

## CFR 47 FCC PART 15 SUBPART C

**TEST REPORT** 

For

## Air Combat/Air Battle HELI WFLIGHTSTICK

#### PL-0305

## FCC ID: 2ASK3PL-0305T

REPORT NUMBER: 4789041432.1-1

ISSUE DATE: June 18, 2019

Prepared for

#### AMAX INDUSTRIAL GROUP CHINA CO.,LTD OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI STREET MONGKOK KOWLOON HONG KONG.

Prepared by

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#### **Revision History**

Rev.	Issue Date	Revisions	Revised By
V0	06/18/2019	Initial Issue	



	Summary of Test Results					
Clause	e Test Items FCC Rules		Test Results			
1	20dB Bandwidth and 99% Occupied Bandwidth	CFR 47 FCC 15.249(d)	Pass			
2	Radiated emission	CFR 47 FCC §15.249 (a)(d)(e) CFR 47 FCC §15.205 and §15.209	Pass			
3	Antenna Requirement	FCC Part 15.203	Pass			



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# **1. ATTESTATION OF TEST RESULTS**

#### Applicant Information

Company Name: Address:	AMAX INDUSTRIAL GROUP CHINA CO.,LTD OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI STREET MONGKOK KOWLOON HONG KONG
Manufacturer Information	

Company Name: Address: AMAX INDUSTRIAL GROUP CHINA CO.,LTD OFFICE NO.3 10/F WITTY COMMERCIAL BUILDING 1A-1L TUNG CHOI STREET MONGKOK KOWLOON HONG KONG

#### **EUT Description**

EUT Name: Model: Sample Status: Sample Received Date: Date of Tested: Air Combat/ Air Battle HELI WFLIGHTSTICK PL-0305 Normal May 22, 2019 May 22, 2019 ~ June 18, 2019

# APPLICABLE STANDARDSSTANDARDTEST RESULTSCFR 47 FCC PART 15 SUBPART CPASS

Prepared By:

Ven

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ephentrio

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 414788 D01 Radiated Test Site v01r01, FCC CFR 47 Part 2, FCC CFR 47 Part 15, ANSI C63.10-2014.

# 3. FACILITIES AND ACCREDITATION

Accreditation Certificate	<ul> <li>A2LA (Certificate No.: 4102.01)         UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.         has been assessed and proved to be in compliance with A2LA.     </li> <li>FCC (FCC Designation No.: CN1187)         UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.         Has been recognized to perform compliance testing on equipment subject to the Commission's Delcaration of Conformity (DoC) and Certification rules     </li> <li>IC(Company No.: 21320)         UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.         has been registered and fully described in a report filed with ISED. The Company Number is 21320.         VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011)         UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.         has been assessed and proved to be in compliance with VCCI, the Mambarabia Na. in 2702     </li> </ul>
	VCCI (Registration No.: G-20019, R-20004, C-20012 and T-20011) UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. has been assessed and proved to be in compliance with VCCI, the Membership No. is 3793.
	Facility Name: Chamber D, the VCCI registration No. is G-20019 and R-20004 Shielding Room B , the VCCI registration No. is C-20012 and T-20011

Note:

- All tests measurement facilities use to collect the measurement data are located at Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
- The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.
- 3. For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. And these measurements below 30MHz had been correlated to measurements performed on an OFS.



# 4. CALIBRATION AND UNCERTAINTY

## 4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

## 4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty	
Conduction emission	3.62dB	
Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	2.2dB	
Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.00dB	
Radiation Emission test	5.78dB (1GHz-18Gz)	
(1GHz to 26GHz)( include Fundamental emission)	5.23dB (18GHz-26Gz)	
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.		

# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

EUT Name	Air Combat/Air Battle HELI WFLIGHTSTICK		
EUT Description	The EUT is a wireless remote controller for drone.		
Model	PL-0305		
Product Description	Operation Frequency 2415 MHz ~ 2472 MH		
	Modulation Type GFSK		
Battery	DC 6.0V		

# 5.2. MAXIMUM OUTPUT POWER

Frequency Range	Number of Transmit Chains	Frequency	Channel Number	Max Power
(MHz)	(NTX)	(MHz)		(dBµV/m)
2415 ~ 2472	1	2472	3[3]	87.32

# 5.3. CHANNEL LIST

Channel	Frequency (MHz)	Channel	Frequency(MHz)	Channel	Frequency (MHz)
1	2415	2	2450	3	2472

# 5.4. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2415 ~ 2472	Line Antenna	2

Test Mode	Transmit and Receive Mode	Description
GFSK	⊠1TX, 1RX	Antenna 1 can be used as transmitting/receiving antenna.

## 5.5. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
GFSK	CH 1, CH 2, CH 3	2415MHz, 2450MHz, 2472MHz



## 5.6. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2415 ~ 2472MHz Band						
Test Se	oftware	/				
Modulation Type	Transmit Antenna	Test Channel				
woodation Type	Number	CH 1	CH 2	CH 3		
GFSK	1	Default	Default	Default		

## 5.7. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests			
Relative Humidity	55 ~ 65%			
Atmospheric Pressure:	1025Pa			
Temperature	TN	22 ~ 28°C		
	VL	/		
Voltage :	VN	DC 6.0V		
	VH	/		

Note: VL= Lower Extreme Test Voltage VN= Nominal Voltage VH= Upper Extreme Test Voltage TN= Normal Temperature



## 5.8. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

Item	tem Equipment Brand Name		Model Name	P/N	
1	/	/	/	/	

#### I/O CABLES

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	/	/	/	/	/

#### ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	/	/	/	/

#### TEST SETUP

The EUT have the engineering mode inside.

#### SETUP DIAGRAM FOR TEST



Note: New battery was used during all tests.



