

ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

OF

Applicant: SHARP CORPORATION
2-13-1, HACHIHONMATSU-IIDA, HIGASHI-HIROSHIMA-SHI,
HIROSHIMA PREFECTURE 739-0192, JAPAN

Manufacturer: SHARP CORPORATION
1 Takumi-Cho, Sakai-Ku, Sakai-Shi, Osaka 590-8522, Japan

Product Name: Tablet

Brand Name: SHARP

Report Number: ER/2020/40046

FCC ID APYHRO00284

FCC Rule Part: 2, 22H

Issue Date: Jun. 20, 2020

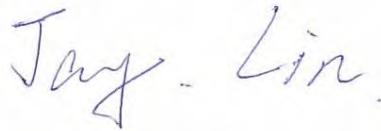
Date of Test: May 06, 2020 ~ May 29, 2020

Date of EUT Received: Apr. 14, 2020

We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. Central RF Lab. 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.

Approved By:**Jay Lin / Asst. Supervisor**

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Revision History

Report Number	Revision	Description	Issue Date	Remark
ER/2020/40046	Rev.00	Original.	Jun. 20, 2020	Revised By: Karen Huang

Note:

1、Disclaimer

Antenna information is provided by the applicant, test results of this report are applicable to the sample EUT received.

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Contents

1	GENERAL PRODUCT INFORMATION.....	4
2	SYSTEM TEST CONFIGURATION.....	7
3	SUMMARY OF TEST RESULTS.....	9
4	DESCRIPTION OF TEST MODES.....	10
5	MEASUREMENT UNCERTAINTY	11
6	MAXMUM OUTPUT POWER.....	12
7	OCCUPIED BANDWIDTH MEASUREMENT.....	20
8	OUT OF BAND EMISSION AT ANTENNA TERMINALS.....	30
9	FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT	43
10	FREQUENCY STABILITY MEASUREMENT	58

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1 GENERAL PRODUCT INFORMATION

1.1 Product Description

Product Name:	Tablet
Brand Name:	SHARP
Hardware Version:	2.0
Software Version:	V1.170
Power Supply:	3.85Vdc from Rechargeable Li-polymer Battery
IMEI:	004401117180246 / 004401117180410

1.2 Operation Frequency Range

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

LTE Band 5			
BW (MHz)	Operation Frequency (MHz)		
1.4	824.7	-	848.3
3	825.5	-	847.5
5	826.5	-	846.5
10	829.0	-	844.0

1.3 Antenna Designation

Vendor	Type	Main / Aux	Antenna Part No.	Modulation	Frequency (MHz)	Peak Antenna Gain (dBi)
N/A	Monopole	Main	N/A	WCDMA / HSPA Band V	826.4 ~ 846.6	-4.2
				LTE Band 5	824 ~ 849	-4.2

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1.4 Type of Emission & Max ERP/EIRP Power Measurement Result:

	ERP / EIRP (dBm)		W	99%	Type of Emission
WCDMA Band V	17.92	ERP	0.062	4.1478	4M15F9W
HSDPA Band V	14.90	ERP	0.031	4.1359	4M14F9W
HSUPA Band V	14.90	ERP	0.031	4.1399	4M14F9W

LTE Band	BW	Modulation	ERP / EIRP (dBm)		(W)	99%	Type of Emission
5	1.4	QPSK	18.56	ERP	0.072	1.1015	1M10G7D
		16QAM	17.54	ERP	0.057	1.1099	1M11D7W
		64QAM	17.55	ERP	0.057	1.1024	1M10D7W
5	3	QPSK	18.59	ERP	0.072	2.7103	2M71G7D
		16QAM	17.60	ERP	0.058	2.7135	2M71D7W
		64QAM	17.60	ERP	0.058	2.7238	2M72D7W
5	5	QPSK	18.61	ERP	0.073	4.5201	4M52G7D
		16QAM	17.62	ERP	0.058	4.5235	4M52D7W
		64QAM	17.62	ERP	0.058	4.5363	4M54D7W
5	10	QPSK	18.64	ERP	0.073	9.0326	9M03G7D
		16QAM	17.64	ERP	0.058	8.9932	8M99D7W
		64QAM	17.63	ERP	0.058	9.0228	9M02D7W

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1.5 Test Methodology of Applied Standards

FCC 47 CFR Part 2, 22H

ANSI C63.26-2015

KDB971168 D01 Power Meas license Digital System v03r01

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

KDB412172 D01 Determining ERP and EIRP v01r01

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

1.6 Test Facility

SGS Taiwan Ltd. Central RF Lab (TAF code 3702)

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

FCC Designation number: TW0027

1.7 Special Accessories

No special accessories were used during testing.

1.8 Equipment Modifications

There was no modifications incorporated into the EUT.

1.9 Radiated Emission Test Sites For Measurements From 9 kHz To 30 MHz

Radiated emission below 30MHz is measured in a 9m*9m*6m semi-anechoic chamber, the measurements correspond to those obtained at an open-field test site.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

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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

The EUT is placed on a 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)

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.

Note:

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

Following shows an offset computation in physical test.

	RF cable loss (dB)	Attenuation factor(dB)	offset(dB)
Low Band (Below 1GHz)	0.43	13.8	14.23

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2.5 Final Amplifier Voltage and Current Information:

Test Mode	DC voltage (V)	DC current (mA)
WCDMA B5	3.8	362
LTE Band 5		855

2.6 Configuration of Tested System

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

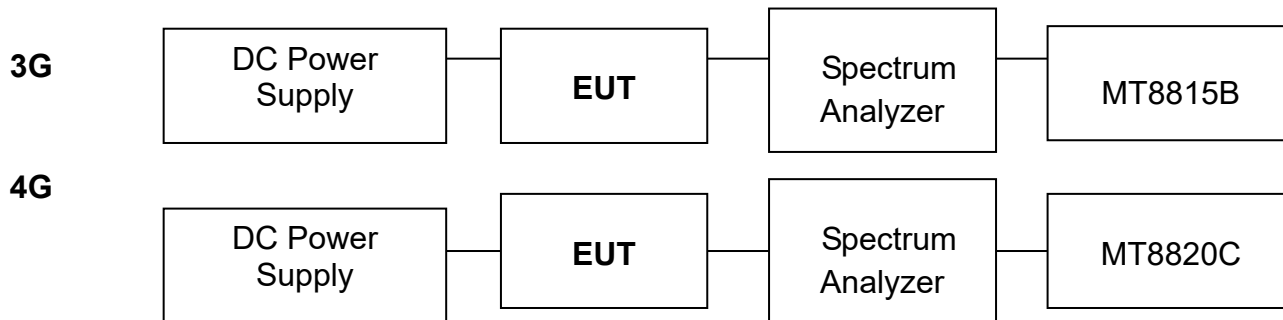


Fig. 2-2 Configuration of Tested System (Fixed Channel-Radiated)

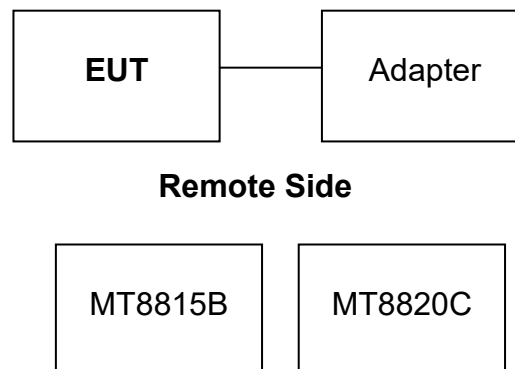


Table 2-1 Equipment Used in

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.	Data Cable	Power Cord
1.	Radio Communication Analyzer	Anritsu	MT8815B	6200711454	shielded	Un-shielded
2.	Radio Communication Analyzer	Anritsu	MT8820C	6200995019	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
§22.913(a)(5)	ERP/ EIRP measurement	Compliant
§2.1049(h)	99% & 26dB Occupied Bandwidth	Compliant
§2.1051 §22.917(a)	Out of Band Emissions at Antenna Terminals and Band Edge / Emission mask requirements	Compliant
§2.1053 §22.917(a)	Field Strength of Spurious Radiation	Compliant
§2.1055(a)(1) §22.355	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	H PLAN	E1 PLAN	E2 PLAN
WCDMA/HSPA Band V		V	
LTE Band 5		V	

4.2 Measurement Configuration

Test Items	WCDMA / HSPA Bands	Test Channel		
		L	M	H
ERP	Band V	v	v	v
FREQUENCY STABILITY	Band V	-	v	-
OCCUPIED BANDWIDTH	Band V	v	v	v
BAND EDGE	Band V	v	-	v
CONDUCTED EMISSION	Band V	v	v	v
RADIATED EMISSION	Band V	v	v	v

Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation			RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full
Max. Output Power	5	v	v	v	v	v	v	v	-	-	v	v	v	v	v	v
Frequency Stability	5	-	v	-			v		-	-	v	-	-	-	-	v
Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation			RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full
26dB and 99% Bandwidth	5	v	v	v	v	v	v	v	-	-	v	v	v	-	-	v
Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation			RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full
Band Edge	5	v	-	v	v	v	v	v	-	-	v	-	-	v	v	v
Conducted Emission	5	v	v	v	v	v	v	v	-	-	v	-	-	v	-	-
Test Items	Band	Test Channel			Bandwidth (MHz)						Modulation			RB #		
		L	M	H	1.4	3	5	10	15	20	QPSK	16QAM	64QAM	1	Half	Full
Radiated Emission	5	v	v	v			v		-	-	v			v		

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

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

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

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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.

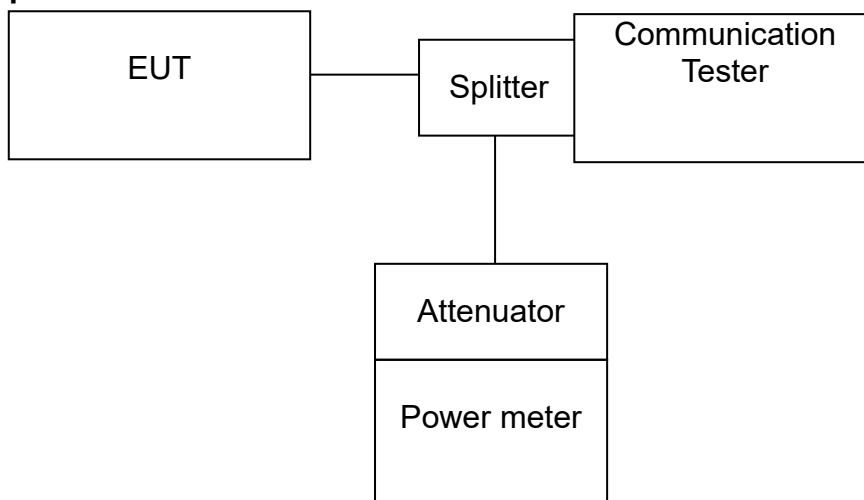
6.1.1 ERP/EIRP LIMIT

According to FCC §2.1046

FCC 22.913(a)

(5) mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

6.2 Test Set-up



Note: Measurement setup for testing on Antenna connector

6.3 Output Power Measurement Applicable Guidance

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.

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6.4 Determining ERP and/or EIRP from conducted RF output power measurements

According to KDB 412172 D01 Power Approach,

$$EIRP = P_T + G_T - L_C,$$

$$ERP = EIRP - 2.15,$$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power (expressed in the same units as P_T , typically dBW, dBm, or power spectral density (PSD)²), relative to either a dipole antenna (ERP) or an isotropic antenna (EIRP);

P_T = transmitter output power, expressed in dBW, dBm, or PSD;

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

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

6.5 Measurement Equipment Used

Conducted Emission (measured at antenna port) Test Site					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Radio Communication Analyzer	Anritsu	MT8815B	6200711454	04/01/2020	03/31/2021
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	04/01/2020	03/31/2021

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6.6 WCDMA & HSPA Measurement Results:

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

WCDMA/HSUPA/HSDPA Band V Result:

EUT Mode	Freq. (MHz)	CH	Conducted Avg. Power (dBm)	Antenna Gain (dBi)	ERP (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
WCDMA	826.4	4132	24.21	-4.20	17.86	20.01	38.50	-18.49
	836.6	4183	24.27	-4.20	17.92	20.07	38.50	-18.43
	846.6	4233	24.16	-4.20	17.81	19.96	38.50	-18.54
HSDPA	826.4	4132	21.18	-4.20	14.83	16.98	38.50	-21.52
	836.6	4183	21.25	-4.20	14.90	17.05	38.50	-21.45
	846.6	4233	21.07	-4.20	14.72	16.87	38.50	-21.63
HSUPA	826.4	4132	21.24	-4.20	14.89	17.04	38.50	-21.46
	836.6	4183	21.25	-4.20	14.90	17.05	38.50	-21.45
	846.6	4233	21.13	-4.20	14.78	16.93	38.50	-21.57

6.6.1 HSPA (HSDPA & HSUPA) Release 6:

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

6.6.2 HSDPA SUB-TEST Setting

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

Sub-test	β_c	β_d	β_d (SF)	β_c/β_d	β_{HS} (Note1, 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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Mode	Sub test	Avg. Power (dBm)		
		Channel		
		4132.00	4183.00	4233.00
HSDPA V	1	21.18	21.25	21.07
	2	21.22	21.23	21.10
	3	21.20	21.28	21.13
	4	21.24	21.26	21.11

6.6.3 HSPA SUB-TEST Setting

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

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

Mode	Sub test	Avg. Power (dBm)		
		Channel		
		4132.00	4183.00	4233.00
HSUPA V	1	21.24	21.25	21.13
	2	20.73	20.75	20.69
	3	20.70	20.73	20.62
	4	20.79	20.74	20.70
	5	21.25	21.31	21.16

6.6.4 WCDMA/HSDPA/HSUPA band V

The EUT output power was controlled by simulator and enter max rated power 24dBm. The EUT is going to be set to max output power to 24dBm then record the read. 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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6.7 LTE Measurement Results:

Antenna gain (dBi) **-4.2**

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)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
1.4	20407	824.7	QPSK	1	0	24.82	18.47	20.62	38.45	-17.83
				1	5	24.87	18.52	20.67	38.45	-17.78
				3	2	23.75	17.40	19.55	38.45	-18.9
				6	0	23.77	17.42	19.57	38.45	-18.88
	20525	836.5	QPSK	1	0	24.83	18.48	20.63	38.45	-17.82
				1	5	24.88	18.53	20.68	38.45	-17.77
				3	2	23.80	17.45	19.60	38.45	-18.85
				6	0	23.82	17.47	19.62	38.45	-18.83
	20643	848.3	QPSK	1	0	24.91	18.56	20.71	38.45	-17.74
				1	5	24.83	18.48	20.63	38.45	-17.82
				3	2	23.79	17.44	19.59	38.45	-18.86
				6	0	23.75	17.40	19.55	38.45	-18.9
	20407	824.7	16QAM	1	0	23.70	17.35	19.50	38.45	-18.95
				1	5	23.75	17.40	19.55	38.45	-18.9
				3	2	22.80	16.45	18.60	38.45	-19.85
				6	0	22.84	16.49	18.64	38.45	-19.81
	20525	836.5	16QAM	1	0	23.85	17.50	19.65	38.45	-18.8
				1	5	23.89	17.54	19.69	38.45	-18.76
				3	2	22.91	16.56	18.71	38.45	-19.74
				6	0	22.77	16.42	18.57	38.45	-19.88
	20643	848.3	16QAM	1	0	23.83	17.48	19.63	38.45	-18.82
				1	5	23.73	17.38	19.53	38.45	-18.92
				3	2	22.87	16.52	18.67	38.45	-19.78
				6	0	22.78	16.43	18.58	38.45	-19.87
	20407	824.7	64QAM	1	0	23.90	17.55	19.70	38.45	-18.75
				1	5	23.74	17.39	19.54	38.45	-18.91
				3	2	22.75	16.40	18.55	38.45	-19.9
				6	0	22.79	16.44	18.59	38.45	-19.86
	20525	836.5	64QAM	1	0	23.78	17.43	19.58	38.45	-18.87
				1	5	23.79	17.44	19.59	38.45	-18.86
				3	2	22.86	16.51	18.66	38.45	-19.79
				6	0	22.82	16.47	18.62	38.45	-19.83
	20643	848.3	64QAM	1	0	23.83	17.48	19.63	38.45	-18.82
				1	5	23.69	17.34	19.49	38.45	-18.96
				3	2	22.76	16.41	18.56	38.45	-19.89
				6	0	22.66	16.31	18.46	38.45	-19.99

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Antenna gain (dBi) -4.2

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)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
3	20415	825.5	QPSK	1	0	24.88	18.53	20.68	38.45	-17.77
				1	14	24.85	18.50	20.65	38.45	-17.8
				8	4	23.82	17.47	19.62	38.45	-18.83
				15	0	23.83	17.48	19.63	38.45	-18.82
	20525	836.5	QPSK	1	0	24.85	18.50	20.65	38.45	-17.8
				1	14	24.84	18.49	20.64	38.45	-17.81
				8	4	23.85	17.50	19.65	38.45	-18.8
				15	0	23.84	17.49	19.64	38.45	-18.81
	20635	847.5	QPSK	1	0	24.94	18.59	20.74	38.45	-17.71
				1	14	24.86	18.51	20.66	38.45	-17.79
				8	4	23.82	17.47	19.62	38.45	-18.83
				15	0	23.85	17.50	19.65	38.45	-18.8
	20415	825.5	16QAM	1	0	23.79	17.44	19.59	38.45	-18.86
				1	14	23.76	17.41	19.56	38.45	-18.89
				8	4	22.86	16.51	18.66	38.45	-19.79
				15	0	22.90	16.55	18.70	38.45	-19.75
	20525	836.5	16QAM	1	0	23.90	17.55	19.70	38.45	-18.75
				1	14	23.95	17.60	19.75	38.45	-18.7
				8	4	22.96	16.61	18.76	38.45	-19.69
				15	0	22.85	16.50	18.65	38.45	-19.8
	20635	847.5	16QAM	1	0	23.92	17.57	19.72	38.45	-18.73
				1	14	23.70	17.35	19.50	38.45	-18.95
				8	4	22.91	16.56	18.71	38.45	-19.74
				15	0	22.79	16.44	18.59	38.45	-19.86
	20415	825.5	64QAM	1	0	23.95	17.60	19.75	38.45	-18.7
				1	14	23.75	17.40	19.55	38.45	-18.9
				8	4	22.81	16.46	18.61	38.45	-19.84
				15	0	22.77	16.42	18.57	38.45	-19.88
	20525	836.5	64QAM	1	0	23.89	17.54	19.69	38.45	-18.76
				1	14	23.79	17.44	19.59	38.45	-18.86
				8	4	22.85	16.50	18.65	38.45	-19.8
				15	0	22.85	16.50	18.65	38.45	-19.8
	20635	847.5	64QAM	1	0	23.90	17.55	19.70	38.45	-18.75
				1	14	23.73	17.38	19.53	38.45	-18.92
				8	4	22.83	16.48	18.63	38.45	-19.82
				15	0	22.72	16.37	18.52	38.45	-19.93

