

FCC LTE REPORT

Certification

Applicant Name: Date of Issue: SAMSUNG Electronics Co., Ltd. June 22, 2020 Location: HCT CO., LTD., Address: 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-2006-FC022 FCC ID:

A3LSMA516V

APPLICANT:

SAMSUNG Electronics Co., Ltd.

Model(s): SM-A516V Mobile Phone EUT Type: FCC Classification: PCS Licensed Transmitter Held to Ear (PCE) FCC Rule Part(s): §27, §2

				ERP		
Mode	Tx Frequency (MHz)	Emission Designator	Modulation	Max. Power	Max. Power	
(MHz)				(W)	(dBm)	
	779.5 –784.5	4M50G7D	QPSK	0.121	20.81	
LTE – Band13 (5)		4M51W7D	16QAM	0.104	20.15	
		4M50W7D	64QAM	0.081	19.08	
		8M94G7D	QPSK	0.122	20.88	
LTE – Band13 (10)	782.0	8M95W7D	16QAM	0.105	20.23	
		8M96W7D	64QAM	0.081	19.08	

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 report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

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 KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)



Version

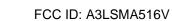
TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2006-FC022	June 22, 2020	- First Approval Report

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:	A3LSMA516V
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§27, §2
EUT Type:	Mobile Phone
Model(s):	SM-A516V
Tx Frequency:	779.5 MHz –784.5 MHz (LTE – Band 13 (5MHz)) 782 MHz (LTE – Band 13 (10 MHz))
Date(s) of Tests:	May 07, 2020 ~ June 17, 2020

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub6(n2/5/66). It also supports IEEE 802.11 a/b/g/n/ac (HT20/40/80), Bluetooth, BT LE, NFC, ANT+, 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.

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 \geq 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;

 $\text{Result}_{(dBm)} = \text{Pg}_{(dBm)} - \text{cable loss }_{(dB)} + \text{antenna gain }_{(dBi)}$

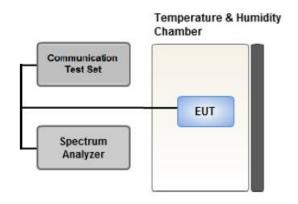
Where: P_{g} is the generator output power into the substitution antenna.

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.

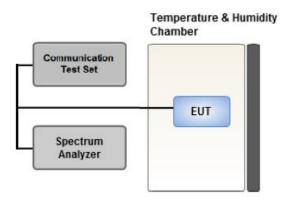
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

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 \geq 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.

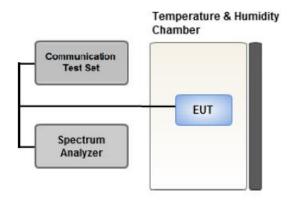
All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

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 x 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

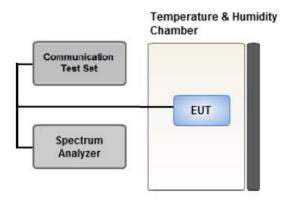
According to FCC 22.917, 24.238, 27.53 specified that power of any emission outside of The authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. In the 1 MHz bands immediately outside and adjacent to the frequency block a 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.

[1000.0000]							
Test Description	Modulation	RB size	RB offset	Axis			
	QPSK,						
Effective Isotropic Radiated Power	16QAM,	1	0	Y			
	64QAM						
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Х			

[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.

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset			
Occupied Bandwidth	QPSK, 16QAM, 64QAM	5, 10	Mid	Full RB	0			
	QPSK	5	Low	1	0			
		5	High	1	24			
Band Edge		10	Low	1	0			
Danu Luge			High	1	49			
		5, 10	Low,	Full RB	0			
		5, 10	High		0			
Spurious and Harmonic Emissions at			Low,					
Antenna Terminal	QPSK	5, 10	Mid,	1	0			
			High					

[Worst case]



Report No.: HCT-RF-2006-FC022

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
Agilent	E3632A/DC Power Supply	MY40004326	07/01/2019	Annual	07/01/2020
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	93000717	08/14/2019	Annual	08/14/2020
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	9160-3368	08/09/2018	Biennial	08/09/2020
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6201502997	08/09/2019	Annual	08/09/2020
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/22/2020	Annual	01/22/2021
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/15/2019	Annual	07/15/2020
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).

- 3. Model : 8493C(S/N: 17280)
 - Use date of Equipment : May 07, 2020 ~ June 03, 2020
- 4. Model : N9030B(S/N: MY55480167)
 - Use date of Equipment : June 07, 2020 ~ June 18, 2020

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, §27.53(c)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
On all frequencies between 763- 775 MHz and 793-805 MHz.	§27.53(c)(4)	< 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, § 27.54	Emission must remain in band	PASS

Note:

- 1. See SAR Report
- 2. The same samples were used for SAR and $\ensuremath{\mathsf{EMC}}$
- 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	Test Limit	Test Result	
	Section(s)		reor nooun	
Effective Radiated Power	§27.50(b)(10)	< 3 Watts max. ERP	PASS	
Radiated Spurious and Harmonic	§2.1053,	< 43 + 10log10 (P[Watts]) for	PASS	
Emissions	§27.53(g)	all out-of band emissions		
Undesirable Emissions in	\$2,4052, 27,52(f)	< -70dBW/MHz EIRP (wideband)	PASS	
the 1559 – 1610 MHz band	§2.1053, 27.53(f)	< -80dBW EIRP (narrowband)	PA22	



7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

Ch./ Freq.		Measured	Substitute	Ant. Gain		Del	EF	RP
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBd)	U.L	C.L Pol.		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		<u></u>	Del	EIRP	
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBi)	C.L	Pol.	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

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

Emission Designator = 4M17F9W

WCDMA BW = 4.17 MHz

F = Frequency Modulation

9 = Composite Digital Info

W = Combination (Audio/Data)

