

FCC Radio Test Report
FCC ID: 057TB3710I
This report concerns (check one): ⊠Original Grant
Project No.: 1512C068Equipment: Portable Tablet ComputerModel Name: Lenovo TB3-710IApplicant: LENOVO (SHANGHAI) ELECTRONICS TECHNOLOGY CO LTDAddress: NO 68 BUILDING 199 FENJU RD, CHINA (SHANGHAI) PILOT FREE TRADE ZONE, SHANGHAI, 200131 CHINA
Date of Receipt : Dec. 08, 2015   Date of Test : Dec. 08, 2015~Dec. 24, 2015   Issued Date : Dec. 25, 2015   Tested by : BTL Inc.
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### Declaration

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# **REPORT ISSUED HISTORY**

Issued No.	Description	Issued Date
BTL-FCCP-3-1512C068	Original Issue.	Dec. 25, 2015



# **1. CERTIFICATION**

Equipment :	Portable Tablet Computer
Brand Name :	Lenovo
Model Name :	Lenovo TB3-710I
Applicant :	LENOVO (SHANGHAI) ELECTRONICS TECHNOLOGY CO LTD
Manufacturer :	Lenovo PC HK Limited
Date of Test :	Dec. 08, 2015~Dec. 24, 2015
Test Sample :	Engineering Sample
Standard(s) :	FCC Part15, Subpart C: 2014 (15.247) / ANSI C63.10-2013

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-FCCP-3-1512C068) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

Test result included in this report is only for the 2.4G WLAN part.

# 2. SUMMARY OF TEST RESULTS

Test procedures according to the technical standard(s):

# Applied Standard(s): FCC Part15 (15.247) , Subpart C: 2014

Standard(s) Section	Test Item	Judgment	Tested By
15.207	Conducted Emission	PASS	Robort Luo
15.247(d)	Antenna conducted Spurious Emission	PASS	Allen Li
15.247(a)(2)	6dB Bandwidth	PASS	Allen Li
15.247(b)(3)	Peak Output Power	PASS	Allen Li
15.247(e)	Power Spectral Density	PASS	Allen Li
15.203	Antenna Requirement	PASS	-
15.209/15.205	Transmitter Radiated Emissions	PASS	Robort Luo

#### NOTE:

(1)" N/A" denotes test is not applicable in this test report.

## 2.1 TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3, Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China. BTL's test firm number for FCC: 319330

## 2.2 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. The BTL measurement uncertainty is less than the CISPR 16-4-2 U<sub>cispr</sub> requirement.

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

A. Conducted Measurement :

Test Site	Method	Measurement Frequency Range	U, (dB)
DG-C02	CISPR	150 KHz ~ 30MHz	2.32

B. Radiated Measurement :

Test Site	Method	Measurement Frequency Range	Ant. H / V	U,(dB
		9KHz~30MHz	V	3.79
		9KHz~30MHz	Н	3.57
		30MHz ~ 200MHz	V	3.82
		30MHz ~ 200MHz	Н	3.78
DG-CB03 (3m)		200MHz ~ 1,000MHz	V	4.10
	CISER	200MHz ~ 1,000MHz	Н	4.06
		1GHz~18GHz	V	3.12
		1GHz~18GHz	Н	3.68
		18GHz~40GHz	V	4.15
		18GHz~40GHz	Н	4.14

Note: Unless specifically mentioned, the uncertainty of measurement has not been taken into account to declare the compliance or non-compliance to the specification.

