

# **FCC Test Report**

Report No.: AGC00439180104FE03

FCC ID : 2ABV6ITL-DK6500A

**APPLICATION PURPOSE**: Original Equipment

**PRODUCT DESIGNATION**: Mobile Bluetooth Sensor

**BRAND NAME** : N/A

MODEL NAME : ITL-DK6500A, ITL-DK6500A(Z)

**CLIENT**: Shenzhen ITLONG Intelligent Technology CO.,LTD

**DATE OF ISSUE** : May 04, 2018

STANDARD(S)

TEST PROCEDURE(S) : FCC Part 15 Subpart C Section 15.249

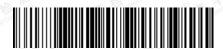
REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd

AGC 3

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# **Report Revise Record**

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	Allenos / Salar	May 04, 2018	Valid	Initial release

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# 1. VERIFICATION OF CONFORMITY

Applicant	Shenzhen ITLONG Intelligent Technology CO.,LTD
Address	12th Floor Buildig C1, Nanshan iPark, 1001Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, China.
Manufacturer	Shenzhen ITLONG Intelligent Technology CO.,LTD
Address	12th Floor Buildig C1, Nanshan iPark, 1001Xueyuan Avenue, Nanshan District, Shenzhen, Guangdong, China.
Product Designation	Mobile Bluetooth Sensor
Brand Name	N/A
Test Model	ITL-DK6500A
Series Model	ITL-DK6500A(Z)
Difference description	All the same except that the test model is with a logo but the series model isn't
Date of test	Jan. 09, 2018 to Jan. 16, 2018 and May 04, 2018
Deviation	None None
Condition of Test Sample	Normal The state of the state o
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, the energy emitted by the sample tested as described in this report is in compliance with the requirements of FCC Rules Part 15.249. The test results of this report relate only to the tested sample identified in this report.

Topted Py	pong lu	
Tested By _	Berg Lu(Lu Bing)	May 04, 2018
Reviewed By	Fowers ce	
	Forrest Lei(Lei Yonggang)	May 04, 2018

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#### 2. GENERAL INFORMATION

#### 2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

EA. CO.	
Operation Frequency	2.402 GHz to 2.480GHz
RF Output Power	-0.82dBm(Max EIRP Power=Max radiation field-95.2)
Bluetooth Version	V4.0
Modulation	BR □GFSK, EDR □π /4-DQPSK, □8DPSK BLE ⊠GFSK
Number of channels	40 for BLE
Hardware Version	ITL-DK6510(V1.2)
Software Version	DK6510AV1050
Antenna Designation	PCB Antenna
Antenna Gain	2.813dBi
Power Supply	DC 12V
Note: The Mobile Bluetoot work at the same time.	Sensor is equipped with eight same Bluetooth modules, furthermore they can't

#### 2.2. TABLE OF CARRIER FREQUENCYS

#### BLE Channel List

Frequency Band	Channel Number	Frequency	
70	0	2402MHz	
e Fr Conditions	-61 60	2404MHz	
2400~2483.5MHz	100 E	The Statement	
Co lo	38	2478 MHz	
The state of the s	39	2480 MHz	

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#### 3. MEASUREMENT UNCERTAINTY

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

- Uncertainty of Conducted Emission, Uc = ±3.2 dB
- Uncertainty of Radiated Emission below 1GHz, Uc = ±3.9 dB
- Uncertainty of Radiated Emission above 1GHz, Uc = ±4.8 dB

Start Freq.: 2402

4. DESCRIPTION OF	TEST MODES	
NO.	TEST MODE DESCRIPTION	
@ ## 1. rd coo. @ 4	Low channel GFSK	
2 2	Middle channel GFSK	The Manusco
3	High channel GFSK	Martin of Cook
4	BT Link	
SmartRF Studio 7 - Texas	Software Setting  Instruments	
Smart TM Stu	♥ 7337 - CC2541_BLE - Device Control Panel  File Settings View Evaluation Board Help	* ?
CC2538 2.4 GHz USB ARW SSC  \$ystem-on-Chip	E asy Mode  Expert Mode  RF Parameters  BLE Channel  Frequency  TX Power  37  Whitening  High Gain	· · · · · · · · · · · · · · · · · · ·
CC2431 24 GHz LOC System-on-Chip  Transceiver	Range Extender None Continuous TX Continuous TX Packet TX Packet RX	

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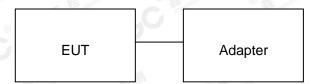


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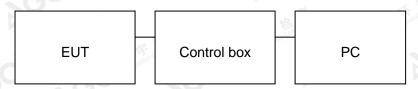
# 5. SYSTEM TEST CONFIGURATION

#### 5.1. CONFIGURATION OF EUT SYSTEM

Configure 1: (Normal hopping)



Configure 2: (Control continuous TX)



#### 5.2 FOUIPMENT USED IN FUT SYSTEM

J.Z. LW	DIFINITION OSED IN EUT STS	I LIVI		
Item	Equipment	Mfr/Brand	Model/Type No.	Remark
1	Mobile Bluetooth Sensor	ITLONG	ITL-DK6500A	EUT
2	DC Source	SAIL	12V 60Ah 356A	A.E
3	PC.	APPLE	A1465	A.E
4	Control box	CC-DEBUGGER	N/A	A.E
5	USB Cable	N/A	1m unshielded	A.E
6	Adapter	Vere	VSL1800220HU	A.E
7 @ 4	LOAD	HXP	RX24	A.E

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#### **5.3. SUMMARY OF TEST RESULTS**

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.249(a) §15.209	Radiated Emission	Compliant
§15.249(d)	Band Edges	Compliant
§15.207	Conduction Emission	Compliant
§15.215	Bandwidth	Compliant

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# 6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2F., Bldg.2, No.1-4, Chaxi Sanwei Technical Industrial Park, Gushu, Xixiang, Bao'an District B112-B113, Bldg.12, Baoan Bldg Materials Center, No.1 of Xixiang Inner Ring Road, Baoan District, Shenzhen 518012
NVLAP Lab Code	600153-0
Designation Number	CN5028
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by National Voluntary Laboratory Accreditation program, NVLAP Code 600153-0

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#### 7. TEST METHOD

All measurements contained in this report were conducted with ANSI C63.10-2013

#### 8. TEST EQUIPMENT LIST

#### **TEST EQUIPMENT OF CONDUCTED EMISSION TEST**

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun.20, 2017	Jun.19, 2018
LISN	R&S	ESH2-Z5	100086	Aug.21, 2017	Aug.20, 2018

