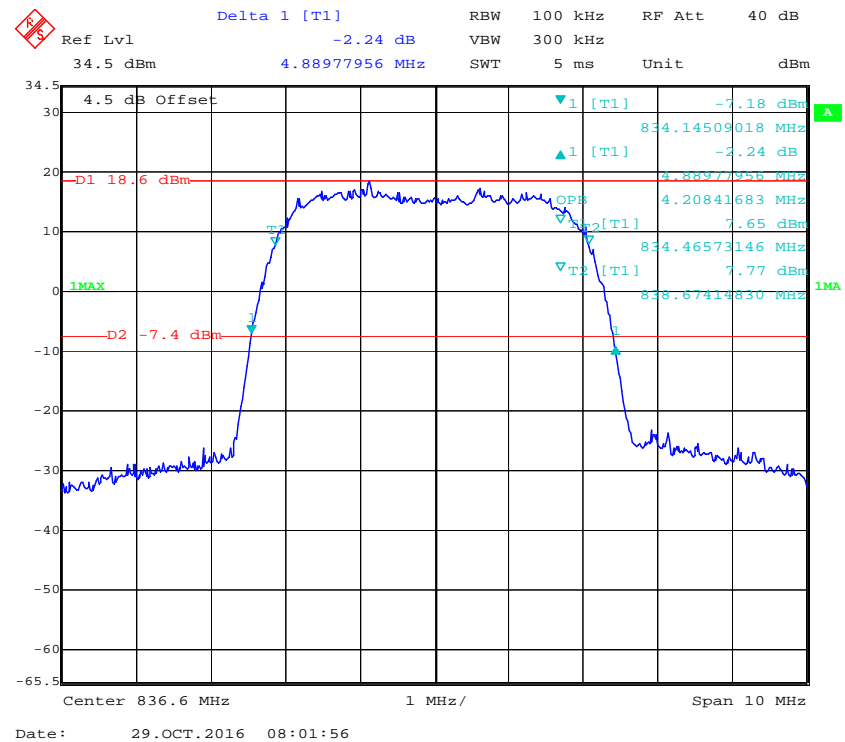
## Cellular Band (Part 22H)

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

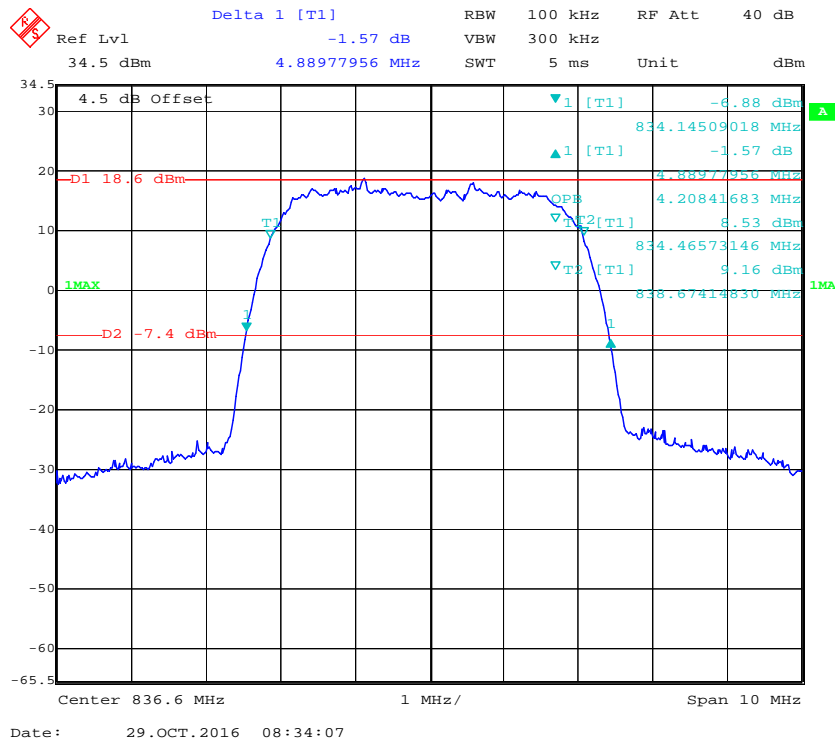
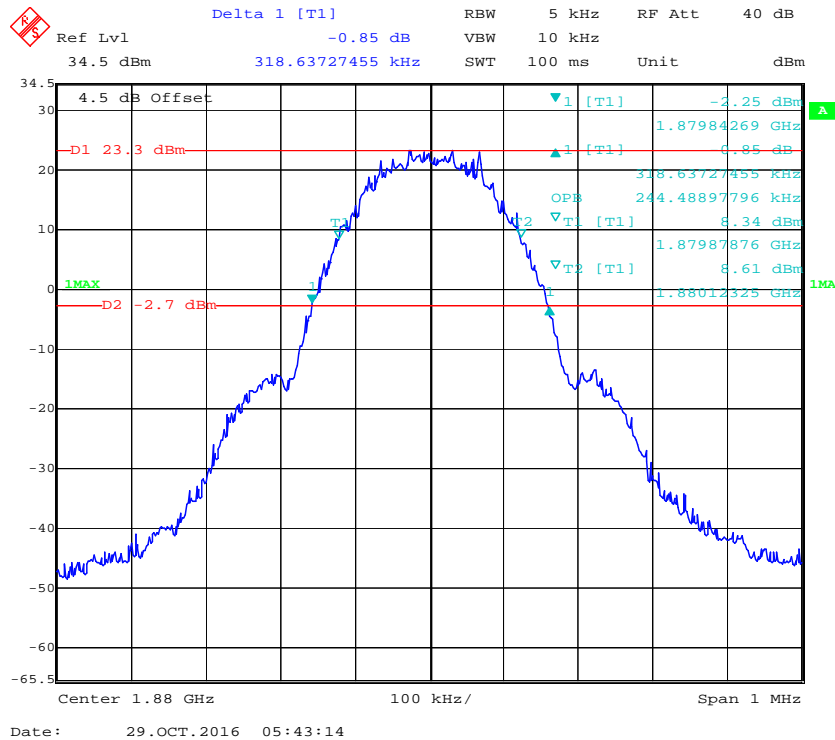


## 26 dB Emissions Bandwidth &amp; 99% Occupied Bandwidth for EDGE Mode

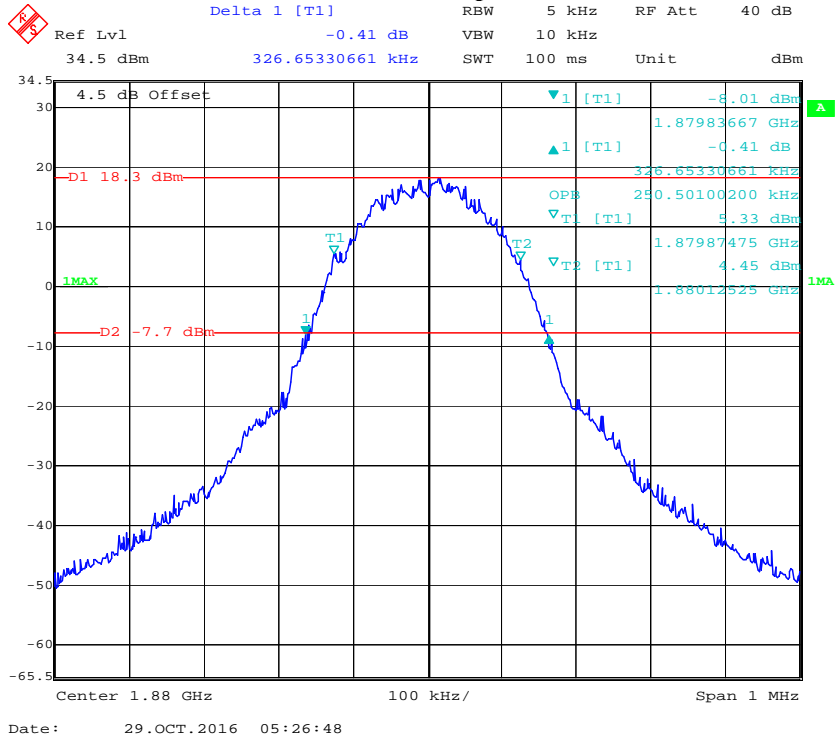


**26 dB Emissions Bandwidth & 99% Occupied Bandwidth for RMC (BPSK) Mode****26 dB Emissions Bandwidth & 99% Occupied Bandwidth for HSUPA (BPSK) Mode**

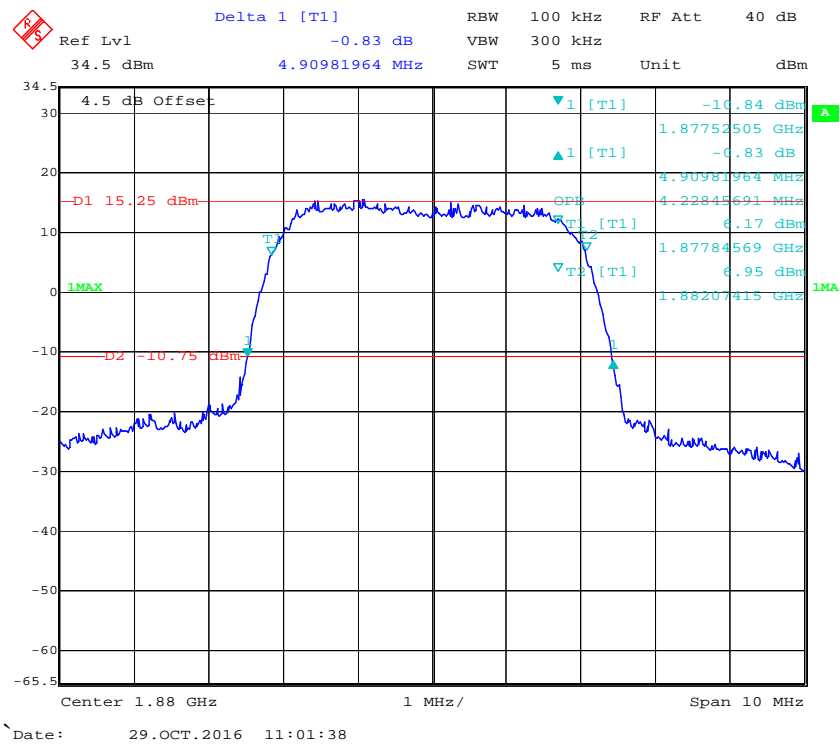


**26 dB Emissions Bandwidth & 99% Occupied Bandwidth for HSDPA (16QAM) Mode****PCS Band (Part 24E)****26 dB Emissions Bandwidth & 99% Occupied Bandwidth for GSM (GMSK) Mode**

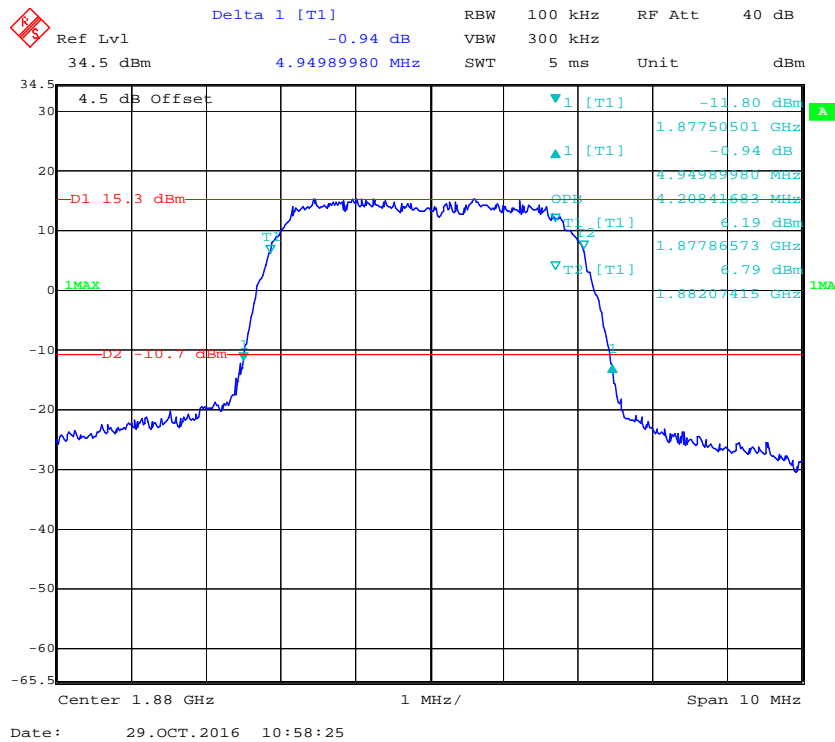
### 26 dB Emissions Bandwidth & 99% Occupied Bandwidth for EDGE Mode



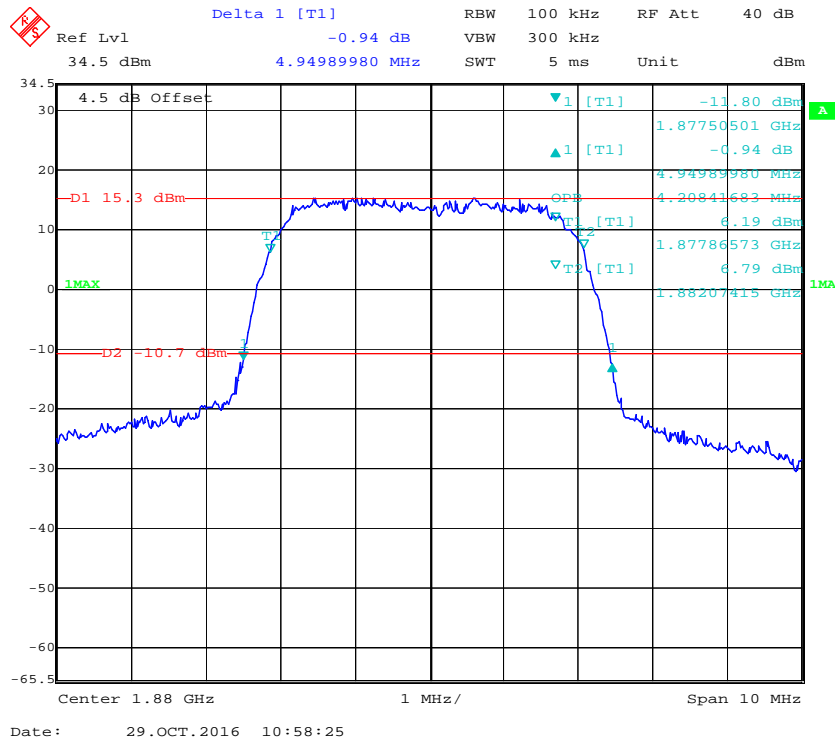
### 26 dB Emissions Bandwidth & 99% Occupied Bandwidth for RMC (BPSK) Mode



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

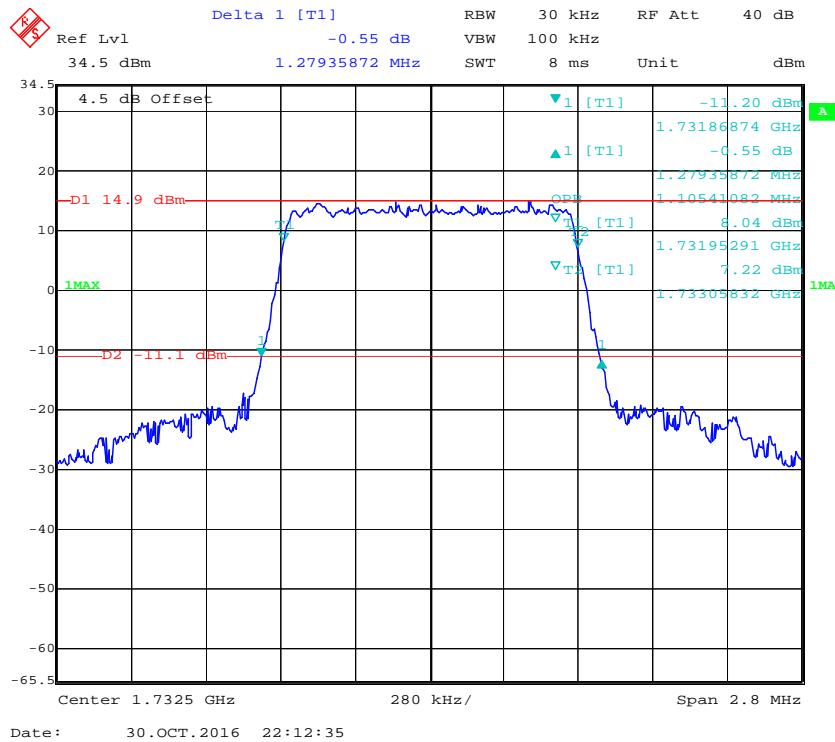
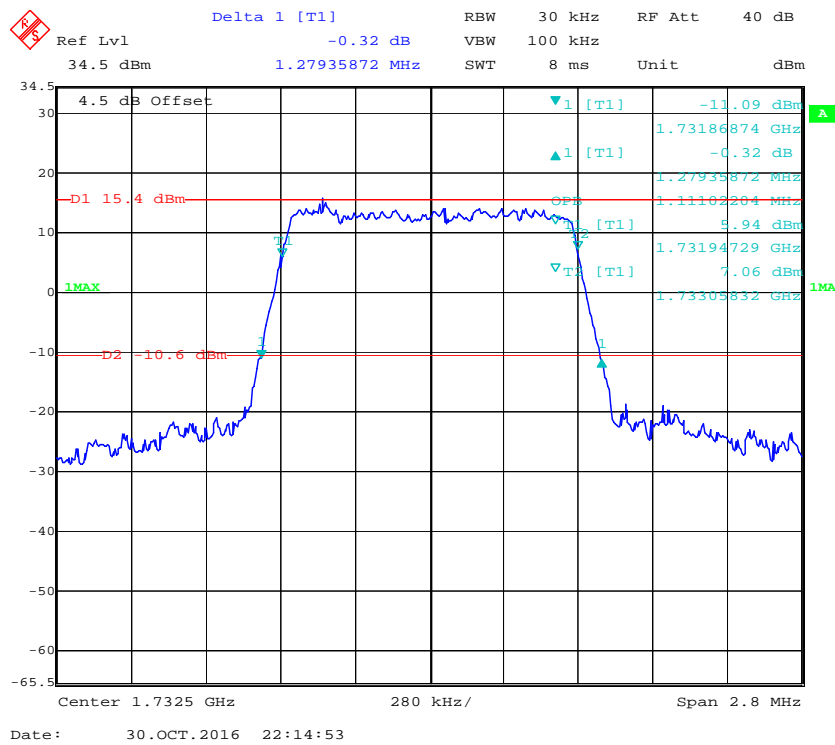


### 26 dB Emissions Bandwidth & 99% Occupied Bandwidth for HSDPA (16QAM) Mode



**LTE Band 4: (Middle Channel)**

<b>Bandwidth (MHz)</b>	<b>Modulation</b>	<b>99% Occupied Bandwidth (MHz)</b>	<b>26 dB Emission Bandwidth (MHz)</b>
1.4	QPSK	1.105	1.279
	16QAM	1.111	1.279
3.0	QPSK	2.705	2.922
	16QAM	2.705	2.970
5.0	QPSK	4.549	5.070
	16QAM	4.549	5.070
10.0	QPSK	8.978	9.860
	16QAM	8.978	9.739
15.0	QPSK	13.587	15.090
	16QAM	13.527	15.090
20.0	QPSK	18.036	19.960
	16QAM	18.036	19.800

**QPSK (1.4 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel****16-QAM (1.4 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel**

Delta 1 [T1] RBW 30 kHz RF Att 40 dB

Ref Lvl -0.43 dB VBW 100 kHz

34.5 dBm 2.92184369 MHz SWT 17 ms Unit dBm

4.5 dB Offset

D1 13.2 dBm

D2 -12.8 dBm

1MAX

1MAX

Center 1.7325 GHz 600 kHz/ Span 6 MHz

Date: 30.OCT.2016 22:07:06

Delta 1 [T1] -2.49 dB  
 Ref Lvl 34.5 dBm  
 RBW 30 kHz  
 RF Att 40 dB  
 2.96993988 MHz  
 SWT 17 ms  
 Unit dBm

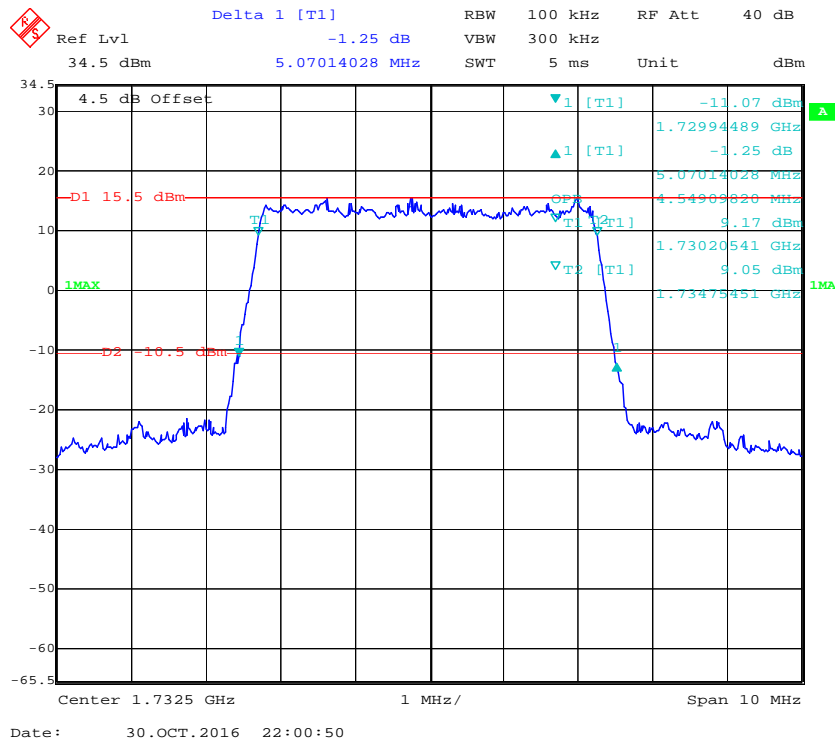
4.5 dB Offset  
 -14.72 dBm  
 1.73103908 GHz  
 -2.49 dB  
 2.96993988 MHz  
 2.70541082 MHz  
 6.03 dBm  
 1.73115932 GHz  
 5.86 dBm  
 1.73386473 GHz

D1 11 dBm  
 D2 -15 dBm  
 1MAX  
 1MAX

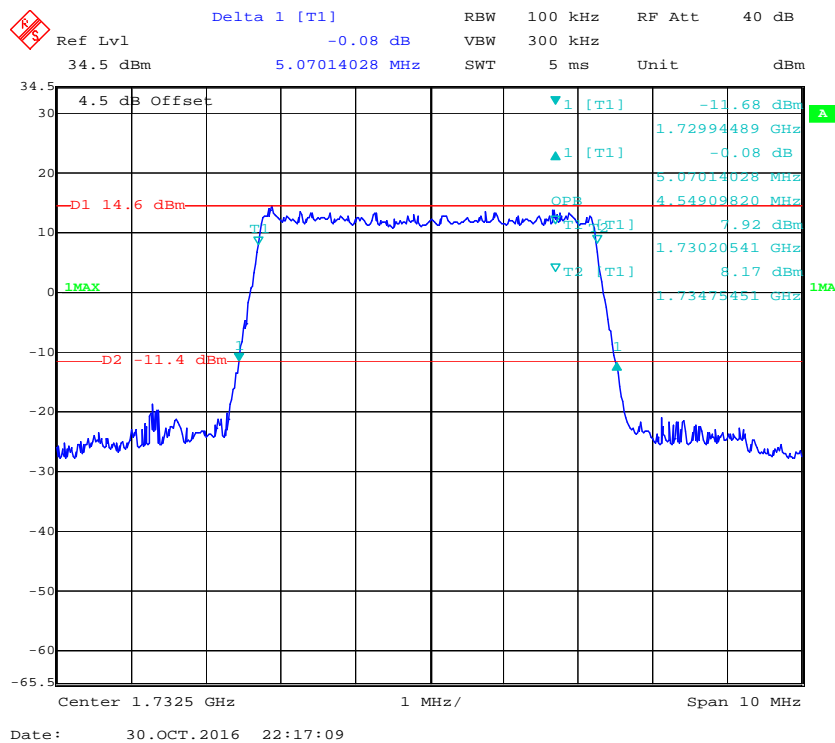
Center 1.7325 GHz  
 600 kHz/  
 Span 6 MHz

