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FCC LTE REPORT

Certification

Applicant Name: Date of Issue: SAMSUNG Electronics Co., Ltd. August 25, 2020 Location: Address: HCT CO., LTD., 129, Samsung-ro, Yeongtong-gu, 74, Seoicheon-ro 578beon-gil, Majang-myeon, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-RF-2008-FC049 FCC ID:

A3LSMG781V

APPLICANT:

SAMSUNG Electronics Co., Ltd.

Model(s): EUT Type: FCC Classification: FCC Rule Part(s):

Mobile Phone PCS Licensed Transmitter Held to Ear (PCE) §90, §2

SM-G781V

Mada	Tu Francisco a	Emission		ERP		
Mode (MHz)	Tx Frequency (MHz)	Emission Designator	Modulation	Max. Power	Max. Power	
				(W)	(dBm)	
		4M52G7D	QPSK	0.117	20.68	
LTE – Band14 (5)	790.5 –795.5	4M50W7D	16QAM	0.100	19.99	
		4M51W7D	64QAM	0.078	18.92	
		8M97G7D	QPSK	0.119	20.76	
LTE – Band14 (10)	793.0	8M95W7D	16QAM	0.103	20.14	
		8M96W7D	64QAM	0.080	19.02	

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)



REVIEWED BY

Report prepared by : Jae Ryang Do Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *. The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

* The report shall not be reproduced except in full(only partly) without approval of the laboratory.



<u>Version</u>

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2008-FC049	August 25, 2020	- First Approval Report

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.



Table of Contents

REVIEWED BY
1. GENERAL INFORMATION
2. INTRODUCTION
2.1. DESCRIPTION OF EUT
2.2. MEASURING INSTRUMENT CALIBRATION6
2.3. TEST FACILITY
3. DESCRIPTION OF TESTS
3.1 TEST PROCEDURE
3.2 RADIATED POWER
3.3 RADIATED SPURIOUS EMISSIONS
3.4 OCCUPIED BANDWIDTH 10
3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL11
3.6 BAND EDGE 12
3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE
3.8 WORST CASE(RADIATED TEST) 15
3.9 WORST CASE(CONDUCTED TEST) 16
4. LIST OF TEST EQUIPMENT
5. MEASUREMENT UNCERTAINTY
6. SUMMARY OF TEST RESULTS
7. SAMPLE CALCULATION
8. TEST DATA
8.1 EFFECTIVE RADIATED POWER
8.2 RADIATED SPURIOUS EMISSIONS
8.3 OCCUPIED BANDWIDTH 27
8.4 CONDUCTED SPURIOUS EMISSIONS
8.5 BAND EDGE
8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE
9. TEST PLOTS
10. APPENDIX A TEST SETUP PHOTO



MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMG781V
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§90, §2
EUT Type:	Mobile Phone
Model(s):	SM-G781V
Tx Frequency:	790.5 MHz –795.5 MHz (LTE – BAND 14 (5MHz)) 793.0 MHz (LTE – BAND 14 (10 MHz))
Date(s) of Tests:	July 06, 2020 ~ August 12, 2020

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS, CDMA(BC0, 1, 10) and LTE, Sub6. It also supports IEEE 802.11 a/b/g/n/ac/ax (HT20/40/80), Bluetooth, BT LE, NFC, WPT, mmWave(n260/261).

2.2. MEASURING INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

2.3. TEST FACILITY

The Fully-anechoic chamber and conducted measurement facility used to collect the radiated data are located at the **74**, **Seoicheon-ro 578beon-gil**, **Majang-myeon**, **Icheon-si**, **Gyeonggi-do**, **17383**, **Rep. of KOREA**.



3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3
	- ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0
	- ANSI C63.26-2015 – Section 5.7
Spurious and Harmonic Emissions at Antenna	- KDB 971168 D01 v03r01 – Section 6.0
Terminal	- ANSI C63.26-2015 – Section 5.7
Conducted Output Power	- N/A (See SAR Report)
Frequency stability	- ANSI C63.26-2015 – Section 5.6
Effective Radiated Power/	- KDB 971168 D01 v03r01 – Section 5.2 & 5.8
Effective Isotropic Radiated Power	- ANSI/TIA-603-E-2016 – Section 2.2.17
Radiated Spurious and Harmonic Emissions	- KDB 971168 D01 v03r01 – Section 6.2
	- ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

The equipment under test is placed on a non-conductive table 3-meters away from the receive antenna in accordance with ANSI/TIA-603-E-2016 Clause 2.2.17.

Test Settings

1. Radiated power measurements are performed using the signal analyzer's "channel power"

measurement capability for signals with continuous operation.

- 2. RBW = 1 5% of the expected OBW, not to exceed 1MHz
- 3. VBW \ge 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points > 2 x span / RBW
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

Test Note

- 1. The turntable is rotated through 360 degrees, and the receiving antenna scans in order to determine the level of the maximized emission.
- 2. A half wave dipole is then substituted in place of the EUT. For emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

 $P_{d(dBm)} = Pg_{(dBm)} - cable loss_{(dB)} + antenna gain_{(dB)}$

Where: P_d is the dipole equivalent power and P_g is the generator output power into the substitution antenna.

3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference

between the gain of the horn and an isotropic antenna are taken into consideration

- 4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- 5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to

ANSI/TIA-603-E-2016.

Test Settings

- 1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
- 2. VBW \ge 3 x RBW
- 3. Span = 1.5 times the OBW
- 4. No. of sweep points > 2 x span / RBW
- 5. Detector = Peak
- 6. Trace mode = Max Hold
- 7. The trace was allowed to stabilize
- 8. Test channel : Low/ Middle/ High
- 9. Frequency range : We are performed all frequency to 10th harmonics from 9 kHz.

Test Note

- Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data
- 3. For spurious emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The spurious emissions is calculated by the following formula;

Result_(dBm) = Pg_(dBm) - cable loss _(dB) + antenna gain _(dBi)

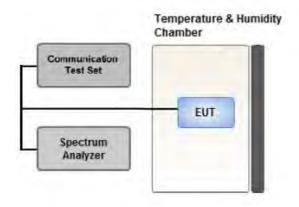
Where: P_g is the generator output power into the substitution antenna.

If the fundalmatal frequency is below 1GHz, RF output power has been converted to EIRP.

 $EIRP_{(dBm)} = ERP_{(dBm)} + 2.15$



3.4 OCCUPIED BANDWIDTH.



Test setup

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

The EUT makes a call to the communication simulator.

The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

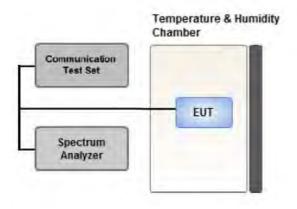
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99% occupied bandwidth and the 26dB bandwidth. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
- 2. RBW = 1 5% of the expected OBW
- 3. VBW \ge 3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize
- 8. If necessary, steps 2 7 were repeated after changing the RBW such that it would be within
 - 1-5% of the 99% occupied bandwidth observed in Step 7



3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



<u>Test setup</u>

Test Overview

The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic.

