

TEST REPORT

of

FCC Part 2 Subpart J, Part 22 Subpart C/H,
Part 24 Subpart E and Part 27 Subpart C

FCC ID: BEJTL1T22NR

Equipment Under Test : Telematics
Model Name : TL1T22NR
Variant Model Name(s) : Refer to the page 3
Applicant : LG Electronics USA
Manufacturer : LG Electronics Inc.
Date of Receipt : 2022.11.04
Date of Test(s) : 2022.11.04 ~ 2022.12.26
Date of Issue : 2022.12.26

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

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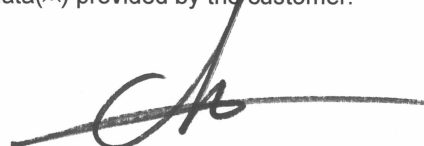
We are responsible for all the information of this test report except for the data(※) provided by the customer.

Tested by:



Teo Kim

Technical
Manager:



Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory



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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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1.2. Details of Applicant

Applicant : LG Electronics USA

Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, United States, 07632

Contact Person : Kim, Sung-soo

Phone No. : +1 201 266 2215

1.3. Details of Manufacturer

Company : LG Electronics Inc.

Address : 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Korea, 07796

1.4. Description of EUT

Kind of Product	Telematics
Model Name	TL1T22NR
Variant Model Name	TL1T22NE
Serial Number	352162110147030
Power Supply	DC 12.5 V
Rated Power	WCDMA II, IV, V: 24 dB m GSM850: 33 dB m GSM1900: 30 dB m
Frequency Range	WCDMA II: 1 850 MHz ~ 1 910 MHz WCDMA IV: 1 710 MHz ~ 1 755 MHz WCDMA V: 824 MHz ~ 849 MHz GSM 850: 824 MHz ~ 849 MHz GSM 1 900: 1 850 MHz ~ 1 910 MHz
Modulation Technique	QPSK, 16QAM, GMSK, 8PSK
Antenna Type	External Antenna
Antenna Gain*	824 MHz ~ 849 MHz: 2.1 dBi 1 710 MHz ~ 1 780 MHz: 5.4 dBi 1 850 MHz ~ 1 915 MHz: 6.2 dBi
H/W Version	Rev.D1
S/W Version	v004.144.010

1.5. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Interval	Cal. Due
Signal Generator	Agilent	E8257D	MY51501169	Mar. 04, 2022	Annual	Mar. 04, 2023
Signal Generator	R&S	SMBV100A	255834	May 25, 2022	Annual	May 25, 2023
Spectrum Analyzer	R&S	FSV30	103210	Dec. 07, 2022	Annual	Dec. 07, 2023
Spectrum Analyzer	Agilent	N9020A	MY53421758	Aug. 26, 2022	Annual	Aug. 26, 2023
Mobile Test Unit	R&S	CMW 500	144034	Feb. 21, 2022	Annual	Feb. 21, 2023
Power Meter	Anritsu	ML2495A	1223004	Nov. 29, 2022	Annual	Nov. 29, 2023
Power Sensor	Anritsu	MA2411B	1207272	May 27, 2022	Annual	May 27, 2023
Temperature Chamber	ESPEC CORP.	SH-662	15004184	Jun. 02, 2022	Annual	Jun. 02, 2023
Low Pass Filter	Mini-Circuits	NLP-1200+	V 8979400903-2	Feb. 10, 2022	Annual	Feb. 10, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX10-900-1000-18000-40SS	7	Mar. 04, 2022	Annual	Mar. 04, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX2.2/12.75G-10SS	8	Mar. 04, 2022	Annual	Mar. 04, 2023
High Pass Filter	Wainwright Instrument GmbH	WHKX3.0/18G-6SS	21	Jun. 09, 2022	Annual	Jun. 09, 2023
High Pass Filter	Wainwright Instrument GmbH	WHNX7.5/26.5G-6SS	11	Oct. 24, 2022	Annual	Oct. 24, 2023
BRIDGE COUPLER	MARKI MICROWAVE INC	CBR16-0012	1542	May 06, 2022	Annual	May 06, 2023
Directional Coupler	KRYTAR	152613	122660	Jul. 06, 2022	Annual	Jul. 06, 2023
DC Power Supply	R&S	HMP2020	020089489	May 17, 2022	Annual	May 17, 2023
Preamplifier	H.P.	8447F	2944A03909	Aug. 04, 2022	Annual	Aug. 04, 2023
Preamplifier	R&S	SCU 18	10117	Jun. 13, 2022	Annual	Jun. 13, 2023
Preamplifier	TESTEK	TK-PA1840H	130016	Jan. 10, 2022	Annual	Jan. 10, 2023
Test Receiver	R&S	ESU26	100109	Jan. 18, 2022	Annual	Jan. 18, 2023
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Aug. 23, 2021	Biennial	Aug. 23, 2023
Bilog Antenna	Schwarzbeck Mess-Elektronik	VULB9163	01126	Feb. 07, 2022	Annual	Feb. 07, 2023
Horn Antenna	R&S	HF906	100326	Feb. 18, 2022	Annual	Feb. 18, 2023
Horn Antenna	Schwarzbeck Mess-Elektronik	BBHA 9170	9170-540	Nov. 30, 2022	Annual	Nov. 30, 2023
Antenna Master	Innco systems GmbH	MA4640-XP-ET	MA4640/536/383 30516/L	N.C.R.	N/A	N.C.R.
Turn Table	Innco systems GmbH	DS 1200S	N/A	N.C.R.	N/A	N.C.R.
Controller	Innco systems GmbH	CONTROLLER CO3000-4P	CO3000/963/383 30516/L	N.C.R.	N/A	N.C.R.
Anechoic Chamber	SY Corporation	L x W x H (9.6 m x 6.4 m x 6.6 m)	N/A	N.C.R.	N/A	N.C.R.
Coaxial Cable	RFONE	MWX221-NMSNMS (4 m)	J1023142	Oct. 04, 2022	Semi-Annual	Apr. 04, 2023
Coaxial Cable	Qualwave Inc.	QA500-18-NN-10 (10 m)	22200114	Oct. 04, 2022	Semi-Annual	Apr. 04, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182287	Aug. 18, 2022	Semi-Annual	Feb. 18, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182288	Aug. 18, 2022	Semi-Annual	Feb. 18, 2023
Coaxial Cable	RADIALL	TESTPRO 3	182291	Aug. 18, 2022	Semi-Annual	Feb. 18, 2023

Note;

- For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 2, 22, 24 and 27		
Section(s)	Test Item	Result
§2.1046 §22.913(a)(5) §24.232(c) §27.50(d)(4)	E.R.P. / E.I.R.P.	Complied
§2.1053 §22.917(a) §24.238(a) §27.53(h)(1)	Spurious Radiated Emission	Complied
§2.1046	Conducted Output Power	Complied
§2.1049	Occupied Bandwidth	Complied
§22.913(d) §24.232(d) §27.50(d)(5)	Peak-Average Ratio	Complied
§2.1051 §22.917(a) §24.238(a) §27.53(h)(1)	Spurious Emission at Antenna Terminal	Complied
§22.917(a) §24.238(a) §27.53(h)(1)	Band Edge	Complied
§2.1055 §22.355 §24.235 §27.54	Frequency Stability	Complied

1.7. Sample Calculation for Offset

Where relevant, the following sample calculation is provided:

1.7.1. Conducted Test

Offset value (dB) = Directional Coupler (dB) + Cable loss (dB)

1.7.2. Radiation test

- E.I.R.P. (dB m) = Measured level (dB μ V) + Antenna factor (dB/m) + Cable loss (dB) + 20 Log D - 104.8;
where D is the measurement distance in meters.
- E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB)

1.8. Worst Case Configuration and Mode

GSM

The worst-case is based on the average conducted output power measurement investigation results. Output power measurements were measured on GSM, GPRS, EDGE Mode. All testing was performed using GSM and EDGE mode, except frequency stability, spurious radiated emission spurious and emission at antenna terminal were tested only GSM mode as worst case.

The radiation test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

WCDMA

The worst-case is based on the average conducted output power measurement investigation results. Output power measurements were measured on RMC, HSDPA, HSUPA, HSPA+ and DC-HSDPA Modulation. All testing was performed using RMC and HSDPA modulations, except frequency stability, spurious radiated emission spurious and emission at antenna terminal were tested only RMC modulation as worst case.

The radiation test of the EUT was investigated in three orthogonal orientations X, Y, and Z, and the worst case data is reported.

1.9. Measurement Configuration

WCDMA

Test Items	Band	Test Channel			Modulation		
		Low	Mid	High	RMC	HSUPA	HSDPA
Conducted Output Power	Band II	V	V	V	V	V	V
	Band IV	V	V	V	V	V	V
	Band V	V	V	V	V	V	V
Frequency Stability	Band II	-	V	-	V	-	-
	Band IV	-	V	-	V	-	-
	Band V	-	V	-	V	-	-
Occupied Bandwidth	Band II	-	V	-	V	-	V
	Band IV	-	V	-	V	-	V
	Band V	-	V	-	V	-	V
Peak to Average Ratio	Band II	V	V	V	V	-	V
	Band IV	V	V	V	V	-	V
	Band V	V	V	V	V	-	V
Band Edge	Band II	V	-	V	V	-	V
	Band IV	V	-	V	V	-	V
	Band V	V	-	V	V	-	V
Spurious Emission at Antenna Terminal	Band II	V	V	V	V	-	-
	Band IV	V	V	V	V	-	-
	Band V	V	V	V	V	-	-
Spurious Radiated Emission	Band II	V	V	V	V	-	-
	Band IV	V	V	V	V	-	-
	Band V	V	V	V	V	-	-

GSM

Test Items	Band	Test Channel			Modulation		
		Low	Mid	High	VOICE	GPRS	EGPRS
Conducted Output Power	GSM 850	V	V	V	V	V	V
	GSM 1900	V	V	V	V	V	V
Frequency Stability	GSM 850	-	V	-	V	-	-
	GSM 1900	-	V	-	V	-	-
Occupied Bandwidth	GSM 850	-	V	-	V	-	V
	GSM 1900	-	V	-	V	-	V
Peak to Average Ratio	GSM 850	V	V	V	V	-	V
	GSM 1900	V	V	V	V	-	V
Band Edge	GSM 850	V	-	V	V	-	V
	GSM 1900	V	-	V	V	-	V
Spurious Emission at Antenna Terminal	GSM 850	V	V	V	V	-	-
	GSM 1900	V	V	V	V	-	-
Spurious Radiated Emission	GSM 850	V	V	V	V	-	-
	GSM 1900	V	V	V	V	-	-

1.10. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Parameter	Uncertainty	
RF Output Power	0.32 dB	
Occupied Bandwidth	3.90 kHz	
Conducted Spurious Emissions	0.61 dB	
Peak to Average Ratio	0.60 dB	
Frequency Stability	5.97 kHz	
Radiated Emission, 9 kHz to 30 MHz	H	3.40 dB
	V	3.40 dB
Radiated Emission, below 1 GHz	H	4.50 dB
	V	5.10 dB
Radiated Emission, above 1 GHz	H	3.70 dB
	V	3.90 dB

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicate a 95 % level of confidence.

1.11. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL003654	2022.12.26	Initial

1.12. Emission Designator and Max Power

WCDMA

Band	Modulation	Low Freq. (MHz)	Upper Freq. (MHz)	Conducted Power (dB m)	Ant. Gain (dB i)	E.R.P. / E.I.R.P. Average (dB m)	E.R.P. / E.I.R.P. Average (W)	Emission Designator
WCDMA II	RMC	1 852.4	1 907.6	22.83	6.2	29.03	0.800	4M12F9W
	HSDPA			21.85		28.05	0.638	4M12F9W
WCDMA IV	RMC	1 712.4	1 752.6	22.73	5.4	28.13	0.650	4M17F9W
	HSDPA			21.82		27.22	0.527	4M14F9W
WCDMA V	RMC	826.4	846.6	23.20	2.1	23.15	0.207	4M14F9W
	HSDPA			22.15		22.10	0.162	4M12F9W

GSM

Band	Modulation	Low Freq. (MHz)	Upper Freq. (MHz)	Conducted Power (dB m)	Duty Cycle (%)	Ant. Gain (dB i)	E.R.P. / E.I.R.P. Average (dB m)	E.R.P. / E.I.R.P. Average (W)	Emission Designator
GSM 850	VOICE	824.2	848.8	32.55	12.5	2.1	23.47	0.222	240KGXW
	EDGE			26.54			17.46	0.056	243KG7W
GSM 1900	VOICE	1 850.2	1 909.8	29.45	12.5	6.2	26.62	0.459	242KGXW
	EDGE			25.55			22.72	0.187	247KG7W

1.13. Information of Variant Model

Model Name		Description
Basic Model	TL1T22NR	Fully mounted module on hardware.
Variant Model	TL1T22NE	Band 21 duplexer, PA are removed.

*Difference between two models does not affect bands that can be used in the US. [Band 21]

- Supported Cellular Band

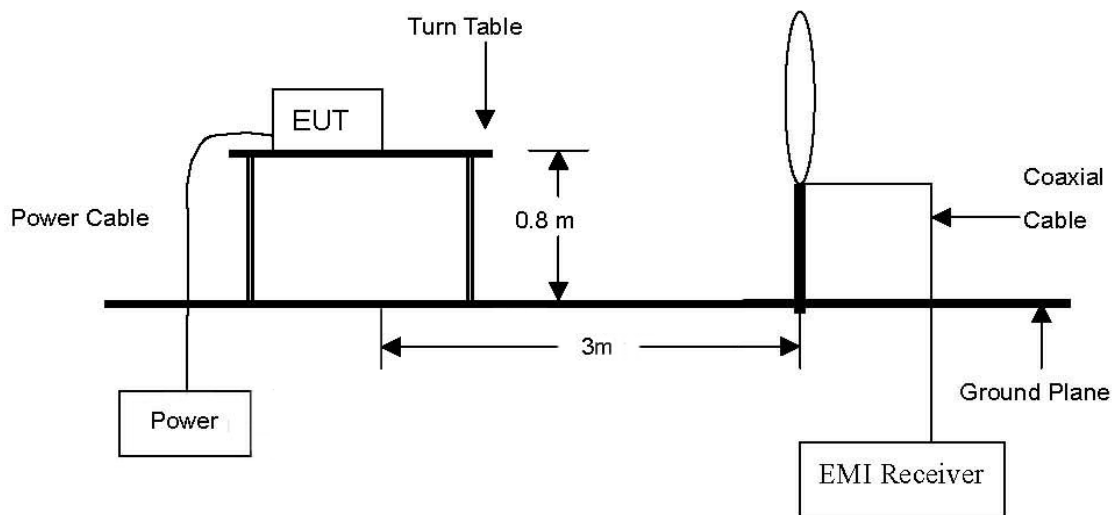
MODEL	GSM	WCDMA	LTE
TL1T22NR	GSM850, PCS1900	B2, B4, B5	B2, B4, B5, B7, B12, B17, B26, B41
TL1T22NE	N/A	B2, B4, B5	B2, B4, B5, B7, B12, B17

*Operating bands are different by Software.

