

# FCC Test Report

Equipment	:	Rugged Tablet Computer
Brand Name	:	AAEON
Model No.	:	xRTC-700Bx (x - Where x may be any combination of alphanumeric characters or "-"or blank.)
FCC ID	:	OHBRTC700BWBGH
Standard	:	47 CFR FCC Part 15.247
Frequency	:	2400 MHz – 2483.5 MHz
FCC Classification	:	DTS
Function	:	🛛 Point-to-multipoint; 🗌 Point-to-point
Applicant / Manufacturer	:	<b>AAEON Technology Inc.</b> 5F, No. 135, Lane 235, Pao Chiao Rd.,Taipei, Taiwan

The product sample received on Jul. 29, 2016 and completely tested on Aug. 18, 2016. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 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:** 

Kevin Liang / Assistant Manager





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Appendix F. Test Photos

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# Summary of Test Result

Conformance Test Specifications									
ReportRef. Std.ClauseDescription			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]: 0.1515980MHz 49.45 (Margin 16.46dB) - QP 31.93 (Margin 23.98dB) - AV	0.1515980MHz FCC 15.207 Margin 16.46dB) - QP Margin 23.98dB) - AV					
3.2	15.247(a)	DTS Bandwidth	Refer as Appendix A	≥500kHz	Complied				
3.3	15.247(b)	Fundamental Emission Output Power	Refer as Appendix B	Power [dBm]:30	Complied				
3.4	15.247(e)	Power Spectral Density	Refer as Appendix C	PSD [dBm/3kHz]:8	Complied				
3.5	15.247(d)	Test Result of Transmitter Radiated Bandedge Emissions	Non-Restricted Bands: 2501.120 MHz: 43.13 dB Restricted Bands [dBuV/m at 3m]: 2498.080 MHz 60.84 (Margin 13.16 dB) - PK 2492.800 MHz 48.25 (Margin 5.75 dB) - AV	Non-Restricted Bands:> 20 dBc Bands: FCC 15.209	Complied				
3.6	15.247(d)	Transmitter Radiated Unwanted Emissions	Restricted Bands [dBuV/m at 3m]: 934.040 MHz 40.55 (Margin 5.45dB)	Non-Restricted Bands:> 20 dBc Restricted Bands: FCC 15.209	Complied				





# **Revision History**

Report No.	Version	Description	Issued Date
FR671417AL	Rev. 01	Initial issue of report	Sep. 09, 2016



# **1** General Description

### 1.1 Information

#### 1.1.1 RF General Information

Band	Mode	BWch (MHz)	Channel Namber	Nss-Min	Nant
2.4G	BT-LE	1	0-39 [40]	1	1

Note:

- 2.4G is the 2.4GHz Band (2.4-2.4835GHz).
- Bluetooth LE (Low Energy) using GFSK modulation for DTS digital modulation.
- BWch is the nominal channel bandwidth.
- Nss-Min is the minimum number of spatial streams.
- Nant is the number of outputs.

#### 1.1.2 Antenna Information

	Antenna Category									
$\boxtimes$	Inte	Integral antenna (antenna permanently attached)								
		Temporary RF connector provided								
	$\boxtimes$	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.								
	Exte	ernal antenna (dedicated antennas)								
		Single power level with corresponding antenna(s).								
		Multiple power level and corresponding antenna(s).								
		RF connector provided								

Antenna General Information							
No.	No. Ant. Cat. Ant. Type Gain (dBi)						
1	Integral	Dipole	3				



### 1.1.3 Type of EUT

	Identify EUT					
EUT	Serial Number	N/A				
Pres	sentation of Equipment	Production ; D Pre-Production ; Prototype				
		Type of EUT				
$\boxtimes$	Stand-alone					
	Combined (EUT where the radio part is fully integrated within another device)					
	Combined Equipment - Brand Name / Model No.:					
	Plug-in radio (EUT intended for a variety of host systems)					
	Host System - Brand Name / Model No.:					
	Other:					

#### 1.1.4 Mode Test Duty Cycle

	Operated Mode for Worst Duty Cycle						
$\boxtimes$	Operated test mode for worst duty cycle						
	Test Signal Duty Cycle (x)	Power Duty Factor [dB] – (10 log 1/x)					
$\boxtimes$	62.6% - test mode single channel – LE	2.03					

#### 1.1.5 EUT Operational Condition

Supply Voltage	$\square$	AC mains	$\square$	DC		
Type of DC Source	$\boxtimes$	External AC adapter		From Host System	$\square$	Battery

