

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 24 SUBPART E REQUIREMENT**

OF

Applicant: Sharp Corporation, Mobile Communication B.U.
2-13-1, Hachihonmatsu-lida, Higashi-hiroshima-shi, Hiroshima, 739-0192, Japan

Manufacturer: Sharp Corporation
1 Takumi-cho, Sakai-ku, Sakai City, Osaka 590-8522, Japan

Product Name: Cellular Phone

Report Number: ER/2018/C0120

FCC ID: APYHRO00269

FCC Rule Part: 2, & 24E

Issue Date: Jan. 17, 2019

Date of Test: Oct. 25, 2018 ~ Nov. 27, 2018

Date of EUT Received: Oct. 25, 2018

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Electronics & Communication Laboratory. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.26-2015 and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits.

The test results of this report relate only to the tested sample identified in this report.

Tested By:

Marcus Tseng

Marcus Tseng / Engineer**Approved By:**

Jazz Huang

Jazz Huang / Asst. Supervisor

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Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2018/C0120	Rev.00	Initial creation of document	All	Dec. 25, 2018	Elle Chang
ER/2018/C0120	Rev.01	Updated applied standard	Page 6	Jan. 17, 2019	Elle Chang

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1. GENERAL PRODUCT INFORMATION

1.1. Product Description

General:

Product Name:	Cellular Phone
Hardware Version:	DVT
Software Version:	N/A
Power Supply:	3.8V from Rechargeable Li-ion Battery
IMEI:	004401116646155 / 004401116643319

1.2. GSM / WCDMA: Cellular Phone Standards Frequency Range

Operating Frequency (MHz)		
GSM/GPRS 1900	1850.2	- 1909.8

Operating Frequency (MHz)		
WCDMA / HSPA+ Band II	1852.4	- 1907.6

LTE Band	BW (MHz)	Operation Frequency (MHz)
2	1.4	1850.7 - 1909.3
	3	1851.5 - 1908.5
	5	1852.5 - 1907.5
	10	1855.0 - 1905.0
	15	1857.5 - 1902.5
	20	1860.0 - 1900.0

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1.3. Type of Emission & Max EIRP Power Measurement Result:

	EIRP (dBm)		(W)	Type of Emission
GSM 1900	29.1	EIRP	0.813	246KGXW
GPRS 1900	30.84	EIRP	1.213	246KGXW

	EIRP (dBm)		(W)	Type of Emission
WCDMA Band II	27.68	EIRP	0.586	4M13F9W
HSDPA Band II	26.99	EIRP	0.500	4M14F9W
HSUPA Band II	25.09	EIRP	0.323	4M14F9W

LTE Band	BW (MHz)	Modulation	EIRP (dBm)		(W)	Type of Emission
2	1.4	QPSK	27.21	EIRP	0.526	1M10G7D
	1.4	16QAM	26.58	EIRP	0.455	1M10D7W
	3	QPSK	27.78	EIRP	0.600	2M71G7D
	3	16QAM	27.1	EIRP	0.513	2M70D7W
	5	QPSK	27.19	EIRP	0.524	4M51G7D
	5	16QAM	26.74	EIRP	0.472	4M51D7W
	10	QPSK	26.06	EIRP	0.403	9M01G7D
	10	16QAM	25.83	EIRP	0.383	8M96D7W
	15	QPSK	22.97	EIRP	0.198	13M5G7D
	15	16QAM	23.23	EIRP	0.210	13M5D7W
	20	QPSK	25.49	EIRP	0.354	17M9G7D
	20	16QAM	23.89	EIRP	0.245	18M0D7W

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1.4. Test Methodology of Applied Standards

CC 47 CFR Part 2, 24.

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

KDB941225 D01 SAR test for 3G devices v03r01 (SAR Measurement Procedures for 3G Devices, WCDMA / HSPA) was used for EUT and Base station setting.

TS 151 010-1 is used to set, and measure the output power.

Note: All test items have been performed and record as per the above standards.

1.5. Test Facility

SGS Taiwan Ltd. Electronics & Communication Laboratory No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803 code 0513)

FCC Registration Numbers are: 509634 / TW0001

1.6. Special Accessories

No special accessories were used during testing.

1.7. Equipment Modifications

There were no modifications incorporated into the EUT.

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2. SYSTEM TEST CONFIGURATION

2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2. EUT Exercise

The EUT (Transmitter) was operated in the continuous transmission mode employed with the simulator of the Base Station that fixates at test default channels to fix the Tx frequency which was for the purpose of the measurements.

2.3. Test Procedure

2.3.1 Conducted Measurement at Antenna Port

According to measurement procured ANSI C63.26-2015, the EUT is placed on a turn table which is 0.8 m above ground plane. A low loss of RF cable was used to connect the antenna port of EUT to measurement equipment.

2.3.2 Radiated Emissions (EIRP)

According to measurement procured ANSI C63.26-2015, The EUT is a placed on as turn table, for emission measurements below 1 GHz is 0.8 m above ground plane, for emission measurements above 1 GHz, the table height shall be 1.5 m. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both Horizontal and Vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna according to the requirements in Section 8 and 13.

2.4. Measurement Results Explanation Example

For all conducted test items:

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuation factor between EUT conducted port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly EUT RF output level.

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Note:

The spectrum analyzer offset is derived from RF cable loss and attenuator factor.

Following shows an offset computation in physical test.

	RF cable loss (dB)	Attenuation factor(dB)	offset(dB)
Low Band (Below 1GHz)	0.2	10	10.2
High Band (Above 1 GHz)	0.5	10	10.5

2.5. Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
GSM 1900	3.8	167
WCDMA B2		168
LTE Band 2		167

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2.6. Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed Channel-Conducted)

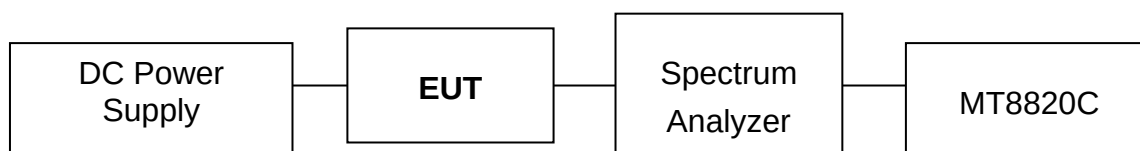


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)

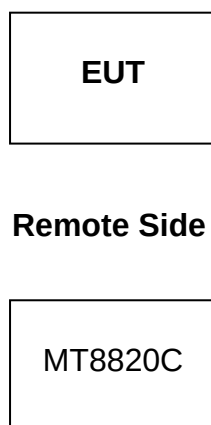


Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Radio Communication Analyer	Anritsu	MT8820C	6201465317	shielded	Un-shielded

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3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a)	RF Power Output	Compliant
§2.1046(a) §24.232(c)	EIRP measurement	Compliant
§2.1049(h)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §24.238(a)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §24.238(a)	Field Strength of Spurious Radiation	Compliant
§24.232(d)	Peak to Average Ratio	Compliant
§2.1055(a)(1) §24.235	Frequency Stability	Compliant

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4. DESCRIPTION OF TEST MODES

4.1. The Worst Test Modes and Channel Details

1. The EUT has been tested under operating condition.
2. Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, X(E1)Y(E2)Z(H) axis and antenna ports. The worst case was found as listed below. Following channel(s) was (were) selected for the final test as listed below:

BAND	EIRP	RADIATED EMISSION
GSM/GPRS 1900	E2-plan	E2-plan
WCDMA/HSPA Band II	E2-plan	E2-plan
LTE Band 2	E2-plan	E2-plan

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GSM/GPRS MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
EIRP	512 to 810	512, 661, 810	GSM/GPRS 1900
FREQUENCY STABILITY	512 to 810	661	GPRS 1900
OCCUPIED BANDWIDTH	512 to 810	661	GSM/GPRS 1900
PEAK TO AVERAGE RATIO	512 to 810	512, 661, 810	GSM/GPRS 1900
BAND EDGE	512 to 810	512, 810	GSM/GPRS 1900
CONDCUDED EMISSION	512 to 810	512, 661, 810	GSM/GPRS 1900
RADIATED EMISSION	512 to 810	512, 661, 810	GPRS 1900

WCDMA/HSPA MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
EIRP	9262 to 9538	9262, 9400, 9583	WCDMA/HSPA Band II
FREQUENCY STABILITY	1312 to 1513	1413	WCDMA Band II
OCCUPIED BANDWIDTH	1312 to 1513	1312, 1413, 1513	WCDMA/HSPA Band II
PEAK TO AVERAGE RATIO	1312 to 1513	1312, 1413, 1513	WCDMA/HSPA Band II
BAND EDGE	1312 to 1513	1312, 1513	WCDMA Band II
CONDCUDED EMISSION	1312 to 1513	1312, 1413, 1513	WCDMA Band II
RADIATED EMISSION	1312 to 1513	1312, 1413, 1513	WCDMA Band II

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LTE Band 2 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
EIRP	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK, 16QAM	1 RB/ 0,5 RB Offest
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK, 16QAM	1 RB/ 0,14 RB Offest
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK, 16QAM	1 RB/ 0,24 RB Offest
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK, 16QAM	1 RB/ 0,49 RB Offest
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK, 16QAM	1 RB/ 0,74 RB Offest
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK, 16QAM	1 RB/ 0,99 RB Offest
FREQUENCY STABILITY	18650 to 19150	18900	10MHz	QPSK	Full RB
OCCUPIED BAND-WIDTH	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK, 16QAM	Full RB
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK, 16QAM	Full RB
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK, 16QAM	Full RB
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK, 16QAM	Full RB
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK, 16QAM	Full RB
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK, 16QAM	Full RB
PEAK TO AVERAGE RATIO	18607 to 19193	18607, 18900, 19193	1.4MHz	16QAM	Full RB
	18615 to 19185	18615, 18900, 19185	3MHz	16QAM	Full RB
	18625 to 19175	18625, 18900, 19175	5MHz	16QAM	Full RB
	18650 to 19150	18650, 18900, 19150	10MHz	16QAM	Full RB
	18675 to 19125	18675, 18900, 19125	15MHz	16QAM	Full RB
	18700 to 19100	18700, 18900, 19100	20MHz	16QAM	Full RB
BAND EDGE	18607 to 19193	18607, 19193	1.4MHz	QPSK	1 RB/ 0,5 RB Offes Full RB
	18615 to 19185	18615, 19185	3MHz	QPSK	1 RB/ 0,14 RB Offest Full RB
	18625 to 19175	18625, 19175	5MHz	QPSK	1 RB/ 0,24 RB Offest Full RB
	18650 to 19150	18650, 19150	10MHz	QPSK	1 RB/ 0,49 RB Offest Full RB
	18675 to 19125	18675, 19125	15MHz	QPSK	1 RB/ 0,74 RB Offest Full RB
	18700 to 19100	18700, 19100	20MHz	QPSK	1 RB/ 0,99 RB Offest Full RB
CONDCUDED EMISSION	18607 to 19193	18607, 18900, 19193	1.4MHz	QPSK	1 RB, 0 RB Offest
	18615 to 19185	18615, 18900, 19185	3MHz	QPSK	1 RB, 0 RB Offest
	18625 to 19175	18625, 18900, 19175	5MHz	QPSK	1 RB, 0 RB Offest
	18650 to 19150	18650, 18900, 19150	10MHz	QPSK	1 RB, 0 RB Offest
	18675 to 19125	18675, 18900, 19125	15MHz	QPSK	1 RB, 0 RB Offest
	18700 to 19100	18700, 18900, 19100	20MHz	QPSK	1 RB, 0 RB Offest
RADIATED EMISSION	18650 to 19150	18650, 18900, 19150	10MHz	16QAM	1 RB, 49 RB Offest

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5. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.10 dB
EIRP measurement	Vertical Polarization = +/- 4.74dB Horizontal Polarization = +/- 4.62dB
99% Occupied Bandwidth	+/- 5.19 Hz
Out of Band Emissions at Antenna Terminals and Band Edge	+/- 0.70 dB
Peak to Average Ratio	+/- 0.70 dB
Frequency Stability vs. Temperature	+/- 5.19 Hz
Frequency Stability vs. Voltage	+/- 5.19 Hz
Temperature	+/- 0.65 °C
Humidity	+/- 4.6 %
DC / AC Power Source	DC= +/- 0.13%, AC= +/- 0.2%

Radiated Spurious Emission:

Measurement uncertainty (Polarization : Vertical)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 180MHz: +/- 3.37dB
	180MHz -417MHz: +/- 3.19dB
	0.417GHz-1GHz: +/- 3.19dB
	1GHz - 18GHz: +/- 4.04dB
	18GHz - 40GHz: +/- 4.04dB

Measurement uncertainty (Polarization : Horizontal)	9kHz – 30MHz: +/- 2.87 dB
	30MHz - 167MHz: +/- 4.22dB
	167MHz -500MHz: +/- 3.44dB
	0.5GHz-1GHz: +/- 3.39dB
	1GHz - 18GHz: +/- 4.08dB
	18GHz - 40GHz: +/- 4.08dB

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

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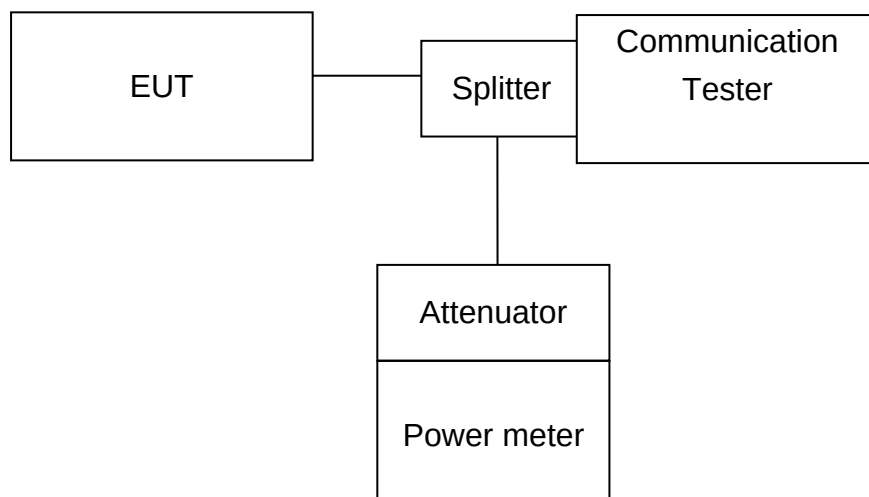
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6. RF CONDUCTED OUTPUT POWER MEASUREMENT

6.1. Standard Applicable

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals.

6.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

6.3. Measurement Procedure

The transmitter output was connected to a calibrated attenuator, the other end of which was connected to a power meter. Transmitter output was read off the power meter in dBm. The power output at the transmitter antenna port was determined by adding the value of the attenuator to the power meter reading. TS 151 010-1 is reference to conduct the test measurement of output power.

The Procedure of KDB941225 (SAR Measurement Procedures for 3G devices, (WCD-MA/HSPA) was used for EUT and Base station setting. RMC 12.2kps is used for this testing, and KDB 971168 D01 Power Meas License Digital System as the supplemental test methodology to adjust the proper setting obtaining the measurement results

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6.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Radio Communication Analyser	Anritsu	MT8820C	6200995019	04/05/2018	04/04/2019
DC Power Supply	Agilent	E3640A	MY52410006	11/28/2017	11/27/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2018	01/01/2019

6.5. Measurement Result

RF Conducted Output Power

GSM/GPRS/EDGE (GMSK; 8-PSK) Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Limit (dBm)	Margin (dB)
GSM 1900	1850.2	512	28.94	33.00	-4.06
	1880.0	661	28.74	33.00	-4.26
	1909.8	810	28.75	33.00	-4.25

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EUT Mode	Frequency (MHz)	CH	Average Burst Power (1DN 1UP) Class 8 (dBm)	Average Burst Power (1DN 2UP) Class 10 (dBm)	Average Burst Power (1DN 3UP) Class 12 (dBm)	Average Burst Power (1DN 4UP) Class 12 (dBm)
GPRS 1900	1850.2	512	28.94	26.55	24.95	23.77
	1880.0	661	28.74	26.72	25.01	23.83
	1909.8	810	28.75	26.64	24.72	23.61

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WCDMA MODE:

The following tests were completed according to the test requirements outlined in section 5.2 of the 3GPP TS34.121-1 specification. The EUT supports power Class 3, which has a nominal maximum output power of 24 dBm (+1.7/-3.7). RMC 12.2kps is used for this testing.

Results:

WCDMA/HSUPA/HSDPA Band II Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)
WCDMA	1852.4	9262	22.29
	1880.0	9400	22.08
	1907.6	9538	21.70
HSDPA	1852.4	9262	21.20
	1880.0	9400	21.11
	1907.6	9538	20.81
HSUPA	1852.4	9262	21.05
	1880.0	9400	20.73
	1907.6	9538	20.75

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LTE Result:
FDD Band 2

BW(MHz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	
1.4	QPSK	1 RB	0	1850.7	18607	22.19	
				1880	18900	21.92	
				1909.3	19193	21.95	
			2	1850.7	18607	22.23	
				1880	18900	21.99	
				1909.3	19193	21.90	
			5	1850.7	18607	22.15	
				1880	18900	22.05	
				1909.3	19193	21.83	
		3 RB	0	1850.7	18607	22.16	
				1880	18900	22.12	
				1909.3	19193	22.07	
			2	1850.7	18607	22.18	
				1880	18900	22.16	
				1909.3	19193	22.00	
			3	1850.7	18607	22.12	
				1880	18900	22.09	
				1909.3	19193	21.97	
		6RB			1850.7	18607	21.13
					1880	18900	20.94
					1909.3	19193	20.91
	16-QAM	1 RB	0	1850.7	18607	21.04	
				1880	18900	20.97	
				1909.3	19193	21.00	
			2	1850.7	18607	21.09	
				1880	18900	21.03	
				1909.3	19193	21.13	
			5	1850.7	18607	21.25	
				1880	18900	21.06	
				1909.3	19193	20.47	
			3 RB	0	1850.7	18607	21.24
					1880	18900	20.92
					1909.3	19193	20.65
				2	1850.7	18607	21.28
					1880	18900	20.98
					1909.3	19193	20.70
				3	1850.7	18607	21.05
					1880	18900	20.94
					1909.3	19193	20.67
		6RB			1850.7	18607	20.21
					1880	18900	19.92
					1909.3	19193	19.75

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BW(MHz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	
3	QPSK	1 RB	0	1851.5	18615	21.99	
				1880	18900	21.94	
				1908.5	19185	21.70	
			7	1851.5	18615	22.02	
				1880	18900	22.03	
				1908.5	19185	21.91	
			14	1851.5	18615	21.96	
				1880	18900	22.08	
				1908.5	19185	21.82	
		8 RB	0	1851.5	18615	21.23	
				1880	18900	21.01	
				1908.5	19185	21.08	
			4	1851.5	18615	21.26	
				1880	18900	21.00	
				1908.5	19185	20.95	
			7	1851.5	18615	21.22	
				1880	18900	21.06	
				1908.5	19185	20.91	
		15RB			1851.5	18615	21.23
					1880	18900	20.96
					1908.5	19185	20.91
	16-QAM	1 RB	0	1851.5	18615	21.21	
				1880	18900	20.51	
				1908.5	19185	20.82	
			7	1851.5	18615	21.47	
				1880	18900	20.92	
				1908.5	19185	20.72	
			14	1851.5	18615	21.39	
				1880	18900	20.73	
				1908.5	19185	20.49	
			8 RB	0	1851.5	18615	20.22
					1880	18900	19.93
					1908.5	19185	19.79
				4	1851.5	18615	20.25
					1880	18900	19.99
					1908.5	19185	19.60
		7		1851.5	18615	20.30	
				1880	18900	19.98	
				1908.5	19185	19.57	
		15RB			1851.5	18615	20.21
					1880	18900	20.13
					1908.5	19185	19.93

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BW(MHz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	
5	QPSK	1 RB	0	1852.5	18625	22.04	
				1880	18900	21.89	
				1907.5	19175	21.81	
			12	1852.5	18625	22.17	
				1880	18900	22.00	
				1907.5	19175	21.89	
			24	1852.5	18625	22.04	
				1880	18900	21.66	
				1907.5	19175	21.62	
		12 RB	0	1852.5	18625	21.23	
				1880	18900	21.02	
				1907.5	19175	20.98	
			6	1852.5	18625	21.27	
				1880	18900	21.02	
				1907.5	19175	20.89	
			13	1852.5	18625	21.21	
				1880	18900	21.08	
				1907.5	19175	20.82	
		25RB			1852.5	18625	21.23
					1880	18900	21.06
					1907.5	19175	20.91
	16-QAM	1 RB	0	1852.5	18625	21.27	
				1880	18900	21.12	
				1907.5	19175	20.44	
			12	1852.5	18625	21.43	
				1880	18900	21.16	
				1907.5	19175	20.74	
			24	1852.5	18625	21.18	
				1880	18900	21.09	
				1907.5	19175	20.54	
		12 RB	0	1852.5	18625	20.22	
				1880	18900	19.91	
				1907.5	19175	19.69	
			6	1852.5	18625	20.35	
				1880	18900	19.99	
				1907.5	19175	19.71	
			13	1852.5	18625	20.21	
				1880	18900	19.98	
				1907.5	19175	19.83	
		25RB			1852.5	18625	20.28
					1880	18900	20.01
					1907.5	19175	19.97

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BW(MHz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	
10	QPSK	1 RB	0	1855	18650	21.96	
				1880	18900	21.90	
				1905	19150	21.69	
			25	1855	18650	22.10	
				1880	18900	22.04	
				1905	19150	21.93	
			49	1855	18650	22.05	
				1880	18900	21.71	
				1905	19150	21.74	
		25 RB	0	1855	18650	21.25	
				1880	18900	21.14	
				1905	19150	20.87	
			12	1855	18650	21.20	
				1880	18900	21.13	
				1905	19150	20.95	
			25	1855	18650	21.13	
				1880	18900	21.15	
				1905	19150	20.77	
		50RB			1855	18650	21.15
					1880	18900	21.11
					1905	19150	20.84
		16-QAM	1 RB	0	1855	18650	20.85
					1880	18900	20.67
					1905	19150	20.58
	25			1855	18650	20.89	
				1880	18900	21.09	
				1905	19150	20.99	
	49			1855	18650	20.57	
				1880	18900	20.53	
				1905	19150	20.51	
	25 RB			0	1855	18650	20.31
					1880	18900	20.32
					1905	19150	19.92
				12	1855	18650	20.24
					1880	18900	20.18
					1905	19150	19.99
				25	1855	18650	20.36
					1880	18900	20.18
					1905	19150	19.73
	50RB			1855	18650	20.34	
				1880	18900	20.11	
				1905	19150	19.74	

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BW(MHz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	
15	QPSK	1 RB	0	1857.5	18675	22.09	
				1880	18900	21.96	
				1902.5	19125	21.90	
			36	1857.5	18675	22.10	
				1880	18900	21.84	
				1902.5	19125	21.88	
			74	1857.5	18675	22.12	
				1880	18900	21.84	
				1902.5	19125	21.66	
		36 RB	0	1857.5	18675	21.19	
				1880	18900	21.14	
				1902.5	19125	20.88	
			18	1857.5	18675	21.27	
				1880	18900	21.12	
				1902.5	19125	20.95	
			37	1857.5	18675	21.27	
				1880	18900	21.05	
				1902.5	19125	20.95	
		75RB			1857.5	18675	21.08
					1880	18900	21.09
					1902.5	19125	20.87
	16-QAM	1 RB	0	1857.5	18675	20.76	
				1880	18900	20.73	
				1902.5	19125	20.47	
			36	1857.5	18675	21.37	
				1880	18900	21.11	
				1902.5	19125	21.11	
			74	1857.5	18675	20.83	
				1880	18900	20.39	
				1902.5	19125	20.47	
			36 RB	0	1857.5	18675	20.22
					1880	18900	20.07
					1902.5	19125	19.72
				18	1857.5	18675	20.29
					1880	18900	20.05
					1902.5	19125	19.77
				37	1857.5	18675	20.29
					1880	18900	20.07
					1902.5	19125	19.78
		75RB			1857.5	18675	20.14
					1880	18900	20.05
					1902.5	19125	19.84

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BW(MHz)	Modulation	RB Size	RB Offset	Frequency (MHz)	Channel	Conducted power (dBm)	
20	QPSK	1 RB	0	1860	18700	21.91	
				1880	18900	21.83	
				1900	19100	21.48	
			50	1860	18700	22.34	
				1880	18900	22.13	
				1900	19100	21.92	
			99	1860	18700	22.06	
				1880	18900	21.61	
				1900	19100	21.51	
		50 RB	0	1860	18700	21.19	
				1880	18900	21.15	
				1900	19100	20.94	
			25	1860	18700	21.24	
				1880	18900	21.14	
				1900	19100	20.96	
			50	1860	18700	21.24	
				1880	18900	21.00	
				1900	19100	20.83	
		100RB			1860	18700	21.23
					1880	18900	21.17
					1900	19100	20.84
		16-QAM	1 RB	0	1860	18700	20.35
					1880	18900	20.67
					1900	19100	20.39
	50			1860	18700	21.55	
				1880	18900	20.87	
				1900	19100	21.01	
	99			1860	18700	20.31	
				1880	18900	20.34	
				1900	19100	20.38	
	50 RB			0	1860	18700	20.36
					1880	18900	20.21
					1900	19100	19.79
				25	1860	18700	20.42
					1880	18900	20.22
					1900	19100	19.83
				50	1860	18700	20.32
					1880	18900	20.07
					1900	19100	19.81
	100RB			1860	18700	20.30	
				1880	18900	20.24	
				1900	19100	19.71	

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HSDPA Release 6 MODE:

The following 4 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C10.1.4 & C11.1.3 in the 3GPP TS34.121-1 RMC 12.2kps is used for this testing.

