

FCC Test Report

(PART 27)

Report No.: RF170328C23-7

FCC ID: V65E4750

Test Model: E4750

Received Date: Mar. 28, 2017

Test Date: Apr. 12, 2017 ~ Apr. 24, 2017

Issued Date: May 02, 2017

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Release Control Record

Issue No.	Description	Date Issued
RF170328C23-7	Original Release	May 02, 2017



Certificate of Conformity 1

Product: Feature Phone

Brand: KYOCERA

Test Model: E4750

Sample Status: Identical Prototype

Applicant: Kyocera Corporation c/o Kyocera International, Inc.

Test Date: Apr. 12, 2017 ~ Apr. 24, 2017

Standards: FCC Part 27, Subpart C, M

The above equipment has been tested by Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Approved by:

David Huang / Project Engineer



2 Summary of Test Results

	Applied Standard: FCC Part 27 & Part 2										
FCC Clause	Test Item	Result	Remarks								
2.1046 27.50(h)			Meet the requirement of limit.								
2.1055 27.54	Frequency Stability		Meet the requirement of limit.								
2.1049	2.1049 Occupied Bandwidth		Meet the requirement of limit.								
	Peak to Average Ratio	Pass	Meet the requirement of limit.								
2.1051 27.53(I)	Band Edge Measurements	Pass	Meet the requirement of limit.								
2.1051 27.53(m)	Conducted Spurious Emissions	Pass	Meet the requirement of limit.								
2.1053 27.53(m)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -6.37 dB at 8040 MHz.								

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

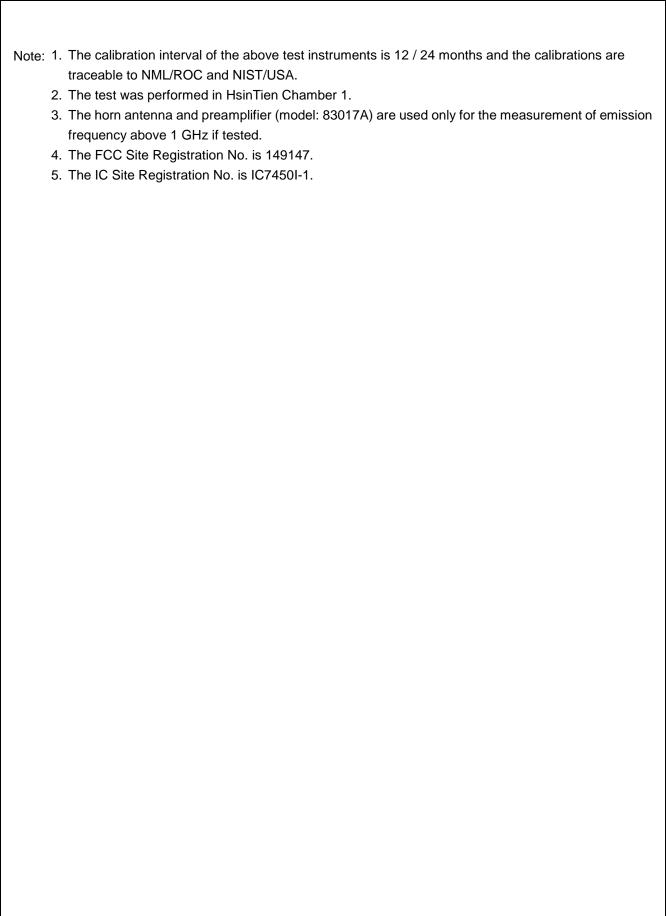
Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.44 dB
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.0153 dB
Radiated Emissions up to 1 GHZ	t mains ports 150 kHz ~ 30 MHz 30 MHz ~ 200 MHz 200 MHz ~1000 MHz 1 GHz ~ 18 GHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
Radiated Emissions above 1 GHZ	18 GHz ~ 40 GHz	1.1508 dB



2.2 Test Site and Instruments

Description & Manaufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent Technologies	N9038A	MY52260177	Jun. 21, 2016	Jun. 20, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 13, 2016	Dec. 12, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Dec. 16, 2016	Dec. 15, 2017
HORN Antenna ETS-Lindgren	3117	00143293	Dec. 29, 2016	Dec. 28, 2017
Double Ridge Guide Horn Antenna EMCO	3115	5619	Dec. 27, 2016	Dec. 26, 2017
BILOG Antenna SCHWARZBECK	VULB 9168	9168-153	Dec. 13, 2016	Dec. 12, 2017
Fixed Attenuator Mini-Circuits	BW-N10W5+	NA	Jul. 08, 2016	Jul. 07, 2017
MXG Vector signal generator Agilent	N5182B	MY53050430	Oct. 19, 2016	Oct. 18, 2017
Preamplifier Agilent	310N	187226	Jun. 24, 2016	Jun. 23, 2017
Preamplifier Agilent	83017A	MY39501357	Jun. 24, 2016	Jun. 23, 2017
Power Meter Anritsu	ML2495A	1232002	Sep. 08, 2016	Sep. 07, 2017
Power Sensor Anritsu	MA2411B	1207325	Sep. 08, 2016	Sep. 07, 2017
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(R FC-SMS-100-SM S-120+RFC-SMS -100-SMS-400)	Jun. 24, 2016	Jun. 23, 2017
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(R FC-SMS-100-SM S-24) Jun. 24, 2016		Jun. 23, 2017
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	NA	NA	NA
Communications Tester-Wireless Agilent	8960 Series 10	MY53201073	Jul. 03, 2015	Jul. 02, 2017
Radio Communication Analyzer Anritsu	MT8820C	6201300640	Aug. 10, 2015	Aug. 09, 2017
Temperature & Humidity Chamber	GTH-120-40-CP-A R	MAA1306-019	Sep. 02, 2016	Sep. 01, 2017
DC Power Supply Topward	33010D	807748	Oct. 25, 2016	Oct. 24, 2018
Digital Multimeter Fluke	87-III	70360742	Jul. 01, 2016	Jun. 30, 2017







3 General Information

3.1 General Description of EUT

Product	Feature Phone								
Brand	KYOCERA								
Test Model	E4750								
Status of EUT	Identical Prototype								
Danier Complex Batings	5.0 Vdc (adapter)								
Power Supply Rating	3.8 Vdc (Li-ion battery)								
Modulation Type	QPSK, 16QAM								
	LTE Band 41 (Channel Bandwidth: 5 MHz)	2498.5 ~ 2687.5 MHz							
Francisco Panas	LTE Band 41 (Channel Bandwidth: 10 MHz)	2501.0 ~ 2685.0 MHz							
Frequency Range	LTE Band 41 (Channel Bandwidth: 15 MHz)	2503.5 ~ 2682.5 MHz							
	LTE Band 41 (Channel Bandwidth: 20 MHz)	2506.0 ~ 2680.0 MHz							
	LTE Band 41 (Channel Bandwidth: 5 MHz)	360.33 mW							
Max. EIRP Power	LTE Band 41 (Channel Bandwidth: 10 MHz)	362.83 mW							
Wax. EIRP POWEI	LTE Band 41 (Channel Bandwidth: 15 MHz)	362.83 mW							
	LTE Band 41 (Channel Bandwidth: 20 MHz)	360.33 mW							
	LTE Band 41 (Channel Bandwidth: 5 MHz)	4M49G7D							
Emissian Designator	LTE Band 41 (Channel Bandwidth: 10 MHz)	8M96W7D							
Emission Designator	LTE Band 41 (Channel Bandwidth: 15 MHz)	13M5G7D							
	LTE Band 41 (Channel Bandwidth: 20 MHz)	17M9G7D							
Antenna Type Fixed Internal Antenna									
Accessory Device Refer to Note as below									
Data Cable Supplied	Refer to Note as below								

Note:

1. The EUT contains following accessory devices.

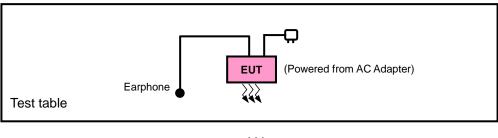
Product	Brand	Model	Description
Adapter	KYOCERA	SCP-50ADT	I/P: 100-240 Vac, 50/60 Hz, 0.25 A O/P: 5 Vdc, 1.5 A
Battery	KYOCERA	SCP-71LBPS	3.8 Vdc, 11.02 Wh
USB Cable	KYOCERA	SCP-22SDC	1 m shielded cable w/o core

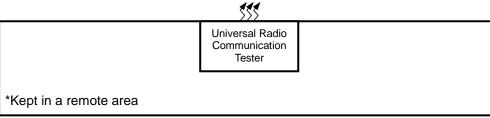
2. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.



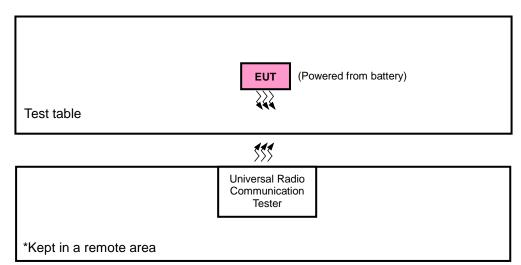
3.2 Configuration of System under Test

<Radiated Emission Test>





<E.I.R.P. Test>



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units.



