

# FCC Test Report

**Equipment** : Personal Computer  
**Brand Name** : SONY  
**Model No.** : SVF14NA1EL  
**FCC ID** : AK8SVF14NA1EL  
**Standard** : 47 CFR FCC Part 15.247  
**Operating Band** : 2400 MHz – 2483.5 MHz  
**Equipment Class** : DTS  
**Applicant** : Sony Corporation  
**Manufacturer** : 1-7-1 Konan, Minato-ku, Tokyo 108-0075, Japan  
**RF Module** : Intel / 7260HMW BN

The product sample received on Sep. 30, 2013 and completely tested on Oct. 03, 2013. 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
3.1	15.207	AC Power-line Conducted Emissions	[dBuV]: 13.560MHz 48.90 (Margin 1.10dB) - AV 50.17 (Margin 9.83dB) - QP	FCC 15.207	Complied
3.2	15.247(a)	6dB Bandwidth	LE: 652.70 kHz	≥500kHz	Complied
3.3	15.247(b)	RF Output Power (Maximum Peak Conducted Output Power)	Power [dBm] LE: 5.36	Power [dBm] LE:30	Complied
3.4	15.247(d)	Power Spectral Density	PSD [dBm/100kHz] LE: -10.41	PSD [dBm/3kHz]: 8	Complied
3.5	15.247(c)	Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2394.66MHz: 42.30dB Restricted Bands [dBuV/m at 3m]: 2362.02MHz 58.80 (Margin 15.20) - PK 50.19 (Margin 3.81) - AV	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied
3.6	15.247(c)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 39.700MHz 36.95 (Margin 3.05dB) - PK	Non-Restricted Bands: > 20 dBc Restricted Bands: FCC 15.209	Complied





# 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)	Co-location
2400-2483.5	v4.0 LE	2402-2480	0-39 [40]	5.36	Yes
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: Co-location, Co-location is generally defined as simultaneously transmitting (co-transmitting) antennas within 20 cm of each other. (i.e., EUT has simultaneously co-transmitting that operating 2.4GHz and 5GHz.)					

### 1.1.2 Antenna Information

Antenna Category	
<input checked="" type="checkbox"/>	Integral antenna (antenna permanently attached)
<input checked="" type="checkbox"/>	Temporary RF connector provided
<input 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	PIFA	0.16



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"/> 83.87% - test mode single channel - LE	0.76

1.1.5 EUT Operational Condition

<b>Supply Voltage</b>	<input checked="" type="checkbox"/> AC mains	<input checked="" type="checkbox"/> DC	
<b>Type of DC Source</b>	<input type="checkbox"/> Internal DC supply	<input checked="" type="checkbox"/> External DC adapter	<input checked="" type="checkbox"/> Li-on Battery

## 1.2 Accessories

Accessories Information				
AC Adapter	Brand Name	SONY	Model Name	VGP-AC19V76
	Power Rating	I/P: 100-240V ~ 1.2A 50/60Hz ; O/P: 19.5V $\overline{\overline{=}}$ 2.3A		
Li-ion Battery	Brand Name	SONY	Model Name	VGP-BPS40
	Power Rating	15.0V $\overline{\overline{=}}$ / 3 170 mAh / 48 Wh		

Reminder: Regarding to more detail and other information, please refer to user manual.

## 1.3 Support Equipment

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Printer	EPSON	C61	DoC
2	(USB) Mouse	Microsoft	1004	DoC
3	Identity Badge	-	-	-
4	Wireless AP (Remote Workstation)	ASUS	RT-AC66U	MSQ-RTAC66U
5	Bluetooth Headset (Remote Workstation)	Sony Ericsson	Z354	PY7DDA-2006

## 1.4 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 v03r01

## 1.5 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	
AC Conduction	CO04-HY	Zeus	22°C / 55%	
RF Conducted	TH01-HY	Ian	22.2°C / 60%	
Radiated Emission	03CH03-HY	Daniel	24.5°C / 56%	



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

## 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	RF Output Power (dBm)
v4.0 LE	1	1 Mbps	LE-1Mbps	5.36
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) Note 3: RF output power specifies that Maximum Peak Conducted Output Power.				

### 2.2 Test Channel Frequencies Configuration

Test Channel Frequencies Configuration	
Bluetooth Mode	Test Channel Frequencies (MHz)
LE	2402-(F1), 2440-(F2), 2480-(F3)

### 2.3 The Worst Case Power Setting Parameter

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

## 2.4 The Worst Case Measurement Configuration

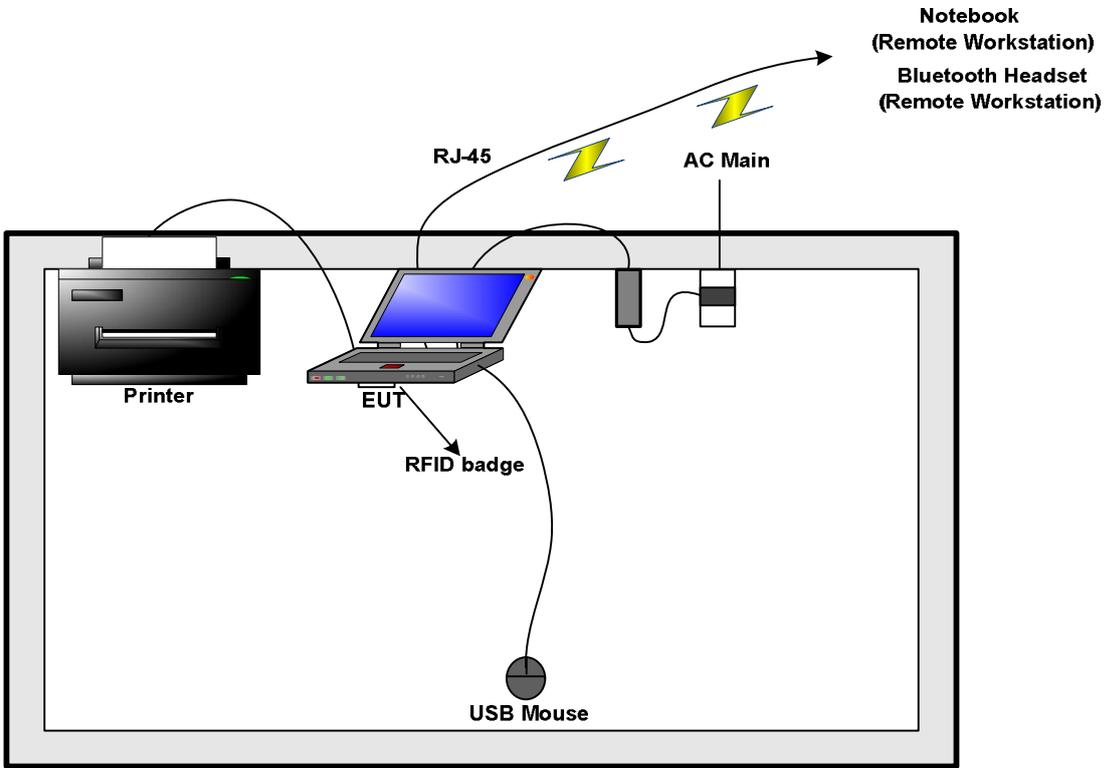
The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	AC power-line conducted emissions
<b>Condition</b>	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz
<b>Operating Mode</b>	Operating Mode Description
1	AC Power & Radio link

