Shenzhen General Testing & Inspection Technology Co.,Ltd.

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TEST REPORT

Report No. ……:	**GTI20181997F**
FCC ID……:	**NKS-S597**
Applicant ……:	**PeopleNet Communications Corporation**
Address……:	4400 Baker Road, Minnetonka, Minnesota, United States
Manufacturer……:	STONKAM CO.,LTD.
Address……:	5/F., #3 Building, Huangzhou Industrial Park, Chebei Rd., Tianhe Dist., 510665 Guangzhou, China
Product Name……:	**DVR S597**
Trade Mark……:	N/A
Model/Type reference……:	E-006-0597
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…:	2018-10-23
Date of testing……..:	2018-10-24 to 2018-11-24
Date of issue……....:	2018-11-25
Result……:	**PASS**

Compiled by: (Printed name+signature)	Terry Su	Terry.Su
Supervised by: (Printed name+signature)	Cary Luo	cary luo
Approved by: (Printed name+signature)	Walter Chen	walter chen

Testing Laboratory Name…...:	**Shenzhen General Testing & Inspection Technology Co.,Ltd.**
Address……:	1-2/F., Building 2, Jiaquan Building, Guanlan High-Tech Park, Shenzhen, Guangdong, China

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Table of Contents Page

1. SUMMARY 3

1.1. TEST STANDARDS 3
1.2. REPORT VERSION 3
1.3. TEST DESCRIPTION 4
1.4. TEST FACILITY 5
1.5. MEASUREMENT UNCERTAINTY 5
1.6. ENVIRONMENTAL CONDITIONS 6

2. GENERAL INFORMATION 7

2.1. CLIENT INFORMATION 7
2.2. GENERAL DESCRIPTION OF EUT 7
2.3. DESCRIPTION OF TEST MODES AND TEST FREQUENCY 8
2.4. MEASUREMENT INSTRUMENTS LIST 8

3. TEST ITEM AND RESULTS 10

3.1. CONDUCTED OUTPUT POWER 10
3.2. PEAK-TO-AVERAGE RATIO 13
5.1. OCCUPY BANDWIDTH 24
5.2. OUT OF BAND EMISSION AT ANTENNA TERMINALS 28
5.3. BAND EDGE COMPLIANCE 46
5.4. RADIATED POWER MEASUREMENT 49
5.5. RADIATED SPURIOUS EMISSION 52
5.6. FREQUENCY STABILITY 56

6. EUT TEST PHOTOS 59

7. PHOTOGRAPHS OF EUT CONSTRUCTIONAL 60

1. SUMMARY

1.1. Test Standards

The tests were performed according to following 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	2018-11-25	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	Young He
Peak-to-Average Ratio	Part 24.232 Part 27.50	Pass	Young He
99% Occupied Bandwidth & 26 dB Bandwidth	Part 2.1049 Part 22.917(b) Part 24.238(b) Part 27.53	Pass	Young He
Band Edge	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	Pass	Young He
Conducted Spurious Emissions	Part 2.1051 Part 22.917 Part 24.238 Part 27.53	Pass	Young He
Frequency stability vs temperature	Part 2.1055(a)(1)(b) Part 22.355 Part 24.235 Part 27.54	Pass	Young He
Frequency stability vs voltage	Part 2.1055(d)(1)(2) Part 22.355 Part 24.235 Part 27.54	Pass	Young He
ERP and EIRP	Part 22.913(a) Part 24.232(b) Part 27.50	Pass	Young He
Radiated Spurious Emissions	Part 2.1053 Part 22.917 Part 24.238 Part 27.53	Pass	Young He

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

1.4. Test Facility

Address of the test laboratory

Shenzhen General Testing & Inspection Technology Co., Ltd.

Add: 1F, 2 Block, Jiaquan Building, Guanlan High-tech Park Baoan District, Shenzhen, Guangdong, China

Laboratory accreditation

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

CNAS-Lab Code: L5365

Shenzhen General Testing & Inspection Technology Co.,Ltd. has been assessed and proved to be in Compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2005 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No.: CN1208

Shenzhen General Testing & Inspection Technology Co.,Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

IC Registration No.: 9783A-1

The 3m alternate test site of Shenzhen General Testing & Inspection Technology Co.,Ltd. EMC Laboratory has been registered by Certification and Engineer Bureau of Industry Canada for the performance of with Registration NO.: 9783A on Jan, 2016.

FCC-Registration No.: 951311

Shenzhen General Testing & Inspection Technology Co.,Ltd. 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 951311, Aug 26, 2017

1.5. 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 Shenzhen General Testing & Inspection Technology Co., Ltd 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 General Testing & Inspection laboratory 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-12.75 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.

1.6. 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:	PeopleNet Communications Corporation
Address:	4400 Baker Road, Minnetonka, Minnesota, United States
Manufacturer:	STONKAM CO.,LTD.
Address:	5/F., #3 Building, Huangzhou Industrial Park, Chebei Rd., Tianhe Dist., 510665 Guangzhou, China

2.2. General Description of EUT

Product Name:	DVR S597
Model/Type reference:	E-006-0597
Marketing Name:	N/A
Listed Model(s):	N/A
Power supply:	12Vdc from Li-ion Battery
Hardware version:	Rev 1.502
Software version:	DV423V1.0.0
WCDMA	
Operation Band:	Band II: UL: 1852.4MHz~1907.6MHz, DL: 1932.6MHz~1987.4MHz Band IV: UL: 1712.4MHz~1752.6MHz, DL: 2112.6MHz~2152.4MHz Band V: UL: 826.4MHz~846.6MHz, DL: 871.6MHz~1891.4MHz
Modulation Type:	QPSK for WCDMA/HSUPA/HSDPA
Antenna Type:	External Antenna
Antenna Gain:	WCDMA II: 4.16dBi WCDMA IV: 4.16dBi WCDMA V: 3.34dBi

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:

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	4182	836.40
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	Jan. 04, 2019
2	High pass filter	Compliance Direction systems	BSU-6	34202	Jan. 04, 2019
3	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4180	Jan. 04, 2019
4	Log-Bicon Antenna	Schwarzbeck	CBL6141A	4181	Jan. 04, 2019
5	Spectrum Analyzer	HP	8563E	02052	Jan. 04, 2019
6	Horn Antenna	Schwarzbeck	BBHA 9120D	648	Jan. 04, 2019
7	Horn Antenna	Schwarzbeck	BBHA 9120D	649	Jan. 04, 2019
8	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25841	Jan. 04, 2019
9	Ultra-Broadband Antenna	ShwarzBeck	BBHA9170	25842	Jan. 04, 2019
10	Pre-Amplifier	HP	8447D	1937A03050	Jan. 04, 2019
11	Pre-Amplifier	EMCI	EMC051835	980075	Jan. 04, 2019
12	Splitter	Mini-Circuit	ZAPD-4	400059	Jan. 04, 2019
13	Signal Generator	Agilent	N5182A	1019356	Jan. 04, 2019
14	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Jan. 04, 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	Jan. 04, 2019
19	Cable Above 1GHz	Hubersuhner	SUCOFLEX102	DA1580	Jan. 04, 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	Jan. 04, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Jan. 04, 2019
3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Jun. 22, 2019
4	Splitter	Mini-Circuit	ZAPD-4	400059	Jan. 04, 2019
5	RF Connection Cable	HUBER+SUHNER	RE-7-FL	N/A	Jan. 04, 2019
6	RF Connection Cable	Chengdu E-Microwave	---	---	Jan. 04, 2019
7	Attenuator	Chengdu E-Microwave	EMCAXX-10 RNZ-3	---	Jan. 04, 2019

Frequency Stability					
Item	Test Equipment	Manufacturer	Model No.	Serial No.	Calibrated until
1	UNIVERSAL RADIO COMMUNICATION	Rohde & Schwarz	CMU200	114694	Jan. 04, 2019
2	Spectrum Analyzer	Rohde & Schwarz	FSU	100105	Jan. 04, 2019
3	Spectrum Analyzer	Rohde & Schwarz	FUV40-N	101331	Jun. 22, 2019
4	Splitter	Mini-Circuit	ZAPD-4	400059	Jan. 04, 2019
5	Climate Chamber	ESPEC	EL-10KA	05107008	Jan. 04, 2019

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

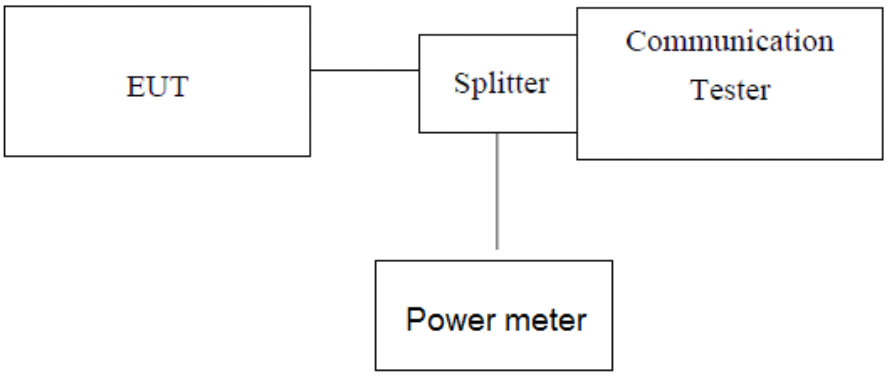
3. TEST ITEM AND RESULTS

3.1. Conducted Output Power

LIMIT:

WCDMA Band V: 7W
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

WCDMA Band II		Conducted Power (dBm)		
		CH9262	CH9400	CH9538
		1852.40	1880.00	1907.60
AMR 12.2K		22.08	22.98	22.77
RMC 12.2K		22.49	22.21	22.59
HSDPA	Subtest-1	22.94	22.03	22.48
	Subtest-2	22.88	22.88	22.66
	Subtest-3	22.40	22.90	21.93
	Subtest-4	22.25	22.43	22.09
HSUPA	Subtest-1	22.79	22.91	22.61
	Subtest-2	22.34	22.39	21.95
	Subtest-3	21.85	22.38	22.53
	Subtest-4	22.47	21.89	22.41
	Subtest-5	21.97	22.95	22.36

WCDMA Band IV		Conducted Power (dBm)		
		CH1312	CH1413	CH1513
		1712.40	1732.60	1752.60
AMR 12.2K		22.57	22.43	22.82
RMC 12.2K		22.95	22.48	23.00
HSDPA	Subtest-1	21.92	22.12	22.02
	Subtest-2	23.02	22.87	22.51
	Subtest-3	22.55	22.57	22.60
	Subtest-4	22.34	22.89	22.32
HSUPA	Subtest-1	22.37	22.37	22.33
	Subtest-2	22.33	22.66	22.77
	Subtest-3	22.88	22.84	22.68
	Subtest-4	22.93	22.54	22.82
	Subtest-5	22.76	22.54	22.01

WCDMA Band V		Conducted Power (dBm)		
		CH4132	CH4182	CH4233
		826.40	836.40	846.60
AMR 12.2K		22.82	22.55	22.98
RMC 12.2K		21.84	22.43	22.16
HSDPA	Subtest-1	21.99	22.79	21.81
	Subtest-2	22.50	22.04	22.37
	Subtest-3	22.08	22.87	22.92
	Subtest-4	22.79	22.07	22.24
HSUPA	Subtest-1	22.59	22.26	22.52
	Subtest-2	22.67	21.84	22.83
	Subtest-3	22.33	22.55	22.15
	Subtest-4	22.66	22.97	22.22
	Subtest-5	22.31	22.31	21.85

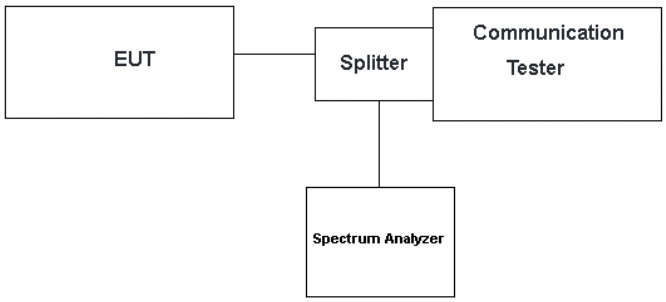
3.2. Peak-to-Average Ratio

LIMIT:

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

TEST CONFIGURATION

- For Peak-to-Average Ratio



TEST PROCEDURE

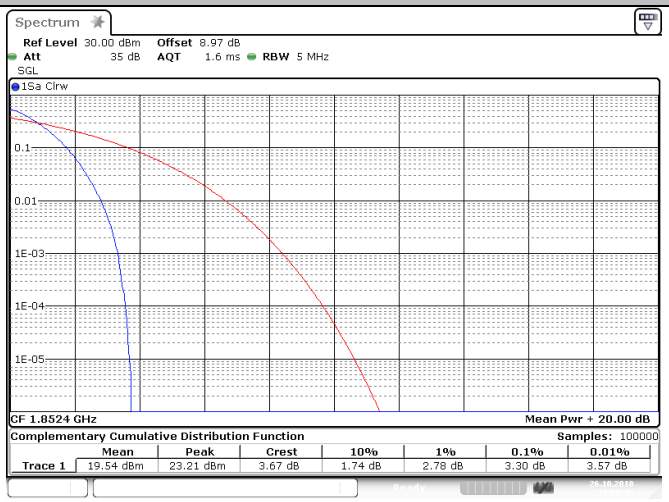
- For Peak-to-Average Ratio

1. The testing follows FCC KDB 971168 v02r02 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 %.
5. Record the deviation as Peak to Average Ratio.

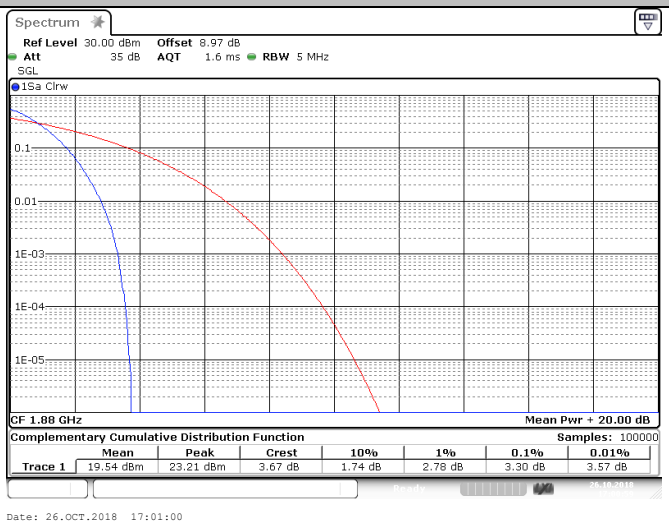
TEST RESULTS

EUT Mode	Channel	Frequency (MHz)	Peak-to-Average Ratio(dB)	Limit (dB)	Result
WCDMA Band II WCDMA	9262	1852.40	3.30	13	PASS
	9400	1880.00	3.30	13	
	9538	1907.60	3.30	13	
WCDMA Band II HSDPA	9262	1852.40	3.42	13	
	9400	1880.00	3.16	13	
	9538	1907.60	3.16	13	
WCDMA Band II HSUPA	9262	1852.40	3.39	13	
	9400	1880.00	3.13	13	
	9538	1907.60	3.07	13	
WCDMA Band IV WCDMA	1312	1712.40	3.36	13	
	1413	1732.60	3.36	13	
	1513	1752.60	3.36	13	
WCDMA Band IV HSDPA	1312	1712.40	3.39	13	
	1413	1732.60	3.39	13	
	1513	1752.60	3.39	13	
WCDMA Band IV HSUPA	1312	1712.40	3.42	13	
	1413	1732.60	3.45	13	
	1513	1752.60	3.45	13	
WCDMA Band V WCDMA	4132	826.40	3.10	13	
	4182	836.40	3.10	13	
	4233	846.60	3.10	13	
WCDMA Band V HSDPA	4132	826.40	3.16	13	
	4182	836.40	3.65	13	
	4233	846.60	2.67	13	
WCDMA Band V HSUPA	4132	826.40	3.13	13	
	4182	836.40	2.58	13	
	4233	846.60	2.72	13	