# **3. GENERAL INFORMATION**

# 3.1 GENERAL DESCRIPTION OF EUT

Equipment	Portable Tablet Computer			
Brand Name	Lenovo	Lenovo		
Model Name	Lenovo TB3-710I			
Model Difference	This model has two configurations: main supply, secondary supply. Please refer to note 3.			
	Operation Frequency	2412~2462 MHz		
Product Description	Modulation Technology	802.11b:DSSS 802.11g:OFDM 802.11n:OFDM		
	Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n up to 150 Mbps		
	Output Power (Max.)	802.11b: 18.72dBm 802.11g: 22.76dBm 802.11n(20MHz): 22.87dBm 802.11n(40MHz): 23.07dBm		
Power Source	<ul><li>#1 DC voltage supplied from AC/DC adapter.</li><li>#2 Supplied from USB port.</li><li>#3 Supplied from rechargeable Li-Polymer battery.</li></ul>			
Power Rating	Please refer to note 2			

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
		C-P56	I/P: 100-240V~ 50/60Hz, 0.15A
Adaptar	Huntkey		O/P: 5.0V, 1.0A
Adapter	Ashal	C-P56	I/P: 100-240V~ 50/60Hz, 0.13A
	Acbei		O/P: 5.0V, 1.0A
Detter	lenovo (SUNWODA)	L13D1P31	3.8VDC, 3450mAh
Battery	lenovo (SCUD)	L13D1P31	3.8VDC, 3450mAh
USB Cable	LIQI	L16B-05100070L	70cm shielded cable w/o core



Main Supply				
Part Name	Model Name	Description	Supplier	
PCBMB	A1901_MB_PCB_V4.0_HF	A1901_ PCB_V4.0	HUASHEN	
Baseband chip	MT8321A/B	WCDMA	MTK	
PMIC	MT6350V/A	-	MTK	
D۸	AP7169-R95MOG	RFPA_3G_two in one PA_BANDS I, II, III, IV, V, VIII	Airoha	
FA	AP6690-R95MOG	RFPA_ 850/900/1800/1900/TD1900/TD2010	Airoha	
	RFDIP1608060TM7T62	Electromagnetic interference two-way stopband filters_ 1.575 GHz/2.4 GHz/5GHz	Walsin	
	SAYFH897MHA0F00	Electromagnetic interference two-way stopband filters_ W900	MURATA	
	SAYFH836MCC0F0A	Electromagnetic interference two-way stopband filtersband5_W850	MURATA	
Duplexer	SAYRF1G88CA0B0A	Electromagnetic interference two-way stopband filters_ band2_W1900	MURATA	
	SAYRF1G95HQ0F0A	Electromagnetic interference two-way stopband filters_band1_W2100	MURATA	
	MDBF21L914H1897M-DB02H	Electromagnetic interference difference converter _ GSM850/GSM900/DCS1800/PCS1900	MICROGATE	
G-sensor	KXTJ2-1009		Kionix	
EMMC+DDR3	KMF820012M-B305	MCP_16GB-eMMC_8Gb-LPDDR3	Samsung	
Crystal	7L26002009	26M_0.5ppm_2.8V_2520	TXC	
audio frequency amplifier	AW8155AFCR	AB type/Dype_sigle-way	Awinic	
RF Switch	SKY13489-001	RF Switch_SPDT	Skyworks	
LNA	WS7916	GPS_LNA	Will	
SAW FILTER	SAFFB1G56KB0F0A	GPS BEIDOU_RX1109	MURATA	
TP	TTCT070121	A1900A	Top-Touch	
LCD	TXDT700EPLA-68	7Inch_1024*600	TXD	
Camera_Front	BLX0A20H-A1900-F	Camera_5x5x2.95mm_30w	BRODSAND	
Camera_Back	BLX2508H-A1900-B	Camera_6.5x6.5x4.2mm_200w	BRODSAND	
5M AF(3G)	O9B5-AW1507BHQ	Camera_8.5*8.5*4.66mm_500W	HUAQUAN	
MIC	OB-F15LX42-1592-C10C33EP	-	HUAFENG	
Motor(3G)	HZF-Z04B-RL126B20-90	-	HONGZHIFA	
SPK	XHS151118SW43P38-02	-	HAOSHENG	
Battery	L13D1P31	3450mAh	SUNWODA	
Adapter(US)	C-P56	5V/1A	Huntkey	
USB Cable	L16B-05100070L	70cm	LIQI	



