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# **FCC LTE REPORT**

# Certification

#### **Applicant Name:** Date of Issue: SAMSUNG Electronics Co., Ltd. July 13, 2023 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-2307-FC005 FCC ID:

# A3LSMX616B

# **APPLICANT:**

# SAMSUNG Electronics Co., Ltd.

Model(s):	SM-X616B
EUT Type:	Tablet
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§27, §2

Mode		Emission		ERP	
(MHz)	Tx Frequency (MHz)	Designator	Modulation	Max. Power (W)	Max. Power (dBm)
		4M54G7D	QPSK	0.114	20.56
	770 5 704 5	4M53W7D	16QAM	0.095	19.80
LTE – Band13 (5)	779.5 –784.5	4M52W7D		0.074	18.68
		4M53W7D		15.62	
LTE – Band13 (10) 782.0	9M03G7D	QPSK	0.113	20.54	
	700.0	9M01W7D	101W7D 16QAM 0.094	0.094	19.73
	782.0	9M05W7D	64QAM	0.073	18.62
		9M01W7D	256QAM	0.036	15.62

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)

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



# <u>Version</u>

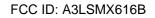
TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2307-FC005	July 13, 2023	- First Approval Report

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:	A3LSMX616B
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	§27, §2
EUT Type:	Tablet
Model(s):	SM-X616B
Tx Frequency:	779.5 MHz –784.5 MHz (LTE – Band 13 (5 MHz))
	782 MHz (LTE – Band 13 (10 MHz))
Date(s) of Tests:	May 08, 2023 ~ June 14, 2023
Serial number:	Radiated: R32W3008GSN
	Conducted: R32W3007ZEN

# 2. INTRODUCTION

### 2.1. DESCRIPTION OF EUT

The EUT was a Tablet with GSM/GPRS/EGPRS/UMTS and LTE, Sub6. It also supports IEEE 802.11 a/b/g/n/ac (20/40/80 MHz), Bluetooth, BT LE.

### 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 1 MHz
- 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 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The power is calculated by the following formula;

 $P_{d}$  (dBm) = Pg (dBm) - cable loss (dB) + antenna gain (dB)

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

- 3. The maximum value is calculated by adding the forward power to the calibrated source plus its appropriate gain value. These steps are repeated with the receiving antenna in both vertical and horizontal polarization. the difference between the gain of the horn and an isotropic antenna are taken into consideration
- 4. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- 5. All measurements are performed as RMS average measurements while the EUT is operating at its maximum duty cycle, at maximum power, and at the appropriate frequencies.

### **3.3 RADIATED SPURIOUS EMISSIONS**

#### **Test Overview**

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

### Test Settings

- 1. RBW = 100 kHz for emissions below 1 GHz and 1 MHz for emissions above 1 GHz
- 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

- 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.
- 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 1 GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The spurious emissions is calculated by the following formula;

Result (dBm) = Pg (dBm) - cable loss (dB) + antenna gain (dBi)

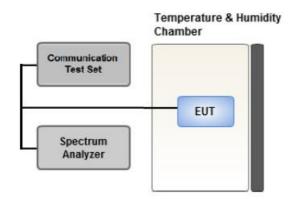
Where:  $P_g$  is the generator output power into the substitution antenna.

If the fundamental frequency is below 1 GHz, 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.

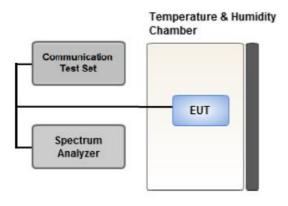
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

#### **Test Settings**

- 1. The signal analyzer's automatic bandwidth measurement capability was used to perform the 99 % occupied bandwidth and the 26 dB 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**

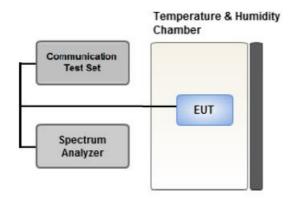
The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured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

Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater.

However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

Also all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment.

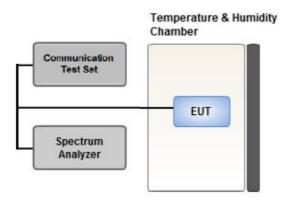
All measurements were done at 2 channels(low and high operational frequency range.)

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

Where Margin < 1 dB the emission level is either corrected by 10 log(1 MHz/ RB) or the emission is integrated over a 1 MHz bandwidth to determine the final result. When using the integration method the integration window is either centered on the emission or, for emissions at the band edge, centered by an offset of 500 kHz from the block edge so that the integration window is the 1 MHz adjacent to the block edge.



### 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

- 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.

Mode : Stand alone, Stand alone + External accessories (Earphone, AC adapter, etc)

Worst case : Stand alone

- We were performed the RSE test in condition of co-location.

Mode : Stand alone, Simultaneous transmission scenarios

Worst case : Stand alone

- 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.

[Worst case]

Test Description	Modulation	RB size	RB offset	Axis
	QPSK,	1	0	х
Effective Redicted Rewar	16QAM,			
Effective Radiated Power	64QAM,			
	256QAM			
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Y



# 3.9 WORST CASE(CONDUCTED TEST)

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

[ Worst case ]						
Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset	
Occupied Bandwidth	QPSK, 16QAM, 64QAM, 256QAM	5, 10	Mid	Full RB	0	
	QPSK	5	Low	1	0	
			High	1	24	
Rand Edge			Low	1	0	
Band Edge			High	1	49	
		5 40	Low,	Full RB	0	
		5, 10			0	
Spurious and Harmonic Emissions at			Low,			
Antenna Terminal	QPSK	5, 10	Mid,	1	0	
			High			

[Worst case]



