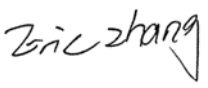
CTC Laboratories, Inc.

2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

Tel: +86-755- 27521059 Fax: +86-755- 27521011 Http://www.sz-ctc.com.cn

TEST REPORT

Report No. ·····:	**GTI20191150F**
FCC ID·····:	**SRQ-ZTEF322**
Applicant·····:	**ZTE Corporation**
Address·····:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Manufacturer·····:	ZTE Corporation
Address·····:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Product Name·····:	WCDMA/GSM Feature Phone
Trade Mark·····:	ZTE
Model/Type reference·····:	ZTE F322
Listed Model(s) ·····:	N/A
Standard·····:	**FCC CFR Title 47 Part 2, Part 22 Subpart H, Part 24 Subpart E** **FCC CFR Title 47 Part 27 Subpart L**
Date of receipt of test sample…:	2019-05-10
Date of testing……..:	2019-05-10 to 2019-06-12
Date of issue……..:	2019-06-12
Result……:	**PASS**

Compiled by: (Printed name+signature)	Zaki Zhang	
Supervised by: (Printed name+signature)	Eric Zhang	
Approved by: (Printed name+signature)	Walter Chen	

Testing Laboratory Name.....	**CTC Laboratories, Inc.**
Address.....	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

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1. SUMMARY

1.1. Test Standards

FCC Rules Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS
FCC Rules Part 22: PRIVATE LAND MOBILE RADIO SERVICES.
FCC Rules Part 24: PUBLIC MOBILE SERVICES
FCC Rules Part 27: MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES
TIA/EIA 603 E March 2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.
ANSI C63.26: 2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
KDB 971168 D01 Power Meas License Digital Systems v03: MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

1.2. Report version

Revised No.	Date of issue	Description
01	2019-06-12	Original

1.3. Test Description

Test Item	Section in CFR 47	Result	Test Engineer
Conducted Output Power	Part 2.1046 Part 22.913(a) Part 24.232(c) Part 27.50	Pass	Roy Luo
Peak-to-Average Ratio	Part 24.232 Part 27.50	Pass	Roy Luo
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53	Pass	Roy Luo
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	Pass	Roy Luo
Conducted Spurious Emissions	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	Pass	Roy Luo
Frequency stability vs temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	Pass	Roy Luo
Frequency stability vs voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	Pass	Roy Luo
ERP and EIRP	Part 22.913(a) Part 24.232(b) Part 27.50	Pass	Roy Luo
Radiated Spurious Emissions	Part 2.1053 Part 22.917 Part 24.238 Part 27.53	Pass	Roy Luo

Note: The measurement uncertainty is not included in the test result.

1.4. Test Facility

1.3.1 Address of the test laboratory

CTC Laboratories, Inc.

Add: 2/F., Building 1 and 1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Longhua District, Shenzhen, Guangdong, China

1.3.2 Laboratory accreditation

The test facility is recognized, certified, or accredited by the following organizations:

ISED Registration No.: CN0029

The 3m alternate test site of CTC Laboratories, Inc.EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: CN0029 on Dec, 2018.

FCC-Registration No.: CN1208

CTC Laboratories, Inc. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration CN1208, Sep 07, 2017.

Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements and is documented in the CTC Laboratories, Inc quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTC Laboratories, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
Frequency stability	25 Hz	(1)
Transmitter power conducted	0.57 dB	(1)
Transmitter power Radiated	2.20 dB	(1)
Conducted spurious emission 9KHz-20 GHz	1.60 dB	(1)
Conducted Emission 9KHz-30MHz	3.39 dB	(1)
Radiated Emission 30~1000MHz	4.24 dB	(1)
Radiated Emission 1~18GHz	5.16 dB	(1)
Radiated Emission 18-40GHz	5.54 dB	(1)
Occupied Bandwidth	---------	(1)
Emission Mask	---------	(1)
Modulation Characteristic	---------	(1)
Transmitter Frequency Behavior	---------	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

1.5. Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Normal Temperature:	25°C
Relative Humidity:	55 %
Air Pressure:	101 kPa

2. GENERAL INFORMATION

2.1. Client Information

Applicant:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Manufacturer:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China
Factory:	ZTE Corporation
Address:	ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R. China

2.2. General Description of EUT

Product Name:	WCDMA/GSM Feature Phone
Model/Type reference:	ZTE F322
Marketing Name:	ZTE
Listed Model(s):	/
Power supply:	3.7Vdc 800mAh from Li-ion Battery
Battery 1:	Model: Li3708T42P3h533456 3.7Vdc 800mAh
Battery 2:	Model: 5C0802 3.7Vdc 800mAh
Adapter 1:	Model:50.069MX03 Input:100-240Vac 50/60Hz 0.2A Output:5Vdc/0.5A
Adapter 2:	Model:TPA-97050050U01 Input:100-240Vac 50/60Hz 0.15A Output:5Vdc/0.5A
Hardware version:	HS520_MB_V2.0
Software version:	ZTE_F322V1.0_20190603
GSM	
Operation Band:	GSM850: UL: 824MHz~848MHz, DL: 869MHz~894MHz PCS1900: UL: 1850MHz~1910, DL: 1930MHz~1990MHz
Supported Type:	GSM/GPRS
Modulation Type:	GMSK for GSM/GPRS
Antenna Type:	PIFA Antenna
Antenna Gain:	GSM 850: -0.81dBi PCS 1900: -0.81dBi
WCDMA	
Operation Band:	Band II: UL: 1852.4MHz~1907.6MHz, DL: 1932.6MHz~1987.4MHz Band V: UL: 826.4MHz~846.6MHz, DL: 871.6MHz~1891.4MHz
Modulation Type:	QPSK for WCDMA
Antenna Type:	Internal Antenna
Antenna Gain:	WCDMA II: -0.26dBi WCDMA V: -0.26dBi

Remark: The Test EUT support two SIM card(SIM1,SIM2),so all the tests are performed at each SIM card (SIM1,SIM2) mode, the datum recorded is the worst case for all the mode at SIM1 Card mode.

2.3. Description of Test Modes and Test Frequency

The EUT has been tested under typical operating condition. The CUM200 used to control the EUT staying in continuous transmitting and receiving mode for testing.

Test Frequency:

GSM 850		PCS 1900	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
128	824.20	512	1850.20
190	836.60	661	1880.00
251	848.80	810	1909.80

WCDMA Band II		WCDMA Band IV		WCDMA Band V	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
9262	1852.40	1312	1712.40	4132	826.40
9400	1880.00	1413	1732.60	4183	836.60
9538	1907.60	1513	1752.60	4233	846.60

2.4. Measurement Instruments List

Output Power (Radiated) & Radiated Spurious Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	EMI Test Receiver	R&S	ESCI	100967	Dec. 28, 2019
2	High pass filter	Compliance Direction systems	BSU-6	34202	Dec. 28, 2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Dec. 28, 2019
4	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4181	Dec. 28, 2019
5	Spectrum Analyzer	HP	8563E	02052	Dec. 28, 2019
6	Horn Antenna	Schwarzbeck	BBHA 9120D	648	Dec. 28, 2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	649	Dec. 28, 2019
8	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Dec. 28, 2019
9	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25842	Dec. 28, 2019
10	Pre-Amplifier	HP	8447D	1937A03050	Dec. 28, 2019
11	Pre-Amplifier	EMCI	EMC051835	980075	Dec. 28, 2019
12	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019
13	Signal Generator	Agilent	N5182A	1019356	Dec. 28, 2019
14	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019
15	Antenna Mast	UC	UC3000	N/A	N/A
16	Antenna mast	MATURO	TAM-4.0-P	N/A	N/A
17	Turn Table	UC	UC3000	N/A	N/A
18	Cable Below 1GHz	Schwarzbeck	AK9515E	33155	Dec. 28, 2019
19	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Dec. 28, 2019

Output Power(Conducted) & Occupied Bandwidth & Emission Bandwidth & Band Edge Compliance & Conducted Spurious Emission					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Dec. 28, 2019
3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Dec. 28, 2019
4	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019
5	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Dec. 28, 2019
6	RF Connection Cable	Chengdu E-Microwave	---	---	Dec. 28, 2019
7	Attenuator	Chengdu E-Microwave	EMCAXX-10 RNZ-3	---	Dec. 28, 2019

Frequency Stability					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Dec. 28, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Dec. 28, 2019
3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Dec. 28, 2019
4	Splitter	Mini-Circuit	ZAPD-4	400059	Dec. 28, 2019
5	Climate Chamber	ESPEC	EL-10KA	05107008	Dec. 28, 2019

Note: 1. The Cal. Interval was one year.
2. The cable loss has calculated in test result which connection between each test instruments.

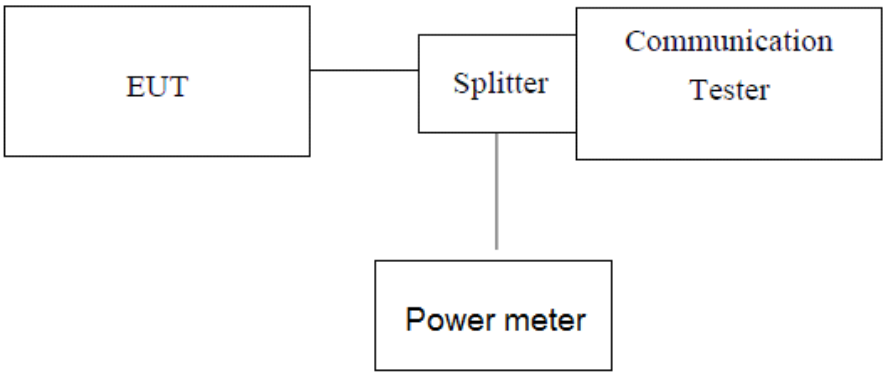
3. TEST ITEM AND RESULTS

3.1. Conducted Output Power

LIMIT:

GSM850/WCDMA Band V: 7W
PCS1900/WCDMA Band II/WCDMA Band IV: 2W

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The transmitter output port was connected to base station.
2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
3. Set EUT at maximum power through base station.
4. Select lowest, middle, and highest channels for each band and different modulation.
5. Measure the maximum PK burst power and maximum Avg. burst power.

TEST RESULTS

GSM850		Conducted Power (dBm)		
		CH128	CH190	CH251
		824.20MHz	836.60MHz	848.80MHz
GSM		31.19	33.00	34.08
GPRS (GMSK)	1TXslot	31.67	33.37	34.28
	2TXslots	30.66	33.75	33.63
	3TXslots	28.21	30.05	31.17
	4TXslots	26.88	28.72	29.89

GSM1900		Conducted Power (dBm)		
		CH512	CH661	CH810
		1850.2MHz	1880.0MHz	1909.8MHz
GSM		28.68	28.67	29.95
GPRS (GMSK)	1TXslot	28.19	28.15	29.31
	2TXslots	27.56	29.56	29.04
	3TXslots	25.11	25.25	26.54
	4TXslots	23.56	23.75	25.04

WCDMA Band II	Conducted Power (dBm)		
	CH9262	CH9400	CH9538
	1852.40	1880.00	1907.60
RMC 12.2K	21.96	23.06	22.08

WCDMA Band V	Conducted Power (dBm)		
	CH4132	CH4183	CH4233
	826.40	836.60	846.60
RMC 12.2K	21.59	21.60	21.37

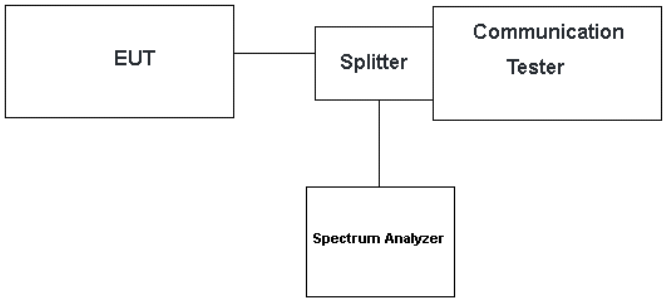
3.2. Peak-to-Average Ratio

LIMIT:

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13dB.

TEST CONFIGURATION

- For Peak-to-Average Ratio



TEST PROCEDURE

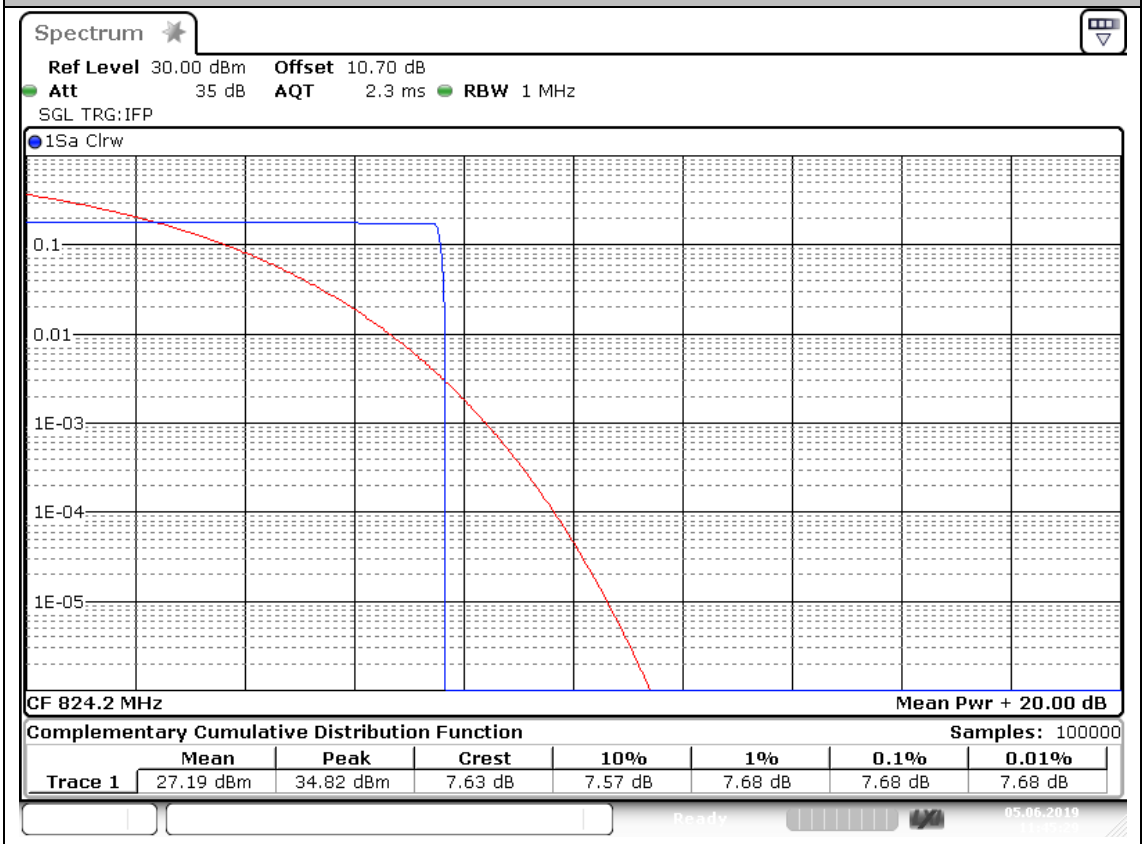
- For Peak-to-Average Ratio

1. The testing follows FCC KDB 971168 v03r01 Section 5.7.1.
2. The EUT was connected to spectrum and communication tester via a splitter
3. Set the CCDF (Complementary Cumulative Distribution Function) option in spectrum analyzer.
4. The highest RF powers were measured and recorded the maximum PAPR level associated with a probability of 0.1 %.
6. Record the deviation as Peak to Average Ratio.

TEST RESULTS

EUT Mode	Channel	Frequency (MHz)	Peak-to-Average Ratio(dB)	Limit (dB)	Result
GSM 850 GMSK	128	824.20	7.68	13	PASS
	190	836.60	7.71	13	
	251	848.80	7.68	13	
GSM 850 GPRS	128	824.20	7.71	13	
	190	836.60	7.71	13	
	251	848.80	7.68	13	
PCS 1900 GMSK	512	1850.20	7.65	13	
	661	1880.00	7.68	13	
	810	1909.80	7.65	13	
PCS 1900 GPRS	512	1850.20	7.68	13	
	661	1880.00	7.68	13	
	810	1909.80	7.65	13	
WCDMA Band II WCDMA	9262	1852.40	3.10	13	PASS
	9400	1880.00	3.10	13	
	9538	1907.60	3.13	13	
WCDMA Band V WCDMA	4132	826.40	3.22	13	
	4183	836.60	2.64	13	
	4233	846.60	3.10	13	

GSM 850_ GMSK_ Lowest channel



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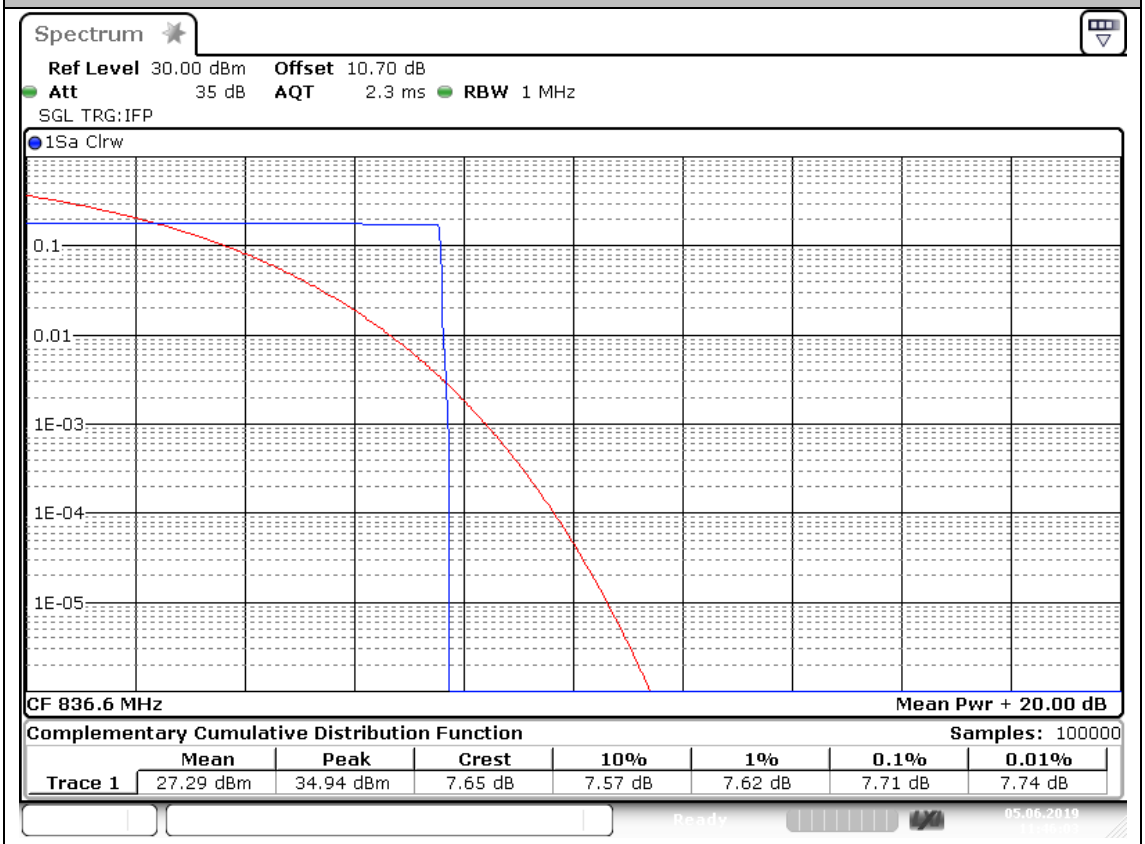
GSM 850_ GMSK_ Middle channel



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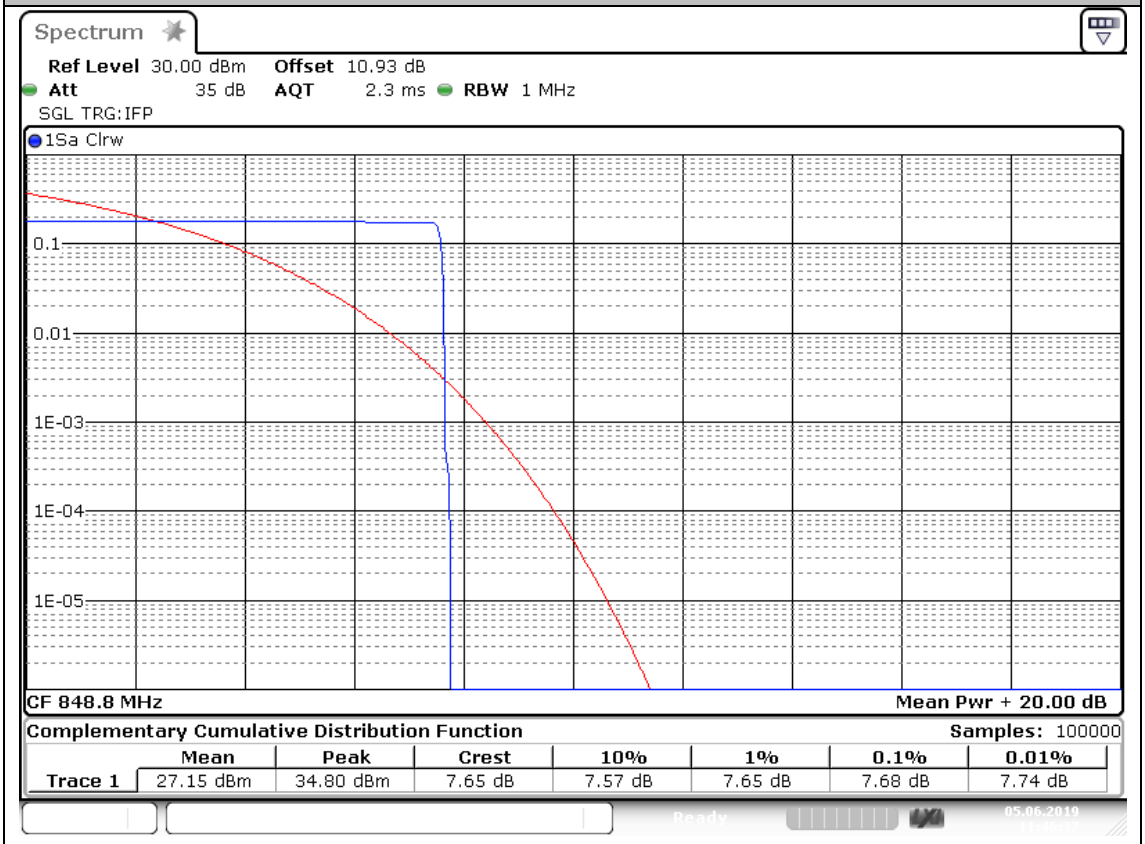
GSM 850_ GMSK_ Highest channel



