

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

For

VIRTUAL TRUNK PTE LTD

12 Kallang Avenue The Annex #04-30 Aperia, Singapore 339511

FCC ID: 2AKDA-VT36

Report Type: Original Report	Product Type: IP WALKIE TALKIE
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Report Number: RKSA170915005-00E	
Report Date: 2017-12-06	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	VIRTUAL TRUNK PTE LTD
Tested Model	VT36
Product Type	IP WALKIE TALKIE
Dimension	26.5 mm(L)×61.5 mm(W)×119.5 mm(H)
Power Supply	IP Walkie Talkie: DC 3.8V from battery and DC 5.0V charging by adapter Desktop Charger: DC 5.0V charging by adapter

Adapter Information:

Model: K2001U-1004UL

Input: AC 100-240V, 50/60 Hz, 0.35A Max

Output: DC 5V, 2000mA

**All measurement and test data in this report was gathered from production sample serial number: 20170915005.
(Assigned by the BACL. The EUT supplied by the applicant was received on 2017-09-15)*

Objective

This type approval report is prepared on behalf of VIRTUAL TRUNK PTE LTD 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 15.247 DTS and Part 15.247 DSS submissions with FCC ID: 2AKDA-VT36.

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 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
RF conducted test with spectrum		0.9dB
RF Output Power with Power meter		0.5dB
Radiated emission	30MHz~1GHz	6.05dB
	1GHz~6GHz	4.48dB
	6GHz~18GHz	5.22dB
Occupied Bandwidth		0.5kHz
Frequency Stability		1Hz
Temperature		1.0°C
Humidity		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) Lab is accredited to ISO/IEC 17025 by A2LA (Lab code: 4323.01) and the FCC designation No. CN1185 under the FCC KDB 974614 D01. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

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.

Channel List

Mode		Channel		Frequency
GSM/GPRS/EDGE 850		Low	128	824.2
		Middle	190	836.6
		High	251	848.8
PCS/GPRS/EDGE 1900		Low	512	1850.2
		Middle	661	1880.0
		High	810	1909.8
WCDMA Band II		Low	9262	1852.4
		Middle	9400	1880.0
		High	9538	1907.6
WCDMA Band V		Low	4132	826.4
		Middle	4182	836.4
		High	4233	846.6
LTE Band 5	1.4M	Low	20407	824.7
		Middle	20525	836.5
		High	20643	848.3
	3M	Low	20415	825.5
		Middle	20525	836.5
		High	20635	847.5
	5M	Low	20425	826.5
		Middle	20525	836.5
		High	20625	846.5
	10M	Low	20450	829.0
		Middle	20525	836.5
		High	20600	844.0

Mode		Channel		Frequency
LTE Band 7	5M	Low	20775	2502.5
		Middle	21100	2535.0
		High	21425	2567.5
	10M	Low	20800	2505.0
		Middle	21100	2535.0
		High	21400	2565.0
	15M	Low	20825	2507.5
		Middle	21100	2535.0
		High	21375	2562.5
	20M	Low	20850	2510.0
		Middle	21100	2535.0
		High	21350	2560.0
LTE Band 41	5M	Low	40265	2557.5
		Middle	40740	2605.0
		High	41215	2652.5
	10M	Low	40290	2560.0
		Middle	40740	2605.0
		High	41190	2650.0
	15M	Low	40315	2562.5
		Middle	40740	2605.0
		High	41165	2647.5
	20M	Low	40340	2565.0
		Middle	40740	2605.0
		High	41140	2645.0

Equipment Modifications

No modifications were made to the EUT.

Support Equipment List and Details

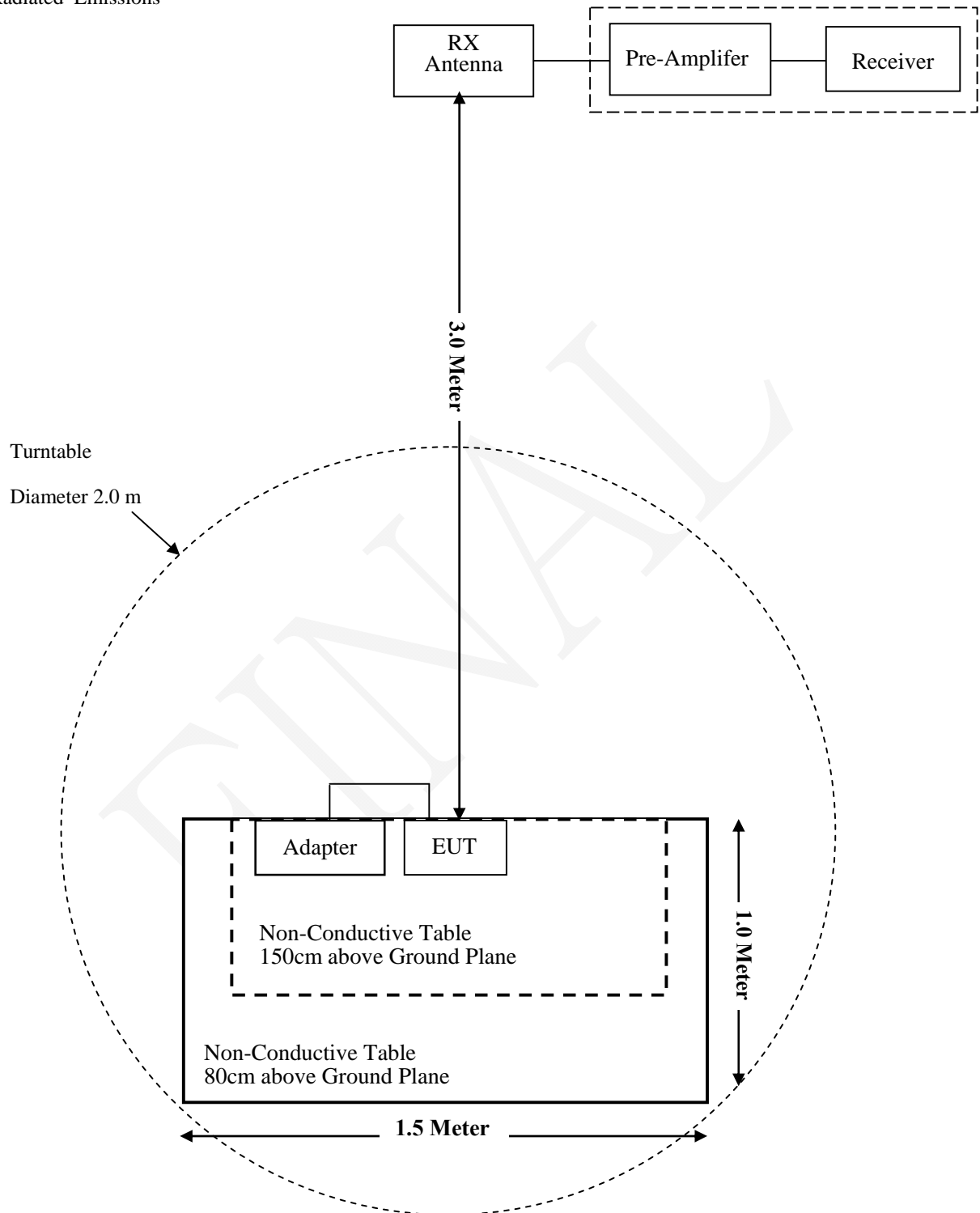
Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478

External Cable List and Details

Cable Description	Shielding Type	Length (m)	From Port	To
USB Cable	Unshielding	0.8	EUT	Adapter

Block Diagram of Test Setup

For Radiated Emissions



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 (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 (m)	Spurious Emissions at Antenna Terminal	Compliance
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53 (m)	Spurious Radiated Emissions	Compliance
§ 22.917 (a); § 24.238 (a); §27.53 (m)	Band Edge	Compliance
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	Compliance

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test (Chamber 1#)					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
HP	Signal Generator	HP 8341B	2624A00116	2017-08-29	2018-08-28
Sunol Sciences	Broadband Antenna	JB3	A040914-2	2016-01-09	2019-01-08
Sunol Sciences	Broadband Antenna	JB3	A090314-2	2016-01-09	2019-01-08
Sonoma Instrument	Pre-amplifier	310N	171205	2017-08-15	2018-08-14
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-8	008	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-9	009	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-10	010	2017-08-15	2018-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21
Radiated Emission Test (Chamber 2#)					
Rohde & Schwarz	EMI Test Receiver	ESU40	100207	2017-08-27	2018-08-26
HP	Signal Generator	HP 8341B	2624A00116	2017-08-29	2018-08-28
ETS-LINDGREN	Horn Antenna	3115	9311-4159	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3115	6229	2016-01-11	2019-01-10
ETS-LINDGREN	Horn Antenna	3116	00084159	2016-12-12	2019-12-12
ETS-LINDGREN	Horn Antenna	3116	2516	2016-12-12	2019-12-12
Narda	Pre-amplifier	AFS42-00101800	2001270	2016-12-12	2017-12-11
Heatsink Required	Amplifier	QLW-18405536-J0	15964001009	2016-12-12	2017-12-11
Rohde & Schwarz	Auto test Software	EMC32	100361	/	/
MICRO-COAX	Coaxial Cable	Cable-6	006	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-11	011	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-12	012	2017-08-15	2018-08-14
MICRO-COAX	Coaxial Cable	Cable-13	013	2017-08-15	2018-08-14
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2017-09-21	2018-09-20
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication Tester	CMW500	104478	2017-07-22	2018-07-21
BACL	Temperature & Humidity Chamber	BTH-150	30023	2016-10-10	2017-10-09
EAST	Regulated DC Power Supply	MCH-303D-II	14070562	/	/
Agilent	Power Meter	N1912A	MY5000492	2016-12-12	2017-12-11
Agilent	Power Sensor	N1921A	MY54210024	2016-12-12	2017-12-11
VIRTUAL	RF Cable	/	/	/	/

* **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(b) & §2.1093 - RF EXPOSURE INFORMATION

Applicable Standard

FCC§1.1307,§2.1093.

Test Result

Compliance, please refer to the SAR report: RSH170921050-20.

FINAL

FCC §2.1047 - MODULATION CHARACTERISTIC

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

FINAL

§2.1046; § 22.913 (a);§ 24.232 (c); §27.50 (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 FCC §27.50 (h) The following power limits shall apply in the BRS and EBS:

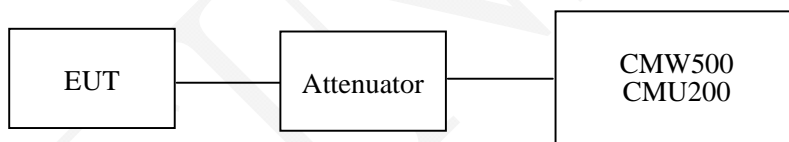
(2) Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Equipment employed must be authorized in accordance with the provisions of §24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

Test Procedure

Conducted method:

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

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

Temperature:	23.4°C
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Chris Wang on 2017-10-10.

Conducted Power:**GSM 850 Band**

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	31.73	38.45
	190	836.6	31.78	38.45
	251	848.8	31.81	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	31.65	29.75	27.96	27.05	38.45
	190	836.6	31.72	29.81	27.99	27.09	38.45
	251	848.8	31.75	29.85	28.05	27.12	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	25.55	23.46	21.38	19.62	38.45
	190	836.6	25.61	23.53	21.52	19.72	38.45
	251	848.8	25.62	23.55	21.45	19.71	38.45

WCDMA Band V

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
				826.4	836.4	846.6
WCDMA (Band V)	Normal	Rel 99	1	23.40	23.57	23.41
			1	23.32	23.63	23.27
		HSDPA	2	23.37	23.53	22.92
			3	23.33	23.46	22.91
			4	23.39	23.10	22.69
			1	23.28	23.24	22.86
		HSUPA	2	23.43	23.28	22.83
			3	23.23	23.53	23.17
			4	23.30	23.21	22.91
			5	23.14	23.43	22.79
			1	23.26	23.18	22.99
		DC-HSDPA	2	23.27	23.09	22.98
			3	23.22	23.21	22.76
			4	23.31	23.16	22.85
			1	23.20	23.13	22.93
		HSPA+	1	23.20	23.13	22.93

PCS 1900 Band

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.85	33
	661	1880.0	28.92	33
	810	1909.8	29.01	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.75	26.87	24.84	24.05	33
	661	1880.0	28.89	26.94	24.96	24.15	33
	810	1909.8	29.16	27.21	25.18	24.31	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	24.99	22.81	20.68	18.55	33
	661	1880.0	24.81	22.67	20.58	18.46	33
	810	1909.8	24.72	22.55	20.29	18.18	33

WCDMA Band II

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA (Band II)	Normal	Rel 99	1	23.42	23.96	24.07
		HSDPA	1	23.41	23.79	24.22
			2	23.09	23.04	22.78
			3	22.90	22.90	23.02
			4	22.77	22.77	22.81
		HSUPA	1	22.79	22.94	22.80
			2	22.77	23.00	22.74
			3	22.77	23.01	22.66
			4	22.90	22.46	22.75
			5	22.87	22.95	22.59
		DC-HSDPA	1	22.87	22.76	22.72
			2	22.85	22.75	22.70
			3	22.79	22.81	22.75
			4	22.88	22.72	22.71
		HSPA+	1	22.99	22.85	22.60

Maximum Output Power:**LTE Band 5**

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
1.4M	QPSK	1#0	22.01	22.52	22.39	38.45
		1#3	22.00	22.47	22.46	
		1#5	22.08	22.40	22.52	
		3#0	21.74	22.19	22.05	
		3#1	21.81	22.22	21.97	
		3#3	21.86	22.31	21.91	
		6#0	21.46	21.86	21.74	
	16-QAM	1#0	21.85	21.96	21.91	
		1#3	21.78	21.92	21.96	
		1#5	21.73	21.98	22.00	
		3#0	21.59	21.64	21.62	
		3#1	21.67	21.74	21.58	
		3#3	21.64	21.70	21.48	
		6#0	21.26	21.33	21.29	
3M	QPSK	1#0	22.99	23.30	23.44	38.45
		1#7	22.91	23.22	23.35	
		1#14	22.92	23.28	23.41	
		8#0	22.74	23.19	23.22	
		8#4	22.72	23.15	23.19	
		8#7	22.71	23.22	23.29	
		15#0	22.48	22.87	22.97	
	16-QAM	1#0	22.78	22.99	23.13	
		1#7	22.87	22.89	23.13	
		1#14	22.88	22.81	23.13	
		8#0	22.54	22.69	22.82	
		8#4	22.62	22.65	22.91	
		8#7	22.58	22.57	22.94	
		15#0	22.26	22.38	22.55	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	23.54	23.52	23.63	38.45
		1#12	23.48	23.45	23.60	
		1#24	23.45	23.49	23.70	
		12#0	23.16	23.13	23.22	
		12#6	23.13	23.06	23.24	
		12#11	23.04	23.09	23.31	
		25#0	22.74	22.76	22.84	
	16-QAM	1#0	23.31	23.26	23.38	
		1#12	23.37	23.33	23.47	
		1#24	23.38	23.41	23.46	
		12#0	22.95	23.01	22.97	
		12#6	22.86	23.04	22.89	
		12#11	22.76	23.14	22.93	
		25#0	22.70	22.76	22.72	
10M	QPSK	1#0	22.11	22.63	22.24	38.45
		1#24	22.08	22.53	22.22	
		1#49	22.16	22.50	22.31	
		25#0	21.84	22.32	21.96	
		25#12	21.90	22.41	22.02	
		25#24	21.98	22.49	21.92	
		50#0	21.55	22.03	21.76	
	16-QAM	1#0	21.78	22.32	21.95	
		1#24	21.85	22.31	21.87	
		1#49	21.91	22.25	21.88	
		25#0	21.51	22.10	21.68	
		25#12	21.58	22.20	21.60	
		25#24	21.57	22.23	21.51	
		50#0	21.26	21.85	21.53	

LTE Band 7

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	22.36	22.51	22.67	33
		1#12	22.43	22.44	22.58	
		1#24	22.44	22.35	22.61	
		12#0	22.06	22.22	22.36	
		12#6	21.99	22.16	22.33	
		12#11	22.08	22.06	22.39	
		25#0	21.78	21.94	21.86	
	16-QAM	1#0	21.89	22.04	22.20	
		1#12	21.97	22.09	22.22	
		1#24	22.01	22.03	22.25	
		12#0	21.64	21.79	21.96	
		12#6	21.64	21.77	22.02	
		12#11	21.60	21.80	21.92	
		25#0	21.35	21.50	21.62	
10M	QPSK	1#0	22.51	22.62	22.65	33
		1#24	22.59	22.68	22.56	
		1#49	22.59	22.77	22.63	
		25#0	22.13	22.22	22.28	
		25#12	22.19	22.22	22.31	
		25#24	22.19	22.30	22.37	
		50#0	21.65	21.68	21.64	
	16-QAM	1#0	21.56	21.68	21.46	
		1#24	21.66	21.72	21.37	
		1#49	21.73	21.69	21.36	
		25#0	21.36	21.43	21.44	
		25#12	21.30	21.42	21.44	
		25#24	21.28	21.32	21.51	
		50#0	20.79	20.84	20.85	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
15M	QPSK	1#0	22.25	22.24	22.29	33
		1#37	22.18	22.25	22.20	
		1#74	22.18	22.25	22.18	
		36#0	22.12	22.10	22.16	
		36#17	22.04	22.02	22.10	
		36#35	22.04	21.92	22.19	
		75#0	21.65	21.52	21.56	
	16-QAM	1#0	22.06	22.02	22.06	
		1#37	22.06	21.97	22.07	
		1#74	22.16	21.98	21.99	
		36#0	21.76	21.77	21.83	
		36#17	21.72	21.68	21.92	
		36#35	21.63	21.70	21.95	
		75#0	21.25	21.26	21.33	
20M	QPSK	1#0	22.19	22.21	22.16	33
		1#49	22.15	22.26	22.11	
		1#99	22.08	22.20	22.02	
		50#0	21.89	21.94	21.86	
		50#24	21.86	21.94	21.87	
		50#49	21.87	21.89	21.81	
		100#0	21.66	21.75	21.63	
	16-QAM	1#0	21.95	21.97	22.05	
		1#49	21.88	22.01	22.02	
		1#99	21.78	21.95	22.01	
		50#0	21.65	21.67	21.72	
		50#24	21.64	21.73	21.72	
		50#49	21.66	21.75	21.62	
		100#0	21.06	21.09	21.15	

LTE Band 41

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
5M	QPSK	1#0	21.85	21.64	21.65	33
		1#12	21.94	21.63	21.67	
		1#24	21.90	21.72	21.64	
		12#0	21.49	21.36	21.35	
		12#6	21.54	21.45	21.42	
		12#11	21.49	21.51	21.42	
		25#0	21.25	21.08	21.12	
	16-QAM	1#0	21.58	21.45	21.43	
		1#12	21.63	21.41	21.50	
		1#24	21.62	21.37	21.41	
		12#0	21.27	21.27	21.25	
		12#6	21.29	21.32	21.23	
		12#11	21.24	21.32	21.33	
		25#0	20.86	21.05	20.98	
10M	QPSK	1#0	21.77	21.44	21.54	33
		1#24	21.84	21.39	21.46	
		1#49	21.81	21.43	21.40	
		25#0	21.42	21.06	21.18	
		25#12	21.45	21.14	21.26	
		25#24	21.38	21.09	21.35	
		50#0	21.13	21.01	20.94	
	16-QAM	1#0	21.59	21.37	21.49	
		1#24	21.55	21.37	21.45	
		1#49	21.47	21.40	21.49	
		25#0	21.08	20.94	21.05	
		25#12	21.08	20.99	21.07	
		25#24	21.13	20.89	21.12	
		50#0	20.58	20.77	20.95	

Test Bandwidth	Test Modulation	Resource Block & RB offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)	Limit (dBm)
15M	QPSK	1#0	21.80	22.04	21.78	33
		1#37	21.85	22.00	21.72	
		1#74	21.85	21.91	21.76	
		36#0	21.52	21.78	21.61	
		36#17	21.62	21.79	21.68	
		36#35	21.52	21.76	21.67	
		75#0	20.79	20.69	20.68	
	16-QAM	1#0	21.45	21.56	21.48	
		1#37	21.40	21.61	21.49	
		1#74	21.34	21.67	21.47	
		36#0	21.22	21.38	21.16	
		36#17	21.29	21.31	21.24	
		36#35	21.20	21.38	21.28	
		75#0	20.46	20.39	20.41	
20M	QPSK	1#0	21.79	21.64	21.61	33
		1#49	21.83	21.54	21.58	
		1#99	21.86	21.63	21.67	
		50#0	21.43	21.34	21.27	
		50#24	21.53	21.26	21.28	
		50#49	21.52	21.23	21.18	
		100#0	20.65	20.71	20.51	
	16-QAM	1#0	21.56	21.38	21.25	
		1#49	21.61	21.29	21.30	
		1#99	21.64	21.29	21.30	
		50#0	21.06	20.94	20.85	
		50#24	21.07	20.88	20.90	
		50#49	20.98	20.92	20.97	
		100#0	20.39	20.51	20.28	

Peak-to-average ratio (PAR):**PCS 1900 Band**

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	2.92	13
	Middle	2.91	13
	High	2.94	13

Mode	Channel	PAR (dB)	Limit (dB)
GPRS	Low	2.98	13
	Middle	2.94	13
	High	3.01	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	5.55	13
	Middle	5.53	13
	High	5.56	13

WCDMA Band II

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA	Low	3.48	13
	Middle	3.39	13
	High	3.57	13
HSDPA	Low	3.15	13
	Middle	3.09	13
	High	3.22	13
HSUPA	Low	3.14	13
	Middle	3.08	13
	High	3.13	13
HSPA+	Low	2.85	13
	Middle	2.79	13
	High	2.83	13
DC-HSDPA	Low	2.76	13
	Middle	2.85	13
	High	2.74	13

LTE Band 5

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	5.91	13	Pass
QPSK (100%RB Size)	7.33	13	Pass
16QAM (1RB Size)	6.16	13	Pass
16QAM (100%RB Size)	7.29	13	Pass

LTE Band 7

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	6.46	13	Pass
QPSK (100%RB Size)	8.12	13	Pass
16QAM (1RB Size)	6.51	13	Pass
16QAM (100%RB Size)	8.17	13	Pass

LTE Band 41

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	8.35	13	Pass
QPSK (100%RB Size)	7.65	13	Pass
16QAM (1RB Size)	8.06	13	Pass
16QAM (100%RB Size)	7.77	13	Pass

Radiated Power:**GSM Mode**

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
GSM850 Band, Middle Channel (ERP)										
836.60	66.05	212	171	H	30.58	0.63	-1.14	28.81	38.45	9.64
836.60	66.78	174	159	V	33.31	0.63	-1.14	31.54	38.45	6.91
PCS1900 Band, Middle Channel (EIRP)										
1880.00	83.55	169	235	H	17.98	0.85	8.81	25.94	33.00	7.06
1880.00	81.23	358	227	V	20.61	0.85	8.81	28.57	33.00	4.43

EGPRS Mode

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
GSM850 Band, Middle Channel(ERP)										
836.60	70.04	72	228	H	26.59	0.63	-1.14	24.82	38.45	13.63
836.60	70.48	278	123	V	27.61	0.63	-1.14	25.84	38.45	10.61
PCS1900 Band, Middle Channel(EIRP)										
1880.00	88.42	302	234	H	13.11	0.85	8.81	21.07	33.00	11.93
1880.00	84.84	62	193	V	17.00	0.85	8.81	24.96	33.00	8.04

WCDMA Mode

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Band V, Middle Channel(ERP)										
836.60	72.98	227	106	H	23.65	0.63	-1.14	21.88	38.45	16.57
836.60	71.35	281	212	V	28.74	0.63	-1.14	26.97	38.45	11.48
WCDMA Band II, Middle Channel(EIRP)										
1880.00	87.01	357	106	H	14.52	0.85	8.81	22.48	33.00	10.52
1880.00	82.33	200	129	V	19.51	0.85	8.81	27.47	33.00	5.53

ERP:**LTE Band 5**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 1.4M BW Middle Channel								
836.50	H	72.56	24.08	0.63	-1.14	22.31	38.45	16.14
836.50	V	74.81	25.29	0.63	-1.14	23.52	38.45	14.93
16-QAM 1.4M BW Middle Channel								
836.50	H	72.82	23.82	0.63	-1.14	22.05	38.45	16.4
836.50	V	75.07	25.03	0.63	-1.14	23.26	38.45	15.19
QPSK 3M BW Middle Channel								
836.50	H	72.70	23.94	0.63	-1.14	22.17	38.45	16.28
836.50	V	75.02	25.08	0.63	-1.14	23.31	38.45	15.14
16-QAM 3M BW Middle Channel								
836.50	H	73.09	23.55	0.63	-1.14	21.78	38.45	16.67
836.50	V	75.34	24.76	0.63	-1.14	22.99	38.45	15.46
QPSK 5M BW Middle Channel								
836.50	H	73.36	23.28	0.63	-1.14	21.51	38.45	16.94
836.50	V	75.70	24.40	0.63	-1.14	22.63	38.45	15.82
16-QAM 5M BW Middle Channel								
836.50	H	73.64	23.00	0.63	-1.14	21.23	38.45	17.22
836.50	V	76.01	24.09	0.63	-1.14	22.32	38.45	16.13
QPSK 10M BW Middle Channel								
836.50	H	74.22	22.42	0.63	-1.14	20.65	38.45	17.8
836.50	V	75.81	24.29	0.63	-1.14	22.52	38.45	15.93
16-QAM 10M BW Middle Channel								
836.50	H	74.59	22.05	0.63	-1.14	20.28	38.45	18.17
836.50	V	76.37	23.73	0.63	-1.14	21.96	38.45	16.49

EIRP:**LTE Band 7**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5M BW Middle Channel								
2535.00	H	86.59	12.79	0.89	10.05	21.95	33	11.05
2535.00	V	85.99	13.46	0.89	10.05	22.62	33	10.38
16-QAM 5M BW Middle Channel								
2535.00	H	86.78	12.60	0.89	10.05	21.76	33	11.24
2535.00	V	86.22	13.23	0.89	10.05	22.39	33	10.61
QPSK 10M BW Middle Channel								
2535.00	H	86.78	12.60	0.89	10.05	21.76	33	11.24
2535.00	V	86.10	13.35	0.89	10.05	22.51	33	10.49
16-QAM 10M BW Middle Channel								
2535.00	H	87.07	12.31	0.89	10.05	21.47	33	11.53
2535.00	V	86.57	12.88	0.89	10.05	22.04	33	10.96
QPSK 15M BW Middle Channel								
2535.00	H	87.82	11.56	0.89	10.05	20.72	33	12.28
2535.00	V	86.76	12.69	0.89	10.05	21.85	33	11.15
16-QAM 15M BW Middle Channel								
2535.00	H	88.26	11.12	0.89	10.05	20.28	33	12.72
2535.00	V	86.87	12.58	0.89	10.05	21.74	33	11.26
QPSK 20M BW Middle Channel								
2535.00	H	88.78	10.60	0.89	10.05	19.76	33	13.24
2535.00	V	87.77	11.68	0.89	10.05	20.84	33	12.16
16-QAM 20M BW Middle Channel								
2535.00	H	88.96	10.42	0.89	10.05	19.58	33	13.42
2535.00	V	88.12	11.33	0.89	10.05	20.49	33	12.51

EIRP:**LTE Band 41**

Frequency (MHz)	Polar (H/V)	Receiver Reading (dBμV)	Substituted Method			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Submitted Level (dBm)	Cable loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5M BW Middle Channel								
2605.00	H	87.00	12.27	0.90	9.95	21.32	33	11.68
2605.00	V	86.34	12.99	0.90	9.95	22.04	33	10.96
16-QAM 5M BW Middle Channel								
2605.00	H	87.37	11.90	0.90	9.95	20.95	33	12.05
2605.00	V	86.82	12.51	0.90	9.95	21.56	33	11.44
QPSK 10M BW Middle Channel								
2605.00	H	87.26	12.01	0.90	9.95	21.06	33	11.94
2605.00	V	86.74	12.59	0.90	9.95	21.64	33	11.36
16-QAM 10M BW Middle Channel								
2605.00	H	87.47	11.80	0.90	9.95	20.85	33	12.15
2605.00	V	86.93	12.40	0.90	9.95	21.45	33	11.55
QPSK 15M BW Middle Channel								
2605.00	H	87.59	11.68	0.90	9.95	20.73	33	12.27
2605.00	V	86.94	12.39	0.90	9.95	21.44	33	11.56
16-QAM 15M BW Middle Channel								
2605.00	H	87.73	11.54	0.90	9.95	20.59	33	12.41
2605.00	V	87.01	12.32	0.90	9.95	21.37	33	11.63
QPSK 20M BW Middle Channel								
2605.00	H	87.96	11.31	0.90	9.95	20.36	33	12.64
2605.00	V	87.42	11.91	0.90	9.95	20.96	33	12.04
16-QAM 20M BW Middle Channel								
2605.00	H	88.13	11.14	0.90	9.95	20.19	33	12.81
2605.00	V	87.61	11.72	0.90	9.95	20.77	33	12.23

Note:

All above data were tested with no amplifier

Absolute Level = Submitted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

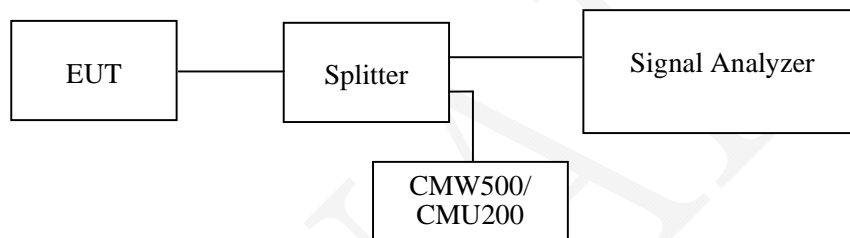
FCC §2.1049, §22.917, §22.905 §24.238 & §27.53 - OCCUPIED BANDWIDTH**Applicable Standards**

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

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

Temperature:	23 °C
Relative Humidity:	50 %
ATM Pressure:	101.0kPa

The testing was performed by Chris Wang on 2017-10-07 to 2017-10-10.

EUT operation mode: Transmitting

Test Result: Compliance.

