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# FCC LTE REPORT

# Certification

### Applicant Name:

SAMSUNG Electronics Co., Ltd.

### Address:

FCC ID:

129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

# Date of Issue:

October 21, 2022 Location: HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-RF-2210-FC014

# A3LSMS911B

# **APPLICANT:**

# SAMSUNG Electronics Co., Ltd.

Model(s):SM-S911B/DSAdditional Model(s):SM-S911BEUT Type:Mobile PhoneFCC Classification:PCS Licensed Transmitter Held to Ear (PCE)FCC Rule Part(s):§27, §2

Mode	Tri Francisco au	Emission		ERP		
(MHz)	Tx Frequency (MHz)	Designator	Modulation	Max. Power (W)	Max. Power (dBm)	
		4M51G7D	QPSK	0.071	18.50	
LTE – Band13 (5)	779.5 –784.5	4M52W7D	16QAM	0.060	17.77	
		4M52W7D	64QAM	0.047	16.69	
		4M52W7D	256QAM	0.023	13.58	
LTE – Band13 (10)	782.0	8M98G7D	QPSK	0.064	18.03	
		8M98W7D	16QAM	0.054	17.29	
		8M99W7D	64QAM	0.042	16.21	
		8M97W7D	256QAM	0.020	13.09	

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>

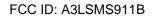
TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2210-FC014	October 21, 2022	- First Approval Report

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:	A3LSMS911B
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-S911B/DS
Additional Model(s):	SM-S911B
Tx Frequency:	779.5 MHz –784.5 MHz (LTE – Band 13 (5 MHz)) 782 MHz (LTE – Band 13 (10 MHz))
Date(s) of Tests:	August 31, 2022~ September 23, 2022
Serial number:	Radiated: R3CT706PCND Conducted: 64208a01b13f7ece

# 2. INTRODUCTION

### 2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80/160 MHz), Bluetooth, BT LE, NFC, AIT, WPT.

# 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  $\geq$  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 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)

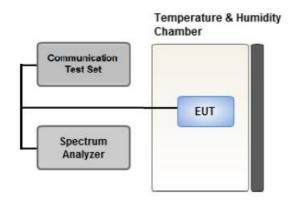
Where:  $P_g$  is the generator output power into the substitution antenna.

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.

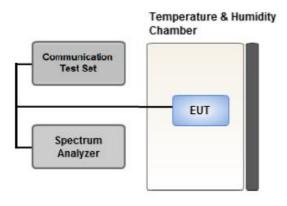
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

#### **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**

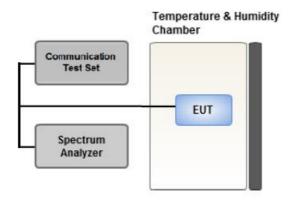
The level of the carrier and the various conducted spurious and harmonic frequencies is measured by means of a calibrated spectrum analyzer. The spectrum is scanned from the lowest frequency generated in the equipment up to a frequency including its 10th harmonic. All out of band emissions are measured 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 >  $3 \times RBW$
- 5. Detector = RMS
- 6. Number of sweep points  $\geq$  2 x Span/RBW
- 7. Trace mode = trace average
- 8. Sweep time = auto couple
- 9. The trace was allowed to stabilize

#### Test Notes

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.

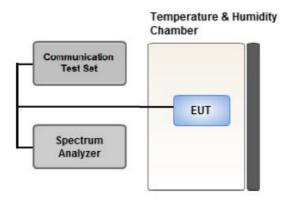
All measurements were done at 2 channels(low and high operational frequency range.)

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

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.
- SM-S911B/DS & additional models were tested and the worst case results are reported.

(Worst case : SM-S911B/DS)

Test Description	Modulation	RB size	RB offset	Axis		
	QPSK,		0	Y		
Effective Dedicted Dever	16QAM,	4				
Effective Radiated Power	64QAM,	I				
	256QAM					
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Х		

# [Worst case]



# 3.9 WORST CASE(CONDUCTED TEST)

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

- SM-S911B/DS & additional models were tested and the worst case results are reported.

(Worst case : SM-S911B/DS)

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



# 4. LIST OF TEST EQUIPMENT

Equipment	Equipment Model Manufacturer Serial No.		Due to Calibration	Calibration Interval	
H.P.F	FBSR-02B(WHK1.2/15 G- 10EF)	T&M SYSTEM	-	02/18/2023	Annual
H.P.F	FBSR-02B(WHK3.3/18 G- 10EF)	T&M SYSTEM	-	02/18/2023	Annual
Power Splitter(DC ~ 26.5 GHz)	11667B	Hewlett Packard	11275	03/11/2023	Annual
DC Power Supply	E3632A	Agilent	MY40010147	06/21/2023	Annual
Dipole Antenna	UHAP	Schwarzbeck	557	04/05/2023	Biennial
Dipole Antenna	UHAP	Schwarzbeck	558	04/05/2023	Biennial
Chamber	SU-642	ESPEC	93008124	03/04/2023	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	04/12/2023	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	05/02/2023	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	05/18/2023	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
Bilog Antenna	VULB9160	Schwarzbeck	3150	03/03/2023	Biennial
Hybrid Antenna	VULB9168	Schwarzbeck	760	02/22/2023	Biennial
Wideband Radio Communication Tester	MT8821C	Anritsu Corp.	6262116770	07/05/2023	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6200863156	12/29/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2023	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)	2.00 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 (Confidence level about 95 %, <i>k</i> =2)
Radiated Disturbance (Above 40 GHz)	5.48 (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	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	1 700	
Undesirable Emissions in	\$2,4052, 27 52/f)	< -70dBW/MHz EIRP (wideband)	DASS	
the 1559 – 1610 MHz band	§2.1053, 27.53(f)	< -80dBW EIRP (narrowband)	PASS	



# 7. SAMPLE CALCULATION

### 7.1 ERP Sample Calculation

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

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

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

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

3) Record the field strength meter's level.