# 4. LIST OF TEST EQUIPMENT

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
RF Switching System	FBSR-02B(1.2G HPF+LNA)	T&M SYSTEM	F1L1	01/19/2024	Annual
RF Switching System	FBSR-02B(3.3G HPF+LNA)	T&M SYSTEM	F1L2	01/19/2024	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	5001	04/19/2024	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/23/2024	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	03/09/2025	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	03/09/2025	Biennial
Chamber	SU-642	ESPEC	93008124	02/22/2024	Annual
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	147	08/30/2023	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	09/29/2024	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	03/28/2025	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	04/20/2024	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	04/19/2024	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	08/29/2023	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2023	Annual
Loop Antenna(9 kHz ~ 30 MHz)	FMZB1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	895	08/16/2024	Biennial
Trilog Broadband Antenna	VULB9168	Schwarzbeck	1135	03/21/2024	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262094331	12/01/2023	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6201026545	01/05/2024	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	06/22/2024	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	05/30/2023	Annual
FCC LTE Mobile Conducted RF Automation Test Software	-	HCT CO., LTD.,	-	-	-

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)	1.90 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.14 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.16 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.57 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.76 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (Above 40 GHz)	5.52 (Confidence level about 95 %, <i>k</i> =2)



# 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 Note2)</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
- 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	§27.50(b)(10)	< 3 Watts max. ERP	PASS	
Radiated Spurious and Harmonic	§2.1053,	< 43 + 10log10 (P[Watts]) for	PASS	
Emissions	§27.53(c)	all out-of band emissions		
Undesirable Emissions in	< -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	Measured Substitute		C.L	Pol.	EF	RP
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBd)	U.L	P01.	w	dBm
128	824.20	-21.37	38.40	-10.61	0.95	Н	0.483	26.84

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

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

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

3) Record the field strength meter's level.

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

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

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

### 7.2 EIRP Sample Calculation

Ch	./ Freq.	Measured	asured Substitute Ant. G		<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	Madulation	Measured	Substitute	Ant.		Del	Limit	EF	RP
(MHz)	(Bandwidth)	Modulation	Level (dBm)	Level (dBm)	Gain(dBd)	C.L	Pol	w	W	dBm
		QPSK	-27.67	31.79	-9.86	1.37	Н		0.114	20.56
779.5		16-QAM	-28.43	31.03	-9.86	1.37	Н		0.095	19.80
779.5		64-QAM	-29.55	29.91	-9.86	1.37	Н		0.074	18.68
		256-QAM	-32.61	26.85	-9.86	1.37	Н		0.036	15.62
		QPSK	-27.88	31.54	-9.87	1.37	Н		0.107	20.30
782.0	LTE B13	16-QAM	-28.60	30.82	-9.87	1.37	Н	< 3.00	0.091	19.58
782.0	(5 MHz)	64-QAM	-29.78	29.64	-9.87	1.37	Н	< 3.00	0.069	18.40
		256-QAM	-32.75	26.67	-9.87	1.37	Н		0.035	15.43
		QPSK	-28.02	31.56	-9.88	1.38	Н		0.107	20.30
704 5		16-QAM	-28.73	30.85	-9.88	1.38	Н		0.091	19.59
784.5		64-QAM	-29.86	29.72	-9.88	1.38	Н		0.070	18.46
		256-QAM	-32.78	26.80	-9.88	1.38	Н		0.036	15.54

Freq	Modulation		Measured	Substitute	Ant.	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm)	Gain(dBd)			w	w	dBm
		QPSK	-27.64	31.78	-9.87	1.37	Н		0.113	20.54
700.0	LTE B13	16-QAM	-28.45	30.97	-9.87	1.37	Н	0.00	0.094	19.73
782.0	(10 MHz)	64-QAM	-29.56	29.86	-9.87	1.37	Н	< 3.00	0.073	18.62
		256-QAM	-32.56	26.86	-9.87	1.37	Н		0.036	15.62



# **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	-54.48	8.88	-62.02	1.96	V	-55.10	-40.00
23205 (779.5)	2 338.5	-55.90	9.96	-58.89	2.47	Н	-51.40	-13.00
(	3 118.0	-57.23	11.24	-57.24	2.84	V	-48.84	-13.00
	1 564.0	-53.67	8.92	-61.45	1.98	Н	-54.51	-40.00
23230 (782.0)	2 346.0	-55.64	10.03	-58.46	2.49	V	-50.93	-13.00
(102.0)	3 128.0	-57.56	11.26	-57.99	2.86	V	-49.59	-13.00
	1 569.0	-53.94	8.96	-61.97	1.99	Н	-55.00	-40.00
23255 (784.5)	2 353.5	-55.86	10.10	-58.52	2.51	V	-50.93	-13.00
(10110)	3 138.0	-57.61	11.28	-57.76	2.89	Н	-49.37	-13.00



I MODE:	<u>LTE B13</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
	1 564.0	-55.24	8.92	-63.02	1.98	V	-56.08	-40.00
23230 (782.0)	2 346.0	-56.23	10.03	-59.05	2.49	Н	-51.52	-13.00
(102.0)	3 128.0	-57.23	11.26	-57.66	2.86	Н	-49.26	-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>-70 dBW/ MHz (= -40 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	1 575.0		-51.24	9.00	-59.60	2.00	V	-52.60	12.60
782.0	1 608.0	Wide Band	-51.77	9.30	-61.96	1.97	V	-54.63	14.63
784.5	1 605.7		-51.20	9.25	-61.29	1.99	V	-54.03	14.03

### Note:

Since the bandwidth of that Spurious emission is greater than 700 Hz, we applied -70 dBW/MHz according to §27.53(f).

OPERATING FREQUENCY:	<u>782.0 MHz</u>
MEASURED OUTPUT POWER:	<u>10 MHz QPSK</u>
DISTANCE:	<u>3 meters</u>
WIDEBAND EMISSION LIMIT:	<u>-70 dBW/ 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)
782.0	1 606.7	Wide Band	-51.32	9.25	-61.42	1.99	Н	-54.15	14.15

-40 dBm/ MHz)

Note:

Since the bandwidth of that Spurious emission is greater than 700 Hz, we applied -70 dBW/MHz according to §27.53(f).



# 8.3 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data ( MHz )
			QPSK	25	0	4.5423
	5 MHz		16-QAM	25	0	4.5314
	5 MILZ		64-QAM	25	0	4.5194
13		700.0	256-QAM	25	0	4.5311
13		782.0	QPSK	50	0	9.0296
	10 MHz		16-QAM	50	0	9.0115
			64-QAM	50	0	9.0477
			256-QAM	50	0	9.0048

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 44 ~ 51.



