



# FCC Test Report

**Equipment** : Aruba BT-100 Location Beacon  
**Brand Name** : Aruba Networks  
**Model No.** : ARBT0100  
**FCC ID** : Q9DBT100  
**Standard** : 47 CFR FCC Part 15.247  
**Operating Band** : 2400 MHz – 2483.5 MHz  
**FCC Classification** : DTS  
**Applicant** : Aruba Networks, Inc.  
1344 Crossman Ave. Sunnyvale, CA 94089 USA  
**Manufacturer** : Sernet (Suzhou) Technologies Corporation  
NO.8 Tangzhuang Road, Suzhou Industrial Park,  
Su Zhou City, JiangSu Province,China Zip:215021

The product sample received on Apr 24, 2014 and completely tested on May. 6, 2014. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2009 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by:

  
Wayne Hsu / Assistant Manager





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### Summary of Test Result

Conformance Test Specifications					
Report Clause	Ref. Std. Clause	Description	Measured	Limit	Result
1.1.2	15.203	Antenna Requirement	Antenna connector mechanism complied	FCC 15.203	Complied
-	15.207	AC Power-line Conducted Emissions	-	FCC 15.207	N/A
3.1	15.247(a)	6dB Bandwidth	LE: 654.00 kHz	≥500kHz	Complied
3.2	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm] LE: -0.93	Power [dBm] LE:30	Complied
3.3	15.247(e)	Power Spectral Density	PSD [dBm/100kHz] LE: -18.38	PSD [dBm/3kHz]: 8	Complied
3.4	15.247(d)	Transmitter Bandedge Emissions	Restricted Bands [dBuV/m at 3m]: 2483.500 MHz 62.41 (Margin 11.59dB) - PK 52.89 (Margin 1.11dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.5	15.247(d)	Transmitter Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 4804.000 MHz 66.42 (Margin 7.58dB) - PK 50.86 (Margin 3.14dB) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied

Note: The EUT is battery powered; the AC power line conducted emissions was not performed.



### Revision History

Report No.	Version	Description	Issued Date
FR442424	Rev. 01	Initial issue of report	May 9, 2014

# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

RF General Information				
Frequency Range (MHz)	Bluetooth Version	Ch. Frequency (MHz)	Channel Number	RF Output Power (dBm)
2400-2483.5	v4.0 LE	2402-2480	0-39 [40]	-0.93
Note 1: Bluetooth LE (Low Energy) using GFSK modulation for DTS digital modulation. Note 2: RF output power specifies that Maximum Peak Conducted Output Power. Note 3: This type of EUT only supports Bluetooth 4.0 LE and can't be downward compatible with another spec.				

### 1.1.2 Antenna Information

Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input type="checkbox"/>	Temporary RF connector provided
<input checked="" type="checkbox"/>	No temporary RF connector provided Transmit chains bypass antenna and soldered temporary RF connector provided for connected measurement. In case of conducted measurements the transmitter shall be connected to the measuring equipment via a suitable attenuator and correct for all losses in the RF path.

Antenna General Information			
No.	Ant. Cat.	Ant. Type	Gain (dBi)
1	Integral	Chip	2.00

### 1.1.3 Type of EUT

Identify EUT	
EUT Serial Number	N/A
Presentation of Equipment	<input type="checkbox"/> Production ; <input type="checkbox"/> Pre-Production ; <input checked="" type="checkbox"/> Prototype
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device) Combined Equipment – Brand Name / Model No.: ...
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems) Host System – Brand Name / Model No.: ...
<input type="checkbox"/>	Other:



1.1.4 Test Signal Duty Cycle

Operated Mode for Worst Duty Cycle	
<input checked="" type="checkbox"/> Operated test mode for worst duty cycle	
Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)
<input checked="" type="checkbox"/> 66.13% - test mode single channel – LE	1.80

1.1.5 EUT Operational Condition

<b>Supply Voltage</b>	<input type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC	<input type="checkbox"/> System
<b>Type of DC Source</b>	<input type="checkbox"/> Internal DC supply	<input type="checkbox"/> From Host	<input checked="" type="checkbox"/> Battery

## 1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ◆ 47 CFR FCC Part 15
- ◆ ANSI C63.10-2009
- ◆ FCC KDB 558074

## 1.3 Testing Location Information

Testing Location			
<input checked="" type="checkbox"/>	HWA YA	ADD : No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.	
		TEL : 886-3-327-3456	FAX : 886-3-327-0973
Test Condition	Test Site No.	Test Engineer	Test Environment
RF Conducted	TH01-HY	Ian	23.6°C / 60%
Radiated Emission	03CH02-HY	Daniel	22.8°C / 59%

## 1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Measurement Uncertainty		
Test Item		Uncertainty
AC power-line conducted emissions		±2.26 dB
Emission bandwidth, 6dB bandwidth		±1.42 %
RF output power, conducted		±0.63 dB
Power density, conducted		±0.81 dB
Unwanted emissions, conducted	30 – 1000 MHz	±0.51 dB
	1 – 18 GHz	±0.67 dB
	18 – 40 GHz	±0.83 dB
	40 – 200 GHz	N/A
All emissions, radiated	30 – 1000 MHz	±2.56 dB
	1 – 18 GHz	±3.59 dB
	18 – 40 GHz	±3.82 dB
	40 – 200 GHz	N/A
Temperature		±0.8 °C
Humidity		±3 %
DC and low frequency voltages		±3 %
Time		±1.42 %
Duty Cycle		±1.42 %

## 2 Test Configuration of EUT

### 2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing			
Bluetooth Version	Transmit Chains (N <sub>TX</sub> )	Data Rate	Modulation Mode
LE	1	1 Mbps	LE-1Mbps
Note 1: Bluetooth LE (Low Energy) using GFSK modulation for DTS digital modulation. Note 2: Modulation modes consist below configuration: DSSS LE-1Mbps: GFSK (1Mbps)			




### 2.2 The Worst Case Power Setting Parameter

The Worst Case Power Setting Parameter			
Test Software Version	COMMTEXT.EXE		
Modulation Mode	2402 MHz	2440 MHz	2480 MHz
LE, 1Mbps	Default	Default	Default

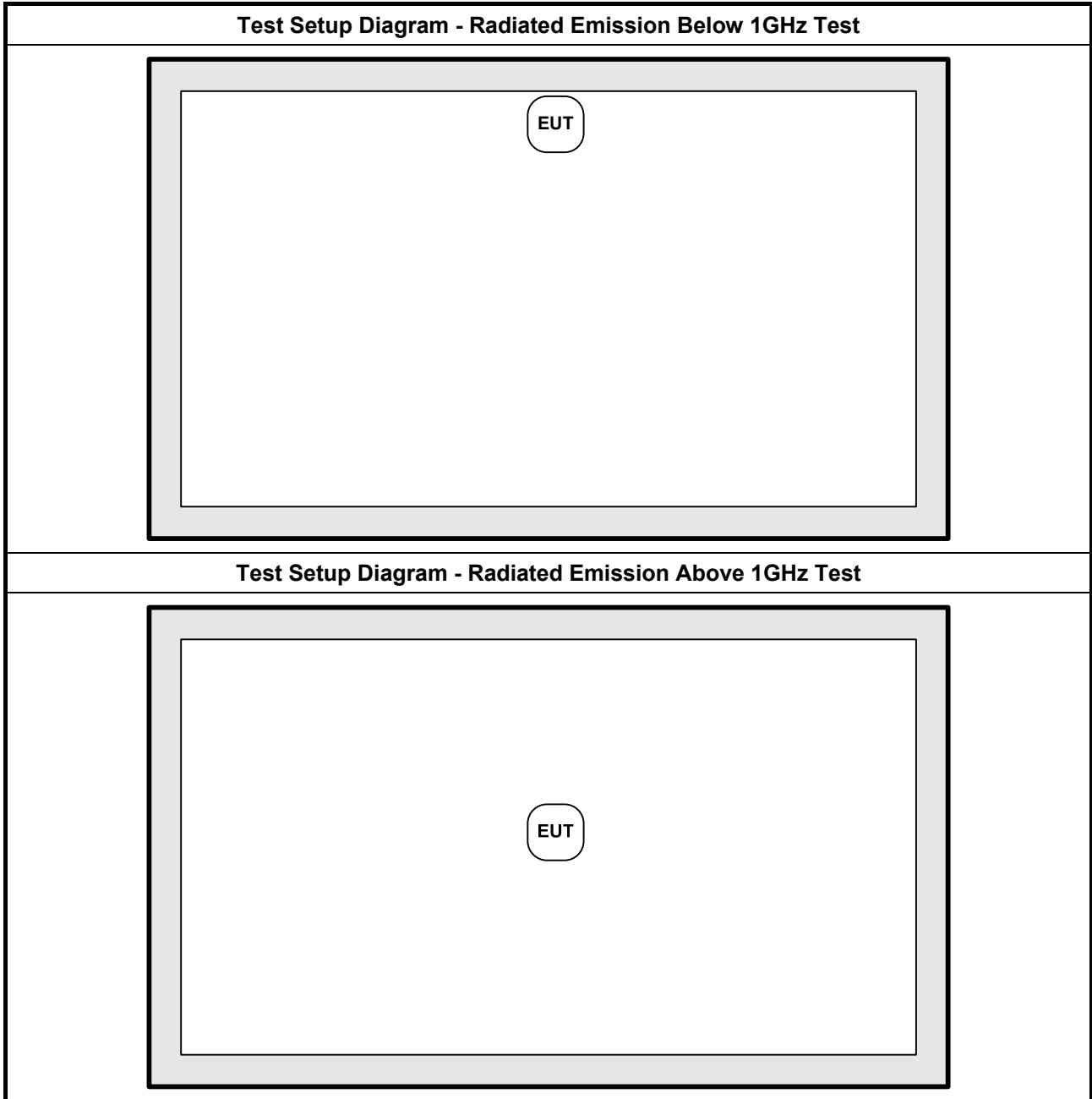


### 2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	RF Output Power, Power Spectral Density, 6 dB Bandwidth
<b>Test Condition</b>	Conducted measurement at transmit chains
<b>Modulation Mode</b>	LE-1Mbps

The Worst Case Mode for Following Conformance Tests			
<b>Tests Item</b>	Transmitter Radiated Unwanted Emissions Transmitter Radiated Bandedge Emissions		
<b>Test Condition</b>	Radiated measurement		
<b>User Position</b>	<input checked="" type="checkbox"/> EUT will be placed in fixed position. The worst planes is X.		
	<input type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed two orthogonal planes.		
	<input type="checkbox"/> EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions. EUT shall be performed two or three orthogonal planes.		
<b>Operating Mode</b>	<input checked="" type="checkbox"/> 1. Battery & Radio link		
<b>Modulation Mode</b>	LE-1Mbps		
<b>Orthogonal Planes of EUT</b>	<b>X Plane</b>	<b>Y Plane</b>	<b>Z Plane</b>
			

## 2.4 Test Setup Diagram



### 3 Transmitter Test Result

#### 3.1 6dB Bandwidth

##### 3.1.1 6dB Bandwidth Limit

6dB Bandwidth Limit	
Systems using digital modulation techniques:	
<input checked="" type="checkbox"/>	6 dB bandwidth $\geq$ 500 kHz.