Secondary Supply							
Part Name	Model Name	Description	Supplier				
PCBMB	A1901_MB_PCB_V4.0_HF	A1901_ PCB_V4.0	HUASHEN				
G-sensor	BMA253		Bosch				
EMMC+DDR3	H9TQ17A8GTMCUR-KUM	MCP_16GB-eMMC_8Gb-LPDDR3	Hynix				
Crystal	X1E000021043400	26M_10ppm_7.4pF_3225	Epson Toyocom				
TP	YCB0880700801A	A1900A	YEJI				
LCD	KD070D54-39NH-B2	7Inch_1024*600	GUOXIAN				
Camera_Front	GI5953A1D-1P0J0	Camera_5x5x2.95mm_30w	QUNHUI				
Camera_Back	GV5954B1S-1P0J0	Camera_6.5x6.5x4.25_200w	QUNHUI				
5M AF(3G)	HNW5889B1S-0P0J0	Camera_8.5*8.5*4.66mm_500W	QUNHUI				
MIC	CM4015BC-423-WR138	-	JINZUN				
Motor(3G)	CY0408L-021HB-047	-	KUNWANG				
SPK	KFSC1115G3.5-08-0.7W-D	-	XICHUN				
Battery	L13D1P31	3450mAh	SCUD				
Adapter(US)	C-P56	5V/1A	Acbel				
USB Cable R16B-05100070		70cm	RIDONGSHENG				

## 4. Channel List:

CH01 – CH11 for 802.11b, 802.11g, 802.11n(20MHz) CH03 – CH11 for 802.11n(40MHz)								
Channel	Channel   Frequency (MHz)   Channel   Frequency (MHz)   Frequency (MHz)							
01	2412	04	2427	07	2442	10	2457	
02	2417	05	2432	08	2447	11	2462	
03	2422	06	2437	09	2452			

## 5. Table for Filed Antenna

Ant.	Mfr/Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	Internal	N/A	0.48

# **3.2 DESCRIPTION OF TEST MODES**

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description		
Mode 1	TX B MODE CHANNEL 01/06/11		
Mode 2	TX G MODE CHANNEL 01/06/11		
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11		
Mode 4	TX N-40MHZ MODE CHANNEL 03/06/09		
Mode 5	Normal Link		

The EUT system operated these modes were found to be the worst case during the pre-scanning test as following:

For Conducted Test					
Final Test Mode Description					
Mode 5	Normal Link				

For Radiated Test				
Final Test Mode Description				
Mode 1	TX B MODE CHANNEL 01/06/11			
Mode 2	TX G MODE CHANNEL 01/06/11			
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11			
Mode 4	TX N-40MHZ MODE CHANNEL 03/06/09			

For Band Edge Test				
Final Test Mode Description				
Mode 1	TX B MODE CHANNEL 01/06/11			
Mode 2	TX G MODE CHANNEL 01/06/11			
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11			
Mode 4	TX N-40MHZ MODE CHANNEL 03/06/09			



6dB Spectrum Bandwidth					
Final Test Mode Description					
Mode 1	TX B MODE CHANNEL 01/06/11				
Mode 2	TX G MODE CHANNEL 01/06/11				
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11				
Mode 4	TX N-40MHZ MODE CHANNEL 03/06/09				

Maximum Conducted Output Power					
Final Test Mode Description					
Mode 1 TX B MODE CHANNEL 01/06/11					
Mode 2 TX G MODE CHANNEL 01/06/11					
Mode 3 TX N-20MHZ MODE CHANNEL 01/06/11					
Mode 4	TX N-40MHZ MODE CHANNEL 03/06/09				

Power Spectral Density				
Final Test Mode Description				
Mode 1	TX B MODE CHANNEL 01/06/11			
Mode 2	TX G MODE CHANNEL 01/06/11			
Mode 3	TX N-20MHZ MODE CHANNEL 01/06/11			
Mode 4	TX N-40MHZ MODE CHANNEL 03/06/09			

Note:

- (1) The measurements are performed at the high, middle, low available channels.
- (2) 802.11b mode: DBPSK (1Mbps)
  - 802.11g mode: OFDM (6Mbps)
  - 802.11n HT20 mode : BPSK (6.5Mbps)
  - 802.11n HT40 mode : BPSK (13.5Mbps)
  - For radiated emission tests, the highest output powers were set for final test.
- (3) For radiated below 1G test, the 802.11b is found to be the worst case and recorded.
- (4) The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

## 3.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing, channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of WLAN

Test software version	N/A				
Frequency (MHz)	2412	2437	2462		
802.11b	15.5	15.5	16		
802.11g	15	14.5	15		
802.11n (20MHz)	14.5	14.5	15		
Frequency(MHz)	2422	2437	2452		
802.11n (40MHz)	15	14.5	15.5		





## 3.5 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.

Item	Equipment	Mfr/Brand	Model/Type No.	FCC ID	Series No.
-	-	-	-	-	-

Item	Shielded Type	Ferrite Core	Length	Note
1	YES	NO	0.7m	USB Cable

# 4. EMC EMISSION TEST

## 4.1 CONDUCTED EMISSION MEASUREMENT

## 4.1.1 POWER LINE CONDUCTED EMISSION LIMITS (Frequency Range 150KHz-30MHz)

Frequency of Emission (MHz)	Conducted Limit (dBµV)		
	Quasi-peak	Average	
0.15 -0.50	66 to 56*	56 to 46*	
0.50 -5.0	56	46	
5.0 -30.0	60	50	

Note:

- (1) The limit of " \* " decreases with the logarithm of the frequency
- (2) The test result calculated as following:
  - Measurement Value = Reading Level + Correct Factor
  - Correct Factor = Insertion Loss + Cable Loss + Attenuator Factor(if use)
  - Margin Level = Measurement Value Limit Value

#### The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

#### 4.1.2 TEST PROCEDURE

- a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
- c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
- d. LISN at least 80 cm from nearest part of EUT chassis.
- e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

#### 4.1.3 DEVIATION FROM TEST STANDARD

No deviation





## 4.1.5 EUT OPERATING CONDITIONS

The EUT was placed on the test table and programmed in normal function.

### 4.1.6 EUT TEST CONDITIONS

Temperature: 24°C Relative Humidity: 56% Test Voltage: AC 120V/60Hz

#### 4.1.7 TEST RESULTS

Please refer to the Attachment A.

## 4.2 RADIATED EMISSION MEASUREMENT

#### 4.2.1 RADIATED EMISSION LIMITS

In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

#### LIMITS OF RADIATED EMISSION MEASUREMENT (9KHz-1000MHz)

Frequency	Field Strength	Measurement Distance
(MHz)	(microvolts/meter)	(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
960~1000	500	3

#### LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

	(dBuV/m) (at 3 meters)		
	PEAK	AVERAGE	
Above 1000	74	54	

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

 (4) The test result calculated as following: Measurement Value = Reading Level + Correct Factor Correct Factor = Antenna Factor + Cable Loss - Amplifier Gain(if use) Margin Level = Measurement Value - Limit Value

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW	1MHz / 3MHz for Peak,
(Emission in restricted band)	1MHz / 1/T for Average



Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9KHz~90KHz for PK/AVG detector
Start ~ Stop Frequency	90KHz~110KHz for QP detector
Start ~ Stop Frequency	110KHz~490KHz for PK/AVG detector
Start ~ Stop Frequency	490KHz~30MHz for QP detector
Start ~ Stop Frequency	30MHz~1000MHz for QP detector

#### 4.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(below 1GHz)
- b. The measuring distance of at 3 m shall be used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.(above 1GHz)
- c. The height of the equipment or of the substitution antenna shall be 0.8 m or 1.5 m; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. The initial step in collecting radiated emission data is a receiver peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
- f. For the actual test configuration, please refer to the related Item -EUT Test Photos.

