

**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**

**B, C & SUBPART L REQUIREMENT**

OF

**Applicant:** FUJITSU CONNECTED TECHNOLOGIES Ltd.  
1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki  
211-8588, Japan

**Product Name:** Smart Phone

**Brand Name:** FUJITSU

**Model No.:** F-01L

**Model Difference:** N/A

**FCC ID:** 2AQYEFMP167

**Report Number:** ER/2018/70056

**FCC Rule Part:** 2, 22H & 24E & 27B, C & L

**Issue Date:** Sep. 20th, 2018

**Date of Test:** Aug. 28th, 2018 ~ Sep.14th, 2018

**Date of EUT Received:** Aug. 28th, 2018

**We hereby certify that:**

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

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

*Marcus Tseng*  
**Tested By:** \_\_\_\_\_  
**Marcus Tseng / Engineer**

*Blue Yang*  
**Approved By:** \_\_\_\_\_  
**Blue Yang / Supervisor**



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## Revision History

Report Number	Revision	Description	Effected Page	Issue Date	Revised By
ER/2018/70056	Rev.00	Initial creation of document	All	Sep. 20th, 2018	Stefanie Yu

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## 1. GENERAL PRODUCT INFORMATION

### 1.1. Product Description

General:

Product Name:	Smart Phone	
Brand Name:	FUJITSU	
Model No.:	F-01L	
Model Difference:	N/A	
Hardware Version:	V2.1.0	
Software Version:	V01R028Ae	
Power Supply:	3.8Vdc from Rechargeable Li-ion Battery or 5Vdc /9Vdc / 12Vdc from AC/DC Adapter	
	Battery:	Model No.: CA54310-0075-A1, Supplier: FUJITSU CONNECTED TECHNOLOGIES LIMITED
	Adapter:	Model No.: AC Adapter 06 Supplier: NTT docomo
IMEI:	357963090013960, 357963090013978	

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## 1.2. GSM / WCDMA / LTE: Cellular Phone Standards Frequency Range

Operating Frequency (MHz)	
GSM/GPRS 850	824.2 - 848.8
GSM/GPRS 1900	1850.2 - 1909.8

Operating Frequency (MHz)	
WCDMA / HSPA+ Band V	826.4 - 846.6

LTE Band	BW (MHz)	Operation Frequency (MHz)
5	1.4	824.7 - 848.3
	3	825.5 - 847.5
	5	826.5 - 846.5
	10	829.0 - 844.0
12	1.4	699.7 - 715.3
	3	700.5 - 714.5
	5	701.5 - 713.5
	10	704.0 - 711.0
17	5	706.5 - 713.5
	10	709.0 - 711.0

## Antenna Designation

Vendor	Type	Antenna Part No.	Modulation	Frequency (MHz)	Peak Antenna
N/A	$\lambda/4$ Monopole	N/A	GSM / GPRS850	824.2 ~ 848.8	-3
			GSM / GPRS1900	1850.2 ~ 1909.8	-1
			WCDMA B5	826.4 ~ 846.6	-3
			LTE Band 5	824 ~ 849	-3
			LTE Band 12	699 ~ 716	-10
			LTE Band 17	704 ~ 716	-10

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

	ERP / EIRP (dBm)		(W)	Type of Emission
GSM 850	28.45	ERP	0.700	249KGXW
GPRS 850	28.45	ERP	0.700	246KGXW
GSM 1900	27.91	EIRP	0.618	251KG7W
GPRS 1900	27.91	EIRP	0.618	248KG7W
WCDMA Band V	<b>20.66</b>	ERP	<b>0.12</b>	4M12F9W
HSDPA Band V	19.57	ERP	0.09	4M13F9W
HSUPA Band V	19.62	ERP	0.09	4M13F9W

LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)	(W)	Type of Emission	LTE Band	BW (MHz)	Modulation	ERP / EIRP (dBm)	(W)	Type of Emission		
5	1.4	QPSK	19.95	ERP	0.099	1M10G7D	12	1.4	QPSK	12.96	ERP	0.020	1M10G7D
	1.4	16QAM	18.95	ERP	0.079	1M10D7W		1.4	16QAM	11.68	ERP	0.015	1M10D7W
	3	QPSK	19.96	ERP	0.099	2M69G7D		3	QPSK	12.95	ERP	0.020	2M70G7D
	3	16QAM	<b>18.99</b>	ERP	<b>0.079</b>	2M70D7W		3	16QAM	<b>11.96</b>	ERP	<b>0.016</b>	2M70D7W
	5	QPSK	<b>19.97</b>	ERP	<b>0.099</b>	4M49G7D		5	QPSK	12.95	ERP	0.020	4M49G7D
	5	16QAM	18.97	ERP	0.079	4M49D7W		5	16QAM	11.81	ERP	0.015	4M49D7W
	10	QPSK	19.92	ERP	0.098	8M99G7D		10	QPSK	<b>12.97</b>	ERP	<b>0.020</b>	9M00G7D
	10	16QAM	<b>18.99</b>	ERP	<b>0.079</b>	8M96D7W		10	16QAM	11.88	ERP	0.015	8M97D7W
						17	5	QPSK	12.85	ERP	0.019	4M49G7D	
							5	16QAM	11.94	ERP	0.016	4M49D7W	
							10	QPSK	<b>12.95</b>	ERP	<b>0.020</b>	9M02G7D	
							10	16QAM	11.87	ERP	0.015	8M97D7W	

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#### 1.4. Test Methodology of Applied Standards

CC 47 CFR Part 2, 22, 24, 27

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03

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

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

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

#### 1.5. Test Facility

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

FCC Registration Numbers are: 509634 / TW0001

#### 1.6. Special Accessories

No special accessories were used during testing.

#### 1.7. Equipment Modifications

There were no modifications incorporated into the EUT.

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## 2. SYSTEM TEST CONFIGURATION

### 2.1. EUT Configuration

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

### 2.2. EUT Exercise

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

### 2.3. Test Procedure

#### 2.3.1 Conducted Measurement at Antenna Port

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

#### 2.3.2 Radiated Emissions (ERP/EIRP)

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

### 2.4. Measurement Results Explanation Example

#### For all conducted test items:

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

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**Note:**

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

Following shows an offset computation in physical test.

	RF cable loss (dB)	Attenuation factor(dB)	offset(dB)
Low Band (Below 1GHz)	4.4	10	14.4
High Band (Above 1 GHz)	4.4	10	14.4

**2.5. Final Amplifier Voltage and Current Information:**

Test Mode	DC voltage (V)	DC current (mA)
GSM 850	3.8	224.0
GSM 1900		242.9
GPRS 850		259.5
GPRS 1900		258.4
WCDMA B5		259.7
LTE Band 5		582.3
LTE Band 12		573.0
LTE Band 17		599.5

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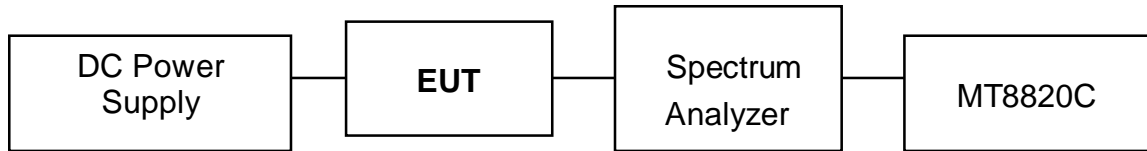
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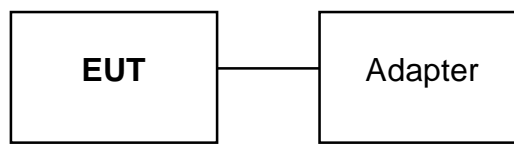
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## 2.6. Configuration of Tested System

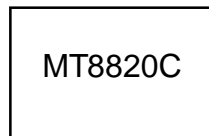
**Fig. 2-1 Configuration of Tested System (Fixed Channel-Conducted)**



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



Remote Side



**Table 2-1 Equipment Used in**

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Universal Radio Communication Tester	Anritsu	MT8820C	6200307563	shielded	Un-shielded

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### 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§2.1046(a)	RF Power Output	Compliant
§2.1046(a) §22.913(a)(5) §24.232(c) §27.50(c)(10) §27.50(h)(2)	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(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(m)(4)	Field Strength of Spurious Radiation	Compliant
§24.232(d) §22.913	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	RADIATED EMISSION
GSM/GPRS/EDGE 850	H-plan
GSM/GPRS/EDGE 1900	H-plan
WCDMA/HSPA Band V	H-plan
LTE Band 5	H-plan
LTE Band 12	H-plan
LTE Band 17	H-plan

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**GSM/GPRS MODE**

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
ERP	128 to 251	128, 190, 251	GSM/GPRS/EDGE 850
EIRP	512 to 810	512, 661, 810	GSM/GPRS/EDGE 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/EDGE 850 GSM/GPRS/EDGE 1900
PEAK TO AVERAGE RATIO	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GSM/GPRS/EDGE 850 GSM/GPRS/EDGE 1900
BAND EDGE	128 to 251 512 to 810	128, 251 512, 810	GSM/GPRS/EDGE 850 GSM/GPRS/EDGE 1900
CONDCUDED EMISSION	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GSM/GPRS/EDGE 850 GSM/GPRS/EDGE 1900
RADIATED EMISSION	128 to 251 512 to 810	128, 190, 251 512, 661, 810	GSM 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	4132 to 4233	4183	WCDMA Band V
OCCUPIED BANDWIDTH	4132 to 4233	4132, 4183, 4233	WCDMA/HSPA Band V
PEAK TO AVERAGE RATIO	4132 to 4233	4132, 4183, 4233	WCDMA/HSPA Band V
BAND EDGE	4132 to 4233	4132, 4233	WCDMA Band V
CONDCUDED EMISSION	4132 to 4233	4132, 4183, 4233	WCDMA/HSPA Band V
RADIATED EMISSION	4132 to 4233	4132, 4183, 4233	WCDMA Band V

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## LTE Band 5 MODE

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
ERP	20470 to 20643	20470, 20525, 20643	1.4MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,5 RB Offest
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,14 RB Offest
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,24 RB Offest
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,49 RB Offest
FREQUENCY STABILITY	20450 to 20600	20525	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	20470 to 20643	20470, 20525, 20643	1.4MHz	QPSK, 16QAM, 64QAM	Full RB
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK, 16QAM, 64QAM	Full RB
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK, 16QAM, 64QAM	Full RB
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK, 16QAM, 64QAM	Full RB
PEAK TO AVERAGE RATIO	20470 to 20643	20470, 20525, 20643	1.4MHz	64QAM	Full RB
	20415 to 20635	20415, 20525, 20635	3MHz	64QAM	Full RB
	20425 to 20625	20425, 20525, 20625	5MHz	64QAM	Full RB
	20450 to 20600	20450, 20525, 20600	10MHz	64QAM	Full RB
BAND EDGE	20470 to 20643	20470, 20643	1.4MHz	QPSK,	1 RB/ 0,5 RB Offes Full RB
	20415 to 20635	20415, 20635	3MHz	QPSK,	1 RB/ 0,14 RB Offest Full RB
	20425 to 20625	20425, 20625	5MHz	QPSK,	1 RB/ 0,24 RB Offest Full RB
	20450 to 20600	20450, 20600	10MHz	QPSK,	1 RB/ 0,49 RB Offest Full RB
CONDCUDED EMISSION	20470 to 20643	20470, 20525, 20643	1.4MHz	QPSK,	1 RB, 0 RB Offest
	20415 to 20635	20415, 20525, 20635	3MHz	QPSK,	1 RB, 0 RB Offest
	20425 to 20625	20425, 20525, 20625	5MHz	QPSK,	1 RB, 0 RB Offest
	20450 to 20600	20450, 20525, 20600	10MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	20450 to 20600	20450, 20525, 20600	1.4MHz	16QAM	1 RB, 0 RB Offest

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**LTE Band 12 MODE**

TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BAND-WIDTH	MODULATION	MODE
ERP	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,5 RB Offest
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,14 RB Offest
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,24 RB Offest
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM, 64QAM	1 RB/ 0,49 RB Offest
FREQUENCY STABILITY	23060 to 23130	23095	10MHz	QPSK,	Full RB
OCCUPIED BANDWIDTH	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM, 64QAM	Full RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM, 64QAM	Full RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM, 64QAM	Full RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM, 64QAM	Full RB
PEAK TO AVERAGE RATIO	23017 to 23173	23017, 23095, 23173	1.4MHz	64QAM	Full RB
	23025 to 23165	23025, 23095, 23165	3MHz	64QAM	Full RB
	23035 to 23155	23035, 23095, 23155	5MHz	64QAM	Full RB
	23060 to 23130	23060, 23095, 23130	10MHz	64QAM	Full RB
BAND EDGE	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK,	1 RB/ 0,5 RB Offes Full RB
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK,	1 RB/ 0,14 RB Offest Full RB
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK,	1 RB/ 0,24 RB Offest Full RB
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK,	1 RB/ 0,49 RB Offest Full RB
CONDCU-DETED EMISSION	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK,	1 RB, 0 RB Offest
	23025 to 23165	23025, 23095, 23165	3MHz	QPSK,	1 RB, 0 RB Offest
	23035 to 23155	23035, 23095, 23155	5MHz	QPSK,	1 RB, 0 RB Offest
	23060 to 23130	23060, 23095, 23130	10MHz	QPSK,	1 RB, 0 RB Offest
RADIATED EMISSION	23035 to 23155	23035, 23095, 23155	5MHz	QPSK	1 RB, 24 RB Offest

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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	23780 to 23800	23780, 23790, 23800	10MHz	16QAM	1 RB/ 49 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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## 6. MAXMUM OUTPUT POWER

### 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.

#### ERP/EIRP LIMIT

According to FCC §2.1046

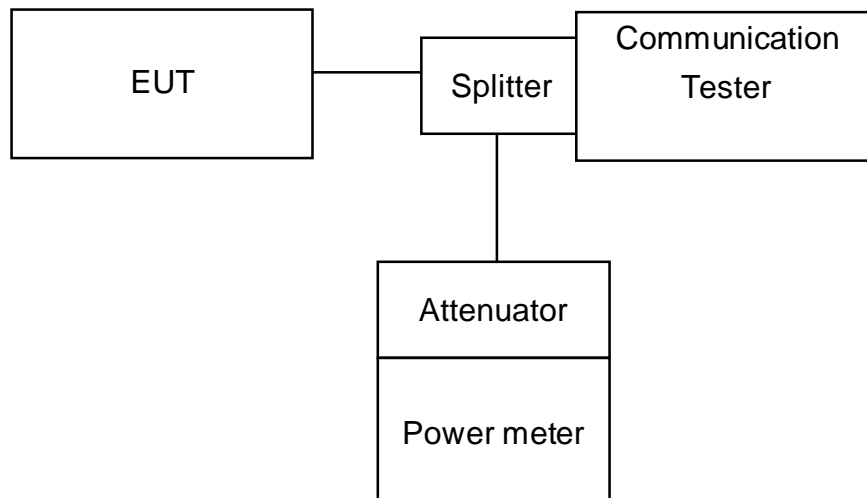
FCC 22.913(a) Mobile station is limited to 7W ERP.

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

FCC 27.50(c)(10) Portable stations (hand-held devices) are limited to 3W ERP.

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

### 6.2. Test Set-up



**Note:** Measurement setup for testing on Antenna connector

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### 6.3. Measurement Procedure

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

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

All LTE bands conducted average power is obtained from the simulator telecommunication test set.

The following tests were conducted according to the test requirements outlined in section 6.2 of the 3GPP.

#### TEST PROCEDURE:

ANSI C63.26:2015

KDB 971168 Section 5.6

$$\text{ERP/EIRP} = \text{PMeas} + \text{GT-LC}$$

where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);

PMeas = measured transmitter output power or PSD, in dBm or dBW;

GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

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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.
Radio Communication Analyser	Anritsu	MT8815B	6200711454	Apr. 05th, 2018	Apr. 04th, 2019
DC Power Supply	Anritsu	E3640A	MY52410006	Nov. 28th, 2017	Nov. 27th, 2018
Attenuator	Mini-Circuit	BW-S10W2+	2	Jan. 02nd, 2018	Jan. 01st, 2019
Coaxial Cables	N/A	WK CE Cable	N/A	Jan. 02nd, 2018	Jan. 01st, 2019

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## 6.5. Measurement Result

### RF Conducted Output Power

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
GSM 850	824.2	128	31.35	-3.00	28.35	38.50	-10.15
	836.6	190	31.45	-3.00	28.45	38.50	-10.05
	848.8	251	31.38	-3.00	28.38	38.50	-10.12
GSM 1900	1850.2	512	28.59	-1.00	27.59	33.00	-5.41
	1880.0	661	28.64	-1.00	27.64	33.00	-5.36
	1909.8	810	28.91	-1.00	27.91	33.00	-5.09

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
GPRS 850	824.2	128	31.35	-3.00	28.35	38.50	-10.15
	836.6	190	31.45	-3.00	28.45	38.50	-10.05
	848.8	251	31.38	-3.00	28.38	38.50	-10.12
GPRS 1900	1850.2	512	28.59	-1.00	27.59	33.00	-5.41
	1880.0	661	28.64	-1.00	27.64	33.00	-5.36
	1909.8	810	28.91	-1.00	27.91	33.00	-5.09

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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:**

**WCDMA/HSUPA/HSDPA Band V Result:**

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Limit (dBm)	Margin (dB)
WCDMA	826.4	4132	23.45	-3.00	20.45	38.50	-18.05
	836.6	4183	23.66	-3.00	<b>20.66</b>	38.50	-17.84
	846.6	4233	23.62	-3.00	20.62	38.50	-17.88
HSDPA	826.4	4132	22.40	-3.00	19.40	38.50	-19.10
	836.6	4183	22.55	-3.00	19.55	38.50	-18.95
	846.6	4233	22.57	-3.00	<b>19.57</b>	38.50	-18.93
HSUPA	826.4	4132	22.43	-3.00	19.43	38.50	-19.07
	836.6	4183	22.62	-3.00	<b>19.62</b>	38.50	-18.88
	846.6	4233	22.53	-3.00	19.53	38.50	-18.97

**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.**

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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)			Power Class 3 Limitation (dBm)	Comments
		4132.00	4183.00	4233.00		
HSDPA V	1	22.40	22.55	22.57	20.3dBm – 25.7dBm	Pass
	2	22.42	22.56	22.54	20.3dBm – 25.7dBm	Pass
	3	21.92	22.04	22.13	19.8dBm – 25.7dBm	Pass
	4	21.90	22.13	22.12	19.8dBm – 25.7dBm	Pass

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## 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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LTE Result:

Antenna gain (dBi) -3

LTE Band 5 Uplink frequency band : 824 to 849 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
1.4	20407	824.7	QPSK	1	0	22.95	<b>19.95</b>	38.45	-18.5
				1	5	22.75	19.75	38.45	-18.7
				3	2	21.99	18.99	38.45	-19.46
				6	0	21.29	18.29	38.45	-20.16
	20525	836.5	QPSK	1	0	22.94	19.94	38.45	-18.51
				1	5	22.74	19.74	38.45	-18.71
				3	2	21.89	18.89	38.45	-19.56
				6	0	21.28	18.28	38.45	-20.17
	20643	848.3	QPSK	1	0	22.61	19.61	38.45	-18.84
				1	5	22.86	19.86	38.45	-18.59
				3	2	21.86	18.86	38.45	-19.59
				6	0	21.42	18.42	38.45	-20.03
	20407	824.7	16QAM	1	0	21.44	18.44	38.45	-20.01
				1	5	21.93	18.93	38.45	-19.52
				3	2	20.67	17.67	38.45	-20.78
				6	0	19.51	16.51	38.45	-21.94
	20525	836.5	16QAM	1	0	21.38	18.38	38.45	-20.07
				1	5	21.85	18.85	38.45	-19.6
				3	2	20.95	17.95	38.45	-20.5
				6	0	19.63	16.63	38.45	-21.82
	20643	848.3	16QAM	1	0	21.95	<b>18.95</b>	38.45	-19.5
				1	5	21.72	18.72	38.45	-19.73
				3	2	20.81	17.81	38.45	-20.64
				6	0	20.04	17.04	38.45	-21.41

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Antenna gain (dBi) -3

LTE Band 5_Uplink frequency band : 824 to 849 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
3	20415	825.5	QPSK	1	0	22.95	19.95	38.45	-18.5
				1	14	22.76	19.76	38.45	-18.69
				8	4	21.80	18.80	38.45	-19.65
				15	0	21.77	18.77	38.45	-19.68
	20525	836.5	QPSK	1	0	22.84	19.84	38.45	-18.61
				1	14	22.96	<b>19.96</b>	38.45	-18.49
				8	4	21.76	18.76	38.45	-19.69
				15	0	21.70	18.70	38.45	-19.75
	20635	847.5	QPSK	1	0	22.74	19.74	38.45	-18.71
				1	14	22.62	19.62	38.45	-18.83
				8	4	21.84	18.84	38.45	-19.61
				15	0	21.90	18.90	38.45	-19.55
	20415	825.5	16QAM	1	0	21.26	18.26	38.45	-20.19
				1	14	21.99	<b>18.99</b>	38.45	-19.46
				8	4	20.99	17.99	38.45	-20.46
				15	0	20.53	17.53	38.45	-20.92
	20525	836.5	16QAM	1	0	21.82	18.82	38.45	-19.63
				1	14	21.84	18.84	38.45	-19.61
				8	4	20.85	17.85	38.45	-20.6
				15	0	20.76	17.76	38.45	-20.69
	20635	847.5	16QAM	1	0	21.49	18.49	38.45	-19.96
				1	14	21.87	18.87	38.45	-19.58
				8	4	20.86	17.86	38.45	-20.59
				15	0	20.86	17.86	38.45	-20.59

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Antenna gain (dBi) -3

LTE Band 5_Uplink frequency band : 824 to 849 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
5	20425	826.5	QPSK	1	0	22.96	19.96	38.45	-18.49
				1	24	22.84	19.84	38.45	-18.61
				12	6	21.93	18.93	38.45	-19.52
				25	0	21.88	18.88	38.45	-19.57
	20525	836.5	QPSK	1	0	22.77	19.77	38.45	-18.68
				1	24	22.76	19.76	38.45	-18.69
				12	6	21.90	18.90	38.45	-19.55
				25	0	21.80	18.80	38.45	-19.65
	20625	846.5	QPSK	1	0	22.72	19.72	38.45	-18.73
				1	24	22.97	<b>19.97</b>	38.45	-18.48
				12	6	21.99	18.99	38.45	-19.46
				25	0	21.86	18.86	38.45	-19.59
	20425	826.5	16QAM	1	0	21.88	18.88	38.45	-19.57
				1	24	21.91	18.91	38.45	-19.54
				12	6	20.99	17.99	38.45	-20.46
				25	0	20.86	17.86	38.45	-20.59
	20525	836.5	16QAM	1	0	21.97	<b>18.97</b>	38.45	-19.48
				1	24	21.71	18.71	38.45	-19.74
				12	6	20.77	17.77	38.45	-20.68
				25	0	20.88	17.88	38.45	-20.57
	20625	846.5	16QAM	1	0	21.78	18.78	38.45	-19.67
				1	24	21.73	18.73	38.45	-19.72
				12	6	20.83	17.83	38.45	-20.62
				25	0	20.86	17.86	38.45	-20.59

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Antenna gain (dBi) -3

LTE Band 5_Uplink frequency band : 824 to 849 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
10	20450	829	QPSK	1	0	22.77	19.77	38.45	-18.68
				1	49	22.72	19.72	38.45	-18.73
				25	12	21.92	18.92	38.45	-19.53
				50	0	21.96	18.96	38.45	-19.49
	20525	836.5	QPSK	1	0	22.72	19.72	38.45	-18.73
				1	49	22.61	19.61	38.45	-18.84
				25	12	21.97	18.97	38.45	-19.48
				50	0	21.97	18.97	38.45	-19.48
	20600	844	QPSK	1	0	22.86	19.86	38.45	-18.59
				1	49	22.92	<b>19.92</b>	38.45	-18.53
				25	12	21.95	18.95	38.45	-19.5
				50	0	21.97	18.97	38.45	-19.48
	20450	829	16QAM	1	0	21.63	18.63	38.45	-19.82
				1	49	21.87	18.87	38.45	-19.58
				25	12	20.97	17.97	38.45	-20.48
				50	0	20.98	17.98	38.45	-20.47
	20525	836.5	16QAM	1	0	21.54	18.54	38.45	-19.91
				1	49	21.99	<b>18.99</b>	38.45	-19.46
				25	12	20.97	17.97	38.45	-20.48
				50	0	20.91	17.91	38.45	-20.54
	20600	844	16QAM	1	0	21.98	18.98	38.45	-19.47
				1	49	21.61	18.61	38.45	-19.84
				25	12	20.92	17.92	38.45	-20.53
				50	0	20.99	17.99	38.45	-20.46

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Antenna gain (dBi) -10

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
1.4	23017	699.7	QPSK	1	0	22.74	12.74	34.77	-22.03
				1	5	22.68	12.68	34.77	-22.09
				3	2	21.90	11.90	34.77	-22.87
				6	0	21.36	11.36	34.77	-23.41
	23095	707.5	QPSK	1	0	22.66	12.66	34.77	-22.11
				1	5	22.67	12.67	34.77	-22.1
				3	2	21.62	11.62	34.77	-23.15
				6	0	21.57	11.57	34.77	-23.2
	23173	715.5	QPSK	1	0	22.56	12.56	34.77	-22.21
				1	5	22.96	<b>12.96</b>	34.77	-21.81
				3	2	21.50	11.50	34.77	-23.27
				6	0	21.55	11.55	34.77	-23.22
	23017	699.7	16QAM	1	0	21.12	11.12	34.77	-23.65
				1	5	21.58	11.58	34.77	-23.19
				3	2	20.72	10.72	34.77	-24.05
				6	0	19.65	9.65	34.77	-25.12
	23095	707.5	16QAM	1	0	21.42	11.42	34.77	-23.35
				1	5	21.48	11.48	34.77	-23.29
				3	2	20.59	10.59	34.77	-24.18
				6	0	19.54	9.54	34.77	-25.23
	23173	715.5	16QAM	1	0	21.68	<b>11.68</b>	34.77	-23.09
				1	5	21.63	11.63	34.77	-23.14
				3	2	20.74	10.74	34.77	-24.03
				6	0	19.65	9.65	34.77	-25.12

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Antenna gain (dBi) -10

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
3	23025	700.5	QPSK	1	0	22.95	<b>12.95</b>	34.77	-21.82
				1	14	22.68	12.68	34.77	-22.09
				8	4	21.76	11.76	34.77	-23.01
				15	0	21.83	11.83	34.77	-22.94
	23095	707.5	QPSK	1	0	22.77	12.77	34.77	-22
				1	14	22.81	12.81	34.77	-21.96
				8	4	21.85	11.85	34.77	-22.92
				15	0	21.86	11.86	34.77	-22.91
	23165	714.5	QPSK	1	0	22.71	12.71	34.77	-22.06
				1	14	22.39	12.39	34.77	-22.38
				8	4	21.91	11.91	34.77	-22.86
				15	0	21.89	11.89	34.77	-22.88
	23025	700.5	16QAM	1	0	21.07	11.07	34.77	-23.7
				1	14	21.01	11.01	34.77	-23.76
				8	4	20.99	10.99	34.77	-23.78
				15	0	20.92	10.92	34.77	-23.85
	23095	707.5	16QAM	1	0	21.57	11.57	34.77	-23.2
				1	14	21.89	11.89	34.77	-22.88
				8	4	20.99	10.99	34.77	-23.78
				15	0	20.88	10.88	34.77	-23.89
	23165	714.5	16QAM	1	0	21.84	11.84	34.77	-22.93
				1	14	21.96	<b>11.96</b>	34.77	-22.81
				8	4	20.97	10.97	34.77	-23.8
				15	0	20.72	10.72	34.77	-24.05

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Antenna gain (dBi) -10

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
5	23035	701.5	QPSK	1	0	22.76	12.76	34.77	-22.01
				1	24	22.79	12.79	34.77	-21.98
				12	6	21.80	11.80	34.77	-22.97
				25	0	21.75	11.75	34.77	-23.02
	23095	707.5	QPSK	1	0	22.95	<b>12.95</b>	34.77	-21.82
				1	24	22.81	12.81	34.77	-21.96
				12	6	21.96	11.96	34.77	-22.81
				25	0	21.96	11.96	34.77	-22.81
	23155	713.5	QPSK	1	0	22.87	12.87	34.77	-21.9
				1	24	22.55	12.55	34.77	-22.22
				12	6	21.77	11.77	34.77	-23
				25	0	21.84	11.84	34.77	-22.93
	23035	701.5	16QAM	1	0	21.72	11.72	34.77	-23.05
				1	24	21.81	<b>11.81</b>	34.77	-22.96
				12	6	20.92	10.92	34.77	-23.85
				25	0	20.75	10.75	34.77	-24.02
	23095	707.5	16QAM	1	0	21.71	11.71	34.77	-23.06
				1	24	21.58	11.58	34.77	-23.19
				12	6	20.85	10.85	34.77	-23.92
				25	0	20.87	10.87	34.77	-23.9
	23155	713.5	16QAM	1	0	21.42	11.42	34.77	-23.35
				1	24	21.79	11.79	34.77	-22.98
				12	6	20.82	10.82	34.77	-23.95
				25	0	20.76	10.76	34.77	-24.01

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Antenna gain (dBi) -10

LTE Band 12_Uplink frequency band : 699 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
10	23060	704	QPSK	1	0	22.76	12.76	34.77	-22.01
				1	49	22.81	12.81	34.77	-21.96
				25	12	21.92	11.92	34.77	-22.85
				50	0	21.88	11.88	34.77	-22.89
	23095	707.5	QPSK	1	0	22.78	12.78	34.77	-21.99
				1	49	22.86	12.86	34.77	-21.91
				25	12	21.88	11.88	34.77	-22.89
				50	0	21.84	11.84	34.77	-22.93
	23130	711	QPSK	1	0	22.97	<b>12.97</b>	34.77	-21.8
				1	49	22.78	12.78	34.77	-21.99
				25	12	21.94	11.94	34.77	-22.83
				50	0	21.89	11.89	34.77	-22.88
	23060	704	16QAM	1	0	21.27	11.27	34.77	-23.5
				1	49	21.88	<b>11.88</b>	34.77	-22.89
				25	12	20.89	10.89	34.77	-23.88
				50	0	20.76	10.76	34.77	-24.01
	23095	707.5	16QAM	1	0	21.84	11.84	34.77	-22.93
				1	49	21.64	11.64	34.77	-23.13
				25	12	20.87	10.87	34.77	-23.9
				50	0	20.98	10.98	34.77	-23.79
	23130	711	16QAM	1	0	21.81	11.81	34.77	-22.96
				1	49	21.87	11.87	34.77	-22.9
				25	12	20.93	10.93	34.77	-23.84
				50	0	20.94	10.94	34.77	-23.83

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Antenna gain (dBi) -10

LTE Band 17_Uplink frequency band : 704 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
5	23755	706.5	QPSK	1	0	22.51	12.51	34.77	-22.26
				1	24	22.68	12.68	34.77	-22.09
				12	6	21.77	11.77	34.77	-23
				25	0	21.83	11.83	34.77	-22.94
	23790	710	QPSK	1	0	22.84	12.84	34.77	-21.93
				1	24	22.84	12.84	34.77	-21.93
				12	6	21.83	11.83	34.77	-22.94
				25	0	21.84	11.84	34.77	-22.93
	23825	713.5	QPSK	1	0	22.85	<b>12.85</b>	34.77	-21.92
				1	24	22.80	12.80	34.77	-21.97
				12	6	21.88	11.88	34.77	-22.89
				25	0	21.86	11.86	34.77	-22.91
	23755	706.5	16QAM	1	0	21.66	11.66	34.77	-23.11
				1	24	21.66	11.66	34.77	-23.11
				12	6	20.82	10.82	34.77	-23.95
				25	0	20.99	10.99	34.77	-23.78
	23790	710	16QAM	1	0	21.90	11.90	34.77	-22.87
				1	24	21.94	<b>11.94</b>	34.77	-22.83
				12	6	20.52	10.52	34.77	-24.25
				25	0	20.73	10.73	34.77	-24.04
23825	713.5	16QAM	1	0	21.44	11.44	34.77	-23.33	
			1	24	21.60	11.60	34.77	-23.17	
			12	6	20.73	10.73	34.77	-24.04	
			25	0	20.88	10.88	34.77	-23.89	

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Antenna gain (dBi) -10

LTE Band 17_Uplink frequency band : 704 to 716 MHz									
BW (MHz)	UL Channel	Frequency (MHz)	Modulation	RB Size	RB Offset	Conducted Average (dBm)	ERP Average (dBm)	ERP Limit (dBm)	Margin (dB)
10	23780	709	QPSK	1	0	22.72	12.72	34.77	-22.05
				1	49	22.72	12.72	34.77	-22.05
				25	12	21.83	11.83	34.77	-22.94
				50	0	21.77	11.77	34.77	-23
	23790	710	QPSK	1	0	22.95	<b>12.95</b>	34.77	-21.82
				1	49	22.68	12.68	34.77	-22.09
				25	12	21.66	11.66	34.77	-23.11
				50	0	21.71	11.71	34.77	-23.06
	23800	711	QPSK	1	0	22.68	12.68	34.77	-22.09
				1	49	22.77	12.77	34.77	-22
				25	12	21.74	11.74	34.77	-23.03
				50	0	21.71	11.71	34.77	-23.06
	23780	709	16QAM	1	0	21.57	11.57	34.77	-23.2
				1	49	21.60	11.60	34.77	-23.17
				25	12	20.93	10.93	34.77	-23.84
				50	0	20.72	10.72	34.77	-24.05
	23790	710	16QAM	1	0	21.18	11.18	34.77	-23.59
				1	49	21.87	<b>11.87</b>	34.77	-22.9
				25	12	20.70	10.70	34.77	-24.07
				50	0	20.65	10.65	34.77	-24.12
23800	711	16QAM	1	0	21.35	11.35	34.77	-23.42	
			1	49	21.46	11.46	34.77	-23.31	
			25	12	20.99	10.99	34.77	-23.78	
			50	0	20.59	10.59	34.77	-24.18	

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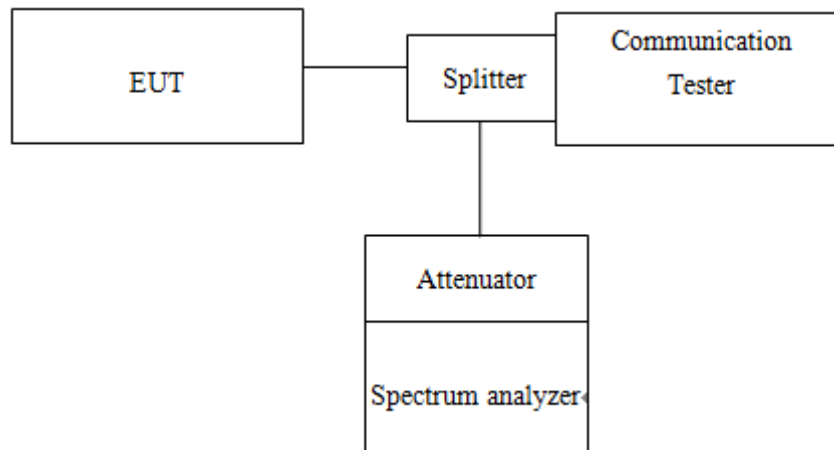
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## 7. OCCUPIED BANDWIDTH MEASUREMENT

### 7.1. 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.

### 7.2. Test Set-up



### 7.3. Measurement Procedure

#### **99% &26dB Bandwidth with detector peak**

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

#### **99% Bandwidth with detector sample**

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

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#### 7.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	Apr. 09th, 2018	Apr. 08th, 2019
Radio Communication Analyser	Anritsu	MT8815B	6200711454	Apr. 05th, 2018	Apr. 04th, 2019
Radio Communication Analyser	Anritsu	MT8820C	6200995019	Apr. 05th, 2018	Apr. 04th, 2019
DC Power Supply	Anritsu	E3640A	MY52410006	Nov. 28th, 2017	Nov. 27th, 2018
Attenuator	Mini-Circuit	BW-S10W2+	2	Jan. 02nd, 2018	Jan. 01st, 2019
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	Jan. 02nd, 2018	Jan. 01st, 2019
Coaxial Cables	N/A	WK CE Cable	N/A	Jan. 02nd, 2018	Jan. 01st, 2019

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## 7.5. Measurement Result

Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		GSM 850	GPRS 850	GPRS 850	GPRS 850
824.2	128	0.24652	<b>0.24650</b>	<b>0.320</b>	0.315
836.6	190	<b>0.24998</b>	0.24310	0.311	0.314
848.8	251	0.24733	0.24430	0.307	<b>0.321</b>

Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		GSM 1900	GPRS 1900	GSM 1900	GPRS 1900
1850.2	512	0.24354	0.24371	0.317	0.318
1880.0	661	<b>0.25101</b>	<b>0.24858</b>	0.317	<b>0.323</b>
1909.8	810	0.24544	0.24337	<b>0.320</b>	0.319

Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		WCDMA V	HSDPA V	HSUPA V	WCDMA V	HSDPA V	HSUPA V
826.40	4132	4.12050	4.10000	4.11400	4.683	<b>4.705</b>	4.692
836.60	4183	4.10620	4.12820	4.12110	<b>4.704</b>	4.686	4.696
846.60	4233	<b>4.12130</b>	<b>4.12860</b>	<b>4.12660</b>	4.702	4.704	<b>4.703</b>