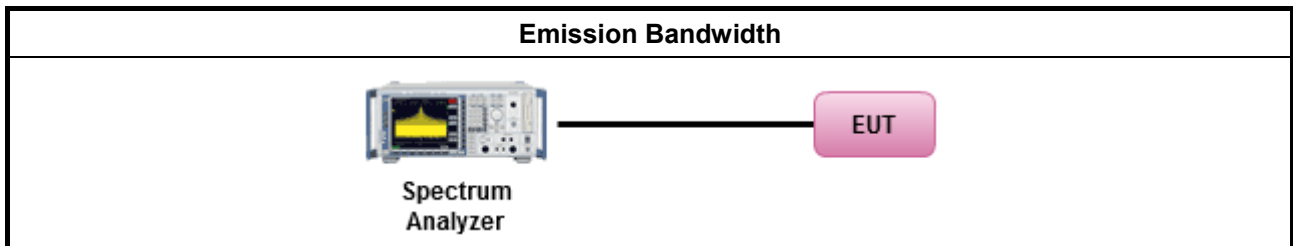
##### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

##### 3.1.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	For the emission bandwidth shall be measured using one of the options below:
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
<input type="checkbox"/>	Refer as FCC KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.
<input checked="" type="checkbox"/>	For conducted measurement.
<input checked="" type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

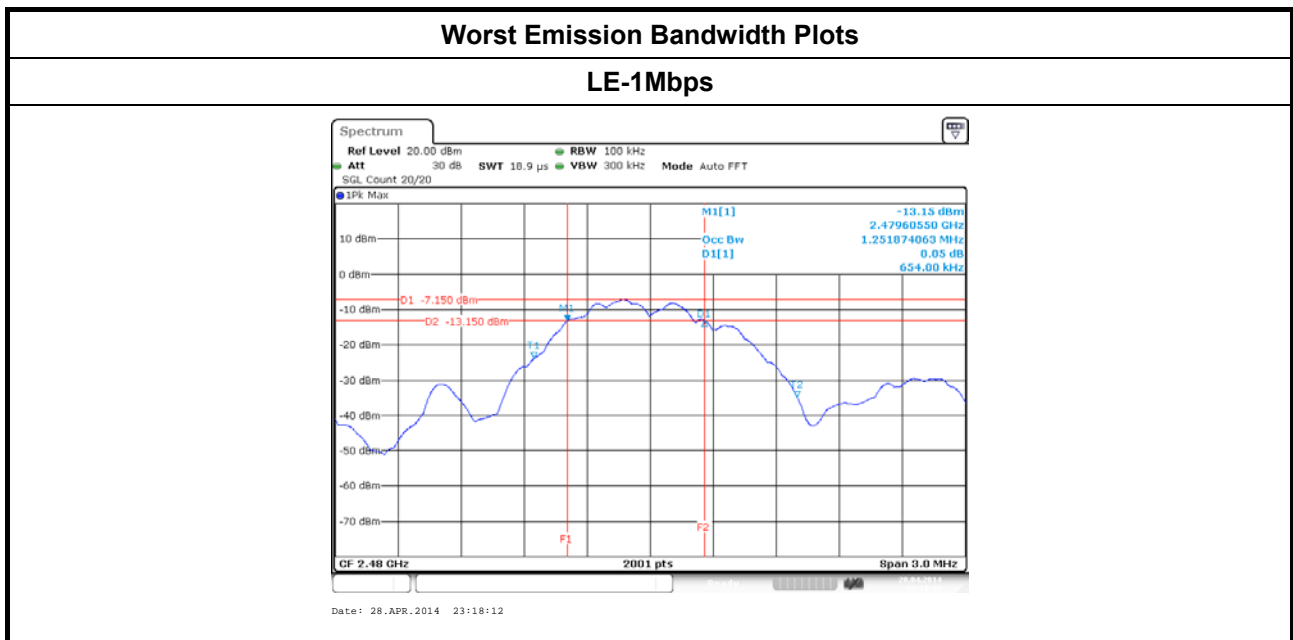
##### 3.1.4 Test Setup





3.1.5 Test Result of Emission Bandwidth

Emission Bandwidth Result			
Modulation Mode	Freq. (MHz)	99% Bandwidth (kHz)	6dB Bandwidth (kHz)
LE-1Mbps	2402	1557.7211	708.0000
LE-1Mbps	2440	1497.7511	690.0000
LE-1Mbps	2480	1251.8740	654.0000
Limit		N/A	≥500 kHz
Result		Complied	



### 3.2 RF Output Power

#### 3.2.1 RF Output Power Limit

RF Output Power Limit for Digital Modulation Systems	
<b>Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit</b>	
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band:	
<input checked="" type="checkbox"/>	If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)
<input type="checkbox"/>	Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm
<b>e.i.r.p. Power Limit:</b>	
<input checked="" type="checkbox"/> 2400-2483.5 MHz Band	
<input checked="" type="checkbox"/>	Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)
$P_{Out}$ = maximum peak conducted output power or maximum conducted output power in dBm, $G_{TX}$ = the maximum transmitting antenna directional gain in dBi. $P_{eirp}$ = e.i.r.p. Power in dBm.	

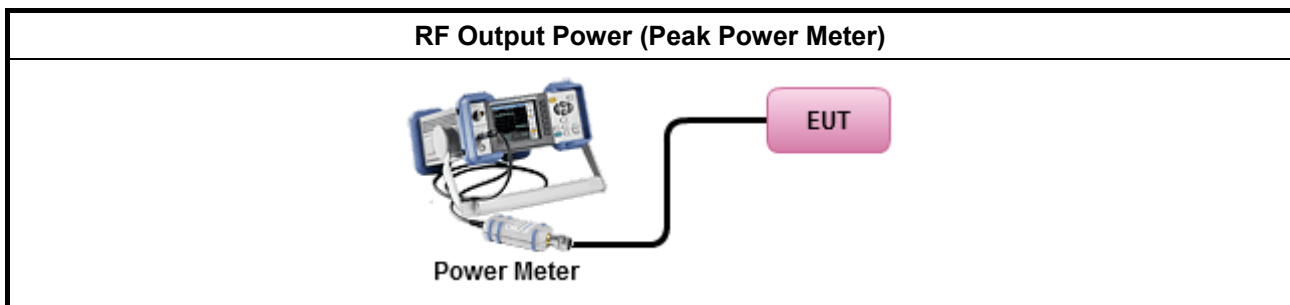
#### 3.2.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/> Maximum Peak Conducted Output Power	
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.10.2.1 a) for peak power meter.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.10.2.1 a) for spectrum analyzer - (RBW $\geq$ EBW).
<input checked="" type="checkbox"/> For conducted measurement.	
<input checked="" type="checkbox"/>	The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/>	The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

#### 3.2.4 Test Setup



**3.2.5 Test Result of Maximum Peak Conducted Output Power**

Maximum Peak Conducted Output Power Result						
Condition		RF Output Power (dBm)				
Modulation Mode	Freq. (MHz)	RF Output Power	Power Limit	Antenna Gain (dBi)	EIRP Power	EIRP Limit
LE-1Mbps	2402	-0.93	30	2.00	1.07	36
LE-1Mbps	2440	-1.43	30	2.00	0.57	36
LE-1Mbps	2480	-2.17	30	2.00	-0.17	36
<b>Result</b>		<b>Complied</b>				

**3.2.6 Test Result of Maximum Average Conducted Output Power**

Maximum Average Conducted Output Power Result						
Condition		RF Output Power (dBm)				
Modulation Mode	Freq. (MHz)	Average Power	Duty Factor (dB)	RF Output Power	Antenna Gain (dBi)	EIRP Power
LE-1Mbps	2402	-5.08	1.80	-3.28	2.00	-1.28
LE-1Mbps	2440	-5.23	1.80	-3.43	2.00	-1.43
LE-1Mbps	2480	-5.68	1.80	-3.88	2.00	-1.88
<b>Result</b>		<b>Complied</b>				

### 3.3 Power Spectral Density

#### 3.3.1 Power Spectral Density Limit

Power Spectral Density Limit
<input checked="" type="checkbox"/> Power Spectral Density (PSD) $\leq$ 8 dBm/3kHz

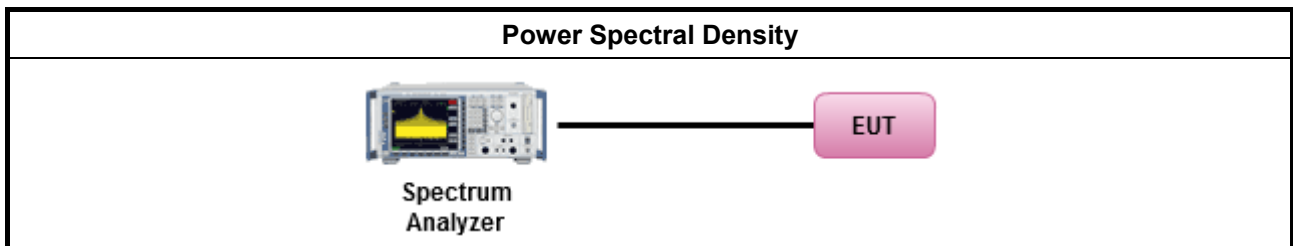
#### 3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.3.3 Test Procedures