#### 1.1.6 EUT Operate Information

Items	Description				
Communication Mode		IP Based (Load Based)		Frame Based	
Beamforming Function		With beamforming	$\boxtimes$	Without beamforming	
Operate Condition		Indoor		Outdoor	
		Fixed P2P	$\boxtimes$	Portable Client	
Operate Mode	$\square$	Client			



## **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 C63.10-2013
- KDB 558074 D01 v03r05

# **1.3 Testing Location Information**

	Testing Location									
$\boxtimes$	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan District, Tao Yuan City, Taiwan, R.O.C.								
	TEL : 886-3-327-3456 FAX : 886-3-327-6973									
Test Condition Test Site No. Test Engineer Test Environment Test Date						Test Date				
AC Conduction				CO04-HY	Ryan	25°C / 52%	16/08/2016			
RF Conducted TH01-HY			TH01-HY	Howard	25°C / 65%	18/08/2016				
Radiated         03CH03-HY         Jeff         21.5°C / 58%         18/08/201						18/08/2016				

Test site registered number [ 553509 ] with FCC.



# **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	Test Item			
AC power-line conducted emissions		±2.3 dB		
Emission bandwidth, 6dB bandwidth		±0.6 %		
RF output power, conducted		±0.1 dB		
Power density, conducted		±0.6 dB		
Unwanted emissions, conducted	9 – 150 kHz	±0.4 dB		
	0.15 – 30 MHz	±0.4 dB		
	30 – 1000 MHz	±0.6 dB		
	1 – 18 GHz	±0.5 dB		
	18 – 40 GHz	±0.5 dB		
	40 – 200 GHz	N/A		
All emissions, radiated	9 – 150 kHz	±2.5 dB		
	0.15 – 30 MHz	±2.3 dB		
	30 – 1000 MHz	±2.6 dB		
	1 – 18 GHz	±3.6 dB		
	18 – 40 GHz	±3.8 dB		
	40 – 200 GHz	N/A		
Temperature		±0.8 °C		
Humidity		±5 %		
DC and low frequency voltages		±0.9%		
Time		±1.4 %		
Duty Cycle		±0.6 %		

Default



#### **Test Configuration of EUT** 2

#### 2.1 The Worst Case Modulation Configuration

Worst Modulation Used for Conformance Testing						
Bluetooth Version	Transmit Chains ( $N_{TX}$ )	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 **Test Channel Mode**

LE

Test Software Version				V	Vin8DUTAp	p/1.0.01	6
Band	Mode	BWch (MHz)	Nss-Min	Nant	Ch. (MHz)	Range	Power Setting
2.4G	LE	1	1	1	2402	L	Default
2.4G	LE	1	1	1	2440	М	Default

1

2480

Н

1

#### **Abbreviation Explanation**

2.4G

Band	Mode	BWch (MHz)	Nss-Min	Nant	Ch. (MHz)	Range	Test Cond.	Abbreviation
2.4G	BT-LE	1	1	1	2402	L	TN,VN	2.4G;BT-LE;1;1;1;2480;TN,VN

Note:

٠

1

- Test range channel consist of L (Low Ch.), M (Middle Ch.), H (High Ch.), S (Single Ch). Test range temperature consist of L (Low Temp.), N (Normal Temp.), H(High Temp.) ٠
- Test range Voltage consist of L (Low Voltage.), N (Normal Voltage), H(High .Voltage).



# 2.3 The Worst Case Measurement Configuration

Th	The Worst Case Mode for Following Conformance Tests				
Tests Item	AC power-line conducted e	emissions			
Condition	AC power-line conducted measurement for line and neutral Test Voltage: 120Vac / 60Hz				
Operating Mode	Operating Mode Description				
1	Adapter Mode				
	X Plane	Y Plane	Z Plane		
Orthogonal Planes of EUT					
Worst Planes of EUT			V		

The Worst Case Mode for Following Conformance Tests				
Tests Item	DTS Bandwidth, Fundamental Emission Output Power, Power Spectral Density, Emissions in Non-restricted Frequency Bands			
Test Condition	Conducted measurement at transmit chains			

Th	The Worst Case Mode for Following Conformance Tests				
Tests Item	Emissions in Restricted Fr	equency Bands			
Test Condition	Radiated measurement				
	EUT will be placed in	fixed position.			
User Position	EUT will be placed in	mobile position and operati	ng multiple positions.		
	EUT will be a hand-held or body-worn battery-powered devices and operating multiple positions.				
Operating Mode < 1GHz	🛛 1. Adapter Mode				
	X Plane	Y Plane	Z Plane		
Orthogonal Planes of EUT					
Worst Planes of EUT	V				