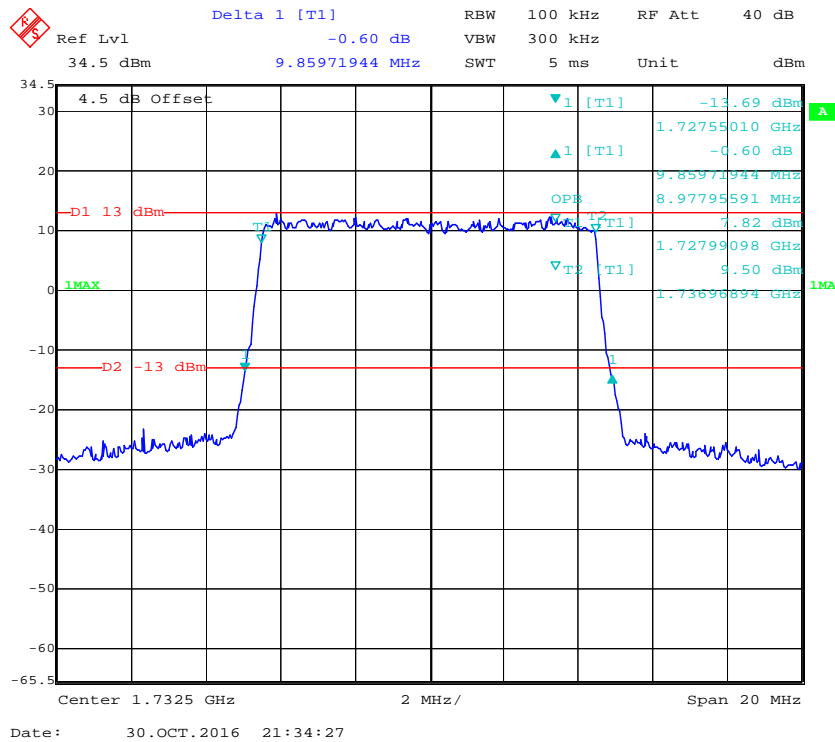
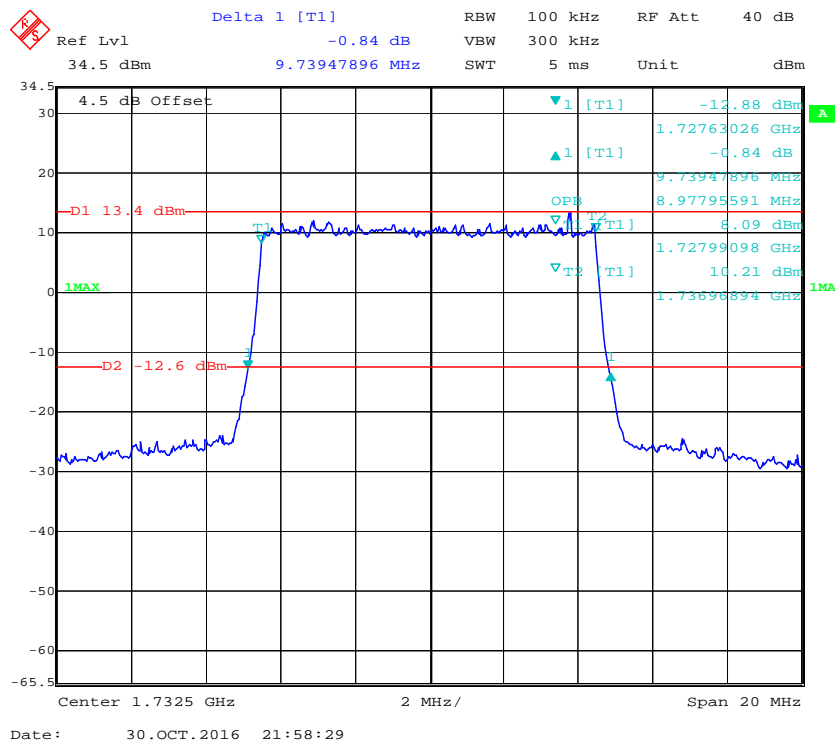
Date: 30.OCT.2016 22:10:14

### QPSK (5.0 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel

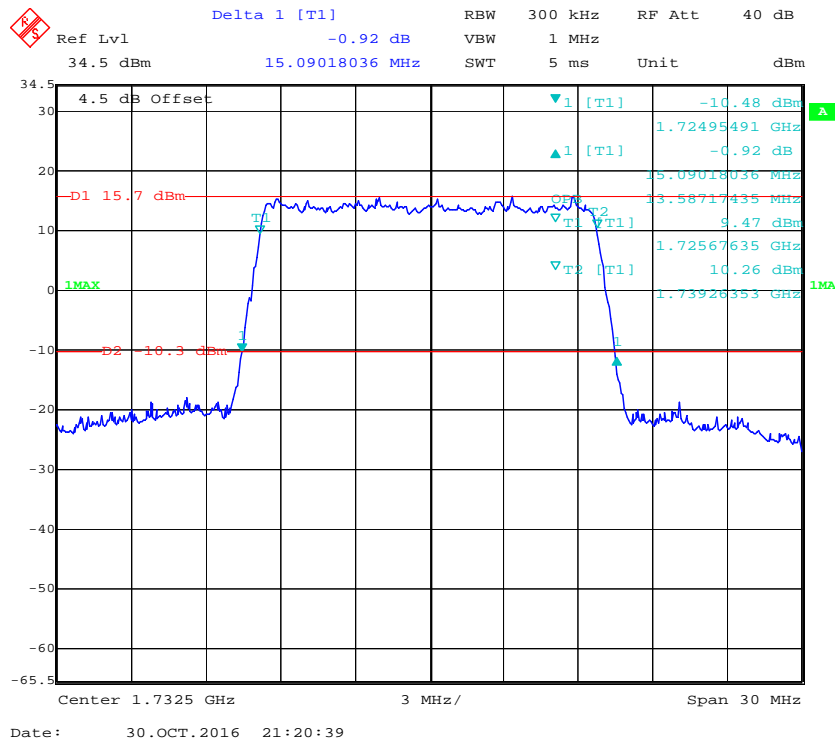
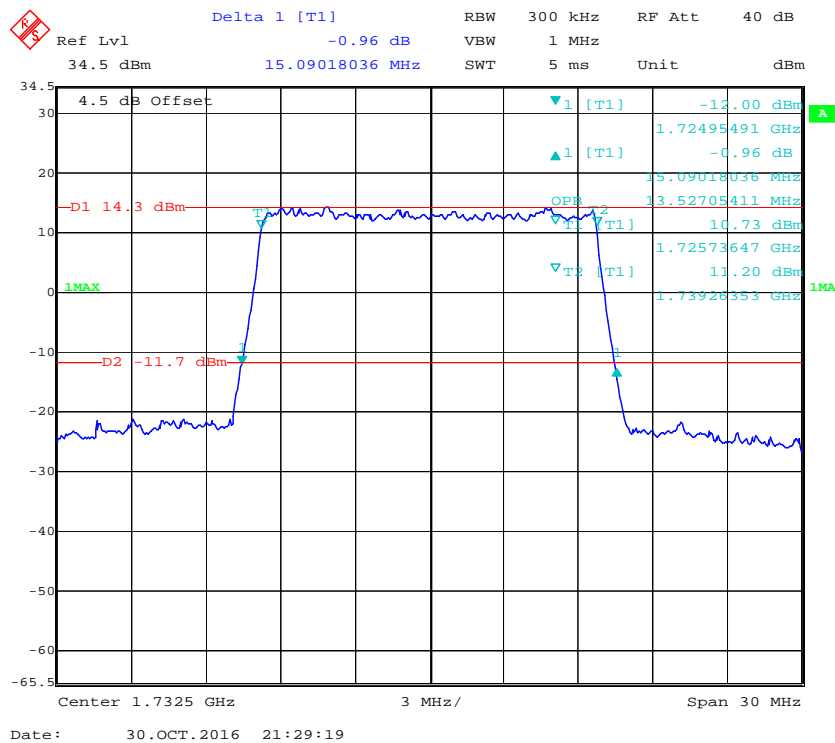


### 16-QAM (5.0 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel

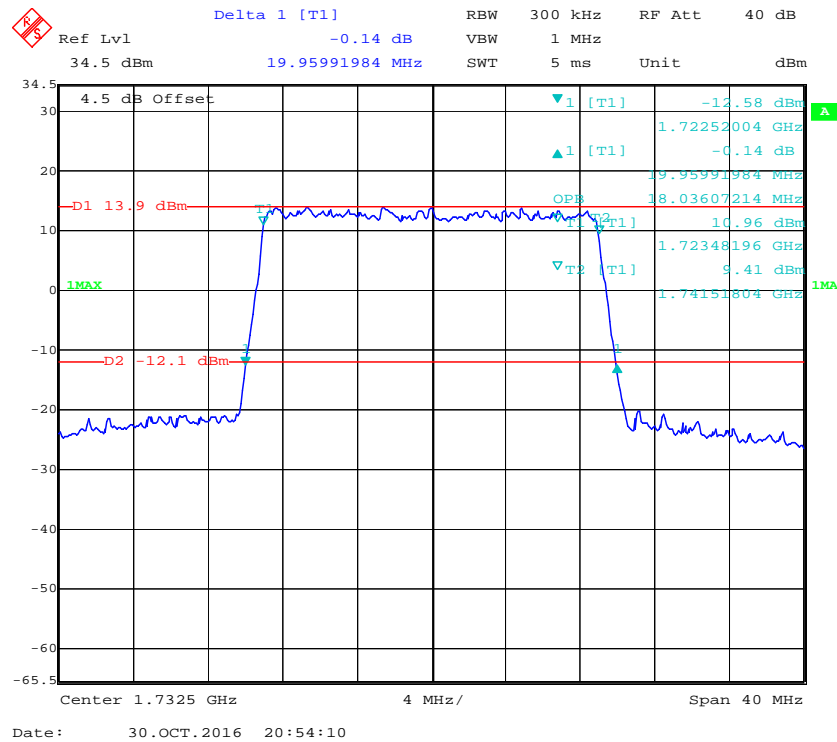


**QPSK (10.0 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel****16-QAM (10.0 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel**

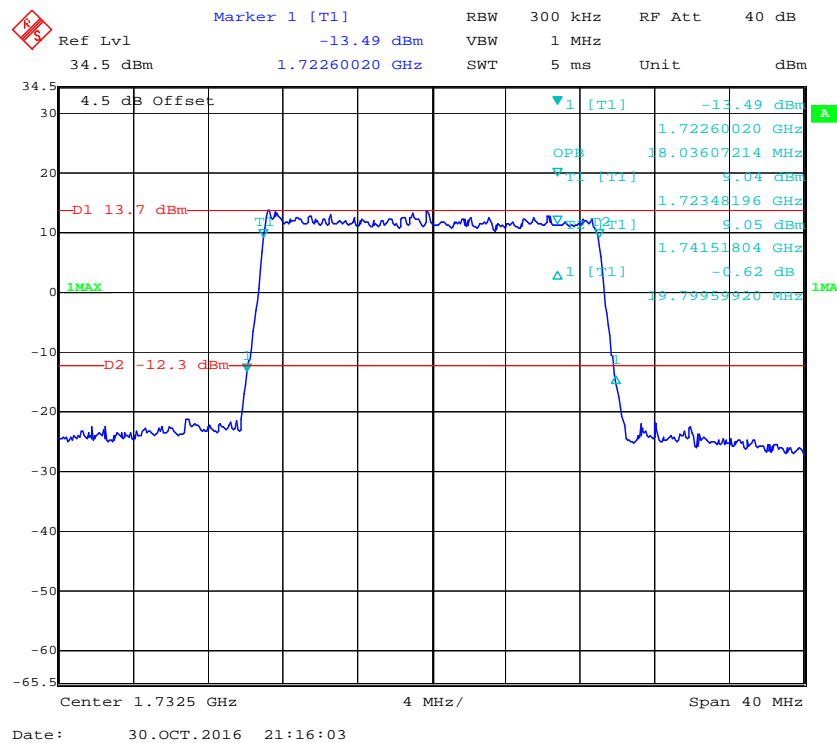


**QPSK (15.0 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel****16-QAM (15.0 MHz) - 26 dB Emissions Bandwidth & 99% Occupied Bandwidth, Middle channel**

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



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



## § 2.1051; § 22.917 (a); § 24.238 (a); §27.53 (h) (m) SPURIOUS EMISSIONS AT ANTENNA TERMINALS

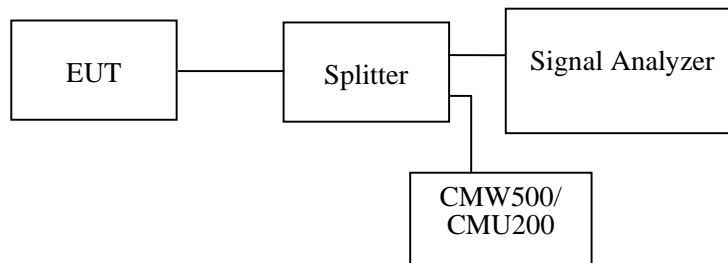
### Applicable Standards

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 10<sup>th</sup> harmonic.



### Test Data

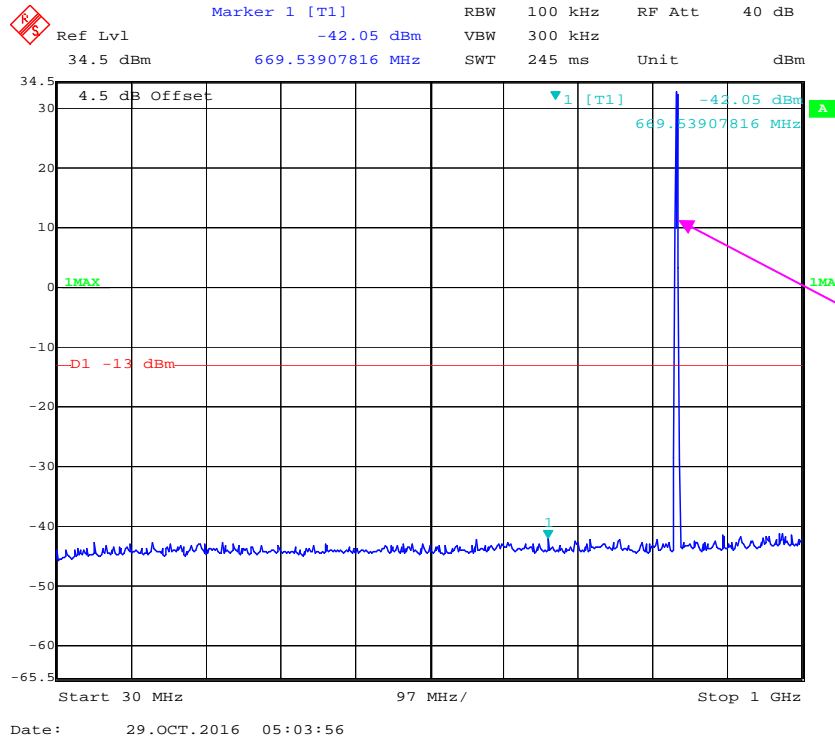
#### Environmental Conditions

Temperature:	23~25°C
Relative Humidity:	53~56 %
ATM Pressure:	100.0~101.0 kPa

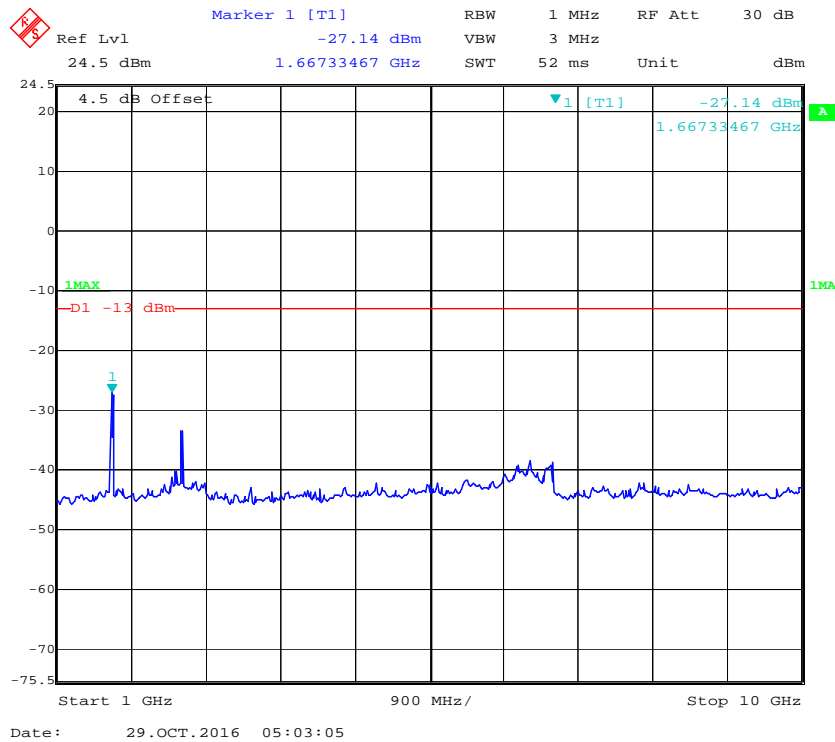
*The testing was performed by Peter Jiang from 2016-10-29 to 2016-10-30.*

Cellular Band (Part 22H)

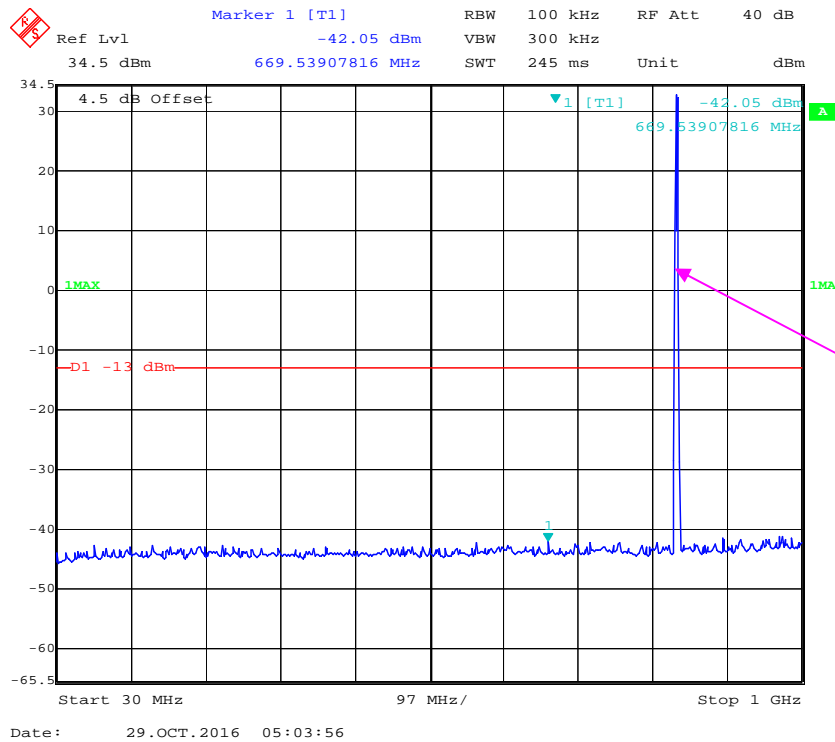
30 MHz – 1 GHz (GSM Mode)



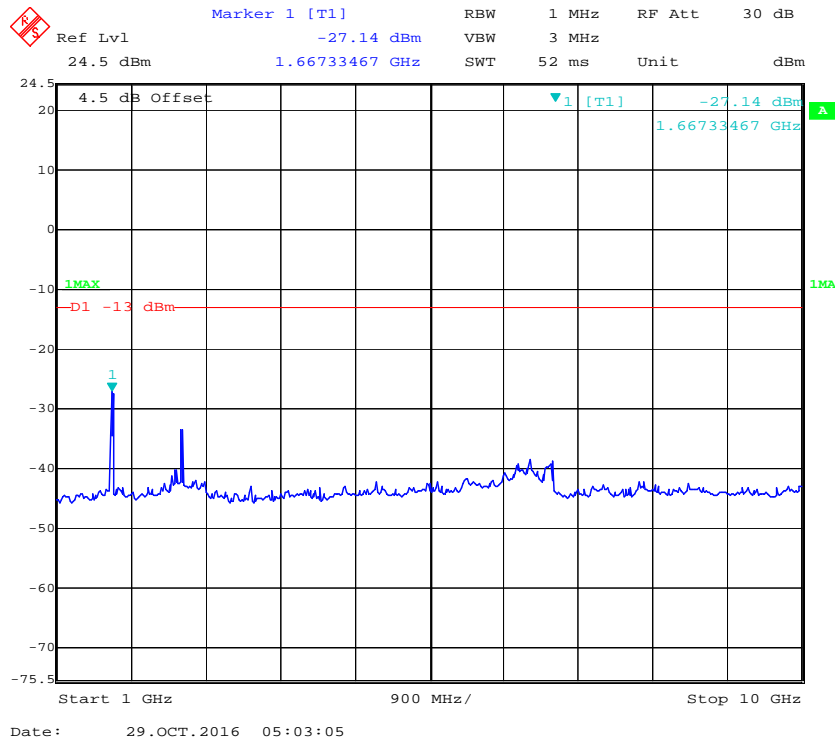
1 GHz – 10 GHz (GSM Mode)



