

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**

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**INTENTIONAL RADIATOR CERTIFICATION TO  
FCC PART 22 SUBPART H, PART 24 SUBPART E and PART 27 SUBPART  
C REQUIREMENT**

OF

**Product Name:** Smart Phone

**FCC ID:** APYHRO00258

**Report No.:** ER/2017/A0171

**Issue Date:** Nov. 06, 2017

**FCC Rule Part:** §2 , 22H & 24E & 27BH

**Prepared for:** Sharp Corporation, IoT Communication B.U.  
2-13-1, Hachihonmatsu-lida, Higashi-hiroshima-shi, Hiroshima 739-0192, Japan

**Manufacturer:** Sharp Corporation  
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SGS Taiwan Ltd.  
Electronics & Communication Laboratory

**Prepared by:** No.134, Wu Kung Road, New Taipei Industrial Park, Wuku District, New Taipei City, Taiwan 24803

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## VERIFICATION OF COMPLIANCE

**Applicant:** Sharp Corporation, IoT Communication B.U.  
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739-0192, Japan

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**Product Name:** Smart Phone

**FCC ID:** APYHRO00258

**File Number:** ER/2017/A0171

**Date of test:** Oct. 16, 2017 ~ Oct. 30, 2017

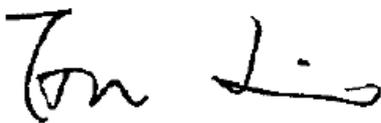
**Date of EUT Received:** Oct. 16 2017

### 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/TIA-603-E-2016 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.

**Test By:**

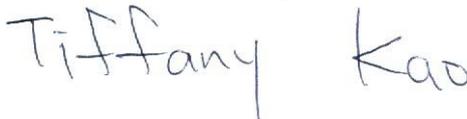


**Date:**

Nov. 06, 2017

**Tin Lin / Engineer**

**Prepared By:**



**Date:**

Nov. 06, 2017

**Tiffany Kao / Clerk**

**Approved By:**



**Date:**

Nov. 06, 2017

**Jim Chang / Asst. Manager**

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## Revision History

Report Number	Revision	Description	Issue Date
ER/2017/A0171	Rev.00	Initial creation of document	Nov. 06, 2017

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## 1 GENERAL PRODUCT INFORMATION

### 1.1 Product Description

General:

Product Name:	Smart Phone	
Hardware Version:	DVT	
Software Version:	N/A	
Power Supply:	3.85V from Rechargeable Li-ion Battery	
	Battery:	Mode No.: UBATIA284AFN2, Supplier: SCUD(Fujian) Electronics Co., Ltd.

GSM / WCDMA / LTE:

Cellular Phone Standards Frequency Range and Power	Operating Frequency		Rated Power
	GSM/GPRS 850	824.2 MHz– 848.8 MHz	32.5dBm
	GSM/GPRS 1900	1850.2MHz – 1909.8MHz	29.5dBm
	WCDMA/HSUPA/HSDPA Band V	826.4MHz - 846.6MHz	23.5dBm
	LTE-Band 17 (5MHz)	706.5MHz – 713.5MHz	23dBm
	LTE-Band 17 (10MHz)	709.0MHz –711.0MHz	23dBm
IMEI:	004401116204708 004401116208600 004401116207115		

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**Type of Emission:**

Frequency Band	Type of Emission:
GSM 850	245KGXW
GPRS 850	245KGXW
GSM 1900	246KGXW
GPRS 1900	247KGXW
WCDMA Band V	4M15F9W
HSDPA Band V	4M14F9W
HSUPA Band V	4M15F9W

LTE Band	BW (MHz)	Modulation	Type of Emission
LTE Band 17	5MHz	QPSK	4M51G7D
LTE Band 17	5MHz	16QAM	4M51W7D
LTE Band 17	10MHz	QPSK	9M03G7D
LTE Band 17	10MHz	16QAM	8M99W7D

**Max ERP/EIRP Power Measurement Result:**

	dBm		W
GSM 850	<b>23.35</b>	ERP	0.216
GPRS 850	<b>19.30</b>	ERP	0.085
GSM 1900	<b>23.54</b>	EIRP	0.226
GPRS 1900	<b>23.53</b>	EIRP	0.225
WCDMA Band V	<b>20.03</b>	ERP	0.101
HSDPA Band V	<b>19.66</b>	ERP	0.092
HSUPA Band V	<b>20.56</b>	ERP	0.114
LTE-Band 17 (Bandwidth 5MHz) QPSK	<b>10.47</b>	ERP	0.011
LTE-Band 17 (Bandwidth 5MHz) 16QAM	<b>10.54</b>	ERP	0.011
LTE-Band 17 (Bandwidth 10MHz) QPSK	<b>9.96</b>	ERP	0.010
LTE-Band 17 (Bandwidth 10MHz) 16QAM	<b>10.12</b>	ERP	0.010

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## 1.2 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22, 24, 27

ANSI/TIA-603-E-2016

KDB 971168 D01 v02r02 Power Meas license Digital System

KDB941225 D01 v03r01 of the Output power Procedure of (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.

## 1.3 Test Facility

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

FCC Registration Numbers are: 509634 / TW0001

## 1.4 Special Accessories

No special accessories were used during testing.

## 1.5 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/TIA-603-E-2016, 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 (ERP/EIRP)

According to measurement procured ANSI/TIA-603-E-2016, The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the re-ceiving 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 rela-tive positions of this 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 meas-urement antenna according to the requirements in Section 8 and 13.

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## 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.

### Note:

Offset = RF cable loss (dB)+ attenuation factor(dB) =4.4+10=14.4(dB)

## 2.5 Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
GSM 850	3.85Vdc	532
GSM1900	3.85Vdc	351
GPRS 850	3.85Vdc	514
GPRS 1900	3.85Vdc	362
WCDMA B5	3.85Vdc	601
HSUPA B5	3.85Vdc	621
HSDPA B5	3.85Vdc	596
LTE Band 17_5M QPSK	3.85Vdc	625
LTE Band 17_5M 16QAM	3.85Vdc	637
LTE Band 17_10M QPSK	3.85Vdc	648
LTE Band 17_10M 16QAM	3.85Vdc	661

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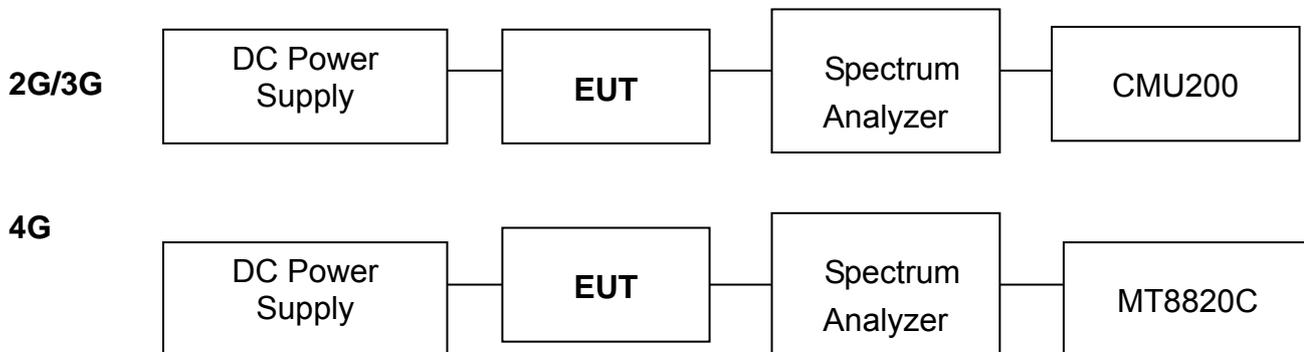
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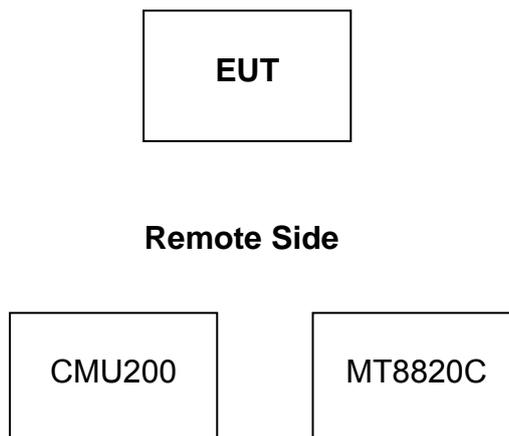
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## 2.6 Configuration of Tested System

**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.	Universal Radio Communication Tester	R&S	CMU200	102189	shielded	Un-shielded
2.	Universal Radio Communication Tester	Anritsu	MT8820C	6200307563	shielded	Un-shielded
3.	DC Power Supply	HP	E3640A	KR93300208	N/A	Unshielded

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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) §22.913(a)(5) §24.232(c) §27.50(h)(2) §27.50(c)(10)	ERP/ EIRP measurement	Compliant
§2.1049(h)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §22.917(a) §24.238(a) §27.53(g) §27.53(h)(3) §27.53(m)(4)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §22.917(a) §24.238(a) §27.53(g) §27.53(h)(3) §27.53(m)(4)	Field Strength of Spurious Radiation	Compliant
§24.232(d) §27.53(d) (5)	Peak to Average Ratio	Compliant
§2.1055(a)(1) §22.355 §24.235 §27.54	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	ERP/EIRP	RADIATED EMISSION and Wireless charging Cover
GSM/GPRS 850	E2-plan	E2-plan
GSM/GPRS 1900	E2-plan	E2-plan
WCDMA/HSPA Band V	E2-plan	E2-plan
LTE Band 17	E2-plan	E2-plan

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GSM/GPRS/EDGE MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
ERP	128 to 251	128, 190, 251	GSM/GPRS 850
EIRP	512 to 810	512, 661, 810	GSM/GPRS 1900
FREQUENCY STABILITY	128 to 251 512 to 810	190 661	GPRS 850 GPRS 1900
OCCUPIED BANDWIDTH	128 to 251 512 to 810	190 661	GSM/GPRS 850 GSM/GPRS 1900
PEAK TO AVERAGE RATIO	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GSM/GPRS 850 GSM/GPRS 1900
BAND EDGE	128 to 251 512 to 810	128, 251 512, 810	GSM/GPRS 850 GSM/GPRS 1900
CONDCUDED EMISSION	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GSM/GPRS 850 GSM/GPRS 1900
RADIATED EMISSION	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GPRS 850 GPRS 1900

WCDMA/HSPA MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
ERP	4132 to 4233	4132, 4183, 4233	WCDMA/HSPA Band V
FREQUENCY STABILITY	9262 to 9538	9400	WCDMA Band V
OCCUPIED BANDWIDTH	9262 to 9538	9262, 9400, 9583	WCDMA/HSPA Band V
PEAK TO AVERAGE RATIO	9262 to 9538	9262, 9400, 9583	WCDMA/HSPA Band V
BAND EDGE	9262 to 9538	9262, 9583	WCDMA Band V
CONDCUDED EMISSION	9262 to 9538	9262, 9400, 9583	WCDMA Band V
RADIATED EMISSION	9262 to 9538	9262, 9400, 9583	HSUPA Band V

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**LTE Band 17 MODE**

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
ERP	23755 to 23825	23755, 23790, 23825	5MHz	QPSK, 16QAM	1 RB/ 0,24 RB Offest
	23780 to 23800	23780, 23790, 23800	10MHz	QPSK, 16QAM	1 RB/ 0,49 RB Offest
FREQUENCY STABILITY	23780 to 23800	23790	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	23755 to 23825	23755, 23790, 23825	5MHz	QPSK, 16QAM	Full RB
	23780 to 23800	23780, 23790, 23800	10MHz	QPSK, 16QAM	Full RB
PEAK TO AVERAGE RATIO	23755 to 23825	23755, 23790, 23825	5MHz	16QAM	Full RB
	23780 to 23800	23780, 23790, 23800	10MHz	16QAM	Full RB
BAND EDGE	23755 to 23825	23755, 23825	5MHz	QPSK,	1 RB/ 0,24 RB Offest Full RB
	23780 to 23800	23780, 23800	10MHz	QPSK,	1 RB/ 0,49 RB Offest Full RB
CONDCUDED EMISSION	23755 to 23825	23755, 23790, 23825	5MHz	QPSK,	1 RB, 0 RB Offest
	23780 to 23800	23780, 23790, 23800	10MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	23755 to 23825	23755, 23790, 23825	5MHz	16QAM	1 RB, 24 RB Offest

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## 5 MEASUREMENT UNCERTAINTY

Test Items	Uncertainty
RF Power Output	+/- 1.10 dB
ERP/ 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 : <b>Vertical</b> )	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 : <b>Horizontal</b> )	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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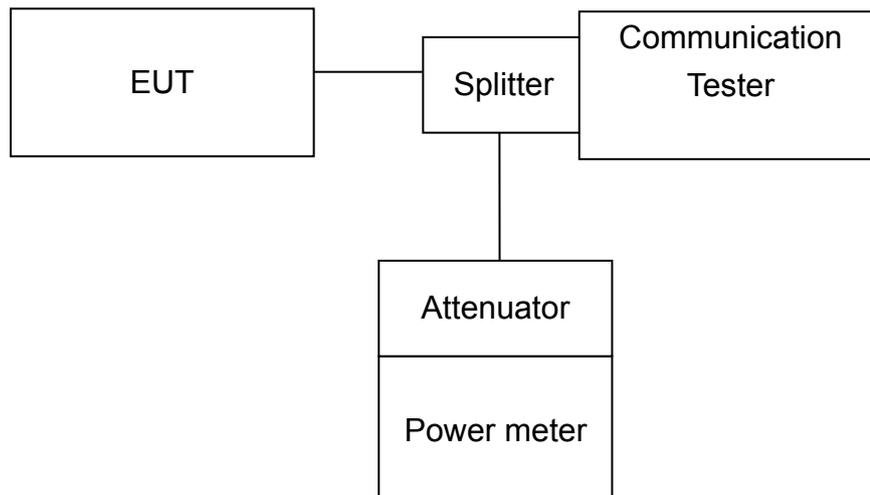
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## 6 RF CONDUCTED OUTPUT POWER MEASUREMENT

### 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, (WCDMA/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

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2017	02/10/2018
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	01/03/2017	01/02/2018

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## 6.5 Measurement Result

### RF Conducted Output Power

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

EUT Mode	Frequency (MHz)	CH	Average Burst Power (1DN 1UP) Class 8 (dBm)
cGSM 850	824.2	128	32.74
	836.6	190	32.79
	848.8	251	<b>32.89</b>
GSM 1900	1850.2	512	<b>30.07</b>
	1880.0	661	29.78
	1909.8	810	29.95

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 850	824.2	128	<b>32.74</b>	30.33	28.37	27.11
	836.6	190	32.79	30.62	28.53	27.16
	848.8	251	32.89	30.61	28.61	27.35
GPRS 1900	1850.2	512	<b>30.07</b>	27.91	25.99	24.51
	1880.0	661	29.78	27.79	25.87	24.37
	1909.8	810	29.95	28.04	25.7	24.26

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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 V8.4.0 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:**

EUT Mode		WCDMA Band V	HSDPA Band V	HSUPA Band V
Frequency (MHz)	CH	Avg. Power (dBm)	Avg. Power (dBm)	Avg. Power (dBm)
826.4	4132	<b>23.61</b>	22.55	22.58
836.6	4183	22.55	<b>22.62</b>	<b>22.73</b>
846.6	4233	22.58	22.54	22.55

**LTE Result:**

**LTE Band 17**

LTE Band 17_Uplink frequency band : 704 to 716 MHz								
BW (MHz)	RB Size	RB Offset	Conducted power(dBm)					
			QPSK			16QAM		
			Channel I (Low) 37775	Channel I (Mid) 38000	Channel I (High) 38225	Channel I (Low) 37775	Channel I (Mid) 38000	Channel I (High) 38225
5	1	0	22.79	22.79	22.77	22.35	<b>22.38</b>	22.15
	1	24	22.98	23.03	<b>23.04</b>	22.36	22.31	22.31
	12	6	21.99	21.98	22.04	20.97	20.93	21.14
	25	0	21.99	21.96	21.97	20.96	21.01	20.98

LTE Band 17_Uplink frequency band : 704 to 716 MHz								
BW (MHz)	RB Size	RB Offset	Conducted power(dBm)					
			QPSK			16QAM		
			Channel (Low) 37800	Channel (Mid) 38000	Channel (High) 38200	Channel (Low) 37800	Channel (Mid) 38000	Channel (High) 38200
10	1	0	22.69	22.78	22.91	22.02	21.92	22.11
	1	49	<b>23.08</b>	22.98	23.03	<b>22.58</b>	22.18	22.34
	25	12	22.08	22.01	22.00	21.08	20.99	20.98
	50	0	22.03	22.03	21.97	21.08	20.99	21.00

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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 V8.4.0 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 V8.4.0. RMC 12.2kps is used for this testing.

### HSDPA SUB-TEST Setting

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

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$ (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			Power Class 3 Lim- itation (dBm)	Comments
		4132	4183	4233		
HSDPA (B5)	1	22.55	22.62	22.54	20.3dBm – 25.7dBm	Pass
	2	22.6	22.66	22.58	20.3dBm – 25.7dBm	Pass
	3	22.13	22.17	22.05	19.8dBm – 25.7dBm	Pass
	4	22.15	22.2	22.04	19.8dBm – 25.7dBm	Pass

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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 V8.4.0 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 V8.4.0. RMC 12.2kps is used for this testing

### HSPA SUB-TEST Setting

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

Sub-test	$\beta_c$	$\beta_d$	$\beta_d$ (SF)	$\beta_c/\beta_d$	$\beta_{HS}$	$\beta_{ec}$	$\beta_{ed}$	$\beta_{ed}$ (SF)	$\beta_{ed}$ (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	$\beta_{ed1}: 47/15$ $\beta_{ed2}: 47/15$	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			Power Class 3 Limitation (dBm)	Comments
		4132	4183	4233		
HSUPA(B5)	1	22.58	22.73	22.55	18.8dBm – 25.7dBm	Pass
	2	22.12	22.18	22.07	16.8dBm – 25.7dBm	Pass
	3	22.60	22.69	22.54	17.8dBm – 25.7dBm	Pass
	4	22.56	22.61	22.50	16.8dBm – 25.7dBm	Pass
	5	22.66	22.69	22.53	18.8dBm – 25.7dBm	Pass

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## Minimum Communications Power Measurement

### PCS 1900 band

PCL	0	1	2	3	4	5	6	7	8
Output power (dBm)	29.37	27.42	25.67	23.55	21.89	19.91	18.22	16.09	14.09

PCL	9	10	11	12	13	14	15
Output power (dBm)	12.1	10.08	8.02	6.05	4.09	2	-0.02

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

### WCDMA/HSDPA/HSUPA band V

The EUT output power was controlled by simulator. Set Communication Tester [MT8820C](#) function key "UE Power Control" and enter max rated power 24dBm. The EUT is going to be set to max output power to 24dBm. Then record the read (see page 15 for measurement data). The min. power was measures by a function key "minimum power" then record the read. It is -52.3dBm. The power variation can be 0.1dB step by setting.

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## 7 EFFECTIVE RADIATED POWER AND EQUIVALENT ISOTROPIC RADIATED POWER MEASUREMENT

### 7.1 Standard Applicable

According to FCC §2.1046

FCC 22.913(a) Mobile station is limited to 7W ERP.

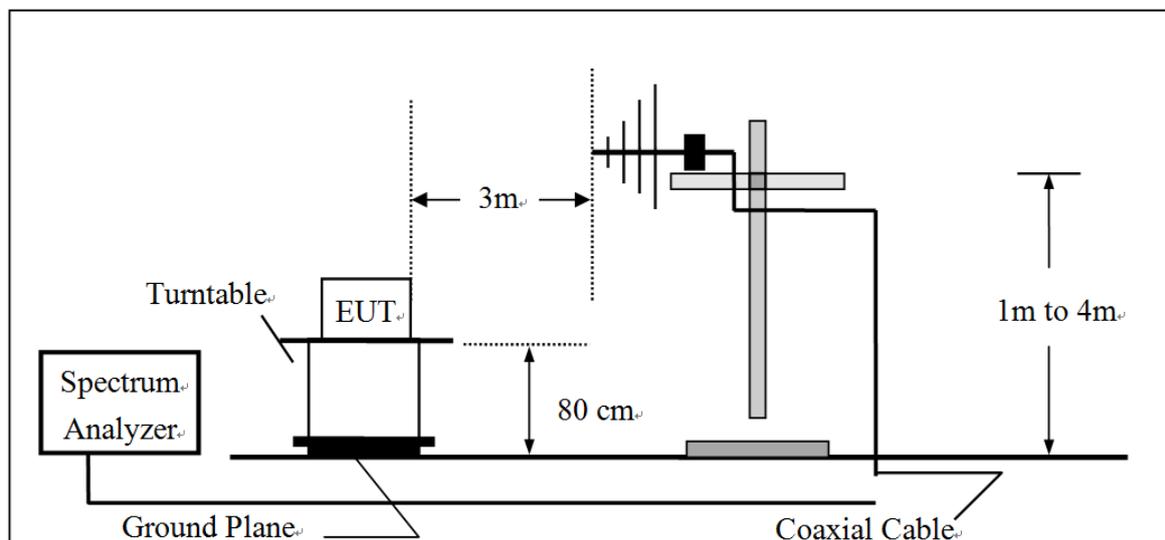
FCC 24.232(c) Mobile and portable stations are limited to 2 W EIRP.

FCC 27, 50(h)(2) Mobile and other user stations. Mobile stations are limited to 2 W EIRP

FCC 27, 50(C)(10) Portable stations (hand-held devices) are limited to 3 W EIRP

### 7.2 Test SET-UP

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

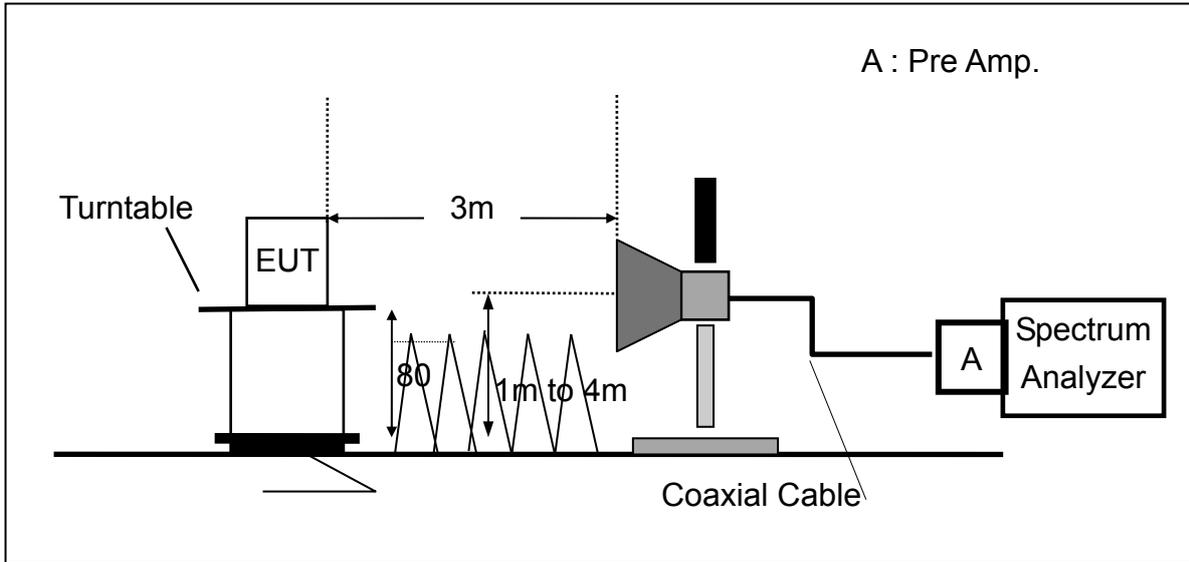


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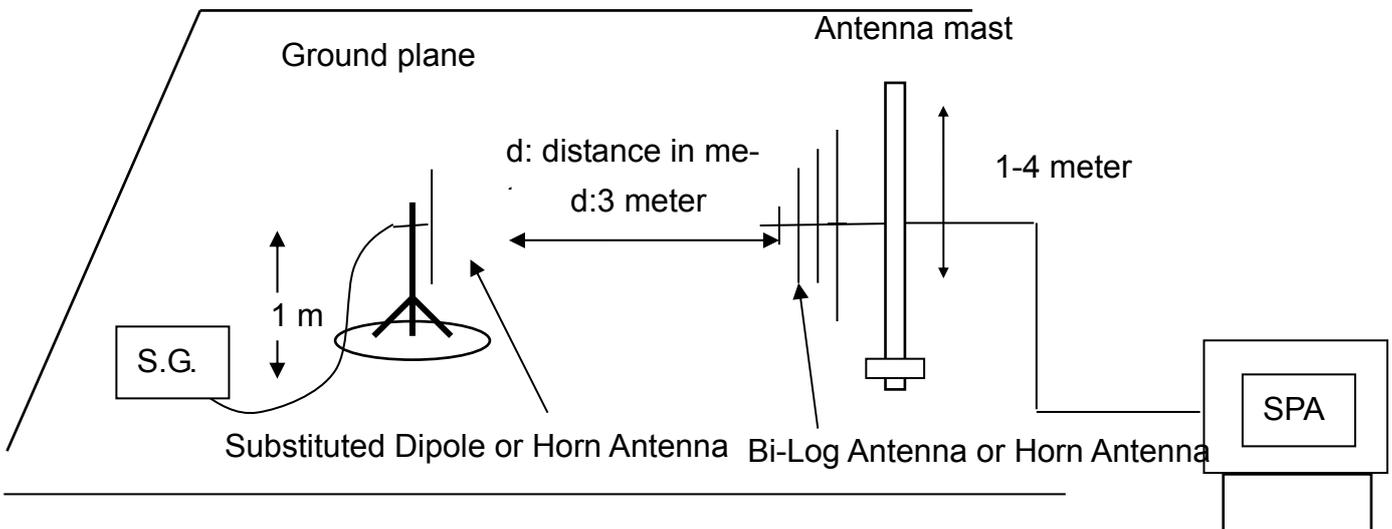
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(B) Radiated Power Test Set-UP Frequency Over 1 GHz



(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. ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)
7. ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)
8. 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 > =3xRBW.
  - (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 ≈ 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\*10<sup>-3</sup> = 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\*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

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2017	09/19/2018
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/04/2017	08/03/2018
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2017	01/02/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/03/2017	01/02/2018
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2017	02/10/2018
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	01/03/2017	01/02/2018