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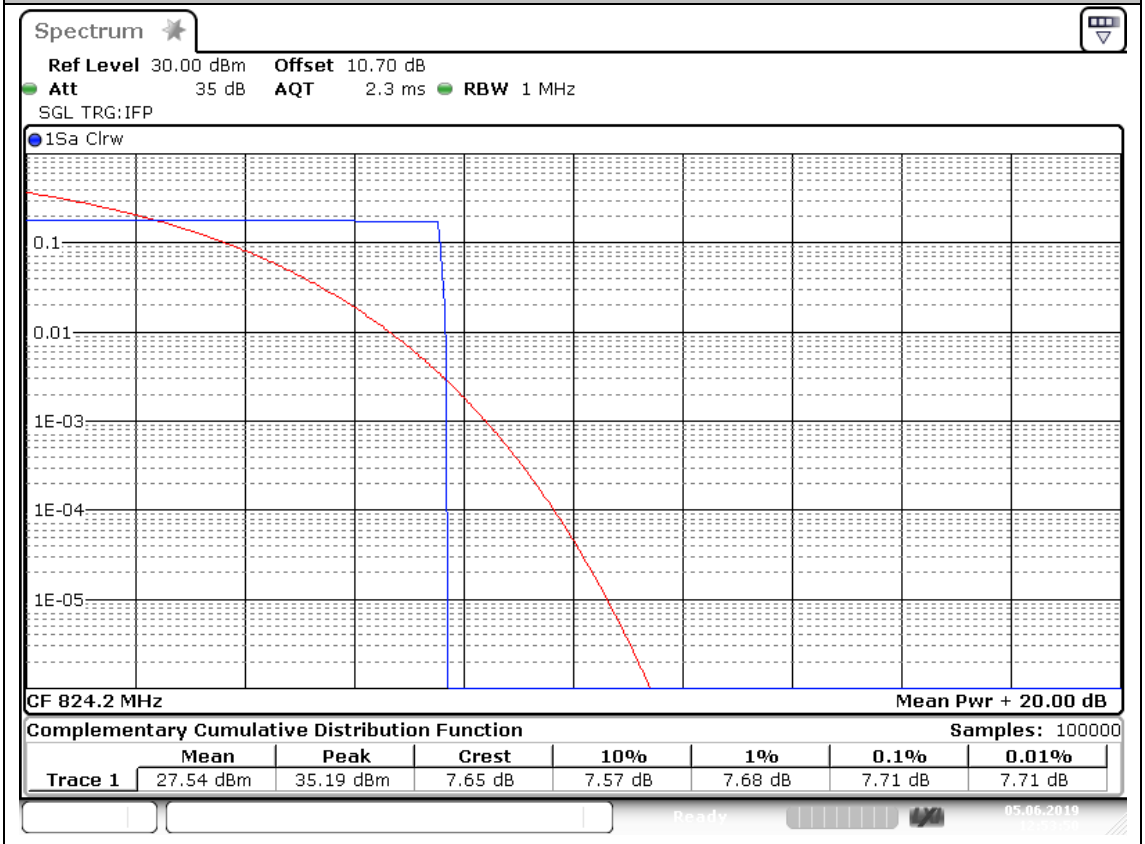
GSM 850_ GPRS_ Lowest channel



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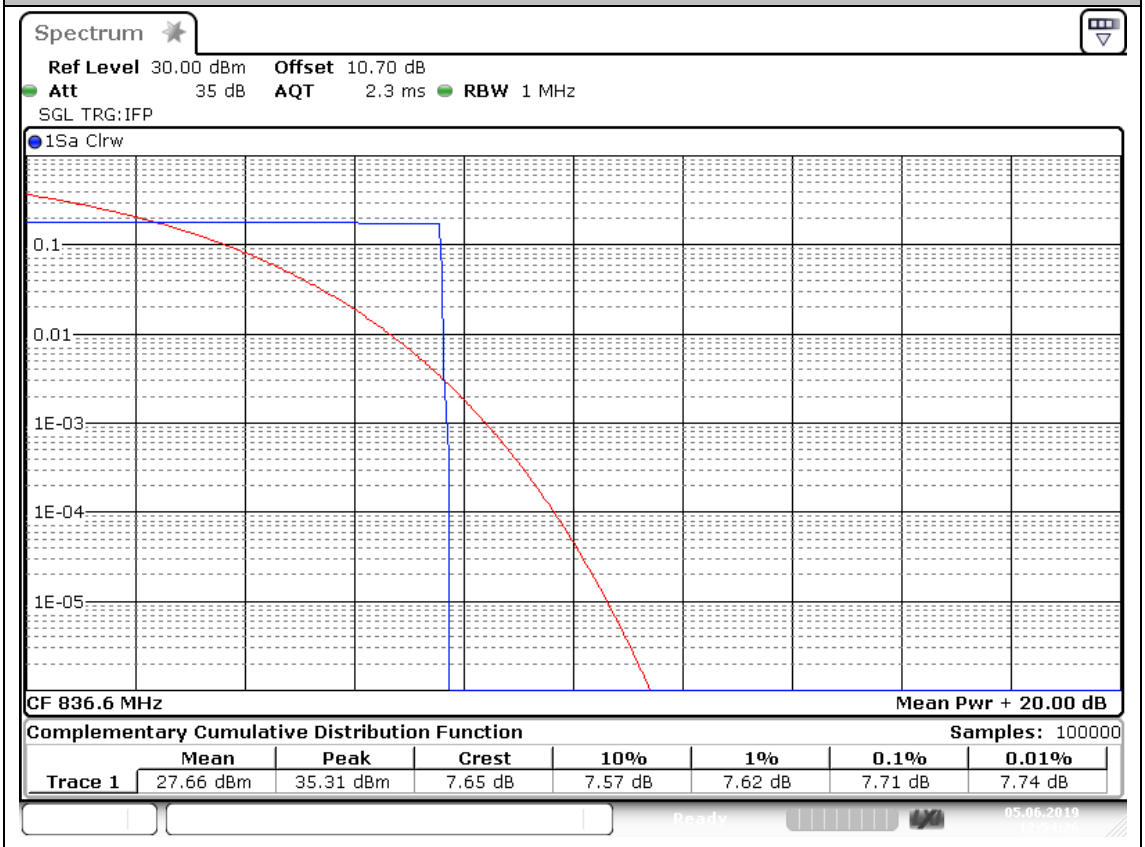
GSM 850_ GPRS_ Middle channel



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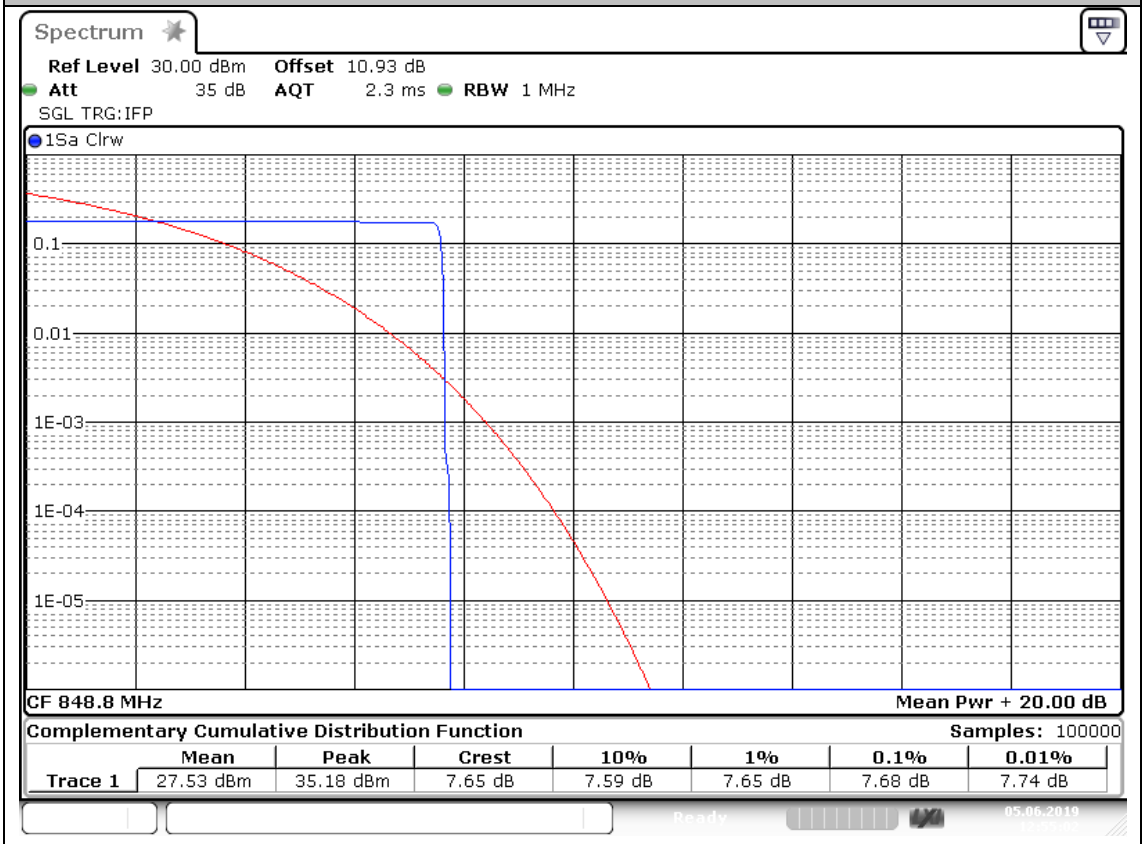
GSM 850_ GPRS_ Highest channel



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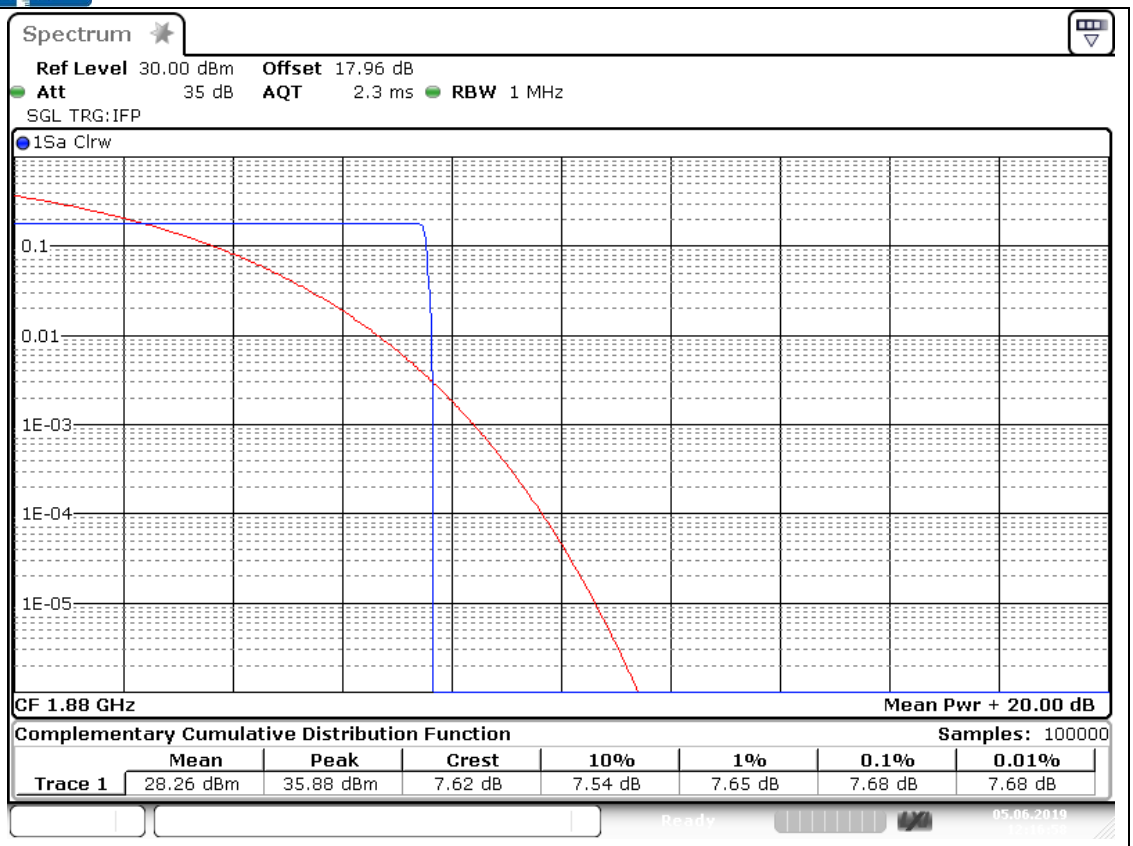
PCS 1900_ GMSK_ Lowest channel

Date: 5.JUN.2019 12:16:25

PCS 1900_ GMSK_ Middle channel



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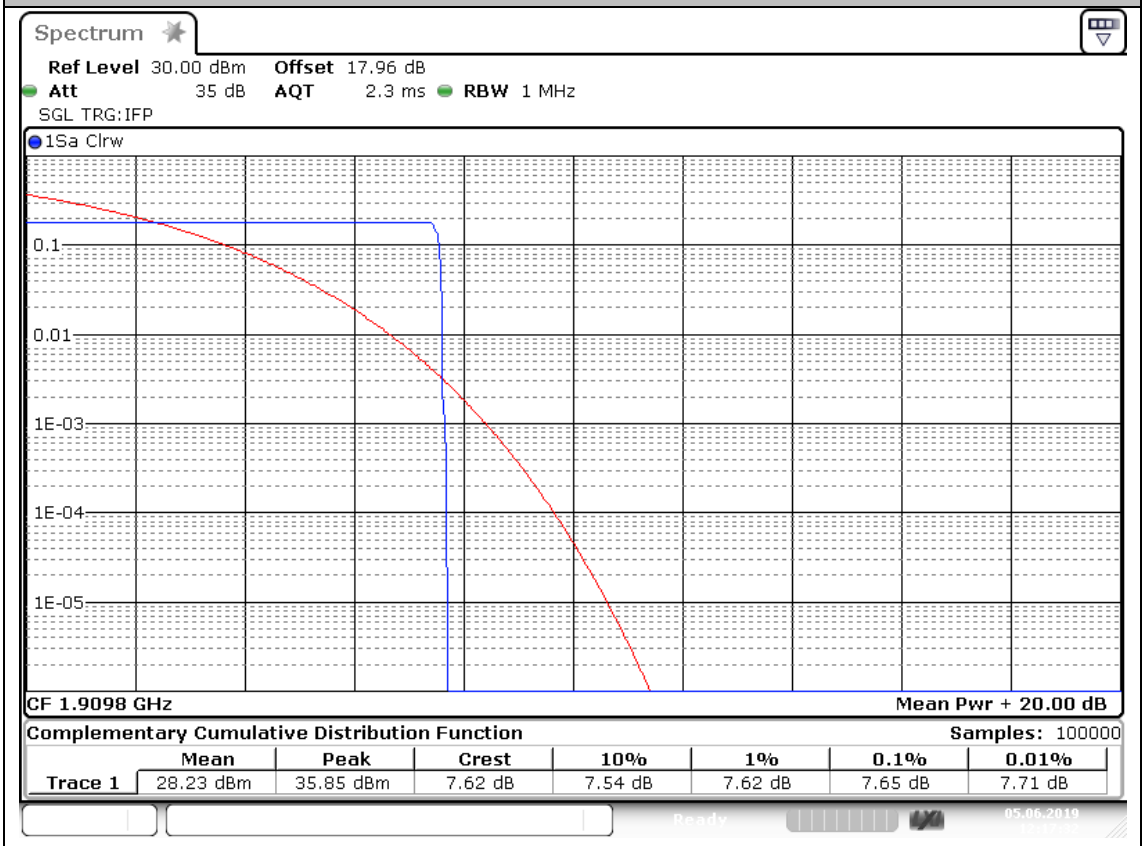
PCS 1900_ GMSK_ Highest channel



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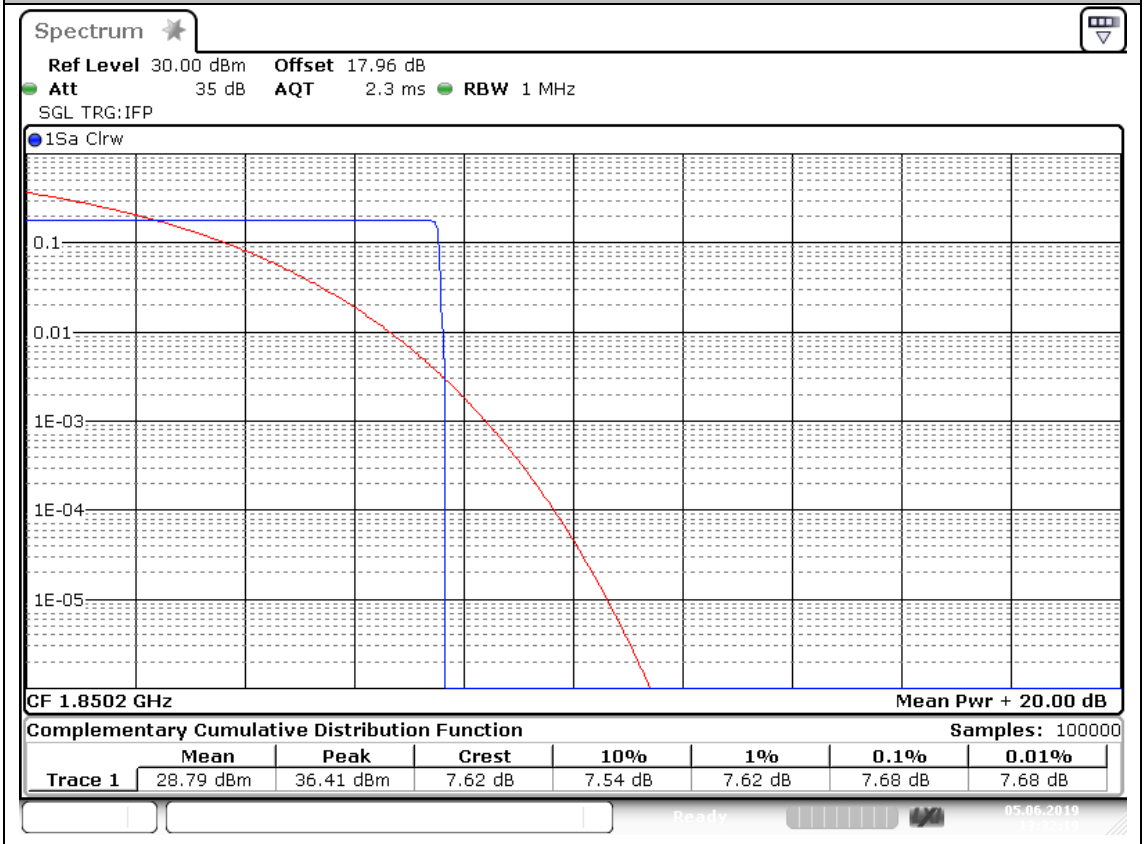
PCS 1900_ GPRS_ Lowest channel