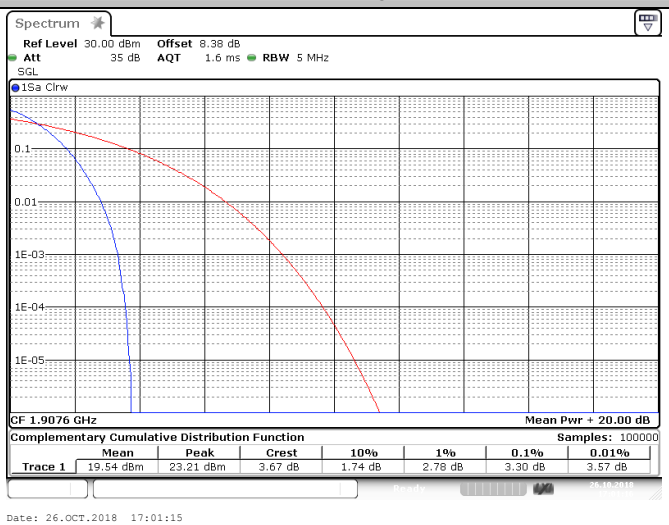
Band II_ WCDMA_ Lowest channel



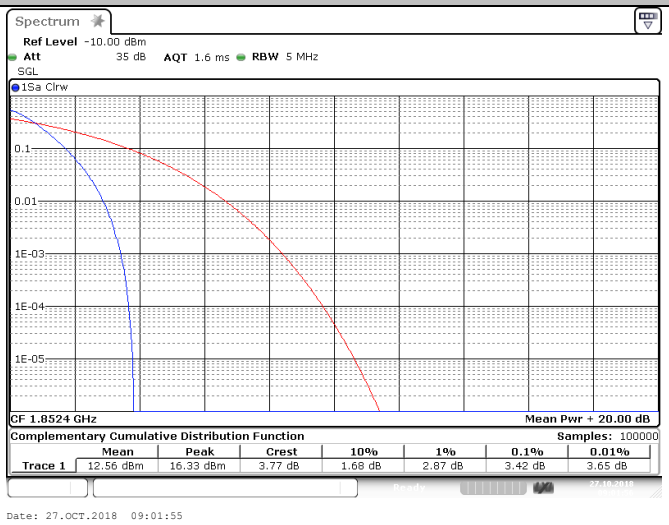
Band II_ WCDMA_ Middle channel



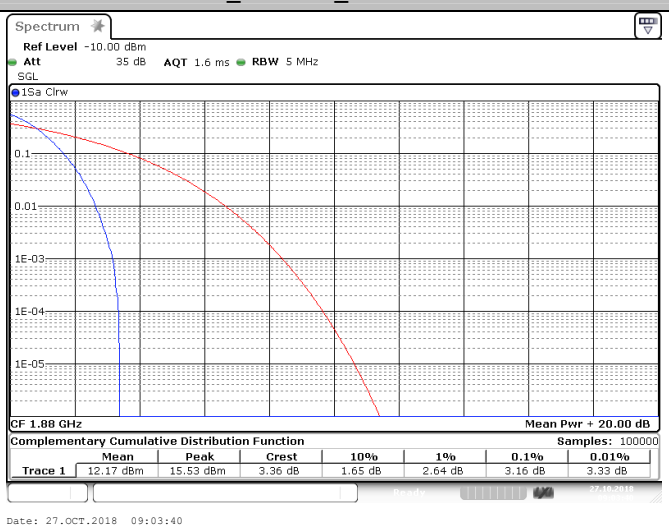
Band II_ WCDMA_ Highest channel



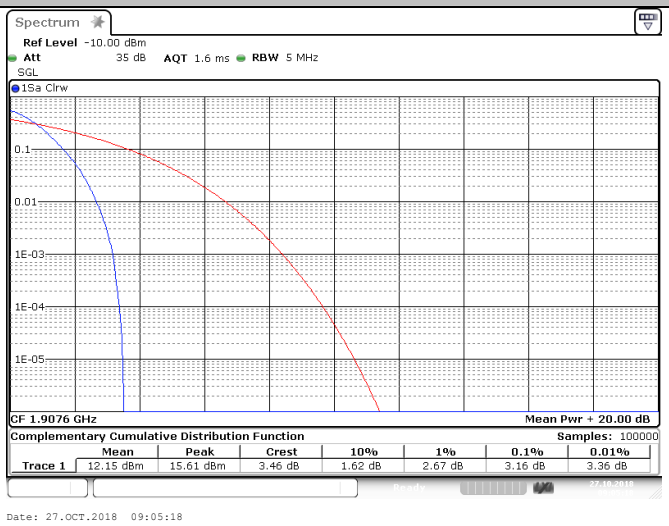
Band II_ HSDPA _ Lowest channel



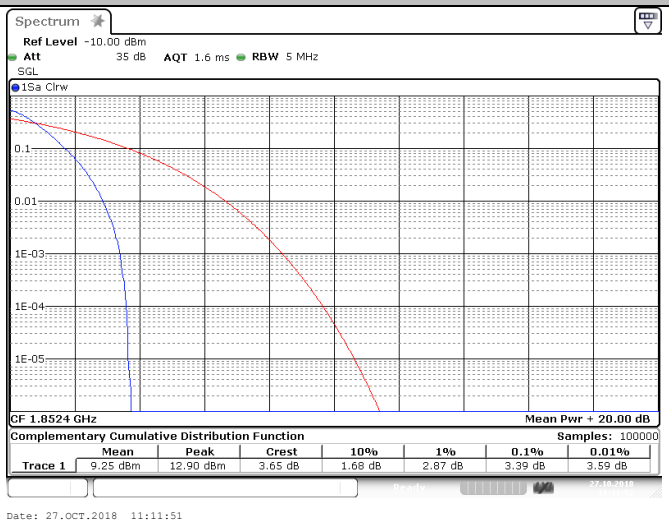
Band II_ HSDPA _ Middle channel



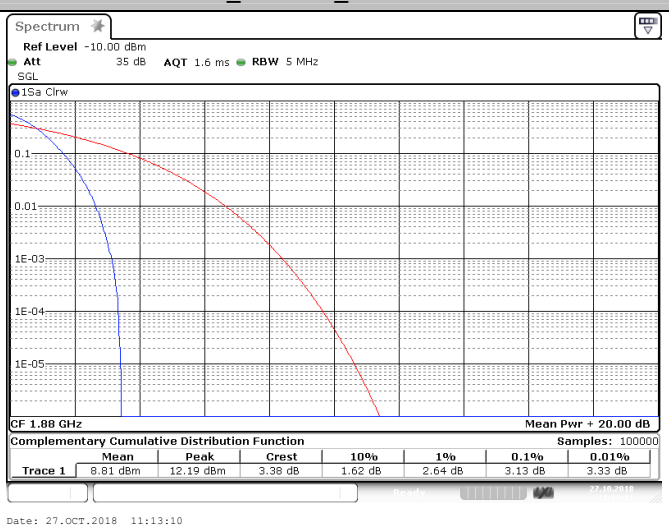
Band II_ HSDPA _ Highest channel



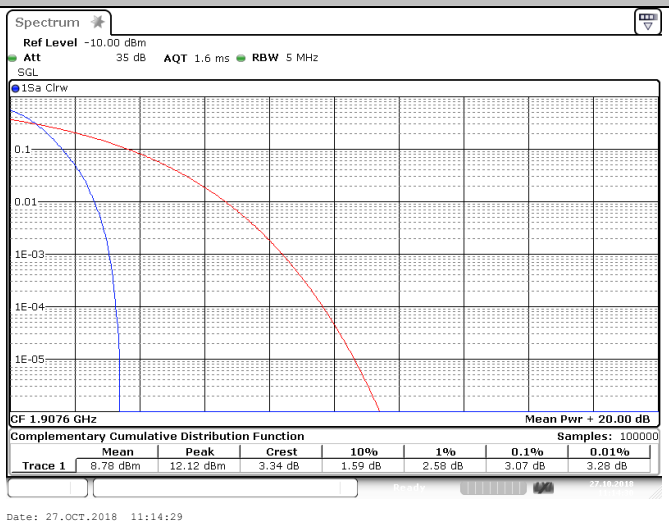
Band II_ HSUPA _ Lowest channel



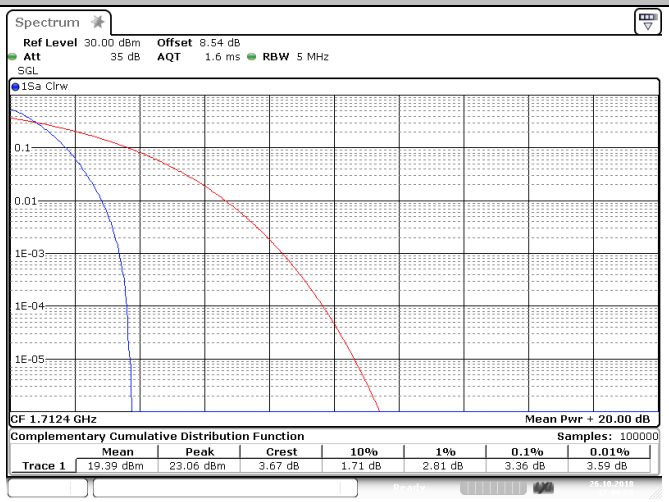
Band II_ HSUPA _ Middle channel



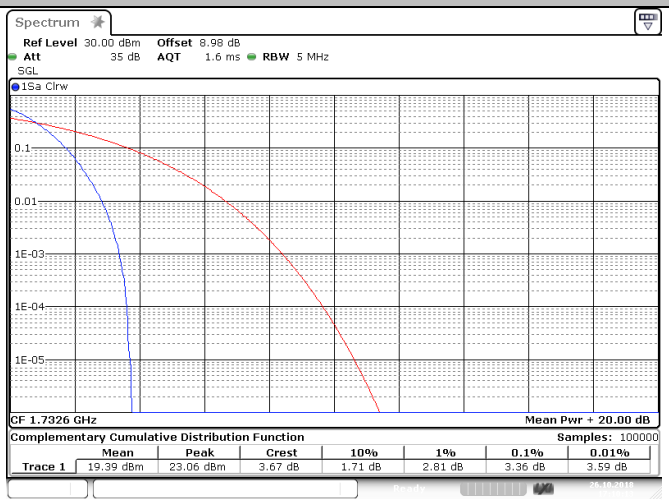
Band II_ HSUPA _ Highest channel



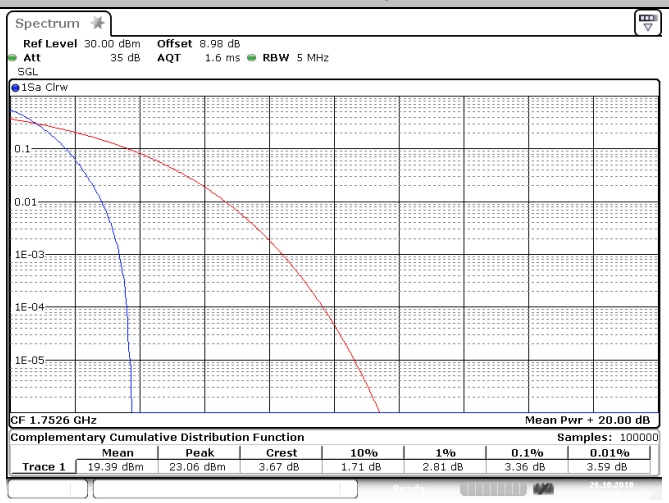
Band IV_ WCDMA_ Lowest channel



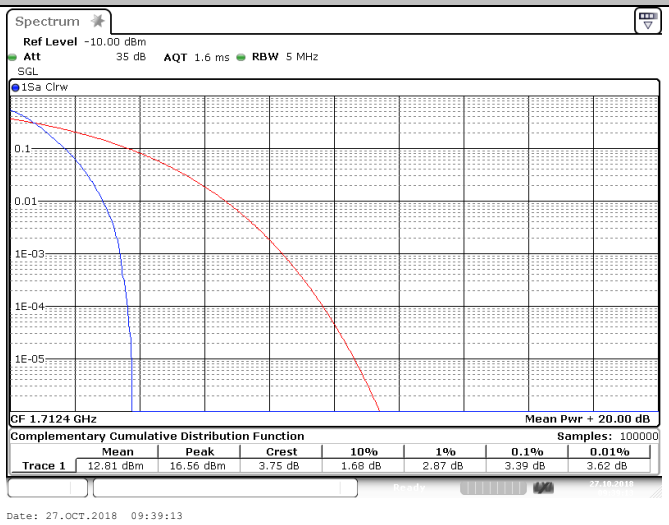
Band IV_ WCDMA_ Middle channel



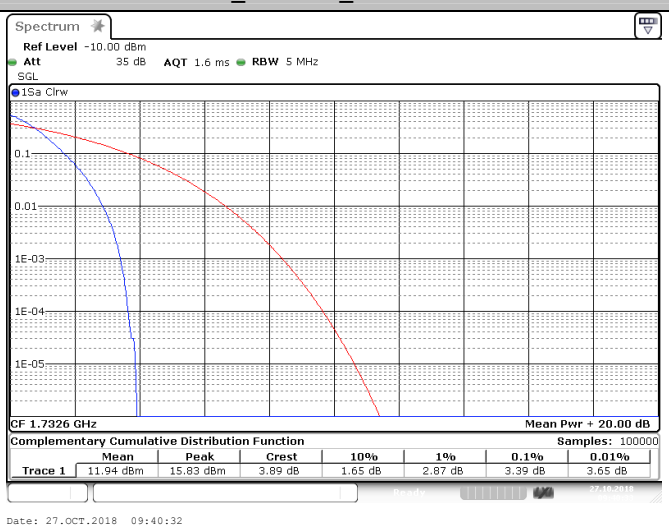
Band IV_ WCDMA_ Highest channel



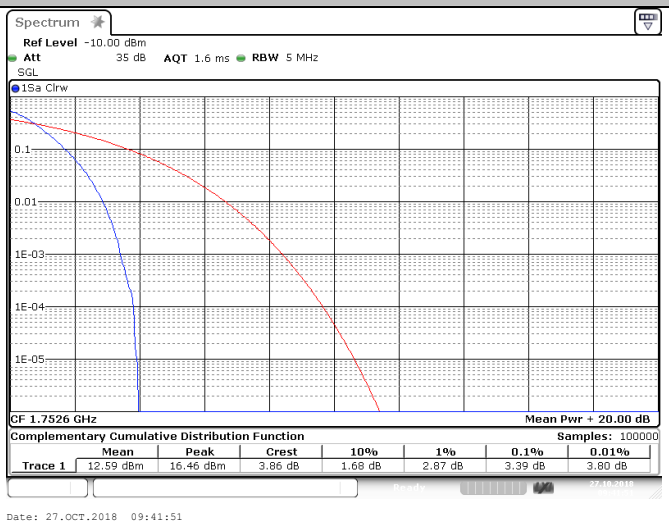
Band IV_ HSDPA _ Lowest channel



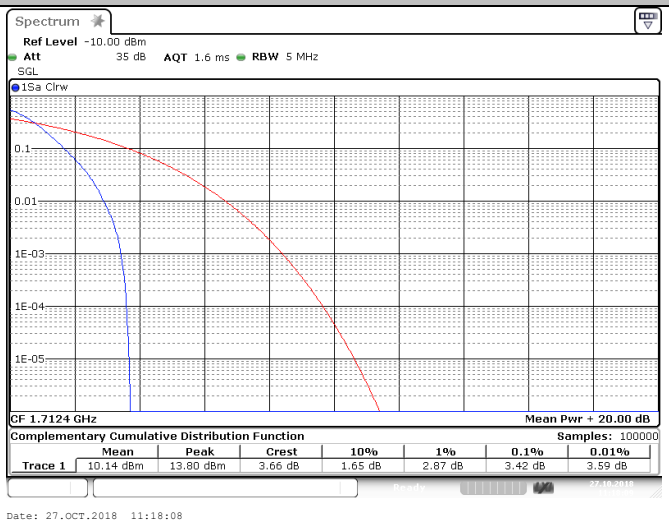
Band IV_ HSDPA _ Middle channel



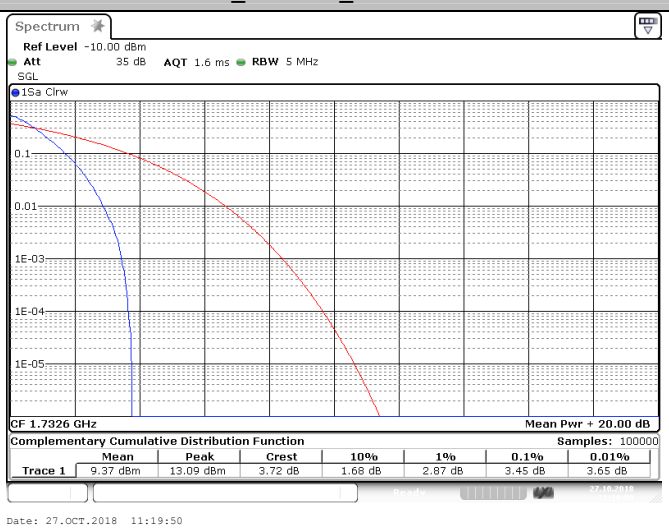
Band IV_ HSDPA _ Highest channel



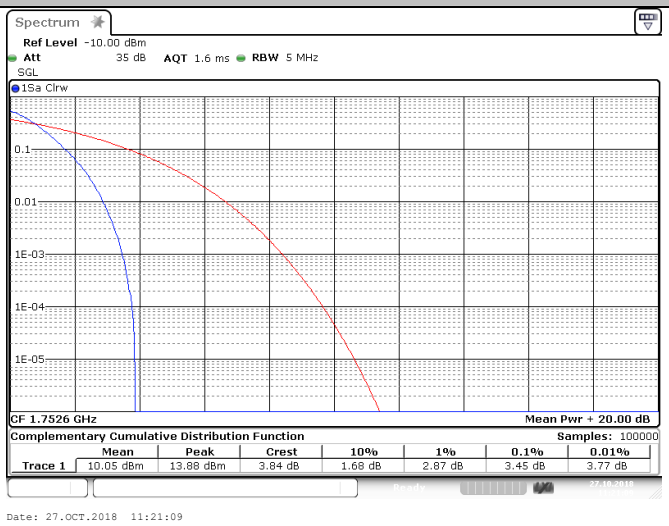
Band IV_ HSUPA _ Lowest channel



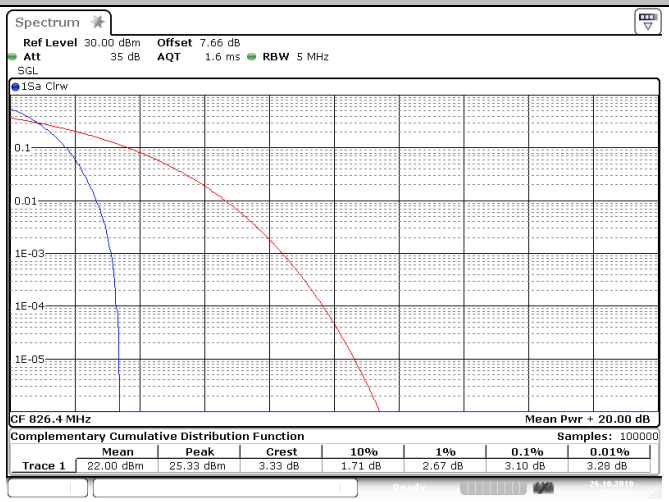
Band IV_ HSUPA _ Middle channel



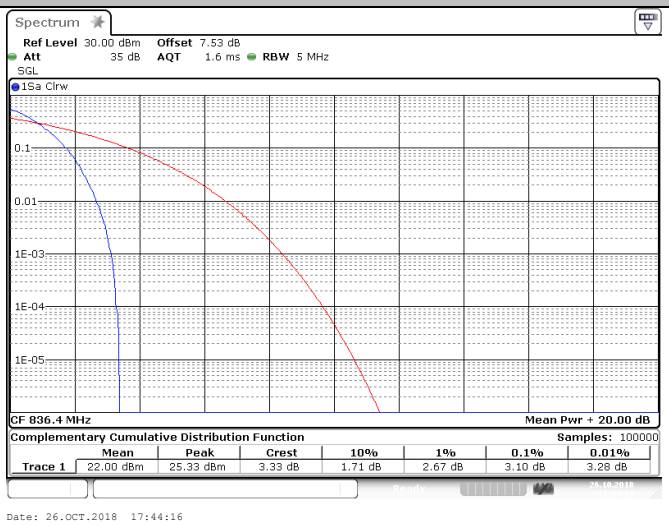
