

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

For

Shanghai Huace Navigation Technology LTD.

Building C,599 Gaojing Road,Qingpu District,Shanghai,China

FCC ID: SY4-B01007

Report Type: Original Report	Product Type: Data Collector
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Report Number: RKS170428003-00C	
Report Date: 2017-10-25	
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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Applicant	Shanghai Huace Navigation Technology LTD.
Tested Model	LT40
Series Model	LT40 WXYZ(WXYZ=0-9, a-z)
Product Type	Data Collector
Dimension	164.8 mm(L) × 86.0 mm(W) × 19.3 mm(H)
Power Supply	DC 3.8V from rechargeable battery and DC 5.0V form adapter

Adapter Information:

Model: EA1012AVRU-050

Input: AC100-240 V 50/60Hz 1.0A

Output:5.0V, 2.4A

* Note: The difference between tested model and series model was explained in the declaration letter.

*All measurement and test data in this report was gathered from production sample serial number: 20170424005.
(Assigned by the BACL. The EUT supplied by the applicant was received on 2017-04-24)

Objective

This type approval report is prepared on behalf of Shanghai Huace Navigation Technology 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 DSS & DTS and Part 15B JBP submissions with FCC ID: SY4-B01007.

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
AC Power Lines Conducted Emissions		3.19 dB
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
	18GHz~40GHz	4.94dB
Occupied Bandwidth		0.5kHz
Temperature		1.0
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.

Test site at Bay Area Compliance Laboratories Corp. (Kunshan) has been fully described in reports Submitted to the Federal Communications 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 February 02, 2012. 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.: 273710. 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

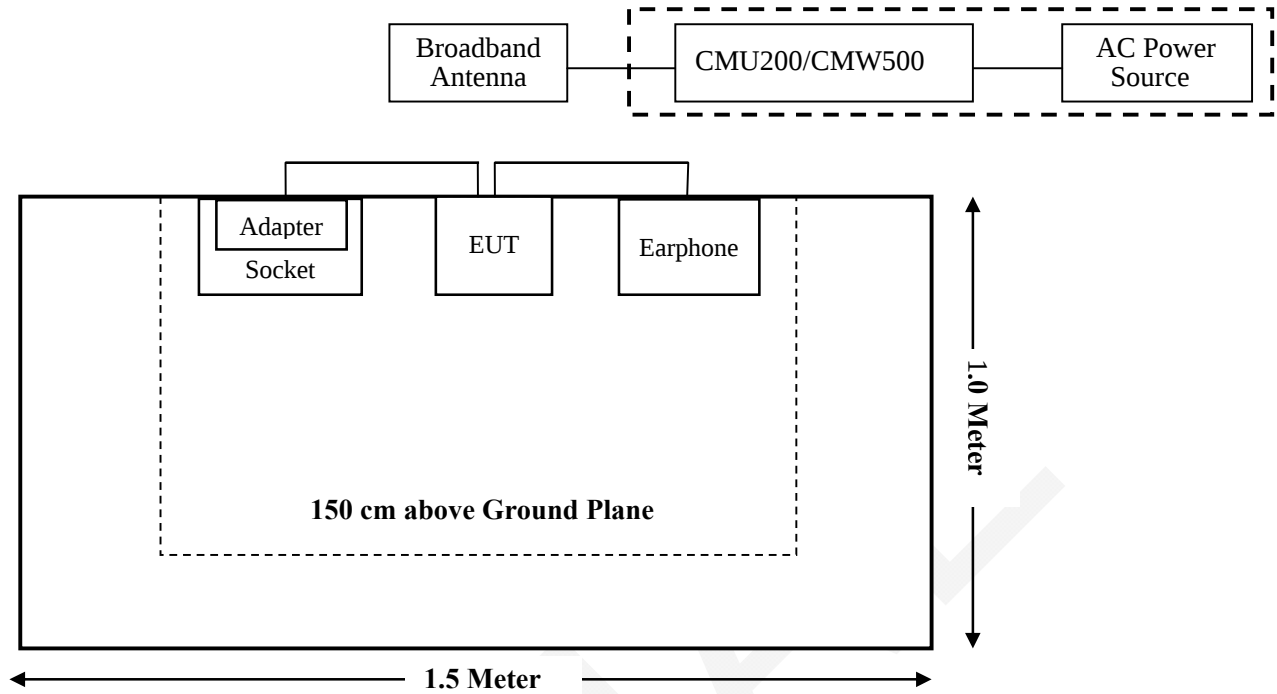
Manufacturer	Description	Model	Serial Number
Huace	Earphone	/	/
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605
Rohde & Schwarz	Wideband Radio Communication tester	CMW500	1201.002K50-146520-wh

External I/O Cable

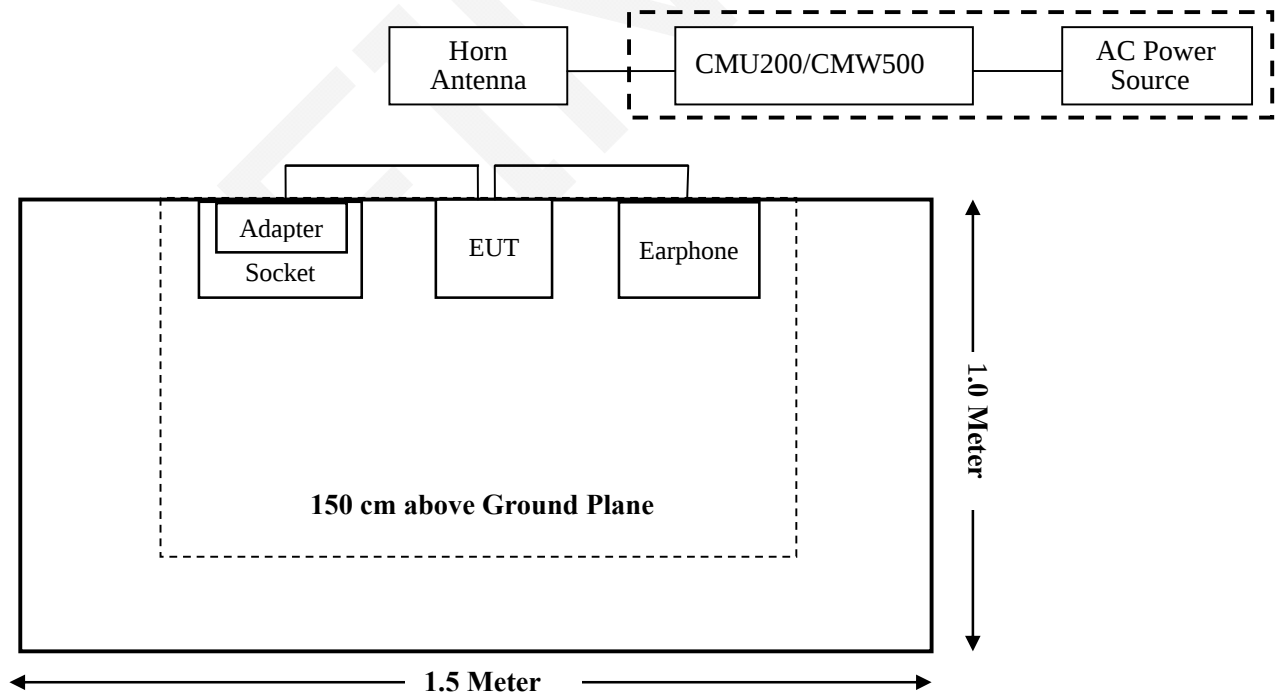
Cable Description	Length (m)	From Port	To
/	/	/	/

Block Diagram of Test Setup

For Radiated Emissions(Below 1GHz):



For Radiated Emissions (Above 1GHz):



SUMMARY OF TEST RESULTS

FCC Rules	Description of Test	Result
§1.1307(b) & §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

Compliance*: Please refer to SAR report released by BACL, report number: RSH170426052-20.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	EMI Test Receiver	ESCI	100195	2016-11-25	2017-11-24
HP	Signal Generator	8341B	DE23437	2016-08-29	2017-08-28
Rohde & Schwarz	Signal Analyzer	FSIQ26	100048	2016-11-25	2017-11-24
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
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
Sonoma Instrunent	Pre-amplifier	330	171377	2016-12-12	2017-12-11
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	/	/
Haojintech	Coaxial Cable	Cable-1	001	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-2	002	2016-12-12	2017-12-11
Haojintech	Coaxial Cable	Cable-3	003	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-4	004	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-5	005	2016-12-12	2017-12-11
MICRO-COAX	Coaxial Cable	Cable-7	007	2016-12-12	2017-12-11
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication tester	CMW500	1201.002K50-146520-wh	2016-10-08	2017-10-07

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
Rohde & Schwarz	FSV40 Signal Analyzer	FSV40	101116	2016-07-04	2017-07-03
Rohde & Schwarz	Signal Analyzer	FSIQ26	836131/009	2016-09-21	2017-09-20
Rohde & Schwarz	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	110605	2016-11-25	2017-11-24
Rohde & Schwarz	Wideband Radio Communication tester	CMW500	1201.002K50-146520-wh	2016-10-08	2017-10-07
BACL	Temperature & Humidity Chamber	BTH-150	30023	2016-10-10	2017-10-09
Agilent	Power Meter	N1912A	MY5000492	2016-11-18	2017-11-17
Agilent	Power Sensor	N1921A	MY54210024	2016-11-18	2017-11-17
Huace	RF Cable	/	/	2017-05-13	2018-05-12

* **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: RSH170426052-20.

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.

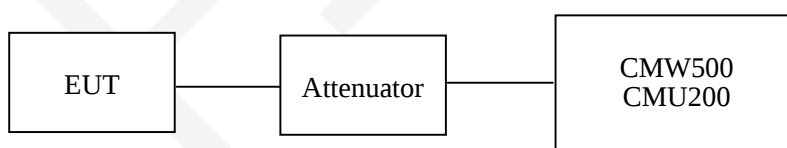
Equipment employed must be authorized in accordance with the provisions of §24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. 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.

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

Test Procedure

Conducted method:

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

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

Temperature:	23.2
Relative Humidity:	50 %
ATM Pressure:	101.1kPa

The testing was performed by Ada Yu on 2017-05-13 to 2017-05-15.

Conducted Power:*GSM850 Band:*

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	128	824.2	31.83	38.45
	190	836.6	31.80	38.45
	251	848.8	31.53	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	128	824.2	32.50	32.39	31.04	30.25	38.45
	190	836.6	32.44	32.30	30.93	30.16	38.45
	251	848.8	32.31	32.19	30.76	29.86	38.45

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	128	824.2	25.68	24.81	22.93	22.00	38.45
	190	836.6	25.55	24.61	22.73	21.83	38.45
	251	848.8	25.32	24.40	22.54	21.58	38.45

WCDMA Band V:

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA	Normal	RMC12.2k		22.03	21.97	21.93
		HSDPA	1	21.77	21.69	21.65
			2	21.57	21.47	21.37
			3	21.37	21.28	21.13
			4	21.13	20.96	20.90
		HSUPA	1	20.92	20.70	20.68
			2	20.69	20.48	20.46
			3	20.46	20.22	20.23
			4	20.23	19.96	20.03
			5	20.03	19.90	19.83

PCS1900 Band:

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limit (dBm)
GSM	512	1850.2	28.67	33
	661	1880.0	29.04	33
	810	1909.8	29.19	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
GPRS	512	1850.2	28.76	27.94	25.99	24.91	33
	661	1880.0	29.13	28.31	26.44	25.31	33
	810	1909.8	29.31	28.67	27.01	25.92	33

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)				Limit (dBm)
			1 slot	2 slots	3 slots	4 slots	
EGPRS	512	1850.2	25.26	24.41	22.65	21.46	33
	661	1880.0	24.49	24.47	22.99	21.83	33
	810	1909.8	26.09	25.40	23.54	22.53	33

WCDMA Band II:

Mode	Test Condition	Test Mode	3GPP Sub Test	Average Output Power (dBm)		
				Low Frequency	Middle Frequency	High Frequency
WCDMA	Normal	Rel 99	1	21.17	21.11	21.02
			1	20.91	20.85	20.79
		HSDPA	2	20.69	20.60	20.58
			3	20.39	20.30	20.33
			4	20.13	20.08	20.12
			1	19.89	19.81	19.89
		HSUPA	2	19.69	19.56	19.60
			3	19.49	19.29	19.37
			4	19.28	19.00	19.13
			5	19.02	18.79	18.92

Maximum Output Power:*LTE Band 7:*

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	22.45	22.98	22.34
		RB Size=1, RB Offset=12	22.41	22.91	22.31
		RB Size=1, RB Offset=24	22.57	23.10	22.42
		RB Size=12, RB Offset=0	22.14	22.42	22.27
		RB Size=12, RB Offset=6	22.05	22.31	22.23
		RB Size=12, RB Offset=11	22.25	22.47	22.37
		RB Size=25, RB Offset=0	21.45	21.91	21.57
	16QAM	RB Size=1, RB Offset=0	22.41	22.96	22.38
		RB Size=1, RB Offset=12	22.37	22.86	22.29
		RB Size=1, RB Offset=24	22.48	23.06	22.41
		RB Size=12, RB Offset=0	22.12	22.38	22.23
		RB Size=12, RB Offset=6	22.08	22.30	22.14
		RB Size=12, RB Offset=11	22.22	22.42	22.28
		RB Size=25, RB Offset=0	21.52	21.90	21.46
10.0	QPSK	RB Size=1, RB Offset=0	22.07	22.32	22.12
		RB Size=1, RB Offset=24	21.94	22.23	22.02
		RB Size=1, RB Offset=49	22.20	22.35	22.18
		RB Size=25, RB Offset=0	21.87	22.07	21.75
		RB Size=25, RB Offset=12	21.76	22.03	21.72
		RB Size=25, RB Offset=24	21.95	22.11	21.82
		RB Size=50, RB Offset=0	21.36	21.68	21.24
	16QAM	RB Size=1, RB Offset=0	22.14	22.34	22.17
		RB Size=1, RB Offset=24	22.08	22.30	22.05
		RB Size=1, RB Offset=49	22.24	22.43	22.26
		RB Size=25, RB Offset=0	21.76	22.03	21.71
		RB Size=25, RB Offset=12	21.72	21.92	21.68
		RB Size=25, RB Offset=24	21.85	22.13	21.80
		RB Size=50, RB Offset=0	21.34	21.71	21.37

Bandwidth (MHz)	Modulation	RB size/RB Offset	Low Channel (dBm)	Middle Channel (dBm)	High Channel (dBm)
15.0	QPSK	RB Size=1, RB Offset=0	22.25	22.48	22.19
		RB Size=1, RB Offset=37	22.19	22.37	22.08
		RB Size=1, RB Offset=74	22.33	22.51	22.25
		RB Size=36, RB Offset=0	21.67	22.06	21.78
		RB Size=36, RB Offset=18	21.60	22.01	21.68
		RB Size=36, RB Offset=37	21.79	22.13	21.84
		RB Size=75, RB Offset=0	21.24	21.71	21.35
	16QAM	RB Size=1, RB Offset=0	22.21	22.44	22.13
		RB Size=1, RB Offset=37	22.17	22.33	22.03
		RB Size=1, RB Offset=74	22.31	22.49	22.19
		RB Size=36, RB Offset=0	21.61	22.01	21.73
		RB Size=36, RB Offset=18	21.58	21.91	21.67
		RB Size=36, RB Offset=37	21.70	22.11	21.84
		RB Size=75, RB Offset=0	21.35	21.61	21.24
20.0	QPSK	RB Size=1, RB Offset=0	22.26	22.51	22.18
		RB Size=1, RB Offset=49	22.14	22.40	22.13
		RB Size=1, RB Offset=99	22.35	22.64	22.25
		RB Size=50, RB Offset=0	21.74	22.08	21.82
		RB Size=50, RB Offset=24	21.64	21.98	21.76
		RB Size=50, RB Offset=49	21.80	22.11	21.92
		RB Size=100, RB Offset=0	21.24	21.67	21.27
	16QAM	RB Size=1, RB Offset=0	22.22	22.55	22.14
		RB Size=1, RB Offset=49	22.12	22.48	22.07
		RB Size=1, RB Offset=99	22.30	22.65	22.21
		RB Size=50, RB Offset=0	21.77	22.1	21.87
		RB Size=50, RB Offset=24	21.71	21.99	21.84
		RB Size=50, RB Offset=49	21.89	22.21	21.93
		RB Size=100, RB Offset=0	21.34	21.65	21.27

Peak-to-average ratio (PAR)*GSM850 Band:*

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	0.7	13
	Middle	0.9	13
	High	0.8	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	0.8	13
	Middle	0.9	13
	High	0.8	13

WCDMA Band V:

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (BPSK)	Low	0.6	13
	Middle	0.8	13
	High	0.7	13
HSDPA (16QAM)	Low	0.6	13
	Middle	0.8	13
	High	0.6	13
HSUPA (BPSK)	Low	0.8	13
	Middle	1.1	13
	High	1.0	13

PCS1900 Band:

Mode	Channel	PAR (dB)	Limit (dB)
GSM	Low	2.22	13
	Middle	2.31	13
	High	2.24	13

Mode	Channel	PAR (dB)	Limit (dB)
EGPRS	Low	2.34	13
	Middle	2.52	13
	High	2.49	13

WCDMA Band II:

Mode	Channel	PAR (dB)	Limit (dB)
WCDMA (BPSK)	Low	2.86	13
	Middle	2.37	13
	High	2.24	13
HSDPA (16QAM)	Low	2.28	13
	Middle	2.62	13
	High	2.27	13
HSUPA (BPSK)	Low	2.05	13
	Middle	2.37	13
	High	2.25	13

LTE Band7:

Modulation	Middle Channel (dB)	PAR Limit (dB)	Result
QPSK (1RB Size)	10.96	13	Pass
QPSK (100%RB Size)	7.40	13	Pass
16QAM (1RB Size)	10.91	13	Pass
16QAM (100%RB Size)	7.32	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										
836.60	82.16	48	111	H	26.02	0.26	4.86	30.62	38.45	7.83
836.60	84.89	280	213	V	26.93	0.26	4.86	30.56	38.45	7.89
PCS 1900 Band, Middle Channel										
1880.00	88.68	242	231	H	20.23	0.44	8.81	28.60	33.00	4.40
1880.00	91.38	209	133	V	20.72	0.44	8.81	29.09	33.00	3.91

EDGE 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										
836.60	75.83	57	221	H	19.69	0.26	4.86	24.29	38.45	14.16
836.60	78.59	245	129	V	20.63	0.26	4.86	25.23	38.45	13.22
PCS 1900 Band, Middle Channel										
1880.00	84.97	228	124	H	16.52	0.44	8.81	24.89	33.00	8.11
1880.00	87.64	134	153	V	16.98	0.44	8.81	25.35	33.00	7.65

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										
836.60	73.12	261	172	H	16.98	0.26	4.86	21.58	38.45	16.87
836.60	75.64	52	152	V	17.68	0.26	4.86	22.28	38.45	16.17
WCDMA Band II , Middle Channel										
1880.00	81.07	197	206	H	12.62	0.44	8.81	20.99	33.00	12.01
1880.00	83.61	2	247	V	12.95	0.44	8.81	21.32	33.00	11.68

Note:

All above data were tested with no amplifier.