3.3 Test Mode Applicability and Tested Channel Detail

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis, and antenna ports.

The worst case was found when positioned as the table below. Following channel(s) was (were) selected for the final test as listed below:

Band	EIRP	Radiated Emission		
LTE Band 41	X-plane	Z-axis		

LTE Band 41

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
		39675 to 41565	39675, 40620, 41565	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
	EIRP	39700 to 41540	39700, 40620, 41540	10 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
-	EIRP	39725 to 41515	39725, 40620, 41515	15 MHz	QPSK, 16QAM	1 RB / 37 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK, 16QAM	1 RB / 50 RB Offset
		39675 to 41565	39675, 41565	5 MHz	QPSK	1 RB / 12 RB Offset
	Frequency	39700 to 41540	39700, 41540	10 MHz	QPSK	1 RB / 24 RB Offset
-	Stability	39725 to 41515	39725, 41515	15 MHz	QPSK	1 RB / 37 RB Offset
		39750 to 41490	39750, 41490	20 MHz	QPSK	1 RB / 50 RB Offset
		39675 to 41565	39675, 40620, 41565	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
-	Occupied Bandwidth	39700 to 41540	39700, 40620, 41540	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		39725 to 41515	39725, 40620, 41515	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
	Peak to Average Ratio	39675 to 41565	39675, 40620, 41565	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		39700 to 41540	39700, 40620, 41540	10 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
-		39725 to 41515	39725, 40620, 41515	15 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		39675 to 41565	39675, 41565	5 MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		39700 to 41540	39700, 41540	10 MHz	QPSK, 16QAM	50 RB / 0 RB Offset
-	Band Edge	39725 to 41515	39725, 41515	15 MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		39750 to 41490	39750, 41490	20 MHz	QPSK, 16QAM	100 RB / 0 RB Offset
		39675 to 41565	39675, 40620, 41565	5 MHz	QPSK	1 RB / 12 RB Offset
	Conducted	39700 to 41540	39700, 40620, 41540	10 MHz	QPSK	1 RB / 24 RB Offset
-	Emission	39725 to 41515	39725, 40620, 41515	15 MHz	QPSK	1 RB / 37 RB Offset
		39750 to 41490	39750, 40620, 41490	20 MHz	QPSK	1 RB / 50 RB Offset
-	Radiated Emission	39750 to 41490	39750, 40620, 41490	20 MHz	QPSK	1 RB / 50 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.



Test Condition:

Test Item	Environmental Conditions	Input Power	Tested By
EIRP	25 deg. C, 65 % RH	3.8 Vdc	Anson Lin
Frequency Stability	25 deg. C, 65 % RH	3.8 Vdc	Anson Lin
Occupied Bandwidth	25 deg. C, 65 % RH	3.8 Vdc	Anson Lin
Band Edge	25 deg. C, 65 % RH	3.8 Vdc	Anson Lin
Peak to Average Ratio	25 deg. C, 65 % RH	3.8 Vdc	Anson Lin
Condcudeted Emission	25 deg. C, 65 % RH	3.8 Vdc	Anson Lin
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Charles Hsiao / Karl Lee

3.4 EUT Operating Conditions

The EUT makes a call to the communication simulator. The communication simulator station system controlled a EUT to export maximum output power under transmission mode and specific channel frequency

3.5 General Description of Applied Standards

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2
FCC 47 CFR Part 27
KDB 971168 D01 Power Meas License Digital Systems v02r02
ANSI/TIA/EIA-603-D 2010

Note: All test items have been performed and recorded as per the above standards.



4 Test Types and Results

4.1 Output Power Measurement

4.1.1 Limits of Output Power Measurement

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that "User stations are limited to 2 watts" and 27.50(i) specific that "Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage."

4.1.2 Test Procedures

EIRP Measurement:

- a. All measurements were done at low, middle and high operational frequency range. RBW and VBW is 10 MHz for LTE mode.
- b. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- c. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a tx cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step b. Record the power level of S.G.
- d. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn.

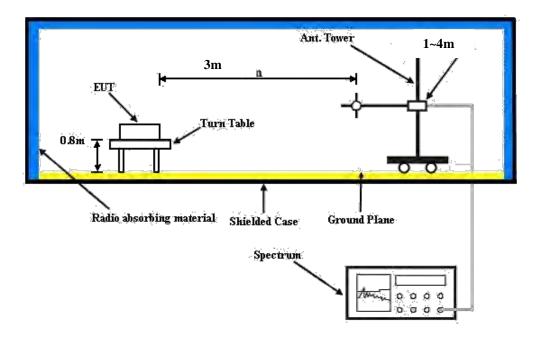
Conducted Power Measurement:

- a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.



4.1.3 Test Setup

EIRP / ERP Measurement:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

Conducted Power Measurement:





4.1.4 Test Results

Conducted Output Power (dBm)

			QPSK							
Band /	RB		Low Ch 39675	Mid Ch 40620	High Ch 41565	3GPP MPR	Low Ch 39675	Mid Ch 40620	High Ch 41565	3GPP MPR
BW	Size	Offset	2498.5 MHz	2593.0 MHz	2687.5 MHz	(dB)	2498.5 MHz	2593.0 MHz	2687.5 MHz	(dB)
	1	0	22.54	24.02	23.99	0	21.51	23.06	23.02	1
	1	12	22.35	23.77	23.67	0	21.31	22.78	22.68	1
	1	24	22.47	23.91	23.86	0	21.43	22.94	22.88	1
41 / 5M	12	0	21.53	22.90	22.85	1	20.49	21.90	21.85	2
	12	6	21.41	22.72	22.63	1	20.36	21.69	21.60	2
	12	13	21.49	22.83	22.76	1	20.45	21.82	21.74	2
	25	0	21.44	22.79	22.69	1	20.39	21.78	21.66	2

		RB RB Size Offset	QPSK							
Band / BW	RB Size		Low Ch 39700	Mid Ch 40620	High Ch 41540	3GPP MPR	Low Ch 39700	Mid Ch 40620	High Ch 41540	3GPP MPR
DVV	Size	Oliset	2501.0	2593.0	2685.0	(dB)	2501.0	2593.0	2685.0	(dB)
			MHz	MHz	MHz		MHz	MHz	MHz	
	1	0	22.68	24.08	24.05	0	21.65	23.13	23.09	1
	1	24	22.49	23.85	23.77	0	21.45	22.87	22.79	1
	1	49	22.61	23.97	23.94	0	21.57	23.01	22.97	1
41 / 10M	25	0	21.68	23.00	22.96	1	20.64	22.01	21.97	2
	25	12	21.56	22.85	22.76	1	20.51	21.84	21.74	2
	25	25	21.64	22.94	22.89	1	20.60	21.95	21.89	2
	50	0	21.59	22.91	22.82	1	20.54	21.92	21.80	2

				QPSK				16QAM		
Band / BW	RB Size	RB Offset	Low Ch 39725	Mid Ch 40620	High Ch 41515	3GPP MPR	Low Ch 39725	Mid Ch 40620	High Ch 41515	3GPP MPR
DVV	Oize	Oliset	2503.5 MHz	2593.0 MHz	2682.5 MHz	(dB)	2503.5 MHz	2593.0 MHz	2682.5 MHz	(dB)
	1	0	22.82	24.14	24.11	0	21.78	23.19	23.16	1
	1	37	22.63	23.94	23.86	0	21.59	22.97	22.88	1
	1	74	22.75	24.04	24.02	0	21.71	23.08	23.05	1
41 / 15M	36	0	21.82	23.10	23.07	1	20.78	22.11	22.06	2
	36	19	21.71	22.97	22.89	1	20.66	21.94	21.86	2
	36	39	21.78	23.05	23.01	1	20.73	22.04	21.99	2
	75	0	21.74	23.02	22.95	1	20.69	22.00	21.92	2

	RB	RB		QPSK				16QAM		
Band /			Low Ch 39750	Mid Ch 40620	High Ch 41490	3GPP MPR	Low Ch 39750	Mid Ch 40620	High Ch 41490	3GPP MPR
BW	Size	Offset	2506.0	2593.0	2680.0	(dB)	2506.0	2593.0	2680.0	(dB)
			MHz	MHz	MHz		MHz	MHz	MHz	
	1	0	22.95	24.19	24.17	0	21.89	23.24	23.21	1
	1	50	22.80	24.01	23.97	0	21.73	23.04	22.96	1
	1	99	22.86	24.11	24.07	0	21.84	23.15	23.13	1
41 / 20M	50	0	22.01	23.18	23.13	1	20.88	22.20	22.17	2
	50	25	21.85	23.08	23.00	1	20.81	22.06	21.99	2
	50	50	21.96	23.14	23.12	1	20.86	22.15	22.11	2
	100	0	21.89	23.13	23.06	1	20.84	22.13	22.05	2