### 30 MHz – 1 GHz (WCDMA Mode)

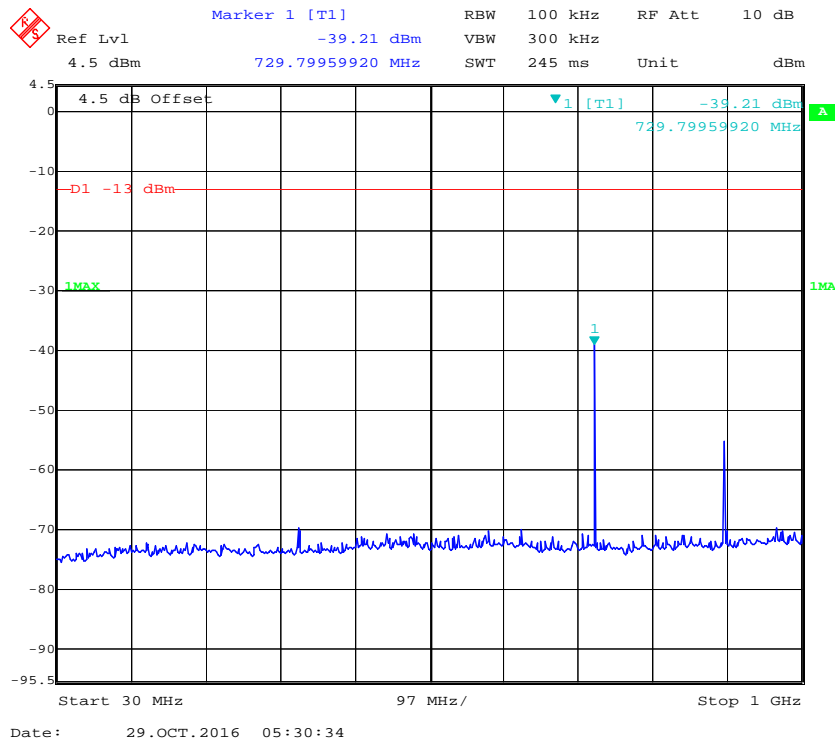


### 1 GHz – 10 GHz (WCDMA Mode)

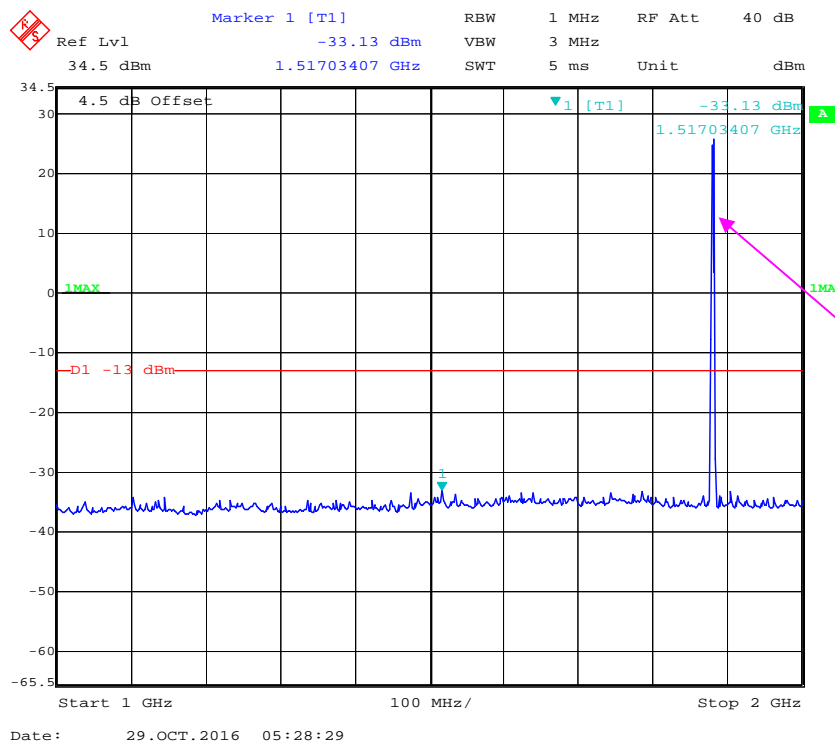


PCS Band (Part 24E)

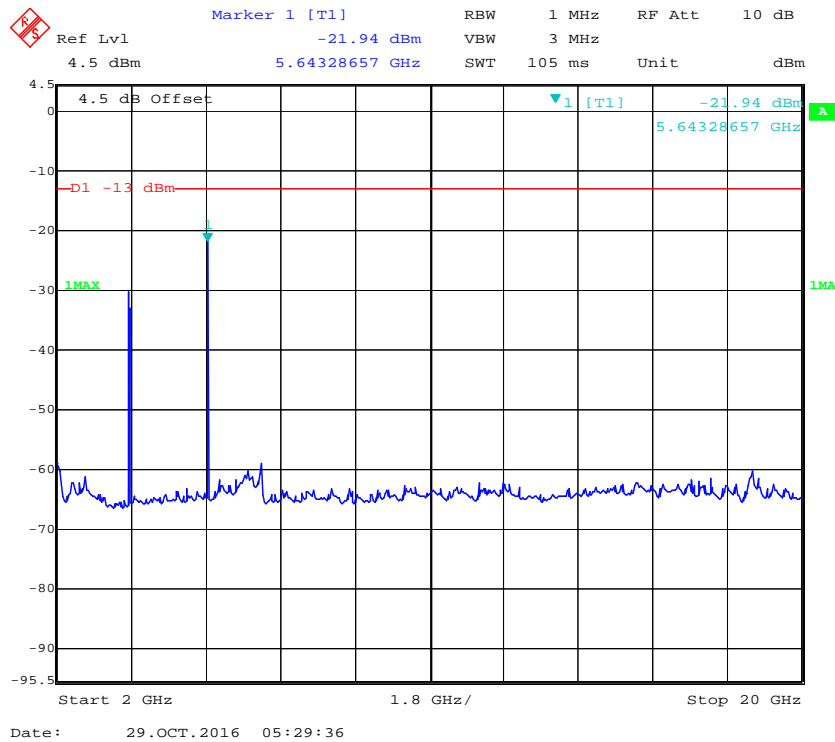
30 MHz – 1 GHz (GSM Mode)



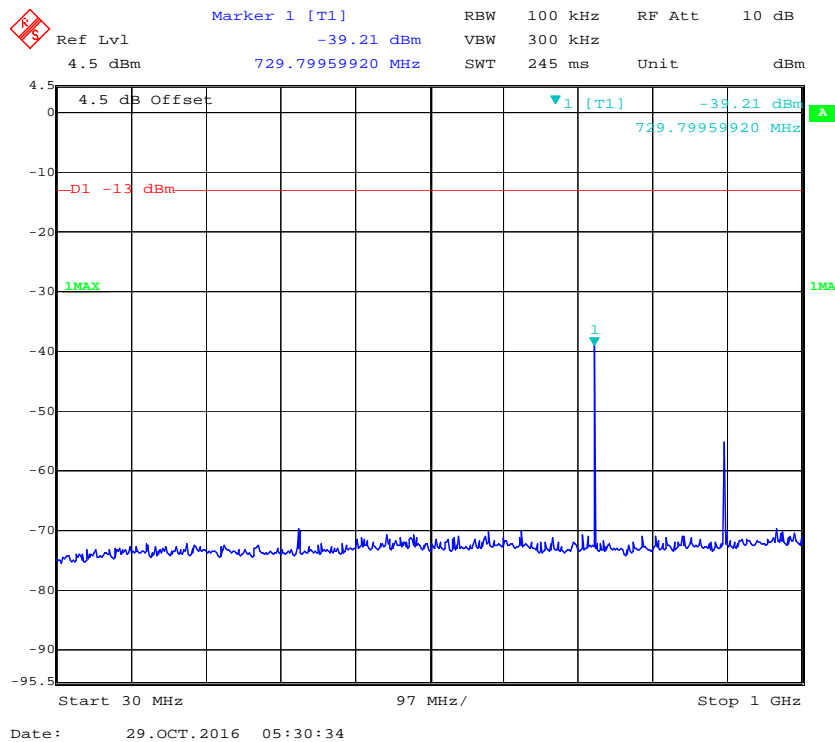
1 GHz – 2 GHz (GSM Mode)



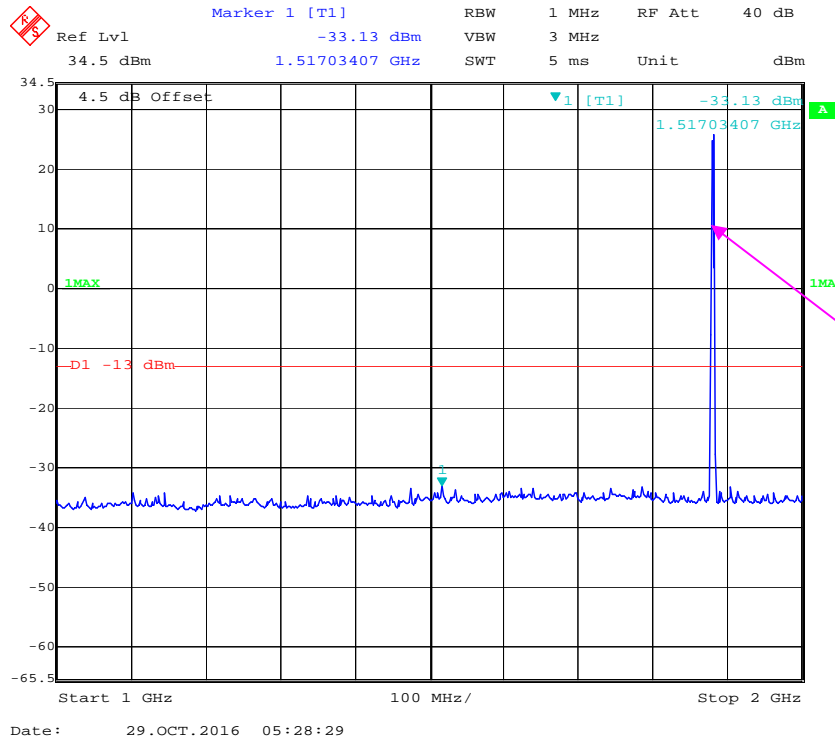
### 2 GHz – 20 GHz (GSM Mode)



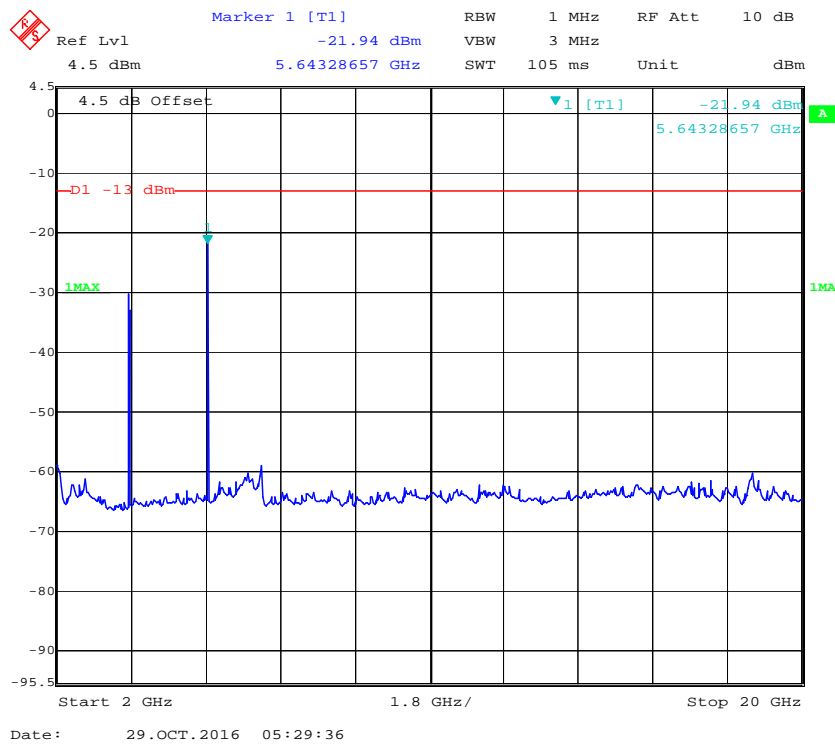
### 30 MHz – 1 GHz (WCDMA Mode)



### 1 GHz – 2 GHz (WCDMA Mode)

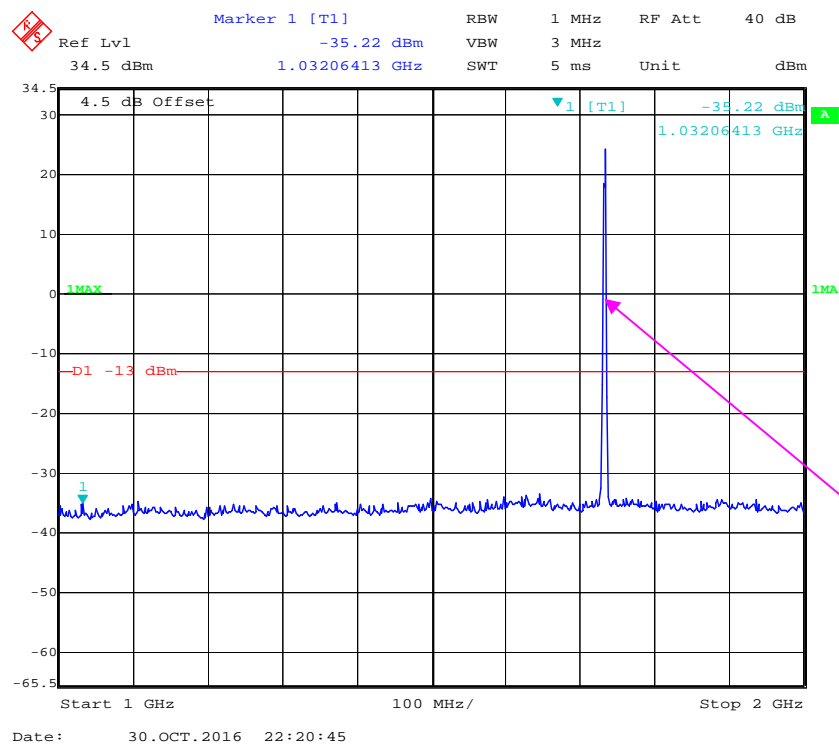


### 2 GHz – 20 GHz (WCDMA Mode)



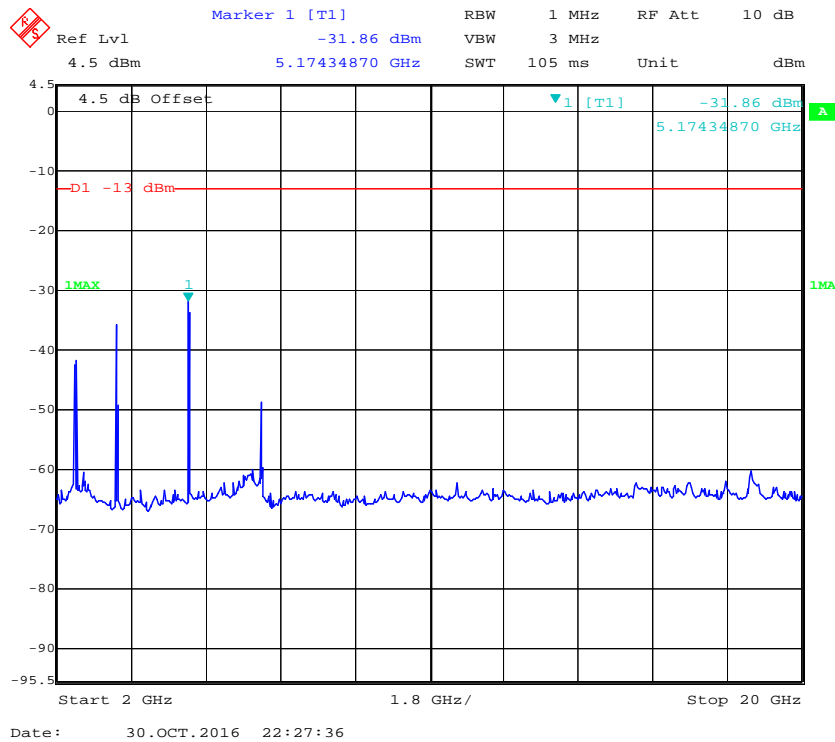


### 30 MHz - 1 GHz (1.4 MHz, Middle Channel)

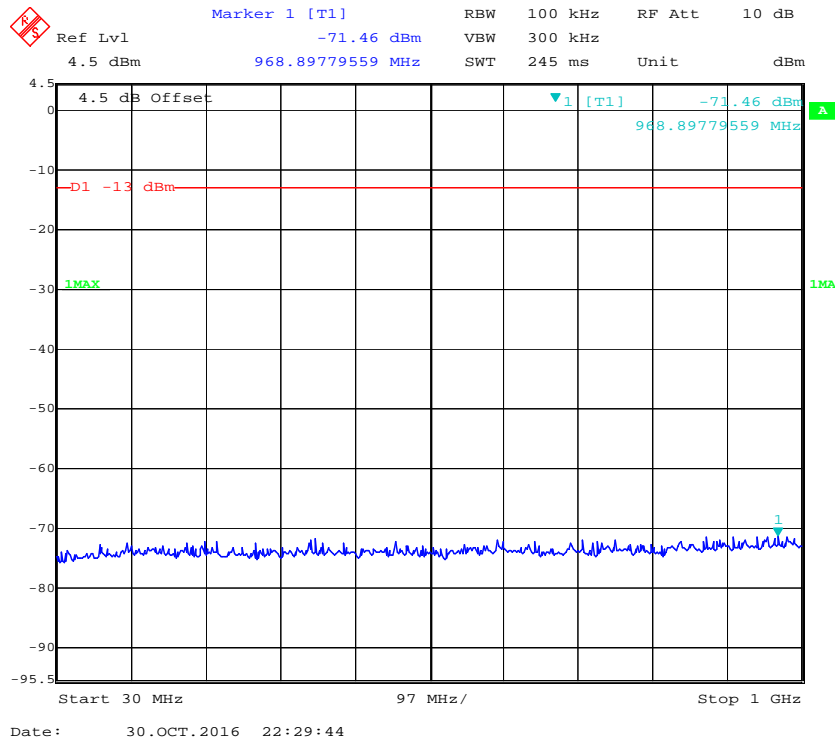


### Fundamental test

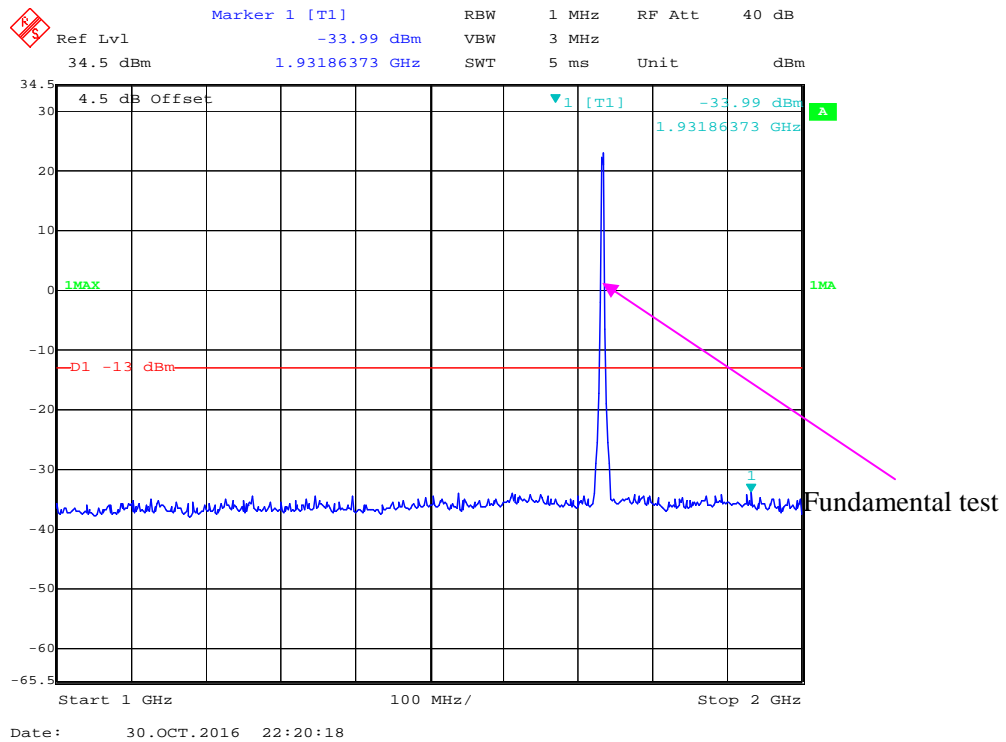
### 2 GHz – 20 GHz (1.4 MHz, Middle Channel)



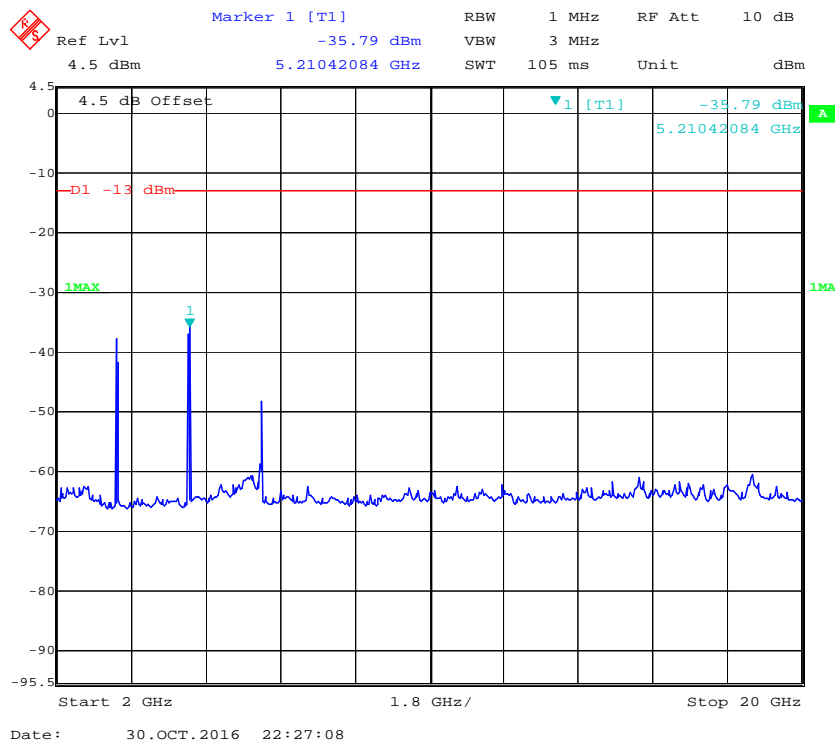
### 30 MHz - 1 GHz (3.0 MHz, Middle Channel)



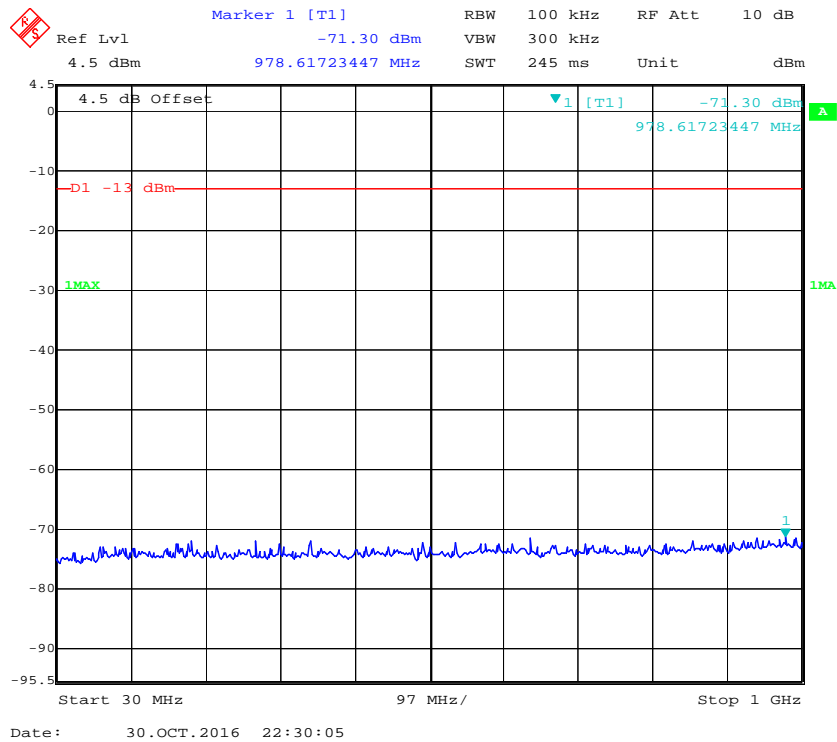
### 1 GHz – 2 GHz (3.0 MHz, Middle Channel)



