

FCC Test Report

(PART 27)

Report No.: RF160104C14-6

FCC ID: GKR-TP00078ASB

Test Model: TP00078A

Received Date: Jan. 04, 2016

Test Date: Jan. 16, 2016

Issued Date: Feb. 18, 2016

Applicant: Compal Electronics Inc

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Release Control Record

Issue No.	Description	Date Issued
RF160104C14-6	Original Release	Feb. 18, 2016



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1 Certificate of Conformity

Product: Tablet Computer

Brand: Lenovo

Test Model: TP00078A

Sample Status: Production Unit

Applicant: Compal Electronics Inc

Test Date: Jan. 16, 2016

Standards: FCC Part 27, Subpart C, L

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.

Prepared by :

Gina Liu

Date:

Feb. 18, 2016

Gina Liu / Specialist

Approved by :

Stanley Wu

Date:

Feb. 18, 2016

Stanley Wu / Assistant Manager



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2 Summary of Test Results

Applied Standard: FCC Part 27 & Part 2 (WCDMA)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(d)(4)	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.

Applied Standard: FCC Part 27 & Part 2 (LTE 4)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(d)(4)	Equivalent Isotropic Radiated Power	Pass	Meet the requirement of limit.
2.1053 27.53(h)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -25.40 dB at 5197.50 MHz.

Applied Standard: FCC Part 27 & Part 2 (LTE 12)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(C)(10)	Effective Radiated Power	Pass	Meet the requirement of limit.

Applied Standard: FCC Part 27 & Part 2 (LTE 13)			
FCC Clause	Test Item	Result	Remarks
2.1046 27.50(b)(10)	Effective Radiated Power	Pass	Meet the requirement of limit.
2.1053 27.53(g)	Radiated Spurious Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -7.89 dB at 1564.00 MHz.

Note: Only test item of Conducted power, ERP, EIRP, and Radiated Emissions tests were performed for this report. Other test data please refer to China Telecommunication Technology Labs module report no.: B15W50341-FCC-RF_Rev1 (Brand: Sierra Wireless Inc., Model: EM7455) Issue date: Jul, 10, 2015.

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	Expanded Uncertainty (k=2) ($\pm$)
Radiated Emissions up to 1 GHz	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB



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2.2 Test Site and Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver Agilent	N9038A	MY51210203	Jan. 21, 2015	Jan. 21, 2016
Spectrum Analyzer Agilent	N9010A	MY52220314	Sep. 03, 2015	Sep. 02, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Dec. 17, 2015	Dec. 16, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-472	Feb. 04, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-969	Feb. 09, 2015	Feb. 09, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Feb. 04, 2015	Feb. 04, 2016
Loop Antenna	EM-6879	269	Jul. 31, 2015	Jul. 30, 2016
Preamplifier EMCI	EMC 012645	980115	Dec. 21, 2015	Dec. 20, 2016
Preamplifier EMCI	EMC 184045	980116	Jan. 09, 2015	Jan. 08, 2016
Preamplifier EMCI	EMC 330H	980112	Dec. 28, 2015	Dec. 27, 2016
Power Meter Anritsu	ML2495A	1232002	Sep. 21, 2015	Sep. 20, 2016
Power Sensor Anritsu	MA2411B	1207325	Sep. 21, 2015	Sep. 20, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309219/4 2950114	Oct. 12, 2015	Oct. 11, 2016
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250130/4	Oct. 12, 2015	Oct. 11, 2016
RF Coaxial Cable Worken	8D-FB	Cable-Ch10-01	Oct. 12, 2015	Oct. 11, 2016
Software BV ADT	E3 6.120103	NA	NA	NA
Antenna Tower MF	MFA-440H	NA	NA	NA
Turn Table MF	MFT-201SS	NA	NA	NA
Antenna Tower & Turn Table Controller MF	MF-7802	NA	NA	NA
Radio Communication Analyzer	MT8820C	6201300640	Aug. 10, 2015	Aug. 09, 2017

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Chamber 10.

3. The horn antenna and preamplifier (model: EMC 184045) are used only for the measurement of emission frequency above 1 GHz if tested.

4. The FCC Site Registration No. is 690701.

5. The IC Site Registration No. is IC7450F-10.



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3 General Information

3.1 General Description of EUT

Product	Tablet Computer	
Brand	Lenovo	
Test Model	TP00078A	
Status of EUT	Production Unit	
Power Supply Rating	20Vdc (Adapter) 15.2Vdc (Li-ion battery)	
Modulation Type	WCDMA	QPSK, BPSK
	LTE	QPSK, 16QAM
Frequency Range	WCDMA	1712.4 ~ 1752.6 MHz
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	1710.7 ~ 1754.3 MHz
	LTE Band 4 (Channel Bandwidth: 3 MHz)	1711.5 ~ 1753.5 MHz
	LTE Band 4 (Channel Bandwidth: 5 MHz)	1712.5 ~ 1752.5 MHz
	LTE Band 4 (Channel Bandwidth: 10 MHz)	1715.0 ~ 1750.0 MHz
	LTE Band 4 (Channel Bandwidth: 15 MHz)	1717.5 ~ 1747.5 MHz
	LTE Band 4 (Channel Bandwidth: 20 MHz)	1720.0 ~ 1745.0 MHz
	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	699.7 ~ 715.3 MHz
	LTE Band 12 (Channel Bandwidth: 3 MHz)	700.5 ~ 714.5 MHz
	LTE Band 12 (Channel Bandwidth: 5 MHz)	701.5 ~ 713.5 MHz
	LTE Band 12 (Channel Bandwidth: 10 MHz)	704.0 ~ 711.0 MHz
	LTE Band 13 (Channel Bandwidth: 5 MHz)	779.5 ~ 784.5 MHz
	LTE Band 13 (Channel Bandwidth: 10 MHz)	782.0 MHz
Max. ERP Power	LTE Band 12 (Channel Bandwidth: 1.4 MHz)	0.5W
	LTE Band 12 (Channel Bandwidth: 3 MHz)	0.5W
	LTE Band 12 (Channel Bandwidth: 5 MHz)	0.5W
	LTE Band 12 (Channel Bandwidth: 10 MHz)	0.5W
	LTE Band 13 (Channel Bandwidth: 5 MHz)	0.10W
	LTE Band 13 (Channel Bandwidth: 10 MHz)	0.10W
Max. EIRP Power	WCDMA	0.19W
	LTE Band 4 (Channel Bandwidth: 1.4 MHz)	0.21W
	LTE Band 4 (Channel Bandwidth: 3 MHz)	0.21W
	LTE Band 4 (Channel Bandwidth: 5 MHz)	0.21W
	LTE Band 4 (Channel Bandwidth: 10 MHz)	0.23W
	LTE Band 4 (Channel Bandwidth: 15 MHz)	0.23W
	LTE Band 4 (Channel Bandwidth: 20 MHz)	0.24W
Antenna Type	PIFA 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 1	Lenovo	ADLX45NCC2A	I/P: 100-240Vac, 50~60Hz, 1.3A O/P: 20Vdc, 2.25A
Adapter 2	Lenovo	ADLX45NDC2A	I/P: 100-240Vac, 50~60Hz, 1.3A O/P: 20Vdc, 2.25A
Battery	Lenovo	SB10F46465	15.2Vdc, 2.895Ah
WLAN Module	Broadcom	BCM94356Z	--
WWAN Module	Sierra	EM7455	--