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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	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
GSM 850	824.2	128	V	19.75	3.31	-2.92	20.13	38.45
			H	22.97	3.31	-2.92	<b>23.35</b>	38.45
	836.6	190	V	19.69	3.29	-2.96	20.02	38.45
			H	22.56	3.29	-2.96	22.89	38.45
	848.8	251	V	18.93	3.27	-3.00	19.19	38.45
			H	22.09	3.27	-3.00	22.36	38.45
GPRS 850	824.2	128	V	17.52	3.31	-2.92	17.90	38.45
			H	18.92	3.31	-2.92	<b>19.30</b>	38.45
	836.6	190	V	17.72	3.29	-2.96	18.04	38.45
			H	18.86	3.29	-2.96	19.18	38.45
	848.8	251	V	17.56	3.27	-3.00	17.83	38.45
			H	18.78	3.27	-3.00	19.05	38.45

**Remark: 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	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
GSM 1900	1850.2	512	V	18.06	9.94	-4.46	<b>23.54</b>	33.00
			H	11.57	9.94	-4.46	17.05	33.00
	1880.0	661	V	16.82	10.03	-4.51	22.35	33.00
			H	12.15	10.03	-4.51	17.68	33.00
	1909.8	810	V	17.13	10.13	-4.55	22.71	33.00
			H	12.93	10.13	-4.55	18.50	33.00
GPRS 1900	1850.2	512	V	18.05	9.94	-4.46	<b>23.53</b>	33.00
			H	8.16	9.94	-4.46	13.64	33.00
	1880.0	661	V	16.96	10.03	-4.51	22.48	33.00
			H	9.04	10.03	-4.51	14.57	33.00
	1909.8	810	V	17.49	10.13	-4.55	23.06	33.00
			H	9.61	10.13	-4.55	15.19	33.00

**Remark: 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	ERP	Limit
	MHz		V/H	dBm	dBd	dB	dBm	dBm
WCDMA Band V	826.4	4132	V	11.90	3.30	-2.93	12.27	38.45
			H	19.65	3.30	-2.93	<b>20.03</b>	38.45
	836.6	4183	V	10.46	3.29	-2.96	10.79	38.45
			H	18.33	3.29	-2.97	18.65	38.45
	846.6	4233	V	10.02	3.27	-2.99	10.30	38.45
			H	17.37	3.27	-3.00	17.64	38.45
HSDPA Band V	826.4	4132	V	10.74	3.30	-2.93	11.12	38.45
			H	19.29	3.30	-2.93	<b>19.66</b>	38.45
	836.6	4183	V	10.94	3.29	-2.97	11.26	38.45
			H	17.97	3.29	-2.96	18.29	38.45
	846.6	4233	V	10.29	3.27	-3.00	10.56	38.45
			H	16.82	3.27	-3.00	17.09	38.45
HSUPA Band V	826.4	4132	V	11.07	3.30	-2.93	11.44	38.45
			H	20.19	3.30	-2.93	<b>20.56</b>	38.45
	836.6	4183	V	11.22	3.29	-2.96	11.55	38.45
			H	19.03	3.29	-2.96	19.35	38.45
	846.6	4233	V	11.33	3.27	-3.00	11.61	38.45
			H	18.09	3.27	-2.99	18.37	38.45

**Remark: The RBW,VBW of SPA for frequency RBW=5 MHz, VBW=8 MHz**

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EUT			Measurement					
Operation Band	Fundamental Frequency MHz	CH	Antenna Pol. V/H	S.G. Output dBm	Antenna Gain dBi	Cable Loss dB	EIRP dBm	Limit dBm
<b>BAND 17 BW: 5M QPSK RB: 1,0</b>	706.5	23755	V	5.37	3.09	-3.03	5.43	34.77
			H	9.95	3.09	-3.03	10.01	34.77
	710.0	23790	V	5.69	3.09	-3.04	5.74	34.77
			H	10.23	3.09	-3.04	<b>10.29</b>	34.77
	713.5	23825	V	5.43	3.10	-3.05	5.49	34.77
			H	10.04	3.10	-3.05	10.09	34.77
<b>BAND 17 BW: 5M QPSK RB: 1,24</b>	706.5	23755	V	5.64	3.10	-3.04	5.69	34.77
			H	10.15	3.10	-3.04	10.21	34.77
	710.0	23790	V	5.56	3.10	-3.05	5.61	34.77
			H	10.42	3.10	-3.05	<b>10.47</b>	34.77
	713.5	23825	V	5.07	3.11	-3.06	5.12	34.77
			H	9.82	3.11	-3.06	9.87	34.77
<b>BAND 17 BW: 5M 16QAM RB: 1,0</b>	706.5	23755	V	5.39	3.09	-3.04	5.45	34.77
			H	9.96	3.09	-3.03	10.01	34.77
	710.0	23790	V	5.86	3.09	-3.04	5.92	34.77
			H	10.44	3.09	-3.04	<b>10.49</b>	34.77
	713.5	23825	V	5.61	3.10	-3.05	5.66	34.77
			H	10.18	3.10	-3.05	10.23	34.77
<b>BAND 17 BW: 5M 16QAM RB: 1,24</b>	706.5	23755	V	5.73	3.10	-3.04	5.78	34.77
			H	10.20	3.10	-3.04	10.26	34.77
	710.0	23790	V	5.74	3.10	-3.05	5.79	34.77
			H	10.49	3.10	-3.05	<b>10.54</b>	34.77
	713.5	23825	V	5.17	3.11	-3.06	5.22	34.77
			H	9.99	3.11	-3.06	10.04	34.77

The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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EUT			Measurement					
Operation Band	Fundamental Frequency MHz	CH	Antenna Pol. V/H	S.G. Output dBm	Antenna Gain dBi	Cable Loss dB	EIRP dBm	Limit dBm
<b>BAND 17 BW: 10M QPSK RB: 1,0</b>	709.0	23780	V	4.71	3.09	-3.03	4.77	34.77
			H	9.41	3.09	-3.03	9.47	34.77
	710.0	23790	V	5.08	3.09	-3.03	5.13	34.77
			H	9.74	3.09	-3.03	9.79	34.77
	711.0	23800	V	5.14	3.09	-3.04	5.19	34.77
			H	9.76	3.09	-3.04	<b>9.81</b>	34.77
<b>BAND 17 BW: 10M QPSK RB: 1,49</b>	709.0	23780	V	5.01	3.11	-3.06	5.06	34.77
			H	9.91	3.11	-3.06	<b>9.96</b>	34.77
	710.0	23790	V	4.94	3.11	-3.06	4.99	34.77
			H	9.91	3.11	-3.06	<b>9.96</b>	34.77
	711.0	23800	V	4.62	3.11	-3.06	4.66	34.77
			H	9.58	3.11	-3.06	9.62	34.77
<b>BAND 17 BW: 10M 16QAM RB: 1,0</b>	709.0	23780	V	4.67	3.09	-3.04	4.73	34.77
			H	9.33	3.09	-3.04	9.38	34.77
	710.0	23790	V	5.09	3.09	-3.03	5.15	34.77
			H	9.71	3.09	-3.03	9.77	34.77
	711.0	23800	V	5.14	3.09	-3.04	5.2	34.77
			H	9.83	3.09	-3.04	<b>9.89</b>	34.77
<b>BAND 17 BW: 10M 16QAM RB: 1,49</b>	709.0	23780	V	5.12	3.11	-3.06	5.17	34.77
			H	10.07	3.11	-3.06	<b>10.12</b>	34.77
	710.0	23790	V	5.03	3.11	-3.06	5.08	34.77
			H	9.95	3.11	-3.06	10	34.77
	711.0	23800	V	4.7	3.11	-3.06	4.75	34.77
			H	9.67	3.11	-3.06	9.71	34.77

The RBW,VBW of SPA for frequency RBW= 8MHz , VBW= 8MHz

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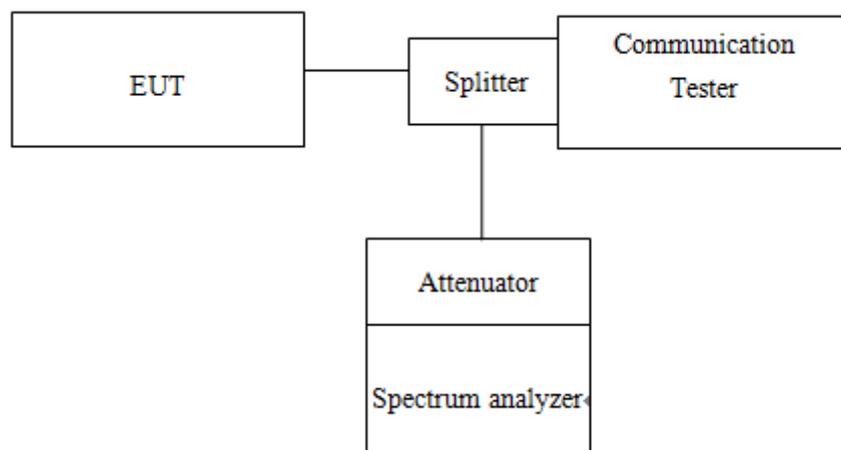
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## 8 OCCUPIED BANDWIDTH MEASUREMENT

### 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%.

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#### 8.4 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2017	02/10/2018
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	01/03/2017	01/02/2018

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### 8.5 Measurement Result

Freq. (MHz)	CH	99% BW (MHz)	99% BW (MHz)	26 dB BW (MHz)	26 dB BW (MHz)
		GSM 850	GPRS 850	GSM 850	GPRS 850
824.2	128	0.24460	0.24293	0.3206	0.3179
836.6	190	<b>0.24466</b>	0.24476	<b>0.3211</b>	0.3124
848.8	251	0.24182	<b>0.24492</b>	0.3128	<b>0.3183</b>

Freq. (MHz)	CH	99% BW (MHz)	99% BW (MHz)	26 dB BW (MHz)	26 dB BW (MHz)
		GSM 1900	GPRS 1900	GSM 1900	GPRS 1900
1850.2	512	0.24560	0.24416	<b>0.3205</b>	0.3093
1880.0	661	<b>0.24644</b>	0.24186	0.3149	0.3204
1909.8	810	0.24240	<b>0.24742</b>	0.3160	<b>0.3230</b>

Freq. (MHz)	CH	99% BW (MHz)	99% BW (MHz)	99% BW (MHz)	26 dB BW (MHz)	26 dB BW (MHz)	26 dB BW (MHz)
		WCDMA V	HSDPA V	HSUPA V	WCDMA V	HSDPA V	HSUPA V
826.40	4132	4.1245	4.1205	<b>4.1429</b>	<b>4.6960</b>	4.6760	4.6780
836.60	4183	4.1354	4.1308	4.1290	4.6900	<b>4.6860</b>	4.6760
846.60	4233	<b>4.1489</b>	<b>4.1387</b>	4.1425	4.6870	4.6850	<b>4.6850</b>

Freq. (MHz)	CH	99% BW (MHz)	99% BW (MHz)	26 dB BW (MHz)	26 dB BW (MHz)
		QPSK	16QAM	QPSK	16QAM
706.5	23755	4.5070	4.5100	5.004	4.993
710.0	23790	<b>4.5075</b>	<b>4.5149</b>	<b>5.008</b>	4.969
713.5	23825	4.5070	4.5057	5.000	<b>5.001</b>

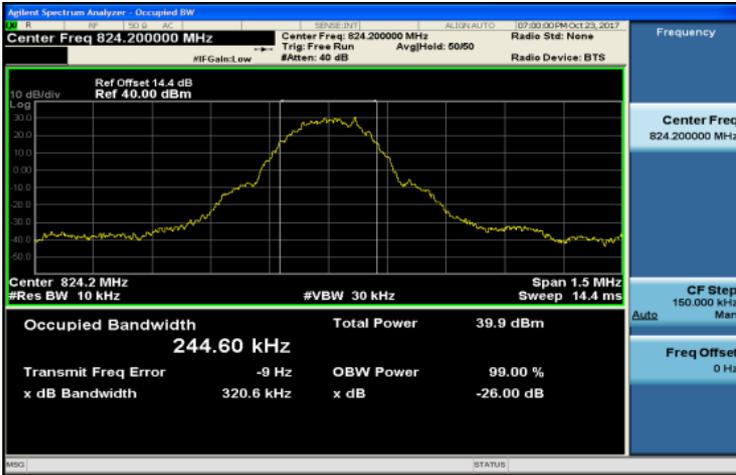
Freq. (MHz)	CH	99% BW (MHz)	99% BW (MHz)	26 dB BW (MHz)	26 dB BW (MHz)
		QPSK	16QAM	QPSK	16QAM
709.0	23780	<b>9.0273</b>	<b>8.9859</b>	9.830	<b>9.813</b>
710.0	23790	9.0256	8.9798	9.824	9.794
711.0	23780	9.0206	8.9764	<b>9.845</b>	9.796

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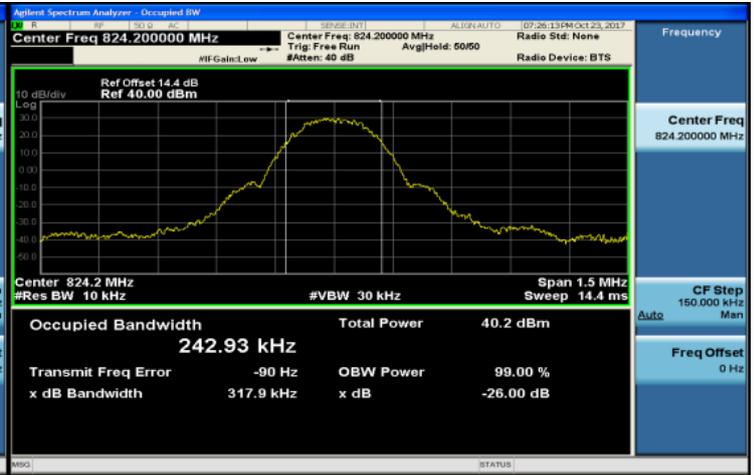
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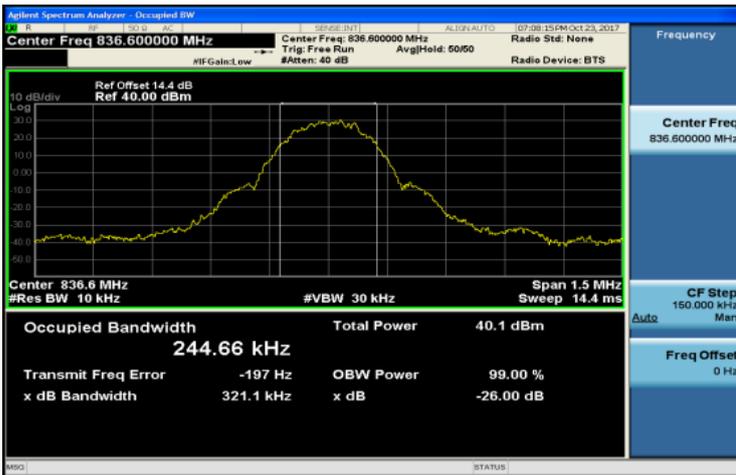
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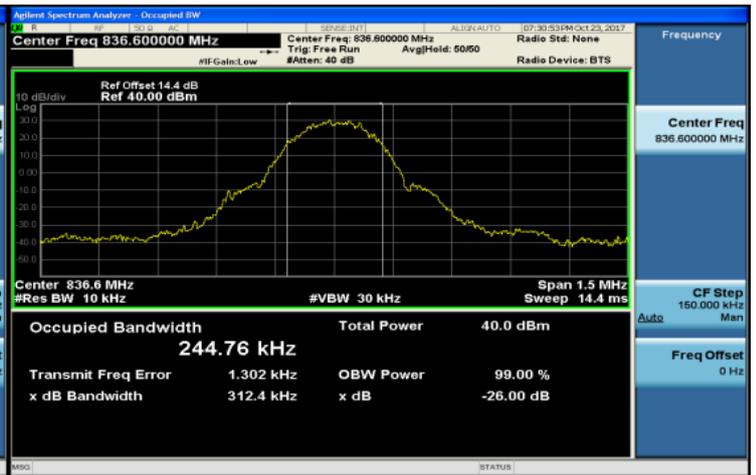
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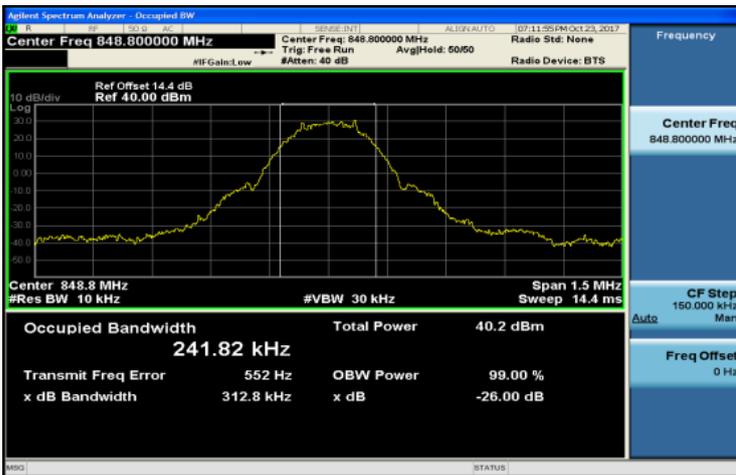
GSM\_850MHz\_MidCH190-836.6



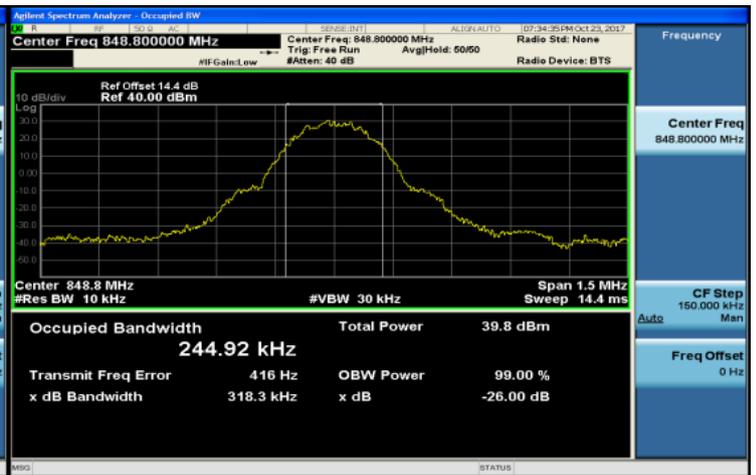
GPRS\_850MHz\_MidCH190-836.6



GSM\_850MHz\_HighCH251-848.8



GPRS\_850MHz\_HighCH251-848.8



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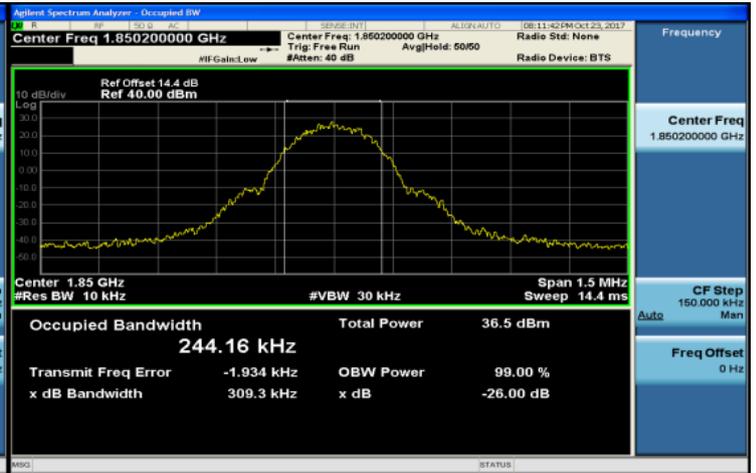
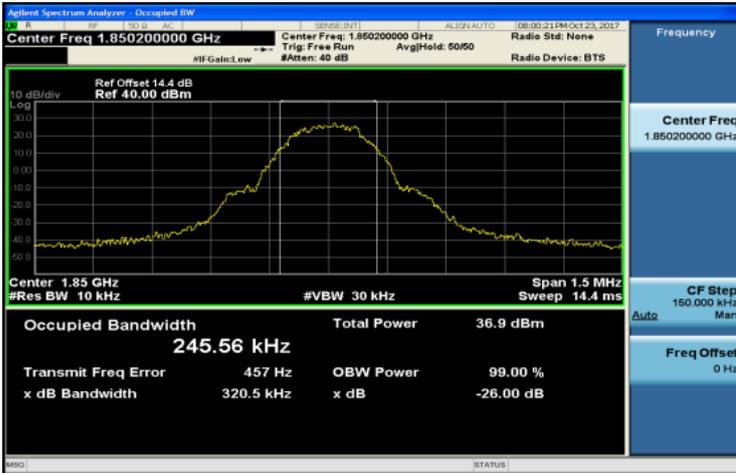
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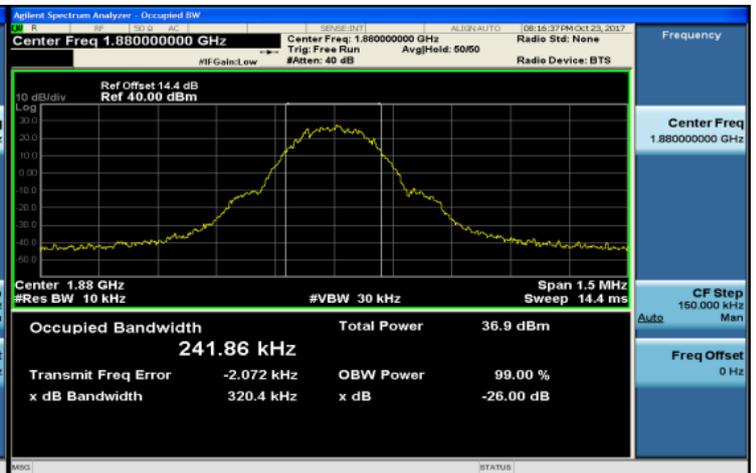
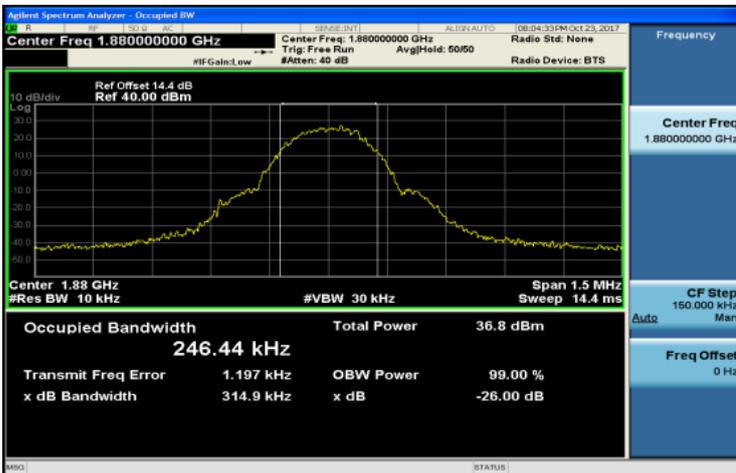
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GPRS\_1900MHz\_LowCH512-1850.2



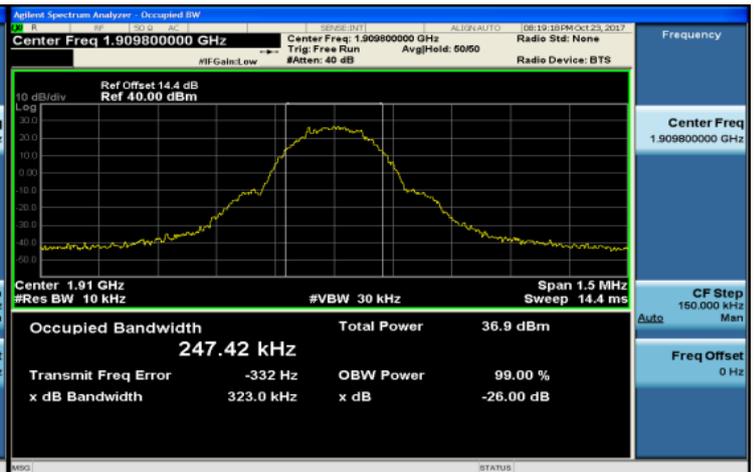
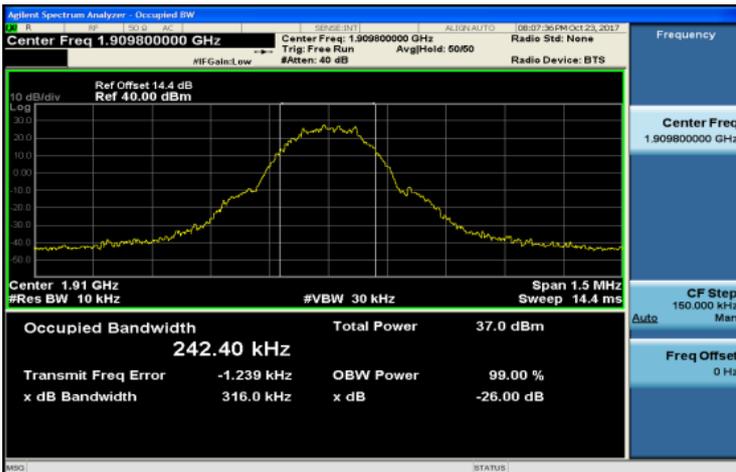
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GPRS\_1900MHz\_MidCH661-1880