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

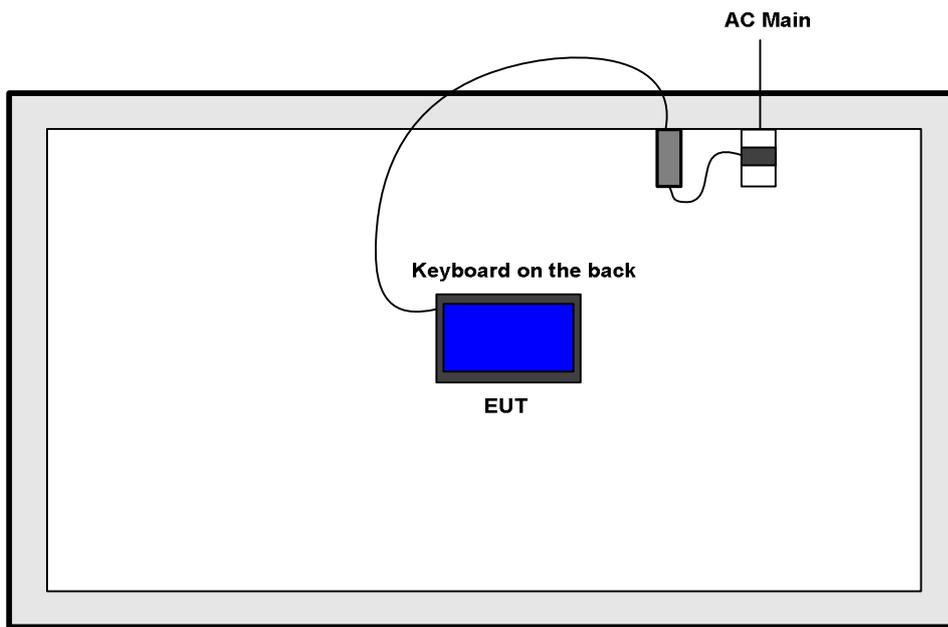
The Worst Case Mode for Following Conformance Tests			
<b>Tests Item</b>	Transmitter Radiated Bandedge Emissions Transmitter Radiated Unwanted Emissions		
<b>Test Condition</b>	Radiated measurement		
<b>User Position</b>	<input type="checkbox"/> EUT will be placed in fixed position.		
	<input checked="" type="checkbox"/> EUT will be placed in mobile position and operating multiple positions. EUT shall be performed three orthogonal planes. Below 1 GHz the worst planes is Z. Above 1 GHz the worst planes is X.		
	<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. AC Power & 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>
			



Test Setup Diagram - Radiated Below 1GHz Test



Test Setup Diagram - Radiated Above 1GHz Test



### 3 Transmitter Test Result

#### 3.1 AC Power-line Conducted Emissions

##### 3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	Quasi-Peak	Average
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50

Note 1: \* Decreases with the logarithm of the frequency.

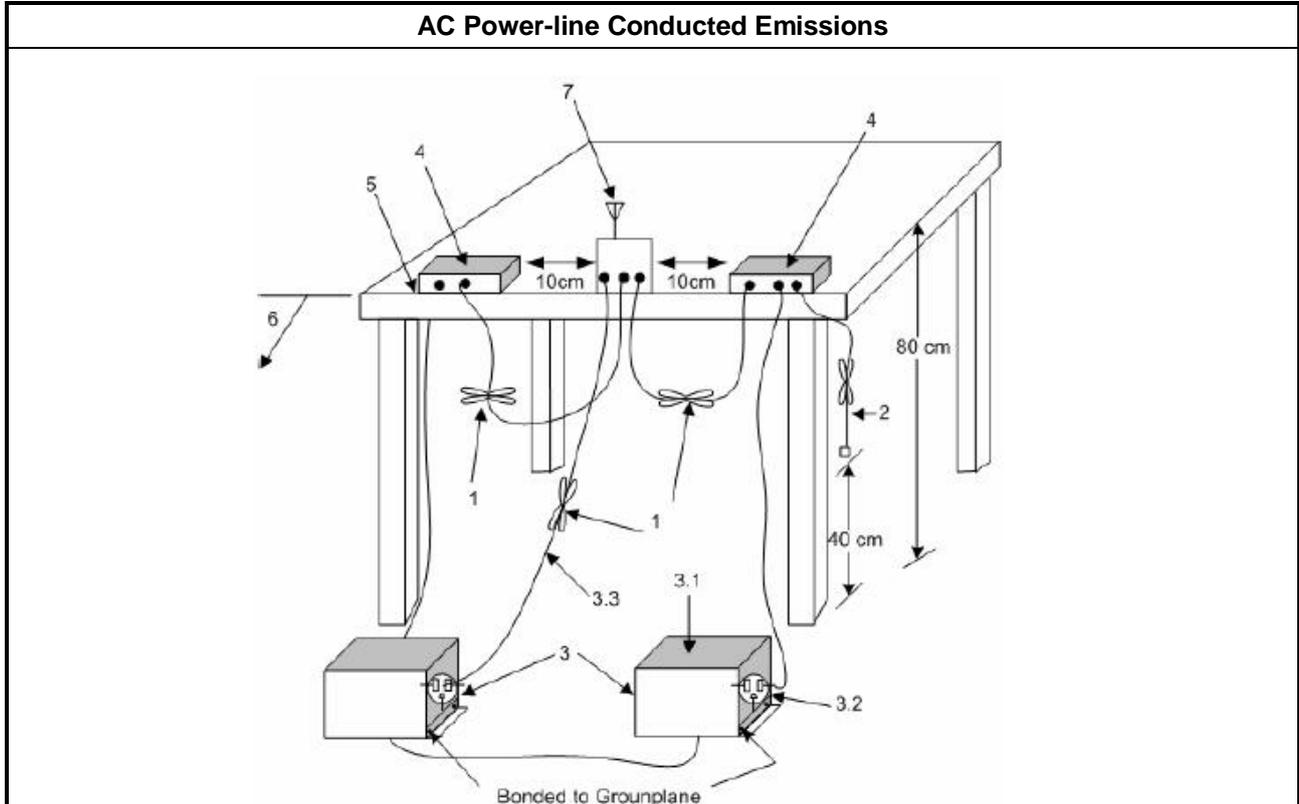
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

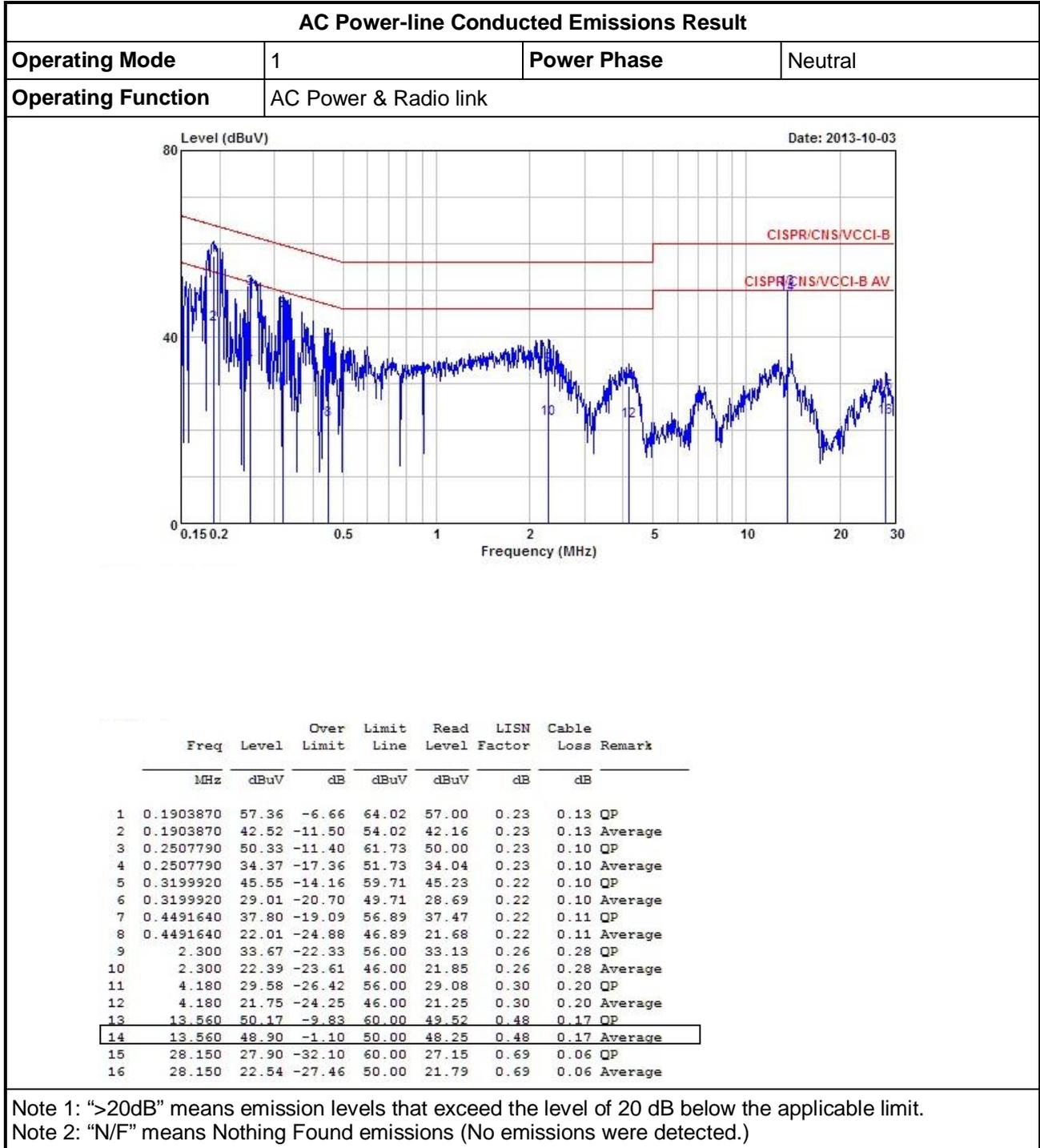
Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2009, clause 6.2 for AC power-line conducted emissions.