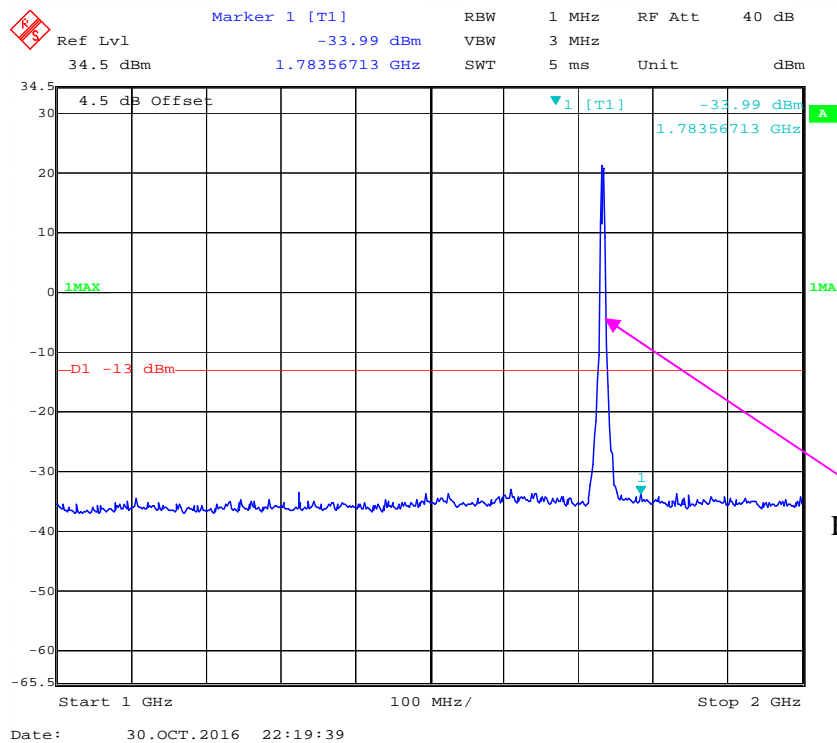
### 2 GHz – 20 GHz (3.0 MHz, Middle Channel)



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

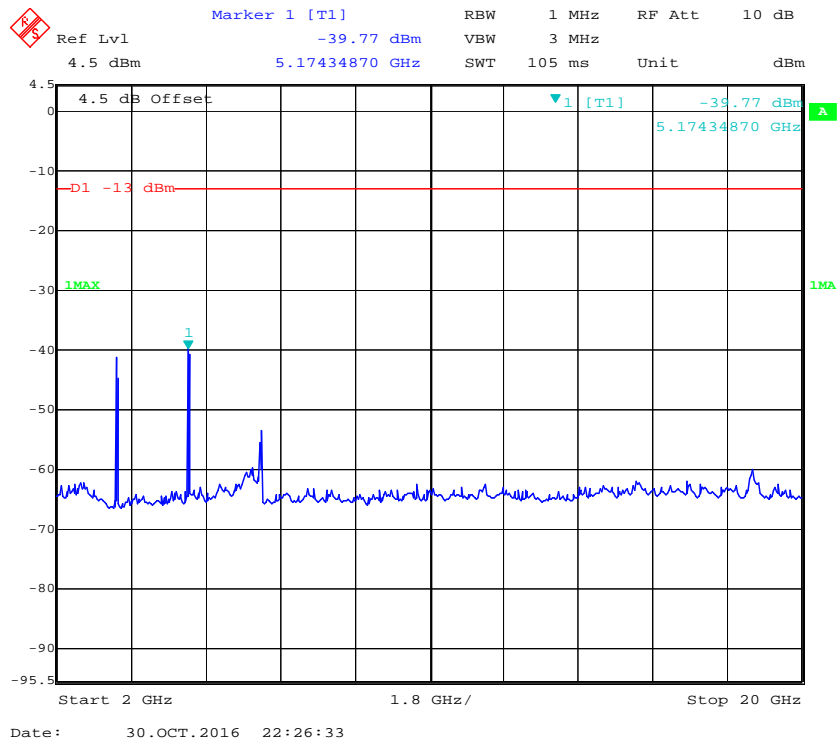


### 1 GHz - 2 GHz (5.0 MHz, Middle Channel)

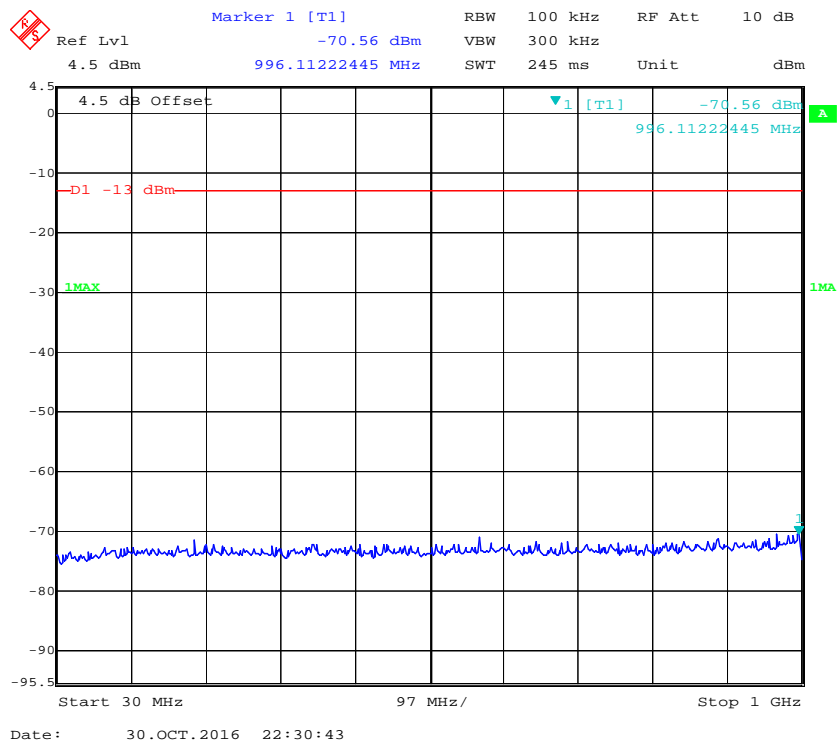


Fundamental test

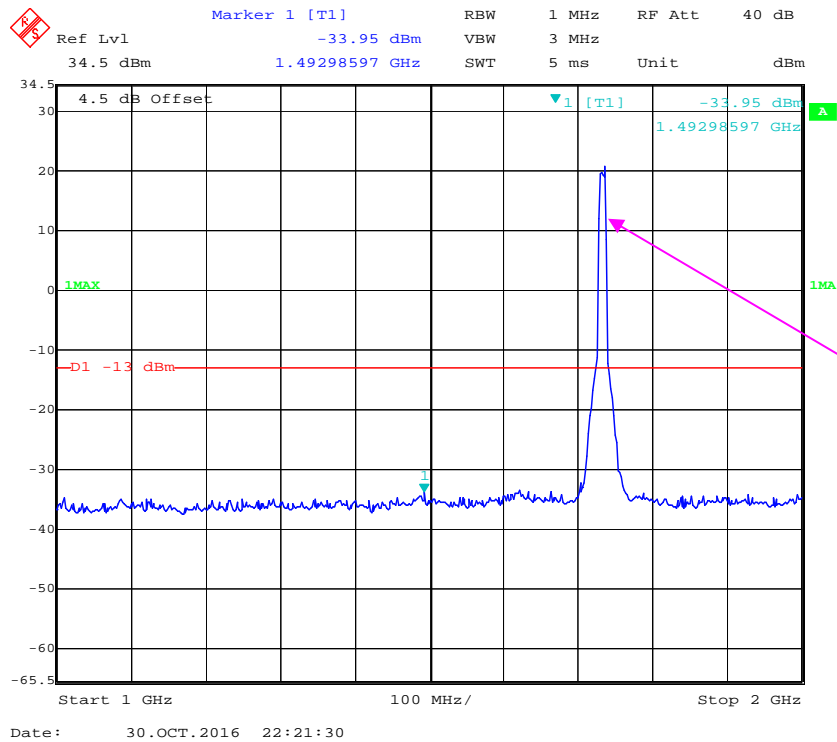
### 2 GHz – 20 GHz (5.0 MHz, Middle Channel)



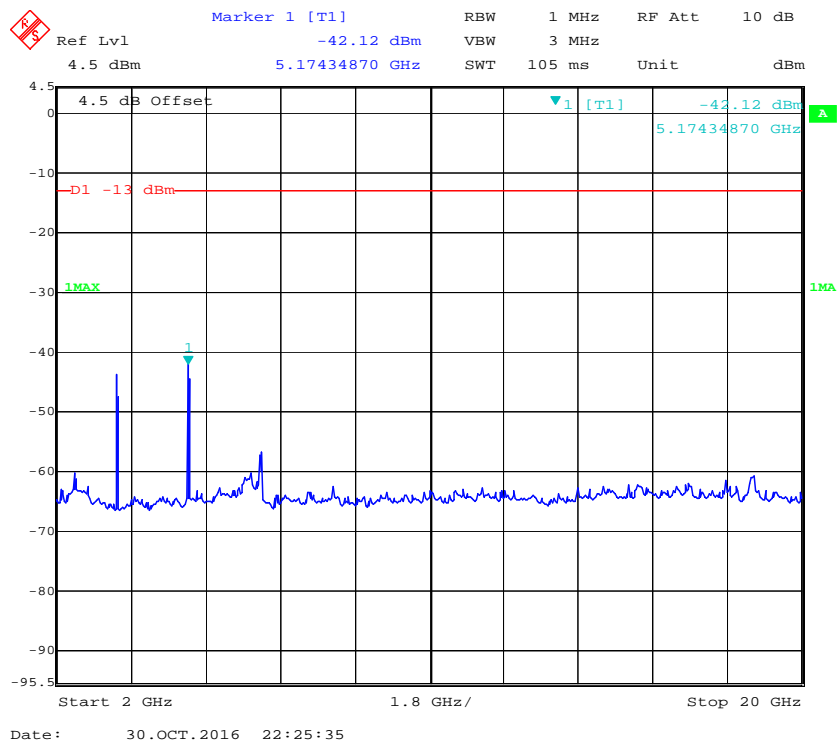
### 30 MHz - 1 GHz (10.0 MHz, Middle Channel)



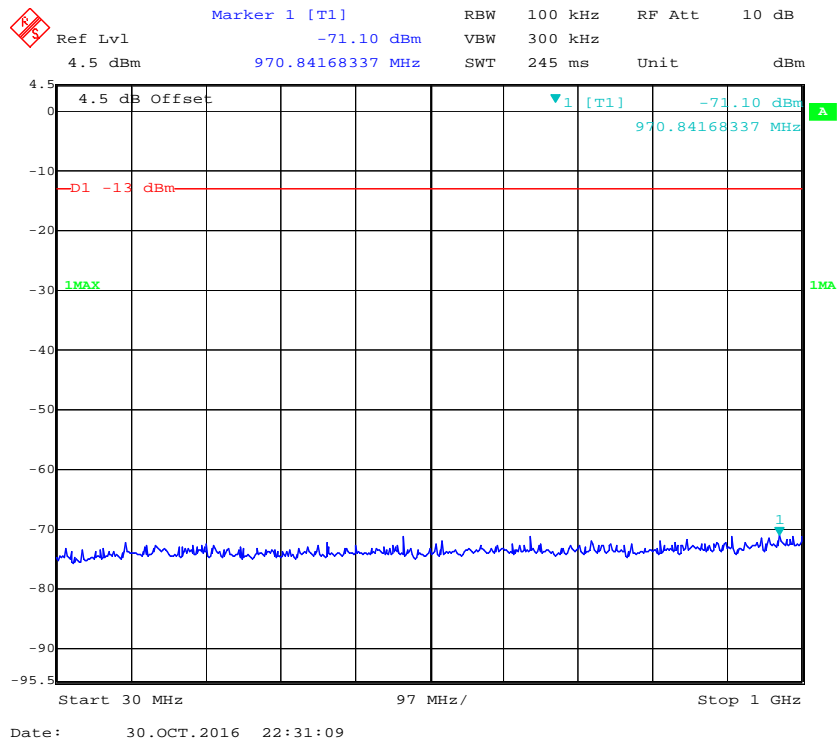
### 1 GHz – 2 GHz (10.0 MHz, Middle Channel)



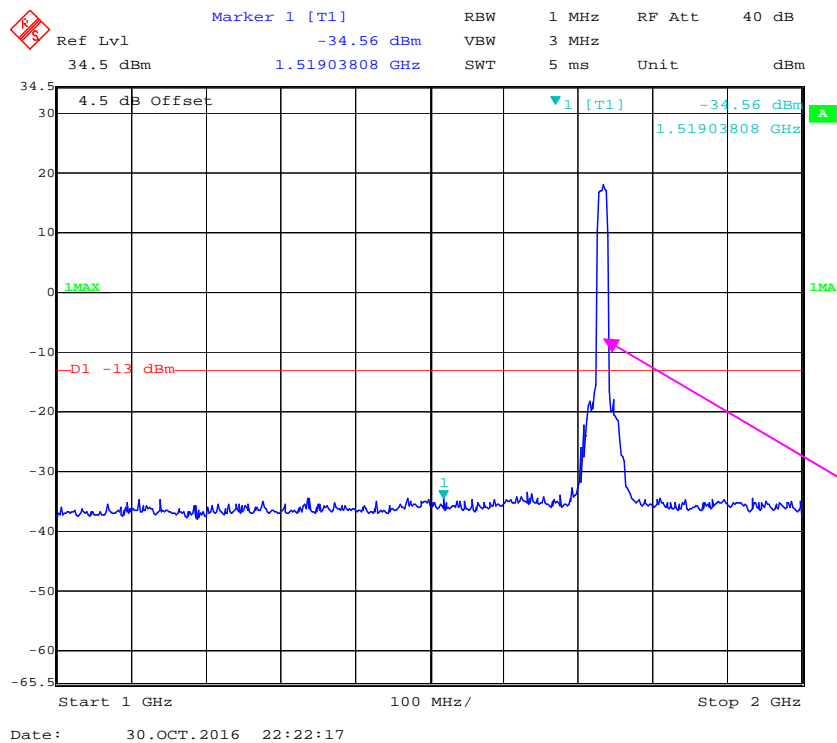
### 2 GHz – 20 GHz (10.0 MHz, Middle Channel)

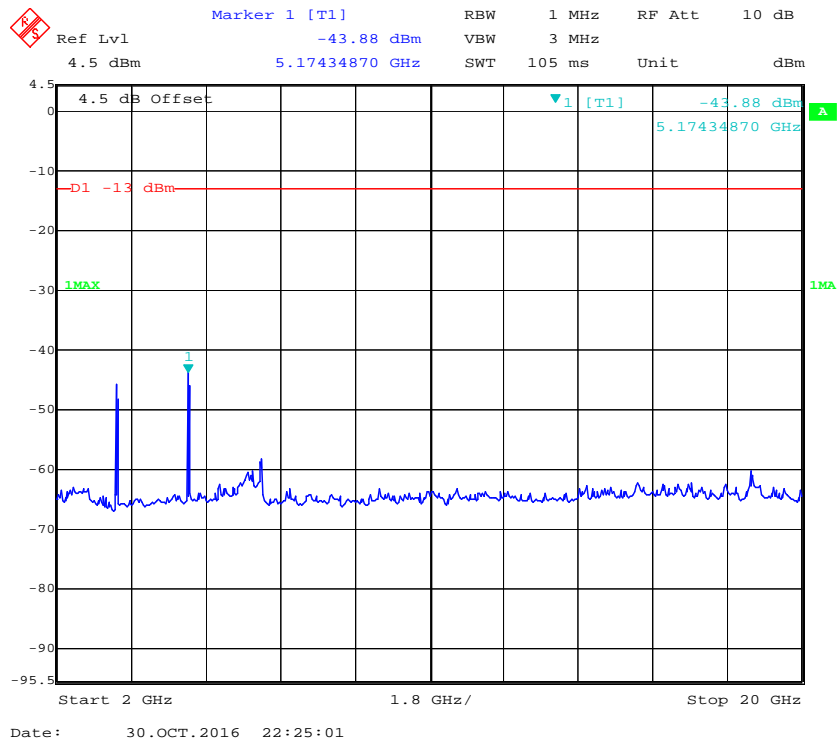
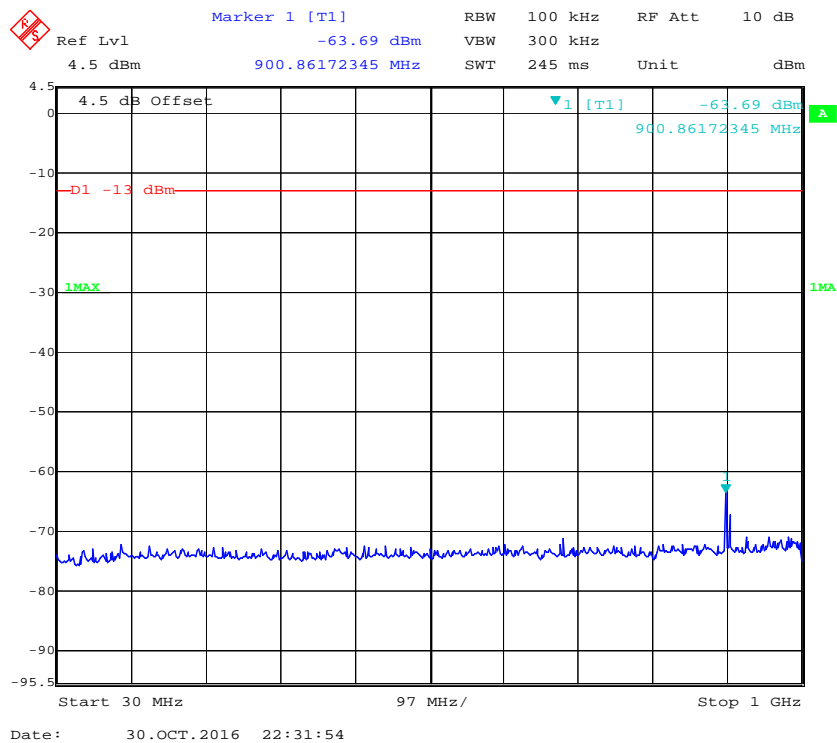


### 30 MHz - 1 GHz (15.0 MHz, Middle Channel)



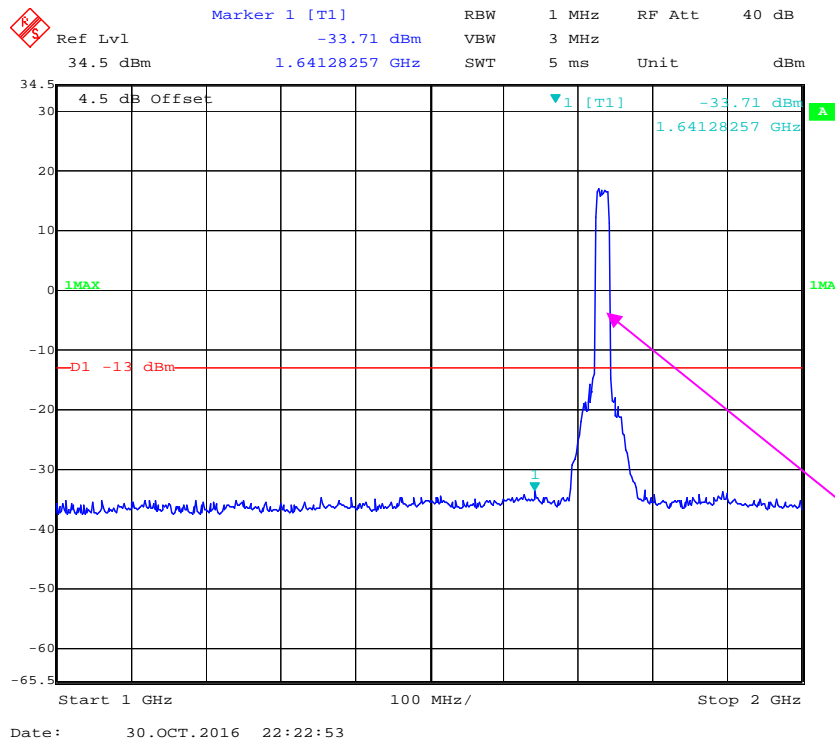
### 1 GHz – 2 GHz (15.0 MHz, Middle Channel)



**2 GHz – 20 GHz (15.0 MHz, Middle Channel)****30 MHz - 1 GHz (20.0 MHz, Middle Channel)**

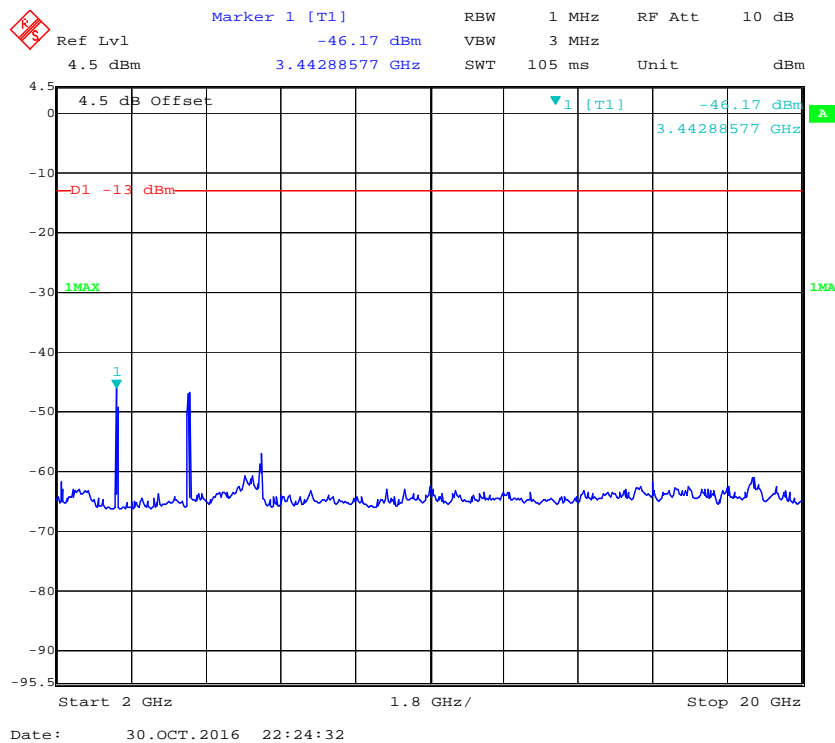


### 1 GHz – 2 GHz (20.0 MHz, Middle Channel)



Fundamental test

### 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 Standards

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

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

### Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

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

### Test Data

#### Environmental Conditions

Temperature:	23 °C
Relative Humidity:	53 %
ATM Pressure:	101.0 kPa

*The testing was performed by Peter Jiang on 2016-11-05.*

*Test mode: Transmitting*

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, and the worse case data 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)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
GSM 850 Mode										
399.88	32.54	198	2.0	H	-34.7	0.27	4.65	-30.32	-13	17.32
399.88	32.46	156	1.3	V	-34.8	0.27	4.65	-30.42	-13	17.42
1673.20	61.23	328	1.9	H	-42.7	0.30	9.40	-33.60	-13	20.60
1673.20	62.82	279	2.3	V	-42.6	0.30	9.40	-33.50	-13	20.50
WCDMA 850 Mode										
430.70	32.44	350	2.2	H	-34.8	0.27	4.65	-30.42	-13	17.42
430.70	31.24	352	2.5	V	-36.0	0.27	4.65	-31.62	-13	18.62
1673.20	52.64	134	1.4	H	-51.3	0.30	9.40	-42.20	-13	29.20
1673.20	53.58	227	1.6	V	-51.9	0.30	9.40	-42.80	-13	29.80

**30 MHz ~ 20 GHz:**

**PCS Band (Part 24E&27)**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (m)	Polar (H/V)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
GSM 1900 Mode										
399.88	33.46	140	1.3	H	-33.8	0.27	4.65	-29.42	-13	16.42
399.88	34.57	3	1.5	V	-32.7	0.27	4.65	-28.32	-13	15.32
3760.00	41.53	170	2.1	H	-52.2	2.42	12.60	-42.02	-13	29.02
3760.00	39.93	290	2.0	V	-52.8	2.42	12.60	-42.62	-13	29.62
WCDMA 1900 Mode										
399.88	33.17	357	1.3	H	-34.1	0.27	4.65	-29.72	-13	16.72
399.88	32.08	115	1.2	V	-35.2	0.27	4.65	-30.82	-13	17.82
3760.00	40.43	237	1.8	H	-53.3	2.42	12.60	-43.12	-13	30.12
3760.00	38.13	286	2.2	V	-54.6	2.42	12.60	-44.42	-13	31.42

**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)	SG Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
<b>Band 4</b>										
<b>Test frequency range:30 MHz ~ 18 GHz</b>										
399.88	32.54	262	2.1	H	-34.7	0.27	4.65	-30.32	-13	17.32
399.88	31.47	145	1.1	V	-35.8	0.27	4.65	-31.42	-13	18.42
3465.00	42.97	256	2.2	H	-51.6	2.34	12.40	-41.54	-13	28.54
3465.00	41.11	33	1.9	V	-51.4	2.34	12.40	-41.34	-13	28.34

**Note:**

- 1) Absolute Level = SG Level - Cable loss + Antenna Gain
- 2) Margin = Limit- Absolute Level

## FCC § 22.917 (a); § 24.238 (a); § 27.53 (h)(m) - BAND EDGES

### Applicable Standards

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.