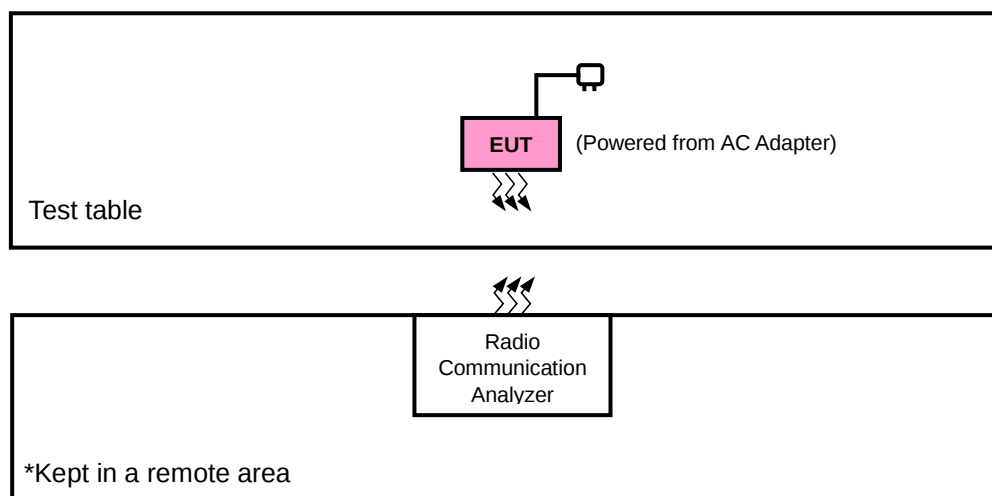
2. The antenna information is listed as below.

Antenna Type	Brand Name	Parts Number	Antenna Gain			
			WCDMA IV	LTE 4	LTE 12	LTE 13
PIFA	Ethertronics Inc.	WWAN Main Antenna: 5001997 WWAN Aux. Antenna: 5002014 (RX only)	0.02	-0.12	-3.62	-0.61

3. 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>



3.2.1 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

No.	Product	Brand	Model No.	Serial No.	FCC ID
1.	Radio Communication Analyzer	Anritsu	MT8820C	6201300640	N/A

No.	Signal Cable Description Of The Above Support Units
1.	N/A

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item 1 acted as communication partners to transfer data.

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	Radiated Emission
LTE Band 4	Z-axis
LTE Band 13	Z-axis



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WCDMA

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Mode
-	EIRP	1312 to 1513	1312, 1413, 1513	WCDMA

LTE Band 4

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	EIRP	19957 to 20393	19957, 20175, 20393	1.4 MHz	QPSK, 16QAM	1 RB / 5 RB Offset
		19965 to 20385	19965, 20175, 20385	3 MHz	QPSK, 16QAM	1 RB / 14 RB Offset
		19975 to 20375	19975, 20175, 20375	5 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
		20000 to 20350	20000, 20175, 20350	10 MHz	QPSK, 16QAM	1 RB / 49 RB Offset
		20025 to 20325	20025, 20175, 20325	15 MHz	QPSK, 16QAM	1 RB / 74 RB Offset
		20050 to 20300	20050, 20175, 20300	20 MHz	QPSK, 16QAM	1 RB / 99 RB Offset
-	Radiated Emission	20050 to 20300	20175	20 MHz	QPSK	1 RB / 99 RB Offset

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

LTE Band 12

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23017 to 23173	23017, 23095, 23173	1.4 MHz	QPSK, 16QAM	1 RB / 2 RB Offset
		23025 to 23165	23025, 23095, 23165	3 MHz	QPSK, 16QAM	1 RB / 7 RB Offset
		23035 to 23155	23035, 23095, 23155	5 MHz	QPSK, 16QAM	1 RB / 12 RB Offset
		23060 to 23130	23060, 23095, 23130	10 MHz	QPSK, 16QAM	1 RB / 24 RB Offset

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

LTE Band 13

EUT Configure Mode	Test Item	Available Channel	Tested Channel	Channel Bandwidth	Modulation	Mode
-	ERP	23205 to 23255	23205, 23230, 23255	5 MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	23230	10 MHz	QPSK, 16QAM	1 RB / 24 RB Offset
		23230	23230	10 MHz	QPSK	1 RB / 0 RB Offset
-	Radiated Emission	23230	23230	10 MHz	QPSK	1 RB / 24 RB Offset
						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
ERP / EIRP	25 deg. C, 65 % RH	15.2 Vdc	Anson Lin
Radiated Emission	25 deg. C, 65 % RH	120 Vac, 60 Hz	Anson Lin



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

KDB 412172 D0 Determining ERP and EIRP v01

KDB 996369 D01 Module Certification Guide v02

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

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 watt EIRP.