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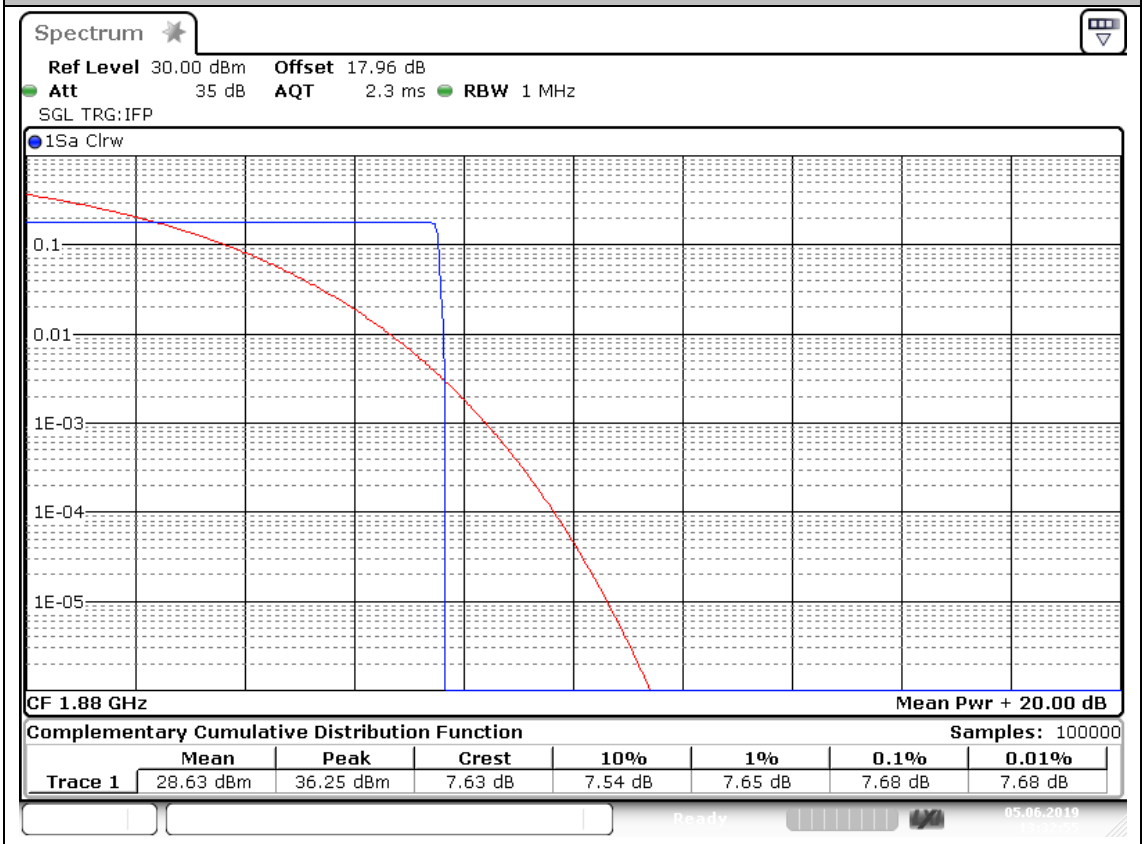
PCS 1900_ GPRS_ Middle channel



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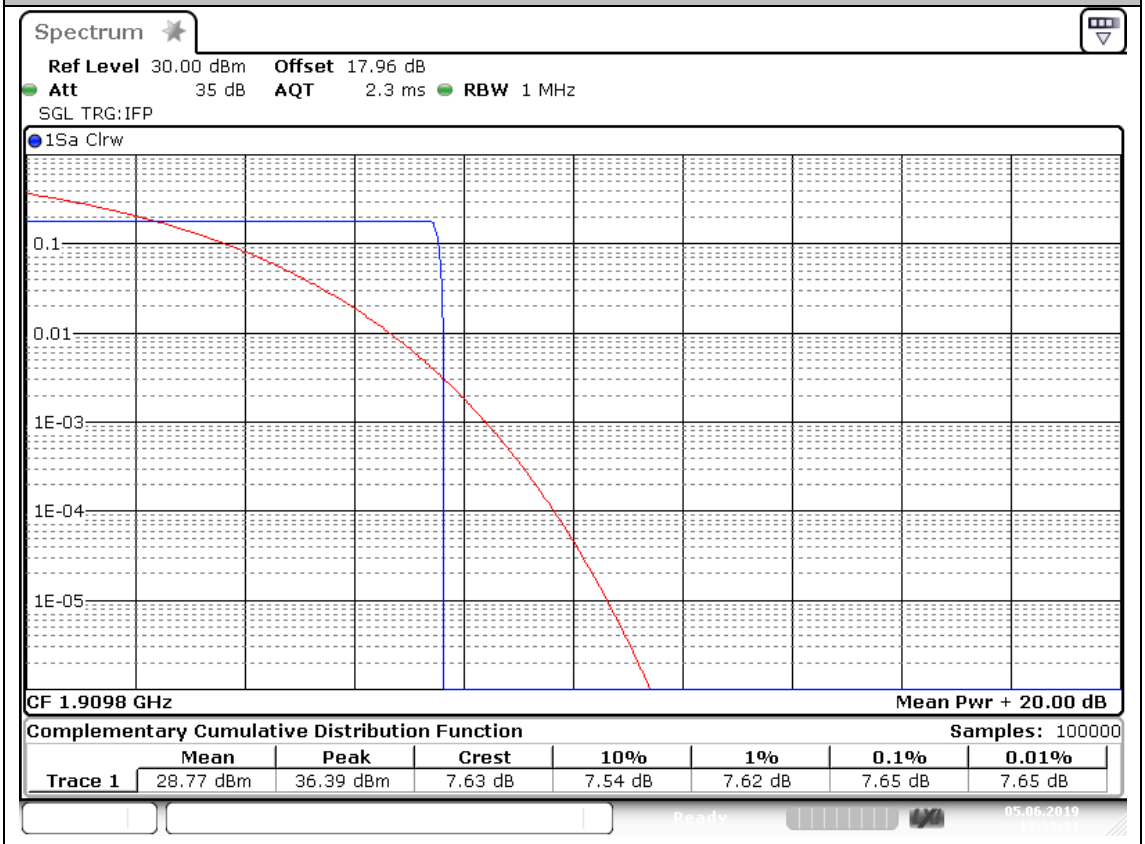
PCS 1900_ GPRS_ Highest channel



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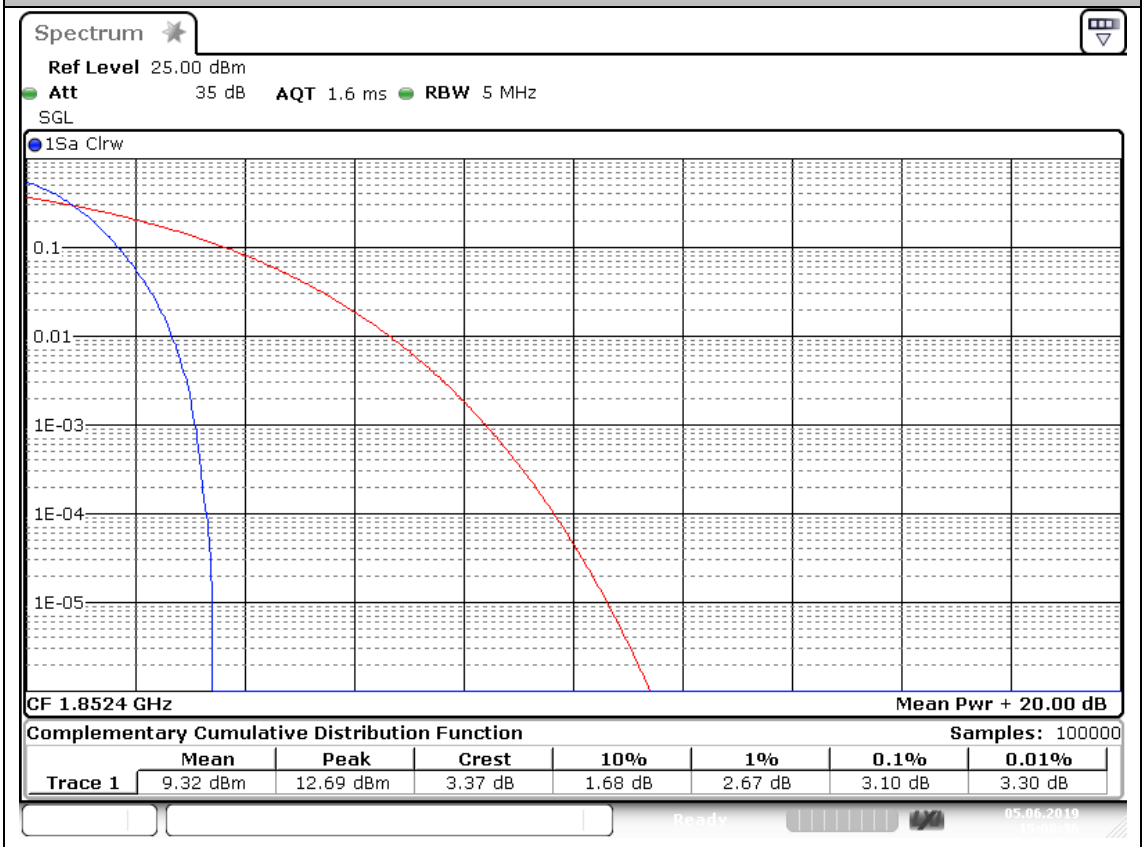
Band II_ WCDMA_ Lowest channel



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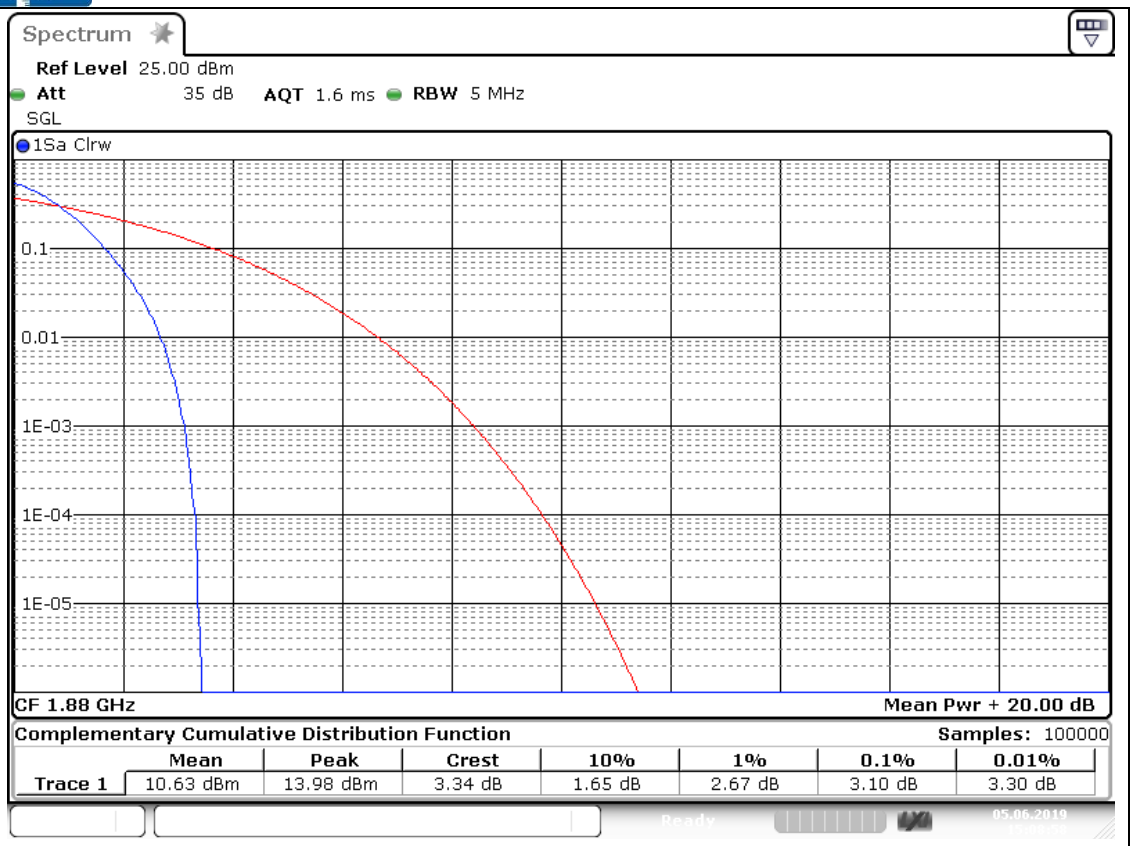
Band II_ WCDMA_ Middle channel



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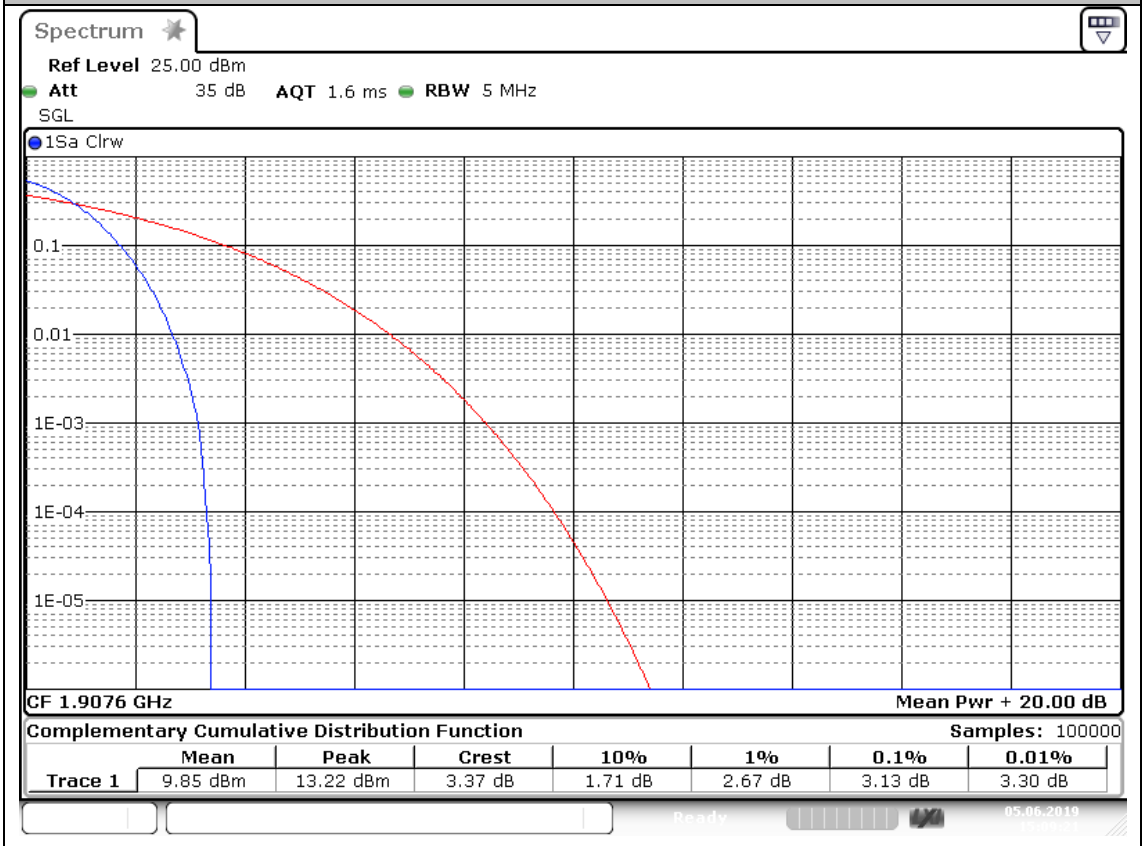
Band II_ WCDMA_ Highest channel



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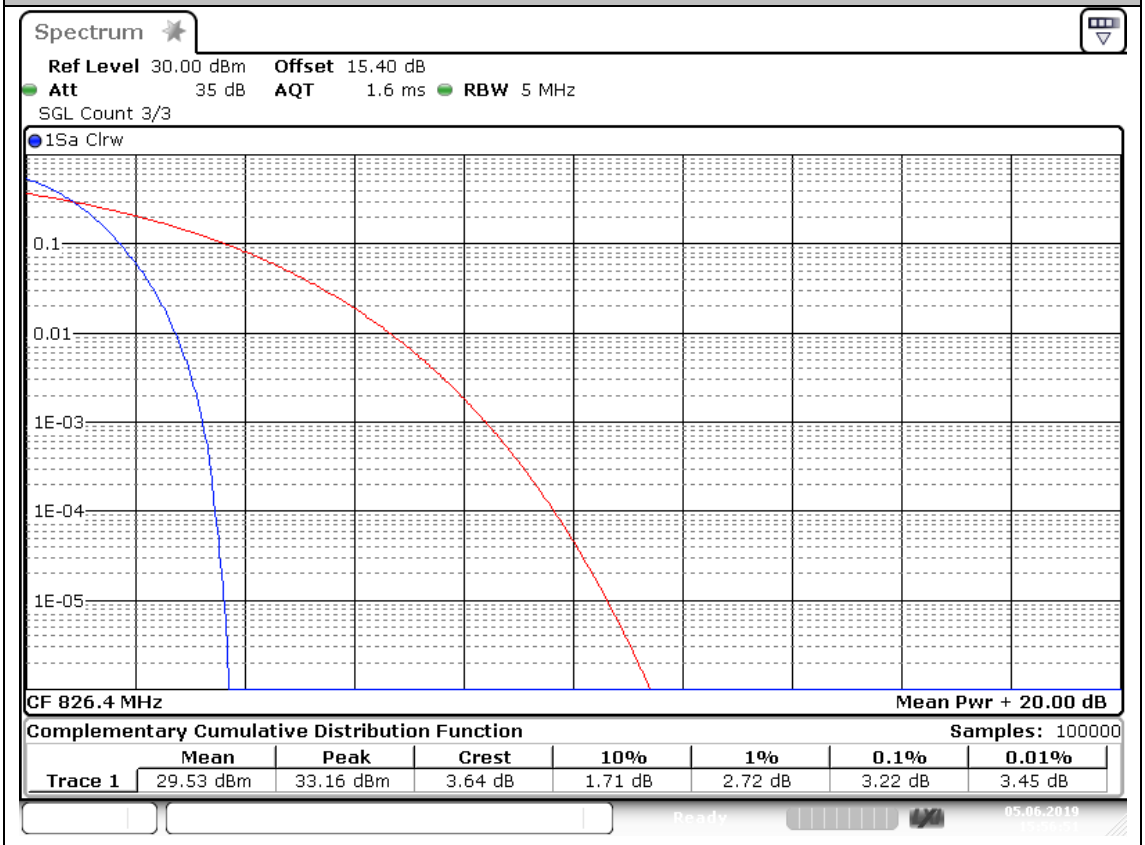
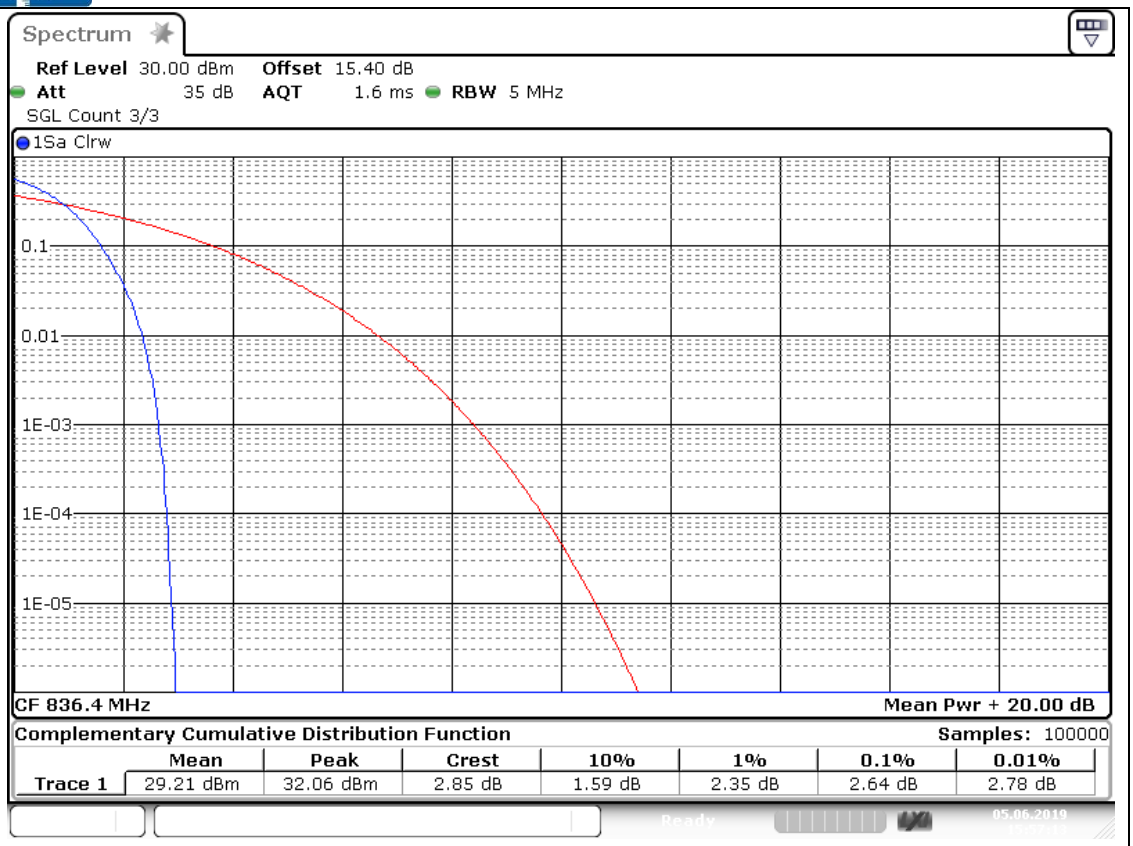
Band V_ WCDMA_ Lowest channel