Band IV_ HSUPA _ Highest channel



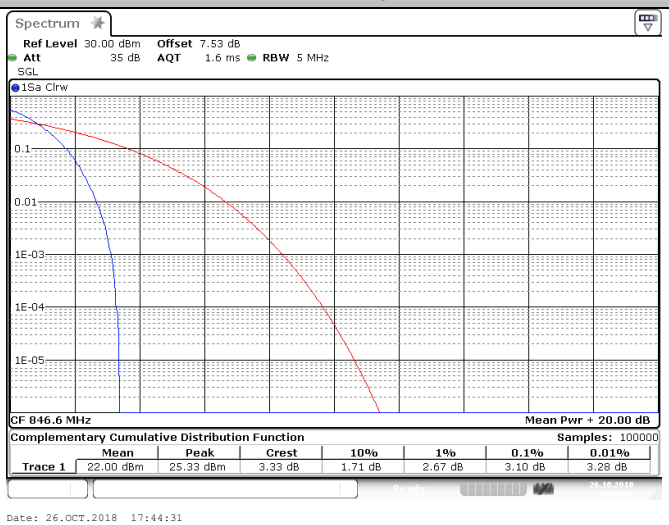
Band V_ WCDMA_ Lowest channel



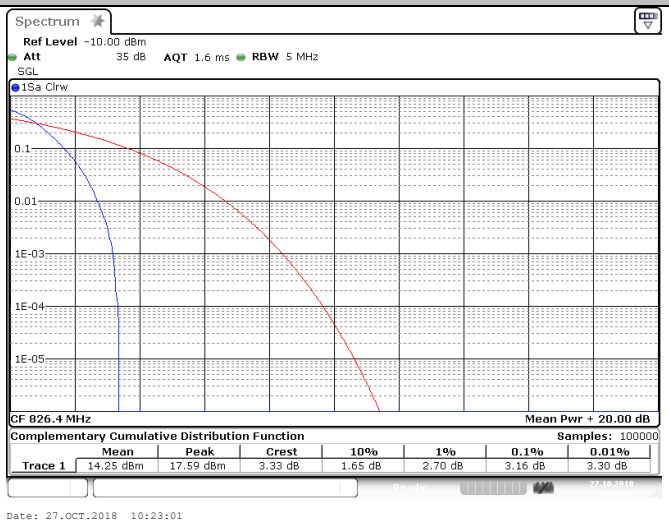
Band V_ WCDMA_ Middle channel



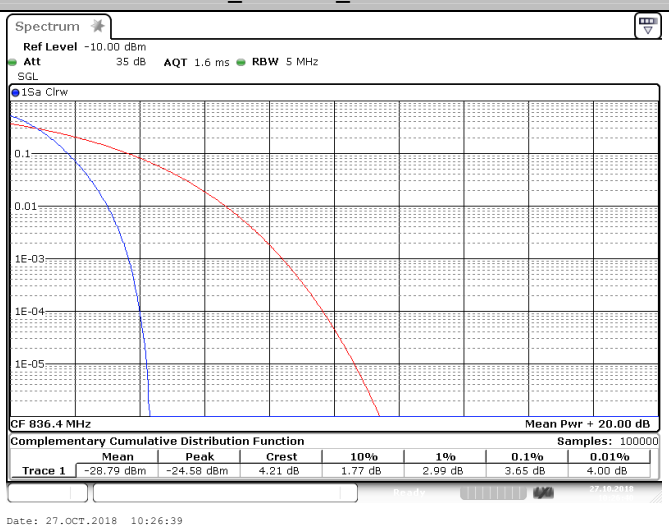
Band V_ WCDMA_ Highest channel



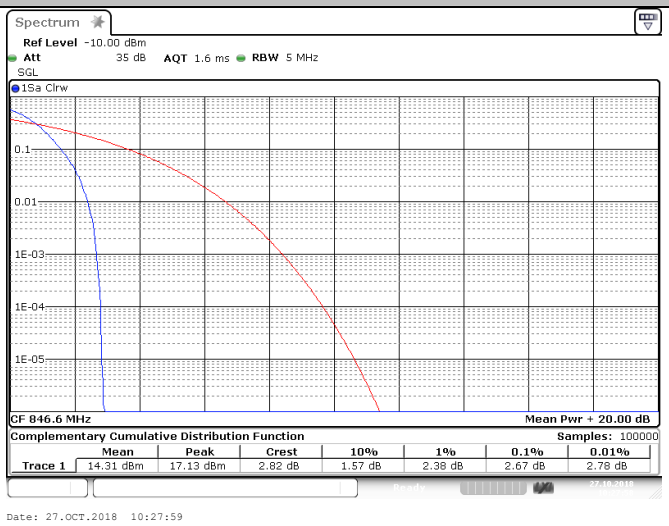
Band V_ HSDPA _ Lowest channel



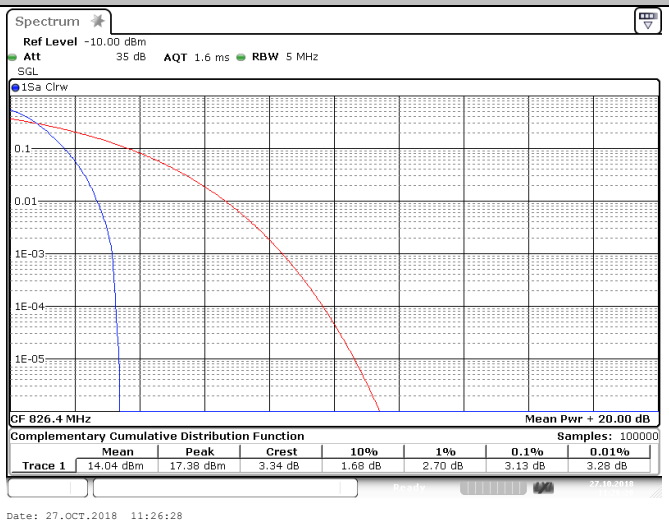
Band V_ HSDPA _ Middle channel



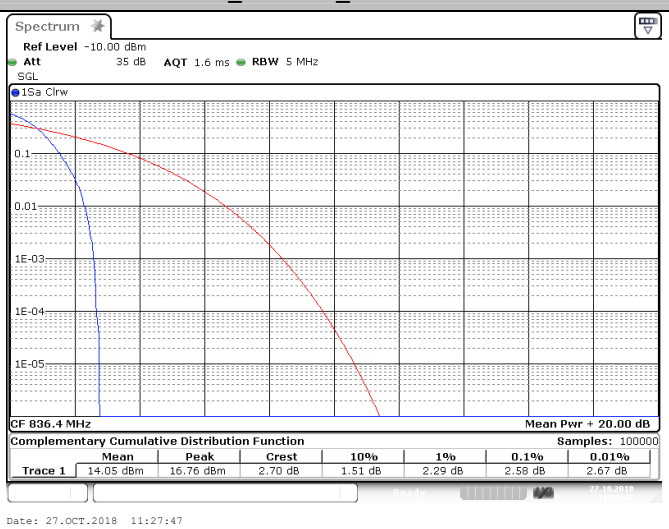
Band V_ HSDPA _ Highest channel



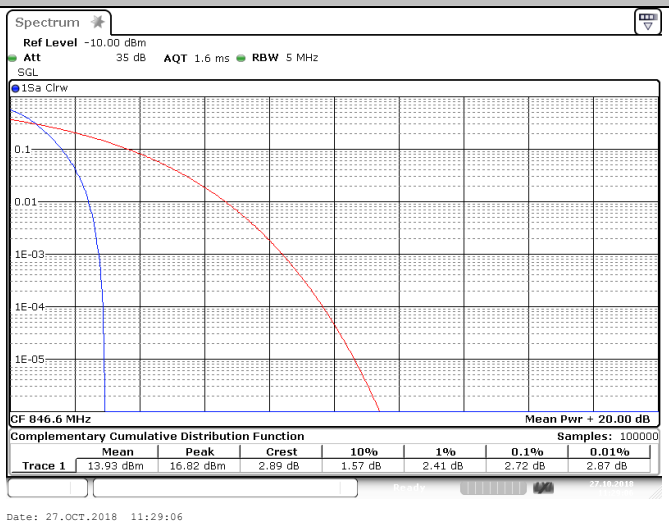
Band V_ HSUPA _ Lowest channel



Band V_ HSUPA _ Middle channel



Band V_ HSUPA _ Highest channel

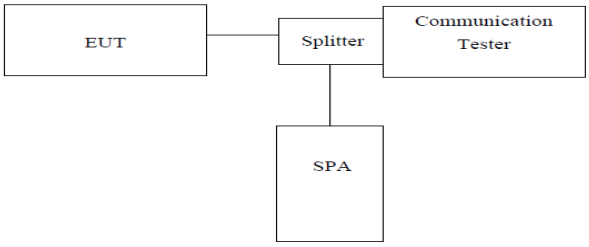


5.1. Occupy Bandwidth

LIMIT

N/A

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

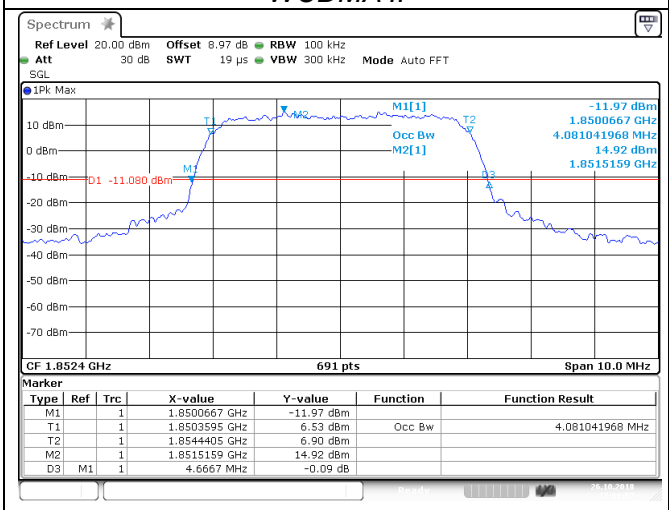
EUT Mode	Channel	Frequency (MHz)	99% Occupy bandwidth (KHz)	-26dB bandwidth (KHz)
WCDMA Band II (QPSK)	9262	1852.40	4081.0	4667
	9400	1880.00	4081.0	4667
	9538	1907.60	4066.6	4652
WCDMA Band IV (QPSK)	1312	1712.40	4066.6	4638
	1413	1732.60	4066.6	4667
	1513	1752.60	4081.0	4652
WCDMA Band V (QPSK)	4132	826.40	4081.0	4667
	4182	836.40	4081.0	4739
	4233	846.60	4081.0	4667

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:

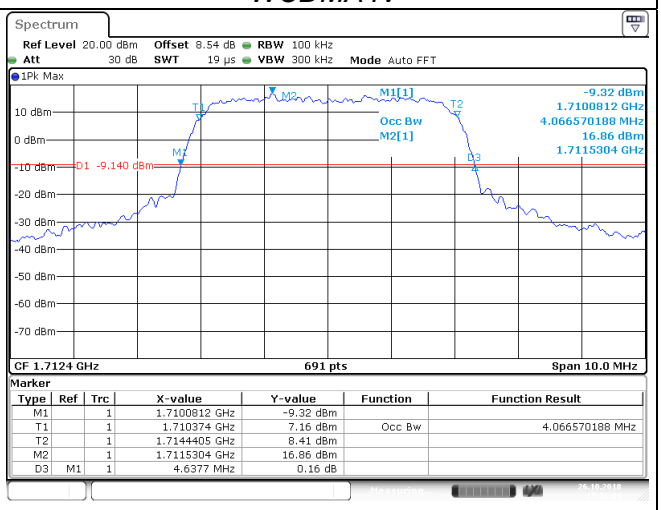
99% Occupy bandwidth and -26dB bandwidth