# 8.4 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)			ctor IB) Measurement Maximum Data (dBm)		Limit (dBm)
		779.5	3.7099	27.976	-67.004	-39.028	
10	5	782.0	3.7149	27.976	-67.507	-39.531	-13.00
13		784.5	3.7144	27.976	-67.145	-39.169	-13.00
	10	782.0	3.6720	27.976	-67.358	-39.382	

### Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 52 ~ 55.

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(26.5)	30.131

### 8.5 BAND EDGE

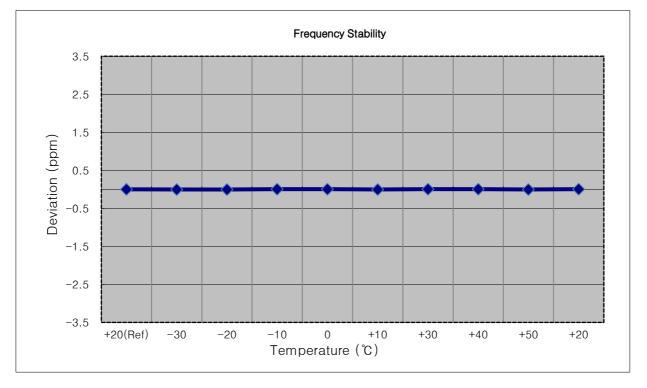
- Plots of the EUT's Band Edge are shown Page 32 ~ 43.



# 8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

MODE:	<u>LTE 13</u>
OPERATING FREQUENCY:	<u>779,500,000 Hz</u>
CHANNEL:	<u>23205 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.850 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	779 499 997	0.00	0.000 000	0.0000
100 %		-30	779 499 995	-2.50	0.000 000	-0.0032
100 %		-20	779 499 993	-3.90	-0.000 001	-0.0050
100 %		-10	779 500 000	2.70	0.000 000	0.0035
100 %	3.850	0	779 500 000	2.40	0.000 000	0.0031
100 %		+10	779 499 994	-3.00	0.000 000	-0.0038
100 %		+30	779 500 001	3.50	0.000 000	0.0045
100 %		+40	779 499 999	2.20	0.000 000	0.0028
100 %		+50	779 499 995	-1.90	0.000 000	-0.0024
Batt. Endpoint	3.400	+20	779 499 999	2.30	0.000 000	0.0030

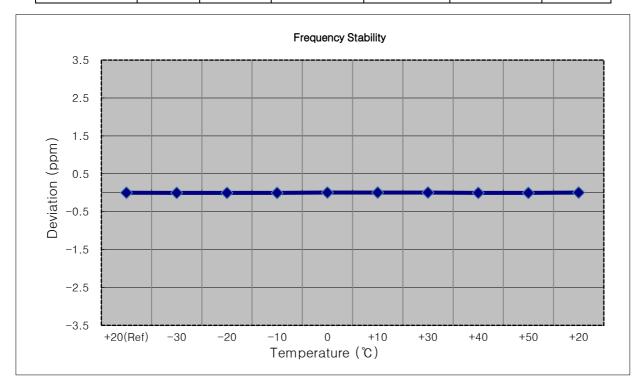




# Report No.: HCT-RF-2307-FC005

MODE:	<u>LTE 13</u>
OPERATING FREQUENCY:	<u>782,000,000 Hz</u>
CHANNEL:	<u>23230 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.850 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

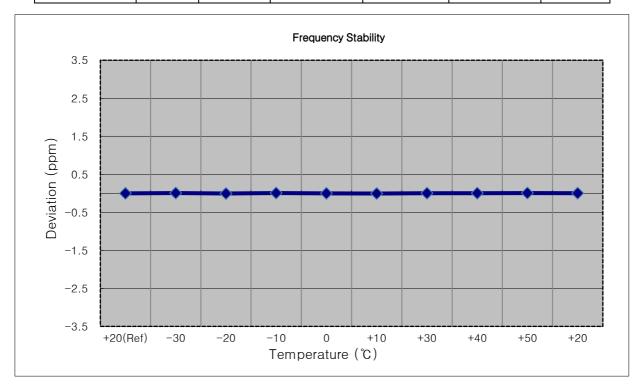
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	782 000 003	0.00	0.000 000	0.0000
100 %		-30	782 000 000	-2.40	0.000 000	-0.0031
100 %		-20	781 999 999	-3.10	0.000 000	-0.0040
100 %		-10	781 999 999	-3.40	0.000 000	-0.0043
100 %	3.850	0	782 000 006	3.80	0.000 000	0.0049
100 %		+10	782 000 005	2.30	0.000 000	0.0029
100 %		+30	782 000 005	2.90	0.000 000	0.0037
100 %		+40	782 000 000	-2.70	0.000 000	-0.0035
100 %		+50	781 999 999	-3.10	0.000 000	-0.0040
Batt. Endpoint	3.400	+20	782 000 006	3.10	0.000 000	0.0040





MODE:	LTE 13
OPERATING FREQUENCY:	<u>784,500,000 Hz</u>
CHANNEL:	<u>23255 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.850 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	784 500 002	0.00	0.000 000	0.0000
100 %		-30	784 500 006	4.10	0.000 001	0.0052
100 %		-20	784 499 998	-3.40	0.000 000	-0.0043
100 %		-10	784 500 006	4.00	0.000 001	0.0051
100 %	3.850	0	784 499 999	-2.70	0.000 000	-0.0034
100 %		+10	784 499 999	-3.30	0.000 000	-0.0042
100 %		+30	784 500 005	2.70	0.000 000	0.0034
100 %		+40	784 500 004	2.30	0.000 000	0.0029
100 %		+50	784 500 006	4.60	0.000 001	0.0059
Batt. Endpoint	3.400	+20	784 500 005	3.50	0.000 000	0.0045