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

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

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

### 7.2 EIRP Sample Calculation

Ch	Ch./ Freq. 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

<b>GSM Emission</b>	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.	<u></u>	Del	Limit	EF	RP
(MHz)	(Bandwidth)	Modulation	Level (dBm)	Level (dBm)	Gain(dBd)	C.L	Pol	w	W	dBm
		QPSK	-29.99	29.47	-10.08	1.37	V		0.063	18.02
779.5		16-QAM	-30.71	28.75	-10.08	1.37	V		0.054	17.30
779.5		64-QAM	-31.77	27.69	-10.08	1.37	V		0.042	16.24
		256-QAM	-34.95	24.51	-10.08	1.37	V		0.020	13.06
		QPSK	-29.85	29.57	-10.09	1.37	V		0.065	18.11
792.0	LTE B13	16-QAM	-30.60	28.82	-10.09	1.37	V	< 3.00	0.054	17.36
782.0	(5 MHz)	64-QAM	-31.66	27.76	-10.09	1.37	V	< 3.00	0.043	16.30
		256-QAM	-34.81	24.61	-10.09	1.37	V		0.021	13.15
		QPSK	-29.64	29.98	-10.10	1.38	V		0.071	18.50
		16-QAM	-30.37	29.25	-10.10	1.38	V		0.060	17.77
784.5		64-QAM	-31.45	28.17	-10.10	1.38	V		0.047	16.69
		256-QAM	-34.56	25.06	-10.10	1.38	V		0.023	13.58

Freq	Mod	Modulation	Measured	Substitute	Ant.	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)	Sandwidth)	Level (dBm)	Level (dBm)	Gain(dBd)			w	w	dBm
782.0	LTE B13 (10 MHz)	QPSK	-29.93	29.49	-10.09	1.37	V	< 3.00	0.064	18.03
		16-QAM	-30.67	28.75	-10.09	1.37	V		0.054	17.29
		64-QAM	-31.75	27.67	-10.09	1.37	V		0.042	16.21
		256-QAM	-34.87	24.55	-10.09	1.37	V		0.020	13.09



# 8.2 RADIATED SPURIOUS EMISSIONS

I MODE:	LTE B13
MODULATION SIGNAL:	<u>5 MHz QPSK</u>
DISTANCE:	3 meters

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1 559.0	-53.47	8.88	-61.01	1.96	Н	-54.09	-40.00
	2 338.5	-54.30	9.96	-57.29	2.47	Н	-49.80	-13.00
23205 (779.5)	3 118.0	-56.27	11.24	-56.28	2.84	V	-47.88	-13.00
(110.0)	3 897.5	-57.82	12.40	-56.64	3.25	V	-47.49	-13.00
	4 677.0	-58.01	12.50	-53.27	3.50	V	-44.27	-13.00
	1 564.0	-53.96	8.92	-61.74	1.98	Н	-54.80	-40.00
	2 346.0	-55.25	10.03	-58.07	2.49	Н	-50.54	-13.00
23230 (782.0)	3 128.0	-55.98	11.26	-56.41	2.86	V	-48.01	-13.00
(102.0)	3 910.0	-57.85	12.42	-56.67	3.27	V	-47.52	-13.00
	4 692.0	-57.79	12.50	-53.00	3.53	V	-44.03	-13.00
	1 569.0	-54.57	8.96	-62.60	1.99	Н	-55.63	-40.00
	2 353.5	-55.57	10.10	-58.23	2.51	Н	-50.64	-13.00
23255 (784.5)	3 138.0	-56.56	11.28	-56.71	2.89	V	-48.32	-13.00
(104.0)	3 922.5	-57.18	12.44	-55.60	3.27	Н	-46.43	-13.00
	4 707.0	-57.60	12.52	-53.01	3.61	V	-44.10	-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	-54.30	8.92	-62.08	1.98	V	-55.14	-40.00
	2 346.0	-54.87	10.03	-57.69	2.49	Н	-50.16	-13.00
23230 (782.0)	3 128.0	-57.27	11.26	-57.70	2.86	V	-49.30	-13.00
	3 910.0	-57.31	12.42	-56.13	3.27	V	-46.98	-13.00
	4 692.0	-58.31	12.50	-53.52	3.53	Н	-44.55	-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	1607.3		-63.48	9.30	-73.67	1.97	Н	-66.34	26.34
782.0	1607.9	Narrow Band	-63.49	9.30	-73.68	1.97	н	-66.35	26.35
784.5	1607.9		-63.46	9.30	-73.65	1.97	Н	-66.32	26.32

### 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:	-70 dBW/ MHz (=

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	1606.8	Narrow Band	-63.53	9.25	-73.63	1.99	V	-66.36	26.36

-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 )
	5 MHz		QPSK	25	0	4.5125
		702.0	16-QAM	25	0	4.5198
			64-QAM	25	0	4.5158
13			256-QAM	25	0	4.5146
13		- 782.0	QPSK	50	0	8.9773
	10 MHz		16-QAM	50	0	8.9834
			64-QAM	50	0	8.9858
			256-QAM	50	0	8.9697

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)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
		779.5	3.6840	27.976	-67.100	-39.124	
10	5	782.0	3.6975	27.976	-67.339	-39.363	-13.00
13	784.	784.5	3.7134	27.976	-67.438	-39.462	-13.00
	10	782.0	3.7024	27.976	-67.391	-39.415	

### 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

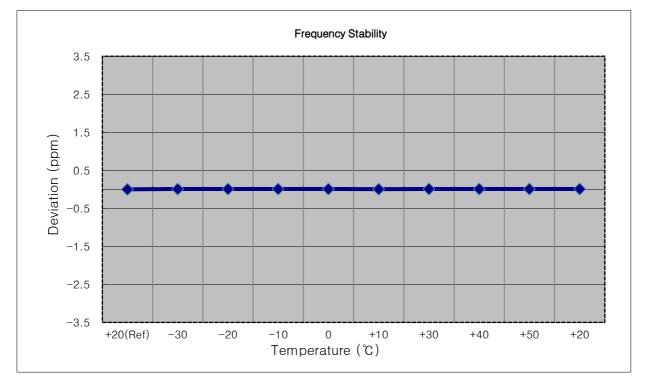
- Plots of the EUT's Band Edge are shown Page 32 ~ 43.