WCDMA II

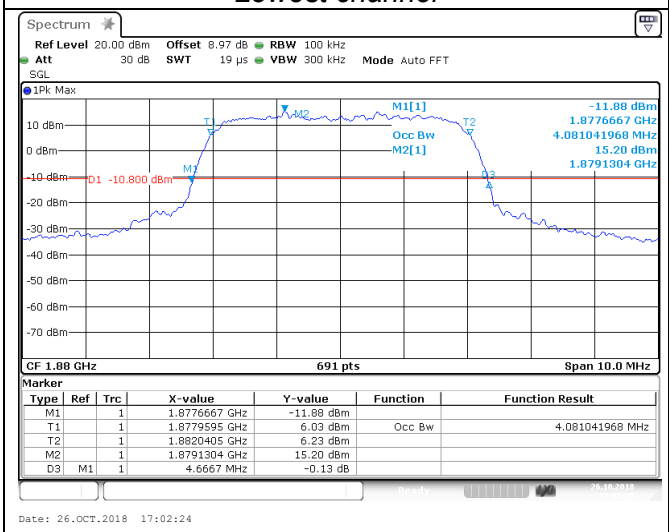


Lowest channel

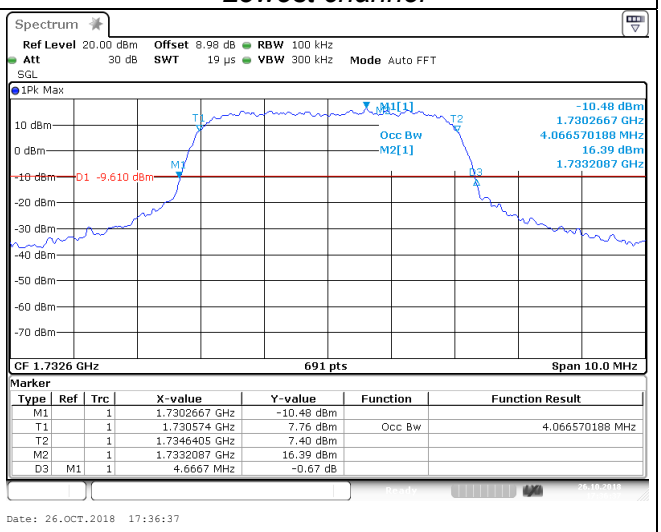
WCDMA IV



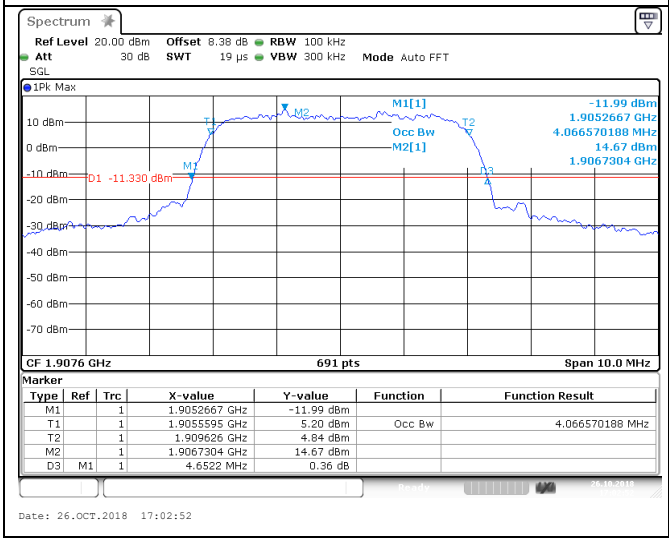
Lowest channel



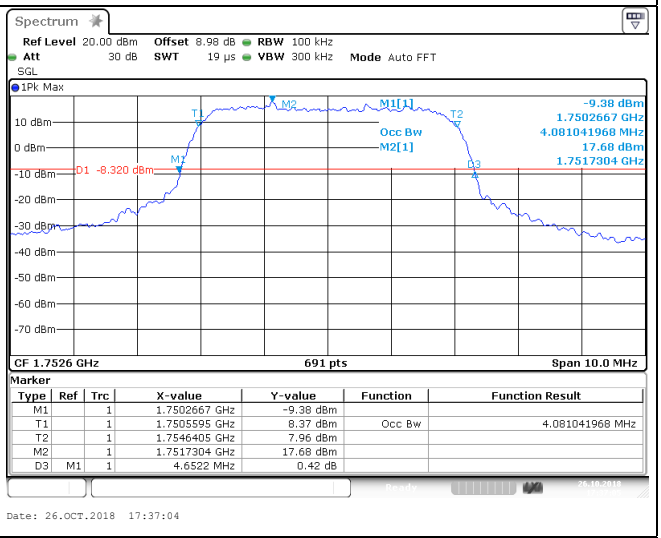
Lowest channel



Middle channel



Middle channel

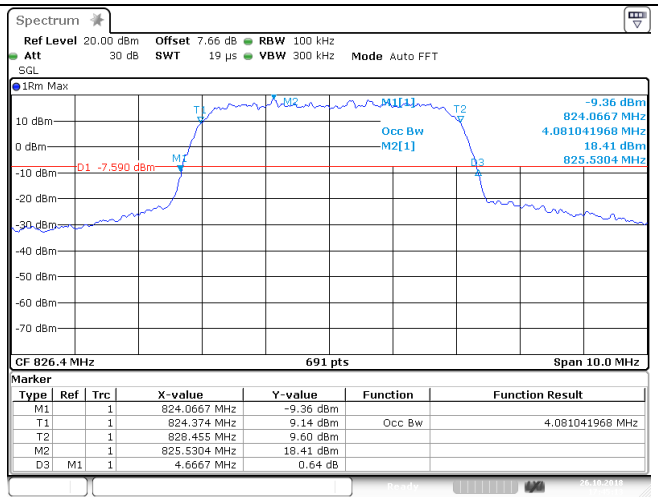


Highest channel

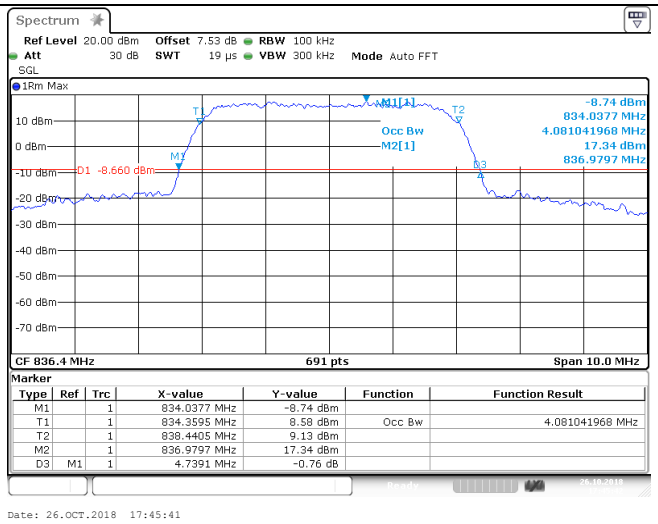
Highest channel

99% Occupy bandwidth and -26dB bandwidth

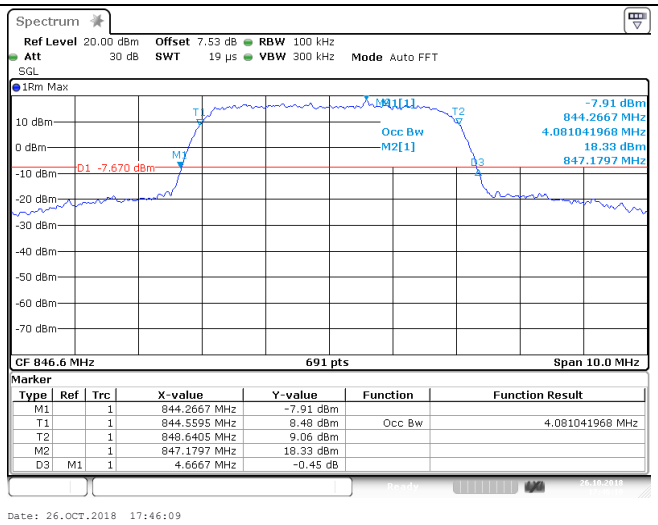
WCDMA V



Lowest channel



Middle channel



Highest channel

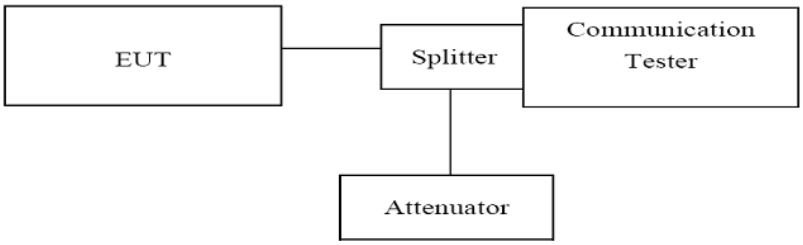
5.2. Out of band emission at antenna terminals

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



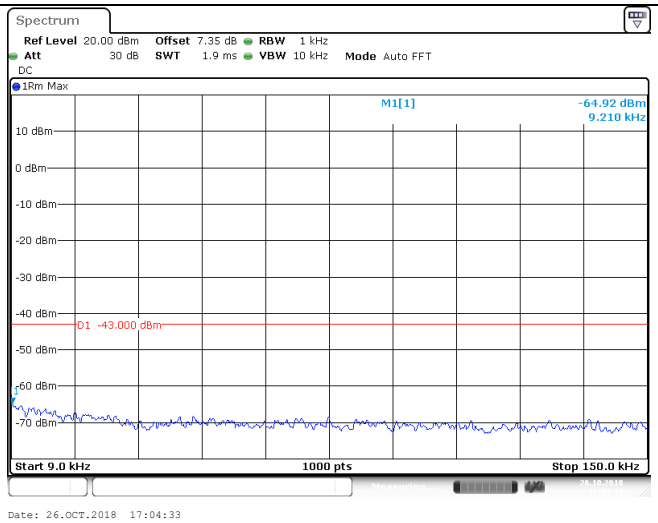
TEST PROCEDURE

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=0.009MHz, Stop= 10th harmonic.

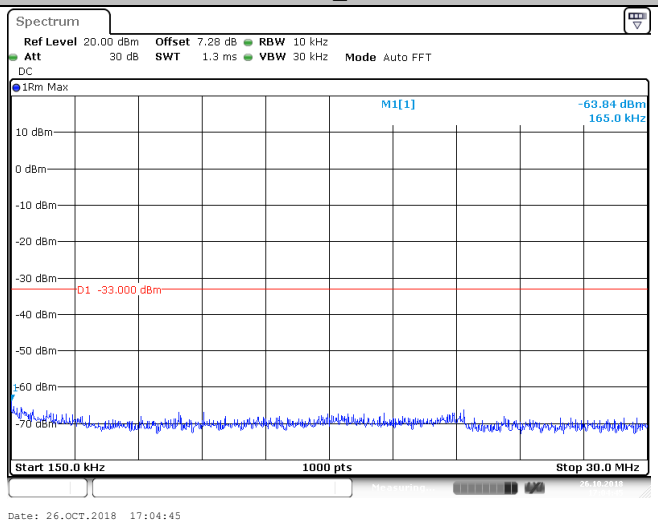
TEST RESULTS

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

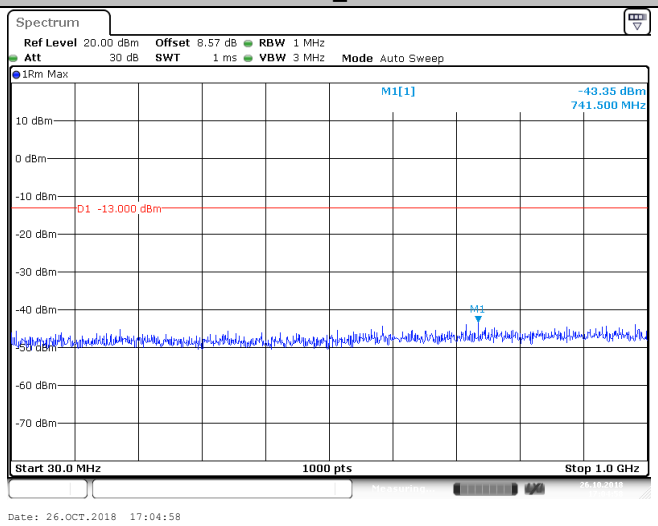
Band	Channel	Frequency Rang(Mhz)	Value(dBm)	Limit(dBm)	Verdict
Band II	9262	0.009~0.15	-64.92	-43	PASS
Band II	9262	0.15~30	-63.84	-33	PASS
Band II	9262	30~1000	-43.35	-13	PASS
Band II	9262	1000~7000	-36.62	-13	PASS
Band II	9262	7000~13600	-38.43	-13	PASS
Band II	9262	13600~20000	-34.57	-13	PASS
Band II	9400	0.009~0.15	-64.68	-43	PASS
Band II	9400	0.15~30	-63.28	-33	PASS
Band II	9400	30~1000	-44.32	-13	PASS
Band II	9400	1000~7000	-34.16	-13	PASS
Band II	9400	7000~13600	-38.54	-13	PASS
Band II	9400	13600~20000	-34.71	-13	PASS
Band II	9538	0.009~0.15	-64.03	-43	PASS
Band II	9538	0.15~30	-65.07	-33	PASS
Band II	9538	30~1000	-43.26	-13	PASS
Band II	9538	1000~7000	-36.50	-13	PASS
Band II	9538	7000~13600	-38.64	-13	PASS
Band II	9538	13600~20000	-34.44	-13	PASS
Band IV	1312	0.009~0.15	-64.85	-43	PASS
Band IV	1312	0.15~30	-64.75	-33	PASS
Band IV	1312	30~1000	-43.98	-13	PASS
Band IV	1312	1000~7000	-35.54	-13	PASS
Band IV	1312	7000~13600	-37.68	-13	PASS
Band IV	1312	13600~20000	-34.53	-13	PASS
Band IV	1413	0.009~0.15	-64.04	-43	PASS
Band IV	1413	0.15~30	-63.64	-33	PASS
Band IV	1413	30~1000	-43.93	-13	PASS
Band IV	1413	1000~7000	-35.80	-13	PASS
Band IV	1413	7000~13600	-37.93	-13	PASS
Band IV	1413	13600~20000	-33.98	-13	PASS
Band IV	1513	0.009~0.15	-63.75	-43	PASS
Band IV	1513	0.15~30	-64.87	-33	PASS
Band IV	1513	30~1000	-43.68	-13	PASS
Band IV	1513	1000~7000	-36.40	-13	PASS
Band IV	1513	7000~13600	-37.94	-13	PASS
Band IV	1513	13600~20000	-34.64	-13	PASS
Band V	4132	0.009~0.15	-64.08	-33	PASS
Band V	4132	0.15~30	-63.99	-23	PASS
Band V	4132	30~1000	-41.85	-13	PASS
Band V	4132	1000~9000	-40.13	-13	PASS
Band V	4182	0.009~0.15	-64.92	-33	PASS
Band V	4182	0.15~30	-62.44	-23	PASS
Band V	4182	30~1000	-43.76	-13	PASS
Band V	4182	1000~9000	-39.23	-13	PASS
Band V	4233	0.009~0.15	-64.15	-33	PASS
Band V	4233	0.15~30	-62.10	-23	PASS
Band V	4233	30~1000	-39.29	-13	PASS
Band V	4233	1000~9000	-39.59	-13	PASS