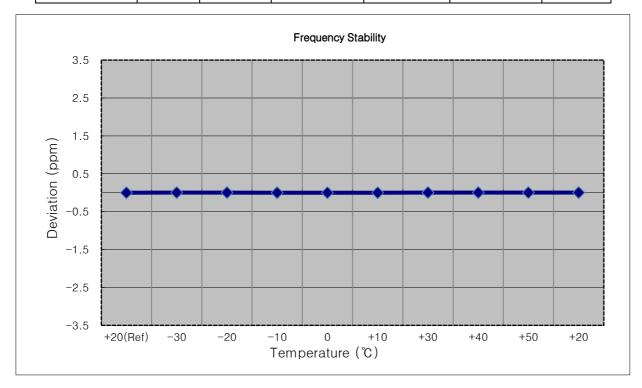




# Report No.: HCT-RF-2307-FC005

MODE:	LTE 13
OPERATING FREQUENCY:	<u>782,000,000 Hz</u>
CHANNEL:	<u>23230 (10 MHz)</u>
REFERENCE VOLTAGE:	<u>3.850 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	782 000 001	0.00	0.000 000	0.0000
100 %		-30	782 000 002	1.30	0.000 000	0.0017
100 %		-20	782 000 002	1.70	0.000 000	0.0022
100 %		-10	782 000 002	1.00	0.000 000	0.0013
100 %	3.850	0	782 000 001	0.70	0.000 000	0.0009
100 %		+10	782 000 002	1.20	0.000 000	0.0015
100 %		+30	782 000 002	1.40	0.000 000	0.0018
100 %		+40	782 000 002	1.50	0.000 000	0.0019
100 %		+50	782 000 002	1.50	0.000 000	0.0019
Batt. Endpoint	3.400	+20	782 000 002	1.40	0.000 000	0.0018





# FCC ID: A3LSMX616B

# 9. TEST PLOTS



							trum Analyzer - Swept SA	
Frequency	02:58:10 PM May 19, 2023 TRACE 1 2 3 4 5 6 TYPE A WWWWW DET A A A A A A	ALIGN AUTO De: RMS	#Avg Tyj			Hz PNO: Wide ↔	RF 50 Ω AC req 776.000000 M	XI RL Center F
Auto Tune	1 775.936 MHz -35.948 dBm	Mkr					Ref Offset 26.5 dB Ref 26.50 dBm	10 dB/div
Center Fre 776.000000 MH	RMS							16.5
Start Fre 772.000000 MH								-3.50
<b>Stop Fre</b> 780.000000 MH	13.00 dBm		Art and a second second					-13.5
CF Ste 800.000 k⊢ <u>Auto</u> Ma				1 mm		and the second		43.5
Freq Offse 0 ⊢								53.5
	Span 8.000 MHz 1.000 s (1001 pts)	#Sween			300 kHz	#\/B\A	6.000 MHz	Center 77
		STATUS			000 MHZ			ISG

# 5 M\_BandEdge\_Lowest Channel\_QPSK\_FullRB(1)



e f								trum Analyzer - Sv				
Frequency	ALIGN AUTO 02:58:30 PM May 19, 2023 #Avg Type: RMS TRACE 1 2 3 4 5 6 TYPE A WWWWW		ide ↔ Trig: Free Run			P	<sub>R</sub> ⊧ 50 req 769.00	Center F				
Auto Tur	Mkr1 774.952 MHz -46.847 dBm						Ref Offset 26.5 dB 0 dB/div Ref -10.00 dBm					
Center Fre 769.000000 MH									- <b>og</b>			
Start Fre 763.000000 MF	-35.00 dBm								40.0			
Stop Fre 775.000000 M⊦	And the second	frommented	All of Marine Marine						-50.0			
CF Ste 1.200000 MH <u>Auto</u> Ma				ageneight als way and a second se	lanan na manana ana ana ana ana ana ana a	กสังจามต่างไหว่าง -	hadymaalaapake	whereas and a second starter	70.0 <b></b>			
Freq Offs 0 H									30.0			
	top 775.000 MHz 1.000 s (1001 pts)	#Swoon			30 kHz	#\/B\\		000 MHz	-100 Start 763 Res BW			
		STATUS			50 MH2	<i></i>		TV NHZ	SG			

# 5 M\_BandEdge\_Lowest Channel\_QPSK\_FullRB(2)



Trig: Free Run TYPE	Center Frequency
10 dB/div Ref 26.50 dBm -36.432	2 dBm Center Fre
16.5	
6.50 <b></b>	788.000000 MH
3.50	Start Fre 784.000000 MH
3.5	-13.00 dBm Stop Fre 792.000000 Mł
3.5	CF Ste 800.000 ki Auto M
3.5	Freq Offs
enter 788.000 MHz Span 8.00 Res BW 100 kHz #VBW 300 kHz #Sweep 1.000 s (10	00 MHz

# 5 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(1)



							•	Spectrum Analyzer		
Frequency	ALIGN AUTO 03:03:13 PM May 19, 2023 #Avg Type: RMS TRACE 1 2 3 4 5 6 TYPE A WWWW DET A AAAA A		SENSE:INT Z PNO: Wide ↔ Trig: Free Run FGain:Low #Atten: 20 dB				<sub>R</sub> , Freq 799.	x <sup>,</sup> RL Cente		
Auto Tur	Mkr1 793.144 MHz -59.551 dBm				WALLEN. 2	FGam.Low	t 26.5 dB	Ref Offset 26.5 dB 0 dB/div Ref -10.00 dBm		
Center Fre 799.000000 M⊦									-20.0	
Start Fre 793.000000 M⊦	-35.00 dBm								30.0	
Stop Fre 805.000000 M⊦							Artum .		50.0 — 60.0 🖍	
CF Ste 1.200000 MH <u>Auto</u> Ma	RMS forgetung northytestation of the second	₽₽₽₽₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩	ngh maya ang hang ha	un and a second	draren erenden er	inerdigeneren anderen gebener.	artinesen for the second s		70.0	
Freq Offs 0 F									90.0 —	
	top 805.000 MHz .000 s (1001 pts)	Swoon			/ 30 kHz	#\/(B)A		93.000 MHz SW 10 kHz		
	.000 S (1001 pts)	Sweep			JU KHZ	#VDV			sg	

