

## FCC LTE REPORT

## Certification

Applicant Name: SAMSUNG Electronics Co., Ltd.

#### Address:

129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea Date of Issue: February 25, 2021 Location: HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-RF-2102-FC046

#### FCC ID:

#### A3LSMA526U

#### **APPLICANT:**

#### SAMSUNG Electronics Co., Ltd.

SM-A526U
SM-A526U1
Mobile Phone
PCS Licensed Transmitter Held to Ear (PCE)
§90, §2

Mada			Ef	RP	
Mode	Tx Frequency	Emission	Modulation	Max. Power	Max. Power
(MHZ)	(MHz) (MHz)	Designator		(W)	(dBm)
		4M51G7D	QPSK	0.094	19.73
LTE – Band14 (5)	790.5 –795.5	4M49W7D	16QAM	0.080	19.05
		4M52W7D	64QAM	0.064	18.04
		8M96G7D	QPSK	0.096	19.82
LTE – Band14 (10)	793.0	8M96W7D	16QAM	0.081	19.11
		8M95W7D	64QAM	0.064	18.04

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** 

4 mer.

Report prepared by : Jae Mun 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)

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# <u>Version</u>

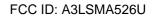
TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2102-FC046	February 25, 2021	- First Approval Report

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



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## **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:	A3LSMA526U
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-A526U
Additional Model(s):	SM-A526U1
Tx Frequency:	790.5 MHz –795.5 MHz (LTE – BAND 14 (5MHz)) 793.0 MHz (LTE – BAND 14 (10 MHz))
Date(s) of Tests:	February 01, 2021 ~ February 22, 2021
Serial number:	Radiated: R3CR10BE9RJ Conducted: R3CR10BBBAL

## 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 (HT20/40/80), Bluetooth, BT LE, NFC.

#### 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.

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 ≥ 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 10<sup>th</sup> harmonics from 9 kHz.

#### Test Note

1. 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<sub>(dBm)</sub> = Pg<sub>(dBm)</sub> - cable loss <sub>(dB)</sub> + antenna gain <sub>(dBi)</sub>

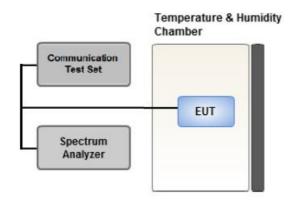
Where: P<sub>g</sub>is the generator output power into the substitution antenna.

If the fundamental 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.

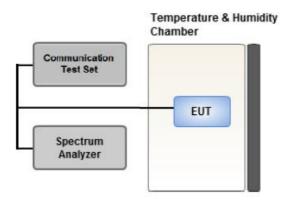
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

#### **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



#### Test setup

#### **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.

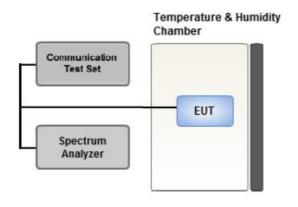
All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

#### **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



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#### 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.

#### Test Notes

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

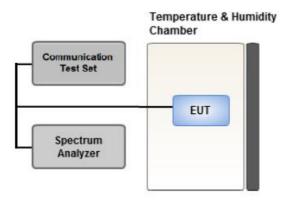
the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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.
- SM-A526U & additional models were tested and the worst case results are reported.

(Worst case : SM-A526U)

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

[Worst case]



#### 3.9 WORST CASE(CONDUCTED TEST)

- All modes of operation were investigated and the worst case configuration results are reported.

- SM-A526U & additional models were tested and the worst case results are reported.

(Worst case : SM-A526U)

[ Worst case ]										
Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset					
Occupied Bandwidth	QPSK, 16QAM, 64QAM	5, 10	Mid	Full RB	0					
		5	Low	1	0					
	QPSK	Э	High	1	24					
		10	Mid	1	0					
Band Edge		QPSK	QPSK	QPSK	QPSK	QPSK	10	IVIIG	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			High							
		10	Mid	1	0					



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### 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
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	04/27/2020	Annual	04/27/2021
Hewlett Packard	E3632A/DC Power Supply	MY40004427	09/16/2020	Annual	09/16/2021
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	10/14/2020	Annual	10/14/2021
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/26/2020	Annual	08/26/2021
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	01/07/2021	Annual	01/07/2022
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/13/2020	Annual	07/13/2021
KEYSIGHT	N9030B / Signal Analyzer(5Hz~40.0GHz)	MY55480167	06/04/2020	Annual	06/04/2021
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 Note2)</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
- 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	§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	PASS	
Undesirable Emissions in	§2.1053,	< -70dBW/MHz EIRP (wideband)	DACO	
the 1559 – 1610 MHz band	§90.543(f)	< -80dBW EIRP (narrowband)	PASS	



## 7. SAMPLE CALCULATION

#### 7.1 ERP Sample Calculation

Ch.	/ Freq.	Measured	Substitute Ant. Gain		. Gain C.L		ERP	
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBd)	U.L	Pol.	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	/ Freq.	Measured	Substitute	Ant. Gain	C.L	Pol.	EIRP	
channel	Freq.(MHz)	Level(dBm)	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	<b>QPSK Modulation</b>
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)	woodulation	Level (dBm)	Level (dBm)	Gain(dBd)	U.L	101	w	W	dBm
		QPSK	-31.41	31.20	-10.11	1.36	Н		0.094	19.73
790.5		16-QAM	-32.09	30.52	-10.11	1.36	Н		0.080	19.05
		64-QAM	-33.10	29.51	-10.11	1.36	Н		0.064	18.04
	LTE B14	QPSK	-31.97	30.75	-10.12	1.36	Н		0.084	19.27
793.0	(5 MHz)	16-QAM	-32.66	30.06	-10.12	1.36	Н	< 3.00	0.072	18.58
		64-QAM	-33.67	29.05	-10.12	1.36	Н		0.057	17.57
		QPSK	-32.22	30.47	-10.13	1.37	Н		0.079	18.97
795.5		16-QAM	-32.90	29.79	-10.13	1.37	Н		0.067	18.29
		64-QAM	-34.01	28.68	-10.13	1.37	Н		0.052	17.18

Freq	Mod	Modulation	Measured	Substitute	Ant.	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm)	Gain(dBd)	U.L		w	W	dBm
		QPSK	-31.42	31.30	-10.12	1.36	Н		0.096	19.82
793.0	LTE B14	16-QAM	-32.13	30.59	-10.12	1.36	Н	< 3.00	0.081	19.11
	(10 MHz)	64-QAM	-33.20	29.52	-10.12	1.36	Н		0.064	18.04