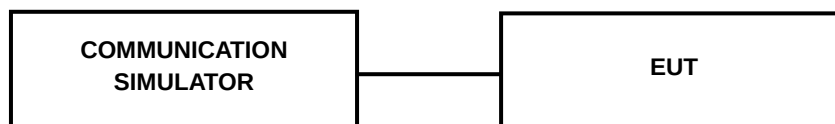
Portable stations (hand-held devices) operating in the 699-787 MHz band are limited to 3 watts ERP

4.1.2 Test Procedures

A base station simulator was used to establish communication with the EUT. Its parameters were set to transmit the maximum power on the EUT. The measured power in the radio frequency on the transmitter output terminals shall be reported.

Conducted Power Measurement:

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



EIRP / ERP Measurement:

According to KDB 412172 D01 Power Approach,

$EIRP = P_T + G_T - L_C$, $ERP = EIRP - 2.15$, where

P_T = transmitter output power in dBm

G_T = gain of the transmitting antenna in dBi

L_C = signal attenuation in the connecting cable between the transmitter and antenna in dB



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4.1.3 Test Results

Conducted Output Power (dBm)

Band	WCDMA IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	22.92	23.02	22.98
HSDPA Subtest-1	21.75	21.80	21.74
HSDPA Subtest-2	21.79	21.84	21.78
HSDPA Subtest-3	21.27	21.33	21.27
HSDPA Subtest-4	21.27	20.95	21.26
HSUPA Subtest-1	21.52	21.51	21.58
HSUPA Subtest-2	19.80	19.85	19.89
HSUPA Subtest-3	20.47	20.45	20.48
HSUPA Subtest-4	20.05	20.35	20.08
HSUPA Subtest-5	21.80	21.90	21.80

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 19957	Mid Ch 20175	High Ch 20393		Low Ch 19957	Mid Ch 20175	High Ch 20393	
			1710.7 MHz	1732.5 MHz	1754.3 MHz		1710.7 MHz	1732.5 MHz	1754.3 MHz	
4 / 1.4M	1	0	23.14	23.09	23.25	0	22.47	22.42	22.58	1
	1	2	22.03	22.10	22.03	0	21.15	21.43	21.24	1
	1	5	22.44	22.16	22.24	0	21.77	21.49	21.57	1
	3	0	22.41	22.57	22.58	0	21.74	21.90	21.91	1
	3	1	22.32	22.28	22.25	0	21.65	21.61	21.58	1
	3	3	22.22	22.12	22.29	0	21.55	21.45	21.62	1
	6	0	21.27	21.30	21.40	1	20.60	20.63	20.73	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 19965	Mid Ch 20175	High Ch 20385		Low Ch 19965	Mid Ch 20175	High Ch 20385	
			1711.5 MHz	1732.5 MHz	1753.5 MHz		1711.5 MHz	1732.5 MHz	1753.5 MHz	
4 / 3M	1	0	23.29	23.24	23.40	0	22.52	22.47	22.63	1
	1	7	22.13	22.25	22.06	0	21.20	21.48	21.29	1
	1	14	22.59	22.31	22.39	0	21.82	21.54	21.62	1
	8	0	21.56	21.72	21.73	1	20.79	20.95	20.96	2
	8	3	21.47	21.43	21.40	1	20.70	20.66	20.63	2
	8	7	21.37	21.27	21.44	1	20.60	20.50	20.67	2
	15	0	21.42	21.45	21.55	1	20.65	20.68	20.78	2



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Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 19975	Mid Ch 20175	High Ch 20375		Low Ch 19975	Mid Ch 20175	High Ch 20375	
			1712.5 MHz	1732.5 MHz	1752.5 MHz		1712.5 MHz	1732.5 MHz	1752.5 MHz	
4 / 5M	1	0	23.41	23.36	23.52	0	22.55	22.50	22.66	1
	1	12	22.09	22.37	22.18	0	21.23	21.51	21.32	1
	1	24	22.71	22.43	22.51	0	21.85	21.57	21.65	1
	12	0	21.68	21.84	21.85	1	20.82	20.98	20.99	2
	12	6	21.59	21.55	21.52	1	20.73	20.69	20.66	2
	12	13	21.49	21.39	21.56	1	20.63	20.53	20.70	2
	25	0	21.54	21.57	21.67	1	20.68	20.71	20.81	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 20000	Mid Ch 20175	High Ch 20350		Low Ch 20000	Mid Ch 20175	High Ch 20350	
			1715.0 MHz	1732.5 MHz	1750.0 MHz		1715.0 MHz	1732.5 MHz	1750.0 MHz	
4 / 10M	1	0	23.54	23.49	23.65	0	22.62	22.57	22.73	1
	1	24	22.22	22.50	22.31	0	21.30	21.58	21.39	1
	1	49	22.84	22.56	22.64	0	21.92	21.64	21.72	1
	25	0	21.81	21.97	21.98	1	20.89	21.05	21.06	2
	25	12	21.72	21.68	21.65	1	20.80	20.76	20.73	2
	25	25	21.62	21.52	21.69	1	20.70	20.60	20.77	2
	50	0	21.67	21.70	21.80	1	20.75	20.78	20.88	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 20025	Mid Ch 20175	High Ch 20325		Low Ch 20025	Mid Ch 20175	High Ch 20325	
			1717.5 MHz	1732.5 MHz	1747.5 MHz		1717.5 MHz	1732.5 MHz	1747.5 MHz	
4 / 15M	1	0	23.65	23.60	23.76	0	22.70	22.65	22.81	1
	1	37	22.33	22.61	22.42	0	21.38	21.66	21.47	1
	1	74	22.95	22.67	22.75	0	22.00	21.72	21.80	1
	36	0	21.92	22.08	22.09	1	20.97	21.13	21.14	2
	36	19	21.83	21.79	21.76	1	20.88	20.84	20.81	2
	36	39	21.73	21.63	21.80	1	20.78	20.68	20.85	2
	75	0	21.78	21.81	21.91	1	20.83	20.86	20.96	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 20050	Mid Ch 20175	High Ch 20300		Low Ch 20050	Mid Ch 20175	High Ch 20300	
			1720.0 MHz	1732.5 MHz	1745.0 MHz		1720.0 MHz	1732.5 MHz	1745.0 MHz	
4 / 20M	1	0	23.79	23.74	23.90	0	22.76	22.71	22.87	1
	1	50	22.47	22.75	22.56	0	21.44	21.72	21.53	1
	1	99	23.09	22.81	22.89	0	22.06	21.78	21.86	1
	50	0	22.06	22.22	22.23	1	21.03	21.19	21.20	2
	50	25	21.97	21.93	21.90	1	20.94	20.90	20.87	2
	50	50	21.87	21.77	21.94	1	20.84	20.74	20.91	2
	100	0	21.92	21.95	22.05	1	20.89	20.92	21.02	2