LTE BAND 5 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
824.7	20407	1.0982	1.0976	<b>1.292</b>	<b>1.293</b>
836.5	20525	<b>1.0983</b>	1.0989	1.285	1.287
848.3	20643	<b>1.0983</b>	<b>1.1011</b>	1.283	1.292

LTE BAND 5 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
825.5	20415	2.6905	2.6968	<b>2.995</b>	2.972
836.5	20525	2.6929	2.6962	2.959	2.986
847.5	20635	<b>2.6947</b>	<b>2.7005</b>	2.993	<b>2.999</b>

LTE BAND 5 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
826.5	20425	4.4842	4.4802	4.978	4.960
836.5	20525	<b>4.4941</b>	<b>4.4921</b>	<b>5.017</b>	4.978
846.5	20625	4.4910	4.4898	5.001	<b>4.983</b>

LTE BAND 5 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
829.0	20450	8.9788	8.9361	9.783	9.748
836.5	20525	<b>8.9915</b>	<b>8.9630</b>	<b>9.852</b>	9.752
844.0	20600	8.9812	8.9383	9.767	<b>9.779</b>

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LTE BAND 12 Channel bandwidth: 1.4MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
699.7	23017	1.0957	1.0992	1.273	1.284
707.5	23095	1.0963	<b>1.0997</b>	1.281	<b>1.288</b>
715.3	23173	<b>1.0982</b>	1.0995	<b>1.299</b>	<b>1.288</b>

LTE BAND 12 Channel bandwidth: 3MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
700.5	23025	2.6930	2.6925	2.970	2.980
707.5	23095	2.6947	2.6977	<b>2.981</b>	<b>2.984</b>
714.5	23165	<b>2.6953</b>	<b>2.6987</b>	2.977	2.977

LTE BAND 12 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
701.5	23035	4.4805	4.4825	4.977	4.974
707.5	23095	<b>4.4914</b>	<b>4.4909</b>	<b>5.003</b>	<b>4.990</b>
713.5	23155	4.4778	4.4801	4.966	4.974

LTE BAND 12 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
704.0	23060	8.9874	8.9172	9.775	9.764
707.5	23095	<b>8.9993</b>	<b>8.9723</b>	9.863	<b>9.811</b>
711.0	23130	8.9862	8.9395	<b>9.877</b>	9.772

LTE BAND 17 Channel bandwidth: 5MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
706.5	23755	4.4814	4.4876	4.977	4.960
710.0	23790	<b>4.4914</b>	<b>4.4932</b>	5.003	<b>5.013</b>
713.5	23825	4.4800	4.4764	<b>5.024</b>	5.003

LTE BAND 17 Channel bandwidth: 10MHz					
Freq. (MHz)	CH	99% BW (MHz)		26 dB BW (MHz)	
		QPSK	16QAM	QPSK	16QAM
709.0	23780	<b>9.0187</b>	<b>8.9742</b>	9.865	<b>9.823</b>
710.0	23790	9.0013	8.9658	<b>9.935</b>	9.769
711.0	23800	8.9525	8.9480	9.861	9.736

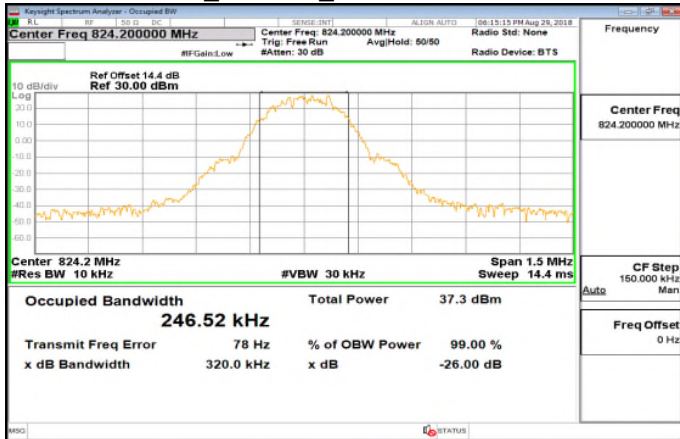
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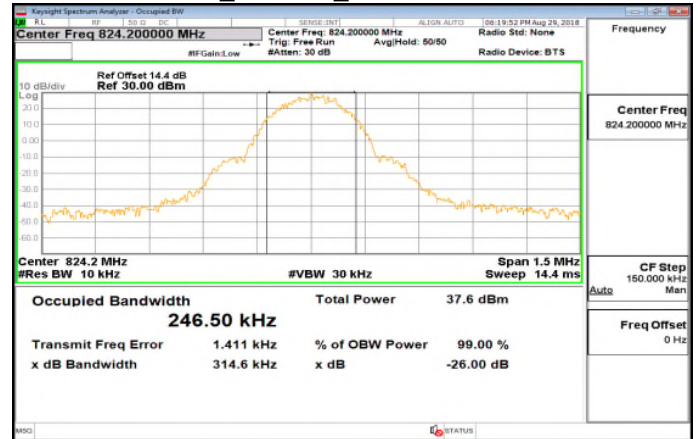
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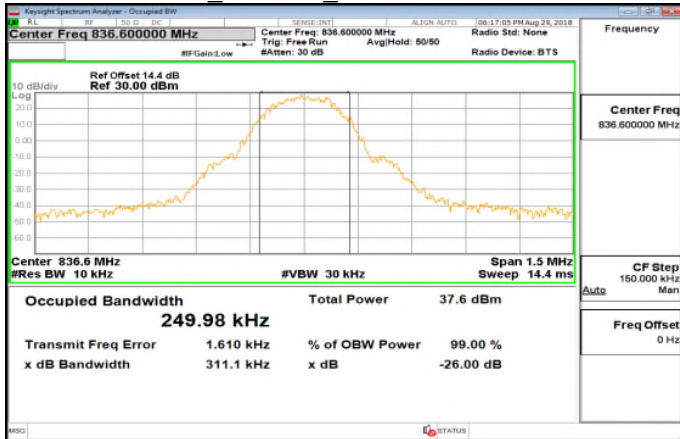
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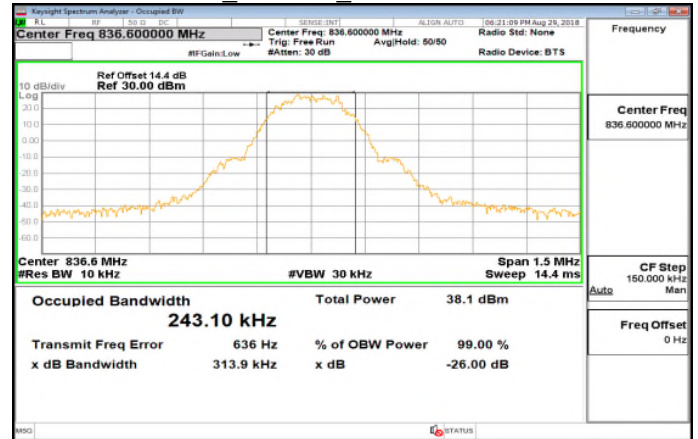
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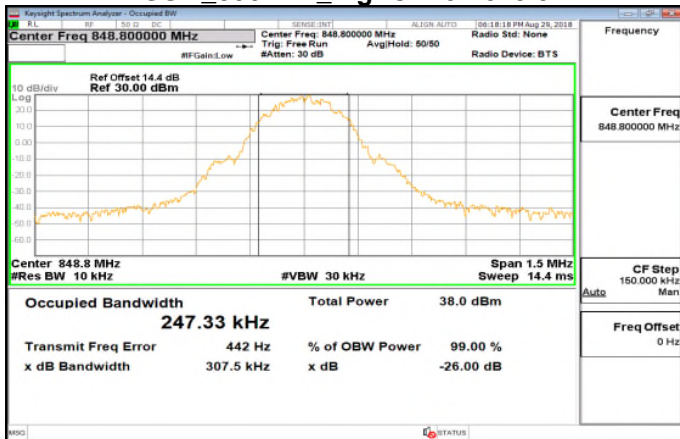
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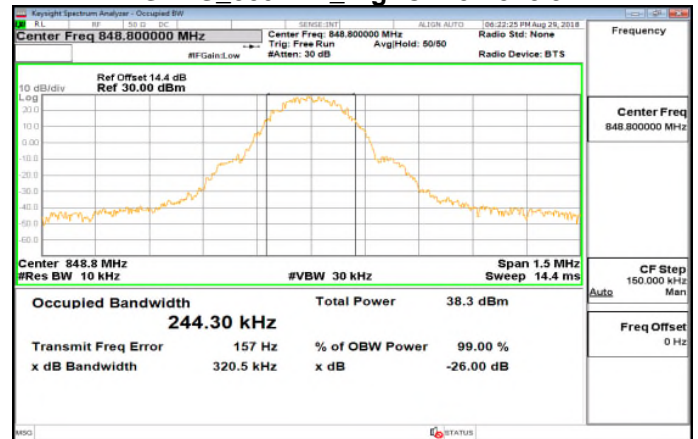
**GPRS 850MHz MidCH190-836.6**



**GSM 850MHz HighCH251-848.8**



**GPRS 850MHz HighCH251-848.8**



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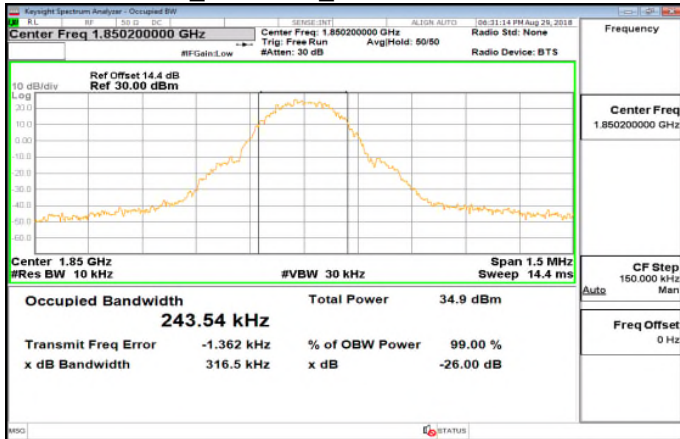
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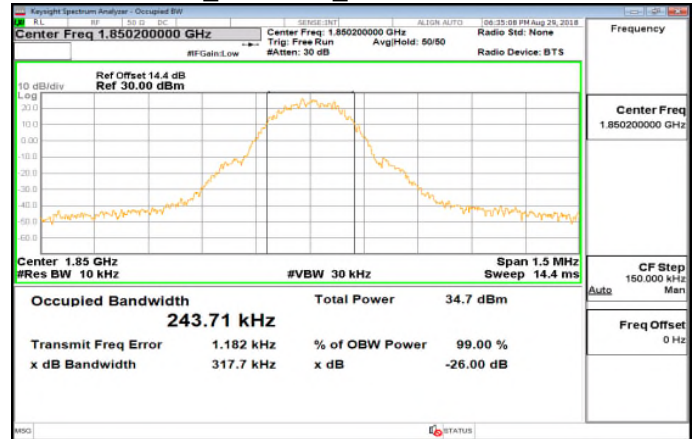
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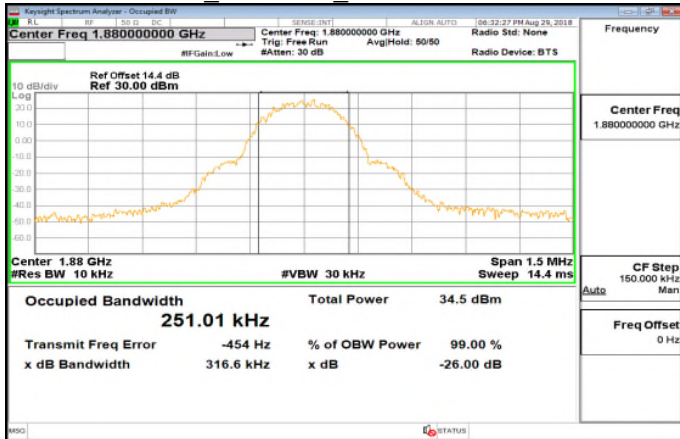
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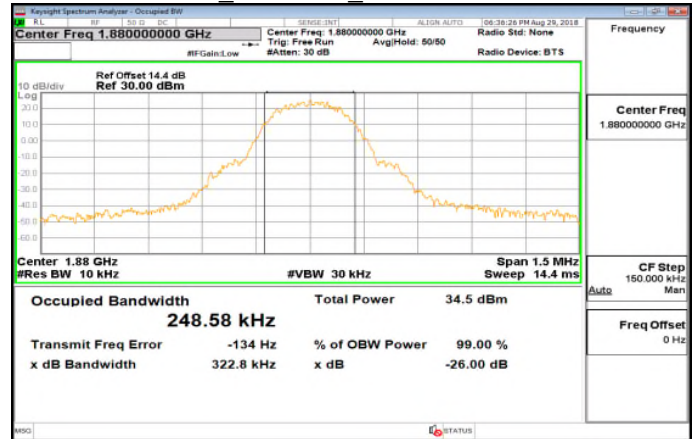
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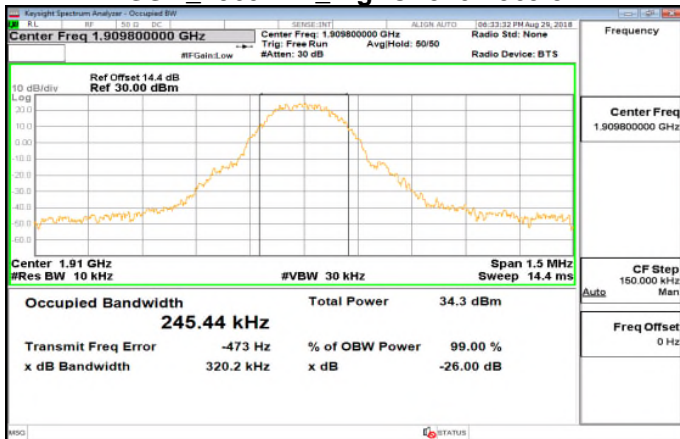
**GSM 1900MHz MidCH661-1880**



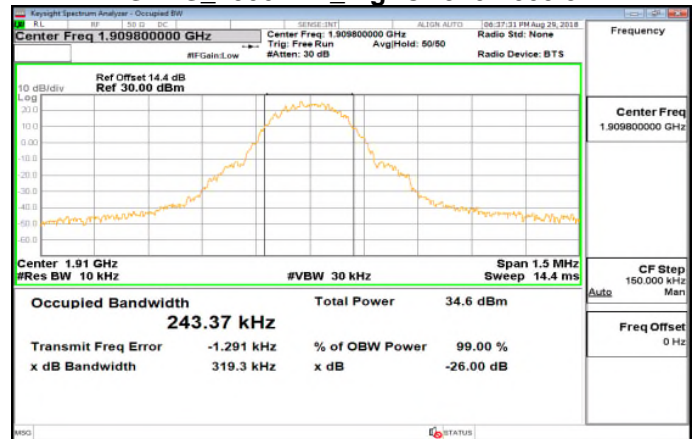
**GPRS 1900MHz MidCH661-1880**



**GSM 1900MHz HighCH810-1909.8**



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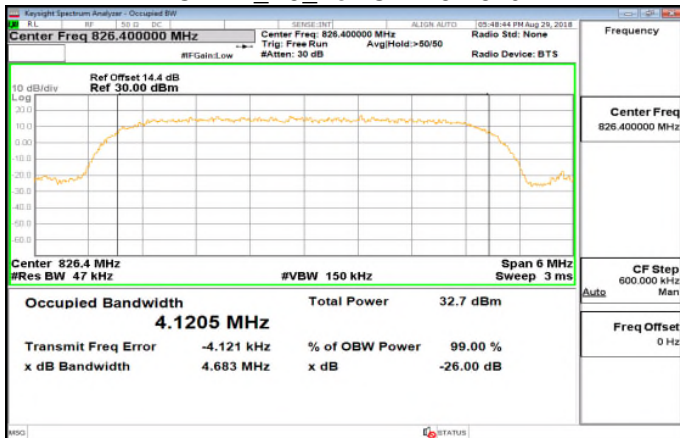
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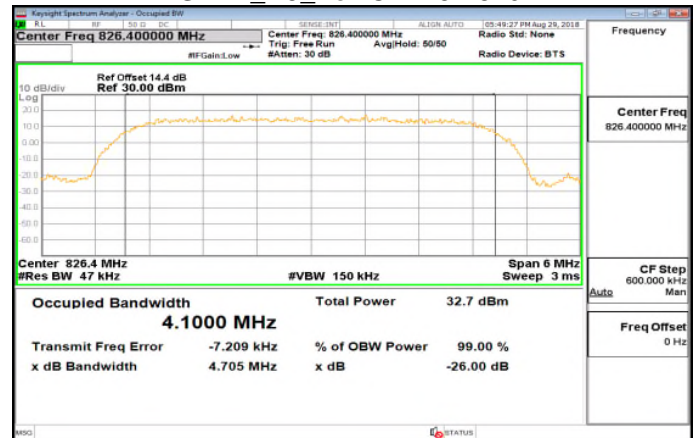
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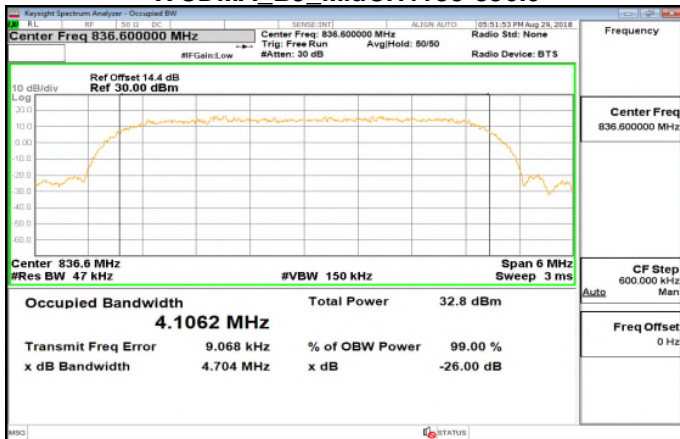
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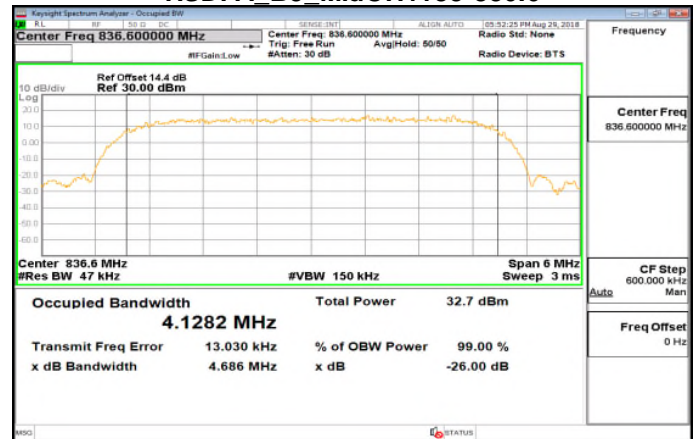
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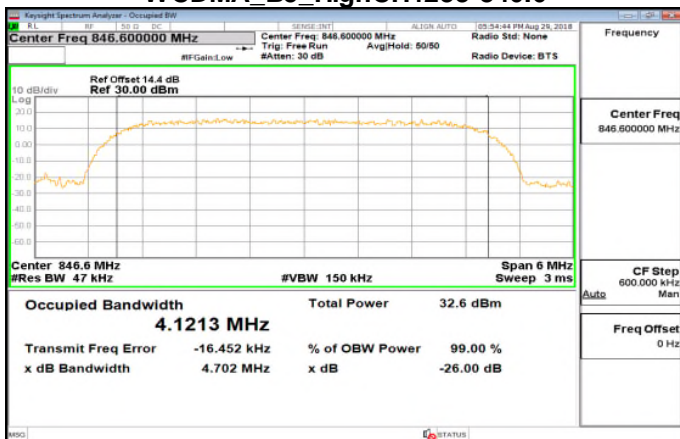
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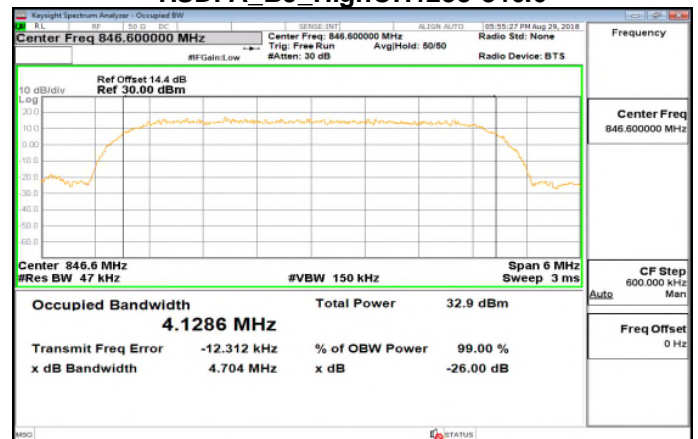
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### WCDMA B5 HighCH4233-846.6



