

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: May 19, 2022 Location: HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA Report No.: HCT-RF-2205-FC023-R1

A3LSMG990U2

APPLICANT:

SAMSUNG Electronics Co., Ltd.

Model(s):	SM-G990U2
Additional Model(s):	SM-G990U3/DS
EUT Type:	Mobile Phone
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§90, §2

Mada	Tu Francisco au	- · · ·		ERP	
Mode	Tx Frequency	Emission	Modulation	Max. Power	Max. Power
(MHz)	(MHz)	Designator		(W)	(dBm)
	700 5 705 5	4M50G7D	QPSK	0.108	20.33
LTE Dond14 (E)		4M50W7D	16QAM	0.093	19.69
LTE – Band14 (5)	790.5 –795.5	4M52W7D	64QAM	0.072	18.60
		4M51W7D	256QAM	Max. Power (W) 0.108 0.093	15.57
		8M98G7D	QPSK	0.116	20.65
LTE – Band14 (10)	793.0	8M99W7D	16QAM	0.101	20.05
	793.0	8M98W7D	64QAM	0.077	18.87
		9M00W7D	256QAM	0.036	15.52

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-2205-FC023	May 13, 2022	- First Approval Report
HCT-RF-2205-FC023-R1	May 19, 2022	- Revised the Section 3.8. (Page 15.)

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:	A3LSMG990U2
Application Type:	Certification
FCC Classification:	PCS Licensed Transmitter Held to Ear (PCE)
FCC Rule Part(s):	§90, §2
EUT Type:	Mobile Phone
Model(s):	SM-G990U2
Additional Model(s):	SM-G990U3/DS
Tx Frequency:	790.5 MHz –795.5 MHz (LTE – BAND 14 (5MHz)) 793.0 MHz (LTE – BAND 14 (10 MHz))
Date(s) of Tests:	April 05, 2022 ~ May 02, 2022
Serial number:	Radiated: R3CT30Q0QPV Conducted: R3CT30Q0SAV

2. INTRODUCTION

2.1. DESCRIPTION OF EUT

The EUT was a Mobile Phone with GSM/GPRS/EGPRS/UMTS, CDMA(BC0, 1, 10) and LTE, Sub6.

It also supports IEEE 802.11 a/b/g/n/ac/ax (20/40/80), Bluetooth, BT LE, NFC, AIT, WPT, mmWave(n260/261).

2.2. MEASURING INSTRUMENT CALIBRATION

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

2.3. TEST FACILITY

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



3. DESCRIPTION OF TESTS

3.1 TEST PROCEDURE

Test Description	Test Procedure Used
Occupied Bandwidth	- KDB 971168 D01 v03r01 – Section 4.3
	- ANSI C63.26-2015 – Section 5.4.4
Band Edge	- KDB 971168 D01 v03r01 – Section 6.0
Dand Euge	- 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
Padiated Spurious and Harmonia Emissions	- KDB 971168 D01 v03r01 – Section 6.2
Radiated Spurious and Harmonic Emissions	- ANSI/TIA-603-E-2016 – Section 2.2.12

3.2 RADIATED POWER

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

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

Test Settings

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

measurement capability for signals with continuous operation.

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

Test Note

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

The power is calculated by the following formula;

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

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

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

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

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



3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber. Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to ANSI/TIA-603-E-2016.

Test Settings

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

Test Note

1. Measurements value show only up to 3 maximum emissions noted, or would be lesser

if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit)

and considered that's already beyond the background noise floor.

2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.

The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data

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

The spurious emissions is calculated by the following formula;

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

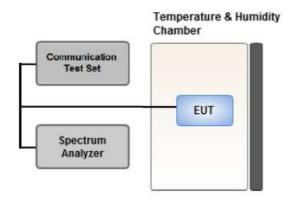
Where: P_gis the generator output power into the substitution antenna.

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

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



3.4 OCCUPIED BANDWIDTH.



Test setup

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

The EUT makes a call to the communication simulator.

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

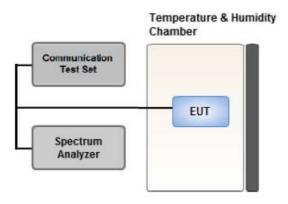
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

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



3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

Test Overview

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

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

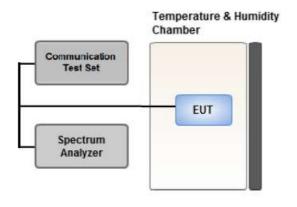
All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

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



3.6 BAND EDGE



Test setup

Test Overview

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

Test Settings

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

Test Notes

§90.543(e)

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

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

Test Notes

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

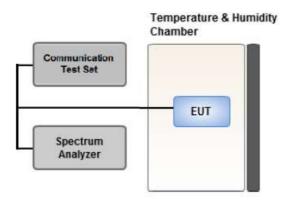
the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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

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



3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

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

The frequency stability of the transmitter is measured by:

1. Temperature:

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

environmental chamber.

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

for other than hand carried battery equipment.

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

Test Settings

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

(20°C to provide a reference).

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

3.8 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
 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, and paging service configurations shown in the test data.
- Please refer to the table below.
- SM-G990U2 & additional models were tested and the worst case results are reported.

(Worst case : SM-G990U2)

[worst case]					
Test Description	Modulation	RB size	RB offset	Axis	
Effective Radiated Power	QPSK,	1	0	Y	
	16QAM,				
	64QAM,				
	256QAM				
Radiated Spurious and Harmonic Emissions	QPSK	1	0	Y	

[Worst case]



3.9 WORST CASE(CONDUCTED TEST)

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

- SM-G990U2 & additional models were tested and the worst case results are reported.