#### **TEST EQUIPMENT OF RADIATED EMISSION TEST**

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Jun.20, 2017	Jun.19, 2018
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec.08, 2017	Dec.07, 2018
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Sep.20, 2017	Sep.19, 2018
preamplifier	ChengYi	EMC184045SE	980508	Sep.15, 2017	Sep.14, 2018
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May 18, 2017	May 17, 2019
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun.20, 2017	Jun.19, 2018
ANTENNA	SCHWARZBECK	VULB9168	D69250	Sep.28, 2017	Sep.27, 2018
Loop Antenna	A.H.Systems,Inc	SAS-562B	G Ame	Mar. 01, 2016	Feb. 28, 2018

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#### 9. RADIATED EMISSION

#### 9.1. TEST LIMIT

#### Standard FCC15.249

Fundamental	Field Strength of Fundamental	Field Strength of Harmonics
Frequency	(millivolts/meter)	(microvolts/meter)
900-928MHz	50	500
2400-2483.5MHz	50	500
5725-5875MHz	50	500
24.0-24.25GHz	250	2500

#### Standard FCC 15.209

Frequency	Distance	Field St	rengths Limit
(MHz)	Meters	μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	2
0.490 ~ 1.705	30	24000/F(kHz)	电测 乐意
1.705 ~ 30	30	30	See The second of the second o
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3 Marine Commission Co	Other:74.0 dB(µV)/m (Average)	(Peak) 54.0 dB(μV)/m

Remark:

- (1) Emission level dB $\mu$  V = 20 log Emission level  $\mu$  V/m
- (2) The smaller limit shall apply at the cross point between two frequency bands.
- (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.

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#### 9.2. MEASUREMENT PROCEDURE

- 1. The measuring distance of 3m shall be used for measurements. The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Below 1GHz)
- 2. The measuring distance of 3m shall used for measurements. The EUT was placed on the top of a rotating table 1.5 meter above the ground at a 3 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation(Above 1GHz)
- The height of the test antenna shall vary between 1m to 4m.Both horizontal and vertical polarization Of the antenna are set to make the measurement.
- 4. The initial step in collecting radiated emission data is a receive peak detector mode. Pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- 5. All readings are peak unless otherwise stated QP in column of Note. Peak denoted that the Peak reading compliance with the QP limits and then QP Mode measurement didn't perform(Below 1GHz)
- 6. All readings are Peak mode value unless otherwise stated AVG in column of Note. If the Peak mode measured value compliance with the Peak limits and lower than AVG Limits, the EUT shall be deemed to meet Peak & AVG limits and then only Peak mode was measured, but AVG mode didn't perform.(Above 1GHz)

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The following table is the setting of spectrum analyzer and receiver.

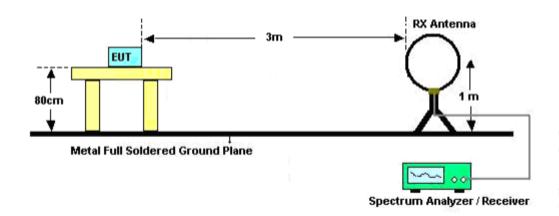
	Spectrum Parameter	Setting
bal Comp	Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
C Miles	Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
, <sub>F</sub>	Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP
Manufaction of Colonia Cor	Start ~Stop Frequency	1GHz~26.5GHz RBW 2MHz/ VBW 6MHz for Peak, RBW 1.5MHz/ VBW 10Hz for Average
	Receiver Parameter	Setting
® 15th	Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
CO MIN	Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
	Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

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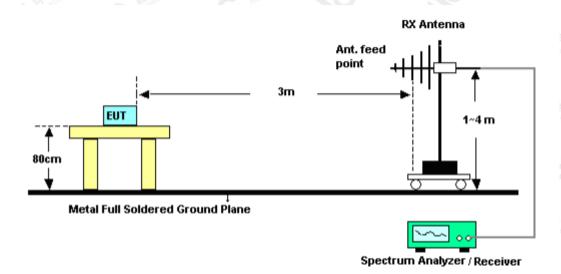


#### 9.3. TEST SETUP

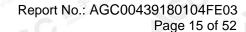
#### RADIATED EMISSION TEST-SETUP FREQUENCY BELOW 30MHz



#### RADIATED EMISSION TEST SETUP 30MHz-1000MHz

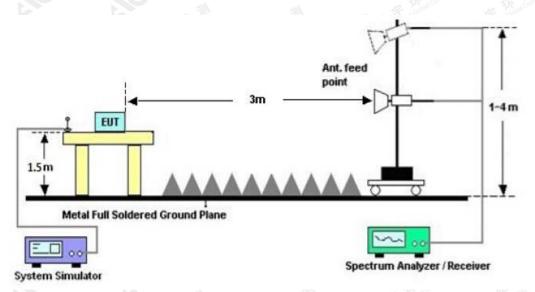


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# RADIATED EMISSION TEST SETUP ABOVE 1000MHz



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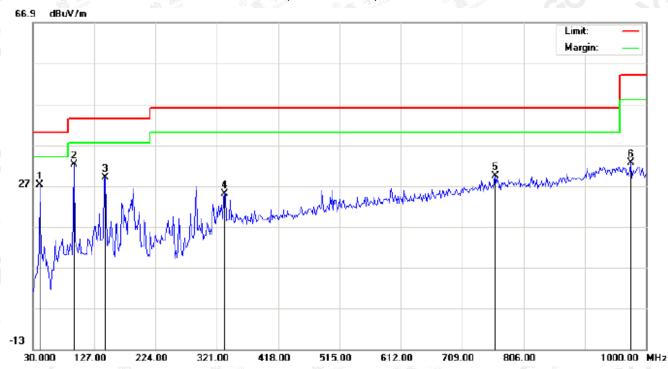
# 9.4. TEST RESULT FOR BLE

#### **RADIATED EMISSION BELOW 30MHz**

No emission found between lowest internal used/generated frequencies to 30MHz.