GSM 850 Band

Mode	Frequency (MHz)	26 dB Emission Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
GSM (GMSK)	836.60	317.43	245.29
EGPRS (8PSK)	836.60	323.85	253.31

WCDMA Band V

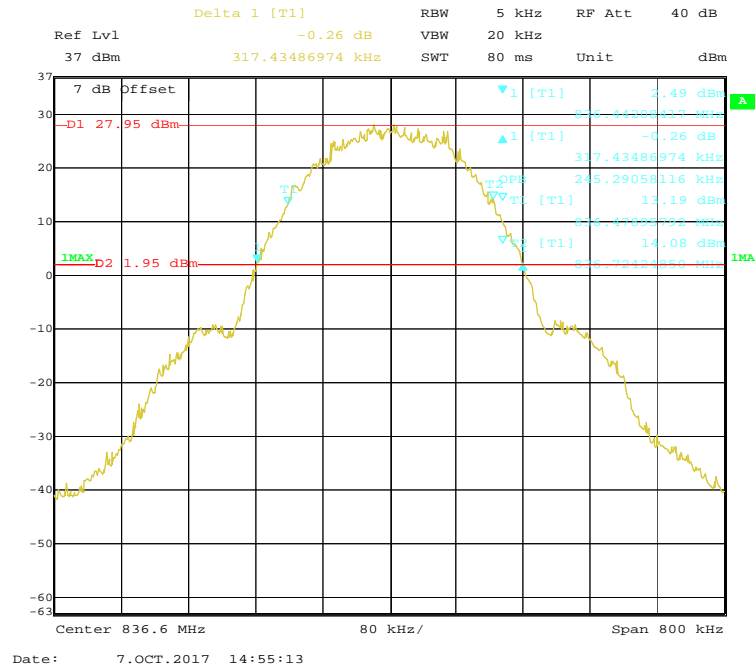
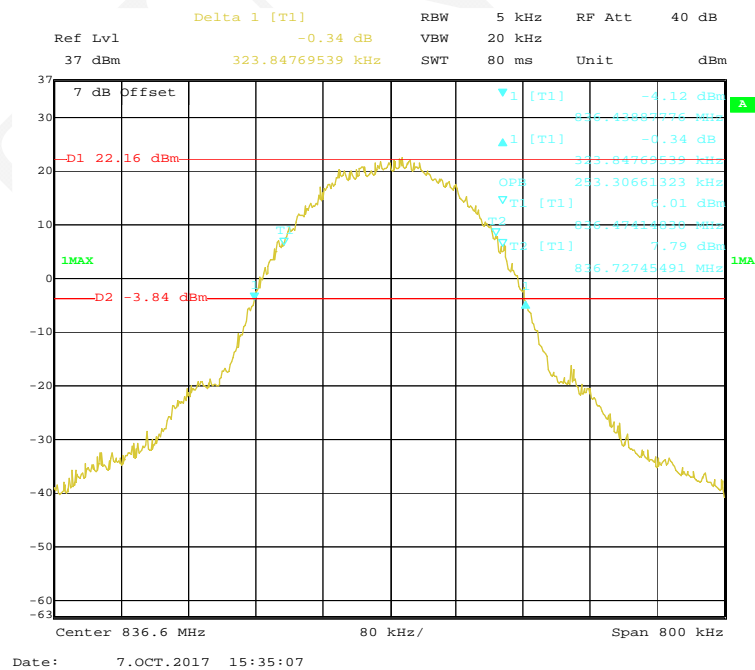
Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (BPSK)	836.60	4.85	4.23

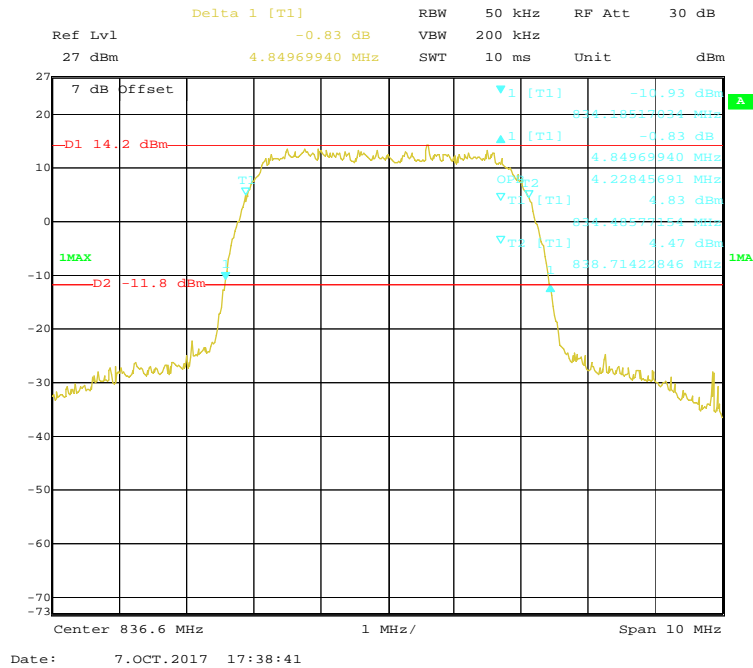
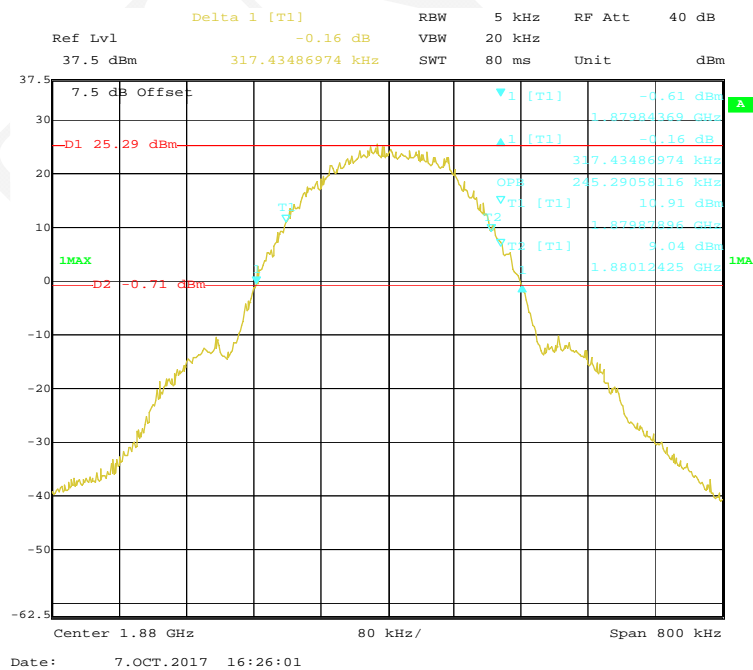
PCS1900 Band

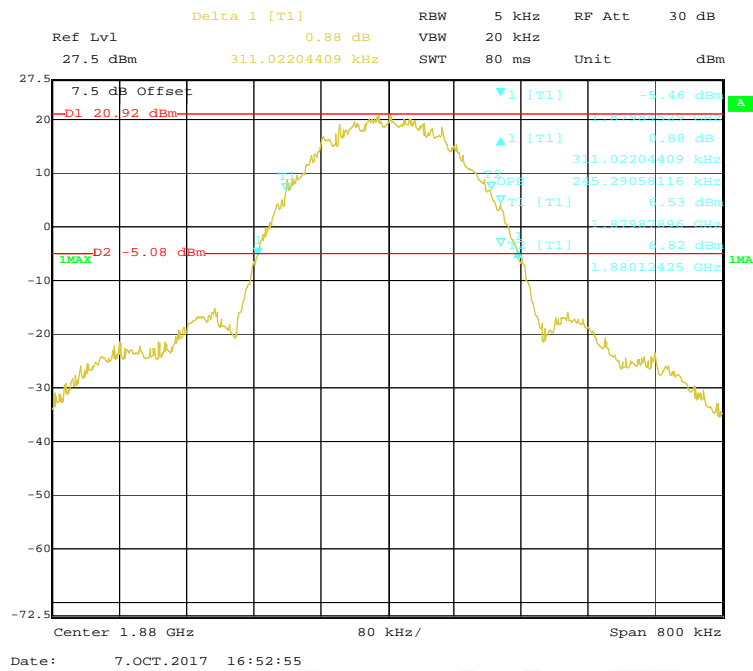
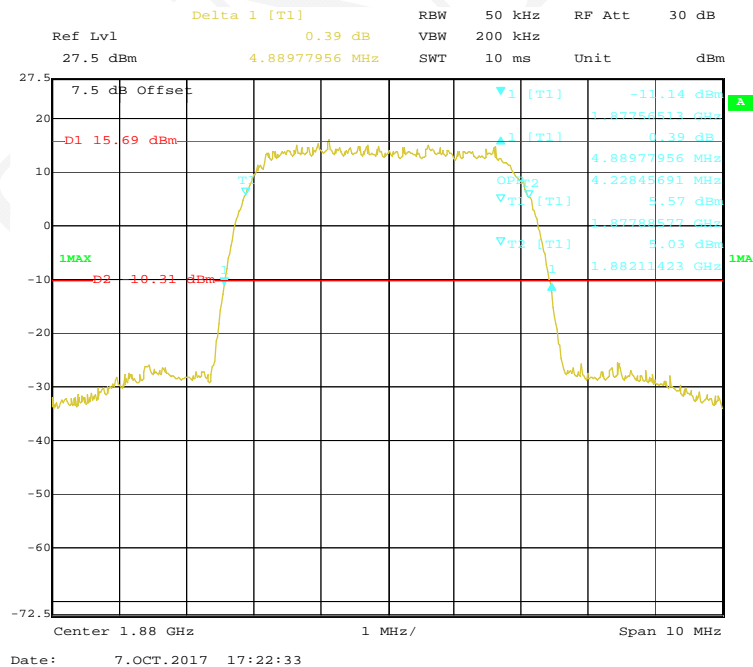
Mode	Frequency (MHz)	26 dB Emission Bandwidth (kHz)	99% Occupied Bandwidth (kHz)
GSM (GMSK)	1880.00	317.43	245.29
EGPRS (8PSK)	1880.00	311.02	245.29

WCDMA Band II

Mode	Frequency (MHz)	26 dB Emission Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
WCDMA (BPSK)	1880.00	4.89	4.23

GSM 850 Band**99% Occupied & 26 dB Emissions Bandwidth for GSM (GMSK) Mode****99% Occupied & 26 dB Emissions Bandwidth for EGRPS (8PSK) Mode**

WCDMA Band V**99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode****PCS 1900 Band****99% Occupied & 26 dB Emissions Bandwidth for GSM (GMSK) Mode**

99% Occupied & 26 dB Emissions Bandwidth for EGRPS (8PSK) Mode**WCDMA Band II****99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode**

LTE Band 5:

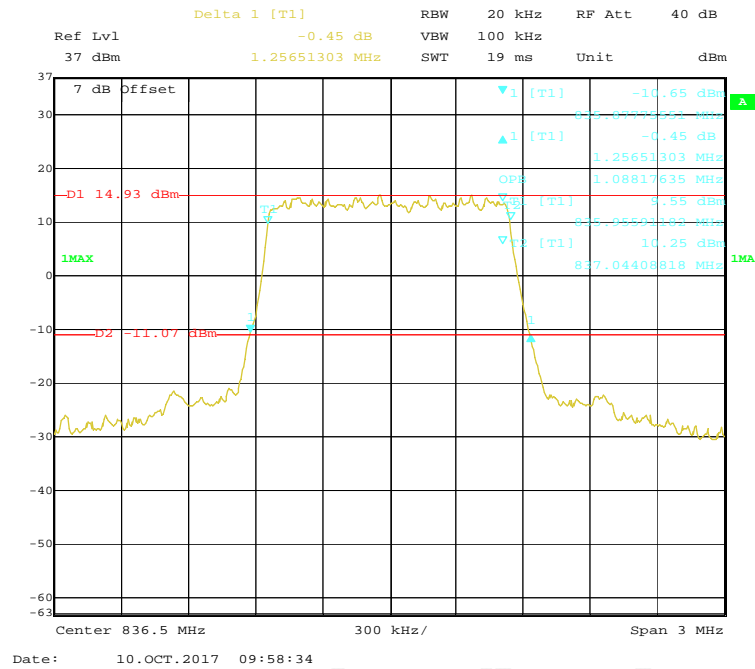
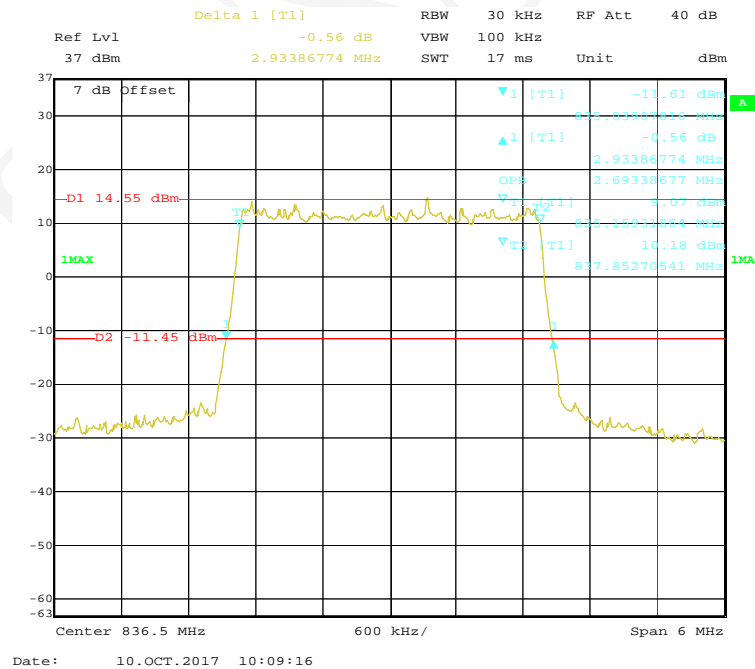
Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
QPSK	1.4M	Middle	1.26	1.09
	3M		2.93	2.69
	5M		5.01	4.51
	10M		9.82	9.02
16-QAM	1.4M	Middle	1.28	1.10
	3M		2.92	2.71
	5M		4.97	4.51
	10M		9.78	9.02

LTE Band 7:

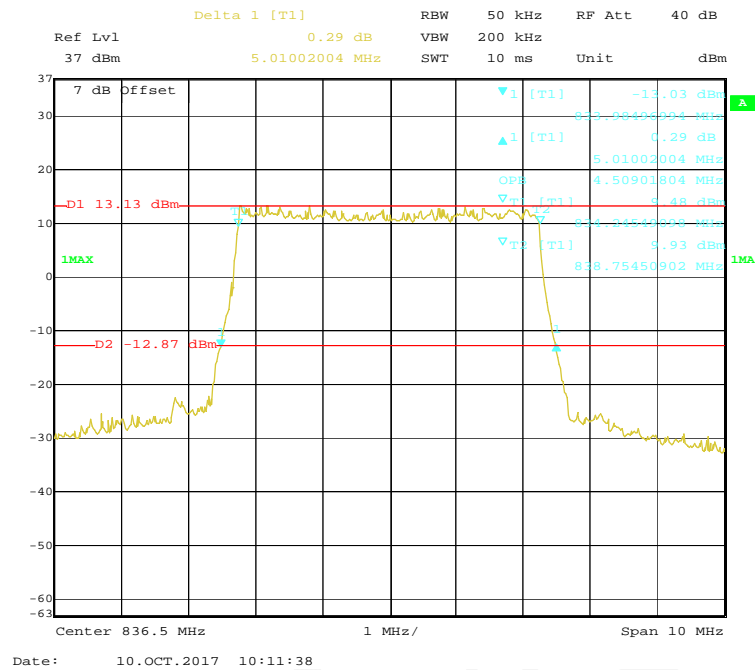
Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
QPSK	5M	Middle	4.99	4.51
	10M		9.78	8.98
	15M		14.85	13.59
	20M		19.24	17.96
16-QAM	5M	Middle	4.99	4.51
	10M		9.82	8.98
	15M		14.79	13.47
	20M		19.48	18.04

LTE Band 41:

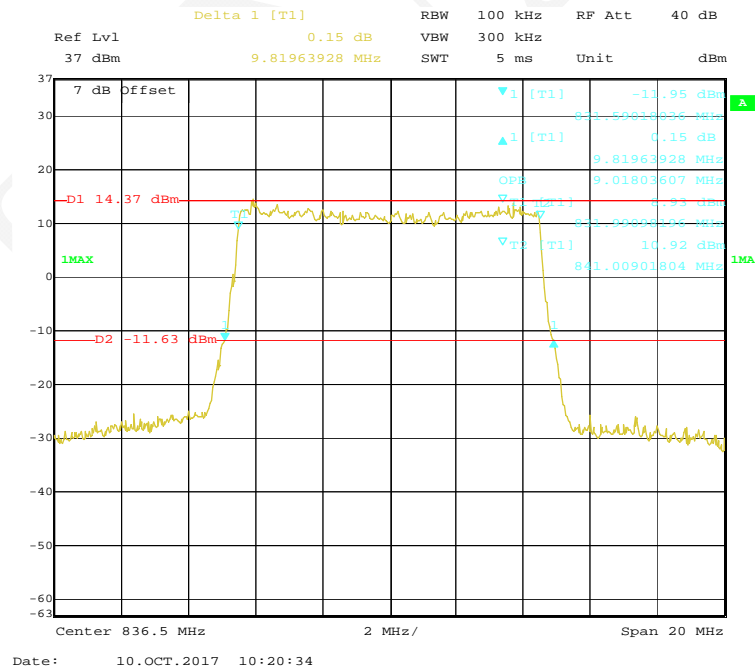
Test Modulation	Test Bandwidth	Test Channel	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
QPSK	5M	Middle	4.99	4.51
	10M		9.82	8.98
	15M		14.91	13.53
	20M		19.24	17.96
16-QAM	5M	Middle	4.93	4.49
	10M		9.62	8.98
	15M		15.03	13.47
	20M		19.40	17.96

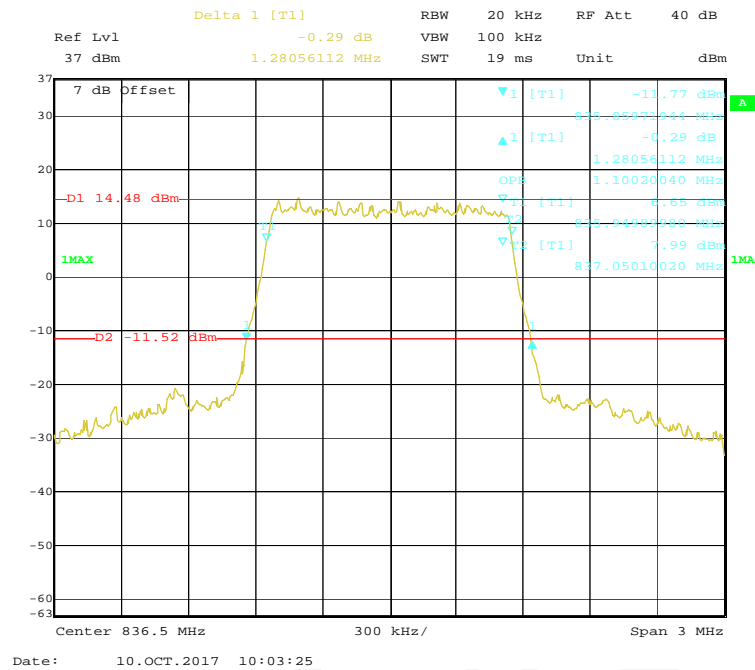
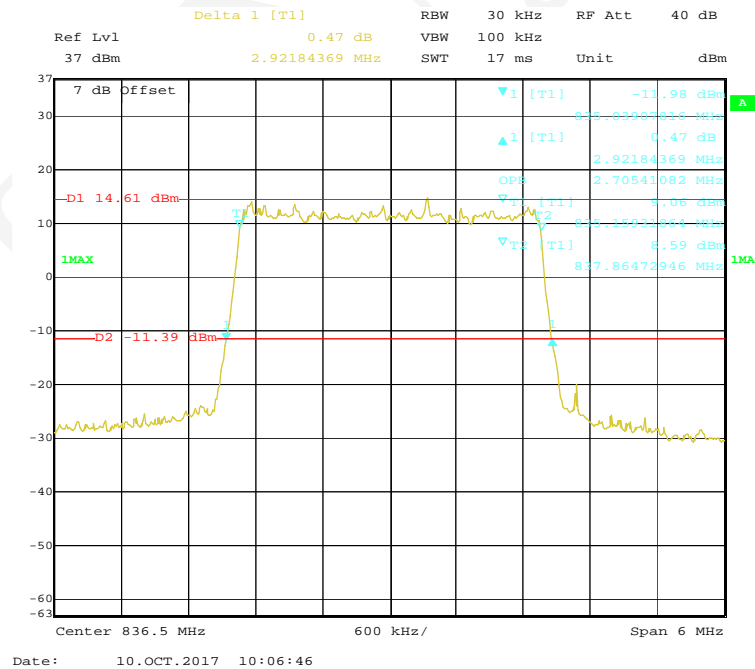
LTE Band 5:**QPSK (1.4 MHz) - Middle channel****QPSK (3.0 MHz) - Middle channel**

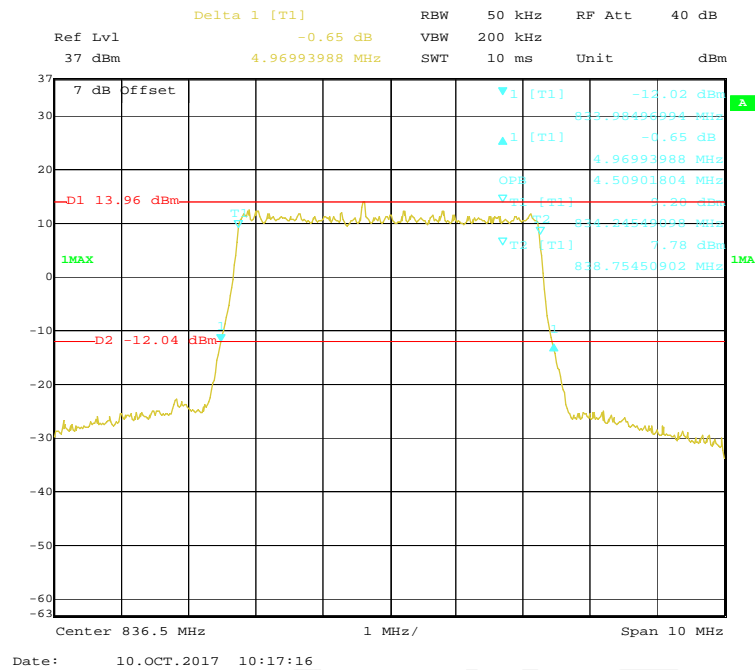
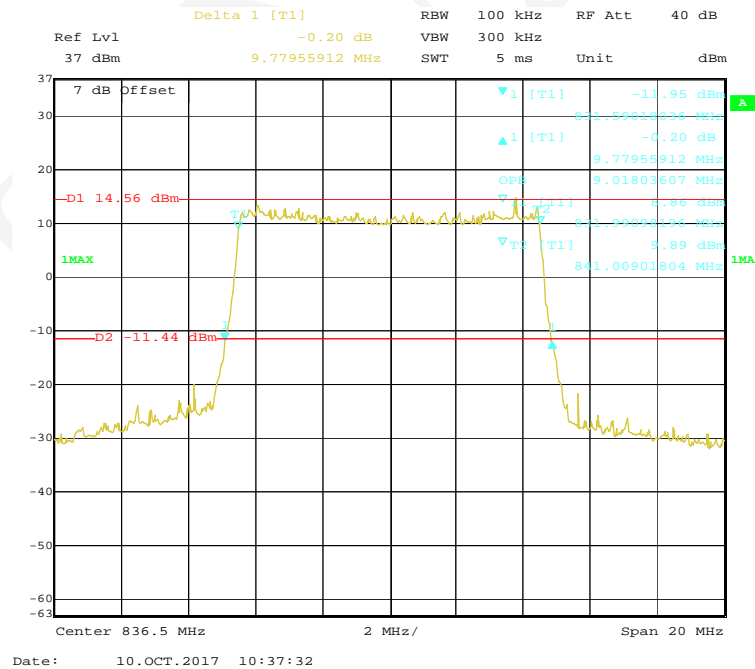
QPSK (5.0 MHz) - Middle channel

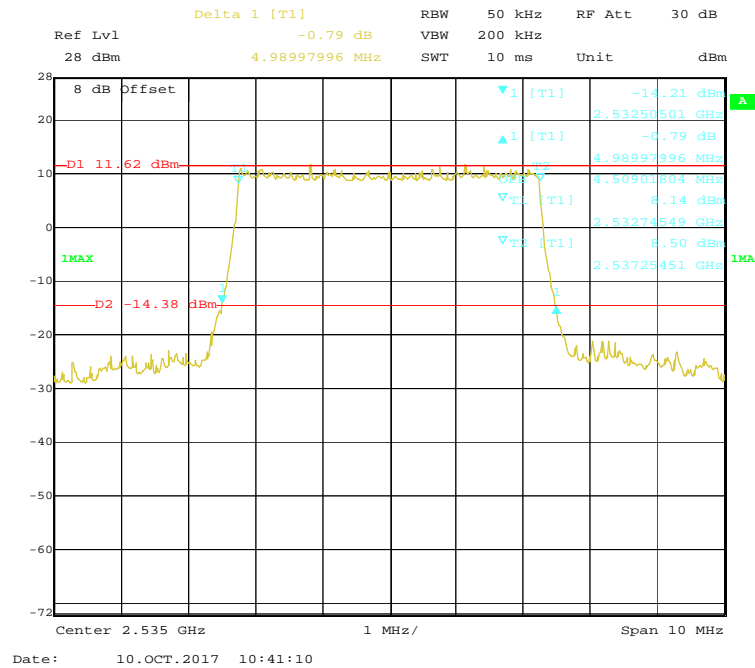
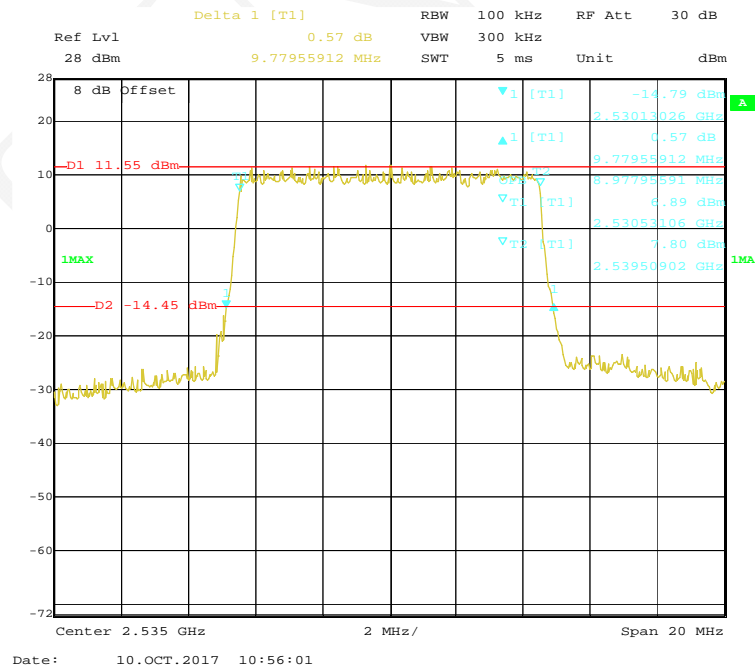


QPSK (10.0MHz) - Middle channel

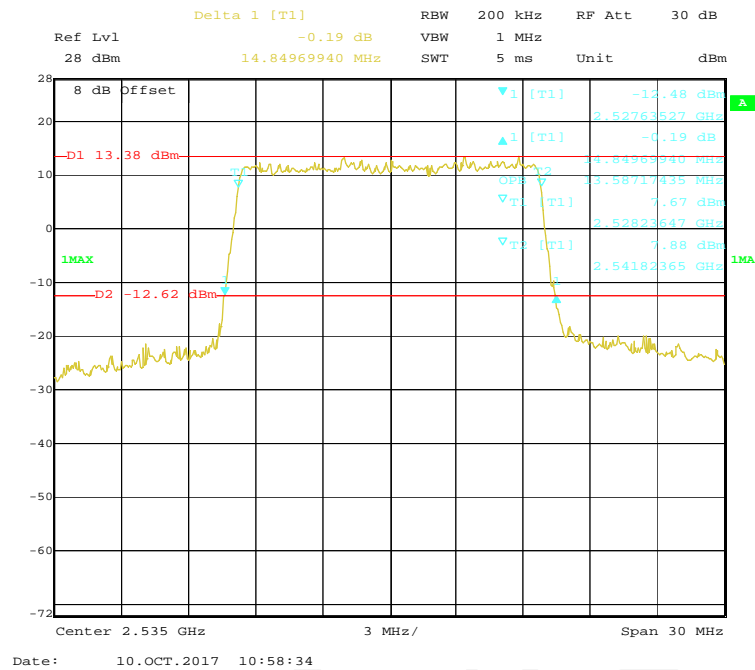


16-QAM (1.4 MHz) - Middle channel**16-QAM (3.0 MHz) - Middle channel**

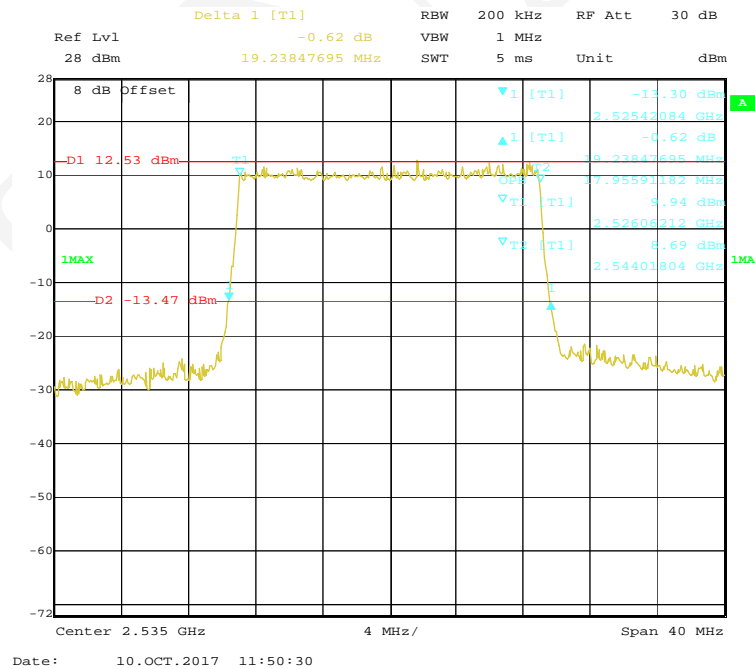
16-QAM (5.0 MHz) - Middle channel**16-QAM (10.0 MHz) - Middle channel**