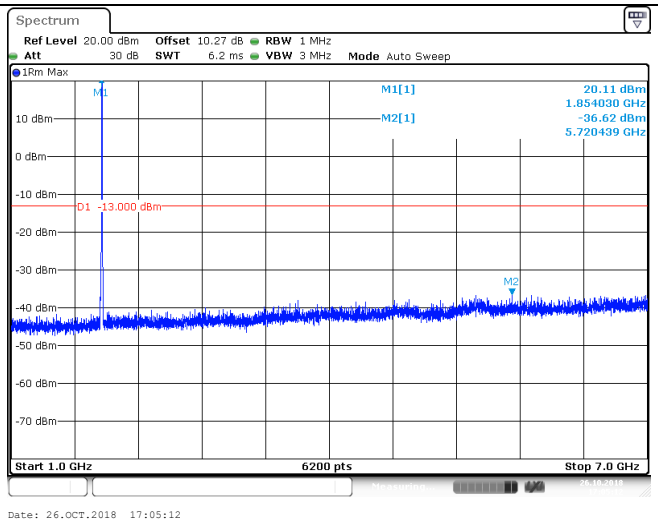
Band II_9262



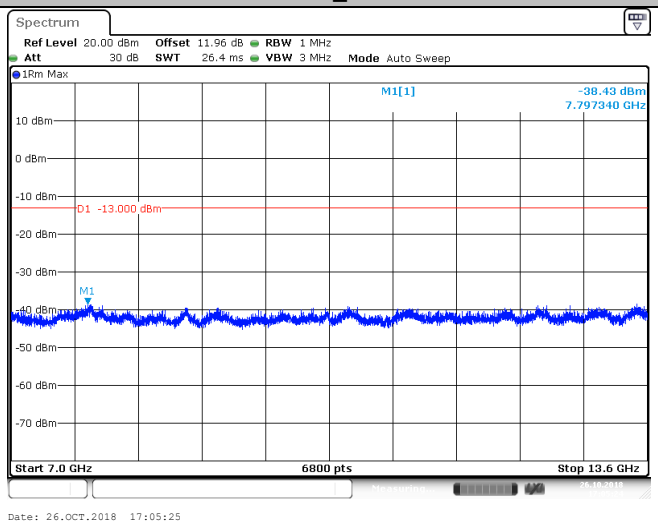
Band II_9262



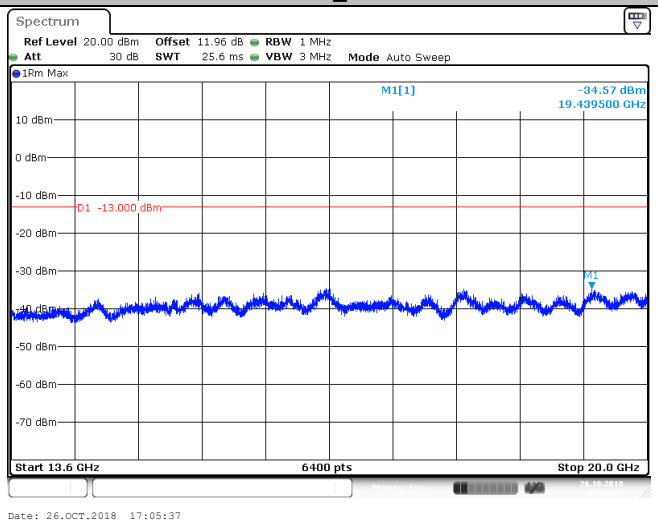
Band II_9262



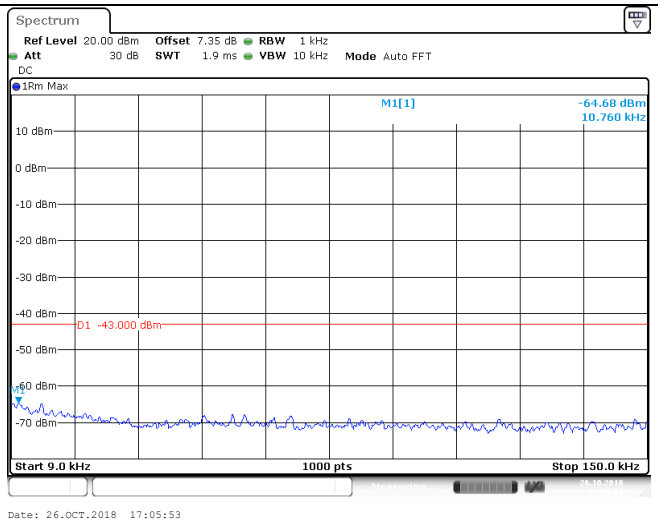
Band II_9262



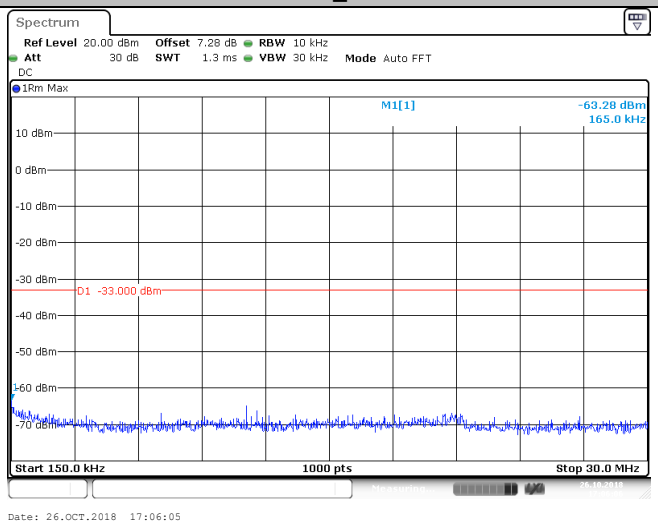
Band II_9262



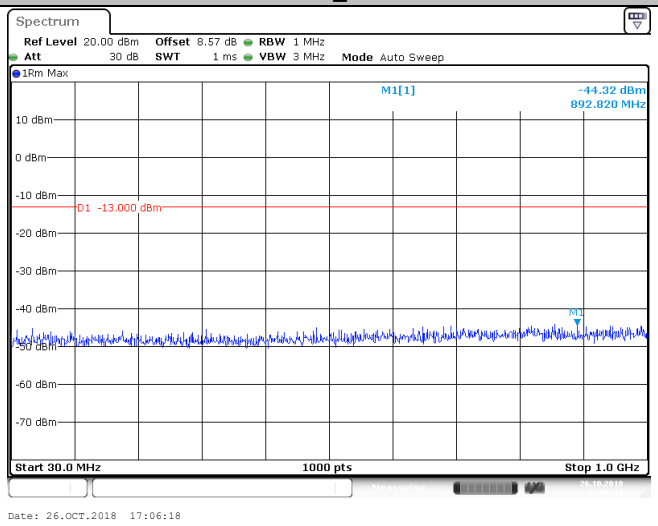
Band II_9262



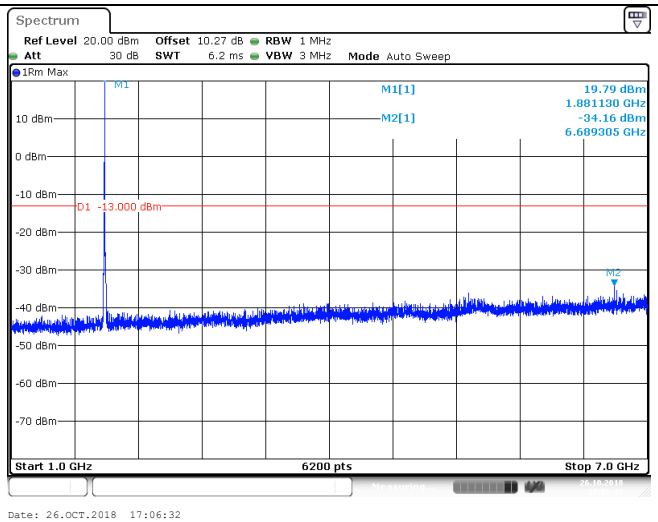
Band II_9400



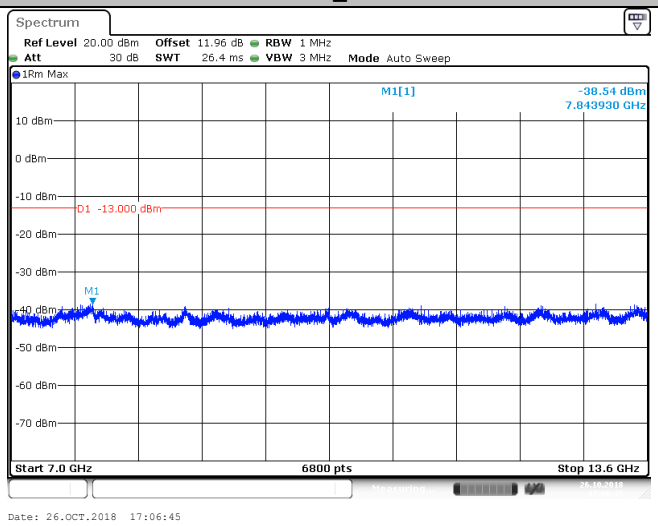
Band II_9400



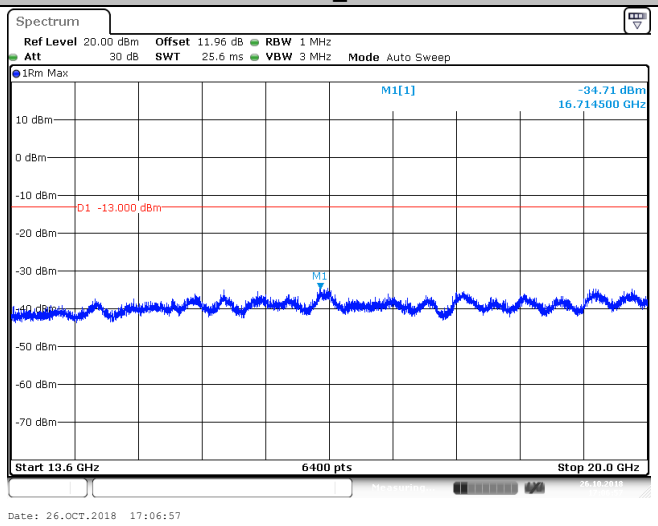
Band II_9400



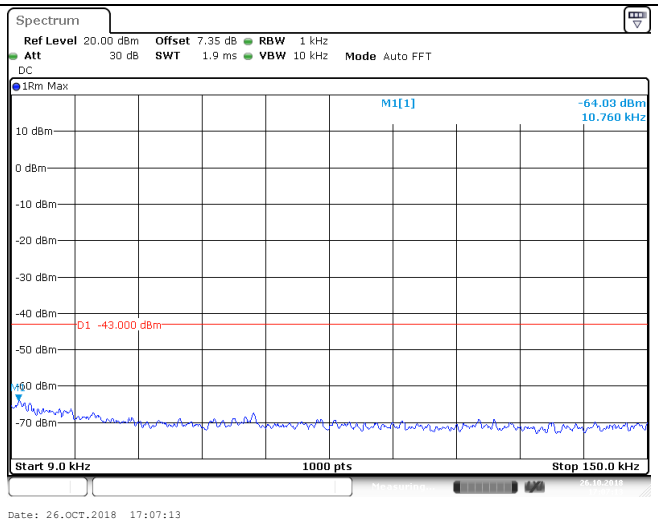
Band II_9400



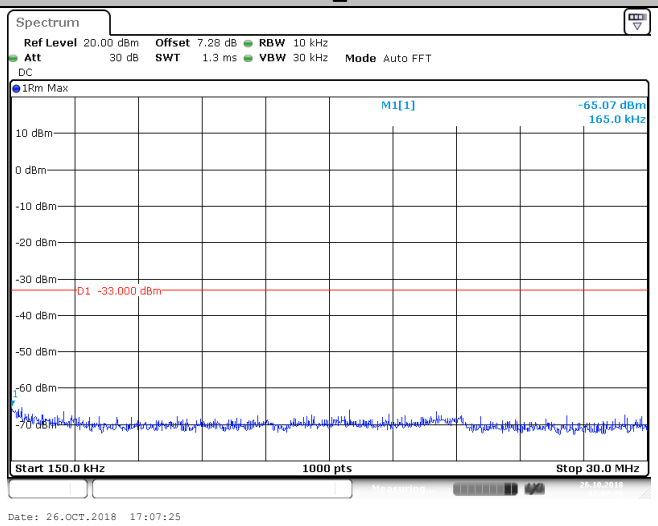
Band II_9400



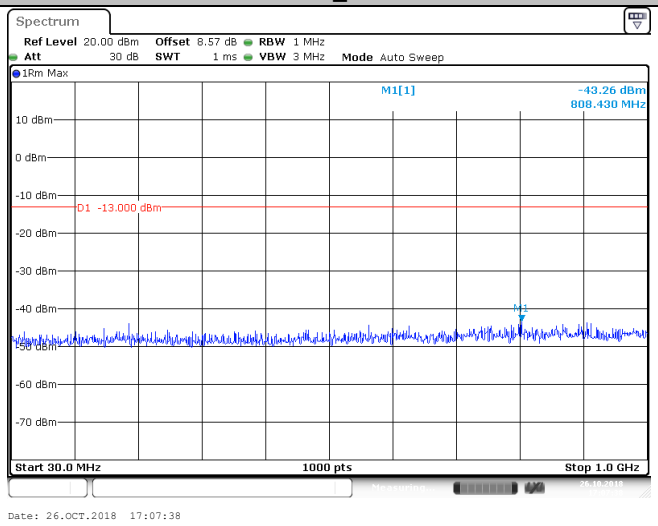
Band II_9400



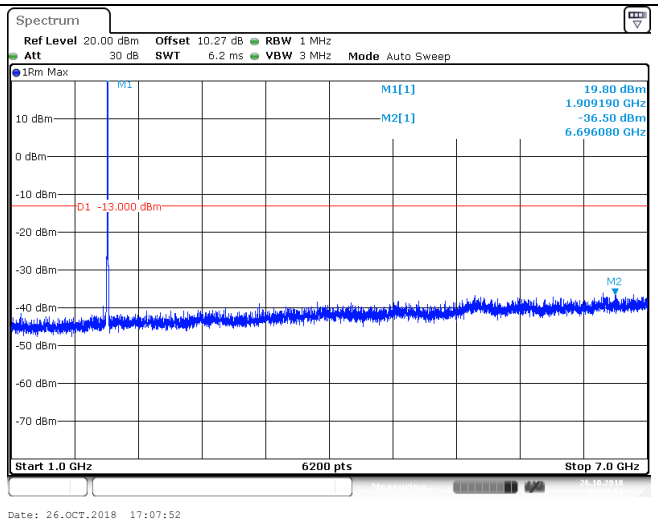
Band II_9538



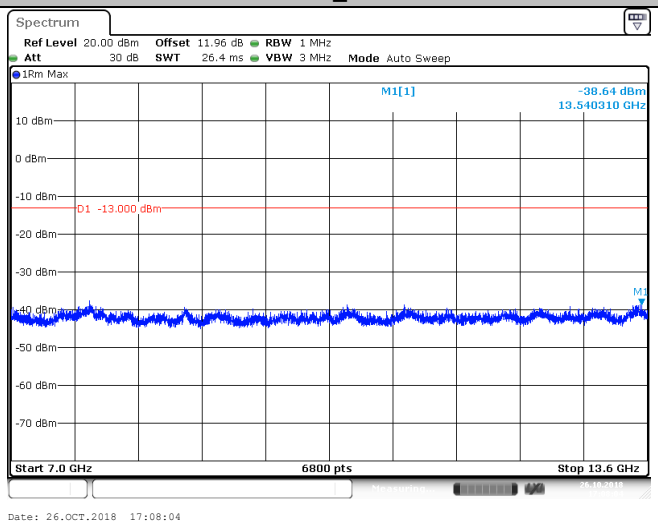
Band II_9538



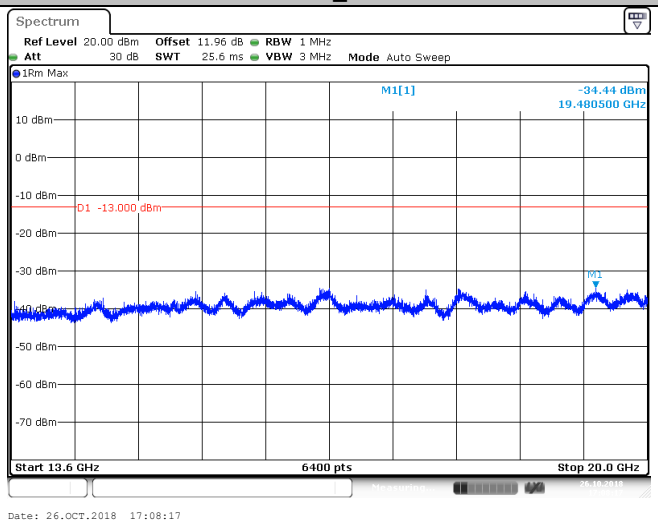
Band II_9538



Band II_9538



Band II_9538



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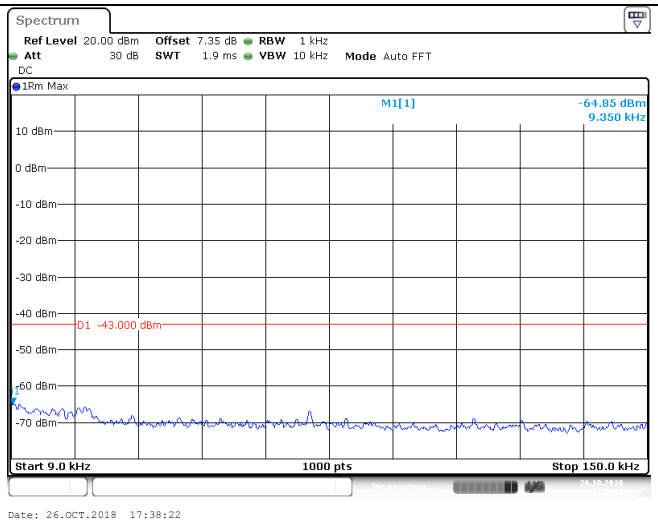

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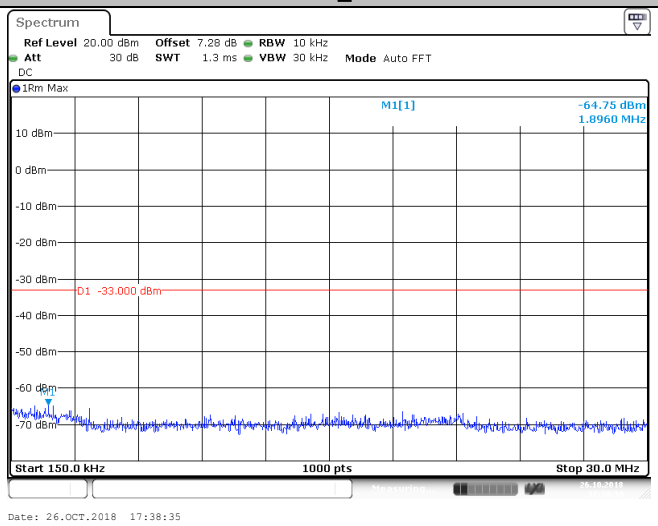

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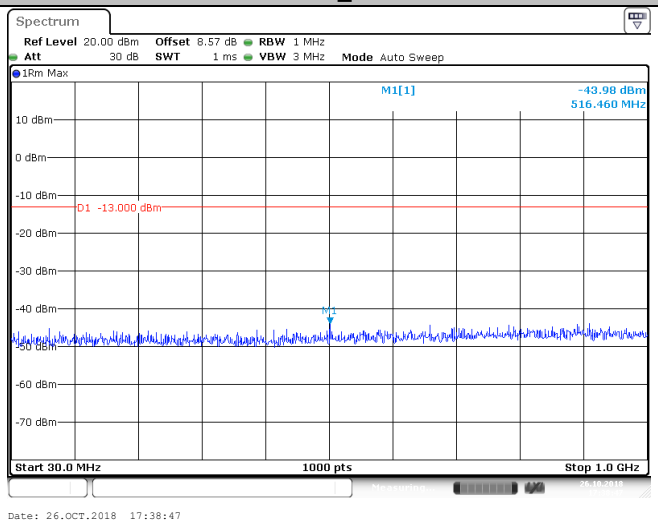