#### **RADIATED EMISSION BELOW 1GHz**

RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL-HORIZONTAL



N	о.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
Г	1		41.3167	15.41	11.81	27.22	40.00	-12.78	peak			
2	2	*	94.6667	27.08	5.16	32.24	43.50	-11.26	peak			
	3		144.7833	14.99	14.04	29.03	43.50	-14.47	peak			
4	4		333.9332	7.38	17.67	25.05	46.00	-20.95	peak			
į	5		760.7333	2.54	26.78	29.32	46.00	-16.68	peak			
(	6		975.7500	2.88	29.75	32.63	54.00	-21.37	peak			

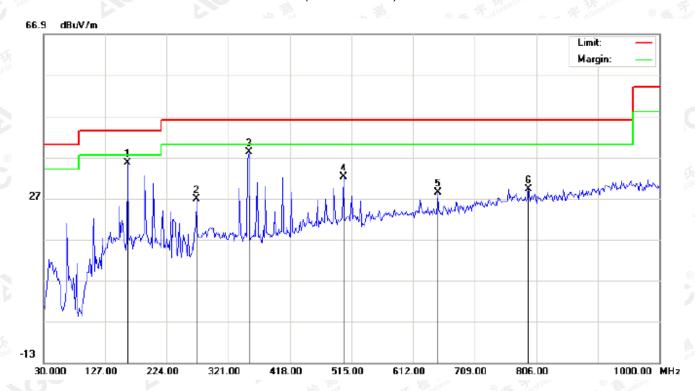
RESULT: PASS

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# RADIATED EMISSION TEST- (30MHz-1GHz)-LOW CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu√/m	dB		cm	degree	
1		162.5667	25.18	10.42	35.60	43.50	-7.90	peak			
2		270.8833	16.33	10.45	26.78	46.00	-19.22	peak			
3	*	353.3333	19.43	18.76	38.19	46.00	-7.81	peak			
4		502.0667	11.04	21.19	32.23	46.00	-13.77	peak			
5		650.8000	4.52	23.87	28.39	46.00	-17.61	peak			
6		793.0667	2.02	27.22	29.24	46.00	-16.76	peak			

#### **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

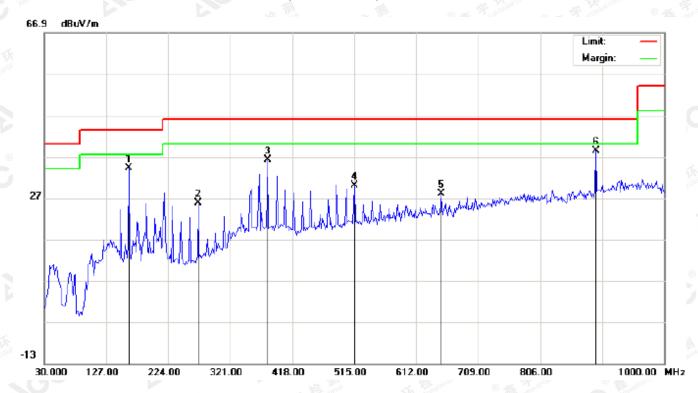
2. The "Factor" value can be calculated automatically by software of measurement system.

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# RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBuV/m	dBu√/m	dB		cm	degree	
1		162.5667	23.84	10.42	34.26	43.50	-9.24	peak			
2		270.8833	15.37	10.45	25.82	46.00	-20.18	peak			
3		379.2000	17.21	18.93	36.14	46.00	-9.86	peak			
4		515.0000	8.52	21.54	30.06	46.00	-15.94	peak			
5		650.8000	4.22	23.87	28.09	46.00	-17.91	peak			
6	*	893.3000	9.91	28.44	38.35	46.00	-7.65	peak			

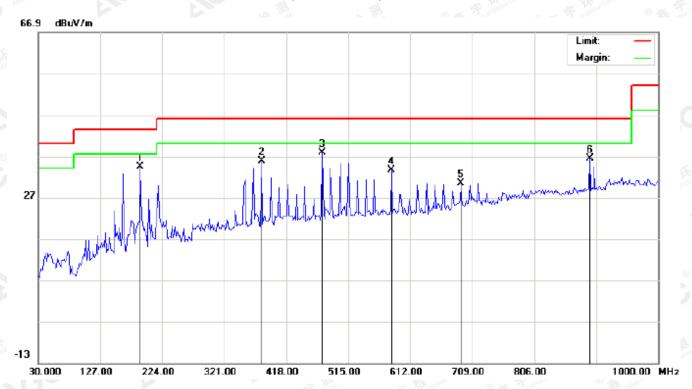
**RESULT: PASS** 

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# RADIATED EMISSION TEST- (30MHz-1GHz)-MIDDLE CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBuV/m	dBu∀/m	dB		cm	degree	
1		190.0500	22.87	11.54	34.41	43.50	-9.09	peak			
2		379.2000	16.95	18.93	35.88	46.00	-10.12	peak			
3	*	474.5833	16.97	20.86	37.83	46.00	-8.17	peak			
4		582.9000	10.34	23.30	33.64	46.00	-12.36	peak			
5		691.2166	5.46	24.95	30.41	46.00	-15.59	peak			
6		893.3000	7.91	28.44	36.35	46.00	-9.65	peak			

#### **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

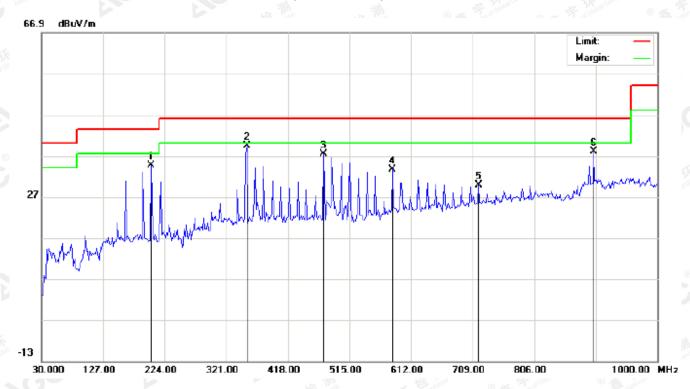
2. The "Factor" value can be calculated automatically by software of measurement system.