(Worst case : SM-G990U2)

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

4. LIST OF TEST 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	06/28/2022	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	08/30/2022	Biennial
Horn Antenna(1 ~ 18 GHz)	BBHA 9120D	Schwarzbeck	9120D-1298	09/15/2023	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170342	10/13/2022	Biennial
Horn Antenna(15 ~ 40 GHz)	BBHA 9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Signal Analyzer(10 Hz ~ 26.5 GHz)	N9020A	Agilent	MY52090906	05/18/2022	Annual
ATTENUATOR(20 dB)	8493C	Hewlett Packard	17280	06/01/2022	Annual
Spectrum Analyzer(10 Hz ~ 40 GHz)	FSV40	REOHDE & SCHWARZ	100931	09/29/2022	Annual
Base Station	8960 (E5515C)	Agilent	MY48360800	08/18/2022	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	07/12/2022	Annual
Wideband Radio Communication Tester	MT8820C	Anritsu Corp.	6200863156	12/29/2022	Annual
SIGNAL GENERATOR (100 kHz ~ 40 GHz)	SMB100A	REOHDE & SCHWARZ	177633	07/05/2022	Annual
Signal Analyzer(5 Hz ~ 40.0 GHz)	N9030B	KEYSIGHT	MY55480167	06/02/2022	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, §90.543(e)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
On all frequencies between 769- 775 MHz and 799-805 MHz.	§90.543(e)	< 65 + 10log10 (P[Watts])	PASS <u>(See Note2)</u>
Conducted Output Power	§2.1046	N/A	See Note1
Frequency stability / variation of ambient temperature	§2.1055, §90.539(e)	< 2.5 ppm	PASS

Note:

- 1. See SAR Report
- Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance.

6.2 Test Condition : Radiated Test

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



7. SAMPLE CALCULATION

7.1 ERP Sample Calculation

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

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

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

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

3) Record the field strength meter's level.

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

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

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

7.2 EIRP Sample Calculation

Ch	./ Freq.	Measured	Measured Substitute Ant. Gain		C.L	Pol.	EII	RP
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBi)	U.L	FUI.	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	QPSK Modulation
Emission Designator = 4M17F9W	Emission Designator = 4M48G7D
WCDMA BW = 4.17 MHz	LTE BW = 4.48 MHz
F = Frequency Modulation	G = Phase Modulation
9 = Composite Digital Info	7 = Quantized/Digital Info
W = Combination (Audio/Data)	D = Data transmission; telemetry; telecommand

QAM Modulation

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



8. TEST DATA

8.1 EFFECTIVE RADIATED POWER

Freq	Mod	Modulation	Measured	Substitute	Ant.	<u></u>	Del	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm)	Gain(dBd)	C.L	Pol	w	W	dBm
		QPSK	-29.75	31.80	-10.11	1.36	V		0.108	20.33
790.5		16-QAM	-30.39	31.16	-10.11	1.36	V		0.093	19.69
790.5		64-QAM	-31.48	30.07	-10.11	1.36	V		0.072	18.60
		256-QAM	-34.51	27.04	-10.11	1.36	V		0.036	15.57
		QPSK	-29.95	31.73	-10.12	1.36	V		0.106	20.25
793.0	LTE B14	16-QAM	-30.52	31.16	-10.12	1.36	V	< 3.00	0.093	19.68
793.0	(5 MHz)	64-QAM	-31.68	30.00	-10.12	1.36	V	< 3.00	0.071	18.52
		256-QAM	-34.75	26.93	-10.12	1.36	V		0.035	15.45
		QPSK	-30.27	31.44	-10.12	1.37	V		0.099	19.96
705 F	795.5	16-QAM	-30.82	30.90	-10.13	1.37	V		0.087	19.41
795.5		64-QAM	-31.98	29.73	-10.12	1.37	V		0.067	18.25
		256-QAM	-35.07	26.65	-10.13	1.37	V		0.033	15.16

Freq	Mod	Modulation	Measured	Substitute	Ant.	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm)	Gain(dBd)	U.L	FUI	W	W	dBm
		QPSK	-29.55	32.13	-10.12	1.36	V		0.116	20.65
702.0	LTE B14	16-QAM	-30.15	31.53	-10.12	1.36	V	. 2.00	0.101	20.05
793.0	(10 MHz)	64-QAM	-31.33	30.35	-10.12	1.36	V	< 3.00	0.077	18.87
		256-QAM	-34.68	27.00	-10.12	1.36	V		0.036	15.52



8.2 RADIATED SPURIOUS EMISSIONS

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

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1 581.0	-54.48	9.04	-63.02	1.95	V	-55.93	-50.00
23305 (790.5)	2 371.5	-49.15	10.10	-52.27	2.42	V	-44.59	-13.00
(10010)	3 162.0	-55.92	11.34	-56.51	2.83	V	-48.00	-13.00
	1 586.0	-53.57	9.08	-62.30	1.96	V	-55.17	-50.00
23330 (793.0)	2 379.0	-49.09	10.10	-52.53	2.44	Н	-44.87	-13.00
(10010)	3 172.0	-56.13	11.38	-56.90	2.83	V	-48.35	-13.00
	1 591.0	-52.24	9.12	-61.15	1.96	V	-53.99	-50.00
23355 (795.5)	2 386.5	-48.59	10.10	-51.99	2.45	V	-44.33	-13.00
(3 182.0	-57.16	11.42	-57.91	2.83	Н	-49.32	-13.00



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

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1 586.0	-53.12	9.08	-61.85	1.96	V	-54.72	-50.00
23330 (793.0)	2 379.0	-49.03	10.10	-52.47	2.44	Н	-44.81	-13.00
(100.0)	3 172.0	-56.76	11.38	-57.53	2.83	V	-48.98	-13.00



1559 MHz ~ 1610 MHz BAND

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

Operating Frequency (MHz)	Measured Frequency (MHz)	EMISSION TYPE	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Margin (dB)
790.5	1606.63		-63.41	9.30	-73.03	1.99	Н	-65.72	15.72
793.0	1608.36	Narrow Band	-63.39	9.30	-73.01	1.99	Н	-65.70	15.70
795.5	1607.01		-63.45	9.30	-73.07	1.99	V	-65.76	15.76

Note:

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

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

Operating Frequency (MHz)	Measured Frequency (MHz)	EMISSION TYPE	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Margin (dB)
793.0	1607.84	Narrow Band	-63.39	9.30	-73.01	1.99	Н	-65.70	15.70

Note:

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



8.3 OCCUPIED BANDWIDTH

Band	Band Width	Frequency (MHz)	Modulation	Resource Block Size	Resource Block Offset	Data (MHz)			
			QPSK	25	0	4.5034			
	5 MHz	702.0	16-QAM	25	0	4.4982			
			64-QAM	25	0	4.5154			
14			256-QAM	25	0	4.5095			
14					793.0	QPSK	50	0	8.9749
	10 MU-	MHz	16-QAM	50	0	8.9852			
			64-QAM	50	0	8.9771			
			256-QAM	50	0	9.0010			

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 49 ~ 56.