#### 8.2 RADIATED SPURIOUS EMISSIONS

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

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1 581.0	-53.88	9.05	-61.86	1.95	Н	-54.76	-13.00
23305 (790.5)	2 371.5	-49.61	10.05	-52.11	2.42	V	-44.48	-13.00
(10010)	3 162.0	-54.62	11.28	-54.61	2.83	V	-46.16	-13.00
	1 586.0	-53.84	9.12	-61.89	1.96	V	-54.73	-13.00
23330 (793.0)	2 379.0	-48.65	10.05	-51.23	2.44	V	-43.62	-13.00
(100.0)	3 172.0	-55.65	11.35	-55.87	2.83	Н	-47.35	-13.00
	1 591.0	-53.54	9.18	-61.65	1.96	V	-54.43	-13.00
23355	2 386.5	-48.60	10.09	-51.19	2.45	V	-43.55	-13.00
(795.5)	3 182.0	-56.87	11.35	-57.14	2.83	V	-48.62	-13.00
	3 977.5	-54.98	12.55	-53.37	3.20	V	-44.02	-13.00



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

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1 586.0	-55.17	9.12	-63.22	1.96	V	-56.06	-13.00
23330	2 379.0	-50.32	10.05	-52.90	2.44	V	-45.29	-13.00
(793.0)	3 172.0	-54.48	11.35	-54.70	2.83	V	-46.18	-13.00
	3 965.0	-55.13	12.54	-53.43	3.19	V	-44.08	-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	1607.07		-63.43	9.35	-72.37	1.99	V	-65.01	15.01
793.0	1607.88	Narrow Band	-63.59	9.35	-72.53	1.99	V	-65.17	15.17
795.5	1607.88		-63.54	9.35	-72.48	1.99	V	-65.12	15.12

#### Note:

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

OPERATING FREQUENCY:	<u>793.0 MHz</u>
MEASURED OUTPUT POWER:	10 MHz QPSK
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	1608.3	Narrow Band	-63.57	9.35	-72.51	1.99	V	-65.15	15.15

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	4.5065
	5 MHz		16-QAM	25	0	4.4923
			64-QAM	25	0	4.5164
14	10 MHz	793.0	QPSK	50	0	8.9546
			16-QAM	50	0	8.9620
			64-QAM	50	0	8.9477

#### Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 33 ~ 38.



#### 8.4 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Maximum Data		Limit (dBm)
		790.5	3.6915	28.376	-66.836	-38.460	
14	5	793.0	3.7024	28.376	-67.294	-38.918	-13.00
14		795.5	3.7034	28.376	-67.333	-38.957	-13.00
	10	793.0	3.7044	28.376	-67.140	-38.764	

#### Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 55 ~ 58.

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	28.376
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20	30.131

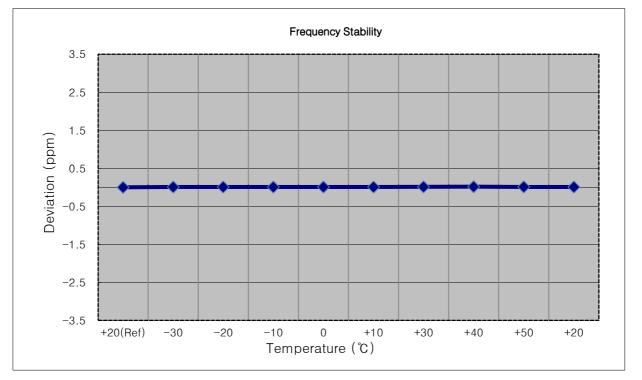
#### 8.5 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 39 ~ 54.

#### 8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>790,500,000 Hz</u>
CHANNEL:	<u>23305 (5 MHz)</u>
REFERENCE VOLTAGE:	3.86 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

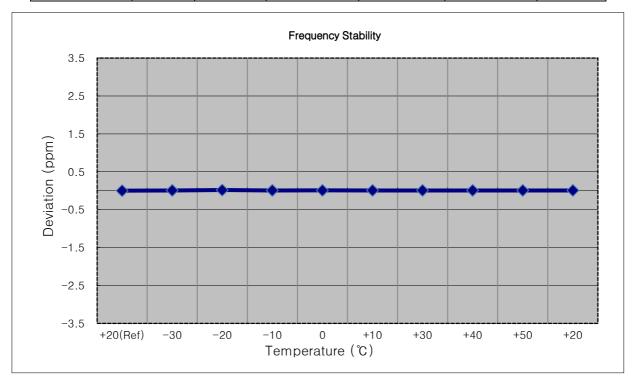
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	790 500 010	0.00	0.000 000	0.0000
100%		-30	790 500 017	6.60	0.000 001	0.0083
100%	3.860	-20	790 500 016	6.00	0.000 001	0.0076
100%		-10	790 500 016	5.50	0.000 001	0.0070
100%		0	790 500 016	6.00	0.000 001	0.0076
100%		+10	790 500 017	6.70	0.000 001	0.0085
100%		+30	790 500 020	10.10	0.000 001	0.0128
100%		+40	790 500 022	12.20	0.000 002	0.0154
100%		+50	790 500 018	7.60	0.000 001	0.0096
Batt. Endpoint	3.400	+20	790 500 016	5.90	0.000 001	0.0075





MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (5 MHz)</u>
REFERENCE VOLTAGE:	3.86 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

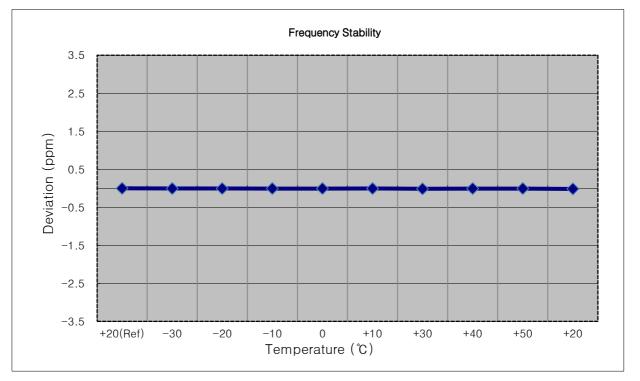
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	793 000 007	0.00	0.000 000	0.0000
100%		-30	793 000 012	5.30	0.000 001	0.0067
100%		-20	793 000 021	14.10	0.000 002	0.0178
100%		-10	793 000 013	6.10	0.000 001	0.0077
100%	3.860	0	793 000 013	6.50	0.000 001	0.0082
100%		+10	793 000 013	6.20	0.000 001	0.0078
100%		+30	793 000 013	5.90	0.000 001	0.0074
100%		+40	793 000 012	5.40	0.000 001	0.0068
100%		+50	793 000 013	6.10	0.000 001	0.0077
Batt. Endpoint	3.400	+20	793 000 013	6.00	0.000 001	0.0076





I MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>795,500,000 Hz</u>
CHANNEL:	<u>23355 (5 MHz)</u>
REFERENCE VOLTAGE:	3.86 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

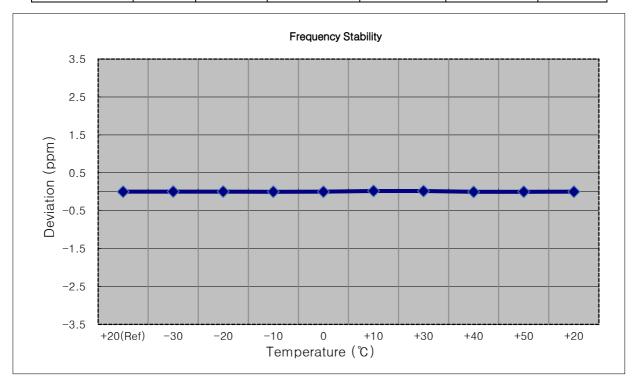
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	795 499 985	0.00	0.000 000	0.0000
100%		-30	795 499 982	-3.40	0.000 000	-0.0043
100%	3.860	-20	795 499 981	-4.30	-0.000 001	-0.0054
100%		-10	795 499 980	-5.70	-0.000 001	-0.0072
100%		0	795 499 979	-6.00	-0.000 001	-0.0075
100%		+10	795 499 981	-4.10	-0.000 001	-0.0052
100%		+30	795 499 975	-10.00	-0.000 001	-0.0126
100%		+40	795 499 981	-4.80	-0.000 001	-0.0060
100%		+50	795 499 980	-5.00	-0.000 001	-0.0063
Batt. Endpoint	3.400	+20	795 499 974	-11.40	-0.000 001	-0.0143





MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (10 MHz)</u>
REFERENCE VOLTAGE:	3.86 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	793 000 013	0.00	0.000 000	0.0000
100%		-30	793 000 015	2.50	0.000 000	0.0032
100%	3.860	-20	793 000 015	2.80	0.000 000	0.0035
100%		-10	793 000 011	-2.00	0.000 000	-0.0025
100%		0	793 000 014	1.20	0.000 000	0.0015
100%		+10	793 000 028	15.40	0.000 002	0.0194
100%		+30	793 000 026	13.80	0.000 002	0.0174
100%		+40	793 000 010	-2.60	0.000 000	-0.0033
100%		+50	793 000 012	-0.90	0.000 000	-0.0011
Batt. Endpoint	3.400	+20	793 000 013	0.40	0.000 000	0.0005





#### FCC ID: A3LSMA526U

## 9. TEST PLOTS



M     RL     RF     50 Ω     AC     SENSE:INT     ALIGN AUTO     04:37:04 PM Feb 02, 2021     Freque       Center Freq 793.000000 MHz     Center Freq: 793.000000 MHz     Radio Std: None     Freque	
Center Fred 793.00000 MHZ	ency
LTIC FREERUN AVCIEDIC DUU/DUU	
PASS #IFGain:Low #Atten: 20 dB Radio Device: BTS	
Ref Offset 26.6 dB 10 dB/div Ref 40.00 dBm	
	ter Freq
20.0 793.000 10.0	
-20.0 -30.0	
-40.0	CF Step
1.000	0000 MHz
Center 793 MHzSpan 10 MHz#Res BW 100 kHz#VBW 390 kHzSweep 1 ms	Man
	<b>q Offset</b> 0 Hz
4.5065 MHz	
Transmit Freq Error 10.929 kHz OBW Power 99.00 %	
x dB Bandwidth 4.960 MHz x dB -26.00 dB	
MSG STATUS	

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



🎉 Agilent Spectrum Analyzer - Occupie												
RL     RF     50 Ω       Center Freq 793.0000		SENSE:INT Center Freq: 793.000	ALIGN A	UTO 04:36:06 PM P Radio Std: N		Frequency						
PASS	- <b>-</b>	Trig: Free Run #Atten: 20 dB	Avg Hold: 500/50		Radio Device: BTS							
	#IFGain:Low	#Atten: 20 dB		Radio Device	BIS							
Ref Offset 26												
10 dB/div Ref 40.00	aBm											
30.0						<b>Center Freq</b>						
20.0						793.000000 MHz						
	mont	man	monor									
10.0												
0.00												
-10.0												
-20.0	~			h m on a								
-20.0 -30.0				Mummun	mm							
-40.0												
-50.0												
-50.0						CF Step 1.000000 MHz						
Center 793 MHz				Span	10 MHz Au							
#Res BW 100 kHz		#VBW 390 k	Hz		p 1 ms							
Occupied Bandw	vidth	Total P	ower	30.8 dBm		Freq Offset						
						0 Hz						
	4.4923 MHz											
Transmit Freq Erro	r 9.288 k	Hz OBW P	ower	99.00 %								
x dB Bandwidth	4.950 M	Hz xdB		-26.00 dB								
			_1 `									
MSG			I 🔊 s	TATUS								

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



	um Analyzer - Occup	oied BW										đ 🔀
(X) RL	RF 50 Ω 2q 793.0000			Cente	SENSE:INT	00000 MHz	ALIGN	AUTO	04:36:30 F Radio Std:	M Feb 02, 2021	Freque	ncy
PASS	eq 795.0000		•	🗖 Trig: F	ree Run	Avg Hol	d: 500	/500				
PA55		#1	FGain:Low	#Atter	1: 20 dB				Radio Dev	ice: BTS		
	Ref Offset 2											
10 dB/div Log	Ref 40.00	dBm										
30.0											Cente	er Freg
											793.0000	
20.0			www	harrow	www.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~						_
10.0												
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-10.0								<u> </u>				
-20.0		{						<u>\</u>				
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-40.0												
-50.0											С	F Step
Center 793											1.0000	00 MHz
#Res BW 1				#	VBW 390	kHz				n 10 MHz ep 1 ms	Auto	Man
					_						Erog	Offeet
Occup	ied Bandv				lotal	Power		29.8	dBm		Freq	Offset 0 Hz
		4.51	164 M	Hz								0112
Transm	Transmit Freq Error -1.093 kH					z OBW Power			99.00 %			
x dB Ba	x dB Bandwidth 4.923 MH				x dB			-26.0	00 dB			
							~					
MSG							<u></u>	STATUS				