Band V_ WCDMA_ Middle channel



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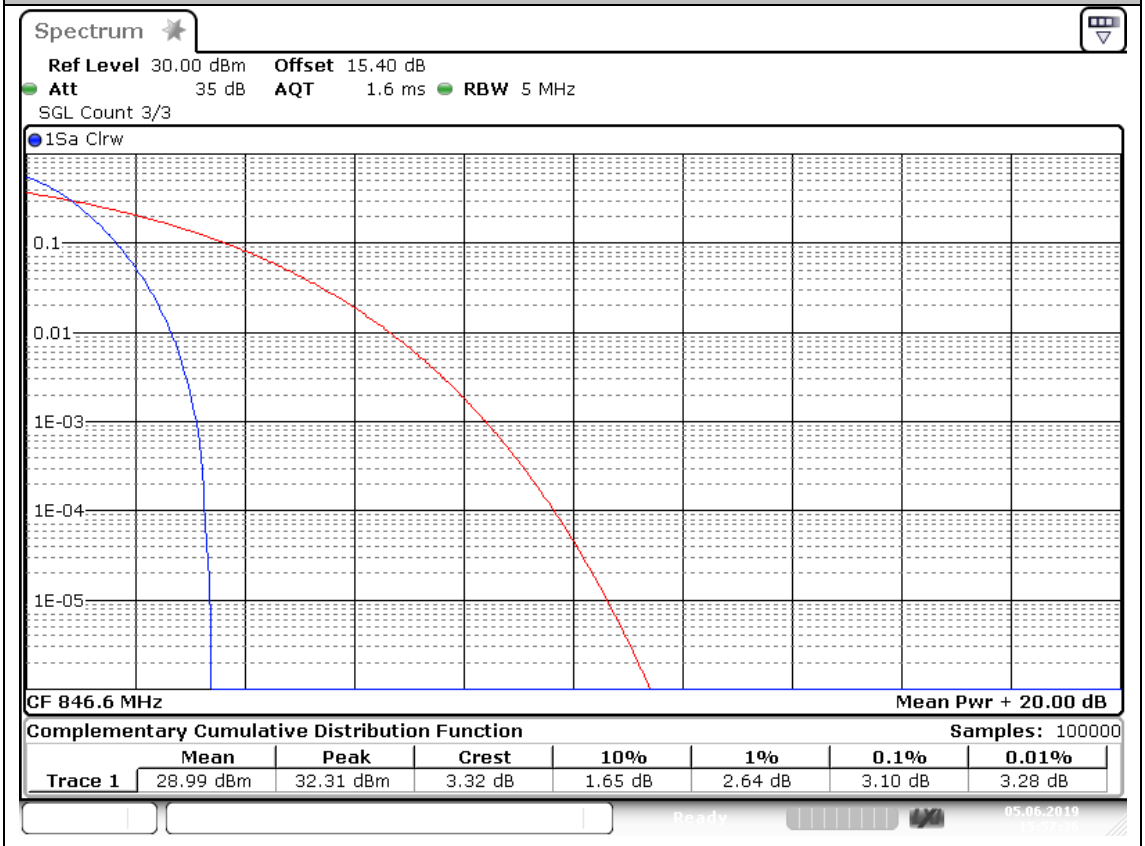
Band V_ WCDMA_ Highest channel



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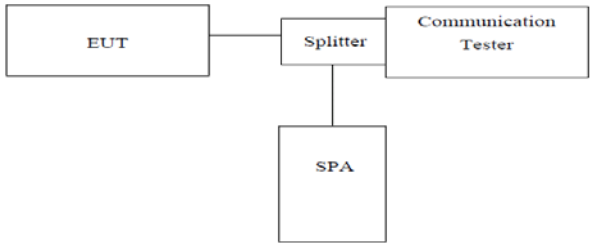
3.3. Occupy Bandwidth

TEST CONFIGURATION



Note: Measurement setup for testing on Antenna connector

TEST PROCEDURE

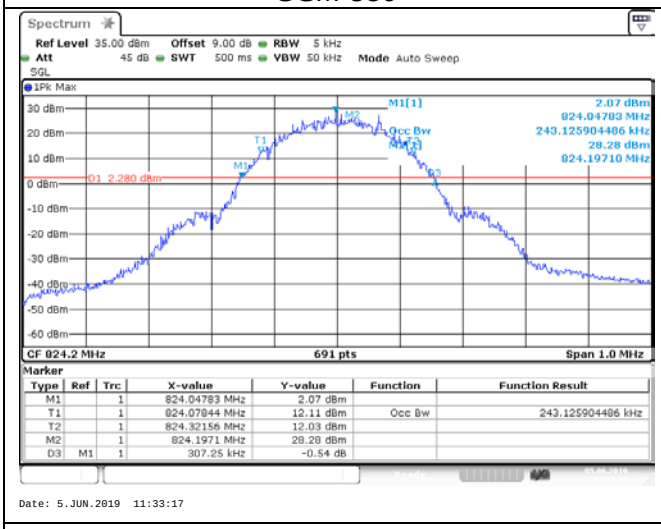
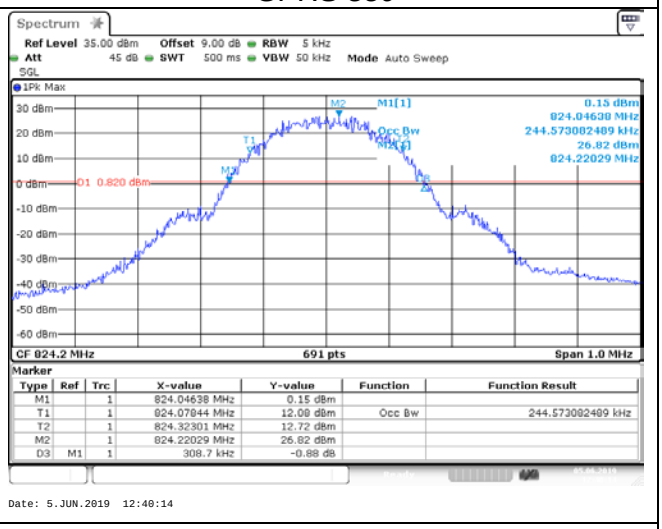
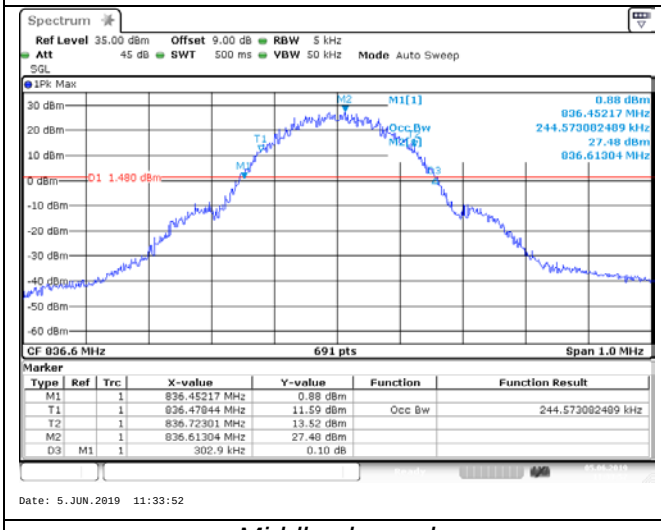
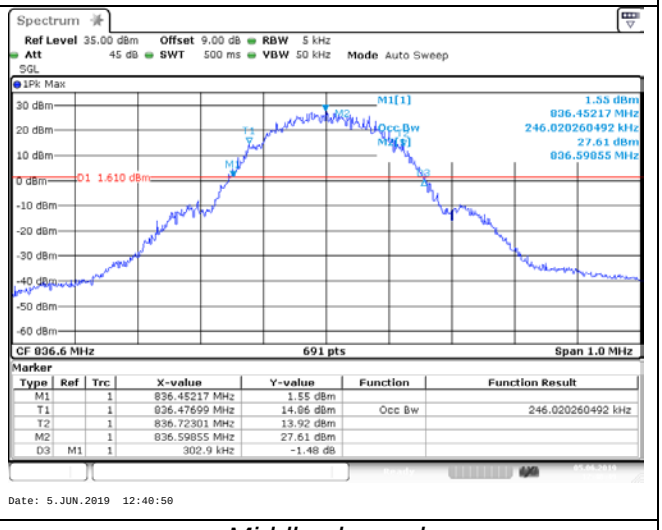
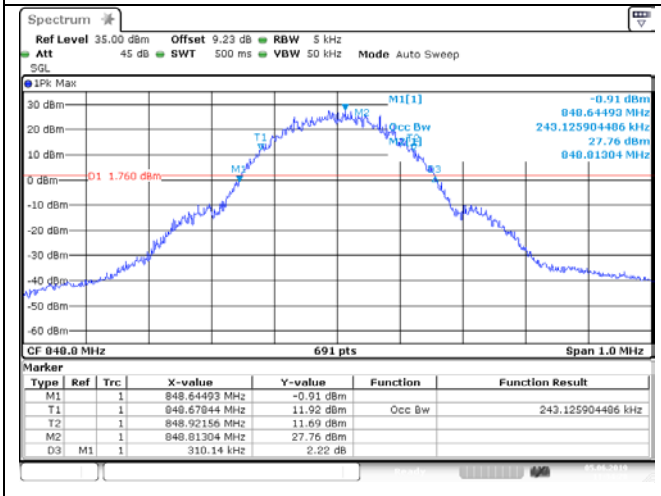
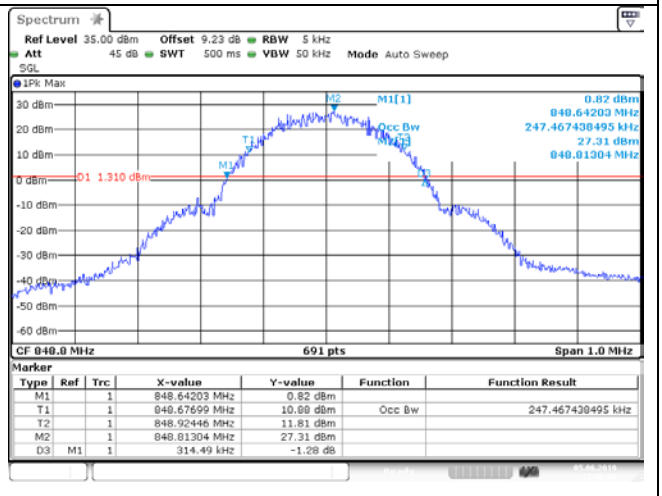
1. The EUT's output RF connector was connected with a short cable to the spectrum analyzer
2. RBW was set to about 1% of emission BW, VBW≥3 times RBW.
3. -26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

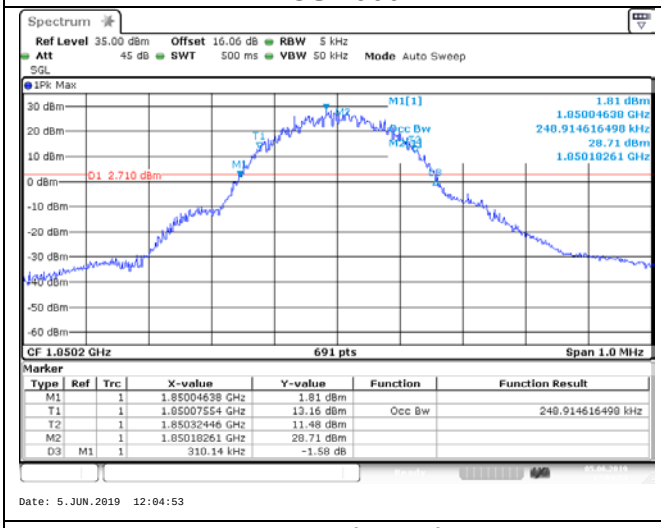
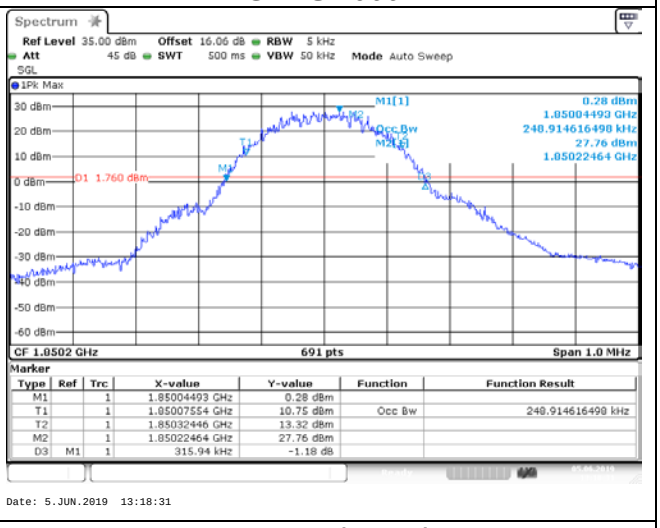
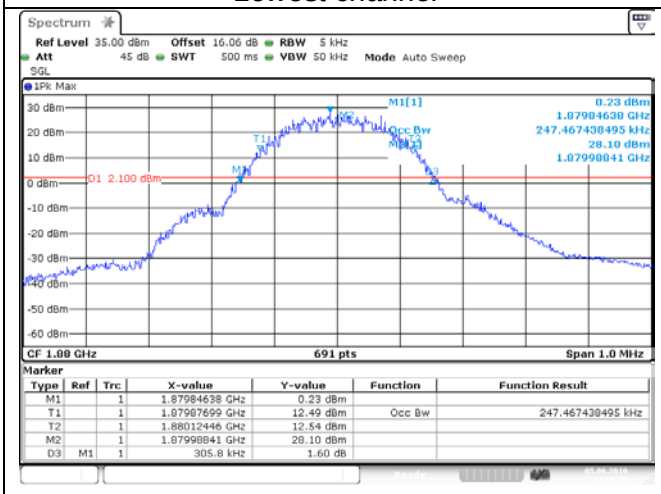
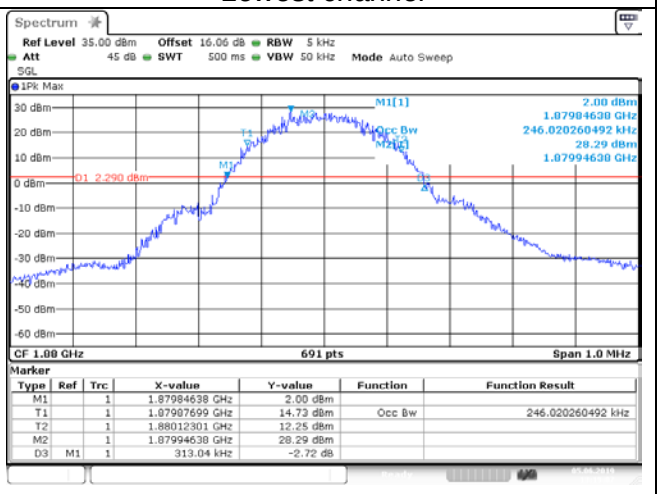
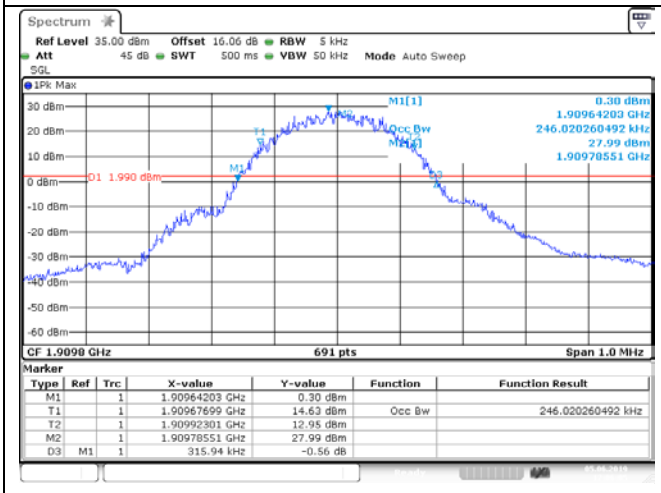
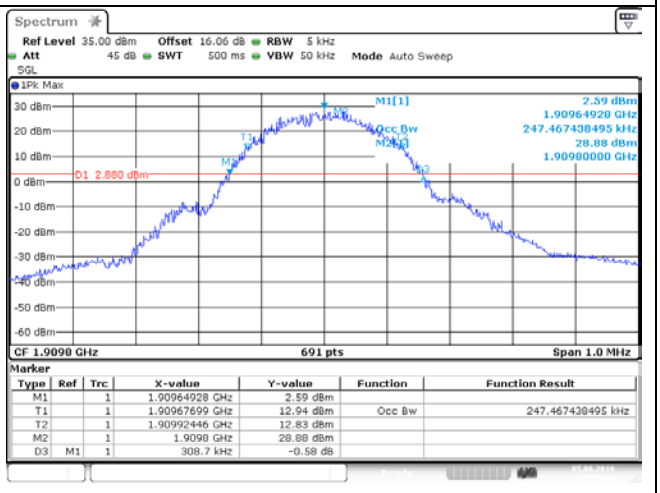
TEST RESULTS

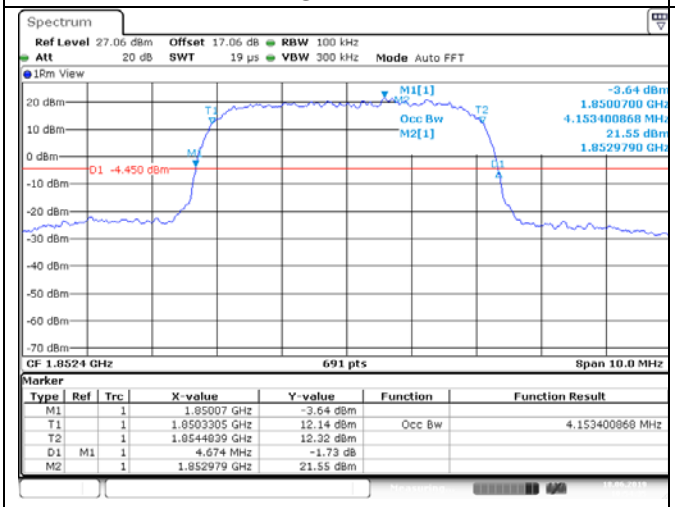
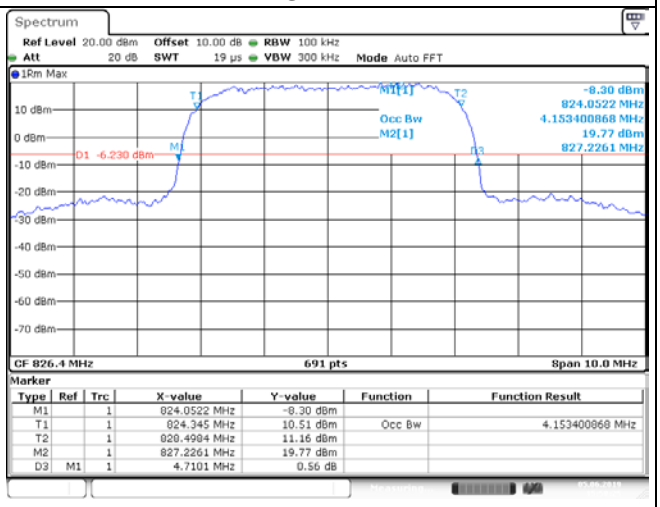
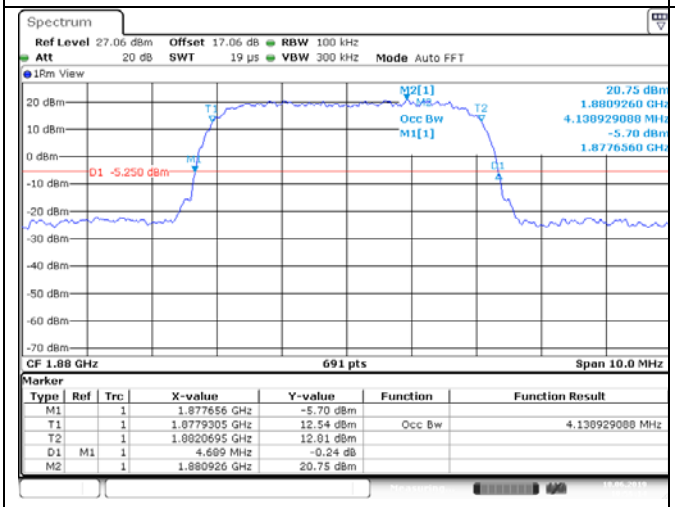
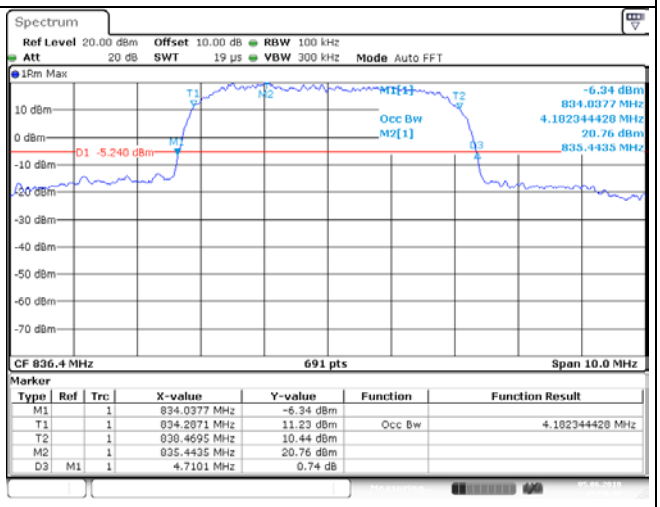
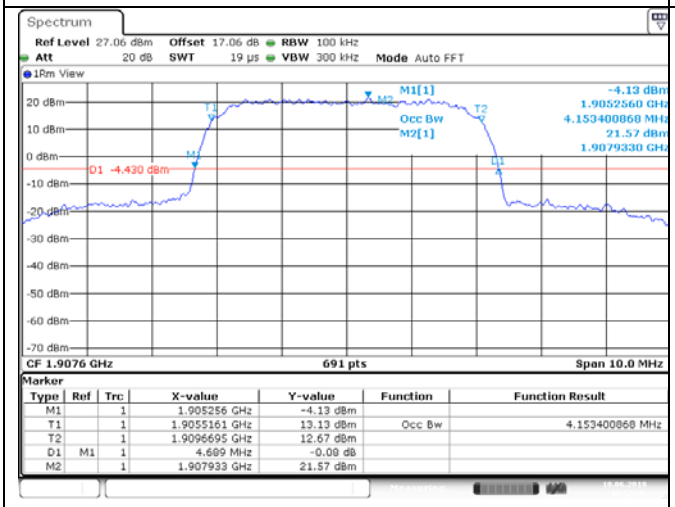
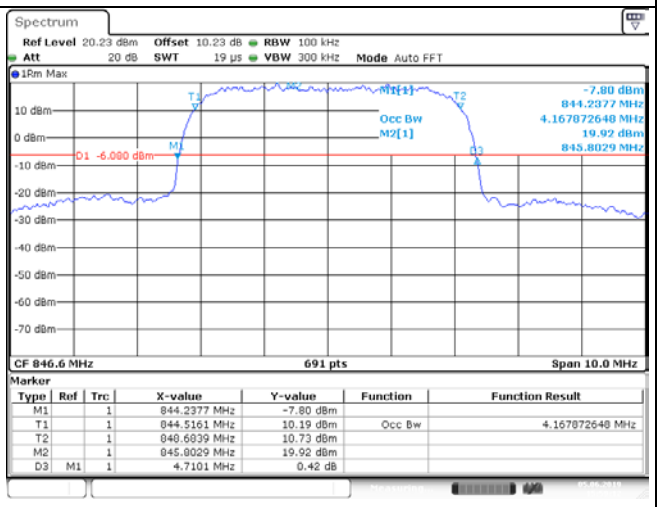
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
GSM 850 (GMSK)	128	824.20	243.13	307.25
	190	836.60	244.57	302.90
	251	848.80	243.13	310.14
GPRS850 (8PSK,1Slot)	128	824.20	244.57	308.70
	190	836.60	246.02	302.90
	251	848.80	247.47	314.49
PCS1900 (GMSK)	512	1850.20	248.91	310.14
	661	1880.00	247.47	305.80
	810	1909.80	246.02	315.94
GPRS1900 (8PSK,1Slot)	512	1850.20	248.91	315.94
	661	1880.00	246.02	313.04
	810	1909.80	247.47	308.70
WCDMA Band II (QPSK)	9262	1852.40	4153.4	4674
	9400	1880.00	4138.9	4689
	9538	1907.60	4153.4	4689
WCDMA Band V (QPSK)	4132	826.40	4153.4	4710
	4183	836.60	4182.3	4710
	4233	846.60	4167.9	4710