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Measurement Maximum Data (dBm)	Result (dBm)	Limit (dBm)
		790.5	3.6850	27.976	-67.369	-39.393	
14	5	793.0	3.6825	27.976	-67.357	-39.381	-13.00
14		795.5	3.7139	27.976	-67.345	-39.369	-13.00
	10	793.0	3.6750	27.976	-67.124	-39.148	

8.4 CONDUCTED SPURIOUS EMISSIONS

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 57 ~ 60.

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

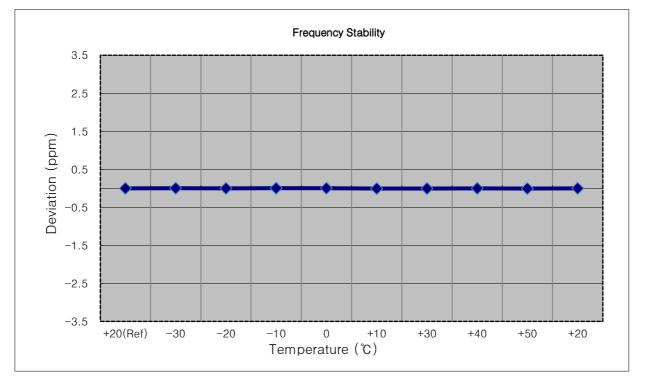
- Plots of the EUT's Band Edge are shown Page 33 ~ 48.



8.6 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE

I MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>790,500,000 Hz</u>
CHANNEL:	<u>23305 (5 MHz)</u>
REFERENCE VOLTAGE:	3.880 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

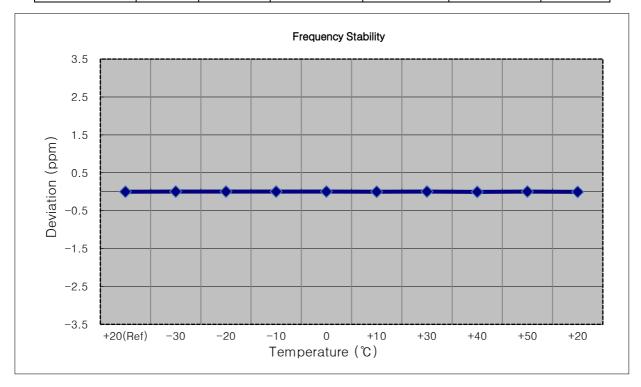
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	790 499 998	0.00	0.000 000	0.0000
100 %		-30	790 500 001	2.40	0.000 000	0.0030
100 %		-20	790 499 996	-1.90	0.000 000	-0.0024
100 %		-10	790 500 001	2.90	0.000 000	0.0037
100 %	3.880	0	790 500 001	2.80	0.000 000	0.0035
100 %		+10	790 499 993	-4.80	-0.000 001	-0.0061
100 %		+30	790 499 995	-3.60	0.000 000	-0.0046
100 %		+40	790 499 996	-2.30	0.000 000	-0.0029
100 %		+50	790 499 994	-3.70	0.000 000	-0.0047
Batt. Endpoint	3.650	+20	790 499 996	-1.80	0.000 000	-0.0023





MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (5 MHz)</u>
REFERENCE VOLTAGE:	3.880 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

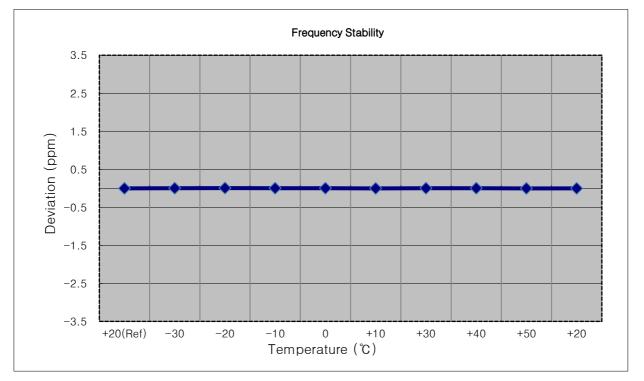
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	793 000 002	0.00	0.000 000	0.0000
100 %		-30	793 000 004	2.50	0.000 000	0.0032
100 %		-20	793 000 004	2.30	0.000 000	0.0029
100 %		-10	793 000 004	2.10	0.000 000	0.0026
100 %	3.880	0	793 000 004	2.20	0.000 000	0.0028
100 %		+10	793 000 000	-1.70	0.000 000	-0.0021
100 %		+30	793 000 004	1.80	0.000 000	0.0023
100 %		+40	792 999 999	-2.80	0.000 000	-0.0035
100 %		+50	793 000 005	2.80	0.000 000	0.0035
Batt. Endpoint	3.650	+20	792 999 999	-3.10	0.000 000	-0.0039





I MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>795,500,000 Hz</u>
CHANNEL:	<u>23355 (5 MHz)</u>
REFERENCE VOLTAGE:	3.880 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

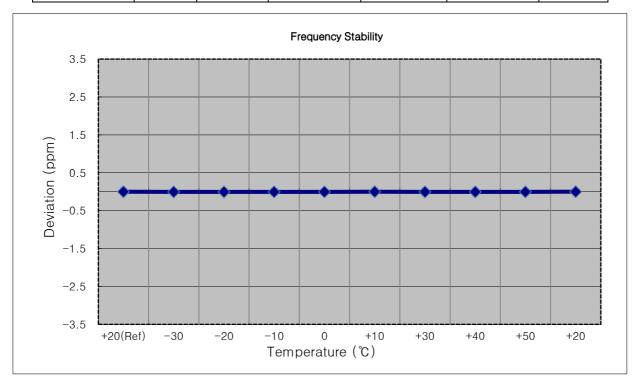
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100 %		+20(Ref)	795 500 003	0.00	0.000 000	0.0000
100 %		-30	795 500 006	3.20	0.000 000	0.0040
100 %		-20	795 500 008	4.50	0.000 001	0.0057
100 %		-10	795 500 005	2.10	0.000 000	0.0026
100 %	3.880	0	795 500 006	2.50	0.000 000	0.0031
100 %		+10	795 500 001	-2.30	0.000 000	-0.0029
100 %		+30	795 500 004	0.90	0.000 000	0.0011
100 %		+40	795 500 005	2.10	0.000 000	0.0026
100 %		+50	795 500 001	-2.30	0.000 000	-0.0029
Batt. Endpoint	3.650	+20	795 500 002	-1.20	0.000 000	-0.0015





MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (10 MHz)</u>
REFERENCE VOLTAGE:	<u>3.880 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

Voltage	Power	Temp.	Frequency	Frequency	Deviation	ppm
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	
100 %		+20(Ref)	793 000 001	0.00	0.000 000	0.0000
100 %	1	-30	792 999 999	-2.30	0.000 000	-0.0029
100 %		-20	792 999 998	-3.50	0.000 000	-0.0044
100 %		-10	792 999 998	-3.60	0.000 000	-0.0045
100 %	3.880	0	792 999 998	-3.30	0.000 000	-0.0042
100 %		+10	793 000 000	-1.70	0.000 000	-0.0021
100 %		+30	792 999 999	-2.30	0.000 000	-0.0029
100 %		+40	792 999 999	-2.40	0.000 000	-0.0030
100 %		+50	792 999 999	-2.10	0.000 000	-0.0026
Batt. Endpoint	3.650	+20	793 000 003	1.10	0.000 000	0.0014





FCC ID: A3LSMG990U2

9. TEST PLOTS



	03:54:21 PM Apr14, 2022	ALIGN AUTO	SENSE:INT	drum Analyzer - Swept SA RF 50 Ω AC	Agilent Spec
Frequency	03:54:21 PM Apr 14, 2022 TRACE 1 2 3 4 5 1 TYPE A WWWWWW DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	10- 50.12 AL req 788.0000000 MHz PNO:Fast ↔ IFGain:Low	and the second se
Auto Tune	1 788.000 MHz -26.255 dBm	Mk		Ref Offset 26.7 dB Ref 26.70 dBm	10 dB/dlv
Center Free 788.000000 MH					16.7
Start Free 775.000000 MH					6.70 3.30
Stop Free 801.000000 MH	13.00 sBm		1		13.3
CF Ste 2.600000 MH Auto Ma					43.3
Freq Offse 0 H					53.3
	Span 26.00 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	8.00 MHz 100 kHz #VBW	Center 78
		Co STATUS			ISG

5 M_BandEdge_Lowest Channel_QPSK_FullRB(1)



0 8 00	-			trum Analyzer - Swept SA	Agilent Spectra
Frequency	03:54:42 PM Apr 14, 2022 TRACE 1 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	RF 50.0 AC req 772.000000 MHz PNO: Wide ↔→ IFGain:Low	Center Fre
Auto Tune	1 774.244 MHz -65.686 dBm	Mki		Ref Offset 26.7 dB Ref -10.00 dBm	10 dB/dlv
Center Fred 772.000000 MH:					40.0
Start Free 769.000000 MH:	-35.00 dBm				49.0
Stop Free 775.000000 MH:					50.0 60.0
CF Step 600.000 kH Auto Mar		Nefanette og anette beser til størt her	นร์เทชรสารใช _{้เ} นาใจใช้สำรังไปในเป็นแห่ง	ŧĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸ	70.0
Freq Offse 0 H					90.0
	Stop 775.000 MHz 1.000 s (1001 pts)	#Sweep	30 kHz		Start 769.0
		Contratus Contratus			ASG .

5 M_BandEdge_Lowest Channel_QPSK_FullRB(2)



				trum Analyzer - Swept SA	
Frequency	03:59:22 PM Apr14, 2022 TRACE 1 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	RF 50.02 AC req 798.000000 MHz PNO: Wide ↔ IFGain:Low	Center Fre
Auto Tune	1 798.000 MHz -25.341 dBm	Mki		Ref Offset 26.7 dB Ref 26.70 dBm	10 dB/dlv
Center Fred 798.000000 MH					16.7
Start Free 796.000000 MH					6,70 3.30
Stop Free 800.000000 MH	+ 3 05 (BH)				13.3
CF Ste 400.000 kH Auto Ma	ny ikana katalogo na sana	and the second se			43.3
Freq Offse 0 H					53.3
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz		63.3 Center 798. #Res BW 10
		Co STATUS			ISG

5 M_BandEdge_Highest Channel_QPSK_FullRB(1)



	03:59:42 PM Apr 14, 2022	ALIGN AUTO	ISE:INT	SEM		rum Analyzer - Swept SA RF 50 Q AC	RL RL
Frequency	TRACE 2 3 4 5 0 TYPE A WWWWW DET A A A A A A	vg Type: RMS	Run	2 . W	PNO: Wide	eq 802.000000 M	Center F
Auto Tur	1 799.138 MHz -40.422 dBm	Mkr				Ref Offset 26.7 dB Ref -10.00 dBm	0 dB/div
Center Fre 802.000000 Mi							100
Start Fre 799.000000 Mi	-35.00 ctine					were lever geter hand were and the price days	
Stop Fre 805.000000 Mi	1975 คลามการจากการจากการจากการจากการจากการจาก	and an and a start and a start	all	brighten wijselen	an an first an airstacht.		υ.0 0.0
CF Ste 600.000 ki Auto Mi	ne anna ann ann ann ann ann ann						0.0
Freq Offs 01							0.0
	Stop 805.000 MHz 1.000 s (1001 pts)	#Sween		30 kHz	#vbw	000 MHz 10 kHz	tart 799. Res BW
		Costatus					ia)

5 M_BandEdge_Highest Channel_QPSK_FullRB(2)



Costatus -	
00 kHz #VBW 300 kHz #Sweep 1.000 s (1	5.00 MHz 1001 pts)
	Freq Offse
	CF Ster 2.600000 MH <u>Auto</u> Ma
	Stop Free 801,000000 MH
	Start Free 775.000000 MH
A	Center Free 788.000000 MH
Ref Offset 26.7 dB Mkr1 788.00 Ref 26.70 dBm -18.40	00 MHz Auto Tuni 07 dBm
A 799 000000 MH-> #Avg Type: RMS TRACE	TAAAAAA
m Analyzer - Swept SA R5 50 (2) AC SENSE: INT ALIGN AUTO 03:55:07 PM	M Apr 14, 2022

