FCC RADIO TEST REPORT-BLE
FCC ID:2AFZT-L1

Product：	Intelligent micro laser projection
Trade Name：	LTV
Model Name：	L1
Serial Model：	N/A
Report No.：	NTEK-2015NT07162286F3

Prepared for

ILLUMINANCE(CANTON) Co.,LTD.

Room 17B, 17th floor, building A, central avenue, No.2002 BaoYuan Road, XiXiang, Bao'an disrict, Shenzhen, Guangdong, P. R. China

Prepared by

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Website:www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name	ILLUMINANCE(CANTON) Co.,LTD.
Address.....	Room 17B, 17th floor, building A, central avenue, No.2002 BaoYuan Road,XiXiang, Bao'an disrict, Shenzhen, Guangdong, P. R. China
Manufacture's Name ..	ILLUMINANCE(CANTON) Co.,LTD.
Address.....	Room 17B, 17th floor, building A, central avenue, No.2002 BaoYuan Road,XiXiang, Bao'an disrict, Shenzhen, Guangdong, P. R. China
Product description	
Product name.....	Intelligent micro laser projection
Model and/or type reference	L1
Serial Model	N/A
Standards	FCC Part15.247: 01 Oct. 2014
Test procedure	ANSI C63.10-2013 and KDB 558074: June 5, 2014

This device described above has been tested by NTEK, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.

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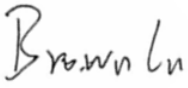
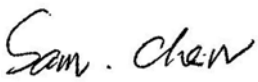
Date of Test .....:	
Date (s) of performance of tests.....:	16 Jul. 2015 ~01 Sep. 2015
Date of Issue .....:	01 Sep. 2015
Test Result.....:	**Pass**

Testing Engineer : 

(Allen Liu)

Technical Manager : 

(Brown Lu)

Authorized Signatory : 

(Sam Chen)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247 (a)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

(1)” N/A” denotes test is not applicable in this Test Report

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd
Add.:1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.
FCC Registration No.:238937; IC Registration No.:9270A-1
CNAS Registration No.:L5516

1.2 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** %。

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	RF power,conducted	±0.16dB
3	Spurious emissions,conducted	±0.21dB
4	All emissions,radiated(<1G)	±4.68dB
5	All emissions,radiated(>1G)	±4.89dB
6	Temperature	±0.5°C
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>Intelligent micro laser projection</td></tr>
<tr><td>Trade Name</td><td>LTV</td></tr>
<tr><td>Model Name</td><td>L1</td></tr>
<tr><td>Serial Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Intelligent micro laser projection
<table>
<tr><td>Operation Frequency:</td><td>2402~2480MHz</td></tr>
<tr><td>Modulation Type:</td><td>GFSK</td></tr>
<tr><td>Number Of Channel</td><td>40CH</td></tr>
<tr><td>Antenna Designation:</td><td>Please see Note 3.</td></tr>
<tr><td>Antenna Gain (dBi)</td><td>1.0dBi</td></tr>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Ratings</td><td>DC 3.7V</td></tr>
<tr><td>Adapter</td><td>Mode : S31A22
Input: 100-240V~, 50/60Hz, 0.35A
Output: 5.0V⎓, 2.0A</td></tr>
<tr><td>Battery</td><td>DC 3.7V, 3000mAh</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

1. For a more detailed features description, please refer to the manufacturer’s specifications or the User's Manual.

2.

Channel	Frequency (MHz)
00	2402
01	2404
……	……
……	…….
…	…
……	……
38	2478
39	2480

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	FPCB Antenna	N/A	1.0	BT Antenna

2.2 DESCRIPTION OF TEST MODES

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned above was evaluated respectively.

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH19
Mode 3	CH39
Mode 4	Link Mode

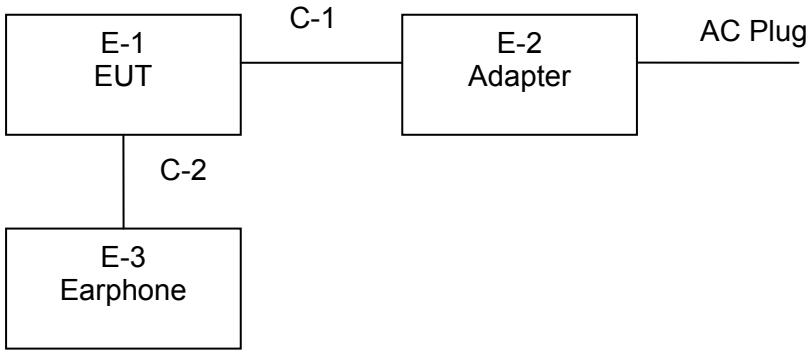
Note:

(1) The measurements are performed at the highest, middle, lowest available channels.

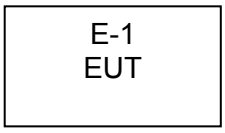
(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	Intelligent micro laser projection	LTV	L1	N/A	EUT
E-2	Adapter	N/A	S31A22	N/A	
E-3	Earphone	N/A	2688		

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	1.2m	
C-2	NO	NO	1.0m	

Note:

(1) The support equipment was authorized by Declaration of Confirmation.
(2) For detachable type I/O cable should be specified the length in cm in『Length』column.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2015.07.06	2016.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2015.06.07	2016.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2015.07.06	2016.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.07	2016.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2015.06.07	2016.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2015.07.06	2016.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2015.07.06	2016.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2015.07.06	2016.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2015.06.06	2016.06.05	1 year
2	LISN	R&S	ENV216	101313	2015.08.24	2016.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2015.08.24	2016.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.07	2016.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2015.06.07	2016.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2015.06.08	2016.06.07	1 year

2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2014.08.24	2015.08.23	1 year

1	Attenuation	MCE	24-10-34	BN9258	2015.06.08	2016.06.07	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

3.1.1 POWER LINE CONDUCTED EMISSION Limits (Frequency Range 150KHz-30MHz)

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)		Standard
	Quasi-peak	Average	Quasi-peak	Average	
0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	CISPR
0.50 -5.0	73.00	60.00	56.00	46.00	CISPR
5.0 -30.0	73.00	60.00	60.00	50.00	CISPR

0.15 -0.5	79.00	66.00	66 - 56 *	56 - 46 *	FCC
0.50 -5.0	73.00	60.00	56.00	46.00	FCC
5.0 -30.0	73.00	60.00	60.00	50.00	FCC

Note:

(1) The tighter limit applies at the band edges.

(2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

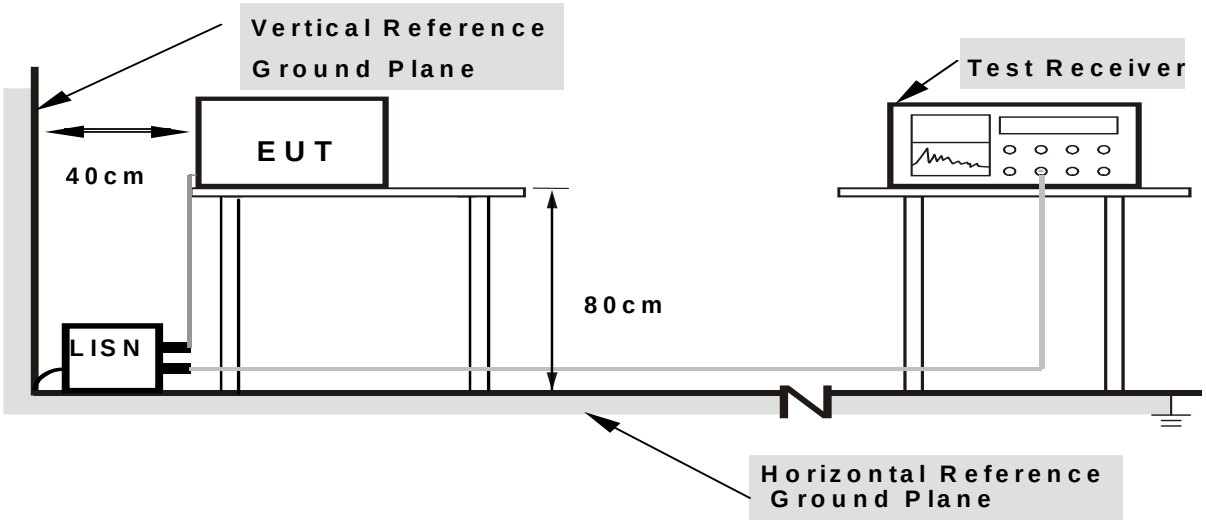
3.1.2 TEST PROCEDURE

a. The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.
b. Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.
c. I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
d. LISN at least 80 cm from nearest part of EUT chassis.
e. For the actual test configuration, please refer to the related Item –EUT Test Photos.