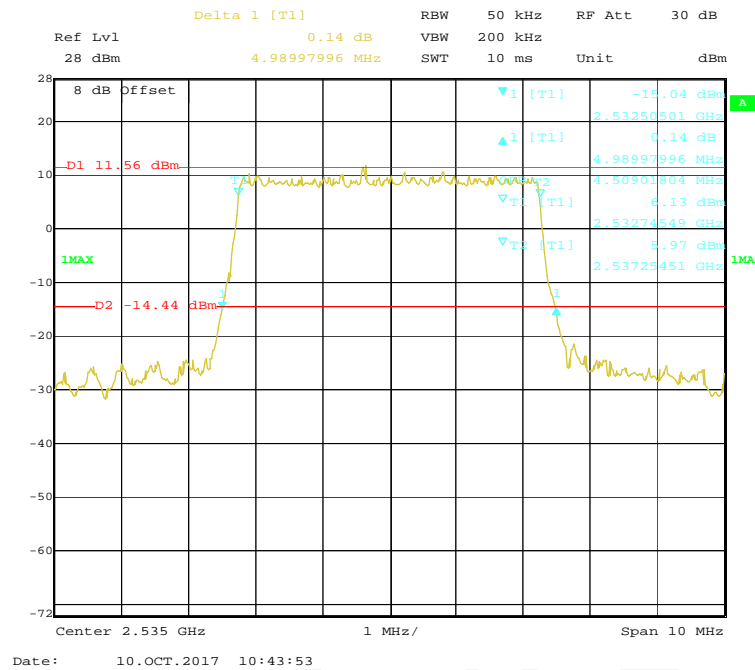
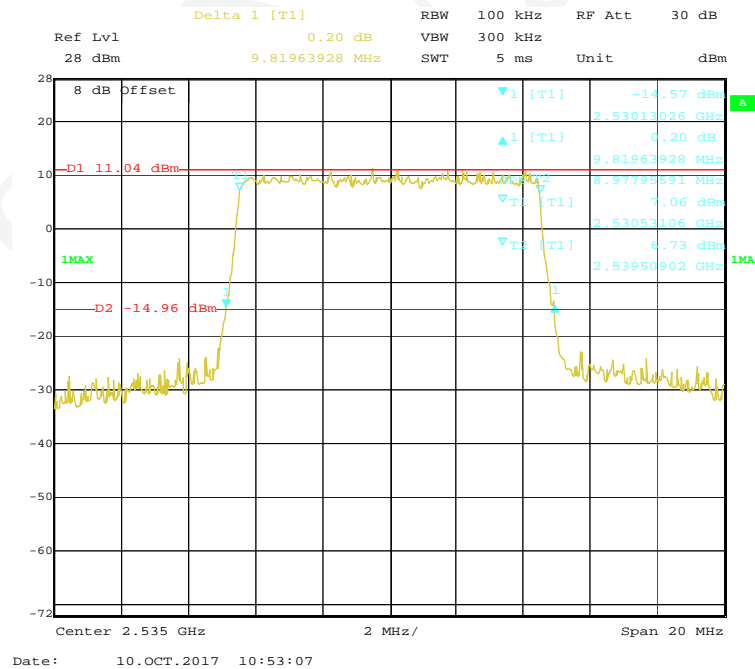
LTE Band 7:**QPSK (5 MHz) - Middle channel****QPSK (10 MHz) - Middle channel**

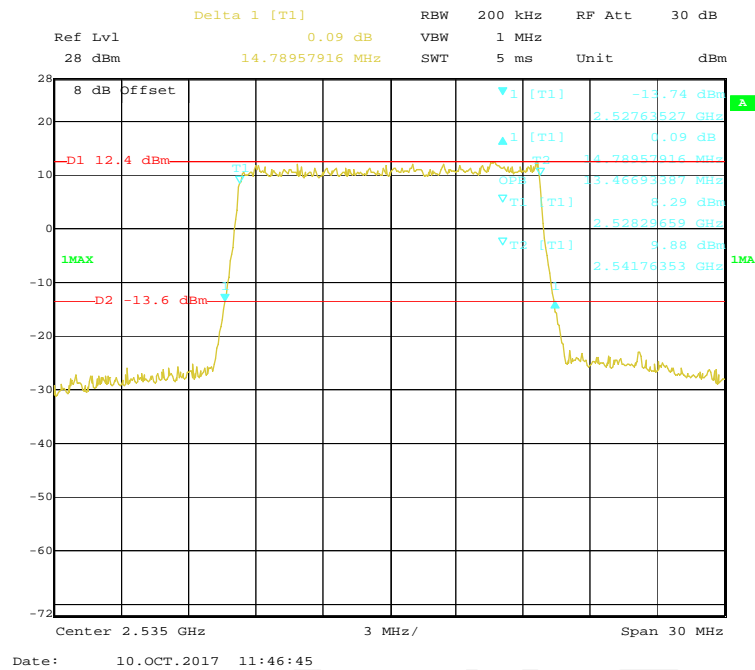
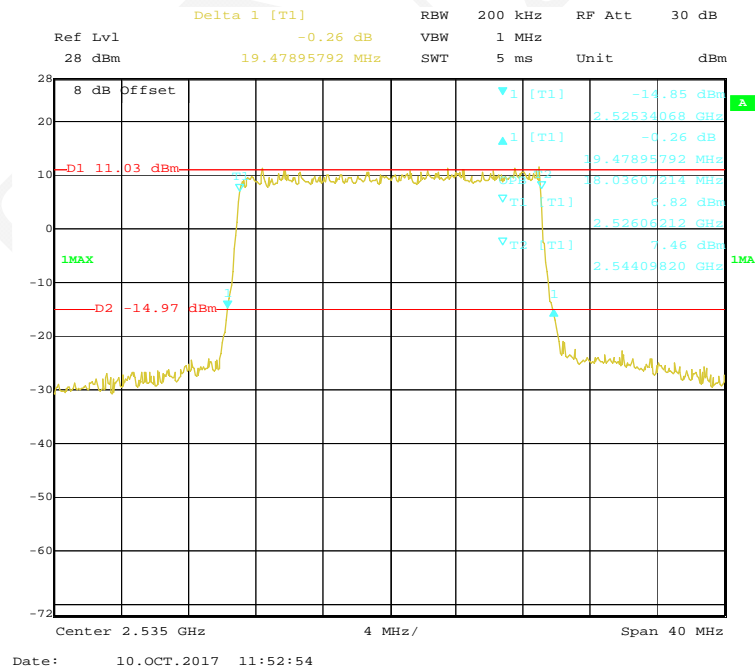
QPSK (15MHz) - Middle channel

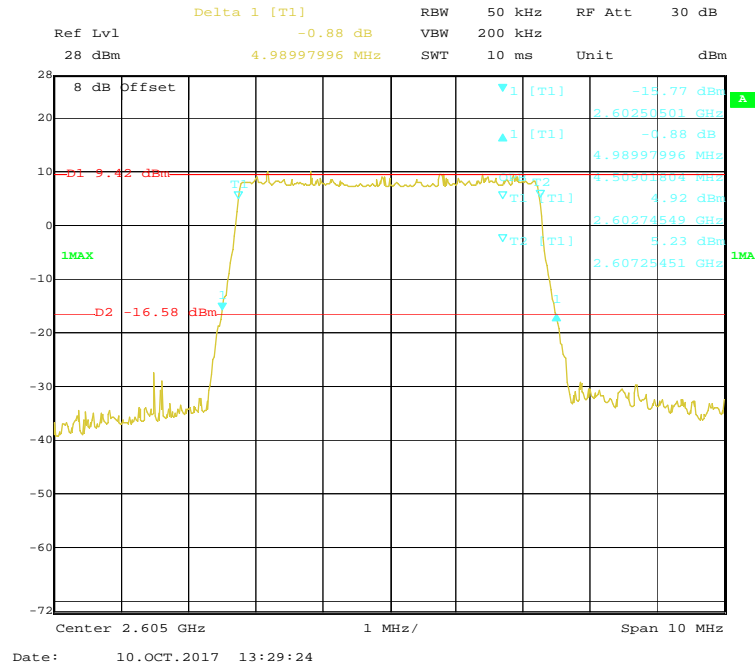
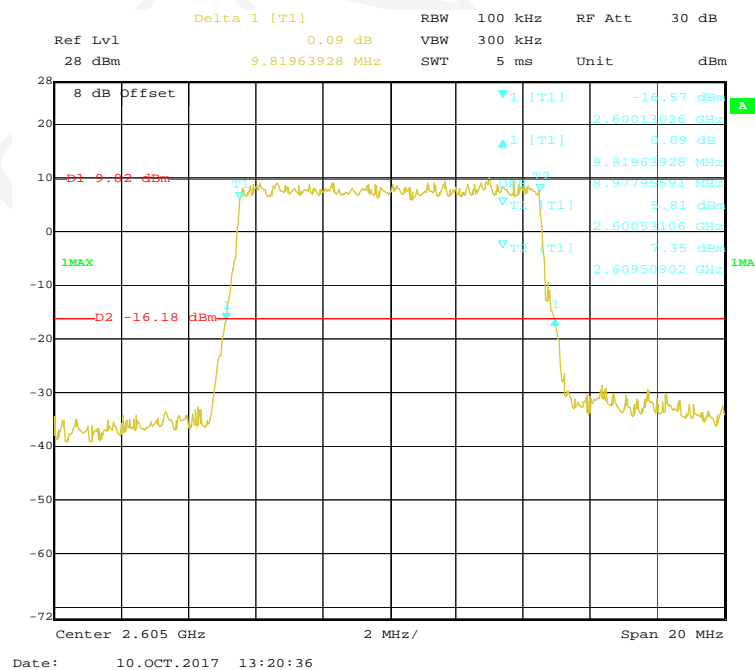


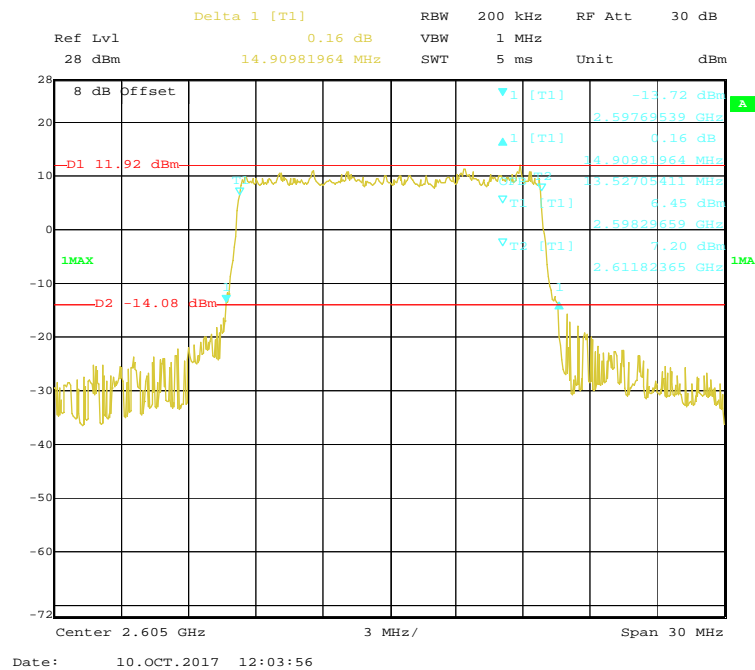
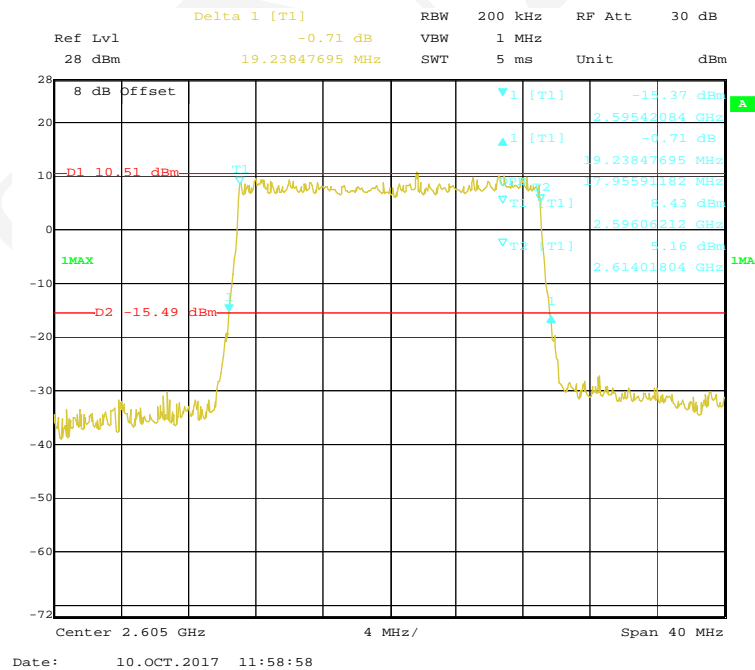
QPSK (20 MHz) - Middle channel

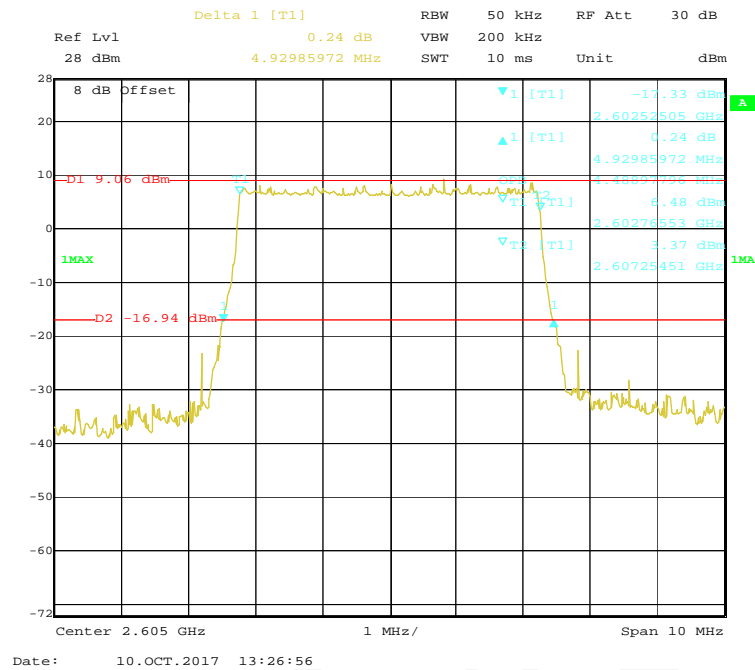
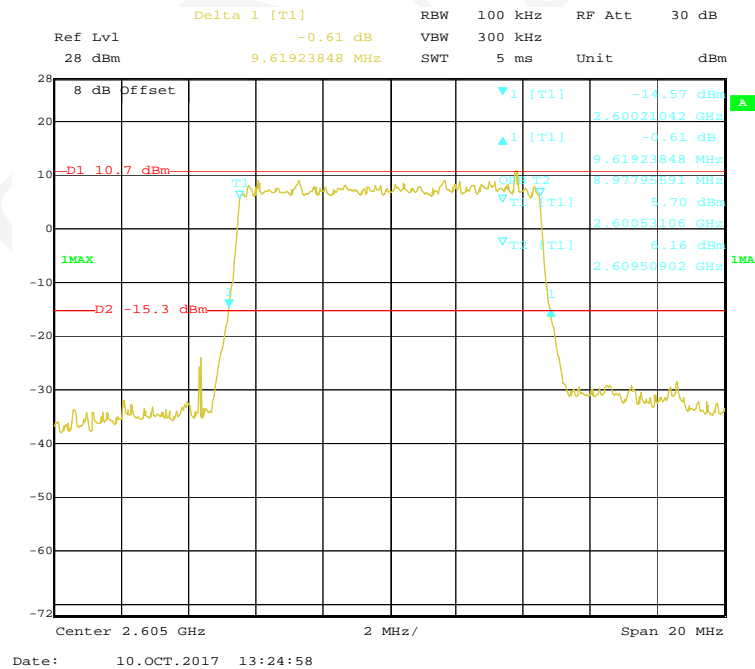


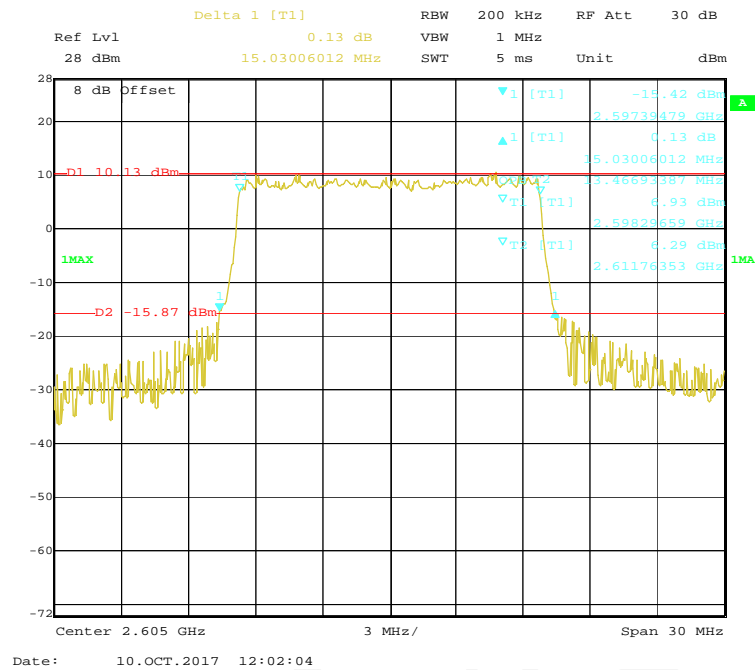
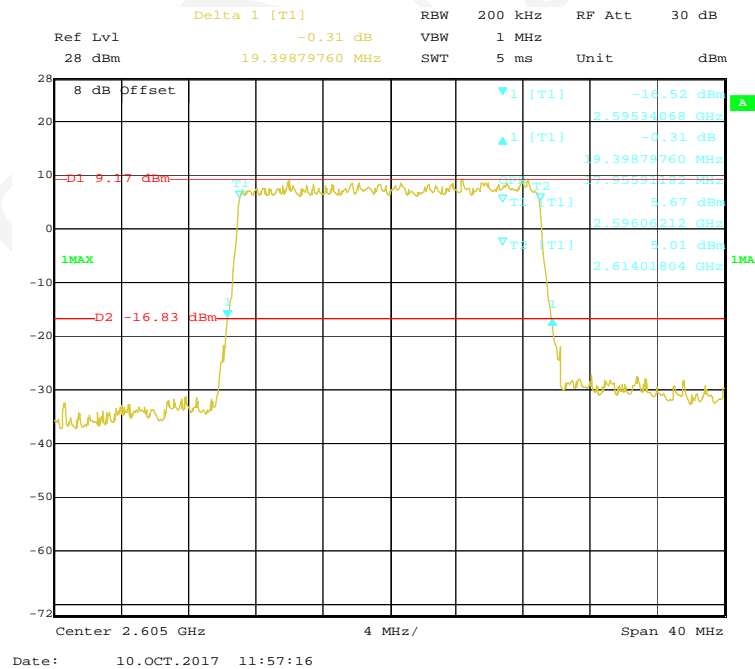
16-QAM (5 MHz) - Middle channel**16-QAM (10 MHz) - Middle channel**

16-QAM (15 MHz) - Middle channel**16-QAM (20 MHz) - Middle channel**

LTE Band 41**QPSK (5MHz) - Middle channel****QPSK (10 MHz) - Middle channel**

QPSK (15 MHz) - Middle channel**QPSK (20 MHz) - Middle channel**

16-QAM (5 MHz) - Middle channel**16-QAM (10 MHz) - Middle channel**

16-QAM (15 MHz) - Middle channel**16-QAM (20 MHz) - Middle channel**

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

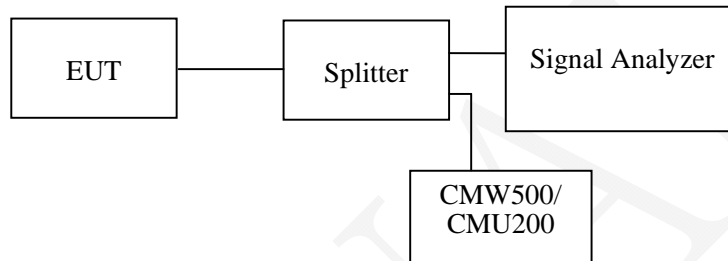
Applicable Standards

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

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

Test Procedure

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

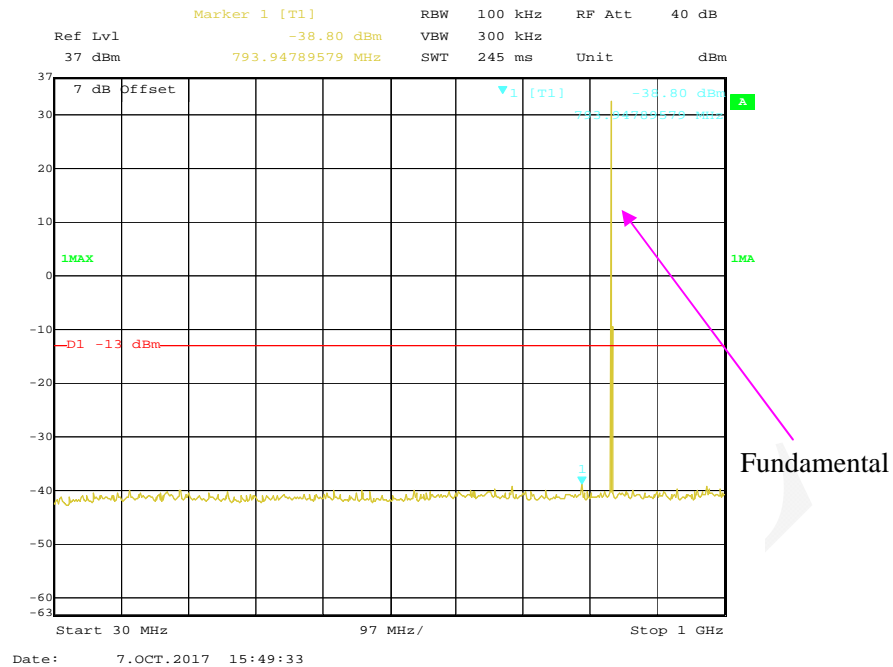
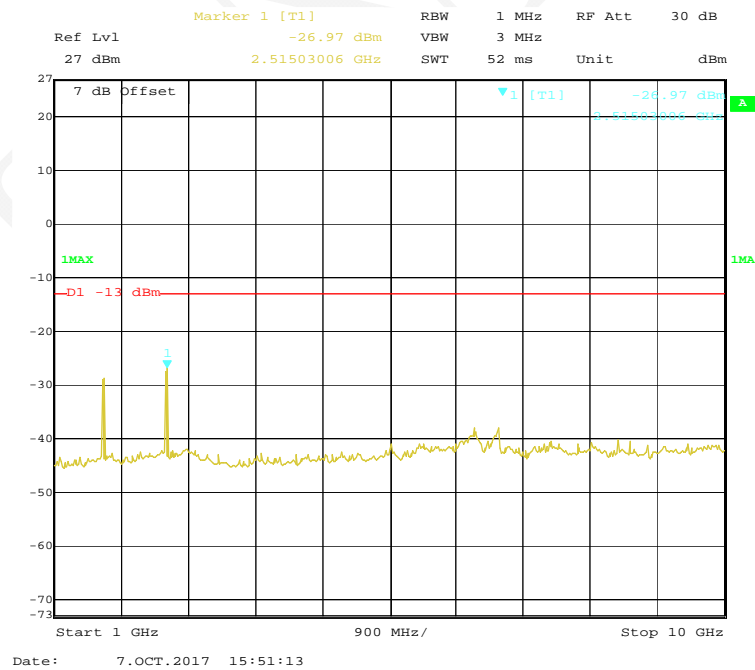


Test Data

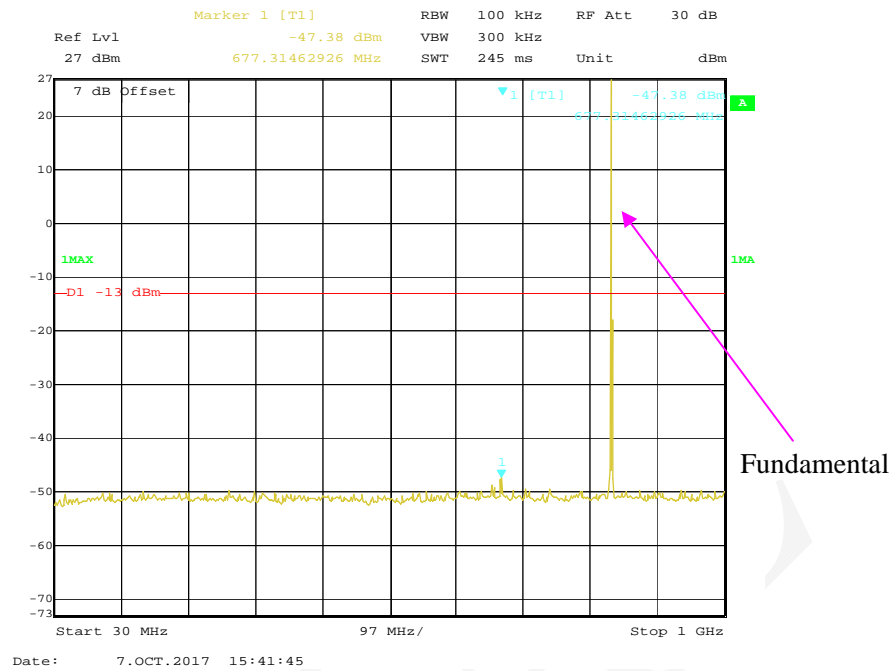
Environmental Conditions

Temperature:	23.2 °C
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

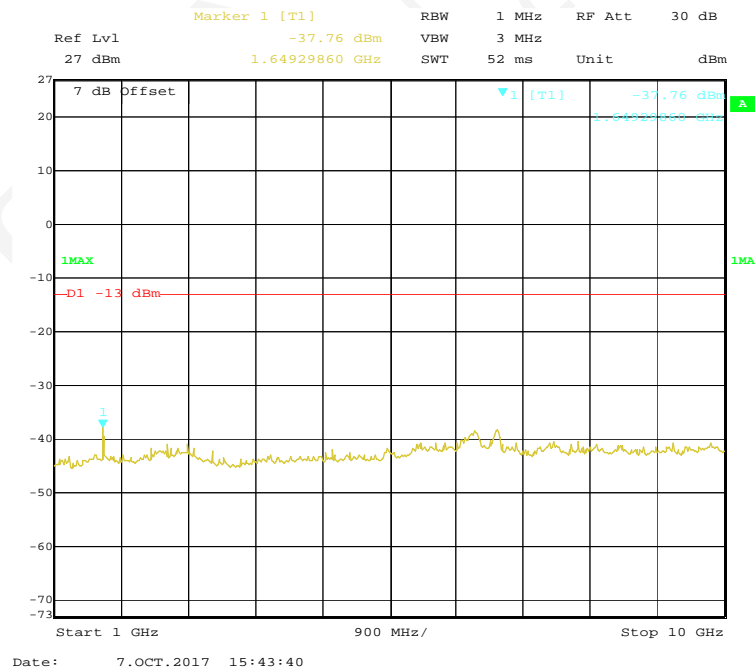
The testing was performed by Chris Wang on 2017-10-07 to 2017-10-10.