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

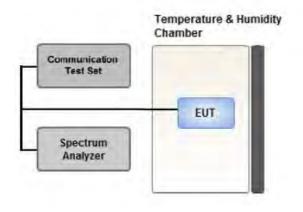
All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

- 1. RBW = 1 MHz
- 2. VBW ≥ 3 MHz
- 3. Detector = RMS
- 4. Trace Mode = trace average
- 5. Sweep time = auto
- 6. Number of points in sweep $\ge 2 \times \text{Span} / \text{RBW}$



3.6 BAND EDGE



Test setup

Test Overview

All out of band emissions are measured with a spectrum analyzer connected to the antenna terminal of the EUT while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies. All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

- 1. Start and stop frequency were set such that the band edge would be placed in the center of the plot
- 2. Span was set large enough so as to capture all out of band emissions near the band edge
- 3. RBW > 1% of the emission bandwidth
- 4. VBW > $3 \times RBW$
- 5. Detector = RMS
- 6. Number of sweep points \geq 2 x Span/RBW
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize



Test Notes

§90.543(e)

- 1. On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.
- 2. On all frequencies between 769-775 MHz and 799-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.
- 3. On any frequency between 775-788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.
- 4. Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.
- 5. Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

<u>Test Notes</u>

According to FCC 22.917, 24.238, 27.53 specified that 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. In

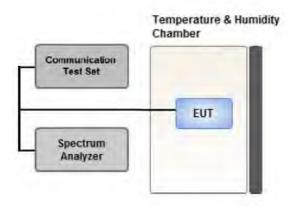
the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

All measurements were done at 2 channels(low and high operational frequency range.)

The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.



3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

Frequency stability testing is performed in accordance with the guidelines of ANSI C63.26-2015.

The frequency stability of the transmitter is measured by:

1. Temperature:

The temperature is varied from -30°C to +50°C in 10°C increments using an

environmental chamber.

- 2. Primary Supply Voltage:
 - .- Unless otherwise specified, vary primary supply voltage from 85% to 115% of the nominal value

for other than hand carried battery equipment.

.- For hand carried, battery powered equipment, reduce the primary ac or dc supply voltage to the battery operating end point, which shall be specified by the manufacturer.

Test Settings

1. The carrier frequency of the transmitter is measured at room temperature

(20°C to provide a reference).

- 2. The equipment is turned on in a "standby" condition for fifteen minutes before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
- 3. Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each temperature level.

3.8 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
- The worst case is reported with the EUT positioning, modulations, RB sizes and offsets,

and channel bandwidth configurations shown in the test data.

- Please refer to the table below.

Test Description	Modulation	RB size	RB offset	Axis				
	QPSK,							
Effective Isotropic Radiated Power	16QAM,	1	0	Х				
	64QAM							
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Z				

[Worst case]



3.9 WORST CASE(CONDUCTED TEST)

- Worst case : Of all modulation, We have tested modulation of the high Conducted Output Power.

Conducted Output Power value can be confirmed on the SAR report.

[Worst case]							
Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset		
Occupied Bandwidth	QPSK, 16QAM, 64QAM	5, 10	Mid	Full RB	0		
		F	Low	1	0		
	QPSK	5 -	High	1	24		
		10	Mid	1	0		
Band Edge			IVIIC	1	49		
		5	Low, High	Full RB	0		
		10	Mid	Full RB	0		
			Low,				
Spurious and Harmonic Emissions at	QPSK	5	Mid,	1	0		
Antenna Terminal	Qrok		High				
		10	Mid	1	0		

[Worst case]



Report No.: HCT-RF-2008-FC049

4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibrati on Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
WAINWRIGHT INSTRUMENT	WHNX6.0/26.5G-6SS/H.P.F	1	03/19/2020	Annual	03/19/2021
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	04/27/2020	Annual	04/27/2021
Hewlett Packard	E3632A/DC Power Supply	MY4004427	09/27/2019	Annual	09/27/2020
Schwarzbeck	UHAP/ Dipole Antenna	557	03/29/2019	Biennial	03/29/2021
Schwarzbeck	UHAP/ Dipole Antenna	558	03/29/2019	Biennial	03/29/2021
ESPEC	SU-642 / Chamber	93008124	03/18/2020	Annual	03/18/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	08/29/2019	Biennial	08/29/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	09/25/2019	Biennial	09/25/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/29/2019	Biennial	04/29/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	02/11/2020	Biennial	02/11/2022
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY51110063	04/27/2020	Annual	04/27/2021
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2020	Annual	06/04/2021
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2019	Annual	10/14/2020
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/27/2019	Annual	08/27/2020
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	04/26/2019	Biennial	04/26/2021
Schwarzbeck	VULB9160/ Bilog Antenna	3150	03/12/2019	Biennial	03/12/2021
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6262116770	07/22/2020	Annual	07/22/2021
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/22/2020	Annual	01/22/2021
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/13/2020	Annual	07/13/2021
KEYSIGHT	E7515B / 5G Wireless Tester	MY58300756	01/07/2020	Annual	01/07/2021
KEYSIGHT	N9030B / Signal Analyzer(5Hz~40.0GHz)	MY55480167	06/04/2020	Annual	06/04/2021
Mini-Circuits	ZC4PD-K1844+ / 4-Way Divider	942907	09/05/2019	Annual	09/05/2020
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

Note:

- 1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
- 2. Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5

(Version : 2017).

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05



6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §90.543(e)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
On all frequencies between 769- 775 MHz and 799-805 MHz.	§90.543(e)	< 65 + 10log10 (P[Watts])	PASS <u>(See Note3)</u>
Conducted Output Power	§2.1046	N/A	See Note1
Frequency stability / variation of ambient temperature	§2.1055, §90.539(e)	< 2.5 ppm	PASS

Note:

- 1. See SAR Report
- 2. The same samples were used for SAR and EMC
- Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance.

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	ective Radiated Power §90.542(a)(7) < 3 Watts max. ERP		PASS
Radiated Spurious and Harmonic	§2.1053,	< 43 + 10log10 (P[Watts]) for	PASS
Emissions	§90.543(e)	all out-of band emissions	1 700
Undesirable Emissions in	§2.1053,	< -70dBW/MHz EIRP (wideband)	PASS
the 1559 – 1610 MHz band	§90.543(f)	< -80dBW EIRP (narrowband)	PA22



7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch./ Freq.		Measured	Substitute	Ant. Gain	C.L	Pol.	EF	RP
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBd)	U.L	P01.	w	dBm
128	824.20	-21.37	38.40	-10.61	0.95	Н	0.483	26.84

ERP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test, the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of effective radiated power.

7.2 EIRP Sample Calculation

Ch.	Ch./ Freq.		Substitute	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	3m) Level(dBm) (dBi)		U.L	POI.	w	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	Н	0.456	26.59

EIRP = Substitute LEVEL(dBm) + Ant. Gain – CL(Cable Loss)

1) The EUT mounted on a non-conductive turntable is 2.5 meter above test site ground level.

2) During the test, the turn table is rotated until the maximum signal is found.

3) Record the field strength meter's level.

4) Replace the EUT with dipole/Horn antenna that is connected to a calibrated signal generator.

5) Increase the signal generator output till the field strength meter's level is equal to the item (3).

6) The signal generator output level with Ant. Gain and cable loss are the rating of equivalent isotropic radiated power.