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

3.1.5 EUT OPERATING CONDITIONS

The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

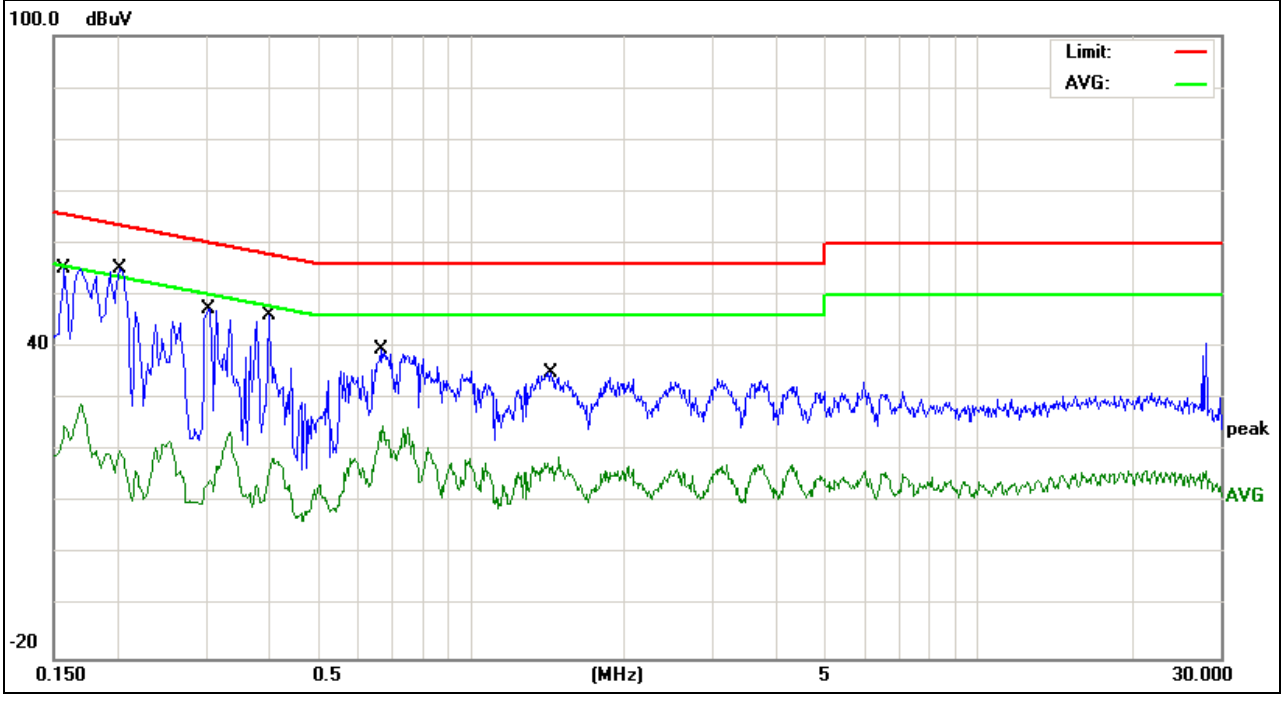
3.1.6 TEST RESULTS

EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form Adapter AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1580	45.59	9.62	55.21	65.56	-10.35	QP
0.1580	30.40	9.62	40.02	55.56	-15.54	AVG
0.2020	45.69	9.60	55.29	63.52	-8.23	QP
0.2020	31.66	9.60	41.26	53.52	-12.26	AVG
0.3020	37.54	9.74	47.28	60.19	-12.91	QP
0.3020	29.51	9.74	39.25	50.19	-10.94	AVG
0.3980	36.90	9.37	46.27	57.89	-11.62	QP
0.3980	25.65	9.37	35.02	47.89	-12.87	AVG
0.6620	29.91	9.78	39.69	56.00	-16.31	QP
0.6620	19.66	9.78	29.44	46.00	-16.56	AVG
1.4340	25.49	9.70	35.19	56.00	-20.81	QP
1.4340	15.95	9.70	25.65	46.00	-20.35	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

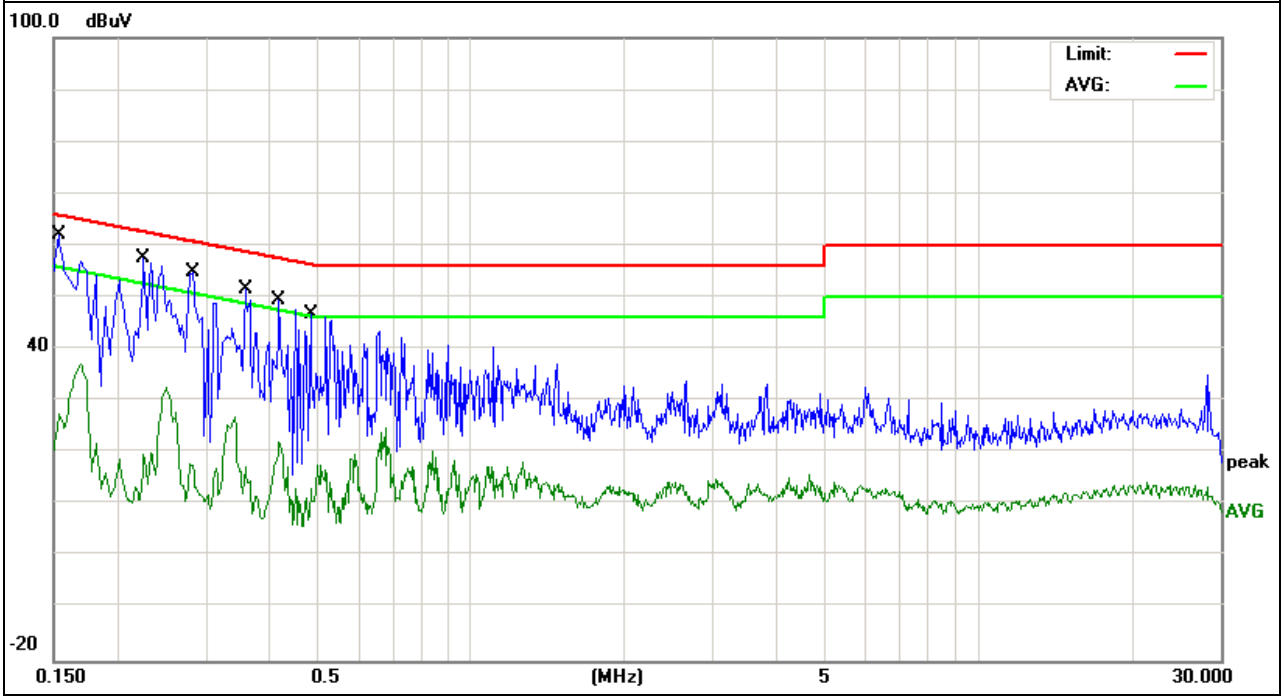


EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form Adapter AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1539	52.34	9.60	61.94	65.78	-3.84	QP
0.1539	30.61	9.60	40.21	55.78	-15.57	AVG
0.2260	47.81	9.61	57.42	62.59	-5.17	QP
0.2260	31.41	9.61	41.02	52.59	-11.57	AVG
0.2819	45.16	9.61	54.77	60.76	-5.99	QP
0.2819	33.65	9.61	43.26	50.76	-7.50	AVG
0.3580	42.00	9.63	51.63	58.77	-7.14	QP
0.3580	29.95	9.63	39.58	48.77	-9.19	AVG
0.4180	39.78	9.64	49.42	57.49	-8.07	QP
0.4180	21.94	9.64	31.58	47.49	-15.91	AVG
0.4820	37.11	9.68	46.79	56.30	-9.51	QP
0.4820	20.09	9.68	29.77	46.30	-16.53	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