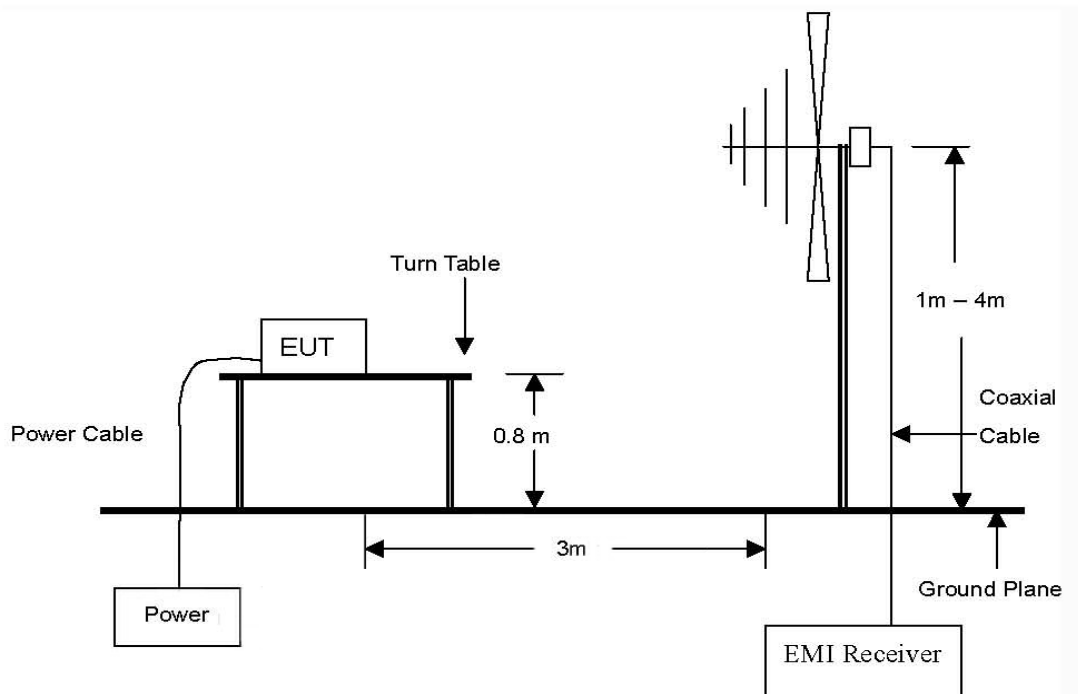
2. E.R.P. / E.I.R.P. & Spurious Radiated Emission

2.1. Test setup

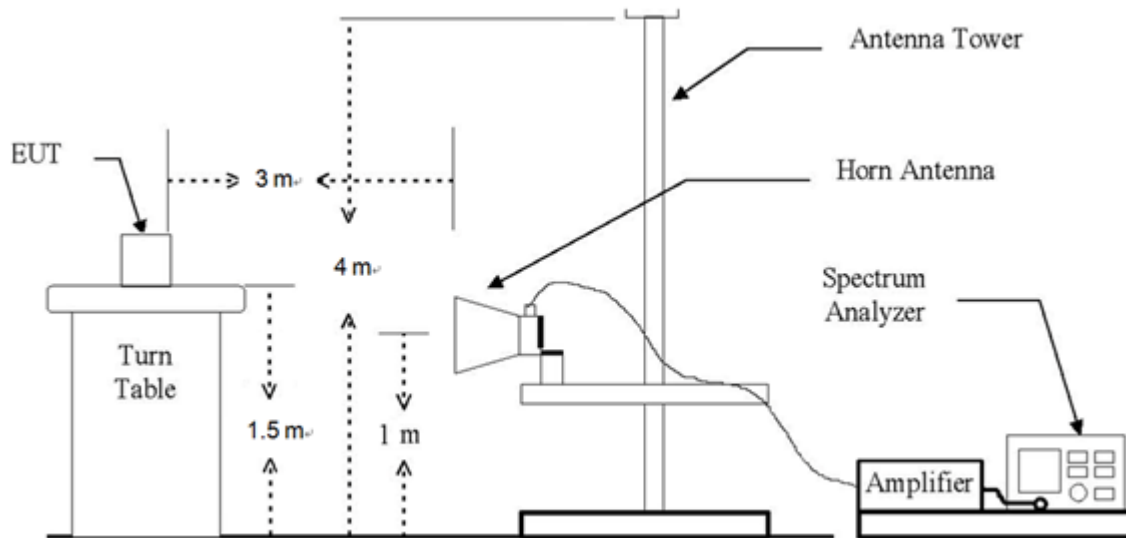
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 20 GHz Emissions.



2.2. Limit

2.2.1. Limit of E.R.P. / E.I.R.P.

- §22.913(a)(5), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
- §24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.
- §27.50(d)(4), fixed, mobile, and portable (hand-held) stations operating in the 1 710-1 755 MHz band and mobile and portable stations operating in the 1 695-1 710 MHz and 1 755-1 780 MHz bands are limited to 1 watt EIRP.

2.2.2. Limit of Spurious Radiated Emission

- §22.917(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.
- §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.
- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

2.3. Test Procedure: Based on ANSI/TIA 603E: 2016 and ANSI C63.26-2015, KDB 971168 D01 Power Meas License Digital Systems v03r01.

1. On a test site, the EUT shall be placed at 0.8 m or 1.5 m height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The output of the test antenna shall be connected to the measuring receiver and the peak detector is used for the measurement.
4. Radiated spurious emissions measurement method was set as follows:
RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz, VBW $\geq 3 \times$ RBW,
Detector = RMS, trace mode = max hold, per the guidelines of KDB 971168 D01 Power Meas License Digital Systems v03r01.
5. The transmitter shall be switched on, the measuring receiver shall be tuned to the frequency of the transmitter under test.
6. The test antenna shall be raised and lowered through the specified range of height until the maximum signal level is detected by the measuring receiver.
7. The transmitter shall be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
8. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
9. The maximum signal level detected by the measuring receiver shall be noted.
10. In necessary, the input attenuator setting on the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
11. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
12. The measurement shall be repeated with the test antenna orientated for horizontal polarization.

2.4. Test results

Ambient temperature : $(23 \pm 1) ^\circ\text{C}$
Relative humidity : 47 % R.H.

2.4.1. E.R.P. / E.I.R.P.

WCDMA

Band	Frequency (MHz)	Maximum Conducted Power (dB m)	Maximum Conducted Power (W)	Antenna Gain (dB i)	Maximum E.I.R.P. (dB m)	Maximum E.I.R.P. (W)	Maximum E.R.P. (dB m)	Maximum E.R.P. (W)	Limit
WCDMA II	1 850 ~ 1 910	22.83	0.192	6.2	29.03	0.800			2 W E.I.R.P.
WCDMA IV	1 710 ~ 1 755	22.73	0.187	5.4	28.13	0.650			1 W E.I.R.P.
WCDMA V	824 ~ 849	23.20	0.209	2.1	25.30	0.339	23.15	0.207	7 W E.R.P.

GSM

Band	Frequency (MHz)	Maximum Conducted Power (dB m)	Maximum Conducted Power (W)	Duty Cycle (%)	Antenna Gain (dB i)	Maximum E.I.R.P. (dB m)	Maximum E.I.R.P. (W)	Maximum E.R.P. (dB m)	Maximum E.R.P. (W)	Limit
GSM 850	824 ~ 849	32.55	1.799	12.5	2.1	25.62	0.365	23.47	0.222	7 W E.R.P.
GSM 1900	1 850 ~ 1 910	29.45	0.881	12.5	6.2	26.62	0.459			2 W E.I.R.P.

Remark;

1. E.I.R.P. (dB m) = Maximum Conducted Power (dB m) + Antenna Gain (dB i)
2. E.R.P. (dB m) = E.I.R.P. (dB m) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.

2.4.2. Spurious Radiated Emission

WCDMA II

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (1 852.4 MHz)									
3 626.81	54.20	H	31.46	-37.11	48.55	-95.26	-46.71	-13	33.71
5 554.65	43.11	V	33.90	-34.18	42.83	-95.26	-52.43	-13	39.43
9 258.10	48.25	V	37.22	-32.68	52.79	-95.26	-42.47	-13	29.47
12 973.10	38.00	V	39.00	-27.36	49.64	-95.26	-45.62	-13	32.62
14 812.20	44.78	H	41.08	-23.47	62.39	-95.26	<u>-32.87</u>	-13	19.87
14 827.80	43.78	V	41.04	-23.50	61.32	-95.26	-33.94	-13	20.94
16 662.00	39.15	V	41.80	-23.11	57.84	-95.26	-37.42	-13	24.42
Above 16 700.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (1 880.0 MHz)									
3 628.41	53.42	H	31.47	-37.10	47.79	-95.26	-47.47	-13	34.47
5 636.50	46.95	V	33.90	-33.48	47.37	-95.26	-47.89	-13	34.89
9 404.60	47.63	V	37.61	-32.30	52.94	-95.26	-42.32	-13	29.32
13 166.65	44.07	V	39.23	-28.24	55.06	-95.26	-40.20	-13	27.20
15 268.80	42.71	H	40.16	-24.61	58.26	-95.26	-37.00	-13	24.00
15 032.20	43.90	V	40.64	-26.30	58.24	-95.26	-37.02	-13	24.02
16 907.90	38.91	V	42.10	-24.14	56.87	-95.26	-38.39	-13	25.39
Above 17 000.00	Not detected	-	-	-	-	-	-	-	-
High Channel (1 907.6 MHz)									
3 627.56	52.49	V	31.47	-37.10	46.86	-95.26	-48.40	-13	35.40
5 726.00	42.74	H	33.95	-33.54	43.15	-95.26	-52.11	-13	39.11
9 544.40	40.99	V	37.70	-32.26	46.43	-95.26	-48.83	-13	35.83
13 360.10	38.93	V	39.74	-27.54	51.13	-95.26	-44.13	-13	31.13
15 269.00	42.59	H	40.16	-24.62	58.13	-95.26	-37.13	-13	24.13
15 268.30	39.40	V	40.16	-24.58	54.98	-95.26	-40.28	-13	27.28
Above 15 300.00	Not detected	-	-	-	-	-	-	-	-

WCDMA IV

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (1 712.4 MHz)									
3 628.81	51.45	H	31.47	-37.09	45.83	-95.26	-49.43	-13	36.43
5 000.22	41.69	V	33.00	-35.26	39.43	-95.26	-55.83	-13	42.83
10 000.11	38.84	V	37.80	-31.98	44.66	-95.26	-50.60	-13	37.60
10 280.25	41.84	V	37.80	-31.27	48.37	-95.26	-46.89	-13	33.89
Above 10 300.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (1 732.6 MHz)									
3 628.51	51.68	H	31.47	-37.10	46.05	-95.26	-49.21	-13	36.21
5 000.33	41.75	V	33.00	-35.26	39.49	-95.26	-55.77	-13	42.77
10 000.19	38.49	V	37.80	-31.98	44.31	-95.26	-50.95	-13	37.95
10 401.50	41.77	V	37.80	-30.97	48.60	-95.26	-46.66	-13	33.66
Above 10 500.00	Not detected	-	-	-	-	-	-	-	-
High Channel (1 752.6 MHz)									
3 629.71	51.17	H	31.48	-37.09	45.56	-95.26	-49.70	-13	36.70
5 000.49	41.57	V	33.00	-35.26	39.31	-95.26	-55.95	-13	42.95
9 998.39	37.51	V	37.80	-31.99	43.32	-95.26	-51.94	-13	38.94
Above 10 000.00	Not detected	-	-	-	-	-	-	-	-

WCDMA V

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (826.4 MHz)									
1 166.75	53.65	H	24.97	-39.92	38.70	-97.41	-58.71	-13	45.71
1 200.25	50.34	H	24.90	-39.85	35.39	-97.41	-62.02	-13	49.02
1 282.75	50.37	V	25.07	-39.30	36.14	-97.41	-61.27	-13	48.27
1 333.50	51.56	H	25.10	-39.29	37.37	-97.41	-60.04	-13	47.04
1 333.50	53.18	V	25.10	-39.29	38.99	-97.41	-58.42	-13	45.42
1 500.00	50.19	H	25.00	-38.90	36.29	-97.41	-61.12	-13	48.12
1 500.00	52.23	V	25.00	-38.90	38.33	-97.41	-59.08	-13	46.08
2 166.75	49.72	H	27.63	-36.48	40.87	-97.41	-56.54	-13	43.54
2 166.75	53.53	V	27.63	-36.48	44.68	-97.41	-52.73	-13	39.73
2 333.50	50.95	H	27.80	-36.44	42.31	-97.41	-55.10	-13	42.10
2 333.50	48.76	V	27.80	-36.44	40.12	-97.41	-57.29	-13	44.29
2 612.50	52.06	H	28.85	-36.88	44.03	-97.41	-53.38	-13	40.38
2 592.00	52.88	V	28.82	-36.78	44.92	-97.41	-52.49	-13	39.49
3 615.75	47.73	H	31.39	-37.06	42.06	-97.41	-55.35	-13	42.35
5 703.75	45.43	V	33.91	-33.56	45.78	-97.41	-51.63	-13	38.63
Above 5 800.00	Not detected	-	-	-	-	-	-	-	-

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Middle Channel (836.6 MHz)									
1 166.75	54.26	H	24.97	-39.92	39.31	-97.41	-58.10	-13	45.10
1 166.75	52.17	V	24.97	-39.92	37.22	-97.41	-60.19	-13	47.19
1 333.50	53.58	H	25.10	-39.29	39.39	-97.41	-58.02	-13	45.02
1 333.50	54.20	V	25.10	-39.29	40.01	-97.41	-57.40	-13	44.40
1 500.25	50.27	H	25.00	-38.90	36.37	-97.41	-61.04	-13	48.04
1 500.25	52.55	V	25.00	-38.90	38.65	-97.41	-58.76	-13	45.76
2 000.25	51.06	H	27.70	-37.64	41.12	-97.41	-56.29	-13	43.29
2 000.25	50.82	V	27.70	-37.64	40.88	-97.41	-56.53	-13	43.53
2 167.00	50.63	H	27.63	-36.47	41.79	-97.41	-55.62	-13	42.62
2 166.75	52.59	V	27.63	-36.48	43.74	-97.41	-53.67	-13	40.67
2 333.75	49.89	H	27.80	-36.43	41.26	-97.41	-56.15	-13	43.15
2 333.50	48.73	V	27.80	-36.44	40.09	-97.41	-57.32	-13	44.32
2 619.75	50.04	H	28.82	-36.89	41.97	-97.41	-55.44	-13	42.44
2 592.00	52.88	V	28.82	-36.78	44.92	-97.41	-52.49	-13	39.49
3 599.75	49.43	H	31.30	-36.95	43.78	-97.41	-53.63	-13	40.63
3 615.75	47.73	V	31.39	-37.06	42.06	-97.41	-55.35	-13	42.35
5 703.75	45.43	H	33.91	-33.56	45.78	-97.41	-51.63	-13	38.63
Above 5 800.00	Not detected	-	-	-	-	-	-	-	-