7.3. Emission Designator

GSM Emission Designator

Emission Designator = 249KGXW GSM BW = 249 kHz G = Phase Modulation

X = Cases not otherwise covered W = Combination (Audio/Data)

EDGE Emission Designator

Emission Designator = 249KG7W GSM BW = 249 kHz G = Phase Modulation 7 = Quantized/Digital Info W = Combination (Audio/Data)

WCDMA Emission Designator	QPSK Modulation				
Emission Designator = 4M17F9W	Emission Designator = 4M48G7D				
WCDMA BW = 4.17 MHz	LTE BW = 4.48 MHz				
F = Frequency Modulation	G = Phase Modulation				
9 = Composite Digital Info	7 = Quantized/Digital Info				
W = Combination (Audio/Data)	D = Data transmission; telemetry; telecommand				

QAM Modulation

Emission Designator = 4M48W7D LTE BW = 4.48 MHz W = Amplitude/Angle Modulated 7 = Quantized/Digital Info D = Data transmission; telemetry; telecommand



8. TEST DATA

8.1 EFFECTIVE RADIATED POWER

Freq	Mod	Modulation	Measured	Substitute	Ant.	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm)	Gain(dBd)			w	w	dBm
		QPSK	-30.46	32.15	-10.11	1.36	Н		0.117	20.68
790.5		16-QAM	-31.15	31.46	-10.11	1.36	Н		0.100	19.99
		64-QAM	-32.22	30.39	-10.11	1.36	Н		0.078	18.92
		QPSK	-30.91	31.81	-10.12	1.36	Н		0.108	20.33
793.0	LTE B14 (5 MHz)	16-QAM	-31.60	31.12	-10.12	1.36	Н	< 3.00	0.092	19.64
	(0	64-QAM	-32.70	30.02	-10.12	1.36	Н		0.071	18.54
		QPSK	-31.23	31.46	-10.13	1.37	Н		0.099	19.96
795.5		16-QAM	-31.96	30.73	-10.13	1.37	Н		0.084	19.23
		64-QAM	-33.87	28.82	-10.13	1.37	Н		0.054	17.32

Freq	Mod	Modulation	Measured	Substitute	Ant.	C.L	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm)	Gain(dBd)			w	W	dBm	
	LTE B14 (10 MHz)	QPSK	-30.48	32.24	-10.12	1.36	Н		0.119	20.76	
793.0		16-QAM	-31.10	31.62	-10.12	1.36	Н	< 3.00	0.103	20.14	
	(64-QAM	-32.22	30.50	-10.12	1.36	Н		0.080	19.02	



8.2 RADIATED SPURIOUS EMISSIONS

I MODE:	LTE B14
MODULATION SIGNAL:	<u>5 MHz QPSK</u>
DISTANCE:	<u>3 meters</u>

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1,581.0	-50.55	9.05	-58.53	1.95	V	-51.43	-13.00
23305 (790.5)	2,371.5	-48.00	10.05	-50.50	2.42	V	-42.87	-13.00
(100.0)	3,162.0	-53.46	11.28	-53.45	2.83	V	-45.00	-13.00
	1,586.0	-50.30	9.12	-58.35	1.96	V	-51.19	-13.00
23330 (793.0)	2,379.0	-48.17	10.05	-50.75	2.44	V	-43.14	-13.00
(10010)	3,172.0	-53.46	11.35	-53.68	2.83	V	-45.16	-13.00
	1,591.0	-50.47	9.18	-58.58	1.96	V	-51.36	-13.00
23355 (795.5)	2,386.5	-48.33	10.09	-50.92	2.45	V	-43.28	-13.00
(1000)	3,182.0	-53.54	11.35	-53.81	2.83	V	-45.29	-13.00



I MODE:	<u>LTE B14</u>
MODULATION SIGNAL:	<u>10 MHz QPSK</u>
DISTANCE:	<u>3 meters</u>

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1,586.0	-50.13	9.12	-58.18	1.96	V	-51.02	-13.00
23330 (793.0)	2,379.0	-47.89	10.05	-50.47	2.44	V	-42.86	-13.00
(1.00.0)	3,172.0	-53.15	11.35	-53.37	2.83	V	-44.85	-13.00



1559 MHz ~ 1610 MHz BAND

OPERATING FREQUENCY:	<u>790.5 MHz, 793.0 MHz, 795.5 MHz</u>
MEASURED OUTPUT POWER:	<u>5 MHz QPSK</u>
DISTANCE:	<u>3 meters</u>
WIDEBAND EMISSION LIMIT:	<u>-80 dBW/ MHz (= -50 dBm/ MHz)</u>

Operating Frequency (MHz)	Measured Frequency (MHz)	EMISSION TYPE	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Margin (dB)
790.5	1586.18		-58.71	9.11	-66.75	1.96	V	-59.60	9.60
793.0	1595.32	Narrow Band	-59.17	9.20	-67.54	1.97	V	-60.31	10.31
795.5	1601.38		-58.69	9.30	-67.40	1.98	V	-60.08	10.08

Note:

The lower narrowband limit was applied because the spurious emission was not found.

OPERATING FREQUENCY: <u>793.0 MHz</u>
MEASURED OUTPUT POWER: <u>10 MHz QPSK</u>
DISTANCE: <u>3 meters</u>
WIDEBAND EMISSION LIMIT: <u>-80 dBW/ MHz (= -50 dBm/ MHz)</u>

Operating Frequency (MHz)	Measured Frequency (MHz)	EMISSION TYPE	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Margin (dB)
793.0	1577.22	Narrow Band	-58.41	9.05	-66.39	1.95	V	-59.29	9.29

Note:

The lower narrowband limit was applied because the spurious emission was not found.



8.3 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data(MHz)
			QPSK	25	0	4.5183
	5 MHz		16-QAM	25	0	4.4987
14			64-QAM	25	0	4.5068
14			QPSK	50	0	8.9660
	10 MHz		16-QAM	50	0	8.9453
			64-QAM	50	0	8.9623

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 34 ~ 39.

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
		790.5	3.6810	27.976	-67.090	-39.114	
14	5	793.0	3.6995	27.976	-67.308	-39.332	-13.00
14		795.5	3.7079	27.976	-67.105	-39.129	-13.00
	10	793.0	3.6830	27.976	-67.228	-39.252	

8.4 CONDUCTED SPURIOUS EMISSIONS

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 56 ~ 59.

2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0

3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)

4. Factor(dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20	30.131

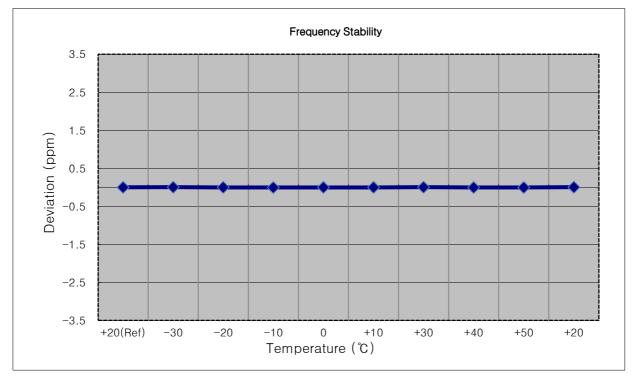
8.5 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 40 ~ 55.