HSDPA SUB-TEST Setting

Table C.10.1.4: β values for transmitter characteristics tests with HS-DPCCH(FOR HSDPA)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note 1, Note 2)	CM (dB) (Note 3)	MPR (dB) (Note 3)	RMC (Kbps)
1	2/15	15/15	64	2/15	4/15	0.0	0.0	12.2
2	12/15 (Note 4)	15/15 (Note 4)	64	12/15 (Note 4)	24/15	1.0	0.0	12.2
3	15/15	8/15	64	15/8	30/15	1.5	0.5	12.2
4	15/15	4/15	64	15/4	30/15	1.5	0.5	12.2

Note: The recommended HSDPA MPRs are implemented as per following sub-tests.

Results:

Mode	Sub test	Avg. Power (dBm)		
		Channel		
		9262.00	9400.00	9538.00
HSDPA II	1	21.20	21.11	20.81
	2	20.75	20.57	20.28
	3	20.78	20.61	20.29
	4	20.78	20.62	20.29

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HSPA (HSDPA & HSUPA) Release 6 MODE

The following 5 Sub-Tests were completed according to the test requirements outlined in section 5.2A of the 3GPP TS34.121-1 specification. All TX RMS power requirements for Power Class 3 were met according to table 5.2AA.5 and 5.2B.5 All UE channels and power ratio's are set according to table C11.1.3 in the 3GPP TS34.121-1 RMC 12.2kps is used for this testing

HSPA SUB-TEST Setting

Table C.11.1.3: β values for transmitter characteristics tests with HS-DPCCH and E-DCH(FOR HSUPA)

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS}	β_{ec}	β_{ed}	β_{ed} (SF)	β_{ed} (Code s)	CM (dB)	MPR (dB)	AG Index	E-TFCI	RMC (Kbps)
1	11/15 (Note 3)	15/15 (Note 3)	64	11/15 (Note 3)	22/15	209/225	1309/225	4	1	1.0	0.0	20	75	12.2
2	6/15	15/15	64	6/15	12/15	12/15	94/75	4	1	3.0	2.0	12	67	12.2
3	15/15	9/15	64	15/9	30/15	30/15	β_{ed1} : 47/15 β_{ed2} : 47/15	4 4	2	2.0	1.0	15	92	12.2
4	2/15	15/15	64	2/15	4/15	2/15	56/75	4	1	3.0	2.0	17	71	12.2
5	15/15 (Note 4)	15/15 (Note 4)	64	15/15 (Note 4)	30/15	24/15	134/15	4	1	1.0	0.0	21	81	12.2

Note: The recommended HSUPA MPRs are implemented as per following sub-tests.

Results:

Mode	Sub test	Avg. Power (dBm)		
		Channel		
		9262.00	9400.00	9538.00
HSUPA II	1	21.05	20.73	20.75
	2	19.62	19.59	19.20
	3	19.18	19.14	19.17
	4	19.97	20.03	19.78
	5	21.10	21.00	20.90

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Minimum Communications Power Measurement

PCS 1900 band

PCL	0	1	2	3	4	5	6	7	8
Output power (dBm)	28.56	26.69	25.09	23.11	21.16	19.28	17.2	15.07	13.12

PCL	9	10	11	12	13	14	15
Output power (dBm)	11.18	9.03	7.06	5.11	3.04	1.14	-0.71

Note: The EUT output power was controlled by simulator. Set Communication Tester [MT8820C](#) PCL as above, and get the mobile phone output power reading.

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7. EQUIVALENT ISOTROPIC RADIATED POWER MEASUREMENT

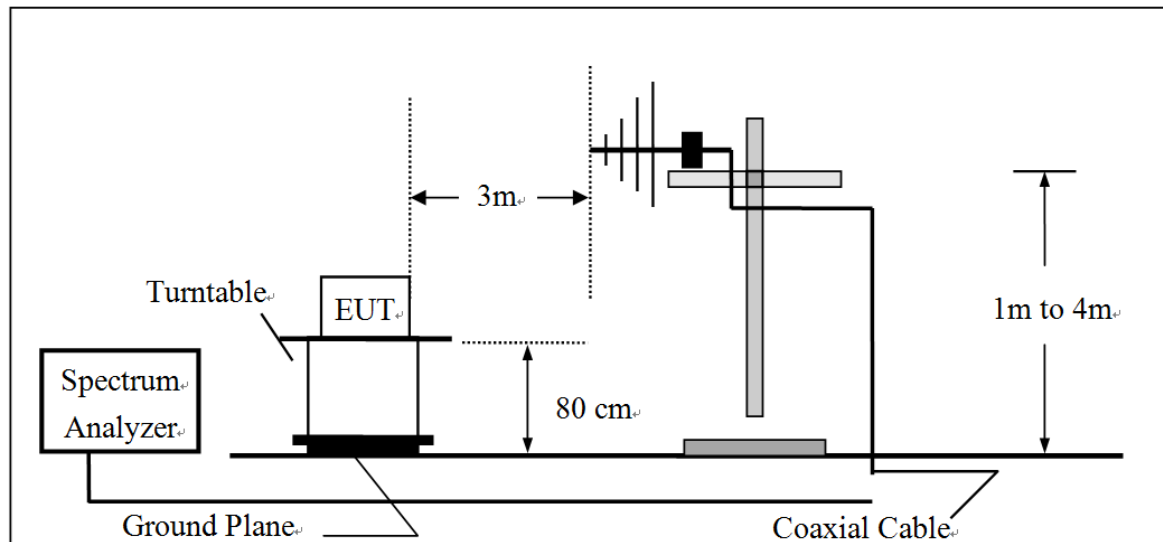
7.1. Standard Applicable

According to FCC §2.1046

FCC 24.232(b) Mobile and portable stations are limited to 2W EIRP.

7.2. Test SET-UP

(A) Radiated Power Test Set-Up, Frequency Below 1000MHz



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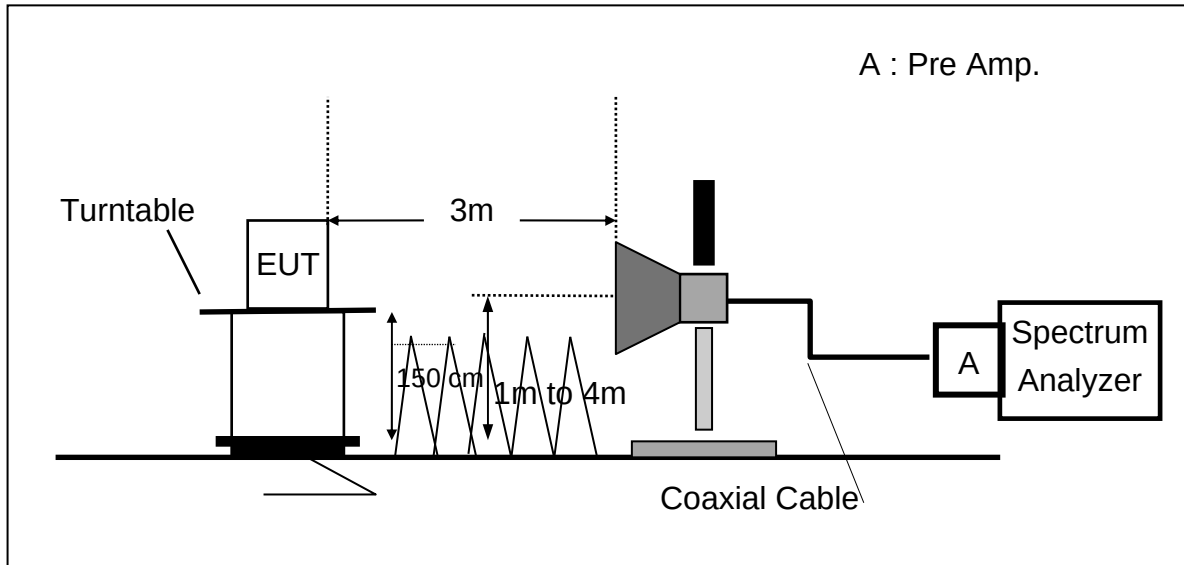
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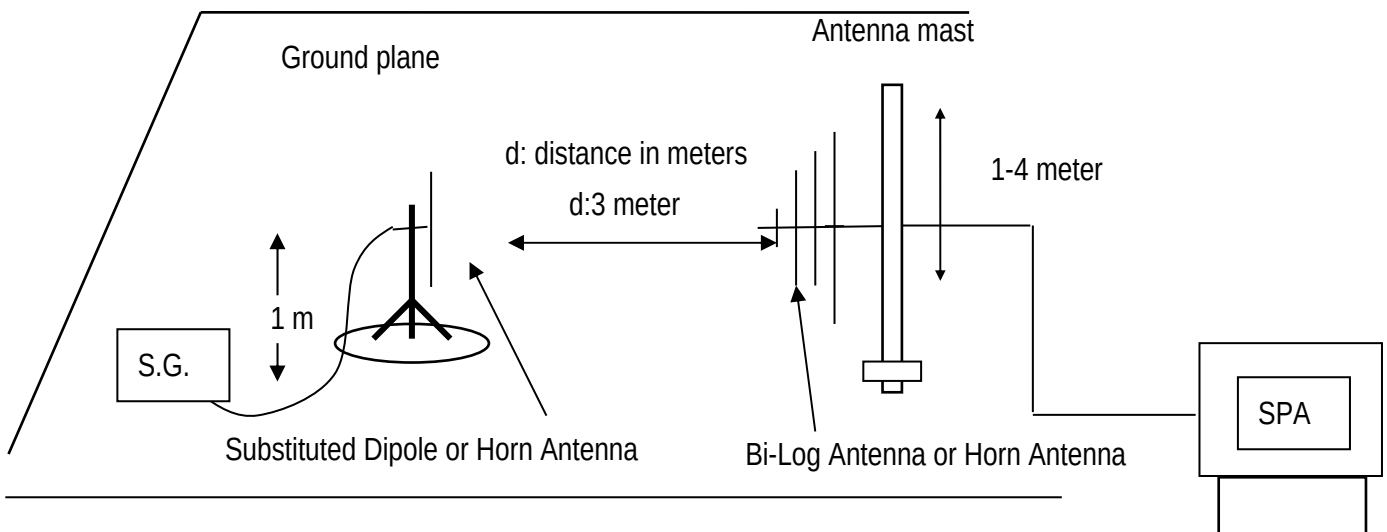
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(B) Radiated Power Test Set-UP Frequency Over 1 GHz



(C) Substituted Method Test Set-UP



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7.3. Measurement Procedure

1. The testing follows the Measurement Procedure of FCC KDB 971168 D01
2. The EUT was placed on a non-conductive turntable using a non-conductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.
3. During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated
4. The testing follows the Measurement Procedure of FCC KDB 971168 D01
5. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
6. $EIRP = S.G. \text{ output (dBm)} + \text{Antenna Gain (dBi)} - \text{Cable Loss (dB)}$
7. Spectrum setting:
 - (1) Detector = Peak, marker the highest value of the detector by maximum hold, set RBW wide enough to capture the entire signal of emission, and $VBW > 3 \times RBW$.
 - (2) KDB 971168 D01 is adopted, and the procedure as lists under item 4, Measurement of the Average Power over the Fundamental Signal Bandwidth, is followed to set correspondingly for the acquisition of proper measurement data.Set frequency = nominal signal center frequency;
Set span = 2 X occupied BW;
Set RBW $\approx$ 1~5% of the span, not to exceed 1 MHz
Set VBW = 3 x RBW;
Select average power (RMS) detector
Set sweep time and number of measurement points to achieve a minimum of 1 millisecond/pt integration time (ex. Point = 601points, then sweep time = $601 \times 10^{-3} = 6s$).

Activate trace averaging routine over a minimum of 10 sweeps;

Activate marker/span pair and set span = signal or channel bandwidth;

Activate the band/interval power marker function;

Record the band power level;

Record adjusted value as the average signal power level. Then activate the occupied bandwidth measurement function.

The proper adjustment due to limitation of spectrum capability is given compensated to spectrum with conversion factor of $10 \times \log (TBW/RBW)$, where TBW is the transmission of UE exceeding the maximum BW UE can extends, and RBW is the resolution BW in UE.

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7.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWAZBECK	VULB9168	378	12/29/2017	12/28/2018
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/16/2018	08/15/2019
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2017	12/11/2018
Loop Antenna	ETS.LINDGREN	6502	148045	10/08/2018	10/07/2019
3m Site NSA	SGS	966 chamber	N/A	01/02/2018	01/01/2019
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/15/2018	05/14/2019
EMI Test Receiver	R&S	ESCI7	100335	02/02/2018	02/01/2019
Pre-Amplifier	HP	8449B	3008A00578	01/02/2018	01/01/2019
Pre-Amplifier	HP	8447D	2944A07676	01/02/2018	01/01/2019
Pre-Amplifier	EMC Instru-ments	EMC184045B	980135	10/02/2018	10/01/2019
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	01/02/2018	01/01/2019
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	01/02/2018	01/01/2019
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2018	01/01/2019

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7.5. Measurement Result: (Peak) –using option of peak measurement

EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
GSM 1900	1850.2	512	V	19.95	9.77	-4.66	25.05	33.00
			H	23.58	9.77	-4.66	28.68	33.00
	1880.0	661	V	13.12	9.86	-4.7	18.28	33.00
			H	23.94	9.86	-4.7	29.1	33.00
	1909.8	810	V	14.71	9.94	-4.72	19.93	33.00
			H	21.36	9.94	-4.72	26.59	33.00
GPRS 1900	1850.2	512	V	21.3	9.77	-4.66	26.4	33.00
			H	25.74	9.77	-4.66	30.84	33.00
	1880.0	661	V	16.35	9.86	-4.7	21.51	33.00
			H	25.34	9.86	-4.7	30.5	33.00
	1909.8	810	V	16.43	9.94	-4.72	21.66	33.00
			H	22.26	9.94	-4.72	27.48	33.00

Remark : (1)The RBW,VBW of SPA for frequency RBW=300 KHz, VBW=1MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
WCDMA Band II	1852.4	9262	V	16.57	9.77	-4.67	21.68	33.00
			H	21.21	9.77	-4.67	26.31	33.00
	1880.0	9400	V	14.01	9.85	-4.7	19.17	33.00
			H	21.25	9.85	-4.7	26.41	33.00
	1907.6	9538	V	14.15	9.94	-4.72	19.37	33.00
			H	22.47	9.94	-4.72	27.68	33.00
HSDPA Band II	1852.4	9262	V	13.19	9.77	-4.67	18.3	33.00
			H	21.25	9.77	-4.67	26.36	33.00
	1880.0	9400	V	12.57	9.85	-4.7	17.73	33.00
			H	21.83	9.86	-4.7	26.99	33.00
	1907.6	9538	V	12.28	9.94	-4.72	17.49	33.00
			H	20.8	9.94	-4.72	26.01	33.00
HSUPA Band II	1852.4	9262	V	12.22	9.77	-4.67	17.33	33.00
			H	18.21	9.77	-4.67	23.31	33.00
	1880.0	9400	V	10.35	9.85	-4.7	15.5	33.00
			H	19.93	9.85	-4.7	25.09	33.00
	1907.6	9538	V	13.57	9.94	-4.72	18.79	33.00
			H	19.69	9.94	-4.72	24.9	33.00

Remark : (1)The RBW,VBW of SPA for frequency RBW=300 KHz, VBW=1MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
LTE BAND 2 BW: 1.4M QPSK RB: 1,0	1850.7	18607	V	17.22	9.77	-4.67	22.33	33.01
			H	21.72	9.77	-4.67	26.83	33.01
	1880.0	18900	V	16.55	9.85	-4.69	21.71	33.01
			H	21.74	9.85	-4.7	26.9	33.01
	1909.3	19193	V	14.61	9.94	-4.72	19.82	33.01
			H	19.59	9.94	-4.72	24.8	33.01
LTE BAND 2 BW: 1.4M QPSK RB: 1,5	1850.7	18607	V	17.57	9.77	-4.66	22.68	33.01
			H	22.11	9.77	-4.66	27.21	33.01
	1880.0	18900	V	16.41	9.85	-4.7	21.56	33.01
			H	21.48	9.85	-4.7	26.64	33.01
	1909.3	19193	V	14.53	9.94	-4.72	19.75	33.01
			H	19.58	9.94	-4.72	24.8	33.01
LTE BAND 2 BW: 1.4M 16QAM RB: 1,0	1850.7	18607	V	16.99	9.77	-4.67	22.1	33.01
			H	21.47	9.77	-4.67	26.58	33.01
	1880.0	18900	V	15.77	9.85	-4.69	20.93	33.01
			H	20.7	9.85	-4.69	25.86	33.01
	1909.3	19193	V	14.54	9.94	-4.72	19.75	33.01
			H	19.6	9.94	-4.72	24.81	33.01
LTE BAND 2 BW: 1.4M 16QAM RB: 1,5	1850.7	18607	V	17.03	9.77	-4.66	22.14	33.01
			H	21.37	9.77	-4.67	26.48	33.01
	1880.0	18900	V	15.66	9.85	-4.7	20.82	33.01
			H	21.31	9.85	-4.7	26.47	33.01
	1909.3	19193	V	14.52	9.94	-4.72	19.73	33.01
			H	19.22	9.94	-4.72	24.44	33.01

Remark : (1)The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
LTE BAND 2 BW: 3M QPSK RB: 1,0	1851.5	18615	V	17.54	9.77	-4.67	22.64	33.01
			H	22.35	9.77	-4.67	27.46	33.01
	1880.0	18900	V	16.63	9.85	-4.69	21.79	33.01
			H	22.62	9.85	-4.69	27.78	33.01
	1908.5	19185	V	21.34	9.93	-4.72	26.55	33.01
			H	19.77	9.94	-4.72	24.99	33.01
LTE BAND 2 BW: 3M QPSK RB: 1,14	1851.5	18615	V	17.69	9.77	-4.67	22.79	33.01
			H	22.49	9.77	-4.66	27.6	33.01
	1880.0	18900	V	16.38	9.85	-4.7	21.54	33.01
			H	22.06	9.85	-4.7	27.22	33.01
	1908.5	19185	V	14.87	9.94	-4.72	20.09	33.01
			H	16.26	9.94	-4.72	21.47	33.01
LTE BAND 2 BW: 3M 16QAM RB: 1,0	1851.5	18615	V	17.02	9.77	-4.67	22.13	33.01
			H	21.92	9.77	-4.67	27.03	33.01
	1880.0	18900	V	16.56	9.85	-4.69	21.71	33.01
			H	21.95	9.85	-4.69	27.1	33.01
	1908.5	19185	V	14.69	9.93	-4.72	19.9	33.01
			H	20.09	9.93	-4.72	25.3	33.01
LTE BAND 2 BW: 3M 16QAM RB: 1,14	1851.5	18615	V	17.13	9.77	-4.66	22.23	33.01
			H	21.81	9.77	-4.66	26.92	33.01
	1880.0	18900	V	16.24	9.85	-4.7	21.4	33.01
			H	21.24	9.85	-4.7	26.4	33.01
	1908.5	19185	V	14.22	9.94	-4.72	19.44	33.01
			H	19.88	9.94	-4.72	25.1	33.01

Remark : (1)The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
LTE BAND 2 BW: 5M QPSK RB: 1,0	1852.5	18625	V	17.69	9.77	-4.67	22.8	33.01
			H	21.96	9.77	-4.67	27.07	33.01
	1880.0	18900	V	17.09	9.84	-4.69	22.24	33.01
			H	21.78	9.84	-4.69	26.93	33.01
	1907.5	19175	V	15.48	9.93	-4.72	20.68	33.01
			H	20.29	9.93	-4.72	25.5	33.01
LTE BAND 2 BW: 5M QPSK RB: 1,24	1852.5	18625	V	17.92	9.78	-4.67	23.03	33.01
			H	22.08	9.78	-4.67	27.19	33.01
	1880.0	18900	V	16.45	9.86	-4.7	21.61	33.01
			H	21.62	9.86	-4.7	26.78	33.01
	1907.5	19175	V	15.19	9.94	-4.72	20.4	33.01
			H	20.05	9.94	-4.72	25.27	33.01
LTE BAND 2 BW: 5M 16QAM RB: 1,0	1852.5	18625	V	17.39	9.77	-4.67	22.5	33.01
			H	21.59	9.77	-4.67	26.7	33.01
	1880.0	18900	V	16.88	9.84	-4.69	22.03	33.01
			H	21.59	9.84	-4.69	26.74	33.01
	1907.5	19175	V	15.28	9.93	-4.72	20.49	33.01
			H	20.08	9.93	-4.72	25.29	33.01
LTE BAND 2 BW: 5M 16QAM RB: 1,24	1852.5	18625	V	17.66	9.78	-4.67	22.77	33.01
			H	21.56	9.78	-4.67	26.67	33.01
	1880.0	18900	V	16.26	9.86	-4.7	21.42	33.01
			H	21.12	9.87	-4.7	26.28	33.01
	1907.5	19175	V	14.85	9.94	-4.72	20.07	33.01
			H	19.91	9.94	-4.72	25.13	33.01

Remark : (1)The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
LTE BAND 2 BW: 10M QPSK RB: 1,0	1855.0	18650	V	1.23	9.77	-4.67	6.34	33.01
			H	20.22	9.77	-4.67	25.33	33.01
	1880.0	18900	V	4.63	9.84	-4.69	9.78	33.01
			H	20.47	9.84	-4.69	25.62	33.01
	1905.0	19150	V	12.07	9.91	-4.72	17.27	33.01
			H	17.88	9.93	-4.72	23.1	33.01
LTE BAND 2 BW: 10M QPSK RB: 1,49	1855.0	18650	V	1.91	9.79	-4.67	7.03	33.01
			H	20.92	9.79	-4.67	26.04	33.01
	1880.0	18900	V	4.64	9.86	-4.7	9.81	33.01
			H	20.89	9.87	-4.7	26.06	33.01
	1905.0	19150	V	3.15	9.92	-4.72	8.36	33.01
			H	14.67	9.94	-4.72	19.88	33.01
LTE BAND 2 BW: 10M 16QAM RB: 1,0	1855.0	18650	V	1.01	9.77	-4.67	6.12	33.01
			H	19.68	9.77	-4.67	24.79	33.01
	1880.0	18900	V	3.93	9.84	-4.69	9.08	33.01
			H	19.79	9.84	-4.69	24.93	33.01
	1905.0	19150	V	3.71	9.92	-4.72	8.92	33.01
			H	20.62	9.92	-4.72	25.83	33.01
LTE BAND 2 BW: 10M 16QAM RB: 1,49	1855.0	18650	V	1.33	9.79	-4.67	6.45	33.01
			H	19.95	9.79	-4.67	25.07	33.01
	1880.0	18900	V	3.75	9.86	-4.7	8.92	33.01
			H	20.15	9.86	-4.7	25.31	33.01
	1905.0	19150	V	2.87	9.94	-4.72	8.09	33.01
			H	18.94	9.94	-4.72	24.15	33.01

