

### FCC TEST REPORT 47 CFR FCC Part 15 Subpart B Report Reference No..... CTA-01-160700204 FCC ID..... H79Q3PLUS Compiled by kevm . Lin kevin . Lin Evic Wang File administrators Kevin Liu ( position+printed name+signature)...: Supervised by ( position+printed name+signature)..: Project Engineer Kevin Liu Approved by **RF** Manager Eric Wang ( position+printed name+signature)..: Date of issue..... July. 20, 2016 Representative Laboratory Name .: Shenzhen CTA Testing Technology Co., Ltd. Room 520,5th Floor, No.1053 Xixiang Baoyuan Road, Baoan Address ..... District, Shenzhen, China Testing Laboratory Name ..... Dongguan Yaxu (AiT) Technology Limited No. 22, JinQianLing Street 3, JiTiGang Village, Huang-Jiang Town, Address ..... DongGuan, Guangdong, 523757 China Applicant's name..... **Delta Electronics Incorporated** 3, Tungyuan Road Chungli Industrial Zone Taoyuan County 32063, Address ..... Taiwan Test specification ..... 47 CFR FCC Part 15 Subpart B - Unintentional Radiators Standard ..... ANSI C63.4: 2014 TRF Originator..... Shenzhen CTA Testing Technology Co., Ltd. Shenzhen CTA Testing Technology Co., Ltd. All rights reserved.

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Test item description	HD Pocket Projector
Trade Mark	VIVITEK
Manufacturer	Delta Electronics Incorporated
Model/Type reference	
Listed Models	Q3PLUS-WH, Q3PLUS-BK, Q3PLUS-RD, Q3PLUS-GD, Q3-BK, Q3-WH, Q3HP2704A, Q3HP2702A, Q3HP2706A, Q3HP2708
Rating	DC 7.40V / DC 12V adapter from AC 120V/60Hz
Hardware version:	2800-AV69S8-06 2016-06-08 V69+S805
Software version	V1.0-2016.07.18
Result	PASS

# **TEST REPORT**

Test Report No. :	СТ	A-01-160700204	July. 20, 2016			
			Date of issue			
Equipment under Test	:	HD Pocket Projector				
Model /Type	:	Q3PLUS				
Listed Models	:	Q3PLUS-WH, Q3PLUS-BK, Q3PLUS-RD, Q3PLUS-GD Q3-BK, Q3-WH, Q3HP2704A, Q3HP2702A, Q3HP2706 Q3HP2708				
Applicant	:	Delta Electronics Inco	rporated			
Address	:	3, Tungyuan Road Chur County 32063, Taiwan	ngli Industrial Zone Taoyuan			
Manufacturer	:	Delta Electronics Inco	rporated			
Address	:	3, Tungyuan Road Chur County 32063, Taiwan	ngli Industrial Zone Taoyuan			

Test Result: PASS	
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The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

# **Revison History**

Revision	Issue Date	Revisions	Revised By
V1.0	2016-07-20	Initial Issue	Eric Wang

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# 1 <u>TEST STANDARDS</u>

The tests were performed according to following standards:

47 CFR FCC Part 15 Subpart B - Unintentional Radiators

<u>ANSI C63.4: 2014</u> – American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40GHz

# 2 <u>SUMMARY</u>

### 2.1 General Remarks

Date of receipt of test sample	:	Feb. 15, 2016
Testing commenced on	:	Feb. 16, 2016
Testing concluded on	:	Feb. 29, 2016

### 2.2 Product Description

The **Delta Electronics Incorporated's** Model: Q3PLUS or the "EUT" as referred to in this report; more general information as follows, for more details, refer to the user's manual of the EUT.

Name of EUT	HD Pocket Projector
Model Number	Q3PLUS
Modilation Type	GFSK,8DPSK,π/4DQPSK
Antenna information	Internal and maximum gain is 2.541dBi
BT FCC Operation frequency	2402MHz-2480MHz
Extreme temp. Tolerance	-30°C to +50°C
Extreme vol. Limits	6.00VDC to 8.40VDC (nominal: 7.40VDC)
	Mode:ADP-36PH A
Adapter information	Input:AC 100-240V 50/60Hz 1A
	Output:DC12V 3A

### 2.3 Equipment under Test

### Power supply system utilised

Power supply voltage	:	0	120V / 60 Hz	0	115V / 60Hz
		0	12 V DC	0	24 V DC
		•	Other (specified in blank below)		

#### DC 7.40V / DC 12V adapter from AC 120V/60Hz

### 2.4 General Test Conditions/Configurations

### 2.4.1 Test Modes

NOTE: The test mode(s) are selected according to relevant radio technology specifications.