EIRP Power (dBm)

				LTE Band 41			
			Channel Ba	andwidth: 5 MHz	/ QPSK		
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
	39675	2498.5	-18.71	44.24	25.53	357.11	
	40620	2593.0	-18.63	44.20	25.57	360.33	Н
	41565	2687.5	-19.24	44.80	25.56	359.83	
Х	39675	2498.5	-21.66	44.19	22.53	179.10	
	40620	2593.0	-21.58	44.09	22.51	178.16	V
	41565	2687.5	-21.90	44.50	22.60	181.93	
			Channel Ba	ndwidth: 5 MHz	/ 16QAM		
	39675	2498.5	-19.68	44.24	24.56	285.63	
	40620	2593.0	-19.64	44.20	24.56	285.56	Н
V	41565	2687.5	-20.23	44.80	24.57	286.48	
X	39675	2498.5	-22.68	44.19	21.51	141.61	
	40620	2593.0	-22.52	44.09	21.57	143.48	V
	41565	2687.5	-22.94	44.50	21.56	143.19	

				LTE Band 41			
			Channel Ba	ndwidth: 10 MHz	/ QPSK		
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
	39700	2501.0	-18.79	44.34	25.55	359.00	
	40620	2593.0	-18.60	44.20	25.60	362.83	Н
X	41540	2685.0	-19.23	44.72	25.49	354.24	
^	39700	2501.0	-21.69	44.23	22.54	179.31	
	40620	2593.0	-21.54	44.09	22.55	179.80	V
	41540	2685.0	-21.89	44.41	22.52	178.48	
		(Channel Bar	ndwidth: 10 MHz	/ 16QAM		
	39700	2501.0	-19.74	44.34	24.60	288.47	
	40620	2593.0	-19.72	44.20	24.48	280.35	Н
V	41540	2685.0	-20.13	44.72	24.59	287.94	
Х	39700	2501.0	-22.69	44.23	21.54	142.43	
	40620	2593.0	-22.54	44.09	21.55	142.82	V
	41540	2685.0	-22.93	44.41	21.48	140.48	



				LTE Band 41			
			Channel Ba	ndwidth: 15 MHz	/ QPSK		
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
	39725	2503.5	-18.76	44.32	25.56	359.58	
	40620	2593.0	-18.60	44.20	25.60	362.83	Н
X	41515	2682.5	-19.34	44.85	25.51	355.47	
^	39725	2503.5	-21.46	43.99	22.53	179.14	
	40620	2593.0	-21.58	44.09	22.51	178.16	V
	41515	2682.5	-21.90	44.51	22.61	182.39	
		(Channel Bar	ndwidth: 15 MHz	/ 16QAM		
	39725	2503.5	-19.74	44.32	24.58	286.95	
	40620	2593.0	-19.65	44.20	24.55	284.90	Н
	41515	2682.5	-20.41	44.85	24.44	277.84	
Х	39725	2503.5	-22.48	43.99	21.51	141.64	
	40620	2593.0	-22.56	44.09	21.53	142.17	V
	41515	2682.5	-22.93	44.51	21.58	143.88	

				LTE Band 41			
			Channel Ba	ndwidth: 20 MHz	/ QPSK		
Plane	Channel	Frequency (MHz)	LVL (dBm)	Correction Factor (dB)	EIRP (dBm)	EIRP (mW)	Polarization (H/V)
	39750	2506.0	-18.66	44.16	25.50	354.81	
	40620	2593.0	-18.68	44.20	25.52	356.20	Н
X	41490	2680.0	-19.24	44.81	25.57	360.33	
^	39750	2506.0	-22.16	44.78	22.62	182.81	
	40620	2593.0	-21.58	44.09	22.51	178.16	V
	41490	2680.0	-22.24	44.72	22.48	177.01	
		(Channel Bar	ndwidth: 20 MHz	/ 16QAM		
	39750	2506.0	-19.66	44.16	24.50	281.84	
	40620	2593.0	-19.76	44.20	24.44	277.78	Н
	41490	2680.0	-20.33	44.81	24.48	280.35	
X	39750	2506.0	-23.14	44.78	21.64	145.88	
	40620	2593.0	-22.58	44.09	21.51	141.51	V
	41490	2680.0	-23.21	44.72	21.51	141.58	



4.2 Frequency Stability Measurement

4.2.1 Limits of Frequency Stability Measurement

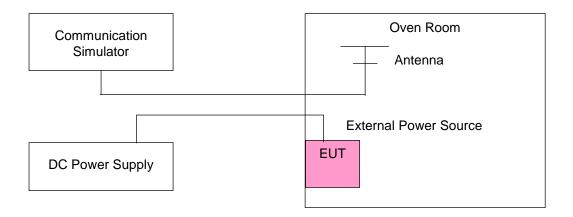
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

4.2.2 Test Procedure

- a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- b. EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

4.2.3 Test Setup





4.2.4 Test Results

Frequency Error vs. Voltage

Voltage (Volts)					
	Low C	hannel	High C	Limit (ppm)	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2498.500001	0.000	2687.500002	0.001	2.5
3.3	2498.500001	0.000	2687.500004	0.001	2.5
4.35	2498.500004	0.002	2687.500001	0.000	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.3 Vdc to 4.35 Vdc.

		Channel Bandwidth: 5 MHz						
Temp. (°C)	Low C	hannel	High C	hannel	Limit (ppm)			
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)				
-30	2498.500003	0.001	2687.500002	0.001	2.5			
-20	2498.500002	0.001	2687.500003	0.001	2.5			
-10	2498.500003	0.001	2687.500002	0.001	2.5			
0	2498.500001	0.001	2687.500003	0.001	2.5			
10	2498.500004	0.001	2687.500002	0.001	2.5			
20	2498.499997	-0.001	2687.499997	-0.001	2.5			
30	2498.499997	-0.001	2687.499997	-0.001	2.5			
40	2498.499997	-0.001	2687.499998	-0.001	2.5			
50	2498.499998	-0.001	2687.499997	-0.001	2.5			
60	2498.499996	-0.002	2687.499998	-0.001	2.5			



Frequency Error vs. Voltage

Voltage (Volts)					
	Low C	hannel	High C	Limit (ppm)	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2501.000004	0.001	2685.000003	0.001	2.5
3.3	2501.000002	0.001	2685.000001	0.000	2.5
4.35	2501.000001	0.001	2685.000002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.3 Vdc to 4.35 Vdc.

		LTE B	and 41		
Temp. (℃)	Low C	hannel	High C	hannel	Limit (ppm)
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2501.000002	0.001	2685.000002	0.001	2.5
-20	2501.000002	0.001	2685.000001	0.000	2.5
-10	2501.000004	0.001	2685.000003	0.001	2.5
0	2501.000004	0.001	2685.000003	0.001	2.5
10	2501.000004	0.002	2685.000003	0.001	2.5
20	2500.999998	-0.001	2684.999997	-0.001	2.5
30	2500.999999	-0.001	2684.999999	0.000	2.5
40	2500.999998	-0.001	2684.999997	-0.001	2.5
50	2500.999998	-0.001	2684.999998	-0.001	2.5
60	2500.999997	-0.001	2684.999997	-0.001	2.5



Frequency Error vs. Voltage

Voltage (Volts)					
	Low C	hannel	High C	Limit (ppm)	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2503.500001	0.000	2682.500002	0.001	2.5
3.3	2503.500004	0.002	2682.500003	0.001	2.5
4.35	2503.500002	0.001	2682.500003	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.3 Vdc to 4.35 Vdc.

		LTE B	and 41		
Temp. (℃)	Low C	hannel	High C	hannel	Limit (ppm)
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2503.500003	0.001	2682.500004	0.001	2.5
-20	2503.500001	0.001	2682.500002	0.001	2.5
-10	2503.500002	0.001	2682.500002	0.001	2.5
0	2503.500004	0.001	2682.500003	0.001	2.5
10	2503.500003	0.001	2682.500004	0.001	2.5
20	2503.499997	-0.001	2682.499996	-0.001	2.5
30	2503.499999	-0.001	2682.499997	-0.001	2.5
40	2503.499998	-0.001	2682.499996	-0.001	2.5
50	2503.499997	-0.001	2682.499999	-0.001	2.5
60	2503.499997	-0.001	2682.499997	-0.001	2.5



Frequency Error vs. Voltage

Voltage (Volts)					
	Low C	hannel	High C	Limit (ppm)	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
3.8	2506.000001	0.001	2680.000002	0.001	2.5
3.3	2506.000001	0.000	2680.000003	0.001	2.5
4.35	2506.000003	0.001	2680.000002	0.001	2.5

Note: The applicant defined the normal working voltage of the battery is from 3.3 Vdc to 4.35 Vdc.