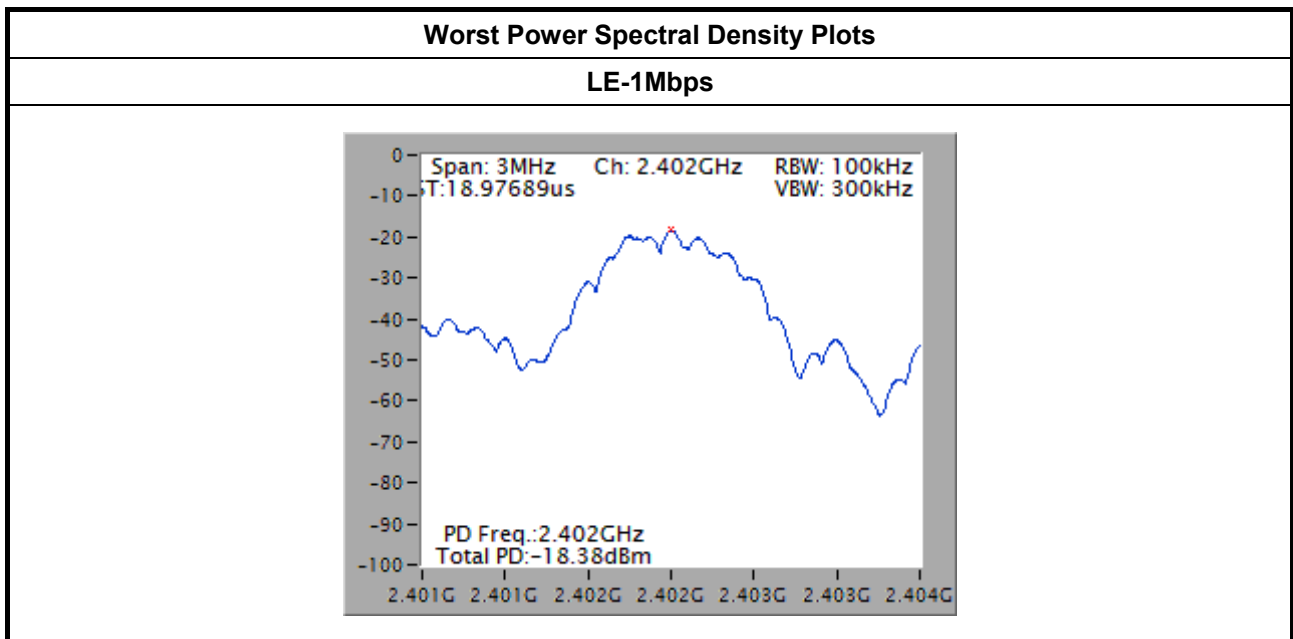
Test Method
<input checked="" type="checkbox"/> Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz;detector=peak).. [duty cycle $\geq$ 98% or external video / power trigger]
<input type="checkbox"/> Refer as FCC KDB 558074, clause 10.3 Method AVGPSD-1 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 558074, clause 10.4 Method AVGPSD-1 Alt. (slow sweep speed) duty cycle $<$ 98% and average over on/off periods with duty factor
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 10.5 Method AVGPSD-2 (spectral trace averaging).
<input type="checkbox"/> Refer as FCC KDB 558074, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)
<input checked="" type="checkbox"/> For conducted measurement.
<input checked="" type="checkbox"/> The EUT supports single transmit chain and measurements performed on this transmit chain.
<input type="checkbox"/> The EUT supports diversity transmitting and the results on transmit chain port 1 is the worst case.

#### 3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

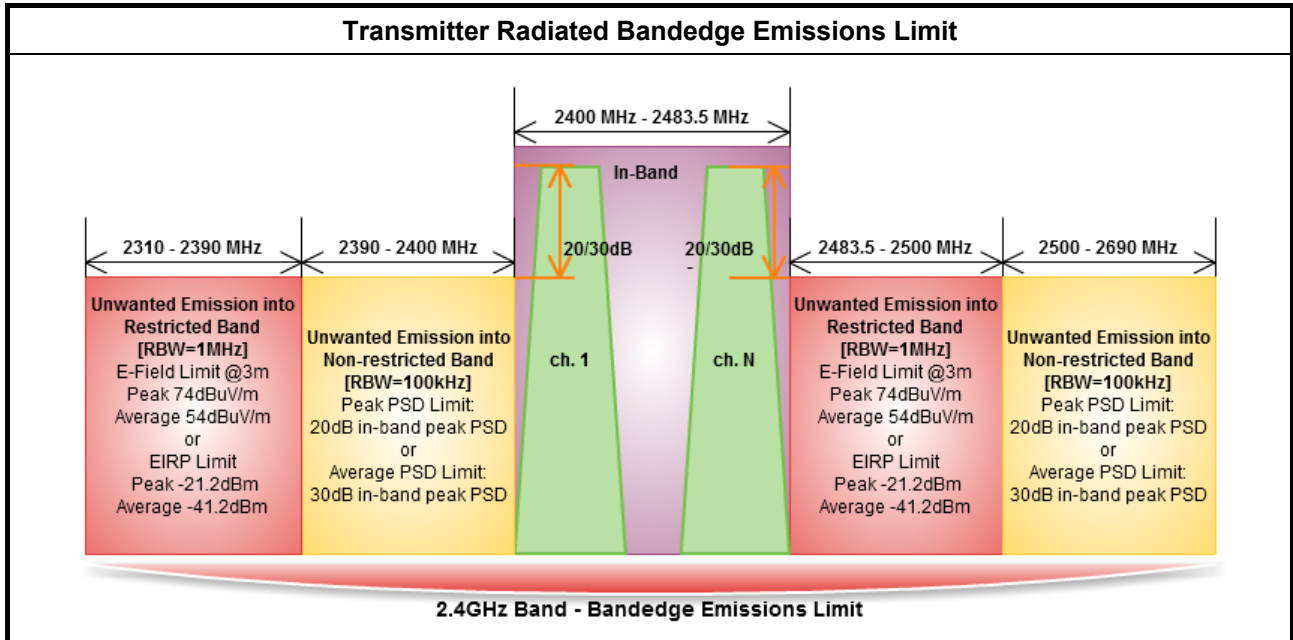
Power Spectral Density Result			
Modulation Mode	Freq. (MHz)	PSD (dBm/100kHz)	PSD Limit (dBm/3kHz)
LE-1Mbps	2402	-18.38	8
LE-1Mbps	2440	-18.90	8
LE-1Mbps	2480	-19.65	8
<b>Result</b>		<b>Complied</b>	





### 3.4 Transmitter Bandedge Emissions

#### 3.4.1 Transmitter Radiated Bandedge Emissions Limit



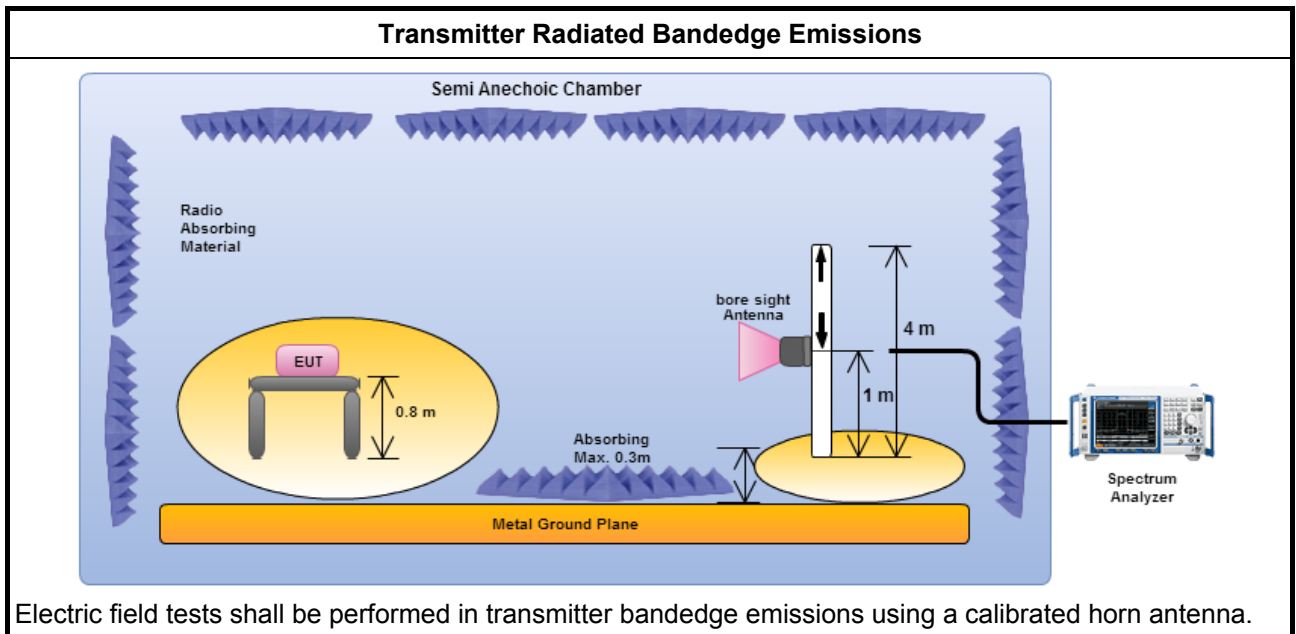
#### 3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

### 3.4.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	The average emission levels shall be measured in [duty cycle $\geq 98$ or duty factor].
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.2.2 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.
<input checked="" type="checkbox"/>	For the transmitter unwanted emissions shall be measured using following options below:
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
<input type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$ )
<input type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq 1/T$ ).
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq 1/T$ , where T is pulse time.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/>	For the transmitter bandedge emissions shall be measured using following options below:
<input type="checkbox"/>	Refer as FCC KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.2 for band-edge testing.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 6.9.3 for marker-delta method for band-edge measurements.
<input checked="" type="checkbox"/>	For radiated measurement, refer as FCC KDB 558074, clause 12.2.7.
<input type="checkbox"/>	For conducted measurement, refer as FCC KDB 558074, clause 12.2.2.