### HSDPA B5 HighCH4233-846.6



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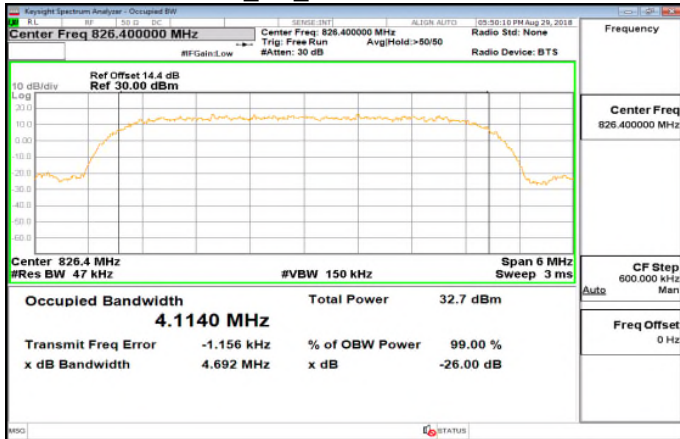
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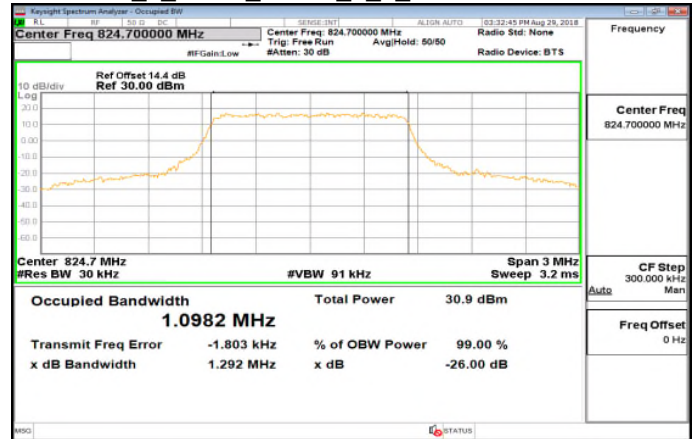
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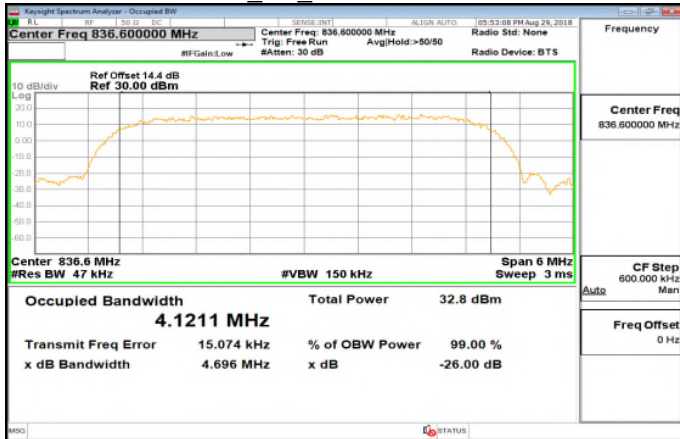
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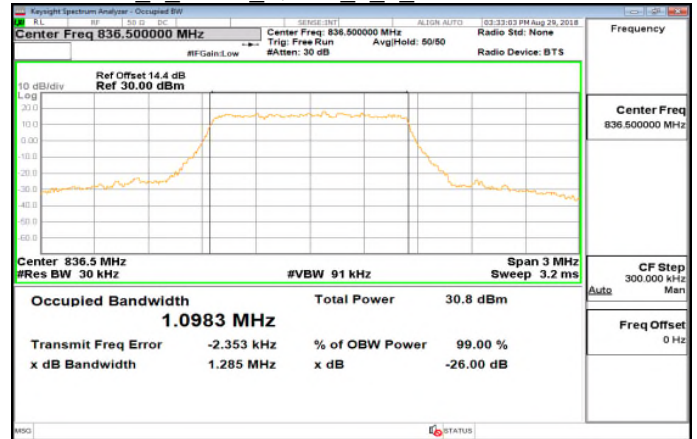
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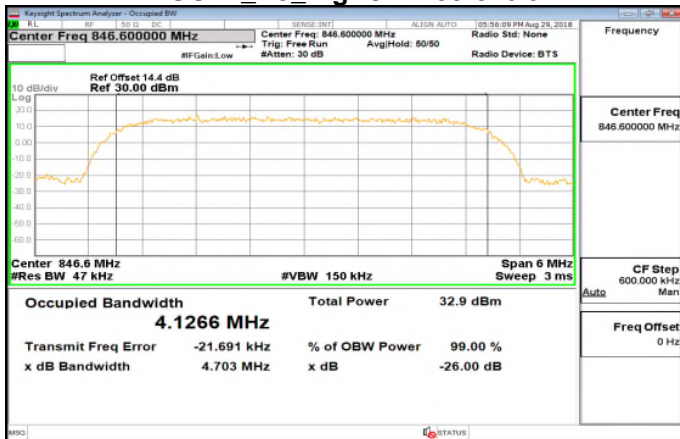
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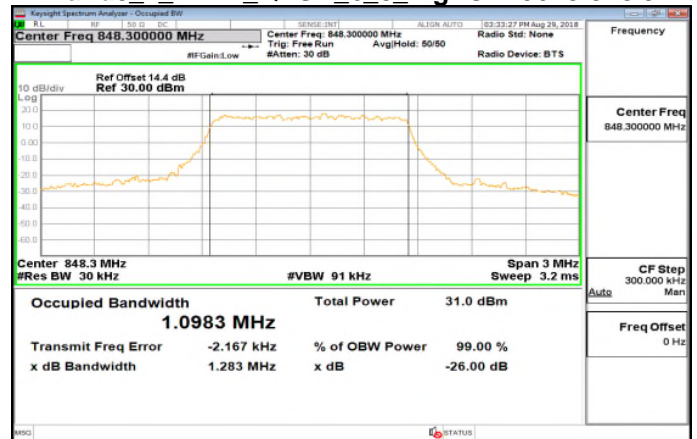
### Band5\_1\_4MHz\_QPSK\_6\_0\_MidCH20525-836.5



### HSUPA\_B5\_HighCH4233-846.6



### Band5\_1\_4MHz\_QPSK\_6\_0\_HighCH20643-848.3



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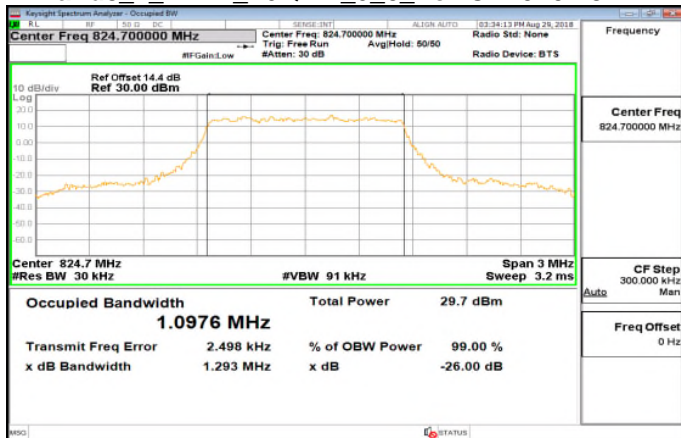
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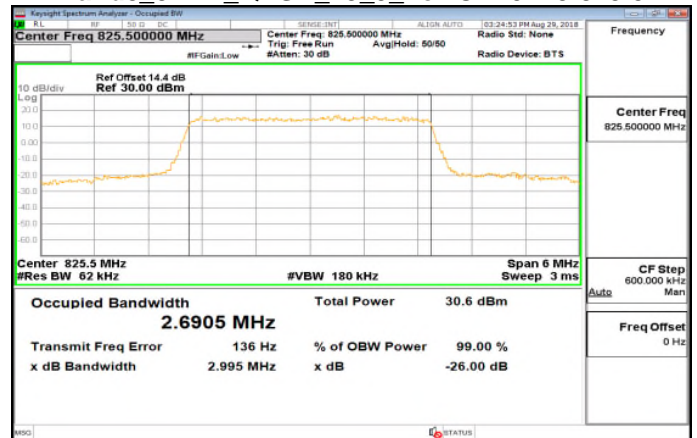
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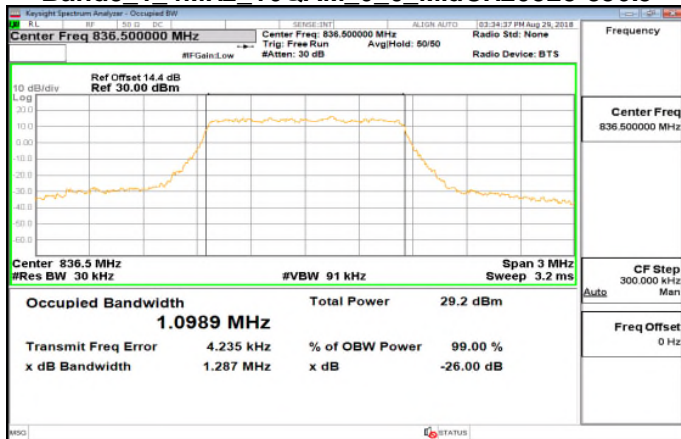
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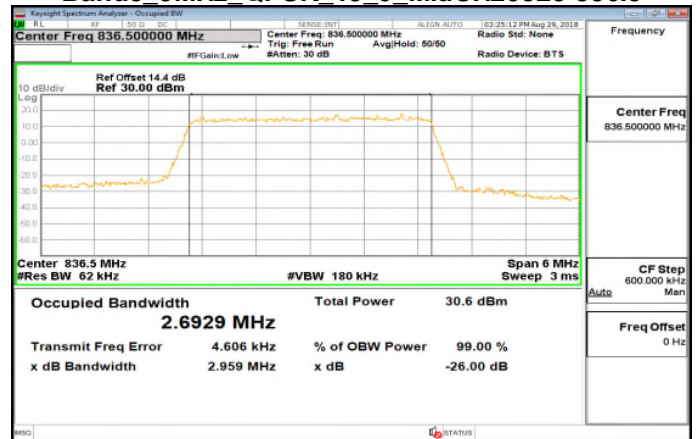
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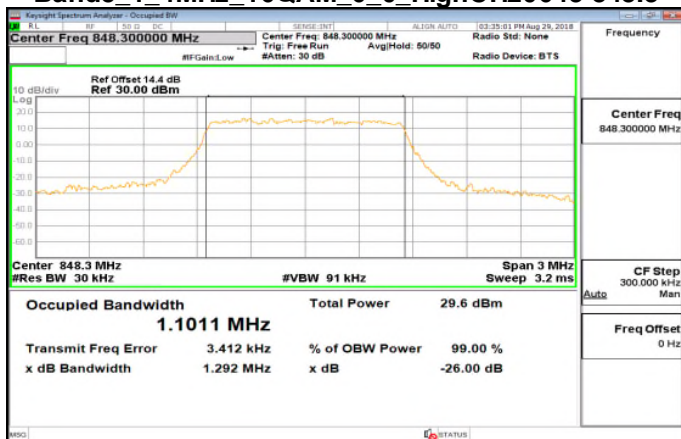
**Band5 1\_4MHz 16QAM 6\_0 MidCH20525-836.5**



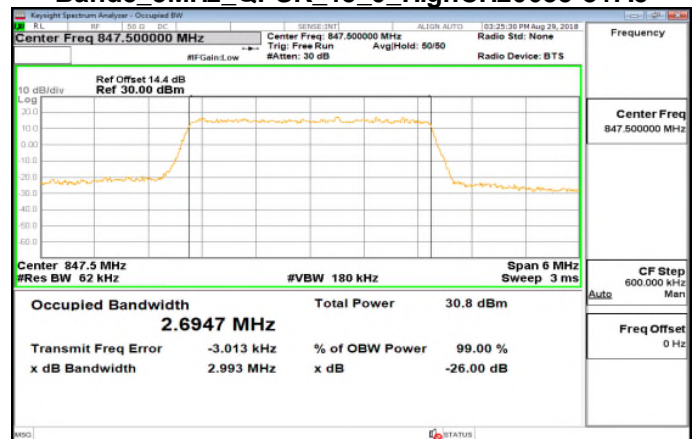
**Band5 3MHz QPSK 15\_0 MidCH20525-836.5**



**Band5 1\_4MHz 16QAM 6\_0 HighCH20643-848.3**



**Band5 3MHz QPSK 15\_0 HighCH20635-847.5**



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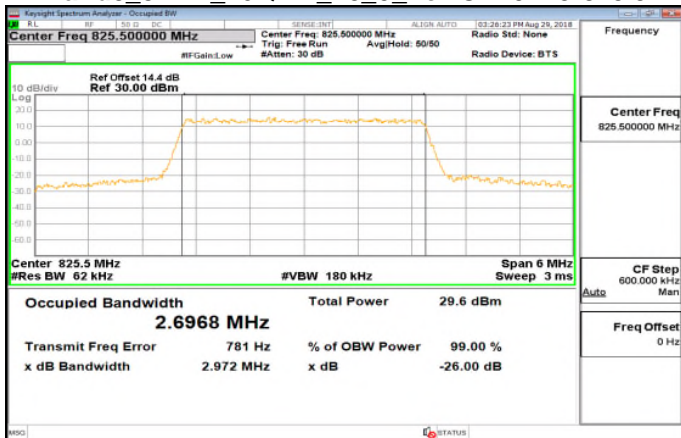
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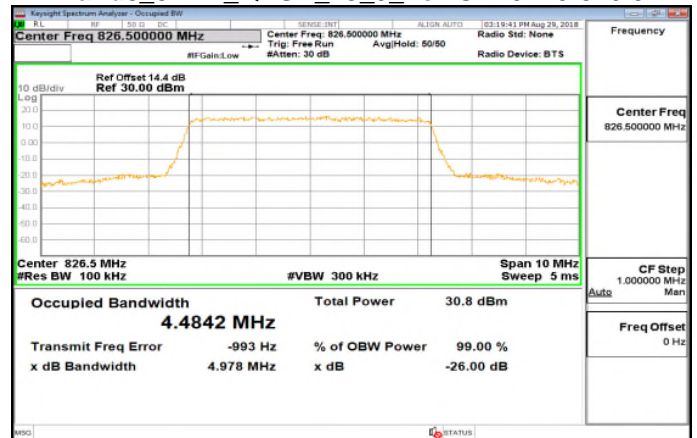
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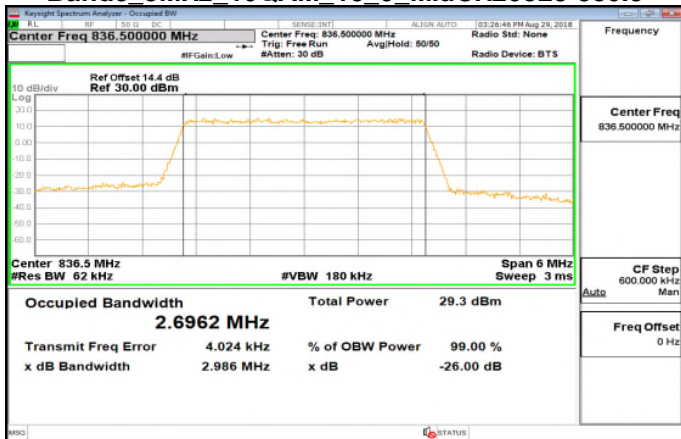
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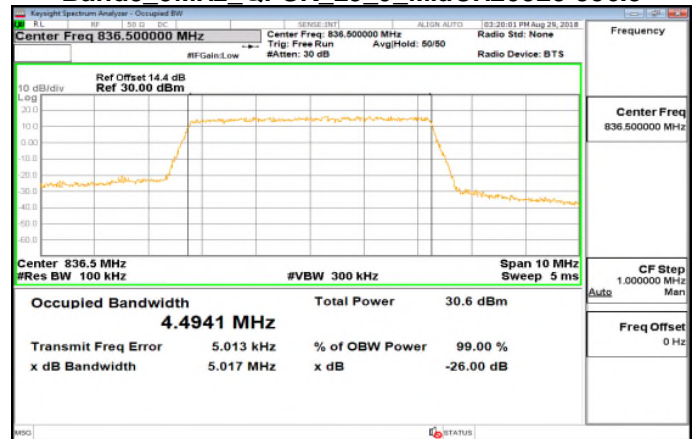
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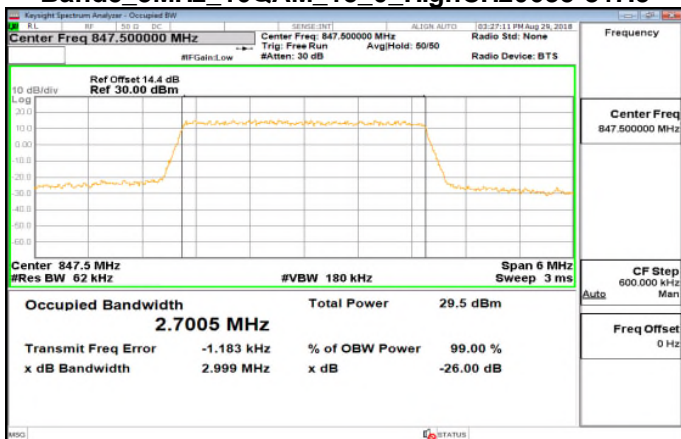
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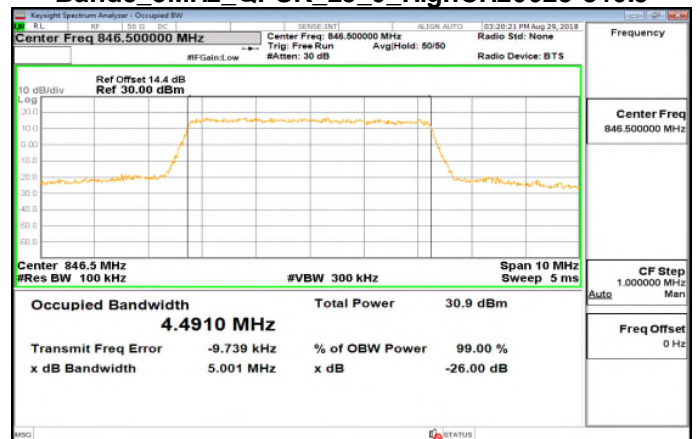
**Band5 5MHz QPSK 25 0 MidCH20525-836.5**