# 5.9. MEASURING INSTRUMENT AND SOFTWARE USED

		Co	nduc	ted Emiss	ione			
		CO		strument	00115			
Used	Equipment	Manufacturer		odel No.	Serial N		Last Cal.	Next Cal.
<u>U3Cu</u>	EMI Test Receiver	R&S		ESR3	101961			Dec.10,2019
	Two-Line V-	Nao			101901		Dec. 10,2010	Dec. 10,2013
	Network	R&S	E	NV216	101983	3	Dec.10,2018	Dec.10,2019
$\checkmark$	Artificial Mains Networks	Schwarzbeck	NS	LK 8126	812646	5	Dec.10,2018	Dec.10,2019
			S	oftware				
Used	Des	cription		Man	ufacturer		Name	Version
$\checkmark$	Test Software for C	Conducted dist	urbar	nce F	arad		EZ-EMC	Ver. UL-3A1
	I	Ra	adiate	ed Emissi	ons	1		
			In	strument				
Used	Equipment	Manufacturer	Mo	odel No.	Serial N	0.	Last Cal.	Next Cal.
$\checkmark$	MXE EMI Receiver	KESIGHT	N	9038A	MY56400	036	Dec.10,2018	Dec.10,2019
V	Hybrid Log Periodic Antenna	TDK	HLI	P-3003C	130960	)	Sep.17,2018	Sep.17,2021
	Preamplifier	HP	8	3447D	2944A090	)99	Dec.10,2018	Dec.10,2019
V	EMI Measurement Receiver	R&S	ESR26		101377		Dec.10,2018	Dec.10,2019
$\checkmark$	Horn Antenna	TDK	HRN-0118		130939		Sep.17,2018	Sep.17,2021
$\checkmark$	High Gain Horn Antenna	Schwarzbeck	BBHA-9170		691		Aug.18,2018	Aug.18,2021
V	Preamplifier	TDK	PA	-02-0118	TRS-305- 00066		Dec.10,2018	Dec.10,2019
V	Preamplifier	TDK	Р	A-02-2	TRS-307- 00003		Dec.10,2018	Dec.10,2019
V	Loop antenna	Schwarzbeck	1	I519B	00008		Jan.17, 2019	Jan.17,2022
			S	oftware	1			1
Used	Descr	ription		Manufact	urer	1	Name	Version
V	Test Software distur			Farac	k	E	Z-EMC	Ver. UL-3A1
			)ther	instrumer	nts			
Used	Equipment	Manufacturer		del No.	Serial N	0.	Last Cal.	Next Cal.
$\checkmark$	Spectrum Analyzer	Keysight	N9030A		MY55410	512	Dec.10,2018	
V	Band Reject Filter	Wainwright	WRCJV8- 2350-2400- 2483.5- 2533.5-40SS		4			Dec.10,2019
V	High Pass Filter	Wi	270	HKX10- )0-3000- 00-40SS	23		Dec.10,2018	Dec.10,2019

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# 6. ANTENNA PORT TEST RESULTS

# 6.1. ON TIME AND DUTY CYCLE

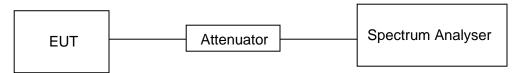
#### <u>LIMITS</u>

None; for reporting purposes only

#### PROCEDURE

KDB 558074 Zero-Span Spectrum Analyzer Method

#### TEST SETUP

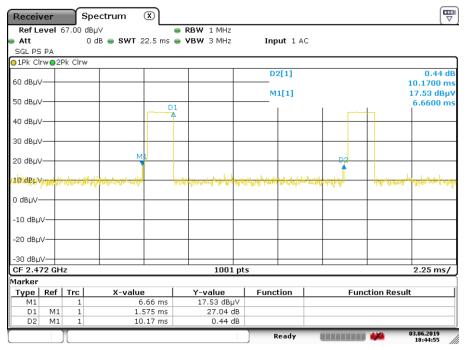


#### **RESULTS**

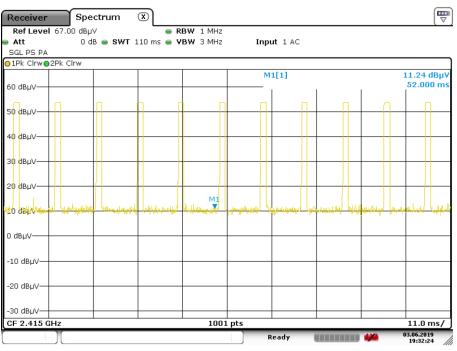
Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)
GFSK	14.175	100	0.142	14.2	-16.95

Note: Duty Cycle Correction Factor=20log(x). Where: x is Duty Cycle

#### ON TIME AND DUTY CYCLE PLOT-1



Date: 3.JUN.2019 18:44:55



#### ON TIME AND DUTY CYCLE PLOT-2

Date: 3.JUN.2019 19:32:24

Note: All the modes and buttons had been tested, but only the worst data recorded in the report.

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## 6.2. 20 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

#### **LIMITS**

CFR 47 FCC Part15 (15.249) , Subpart C						
Section Test Item		Limit	Frequency Range (MHz)			
CFR 47 FCC 15.249(d)	20dB Bandwidth	for reporting purposes only	2400-2483.5			

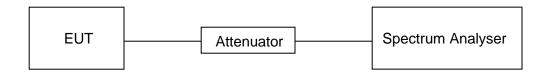
#### TEST PROCEDURE

Connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	1% to 5% of the occupied bandwidth
VBW	approximately 3×RBW
Trace	Max hold
Sweep	Auto couple

Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

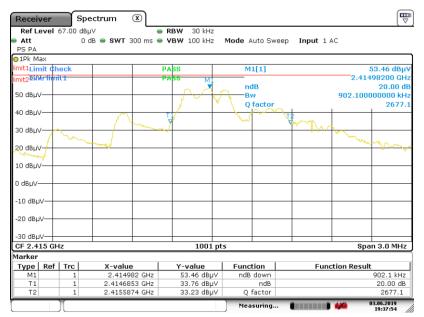
#### TEST SETUP



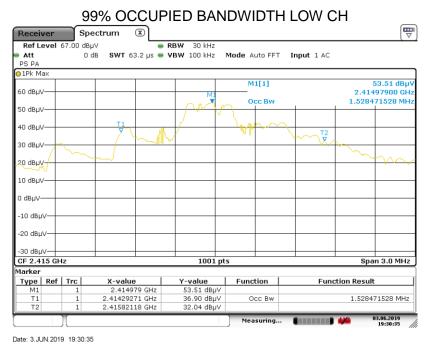


Frequency	20dB bandwidth	99% bandwidth	Result	
(MHz)	(MHz)	(MHz)		
2415	0.9021	1.5285	PASS	

#### 20 dB BANDWIDTH LOW CH



Date: 3.JUN.2019 19:37:54

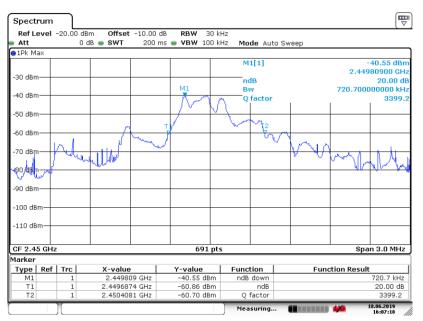


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Frequency (MHz)	• •		Result
2445	0.7207	1.5465	PASS

#### 20 dB BANDWIDTH MID CH



Date: 18.JUN.2019 16:07:18

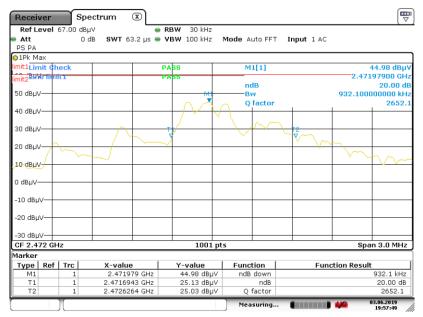


Receiver	Sp	ectrum (	×					
Ref Level	67.00 dB	μV	- R	BW 30 kHz				
Att	0	dB 👄 SWT 30	00 ms 👄 🖌	'BW 100 kHz	Mode Auto S	weep Input	1 AC	
PS PA								
1Pk Max								
					M1[1]			53.64 dBµV
60 dBµV				M1			2.44	997900 GHz
					Occ Bw	· .	1.5464	153546 MHz
50 dBµV				HV W				
40 dBuV		τ1.				$\sim$		
					- North	M o T	2	
30 dвµV—		1	Jammer Land				<u>.</u>	
1	m.						1	
20 dBµV	- V.	- margine					+V	$\uparrow \land \land \land \land$
" "mont								
10 dBµV								
0 dBµV								
-10 dBµV								
-10 0000								
-20 dBuV								
.								
-30 dBµV								
CF 2.45 GHz	z			1001 pt	s		Spa	an 3.0 MHz
1arker								
Type Ref	Trc	X-value		Y-value	Function	Fu	nction Resul	t
M1	1	2.44997		53.64 dBµV				
T1	1	2.4492897		36.55 dBµV	Occ Bw	/	1.5464	53546 MHz
T2	1	2.4508361	6 GHz	30.98 dBµV				
					Measurin	g		03.06.2019 19:41:31