### 3.4.4 Test Setup





3.4.5 Transmitter Radiated Bandedge Emissions

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band)								
Modulation	N <sub>TX</sub>	Test Freq. (MHz)	In-band PSD [i] (dBuV/100kHz)	Freq. (MHz)	Out-band PSD [o] (dBuV/100kHz)	[i] – [o] (dB)	Limit (dB)	Pol.
LE-1Mbps	1	2402	89.43	2399.380	66.17	23.26	20	H
LE-1Mbps	1	2480	91.67	2537.810	64.14	27.53	20	H

Note 1: Measurement worst emissions of receive antenna polarization

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)										
Modulation Mode	N <sub>TX</sub>	Freq. (MHz)	Measure Distance (m)	Freq. (MHz) PK	Level (dBuV/m) PK	Limit (dBuV/m) PK	Freq. (MHz) AV	Level (dBuV/m) AV	Limit (dBuV/m) AV	Pol.
LE-1Mbps	1	2402	3	2330.940	60.21	74	2314.260	48.06	54	H
LE-1Mbps	1	2480	3	2483.530	62.41	74	2483.500	52.89	54	H

Note 1: Measurement worst emissions of receive antenna polarization.  
 Note 2: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is “Pulse On Time”, e.g., LE VBW≥1/625us, VBW=3kHz.

### 3.5 Transmitter Unwanted Emissions

#### 3.5.1 Transmitter Radiated Unwanted Emissions Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB/decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dB)
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

#### 3.5.2 Measuring Instruments

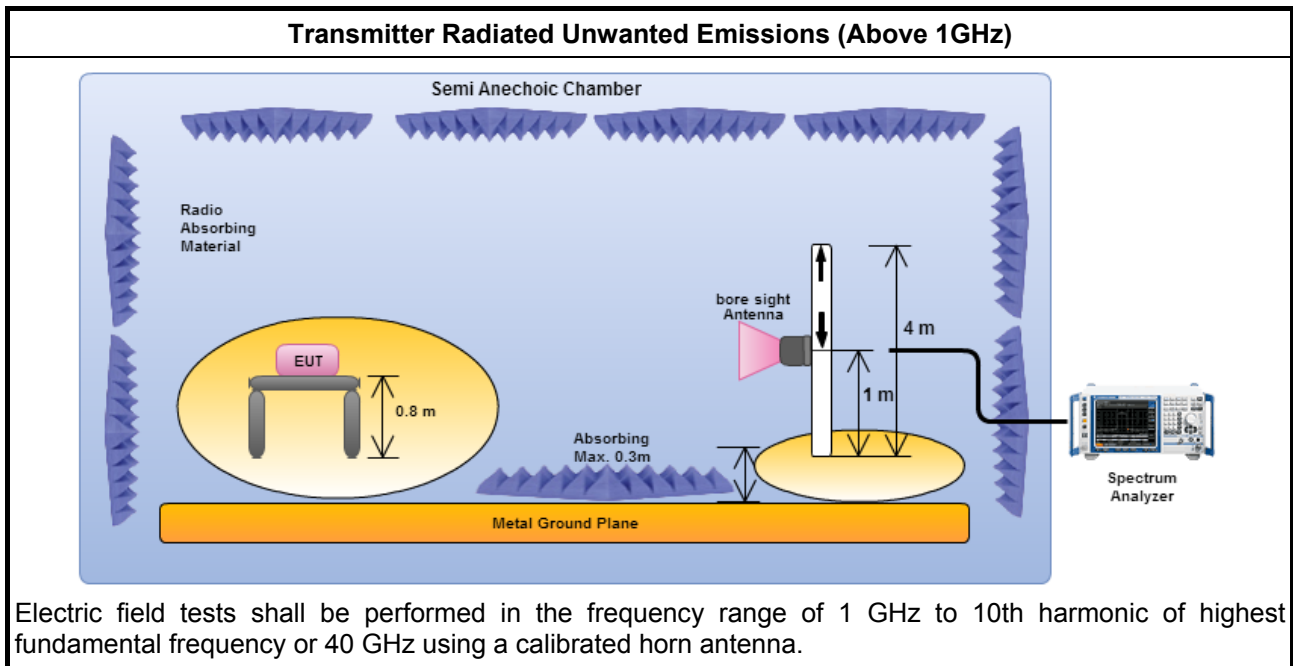
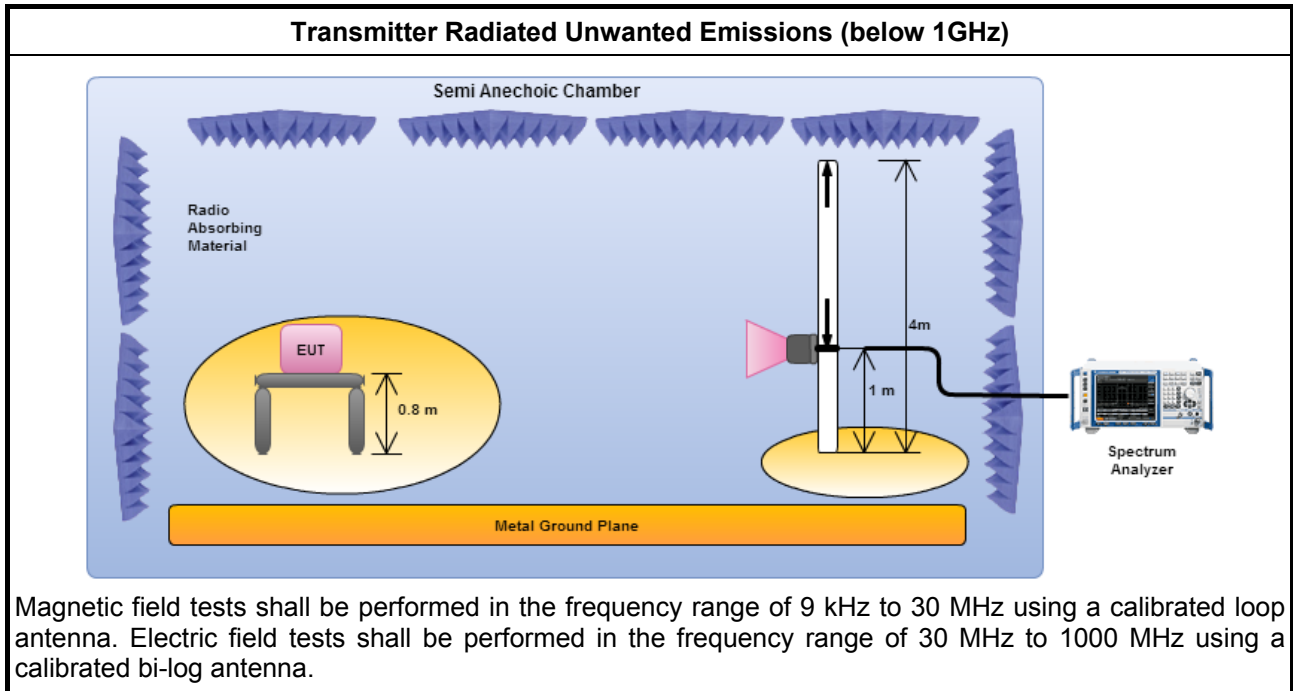
Refer a test equipment and calibration data table in this test report.



3.5.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	Measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).
<input checked="" type="checkbox"/>	Measurements in the frequency range 10 GHz - 18GHz are typically made at a closer distance 1m, because the instrumentation noise floor is typically close to the radiated emission limit.
<input checked="" type="checkbox"/>	Measurements in the frequency range above 18 GHz - 25GHz are typically made at a closer distance 0.5m, because the instrumentation noise floor is typically close to the radiated emission limit.
<input checked="" type="checkbox"/>	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].
<input checked="" type="checkbox"/>	For the transmitter unwanted emissions shall be measured using following options below:
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 11 for unwanted emissions into non-restricted bands.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
<input type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq$ 98%)
<input type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq$ 1/T).
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq$ 1/T, where T is pulse time.
<input type="checkbox"/>	Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.
<input checked="" type="checkbox"/>	Refer as FCC KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.
<input checked="" type="checkbox"/>	For radiated measurement, refer as FCC KDB 558074, clause 12.2.7.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.
<input type="checkbox"/>	For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 12.2.2.

### 3.5.4 Test Setup



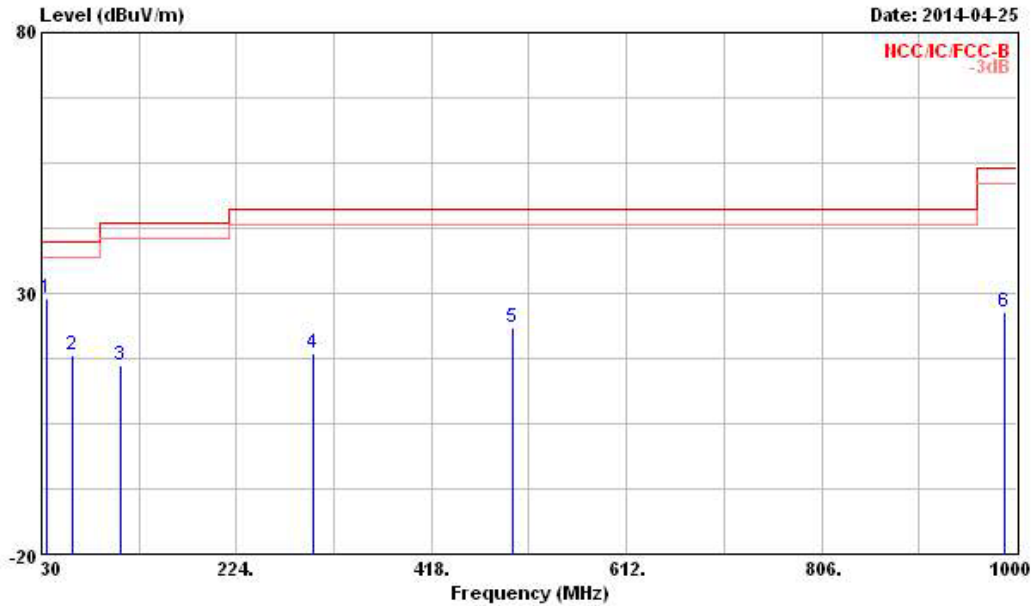
### 3.5.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.