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Antenna gain (dBi) -4.2

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)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
5	20425	826.5	QPSK	1	0	24.90	18.55	20.70	38.45	-17.75
				1	24	24.91	18.56	20.71	38.45	-17.74
				12	6	23.85	17.50	19.65	38.45	-18.8
				25	0	23.83	17.48	19.63	38.45	-18.82
	20525	836.5	QPSK	1	0	24.89	18.54	20.69	38.45	-17.76
				1	24	24.92	18.57	20.72	38.45	-17.73
				12	6	23.92	17.57	19.72	38.45	-18.73
				25	0	23.91	17.56	19.71	38.45	-18.74
	20625	846.5	QPSK	1	0	24.96	18.61	20.76	38.45	-17.69
				1	24	24.90	18.55	20.70	38.45	-17.75
				12	6	23.89	17.54	19.69	38.45	-18.76
				25	0	23.86	17.51	19.66	38.45	-18.79
	20425	826.5	16QAM	1	0	23.80	17.45	19.60	38.45	-18.85
				1	24	23.84	17.49	19.64	38.45	-18.81
				12	6	22.88	16.53	18.68	38.45	-19.77
				25	0	22.92	16.57	18.72	38.45	-19.73
	20525	836.5	16QAM	1	0	23.92	17.57	19.72	38.45	-18.73
				1	24	23.97	17.62	19.77	38.45	-18.68
				12	6	22.99	16.64	18.79	38.45	-19.66
				25	0	22.87	16.52	18.67	38.45	-19.78
	20625	846.5	16QAM	1	0	23.92	17.57	19.72	38.45	-18.73
				1	24	23.78	17.43	19.58	38.45	-18.87
				12	6	22.93	16.58	18.73	38.45	-19.72
				25	0	22.83	16.48	18.63	38.45	-19.82
	20425	826.5	64QAM	1	0	23.97	17.62	19.77	38.45	-18.68
				1	24	23.79	17.44	19.59	38.45	-18.86
				12	6	22.82	16.47	18.62	38.45	-19.83
				25	0	22.84	16.49	18.64	38.45	-19.81
	20525	836.5	64QAM	1	0	23.89	17.54	19.69	38.45	-18.76
				1	24	23.87	17.52	19.67	38.45	-18.78
				12	6	22.90	16.55	18.70	38.45	-19.75
				25	0	22.86	16.51	18.66	38.45	-19.79
	20625	846.5	64QAM	1	0	23.90	17.55	19.70	38.45	-18.75
				1	24	23.78	17.43	19.58	38.45	-18.87
				12	6	22.85	16.50	18.65	38.45	-19.8
				25	0	22.77	16.42	18.57	38.45	-19.88

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Antenna gain (dBi) -4.2

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)	EIRP Average (dBm)	EIRP Limit (dBm)	Margin (dB)
10	20450	829	QPSK	1	0	24.91	18.56	20.71	38.45	-17.74
				1	49	24.92	18.57	20.72	38.45	-17.73
				25	12	23.91	17.56	19.71	38.45	-18.74
				50	0	23.88	17.53	19.68	38.45	-18.77
	20525	836.5	QPSK	1	0	24.93	18.58	20.73	38.45	-17.72
				1	49	24.96	18.61	20.76	38.45	-17.69
				25	12	23.93	17.58	19.73	38.45	-18.72
				50	0	23.91	17.56	19.71	38.45	-18.74
	20600	844	QPSK	1	0	24.99	18.64	20.79	38.45	-17.66
				1	49	24.93	18.58	20.73	38.45	-17.72
				25	12	23.95	17.60	19.75	38.45	-18.7
				50	0	23.89	17.54	19.69	38.45	-18.76
	20450	829	16QAM	1	0	23.88	17.53	19.68	38.45	-18.77
				1	49	23.85	17.50	19.65	38.45	-18.8
				25	12	22.97	16.62	18.77	38.45	-19.68
				50	0	22.93	16.58	18.73	38.45	-19.72
	20525	836.5	16QAM	1	0	23.92	17.57	19.72	38.45	-18.73
				1	49	23.98	17.63	19.78	38.45	-18.67
				25	12	23.00	16.65	18.80	38.45	-19.65
				50	0	22.96	16.61	18.76	38.45	-19.69
	20600	844	16QAM	1	0	23.99	17.64	19.79	38.45	-18.66
				1	49	23.81	17.46	19.61	38.45	-18.84
				25	12	22.94	16.59	18.74	38.45	-19.71
				50	0	22.91	16.56	18.71	38.45	-19.74
	20450	829	64QAM	1	0	23.98	17.63	19.78	38.45	-18.67
				1	49	23.80	17.45	19.60	38.45	-18.85
				25	12	22.90	16.55	18.70	38.45	-19.75
				50	0	22.91	16.56	18.71	38.45	-19.74
	20525	836.5	64QAM	1	0	23.90	17.55	19.70	38.45	-18.75
				1	49	23.90	17.55	19.70	38.45	-18.75
				25	12	22.99	16.64	18.79	38.45	-19.66
				50	0	22.93	16.58	18.73	38.45	-19.72
	20600	844	64QAM	1	0	23.90	17.55	19.70	38.45	-18.75
				1	49	23.81	17.46	19.61	38.45	-18.84
				25	12	22.91	16.56	18.71	38.45	-19.74
				50	0	22.82	16.47	18.62	38.45	-19.83

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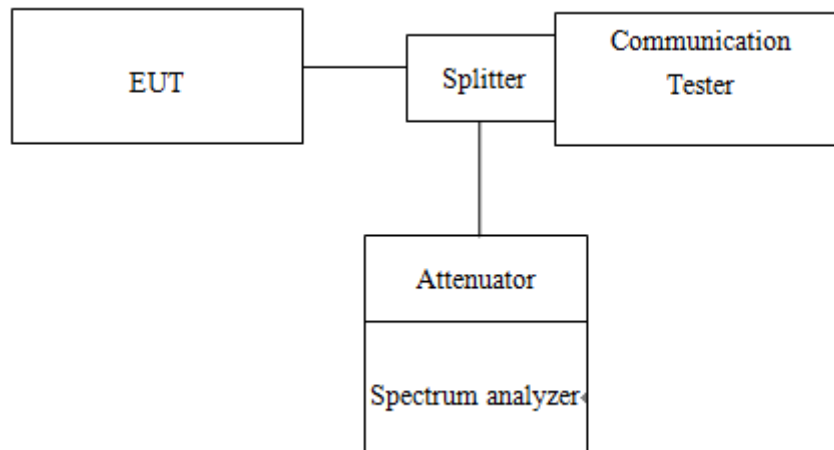
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7 OCCUPIED BANDWIDTH MEASUREMENT

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%.

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	04/21/2020	04/20/2021
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Radio Communication Analyzer	Anritsu	MT8815B	6200711454	04/01/2020	03/31/2021
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	04/01/2020	03/31/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

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7.5 Measurement Result

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	4.13950	4.13360	4.13990	4.695	4.709	4.661
836.60	4183	4.13590	4.13590	4.13590	4.679	4.666	4.673
846.60	4233	4.14780	4.13480	4.13390	4.702	4.686	4.648

LTE BAND 5 Channel bandwidth: 1.4MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
824.7	20407	1.1015	1.1099	1.1019	1.366	1.370	1.281
836.5	20525	1.1015	1.1072	1.1019	1.371	1.407	1.262
848.3	20643	1.1001	1.1090	1.1024	1.349	1.458	1.299

LTE BAND 5 Channel bandwidth: 3MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
825.5	20415	2.7095	2.7099	2.7212	3.226	3.315	3.518
836.5	20525	2.7053	2.7126	2.7238	3.181	3.404	3.710
847.5	20635	2.7103	2.7135	2.7229	3.207	3.340	3.459

LTE BAND 5 Channel bandwidth: 5MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
826.5	20425	4.5201	4.5193	4.5320	5.761	6.314	5.764
836.5	20525	4.5177	4.5235	4.5318	5.933	6.963	5.770
846.5	20625	4.5201	4.5226	4.5363	5.739	6.445	5.813

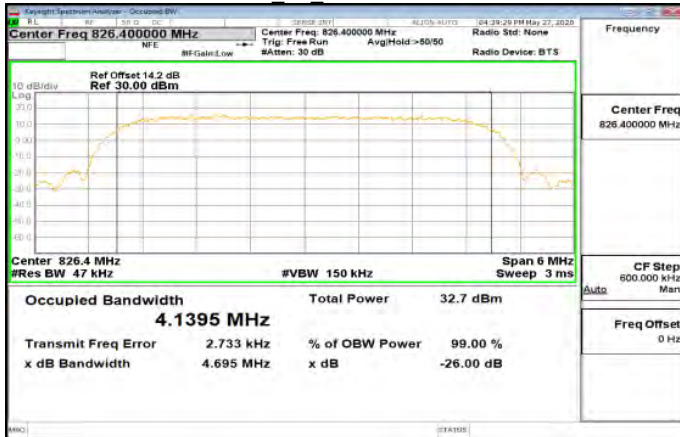
LTE BAND 5 Channel bandwidth: 10MHz							
Freq. (MHz)	CH	99% BW (MHz)			26 dB BW (MHz)		
		QPSK	16QAM	64QAM	QPSK	16QAM	64QAM
829.0	20450	9.0326	8.9932	9.0218	10.705	11.083	10.753
836.5	20525	9.0223	8.9856	9.0228	10.457	10.971	11.031
844.0	20600	9.0023	8.9713	8.9821	10.139	10.909	10.209

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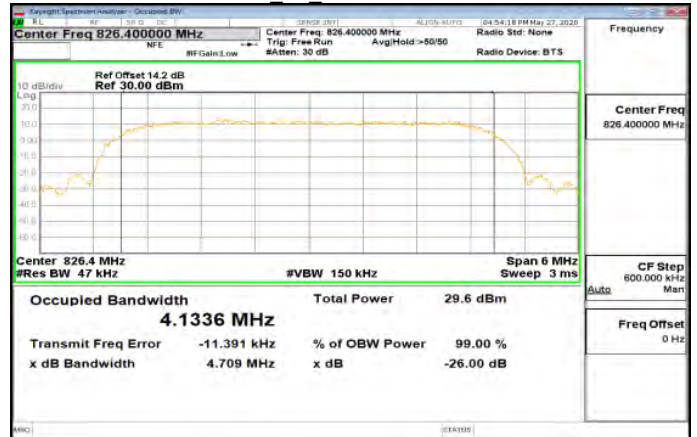
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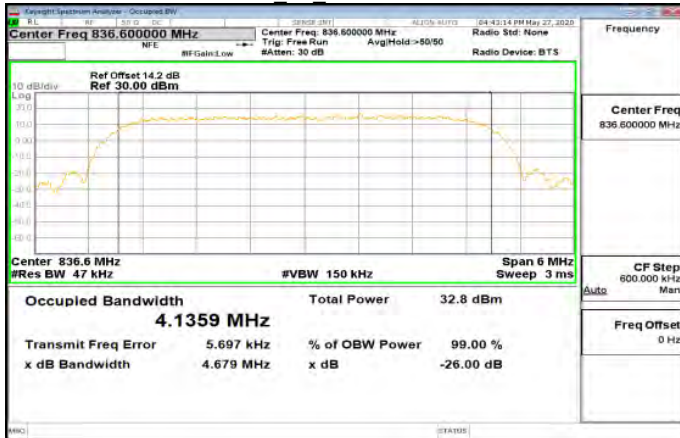
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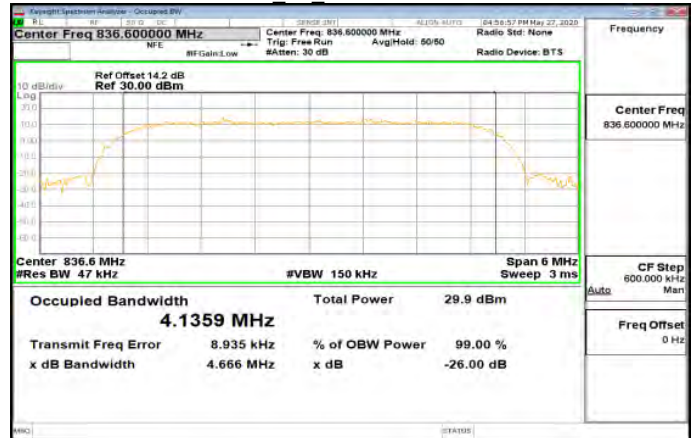
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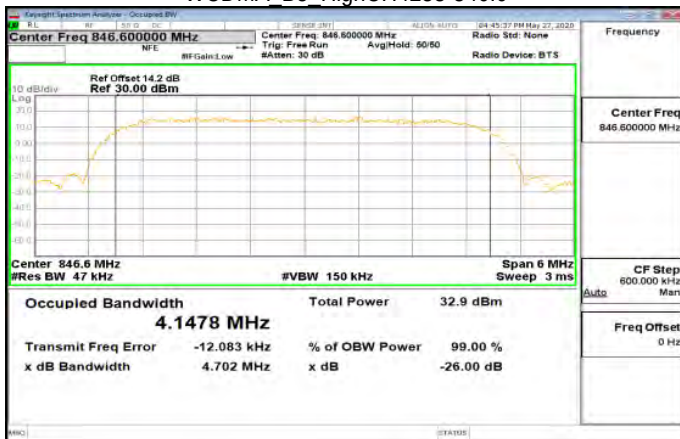
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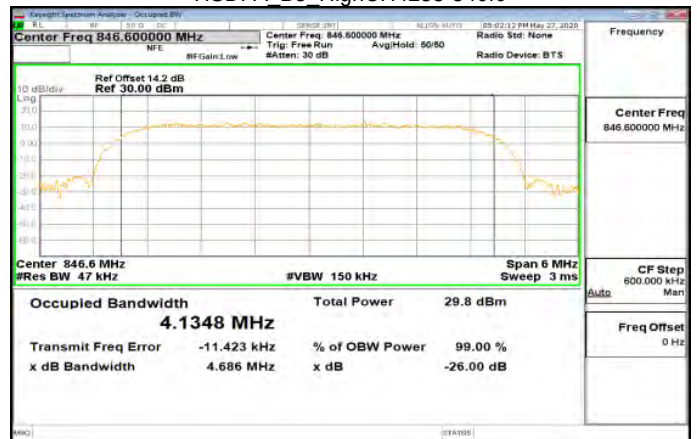
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WCDMA B5 HighCH4233-846.6



HSDPA B5 HighCH4233-846.6

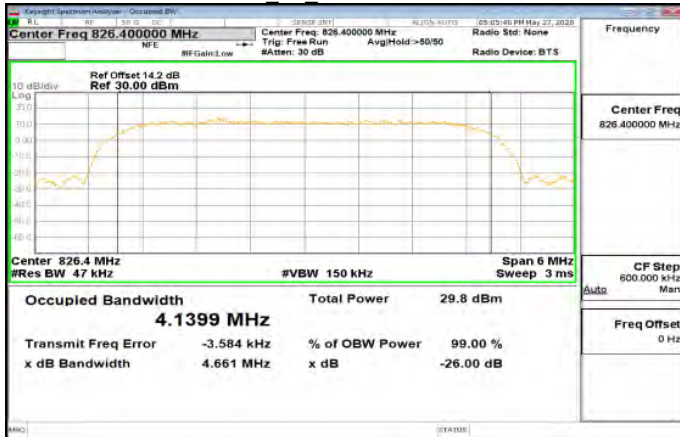


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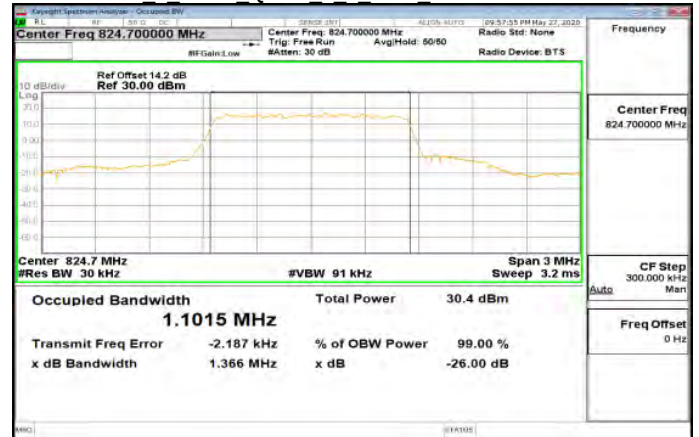
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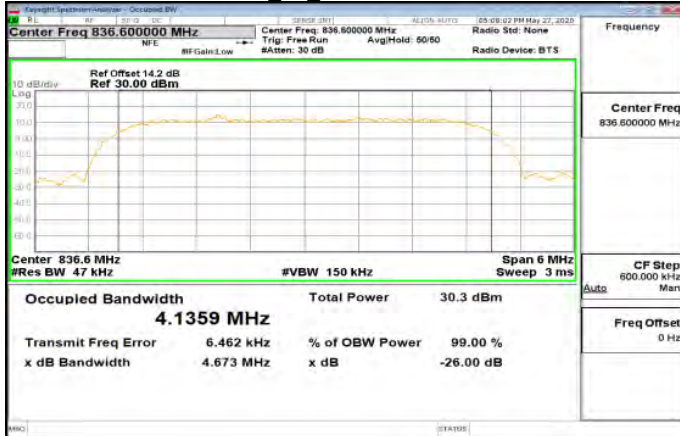
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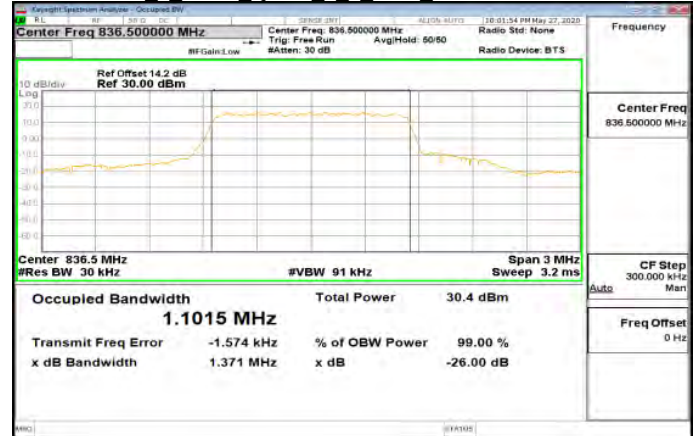
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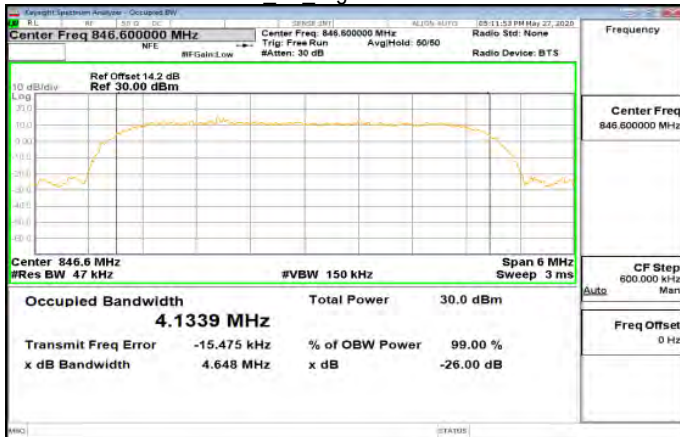
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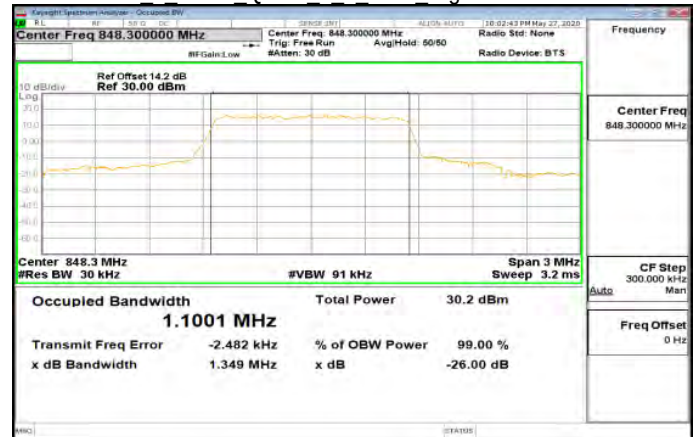
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HSUPA B5 HighCH4233-846.6