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
High Channel (846.6 MHz)									
1 167.00	55.06	H	24.97	-39.92	40.11	-97.41	-57.30	-13	44.30
1 166.75	52.01	V	24.97	-39.92	37.06	-97.41	-60.35	-13	47.35
1 333.50	52.83	H	25.10	-39.29	38.64	-97.41	-58.77	-13	45.77
1 333.50	53.84	V	25.10	-39.29	39.65	-97.41	-57.76	-13	44.76
1 500.50	51.44	H	25.00	-38.90	37.54	-97.41	-59.87	-13	46.87
1 500.25	52.95	V	25.00	-38.90	39.05	-97.41	-58.36	-13	45.36
2 000.25	48.99	H	27.70	-37.64	39.05	-97.41	-58.36	-13	45.36
2 000.25	51.98	V	27.70	-37.64	42.04	-97.41	-55.37	-13	42.37
2 166.75	50.47	H	27.63	-36.48	41.62	-97.41	-55.79	-13	42.79
2 167.25	52.25	V	27.63	-36.47	43.41	-97.41	-54.00	-13	41.00
2 591.50	51.59	H	28.82	-36.77	43.64	-97.41	-53.77	-13	40.77
2 563.50	56.18	V	28.54	-36.56	48.16	-97.41	-49.25	-13	36.25
2 763.00	47.64	H	28.75	-36.84	39.55	-97.41	-57.86	-13	44.86
2 613.25	51.94	V	28.85	-36.88	43.91	-97.41	-53.50	-13	40.50
3 629.50	53.71	H	31.48	-37.09	48.10	-97.41	-49.31	-13	36.31
3 628.50	47.86	V	31.47	-37.10	42.23	-97.41	-55.18	-13	42.18
5 702.25	44.31	V	33.90	-33.56	44.65	-97.41	-52.76	-13	39.76
Above 5 800.00	Not detected	-	-	-	-	-	-	-	-

GSM 850_VOICE

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dBμV/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (824.2 MHz)									
1 166.78	54.08	H	24.97	-39.92	39.13	-97.41	-58.28	-13	45.28
1 166.78	52.34	V	24.97	-39.92	37.39	-97.41	-60.02	-13	47.02
1 250.03	55.05	H	25.00	-39.57	40.48	-97.41	-56.93	-13	43.93
1 284.63	52.86	V	25.07	-39.30	38.63	-97.41	-58.78	-13	45.78
1 333.56	54.50	H	25.10	-39.29	40.31	-97.41	-57.10	-13	44.10
1 333.56	53.67	V	25.10	-39.29	39.48	-97.41	-57.93	-13	44.93
1 500.06	50.52	H	25.00	-38.90	36.62	-97.41	-60.79	-13	47.79
1 500.06	51.71	V	25.00	-38.90	37.81	-97.41	-59.60	-13	46.60
1 648.84	73.60	H	25.60	-38.68	60.52	-97.41	-36.89	-13	23.89
1 648.56	68.72	V	25.60	-38.68	55.64	-97.41	-41.77	-13	28.77
2 000.13	51.13	H	27.70	-37.64	41.19	-97.41	-56.22	-13	43.22
2 000.41	50.72	V	27.70	-37.64	40.78	-97.41	-56.63	-13	43.63
2 166.91	50.84	H	27.63	-36.47	42.00	-97.41	-55.41	-13	42.41
2 166.63	50.21	V	27.63	-36.48	41.36	-97.41	-56.05	-13	43.05
2 472.91	51.93	H	28.15	-36.80	43.28	-97.41	-54.13	-13	41.13
2 400.63	48.56	V	28.10	-36.24	40.42	-97.41	-56.99	-13	43.99
2 620.28	47.55	H	28.82	-36.89	39.48	-97.41	-57.93	-13	44.93
2 615.78	53.11	V	28.84	-36.89	45.06	-97.41	-52.35	-13	39.35
2 756.13	48.65	H	28.72	-36.87	40.50	-97.41	-56.91	-13	43.91
3 630.25	48.07	H	31.48	-37.07	42.48	-97.41	-54.93	-13	41.93
3 628.00	47.56	V	31.47	-37.10	41.93	-97.41	-55.48	-13	42.48
Above 3 700.00	Not detected	-	-	-	-	-	-	-	-

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
Middle Channel (836.6 MHz)									
1 166.50	53.59	H	24.97	-39.93	38.63	-97.41	-58.78	-13	45.78
1 166.78	51.41	V	24.97	-39.92	36.46	-97.41	-60.95	-13	47.95
1 333.28	51.52	H	25.10	-39.29	37.33	-97.41	-60.08	-13	47.08
1 287.74	53.74	V	25.08	-39.30	39.52	-97.41	-57.89	-13	44.89
1 500.06	51.04	H	25.00	-38.90	37.14	-97.41	-60.27	-13	47.27
1 500.34	51.50	V	25.00	-38.90	37.60	-97.41	-59.81	-13	46.81
1 673.31	70.56	H	25.88	-38.66	57.78	-97.41	-39.63	-13	26.63
1 673.31	66.70	V	25.88	-38.66	53.92	-97.41	-43.49	-13	30.49
2 000.13	49.56	H	27.70	-37.64	39.62	-97.41	-57.79	-13	44.79
2 000.13	51.94	V	27.70	-37.64	42.00	-97.41	-55.41	-13	42.41
2 166.91	51.49	H	27.63	-36.47	42.65	-97.41	-54.76	-13	41.76
2 166.91	52.01	V	27.63	-36.47	43.17	-97.41	-54.24	-13	41.24
2 333.41	50.77	H	27.80	-36.44	42.13	-97.41	-55.28	-13	42.28
2 510.03	57.84	H	28.16	-37.06	48.94	-97.41	-48.47	-13	35.47
2 510.03	59.51	V	28.16	-37.06	50.61	-97.41	-46.80	-13	33.80
2 618.59	51.55	H	28.83	-36.89	43.49	-97.41	-53.92	-13	40.92
2 591.88	52.91	V	28.82	-36.78	44.95	-97.41	-52.46	-13	39.46
3 628.00	48.02	V	31.47	-37.10	42.39	-97.41	-55.02	-13	42.02
5 703.06	48.01	V	33.91	-33.56	48.36	-97.41	-49.05	-13	36.05
Above 5 800.00	Not detected	-	-	-	-	-	-	-	-

Frequency (MHz)	Measured Level (dB μ V)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dB μ V/m)	CF (dB)	E.R.P. (dB m)	Limit (dB m)	Margin (dB)
High Channel (848.8 MHz)									
1 166.78	53.04	H	24.97	-39.92	38.09	-97.41	-59.32	-13	46.32
1 166.78	52.78	V	24.97	-39.92	37.83	-97.41	-59.58	-13	46.58
1 333.56	51.87	H	25.10	-39.29	37.68	-97.41	-59.73	-13	46.73
1 333.84	53.26	V	25.10	-39.29	39.07	-97.41	-58.34	-13	45.34
1 500.34	50.62	H	25.00	-38.90	36.72	-97.41	-60.69	-13	47.69
1 500.34	52.35	V	25.00	-38.90	38.45	-97.41	-58.96	-13	45.96
1 697.78	57.11	H	26.17	-38.77	44.51	-97.41	-52.90	-13	39.90
1 698.06	56.34	V	26.18	-38.77	43.75	-97.41	-53.66	-13	40.66
1 999.84	48.84	H	27.70	-37.64	38.90	-97.41	-58.51	-13	45.51
2 000.13	51.65	V	27.70	-37.64	41.71	-97.41	-55.70	-13	42.70
2 166.91	49.30	H	27.63	-36.47	40.46	-97.41	-56.95	-13	43.95
2 166.91	49.48	V	27.63	-36.47	40.64	-97.41	-56.77	-13	43.77
2 333.41	51.07	H	27.80	-36.44	42.43	-97.41	-54.98	-13	41.98
2 333.69	47.67	V	27.80	-36.44	39.03	-97.41	-58.38	-13	45.38
2 546.59	55.25	H	28.38	-36.57	47.06	-97.41	-50.35	-13	37.35
2 590.75	52.51	V	28.81	-36.77	44.55	-97.41	-52.86	-13	39.86
3 627.72	49.00	H	31.47	-37.10	43.37	-97.41	-54.04	-13	41.04
3 628.28	48.82	V	31.47	-37.10	43.19	-97.41	-54.22	-13	41.22
5 000.22	43.53	V	33.00	-35.26	41.27	-97.41	-56.14	-13	43.14
Above 5 100.00	Not detected	-	-	-	-	-	-	-	-

GSM 1900_VOICE

Frequency (MHz)	Measured Level (dBμV)	Ant. Pol.	AF (dB/m)	AMP+CL (dB)	E (dBμV/m)	CF (dB)	E.I.R.P. (dB m)	Limit (dB m)	Margin (dB)
Low Channel (1 850.2 MHz)									
3 628.30	50.49	H	31.47	-37.10	44.86	-95.26	-50.40	-13	37.40
3 627.95	47.85	V	31.47	-37.10	42.22	-95.26	-53.04	-13	40.04
5 000.03	45.18	V	33.00	-35.26	42.92	-95.26	-52.34	-13	39.34
5 550.39	45.00	V	33.90	-34.22	44.68	-95.26	-50.58	-13	37.58
Above 5 600.00	Not detected	-	-	-	-	-	-	-	-
Middle Channel (1 880.0 MHz)									
3 629.95	48.76	H	31.48	-37.09	43.15	-95.26	-52.11	-13	39.11
3 628.55	49.80	V	31.47	-37.10	44.17	-95.26	-51.09	-13	38.09
5 000.03	45.02	V	33.00	-35.26	42.76	-95.26	-52.50	-13	39.50
5 640.30	46.52	V	33.90	-33.45	46.97	-95.26	-48.29	-13	35.29
Above 5 700.00	Not detected	-	-	-	-	-	-	-	-
High Channel (1 909.8 MHz)									
3 628.50	48.20	H	31.47	-37.10	42.57	-95.26	-52.69	-13	39.69
3 628.60	49.86	V	31.47	-37.10	44.23	-95.26	-51.03	-13	38.03
5 000.02	45.03	V	33.00	-35.26	42.77	-95.26	-52.49	-13	39.49
5 729.42	45.13	V	33.96	-33.56	45.53	-95.26	-49.73	-13	36.73
Above 5 800.00	Not detected	-	-	-	-	-	-	-	-

Remark;

1. AF = Antenna Factor, CL = Cable Loss, CF = Conversion Factor.
2. E (dBμV/m) = Measured Level (dBμV) + Antenna Factor (dB/m) + Cable Loss (dB) + Amp (dB).
3. E.I.R.P. (dB m) = E (dBμV/m) + CF (dB).
4. E.R.P. (dB m) = E (dBμV/m) + CF (dB) - 2.15 (dB); where E.R.P. and E.I.R.P. are expressed in consistent units.
5. CF (dB) = 20 log D - 104.8; where D is the measurement distance in meters, According to ANSI C63.26-2015 5.2.7 and KDB 971168 D01 v03r01 5.8.4
6. The frequency spectrum is examined from 9 kHz to the 10th harmonic of the fundamental frequency of the transmitter. No other spurious and harmonic emissions were reported greater than listed emissions above table.

3. Conducted Output Power

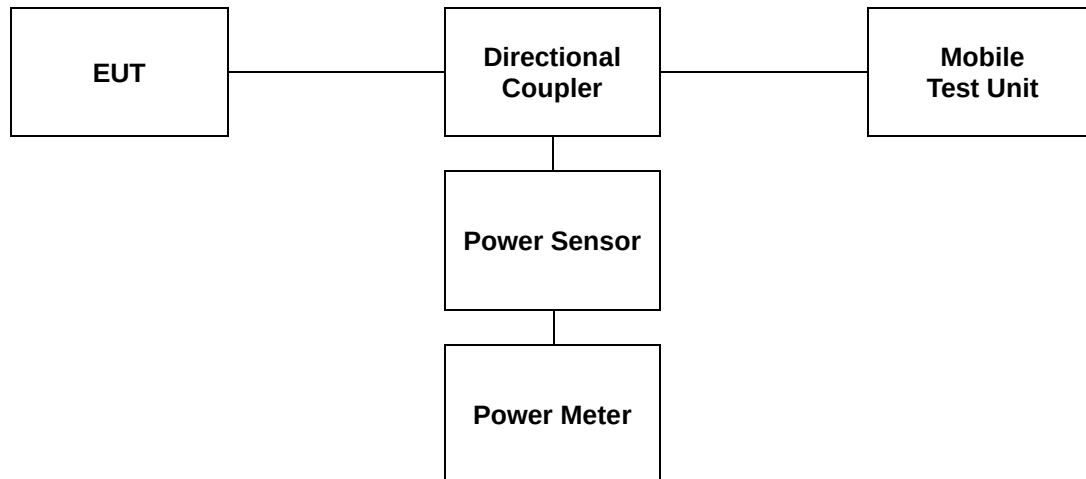
3.1. Limit

CFR 47, Section FCC §2.1046.

3.2. Test Procedure

Output power shall be measured at the RF output terminals for all configurations.

1. The RF output of the transmitter was connected to the input of the mobile test unit in order to establish communication with the EUT.
2. The EUT was set up for the max. output power with pseudo random data modulation by using mobile test unit parameters.
3. The measurement performed using a wideband RF power meter.
4. This EUT was tested under all configurations and the highest power was investigated and reported.