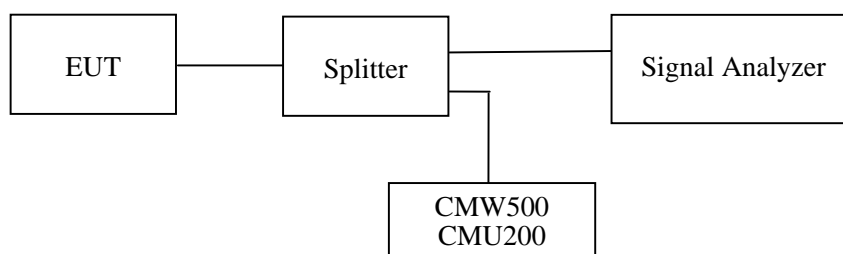
According to FCC § 27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB.

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log(P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log(P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log(P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log(P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log(P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

### 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

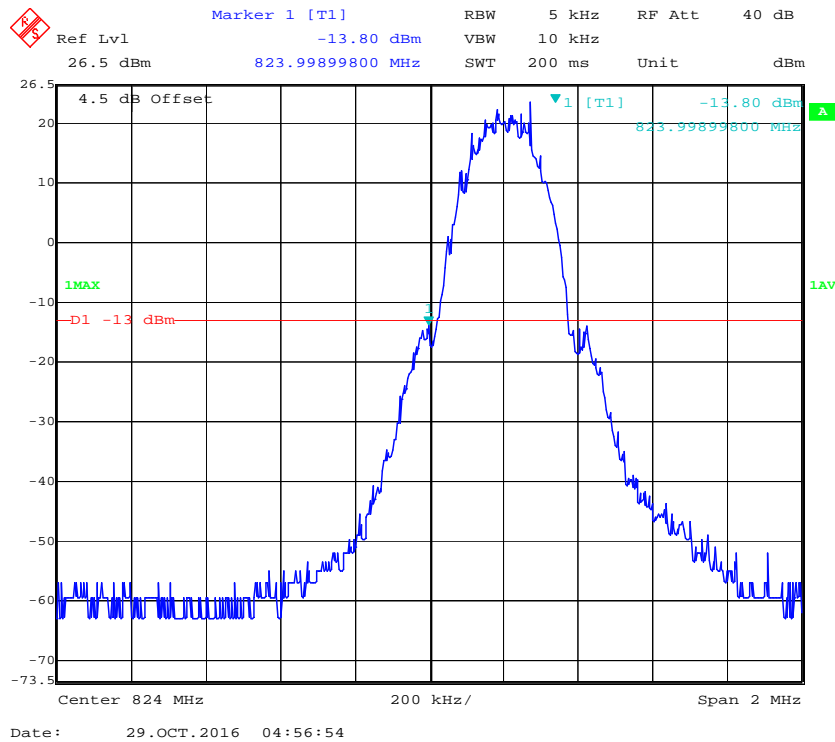
Temperature:	23~25°C
Relative Humidity:	53~56 %
ATM Pressure:	100.0~101.0 kPa

The testing was performed by Peter Jiang from 2016-10-28 to 2016-10-30.

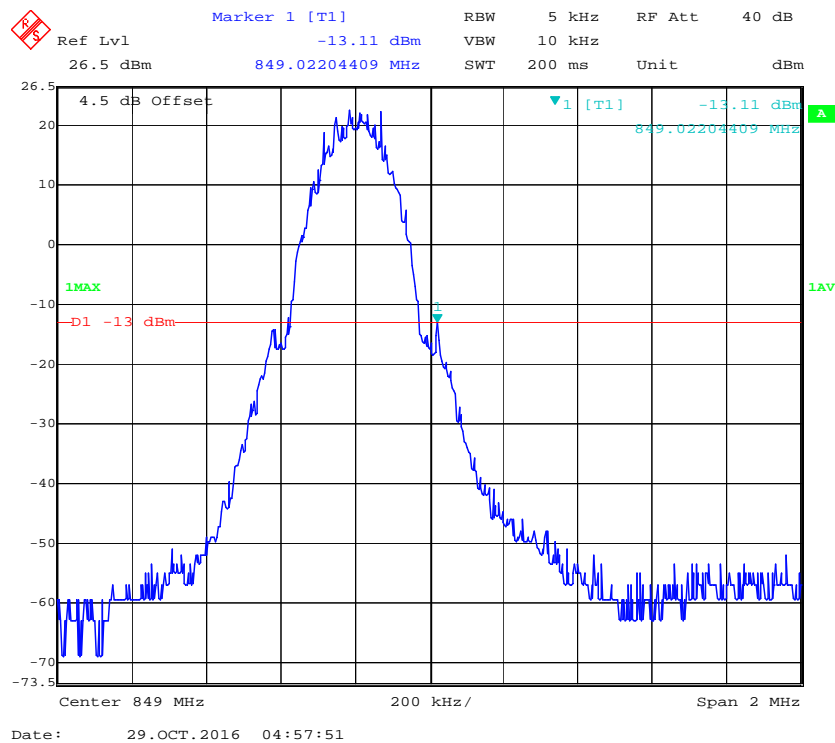
EUT operation mode: Transmitting

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

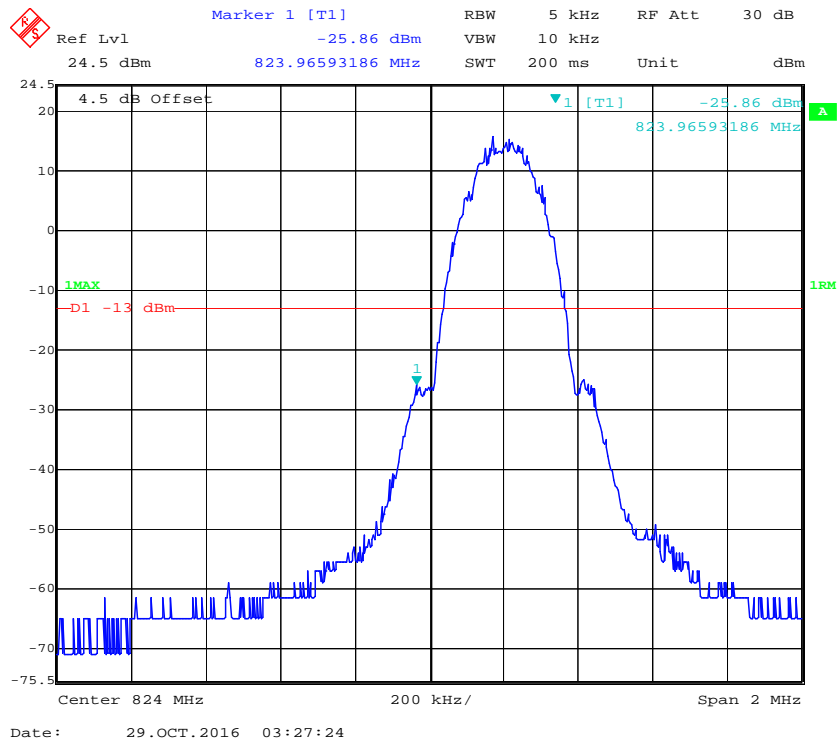
### Cellular Band, Left Band Edge for GSM (GMSK) Mode



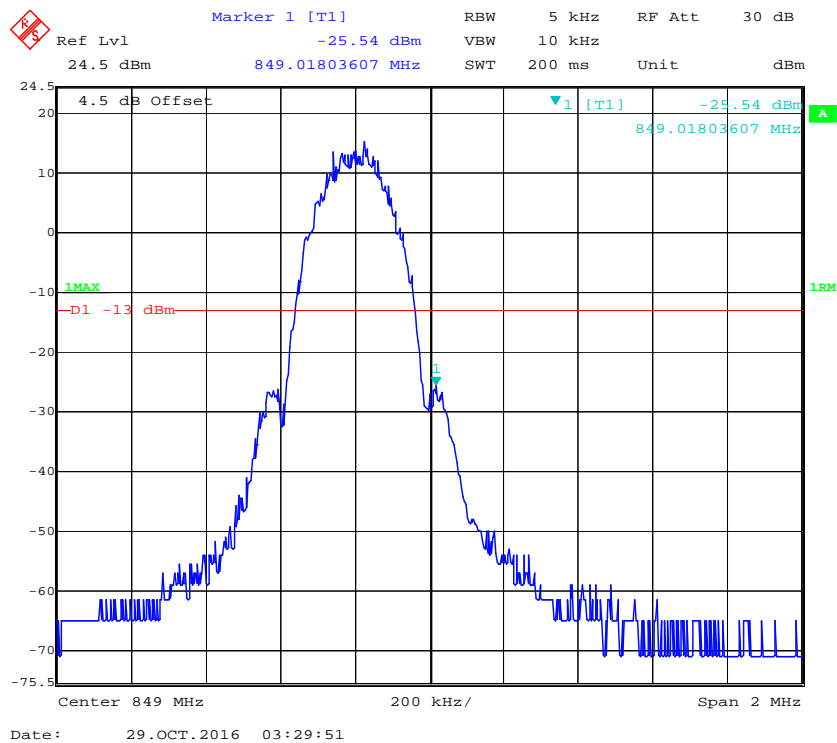
### Cellular Band, Right Band Edge for GSM (GMSK) Mode



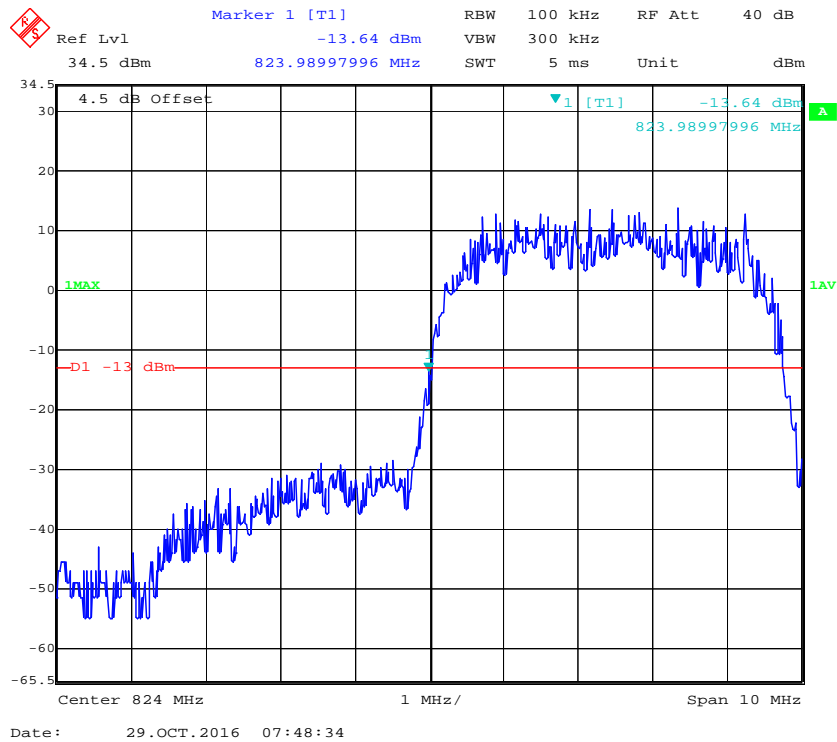
### Cellular Band, Left Band Edge for EGPRS Mode



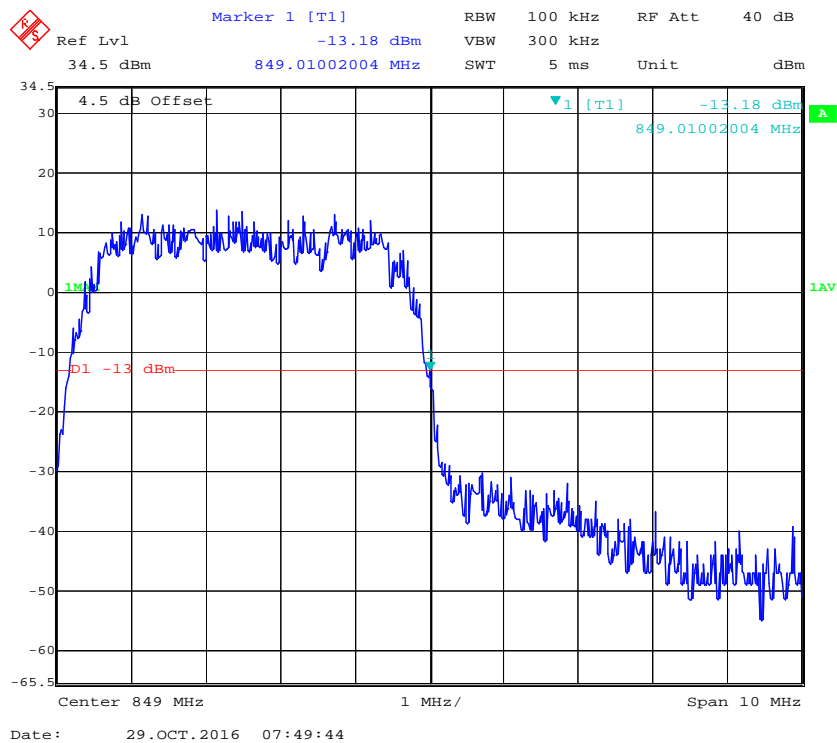
### Cellular Band, Right Band Edge for EGPRS Mode



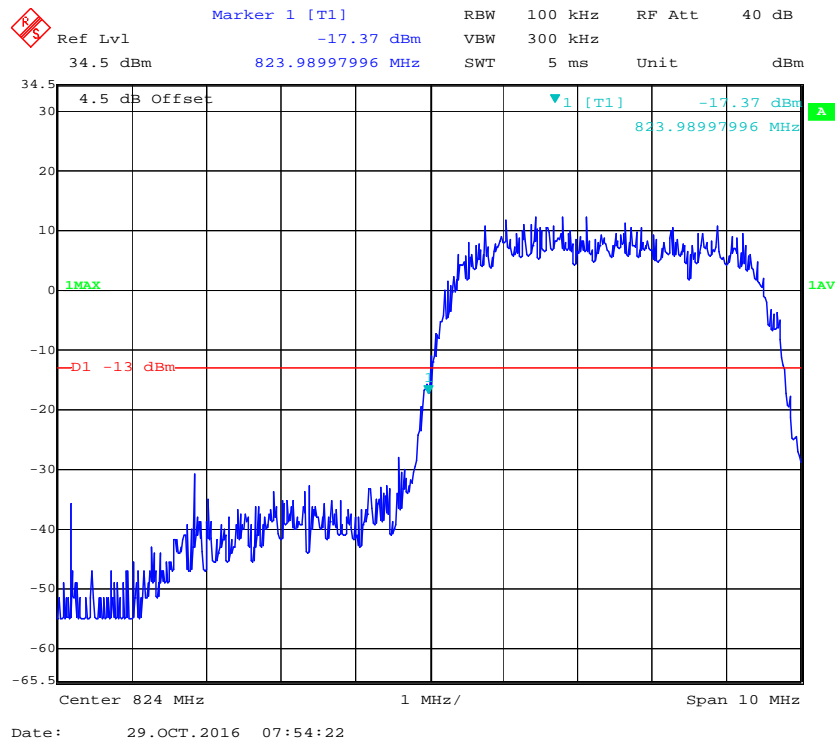
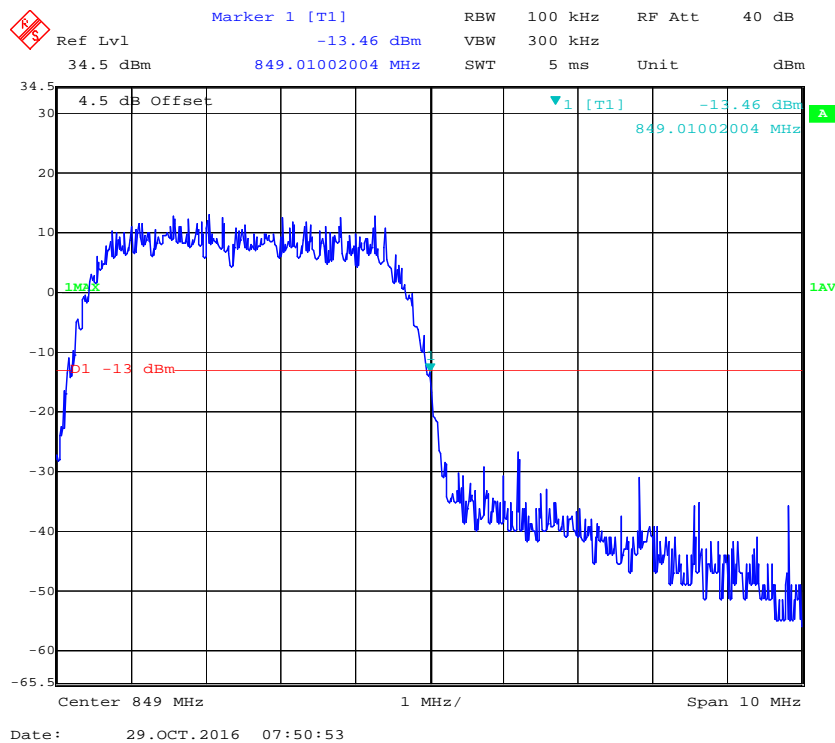
### Cellular Band, Left Band Edge for RMC (BPSK) Mode



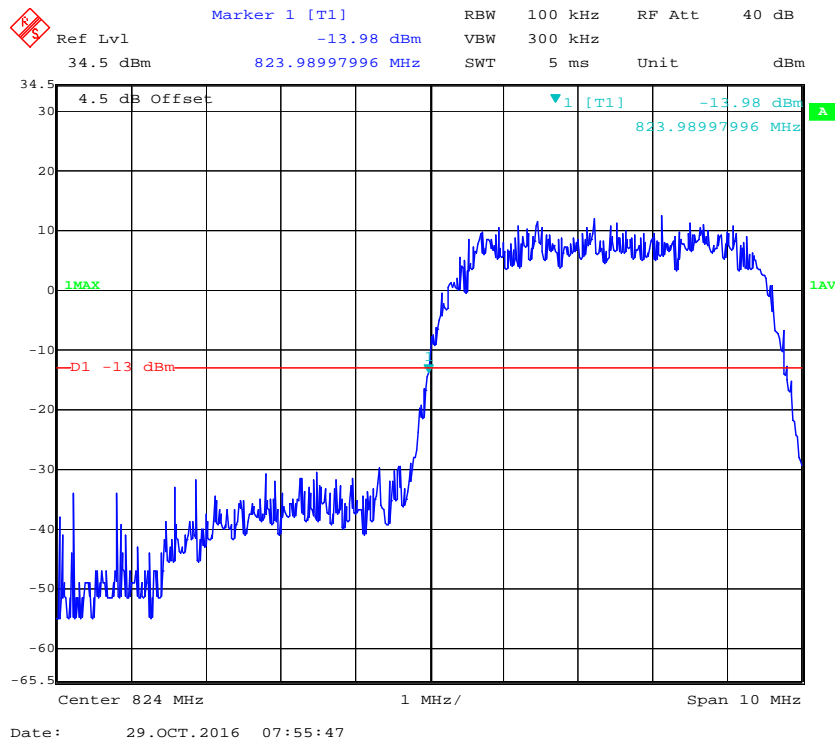
### Cellular Band, Right Band Edge for RMC (BPSK) Mode



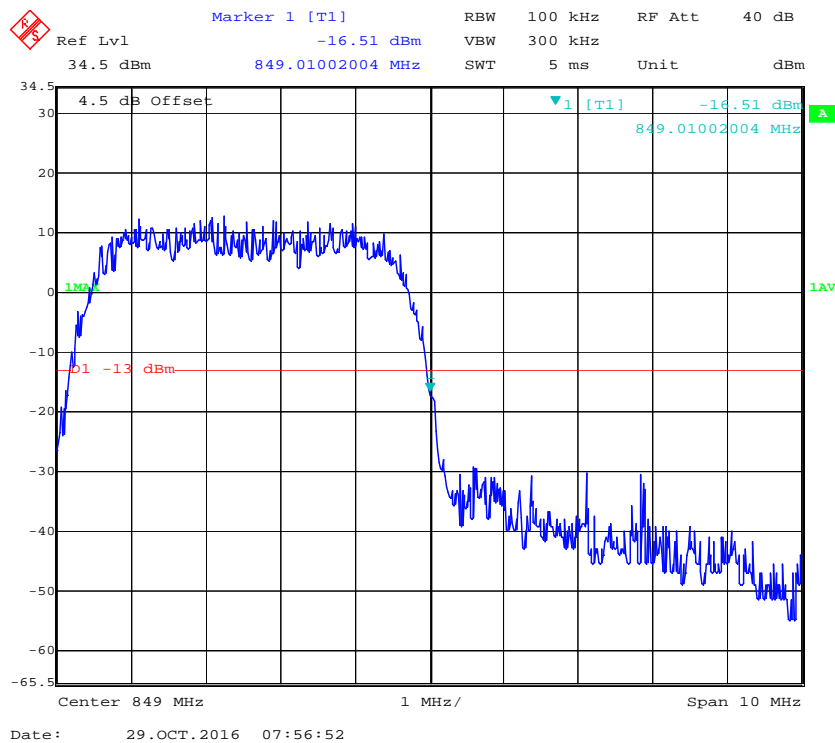


**Cellular Band, Left Band Edge for HSDPA (16QAM) Mode****Cellular Band, Right Band Edge for HSDPA (16QAM) Mode**

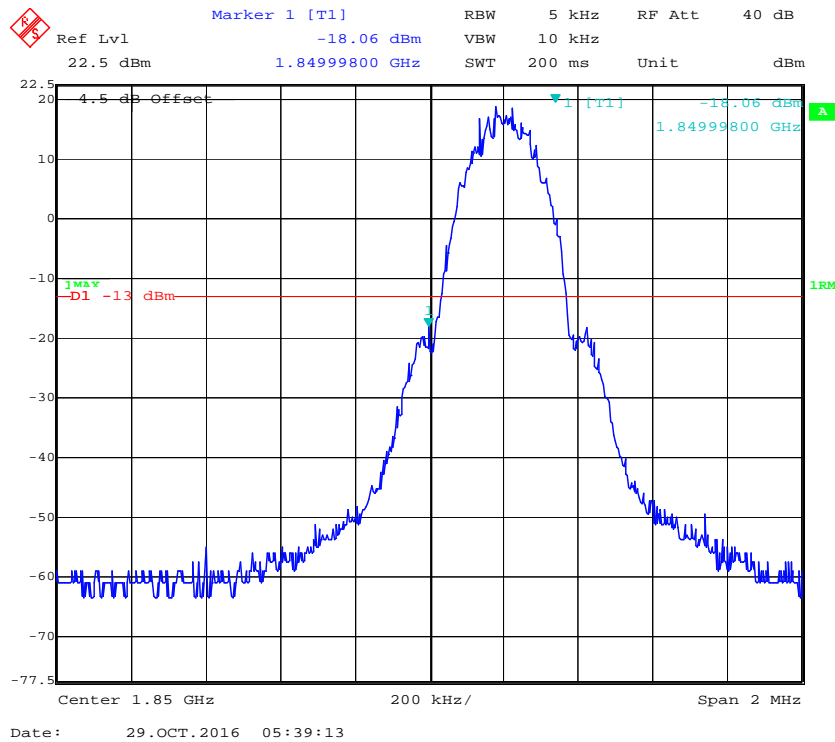
### Cellular Band, Left Band Edge for HSUPA (BPSK) Mode