**Band5 3MHz 16QAM 15 0 HighCH20635-847.5**



**Band5 5MHz QPSK 25 0 HighCH20625-846.5**



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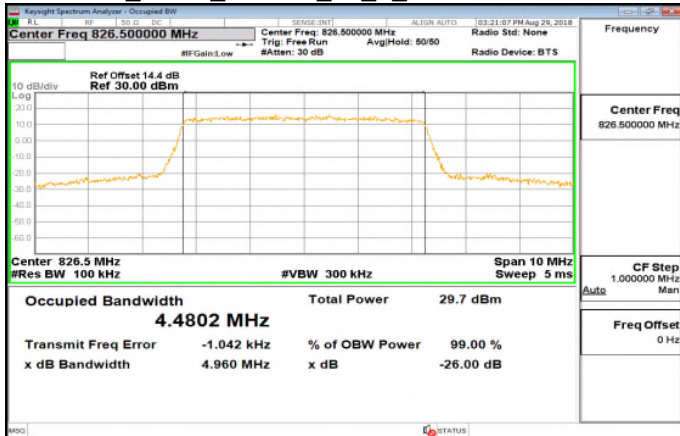
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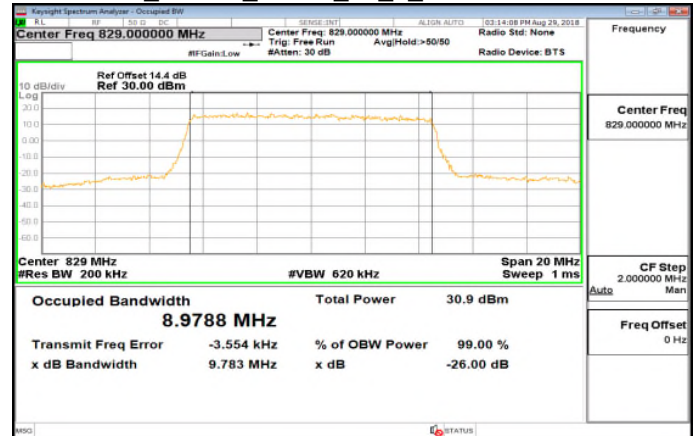
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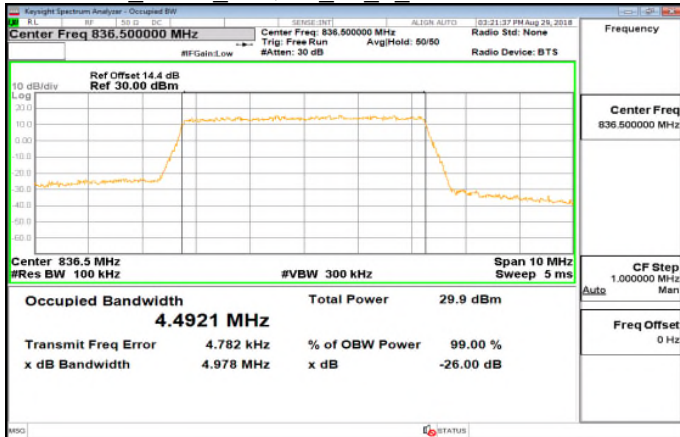
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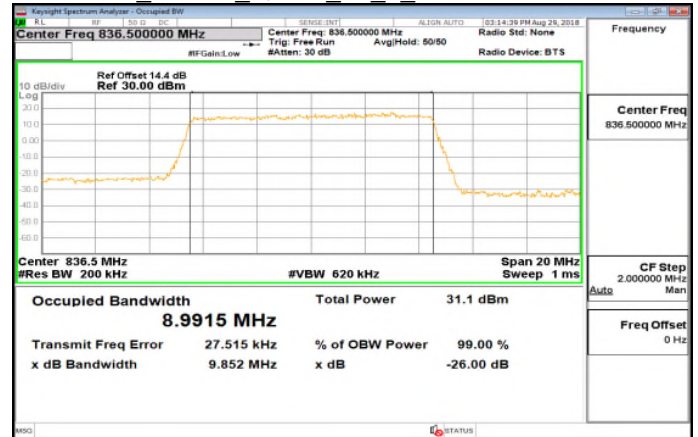
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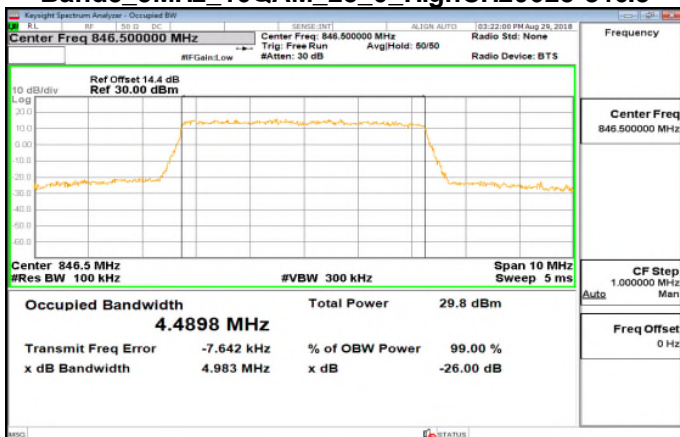
**Band5 5MHz 16QAM 25 0 MidCH20525-836.5**



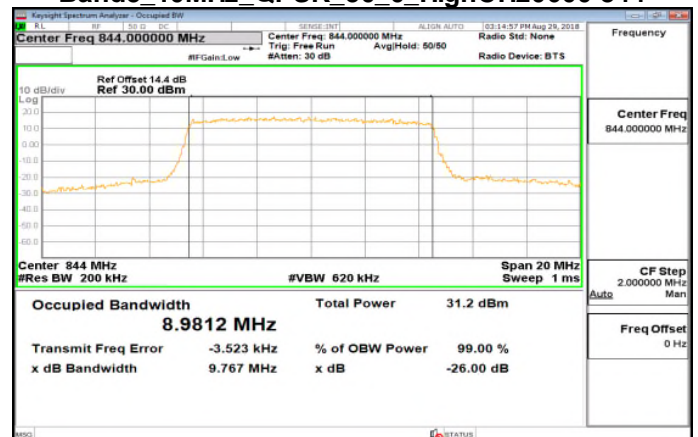
**Band5 10MHz QPSK 50 0 MidCH20525-836.5**



**Band5 5MHz 16QAM 25 0 HighCH20625-846.5**



**Band5 10MHz QPSK 50 0 HighCH20600-844**



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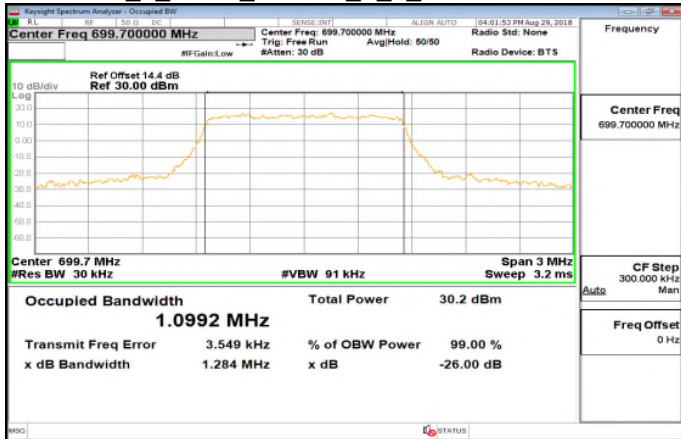
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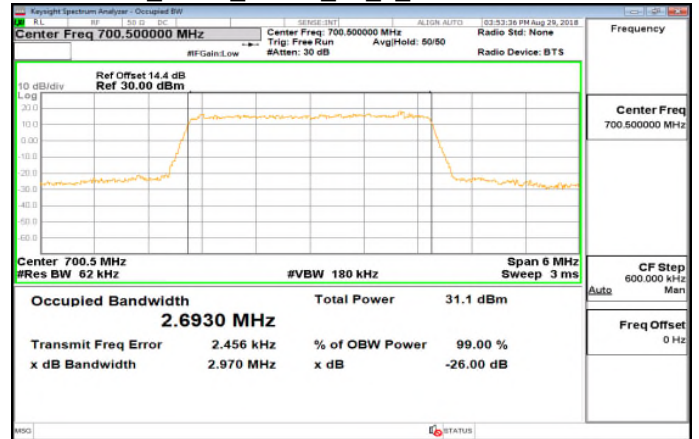




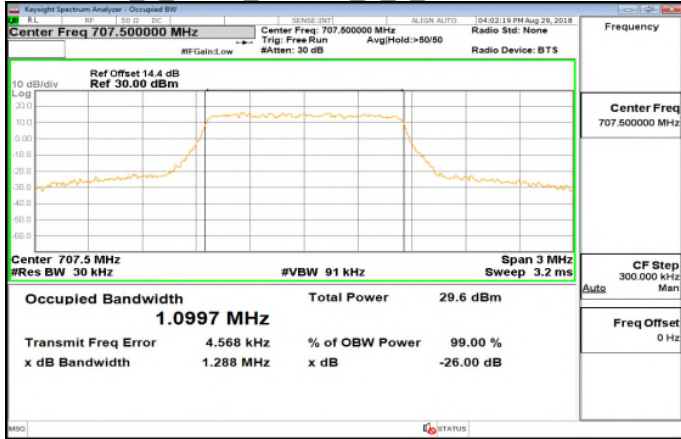
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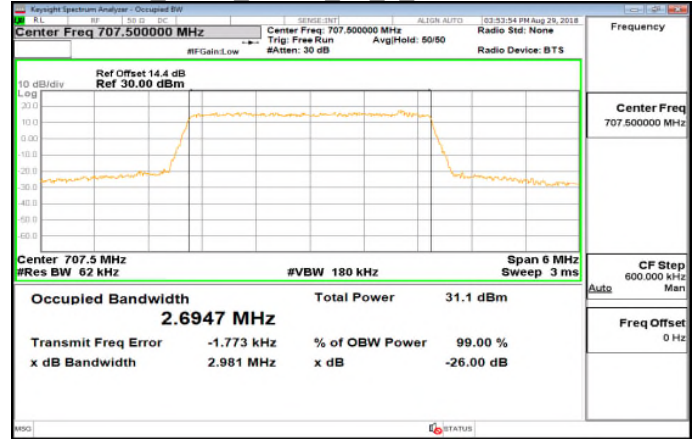
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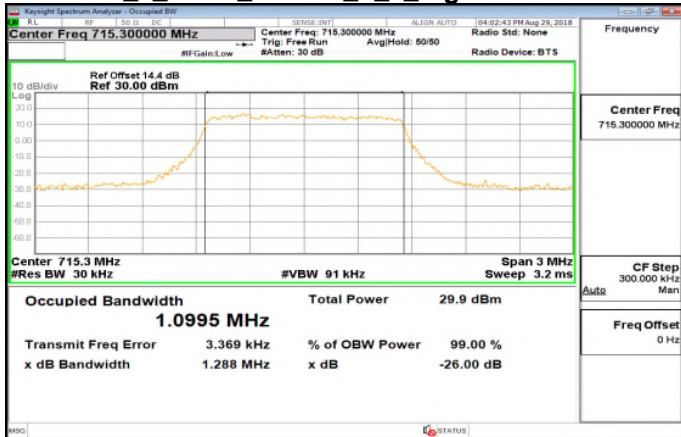
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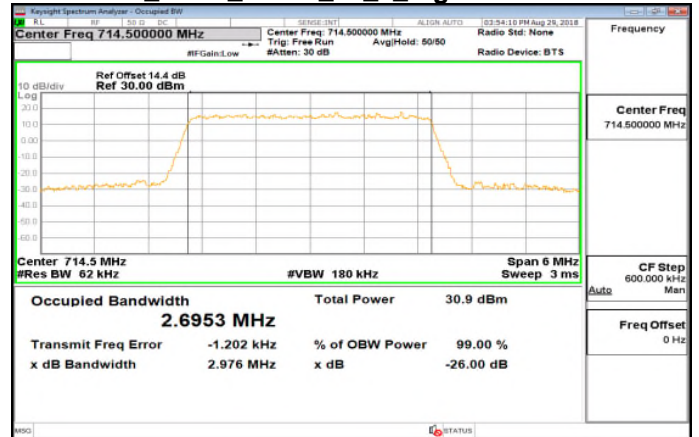
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**Band12 1 4MHz 16QAM 6 0 HighCH23173-715.3**



**Band12 3MHz QPSK 15 0 HighCH23165-714.5**



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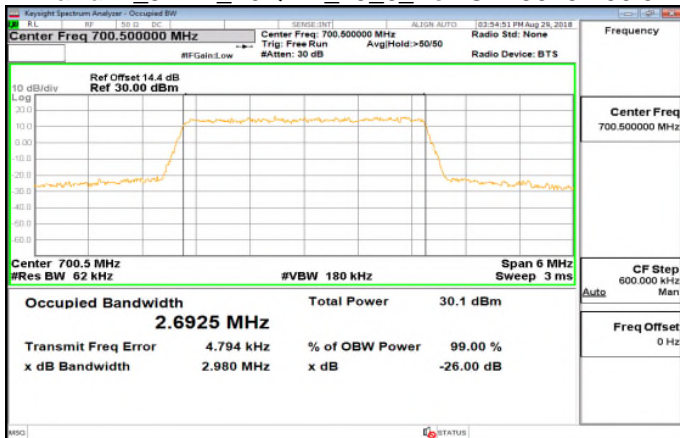
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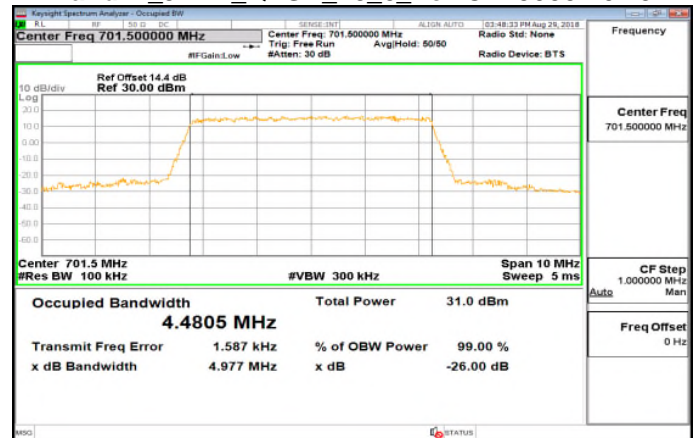
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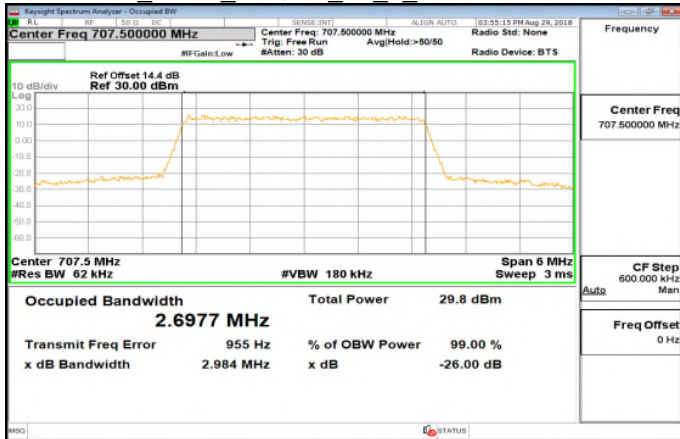
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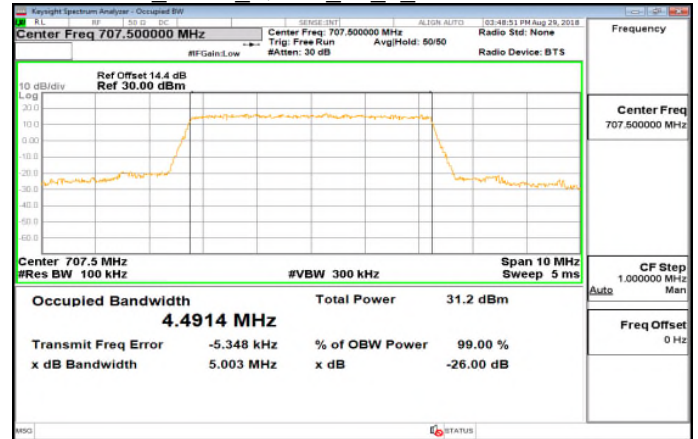
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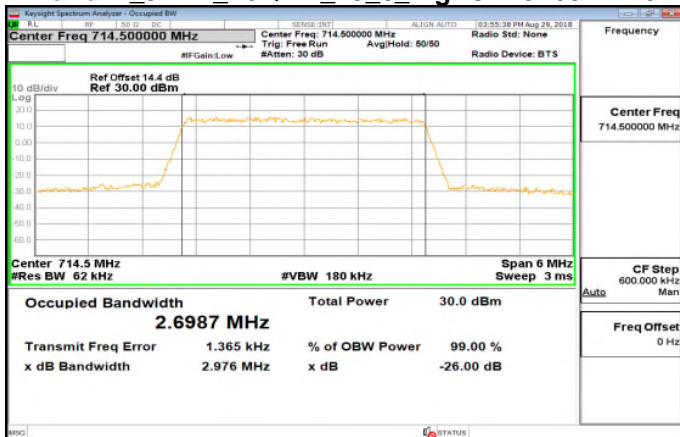
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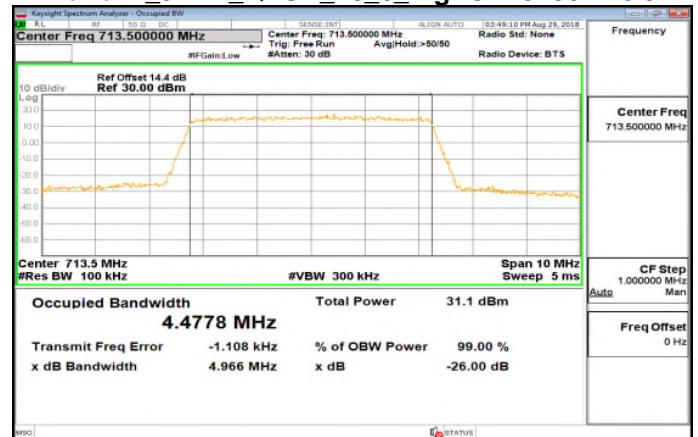
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**Band12\_3MHz\_16QAM\_15\_0\_HighCH23165-714.5**