3.3. Test Result

Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

WCDMA II							
Mode	3GPP 34.121 Subtest	Conducted Output Power					
		9262 (1 852.4 MHz)		9400 (1 880.0 MHz)		9538 (1 907.6 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Release 99	12.2 Kbps RMC	22.71	0.187	22.83	0.192	22.74	0.188
HSDPA	Subtest 1	21.65	0.146	21.85	0.153	21.71	0.148
	Subtest 2	21.62	0.145	21.85	0.153	21.74	0.149
	Subtest 3	21.16	0.131	21.36	0.137	21.23	0.133
	Subtest 4	21.13	0.130	21.37	0.137	21.24	0.133
HSUPA	Subtest 1	21.61	0.145	21.29	0.135	21.65	0.146
	Subtest 2	19.60	0.091	19.73	0.094	19.66	0.092
	Subtest 3	20.58	0.114	20.87	0.122	20.33	0.108
	Subtest 4	19.65	0.092	19.83	0.096	19.54	0.090
	Subtest 5	21.51	0.142	21.76	0.150	21.60	0.145
DC-HSDPA	Subtest 1	21.63	0.146	21.54	0.143	21.60	0.145
	Subtest 2	21.65	0.146	21.57	0.144	21.60	0.145
	Subtest 3	21.13	0.130	21.00	0.126	21.10	0.129
	Subtest 4	21.15	0.130	21.05	0.127	21.10	0.129
HSPA+		19.15	0.082	19.03	0.080	19.10	0.081

WCDMA IV							
Mode	3GPP 34.121 Subtest	Conducted Output Power					
		1312 (1 712.4 MHz)		1413 (1 732.6 MHz)		1513 (1 752.6 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Release 99	12.2 Kbps RMC	22.73	0.187	22.66	0.185	<u>22.73</u>	<u>0.187</u>
HSDPA	Subtest 1	<u>21.82</u>	<u>0.152</u>	21.69	0.148	21.74	0.149
	Subtest 2	21.81	0.152	21.67	0.147	21.73	0.149
	Subtest 3	21.27	0.134	21.24	0.133	21.25	0.133
	Subtest 4	21.30	0.135	21.19	0.132	21.21	0.132
HSUPA	Subtest 1	21.78	0.151	21.69	0.148	21.74	0.149
	Subtest 2	19.78	0.095	19.62	0.092	19.64	0.092
	Subtest 3	20.77	0.119	20.48	0.112	20.64	0.116
	Subtest 4	19.85	0.097	19.48	0.089	19.68	0.093
	Subtest 5	21.68	0.147	21.61	0.145	21.55	0.143
DC-HSDPA	Subtest 1	21.75	0.150	21.63	0.146	21.65	0.146
	Subtest 2	21.74	0.149	21.60	0.145	21.61	0.145
	Subtest 3	21.16	0.131	21.03	0.127	21.06	0.128
	Subtest 4	21.20	0.132	21.07	0.128	21.11	0.129
HSPA+		19.75	0.094	19.61	0.091	19.63	0.092

WCDMA V							
Mode	3GPP 34.121 Subtest	Conducted Output Power					
		4132 (826.4 MHz)		4183 (836.6 MHz)		4233 (846.6 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
Release 99	12.2 Kbps RMC	23.03	0.201	<u>23.20</u>	<u>0.209</u>	22.88	0.194
HSDPA	Subtest 1	22.06	0.161	<u>22.15</u>	<u>0.164</u>	21.86	0.153
	Subtest 2	22.04	0.160	22.15	0.164	21.86	0.153
	Subtest 3	21.53	0.142	21.61	0.145	21.36	0.137
	Subtest 4	21.56	0.143	21.59	0.144	21.35	0.136
HSUPA	Subtest 1	22.04	0.160	22.13	0.163	22.08	0.161
	Subtest 2	20.07	0.102	20.16	0.104	20.09	0.102
	Subtest 3	21.06	0.128	21.15	0.130	21.07	0.128
	Subtest 4	20.07	0.102	20.14	0.103	20.09	0.102
	Subtest 5	21.94	0.156	21.99	0.158	21.94	0.156
DC-HSDPA	Subtest 1	21.65	0.146	21.43	0.139	21.51	0.142
	Subtest 2	21.63	0.146	21.39	0.138	21.50	0.141
	Subtest 3	21.08	0.128	20.82	0.121	20.92	0.124
	Subtest 4	21.11	0.129	20.86	0.122	20.97	0.125
HSPA+		19.60	0.091	19.35	0.086	19.43	0.088

GSM 850							
Mode		Conducted Output Power					
		128 (824.2 MHz)		190 (836.6 MHz)		251 (848.8 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
VOICE		32.52	1.786	<u>32.55</u>	<u>1.799</u>	32.49	1.774
GPRS	1 Tx slot	32.48	1.770	32.46	1.762	32.44	1.754
	2 Tx slot	32.41	1.742	32.31	1.702	32.33	1.710
EGPRS	1 Tx slot	<u>26.54</u>	<u>0.451</u>	26.45	0.442	26.51	0.448
	2 Tx slot	26.51	0.448	26.39	0.436	26.50	0.447

GSM 1900							
Mode		Conducted Output Power					
		512 (1 850.2 MHz)		661 (1 880.0 MHz)		810 (1 909.8 MHz)	
		(dB m)	(W)	(dB m)	(W)	(dB m)	(W)
VOICE		29.44	0.879	<u>29.45</u>	<u>0.881</u>	29.39	0.869
GPRS	1 Tx slot	29.39	0.869	29.41	0.873	29.37	0.865
	2 Tx slot	29.35	0.861	29.36	0.863	29.40	0.871
EGPRS	1 Tx slot	25.54	0.358	<u>25.55</u>	<u>0.359</u>	25.39	0.346
	2 Tx slot	25.53	0.357	25.49	0.354	25.44	0.350

4. Occupied Bandwidth

4.1. Limit

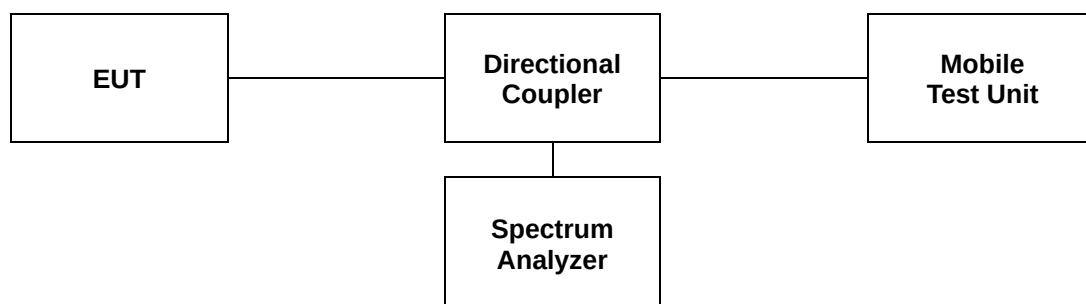
CFR 47, Section FCC §2.1049.

4.2. Test Procedure

The test follows section 5.4.4 of ANSI C63.26-2015.

- a. The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation. products including the emission skirts (typically a span of $1.5 \times \text{OBW}$ is sufficient).
- b. The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1 % to 5 % of the anticipated OBW, and the VBW shall be set $\geq 3 \times \text{RBW}$.
- c. Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d. Set the detection mode to peak, and the trace mode to max-hold.
- e. If the instrument does not have a 99 % OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5 % of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5 % of the total is reached and record that frequency as the upper OBW frequency. The 99 % power OBW can be determined by computing the difference these two frequencies.
- f. The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

For the 99 % emission bandwidth, the trace data points are recovered and directly summed in linear power level terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached, and that frequency recorded. The process is repeated for the highest frequency data points (starting at the highest frequency, at the right side of the span, and going down in frequency). This frequency is then recorded. The difference between the two recorded frequencies is the occupied bandwidth (or the 99 % emission bandwidth).



4.3 Test Results

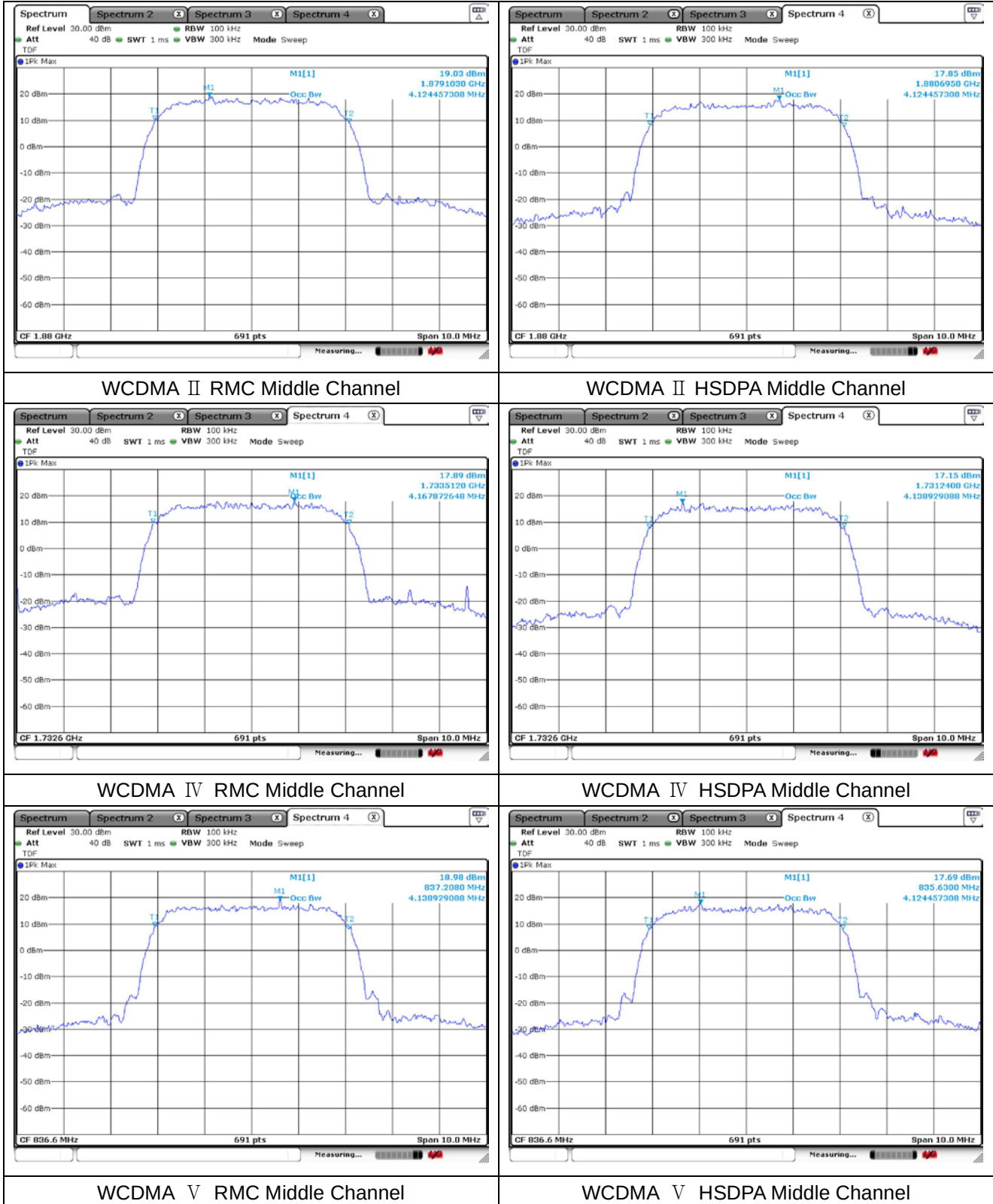
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
WCDMA II	RMC	1 880.0	4.124
	HSDPA		4.124
WCDMA IV	RMC	1 732.6	4.168
	HSDPA		4.139
WCDMA V	RMC	836.6	4.139
	HSDPA		4.124

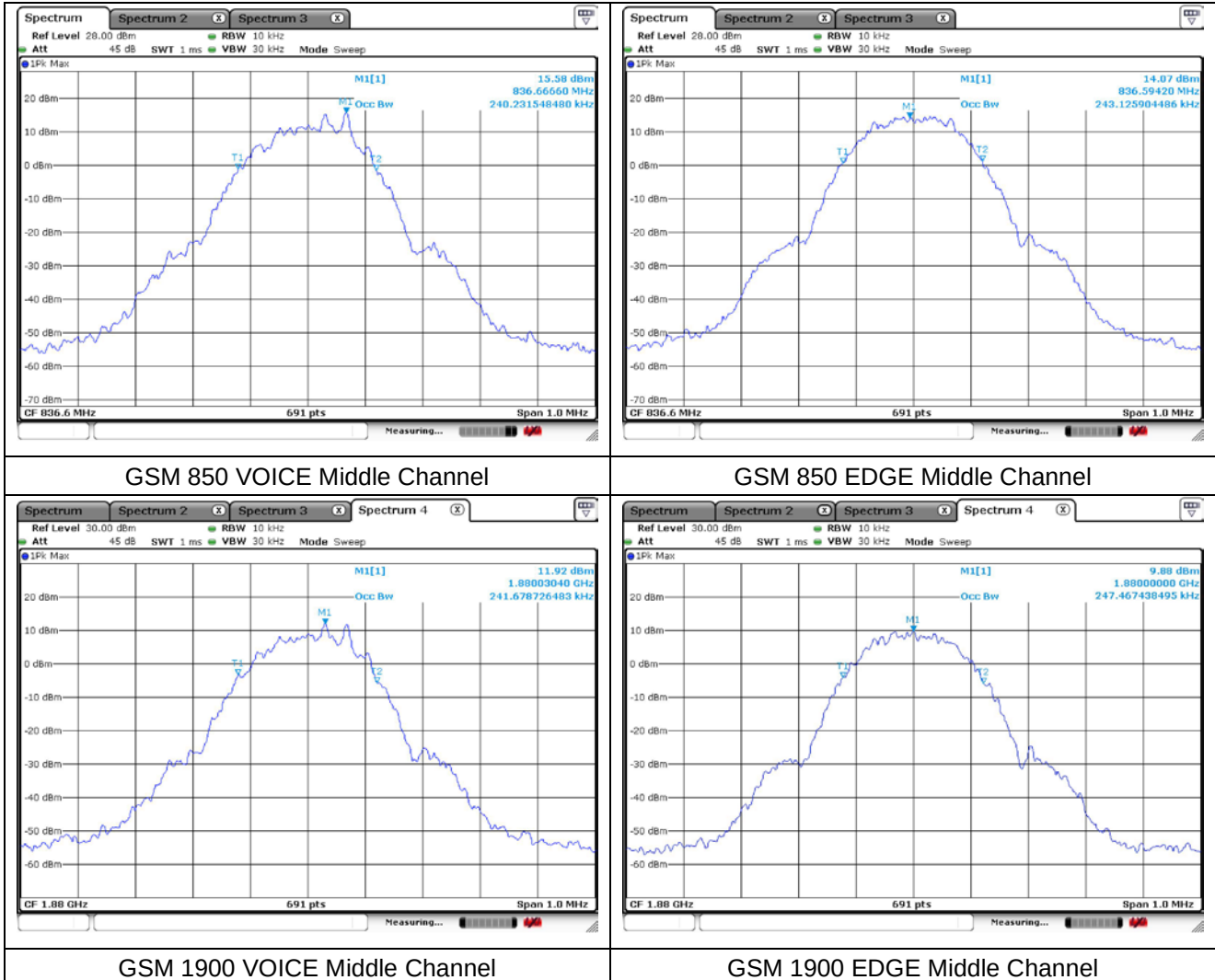
Band	Mode	Frequency (MHz)	Occupied Bandwidth (MHz)
GSM 850	VOICE	836.6	0.240
	EDGE		0.243
GSM 1900	VOICE	1 880.0	0.242
	EDGE		0.247

- Test plots

WCDMA



GSM



5. Peak-Average Ratio

5.1. Limit

- §22.913(d) Measurement of the ERP of Cellular base transmitters and repeaters must be made using an average power measurement technique. The peak-to-average ratio (PAR) of the transmission must not exceed 13 dB.