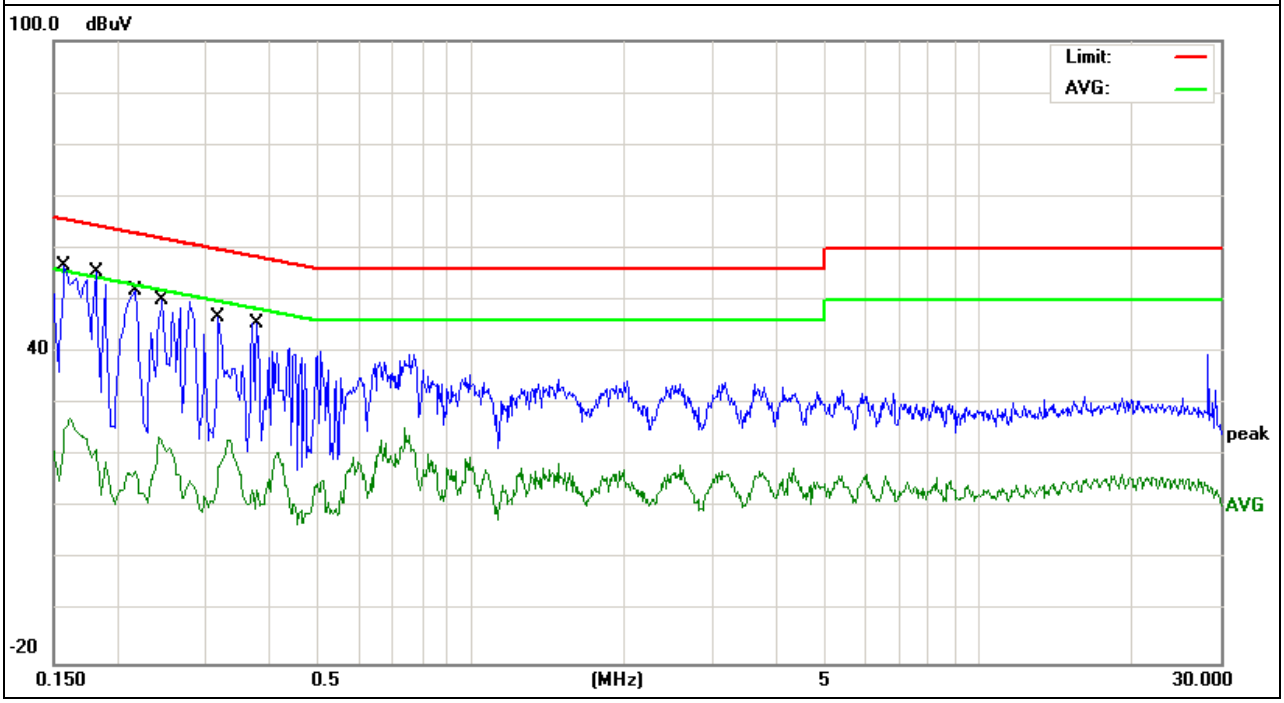


EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form Adapter AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1580	47.14	9.62	56.76	65.56	-8.80	QP
0.1580	27.27	9.62	36.89	55.56	-18.67	AVG
0.1819	45.83	9.61	55.44	64.39	-8.95	QP
0.1819	31.64	9.61	41.25	54.39	-13.14	AVG
0.2179	42.22	9.63	51.85	62.89	-11.04	QP
0.2179	32.42	9.63	42.05	52.89	-10.84	AVG
0.2459	40.32	9.66	49.98	61.89	-11.91	QP
0.2459	30.45	9.66	40.11	51.89	-11.78	AVG
0.3180	36.94	9.68	46.62	59.76	-13.14	QP
0.3180	28.57	9.68	38.25	49.76	-11.51	AVG
0.3780	36.25	9.44	45.69	58.32	-12.63	QP
0.3780	27.14	9.44	36.58	48.32	-11.74	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

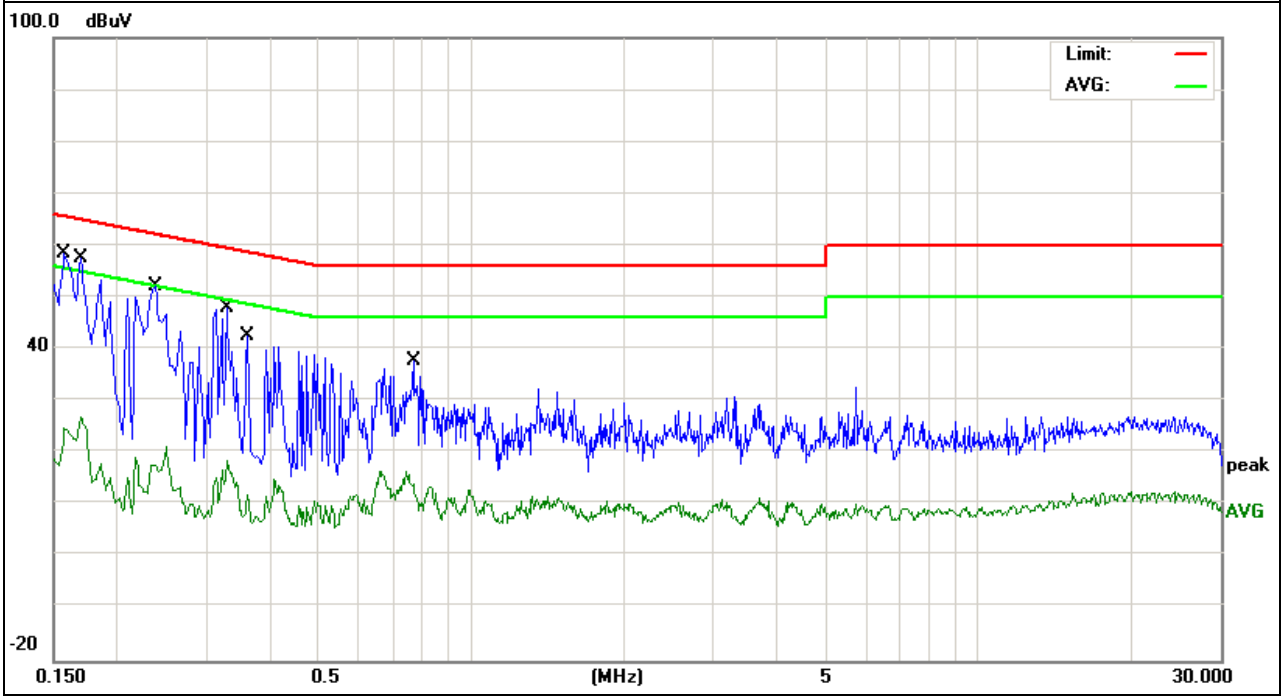


EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form Adapter AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1580	48.74	9.60	58.34	65.56	-7.22	QP
0.1580	32.45	9.60	42.05	55.56	-13.51	AVG
0.1700	48.08	9.61	57.69	64.96	-7.27	QP
0.1700	31.97	9.61	41.58	54.96	-13.38	AVG
0.2380	42.48	9.61	52.09	62.16	-10.07	QP
0.2380	33.45	9.61	43.06	52.16	-9.10	AVG
0.3300	38.42	9.62	48.04	59.45	-11.41	QP
0.3300	29.82	9.62	39.44	49.45	-10.01	AVG
0.3620	33.06	9.63	42.69	58.68	-15.99	QP
0.3620	28.96	9.63	38.59	48.68	-10.09	AVG
0.7700	28.21	9.63	37.84	56.00	-18.16	QP
0.7700	19.92	9.63	29.55	46.00	-16.45	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