# 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>3.880 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	779 500 004	0.00	0.000 000	0.0000
100 %		-30	779 500 011	6.80	0.000 001	0.0087
100 %		-20	779 500 010	5.70	0.000 001	0.0073
100 %		-10	779 500 010	5.40	0.000 001	0.0069
100 %	3.880	0	779 500 012	7.40	0.000 001	0.0095
100 %		+10	779 500 009	4.10	0.000 001	0.0053
100 %		+30	779 500 011	6.80	0.000 001	0.0087
100 %		+40	779 500 011	6.10	0.000 001	0.0078
100 %		+50	779 500 010	5.90	0.000 001	0.0076
Batt. Endpoint	3.300	+20	779 500 011	6.50	0.000 001	0.0083

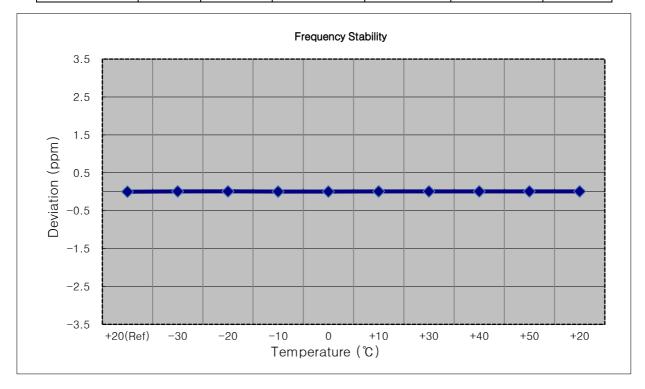




# Report No.: HCT-RF-2210-FC014

MODE:	LTE 13
OPERATING FREQUENCY:	<u>782,000,000 Hz</u>
CHANNEL:	<u>23230 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.880 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

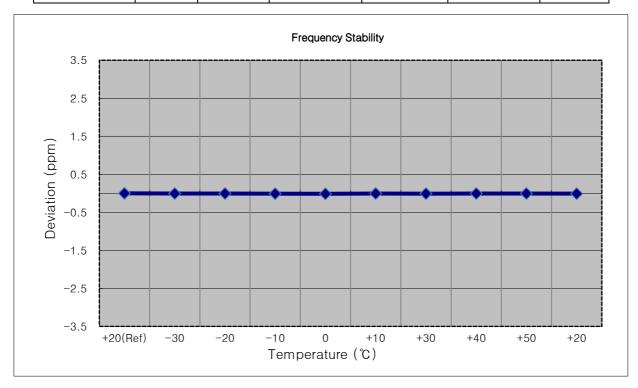
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	782 000 003	0.00	0.000 000	0.0000
100 %		-30	782 000 009	6.00	0.000 001	0.0077
100 %		-20	782 000 011	7.80	0.000 001	0.0100
100 %		-10	782 000 007	3.40	0.000 000	0.0043
100 %	3.880	0	782 000 006	2.30	0.000 000	0.0029
100 %		+10	782 000 010	7.00	0.000 001	0.0090
100 %		+30	782 000 008	5.00	0.000 001	0.0064
100 %		+40	782 000 009	5.20	0.000 001	0.0066
100 %		+50	782 000 010	6.30	0.000 001	0.0081
Batt. Endpoint	3.300	+20	782 000 009	6.10	0.000 001	0.0078





MODE:	<u>LTE 13</u>
OPERATING FREQUENCY:	<u>784,500,000 Hz</u>
CHANNEL:	<u>23255 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.880 VDC</u>
DEVIATION LIMIT:	Emission must remain in band

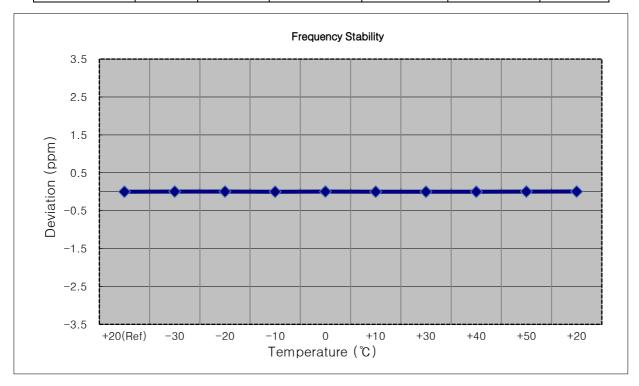
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	784 499 994	0.00	0.000 000	0.0000
100 %		-30	784 499 988	-6.10	-0.000 001	-0.0078
100 %		-20	784 499 989	-5.10	-0.000 001	-0.0065
100 %		-10	784 499 988	-6.80	-0.000 001	-0.0087
100 %	3.880	0	784 499 985	-9.90	-0.000 001	-0.0126
100 %		+10	784 499 988	-6.10	-0.000 001	-0.0078
100 %		+30	784 499 987	-7.70	-0.000 001	-0.0098
100 %		+40	784 499 990	-4.70	-0.000 001	-0.0060
100 %		+50	784 499 989	-5.10	-0.000 001	-0.0065
Batt. Endpoint	3.300	+20	784 499 988	-6.60	-0.000 001	-0.0084





MODE:	<u>LTE 13</u>
OPERATING FREQUENCY:	<u>782,000,000 Hz</u>
CHANNEL:	<u>23230 (10 MHz)</u>
REFERENCE VOLTAGE:	<u>3.880 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	782 000 004	2.50	0.000 000	0.0032
100 %		-20	782 000 003	1.60	0.000 000	0.0020
100 %		-10	782 000 000	-1.20	0.000 000	-0.0015
100 %	3.880	0	782 000 003	1.50	0.000 000	0.0019
100 %		+10	782 000 002	0.80	0.000 000	0.0010
100 %		+30	782 000 001	-0.50	0.000 000	-0.0006
100 %		+40	782 000 001	-0.70	0.000 000	-0.0009
100 %		+50	782 000 003	2.10	0.000 000	0.0027
Batt. Endpoint	3.300	+20	782 000 005	3.90	0.000 000	0.0050





# FCC ID: A3LSMS911B

# 9. TEST PLOTS



	trum Analyzer - Swept										
Center Fi	RF 50 Ω eq 776.0000		lz		ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Sep 02, 2022	Fi	requency
	•		PNO: Wide ↔↔ FGain:Low	Trig: Free #Atten: 20				TYF			
	Ref Offset 26.7	7 dB					Mkı	1 775.9	92 MHz 84 dBm		Auto Tune
10 dB/div Log	Ref 26.70 dl	Bm						-32.8	84 dBm		
0											Center Freq
16.7											6.000000 MHz
									RMS		
6.70											Start Freq
-3.30										772	2.000000 MHz
-13.3									-13.00 dBm		Stop Freq
										780	.000000 MHz
-23.3					1	J.					
-33.3					and the state of t						CF Step
		and and a state of the state of	and a second							Auto	800.000 kHz Man
-43.3	A										
											Freq Offset
-53.3											0 Hz
-63.3											
Center 77	6.000 MHz							Span 8	.000 MHz		
#Res BW			#VBW	300 kHz			#Sweep	1.000 s (	1001 pts)		
MSG											