Note: GSM&GPRS use the same modulation technical (GMSK), and with the same channels, so the 99% OBW and the -26dB of GPRS not performed.

Test plots as follow:

99% Occupy bandwidth and -26dB bandwidth	
GSM 850	*GPRS 850*
	
Lowest channel	*Lowest channel*
	
Middle channel	*Middle channel*
	
Highest channel	*Highest channel*

99% Occupy bandwidth and -26dB bandwidth	
PCS 1900	*GPRS 1900*
	
Lowest channel	*Lowest channel*
	
Middle channel	*Middle channel*
	
Highest channel	*Highest channel*

99% Occupy bandwidth and -26dB bandwidth	
WCDMA II	*WCDMA V*
	
Lowest channel	*Lowest channel*
	
Middle channel	*Middle channel*
	
Highest channel	*Highest channel*

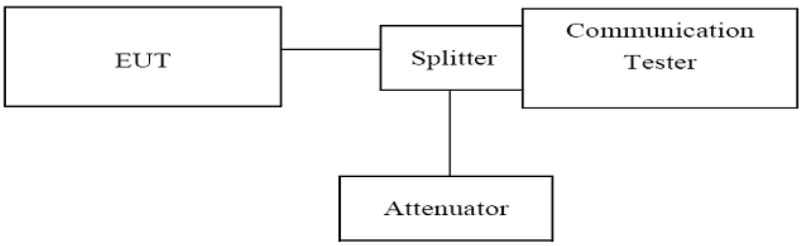
3.4. Out of band emission at antenna terminals

LIMIT

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST CONFIGURATION



TEST PROCEDURE

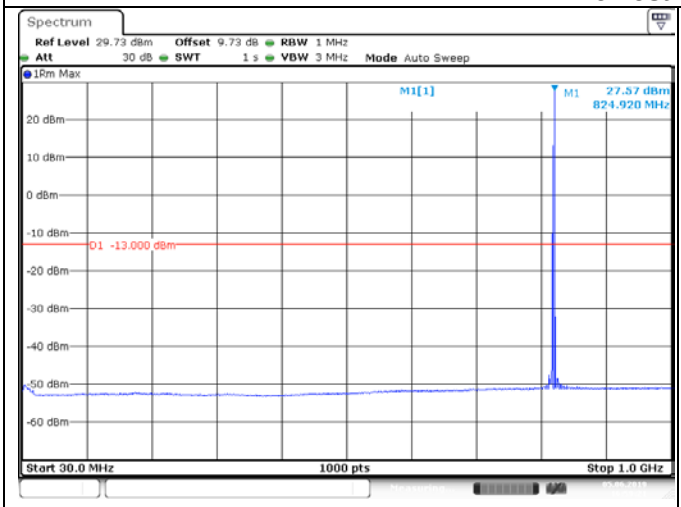
1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. The resolution bandwidth of the spectrum analyzer was set at 1MHz; sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.
3. For the out of band: Set the RBW = 1MHz VBW≥3 times RBW, Start=30MHz, Stop= 10th harmonic.

TEST RESULTS

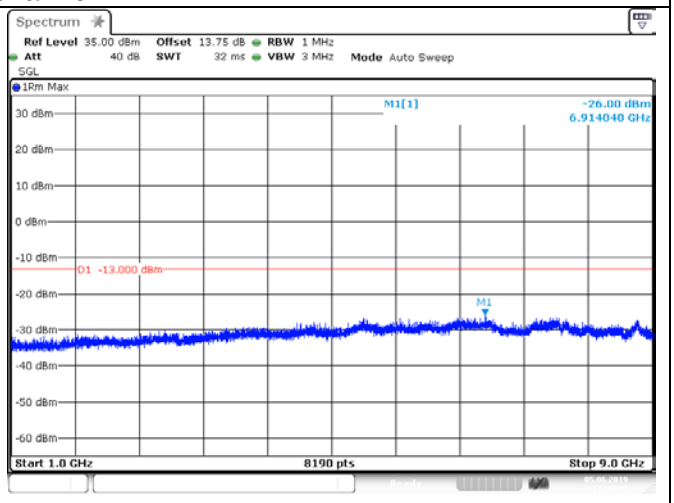
Remark: we test all modulation type and record worst case at Voice mode.

GSM 850

Lowest channel

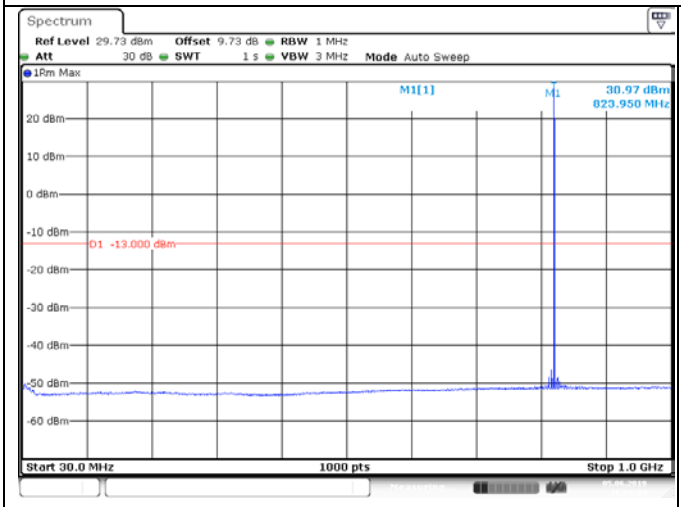


30MHz~1GHz

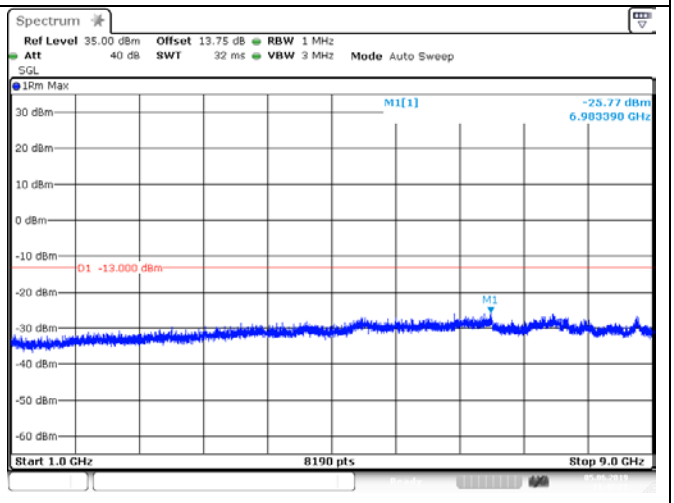


1GHz~10GHz

Middle channel

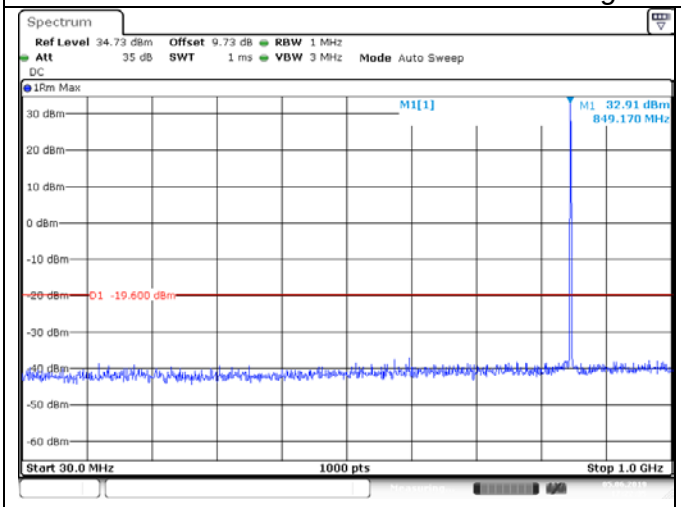


30MHz~1GHz

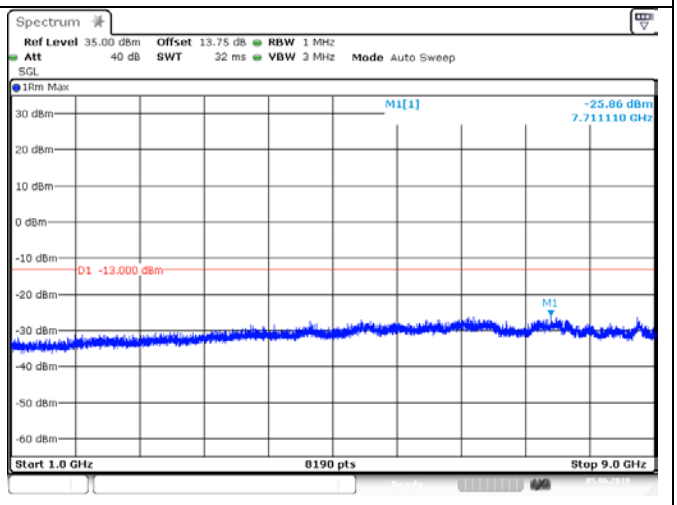


1GHz~10GHz

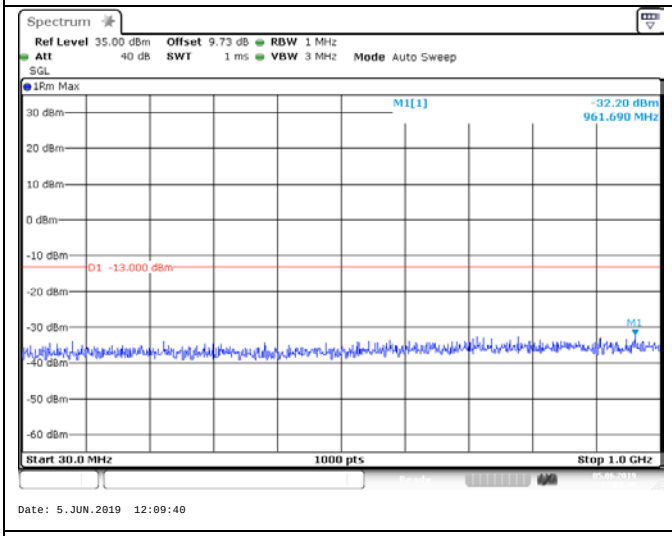
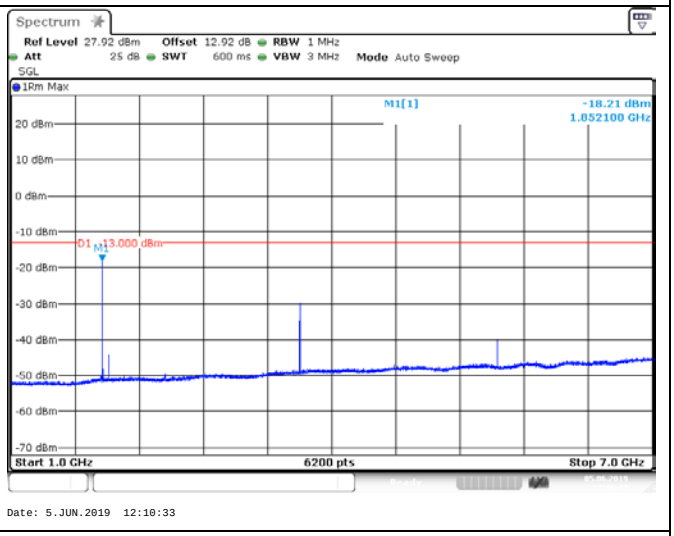
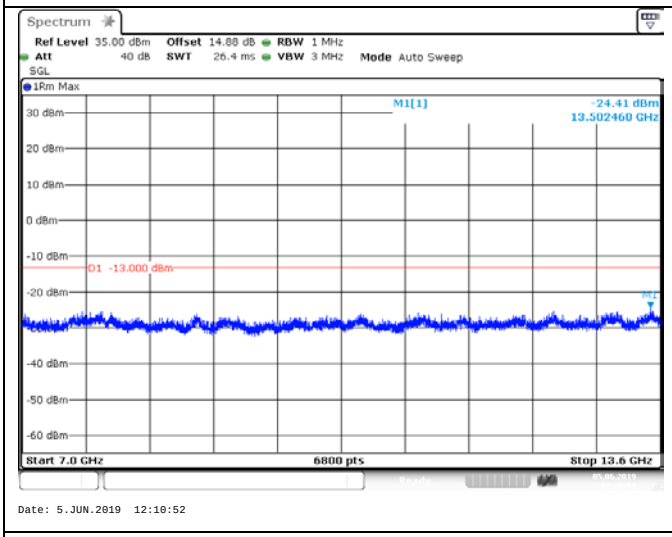
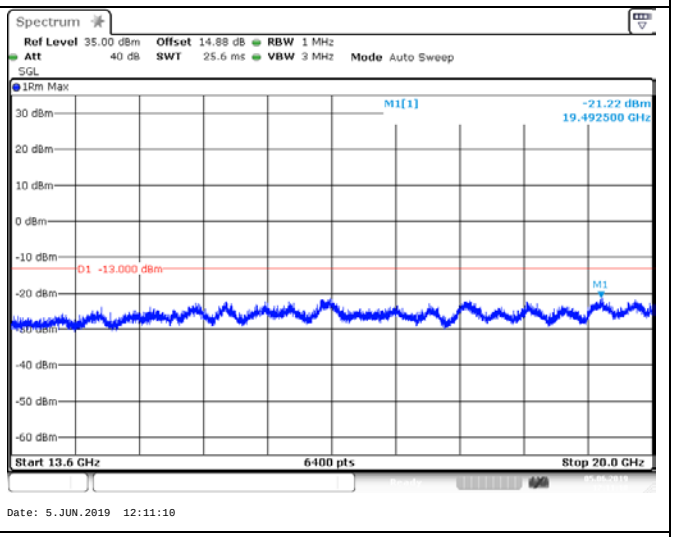
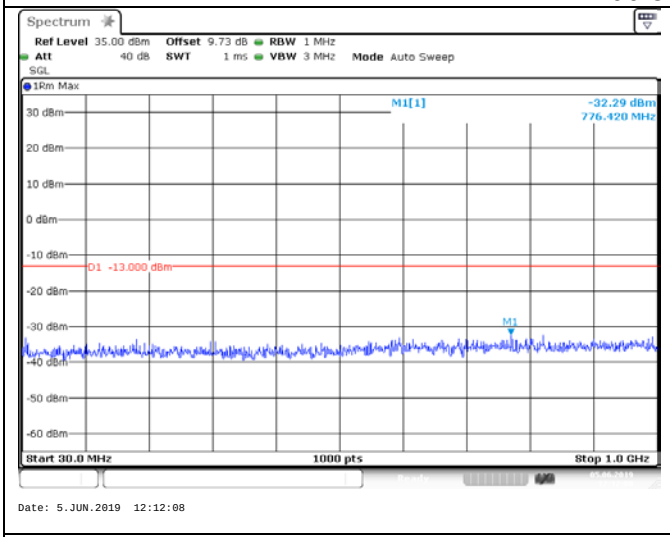
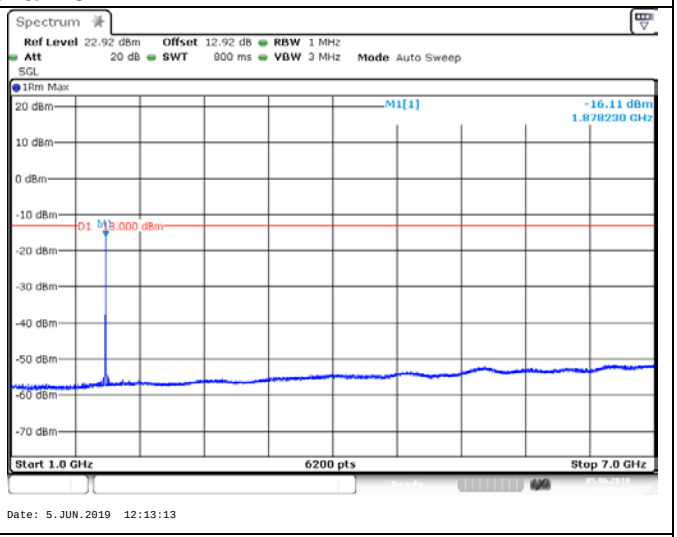
Highest channel