3.5.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Transmitter Radiated Unwanted Emissions			
Operating Mode	1	Polarization	V
Operating Function	Battery & Radio link		

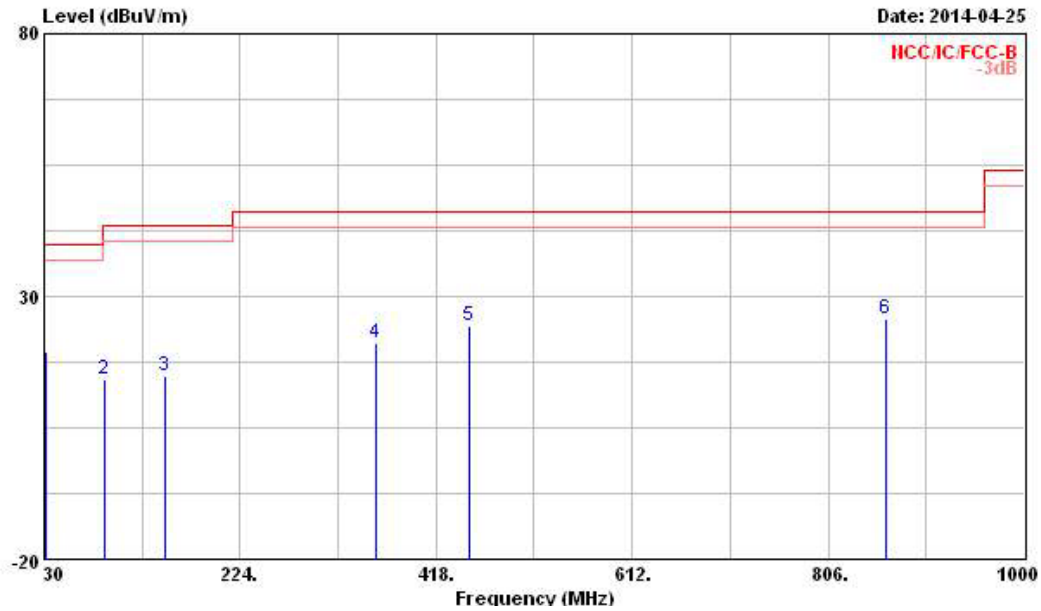


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	35.820	29.05	-10.95	40.00	40.36	15.59	0.82	27.72	Peak	---	---
2	60.070	18.27	-21.73	40.00	38.00	6.75	1.07	27.55	Peak	---	---
3	109.540	16.34	-27.16	43.50	30.33	12.28	1.45	27.72	Peak	---	---
4	300.630	18.35	-27.65	46.00	29.71	13.28	2.52	27.16	Peak	---	---
5	498.510	23.34	-22.66	46.00	30.95	17.59	3.23	28.43	Peak	---	---
6	987.390	26.40	-27.60	54.00	27.99	21.23	4.84	27.66	Peak	---	---

Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).  
 Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.



Transmitter Radiated Unwanted Emissions			
Operating Mode	1	Polarization	H
Operating Function	Battery & Radio link		



	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	31.940	19.60	-20.40	40.00	29.04	17.57	0.76	27.77	Peak	---	---
2	90.140	14.10	-29.40	43.50	31.79	8.68	1.34	27.71	Peak	---	---
3	149.310	14.94	-28.56	43.50	30.03	10.74	1.76	27.59	Peak	---	---
4	357.860	21.07	-24.93	46.00	31.06	14.79	2.81	27.59	Peak	---	---
5	450.980	24.43	-21.57	46.00	32.55	16.92	3.13	28.17	Peak	---	---
6	863.230	25.65	-20.35	46.00	28.60	20.40	4.53	27.88	Peak	---	---

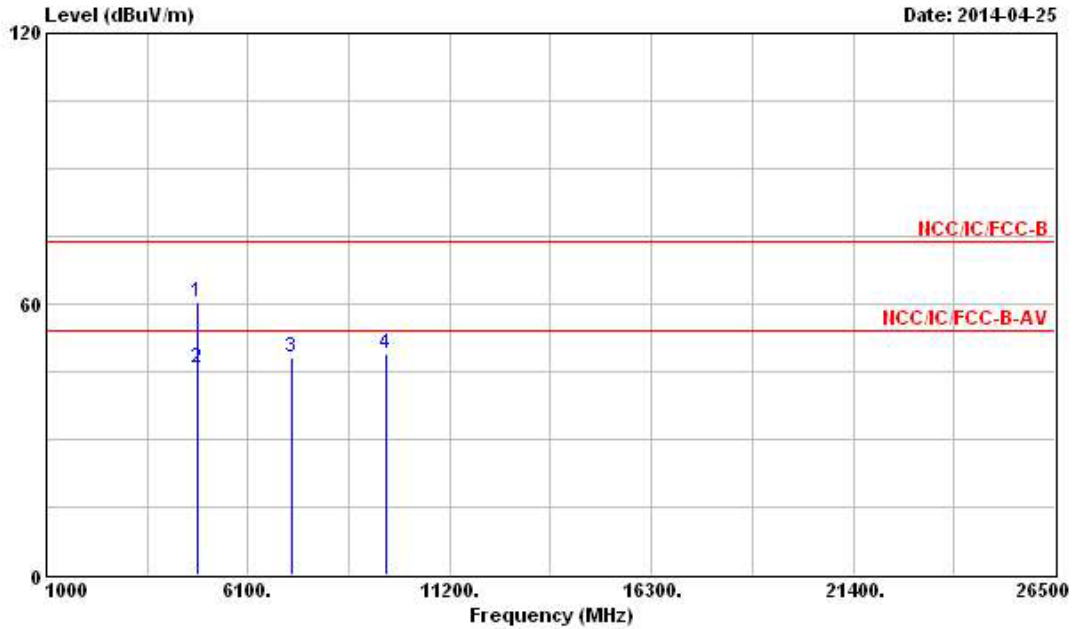
Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found spurious emissions (No spurious emissions were detected.)  
 Note 3: Measurement receive antenna polarization: H (Horizontal), V (Vertical).  
 Note 4: No level of unwanted emissions exceeds the level of the fundamental emission.





3.5.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Transmitter Radiated Unwanted Emissions			
Modulation Mode	LE-1Mbps	Test Freq. (MHz)	2402
N <sub>TX</sub>	1	Polarization	V



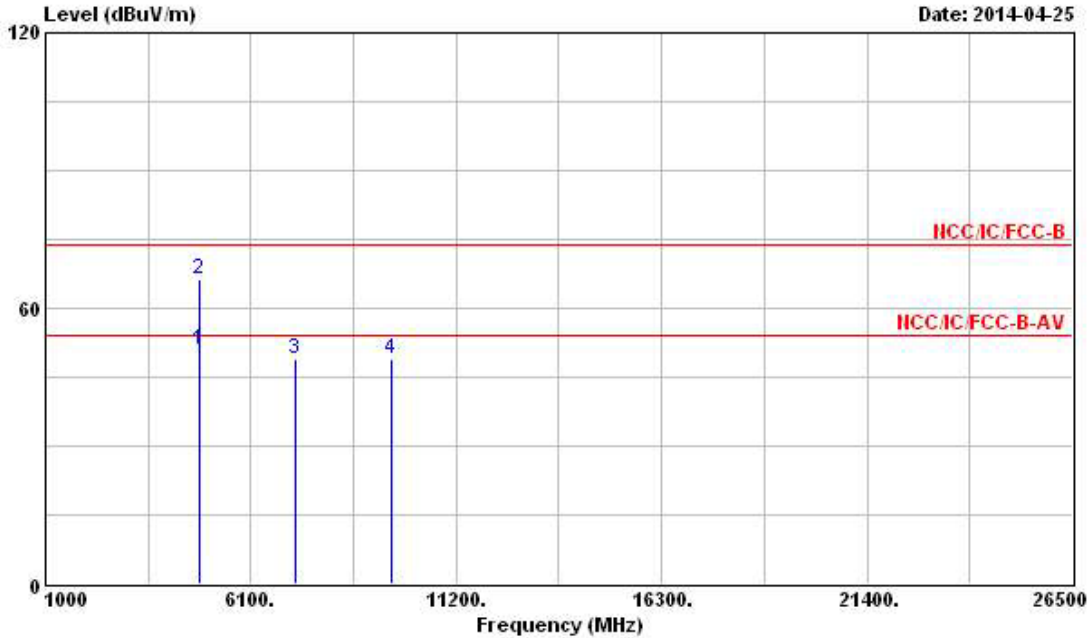
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4804.000	60.44	-13.56	74.00	56.09	34.34	4.70	34.69	Peak	---	---
2	4804.000	45.86	-8.14	54.00	41.51	34.34	4.70	34.69	Average	---	---
3	7206.000	48.02			41.70	35.92	5.33	34.93	Peak	---	---
4	9608.000	49.12			41.63	36.52	6.32	35.35	Peak	---	---

- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
- Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (90.25 dBuV/m).
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