#### 4.2.3 DEVIATION FROM TEST STANDARD

No deviation



# 4.2.4 TEST SETUP

# (A) Radiated Emission Test Set-Up Frequency Below 1 GHz



# (B) Radiated Emission Test Set-Up Frequency Above 1 GHz









# 5. BANDWIDTH TEST

#### 5.1 APPLIED PROCEDURES

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Frequency Range (MHz)	Result	
15.247(a)(2)	Bandwidth	2400-2483.5	PASS	

#### 5.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = 2.5 ms.

#### 5.1.2 DEVIATION FROM STANDARD

No deviation.

#### 5.1.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

#### 5.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 5.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

#### 5.1.6 TEST RESULTS

Please refer to the Attachment E.



# 6. MAXIMUM PEAK CONDUCTED OUTPUT POWER TEST

#### 6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C					
Section	Test Item	Limit	Frequency Range (MHz)	Result	
15.247(b)(3)	Maximum Output Power	1 Watt or 30dBm	2400-2483.5	PASS	

#### 6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the power meter and antenna output port as show in the block diagram below,
- b. The maximum peak conducted output power was performed in accordance with method 9.1.2 of FCC KDB 558074 D01 DTS Meas Guidance v03r03.

#### 6.1.2 DEVIATION FROM STANDARD

No deviation.

#### 6.1.3 TEST SETUP



#### 6.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 6.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

#### 6.1.6 TEST RESULTS

Please refer to the Attachment F.

# 7. ANTENNA CONDUCTED SPURIOUS EMISSION

### 7.1 APPLIED PROCEDURES / LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits.

## 7.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW= 100KHz, VBW=300KHz, Sweep time = Auto.
- c. Offset=antenna gain+cable loss

#### 7.1.2 DEVIATION FROM STANDARD

No deviation.

# 7.1.3 TEST SETUP



## 7.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 7.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

## 7.1.6 TEST RESULTS

Please refer to the Attachment G.



# 8. POWER SPECTRAL DENSITY TEST

#### 8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C					
Section	Test Item	Limit	Frequency Range (MHz)	Result	
15.247(e)	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS	

#### 8.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- b. Spectrum Setting: RBW=3KHz, VBW=10KHz, Sweep time = Auto.

#### 8.1.2 DEVIATION FROM STANDARD

No deviation.

#### 8.1.3 TEST SETUP

EUT	SPECTRUM
	ANALYZER

#### 8.1.4 EUT OPERATION CONDITIONS

The EUT was programmed to be in continuously transmitting mode.

#### 8.1.5 EUT TEST CONDITIONS

Temperature: 25°C Relative Humidity: 55% Test Voltage: AC 120V/60Hz

# 8.1.6 TEST RESULTS

Please refer to the Attachment H.

# 9. MEASUREMENT INSTRUMENTS LIST

E.

	Conducted Emission Measurement									
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until					
1	LISN	EMCO	3816/2	00052765	Mar. 28, 2016					
2	LISN	R&S	ENV216	101447	Mar. 28, 2016					
3	Test Cable	emci	RG223(9KHz-30 MHz)	C_17	Mar. 13, 2016					
4	EMI TEST RECEIVER	R&S	ESCS30	833364/017	Mar. 28, 2016					
5	50Ω Terminator	SHX	TF2-3G-A	08122902	Mar. 28, 2016					
6	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A					

	Radiated Emission Measurement								
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until				
1	Antenna	Schwarbeck	VULB9160	9160-3232	Mar. 28, 2016				
2	Amplifier	HP	8447D	2944A09673	Nov. 16, 2016				
3	Receiver	AGILENT	N9038A	MY52130039	Oct. 11, 2016				
4	Test Cable	emci	LMR-400(30MH z-1GHz)	C-01	Jun. 28, 2016				
5	Controller	СТ	SC100	N/A	N/A				
6	Antenna	ETS	3115	00075789	Mar. 28, 2016				
7	Amplifier	Agilent	8449B	3008A02274	Oct. 11, 2016				
8	Test Cable	emci	EMC104-SM-S M-10000(1GHz -26.5GHz)	C-68	Jun. 28, 2016				
9	Broad-Band Horn Antenna	Schwarzbeck	BBHA 9170	9170319	Mar. 28, 2016				
10	Microwave Preamplifier With Adaptor	EMC INSTRUMENT	EMC2654045	980039 & HA01	Mar. 28, 2016				
11	Active Loop Antenna	R&S	HFH2-Z2	830749/020	Sep. 07, 2016				
12	Measurement Software	Farad	EZ-EMC Ver.NB-03A1-01	N/A	N/A				