5 M_BandEdge_Lowest Channel_QPSK_1RB(1)



0 9 00					trum Analyzer - Swept SA	A CONTRACTOR OF A CONT
Frequency	03:55:26 PM Apr 14, 2022 TRACE 1 2 3 4 5 (TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	PNO: Wide +++	req 772.000000 N	Center F
Auto Tuni	1 770.482 MHz -65.475 dBm	Mkr	#Atten: 20 db	IFGain:Low	Ref Offset 26.7 dB Ref -10.00 dBm	10 dB/dlv
Center Free 772.000000 MH						20.0
Start Free 769.000000 MH	-35.00 dðing					40.0
Stop Free 775.000000 MH				s 1		50.0 60.0
CF Ster 600.000 kH Auto Mar		AN CONTRACTORISTICS	دىرىمەرىمەر يەتىچىنىيە تەرىپىلەر تەرىپىلەرلەردى مەرىپىدىرىمەر يەتىچىنىيە تەرىپىلەر تەرىپىلەرلەردى	en e	ternelation of the second second second	20.0
Freq Offse 0 H						90.0
	Stop 775.000 MHz 1.000 s (1001 pts)	#Sweep	30 kHz	#VBW	000 MHz	Start 769
		Co STATUS				ASG

5 M_BandEdge_Lowest Channel_QPSK_1RB(2)



0 9 23			anare wet	12 12	ctrum Analyzer - Swept SA	Agilent Spe
Frequency	04:00:09 PM Apr14, 2022 TRACE 1 2 3 4 5 0 TYPE A VANAMAN DET A A A A A A	ALIGN AUTO #Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	PNO: Wide	RF 50 0 AC req 798.000000 I	1.
Auto Tune	1 798.000 MHz -17.893 dBm	Mkr		Contraction of the local distance of the loc	Ref Offset 26.7 dB Ref 26.70 dBm	10 dB/dlv
Center Freq 798.000000 MHz						167
Start Free 796.000000 MHz						670 -3.30
Stop Free 800.000000 MH	t300 dBM		1			-13.3
CF Step 400.000 kH Auto Mar		×				43.3
Freq Offse 0 Ha	RIG					-53.3
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	#VBW	98.000 MHz 100 kHz	Center 79
		Costatus.				/ISG

5 M_BandEdge_Highest Channel_QPSK_1RB(1)



0 9 0	-			trum Analyzer - Swept SA	
Frequency	04:00:30 PM Apr 14, 2022 TRACE 1 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	RF 50 £ AC req 802.000000 MHz PNO: Wide ↔ IFGain:Low	Center Fr
Auto Tun	1 799.762 MHz -60.818 dBm	Mkr		Ref Offset 26.7 dB Ref -10.00 dBm	10 dB/dlv
Center Fre 802.000000 MH					20.0
Start Fre 799.000000 MH	-35.00 dBm				40.0
Stop Fre 805.000000 MH					90.0 90.0
CF Ste 600.000 kH Auto Ma		ىرىمىيە (ئارىدىغار يەرىيەن ئۇمىيە بەرىيە يەرىيە يەرىيە بەرىيە بەرىيە بەرىيە بەرىيە بەرىيە بەرىيە بەرىيە بەرىيە يەرىپەر يەرىيە بەرىيە	and a second and a second s	and the second	73.0
Freq Offso 0 H					30.0
	Stop 805.000 MHz 1.000 s (1001 pts)	#Sweep	30 kHz		Start 799.0
		Costatus			190

5 M_BandEdge_Highest Channel_QPSK_1RB(2)



0 7 23				ent Spectrum Analyzer - Swept SA
Frequency	04:02:01 PM Apr 14, 2022 TRACE 1 2 3 4 5 TYPE A WWWWW DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	er Freq 788.000000 MHz PNO: Fast ↔ IFGain:Low
Auto Tune	1 788.000 MHz -30.907 dBm	Mki		Ref Offset 26.7 dB /dlv Ref 26.70 dBm
Center Fred 788.000000 MHz				
Start Fred 775.000000 MH2				
Stop Free 801.000000 MH;	13 00 dBm			
CF Step 2.600000 MH; Auto Mar	RMS			
Freq Offse 0 Ha				
	Span 26.00 MHz 1.000 s (1001 pts)	#Sweep	/ 300 kHz	er 788.00 MHz BW 100 kHz #VBM
		Co STATUS		

10 M_BandEdge_Mid Channel(Lower)_QPSK_FullRB(1)



0-9-6			1	trum Analyzer - Swept SA
Frequency	04:02:21 PM Apr14, 2022 TRACE 2 3 4 5 TYPE A VANNAN DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB	RF 50.0 AC req 772.000000 MHz PNO: Wide ↔ IF Gain:Low
Auto Tun	1 769.216 MHz -65.575 dBm	Mki		Ref Offset 26.7 dB Ref -10.00 dBm
Center Fre 772.000000 MH				
Start Fre 769.000000 MH	-35.00 dðm			
Stop Fre 775.000000 MH				
CF Ste 600.000 kH Auto Ma		fa geografia da glaser y dilla de Basher (beren)	an a	dayaway ka ¹ an dina mangangka pangka pangka pangka (19) na ma
Freq Offs 0 F				
	Stop 775.000 MHz 1.000 s (1001 pts)	#Sweep	30 kHz	000 MHz 10 kHz #VBW
		Co STATUS		

10 M_BandEdge_Mid Channel(Lower)_QPSK_FullRB(2)



0 4 43					pectrum Analyzer - Swept SA	Agilent Sp
Frequency	04:05:41 PM Apr 14, 2022 TRACE 1 2 3 4 P TYPE A VANANAN DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB		RF 50.0 AC Freq 798.000000 I	Center I
Auto Tune	1 798.000 MHz -29.803 dBm	Mkr		.7 dB dBm	Ref Offset 26.7 dB Ref 26.70 dBm	10 dB/dlv
Center Free 798.000000 MH						167
Start Free 796.000000 MH2					*****	6 70 3 30
Stop Free 800.000000 MH:	13.05 dBm		×			13.3
CF Step 400.000 kH Auto Mar	5115 	N				43.3
Freq Offse 0 H						53.3
	Span 4.000 MHz 1.000 s (1001 pts)	#Sweep	300 kHz	#VBW	798.000 MHz W 100 kHz	
		Co STATUS				MSG