- §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.

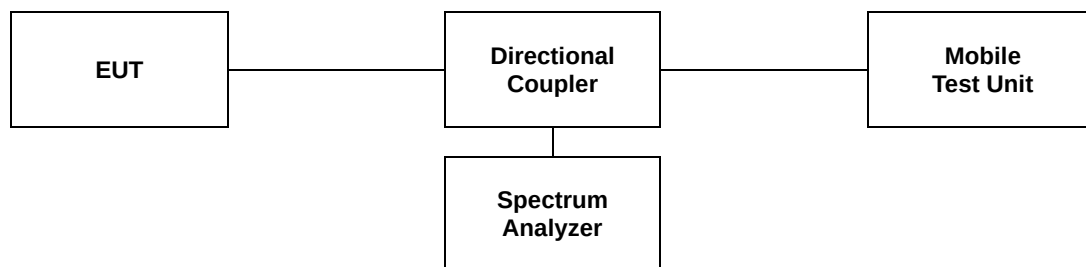
- §27.50(d)(5), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. In measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

5.2. Test Procedure

The test follows section 5.2.3.4 of ANSI C63.26-2015.

See instrumentation-specific application literature for further guidance regarding use of the CCDF capability. The following guidelines are offered for performing a CCDF measurement.

- a. Set resolution/measurement bandwidth $\geq$ OBW or specified reference bandwidth.
- b. Set the number of counts to a value that stabilizes the measured CCDF curve.
- c. Set the measurement interval as follows:
 - 1) For continuous transmissions, set to greater of $[10 \times (\text{number of points in sweep}) \times (\text{transmission symbol period})]$ or 1 ms.
 - 2) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement interval to a time that is less than or equal to the burst duration.
 - 3) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
- d. Record the maximum PAPR level associated with a probability of 0.1 %.
- e. The peak power level is calculated from the sum of the PAPR value from step d) to the measured average power.



5.3 Test Results

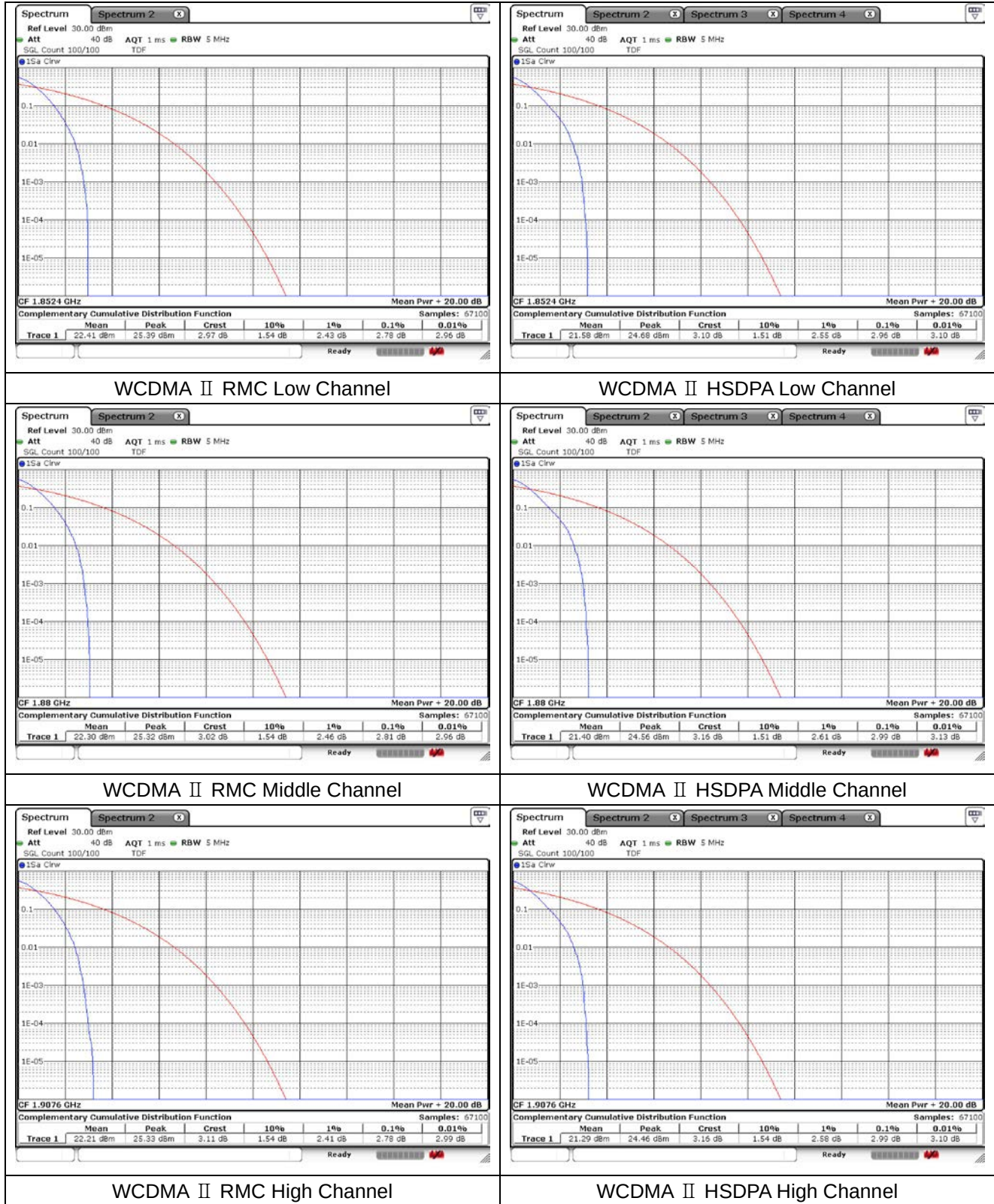
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

Band	Mode	Frequency (MHz)	PAR (dB)
WCDMA II	RMC	1 852.4	2.78
		1 880.0	2.81
		1 907.6	2.78
	HSDPA	1 852.4	2.96
		1 880.0	2.99
		1 907.6	2.99
WCDMA IV	RMC	1 712.4	2.70
		1 732.6	2.61
		1 752.6	2.81
	HSDPA	1 712.4	2.93
		1 732.6	2.96
		1 752.6	3.10
WCDMA V	RMC	826.4	3.04
		836.6	3.07
		846.6	3.07
	HSDPA	826.4	3.39
		836.6	3.36
		846.6	3.25

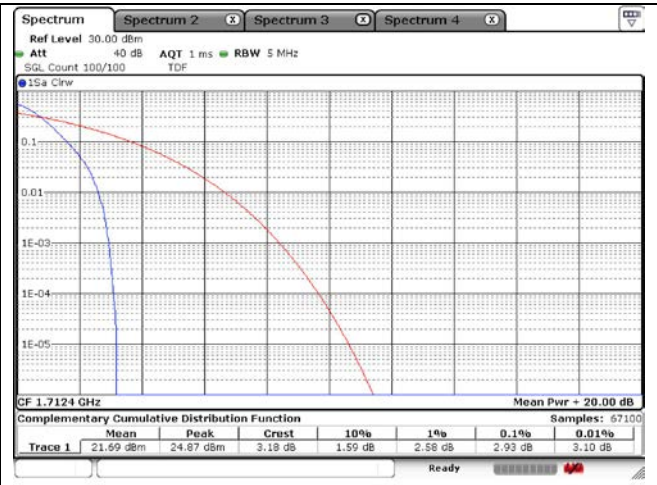
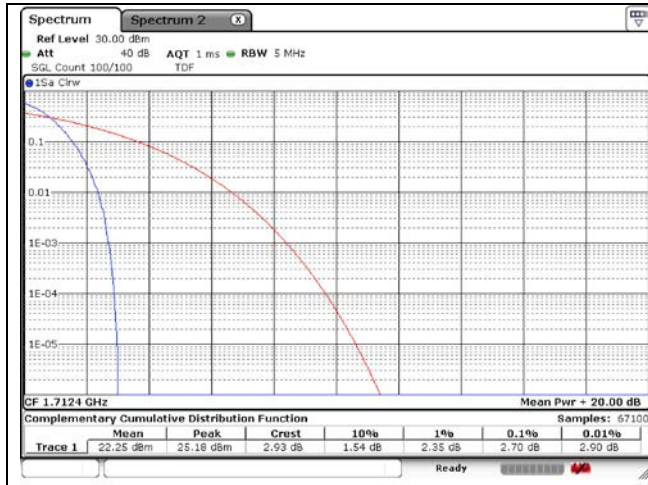
Band	Mode	Frequency (MHz)	PAR (dB)
GSM 850	VOICE	824.2	3.01
		836.6	3.01
		848.8	3.01
	EDGE	824.2	3.01
		836.6	3.01
		848.8	2.96
GSM 1900	VOICE	1 850.2	3.01
		1 880.0	3.01
		1 909.8	3.22
	EDGE	1 850.2	2.96
		1 880.0	2.99
		1 909.8	3.19

