

FCC LTE REPORT

Certification

Applicant Name:		Date of Issue:
SAMSUNG Electronics Co., Ltd.		August 27, 2020
		Location:
Address:		HCT CO., LTD.,
129, Samsung-ro, Yeongtong-gu	,	74, Seoicheon-ro 578beon-gil, Majang-myeon,
Suwon-si, Gyeonggi-do, 16677, I	Rep. of Korea	Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
		Report No.: HCT-RF-2008-FC074
FCC ID:	A3LSMG781U	

APPLICANT: SAMSUNG Electronics Co., Ltd. According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : A3LSMG781V report.

SM-G781U
SM-G781U1/DS, SM-G781W
Mobile Phone
PCS Licensed Transmitter Held to Ear (PCE)
§90, §2

Mode	Tx Frequency	Emission		ERP		
(MHz)	(MHz)	Designator	Modulation	Max. Power	Max. Power	
(MHZ)	(1112)	Designator		(W)	(dBm)	
		4M52G7D	QPSK	0.117	20.68	
LTE – Band14 (5)	790.5 –795.5	4M50W7D	16QAM	0.100	19.99	
		4M51W7D	64QAM	0.078	18.92	
		8M97G7D	QPSK	0.119	20.76	
LTE – Band14 (10)	793.0	8M95W7D	16QAM	0.103	20.14	
		8M96W7D	64QAM	0.080	19.02	

The measurements shown in this report were made in accordance with the procedures specified in CFR47 section §2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)



REVIEWED BY

Report prepared by : Jae Ryang Do Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee Manager of Telecommunication Testing Center

This 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>

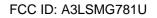
TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2008-FC074	August 27, 2020	- First Approval Report

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



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MEASUREMENT REPORT

1. GENERAL INFORMATION

Applicant Name:	SAMSUNG Electronics Co., Ltd.
Address:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
FCC ID:	A3LSMG781U
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-G781U
Additional Model(s):	SM-G781U1/DS, SM-G781W
Tx Frequency:	790.5 MHz –795.5 MHz (LTE – BAND 14 (5MHz)) 793.0 MHz (LTE – BAND 14 (10 MHz))
Date(s) of Tests:	July 06, 2020 ~ August 12, 2020

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 (HT20/40/80), Bluetooth, BT LE, NFC, 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 1MHz
- 3. VBW \ge 3 x RBW
- 4. Span = 1.5 times the OBW
- 5. No. of sweep points > 2 x span / RBW
- 6. Detector = RMS
- 7. Trigger is set to "free run" for signals with continuous operation with the sweep times set to "auto".
- 8. The integration bandwidth was roughly set equal to the measured OBW of the signal for signals with continuous operation.
- 9. Trace mode = trace averaging (RMS) over 100 sweeps
- 10. The trace was allowed to stabilize

Test Note

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

The power is calculated by the following formula;

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

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

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

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

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

3.3 RADIATED SPURIOUS EMISSIONS

Test Overview

Radiated tests are performed in the Fully-anechoic chamber.

Radiated Spurious Emission Measurements at 3 meters by Substitution Method according to

ANSI/TIA-603-E-2016.

Test Settings

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

Test Note

- Measurements value show only up to 3 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
- 2. The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the test data
- 3. For spurious emissions above 1GHz, a horn antenna is substituted in place of the EUT. The substitute antenna is driven by a signal generator and the previously recorded signal was duplicated.

The spurious emissions is calculated by the following formula;

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

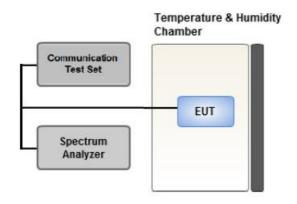
Where: P_g is the generator output power into the substitution antenna.

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

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



3.4 OCCUPIED BANDWIDTH.



Test setup

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

The EUT makes a call to the communication simulator.

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

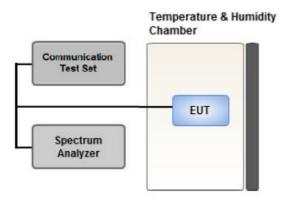
The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth

Test Settings

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



3.5 SPURIOUS AND HARMONIC EMISSIONS AT ANTENNA TERMINAL



Test setup

Test Overview

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

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

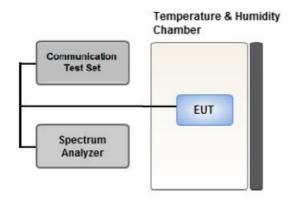
All data rates were investigated to determine the worst case configuration. All modes of operation were investigated and the worst case configuration results are reported in this section.

Test Settings

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



3.6 BAND EDGE



Test setup

Test Overview

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

Test Settings

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



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Test Notes

§90.543(e)

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

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

Test Notes

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

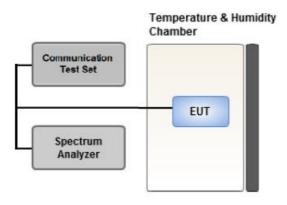
the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

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

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



3.7 FREQUENCY STABILITY / VARIATION OF AMBIENT TEMPERATURE



Test setup

Test Overview

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

The frequency stability of the transmitter is measured by:

1. Temperature:

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

environmental chamber.

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

for other than hand carried battery equipment.

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

Test Settings

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

(20°C to provide a reference).

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

3.8 WORST CASE(RADIATED TEST)

- The EUT was tested in three orthogonal planes(X, Y, Z) and in all possible test configurations and positioning.
- All modes of operation were investigated and the worst case configuration results are reported.
- The worst case is reported with the EUT positioning, modulations, RB sizes and offsets,

and channel bandwidth configurations shown in the test data.

- Please refer to the table below.
- -SM-G781U & additional models were tested and the worst case results are reported.

(Worst case : SM-G781U)

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



3.9 WORST CASE(CONDUCTED TEST)

- Worst case : Of all modulation, We have tested modulation of the high Conducted Output Power.

Conducted Output Power value can be confirmed on the SAR report.

-SM-G781U & additional models were tested and the worst case results are reported.