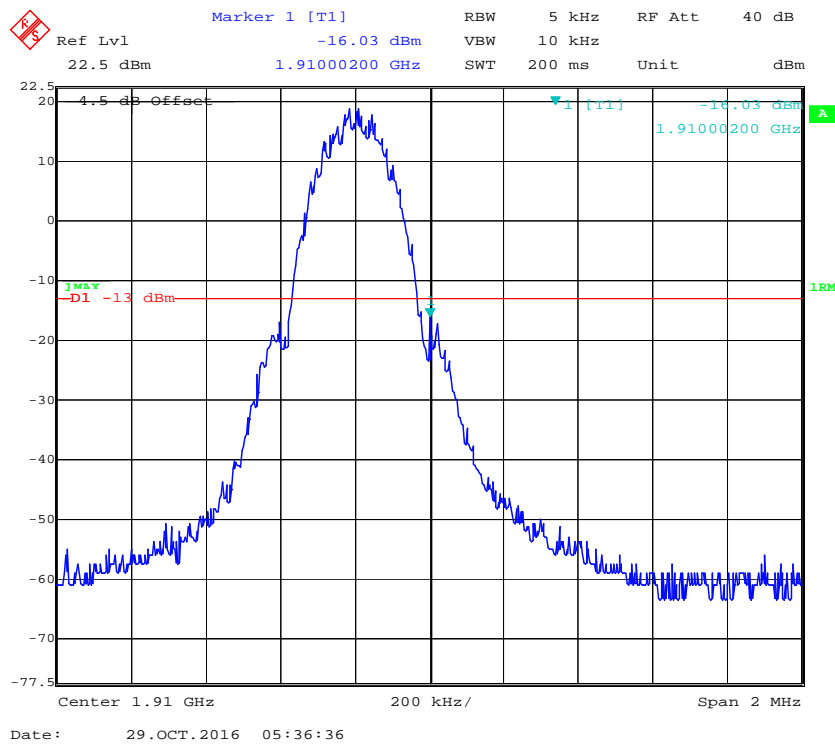
### Cellular Band, Right Band Edge for HSUPA (BPSK) Mode



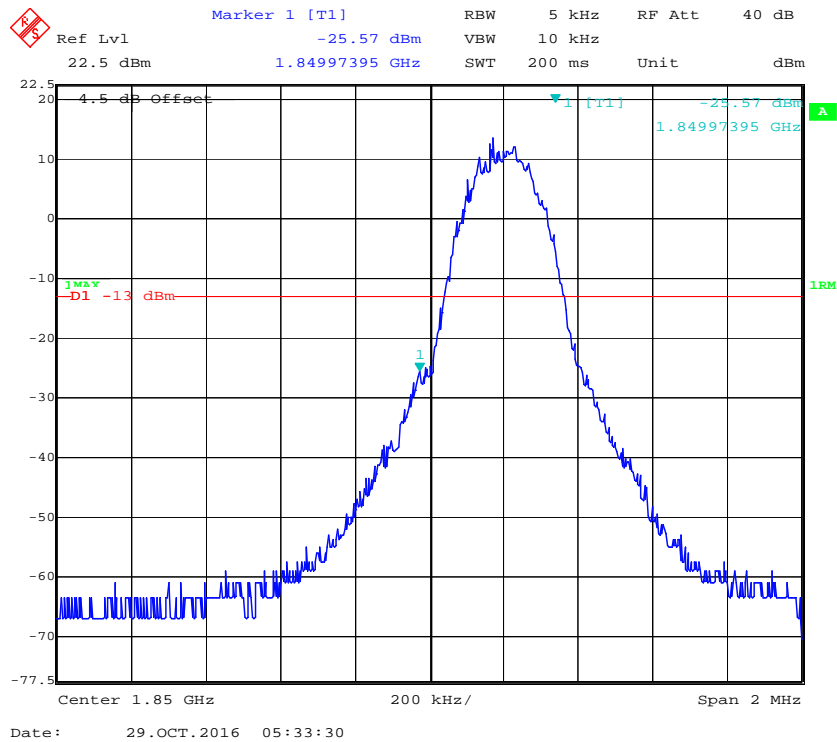
### PCS Band, Left Band Edge for GSM (GMSK) Mode



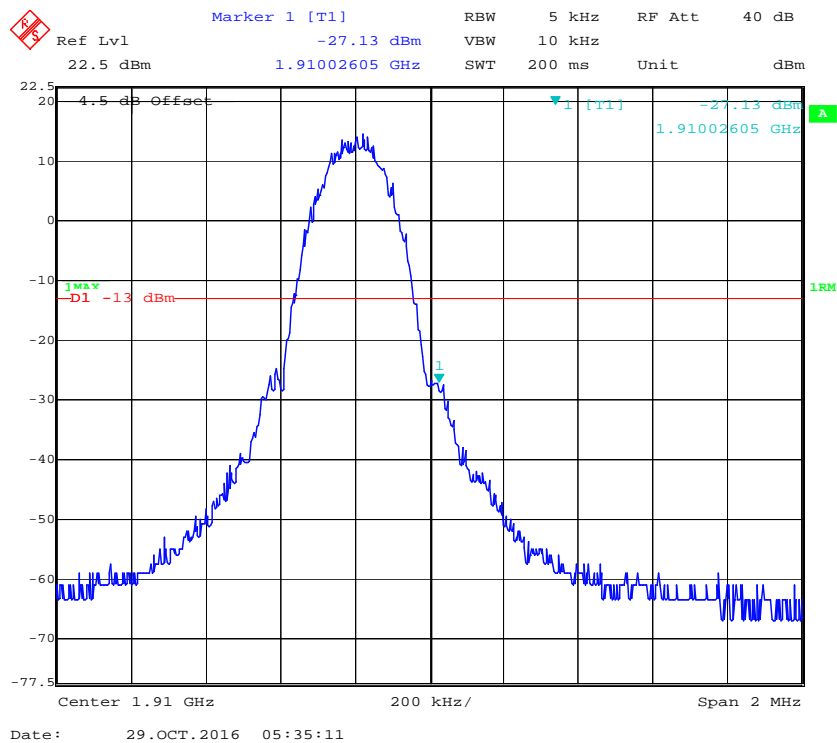
### PCS Band, Right Band Edge for GSM (GMSK) Mode



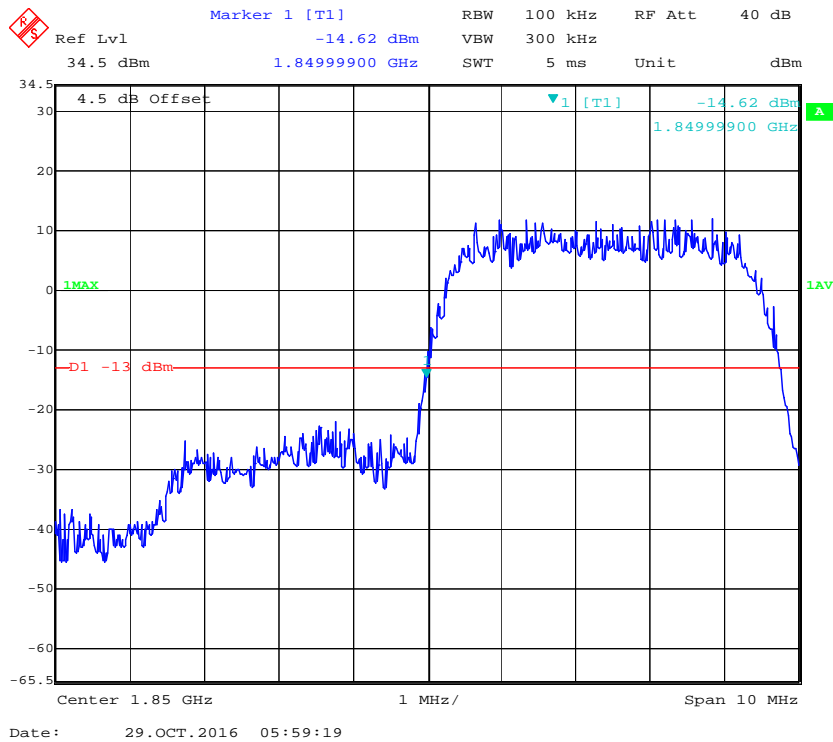
### PCS Band, Left Band Edge for EGPRS Mode



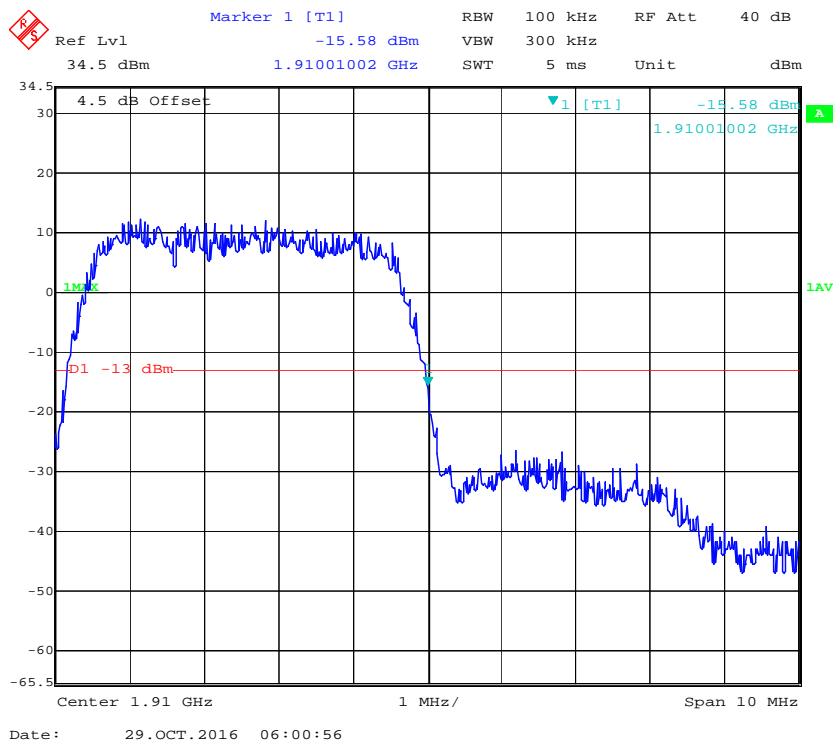
### PCS Band, Right Band Edge for EGPRS Mode



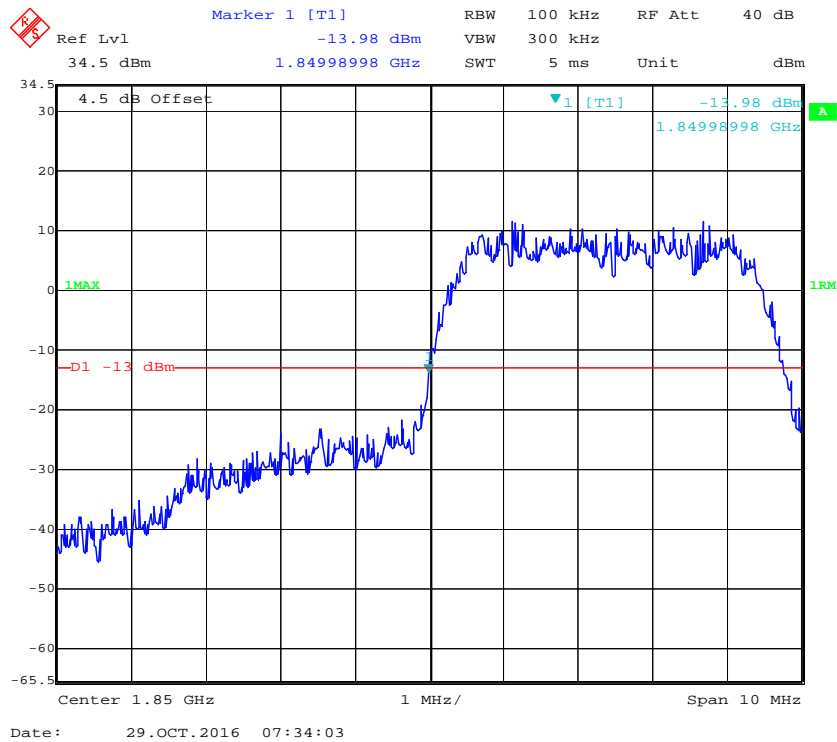
### PCS Band, Left Band Edge for RMC (BPSK) Mode



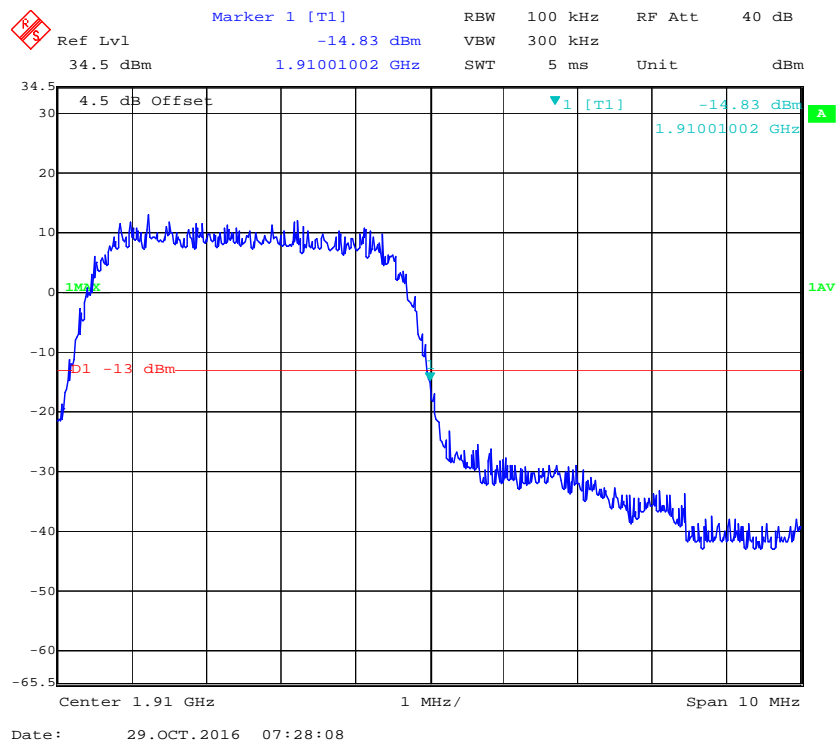
### PCS Band, Right Band Edge for RMC (BPSK) Mode



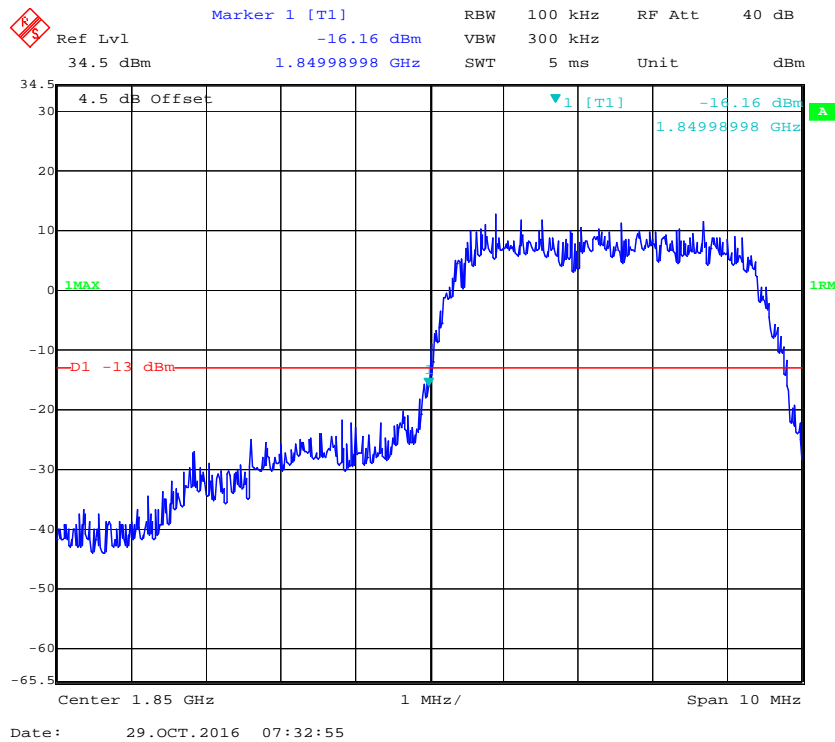
### PCS Band, Left Band Edge for HSDPA (16QAM) Mode



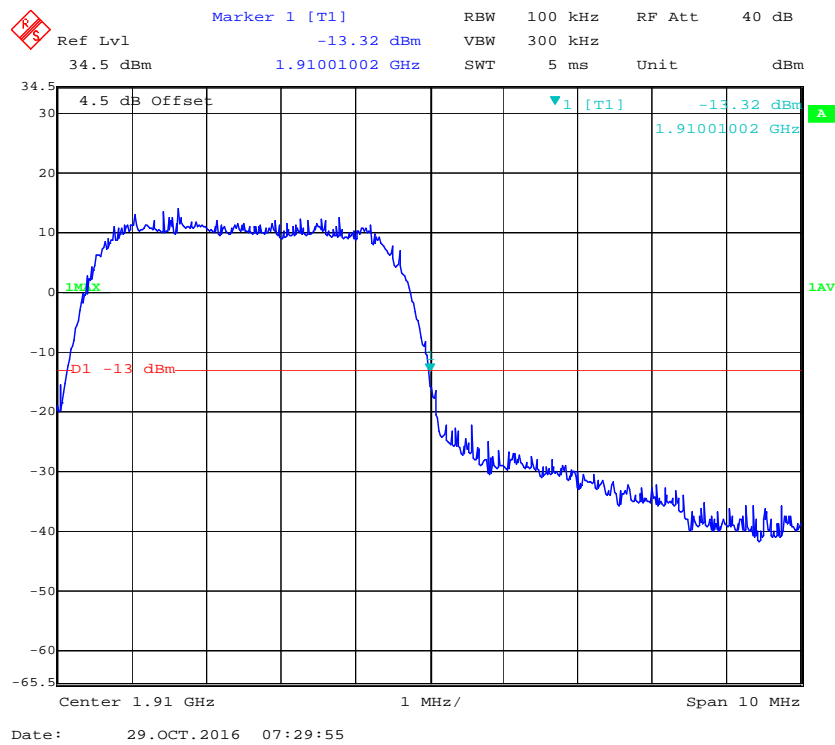
### PCS Band, Right Band Edge for HSDPA (16QAM) Mode