10 M_BandEdge_Mid Channel(Higher)_QPSK_FullRB(1)



0 9 🜌					ctrum Analyzer - Swept SA	
Frequency	04:06:00 PM Apr 14, 2022 TRACE 1 2 3 4 P TYPE A VANANAN DET A A A A A A	#Avg Type: RMS	SENSE:INT Trig: Free Run #Atten: 20 dB		req 802.000000	Center F
Auto Tun	1 799.198 MHz -42.654 dBm	Mkr		7 dB	Ref Offset 26.7 dB Ref -10.00 dBm	10 dB/div
Center Free 802.000000 MH						40.0
Start Free 799.000000 MH	-35.00 atom					30.0 40.0
Stop Free 805.000000 MH	and a state of the	int - hour we have a firm of the second	WENDALING CONTRACT	and and a second se		50.0 60.0
CF Ste 600.000 kH Auto Ma						70.0
Freq Offse 0 H						90.0
	Stop 805.000 MHz 1.000 s (1001 pts)	#Sween	30 kHz	#VBW	.000 MHz 10 KHz	Start 799
		Co STATUS				190

10 M_BandEdge_Mid Channel(Higher)_QPSK_FullRB(2)



Agilent Spectrum Analyzer - Swept SA			0 8 1
Center Freq 788.000000		ALIGN AUTO 04:02:45 PM Apr1 #Avg Type: RMS TRACE 12 TYPE A	Frequency
Ref Offset 26.7 dB 10 dB/dlv Ref 26.70 dBm		Mkr1 788.000 -32.885 c	MHz Auto Tune IBm
16.7			Center Free 788.000000 MHz
3.30			Start Free 775.000000 MH
-13.3			Stop Free 801.000000 MH
43.3			CF Stej 2.600000 MH <u>Auto</u> Ma
53.3		mm	Freq Offse
63.3 Center 788.00 MHz #Res BW 100 kHz	#VBW 300 kHz	Span 26.00 #Sweep 1.000 s (1001	MHz pts)
MSG :		STATUS	

10 M_BandEdge_Mid Channel(Lower)_QPSK_1RB(1)



0 9 100				rum Anølyzer – Swept SA	and the second second second second
Frequency	04:03:06 PM Apr 14, 2022 TRACE 1 2 3 4 5 TYPE A 00000000 DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	R5 50 Ω AC eq 772.000000 MHz PNO: Wide ↔ IFGain:Low	Center Fr
Auto Tune	1 771.706 MHz -65.275 dBm	Mki		Ref Offset 26.7 dB Ref -10.00 dBm	10 dB/dlv
Center Fred 772.000000 MHz					-20.0
Start Free 769.000000 MHz	-35.00 d9m				-40.0
Stop Free 775.000000 MH			.1		-53.0
CF Step 600.000 kH Auto Mar		nghifindhaifan tadio chaifinahaifin a faraigan d	auren Parresperantering	ĸĨġġġĨġġġĸġġġġŀĸġġġĸĸġĊĸĸţŎijŶŷijĸġŀŷĊĴŀĸĬĸĸĴĸſĸĸţŎIJ	20.0
Freq Offse 0 Hi					-90.0
	Stop 775.000 MHz 1.000 s (1001 pts)	#Suusan	/ 30 kHz		Start 769.0
		Status	50 KH2	*VDV	MSG

10 M_BandEdge_Mid Channel(Lower)_QPSK_1RB(2)



			1	Analyzer - Swept SA	the second se
Frequency	04:06:29 PM Apr14, 2022 TRACE 1 2 3 4 5 1 TYPE A 9444444 DET A A A A A A	#Avg Type: RMS	SENSE:INT	RF 50 02 AC 798.000000 MHz PNO: Wide	Center Fre
Auto Tune	1 798.000 MHz -31.680 dBm	Mk	#Atten: 20 dB	IFGain:Low ef Offset 26.7 dB ef 26.70 dBm	10 dB/dlv
Center Fred 798.000000 MH					167
Start Free 796.000000 MH					3.30
Stop Free 800.000000 MH	1300 dBm				13.3
CF Stej 400.000 kH Auto Mar					43.3
Freq Offse 0 H	Fails	terror to a second second			53.3
	Span 4.000 MHz 1.000 s (1001 pts)	#Sween	300 kHz		Center 798
		Co STATUS			ISG

10 M_BandEdge_Mid Channel(Higher)_QPSK_1RB(1)



0- 7-23		1	1	ctrum Analyzer - Swept SA	Contract of the second s
Frequency	04:06:48 PM Apr14, 2022 TRACE 1 2 3 4 5 TYPE A VMMMM DET A A A A A A	#Avg Type: RMS	Trig: Free Run #Atten: 20 dB	RF 50.02 AC req 802.0000000 MHz PNO: Wide ↔ IFGain:Low	and the second se
Auto Tune	1 799.012 MHz -59.775 dBm	Mki		Ref Offset 26.7 dB Ref -10.00 dBm	
Center Free 802.000000 MHz					20.0
Start Free 799.000000 MH	-35.00 atêm				40.0
Stop Free 805.000000 MH					50.0 1 60.0
CF Stej 600.000 kH Auto Ma		างรู้ที่ สำหารรู้และสรรณรรณรรณร์ มีมีสีที่สามสมาคณรู	alahan dari Marazak dari baran da kara	^{Ma} y ^a ncingan ^m arting anaya <u>kan</u> paketan kandar dan diri diri kan manaka i _l an	70.0
Freq Offse 0 H					90.0
	Stop 805.000 MHz 1.000 s (1001 pts)	#Sweep	N 30 kHz		Start 799.000 f
		Co STATUS			ISG

10 M_BandEdge_Mid Channel(Higher)_QPSK_1RB(2)



Agilent Spectrum Analyzer - Occupied 8 30 RL RF 50 Q AC	w.	SENSE:INT		ALIGN AUTO	:57:39 PM Apr 14, 2022	0 8 00
Center Freq 793.000000 PASS	MIHZ #FGain:Low	Center Freq: 793.0		Rad 500/500	o Std: None o Device: BTS	Frequency
Ref Offset 26.7 10 dB/dly Ref 40.00 dB						
20.0	mm	Lunn	~_~~~	~		Center Free 793.000000 MH 793.000000 MH 1.000000 MH Auto Mar Freq Offse
10.0				<u>\</u>		
10.0 20.0 30.0 40.0				him	hmmm	
Center 793 MHz #Res BW 100 kHz		#VBW 390	kHz		Span 10 MHz Sweep 1 ms	1.000000 MH
Occupied Bandwic	Ith .5034 MH		Power	31.6 dB	n	Freq Offse 0 H
Transmit Freq Error x dB Bandwidth	19.991 k 4.932 M		Power	99.00 -26.00 d		
MSG				G STATUS		