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



		rum Analyzer - Sw	•									
LXI RI		RF 50			SEI	NSE:INT	#Avg Typ	ALIGN AUTO		M Sep 02, 2022	F	requency
Cen	ter Fr	eq 769.00		PNO: Wide ↔	. Trig: Fre	Run	#Avg iyp	e. RWD	TY			
				IFGain:Low	#Atten: 2	0 dB			DI			
		Ref Offset 2	6 7 AD					Mk	r1 774.9	76 MHz		Auto Tune
10 dE Log I	3/div	Ref -10.00							-45.2	39 dBm		
LUg												Center Freq
-20.0												•
-20.0											/6	9.000000 MHz
-30.0										-35.00 dBm		Start Freq
											76	3.000000 MHz
-40.0										1	10	0.000000 Mil 12
										RIVA		
-50.0									- Aller			Stop Freq
									A Comment		77	5.000000 MHz
-60.0			_					and the second second				
	with	warman		ومعبول والمرومين المراجع	quarier and a state of the stat	المحمد الملحان ومحمد ومالح	and the state of t					
-70.0	darred I deta t											CF Step 1.200000 MHz
											Auto	Man
-80.0											rato	marr
-90.0												Freq Offset
00.0												0 Hz
400												
-100												
Star	t 763.	000 MHz							Stop 775	.000 MHz		
		10 kHz		#VBM	30 kHz			#Sweep	1.000 <u>s (</u>	1001 pts)		
MSG								<b>I</b> STATUS				
	_							Noratio				

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



	Spectrum Analyzer - Swept SA					
IXI RL Contor	RF 50 Ω AC r Freq 788.000000		SENSE:INT	ALIGN AUTO #Avg Type: RMS	08:35:27 PM Sep 02, 2022 TRACE 1 2 3 4 5 6	Frequency
Cente		PNO: Wide ↔ IFGain:Low	Trig: Free Run #Atten: 20 dB	m tig type time		
10 dB/di Log r	Ref Offset 26.7 dB Ref 26.70 dBm			Mk	r1 788.112 MHz -33.461 dBm	Auto Tune
16.7						Center Freq 788.000000 MHz
6.70						Start Freq 784.000000 MHz
-13.3					-13.00 dBm	Stop Freq 792.000000 MHz
-33.3 —		^	1	handa alay faran a saya a s	RMS	CF Step 800.000 kHz <u>Auto</u> Man
-43.3						<b>Freq Offset</b> 0 Hz
-63.3 Center	788.000 MHz				Span 8.000 MHz	
#Res B	W 100 kHz	#VBW	300 kHz		1.000 s (1001 pts)	
MSG					3	

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



	ectrum Analyzer - Swept S								
Contor E	RF 50 Ω req 799.0000		SE	NSE:INT	#Avg Typ	ALIGN AUTO e: RMS		4 Sep 02, 2022	Frequency
Centerr	1eq 733.0000	PNO: Wi IFGain:L					TYP DE		
	D-608					Mki	r1 793.0	60 MHz	Auto Tun
10 dB/div Log	Ref Offset 26.7 Ref -10.00 df						-57.62	28 dBm	
									Center Fre
-20.0									799.000000 MH
-30.0								-35.00 dBm	Start Fre
-40.0									793.000000 MH
-50.0									Stop Fre
Mandal									805.000000 MH
-60.0	ar for the second of the secon	-						RMS	
-70.0		and a second sec	dere ander strik del fan de standerstrage strage strage strage strage strage strage strage strage strage strage Strage strage	ร <sup>ุ</sup> ระสารให้การสารกา	Marina ang ang ang ang ang ang ang ang ang a	ซ <sup>1</sup> ี ()=	๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛๛	ĸ <u>ſ</u> ₩₩₩₩₩₩₩₩₩	CF Ste
									1.200000 MH <u>Auto</u> Ma
-80.0									
-90.0									Freq Offse
-50.0									0 H
-100									
Start 793	.000 MHz						Stop 805.	000 MHz	
#Res BW		#	VBW 30 kHz			#Sweep	1.000 s (	1001 pts)	
MSG						<b>I</b> STATUS			

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



	nt Spectrum Ar											
LXI RL	RF				SEN	ISE:INT	#Avg Typ	ALIGN AUTO		M Sep 02, 2022		Frequency
Cente	er Freq 7	76.000		PNO: Wide	Trig: Free		#Avg iyp	e. RWS	TYF	E A WWWW A A A A A A		
				IFGain:Low	#Atten: 20	0 dB						A
	Ref	Offset 26.	7 dB					Mk	r1 775.9	84 MHz 99 dBm		Auto Tune
10 dB/d	liv Ref	26.70 d	Bm						-46.0	99 dBm		
10.7							$\cap$					Center Freq
16.7											77	76.000000 MHz
6.70												Start Freq
											7	72.000000 MHz
-3.30 —								\			- ''	2.000000 19112
								l l		-13.00 dBm		
-13.3 —										-13.00 dBm		Stop Freq
22.2											78	30.000000 MHz
-23.3 —												
							<u>}</u>					CF Step
-33.3						1	í	N,				800.000 kHz
						1 1		What I			<u>Auto</u>	Man
-43.3 —						- WWW		لىر.	hu.	RMS		
					and the states				"What the works			<b>Freq Offset</b>
-53.3		humperter		An alon May marked good of the state						and the second se		0 Hz
-63.3 —												
Cente	r 776.00	0 MHz							Span 8	.000 MHz		
	BW 100			#VBW	300 kHz			#Sweep	1.000 s (	.000 MHz 1001 pts)		
MSG								STATUS				
								<u> </u>				

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



🎉 Agilent Spec	trum Analyzer - Swept	t SA									
LXIRL			_	SEN	ISE:INT	#Avg Typ	ALIGN AUTO		M Sep 02, 2022	F	requency
Center F	req 788.000		∠ NO:Wide ↔►	. Trig: Free		#/\¥8   ¥F	Je. KNIJ	TYP	E A <del>WWWW</del> T A A A A A A A		
			Gain:Low	#Atten: 2	0 dB						
	Ref Offset 26.	7 dB					Mki	r1 788.0	00 MHz		Auto Tune
10 dB/div	Ref 26.70 d	Bm						-46.3	00 dBm		
16.7			$  \land  $								Center Freq
										78	3.000000 MHz
6.70											Start Freq
										784	1.000000 MHz
-3.30											
									-13.00 dBm		
-13.3		{									Stop Freq
-23.3 ———		{								792	2.000000 MHz
-33.3		<u>X</u>									CF Step
		Jowe Pr		No down	1					<u>Auto</u>	800.000 kHz Man
-43.3	لمحكمه المعار	p <sup>ra</sup>		Will Will							
	Jamera harrenter				AN MANUNAW AND						Freq Offset
-53.3						and a share a	**************************************	www.	RMS Alaton and a state		0 Hz
-63.3											
Center 78	8.000 MHz							Span 8	.000 MHz		
#Res BW			#VBW	300 kHz			#Sweep	1.000 s (	1001 pt <u>s)</u>		
MSG							STATUS				