Test Mode	Test Modes Description
TM1	data exchange with PC by USB
TM2	data exchange with PC by HDMI
TM3	data exchange with PC by HDMI and USB together

### 2.4.2 Test Environments

NOTE: The values used in the test report maybe stringent than the declared.

Environment Parameter	Selected Values During Tests				
NTNV	Temperature	Voltage	Relative Humidity		
	Ambient	7.40VDC	Ambient		

### 2.5 EUT operation mode

The EUT has been tested under typical operating condition.

### 2.6 Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for **FCC ID: H79Q3PLUS** filing to comply with FCC Part 15, Subpart B Rules.

### 2.7 Modifications

No modifications were implemented to meet testing criteria.

### 2.8 EUT configuration

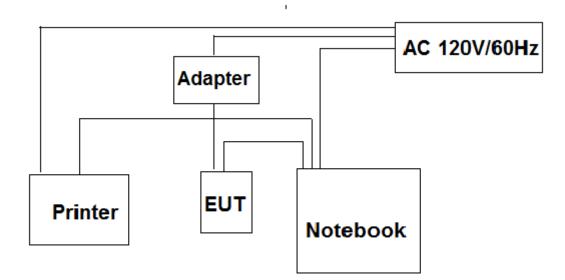
#### The following peripheral devices and interface cables were connected during the measurement:

- - supplied by the manufacturer
- $\ensuremath{\bigcirc}$  supplied by the lab

Ο	Power Cable	Length (m) :	/
		Shield :	1
		Detachable :	1
0	Multimeter	Manufacturer :	1
		Model No. :	1

### 2.9 Configuration of Tested System

#### **Configuration of Tested System**



#### Equipment Used in Tested System

No.	Equipment	Manufacturer	Model No.	Serial No.	Length	shielded/unshielded	Notes
1	Notebook	ASUS	R510V	A131101550	/	/	DOC
5	Printer	Epson	R230	R8792T58	/	/	DOC

### V1.0

# 3 TEST ENVIRONMENT

### 3.1 Address of the test laboratory

#### Dongguan Yaxu (AiT) Technology Limited

No. 22, JinQianLing Street 3, JiTiGang Village, Huang-Jiang Town, DongGuan, Guangdong, 523757 China

There is one 3m semi-anechoic chamber and two line conducted labs for final test. The Test Sites meet the requirements in documents ANSI C63.4, CISPR 22/EN 55022 and CISPR16-1-4:2010 SVSWR requirements.

### 3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS- Registration No: L6177

Dongguan Yaxu (AiT) technology Limited is accredited to ISO/IEC 17025:2005 general Requirements for the competence of testing and calibration laboratories (CNAS-CL01 Accreditation Criteria for the competence of testing and calibration laboratories) on Apr. 18, 2013

#### FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Dongguan Yaxu (AiT) Technology Limited have been registered by Federal Communications Commission (FCC) on Aug.29, 2014.

#### Industry Canada(IC)-Registration No: IC6819A

The 3m Semi-Ánechoic Chamber and 3m/10m Open Area Test Site of Dongguan Yaxu (AiT) Technology Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Oct. 01, 2014.

#### VCCI- Registration No: 2705

The 3m/10m Open Area Test Site, Shielding Room and 3m Chamber of Dngguan Yaxu (AiT) technology Limited have been registered by Voluntary Control Council for Interference on Nov. 21, 2012. The Telecommunication Ports Conducted Disturbance Measurement of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on May. 13, 2013.

### 3.3 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	950-1050mbar

### 3.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Dongguan Yaxu (AiT) Technology Limited quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for CTL laboratory is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.5 dB	(1)
Radiated Emission	1~18GHz	4.6 dB	(1)
Conducted Disturbance	0.009~30MHz	3.5 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.5 Test Conditions

Test Case	Test Conditions	
Test Case	Configuration	Description
	Meas. Method	ANSI C63.4:2014
AC Conducted Emission	Test Environment	NTNV
	EUT Conf.	TM1, TM2, TM3
	Meas. Method	ANSI C63.4:2014
Radiated Emission	Test Environment	NTNV
	EUT Conf.	TM1, TM2, TM3

Note:

1. We pre-test both AC 120V/60Hz and AC 240V/50Hz for AC conducted emission, recorded worst case at AC 120V/60Hz;

### 3.6 Summary of measurement results

Test Specification clause	Test case	Test Mode	Recorded In Report	Pass	Fail	NA	NP	Remark
§15.107(a)	Conducted Emissions < 30 MHz	TM1, TM2, TM3	TM3	$\boxtimes$				complies
§15.109	Radiated Emissions (30 MHz – 18GHz)	TM1, TM2, TM3	TM3					complies