GPRS\_1900MHz\_HighCH810-1909.8

GPRS\_1900MHz\_HighCH810-1909.8



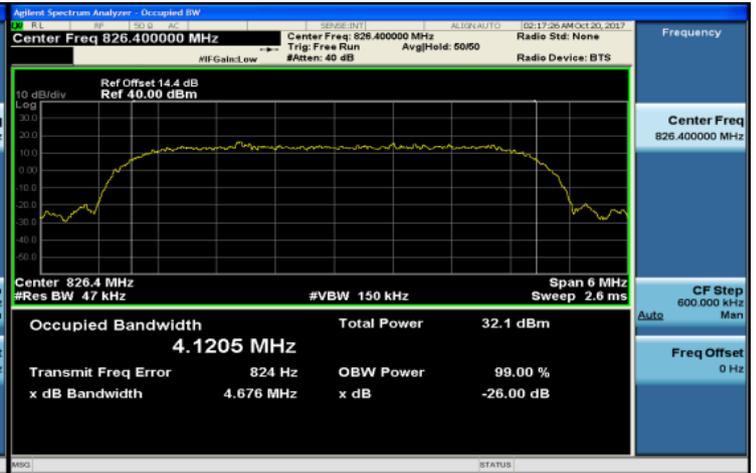
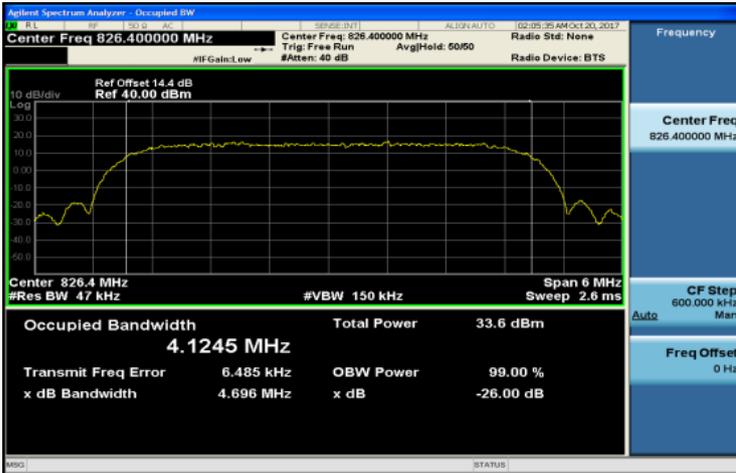
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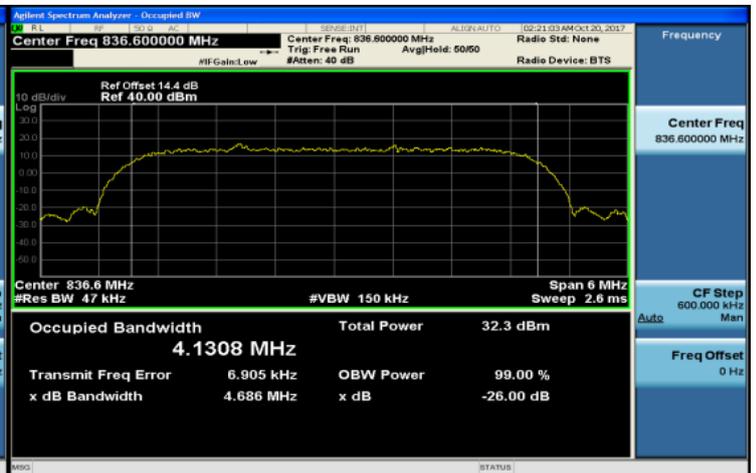
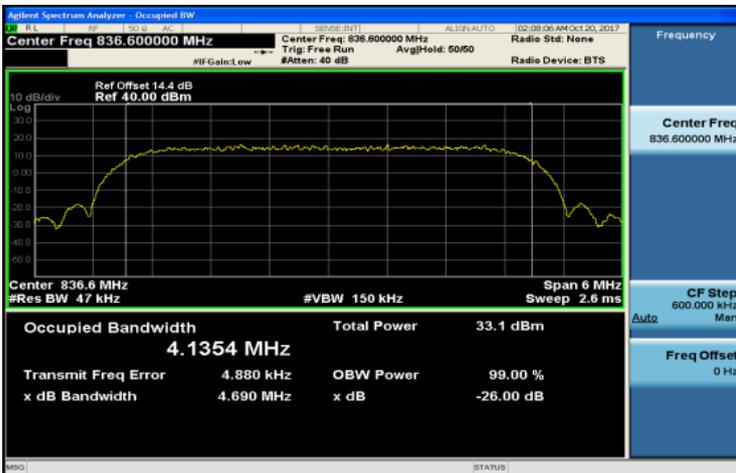
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HSDPA\_B5\_LowCH4132-826.4



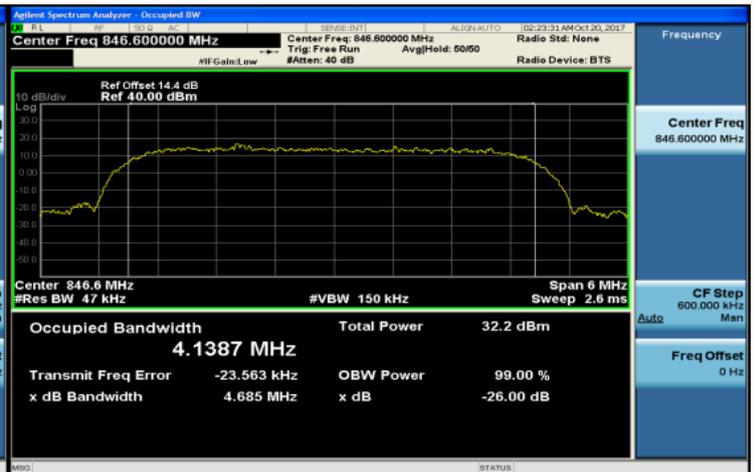
WCDMA\_B5\_MidCH4183-836.6

HSDPA\_B5\_MidCH4183-836.6



WCDMA\_B5\_HighCH4233-846.6

HSDPA\_B5\_HighCH4233-846.6

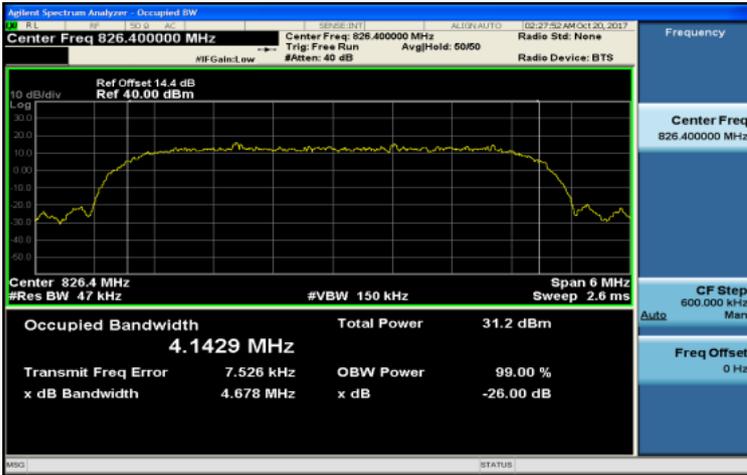


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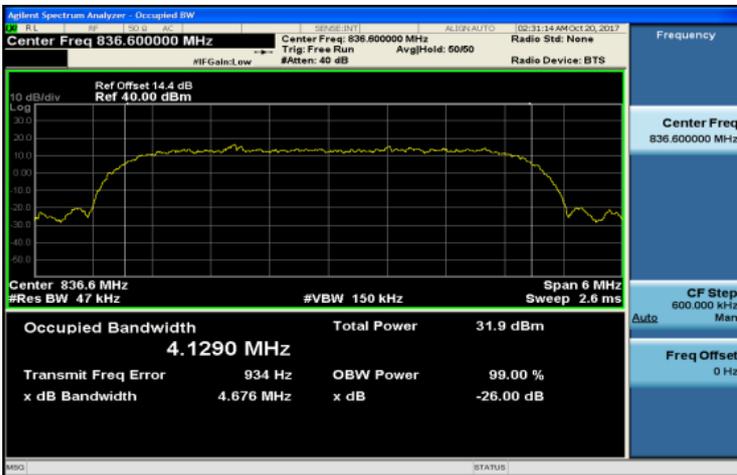
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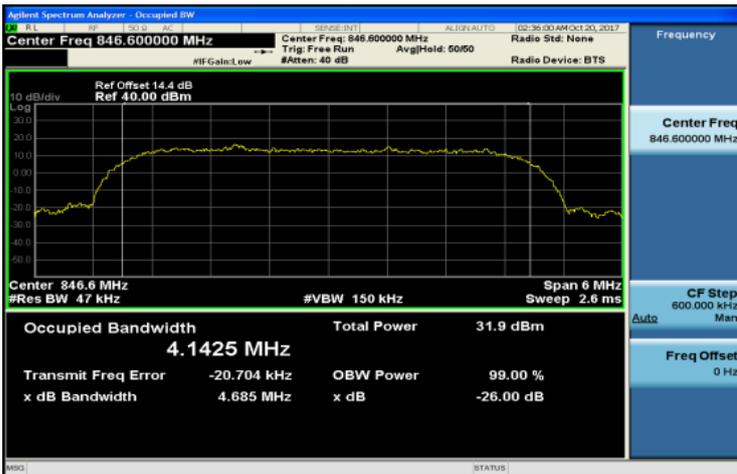
HSUPA\_B5\_LowCH4132-826.4



HSUPA\_B5\_MidCH4183-836.6



HSUPA\_B5\_HighCH4233-846.6

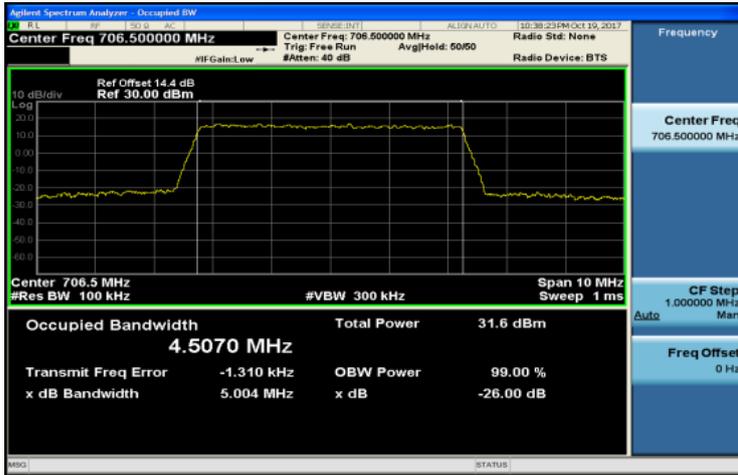


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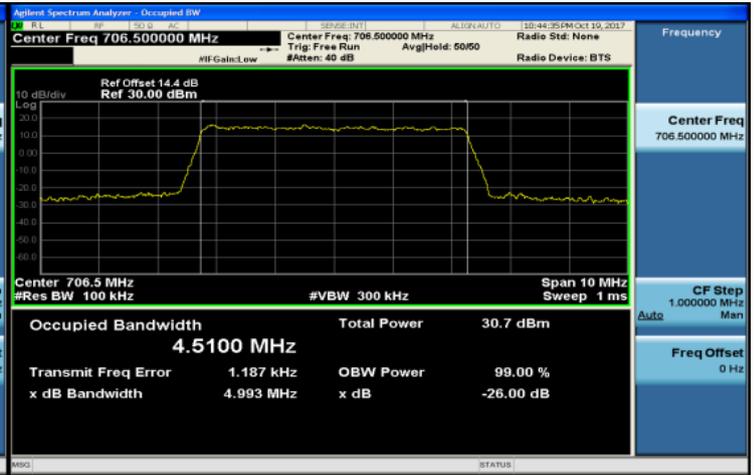
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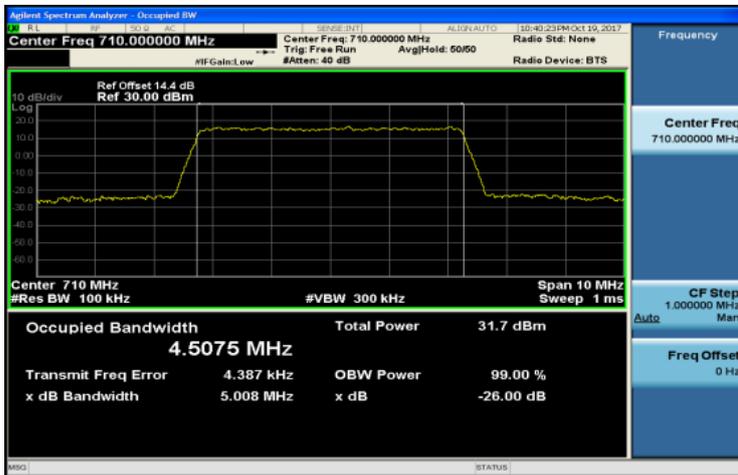
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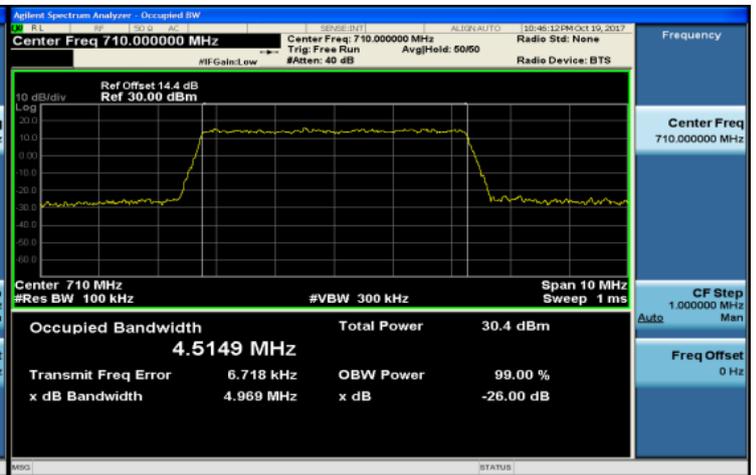
Band17\_5MHz\_16QAM\_25\_0\_LowCH23755-706.5



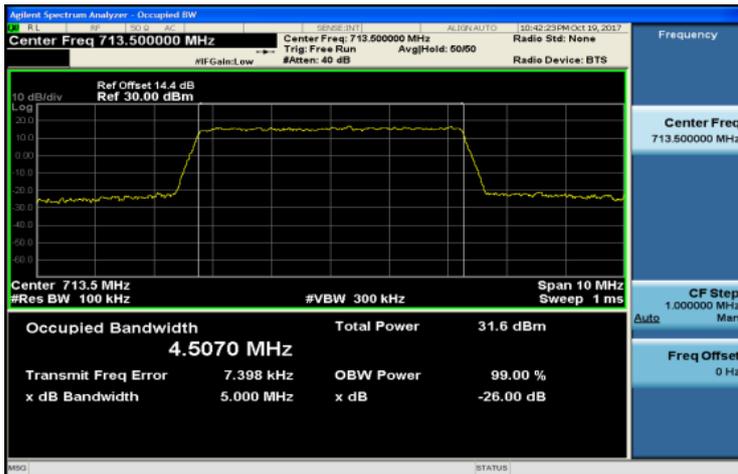
Band17\_5MHz\_QPSK\_25\_0\_MidCH23790-710



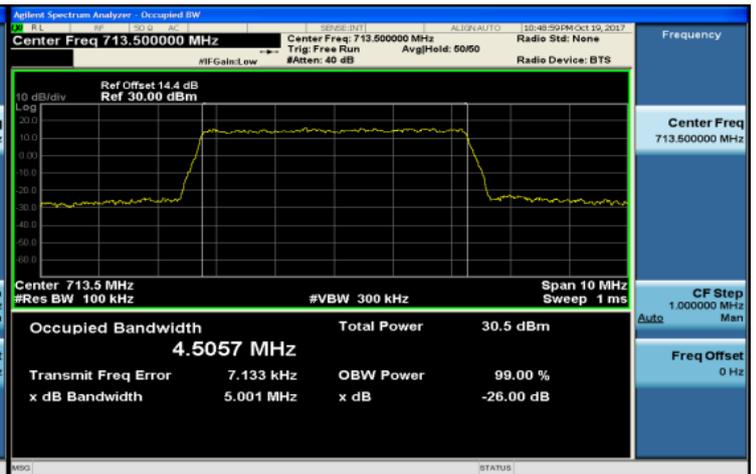
Band17\_5MHz\_16QAM\_25\_0\_MidCH23790-710



Band17\_5MHz\_QPSK\_25\_0\_HighCH23825-713.5



Band17\_5MHz\_16QAM\_25\_0\_HighCH23825-713.5

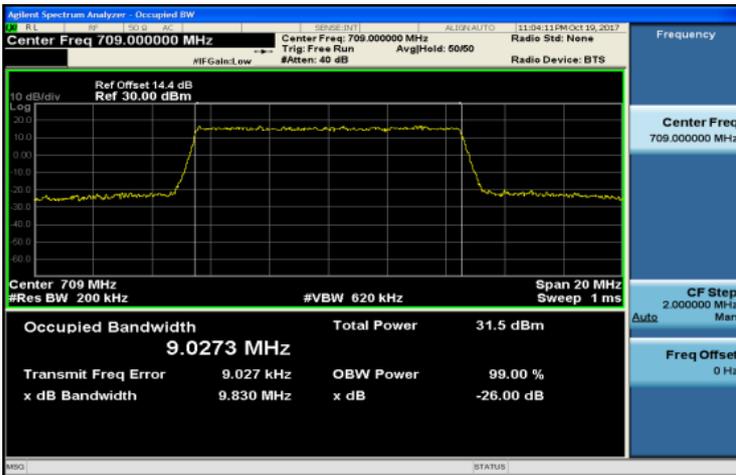


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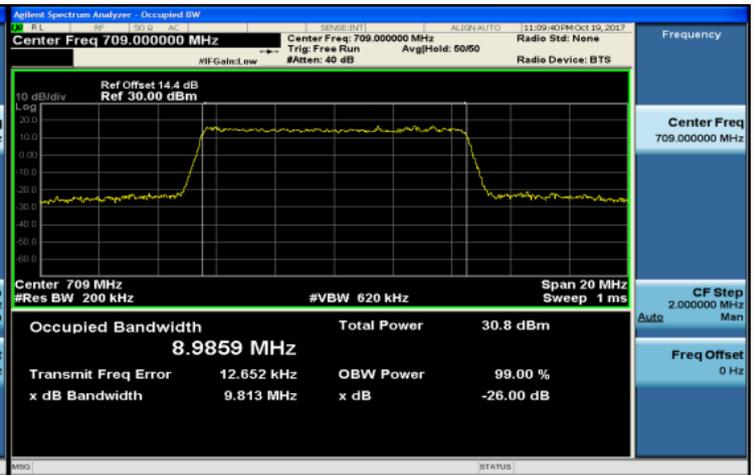
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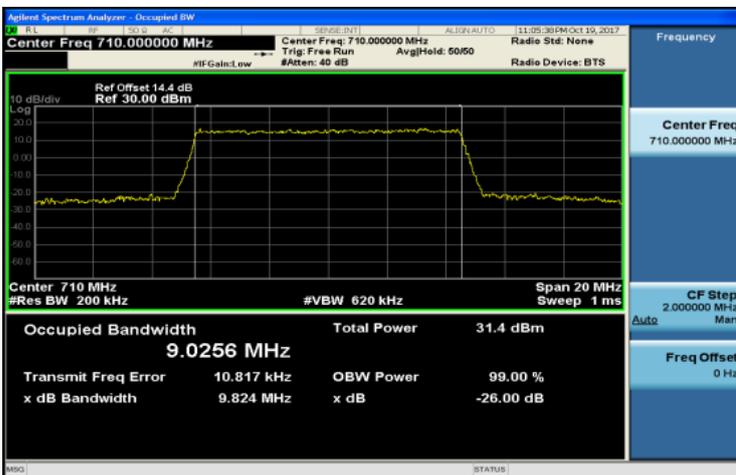
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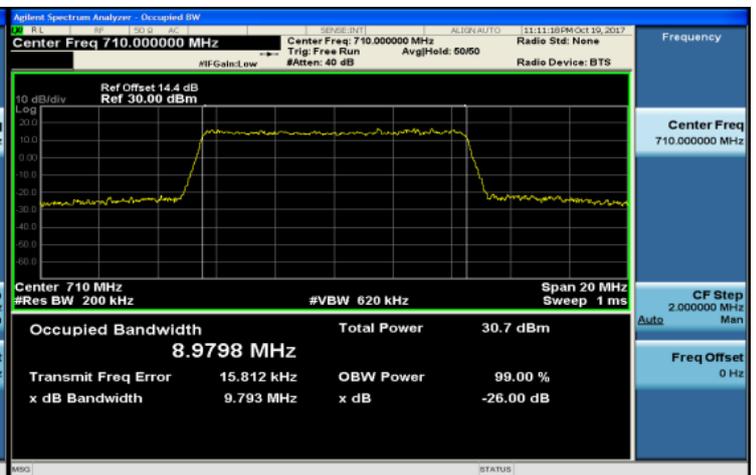
Band17\_10MHz\_16QAM\_50\_0\_LowCH23780-709



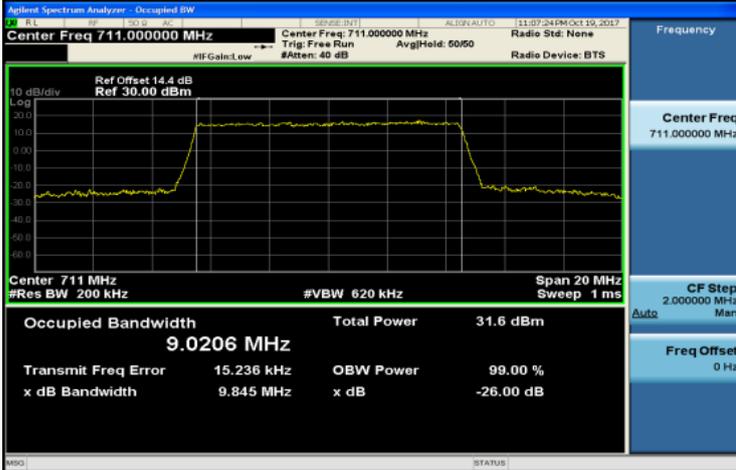
Band17\_10MHz\_QPSK\_50\_0\_MidCH23790-710



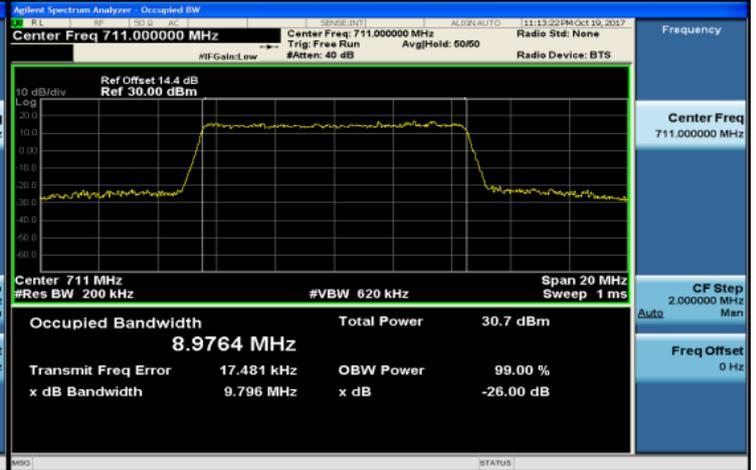
Band17\_10MHz\_16QAM\_50\_0\_MidCH23790-710



Band17\_10MHz\_QPSK\_50\_0\_HighCH23800-711



Band17\_10MHz\_16QAM\_50\_0\_HighCH23800-711



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## 9 OUT OF BAND EMISSION AT ANTENNA TERMINALS

### 9.1 Standard Applicable

FCC §22.917(a), §24.238(a), §27.53(h), *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.