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



	trum Analyzer - Swept										
Center Fi	RF 50 Ω req 776.000		-17	SEN	ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	M Sep 02, 2022	F	requency
Contor II			PNO: Wide ++- IFGain:Low	Trig: Free #Atten: 20		• ,,,		TYI			
			IFGain:Low	#Atten: 20	Jub		Mic				Auto Tune
10 dB/div Log	Ref Offset 26. <b>Ref 26.70 d</b>	7 dB <b>Bm</b>					WIK	-33.8	92 MHz 59 dBm		
_ • g											Center Freq
16.7											6.000000 MHz
6.70									RMS		
						1		مە <sup>ر</sup> ەمەلىكە ئەتىرىيە يەرىپىيە بەرىپىيە			Start Freq
-3.30						+				77	2.000000 MHz
-13.3									-13.00 dBm		Stop Freq
										78	0.000000 MHz
-23.3						- A					
					1	- Markow Contraction					CF Step
-33.3				hit-puttones	Langer and the second s	Net and a second se					800.000 kHz
and the state of the	มูรัฐรรมมีสารสารสารสารสารการการการการการการการการการการการการกา	ales a la seconda de la se								<u>Auto</u>	Man
-43.3											
											<b>Freq Offset</b>
-53.3											0 Hz
62.2											
-63.3											
	6.000 MHz							Span 8	.000 MHz		
#Res BW	100 kHz		#VBW	300 kHz					(1001 pts)		
MSG							<b>I</b> STATUS				

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



	nt Spectru	um Analyzer										
LXI RL			50 Ω AC		SE	NSE:INT	#Avg Typ	ALIGN AUTO		M Sep 02, 2022	F	requency
Cente	er ⊢re	eq 769.	000000	PNO: Wide +	Trig: Fre	e Run	#Avg Typ	e: RIVIS	TYP	PE A WWWW T A A A A A A		
				IFGain:Low	#Atten: 2	0 dB			DE			
		D-608-	et 26.7 dB					Mk	r1 774.9	52 MHz		Auto Tune
10 dB/c Log 🖵			.00 dBm						-44.5	93 dBm		
3												Center Freq
-20.0 —												9.000000 MHz
-20.0											/6	9.000000 MHz
-30.0 —										-35.00 dBm		Start Freq
											76	3.000000 MHz
-40.0 —										RM RM	10	0.000000 11112
										menterproperty		
-50.0								and the state of the state	WHAT WALKER - M			Stop Freq
							1	a ward a			77	5.000000 MHz
-60.0												
	phone	مسرمعاليكاماليوه	&^~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	หรือสู่สะวัตรรูลิเลกาสารุโครการูโกรูการู	him but the second	www.www.	an all all all all all all all all all a					
-70.0	1.000.00											CF Step 1.200000 MHz
											Auto	Man
-80.0											<u>/ (are</u>	
-90.0												Freq Offset
												0 Hz
-100 —												
-100												
Start	763.0	00 MHz							Stop 775	.000 MHz		
#Res				#VB	W 30 kHz			#Sweep	1.000 s (	1001 pts)		
MSG												
	-	_										

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



	ectrum Analyzer - Swept SA					
LXI RL	RF 50 Ω AC	D411-	SENSE:INT	ALIGN AUTO #Avg Type: RMS	08:41:06 PM Sep 02, 2022 TRACE 1 2 3 4 5 6	Frequency
Center	req 788.000000	PNO: Wide ↔	. Trig: Free Run	#Avg Type. Kino		
		IFGain:Low	#Atten: 20 dB			Auto Tomo
	Ref Offset 26.7 dB			Mk	r1 788.048 MHz	Auto Tune
10 dB/div Log	Ref 26.70 dBm				-33.602 dBm	
						O
16.7						Center Freq
10.7						788.000000 MHz
0.70						
6.70	Arr. group by the day and a star and provide a star and a sta					Start Freq
		$\mathbf{i}$				784.000000 MHz
-3.30						104.000000 11112
					-13.00 dBm	
-13.3						Stop Freq
						792.000000 MHz
-23.3						
		- North	<u>1</u>			OF Otom
-33.3			Warmer and a state of the state	were that a fact and a start of the second	RMS	CF Step 800.000 kHz
				and the second sec	and the second s	<u>Auto</u> Man
-43.3						
						Eron Offerst
-53.3						Freq Offset
						0 Hz
-63.3						
	88.000 MHz				Span 8.000 MHz	
#Res BW	100 kHz	#VBW	300 kHz		1.000 s (1001 pts)	
MSG					3	

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



	trum Analyzer - Swep										
IXI RL	RF 50 Ω req 799.000			SE	NSE:INT	#Avg Typ	ALIGN AUTO		M Sep 02, 2022	Fr	equency
Center F	req 799.000		NO: Wide ↔	, Trig: Fre		#/( <b>1</b> 8   <b>)</b> P		TYF			
		IF	Gain:Low	#Atten: 2	0 dB						
	Ref Offset 26.	7 dB					Mk	r1 793.0	96 MHz		Auto Tune
10 dB/div	Ref -10.00 (							-50.8	46 dBm		
											Center Freq
-20.0										799	.000000 MHz
-30.0											
									-35.00 dBm		Start Freq
-40.0										793	000000 MHz
. 1											
-50.0											Oton Erog
Wandgaller	Phylodel 1 and 1										Stop Freq
-60.0	1 and allowing where	<b>4</b>								805	.000000 MHz
00.0		۲۰۵٬۱۹۰ مهموم ال ۲۰۵۰ وا	erend an and the state of the second	man from the many	Man Palatin Martin	-			RMS		
-70.0						ALC: NOT A	and a specific the second	<sup>เพราส</sup> ุปสรมเวลสุขา <sub>นปีส</sub> ุปไป	allered and the state		CF Step
-70.0											.200000 MHz
										<u>Auto</u>	Man
-80.0											
											Freq Offset
-90.0											0 Hz
-100											
Start 793.			41 (BH				<b>#0</b>	Stop 805	.000 MHz		
#Res BW	TU KHZ		#VBV	/ 30 kHz			-		1001 pts)		
MSG							<b>I</b> STATUS	3			