##### 3.1.4 Test Setup





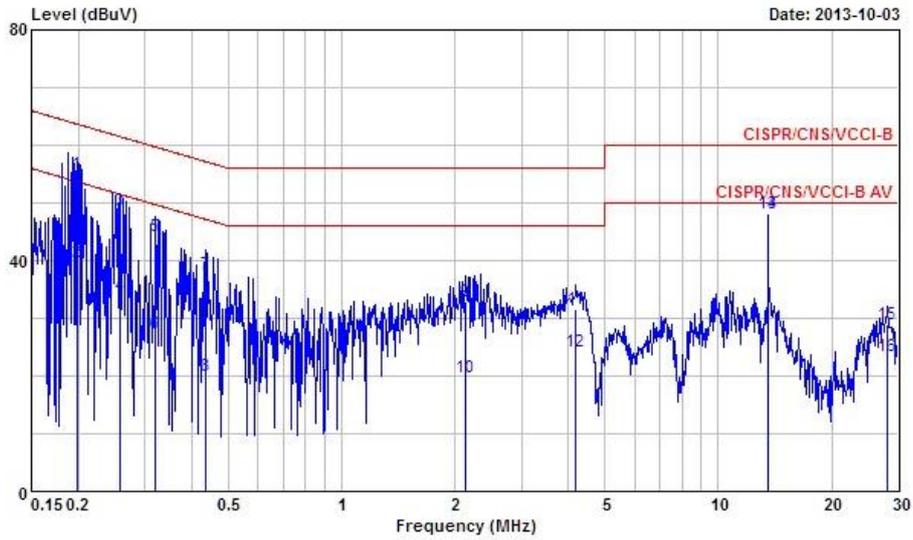
3.1.5 Test Result of AC Power-line Conducted Emissions





AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	AC Power & Radio link		



	Freq	Level	Over	Limit	Read	LISN	Cable	
	MHz	dBuV	Limit	Line	Level	Factor	Loss	Remark
			dB	dBuV	dBuV	dB	dB	
1	0.1986310	54.94	-8.73	63.67	54.73	0.11	0.10	QP
2	0.1986310	39.79	-13.88	53.67	39.58	0.11	0.10	Average
3	0.2575110	48.59	-12.92	61.51	48.38	0.11	0.10	QP
4	0.2575110	33.93	-17.58	51.51	33.72	0.11	0.10	Average
5	0.3199920	44.19	-15.52	59.71	43.99	0.10	0.10	QP
6	0.3199920	27.37	-22.34	49.71	27.17	0.10	0.10	Average
7	0.4351090	37.56	-19.59	57.15	37.35	0.10	0.11	QP
8	0.4351090	19.99	-27.16	47.15	19.78	0.10	0.11	Average
9	2.130	32.87	-23.13	56.00	32.45	0.13	0.29	QP
10	2.130	19.71	-26.29	46.00	19.29	0.13	0.29	Average
11	4.180	31.69	-24.31	56.00	31.34	0.15	0.20	QP
12	4.180	24.08	-21.92	46.00	23.73	0.15	0.20	Average
13	13.560	48.25	-11.75	60.00	47.81	0.27	0.17	QP
14	13.560	48.14	-1.86	50.00	47.70	0.27	0.17	Average
15	28.150	28.84	-31.16	60.00	28.42	0.36	0.06	QP
16	28.150	23.50	-26.50	50.00	23.08	0.36	0.06	Average

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.  
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

### 3.2 6dB Bandwidth

#### 3.2.1 6dB Bandwidth Limit

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

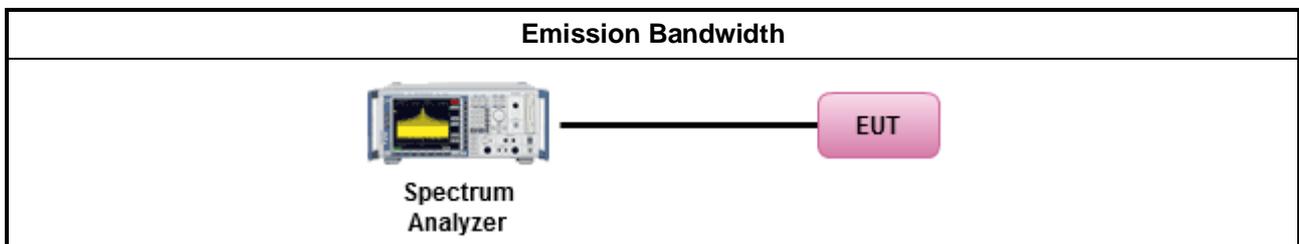
#### 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	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.

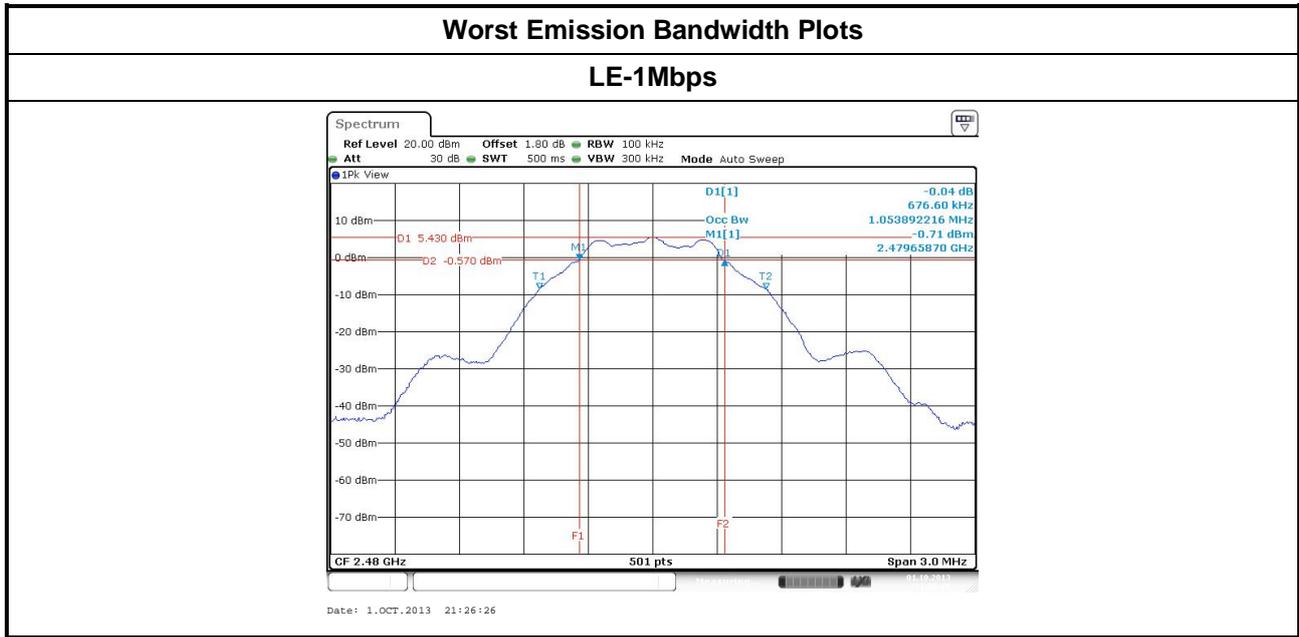
#### 3.2.4 Test Setup





3.2.5 Test Result of Emission Bandwidth

Emission Bandwidth Result			
Modulation Mode	Freq. (MHz)	99% Bandwidth (kHz)	6dB Bandwidth (kHz)
LE-1Mbps	2402	1053.8922	652.70
LE-1Mbps	2440	1053.8922	664.70
LE-1Mbps	2480	1053.8922	676.60
Limit		N/A	≥500 kHz
Result		Complied	