GSM 850 Band:**30 MHz – 1GHz(GSM Mode)****1 GHz – 10 GHz (GSM Mode)**

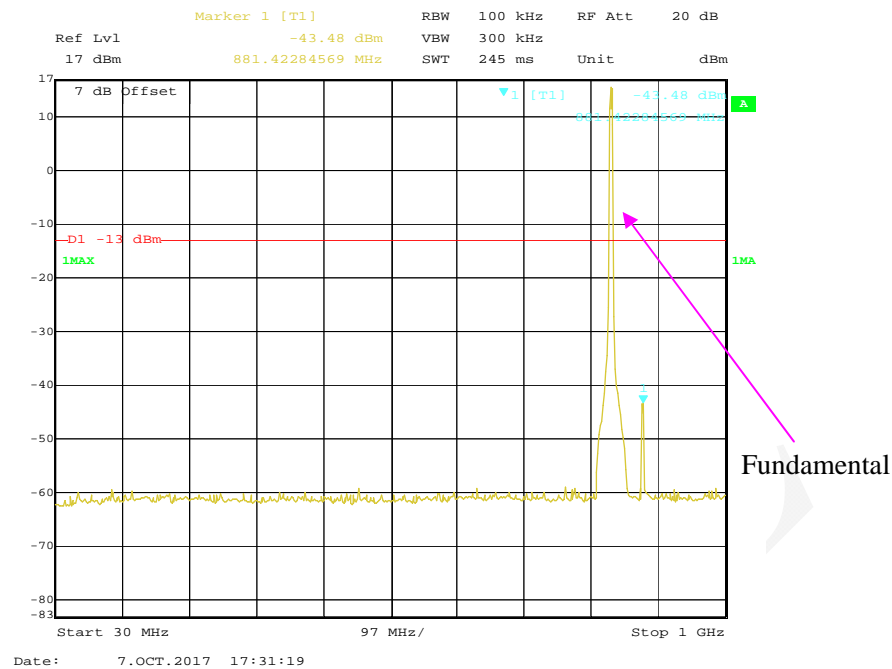
30 MHz – 1GHz(EGPRS Mode)



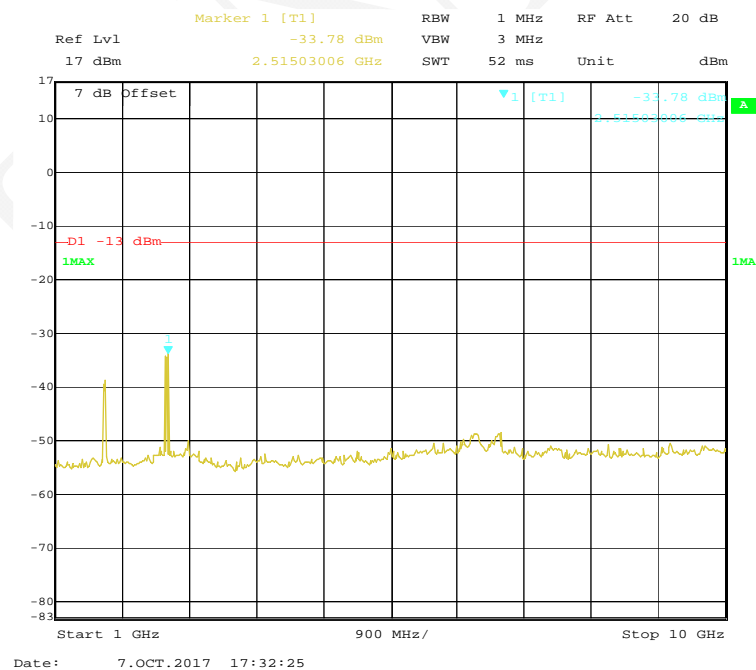
1 GHz – 10 GHz (EGPRS Mode)



30 MHz – 1GHz(WCDMA Mode)

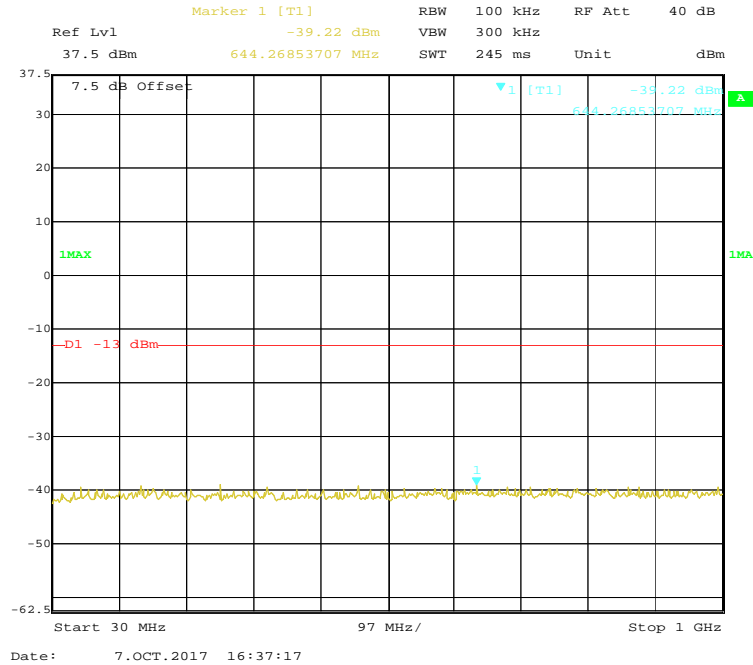


1 GHz – 10 GHz (WCDMA Mode)



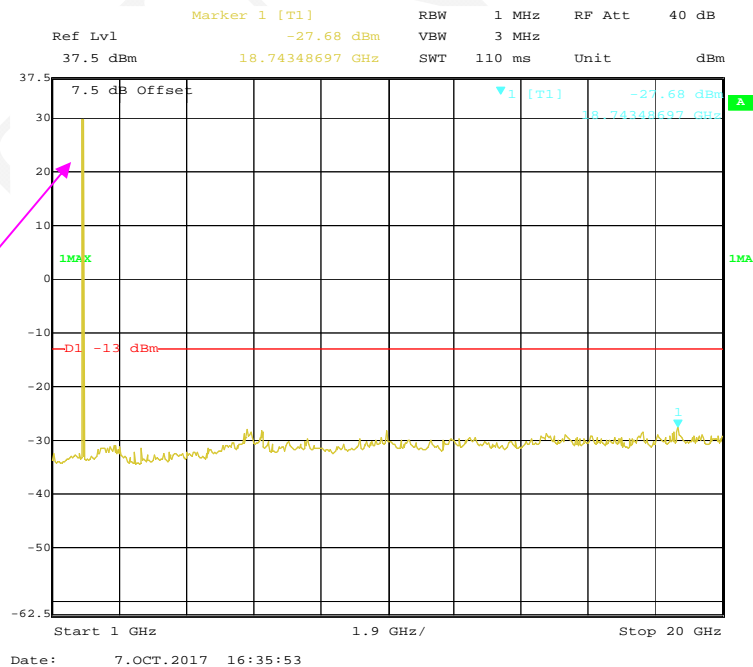
PCS 1900 Band:

30 MHz – 1GHz(GSM Mode)

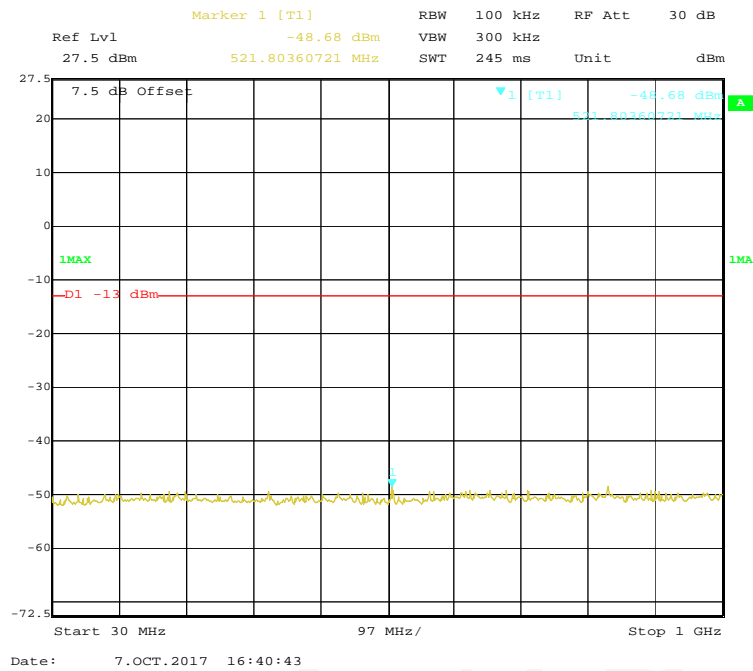


1 GHz – 20 GHz (GSM Mode)

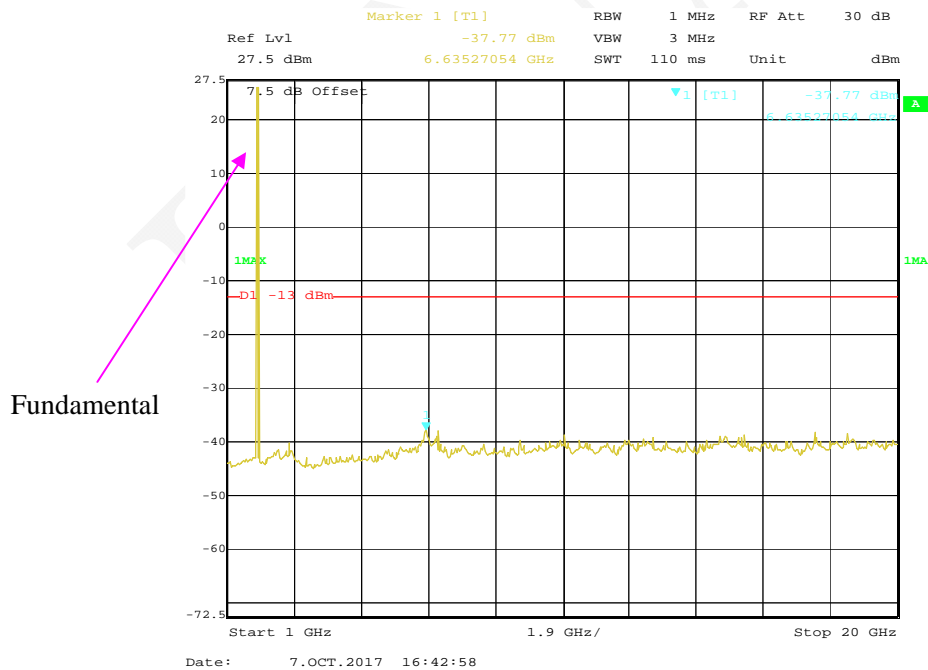
Fundamental

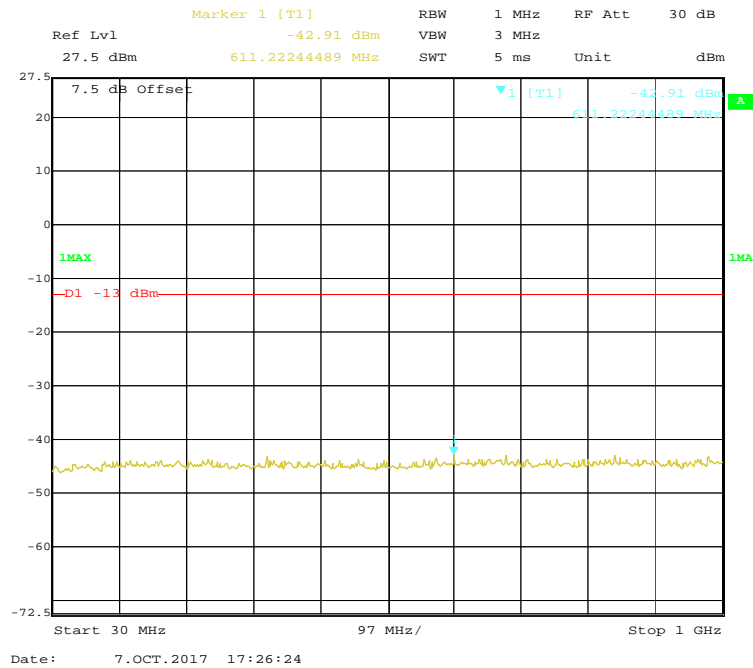
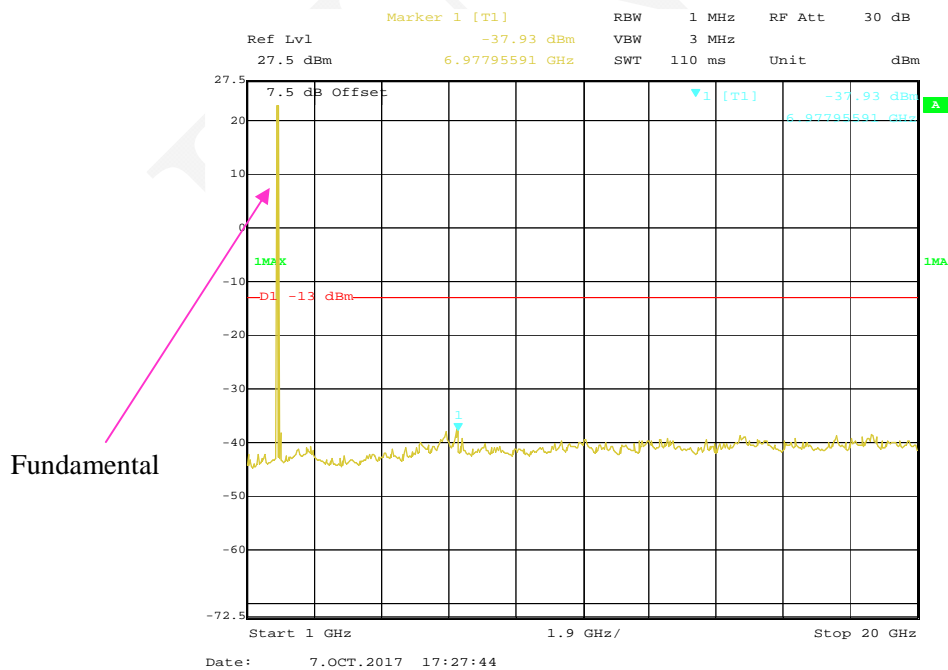


30 MHz – 1GHz((EGPRS Mode)

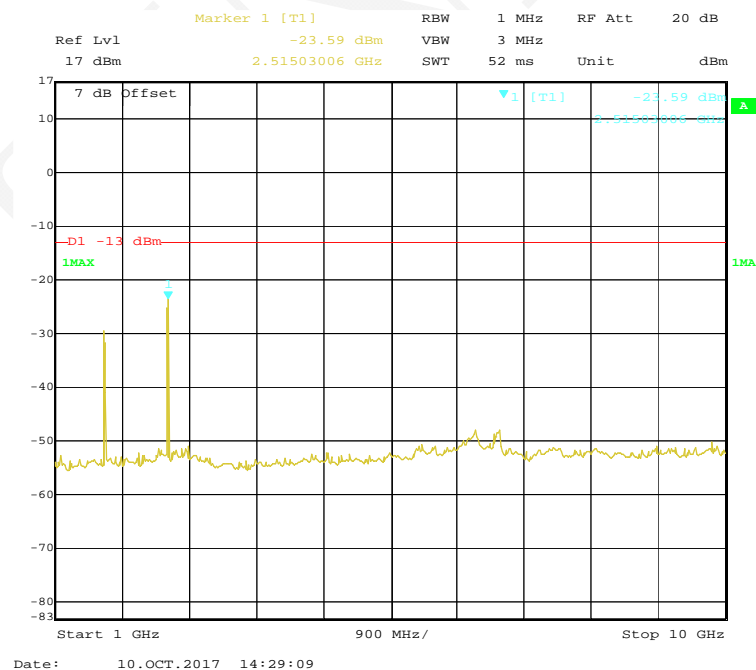
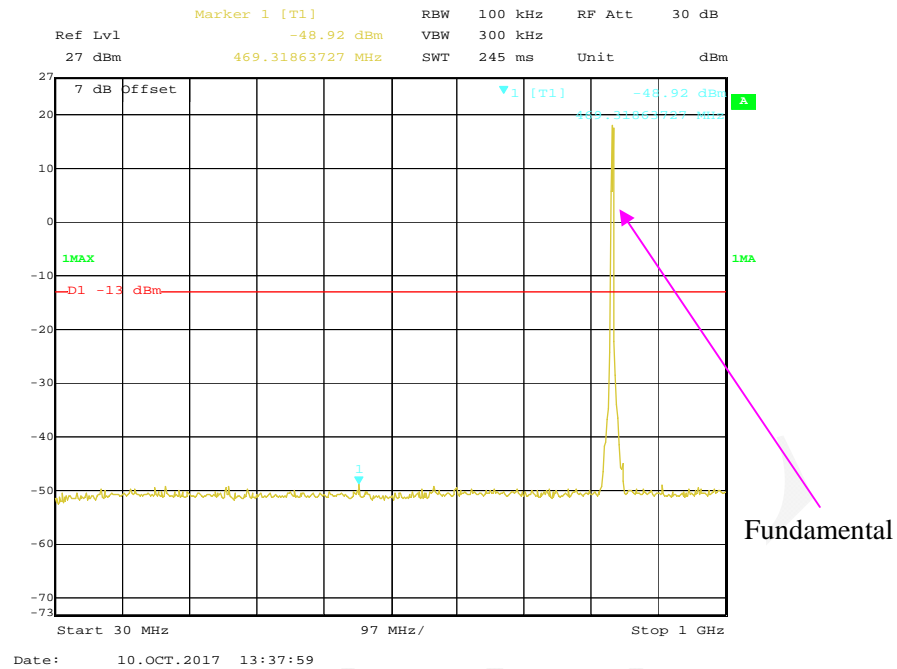


1 GHz – 20 GHz (EGPRS Mode)

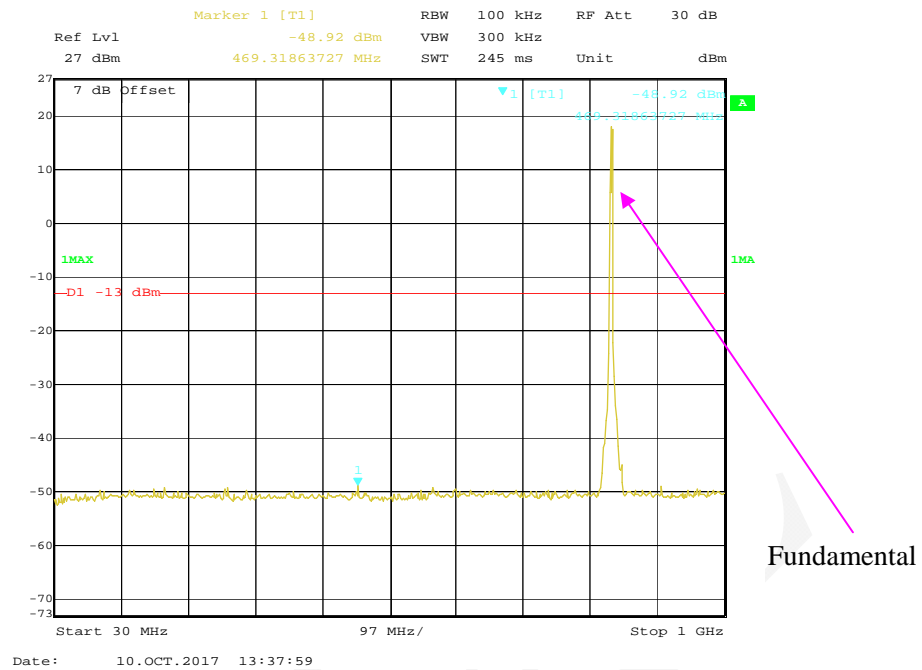


WCDMA Band II:**30 MHz – 1 GHz (WCDMA Mode)****1 GHz – 20 GHz (WCDMA Mode)**

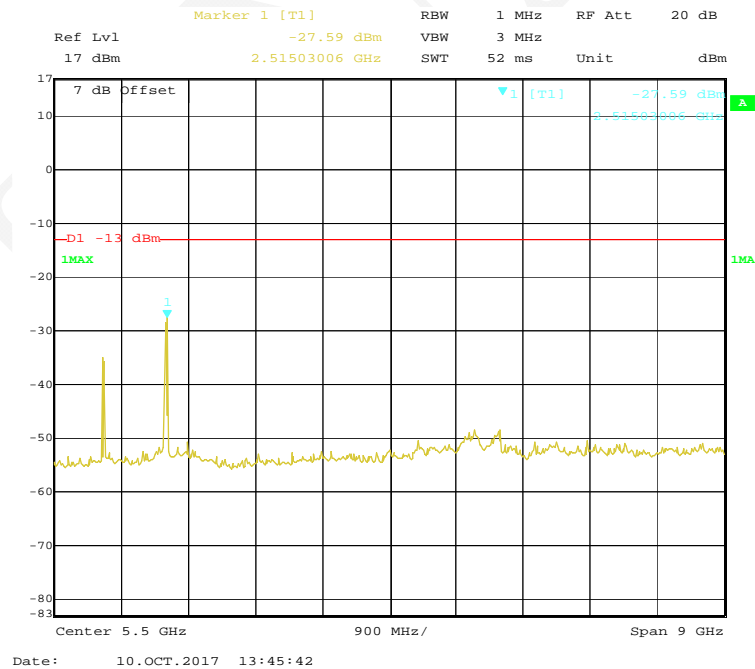
30 MHz - 1 GHz (1.4 MHz, Middle Channel)



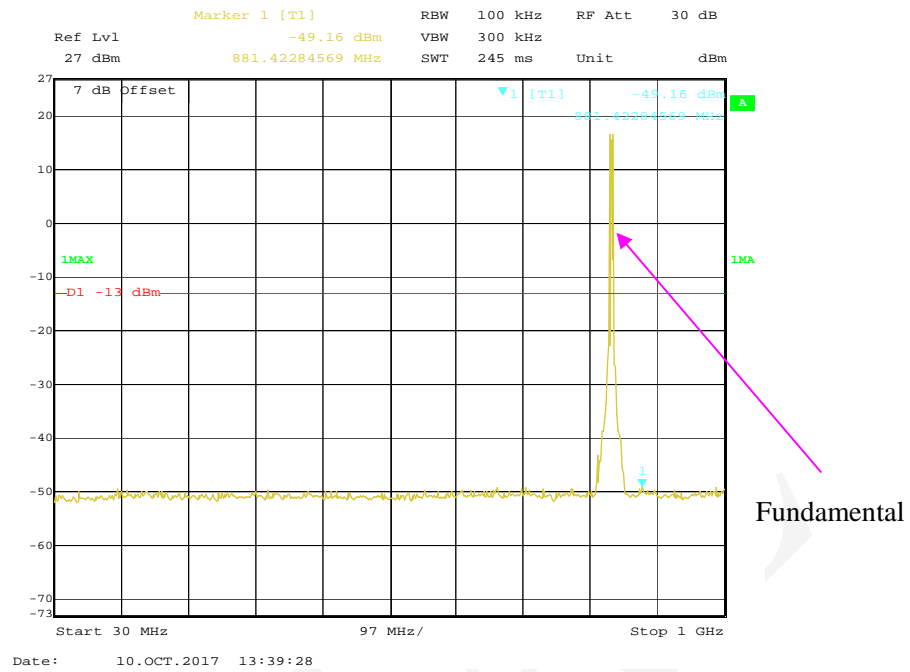
30 MHz - 1 GHz (3.0 MHz, Middle Channel)



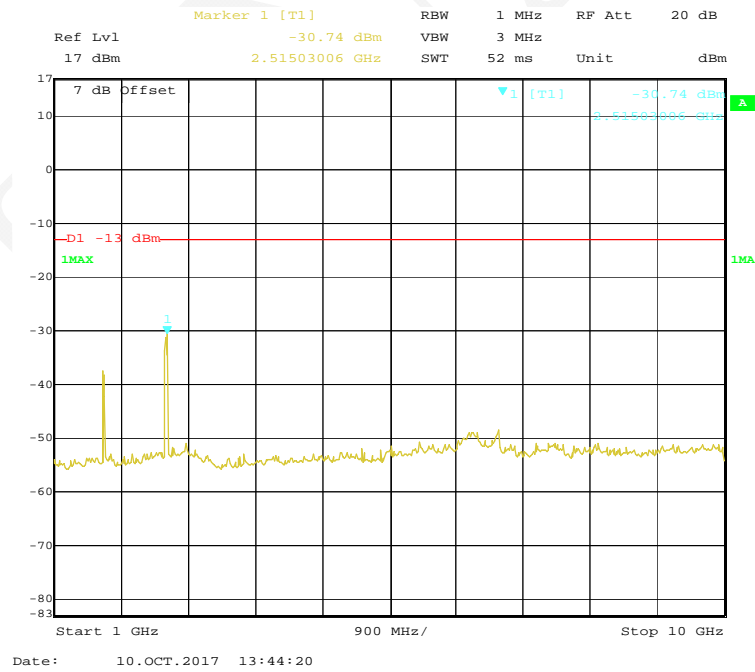
1 GHz – 10 GHz (3.0 MHz, Middle Channel)

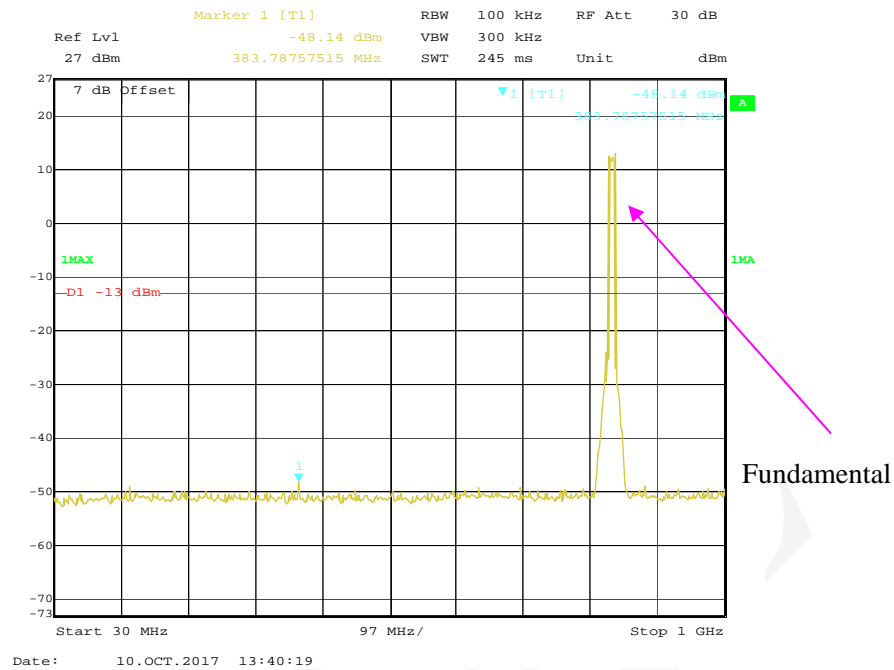
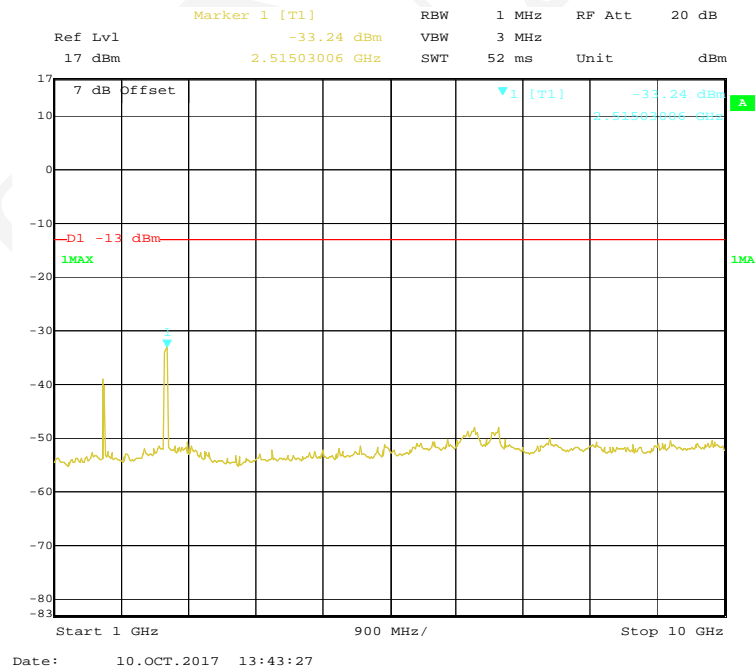


30 MHz - 1 GHz (5.0 MHz, Middle Channel)



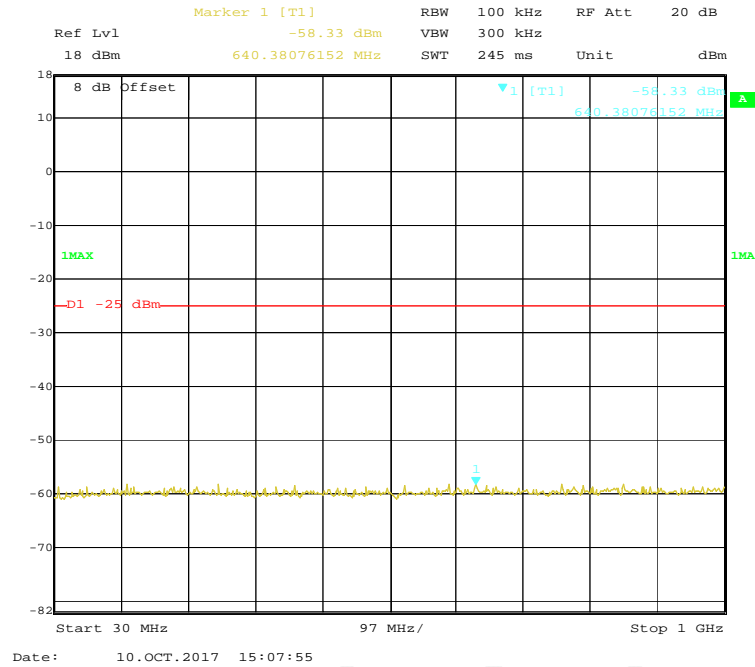
1 GHz – 10 GHz (5.0MHz, Middle Channel)



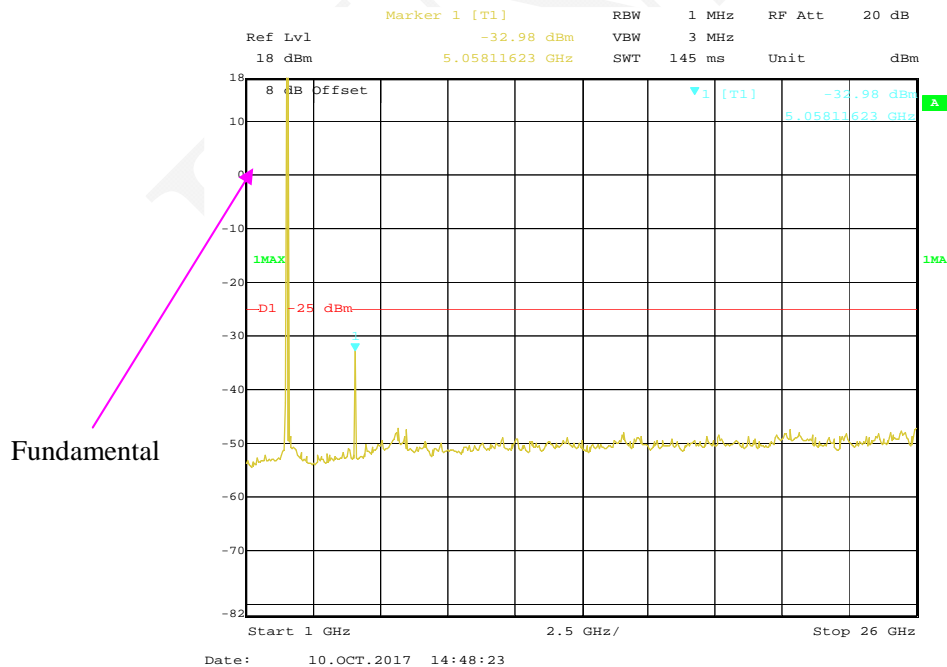
30 MHz - 1 GHz (10.0 MHz, Middle Channel)**1 GHz – 10 GHz (10.0 MHz, Middle Channel)**

LTE Band 7:

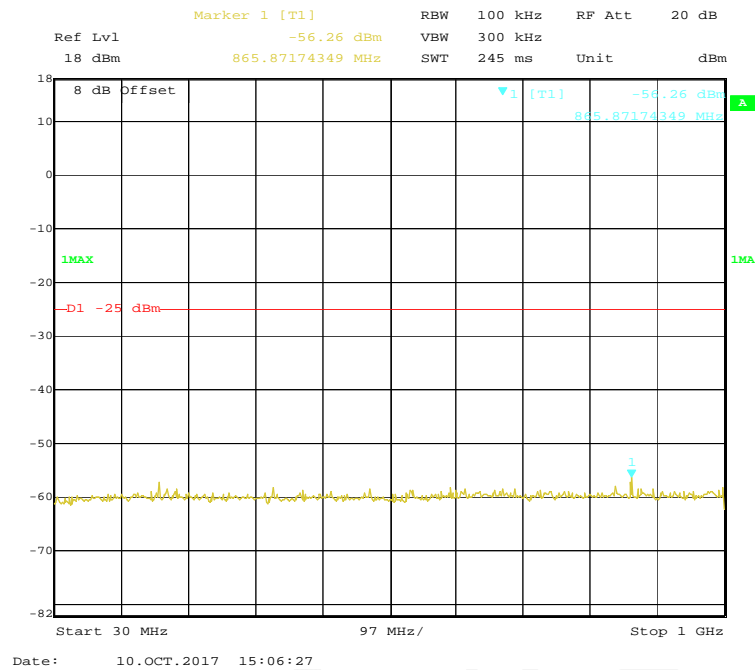
30 MHz - 1 GHz (5 MHz, Middle Channel)



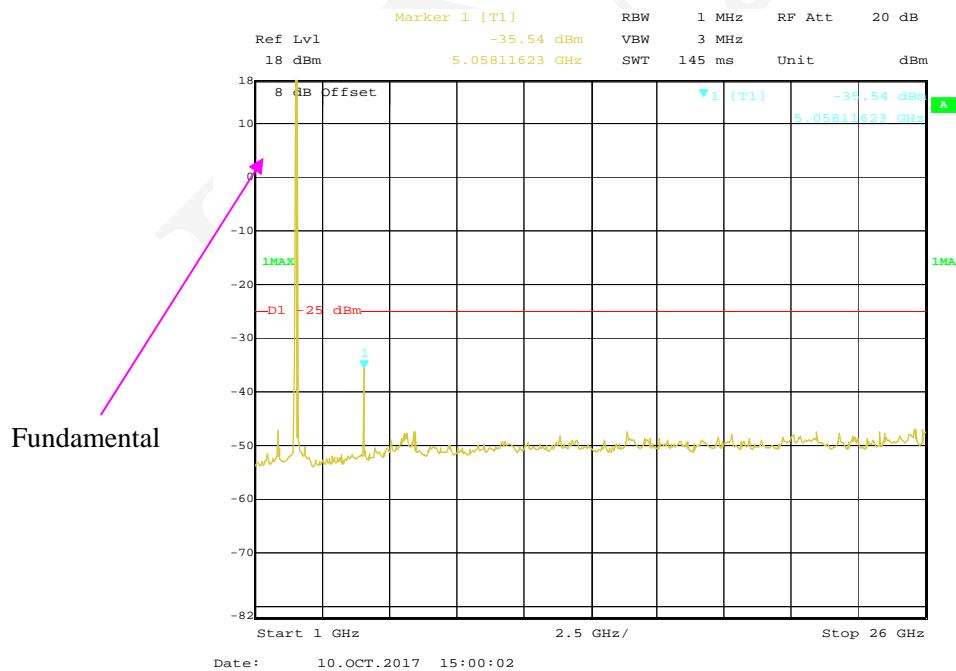
1 GHz – 26 GHz (5 MHz, Middle Channel)