Absolute Level = Submitted Level - Cable loss + Antenna Gain

Margin = Limit- Absolute Level

EIRP:

LTE Band7:

QPSK:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table 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 (dBi)			
5 MHz Bandwidth, Middle Channel										
2535.00	71.86	300	148	H	9.3	0.49	10.10	18.91	33	14.09
2535.00	74.47	354	165	V	11.2	0.49	10.10	20.81	33	12.19
10 MHz Bandwidth, Middle Channel										
2535.00	70.76	181	215	H	8.2	0.49	10.10	17.81	33	15.19
2535.00	74.17	287	226	V	10.9	0.49	10.10	20.51	33	12.49
15 MHz Bandwidth, Middle Channel										
2535.00	70.66	44	241	H	8.1	0.49	10.10	17.71	33	15.29
2535.00	72.97	240	132	V	9.7	0.49	10.10	19.31	33	13.69
20 MHz Bandwidth, Middle Channel										
2535.00	70.16	86	226	H	7.6	0.49	10.10	17.21	33	15.79
2535.00	73.37	277	174	V	10.1	0.49	10.10	19.71	33	13.29

16QAM:

Frequency (MHz)	Receiver Reading (dBμV)	Turn table 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 (dBi)			
5 MHz Bandwidth, Middle Channel										
2535.00	69.06	104	173	H	6.5	0.49	10.10	16.11	33	16.89
2535.00	73.97	102	191	V	10.7	0.49	10.10	20.31	33	12.69
10 MHz Bandwidth, Middle Channel										
2535.00	68.06	129	156	H	5.5	0.49	10.10	15.11	33	17.89
2535.00	73.57	170	168	V	10.3	0.49	10.10	19.91	33	13.09
15 MHz Bandwidth, Middle Channel										
2535.00	68.96	195	237	H	6.4	0.49	10.10	16.01	33	16.99
2535.00	74.27	117	315	V	11.0	0.49	10.10	20.61	33	12.39
20 MHz Bandwidth, Middle Channel										
2535.00	69.46	186	202	H	6.9	0.49	10.10	16.51	33	16.49
2535.00	74.47	164	134	V	11.2	0.49	10.10	20.81	33	12.19

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

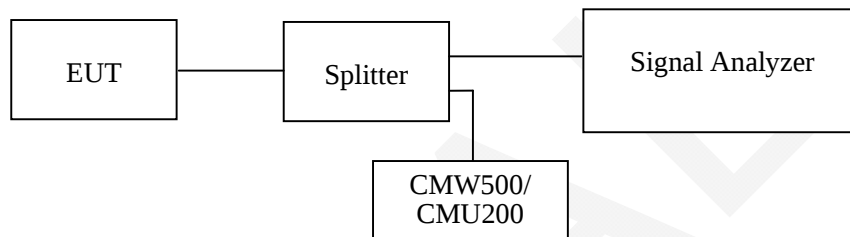
Applicable Standards

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 5 kHz (Cellular /PCS) & 100 kHz (WCDMA) & 1% OBW (LTE) and the 26 dB & 99% bandwidth was recorded.



Test Data**Environmental Conditions**

Temperature:	23.2
Relative Humidity:	50 %
ATM Pressure:	101.1kPa

The testing was performed by Ada Yu on 2017-05-13 to 2017-05-15.

EUT operation mode: Transmitting

Test Result: Compliance.

GSM850 Band:

Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	836.6	244.57	321.30
EGPRS(8PSK)	836.6	234.44	309.70

WCDMA Band V:

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA (BPSK)	836.6	4.20	4.86

PCS1900 Band:

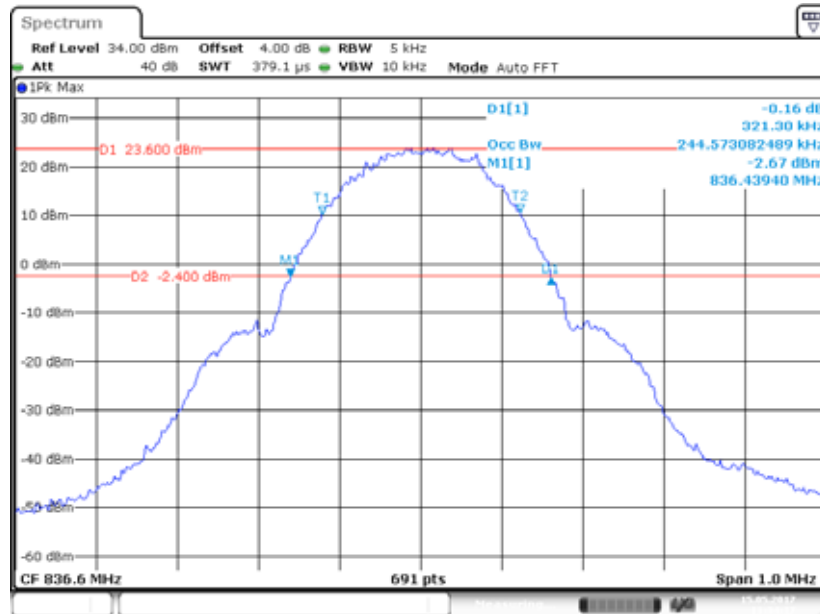
Mode	Frequency (MHz)	99% Occupied Bandwidth (kHz)	26 dB Emission Bandwidth (kHz)
GSM(GMSK)	1880.0	244.57	318.40
EGPRS(8PSK)	1880.0	247.47	318.40

WCDMA Band II:

Mode	Frequency (MHz)	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
WCDMA (BPSK)	1880.0	4.21	4.88

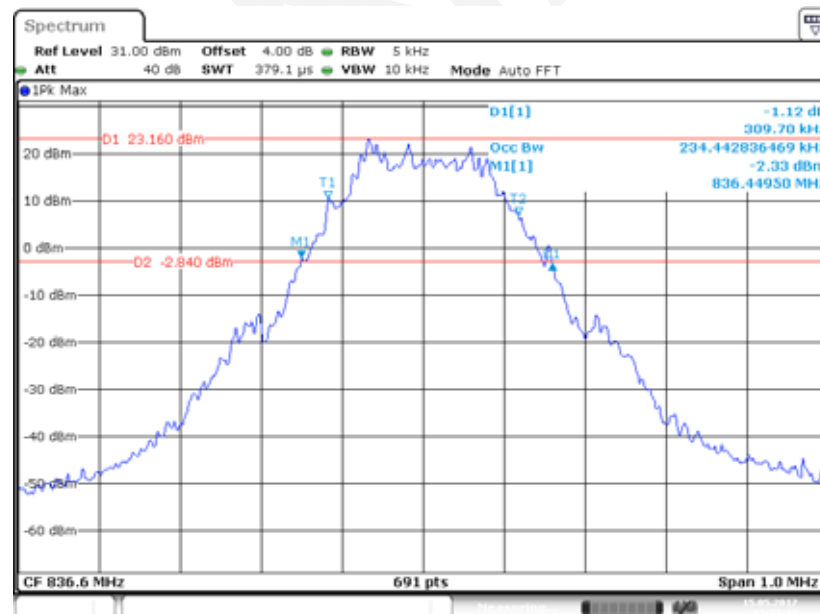
GSM850 Band:

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



Date: 15 MAY 2017 11:34:17

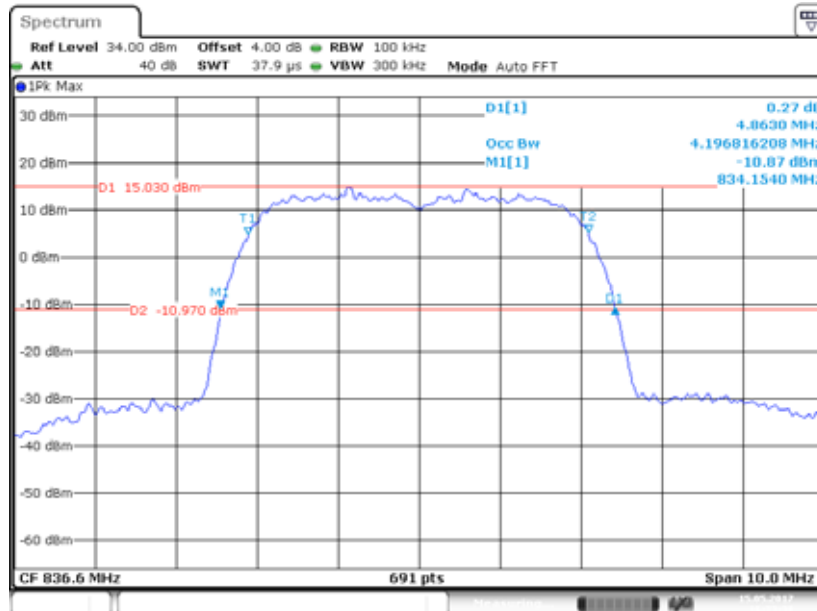
99% Occupied & 26 dB Emissions Bandwidth for EDGE Mode



Date: 15 MAY 2017 13:37:34

WCDMA Band V:

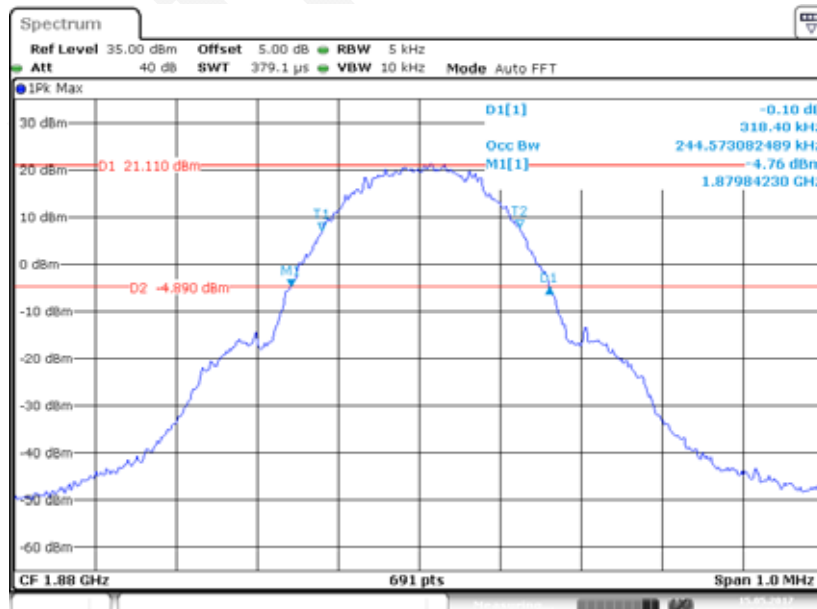
99% Occupied & 26 dB Emissions Bandwidth for WCDMA (BPSK) Mode



Date: 15 MAY 2017 16:33:38

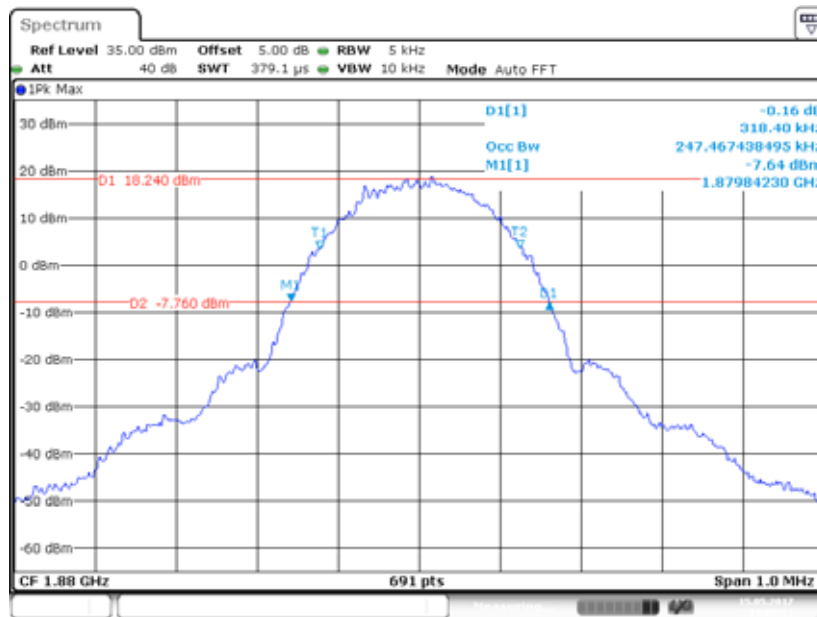
PCS1900 Band:

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



Date: 15 MAY 2017 14:16:19

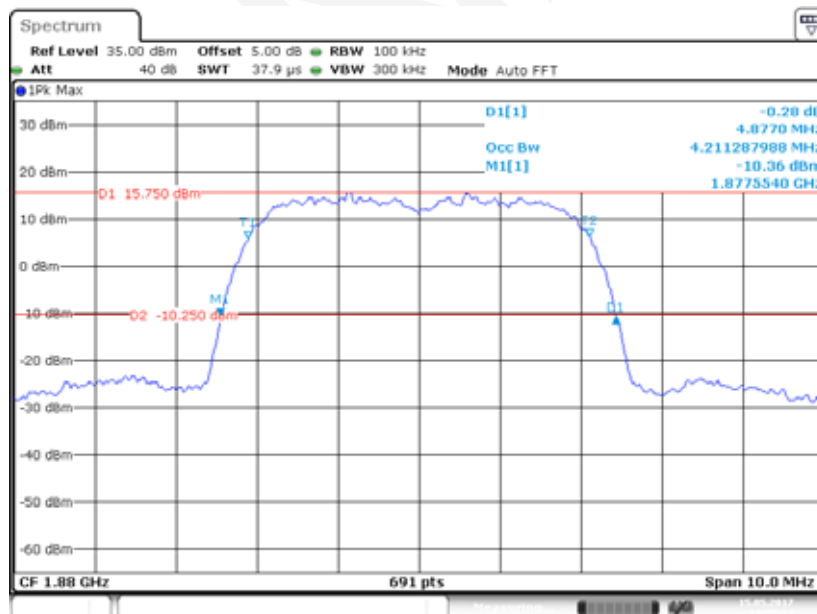
99% Occupied & 26 dB Emissions Bandwidth for EGPRS Mode



Date: 15 MAY 2017 14:00:11

WCDMA Band II:

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



Date: 15 MAY 2017 14:25:23

LTE Band 7:

Bandwidth (MHz)	Modulation	99% Occupied Bandwidth (MHz)	26 dB Emission Bandwidth (MHz)
5.0	QPSK	4.529	5.010
	16QAM	4.529	5.030
10.0	QPSK	9.018	9.860
	16QAM	8.978	9.699
15.0	QPSK	13.527	14.970
	16QAM	13.587	14.970
20.0	QPSK	17.876	19.479
	16QAM	17.956	19.399

[illegible]

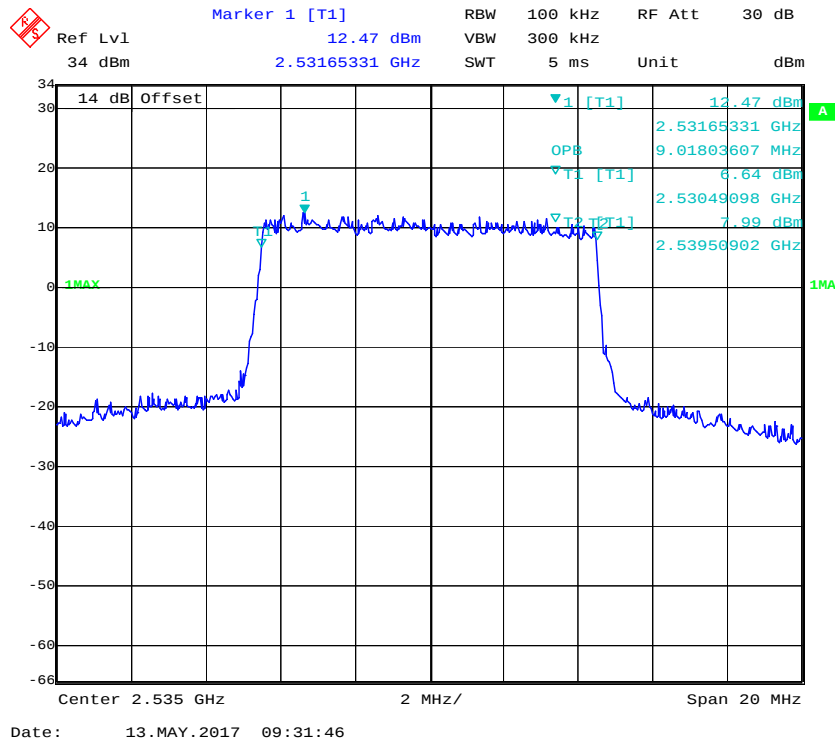
Ref Lvl 34 dBm
 Marker 1 [T1] 16.33 dBm
 RBW 100 kHz
 VBW 300 kHz
 RF Att 30 dB
 Unit dBm
 2.53316633 GHz
 SWT 5 ms