# 2.4 Accessories and Support Equipment

	Accessories						
	Brand Name	FSP	Model Name	FSP036-RBBN2			
AC Adapter	Power Rating	I/P: 100 - 240 Vac, 1	.2 A, O/P: 12 V	dc, 3 A			
	Power Cord	1.2 meter, non-shielded	1.2 meter, non-shielded cable, with one ferrite core				
	Brand Name	Getac	Model Name	RTC600S			
Battery 1	Power Rating	7.4 Vdc, 1530 mAh	Туре	Li-ion, 2S1P			
Pottory 2	Brand Name	Getac	Model Name	RTC600H			
Dattery 2	Power Rating	7.4Vdc, 1530 mAh	Туре	Li-ion, 2S1P			
LCD Panel	Brand Name	INNOLUX	Model Name	N070ICG-LD1			

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

	Support Equipment –AC Conduction and Radiated Emission					
No.	o. Equipment Brand Name Model Name FCC ID					
1	-	-	-	_		

	Support Equipment - RF Conducted					
No.	No. Equipment Brand Name Model Name FCC ID					
1	Notebook	DELL	E6400	DoC		
2	AC Adapter for Notebook	DELL	HA65NM130	DoC		



### 2.5 Test Setup Diagram







#### **Transmitter Test Result** 3

#### 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				

ecreases 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** 

Refer as ANSI C63.10-2013, 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

Refer as Appendix I



### 3.2 DTS Bandwidth

#### 3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit

#### Systems using digital modulation techniques:

• 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
-	For the emission bandwidth shall be measured using one of the options below:
	Refer as KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
	Refer as KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
	Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.

#### 3.2.4 Test Setup



### 3.2.5 Test Result of Emission Bandwidth

Refer as Appendix A



# 3.3 Fundamental Emission Output Power

#### 3.3.1 Fundamental Emission Output Power Limit

#### Maximum Peak Conducted Output Power or Maximum Conducted Output Power Limit

•	• 2400-2483.5 MHz Band:								
	• If $G_{TX} \le 6$ dBi, then $P_{Out} \le 30$ dBm (1 W)								
	•	Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)$ dBm							
	•	• Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm							
	•	Smart antenna system (SAS):							
		- Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm							
		- Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 - (G_{TX} - 6)/3$ dBm							
		- Aggregate power on all beams: If $G_{TX} > 6 \text{ dBi}$ , then $P_{Out} = 30 - (G_{TX} - 6)/3 + 8 \text{dBm}$							
e.i.r.	e.i.r.p. Power Limit:								
•	2400	0-2483.5 MHz Band							
	•	Point-to-multipoint systems (P2M): $P_{eirp} \le 36 \text{ dBm} (4 \text{ W})$							
	•	Point-to-point systems (P2P): $P_{eirp} \le MAX(36, [P_{Out} + G_{TX}]) dBm$							
	•	Smart antenna system (SAS)							
		<ul> <li>Single beam: P<sub>eirp</sub> ≤ MAX(36, P<sub>Out</sub> + G<sub>TX</sub>) dBm</li> </ul>							
	- Overlap beam: $P_{eirp} \le MAX(36, P_{Out} + G_{TX}) dBm$								
	- Aggregate power on all beams: $P_{eirp} \le MAX(36, [P_{Out} + G_{TX} + 8]) dBm$								
P <sub>Out</sub> G <sub>TX</sub> P <sub>eirp</sub>	$P_{out}$ = 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
•	Maximum Peak Conducted Output Power
	Refer as KDB 558074, clause 9.1.1 Option 1 (RBW ≥ EBW method).
	Refer as KDB 558074, clause 9.1.2 Option 2 (peak power meter for VBW ≥ DTS BW)
•	Maximum Conducted Output Power
	[duty cycle ≥ 98% or external video / power trigger]
	Refer as KDB 558074, clause 9.2.2.2 Method AVGSA-2 (spectral trace averaging).
	Refer as KDB 558074, clause 9.2.2.3 Method AVGSA-2 Alt. (slow sweep speed)
	duty cycle < 98% and average over on/off periods with duty factor
	Refer as KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
	Refer as KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
	RF power meter and average over on/off periods with duty factor or gated trigger
	Refer as KDB 558074, clause 9.2.3 Method AVGPM (using an RF average power meter).
•	For conducted measurement.
	<ul> <li>If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.</li> </ul>
	<ul> <li>If multiple transmit chains, EIRP calculation could be following as methods:</li> <li>P<sub>total</sub> = P<sub>1</sub> + P<sub>2</sub> + + P<sub>n</sub> (calculated in linear unit [mW] and transfer to log unit [dBm])</li> <li>EIRP<sub>total</sub> = P<sub>total</sub> + DG</li> </ul>