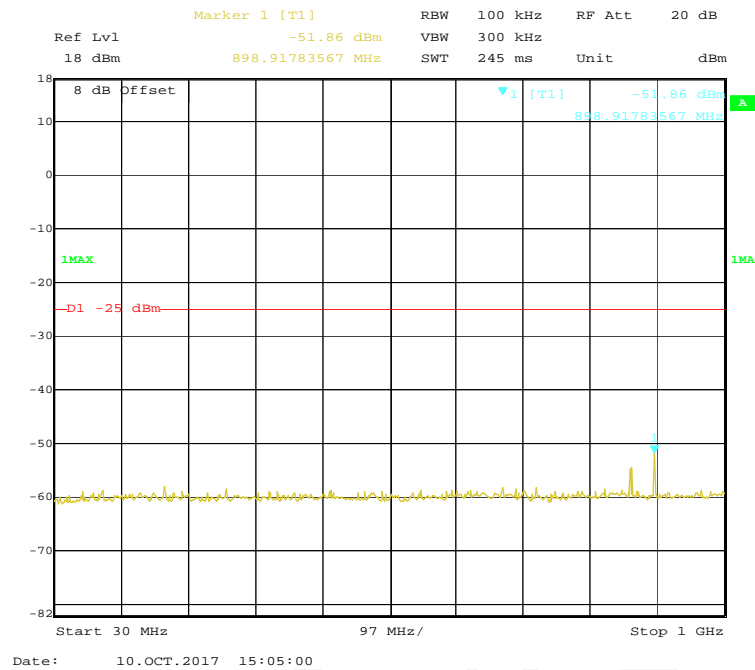
30 MHz - 1 GHz (10MHz, Middle Channel)



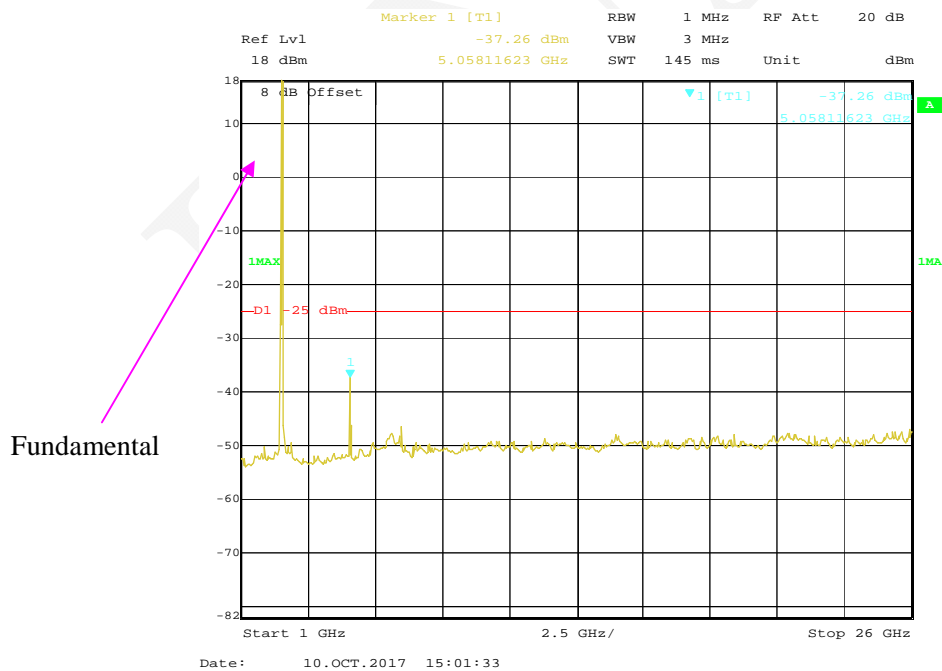
1 GHz – 26 GHz (10 MHz, Middle Channel)



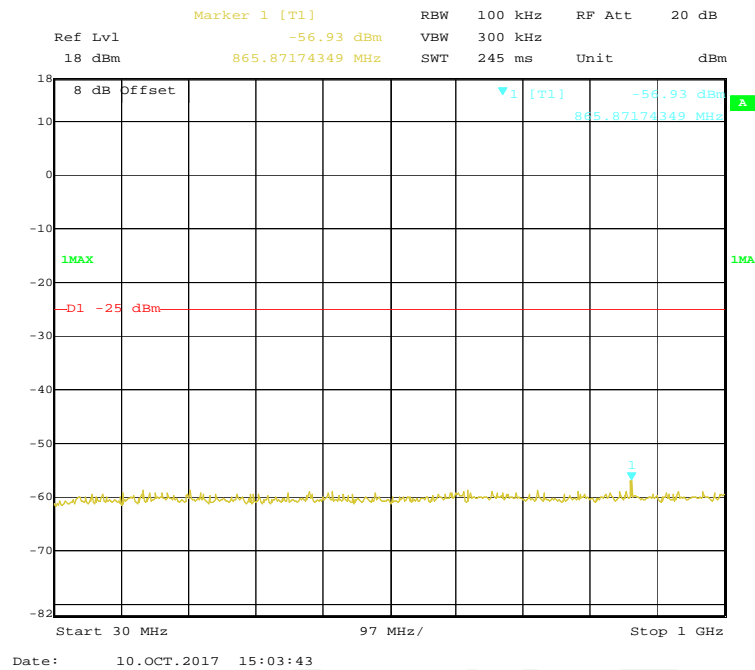
30 MHz - 1 GHz (15 MHz, Middle Channel)



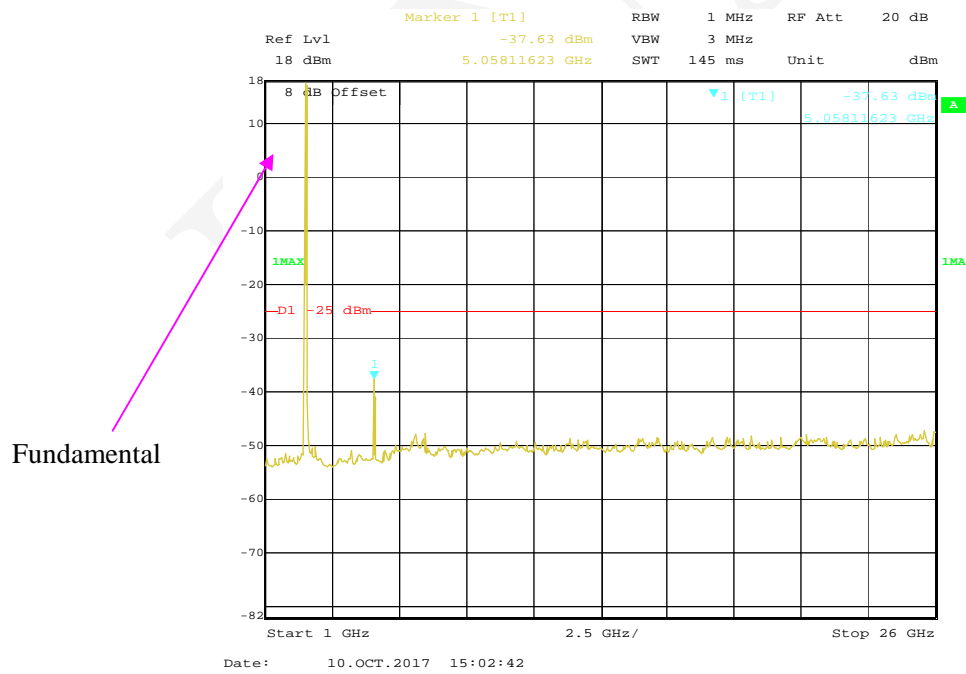
1 GHz – 26 GHz (15MHz, Middle Channel)



30 MHz - 1 GHz (20 MHz, Middle Channel)

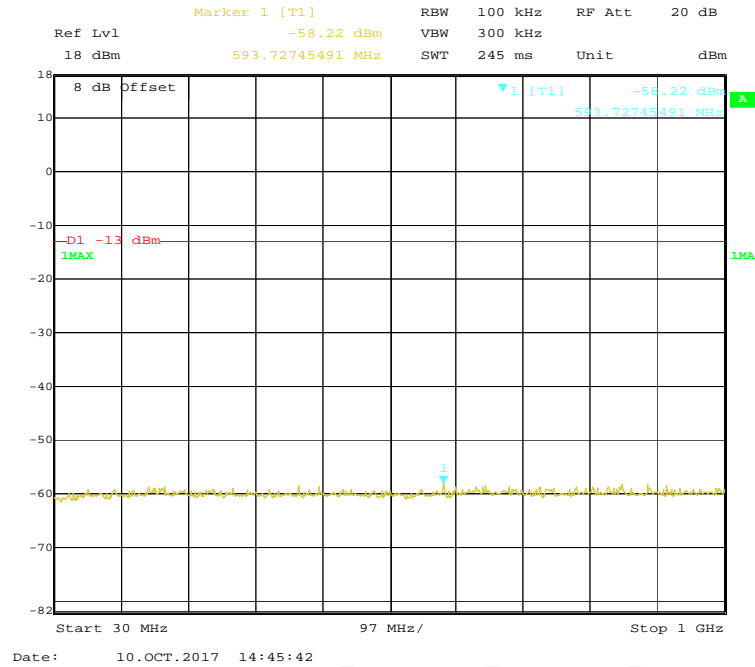


1 GHz – 26 GHz (20 MHz, Middle Channel)

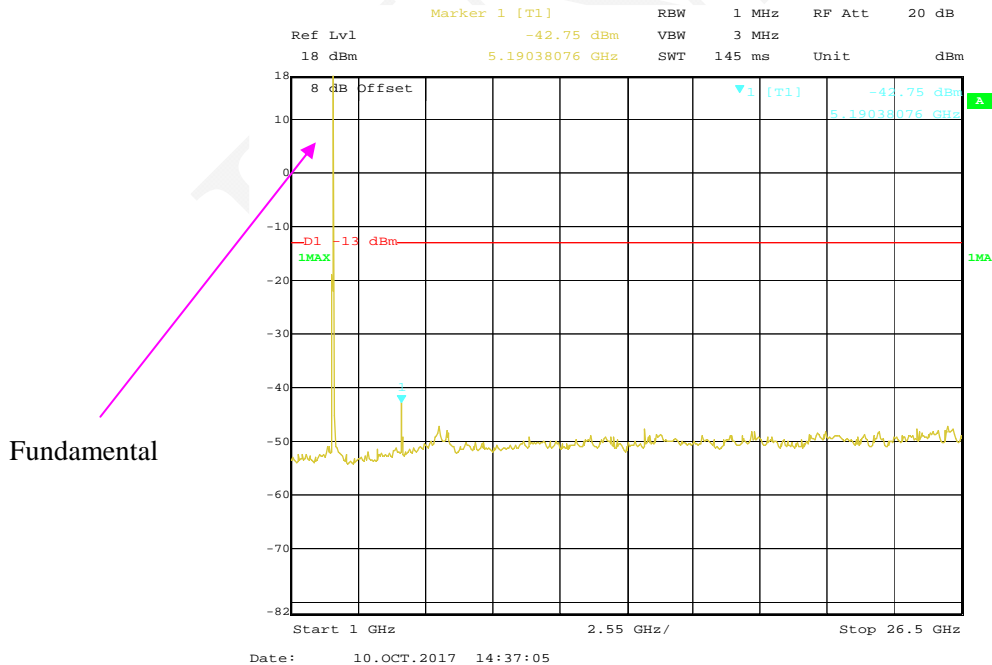


LTE Band 41:

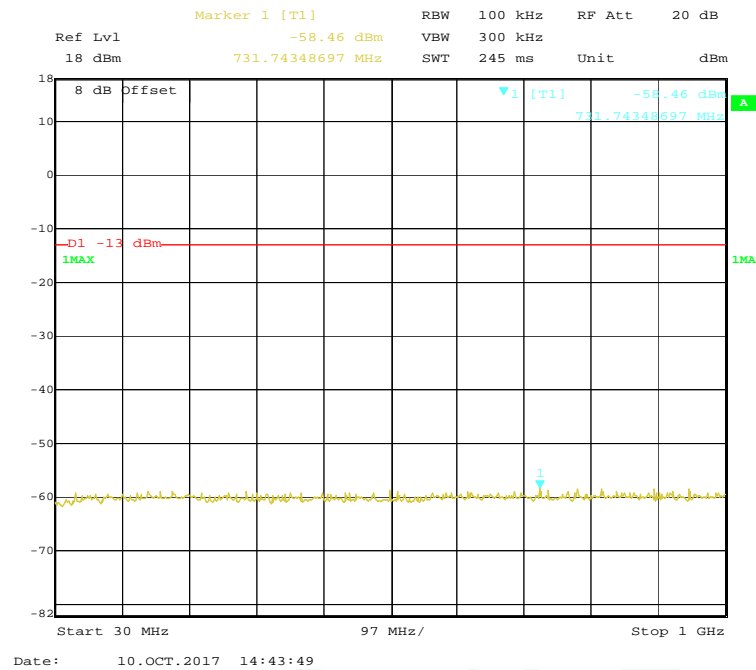
30 MHz - 1 GHz (5 MHz, Middle Channel)



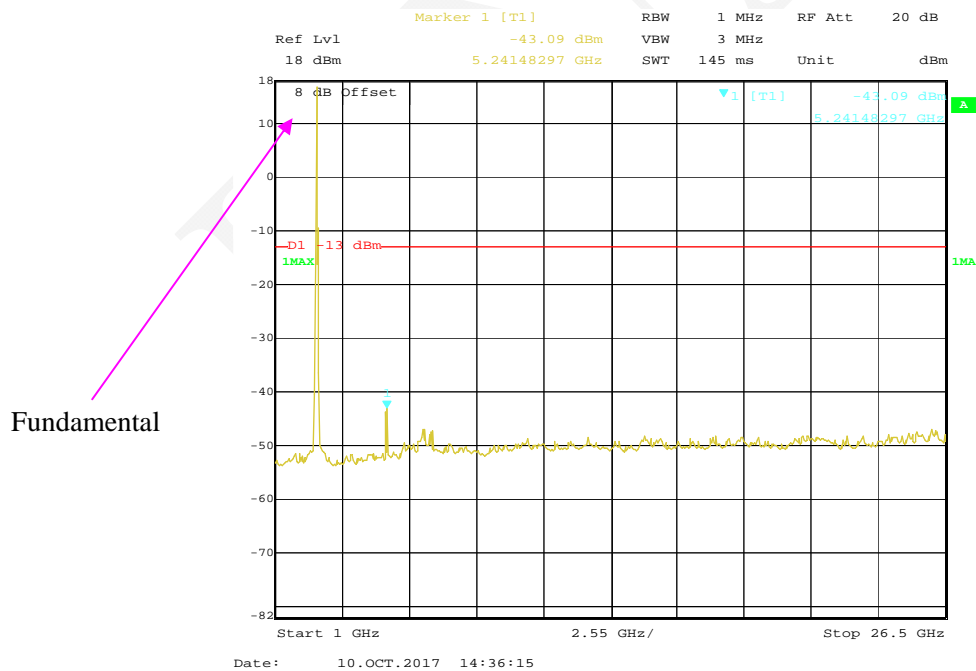
1 GHz – 26.5 GHz (5 MHz, Middle Channel)



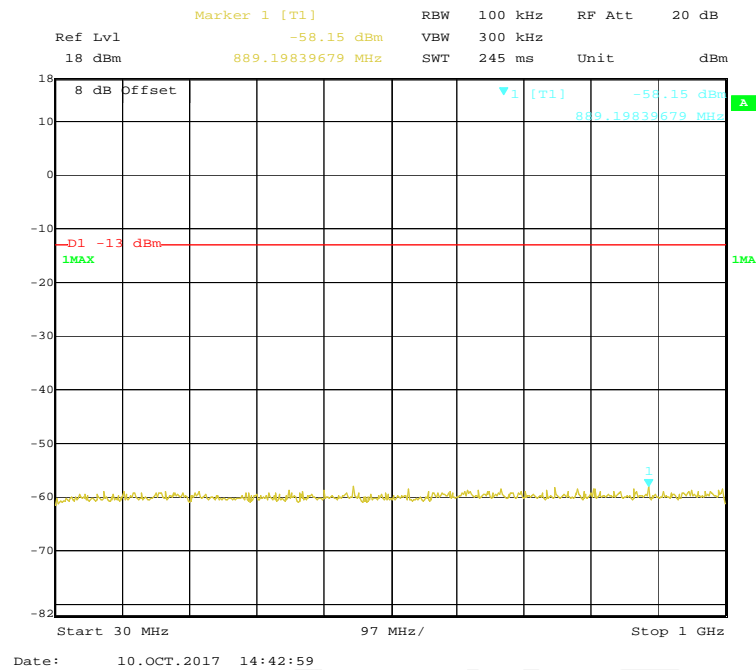
30 MHz - 1 GHz (10 MHz, Middle Channel)



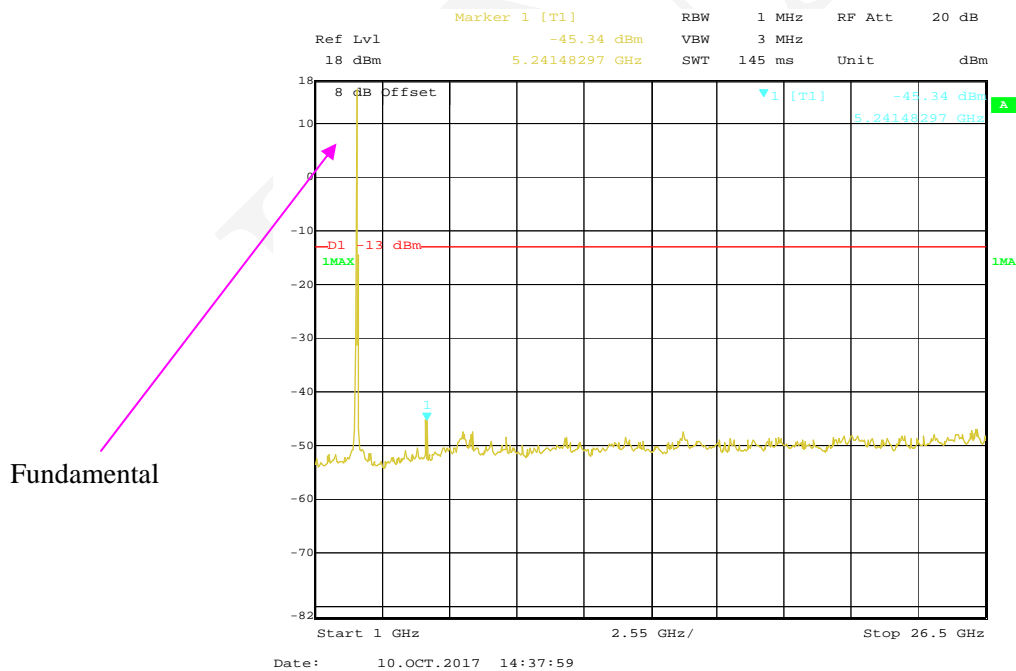
1 GHz -26.5 GHz (10 MHz, Middle Channel)



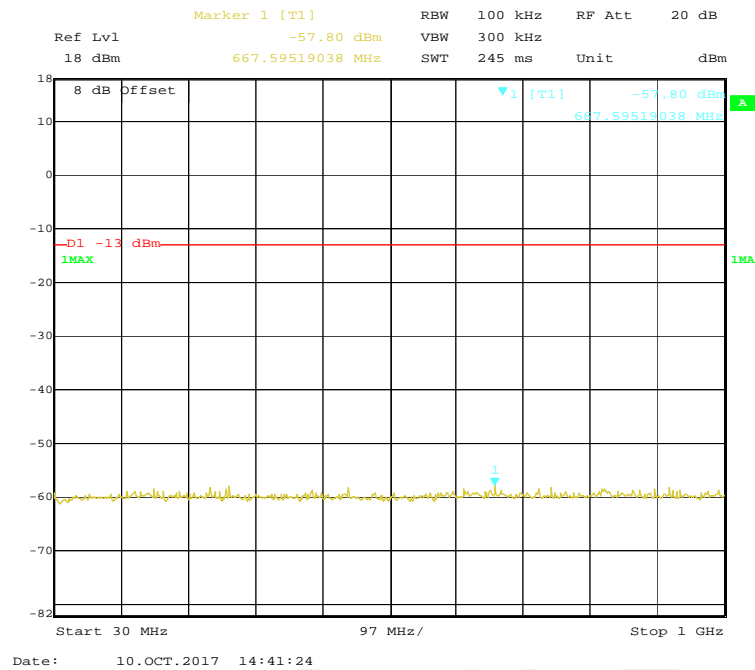
30 MHz - 1 GHz (15 MHz, Middle Channel)



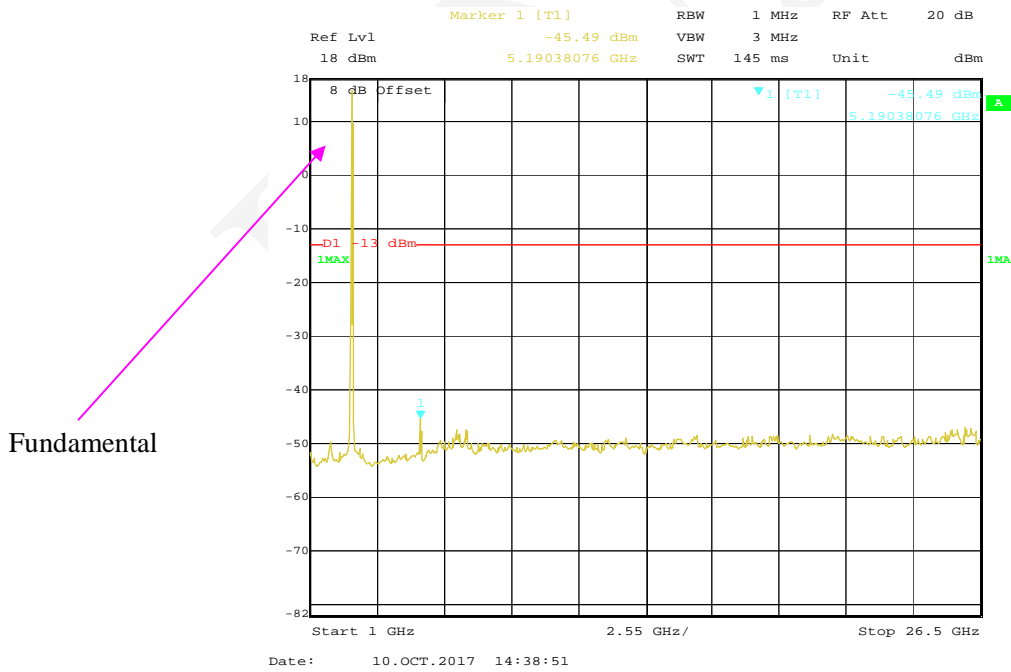
1 GHz – 26.5 GHz (15MHz, Middle Channel)



30 MHz - 1 GHz (20 MHz, Middle Channel)



1 GHz – 26.5 GHz (20 MHz, Middle Channel)



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

Applicable Standards

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

22.917 (a) Out of band emissions. 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.

24.238 (a) Out of band emissions. 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.

27.53 (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:	23.3 °C
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Chris Wang on 2017-10-10.

Test mode: Transmitting (Pre-scan with Low, Middle, High channel, and the worse case data as below)

GSM 850 Band (30 MHz ~ 10 GHz):

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GSM Mode, Middle channel										
644.27	44.95	306	146	H	-51.17	0.60	-1.14	-52.91	-13	39.91
644.27	43.43	276	125	V	-57.48	0.60	-1.14	-59.22	-13	46.22
1673.20	53.50	160	207	H	-57.45	0.84	8.48	-49.81	-13	36.81
1673.20	54.82	2	216	V	-56.38	0.84	8.48	-48.74	-13	35.74
2509.80	50.76	143	183	H	-37.86	0.89	10.09	-48.66	-13	35.66
2509.80	52.52	125	124	V	-36.17	0.89	10.09	-46.97	-13	33.97

WCDMA Band V (30 MHz ~ 10 GHz):

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Middle channel										
644.27	44.98	143	135	H	-51.14	0.60	-1.14	-52.88	-13	39.88
644.27	43.41	320	137	V	-57.50	0.60	-1.14	-59.24	-13	46.24
1673.20	65.16	175	164	H	-45.79	0.84	8.48	-38.15	-13	25.15
1673.20	66.69	101	231	V	-44.51	0.84	8.48	-36.87	-13	23.87
2509.80	64.84	7	247	H	-43.78	0.89	10.09	-34.58	-13	21.58
2509.80	65.71	310	123	V	-42.98	0.89	10.09	-33.78	-13	20.78

PCS 1900 Band (30 MHz ~ 20GHz):

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
GSM Mode, Middle channel										
644.27	55.22	327	237	H	-40.90	0.60	-1.14	-42.64	-13	29.64
644.27	63.44	41	180	V	-37.47	0.60	-1.14	-39.21	-13	26.21
3760.00	65.34	273	192	H	-38.35	0.95	9.74	-29.56	-13	16.56
3760.00	66.80	80	185	V	-37.21	0.95	9.74	-28.42	-13	15.42
5640.00	62.38	323	234	H	-38.13	1.15	10.74	-28.54	-13	15.54
5640.00	64.35	345	251	V	-36.46	1.15	10.74	-26.87	-13	13.87

WCDMA Band II (30 MHz ~ 20GHz):

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
WCDMA Mode, Middle channel										
644.27	55.20	134	193	H	-40.92	0.60	-1.14	-42.66	-13	29.66
644.27	63.56	7	241	V	-37.35	0.60	-1.14	-39.09	-13	26.09
3760.00	56.65	109	236	H	-47.04	0.95	9.74	-38.25	-13	25.25
3760.00	58.30	100	129	V	-45.71	0.95	9.74	-36.92	-13	23.92
5640.00	56.31	149	147	H	-44.20	1.15	10.74	-34.61	-13	21.61
5640.00	57.47	241	153	V	-43.34	1.15	10.74	-33.75	-13	20.75

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

LTE Band 5 (30 MHz ~ 10GHz):

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 1.4MHz Bandwidth Middle Channel										
644.27	55.37	69	136	H	-40.75	0.60	-1.14	-42.49	-13	29.49
644.27	63.67	174	224	V	-37.24	0.60	-1.14	-38.98	-13	25.98
1673.00	77.17	341	149	H	-33.78	0.84	8.48	-26.14	-13	13.14
1673.00	78.09	101	193	V	-33.11	0.84	8.48	-25.47	-13	12.47
2509.50	74.83	44	175	H	-33.79	0.89	10.09	-24.59	-13	11.59
2509.50	75.71	200	207	V	-32.98	0.89	10.09	-23.78	-13	10.78
16-QAM 1.4MHz Bandwidth Middle Channel										
644.27	55.35	177	125	H	-40.77	0.60	-1.14	-42.51	-13	29.51
644.27	63.64	311	199	V	-37.27	0.60	-1.14	-39.01	-13	26.01
1673.00	76.90	53	114	H	-34.05	0.84	8.48	-26.41	-13	13.41
1673.00	77.75	108	243	V	-33.45	0.84	8.48	-25.81	-13	12.81
2509.50	74.66	98	233	H	-33.96	0.89	10.09	-24.76	-13	11.76
2509.50	75.45	26	124	V	-33.24	0.89	10.09	-24.04	-13	11.04

LTE Band 7 (30 MHz ~ 26.5 GHz):

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5MHz Bandwidth Middle Channel										
644.27	54.89	8	130	H	-41.23	0.60	-1.14	-42.97	-25	17.97
644.27	63.87	257	101	V	-37.04	0.60	-1.14	-38.78	-25	13.78
5070.00	59.77	26	159	H	-42.85	1.09	10.30	-33.64	-25	8.64
5070.00	60.60	330	243	V	-42.19	1.09	10.30	-32.98	-25	7.98
7605.00	46.89	273	159	H	-49.17	1.78	10.08	-40.87	-25	15.87
7605.00	48.35	176	238	V	-47.85	1.78	10.08	-39.55	-25	14.55
16-QAM 5MHz Bandwidth Middle Channel										
644.27	55.00	263	193	H	-41.12	0.60	-1.14	-42.86	-25	17.86
644.27	63.37	337	134	V	-37.54	0.60	-1.14	-39.28	-25	14.28
5070.00	59.70	10	196	H	-42.92	1.09	10.30	-33.71	-25	8.71
5070.00	60.76	152	202	V	-42.03	1.09	10.30	-32.82	-25	7.82
7605.00	46.78	312	206	H	-49.28	1.78	10.08	-40.98	-25	15.98
7605.00	48.06	20	156	V	-48.14	1.78	10.08	-39.84	-25	14.84

LTE Band 41 (30 MHz ~ 26.5 GHz):

Frequency (MHz)	Receiver Reading (dBμV)	Turntable Angle Degree	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
			Height (cm)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dBd/dBi)			
QPSK 5MHz Bandwidth Middle Channel										
644.27	54.80	292	189	H	-41.32	0.60	-1.14	-43.06	-13	30.06
644.27	63.34	330	242	V	-37.57	0.60	-1.14	-39.31	-13	26.31
5210.00	52.10	304	235	H	-49.93	1.11	10.30	-40.74	-13	27.74
5210.00	50.30	174	123	V	-51.94	1.11	10.30	-42.75	-13	29.75
7815.00	37.52	266	112	H	-57.87	1.82	10.04	-49.65	-13	36.65
7815.00	38.65	172	205	V	-56.84	1.82	10.04	-48.62	-13	35.62
16-QAM 5MHz Bandwidth Middle Channel										
644.27	54.73	119	194	H	-41.39	0.60	-1.14	-43.13	-13	30.13
644.27	63.40	202	128	V	-37.51	0.60	-1.14	-39.25	-13	26.25
5210.00	52.02	64	101	H	-50.01	1.11	10.30	-40.82	-13	27.82
5210.00	50.41	125	232	V	-51.83	1.11	10.30	-42.64	-13	29.64
7815.00	37.33	320	133	H	-58.06	1.82	10.04	-49.84	-13	36.84
7815.00	38.50	298	135	V	-56.99	1.82	10.04	-48.77	-13	35.77

FCC § 22.917 (a);§ 24.238 (a); §27.53 (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.