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#### RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		202.9833	22.91	11.70	34.61	43.50	-8.89	peak			
2	*	353.3333	20.68	18.76	39.44	46.00	-6.56	peak			
3		474.5833	16.54	20.86	37.40	46.00	-8.60	peak			
4		582.9000	10.34	23.30	33.64	46.00	-12.36	peak			
5		718.7000	4.08	25.73	29.81	46.00	-16.19	peak			
6		899.7667	9.44	28.60	38.04	46.00	-7.96	peak			

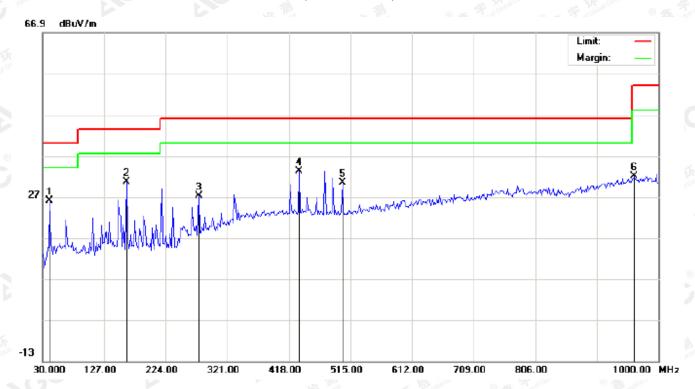
**RESULT: PASS** 

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# RADIATED EMISSION TEST- (30MHz-1GHz)-HIGH CHANNEL -VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu√/m	dBu∀/m	dB		cm	degree	
1		41.3167	17.20	8.81	26.01	40.00	-13.99	peak			
2		162.5667	15.38	15.17	30.55	43.50	-12.95	peak			
3		275.7333	12.46	14.68	27.14	46.00	-18.86	peak			
4	*	434.1667	13.02	20.11	33.13	46.00	-12.87	peak			
5		502.0667	9.29	21.19	30.48	46.00	-15.52	peak			
6		961.2000	2.15	29.89	32.04	54.00	-21.96	peak			

#### **RESULT: PASS**

Note: 1. Factor=Antenna Factor + Cable loss, Margin=Measurement-Limit.

2. The "Factor" value can be calculated automatically by software of measurement system.

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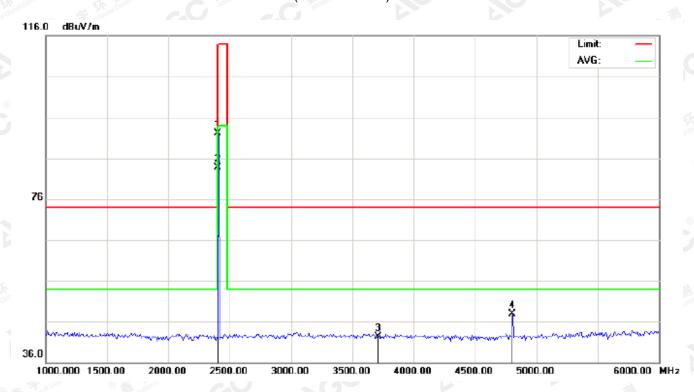


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# RADIATED EMISSION ABOVE 1GHz

#### **FOR BLE**

# RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		2402.000	81.71	10.32	92.03	114.00	-21.97	peak			
2	*	2402.000	73.37	10.32	83.69	94.00	-10.31	AVG	100	331	
3		3708.333	28.85	13.39	42.24	74.00	-31.76	peak			
4		4804.000	40.24	7.69	47.93	74.00	-26.07	peak			

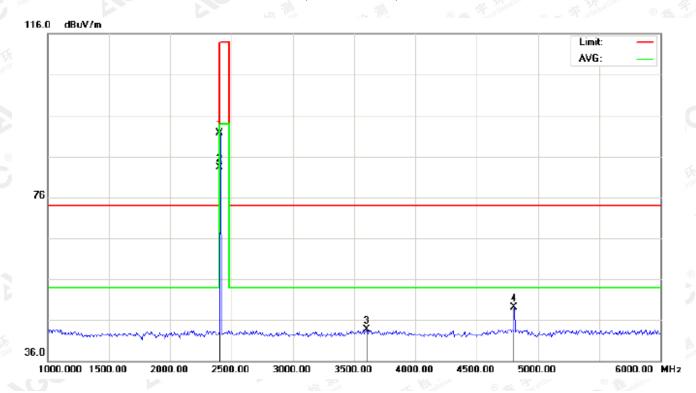
**RESULT: PASS** 

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# RADIATED EMISSION TEST- (ABOVE 1GHz)-LOW CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		2402.000	81.32	10.32	91.64	114.00	-22.36	peak			
2	*	2402.000	72.95	10.32	83.27	94.00	-10.73	AVG	100	125	
3		3600.000	31.06	12.73	43.79	74.00	-30.21	peak			
4		4804.000	41.38	7.69	49.07	74.00	-24.93	peak			

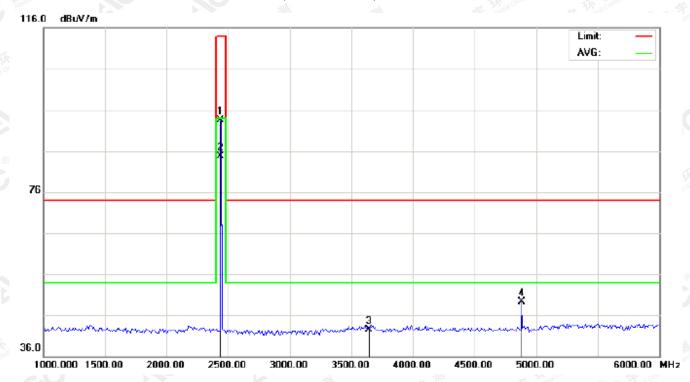
**RESULT: PASS** 

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# RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		2440.000	83.24	10.36	93.60	114.00	-20.40	peak			
2	*	2440.000	74.36	10.36	84.72	94.00	-9.28	AVG	100	314	
3		3641.667	29.53	12.98	42.51	74.00	-31.49	peak			
4		4880.000	41.38	7.89	49.27	74.00	-24.73	peak			

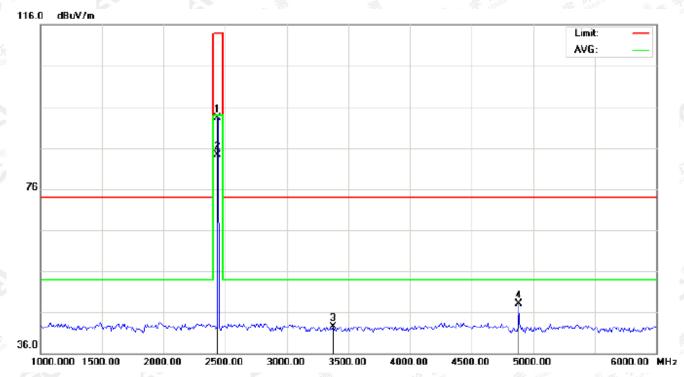
RESULT. PASS

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# RADIATED EMISSION TEST- (ABOVE 1GHz)-MIDDLE CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBuV/m	dBu∀/m	dB		cm	degree	
1		2440.000	82.99	10.36	93.35	114.00	-20.65	peak			
2	*	2440.000	73.95	10.36	84.31	94.00	-9.69	AVG	100	108	
3		3375.000	30.49	11.99	42.48	74.00	-31.52	peak			
4		4880.000	40.31	7.89	48.20	74.00	-25.80	peak			