Band5 1 4MHz QPSK 6 0 Main HighCH20643-848.3

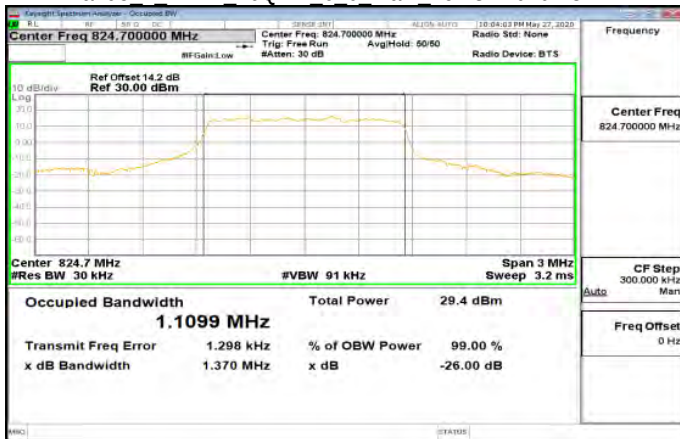


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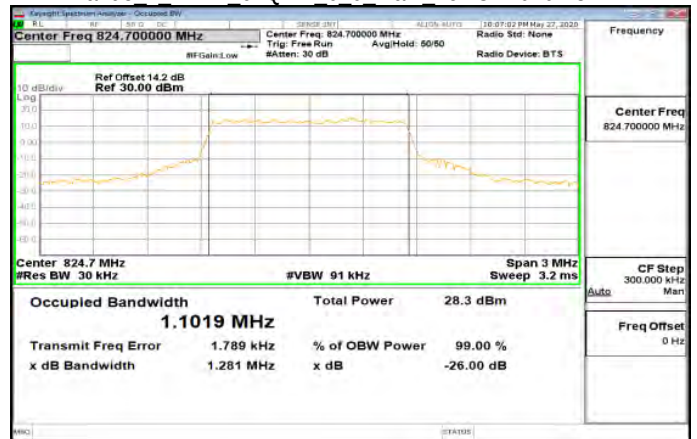
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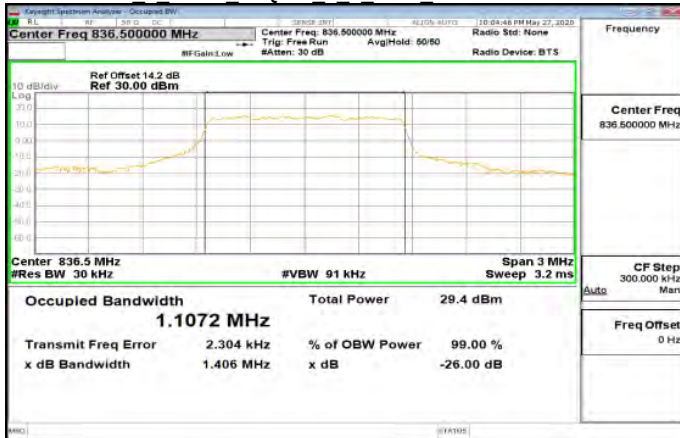
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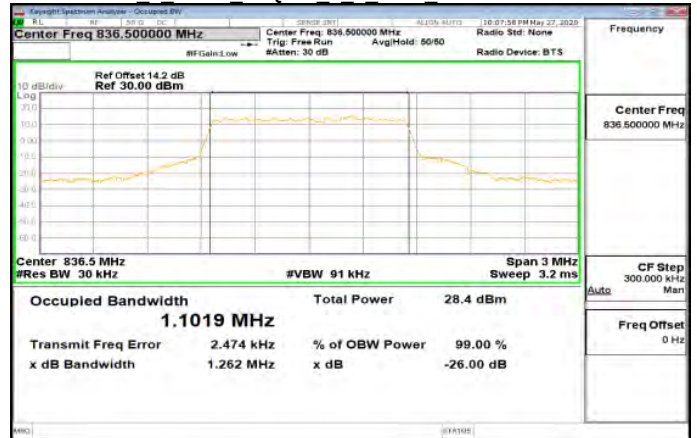
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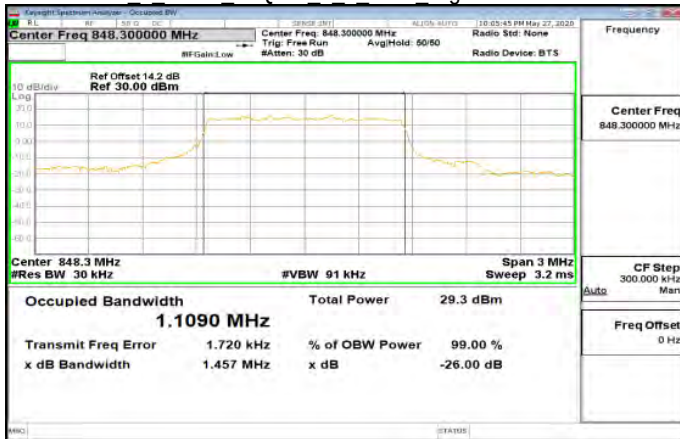
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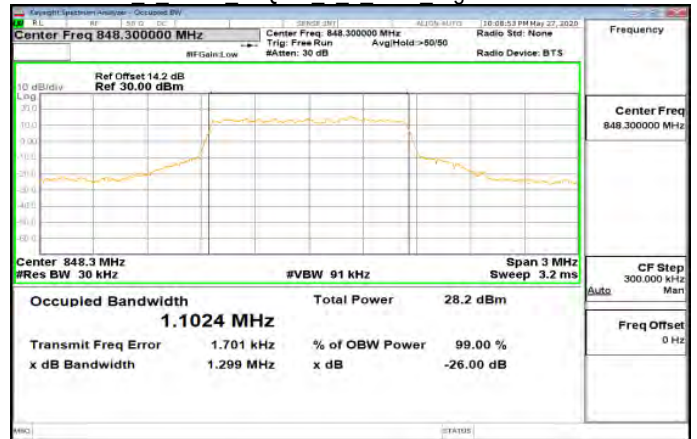
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Band5 1 4MHz 64QAM 6 0 Main HighCH20643-848.3



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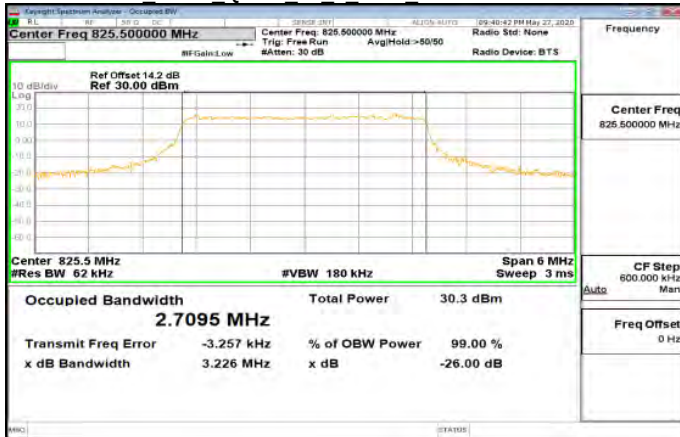
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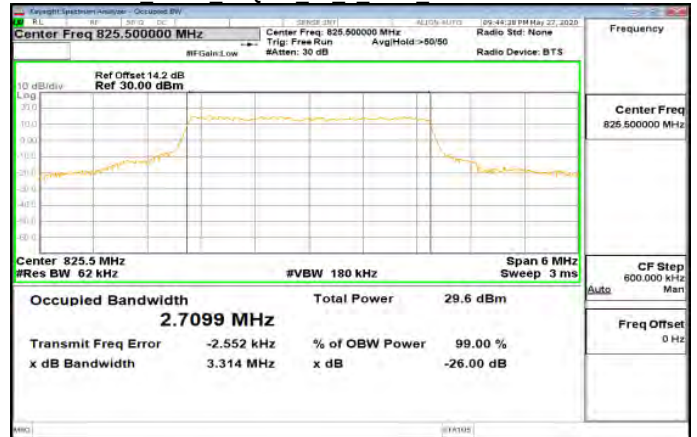
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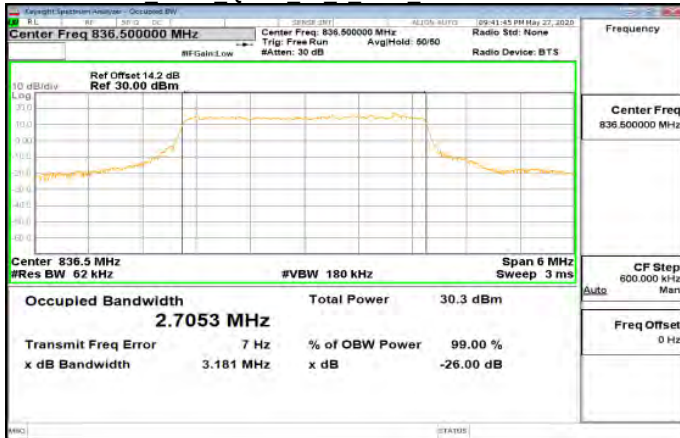
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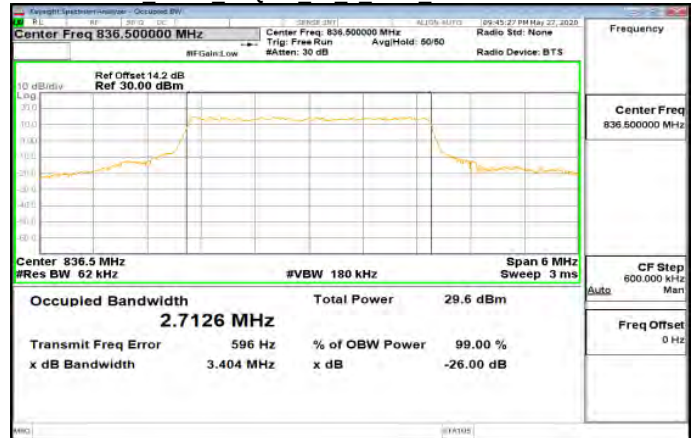
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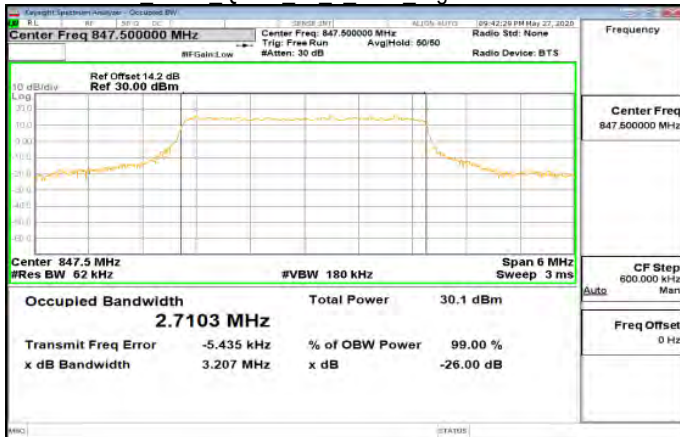
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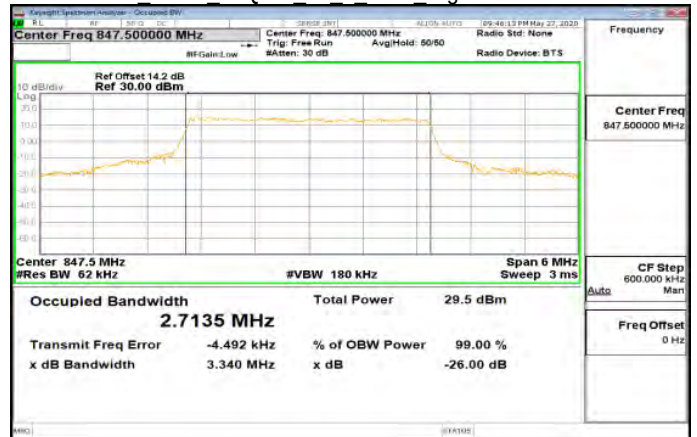
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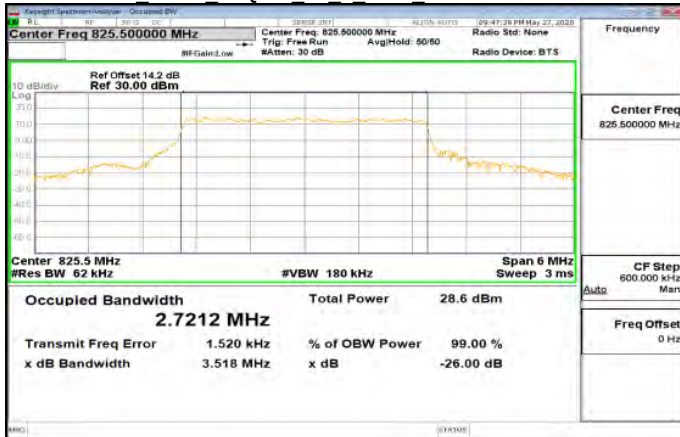


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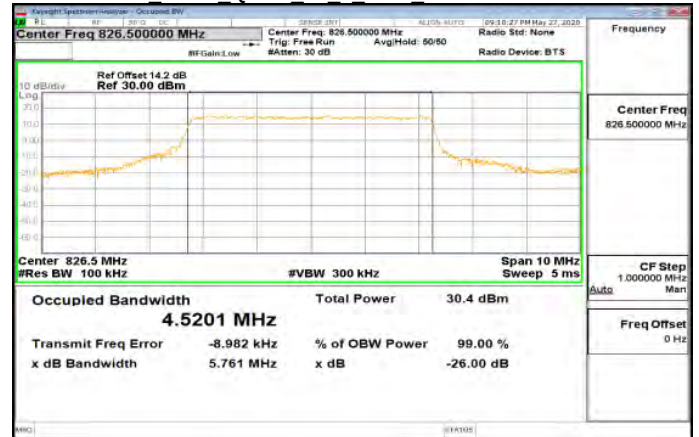
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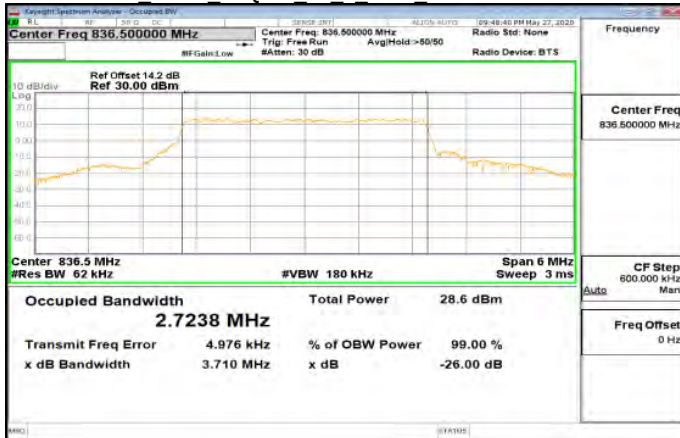
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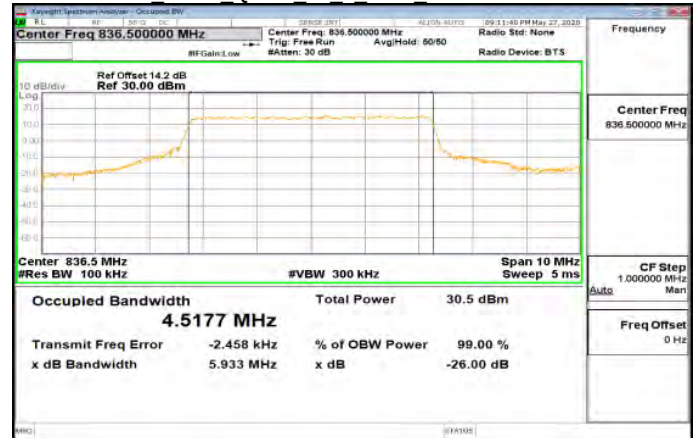
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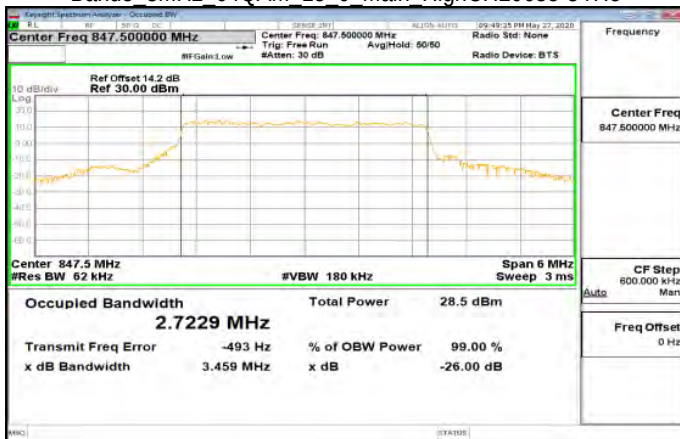
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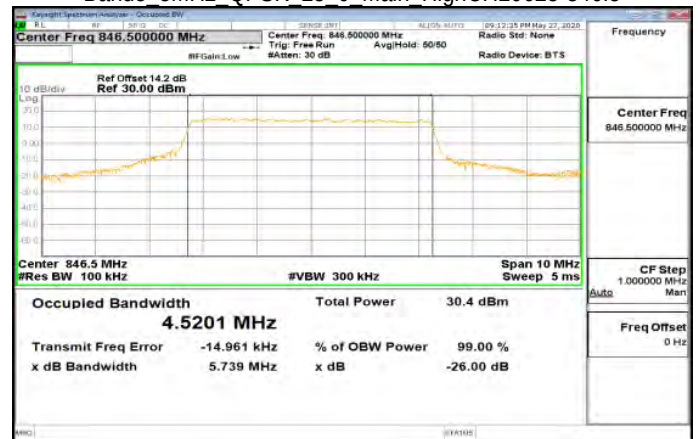
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Band5 3MHz 64QAM 15 0 Main HighCH20635-847.5