QPSK Modulation

Emission Designator = 4M48G7D
LTE BW = 4.48 MHz
G = Phase Modulation
7 = Quantized/Digital Info
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	-29.99	31.91	-10.08	1.24	V		0.115	20.60
779.5		16-QAM	-30.67	31.23	-10.08	1.24	V		0.098	19.92
		64-QAM	-31.87	30.03	-10.08	1.24	V		0.074	18.72
			QPSK	-30.10	32.01	-10.09	1.24	V		0.117
782.0	LTE B13 (5 MHz)	16-QAM	-30.81	31.30	-10.09	1.24	V	< 3.00	0.099	19.97
	(0 101 12)	64-QAM	-31.82	30.29	-10.09	1.24	V		0.079	18.96
		QPSK	-30.15	32.15	-10.10	1.24	V		0.121	20.81
784.5		16-QAM	-30.81	31.49	-10.10	1.24	V		0.104	20.15
		64-QAM	-31.88	30.42	-10.10	1.24	V		0.081	19.08

Freq	Mod	Modulation	Measured	Substitute	Ant.	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm) Gain(dBd)				w	W	dBm
	32.0 (10 MHz)	QPSK	-29.90	32.21	-10.09	1.24	V		0.122	20.88
782.0		16-QAM	-30.55	31.56	-10.09	1.24	V	< 3.00	0.105	20.23
		64-QAM	-31.70	30.41	-10.09	1.24	V		0.081	19.08



8.2 RADIATED SPURIOUS EMISSIONS

I MODE:	LTE B13
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
	1,559.0	-54.95	8.93	-62.70	1.79	V	-55.56	-13.00
23205 (779.5)	2,338.5	-55.67	9.83	-59.11	2.20	Н	-51.48	-13.00
(110.0)	3,118.0	-56.68	11.15	-57.93	2.60	V	-49.38	-13.00
	1,564.0	-54.83	8.99	-63.16	1.79	н	-55.96	-13.00
23230 (782.0)	2,346.0	-56.64	9.87	-59.99	2.21	V	-52.33	-13.00
(102.0)	3,128.0	-57.08	11.15	-58.25	2.59	V	-49.69	-13.00
	1,569.0	-54.36	9.05	-63.27	1.79	н	-56.01	-13.00
23255 (784.5)	2,353.5	-55.22	9.94	-58.60	2.23	Н	-50.89	-13.00
(104.0)	3,138.0	-57.07	11.18	-58.38	2.60	Н	-49.80	-13.00



I MODE:	LTE B13
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
	1,564.0	-55.05	8.99	-63.38	1.79	V	-56.18	-13.00
23230 (782.0)	2,346.0	-56.44	9.87	-59.79	2.21	V	-52.13	-13.00
(1.02.0)	3,128.0	-57.80	11.15	-58.97	2.59	Н	-50.41	-13.00



1559 MHz ~ 1610 MHz BAND

OPERATING FREQUENCY:	<u>779.5 MHz, 782.0 MHz, 784.5 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)
779.5	1606.78		-64.11	9.33	-74.02	1.82	Н	-66.51	16.51
782.0	1601.13	Narrow Band	-64.79	9.30	-74.51	1.82	Н	-67.03	17.03
784.5	1602.47		-64.00	9.30	-73.72	1.82	Н	-66.24	16.24

Note:

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

OPERATING FREQUENCY:	<u>782.0 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)		Substitute Level (dBm)	C.L	Pol	Result (dBm)	Margin (dB)
782.0	1602.12	Narrow Band	-64.28	9.30	-74.00	1.82	Н	-66.52	16.52

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	4.5025
	5 MHz	782.0	16-QAM	25	0	4.5061
40			64-QAM	25	0	4.4986
13	10 MHz		QPSK	50	0	8.9393
			16-QAM	50	0	8.9498
			64-QAM	50	0	8.9583

Note:

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

Band	Band Width (MHz)	Frequency (MHz)			Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
		779.5	3.7114	27.976	-67.545	-39.569	
12	5	782.0	3.7074	27.976	-67.207	-39.231	-13.00
13		784.5	3.7024	27.976	-67.323	-39.347	-13.00
	10	782.0	3.6940	27.976	-67.039	-39.063	

8.4 CONDUCTED SPURIOUS EMISSIONS

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 51 ~ 54.

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

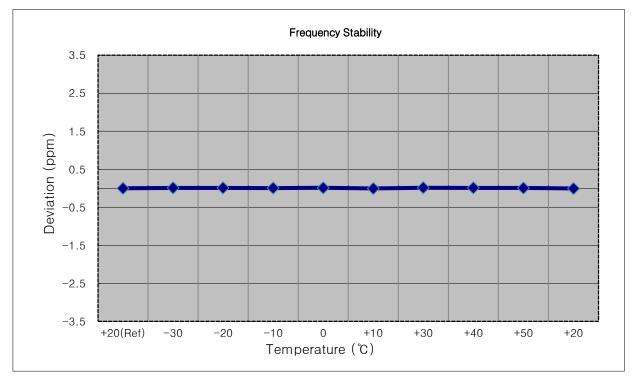
8.5 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 39 ~ 50.

8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

I MODE:	<u>LTE 13</u>
OPERATING FREQUENCY:	<u>779,500,000 Hz</u>
CHANNEL:	<u>23205 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.88 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

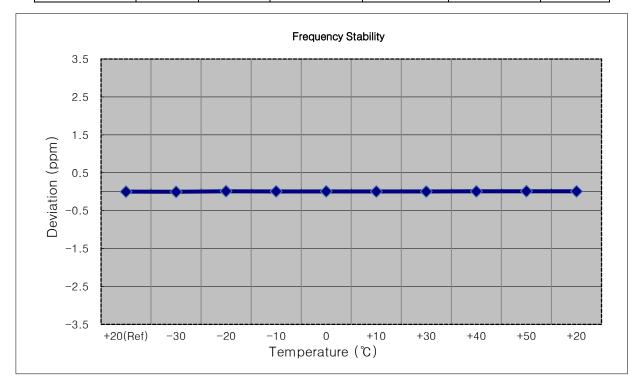
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	779 499 995	0.00	0.000 000	0.0000
100%		-30	779 500 003	7.80	0.000 001	0.0100
100%		-20	779 500 002	6.90	0.000 001	0.0089
100%		-10	779 499 998	3.70	0.000 000	0.0047
100%	3.880	0	779 500 004	9.60	0.000 001	0.0123
100%		+10	779 499 991	-3.70	0.000 000	-0.0047
100%		+30	779 500 005	10.40	0.000 001	0.0133
100%		+40	779 500 003	8.50	0.000 001	0.0109
100%		+50	779 500 001	5.90	0.000 001	0.0076
Batt. Endpoint	3.400	+20	779 499 992	-3.20	0.000 000	-0.0041