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



_		pectrum Analyz	zer - Occu	pied BW											
	RL		50 Ω		L.I			NSE:INT eq: 793.000	000 MHz	ALIG	IN AUTO	04:43:48 P Radio Std:	M Feb 02, 2021	F	requency
		Freq 79	3.000		ΠZ	- <b>-</b> +-	. Trig: Free	Run	Avg Hold	d: 50	0/500				
PA	SS				#IFGain:l	ow	#Atten: 2	0 dB				Radio Dev	ice: BTS		
	dB/div			26.6 dB ) dBm						_					
Log   30.	-														Center Freq
20.	<u> </u>													79	3.000000 MHz
10.					million	wwwww	manne anno	৵৽৵ᠺᡢᡃᢊᠺᡀᡗᢧ	· <sup>1</sup> ···································	- m					
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-40.															
-50.															
	Ĭ														CF Step 2.000000 MHz
Ce	nter	793 MHz										Spa	n 20 MHz		Man
#R	es BV	V 200 kH	IZ				#VE	SW 820 k	Hz			Swe	ep 1 ms		
	Occupied Bandwidth Total Power 31.5 dBm											Freq Offset			
	8.9546 MHz												0 Hz		
	Transmit Freq Error 4				Hz	Hz OBW Power			99.00 %						
	x dB	Bandwi	dth		9.7	79 M	Hz	z xdB			-26.00 dB				
MSG										Ľ	STATUS	;			
-			-	_	_	-					_			_	

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



		Analyzer - Occu	upied BW											ð X
LXI RL		RF <u>50 Ω</u> 793.000		<b>U</b> 7			NSE:INT reg: 793.00	0000 MHz	ALIC	GN AUTO	04:42:52 P Radio Std:	M Feb 02, 2021	Frequen	су
PAS		795.000		#IFGain:L	ow wo	Trig: Fre #Atten: 2	e Run	Avg Holo	d: 50	0/500	Radio Dev			
10 dB	l/div	Ref Offset Ref 40.0												
<b>Log</b>													Cente 793.0000	
20.0 -				room	๛๛๛	ᠺᢦᠰ᠆ <sub>ᡪ</sub> ᡗ <sub>ᢦ</sub> ᠼᡳ᠆ᢇᢩ	᠇᠊ᡰᢆᡧᡗ᠇ᠰᡨᡔ᠋᠆ᢦᡨᠬᢦᡀᠬᠲᡗᠮ	mansham	w					
0.00														
-10.0			ļ j											
-20.0 - -30.0 <mark>-</mark>	humuni	h hand hand hand hand hand hand hand han	ww.v <sup>r</sup>							h line	Mart Marting	mmmmhl		
-40.0														
-50.0													2.00000	Step
	er 793   BW 20					#VI	BW 8201	kHz				n 20 MHz ep 1 ms	<u>Auto</u>	Man
0	ccupie	d Band	width				Total F	ower		30.6	dBm		Freq	Offset
			8.9	620	MH	Ζ								0 Hz
Tr	ansmit	Freq Err	or	10.8	353 kl	IZ	OBW P	ower		99	.00 %			
x	dB Ban	dwidth		9.7	92 MI	lz	x dB			-26.0	00 dB			
MSG									1	STATUS				
	_									<b>V</b>				

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



		ım Analyzer - Occi	upied BW											×
LXI RI			AC			SENSE:IN			ALIGN	AUTO	04:43:15 P Radio Std:	M Feb 02, 2021	Frequenc	У
		q 793.000			the Tr	ig: Free Run	1	Avg Hold:	500/	500				
PAS	5		i	#IFGain:L	.ow #A	tten: 20 dB					Radio Dev	ice: BTS		
10 dE	3/div	Ref Offset <b>Ref 40.0</b>												
Log													• •	_
30.0													Center	
20.0													793.000000	MHZ
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-40.0														
-50.0													CE	Step
													2.000000	
	ter 793											n 20 MHz	<u>Auto</u>	Man
#Res	s BW 2	200 kHz				#VBW	820 kH	Z			Swe	ep 1 ms		
0	ccupi	ed Band	width			То	tal Po	wer		29.5	dBm		Freq O	ffset
	ooapi	ou Bana												0 Hz
			0.9	4//	MHz									
T	ransmi	it Freq Eri	ror	11.	761 kHz	OE	W Pov	ver		99	.00 %			
x	dB Ba	ndwidth		9.7	'84 MHz	хс	IB			-26.0	)0 dB			
									1					
MSG									- <b>L</b> o	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 Typ	ALIGN AUTO e: RMS	04:34:32 PM Feb 02, 2021 TRACE 1 2 3 4 5 6	Frequency
Genter T		PNO: Fast +++ Trig: F IFGain:Low #Atten	ree Run : 20 dB	• //			
10 dB/div Log	Ref Offset 26.6 dB Ref 26.60 dBm				Mk	r1 788.000 MHz -18.063 dBm	Auto Tune
16.6			A				Center Freq 788.000000 MHz
6.60 -3.40							Start Freq 775.000000 MHz
-13.4						-13.00 dBm	<b>Stop Freq</b> 801.000000 MHz
-33.4							CF Step 2.600000 MHz <u>Auto</u> Man
-43.4					- and and a second	RMS	Freq Offset 0 Hz
-63.4							
Center 78 #Res BW	38.00 MHz 100 kHz	#VBW 300 kH	łz		#Sweep	Span 26.00 MHz 1.000 s (1001 pts)	
MSG							

BAND 14 Lower Band Edge Plot (5M BW Ch.23305 QPSK\_RB1 OFFSET\_0)