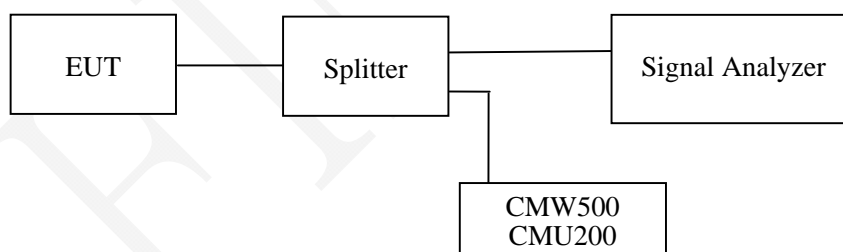
According to FCC §27.53 (m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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:	23.3 °C
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

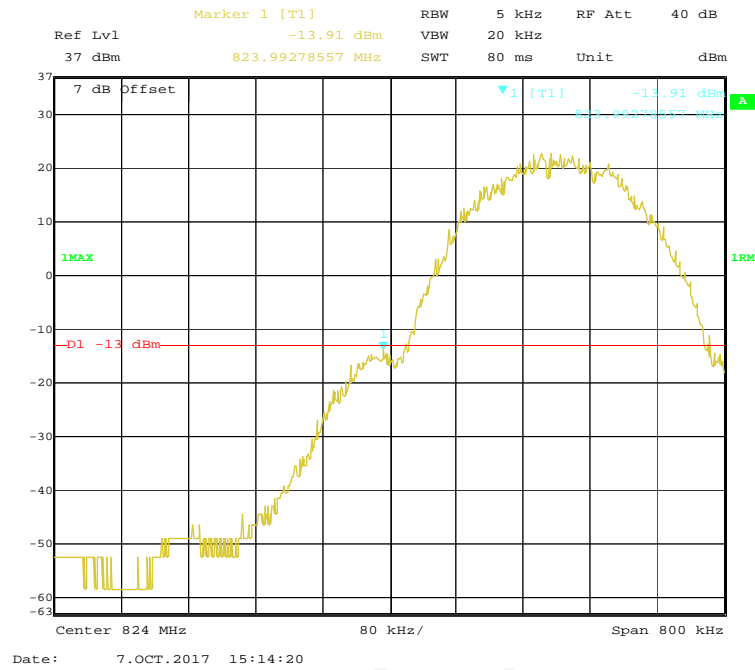
The testing was performed by Chris Wang on 2017-10-07 to 2017-11-21.

EUT operation mode: Transmitting

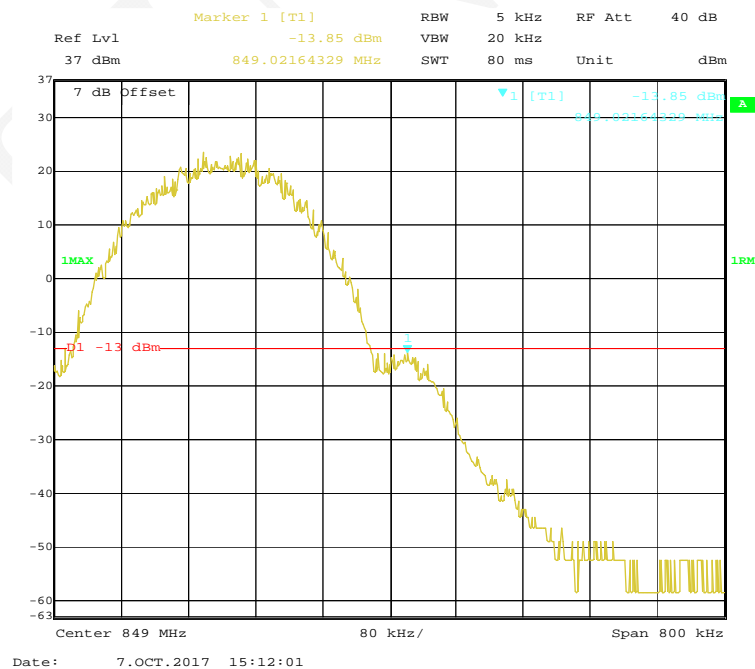
Test Result: Compliance.

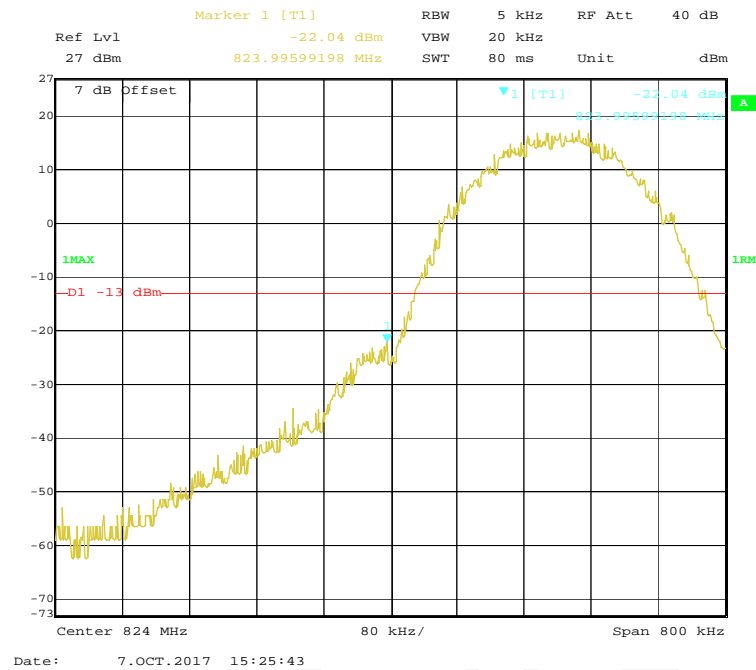
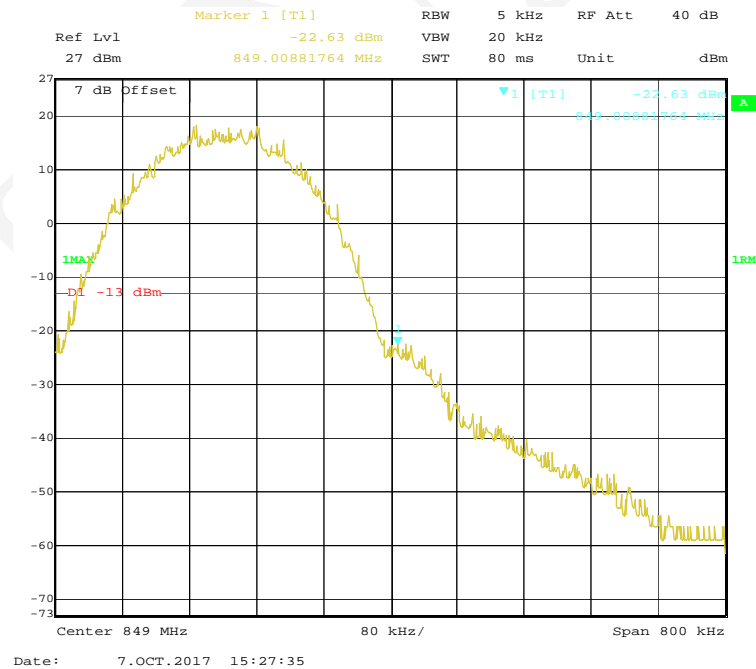
GSM 850 Band:

GSM Mode, Left Band Edge

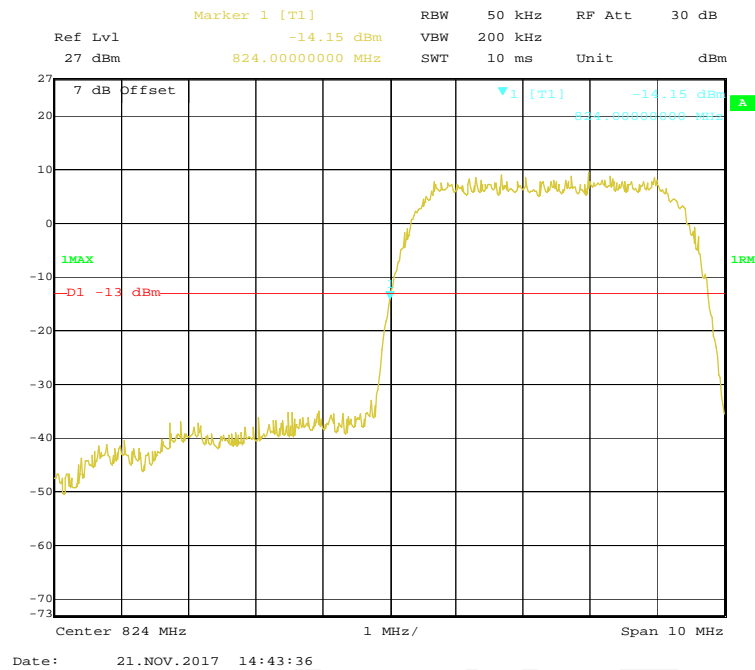


GSM Mode, Right Band Edge

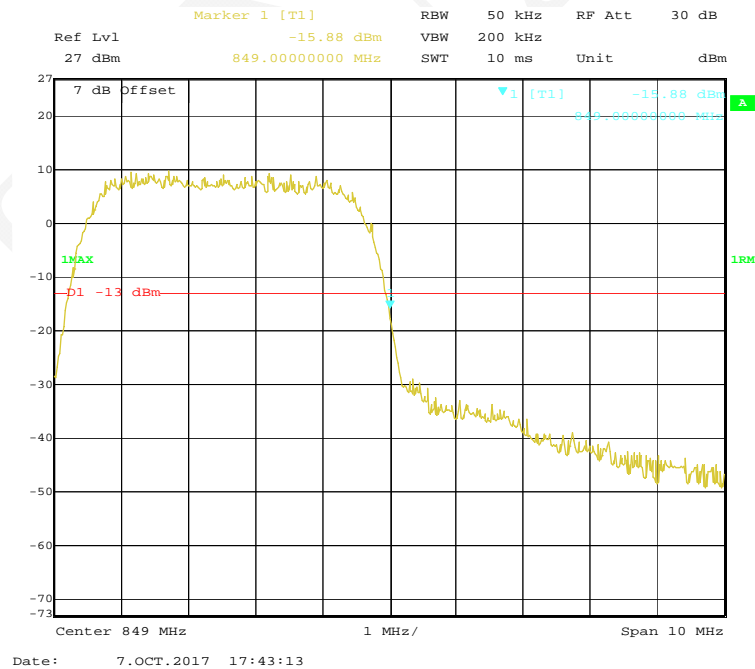


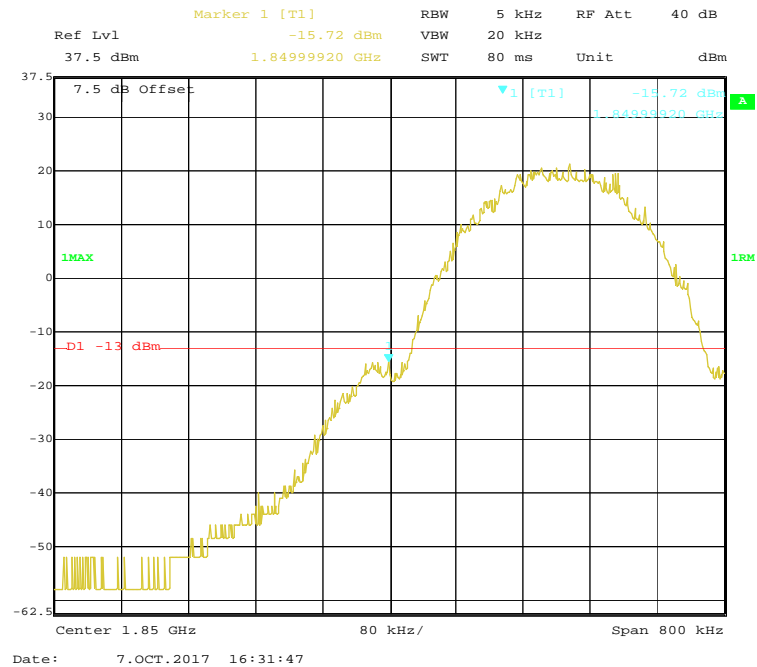
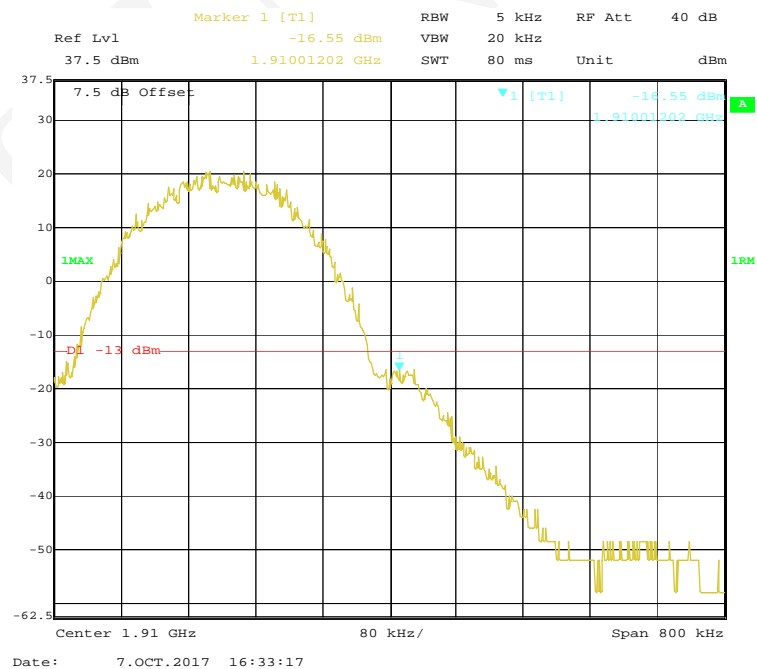
EGPRS Mode, Left Band Edge**EGPRS Mode, Right Band Edge**

WCDMA Mode Band V, Left Band Edge

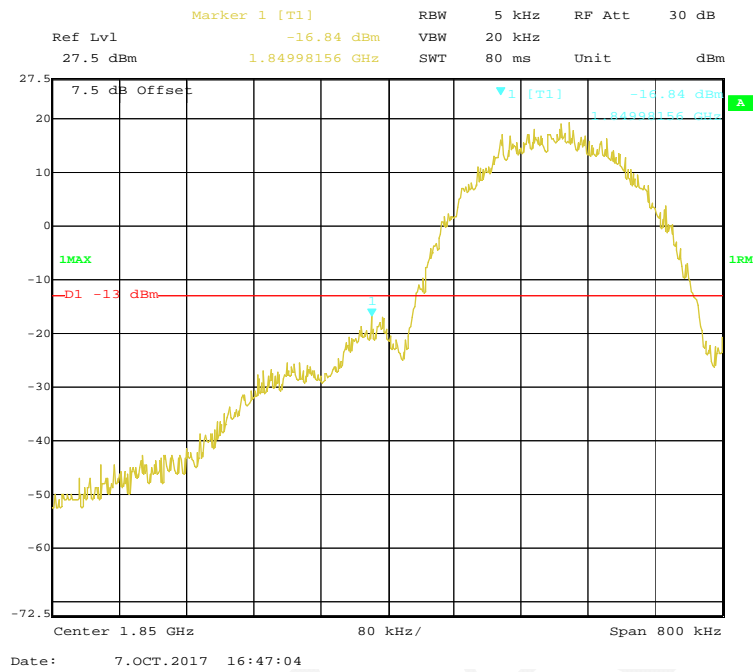


WCDMA Mode Band V, Right Band Edge

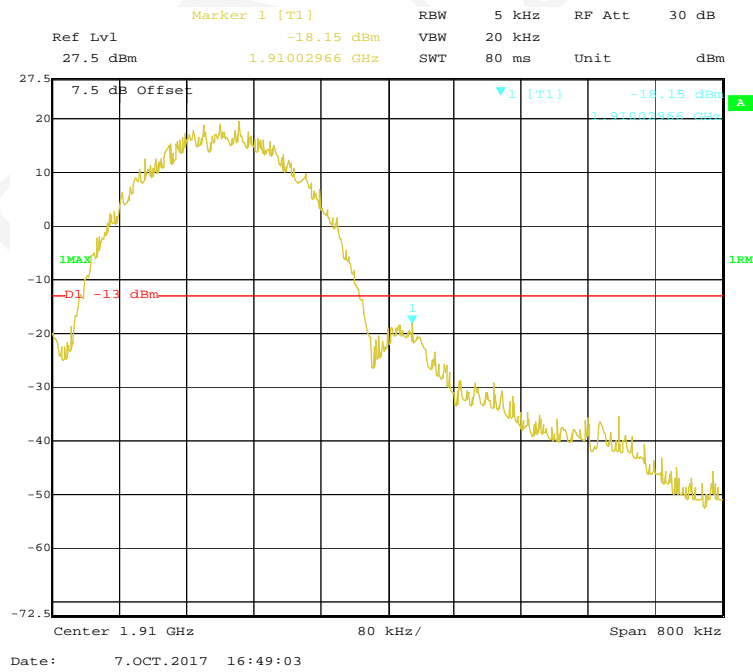


PCS 1900 Band:**GSM Mode, Left Band Edge****GSM Mode, Right Band Edge**

EGPRS Mode, Left Band Edge

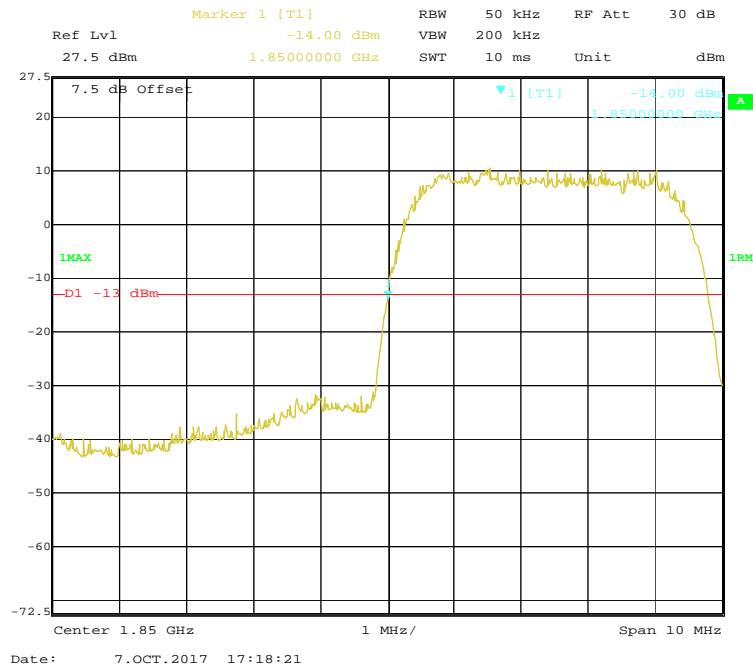


EGPRS Mode, Right Band Edge

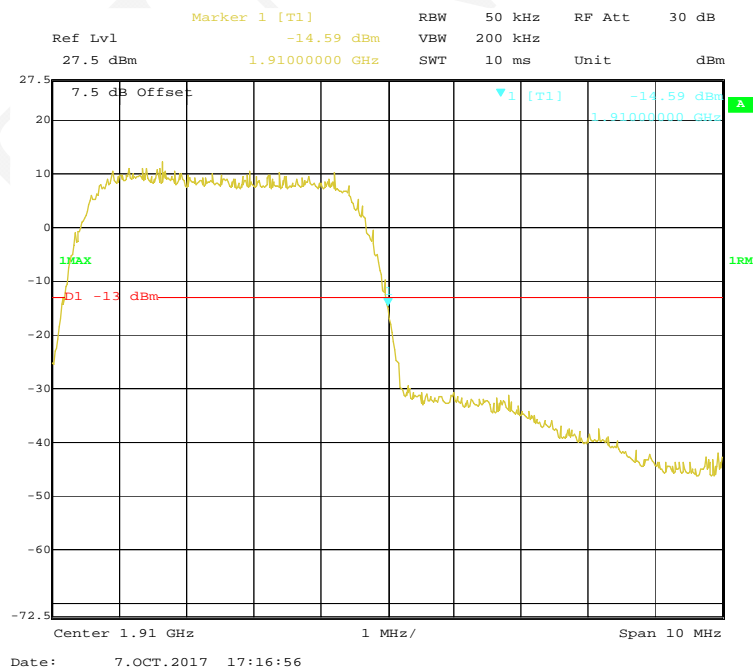


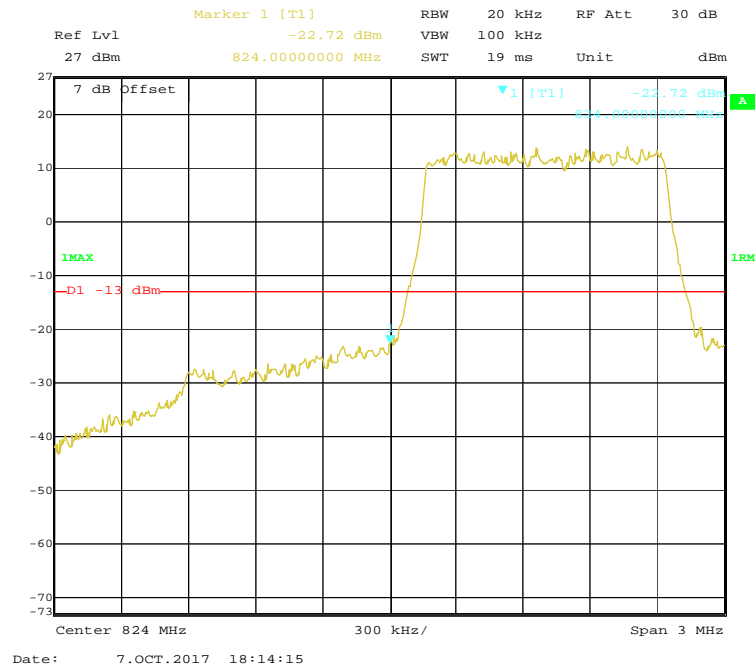
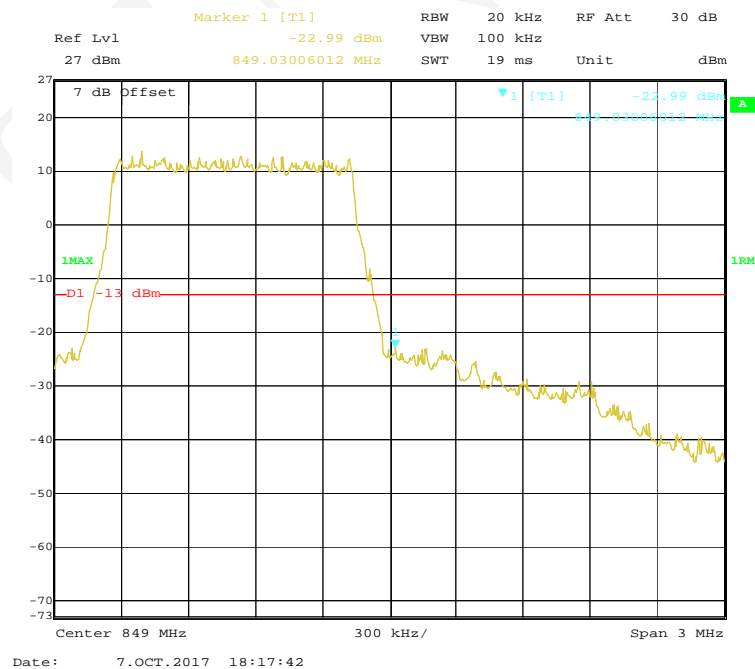
WCDMA Band II

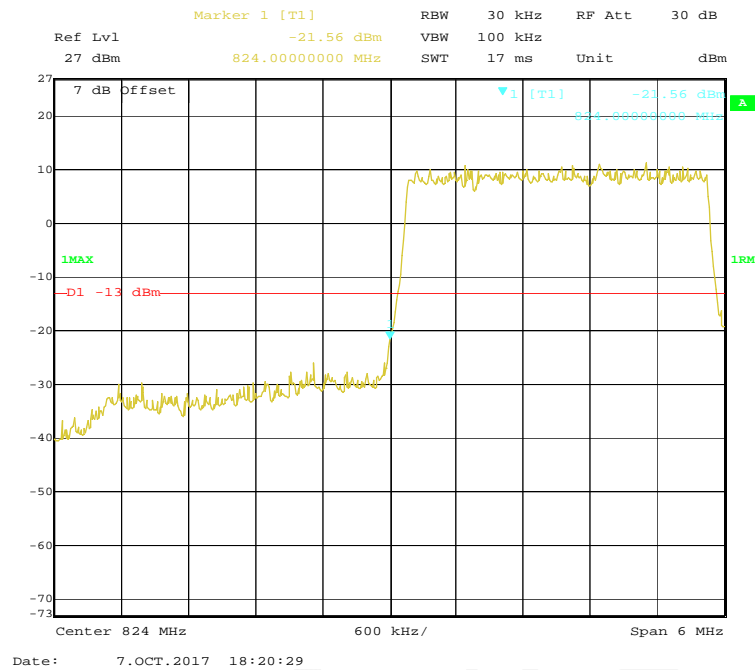
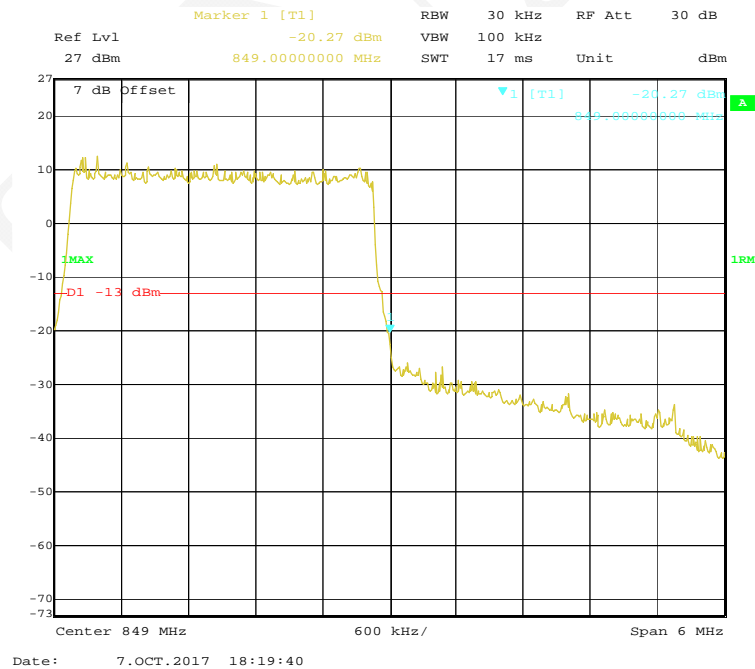
WCDMA Mode, Left Band Edge



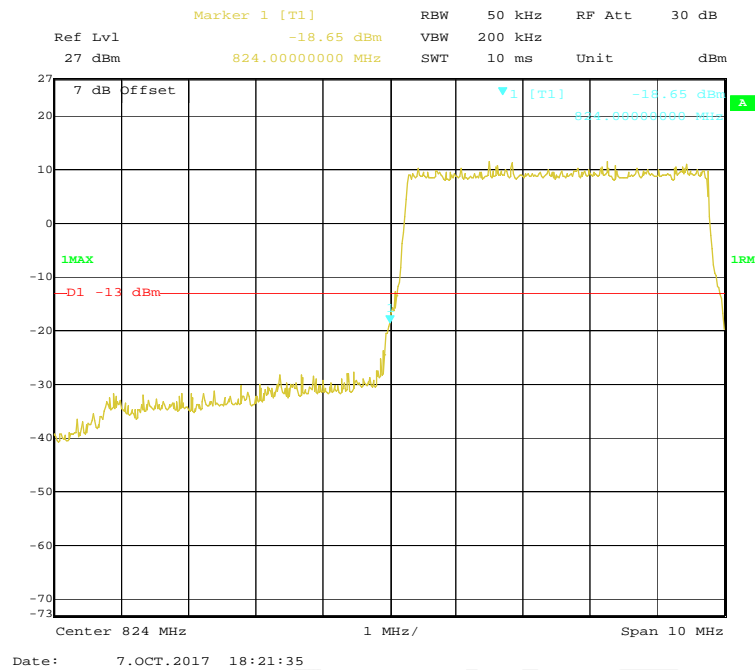
WCDMA Mode, Right Band Edge



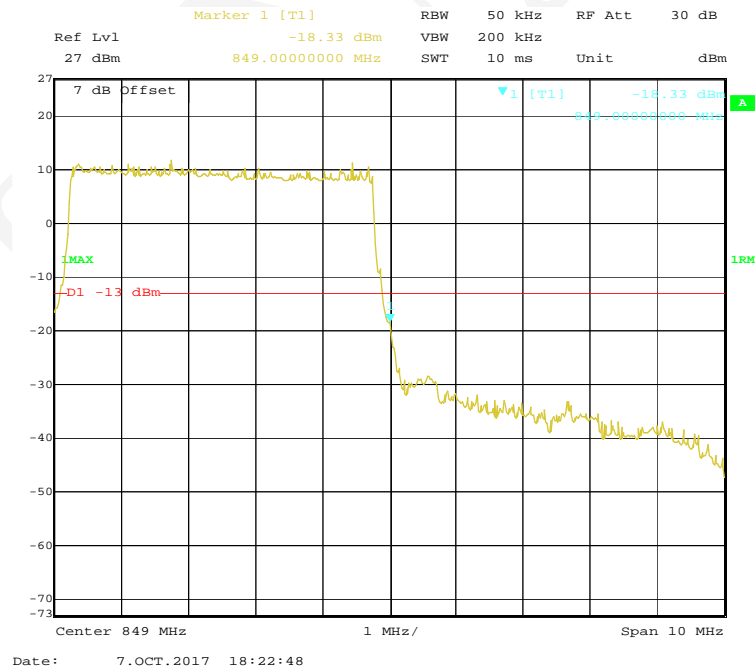
LTE Band 5:**QPSK (1.4 MHz, FULL RB) - Left Band Edge****QPSK (1.4 MHz, FULL RB) - Right Band Edge**