14 dB Offset
 16.33 dBm
 2.53316633 GHz
 4.52905812 MHz
 9.68 dBm
 2.53272545 GHz
 11.59 dBm
 2.53725451 GHz

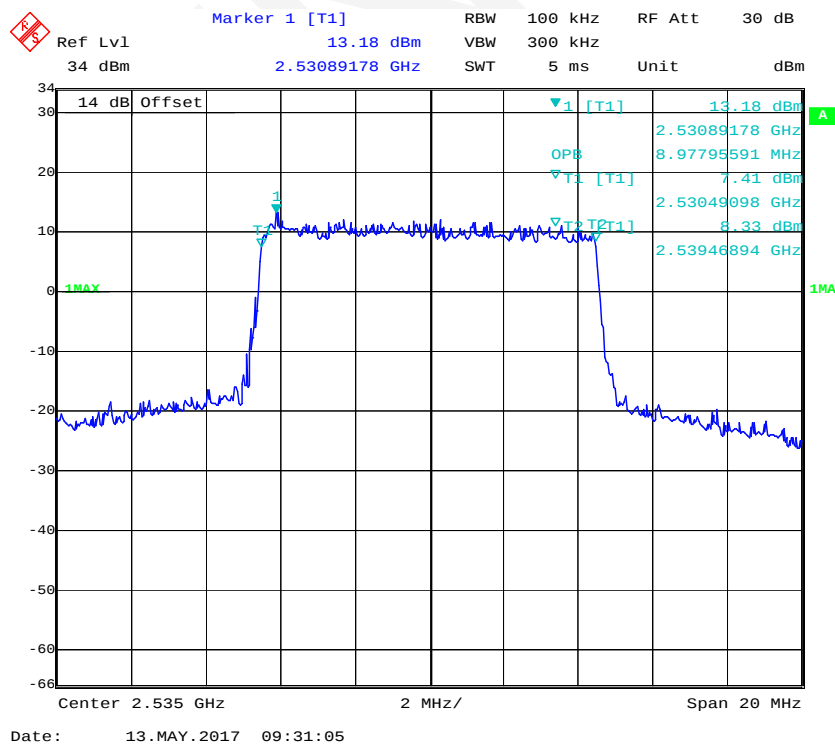
Center 2.535 GHz
 1 MHz/
 Span 10 MHz

Date: 13.MAY.2017 09:28:56

QPSK (10 MHz) - 99% Occupied Bandwidth, Middle channel



16-QAM (10MHz) - 99% Occupied Bandwidth, Middle channel



Ref Lvl 34 dBm

Marker 1 [T1] 15.92 dBm

RBW 300 kHz

RF Att 30 dB

Unit dBm

SWT 5 ms

Center 2.535 GHz

Span 30 MHz

15.92 dBm

2.53292585 GHz

11.30 dBm

2.52823647 GHz

9.99 dBm

2.54176353 GHz

14 dB

Offset

1

OP8

T1

T2

T1

1MAX

1MAX

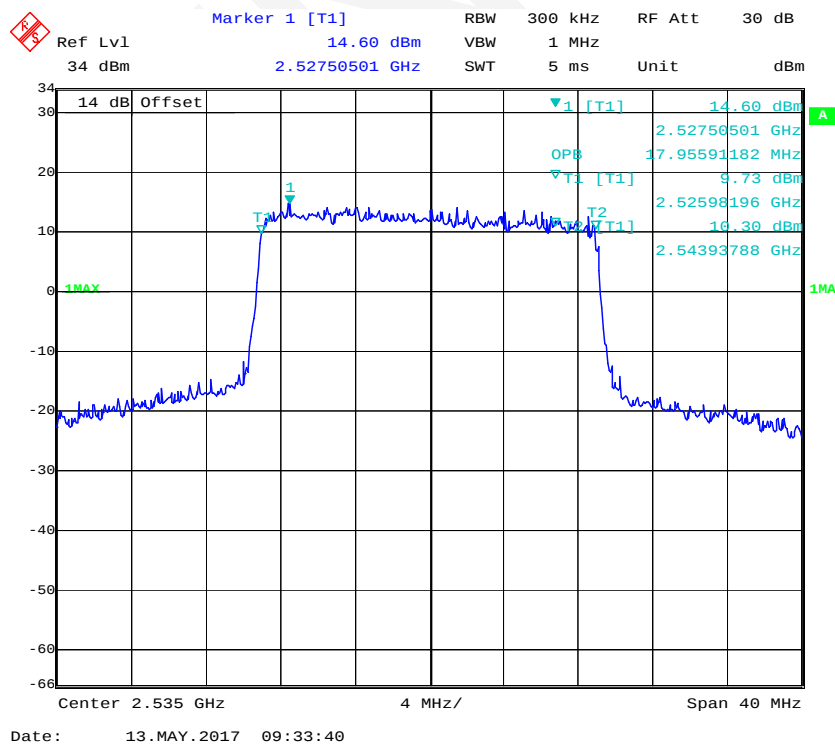
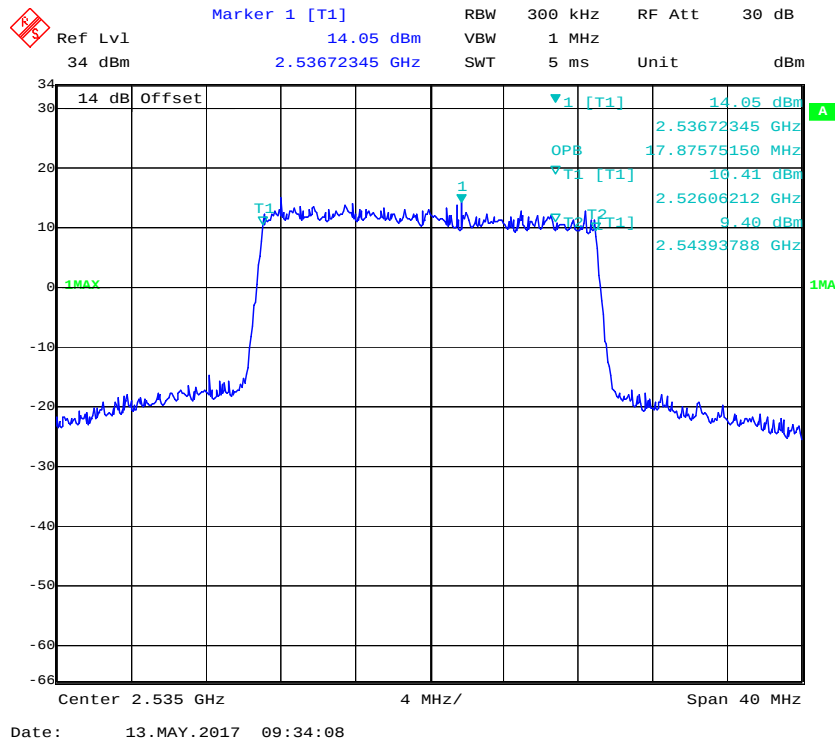
Date: 13.MAY.2017 09:32:45

Marker 1 [T1]
 Ref Lvl 14.86 dBm
 34 dBm 2.53160321 GHz
 RBW 300 kHz RF Att 30 dB
 VBW 1 MHz
 SWT 5 ms Unit dBm

Label	Value
14 dB Offset	
1 [T1]	14.86 dBm
OP8	2.53160321 GHz
13 [T1]	13.58717435 MHz
8.67 dBm	
2.52817635 GHz	
8.11 dBm	
2.54176353 GHz	

Center 2.535 GHz 3 MHz/ Span 30 MHz

Date: 13.MAY.2017 09:33:06



Ref Lvl 34 dBm Marker 1 [T1 ndB] ndB 26.00 dB RBW 100 kHz RF Att 30 dB
 34 dBm BW 5.01002004 MHz SWT 5 ms Unit dBm

Marker	Frequency (GHz)	Power (dBm)
1	2.53579158	18.60

Center 2.535 GHz 1 MHz/ Span 10 MHz

Date: 13.MAY.2017 09:40:51

Ref Lvl 34 dBm Marker 1 [T1 ndB] 26.00 dB RBW 100 kHz VBW 300 kHz RF Att 30 dB Unit dBm

14 dB Offset

15.41 dBm

2.53320641 GHz

26.00 dB

5.03006012 MHz

-12.57 dBm

2.53244489 GHz

-16.30 dBm

2.53747495 GHz

Center 2.535 GHz 1 MHz/ Span 10 MHz

Ref Lvl 34 dBm

Marker 1 [T1 ndB] 26.00 dB

BW 9.85971944 MHz

RBW 100 kHz

VBW 300 kHz

SWT 5 ms

RF Att 30 dB

Unit dBm

14 dB Offset

1 MAX

1

T1

12.08 dBm

2.53085170 GHz

ndB 26.00 dB

BW 9.85971944 MHz

T1 [T1] -15.62 dBm

2.53005010 GHz

T2 [T1] -13.90 dBm

2.53990982 GHz

1 MAX

Center 2.535 GHz

2 MHz/

Span 20 MHz

Date: 13.MAY.2017 09:43:02

Ref Lvl 34 dBm

Marker 1 [T1] 26.00 dB

RBW 100 kHz

RF Att 30 dB

VBW 300 kHz

SWT 5 ms

Unit dBm

14 dB Offset

11.71 dBm

2.53329659 GHz

26.00 dB

9.69939880 MHz

-13.05 dBm

2.53013026 GHz

-14.85 dBm

2.53982966 GHz

Center 2.535 GHz

2 MHz/

Span 20 MHz

Date: 13.MAY.2017 09:42:34

Ref Lvl 34 dBm
Marker 1 [T1 ndB] 26.00 dB
BW 14.96993988 MHz
RBW 300 kHz
RF Att 30 dB
SWT 5 ms
Unit dBm

14 dB Offset
18.19 dBm
2.52889780 GHz
ndB 26.00 dB
BW 14.96993988 MHz
T1 [T1] -11.61 dBm
T2 [T1] -16.98 dBm
2.52751503 GHz
2.54248497 GHz

Center 2.535 GHz
3 MHz/
Span 30 MHz

Date: 13.MAY.2017 09:39:44

Marker 1 [T1 ndB]

Ref Lvl	ndB	26.00 dB	VBW	1 MHz	RF Att	30 dB
34 dBm	BW	14.96993988 MHz	SWT	5 ms	Unit	dBm

14 dB Offset

1

2

15.47 dBm

2.53298597 GHz

26.00 dB

14.96993988 MHz

-16.51 dBm

2.52751503 GHz

-11.28 dBm

2.54248497 GHz

Center 2.535 GHz

3 MHz/

Span 30 MHz

Date: 13.MAY.2017 09:39:12

Ref Lvl 34 dBm

Marker 1 [T1 ndB] 26.00 dB

RBW 300 kHz RF Att 30 dB

Unit dBm

14 dB Offset

18.37 dBm

2.53103206 GHz

ndB 26.00 dB

BW 19.47895792 MHz

T1 [T1] -11.49 dBm

T2 [T1] -9.67 dBm

2.52518036 GHz

2.54465932 GHz

Center 2.535 GHz

4 MHz/

Span 40 MHz

Date: 13.MAY.2017 09:35:28

The screenshot displays a spectrum analyzer interface. The main plot shows a signal with two markers, T1 and T2, indicating specific frequency points. The y-axis represents power in dBm, ranging from -60 to 34. The x-axis represents frequency in MHz, with a center frequency of 2.535 GHz and a span of 40 MHz. The signal is a blue line with a noise floor around -20 dBm. The peak of the signal is at approximately 10 dBm. The markers T1 and T2 are placed at the edges of the signal, with T1 at approximately 2.529 GHz and T2 at approximately 2.545 GHz. The measurement parameters are listed at the top: Ref Lvl 34 dBm, Marker 1 [T1 ndB] 26.00 dB, RBW 300 kHz, RF Att 30 dB, BW 19.39879760 MHz, VSWR 5 ms, Unit dBm. The bottom status bar shows the date 13.MAY.2017 and time 09:35:57.

Parameter	Value
Ref Lvl	34 dBm
Marker 1 [T1 ndB]	26.00 dB
RBW	300 kHz
RF Att	30 dB
BW	19.39879760 MHz
VSWR	5 ms
Unit	dBm

Center 2.535 GHz 4 MHz/ Span 40 MHz

Date: 13.MAY.2017 09:35:57

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

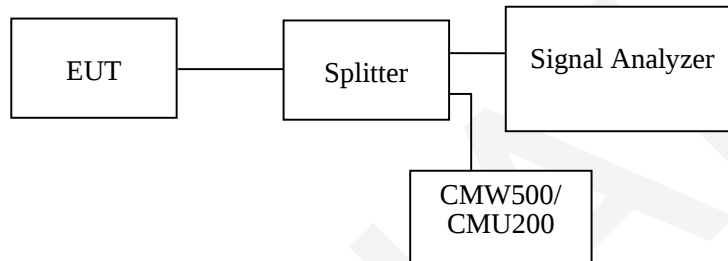
Applicable Standards

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



Test Data

Environmental Conditions

Temperature:	23.2
Relative Humidity:	50 %
ATM Pressure:	101.1kPa

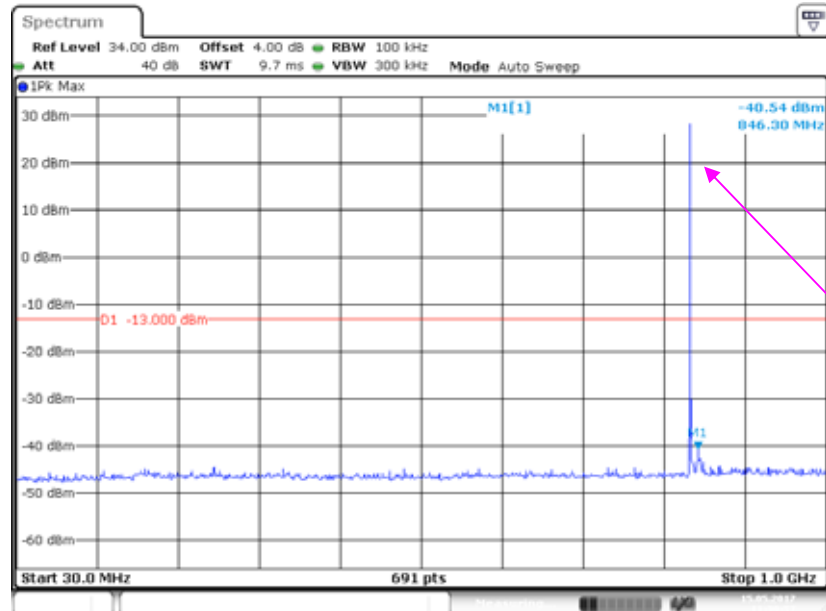
The testing was performed by Ada Yu on 2017-05-13 to 2017-05-15.

EUT operation mode: Transmitting

Test Result: Compliance.