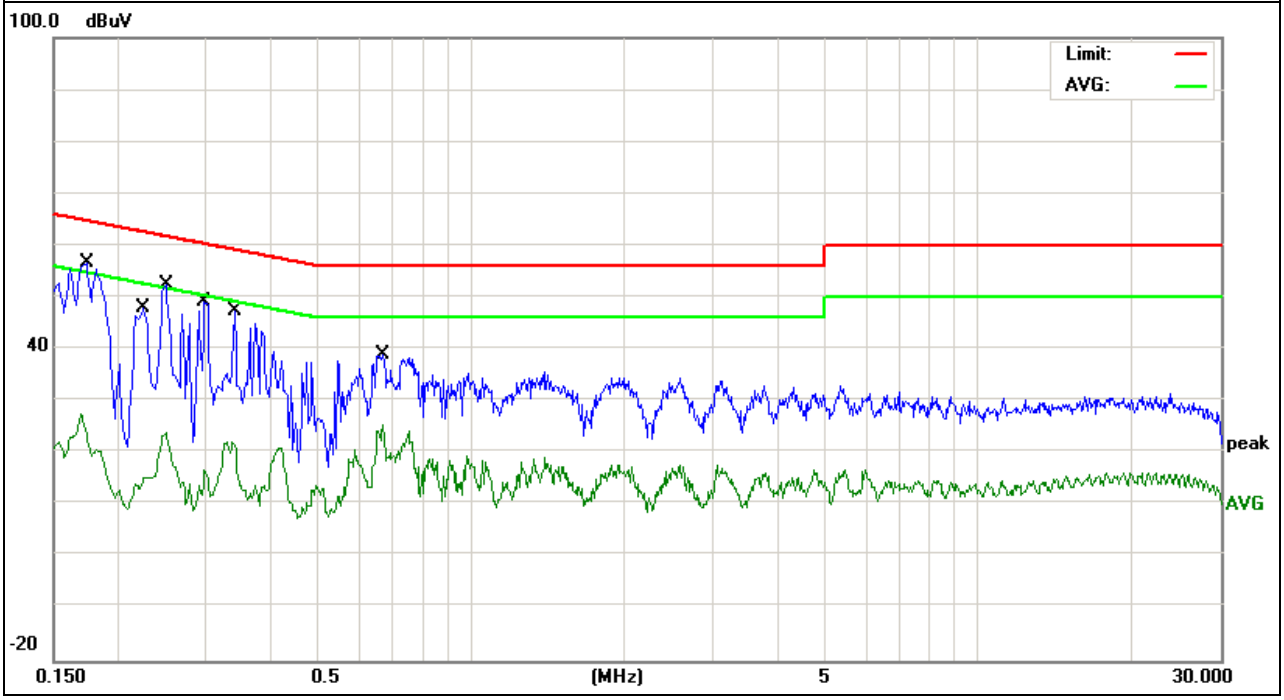


EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form PC AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1740	47.01	9.62	56.63	64.76	-8.13	QP
0.1740	33.74	9.62	43.36	54.76	-11.40	AVG
0.2260	38.20	9.64	47.84	62.59	-14.75	QP
0.2260	20.05	9.64	29.69	52.59	-22.90	AVG
0.2500	42.88	9.67	52.55	61.75	-9.20	QP
0.2500	34.11	9.67	43.78	51.75	-7.97	AVG
0.2980	39.41	9.74	49.15	60.30	-11.15	QP
0.2980	29.73	9.74	39.47	50.30	-10.83	AVG
0.3420	37.83	9.58	47.41	59.15	-11.74	QP
0.3420	26.11	9.58	35.69	49.15	-13.46	AVG
0.6700	29.25	9.78	39.03	56.00	-16.97	QP
0.6700	18.66	9.78	28.44	46.00	-17.56	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

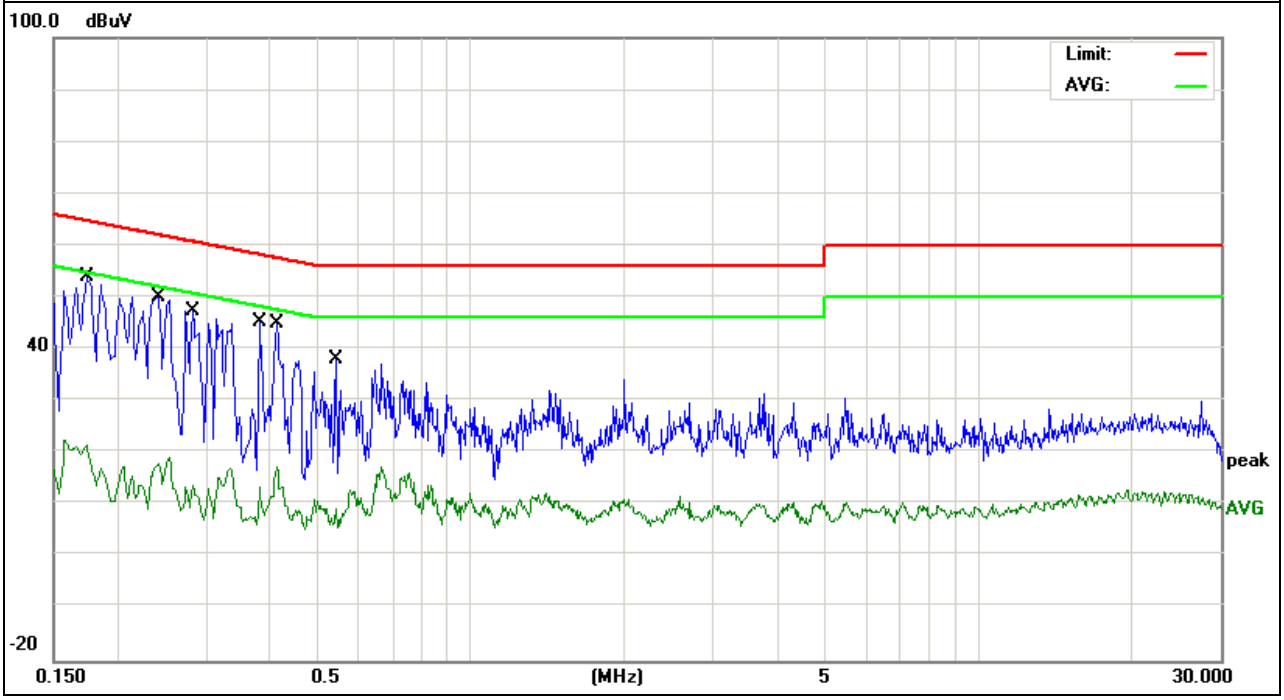


EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form PC AC 120V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1740	44.33	9.61	53.94	64.76	-10.82	QP
0.1740	32.08	9.61	41.69	54.76	-13.07	AVG
0.2420	40.47	9.61	50.08	62.02	-11.94	QP
0.2420	33.17	9.61	42.78	52.02	-9.24	AVG
0.2819	37.84	9.61	47.45	60.76	-13.31	QP
0.2819	29.64	9.61	39.25	50.76	-11.51	AVG
0.3820	35.57	9.63	45.20	58.23	-13.03	QP
0.3820	20.39	9.63	30.02	48.23	-18.21	AVG
0.4140	35.41	9.64	45.05	57.57	-12.52	QP
0.4140	21.61	9.64	31.25	47.57	-16.32	AVG
0.5420	28.32	9.67	37.99	56.00	-18.01	QP
0.5420	18.88	9.67	28.55	46.00	-17.45	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