	6dB Bandwidth Measurement									
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until					
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016					

	Peak Output Power Measurement									
ltem	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until					
1	P-series Power meter	Agilent	N1911A	MY45100473	Mar. 28, 2016					
2	Wireband Power sensor	Agilent	N1921A	MY51100041	Mar. 28, 2016					

Antenna Conducted Spurious Emission Measurement									
Item	Kind of Equipment	Manufacturer	Type No. Serial No.		Calibrated until				
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016				

Power Spectral Density Measurement									
Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Calibrated until				
1	Spectrum Analyzer	R&S	FSP 40	100185	Oct. 11, 2016				

Remark: "N/A" denotes no model name, serial no. or calibration specified.

All calibration period of equipment list is one year.

# **10. EUT TEST PHOTO**

**Conducted Measurement Photos** 





# **Radiated Measurement Photos**

9KHz to 30MHz







# **Radiated Measurement Photos**

Above 1000MHz



















1 *	0.1620	44.18	9.55	53.73	65.36	-11.63	peak		
2	0.1620	23.35	9.55	32.90	55.36	-22.46	AVG		
3	0.1780	43.28	9.56	52.84	64.58	-11.74	peak		
4	0.1780	24.72	9.56	34.28	54.58	-20.30	AVG		
5	0.3260	36.78	9.64	46.42	59.55	-13.13	peak		
6	0.7700	26.74	9.75	36.49	56.00	-19.51	peak		
7	1.0780	25.32	9.80	35.12	56.00	-20.88	peak		
8	4.6980	31.45	9.99	41.44	56.00	-14.56	peak		





9

10

0.7540

4.9580

29.56

30.94

9.55

9.91

39.11

40.85

56.00

56.00

-16.89

-15.15

peak

peak
## ATTACHMENT B - RADIATED EMISSION (9KHZ TO 30MHZ)

TX B MODE CHANNEL 01(Adapter\_ Huntkey)

Frequency (MHz)	Ant 0°/90°	Read level dBuV/m	Factor (dB)	Measured(FS) (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Note
0.0093	0°	13.27	24.9777	38.2477	128.2346	-89.9869	AVG
0.0093	0°	14.15	24.9777	39.1277	148.2346	-109.1069	PEAK
0.0274	0°	6.60	23.8313	30.4313	118.8492	-88.4179	AVG
0.0274	0°	8.40	23.8313	32.2313	138.8492	-106.6179	PEAK
0.0353	0°	3.53	23.3310	26.8610	116.6487	-89.7877	AVG
0.0353	0°	5.56	23.3310	28.8910	136.6487	-107.7577	PEAK
0.0575	0°	1.20	22.2500	23.4500	112.4109	-88.9609	AVG
0.0575	0°	2.40	22.2500	24.6500	132.4109	-107.7609	PEAK
0.5088	0°	19.23	19.8282	39.0582	73.4733	-34.4151	QP
1.9636	0°	23.62	19.5036	43.1236	69.5400	-26.4164	QP
				1			
Frequency	Ant	Read level	Factor	Measured(FS)	Limit	Margin	Note
(MHz)	0°/90°	dBuV/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
0.0123	90°	13.20	24.3000	37.5000	125.8061	-88.3061	AVG
0.0123	90°	14.60	24.3000	38.9000	145.8061	-106.9061	PEAK
0.0239	90°	7.74	24.0530	31.7930	120.0363	-88.2433	AVG
0.0239	90°	8.85	24.0530	32.9030	140.0363	-107.1333	PEAK
0.045	90°	5.37	22.7167	28.0867	114.5400	-86.4533	AVG
0.045	90°	6.29	22.7167	29.0067	134.5400	-105.5333	PEAK
0.0575	90°	1.63	22.2500	23.8800	112.4109	-88.5309	AVG
0.0575	90°	2.65	22.2500	24.9000	132.4109	-107.5109	PEAK
0.6235	90°	22.10	20.1952	42.2952	71.7075	-29.4123	QP
	0.00	04.05	40.4054	44.4454	00 5400	05 40 40	0.5