I MODE:	<u>LTE 13</u>
OPERATING FREQUENCY:	<u>782,000,000 Hz</u>
CHANNEL:	<u>23230 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.88 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	782 000 002	0.00	0.000 000	0.0000
100%		-30	782 000 000	-2.60	0.000 000	-0.0033
100%	3.880	-20	782 000 011	8.10	0.000 001	0.0104
100%		-10	782 000 008	5.10	0.000 001	0.0065
100%		0	782 000 008	5.50	0.000 001	0.0070
100%		+10	782 000 007	4.50	0.000 001	0.0058
100%		+30	782 000 005	3.00	0.000 000	0.0038
100%		+40	782 000 010	7.40	0.000 001	0.0095
100%		+50	782 000 011	8.60	0.000 001	0.0110
Batt. Endpoint	3.400	+20	782 000 009	6.30	0.000 001	0.0081

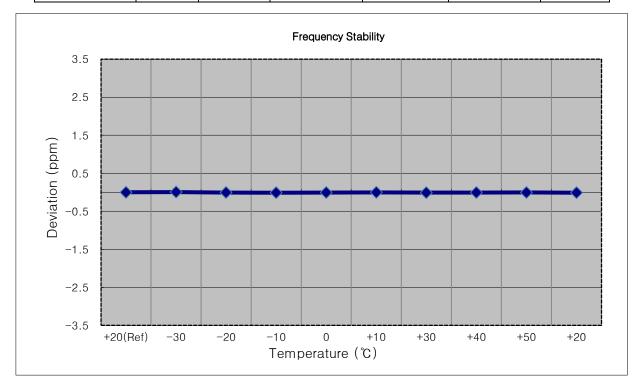




Report No.: HCT-RF-2006-FC022

I MODE:	LTE 13
OPERATING FREQUENCY:	<u>784,500,000 Hz</u>
CHANNEL:	<u>23255 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.88 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	784 499 993	0.00	0.000 000	0.0000
100%		-30	784 499 997	4.30	0.000 001	0.0055
100%		-20	784 499 988	-5.10	-0.000 001	-0.0065
100%		-10	784 499 985	-8.10	-0.000 001	-0.0103
100%	3.880	0	784 499 988	-4.90	-0.000 001	-0.0062
100%		+10	784 499 991	-2.30	0.000 000	-0.0029
100%		+30	784 499 986	-7.20	-0.000 001	-0.0092
100%		+40	784 499 988	-5.20	-0.000 001	-0.0066
100%		+50	784 499 989	-4.00	-0.000 001	-0.0051
Batt. Endpoint	3.400	+20	784 499 984	-9.00	-0.000 001	-0.0115

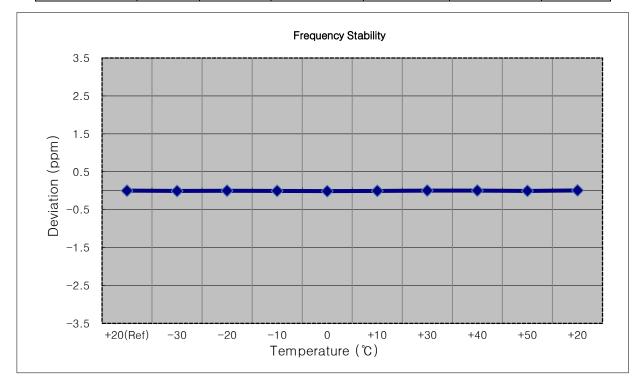




Report No.: HCT-RF-2006-FC022

MODE:	LTE 13
OPERATING FREQUENCY:	<u>782,000,000 Hz</u>
CHANNEL:	<u>23230 (10 MHz)</u>
REFERENCE VOLTAGE:	<u>3.88 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	781 999 994	0.00	0.000 000	0.0000
100%		-30	781 999 988	-6.20	-0.000 001	-0.0079
100%		-20	781 999 992	-1.60	0.000 000	-0.0020
100%		-10	781 999 989	-4.90	-0.000 001	-0.0063
100%	3.880	0	781 999 985	-9.00	-0.000 001	-0.0115
100%		+10	781 999 989	-5.10	-0.000 001	-0.0065
100%		+30	781 999 996	1.90	0.000 000	0.0024
100%		+40	781 999 996	2.50	0.000 000	0.0032
100%		+50	781 999 990	-4.00	-0.000 001	-0.0051
Batt. Endpoint	3.400	+20	781 999 999	5.40	0.000 001	0.0069





FCC ID: A3LSMA516V

9. TEST PLOTS



		ım Analyzer - Occu												
LXI RL	-	RF 50 Ω cq 782.000		17	C	SENSE		000 MHz	ALI	GN AUTO	10:04:06	PM May 08, 2020	Frequ	ency
PAS		9 702.000			T	rig: Free R Atten: 20 c	lun	Avg Ho	old: 50	0/500	Radio Dev			
			Ħ	IFGain:Lo	w #	Atten: 20 C					Radio De	VICE. D13		
10 dE	3/div	Ref Offset Ref 40.0												
Log 30.0													Cen	ter Freq
20.0 -														0000 MHz
10.0				mar	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m	ᠴᡘᢇᡗᢦᠬᢦᡗᠬᢇᠴ	-www.www	mr_n					
0.00			{							\				
-10.0			{							4				
-20.0			1											
-30.0	ᡗᠳ᠕᠕᠕᠕	m	man							μη	ᡝᡢᡢᢧᢧᠬ᠕	and the second s		
-40.0														
-50.0														
														CF Step
	ter 782											an 10 MHz		Man
#Res	S BW 1	00 kHz				#VBV	/ 390 k	HZ			SW	eep 1ms		
0	ccupi	ed Band	width			T	otal P	ower		31.	5 dBm		Fre	q Offset
4.5025 MHz												0 Hz		
Tr	Transmit Freq Error 20.746 kH					OBW Power			99.00 %					
x	dB Ba	ndwidth		4.94	42 MHz	z x dB			-26.00 dB					
MSG									[I STATI	JS			
-														