Date: 3.JUN.2019 19:41:32

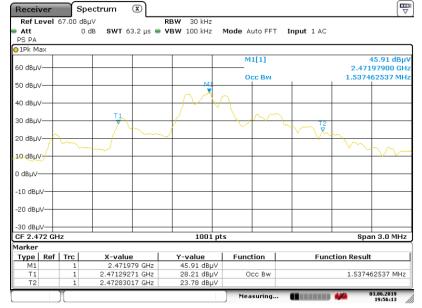
Frequency	20dB bandwidth	99% bandwidth	Result
(MHz)	(MHz)	(MHz)	
2472	0.9321	1.5375	PASS

#### 20 dB BANDWIDTH HIG CH



Date: 3.JUN.2019 19:57:49

#### 99% OCCUPIED BANDWIDTH HIG CH



Date: 3.JUN.2019 19:56:12

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# 7. RADIATED TEST RESULTS 7.1. LIMITS AND PROCEDURE

#### **LIMITS**

CFR 47 FCC §15.205 and §15.209

CFR 47 FCC §15.249 (a)(d)(e)

The field strength of emissions from intentional radiators operated within these frequency bands								
Frequency (MHz)								
902 - 928	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3					
2400 - 2483.5	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3					
5725 – 5875	50 mV/m (94dBuV/m)	500 uV/m (54dBuV/m)	3					

Emissions radiated outside of the specified frequency bands above 30MHz							
Frequency Range	Field Strength Limit	Field Strength Limit					
(MHz)	(uV/m) at 3 m	(dBuV/m) at 3 m					
(		Quasi-Peak					
30 - 88	100	40					
88 - 216	150	43.5					
216 - 960	200	46					
Above 960	500	54					
Above 1000	500	Peak	Average				
	500	74	54				

Emissions radiated outside of the specified frequency bands below 30MHz							
Frequency (MHz)         Field strength (microvolts/meter)         Measurement distance (meters)							
0.009-0.490	2400/F(kHz)	300					
0.490-1.705	24000/F(kHz)	30					
1.705-30.0	30	30					

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#### FCC Restricted bands of operation:

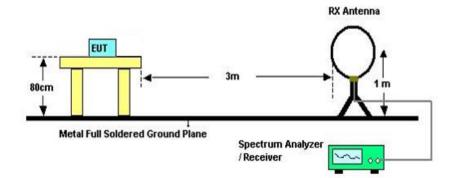
MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
<sup>1</sup> 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

Note: <sup>1</sup>Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. <sup>2</sup>Above 38.6c



#### TEST SETUP AND PROCEDURE

Below 30MHz



The setting of the spectrum analyser

RBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
VBW	200Hz (From 9kHz to 0.15MHz)/ 9KHz (From 0.15MHz to 30MHz)
Sweep	Auto
Detector	Peak/QP/ Average
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013

2. The EUT was arranged to its worst case and then turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm meter above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

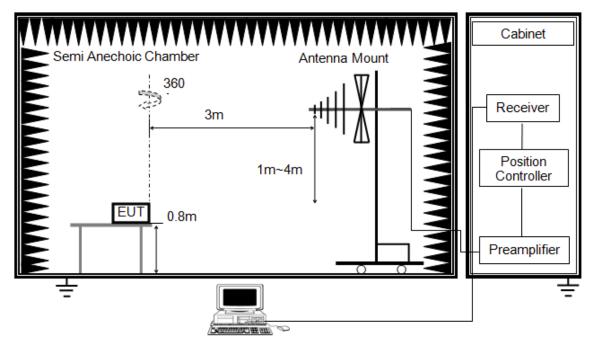
5. The radiated emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

6. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

7. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.



#### Below 1G



The setting of the spectrum analyser

RBW	120K
VBW	300K
Sweep	Auto
Detector	Peak/QP
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

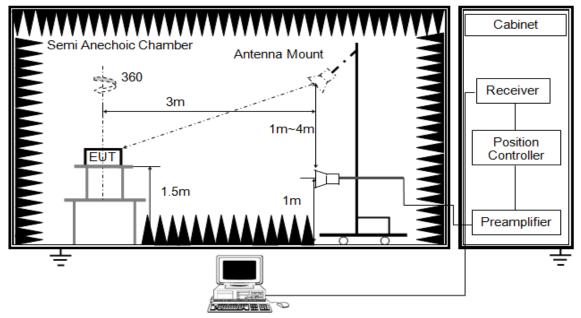
3. The EUT was placed on a turntable with 80cm above ground.

4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement below 1GHz, the initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured. If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.



#### Above 1G



The setting of the spectrum analyser

RBW	1M
IV BWV	PEAK: 3M AVG: see note 6
Sweep	Auto
Detector	Peak
Trace	Max hold

1. The testing follows the guidelines in ANSI C63.10-2013.

2. The EUT was arranged to its worst case and then tune the antenna tower (1.5 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

3. The EUT was placed on a turntable with 80cm above ground.

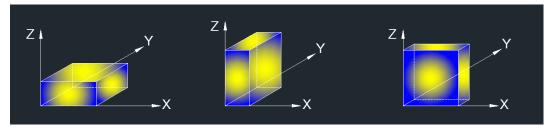
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.

5. For measurement above 1GHz, the emission measurement will be measured by the peak detector. This peak level, once corrected, must comply with the limit specified in Section 15.209.

6. For measurements above 1 GHz the resolution bandwidth is set to 1 MHz, then the video bandwidth is set to 3 MHz for peak measurements. Where necessary, average emission are determined by applying the Duty Cycle Correction Factor to the peak measurements. For the Duty Cycle and Correction Factor please refer to clause 6.1.ON TIME AND DUTY CYCLE.