Temp. (℃)	Low C	hannel	High C	Limit (ppm)	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)	
-30	2506.000002	0.001	2680.000002	0.001	2.5
-20	2506.000001	0.001	2680.000003	0.001	2.5
-10	2506.000003	0.001	2680.000002	0.001	2.5
0	2506.000001	0.001	2680.000002	0.001	2.5
10	2506.000001	0.001	2680.000001	0.000	2.5
20	2505.999997	-0.001	2679.999996	-0.001	2.5
30	2505.999996	-0.002	2679.999997	-0.001	2.5
40	2505.999999	0.000	2679.999998	-0.001	2.5
50	2505.999996	-0.002	2679.999998	-0.001	2.5
60	2505.999996	-0.002	2679.999997	-0.001	2.5



4.3 Occupied Bandwidth Measurement

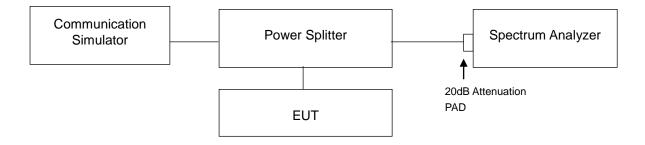
4.3.1 Limits of Occupied Bandwidth Measurement

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.

4.3.2 Test Procedure

- a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

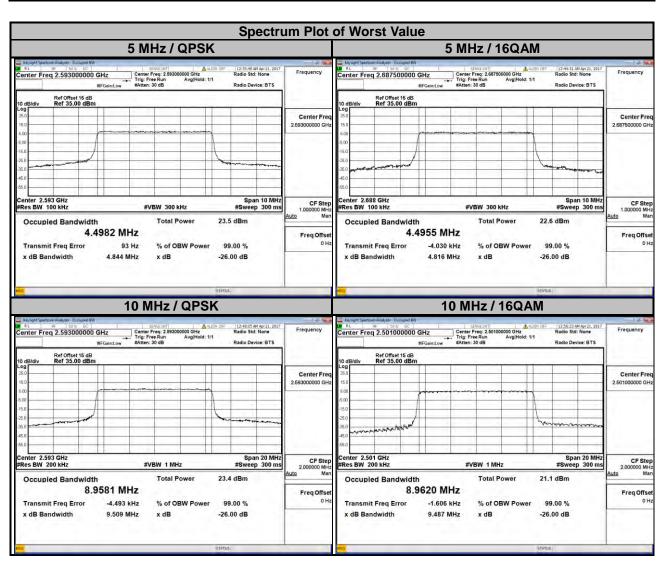
4.3.3 Test Setup





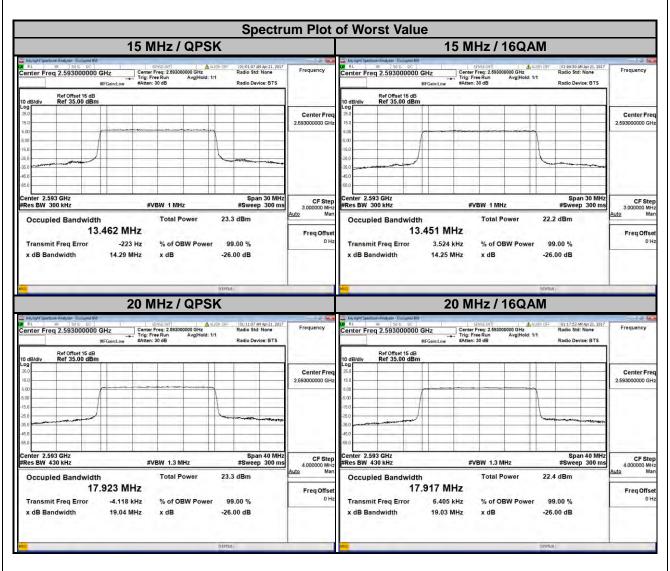
4.3.4 Test Result

LTE Band 41									
(Channel Band	dwidth: 5 MH	z	Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)		99 % Occupied Bandwidth (MHz)		Frequency	99 % Occupied Bandwidth (MHz)			
		QPSK	16QAM		(MHz)	QPSK	16QAM		
39675	2498.5	4.4972	4.4928	39700	2501.0	8.9448	8.9620		
40620	2593.0	4.4982	4.4944	40620	2593.0	8.9581	8.9611		
41565	2687.5	4.4969	4.4955	41540	2685.0	8.9516	8.9557		





LTE Band 41									
C	hannel Band	width: 15 MH	Iz	Channel Bandwidth: 20 MHz					
Channel	Frequency (MHz)	99 % Occupied Bandwidth (MHz)		Channel	Frequency	99 % Occupied Bandwidth (MHz)			
		QPSK	16QAM		(MHz)	QPSK	16QAM		
39725	2503.5	13.4460	13.4380	39750	2506.0	17.9070	17.9040		
40620	2593.0	13.4620	13.4510	40620	2593.0	17.9230	17.9170		
41515	2682.5	13.4580	13.4430	41490	2680.0	17.9210	17.9110		



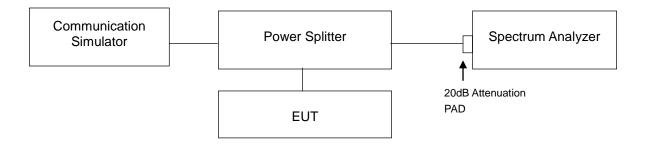


4.4 Band Edge Measurement

4.4.1 Limits of Band Edge Measurement

According to FCC 27.53(I)(4) specified that power of any emission outside of the channel edge must be attenuated below the transmitting power (P) by a factor shall be not less than 40 + 10 log (P) dB on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10 log (P) dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10 log (P) dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth. In addition, the attenuation factor shall not be less that 43 + 10 log (P) dB on all frequencies between 2490.5 MHz and 2496 MHz and 55 + 10 log (P) dB at or below 2490.5 MHz. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 MHz, in which case a resolution bandwidth of at least one percent may be employed.