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Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 23017	Mid Ch 23095	High Ch 23173		Low Ch 23017	Mid Ch 23095	High Ch 23173	
			699.7 MHz	707.5 MHz	715.3 MHz		699.7 MHz	707.5 MHz	715.3 MHz	
12 / 1.4M	1	0	22.16	22.21	22.33	0	21.29	21.34	21.46	1
	1	2	22.12	22.30	22.31	0	21.25	21.43	21.44	1
	1	5	22.04	22.25	22.28	0	21.17	21.38	21.41	1
	3	0	22.20	22.22	22.23	0	21.33	21.35	21.36	1
	3	1	22.21	22.12	22.12	0	21.34	21.25	21.25	1
	3	3	22.14	22.08	22.18	0	21.27	21.21	21.31	1
	6	0	21.13	21.12	21.04	1	20.26	20.25	20.17	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 23025	Mid Ch 23095	High Ch 23165		Low Ch 23025	Mid Ch 23095	High Ch 23165	
			700.5 MHz	707.5 MHz	714.5 MHz		700.5 MHz	707.5 MHz	714.5 MHz	
12 / 3M	1	0	22.31	22.36	22.48	0	21.36	21.41	21.53	1
	1	7	22.27	22.45	22.46	0	21.32	21.50	21.51	1
	1	14	22.19	22.40	22.43	0	21.24	21.45	21.48	1
	8	0	21.35	21.37	21.38	1	20.40	20.42	20.43	2
	8	3	21.36	21.27	21.27	1	20.41	20.32	20.32	2
	8	7	21.29	21.23	21.33	1	20.34	20.28	20.38	2
	15	0	21.28	21.27	21.19	1	20.33	20.32	20.24	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 23035	Mid Ch 23095	High Ch 23155		Low Ch 23035	Mid Ch 23095	High Ch 23155	
			701.5 MHz	707.5 MHz	713.5 MHz		701.5 MHz	707.5 MHz	713.5 MHz	
12 / 5M	1	0	22.42	22.47	22.59	0	21.45	21.50	21.62	1
	1	12	22.38	22.56	22.57	0	21.41	21.59	21.60	1
	1	24	22.30	22.51	22.54	0	21.33	21.54	21.57	1
	12	0	21.46	21.48	21.49	1	20.49	20.51	20.52	2
	12	6	21.47	21.38	21.38	1	20.50	20.41	20.41	2
	12	13	21.40	21.34	21.44	1	20.43	20.37	20.47	2
	25	0	21.39	21.38	21.30	1	20.42	20.41	20.33	2

Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 23060	Mid Ch 23095	High Ch 23130		Low Ch 23060	Mid Ch 23095	High Ch 23130	
			704.0 MHz	707.5 MHz	711.0 MHz		704.0 MHz	707.5 MHz	711.0 MHz	
12 / 10M	1	0	22.58	22.63	22.75	0	21.49	21.54	21.66	1
	1	24	22.54	22.72	22.73	0	21.45	21.63	21.64	1
	1	49	22.46	22.67	22.70	0	21.37	21.58	21.61	1
	25	0	21.62	21.64	21.65	1	20.53	20.55	20.56	2
	25	12	21.63	21.54	21.54	1	20.54	20.45	20.45	2
	25	25	21.56	21.50	21.60	1	20.47	20.41	20.51	2
	50	0	21.55	21.54	21.46	1	20.46	20.45	20.37	2



Band / BW	RB Size	RB Offset	QPSK			3GPP MPR (dB)	16QAM			3GPP MPR (dB)
			Low Ch 23205	Mid Ch 23230	High Ch 23255		Low Ch 23205	Mid Ch 23230	High Ch 23255	
			779.5 MHz	782.0 MHz	784.5 MHz		779.5 MHz	782.0 MHz	784.5 MHz	
13 / 5M	1	0	22.65	22.60	22.72	0	21.56	21.51	21.69	1
	1	12	21.95	22.66	22.15	0	20.86	21.57	21.12	1
	1	24	22.55	22.58	22.68	0	21.46	21.49	21.65	1
	12	0	21.59	21.60	21.59	1	20.50	20.51	20.56	2
	12	6	21.50	21.60	21.58	1	20.41	20.51	20.55	2
	12	13	21.63	21.62	21.54	1	20.54	20.53	20.51	2
	25	0	21.48	21.61	21.65	1	20.39	20.52	20.62	2

Band / BW	RB Size	RB Offset	QPSK	3GPP MPR (dB)	16QAM	3GPP MPR (dB)
			Mid Ch 23230		Mid Ch 23230	
			782.0 MHz		782.0 MHz	
13 / 10M	1	0	22.83	0	21.74	1
	1	24	22.59	0	21.50	1
	1	49	22.59	0	21.50	1
	25	0	21.64	1	20.55	2
	25	12	21.50	1	20.41	2
	25	25	21.54	1	20.45	2



A O T

ERP / EIRP Power (dBm)

Band	WCDMA IV		
Channel	1312	1413	1513
Rx Channel	1537	1638	1738
Frequency	1712.4	1732.6	1752.6
Conducted power(dBm)	22.92	23.02	22.98
Conducted power (Watts)	0.20	0.20	0.20
EIRP (dBm)	22.8	22.9	22.86
EIRP (Watts)	0.19	0.19	0.19

