

Report No.SH15030055W13

FCC RF TESTREPORT

Issued to

TRIMBLE EUROPE B.V.

For

Rugged Smart Phone

Model Name : MobileMapper50_4G
Trade Name : Spectra Precision
Brand Name : Spectra Precision
Standard : 47 CFR Part 2
47 CFR Part 22 Subpart H
47 CFR Part 24 Subpart E
RSS-132 issue 3
RSS-133 issue 6
FCC ID : NZI-10900300
IC ID : 9288A-10900300
Test date : Apr.4,2016 to May.6,2016
Issue date : Jul.12,2016

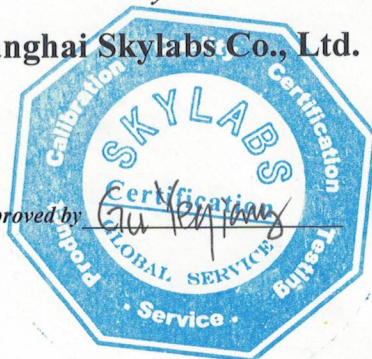
by

Shanghai Skylabs Co., Ltd.

Tested by Wu Hongfei

Approved by Gao Yifang

Review by Leonard Bao



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**Change History**

Issue	Date	Reason for change
1.0	May.7,2016	First edition
2.0	Jul.12,2016	Second edition



1. General Information

1.1 Applicant

TRIMBLE EUROPE B.V.

European Regional Fulfilment Centre
Meerheide, 45
5521DZ Eersel
THE NETHERLANDS

1.2 Manufacturer

TRIMBLE EUROPE B.V.

European Regional Fulfilment Centre
Meerheide, 45
5521DZ Eersel
THE NETHERLANDS

1.3 Description of EUT

EUT Type: Rugged Smart Phone
Brand Name.....: MobileMapper50_4G
Trade Name: Spectra Precision
Model Name: Spectra Precision
Hardware Version: MM50.4G_V1.0
Software Version: MM50.4G.16.22.39
Antenna type.....: ABS Frame and FPC antenna
Antenna gain.....: WCDMA Band II: 1.03 dBi
WCDMA Band V: -2.56 dBi
Frequency Range..... WCDMA Band II
Tx: 1852.4 - 1907.6MHz (at intervals of 200kHz);
Rx: 1932.4 - 1987.6MHz (at intervals of 200kHz)
WCDMA Band V
Tx: 826.4 - 846.6MHz (at intervals of 200kHz);
Rx: 871.4 - 891.6MHz (at intervals of 200kHz)
Modulation Type: QPSK,
Battery: 3.8V

NOTE:

(1) The transmitter (Tx) frequency arrangement of the WCDMA 850MHz band used by the EUT can be represented with the formula $F(n)=826.4+0.2*(n-4132)$, $4132 \leq n \leq 4233$; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 4132 (826.4MHz), 4182(836.4MHz) and 4233 (846.6MHz).

(2) The transmitter (Tx) frequency arrangement of the WCDMA 1900MHz band used by the EUT can



be represented with the formula $F(n)=1852.4+0.2*(n-9262)$, $9262 \leq n \leq 9538$; the lowest, middle and highest channel numbers (ARFCHs) used and tested in this report are separately 9262 (1852.4MHz), 9400 (1880MHz) and 9538 (1907.6MHz).

(3) For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



2. Facilities and Accreditations

2.1 Test Facility

Shanghai Skylabs Co., Ltd. Skylabs Laboratory is a third party testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6644. A 9*6*6(m) fully anechoic chamber was used for the radiated spurious emissions test.

2.2 Environmental Conditions

Ambient temperature: 20~25°C

Relative humidity: 40~60%

Atmosphere pressure: 86-102kPa



2.3 List of Equipments Used

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
System Simulator	Agilent	E5515C	GB46040102	2015.9.22	1year
Spectrum Analyzer	Rohde&Schwarz	FSU26	200880	2016.2.25	1year
Power Splitter	Weinschel	1506A	NW521	(n.a.)	(n.a.)
Power Splitter	Mini-Circuits	ZFRSC-183-S+	765001016	(n.a.)	(n.a.)
Attenuator 1	Mini-Circuits	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 2	Resnet	10dB	(n.a.)	(n.a.)	(n.a.)
Attenuator 3	Resnet	3dB	(n.a.)	(n.a.)	(n.a.)
DC Power Supply	Good Will	GPS-3030DD	EF920938	2015.10.12	2year
Temperature Chamber	YinHe Experimental Equip.	HL4003T	(n.a.)	2015.9.20	1year
Full/Half-Anechoic Chamber	CHENGYU	9.2×6.25×6.15m	SAR	2015.9.14	3year
Singal Generator	Rohde&Schwarz	SMF100A	101935	2015.9.22	1year
Broadband Trilog Antenna	Schwarzbeck	VULB 9163	9163-561	2015.9.25	1year
Substitution Broadband Trilog Antenna	Schwarzbeck	VULB 9163	9163-572	2015.9.25	1year
Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1033	2015.7.25	1year
Substitution Broadband Horn Antenna	Schwarzbeck	BBHA 9120D	9120D-1034	2015.7.25	1year
Broadband Horn Antenna	Schwarzbeck	BBHA 9170	BBHA91970171	2015.9.22	1year
Substitution Broadband Horn Antenna	Schwarzbeck	BBHA 9170	BBHA91970208	2015.9.22	1year
Test Antenna-Loop	Rohde&Schwarz	HFH2-Z2	860004/001	2015.9.22	1year
Temporary Antenna Connector	Farpu	SMA-K	(n.a.)	(n.a.)	(n.a.)
RF Cable	(n.a.)	(n.a.)	(n.a.)	(n.a.)	(n.a.)

NOTE:

Equipments listed above have been calibrated and are in the period of validation.



3. Test Standards and Results

The objective of the report is to perform testing according to 47 CFR Part 2, Part 22 and Part 24 for the EUT FCC ID Certification:

No.	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 22	Public Mobile Services
3	47 CFR Part 24	Personal Communications Services
4	RSS-132 issue 3	Cellular Telephone Systems Operating in the Bands 824-849 MHz and 869-894 MHz
5	RSS-133 issue 6	2 GHz Personal Communications Services

Test detailed items/section required by FCC rules& IC rules and results are as below:

No.	FCC Rules	IC Rules	Description	Result
1	2.1046	RSS-132 (5.4) RSS-133 (6.4)	Conducted Output Power	PASS
2	2.1049 22.917 24.238	RSS-GEN (6.6)	Occupied Bandwidth	PASS
3	2.1055 22.355 24.235	RSS-132 (5.3) RSS-133 (6.3)	Frequency Stability	PASS
4	24.232	RSS-133 (6.4)	Peak-to-Average Ratio	PASS
5	2.1051 2.1057 22.917 24.238	RSS-132 (5.5) RSS-133 (6.5)	Conducted Out of Band Emissions	PASS
6	2.1051 2.1057 22.917 24.238	RSS-GEN (6.6)	Band Edge	PASS
7	22.913 24.232	RSS-132(5.4) RSS-133 (6.4)	Transmitter Radiated Power (EIPR/ERP)	PASS
8	2.1053 2.1057 22.917 24.238	RSS-132 (5.5) RSS-133 (6.5)	Radiated Out of Band Emissions	PASS

NOTE: Measurement method according to TIA/EIA 603.D-2010



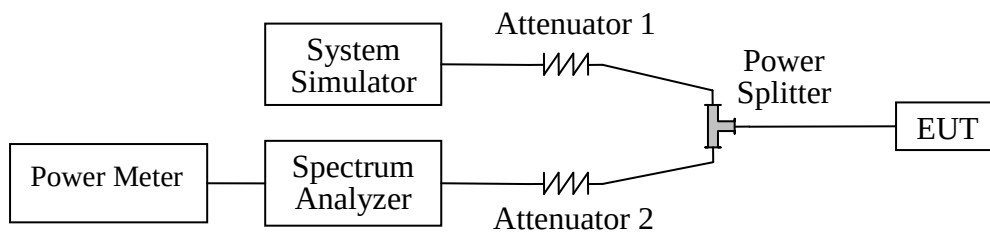
4. Test Result

4.1 Conducted Output Power

4.1.1 Requirement

According to FCC section 2.1046(a), for transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in FCC section 2.1033(c)(8).

4.1.2 Test Description



The EUT, which is powered by battery, is coupled to the Spectrum Analyzer (SA) and the System Simulator (SS) with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the SS to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS.



4.1.3 Test Result

Band	Channel	Frequency (MHz)	Measured Output Power(dBm)	Limited (dBm)	Verdict
WCDMA Band V	4132	826.4	22.56	38.5	PASS
	4182	836.4	22.64	38.5	PASS
	4233	846.6	22.41	38.5	PASS
HSDPA Band V	4132	826.4	22.41	38.5	PASS
	4182	836.4	22.58	38.5	PASS
	4233	846.6	22.56	38.5	PASS
HSUPA Band V	4132	826.4	22.55	38.5	PASS
	4182	836.4	22.52	38.5	PASS
	4233	846.6	22.47	38.5	PASS
HSPA+ Band V	4132	826.4	22.47	38.5	PASS
	4182	836.4	22.61	38.5	PASS
	4233	846.6	22.48	38.5	PASS
WCDMA Band II	9262	1852.4	21.23	38.5	PASS
	9400	1880	21.62	38.5	PASS
	9538	1907.6	21.40	38.5	PASS
HSDPA Band II	9262	1852.4	21.29	38.5	PASS
	9400	1880	21.57	38.5	PASS
	9538	1907.6	21.47	38.5	PASS
HSUPA Band II	9262	1852.4	21.26	38.5	PASS
	9400	1880	21.73	38.5	PASS
	9538	1907.6	21.44	38.5	PASS
HSPA+ Band II	9262	1852.4	21.23	38.5	PASS
	9400	1880	21.67	38.5	PASS
	9538	1907.6	21.36	38.5	PASS

Note: The Conducted RF Output Power test of WCDMA /HSDPA /HSUPA/HSPA+ was tested by power meter.



4.2 Occupied Bandwidth

4.2.1 Definition

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission.

Occupied bandwidth is also known as the 99% emission bandwidth, or 26dB bandwidth taking the total RF output power as reference.

4.2.2 Test Description

See section 4.2.1 of this report.

4.2.3 Test Results

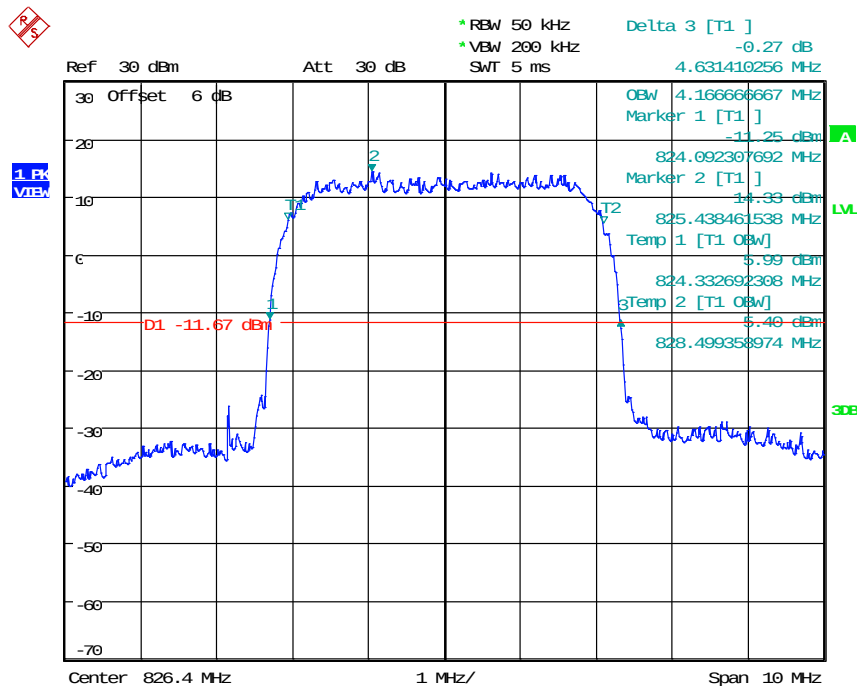
Here the lowest, middle and highest channels are tested to record the 99% and -26dB occupied bandwidth

Band	Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Refer to Plot
WCDMA Band V	4132	826.4	4.631	4.166	Plot A1
	4182	836.4	4.615	4.182	Plot A2
	4233	846.6	4.647	4.134	Plot A3
HSDPA Band V	4132	826.4	4.647	4.166	Plot B1
	4182	836.4	4.631	4.150	Plot B2
	4233	846.6	4.631	4.150	Plot B3
HSUPA Band V	4132	826.4	4.631	4.150	Plot C1
	4182	836.4	4.647	4.105	Plot C2
	4233	846.6	4.631	4.134	Plot C3
HSPA+ Band V	4132	826.4	4.663	4.166	Plot D1
	4182	836.4	4.599	4.134	Plot D2
	4233	846.6	4.631	4.150	Plot D3



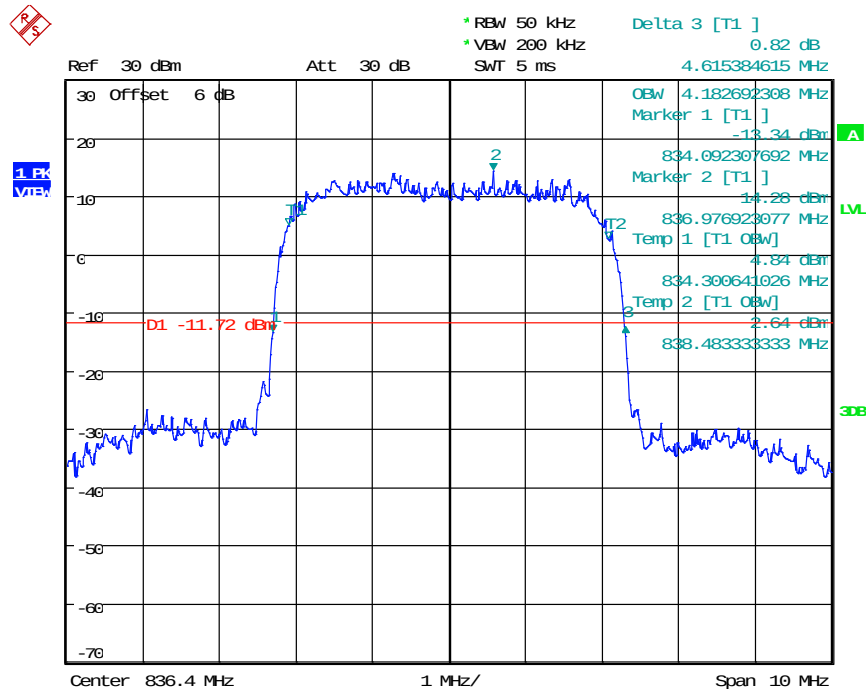
Band	Channel	Frequency (MHz)	-26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Refer to Plot
WCDMA Band II	9262	1852.4	4.663	4.182	Plot E1
	9400	1880	4.663	4.182	Plot E2
	9538	1907.6	4.679	4.198	Plot E3
HSDPA Band II	9262	1852.4	4.647	4.198	Plot F1
	9400	1880	4.679	4.182	Plot F2
	9538	1907.6	4.663	4.166	Plot F3
HSUPA Band II	9262	1852.4	4.663	4.186	Plot G1
	9400	1880	4.647	4.182	Plot G2
	9538	1907.6	4.647	4.182	Plot G3
HSPA+ Band II	9262	1852.4	4.663	4.166	Plot H1
	9400	1880	4.679	4.182	Plot H2
	9538	1907.6	4.679	4.182	Plot H3

Test Plots:



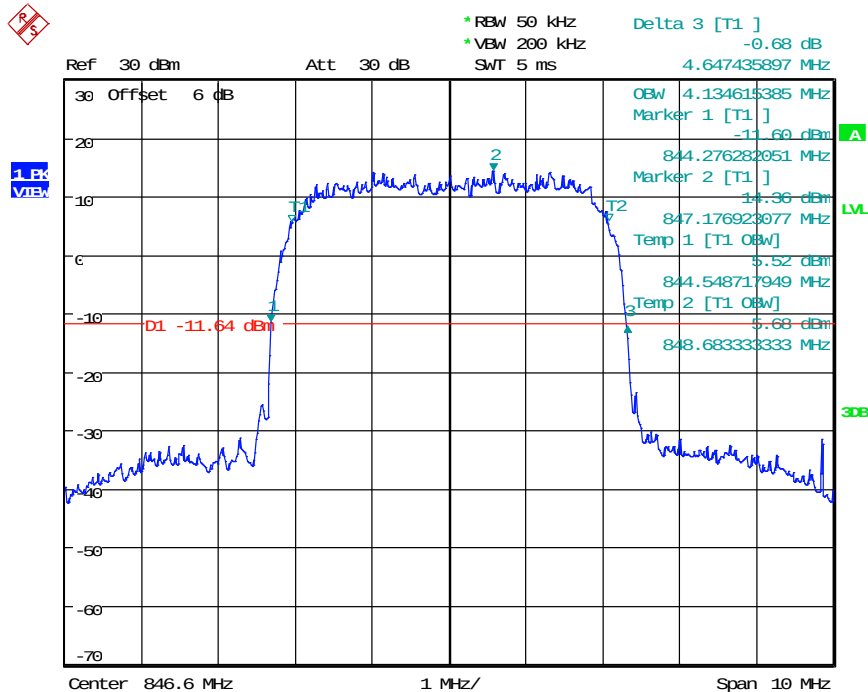
Date: 3.MAY.2016 20:22:58

(Plot A1:WCDMA Band V Channel=4132)



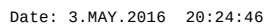
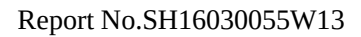
Date: 3.MAY.2016 20:28:51

(Plot A2:WCDMA Band V Channel=4182)

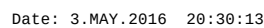


Date: 3.MAY.2016 20:34:19

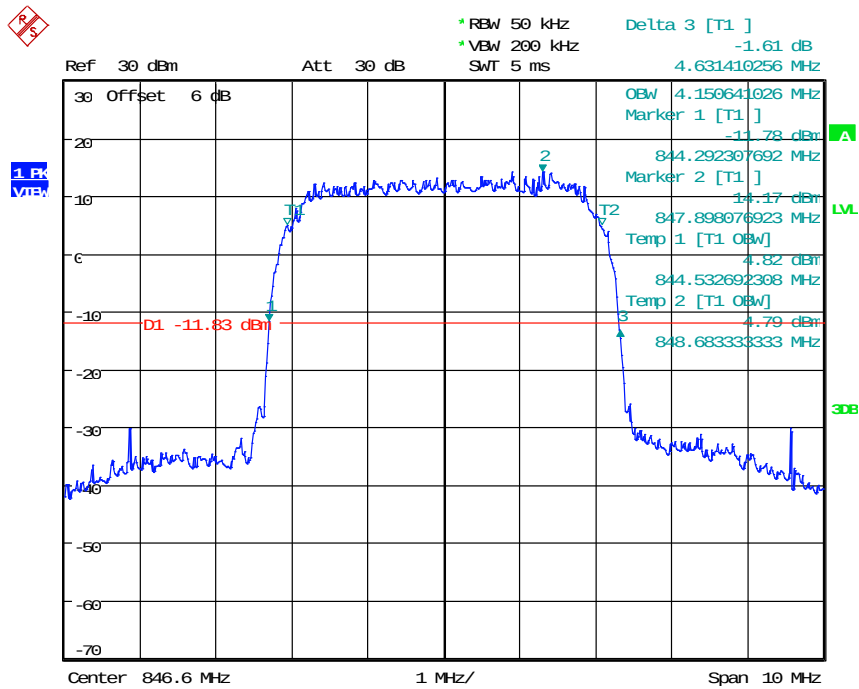
(Plot A3:WCDMA Band V Channel=4233)



(Plot B1: HSDPA Band V Channel=4132)

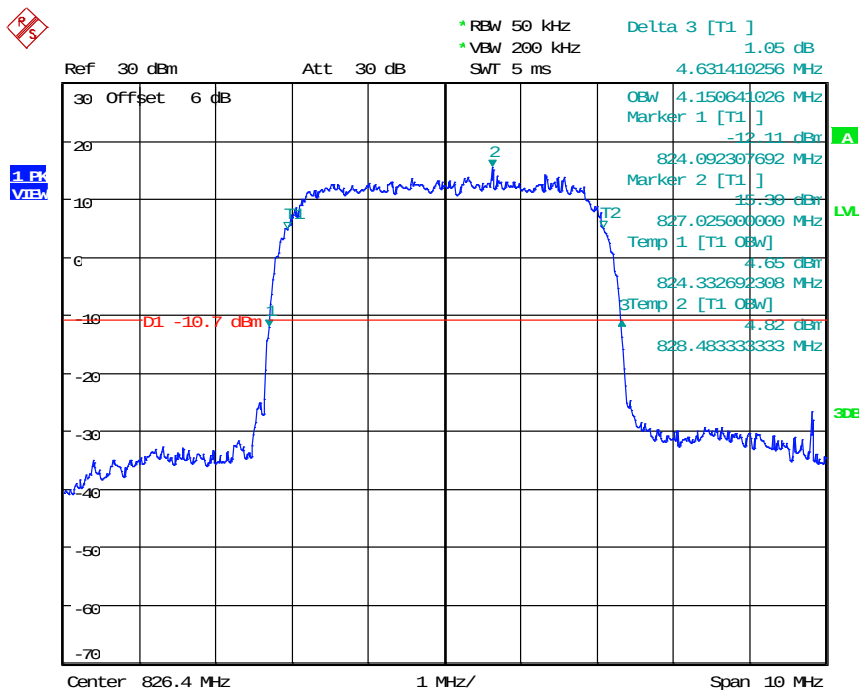


(Plot B2: HSDPA Band V Channel=4182)