4.4.2 Test Setup

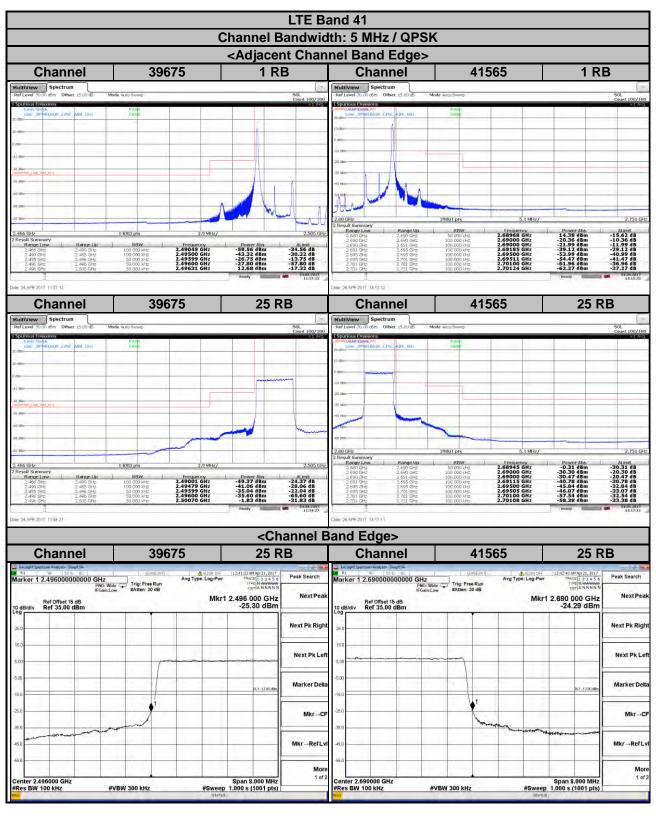


4.4.3 Test Procedures

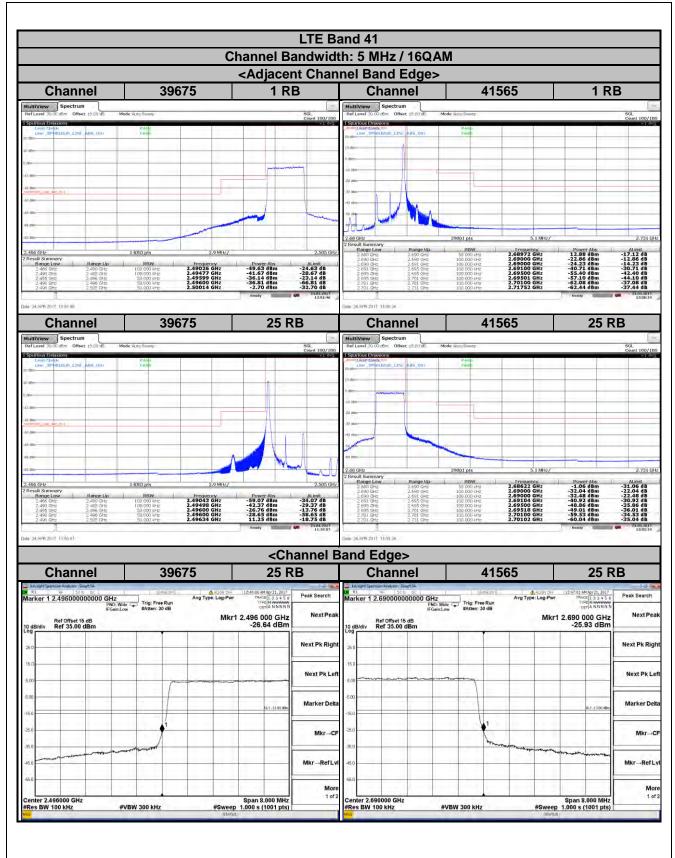
- a. The EUT was set up for the maximum peak power with LTE link data modulation. The power was measured with R&S Spectrum Analyzer. All measurements were done at 2 channels (low and high operational frequency range.).
- b. The band edge measurement used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- c. The center frequency of spectrum is the band edge frequency and span is 20 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (Channel bandwidth 5 MHz).
- d. The center frequency of spectrum is the band edge frequency and span is 40 MHz. RB of the spectrum is 100 kHz and VB of the spectrum is 300 kHz (Channel bandwidth 10 MHz).
- e. The center frequency of spectrum is the band edge frequency and span is 60 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (Channel bandwidth 15 MHz).
- f. The center frequency of spectrum is the band edge frequency and span is 80 MHz. RB of the spectrum is 200 kHz and VB of the spectrum is 1 MHz (Channel bandwidth 20 MHz).
- g. Record the max trace plot into the test report.