🗾 Agilent Spectrum Analyzer - Swept SA					
M RL RF 50 Ω AC Center Freq 788.000000	MHz	SENSE:INT	#Avg Type: RMS	04:33:47 PM Feb 02, 2021 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast ↔ IFGain:Low	. Trig: Free Run #Atten: 20 dB			
	IFGain:Low	#Atten: 20 db	Mk	r1 788.000 MHz	Auto Tune
Ref Offset 26.6 dB 10 dB/div Ref 26.60 dBm				-26.017 dBm	
Log					
16.6					Center Freq 788.000000 MHz
10.0					788.000000 101-2
6.60			~~~~		
					Start Freq
-3.40					775.000000 MHz
				-13.00 dBm	
-13.4				-13.00 dBm	Stop Freq
		1			801.000000 MHz
-23.4		•••••			
-33.4					CF Step
-33.4		and the second se		many	2.600000 MHz Auto Man
-43.4				Kong RMS	<u>Auto</u> Man
	and the second			a second	
-53.4					Freq Offset 0 Hz
and a second and a second s					UHZ
-63.4					
Center 788.00 MHz				Span 26.00 MHz	
#Res BW 100 kHz	#VBW	300 kHz	#Sweep	1.000 s (1001 pts)	
MSG				S	

## BAND 14 Lower Band Edge Plot (5M BW Ch.23305 QPSK\_RB\_25)



	ctrum Analyzer - Swept SA						
Center F	RF 50 Ω AC req 772.000000 N	AHZ PNO: Wide ↔ Trig: Free		ALIGN AU #Avg Type: RMS	TO 04:34:52 PM Feb ( TRACE 2 TYPE A W DET A A	3 4 5 6 www	Frequency
10 dB/div Log	Ref Offset 26.6 dB Ref -10.00 dBm	IFGain:Low #Atten: 2	0 dB	Ν	Akr1 773.410   -65.584 c	MHz	Auto Tune
-20.0							Center Freq 772.000000 MHz
-30.0					-3:	5.00 dBm	Start Freq 769.000000 MHz
-50.0				1			Stop Freq 775.000000 MHz
-70.0 -80.0	ประสอบคริสัทษารูปประชุมหนึ่งสามรูปประสาท	การแสดร์ที่การจะที่สามหรือมีหรือมีหรือมีหรือม 	le+##1,41,91-21-18#43.17	ningan mengenang sa	ใอกญาแห่งข้างสัญเว็บไข่ไข่ไข่ไข่ไข่ไข่ไข่ไข่ไข่ไข่ไข่ไข่ไข่ไ	RMS hlefnykerv	<b>CF Step</b> 600.000 kHz <u>Auto</u> Man
-90.0							<b>Freq Offset</b> 0 Hz
-100 Start 769 #Res BW		#VBW 30 kHz		#Swe	Stop 775.000 ep   1.000 s (1001	MHz	
MSG				"Out		- pres/	

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (5M BW Ch.23305 QPSK\_RB1\_0)-1



	trum Analyzer - Swept SA						
	RF 50 Ω AC req 772.000000 M		ENSE:INT	ALIGN AUT #Avg Type: RMS		2 3 4 5 6	Frequency
Center Pr	eq 772.000000 N	PNO: Wide ↔ Trig: Fre IFGain:Low #Atten: 2		mitig Type. Itilie	TYPE A		
10 dB/div Log	Ref Offset 26.6 dB Ref -10.00 dBm			N	1kr1 770.140 -65.591	) MHz dBm	Auto Tune
-20.0							Center Freq 772.000000 MHz
-30.0						-35.00 dBm	Start Freq 769.000000 MHz
-50.0							Stop Freq 775.000000 MHz
-70.0	alis-Africana mare du ani ana an	างกับรม <mark>าว</mark> างการ <sub>การที่</sub> นางสูงร่างสูงรู้รุงที่สุดสุดสุดรู้	<b>่ข</b> ⊷,≋๛ราช∺งาะป∦	e[]?>=_[?>=_]?>=]??===]?===??	ennethenseten and an and a second	RMS ԽոչԻվսերվեստ	<b>CF Step</b> 600.000 kHz <u>Auto</u> Man
-90.0							Freq Offset 0 Hz
-100 Start 769. #Res BW		#VBW 30 kHz		#9\\\\0	Stop 775.00	0 MHz	
MSG	W-M1/2	#VBW 30 KH2		#SWC	-	or pis)	

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (5M BW Ch.23305 QPSK\_RB25\_0)-2



IX RF 50 Ω AC SENSE:INT ALIGN AUTO 04:42:08 PM Feb 02, 2021   Center Freq 788.000000 MHz PNO: Fast Trig: Free Run #Avg Type: RMS TRACE 12.34.56   PNO: Fast PNO: Fast Trig: Free Run #Atten: 20 dB TRACE 12.34.56 TYPE   Ref Offset 26.6 dB Mikr1 788.000 MiHz -32.741 dBm Auto   10 dB/div Ref 26.60 dBm -32.741 dBm Center   16.6 16.6 788.00000 788.00000	Tune r Freq
PNO: Fast Trig: Free Run IFGain:Low Mitri 788.000 MHz   Ref Offset 26.6 dB 10 dB/div Ref 26.60 dBm -32.741 dBm	r Freq
Ref Offset 26.6 dB     MKI 1768.000 WH2       10 dB/div     Ref 26.60 dBm     -32.741 dBm	r Freq
Center	
	0 MHz
6.60 Star	t Freq
-3.40 775.00000	
-13.4	
	o <b>Freq</b> 0 MHz
-23.4	
-33.4 2.60000	
-43.4	Man
-53.4 Freq C	
	0 Hz
-63.4	
Center 788.00 MHz Span 26.00 MHz #Res BW 100 kHz #VBW 300 kHz #Sweep 1.000 s (1001 pts)	
#Res BW 100 kHz #VBW 300 kHz #Sweep 1.000 s (1001 pts)	

BAND 14 Lower Band Edge Plot (10M BW Ch.23330 QPSK\_RB1 OFFSET\_0)