### 3.3.4 Test Setup



### 3.3.5 Test Result of Maximum Peak Conducted Output Power

Refer as Appendix B

### 3.3.6 Test Result of Maximum Average Conducted Output Power

Refer as Appendix B



#### **Power Spectral Density** 3.4

#### 3.4.1 **Power Spectral Density Limit**

**Power Spectral Density Limit** 

Power Spectral Density (PSD) ≤ 8 dBm/3kHz •

#### **Measuring Instruments** 3.4.2

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

#### 3.4.3 Test Procedures

	Test Method					
	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).					
	Refer as KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz; Detector=peak).					
	[duty cycle ≥ 98% or external video / power trigger]					
	Refer as KDB 558074, clause 10.3 Method AVGPSD-2 (spectral trace averaging).					
	Refer as KDB 558074, clause 10.4 Method AVGPSD-2 (slow sweep speed)					
	duty cycle < 98% and average over on/off periods with duty factor					
	Refer as KDB 558074, clause 10.5 Method AVGPSD-2 Alt (spectral trace averaging).					
	Refer as KDB 558074, clause 10.6 Method AVGPSD-2 Alt. (slow sweep speed)					
•	For conducted measurement.					
	<ul> <li>If The EUT supports multiple transmit chains using options given below:</li> </ul>					
	○ Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the N <sub>TX</sub> output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.					
	Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,					
	Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.					



### 3.4.4 Test Setup



### 3.4.5 Test Result of Power Spectral Density

Refer as Appendix C



# 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						
$\boxtimes$	The average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].							
$\boxtimes$	Refer as ANSI C63.10, clause 6.10 bandedge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.							
$\boxtimes$	For	the transmitter unwanted emissions shall be measured using following options below:						
	$\boxtimes$	Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.						
	$\square$	Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.						
		Refer as KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)						
		Refer as KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).						
	Refer as KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).							
		□ Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). VBW ≥ 1/T, where T is pulse time.						
		Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.						
		Refer as KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.						
$\boxtimes$	For	the transmitter bandedge emissions shall be measured using following options below:						
		Refer as KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).						
	$\boxtimes$	Refer as ANSI C63.10, clause 6.10 for band-edge testing.						
		Refer as ANSI C63.10, clause 6.10.6.2 for marker-delta method for band-edge measurements.						
	For dista	radiated measurement, refer as KDB 558074, clause 12.2.7 and ANSI C63.10, clause 6.6. Test ance is 3m.						

### 3.5.4 Test Setup





### 3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix D



# 3.6 Transmitter Radiated Unwanted Emissions

#### 3.6.1 Transmitter in 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				
<ul> <li>Note 1: If the peak output power procedure is used to demonstrate compliance to requirements, ther any 100 kHz outside the authorized frequency the maximum measured in-band peak PSD lev</li> <li>Note 2: If the average output power procedure is used demonstrate compliance to requirements, ther frequency band shall be attenuated by at least average PSD level.</li> </ul>	measure the fundamental emission power to the peak conducted output power measured within band shall be attenuated by at least 20 dB relative to vel. to measure the fundamental emission power to the power in any 100 kHz outside of the authorized t 30 dB relative to the maximum measured in-band				