BAND 13. Occupied Bandwidth Plot (Ch.23230 QPSK RB 25) 5 MHz



🔰 Agilent Spectrum Analyzer - Occupied						
RL RF 50 Ω A0 Center Freq 782.00000 A0		SENSE:INT		IGN AUTO	10:03:52 PM May 08, 2020 Radio Std: None	Frequency
PASS	- -	Trig: Free Run #Atten: 20 dB	Avg Hold: 5		Radio Device: BTS	
	#IFGain:Low	#Atten: 20 dB		F	Radio Device: B13	
Ref Offset 26.8 10 dB/div Ref 40.00 d						
30.0						Center Freq
20.0						782.000000 MHz
10.0	mm	······	$\Lambda \mu m m$	~		
0.00	4					
	1					
-10.0				1		
-20.0					- 40	
-30.0 manana					Marman	
-40.0						
-50.0						0.5.01
						CF Step 1.000000 MHz
Center 782 MHz					Span 10 MHz	<u>Auto</u> Man
#Res BW 100 kHz		#VBW 390	kHz		Sweep 1 ms	
Occupied Bandwi	dth	Total F	Power	30.5 c	IBm	Freq Offset
	0 Hz					
	4.5061 MH					
Transmit Freq Error	Transmit Freq Error 11.082 kH			99.0	0 %	
x dB Bandwidth	4.910 MI	Hz x dB	x dB) dB	
MSG				STATUS		
				-00		

BAND 13. Occupied Bandwidth Plot (Ch.23230 16-QAM RB 25) 5 MHz



		m Analyzer - Occi	•									
LXI RI Cent	-	RF 50 Ω q 782.000		-17	Ce	SENSE:INT	2.000000 MH		IGN AUTO	10:58:24 F Radio Std	M May 11, 2020	Frequency
PAS		9702.000		#FGain:L		ig: Free Run Atten: 20 dB	Avg	Hold: 5	00/500	Radio Dev	vice: BTS	
		Ref Offset	26.0 40									
10 dE	3/div	Ref 40.0							•.			
Log 30.0												Center Free
20.0												782.000000 MH
10.0				who have	m		vvvv	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
0.00												
-10.0			X									
-20.0												
-30.0	w.pAr.	mon	mont						5	᠕᠕᠁᠕	1. Marine	
-40.0												
-50.0												
												CF Step 1.000000 MH
	ter 782 s BW 1	MHz 00 kHz				#VBW 39	0 kHz				n 10 MHz eep 1 ms	
0	ccupi	ed Band					I Power		29.6	dBm		Freq Offse 0 H
4.4986 MHz												
Tr	Transmit Freq Error 11.180 kHz					OBV	OBW Power 99		99	99.00 %		
x	dB Bai	ndwidth		4.9	59 MHz	x dE	x dB -26.0			00 dB		
MSG										;		

BAND 13. Occupied Bandwidth Plot (Ch.23230 64-QAM RB 25) 5 MHz



Agilent Spectrum Analyzer - Occupied BW					
Ω RL RF 50 Ω AC Center Freq 782.000000 M	Liz Cent	SENSE:INT er Freg: 782.000000 MHz	ALIGN AUTO	10:08:38 PM May 08, 2020 adio Std: None	Frequency
DACC	Ling:	Free Run Avg Ho en: 20 dB	ld: 500/500 F	adio Device: BTS	
Ref Offset 26.8 dB					
10 dB/div Ref 40.00 dBm					
Log 30.0					Center Freq
20.0					782.000000 MHz
10.0	Mary Mary Mary	whater have have a second	m		
0.00					
-10.0					
-20.0			Land Contraction of the second	alm montally and a start	
-30.0					
-40.0 monor hand					
-50.0					CF Step
Center 782 MHz				Span 20 MHz	2.000000 MHz <u>Auto</u> Man
#Res BW 200 kHz	:	#VBW 820 kHz		Sweep 1 ms	
Occupied Bandwidth		Total Power	31.5 d	Bm	Freq Offset
8.9	0 Hz				
			00.0	0.0/	
Transmit Freq Error	44.995 kHz	OBW Power	99.0		
x dB Bandwidth	9.744 MHz	x dB	-26.00	dB	
MSG			I STATUS		

BAND 13. Occupied Bandwidth Plot (Ch.23230 QPSK RB 50) 10 MHz



		Analyzer - Occ												- F	×
LXI RI		RF 50 Ω 782.000		1-7		Center	SENSE:INT	000000 N		IGN A	UTO	10:08:24 F	M May 08, 2020	Frequency	
PAS		102.000		IFGain:L	ow ow	Trig: F	ree Run : 20 dB		g Hold: {	500/5	00	Radio Dev			
		D.(07-1		il Guille										Í	
10 dE	3/div	Ref Offset Ref 40.0								_					
Log 30.0														Center F	rea
20.0														782.000000	- 1
10.0			ļ,		K allan	ᡁᢂᡃᠬᢦᢇᡀ᠆ᢑᠬ	man way w	๛๚๛๛๚๚	๛฿ ไก/ไปเร _{าสู่ไป}	w					
0.00			/												
-10.0			<u> </u>							ļ					
-20.0												MA .			
-30.0		л	A RANNI								"'YWY''	Mutanoph	and the straight of the		
-40.0		مر مر													
-50.0	hund on the second s	berthen work												CF S	ten
												0		2.000000	ин́z
	ter 782 s BW 20					#	VBW 82	0 kHz				Swe	in 20 MHz eep 1 ms	<u>Auto</u> I	Man
0	ccunie	d Band	width				Tota	Powe	r		30.4	dBm		Freq Off	set
	coupie	a Bana		498	MН	7								- c) Hz
		Freq Er	ror		770 kl			Powe	r			.00 %			
X	dB Ban	dwidth		9.7	83 MI	Ηz	x dB				-26.()0 dB			
MSG										10s	STATUS				