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



	trum Analyzer - Swept SA								
(XI RL	RF 50 Ω AC		SENSE:	INT #Avg Typ	ALIGN AUTO		4 Sep 02, 2022	Frequency	у
Center F	req 776.00000	PNO: Wide ++-	Trig: Free Ru	un	e. 11115	TYP	E A WWWWW T A A A A A A A		
		IFGain:Low	#Atten: 20 d	В				Auto T	Funo
	Ref Offset 26.7 dB				Mki	1 776.0 -49.8	00 MHz	Autor	rune
10 dB/div Log	Ref 26.70 dBm					-49.80	00 dBm		
LUg								0	
16.7				(	$\mathbb{N}$			Center	-
10.7								776.000000	MHZ
C 70									
6.70								Start	Freq
0.00								772.000000	
-3.30									
							-13.00 dBm		
-13.3								Stopl	Freq
								780.000000	) MHz
-23.3									
								CES	Step
-33.3					1			800.000	0 kHz
				San Pro		the second s		<u>Auto</u>	Man
-43.3			1			Marriero			
			and the second second	And the second se		The second se	RMS	Freq O	ffset
-53.3	مى يەرىپى يەرىپ	and the start for the start of	and the second se					i i cq O	0 Hz
									5112
-63.3									
						0	000 8411-		
Center 77 #Res BW	6.000 MHz	#\/B\M	300 kHz		#Sween	Span 8. 1.000 s (′	000 WHZ		
	TOO KH2	#VDVV	JOU KHZ				roo r pts)		
MSG					<b>I</b> STATUS				

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



	ctrum Analyzer - Swep	it SA									
(XI RL	RF 50 Ω req 788.000		-	SEI	ISE:INT	#Avg Typ	ALIGN AUTO		M Sep 02, 2022	F	requency
Center F	req 788.000	PI	NO: Wide 🔶	. Trig: Fre		#/ <b>18</b> 1 JP		TYP			
		IF	Gain:Low	#Atten: 2	0 dB						
	Ref Offset 26.	7 dB					Mk	r1 788.0 -49.6	00 MHz		Auto Tune
10 dB/div Log	Ref 26.70 d							-49.60	)5 dBm		
LUg											Conton From
16.7		/	$\sum$								Center Freq
10.7										/8	8.000000 MHz
6.70											
											Start Freq
-3.30			<u> </u>							78	4.000000 MHz
		/	$ \rangle$								
-13.3									-13.00 dBm		Stop Freq
-23.3										79	2.000000 MHz
-23.3		1	1								
22.2		5	\								CF Step
-33.3	معلم	لعم	<u> </u>	eve_						<u>Auto</u>	800.000 kHz Man
-43.3	white				1						
الىلىمەلىر <sub>ىر</sub>	weekseether			and a short a second							Freq Offset
-53.3					اسر و و یہ سے بارے	- married all the	Housenan	manually	RMS		0 Hz
											0112
-63.3											
	8.000 MHz							Span 8. 1.000 s (1	.000 MHz		
#Res BW	100 kHz		#VBW	300 kHz			#Sweep	1.000 s (	1001 pts)		
MSG							<b>I</b> STATUS	3			

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



Magilent Spectrum Analyzer - Occupied BW						
RL         RF         50 Ω         AC           Center Freq 782.000000 I         PASS	MHz #IFGain:Low	SENSE:INT Center Freq: 782.00 Trig: Free Run #Atten: 20 dB		500/500	08:33:44 PM Sep 02, 2022 adio Std: None adio Device: BTS	Frequency
Ref Offset 26.7 dl 10 dB/div Ref 40.00 dBn						
30.0 20.0	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	᠆ᡗᠰᡊᡙ᠋ᡎᠬᠵᠴᡳᡔ᠈ᡢ᠇	ama tama fa			Center Freq 782.000000 MHz
-10.0 -20.0					ᡔᠬᢧᢧᢧᡀᢆᠬᡗᢑᡊᡙᠬᠬᡧ᠕ᡢᡞ	
-40.0						CF Step
Center 782 MHz #Res BW 100 kHz		#VBW 390	kHz		Span 10 MHz Sweep 1 ms	1.000000 MHz
Occupied Bandwidt	հ 5125 MF	Total F	ower	31.4 d	Bm	<b>Freq Offset</b> 0 Hz
Transmit Freq Error	12.280 k	Hz OBW P	ower	99.0	0 %	
x dB Bandwidth	5.077 M	Hz x dB		-26.00	dB	
MSG				STATUS		

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



Agilent Spectrum Analyzer - Occupied BW	/				_		
IXI         RF         50 Ω         AC           Center Freq         782.000000	MHz	SENSE:INT		IGN AUTO	08:32:45 PM Radio Std:	Sep 02, 2022 None	Frequency
PASS	#IFGain:Low		Avg Hold: 5	00/500	Radio Devid	e: BTS	
Ref Offset 26.7 c 10 dB/div Ref 40.00 dBi Log	IB						
20.0							Center Freq 782.000000 MHz
0.00	/ ·····	hhhindrand		N   			
-10.0 -20.0				N N N N N N N N N N N N N N N N N N N	ᢦᢂᢑᡊᢧᢩᠰ᠆ᠬ᠕ᡁ	mmahry	
-30.0							
-50.0							CF Step 1.000000 MHz
Center 782 MHz #Res BW 100 kHz		#VBW 390	kHz		Spar Swee	10 MHz ep 1 ms	<u>Auto</u> Man
Occupied Bandwid	<sup>th</sup> .5198 MH	Total I <b>- Z</b>	Power	30.6	dBm		Freq Offset 0 Hz
Transmit Freq Error	14.654		ower	99	.00 %		
x dB Bandwidth	5.119 N	IHz x dB		-26.0	)0 dB		
MSG							