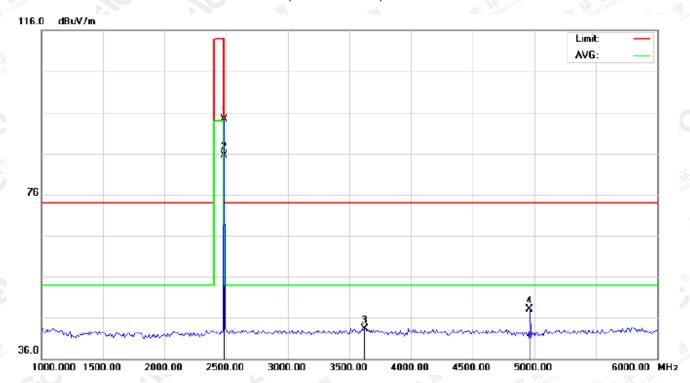
**RESULT: PASS** 

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# RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL-HORIZONTAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		2480.000	83.97	10.41	94.38	114.00	-19.62	peak			
2	*	2480.000	75.14	10.41	85.55	94.00	-8.45	AVG	100	317	
3		3625.000	30.33	12.88	43.21	74.00	-30.79	peak			
4		4960.000	40.01	8.09	48.10	74.00	-25.90	peak			

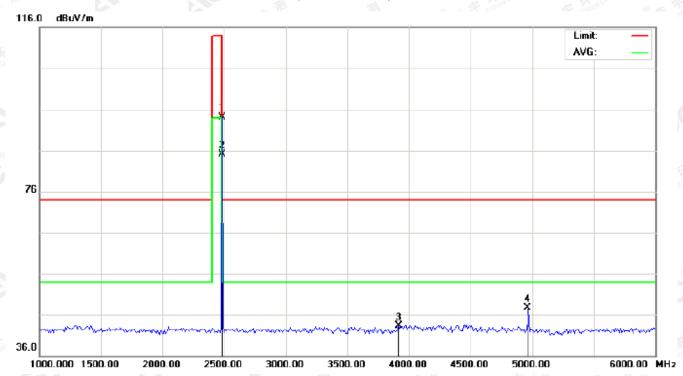
**RESULT: PASS** 

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# RADIATED EMISSION TEST- (ABOVE 1GHz)-HIGH CHANNEL- VERTICAL



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	//m dB	cm	degree		
1		2480.000	83.69	10.41	94.10	114.00	-19.90	peak			
2	*	2480.000	74.78	10.41	85.19	94.00	-8.81	AVG	100	112	
3		3916.667	28.62	14.68	43.30	74.00	-30.70	peak			
4		4960.000	39.66	8.09	47.75	74.00	-26.25	peak			

#### **RESULT: PASS**

**Note:** 6~25GHz at least have 20dB margin. No recording in the test report.

Factor=Antenna Factor + Cable loss - Amplifier gain, Margin=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

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# Field strength of the fundamental signal

# 1Mbps Result:

#### Peak value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna Polarization	
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)		
2402	81.71	10.32	92.03	114	-21.97	Horizontal	
2402	81.32	10.32	91.64	114	-22.36	Vertical	
2440	83.24	10.36	93.60	114	-20.40	Horizontal	
2440	82.99	10.36	93.35	114	-20.65	Vertical	
2480	83.97	10.41	94.38	114	-19.62	Horizontal	
2480	83.69	10.41	94.10	114	-19.90	Vertical	

#### Average value

Frequency	Reading Level	Factor	Measurement	Limit	Over	Antenna	
(MHz)	(dBuv)	(dB/m)	(dBuv/m)	(dBuv/m)	(dB)	Polarization	
2402	73.37	10.32	83.69	94	-10.31	Horizontal	
2402	72.95	10.32	83.27	94	-10.73	Vertical	
2440	74.36	10.36	84.72	94	-9.28	Horizontal	
2440	73.95	10.36	84.31	94	-9.69	Vertical	
2480	75.14	10.41	85.55	94	-8.45	Horizontal	
2480	74.78	10.41	85.19	94	-8.81	Vertical	

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#### 10. BAND EDGE EMISSION

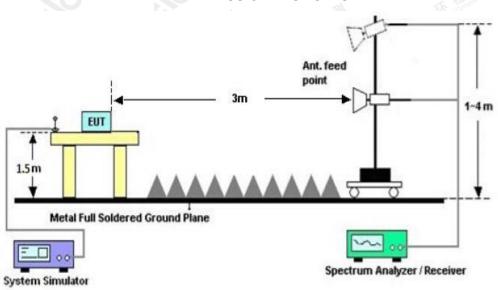
#### 10.1. MEASUREMENT PROCEDURE

- 1. The EUT operates at hopping-off test mode. The lowest or highest channels are tested to verify the largest transmission and spurious emissions power at the continuous transmission mode.
- 2. Max hold the trace of the setup 1, and the EUT operates at hopping-on test mode to verify the largest spurious emissions power.
- 3. Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission.

Start frequency(MHz)	Stop frequency(MHz)
2200	2405
2478	2500

#### 10.2 TEST SETUP

#### RADIATED EMISSION TEST SETUP



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# 10.3 RADIATED TEST RESULT

#### **FOR BLE**

#### TEST PLOT OF BAND EDGE FOR LOW CHANNEL-Horizontal



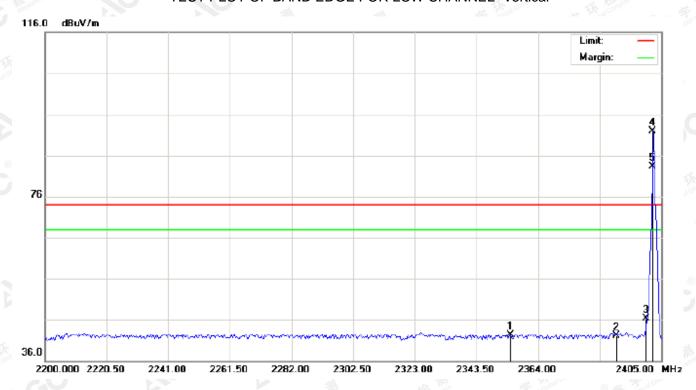
N	No. Mi	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height		Comment
		-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
	1		2351.017	31.77	10.27	42.04	74.00	-31.96	peak			
	2		2390.000	33.00	10.31	43.31	74.00	-30.69	peak			
,	3		2400.000	42.47	10.32	52.79	74.00	-21.21	peak			
4	4	*	2402.000	81.72	10.32	92.04	74.00	18.04	peak			
	5	Х	2402.000	73.27	10.32	83.59	74.00	9.59	AVG	100	329	