## TX B MODE CHANNEL 01 (Adapter\_ Acbel)

Frequency	Ant	Read level	Factor	Measured(FS)	Limit	Margin	Note
(MHz)	0°/90°	dBuV/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
0.0091	0°	13.50	24.9903	38.4903	128.4234	-89.9331	AVG
0.0091	0°	14.41	24.9903	39.4003	148.4234	-109.0231	PEAK
0.026	0°	6.80	23.9200	30.7200	119.3048	-88.5848	AVG
0.026	0°	8.51	23.9200	32.4300	139.3048	-106.8748	PEAK
0.0347	0°	3.46	23.3690	26.8290	116.7976	-89.9686	AVG
0.0347	0°	5.39	23.3690	28.7590	136.7976	-108.0386	PEAK
0.0553	0°	1.24	22.2940	23.5340	112.7497	-89.2157	AVG
0.0553	0°	2.49	22.2940	24.7840	132.7497	-107.9657	PEAK
0.5092	0°	19.48	19.8294	39.3094	73.4665	-34.1570	QP
1.9526	0°	23.36	19.5047	42.8647	69.5400	-26.6753	QP
	T		- 	I			
Frequency	Ant	Read level	Factor	Measured(FS)	Limit	Margin	Note
(MHz)	0°/90°	dBuV/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
0.0127	90°	13.51	24.3000	37.8100	125.5282	-87.7182	AVG
0.0127	90°	14.78	24.3000	39.0800	145.5282	-106.4482	PEAK
0.0284	90°	7.52	23.7680	31.2880	118.5379	-87.2499	AVG
0.0284	90°	8.63	23.7680	32.3980	138.5379	-106.1399	PEAK
0.036	90°	5.46	23.2867	28.7467	116.4782	-87.7315	AVG
0.036	90°	6.35	23.2867	29.6367	136.4782	-106.8415	PEAK
0.0561	90°	1.87	22.2780	24.1480	112.6250	-88.4770	AVG
0.0561	90°	2.64	22.2780	24.9180	132.6250	-107.7070	PEAK
0.6040	-						
0.6249	90°	22.49	20.1997	42.6897	71.6880	-28.9983	QP

## ATTACHMENT C - RADIATED EMISSION (30MHZ TO 1000MHZ)

















































## ATTACHMENT D - RADIATED EMISSION (ABOVE 1000MHZ)


































































































































































































## ATTACHMENT E - BANDWIDTH



## Test Mode : TX B Mode\_CH01/06/11

Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result
2412	9.10	12.52	500	Complies
2437	9.08	12.52	500	Complies
2462	9.15	12.52	500	Complies



Date: 14.DEC.2015 16:03:17





Test Mode: TX G Mode_CH01/06/11						
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result		
2412	15.17	16.40	500	Complies		
2437	16.12	16.44	500	Complies		
2462	14.80	16.40	500	Complies		





Date: 14.DEC.2015 16:08:21





Test Mode : TX N-20MHz Mode_CH01/06/11						
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result		
2412	15.10	17.56	500	Complies		
2437	15.98	17.56	500	Complies		
2462	15.39	17.56	500	Complies		



Date: 14.DEC.2015 16:12:15




Test Mode : TX N-40MHz Mode_CH03/06/09						
Frequency (MHz)	6dB Bandwidth (MHz)	99% Occupied BW (MHz)	Min. Limit (kHz)	Test Result		
2422	35.21	35.76	500	Complies		
2437	35.28	35.76	500	Complies		
2452	35.24	35.76	500	Complies		