#### **3.6.2 Measuring Instruments**

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



### 3.6.3 Test Procedures

		Test Method			
	Mea perfo equi extra dista mea	surements may be performed at a distance other than the limit distance provided they are not ormed in the near field and the emissions to be measured can be detected by the measurement pment. When performing measurements at a distance other than that specified, the results shall be apolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear ance for field-strength measurements, inverse of linear distance-squared for power-density surements).			
$\square$	The	average emission levels shall be measured in [duty cycle $\geq$ 98 or duty factor].			
$\boxtimes$	For t	the transmitter unwanted emissions shall be measured using following options below:			
	$\boxtimes$	Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.			
	$\square$	Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.			
		☐ Refer as KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle ≥98%)			
		Refer as KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).			
		Refer as KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW≥1/T).			
		□ Refer as ANSI C63.10, clause 4.1.4.2.3 (Reduced VBW). VBW $\ge$ 1/T, where T is pulse time.			
	Refer as ANSI C63.10, clause 4.1.4.2.4 average value of pulsed emissions.				
		Refer as KDB 558074, clause 11.3 and 12.2.4 measurement procedure peak limit.			
		Refer as KDB 558074, clause 12.2.3 measurement procedure Quasi-Peak limit.			
$\bowtie$	For I	radiated measurement, refer as KDB 558074, clause 12.2.7.			
	$\square$	Refer as ANSI C63.10, clause 6.4 for radiated emissions below 30 MHz and test distance is 3m.			
	$\square$	Refer as ANSI C63.10, clause 6.5 for radiated emissions 30 MHz to 1 GHz and test distance is 3m.			
	$\square$	Refer as ANSI C63.10, clause 6.6 for radiated emissions above 1 GHz and test distance is 3m.			
$\boxtimes$	The	any unwanted emissions level shall not exceed the fundamental emission level.			
$\square$	All a has	mplitude of spurious emissions that are attenuated by more than 30 dB below the permissible value no need to be reported.			



#### 3.6.4 Test Setup









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

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

Any spurious which has more than 20 dB of margin compared to the applicable limit is not necessarily reported.

#### 3.6.6 Transmitter Radiated Unwanted Emissions

Refer as Appendix E



# 4 Test Equipment and Calibration Data

#### Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
EMC Receiver	KEYSIGHT	N9038A	MY54130031	20Hz ~ 8.4GHz	14/04/2016	13/04/2017
LISN	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127-477	9kHz ~ 30MHz	26/01/2016	25/01/2017
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	30/10/2015	29/10/2016
EMI Filter	LINDGREN	LRE-2030	2651	< 450 Hz	NCR	NCR

NCR: Non-Calibration required.

#### **Instrument for Conducted Test**

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9KHz~40GHz	16/02/2016	15/02/ 2017
Power Sensor	Anritsu	MA2411B	917017	300MHz ~ 40GHz	04/02/2016	03/02/2017
Power Meter	Anritsu	ML2495A	949003	300MHz ~ 40GHz	04/02/2016	03/02/2017
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	21/07/2016	20/07/2017

#### Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	28/11/2015	27/11/2016
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz ~ 18GHz 3m	16/12/2015	15/12/ 2016
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	10/05//2016	09/05/2017
Amplifier	Agilent	8449B	3008A02120	1GHz ~ 26.5GHz	02/09/2015	01/09/ 2016
Spectrum	R&S	FSV40	101513	9kHz ~ 40GHz	16/02/ 2016	15/02/ 2017
Bilog Antenna	SCHAFFNER	CBL 6112D	22237	30MHz ~ 1GHz	18/09/ 2015	17/09/2016
Horn Antenna	SCHWARZBECK	BBHA9120D	1531	1GHz ~ 18GHz	22/04/ 2016	21/04/ 2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz ~ 40GHz	29/01/ 2016	28/01/ 2017
Loop Antenna	TESEQ	HLA 6120	31244	9 kHz~30 MHz	02/02/2015	01/02/2017





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# Summary

Mode	Max-N dB	Max-OBW	ITU-Code	Min-N dB	Min-OBW
	(Hz)	(Hz)		(Hz)	(Hz)
2.4G;BT-LE;1;1;1	706.25k	1.058M	1M06F1D	703.75k	1.049M

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### Result

Mode	Result	Limit	P1-N dB	P1-OBW
			(Hz)	(Hz)
2.4G;BT-LE;1;1;1;2402;L;TN,VN	Pass	500k	705k	1.056M
2.4G;BT-LE;1;1;1;2440;M;TN,VN	Pass	500k	703.75k	1.058M
2.4G;BT-LE;1;1;1;2480;H;TN,VN	Pass	500k	706.25k	1.049M

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Summary

Mode	Sum	Sum	EIRP	EIRP
	(dBm)	(W)	(dBm)	(W)
2.4G;BT-LE;1;1;1	2.48	0.00177	5.48	0.00353

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#### Result

Mode	Result	DG	EIRP	EIRP Lim.	Sum	Sum Lim.	P1
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
2.4G;BT-LE;1;1;1;2402;L;TN,VN	Pass	3.00	5.48	36.00	2.48	30.00	2.48
2.4G;BT-LE;1;1;1;2440;M;TN,VN	Pass	3.00	5.07	36.00	2.07	30.00	2.07
2.4G;BT-LE;1;1;1;2480;H;TN,VN	Pass	3.00	5.39	36.00	2.39	30.00	2.39