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



J Agilent Spectrum Analyzer - Occupied BV	/	SENSE:INT			09,22,10,0	1500.02.2022	
Center Freq 782.000000 PASS	MHz #IFGain:Low	Center Freq: 782		ALIGN AUTO	Radio Std:		Frequency
Ref Offset 26.7 o 10 dB/div Ref 40.00 dB/ Log	IB						
20.0							<b>Center Fred</b> 782.000000 MHz
0.00	/ Marin		m.				
-10.0	<u>۲</u>					_Λ	
-20.0 M.					han	<sup>r</sup> W <sup>r</sup> vy Jyz	
-50.0 Center 782 MHz					Enar	ו 10 MHz	CF Step 1.000000 MHz
#Res BW 100 kHz		#VBW 39	0 kHz			ep 1 ms	<u>Auto</u> Man
Occupied Bandwid	<sup>th</sup> .5158 MI		l Power	29.7	′ dBm		<b>Freq Offset</b> 0 Hz
Transmit Freq Error	12.426 I	kHz OBW	/ Power	99	.00 %		
x dB Bandwidth	5.116 N	NHZ X dB		-26.	00 dB		
MSG					6		

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



Magilent Spectrum Analyzer - Occupied BW					
IX         RL         RF         50 Ω         AC           Center Freq 782.000000 Ν           PASS	🛶 Trig:	sense:INT er Freq: 782.000000 MHz Free Run Avg Hold n: 20 dB	Radio Std		Frequency
Ref Offset 26.7 dB					
20.0					Center Freq 782.000000 MHz
0.00		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
-10.0					
-30.0					
Center 782 MHz #Res BW 100 kHz	 ;	¥VBW 390 kHz	Spa Swe	n 10 MHz ep 1 ms	CF Step 1.000000 MHz <u>Auto</u> Man
Occupied Bandwidth 4.5	5146 MHz	Total Power	27.7 dBm		<b>Freq Offset</b> 0 Hz
Transmit Freq Error	10.191 kHz	OBW Power	99.00 %		
x dB Bandwidth	5.105 MHz	x dB	-26.00 dB		
MSG			STATUS		

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



Agilent Spectrum Analyzer - Occupied BW							
RL         RF         50 Ω         AC           Center Freq         782.000000         I	MHz	SENSE:INT Center Freg: 782.00		LIGN AUTO	08:39:51 PM Radio Std:	<sup>4</sup> Sep 02, 2022 None	Frequency
PASS	· →	Tains France Drug	Avg Hold:	500/500	Radio Devi	oo: BTS	
	#IFGain:Low	#Atten: 20 dB			Radio Devi	ce. DT3	
Ref Offset 26.7 dl 10 dB/div Ref 40.00 dBn Log				_			
30.0							Center Freq
20.0							782.000000 MHz
10.0	malalarteranter	ᡐᠬᢪᡧ᠆᠆᠆᠆ᡀᠰᡘᠼᡘ᠆ᡧ᠆᠆᠆᠆	mmmm	~			
				l,			
0.00	/			\			
-10.0				Wh.w			
-20.0					Munder Manufly	wall	
-30.0							
-40.0							
-50.0							CF Step
							2.000000 MHz
Center 782 MHz #Res BW 200 kHz		#VBW 820	kHz			n 20 MHz ep 1 ms	<u>Auto</u> Man
Occupied Bandwidt	h	Total	Power	31.4	dBm		Freq Offset
8.	9773 MI	lz					0 Hz
Transmit Freq Error	25.237	Hz OBW	Power	99.	00 %		
x dB Bandwidth	10.03 N	lHz x dB		-26.0	0 dB		
MSG				STATUS			
				<u></u>			

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



Milent Spectrum Analyzer - Occupied BW					1		
RL         RF         50 Ω         AC           Center Freq         782.000000	MHz	SENSE:INT Center Freq: 782.00 Trig: Free Run		LIGN AUTO	08:38:54 P Radio Std:	M Sep 02, 2022 None	Frequency
PASS	#IFGain:Low	#Atten: 20 dB			Radio Dev	ice: BTS	
Ref Offset 26.7 d 10 dB/div Ref 40.00 dBn							
30.0							Center Freq 782.000000 MHz
20.0	Jan Marine Marin	Production and a start and	4JVHVWWWWW	~~~			702.000000 Mil 12
0.00	<i>(</i>			۲ ۲			
-10.0 -20.0 -30.0 mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm				<sup>N</sup> Y Wr dely	ᠬ᠋ᡀᡀᡢᡨᠬᠬᢦᡁᡨᠰ	Maria .	
-30.0 Jan 200							
-50.0							CF Step 2.000000 MHz
Center 782 MHz #Res BW 200 kHz		#VBW 820	kHz		Spa Swe	n 20 MHz ep 1 ms	<u>Auto</u> Man
Occupied Bandwidt	h	Total F	Power	30.4	dBm		Freq Offset
8.	9834 MF	lz					0 H2
Transmit Freq Error	19.428 k	Hz OBW F	Power	99	.00 %		
x dB Bandwidth	9.944 M	Hz x dB		-26.0	00 dB		
MSG				<b>STATUS</b>			
				STATUS			

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



Mailent Spectrum Analyzer - Occupied BW	1				
M RL RF 50 Ω AC Center Freq 782.000000 PASS	MHz #IFGain:Low	SENSE:INT Center Freq: 782.000000 Trig: Free Run Av #Atten: 20 dB	ALIGN AUTO MHz /g Hold: 500/500	08:39:18 PM Sep 02, 2022 Radio Std: None Radio Device: BTS	Frequency
Ref Offset 26.7 d 10 dB/div <b>Ref 40.00 dB</b> r Log					
20.0					Center Freq 782.000000 MHz
0.00	Margarian Same	Instruction of the second s	www.www.		
-10.0 -20.0 -30.0			հղ հ հներ	M.M. Magnesser and and a	
-40.0					
-50.0 Center 782 MHz #Res BW 200 kHz		#VBW 820 kHz		Span 20 MHz Sweep 1 ms	CF Step 2.000000 MHz <u>Auto</u> Man
Occupied Bandwid	<sup>th</sup> 9858 MH	Total Pow	er 29.5	i dBm	<b>Freq Offset</b> 0 Hz
Transmit Freq Error	28.806 kl		er 99	.00 %	
x dB Bandwidth	10.06 MI	Hz x dB	-26.	00 dB	
MSG			<b>I</b> o Status	3	