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

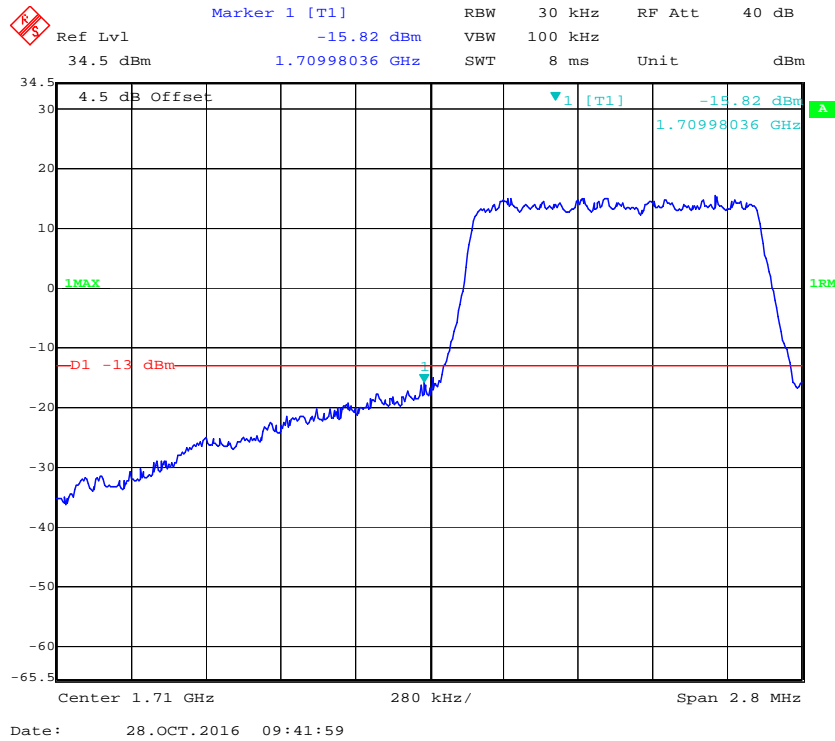


### PCS Band, Right Band Edge for HSUPA (BPSK) Mode

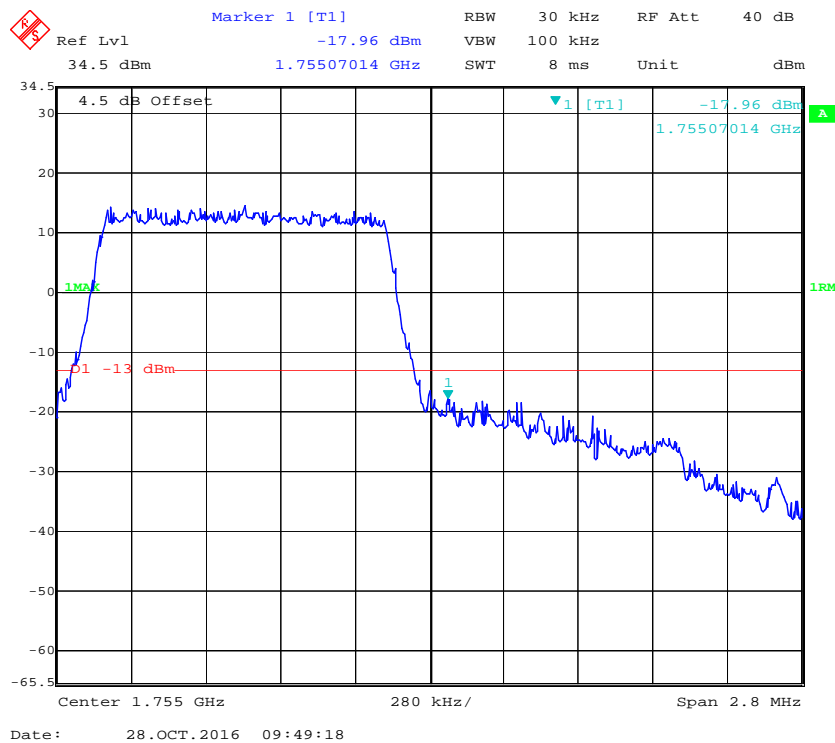


**Band 4:**

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

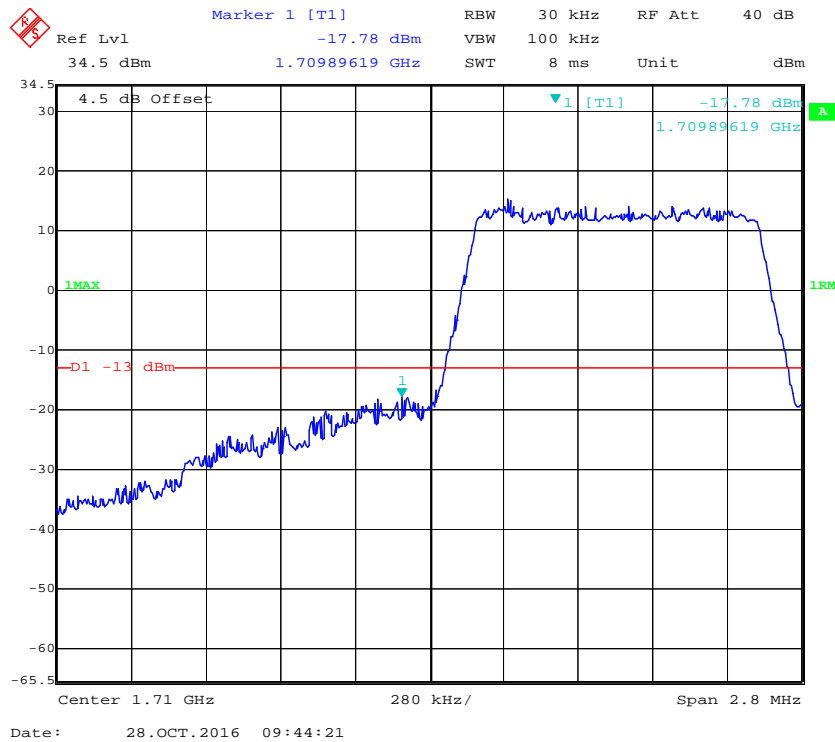


**QPSK (1.4 MHz, FULL RB) - Right Band Edge**

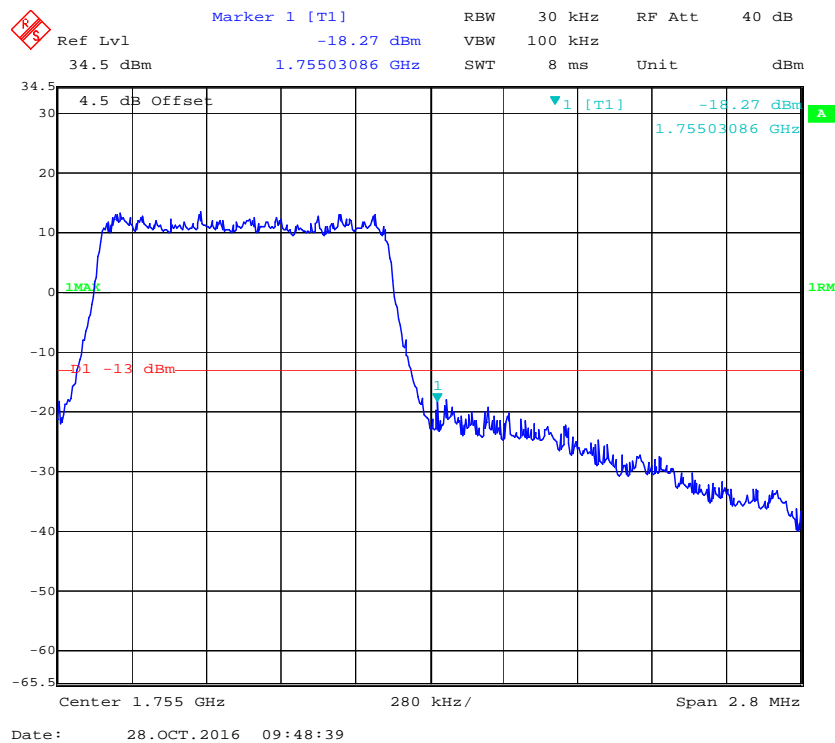




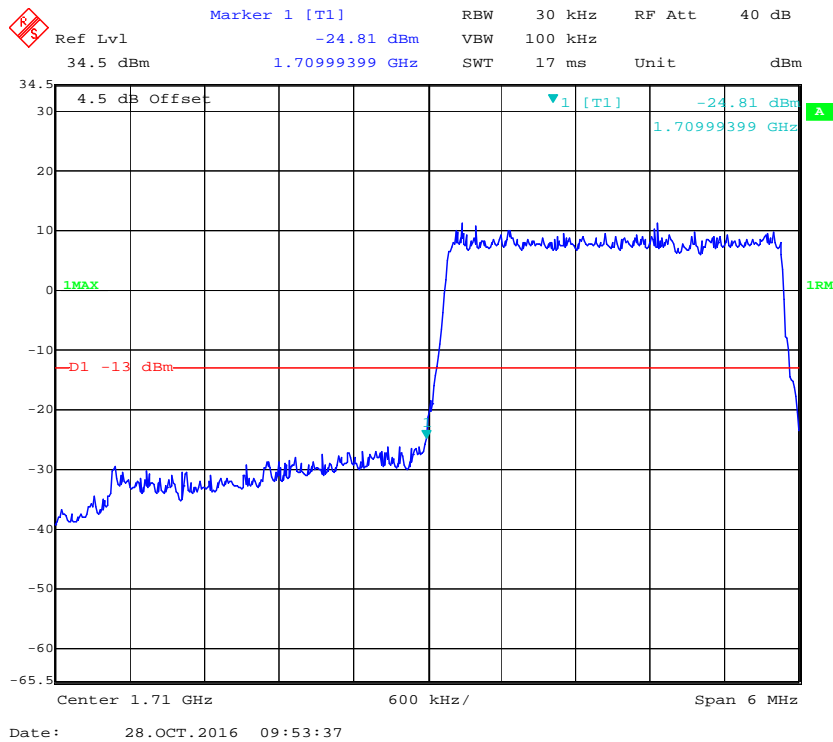
### 16-QAM (1.4 MHz, FULL RB) - Left Band Edge



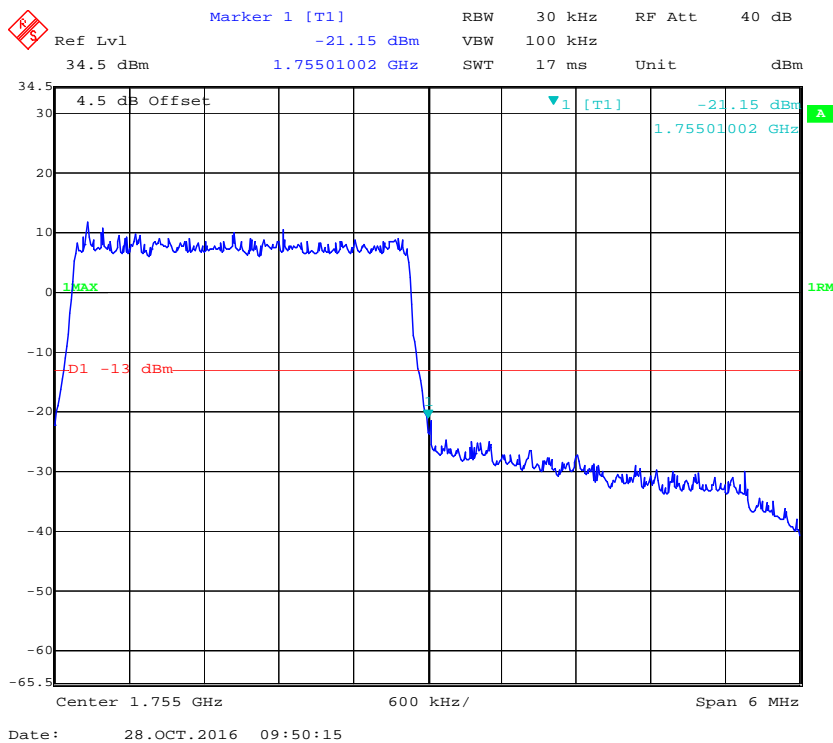
### 16-QAM (1.4 MHz, FULL RB) - Right Band Edge



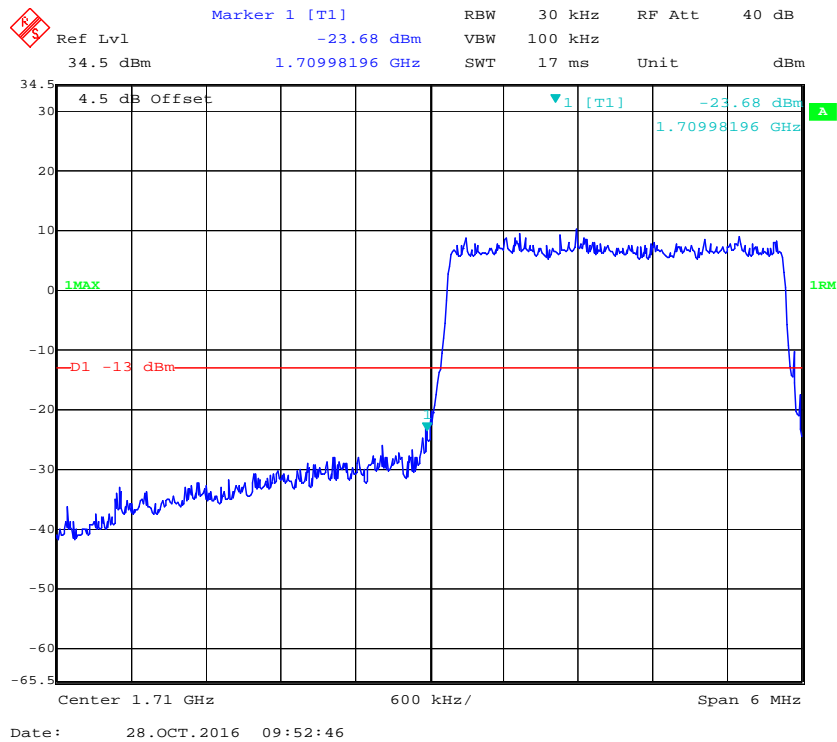
### QPSK (3.0 MHz, FULL RB) - Left Band Edge



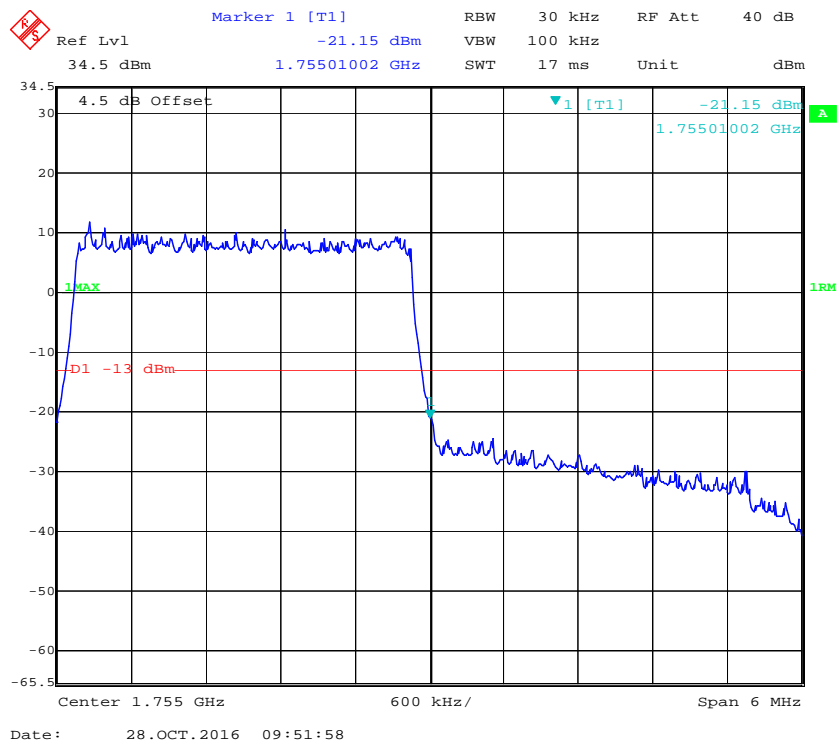
### QPSK (3.0 MHz, FULL RB) - Right Band Edge



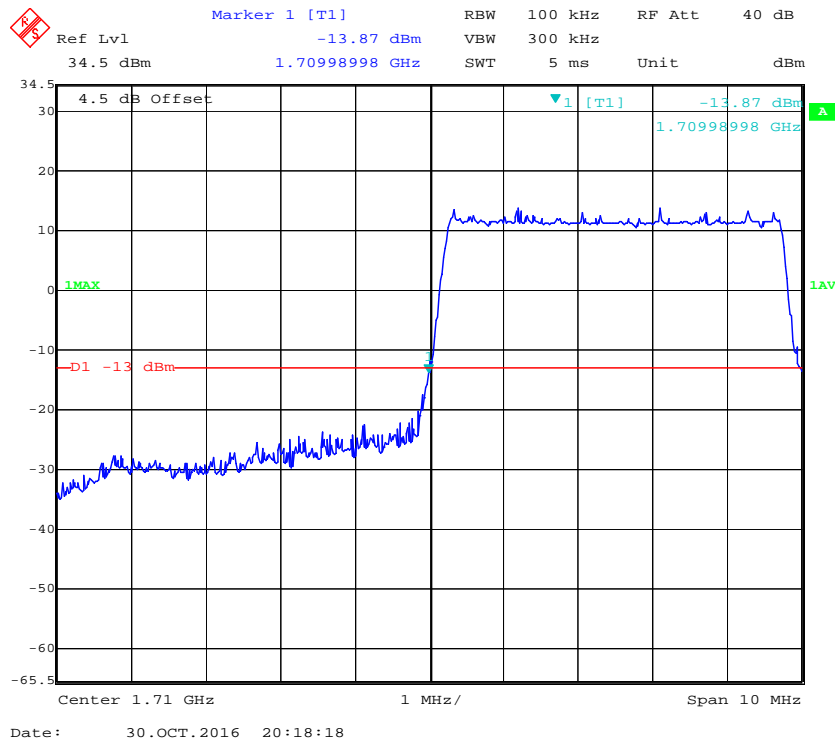
### 16-QAM (3.0 MHz, FULL RB) - Left Band Edge



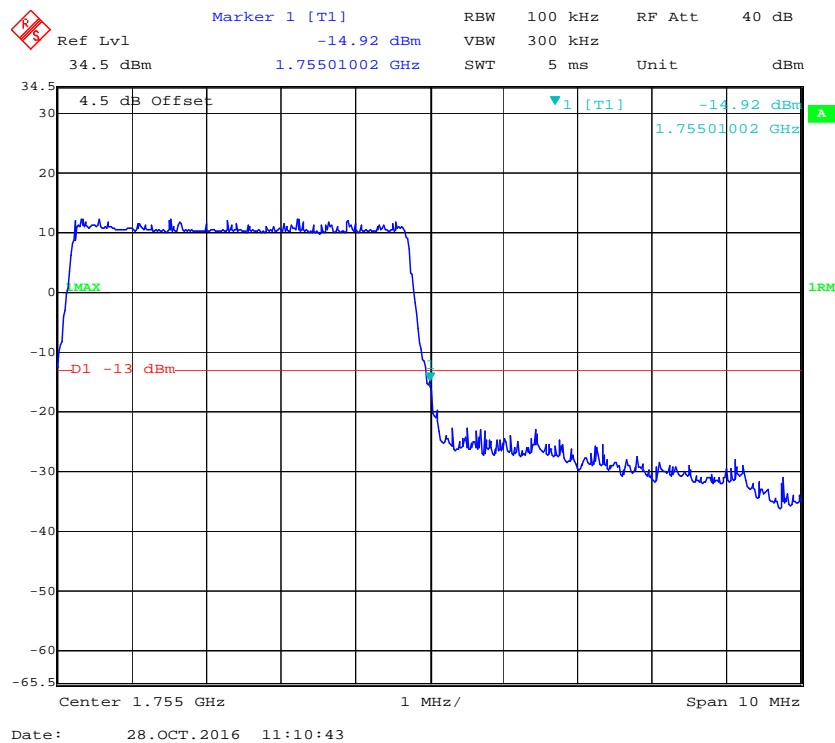
### 16-QAM (3.0 MHz, FULL RB) - Right Band Edge



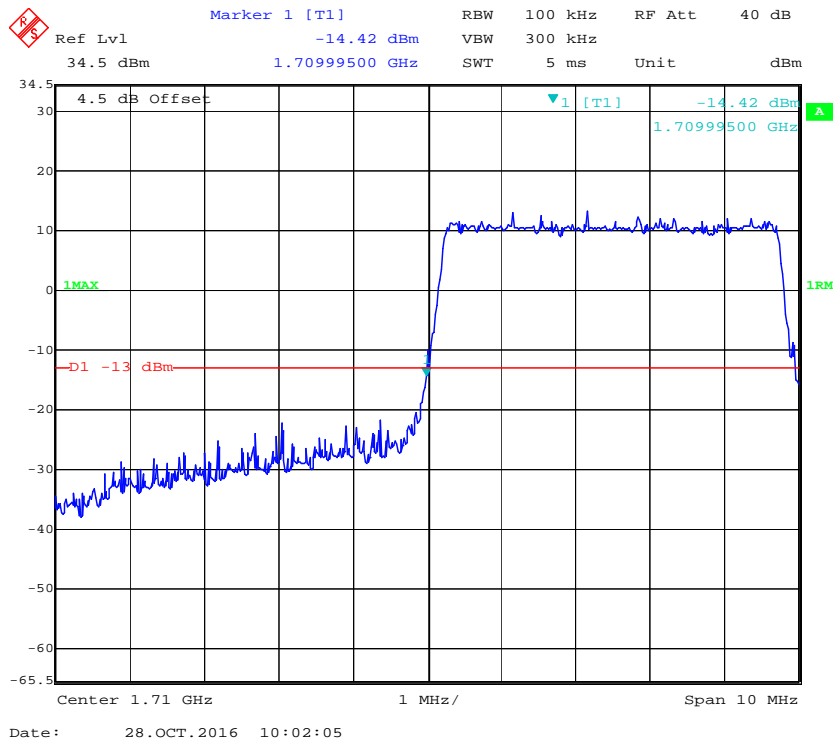
### QPSK (5.0 MHz, FULL RB) - Left Band Edge



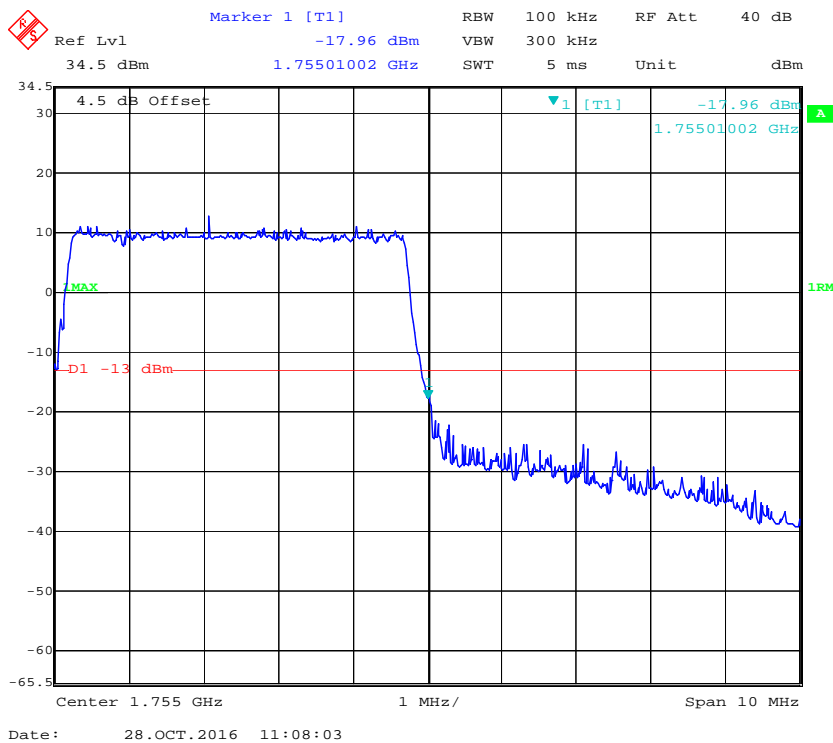
### QPSK (5.0 MHz, FULL RB) - Right Band Edge



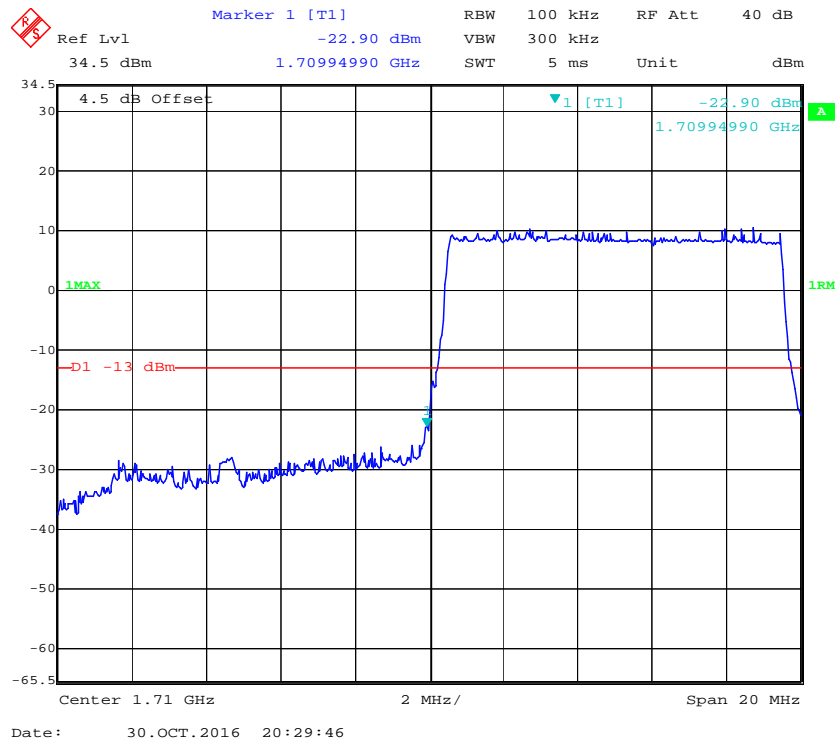
### 16-QAM (5.0 MHz, FULL RB) - Left Band Edge



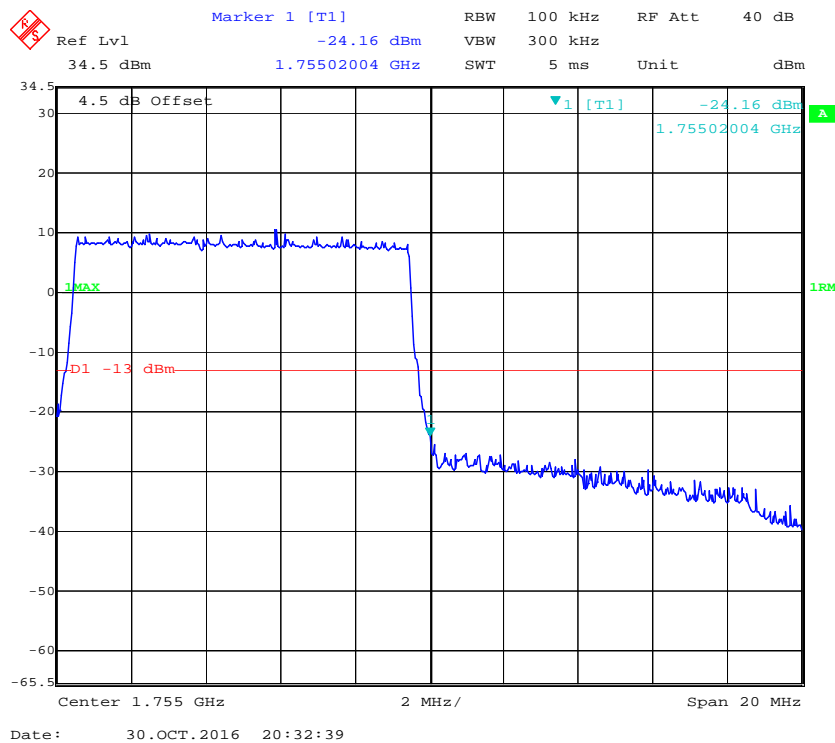
### 16-QAM (5.0 MHz, FULL RB) - Right Band Edge