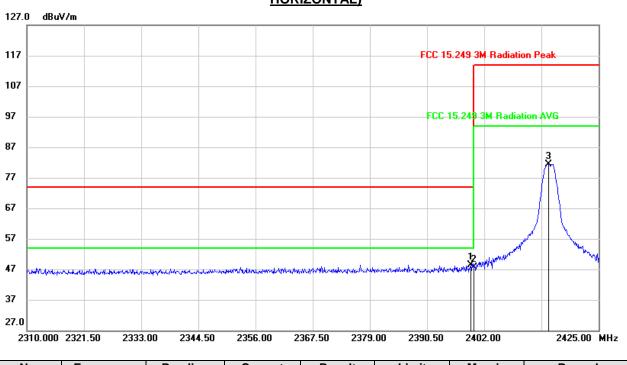
X axis, Y axis, Z axis positions:



Note 1: For all radiated test, EUT in each of three orthogonal axis emissions had been tested, but only the worst case (Z axis) data recorded in the report.



## 7.2. RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS



#### RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	2399.355	15.52	32.98	48.50	74.00	-25.50	peak
2	2400.000	14.61	32.98	47.59	74.00	-26.41	peak
3	2414.880	48.41	33.09	81.50	114.00	-32.50	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

#### 127.0 dBuV/m 117 FCC 15.249 3M Radiation Peak 107 97 CC 15.249 3M Radiation AVG 87 77 67 57 ыİ. 47 37 27.0 2310.000 2321.50 2333.00 2344.50 2356.00 2367.50 2379.00 2390.50 2402.00 2425.00 MHz

<b>RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (LOW CHANNEL,</b>
VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	2398.550	19.96	32.98	52.94	74.00	-21.06	peak
2	2400.000	19.03	32.98	52.01	74.00	-21.99	peak
3	2414.880	53.52	33.09	86.61	114.00	-27.39	peak

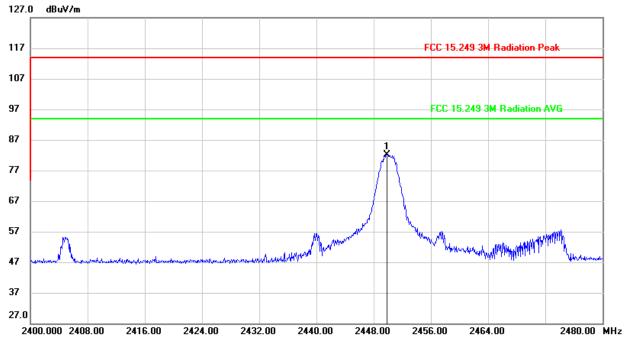
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



#### FIELD STRENGTH OF INTENTIONAL EMISSIONS (MIDDLE CHANNEL, HORIZONTAL)



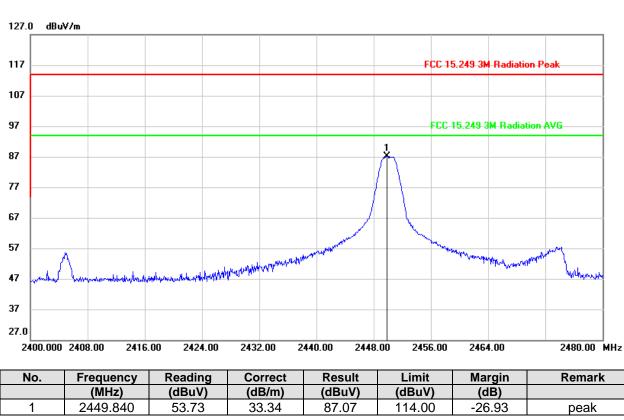
N	lo.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
		(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
	1	2449.840	48.77	33.34	82.11	114.00	-31.89	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.





#### FIELD STRENGTH OF INTENTIONAL EMISSIONS (MIDDLE CHANNEL, VERTICAL)

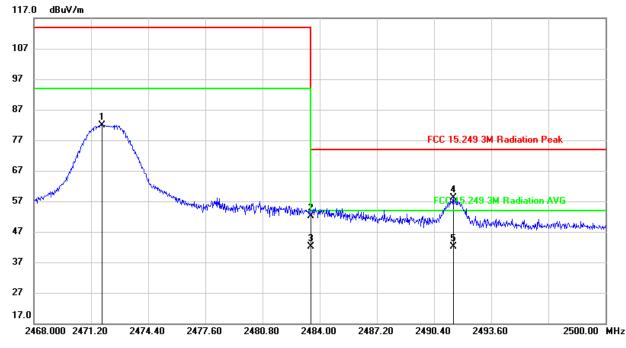
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.



#### RESTRICTED BANDEDGE AND FIELD STRENGTH OF INTENTIONAL EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	2471.808	48.42	33.50	81.92	114.00	-32.08	peak
2	2483.500	18.52	33.58	35.15	74.00	-38.85	peak
3	2483.500	18.52	33.58	18.20	54.00	-35.80	AVG
4	2491.488	24.62	33.63	58.25	74.00	-15.75	peak
5	2491.488	24.62	33.63	41.30	54.00	-12.70	AVG

Note: 1. Measurement = Reading Level + Correct Factor.

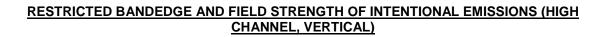
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

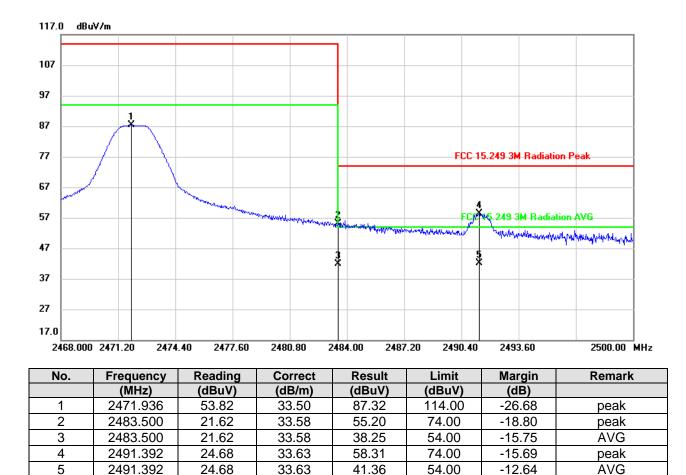
3. Peak: Peak detector.

4. AVG Result=Peak Result + Duty Cycle Correction Factor.

5. For transmit duration, please refer to clause 6.1.







Note: 1. Measurement = Reading Level + Correct Factor.

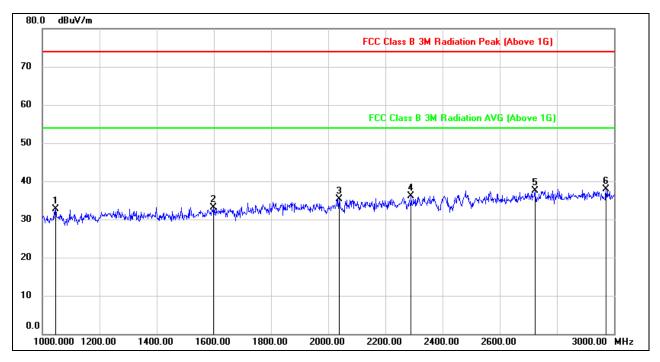
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. AVG Result=Peak Result + Duty Cycle Correction Factor.