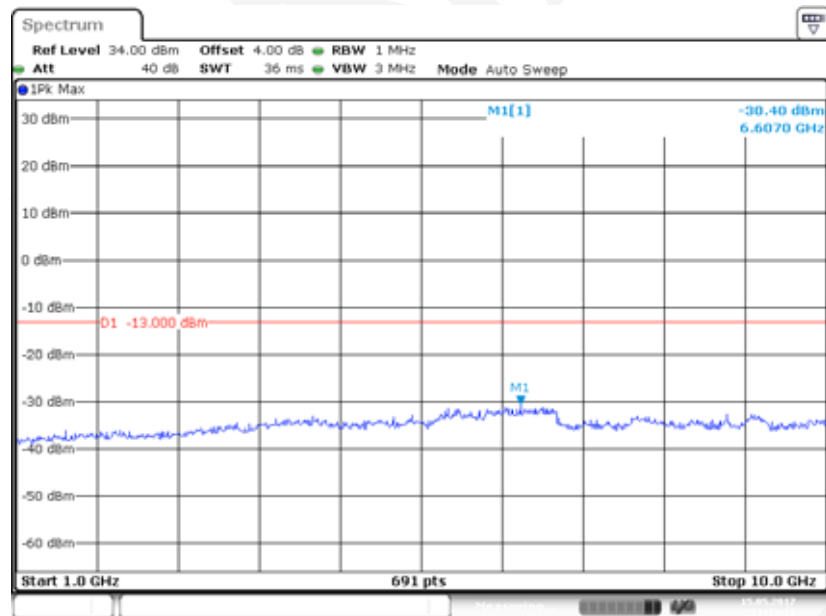
GSM850 Band:

30 MHz – 1 GHz (GSM Mode)

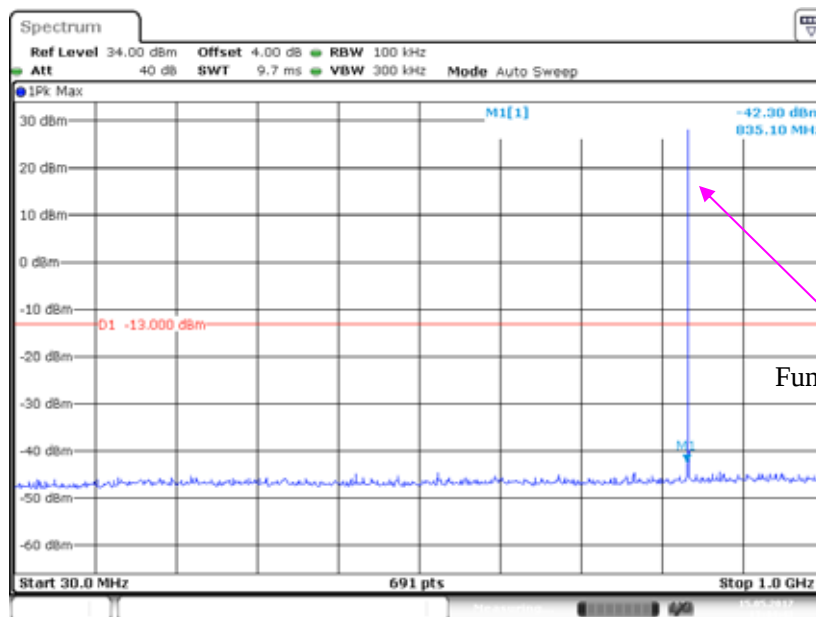


Fundamental test

1 GHz – 10 GHz (GSM Mode)

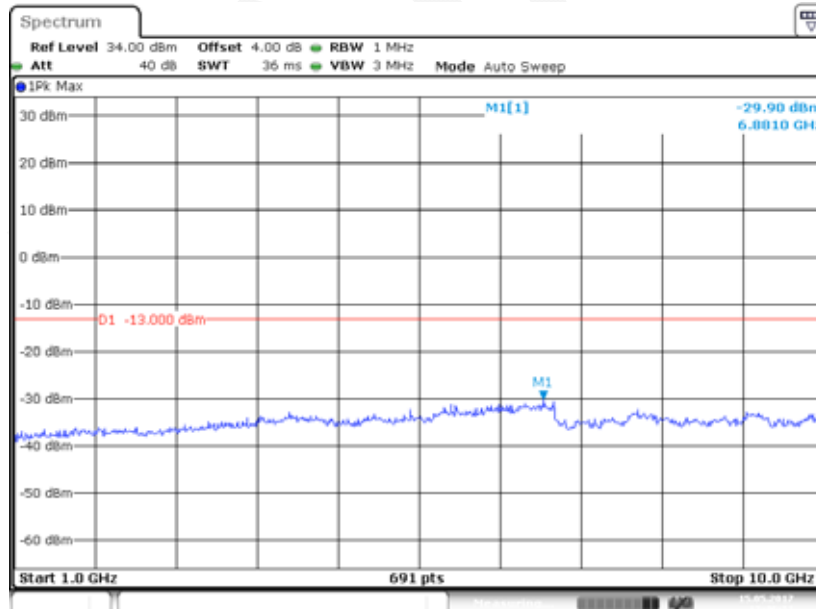


30 MHz – 1 GHz (EGPRS Mode)



Date: 15 MAY 2017 13:44:43

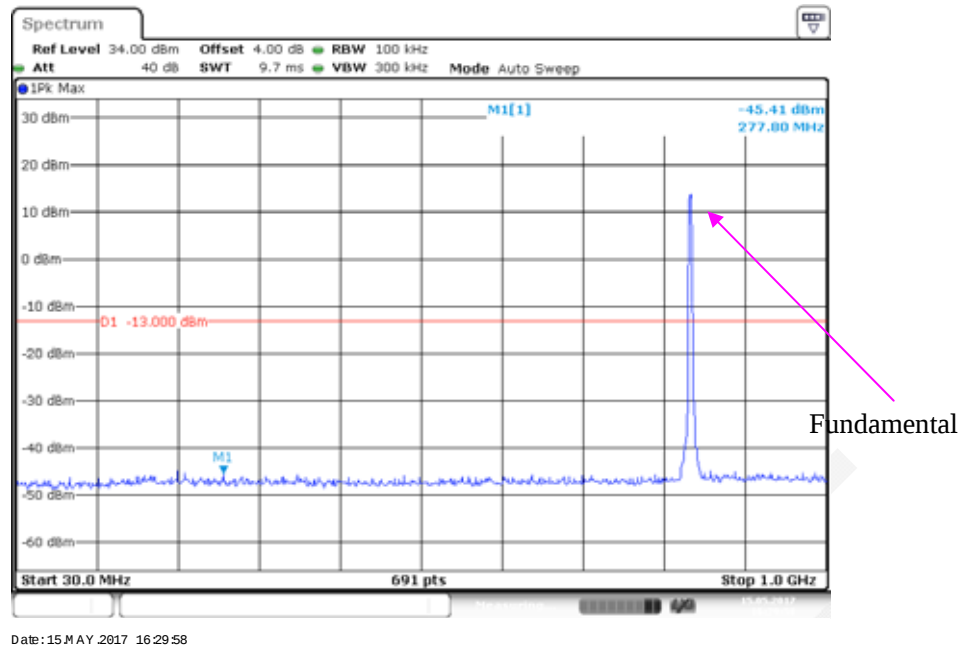
1 GHz – 10 GHz (EGPRS Mode)



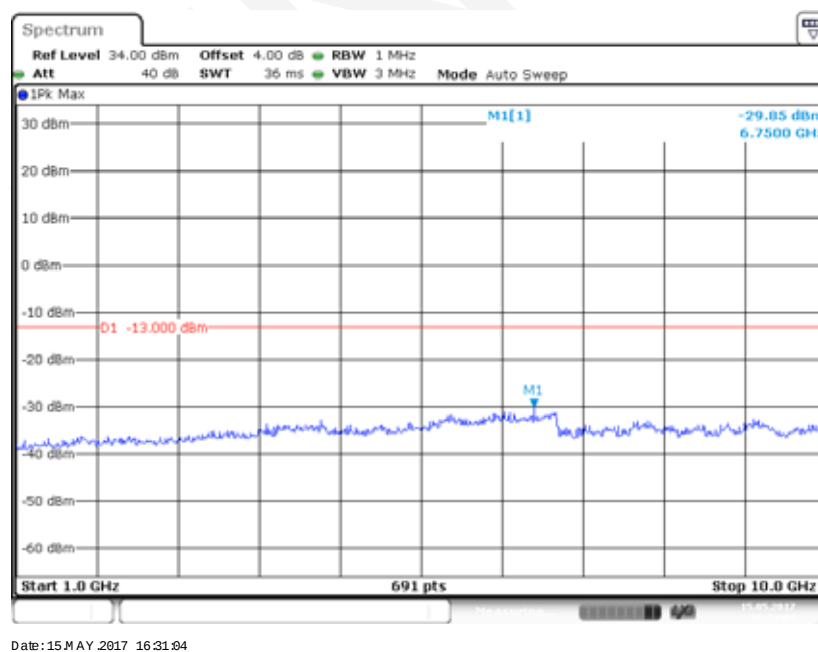
Date: 15 MAY 2017 13:46:11

WCDMA Band V:

30 MHz – 1GHz(WCDMA Mode)

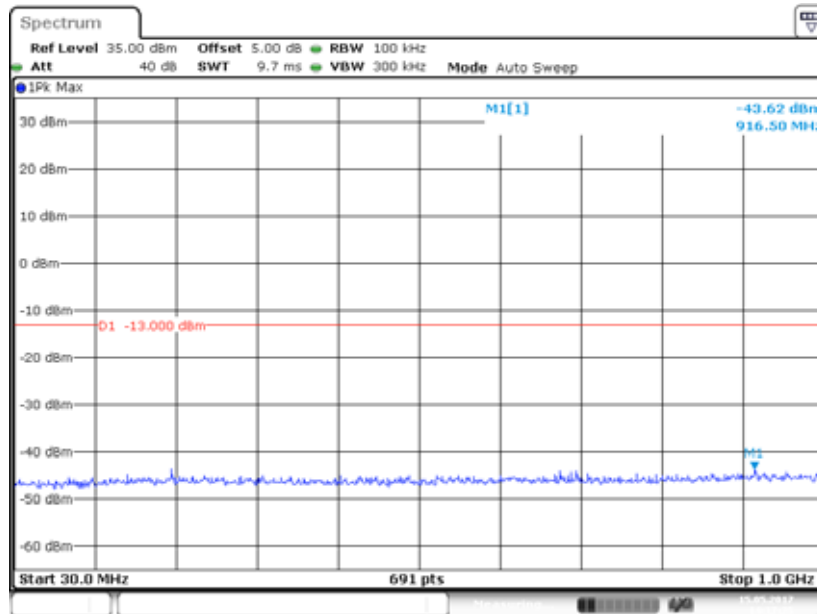


1 GHz – 10 GHz (WCDMA Mode)



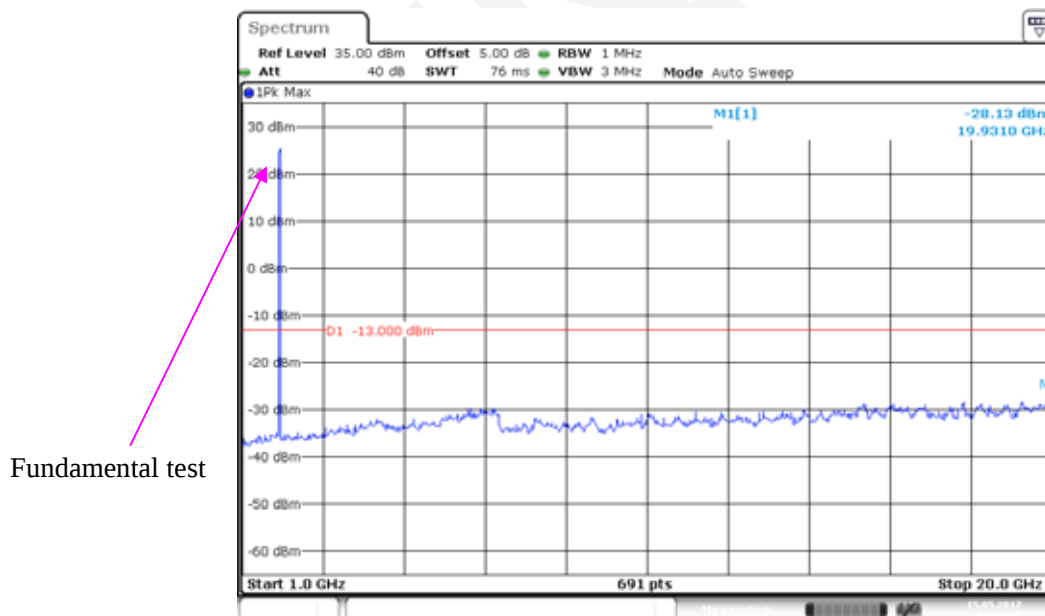
PCS1900 Band:

30 MHz – 1 GHz (GSM Mode)



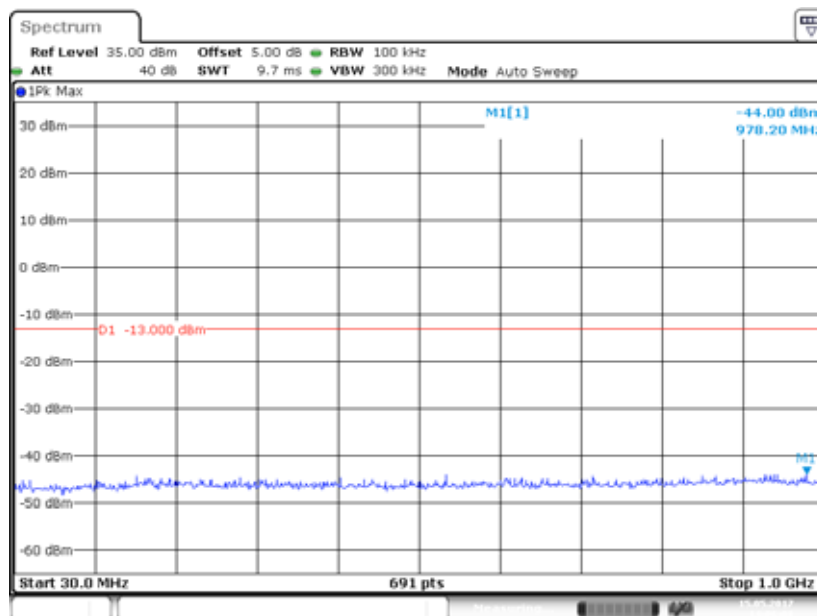
Date: 15 MAY 2017 14:17:25

1 GHz – 20 GHz (GSM Mode)



Date: 15 MAY 2017 14:19:37

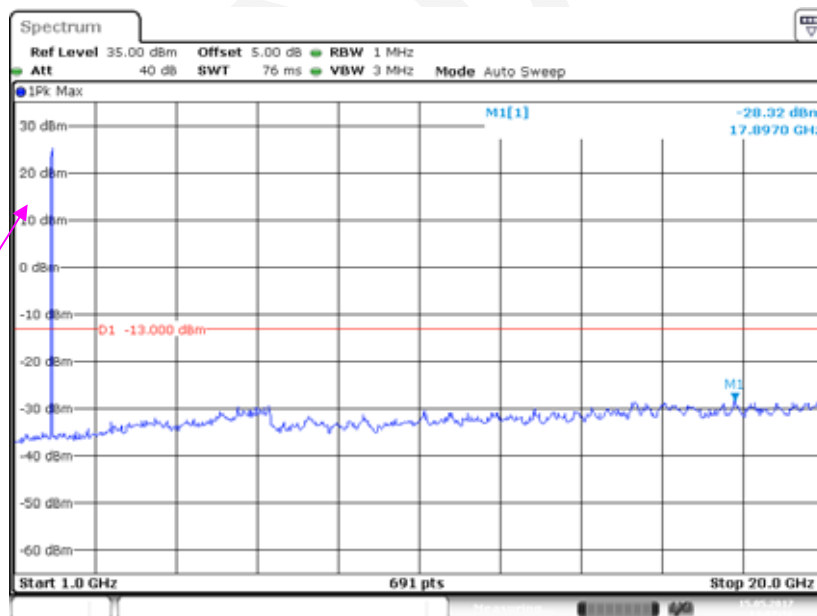
30 MHz – 1 GHz (EGPRS Mode)



Date: 15 MAY 2017 14:26:37

1 GHz – 20 GHz (EGPRS Mode)

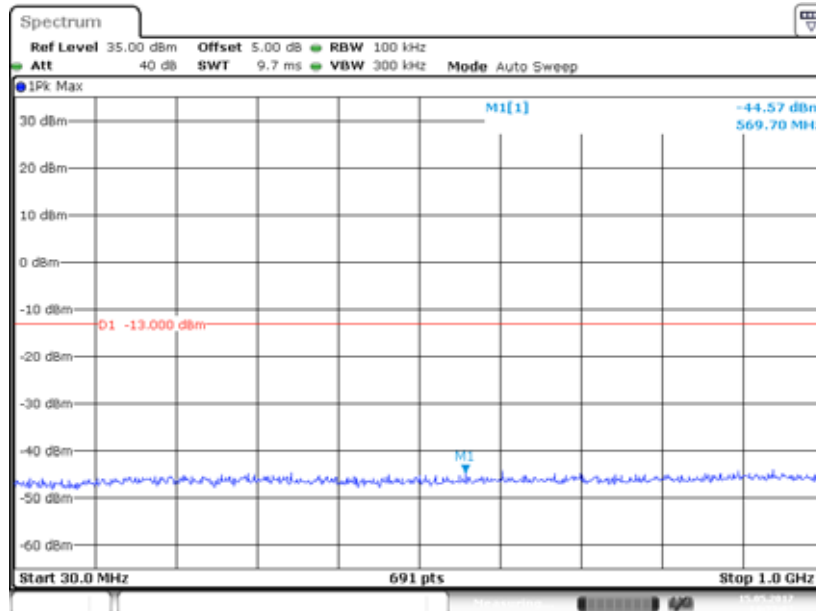
Fundamental test



Date: 15 MAY 2017 14:27:16

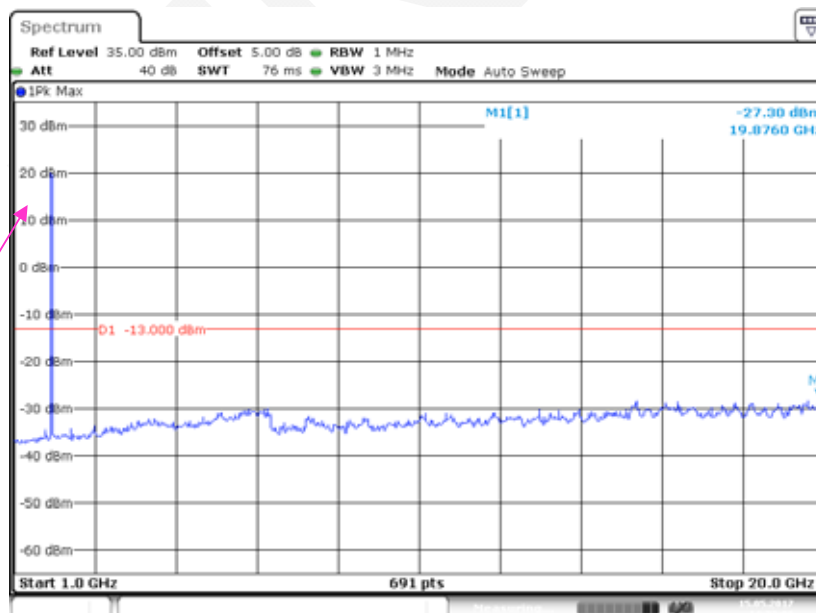
WCDMA Band II:

30 MHz – 1 GHz (WCDMA Mode)



Date: 15 MAY 2017 14:23:02

1 GHz – 20 GHz (WCDMA Mode)

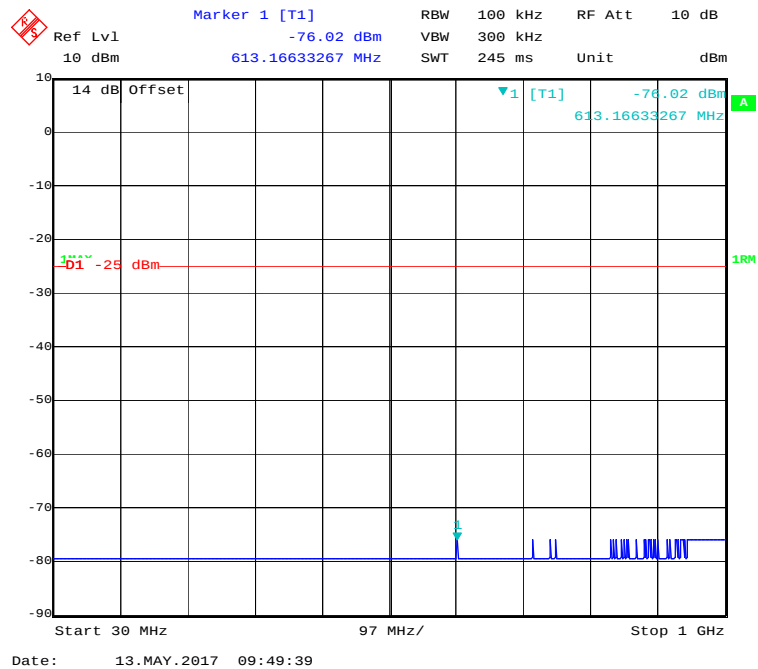


Fundamental test

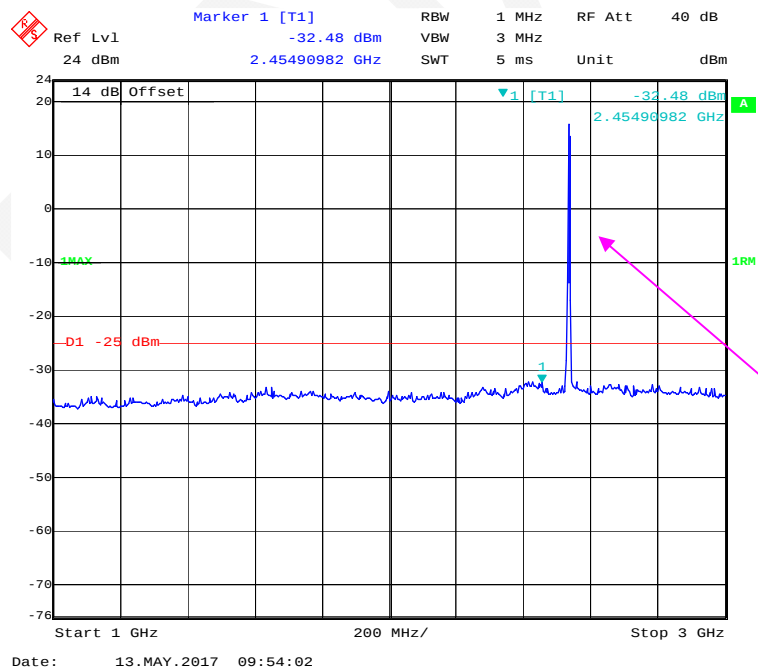
Date: 15 MAY 2017 14:22:00

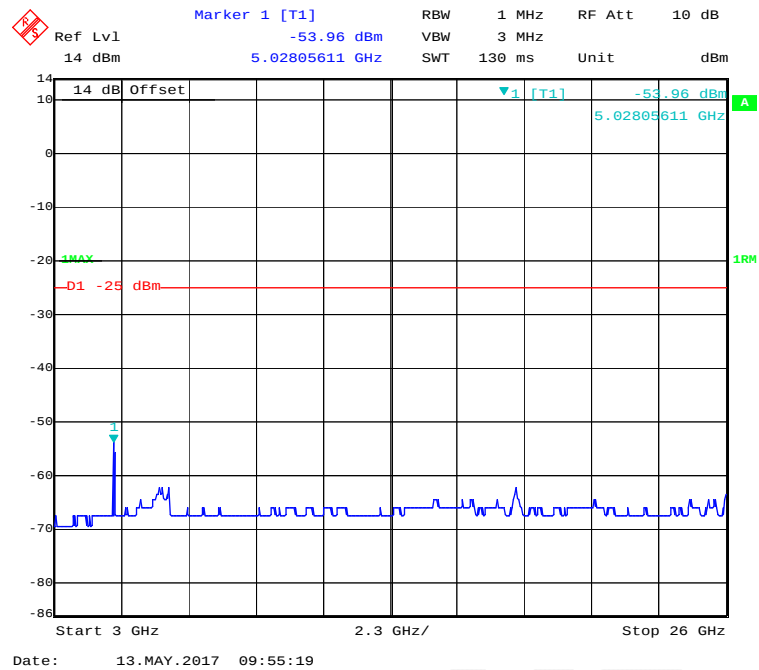
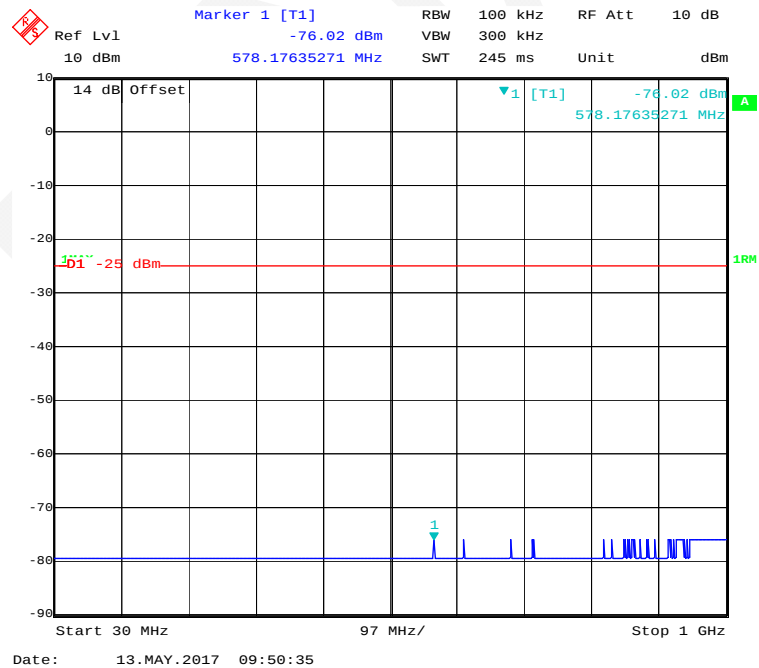
LTE Band 7:

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

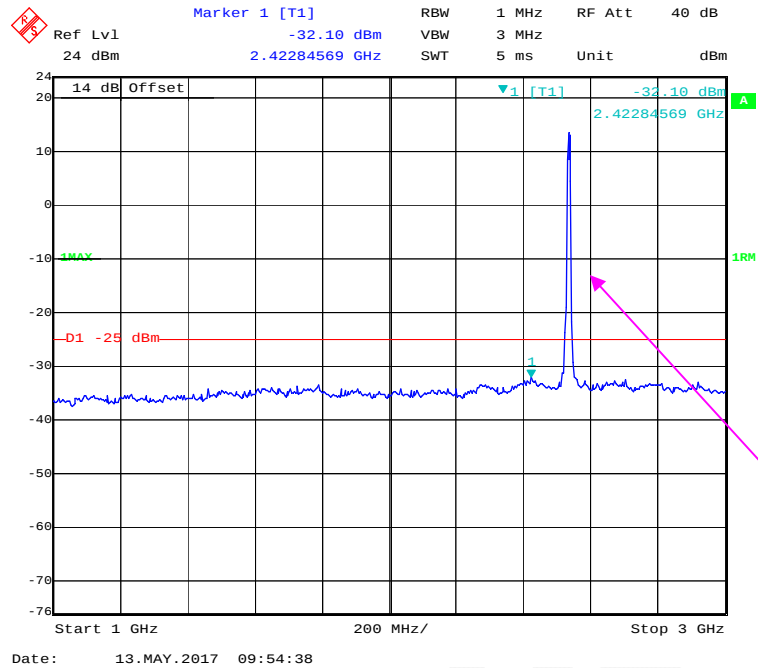


1 GHz – 3.0 GHz (5.0 MHz, Middle Channel)



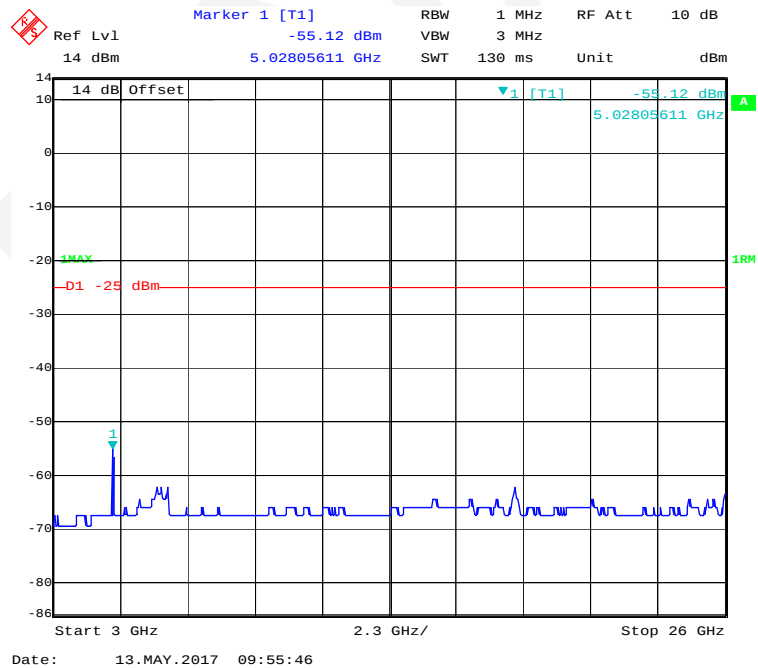
3.0 GHz – 26 GHz (5.0 MHz, Middle Channel)**30 MHz – 1.0 GHz (10.0 MHz, Middle Channel)**

1 GHz – 3 GHz (10.0 MHz, Middle Channel)

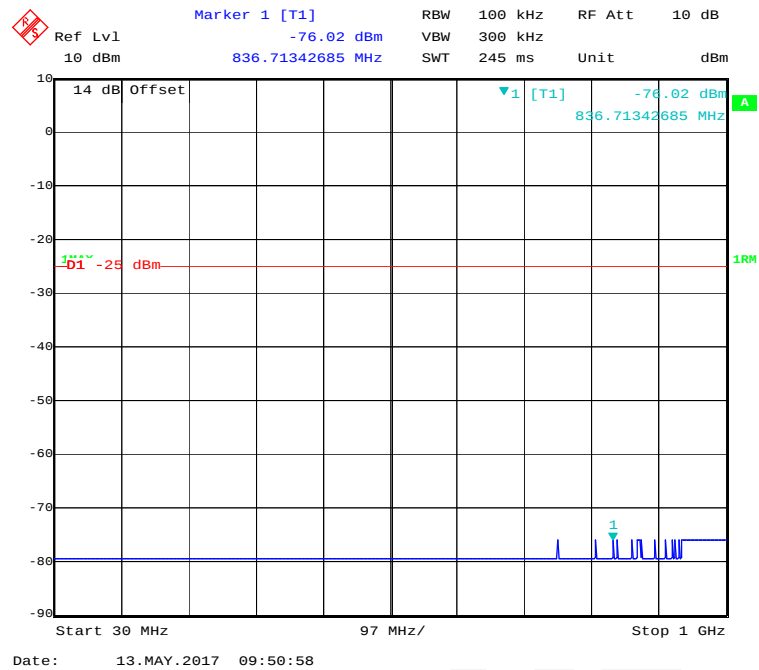


Fundamental test

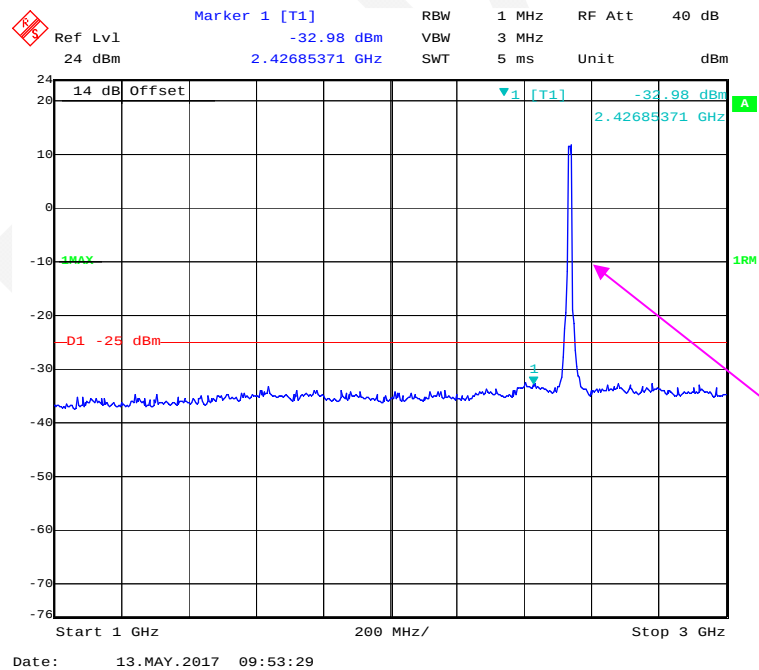
3 GHz – 26 GHz (10.0 MHz, Middle Channel)



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



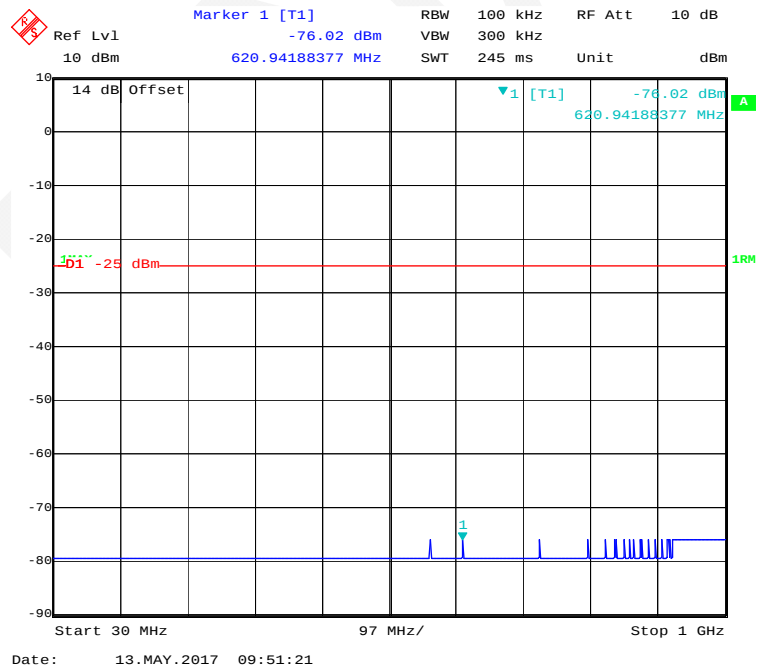
1 GHz – 3 GHz (15.0 MHz, Middle Channel)



3 GHz – 26 GHz (15.0 MHz, Middle Channel)



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



Marker 1 [T1]
 -32.38 dBm
 2.39879760 GHz

RBW 1 MHz
 VBW 3 MHz
 SWT 5 ms

Ref Lvl 24 dBm
 RF Att 40 dB
 Unit dBm

14 dB Offset
 -32.38 dBm
 2.39879760 GHz
 -25 dBm
 -10 dBm
 -20 dBm
 -30 dBm
 -40 dBm
 -50 dBm
 -60 dBm
 -70 dBm
 -76 dBm

Start 1 GHz
 200 MHz/
 Stop 3 GHz

Date: 13.MAY.2017 09:52:56

Fundamental test

Ref Lvl 14 dBm Marker 1 [T1] -56.46 dBm RBW 1 MHz RF Att 10 dB
 5.02805611 GHz VBW 3 MHz SWT 130 ms Unit dBm

14 dB Offset

▼1 [T1] -56.46 dBm
 5.02805611 GHz

14WAX

-D1 -25 dBm

1

Start 3 GHz 2.3 GHz/ Stop 26 GHz

Date: 13.MAY.2017 09:57:24

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)

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 (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:	23.2
Relative Humidity:	50 %
ATM Pressure:	101.1kPa

The testing was performed by Ada Yu on 2017-05-13 to 2017-05-15.