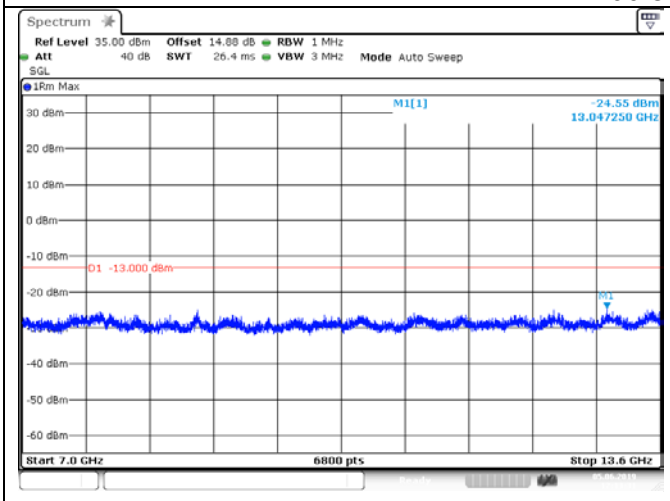
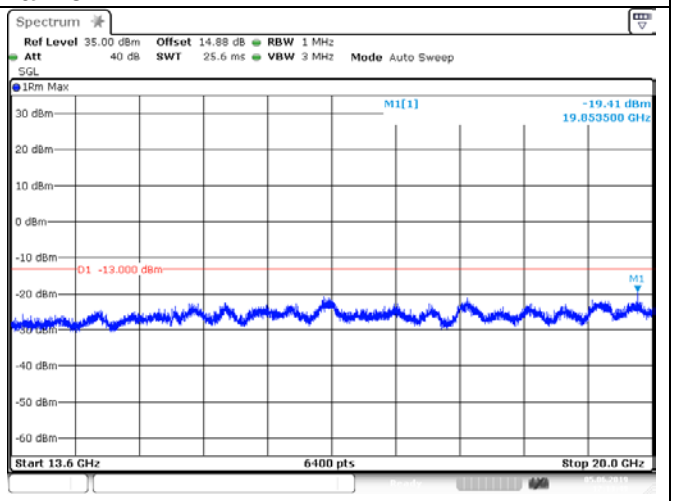
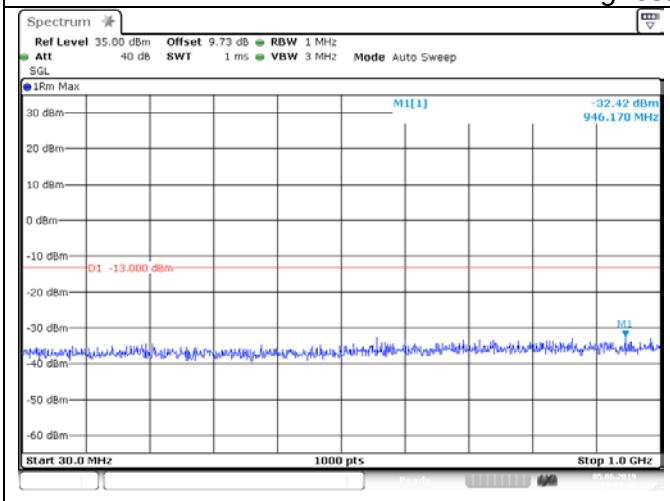
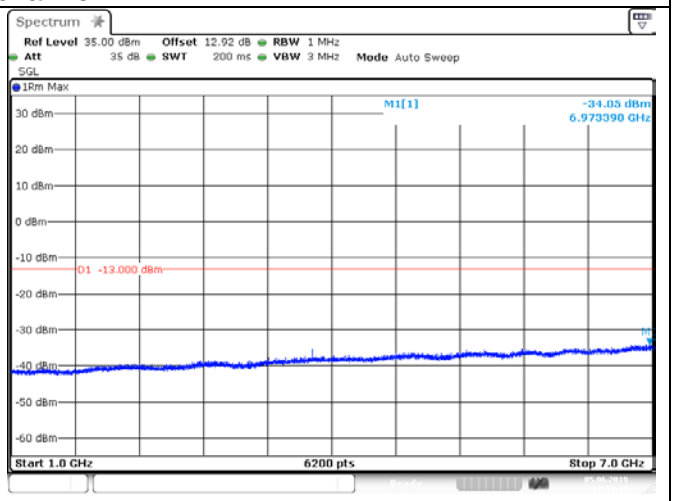
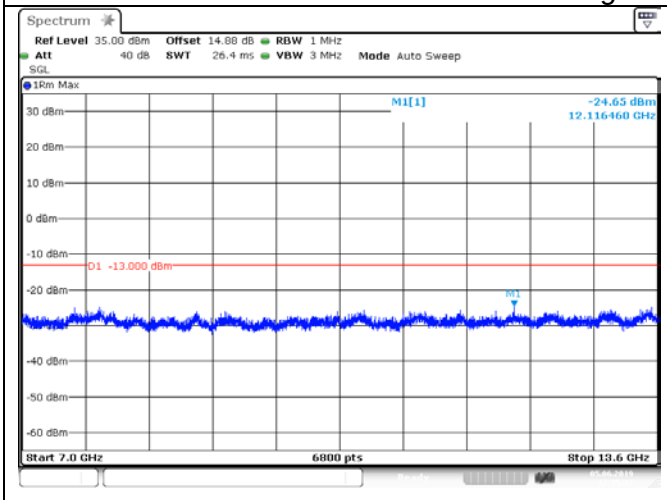
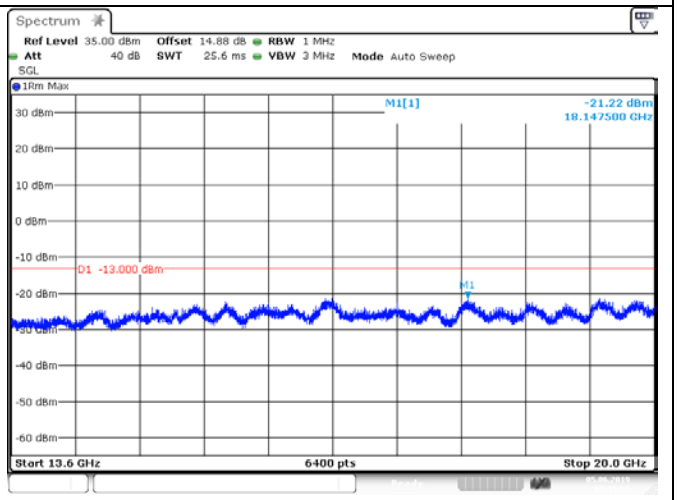


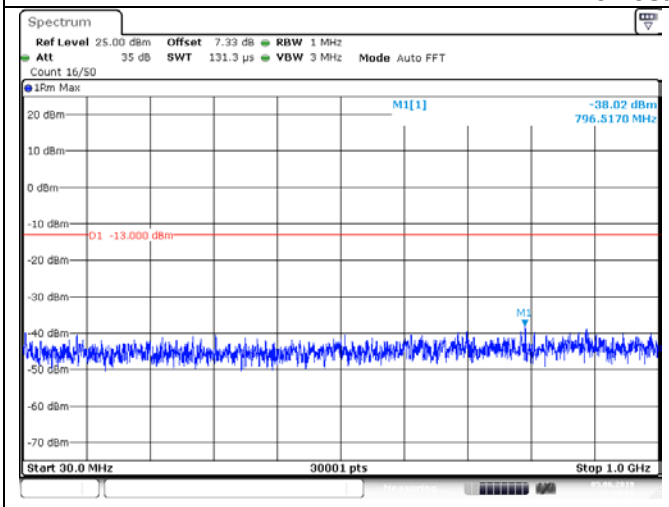
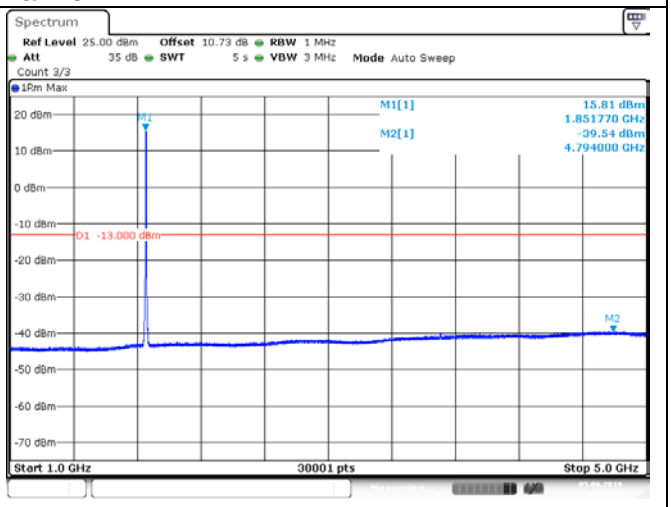
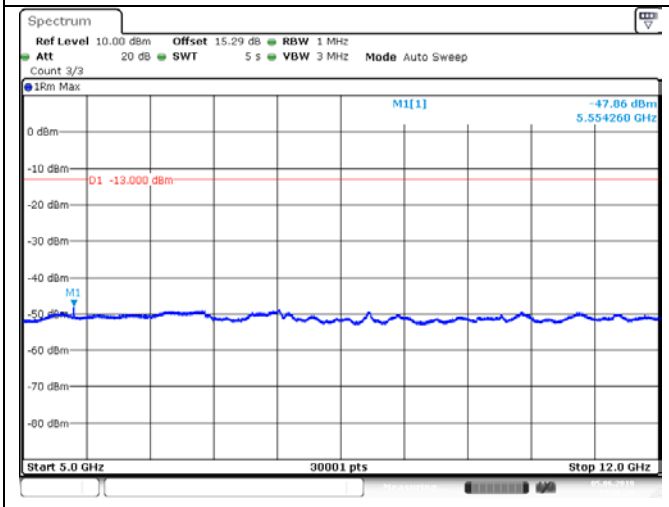
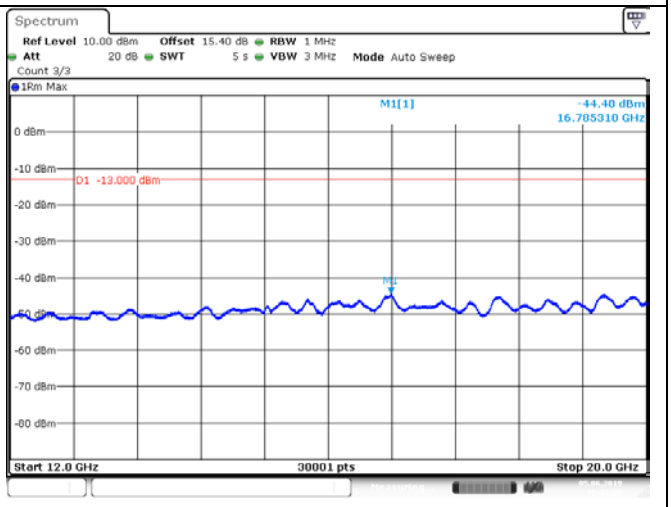
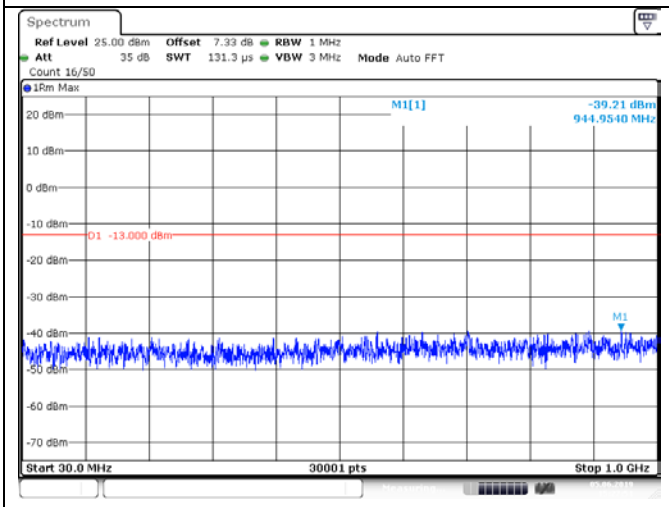
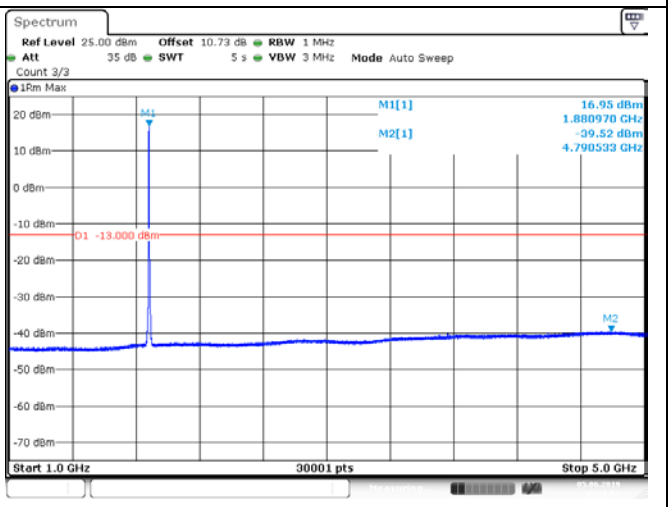
30MHz~1GHz

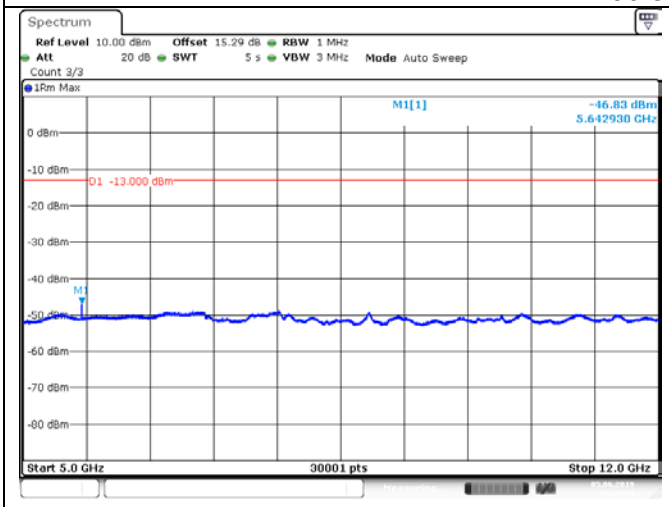
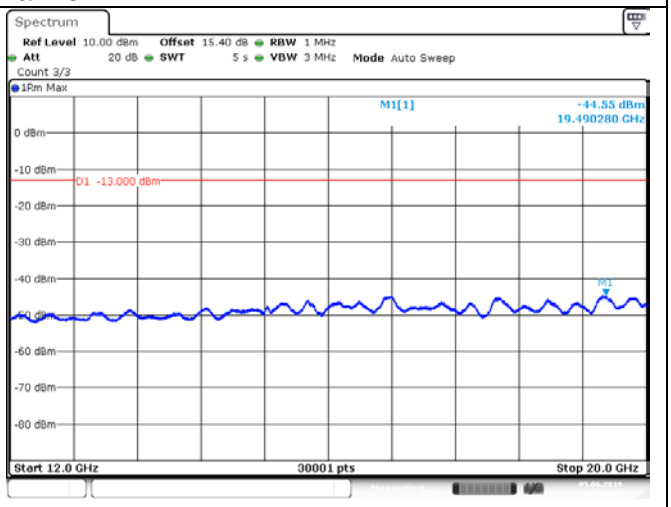
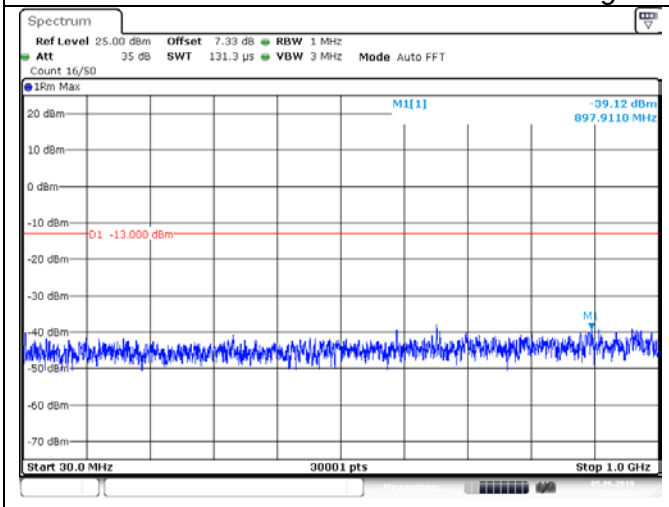
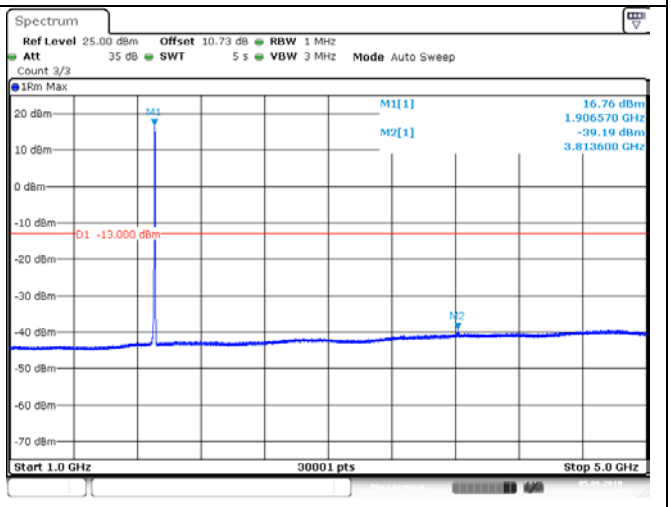
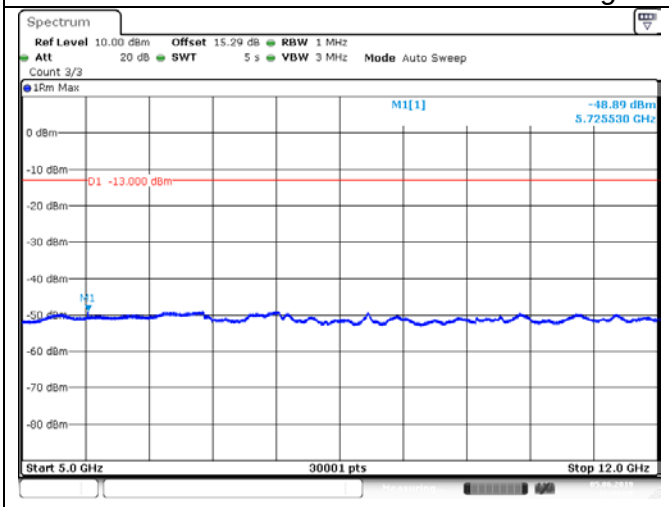
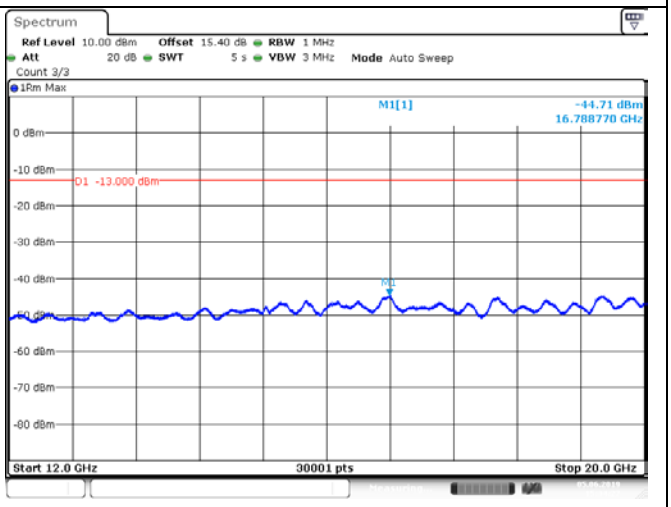