### 3.3 RF Output Power

#### 3.3.1 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.	

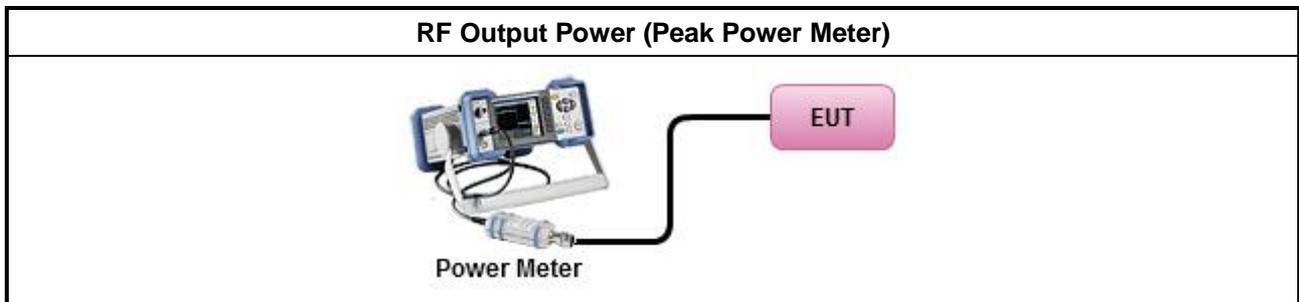
#### 3.3.2 Measuring Instruments

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

#### 3.3.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	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.

#### 3.3.4 Test Setup





### 3.3.5 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	3.76	30	0.16	3.92	36
LE-1Mbps	2440	4.87	30	0.16	5.03	36
LE-1Mbps	2480	5.36	30	0.16	5.52	36
Result		Complied				

### 3.3.6 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	1.69	0.76	2.45	0.16	2.61
LE-1Mbps	2440	2.85	0.76	3.61	0.16	3.77
LE-1Mbps	2480	3.31	0.76	4.07	0.16	4.23
Result		Complied				

### 3.4 Power Spectral Density

#### 3.4.1 Power Spectral Density Limit

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

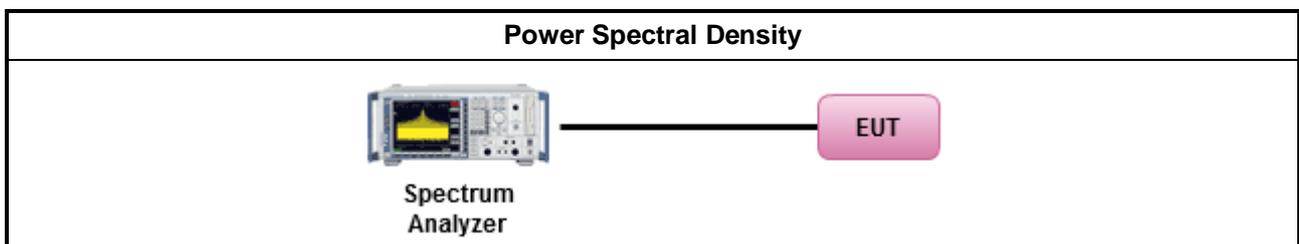
#### 3.4.2 Measuring Instruments

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

#### 3.4.3 Test Procedures

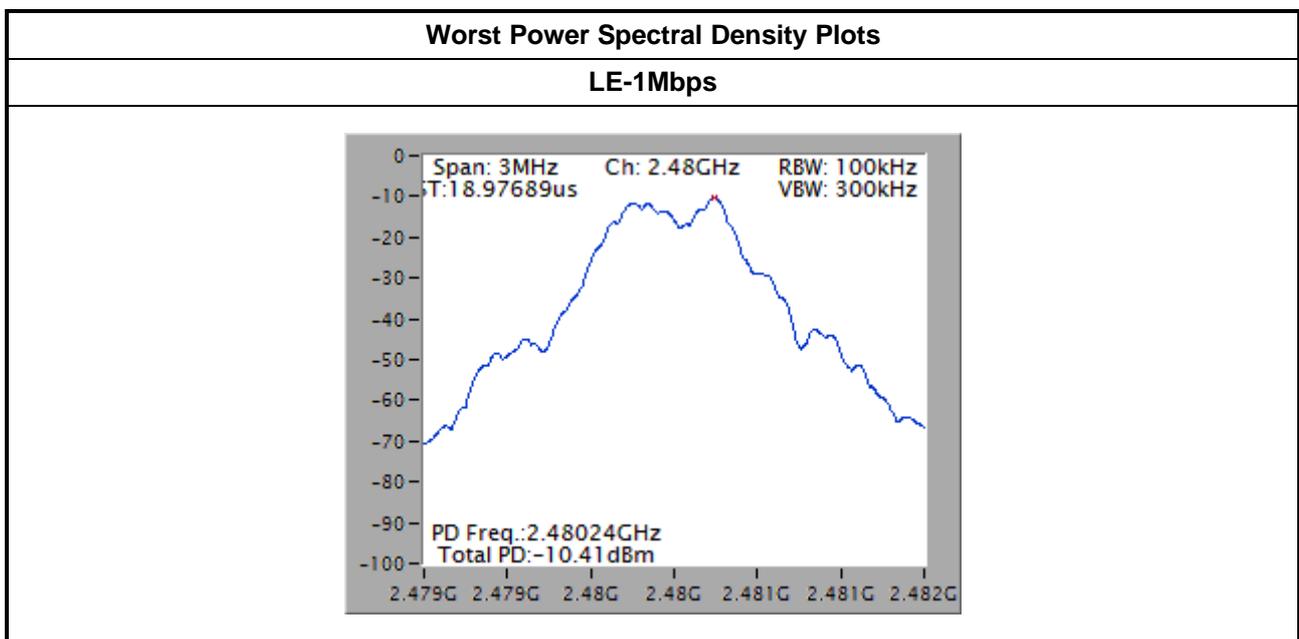
Test Method
<input checked="" type="checkbox"/> Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method 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 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.

#### 3.4.4 Test Setup



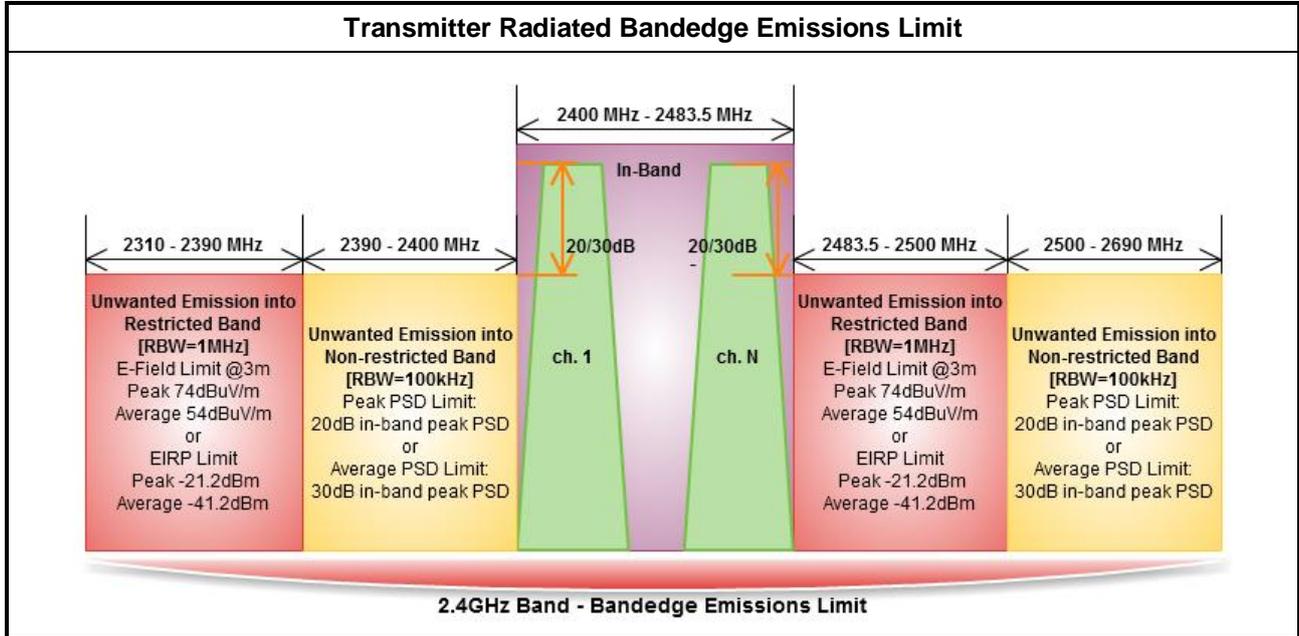
3.4.5 Test Result of Power Spectral Density