Band5 5MHz QPSK 25 0 Main HighCH20625-846.5

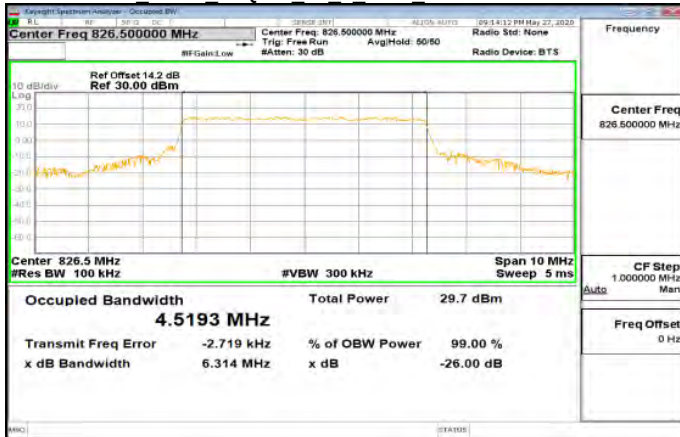


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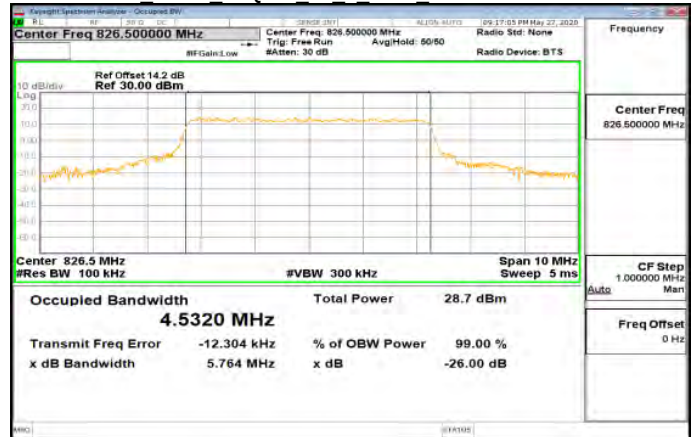
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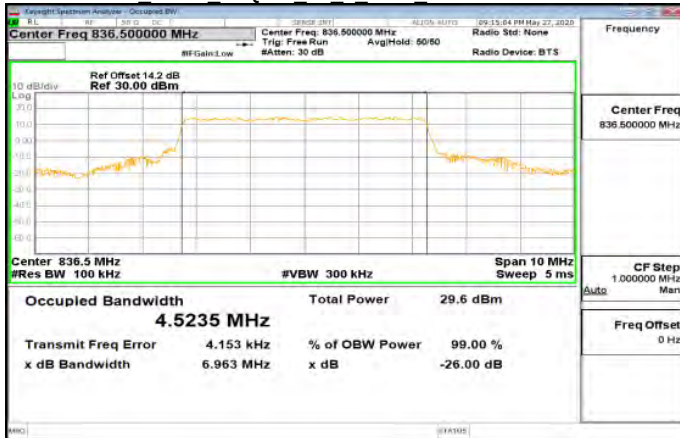
Band5 5MHz 16QAM 25 0 Main LowCH20425-826.5



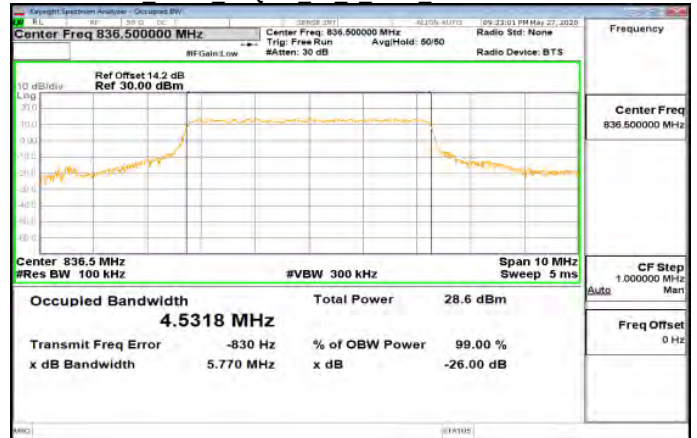
Band5 5MHz 64QAM 25 0 Main LowCH20425-826.5



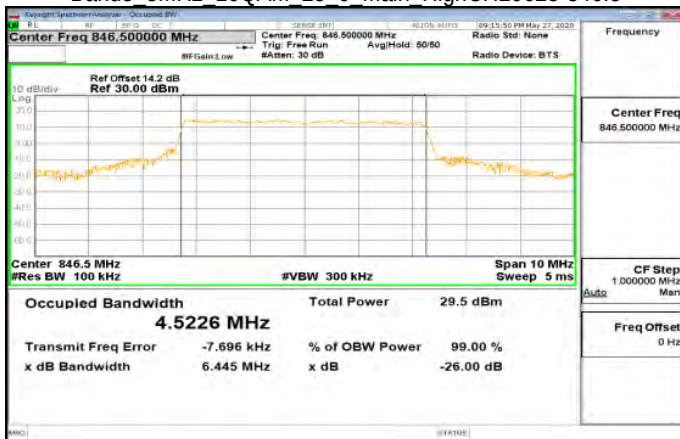
Band5 5MHz 16QAM 25 0 Main MidCH20525-836.5



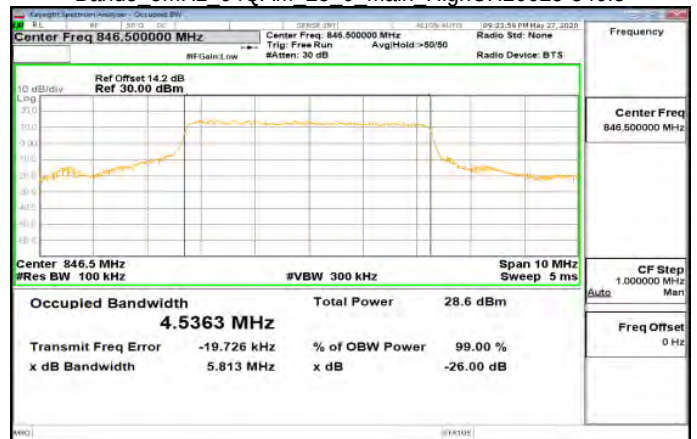
Band5 5MHz 64QAM 25 0 Main MidCH20525-836.5



Band5 5MHz 16QAM 25 0 Main HighCH20625-846.5



Band5 5MHz 64QAM 25 0 Main HighCH20625-846.5

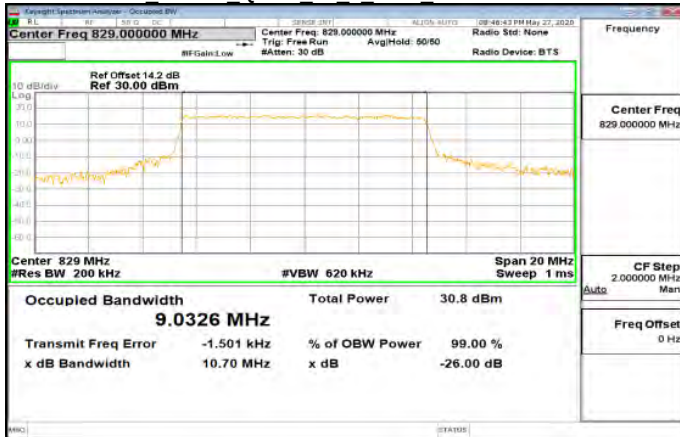


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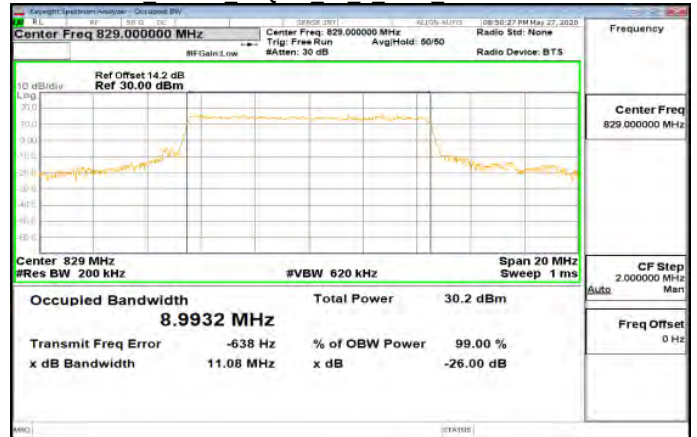
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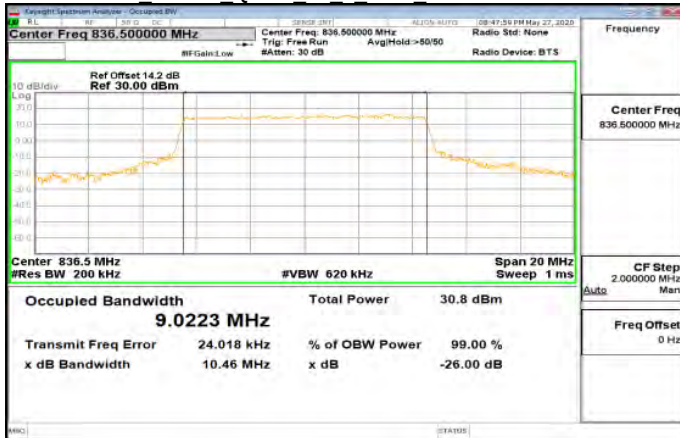
Band5 10MHz QPSK 50 0 Main LowCH20450-829



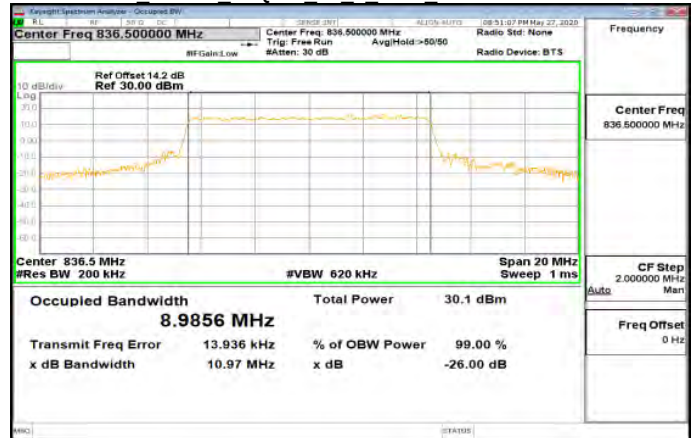
Band5 10MHz 16QAM 50 0 Main LowCH20450-829



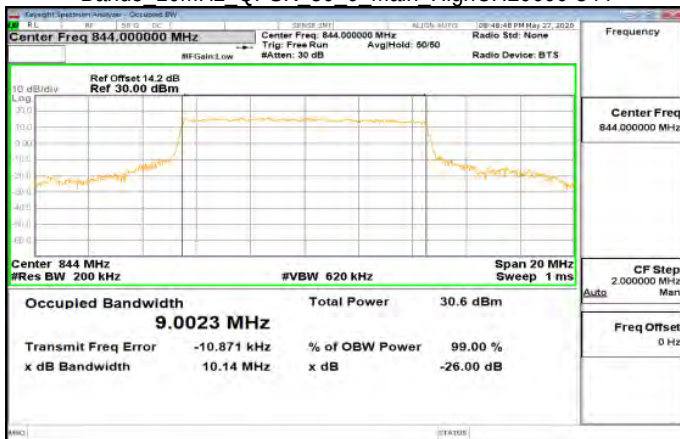
Band5 10MHz QPSK 50 0 Main MidCH20525-836.5



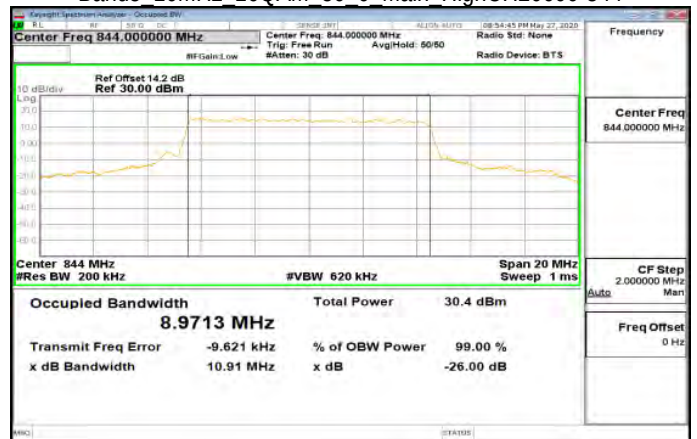
Band5 10MHz 16QAM 50 0 Main MidCH20525-836.5



Band5 10MHz QPSK 50 0 Main HighCH20600-844



Band5 10MHz 16QAM 50 0 Main HighCH20600-844

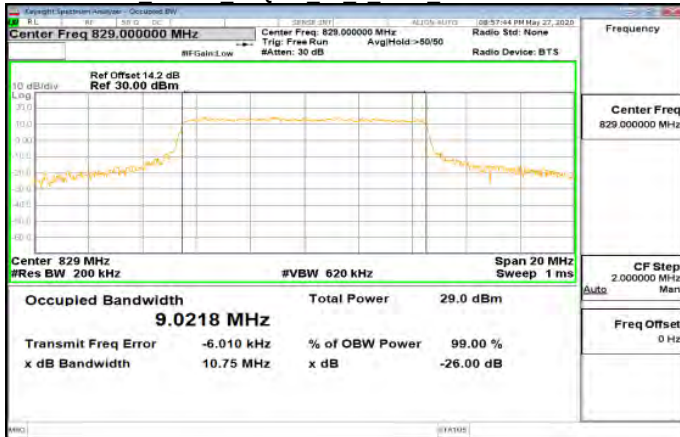


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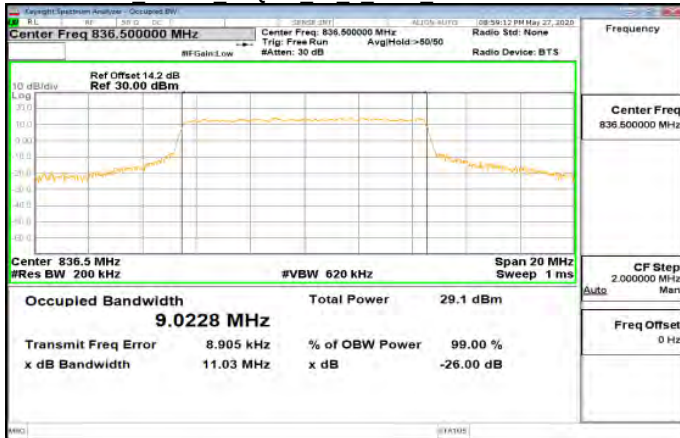
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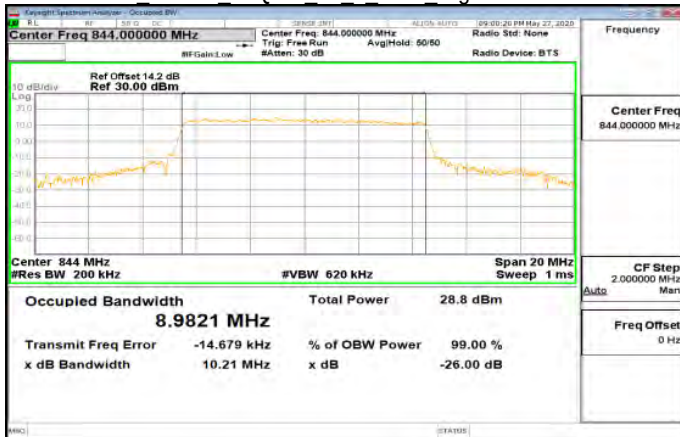
Band5 10MHz 64QAM 50 0 Main LowCH20450-829



Band5 10MHz 64QAM 50 0 Main MidCH20525-836.5



Band5 10MHz 64QAM 50 0 Main HighCH20600-844



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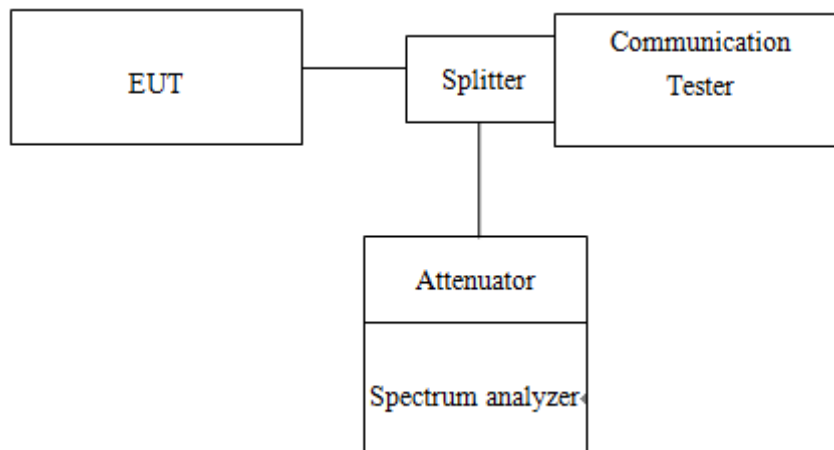
8 OUT OF BAND EMISSION AT ANTENNA TERMINALS

8.1 Standard Applicable

FCC §22.917(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.

8.2 Test SET-UP



8.3 Measurement Procedure

8.3.1 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.

8.3.2 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 $RBW \geq 1\% \text{ EBW}$.
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	04/21/2020	04/20/2021
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Radio Communication Analyzer	Anritsu	MT8815B	6200711454	04/01/2020	03/31/2021
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	04/01/2020	03/31/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021

8.5 Measurement Result:

Refer to next pages.

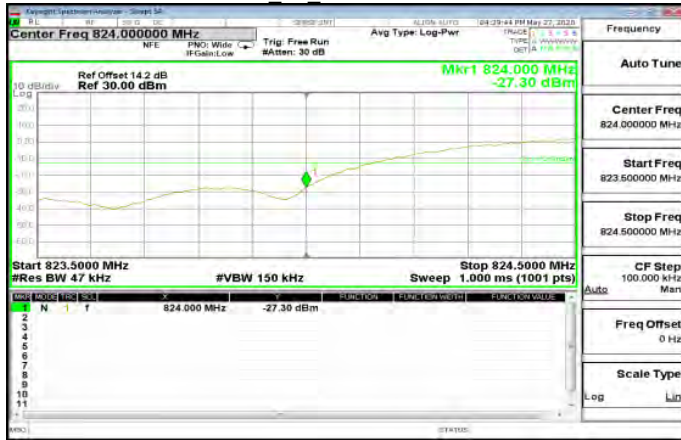
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Band Edge