#### FCC §27.53(g)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

#### FCC §27.53(h) (3)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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## FCC §27.53(m) (4)

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

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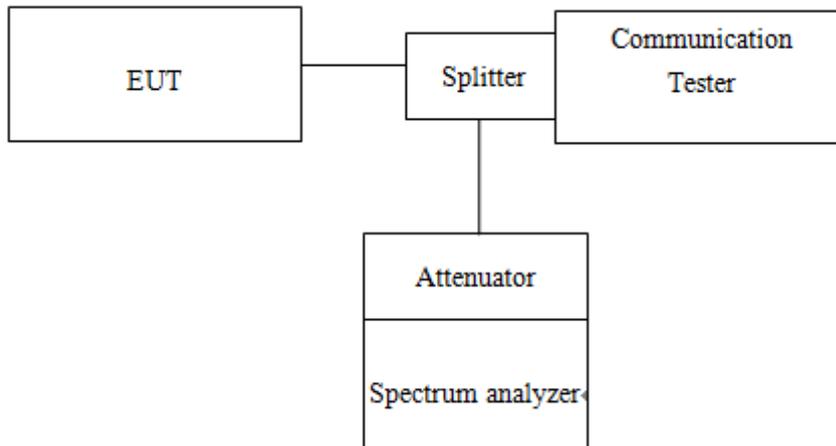
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## 9.2 Test SET-UP



## 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

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HU-BER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2017	02/10/2018
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	01/03/2017	01/02/2018

#### 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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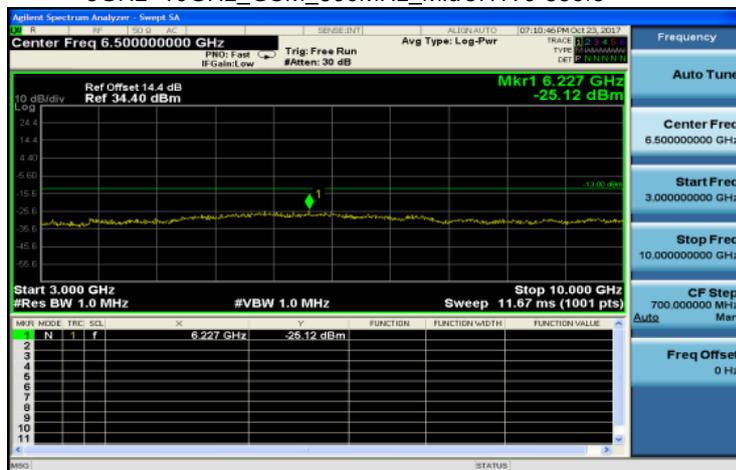
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30MHz~3GHz\_GSM\_850MHz\_LowCH128-824.2



3GHz~10GHz\_GSM\_850MHz\_MidCH190-836.6



3GHz~10GHz\_GSM\_850MHz\_LowCH128-824.2



30MHz~3GHz\_GSM\_850MHz\_HighCH251-848.8



30MHz~3GHz\_GSM\_850MHz\_MidCH190-836.6



3GHz~10GHz\_GSM\_850MHz\_HighCH251-848.8



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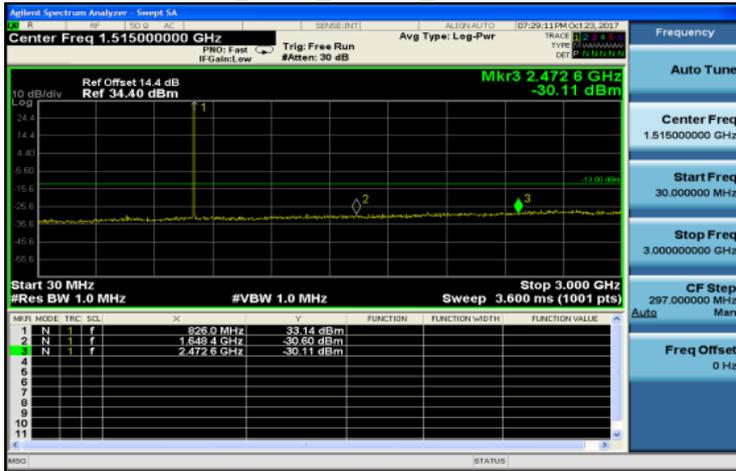
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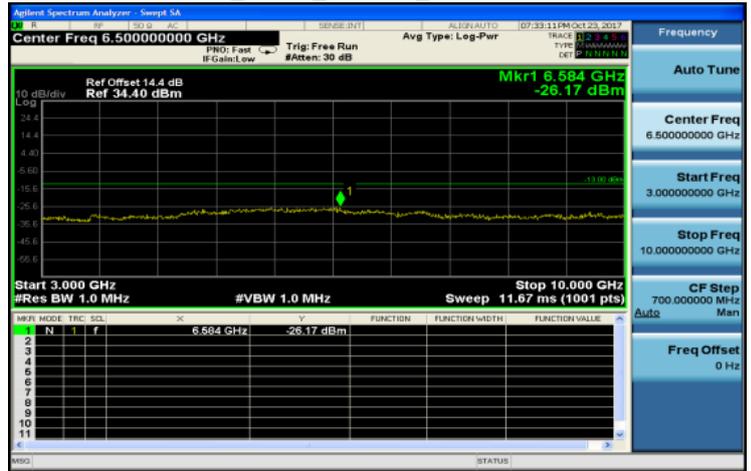
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30MHz~3GHz\_GPRS\_850MHz\_LowCH128-824.2



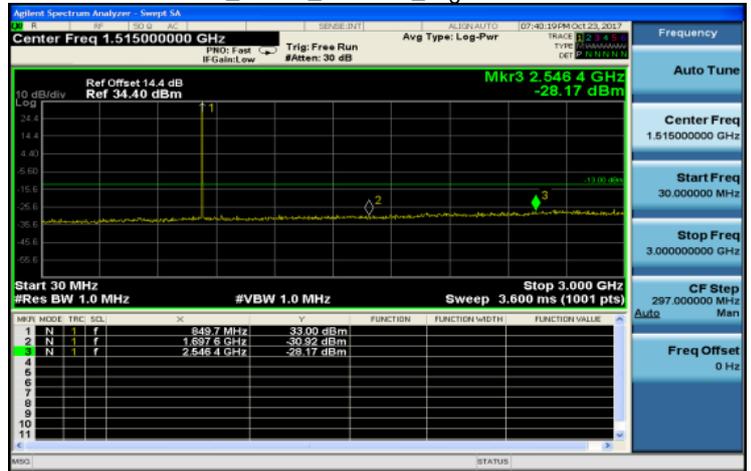
3GHz~10GHz\_GPRS\_850MHz\_MidCH190-836.6



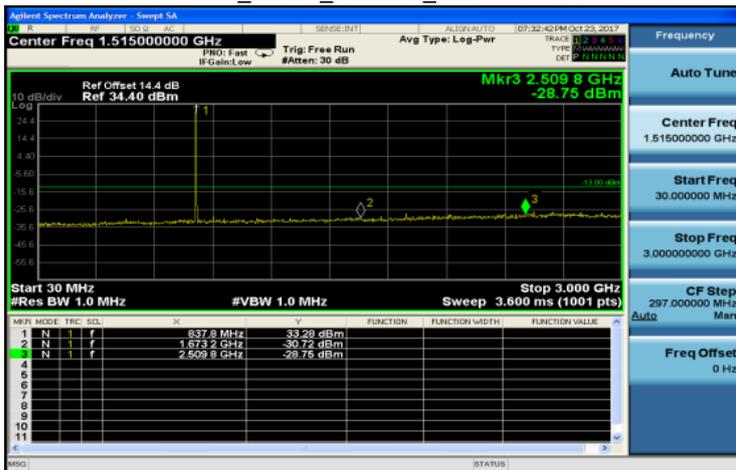
3GHz~10GHz\_GPRS\_850MHz\_LowCH128-824.2



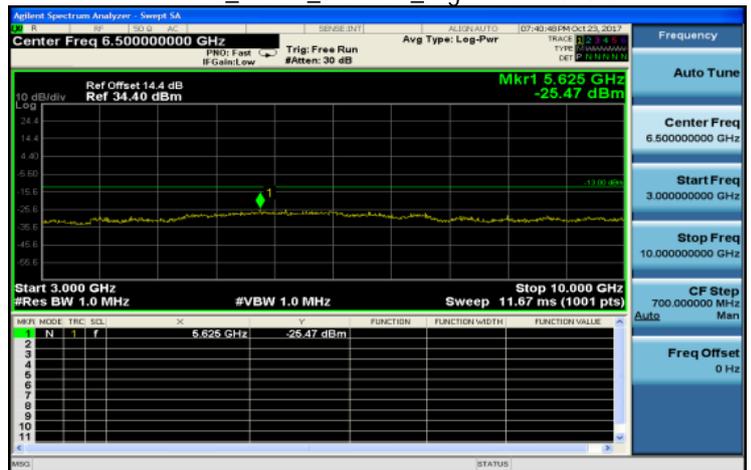
30MHz~3GHz\_GPRS\_850MHz\_HighCH251-848.8



30MHz~3GHz\_GPRS\_850MHz\_MidCH190-836.6



3GHz~10GHz\_GPRS\_850MHz\_HighCH251-848.8

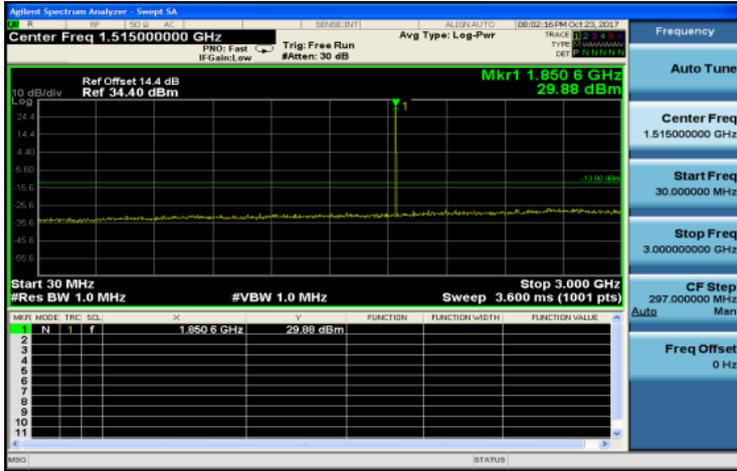


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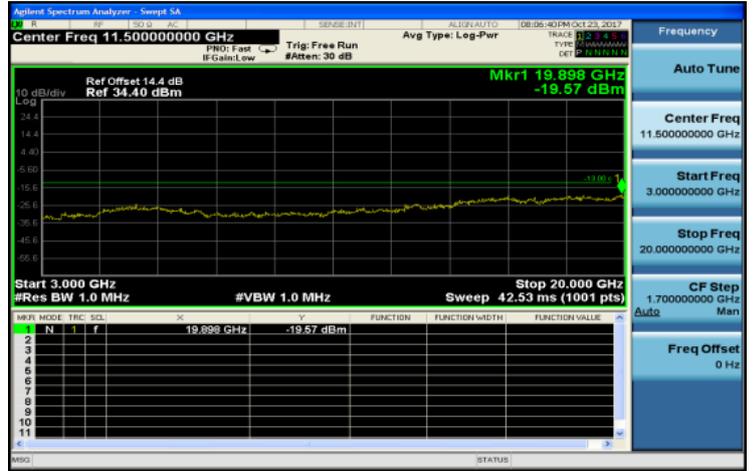
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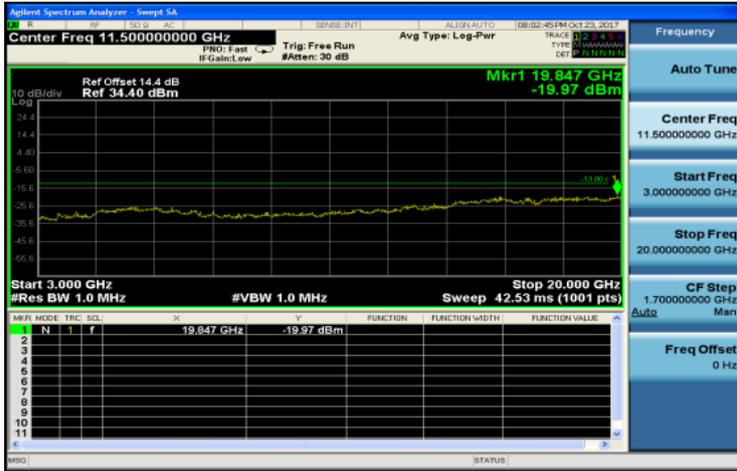
30MHz-3GHz\_GSM\_1900MHz\_LowCH512-1850.2



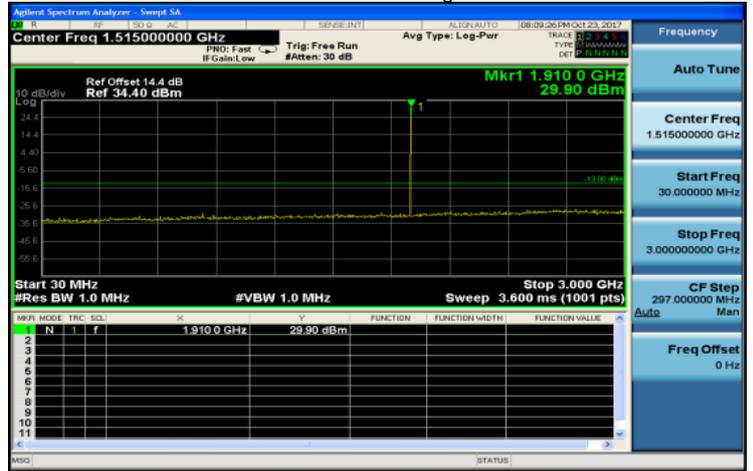
3GHz-10GHz\_GSM\_1900MHz\_MidCH661-1880



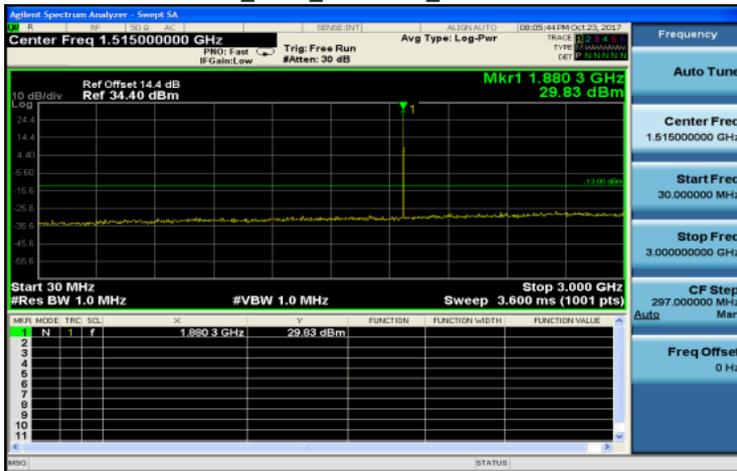
3GHz-10GHz\_GSM\_1900MHz\_LowCH512-1850.2



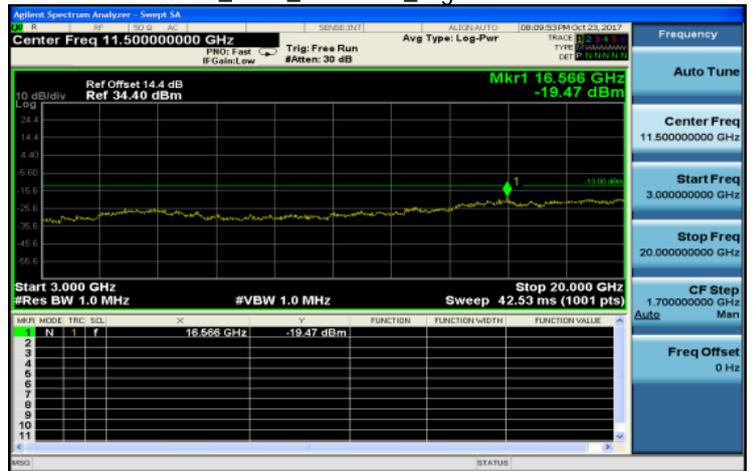
30MHz-3GHz\_GSM\_1900MHz\_HighCH810-1909.8



30MHz-3GHz\_GSM\_1900MHz\_MidCH661-1880



3GHz-10GHz\_GSM\_1900MHz\_HighCH810-1909.8

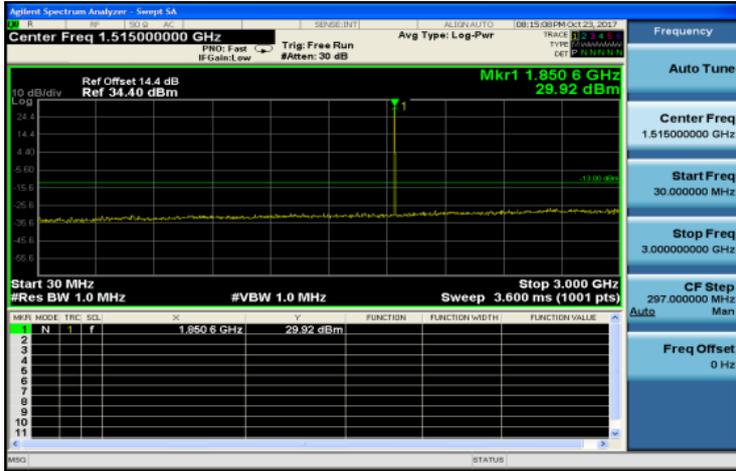


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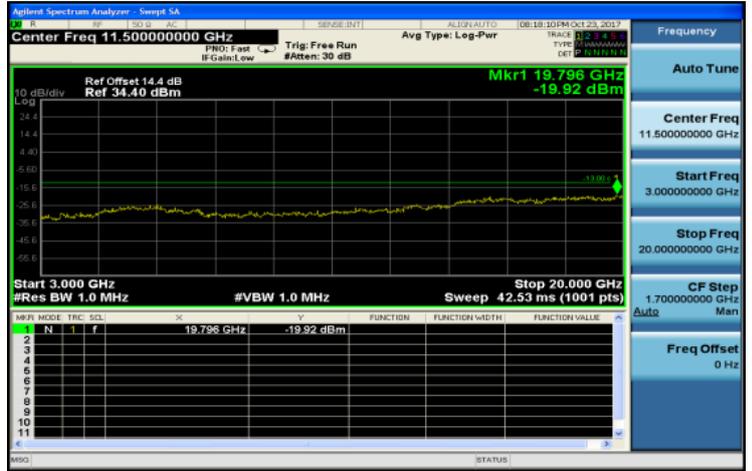
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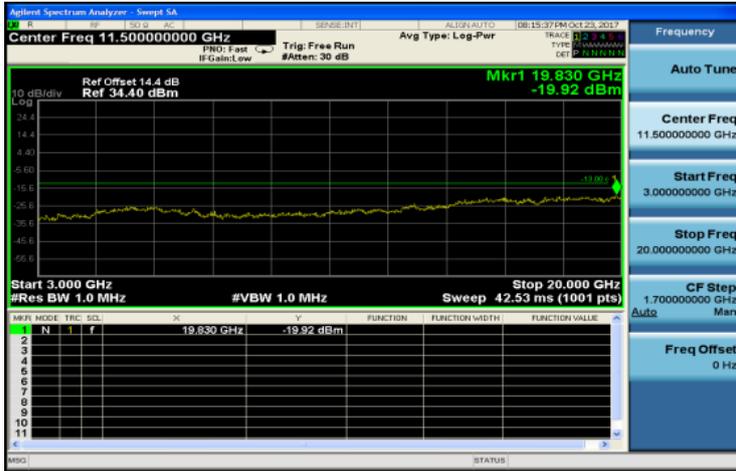
30MHz~3GHz\_GPRS\_1900MHz\_LowCH512-1850.2



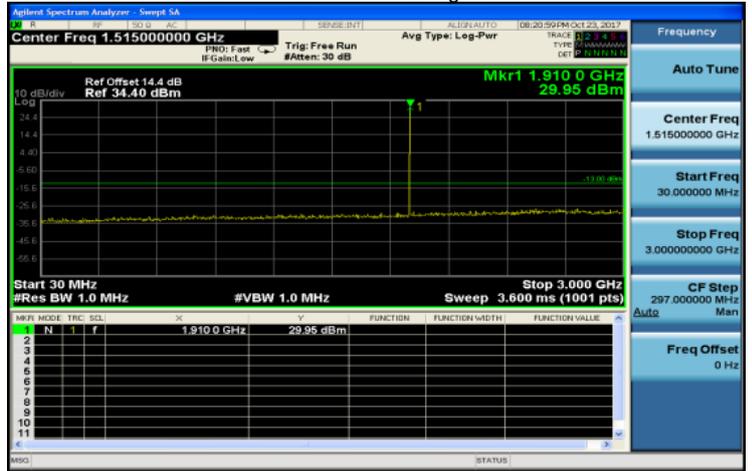
3GHz~10GHz\_GPRS\_1900MHz\_MidCH661-1880



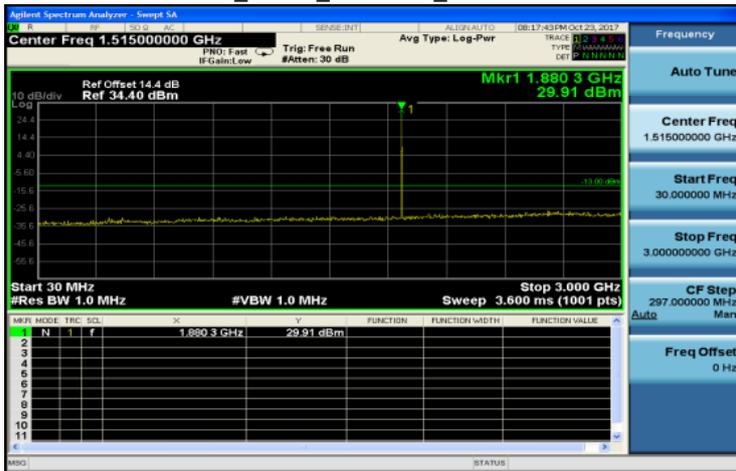
3GHz~10GHz\_GPRS\_1900MHz\_LowCH512-1850.2



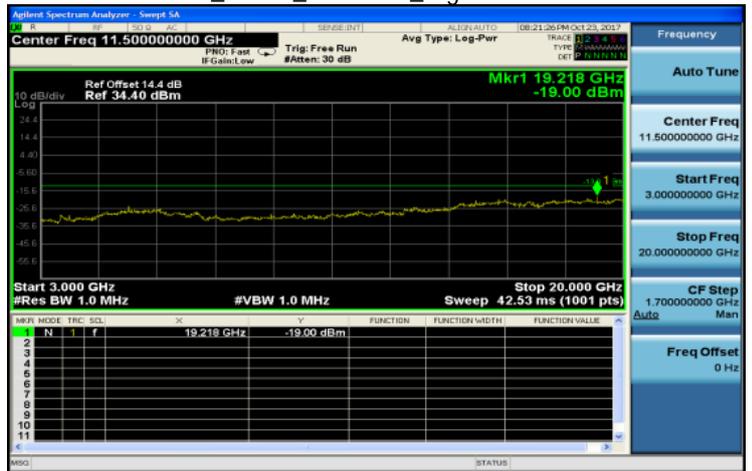
30MHz~3GHz\_GPRS\_1900MHz\_HighCH810-1909.8



30MHz~3GHz\_GPRS\_1900MHz\_MidCH661-1880



3GHz~10GHz\_GPRS\_1900MHz\_HighCH810-1909.8



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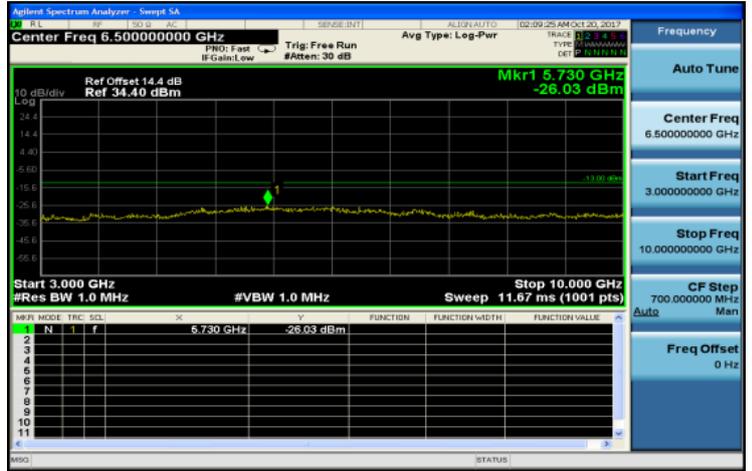
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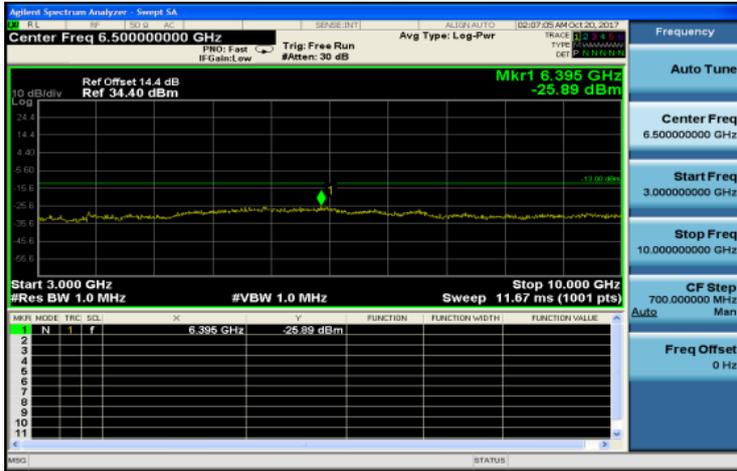
30MHz~3GHz\_WCDMA\_B5\_LowCH4132-826.4



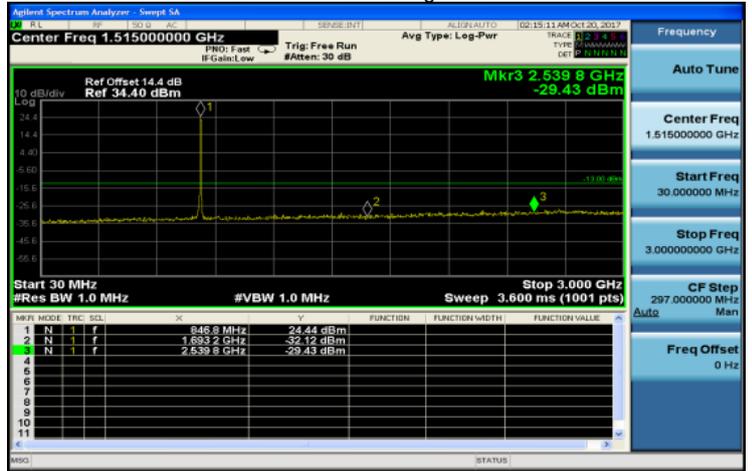
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3GHz~10GHz\_WCDMA\_B5\_LowCH4132-826.4