**Band12\_5MHz\_QPSK\_25\_0\_HighCH23155-713.5**



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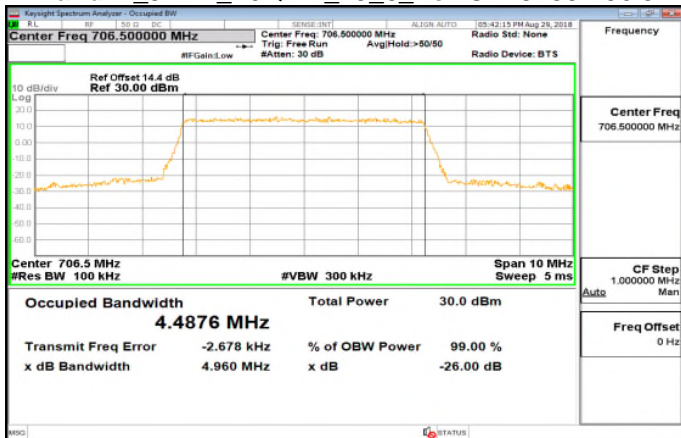




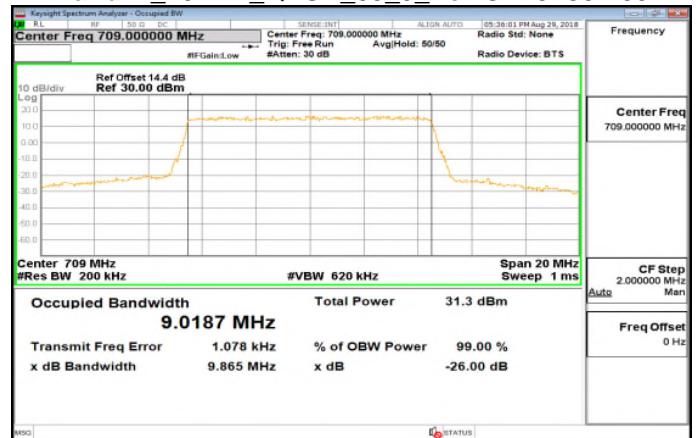




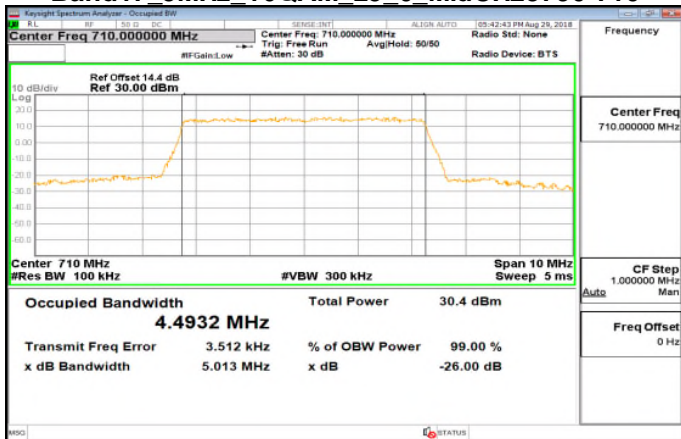
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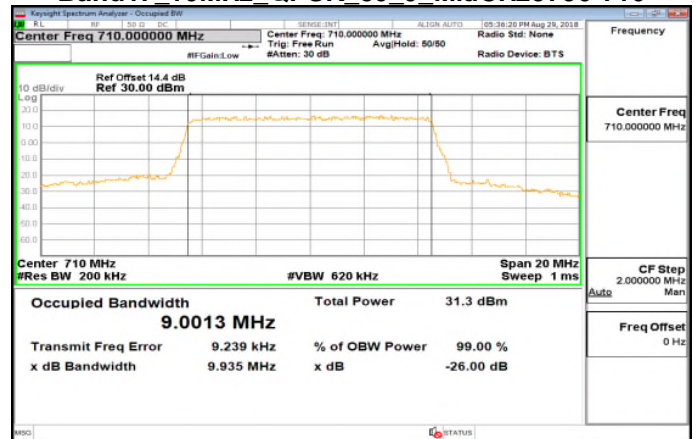
**Band17\_10MHz\_QPSK\_50\_0\_LowCH23780-709**



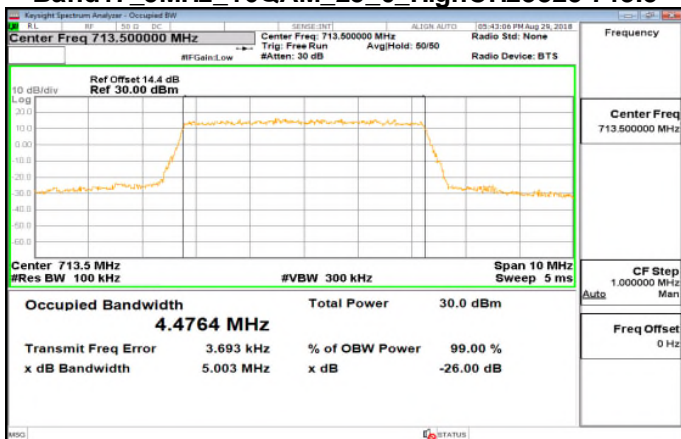
**Band17\_5MHz\_16QAM\_25\_0\_MidCH23790-710**



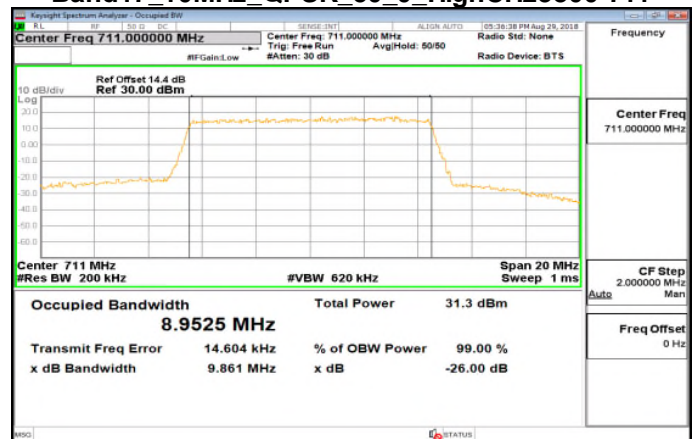
**Band17\_10MHz\_QPSK\_50\_0\_MidCH23790-710**



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



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



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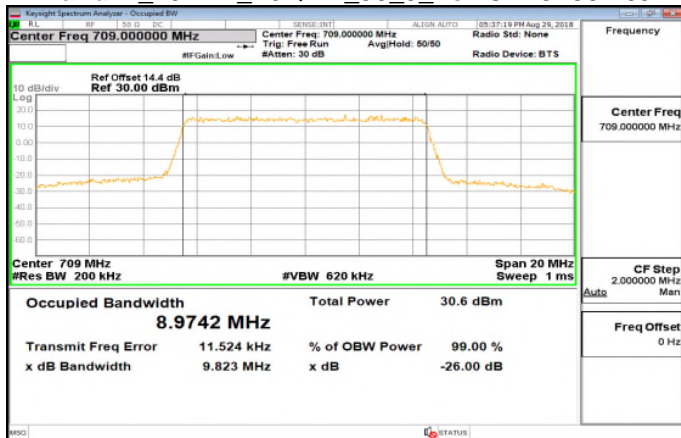
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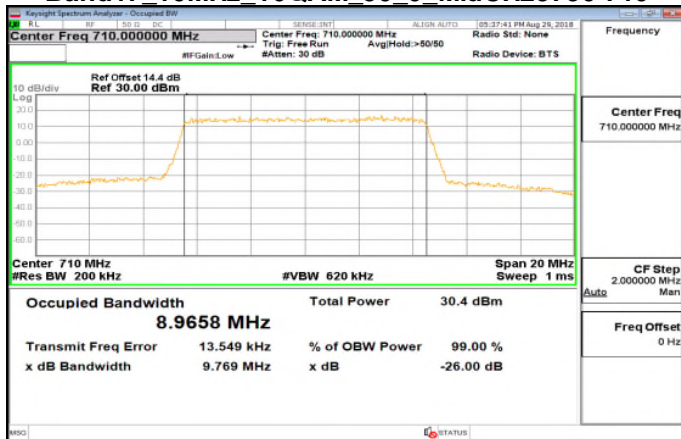
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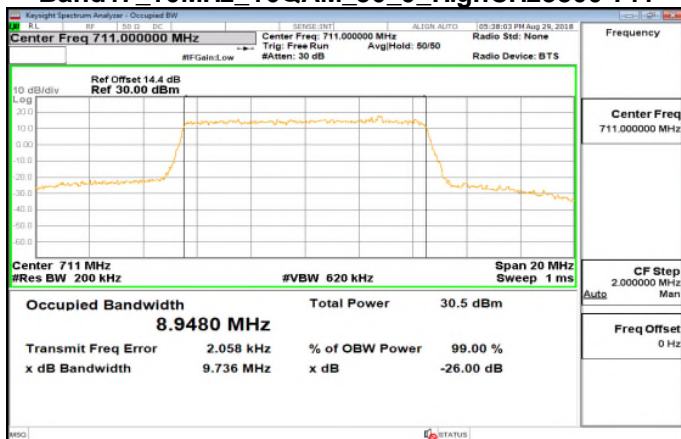
**Band17\_10MHz\_16QAM\_50\_0\_LowCH23780-709**



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



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



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## 8. OUT OF BAND EMISSION AT ANTENNA TERMINALS

### 8.1. Standard Applicable

FCC §22.917(a), §24.238(a), Out of band emissions. The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB..

#### 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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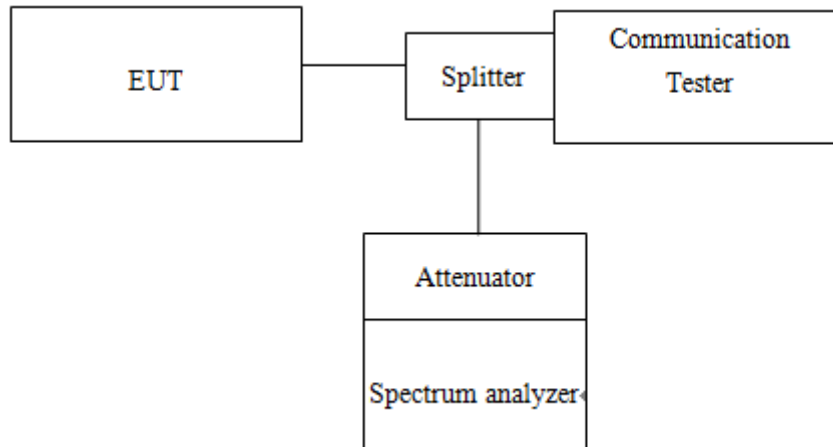
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## 8.2. Test SET-UP



## 8.3. 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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#### 8.4. Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
PXA Spectrum Analyzer	Agilent	N9030A	MY53120760	Apr. 09th, 2018	Apr. 08th, 2019
Radio Communication Analyser	Anritsu	MT8815B	6200711454	Apr. 05th, 2018	Apr. 04th, 2019
Radio Communication Analyser	Anritsu	MT8820C	6200995019	Apr. 05th, 2018	Apr. 04th, 2019
DC Power Supply	Anritsu	E3640A	MY52410006	Nov. 28th, 2017	Nov. 27th, 2018
Attenuator	Mini-Circuit	BW-S10W2+	2	Jan. 02nd, 2018	Jan. 01st, 2019
Splitter	RF-LAMBAD	RFLT2W1G18 G	11-JSPF412-018	Jan. 02nd, 2018	Jan. 01st, 2019
Coaxial Cables	N/A	WK CE Cable	N/A	Jan. 02nd, 2018	Jan. 01st, 2019

#### 8.5. 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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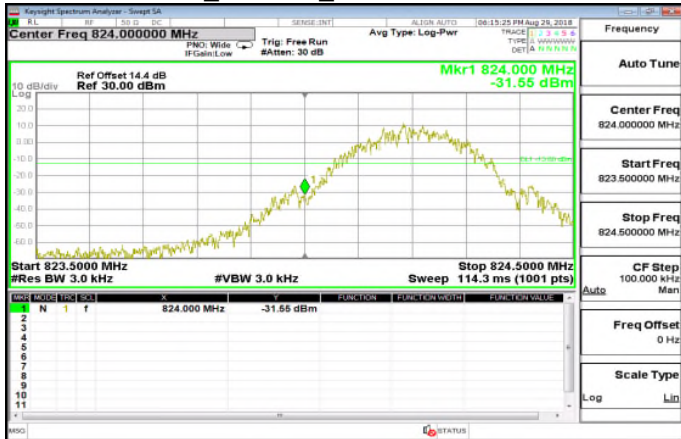
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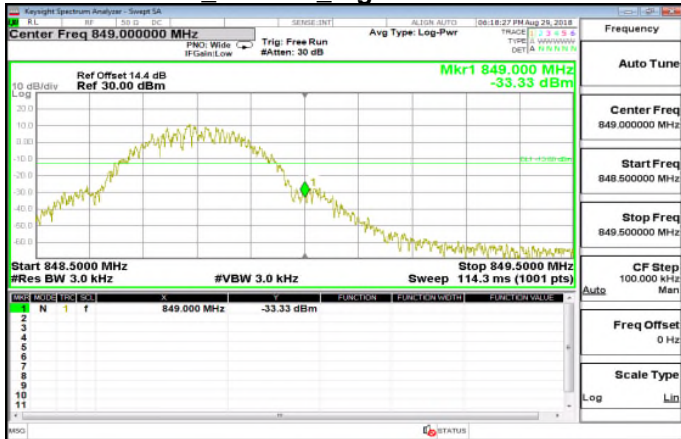
GSM 850MHz LowCH128-824.2



GPRS 850MHz HighCH251-848.8



GSM 850MHz HighCH251-848.8



GSM 1900MHz LowCH512-1850.2



GPRS 850MHz LowCH128-824.2



GSM 1900MHz HighCH810-1909.8



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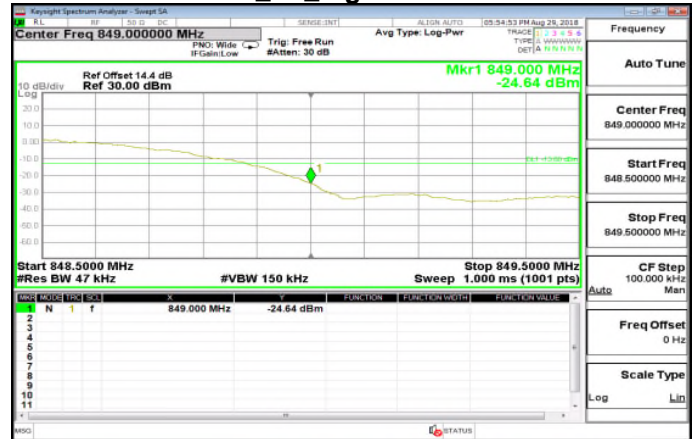
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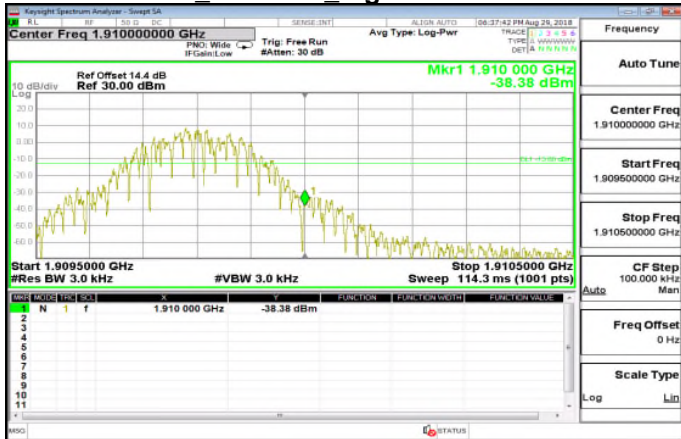
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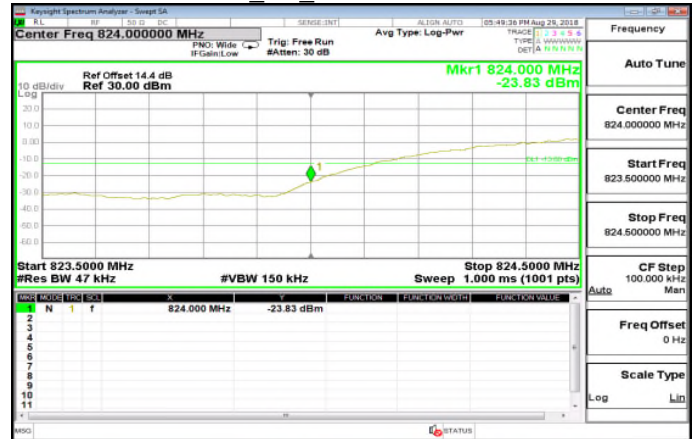
WCDMA\_B5\_HighCH4233-846.6