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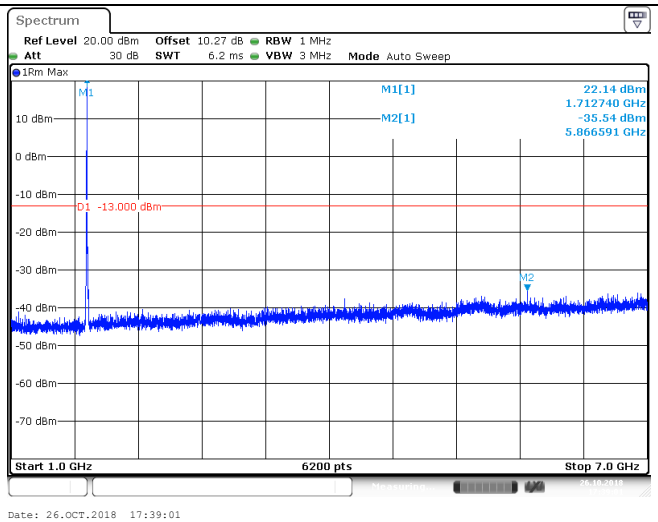

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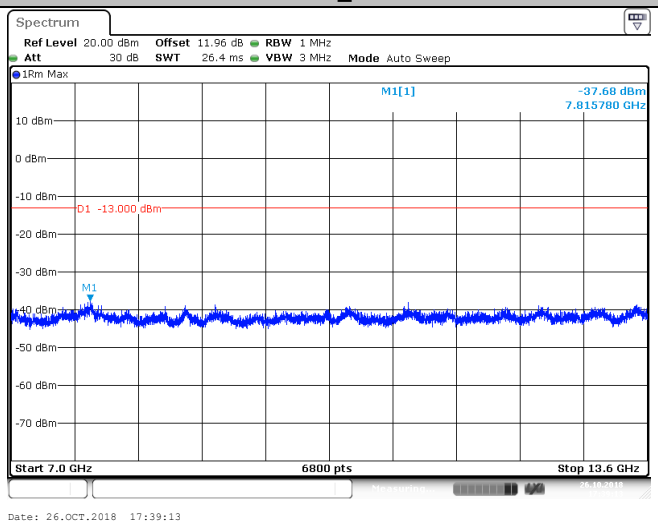

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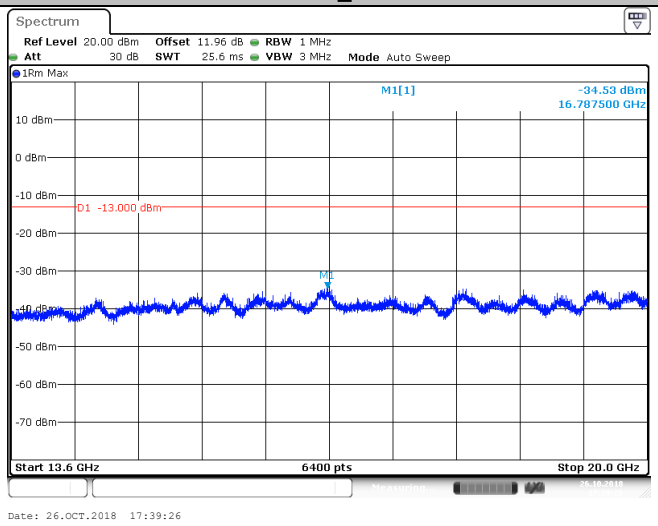

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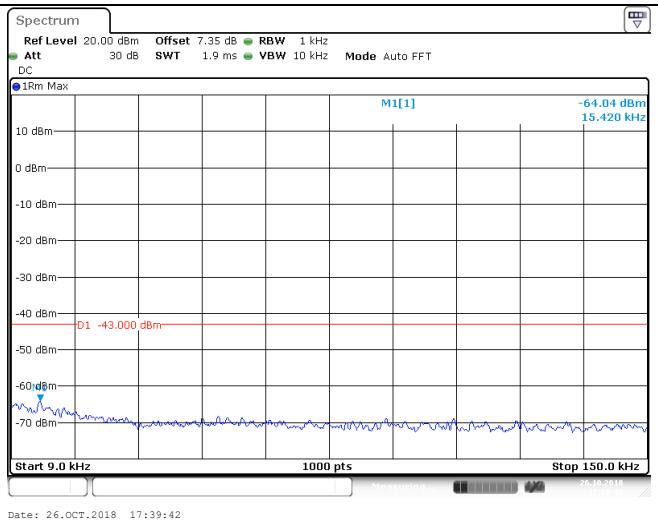

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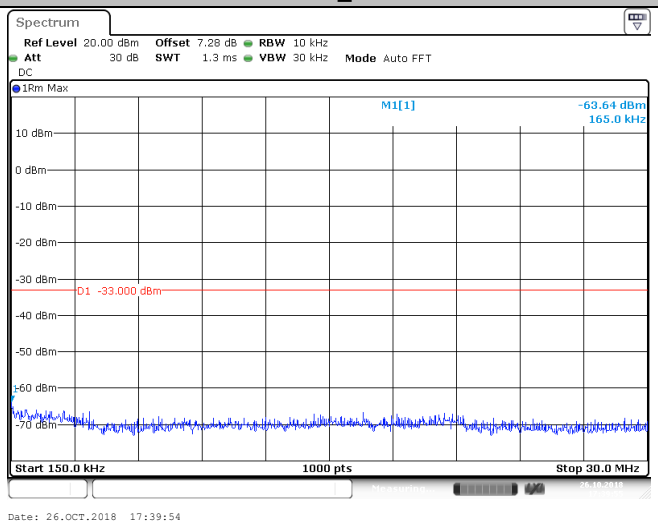

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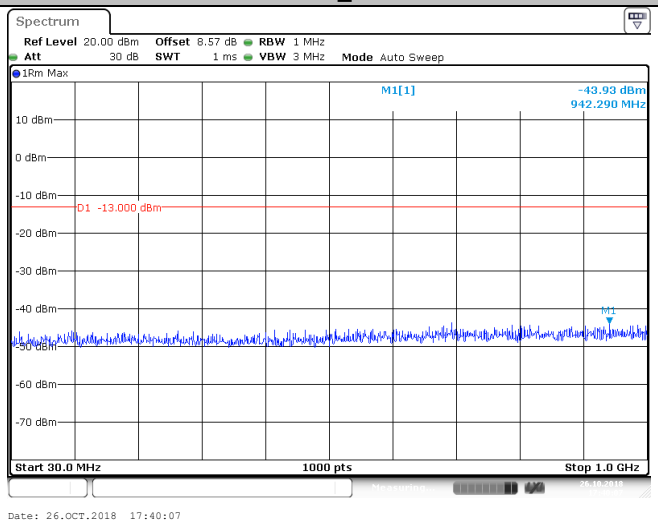

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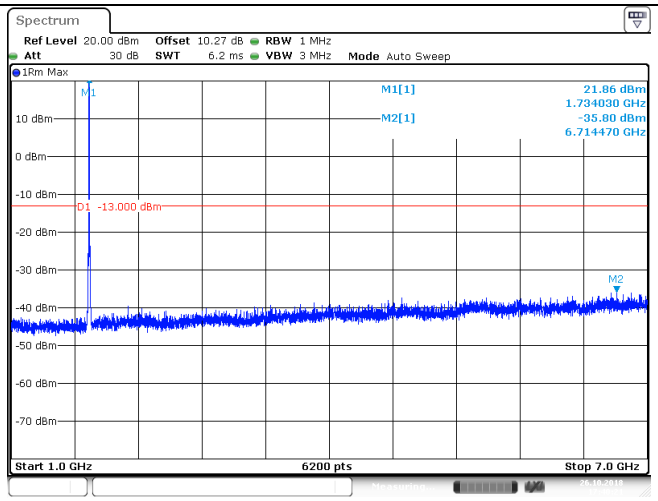

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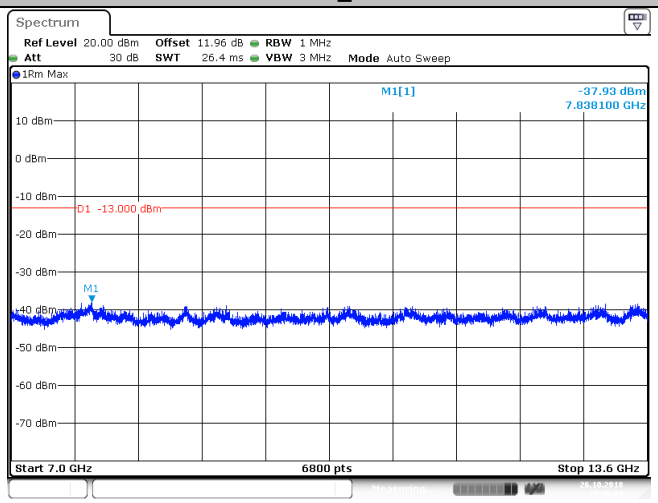
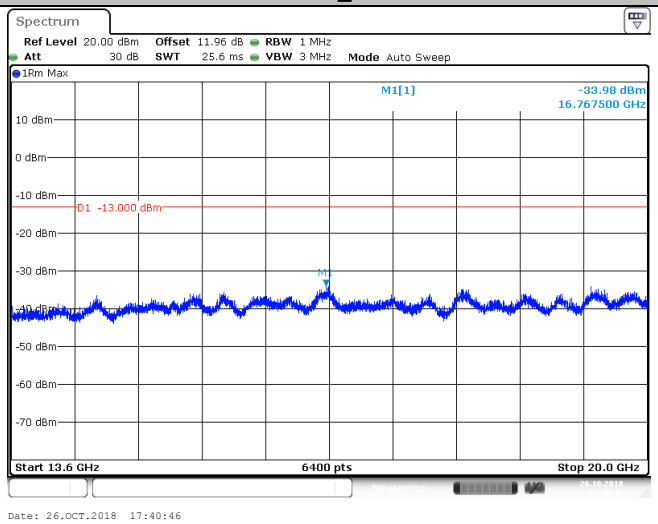
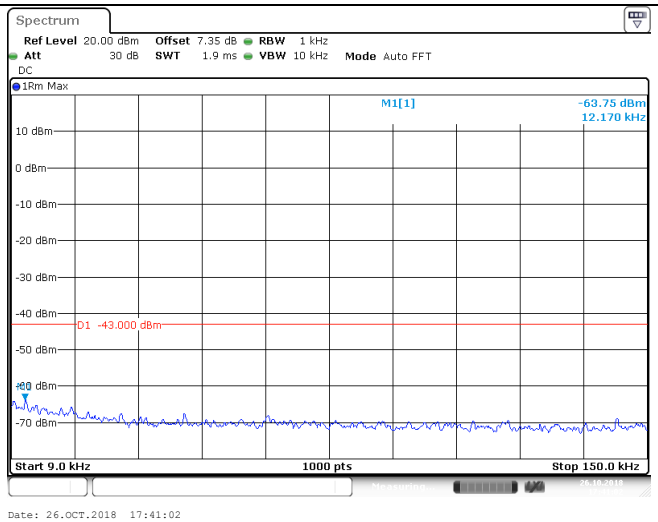


Band IV_1413



Band IV_1413



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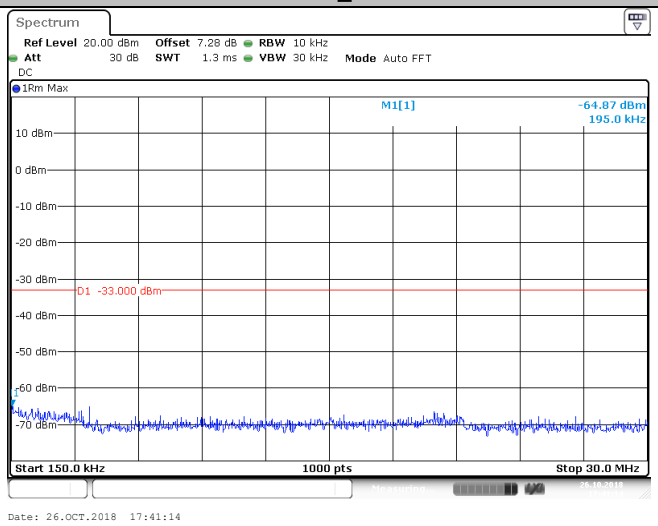
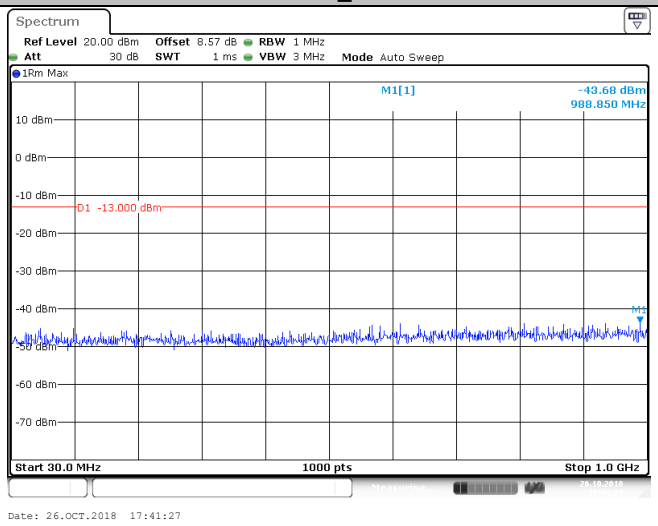


Band IV_1513



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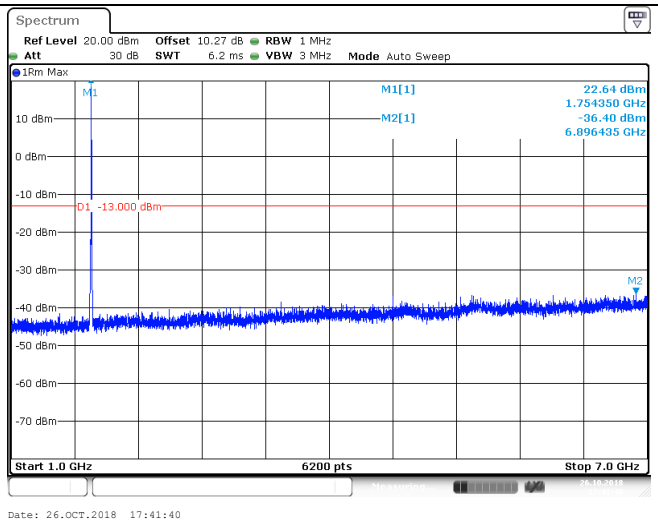

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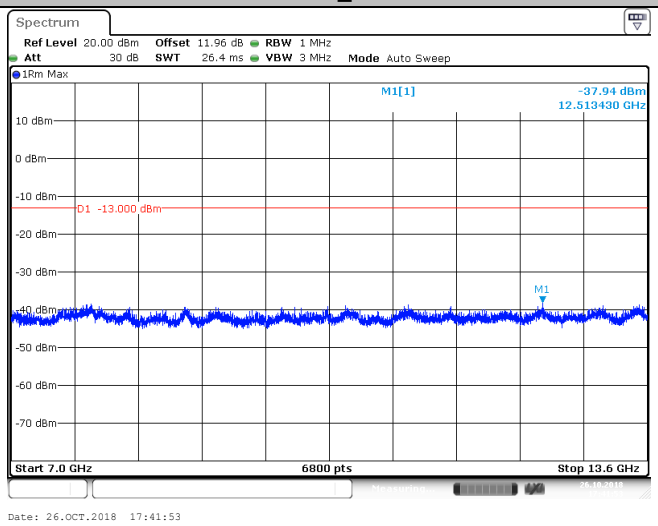
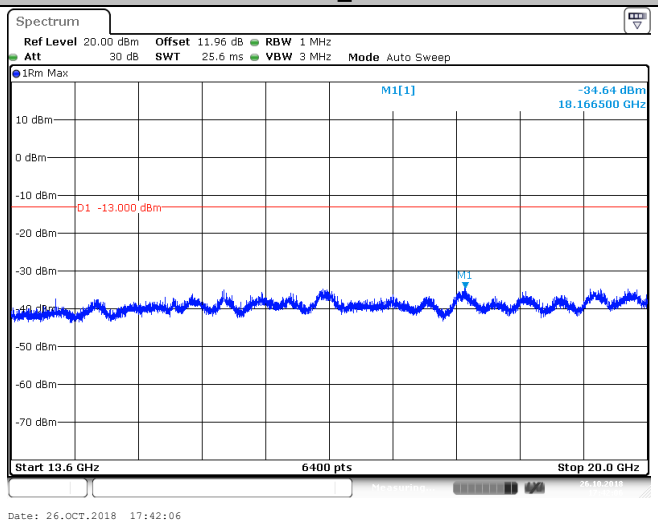