(Worst case : SM-G781U)

[Worst case]

Test Description	Modulation	Bandwidth (MHz)	Frequency	RB size	RB offset
Occupied Bandwidth	QPSK, 16QAM, 64QAM	5, 10	Mid	Full RB	0
		F	Low	1	0
		5	High	1	24
Band Edge	QPSK	10	Mid	1	0
				1	49
		5	Low, High	Full RB	0
		10	Mid	Full RB	0
Spurious and Harmonic Emissions at Antenna Terminal			Low,		
	QPSK	5	Mid,	1	0
	Qr3N		High		
		10	Mid	1	0



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4. LIST OF TEST EQUIPMENT

Manufacture	Model/ Equipment	Serial Number	Calibration Date	Calibrati on Interval	Calibration Due
T&M SYSTEM	FBSR-02B(WHK1.2/15G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
T&M SYSTEM	FBSR-02B(WHK3.3/18G-10EF)/H.P.F	-	03/09/2020	Annual	03/09/2021
WAINWRIGHT INSTRUMENT	WHNX6.0/26.5G-6SS/H.P.F	1	03/19/2020	Annual	03/19/2021
Hewlett Packard	11667B / Power Splitter(DC~26.5 GHz)	11275	04/27/2020	Annual	04/27/2021
Hewlett Packard	E3632A/DC Power Supply	MY4004427	09/27/2019	Annual	09/27/2020
Schwarzbeck	UHAP/ Dipole Antenna	557	03/29/2019	Biennial	03/29/2021
Schwarzbeck	UHAP/ Dipole Antenna	558	03/29/2019	Biennial	03/29/2021
ESPEC	SU-642 / Chamber	93008124	03/18/2020	Annual	03/18/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	147	08/29/2019	Biennial	08/29/2021
Schwarzbeck	BBHA 9120D/ Horn Antenna(1~18GHz)	9120D-1298	09/25/2019	Biennial	09/25/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170342	04/29/2019	Biennial	04/29/2021
Schwarzbeck	BBHA 9170/ Horn Antenna(15~40GHz)	BBHA9170124	02/11/2020	Biennial	02/11/2022
Agilent	N9020A/Signal Analyzer(10Hz~26.5GHz)	MY51110063	04/27/2020	Annual	04/27/2021
Hewlett Packard	8493C/ATTENUATOR(20dB)	17280	06/04/2020	Annual	06/04/2021
REOHDE & SCHWARZ	FSV40/Spectrum Analyzer(10Hz~40GHz)	100931	10/14/2019	Annual	10/14/2020
Agilent	8960 (E5515C)/ Base Station	MY48360800	08/27/2019	Annual	08/27/2020
Schwarzbeck	FMZB1513/ Loop Antenna(9kHz~30MHz)	1513-175	04/26/2019	Biennial	04/26/2021
Schwarzbeck	VULB9160/ Bilog Antenna	3150	03/12/2019	Biennial	03/12/2021
Schwarzbeck	VULB9160/ Hybrid Antenna	760	03/22/2019	Biennial	03/22/2021
Anritsu Corp.	MT8821C/Wideband Radio Communication Tester	6262116770	07/22/2020	Annual	07/22/2021
Anritsu Corp.	MT8820C/Wideband Radio Communication Tester	6201026545	01/22/2020	Annual	01/22/2021
REOHDE & SCHWARZ	SMB100A/ SIGNAL GENERATOR (100kHz~40GHz)	177633	07/13/2020	Annual	07/13/2021
KEYSIGHT	E7515B / 5G Wireless Tester	MY58300756	01/07/2020	Annual	01/07/2021
KEYSIGHT	N9030B / Signal Analyzer(5Hz~40.0GHz)	MY55480167	06/04/2020	Annual	06/04/2021
Mini-Circuits	ZC4PD-K1844+ / 4-Way Divider	942907	09/05/2019	Annual	09/05/2020
HCT CO., LTD.,	FCC LTE Mobile Conducted RF Automation Test Software	-	-	-	-

Note:

- 1. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
- 2. Espectially, all antenna for measurement is calibrated in accordance with the requirements of C63.5

(Version : 2017).

5. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4:2014. All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05



6. SUMMARY OF TEST RESULTS

6.1 Test Condition : Conducted Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Occupied Bandwidth	§2.1049	N/A	PASS
Band Edge / Spurious and Harmonic Emissions at Antenna Terminal.	§2.1051, §90.543(e)	< 43 + 10log10 (P[Watts]) at Band Edge and for all out-of-band emissions	PASS
On all frequencies between 769- 775 MHz and 799-805 MHz.	§90.543(e)	< 65 + 10log10 (P[Watts])	PASS <u>(See Note3)</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
- 2. The same samples were used for SAR and EMC
- Since it was not possible to set the resolution bandwidth to 6.25 kHz with the available equipment, a bandwidth of 10 kHz was used instead to show compliance.

6.2 Test Condition : Radiated Test

Test Description	FCC Part Section(s)	Test Limit	Test Result
Effective Radiated Power	§90.542(a)(7)	< 3 Watts max. ERP	PASS
Radiated Spurious and Harmonic	§2.1053,	< 43 + 10log10 (P[Watts]) for	PASS
Emissions	§90.543(e)	all out-of band emissions	FA33
Undesirable Emissions in	§2.1053,	< -70dBW/MHz EIRP (wideband)	PASS
the 1559 – 1610 MHz band	§90.543(f)	< -80dBW EIRP (narrowband)	PA33



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)	U.L	POI.	w	dBm
128	824.20	-21.37	38.40	-10.61	0.95	Н	0.483	26.84

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

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

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

3) Record the field strength meter's level.

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

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

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

7.2 EIRP Sample Calculation

Ch.	/ Freq.	Measured Substitute		Ant. Gain	C.L	Pol.	EII	RP
channel	Freq.(MHz)	Level(dBm)	Level(dBm)	(dBi)	U.L	F0I.	w	dBm
20175	1,732.50	-15.75	18.45	9.90	1.76	Н	0.456	26.59

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

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

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

3) Record the field strength meter's level.

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

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

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

7.3. Emission Designator

GSM	Emission	Designator

Emission Designator = 249KGXW GSM BW = 249 kHz G = Phase Modulation

X = Cases not otherwise coveredW = 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.	C.L	Pol	Limit	EF	RP
(MHz)	(Bandwidth)		Level (dBm)	Level (dBm)	Gain(dBd)			w	w	dBm
		QPSK	-30.46	32.15	-10.11	1.36	Н		0.117	20.68
790.5		16-QAM	-31.15	31.46	-10.11	1.36	Н		0.100	19.99
		64-QAM	-32.22	30.39	-10.11	1.36	Н		0.078	18.92
		QPSK	-30.91	31.81	-10.12	1.36	Н		0.108	20.33
793.0	LTE B14 (5 MHz)	16-QAM	-31.60	31.12	-10.12	1.36	Н	< 3.00	0.092	19.64
	(0	64-QAM	-32.70	30.02	-10.12	1.36	Н		0.071	18.54
		QPSK	-31.23	31.46	-10.13	1.37	Н		0.099	19.96
795.5	95.5	16-QAM	-31.96	30.73	-10.13	1.37	Н		0.084	19.23
		64-QAM	-33.87	28.82	-10.13	1.37	Н		0.054	17.32

Freq	Mod	Modulation	Measured	Substitute	Ant.	C.L	Pol	Limit	EF	RP
(MHZ)	MHz) (Bandwidth)	dwidth)	Level (dBm)	Level (dBm)	Gain(dBd)			w	W	dBm
		QPSK	-30.48	32.24	-10.12	1.36	Н		0.119	20.76
793.0	LTE B14 (10 MHz)	16-QAM	-31.10	31.62	-10.12	1.36	Н	< 3.00	0.103	20.14
	(10 100 12)	64-QAM	-32.22	30.50	-10.12	1.36	Н		0.080	19.02