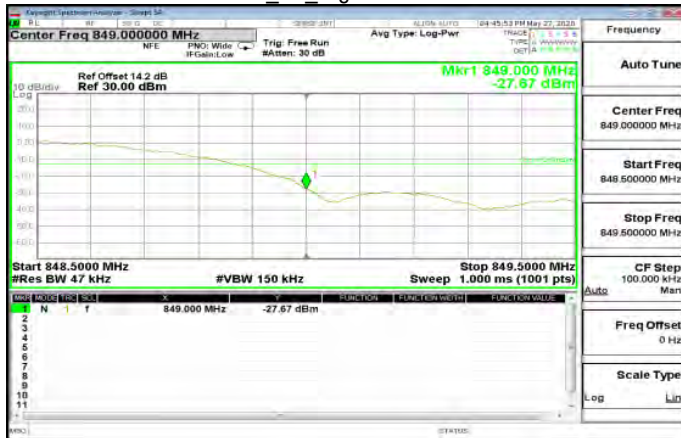
WCDMA B5 LowCH4132-826.4



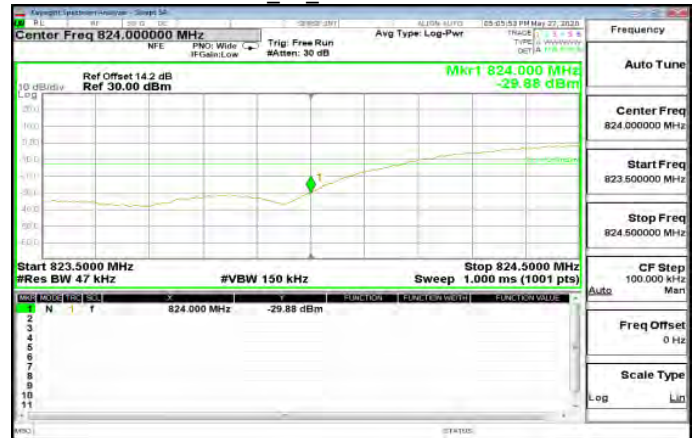
HSDPA B5 HighCH4233-846.6



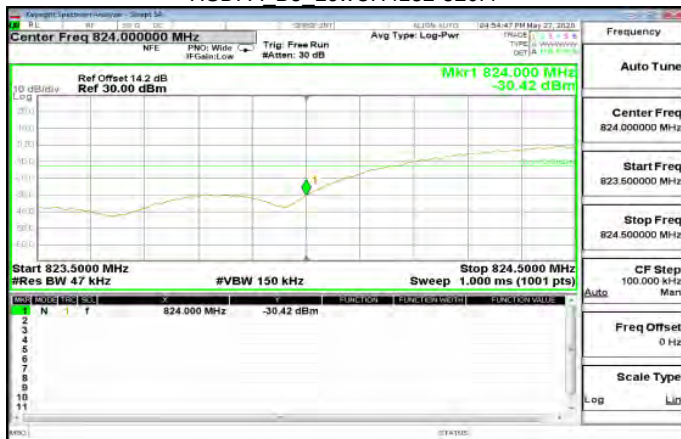
WCDMA B5 HighCH4233-846.6



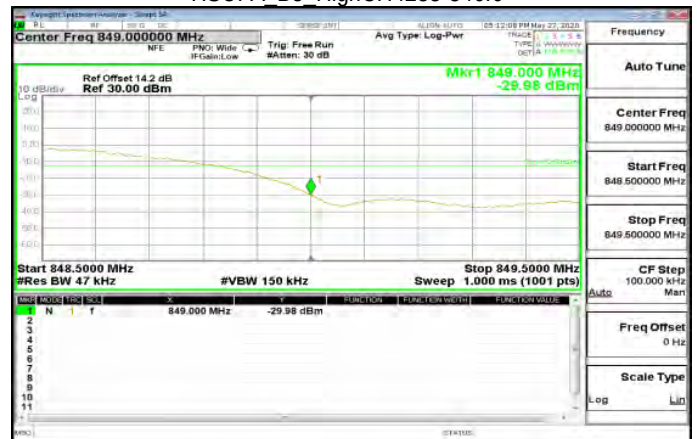
HSUPA B5 LowCH4132-826.4



HSDPA B5 LowCH4132-826.4



HSUPA B5 HighCH4233-846.6



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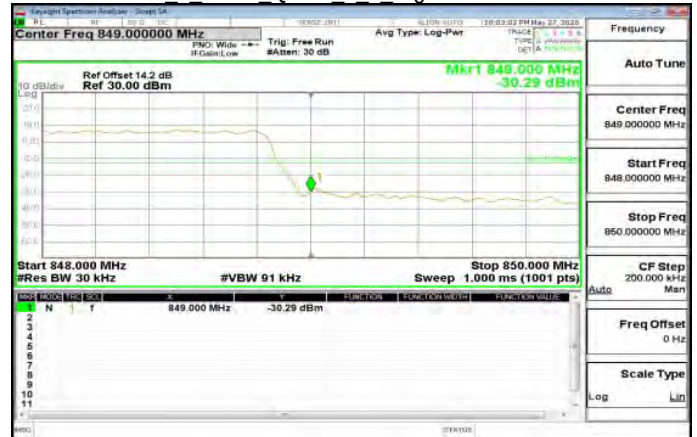
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Band5 1 4MHz QPSK 1 0 LowCH20407-824.7



Band5 1 4MHz QPSK 6 0 HighCH20643-848.3



Band5 1 4MHz QPSK 1 5 HighCH20643-848.3



Band5 3MHz QPSK 1 0 LowCH20415-825.5



Band5 1 4MHz QPSK 6 0 LowCH20407-824.7



Band5 3MHz QPSK 1 14 HighCH20635-847.5



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Band5 3MHz QPSK 15 0 LowCH20415-825.5



Band5 5MHz QPSK 1 24 HighCH20625-846.5



Band5 3MHz QPSK 15 0 HighCH20635-847.5



Band5 5MHz QPSK 25 0 LowCH20425-826.5



Band5 5MHz QPSK 1 0 LowCH20425-826.5



Band5 5MHz QPSK 25 0 HighCH20625-846.5

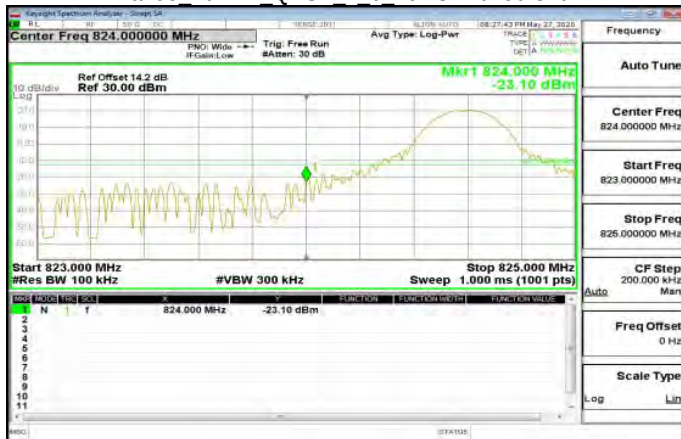


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Band5 10MHz QPSK 1 0 LowCH20450-829



Band5 10MHz QPSK 50 0 HighCH20600-844



Band5 10MHz QPSK 1 49 HighCH20600-844



Band5 10MHz QPSK 50 0 LowCH20450-829



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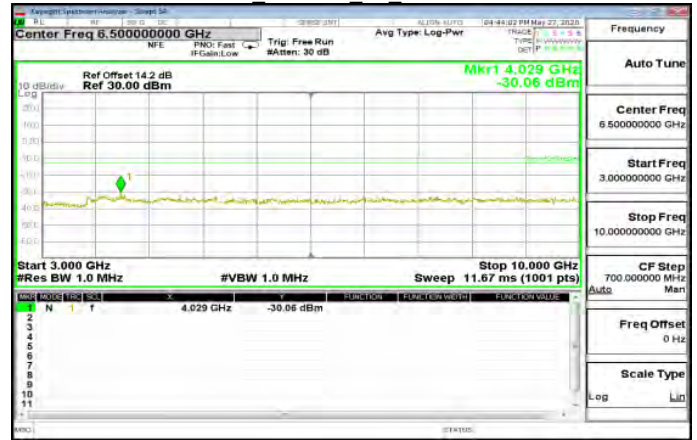
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Spurious Emission

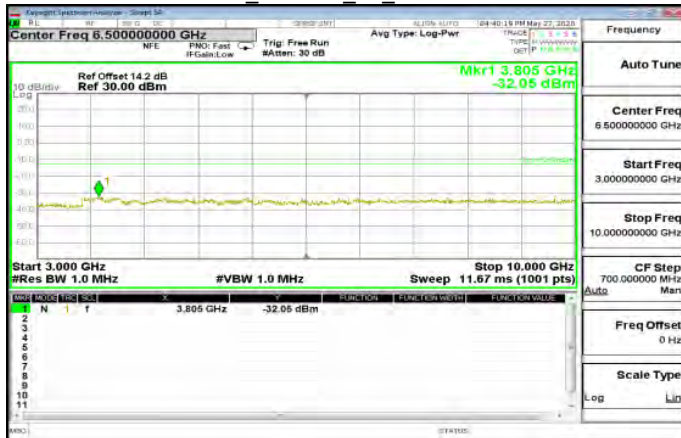
30MHz~3GHz WCDMA B5 LowCH4132-826.4



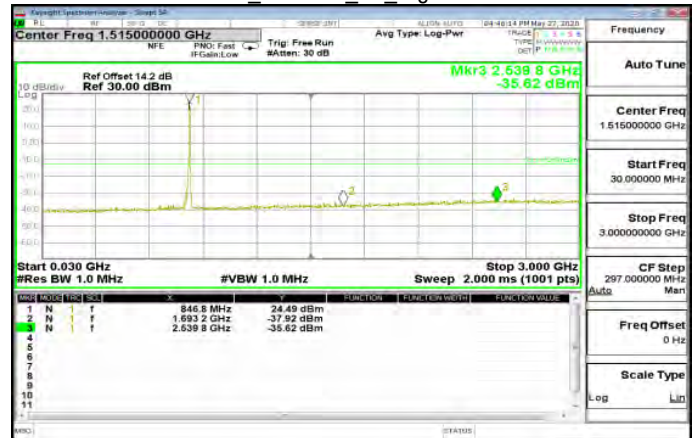
3GHz~10GHz WCDMA B5 MidCH4183-836.6



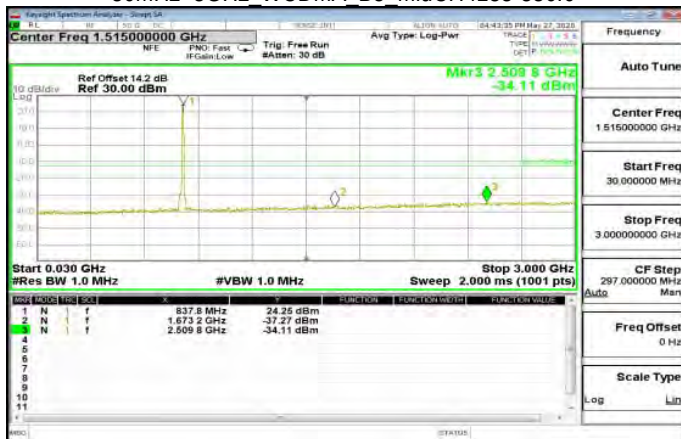
3GHz~10GHz WCDMA B5 LowCH4132-826.4



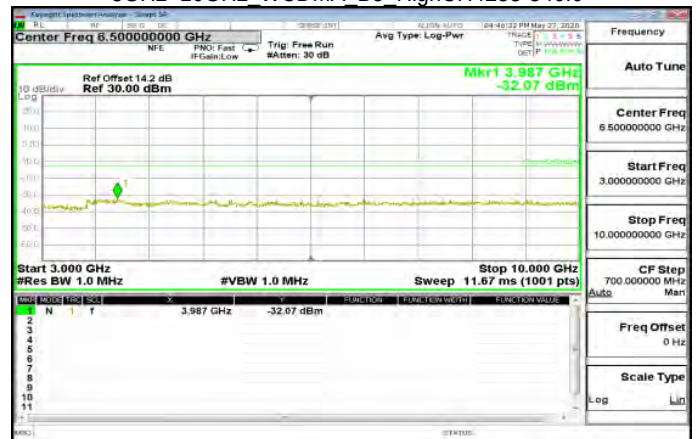
30MHz~3GHz WCDMA B5 HighCH4233-846.6



30MHz~3GHz WCDMA B5 MidCH4183-836.6



3GHz~10GHz WCDMA B5 HighCH4233-846.6

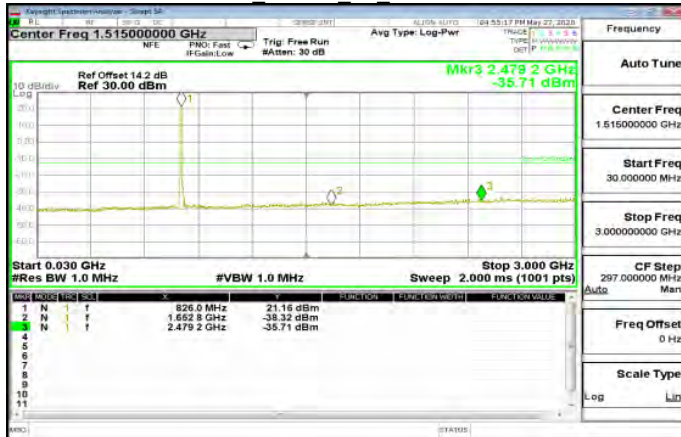


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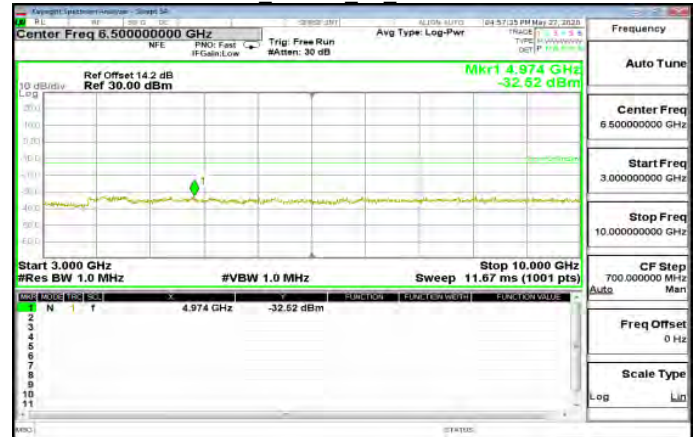
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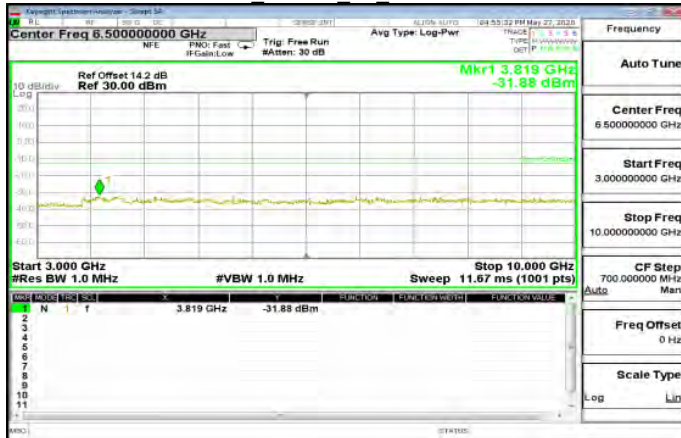
30MHz~3GHz HSDPA B5 LowCH4132-826.4



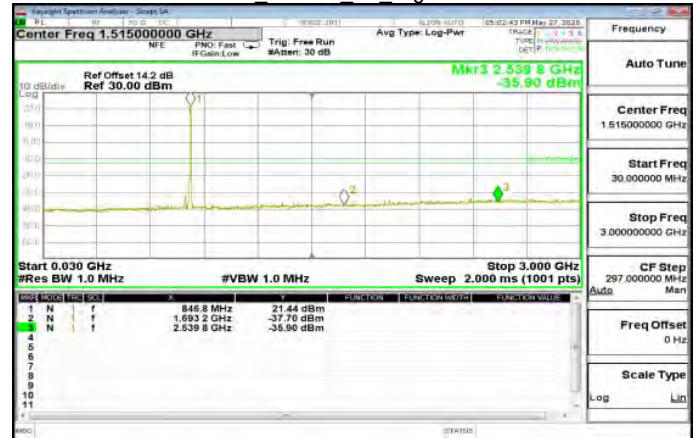
3GHz~10GHz HSDPA B5 MidCH4183-836.6



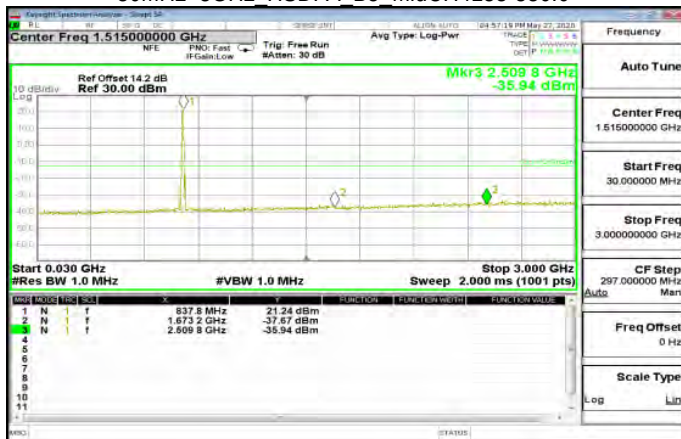
3GHz~10GHz HSDPA B5 LowCH4132-826.4



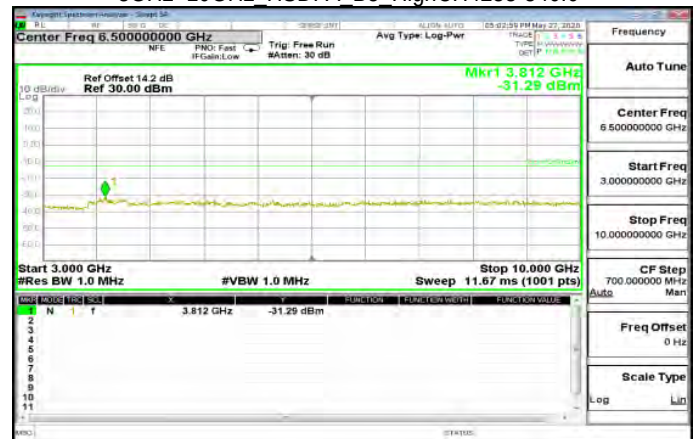
30MHz~3GHz HSDPA B5 HighCH4233-846.6



30MHz~3GHz HSDPA B5 MidCH4183-836.6



3GHz~10GHz HSDPA B5 HighCH4233-846.6



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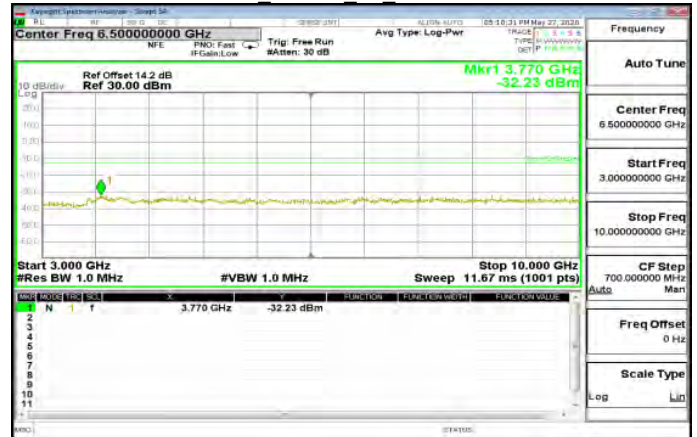
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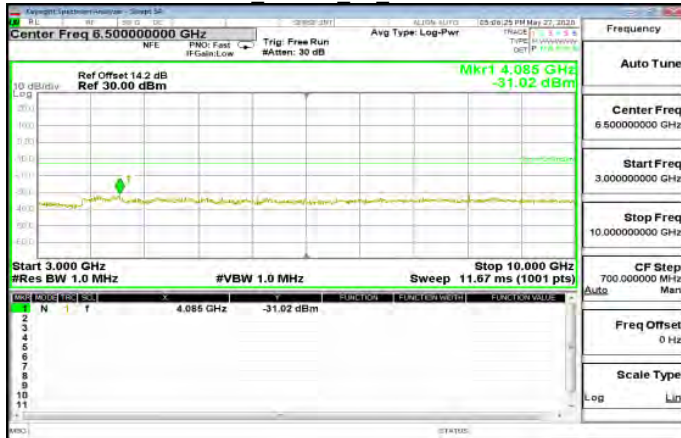
30MHz~3GHz HSUPA B5 LowCH4132-826.4