- Test plots

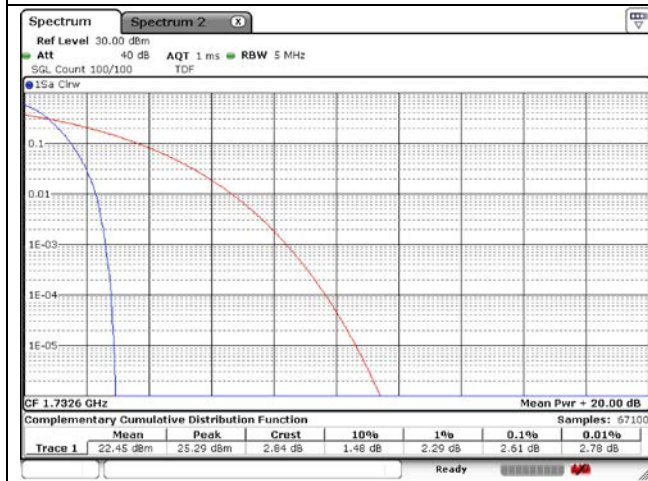
WCDMA II



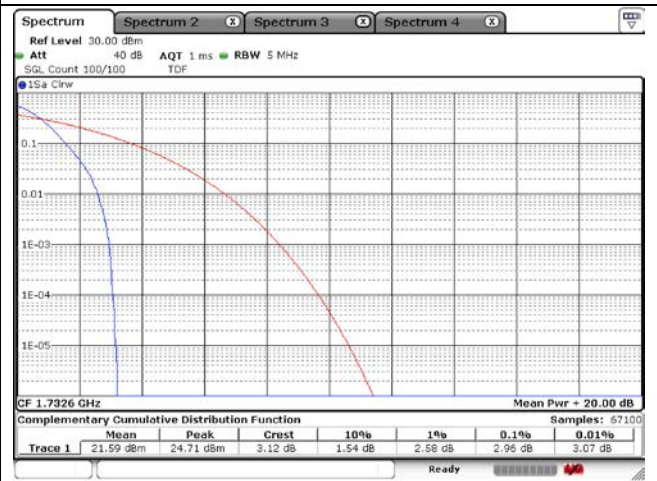
WCDMA IV



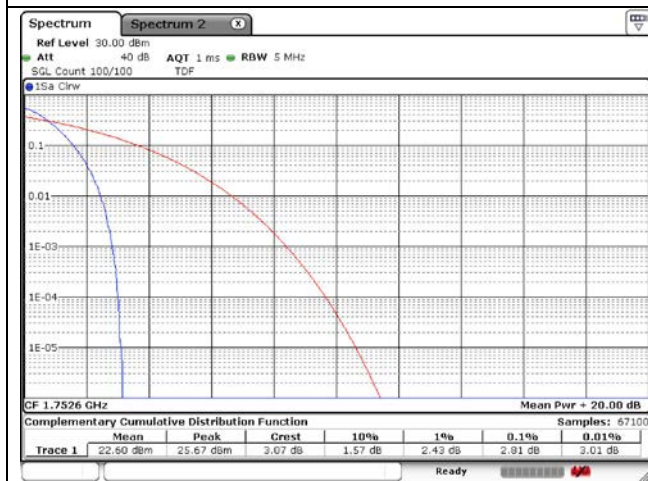
WCDMA IV RMC Low Channel



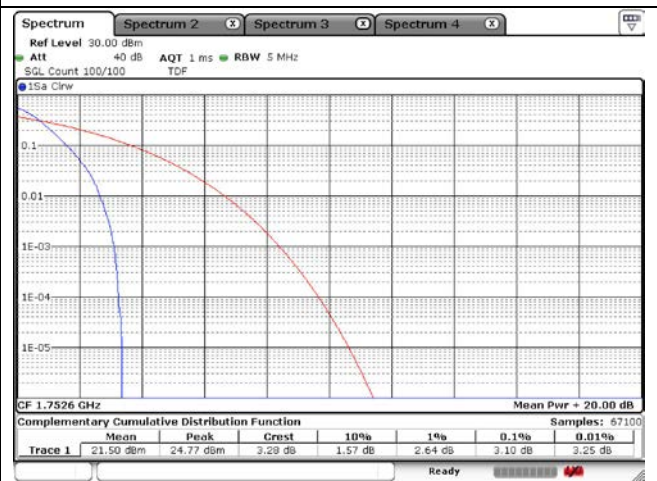
WCDMA IV HSDPA Low Channel



WCDMA IV RMC Middle Channel



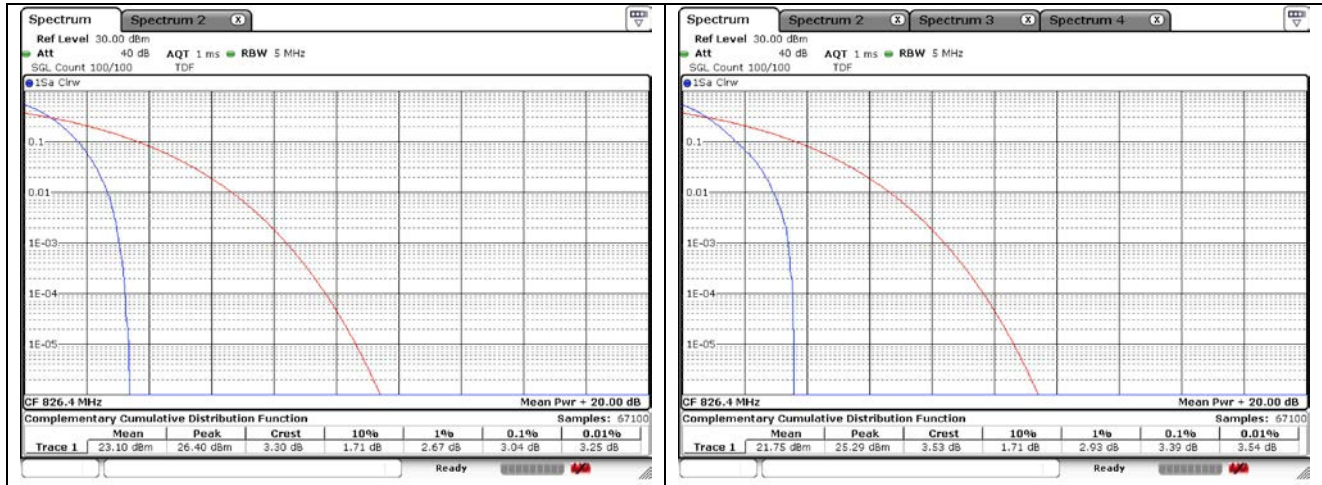
WCDMA IV HSDPA Middle Channel



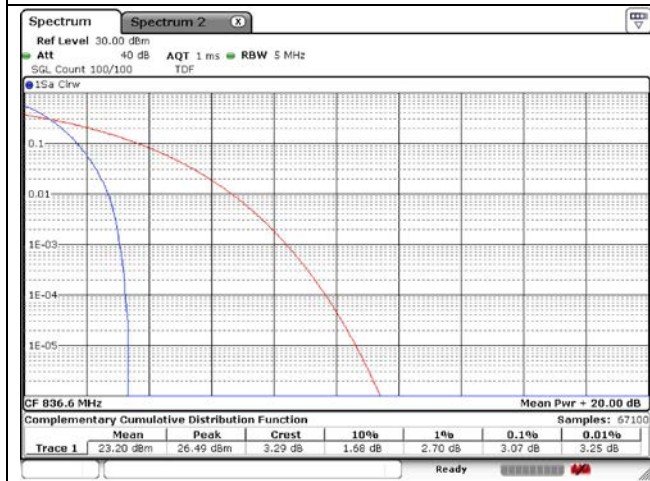
WCDMA IV RMC High Channel

WCDMA IV HSDPA High Channel

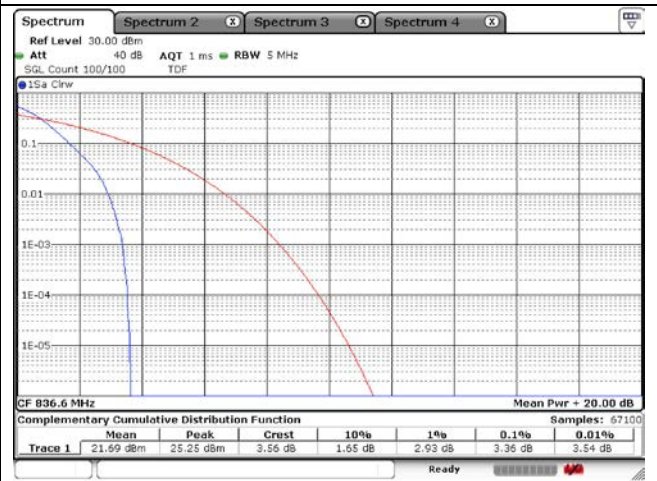
WCDMA V



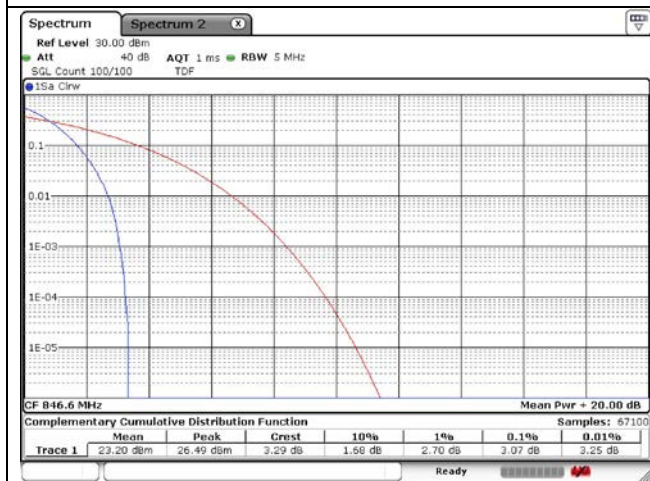
WCDMA V RMC Low Channel



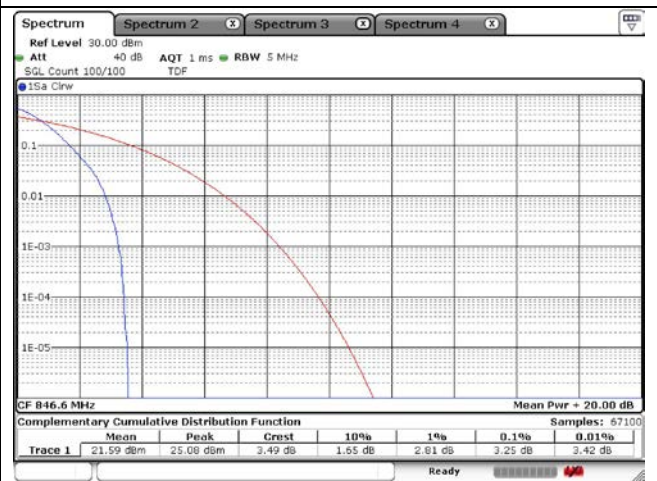
WCDMA V HSDPA Low Channel



WCDMA V RMC Middle Channel



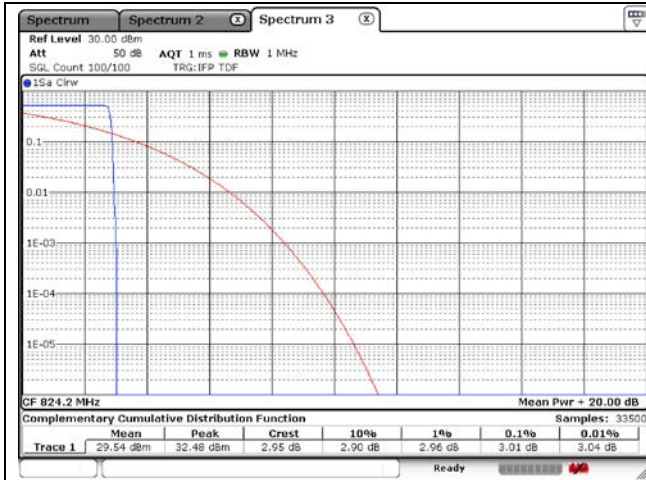
WCDMA V HSDPA Middle Channel



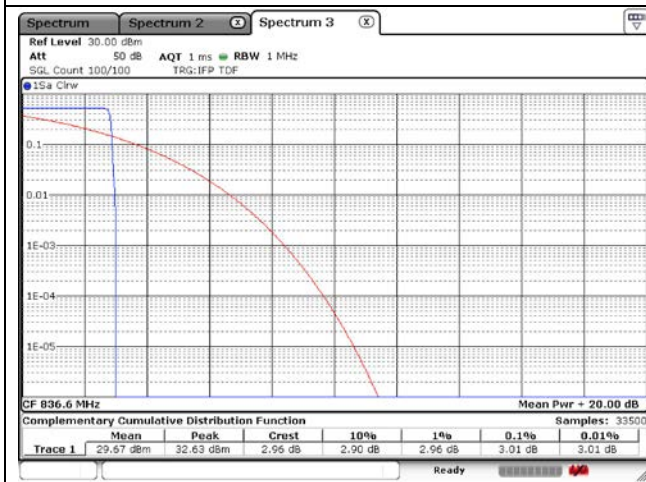
WCDMA V RMC High Channel

WCDMA V HSDPA High Channel

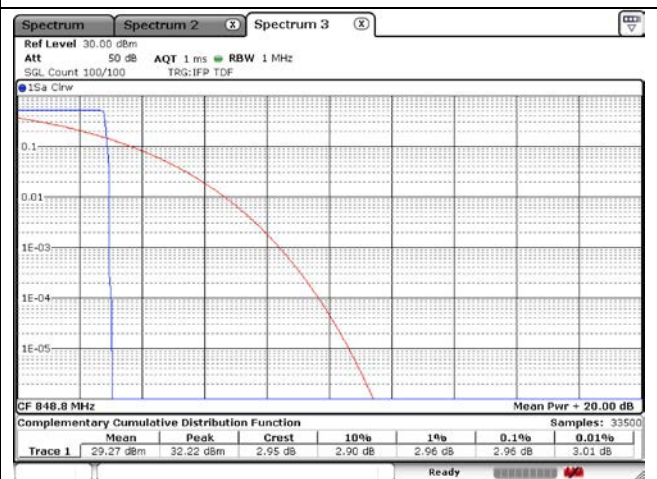
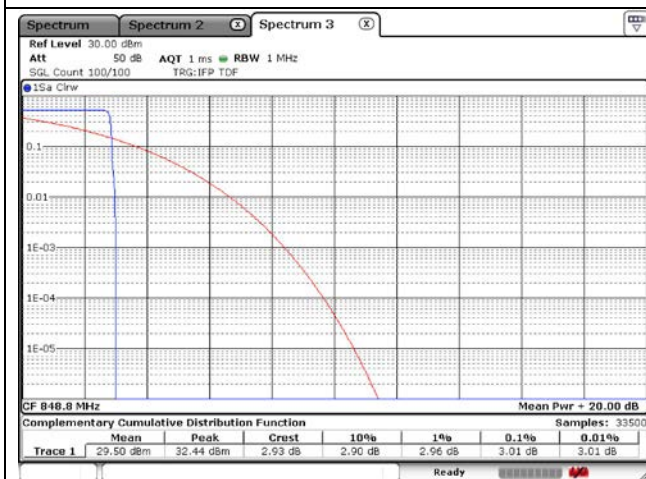
GSM 850



GSM 850 VOICE Low Channel



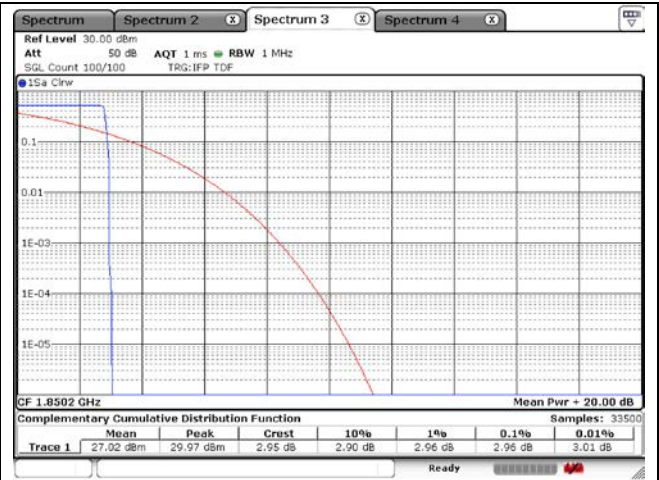
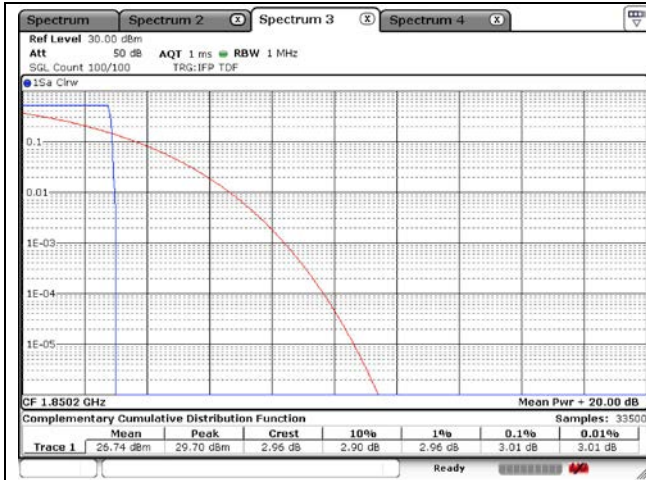
GSM 850 VOICE Middle Channel



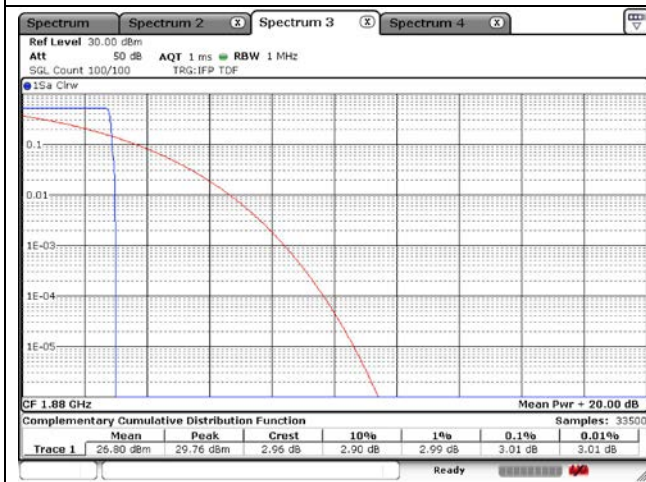
GSM 850 VOICE High Channel

GSM 850 EDGE High Channel

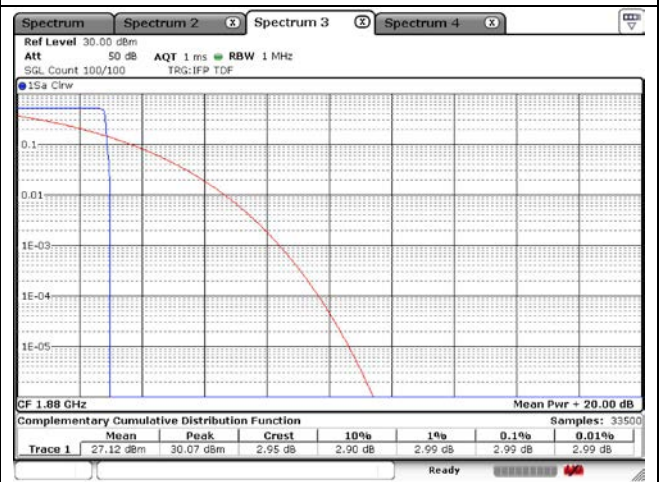
GSM 1900



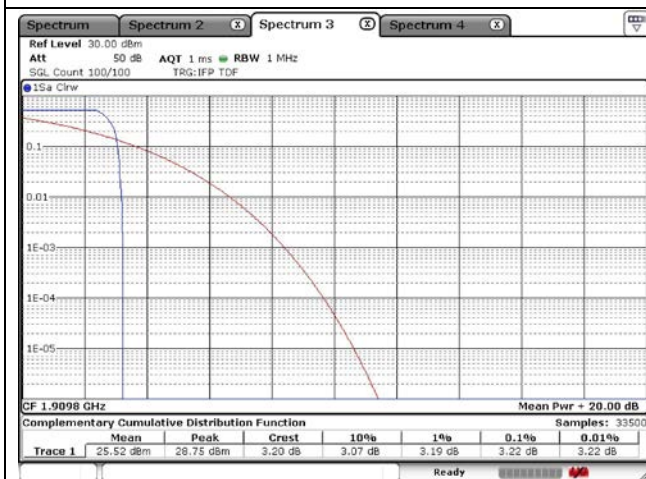
GSM 1900 VOICE Low Channel



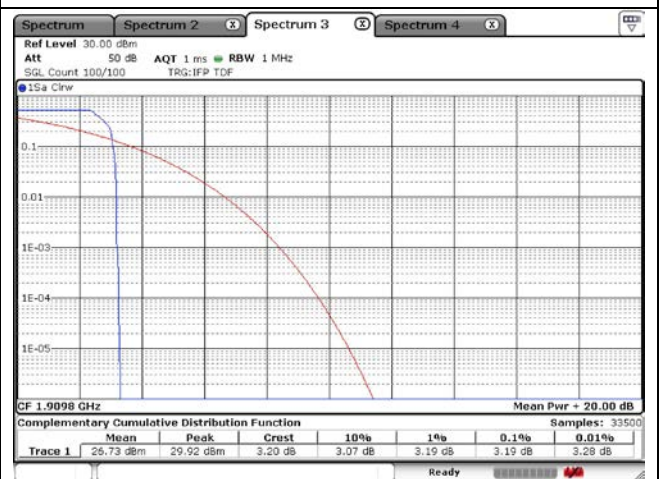
GSM 1900 EDGE Low Channel



GSM 1900 VOICE Middle Channel



GSM 1900 EDGE Middle Channel



GSM 1900 VOICE High Channel

GSM 1900 EDGE High Channel

6. Spurious Emissions at Antenna Terminal

6.1. Limit

- §22.917(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.