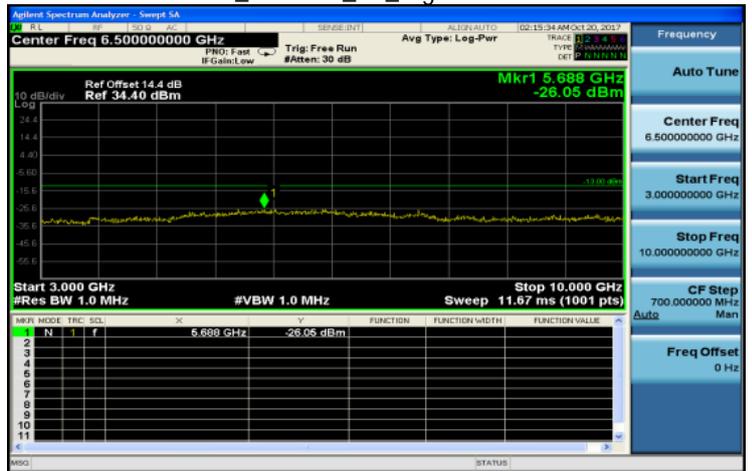
30MHz~3GHz\_WCDMA\_B5\_HighCH4233-846.6



30MHz~3GHz\_WCDMA\_B5\_MidCH4183-836.6



3GHz~10GHz\_WCDMA\_B5\_HighCH4233-846.6



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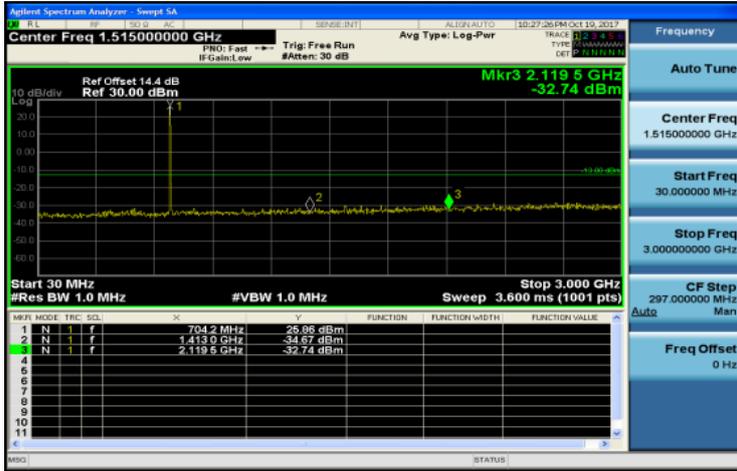
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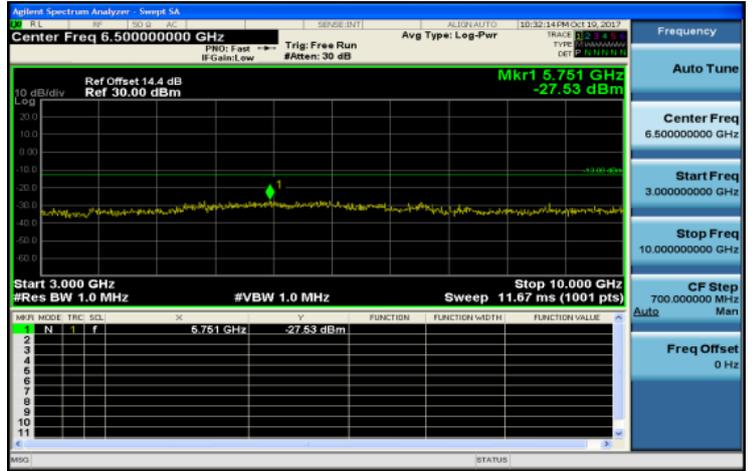
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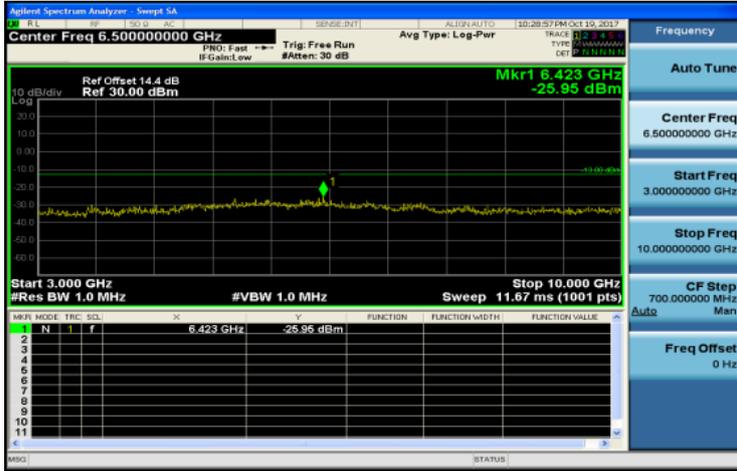
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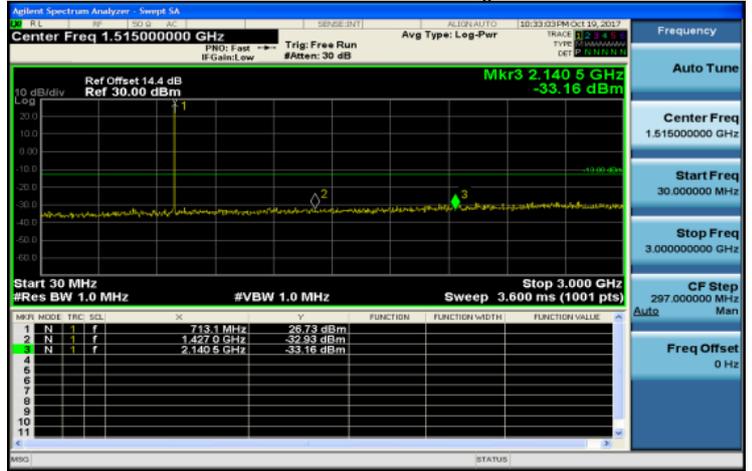
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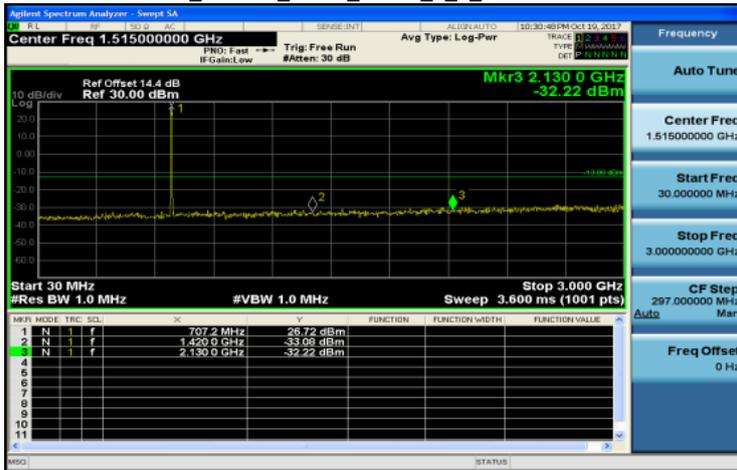
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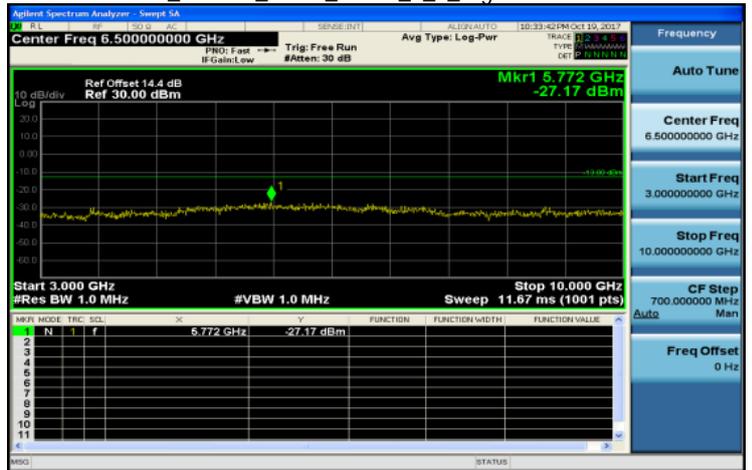
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30MHz-3GHz\_Band17\_5MHz\_QPSK\_1\_0\_MidCH23790-710



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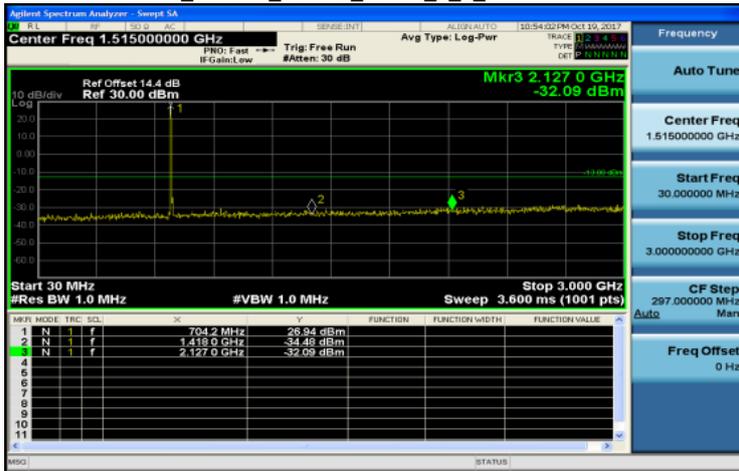


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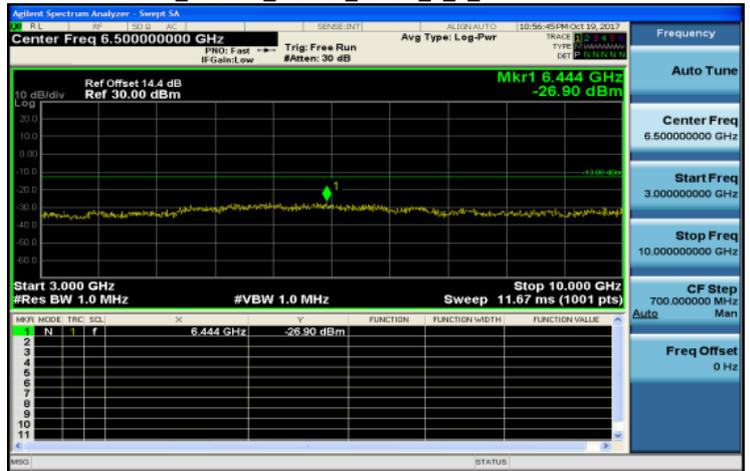
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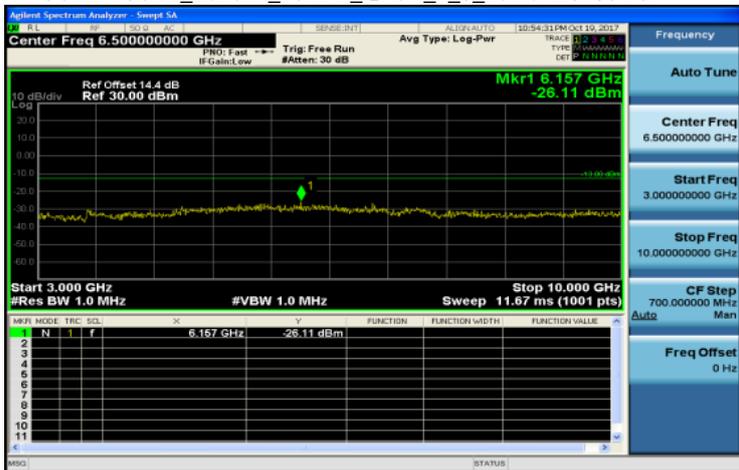
30MHz-3GHz\_Band17\_10MHz\_QPSK\_1\_0\_LowCH23780-709



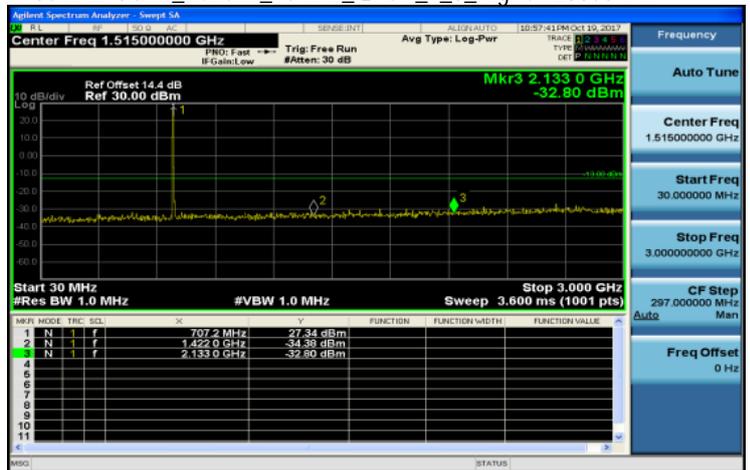
3GHz-10GHz\_Band17\_10MHz\_QPSK\_1\_0\_MidCH23790-710



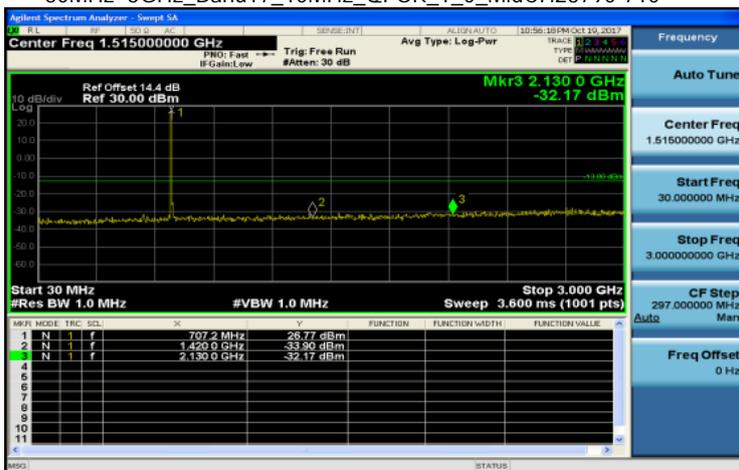
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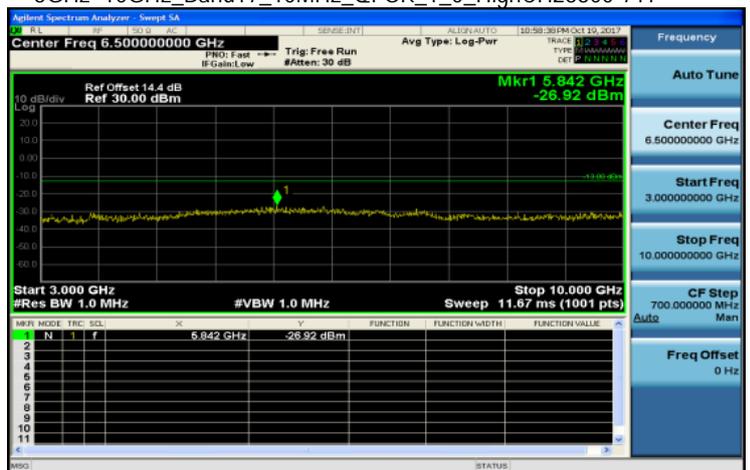
30MHz-3GHz\_Band17\_10MHz\_QPSK\_1\_0\_HighCH23800-711



30MHz-3GHz\_Band17\_10MHz\_QPSK\_1\_0\_MidCH23790-710



3GHz-10GHz\_Band17\_10MHz\_QPSK\_1\_0\_HighCH23800-711



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Band Edge\_GSM\_850MHz\_LowCH128-824.2



Band Edge\_GPRS\_850MHz\_LowCH128-824.2



Band Edge\_GSM\_850MHz\_HighCH251-848.8



Band Edge\_GPRS\_850MHz\_HighCH251-848.8



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Band Edge\_GPRS\_1900MHz\_LowCH512-1850.2



Band Edge\_GSM\_1900MHz\_HighCH810-1909.8



Band Edge\_GPRS\_1900MHz\_HighCH810-1909.8



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Band Edge\_WCDMA\_B5\_LowCH4132-826.4



Band Edge\_WCDMA\_B5\_HighCH4233-846.6



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Band Edge\_Band17\_5MHz\_QPSK\_1\_0\_LowCH23755-706.5



Band Edge\_Band17\_5MHz\_QPSK\_25\_0\_HighCH23825-713.5



Band Edge\_Band17\_5MHz\_QPSK\_1\_24\_HighCH23825-713.5



Band Edge\_Band17\_10MHz\_QPSK\_1\_0\_LowCH23780-709



Band Edge\_Band17\_5MHz\_QPSK\_25\_0\_LowCH23755-706.5



Band Edge\_Band17\_10MHz\_QPSK\_1\_49\_HighCH23800-711



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Band Edge\_Band17\_10MHz\_QPSK\_50\_0\_LowCH23780-709

Band Edge\_Band17\_10MHz\_QPSK\_50\_0\_HighCH23800-711



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## 10 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

### 10.1 Standard Applicable

According to FCC §2.1053,

FCC §22.917(a) , §24.238(a) , §27.53 (h) , 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).

#### FCC §27.53(g)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

#### FCC §27.53(h) (3)

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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## FCC §27.53(m) (4)

For mobile digital stations, the attenuation factor shall be not less than  $40 + 10 \log (P)$  dB on all frequencies between the channel edge and 5 megahertz from the channel edge,  $43 + 10 \log (P)$  dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and  $55 + 10 \log (P)$  dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than  $43 + 10 \log (P)$  dB on all frequencies between 2490.5 MHz and 2496 MHz and  $55 + 10 \log (P)$  dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees.

Measurement procedure. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 megahertz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed; for mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 MHz). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

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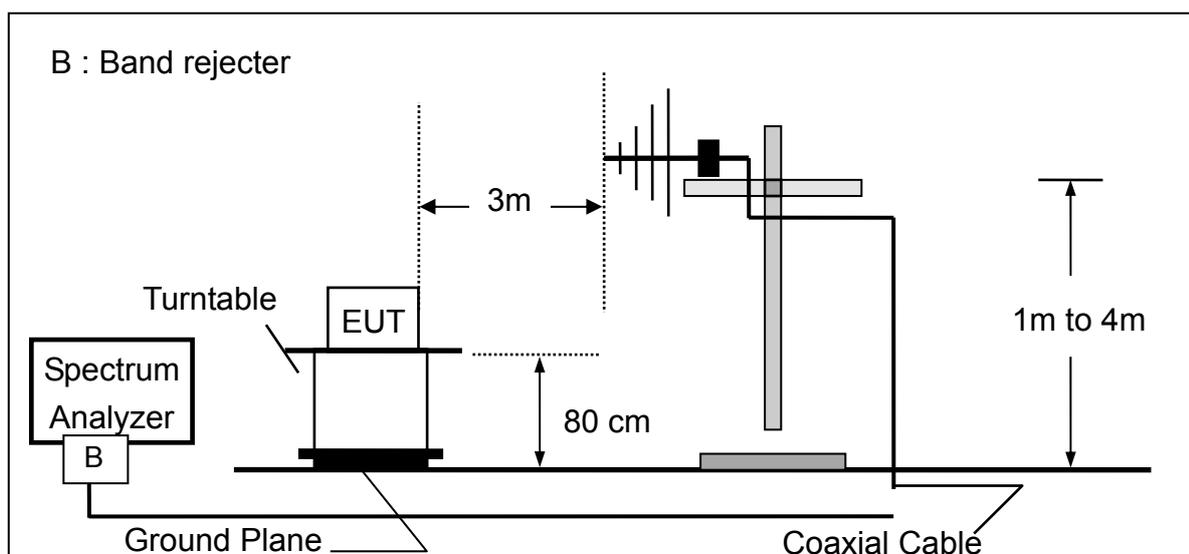
**Table 2 — Unwanted Emissions for Mobile, Portable and Low-Power Fixed Subscriber Equipment**

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	$43 + 10 \log_{10}(p)$ <sup>Note</sup>
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	$43 + 10 \log_{10}(p)$ <sup>Note</sup>
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 5.2 for the permitted frequency ranges for various equipment types.

## 10.2 EUT Setup

### Radiated Emission Test Set-Up, Frequency Below 1000MHz

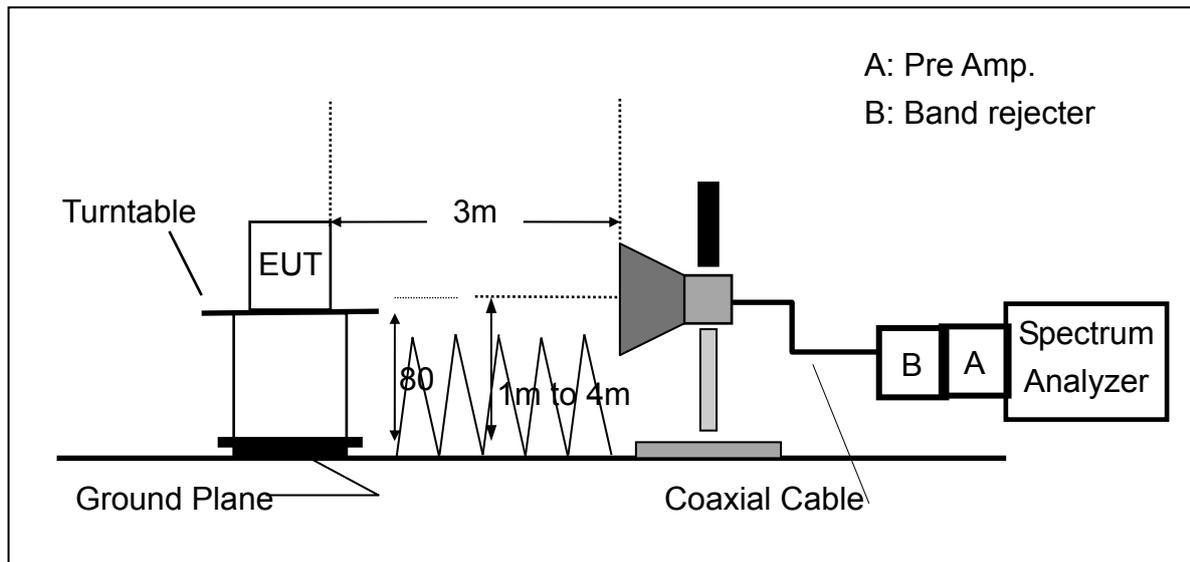


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### Radiated Emission Test Set-UP Frequency Over 1 GHz



### 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.

$$\text{ERP (dBm)} = \text{SG Level(dBm)} + \text{Antenna Gain(dBd)} + \text{Cable Loss(dB)}$$

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

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:

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI Test Receiver	R&S	ESCI7	100760	05/11/2017	05/10/2018
Spectrum Analyzer	Agilent	E4446A	MY51100003	04/25/2017	04/24/2018
Loop Antenna	ETS-Lindgren	6502	148045	09/20/2017	09/19/2018
Bilog Antenna	SCHWAZBECK	VULB9168	378	12/19/2016	12/18/2017
Horn Antenna	Schwarzbeck	BBHA9120D	1441	08/04/2017	08/03/2018
Pre-Amplifier	Agilent	8447D	2944A07676	01/03/2017	01/02/2018
Pre-Amplifier	EMC Instruments Corp.	EMC0126530	980038	01/03/2017	01/02/2018
Turn Table	HD	DT420	N/A	N.C.R	N.C.R
Antenna Tower	ChamPro	AM-BS-4500-B	060776-ABS	N.C.R	N.C.R
Controller	ChamPro	EM1000	60776	N.C.R	N.C.R
Low Loss Cable	Huber Suhner	966_RX	9	01/05/2017	01/04/2018
3m Site NSA	SGS	966 chamber	N/A	07/01/2017	06/30/2018
Low Loss Cable	Huber Suhner	966 TX	1	01/05/2017	01/04/2018
Horn Antenna	Schwarzbeck	BBHA9170	184	12/12/2016	12/11/2017
Pre-Amplifier	EMC Instruments Corp.	EMC184045	980135	01/05/2017	01/04/2018
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2017	02/10/2018
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	01/03/2017	01/02/2018

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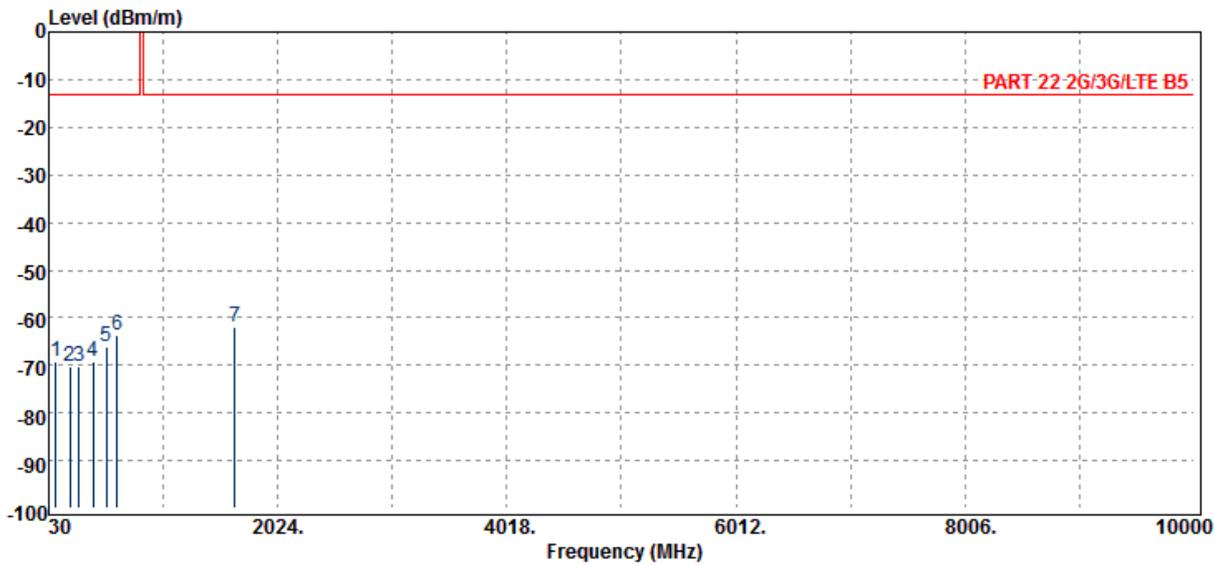
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### 10.5 Measurement Result:

#### Radiated Spurious Emission Measurement Result: GSM850 Mode

Operation Band :GSM 850 Temp./Humi. :24 deg\_C / 61 RH  
 Fundamental Frequency :824.2 MHz Engineer :Tin  
 Operation Mode :Tx CH LOW  
 EUT Pol. :E2 Plane Measurement Pol. Antenna :VERTICAL



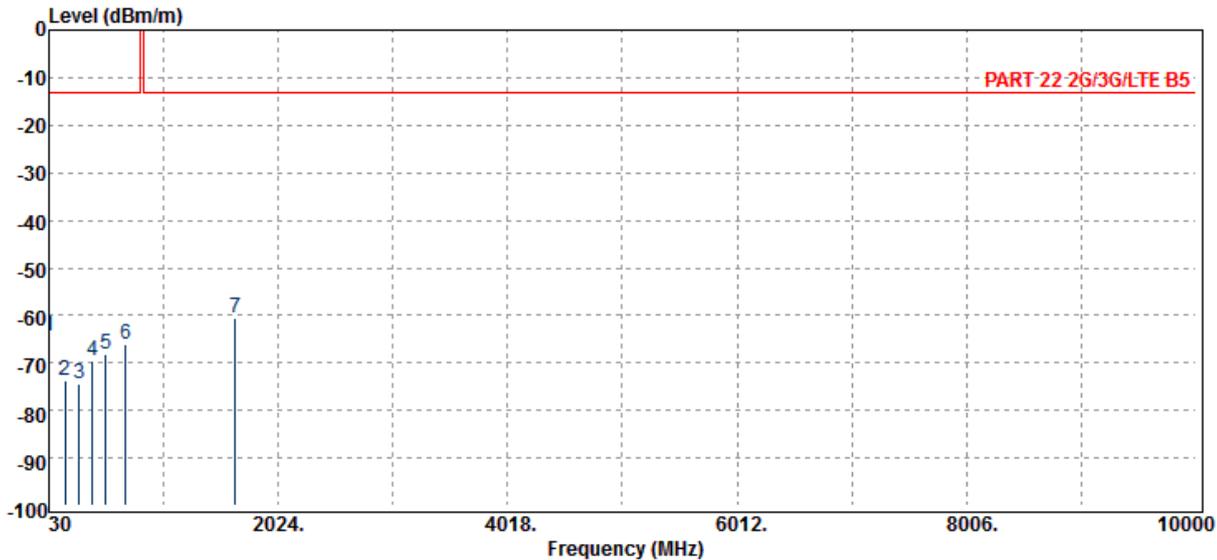
Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
93.05	S	-69.06	-67.03	-0.81	-1.22	-13.00	-56.06
211.39	S	-70.19	-72.01	3.50	-1.68	-13.00	-57.19
291.90	S	-70.37	-71.90	3.47	-1.93	-13.00	-57.37
416.06	S	-69.25	-70.65	3.76	-2.36	-13.00	-56.25
532.46	S	-66.21	-67.37	3.68	-2.52	-13.00	-53.21
626.55	S	-63.51	-64.20	3.19	-2.49	-13.00	-50.51
1648.40	H	-61.76	-66.80	9.26	-4.22	-13.00	-48.76

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Operation Band	:GSM 850	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:824.2 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



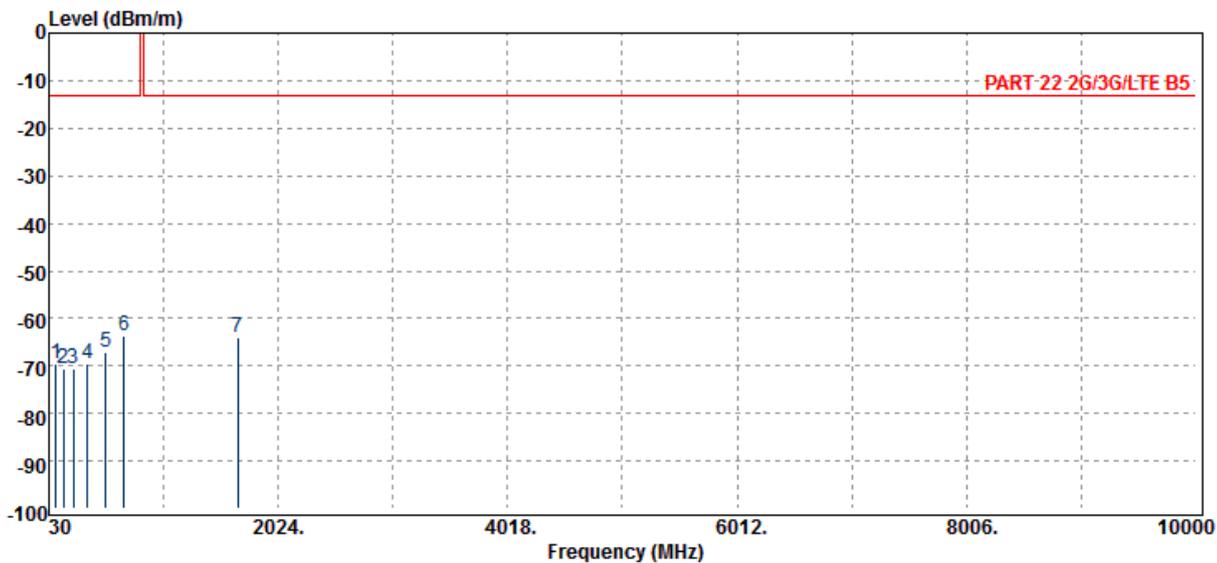
Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.40	-48.67	-14.78	-0.96	-13.00	-51.40
173.56	S	-73.71	-71.92	-0.26	-1.53	-13.00	-60.71
293.84	S	-74.47	-76.04	3.50	-1.94	-13.00	-61.47
410.24	S	-69.67	-71.06	3.78	-2.40	-13.00	-56.67
527.61	S	-68.18	-69.42	3.71	-2.47	-13.00	-55.18
699.30	S	-66.21	-66.33	3.08	-2.96	-13.00	-53.21
1648.40	H	-60.62	-65.65	9.26	-4.22	-13.00	-47.62

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Operation Band	:GSM 850	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:836.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID	Measurement Antenna	:VERTICAL
EUT Pol.	:E2 Plane	Pol.	