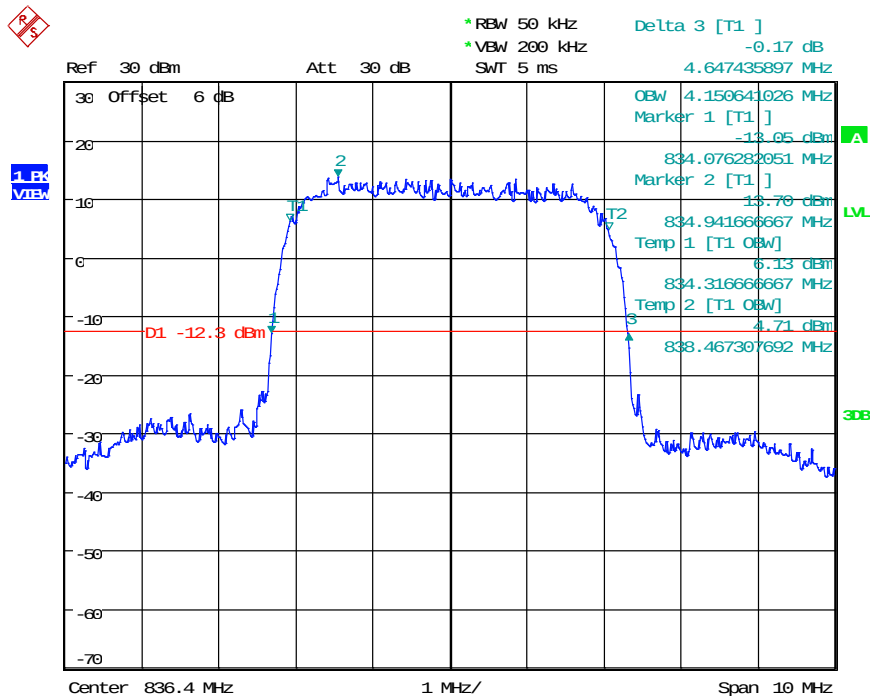
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(Plot B3: HSDPA Band V Channel=4233)



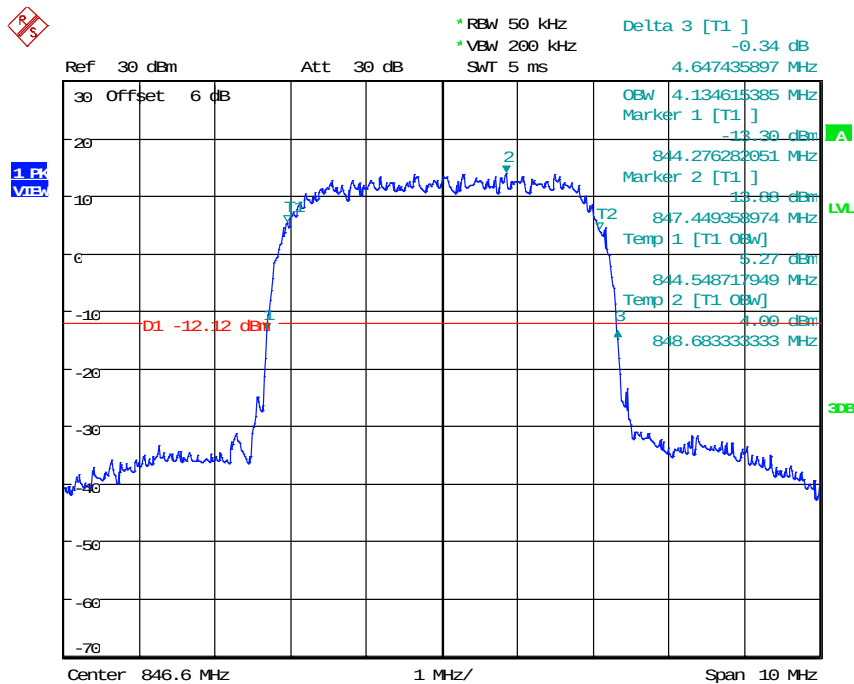
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(Plot C1: HSUPA Band V Channel=4132)



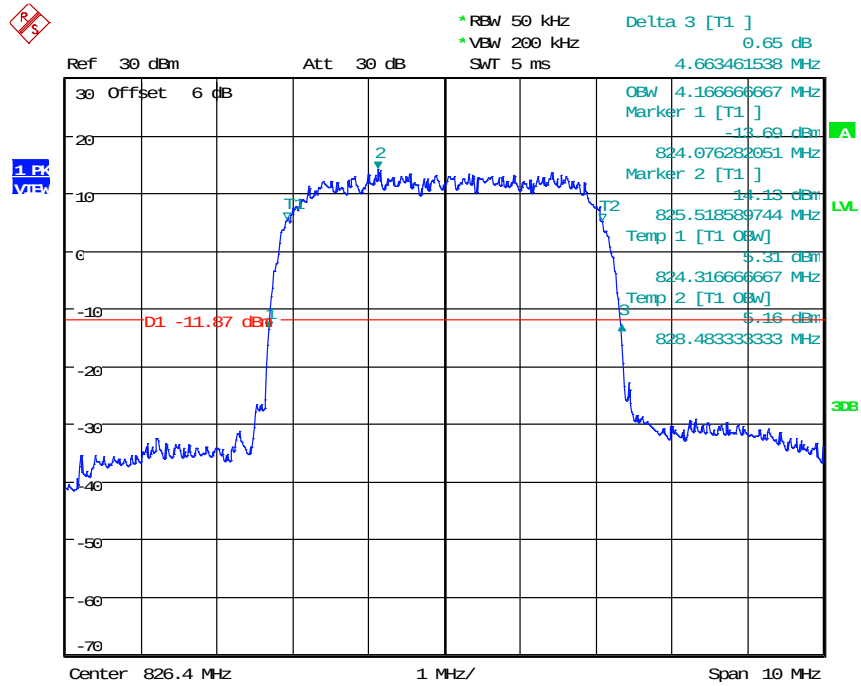
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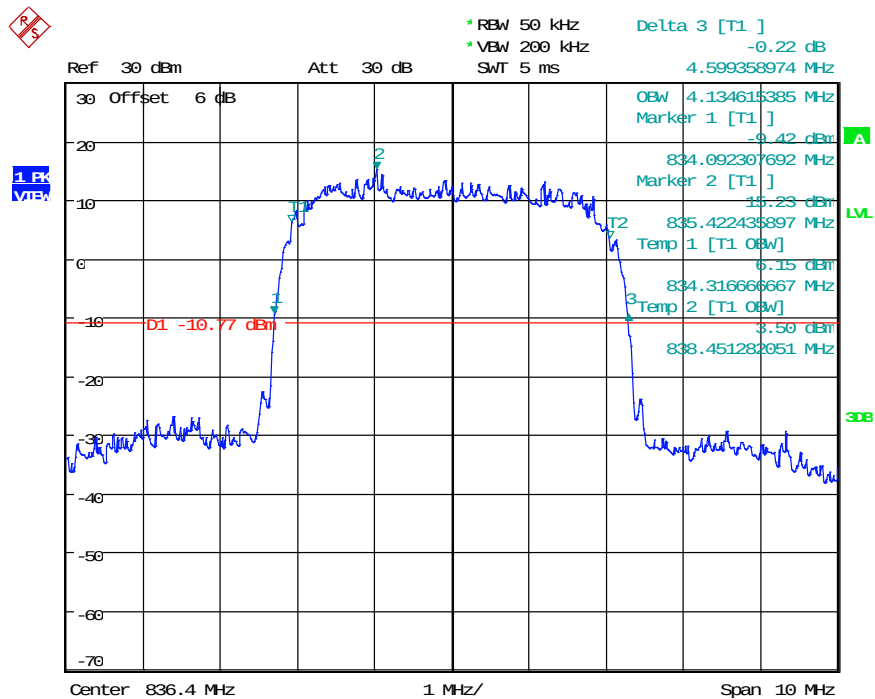
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(Plot C3: HSUPA Band V Channel=4233)



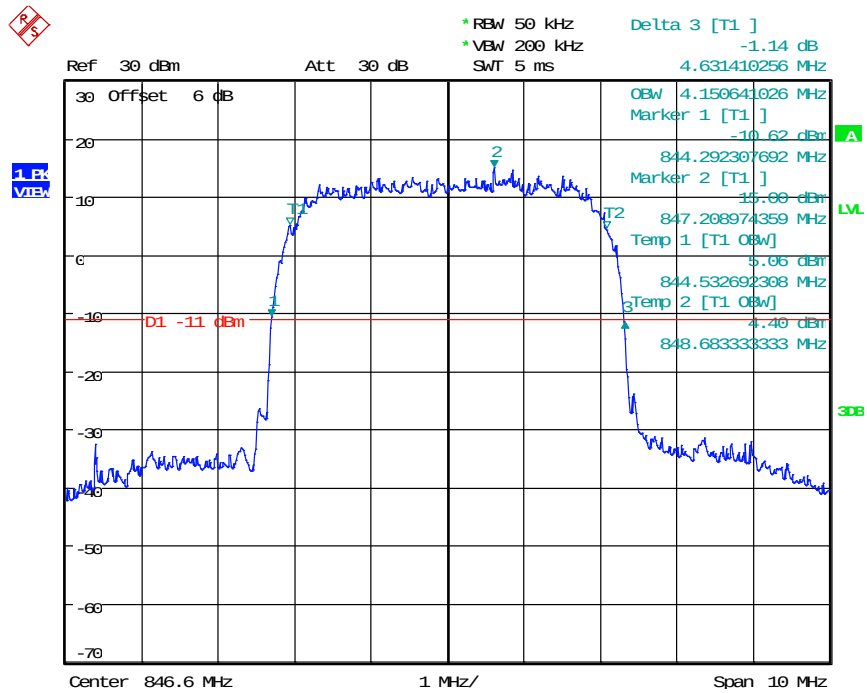
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(Plot D1: HSPA+ Band V Channel=4132)



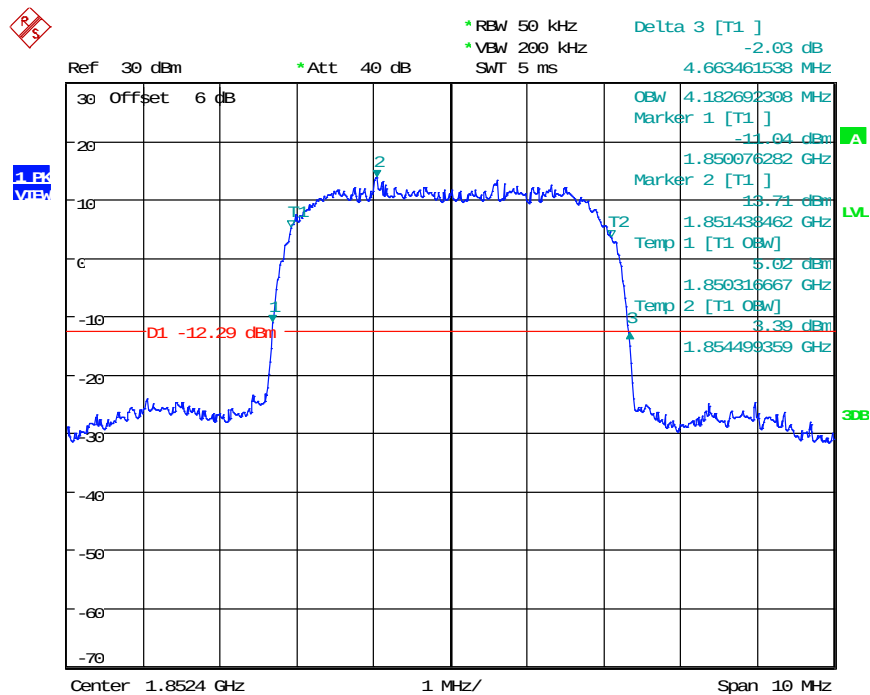
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(Plot D2: HSPA+ Band V Channel=4182)



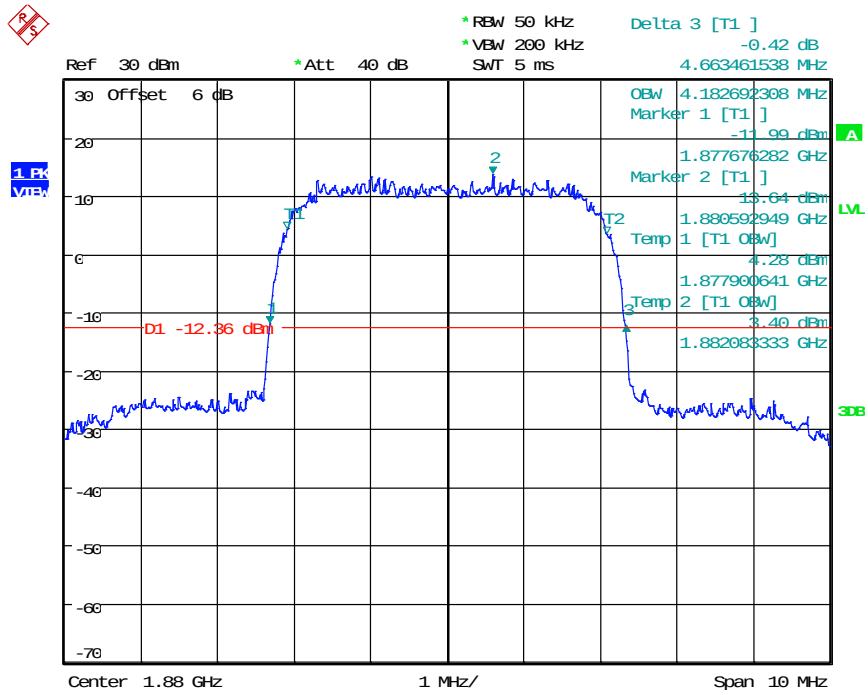
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(Plot D3: HSPA+ Band V Channel=4233)



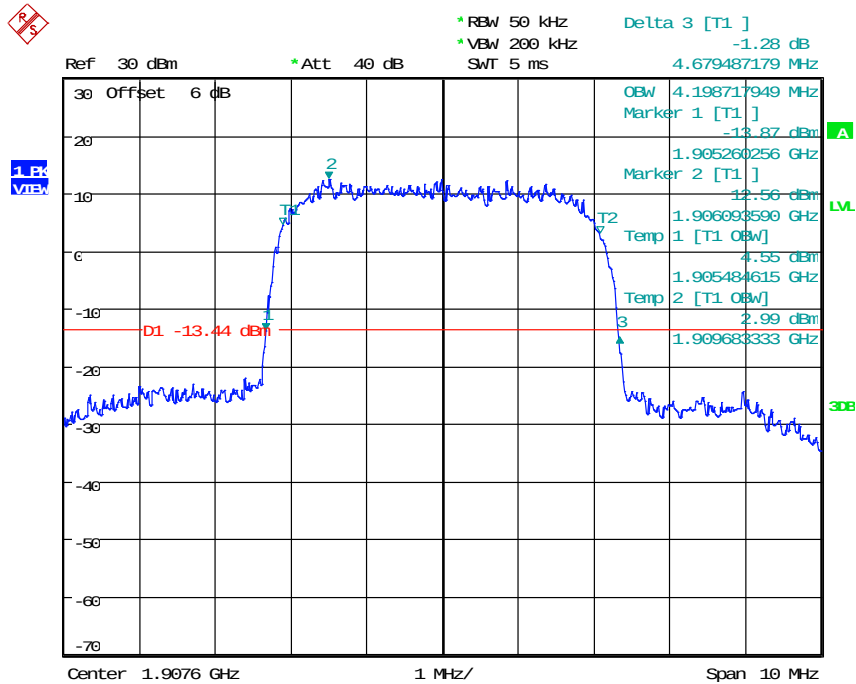
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(Plot E1: WCDMA Band II Channel=9262)



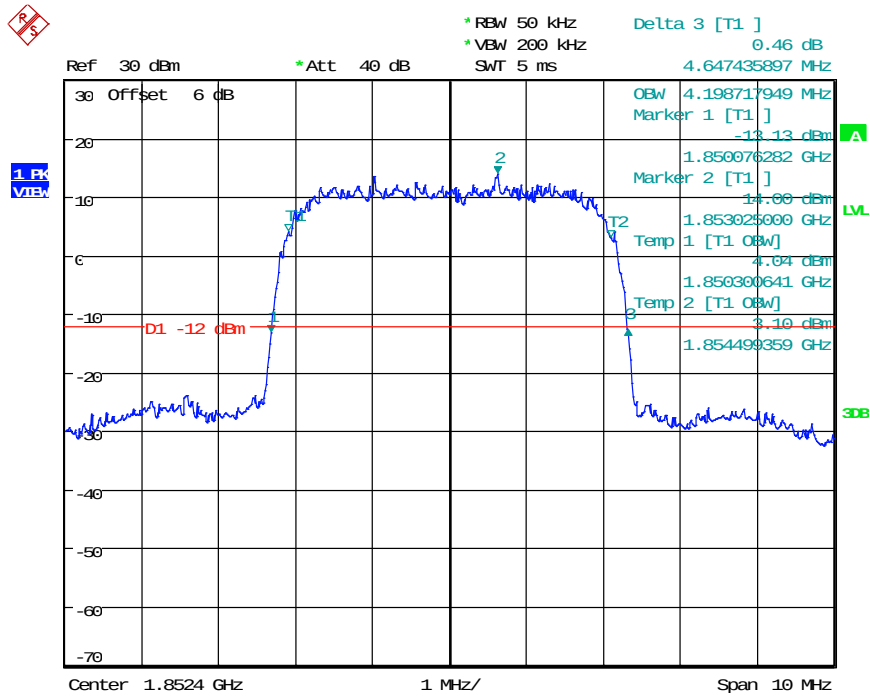
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(Plot E2: WCDMA Band II Channel=9400)



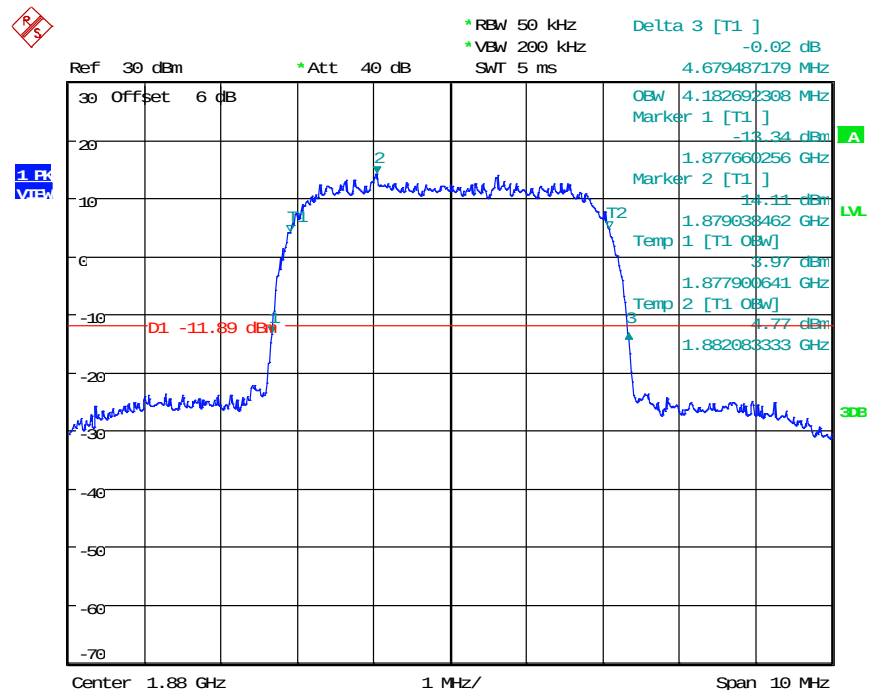
Date: 4.MAY.2016 13:45:00

(Plot E3: WCDMA Band II Channel=9538)



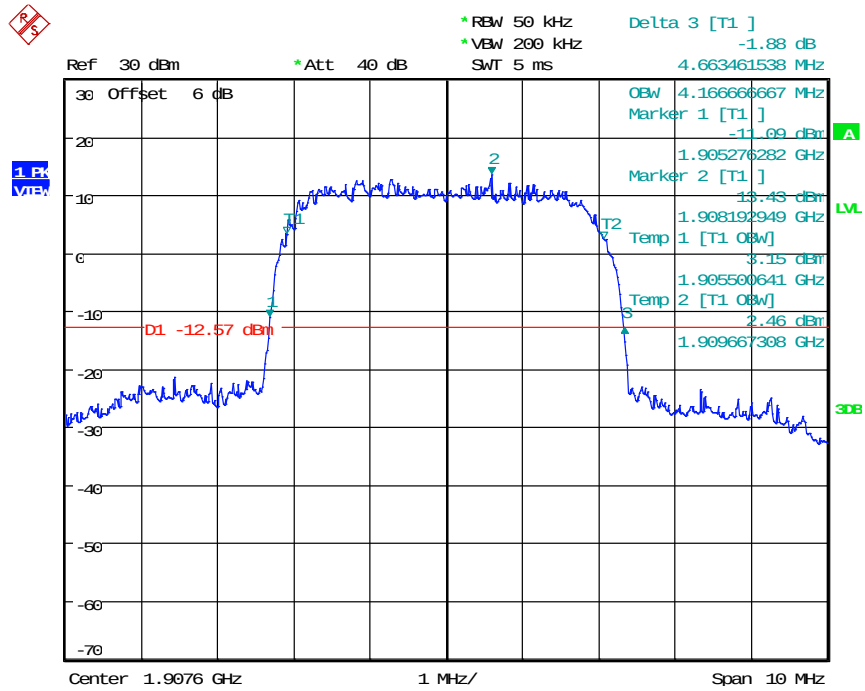
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(Plot F1:HSDPA Band II Channel=9262)



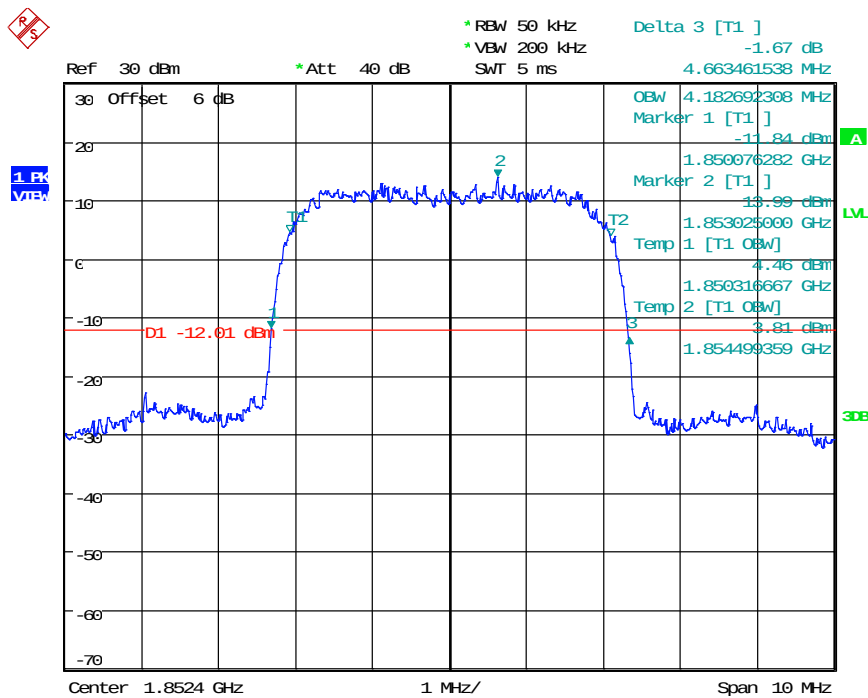
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(Plot F2: HSDPA Band II Channel=9400)