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

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 (dB)			
GSM 850 Band, Middle channel										
489.34	32.18	248	102	H	-67.45	0.24	4.96	-62.73	-13	49.73
489.34	31.67	38	134	V	-66.07	0.24	4.96	-61.35	-13	48.35
1673.20	46.37	94	201	H	-63.79	0.39	8.48	-55.70	-13	42.70
1673.20	48.26	68	151	V	-63.84	0.39	8.48	-55.75	-13	42.75
2509.80	41.25	30	231	H	-69.66	0.49	10.09	-60.06	-13	47.06
2509.80	42.37	266	180	V	-69.25	0.49	10.09	-59.65	-13	46.65
WCDMA Band V, Middle channel										
256.71	32.59	76	188	H	-72.51	0.24	4.96	-67.79	-13	54.79
256.71	31.05	300	233	V	-72.56	0.24	4.96	-67.84	-13	54.84
1673.20	44.23	87	135	H	-65.93	0.39	8.48	-57.84	-13	44.84
1673.20	45.87	263	228	V	-66.23	0.39	8.48	-58.14	-13	45.14
2509.80	42.21	254	214	H	-68.70	0.49	10.09	-59.10	-13	46.10
2509.80	42.85	358	206	V	-68.77	0.49	10.09	-59.17	-13	46.17

30 MHz ~ 20 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 (dB)			
PCS1900 Band, Middle channel										
541.63	34.26	62	242	H	-64.65	0.23	4.20	-60.68	-13	47.68
541.63	33.31	177	133	V	-63.78	0.23	4.20	-59.81	-13	46.81
3760.00	44.03	212	162	H	-61.30	0.59	9.74	-52.15	-13	39.15
3760.00	45.21	77	115	V	-61.24	0.59	9.74	-52.09	-13	39.09
5640.00	41.22	194	173	H	-60.43	0.67	10.47	-50.63	-13	37.63
5640.00	42.35	204	236	V	-61.17	0.67	10.47	-51.37	-13	38.37
WCDMA Band II, Middle channel										
629.18	31.57	320	125	H	-66.33	0.23	4.20	-62.36	-13	49.36
629.18	30.66	42	218	V	-65.05	0.23	4.20	-61.08	-13	48.08
3760.00	43.69	345	208	H	-61.64	0.59	9.74	-52.49	-13	39.49
3760.00	44.51	153	104	V	-61.94	0.59	9.74	-52.79	-13	39.79
5640.00	41.23	126	180	H	-60.42	0.67	10.47	-50.62	-13	37.62
5640.00	41.97	265	128	V	-41.99	0.67	10.47	-32.19	-13	19.19

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

30 MHz ~ 20 GHz:

Frequency	Receiver	Turntable	Rx Antenna		Substituted			Absolute Level (dBm)	Limit (dBm)	Margin (dB)
(MHz)	Reading (dBμV)	Angle Degree	Height (m)	Polar (H/V)	Submitted Level (dBm)	Cable Loss (dB)	Antenna Gain (dB)			
LTE Band 7, QPSK 5.0MHz Bandwidth, Middle channel										
178.26	44.38	15	1.9	H	-63.7	0.14	2.05	-61.79	-25	36.79
178.26	42.62	338	1.4	V	-65.9	0.14	2.05	-63.99	-25	38.99
5070.00	44.64	112	1.5	H	-48.5	0.64	10.30	-38.84	-25	13.84
5070.00	44.07	147	1.2	V	-50.6	0.64	10.30	-40.94	-25	15.94
7605.00	39.29	189	1.1	H	-49.4	0.90	10.08	-40.22	-25	15.22
7605.00	39.42	351	2.2	V	-49.9	0.90	10.08	-40.72	-25	15.72

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.

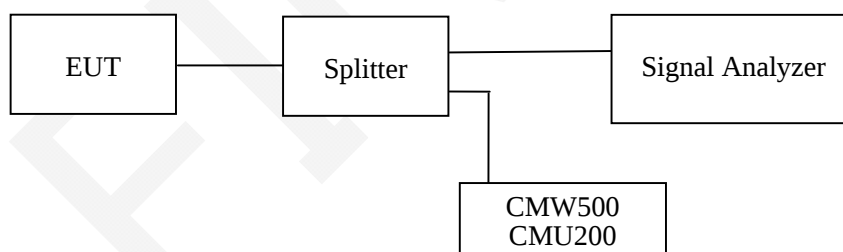
According to FCC §27.53 (h)(m), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

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:	23.2
Relative Humidity:	50 %
ATM Pressure:	101.1kPa

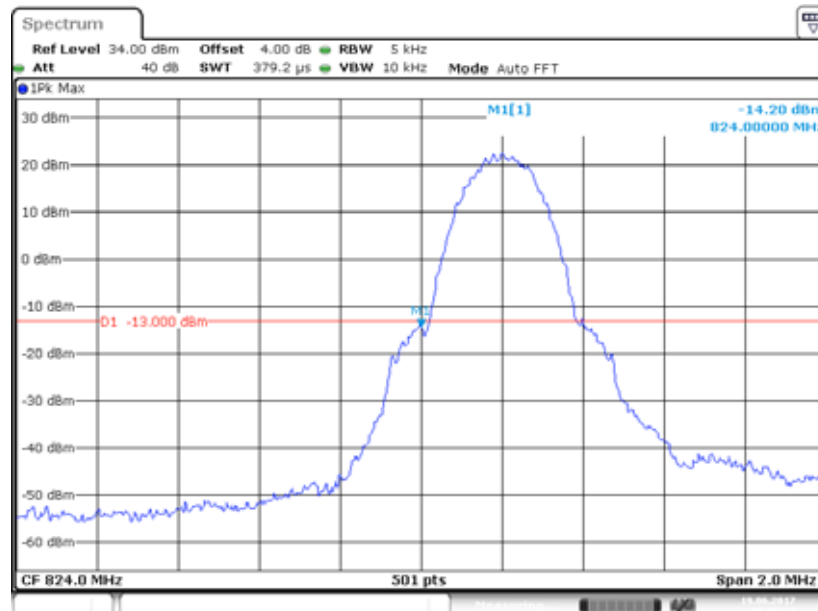
The testing was performed by Ada Yu on 2017-05-13 to 2017-06-19.

EUT operation mode: Transmitting

Test Result: Compliance.

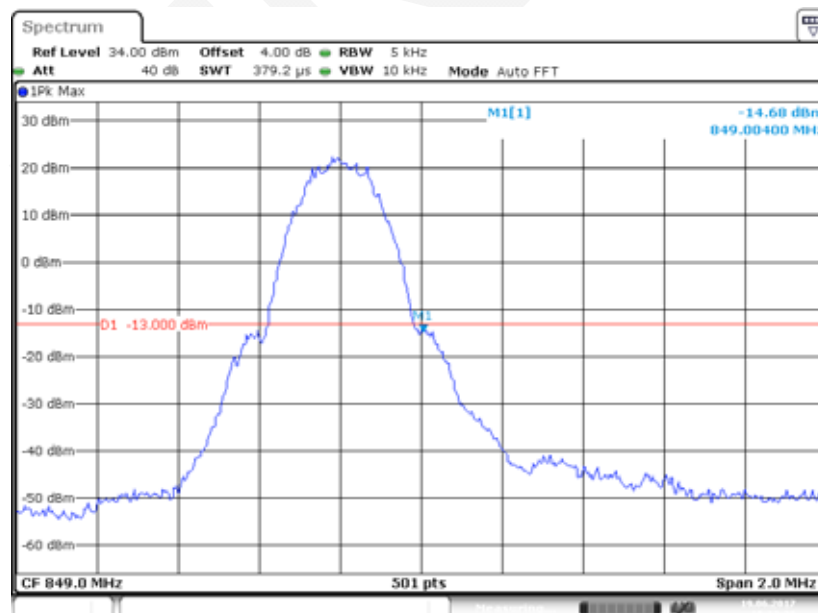
GSM850 Band:

Left Band Edge for GSM (GMSK) Mode



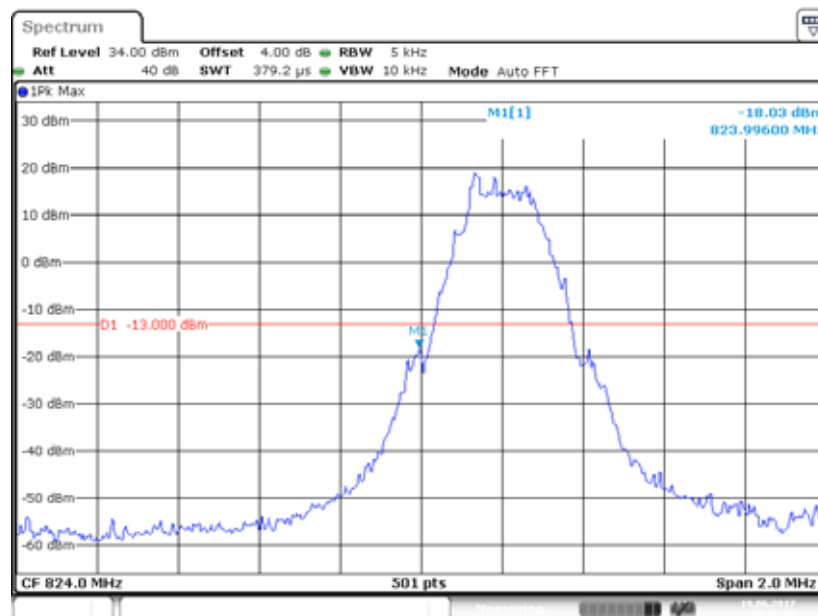
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Right Band Edge for GSM (GMSK) Mode



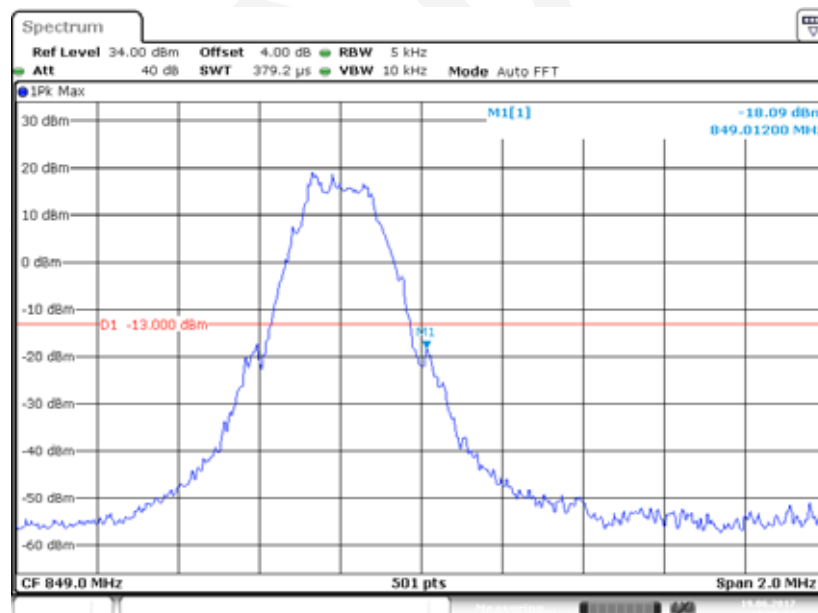
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Left Band Edge for EGPRS Mode



Date:19 JUN 2017 10:16:49

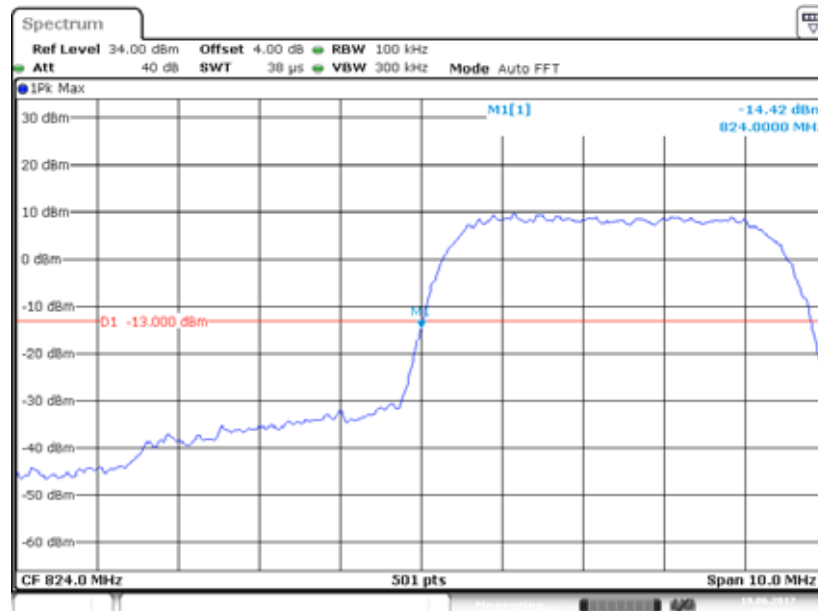
Right Band Edge for EGPRS Mode



Date:19 JUN 2017 10:15:33

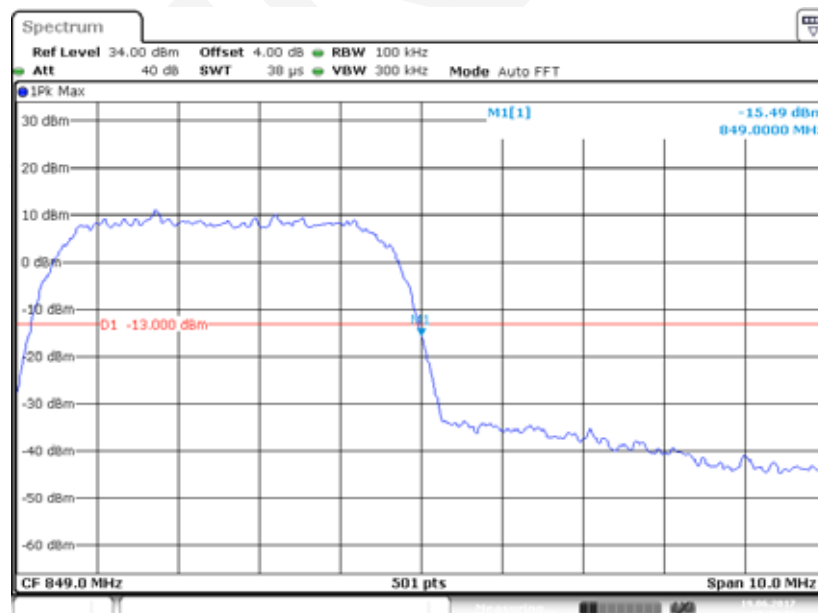
WCDMA Band V:

Left Band Edge for WCDMA Mode



Date: 19 JUN 2017 10:42:54

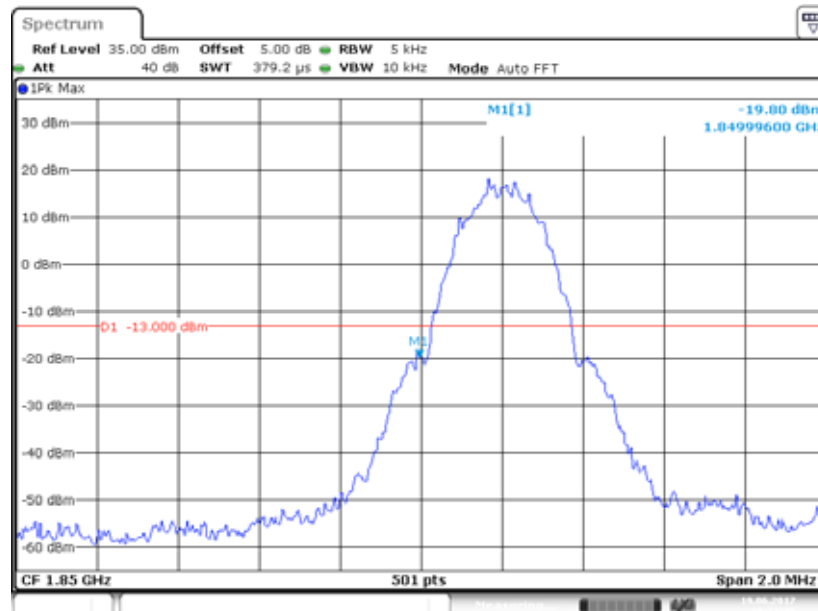
Right Band Edge for WCDMA Mode



Date: 19 JUN 2017 10:43:39

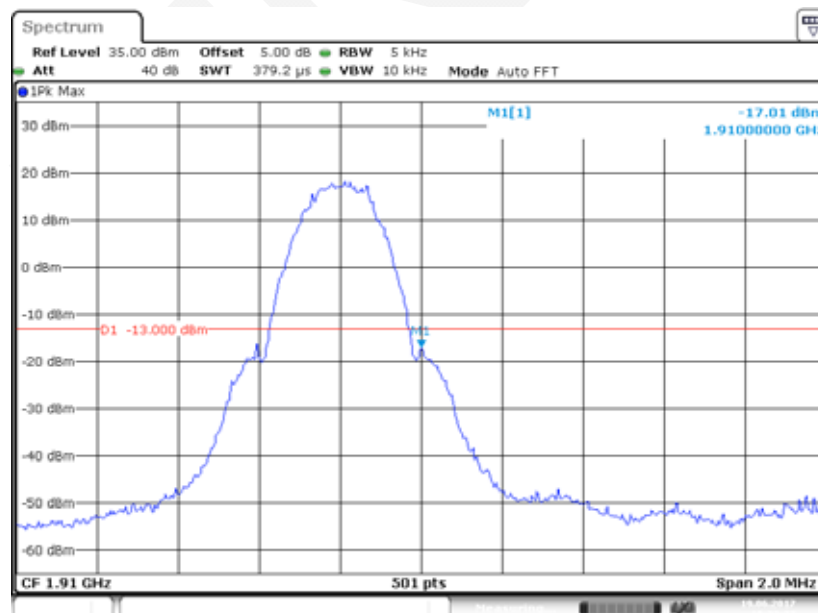
PCS1900 Band:

Left Band Edge for GSM (GMSK) Mode

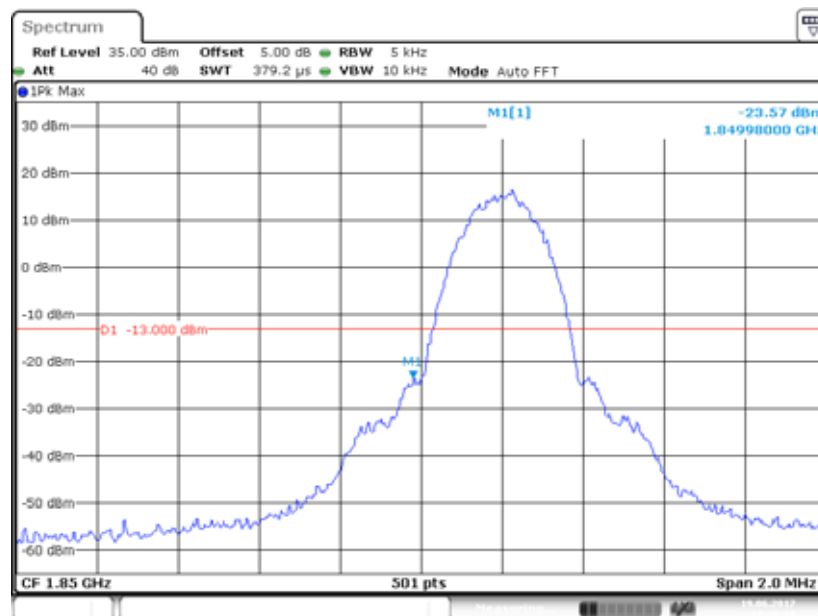


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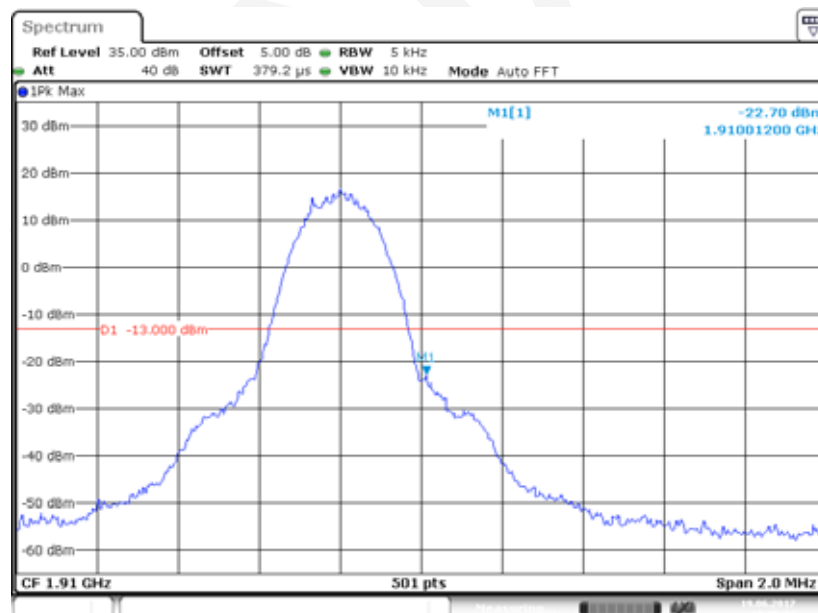
Right Band Edge for GSM (GMSK) Mode



Date: 19 JUN 2017 10:23:27

Left Band Edge for EGPRS Mode

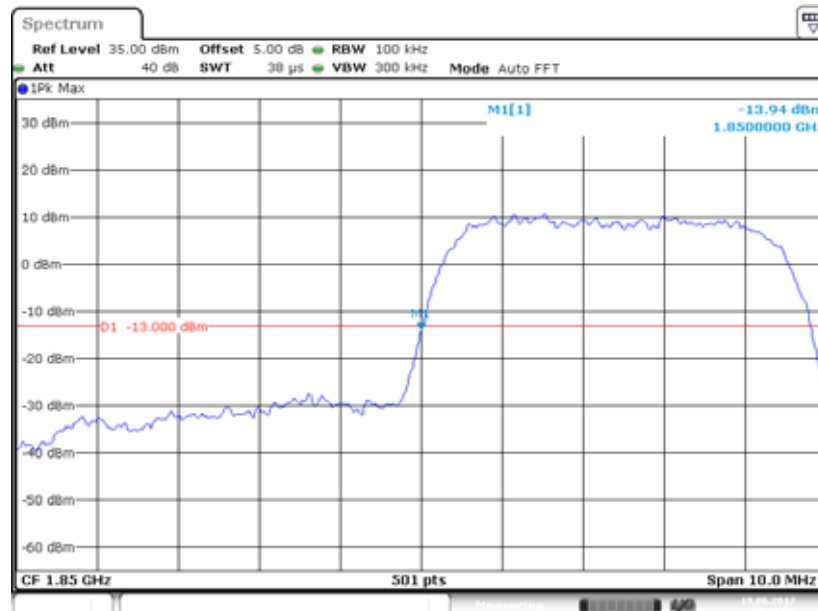
Date:19 JUN 2017 10:26:50

Right Band Edge for EGPRS Mode

Date:19 JUN 2017 10:25:35

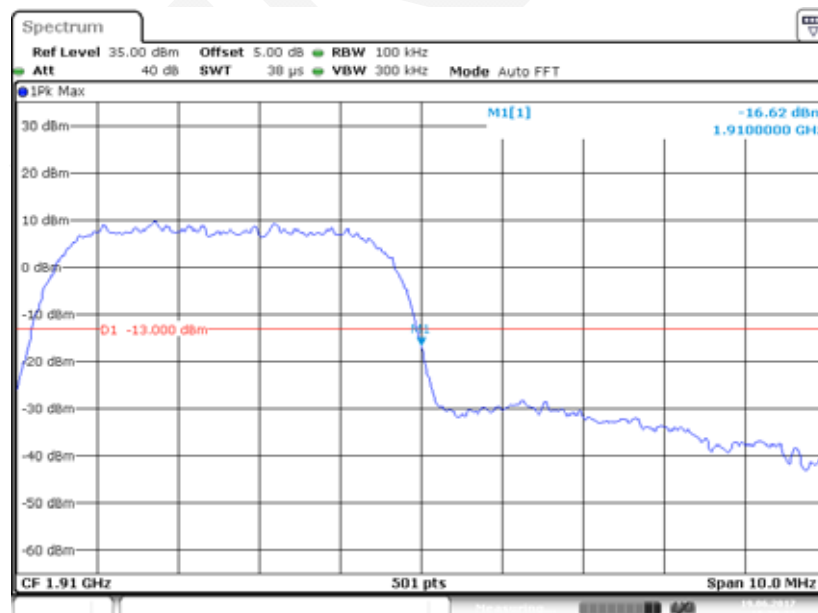
WCDMA Band II:

Left Band Edge for WCDMA Mode



Date:19 JUN 2017 10:37:01

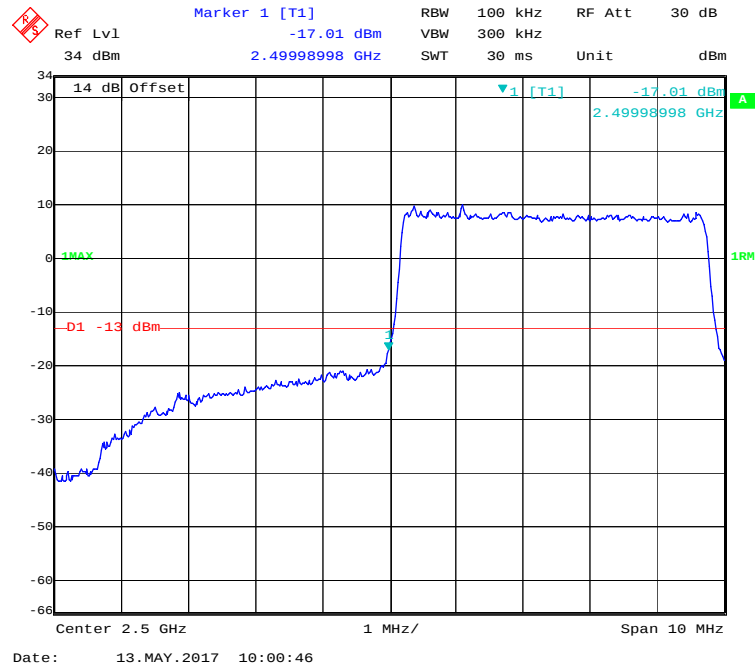
Right Band Edge for WCDMA Mode



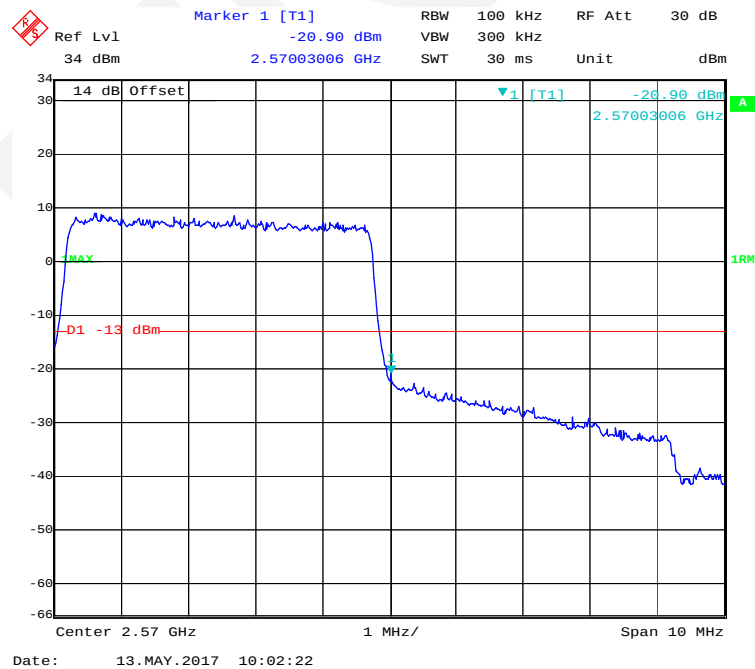
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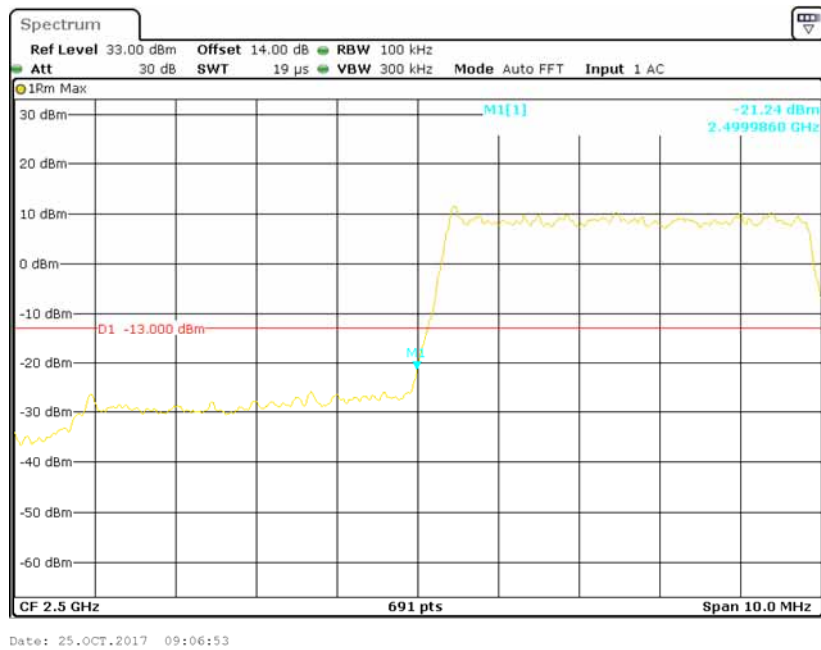
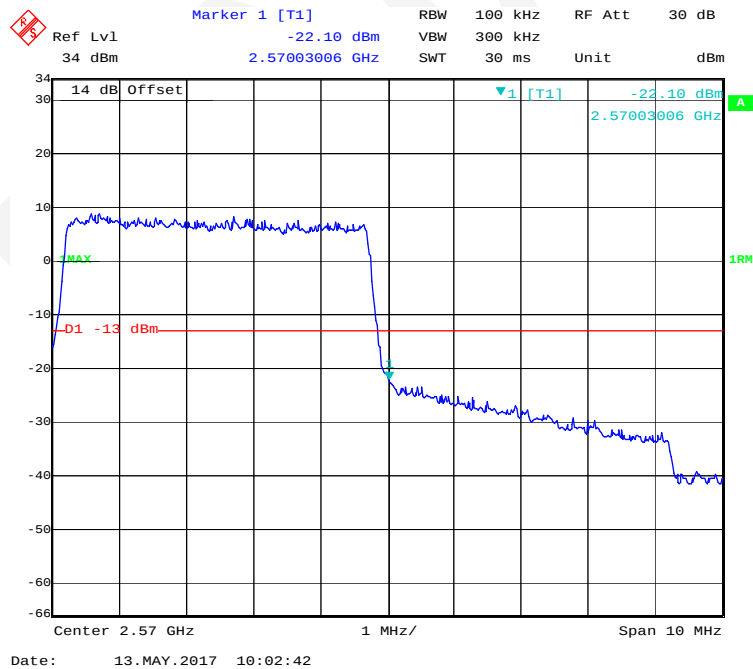
LTE Band 7:

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

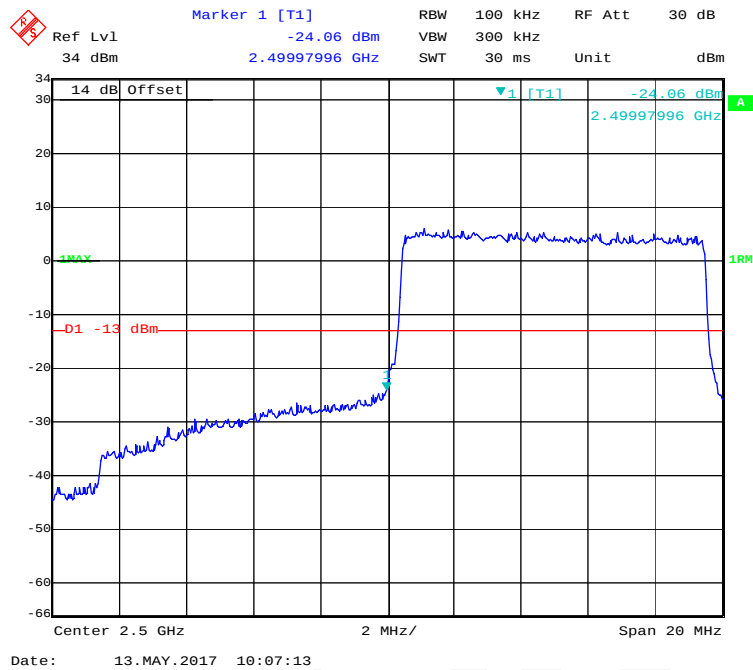


QPSK (5.0 MHz, FULL RB) - Right Band Edge

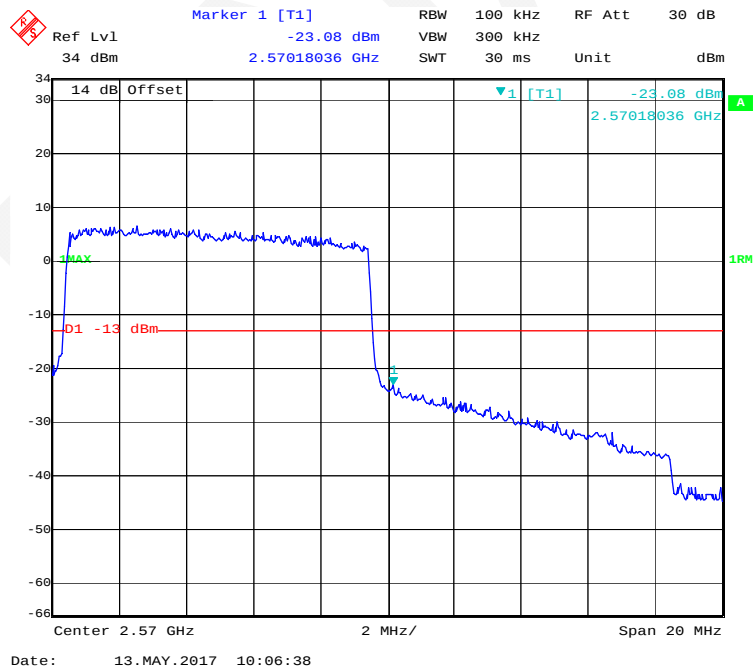


16-QAM (5.0 MHz, FULL RB) - Left Band Edge**16-QAM (5.0 MHz, FULL RB) - Right Band Edge**