Date: 14.DEC.2015 16:16:49



## ATTACHMENT F – MAXIMUM PEAK CONDUCTED OUTPUT POWER



Test Mode :TX B Mode_CH01/06/11						
Frequency	Conducted	Conducted	Max. Limit	Max. Limit	Booult	
(MHz)	Power (dBm)	Power (W)	(dBm)	(W)	Result	
2412	18.72	0.07	30.00	1.00	Complies	
2437	18.48	0.07	30.00	1.00	Complies	
2462	18.15	0.07	30.00	1.00	Complies	

Test Mode :TX G Mode_CH01/06/11						
Frequency	Conducted	Conducted	Max. Limit	Max. Limit	Popult	
(MHz)	Power (dBm)	Power (W)	(dBm)	(W)	Result	
2412	22.74	0.19	30.00	1.00	Complies	
2437	22.76	0.19	30.00	1.00	Complies	
2462	22.67	0.18	30.00	1.00	Complies	

Test Mode :TX N20 Mode_CH01/06/11						
Frequency	Conducted	Conducted	Max. Limit	Max. Limit	Popult	
(MHz)	Power (dBm)	Power (W)	(dBm)	(W)	Result	
2412	22.56	0.18	30.00	1.00	Complies	
2437	22.87	0.19	30.00	1.00	Complies	
2462	22.82	0.19	30.00	1.00	Complies	

Test Mode :TX N40 Mode_CH03/06/09						
Frequency	Conducted	Conducted	Max. Limit	Max. Limit	Booult	
(MHz)	Power (dBm)	Power (W)	(dBm)	(W)	Result	
2422	22.73	0.19	30.00	1.00	Complies	
2437	22.56	0.18	30.00	1.00	Complies	
2452	23.07	0.20	30.00	1.00	Complies	

# ATTACHMENT G - ANTENNA CONDUCTED SPURIOUS EMISSION





Report No.: BTL-FCCP-3-1512C068









Report No.: BTL-FCCP-3-1512C068

















Report No.: BTL-FCCP-3-1512C068







# ATTACHMENT H - POWER SPECTRAL DENSITY



#### Test Mode :TX B Mode\_CH01/06/11 Frequency **Power Density Power Density** Max. Limit Result (MHz) (dBm/3kHz) (mW/3kHz) (dBm/3kHz) 2412 -9.82 0.10 8.00 Complies 2437 -8.43 0.14 Complies 8.00 2462 -9.11 0.12 8.00 Complies



Date: 14.DEC.2015 16:03:48





#### Test Mode :TX G Mode\_CH01/06/11 Frequency **Power Density Power Density** Max. Limit Result (MHz) (dBm/3kHz) (mW/3kHz) (dBm/3kHz) 2412 -11.02 0.08 8.00 Complies 2437 -12.08 0.06 Complies 8.00 2462 -11.88 0.06 8.00 Complies



Date: 14.DEC.2015 16:08:51





Test Mode : TX N-20M Mode_CH01/06/11						
FrequencyPower DensityPower DensityMax. Limit(MHz)(dBm/3kHz)(mW/3kHz)(dBm/3kHz)						
2412	-10.63	0.09	8.00	Complies		
2437	-11.48	0.07	8.00	Complies		
2462	-12.12	0.06	8.00	Complies		



### Date: 14.DEC.2015 16:12:46

Report No.: BTL-FCCP-3-1512C068





Test Mode : TX N-40M Mode_CH03/06/09						
Frequency (MHz)	Power Density (dBm/3kHz)	Power Density (mW/3kHz)	Max. Limit (dBm/3kHz)	Result		
2422	-15.13	0.03	8.00	Complies		
2437	-14.87	0.03	8.00	Complies		
2452	-14.95	0.03	8.00	Complies		



Date: 14.DEC.2015 16:17:22