Power Spectral Density Result			
Modulation Mode	Freq. (MHz)	PSD (dBm/100kHz)	PSD Limit (dBm/3kHz)
LE-1Mbps	2402	-12.76	8
LE-1Mbps	2440	-10.49	8
LE-1Mbps	2480	-10.41	8
<b>Result</b>		<b>Complied</b>	



### 3.5 Transmitter Radiated Bandedge Emissions

#### 3.5.1 Transmitter Radiated Bandedge Emissions Limit



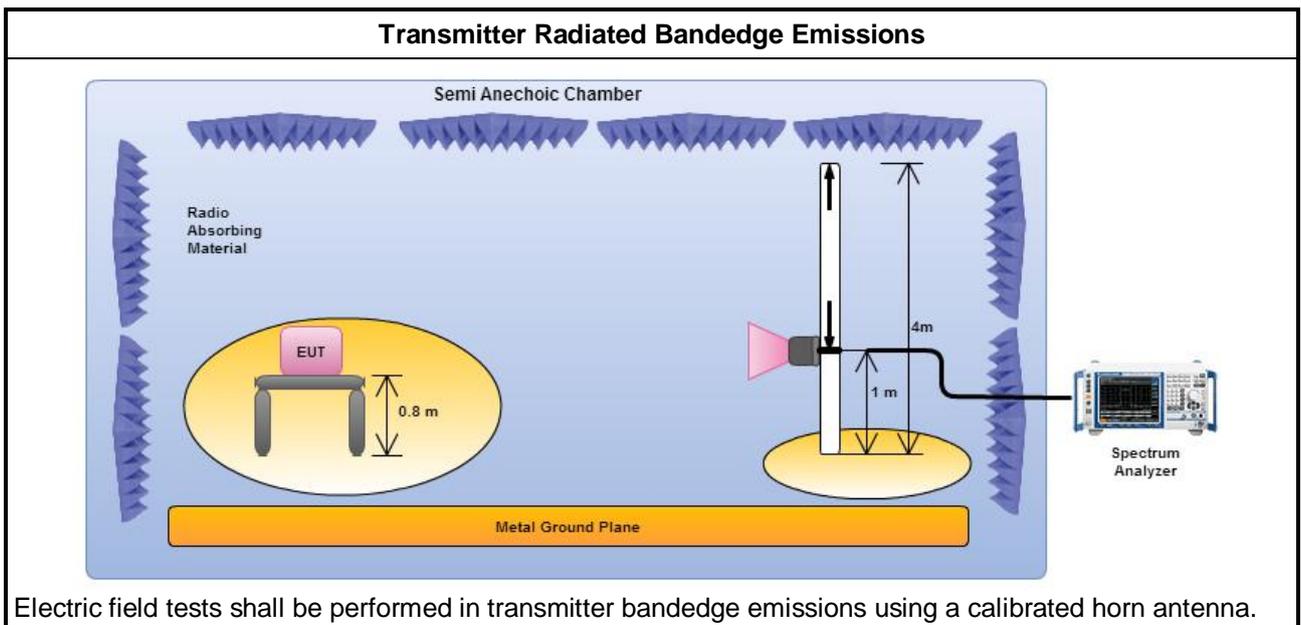
#### 3.5.2 Measuring Instruments

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

### 3.5.3 Test Procedures

Test Method	
<input checked="" type="checkbox"/>	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.

### 3.5.4 Test Setup





3.5.5 Test Result of Transmitter Radiated Bandedge Emissions

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Non-restricted Band)							
Modulation	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	2402	99.63	2394.66	57.33	42.30	20	V
LE-1Mbps	2480	100.96	2520.02	52.15	48.81	20	V

Note 1: Measurement worst emissions of receive antenna polarization

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)									
Modulation Mode	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	2402	3	2362.02	58.80	74	2362.02	50.19	54	V
LE-1Mbps	2480	3	2483.50	63.96	74	2483.50	46.21	54	V

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.

### 3.6 Transmitter Radiated Unwanted Emissions

#### 3.6.1 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.

#### 3.6.2 Measuring Instruments

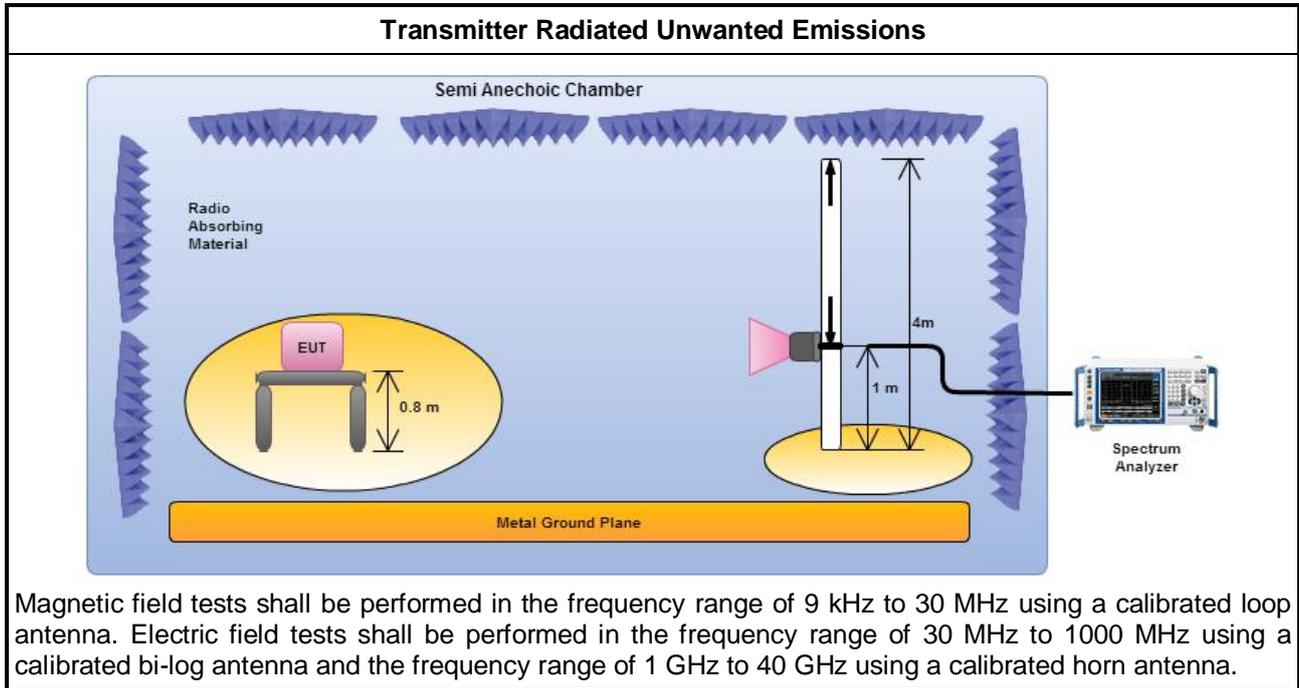
Refer a test equipment and calibration data table in this test report.