8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

I MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>790,500,000 Hz</u>
CHANNEL:	<u>23305 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.85 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

Voltage	Power	Temp.	Frequency	Frequency	Deviation		
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm	
100%		+20(Ref)	790 500 002	0.00	0.000 000	0.0000	
100%		-30	790 500 004	2.00	0.000 000	0.0025	
100%		-20	790 500 000	-2.00	0.000 000	-0.0025	
100%		-10	790 499 998	-4.30	-0.000 001	-0.0054	
100%	3.850	0	790 500 000	-2.10	0.000 000	-0.0027	
100%		+10	790 500 000	-2.70	0.000 000	-0.0034	
100%		+30	790 500 005	2.90	0.000 000	0.0037	
100%		+40	790 499 999	-3.30	0.000 000	-0.0042	
100%		+50	790 499 999	-3.50	0.000 000	-0.0044	
Batt. Endpoint	3.400	+20	790 500 005	2.50	0.000 000	0.0032	

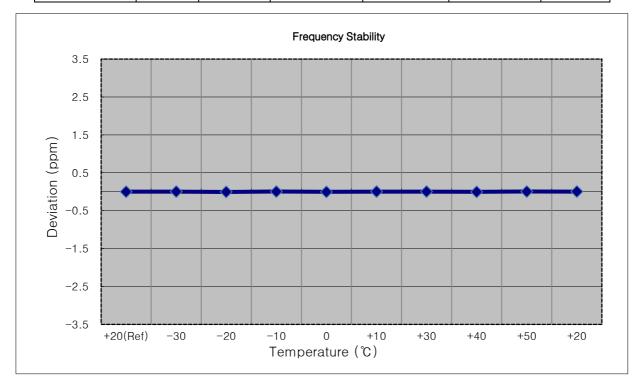




Report No.: HCT-RF-2008-FC049

I MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.85 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

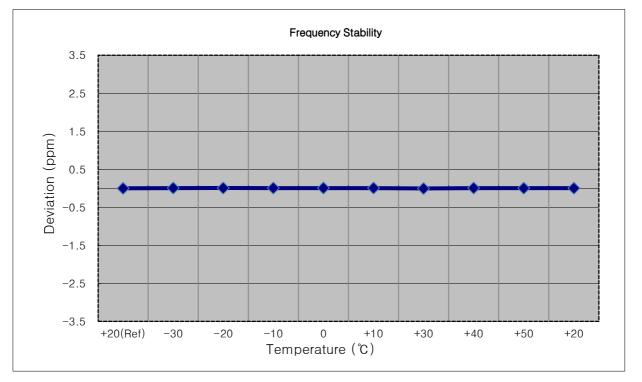
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	792 999 998	0.00	0.000 000	0.0000
100%		-30	793 000 000	2.40	0.000 000	0.0030
100%		-20	792 999 993	-4.20	-0.000 001	-0.0053
100%		-10	793 000 001	3.70	0.000 000	0.0047
100%	3.850	0	792 999 995	-2.70	0.000 000	-0.0034
100%		+10	793 000 000	2.60	0.000 000	0.0033
100%		+30	793 000 000	1.90	0.000 000	0.0024
100%		+40	792 999 995	-2.80	0.000 000	-0.0035
100%		+50	793 000 001	3.60	0.000 000	0.0045
Batt. Endpoint	3.400	+20	793 000 000	2.50	0.000 000	0.0032





I MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>795,500,000 Hz</u>
CHANNEL:	<u>23355 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.85 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

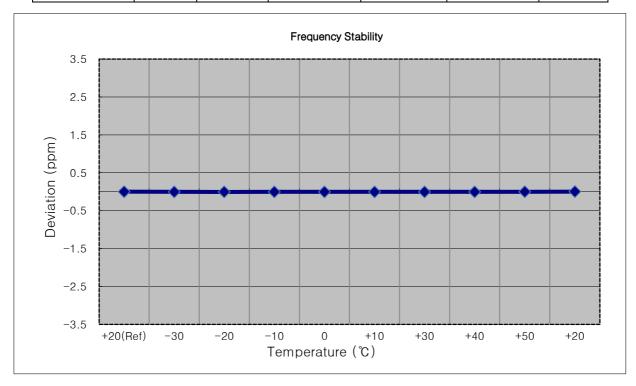
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	795 500 002	0.00	0.000 000	0.0000
100%		-30	795 500 007	4.60	0.000 001	0.0058
100%		-20	795 500 007	5.40	0.000 001	0.0068
100%		-10	795 500 007	5.30	0.000 001	0.0067
100%	3.850	0	795 500 007	5.00	0.000 001	0.0063
100%		+10	795 500 007	4.80	0.000 001	0.0060
100%		+30	795 499 999	-3.40	0.000 000	-0.0043
100%		+40	795 500 006	4.40	0.000 001	0.0055
100%		+50	795 500 006	3.60	0.000 000	0.0045
Batt. Endpoint	3.400	+20	795 500 004	2.40	0.000 000	0.0030





■ MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (10 MHz)</u>
REFERENCE VOLTAGE:	<u>3.85 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	792 999 997	0.00	0.000 000	0.0000
100%		-30	792 999 995	-2.20	0.000 000	-0.0028
100%		-20	792 999 993	-3.80	0.000 000	-0.0048
100%		-10	792 999 995	-2.70	0.000 000	-0.0034
100%	3.850	0	792 999 994	-3.50	0.000 000	-0.0044
100%		+10	792 999 995	-2.50	0.000 000	-0.0032
100%		+30	792 999 994	-2.80	0.000 000	-0.0035
100%		+40	792 999 994	-2.80	0.000 000	-0.0035
100%		+50	792 999 995	-2.00	0.000 000	-0.0025
Batt. Endpoint	3.400	+20	793 000 000	2.60	0.000 000	0.0033





FCC ID: A3LSMG781V

9. TEST PLOTS



	ent Spectrun	n Analyzer - O	•											
LXI RL	or Ero		Ω ΑC				NSE:INT reg: 793.000	000 MHz	ALIG	IN AUTO	01:22:10 Radio Std	PM Jul 28, 2020	F	requency
PAS		q 793.0(00000 N	IIIIZ	÷	Trig: Fre	e Run	Avg Ho	ld: 50	0/500				
PAS	S			#IFGain:	Low	#Atten: 2	0 dB				Radio Dev	rice: BTS		
10 dB	/div		et 26.2 dB . 00 dBm											
Log 30.0														Center Freq
20.0													793	3.000000 MHz
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-20.0														
-30.0	A Photos	M. M. M. W. W.	why							1/m	Immore	Ad a strate in		
	ሌሌላ ላ	MAA A M									I TO CONTRACT	All Marken V		
-40.0														
-50.0														CF Step
Cente	er 793	MHz									Spa	in 10 MHz	Auto	1.000000 MHz Man
	BW 10					#VE	390 I	κHz				eep 1 ms		
00	ccupie	ed Ban	dwidt	า			Total P	ower		31.5	dBm			Freq Offset
	4.5183 MHz													0 Hz
Tra	ansmit	t Freq E	rror	15.	687 kl	Hz	OBW P	ower		99	.00 %			
		dwidth		4.9	955 MI	Hz	x dB			-26.	00 dB			
MSG									П	STATUS	3			
	-									N ervice				

BAND 14. Occupied Bandwidth Plot (Ch.23330 QPSK RB 25) 5 MHz



		um Analyzer - Occ	•											
(X) RL		RF 50 Ω ຊ 793.000		Hz			NSE:INT req: 793.000	0000 MHz	ALI	GN AUTO	01:21:55 Radio Std:	PM Jul 28, 2020 None	Fred	uency
PAS		sq 733.000		#IFGain:L	Low	Trig: Fre #Atten: 2	e Run	Avg Ho	ld: 50	0/500	Radio Dev			
10 dE	3/div	Ref Offset Ref 40.0												
Log 30.0														nter Freq
20.0				مرميم	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	ᡃᢧᡗᢆ᠕ᢧᢑ᠋᠊ᠬ᠇ᢦ᠆	ᠰ᠆᠁ᠰᡗ᠕ᢧ	᠕᠁ᠬᠬᠬ	<u>~~~</u>				793.0	00000 MHz
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-10.0										\backslash				
-20.0														
-30.0	w	\sim	har /								and the second s	m^{Λ}		
-40.0 -50.0														
														CF Step 00000 MHz
	er 793 8 BW 1	3 MHz 100 kHz				#VI	3W 390 I	κHz				n 10 MHz ep 1 ms	<u>Auto</u>	Man
0	ccupi	ied Band	lwidth				Total P	ower		30.6	dBm		Fr	eq Offset
			4.4	987	MH	z								0 Hz
Tr	ansm	it Freq Er	ror	2.	671 k	Hz	OBW P	ower		99	.00 %			
X	dB Ba	ndwidth		4.9	945 M	Hz	x dB			-26.0	00 dB			
										1				
MSG														