# 5 M\_BandEdge\_Highest Channel\_QPSK\_FullRB(2)



							trum Analyzer - Swept SA	
Frequency	02:58:55 PM May 19, 2023 TRACE 1 2 3 4 5 6	ALIGN AUTO	#Ava Tvr	ISE:INT	SEN		RF 50 Ω AC	XIRL
Auto Tune	#Avg Type: RMS TRACE 1 2 3 4 5 6 TYPE A WWWW DET A A A A A A				. Trig: Free #Atten: 20	■Z PNO: Wide ↔→ IFGain:Low	req 776.000000 M	Center F
	1 776.000 MHz -41.158 dBm	Mkr					Ref Offset 26.5 dB Ref 26.50 dBm	10 dB/div Log
Center Fred 776.000000 MH;			$ \land $					16.5
								6.50
Start Fred 772.000000 MH:								-3.50
Stop Free	-13.00 dBm							-13.5
780.000000 MH		Jone Contraction	J					23.5
<b>CF Ste</b> 800.000 kH <u>Auto</u> Ma								33.5
Freq Offse				ĺ	$\sim$	- A Contraction of the second s	^	43.5 53.5
0 H								63.5
	Span 8,000 MHz						6.000 MHz	Center Z
	Span 8.000 MHz 1.000 s (1001 pts)	#Sweep			300 kHz	#VBW		Res BW
		<b>I</b> STATUS						ISG

# 5 M\_BandEdge\_Lowest Channel\_QPSK\_1RB





#### 5 M\_BandEdge\_Highest Channel\_QPSK\_1RB



							ctrum Analyzer - Swept SA	
Frequency	03:05:25 PM May 19, 2023 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A A A A A A	ALIGN AUTO e: RMS	#Avg Typ			Hz PNO: Wide ↔→→	RF 50 Ω AC req 776.000000 N	Center F
Auto Tun	1 775.832 MHz -35.839 dBm	Mkr				In Gam.Low	Ref Offset 26.5 dB Ref 26.50 dBm	10 dB/div
Center Fre 776.000000 М⊦								. <b>og</b> 16.5
Start Fre 772.000000 MH	RMS							6.50 3.50
<b>Stop Fr</b> 780.000000 Mi	-13.00 dBm							3.5
<b>CF St</b> e 800.000 k <u>Auto</u> M			And the second sec	and and a start of the start of		a. to marked and a state of the state	1997 - 19	3.5
Freq Offs								3.5
	Span 8.000 MHz						6.000 MHz	3.5
	1.000 s (1001 pts)				300 kHz	#VBW	100 kHz	
		<b>I</b> STATUS						G

## 10 M\_BandEdge\_Mid Channel(Lower)\_QPSK\_FullRB(1)





#### 10 M\_BandEdge\_Mid Channel(Lower)\_QPSK\_FullRB(2)



SG					<b>I</b> STATUS			
Res BW	8.000 MHz 100 kHz	#VBW	/ 300 kHz		#Sweep	Span 8.00 1.000 s (100	0 MHz 01 pts)	
63.5								
53.5								Freq Offs 0 F
3.5						Contraction of the second s		
5.5				deren and a second de			RMS 4	800.000 k Auto M
3.5		and the second sec	1					CF St
3.5								792.000000 M
3.5							-13.00 dBm	Stop Fr
.50								784.000000 M
								Start Fr
.50								
6.5								Center Fr 788.000000 M
) dB/div	Ref 26.50 dBm					-36.349	dBm	
	Ref Offset 26.5 dB		<i>"</i>		Mk	1 788.008	MHz	Auto Tu
enter F	req 788.00000	MHZ PNO: Wide ↔ IEGain:Low	- Trig: Free Run #Atten: 20 dB	#Avg Ty	pe: RMS	TRACE 1 TYPE A DET A	2 3 4 5 6 WWWWW A A A A A	requercy
RL	ctrum Analyzer - Swept SA RF 50 Ω AC		SENSE:INT		ALIGN AUTO	03:08:46 PM Ma		Frequency

## 10 M\_BandEdge\_Mid Channel(Higher)\_QPSK\_FullRB(1)



- F								t Spectrum Analyzer - S	
Frequency	03:09:05 PM May 19, 2023 TRACE 1 2 3 4 5 6	ALIGN AUTO e: RMS	#Avg Typ	ISE:INT		z	50 Ω AC 000000 MH	RF 50 r Freq 799.00	XI RL Centei
	DET A A A A A A				Trig: Free #Atten: 2	PNO: Wide ↔ FGain:Low			
Auto Tun	1 794.740 MHz -53.955 dBm	Mkr						Ref Offset 2 iv <b>Ref -10.0</b>	10 dB/di
Center Fre									
799.000000 MH									20.0
									30.0
Start Fre 793.000000 M⊦	-35.00 dBm								
793.000000 MIP									40.0
Stop Fre							I	<b>1</b> .	50.0
805.000000 MH						mannytheres	warment	moundatornation	<b>יייייי</b> 60.0 —
05.044	RMS	Lywysennoge all the and the second	<sup>1</sup> 9 <sup>1-</sup> 8 <sup>-4</sup> 996 <sub>1</sub> 19 <sub>1</sub> 19 <sub>1</sub> 19 <sub>1</sub> 19 <sub>1</sub> 191	When you have been	high and by diplate any owned on				
CF Ste 1.200000 MH									'0.0
<u>Auto</u> Ma									30.0
Freq Offs									
01									90.0
									100
	Stop 805.000 MHz	5						93.000 MHz	itart 7
	1.000 s (1001 pts)				30 kHz	#VBW		3W 10 kHz	Res E
		<b>I</b> STATUS							