BAND 13. Occupied Bandwidth Plot (Ch.23230 16-QAM RB 50) 10 MHz



		ım Analyzer - Oc											
LXI RL		RF 50 g 782.00		L 17			SENSE:INT	000000 MH		IGN AUTO	10:59:42 Radio Sto	PM May 11, 2020	Frequency
PAS		q 702.00		#IFGain:L	.ow	Trig: F	ree Run : 20 dB			00/500	Radio De		
10 dB	3/div		et 26.8 dB 00 dBm										
Log 30.0 -													Center Freq
20.0													782.000000 MHz
10.0				norhow	Jan-Armandalan	rafe/verv	when the second		لوره مراسها موريه	<u>~</u>			
0.00													
-10.0										+			
-20.0													
-30.0 -			Mount							MAN A	www.www.www	ᢣᠡ᠋ᡧᢦᡘ᠆ᡗᢧᡁᢦᠲᢩᡘᡀ	
-40.0	n 1.	<u>^</u>											
-50.0	᠕ᡎᠬᡟ ^ᡅ ᠘ᡒ᠕ᠰ												CF Step
													2.000000 MHz
	ter 782 8 BW 2	2 MHZ 200 kHz				#\	VBW 82	0 kHz				an 20 MHz eep 1 ms	
0	ccupi	ed Ban	dwidth				Total	Power		29.	3 dBm		Freq Offset
	ccupi				MH	Z							0 Hz
Tr	ansmi	it Freq Eı			989 kl		OBW	Power		9	9.00 %		
		ndwidth			78 MI		x dB				.00 dB		
		hawhaun		5.1	TO MI	12	X UD			-20			
MSG											10		
MSG	_									STAT	15		

BAND 13. Occupied Bandwidth Plot (Ch.23230 64-QAM RB 50) 10 MHz



	ectrum Analyzer - Swept SA						
(X) RL	RF 50 Ω AC req 776.000000	MHZ	SENSE:INT	#Avg Typ	ALIGN AUTO e: RMS	10:02:58 PM May 08, 202 TRACE 1 2 3 4 5	
Center I		PNO: Wide +++ Irig:	Free Run n: 20 dB				Ă
10 dB/div Log	Ref Offset 26.8 dB Ref 26.80 dBm				Mk	r1 776.000 MH -53.308 dBn	Auto Tune
16.8							Center Freq 776.000000 MHz
6.80 -3.20							Start Freq 772.000000 MHz
-13.2						-13.00 dB	Stop Freq 780.000000 MHz
-33.2				/	- Landard Contraction of the second s		CF Step 800.000 kHz <u>Auto</u> Man
-43.2			1,000			RIV	Freq Offset 0 Hz
-63.2							
Center 77 #Res BW	76.000 MHz ' 100 kHz	#VBW 300 k	Hz		#Sweep	Span 8.000 MH 1.000 s (1001 pts	2
MSG							

Band 13 Lower Band Edge Plot (5M BW Ch.23205 QPSK_RB1 OFFSET_0)



鯅 Agi LXI RI			er - Swept S									_	
		_R ⊧ eq 770		AC	Z		ISE:INT	#Avg Typ	ALIGN AUTO	TRAC	M May 08, 2020	Fr	equency
				P	NO: Wide 🔸	Trig: Free #Atten: 2				TYF			
		Ref Off	set 26.8		Gameon				Mk	r1 776.0	00 MHz 50 dBm		Auto Tune
10 dE Log	3/div		6.80 dE							-37.4	50 dBm		
3												c	enter Freq
16.8	_												.000000 MHz
0.00											RMS		
6.80													Start Freq
-3.20												772	.000000 MHz
-13.2											-13.00 dBm		Stop Freq
-23.2												780	.000000 MHz
-23.2													
-33.2							1						CF Step 800.000 kHz
												<u>Auto</u>	Man
-43.2													
-53.2						and the second se						F	Freq Offset
0000				and and a second se	and the second								0 Hz
-63.2													
		6.000 N								Span 8	.000 MHz 1001 pts)		
#Re	s BW	100 kH	z		#VBW	300 kHz					1001 pts)		
MSG									I STATUS	6			

Band 13 Lower Band Edge Plot (5M BW Ch.23205 QPSK_RB_25)



				rum Analyzer - Swept SA	
Frequency	10:02:34 PM May 08, 2020 TRACE 1 2 3 4 5 6	ALIGN AUTO #Avg Type: RMS	SENSE:INT		
		#Avg Type. Kin3	Trig: Free Run #Atten: 20 dB	eq 769.000000 MHz PNO: Wide ↔ IFGain:Low	Center Fred
Auto Tune	1 774.976 MHz -63.147 dBm	Mki		Ref Offset 26.8 dB Ref -10.00 dBm	Re 10 dB/div Ro Log
Center Freq 769.000000 MHz					-20.0
Start Freq 763.000000 MHz	-35.00 dBm				-40.0
Stop Freq 775.000000 MHz	1				-50.0
CF Step 1.200000 MHz <u>Auto</u> Man	an production of the second south of the	ารกระสถารูปหลือไปเหตุการแปรงหลุมการใหญ่และ	njenjerostove planet okonom (njednostva	ระอะแก่งแก่งไม่สาระที่เหตุใหญ่ให้เห็นการเกิดที่สุดที่ได้สุดที่ได้สารที่สุดที่ได้	-70.0
Freq Offset 0 Hz					-90.0
	Stop 775.000 MHz				-100 Start 763.000
	1.000 s (1001 pts)	#Sweep	30 kHz	10 kHz #VBW 3	#Res BW 10