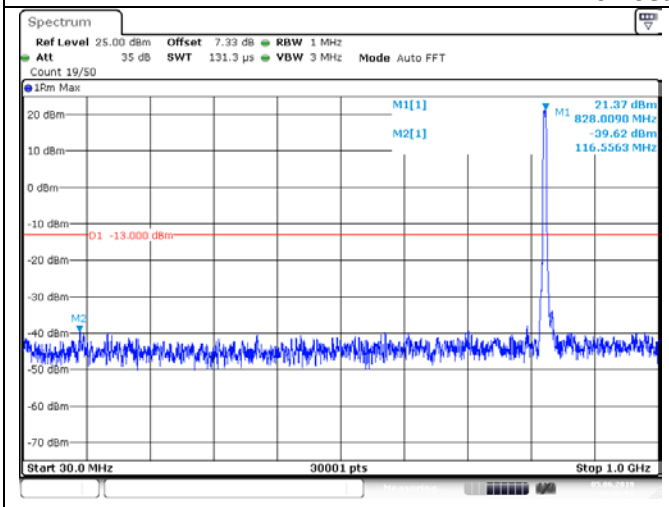
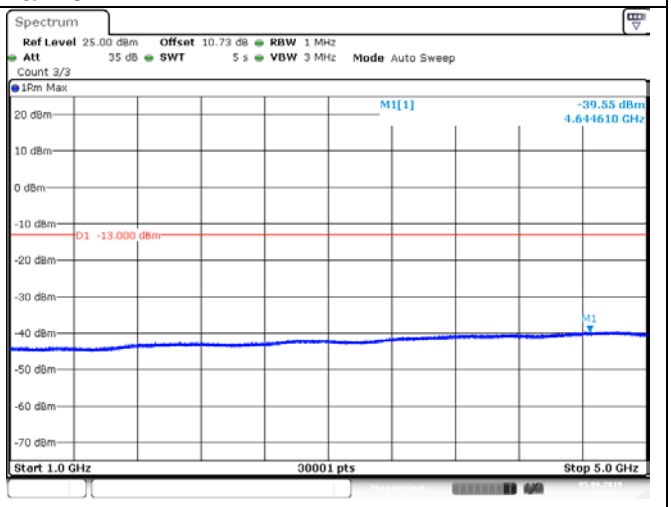
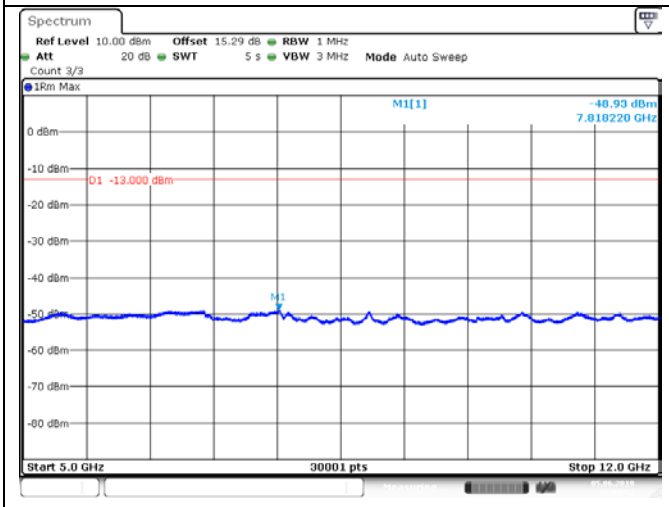
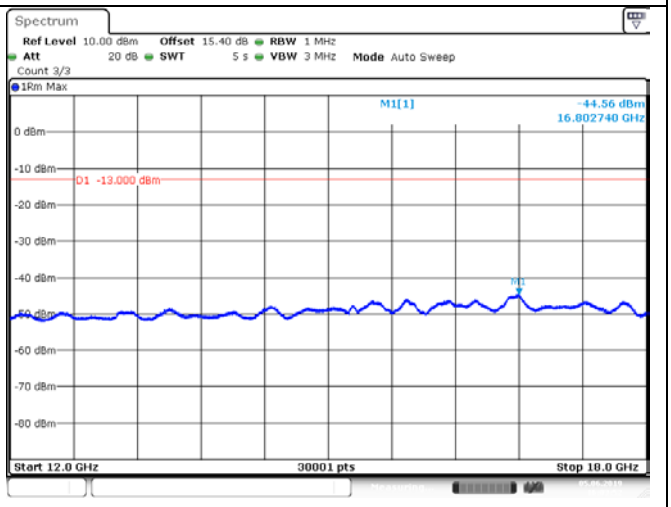
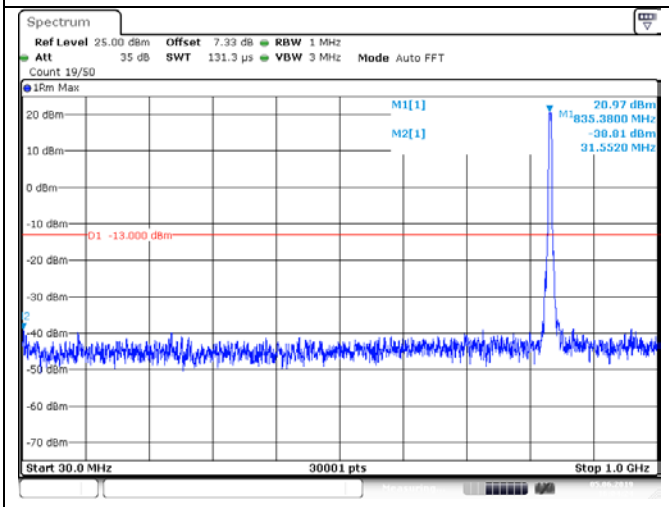
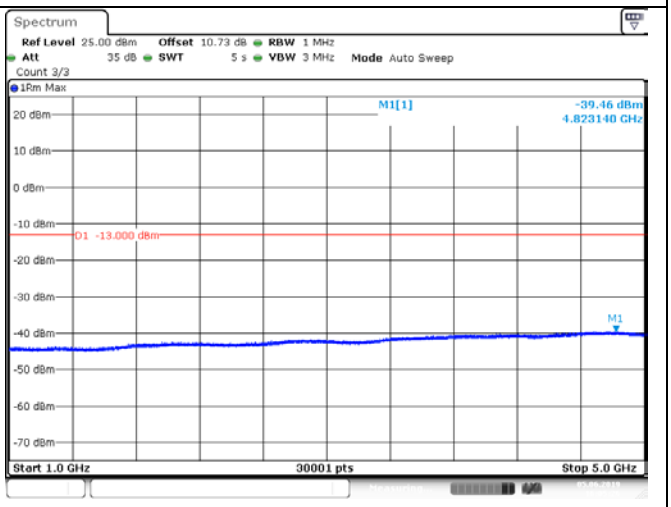
1GHz~10GHz

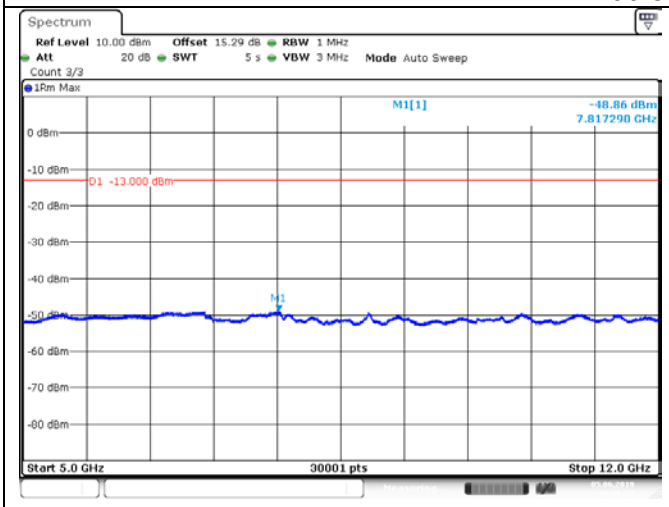
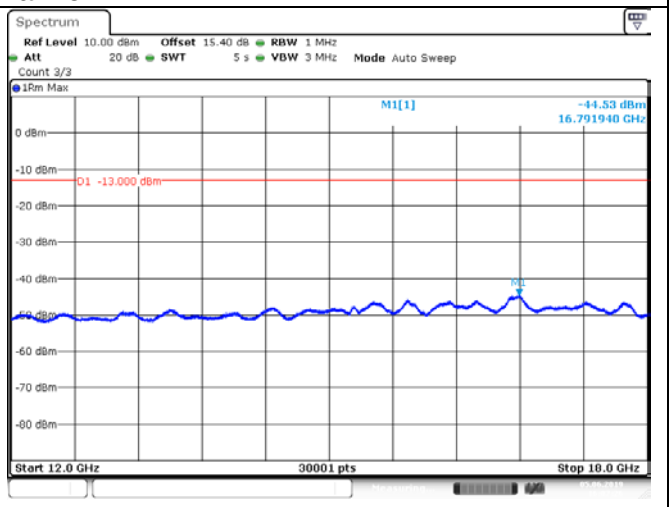
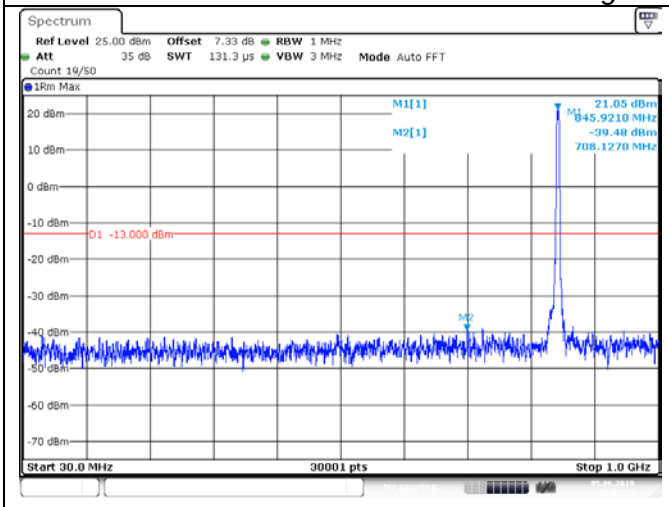
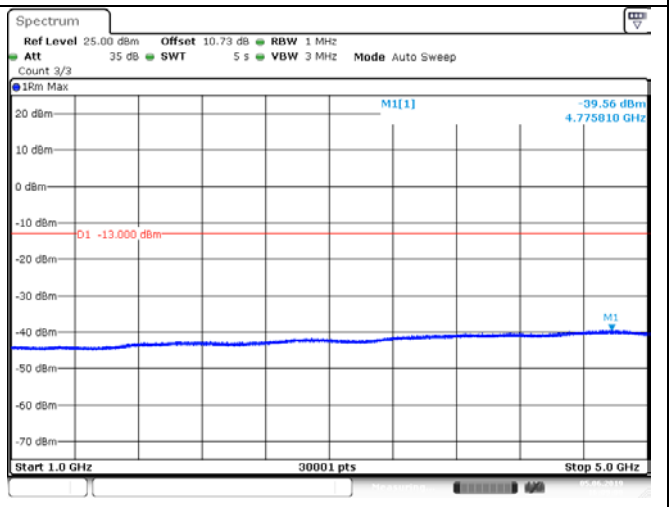
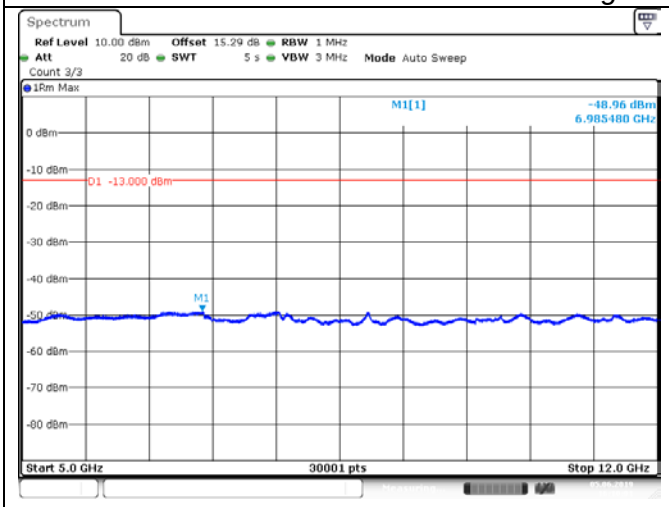
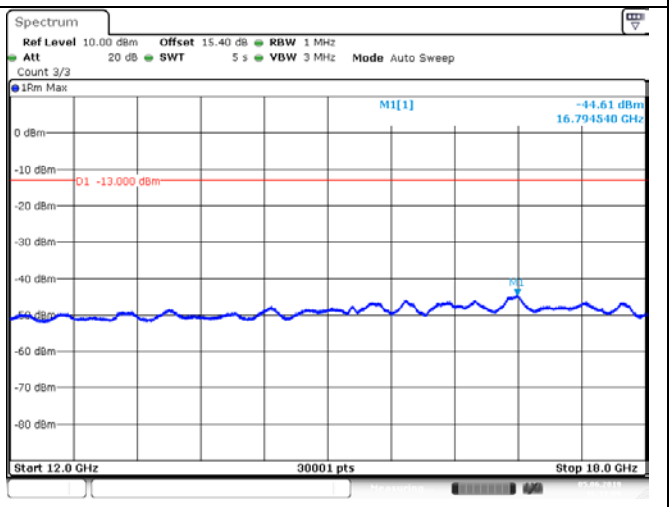
PCS 1900	
Lowest channel	
	
30MHz~1GHz	1GHz~7GHz
Lowest channel	
	
7GHz~13.6GHz	13.6GHz~20GHz
Middle channel	
	
30MHz~1GHz	1GHz~7GHz

PCS 1900	
Middle channel	
	
7GHz~13.6GHz	*13.6GHz~20GHz*
Highest channel	
	
30MHz~1GHz	*1GHz~7GHz*
Highest channel	
	
7GHz~13.6GHz	*13.6GHz~20GHz*

WCDMA Band II	
Lowest channel	
	
30MHz~1GHz	1GHz~5GHz
Lowest channel	
	
5GHz ~12GHz	12GHz~20GHz
Middle channel	
	
30MHz~1GHz	1GHz~5GHz

WCDMA Band II	
Middle channel	
	
5GHz ~12GHz	12GHz~20GHz
Highest channel	
	
30MHz~1GHz	1GHz~5GHz
Highest channel	
	
5GHz ~12GHz	12GHz~20GHz

WCDMA Band V	
Lowest channel	
	
30MHz~1GHz	1GHz~5GHz
Lowest channel	
	
5GHz ~12GHz	12GHz~18GHz
Middle channel	
	
30MHz~1GHz	1GHz~5GHz

WCDMA Band V	
Middle channel	
	
5GHz ~12GHz	12GHz~18GHz
Highest channel	
	
30MHz~1GHz	1GHz~5GHz
Highest channel	
	
5GHz ~12GHz	12GHz~18GHz

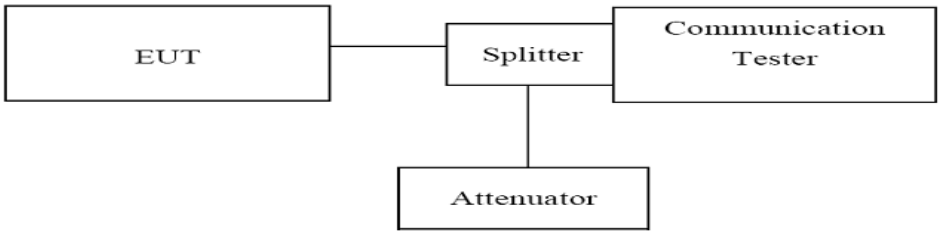
3.5. Band Edge compliance

LIMIT

Part 24.238 and Part 22.917 specify that 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.

The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

TEST CONFIGURATION

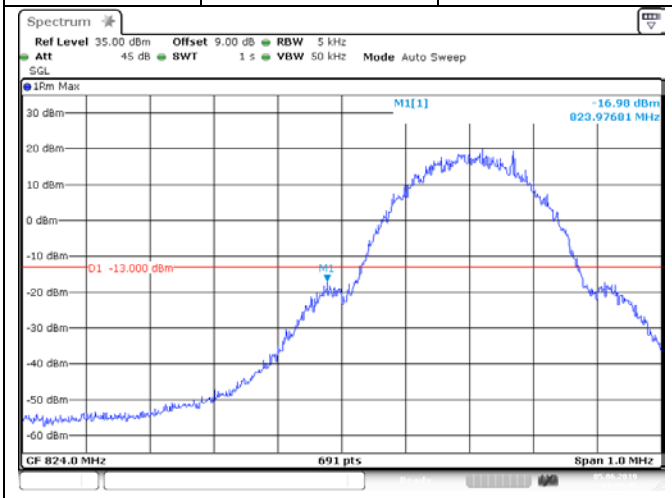


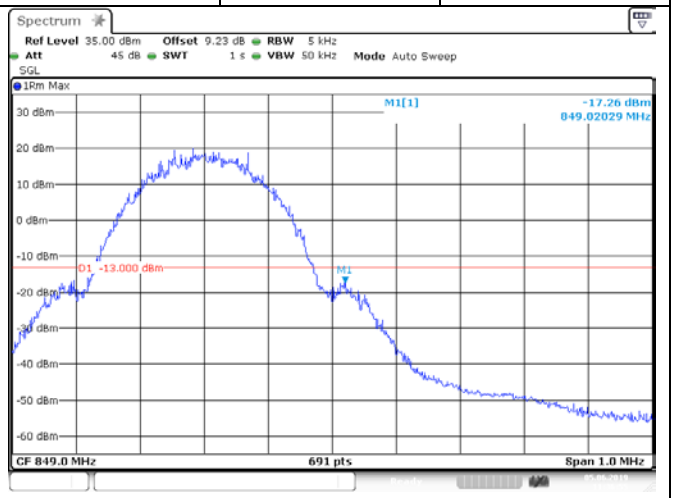
TEST PROCEDURE

1. The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation.
2. Set the RBW=5 KHz, VBW = 50KHz, Span=1MHz Sweep time= Auto for 2G system measurement.
3. Set the RBW=50 KHz, VBW = 300KHz, Span=1MHz Sweep time= Auto for 3G system measurement.

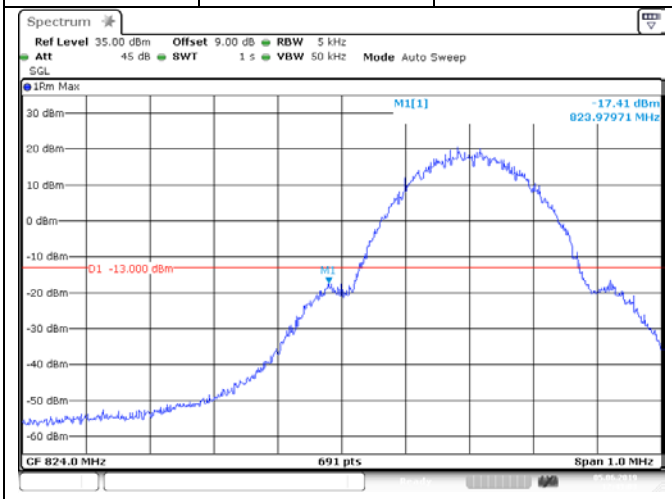
TEST RESULTS

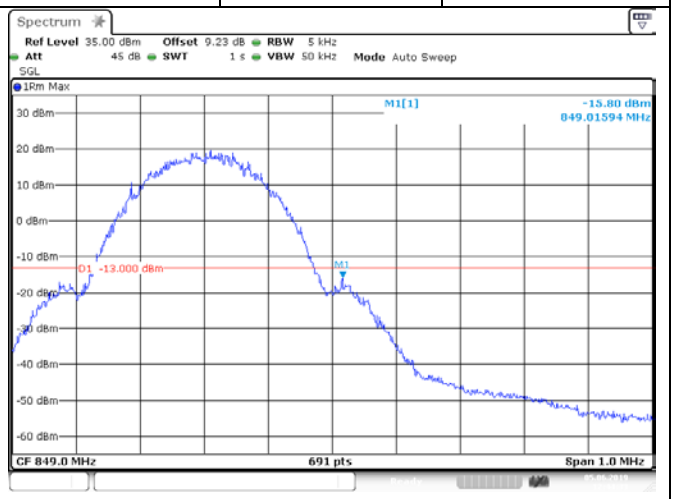
GSM 850					
Channel Number	Frequency (MHz)	Max Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
128	824.20	823.976	-16.98	-13.00	Pass
251	848.80	849.021	-17.26	-13.00	Pass



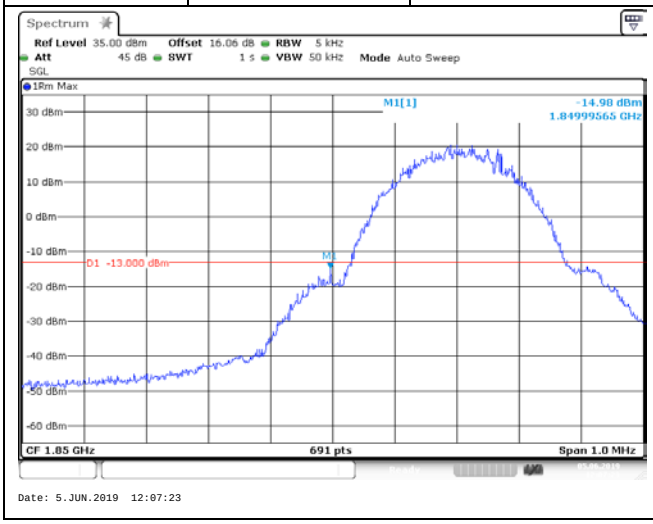


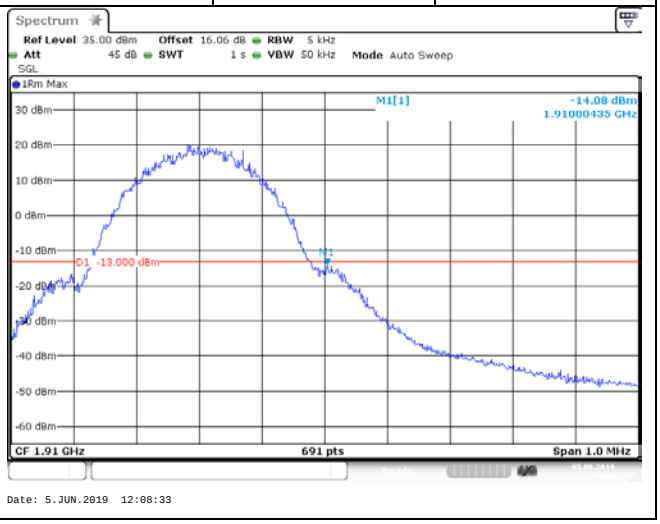
GPRS 850					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
128	824.20	823.979	-17.41	-13.00	Pass
251	848.80	849.015	-15.80	-13.00	Pass



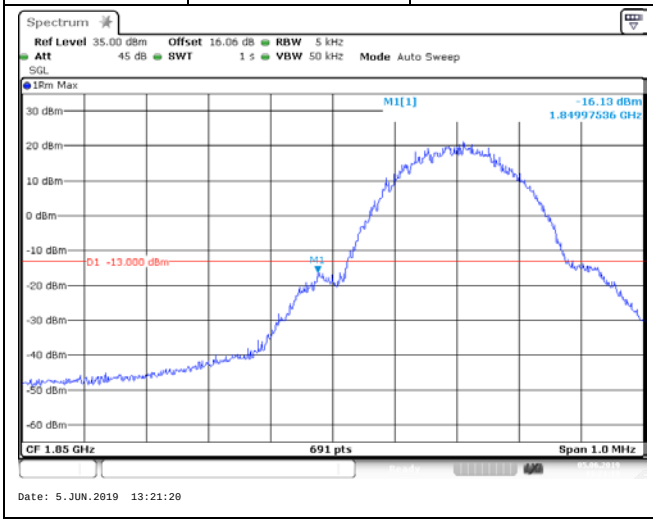


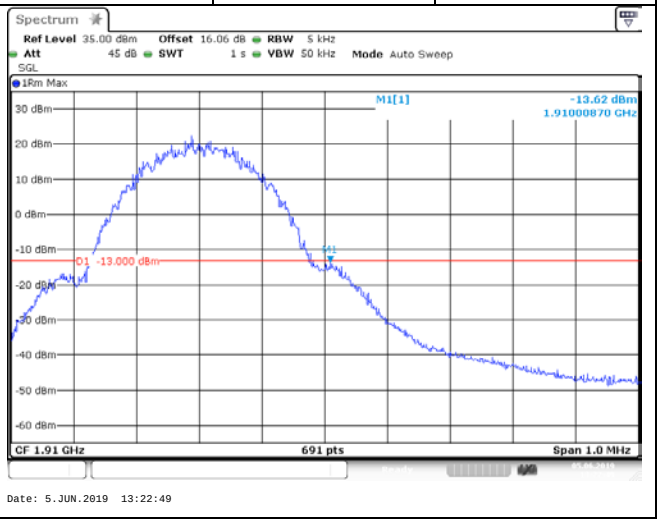
PCS 1900					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
512	1850.20	1849.995	-14.98	-13.00	Pass
810	1909.80	1910.004	-14.08	-13.00	Pass