3GHz~10GHz HSUPA B5 MidCH4183-836.6



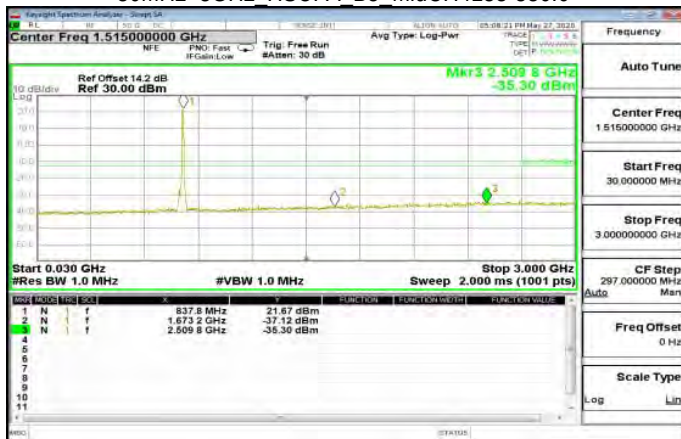
3GHz~10GHz HSUPA B5 LowCH4132-826.4



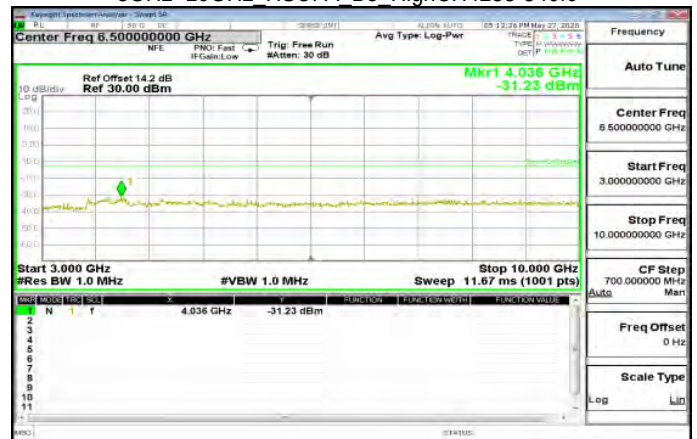
30MHz~3GHz HSUPA B5 HighCH4233-846.6



30MHz~3GHz HSUPA B5 MidCH4183-836.6



3GHz~10GHz HSUPA B5 HighCH4233-846.6



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30MHz~3GHz Band5 1 4MHz QPSK 1 0 LowCH20407-824.7



3GHz~10GHz Band5 1 4MHz QPSK 1 0 MidCH20525-836.5



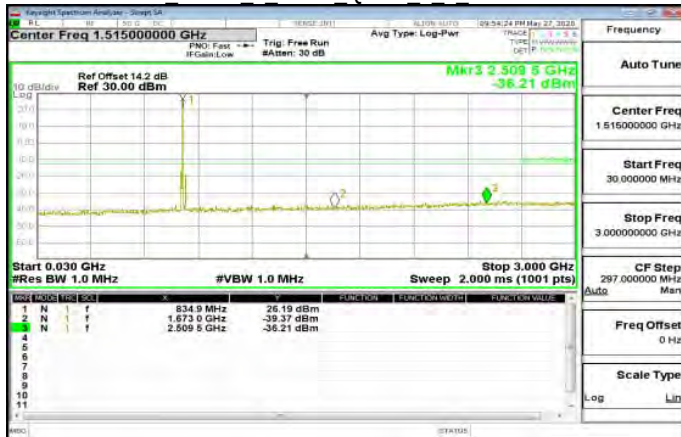
3GHz~10GHz Band5 1 4MHz QPSK 1 0 LowCH20407-824.7



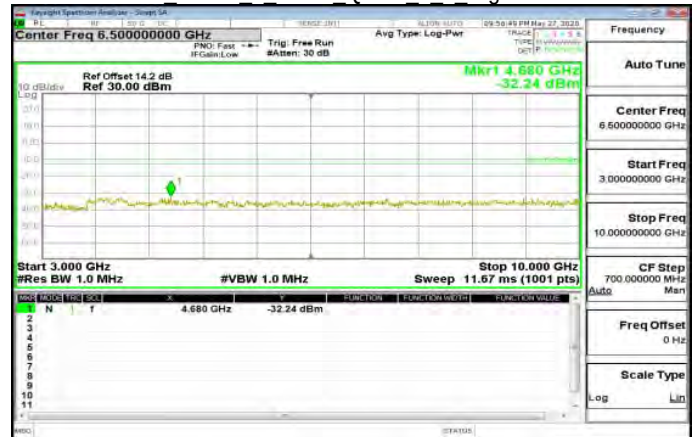
30MHz~3GHz Band5 1 4MHz QPSK 1 0 HighCH20643-848.3



30MHz~3GHz Band5 1 4MHz QPSK 1 0 MidCH20525-836.5



3GHz~10GHz Band5 1 4MHz QPSK 1 0 HighCH20643-848.3



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30MHz~3GHz Band5 3MHz QPSK 1 0 LowCH20415-825.5



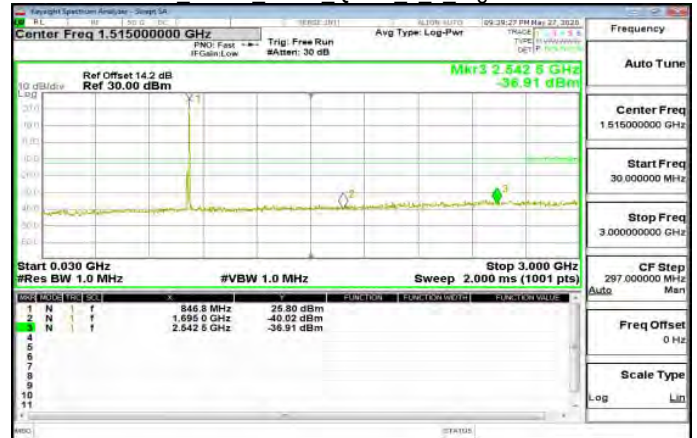
3GHz~10GHz Band5 3MHz QPSK 1 0 MidCH20525-836.5



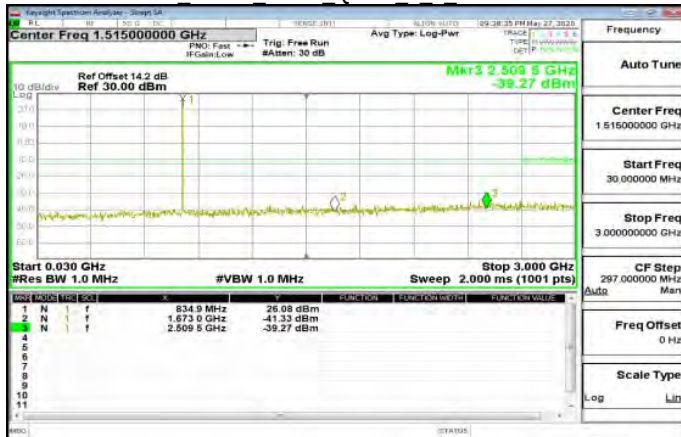
3GHz~10GHz Band5 3MHz QPSK 1 0 LowCH20415-825.5



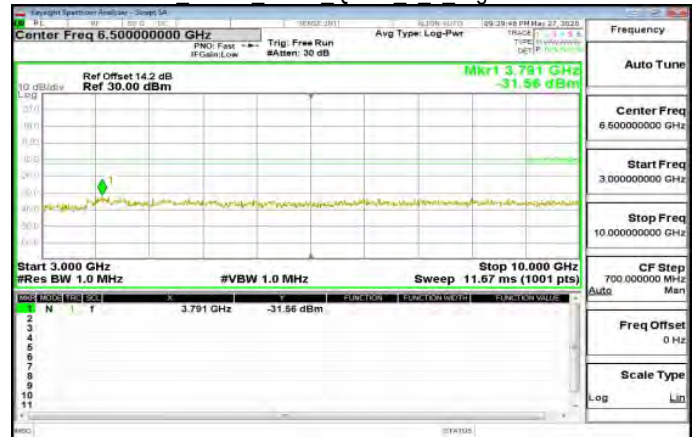
30MHz~3GHz Band5 3MHz QPSK 1 0 HighCH20635-847.5



30MHz~3GHz Band5 3MHz QPSK 1 0 MidCH20525-836.5



3GHz~10GHz Band5 3MHz QPSK 1 0 HighCH20635-847.5



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30MHz~3GHz Band5 5MHz QPSK 1 0 LowCH20425-826.5



3GHz~10GHz Band5 5MHz QPSK 1 0 MidCH20525-836.5



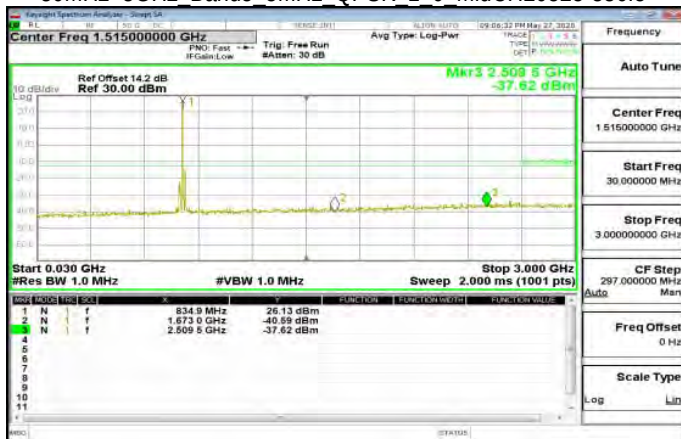
3GHz~10GHz Band5 5MHz QPSK 1 0 LowCH20425-826.5



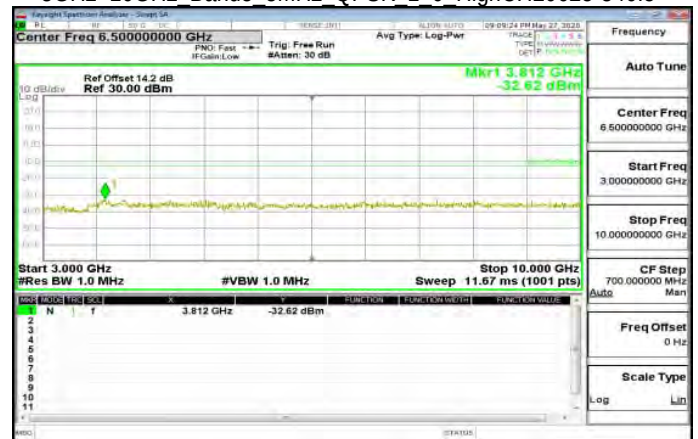
30MHz~3GHz Band5 5MHz QPSK 1 0 HighCH20625-846.5



30MHz~3GHz Band5 5MHz QPSK 1 0 MidCH20525-836.5



3GHz~10GHz Band5 5MHz QPSK 1 0 HighCH20625-846.5



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30MHz-3GHz Band5 10MHz QPSK 1 0 LowCH20450-829



3GHz-10GHz Band5 10MHz QPSK 1 0 MidCH20525-836.5



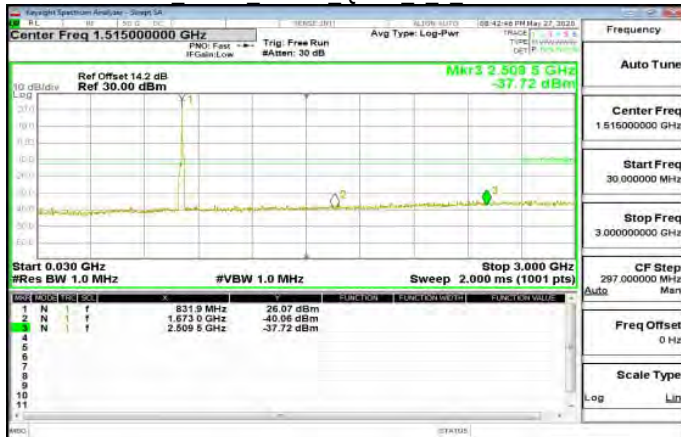
3GHz-10GHz Band5 10MHz QPSK 1 0 LowCH20450-829



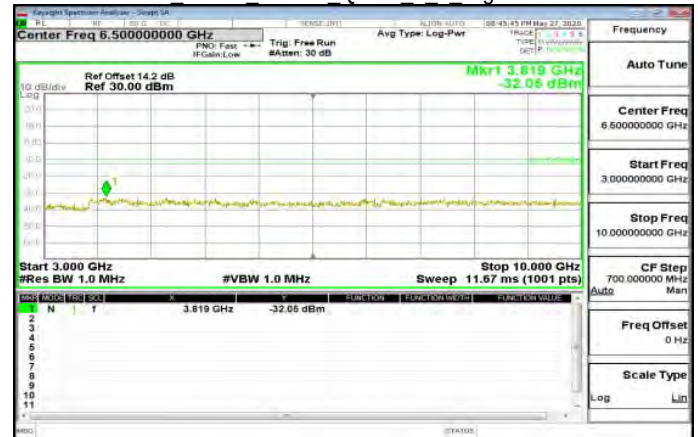
30MHz-3GHz Band5 10MHz QPSK 1 0 HighCH20600-844



30MHz-3GHz Band5 10MHz QPSK 1 0 MidCH20525-836.5



3GHz-10GHz Band5 10MHz QPSK 1 0 HighCH20600-844



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9 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

9.1 Standard Applicable

According to FCC §2.1053,

FCC §22.917(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.

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	$43 + 10 \log_{10}(p)$ ^{Note}
2320 - 2324	$55 + 10 \log_{10}(p)$
2324 - 2328	$61 + 10 \log_{10}(p)$
2328 - 2337	$67 + 10 \log_{10}(p)$
2337 - 2341	$61 + 10 \log_{10}(p)$
2341 - 2345	$55 + 10 \log_{10}(p)$
2345 - 2360	$43 + 10 \log_{10}(p)$ ^{Note}
2360 - 2365	$43 + 10 \log_{10}(p)$
2365 - 2395	$70 + 10 \log_{10}(p)$
>2395	$43 + 10 \log_{10}(p)$

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

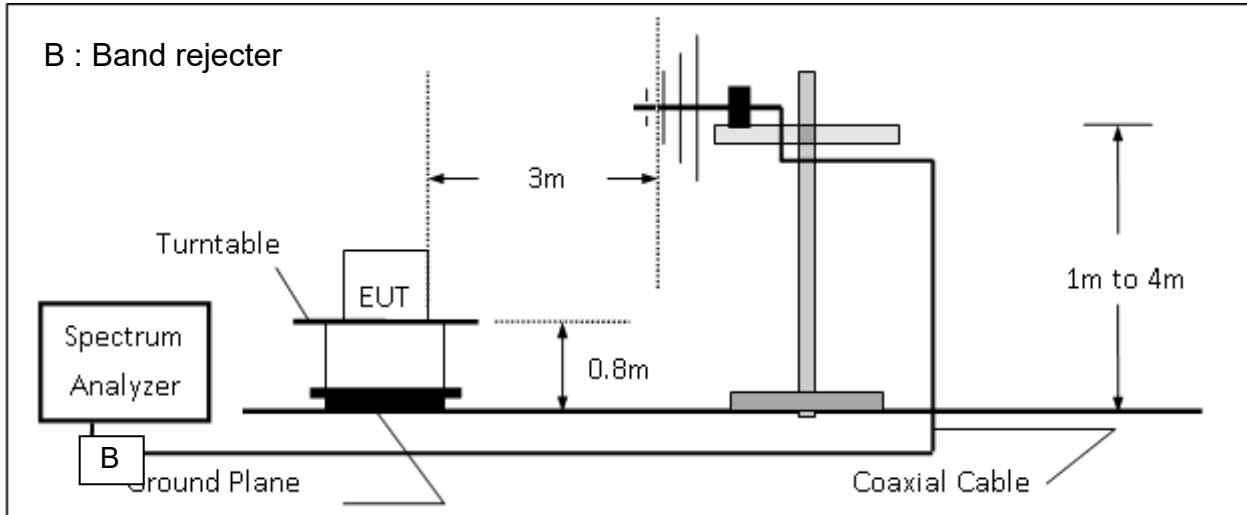
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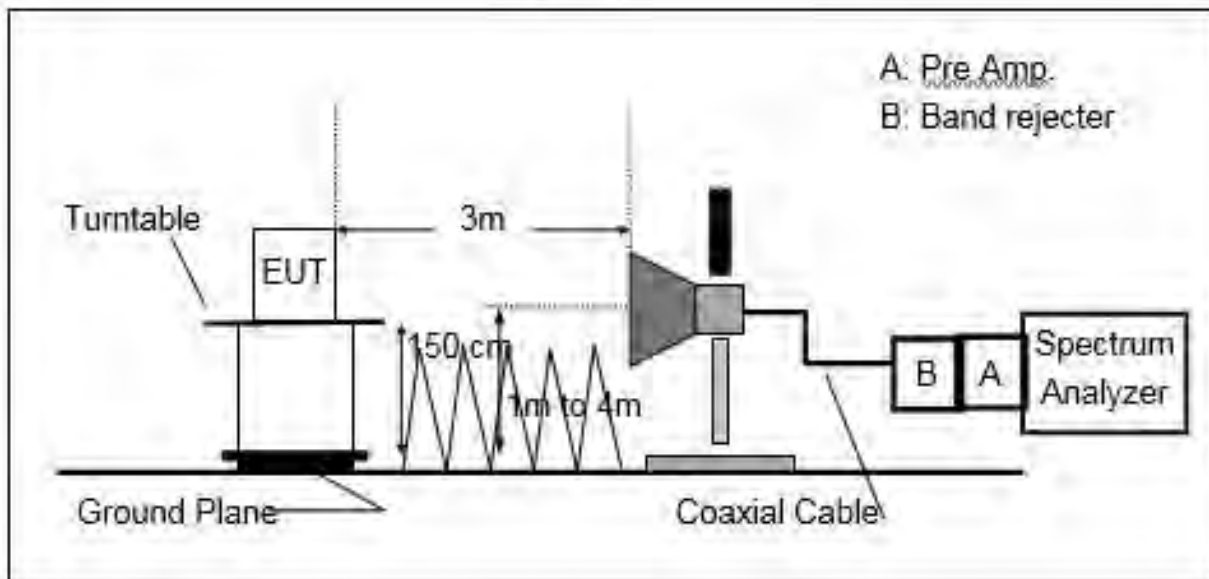
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9.2 EUT Setup

Radiated Emission Test Set-Up, Frequency Below 1000MHz



Radiated Emission Test Set-UP Frequency Over 1 GHz



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9.3 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.