Remark : (1)The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
LTE BAND 2 BW: 15M QPSK RB: 1,0	1857.5	18675	V	14.96	9.77	-4.67	20.07	33.01
			H	17.1	9.77	-4.67	22.21	33.01
	1880.0	18900	V	14.01	9.83	-4.69	19.15	33.01
			H	17.11	9.83	-4.69	22.26	33.01
	1902.5	19125	V	13.57	9.9	-4.71	18.76	33.01
			H	17.62	9.9	-4.71	22.81	33.01
LTE BAND 2 BW: 15M QPSK RB: 1,74	1857.5	18675	V	15.15	9.8	-4.68	20.27	33.01
			H	17.37	9.8	-4.68	22.5	33.01
	1880.0	18900	V	13.6	9.87	-4.7	18.77	33.01
			H	17.8	9.87	-4.7	22.97	33.01
	1902.5	19125	V	12.88	9.94	-4.72	18.1	33.01
			H	16.66	9.94	-4.72	21.87	33.01
LTE BAND 2 BW: 15M 16QAM RB: 1,0	1857.5	18675	V	14.5	9.77	-4.66	19.6	33.01
			H	17.06	9.77	-4.67	22.17	33.01
	1880.0	18900	V	13.36	9.83	-4.69	18.5	33.01
			H	16.49	9.83	-4.69	21.63	33.01
	1902.5	19125	V	13.05	9.9	-4.71	18.23	33.01
			H	17.69	9.9	-4.71	22.87	33.01
LTE BAND 2 BW: 15M 16QAM RB: 1,74	1857.5	18675	V	14.45	9.8	-4.68	19.58	33.01
			H	16.5	9.8	-4.68	21.62	33.01
	1880.0	18900	V	12.51	9.87	-4.7	17.68	33.01
			H	17.28	9.87	-4.7	22.45	33.01
	1902.5	19125	V	12.34	9.94	-4.72	17.55	33.01
			H	18.03	9.92	-4.72	23.23	33.01

Remark : (1)The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency	CH	Antenna Pol.	S.G. Output	Antenna Gain	Cable Loss	EIRP	Limit
	MHz		V/H	dBm	dBi	dB	dBm	dBm
LTE BAND 2 BW: 20M QPSK RB: 1,0	1860.0	18700	V	14.12	9.77	-4.66	19.22	33.01
			H	17.43	9.77	-4.66	22.53	33.01
	1880.0	18900	V	12.9	9.83	-4.69	18.04	33.01
			H	17.34	9.83	-4.69	22.48	33.01
	1900.0	19100	V	10.91	9.91	-4.71	16.1	33.01
			H	20.3	9.9	-4.71	25.49	33.01
LTE BAND 2 BW: 20M QPSK RB: 1,99	1860.0	18700	V	13.28	9.82	-4.68	18.41	33.01
			H	17.62	9.82	-4.68	22.76	33.01
	1880.0	18900	V	12.73	9.88	-4.7	17.9	33.01
			H	18.15	9.88	-4.7	23.32	33.01
	1900.0	19100	V	15.6	9.91	-4.72	20.79	33.01
			H	13.47	9.93	-4.72	18.68	33.01
LTE BAND 2 BW: 20M 16QAM RB: 1,0	1860.0	18700	V	13.33	9.77	-4.67	18.43	33.01
			H	16.67	9.77	-4.66	21.77	33.01
	1880.0	18900	V	12.35	9.83	-4.69	17.49	33.01
			H	16.87	9.83	-4.69	22.01	33.01
	1900.0	19100	V	12.21	9.89	-4.71	17.39	33.01
			H	18.69	9.91	-4.71	23.89	33.01
LTE BAND 2 BW: 15M 16QAM RB: 1,99	1860.0	18700	V	12.54	9.82	-4.68	17.68	33.01
			H	16.85	9.82	-4.68	21.99	33.01
	1880.0	18900	V	13.11	9.86	-4.7	18.27	33.01
			H	17.52	9.88	-4.7	22.69	33.01
	1900.0	19100	V	11.34	9.94	-4.72	16.56	33.01
			H	16.27	9.94	-4.72	21.48	33.01

Remark : (1)The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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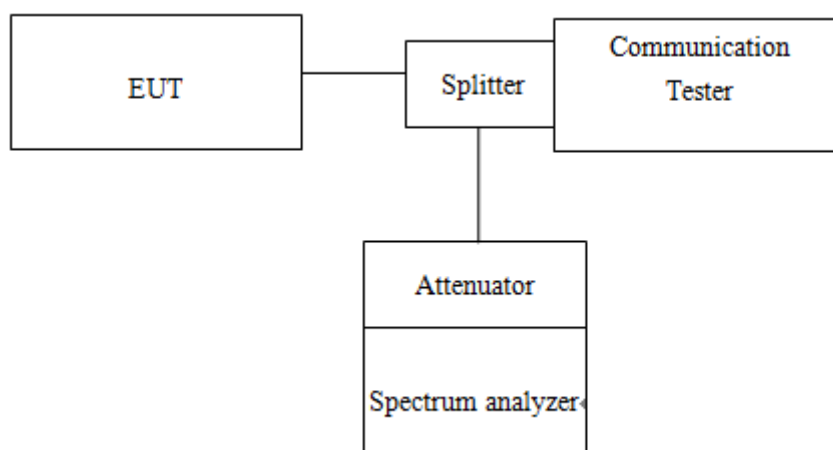
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8. OCCUPIED BANDWIDTH MEASUREMENT

8.1. Standard Applicable

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.

8.2. Test Set-up



8.3. Measurement Procedure

99% & 26dB Bandwidth with detector peak

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

99% Bandwidth with detector sample

The EUT's output RF connector was connected with a short cable to the spectrum analyzer, RBW was set to about 1% ~ 5% of emission BW, VBW= 3 times RBW, -20dBc display line was placed on the screen (or 20dB bandwidth). Set RBW to 99% bandwidth, RBW= 1% ~ 5%, VBW= 3 RBW, with span > 2 * Signal BW, set % Power = 99%.

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8.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUM-BER	SERIAL NUM-BER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/03/2018	05/02/2019
Radio Communication Analyer	Anritsu	MT8820C	6200995019	04/05/2018	04/04/2019
DC Power Supply	Agilent	E3640A	MY52410006	11/28/2017	11/27/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2018	01/01/2019
2WayDivider	Woken	DSU7AMK1A1	N/A	01/02/2018	01/01/2019
Coaxial Cable	Huber Suhner	SUCOFLEX 102EPA	MY2616/2	01/02/2018	01/01/2019

8.5. Measurement Result

Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		GSM 1900	GPRS 1900	GSM 1900	GPRS 1900
1850.2	512	0.24283	0.24384	0.318	0.323
1880.0	661	0.24051	0.24420	0.321	0.321
1909.8	810	0.24584	0.24641	0.318	0.316

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		WCDMA II	HSDPA II	HSUPA II	WCDMA II	HSDPA II	HSUPA II
1852.40	9262	4.12800	4.12340	4.13670	4.709	4.685	4.701
1880.00	9400	4.12430	4.13770	4.14330	4.715	4.702	4.695
1907.60	9538	4.13470	4.13140	4.13410	4.710	4.695	4.709

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LTE BAND 2 Channel bandwidth: 1.4MHz						LTE BAND 2 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)		Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM			QPSK	16QAM	QPSK	16QAM
1850.7	18607	1.0988	1.1033	1.284	1.299	1851.5	18615	2.6977	2.7006	2.995	2.994
1880.0	18900	1.0977	1.1021	1.282	1.295	1880.0	18900	2.7020	2.7052	3.001	2.994
1909.3	19193	1.0994	1.1039	1.286	1.304	1908.5	19185	2.7052	2.7035	3.002	3.008
LTE BAND 2 Channel bandwidth: 5MHz						LTE BAND 2 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)		Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM			QPSK	16QAM	QPSK	16QAM
1852.5	18625	4.5091	4.5114	5.039	5.022	1855.0	18650	8.9941	8.9518	9.857	9.875
1880.0	18900	4.5105	4.5140	5.039	4.988	1880.0	18900	8.9969	8.9458	9.886	9.847
1907.5	19175	4.5133	4.5123	5.057	5.052	1905.0	19150	8.9706	8.9570	9.910	9.770
LTE BAND 2 Channel bandwidth: 15MHz						LTE BAND 2 Channel bandwidth: 20MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)		Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM			QPSK	16QAM	QPSK	16QAM
1857.5	18675	13.482	13.446	14.722	14.740	1860.0	18700	17.882	17.906	19.463	19.450
1880.0	18900	13.442	13.439	14.745	14.668	1880.0	18900	17.899	17.918	19.395	19.509
1902.5	19125	13.483	13.456	14.763	14.650	1900.0	19100	17.934	17.965	19.425	19.519

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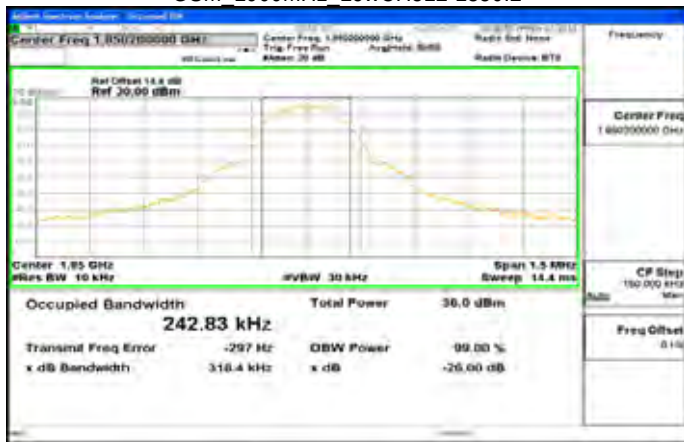
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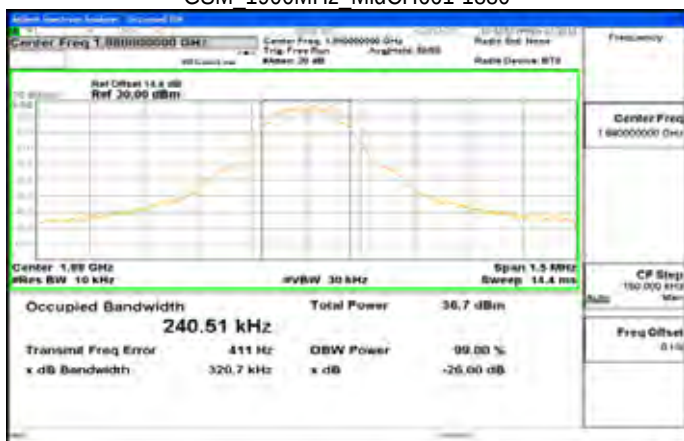
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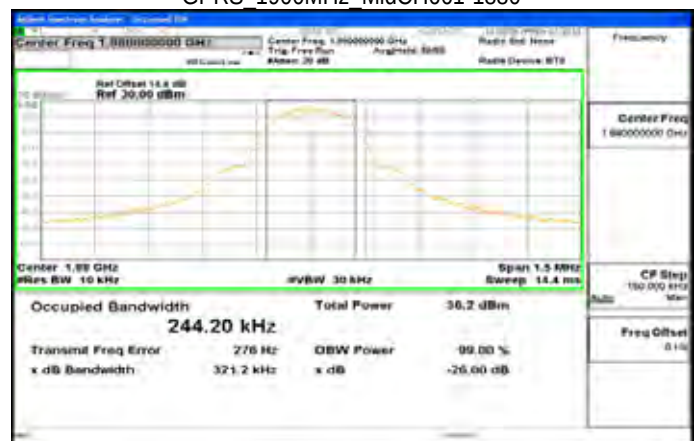
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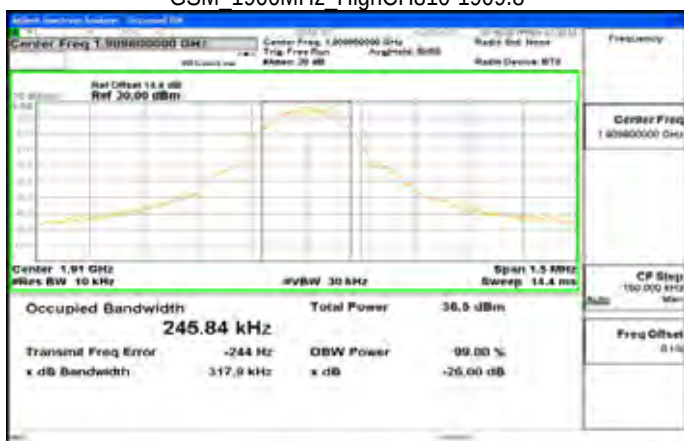
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GPRS 1900MHz MidCH661-1880



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GPRS 1900MHz HighCH810-1909.8



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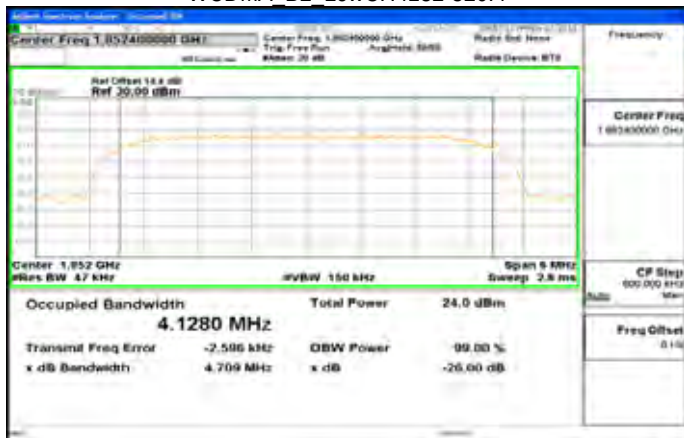
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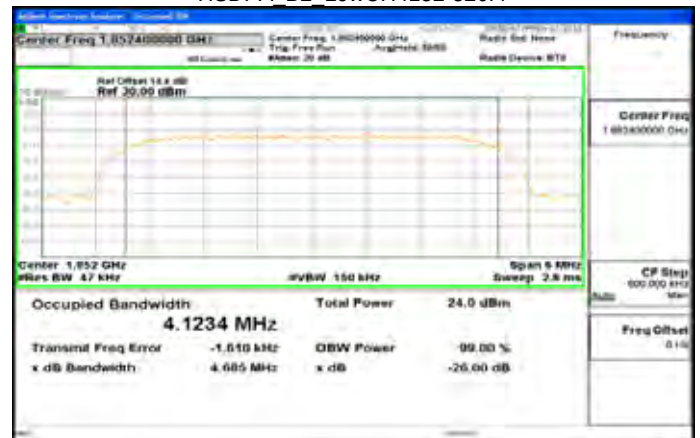
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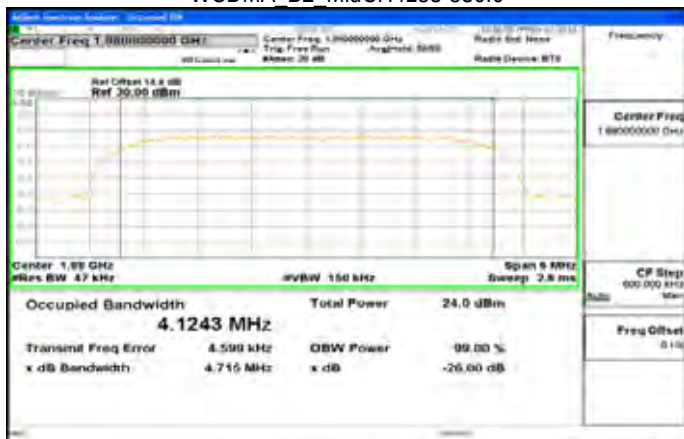
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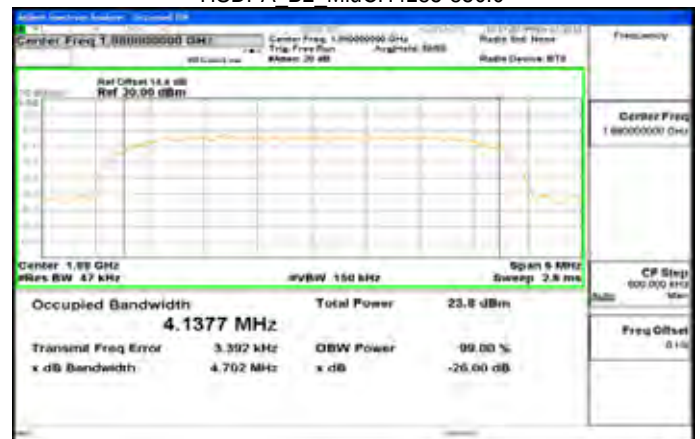
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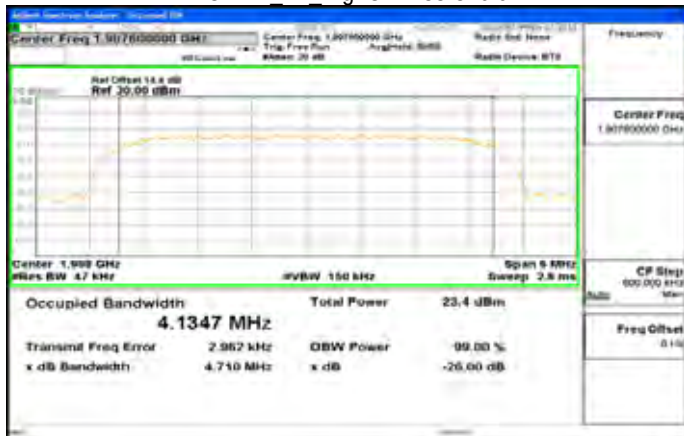
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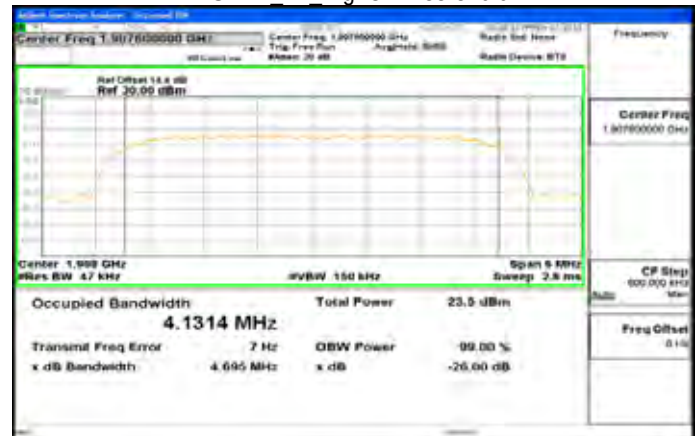
HSDPA B2 MidCH4183-836.6



WCDMA B2 HighCH4233-846.6



HSDPA B2 HighCH4233-846.6



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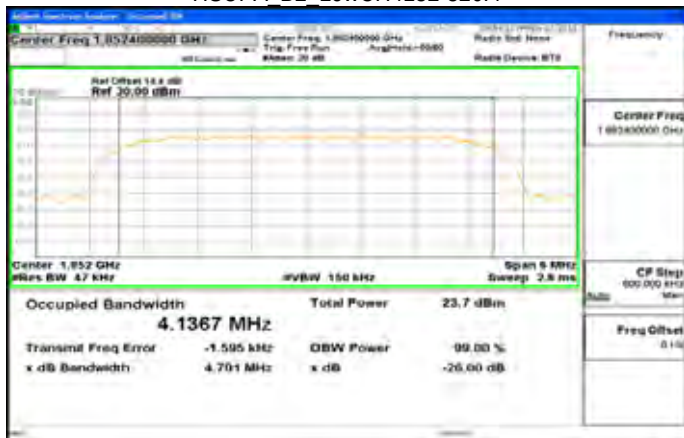
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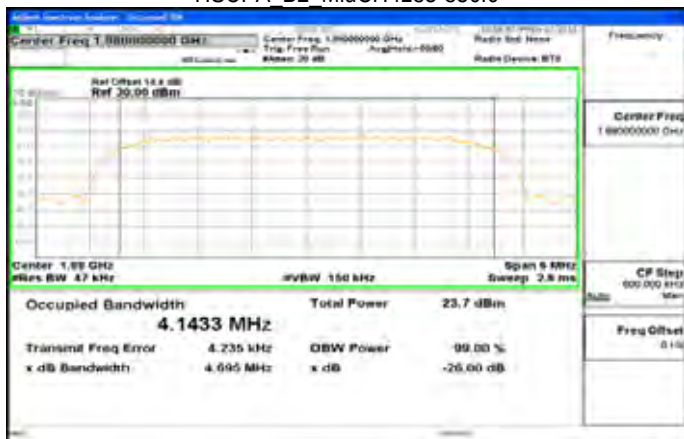
HSUPA B2 LowCH4132-826.4



Band2 1 4MHz QPSK 6 0 LowCH18607-1850.7



HSUPA B2 MidCH4183-836.6



Band2 1 4MHz QPSK 6 0 MidCH18900-1880



HSUPA B2 HighCH4233-846.6



Band2 1 4MHz QPSK 6 0 HighCH19193-1909.3



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Band2 1 4MHz 16QAM 6 0 LowCH18607-1850.7



Band2 3MHz QPSK 15 0 LowCH18615-1851.5



Band2 1 4MHz 16QAM 6 0 MidCH18900-1880



Band2 3MHz QPSK 15 0 MidCH18900-1880



Band2 1 4MHz 16QAM 6 0 HighCH19193-1909.3



Band2 3MHz QPSK 15 0 HighCH19185-1908.5



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Band2 3MHz 16QAM 15 0 LowCH18615-1851.5



Band2 5MHz QPSK 25 0 LowCH18625-1852.5



Band2 3MHz 16QAM 15 0 MidCH18900-1880



Band2 5MHz QPSK 25 0 MidCH18900-1880



Band2 3MHz 16QAM 15 0 HighCH19185-1908.5



Band2 5MHz QPSK 25 0 HighCH19175-1907.5



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Band2 5MHz 16QAM 25 0 LowCH18625-1852.5



Band2 10MHz QPSK 50 0 LowCH18650-1855



Band2 5MHz 16QAM 25 0 MidCH18900-1880



Band2 10MHz QPSK 50 0 MidCH18900-1880



Band2 5MHz 16QAM 25 0 HighCH19175-1907.5



Band2 10MHz QPSK 50 0 HighCH19150-1905



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Band2 10MHz 16QAM 50 0 LowCH18650-1855



Band2 15MHz QPSK 75 0 LowCH18675-1857.5



Band2 10MHz 16QAM 50 0 MidCH18900-1880



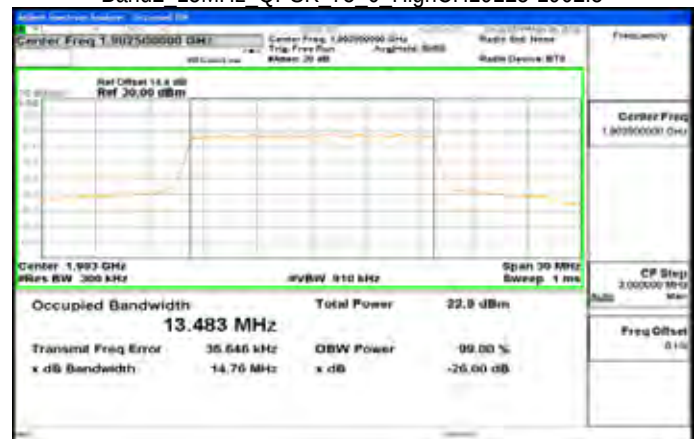
Band2 15MHz QPSK 75 0 MidCH18900-1880



Band2 10MHz 16QAM 50 0 HighCH19150-1905



Band2 15MHz QPSK 75 0 HighCH19125-1902.5



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Band2 15MHz 16QAM 75 0 LowCH18675-1857.5