Band 13 Lower Emission Mask (763 MHz ~ 775 MHz) Plot (5M BW Ch.23205 QPSK_RB25_0)



	Analyzer - Swept SA							
	RF 50 Ω AC 776.000000 N	1Hz	SENSE:INT	#Avg Typ	ALIGN AUTO e: RMS		May 08, 2020	Frequency
Center med	770.000000	PNO: Wide ++++	Trig: Free Run #Atten: 20 dB			TYP		
		IFGain:Low	#Atten: 20 dB		Mk		68 MHz	Auto Tune
10 dB/div R	ef Offset 26.8 dB ef 26.80 dBm					-54.7	11 dBm	
16.8					\mathbb{N}			Center Freq
10.0								776.000000 MHz
6.80								
								Start Freq
-3.20								772.000000 MHz
-13.2					<u> </u>		-13.00 dBm	Stop Freq
-23.2								780.000000 MHz
-23.2								
-33.2								CF Step
-43.2								800.000 kHz <u>Auto</u> Man
-43.2				part of the second s		- No and a second	RMS	
-53.2			¹				Num	Freq Offset
· · · · · · · · · · · · · · · · · · ·	· ····································		and a star and a star and a star a					0 Hz
-63.2								
Center 776.0	00 MHz					Snan 8	000 MHz	
#Res BW 10		#VBW 3	00 kHz		#Sweep	1.000 <u>s (</u>	.000 MHz 1001 pts)	
MSG								

Band 13 Lower Band Edge Plot (10M BW Ch.23230 QPSK_RB1 OFFSET_0)



🎉 Agilent Spee	ctrum Analyzer - Swept SA						
(X) RL	RF 50 Ω AC		SENSE:INT	A #Avg Type	LIGN AUTO	10:07:16 PM May 08, 20 TRACE 1 2 3 4 5	
	req 776.000000	PNO: Wide +++ Irig:	Free Run en: 20 dB	#Avg Type			
10 dB/div Log	Ref Offset 26.8 dB Ref 26.80 dBm				Mki	1 775.968 MH -42.372 dBr	z Auto Tune n
16.8							Center Freq 776.000000 MHz
-3.20						Ri	Start Freq 772.000000 MHz
-13.2						-13.00 dE	Stop Freq 780.000000 MHz
-33.2			↓ ¹				CF Step 800.000 kHz <u>Auto</u> Man
-43.2							Freq Offset 0 Hz
-63.2							
Center 77 #Res BW	'6.000 MHz 100 kHz	#VBW 300	kHz	;	#Sweep	Span 8.000 MH 1.000 s (1001 pts	z 5)
MSG							

BAND 13. Lower & Upper Band Edge Plot (10M BW Ch.23230 QPSK RB_50)



					ilent Spectrum Analyzer - Swept SA	
Frequency	10:07:35 PM May 08, 2020 TRACE 1 2 3 4 5 6	ALIGN AUTO #Avg Type: RMS	SENSE:INT		L RF 50 Ω AC ter Freq 769.000000	LXI RL
A	TYPE A WWWWW DET A A A A A A		Trig: Free Run #Atten: 20 dB	PNO: Wide ↔→ IFGain:Low		Cent
Auto Tune	1 774.004 MHz -64.410 dBm	Mki			Ref Offset 26.8 dB B/div Ref -10.00 dBn	10 dB Log r
Center Freq 769.000000 MHz						-20.0
Start Freq	-35.00 dBm					-30.0 -
763.000000 MHz						-40.0
Stop Freq 775.000000 MHz						-50.0 -
	RMS			and by the boards are stored as to all		-60.0 -
CF Step 1.200000 MHz <u>Auto</u> Man				analoh ya heyo ya na		-70.0
Freq Offset 0 Hz						-90.0
						-100 -
	Stop 775.000 MHz 1.000 s (1001 pts)	#Sweep	80 kHz	#VBW :	t 763.000 MHz s BW 10 kHz	
						MSG

Band 13 Lower Emission Mask (763 MHz ~ 775 MHz) Plot (10M BW Ch.23230 QPSK_RB50_0)



	trum Analyzer - Swep										- 6 💌
LXI RL	RF 50 Ω			SEI	NSE:INT	#Avg Typ	ALIGN AUTO		May 08, 2020	Fre	equency
Center F	req 788.000	F	Z PNO: Wide ↔ Gain:Low	Trig: Free #Atten: 2		#Avg Typ		TYP DE			
10 dB/div Log	Ref Offset 26 Ref 26.80 d	8 dB IBm					Mk	r1 788.0 -51.6	08 MHz 43 dBm		Auto Tune
16.8											enter Freq .000000 MHz
-3.20										784	Start Freq .000000 MHz
-13.2									-13.00 dBm	792	Stop Freq .000000 MHz
-33.2		and the second s								<u>Auto</u>	CF Step 800.000 kHz Man
-53.2				and the second	1	Therefore, and the state of the	a		RMS	F	F req Offset 0 Hz
-63.2	8.000 MHz							Span 8	.000 MHz		
#Res BW			#VBW	300 kHz				1.000 s (1001 pts)		
MSG											

Band 13 Upper Band Edge Plot (5M BW Ch.23255 QPSK_RB1_Offset 24)



	ctrum Analyzer - Swept SA					
Center E	RF 50 Ω AC req 788.000000 M	MHz	SENSE:INT	ALIGN AUTO	D 10:05:19 PM May 08, 2020 TRACE 1 2 3 4 5 6	Frequency
Contor I		PNO: Wide ++++	Trig: Free Run #Atten: 20 dB			
		IFGain:Low	#Atten: 20 dB			Auto Tune
	Ref Offset 26.8 dB			IVI	kr1 788.296 MHz -34.040 dBm	
10 dB/div Log	Ref 26.80 dBm				-34.040 UBIII	
						Center Freq
16.8						788.000000 MHz
6.80	· · · · · · · · · · · · · · · · · · ·					
						Start Freq
-3.20						784.000000 MHz
-13.2					-13.00 dBm	Stop Freq
						792.000000 MHz
-23.2						
			1			CE Oton
-33.2		\\\\\			RMS	CF Step 800.000 kHz
						<u>Auto</u> Man
-43.2						
						Freq Offset
-53.2						0 Hz
-63.2						
Center 78	38.000 MHz				Span 8.000 MHz	
#Res BW		#VBW	300 kHz	#Swee	Span 8.000 MHz p 1.000 s (1001 pts)	
MSG				to sta	rus	