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
		19957	20175	20393	19957	20175	20393
	Frequency	1710.7 MHz	1732.5 MHz	1754.3 MHz	1710.7 MHz	1732.5 MHz	1754.3 MHz
4 / 1.4M	Conducted power(dBm)	23.14	23.09	23.25	22.47	22.42	22.58
	Conducted power (Watts)	0.21	0.20	0.21	0.18	0.17	0.18
	EIRP (dBm)	23.02	22.97	23.13	22.35	22.3	22.46
	EIRP (Watts)	0.20	0.20	0.21	0.17	0.17	0.18

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
		19965	20175	20385	19965	20175	20385
	Frequency	1711.5 MHz	1732.5 MHz	1753.5 MHz	1711.5 MHz	1732.5 MHz	1753.5 MHz
4 / 3M	Conducted power(dBm)	23.29	23.24	23.4	22.52	22.47	22.63
	Conducted power (Watts)	0.21	0.21	0.22	0.18	0.18	0.18
	EIRP (dBm)	23.17	23.12	23.28	22.4	22.35	22.51
	EIRP (Watts)	0.21	0.21	0.21	0.17	0.17	0.18

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
		19975	20175	20375	19975	20175	20375
	Frequency	1712.5 MHz	1732.5 MHz	1752.5 MHz	1712.5 MHz	1732.5 MHz	1752.5 MHz
4 / 5M	Conducted power(dBm)	23.41	23.36	23.52	22.55	22.5	22.66
	Conducted power (Watts)	0.22	0.22	0.22	0.18	0.18	0.18
	EIRP (dBm)	23.29	23.24	23.4	22.43	22.38	22.54
	EIRP (Watts)	0.21	0.21	0.22	0.17	0.17	0.18



A O T

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	20000	20175	20350	20000	20175	20350
4 / 10M	Conducted power(dBm)	23.54	23.49	23.65	22.62	22.57	22.73
	Conducted power (Watts)	0.23	0.22	0.23	0.18	0.18	0.19
	EIRP (dBm)	23.42	23.37	23.53	22.5	22.45	22.61
	EIRP (Watts)	0.22	0.22	0.23	0.18	0.18	0.18

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	20025	20175	20325	20025	20175	20325
4 / 15M	Conducted power(dBm)	23.65	23.6	23.76	22.7	22.65	22.81
	Conducted power (Watts)	0.23	0.23	0.24	0.19	0.18	0.19
	EIRP (dBm)	23.53	23.48	23.64	22.58	22.53	22.69
	EIRP (Watts)	0.23	0.22	0.23	0.18	0.18	0.19

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	20050	20175	20300	20050	20175	20300
4 / 20M	Conducted power(dBm)	23.79	23.74	23.9	22.76	22.71	22.87
	Conducted power (Watts)	0.24	0.24	0.25	0.19	0.19	0.19
	EIRP (dBm)	23.67	23.62	23.78	22.64	22.59	22.75
	EIRP (Watts)	0.23	0.23	0.24	0.18	0.18	0.19



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Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	23017	23095	23173	23017	23095	23173
12 / 1.4M	Conducted power(dBm)	699.7	707.5	715.3	699.7	707.5	715.3
		MHz	MHz	MHz	MHz	MHz	MHz
	Conducted power (Watts)	22.21	22.3	22.33	21.34	21.43	21.46
	ERP (dBm)	0.17	0.17	0.17	0.14	0.14	0.14
	ERP (Watts)	16.44	16.53	16.56	15.57	15.66	15.69
		0.04	0.04	0.05	0.04	0.04	0.04

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	23025	23095	23165	23025	23095	23165
12 / 3M	Conducted power(dBm)	700.5	707.5	714.5	700.5	707.5	714.5
		MHz	MHz	MHz	MHz	MHz	MHz
	Conducted power (Watts)	22.31	22.45	22.48	21.36	21.5	21.53
	ERP (dBm)	0.17	0.18	0.18	0.14	0.14	0.14
	ERP (Watts)	16.54	16.68	16.71	15.59	15.73	15.76
		0.05	0.05	0.05	0.04	0.04	0.04

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	23035	23095	23155	23035	23095	23155
12 / 5M	Conducted power(dBm)	701.5	707.5	713.5	701.5	707.5	713.5
		MHz	MHz	MHz	MHz	MHz	MHz
	Conducted power (Watts)	22.42	22.56	22.59	21.45	21.59	21.62
	ERP (dBm)	0.17	0.18	0.18	0.14	0.14	0.15
	ERP (Watts)	16.65	16.79	16.82	15.68	15.82	15.85
		0.05	0.05	0.05	0.04	0.04	0.04



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Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	23060	23095	23130	23060	23095	23130
12 / 10M	Conducted power(dBm)	22.58	22.72	22.75	21.49	21.63	21.66
	Conducted power (Watts)	0.18	0.19	0.19	0.14	0.15	0.15
	ERP (dBm)	16.81	16.95	16.98	15.72	15.86	15.89
	ERP (Watts)	0.05	0.05	0.05	0.04	0.04	0.04

Band / BW	Mode	QPSK			16QAM		
	Channel	Low CH	Mid CH	High CH	Low CH	Mid CH	High CH
	Frequency	23205	23230	23255	23205	23230	23255
13 / 5M	Conducted power(dBm)	22.65	22.66	22.72	21.56	21.57	21.69
	Conducted power (Watts)	0.18	0.18	0.19	0.14	0.14	0.15
	ERP (dBm)	19.89	19.9	19.96	18.8	18.81	18.93
	ERP (Watts)	0.10	0.10	0.10	0.08	0.08	0.08

Band / BW	Mode	QPSK	16QAM
	Channel	Mid CH	Mid CH
	Frequency	23230	23230
13 / 10M	Conducted power(dBm)	22.66	21.57
	Conducted power (Watts)	0.18	0.14
	ERP (dBm)	19.9	18.81
	ERP (Watts)	0.10	0.08

4.2 Radiated Emission Measurement

4.2.1 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 $43 + 10 \log_{10}(P)$ dB. The limit of emission is equal to -13 dBm.