BAND 14. Occupied Bandwidth Plot (Ch.23330 16-QAM RB 25) 5 MHz



														d X
κ 50 Ω AC Center Freq 793.000000 MHz					Center Freq: 793.000000 MHz				IN AUTO	06:49:05 PM Aug 03, 2020 Radio Std: None		Freque	ency	
PASS #IFGain:Low					Trig: Free Run Avg Hold: 500/ #Atten: 20 dB			0/500	Radio Dev					
Ref Offset 26.2 dB 10 dB/div Ref 40.00 dBm														
Log														er Freq 000 MHz
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-10.0			- {							\				
-20.0														
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-50.0														F Step
		B 41 1-											1.000	000 MHz
										n 10 MHz ep 1 ms	<u>Auto</u>	Man		
Occupied Bandwidth Total Power 29.7 dBm											Fred	Offset		
4.5068 MHz														0 Hz
Transmit Freq Error 8.679 kHz					Hz	OBW Power			99.00 %					
x dB Bandwidth 4.939					39 M	lz x dB				-26.00 dB				
										1				
MSG	MSG STATUS													

BAND 14. Occupied Bandwidth Plot (Ch.23330 64-QAM RB 25) 5 MHz



🎉 Agilent Spectrum	• •										
Center Freq	RF 50 Ω		Z		ENSE:INT Freq: 793.000	000 MHz	ALIGN AU		1:27:26 PM J io Std: No	Jul 28, 2020 one	Frequency
PASS			⊷ FGain:Low	Trig: Fro #Atten:		Avg Hold	1: 500/50		io Device	BTS	
			Guinizow								
10 dB/div	Ref Offset 2 Ref 40.00										
Log											O antes Error
30.0											Center Freq 793.000000 MHz
20.0		r	Mentra way way	ummmmmm	, Marillow Program	(Lewmly and	vw				795.000000 10112
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-30.0 - mailman	monulum	M V						halvenal	اسرور 101 عهرماوم	L'MAN MUL	
-40.0											
-50.0											CF Step
											2.000000 MHz
Center 793 #Res BW 20				#V	BW 820 k	Hz				20 MHz o 1 ms	<u>Auto</u> Man
										5 11115	
Occupie	d Bandv	vidth			Total P	ower	3	1.6 dB	m		Freq Offset 0 Hz
		8.96	560 MI	Z							UHZ
Transmit	Freg Erro	or	15.828 k	Hz	OBW P	ower		99.00	%		
x dB Ban			9.831 N		x dB		_	26.00 d	в		
MSG							Í o si				
								AIUS			

BAND 14. Occupied Bandwidth Plot (Ch.23330 QPSK RB 50) 10 MHz



	nt Spectrum	Analyzer - Occu	upied BW										
LXI RL		RF 50 Ω 793.000		U7			NSE:INT reg: 793.000	000 MHz	ALI	GN AUTO	01:27:11 Radio Std:	PM Jul 28, 2020	Frequency
PASS		195.000			⊷	Trig: Free #Atten: 2	e Run	Avg Ho	ld: 50	0/500			
TAGO	<u></u>			#IFGain:l	_ow	#Atten: 2	U dB				Radio Dev	ICE: BIS	
10 dB/c	div	Ref Offset Ref 40.0											
30.0													Center Freq
20.0													793.000000 MHz
10.0				monan	ᠬᢑᠰ᠋ᢦᠬᡁᠰ	Lobopulet and	๛ ๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	᠕ᡀᡙᠬᢧᢧᡅ	r-m.r11				
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-10.0			*کہ							h h			
-20.0													
	·• -(ann Mana	, Mrs							Lan	Murleytow	MAA	
	Multim											· III Warner Varal	
-40.0													
-50.0													CF Step
Cente	er 793 f	MHz									Spa	n 20 MHz	2.000000 MHz <u>Auto</u> Man
#Res	BW 20	0 kHz				#VE	3W 820 k	Hz				ep 1 ms	
Oc	cupie	d Band	width				Total P	ower		30.5	dBm		Freq Offset
			8.9	453	MH	Z							0 Hz
Tra	insmit	Freq Err	or		-598 H	Iz	OBW P	ower		99	.00 %		
x d	B Ban	dwidth		9.8	845 M⊦	z	x dB			-26.0	00 dB		
MSG										STATUS			
										V			

BAND 14. Occupied Bandwidth Plot (Ch.23330 16-QAM RB 50) 10 MHz



		n Analyzer - Occu			1								
Cen		RF 50 Ω 793.000	AC	Hz			NSE:INT req: 793.000	0000 MHz	ALIO	GN AUTO	06:50:31 P Radio Std	M Aug 03, 2020	Frequency
PAS		1755.000		#IFGain:L		Trig: Fre #Atten: 2		Avg Ho	ld: 50	0/500	Radio Dev	ice: BTS	
10 dE	3/div	Ref Offset Ref 40.0											
Log 30.0													Center Freq 793.000000 MHz
20.0					m of my or a start way	ryMayrow	a Marilion af a straight way	ᡙᠣᠬᡙᠮᠰᠰᢦᢐᠶᡁᢇ	mar				735.000000 MiHz
0.00			ļ ļ										
-10.0													
-20.0		Lugenperman	wall							hum	βγαζβ _{αβαστ} ια αιά		
-40.0	Handd adda											M. Margaret and the second sec	
-50.0													CF Step 2.000000 MHz
	ter 793 s BW 20					#VI	3W 820 k	۲				n 20 MHz ep 1 ms	
0	ccupie	ed Band	width				Total P	ower		29.5	dBm		Freq Offset
			8.9	623	MHz	Ζ							0 Hz
T	ransmit	Freq Err	or	7.	237 kH	Z	OBW P	ower		99	.00 %		
x	dB Ban	dwidth		9.7	'66 MH	Z	x dB			-26.0	00 dB		
MEC.										STATUS			
MSG	_									STATUS			

BAND 14. Occupied Bandwidth Plot (Ch.23330 64-QAM RB 50) 10 MHz



	ctrum Analyzer - Swept SA							
Center F	RF 50 Ω AC req 788.000000 M		SENSE:INT	#Avg Type	ALIGN AUTO e: RMS		PM Jul 28, 2020	Frequency
Center		PNO: Fast +++ Irig:	: Free Run en: 20 dB			TYF		
10 dB/div Log	Ref Offset 26.2 dB Ref 26.20 dBm				Mki	1 788.0 -18.1	00 MHz 72 dBm	Auto Tune
16.2								Center Freq 788.000000 MHz
6.20 -3.80								Start Freq 775.000000 MHz
-13.8							-13.00 dBm	Stop Freq 801.000000 MHz
-33.8				M				CF Step 2.600000 MHz <u>Auto</u> Man
-53.8					\sim		RMS	Freq Offset 0 Hz
-63.8								
Center 78 #Res BW	38.00 MHz 100 kHz	#VBW 3001	kHz		#Sweep	Span 2 1.000 s (6.00 MHz 1001 pts)	
MSG								