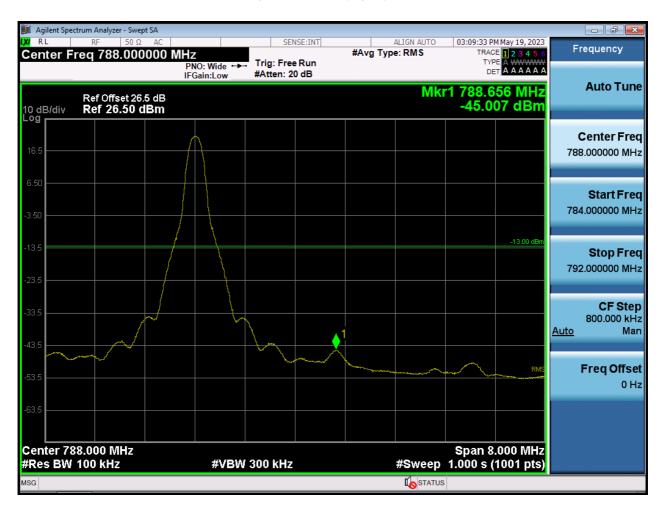
## 10 M\_BandEdge\_Mid Channel(Higher)\_QPSK\_FullRB(2)



							Analyzer - Swept SA	
Frequency	03:06:09 PM May 19, 2023 TRACE 1 2 3 4 5 6	ALIGN AUTO e: RMS	#Avg Typ	NSE:INT		MHz	F 50 Ω AC 776.000000 M	KI RL Center Fi
					Trig: Free #Atten: 20	PNO: Wide ++- IFGain:Low		
Auto Tune	1 773.192 MHz -45.177 dBm	Mkr					f Offset 26.5 dB f 26.50 dBm	10 dB/div Log
Center Free		7	ſ					
776.000000 MH								16.5
Start Free 772.000000 MH								6.50
	-13.00 dBm							-3.50
<b>Stop Fre</b> 780.000000 MH								-13.5
CF Ster								-23.5
800.000 kH <u>Auto</u> Ma	RMS	5		~/			<b>▲</b> 1	-33.5
Freq Offse				$\sim$	$\sim$		·/	-43.5
0 H								-63.5
								-03.3
	Span 8.000 MHz 1.000 s (1001 pts)	#Sweep			V 300 kHz	#VBW		Center 77 #Res BW
		STATUS						MSG

## 10 M\_BandEdge\_Mid Channel(Lower)\_QPSK\_1RB





#### 10 M\_BandEdge\_Mid Channel(Higher)\_QPSK\_1RB



🔰 Agilent Spectrum Analyzer - Occupied BW					
M         RL         RF         50 Ω         AC           Center Freq 782.000000 Μ           PASS	Trig:	SENSE:INT er Freq: 782.000000 MH Free Run Avg n: 20 dB	ALIGN AUTO Iz Hold: 500/500	03:01:09 PM May 19, 2023 Radio Std: None Radio Device: BTS	Frequency
Ref Offset 26.5 dE 10 dB/div Ref 40.00 dBm Log					
30.0					Center Freq 782.000000 MHz
	f f f f f f f f f f f f f f f f f f f	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
-10.0			- Vyg		
-20.0				M. A.M. M.	
-40.0					CF Step
Center 782 MHz #Res BW 100 kHz	;	≠VBW 390 kHz		Span 10 MHz Sweep 1 ms	1.000000 MHz <u>Auto</u> Man I
Occupied Bandwidt	n 5423 MHz	Total Power	30.9	dBm	<b>Freq Offset</b> 0 Hz
Transmit Freq Error	17.019 kHz	OBW Power	99	.00 %	
x dB Bandwidth	5.462 MHz	x dB	-26.	00 dB	
MSG				3	

## 5 M\_OBW\_Mid Channel\_QPSK\_FullRB



	nalyzer - Occupied BW					
Center Freq 7		I <b>HZ</b> #IFGain:Low	SENSE:INT Center Freq: 782.000 Trig: Free Run #Atten: 20 dB	ALIGN AUTO 000 MHz Avg Hold: 500/500	03:00:09 PM May 19, 202: Radio Std: None Radio Device: BTS	Frequency
	Ref Offset 26.5 dB Ref 40.00 dBm					
30.0						Center Freq 782.000000 MHz
10.0		pgl	honder and the second s	man ha		
-10.0	and the second s			- hy	m <sub>h</sub>	
-30.0	Streen and a				Marka Marka	
-50.0						CF Step 1.000000 MHz
Center 782 M #Res BW 100			#VBW 390 k	Hz	Span 10 MHz Sweep 1 ms	<u>Auto</u> Man
Occupied	Bandwidth 4.5	5314 MH	Total Po Z	ower 30	.0 dBm	<b>Freq Offset</b> 0 Hz
Transmit F	req Error	14.169 kH	Iz OBW Po	ower 9	99.00 %	
x dB Band	width	5.273 MH	lz xdB	-20	6.00 dB	
MSG				Ko sta	TUS	

## 5 M\_OBW\_Mid Channel\_16QAM\_FullRB



	um Analyzer - Occupied BW						
KI RL Center Fre	RF 50 Ω AC <b>q 782.000000 M</b>	Hz	SENSE:INT		N AUTO 03:00:36 Radio Sto	PM May 19, 2023	Frequency
PASS	rq 702.000000 ii		Trig: Free Run #Atten: 20 dB	Avg Hold: 500	/500 Radio De	vice: BTS	
		#IFGaIn:Low	#Atten: 20 ub		Radio De	vice. D13	
10 dB/div	Ref Offset 26.5 dB Ref 40.00 dBm						
Log							
30.0							Center Freq
20.0							782.000000 MHz
10.0		monter	was the the owner was	mound			
0.00							
	1				Long Long Long Long Long Long Long Long		
-10.0					Vwy .		
-20.0	A m a man w					~~~~~~	
-30.0	~/~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					$\langle \gamma \gamma \rangle \langle \gamma \gamma \rangle \langle \gamma $	
-40.0							
-50.0							OF Oton
							CF Step 1.000000 MHz
Center 782					Spa	an 10 MHz	<u>Auto</u> Man
#Res BW 1	IOO KHZ		#VBW 390 k	Hz	Sw	eep 1ms	
Occupi	ied Bandwidth		Total Po	ower	29.1 dBm		Freq Offset
		5194 MH	7				0 Hz
Transmi	it Freq Error	16.045 kH	z OBW Po	ower	99.00 %		
x dB Ba	ndwidth	5.296 MH	z x dB		-26.00 dB		
MSG				T.	STATUS		
	-				<b>yy</b>		