5. For transmit duration, please refer to clause 6.1.

# 7.3. SPURIOUS EMISSIONS (1~3GHz)



#### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	1046.000	45.89	-13.25	32.64	74.00	-41.36	peak
2	1598.000	44.05	-10.85	33.20	74.00	-40.80	peak
3	2038.000	44.43	-9.11	35.32	74.00	-38.68	peak
4	2290.000	43.69	-7.54	36.15	74.00	-37.85	peak
5	2724.000	43.34	-5.81	37.53	74.00	-36.47	peak
6	2972.000	42.32	-4.44	37.88	74.00	-36.12	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

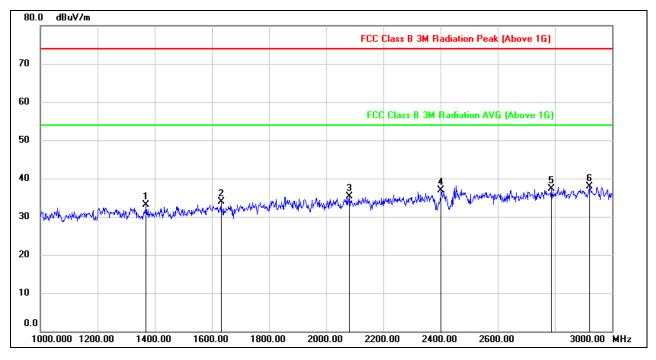
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. The Band Reject filter loss factor already add into the correct factor except band 2400~2483.5MHz.



#### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	1370.000	45.02	-11.89	33.13	74.00	-40.87	peak
2	1632.000	44.71	-10.75	33.96	74.00	-40.04	peak
3	2082.000	44.08	-8.74	35.34	74.00	-38.66	peak
4	2402.000	43.84	-7.00	36.84	74.00	-37.16	peak
5	2788.000	42.59	-5.36	37.23	74.00	-36.77	peak
6	2920.000	42.56	-4.66	37.90	74.00	-36.10	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

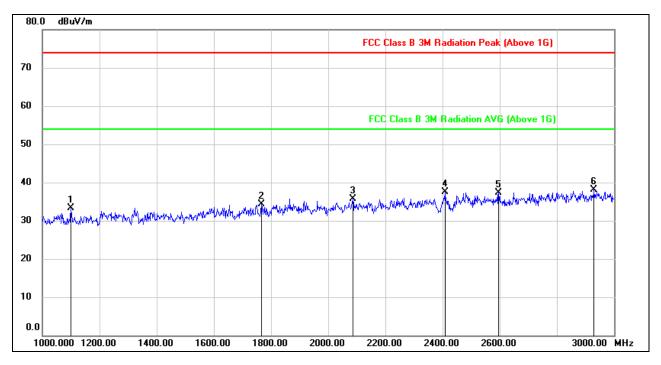
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. The Band Reject filter loss factor already add into the correct factor except band 2400~2483.5MHz.



#### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, HORIZONTAL)



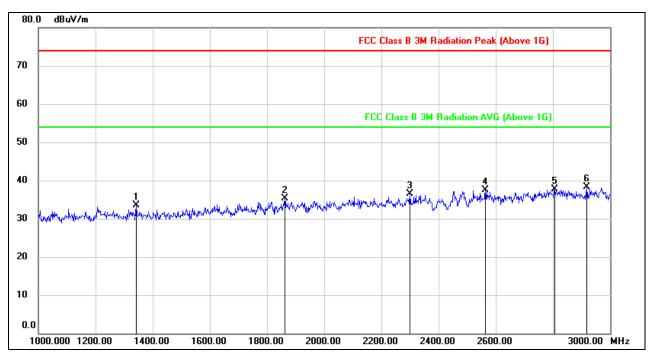
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	1100.000	46.47	-13.14	33.33	74.00	-40.67	peak
2	1766.000	44.27	-9.96	34.31	74.00	-39.69	peak
3	2086.000	44.37	-8.71	35.66	74.00	-38.34	peak
4	2408.000	44.37	-6.94	37.43	74.00	-36.57	peak
5	2596.000	43.96	-6.56	37.40	74.00	-36.60	peak
6	2930.000	42.69	-4.61	38.08	74.00	-35.92	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.
 Peak: Peak detector.

4. The Band Reject filter loss factor already add into the correct factor except band 2400~2483.5MHz.





#### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	1342.000	45.44	-11.87	33.57	74.00	-40.43	peak
2	1862.000	44.68	-9.45	35.23	74.00	-38.77	peak
3	2300.000	43.89	-7.47	36.42	74.00	-37.58	peak
4	2564.000	43.91	-6.43	37.48	74.00	-36.52	peak
5	2806.000	42.92	-5.25	37.67	74.00	-36.33	peak
6	2918.000	42.94	-4.67	38.27	74.00	-35.73	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

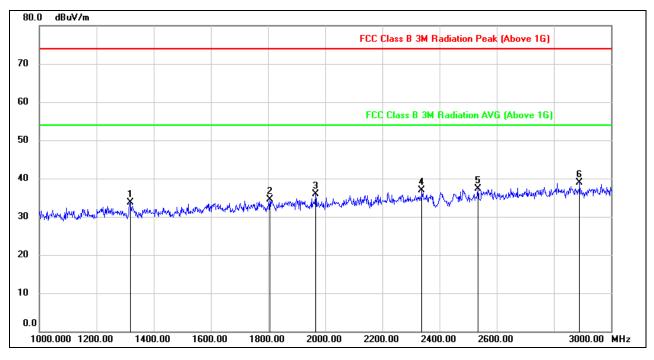
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. The Band Reject filter loss factor already add into the correct factor except band 2400~2483.5MHz.



#### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, HORIZONTAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	1318.000	45.48	-11.86	33.62	74.00	-40.38	peak
2	1806.000	44.21	-9.61	34.60	74.00	-39.40	peak
3	1966.000	45.24	-9.41	35.83	74.00	-38.17	peak
4	2338.000	44.19	-7.29	36.90	74.00	-37.10	peak
5	2534.000	43.68	-6.31	37.37	74.00	-36.63	peak
6	2890.000	43.68	-4.80	38.88	74.00	-35.12	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

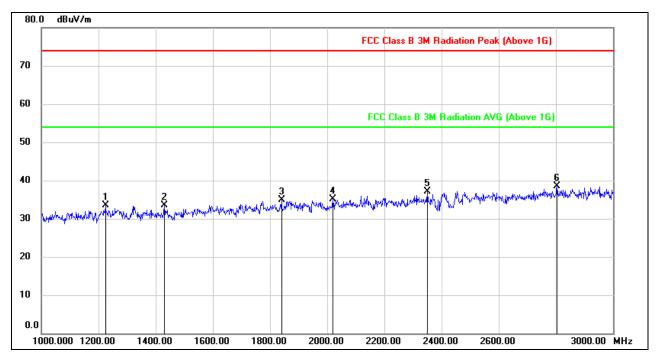
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. The Band Reject filter loss factor already add into the correct factor except band 2400~2483.5MHz.