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
91.11	S	-69.52	-67.74	-0.57	-1.21	-13.00	-56.52
153.19	S	-70.57	-67.18	-1.95	-1.44	-13.00	-57.57
246.31	S	-70.55	-72.18	3.38	-1.75	-13.00	-57.55
367.56	S	-69.61	-71.28	3.85	-2.18	-13.00	-56.61
527.61	S	-67.22	-68.46	3.71	-2.47	-13.00	-54.22
681.84	S	-63.71	-64.16	3.10	-2.65	-13.00	-50.71
1673.20	H	-64.11	-67.02	7.20	-4.29	-13.00	-51.11

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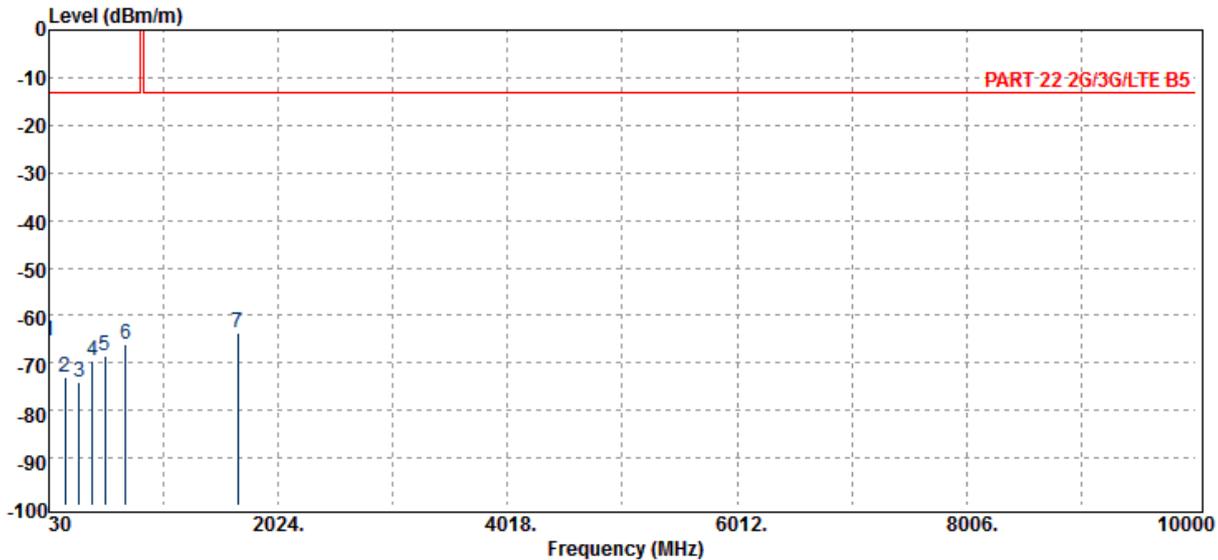
t (886-2) 2299-3279

f (886-2) 2298-0488

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Member of SGS Group

Operation Band	:GSM 850	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:836.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID	Measurement Antenna	:HORIZONTAL
EUT Pol.	:E2 Plane	Pol.	



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-65.23	-49.49	-14.78	-0.96	-13.00	-52.23
173.56	S	-72.98	-71.19	-0.26	-1.53	-13.00	-59.98
289.96	S	-73.99	-75.50	3.43	-1.92	-13.00	-60.99
411.21	S	-69.55	-70.94	3.78	-2.39	-13.00	-56.55
515.00	S	-68.35	-69.76	3.77	-2.36	-13.00	-55.35
696.39	S	-66.24	-66.41	3.09	-2.91	-13.00	-53.24
1673.20	H	-63.67	-66.57	7.20	-4.29	-13.00	-50.67

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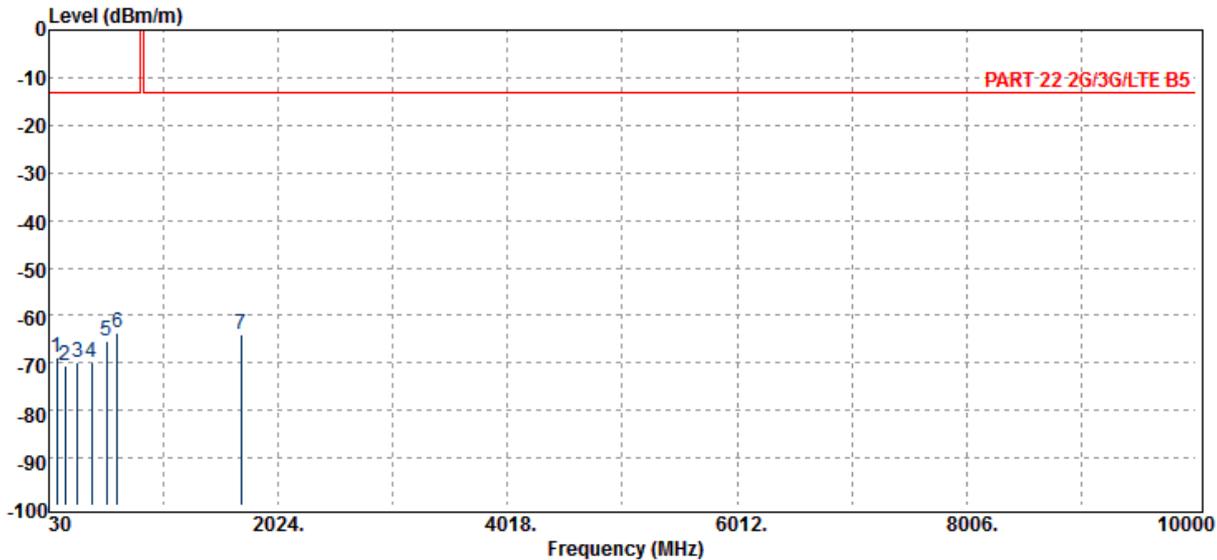
t (886-2) 2299-3279

f (886-2) 2298-0488

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Operation Band	:GSM 850	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:848.8 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
94.99	S	-68.76	-66.49	-1.04	-1.23	-13.00	-55.76
172.59	S	-70.72	-68.75	-0.44	-1.53	-13.00	-57.72
282.20	S	-70.00	-71.54	3.42	-1.89	-13.00	-57.00
398.60	S	-70.01	-71.46	3.82	-2.37	-13.00	-57.01
529.55	S	-65.39	-66.60	3.70	-2.49	-13.00	-52.39
626.55	S	-63.59	-64.28	3.19	-2.49	-13.00	-50.59
1697.60	H	-63.97	-66.95	7.28	-4.31	-13.00	-50.97

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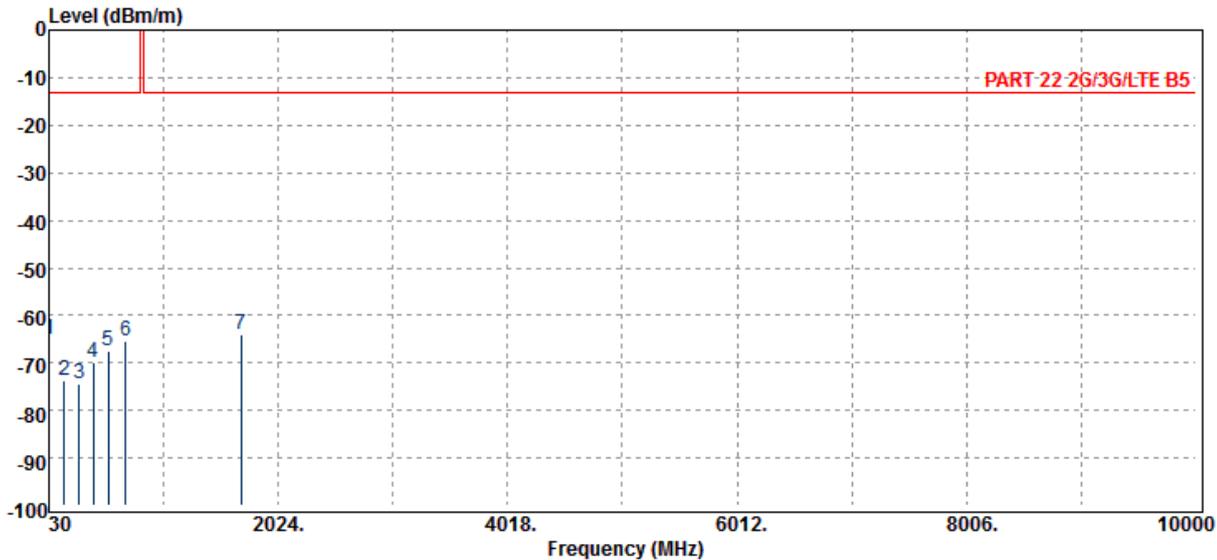
t (886-2) 2299-3279

f (886-2) 2298-0488

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Member of SGS Group

Operation Band	:GSM 850	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:848.8 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.91	-49.18	-14.78	-0.96	-13.00	-51.91
163.86	S	-73.65	-70.80	-1.35	-1.49	-13.00	-60.65
294.81	S	-74.48	-76.06	3.52	-1.94	-13.00	-61.48
418.00	S	-69.73	-71.14	3.76	-2.35	-13.00	-56.73
547.01	S	-67.42	-68.36	3.60	-2.67	-13.00	-54.42
699.30	S	-65.40	-65.52	3.08	-2.96	-13.00	-52.40
1697.60	H	-64.11	-67.09	7.28	-4.31	-13.00	-51.11

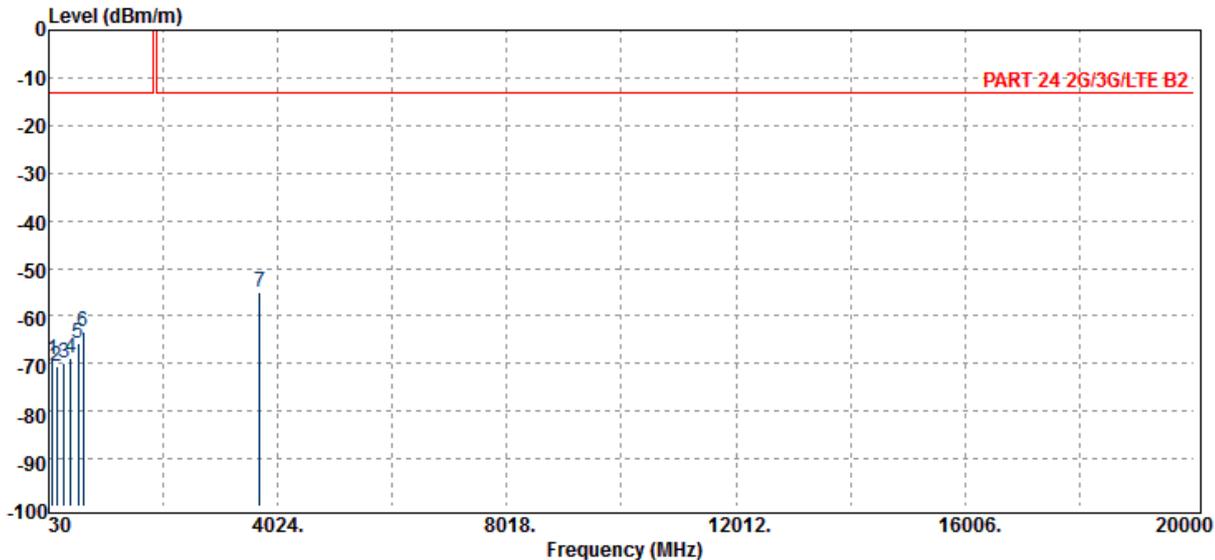
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### Radiated Spurious Emission Measurement Result: GPRS 1900 Mode

Operation Band :GSM 1900 Temp./Humi. :22 deg\_C / 62 RH  
 Fundamental Frequency :1850.2 MHz Engineer :Tin  
 Operation Mode :Tx CH LOW  
 EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL



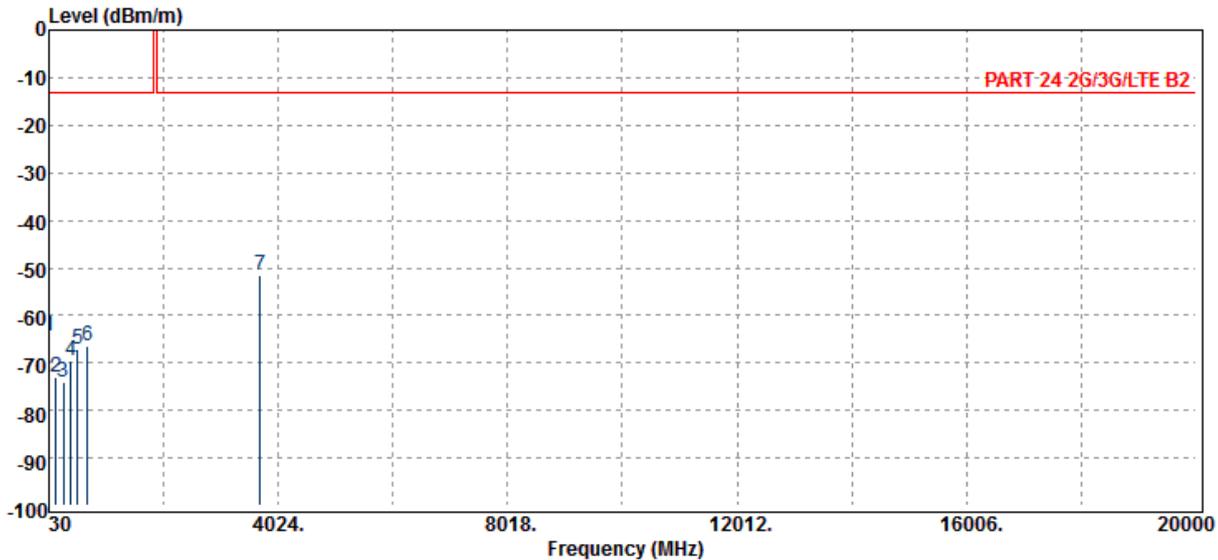
Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
91.11	S	-69.22	-67.44	-0.57	-1.21	-13.00	-56.22
173.56	S	-70.69	-68.90	-0.26	-1.53	-13.00	-57.69
296.75	S	-70.05	-71.66	3.56	-1.95	-13.00	-57.05
419.94	S	-69.00	-70.41	3.75	-2.33	-13.00	-56.00
547.01	S	-65.65	-66.58	3.60	-2.67	-13.00	-52.65
628.49	S	-63.31	-64.02	3.18	-2.47	-13.00	-50.31
3700.40	H	-55.05	-60.91	12.44	-6.58	-13.00	-42.05

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Operation Band	:GSM 1900	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:1850.2 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.40	-48.66	-14.78	-0.96	-13.00	-51.40
146.40	S	-72.87	-69.14	-2.31	-1.42	-13.00	-59.87
280.26	S	-74.12	-75.66	3.42	-1.88	-13.00	-61.12
408.30	S	-69.58	-70.96	3.79	-2.41	-13.00	-56.58
521.79	S	-67.08	-68.41	3.74	-2.41	-13.00	-54.08
697.36	S	-66.45	-66.60	3.08	-2.93	-13.00	-53.45
3700.40	H	-51.72	-57.58	12.44	-6.58	-13.00	-38.72

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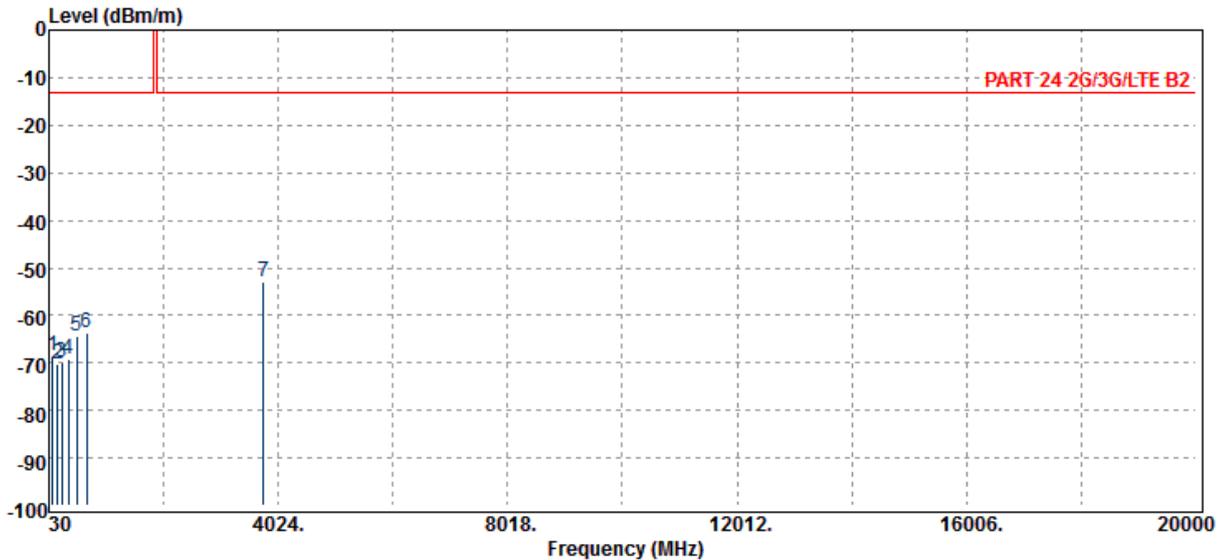
t (886-2) 2299-3279

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Operation Band	:GSM 1900	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID	Measurement Antenna	:VERTICAL
EUT Pol.	:E2 Plane	Pol.	



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
93.05	S	-68.54	-66.51	-0.81	-1.22	-13.00	-55.54
180.35	S	-70.19	-69.57	0.95	-1.56	-13.00	-57.19
251.16	S	-69.92	-71.63	3.47	-1.76	-13.00	-56.92
366.59	S	-69.31	-70.98	3.85	-2.17	-13.00	-56.31
517.91	S	-64.48	-65.87	3.76	-2.37	-13.00	-51.48
691.54	S	-63.55	-63.81	3.09	-2.83	-13.00	-50.55
3760.00	H	-53.07	-58.93	12.45	-6.60	-13.00	-40.07

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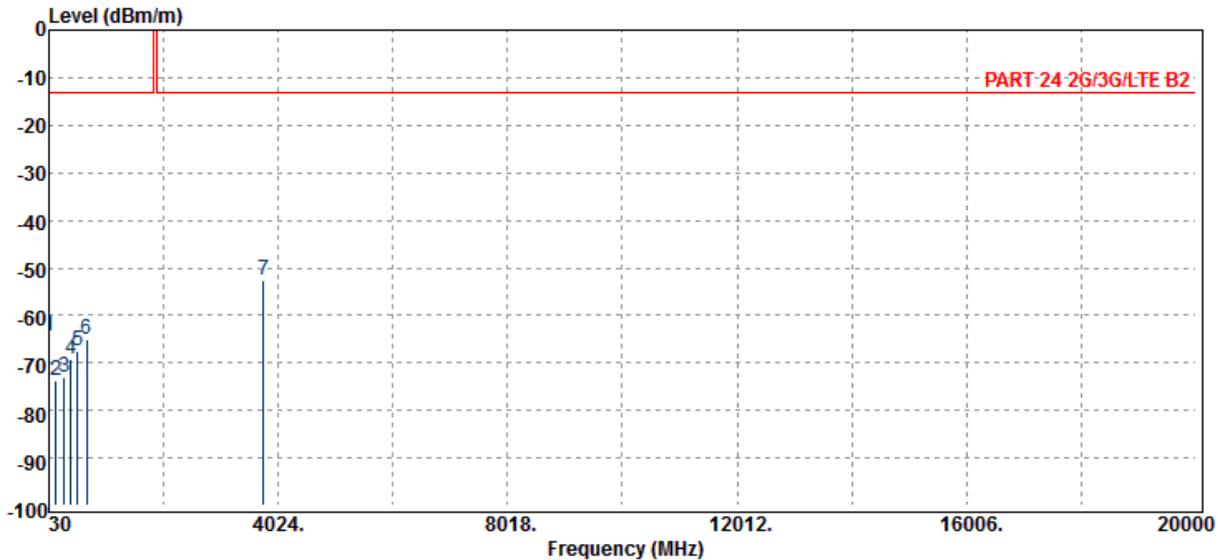
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Operation Band	:GSM 1900	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:1880 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.34	-48.60	-14.78	-0.96	-13.00	-51.34
146.40	S	-73.69	-69.97	-2.31	-1.42	-13.00	-60.69
293.84	S	-73.00	-74.56	3.50	-1.94	-13.00	-60.00
415.09	S	-69.37	-70.77	3.77	-2.37	-13.00	-56.37
527.61	S	-67.41	-68.64	3.71	-2.47	-13.00	-54.41
694.45	S	-65.05	-65.26	3.09	-2.88	-13.00	-52.05
3760.00	H	-52.72	-58.58	12.45	-6.60	-13.00	-39.72

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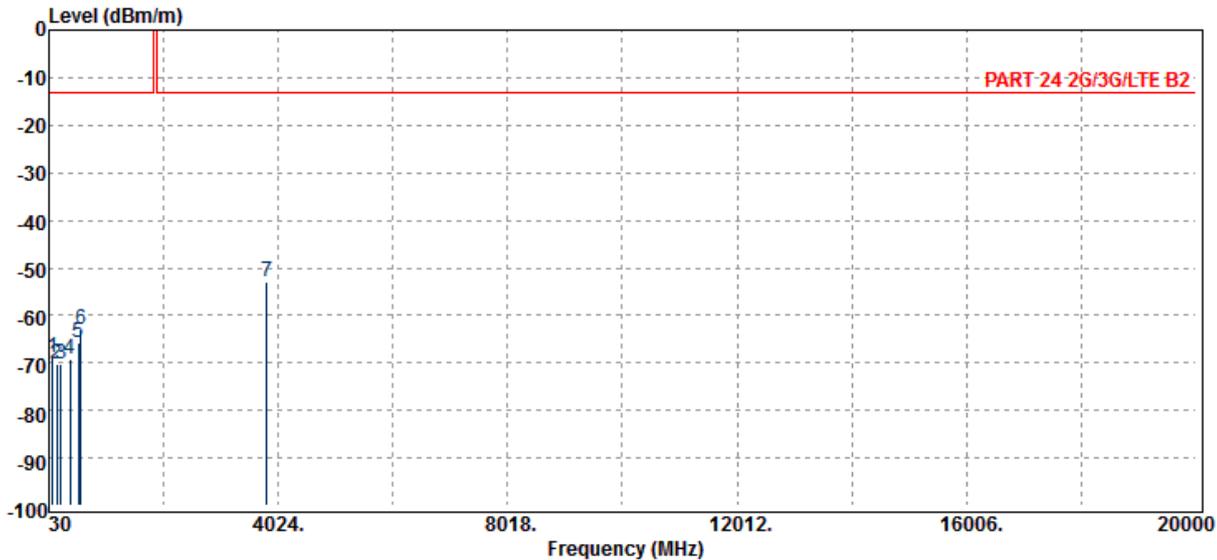
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Operation Band	:GSM 1900	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:1909.8 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH	Measurement Antenna	:VERTICAL
EUT Pol.	:E2 Plane	Pol.	