## 5 M\_OBW\_Mid Channel\_64QAM\_FullRB



📁 Agilent Spectrum Analyzer - Occupied BW					
RL         RF         50 Ω         AC           Center Freq 782.000000 Ν	lHz Ce	SENSE:INT Inter Freq: 782.000000 MH	ALIGN AUTO	03:13:40 PM May 19, 2023 Radio Std: None	Frequency
PASS	ti tri	ig: Free Run Avg tten: 20 dB	Hold: 500/500	Radio Device: BTS	
,				radio Beride. Bito	
Ref Offset 26.5 dB 10 dB/div Ref 40.00 dBm					
Log					
30.0					Center Freq
20.0					782.000000 MHz
10.0	man	$\sim$	may		
0.00	/		<u>\</u>		
-10.0					
-20.0					
				M. Marchanger and a second sec	
-30.0 mgr Angel - Will				A Marken A Market	
-40.0					
-50.0					CF Step
Center 782 MHz				Span 10 MHz	1.000000 MHz
#Res BW 100 kHz		#VBW 390 kHz		Sweep 1 ms	<u>Auto</u> Man
Occupied Bandwidth	1	Total Power	27.2	dBm	Freq Offset
	5311 MHz				0 Hz
				00.9/	
Transmit Freq Error	17.522 kHz	OBW Power		.00 %	
x dB Bandwidth	5.322 MHz	x dB	-26.	00 dB	
MSG				3	

5 M\_OBW\_Mid Channel\_256QAM\_FullRB



	Analyzer - Occupied BW						
Center Freq	782.000000 M		SENSE:INT Center Freq: 782.000 Trig: Free Run	ALIGN AU 000 MHz Avg Hold: 500/50	Radio Std: I	May 19, 2023 None	Frequency
PASS			#Atten: 20 dB		Radio Devid	e: BTS	
10 dB/div	Ref Offset 26.5 dB Ref 40.00 dBm						
30.0							Center Freq
20.0							782.000000 MHz
10.0		mannonom	when when we	Mannaly			
0.00							
-10.0	الر			<u> </u>	h		
-20.0					N <sub>V1</sub>		
-30.0 mmmmmmmm	Val aller and a				Mar marken and	ulundadim .	
-40.0							
-50.0							
-30.0							CF Step 2.000000 MHz
Center 782 M #Res BW 20			#VBW 820 k	Hz	Span Swee	20 MHz ep 1 ms	<u>Auto</u> Man
Occupie	d Bandwidth		Total Po	ower 3	31.0 dBm		Freq Offset
	9.0	296 MH	Ζ				0 Hz
Transmit	Freq Error	18.828 kH	z OBW Po	ower	99.00 %		
x dB Band	dwidth	10.14 MH	z xdB		26.00 dB		
MSG				<b>Í</b> ₀s	TATUS		

## 10 M\_OBW\_Mid Channel\_QPSK\_FullRB



jji Agilent Spectrum Analyzer - Occ	cupied BW							
XI         RF         50 G           Center Freq         782.000           PASS         Content         Content		SENSE:INT Center Freq: 782.000000 f Trig: Free Run Av #Atten: 20 dB	ALIGN AUTO MHz /g Hold: 500/500	03:06:34 PM May 19, 2023 Radio Std: None Radio Device: BTS	Frequency			
Ref Offset 10 dB/div Ref 40.0								
30.0					Center Freq 782.000000 MHz			
10.0	phy man man of	hand and a particular and	hand here					
-10.0								
-20.0 -30.0			<u> </u>	M. M. Martin July Ray Contraction of the start of the sta				
-40.0 -50.0					CF Step			
Center 782 MHz #Res BW 200 kHz		#VBW 820 kHz		Span 20 MHz Sweep 1 ms	2.000000 MHz			
Occupied Band	dwidth	Total Powe	er 30.0	dBm	Freq Offset			
	9.0115 MHz							
Transmit Freq Er	ror 27.258	kHz OBW Powe	er 99.	.00 %				
x dB Bandwidth	10.27 1	MHz x dB	-26.0	00 dB				
MSG			<b>I</b> ostatus					

10 M\_OBW\_Mid Channel\_16QAM\_FullRB



	Analyzer - Occupied BW		SENSE:INT					
	RF         50 Ω         AC           Penter Freq 782.000000 MHz         #IFGain:Low			000 MHz Avg Hold: 50	Radio 00/500	38 PM May 19, 2023 Std: None Device: BTS	Frequency	
10 dB/div Log	Ref Offset 26.5 dB Ref 40.00 dBm							
30.0							Center Freq 782.000000 MHz	
10.0	/	᠆ᡙᡃ᠋ᠴ᠋ᢇ᠘ᡅ᠕ᠰ᠕ᠰ᠆ᡟᡟ	<sup>ֈՠֈֈՠֈ</sup> ֎ՠֈՠֈՠֈՠֈՠֈՠֈՠՠՠՠՠՠՠՠՠՠՠՠՠՠՠՠՠՠՠ	ᡁ᠕᠋ᡎᡄᠲᢪᢛᡳᠬᢦᡕᡧᠭᢑ᠕ᢧ	\			
-10.0	and the second second				h h			
-20.0 -30.0 <mark>4/7~~7~~1/~~4</mark>	mpmmmmm				Why have	ᡧᡙᢇᠬ᠇ᢦᢛᡔᢑᡅᢆᢦᡙᢇ		
-40.0							CF Step	
Center 782   #Res BW 20			#VBW 820 k	·H7	S	pan 20 MHz weep 1 ms	2.000000 MHz	
	d Bandwidth		Total P		29.1 dBm	weep rms	Freq Offset	
	9.0477 MHz							
Transmit	Freq Error	12.799 kHz	OBW P	ower	99.00 %			
x dB Ban	dwidth	10.42 MHz	z xdB		-26.00 dB			
MSG					<b>I</b> ostatus			