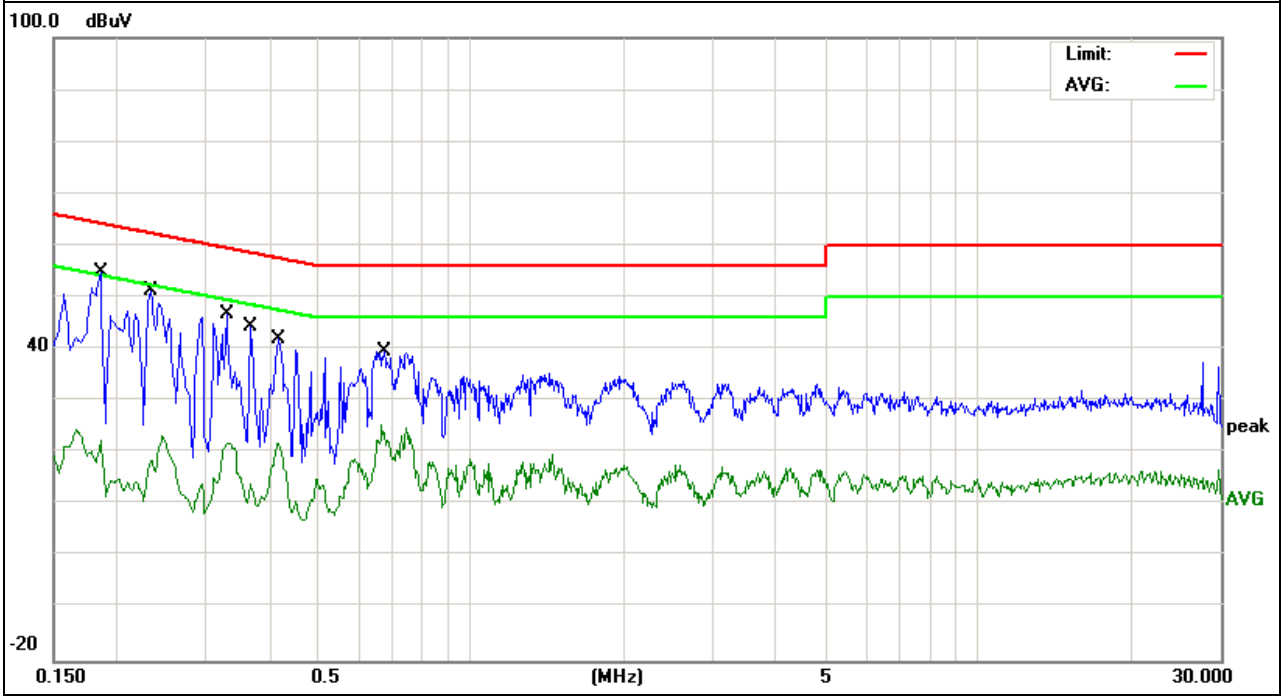


EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 5.0V form PC AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1859	45.29	9.61	54.90	64.21	-9.31	QP
0.1859	30.52	9.61	40.13	54.21	-14.08	AVG
0.2340	41.72	9.65	51.37	62.30	-10.93	QP
0.2340	29.37	9.65	39.02	52.30	-13.28	AVG
0.3300	36.99	9.63	46.62	59.45	-12.83	QP
0.3300	26.93	9.63	36.56	49.45	-12.89	AVG
0.3659	34.76	9.49	44.25	58.59	-14.34	QP
0.3659	24.29	9.49	33.78	48.59	-14.81	AVG
0.4179	32.43	9.43	41.86	57.49	-15.63	QP
0.4179	22.59	9.43	32.02	47.49	-15.47	AVG
0.6740	29.71	9.78	39.49	56.00	-16.51	QP
0.6740	19.80	9.78	29.58	46.00	-16.42	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.

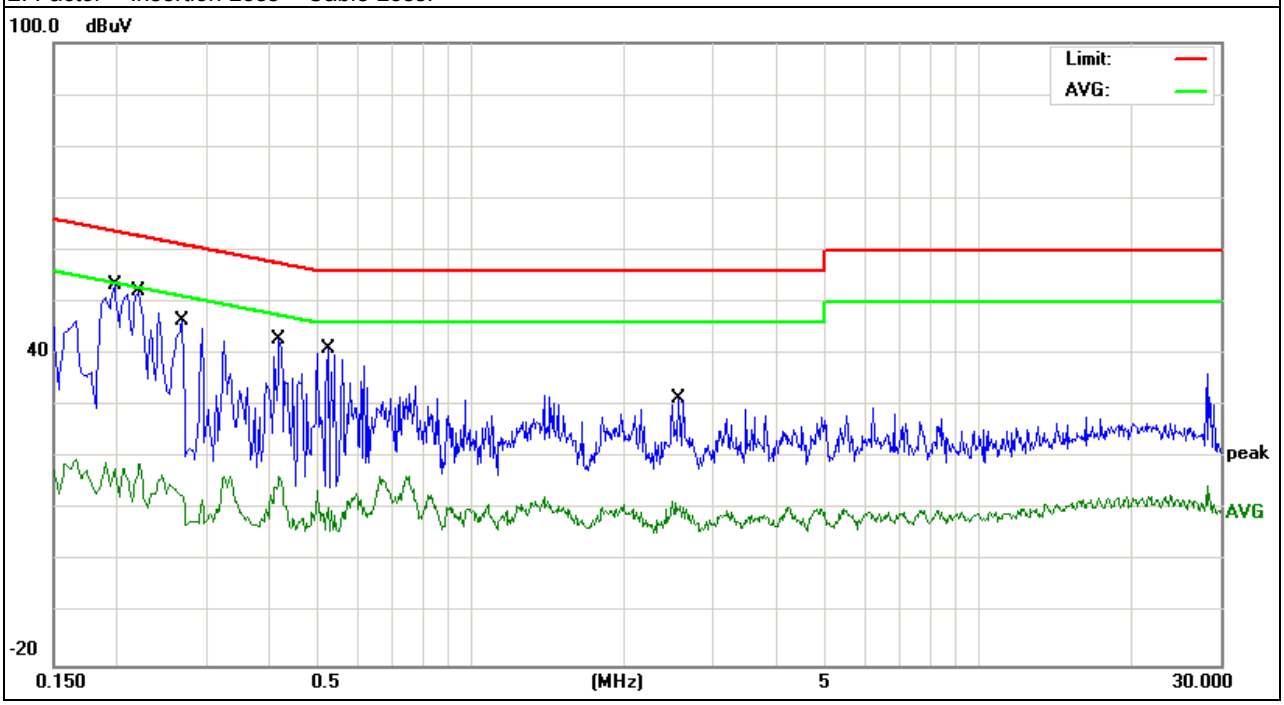


EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 5.0V form PC AC 240V/60Hz	Test Mode：	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1980	43.85	9.61	53.46	63.69	-10.23	QP
0.1980	32.42	9.61	42.03	53.69	-11.66	AVG
0.2220	42.42	9.62	52.04	62.74	-10.70	QP
0.2220	31.63	9.62	41.25	52.74	-11.49	AVG
0.2700	36.87	9.62	46.49	61.12	-14.63	QP
0.2700	29.60	9.62	39.22	51.12	-11.90	AVG
0.4180	33.22	9.64	42.86	57.49	-14.63	QP
0.4180	27.01	9.64	36.65	47.49	-10.84	AVG
0.5220	31.26	9.68	40.94	56.00	-15.06	QP
0.5220	20.57	9.68	30.25	46.00	-15.75	AVG
2.5660	21.82	9.53	31.35	56.00	-24.65	QP
2.5660	11.49	9.53	21.02	46.00	-24.98	AVG

Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



3.2 RADIATED EMISSION MEASUREMENT

3.2.1 RADIATED EMISSION LIMITS (Frequency Range 9kHz-1000MHz)

20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to FCC PART 15C.