3.6.3 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 from below 30 MHz.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.5 for radiated emissions from 30 MHz to 1000 MHz.
<input checked="" type="checkbox"/>	Refer as ANSI C63.10, clause 6.6 for radiated emissions from above 1 GHz.
<input type="checkbox"/>	For conducted and cabinet radiation measurement, refer as FCC KDB 558074, clause 12.2.2.

### 3.6.4 Test Setup



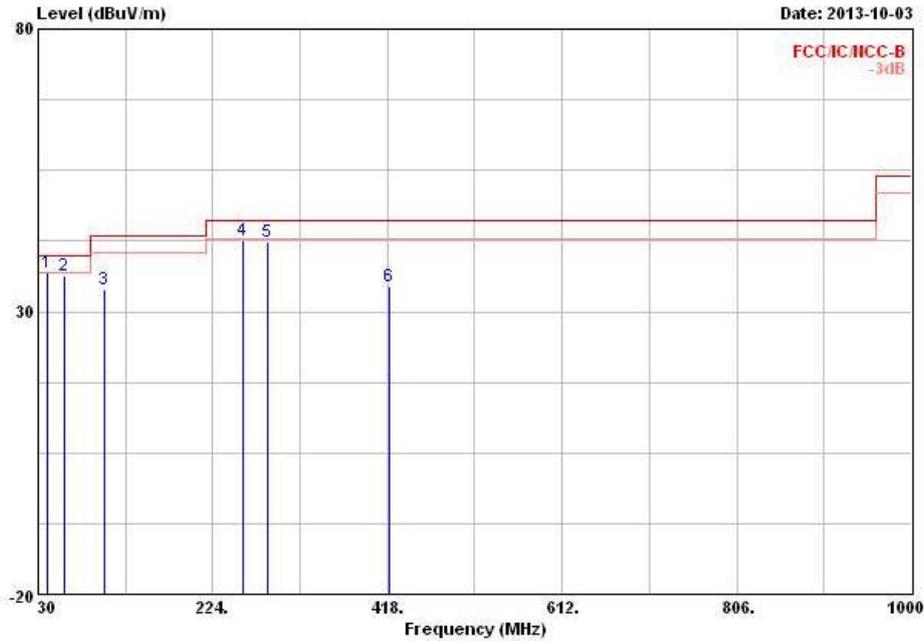
### 3.6.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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



3.6.6 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Transmitter Radiated Unwanted Emissions (Below 1GHz)			
Operating Mode	1	Polarization	V
Operating Function	AC Power & Radio link		



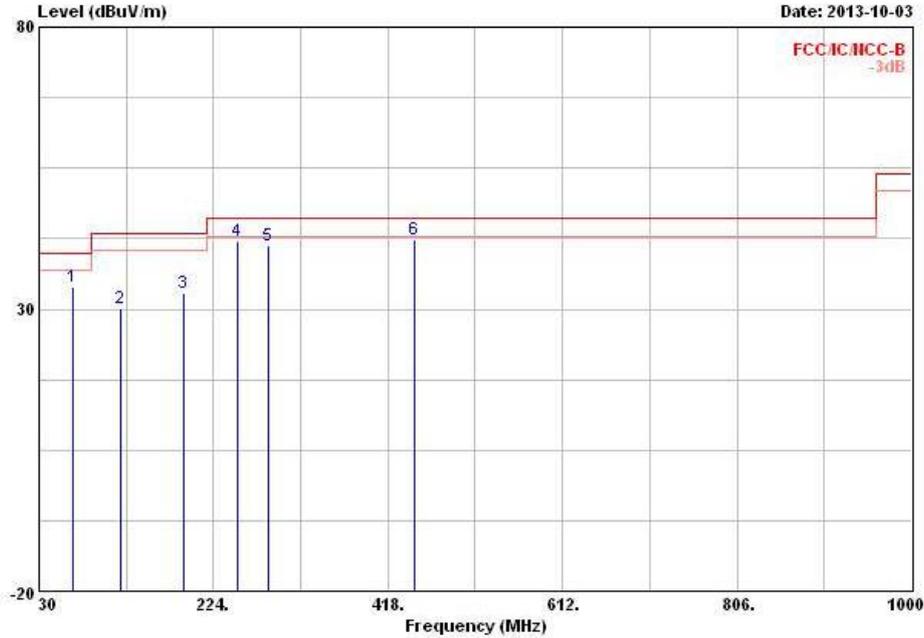
	Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	39.700	36.95	-3.05	40.00	50.56	13.08	0.91	27.60	Peak	---	---
2	59.100	36.48	-3.52	40.00	55.98	6.93	1.11	27.54	Peak	---	---
3	102.750	33.89	-9.61	43.50	48.40	11.38	1.48	27.37	Peak	---	---
4	256.980	42.64	-3.36	46.00	53.59	13.50	2.35	26.80	Peak	---	---
5	284.140	42.40	-3.60	46.00	53.71	12.90	2.49	26.70	Peak	---	---
6	419.940	34.53	-11.47	46.00	42.45	16.48	3.05	27.45	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)



Transmitter Radiated Unwanted Emissions (Below 1GHz)

Operating Mode	1	Polarization	H
Operating Function	AC Power & Radio link		



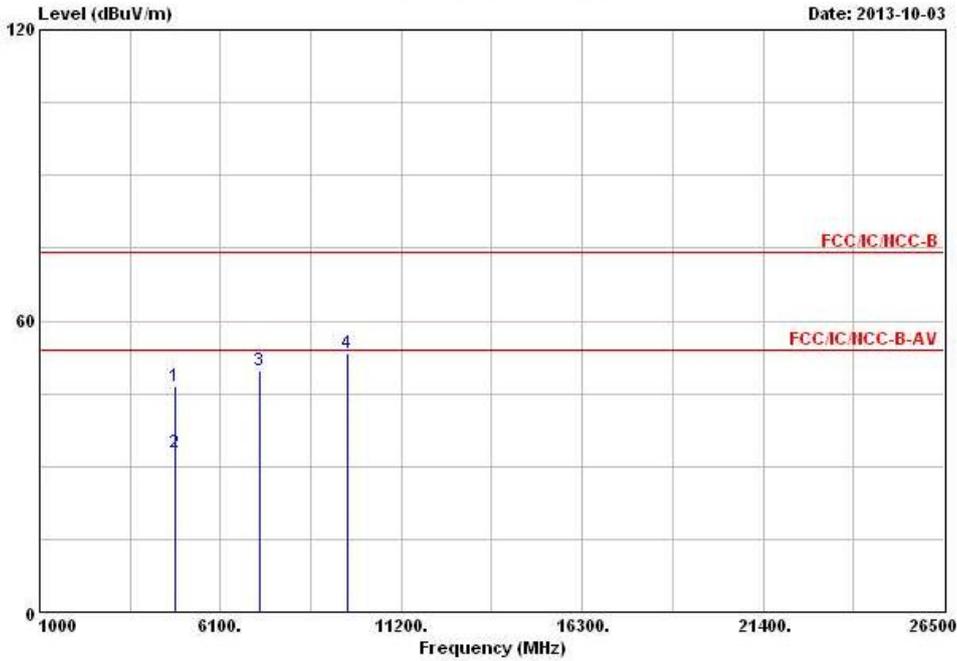
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	66.860	34.01	-5.99	40.00	53.75	6.62	1.15	27.51	Peak	---	---
2	121.180	30.26	-13.24	43.50	43.36	12.56	1.64	27.30	Peak	---	---
3	191.020	32.86	-10.64	43.50	48.74	9.13	2.02	27.03	Peak	---	---
4	250.190	42.09	-3.91	46.00	53.88	12.73	2.31	26.83	QP	---	---
5	284.140	41.31	-4.69	46.00	52.62	12.90	2.49	26.70	QP	---	---
6	447.100	42.24	-3.76	46.00	50.25	16.41	3.17	27.59	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)



3.6.7 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	Test Freq. (FX)	F1
Operating Function	Transmit	Polarization	V