BAND 14 Lower Band Edge Plot (5M BW Ch.23305 QPSK_RB1 OFFSET_0)



			er - Swept SA									
LXI RI		RF 00.789	50 Ω A	O MHz		SEI	NSE:INT	#Avg Ty	ALIGN AUTO	TRA	PM Jul 28, 2020 DE 1 2 3 4 5 6	Frequency
Cell		eq 700		PN	D: Fast 🔸	Trig: Free				TY		
				IFGa	ain:Low	#Atten: 2	0 dB					Auto Tune
			set 26.2 c						MK	r1 788.0	00 MHz 23 dBm	Auto Tune
10 dE Log	3/div	Ref 26	.20 dBi	m						-28.3	23 авт	
												Center Freq
16.2												788.000000 MHz
6.20							man					
												Start Freq
-3.80												775.000000 MHz
							lí					
-13.8											-13.00 dBm	Stop Freq
							ſ					801.000000 MHz
-23.8							1					801.000000 WHZ
							7					
-33.8												CF Step 2.600000 MHz
						j						Auto Man
-43.8						and a start water			man water			
					~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					how	RMS	En offerst
-53.8												Freq Offset
												0 Hz
-63.8												
0												
		8.00 MH 100 kH;			#VBM	300 kHz			#Sween	Span 2	26.00 MHz (1001 pts)	
MSG						-000 1112			STATU		recer proj	
MSG									LO STATU:	3		

# BAND 14 Lower Band Edge Plot (5M BW Ch.23305 QPSK_RB_25)



		m Analyzer - Swept										
Cen		RF 50 Ω q 772.0000	AC 000 MH	Z		ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	PM Jul 28, 2020 E <b>1 2 3 4 5 6</b>	Frequenc	ÿ
			P	NO: Wide ↔→ Gain:Low	Trig: Free #Atten: 2				TYP			
		Ref Offset 26.2	dB					Mk	r1 772.4	32 MHz	Auto 1	Tune
10 dE Log i		Ref -10.00 d							-65.9	98 dBm		
209											Center	Frea
-20.0											772.000000	
-30.0										-35.00 dBm	Start	Frea
-40.0											769.00000	
-50.0											Stop	Freq
											775.00000	) MHz
-60.0						↓ ¹				RMS		
-70.0	a for a start of the	and may be seen the first	ዀቘቔኇቝኇዀዀ	¹ มาเหมู่ใน _{ไป}	๛๛๛๛๛๛๛๚๛๚๚	_{ประเทศ} การสถางสัง _{การ} ห	all Marian and a second	hen, hover the party	มีเวลระไปสามาราช เมือง	สาวาราสาร		Step
											600.000 <u>Auto</u>	Man
-80.0												
-90.0											Freq O	ffset
-50.0												0 Hz
-100												
	t 769.00								⊥ Stop 775.	.000 MHz		
#Res	s BW 1	0 kHz		#VBW	30 kHz			#Sweep	1.000 s (	1001 pts)		
MSG								<b>I</b> STATUS	6			

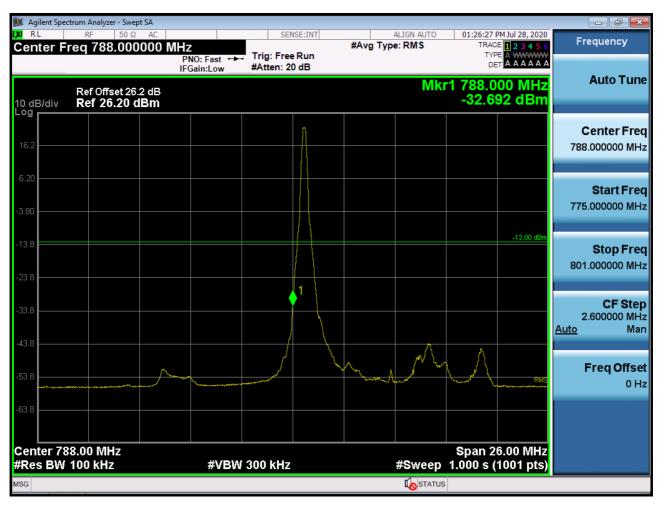
BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (5M BW Ch.23305 QPSK_RB1_0)-1



	ım Analyzer - Swept SA						
(X) RL	RF 50 Ω AC q 772.000000 N		ENSE:INT	ALIGN #Avg Type: RN		01:20:15 PM Jul 28, 2020 TRACE 1 2 3 4 5 (	
	eq 772.000000 h	PNO: Wide +++ Trig: Fr IFGain:Low #Atten:					
10 dB/div Log	Ref Offset 26.2 dB Ref -10.00 dBm				Mkr1	773.656 MHz -65.855 dBm	Auto Tune
-20.0							Center Freq 772.000000 MHz
-30.0						-35.00 dBm	Start Freq 769.000000 MHz
-50.0					1		Stop Freq 775.000000 MHz
-70.0	เการ์ได้แสด้างที่สารที่สารสุขาสุขาสุขาร์ 	(กระการทำงางสมโทษีทราวงสุมปุกกระสุปกระว	~~\$*~\$* <b>}*}}.*</b>	มีสาระขับรูประมุสารูรูปรับควรมสารปัตรุไ	anghalananagh	RMS กล้างเรืองไทยของกระการการการการการการการการการการการการการก	CF Step 600.000 kHz <u>Auto</u> Man
-90.0							<b>Freq Offset</b> 0 Hz
-100 Start 769.00 #Res BW 10		#VBW 30 kHz		#\$\	Str	op 775.000 MHz 000 s (1001 pts	
MSG					STATUS	and the pro-	

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (5M BW Ch.23305 QPSK_RB25_0)-2





BAND 14 Lower Band Edge Plot (10M BW Ch.23330 QPSK_RB1 OFFSET_0)



	ctrum Analyzer - Swept SA						
LXI RL	RF 50 Ω AC req 788.000000 M		SENSE:INT	ALIGN #Avg Type: RM		01:25:42 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	Frequency
Center F		PNO: Fast +++ Irig:	: Free Run en: 20 dB				
10 dB/div Log	Ref Offset 26.2 dB Ref 26.20 dBm				Mkr1	788.000 MHz -32.554 dBm	Auto Tune
16.2							Center Freq 788.000000 MHz
-3.80 <b></b>					******		Start Freq 775.000000 MHz
-13.8						-13.00 dBm	Stop Freq 801.000000 MHz
-33.8			1			RMS	<b>CF Step</b> 2.600000 MHz <u>Auto</u> Man
-53.8							<b>Freq Offset</b> 0 Hz
	88.00 MHz				s	pan 26.00 MHz 000 s (1001 pts)	
#Res BW	100 kHz	#VBW 300	kHz		veep 1.0 status	000 s (1001 pts)	

## BAND 14. Lower & Upper Band Edge Plot (10M BW Ch.23330 QPSK RB_50)



	jilent Spectrum Analyzer - Swept SA					
Cen	L RF 50 Ω AC ter Freq 772.000000	MHz		ALIGN AUTO #Avg Type: RMS	01:26:47 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	Frequency
		PNO: Wide +++ Trig: Fre IFGain:Low #Atten: 2				
40	Ref Offset 26.2 dB B/div Ref -10.00 dBm			Mkı	1 773.194 MHz -66.012 dBm	Auto Tune
	B/div Ref -10.00 dBm					
						Center Freq
-20.0						772.000000 MHz
-30.0						
					-35.00 dBm	Start Freq
-40.0						769.000000 MHz
-50.0						
-30.0						<b>Stop Freq</b> 775.000000 MHz
-60.0				1		775.000000 14112
		ยาสมุขารใหญ่มารามบาร ^{เป็น} ราชการใหญ่ป	- Jane - Alabart - Andrew - Alabart	and a strategy and the	RMS phasemannesserver	CF Step
-70.0						600.000 kHz
-80.0						<u>Auto</u> Man
						Freq Offset
-90.0						0 Hz
-100						
100						
Star	t 769.000 MHz				Stop 775.000 MHz	
	s BW 10 kHz	#VBW 30 kHz		#Sweep	1.000 s (1001 pts)	
MSG				<b>K</b> STATUS		