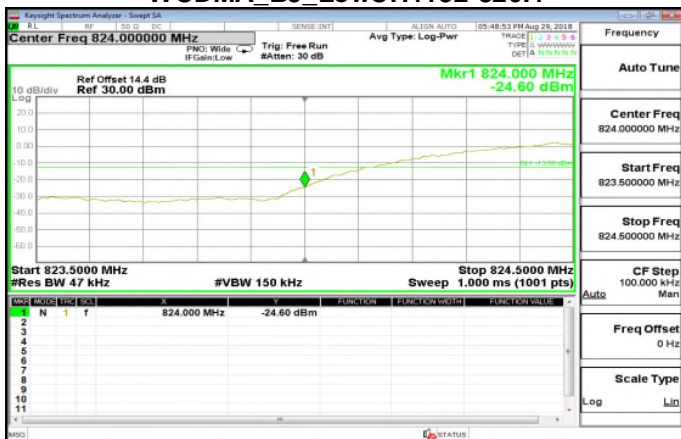
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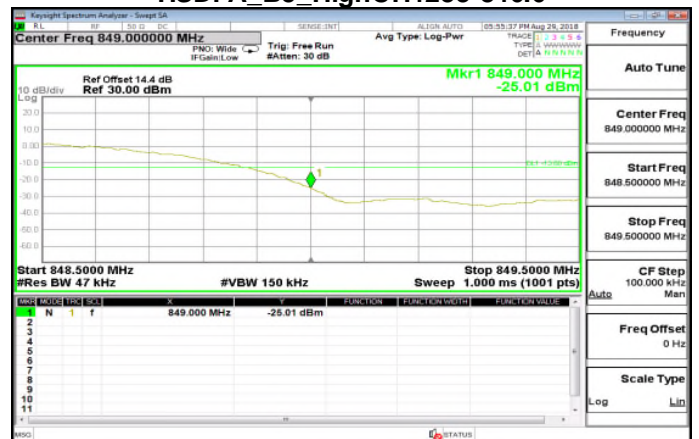
HSDPA\_B5\_LowCH4132-826.4



WCDMA\_B5\_LowCH4132-826.4



HSDPA\_B5\_HighCH4233-846.6



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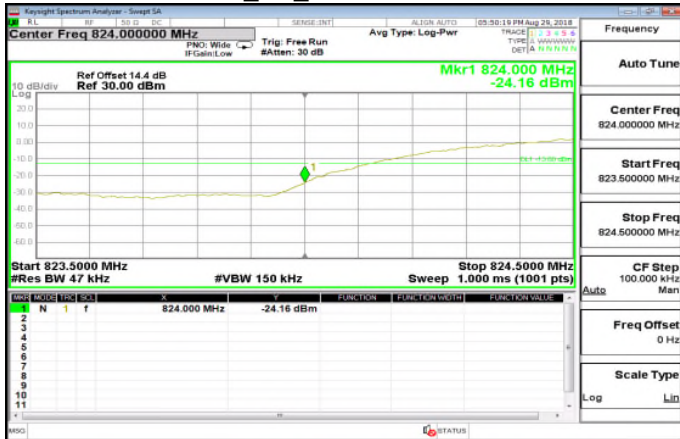
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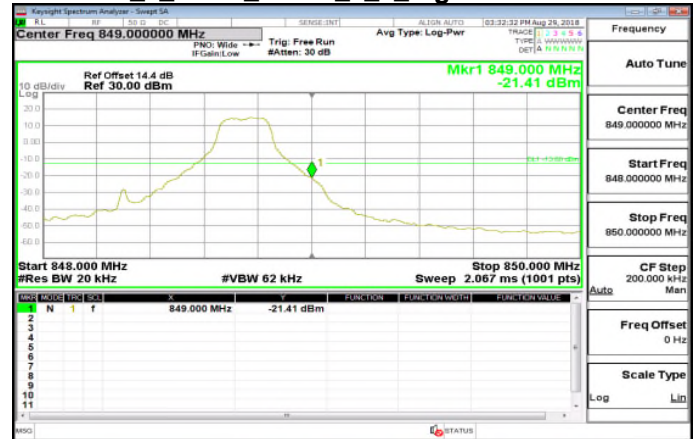
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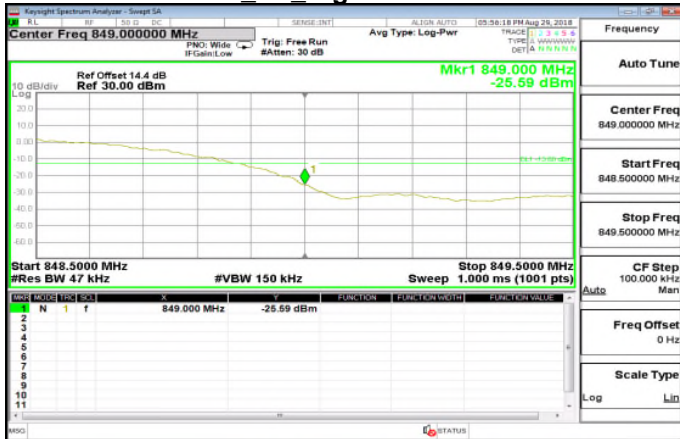
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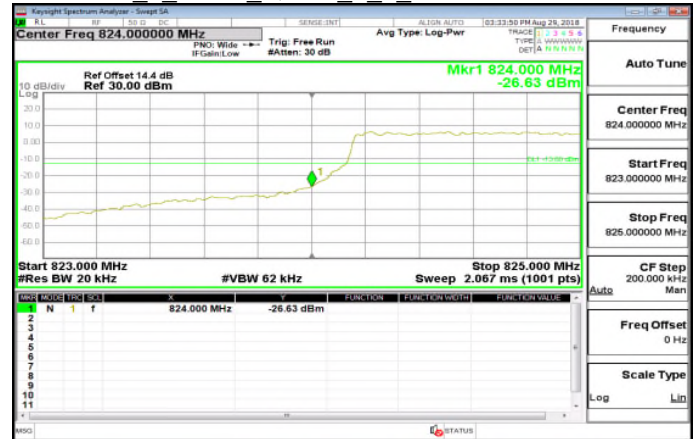
Band5 1 4MHz QPSK 1 5 HighCH20643-848.3



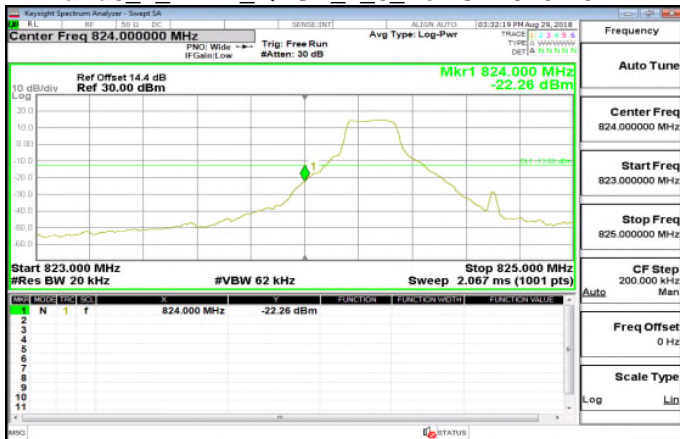
HSUPA B5 HighCH4233-846.6



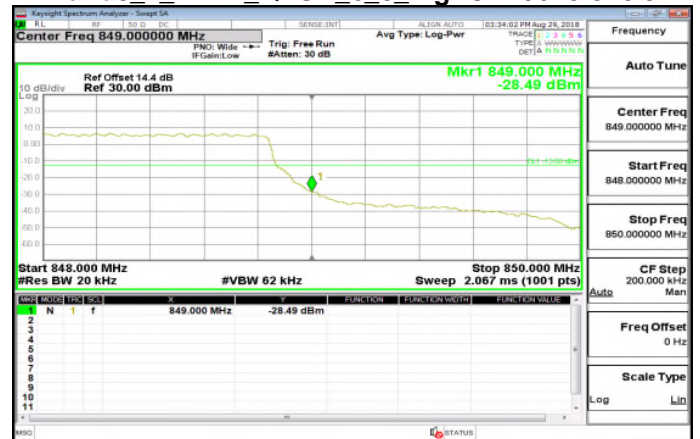
Band5 1 4MHz QPSK 6 0 LowCH20407-824.7



Band5 1 4MHz QPSK 1 0 LowCH20407-824.7



Band5 1 4MHz QPSK 6 0 HighCH20643-848.3



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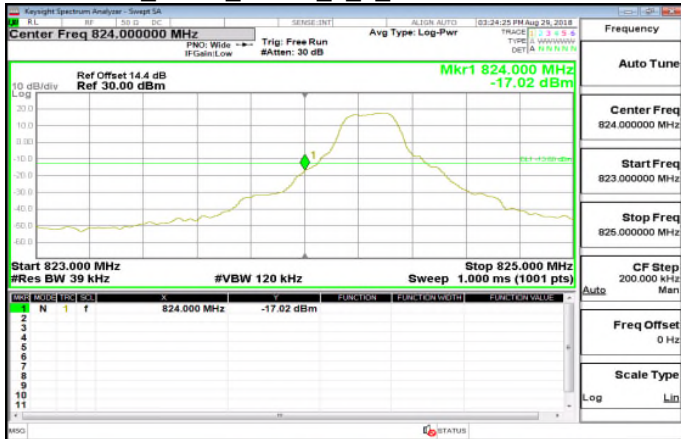
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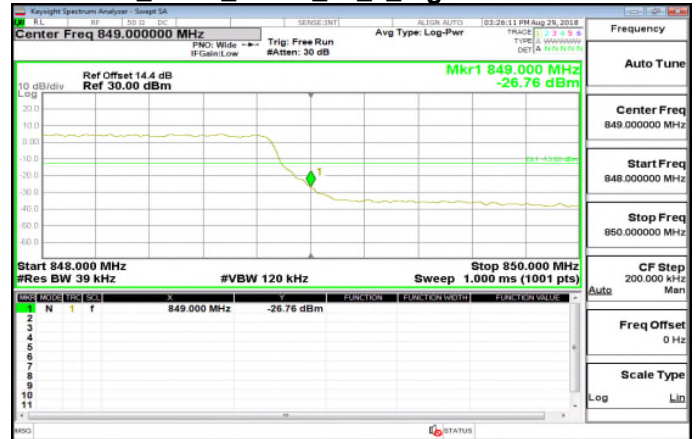
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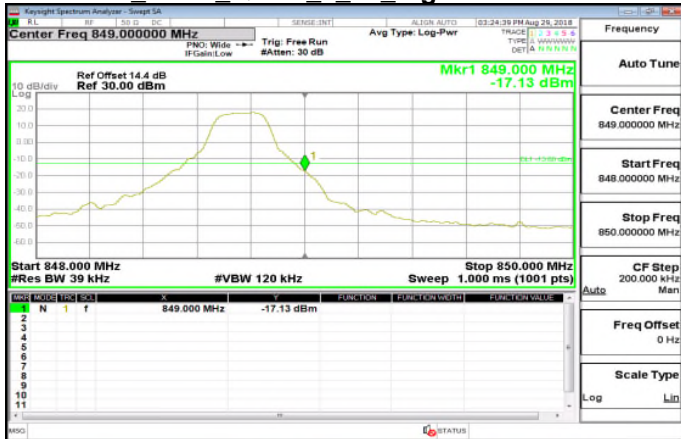
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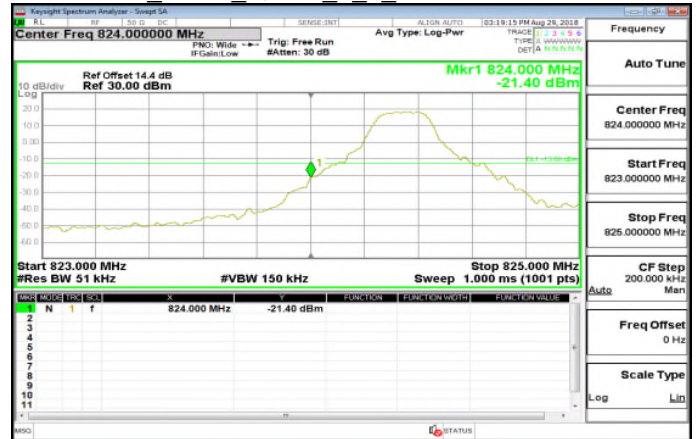
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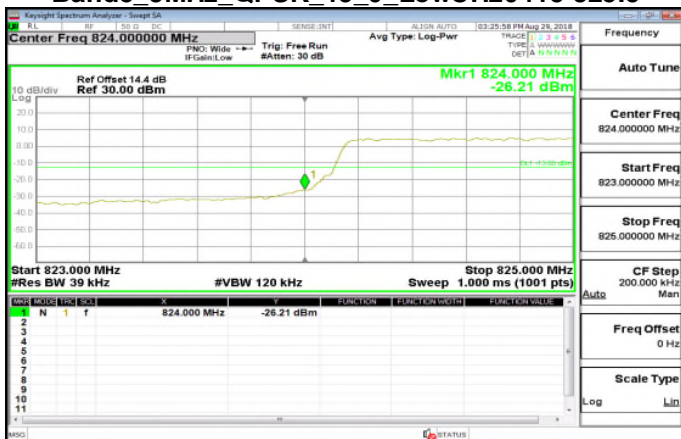
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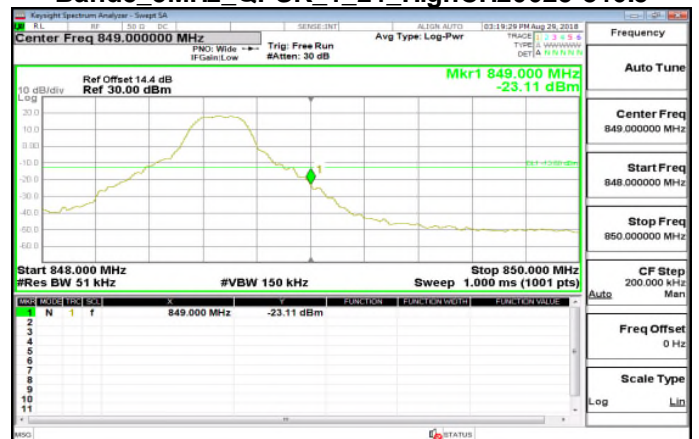
**Band5 5MHz QPSK 1 0 LowCH20425-826.5**



**Band5 3MHz QPSK 15 0 LowCH20415-825.5**



**Band5 5MHz QPSK 1 24 HighCH20625-846.5**



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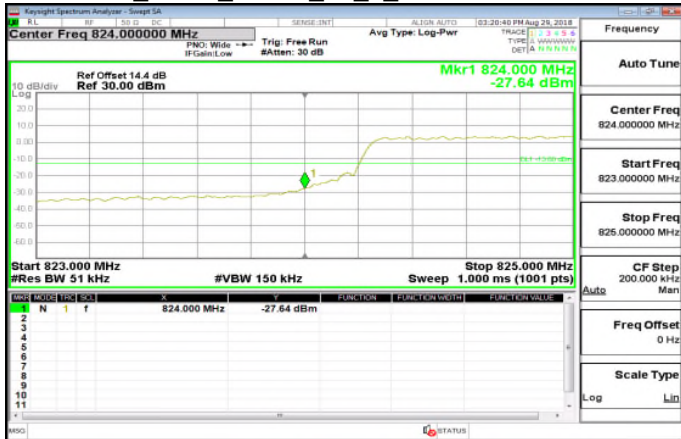
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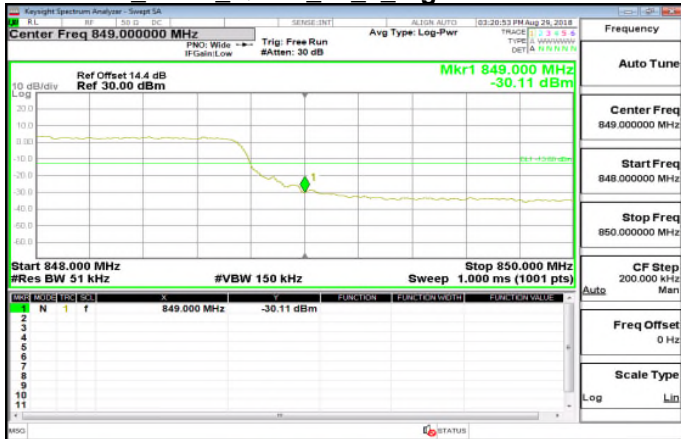
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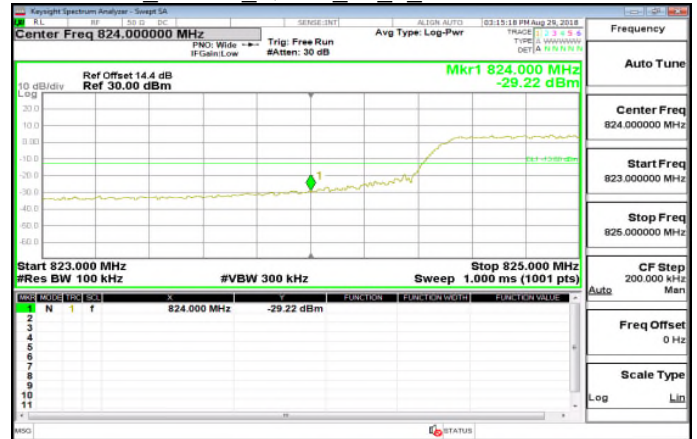
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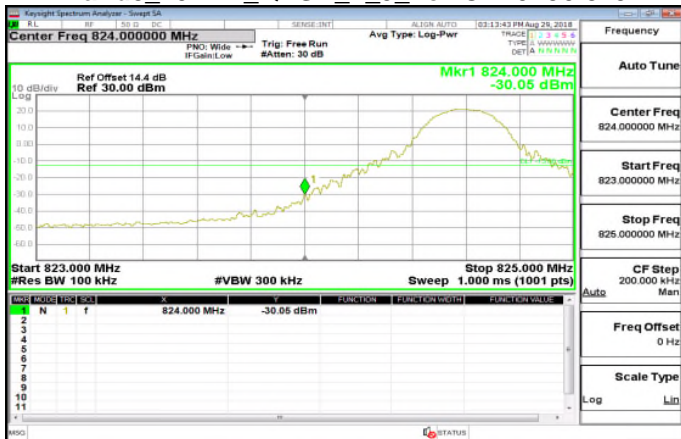
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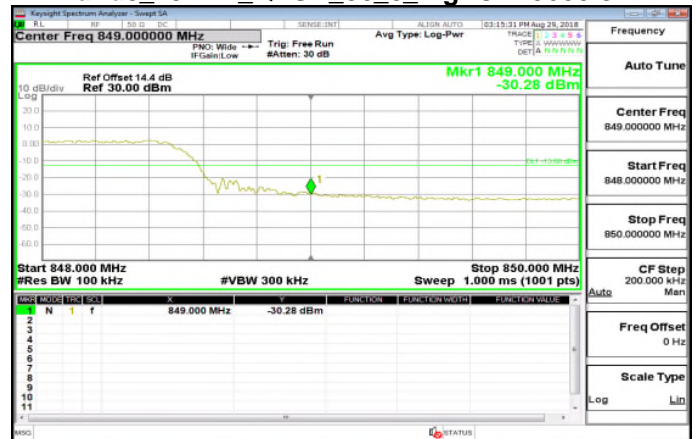
Band5\_10MHz\_QPSK\_50\_0\_LowCH20450-829