No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	1224.000	45.57	-12.12	33.45	74.00	-40.55	peak
2	1430.000	45.32	-11.87	33.45	74.00	-40.55	peak
3	1840.000	44.38	-9.51	34.87	74.00	-39.13	peak
4	2020.000	44.31	-9.26	35.05	74.00	-38.95	peak
5	2350.000	44.37	-7.23	37.14	74.00	-36.86	peak
6	2804.000	43.69	-5.27	38.42	74.00	-35.58	peak

Note: 1. Peak Result = Reading Level + Correct Factor.

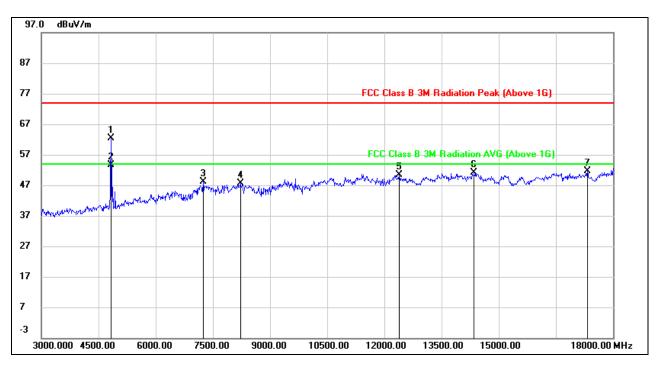
2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. The Band Reject filter loss factor already add into the correct factor except band 2400~2483.5MHz.



# 7.4. SPURIOUS EMISSIONS (3~18GHz)



#### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, HORIZONTAL)

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	4830.000	62.67	-0.20	62.47	74.00	-11.53	peak
2	4830.000	62.67	-0.20	45.52	54.00	-8.48	AVG
3	7245.000	41.08	7.00	48.08	74.00	-25.92	peak
4	8220.000	38.22	9.40	47.62	74.00	-26.38	peak
5	12390.000	35.97	14.32	50.29	74.00	-23.71	peak
6	14355.000	34.77	16.38	51.15	74.00	-22.85	peak
7	17325.000	29.94	21.80	51.74	74.00	-22.26	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

4. AVG Result=Peak Result + Duty Cycle Correction Factor.

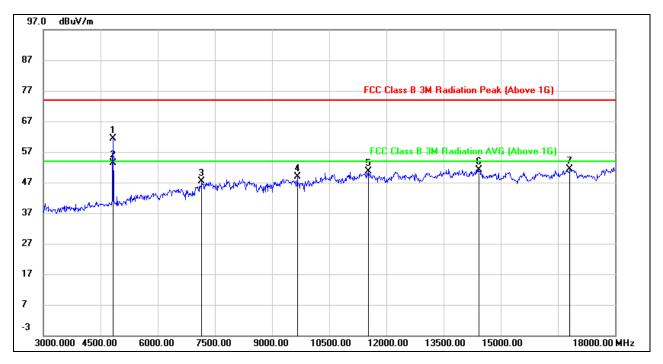
5. For the Duty Cycle and Correction Factor, please refer to clause 6.1.

6.The Band Reject filter loss factor already add into the correct factor.

7. Proper operation of the transmitter prior to adding the filter to the measurement chain.



### HARMONICS AND SPURIOUS EMISSIONS (LOW CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	4830.000	61.67	-0.20	61.47	74.00	-12.53	peak
2	4830.000	61.67	-0.20	44.52	54.00	-9.48	AVG
3	7155.000	40.50	6.88	47.38	74.00	-26.62	peak
4	9660.000	38.84	10.06	48.90	74.00	-25.10	peak
5	11520.000	36.48	14.10	50.58	74.00	-23.42	peak
6	14430.000	34.78	16.39	51.17	74.00	-22.83	peak
7	16815.000	31.41	19.92	51.33	74.00	-22.67	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

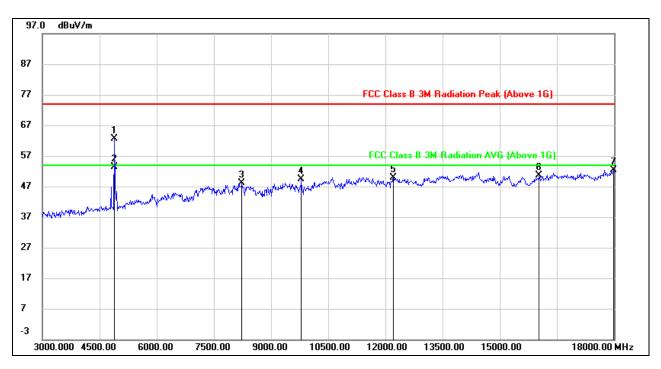
4. AVG Result=Peak Result + Duty Cycle Correction Factor.

5. For the Duty Cycle and Correction Factor, please refer to clause 6.1.

6.The Band Reject filter loss factor already add into the correct factor.







No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	4899.950	62.66	-0.09	62.57	74.00	-11.43	peak
2	4899.950	62.66	-0.09	45.62	54.00	-8.38	AVG
3	8235.000	38.83	9.23	48.06	74.00	-25.94	peak
4	9795.000	39.22	10.17	49.39	74.00	-24.61	peak
5	12210.000	35.59	14.25	49.84	74.00	-24.16	peak
6	16035.000	33.23	17.36	50.59	74.00	-23.41	peak
7	17985.000	29.22	23.25	52.47	74.00	-21.53	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

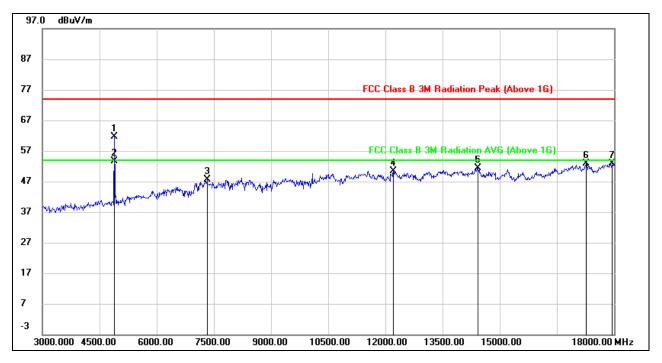
4. AVG Result=Peak Result + Duty Cycle Correction Factor.

5. For the Duty Cycle and Correction Factor, please refer to clause 6.1.

6.The Band Reject filter loss factor already add into the correct factor.



### HARMONICS AND SPURIOUS EMISSIONS (MID CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	4899.980	61.64	-0.09	61.55	74.00	-12.45	peak
2	4899.980	61.64	-0.09	44.60	54.00	-9.40	AVG
3	7320.000	40.55	7.20	47.75	74.00	-26.25	peak
4	12210.000	36.23	14.25	50.48	74.00	-23.52	peak
5	14430.000	35.06	16.39	51.45	74.00	-22.55	peak
6	17265.000	31.23	21.59	52.82	74.00	-21.18	peak
7	17955.000	29.54	23.23	52.77	74.00	-21.23	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

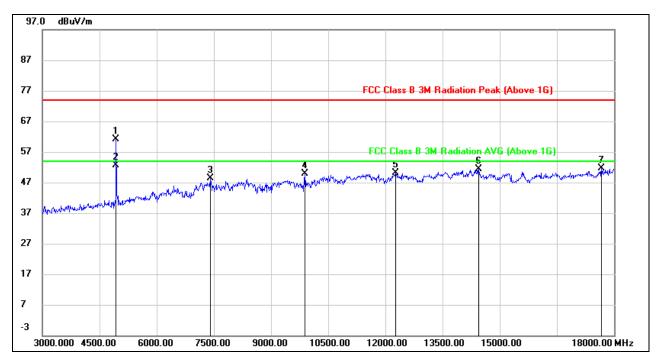
3. Peak: Peak detector.