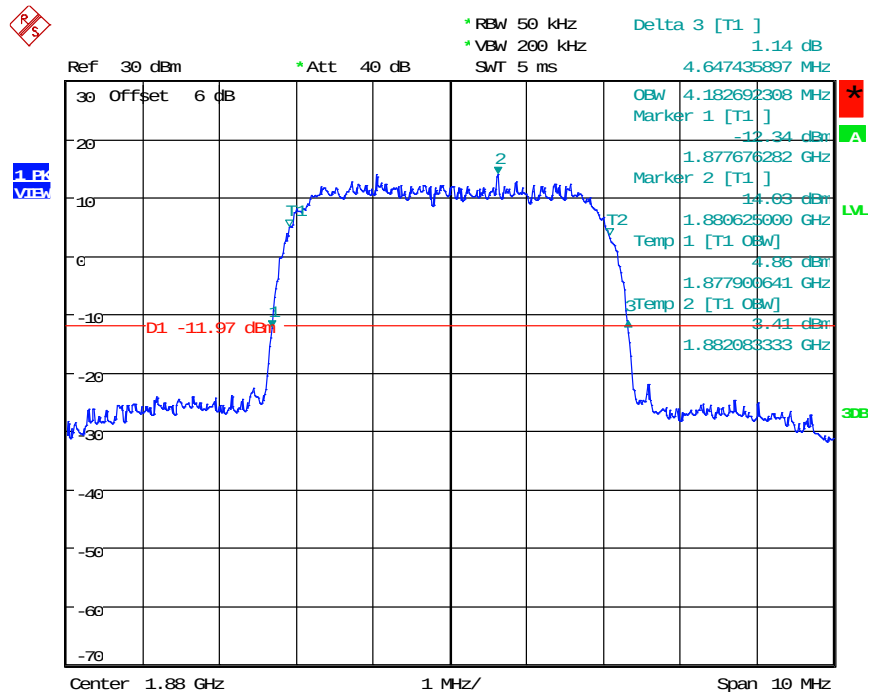
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(Plot F3: HSDPA Band II Channel=9538)



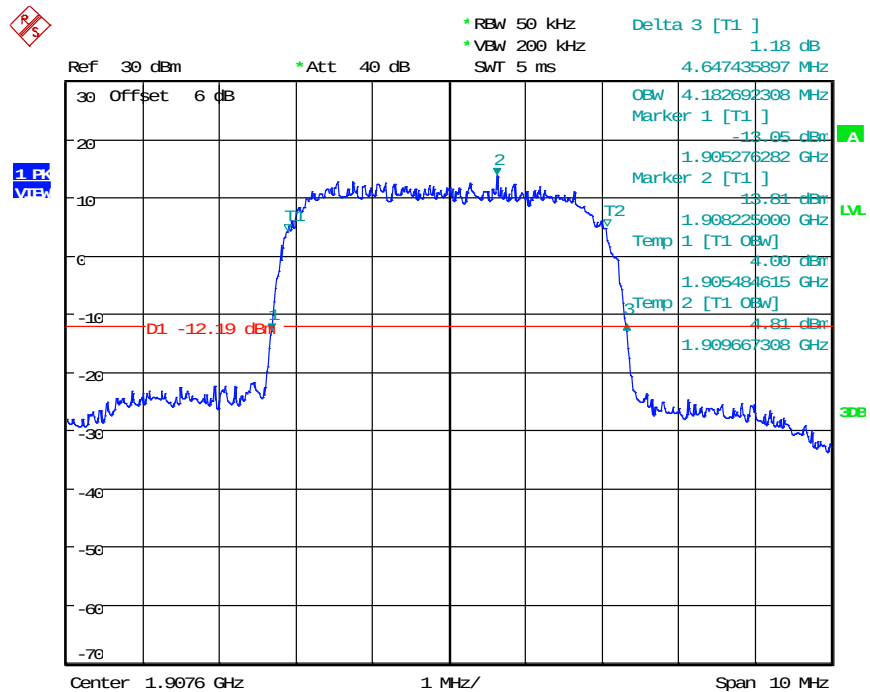
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(Plot G1: HSUPA Band II Channel=9262)



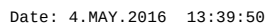
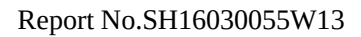
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(Plot G2: HSUPA Band V Channel=9400)

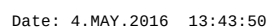


Date: 4.MAY.2016 13:46:27

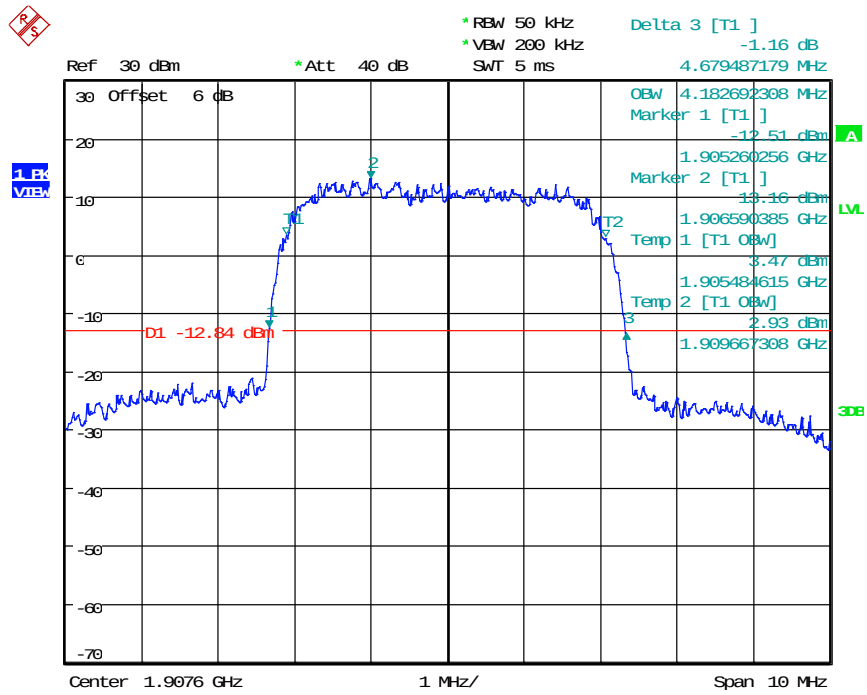
(Plot G3: HSUPA Band II Channel=9538)



(Plot H1: HSPA+ Band II Channel=9262)



(Plot H2: HSPA+ Band II Channel=9400)



Date: 4.MAY.2016 13:47:06

(Plot H3: HSPA+ Band II Channel=9538)

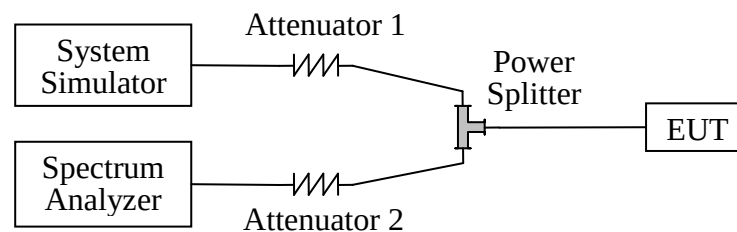


4.3 Peak-to-Average Ratio

4.3.1 Requirement

According to FCC section 24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.3.2 Test Description



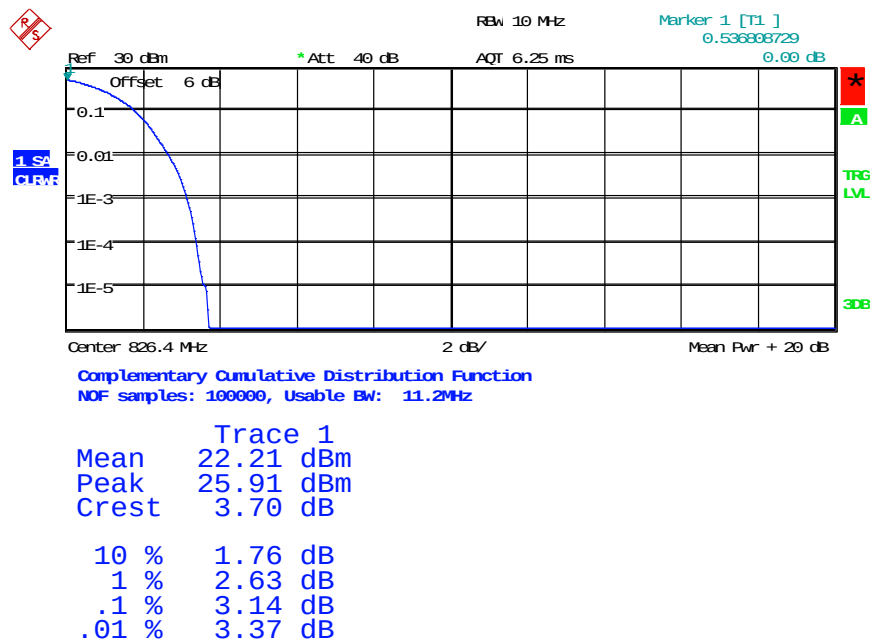
4.3.3 Test Result

Band	Channel	Frequency (MHz)	Peak-to-Average Ratio (dB)	Refer to Plot
WCDMA Band V	4132	826.4	3.37	A1
	4182	836.4	3.43	A2
	4233	846.6	3.43	A3
HSDPA Band V	4132	826.4	3.33	B1
	4182	836.4	3.43	B2
	4233	846.6	3.46	B3
HSUPA Band V	4132	826.4	3.40	C1
	4182	836.4	3.40	C2
	4233	846.6	3.40	C3
HSPA+ Band V	4132	826.4	3.40	D1
	4182	836.4	3.40	D2
	4233	846.6	3.43	D3



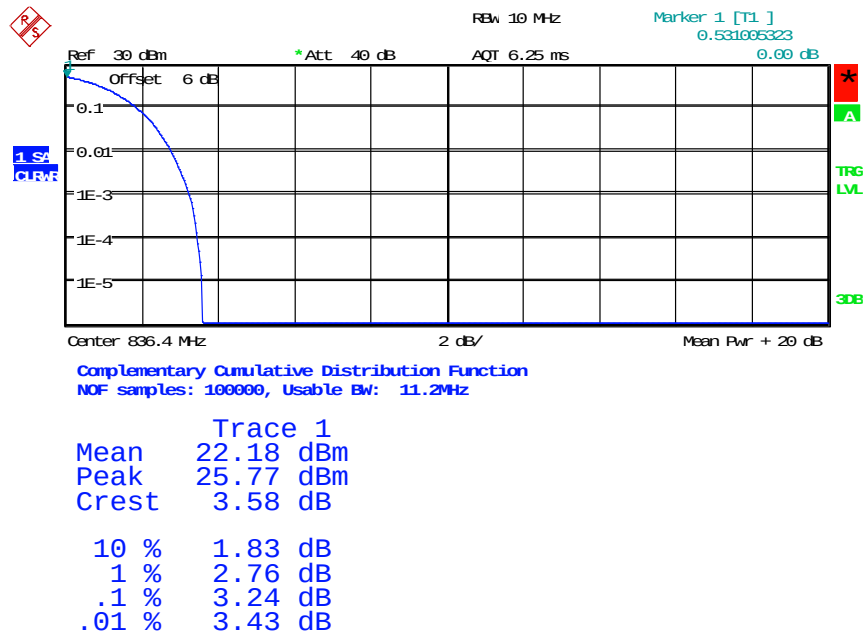
Band	Channel	Frequency (MHz)	Peak-to-Average Ratio (dB)	Refer to Plot
WCDMA Band II	9262	1852.4	3.01	E1
	9400	1880	2.40	E2
	9538	1907.6	2.40	E3
HSDPA Band II	9262	1852.4	2.95	F1
	9400	1880	2.40	F2
	9538	1907.6	2.18	F3
HSUPA Band II	9262	1852.4	2.98	G1
	9400	1880	2.40	G2
	9538	1907.6	2.18	G3
HSPA+ Band II	9262	1852.4	2.95	H1
	9400	1880	2.44	H2
	9538	1907.6	2.34	H3

Test Plots:



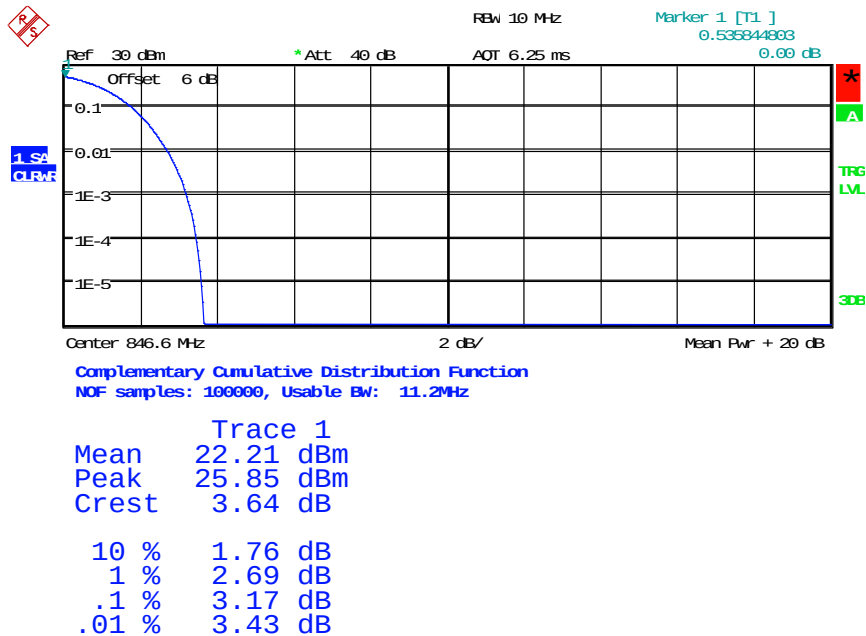
Date: 4.MAY.2016 13:18:59

(Plot A1:WCDMA Band V Channel=4132)



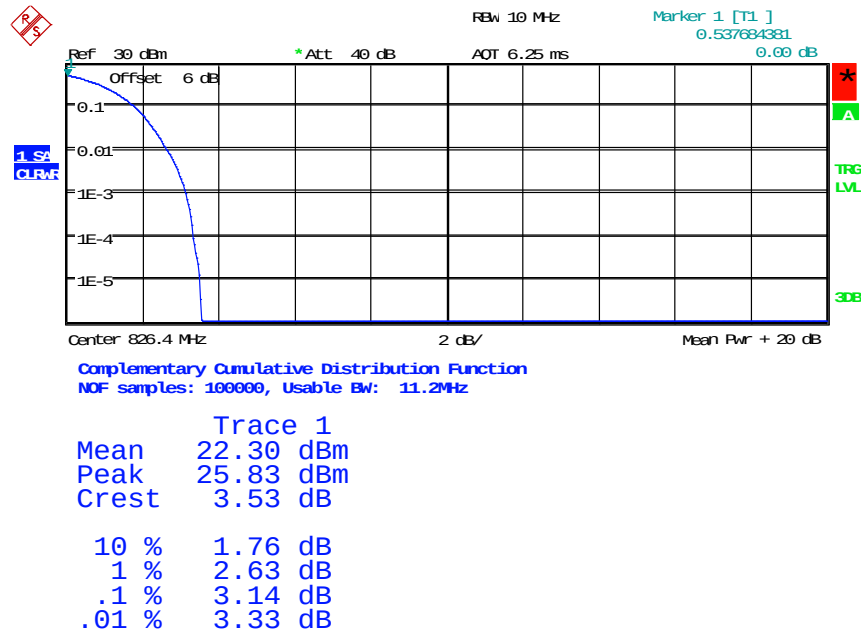
Date: 4.MAY.2016 13:16:53

(Plot A2:WCDMA Band V Channel=4182)



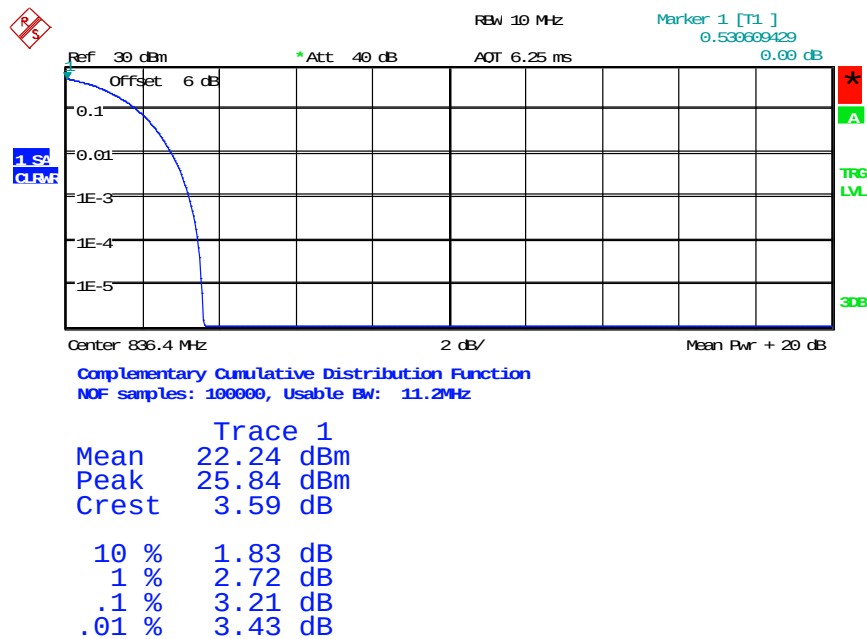
Date: 4.MAY.2016 13:14:18

(Plot A3:WCDMA Band V Channel=4233)



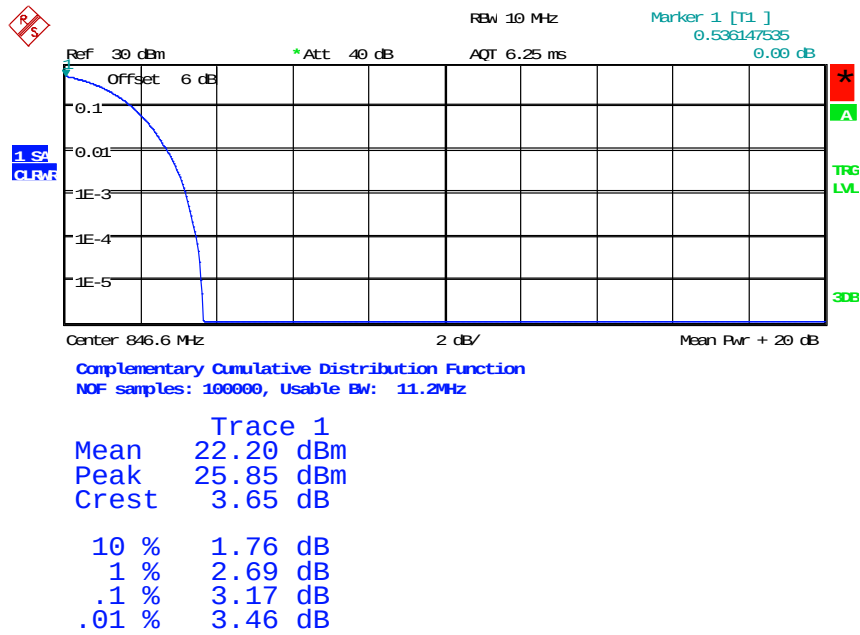
Date: 4.MAY.2016 13:19:12

(Plot B1: HSDPA Band V Channel=4132)



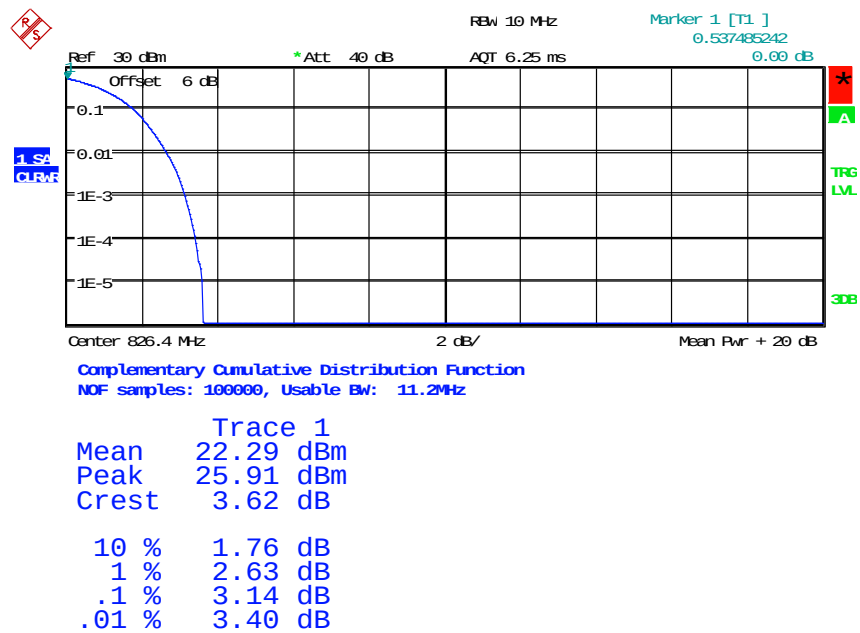
Date: 4.MAY.2016 13:17:10

(Plot B2: HSDPA Band V Channel=4182)