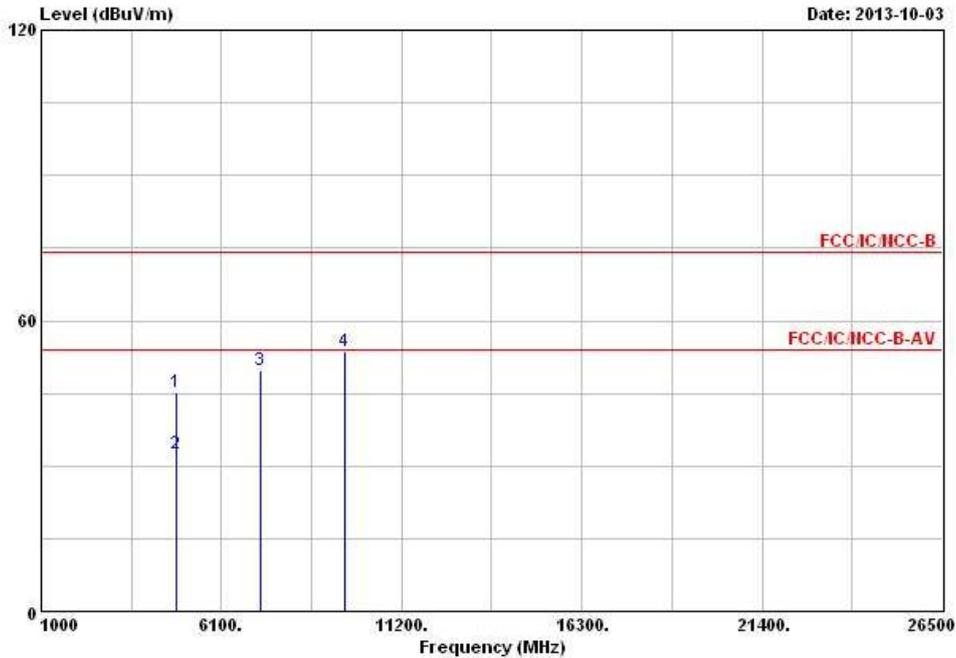


	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg
1	4804.000	46.62	-27.38	74.00	42.09	33.06	3.91	32.44	Peak	---	---
2	4804.000	32.81	-21.19	54.00	28.28	33.06	3.91	32.44	Average	---	---
3	7206.000	49.72			42.27	35.80	4.29	32.64	Peak	---	---
4	9680.000	53.36			42.53	38.42	5.50	33.09	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.  
 Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.



Transmitter Radiated Unwanted Emissions (Above 1GHz)			
Modulation Mode	LE-1Mbps	Test Freq. (FX)	F1
Operating Function	Transmit	Polarization	H



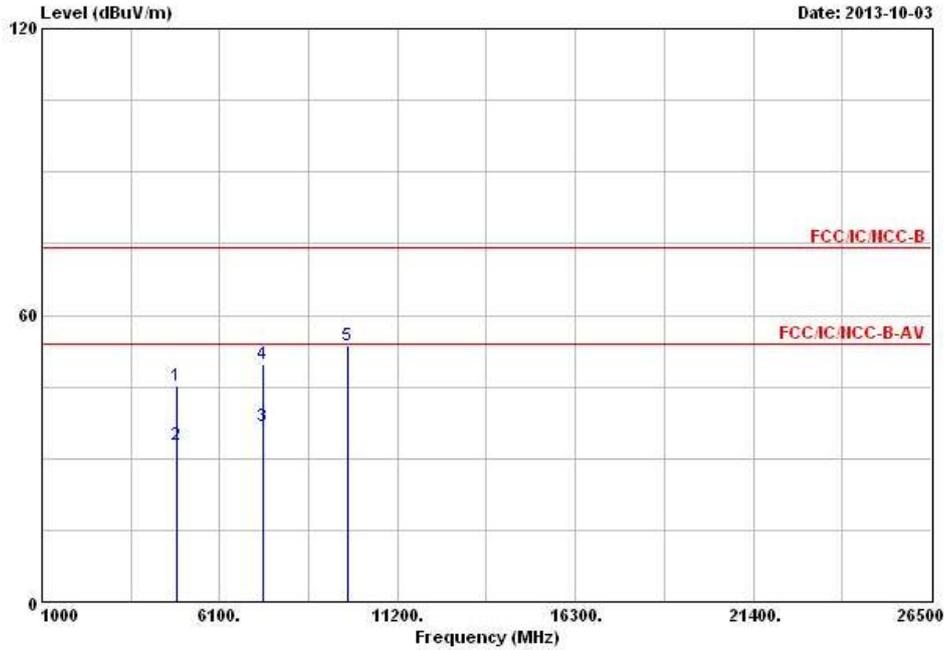
	Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
	MHz	dBUV/m	dB	dBUV/m	dBuV	dB/m	dB	dB		cm	deg
1	4804.000	45.32	-28.68	74.00	40.79	33.06	3.91	32.44	Peak	---	---
2	4804.000	32.55	-21.45	54.00	28.02	33.06	3.91	32.44	Average	---	---
3	7206.000	49.60			42.15	35.80	4.29	32.64	Peak	---	---
4	9608.000	53.75			43.09	38.23	5.53	33.10	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.
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	LE-1Mbps	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	V



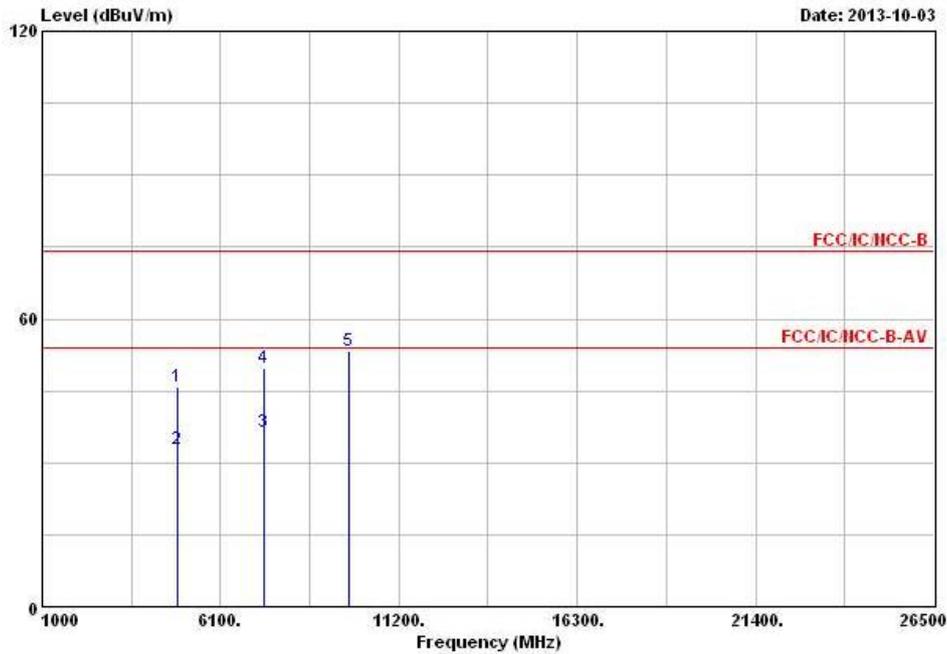
Freq	Level	Over Limit	Limit Line	ReadAntenna Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4880.000	45.17	-28.83	74.00	40.47	33.18	3.94	32.42	Peak	---	---
2	4880.000	32.86	-21.14	54.00	28.16	33.18	3.94	32.42	Average	---	---
3	7320.000	36.64	-17.36	54.00	28.99	36.09	4.23	32.67	Average	---	---
4	7320.000	49.63	-24.37	74.00	41.98	36.09	4.23	32.67	Peak	---	---
5	9760.000	53.56			42.60	38.57	5.47	33.08	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.
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	LE-1Mbps	Test Freq. (FX)	F2
Operating Function	Transmit	Polarization	H