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### TEST PLOT OF BAND EDGE FOR LOW CHANNEL -Vertical



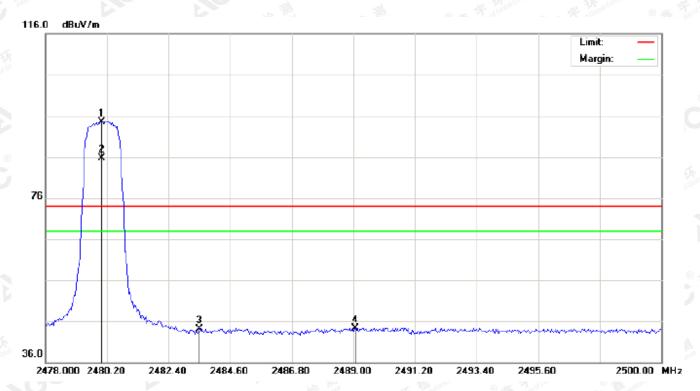
No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1		2354.775	32.01	10.27	42.28	74.00	-31.72	peak			
2		2390.000	31.71	10.31	42.02	74.00	-31.98	peak			
3		2400.000	36.06	10.32	46.38	74.00	-27.62	peak			
4	*	2402.000	81.59	10.32	91.91	74.00	17.91	peak			
5	Х	2402.000	72.91	10.32	83.23	74.00	9.23	AVG	100	124	

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# TEST PLOT OF BAND EDGE FOR HIGH CHANNEL -Horizontal



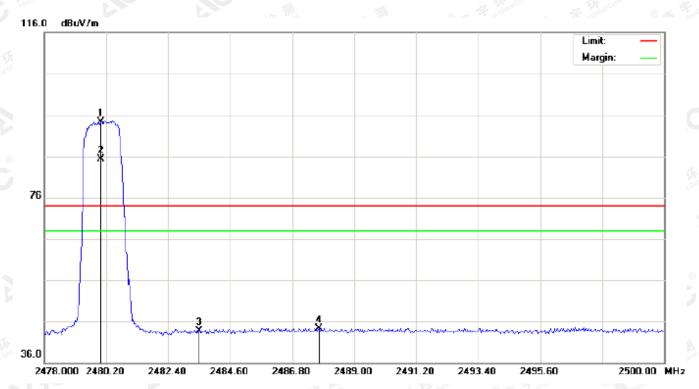
N	o. N	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
		-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	ı	*	2480.000	84.05	10.41	94.46	74.00	20.46	peak			
2	2	Х	2480.000	75.33	10.41	85.74	74.00	11.74	AVG	100	324	
3	3		2483.500	33.69	10.41	44.10	74.00	-29.90	peak			
4	1		2489.073	33.93	10.42	44.35	74.00	-29.65	peak			

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#### TEST PLOT OF BAND EDGE FOR HIGH CHANNEL-Vertical



No.	Mk	Freq.	Reading	Factor	Measurement	Limit	Over	Detector	Antenna Height	Table Degree	Comment
	-	MHz	dBu∀	dB/m	dBu∀/m	dBu∀/m	dB		cm	degree	
1	*	2480.000	83.82	10.41	94.23	74.00	20.23	peak			
2	Х	2480.000	74.90	10.41	85.31	74.00	11.31	AVG	100	119	
3		2483.500	33.26	10.41	43.67	74.00	-30.33	peak			
4		2487.753	33.95	10.42	44.37	74.00	-29.63	peak			

#### **RESULT: PASS**

**Note**: Factor=Antenna Factor + Cable loss - Amplifier gain, Over=Measure-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

Hopping on mode and Hopping off mode have been tested, but only worst case reported.

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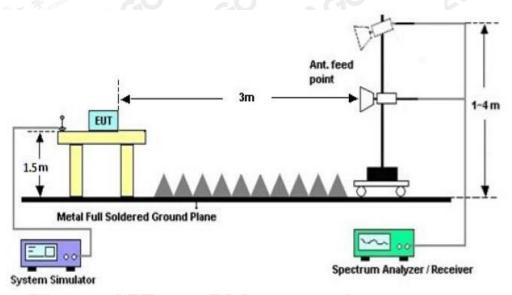
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#### 11. 20DB BANDWIDTH

#### 11.1. MEASUREMENT PROCEDURE

- 1. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- 2. Set Span = approximately 2 to 3 times the 20 dB bandwidth, centered on a hoping channel RBW ≥ 1% of the 20 dB bandwidth, VBW ≥ 3RBW; Sweep = auto; Detector function = peak
- 3. Set SPA Trace 1 Max hold, then View.

#### 11.2. TEST SET-UP



#### 11.3. LIMITS AND MEASUREMENT RESULTS

#### **FOR BLE**

BLUETOOTH 1MBPS LIMITS AND MEASUREMENT RESULT												
	Measurement Result											
Applicable Limits		Result										
		99%OBW (MHz)	-20dB BW(MHz)	Result								
Solution Company	Low Channel	1.073	1.223	PASS								
N/A	Middle Channel	1.074	1.224	PASS								
	High Channel	1.076	1.225	PASS								

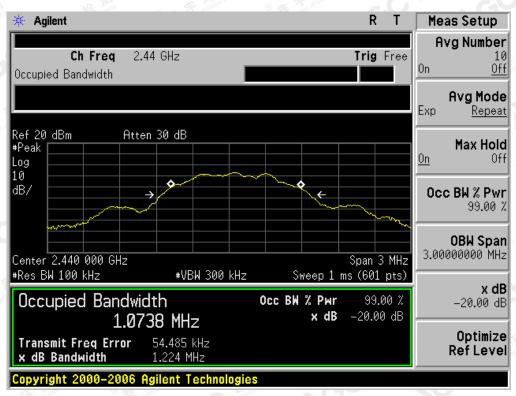
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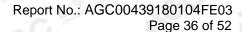
#### TEST PLOT OF BANDWIDTH FOR LOW CHANNEL