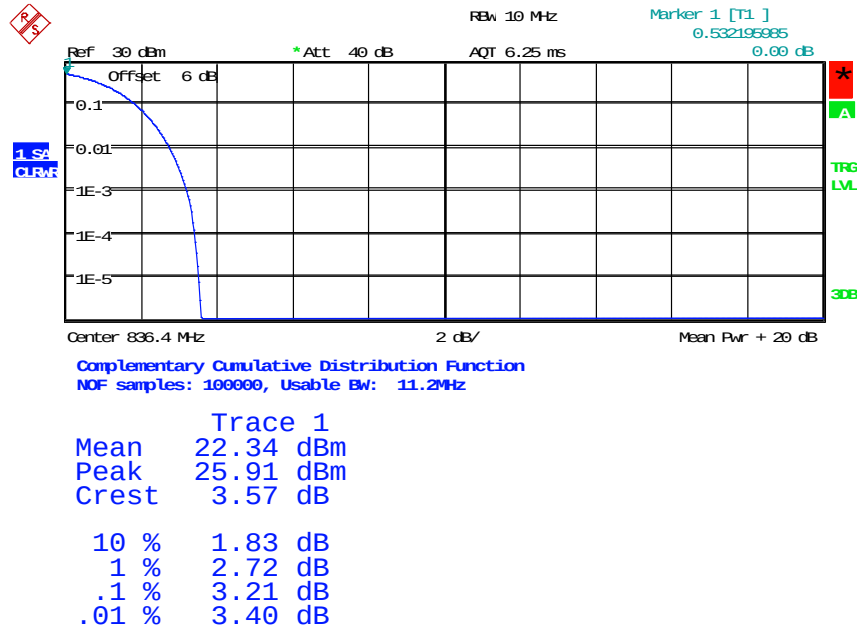
Date: 4.MAY.2016 13:14:55

(Plot B3: HSDPA Band V Channel=4233)



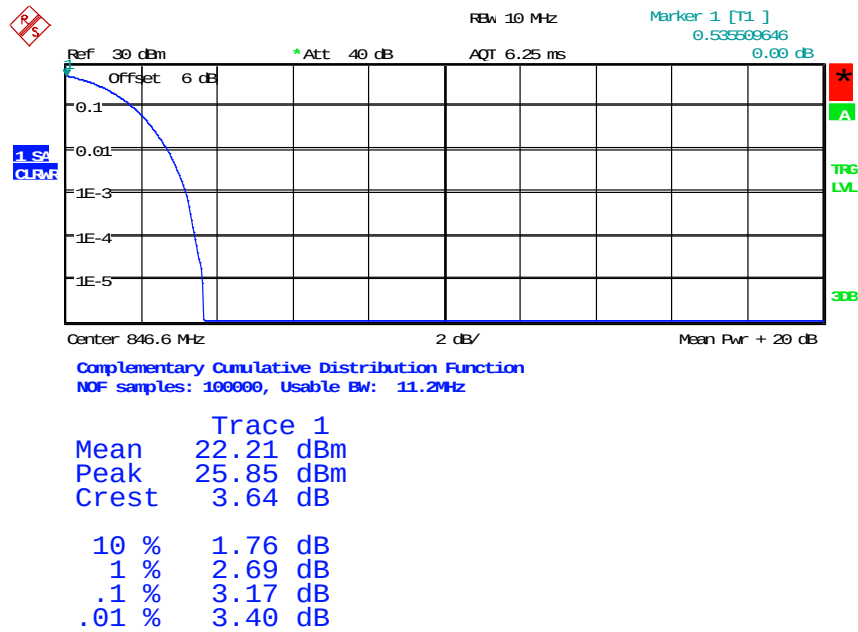
Date: 4.MAY.2016 13:19:53

(Plot C1: HSUPA Band V Channel=4132)



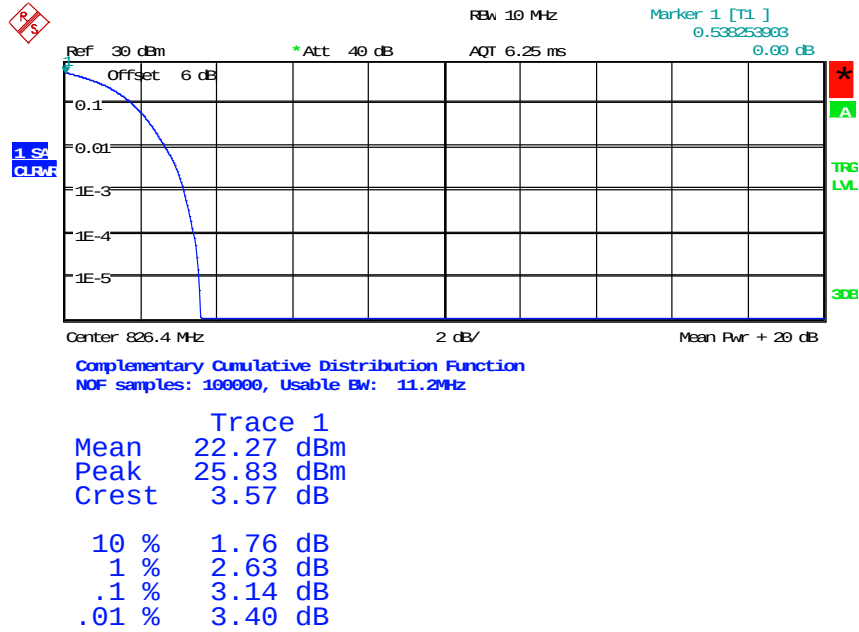
Date: 4.MAY.2016 13:17:34

(Plot C2: HSUPA Band V Channel=4182)



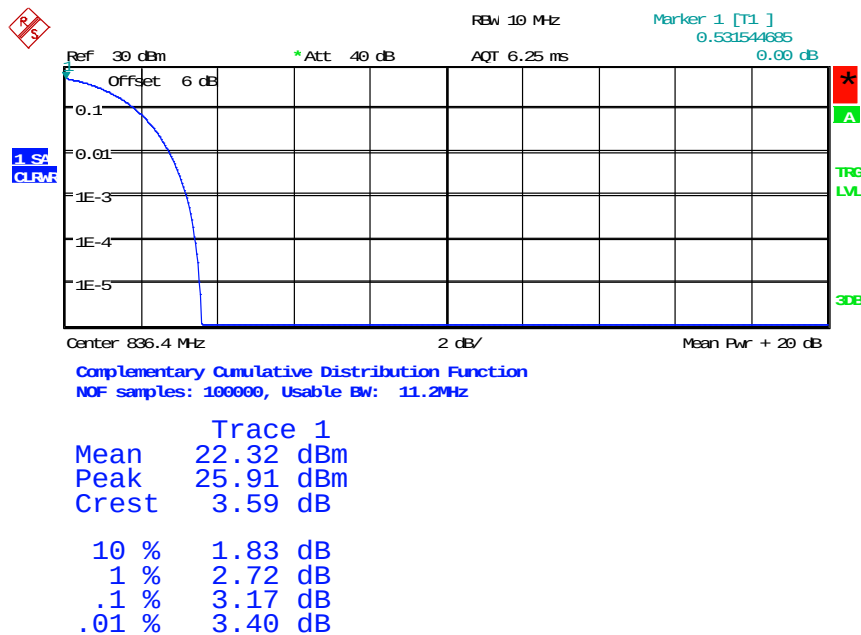
Date: 4.MAY.2016 13:15:19

(Plot C3: HSUPA Band V Channel=4233)



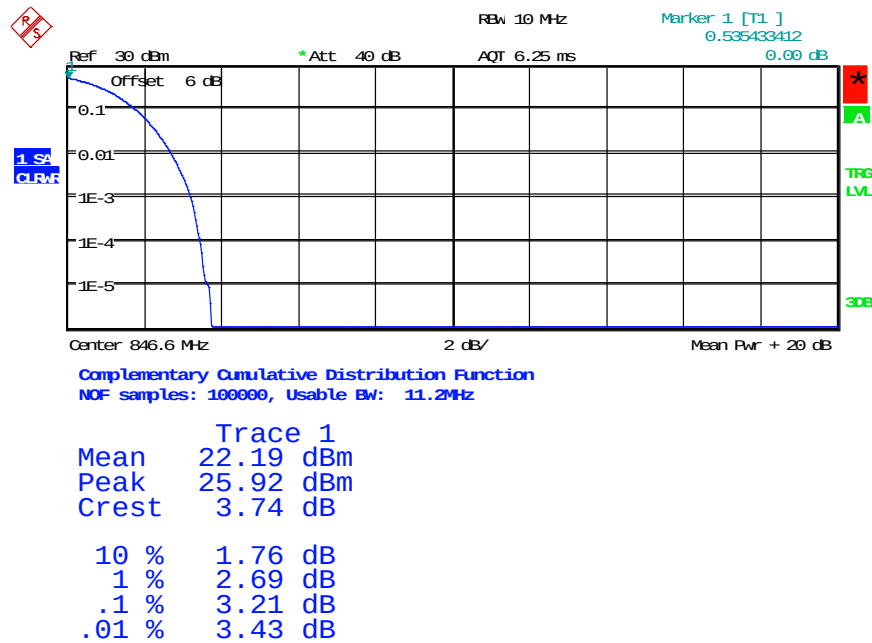
Date: 4.MAY.2016 13:20:06

(Plot D1: HSPA+ Band V Channel=4132)



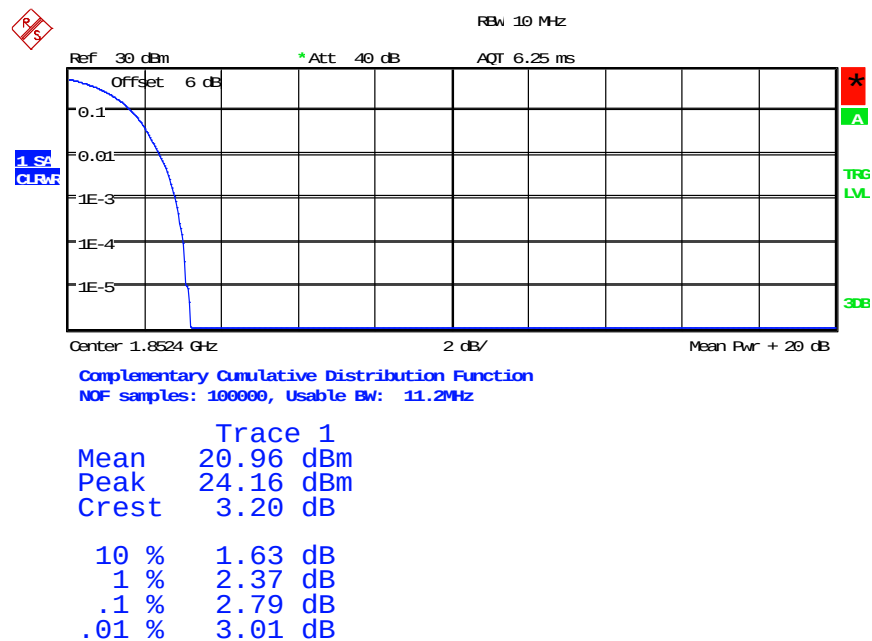
Date: 4.MAY.2016 13:17:56

(Plot D2: HSPA+ Band V Channel=4182)



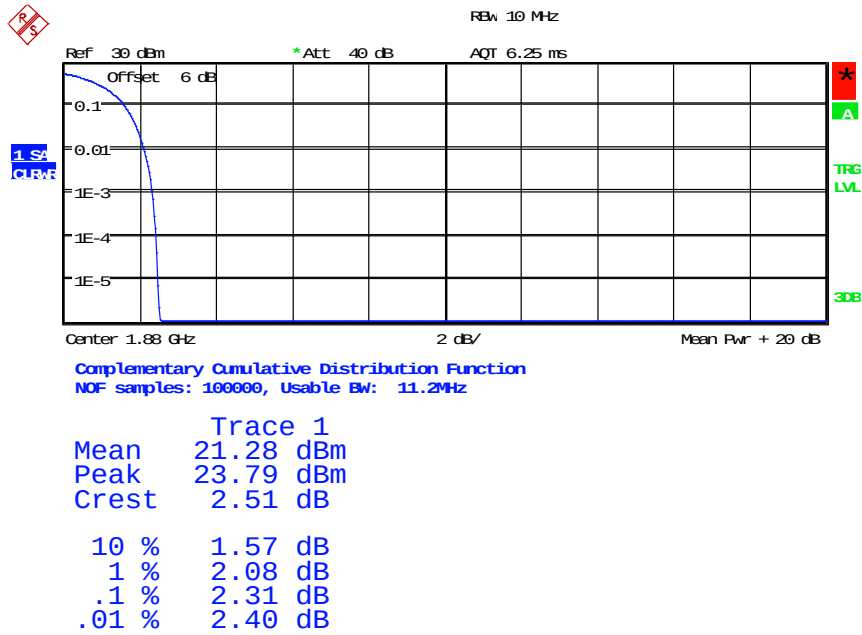
Date: 4.MAY.2016 13:15:35

(Plot D3: HSPA+ Band V Channel=4233)



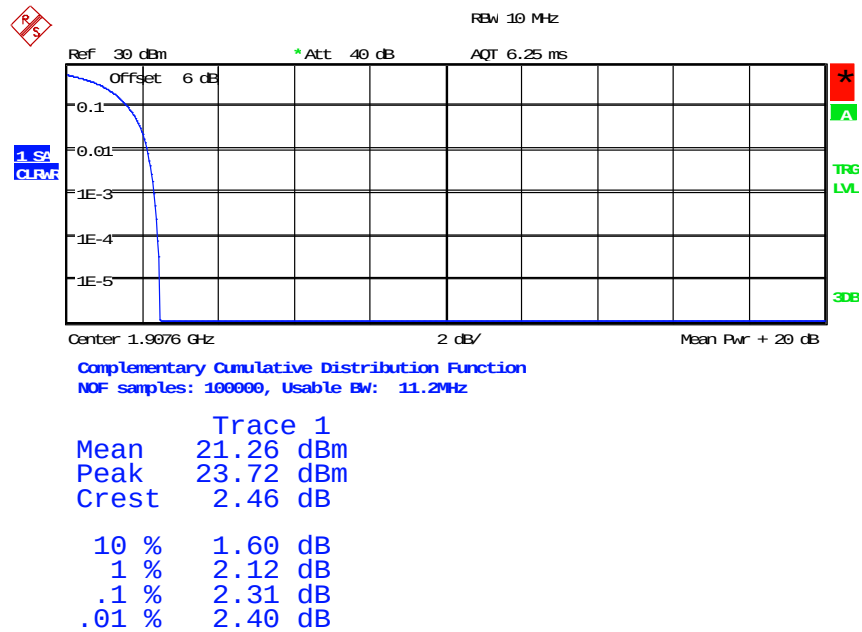
Date: 4.MAY.2016 14:17:37

(Plot E1: WCDMA Band II Channel=9262)



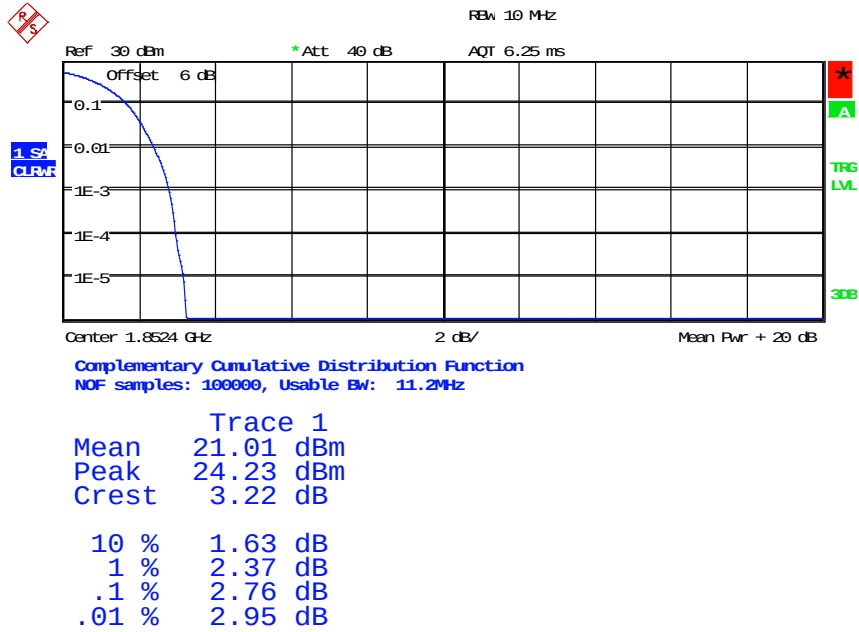
Date: 4.MAY.2016 14:21:28

(Plot E2: WCDMA Band II Channel=9400)



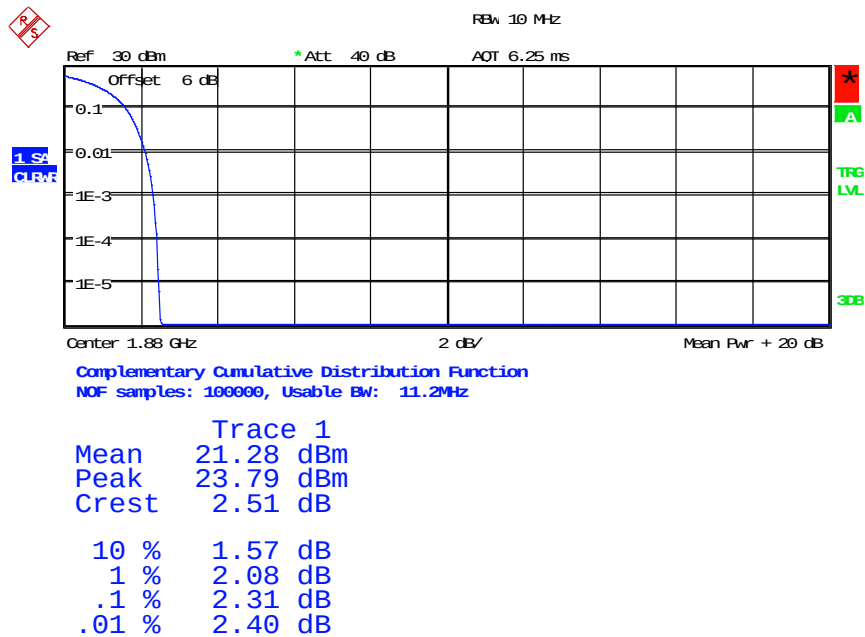
Date: 4.MAY.2016 14:15:15

(Plot E3: WCDMA Band II Channel=9538)



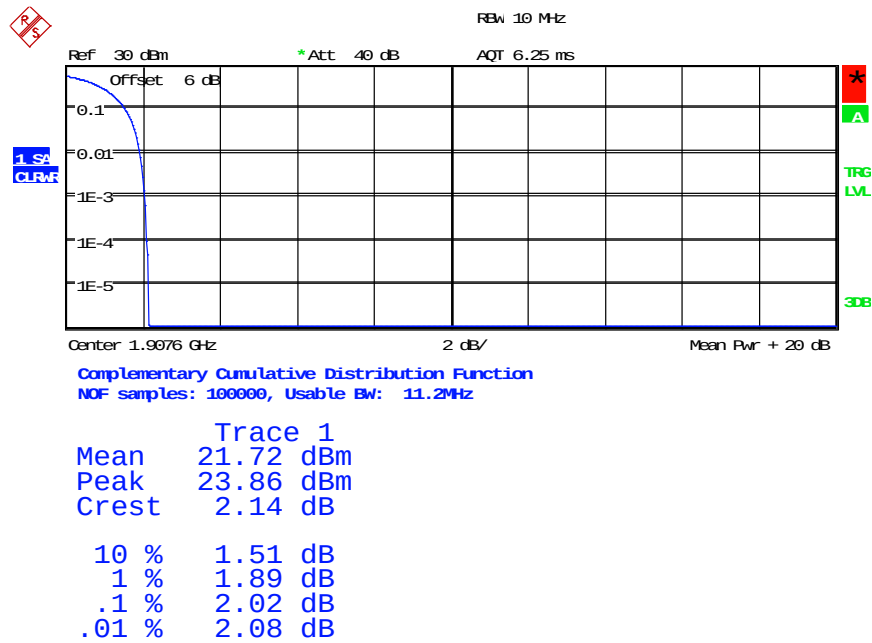
Date: 4.MAY.2016 14:18:00

(Plot F1:HSDPA Band II Channel=9262)



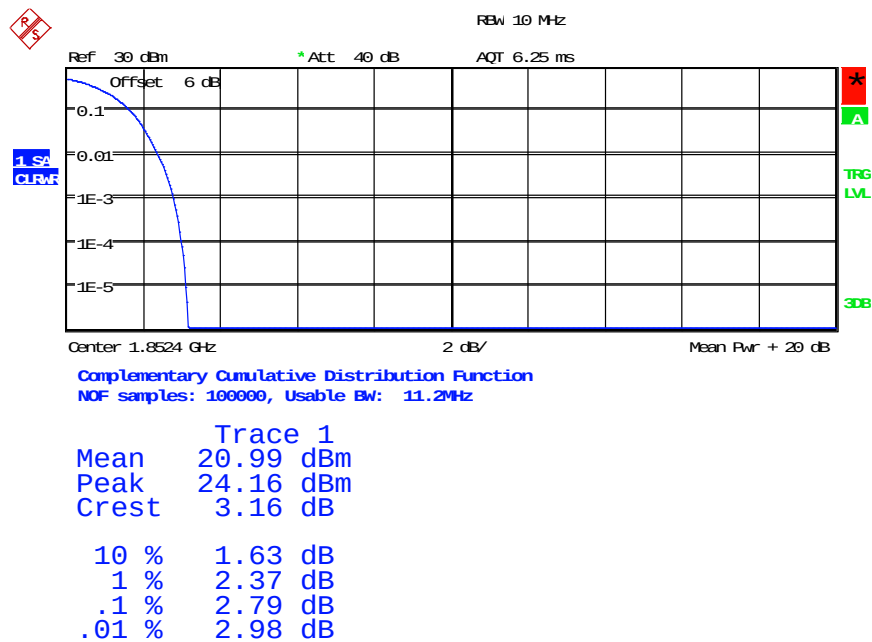
Date: 4.MAY.2016 14:21:46

(Plot F2: HSDPA Band II Channel=9400)