Band2 20MHz QPSK 100 0 LowCH18700-1860



Band2 15MHz 16QAM 75 0 MidCH18900-1880



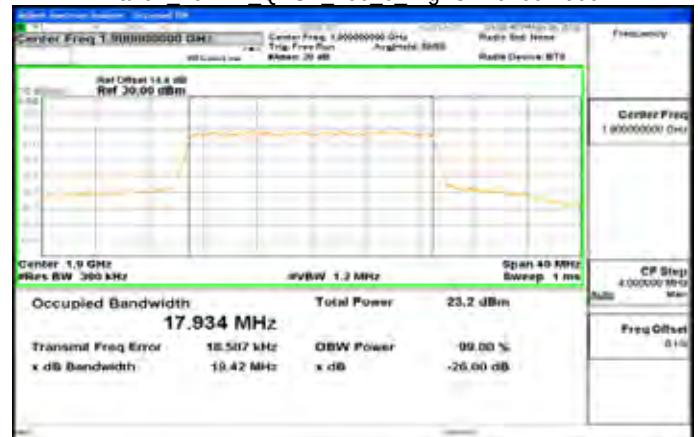
Band2 20MHz QPSK 100 0 MidCH18900-1880



Band2 15MHz 16QAM 75 0 HighCH19125-1902.5



Band2 20MHz QPSK 100 0 HighCH19100-1900



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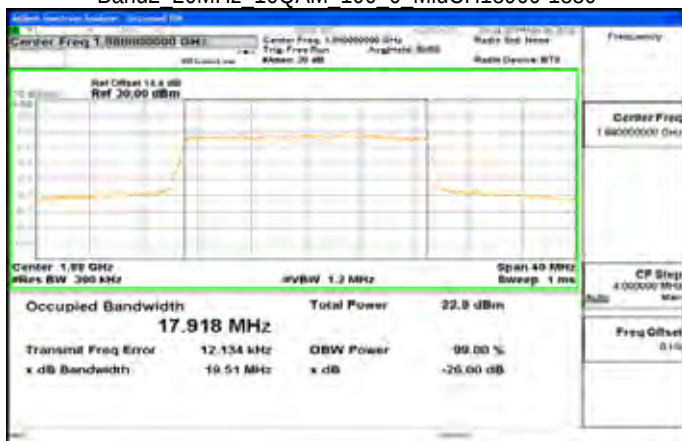
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Band2 20MHz 16QAM 100 0 LowCH18700-1860



Band2 20MHz 16QAM 100 0 MidCH18900-1880



Band2 20MHz 16QAM 100 0 HighCH19100-1900



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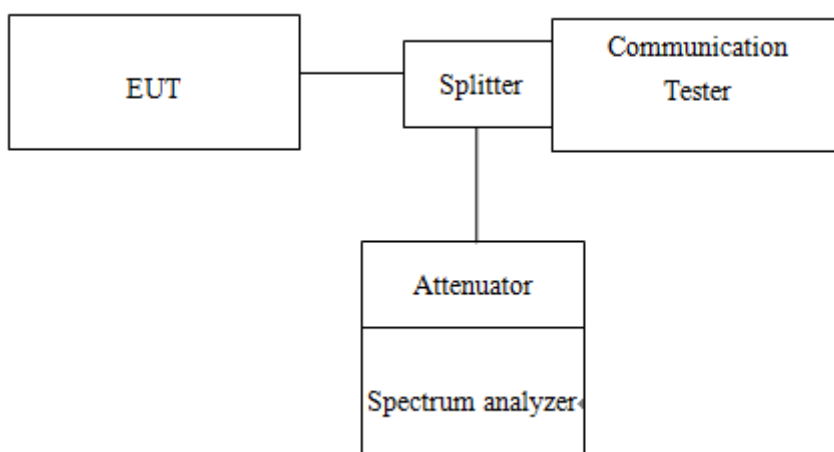
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9. OUT OF BAND EMISSION AT ANTENNA TERMINALS

9.1. Standard Applicable

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

9.2. Test SET-UP



9.3. Measurement Procedure

Conducted Emission

The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz, sufficient scans were taken to show the out of band Emissions if any up to 10th harmonic.

1. To connect Antenna Port of EUT to Spectrum.
2. Set RBW = 1MHz & VBW = 1MHz on Spectrum.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

Band Edge

1. To connect Antenna Port of EUT to Spectrum.
2. The band edge of low and high channels for the highest RF powers was measured. Setting $RBW \geq 1\% EBW$.
3. Allow trace to fully stabilize
4. Repeat above procedures until all default test channel measured were complete.

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9.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWAZBECK	VULB9168	378	12/29/2017	12/28/2018
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/16/2018	08/15/2019
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2017	12/11/2018
Loop Antenna	ETS.LINDGREN	6502	148045	10/08/2018	10/07/2019
3m Site NSA	SGS	966 chamber	N/A	01/02/2018	01/01/2019
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/15/2018	05/14/2019
EMI Test Receiver	R&S	ESCI7	100335	02/02/2018	02/01/2019
Pre-Amplifier	HP	8449B	3008A00578	01/02/2018	01/01/2019
Pre-Amplifier	HP	8447D	2944A07676	01/02/2018	01/01/2019
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/02/2018	10/01/2019
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	01/02/2018	01/01/2019
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	01/02/2018	01/01/2019
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2018	01/01/2019

9.5. Measurement Result:

Refer to next pages.

NOTE: The occurrence of the spike on the conducted emission is the signal of the fundamental emission.

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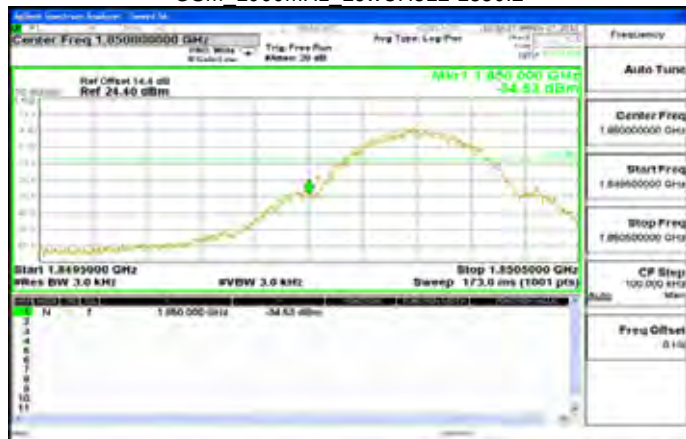
f (886-2) 2298-0488

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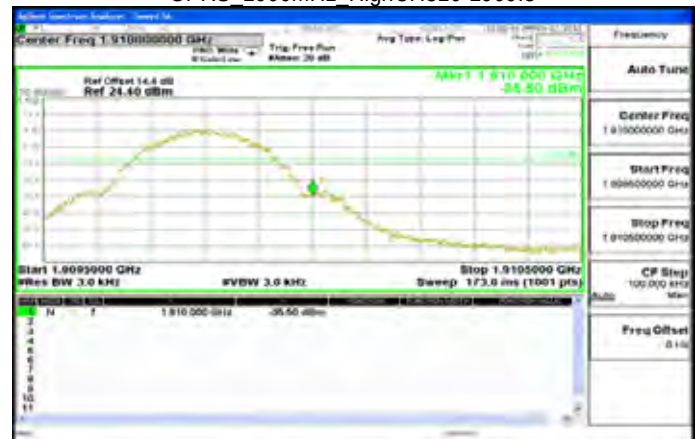
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Band Edge

GSM 1900MHz LowCH512-1850.2



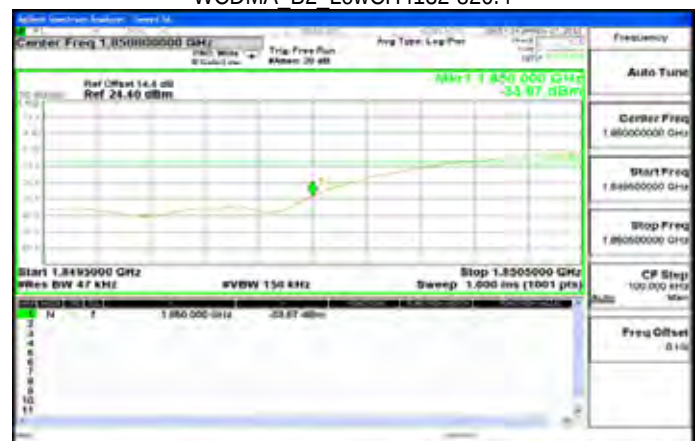
GPMS 1900MHz HighCH810-1909.8



GSM 1900MHz HighCH810-1909.8



WCDMA B2 LowCH4132-826.4



GPMS 1900MHz LowCH512-1850.2



WCDMA B2 HighCH4233-846.6



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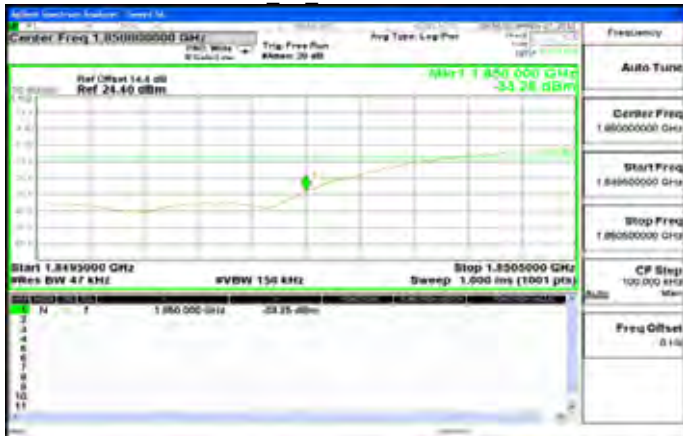
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HSDPA B2 LowCH4132-826.4



HSUPA B2 HighCH4233-846.6



HSDPA B2 HighCH4233-846.6



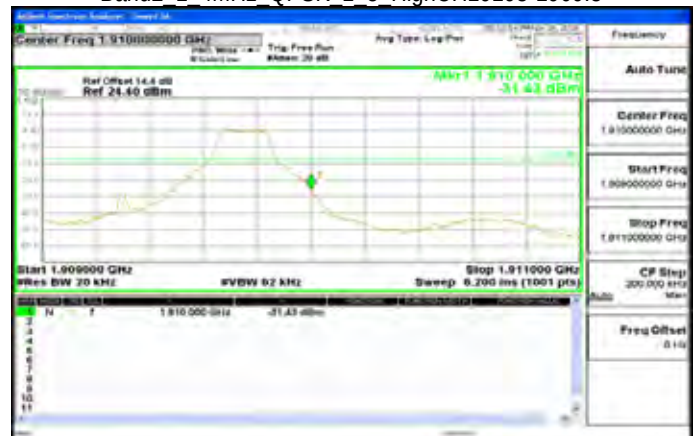
Band2 1 4MHz QPSK 1 0 LowCH18607-1850.7



HSUPA B2 LowCH4132-826.4



Band2 1 4MHz QPSK 1 5 HighCH19193-1909.3



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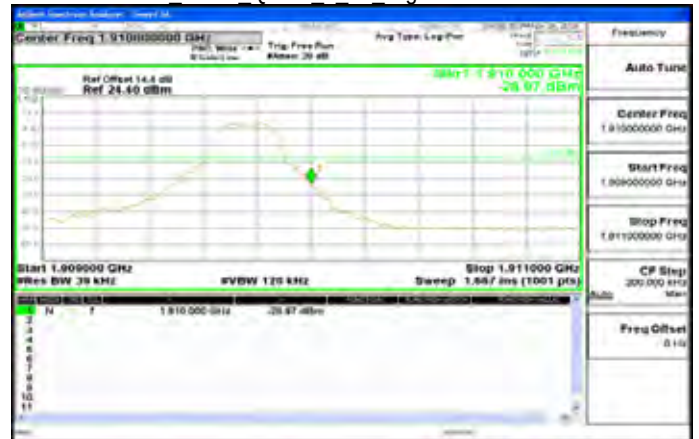
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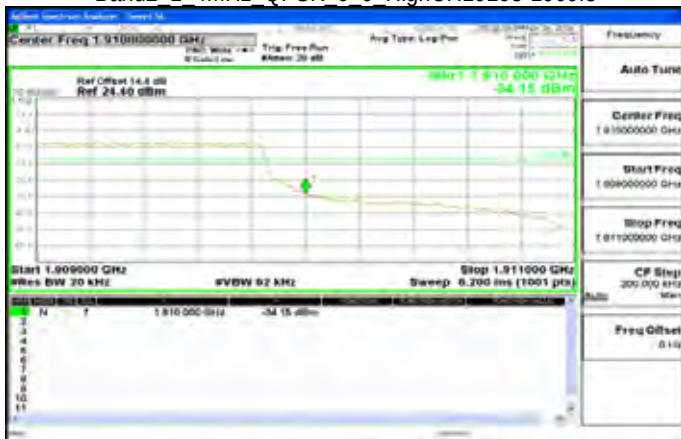
Band2 1 4MHz QPSK 6 0 LowCH18607-1850.7



Band2 3MHz QPSK 1 14 HighCH19185-1908.5



Band2 1 4MHz QPSK 6 0 HighCH19193-1909.3



Band2 3MHz QPSK 15 0 LowCH18615-1851.5



Band2 3MHz QPSK 1 0 LowCH18615-1851.5



Band2 3MHz QPSK 15 0 HighCH19185-1908.5



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Band2 5MHz QPSK 1 0 LowCH18625-1852.5



Band2 5MHz QPSK 25 0 HighCH19175-1907.5



Band2 5MHz QPSK 1 24 HighCH19175-1907.5



Band2 10MHz QPSK 1 0 LowCH18650-1855



Band2 5MHz QPSK 25 0 LowCH18625-1852.5



Band2 10MHz QPSK 1 49 HighCH19150-1905



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Band2 10MHz QPSK 50 0 LowCH18650-1855



Band2 15MHz QPSK 1 74 HighCH19125-1902.5



Band2 10MHz QPSK 50 0 HighCH19150-1905



Band2 15MHz QPSK 75 0 LowCH18675-1857.5



Band2 15MHz QPSK 1 0 LowCH18675-1857.5



Band2 15MHz QPSK 75 0 HighCH19125-1902.5



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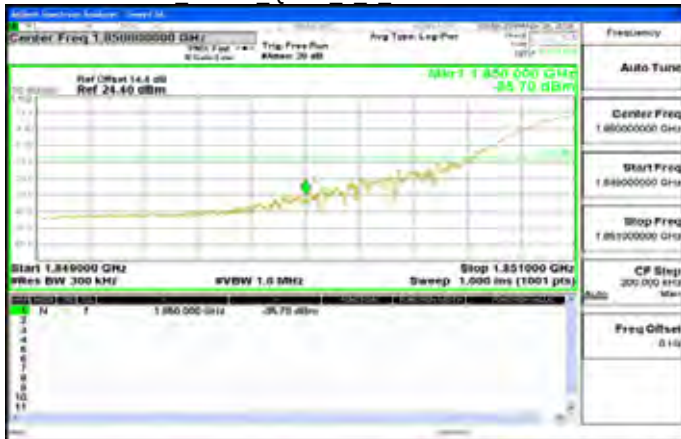
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Band2 20MHz QPSK 1 0 LowCH18700-1860



Band2 20MHz QPSK 100 0 HighCH19100-1900



Band2 20MHz QPSK 1 99 HighCH19100-1900



Band2 20MHz QPSK 100 0 LowCH18700-1860



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Out of Band Emission

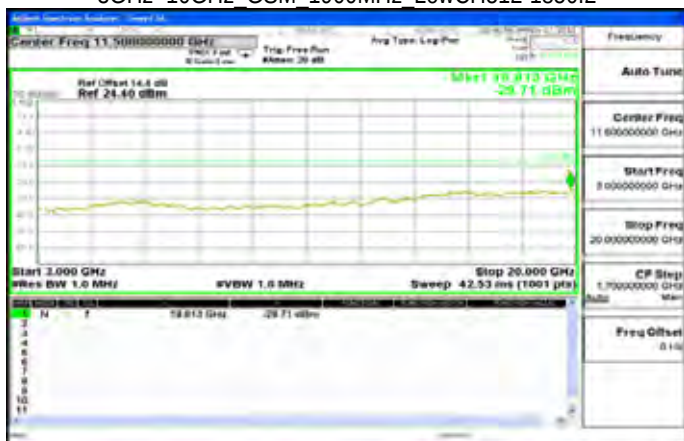
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3GHz~10GHz GSM 1900MHz MidCH661-1880



3GHz~10GHz GSM 1900MHz LowCH512-1850.2



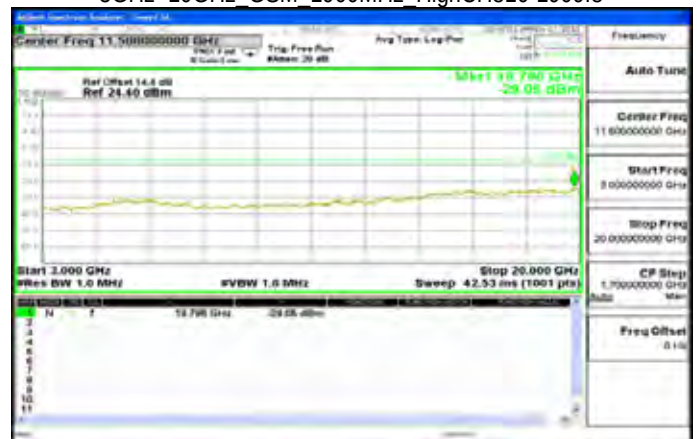
30MHz~3GHz GSM 1900MHz HighCH810-1909.8



30MHz~3GHz GSM 1900MHz MidCH661-1880



3GHz~10GHz GSM 1900MHz HighCH810-1909.8



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30MHz~3GHz GPRS 1900MHz LowCH512-1850.2



3GHz~10GHz GPRS 1900MHz MidCH661-1880



3GHz~10GHz GPRS 1900MHz LowCH512-1850.2



30MHz~3GHz GPRS 1900MHz HighCH810-1909.8



30MHz~3GHz GPRS 1900MHz MidCH661-1880



3GHz~10GHz GPRS 1900MHz HighCH810-1909.8



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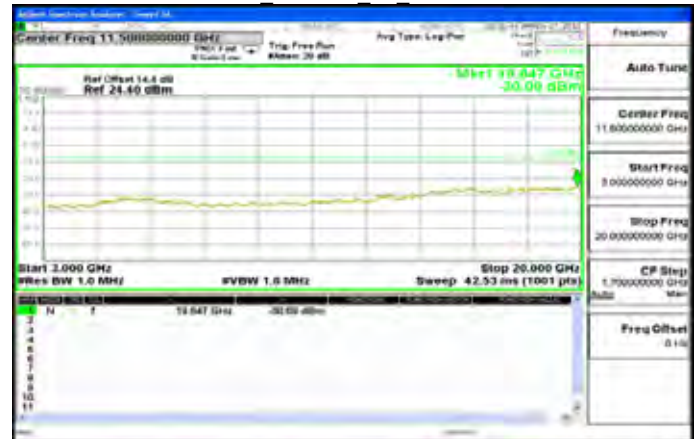
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30MHz~3GHz WCDMA B2 LowCH9262-1852.4



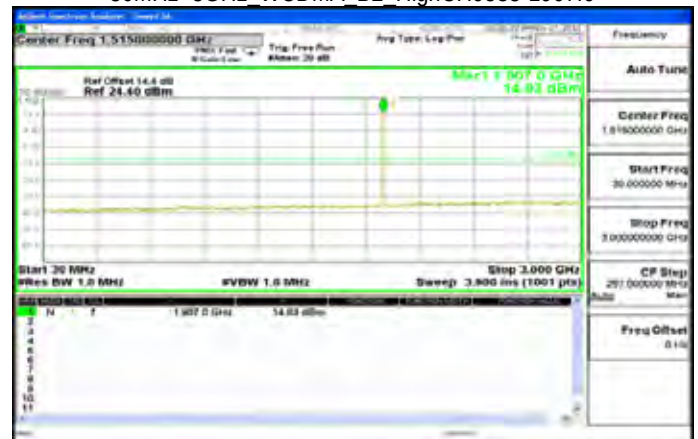
3GHz~10GHz WCDMA B2 MidCH9400-1880



3GHz~10GHz WCDMA B2 LowCH9262-1852.4



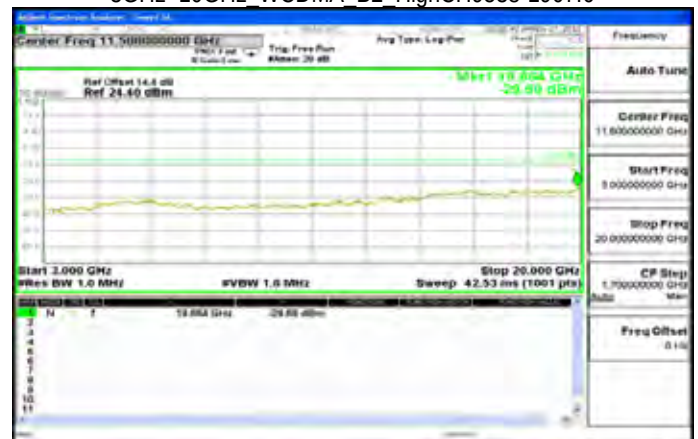
30MHz~3GHz WCDMA B2 HighCH9538-1907.6



30MHz~3GHz WCDMA B2 MidCH9400-1880



3GHz~10GHz WCDMA B2 HighCH9538-1907.6



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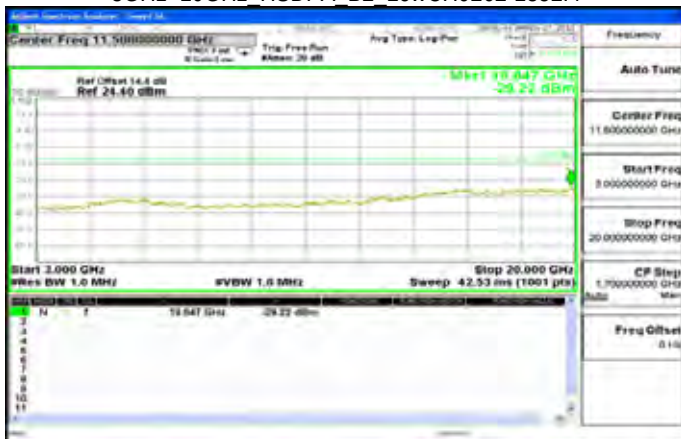
30MHz~3GHz HSDPA B2 LowCH9262-1852.4



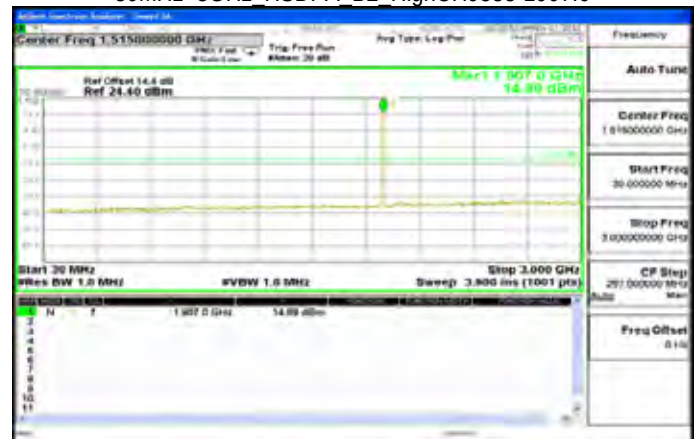
3GHz~10GHz HSDPA B2 MidCH9400-1880



3GHz~10GHz HSDPA B2 LowCH9262-1852.4



30MHz~3GHz HSDPA B2 HighCH9538-1907.6



30MHz~3GHz HSDPA B2 MidCH9400-1880



3GHz~10GHz HSDPA B2 HighCH9538-1907.6



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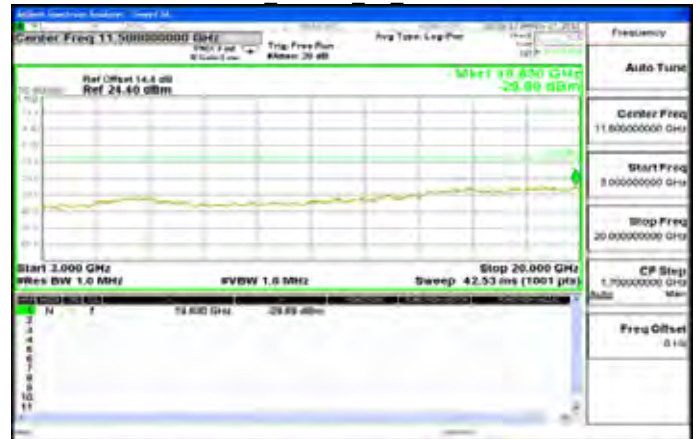
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30MHz~3GHz HSUPA B2 LowCH9262-1852.4