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

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

9.4 Measurement Equipment Used:

ERP, EIRP MEASUREMENT EQUIPMENT List 966 Chamber					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
Horn Antenna	Schwarzbeck	BBHA9120D	D803	12/20/2019	12/19/2020
Bi-log Antenna	TESEO	CBL 6112D	35242 & AT-N0555	01/13/2020	01/12/2021
Loop Antenna	ETS.LINDGREN	6502	148045	10/15/2019	10/14/2020
Spectrum Analyzer	Agilent	E4446A	MY51100003	10/23/2019	10/22/2020
Radio Communication Analyzer	Anritsu	MT8815B	6200711454	04/01/2020	03/31/2021
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	04/01/2020	03/31/2021
Pre-Amplifier	EMC Instruments	EMC051825	980152	01/02/2020	01/01/2021
Pre-Amplifier	HP	8447D	2944A09469	01/02/2020	01/01/2021
Filter 800-1000	Micro-Tronics	EWT	M1	01/02/2020	01/01/2021
1GHz High Pass Filter	Micro-Tronics	HPM50108	32	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	succoflex 102	MY2622/2	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	succoflex 104A	800086/4a	01/02/2020	01/01/2021
Coaxial Cable	Huber Suhner	EMC 104-SM-SM-2000	160123	01/02/2020	01/01/2021

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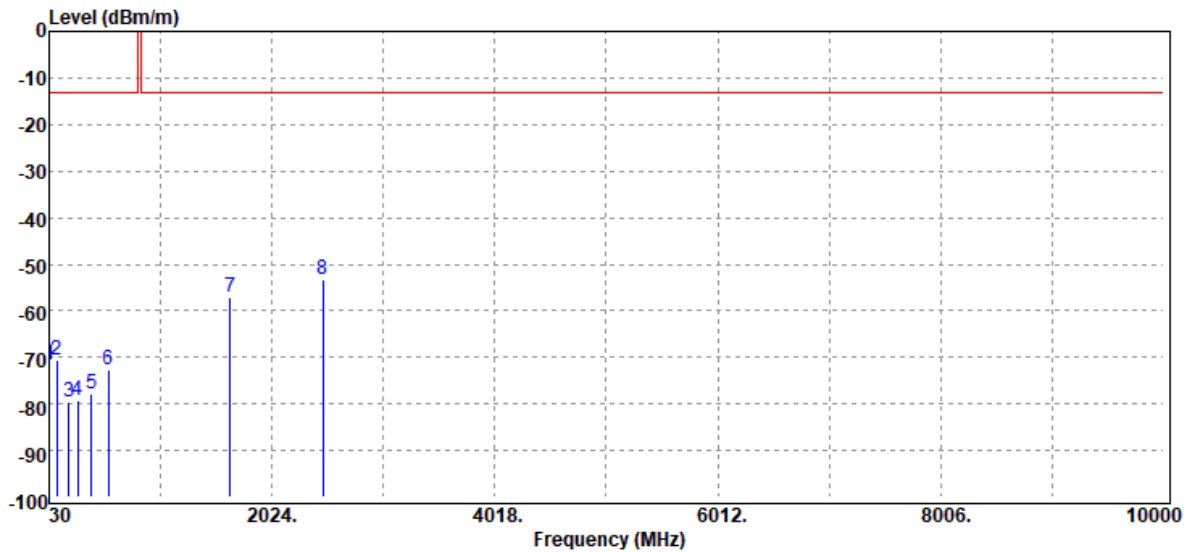
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9.5 Measurement Result:

Report Number :ER/2020/40046
Operation Mode :WCDMA B5
Test Mode :Tx CH Low
EUT Pol :E1 Plane
Test Frequency :826.4 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :VERTICAL
Engineer :Neo



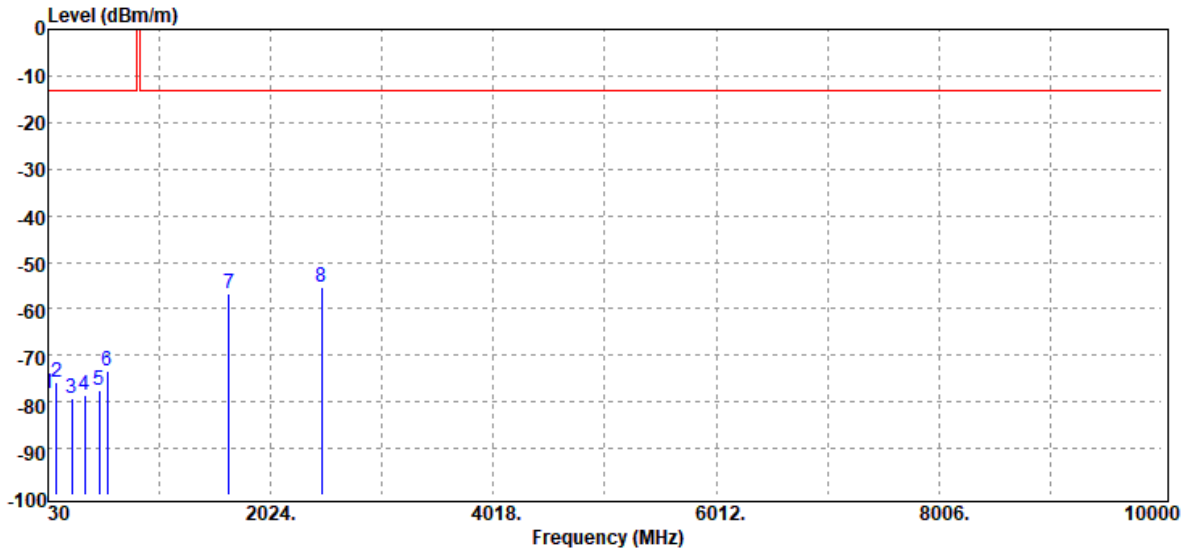
Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
34.85	-71.56	-51.34	-19.65	-0.57	-13.00	-58.56
100.81	-70.66	-63.51	-6.20	-0.95	-13.00	-57.66
209.45	-79.74	-76.66	-1.71	-1.37	-13.00	-66.74
285.11	-79.40	-75.98	-1.83	-1.59	-13.00	-66.40
411.21	-77.97	-74.68	-1.39	-1.90	-13.00	-64.97
563.50	-72.75	-69.09	-1.38	-2.28	-13.00	-59.75
1652.80	-57.02	-62.95	9.80	-3.87	-13.00	-44.02
2479.20	-53.32	-59.37	10.83	-4.78	-13.00	-40.32

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Report Number :ER/2020/40046
Operation Mode :WCDMA B5
Test Mode :Tx CH Low
EUT Pol :E1 Plane
Test Frequency :826.4 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :HORIZONTAL
Engineer :Neo


Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-78.31	-56.49	-21.28	-0.54	-13.00	-65.31
102.75	-75.77	-68.37	-6.44	-0.96	-13.00	-62.77
241.46	-79.18	-75.97	-1.73	-1.48	-13.00	-66.18
354.95	-78.51	-75.22	-1.52	-1.77	-13.00	-65.51
487.84	-77.56	-73.84	-1.62	-2.10	-13.00	-64.56
556.71	-73.22	-69.61	-1.35	-2.26	-13.00	-60.22
1652.80	-56.88	-62.81	9.80	-3.87	-13.00	-43.88
2479.20	-55.33	-61.38	10.83	-4.78	-13.00	-42.33

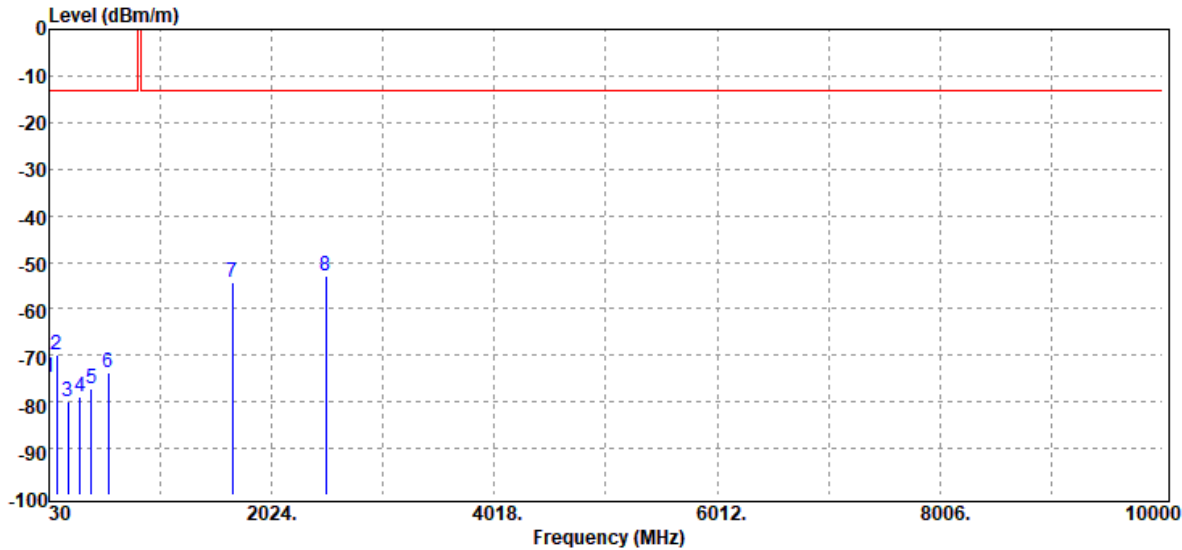
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Report Number :ER/2020/40046
Operation Mode :WCDMA B5
Test Mode :Tx CH Mid
EUT Pol :E1 Plane
Test Frequency :836.6 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :VERTICAL
Engineer :Neo



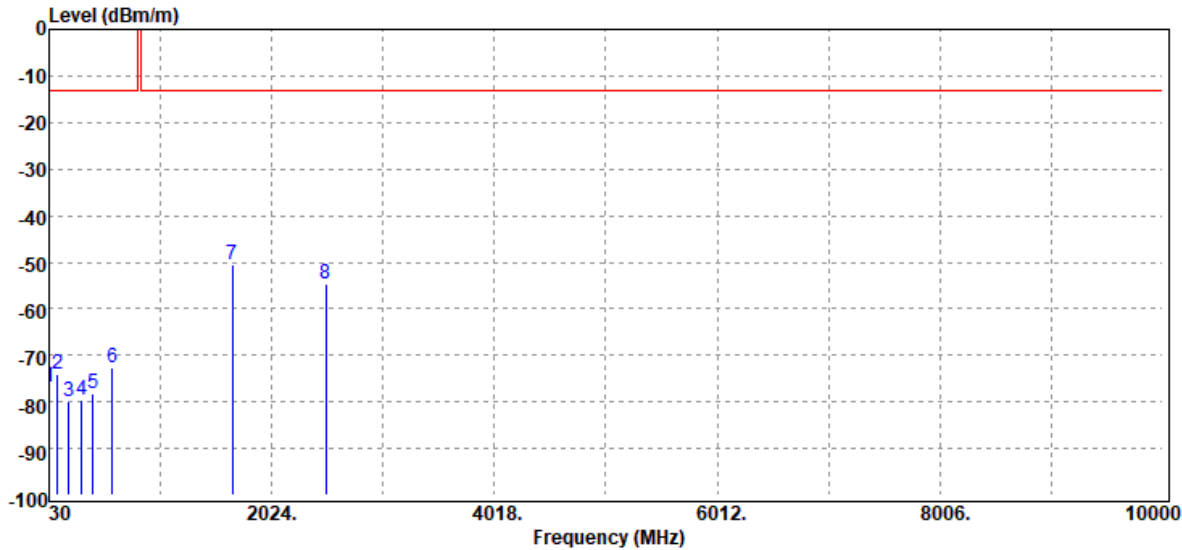
Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
34.85	-74.61	-54.39	-19.65	-0.57	-13.00	-61.61
100.81	-69.77	-62.62	-6.20	-0.95	-13.00	-56.77
197.81	-79.76	-76.14	-2.30	-1.32	-13.00	-66.76
308.39	-79.00	-75.79	-1.61	-1.60	-13.00	-66.00
405.39	-77.17	-73.83	-1.47	-1.87	-13.00	-64.17
558.65	-73.66	-70.03	-1.36	-2.27	-13.00	-60.66
1673.20	-54.45	-60.35	9.80	-3.90	-13.00	-41.45
2509.80	-52.99	-59.21	11.04	-4.82	-13.00	-39.99

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Report Number :ER/2020/40046
Operation Mode :WCDMA B5
Test Mode :Tx CH Mid
EUT Pol :E1 Plane
Test Frequency :836.6 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :HORIZONTAL
Engineer :Neo


Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
34.85	-76.98	-56.76	-19.65	-0.57	-13.00	-63.98
102.75	-73.90	-66.50	-6.44	-0.96	-13.00	-60.90
206.54	-79.89	-76.70	-1.83	-1.36	-13.00	-66.89
321.00	-79.68	-76.48	-1.54	-1.66	-13.00	-66.68
422.85	-78.25	-74.62	-1.52	-2.11	-13.00	-65.25
597.45	-72.83	-68.62	-1.85	-2.36	-13.00	-59.83
1673.20	-50.55	-56.45	9.80	-3.90	-13.00	-37.55
2509.80	-54.53	-60.75	11.04	-4.82	-13.00	-41.53

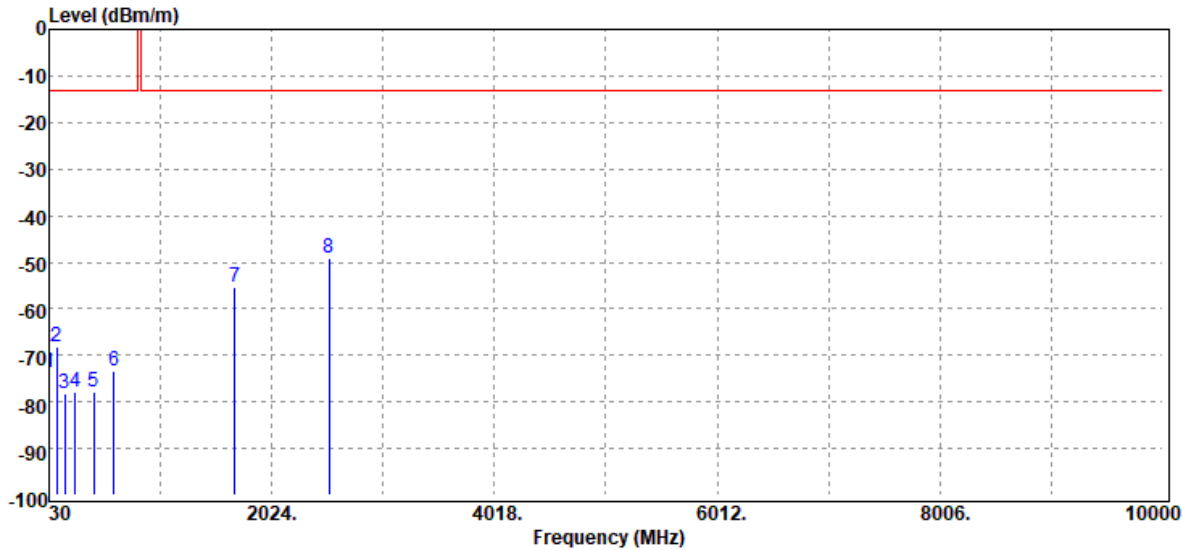
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Report Number :ER/2020/40046
Operation Mode :WCDMA B5
Test Mode :Tx CH High
EUT Pol :E1 Plane
Test Frequency :846.6 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :VERTICAL
Engineer :Neo



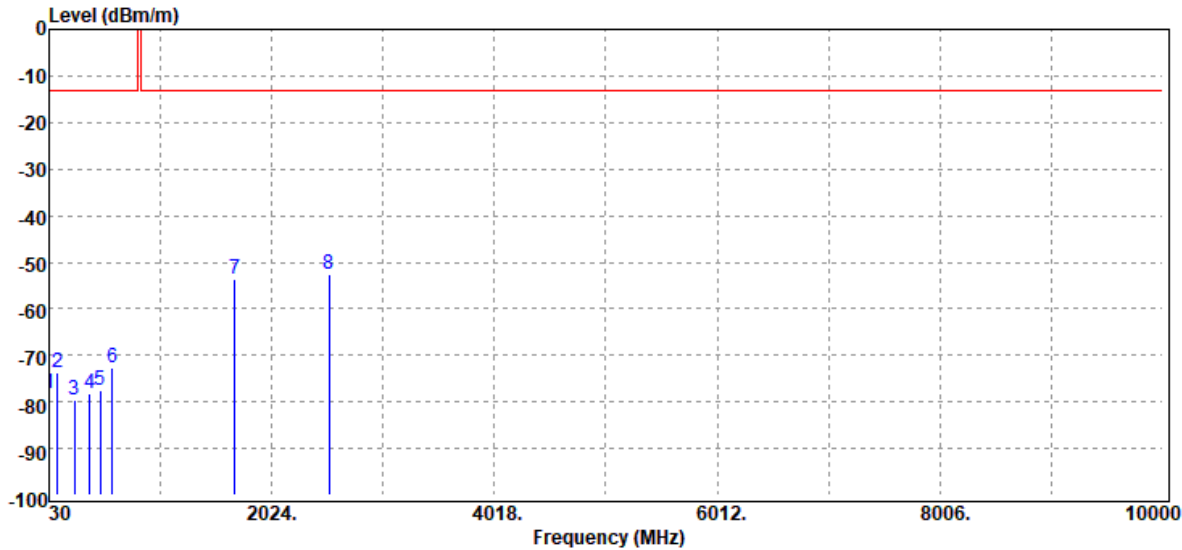
Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
34.85	-73.80	-53.58	-19.65	-0.57	-13.00	-60.80
100.81	-68.08	-60.93	-6.20	-0.95	-13.00	-55.08
167.74	-78.03	-70.54	-6.23	-1.26	-13.00	-65.03
260.86	-77.85	-74.69	-1.63	-1.53	-13.00	-64.85
427.70	-78.00	-74.24	-1.61	-2.15	-13.00	-65.00
609.09	-73.49	-69.59	-1.91	-1.99	-13.00	-60.49
1693.20	-55.40	-61.28	9.80	-3.92	-13.00	-42.40
2539.80	-49.19	-55.50	11.16	-4.85	-13.00	-36.19

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Report Number :ER/2020/40046
Operation Mode :WCDMA B5
Test Mode :Tx CH High
EUT Pol :E1 Plane
Test Frequency :846.6 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :HORIZONTAL
Engineer :Neo


Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-78.12	-56.30	-21.28	-0.54	-13.00	-65.12
102.75	-73.64	-66.24	-6.44	-0.96	-13.00	-60.64
256.01	-79.56	-76.43	-1.60	-1.53	-13.00	-66.56
390.84	-78.18	-74.86	-1.52	-1.80	-13.00	-65.18
485.90	-77.40	-73.69	-1.61	-2.10	-13.00	-64.40
595.51	-72.64	-68.38	-1.84	-2.42	-13.00	-59.64
1693.20	-53.54	-59.42	9.80	-3.92	-13.00	-40.54
2539.80	-52.53	-58.84	11.16	-4.85	-13.00	-39.53

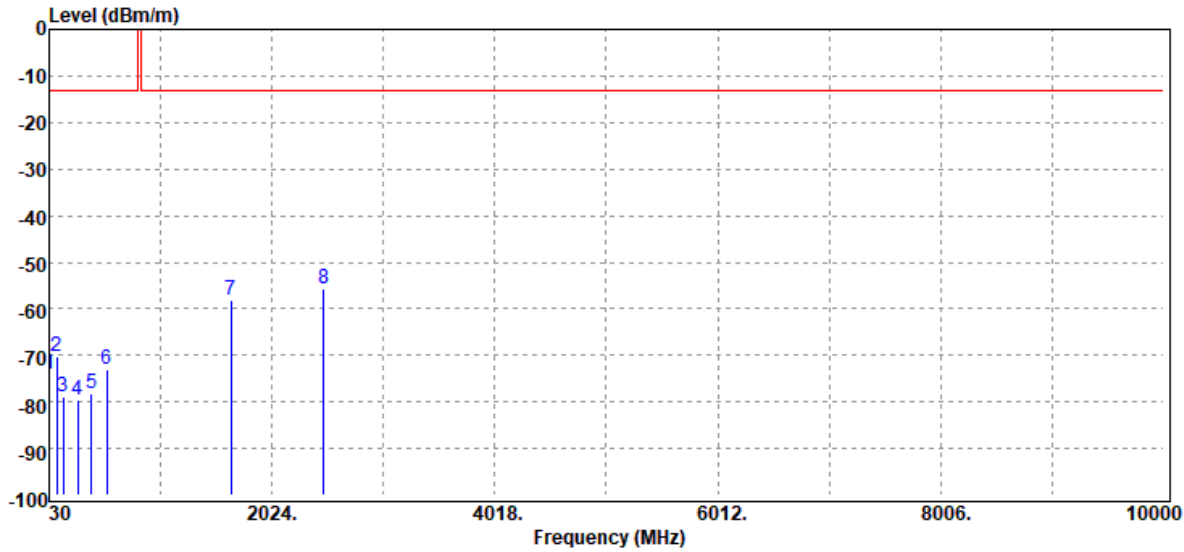
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Report Number :ER/2020/40046
Operation Mode :LTE B5
Test Mode :Tx CH Low
EUT Pol :E1 Plane
Test Frequency :829 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :VERTICAL
Engineer :Neo