Transmitter Radiated Unwanted Emissions

Modulation Mode	LE-1Mbps	Test Freq. (MHz)	2402
N <sub>TX</sub>	1	Polarization	H



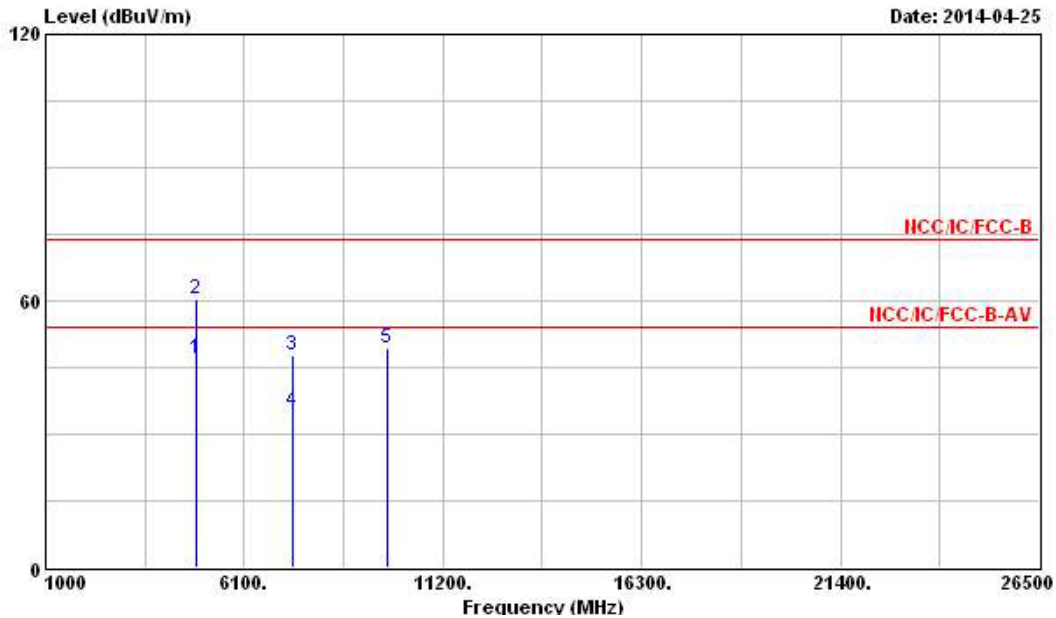
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4804.000	50.86	-3.14	54.00	46.51	34.34	4.70	34.69	Average	---	---
2	4804.000	66.42	-7.58	74.00	62.07	34.34	4.70	34.69	Peak	---	---
3	7206.000	48.90			42.58	35.92	5.33	34.93	Peak	---	---
4	9608.000	49.05			41.56	36.52	6.32	35.35	Peak	---	---

- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
- Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (90.25 dBuV/m).
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



**Transmitter Radiated Unwanted Emissions**

<b>Modulation Mode</b>	LE-1Mbps	<b>Test Freq. (MHz)</b>	2440
<b>N<sub>TX</sub></b>	1	<b>Polarization</b>	V



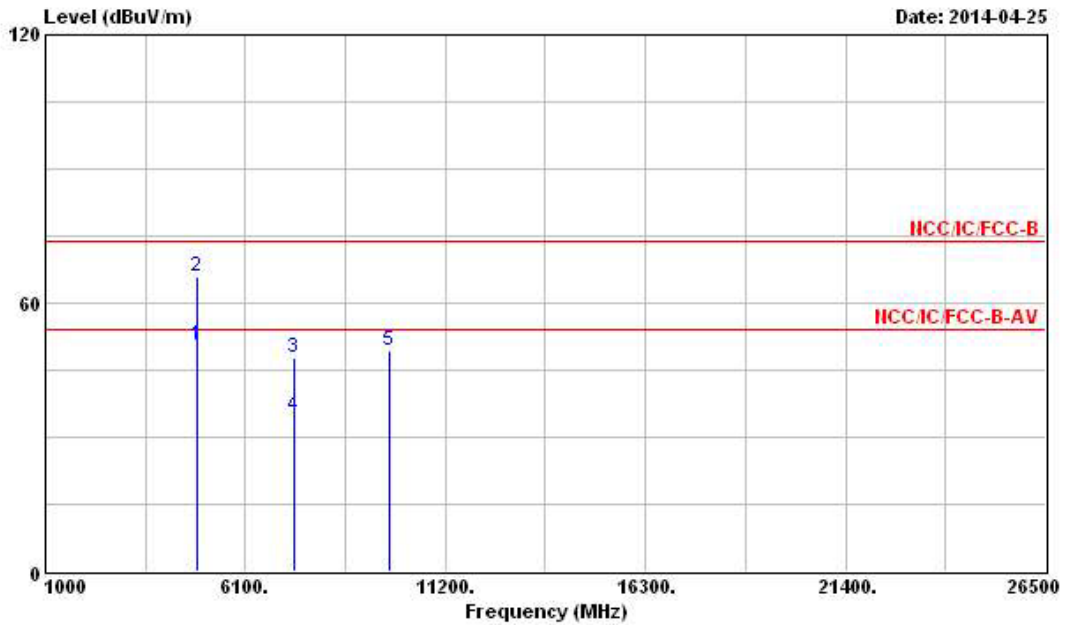
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @	4880.000	46.91	-7.09	54.00	42.53	34.32	4.73	34.67	Average	---	---
2	4880.000	60.43	-13.57	74.00	56.05	34.32	4.73	34.67	Peak	---	---
3	7320.000	47.92	-26.08	74.00	41.54	35.87	5.47	34.96	Peak	---	---
4	7320.000	35.00	-19.00	54.00	28.62	35.87	5.47	34.96	Average	---	---
5	9760.000	49.17			41.38	36.71	6.44	35.36	Peak	---	---

- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
- Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (89.86 dBuV/m).
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



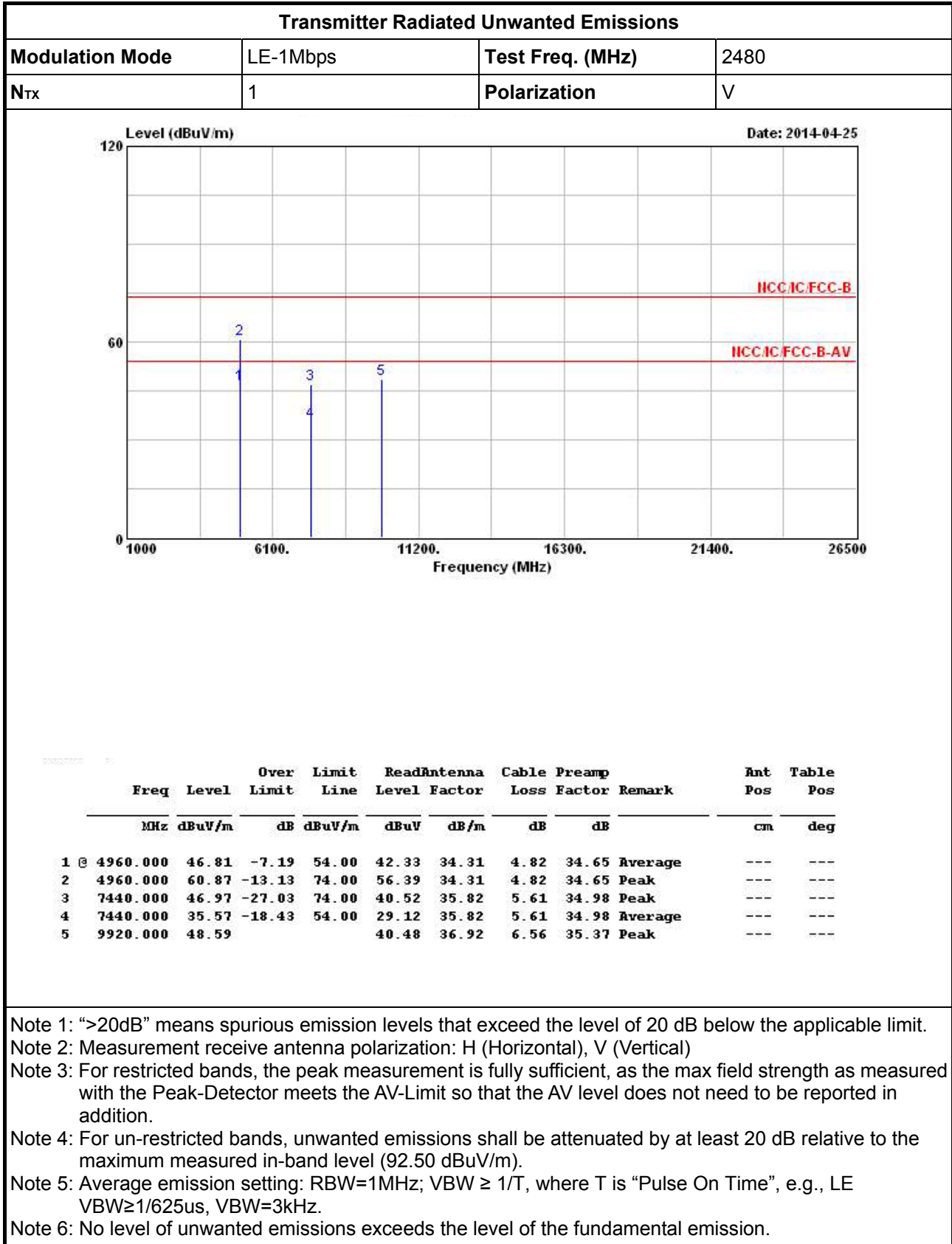
**Transmitter Radiated Unwanted Emissions**

<b>Modulation Mode</b>	LE-1Mbps	<b>Test Freq. (MHz)</b>	2440
<b>N<sub>TX</sub></b>	1	<b>Polarization</b>	H



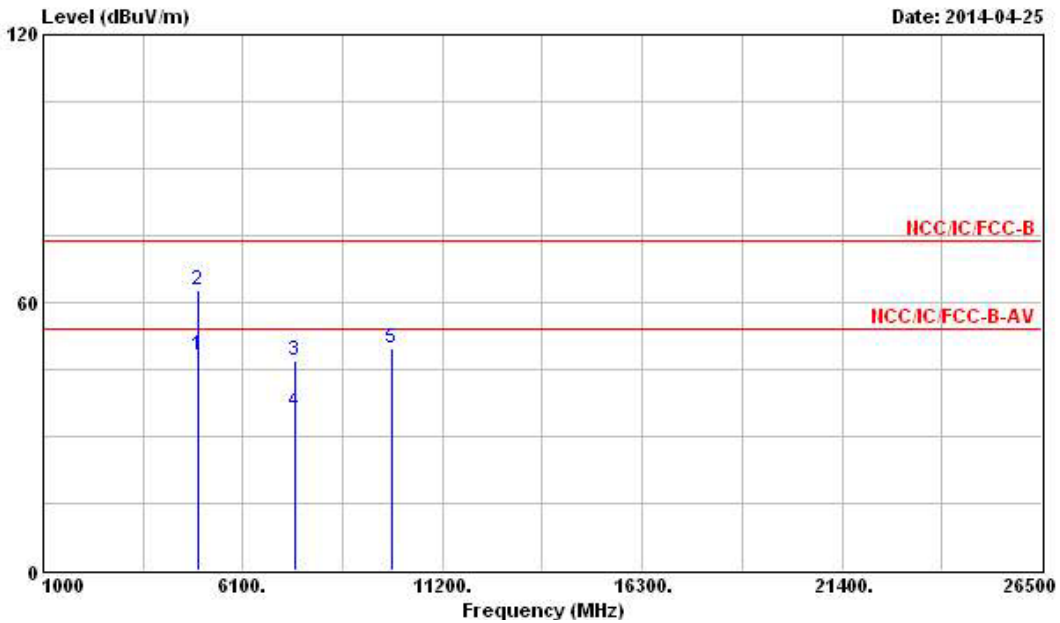
Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @ 4880.000	50.70	-3.30	54.00	46.32	34.32	4.73	34.67	Average	---	---
2 @ 4880.000	65.87	-8.13	74.00	61.49	34.32	4.73	34.67	Peak	---	---
3 7320.000	47.85	-26.15	74.00	41.47	35.87	5.47	34.96	Peak	---	---
4 7320.000	34.85	-19.15	54.00	28.47	35.87	5.47	34.96	Average	---	---
5 9760.000	49.48			41.69	36.71	6.44	35.36	Peak	---	---

- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
- Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (89.86 dBuV/m).
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.