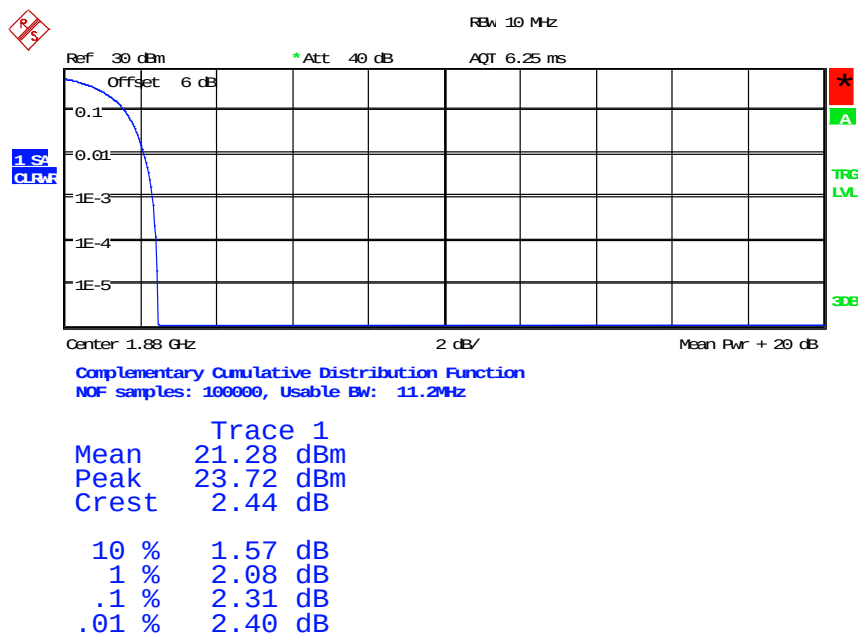
Date: 4.MAY.2016 14:15:35

(Plot F3: HSDPA Band II Channel=9538)



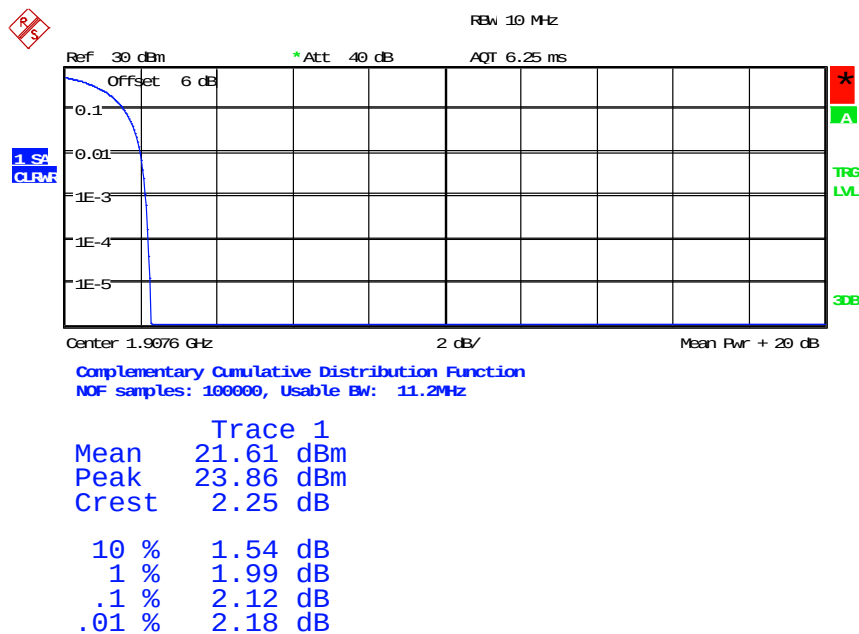
Date: 4.MAY.2016 14:18:14

(Plot G1: HSUPA Band II Channel=9262)



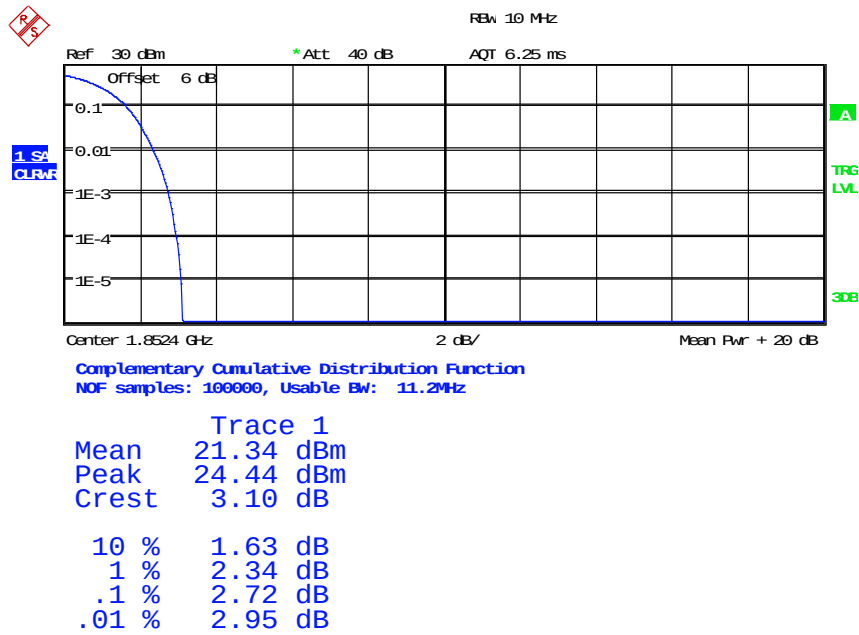
Date: 4.MAY.2016 14:22:06

(Plot G2: HSUPA Band V Channel=9400)



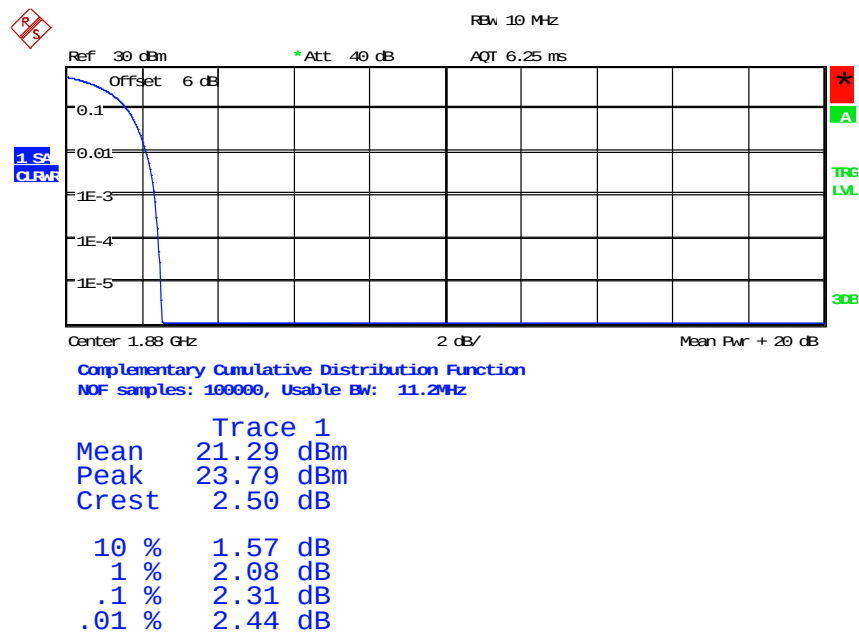
Date: 4.MAY.2016 14:16:00

(Plot G3: HSUPA Band II Channel=9538)



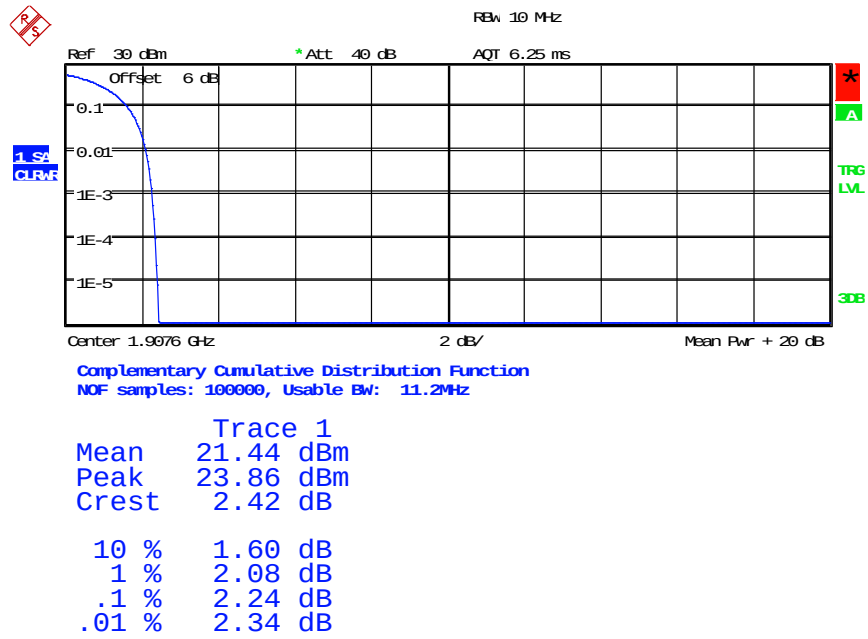
Date: 4.MAY.2016 14:18:59

(Plot H1: HSPA+ Band II Channel=9262)



Date: 4.MAY.2016 14:22:28

(Plot H2: HSPA+ Band II Channel=9400)



Date: 4.MAY.2016 14:16:12

(Plot H3: HSPA+ Band II Channel=9538)



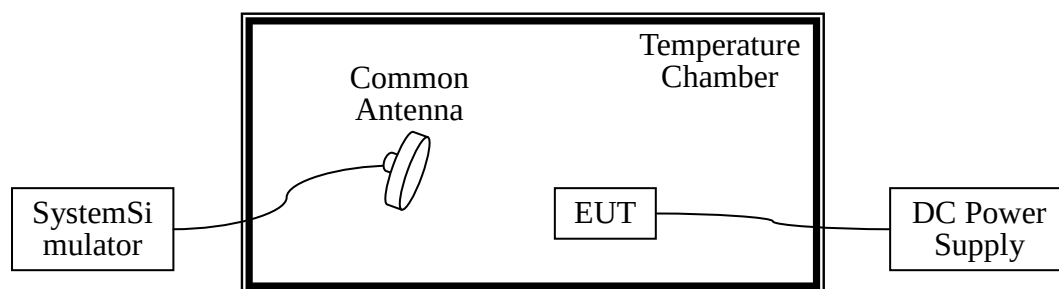
4.4 Frequency Stability

4.4.1 Requirement

According to FCC section 22.355 and FCC section 24.235, the frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. According to FCC section 2.1055, the test conditions are:

- (a) The temperature is varied from -30°C to $+50^{\circ}\text{C}$ at intervals of not more than 10°C .
- (b) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided.

4.4.2 Test Description



4.4.3 Test Setup

The EUT, which is powered by the DC Power Supply directly, is located in the Temperature Chamber. The EUT is commanded by the System Simulator (SS) to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the SS via a Common Antenna.



4.4.4 Test Results

For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer; the normal temperature here used is 25°C. The frequency deviation limit is ± 2.5 ppm.

Band	Test Conditions		Frequency Deviation						Limit/Verdict
	Power (VDC)	Temp (°C)	Low Channel		Middle Channel		High Channel		±2.5ppm 850 ±1ppm 1900
			Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	
WCDMA 850 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	-12	-0.015	49	0.059	77	0.091	
		-10	55	0.067	41	0.050	-60	-0.071	
		0	40	0.049	55	0.066	0	0.001	
		10	42	0.051	49	0.059	35	0.041	
		20	53	0.065	-76	-0.091	-76	-0.090	
		30	-29	-0.035	59	0.070	51	0.060	
		40	-38	-0.046	-8	-0.009	-54	-0.064	
		50	42	0.051	-69	-0.082	27	0.032	
		60	25	0.030	19	0.022	-60	-0.071	
		70	---	---	---	---	---	---	
	4.2	25	34	0.041	61	0.073	47	0.056	
	3.6	25	9	0.010	-60	-0.072	-29	-0.034	
WCDMA 1900 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	11	0.006	20	0.011	-65	-0.034	
		-10	26	0.014	43	0.051	22	0.011	
		0	63	0.034	-71	-0.085	-11	-0.006	
		10	47	0.025	48	0.058	-46	-0.024	
		20	-54	-0.029	63	0.076	24	0.013	
		30	4	0.002	20	0.024	41	0.021	
		40	-63	-0.034	66	0.079	4	0.002	
		50	71	0.038	60	0.072	-80	-0.042	
		60	38	0.020	-28	-0.033	53	0.028	
		70	---	---	---	---	---	---	
	4.2	25	-13	-0.007	14	0.017	14	0.008	
	3.6	25	61	0.033	-78	-0.093	71	0.037	



Band	Test Conditions		Frequency Deviation						Limit/Verdict
	Power (VDC)	Temp (°C)	Low Channel		Middle Channel		High Channel		±2.5ppm 850 ±1ppm 1900
			Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	
HSDPA 850 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	26	0.032	-64	-0.076	21	0.025	
		-10	28	0.034	28	0.034	37	0.044	
		0	43	0.053	70	0.083	-76	-0.089	
		10	31	0.038	-12	-0.015	-58	-0.068	
		20	-8	-0.009	56	0.067	-3	-0.004	
		30	28	0.034	57	0.068	22	0.025	
		40	-53	-0.064	33	0.039	-41	-0.049	
		50	58	0.070	-49	-0.059	8	0.009	
		60	16	0.019	-72	-0.087	30	0.035	
		70	---	---	---	---	---	---	
	4.2	25	41	0.050	55	0.065	12	0.015	
	3.6	25	-72	-0.088	45	0.053	33	0.038	
HSDPA 1900 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	-41	-0.022	29	0.015	-40	-0.021	
		-10	17	0.009	-51	-0.060	30	0.016	
		0	54	0.029	-22	-0.026	54	0.028	
		10	60	0.032	-38	-0.045	-48	-0.025	
		20	-1	-0.001	7	0.009	-11	-0.006	
		30	-9	-0.005	-44	-0.052	-49	-0.026	
		40	-5	-0.003	44	0.053	-27	-0.014	
		50	-28	-0.015	78	0.093	-70	-0.036	
		60	-42	-0.023	-26	-0.031	44	0.023	
		70	---	---	---	---	---	---	
	4.2	25	-27	-0.014	9	0.011	43	0.023	
	3.6	25	-47	-0.026	-45	-0.053	-22	-0.011	



Band	Test Conditions		Frequency Deviation						Limit/Verdict
	Power (VDC)	Temp (°C)	Low Channel		Middle Channel		High Channel		±2.5ppm 850 ±1ppm 1900
			Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	
HSUPA 850 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	78	0.095	57	0.068	-40	-0.048	
		-10	-38	-0.046	-22	-0.026	-54	-0.064	
		0	-27	-0.033	-6	-0.007	-3	-0.003	
		10	67	0.082	-37	-0.045	-71	-0.084	
		20	24	0.028	-50	-0.060	78	0.092	
		30	-24	-0.029	-67	-0.080	74	0.088	
		40	17	0.020	35	0.042	17	0.020	
		50	-41	-0.050	-42	-0.050	-18	-0.022	
		60	-67	-0.082	30	0.036	54	0.064	
		70	---	---	---	---	---	---	
	4.2	25	-41	-0.050	-54	-0.064	-76	-0.090	
	3.6	25	74	0.090	-70	-0.083	52	0.062	
HSUPA 1900 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	44	0.024	10	0.005	73	0.038	
		-10	60	0.032	53	0.063	-77	-0.040	
		0	37	0.020	-40	-0.048	-33	-0.017	
		10	-15	-0.008	-37	-0.044	-74	-0.039	
		20	1	0.000	-59	-0.070	-11	-0.006	
		30	-44	-0.024	21	0.025	-47	-0.025	
		40	21	0.011	3	0.004	26	0.014	
		50	22	0.012	35	0.041	27	0.014	
		60	33	0.018	44	0.053	15	0.008	
		70	---	---	---	---	---	---	
	4.2	25	-41	-0.022	-39	-0.047	-43	-0.023	
	3.6	25	48	0.026	-36	-0.043	-26	-0.013	



Band	Test Conditions		Frequency Deviation						Limit/Verdict
	Power (VDC)	Temp (°C)	Low Channel		Middle Channel		High Channel		±2.5ppm 850 ±1ppm 1900
			Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	Dev. Freq. Hz	Deviation (ppm)	
HSPA+ 850 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	61	0.074	16	0.020	35	0.041	
		-10	-23	-0.028	-72	-0.086	-15	-0.017	
		0	71	0.085	-6	-0.007	-36	-0.043	
		10	24	0.029	-67	-0.080	-32	-0.038	
		20	-37	-0.045	-46	-0.055	-64	-0.075	
		30	62	0.075	38	0.045	-57	-0.067	
		40	23	0.028	52	0.062	-74	-0.087	
		50	-18	-0.021	25	0.030	77	0.091	
		60	24	0.029	46	0.055	47	0.056	
		70	---	---	---	---	---	---	
	4.2	25	50	0.061	-4	-0.005	52	0.062	
	3.6	25	9	0.011	-65	-0.078	77	0.091	
HSPA+ 1900 MHz	3.8	-30	---	---	---	---	---	---	PASS
		-20	63	0.034	13	0.007	-70	-0.037	
		-10	26	0.014	-29	-0.034	34	0.018	
		0	63	0.034	-75	-0.090	4	0.002	
		10	47	0.025	-58	-0.069	-15	-0.008	
		20	-69	-0.037	-19	-0.023	44	0.023	
		30	-40	-0.022	-71	-0.085	64	0.034	
		40	3	0.002	-6	-0.007	25	0.013	
		50	68	0.036	18	0.021	44	0.023	
		60	44	0.024	-53	-0.063	-48	-0.025	
		70	---	---	---	---	---	---	
	4.2	25	-8	-0.005	-40	-0.048	-13	-0.007	
	3.6	25	30	0.016	41	0.049	-30	-0.016	

NOTE:

(1) The EUT stops transmitting at temperatures -30°C, 70°C

(2) The manufacturer declared that the EUT could work properly between temperatures -20°C~60°C.

(3) Normal Voltage = 3.6V; Max Voltage= 3.8V; Min Voltage=4.2V.



4.5 Conducted Out of Band Emissions

4.5.1 Requirement

According to FCC section 22.917(a) and FCC section 24.238(a), 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 $43 + 10 \cdot \log(P)$ dB. This calculated to be -13 dBm.

4.5.2 Test Description

See section 4.2.1 of this report.

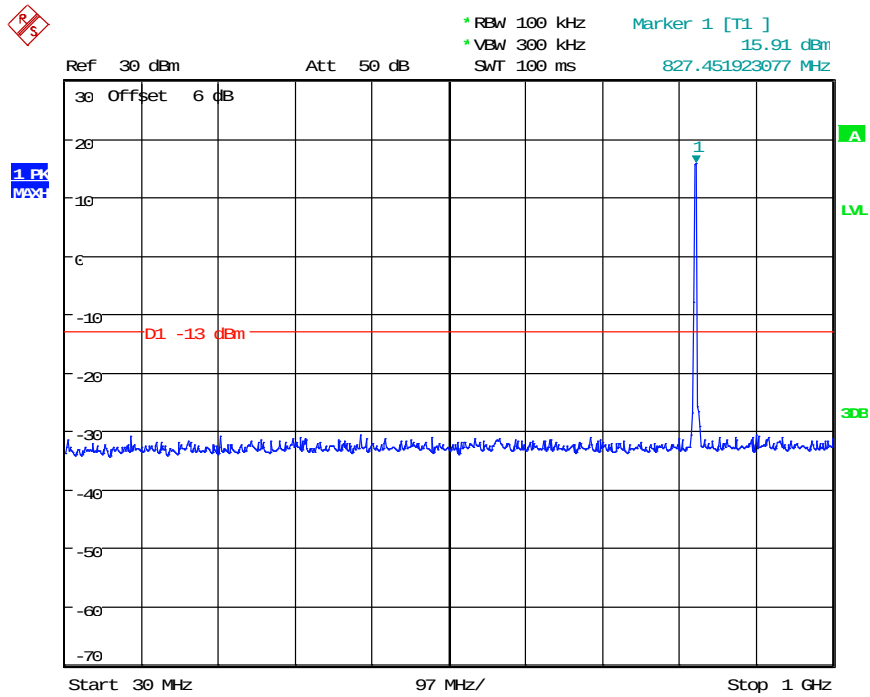
4.5.3 Test Results

The measurement frequency range is from 30 MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

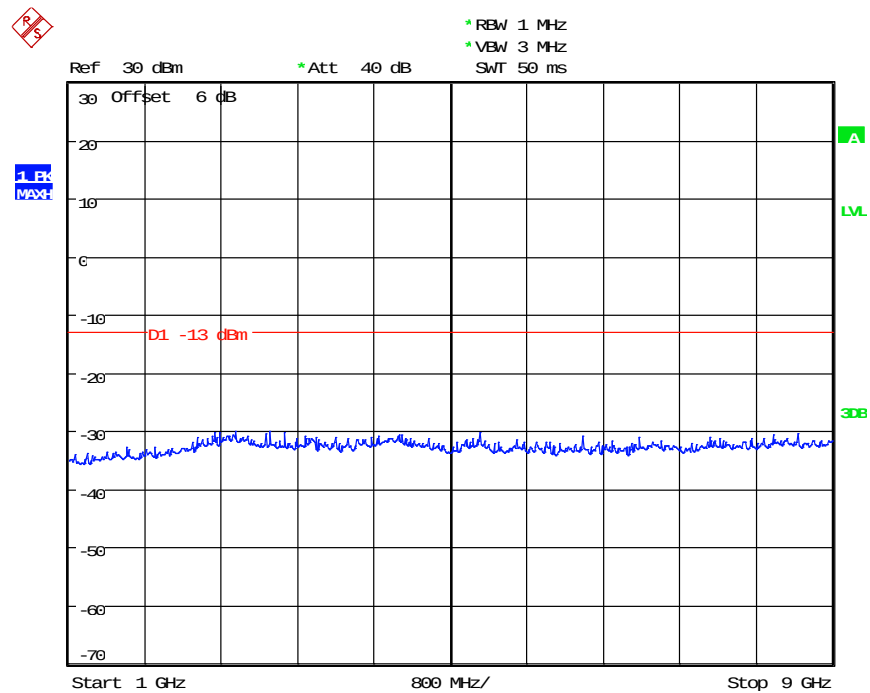
Test Plots:

NOTE:

- 1) the power of the EUT transmitting frequency should be ignored.*
- 2) All of WCDMA/HSDPA/HSUPA/HSPA+ mode were tested, and just the worst data was recorded in this report.*