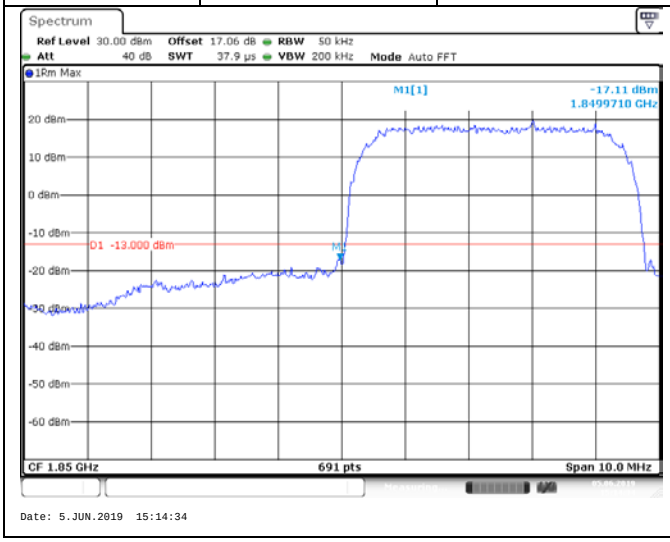


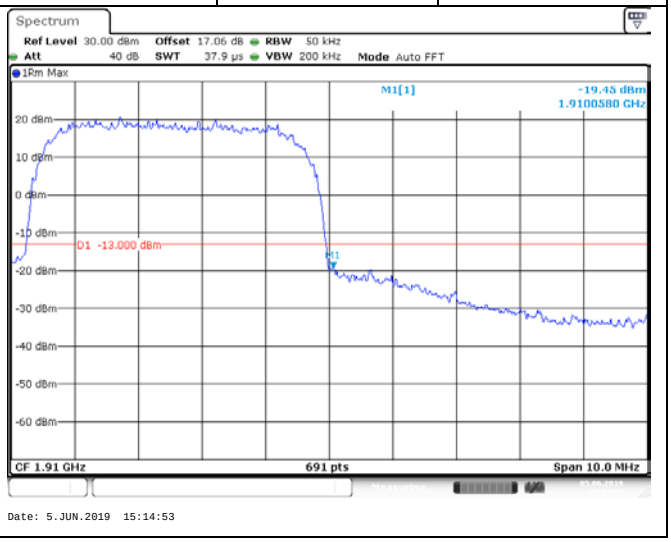
EGPRS 1900					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
512	1850.20	1849.975	-16.13	-13.00	Pass
810	1909.80	1910.008	-13.62	-13.00	Pass



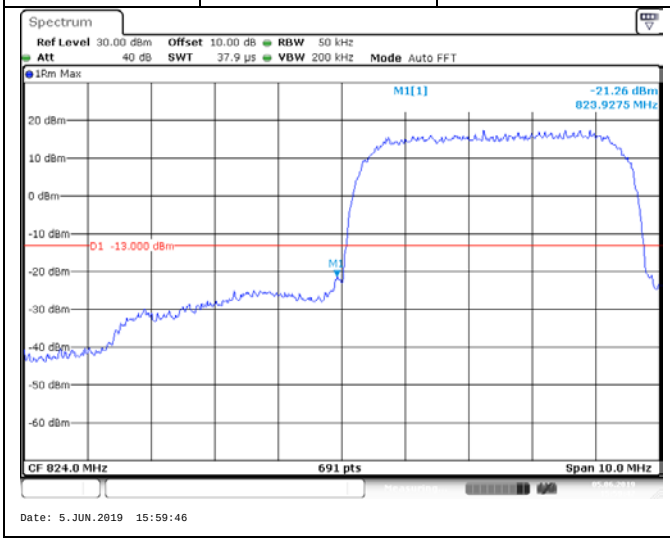


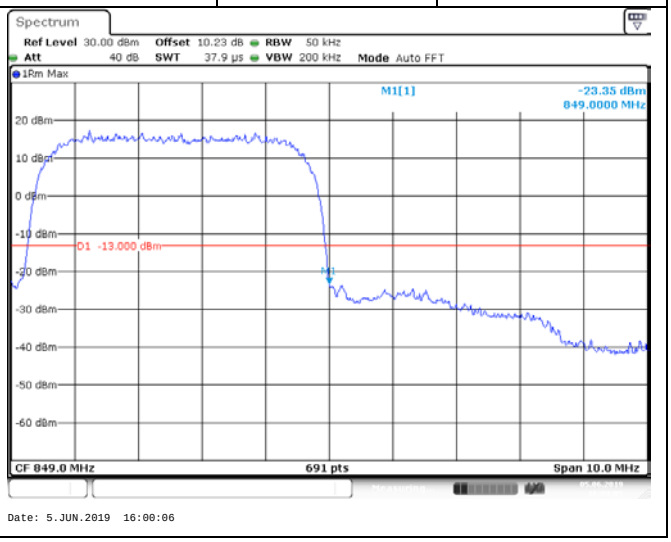
WCDMA Band II					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
9262	1852.40	1849.97	-17.11	-13.00	Pass
9538	1907.60	1910.05	-19.45	-13.00	Pass





WCDMA Band V					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
4132	826.40	823.92	-21.26	-13.00	Pass
4233	846.60	849.00	-23.35	-13.00	Pass





3.6. Radiated Power Measurement

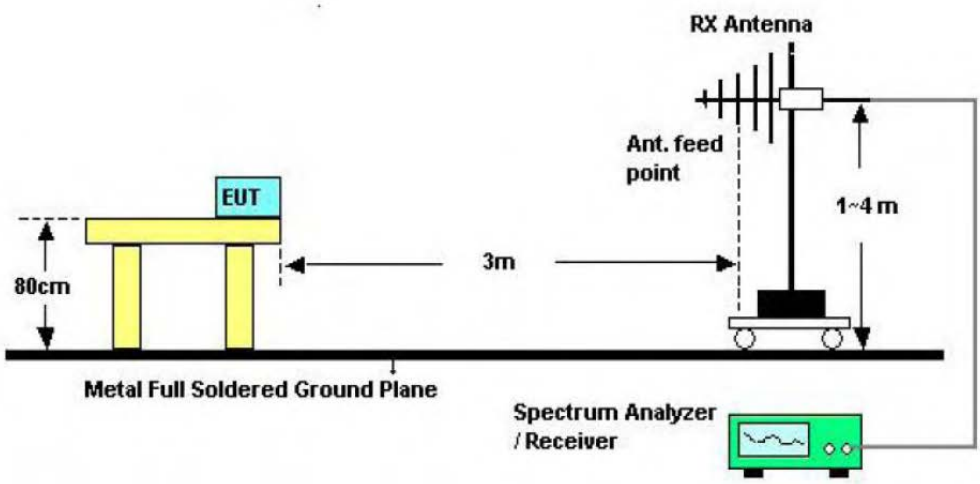
LIMIT

GSM850/WCDMA Band V: 7W ERP

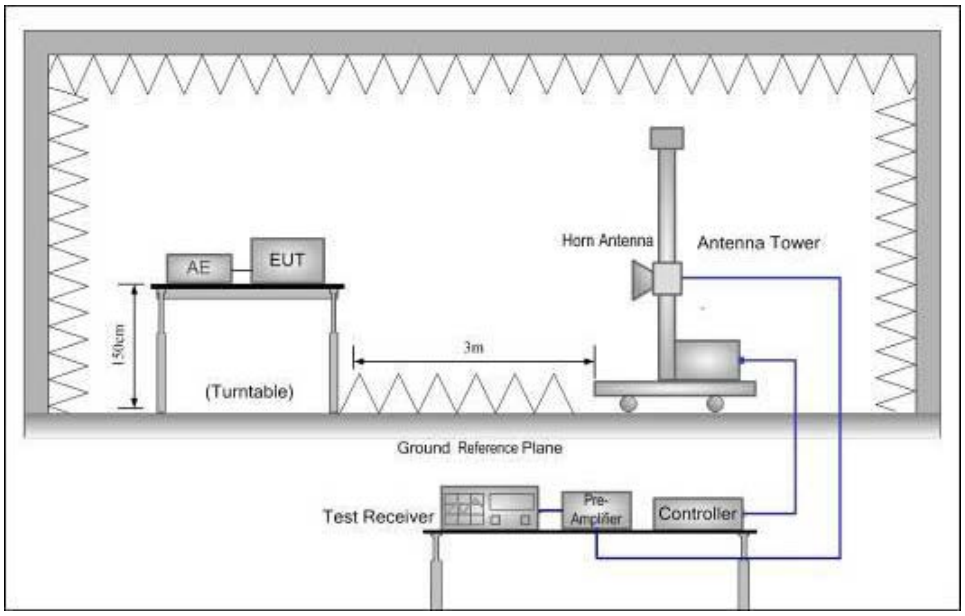
PCS1900/WCDMA Band II/WCDMA Band IV: 2W ERP

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl), the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl + Ga
   We used N5182A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

TEST RESULTS

Remark:

1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.

Measurement Data (worst case) :

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
GSM850 (GMSK)	128	V	30.36	38.45	Pass
		H	28.49		
	190	V	32.53		
		H	28.07		
	251	V	33.23		
		H	28.77		
GSM850 (GPRS)	128	V	30.71	38.45	Pass
		H	26.92		
	190	V	32.04		
		H	27.10		
	251	V	31.98		
		H	28.61		

Mode	Channel	Antenna Pol.	EIRP	Limit (dBm)	Result
PCS1900 (GMSK)	512	V	27.45	33.00	Pass
		H	24.17		
	661	V	28.06		
		H	23.81		
	810	V	27.05		
		H	23.03		
PCS1900 (GPRS)	512	V	27.31	33.00	Pass
		H	24.15		
	661	V	25.48		
		H	24.32		
	810	V	25.10		
		H	23.15		

Mode	Channel	Antenna Pol.	EIRP	Limit (dBm)	Result
WCDMA Band II (QPSK)	9262	V	20.16	33.00	Pass
		H	19.78		
	9400	V	22.06		
		H	19.77		
	9538	V	22.08		
		H	19.87		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
WCDMA Band V (QPSK)	4132	V	21.57	38.45	Pass
		H	18.39		
	4183	V	21.41		
		H	18.06		
	4233	V	21.34		
		H	18.39		

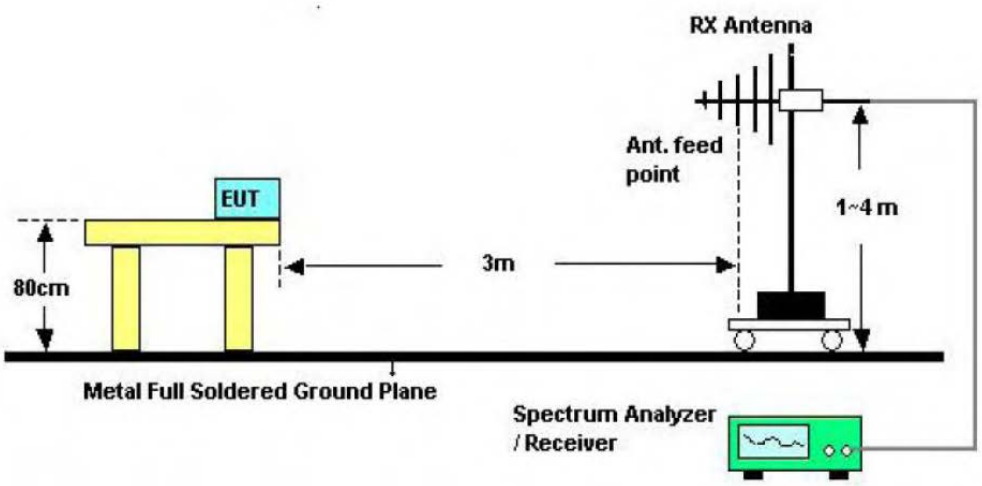
3.7. Radiated Spurious Emission

LIMIT

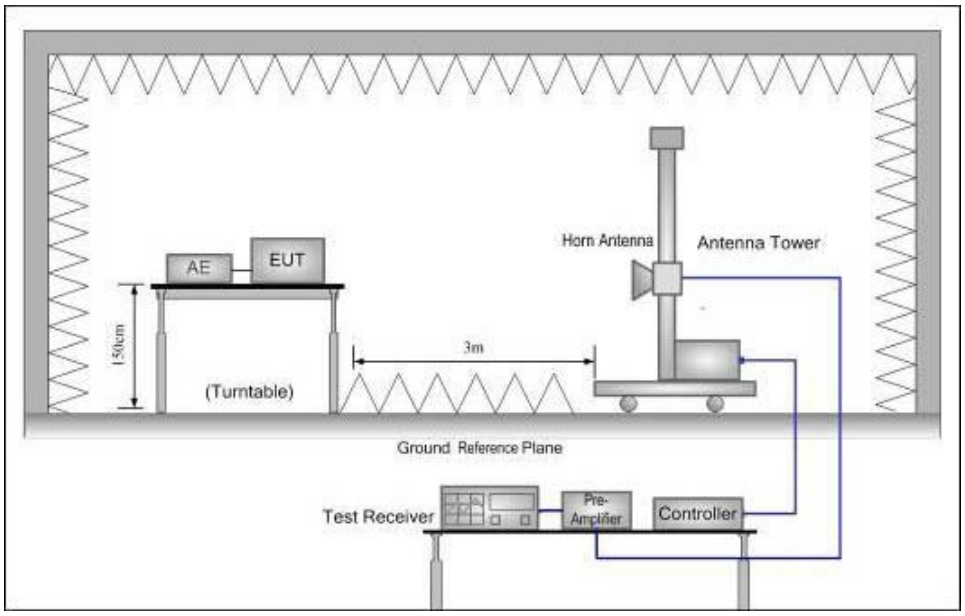
-13dBm

TEST CONFIGURATION

For the actual test configuration, please refer to the related Item – EUT Test Photos.



Below 1GHz



Above 1GHz

TEST PROCEDURE

1. EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
3. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=1MHz, VBW=3MHz, and the maximum value of the receiver should be recorded as (Pr).
4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjusts the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
5. An amplifier should be connected to the Signal Source output port. And the cable should be connecting between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
6. The measurement results are obtained as described below:
   Power(EIRP)=PMea- PAg - Pcl + Ga
   We used SMF100A microwave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substitution test; The measurement results are amend as described below:
   Power(EIRP)=PMea- Pcl + Ga
7. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
   ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.
8. Test frequency range should extend to 10^{th} harmonic of highest fundamental frequency.

TEST RESULTS

Remark:
1. By preliminary testing and verifying three axis (X, Y and Z) position of EUT transmitted status, it was found that “Z axis” position was the worst, and test data recorded in this report.
2. We test all modulation type and record worst case at Voice mode.

Measurement Data (worst case):

GSM850					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
128	1648.40	Vertical	-43.47	-13.00	Pass
	2472.60	Vertical	-48.07		
	1648.40	Horizontal	-47.88		
	2472.60	Horizontal	-53.53		
190	1673.20	Vertical	-43.67		
	2509.80	Vertical	-49.68		
	1673.20	Horizontal	-47.05		
	2509.80	Horizontal	-54.44		
251	1697.60	Vertical	-44.88		
	2546.40	Vertical	-46.30		
	1697.60	Horizontal	-44.42		
	2546.40	Horizontal	-47.40		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

PCS1900					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
512	3700.40	Vertical	-46.48	-13.00	Pass
	5550.60	Vertical	-51.16		
	3700.40	Horizontal	-47.10		
	5550.60	Horizontal	-52.08		
661	3760.00	Vertical	-42.86		
	5640.00	Vertical	-51.58		
	3760.00	Horizontal	-44.91		
	5640.00	Horizontal	-53.91		
810	3819.60	Vertical	-42.55		
	5729.40	Vertical	-46.50		
	3819.60	Horizontal	-48.74		
	5729.40	Horizontal	-52.67		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

WCDMA Band II					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
9262	3705.20	Vertical	-40.40	-13.00	Pass
	5557.80	Vertical	-50.42		
	3705.20	Horizontal	-47.96		
	5557.80	Horizontal	-52.99		
9400	3760.00	Vertical	-43.39		
	5640.00	Vertical	-53.34		
	3760.00	Horizontal	-43.43		
	5640.00	Horizontal	-52.69		
9538	3814.80	Vertical	-41.58		
	5722.20	Vertical	-52.12		
	3814.80	Horizontal	-42.09		
	5722.20	Horizontal	-48.24		

Remark：

1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

WCDMA Band V					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
4132	1653.20	Vertical	-41.69	-13.00	Pass
	2479.80	Vertical	-52.33		
	1653.20	Horizontal	-49.78		
	2479.80	Horizontal	-50.00		
4183	1672.80	Vertical	-44.10		
	2509.20	Vertical	-51.76		
	1672.80	Horizontal	-46.12		
	2509.20	Horizontal	-51.15		
4233	1692.80	Vertical	-38.94		
	2539.20	Vertical	-54.48		
	1692.80	Horizontal	-45.91		
	2539.20	Horizontal	-51.99		

Remark：

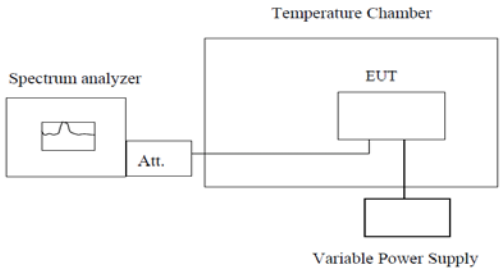
1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

3.8. Frequency stability

LIMIT

Cellular Band: ±2.5ppm PCS Band: Within the authorized frequency block

TEST CONFIGURATION



Note : Measurement setup for testing on Antenna connector

TEST PROCEDURE

1. The equipment under test was connected to an external DC power supply and input rated voltage.
2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators.
3. The EUT was placed inside the temperature chamber.
4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25 °C operating frequency as reference frequ
5. Turn EUT off and set the chamber temperature to –30 °C. After the te approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10 °C increased pe reached.
7. Reduce the input voltage to specified extreme voltage variation (+/- 15%) and endpoint, record the maximum frequency change.

TEST RESULTS

Remark: we test all modulation type and record worst case at Voice mode

1. Temperature measurement:

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	-1.65	-0.002005	±2.5	Pass
	-20	-1.30	-0.001573		
	-10	1.37	0.001668		
	0	8.25	0.010013		
	10	12.21	0.014820		
	20	14.46	0.017544		
	30	4.00	0.004849		
	40	-0.63	-0.000768		
	50	4.19	0.005086		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	46.66	0.024818	±2.5	Pass
	-20	-14.03	-0.007462		
	-10	17.42	0.009264		
	0	40.87	0.021739		
	10	-6.43	-0.003419		
	20	-13.13	-0.006987		
	30	40.39	0.021485		
	40	43.58	0.023180		
	50	-7.59	-0.004035		

Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	1.48	0.000798	±2.5	Pass
	-20	0.78	0.000421		
	-10	2.93	0.001581		
	0	-1.20	-0.000648		
	10	-0.39	-0.000212		
	20	3.41	0.001840		
	30	-1.51	-0.000816		
	40	-0.11	-0.000062		
	50	3.11	0.001678		
Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
3.70	-30	1.32	0.001576	±2.5	Pass
	-20	-2.50	-0.002989		
	-10	-0.34	-0.000410		
	0	0.90	0.001073		
	10	-1.45	-0.001730		
	20	0.13	0.000159		
	30	2.38	0.002840		
	40	1.39	0.001667		
	50	-0.94	-0.001121		

2. Voltage measurement:

Reference Frequency: GSM850 Middle channel=190 channel=836.6MHz					
Temperature (℃)	Voltage (V)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.42	4.33	0.005175	±2.5	Pass
	3.70	6.99	0.008361		
	3.27	2.88	0.003444		
Reference Frequency: PCS1900 Middle channel=661 channel=1880MHz					
Temperature (℃)	Voltage (V)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.42	12.46	0.006626	±2.5	Pass
	3.70	37.82	0.020118		
	3.27	7.56	0.004024		
Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Temperature (℃)	Voltage (V)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.42	-8.27	-0.004467	±2.5	Pass
	3.70	0.84	0.000454		
	3.27	3.02	0.001629		
	3.70	-6.84	-0.003638		
	3.27	-0.26	-0.000140		
Reference Frequency: WCDMA Band V Middle channel=4183 channel=836.6MHz					
Temperature (℃)	Voltage (V)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	4.42	-1.85	-0.002243	±2.5	Pass
	3.70	0.47	0.000563		
	3.27	1.33	0.001608		

4. EUT TEST PHOTOS

Reference to the document No.: Test Photographs 1.

5. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

Reference to the document No.: External Photographs and Internal Photographs.

**********THE END**********