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
91.11	S	-68.69	-66.91	-0.57	-1.21	-13.00	-55.69
173.56	S	-70.25	-68.46	-0.26	-1.53	-13.00	-57.25
245.34	S	-70.10	-71.72	3.37	-1.75	-13.00	-57.10
396.66	S	-69.25	-70.71	3.82	-2.36	-13.00	-56.25
537.31	S	-65.67	-66.76	3.65	-2.57	-13.00	-52.67
584.84	S	-62.85	-63.41	3.34	-2.79	-13.00	-49.85
3819.60	H	-53.05	-58.87	12.47	-6.65	-13.00	-40.05

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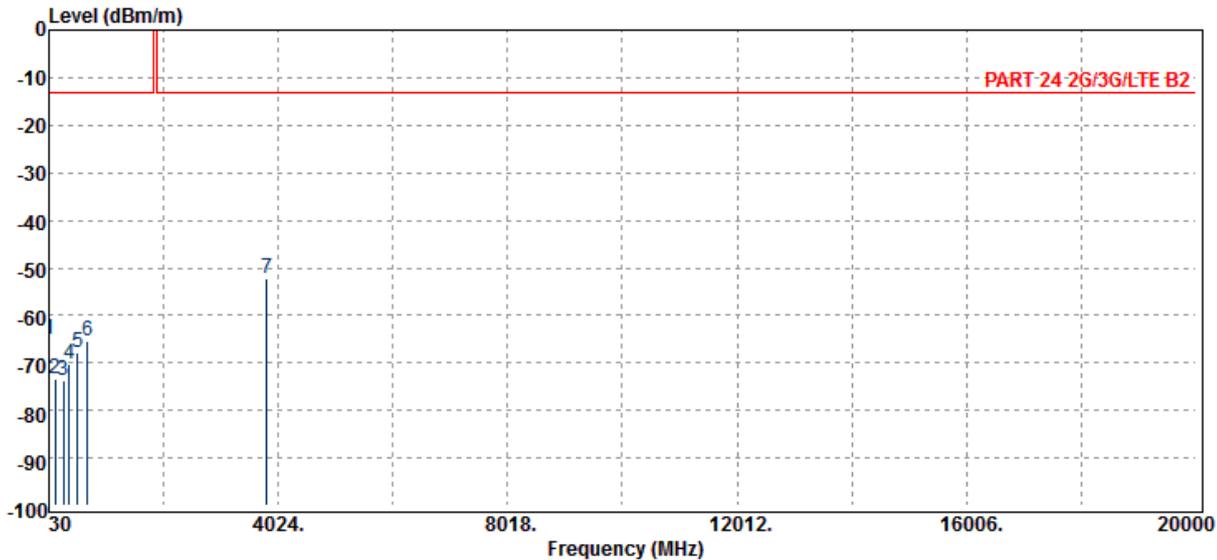
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Operation Band	:GSM 1900	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:1909.8 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.90	-49.17	-14.78	-0.96	-13.00	-51.90
139.61	S	-73.21	-69.12	-2.70	-1.39	-13.00	-60.21
287.05	S	-73.58	-75.10	3.43	-1.91	-13.00	-60.58
386.96	S	-70.13	-71.66	3.83	-2.30	-13.00	-57.13
522.76	S	-67.94	-69.25	3.73	-2.42	-13.00	-54.94
697.36	S	-65.46	-65.61	3.08	-2.93	-13.00	-52.46
3819.60	H	-52.20	-58.01	12.47	-6.65	-13.00	-39.20

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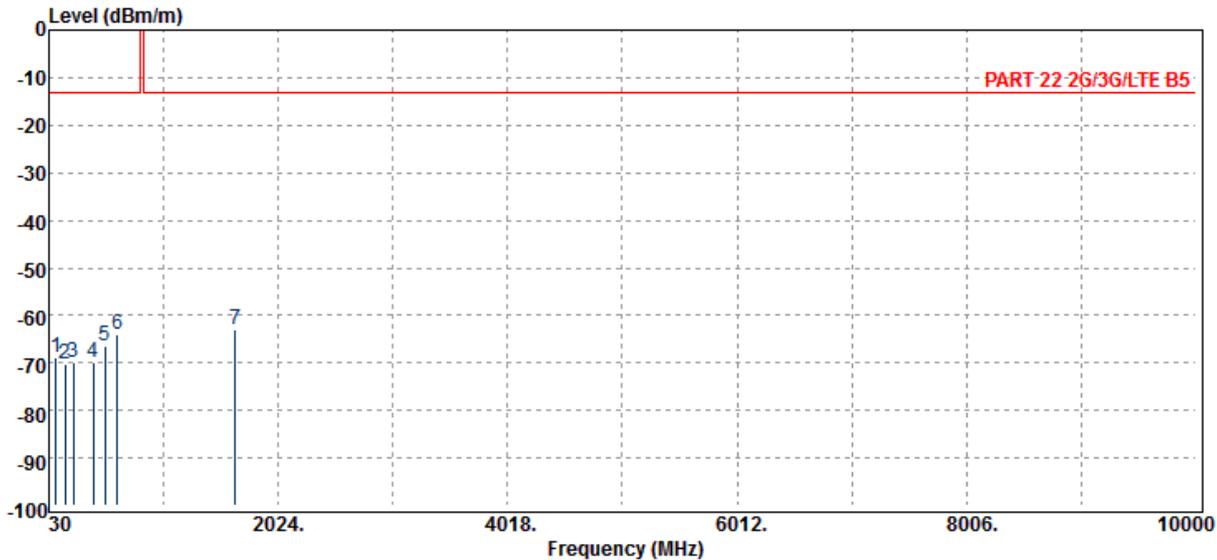
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### Radiated Spurious Emission Measurement Result: HSUPABand 5 Mode

Operation Band :HSUPA B5 Temp./Humi. :24 deg\_C / 61 RH  
 Fundamental Frequency :826.4 MHz Engineer :Tin  
 Operation Mode :Tx CH LOW  
 EUT Pol. :E2 Plane Measurement Antenna Pol.:VERTICAL



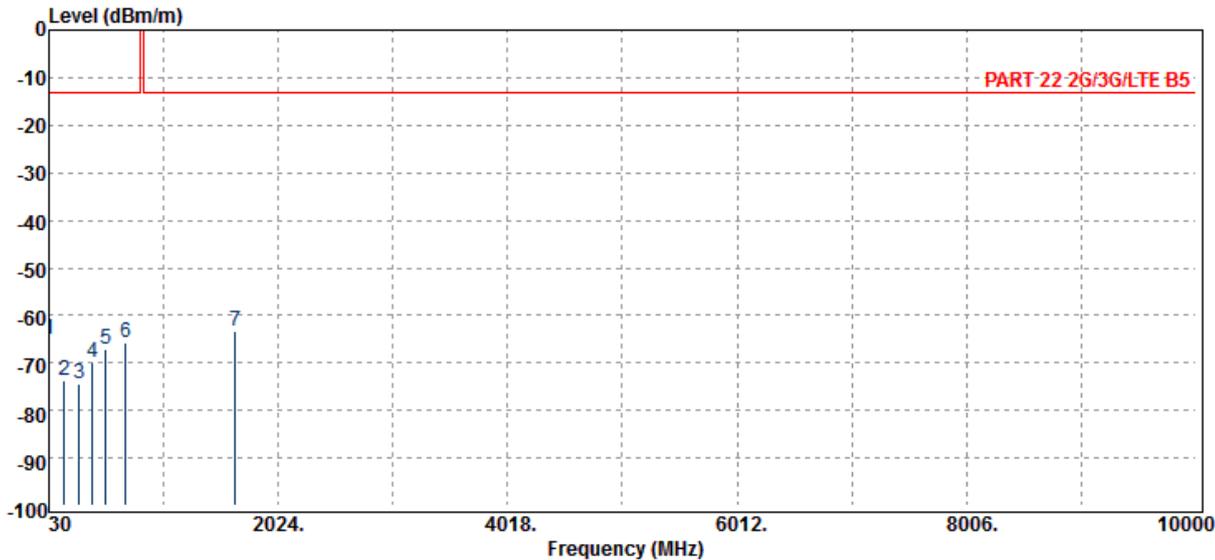
Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
93.05	S	-68.75	-66.72	-0.81	-1.22	-13.00	-55.75
170.65	S	-70.37	-68.05	-0.79	-1.52	-13.00	-57.37
240.49	S	-69.74	-71.29	3.29	-1.74	-13.00	-56.74
416.06	S	-69.80	-71.21	3.76	-2.36	-13.00	-56.80
517.91	S	-66.44	-67.83	3.76	-2.37	-13.00	-53.44
624.61	S	-63.92	-64.61	3.19	-2.51	-13.00	-50.92
1652.80	H	-62.83	-67.86	9.27	-4.24	-13.00	-49.83

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Operation Band	:HSUPA B5	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:826.4 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW	Measurement Antenna	:HORIZONTAL
EUT Pol.	:E2 Plane	Pol.	



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
31.94	S	-64.91	-49.63	-14.31	-0.96	-13.00	-51.91
159.98	S	-73.54	-70.43	-1.64	-1.48	-13.00	-60.54
291.90	S	-74.37	-75.90	3.47	-1.93	-13.00	-61.37
410.24	S	-69.93	-71.32	3.78	-2.40	-13.00	-56.93
522.76	S	-67.13	-68.44	3.73	-2.42	-13.00	-54.13
697.36	S	-65.64	-65.80	3.08	-2.93	-13.00	-52.64
1652.80	H	-63.17	-68.21	9.27	-4.24	-13.00	-50.17

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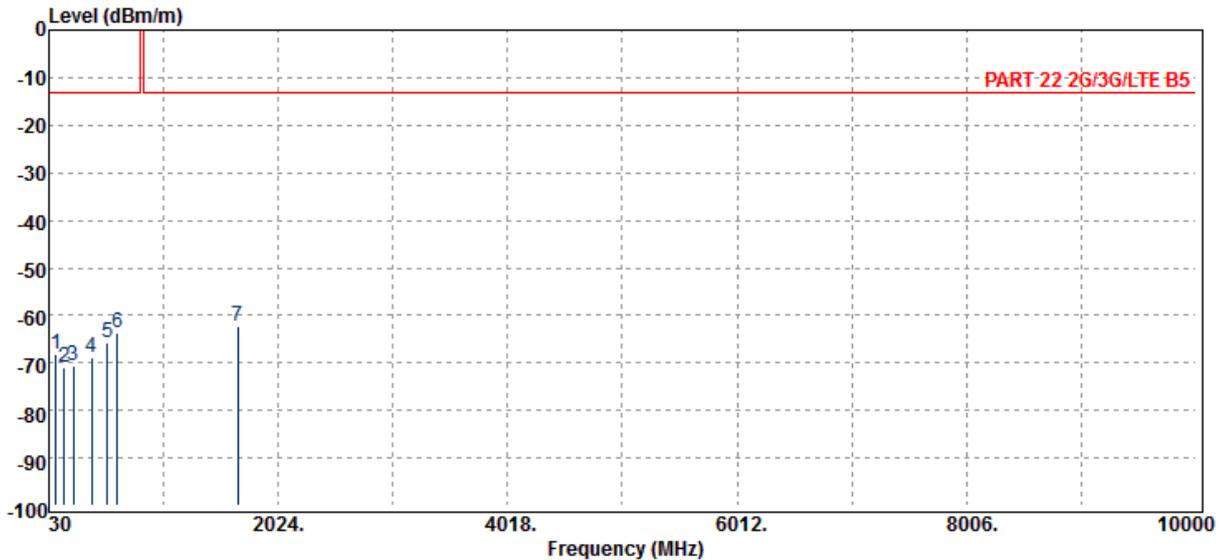
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Operation Band	:HSUPA B5	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:836.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID	Measurement Antenna	:VERTICAL
EUT Pol.	:E2 Plane	Pol.	



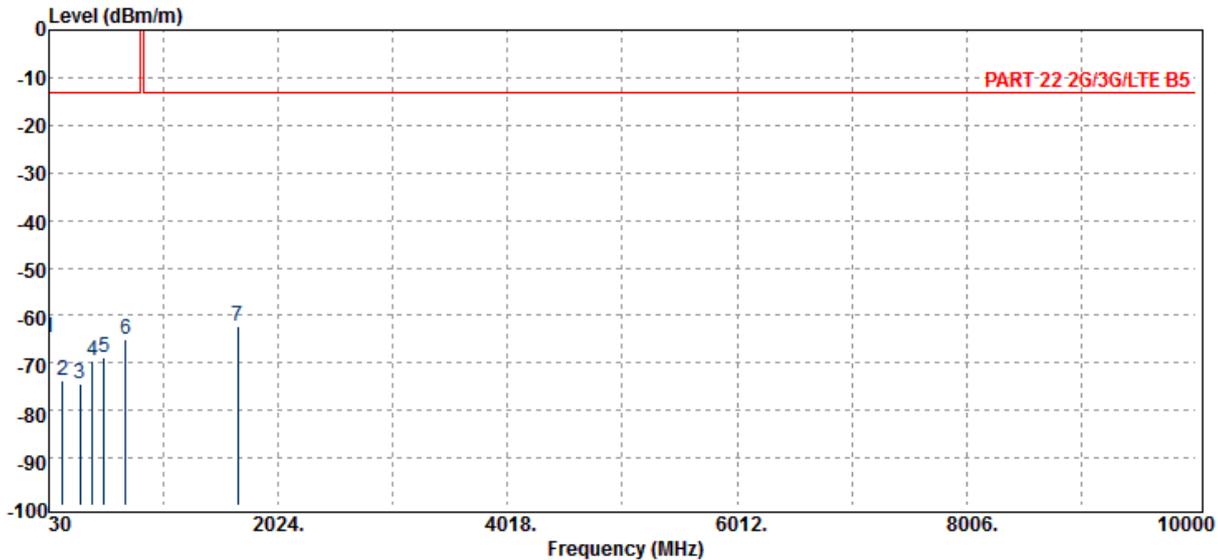
Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
93.05	S	-68.09	-66.06	-0.81	-1.22	-13.00	-55.09
165.80	S	-70.94	-68.23	-1.21	-1.50	-13.00	-57.94
243.40	S	-70.50	-72.10	3.34	-1.75	-13.00	-57.50
403.45	S	-68.91	-70.32	3.81	-2.40	-13.00	-55.91
539.25	S	-65.80	-66.85	3.64	-2.59	-13.00	-52.80
623.64	S	-63.66	-64.34	3.19	-2.52	-13.00	-50.66
1673.20	H	-62.35	-67.41	9.35	-4.29	-13.00	-49.35

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Operation Band	:HSUPA B5	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:836.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID	Measurement Antenna	:HORIZONTAL
EUT Pol.	:E2 Plane	Pol.	



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
31.94	S	-64.64	-49.36	-14.31	-0.96	-13.00	-51.64
146.40	S	-73.68	-69.96	-2.31	-1.42	-13.00	-60.68
299.66	S	-74.50	-76.17	3.62	-1.95	-13.00	-61.50
410.24	S	-69.38	-70.76	3.78	-2.40	-13.00	-56.38
513.06	S	-68.78	-70.21	3.79	-2.35	-13.00	-55.78
696.39	S	-64.91	-65.09	3.09	-2.91	-13.00	-51.91
1673.20	H	-62.31	-67.37	9.35	-4.29	-13.00	-49.31

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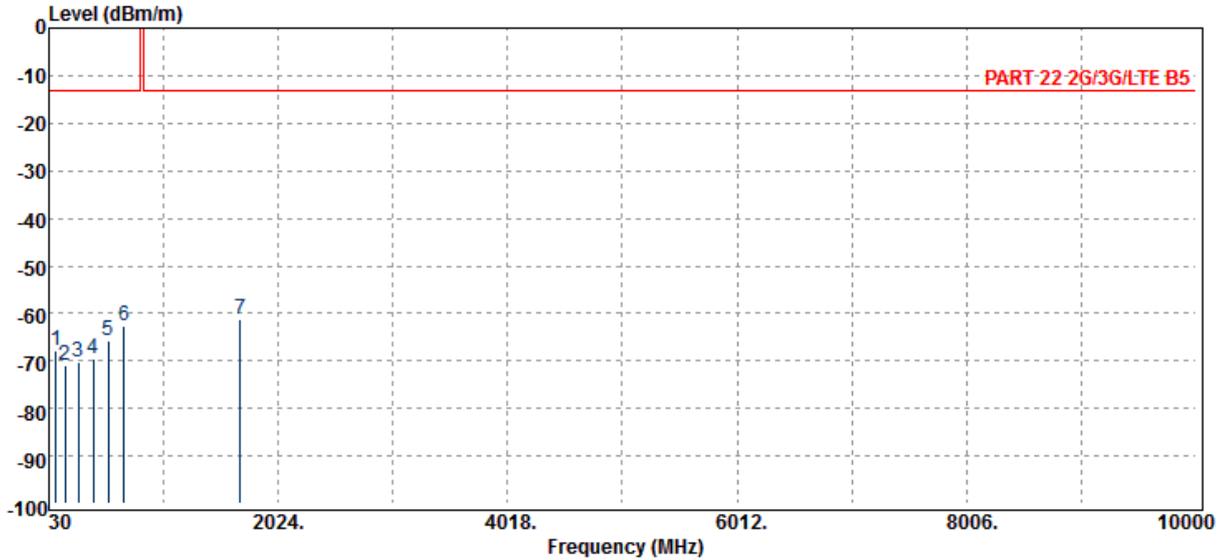
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Operation Band	:HSUPA B5	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:846.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
93.05	S	-67.99	-65.96	-0.81	-1.22	-13.00	-54.99
168.71	S	-70.91	-68.39	-1.00	-1.51	-13.00	-57.91
284.14	S	-70.29	-71.82	3.43	-1.89	-13.00	-57.29
415.09	S	-69.65	-71.05	3.77	-2.37	-13.00	-56.65
548.95	S	-65.68	-66.58	3.59	-2.69	-13.00	-52.68
684.75	S	-62.66	-63.06	3.10	-2.70	-13.00	-49.66
1693.20	H	-61.21	-66.32	9.42	-4.30	-13.00	-48.21

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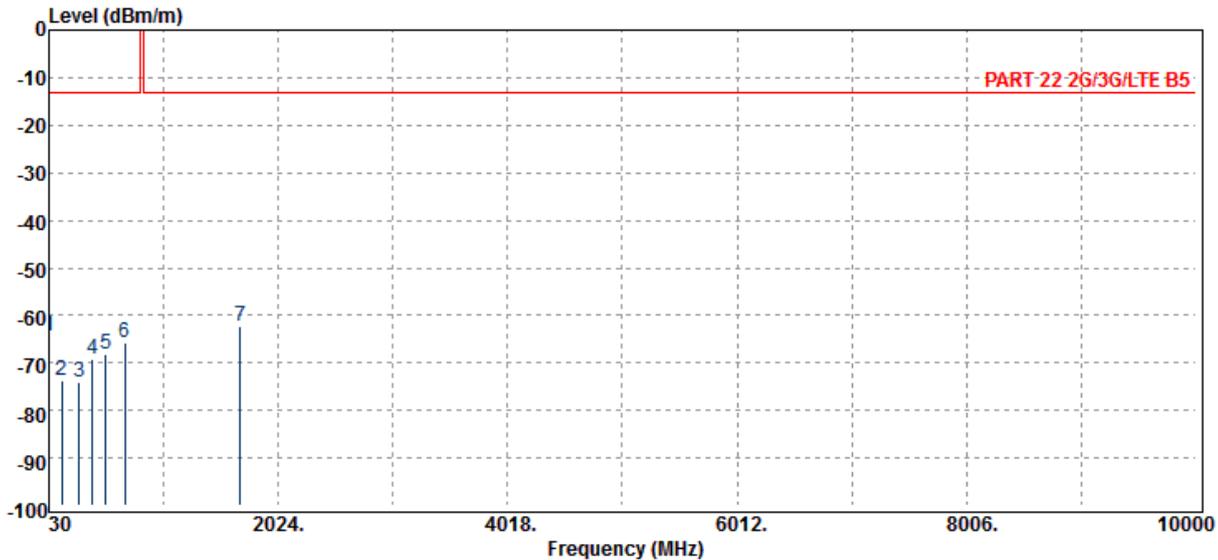
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Operation Band	:HSUPA B5	Temp./Humi.	:24 deg_C / 61 RH
Fundamental Frequency	:846.6 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.25	-48.51	-14.78	-0.96	-13.00	-51.25
144.46	S	-73.85	-70.02	-2.43	-1.41	-13.00	-60.85
296.75	S	-74.03	-75.64	3.56	-1.95	-13.00	-61.03
408.30	S	-69.24	-70.62	3.79	-2.41	-13.00	-56.24
521.79	S	-68.30	-69.63	3.74	-2.41	-13.00	-55.30
692.51	S	-65.87	-66.11	3.09	-2.84	-13.00	-52.87
1693.20	H	-62.25	-67.37	9.42	-4.30	-13.00	-49.25

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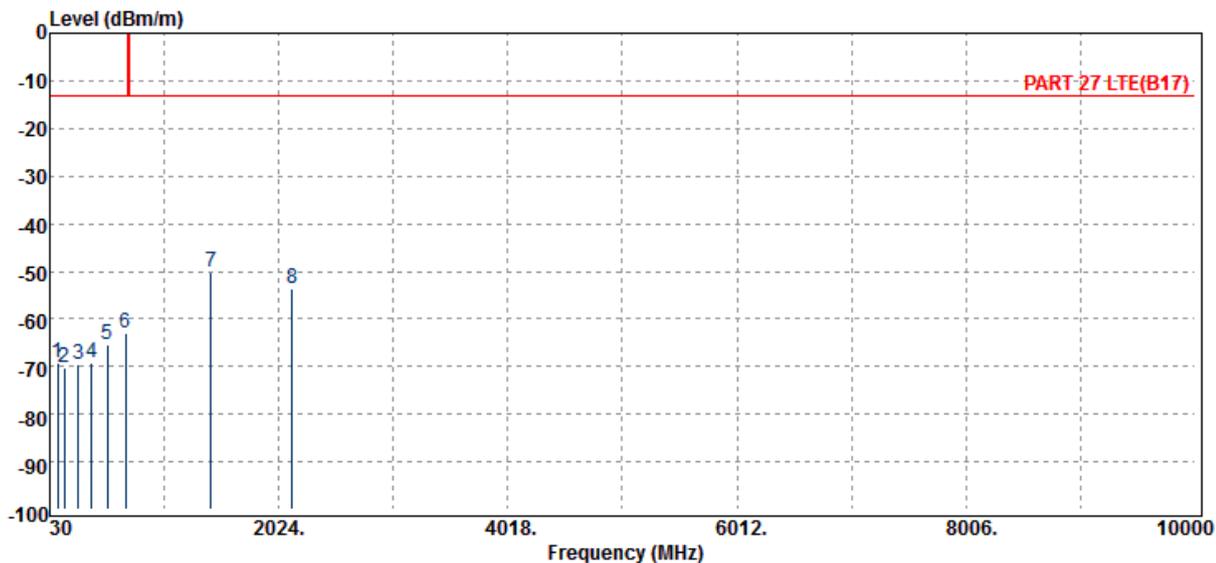
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### Radiated Spurious Emission Measurement Result: LTE-Band 17 (The Worst Case)

Operation Band :LTE B17 Temp./Humi. :22 deg\_C / 62 RH  
 Fundamental Frequency :706.5 MHz Engineer :Tin  
 Operation Mode :Tx CH LOW  
 EUT Pol. :E2 Plane Measurement Antenna Pol. :VERTICAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
94.99	S	-69.19	-66.92	-1.04	-1.23	-13.00	-56.19
159.01	S	-70.17	-67.02	-1.68	-1.47	-13.00	-57.17
279.29	S	-69.72	-71.28	3.43	-1.87	-13.00	-56.72
396.66	S	-69.26	-70.73	3.82	-2.36	-13.00	-56.26
531.49	S	-65.43	-66.60	3.69	-2.51	-13.00	-52.43
689.60	S	-62.95	-63.25	3.09	-2.79	-13.00	-49.95
1432.00	H	-50.02	-54.50	8.41	-3.94	-13.00	-37.02
2143.00	H	-53.76	-59.50	10.55	-4.82	-13.00	-40.76

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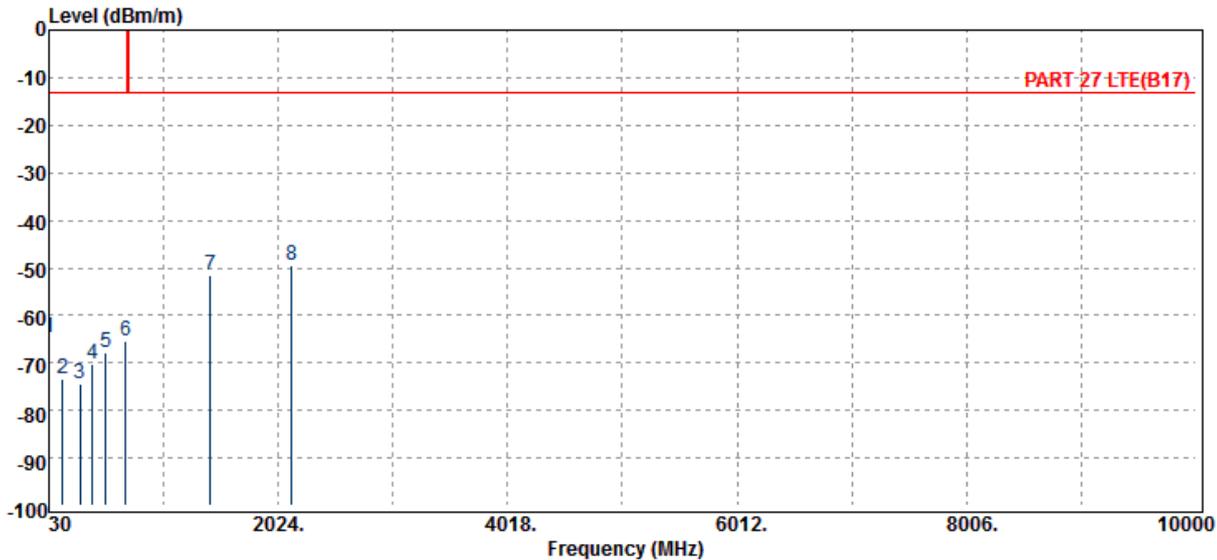
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Operation Band	:LTE B17	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:706.5 MHz	Engineer	:Tin
Operation Mode	:Tx CH LOW		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.87	-49.13	-14.78	-0.96	-13.00	-51.87
148.34	S	-73.21	-69.60	-2.19	-1.42	-13.00	-60.21
299.66	S	-74.45	-76.12	3.62	-1.95	-13.00	-61.45
408.30	S	-70.31	-71.69	3.79	-2.41	-13.00	-57.31
522.76	S	-67.67	-68.98	3.73	-2.42	-13.00	-54.67
694.45	S	-65.37	-65.58	3.09	-2.88	-13.00	-52.37
1432.00	H	-51.68	-56.15	8.41	-3.94	-13.00	-38.68
2143.00	H	-49.52	-55.26	10.55	-4.82	-13.00	-36.52