8.2 RADIATED SPURIOUS EMISSIONS

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

Ch	Freq (MHz)	Measured Level (dBm)	Ant. Gain (dBi)	Substitute Level (dBm)	C.L	Pol	Result (dBm)	Limit
	1,581.0	-50.55	9.05	-58.53	1.95	V	-51.43	-13.00
23305 (790.5)	2,371.5	-48.00	10.05	-50.50	2.42	V	-42.87	-13.00
(100.0)	3,162.0	-53.46	11.28	-53.45	2.83	V	-45.00	-13.00
	1,586.0	-50.30	9.12	-58.35	1.96	V	-51.19	-13.00
23330 (793.0)	2,379.0	-48.17	10.05	-50.75	2.44	V	-43.14	-13.00
(*****)	3,172.0	-53.46	11.35	-53.68	2.83	V	-45.16	-13.00
	1,591.0	-50.47	9.18	-58.58	1.96	V	-51.36	-13.00
23355 (795.5)	2,386.5	-48.33	10.09	-50.92	2.45	V	-43.28	-13.00
(100.0)	3,182.0	-53.54	11.35	-53.81	2.83	V	-45.29	-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	-50.13	9.12	-58.18	1.96	V	-51.02	-13.00
23330 (793.0)	2,379.0	-47.89	10.05	-50.47	2.44	V	-42.86	-13.00
(100.0)	3,172.0	-53.15	11.35	-53.37	2.83	V	-44.85	-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:	-80 dBW/ MHz (= -50 dBm/ 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)
790.5	1586.18		-58.71	9.11	-66.75	1.96	V	-59.60	9.60
793.0	1595.32	Narrow Band	-59.17	9.20	-67.54	1.97	V	-60.31	10.31
795.5	1601.38		-58.69	9.30	-67.40	1.98	V	-60.08	10.08

Note:

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

OPERATING FREQUENCY: <u>793.0 MHz</u>
MEASURED OUTPUT POWER: <u>10 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)
793.0	1577.22	Narrow Band	-58.41	9.05	-66.39	1.95	V	-59.29	9.29

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)
	5 MHz		QPSK	25	0	4.5183
			16-QAM	25	0	4.4987
			64-QAM	25	0	4.5068
14		- 793.0	QPSK	50	0	8.9660
	10 MHz		16-QAM	50	0	8.9453
			64-QAM	50	0	8.9623

Note:

1. Plots of the EUT's Occupied Bandwidth are shown Page 34 ~ 39.



8.4 CONDUCTED SPURIOUS EMISSIONS

Band	Band Width (MHz)	Frequency (MHz)	Frequency of Maximum Harmonic (GHz)	Factor (dB)	Maximum Data		Limit (dBm)
		790.5	3.6810	27.976	-67.090	-39.114	
14	5	793.0	3.6995	27.976	-67.308	-39.332	-13.00
14	795.5	3.7079	27.976	-67.105	-39.129	-13.00	
	10	793.0	3.6830	27.976	-67.228	-39.252	

Note:

1. Plots of the EUT's Conducted Spurious Emissions are shown Page 56 ~ 59.

2. Conducted Spurious Emissions was Tested QPSK Modulation, Resource Block Size 1 and Resource Block Offset 0

3. Result (dBm) = Measurement Maximum Data (dBm) + Factor (dB)

4. Factor(dB) = Cable Loss + Attenuator + Power Splitter

Frequency Range (GHz)	Factor [dB]
0.03 – 1	25.270
1 – 5	27.976
5 – 10	28.591
10 – 15	29.116
15 – 20	29.489
Above 20	30.131

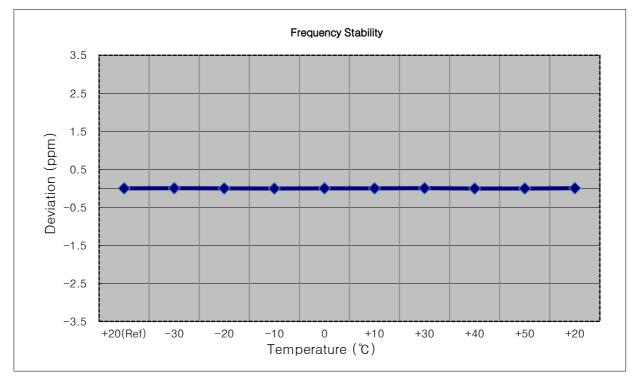
8.5 BAND EDGE

- Plots of the EUT's Band Edge are shown Page 40 ~ 55.

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:	<u>3.85 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

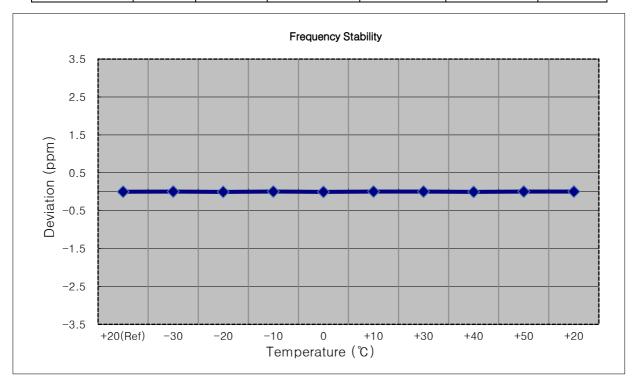
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	790 500 002	0.00	0.000 000	0.0000
100%		-30	790 500 004	2.00	0.000 000	0.0025
100%	-	-20	790 500 000	-2.00	0.000 000	-0.0025
100%		-10	790 499 998	-4.30	-0.000 001	-0.0054
100%	3.850	0	790 500 000	-2.10	0.000 000	-0.0027
100%		+10	790 500 000	-2.70	0.000 000	-0.0034
100%		+30	790 500 005	2.90	0.000 000	0.0037
100%		+40	790 499 999	-3.30	0.000 000	-0.0042
100%		+50	790 499 999	-3.50	0.000 000	-0.0044
Batt. Endpoint	3.400	+20	790 500 005	2.50	0.000 000	0.0032





MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (5 MHz)</u>
REFERENCE VOLTAGE:	3.85 VDC
DEVIATION LIMIT:	<u>2.5ppm</u>

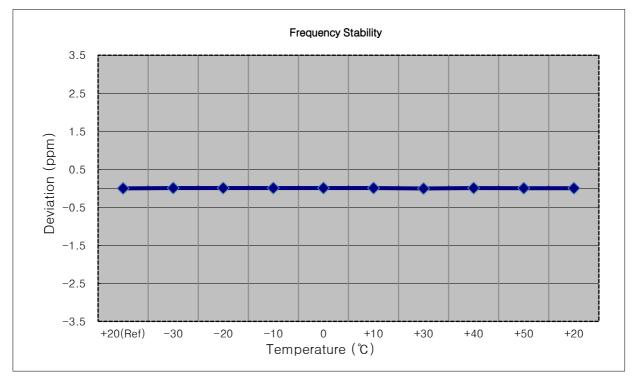
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	792 999 998	0.00	0.000 000	0.0000
100%		-30	793 000 000	2.40	0.000 000	0.0030
100%		-20	792 999 993	-4.20	-0.000 001	-0.0053
100%		-10	793 000 001	3.70	0.000 000	0.0047
100%	3.850	0	792 999 995	-2.70	0.000 000	-0.0034
100%		+10	793 000 000	2.60	0.000 000	0.0033
100%		+30	793 000 000	1.90	0.000 000	0.0024
100%		+40	792 999 995	-2.80	0.000 000	-0.0035
100%		+50	793 000 001	3.60	0.000 000	0.0045
Batt. Endpoint	3.400	+20	793 000 000	2.50	0.000 000	0.0032





MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>795,500,000 Hz</u>
CHANNEL:	<u>23355 (5 MHz)</u>
REFERENCE VOLTAGE:	<u>3.85 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

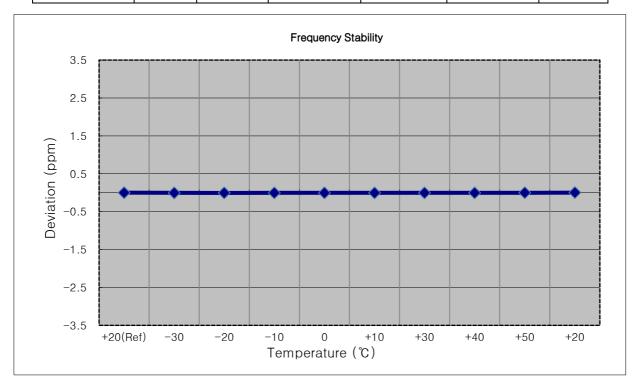
Voltage	Power	Temp.	Frequency	Frequency	Deviation	
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm
100%		+20(Ref)	795 500 002	0.00	0.000 000	0.0000
100%		-30	795 500 007	4.60	0.000 001	0.0058
100%		-20	795 500 007	5.40	0.000 001	0.0068
100%		-10	795 500 007	5.30	0.000 001	0.0067
100%	3.850	0	795 500 007	5.00	0.000 001	0.0063
100%		+10	795 500 007	4.80	0.000 001	0.0060
100%		+30	795 499 999	-3.40	0.000 000	-0.0043
100%		+40	795 500 006	4.40	0.000 001	0.0055
100%		+50	795 500 006	3.60	0.000 000	0.0045
Batt. Endpoint	3.400	+20	795 500 004	2.40	0.000 000	0.0030





■ MODE:	<u>LTE 14</u>
OPERATING FREQUENCY:	<u>793,000,000 Hz</u>
CHANNEL:	<u>23330 (10 MHz)</u>
REFERENCE VOLTAGE:	<u>3.85 VDC</u>
DEVIATION LIMIT:	<u>2.5ppm</u>

Voltage	Power	Temp.	Frequency	Frequency	Deviation		
(%)	(VDC)	(°C)	(Hz)	Error (Hz)	(%)	ppm	
100%		+20(Ref)	792 999 997	0.00	0.000 000	0.0000	
100%		-30	792 999 995	-2.20	0.000 000	-0.0028	
100%		-20	792 999 993	-3.80	0.000 000	-0.0048	
100%		-10	792 999 995	-2.70	0.000 000	-0.0034	
100%	3.850	0	792 999 994	-3.50	0.000 000	-0.0044	
100%		+10	792 999 995	-2.50	0.000 000	-0.0032	
100%		+30	792 999 994	-2.80	0.000 000	-0.0035	
100%		+40	792 999 994	-2.80	0.000 000	-0.0035	
100%		+50	792 999 995	-2.00	0.000 000	-0.0025	
Batt. Endpoint	3.400	+20	793 000 000	2.60	0.000 000	0.0033	





FCC ID: A3LSMG781U

9. TEST PLOTS



-	-	•	Analyzer - Occ												
	RL ofer	Fred	⊧ <u>50 Ω</u> 793.000		Hz		_	ENSE:INT Freg: 793.000	000 MHz	ALIC	SN AUTO	01:22:10 Radio Std	PM Jul 28, 2020	Fre	quency
PA		Ticq	735.000				, Trig: Fr #Atten:	ee Run	Avg Hold	1: 50	0/500	Radio Dev	ine PTS		
					#IFGai	n:Low	#Atten:	20 06		_		Radio Dev	ICE: DI S		
	B/div		Ref Offset Ref 40.0				-								
Log														C	enter Freq
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-30.0	ΥΥ	ᢉᢩᡗᢅᢡᡃᡳᡗᡐᡑ	w have									Ward & Warke	Managen		
-40.0															
-50.0															CF Step
Cer	nter	793 N	1Hz									Spa	n 10 MHz		000000 MHz Man
		N 100					#V	BW 390 H	(Hz				eep 1 ms		
C	Dcc	upied	d Band	lwidth				Total P	ower		31.5	dBm		F	req Offset
	4.5183 MHz												0 Hz		
T	ran	smit I	Freq Er	ror	1	5.687 k	(Hz	OBW P	ower		99	.00 %			
x	dB	Band	width		4	.955 N	IHz	x dB			-26.	00 dB			
MSG										0	STATUS				
	-				-					-	-				

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



🊺 Ag	ilent Spectru	ım Analyzer - Occu	upied BW											X-
L <mark>XI</mark> R	-	RF 50 Ω cq 793.000	AC	11-1-2			NSE:INT eq: 793.000	000 MHz	ALIO	GN AUTO	01:21:55 Radio Std:	PM Jul 28, 2020	Frequ	ency
PAS		q 793.000		#IFGain:	⊷ Low	Takan Frank	Run	Avg Hol	d: 50	0/500	Radio Dev			
	B/div	Ref Offset Ref 40.0												
Log 30.0 20.0														ter Freq 0000 MHz
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-50.0														CF Step
	ter 793 s BW 1	3 MHz 100 kHz				#VE	SW 390 k	Hz				n 10 MHz ep 1 ms		Man
0	ccupi	ied Band					Total P	ower		30.6	dBm		Fre	q Offset 0 Hz
			4.4	987	∕ Mŀ	Z								0 H2
Т	ransmi	it Freq Err	or	2	.671 k	Hz	OBW P	ower		99	.00 %			
x	dB Ba	ndwidth		4.	945 M	Hz	x dB			-26.	00 dB			
MSG									-	STATUS				
Mod										No sixius				

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



-		n Analyzer - Occu												a x
LXI RL Cent	-	RF 50 Ω 793.000	AC 0000 M	Hz			NSE:INT req: 793.000			SN AUTO	06:49:05 F Radio Std	M Aug 03, 2020	Freque	ency
PAS				#IFGain:L	 ow	Trig: Fre #Atten: 2		Avg Ho	ld: 50	0/500	Radio Dev	ice: BTS		
		Ref Offset	26.2 dB											
10 dE Log r	3/div	Ref 40.00												
30.0													Cent	er Freq
20.0														000 MHz
10.0				m	$\sim\sim\sim\sim$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	an - Mary James	ᢆᢦ᠇ᢇᠧᢛᡳᢧᠯᢦᠵᠮ	᠋᠂ᡁᢦᢦᢑ					
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-50.0														
													1.000	CF Step
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#Res						#VC						ep mis		
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	4.5068 MHz												0 Hz	
Tr	ansmit	Freq Err	or	8.	679 k⊦	z	OBW P	ower		99	.00 %			
x	dB Ban	dwidth		4.9	39 M⊦	z	x dB			-26.0	00 dB			
MSG														
									_	<u> </u>				