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (10M BW Ch.23330 QPSK_RB51_0)-1



🗾 Agilent Spectrum Analyzer - Swept SA				
RL     RF     50 Ω     AC       Center Freq     772.000000	MHz	#Avg Type:		6 Frequency
	PNO: Wide Trig: Free IFGain:Low #Atten: 20			AA
Ref Offset 26.2 dB 10 dB/div Ref -10.00 dBm Log	1		Mkr1 772.450 MH -65.980 dBi	Z Auto Tune
-20.0				Center Freq 772.000000 MHz
-30.0			-35.00 d	Start Freq 769.000000 MHz
-50.0		41		Stop Freq 775.000000 MHz
-70.0		an De Caracter de la general (De caracter De caracter)	F	CF Step 600.000 kHz <u>Auto</u> Man
-90.0				Freq Offset 0 Hz
Start 769.000 MHz			Stop 775.000 MH	12
#Res BW 10 kHz	#VBW 30 kHz		Sweep 1.000 s (1001 pt	s)

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (10M BW Ch.23330 QPSK_RB50_0)-2





BAND 14 Upper Band Edge Plot (5M BW Ch.23355 QPSK_RB1_Offset 24)



	trum Analyzer - Swept SA								e e 🔀
Center E	RF 50 Ω AC req 798.000000 I	MHz	SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	PM Jul 28, 2020 E <b>1 2 3 4 5 6</b>	Frequency
Contor	100100001	PNO: Wide +++ IFGain:Low	Trig: Free #Atten: 20		• • • •		TYF		
		IFGaIn:Low	#Atten: 20	705		Mk		08 MHz	Auto Tune
10 dB/div Log	Ref Offset 26.2 dB Ref 26.20 dBm					WIN	-27.8	85 dBm	
9									Center Freq
16.2									798.000000 MHz
6.20		<u>ah a na artice a state a sec</u>	~~~						Start Freq
-3.80 ———									796.000000 MHz
-3.00									
-13.8								-13.00 dBm	Stop Freq
-23.8			L L	. 1					800.000000 MHz
-23.0			Y						
-33.8				<u>\</u>					CF Step
(2.2)				and the second		-Artonication of the solution	her linguage and an and an an	RMS	400.000 kHz <u>Auto</u> Man
-43.8								and the second	
-53.8									Freq Offset
									0 Hz
-63.8									
	8.000 MHz						Span 4	.000 MHz	
#Res BW	100 kHz	#VBW	300 kHz				1.000 s (	1001 pts)	
MSG							6		

# BAND 14 Upper Band Edge Plot (5M BW Ch.23355 QPSK_RB_25)





BAND 14 Upper Emission Mask (799 MHz ~805 MHz) Plot (5M BW Ch.23355 QPSK_RB1_24)



RL   RF   50 Ω   AC   SENSE:INT   ALIGN AUTO   01:23:43 PM Jul 28, 2020     Enter Freq 802.000000 MHz   PNO: Wide   Trig: Free Run   #Avg Type: RMS   TRACE   2 3 4 5 6   Frequency     PNO: Wide   PNO: Wide   Trig: Free Run   #Atten: 20 dB   Mkr1 799.180 MHz   Auto Tune     Ref Offset 26.2 dB   Ref -10.00 dBm   Center Freq   802.000000 MHz   Start Freq     0   Start Freq   Start Freq   799.000000 MHz   Start Freq     0   Start Freq   799.000000 MHz   Start Freq
Auto Tune Ref Offset 26.2 dB dB/div Ref -10.00 dBm Center Freq 802.000000 MHz Start Freq 700 000000 MHz
Ref Offset 26.2 dB     HIKT 7.99.180 MHZ       dB/div     Ref -10.00 dBm     -49.745 dBm       0
Center Freq 802.000000 MHz 35.00 dBm
0
Start Freq
0 799.000000 MHz
0 with sector Stop Freq
805.000000 MHz
CE Step
0 600.000 kHz 0 400 Man
n Freq Offset
0 Hz
art 799.000 MHz Stop 805.000 MHz
es BW 10 kHz #VBW 30 kHz #Sweep 1.000 s (1001 pts)

BAND 14 Upper Emission Mask (799 MHz ~805 MHz) Plot (5M BW Ch.23355 QPSK_RB25_0)-2





BAND 14 Upper Band Edge Plot (10M BW Ch.23330 QPSK_RB1_Offset_49)



	ctrum Analyzer - Swept SA					
Center F	RF 50 Ω AC req 798.000000 M	1Hz	SENSE:INT	ALIGN AUTO #Avg Type: RMS	01:28:23 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	Frequency
		PNO: Wide ++++	Trig: Free Run #Atten: 20 dB			
10 dB/div Log	Ref Offset 26.2 dB Ref 26.20 dBm			Mk	r1 798.004 MHz -34.028 dBm	Auto Tune
16.2						Center Freq 798.000000 MHz
6.20 -3.80						Start Freq 796.000000 MHz
-13.8			<u> </u>		-13.00 dBm	Stop Freq 800.000000 MHz
-33.8					RMS	CF Step 400.000 kHz <u>Auto</u> Man
-43.8						Freq Offset 0 Hz
	98.000 MHz				Span 4.000 MHz 1.000 s (1001 pts)	
#Res BW	100 kHz	#VBW 3	300 kHz	#Sweep		

BAND 14 Upper Band Edge Plot (10M BW Ch.23330 QPSK_QPSK_RB_50)



🗾 Agilent Spectrum Analyzer - Swept SA				
RL RF 50 Ω AC Center Freq 802.000000	MHz	ALIGN A	S TRACE 1 2 3 4 5 6	Frequency
	PNO: Wide +++ Trig: Free IFGain:Low #Atten: 20			
Ref Offset 26.2 dB 10 dB/div Ref -10.00 dBm	1		Mkr1 804.358 MHz -63.680 dBm	Auto Tune
-20.0				Center Freq 802.000000 MHz
-40.0			-35.00 dBm	Start Freq 799.000000 MHz
-50.0			1	Stop Freq 805.000000 MHz
-70.0	and the second	มูลารางสาวรองรางมีขนับหมู่ก่องรูงสาวราชที่จะมีการการก	fish.gegen gegin en anvidentikket in alle winden porten	CF Step 600.000 kHz <u>Auto</u> Man
-90.0				<b>Freq Offset</b> 0 Hz
Start 799.000 MHz			Stop 805.000 MHz	
#Res BW 10 kHz	#VBW 30 kHz		reep 1.000 s (1001 pts) status	