4.2.2 Test Procedure

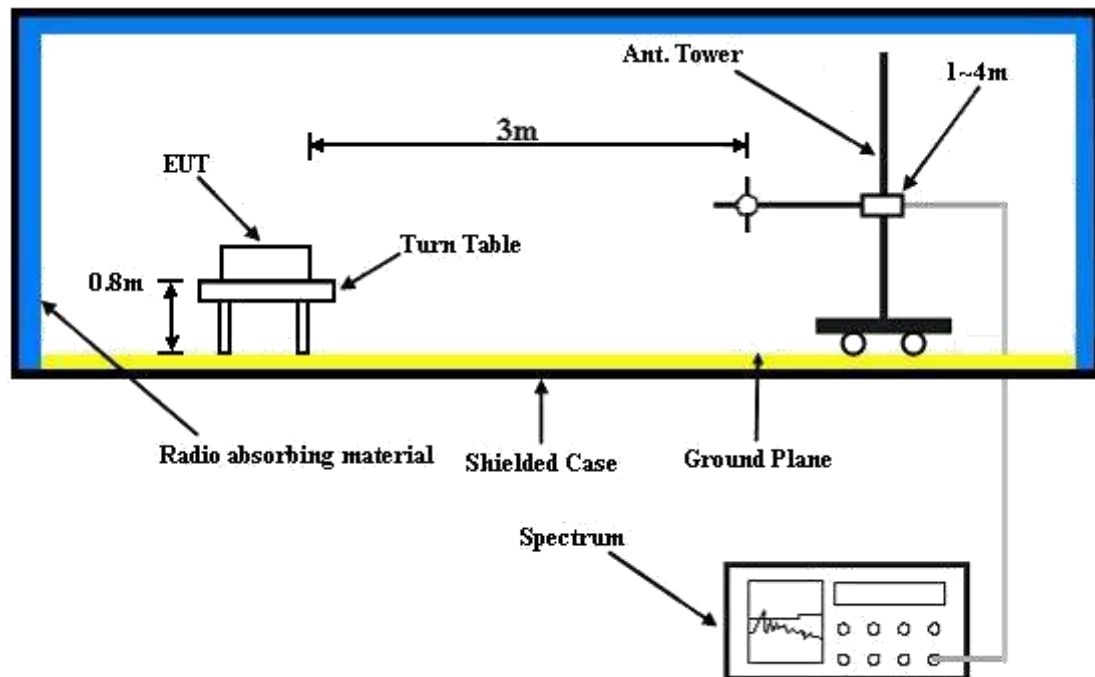
- Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8 m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1 m to 4 m to find the maximum polar radiated power. The "Read Value" is the spectrum reading the maximum power value.
- 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.
- $EIRP = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}.$
- E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $E.R.P \text{ power} = E.I.P.R \text{ power} - 2.15 \text{ dBi}.$

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

4.2.3 Deviation from Test Standard

No deviation.

4.2.4 Test Setup



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

4.2.5 Test Results

LTE Band 4

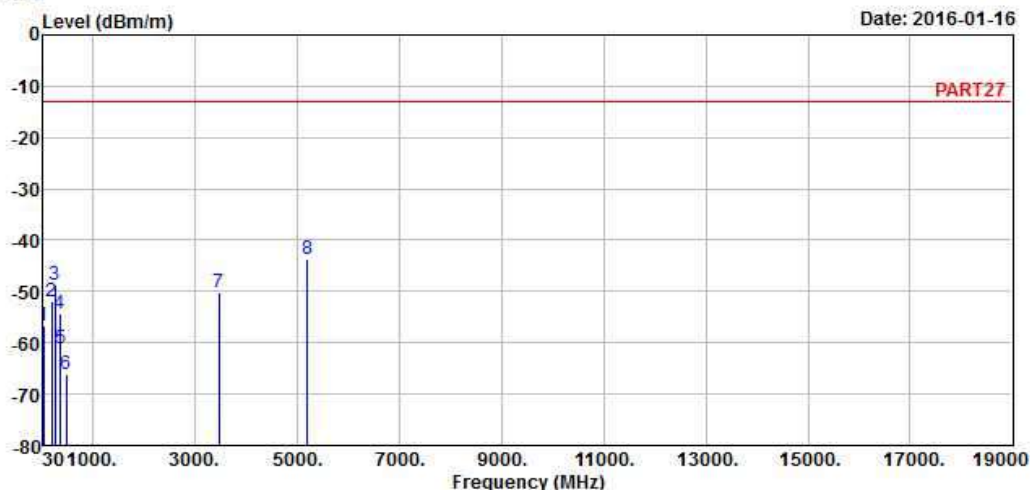
Channel Bandwidth: 20 MHz / QPSK



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Data: 7



Site : 966 Chamber 5

Condition: PART27 3m HORIZONTAL

Remak : LTE Band IV QPSK_20M(1,0) Link

Tested by: Anson Lin

Plane : NB

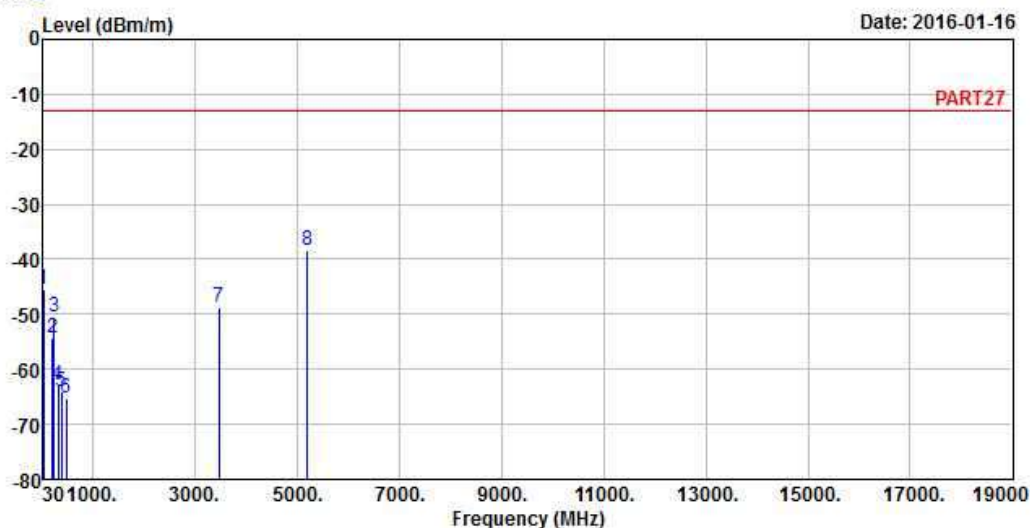
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	30.00	-56.59	-56.97	-13.00	-43.59	0.38	Peak
2	191.99	-51.85	-44.57	-13.00	-38.85	-7.28	Peak
3	252.13	-48.83	-42.80	-13.00	-35.83	-6.03	Peak
4	350.10	-54.20	-47.96	-13.00	-41.20	-6.24	Peak
5	375.32	-61.04	-54.95	-13.00	-48.04	-6.09	Peak
6	484.93	-66.20	-61.30	-13.00	-53.20	-4.90	Peak
7	3465.00	-50.28	-41.37	-13.00	-37.28	-8.91	Peak
8 pp	5197.50	-43.78	-40.92	-13.00	-30.78	-2.86	Peak