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



Magilent Spectrum Analyzer - Occupied BW								- F X
ເ₩ RL RF 50 Ω AC Center Freq 793.000000 M		SENSE Center Freq			IGN AUTO	01:27:26	PM Jul 28, 2020 None	Frequency
PACC		Trig: Free R	un /	Avg Hold: 5	600/500			
FA55	#IFGain:Low	#Atten: 20 d	В			Radio Devi	ICE: BIS	
Ref Offset 26.2 dB								
10 dB/div Ref 40.00 dBm					- <u>1</u>		1	
30.0								Center Freq
20.0								793.000000 MHz
	mannaman	montant	®LIWA Phantes	www.l.	~ <mark>.</mark>			
0.00								
-10.0					<u> </u>			
-20.0					_\			
-30.0 A Durlow Manufacture and					harly	the Mangalle	du	
							L. Trade and a lot	
-40.0								
-50.0								CF Step
Center 793 MHz						Ena	n 20 MHz	2.000000 MHz
#Res BW 200 kHz		#VBW	820 kH	Z			n 20 MHz ep 1 ms	<u>Auto</u> Man
								En a Official
Occupied Bandwidth			otal Pov	ver	31.6	dBm		Freq Offset 0 Hz
8.9	660 MF	z						UHZ
Transmit Freq Error	15.828 k	Hz O	BW Pov	ver	99	.00 %		
x dB Bandwidth	9.831 M	Hz x	dB		-26.	00 dB		
					5			
MSG					I STATUS			

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



	m Analyzer - Occupied	BW							
	RF 50 Ω AC q 793.00000			SENSE:INT Freg: 793.000000 N		N AUTO	01:27:11 P adio Std:	M Jul 28, 2020	Frequency
PASS	q 795.00000	#IFGain:L	🛶 Trig: F		g Hold: 500	/500	adio Devi		
10 dB/div	Ref Offset 26.2 Ref 40.00 d								
Log 30.0									Center Freq 793.000000 MHz
10.0		peranner	ᢣ᠆ᢧᡗᠯᢦᠧᡣᡙᡁᠺᡗ᠘ᡔ᠋ᢇᢇᢧᠾ᠇ᡟ᠊	۲۰۰۰ In Menut	www.morty				
0.00						Ŋ			
-10.0									
-30.0	RARA MILANALA	J				lahn	weber	Mannan	
-40.0									CF Step
									2.000000 MHz
Center 793 #Res BW 2			#	VBW 820 kHz				n 20 MHz ep 1 ms	<u>Auto</u> Man
Occupi	ed Bandwi			Total Powe	r	30.5 d	Bm		Freq Offset 0 Hz
	8	8.9453	MHZ						
Transmi	t Freq Error		-598 Hz	OBW Powe	r	99.0	0 %		
x dB Bar	ndwidth	9.8	45 MHz	x dB		-26.00	dB		
					~				
MSG					Ц	STATUS			

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



	•	n Analyzer - Occu			_								
Cent		RF 50 Ω 793.000	AC 0000 M	Hz		Center F	NSE:INT req: 793.00			GN AUTO	06:50:31 F	M Aug 03, 2020	Frequency
PAS				#IFGain:l		Trig: Fre #Atten: 2		Avg Ho	old: 50	0/500	Radio Dev	ice: BTS	
10 dE	3/div	Ref Offset Ref 40.0											
Log 30.0													Center Freq 793.000000 MHz
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-10.0			- 1							$\left\{ \right\}$			
-20.0										- \			
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-40.0													
-50.0													CF Step 2.000000 MHz
	ter 793 s BW 20					#VE	3W 8201	kHz			Spa Swe	n 20 MHz ep 1 ms	<u>Auto</u> Man
0	ccupie	ed Band	width				Total F	ower		29.5	dBm		Freq Offset
			8.9	623	MH	Ζ							0 Hz
Tr	ansmit	Freq Err	or	7.	237 kH	z	OBW P	ower		99	.00 %		
X	dB Ban	dwidth		9.7	′66 MH	Z	x dB			-26.	00 dB		
										1			
MSG	_									I STATUS			

BAND 14. Occupied Bandwidth Plot (Ch.23330 64-QAM RB 50) 10 MHz



							rum Analyzer - Swept SA	
Frequency	01:20:41 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	ALIGN AUTO e: RMS	#Avg Typ	NSE:INT	SEN	Hz	RF 50 Ω AC eq 788.000000 N	Center F
	DET A A A A A A				Trig: Free #Atten: 2	PNO: Fast ↔→ IFGain:Low		
Auto Tune	1 788.000 MHz -18.172 dBm	Mkr					Ref Offset 26.2 dB Ref 26.20 dBm	10 dB/div Log
Center Freq 788.000000 MHz								16.2
Start Freq 775.000000 MHz								6.20 -3.80
Stop Freq 801.000000 MHz	-13.00 dBm			1				-13.8
CF Step 2.600000 MHz <u>Auto</u> Man			M					-33.8
Freq Offset 0 Hz	RMS	$\sim \Lambda$						-43.8
								-63.8
	Span 26.00 MHz 1.000 s (1001 pts)	#Sweep			300 kHz	#VBW		Center 78 #Res BW
								MSG

BAND 14 Lower Band Edge Plot (5M BW Ch.23305 QPSK_RB1 OFFSET_0)



	ectrum Analyzer - Swept SA								
Center B	RF 50 Ω AC Freq 788.000000	MHz	SENSE:		AI	IGN AUTO	TRAC	PM Jul 28, 2020	Frequency
Contor	100.000000	PNO: Fast +	. Trig: Free Ru #Atten: 20 dB	ın	• ,1		TYF		
		IFGain:Low	#Atten: 20 dt			Mir			Auto Tune
10 dB/div	Ref Offset 26.2 dB Ref 26.20 dBm					IVIKI	-28.3	00 MHz 23 dBm	
40.0									Center Freq
16.2									788.000000 MHz
6.20				and a second	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~				
0.20									Start Freq
-3.80									775.000000 MHz
-13.8								-13.00 dBm	Stop Freq
									801.000000 MHz
-23.8			1						001.000000 Mil 12
									05.01
-33.8					\				CF Step 2.600000 MHz
-43.8			and the second		ĥ	man water			<u>Auto</u> Man
-43.0		formation	and go and a			رمير	hanna	RMS	
-53.8								Margare and	Freq Offset
									0 Hz
-63.8									
Center 7	88.00 MHz						Snan 2	6 00 MHz	
#Res BW	100 kHz	#VBW	300 kHz		\$	#Sweep	1.000 <u>s (</u>	6.00 MHz 1001 pts)	
MSG						STATUS			