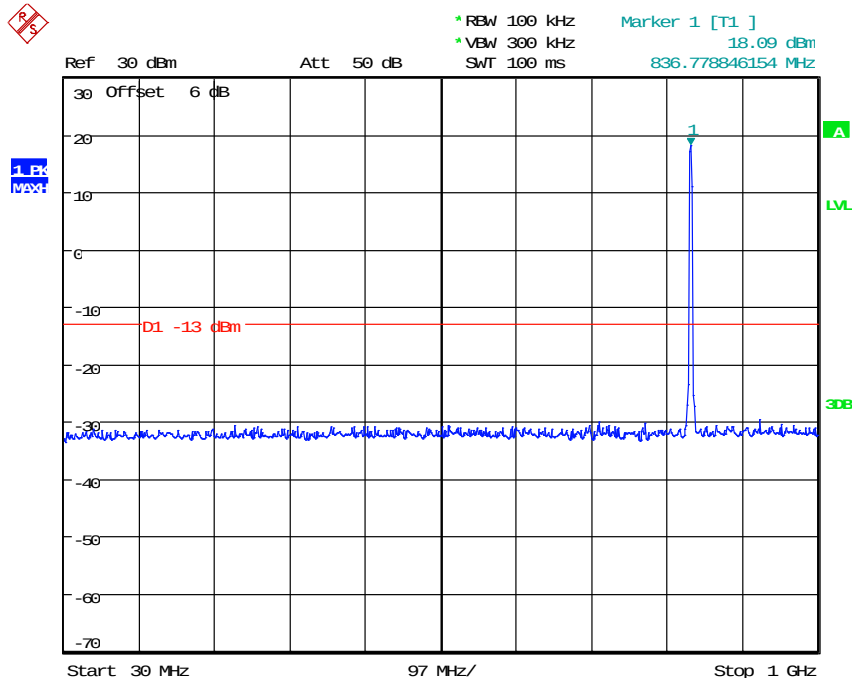


Date: 3.MAY.2016 20:53:59

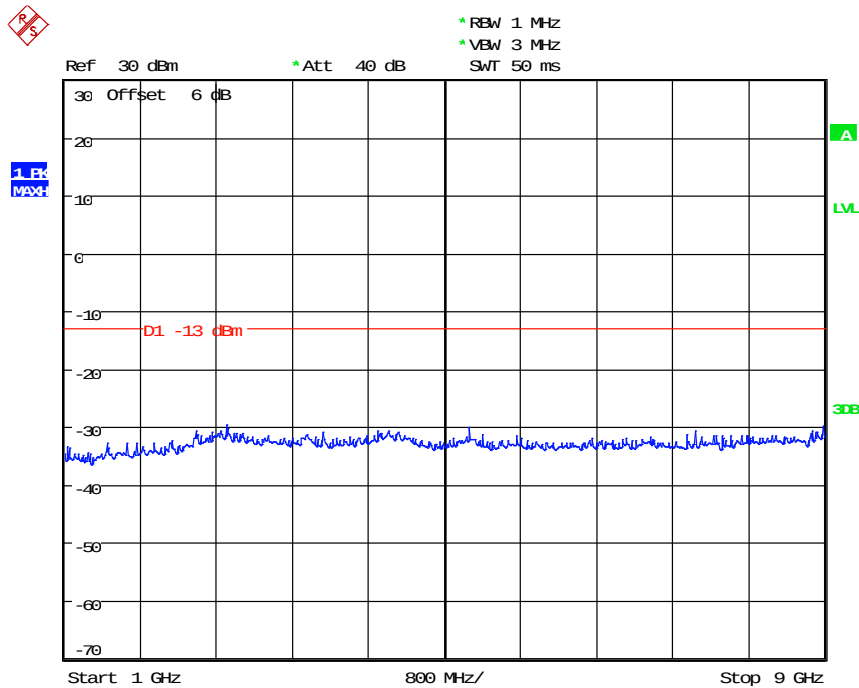


Date: 3.MAY.2016 20:57:10

(WCDMA Band V, Channel = 4132, 30MHz to 9GHz)

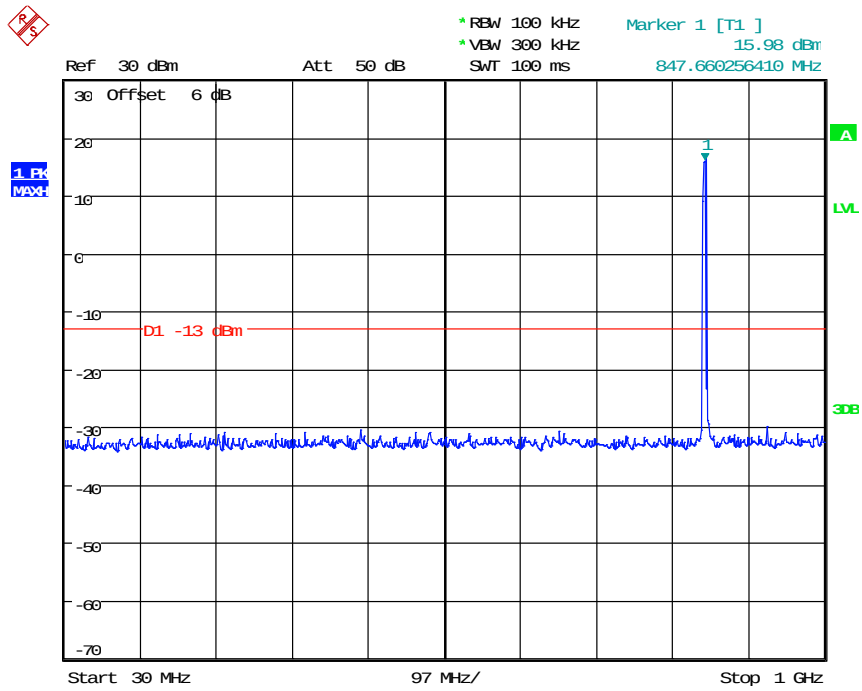


Date: 3.MAY.2016 20:48:34

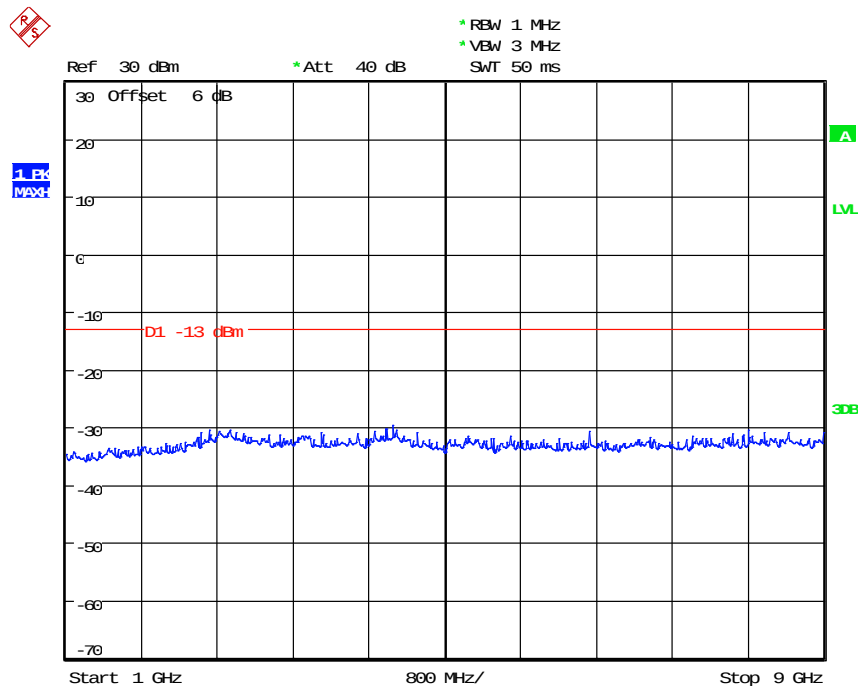


Date: 3.MAY.2016 20:58:00

(WCDMA BandV Channel = 4182, 30MHz to 9GHz)

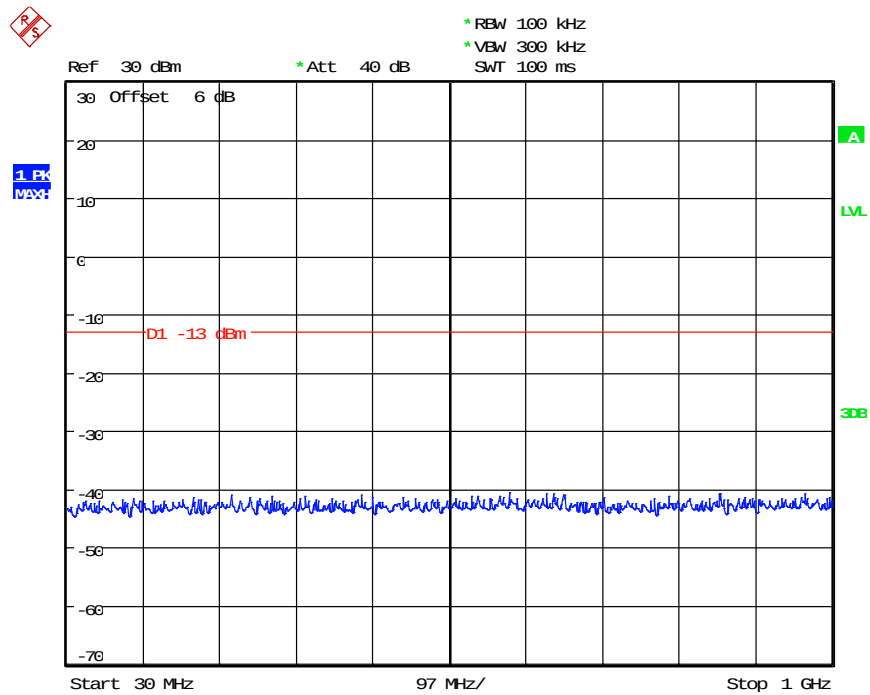


Date: 3.MAY.2016 20:54:56

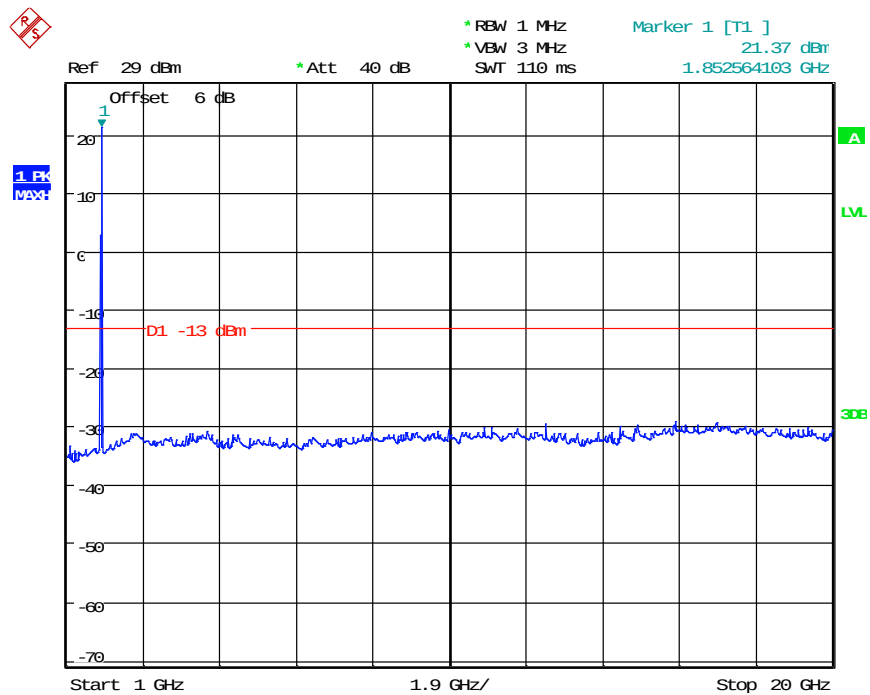


Date: 3.MAY.2016 20:58:34

(WCDMA Band V Channel = 4233, 30MHz to 9GHz)

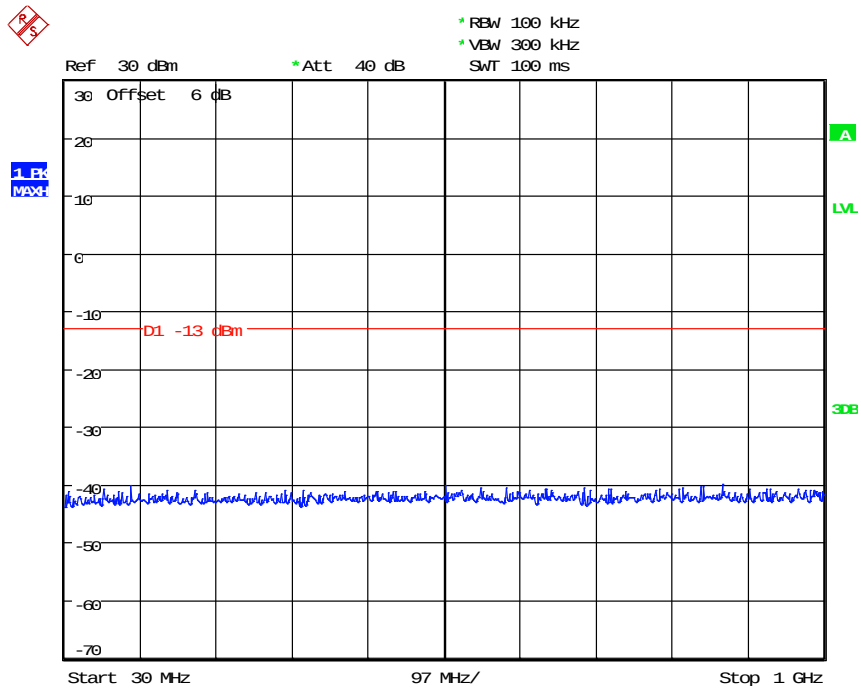


Date: 4.MAY.2016 13:50:44

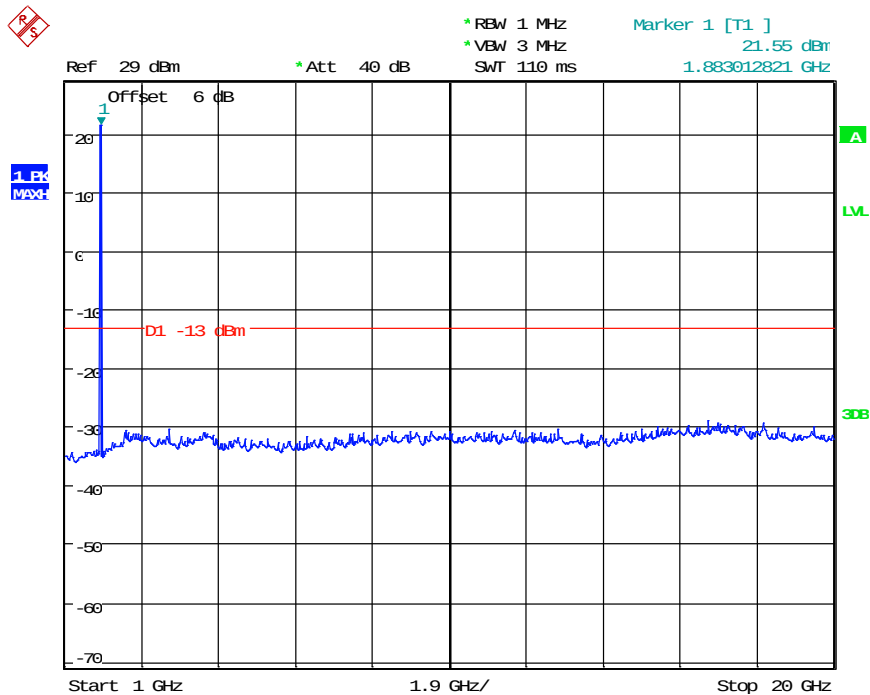


Date: 5.MAY.2016 12:32:02

(WCDMA Band II, Channel = 9262, 30MHz to 20GHz)

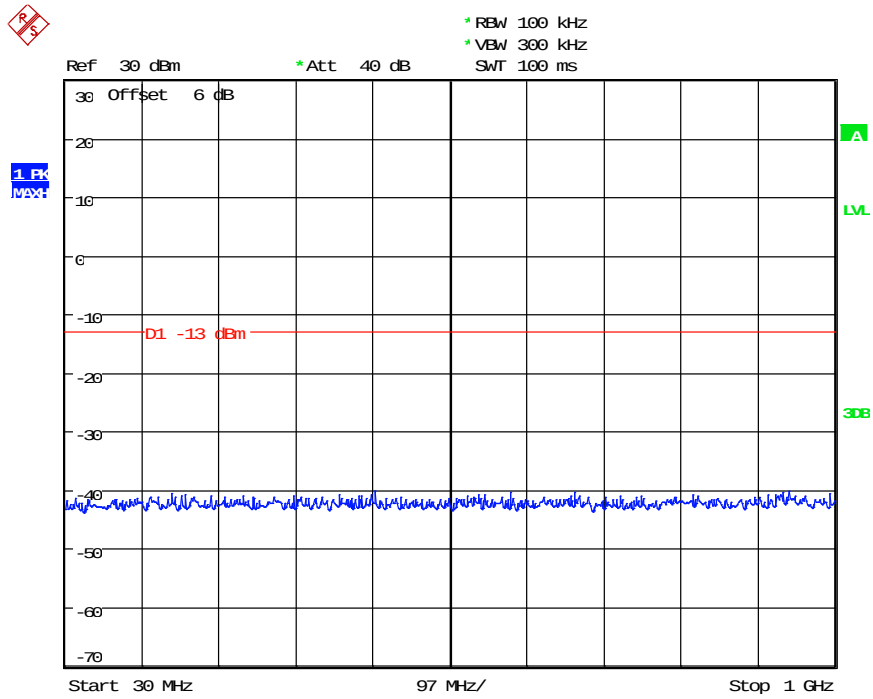


Date: 4.MAY.2016 13:50:18

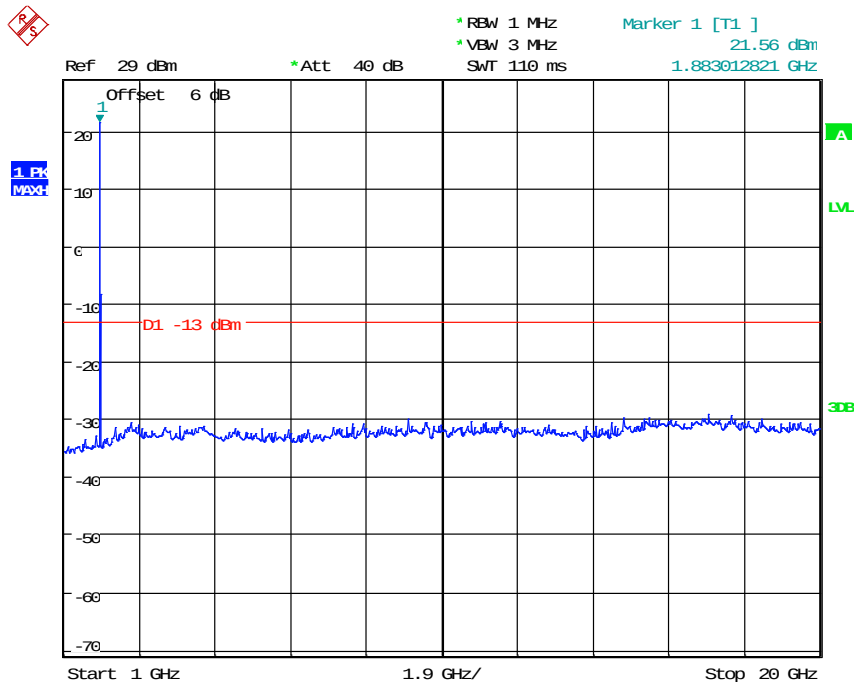


Date: 5.MAY.2016 12:32:30

(WCDMA Band II Channel =9400, 30MHz to 20GHz)



Date: 4.MAY.2016 13:49:24



Date: 5.MAY.2016 12:32:57

(WCDMA Band II Channel = 9538, 30MHz to 20GHz)



4.6 Band Edge

4.6.1 Requirement

According to FCC section 22.917(b) and FCC section 24.238(b), in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

4.6.2 Test Description

See section 4.2.1 of this report.

4.6.3 Test Results

The lowest and highest channels are tested to verify the band edge emissions.

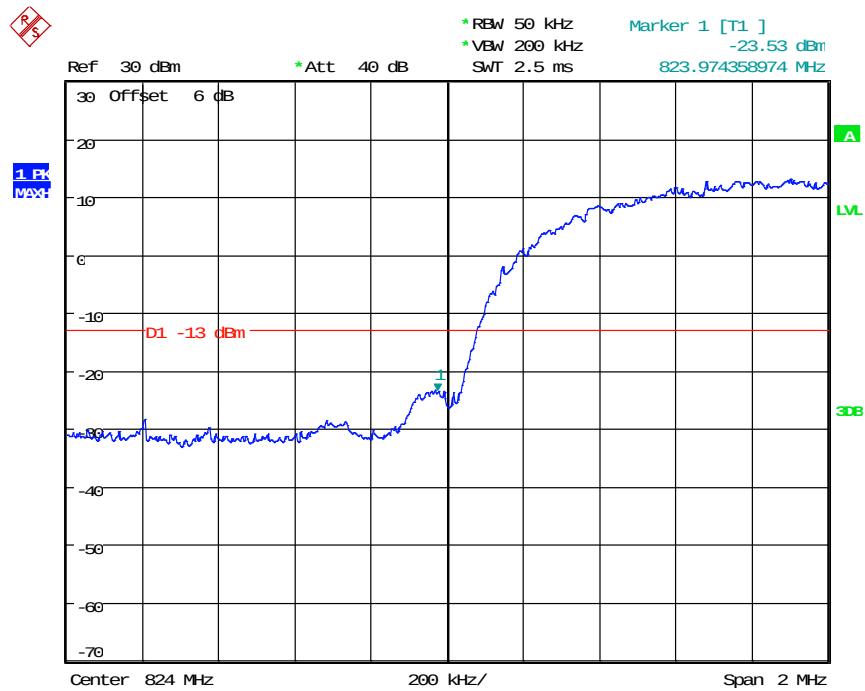
Band	Channel	Frequency (MHz)	Measured Max. Band Edge Emission (dBm)	Refer to Plot	Limit (dBm)	Verdict
WCDMA Band V	4132	826.4	-23.53	Plat A1	-13	PASS
	4233	846.6	-22.67	Plot A2		PASS
HSDPA Band V	4132	826.4	-23.51	Plat B1		PASS
	4233	846.6	-21.77	Plot B2		PASS
HSUPA Band V	4132	826.4	-23.75	Plat C1		PASS
	4233	846.6	-22.84	Plot C2		PASS
HSPA+ Band V	4132	826.4	-23.88	Plat D1		PASS
	4233	846.6	-23.19	Plot D2		PASS
WCDMA Band II	9262	1852.4	-22.43	Plat E1		PASS
	9538	1907.6	-18.45	Plot E2		PASS
HSDPA Band II	9262	1852.4	-22.49	Plat F1		PASS
	9538	1907.6	-18.16	Plot F2		PASS
HSUPA Band II	9262	1852.4	-22.78	Plat G1		PASS
	9538	1907.6	-19.07	Plot G2		PASS
HSPA+ Band II	9262	1852.4	-22.30	Plat H1		PASS
	9538	1907.6	-17.78	Plot H2		PASS

NOTE:

1) The power of the EUT transmitting frequency should be ignored.