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Data: 8



Site : 966 Chamber 5
Condition: PART27 3m VERTICAL
Remak : LTE Band IV QPSK_20M(1,0) Link
Tested by: Anson Lin
Plane : NB

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	31.94	-45.45	-44.85	-13.00	-32.45	-0.60	Peak
2	207.51	-54.32	-46.61	-13.00	-41.32	-7.71	Peak
3	247.28	-50.34	-44.23	-13.00	-37.34	-6.11	Peak
4	326.82	-62.83	-56.23	-13.00	-49.83	-6.60	Peak
5	380.17	-64.17	-58.11	-13.00	-51.17	-6.06	Peak
6	486.87	-65.37	-60.51	-13.00	-52.37	-4.86	Peak
7	3465.00	-48.62	-39.71	-13.00	-35.62	-8.91	Peak
8 pp	5197.50	-38.40	-35.54	-13.00	-25.40	-2.86	Peak

LTE Band 13

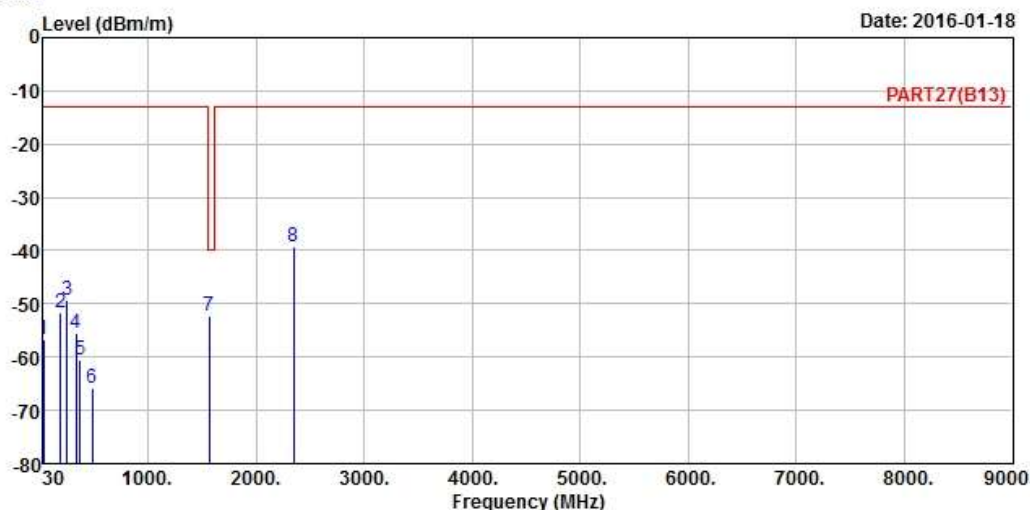
Channel Bandwidth: 10 MHz / QPSK



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Data: 7



Site : 966 Chamber 5
Condition: PART27(B13) 3m HORIZONTAL
Remak : LTE Band 13_QPSK_10M(1,0) link
Tested by: Anson Lin
Plane : NB

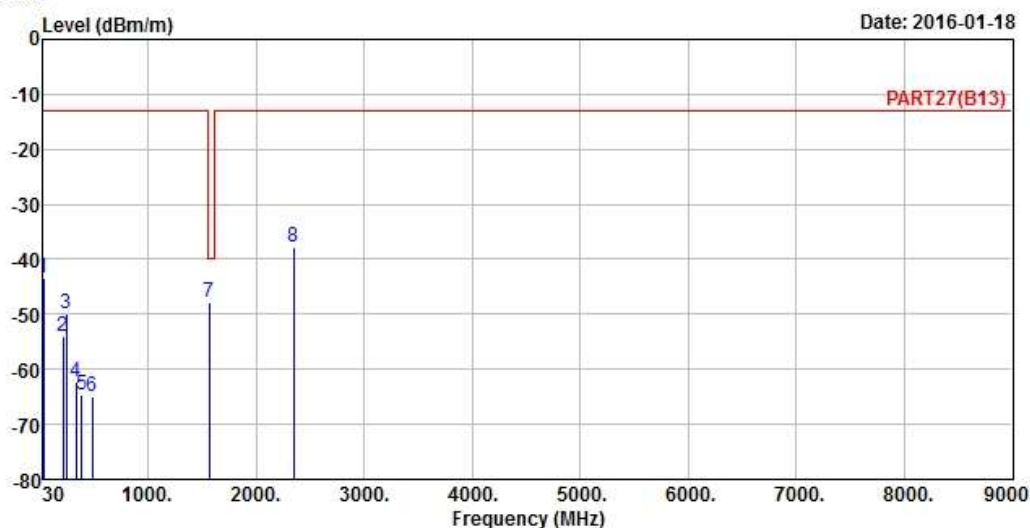
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	32.91	-56.73	-55.64	-13.00	-43.73	-1.09	Peak
2	191.99	-51.54	-44.26	-13.00	-38.54	-7.28	Peak
3	247.28	-49.33	-43.22	-13.00	-36.33	-6.11	Peak
4	333.61	-55.40	-48.91	-13.00	-42.40	-6.49	Peak
5	367.56	-60.57	-54.43	-13.00	-47.57	-6.14	Peak
6	481.05	-65.78	-60.81	-13.00	-52.78	-4.97	Peak
7 pp	1564.00	-52.13	-37.11	-40.00	-12.13	-15.02	Peak
8	2346.00	-39.34	-28.90	-13.00	-26.34	-10.44	Peak