BAND 14 Lower Band Edge Plot (5M BW Ch.23305 QPSK_RB_25)



	ctrum Analyzer - Swept SA					
Center F	RF 50 Ω AC req 772.000000	ИНZ	SENSE:INT	ALIGN AUTO #Avg Type: RMS	01:21:01 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	Frequency
		PNO: Wide +++ Irig:	Free Run n: 20 dB			
10 dB/div Log	Ref Offset 26.2 dB Ref -10.00 dBm			Mk	r1 772.432 MHz -65.998 dBm	Auto Tune
-20.0						Center Freq 772.000000 MHz
-30.0					-35.00 dBm	Start Freq 769.000000 MHz
-50.0			1			Stop Freq 775.000000 MHz
-70.0	┉ୢଽୄୄୠଌଽ୶୶ଽ୕୴୷୶ୄୢଽଽଽଡ଼୳ଽଡ଼ଽଽଽଽ୶ୄଽଽ୷ୄ୳ଽ୷ଡ଼ୖ୶୶୷୲ଽ୶ୄ୶ଽ୷ୣ	han halanda an	สารกิจรังสารสารสารสารสารสาร	ullyphanisman a fair, in sinthing any	RMS	CF Step 600.000 kHz <u>Auto</u> Man
-90.0						Freq Offset 0 Hz
-100 Start 769		#\/D\\/ 20.11		40	Stop 775.000 MHz	
#Res BW		#VBW 30 kH		#Sweep	1.000 s (1001 pts)	

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (5M BW Ch.23305 QPSK_RB1_0)-1



	ctrum Analyzer - Swept SA					
Center F	RF 50 Ω AC req 772.000000	MHz	SENSE:INT	ALIGN AUTO #Avg Type: RMS	01:20:15 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	Frequency
		PNO: Wide +++ Tri	g: Free Run tten: 20 dB			
10 dB/div Log	Ref Offset 26.2 dB Ref -10.00 dBm			Mk	r1 773.656 MHz -65.855 dBm	Auto Tune
-20.0						Center Freq 772.000000 MHz
-30.0					-35.00 dBm	Start Freq 769.000000 MHz
-50.0						Stop Freq 775.000000 MHz
-70.0	ณาม.ก.สีเกลร์การให้เหลือหลังสารสารสาร	the second states and the second s	Norryon tala kterengeno	algerettergenagengigtetiskenskathalispikassikalandare	RMS ถางรู้ในสาวมอิทธิบที่ในรู้เกมมีหนังสาวารรูกรู	CF Step 600.000 kHz <u>Auto</u> Man
-90.0						Freq Offset 0 Hz
-100 Start 769.		#\(B)\((20	///	#0:	Stop 775.000 MHz	
#Res BW		#VBW 30		#Sweep	1.000 s (1001 pts)	

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (5M BW Ch.23305 QPSK_RB25_0)-2



	m Analyzer - Swept SA								- F
Center Fre	RF 50 Ω AC q 788.000000 M	Hz	SENSE	:INT	#Avg Typ	ALIGN AUTO e: RMS		PM Jul 28, 2020 E 1 2 3 4 5 6	Frequency
	q 700.000000 M	PNO: Fast +++	Trig: Free R #Atten: 20 d				TYP		
	Ref Offset 26.2 dB Ref 26.20 dBm					Mk	r1 788.0 -32.6	00 MHz 92 dBm	Auto Tune
16.2				ſ <u></u>					Center Freq 788.000000 MHz
6.20 -3.80									Start Freq 775.000000 MHz
-13.8								-13.00 dBm	Stop Freq 801.000000 MHz
-33.8			↓ ¹						CF Step 2.600000 MHz <u>Auto</u> Man
-43.8	^) L	Amaran A	- A		RMS	Freq Offset 0 Hz
-63.8	00 MHz						Snan 2	6 00 MH .	
#Res BW 10		#VBW 3	300 kHz			#Sweep	1.000 s (6.00 MHz 1001 pts)	
MSG						I STATUS	5		

BAND 14 Lower Band Edge Plot (10M BW Ch.23330 QPSK_RB1 OFFSET_0)



	Analyzer - Swept SA					
	RF 50Ω AC		SENSE:IN	ALIGN AUTO g Type: RMS	01:25:42 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	
	1 788.000000 N	PNO: Fast ↔→→ IFGain:Low	Trig: Free Run #Atten: 20 dB			
Re 10 dB/div R Log	ef Offset 26.2 dB ef 26.20 dBm			Mk	r1 788.000 MHz -32.554 dBm	Auto Tune
16.2						Center Freq 788.000000 MHz
-3.80						Start Freq 775.000000 MHz
-13.8					-13.00 dBm	Stop Freq 801.000000 MHz
-33.8					RMS	CF Step 2.600000 MHz <u>Auto</u> Man
-53.8		200				Freq Offset 0 Hz
-63.8 Center 788.0 #Res BW 100		#\/B\M	300 kHz	#Sween	Span 26.00 MHz 1.000 s (1001 pts)	
MSG		#0000	500 KHZ	#Sweep		

BAND 14. Lower & Upper Band Edge Plot (10M BW Ch.23330 QPSK RB_50)



	ctrum Analyzer - Swept SA							
Center F	RF 50 Ω AC req 772.000000	MHz	ENSE:INT	ALIGI #Avg Type: RI	N AUTO	01:26:47 PM Jul 2	3456	Frequency
		PNO: Wide ↔ Trig: Free IFGain:Low #Atten:					A A A A	Auto Tuno
10 dB/div	Ref Offset 26.2 dB Ref -10.00 dBm				Mkr1	773.194 -66.012 (MHz dBm	Auto Tune
								Center Freq
-20.0								772.000000 MHz
-30.0							5.00 dBm	Start Freq
-40.0								769.000000 MHz
-50.0								
								Stop Freq 775.000000 MHz
-60.0	18			1	. No. 1 de la state		RMS	
-70.0	ไข้ _{หลู} ใหญ่ๆมีผู้ขึ้นได้มูกให้เข้ามากับกันไม่	างสู่สาวสถาสุขสาวอาการเหตุกร่างสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวสาวส	a di nordi angle di di nanga	flanten generation og geten flandskope	All and all substants	and the standard and the standard state		CF Step 600.000 kHz
-80.0								<u>Auto</u> Man
-90.0								Freq Offset
-100								0 Hz
-100								
Start 769 #Res BW	.000 MHz	#VBW 30 kHz			St	op 775.000 .000 s (100	MHz (ptc)	
#Res BW		#VBW 30 KH2			STATUS	.000 S (100	r pisj	