3GHz~10GHz HSUPA B2 MidCH9400-1880



3GHz~10GHz HSUPA B2 LowCH9262-1852.4



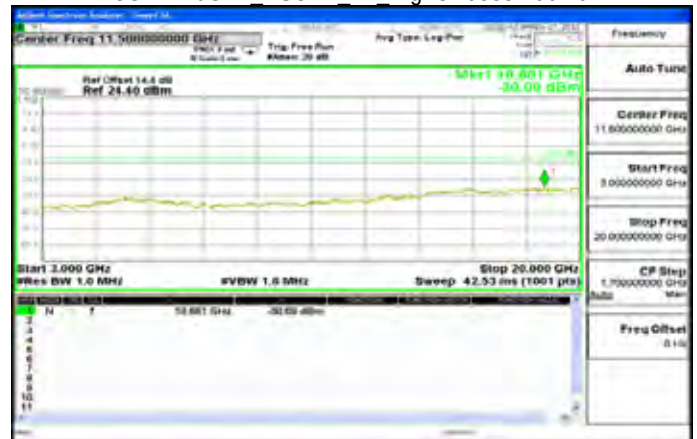
30MHz~3GHz HSUPA B2 HighCH9538-1907.6



30MHz~3GHz HSUPA B2 MidCH9400-1880



3GHz~10GHz HSUPA B2 HighCH9538-1907.6



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3GHz~10GHz Band2 1 4MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 1 4MHz QPSK 1 0 LowCH18607-1850.7



30MHz~3GHz Band2 1 4MHz QPSK 1 0 HighCH19193-1909.3



30MHz~3GHz Band2 1 4MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 1 4MHz QPSK 1 0 HighCH19193-1909.3



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30MHz~3GHz Band2 3MHz QPSK 1 0 LowCH18615-1851.5



3GHz~10GHz Band2 3MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 3MHz QPSK 1 0 LowCH18615-1851.5



30MHz~3GHz Band2 3MHz QPSK 1 0 HighCH19185-1908.5



30MHz~3GHz Band2 3MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 3MHz QPSK 1 0 HighCH19185-1908.5



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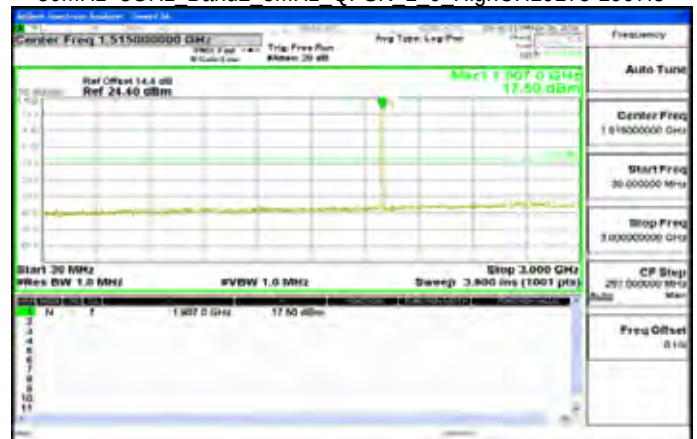
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30MHz~3GHz Band2 5MHz QPSK 1 0 HighCH19175-1907.5



30MHz~3GHz Band2 5MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 5MHz QPSK 1 0 HighCH19175-1907.5



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30MHz~3GHz Band2 10MHz QPSK 1 0 LowCH18650-1855



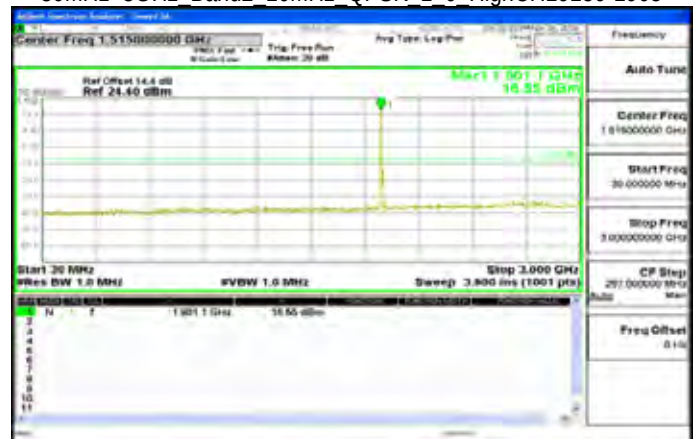
3GHz~10GHz Band2 10MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 10MHz QPSK 1 0 LowCH18650-1855



30MHz~3GHz Band2 10MHz QPSK 1 0 HighCH19150-1905



30MHz~3GHz Band2 10MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 10MHz QPSK 1 0 HighCH19150-1905



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30MHz~3GHz Band2 15MHz QPSK 1 0 LowCH18675-1857.5



3GHz~10GHz Band2 15MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 15MHz QPSK 1 0 LowCH18675-1857.5



30MHz~3GHz Band2 15MHz QPSK 1 0 HighCH19125-1902.5



30MHz~3GHz Band2 15MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 15MHz QPSK 1 0 HighCH19125-1902.5



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30MHz~3GHz Band2 20MHz QPSK 1 0 LowCH18700-1860



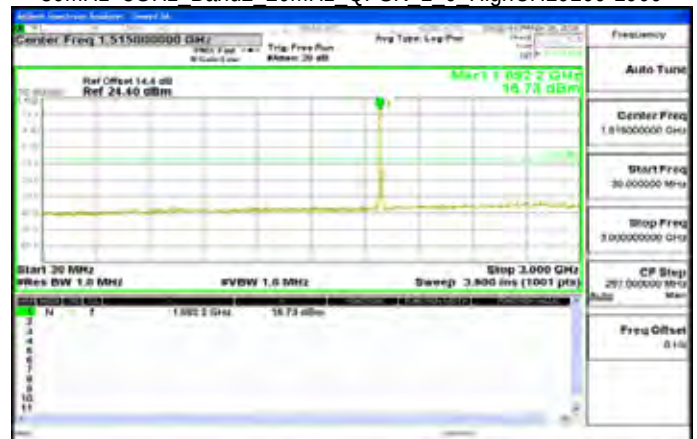
3GHz~10GHz Band2 20MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 20MHz QPSK 1 0 LowCH18700-1860



30MHz~3GHz Band2 20MHz QPSK 1 0 HighCH19100-1900



30MHz~3GHz Band2 20MHz QPSK 1 0 MidCH18900-1880



3GHz~10GHz Band2 20MHz QPSK 1 0 HighCH19100-1900



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10. FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

10.1. Standard Applicable

According to FCC §2.1053,

FCC §24.238(a), the magnitude of each spurious and harmonic emission that can be detected when the equipment is operated under the conditions specified in the instruction manual and/ or alignment procedure, shall not be less than $43 + 10 \log$ (mean output power in watts) dBc below the mean power output outside a license's frequency block (-13dBm).

Table 2 — Unwanted Emissions for Mobile, Portable and Low-Power Fixed Subscriber Equipment

Frequency (MHz)	Attenuation (dB)
<2200	$43 + 10 \log_{10}(p)$
2200 - 2288	$70 + 10 \log_{10}(p)$
2288 - 2292	$67 + 10 \log_{10}(p)$
2292 - 2296	$61 + 10 \log_{10}(p)$
2296 - 2300	$55 + 10 \log_{10}(p)$
2300 - 2305	$43 + 10 \log_{10}(p)$
2305 - 2320	$43 + 10 \log_{10}(p)^{\text{Note}}$
2320 - 2324	$55 + 10 \log_{10}(p)$
2324 - 2328	$61 + 10 \log_{10}(p)$
2328 - 2337	$67 + 10 \log_{10}(p)$
2337 - 2341	$61 + 10 \log_{10}(p)$
2341 - 2345	$55 + 10 \log_{10}(p)$
2345 - 2360	$43 + 10 \log_{10}(p)^{\text{Note}}$
2360 - 2365	$43 + 10 \log_{10}(p)$
2365 - 2395	$70 + 10 \log_{10}(p)$
>2395	$43 + 10 \log_{10}(p)$

Note: Measured at the edges of the highest and lowest frequency range(s) in which the equipment is designed to operate. See Section 1.2 for the permitted frequency ranges for various equipment types.

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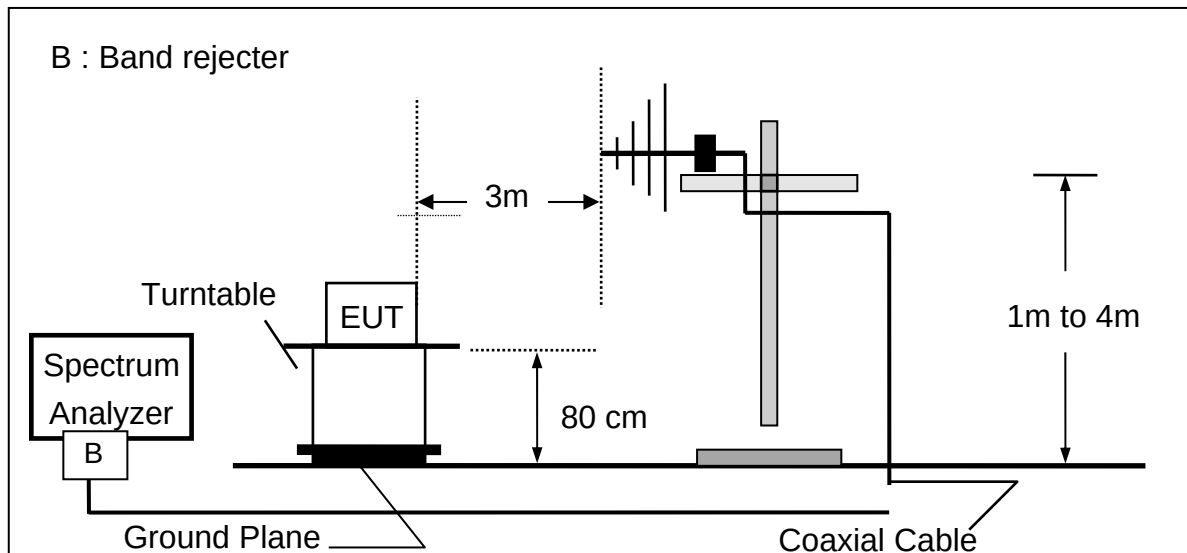
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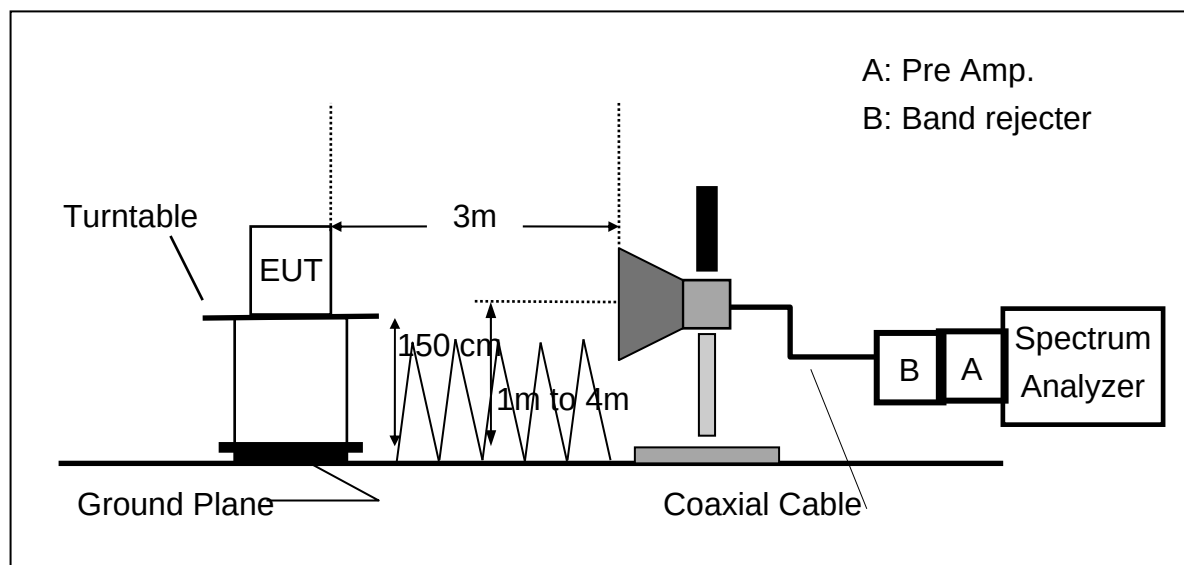
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10.2. EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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10.3. Measurement Procedure:

The EUT was placed on a non-conductive; the measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

The frequency range up to tenth harmonic was investigated for each of three fundamental frequencies (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

$EIRP\ (dBm) = SG\ Level(dBm) + Antenna\ Gain(dBi) + Cable\ Loss(dB)$

Note : “F” : denotes Fundamental Frequency. ; “H” : denotes Harmonic Frequency.
“E” : denotes Band Edge Frequency. ; “S” : denotes Spurious Frequency.
“---” : denotes Noise Floor.

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10.4. Measurement Equipment Used:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Bi-log Antenna	SCHWAZBECK	VULB9168	378	12/29/2017	12/28/2018
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/16/2018	08/15/2019
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2017	12/11/2018
Loop Antenna	ETS.LINDGREN	6502	148045	10/08/2018	10/07/2019
3m Site NSA	SGS	966 chamber	N/A	01/02/2018	01/01/2019
Spectrum Analyzer	Agilent	E4446A	MY51100003	05/15/2018	05/14/2019
EMI Test Receiver	R&S	ESCI7	100335	02/02/2018	02/01/2019
Pre-Amplifier	HP	8449B	3008A00578	01/02/2018	01/01/2019
Pre-Amplifier	HP	8447D	2944A07676	01/02/2018	01/01/2019
Pre-Amplifier	EMC Instruments	EMC184045B	980135	10/02/2018	10/01/2019
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
2GHz High Pass Filter	Micro-Tronics	HPM50110	36	01/02/2018	01/01/2019
Filter 5150-5350 MHz	Micro-Tronics	BRM50703	1	01/02/2018	01/01/2019
Low Loss Cable	Huber Suhner	966_RX	9	01/02/2018	01/01/2019

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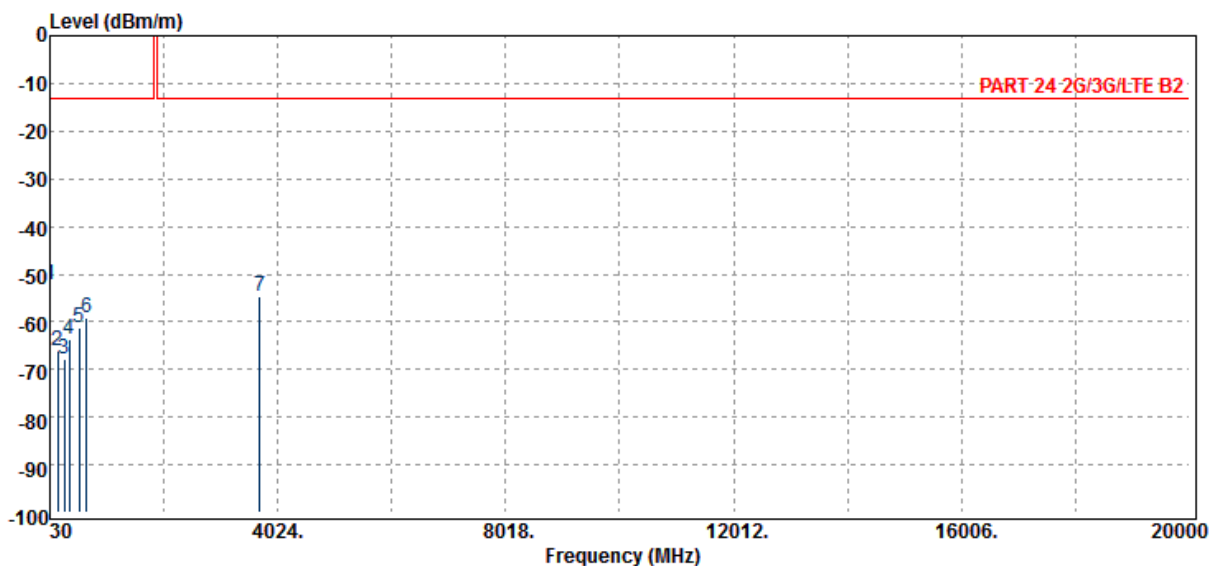
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10.5. Measurement Result:

Radiated Spurious Emission Measurement Result: GPRS 1900 Mode

Operation Band	:GPRS 1900	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1850.2 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.08	-39.07	-12.43	-0.58	-13.00	-39.08
162.89	-66.24	-66.02	1.09	-1.31	-13.00	-53.24
289.96	-67.74	-71.53	5.57	-1.78	-13.00	-54.74
364.65	-63.76	-67.65	5.96	-2.07	-13.00	-50.76
541.19	-61.21	-65.44	6.14	-1.91	-13.00	-48.21
670.20	-59.03	-62.64	5.92	-2.31	-13.00	-46.03
3700.40	-54.52	-60.18	12.57	-6.91	-13.00	-41.52

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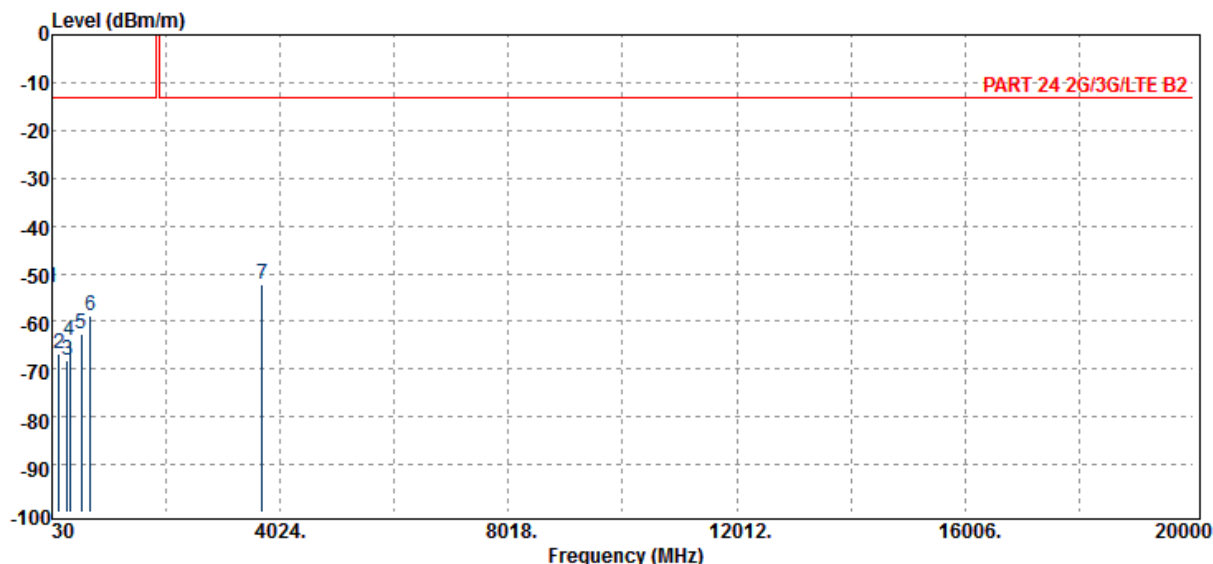
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Operation Band	:GPRS 1900	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1850.2 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.78	-39.77	-12.43	-0.58	-13.00	-39.78
148.34	-66.64	-65.62	0.26	-1.29	-13.00	-53.64
296.75	-68.19	-72.08	5.70	-1.81	-13.00	-55.19
342.34	-64.08	-68.06	5.97	-1.99	-13.00	-51.08
537.31	-62.55	-66.63	6.15	-2.07	-13.00	-49.55
700.27	-58.81	-62.47	5.82	-2.16	-13.00	-45.81
3700.40	-52.35	-58.00	12.57	-6.91	-13.00	-39.35

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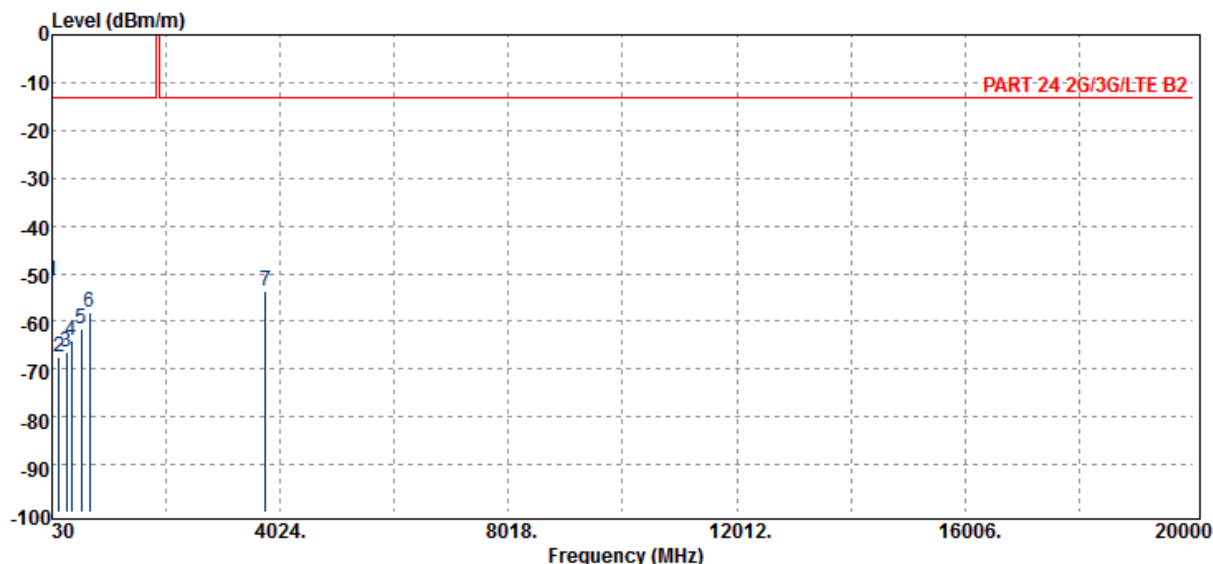
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Operation Band	:GPRS 1900	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-51.73	-38.72	-12.43	-0.58	-13.00	-38.73
146.40	-67.41	-66.29	0.17	-1.29	-13.00	-54.41
288.99	-66.31	-70.10	5.57	-1.78	-13.00	-53.31
362.71	-63.99	-67.89	5.97	-2.07	-13.00	-50.99
541.19	-61.66	-65.90	6.14	-1.91	-13.00	-48.66
694.45	-57.99	-61.23	5.84	-2.61	-13.00	-44.99
3760.00	-53.70	-59.43	12.61	-6.89	-13.00	-40.70