## 10 M\_OBW\_Mid Channel\_64QAM\_FullRB



Ju Agilent Spectrum Analyzer - Occupied BW									
KI RF 50 Ω AC     Center Freq 782.000000		SENSE:INT	Radio Std	M May 19, 2023 : None	Frequency				
PASS		Free Run Avg Hol n: 20 dB	d: 500/500 Radio Dev	vice: BTS					
Ref Offset 26.5 d 10 dB/div <b>Ref 40.00 dB</b> r									
Log 30.0					Center Freq				
20.0					782.000000 MHz				
10.0	Mary and a stranger of a stranger of a stranger of the	man Maran Mardena	all Cost of						
0.00									
-10.0			<u>\</u>						
-20.0			- <sup>1</sup> / <sub>v</sub>						
-30.0 with more maken who may of			My how have a						
-40.0				Willow and hallow Area					
-50.0									
					CF Step 2.000000 MHz				
Center 782 MHz #Res BW 200 kHz	#	VBW 820 kHz	Spa Swe	an 20 MHz eep 1 ms	<u>Auto</u> Man				
Occupied Bandwidt	h	Total Power	27.0 dBm		Freq Offset 0 Hz				
9.	9.0048 MHz								
Transmit Freq Error	17.549 kHz	<b>OBW Power</b>	99.00 %						
x dB Bandwidth	10.23 MHz	x dB	-26.00 dB						
MSG			STATUS						

## 10 M\_OBW\_Mid Channel\_256QAM\_FullRB



	ım Analyzer - Swept SA							
Center Fre	RF 50 Ω AC Pq 5.015000000	) GHz PNO: Fast			ALIGN AUTO		lay 19, 2023 1 2 3 4 5 6 A WWWWW	Frequency
		IFGain:Low	#Atten: 20			DET	A A A A A A	Auto Tune
10 dB/div	Ref 10.00 dBm				MI	(r1 3.709 -67.004	9 GHz I dBm	
	2							Center Freq
-10.0								5.015000000 GHz
-30.0								Start Freq
-40.0								30.000000 MHz
-60.0			,1					Stop Eros
-70.0							RMS	<b>Stop Freq</b> 10.000000000 GHz
Start 30 Mi						Stop 10.0		05.04+*
#Res BW 1		#VB	W 3.0 MHz		Sweep 17	.33 ms (200	001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TRC		3.709 9 GHz	۲ -67.004 dBr		FUNCTION WIDTH	FUNCTION	VALUE 🔺	<u>Auto</u> man
2 N 1 3	f	777.8 MHz	-3.782 dBr	n				Freq Offset
5 6							=	UHZ
7 8 9								
10 11							-	
MSG			III			3	•	

## 5 M\_CSE(30 M-10 G)\_Lowest Channel\_QPSK\_1RB



	trum Analyzer - Swept SA							
Center Fr	RF 50 Ω AC req 5.0150000		SENS	E:INT #Av	ALIGN AUTO Type: RMS	03:01:40 PM TRACE	May 19, 2023	Frequency
		PNO: Fast IFGain:Low	Trig: Free # #Atten: 20			TYPE		
10 dB/div	Ref 10.00 dBm	1			Mł	(r1 3.714 -67.50		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		clusters					RMS	<b>Stop Freq</b> 10.000000000 GHz
Start 30 N #Res BW		#VE	3W 3.0 MHz		Sweep 17	Stop 10.0 .33 ms (20	000 GHz 001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TR		× 3.714 9 GHz	۲ -67.507 dBr	FUNCTION	FUNCTION WIDTH	FUNCTION	I VALUE	<u>Auto</u> Mari
2 N 1 3 4 5	f	780.2 MHz	-4.547 dBr	n				<b>Freq Offset</b> 0 Hz
6 7 8 9								
11			Ш					
MSG						S		

## 5 M\_CSE(30 M-10 G)\_Mid Channel\_QPSK\_1RB



📕 Agilent Spectrum Analyzer - Swept SA						
x/ RL RF 50Ω A( Center Freq 5.0150000		Trig: Free Ru #Atten: 20 dB	#Avg In	ALIGN AUTO g Type: RMS	03:03:55 PM May 19, TRACE 1 2 3 4 TYPE A WW DET A A A	456 Frequency
10 dB/div Ref 10.00 dBr		# Ref 20 di	-	Mk	r1 3.714 4 G -67.145 dB	Hz Auto Tune 3m
-20.0 2 -20.0						Center Fred 5.015000000 GH
30.0 40.0 50.0						Start Fre 30.000000 MH
60.0 70.0 80.0						<b>Stop Fre</b> 10.000000000 GH
Start 30 MHz ¢Res BW 1.0 MHz	#VE	SW 3.0 MHz		Sweep 17	Stop 10.000 G .33 ms (20001 p	Hz CF Ste ots) 997.000000 M⊢ Auto Ma
MKR MODE TRC SCL 1 N 1 f 2 N 1 f 3 4 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	× 3.714 4 GHz 787.2 MHz	Y -67.145 dBm -3.539 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE	Freq Offse
6 7 8 9 10 11						
SG		III		<b>I</b> STATUS	\$	

## 5 M\_CSE(30 M-10 G)\_Highest Channel\_QPSK\_1RB



🚺 Agilent Spectrum Analyzer - Swept SA							
X RL RF 50 Ω AC Center Freq 5.015000000	GHz	SENSE:II	#Avg	ALIGN AUTO Type: RMS		123456	Frequency
	PNO: Fast +++ IFGain:Low	Trig: Free Rui #Atten: 20 dB				A A A A A A	
10 dB/div Ref 10.00 dBm				Mk	r1 3.672 -67.35	0 GHz 8 dBm	Auto Tune
Log 0.00 -10.0 -20.0							Center Freq 5.015000000 GHz
-30.0							Start Freq 30.000000 MHz
-60.0 -70.0 -80.0	1-					RMS	<b>Stop Freq</b> 10.000000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz		Sweep 17	Stop 10.0 .33 ms (20	001 pts)	CF Step 997.000000 MHz Auto Man
2 N 1 f 7 3 4 9 9	72 0 GHz 78.2 MHz	Y -67.358 dBm -3.320 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION	VALUE •	Freq Offset
5 6 7 8 8 9 9 10							
11 < MSG		m				•	

## 10 M\_CSE(30 M-10 G)\_Mid Channel\_QPSK\_1RB



# 10. APPENDIX A\_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2307-FC005-P