Band5\_10MHz\_QPSK\_1\_0\_LowCH20450-829



Band5\_10MHz\_QPSK\_50\_0\_HighCH20600-844



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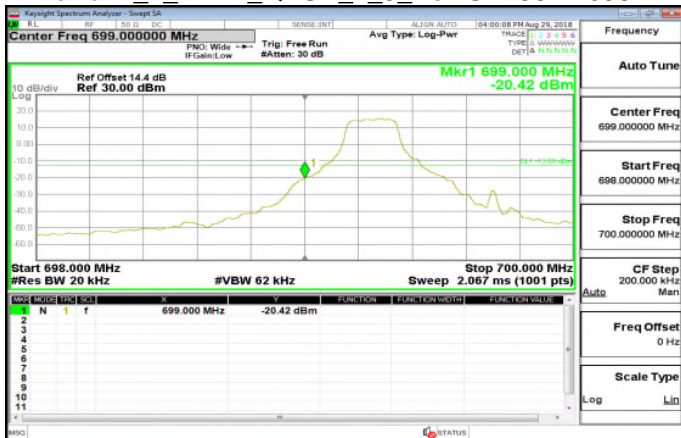
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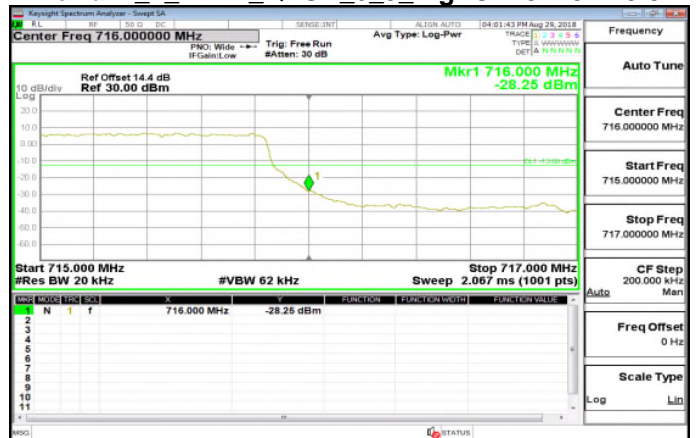
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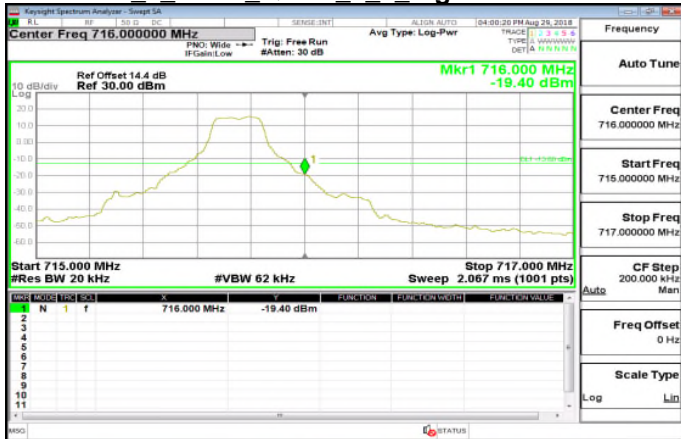
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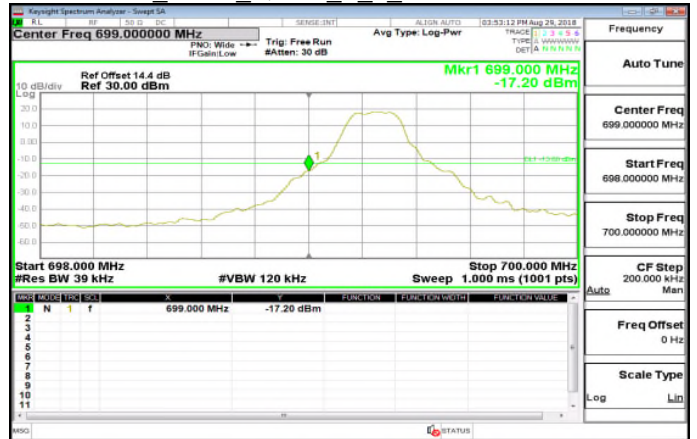
**Band12\_1\_4MHz\_QPSK\_6\_0\_HighCH23173-715.3**



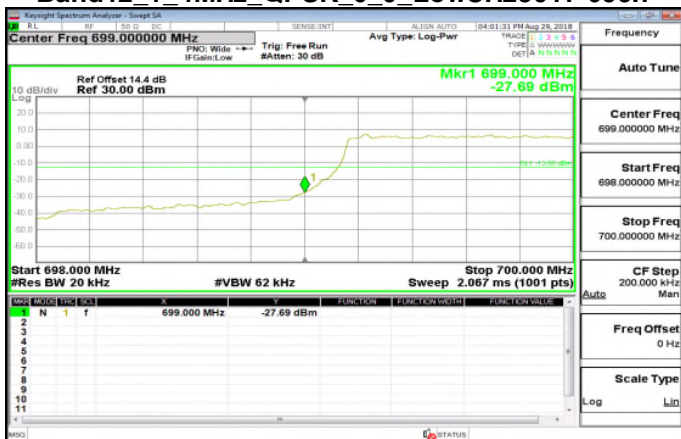
**Band12\_1\_4MHz\_QPSK\_1\_5\_HighCH23173-715.3**



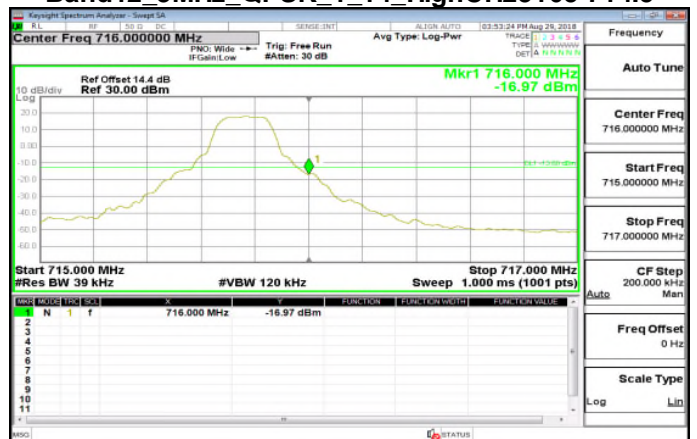
**Band12\_3MHz\_QPSK\_1\_0\_LowCH23025-700.5**



**Band12\_1\_4MHz\_QPSK\_6\_0\_LowCH23017-699.7**



**Band12\_3MHz\_QPSK\_1\_14\_HighCH23165-714.5**



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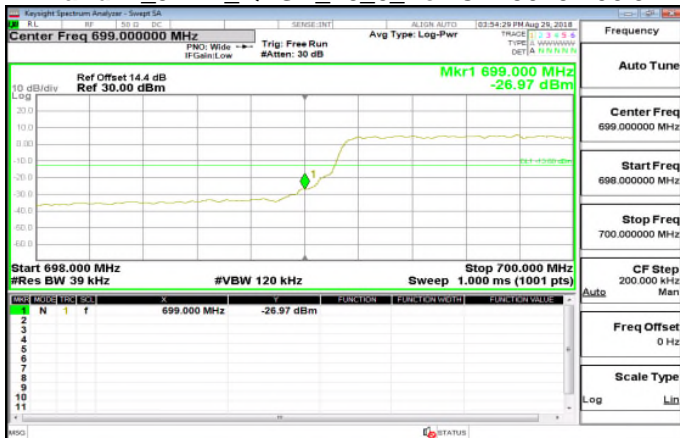
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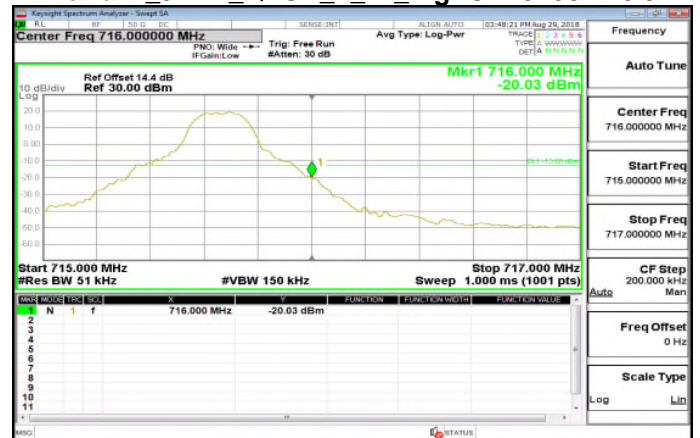
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**Band12 3MHz QPSK 15 0 LowCH23025-700.5**



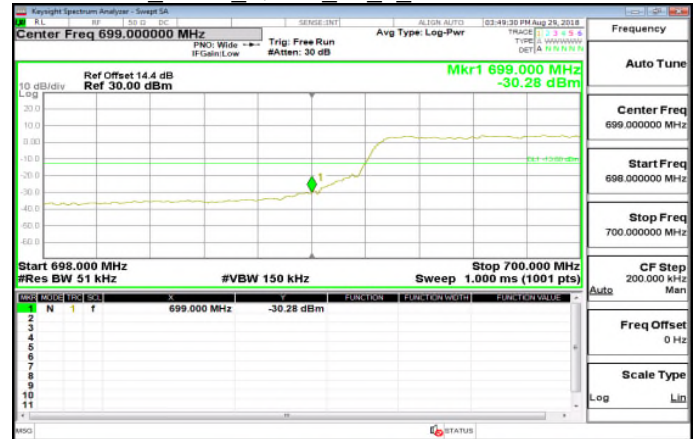
**Band12 5MHz QPSK 1 24 HighCH23155-713.5**



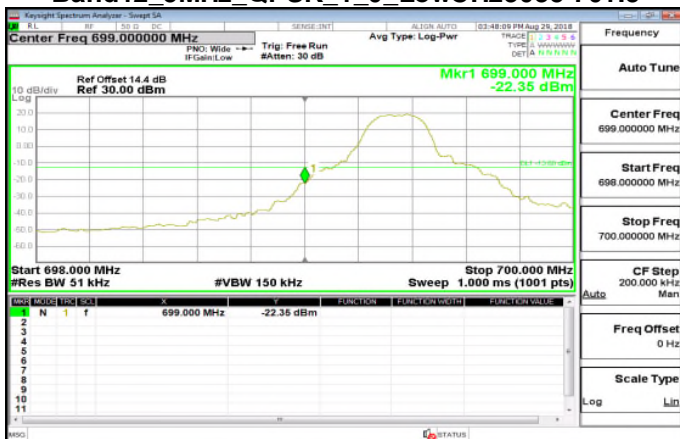
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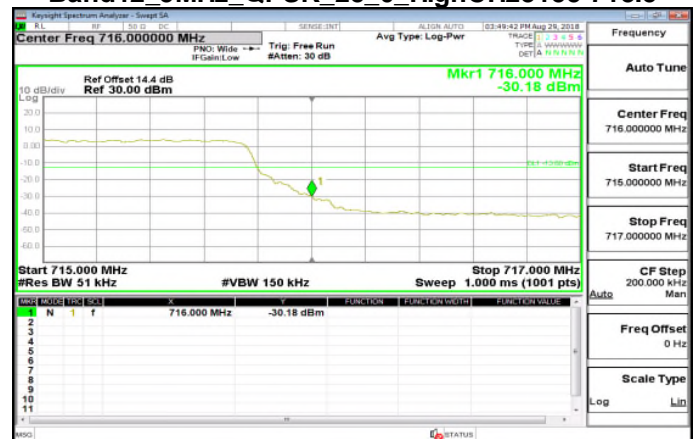
**Band12 5MHz QPSK 25 0 LowCH23035-701.5**



**Band12 5MHz QPSK 1 0 LowCH23035-701.5**



**Band12 5MHz QPSK 25 0 HighCH23155-713.5**



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**Band12 10MHz QPSK 1 0 LowCH23060-704**



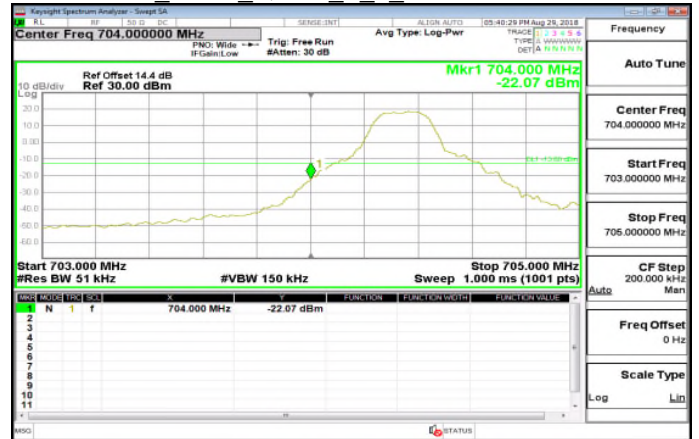
**Band12 10MHz QPSK 50 0 HighCH23130-711**



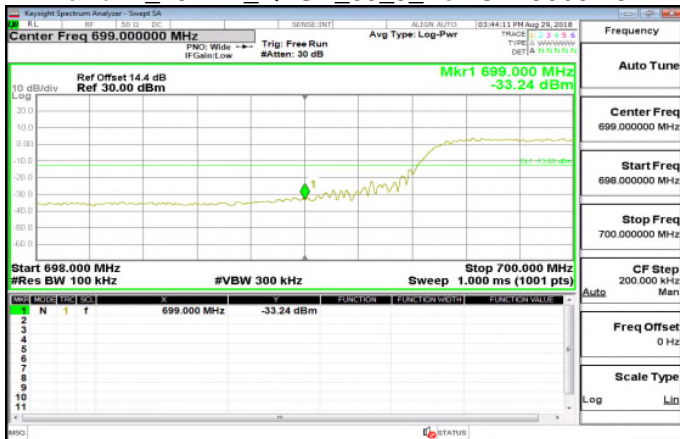
**Band12 10MHz QPSK 1 49 HighCH23130-711**



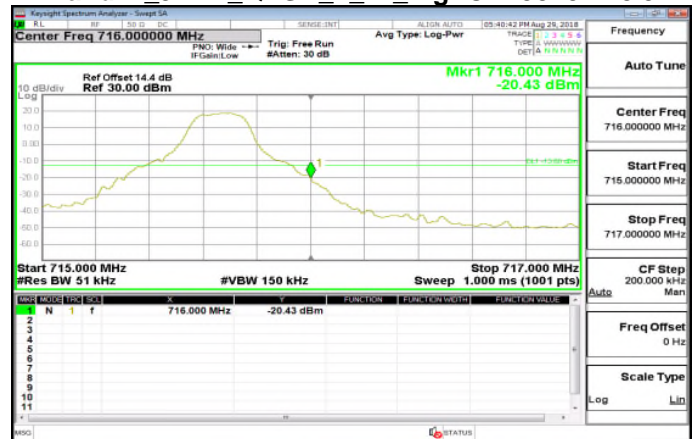
**Band17 5MHz QPSK 1 0 LowCH23755-706.5**



**Band12 10MHz QPSK 50 0 LowCH23060-704**



**Band17 5MHz QPSK 1 24 HighCH23825-713.5**



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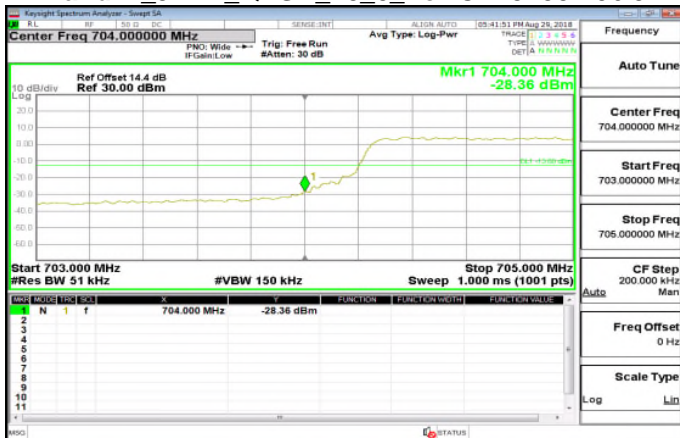
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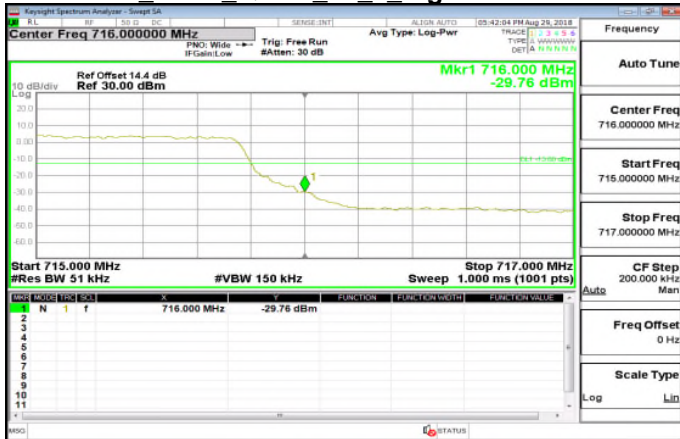
**Band17 5MHz QPSK 25 0 LowCH23755-706.5**



**Band17 10MHz QPSK 1 49 HighCH23800-711**



**Band17 5MHz QPSK 25 0 HighCH23825-713.5**



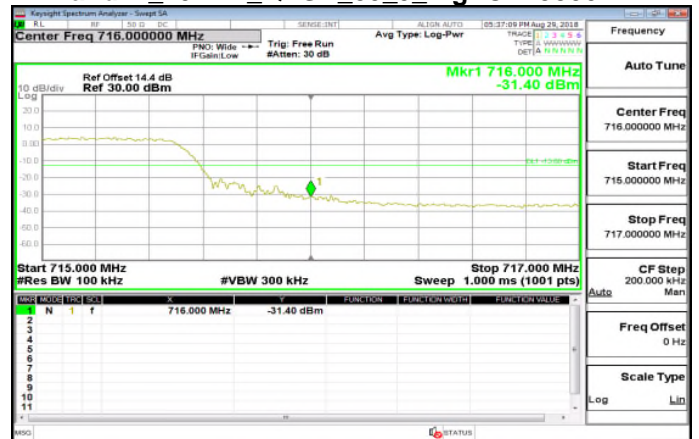
**Band17 10MHz QPSK 50 0 LowCH23780-709**



**Band17 10MHz QPSK 1 0 LowCH23780-709**



**Band17 10MHz QPSK 50 0 HighCH23800-711**



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