Remark:

1. The measurement uncertainty is not included in the test result.

2. NA = Not Applicable; NP = Not Performed

3. We tested all test mode and recorded worst case in report

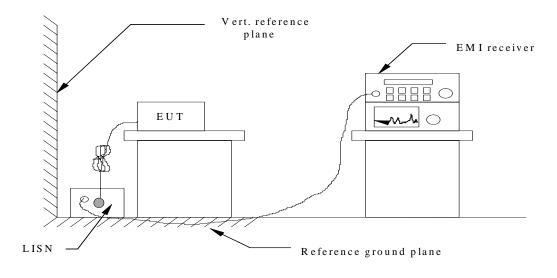
No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2016/06/29	2017/06/28
2	EMI Measuring Receiver	R&S	ESR	101660	2016/06/29	2017/06/28
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2016/06/29	2017/06/28
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2016/06/29	2017/06/28
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2016/06/29	2017/06/28
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120D	452	2016/06/29	2017/06/28
7	SHF-EHF Horn	SCHWARZBECK	BBHA9170	BBHA9170367	2016/06/29	2017/06/28
8	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016/06/29	2017/06/28
9	EMI Test Receiver	R&S	ESCI	100124	2016/06/29	2017/06/28
10	LISN	Kyoritsu	KNW-242	8-837-4	2016/06/29	2017/06/28
11	LISN	Kyoritsu	KNW-407	8-1789-3	2016/06/29	2017/06/28
12	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016/06/29	2017/06/28
13	Loop Antenna	ARA	PLA-1030/B	1029	2016/06/29	2017/06/28
14	Radiated Cable 1# (30MHz-1GHz)	FUJIKURA	5D-2W	01	2016/06/29	2017/06/28
15	Radiated Cable 2# (1GHz -25GHz)	FUJIKURA	10D2W	02	2016/06/29	2017/06/28
16	Conducted Cable 1#(9KHz-30MHz)	FUJIKURA	1D-2W	01	2016/06/29	2017/06/28
17	Power Meter	Anritsu	ML2495A	N/A	2016/06/29	2017/06/28
18	Power sensor	Anritsu	MA2411B	N/A	2016/06/29	2017/06/28
19	Signal Analyzer	Agilent	N9020A	MY49430428	2016/06/07	2017/06/06

## 3.7 Equipment Used during the Test

## 4 TEST CONDITIONS AND RESULTS

#### 4.1 Conducted Emissions Test

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. 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 C63.4-2014.
- 2. Support equipment, if needed, was placed as per ANSI C63.4-2014.
- 3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.4-2014.
- 4. The EUT received AC120V/60Hz power through a Line Impedance Stabilization Network (LISN) which supplied power source and was grounded to the ground plane.
- 5. All support equipments received AC power from a second LISN, if any.
- 6. The EUT 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.

#### CONDUCTED POWER LINE EMISSION LIMIT

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

Frequency	Maximum RF Line Voltage (dBµV)					
Frequency (MHz)	CLASS A		CLASS B			
	Q.P.	Ave.	Q.P.	Ave.		
0.15 - 0.50	79	66	66-56*	56-46*		
0.50 - 5.00	73	60	56	46		
5.00 - 30.0	73	60	60	50		

\* Decreasing linearly with the logarithm of the frequency

#### TEST RESULTS

Note: We tested TM1, TM2 and TM3, recorded worst case at TM3.