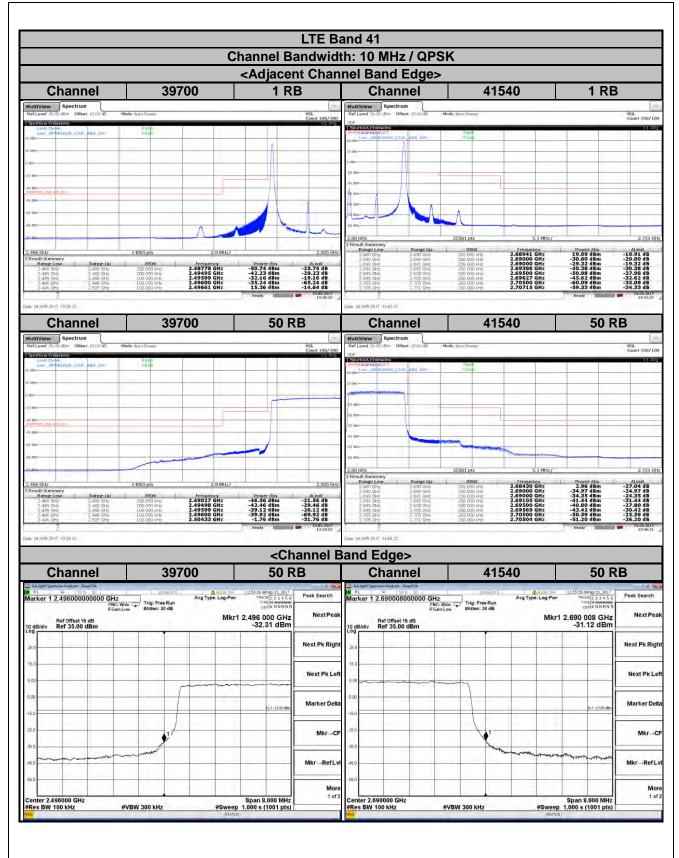
4.4.4 Test Results



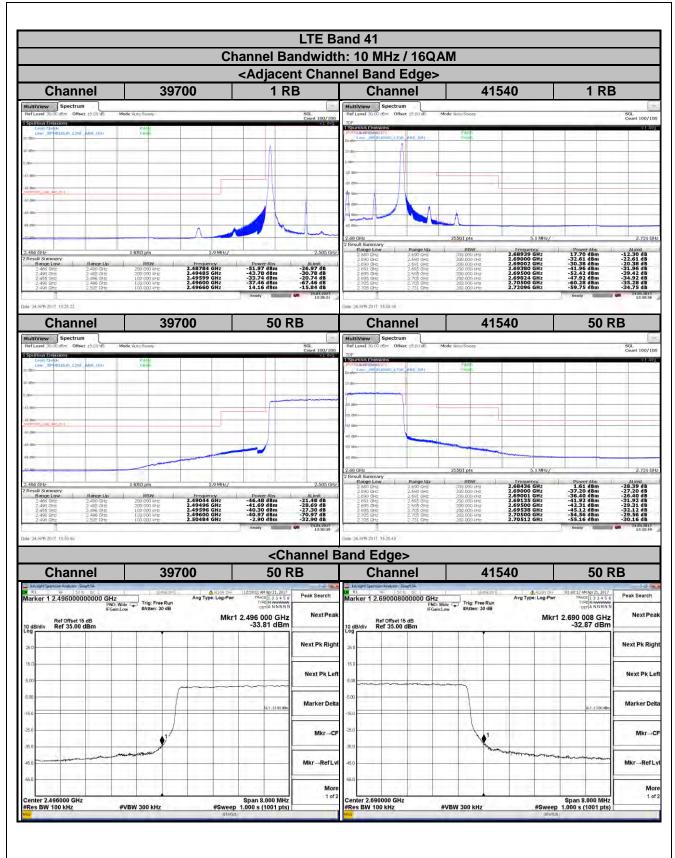




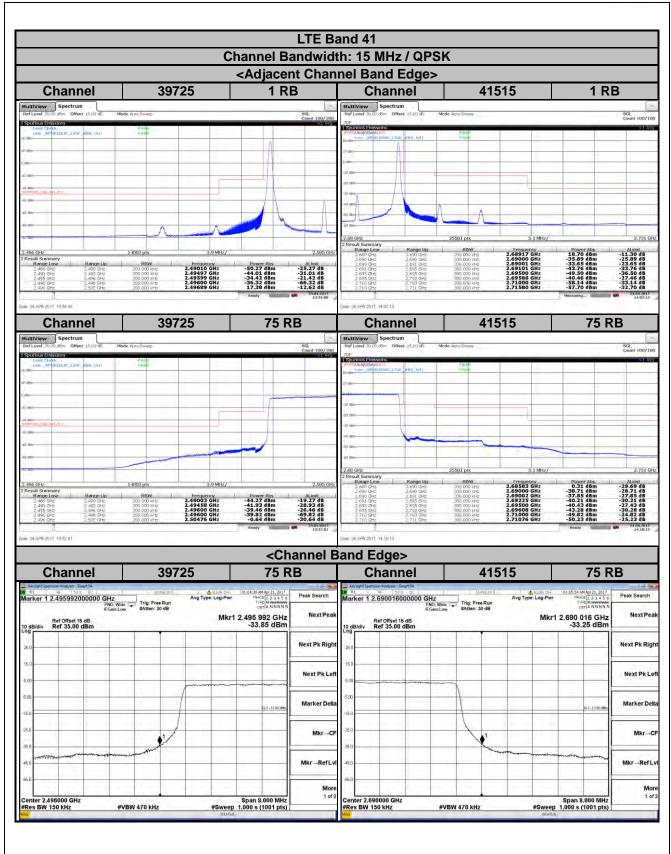




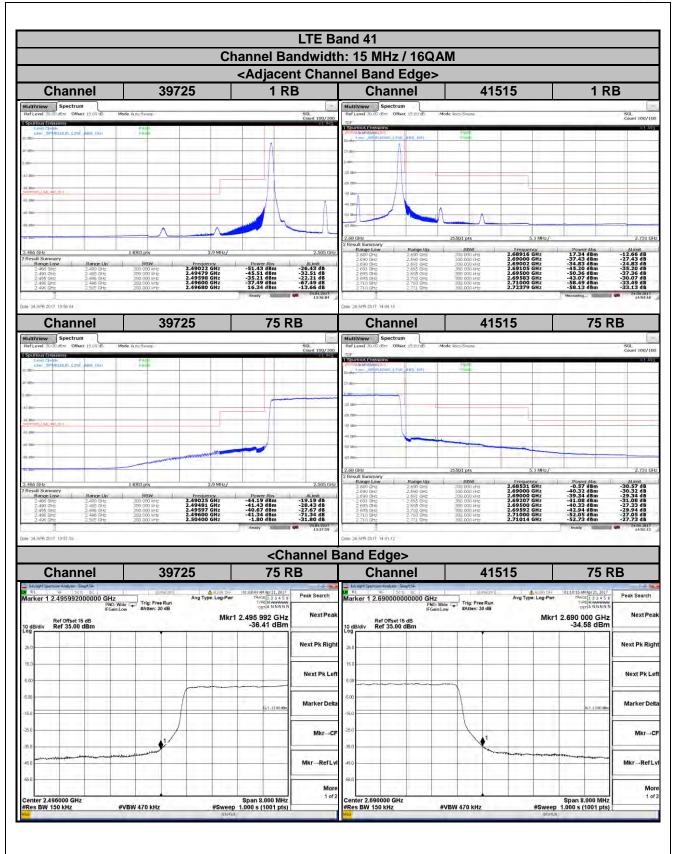




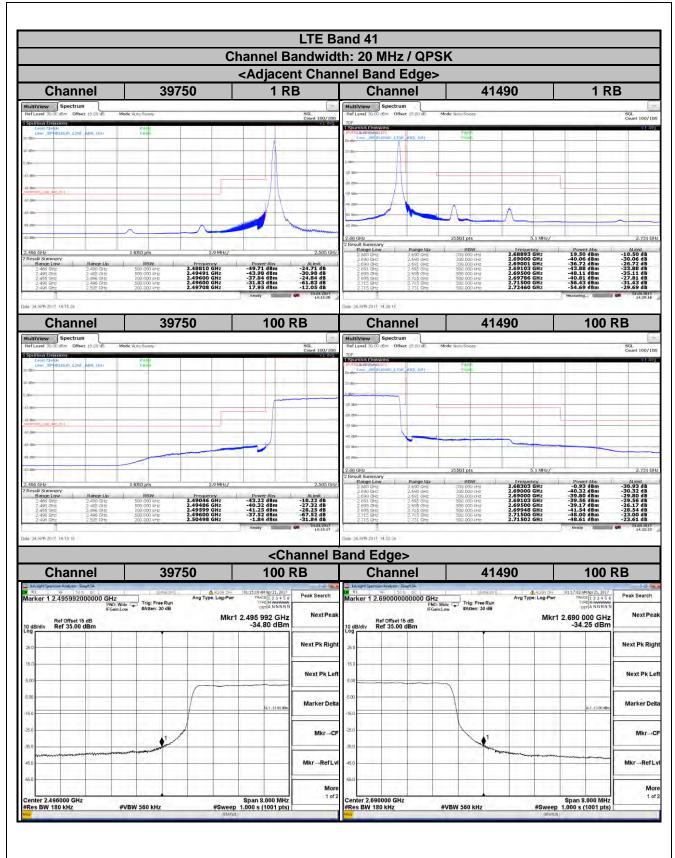




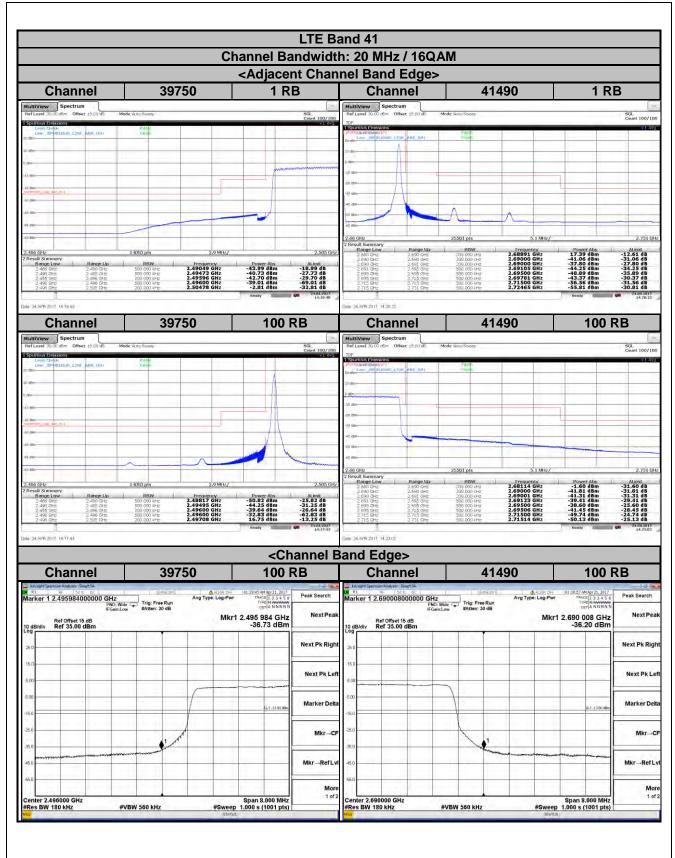












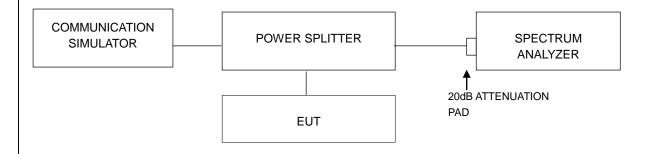


4.5 Peak to Average Ratio

4.5.1 Limits of Peak to Average Ratio Measurement

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB.

4.5.2 Test Setup



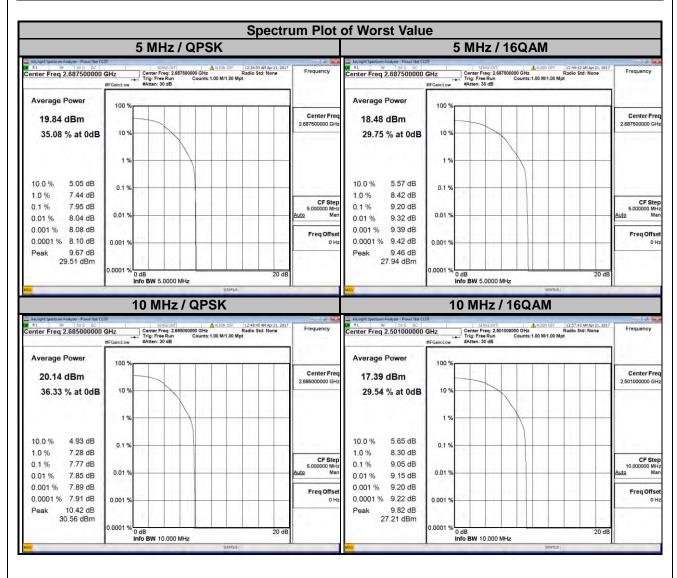
4.5.3 Test Procedures

- 1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
- 2. Set the number of counts to a value that stabilizes the measured CCDF curve;
- 3. Record the maximum PAPR level associated with a probability of 0.1 %.



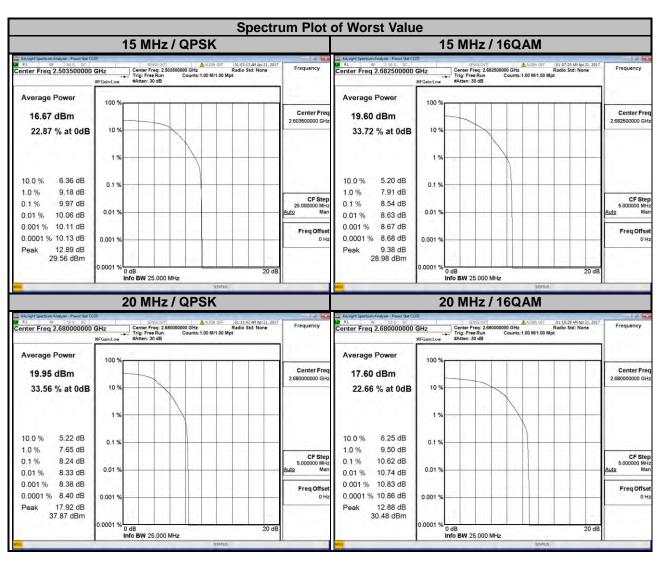
4.5.4 Test Results

LTE Band 41									
Channel Bandwidth: 5 MHz				Channel Bandwidth: 10 MHz					
Channel	Frequency (MHz)	Peak to Average Ratio (dB)		Channel	Frequency	Peak to Average Ratio (dB)			
		QPSK	16QAM		(MHz)	QPSK	16QAM		
39675	2498.5	7.67	9.18	39700	2501.0	7.70	9.05		
40620	2593.0	7.38	8.17	40620	2593.0	7.36	7.59		
41565	2687.5	7.95	9.20	41540	2685.0	7.77	8.83		





LTE Band 41									
C	hannel Band	width: 15 MH	Iz	Channel Bandwidth: 20 MHz					
Channel	Frequency (MHz)		Average Ratio (dB)	Channel	Frequency (MHz)	Peak to Average Ratio (dB)			
		QPSK	16QAM			QPSK	16QAM		
39725	2503.5	9.97	8.49	39750	2506.0	8.12	8.46		
40620	2593.0	7.81	8.25	40620	2593.0	7.83	8.41		
41515	2682.5	8.25	8.54	41490	2680.0	8.24	10.62		



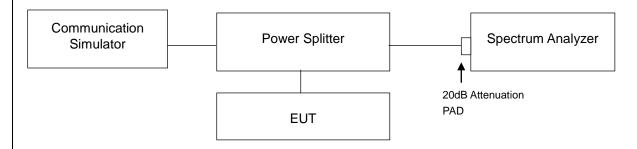


4.6 Conducted Spurious Emissions

4.6.1 Limits of Conducted Spurious Emissions Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 55 +10 log10(P) dB. The limit of emission is equal to -25 dBm.