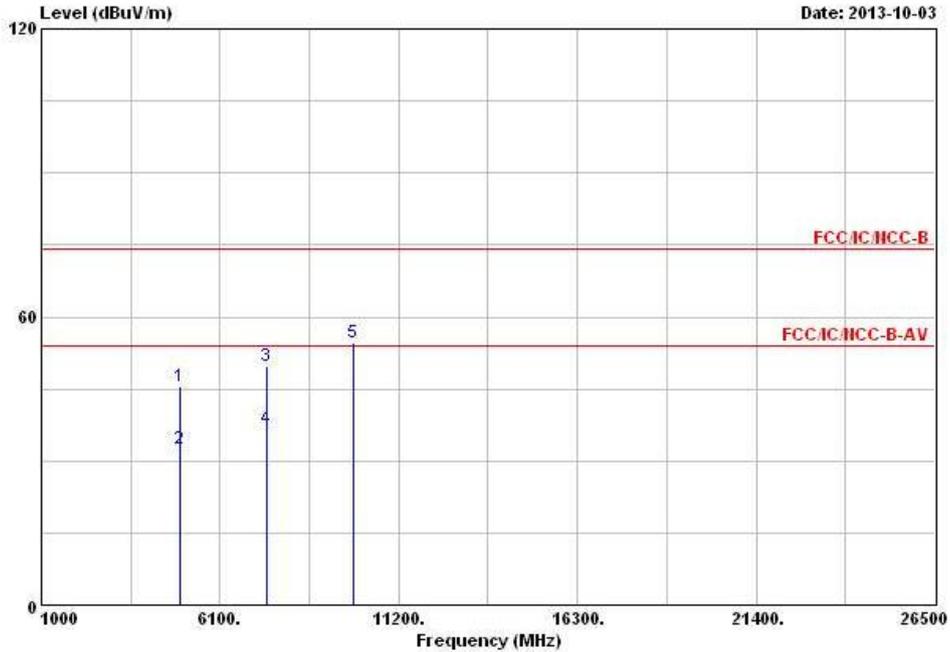
Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos	
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg	
1	4880.000	45.79	-28.21	74.00	41.09	33.18	3.94	32.42	Peak	---	---
2	4880.000	32.83	-21.17	54.00	28.13	33.18	3.94	32.42	Average	---	---
3	7320.000	36.48	-17.52	54.00	28.83	36.09	4.23	32.67	Average	---	---
4	7320.000	49.67	-24.33	74.00	42.02	36.09	4.23	32.67	Peak	---	---
5	9760.000	53.29			42.33	38.57	5.47	33.08	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.
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	LE-1Mbps	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	V



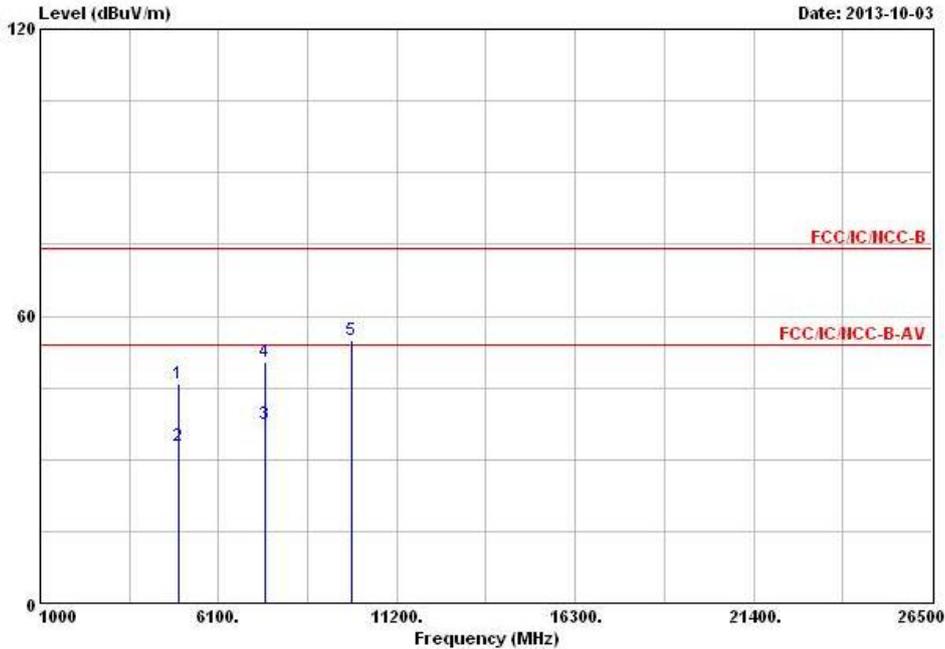
Freq	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Remark	Ant Pos	Table Pos
MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	dB	dB		cm	deg
1	4960.000	45.61 -28.39	74.00	40.67	33.34	4.01	32.41	Peak	---	---
2	4960.000	32.67 -21.33	54.00	27.73	33.34	4.01	32.41	Average	---	---
3	7440.000	49.72 -24.28	74.00	41.88	36.38	4.17	32.71	Peak	---	---
4	7440.000	36.89 -17.11	54.00	29.05	36.38	4.17	32.71	Average	---	---
5	9920.000	54.69		43.40	38.95	5.41	33.07	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.
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.



Transmitter Radiated Unwanted Emissions (Above 1GHz)

Modulation Mode	LE-1Mbps	Test Freq. (FX)	F3
Operating Function	Transmit	Polarization	H



Date: 2013-10-03

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	45.71	-28.29	74.00	40.77	33.34	4.01	32.41 Peak	---	---
2	4960.000	32.75	-21.25	54.00	27.81	33.34	4.01	32.41 Average	---	---
3	7440.000	37.25	-16.75	54.00	29.41	36.38	4.17	32.71 Average	---	---
4	7440.000	50.48	-23.52	74.00	42.64	36.38	4.17	32.71 Peak	---	---
5	9920.000	54.87			43.58	38.95	5.41	33.07 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.
- Note 5: Average emission setting: RBW=1MHz; VBW ≥ 1/T, where T is "Pulse On Time", e.g., LE VBW≥1/625us, VBW=3kHz.



## 4 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMC Receiver	R&S	ESCS 30	100174	9kHz ~ 2.75GHz	Mar. 26, 2013	Conduction (CO04-HY)
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	Jan. 21, 2013	Conduction (CO04-HY)
LISN (Support Unit)	EMCO	3810/2NM	9703-1839	9kHz ~ 30MHz	Apr. 18, 2013	Conduction (CO04-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	7.61183201e+012	9kHz ~ 30MHz	Nov. 09, 2012	Conduction (CO04-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	FSV 40	101013	9KHz ~ 40GHz	Jan. 29, 2013	Conducted (TH01-HY)
AC Power Source	G.W	APS-9102	EL920581	AC 0V ~ 300V	Jul. 16, 2013	Conducted (TH01-HY)
Temp. and Humidity Chamber	Giant Force	GTH-225-20-SP-SD	MAA1112-007	-20 ~ 100°C	Nov. 21, 2012	Conducted (TH01-HY)
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	Feb. 02, 2013	Conducted (TH01-HY)
RF Cable-2m	HUBER+SUHNER	SUCOFLEX_104	SN 345675/4	1GHz ~ 26.5GHz	Dec. 04, 2012	Conducted (TH01-HY)
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_103	10712/4	1GHz ~ 33GHz	Dec. 04, 2012	Conducted (TH01-HY)

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



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	Dec. 01, 2012	Radiation (03CH03-HY)
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	May. 03, 2013	Radiation (03CH03-HY)
Amplifier	Agilent	8449B	3008A02364	1GHz ~ 26.5GHz	May. 06, 2013	Radiation (03CH03-HY)
Receiver	R&S	ESU26	1302.6005.26	20Hz ~ 26.5GHz	Apr. 02, 2013	Radiation (03CH03-HY)
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	Sep. 21, 2013	Radiation (03CH03-HY)
Horn Antenna	EMCO	3115	6741	1GHz ~ 18GHz	May 31, 2013	Radiation (03CH03-HY)
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz ~ 40GHz	Jan. 08, 2013	Radiation (03CH03-HY)
RF Cable-R03m	Jye Bao	RG142	CB021	9MHz ~ 1GHz	Jan. 17, 2013	Radiation (03CH03-HY)
RF Cable-high	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz ~ 40GHz	Jan. 17, 2013	Radiation (03CH03-HY)
Turn Table	EM Electronics	EM Electronics	060615	0 ~ 360 degree	N/A	Radiation (03CH03-HY)
Antenna Mast	MF	MF-7802	MF780208179	1 ~ 4 m	N/A	Radiation (03CH03-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	9 kHz ~ 30 MHz	Dec. 02, 2012	Radiation (03CH03-HY)

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