Band 13 Upper Band Edge Plot (5M BW Ch.23255 QPSK_RB_25)



		rum Analyzer - 3	•									×
LXI RL		RF 5 eq 799.0	0 Ω AC		SEI	NSE:INT	#Avg Typ	ALIGN AUTO		May 08, 2020	Frequency	
Cen		eq 799.0	00000	PNO: Wide ↔→→ IFGain:Low	Trig: Free #Atten: 2		#/(1 81)p		TYP DE			
10 dB Log r	3/div	Ref Offset Ref -10.0	26.8 dB 00 dBm					Mki	1 793.5 -57.74	28 MHz 44 dBm	Auto Tu	ne
-20.0 -											Center Fr 799.000000 M	- 1
-30.0 - -40.0 -										-35.00 dBm	Start Fr 793.000000 M	
-50.0	1 1 1 1 1	Weter Streets									Stop Fr 805.000000 M	
-70.0 -		Windson	Martin Martin	gerfally hereine for sold for the	frá glinna sa lindigana	portugionalista	กรณ์สูงมุ่งกับจะหูรัสจะรู้ได้	ֈ՟ ^՟ֈֈ՟ֈ֎ֈֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈՠֈ	ปุ่ม งอาจจะเคริญ ญาร	RMS กฎษณฑษาณช่งเพโา	CF St 1.200000 M <u>Auto</u> M	
-90.0											Freq Offs 0	set Hz
		DOO MHz							Stop 805.	000 MHz		
	s BW 1	10 kHz		#VBW	30 kHz			#Sweep	1.000 s (1001 pts)		
MSG	_											

Band 13 Upper Emission Mask (793 MHz ~805 MHz) Plot (5M BW Ch.23255 QPSK_RB25_0)



	trum Analyzer - Swept S	A				
Center F	RF 50 Ω req 788.0000		SENSE:INT	ALIGN AUTO #Avg Type: RMS	10:10:21 PM May 08, 2020 TRACE 1 2 3 4 5 6	Frequency
Center	req 700.0000	PNO: Wide ↔ IFGain:Low	. Trig: Free Run #Atten: 20 dB			Auto Tomo
10 dB/div Log	Ref Offset 26.8 Ref 26.80 dB	dB Sm		Mk	r1 788.000 MHz -52.704 dBm	Auto Tune
16.8						Center Freq 788.000000 MHz
-3.20						Start Freq 784.000000 MHz
-13.2					-13.00 dBm	Stop Freq 792.000000 MHz
-33.2						CF Step 800.000 kHz <u>Auto</u> Man
-53.2			1	and the second definition of the product of the second definition of th	RMS	Freq Offset 0 Hz
-63.2	8.000 MHz				Span 8.000 MHz	
#Res BW		#VBW	300 kHz	-	1.000 s (1001 pts)	
MSG					3	

Band 13 Upper Band Edge Plot (10M BW Ch.23230 QPSK_RB1_Offset_49)



	ctrum Analyzer - Swept SA					
Center F	RF 50 Ω AC	MHz	SENSE:INT	ALIGN AUTO #Avg Type: RMS	10:09:35 PM May 08, 2020 TRACE 1 2 3 4 5 6	Frequency
Conton		PNO: Wide ↔↔ IFGain:Low	Trig: Free Run #Atten: 20 dB	-		
	Ref Offset 26.8 dB	II Guilleon		Mk	r1 788.048 MHz	Auto Tune
10 dB/div	Ref 26.80 dBm				-34.517 dBm	
						Center Freq
16.8						788.000000 MHz
6.80						Start Freq
-3.20						784.000000 MHz
-3.20						
-13.2					-13.00 dBm	Stop Freq
						792.000000 MHz
-23.2						
-33.2		- And	<u> </u> 1			CF Step
-33.2			and the second s		RMS	800.000 kHz Auto Man
-43.2						<u>Auto</u> mari
						Freq Offset
-53.2						0 Hz
-63.2						
00.2						
Contor 7	38.000 MHz				Span 8 000 MHz	
#Res BW		#VBW	300 kHz	#Sweep	Span 8.000 MHz 1.000 s (1001 pts)	
MSG						

Band 13 Upper Band Edge Plot (10M BW Ch.23230 QPSK_ QPSK_RB_50)



	ctrum Analyzer - Swej										×
LXI RL	RF 50 Ω req 799.000			SEI	NSE:INT	#Avg Typ	ALIGN AUTO		May 08, 2020	Frequency	
	req 799.000		PNO: Wide ++- FGain:Low	Trig: Free #Atten: 2		#1181JP		TYPE DET	A WWWWW A A A A A A A		
10 dB/div Log	Ref Offset 26 Ref -10.00	.8 dB dBm					Mk	r1 793.09 -51.14	96 MHz I4 dBm	Auto Tu	Ine
-20.0										Center Fi 799.000000 N	- 1
-30.0									-35.00 dBm	Start Fi 793.000000 N	
-50.0	wyerlangers and produced	•								Stop Fr 805.000000 N	
-70.0		want marting and	Fp4-6-19(00-96-16-16)	กะสารไฟเราะสมให้เรา	4.4.444¥\$\$\$\$\$\$\$\$\$	in some of the constant of the second	ەمەلىر <u>ە</u> مەر يەلىرى	a for a survey of a for for for for the for	RMS հերծողություն	CF St 1.20000 M <u>Auto</u> M	
-90.0										Freq Off 0	f set DHz
-100 Start 793.								Stop 805.0	000 MHz		
#Res BW	10 kHz		#VBW	30 kHz			#Sweep	1.000 s (1	001 pts)		