BAND 14 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23330 QPSK_RB1_49)-1



	trum Analyzer - Swept SA					
LXI RL	RF 50 Ω AC		SENSE:INT	ALIGN AUTO	01:28:42 PM Jul 28, 2020	Frequency
Center F	req 802.000000	PNO: Wide +++ Irig:	Free Run n: 20 dB	#Avg Type: RMS	TRACE 123456 TYPE A WWWW DET A A A A A A	
10 dB/div Log	Ref Offset 26.2 dB Ref -10.00 dBm			Mk	r1 799.054 MHz -47.980 dBm	Auto Tune
-20.0						Center Freq 802.000000 MHz
-40.0					-35.00 dBm	Start Freq 799.000000 MHz
-50.0	nnyulay kutuk kutik vinnen Akyav Uniy	Participation and and the second s	ognallhadburnanggade	an a	RMS กปัณฑาสารการการการการการการการการการการการการกา	<b>Stop Freq</b> 805.000000 MHz
-70.0						CF Step 600.000 kHz <u>Auto</u> Man
-90.0						Freq Offset 0 Hz
-100 Start 799.		#\/D\// 2014			Stop 805.000 MHz	
#Res BW		#VBW 30 kH		#Sweep	s <b>1.000 s (1001 pts)</b>	

## BAND 14 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23330 QPSK_RB50_0)-2



	trum Analyzer:									
(X) RL	RF	50 Ω AC	CH-	SEN	SE:INT	#Ava Tu	ALIGN AUTO		PM Jul 28, 2020 E <b>1 2 3 4 5 6</b>	Frequency
Center F	eq 5.0	5000000	PNO: Fast 🕂	📑 Trig: Free			peritai	TYP		
			IFGain:Low	#Atten: 20	dB					Auto Tun
							M	r1 3.681	1 0 GHz	Autorun
10 dB/div Log		.00 dBm						-67.0	90 dBm	
0.00	<mark>2</mark>									Center Fre
-10.0										5.015000000 GH
-20.0										
-30.0										
										Start Fre
-40.0										30.000000 MH
-50.0										
-60.0			<b></b> ♦'						RMS	Stop Fre
-70.0			and the second							10.000000000 GH
-80.0										
Start 30 N	л <b>ы</b>							Stop 10	.000 GHz	CF Ste
#Res BW			#VB\	N 3.0 MHz			Sweep 17	.33 ms (2	0001 pts)	997.000000 MH
MKR MODE TH		X		Y	FUNC		UNCTION WIDTH		DN VALUE	<u>Auto</u> Ma
	f	3.	681 0 GHz	-67.090 dB	m			Towerie		
2 N 1 3	f		789.2 MHz	<u>-3.252 dB</u>	m				_	Freq Offse
4										он
5 6									E	
7 8										
9										
10										
•				III					• •	
MSG							<b>I</b> STATU:	5		
	-						<u> </u>			

## BAND 14. Conducted Spurious Plot (23305ch_5MHz_QPSK_RB 1_0)



	trum Analyzer - Swe	ept SA								
LXI RL	RF 50 Ω req 5.0150		2117	SEN	ISE:INT	#Avg Ty	ALIGN AUTO		PM Jul 28, 2020 DE <b>1 2 3 4 5 6</b>	Frequency
Center F	eq 5.0150		PNO: Fast ↔	Trig: Free #Atten: 20				TY		
			IFGain:Low	#Atten: 20	) dB					Auto Tune
							M	kr1 3.69	9 5 GHZ 08 dBm	
10 dB/div Log	Ref 10.00	dBm						-07.5		
0.00	2									Center Freq
-10.0										5.015000000 GHz
-20.0										
-30.0										
-40.0										Start Freq
-50.0										30.000000 MHz
-60.0			. 1							
									RMS	Stop Freq
-70.0					And a strength of the second					10.00000000 GHz
-80.0										
Start 30 M	/IHz							Stop 10	.000 GHz	CF Step
#Res BW	1.0 MHz		#VB\	V 3.0 MHz		S	Sweep 1	7.33 ms (2	:0001 pts)	997.000000 MHz
		х		Y		TION FU	INCTION WIDT	H FUNCTI	ON VALUE 🔺	<u>Auto</u> Man
1 N 1 2 N 1		3.69	9 5 GHz 1.7 MHz	<u>-67.308 dE</u> -3.654 dE						
3				-0.004 02						Freq Offset
4 5									=	0 Hz
6										
8										
9										
11									-	
MSG				III			<b>I</b> STAT	116	•	
MoG								03		

## BAND 14. Conducted Spurious Plot (23330ch_5MHz_QPSK_RB 1_0)



MX   RL   RF   50 Ω   AC   SENSE:INT   ALIGN AUTO   01:24:45 PMJul 28, 2020     Center Freq 5.015000000 GHz   Trig: Free Run   #Avg Type: RMS   TRACE   2.3.4.5 G   Frequency     PNO: Fast   →→   Trig: Free Run   #Atten: 20 dB   Mkr1 3.707 9 GHz   Auto Tur     10 dB/div   Ref 10.00 dBm   -67.105 dBm   -67.105 dBm   Center Free     10.00   -20.0   -20.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0   -40.0 </th
PNO: Fast     Trig: Free Run #Atten: 20 dB     Type A AAAAA Der AAAAAA     Auto Tur       10 dB/div     Ref 10.00 dBm     -67.105 dBm     -67.105 dBm     Center Free 5.015000000 GF       -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0     -20.0<
Inclain: Low     Watter: 20 dB     Auto Tur       10 dB/div     Ref 10.00 dBm     -67.105 dBm     Center Fre       -10.0     -20.0     -20.0     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00     -00.00
MKP1 3.707 9 GHZ       10 dB/div     Ref 10.00 dBm     -67.105 dBm       0.00     2     Center Fre       10.0     -67.105 dBm     Center Fre       -20.0     -2     -67.105 dBm     Center Fre
Log 2 0.00 2 -10.0
0.00 2 Center Fre -10.0
-10.0
-20.0
start Free
-40.0 30.000000 MH
-70.0 10.00000000 GF
-80.0
Start 30 MHz Stop 10.000 GHz CF Ste
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 17.33 ms (20001 pts) 997.000000 MHz
1 N 1 f 3.707 9 GHz -67.105 dBm
2 N 1 f 798.2 MHz -2.620 dBm Freq Offs

## BAND 14. Conducted Spurious Plot (23355ch_5MHz_QPSK_ RB 1_0)



	trum Analyzer - Sw												×
LXIRL		Ω AC			SEN	SE:INT	#Avo		ALIGN AUTO		PM Jul 28, 2020 E <mark>1 2 3 4 5</mark> 6		
	req 5.0150	00000	PNO: Fast IFGain:Low		Trig: Free #Atten: 20		#// 19	, rype	E. RIVIS	TYI		A	
10 dB/div	Ref 10.00	dBm							Mk	r1 3.68 -67.2	3 0 GHz 28 dBm	Auto Tu	Ine
Log 0.00 -10.0 -20.0												Center F 5.015000000 c	- 1
-30.0 -40.0 -50.0												Start Fi 30.000000 N	
-60.0 -70.0 -80.0								~~			RMS	Stop Fi 10.000000000 c	
Start 30 M #Res BW			#V	BW 3	3.0 MHz			Sı	weep 17	Stop 10 .33 ms (2	.000 GHz 0001 pts)	997.000000 N	
MKR MODE TR 1 N 1 2 N 1 3 4 5	f		8 <u>3 0 GHz</u> 89.2 MHz	_	Y 67.228 dB -2.602 dB	m	NCTION	FUN	CTION WIDTH	FUNCTION	ON VALUE	Freq Off	
6 7 8 9 10 11													
MSG										3	•		

BAND 14. Conducted Spurious Plot (Ch.23330 10 MHz QPSK RB 1, Offset 0)



# 10. APPENDIX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2008-FC049-P