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0.2700

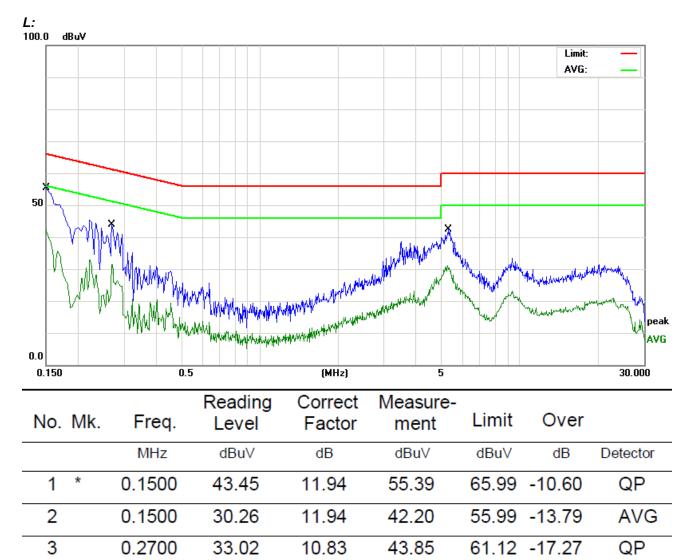
5.2700

5.2940

20.64

20.97

32.39



10.83

10.12

10.12

31.47

31.09

42.51

51.12 -19.65

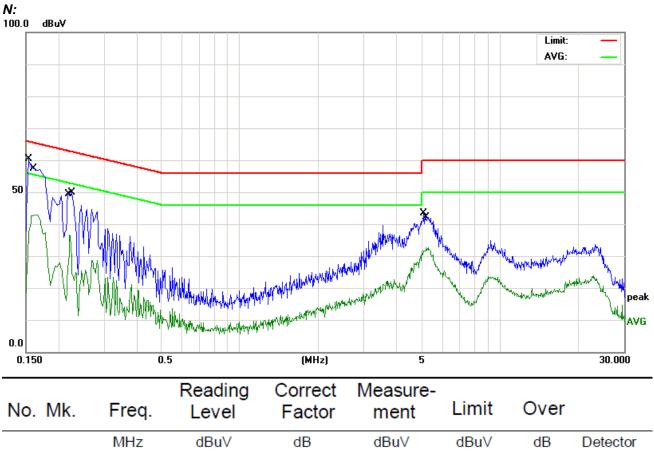
50.00 -18.91

60.00 -17.49

AVG

AVG

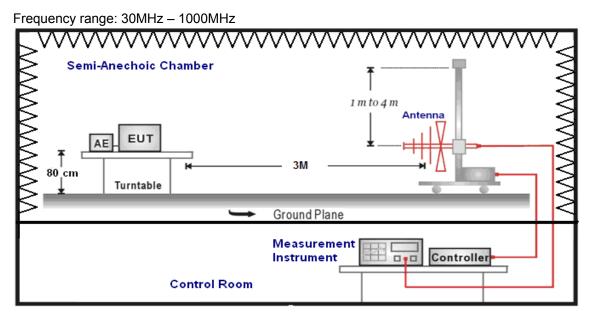
QP



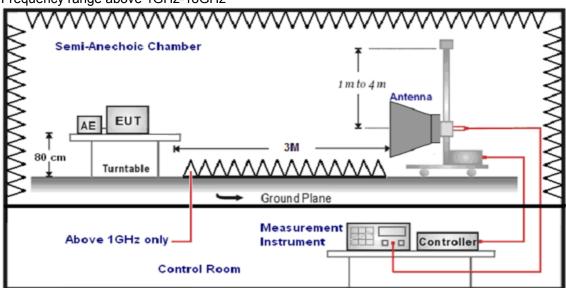
No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over	
	MHz	dBuV	dB	dBuV	dBu∨	dB	Detector
1 *	0.1539	48.49	11.84	60.33	65.78	-5.45	QP
2	0.1620	31.09	11.68	42.78	55.36	-12.58	AVG
3	0.2220	25.56	10.98	36.54	52.74	-16.20	AVG
4	0.2260	38.96	10.96	49.92	62.59	-12.67	QP
5	5.0939	33.25	10.11	43.36	60.00	-16.64	QP
6	5.2100	22.63	10.11	32.74	50.00	-17.26	AVG

### 4.2 Radiated Emission Test

### TEST CONFIGURATION



#### Frequency range above 1GHz-18GHz



#### TEST PROCEDURE

- 1. The EUT is placed on a turntable, which is 0.8m above ground plane.
- 2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 6. Repeat above procedures until the measurements for all frequencies are complete.
- 7. The maximum operation frequency was 2.48GHz, the radiated emission test frequency from 30 MHz to 18GHz.
- 8. The distance between test antenna and EUT as following table states:

	Test Frequency range	Test Antenna Type	Test Distance
	30MHz-1GHz	Ultra-Broadband Antenna	3
	1GHz-18GHz	Double Ridged Horn Antenna	3
0 - 4	the endered and a short of a statement of the second s	fallessie stable states	

9. Setting test receiver/spectrum as following table states:

Test Frequency range	Test Receiver/Spectrum Setting	Detector	
9KHz-150KHz	RBW=200Hz/VBW=3KHz,Sweep time=Auto	QP	
150KHz-30MHz	RBW=9KHz/VBW=100KHz,Sweep time=Auto	QP	
30MHz-1GHz	RBW=120KHz/VBW=1000KHz,Sweep time=Auto	QP	
	Peak Value: RBW=1MHz/VBW=3MHz,	Peak	
1GHz-40GHz	Sweep time=Auto	reak	
10112-400Hz	Average Value: RBW=1MHz/VBW=10Hz,	Peak	
	Sweep time=Auto	Реак	