5 M_OBW_Mid Channel_QPSK_FullRB



RL RF 50.0 AC Center Freq 793.000000 PASS	MHz #FGain:Low		793.000000 MHz n Avg Hol	ALIGN AUTO	03:56:41 PM Radio Std: N Radio Devic	1012102	Frequency
Ref Offset 26.7 (0 dB/div Ref 40.00 dB							
20.0							Center Fred 793.000000 MH
10.0	Junam	mmin	e Mayor	~~~			
10.0	/			1			
20.0 30.0 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				~	minan	mm	
50.0							CF Step 1.000000 MH
Center 793 MHz #Res BW 100 kHz		#VBW	390 kHz			10 MHz p 1 ms	<u>uto</u> Mar
Occupied Bandwid 4	th .4982 MF		otal Power	30.	6 dBm		Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	17.979 k 4.967 M		BW Power dB		9.00 % 6.00 dB		
49G				L ostat	US		

5 M_OBW_Mid Channel_16QAM_FullRB



Agilent Spectrum Analyzer - Occupied 8	N.	1	-			
RL RF 50.0 AC Center Freq 793.000000 PASS	MHz #FGain:Low	The Part of Party of Party	93.000000 MHz	ALIGN AUTO	03:57:06 PM Apr Radio Std: Non Radio Device: E	Frequency
Ref Offset 26.7 10 dB/div Ref 40.00 dB						
30.0 20.0						Center Free 793.000000 MH
10.0 0.00	Julian	the second second	many			
10.0 20.0 30.0 Marcally				h	manny	nor
Center 793 MHz						CF Step 1.000000 MH Auto Mar
Res BW 100 kHz	14.50	#VBW 3		20	Sweep	1 ms Freq Offse
Occupied Bandwid	.5154 MI		tal Power	29.	8 dBm	0 Hz
Transmit Freq Error x dB Bandwidth	7.659 H 4.952 N		W Power B		9.00 % .00 dB	
ASG)				L ostatu	8	

5 M_OBW_Mid Channel_64QAM_FullRB



Agilent Spectrum Analyzer - Occupied BW			SENSE:INT			1.01.05.00	PM Apr 14, 2022	0.0	
Center Freq 793.000000	MHz #IFGain:Low	Center	Freq: 793.00 ree Run		500/500	Radio Std	: None	Center Freq 793.00000 MHz 793.00000 MHz 2 CF Step 1.00000 MHz Auto Man	
Ref Offset 26.7 d 0 dB/dlv Ref 40.00 dBr									
0.0 0.0									
0.0	panan	-	man	-n.Am	~				
0.0	/				1				
10.0					Inst	and and	mm		
								1.000000 MH	
enter 793 MHz Res BW 100 kHz		#\	/BW 390	kHz		Spa Swe	ep 1 ms	<u>Auto</u> Ma	
Occupied Bandwid 4.	th 5095 MH	Ηz	Total F	ower	27.6	dBm		Freq Offset 0 Hz	
Transmit Freq Error x dB Bandwidth	11.790 k 5.018 M		OBW F x dB	ower		0.00 % 00 dB			
5G)					G STATU	4 ·			

5 M_OBW_Mid Channel_256QAM_FullRB



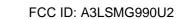
RL RF 50.0 AC Center Freq 793.000000 PASS	Tr	SENSE:INT enter Freq: 793.000000 MHz ig: Free Run Avg Hol itten: 20 dB	Rad d: 500/500	:04:26 PM Apr 14, 2022 lo Std: None lo Device: BTS	Frequency
Ref Offset 26.7 c Ref 40.00 dB					
20.0					Center Fred 793.000000 MH;
10.0	printermentingunur	ingeneration and the			
10.0	/				
20.0 30.0 hoven may mark the month			harden	and along with	
40.0 50.0					CF Step
Center 793 MHz #Res BW 200 kHz		#VBW 820 kHz		Span 20 MHz Sweep 1 ms	
Occupied Bandwid	th .9749 MHz	Total Power	31.6 dB	m	Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	27.191 kHz 9.696 MHz	OBW Power x dB	99.00 -26.00 d		
ASG			Contatus .		

10 M_OBW_Mid Channel_QPSK_FullRB



Agilent Spectrum Analyzer - Occupied 8W								0 9 00
RL RF 50 0 AC Center Freq 793.000000 PASS	MHz #FGain:Low	Trig: F	SENSE:INT Freq: 793.00 Free Run I: 20 dB	0000 MHz Avg Hold	ALIGN AUTO	Radio Std	1.017175)	Center Freq 793.000000 MHz CF Step 2.000000 MHz
Ref Offset 26.7 d								
20.0								
0.0		to the second	rend mentalina	an circum and a second s	1			
100 200 300 marshart and an and					J.	and any of the second	munne	
40.0 50.0								
Center 793 MHz Res BW 200 kHz		#	VBW 820	kHz			an 20 MHz eep 1 ms	
Occupied Bandwidt 8.	^h 9852 MI	Hz	Total I	ower	30.	.8 dBm		Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	17.971 9.790 M		OBW F x dB	Power		9.00 % 5.00 dB		
150					Co STAT	HE		

10 M_OBW_Mid Channel_16QAM_FullRB





RL RF 50.0 AC Center Freq 793.000000 PASS	MHz #FGain:Low	Center Trig: F	SENSE:INT Freq: 793.000 ree Run : 20 dB		LIGN AUTO 500/500	Radio Sto	PM Apr 14, 2022 d: None vice: BTS	Frequency
Ref Offset 26.7 d 10 dB/dlv Ref 40.00 dBr					_			
30.0 20.0								Center Free 793.000000 MH
10.0	Janan	menne	mounder	12-16-12-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-5-	N.			
10.0 20.0					L	mallenge	malim	
30.0 Norman Popung Miniman 40.0 50.0								
Center 793 MHz #Res BW 200 kHz		#\	VBW 8201	(Hz			an 20 MHz eep 1 ms	CF Step 2.000000 MH; <u>Auto</u> Mar
Occupied Bandwidi 8.	th 9771 M	Hz	Total P	ower	29.	.6 dBm		Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	24.203 9.782 M		OBW P x dB	ower		9.00 % 5.00 dB		
ASG					G STAT	US		