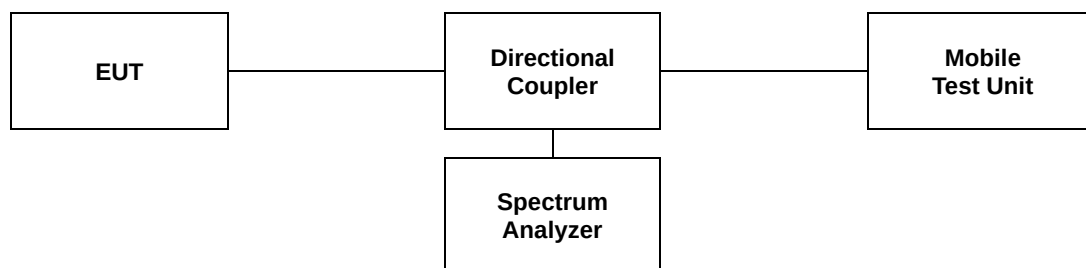
- §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

- §27.53(h)(1), for operations in the 1 695-1 710 MHz, 1 710-1 755 MHz, 1 755-1 780 MHz, 1 915-1 920 MHz, 1 995-2 000 MHz, 2 000-2 020 MHz, 2 110-2 155 MHz, 2 155-2 180 MHz, and 2 180-2 200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

6.2. Test Procedure

The test follows section 5.7 of ANSI C63.26-2015.

1. Start frequency was set to 9 kHz and stop frequency was set to at least 10* the fundamental frequency.
2. Detector = RMS.
3. Trace mode = Max hold.
4. Sweep time = Auto couple.
5. The trace was allowed to stabilize.
6. Please see notes below for RBW and VBW settings.
7. For plots showing conducted spurious emissions from 9 kHz to 20 GHz, all path loss of wide frequency range was investigated and compensated to spectrum analyzer as TDF function.



Note;

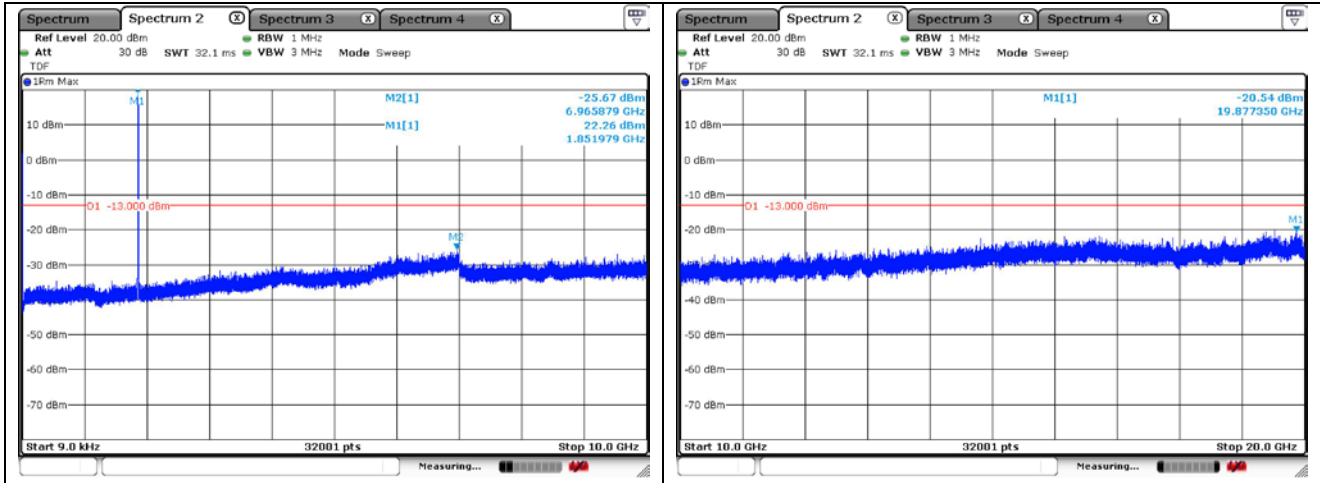
Compliance with the applicable limits is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater for frequencies less than 1 GHz and frequencies greater than 1 GHz. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two point, one below the carrier center frequency and one above the carrier center frequency, outside of which all emission are attenuated at least 26 dB below the transmitter power.

6.3. Test Results

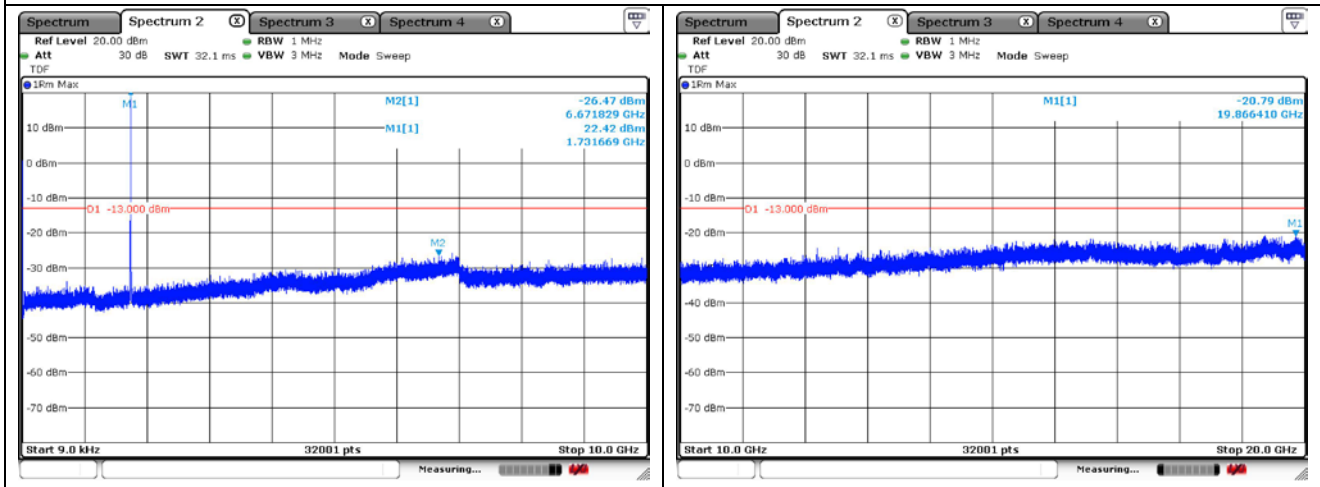
Ambient temperature : (23 ± 1) °C
 Relative humidity : 47 % R.H.