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

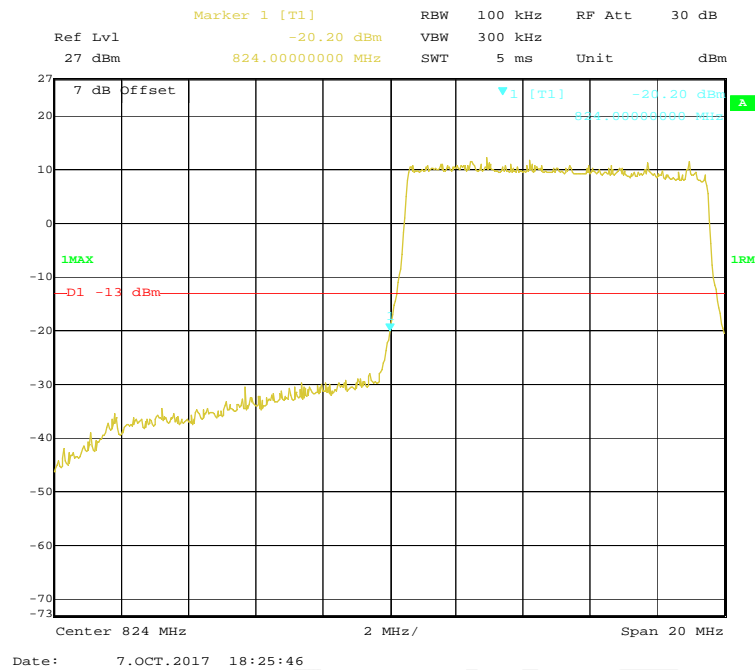
QPSK (5.0 MHz, FULL RB) - Left Band Edge



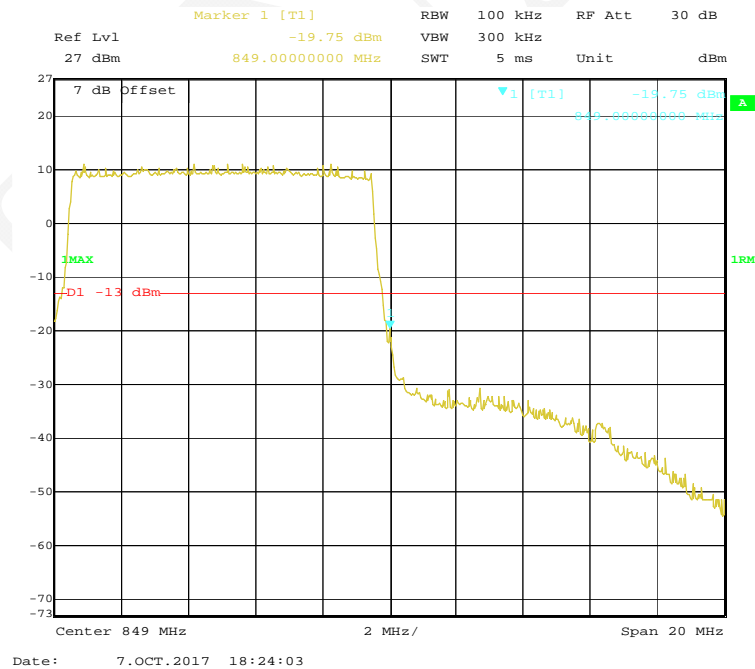
QPSK (5.0 MHz, FULL RB) - Right Band Edge



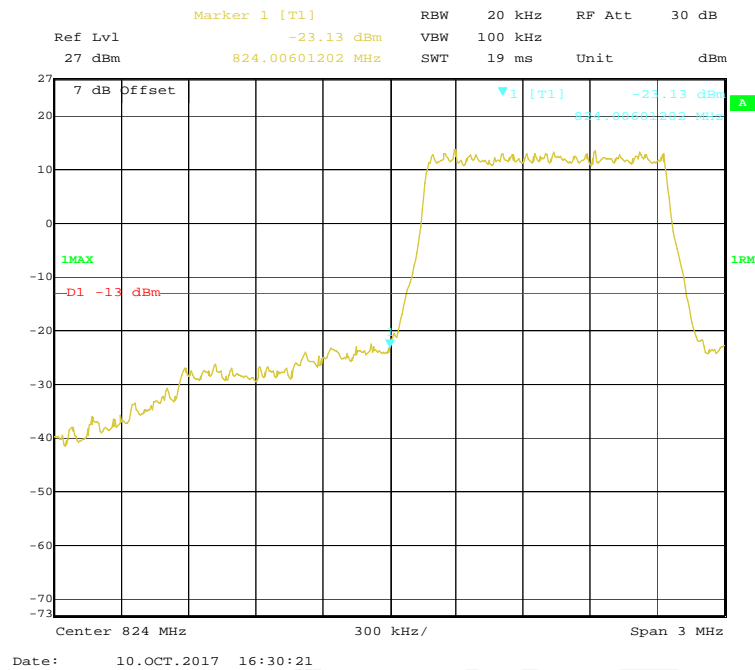
QPSK (10.0 MHz, FULL RB) - Left Band Edge



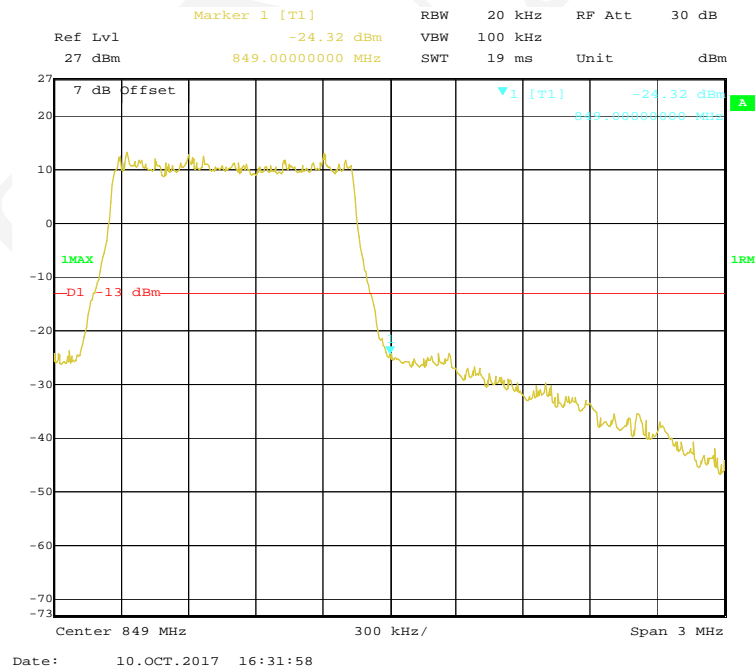
QPSK (10.0 MHz, FULL RB) - Right Band Edge



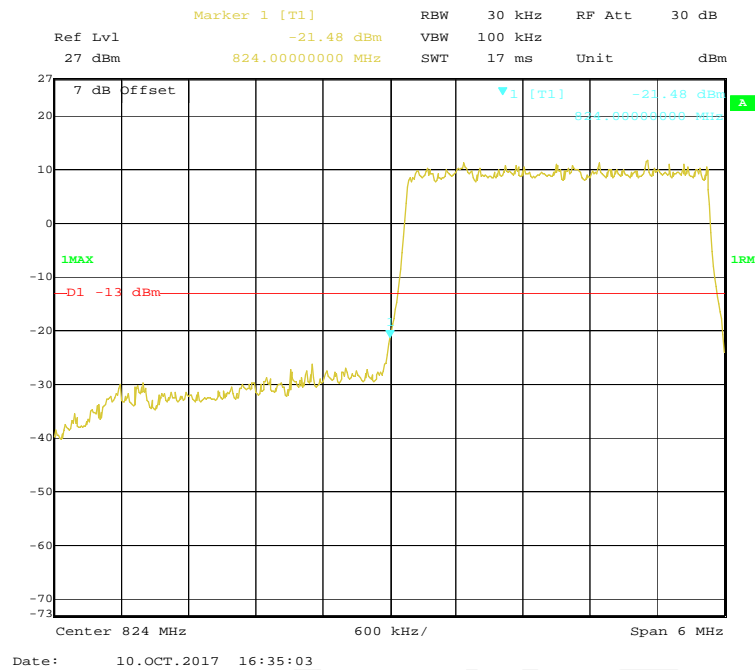
16-QAM (1.4 MHz, FULL RB) - Left Band Edge



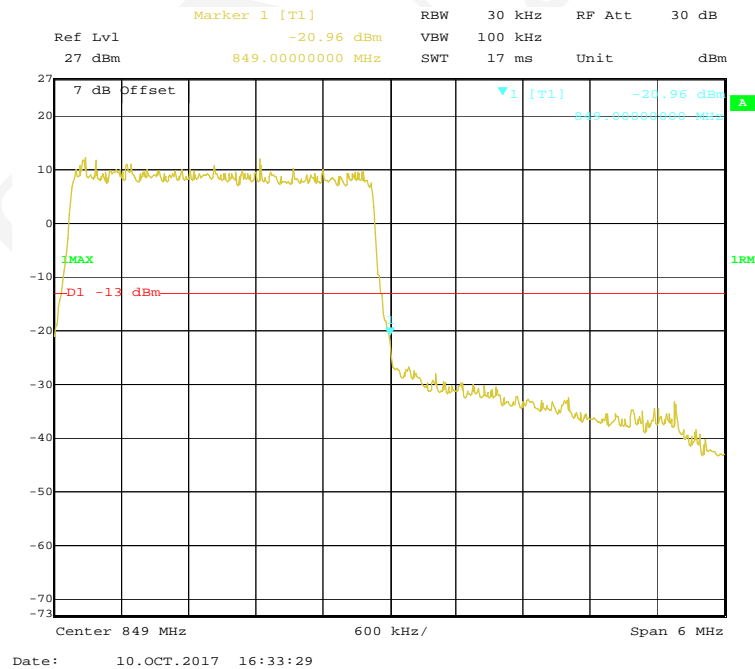
16-QAM (1.4 MHz, FULL RB) - Right Band Edge

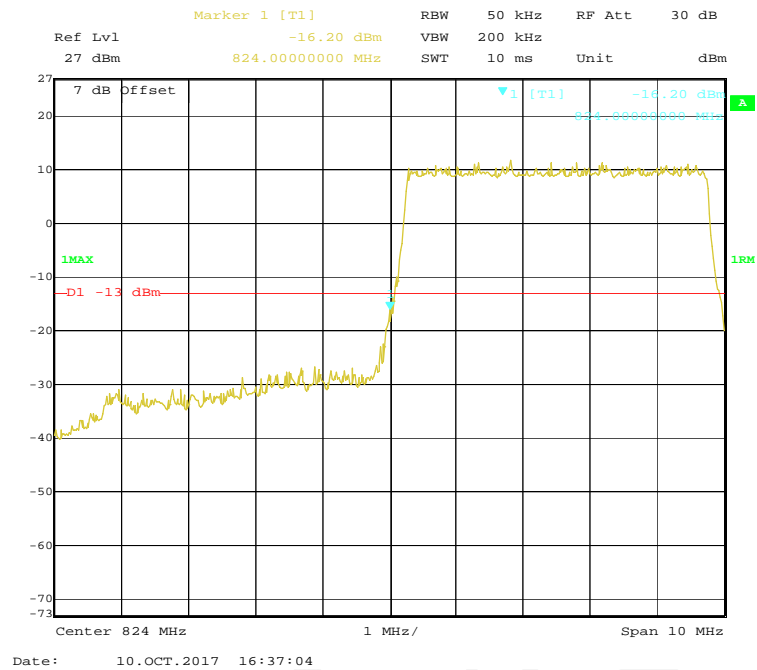
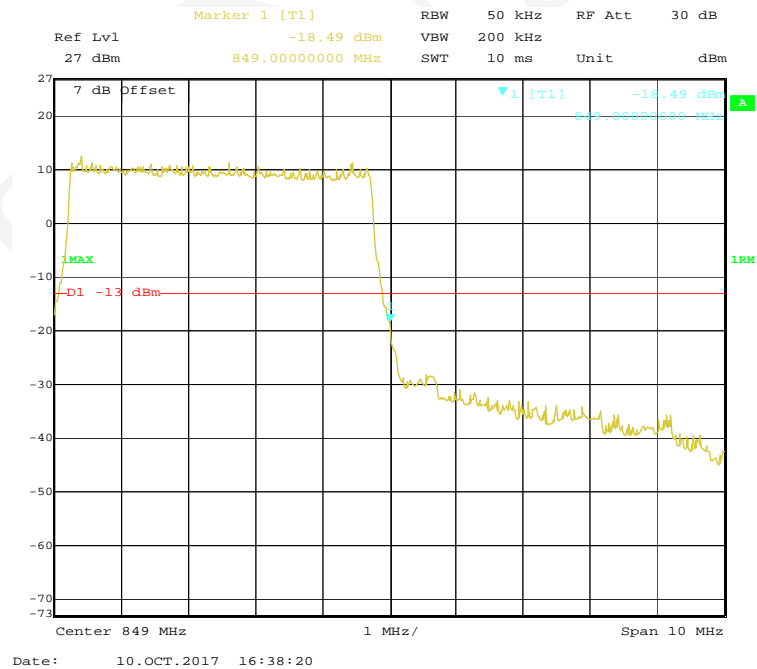


16-QAM (3.0 MHz, FULL RB) - Left Band Edge

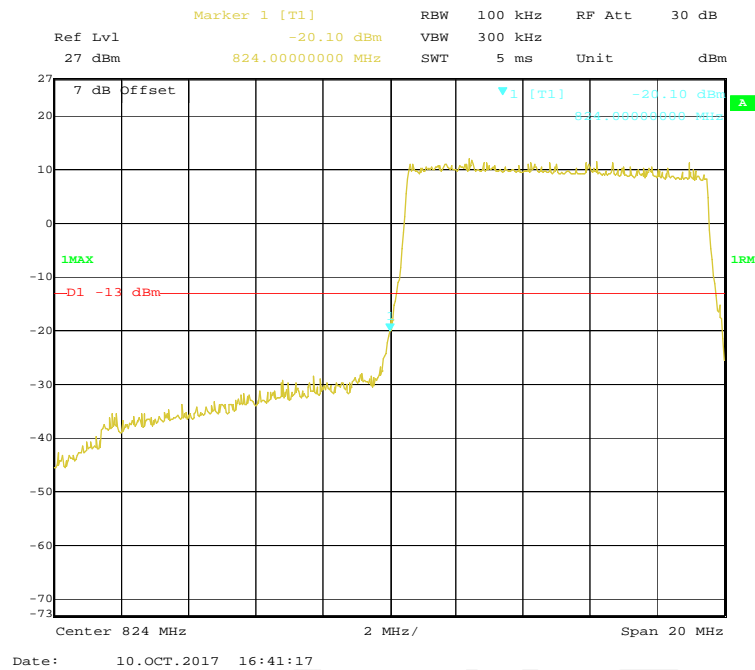


16-QAM (3.0 MHz, FULL RB) - Right Band Edge

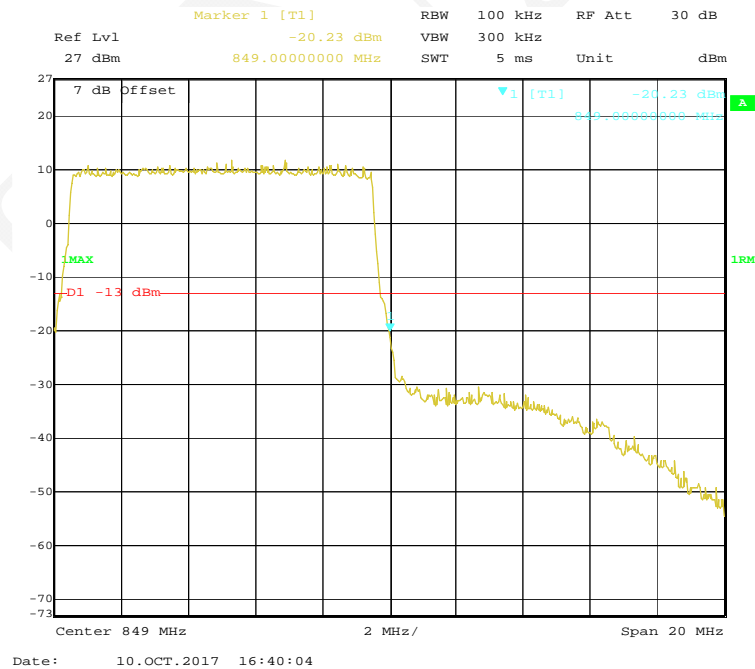


16-QAM (5.0 MHz, FULL RB) - Left Band Edge**16-QAM (5.0 MHz, FULL RB) - Right Band Edge**

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

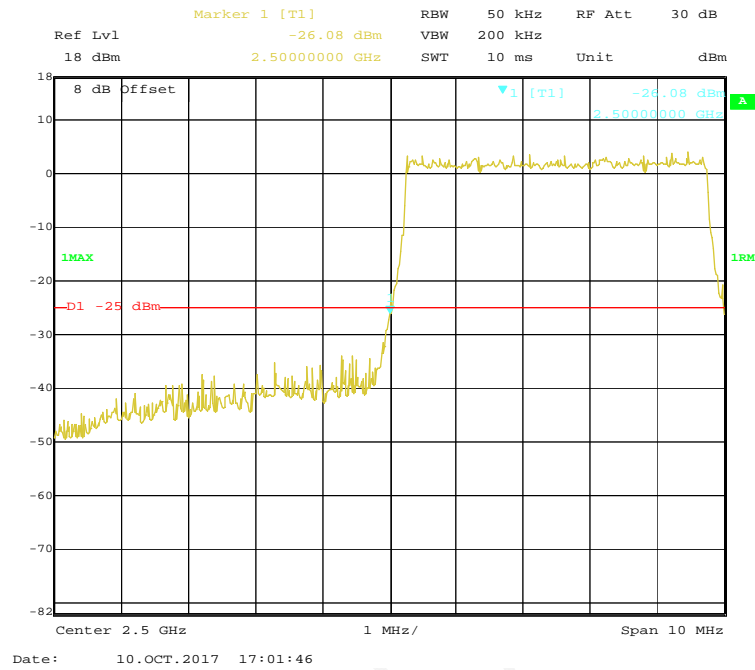


16-QAM (10.0 MHz, FULL RB) - Right Band Edge

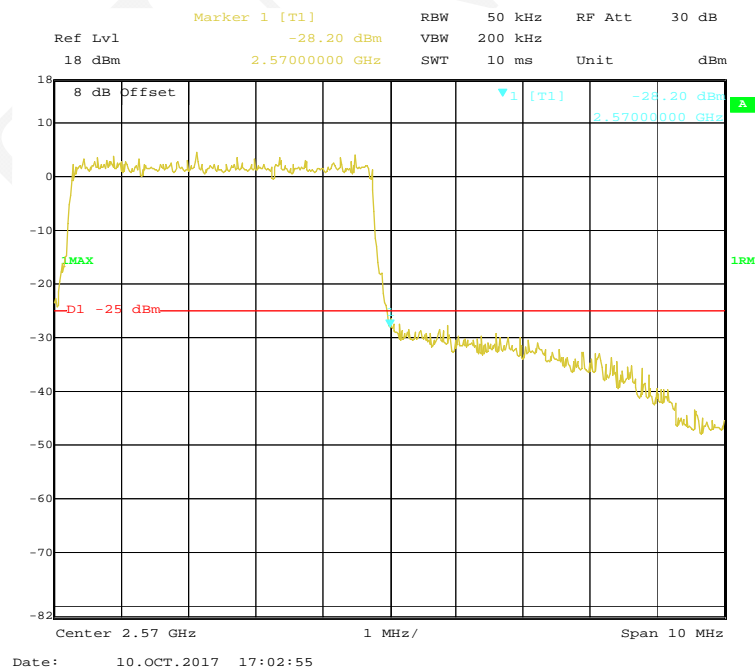


LTE Band 7:

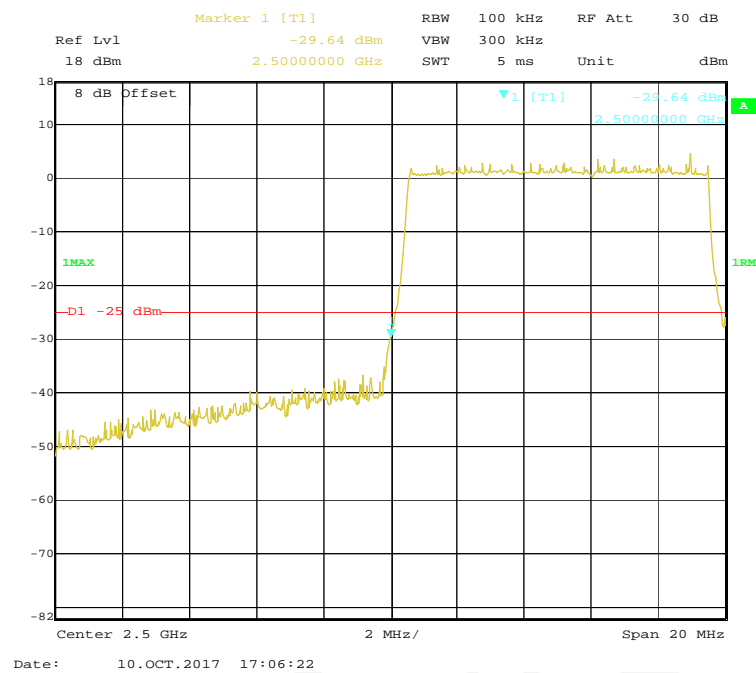
QPSK (5 MHz, FULL RB) - Left Band Edge



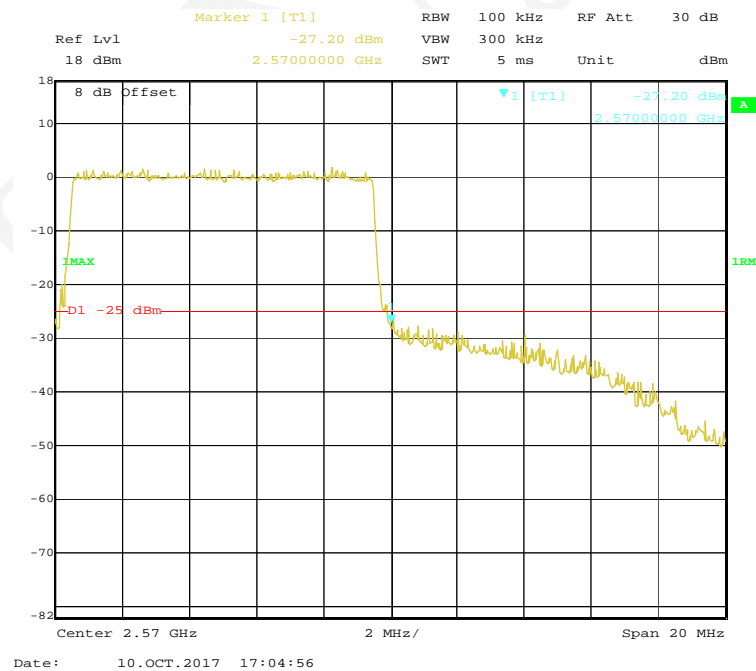
QPSK (5 MHz, FULL RB) - Right Band Edge

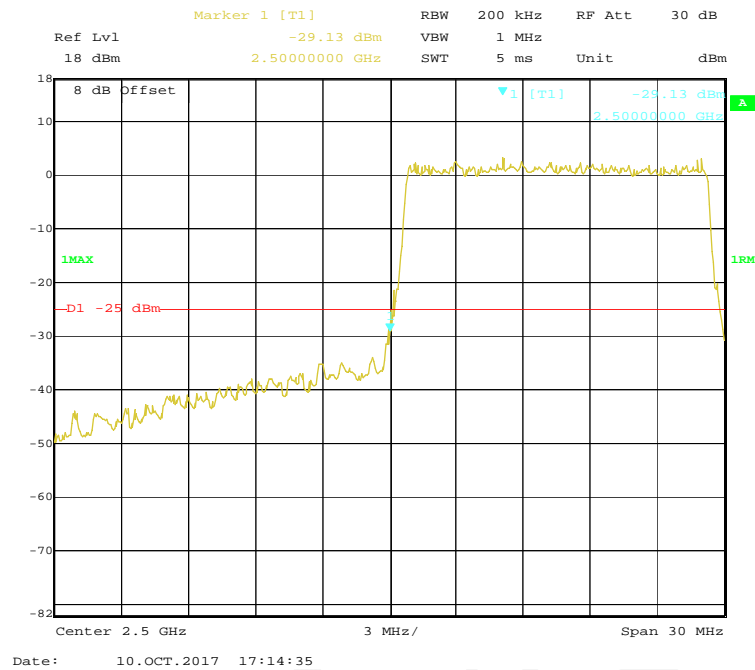
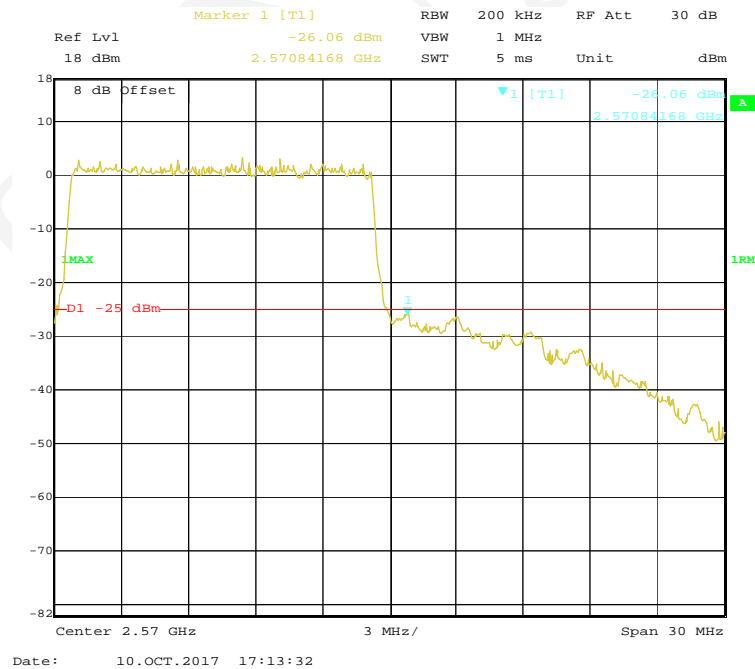


QPSK (10 MHz, FULL RB) - Left Band Edge

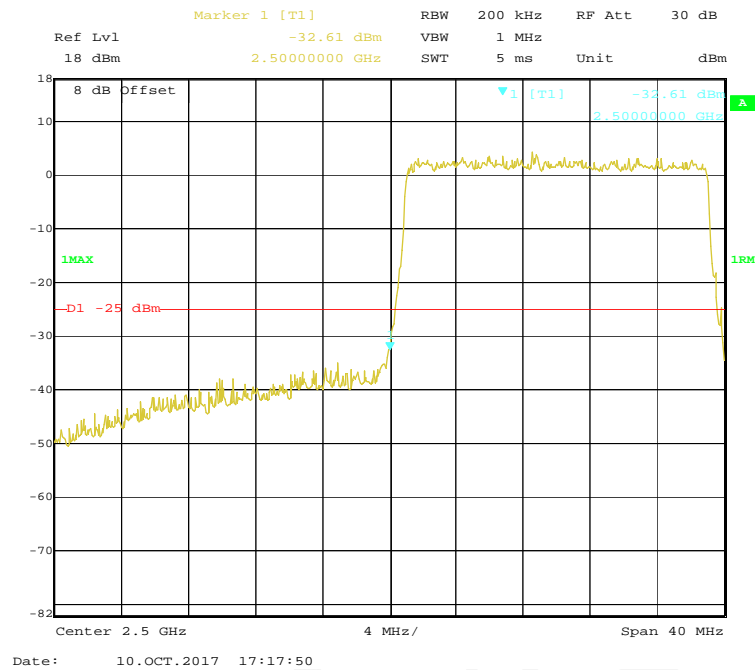


QPSK (10 MHz, FULL RB) - Right Band Edge

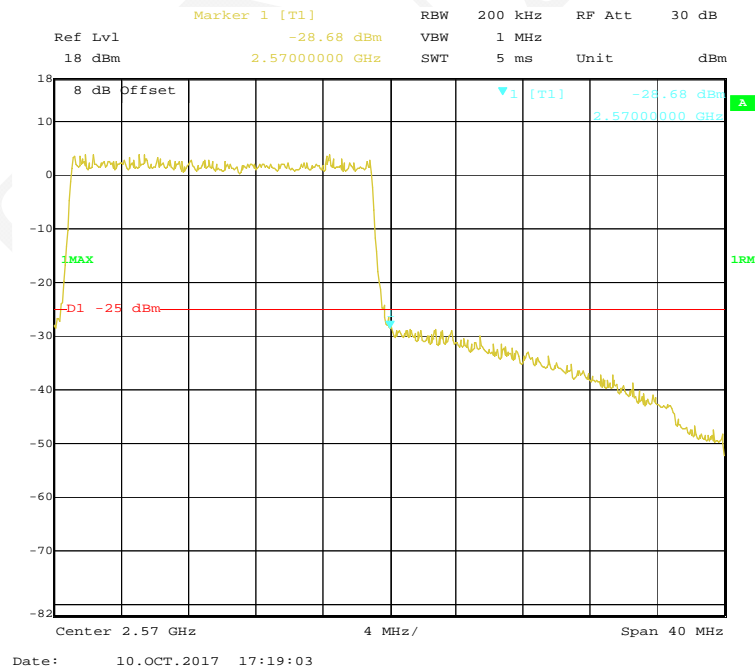


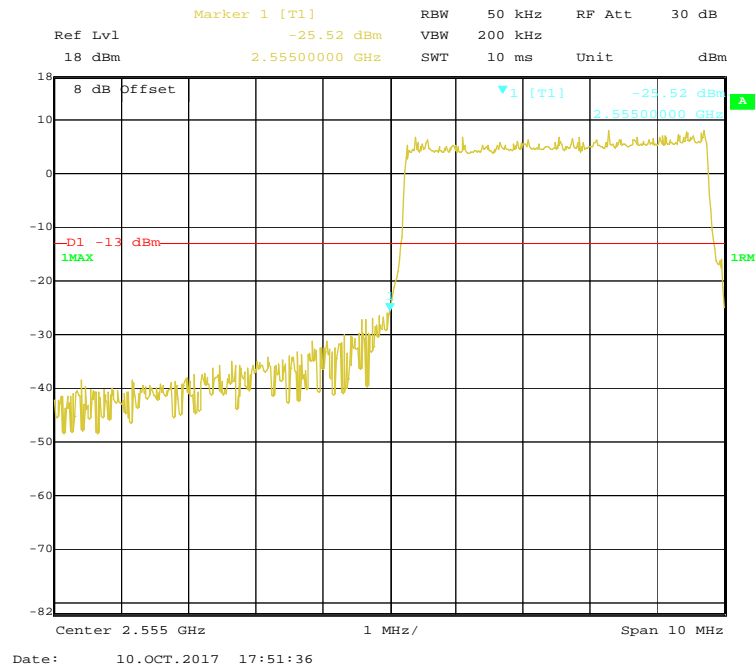
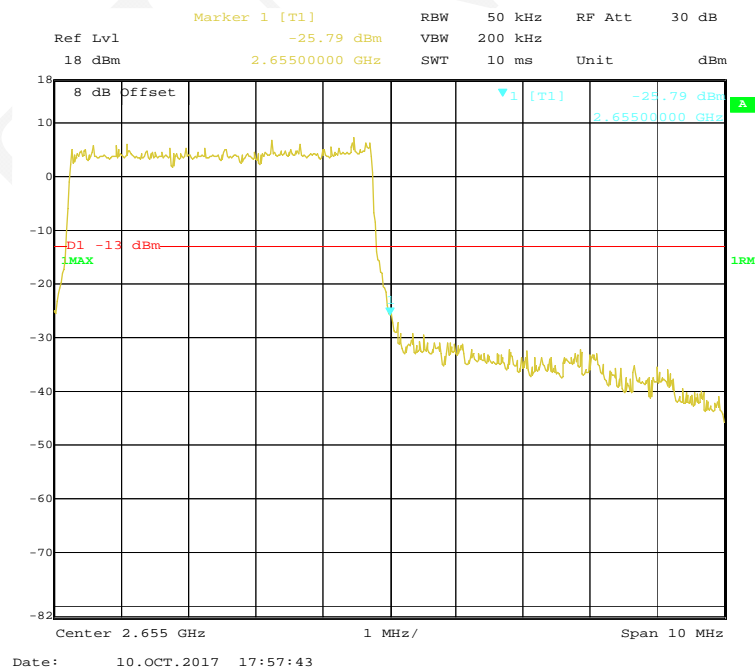
QPSK (15 MHz, FULL RB) - Left Band Edge**QPSK (15 MHz, FULL RB) - Right Band Edge**