Transmitter Radiated Unwanted Emissions			
Modulation Mode	LE-1Mbps	Test Freq. (MHz)	2480
N <sub>TX</sub>	1	Polarization	H



Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1 @ 4960.000	48.25	-5.75	54.00	43.77	34.31	4.82	34.65	Average	---	---
2 4960.000	62.83	-11.17	74.00	58.35	34.31	4.82	34.65	Peak	---	---
3 7440.000	47.15	-26.85	74.00	40.70	35.82	5.61	34.98	Peak	---	---
4 7440.000	35.61	-18.39	54.00	29.16	35.82	5.61	34.98	Average	---	---
5 9920.000	49.73			41.62	36.92	6.56	35.37	Peak	---	---

- Note 1: ">20dB" means spurious emission levels that exceed the level of 20 dB below the applicable limit.
- Note 2: Measurement receive antenna polarization: H (Horizontal), V (Vertical)
- Note 3: For restricted bands, the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
- Note 4: For un-restricted bands, unwanted emissions shall be attenuated by at least 20 dB relative to the maximum measured in-band level (92.50 dBuV/m).
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.
- Note 6: No level of unwanted emissions exceeds the level of the fundamental emission.



## 4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSV 40	101013	9kHz ~ 40GHz	Jan. 25, 2014	Conducted (TH01-HY)
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	Jun. 27, 2013	Conducted (TH01-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum Analyzer	R&S	FSP40	100593	9kHz ~ 40GHz	Oct. 03, 2013	Radiation (03CH02-HY)
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	May 11, 2013	Radiation (03CH02-HY)
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	Jul. 18, 2013	Radiation (03CH02-HY)
Amplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	Aug. 28, 2013	Radiation (03CH02-HY)
Horn Antenna	ETS-LINDGREN	3117	00091920	1GHz ~ 18GHz	Nov. 25, 2013	Radiation (03CH02-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jan. 10, 2014	Radiation (03CH02-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	Nov. 09, 2013	Radiation (03CH02-HY)
RF Cable-high	SUHNER	SUCOFLEX106	03CH02-HY	1GHz ~ 40GHz	Mar. 05, 2014	Radiation (03CH02-HY)
Bilog Antenna	SCHAFFNER	CBL61128	2723	30MHz ~ 2GHz	Oct. 10, 2013	Radiation (03CH02-HY)
Turn Table	Chaintek Instruments	3000	MF7802058	0 ~ 360 degree	N/A	Radiation (03CH02-HY)
Antenna Mast	MF	MF7802	MF780208205	1 ~ 4 m	N/A	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is one year.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Loop Antenna	TESEQ	HLA 6120	31244	9kHz ~ 30MHz	Dec. 02, 2012	Radiation (03CH02-HY)

Note: Calibration Interval of instruments listed above is two year.



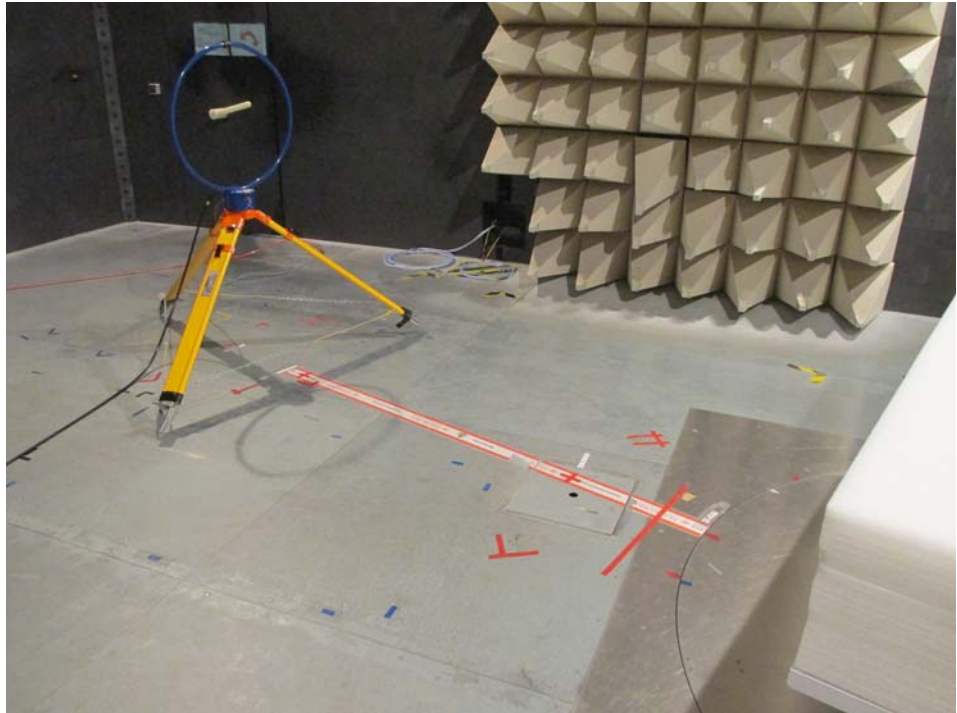
## **Appendix A. Test Photos**



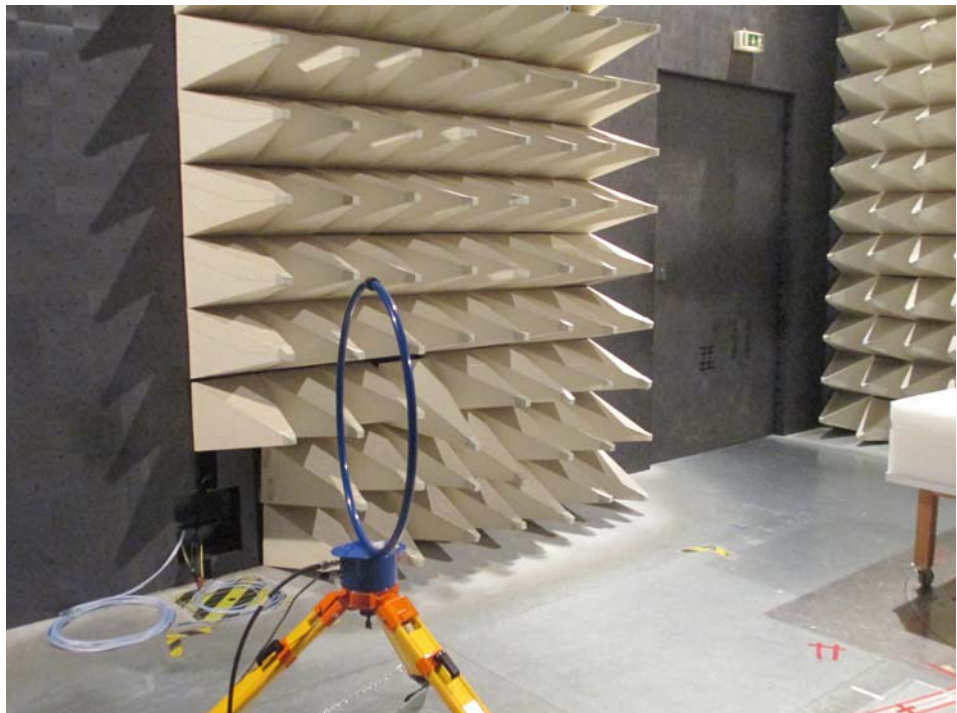
## 1 Photographs of Radiated Emissions Test Configuration