- Test plots

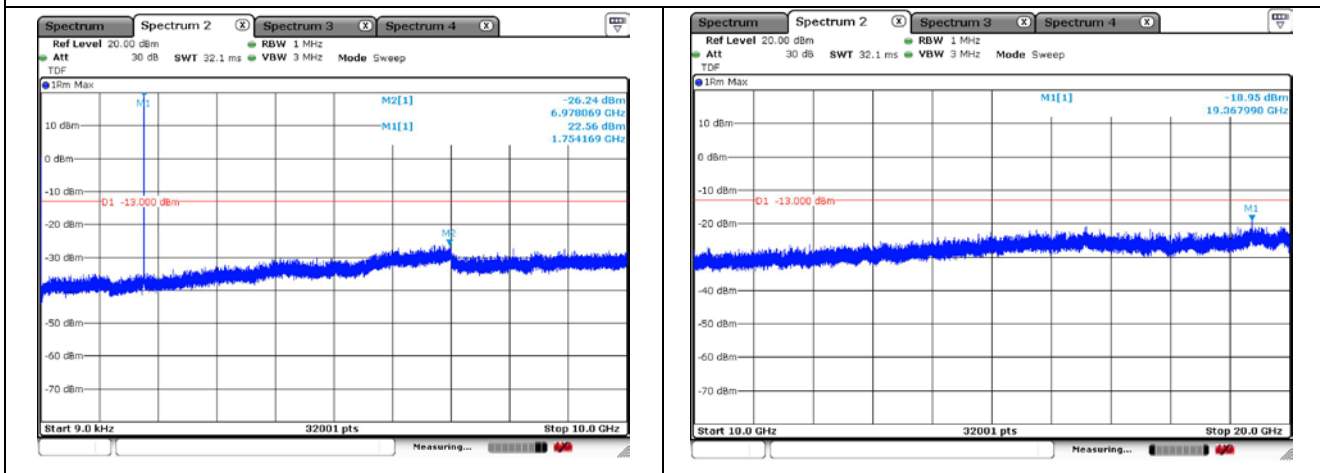
WCDMA II



WCDMA II RMC Low Channel

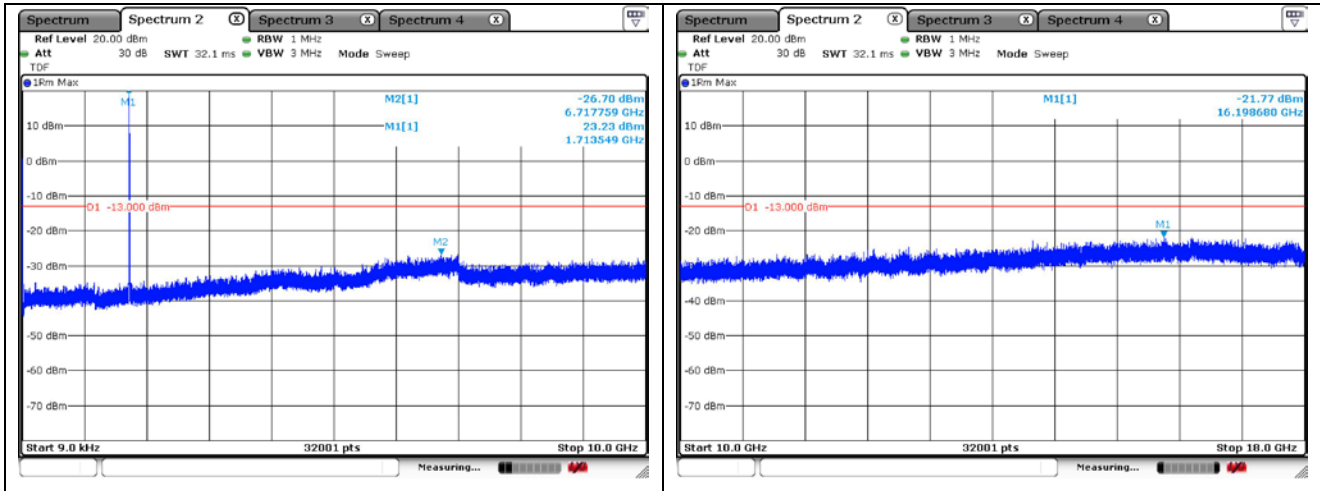


WCDMA II RMC Middle Channel

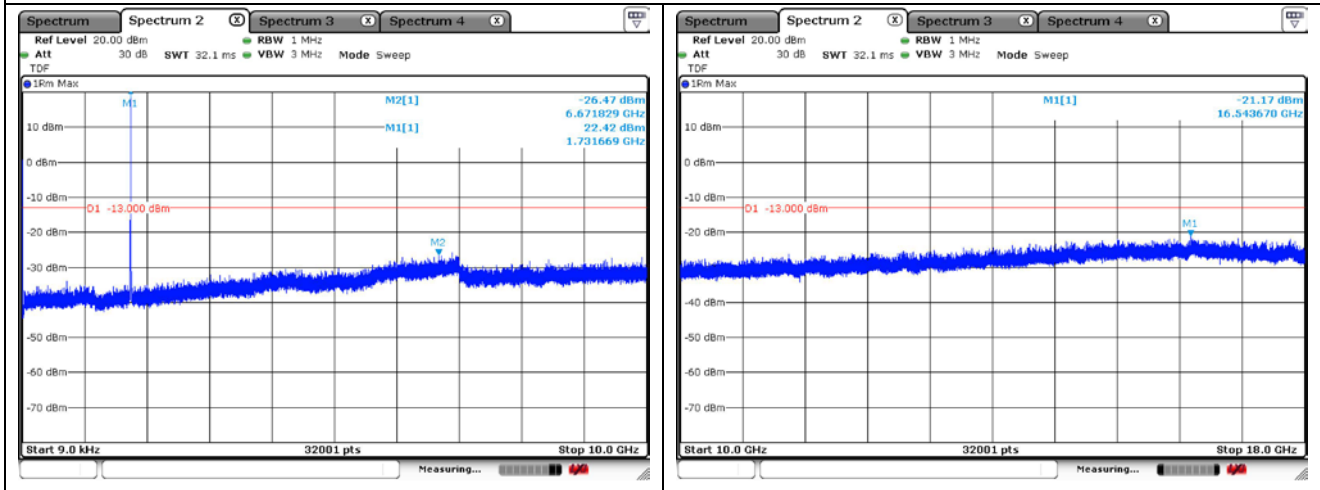


WCDMA II RMC High Channel

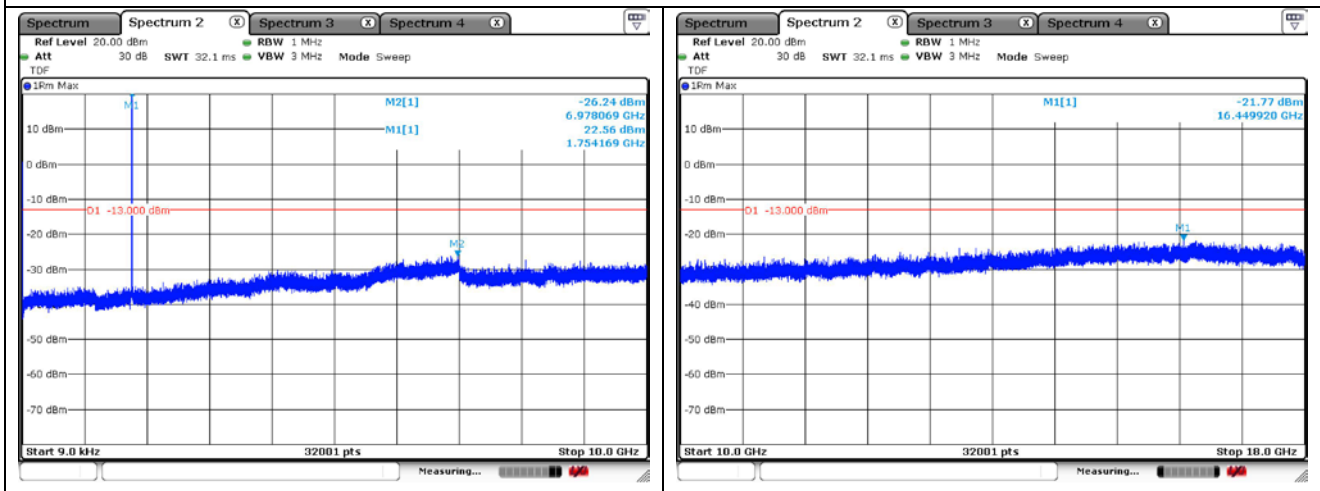
WCDMA IV



WCDMA IV RMC Low Channel

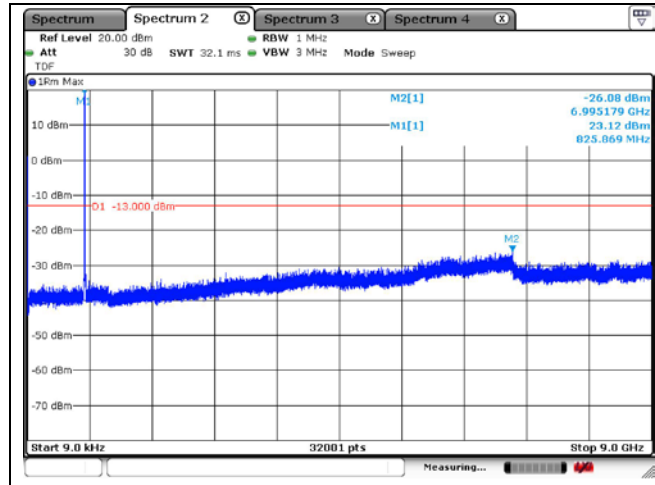


WCDMA IV RMC Middle Channel

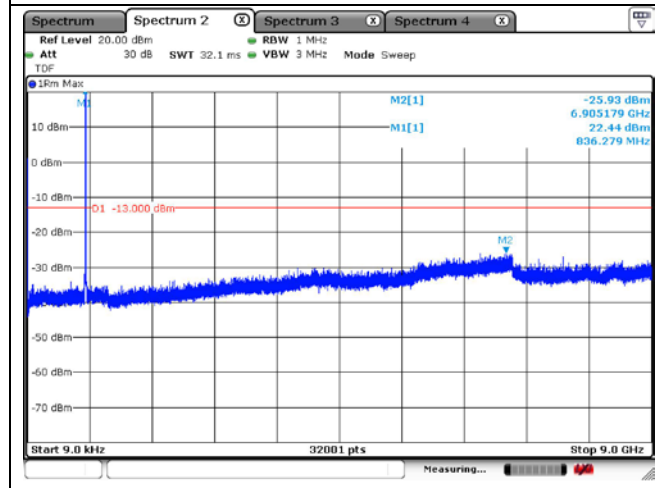


WCDMA IV RMC High Channel

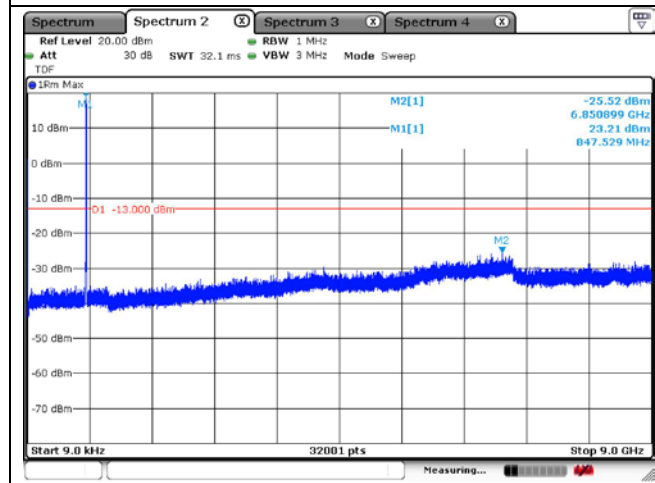
WCDMA V



WCDMA V RMC Low channel

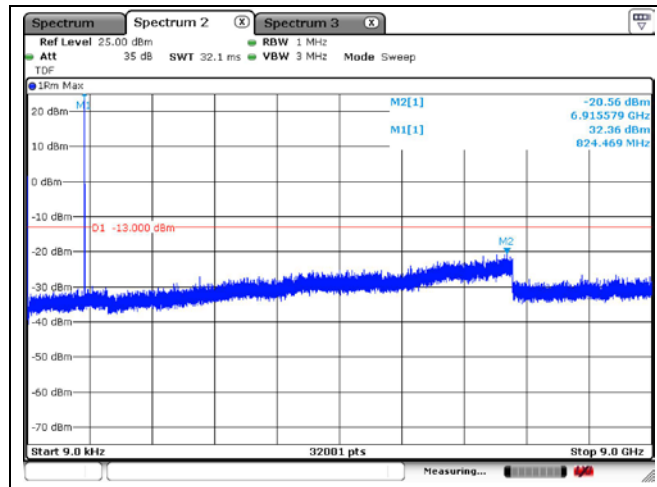


WCDMA V RMC Middle channel

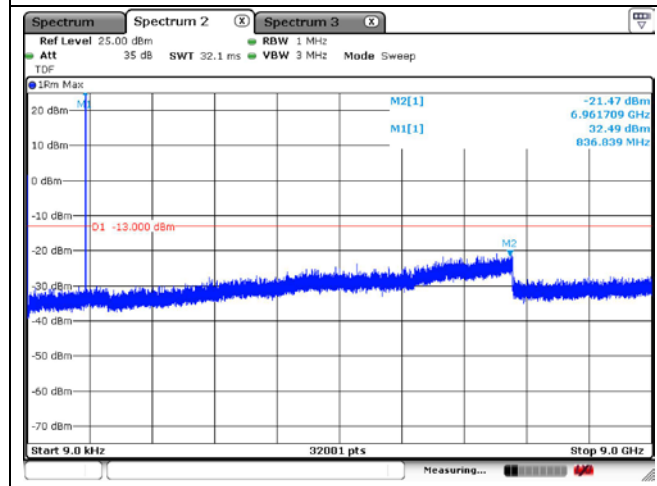


WCDMA V RMC High channel

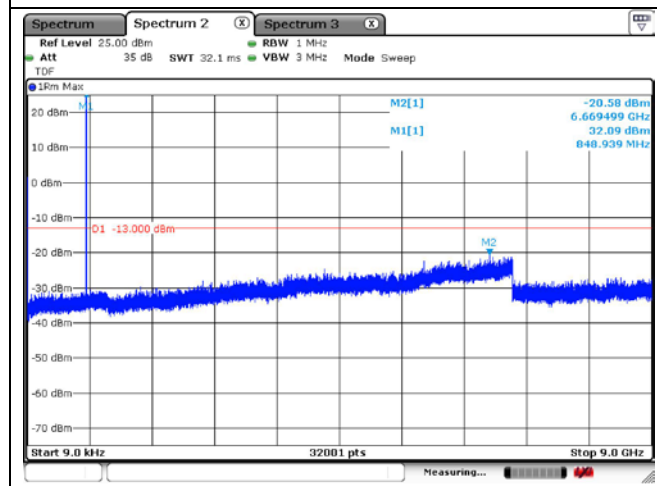
GSM 850



GSM 850 VOICE Low Channel

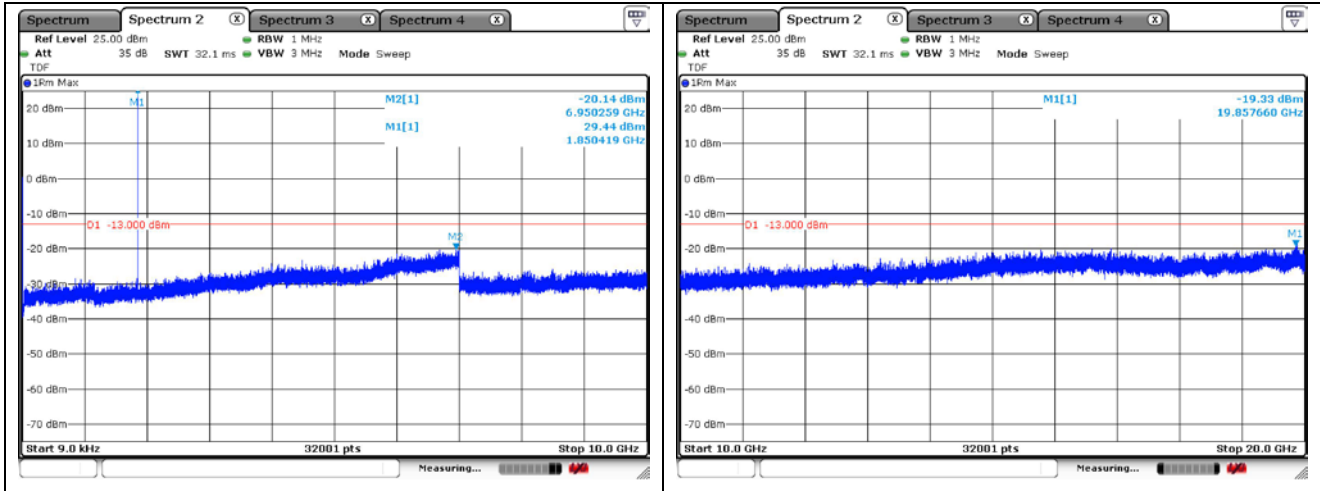


GSM 850 VOICE Middle Channel

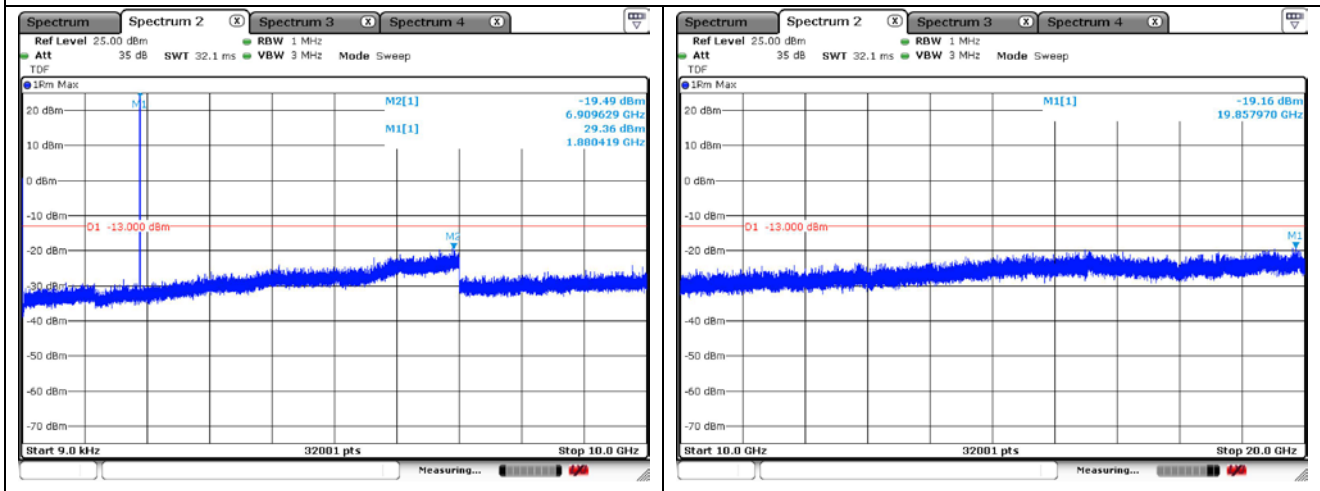


GSM 850 VOICE High Channel

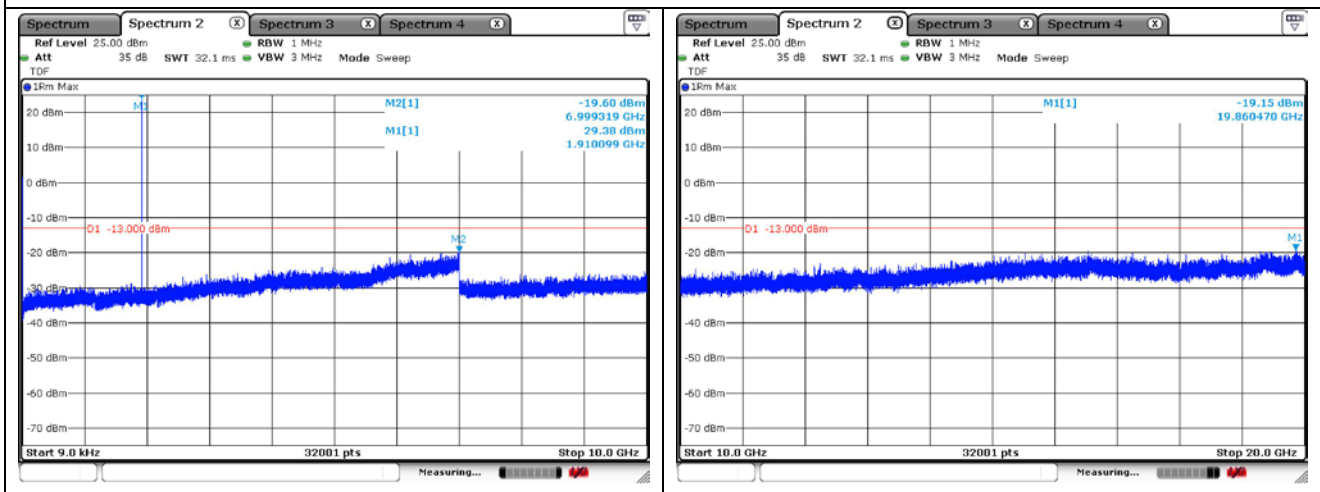
GSM 1900



GSM 1900 VOICE Low Channel



GSM 1900 VOICE Middle Channel



GSM 1900 VOICE High Channel