#### FIELD STRENGTH CALCULATION

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor (if any) from the measured reading. The basic equation with a sample calculation is as follows:

#### FS = RA + AF + CL - AG

Where FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude	AG = Amplifier Gain
AF = Antenna Factor	

For example

Frequency	FS	RA	AF	CL	AG	Transd
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(dB)	(dB)	(dB)
300.00	40	58.1	12.2	1.6	31.90	

Transd=AF +CL-AG

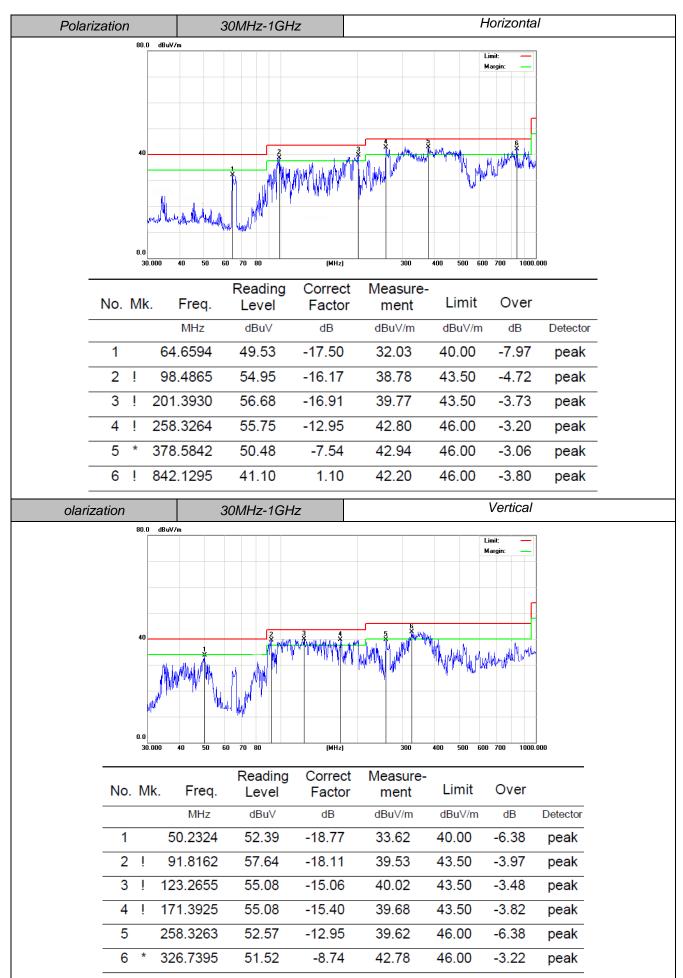
#### **RADIATION LIMIT**

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency (MHz)	Distance (Meters)	Radiated (dBµV/m)	Radiated (µV/m)
0.009-0.49	300	20log(2400/F(KHz))+80	2400/F(KHz)
0.49-1.705	30	20log(24000/F(KHz))+40	24000/F(KHz)
1.705-30	30	20log(30)+40	30
30-88	3	40.0	100
88-216	3	43.5	150
216-960	3	46.0	200
Above 960	3	54.0	500

#### TEST RESULTS

Note: We tested TM1, TM2 and TM3, recorded worst case at TM3.



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Vertical
Vertical
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#### For 1 GHz – 18 GHz

#### Remark:

- 1. According to FCC part 15.33(b) require <if highest frequency generated or used in the device or on which the device operates or tunes, the higest measure frequency up to 5<sup>th</sup> harmonic of the highest frequency or 40 GHz, whichever is lower>, the sample highest operate frequency is 2.48GHz, need meausred highest frequency up to 12.4GHz, we measured frequency range up to 18GHz;
- 2. Over Limit = Emission level Limit value
- 3. "---" means emission in Peak detector below Average limits;
- 4. Emission level (dBuV/m) =Raw Value (dBuV)+Correction Factor (dB/m)
- 5. Correction Factor (dB/m) = Antenna Factor (dB/m)+Cable Factor (dB)-Pre-amplifier Factor
- 6. RBW=1MHz VBW=3MHz Peak detector is for PK value; RBW=1MHz VBW=10Hz Peak detector is for AV value.

## 5 <u>Test Setup Photos of the EUT</u>

Please refer to separated files for Test Setup Photos of the EUT.

## 6 External Photos of the EUT

Please refer to separated files for External Photos of the EUT.

## 7 Internal Photos of the EUT

Please refer to separated files for Internal Photos of the EUT.

.....End of Report.....