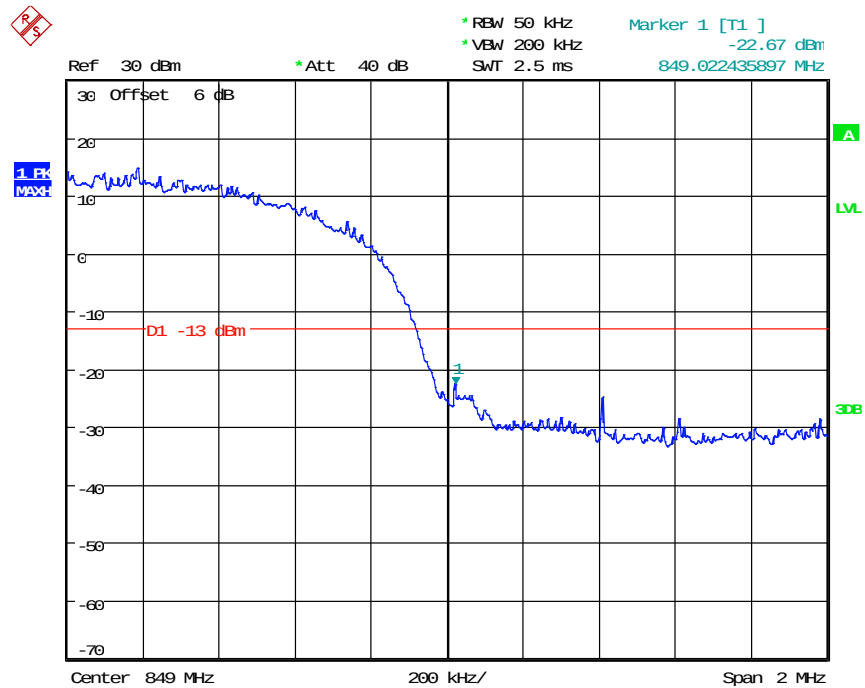


Test Plots:



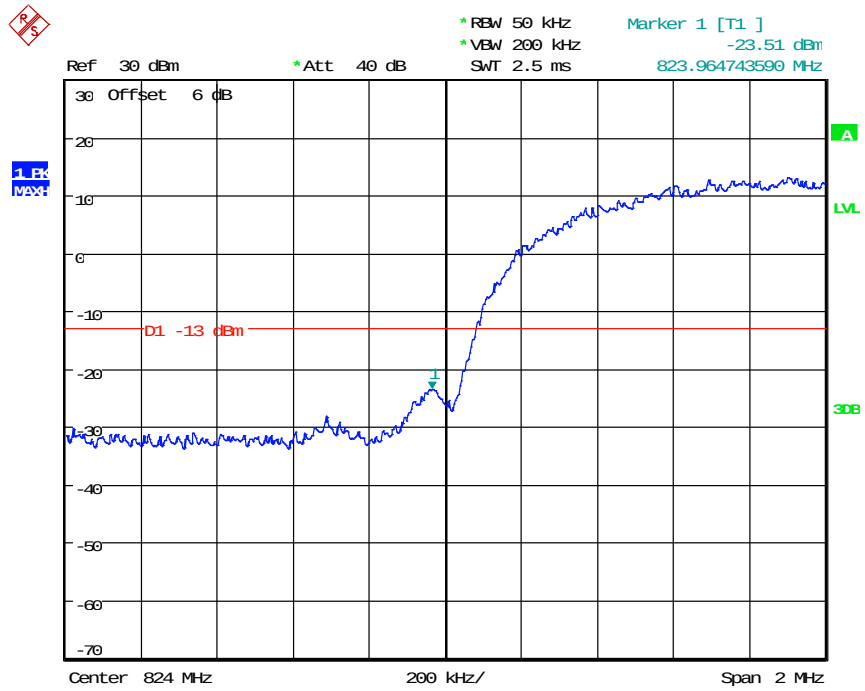
Date: 4.MAY.2016 13:06:07

(Plot A1:WCDMA Band V Channel=4132)



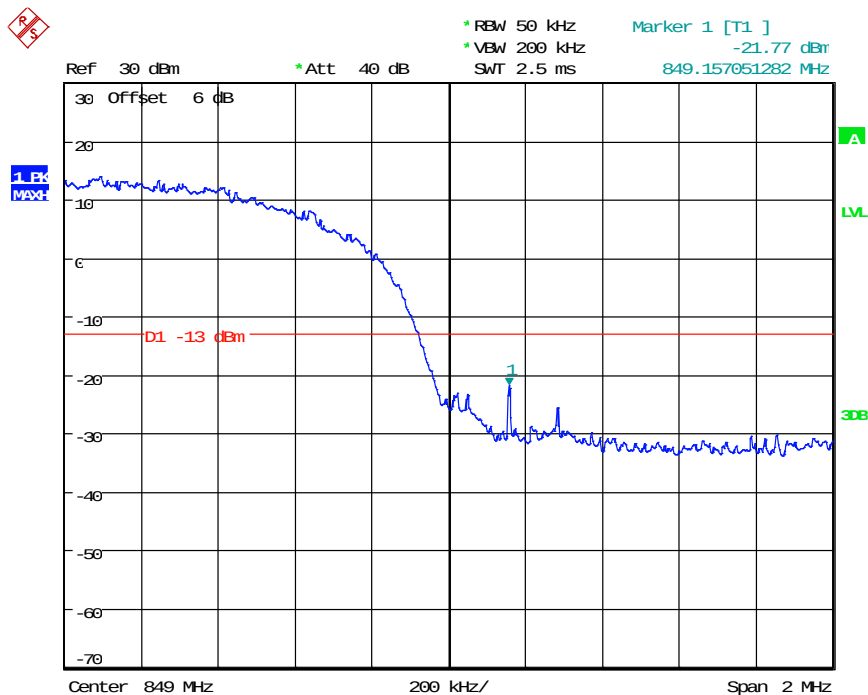
Date: 4.MAY.2016 13:08:45

(Plot A2:WCDMA Band V Channel=4233)



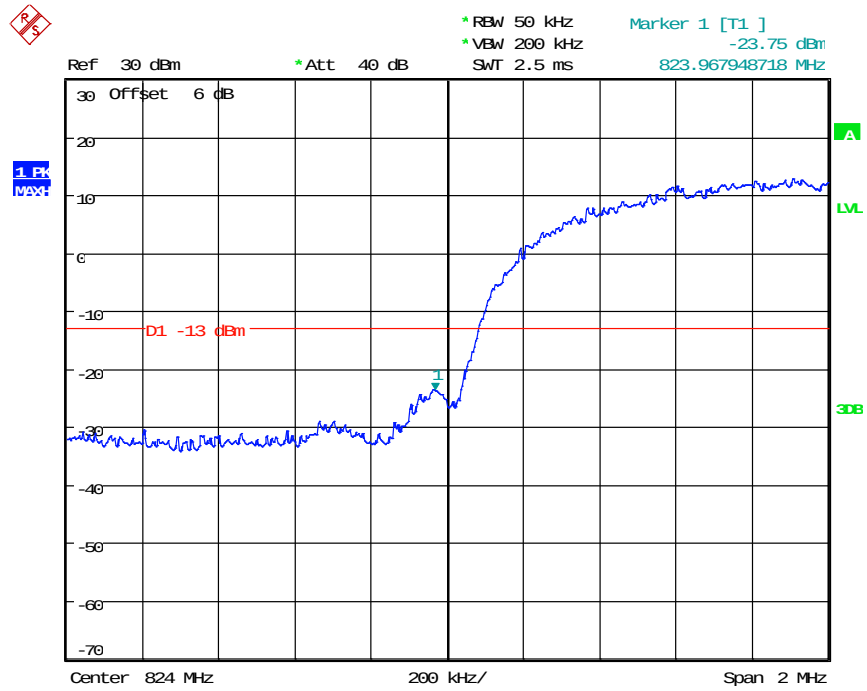
Date: 4.MAY.2016 13:06:49

(Plot B1: HSDPA Band V Channel=4132)



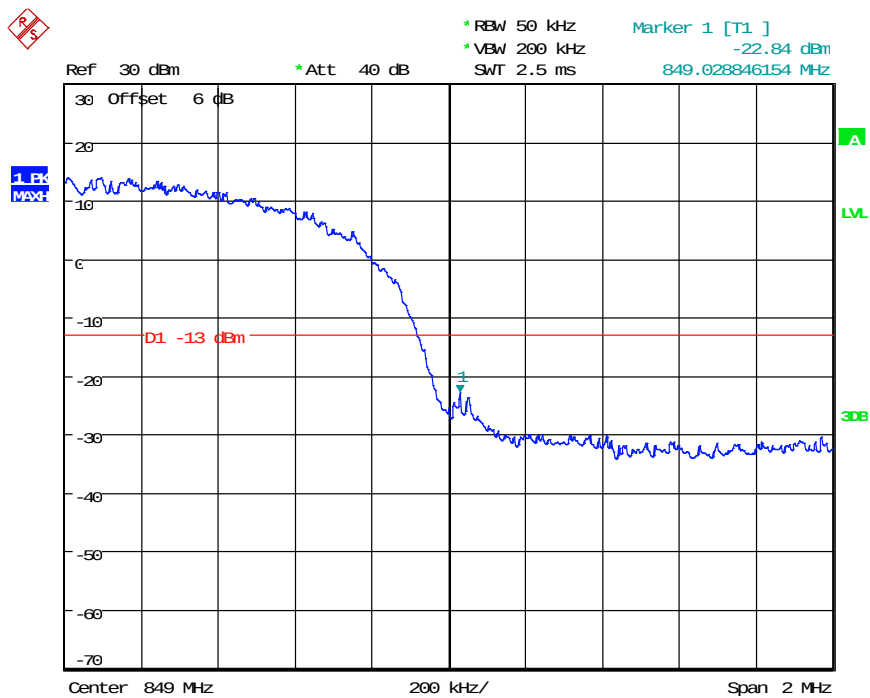
Date: 4.MAY.2016 13:09:13

(Plot B2: HSDPA Band V Channel=4233)



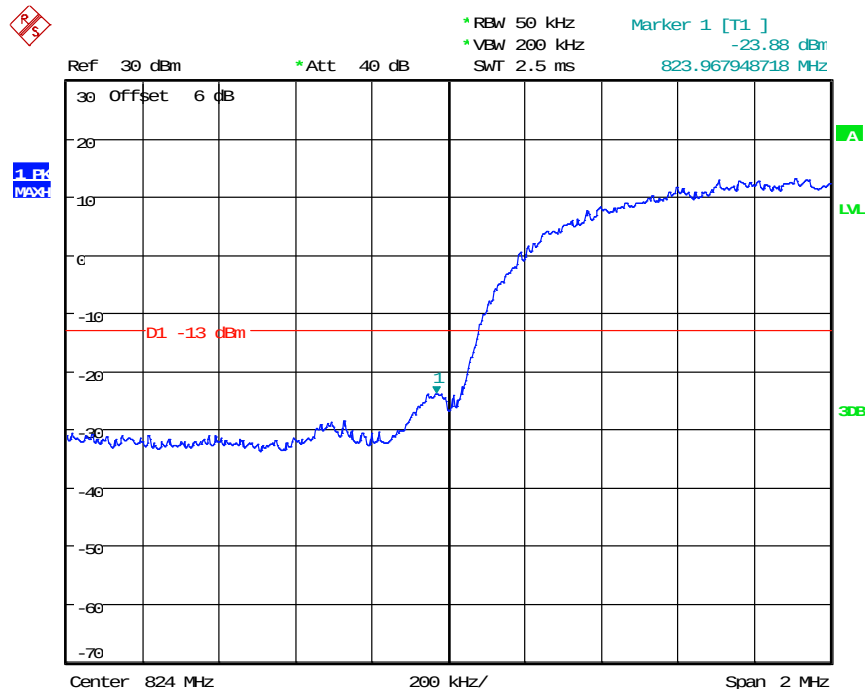
Date: 4.MAY.2016 13:07:08

(Plot C1: HSUPA Band V Channel=4132)



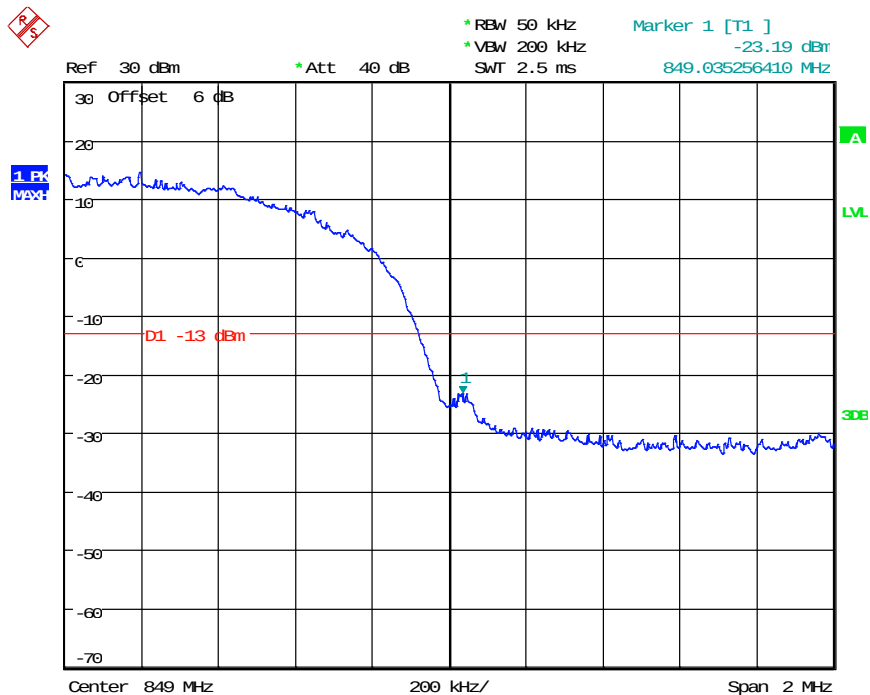
Date: 4.MAY.2016 13:09:32

(Plot C2: HSUPA Band V Channel=4233)



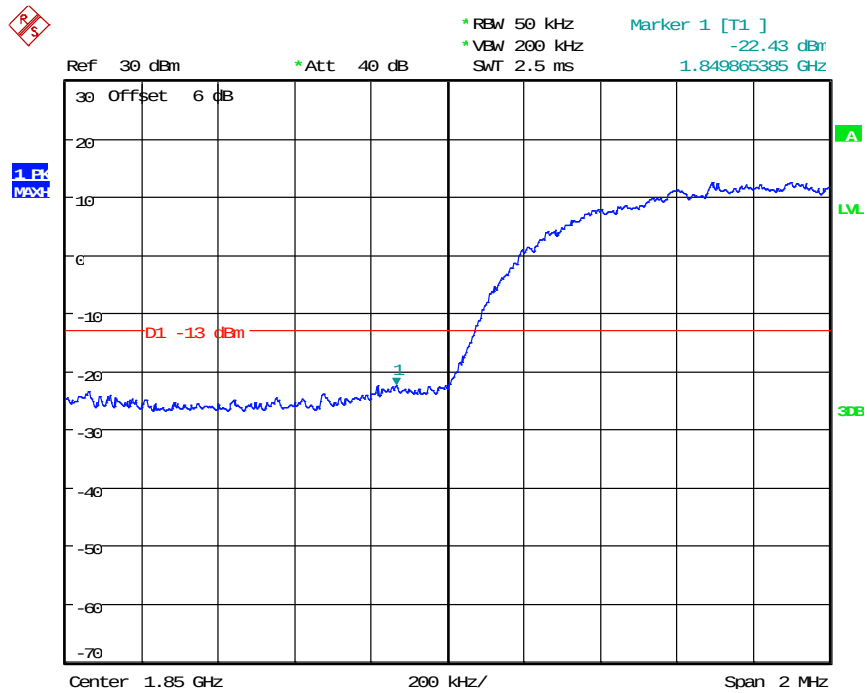
Date: 4.MAY.2016 13:07:31

(Plot D1: HSPA+ Band V Channel=4132)



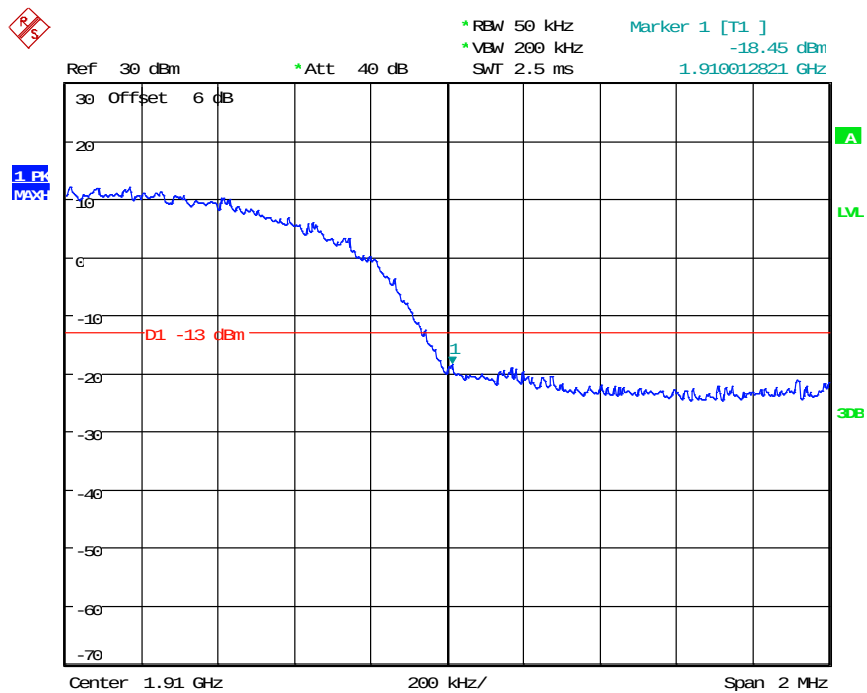
Date: 4.MAY.2016 13:10:02

(Plot D2: HSPA+ Band V Channel=4233)



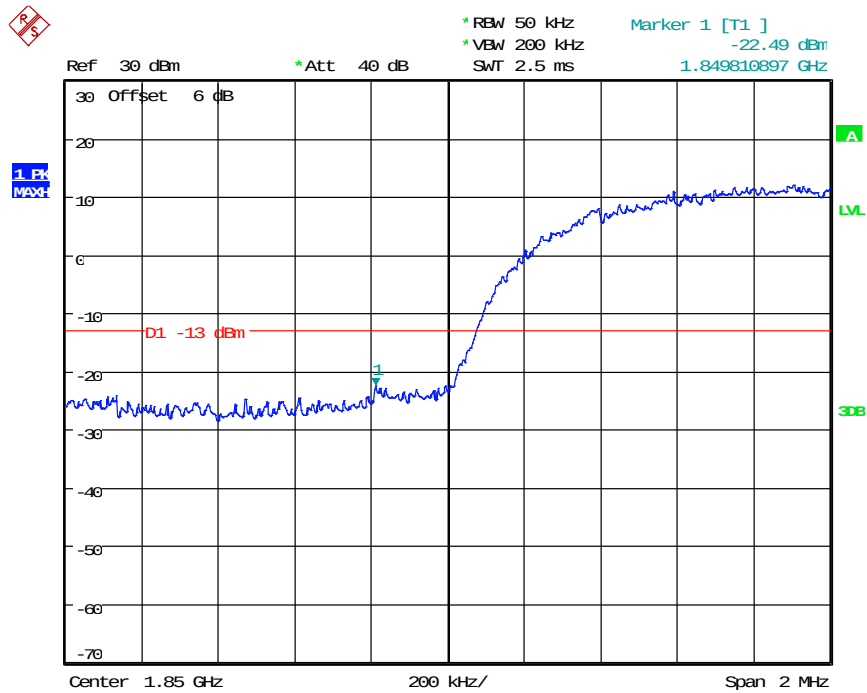
Date: 4.MAY.2016 14:10:52

(Plot E1: WCDMA Band II Channel=9262)



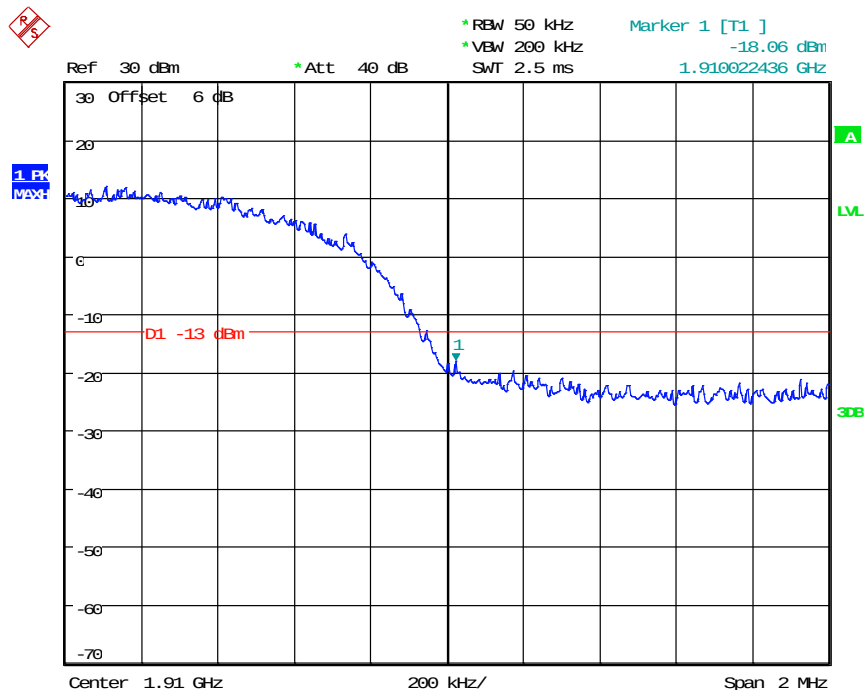
Date: 4.MAY.2016 14:12:43

(Plot E2: WCDMA Band II Channel=9538)