For radiated emissions 9kHz~30MHz

FRONT VIEW

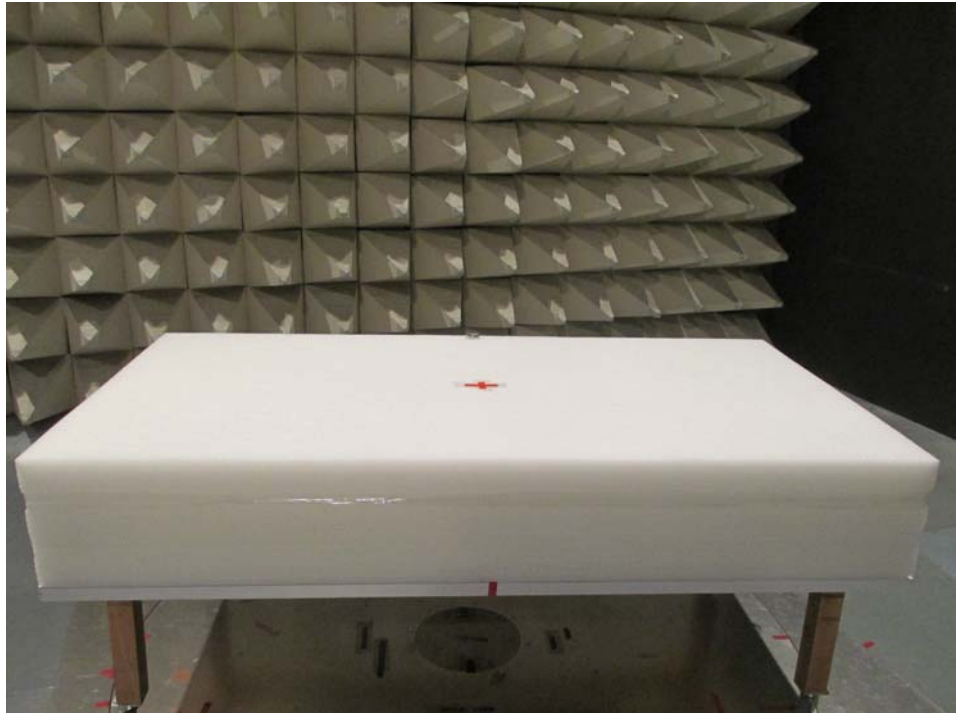


REAR VIEW

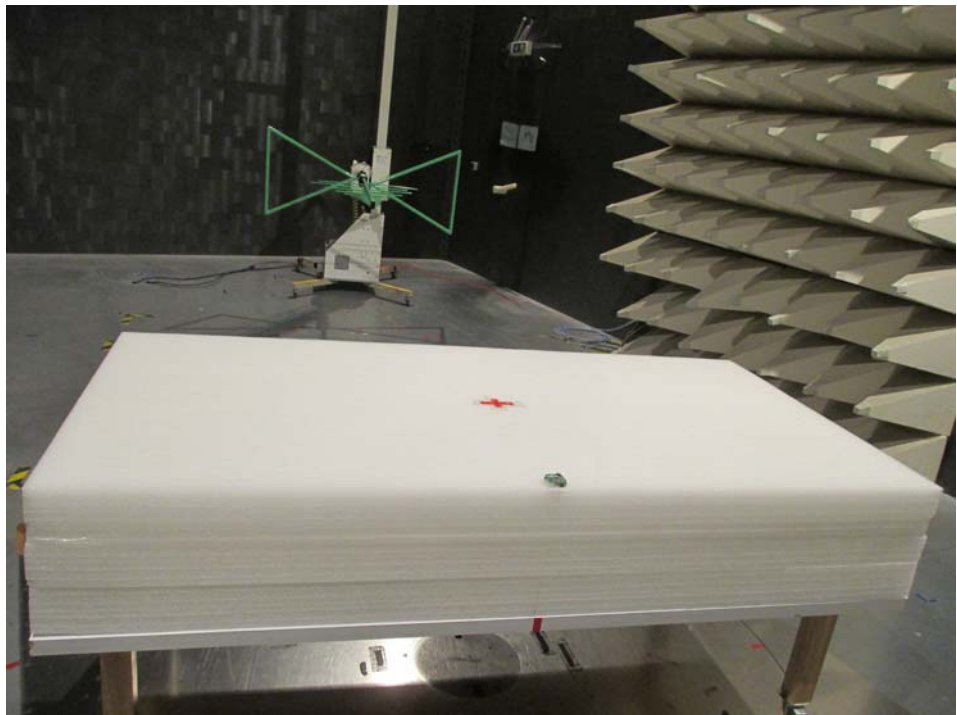


For radiated emissions 30MHz~1GHz

**FRONT VIEW**

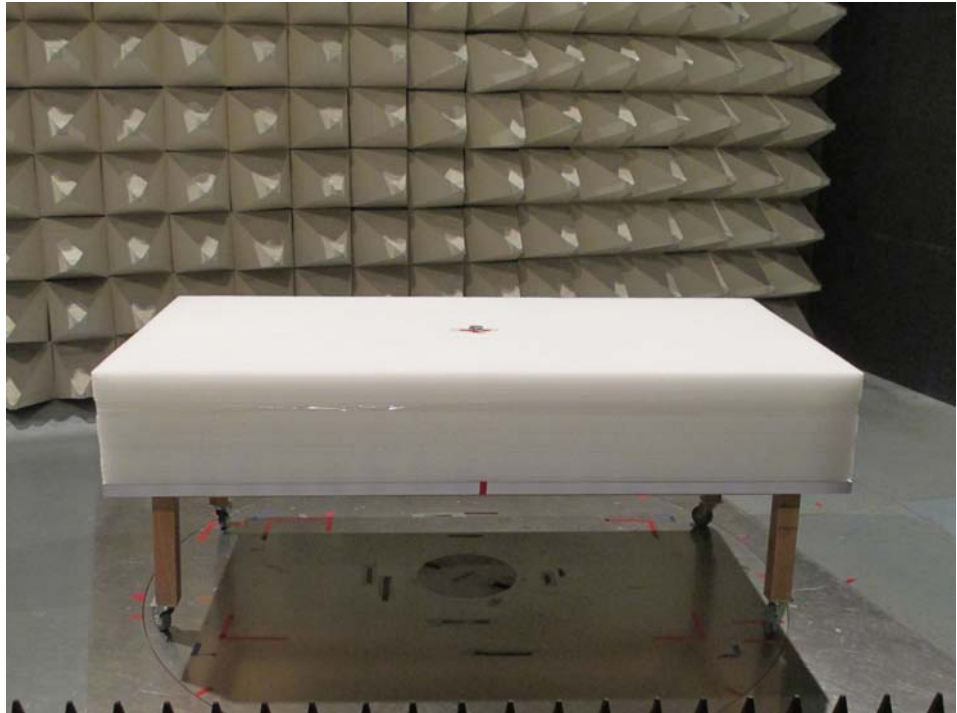


**REAR VIEW**



For radiated emissions above 1GHz

**FRONT VIEW**

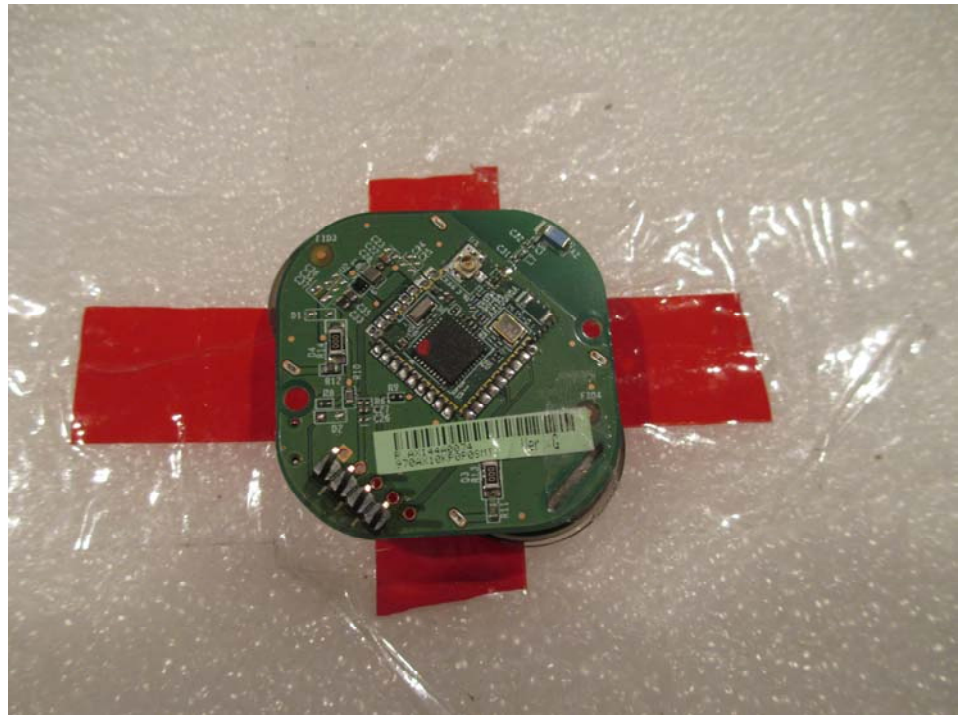


**REAR VIEW**

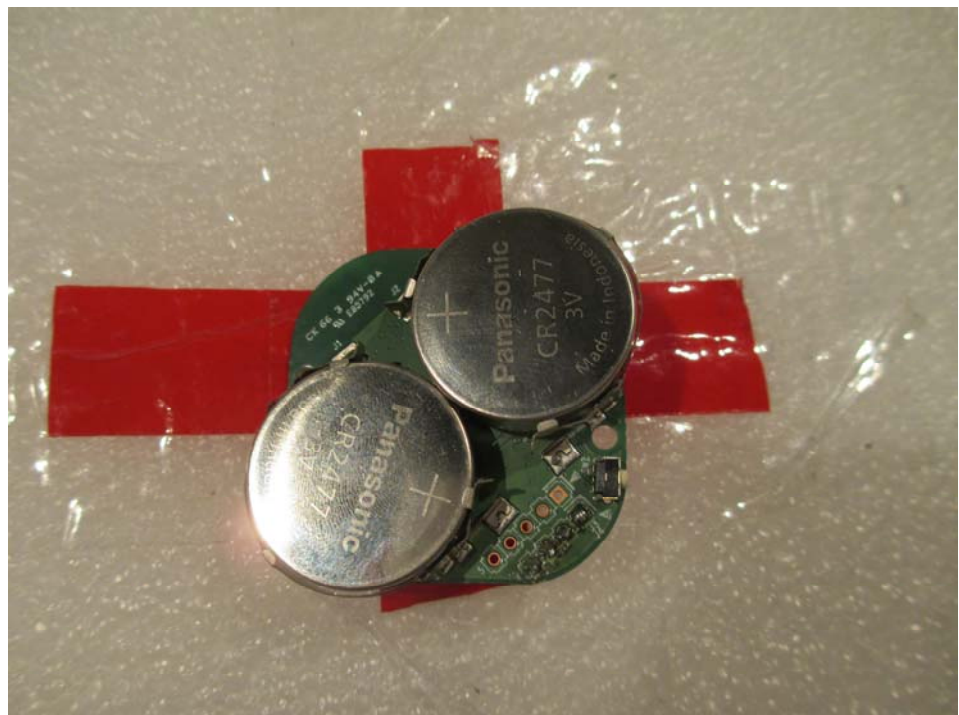


EUT take a close-up

FRONT VIEW



REAR VIEW



APPENDIX B. Photographs of EUT