QPSK (20 MHz, FULL RB) - Left Band Edge

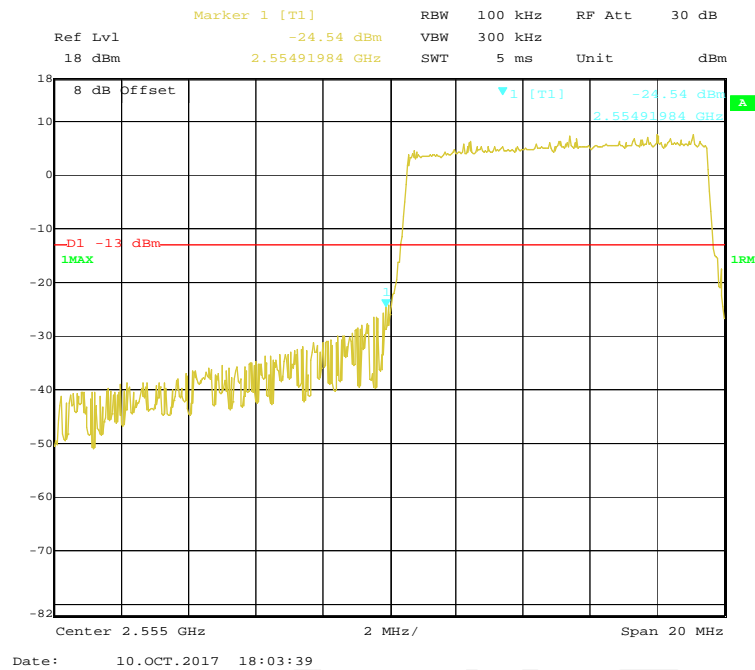


QPSK (20 MHz, FULL RB) - Right Band Edge

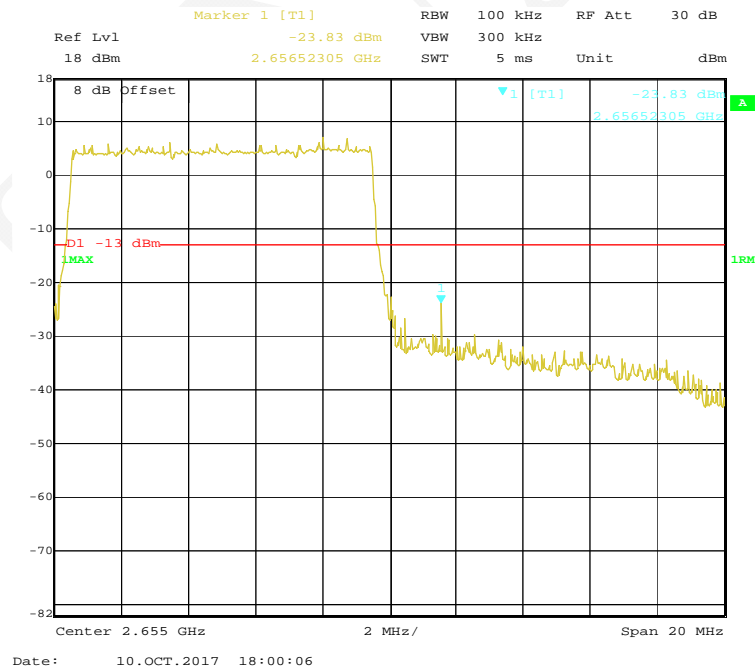


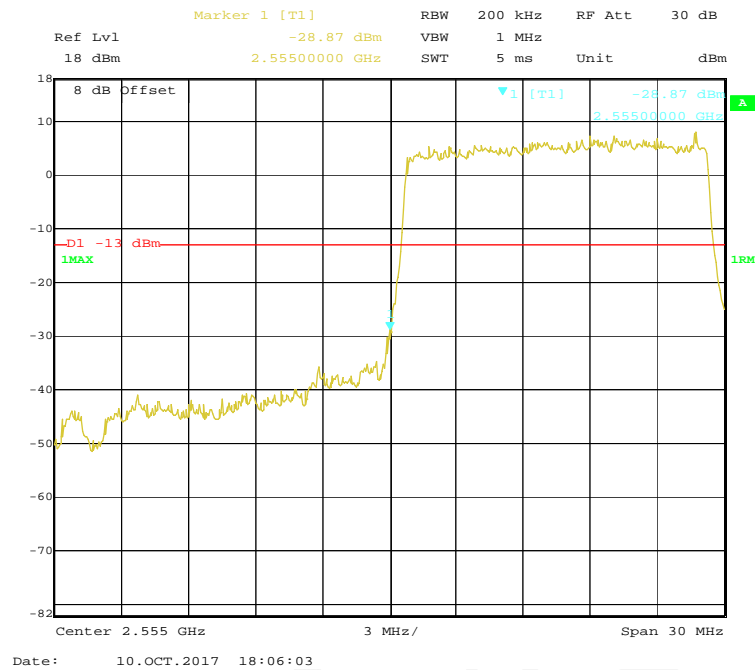
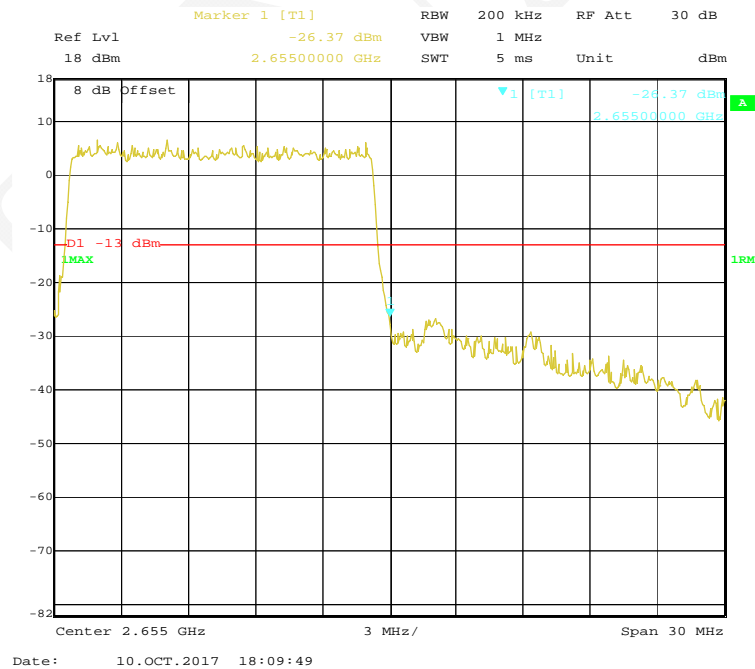
LTE Band 41:**QPSK (5 MHz, FULL RB) - Left Band Edge****QPSK (5 MHz, FULL RB) - Right Band Edge**

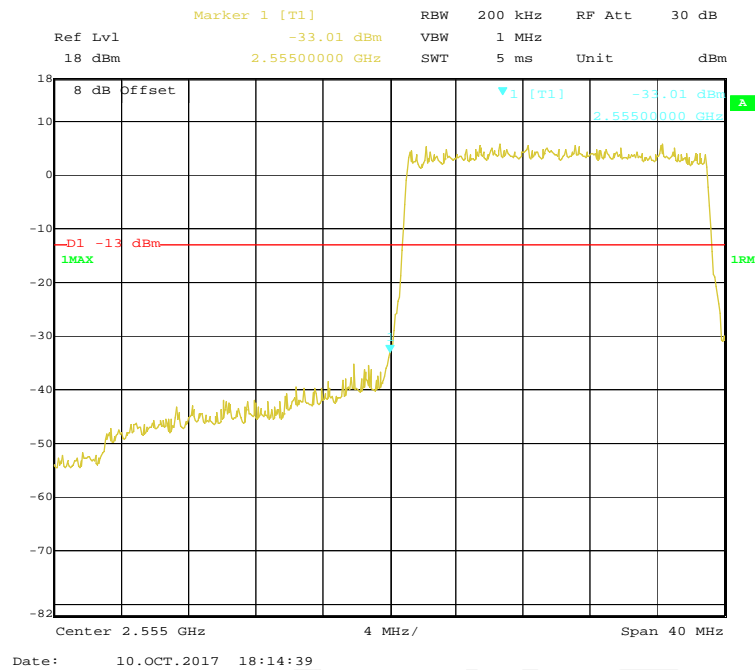
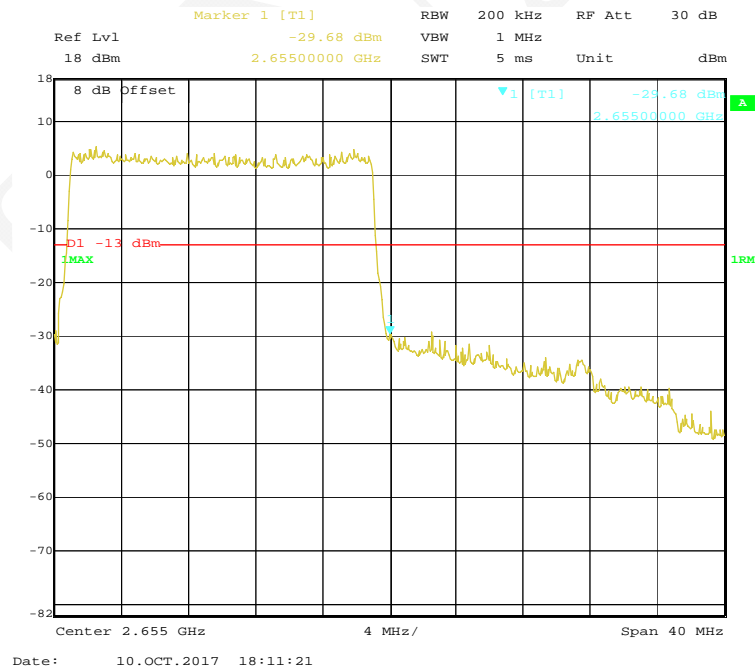
QPSK (10 MHz, FULL RB) - Left Band Edge

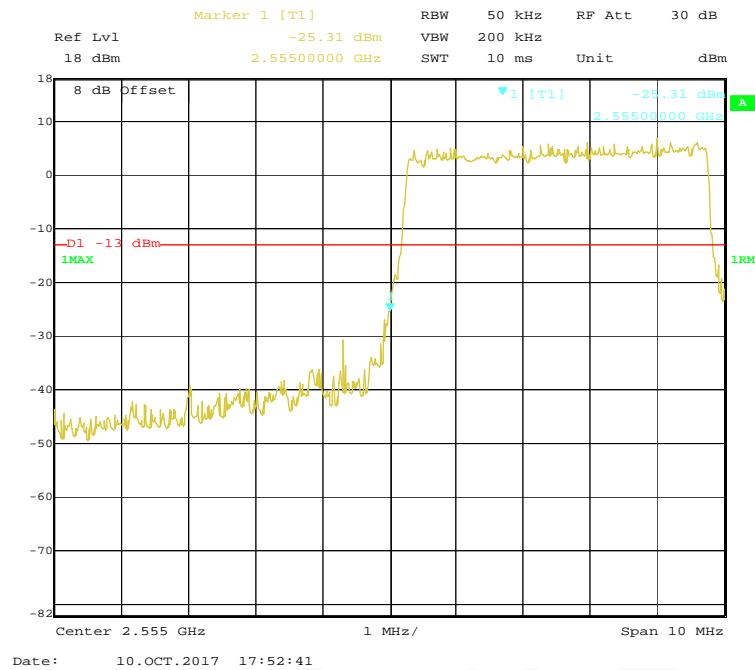
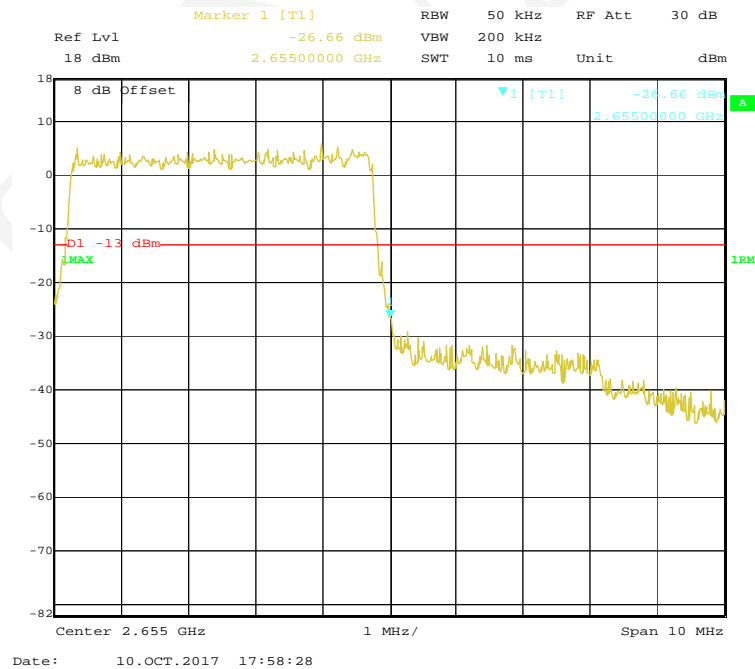


QPSK (10 MHz, FULL RB) - Right Band Edge

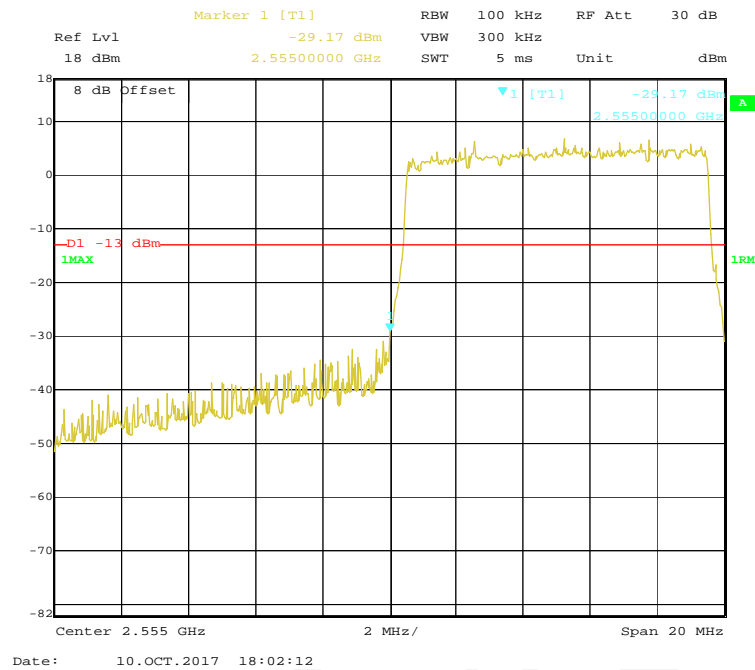


QPSK (15MHz, FULL RB) - Left Band Edge**QPSK (15 MHz, FULL RB) - Right Band Edge**

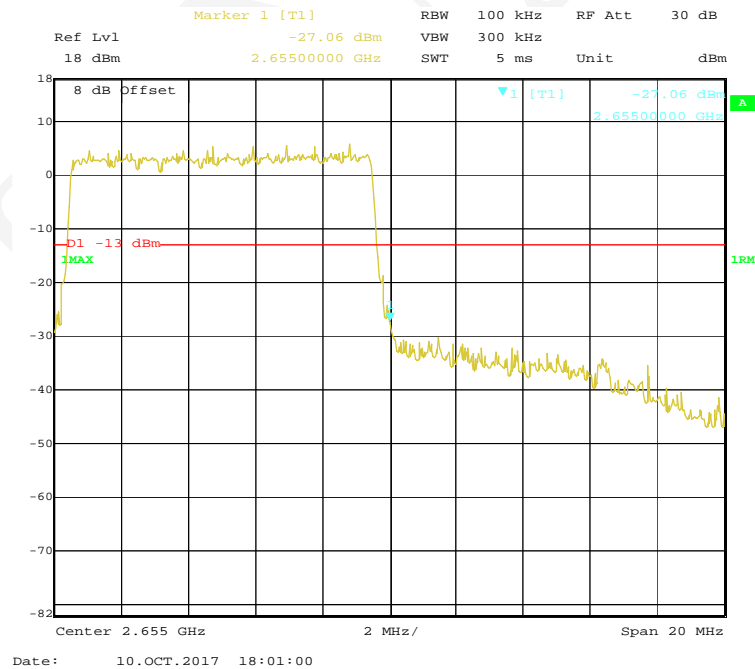
QPSK (20MHz, FULL RB) - Left Band Edge**QPSK (20 MHz, FULL RB) - Right Band Edge**

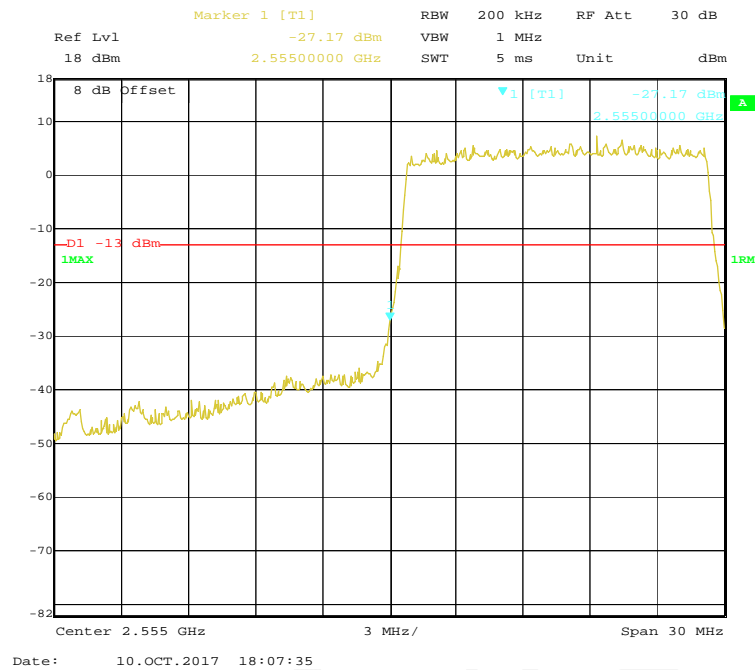
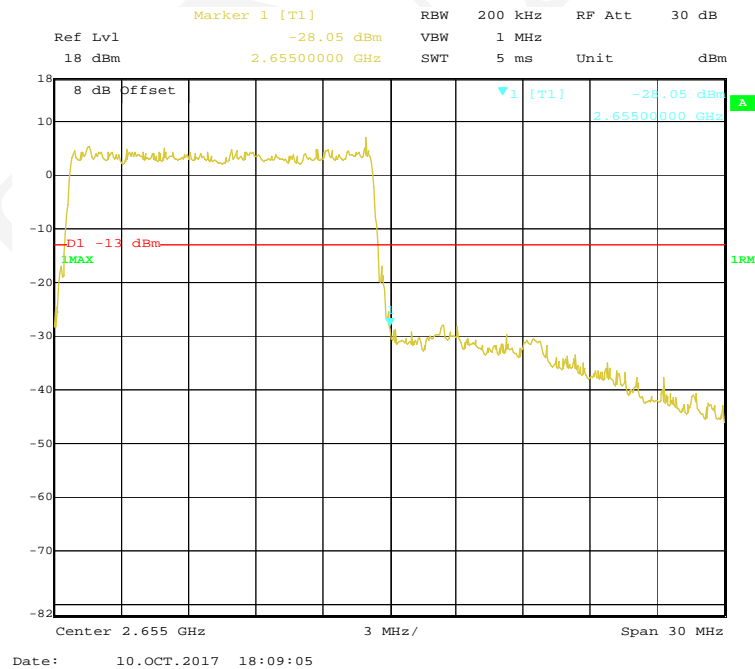
16-QAM (5MHz, FULL RB) - Left Band Edge**16-QAM (5MHz, FULL RB) - Right Band Edge**

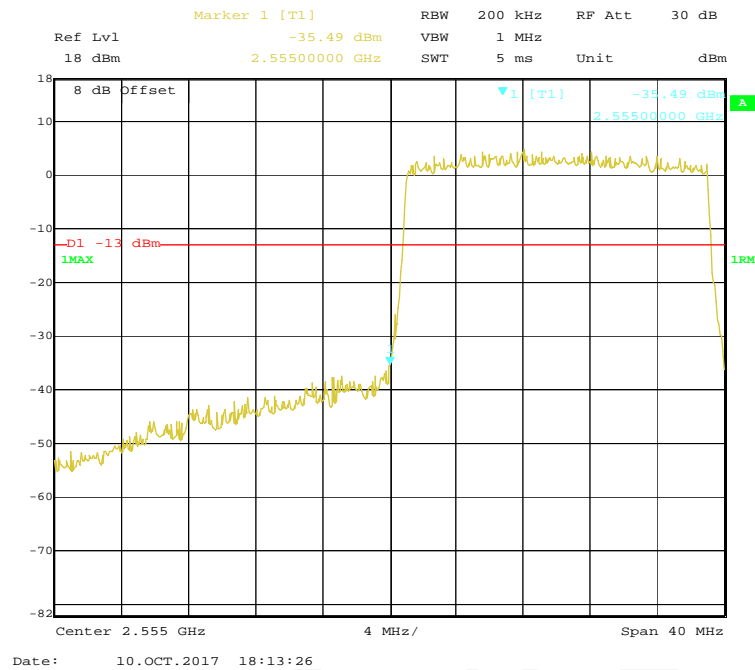
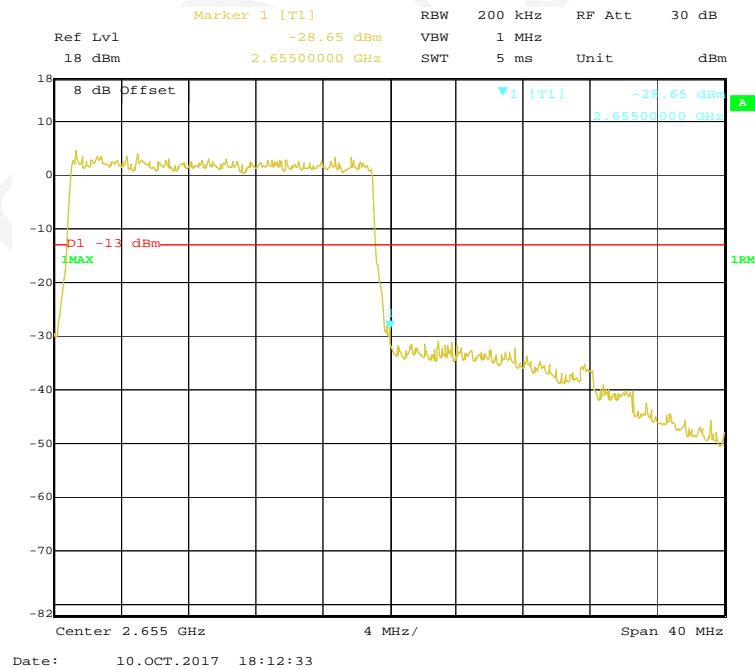
16-QAM (10 MHz, FULL RB) - Left Band Edge



16-QAM (10 MHz, FULL RB) - Right Band Edge



16-QAM (15 MHz, FULL RB) - Left Band Edge**16-QAM (15 MHz, FULL RB) - Right Band Edge**

16-QAM (20 MHz, FULL RB) - Left Band Edge**16-QAM (20 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

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

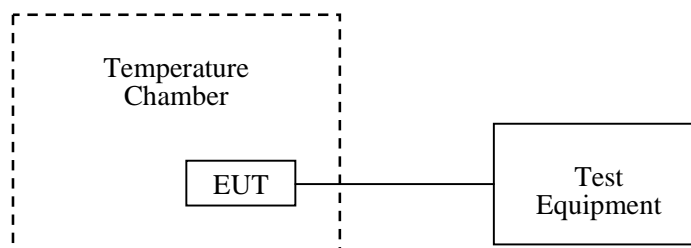
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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:	23.2 °C
Relative Humidity:	50 %
ATM Pressure:	101.2kPa

The testing was performed by Chris Wang on 2017-10-10.

EUT operation mode: Transmitting

Test Result: Compliance.

GSM 850 Band

GSM Mode, Middle Channel, $f_0=836.6$ MHz				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	9	0.0108	2.5
-20		5	0.0060	2.5
-10		4	0.0048	2.5
0		2	0.0024	2.5
10		5	0.0060	2.5
20		1	0.0012	2.5
30		3	0.0036	2.5
40		6	0.0072	2.5
50		7	0.0084	2.5
25	V min.= 3.6	6	0.0072	2.5
25	V max.= 4.4	8	0.0096	2.5

EGPRS Mode, Middle Channel, $f_0=836.6$ MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	14	0.0167	2.5
-20		13	0.0155	2.5
-10		11	0.0131	2.5
0		9	0.0108	2.5
10		10	0.0120	2.5
20		13	0.0155	2.5
30		13	0.0155	2.5
40		12	0.0143	2.5
50		15	0.0179	2.5
25	V min.= 3.6	12	0.0143	2.5
25	V max.= 4.4	13	0.0155	2.5

WCDMA Band V

Middle Channel, $f_0=836.6$ MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	-5	-0.0060	2.5
-20		-4	-0.0048	2.5
-10		-9	-0.0108	2.5
0		-4	-0.0048	2.5
10		-7	-0.0084	2.5
20		-7	-0.0084	2.5
30		-3	-0.0036	2.5
40		-4	-0.0048	2.5
50		-5	-0.0060	2.5
25	V min.= 3.6	-7	-0.0084	2.5
25	V max.= 4.4	-5	-0.0060	2.5

PCS 1900 Band

GSM Mode, Middle Channel, $f_0=1880.0$ MHz				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-6	-0.0032	pass
-20		-7	-0.0037	pass
-10		-10	-0.0053	pass
0		-5	-0.0027	pass
10		3	0.0016	pass
20		-1	-0.0005	pass
30		4	0.0021	pass
40		-5	-0.0027	pass
50		-12	-0.0064	pass
25	V min.= 3.6	-5	-0.0027	pass
25	V max.= 4.4	-9	-0.0048	pass

EGPRS 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	-0.0048	pass
-20		-6	-0.0032	pass
-10		-3	-0.0016	pass
0		-7	-0.0037	pass
10		-2	-0.0011	pass
20		5	0.0027	pass
30		0	0.0000	pass
40		-3	-0.0016	pass
50		6	0.0032	pass
25	V min.= 3.6	4	0.0021	pass
25	V max.= 4.4	3	0.0016	pass

WCDMA Band II

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	8	0.0043	pass
-20		7	0.0037	pass
-10		1	0.0005	pass
0		0	0.0000	pass
10		6	0.0032	pass
20		4	0.0021	pass
30		5	0.0027	pass
40		7	0.0037	pass
50		11	0.0059	pass
25	V min.= 3.6	5	0.0027	pass
25	V max.= 4.4	8	0.0043	pass

LTE Band 5:

10.0 MHz Middle Channel, $f_0=836.5$ MHz (QPSK)				
Temperature (°C)	Power Supplied (V_{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	2	0.0024	2.5
-20		1	0.0012	2.5
-10		4	0.0048	2.5
0		-2	-0.0024	2.5
10		-4	-0.0048	2.5
20		-3	-0.0036	2.5
30		-5	-0.0060	2.5
40		-7	-0.0084	2.5
50		-5	-0.0060	2.5
25	V min.= 3.6	-7	-0.0084	2.5
25	V max.= 4.4	-6	-0.0072	2.5

10.0 MHz Middle Channel, $f_0 = 836.5$ MHz (16QAM)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.8	5	0.0060	2.5
-20		6	0.0072	2.5
-10		4	0.0048	2.5
0		2	0.0024	2.5
10		4	0.0048	2.5
20		1	0.0012	2.5
30		3	0.0036	2.5
40		4	0.0048	2.5
50		1	0.0012	2.5
25	V min.= 3.6	2	0.0024	2.5
25	V max.= 4.4	7	0.0084	2.5

LTE Band 7:

10.0 MHz Middle Channel, $f_0 = 2535$ MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	9	0.0036	pass
-20		8	0.0032	pass
-10		8	0.0032	pass
0		7	0.0028	pass
10		0	0.0000	pass
20		-2	-0.0008	pass
30		-4	-0.0016	pass
40		-3	-0.0012	pass
50		-5	-0.0020	pass
25	V min.= 3.6	-2	-0.0008	pass
25	V max.= 4.4	-7	-0.0028	pass

10.0 MHz Middle Channel, $f_0 = 2535$ MHz (16QAM)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	-8	-0.0032	pass
-20		-7	-0.0028	pass
-10		-5	-0.0020	pass
0		-5	-0.0020	pass
10		-3	-0.0012	pass
20		0	0.0000	pass
30		2	0.0008	pass
40		3	0.0012	pass
50		5	0.0020	pass
25	V min.= 3.6	7	0.0028	pass
25	V max.= 4.4	10	0.0039	pass

LTE Band 41:

10.0 MHz Middle Channel, $f_0 = 2605$ MHz (QPSK)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	8	0.0031	pass
-20		7	0.0027	pass
-10		7	0.0027	pass
0		6	0.0023	pass
10		0	0.0000	pass
20		2	0.0008	pass
30		-1	-0.0004	pass
40		-2	-0.0008	pass
50		-2	-0.0008	pass
25	V min.= 3.6	5	0.0019	pass
25	V max.= 4.4	8	0.0031	pass

10.0 MHz Middle Channel, $f_o = 2605$ MHz (16QAM)				
Temperature (°C)	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.8	5	0.0019	pass
-20		3	0.0012	pass
-10		2	0.0008	pass
0		2	0.0008	pass
10		1	0.0004	pass
20		0	0.0000	pass
30		-2	-0.0008	pass
40		-3	-0.0012	pass
50		-3	-0.0012	pass
25	V min.= 3.6	-5	-0.0019	pass
25	V max.= 4.4	-7	-0.0027	pass

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