10 M_OBW_Mid Channel_64QAM_FullRB



RL RF 50.0 AC Center Freq 793.000000 PASS	MHz #FGain:Low	SENSE:INT Center Freq: 793. Trig: Free Run #Atten: 20 dB	000000 MHz Avg Hold	ALIGN AUTO	04:28:03 Radio Std Radio Dev	10171170	Frequency
Ref Offset 26.7 0 0 dB/div Ref 40.00 dB							
-0g 30.0 20.0							Center Free 793.000000 MH
10.0 7.00	provention	manamun haaro	anter my road of				
10.0							
30.0 mounterverse					mmun	and the second	
Center 793 MHz #Res BW 200 kHz		#VBW 82	0 kHz		Spa	an 20 MHz eep 1 ms	CF Step 2.000000 MH; Auto Mar
Occupied Bandwid 9	th .0010 MH		Power	27.	5 dBm		Freq Offset 0 Hz
Transmit Freq Error x dB Bandwidth	31.245 k 9.805 M		Power		9.00 % .00 dB		
49G				Lo STATU	15		

10 M_OBW_Mid Channel_256QAM_FullRB



0 4		1							n Analyzer – S	Spectru	ALCOLUMN THE REAL PROPERTY AND A
Frequency	PM Apr 14, 2022 CE 1 2 3 4 5 PE A WWWWW ET A A A A A A	TRA	ALIGN AUTO pe: RMS	#Avg		23 A.	Hz PNO: Fast ↔ FGain:Low	000000 (Fre	RL
Auto Tuni	5 0 GHz 69 dBm	r1 3.68 -67.3	Mk) dBm	tef 10.0	v	dB/di
Center Fre 5.015000000 GH									2	4	
Start Fre 30.000000 MH											
Stop Fre 10.000000000 GH	FaxS	*****				~~~~	^1			-	
CF Ste 997.000000 MH Auto Ma	0.000 GHz 20001 pts)	.33 ms (2	Sweep 17.	FUNCTION		/ 3.0 MHz	#VB\	x	0 MHz	W 1	art 3 tes B
Freq Offse 0 F	*					-67.369 dl -3.517 dl	5 0 GHz 9.2 MHz	3.6	1	A	NN
		1	G STATUS		_					_	

5 M_CSE(30 M-10 G)_Lowest Channel_QPSK_1RB



Agilent Spectrum Analyzer - Swept SA						0 9 00
RL RF 50.0 A Center Freq 5.0150000		Trig: Free Run #Atten: 20 dB	#Avg	ALIGN AUTO Type: RMS	03:58:09 PM Apr14, 202: TRACE 1 2 3 4 5 TYPE A WWWW DET A A A A A	Frequency
10 dB/div Ref 10.00 dB				Mk	r1 3.682 5 GHz -67.357 dBm	Auto Tuni
10.0 2000 ↓2 2000 ↓2						Center Free 5.015000000 GH
30.0 40.0 50.0						Start Fre 30.000000 MH
60 0 70 0 80 0			~~~		First	Stop Fre 10.000000000 GH
Start 30 MHz Res BW 1.0 MHz	#VB	W 3.0 MHz	FUNCTION	Sweep 17	Stop 10.000 GHz .33 ms (20001 pts)	CF Ste 997.000000 MH Auto Ma
1 N 1 f 2 N 1 f 3 4 5 6	3.682 5 GHz 791.7 MHz	-67.357 dBm -4.074 dBm				Freq Offse 0 H
9 10						
* ISG						

5 M_CSE(30 M-10 G)_Mid Channel_QPSK_1RB



0 9 1						1		5000-500-500 FBT	m Analyzer -	Spectru	CALCULATION OF A DESCRIPTION OF A DESCRI
Frequency	PM Apr 14, 2022 DE 1 2 3 4 5 PE A VANIA 444 ET A A A A A A	TRAC	ALIGN AUTO	#Avg		22. 20	GHz PNO: Fast +	0000000		r Fre	enter
Auto Tun	3 9 GHz 45 dBm	r1 3.71 -67.3	Mk		a ab	WHILEIT. 2	P Gain.Low	0 dBm	Ref 10.(liv) dB/d
Center Fre 5.015000000 GH									2		
Start Fre 30.000000 MH											00 00 00
Stop Fre 10.000000000 GH	Fixes							****			6-0 0.0 0.0
CF Ste 997.000000 MH Auto Ma	.000 GHz 0001 pts)	33 ms (2	weep 17.	UNCTION		V 3.0 MHz	#VB	×	.0 MHz	3W 1	tart 3 Res E
Freq Offse 0 H	UN VALUE	PONCIN		UNC NON	Bm Bm	-67.345 df -3.759 df	13 9 GHz 98.2 MHz	3.7	1	1	1 N 2 N 3 4 5 6
											7 8 9 0
			G STATUS								0

5 M_CSE(30 M-10 G)_Highest Channel_QPSK_1RB



0 8 23		1			1			ım Analyzer - Sı	nt Spectru	
Frequency	PM Apr 14, 2022 CE 1 2 3 4 5 PE A WWWWWW ET A A A A A A	TRA	ALIGN AUTO		Trig: Free Run #Atten: 20 dB	Fast ++-			er Fre	Cent
Auto Tuni	5 0 GHz 24 dBm	r1 3.67 -67.1	Mk					Ref 10.00	div	10 dB
Center Free 5.015000000 GH) ²	(- og 0.00 - -10.0 -
Start Fre 30.000000 MH										40.0 - 50.0 -
Stop Fre 10.000000000 GH	Faits	V ^{ang} aw ^{ang} ad ^a ng		~~~						60:0 70.0 80.0
CF Ste 997.000000 MH Auto Ma		.33 ms (2	Sweep 17		3.0 MHz	#VBW		.0 MHz		Res
Freq Offse	ON VALUE +	FUNCTI	FUNCTION WIDTH	FUNCTION	ץ 67.124 dBm -3.092 dBm	GHz MHz	× 3.675 0 789.2	1		1
										6 7 8 9 10
			GSTATUS		H.)					e (

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-2205-FC023-P