4. AVG Result=Peak Result + Duty Cycle Correction Factor.

5. For the Duty Cycle and Correction Factor, please refer to clause 6.1.

6.The Band Reject filter loss factor already add into the correct factor.





No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	4943.871	61.02	0.17	61.19	74.00	-12.81	peak
2	4943.871	61.02	0.17	44.24	54.00	-9.76	AVG
3	7410.000	40.84	7.47	48.31	74.00	-25.69	peak
4	9885.000	39.27	10.49	49.76	74.00	-24.24	peak
5	12270.000	35.80	14.34	50.14	74.00	-23.86	peak
6	14445.000	35.02	16.37	51.39	74.00	-22.61	peak
7	17670.000	29.56	21.98	51.54	74.00	-22.46	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

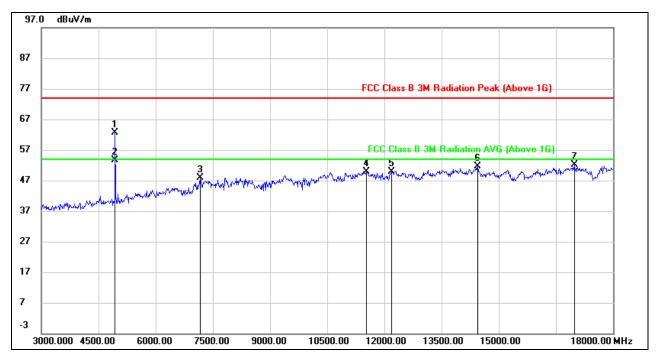
4. AVG Result=Peak Result + Duty Cycle Correction Factor.

5. For the Duty Cycle and Correction Factor, please refer to clause 6.1.

6.The Band Reject filter loss factor already add into the correct factor.



### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	4943.931	62.56	0.17	62.73	74.00	-11.27	peak
2	4943.931	62.56	0.17	45.78	54.00	-8.22	AVG
3	7170.000	41.01	6.87	47.88	74.00	-26.12	peak
4	11535.000	35.78	14.10	49.88	74.00	-24.12	peak
5	12195.000	35.73	14.24	49.97	74.00	-24.03	peak
6	14445.000	35.18	16.37	51.55	74.00	-22.45	peak
7	16980.000	31.98	20.25	52.23	74.00	-21.77	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

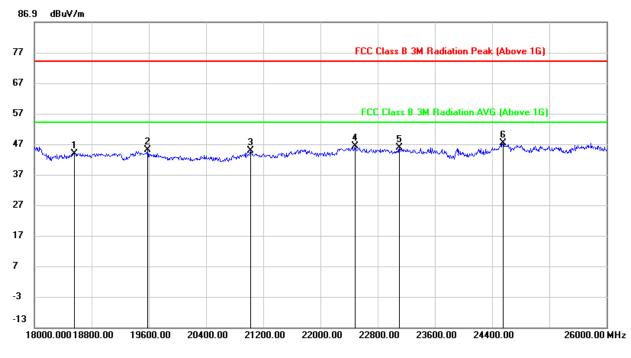
4. AVG Result=Peak Result + Duty Cycle Correction Factor.

5. For the Duty Cycle and Correction Factor, please refer to clause 6.1.

6.The Band Reject filter loss factor already add into the correct factor.

## 7.5. SPURIOUS EMISSIONS (18~26GHz)





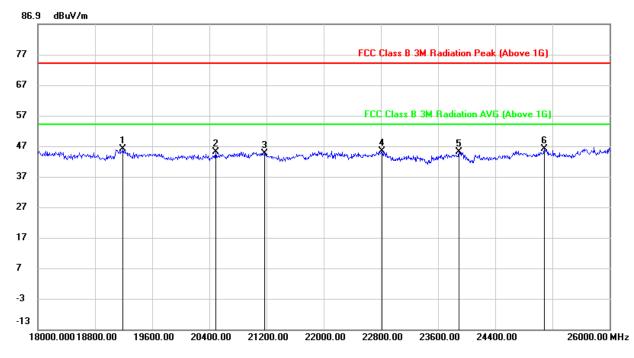
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	18560.000	48.37	-4.49	43.88	74.00	-30.12	peak
2	19584.000	49.67	-4.64	45.03	74.00	-28.97	peak
3	21024.000	50.12	-5.30	44.82	74.00	-29.18	peak
4	22480.000	51.98	-5.82	46.16	74.00	-27.84	peak
5	23104.000	51.35	-5.47	45.88	74.00	-28.12	peak
6	24552.000	49.64	-2.46	47.18	74.00	-26.82	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

3. Peak: Peak detector.

#### HARMONICS AND SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	19192.000	50.98	-5.01	45.97	74.00	-28.03	peak
2	20488.000	49.95	-4.96	44.99	74.00	-29.01	peak
3	21176.000	50.03	-5.44	44.59	74.00	-29.41	peak
4	22816.000	51.08	-5.71	45.37	74.00	-28.63	peak
5	23888.000	49.30	-4.29	45.01	74.00	-28.99	peak
6	25088.000	47.13	-1.12	46.01	74.00	-27.99	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV limit, AV Result is deemed to comply with AV limit.

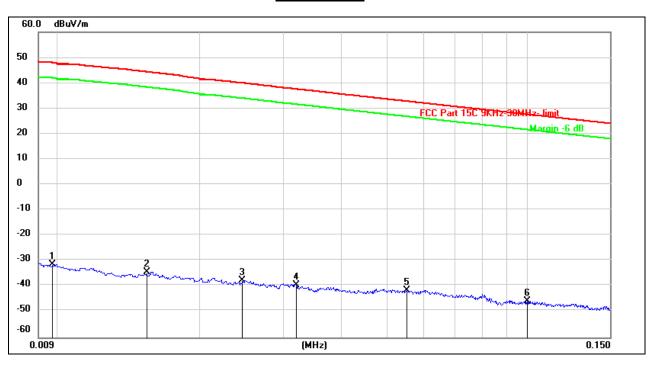
3. Peak: Peak detector.

Note: All test mode has been tested, only the worst data record in the report.