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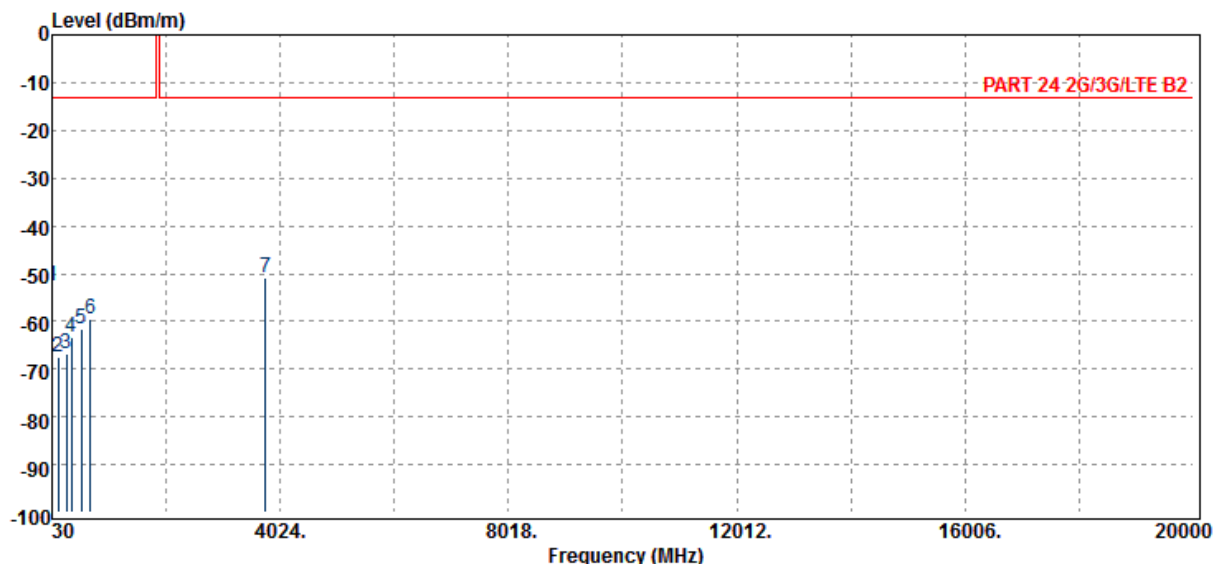
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Operation Band	:GPRS 1900	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.69	-39.68	-12.43	-0.58	-13.00	-39.69
139.61	-67.63	-66.23	-0.14	-1.26	-13.00	-54.63
284.14	-66.83	-70.64	5.57	-1.76	-13.00	-53.83
362.71	-63.31	-67.21	5.97	-2.07	-13.00	-50.31
544.10	-61.59	-65.94	6.14	-1.79	-13.00	-48.59
699.30	-59.43	-63.02	5.83	-2.24	-13.00	-46.43
3760.00	-50.77	-56.50	12.61	-6.89	-13.00	-37.77

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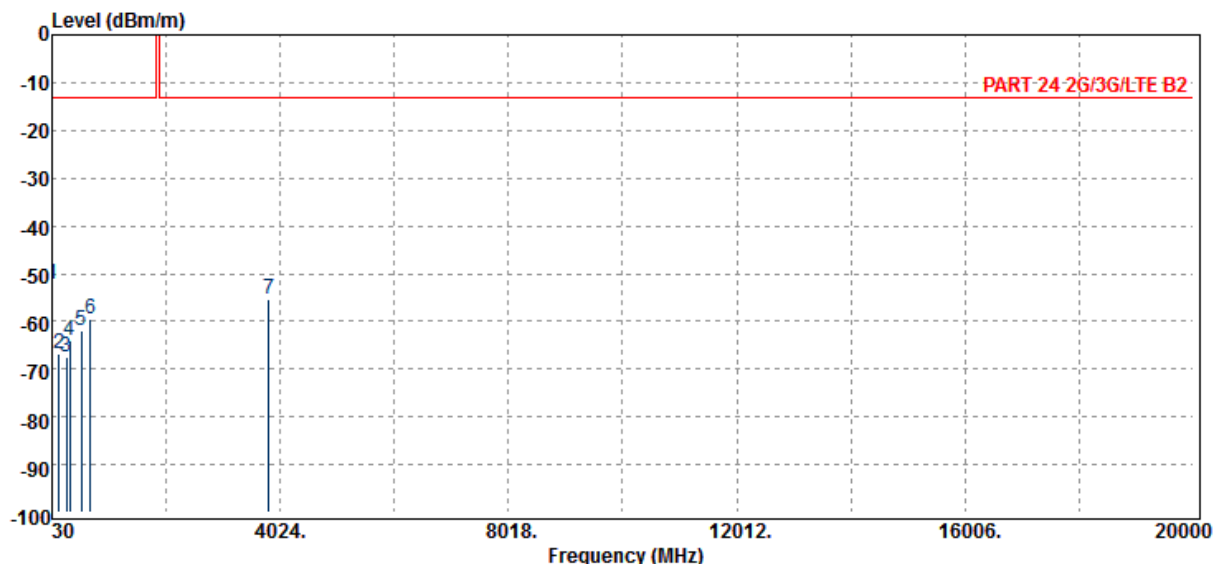
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Operation Band	:GPRS 1900	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1909.8 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.42	-39.41	-12.43	-0.58	-13.00	-39.42
149.31	-66.70	-65.72	0.31	-1.29	-13.00	-53.70
289.96	-67.64	-71.43	5.57	-1.78	-13.00	-54.64
343.31	-64.04	-68.01	5.97	-2.00	-13.00	-51.04
548.95	-62.07	-66.23	6.13	-1.97	-13.00	-49.07
696.39	-59.44	-62.81	5.84	-2.46	-13.00	-46.44
3819.60	-55.31	-60.95	12.66	-7.02	-13.00	-42.31

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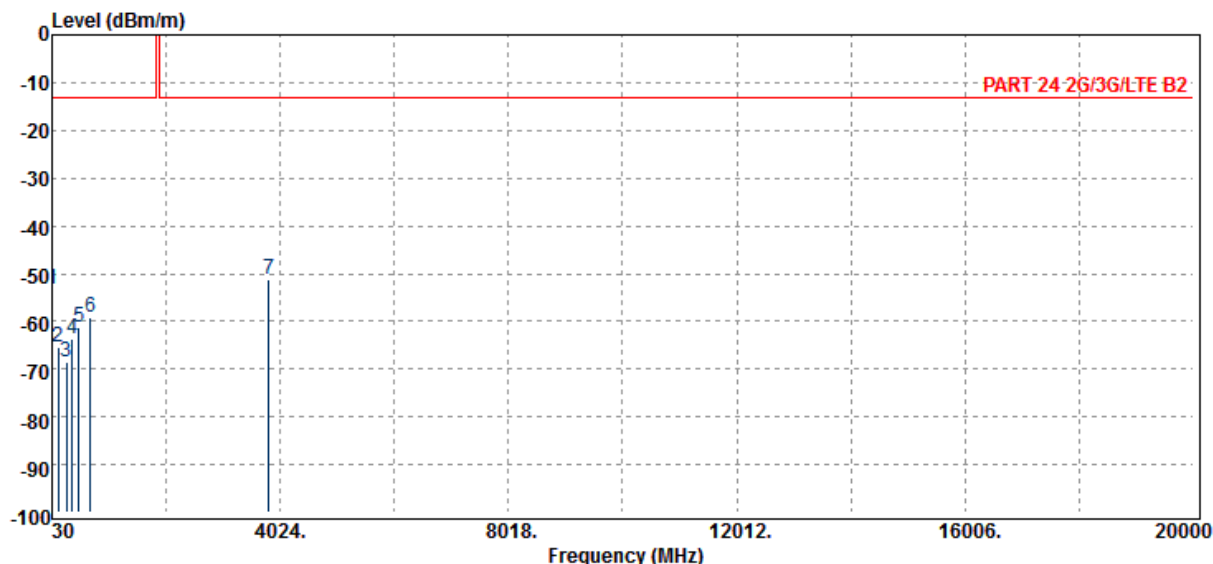
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Operation Band	:GPRS 1900	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1909.8 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-53.44	-40.43	-12.43	-0.58	-13.00	-40.44
144.46	-65.41	-64.20	0.07	-1.28	-13.00	-52.41
288.99	-68.57	-72.36	5.57	-1.78	-13.00	-55.57
386.96	-63.70	-67.57	5.90	-2.02	-13.00	-50.70
495.60	-61.25	-65.32	6.16	-2.09	-13.00	-48.25
696.39	-59.23	-62.61	5.84	-2.46	-13.00	-46.23
3819.60	-51.36	-57.00	12.66	-7.02	-13.00	-38.36

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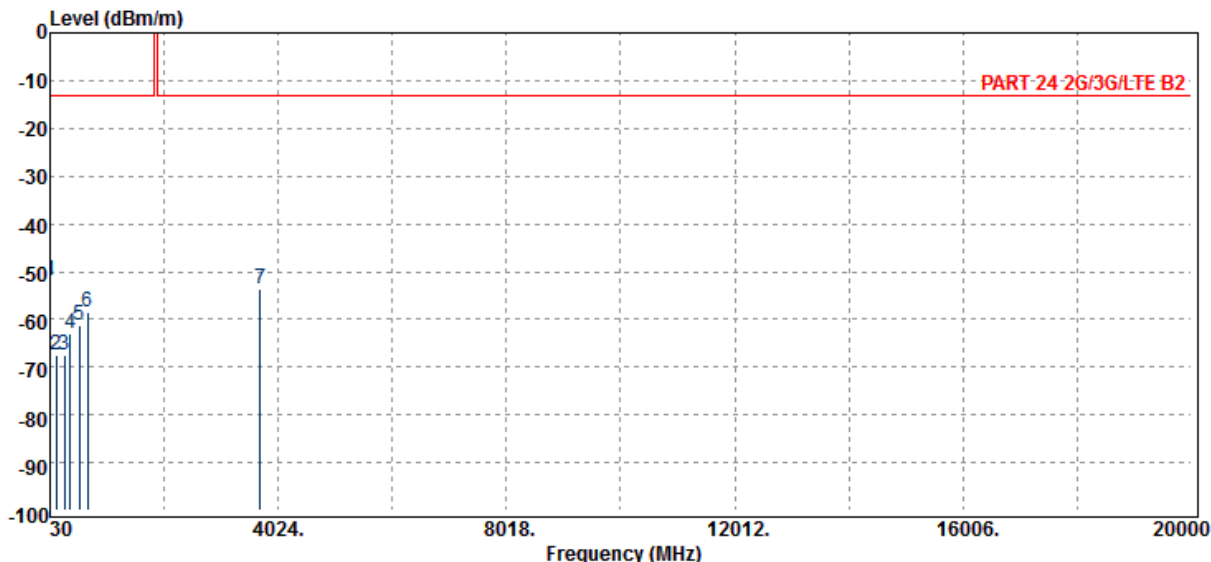
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Radiated Spurious Emission Measurement Result: WCDMA Band II Mode

Operation Band	:WCDMA B2	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1852.4 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-51.85	-38.85	-12.43	-0.58	-13.00	-38.85
143.49	-67.44	-66.18	0.02	-1.28	-13.00	-54.44
282.20	-67.40	-71.21	5.57	-1.75	-13.00	-54.40
379.20	-62.82	-66.72	5.92	-2.03	-13.00	-49.82
549.92	-61.41	-65.51	6.13	-2.02	-13.00	-48.41
694.45	-58.62	-61.86	5.84	-2.61	-13.00	-45.62
3704.80	-53.51	-59.18	12.57	-6.90	-13.00	-40.51

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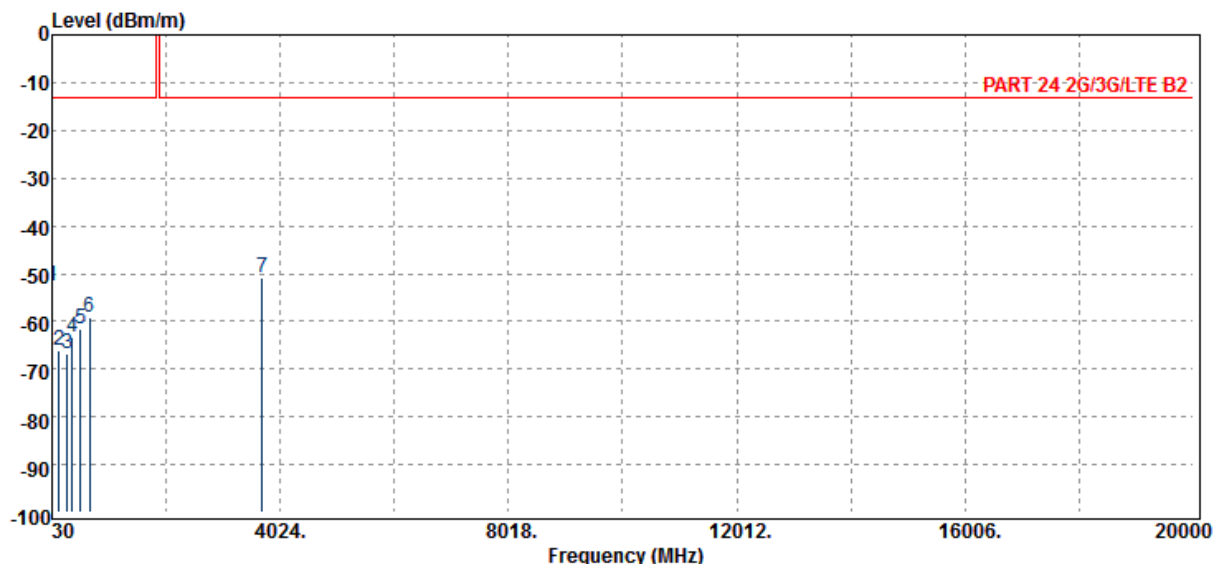
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Operation Band	:WCDMA B2	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1852.4 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.76	-39.75	-12.43	-0.58	-13.00	-39.76
149.31	-66.16	-65.18	0.31	-1.29	-13.00	-53.16
299.66	-66.91	-70.85	5.76	-1.82	-13.00	-53.91
385.99	-63.35	-67.24	5.90	-2.01	-13.00	-50.35
531.49	-61.62	-65.47	6.16	-2.31	-13.00	-48.62
692.51	-59.26	-62.35	5.85	-2.76	-13.00	-46.26
3704.80	-50.81	-56.48	12.57	-6.90	-13.00	-37.81

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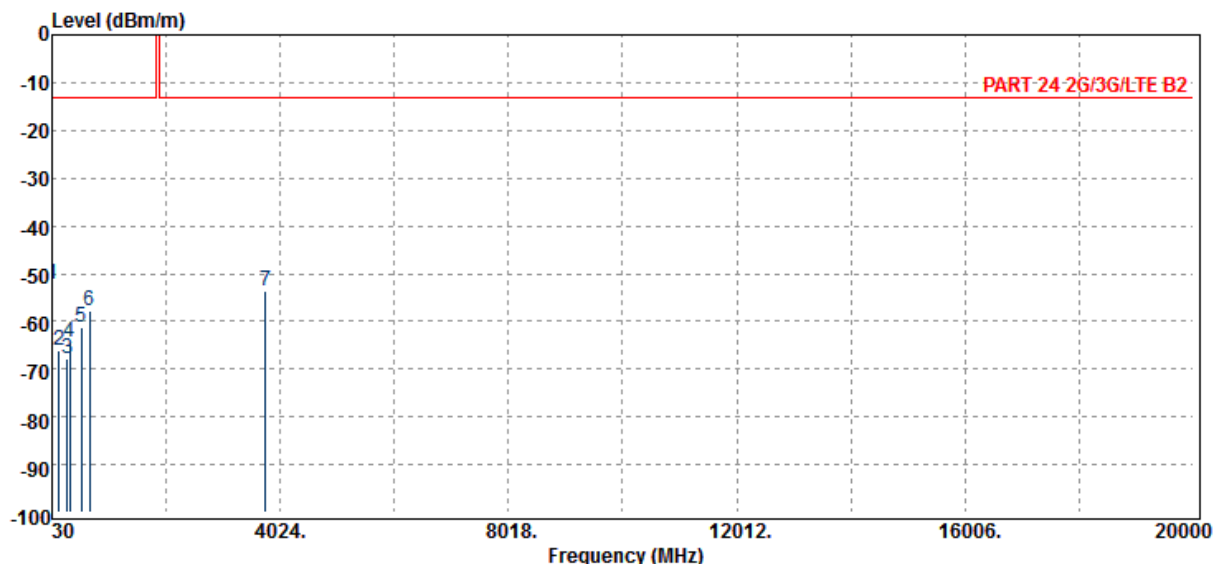
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Operation Band	:WCDMA B2	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.22	-39.21	-12.43	-0.58	-13.00	-39.22
156.10	-66.12	-65.51	0.69	-1.30	-13.00	-53.12
296.75	-67.98	-71.88	5.70	-1.81	-13.00	-54.98
347.19	-64.34	-68.32	5.99	-2.02	-13.00	-51.34
539.25	-61.35	-65.51	6.15	-1.99	-13.00	-48.35
692.51	-57.63	-60.72	5.85	-2.76	-13.00	-44.63
3760.00	-53.55	-59.28	12.61	-6.89	-13.00	-40.55

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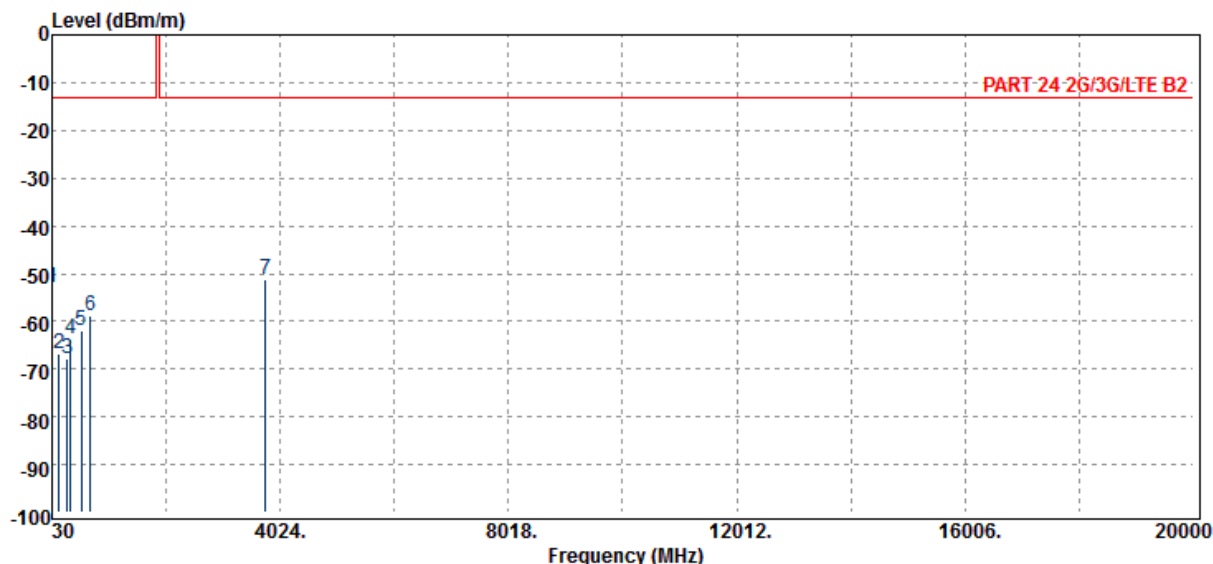
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Operation Band	:WCDMA B2	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.85	-39.84	-12.43	-0.58	-13.00	-39.85
146.40	-66.78	-65.66	0.17	-1.29	-13.00	-53.78
291.90	-67.82	-71.64	5.61	-1.79	-13.00	-54.82
352.04	-63.65	-67.61	6.00	-2.03	-13.00	-50.65
541.19	-61.93	-66.17	6.14	-1.91	-13.00	-48.93
696.39	-58.68	-62.06	5.84	-2.46	-13.00	-45.68
3760.00	-51.15	-56.88	12.61	-6.89	-13.00	-38.15

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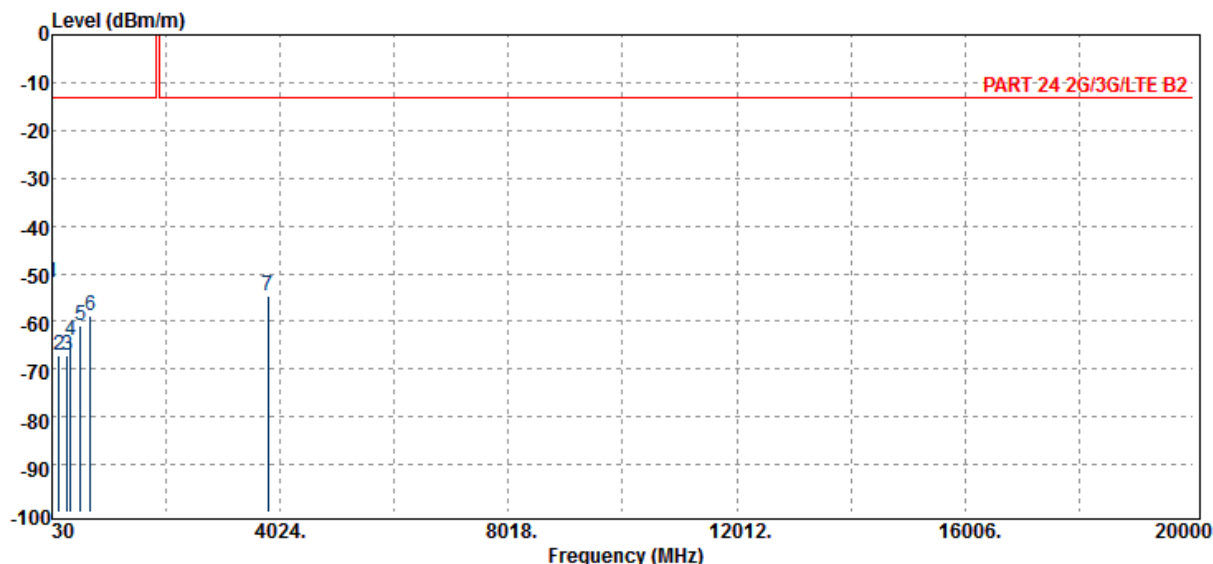
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Operation Band	:WCDMA B2	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1907.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.06	-39.05	-12.43	-0.58	-13.00	-39.06
149.31	-67.25	-66.27	0.31	-1.29	-13.00	-54.25
298.69	-67.13	-71.05	5.74	-1.82	-13.00	-54.13
352.04	-63.94	-67.91	6.00	-2.03	-13.00	-50.94
527.61	-60.83	-64.52	6.16	-2.47	-13.00	-47.83
696.39	-58.96	-62.33	5.84	-2.46	-13.00	-45.96
3815.20	-54.81	-60.46	12.66	-7.00	-13.00	-41.81

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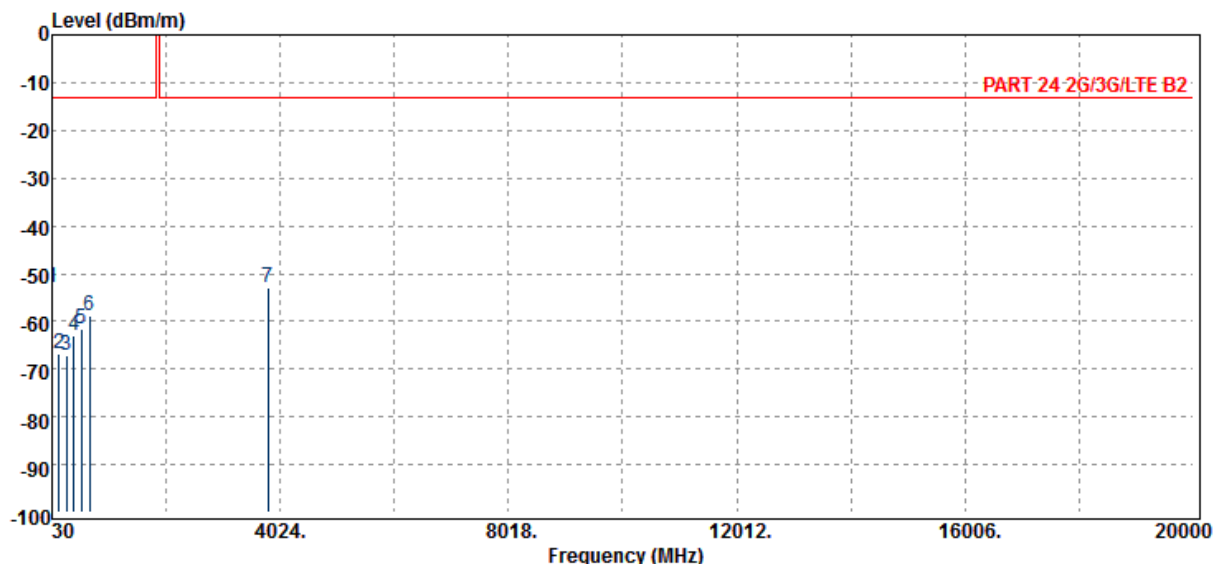
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Operation Band	:WCDMA B2	Temp./Humi.	:22 deg_C / 61 RH
Fundamental Frequency	:1907.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-52.79	-39.78	-12.43	-0.58	-13.00	-39.79
146.40	-66.79	-65.67	0.17	-1.29	-13.00	-53.79
289.96	-67.17	-70.96	5.57	-1.78	-13.00	-54.17
415.09	-62.98	-66.67	5.81	-2.12	-13.00	-49.98
544.10	-61.70	-66.05	6.14	-1.79	-13.00	-48.70
691.54	-58.69	-61.70	5.85	-2.83	-13.00	-45.69
3815.20	-52.95	-58.61	12.66	-7.00	-13.00	-39.95