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (10M BW Ch.23330 QPSK_RB51_0)-1



	ctrum Analyzer - Swept SA					
Center F	RF 50Ω AC req 772.000000 N	/Hz	SENSE:INT	ALIGN AUTO #Avg Type: RMS	01:26:01 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	Frequency
		PNO: Wide ++++ Tri	g: Free Run ten: 20 dB			
10 dB/div Log	Ref Offset 26.2 dB Ref -10.00 dBm			Mk	r1 772.450 MHz -65.980 dBm	Auto Tune
-20.0						Center Freq 772.000000 MHz
-30.0					-35.00 dBm	Start Freq 769.000000 MHz
-50.0						Stop Freq 775.000000 MHz
-70.0	ระหรังก่อ _น ารแห่งประกังสมใ _{ห้ห} มดูการจะไ	ปสุขาลา ⁴ สบบสะครัฐาญญ _า ล่อกั _น จะสูบสั	nyatabangsalati Paratana darahang darahang darahang darahang darahang darahang darahang darahang darahang darah	ngun yak ya kusha filogik bila kusha maykan	gheilinean gellaligeneturiegene	CF Step 600.000 kHz <u>Auto</u> Man
-90.0						Freq Offset 0 Hz
-100 Start 769.		<i>4</i>) (D))/ 00 J			Stop 775.000 MHz	
#Res BW	10 KHZ	#VBW 30 I	(HZ	#Sweep	1.000 s (1001 pts)	

BAND 14 Lower Emission Mask (769 MHz ~ 775 MHz) Plot (10M BW Ch.23330 QPSK_RB50_0)-2





BAND 14 Upper Band Edge Plot (5M BW Ch.23355 QPSK_RB1_Offset 24)



	ctrum Analyzer - Swept SA								
Center F	RF 50 Ω AC req 798.000000 I	MHz		ISE:INT	#Avg Typ	ALIGN AUTO e: RMS	TRAC	PM Jul 28, 2020 E 1 2 3 4 5 6	Frequency
		PNO: Wide ↔→→ IFGain:Low	Trig: Free #Atten: 20				TYF		
	Ref Offset 26.2 dB	in Gameen				Mk	r1 798.0	08 MHz	Auto Tune
10 dB/div Log	Ref 26.20 dBm						-27.8	08 MHz 85 dBm	
LUg									Center Freq
16.2									798.000000 MHz
6.20		20-0-00-00 ⁻⁰⁰⁻⁰ -0 ⁻⁰ -0-00-0-0-0-0-0-0-	~						Start Freq
-3.80 ———									796.000000 MHz
-13.8								-13.00 dBm	Stop Freq
			۲ _۲	. 1					800.000000 MHz
-23.8			X)'					
-33.8				\					CF Step 400.000 kHz
				The second			Jer 10-	RMS	Auto Man
-43.8							a suggestion where	and the first of the second	
-53.8									Freq Offset
55.0									0 Hz
-63.8									
	98.000 MHz						Span 4	.000 MHz 1001 pts)	
#Res BW	100 kHz	#VBW	300 kHz					1001 pts)	
MSG							6		

BAND 14 Upper Band Edge Plot (5M BW Ch.23355 QPSK_RB_25)





BAND 14 Upper Emission Mask (799 MHz ~805 MHz) Plot (5M BW Ch.23355 QPSK_RB1_24)



								Agilent Spectrum
Frequency	01:23:43 PM Jul 28, 2020 TRACE 1 2 3 4 5 6 TYPE A WWWW DET A A A A A A	ALIGN AUTO e: RMS	#Avg T			<mark>IZ</mark> PNO: Wide ↔ IFGain:Low	50 Ω AC 02.000000 M	enter Freq
Auto Tune	1 799.180 MHz -49.745 dBm	Mkr′					Offset 26.2 dB -10.00 dBm	Re dB/div R e
Center Fred 802.000000 MH:).0
Start Fred 799.000000 MH:	-35.00 dBm).0 .0
Stop Fred 805.000000 MH:	RMS		A.A And - 1 - 1 - 1 - 1	pality the first	webourge	~ynlutellandelande	mun have applying).0 www.man/ww
CF Stej 600.000 kH <u>Auto</u> Ma	การการการการการการการการสำนักงารสมบัตร (1996) การสมบัตร (1997) การการการการการการการการการการการการการก	hann ann ann ann ann ann ann ann ann ann).0
Freq Offse 0 H).0
	Stop 805.000 MHz						лнz	art 799.000
	1.000 s (1001 pts)	#Sweep			/ 30 kHz	#VBW	lz	Res BW 10

BAND 14 Upper Emission Mask (799 MHz ~805 MHz) Plot (5M BW Ch.23355 QPSK_RB25_0)-2





BAND 14 Upper Band Edge Plot (10M BW Ch.23330 QPSK_RB1_Offset_49)



						ctrum Analyzer - Swept SA	
Frequency	01:28:23 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	ALIGN AUTO	NSE:INT	SEN	Hz	RF 50 Ω AC req 798.000000 N	Center F
		• /		Trig: Free #Atten: 2	PNO: Wide ↔→ IFGain:Low		Genter I
Auto Tune	1 798.004 MHz -34.028 dBm	Mkı				Ref Offset 26.2 dB Ref 26.20 dBm	10 dB/div Log
Center Freq 798.000000 MHz							16.2
Start Freq 796.000000 MHz							6.20 -3.80
Stop Freq 800.000000 MHz	-13.00 dBm			hy and the second se			-13.8
CF Step 400.000 kHz <u>Auto</u> Man	RMS		1	and a second			-33.8
Freq Offset 0 Hz							-53.8
	Span 4.000 MHz					18.000 MHz	
	1.000 s (1001 pts)	#Sweep		300 kHz	#VBW	100 kHz	#Res BW

BAND 14 Upper Band Edge Plot (10M BW Ch.23330 QPSK_QPSK_RB_50)



e e <mark>x</mark>					ctrum Analyzer - Swept SA	
Frequency	01:29:30 PM Jul 28, 2020 TRACE 1 2 3 4 5 6	ALIGN AUTO #Avg Type: RMS	NSE:INT		RF 50 Ω AC req 802.000000 MHz	Center F
				D: Wide ↔ Trig: Free ain:Low #Atten: 2	PN	
Auto Tune	1 804.358 MHz -63.680 dBm	Mkı			Ref Offset 26.2 dB Ref -10.00 dBm	10 dB/div Log
Center Freq						
802.000000 MHz						-20.0
						-30.0
Start Freq 799.000000 MHz	-35.00 dBm					-40.0
Stop Freq 805.000000 MHz						-50.0
805.00000 MHZ	1					-60.0
CF Step 600.000 kHz	upirtup.anoilutuBrallenatituratioyanan	daysersered and a state of the second s	aller and a second	Hardy harry reading and a reading	and a she was a state and a she and a she	-70.0
Auto Man						-80.0
Freq Offset						-00.0
0 Hz						-90.0
						-100
	Stop 805.000 MHz 1.000 s (1001 pts)	#Sweep		#VBW 30 kHz		Start 799. #Res BW
						MSG