## 7.6. SPURIOUS EMISSIONS BELOW 30M

### SPURIOUS EMISSIONS (HIGH CHANNEL, LOOP ANTENNA FACE ON TO THE EUT, WORST-CASE CONFIGURATION)



9kHz~ 150kHz

No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	0.0097	69.93	-101.38	-31.45	47.83	-79.28	peak
2	0.0154	66.94	-101.37	-34.43	44.35	-78.78	peak
3	0.0246	63.70	-101.36	-37.66	39.96	-77.62	peak
4	0.0320	61.84	-101.40	-39.56	37.56	-77.12	peak
5	0.0551	59.95	-101.50	-41.55	32.81	-74.36	peak
6	0.1000	56.17	-101.80	-45.63	27.60	-73.23	peak

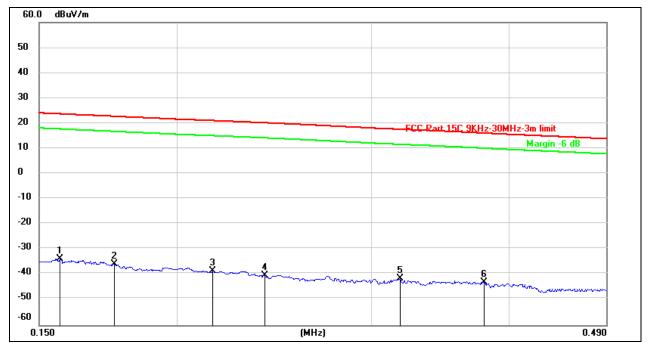
Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.



#### <u>150kHz ~ 490kHz</u>



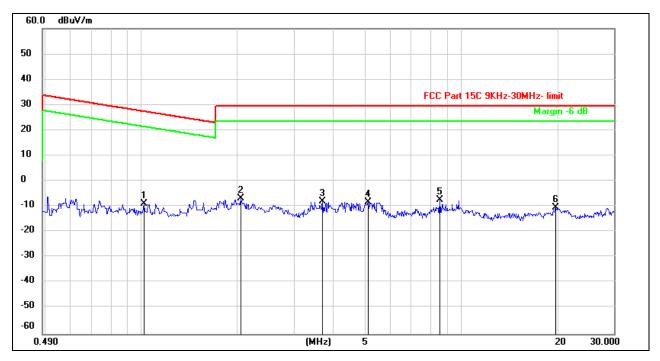
No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	0.1565	68.03	-101.65	-33.62	23.72	-57.34	peak
2	0.1756	65.84	-101.68	-35.84	22.72	-58.56	peak
3	0.2156	63.15	-101.75	-38.60	21.03	-59.63	peak
4	0.2404	61.45	-101.78	-40.33	20.16	-60.49	peak
5	0.3190	60.29	-101.88	-41.59	17.58	-59.17	peak
6	0.3800	59.02	-101.94	-42.92	16.06	-58.98	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

### <u>490kHz ~ 30MHz</u>



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV)	(dBuV)	(dB)	
1	1.0212	53.48	-62.25	-8.77	27.43	-36.20	peak
2	2.0430	54.95	-61.82	-6.87	29.54	-36.41	peak
3	3.6793	53.53	-61.41	-7.88	29.54	-37.42	peak
4	5.1230	53.19	-61.48	-8.29	29.54	-37.83	peak
5	8.5754	53.52	-61.00	-7.48	29.54	-37.02	peak
6	19.7895	50.42	-60.84	-10.42	29.54	-39.96	peak

Note: 1. Measurement = Reading Level + Correct Factor.

2. If Peak Result complies with AV and QP limit, AV and QP Result are deemed to comply with AV limit.

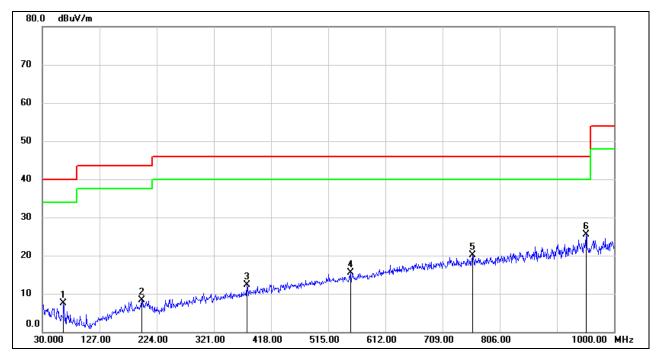
3. All 3 polarizations(Horizontal, Face-on and Face-off) of the loop antenna had been tested, but only the worst data recorded in the report.

Note: All test mode has been tested, only the worst data record in the report.



### 7.7. SPURIOUS EMISSIONS BELOW 1 GHz





No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	65.8900	27.34	-19.80	7.54	40.00	-32.46	QP
2	198.7800	24.61	-16.26	8.35	43.50	-35.15	QP
3	377.2600	24.96	-12.69	12.27	46.00	-33.73	QP
4	552.8300	24.83	-9.41	15.42	46.00	-30.58	QP
5	759.4400	25.80	-5.73	20.07	46.00	-25.93	QP
6	952.4700	28.79	-3.36	25.43	46.00	-20.57	QP

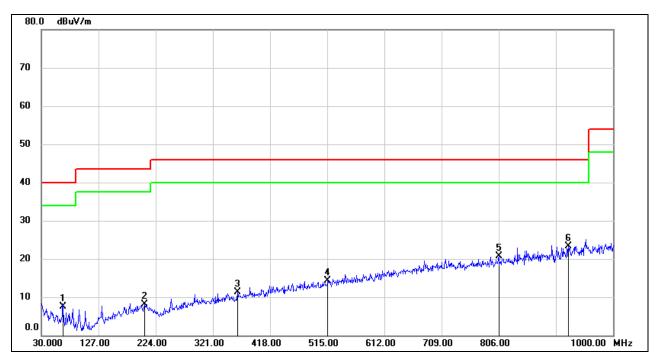
Note: 1. Result Level = Read Level + Correct Factor.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto.



### SPURIOUS EMISSIONS (HIGH CHANNEL, WORST-CASE CONFIGURATION, VERTICAL)



No.	Frequency	Reading	Correct	Result	Limit	Margin	Remark
	(MHz)	(dBuV)	(dB/m)	(dBuV/m)	(dBuV/m)	(dB)	
1	66.8600	27.40	-19.89	7.51	40.00	-32.49	QP
2	204.6000	24.05	-15.92	8.13	43.50	-35.37	QP
3	362.7100	24.24	-12.98	11.26	46.00	-34.74	QP
4	515.9699	24.40	-10.07	14.33	46.00	-31.67	QP
5	806.0000	25.92	-5.26	20.66	46.00	-25.34	QP
6	924.3400	27.16	-3.77	23.39	46.00	-22.61	QP

Note: 1. Result Level = Read Level + Correct Factor.

2. If Peak Result complies with QP limit, QP Result is deemed to comply with QP limit.

3. Test setup: RBW: 120 kHz, VBW: 300 kHz, Sweep time: auto

Note: All test mode has been tested, only the worst data record in the report.



## 8. ANTENNA REQUIREMENTS

### APPLICABLE REQUIREMENTS

### Please refer to FCC §15.203

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### Please refer to FCC §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### <u>RESULTS</u>

Complies

# END OF REPORT