🎉 Agilent Spectrum Analyzer - Swept SA					
RL RF 50 Ω A Center Freq 788.00000	0 MHz	SENSE:INT	ALIGN AUTO #Avg Type: RMS	04:41:25 PM Feb 02, 2021 TRACE 1 2 3 4 5 6	Frequency
	PNO: Fast +++	rig: Free Run Atten: 20 dB			
Ref Offset 26.6 d 10 dB/div Ref 26.60 dBr			Mk	r1 788.000 MHz -32.205 dBm	Auto Tune
16.6					Center Freq 788.000000 MHz
-3.40					Start Freq 775.000000 MHz
-13.4				13.00 dBm	Stop Freq 801.000000 MHz
-33.4	and the second	· ·		h RMS	<b>CF Step</b> 2.600000 MHz <u>Auto</u> Man
-53.4					Freq Offset 0 Hz
-63.4 Center 788.00 MHz				Span 26.00 MHz	
#Res BW 100 kHz	#VBW 30	0 kHz	#Sweep	1.000 s (1001 pts)	

BAND 14. Lower & Upper Band Edge Plot (10M BW Ch.23330 QPSK RB50\_0)



	ctrum Analyzer - Swept SA					- 6 ×
LXIRL	RF 50 Ω AC	MILL	SENSE:INT	ALIGN AUTO #Avg Type: RMS	04:42:28 PM Feb 02, 2021 TRACE 1 2 3 4 5 6	Frequency
Center F	req 772.000000	PNO: Wide +++	Trig: Free Run #Atten: 20 dB	#Avg Type. Allo		
10 dB/div Log	Ref Offset 26.6 dB Ref -10.00 dBm			Mk	r1 771.184 MHz -65.601 dBm	Auto Tune
-20.0						Center Freq 772.000000 MHz
-30.0					-35.00 dBm	Start Freq 769.000000 MHz
-50.0		1				<b>Stop Freq</b> 775.000000 MHz
-70.0	ะ.โรกห์สุขาสุขางสังหางสร้างการให้จะสำคัญ	an a she	all an standard and a state of the state of	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	RMS การขุนร่างประวัตร์ประมีการจะร่างจะร่งในเริ่ม	<b>CF Step</b> 600.000 kHz <u>Auto</u> Man
-90.0						<b>Freq Offset</b> 0 Hz
-100 Start 769.		#\/D\\/		<u> </u>	Stop 775.000 MHz	
#Res BW		#VBW 3		#Sweep	1.000 s (1001 pts)	

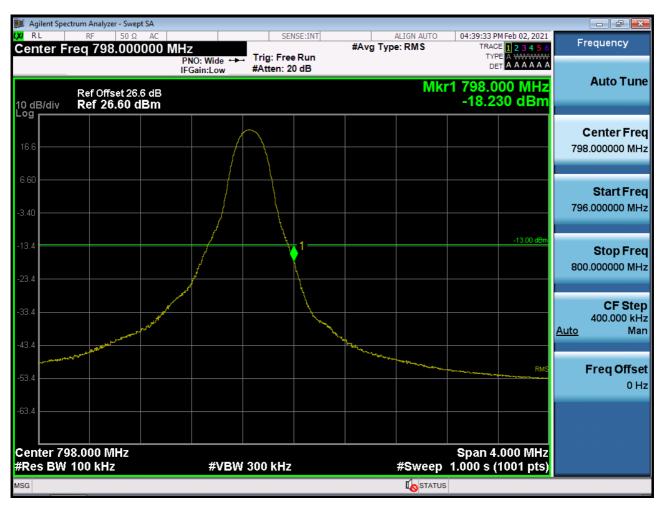
BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (10M BW Ch.23330 QPSK\_RB50\_0)-1



	trum Analyzer - Swept SA					
LXI RL	RF 50 Ω AC		SENSE:INT	ALIGN AUTO	04:41:44 PM Feb 02, 2021	Frequency
Center Fi	req 772.00000	PNO: Wide +++	Trig: Free Run #Atten: 20 dB	#Avg Type: RMS	TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A A A A A A A	
10 dB/div Log	Ref Offset 26.6 dE Ref -10.00 dBn	3 n		Mk	r1 769.954 MHz -65.515 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	angtong belging to the stand of the specific	มะสารีสาปไม่ก่า <sub>น</sub> ปัญญัญมีหมูมสมบรณบัตรณรุกสาร <sub>า</sub> มสัญหา	ynden Angensken sylluktivere	ณ <sup>1</sup> มศักร <sub>าช</sub> มากุษายางการสารหรือเป็นที่ได้เกิดจำนายใ	RMS ทรงสำนางที่มีนายทุกสาวประมาณ	<b>CF Step</b> 600.000 kHz <u>Auto</u> Man
-90.0						<b>Freq Offset</b> 0 Hz
-100 Start 769. #Res BW		#VBW 3	0 1/47	# <b>C</b> uvoo <b>n</b>	Stop 775.000 MHz 1.000 s (1001 pts)	
#Res DW		#VBW J	V M12	#Sweep		

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)



	ctrum Analyzer - Swept SA							
LXIRL	RF 50 Ω AC		SENSE:		ALIGN AUT Avg Type: RMS		M Feb 02, 2021 E <b>1 2 3 4 5 6</b>	Frequency
Center F	req 798.00000 I	PNO: Wide ↔ IFGain:Low	Trig: Free Ru #Atten: 20 dB	n		TYF DE		
10 dB/div Log	Ref Offset 26.6 dB Ref 26.60 dBm				N	lkr1 798.0 -25.8	00 MHz 97 dBm	Auto Tune
16.6								Center Freq 798.000000 MHz
6.60 -3.40								Start Freq 796.000000 MHz
-13.4							-13.00 dBm	Stop Freq 800.000000 MHz
-33.4					u-approximation and a second		RMS	CF Step 400.000 kHz <u>Auto</u> Man
-53.4								Freq Offset 0 Hz
-63.4 Center 79 #Res BW	18.000 MHz	#\/B\M	300 kHz		#\$\\\\\	Span 4 ep 1.000 s (	.000 MHz	
MSG			500-MHZ		I STA		100 F pt5)	

BAND 14 Upper Band Edge Plot (5M BW Ch.23355 QPSK\_RB\_25\_0)



	ctrum Analyzer - Swept SA									ð X
Center F	RF 50 Ω AC req 802.000000	MHz	SEN	SE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRACE	Feb 02, 2021 <b>1 2 3 4 5 6</b> A WWWWW	Frequer	су
		PNO: Wide ↔ IFGain:Low	#Atten: 20				DET	<b>A A A A A A</b>	Auto	Tune
10 dB/div Log	Ref Offset 26.6 dB Ref -10.00 dBm					Mki	1 799.04 -59.07	48 MHz ′6 dBm	Auto	Tune
									Cente	r Freq
-20.0									802.0000	00 MHz
-30.0								-35.00 dBm	Star	tFreq
-40.0									799.0000	
-50.0									Sto	p Freq
-60.0									805.0000	
	to many property of the service and the service of	and the second	laft and the states	ware and the second second	านหาริการการกา	edwarddwydanigwed	ามาร์สเขาร์ลกฎรประเทร	RMS	CI	- Step
-70.0										00 kHz Man
-80.0										
-90.0									Freq	Offset 0 Hz
-100										
Start 799. #Res BW		#VBW	30 kHz			#Sweep	Stop 805. 1.000 s (1	000 MHz 1001 pts)		
MSG						<b>I</b> STATUS				