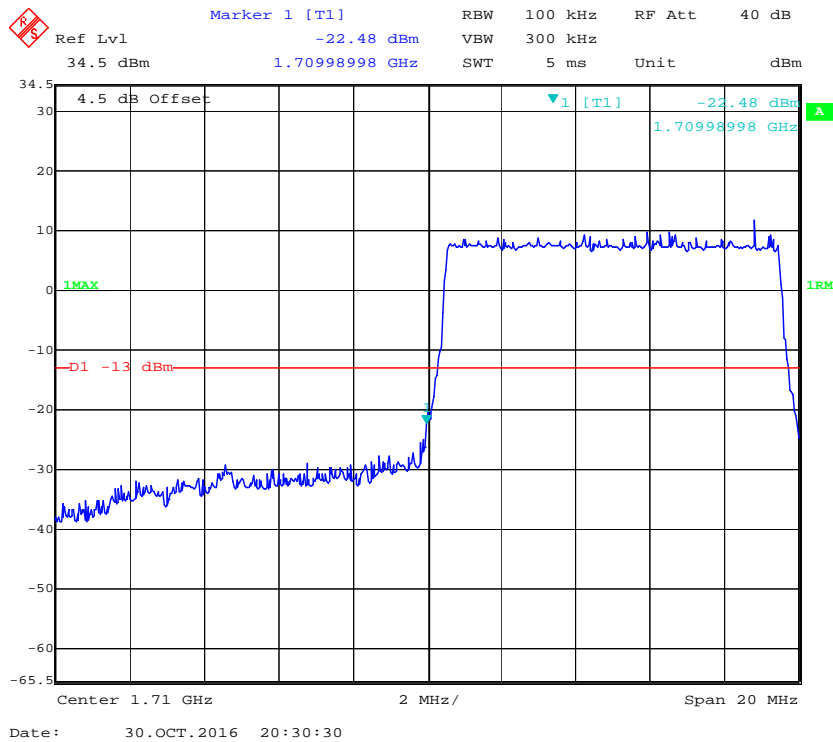
### QPSK (10.0 MHz, FULL RB) - Left Band Edge



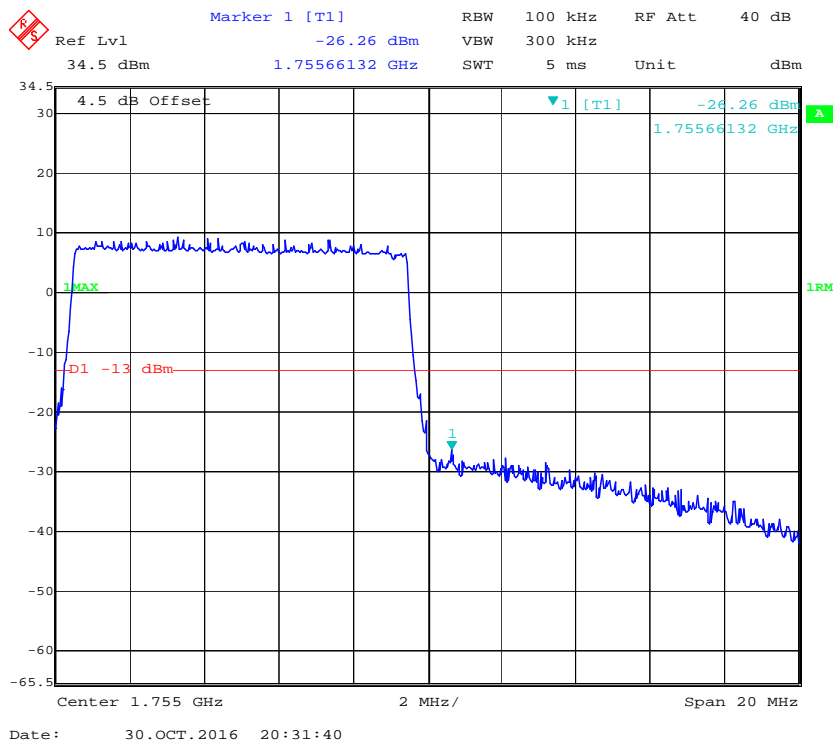
### QPSK (10.0 MHz, FULL RB) - Right Band Edge



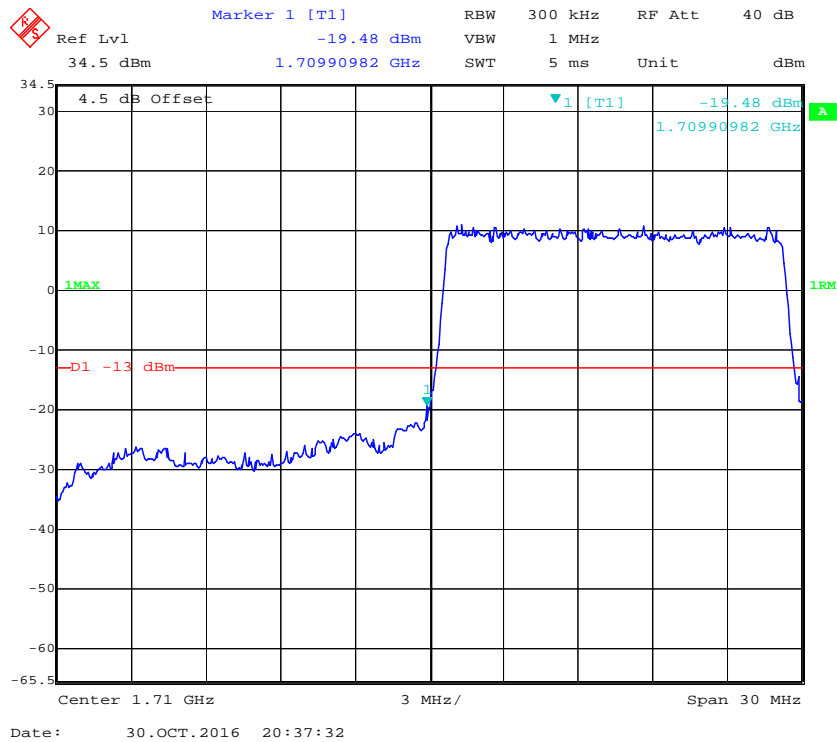
### 16-QAM (10.0 MHz, FULL RB) - Left Band Edge



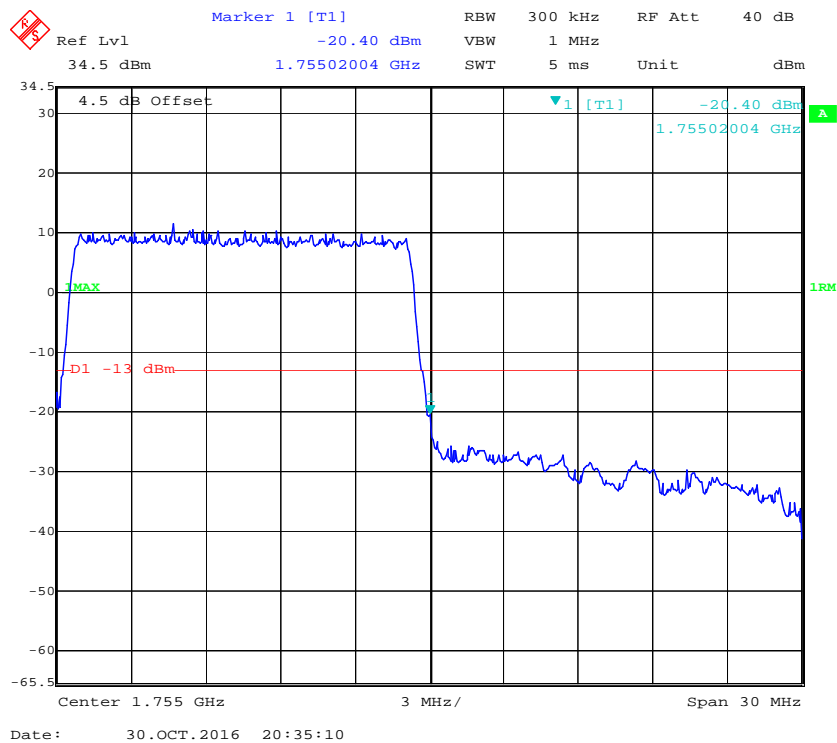
### 16-QAM (10.0 MHz, FULL RB) - Right Band Edge



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

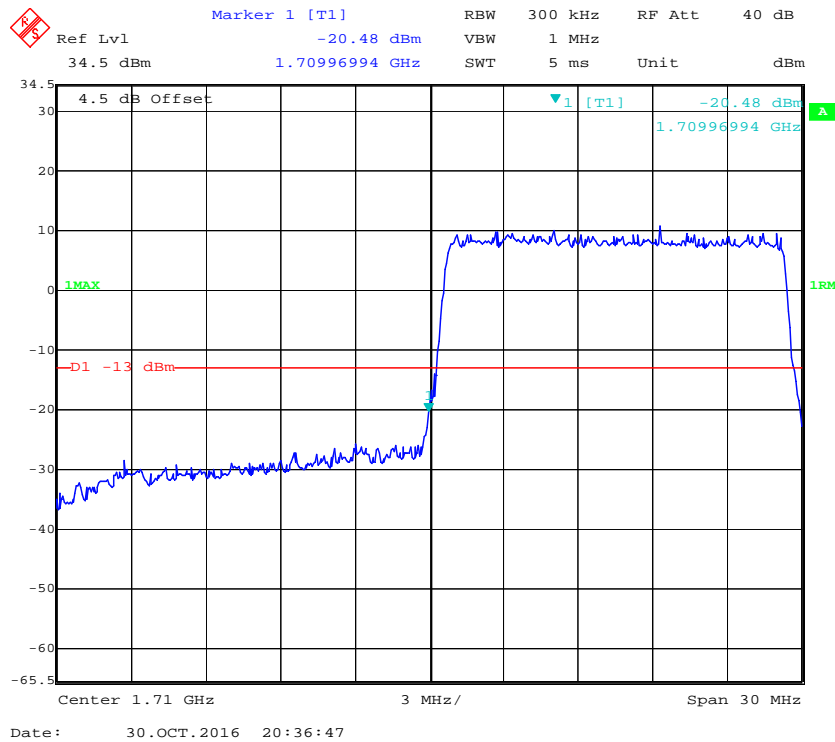


### QPSK (15.0 MHz, FULL RB) - Right Band Edge

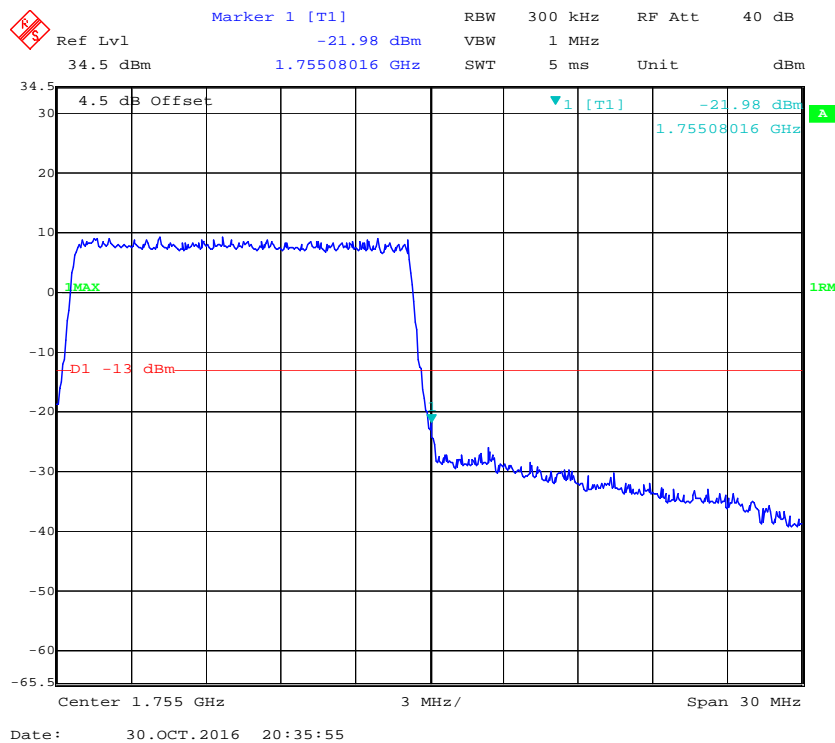




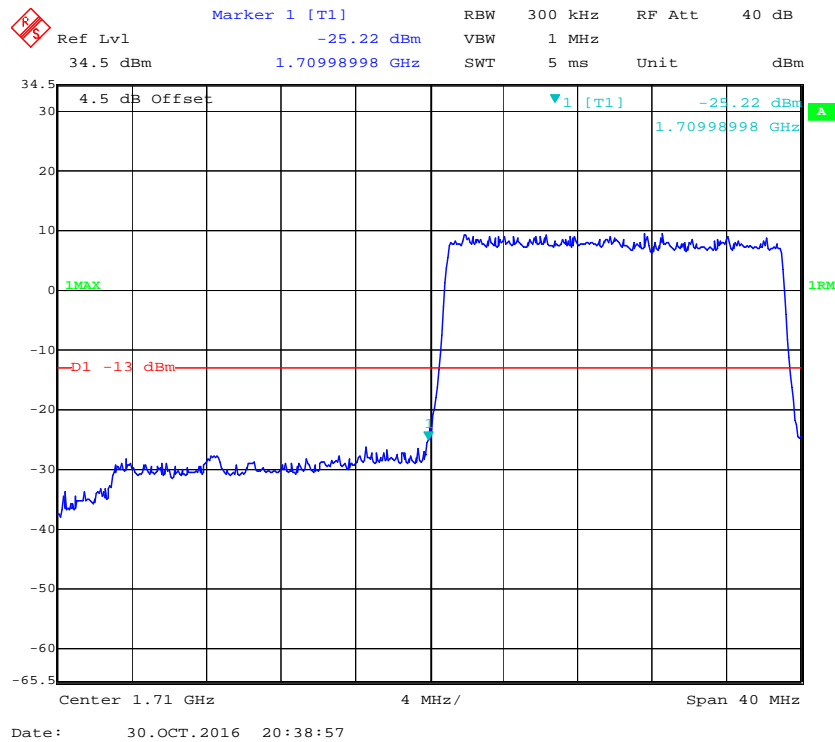
### 16-QAM (15.0 MHz, FULL RB) - Left Band Edge



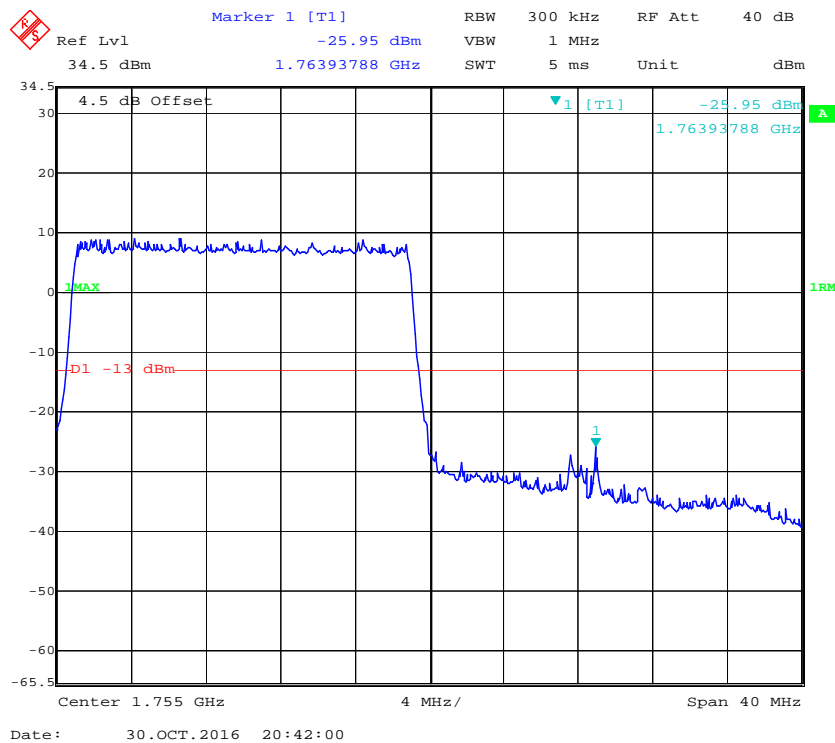
### 16-QAM (15.0 MHz, FULL RB) - Right Band Edge



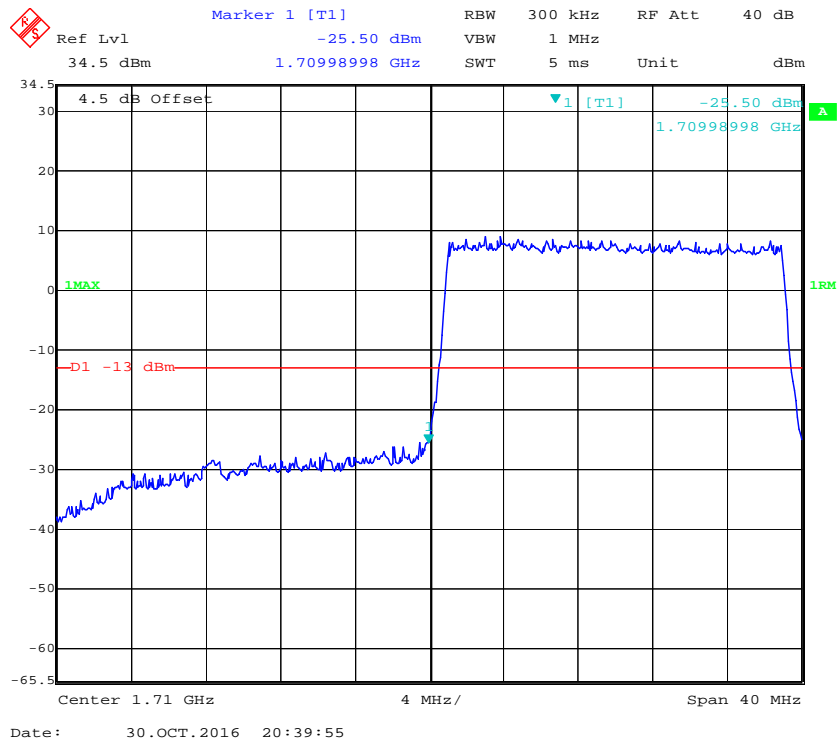
### QPSK (20.0 MHz, FULL RB) - Left Band Edge



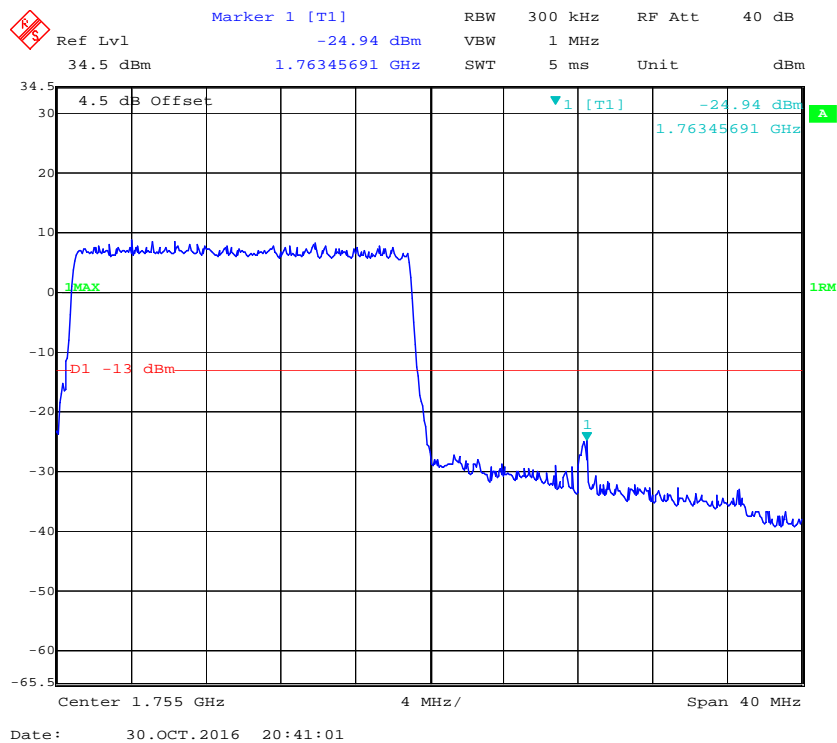
### QPSK (20.0 MHz, FULL RB) - Right Band Edge



### 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 Standards**

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**

<b>Frequency Range (MHz)</b>	<b>Base, fixed (ppm)</b>	<b>Mobile &gt; 3 watts (ppm)</b>	<b>Mobile ≤ 3 watts (ppm)</b>
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

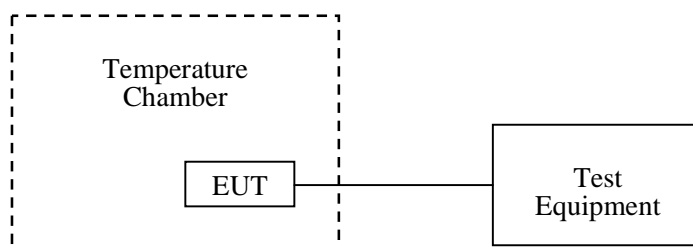
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

### **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**

<b>Temperature:</b>	23 °C
<b>Relative Humidity:</b>	53 %
<b>ATM Pressure:</b>	101.0 kPa

*The testing was performed by Peter Jiang on 2016-11-06.*

*EUT operation mode: Transmitting*

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

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

Middle Channel, $f_0=836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	-2	-0.0011	2.5
-20		2	0.0011	2.5
-10		-5	-0.0027	2.5
0		-2	-0.0011	2.5
10		-2	-0.0011	2.5
20		-1	-0.0005	2.5
30		-2	-0.0011	2.5
40		2	0.0011	2.5
50		-2	-0.0011	2.5
25	V min.= 3.5	-1	-0.0005	2.5
	V max.= 4.2	1	0.0005	2.5

**EDGE Mode**

Middle Channel, $f_0=836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.7	5	0.0027	2.5
-20		7	0.0037	2.5
-10		5	0.0027	2.5
0		4	0.0021	2.5
10		5	0.0027	2.5
20		3	0.0036	2.5
30		3	0.0016	2.5
40		5	0.0027	2.5
50		6	0.0032	2.5
25	V min.= 3.5	7	0.0037	2.5
	V max.= 4.2	8	0.0043	2.5

**WCDMA Mode**

Middle Channel, $f_0 = 836.6$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-20	3.7	-4	-0.005	2.5
-10		-3	-0.004	2.5
0		-9	-0.011	2.5
10		-5	-0.006	2.5
20		-3	-0.0036	2.5
30		-2	-0.002	2.5
40		3	0.004	2.5
50		2	0.002	2.5
25	V min.= 3.5	4	0.005	2.5
	V max.= 4.2	5	0.006	2.5

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

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	-2	-0.0011	pass
-20		2	0.0011	pass
-10		-5	-0.0027	pass
0		-2	-0.0011	pass
10		-2	-0.0011	pass
20		-3	-0.0016	pass
30		-2	-0.0011	pass
40		2	0.0011	pass
50		-2	-0.0011	pass
25	V min.= 3.5	-1	-0.0005	pass
	V max.= 4.2	1	0.0005	pass

**EDGE Mode**

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	5	0.0027	pass
-20		7	0.0037	pass
-10		5	0.0027	pass
0		4	0.0021	pass
10		5	0.0027	pass
20		6	0.0032	pass
30		3	0.0016	pass
40		5	0.0027	pass
50		6	0.0032	pass
25	V min.= 3.5	7	0.0037	pass
	V max.= 4.2	8	0.0043	pass

**WCDMA Mode**

Middle Channel, $f_0 = 1880.0$ MHz				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-20	3.7	-2	-0.0011	pass
-10		2	0.0011	pass
0		-4	-0.0021	pass
10		-2	-0.0011	pass
20		0	0.0000	pass
30		-3	-0.0016	pass
40		-3	-0.0016	pass
50		-1	-0.0005	pass
25	V min.= 3.5	-2	-0.0011	pass
	V max.= 4.2	-1	-0.0005	pass



**Band 4:**

20.0 MHz Middle Channel, $f_0$ = 1732.5 MHz (QPSK)				
Temperature (°C)	Power Supplied (V <sub>DC</sub> )	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.7	12	0.00693	pass
-20		11	0.00635	pass
-10		4	0.00231	pass
0		2	0.00115	pass
10		4	0.00231	pass
20		6	0.00346	pass
30		2	0.00115	pass
40		10	0.00577	pass
50		11	0.00635	pass
25	V min.= 3.5	12	0.00693	pass
25	V max.= 4.35	11	0.00635	pass

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