#### TEST PLOT OF BANDWIDTH FOR MIDDLE CHANNEL

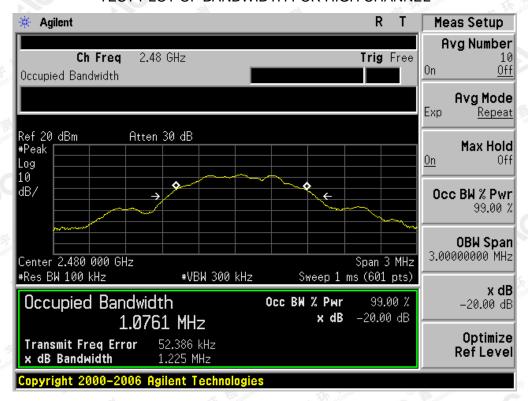


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#### TEST PLOT OF BANDWIDTH FOR HIGH CHANNEL



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# 12. FCC LINE CONDUCTED EMISSION TEST

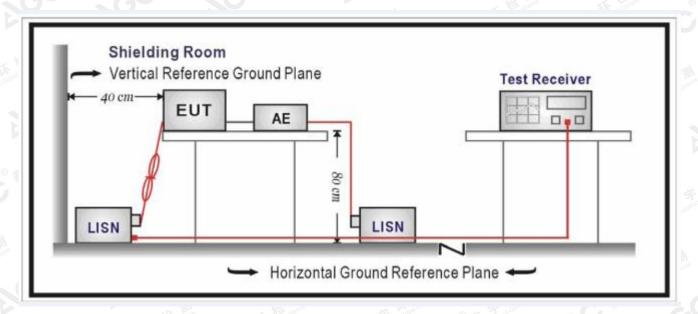
## 12.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage						
	Q.P.( dBuV)	Average( dBuV)					
150kHz~500kHz	66-56	56-46					
500kHz~5MHz	8 Age 12	46/					
5MHz~30MHz	60	50					

#### Note:

- 1. The lower limit shall apply at the transition frequency.
- 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

### 12.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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#### 12.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
- 2. Support equipment, if needed, was placed as per ANSI C63.10.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
- 4. All support equipments received AC120V/60Hz power from a LISN, if any.
- 5. The EUT received voltage by adapter which received 120V/60Hzpower by a LISN.
- 6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
- 7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
- 8. During the above scans, the emissions were maximized by cable manipulation.
- 9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

#### 12.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

- EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
- 2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less –2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
- 3. The test data of the worst case condition(s) was reported on the Summary Data page.

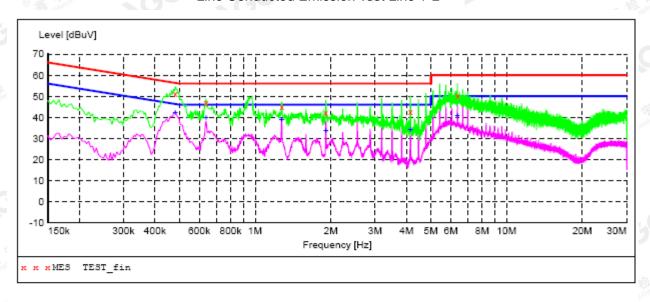
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#### 12.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

# By adapter(worst case)

#### Line Conducted Emission Test Line 1-L



#### MEASUREMENT RESULT: "TEST fin"

2018/5/2 15 Frequency MHz	Level	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.482000	51.40	11.4	56	4.9	QP	L1	FLO
0.638000	46.90	11.4	56	9.1	QP	L1	FLO
1.278000	45.10	11.3	56	10.9	QP	L1	FLO
1.910000	42.00	11.3	56	14.0	QP	L1	FLO
4.142000	42.70	11.4	56	13.3	QP	L1	FLO
6.374000	50.50	11.2	60	9.5	QP	L1	FLO

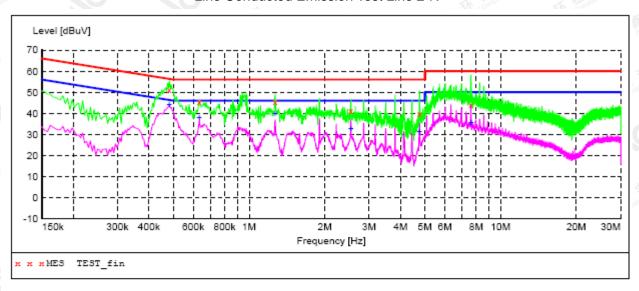
#### MEASUREMENT RESULT: "TEST fin2"

2018/5/2 15:10 Frequency MHz	Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.482000	42.30	11.4	46	4.0	AV	L1	FLO
0.638000	39.60	11.4	46	6.4	AV	L1	FLO
1.274000	38.70	11.3	46	7.3	AV	L1	FLO
1.910000	33.70	11.3	46	12.3	AV	L1	FLO
4.142000	34.00	11.4	46	12.0	AV	L1	FLO
6.370000	41.00	11.2	50	9.0	AV	L1	FLO

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#### Line Conducted Emission Test Line 2-N



## MEASUREMENT RESULT: "TEST fin"

2018/5/2 15:02 Frequency MHz		Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.482000	51.30	11.4	56	5.0	QP	N	FLO
0.634000	45.50	11.4	56	10.5	QP	N	FLO
1.270000	45.70	11.3	56	10.3	QP	N	FLO
2.538000	41.30	11.3	56	14.7	QP	N	FLO
4.758000	39.60	11.4	56	16.4	QP	N	FLO
7.610000	44.30	11.2	60	15.7	QP	N	FLO

#### MEASUREMENT RESULT: "TEST fin2"

2018/5/2 15:02 Frequency MHz	2 Level dBuV	Transd dB	Limit dBuV	Margin dB	Detector	Line	PE
0.482000	44.00	11.4	46	2.3	AV	N	FLO
0.634000	37.90	11.4	46	8.1	AV	N	FLO
1.270000	39.80	11.3	46	6.2	AV	N	FLO
2.538000	32.70	11.3	46	13.3	AV	N	FLO
4.758000	31.10	11.4	46	14.9	AV	N	FLO
7.618000	35.50	11.2	50	14.5	AV	N	FLO

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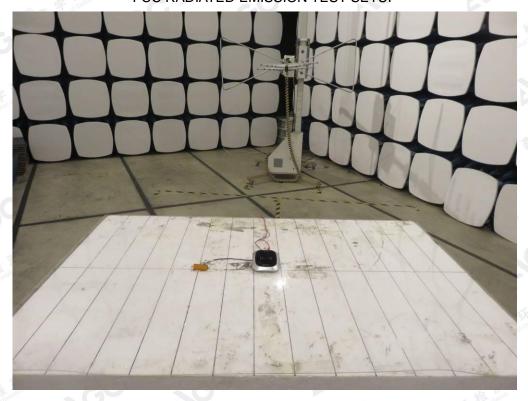