BAND 14 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23330 QPSK_RB1_49)-1



	trum Analyzer - Swep										×
LXI RL	RF 50 Ω		-	SEN	SE:INT		ALIGN AUTO		M Jul 28, 2020	Frequency	
Center F	req 802.000		Z PNO: Wide ↔ FGain:Low	Trig: Free #Atten: 2		#Avg Type	e: RMS	TYPE	1 2 3 4 5 6 A WWWW A A A A A A A		
10 dB/div Log	Ref Offset 26 Ref -10.00	.2 dB dBm					Mk	r1 799.04 -47.98	54 MHz 80 dBm	Auto Tu	ine
-20.0										Center Fr 802.000000 M	- 1
-30.0									-35.00 dBm	Start Fr 799.000000 M	- 1
-50.0 -60.0	Chulter a dale ta de transm			[₩] ₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩₩	handhailten afgerala	and the state of t	ศึกรรโปสุรัทการ _{โอส} ิกรรร	Juli Mangaliyan pady	RMS Muhaapadaababa	Stop Fr 805.000000 M	- 1
-70.0										CF St 600.000 k <u>Auto</u> M	
-90.0										Freq Offs 0	set Hz
-100								Stop 805.	000 MHz		
#Res BW ^{MSG}	10 kHz		#VBW	30 kHz			#Sweep	1.000 s (1	001 pts)		

BAND 14 Upper Emission Mask (793 MHz ~805 MHz) Plot (10M BW Ch.23330 QPSK_RB50_0)-2



Image: Market Allow RE 50 Ω AC SENSE:INT ALIGN AUTO 01:21:15 PM Jul 28, 2020 Center Freq 5.015000000 GHz Frequen PNO: Fast →→ Trig: Free Run Trig: Free Run TRACE 1 2 3 4 5 6 IFGain:Low #Atten: 20 dB Det A A A A A A A	су
PNO: Fast Trig: Free Run TYPE A WWWWW IFGain:Low #Atten: 20 dB DET A A A A A A	
IFGaintLow #Atten. 20 dB	
	Tune
Mkr1 3.681 0 GHz	Turic
10 dB/div Ref 10.00 dBm -67.090 dBm	
0.00 2 Cente	Frea
-10.0 5.01500000	
-20.0	
star	tFreq
-40.0	0 MHz
	Freq
-80.0	
Start 30 MHz Stop 10.000 GHz CF	Step
#Res BW 1.0 MHz #VBW 3.0 MHz Sweep 17.33 ms (20001 pts) 997.0000	
	Man
1 N 1 f 3.681 0 GHz -67.090 dBm	
2 N 1 f 789.2 MHz -3.252 dBm Freq (Offset
	0 Hz
MSG STATUS	

BAND 14. Conducted Spurious Plot (23305ch_5MHz_QPSK_RB 1_0)



	trum Analyzer - Swe	ept SA								
LXI RL	RF 50 Ω req 5.0150		2117	SEN	ISE:INT	#Avg Ty	ALIGN AUTO		PM Jul 28, 2020 DE 1 2 3 4 5 6	Frequency
Center P	eq 5.0150		PNO: Fast ↔	Trig: Free #Atten: 20				TY		
			IFGain:Low	#Atten: 20) dB					Auto Tune
							M	kr1 3.69	9 5 GHZ 08 dBm	
10 dB/div Log	Ref 10.00	dBm						-07.5		
0.00	2									Center Freq
-10.0										5.015000000 GHz
-20.0										
-30.0										
-40.0										Start Freq
-50.0										30.000000 MHz
-60.0			. 1							
									RMS	Stop Freq
-70.0					And a strength of the second					10.00000000 GHz
-80.0										
Start 30 M	/IHz							Stop 10	.000 GHz	CF Step
#Res BW	1.0 MHz		#VB\	V 3.0 MHz		S	Sweep 1	7.33 ms (2	0001 pts)	997.000000 MHz
		х		Y		TION FU	INCTION WIDT	H FUNCTI	ON VALUE 🔺	<u>Auto</u> Man
1 N 1 2 N 1		3.69	9 5 GHz 1.7 MHz	-67.308 dE -3.654 dE						
3				-0.004 02						Freq Offset
4 5									=	0 Hz
6										
8										
9										
11				105					-	
MSG				III			I STAT	116	•	
MoG								03		

BAND 14. Conducted Spurious Plot (23330ch_5MHz_QPSK_RB 1_0)



	trum Analyzer - Sw	vept SA								
LXI RL	RF 50			SENS	E:INT	#Avg Typ	ALIGN AUTO		PM Jul 28, 2020 E 1 2 3 4 5 6	Frequency
Center Fr	req 5.0150	00000	PNO: Fast ↔	Trig: Free I		#Avg iyp	e. Rivis	TYP	E A WWWW T A A A A A A	
			IFGain:Low	#Atten: 20	dB			DE		
							Mk	r1 3.707	' 9 GHz	Auto Tune
10 dB/div	Ref 10.00	dBm						-67.10	05 dBm	
Log	2									
0.00	-Y-									Center Freq
-10.0										5.015000000 GHz
-20.0										
-30.0										Start Freq
-40.0										30.000000 MHz
-50.0										30.000000 WIHZ
-60.0			. 1							
									RMS	Stop Freq
-70.0			A DESCRIPTION OF THE OWNER OWNER OF THE OWNER OWNER OF THE OWNER			and the second				10.00000000 GHz
-80.0										
Start 30 M								Stop 10	.000 GHz	CF Step
#Res BW			#VBV	N 3.0 MHz		s	weep 17	.33 ms (2)	0000 GHZ	997.000000 MHz
MKR MODE TR		×			FUNCT		-	•	ON VALUE	<u>Auto</u> Man
		× 3.7	707 9 GHz	Y -67.105 dBr	FUNCT		NCTION WIDTH	FUNCTIO	JN VALUE	
2 N 1	f	7	798.2 MHz	-2.620 dBr						Freq Offset
3										0 Hz
5									E	0 H2
6										
8										
9 10										
11									~	
•							_1		•	
MSG								3		

BAND 14. Conducted Spurious Plot (23355ch_5MHz_QPSK_ RB 1_0)



	trum Analyzer - Sv	•									
LXI RL		Ω AC	<u>сц-</u>		SEN	SE:INT	#Ava	ALIGN AUTO Type: RMS		. PM Jul 28, 2020 CE <mark>1 2 3 4 5</mark> 6	
	req 5.0150	00000	PNO: Fast IFGain:Low		rig: Free Atten: 20		#//19	Type. Kino	T) [
10 dB/div	Ref 10.00) dBm						М		3 0 GHz 28 dBm	Auto Tune
Log 0.00 -10.0 -20.0											Center Freq 5.015000000 GHz
-30.0 -40.0 -50.0											Start Freq 30.000000 MHz
-60.0 -70.0 -80.0										RMS	Stop Freq 10.000000000 GHz
Start 30 N #Res BW			#V	BW 3.	0 MHz			Sweep 1	Stop 10 7.33 ms (2).000 GHz 20001 pts)	CF Step 997.000000 MHz Auto Man
MKR MODE TR 1 N 1 2 N 1 3	RC SCL		83 0 GHz 89.2 MHz	-6	Y 7.228 dB 2.602 dB	m	ICTION	FUNCTION WIDT	H FUNCT	ION VALUE	Freq Offset
4 5 6 7										E	0 Hz
8 9 10 11											
MSG								I o STAT	US		

BAND 14. Conducted Spurious Plot (Ch.23330 10 MHz QPSK RB 1, Offset 0)



10. APPENDIX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2008-FC074-P