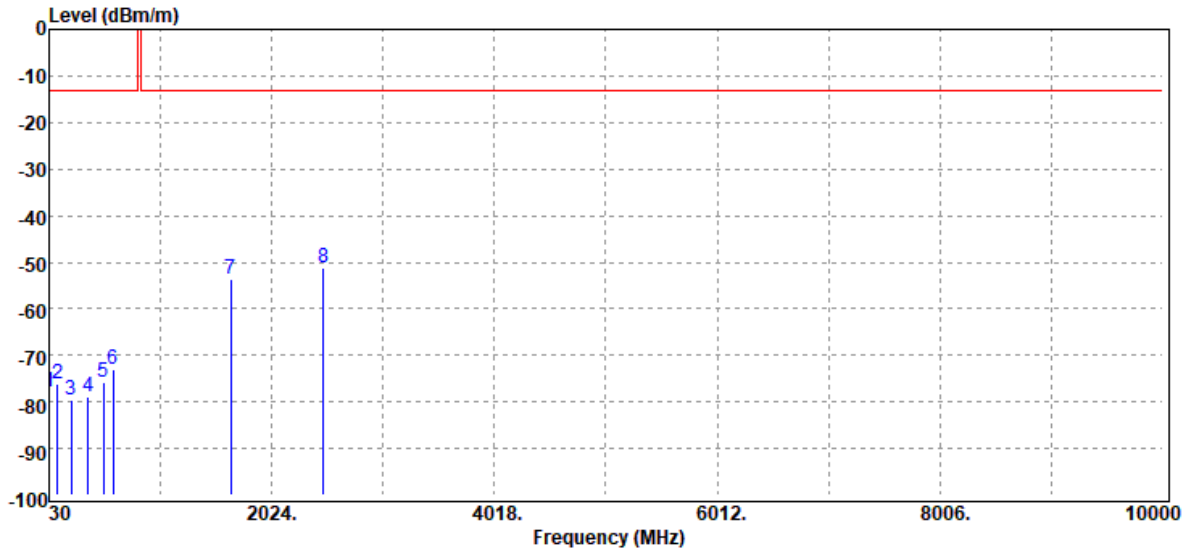
Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
34.85	-73.90	-53.68	-19.65	-0.57	-13.00	-60.90
100.81	-70.10	-62.95	-6.20	-0.95	-13.00	-57.10
158.04	-78.78	-70.52	-7.05	-1.21	-13.00	-65.78
284.14	-79.64	-76.22	-1.84	-1.58	-13.00	-66.64
410.24	-78.07	-74.81	-1.38	-1.88	-13.00	-65.07
546.04	-73.14	-69.85	-1.20	-2.09	-13.00	-60.14
1658.00	-58.11	-64.03	9.80	-3.88	-13.00	-45.11
2487.00	-55.60	-61.71	10.90	-4.79	-13.00	-42.60

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Report Number :ER/2020/40046
Operation Mode :LTE B5
Test Mode :Tx CH Low
EUT Pol :E1 Plane
Test Frequency :829 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :HORIZONTAL
Engineer :Neo


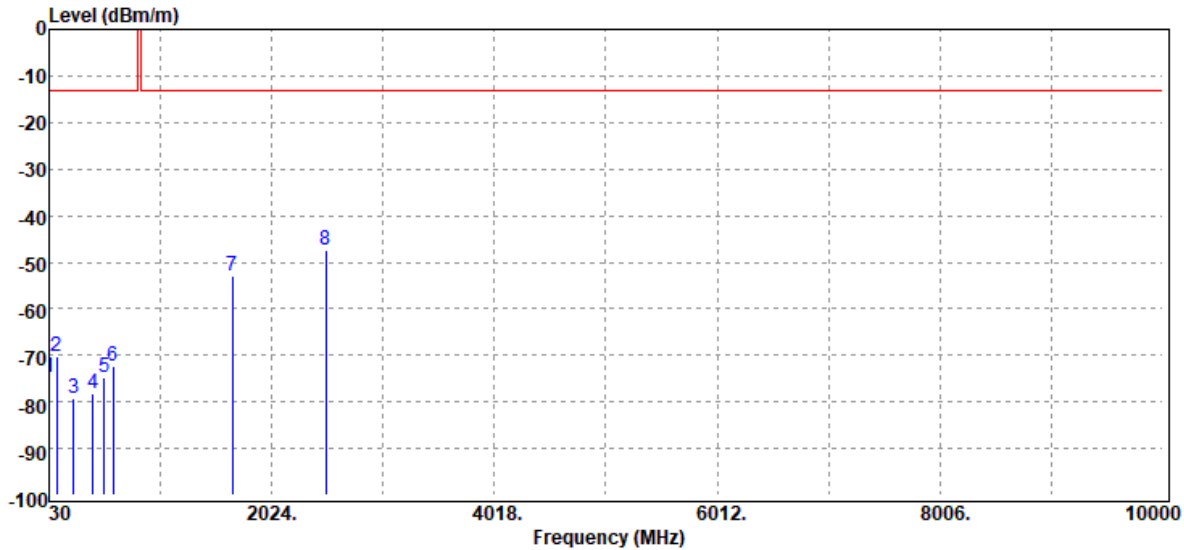
Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-77.69	-55.87	-21.28	-0.54	-13.00	-64.69
104.69	-76.06	-68.42	-6.67	-0.97	-13.00	-63.06
228.85	-79.58	-76.79	-1.37	-1.42	-13.00	-66.58
377.26	-78.99	-75.66	-1.54	-1.79	-13.00	-65.99
519.85	-75.77	-72.20	-1.41	-2.16	-13.00	-62.77
605.21	-72.95	-68.95	-1.89	-2.11	-13.00	-59.95
1658.00	-53.59	-59.51	9.80	-3.88	-13.00	-40.59
2487.00	-51.06	-57.17	10.90	-4.79	-13.00	-38.06

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Report Number :ER/2020/40046
Operation Mode :LTE B5
Test Mode :Tx CH Mid
EUT Pol :E1 Plane
Test Frequency :836.5 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :VERTICAL
Engineer :Neo


Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
34.85	-74.78	-54.56	-19.65	-0.57	-13.00	-61.78
101.78	-70.25	-62.96	-6.33	-0.96	-13.00	-57.25
250.19	-79.28	-76.09	-1.67	-1.52	-13.00	-66.28
420.91	-78.05	-74.48	-1.48	-2.09	-13.00	-65.05
521.79	-74.63	-71.15	-1.38	-2.10	-13.00	-61.63
605.21	-72.28	-68.28	-1.89	-2.11	-13.00	-59.28
1673.00	-52.86	-58.76	9.80	-3.90	-13.00	-39.86
2509.50	-47.28	-53.50	11.04	-4.82	-13.00	-34.28

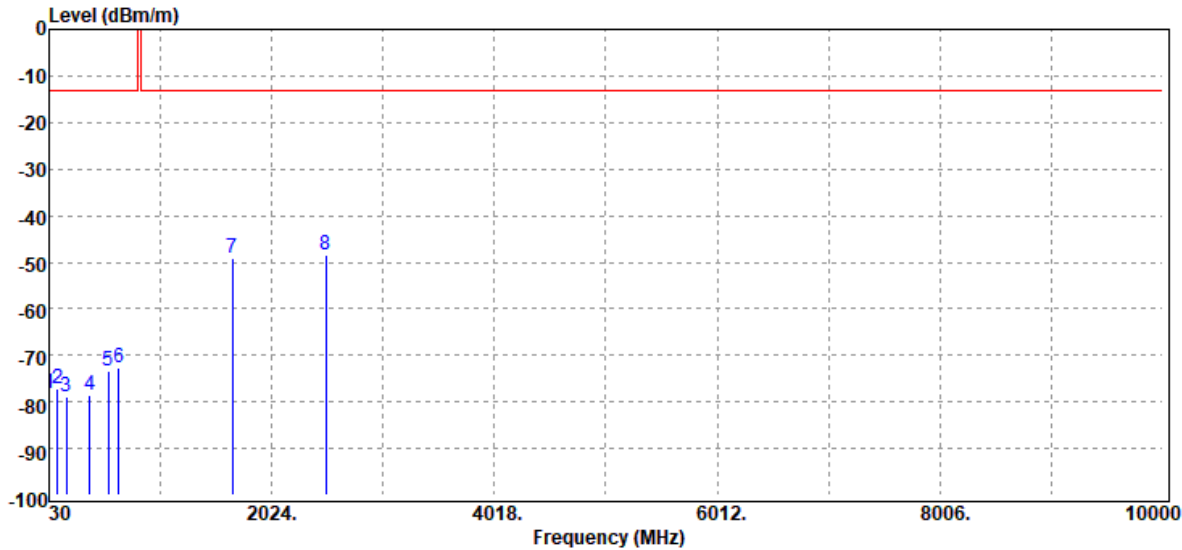
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Report Number :ER/2020/40046
Operation Mode :LTE B5
Test Mode :Tx CH Mid
EUT Pol :E1 Plane
Test Frequency :836.5 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :HORIZONTAL
Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.00	-78.31	-56.49	-21.28	-0.54	-13.00	-65.31
107.60	-77.14	-69.20	-6.95	-0.99	-13.00	-64.14
182.29	-79.03	-73.99	-3.81	-1.23	-13.00	-66.03
393.75	-78.61	-75.22	-1.57	-1.82	-13.00	-65.61
561.56	-73.38	-69.73	-1.37	-2.28	-13.00	-60.38
655.65	-72.64	-68.73	-1.31	-2.60	-13.00	-59.64
1673.00	-49.21	-55.11	9.80	-3.90	-13.00	-36.21
2509.50	-48.42	-54.64	11.04	-4.82	-13.00	-35.42

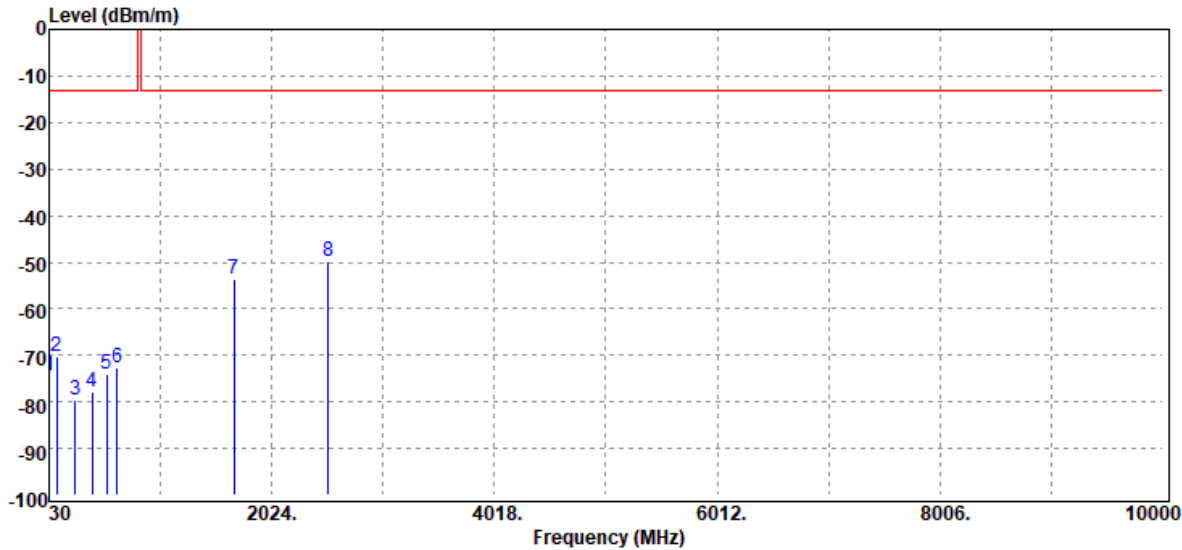
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Report Number :ER/2020/40046
Operation Mode :LTE B5
Test Mode :Tx CH High
EUT Pol :E1 Plane
Test Frequency :844 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :VERTICAL
Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
34.85	-74.39	-54.17	-19.65	-0.57	-13.00	-61.39
100.81	-70.22	-63.07	-6.20	-0.95	-13.00	-57.22
265.71	-79.43	-76.22	-1.68	-1.53	-13.00	-66.43
416.06	-77.84	-74.38	-1.46	-2.00	-13.00	-64.84
544.10	-74.10	-70.85	-1.21	-2.04	-13.00	-61.10
643.04	-72.56	-68.60	-1.46	-2.50	-13.00	-59.56
1688.00	-53.54	-59.42	9.80	-3.92	-13.00	-40.54
2532.00	-49.75	-56.04	11.13	-4.84	-13.00	-36.75

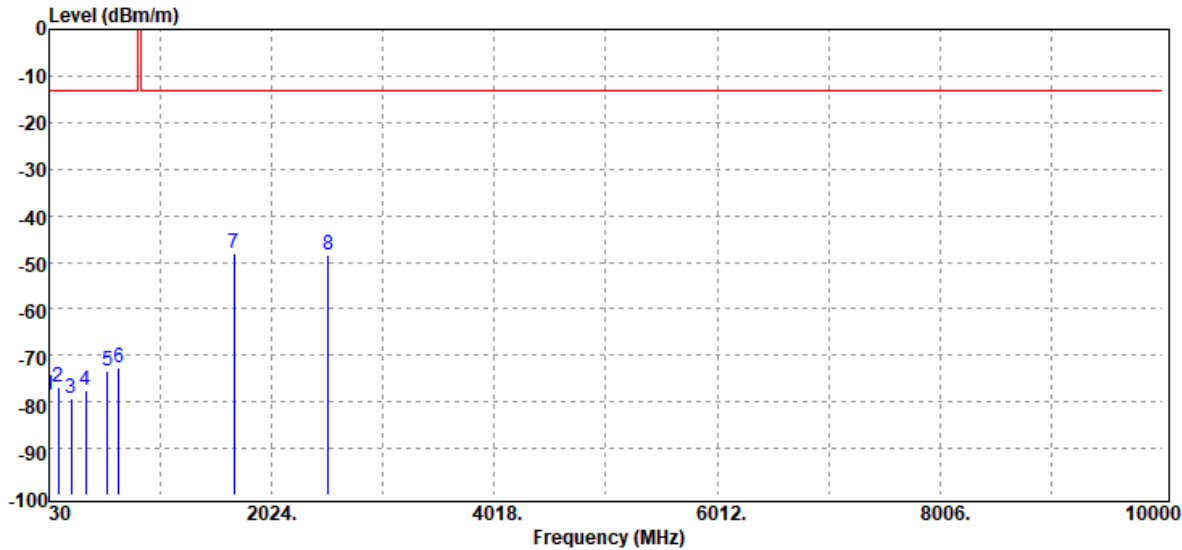
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Report Number :ER/2020/40046
Operation Mode :LTE B5
Test Mode :Tx CH High
EUT Pol :E1 Plane
Test Frequency :844 MHz

Test Date :2020-05-22
Temp./Humi. :24.3/71
Antenna Pol. :HORIZONTAL
Engineer :Neo



Freq. MHz	EIRP/ERP dBm	SG Output Level dBm	Antenna Gain dBi/dBd	Cable Loss dB	Limit dBm	Margin dB
30.97	-78.53	-57.37	-20.62	-0.54	-13.00	-65.53
109.54	-76.86	-68.77	-7.09	-1.00	-13.00	-63.86
231.76	-79.36	-76.42	-1.50	-1.44	-13.00	-66.36
361.74	-77.56	-74.32	-1.53	-1.71	-13.00	-64.56
550.89	-73.24	-69.79	-1.24	-2.21	-13.00	-60.24
657.59	-72.67	-68.71	-1.32	-2.64	-13.00	-59.67
1688.00	-48.26	-54.14	9.80	-3.92	-13.00	-35.26
2532.00	-48.59	-54.88	11.13	-4.84	-13.00	-35.59

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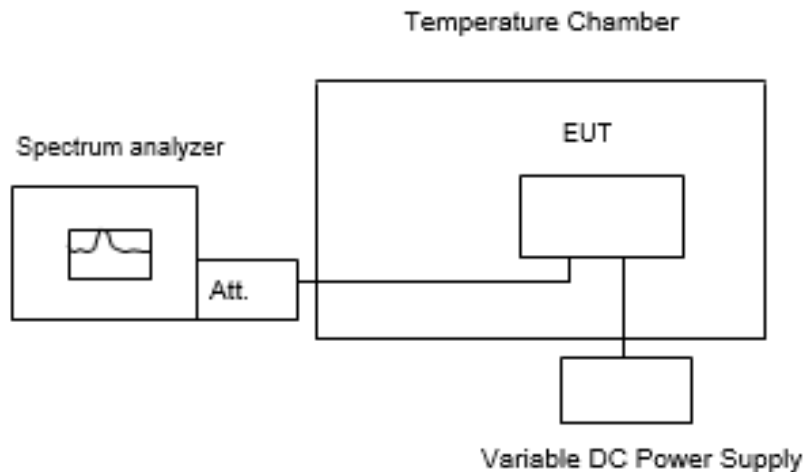
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10 FREQUENCY STABILITY MEASUREMENT

10.1 Standard Applicable

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

10.2 Test Set-up



Note: Measurement setup for testing on Antenna connector

10.3 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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10.4 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	04/21/2020	04/20/2021
DC Power Supply	Agilent	E3640A	MY40000811	12/23/2019	12/22/2020
Radio Communication Analyzer	Anritsu	MT8815B	6200711454	04/01/2020	03/31/2021
Radio Communication Analyzer	Anritsu	MT8820C	6200995019	04/01/2020	03/31/2021
Attenuator	Mini-Circuit	BW-S10W2+	2	01/02/2020	01/01/2021
DC Block	Mini-Circuits	BLK-18-S+	1	01/02/2020	01/01/2021
Splitter	RF-LAMBAD	RFLT2W1G18G	11-JSPF412-018	01/02/2020	01/01/2021
Temperature Chamber	TERCHY	MHG-120LF	911009	05/20/2020	05/19/2021

10.5 Measurement Result

Note: The battery is rated 3.85V dc.

WCDMA V Mid Channel 836.6 MHz				
Limit: +/- 2.5 ppm				
Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit (Hz)
FREQUENCY ERROR vs. VOLTAGE				
4.2	20	836.599994	-6	2091
3.85	20	836.600002	2	2091
3.5	20	836.599997	-3	2091
3.1 (End point)	20	836.600007	7	2091
FREQUENCY ERROR vs. Temp.				
3.85	50	836.600008	8	2091
3.85	40	836.600001	1	2091
3.85	30	836.599995	-5	2091
3.85	20	836.599994	-6	2091
3.85	10	836.600002	2	2091
3.85	0	836.600003	3	2091
3.85	-10	836.599996	-4	2091
3.85	-20	836.599991	-9	2091
3.85	-30	836.599989	-11	2091

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Reference Freq.:		LTE B5 Mid Channel		836.5	MHz 10M QPSK CH 20525
Power Supply Vdc	Temp. (°C)	Freq. (MHz)	Delta (Hz)	Limit = +/- 2.5 ppm (Hz)	
Freq. ERROR vs. VOLTAGE					
4.2	25	836.499995	-5	2091	
3.85	25	836.499997	-3	2091	
3.5	25	836.500004	4	2091	
3.1 (End Point)	25	836.499999	-1	2091	
Freq. ERROR vs. Temp.					
3.85	-30	836.500006	6	2091	
3.85	-20	836.500008	8	2091	
3.85	-10	836.500002	2	2091	
3.85	0	836.499993	-7	2091	
3.85	10	836.499997	-3	2091	
3.85	20	836.500001	1	2091	
3.85	30	836.499996	-4	2091	
3.85	40	836.500006	6	2091	
3.85	50	836.500005	5	2091	

~ End of Report ~

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