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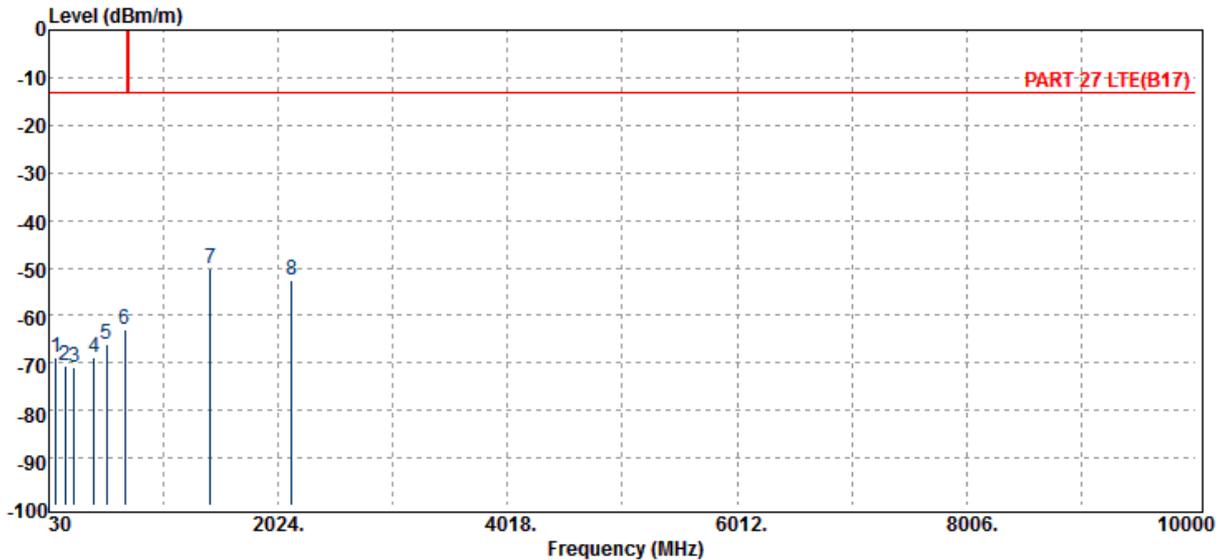
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Operation Band	:LTE B17	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:710.0 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



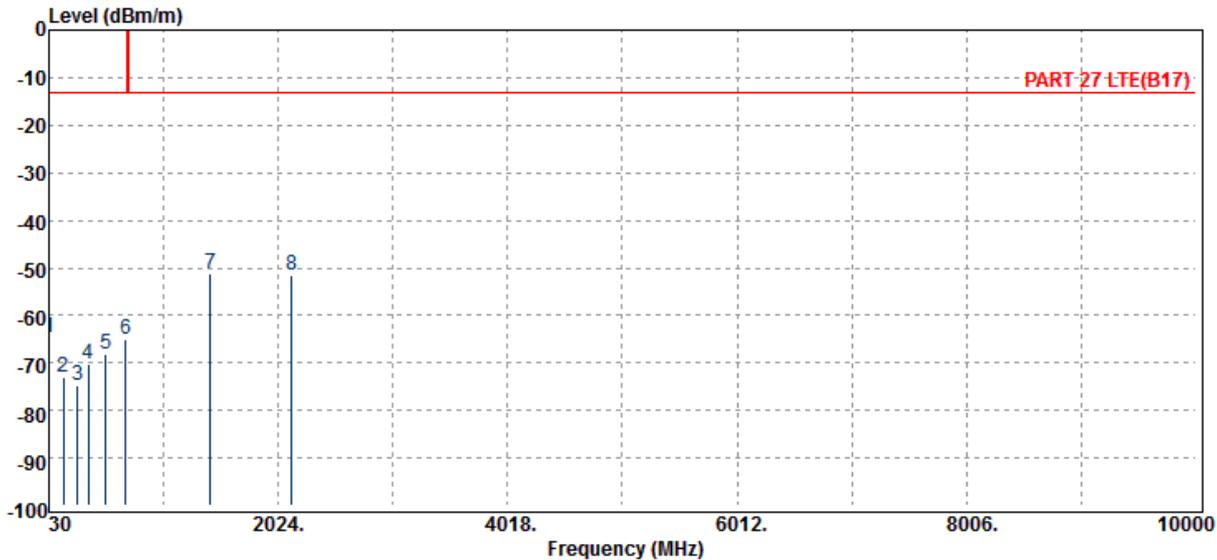
Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
94.02	S	-68.83	-66.68	-0.93	-1.22	-13.00	-55.83
173.56	S	-70.64	-68.84	-0.26	-1.53	-13.00	-57.64
248.25	S	-71.01	-72.67	3.41	-1.75	-13.00	-58.01
419.94	S	-68.86	-70.28	3.75	-2.33	-13.00	-55.86
529.55	S	-65.99	-67.20	3.70	-2.49	-13.00	-52.99
691.54	S	-63.02	-63.28	3.09	-2.83	-13.00	-50.02
1432.00	H	-50.02	-54.49	8.41	-3.94	-13.00	-37.02
2143.00	H	-52.45	-58.19	10.55	-4.82	-13.00	-39.45

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Operation Band	:LTE B17	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:710.0 MHz	Engineer	:Tin
Operation Mode	:Tx CH MID	Measurement Antenna	:HORIZONTAL
EUT Pol.	:E2 Plane	Pol.	



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
30.00	S	-64.69	-48.95	-14.78	-0.96	-13.00	-51.69
154.16	S	-73.17	-69.82	-1.90	-1.45	-13.00	-60.17
275.41	S	-74.76	-76.36	3.46	-1.85	-13.00	-61.76
374.35	S	-70.28	-71.90	3.84	-2.23	-13.00	-57.28
521.79	S	-68.06	-69.39	3.74	-2.41	-13.00	-55.06
696.39	S	-65.17	-65.34	3.09	-2.91	-13.00	-52.17
1432.00	H	-51.16	-55.63	8.41	-3.94	-13.00	-38.16
2143.00	H	-51.59	-57.32	10.55	-4.82	-13.00	-38.59

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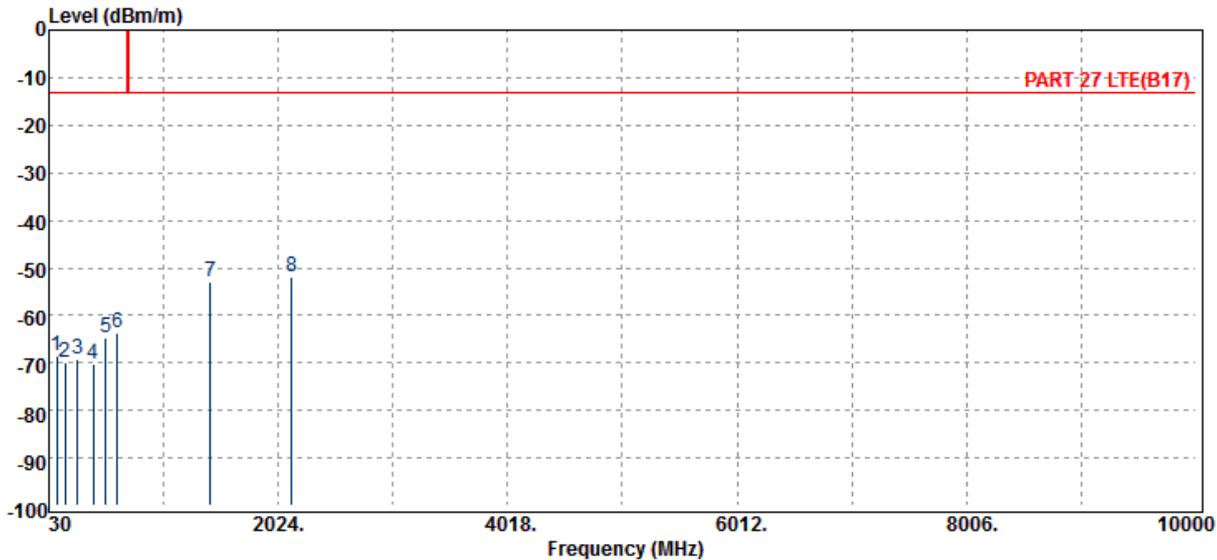
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Operation Band	:LTE B17	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:713.5 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:VERTICAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
95.96	S	-68.58	-66.19	-1.16	-1.23	-13.00	-55.58
172.59	S	-70.05	-68.09	-0.44	-1.53	-13.00	-57.05
277.35	S	-69.35	-70.93	3.45	-1.86	-13.00	-56.35
415.09	S	-70.20	-71.60	3.77	-2.37	-13.00	-57.20
522.76	S	-64.76	-66.07	3.73	-2.42	-13.00	-51.76
628.49	S	-63.82	-64.53	3.18	-2.47	-13.00	-50.82
1432.00	H	-52.93	-57.41	8.41	-3.94	-13.00	-39.93
2143.00	H	-51.76	-57.50	10.55	-4.82	-13.00	-38.76

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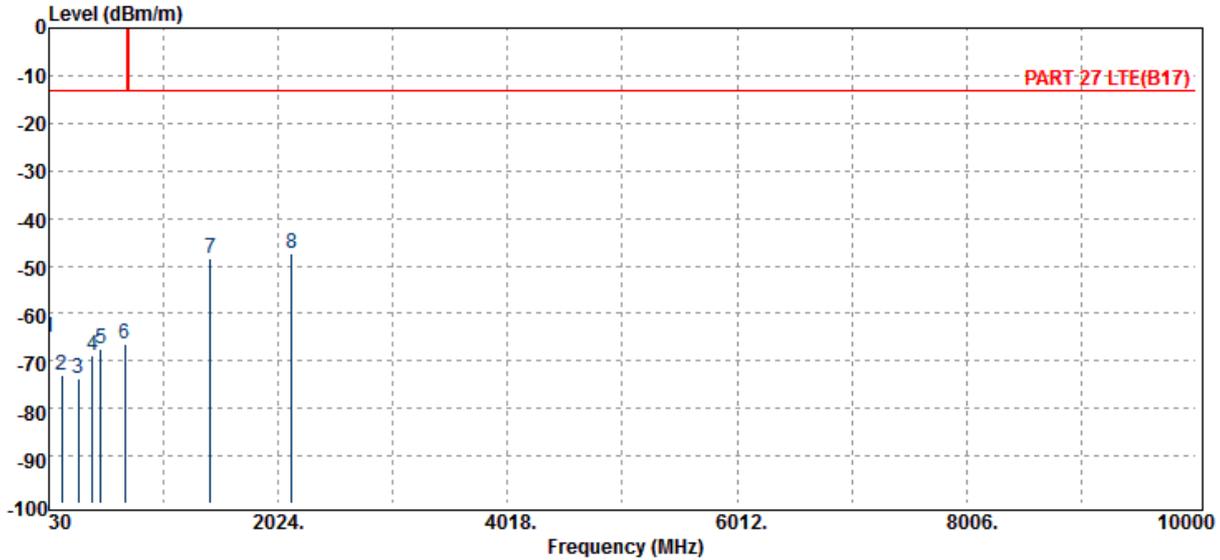
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Operation Band	:LTE B17	Temp./Humi.	:22 deg_C / 62 RH
Fundamental Frequency	:713.5 MHz	Engineer	:Tin
Operation Mode	:Tx CH HIGH		
EUT Pol.	:E2 Plane	Measurement Antenna Pol.	:HORIZONTAL



Freq. MHz	Note F/H/E/S	ERP/EIRP dBm	SG Output Level dBm	Antenna Gain dBi	Cable Loss dB	Limit dBm	Margin dB
31.94	S	-64.99	-49.71	-14.31	-0.96	-13.00	-51.99
138.64	S	-73.13	-69.05	-2.69	-1.39	-13.00	-60.13
285.11	S	-73.63	-75.16	3.43	-1.90	-13.00	-60.63
410.24	S	-68.75	-70.13	3.78	-2.40	-13.00	-55.75
481.05	S	-67.56	-69.10	3.78	-2.24	-13.00	-54.56
689.60	S	-66.55	-66.85	3.09	-2.79	-13.00	-53.55
1432.00	H	-48.38	-52.86	8.41	-3.94	-13.00	-35.38
2143.00	H	-47.47	-53.20	10.55	-4.82	-13.00	-34.47

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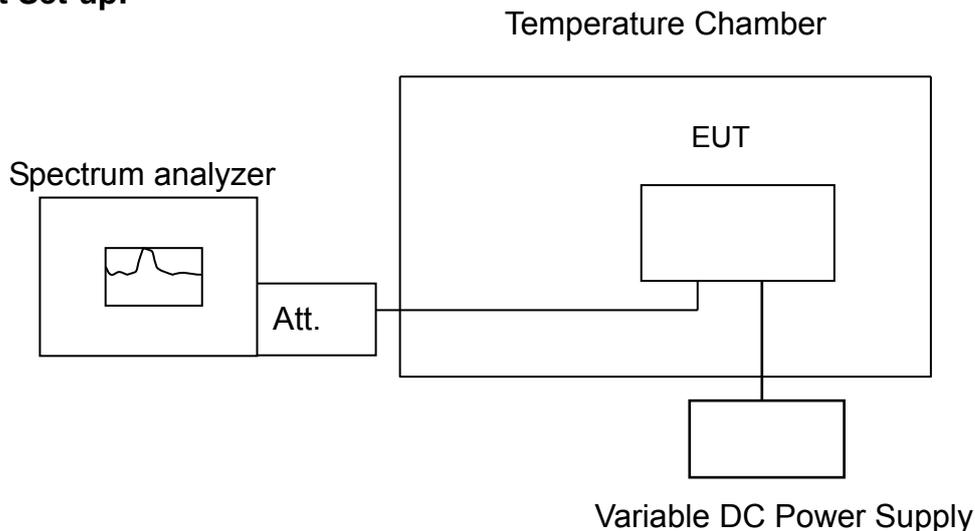
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## 11 FREQUENCY STABILITY MEASUREMENT

### 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:

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HU-BER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2017	02/10/2018
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	01/03/2017	01/02/2018

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## 11.5 Measurement Result:

### FREQUENCY ERROR vs. VOLTAGE

Reference Frequency: GPRS 850 Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
4.43	20	836.600025	3	2091
3.85	20	836.600022	0	2091
3.27	20	836.600024	2	2091
3.2 (End point)	20	836.600023	1	2091

### FREQUENCY ERROR vs. TEMPERATURE

Reference Frequency: GPRS 850 Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
3.85	50	836.600022	0	2091
3.85	40	836.600024	2	2091
3.85	30	836.600023	1	2091
3.85	20	836.600022	0	2091
3.85	10	836.60002	-2	2091
3.85	0	836.600026	4	2091
3.85	-10	836.600026	4	2091
3.85	-20	836.600021	-1	2091
3.85	-30	836.600018	-4	2091

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### FREQUENCY ERROR vs. VOLTAGE

Reference Frequency: GPRS 1900 Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
4.43	20	1880.000022	2	4700
3.85	20	1880.00002	0	4700
3.27	20	1880.000015	-5	4700
3.2 (End point)	20	1880.000022	2	4700

### FREQUENCY ERROR vs. TEMPERATURE

Reference Frequency: GPRS 1900 Mid Channel 1880 MHz				
Limit: +/- 2.5 ppm = Hz				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
3.85	50	1880.000025	5	4700
3.85	40	1880.000031	11	4700
3.85	30	1880.000028	8	4700
3.85	20	1880.00002	0	4700
3.85	10	1880.000019	-1	4700
3.85	0	1880.000022	2	4700
3.85	-10	1880.000023	3	4700
3.85	-20	1880.000026	6	4700
3.85	-30	1880.00003	10	4700

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**FREQUENCY ERROR vs. VOLTAGE**

Reference Frequency: WCDMA V Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
4.43	20	836.60003	3	2091
3.85	20	836.600027	0	2091
3.27	20	836.600032	5	2091
3.2 (End point)	20	836.600021	-6	2091

**FREQUENCY ERROR vs. TEMPERATURE**

Reference Frequency: WCDMA V Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)
Vdc	Temperature (°C)	(MHz)		
3.85	50	836.600032	5	2091
3.85	40	836.600034	7	2091
3.85	30	836.600031	4	2091
3.85	20	836.600027	0	2091
3.85	10	836.600029	2	2091
3.85	0	836.600027	0	2091
3.85	-10	836.600033	6	2091
3.85	-20	836.600036	8	2091
3.85	-30	836.600037	10	2091

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**FREQUENCY ERROR vs. VOLTAGE**

Reference Frequency:		LTE B17 Mid Channel	2595.0	MHz	10M QPSK CH 38000
Limit: +/- 2.5 ppm					
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)	
Vdc	Temperature (°C)	(MHz)			
4.43	25	710.00003	-12	1775	
3.85	25	710.00005	0	1775	
3.27	25	710.00006	19	1775	
3.2 (End point)	25	710.00008	30	1775	

**FREQUENCY ERROR vs. TEMPERATURE**

Reference Frequency:		LTE B17 Mid Channel	2595.0	MHz	10M QPSK CH 38000
Limit: +/- 2.5 ppm					
Power Supply	Environment	Frequency	Delta (Hz)	Limit (Hz)	
Vdc	Temperature (°C)	(MHz)			
3.85	-30	710.00007	41	1775	
3.85	-20	710.00004	11	1775	
3.85	-10	710.00002	-9	1775	
3.85	0	710.00002	-2	1775	
3.85	10	710.00002	-10	1775	
3.85	20	710.00003	0	1775	
3.85	30	710.00009	62	1775	
3.85	40	710.00005	27	1775	
3.85	50	710.00002	-6	1775	

**Note: The battery is rated 3.85V dc.**

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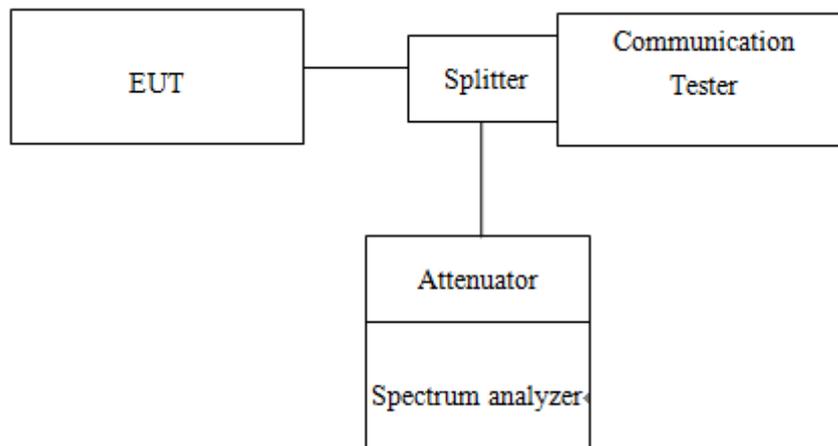
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## 12 PEAK TO AVERAGE RATIO

### 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.

### 12.4 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Power Meter	Anritsu	ML2495A	1005007	12/15/2016	12/14/2017
Power Sensor	Anritsu	MA2411B	917032	12/15/2016	12/14/2017
EXA Spectrum Analyzer	Agilent	N9030A	MY53120760	03/21/2017	03/20/2018
DC Block	Mini-Circuits	BLK-18-S+	1	01/05/2017	01/04/2018
Coaxial Cable	HUBER+SUHNER	SUCOFLEX 102	23670/2	01/05/2017	01/04/2018
Attenuator	Mini-Circuit	BW-S10W2+	2	01/05/2017	01/04/2018
Splitter	Agilent	11636B	N/A	01/05/2017	01/04/2018
DC Power Supply	Agilent	E3640A	MY52410006	11/21/2016	11/20/2017
Temperature Chamber	TERCHY	MHG-120LF	911009	05/19/2017	05/18/2018
Radio Communication Analyzer	R&S	CMU200	102189	02/11/2017	02/10/2018
Radio Communication Analyzer	Anritsu	MT8820C	6201465317	01/03/2017	01/02/2018

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## 12.5 Measurement Result

### Tabular Results:

Freq. (MHz)	CH	Peak-to-Average Ratio (dB)	
		GSM 1900	GPRS 1900
1850.2	9296	9.51	9.45
1880.0	9400	9.11	8.37
1909.8	9538	<b>11.25</b>	<b>10.53</b>

LTE BAND 17							
Channel bandwidth: 5MHz				Channel bandwidth: 10MHz			
Freq. (MHz)	CH	Peak-to-Average Ratio (dB)		Freq. (MHz)	CH	Peak-to-Average Ratio (dB)	
		16QAM	LIMIT			16QAM	LIMIT
706.5	23755	<b>6.24</b>	13	709.0	23780	6.17	13
710.0	23790	6.20	13	710.0	23790	<b>6.38</b>	13
713.5	23825	6.19	13	711.0	23780	6.18	13

### Measurement Results:

Please refer to next page.

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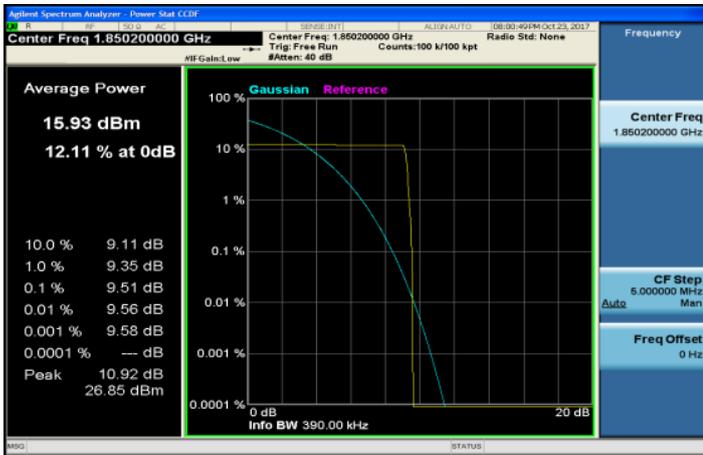
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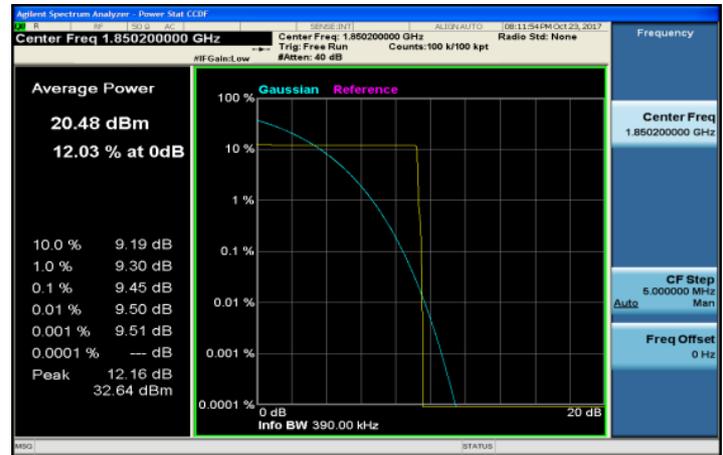
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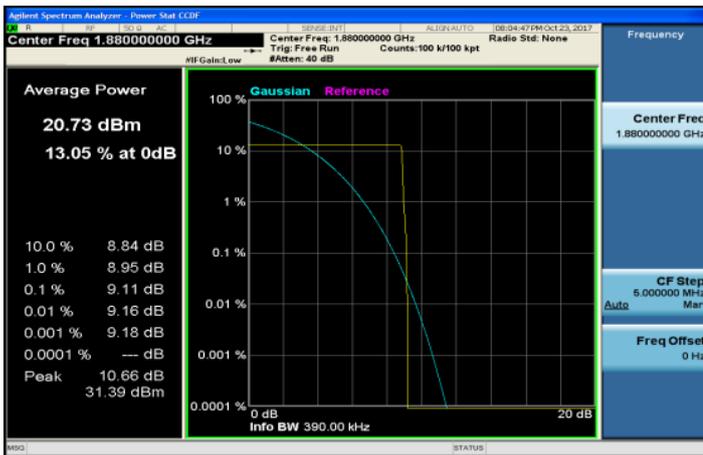
GSM 1900 Channel Low



GPRS 1900 Channel Low



GSM 1900 Channel Mid



GPRS 1900 Channel Mid



GSM 1900 Channel High



GPRS 1900 Channel High

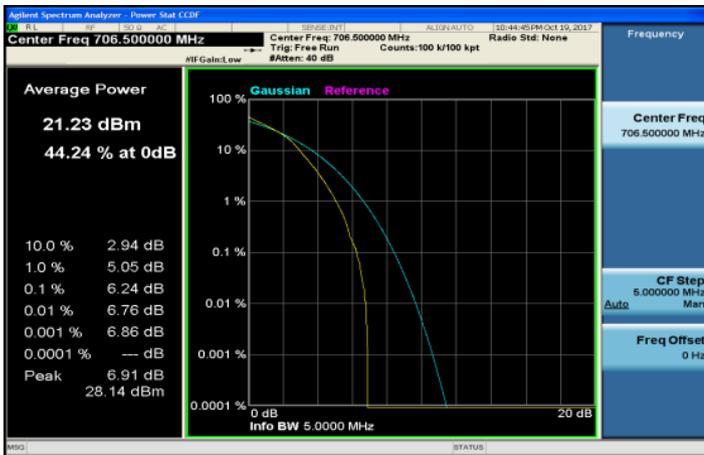


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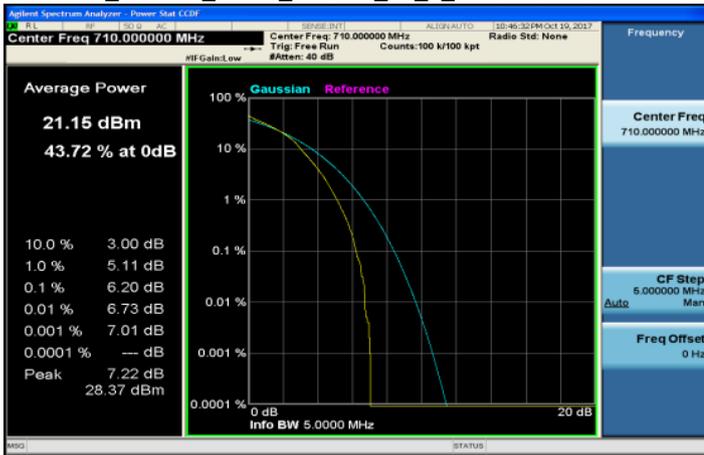
LTE\_Band17\_5MHz\_16QAM\_25\_0\_Channel Low



LTE\_Band17\_10MHz\_16QAM\_50\_0\_Channel Low



LTE\_Band17\_5MHz\_16QAM\_25\_0\_Channel Mid



LTE\_Band17\_10MHz\_16QAM\_50\_0\_Channel Mid



LTE\_Band17\_5MHz\_16QAM\_25\_0\_Channel High



LTE\_Band17\_10MHz\_16QAM\_50\_0\_Channel High



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