BAND 14 Upper Emission Mask (799 MHz ~805 MHz) Plot (5M BW Ch.23355 QPSK\_RB1\_24)



	ctrum Analyzer - Swept SA					
LXIRL	RF 50 Ω AC	NAL I-	SENSE:INT	ALIGN AUTO #Avg Type: RMS	04:39:06 PM Feb 02, 2021 TRACE 1 2 3 4 5 6	Frequency
Center F	req 802.000000	PNO: Wide	Trig: Free Run #Atten: 20 dB	#Avg Type. Rins		
10 dB/div Log	Ref Offset 26.6 dB Ref -10.00 dBm			Mk	r1 799.696 MHz -42.115 dBm	Auto Tune
-20.0						Center Freq 802.000000 MHz
-30.0 -40.0	1	Manufan Julia water at any			-35.00 dBm	Start Freq 799.000000 MHz
-50.0				mart the provident and the second	RMS	<b>Stop Freq</b> 805.000000 MHz
-70.0						CF Step 600.000 kHz <u>Auto</u> Man
-90.0						<b>Freq Offset</b> 0 Hz
-100						
Start 799. #Res BW		#VBW	30 kHz	#Sweep	Stop 805.000 MHz 1.000 s (1001 pts)	
MSG				STATU		

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)



								🕻 Agilent Spectrum A
Frequency	04:45:02 PM Feb 02, 2021 TRACE 1 2 3 4 5 6	ALIGN AUTO	#Av	NSE:INT		-lz	50 Ω AC 98.000000 M	enter Freg
					Trig: Fre #Atten: 2	PNO: Wide ↔↔ FGain:Low		
Auto Tune	1 798.000 MHz -32.228 dBm	Mkr					ffset 26.6 dB 2 <b>6.60 dBm</b>	Re: 0 dB/div Re
Center Freq								
798.000000 MHz								16.6
Start Freq								6.60
796.000000 MHz								3.40
	-13.00 dBm							13.4
<b>Stop Freq</b> 800.000000 MHz					ι.			13.4
				1	A AND A			23.4
<b>CF Step</b> 400.000 kHz				and the second second	and a second			33.4
<u>Auto</u> Man								43.4
Freq Offset								53.4
0 Hz								
								63.4
	Span 4.000 MHz							enter 798.00
	1.000 s (1001 pts)	#Sweep			300 kHz	#VBW	IZ	Res BW 100

BAND 14 Upper Band Edge Plot (10M BW Ch.23330 QPSK\_QPSK\_RB\_50)



	um Analyzer - Swept SA									
	RF 50 Ω AC eq 802.000000 MH	7	SENSE:1		 #Avg Type	LIGN AUTO	TRAC	M Feb 02, 2021	Fr	equency
		PNO: Wide ++++	Trig: Free Ru #Atten: 20 dE				TYP DE			
	Ref Offset 26.6 dB Ref -10.00 dBm					Mki	1 799.0 -60.2	06 MHz 03 dBm		Auto Tune
-20.0										enter Freq
-30.0										
-40.0								-35.00 dBm	799	Start Freq
-50.0										Stop Freq
-60.0 1	w-way have a physical and a second							RMS	805	.000000 MHz
-70.0		¶¢¶t+[++d+(]s+,+t+n <sub>(+</sub> - <sub>1+1+1</sub> ){t+	esterf the set was for a split with the second	ી⊧ <b>ી∔#,⊕</b> ⊱-η∖ <u>γ</u> ,⊫ <sub>η</sub> δ,η	ኒሳቀት <del>ս</del> አየግብረትመ	Model of the second sec	and the second	warther managed		CF Step 600.000 kHz
-80.0									<u>Auto</u>	Man
-90.0										F <b>req Offset</b> 0 Hz
-100										
Start 799.0 #Res BW 1		#VBW 3	0 kHz			#Sweep	Stop 805. 1.000 s (	000 MHz 1001 pts)		
MSG							-			

BAND 14 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23330 QPSK\_RB1\_49)-1



							trum Analyzer - Swept SA	
Frequency	04:45:21 PM Feb 02, 2021 TRACE 1 2 3 4 5 6 TYPE A WWWWW	ALIGN AUTO	#Avg Ty	NSE:INT			RF 50 Ω AC req 802.000000 M	Center Fi
Auto Tune	DET A A A A A A				#Atten: 2	PNO: Wide ↔ IFGain:Low		
Auto Tune	1 799.054 MHz -46.282 dBm	Mkr					Ref Offset 26.6 dB Ref -10.00 dBm	10 dB/div Log
Center Freq								
802.000000 MHz								-20.0
Start Freq	-35.00 dBm							-30.0
799.000000 MHz								-40.0
Stop Freq 805.000000 MHz	RMS อาสาร์การเป็นเป็นรู้ประเทศเหตุการการเป็น	<sub>ส่งท</sub> ั้งมารูปการแก่ไปข้างมา <sub>หม</sub>	Asternation	<b>Ise Andreamples</b>	<sup>ม</sup> องคนที่ที่สุดสุญาตร์ไ	<sup>مر</sup> ي <sup>194</sup> 0يوريغ بېخمورانۍ	<del>۹۳ ۵</del> ۵۰۹۹ مارونه و ۲۰ مارونه و ۲۹ مارونه و ۲۹	-50.0
805.00000 MHZ								-60.0
CF Step 600.000 kHz								-70.0
<u>Auto</u> Man								-80.0
Freq Offset								-90.0
0 Hz								100
								-100
	Stop 805.000 MHz	# <b>C</b>			20 1/11-	#\/D\\		Start 799.
	1.000 s (1001 pts)	#Sweep			30 kHz	#VBW		#Res BW