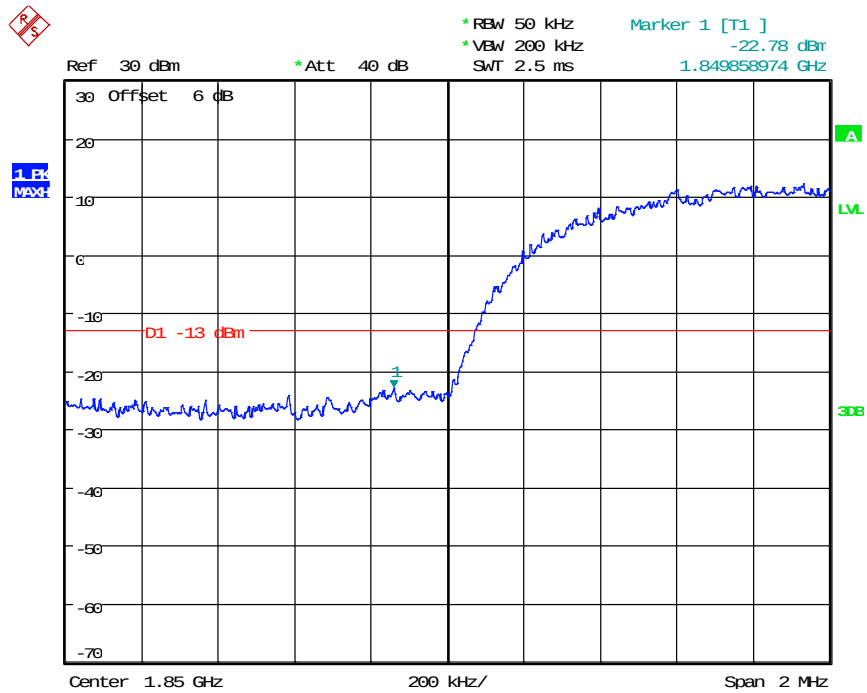
Date: 4.MAY.2016 14:11:12

(Plot F1:HSDPA Band II Channel=9262)



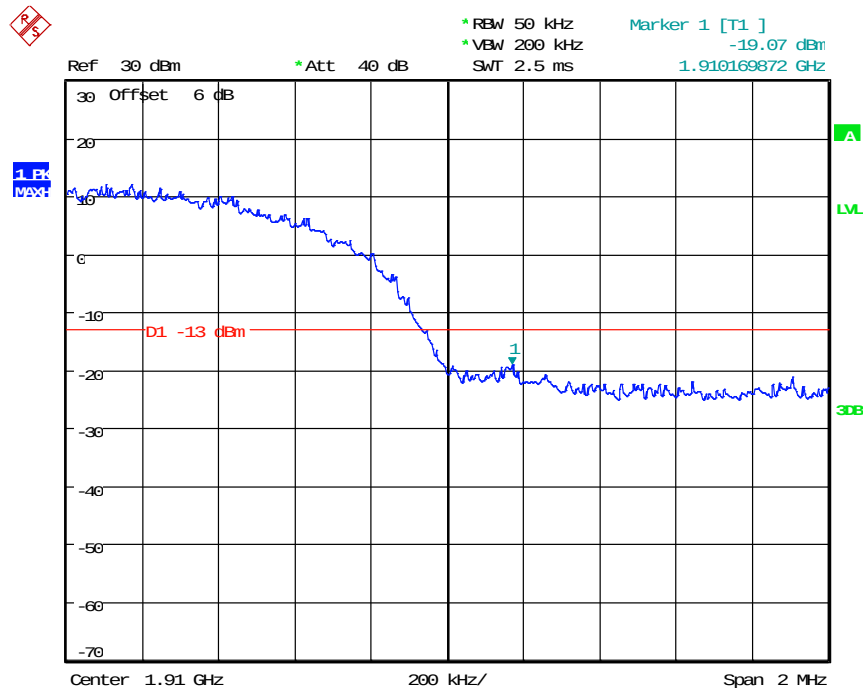
Date: 4.MAY.2016 14:13:00

(Plot F2: HSDPA Band II Channel=9538)



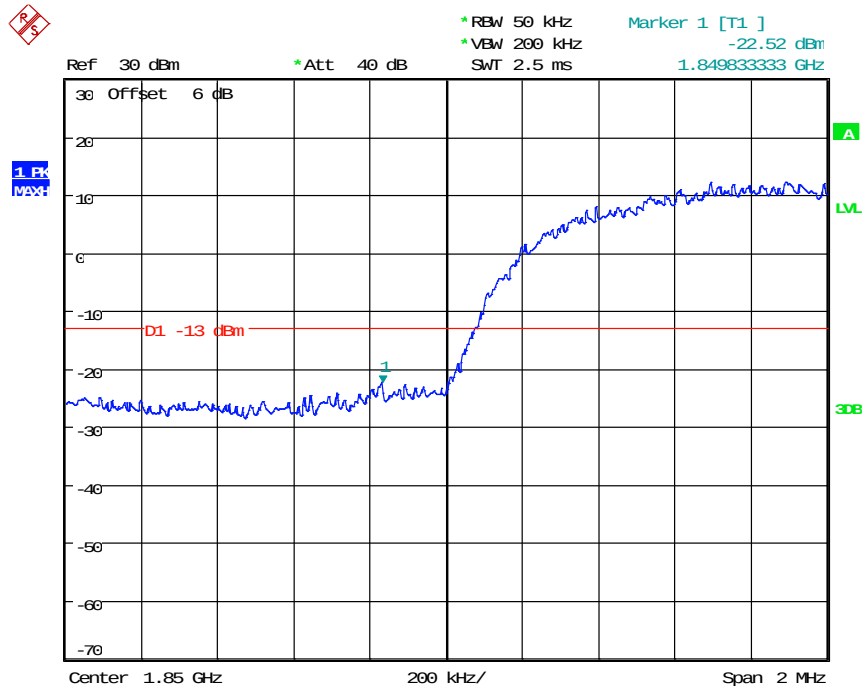
Date: 4.MAY.2016 14:11:27

(Plot G1: HSUPA Band II Channel=9262)



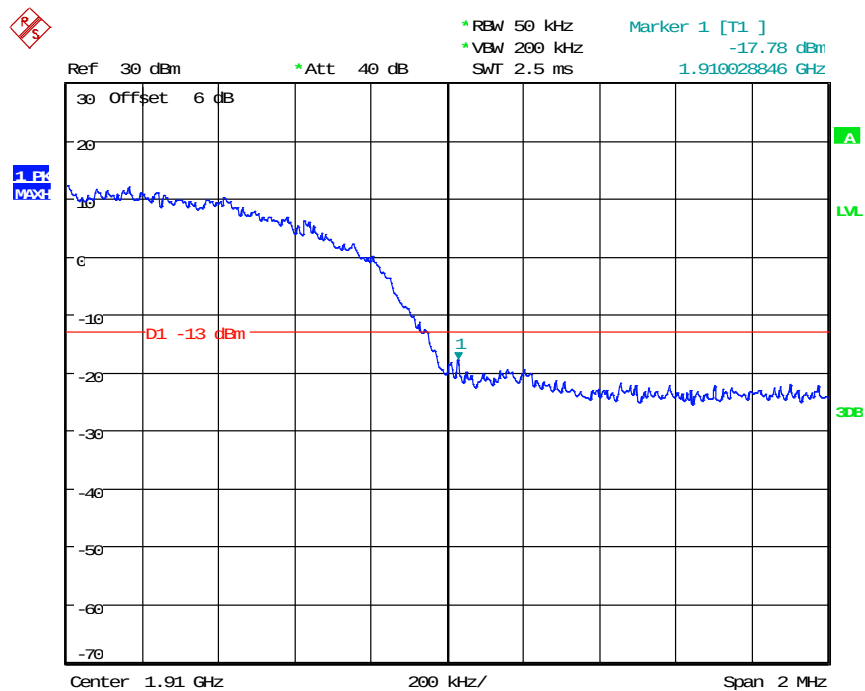
Date: 4.MAY.2016 14:13:19

(Plot G2: HSUPA Band II Channel=9538)



Date: 4.MAY.2016 14:11:44

(Plot H1: HSPA+ Band II Channel=9262)



Date: 4.MAY.2016 14:13:37

(Plot H2: HSPA+ Band II Channel=9538)

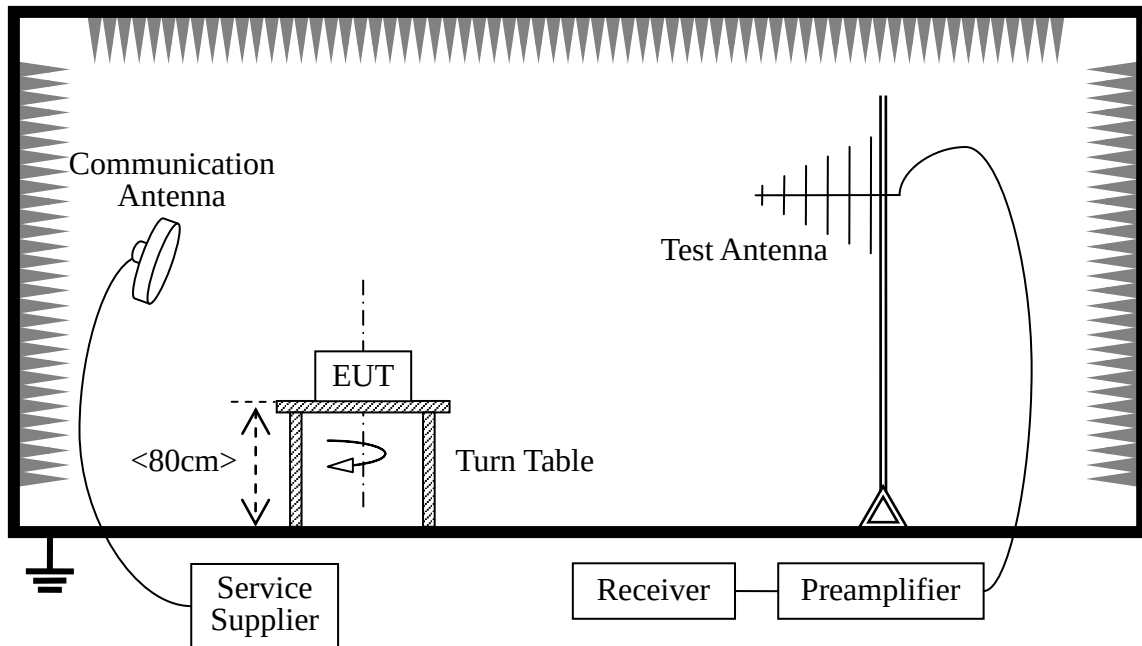


4.7 Transmitter Radiated Power (EIRP/ERP)

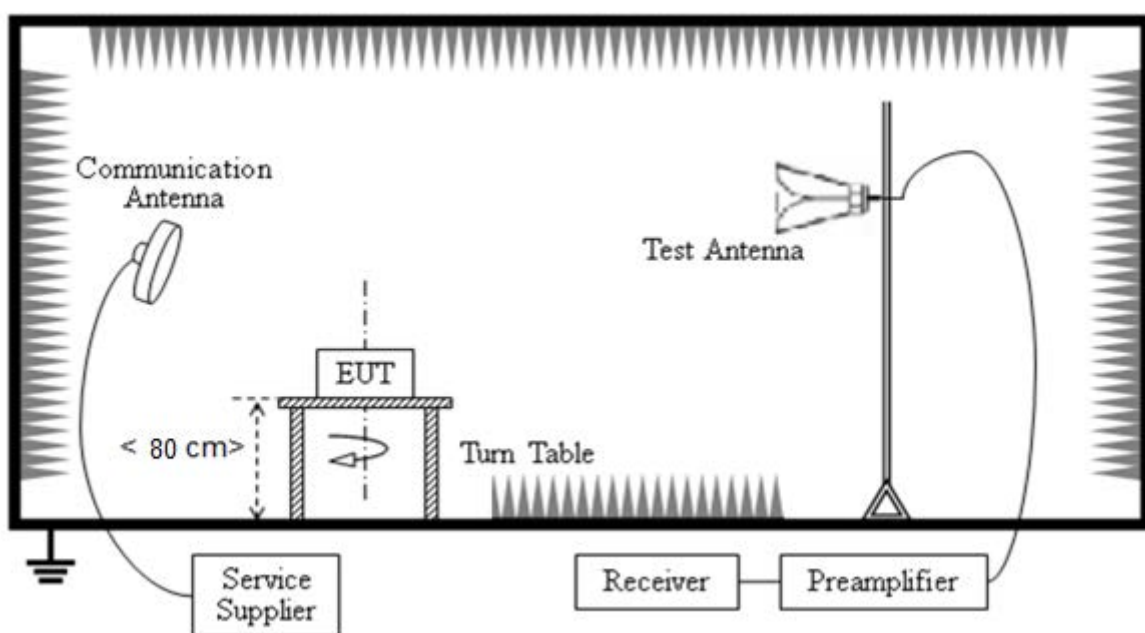
4.7.1 Requirement

According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, the broadband PCS mobile station is limited to 2Wattse.i.r.p.peak power.

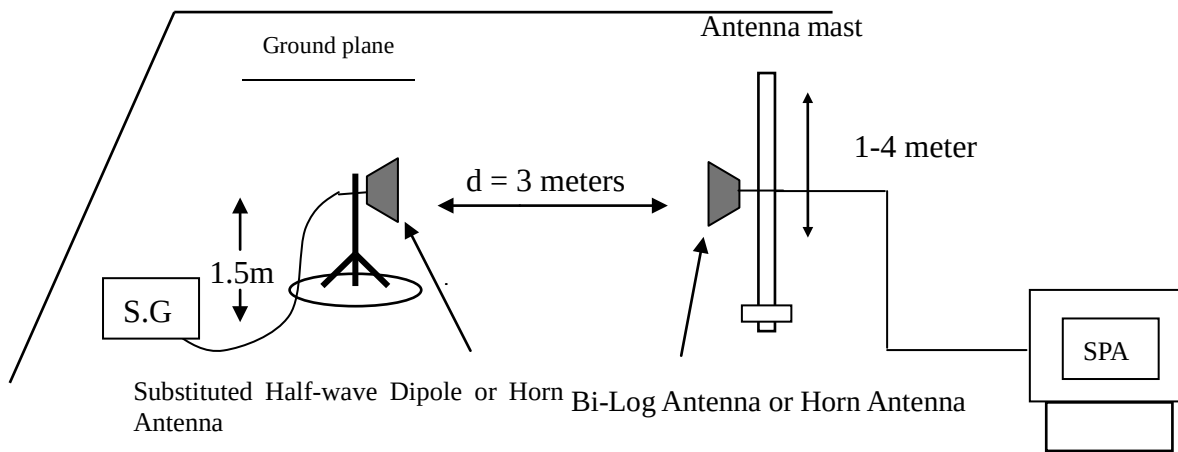
4.7.2 Test Description



Radiated Emissions 30-1000MHz



Radiated Emissions above 1000MHz



Substituted method

4.7.3 Test Procedure

The measurements procedures in TIA-603C-2004 are used.

1. EUT was placed on a 0.8 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 1-4m. 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. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (P_r).
3. 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 (P_{Mea}) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
4. The cable loss (P_{cl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test. The measurement results are obtained as described below:
$$\text{Power(EIRP)} = P_{Mea} + P_{cl} + G_a$$
5. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dBi}$.



4.7.4 Test Results

The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. The lowest, middle and highest channels are tested. All modes are tested.

Limits

Band	Burst Peak ERP (dBm)
WCDMA Band V	≤38.5dBm (7W)
WCDMA Band II	≤38.5dBm (7W)

Measurement Result

Band	Channel	Peak ERP (dBm)	Limit (dBm)	Polarization
V	4132	18.30	38.5	Horizontal
	4182	18.15	38.5	Horizontal
	4233	18.95	38.5	Horizontal
	4132	15.79	38.5	Vertical
	4182	14.62	38.5	Vertical
	4233	15.11	38.5	Vertical

Band	Channel	Peak EIRP (dBm)	Limit (dBm)	Polarization
II	9262	23.54	38.5	Horizontal
	9400	23.14	38.5	Horizontal
	9538	22.03	38.5	Horizontal
	9262	20.74	38.5	Vertical
	9400	20.98	38.5	Vertical
	9538	20.36	38.5	Vertical

Remark:

$$\text{ERP(dBm)} = P_{\text{Mea}} + P_{\text{cl}} + G_a - 2.15$$

NOTE:

- 1) the power of the EUT transmitting frequency should be ignored.
- 2) All of WCDMA/HSDPA/HSUPA/HSPA+ modes were tested, and only the highest power was record in this report.



4.8 Radiated Out of Band Emissions

4.8.1 Requirement

According to FCC section 22.917(a) and section 24.238(a), 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. This calculated to be -13dBm.

4.8.2 Test Description

See section 4.6.2 of this report.

4.8.3 Test Description

See section 4.7.2 of this report.

4.8.4 Test Procedure

1. The lowest, middle and the highest channel were selected to perform tests respectively.
2. The EUT was placed on a rotatable non-conductive table 0.8 meters above the ground.
3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.
4. The table was rotated 360 degrees to determine the position of the highest spurious emission.
5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical polarizations.
6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.
7. A substituted antenna was in place of the EUT and was driven by a signal generator.
8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.
9. Taking the record of output power at antenna port.
10. Repeat step 7 to step 8 for another polarization.
11. $EIRP \text{ (dBm)} = S.G. \text{ Power} - Tx \text{ Cable Loss} + Tx \text{ Antenna Gain}$
12. $ERP \text{ (dBm)} = EIRP - 2.15$
13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
14. The limit line is derived from $43 + 10 \log(P)$ dB below the transmitter power P(Watts)
 $= P(W) - [43 + 10 \log(P)] \text{ (dB)}$
 $= [30 + 10 \log(P)] \text{ (dBm)} - [43 + 10 \log(P)] \text{ (dB)}$
 $= -13 \text{ dBm}.$



4.8.5 Test Results

Measured Max. Spurious Emission(dBm)						
Band	Channel	Polarization	Frequency	Level(dBm)	Limit(dBm)	Verdict
Band V	4132	V	1652.8	-51.3	-13	Pass
		V	2479.2	-50.1	-13	Pass
		V	3305.6	nf	-13	Pass
		V	4132.0	nf	-13	Pass
		V	4958.4	nf	-13	Pass
		H	1652.8	-52.0	-13	Pass
		H	2479.2	-47.7	-13	Pass
		H	3305.6	nf	-13	Pass
		H	4132.0	nf	-13	Pass
		H	4958.4	nf	-13	Pass
Band V	4182	V	1672.8	-52.7	-13	Pass
		V	2509.2	-51.6	-13	Pass
		V	3345.6	nf	-13	Pass
		V	4182.0	nf	-13	Pass
		V	5018.4	nf	-13	Pass
		H	1672.8	-49.0	-13	Pass
		H	2509.2	-51.7	-13	Pass
		H	3345.6	nf	-13	Pass
		H	4182.0	nf	-13	Pass
		H	5018.4	nf	-13	Pass
Band V	4233	V	1693.2	-50.6	-13	Pass
		V	2539.8	-52.7	-13	Pass
		V	3386.4	nf	-13	Pass
		V	4233.0	nf	-13	Pass
		V	5079.6	nf	-13	Pass
		H	1693.2	-51.0	-13	Pass
		H	2539.8	-49.7	-13	Pass
		H	3386.4	nf	-13	Pass
		H	4233.0	nf	-13	Pass
		H	5079.6	nf	-13	Pass



Measured Max. Spurious Emission(dBm)						
Band	Channel	Polarization	Frequency	Level(dBm)	Limit(dBm)	Verdict
Band II	9262	V	3704.8	-53.9	-13	Pass
		V	5557.2	-52.1	-13	Pass
		V	7409.6	-50.3	-13	Pass
		V	9262.0	nf	-13	Pass
		V	11114.4	nf	-13	Pass
		H	3704.8	-47.0	-13	Pass
		H	5557.2	-52.6	-13	Pass
		H	7409.6	-51.7	-13	Pass
		H	9262.0	nf	-13	Pass
		H	11114.4	nf	-13	Pass
Band II	9400	V	3760.0	-55.2	-13	Pass
		V	5640.0	-52.6	-13	Pass
		V	7520.0	-52.4	-13	Pass
		V	9400.0	nf	-13	Pass
		V	11280.0	nf	-13	Pass
		H	3760.0	-44.1	-13	Pass
		H	5640.0	-55.7	-13	Pass
		H	7520.0	-52.1	-13	Pass
		H	9400.0	nf	-13	Pass
		H	11280.0	nf	-13	Pass
Band II	9538	V	3815.2	-50.3	-13	Pass
		V	5722.8	-53.6	-13	Pass
		V	7630.4	-51.3	-13	Pass
		V	9538.0	nf	-13	Pass
		V	11445.6	nf	-13	Pass
		H	3815.2	-49.1	-13	Pass
		H	5722.8	-50.7	-13	Pass
		H	7630.4	-53.0	-13	Pass
		H	9538.0	nf	-13	Pass
		H	11445.6	nf	-13	Pass

NOTE:

- 1) the power of the EUT transmitting frequency should be ignored.
- 2) All spurious emission tests were performed in X,Y,Z axis direction, EUT was tested in Voice and HSDPA mode.
Only the worst axis test condition was recored in this test report.
- 3) 'nf' means that the emission level is too low to read out from the noise floor.
- 4) The emission levels of below 1 GHz are very lower than the limit(<-40dBm) and not show in this report.
- 5) All of WCDMA/HSDPA/HSUPA/HSPA+ modes were tested, and only the worst result was record in this report.



Photos of the EUT



**** END OF REPORT ****