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Summary

Mode	Sum	Sum	EIRP	EIRP
	(dBm)	(W)	(dBm)	(W)
2.4G;BT-LE;1;1;1	1.71	0.00148	4.71	0.00296

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### Result

Mode	Result	DG	EIRP	EIRP Lim.	Sum	Sum Lim.	P1
		(dBi)	(dBm)	(dBm)	(dBm)	(dBm)	(dBm)
2.4G;BT-LE;1;1;1;2402;L;TN,VN	Pass	3.00	4.71	36.00	1.71	30.00	1.71
2.4G;BT-LE;1;1;1;2440;M;TN,VN	Pass	3.00	4.34	36.00	1.34	30.00	1.34
2.4G;BT-LE;1;1;1;2480;H;TN,VN	Pass	3.00	4.68	36.00	1.68	30.00	1.68

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### Summary

Mode	PD	EIRP.PD
	(dBm/RBW)	(dBm/RBW)
2.4G;BT-LE;1;1;1	-11.58	-8.58

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### Result

Mode	Result	Meas.RBW	Lim.RBW	BWCF	DG	Sum.Max	PD	PD.Limit	EIRP.PD	EIRP.PD.Li m	P1
		(Hz)	(Hz)	(dB)	(dBi)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
2.4G;BT-LE;1;1;1;2402;L;TN,VN	Pass	3k	3k	0.00	3.00	-11.58	-11.58	8.00	-8.58	Inf	-11.58
2.4G;BT-LE;1;1;1;2440;M;TN,VN	Pass	3k	3k	0.00	3.00	-14.16	-14.16	8.00	-11.16	Inf	-14.16
2.4G;BT-LE;1;1;1;2480;H;TN,VN	Pass	3k	3k	0.00	3.00	-12.77	-12.77	8.00	-9.77	Inf	-12.77

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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	98.61	2390.988	50.16	48.45	20	Н
LE-1Mbps	1	2480	94.95	2501.120	51.82	43.13	20	Н
Note 1: Measurement worst emissions of receive antenna polarization								

2400-2483.5MHz Transmitter Radiated Bandedge Emissions (Restricted Band)										
Modulation Mode	Ντχ	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	2322.852	60.20	74	2342.028	47.69	54	Н
LE-1Mbps	1	2480	3	2498.080	60.84	74	2492.800	48.25	54	Н
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										

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#### **Transmitter Radiated Bandedge Emissions Modulation Mode** LE-1Mbps Test Freq. (MHz) 2402 1 Н N<sub>TX</sub> Polarization 130 Level (dBuV/m) Date: 2016-08-17 120 100 80 NCC/IC/FCC-B 60 CC-B-AV NCCAC 40 20 <sup>0</sup>2310 2320. 2340. 2360. 2380. 2400. 2412 Frequency (MHz) Over Limit ReadAntenna Cable Preamp Line Level Factor Loss Factor Remark Freq Level Limit MHz dBuV/m dB dBuV/m dBuV dB/m dB dB 2345.292 50.51 19.65 27.06 3.80 0.00 Peak 1 2 2390.988 50.16 19.17 27.16 3.83 0.00 Peak 3 \* 2402.004 98.61 67.59 27.18 3.84 0.00 Peak

#### Transmitter Radiated Bandedge Emissions (Non-restricted Band)

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Appendix D





#### **Transmitter Radiated Bandedge Emissions Modulation Mode** LE-1Mbps Test Freq. (MHz) 2402 N<sub>TX</sub> 1 Polarization Н 130 Level (dBuV/m) Date: 2016-08-17 120 100 80 IC/FCC-B NICO 60 NCC C-B-AV 40 20 <sup>0</sup>2310 2320. 2340. 2360. 2380. 2400. 2412 Frequency (MHz) Over Limit ReadAntenna Cable Preamp Freq Level Limit Line Level Factor Loss Factor Remark MHz dBuV/m dB dBuV/m dBuV dB/m dB dB 2342.028 47.69 -6.31 54.00 16.85 27.05 1 3.79 0.00 Average 2 \* 2402.004 98.32 67.30 27.18 3.84 0.00 Average

### Transmitter Radiated Bandedge Emissions (Restricted Band)





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Appendix D











#### Transmitter Radiated Unwanted Emissions (Below 1GHz)









#### Transmitter Radiated Unwanted Emissions (Above 1GHz)

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