4.6.2 Test Setup

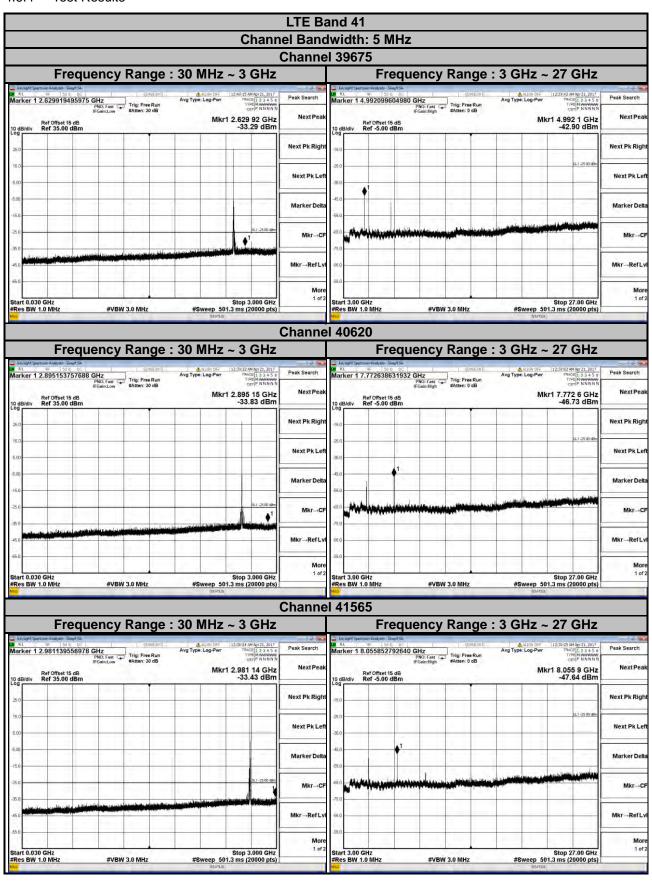


4.6.3 Test Procedure

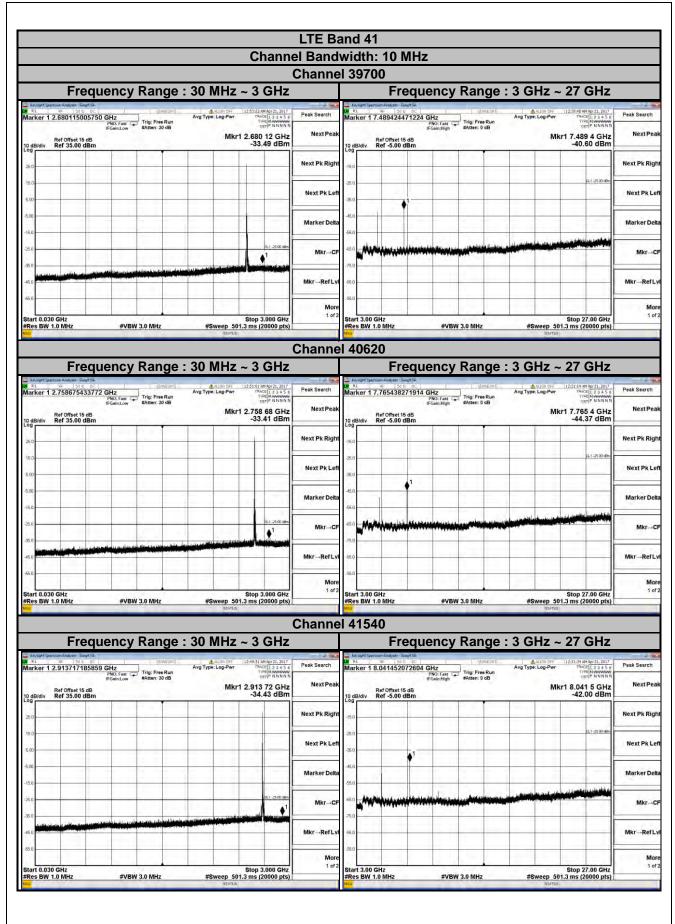
- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 30 MHz to 27 GHz for LTE Band 41. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz are used for conducted emission measurement.



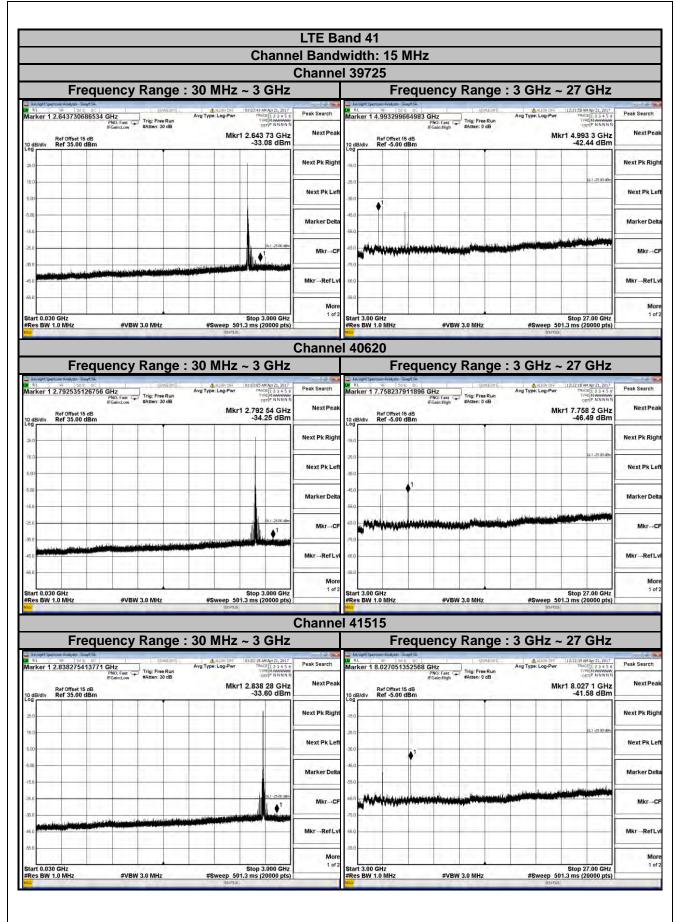
4.6.4 Test Results



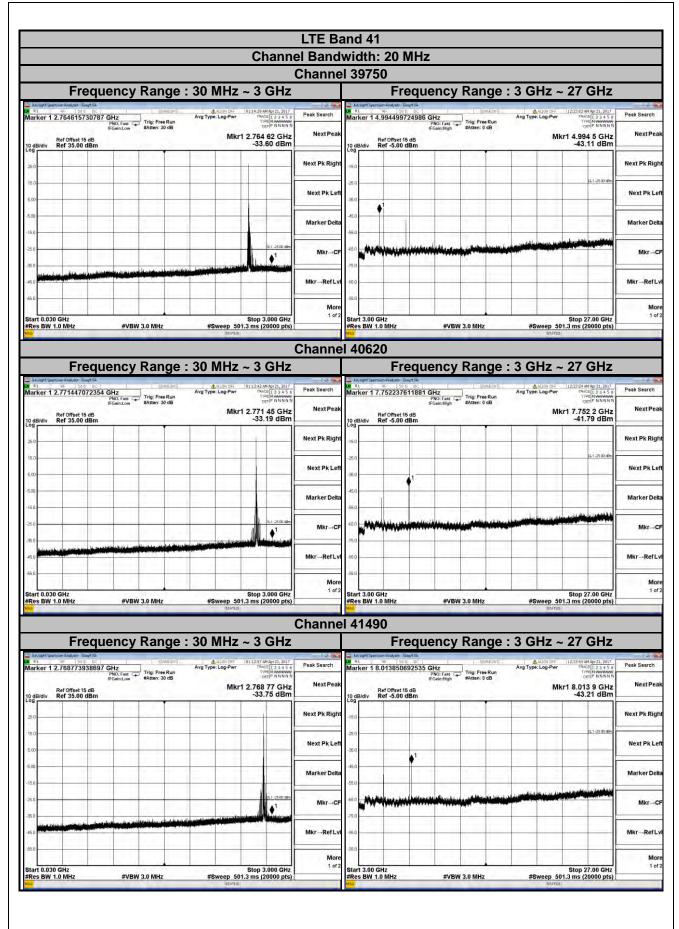














4.7 Radiated Emission Measurement

4.7.1 Limits of Radiated Emission Measurement

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 55 +10 log10(P) dB. The limit of emission is equal to -25 dBm.