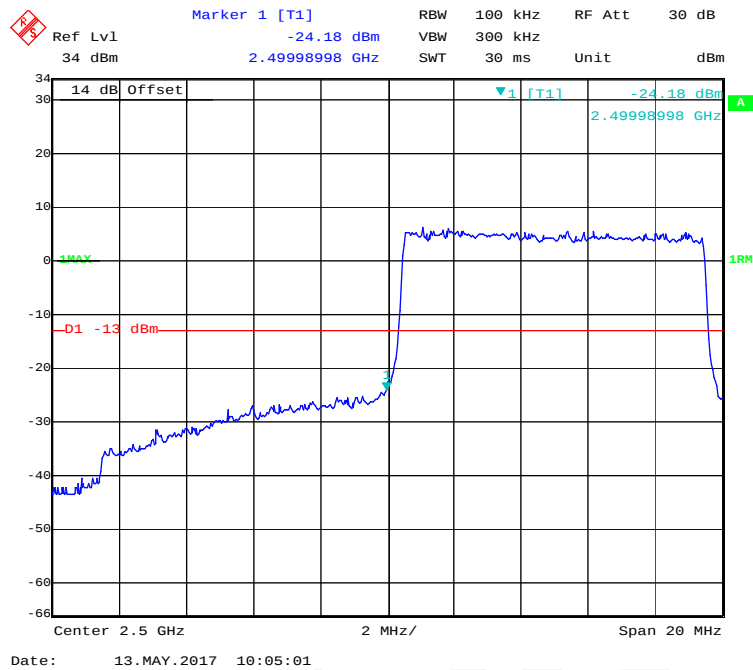
QPSK (10.0 MHz, FULL RB) - Left Band Edge



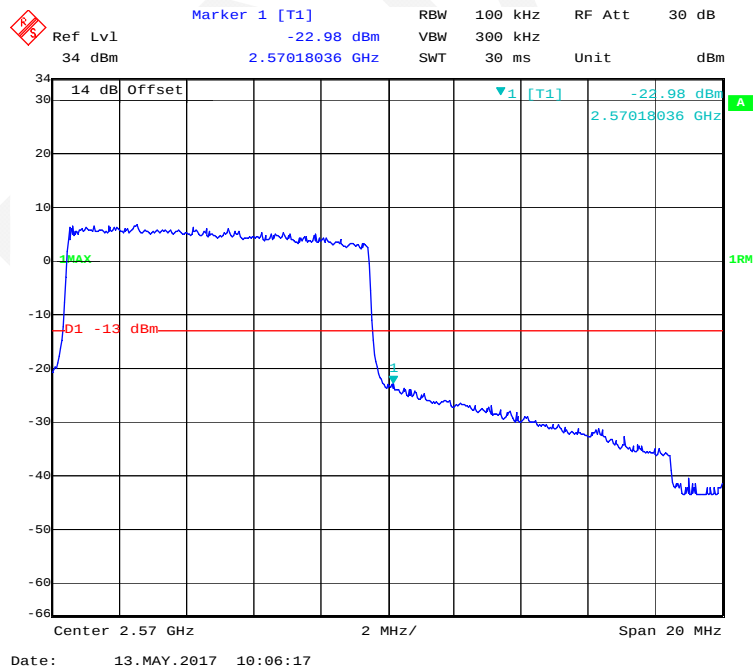
QPSK (10.0 MHz, FULL RB) - Right Band Edge



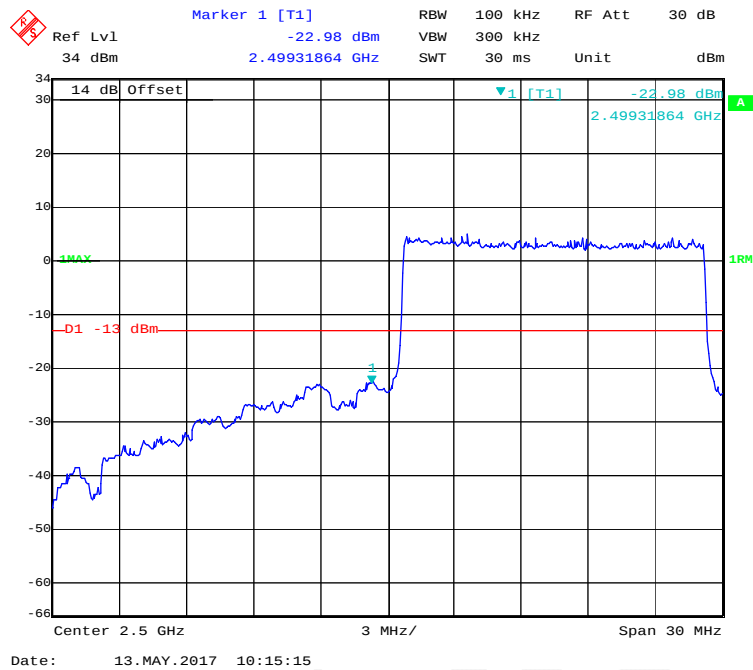
16-QAM (10.0 MHz, FULL RB) - Left Band Edge



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



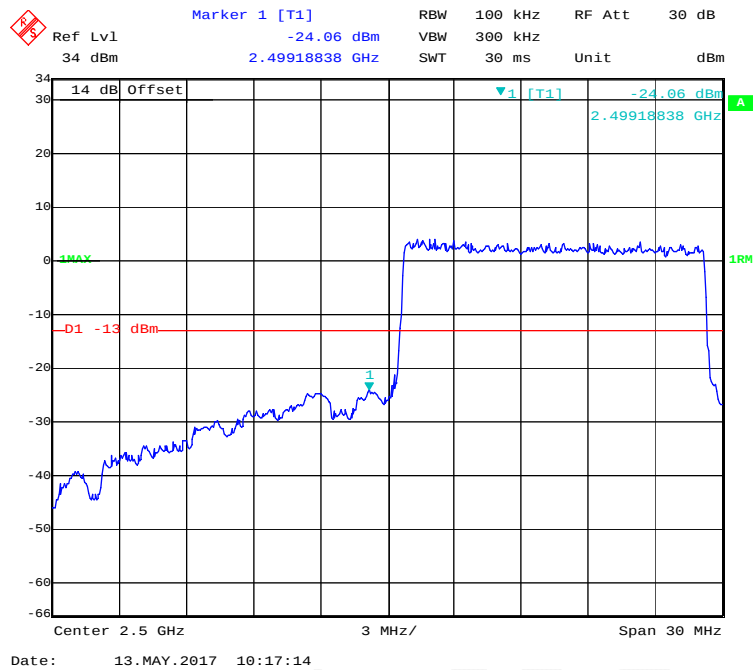
QPSK (15.0 MHz, FULL RB) - Left Band Edge



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



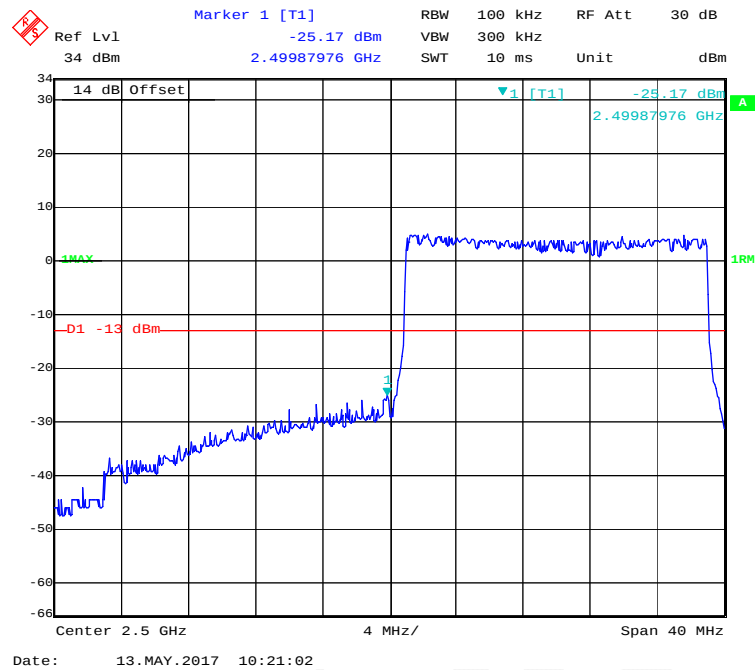
16-QAM (15.0 MHz, FULL RB) - Left Band Edge



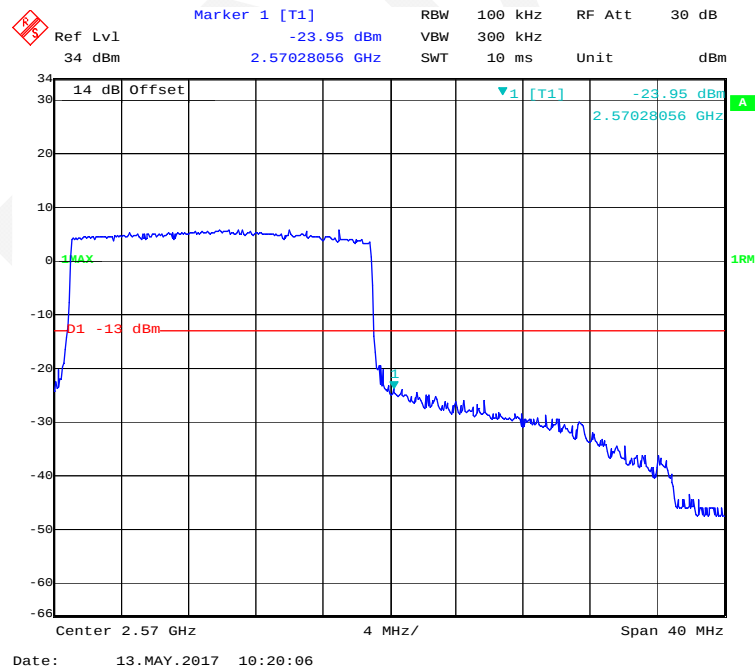
16-QAM (15.0 MHz, FULL RB) - Right Band Edge



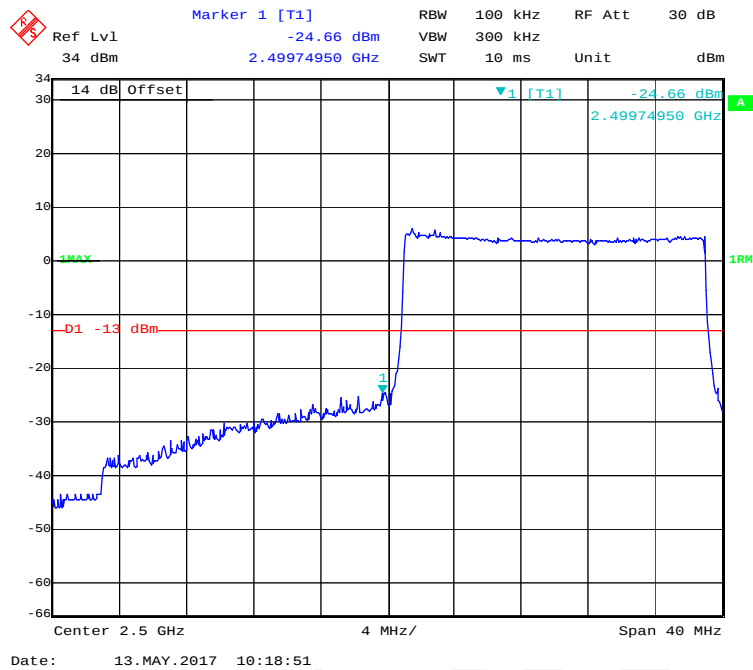
QPSK (20.0MHz, FULL RB) - Left Band Edge



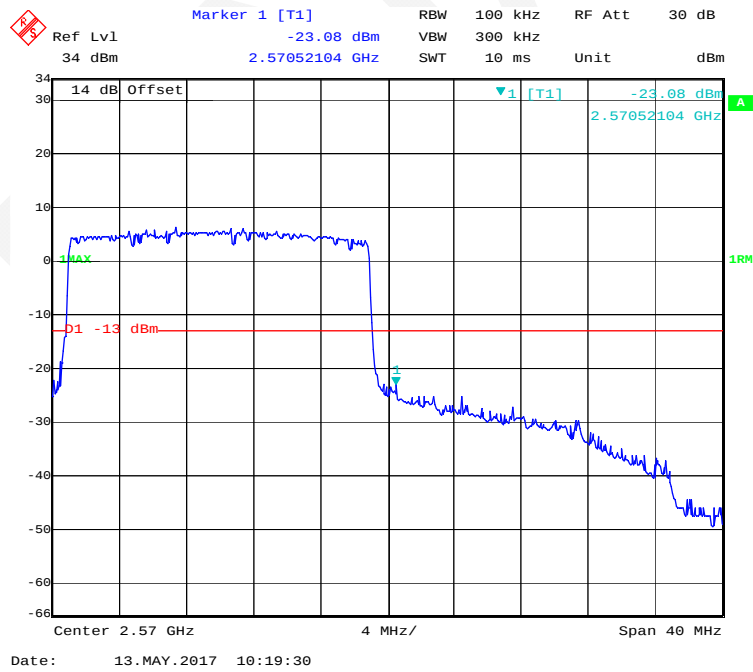
QPSK (20.0MHz, FULL RB) - Right Band Edge



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

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

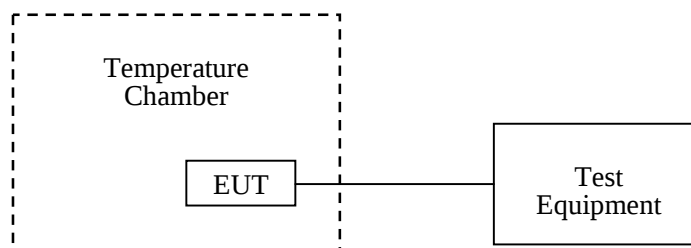
According to §24.235, the frequency stability shall be sufficient to ensure that the fundamental emissions stays within the authorized frequency block.

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
Relative Humidity:	50 %
ATM Pressure:	101.1kPa

The testing was performed by Ada Yu on 2017-05-13.

EUT operation mode: Transmitting

Test Result: Compliance.

GSM 850 Band:

GSM Mode, Middle Channel, $f_0=836.6$ MHz				
Temperature ()	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.80	12	0.014	2.5
-20		11	0.013	2.5
-10		12	0.014	2.5
0		11	0.013	2.5
10		12	0.014	2.5
20		-1	-0.001	2.5
30		10	0.012	2.5
40		6	0.007	2.5
50		5	0.006	2.5
20	V min.= 3.4	5	0.006	2.5
	V max.= 4.35	9	0.011	2.5

EDGE Mode, Middle Channel, $f_o=836.6$ MHz				
Temperature ()	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.80	19	0.023	2.5
-20		18	0.022	2.5
-10		18	0.022	2.5
0		18	0.022	2.5
10		19	0.023	2.5
20		6	0.007	2.5
30		12	0.014	2.5
40		17	0.020	2.5
50		12	0.014	2.5
20	V min.= 3.4	10	0.012	2.5
	V max.= 4.35	10	0.012	2.5

WCDMA Band V:

WCDMA Mode, Middle Channel, $f_o=836.6$ MHz				
Temperature ()	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.80	13	0.016	2.5
-20		13	0.016	2.5
-10		12	0.014	2.5
0		13	0.016	2.5
10		12	0.014	2.5
20		0	0.000	2.5
30		8	0.010	2.5
40		4	0.005	2.5
50		8	0.010	2.5
20	V min.= 3.4	5	0.006	2.5
	V max.= 4.35	3	0.004	2.5

PCS1900 Band:

GSM Mode, Middle Channel, $f_0 = 1880.0$ MHz				
Temperature ()	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.80	17	0.009	pass
-20		17	0.009	pass
-10		18	0.010	pass
0		17	0.009	pass
10		18	0.010	pass
20		5	0.003	pass
30		9	0.005	pass
40		7	0.004	pass
50		9	0.005	pass
20	V min.= 3.4	11	0.006	pass
	V max.= 4.35	16	0.009	pass

EDGE Mode, Middle Channel, $f_0 = 1880.0$ MHz				
Temperature ()	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.80	13	0.007	pass
-20		13	0.007	pass
-10		12	0.006	pass
0		12	0.006	pass
10		13	0.007	pass
20		0	0.000	pass
30		5	0.003	pass
40		12	0.006	pass
50		10	0.005	pass
20	V min.= 3.4	3	0.002	pass
	V max.= 4.35	11	0.006	pass

WCDMA Band II:

WCDMA Mode, Middle Channel, $f_0=1880.0$ MHz				
Temperature ()	Power Supplied (VDC)	Frequency Error (Hz)	Frequency Error (ppm)	Result
-30	3.80	14	0.007	pass
-20		14	0.007	pass
-10		15	0.008	pass
0		15	0.008	pass
10		14	0.007	pass
20		2	0.001	pass
30		5	0.003	pass
40		8	0.004	pass
50		13	0.007	pass
20	V min.= 3.6	5	0.003	pass
	V max.= 4.35	13	0.007	pass

LTE Band 7:

20 MHz Bandwidth, Middle Channel, $f_0=2535$ MHz(QPSK)				
Temperature ()	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.80	7	0.00276	pass
-20		7	0.00276	pass
-10		5	0.00197	pass
0		5	0.00197	pass
10		5	0.00197	pass
20		3	0.00118	pass
30		4	0.00158	pass
40		5	0.00197	pass
50		6	0.00237	pass
20	V min.= 3.6	11	0.00434	pass
	V max.= 4.35	13	0.00513	pass

20 MHz Bandwidth, Middle Channel, $f_o=2535$ MHz(16QAM)				
Temperature ()	Power Supplied (V _{DC})	Frequency Error (Hz)	Frequency Error (ppm)	Limit (ppm)
-30	3.80	8	0.0032	pass
-20		6	0.0024	pass
-10		6	0.0024	pass
0		5	0.0020	pass
10		5	0.0020	pass
20		2	0.0008	pass
30		3	0.0012	pass
40		5	0.0020	pass
50		7	0.0028	pass
20	V min.= 3.6	8	0.0032	pass
	V max.= 4.35	12	0.0047	pass

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