(2) The tighter limit applies at the band edges.

(3) Emission level (dBuV/m)=20log Emission level (uV/m).

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (emission in restricted band)	1 MHz / 1 MHz for Peak, 1 MHz / *10Hz* for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

3.2.2 TEST PROCEDURE

a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. 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.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.

Note:

Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

During the radiated emission test, the Spectrum Analyzer was set with the following configurations:

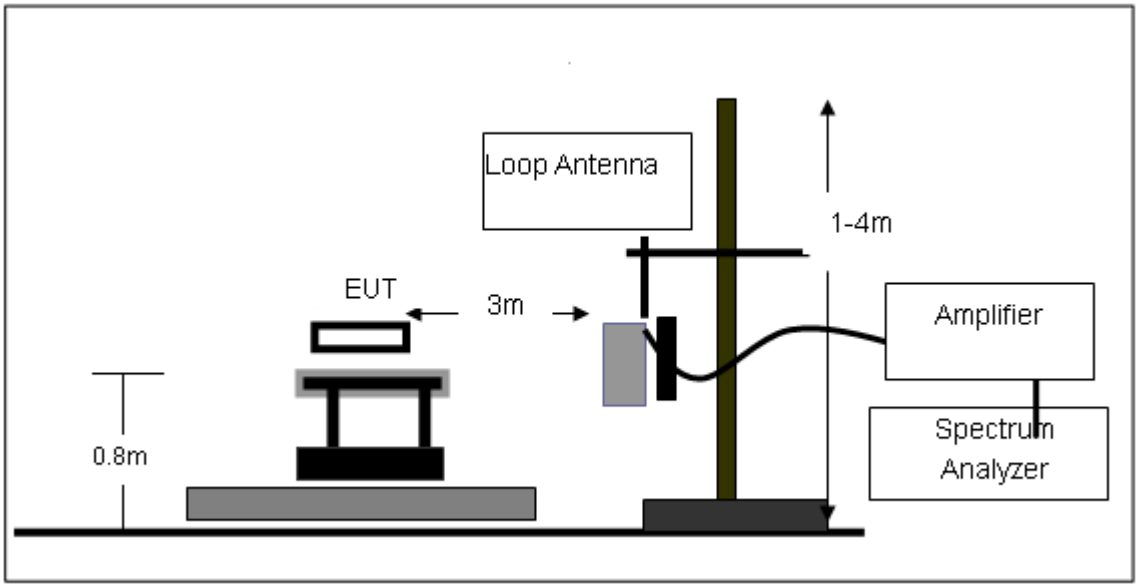
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Peak	1 MHz	10 Hz

3.2.3 DEVIATION FROM TEST STANDARD

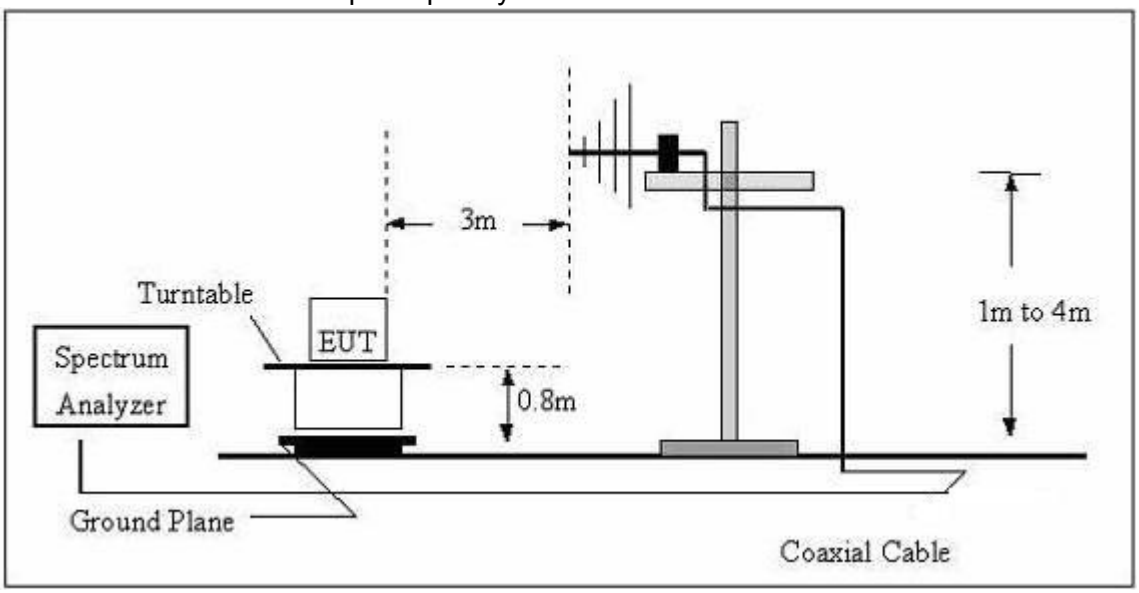
No deviation

3.2.4 TEST SETUP

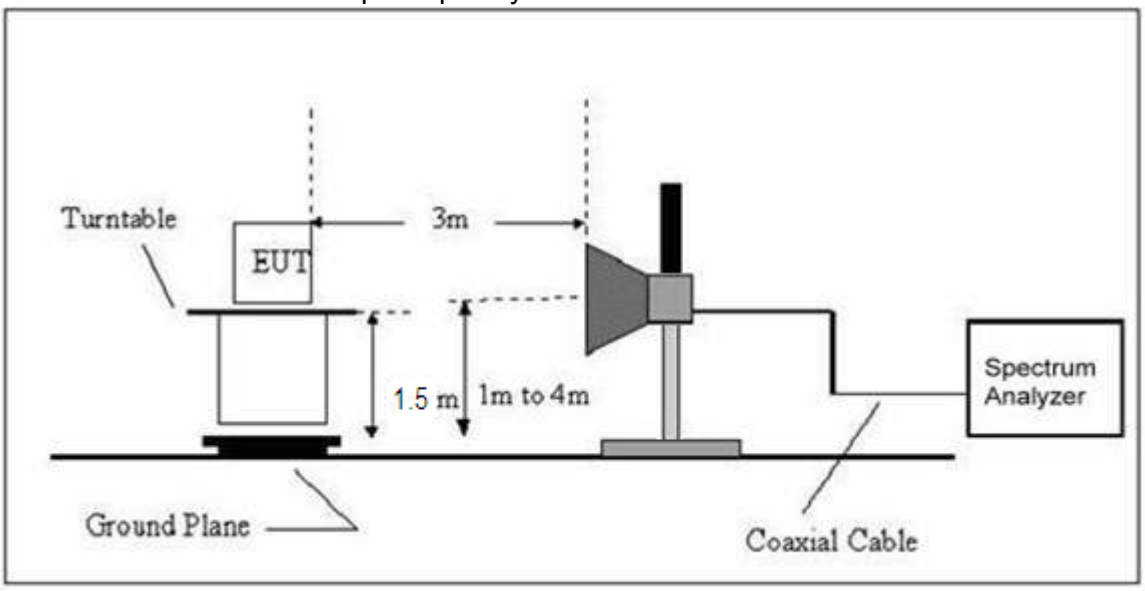
（A）Radiated Emission Test-Up Frequency Below 30MHz