4.7.2 Test Procedure

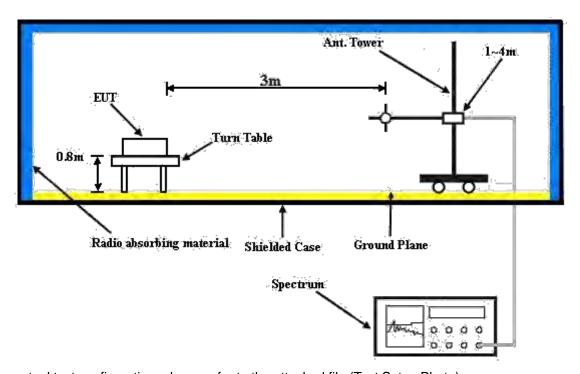
- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to "Read Value" of step a. Record the power level of S.G.
- c. EIRP = Output power level of S.G TX cable loss + Antenna gain of substitution horn.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, E.R.P power = E.I.P.R power 2.15 dBi.

NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

4.7.3 Deviation from Test Standard

No deviation.

4.7.4 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).



4.7.5 Test Results

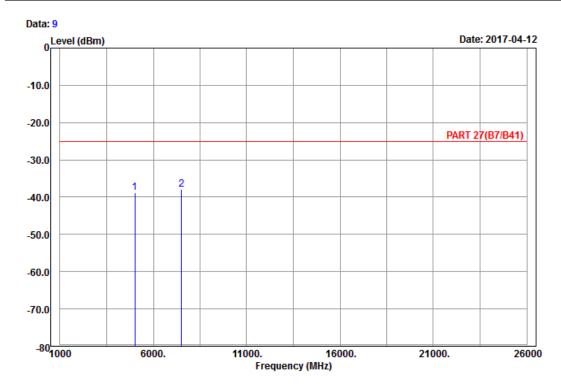
LTE Band 41

Channel Bandwidth: 20 MHz / QPSK

Low Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 27(B7/B41) Horizontal Remark : LTE_Band 41_Link_CH39750

Tested by: Karl Lee

Read Limit Over Freq Level Level Line Limit Factor Remark

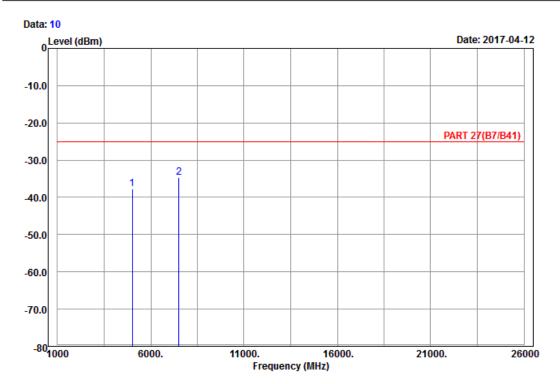
MHz dBm dBm dB dB

1 5012.00 -38.77 -57.85 -25.00 -13.77 19.08 Peak 2 pp 7518.00 -37.98 -60.66 -25.00 -12.98 22.68 Peak





Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 27(B7/B41) Vertical Remark : LTE_Band 41_Link_CH39750

Tested by: Karl Lee

Read Limit Over
Freq Level Level Line Limit Factor Remark

MHz dBm dBm dBm dB dB

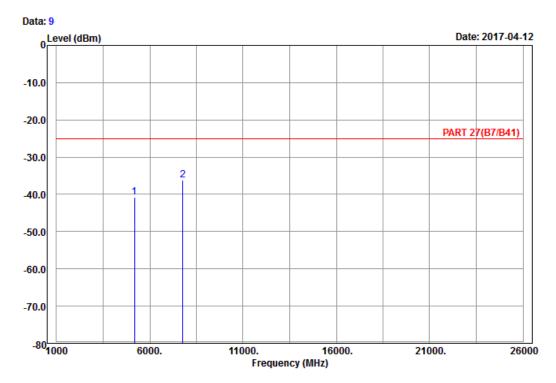
1 5012.00 -37.80 -56.88 -25.00 -12.80 19.08 Peak 2 pp 7518.00 -34.68 -57.36 -25.00 -9.68 22.68 Peak



Middle Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 27(B7/B41) Horizontal Remark : LTE_Band 41_Link_CH40620

Tested by: Charles Hsiao

Read Limit Over

Freq Level Line Limit Factor Remark

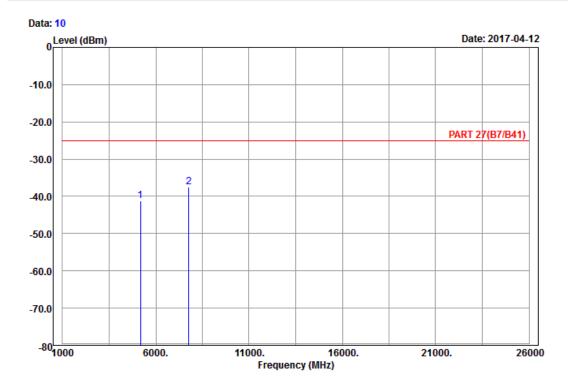
MHz dBm dBm dB dB

1 5186.00 -40.78 -60.90 -25.00 -15.78 20.12 Peak 2 pp 7779.00 -36.10 -59.43 -25.00 -11.10 23.33 Peak





Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 27(B7/B41) Vertical Remark : LTE_Band 41_Link_CH40620

Tested by: Charles Hsiao

Read Limit Over
Freq Level Level Lime Limit Factor Remark

MHz dBm dBm dBm dB dB

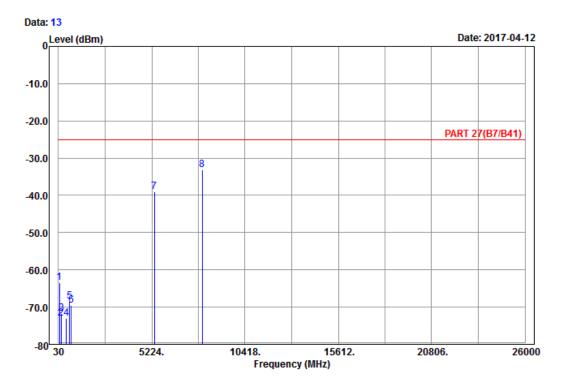
1 5186.00 -41.26 -61.38 -25.00 -16.26 20.12 Peak 2 pp 7779.00 -37.52 -60.85 -25.00 -12.52 23.33 Peak



High Channel



Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 27(B7/B41) Horizontal Remark : LTE_Band 41_Link_CH41490

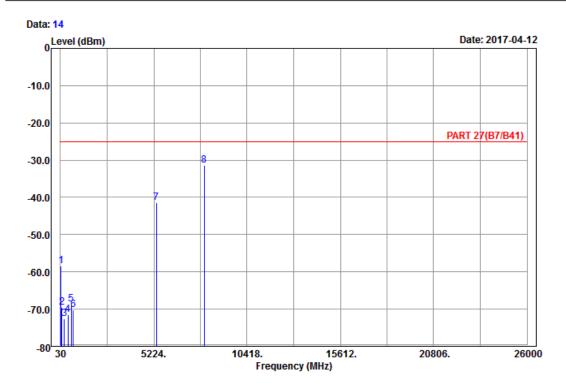
Tested by: Karl Lee

	Freq	Level		Limit Line		Factor	Remark
-	MHz	dBm	dBm	dBm	dB	dB	
1	83.73	-63.42	-51.98	-25.00	-38.42	-11.44	Peak
2	167.97	-73.12	-66.22	-25.00	-48.12	-6.90	Peak
3	202.26	-71.64	-65.50	-25.00	-46.64	-6.14	Peak
4	481.30	-73.01	-68.28	-25.00	-48.01	-4.73	Peak
5	651.40	-68.53	-68.39	-25.00	-43.53	-0.14	Peak
6	743.10	-69.58	-68.40	-25.00	-44.58	-1.18	Peak
7	5360.00	-38.94	-59.24	-25.00	-13.94	20.30	Peak
8 рр	8040.00	-33.20	-56.95	-25.00	-8.20	23.75	Peak





Bureau Veritas Consumer Products Services Ltd., Taoyuan Branch



Site : 966 chamber 1

Condition: PART 27(B7/B41) Vertical Remark : LTE_Band 41_Link_CH41490

Tested by: Karl Lee

	Freq	Level		Limit Line		Factor	Remark
-	MHz	dBm	dBm	dBm	dB	dB	
1	53.49	-58.49	-44.43	-25.00	-33.49	-14.06	Peak
2	106.95	-69.43	-60.13	-25.00	-44.43	-9.30	Peak
3	240.06	-72.52	-66.88	-25.00	-47.52	-5.64	Peak
4	440.70	-71.54	-67.91	-25.00	-46.54	-3.63	Peak
5	630.40	-68.60	-68.69	-25.00	-43.60	0.09	Peak
6	741.70	-70.17	-69.01	-25.00	-45.17	-1.16	Peak
7	5360.00	-41.38	-61.68	-25.00	-16.38	20.30	Peak
8 pp	8040.00	-31.37	-55.12	-25.00	-6.37	23.75	Peak



5 Pictures of Test Arrangements						
Please refer to the attached file (Test Setup Photo).						



Appendix - Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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The address and road map of all our labs can be found in our web site also.

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