# APPENDIX A: PHOTOGRAPHS OF TEST SETUP

FCC LINE CONDUCTED EMISSION TEST SETUP

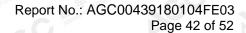


FCC RADIATED EMISSION TEST SETUP



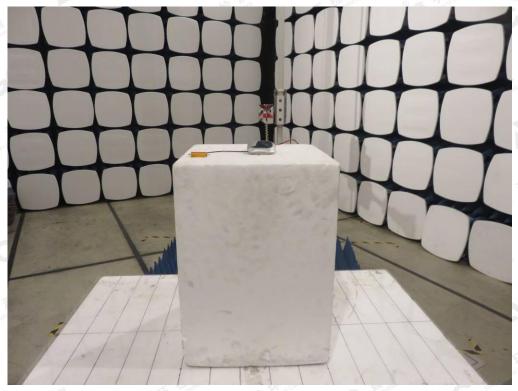
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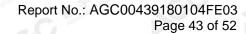




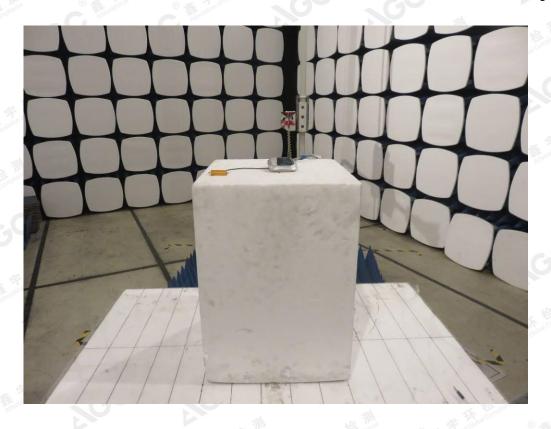




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## **APPENDIX B: PHOTOGRAPHS OF EUT**

TOP VIEW OF EUT



**BOTTOM VIEW OF EUT** 



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#### FRONT VIEW OF EUT



**BACK VIEW OF EUT** 



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#### LEFT VIEW OF EUT



RIGHT VIEW OF EUT

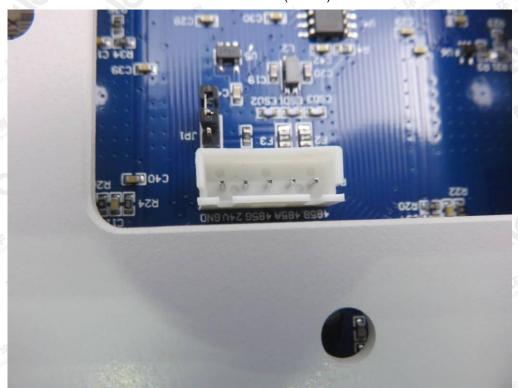


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## VIEW OF EUT (PORT)



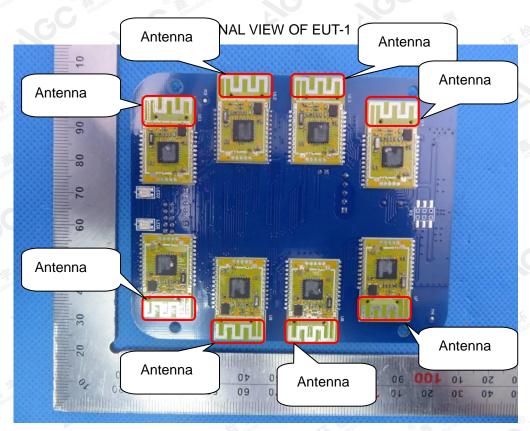
**OPEN VIEW OF EUT** 



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**INTERNAL VIEW OF EUT-2** 

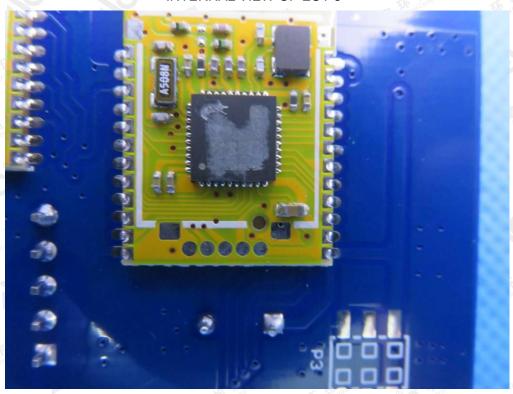


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# **INTERNAL VIEW OF EUT-3**



VIEW OF ADAPTER (AE)



The adapter was supplied by AGC

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# Series Model TOP VIEW OF EUT



**BOTTOM VIEW OF EUT** 



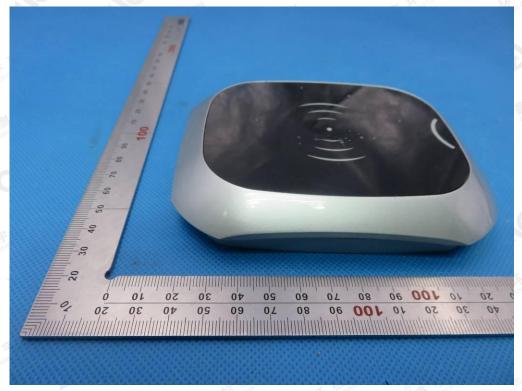
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#### FRONT VIEW OF EUT



**BACK VIEW OF EUT** 

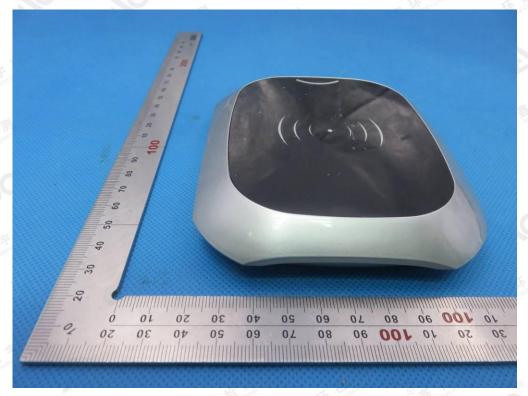


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#### LEFT VIEW OF EUT



RIGHT VIEW OF EUT



----END OF REPORT----

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