Band IV_1513



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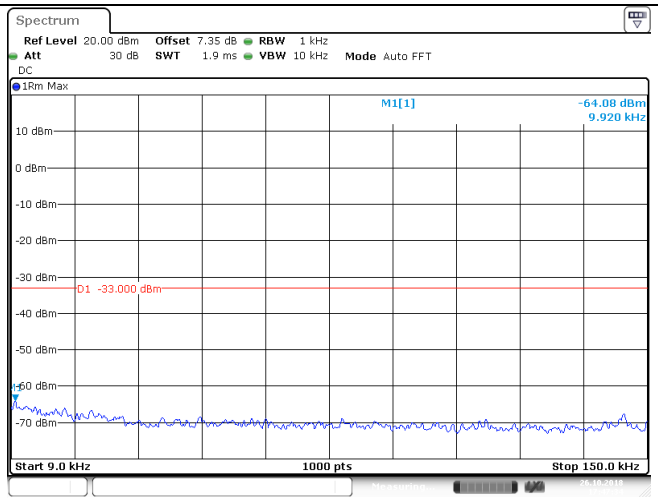
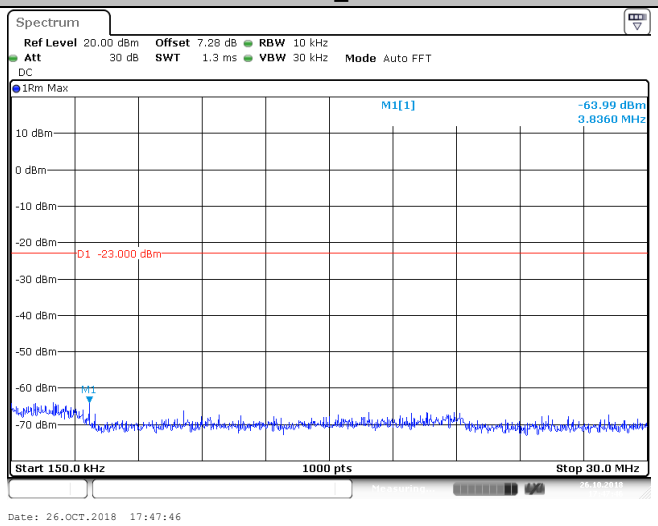


Band V_4132



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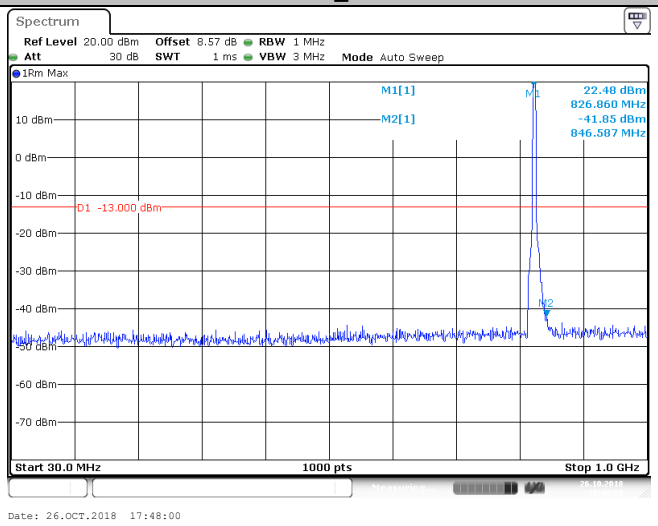

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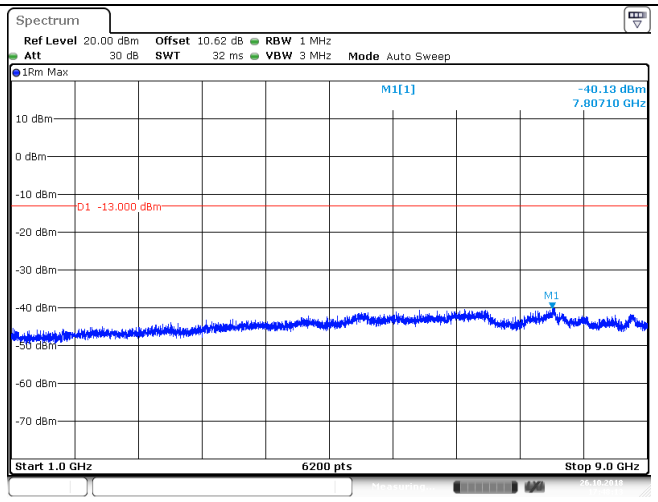

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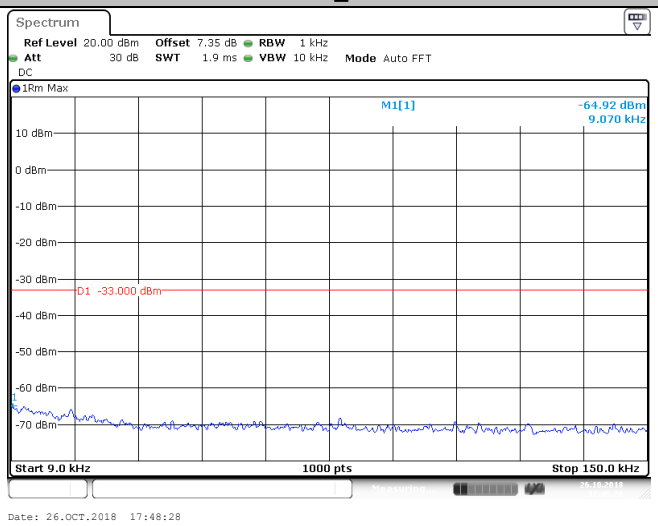

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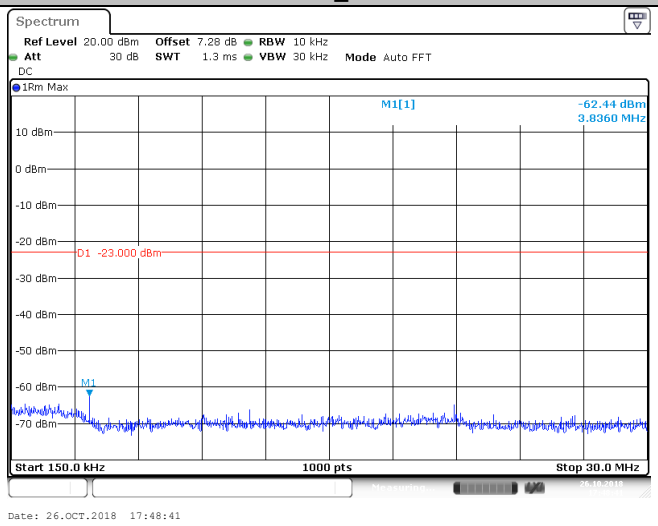

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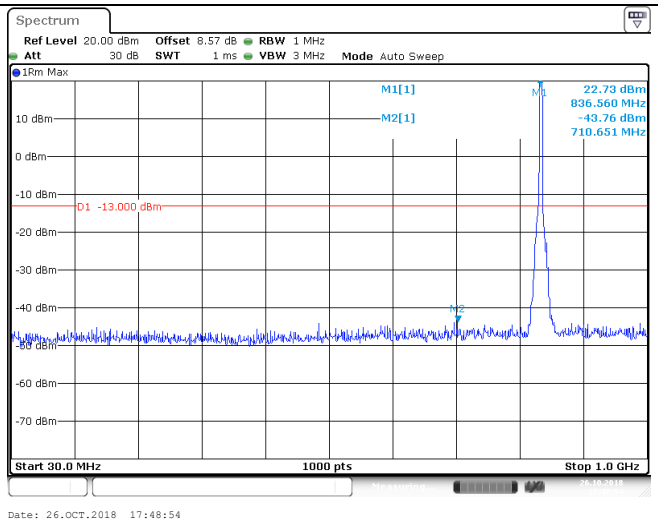

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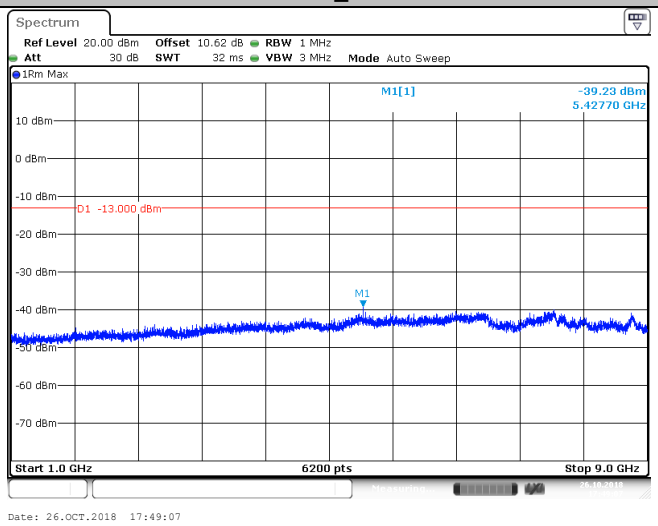
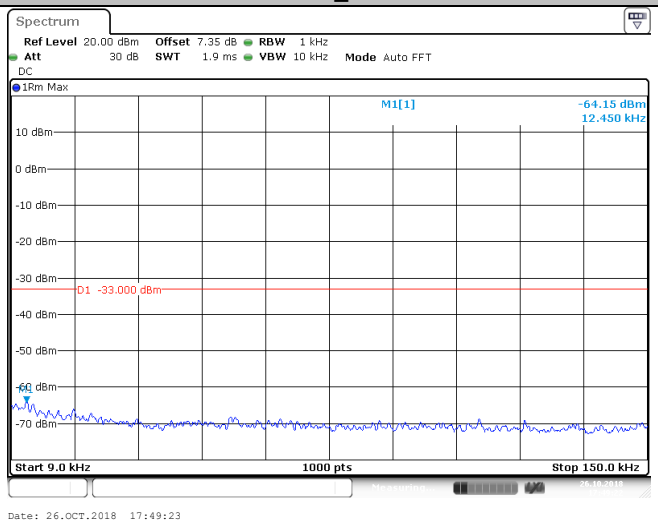


Band V_4182



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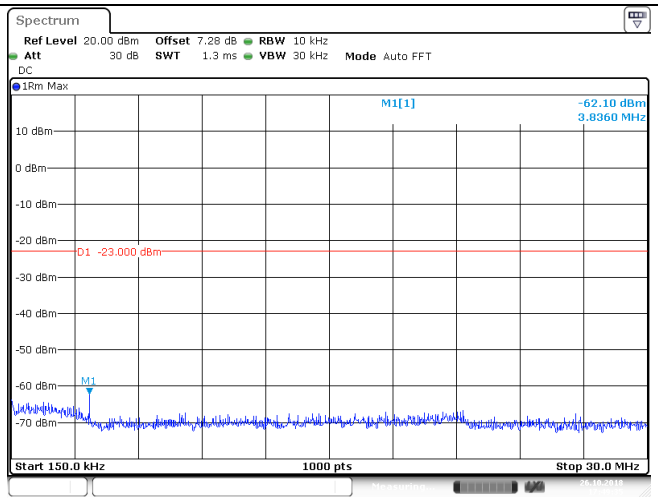
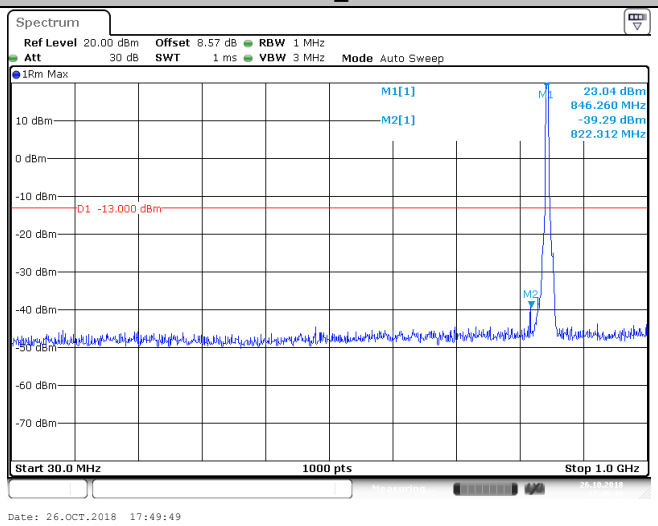
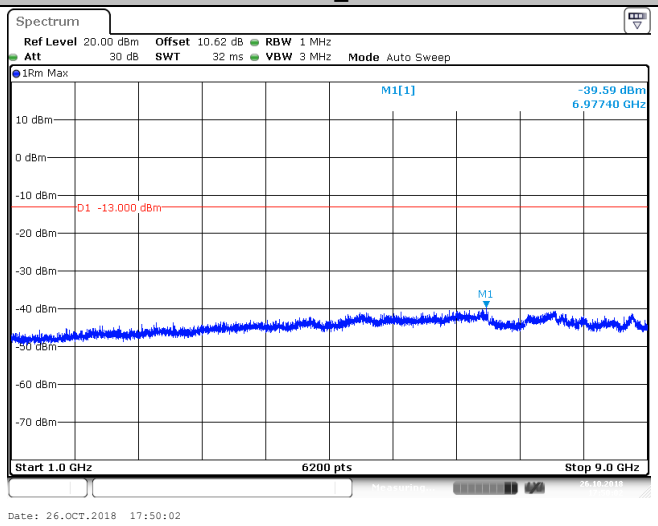


Band V_4233



Band V_4233



Band V_4233

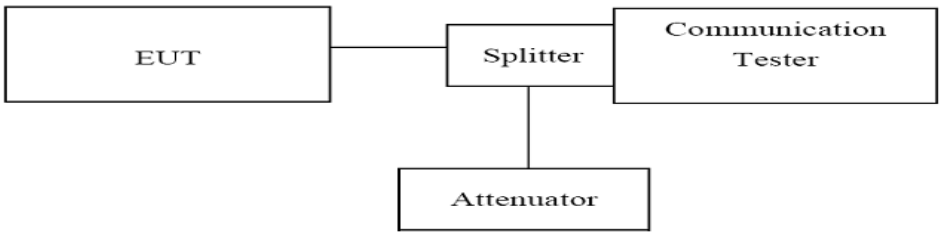
5.3. Band Edge compliance

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

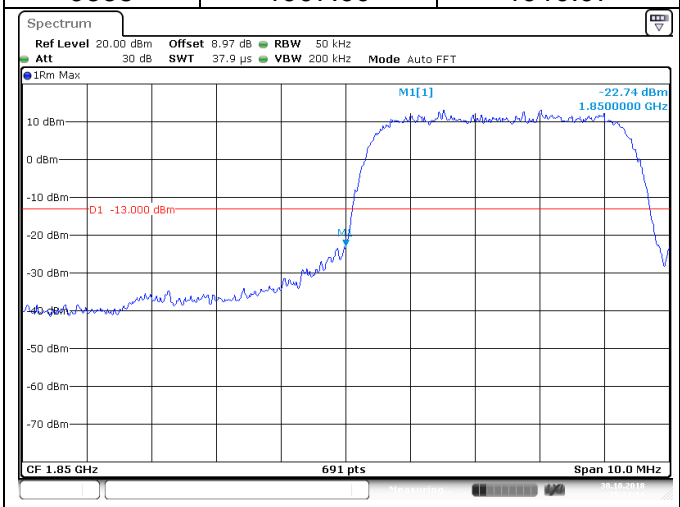


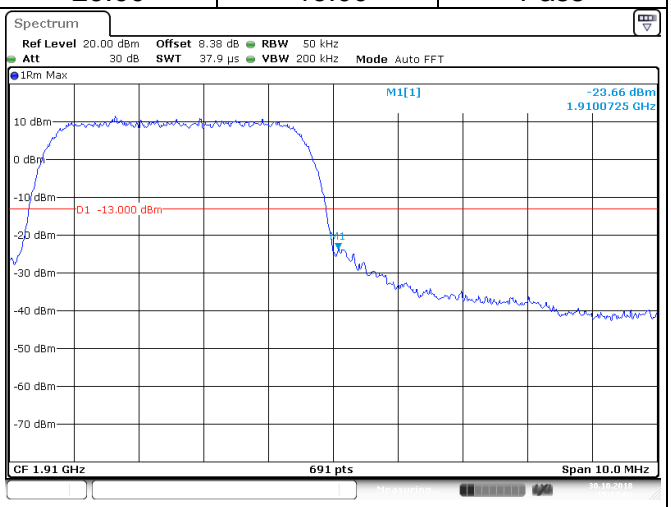
TEST PROCEDURE

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=10MHz Sweep time= Auto for 2G system measurement.
3. Set the RBW=50 KHz, VBW = 200KHz, Span=10MHz Sweep time= Auto for 3G system measurement.