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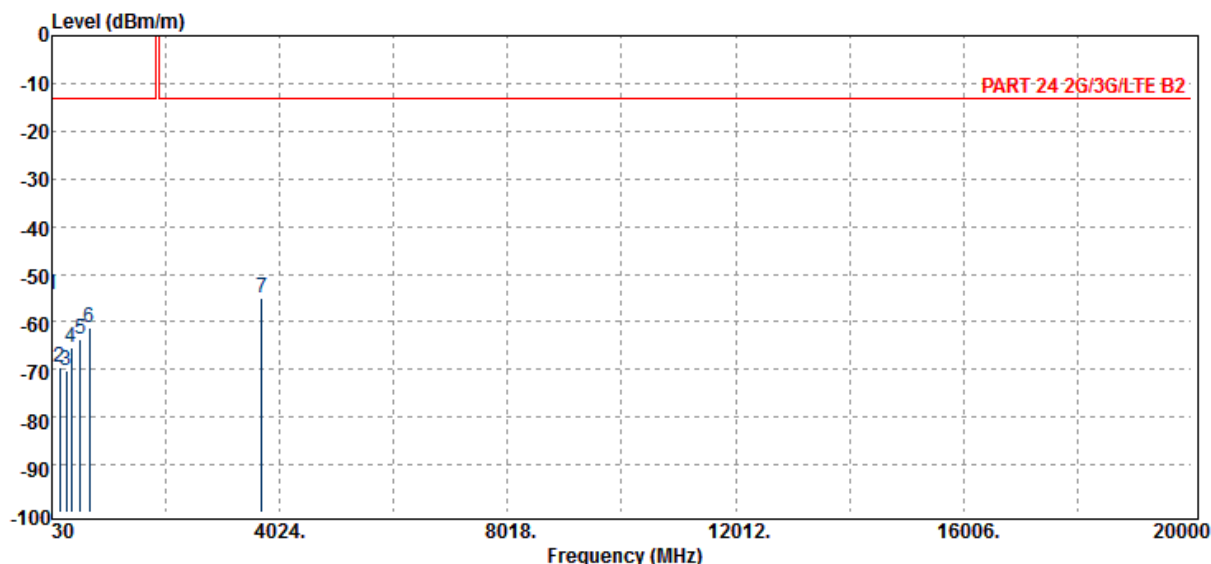
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Radiated Spurious Emission Measurement Result: LTE Band 2 Mode

Operation Band	:LTE B2	Temp./Humi.	:24.1 deg_C / 65 RH
Fundamental Frequency	:1851.5 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-54.40	-39.24	-14.58	-0.58	-13.00	-41.40
162.89	-69.51	-67.15	-1.06	-1.31	-13.00	-56.51
289.96	-70.15	-71.79	3.42	-1.78	-13.00	-57.15
364.65	-65.51	-67.25	3.81	-2.07	-13.00	-52.51
531.49	-63.68	-65.37	4.01	-2.31	-13.00	-50.68
692.51	-61.30	-62.24	3.70	-2.76	-13.00	-48.30
3703.00	-55.07	-60.73	12.57	-6.91	-13.00	-42.07

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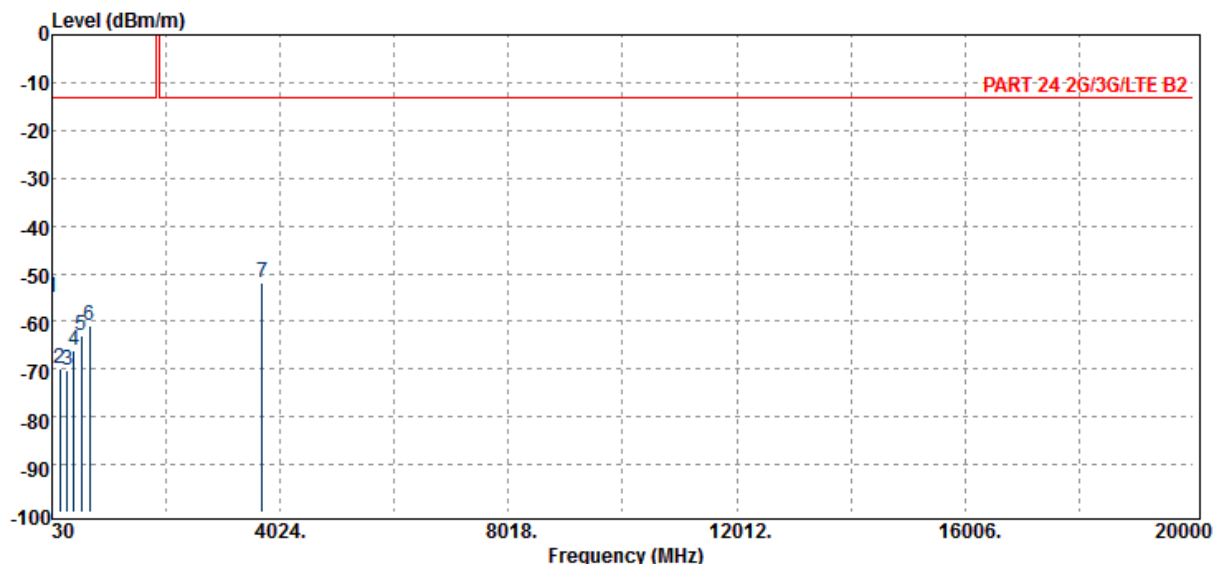
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Operation Band	:LTE B2	Temp./Humi.	:24.1 deg_C / 65 RH
Fundamental Frequency	:1851.5 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-55.09	-39.93	-14.58	-0.58	-13.00	-42.09
168.71	-69.78	-67.75	-0.70	-1.33	-13.00	-56.78
299.66	-70.18	-71.97	3.61	-1.82	-13.00	-57.18
406.36	-65.93	-67.48	3.69	-2.15	-13.00	-52.93
541.19	-62.89	-64.98	3.99	-1.91	-13.00	-49.89
692.51	-60.92	-61.86	3.70	-2.76	-13.00	-47.92
3703.00	-51.83	-57.49	12.57	-6.91	-13.00	-38.83

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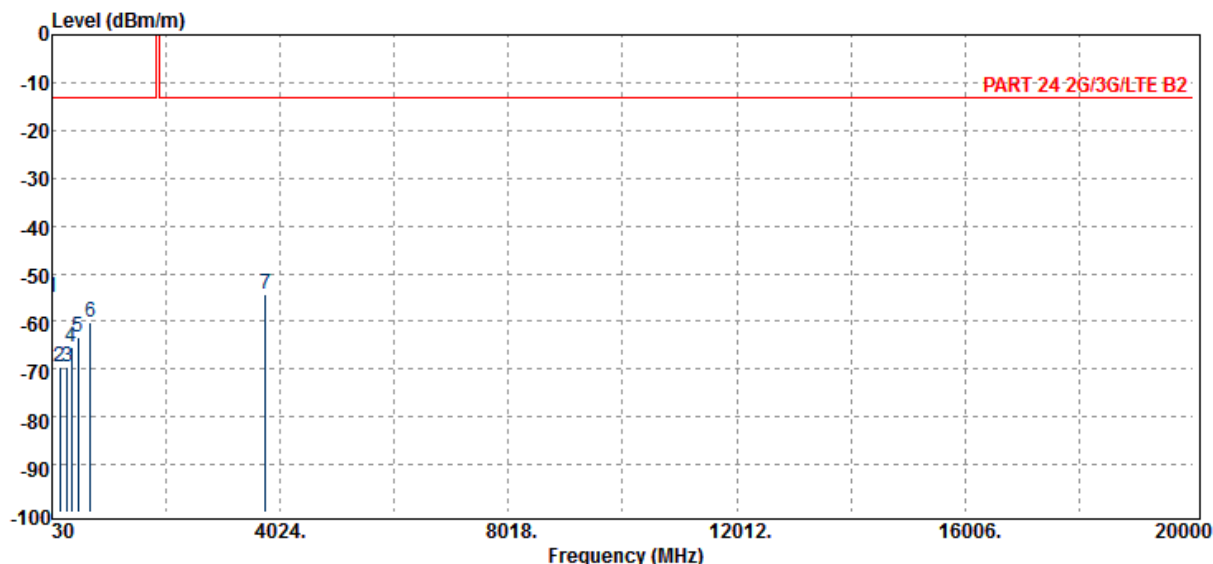
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Operation Band	:LTE B2	Temp./Humi.	:24.1 deg_C / 65 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-54.94	-39.78	-14.58	-0.58	-13.00	-41.94
170.65	-69.64	-67.79	-0.51	-1.33	-13.00	-56.64
298.69	-69.55	-71.32	3.59	-1.82	-13.00	-56.55
369.50	-65.43	-67.17	3.80	-2.06	-13.00	-52.43
487.84	-63.24	-65.29	3.93	-1.89	-13.00	-50.24
696.39	-60.32	-61.55	3.69	-2.46	-13.00	-47.32
3760.00	-54.38	-60.11	12.61	-6.89	-13.00	-41.38

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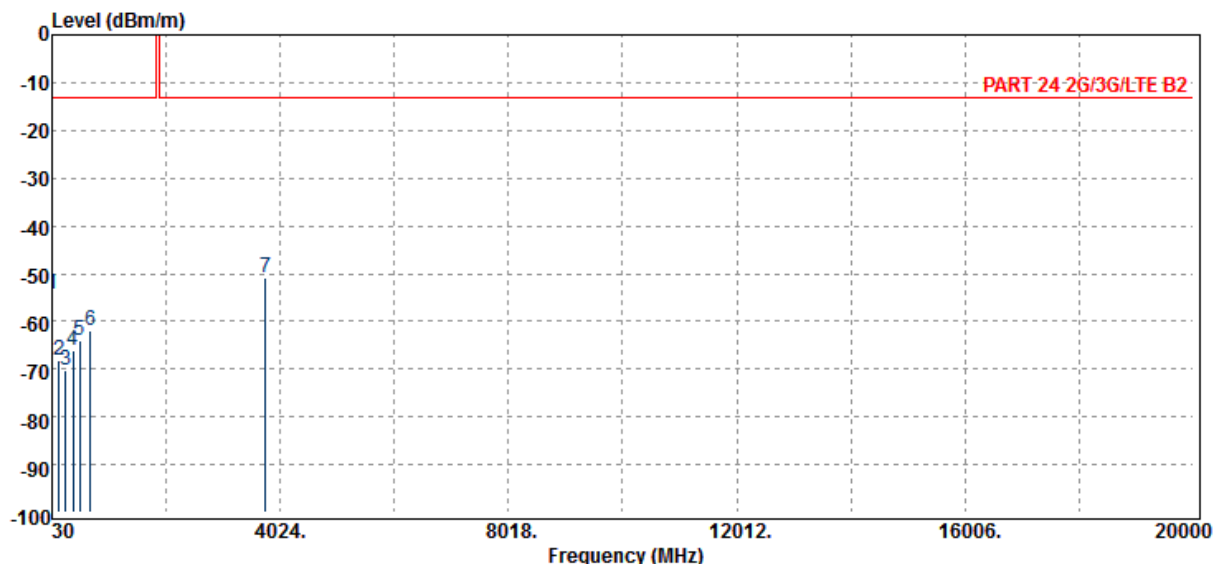
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Operation Band	:LTE B2	Temp./Humi.	:24.1 deg_C / 65 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-54.23	-39.07	-14.58	-0.58	-13.00	-41.23
154.16	-68.14	-65.27	-1.57	-1.30	-13.00	-55.14
274.44	-70.36	-72.09	3.46	-1.73	-13.00	-57.36
401.51	-66.03	-67.61	3.71	-2.13	-13.00	-53.03
516.94	-64.06	-65.61	4.03	-2.48	-13.00	-51.06
697.36	-61.85	-63.15	3.68	-2.38	-13.00	-48.85
3760.00	-50.94	-56.67	12.61	-6.89	-13.00	-37.94

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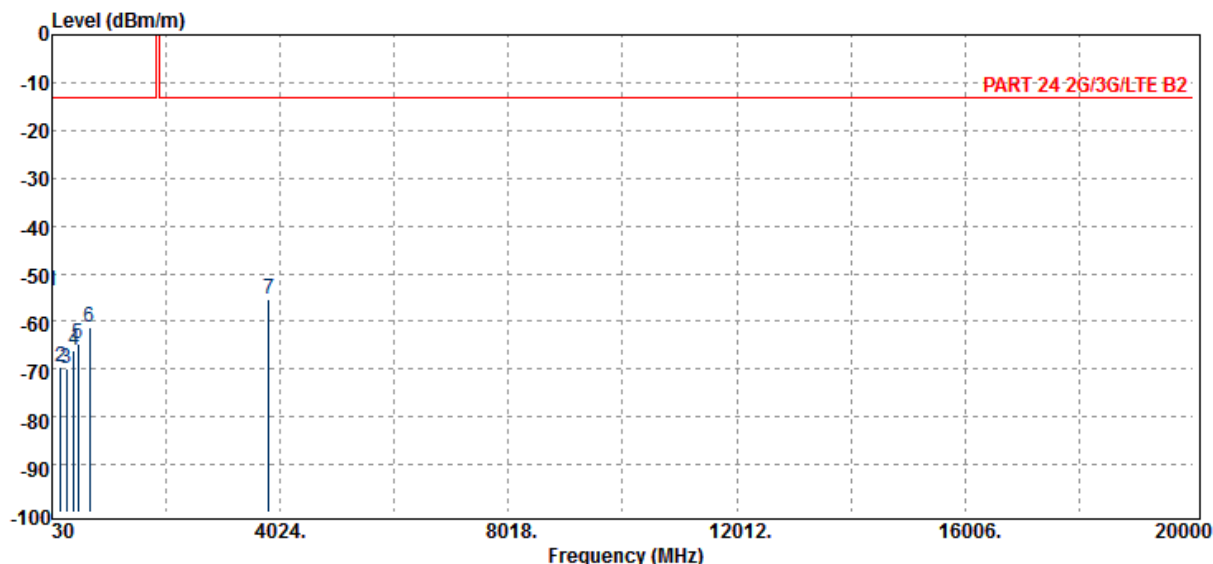
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Operation Band	:LTE B2	Temp./Humi.	:24.1 deg_C / 65 RH
Fundamental Frequency	:1908.5 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-53.80	-38.64	-14.58	-0.58	-13.00	-40.80
175.50	-69.57	-68.49	0.27	-1.36	-13.00	-56.57
285.11	-69.80	-71.46	3.42	-1.76	-13.00	-56.80
418.00	-66.09	-67.62	3.65	-2.11	-13.00	-53.09
490.75	-64.77	-66.76	3.96	-1.96	-13.00	-51.77
689.60	-61.13	-61.85	3.71	-2.98	-13.00	-48.13
3817.00	-55.52	-61.17	12.66	-7.01	-13.00	-42.52

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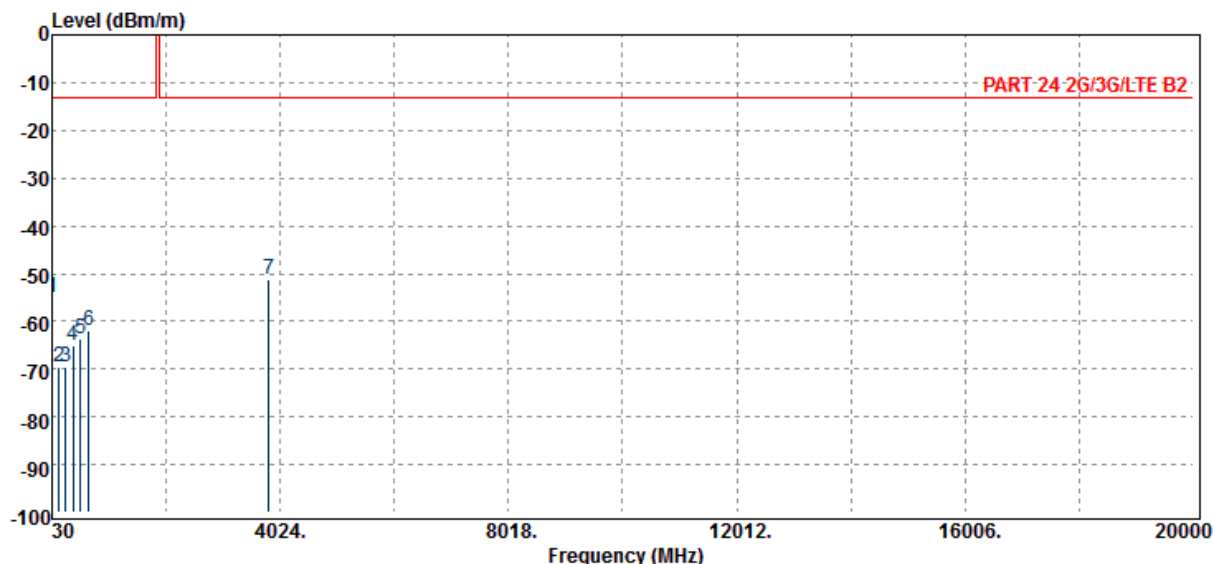
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Operation Band	:LTE B2	Temp./Humi.	:24.1 deg_C / 65 RH
Fundamental Frequency	:1908.5 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBd/dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	-55.08	-39.92	-14.58	-0.58	-13.00	-42.08
154.16	-69.63	-66.77	-1.57	-1.30	-13.00	-56.63
272.50	-69.48	-71.23	3.48	-1.73	-13.00	-56.48
403.45	-65.02	-66.58	3.70	-2.14	-13.00	-52.02
532.46	-63.75	-65.49	4.01	-2.27	-13.00	-50.75
675.05	-61.83	-62.93	3.75	-2.65	-13.00	-48.83
3817.00	-51.32	-56.96	12.66	-7.01	-13.00	-38.32

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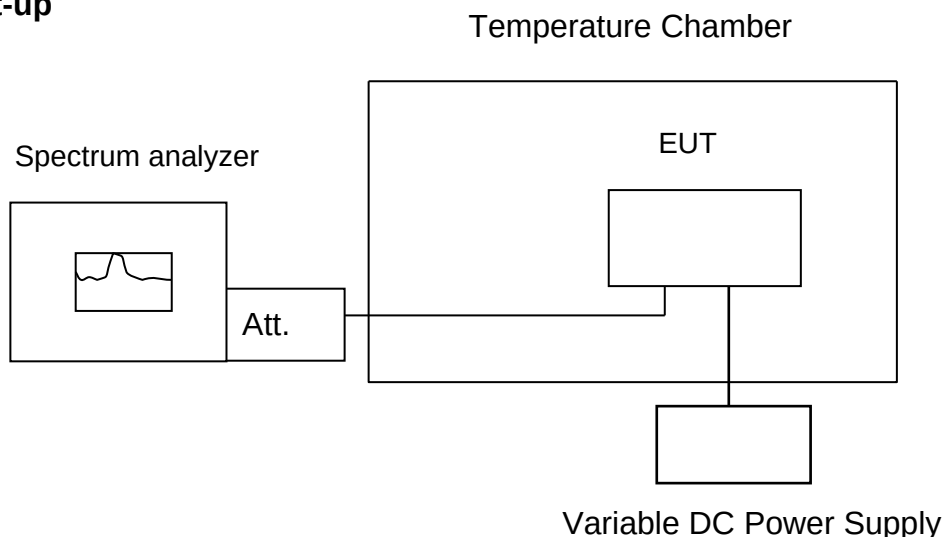
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11. FREQUENCY STABILITY MEASUREMENT

11.1. Standard Applicable

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

11.2. Test Set-up



Note: Measurement setup for testing on Antenna connector

11.3. Measurement Procedure

The equipment under test was connected to an external AC or DC power supply and input rated voltage. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. The EUT was placed inside the temperature chamber. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached.

Set chamber temperature to 25°C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (+/- 15%) and endpoint as declared by the manufacturer, record the maximum frequency change.

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11.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/03/2018	05/02/2019
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	04/05/2018	04/04/2019
DC Power Supply	Agilent	E3640A	MY52410006	11/28/2017	11/27/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2018	01/01/2019
2WayDivider	Woken	DSU7AMK1A1	N/A	01/02/2018	01/01/2019
Coaxial Cable	Huber Su-hner	SUCOFLEX 102EPA	MY2616/2	01/02/2018	01/01/2019

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11.5. Measurement Result

FREQUENCY ERROR vs. VOLTAGE

GPRS 1900 Mid Channel			1880	MHz
Limit: +/- 2.5 ppm				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit (Hz)
FREQUENCY ERROR vs. VOLTAGE				
4.37	20	1880.00237	2370	4700
3.8	20	1879.99863	-1370	4700
3.23	20	1879.99871	-1290	4700
3.1 (End point)	20	1879.99842	-1580	4700

FREQUENCY ERROR vs. TEMPERATURE

FREQUENCY ERROR vs. Temp.				
3.8	50	1879.99807	-1930	4700
3.8	40	1880.00227	2270	4700
3.8	30	1879.9988	-1200	4700
3.8	20	1879.99863	-1370	4700
3.8	10	1880.00118	1180	4700
3.8	0	1879.99779	-2210	4700
3.8	-10	1880.00169	1690	4700
3.8	-20	1880.00174	1740	4700
3.8	-30	1879.99735	-2650	4700

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FREQUENCY ERROR vs. VOLTAGE

WCDMA II Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit (Hz)
FREQUENCY ERROR vs. VOLTAGE				
4.37	20	1880.00144	1440	4700
3.8	20	1879.99898	-1020	4700
3.23	20	1879.99902	-980	4700
3.1 (End point)	20	1879.99734	-2660	4700

FREQUENCY ERROR vs. TEMPERATURE

FREQUENCY ERROR vs. Temp.				
3.8	50	1880.00218	2180	4700
3.8	40	1879.99891	-1090	4700
3.8	30	1880.00252	2520	4700
3.8	20	1879.99898	-1020	4700
3.8	10	1880.00242	2420	4700
3.8	0	1879.99974	-260	4700
3.8	-10	1879.99763	-2370	4700
3.8	-20	1879.99844	-1560	4700
3.8	-30	1879.99929	-710	4700

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Reference Freq.:		LTE B2 Mid Channel		1880 MHz	20M QPSK CH 18900
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)	
Freq. ERROR vs. VOLTAGE					
4.37	25	1880.000020	19.9999999	4700	
3.8	25	1879.999985	-15	4700	
3.23	25	1880.000006	5.99999998	4700	
3.1 (End Point)	25	1879.999985	-15	4700	
Freq. ERROR vs. Temp.					
3.8	-30	1880.000012	12	4700	
3.8	-20	1880.000018	18	4700	
3.8	-10	1880.000030	29.9999999	4700	
3.8	0	1879.999975	-25	4700	
3.8	10	1880.000019	19.0000001	4700	
3.8	20	1879.999986	-14	4700	
3.8	30	1879.999982	-18	4700	
3.8	40	1879.999984	-16	4700	
3.8	50	1880.000020	19.9999999	4700	

Note: The battery is rated 3.8V dc.

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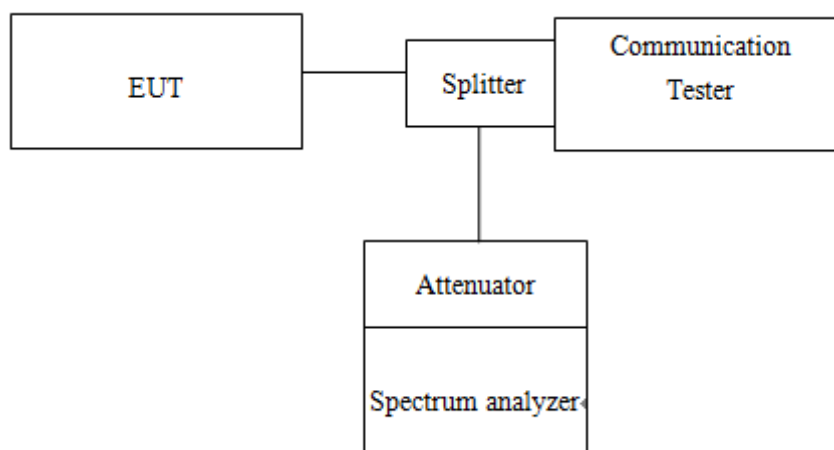
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12. PEAK TO AVERAGE RATIO

12.1. Standard Applicable

The peak-to-average ratio (PAR) of the transmission may not exceed 13dB.