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Data: 8



Site : 966 Chamber 5
Condition: PART27(B13) 3m VERTICAL
Remak : LTE Band 13_QPSK_10M(1,0) link
Tested by: Anson Lin
Plane : NB

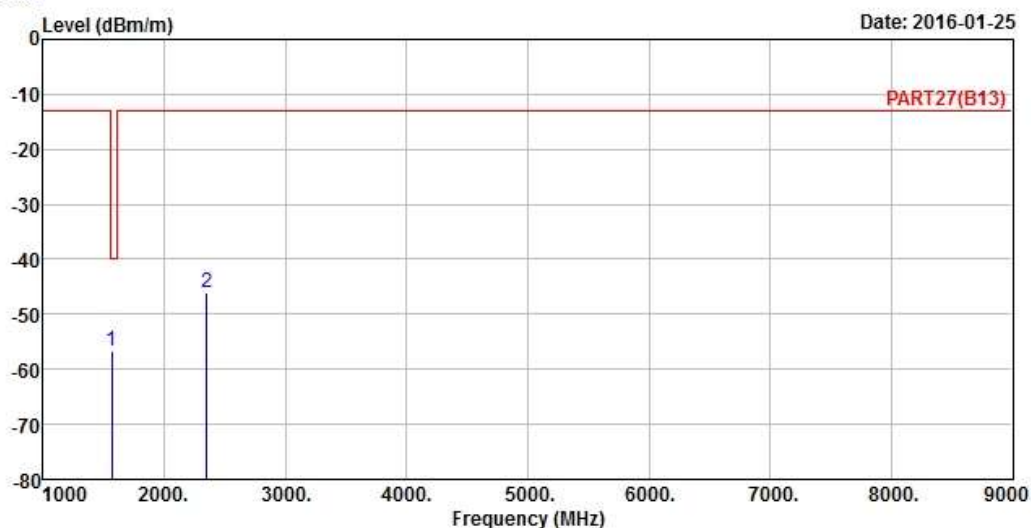
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	30.00	-43.49	-43.87	-13.00	-30.49	0.38	Peak
2	212.36	-54.11	-46.60	-13.00	-41.11	-7.51	Peak
3	246.31	-49.87	-43.72	-13.00	-36.87	-6.15	Peak
4	332.64	-62.21	-55.70	-13.00	-49.21	-6.51	Peak
5	385.02	-64.72	-58.69	-13.00	-51.72	-6.03	Peak
6	481.05	-65.05	-60.08	-13.00	-52.05	-4.97	Peak
7 pp	1564.00	-47.89	-32.87	-40.00	-7.89	-15.02	Peak
8	2346.00	-37.91	-27.47	-13.00	-24.91	-10.44	Peak



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Data: 7



Site : 966 Chamber 5

Condition: PART27(B13) 3m HORIZONTAL

Remak : LTE Band 13_QPSK_10M(50,0) Link

Tested by: Anson Lin

Plane : NB

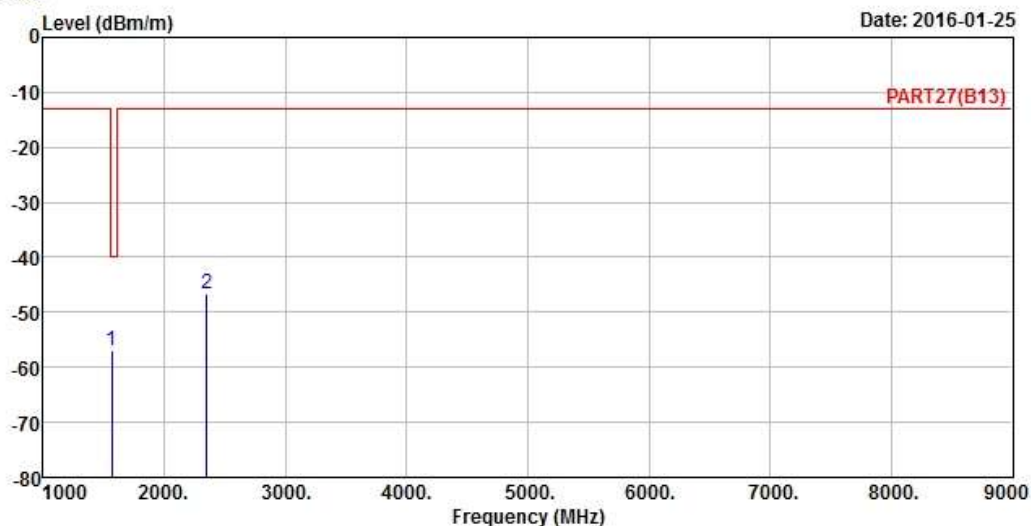
			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1 pp	1564.00	-56.81	-41.79	-40.00	-16.81	-15.02	Peak
2	2346.00	-46.04	-35.60	-13.00	-33.04	-10.44	Peak



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Data: 8



Site : 966 Chamber 5

Condition: PART27(B13) 3m VERTICAL

Remak : LTE Band 13_QPSK_10M(50,0) Link

Tested by: Anson Lin

Plane : NB

			Read	Limit	Over		
	Freq	Level	Level	Line	Limit	Factor	Remark
	MHz	dBm/m	dBm	dBm/m	dB	dB/m	
1	pp	1564.00	-56.96	-41.94	-40.00	-16.96	-15.02 Peak
2		2346.00	-46.55	-36.11	-13.00	-33.55	-10.44 Peak



A S M E

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).



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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:

Linko EMC/RF Lab

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab

Tel: 886-3-6668565

Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety

Tel: 886-3-3183232

Fax: 886-3-3270892

Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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