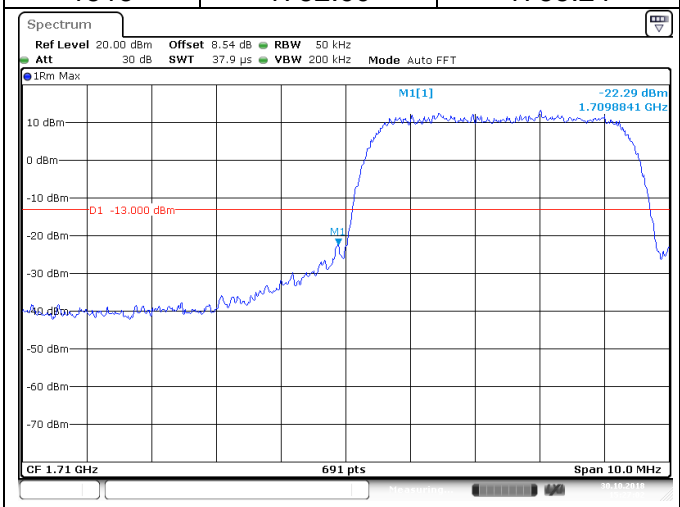
TEST RESULTS

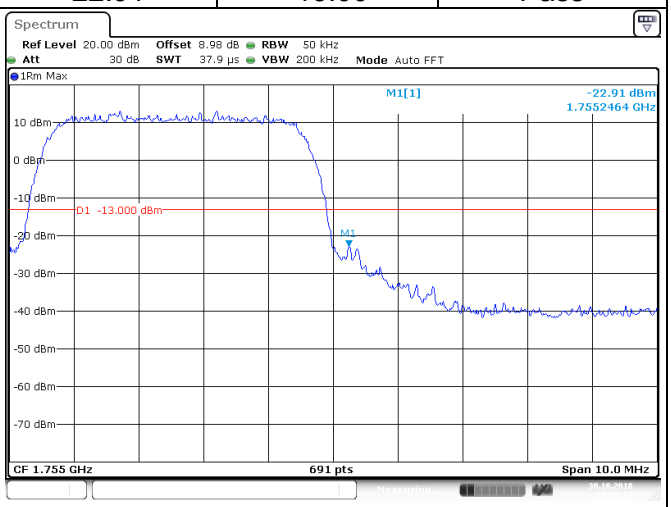
WCDMA Band II					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
9262	1852.40	1850.00	-22.74	-13.00	Pass
9538	1907.60	1910.07	-23.66	-13.00	Pass



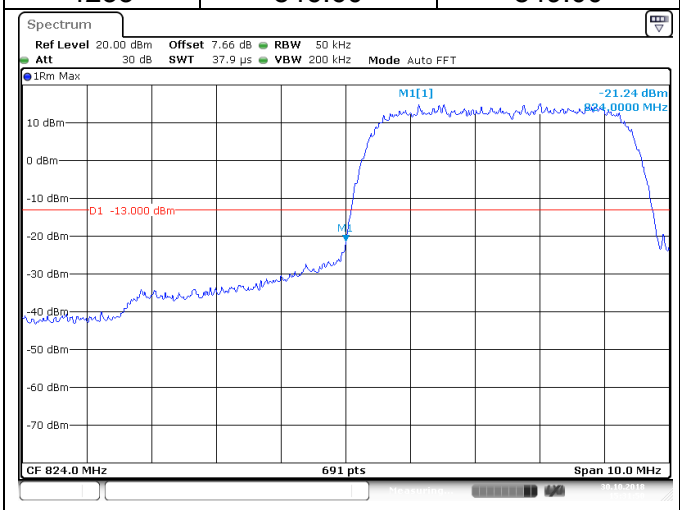


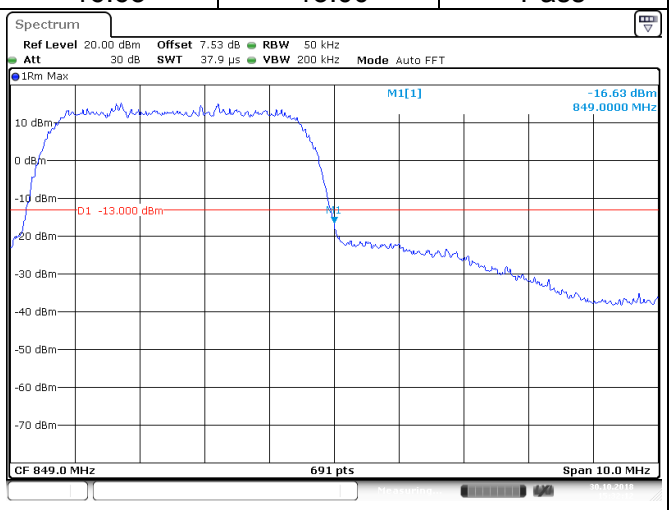
WCDMA Band IV					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
1312	1712.40	1709.88	-22.29	-13.00	Pass
1513	1752.60	1755.24	-22.91	-13.00	Pass





WCDMA Band V					
Channel Number	Frequency (MHz)	Measurement Results		Limit (dBm)	Verdict
		Frequency (MHz)	Values (dBm)		
4132	826.40	824.00	-21.24	-13.00	Pass
4233	846.60	849.00	-16.63	-13.00	Pass





5.4. Radiated Power Measurement

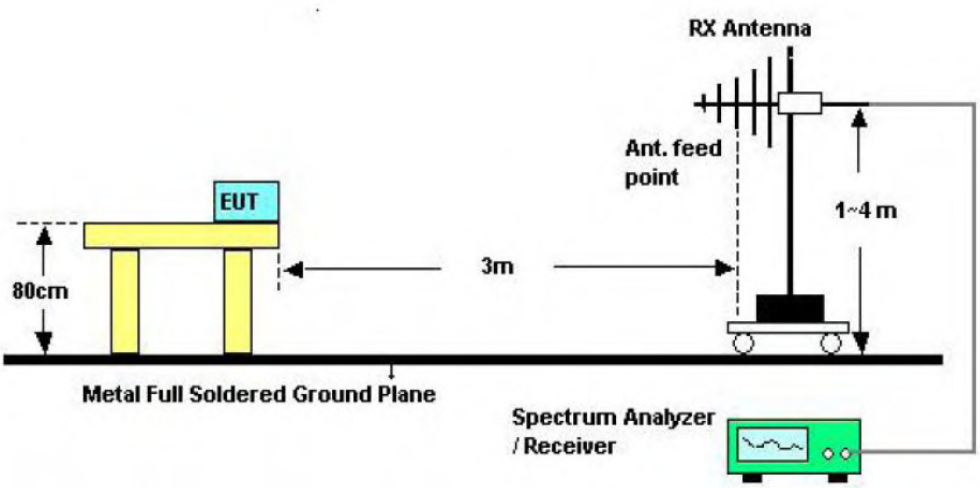
LIMIT

WCDMA Band V: 7W ERP

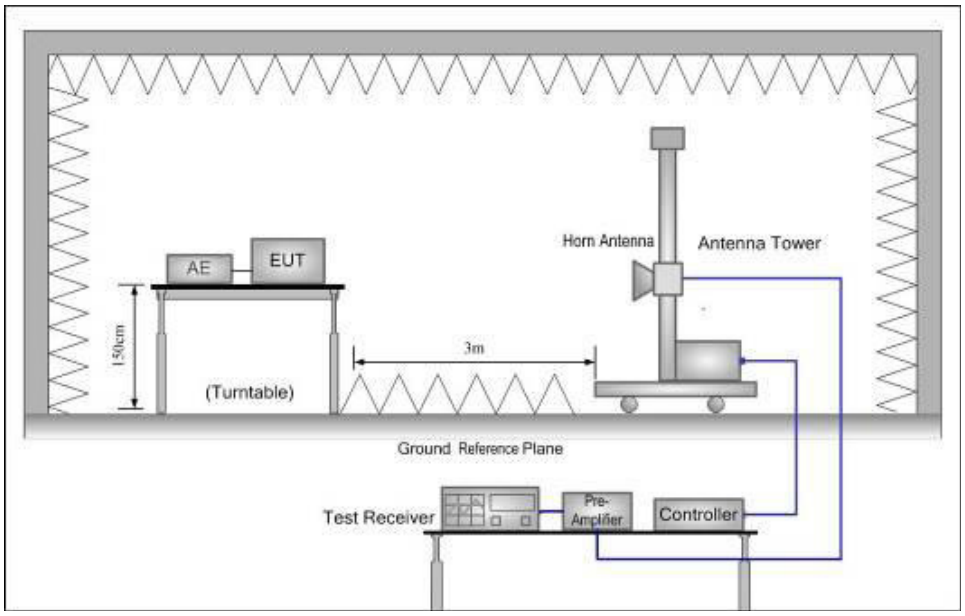
WCDMA Band II/WCDMA Band IV: 2W ERP

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.	EIRP	Limit (dBm)	Result
WCDMA Band II (QPSK)	9262	V	23.76	33.00	Pass
		H	20.98		
	9400	V	23.72		
		H	20.77		
	9538	V	23.96		
		H	20.67		

Mode	Channel	Antenna Pol.	EIRP	Limit (dBm)	Result
WCDMA Band IV (QPSK)	1312	V	23.93	33.00	Pass
		H	20.26		
	1413	V	23.25		
		H	20.45		
	1513	V	23.56		
		H	20.42		

Mode	Channel	Antenna Pol.	ERP	Limit (dBm)	Result
WCDMA Band V (QPSK)	4132	V	20.07	38.45	Pass
		H	17.39		
	4182	V	20.42		
		H	17.06		
	4233	V	20.14		
		H	17.19		

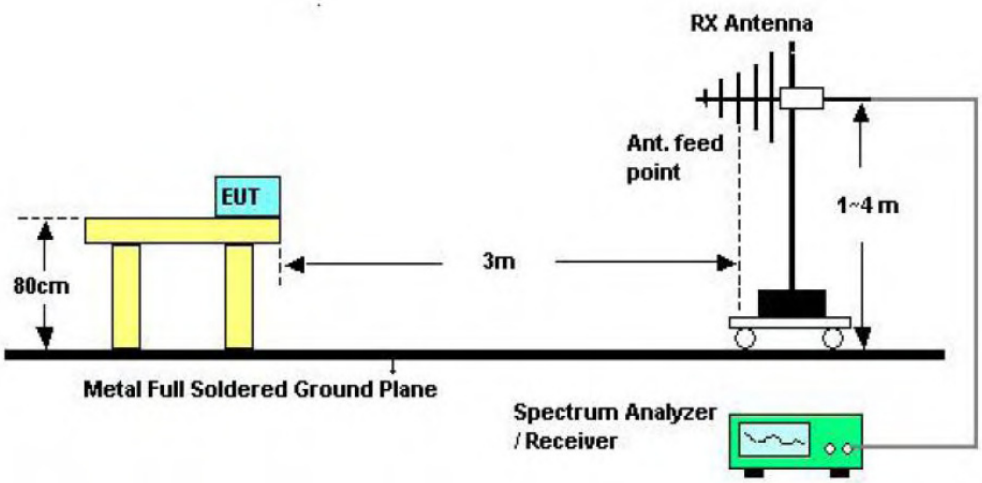
5.5. Radiated Spurious Emission

LIMIT

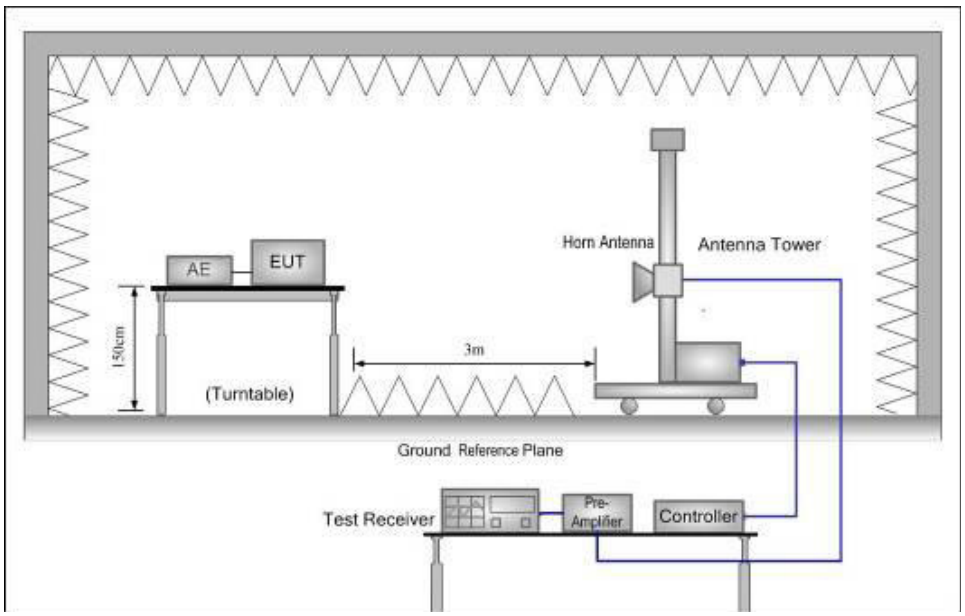
-13dBm

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 10th 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.
3. No report for the emission which more than 10 dB below the prescribed limit.

Measurement Data (worst case):

WCDMA Band II					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
9262	3705.20	Vertical	-42.76	-13.00	Pass
	5557.80	Vertical	-50.91		
	3705.20	Horizontal	-47.50		
	5557.80	Horizontal	-53.19		
9400	3760.00	Vertical	-44.93		
	5640.00	Vertical	-54.44		
	3760.00	Horizontal	-42.43		
	5640.00	Horizontal	-52.68		
9538	3814.80	Vertical	-42.72		
	5722.20	Vertical	-52.67		
	3814.80	Horizontal	-41.59		
	5722.20	Horizontal	-45.24		

Remark：

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

WCDMA Band IV					
Channel	Frequency (MHz)	Spurious Emission		Limit (dBm)	Result
		Polarization	Level (dBm)		
1312	3425.20	Vertical	-43.94	-13.00	Pass
	5137.80	Vertical	-56.14		
	3425.20	Horizontal	-49.59		
	5137.80	Horizontal	-51.65		
1413	3465.20	Vertical	-50.90		
	5197.80	Vertical	-55.11		
	3465.20	Horizontal	-51.65		
	5197.80	Horizontal	-52.14		
1513	3504.80	Vertical	-52.68		
	5257.20	Vertical	-56.32		
	3504.80	Horizontal	-47.27		
	5257.20	Horizontal	-53.59		

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	-44.08	-13.00	Pass
	2479.80	Vertical	-51.49		
	1653.20	Horizontal	-51.77		
	2479.80	Horizontal	-51.09		
4182	1672.80	Vertical	-43.51		
	2509.20	Vertical	-54.19		
	1672.80	Horizontal	-47.09		
	2509.20	Horizontal	-54.33		
4233	1692.80	Vertical	-39.17		
	2539.20	Vertical	-52.12		
	1692.80	Horizontal	-45.36		
	2539.20	Horizontal	-54.56		

Remark：

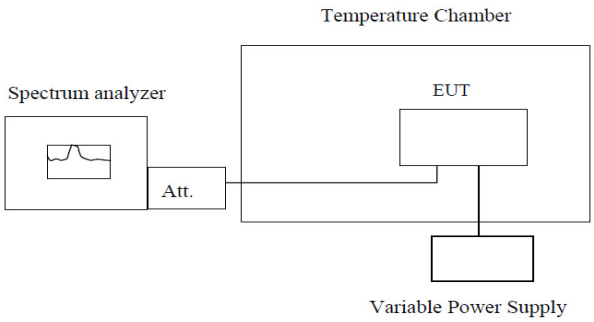
1. The emission levels of below 1 GHz are very lower than the limit above10dB and not show in test report.

5.6. 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℃ operating frequency as reference frequency.
5. Turn EUT off and set the chamber temperature to –30℃. After the temperature stabilized for approximately 30 minutes recorded the frequency.
6. Repeat step measure with 10℃ increased per stage until the highest temperature of +50℃ 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: WCDMA Band II Middle channel=9400 channel=1880MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12	-30	307	0.16	±2.5	Pass
	-20	209	0.11		
	-10	209	0.11		
	0	208	0.11		
	10	218	0.12		
	20	215	0.11		
	30	149	0.08		
	40	233	0.12		
	50	237	0.13		

Reference Frequency: WCDMA Band IV Middle channel=1413 channel=1732.6MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Voltage (V)	Temperature (℃)		
12	-30	95	0.06	±2.5	Pass
	-20	131	0.08		
	-10	207	0.12		
	0	213	0.12		
	10	244	0.14		
	20	267	0.15		
	30	184	0.11		
	40	204	0.12		
	50	337	0.19		

Reference Frequency: WCDMA Band V Middle channel=4182 channel=836.6MHz					
Voltage (V)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
12	-30	104	0.12	±2.5	Pass
	-20	138	0.16		
	-10	213	0.26		
	0	189	0.23		
	10	213	0.25		
	20	288	0.34		
	30	186	0.22		
	40	211	0.25		
	50	309	0.37		

2. Voltage measurement:

Reference Frequency: WCDMA Band II Middle channel=9400 channel=1880MHz					
Temperature (℃)	Voltage (V)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.8	104	0.06	±2.5	Pass
	12.0	251	0.13		
	10.2	100	0.05		
Reference Frequency: WCDMA Band IV Middle channel=1413 channel=1732.6MHz					
Temperature (℃)	Voltage (V)	Frequency error	Limit (ppm)	Limit (ppm)	Result
		Hz	ppm		
25	13.8	111	0.06	±2.5	Pass
	12.0	256	0.15		
	10.2	263	0.15		
Reference Frequency: WCDMA Band V Middle channel=4182 channel=836.6MHz					
Temperature (℃)	Voltage (V)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
25	13.8	95	0.11	±2.5	Pass
	12.0	253	0.30		
	10.2	163	0.19		

6. EUT TEST PHOTOS

Reference to the document No.: Test Photographs 3.

7. PHOTOGRAPHS OF EUT CONSTRUCTIONAL

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

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