12.2. Test SET-UP



12.3. Measurement Procedure

1. KDB 971168 D01 is employed as the following procedure is proper adjusted accordingly:
2. Set resolution/measurement bandwidth $\geq$ signal's occupied bandwidth; & internal =1ms
3. Set the number of counts to a value that stabilizes the measured CCDF curve.

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12.4. Measurement Equipment Used

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EXA Spectrum Analyzer	Agilent	N9010A	MY50420195	05/03/2018	05/02/2019
Radio Communication Analyser	Anritsu	MT8820C	6200995019	04/05/2018	04/04/2019
DC Power Supply	Agilent	E3640A	MY52410006	11/28/2017	11/27/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2018	01/01/2019
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2018	01/01/2019
2WayDivider	Woken	DSU7AMK1A1	N/A	01/02/2018	01/01/2019
Coaxial Cable	Huber Su-hner	SUCOFLEX 102EPA	MY2616/2	01/02/2018	01/01/2019

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12.5. Measurement Result

Tabular Results:

Freq. (MHz)	CH	Peak-to-Average Ratio (dB)	
		GSM 1900	GPRS 1900
1850.2	512	9	8.98
1880	661	8.89	9.94
1909.8	810	9.04	9.13

Freq. (MHz)	CH	Peak-to-Average Ratio (dB)		
		WCDMA II	HSDPA II	HSUPA II
1852.4	9262	3.30	3.31	3.19
1880	9400	3.24	3.36	3.38
1907.6	9538	3.31	3.28	3.29

LTE BAND 2							
Channel bandwidth: 1.4MHz				Channel bandwidth: 3MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1850.7	18607	5.77	13	1851.5	18615	5.70	13
1880.0	18900	5.52	13	1880.0	18900	5.87	13
1909.3	19193	5.38	13	1908.5	19185	5.77	13

LTE BAND 2							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1852.5	18625	5.58	13	1855.0	18650	5.71	13
1880.0	18900	5.69	13	1880.0	18900	5.79	13
1907.5	19175	5.57	13	1905.0	19150	5.98	13

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LTE BAND 2							
Channel bandwidth: 15MHz				Channel bandwidth: 20MHz			
Freq. (MHz)	CH	PAPR (dB)		Freq. (MHz)	CH	PAPR (dB)	
		16QAM	Limit			16QAM	Limit
1857.5	18675	5.99	13	1860.0	18700	6.49	13
1880.0	18900	6.03	13	1880.0	18900	6.53	13
1902.5	19125	6.01	13	1900.0	19100	6.56	13

Measurement Results:

Please refer to next page.

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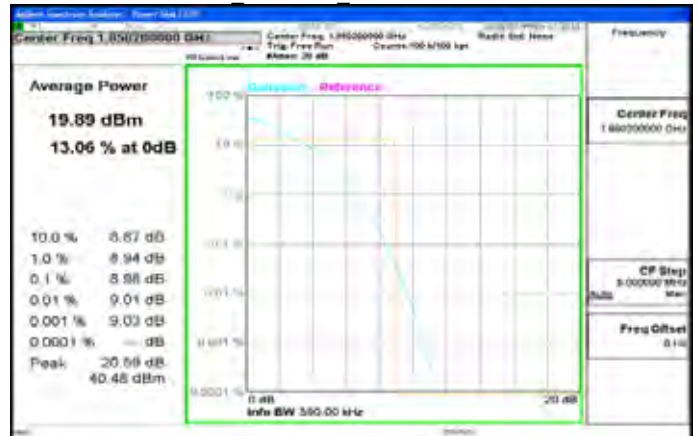
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GSM 1900MHz LowCH512-1850.2



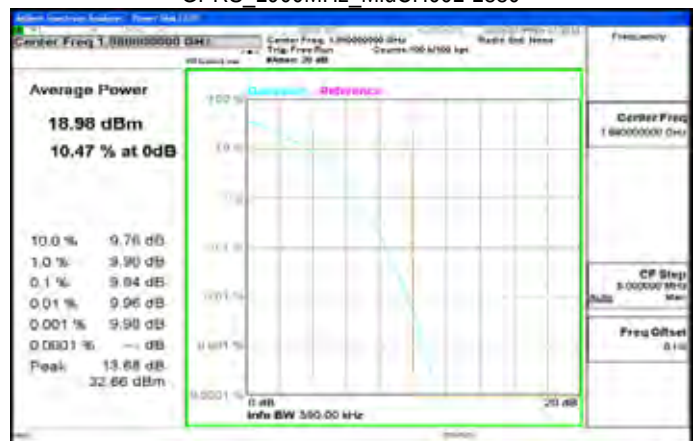
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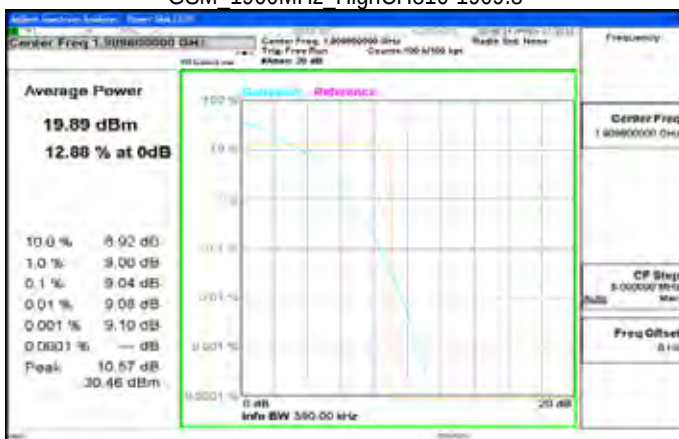
GSM 1900MHz MidCH661-1880



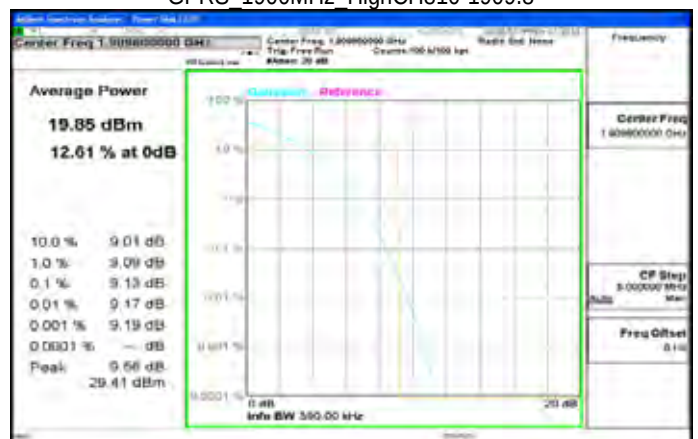
GRPS 1900MHz MidCH661-1880



GSM 1900MHz HighCH810-1909.8



GRPS 1900MHz HighCH810-1909.8



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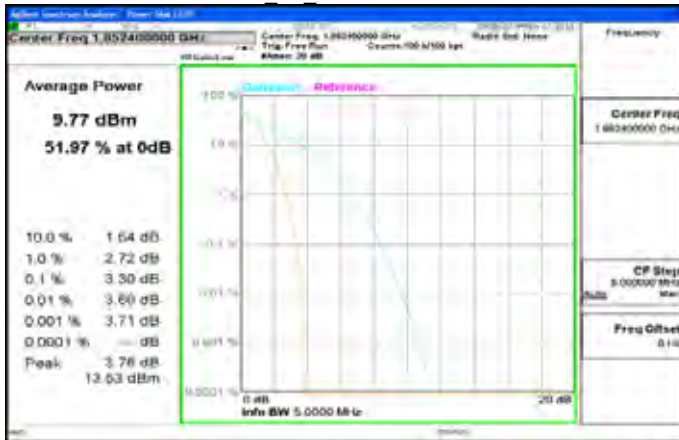
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WCDMA B2 LowCH9262-1852.4



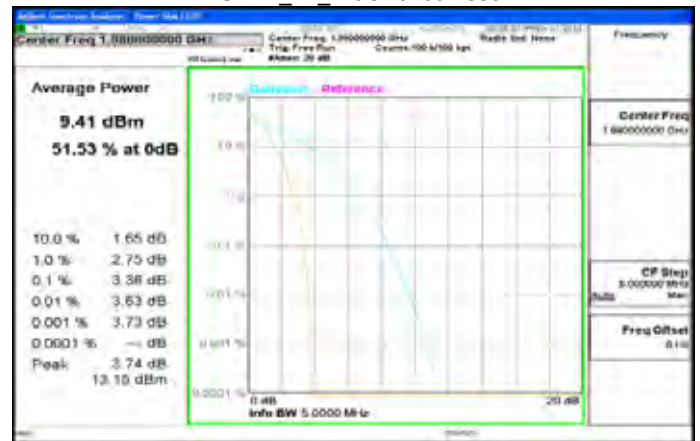
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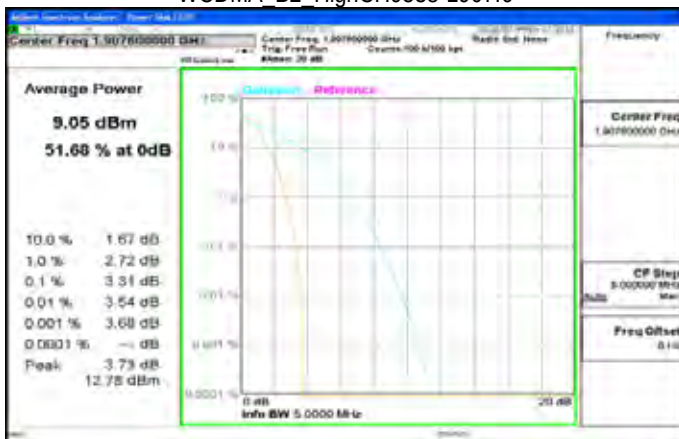
WCDMA B2 MidCH9400-1880



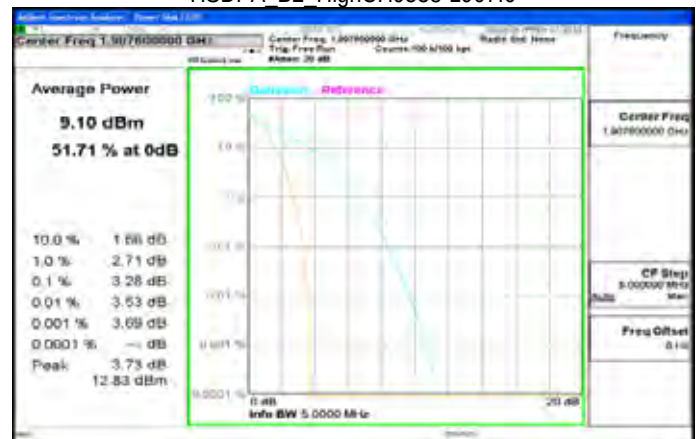
HSDPA B2 MidCH9400-1880



WCDMA B2 HighCH9538-1907.6



HSDPA B2 HighCH9538-1907.6



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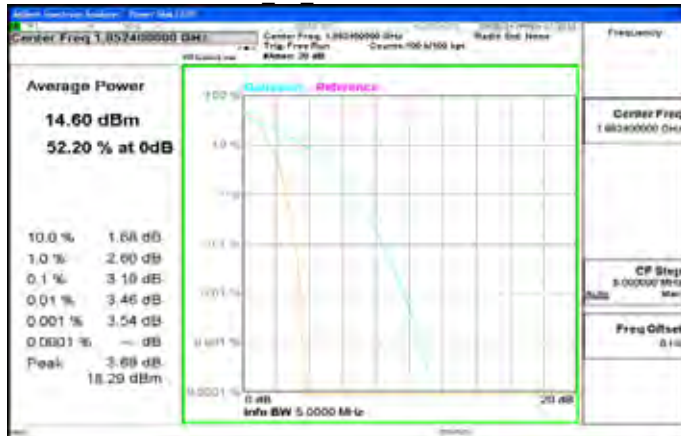
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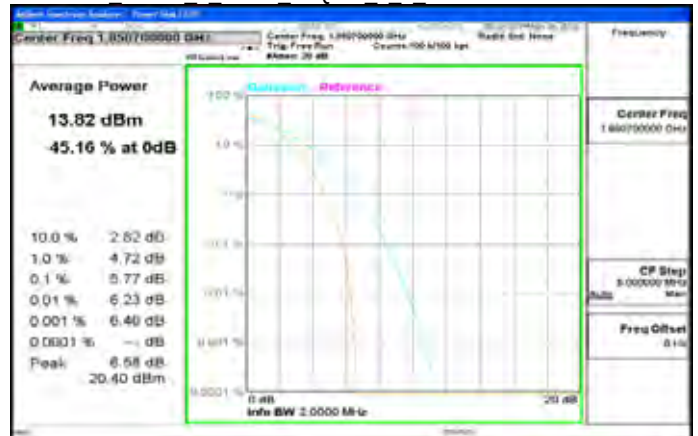
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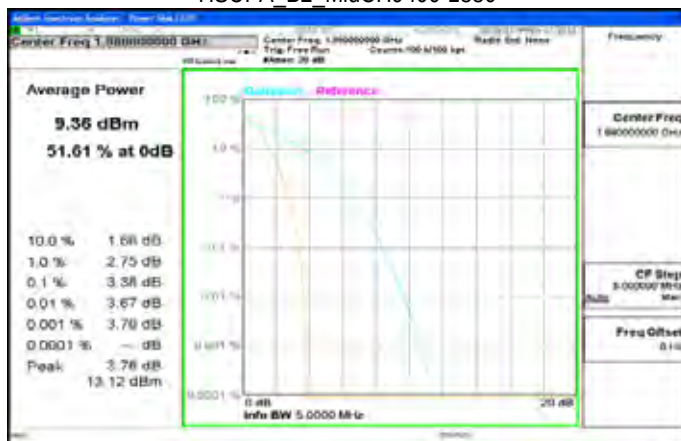
HSUPA B2_LowCH9262-1852.4



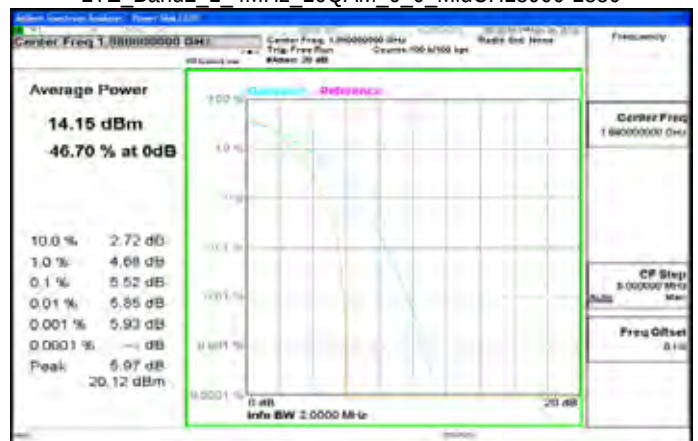
LTE Band2_1_4MHz_16QAM_6_0_LowCH18607-1850.7



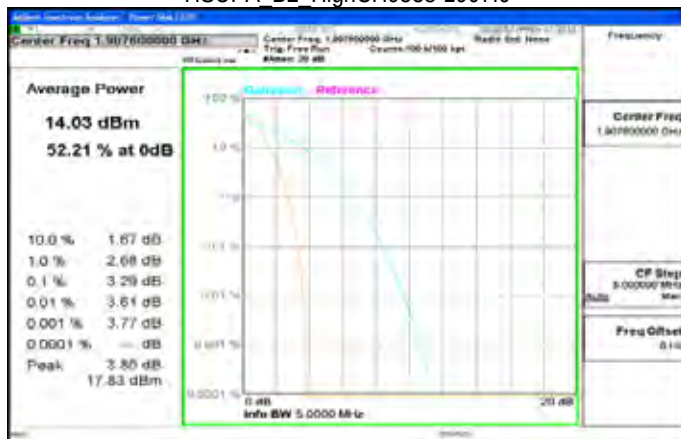
HSUPA B2_MidCH9400-1880



LTE Band2_1_4MHz_16QAM_6_0_MidCH18900-1880



HSUPA B2_HighCH9538-1907.6



LTE Band2_1_4MHz_16QAM_6_0_HighCH19193-1909.3



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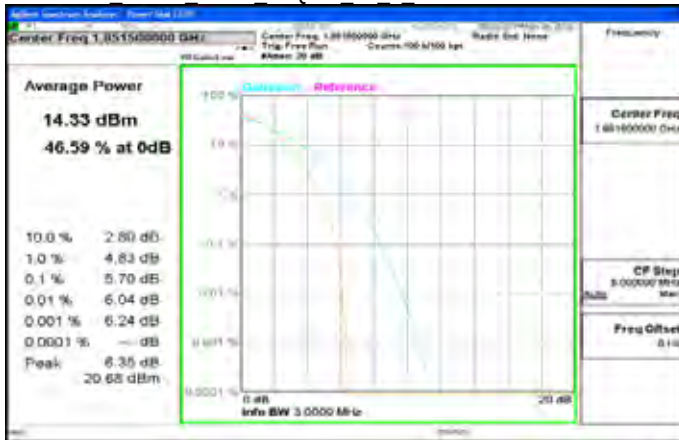
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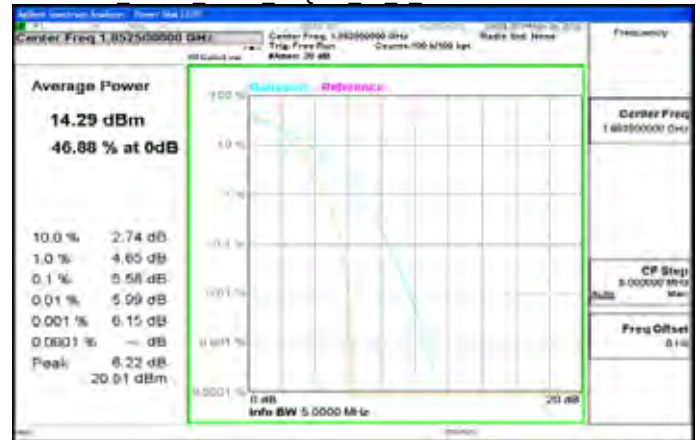
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LTE Band2 3MHz 16QAM 15 0 LowCH18615-1851.5



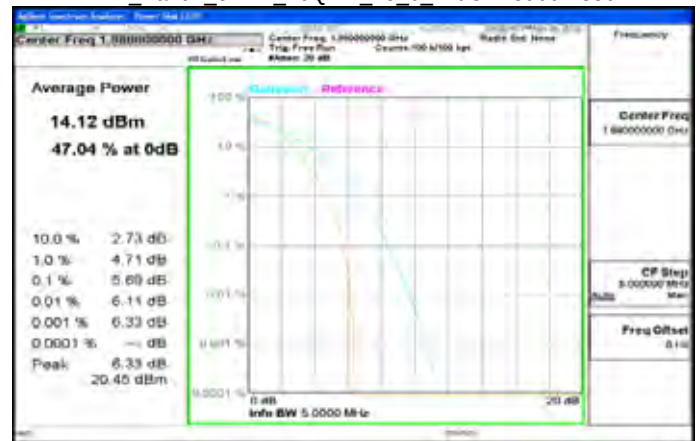
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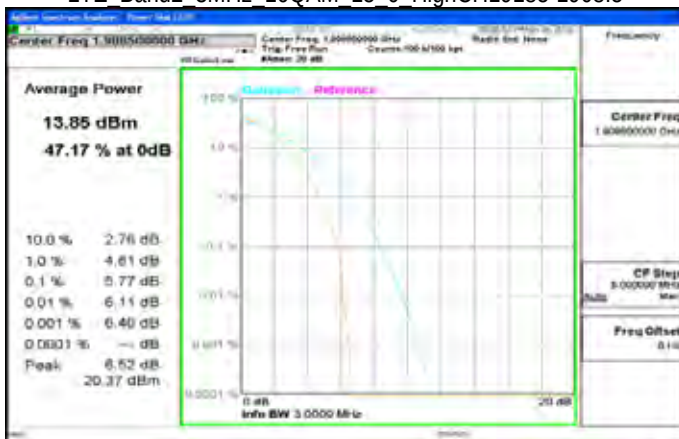
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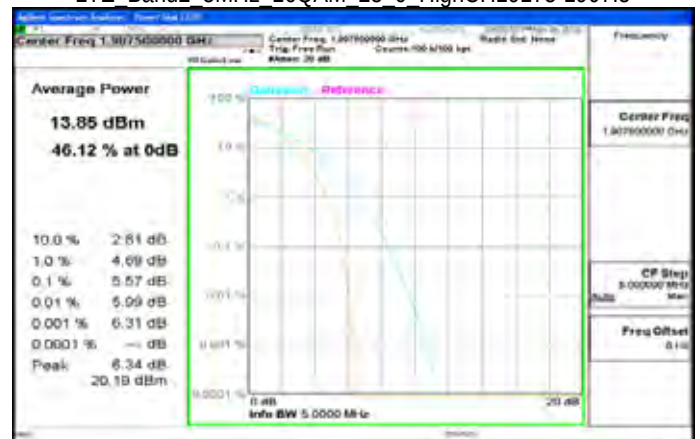
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LTE Band2 3MHz 16QAM 15 0 HighCH19185-1908.5



LTE Band2 5MHz 16QAM 25 0 HighCH19175-1907.5



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LTE Band2 10MHz 16QAM 50 0 LowCH18650-1855



LTE Band2 15MHz 16QAM 75 0 LowCH18675-1857.5



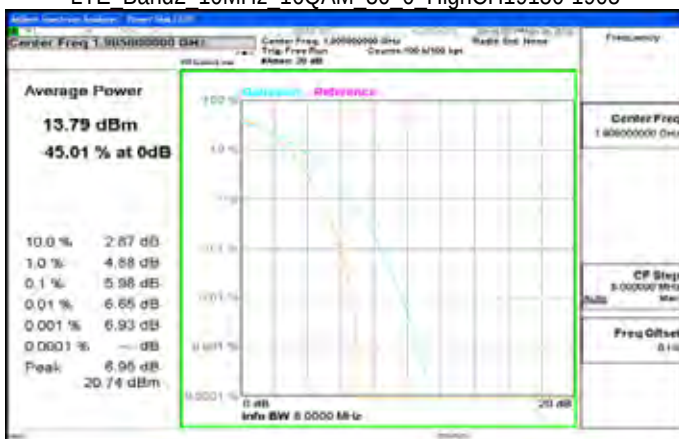
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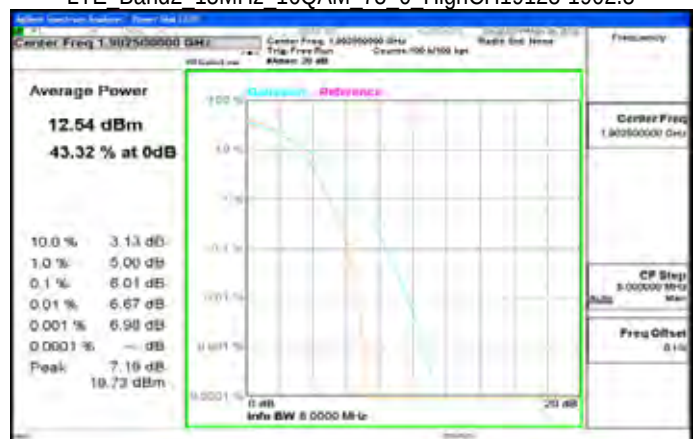
LTE Band2 15MHz 16QAM 75 0 MidCH18900-1880



LTE Band2 10MHz 16QAM 50 0 HighCH19150-1905



LTE Band2 15MHz 16QAM 75 0 HighCH19125-1902.5



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LTE Band2 20MHz 16QAM 100 0 LowCH18700-1860



LTE Band2 20MHz 16QAM 100 0 HighCH19100-1900



LTE Band2 20MHz 16QAM 100 0 MidCH18900-1880



~ End of Report ~

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