### BAND 14 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23330 QPSK\_RB50\_0)-2



jji Agilent Spect		er - Swept SA										
Center Fr	RF	50 Ω AC		,	SEN	ISE:INT	#Ava	ALIGN AU Type: RMS		:05 PM Feb 02, 2 TRACE 1 2 3 4		Frequency
Center Fr	eq 5.0	150000	DU GHZ PNC	):Fast 🕶	, Trig: Free			rype. runo				
1			IFGa	in:Low	#Atten: 20	) dB				-	_	Auto Tune
									Mkr1 3.	691 5 GH	z	Autorune
10 dB/div Log		0.00 dBn	n						-66	5.836 dB	m	
0.00	<sup>2</sup>											Center Freq
-10.0	Ϋ́Ι											5.015000000 GHz
												5.01500000 GHZ
-20.0												
-30.0												Start Freq
-40.0												30.000000 MHz
-50.0												
-60.0	<u> </u>			<b>_1</b> .								01 F
-70.0				-						F	RMS	Stop Freq
-80.0												10.00000000 GHz
Start 30 M								_	Stop	10.000 GI	1Z	CF Step
#Res BW	1.U IVIH:	Z		#VBW	/ 3.0 MHz			Sweep	17.33 m	s (20001 pi		997.000000 MHz Auto Man
MKR MODE TR	C SCL		X		Y		CTION	FUNCTION WI	DTH FU	NCTION VALUE	i i	<u>tuto</u> mun
1 N 1 2 N 1	f		3.691 5 789.2	GHZ MHZ	-66.836 dE -3.276 dB	sm Sm						
3												Freq Offset
5											Ξ	0 Hz
6												
8												
9												
11											Ŧ	
<b> </b> • <b> </b>					m					•		
MSG								Г <mark>ю</mark> sт	ATUS			

#### BAND 14. Conducted Spurious Plot (23305ch\_5MHz\_QPSK\_RB 1\_0)



🎉 Agilent Spec		er - Swept SA											- ē 🗙
LXIRL	RF	50 Ω AC			SEN	SE:INT	#^		ALIGN AUTO		PM Feb 02, 2021		requency
Center Fr	req 5.0	150000	UU GHZ PNO: Fa	st 🛏	Trig: Free	Run	#AV	giype	E. RIVIS	TY			
			IFGain:L		#Atten: 20	dB				D			
									M	(r1 3.70)	2 4 GHz		Auto Tune
10 dB/div	Ref 1	0.00 dBn	า							-67.2	94 dBm		
Log			• 										
0.00													Center Freq
-10.0												5.01	15000000 GHz
-20.0													
-30.0													Start Freq
-40.0												3	0.000000 MHz
-50.0													
-60.0				1									
-70.0											RMS		Stop Freq
-80.0				<u> </u>								10.00	00000000 GHz
-80.0													
Start 30 M	1Hz									Stop 10	.000 GHz		CF Step
#Res BW		z	#	VBW	3.0 MHz			S	weep 17	.33 ms (2	0001 pts)	99	7.000000 MHz
MKR MODE TR			X	1	Y	EUN	ICTION		CTION WIDTH		ON VALUE	<u>Auto</u>	Man
	f		^ 3.702 4 GH	<b>Z</b>	-67.294 dB		CHON	FUN		FUNCTI	UN VALUE ~		
2 N 1	f		791.7 MH	Z	-3.683 dB	m							Freq Offset
3													0 Hz
5											Ξ		0 H2
6													
8													
9													
11											-		
•					III						•		
MSG										S			

#### BAND 14. Conducted Spurious Plot (23330ch\_5MHz\_QPSK\_RB 1\_0)



🎉 Agilent Spect		er - Swept SA								
Center Fr	RF	50 Ω AC		SEN	SE:INT	#Ava	ALIGN AUT Type: RMS		OPM Feb 02, 2021	
Center Fr	eq 5.0	1500000	PNO: Fast	🛶 Trig: Free			rype. Kino	т		
1			IFGain:Low	#Atten: 2	0 dB					Auto Tun
								Mkr1 3.70	3 4 GHz	Auto Tuli
10 dB/div Log		0.00 dBm						-67.3	333 dBm	
0.00	2									Center Fre
-10.0	Ϋ́									5.015000000 GH
										5.01500000 GF
-20.0										
-30.0										Start Fre
-40.0										30.000000 MH
-50.0										
-60.0				1						
-70.0									RMS	Stop Fre
-80.0										10.00000000 GH
Start 30 N								Stop 1	0.000 GHz	CF Ste
#Res BW	1.0 MHz	Z	#VE	3W 3.0 MHz			Sweep	17.33 ms (	20001 pts)	
MKR MODE TR		Х		Y		CTION	FUNCTION WIE	TH FUNCT	FION VALUE	Auto Ma
1 N 1 2 N 1	f		3.703 4 GHz 798.2 MHz	-67.333 dE -2.998 dE						
3			730.2 Militz	-2.550 ul	5.00					Freq Offse
4 5										0 H
6										
7 8										
9										
10										
•				III					4	
MSG							Iosт/	TUS		

## BAND 14. Conducted Spurious Plot (23355ch\_5MHz\_QPSK\_ RB 1\_0)



	trum Analyzer - S	wept SA								
LXI RL		Ω AC		SEN	NSE:INT	#A.u.a. T	ALIGN AUTO		M Feb 02, 2021	Frequency
Center Fi	req 5.0150	00000	PNO: Fast + IFGain:Low	→ Trig: Free #Atten: 2		#Avg T	ype: RMS	TYP	CE 1 2 3 4 5 6 CE A WWWW A A A A A A A	
10 dB/div	Ref 10.00	) dBm					Mk	r1 3.704 -67.14	4 4 GHz 40 dBm	Auto Tune
Log 0.00 -10.0 -20.0										Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0										Start Freq 30.000000 MHz
-60.0 -70.0 -80.0			******	1					RMS	<b>Stop Freq</b> 10.000000000 GHz
Start 30 N #Res BW			#VB	W 3.0 MHz			Sweep 17	Stop 10 .33 ms (2	.000 GHz 0001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TR 1 N 1 2 N 1 3 4 5	f		704 4 GHz 789.2 MHz	Y -67.140 dE -2.780 dE	3m	CTION F	UNCTION WIDTH	FUNCTIO	DN VALUE	Freq Offset
6 7 8 9 10 11										
MSG				III				3	- F	

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-2102-FC046-P