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



Agilent Spectrum Analyzer - Occupied BW           K         RL         RF         50 Ω         AC		SENSE:INT		ALIGN AUTO	07:22:37 PM	Con 05, 2022	
Center Freq 782.000000 N	/IHz #IFGain:Low	Center Freq: 782.0	00000 MHz Avg Hold		Radio Std: N	one	Frequency
Ref Offset 26.7 dE 10 dB/div Ref 40.00 dBm Log				_			
20.0							Center Freq 782.000000 MHz
0.00	promption of	ᡊᡙᡗᡰᢛᡊᢧᠧᡘᢦᠰᢤᠰ᠆ᡪᢧᡞᢛᡣᡆᢂ	ware and the fame of				
-10.0							
-30.0					ᡐᠰᢦᡟᡟᡊᢧᢇᡄᢑᢦᠨᡁ	MP Mary	
- <sup>50.0</sup> Center 782 MHz #Res BW 200 kHz		#VBW 820	kH7		Span Swee	20 MHz p 1 ms	<b>CF Step</b> 2.000000 MHz <u>Auto</u> Man
Occupied Bandwidtl	n 9697 MH	Total	Power	27.5	ō dBm		<b>Freq Offset</b> 0 Hz
O., Transmit Freq Error	25.037		Power	99	0.00 %		
x dB Bandwidth	9.871 N	IHz x dB		-26.	00 dB		
MSG					5		

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



	um Analyzer - Swept SA							
Center Fre	RF 50 Ω AC		SENSE:I		ALIGN AUTO Type: RMS		4 Sep 02, 2022	Frequency
		PNO: Fast ↔ IFGain:Low	Trig: Free Ru #Atten: 20 dE					
		IFGain:Low	#Atten: 20 de	,	ML	r1 3.684		Auto Tune
10 dB/div	Ref 10.00 dBn	0			IVIN	-67.10	0 dBm	
	√ <sup>2</sup>							
0.00	}=							Center Freq
-10.0								5.015000000 GHz
-20.0								
-30.0								Start Freq
-40.0								30.000000 MHz
-50.0								
-60.0		<b>1</b>						Stop Freq
-70.0		and the second s					RMS	10.000000000 GHz
-80.0								
Start 30 MI						Stop 10	000 GHz	CF Step
#Res BW 1		#VBV	V 3.0 MHz		Sweep 17	.33 ms (2)	000 GH2	997.000000 MHz
MKR MODE TRC		X	Y	FUNCTION	FUNCTION WIDTH	FUNCTIO		<u>Auto</u> Man
1 N 1	f	3.684 0 GHz	-67.100 dBm					
2 N 1 3	f	778.2 MHz	-3.764 dBm					Freq Offset
4								0 Hz
6								
8								
9								
11							<b>.</b>	
MSG			III			2	•	
mog					STATUS			

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



🔰 Agilent Spect	trum Analyzer - Swept	t SA									x
LXI RL	RF 50 Ω	AC	-	SENS	SE:INT	#Avg Typ	ALIGN AUTO		M Sep 02, 2022		
Center Fr	req 5.01500		): Fast 🔸	. Trig: Free	Run	#Avg iyp	e. Rivis	TYF			
			in:Low	#Atten: 20	dB			DE			
							Mk	r1 3.697	7 5 GHz	Auto Tur	ne
10 dB/div	Ref 10.00 d	Bm							39 dBm		
0.00	_ <mark>}</mark> 2									Center Fre	eq
-10.0										5.015000000 GH	- 1
-20.0											
-30.0										Start Fre	ea
-40.0										30.000000 MI	
-50.0										00.000000 111	
			. 1								
-60.0									PMS	Stop Fre	ea
-70.0			terrane (the second sec							10.000000000 GI	
-80.0										10.000000000000	
Start 30 N								Stop 10	.000 GHz	CF Ste	
#Res BW	1.0 MHz		#VBW	3.0 MHz		S	weep 17	.33 ms (2	0001 pts)	997.000000 MH	
MKR MODE TR		Х		Y	FUNC	TION FU	NCTION WIDTH	FUNCTIO	DN VALUE	Auto Ma	an
1 N 1	f	3.697 5		-67.339 dB							
2 N 1	f	780.7	MHz	<u>-3.806 dB</u>	m					Freq Offs	et
4											Hz
5									E	01	12
6											
8											
9											
10											
<									+		
MSG								;			
							No.				_

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



	um Analyzer - Swept SA							
Center Fre	RF 50 Ω AC eq 5.015000000	GHz	SENSE		ALIGN AUTO		M Sep 02, 2022	Frequency
		PNO: Fast ++	<ul> <li>Trig: Free R #Atten: 20 d</li> </ul>			TYP		
		II Galli.cow		-	M	kr1 3.713		Auto Tune
10 dB/div	Ref 10.00 dBm					-67.43	38 dBm	
	∆ <mark>2</mark>							
0.00	V							Center Freq
-10.0								5.015000000 GHz
-20.0								
-30.0								Start Freq
-40.0								30.000000 MHz
-50.0								
-60.0		<b>1</b>					PMC	Stop Freq
-70.0								10.000000000 GHz
-80.0								
Start 30 MI	H7					Stop 10	.000 GHz	CF Step
#Res BW 1		#VBW	/ 3.0 MHz		Sweep 17	7.33 ms (2	0001 pts)	997.000000 MHz
MKR MODE TRC	SCL X		Y	FUNCTION	FUNCTION WIDTH	I FUNCTIO	N VALUE	<u>Auto</u> Man
1 N 1 2 N 1		713 4 GHz 787.2 MHz	-67.438 dBm -2.858 dBm					
3			-2.000 UDIII					Freq Offset
4 5							=	0 Hz
6								
8								
9								
11								
MSG					STATU	IS		

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



🗾 Agilent Spectrum Analyzer - Swept SA							
RL RF 50 Ω AC     Center Freq 5.015000000		SENSE:IN		ALIGN AUTO Type: RMS		1 Sep 02, 2022	Frequency
	PNO: Fast +++ IFGain:Low	Trig: Free Run #Atten: 20 dB			TYPE DE 11 3.702	4 GHz	Auto Tune
10 dB/div Ref 10.00 dBm					-67.39	1 dBm	
-10.0							Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0							Start Freq 30.000000 MHz
-60.0 -70.0 -80.0	1- 					RMS	<b>Stop Freq</b> 10.00000000 GHz
Start 30 MHz #Res BW 1.0 MHz	#VBW	3.0 MHz		Sweep 17	Stop 10. .33 ms (20	000 GHz 0001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TRC SCL X	702 4 GHz	Y -67.391 dBm	FUNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE	
	778.2 MHz	-3.636 dBm					<b>Freq Offset</b> 0 Hz
6 7 8 9							
10						-	
MSG		III			\$		

# 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-2210-FC014-P