Band 13 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23230 QPSK_RB50_0)



🎉 Agilent Spect		er - Swept SA								
Center Fr	RF ea 5.0	50 Ω AC	0 GHz	5	SENSE:INT	#Avç	ALIGN AUTO Type: RMS	TRA	PM May 08, 2020 CE <mark>1 2 3 4 5</mark> 6	Frequency
			PNO: Fast IFGain:Lov		ree Run 20 dB			TY C		
			in Guilleon				M	lkr1 3.71	1 4 GHz	Auto Tune
10 dB/div	Ref 10).00 dBm						-67.5	45 dBm	
Log 0.00										Center Freq
-10.0	Y									5.015000000 GHz
-20.0										
-30.0										Start Freq
-40.0										30.000000 MHz
-50.0										
-60.0				▲1						Stop Freq
-70.0									RMS	10.000000000 GHz
-80.0										
Start 30 N	1Hz							Stop 10).000 GHz	CF Step
#Res BW	1.0 MH:	Z	#V	BW 3.0 MH	z		Sweep 1	7.33 ms (2	20001 pts)	997.000000 MHz
MKR MODE TR	C SCL	Х		Y		NCTION	FUNCTION WIDT	H FUNCT	ION VALUE	Auto Man
1 N 1 2 N 1	f		3.711 4 GHz 777.8 MHz	<u>-67.545</u> -4.111	dBm dBm					Freq Offset
3 4										0 Hz
5 6									=	
7										
9										
11									-	
MSG							I STAT	US		
	_									

BAND 13. Conducted Spurious Plot (23205ch_5MHz_QPSK_RB 1_0)



	trum Analyzer - Sv	•								
Center Fr	RF 50		CH2	SEN	SE:INT	#Avg Typ	ALIGN AUTO	10:04:27 P TRAC	M May 08, 2020	Frequency
Center II	eq 5.0150	000000	PNO: Fast 🕂	Trig: Free				TYF		
			IFGain:Low	#Atten: 20	dB					Auto Tune
							Mk	r1 3.707	74GHz 07dBm	riato rano
10 dB/div Log	Ref 10.00) dBm					1	-07.20	or abm	
0.00										Center Freq
-10.0										5.015000000 GHz
-20.0										
-30.0										
-40.0										Start Freq
										30.000000 MHz
-50.0			. 1							
-60.0			• '						RMS	Stop Freq
-70.0			A CONTRACTOR OF A CONTRACTOR OF A CONTRACTOR OF A CONTRACTOR OF A CONTRACTOR A CO							10.00000000 GHz
-80.0										
Start 30 N	1Hz							Stop 10	.000 GHz	CF Step
#Res BW			#VBV	N 3.0 MHz		S	weep 17	.33 ms (2	0001 pts)	997.000000 MHz
MKR MODE TR	C SCL	Х		Y	FUNCT	TION FUI	ICTION WIDTH	FUNCTIO	ON VALUE	<u>Auto</u> Man
1 N 1	f	3.7	707 4 GHz	-67.207 dB	m					
2 N 1 3		/	780.2 MHz	-3.788 dB	m					Freq Offset
4 5										0 Hz
6										
8										
9										
11										
•				III					► E	
MSG										

BAND 13. Conducted Spurious Plot (23230ch_5MHz_QPSK_RB 1_0)



	ctrum Analy	zer - Swept SA	4								
LXI RL	RF			1	SE	NSE:INT	#4.ve T	ALIGN AUTO		M May 08, 2020 E <mark>1 2 3 4 5</mark> 6	Frequency
Center F	req 5.u	J150000	000 GF	iZ NO:Fast ∺	Trig: Fre	e Run	#Avg i)	pe. RM3	TY		
				Gain:Low	#Atten: 2	0 dB			Di		
								Mk	(r1 3.70)	2 4 GHz	Auto Tune
10 dB/div Log		0.00 dB	m		_				-67.3	23 dBm	
0.00	<mark>2</mark>										Center Freq
	Y										5.015000000 GHz
-10.0											5.015000000 GHZ
-20.0											
-30.0											Start Freq
-40.0											30.000000 MHz
-50.0											00.000000 11112
-60.0				1							
										RMS	Stop Freq
-70.0	-										10.00000000 GHz
-80.0											
Start 30 M									Oton 40		0.5.04
#Res BW		17		#\/B)	N 3.0 MHz			Sweep 17	33 me (2	.000 GHz	CF Step 997.000000 MHz
		12		#VD1							Auto Man
MKR MODE TR			X 2 702	4 GHz	Y -67.323 d		CTION F	UNCTION WIDTH	FUNCTI	ON VALUE	
2 N			787	2 MHz	-3.287 d	Bm					
3											Freq Offset
4 5										=	0 Hz
6											
7 8											
9											
10											
•					III					•	
MSG									5		

BAND 13. Conducted Spurious Plot (23255ch_5MHz_QPSK_ RB 1_0)



	trum Analyzer -	- Swept SA								
<mark>⋈</mark> ℝ∟ Center Fi		50 Ω AC	GHz		SENSE:INT	#Avg	ALIGN AUTO J Type: RMS	TRAC	M May 08, 2020 E 1 2 3 4 5 6	Frequency
			PNO: Fast IFGain:Low	#Atten	ree Run : 20 dB			Di		
10 dB/div	Ref 10.0	00 dBm					Mk		4 0 GHz 39 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					-				RMS	Stop Freq 10.000000000 GHz
Start 30 N #Res BW	1.0 MHz		#VI	3W 3.0 MI	lz		Sweep 17	.33 ms (2		CF Step 997.000000 MHz Auto Man
MKR MODE TF 1 N 1 2 N 1 3 4 5 6	IC SCL	× 3.	694 0 GHz 778.2 MHz	Ƴ -67.039 -3.456	dBm	NCTION	FUNCTION WIDTH	FUNCTI	ON VALUE	Freq Offset 0 Hz
6 7 8 9 10 11										
MSG								5		

BAND 13. Conducted Spurious Plot (Ch.23230 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-2006-FC022-P