（B）Radiated Emission Test-Up Frequency 30MHz~1GHz



（C）Radiated Emission Test-Up Frequency Above 1GHz



3.2.5 EUT OPERATING CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT：	Intelligent micro laser projection	Model Name. ：	L1
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX	Polarization :	--

Freq.	Reading	Limit	Margin	State
(MHz)	(dBuV/m)	(dBuV/m)	(dB)	P/F
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

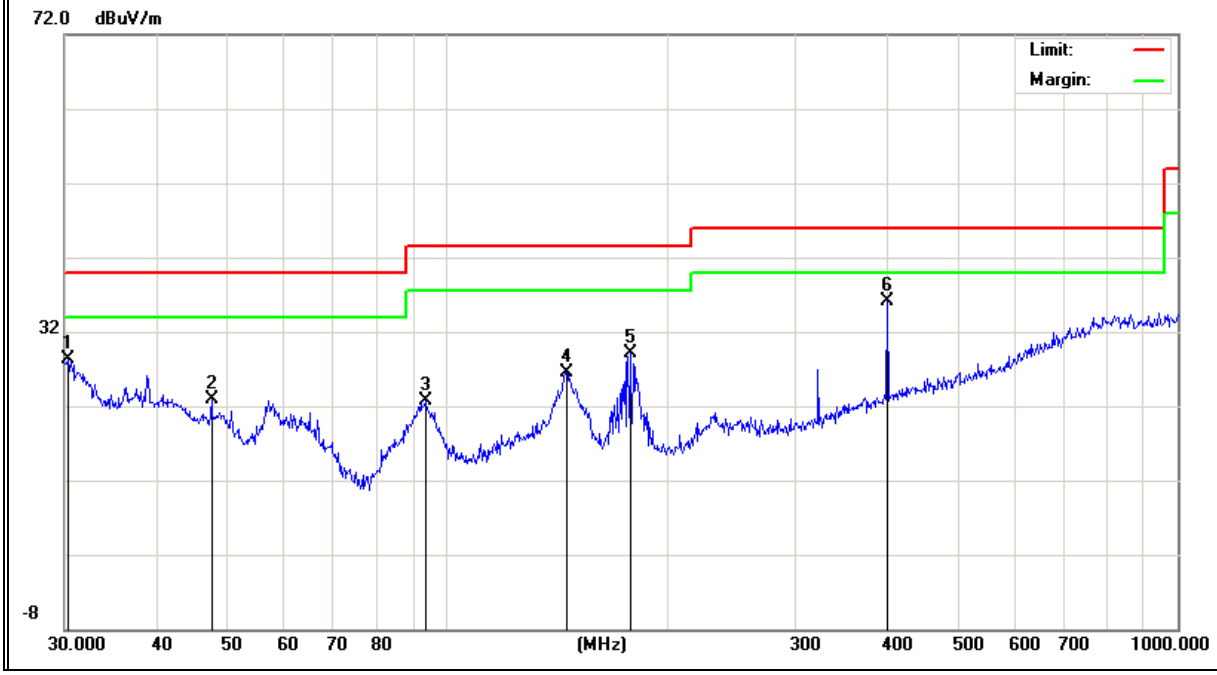
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	30.3173	9.04	19.25	28.29	40.00	-11.71	QP
V	47.6584	11.61	11.27	22.88	40.00	-17.12	QP
V	93.4402	14.47	8.29	22.76	43.50	-20.74	QP
V	145.8611	15.70	10.83	26.53	43.50	-16.97	QP
V	178.1327	18.49	10.61	29.10	43.50	-14.40	QP
V	400.4318	17.85	18.32	36.17	46.00	-9.83	QP

Remark:

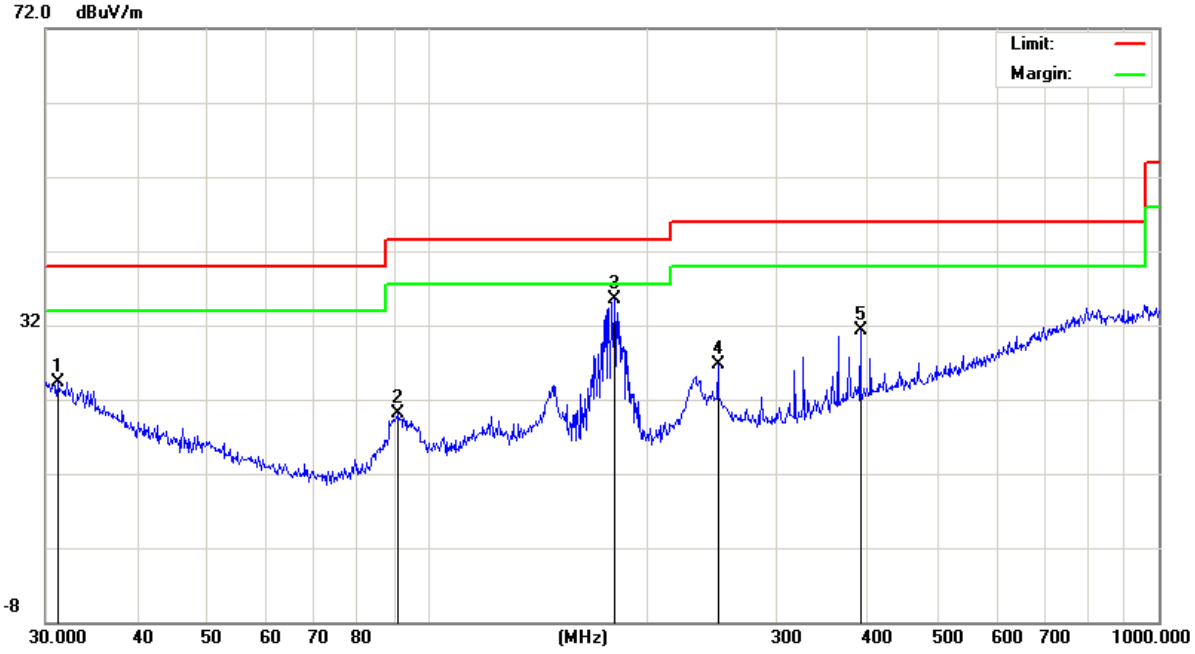
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	31.1798	5.59	18.78	24.37	40.00	-15.63	QP
H	91.1745	12.13	8.05	20.18	43.50	-23.32	QP
H	180.0165	24.80	10.63	35.43	43.50	-8.07	QP
H	249.4250	13.18	13.59	26.77	46.00	-19.23	QP
H	390.7225	13.35	17.93	31.28	46.00	-14.72	QP

Remark:

Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX		

Frequency (MHz)	Reading (dBμV)	Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark	Polar (H/V)
Low Channel (2402 MHz)-Above 1G							
4804.152	58.63	-3.64	62.00	74.00	-12.00	Pk	Vertical
4804.152	40.94	-3.64	43.02	54.00	-10.98	AV	Vertical
7206.511	58.75	-0.95	60.25	74.00	-13.75	Pk	Vertical
7206.511	36.88	-0.95	39.25	54.00	-14.75	AV	Vertical
4804.122	58.98	-3.64	60.36	74.00	-13.64	Pk	Horizontal
4804.122	41.84	-3.64	44.23	54.00	-9.77	AV	Horizontal
7206.425	56.95	-0.95	56.81	74.00	-17.19	Pk	Horizontal
7206.425	36.77	-0.95	36.52	54.00	-17.48	AV	Horizontal
Mid Channel (2440 MHz)-Above 1G							
4880.258	59.35	-3.68	62.02	74.00	-11.98	Pk	Vertical
4880.258	41.38	-3.68	45.12	54.00	-8.88	AV	Vertical
7320.152	58.74	-0.82	58.36	74.00	-15.64	Pk	Vertical
7320.152	39.58	-0.82	41.02	54.00	-12.98	AV	Vertical
4880.235	61.25	-3.68	63.25	74.00	-10.75	Pk	Horizontal
4880.235	44.38	-3.68	47.05	54.00	-6.95	AV	Horizontal
7320.021	58.68	-0.82	58.48	74.00	-15.52	Pk	Horizontal
7320.021	38.85	-0.82	40.20	54.00	-13.80	AV	Horizontal
High Channel (2480MHz)- Above 1G							
4960.758	58.67	-3.59	61.06	74.00	-12.94	Pk	Vertical
4960.758	41.52	-3.59	44.69	54.00	-9.31	AV	Vertical
7440.025	57.14	-0.68	56.58	74.00	-17.42	Pk	Vertical
7440.025	41.44	-0.68	42.05	54.00	-11.95	AV	Vertical
4960.365	58.58	-3.59	61.77	74.00	-12.23	Pk	Horizontal
4960.365	41.68	-3.59	43.58	54.00	-10.42	AV	Horizontal
7440.256	60.06	-0.68	59.02	74.00	-14.98	Pk	Horizontal
7440.256	38.87	-0.68	40.20	54.00	-13.80	AV	Horizontal
Remark: Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit							

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247	Power Spectral Density	8 dBm (in any 3KHz)	2400-2483.5	PASS

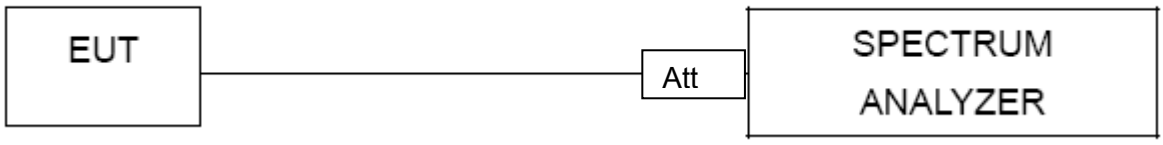
4.1.1 TEST PROCEDURE

1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to 1.5 times the DTS channel bandwidth.
3. 3 kHz ≤Set the RBW≤100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



4.1.4 EUT OPERATION CONDITIONS

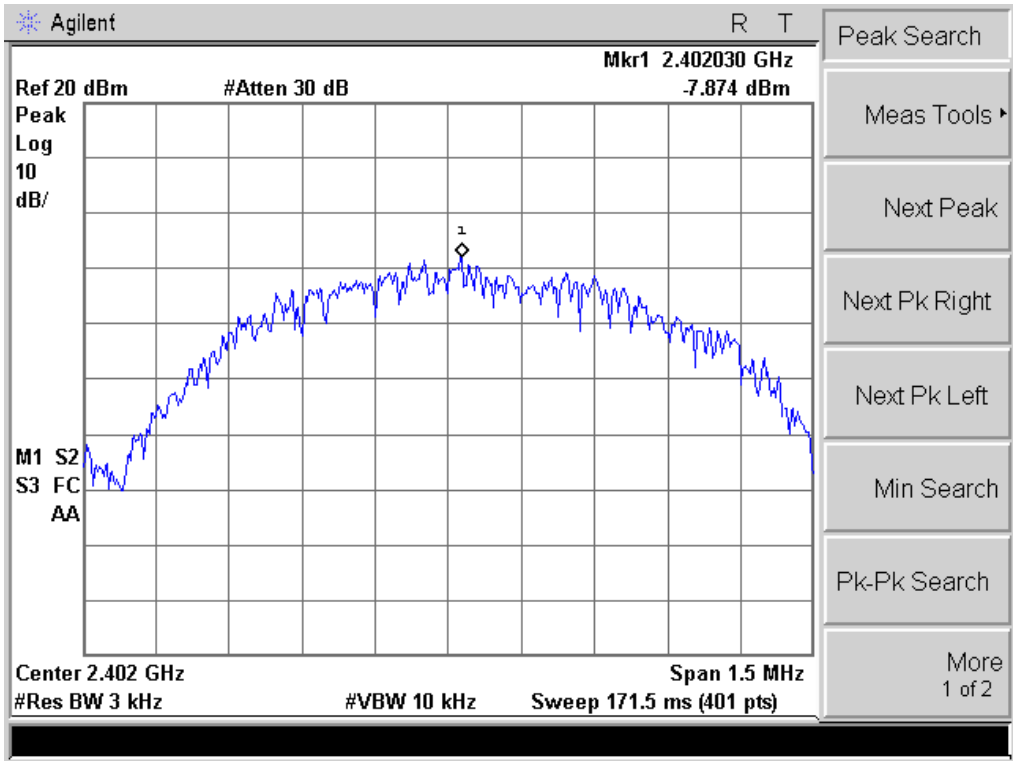
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

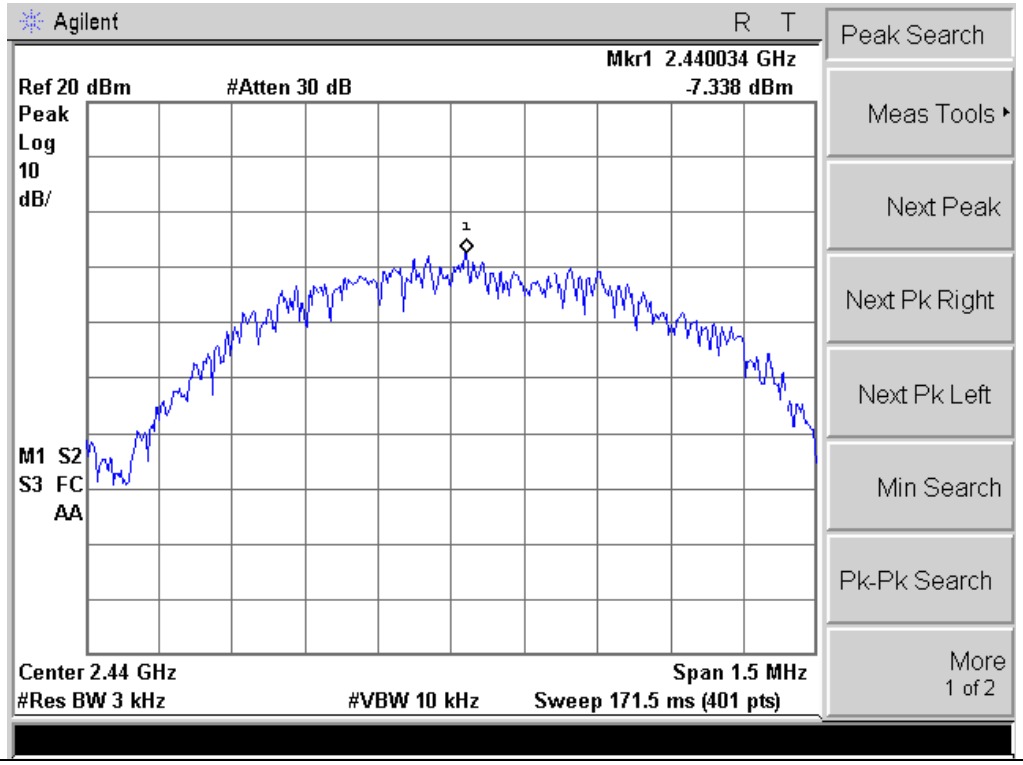
EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1015 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX Mode /CH00, CH19, CH39		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2402 MHz	-7.874	8	PASS
2440 MHz	-7.338	8	PASS
2480 MHz	-7.286	8	PASS

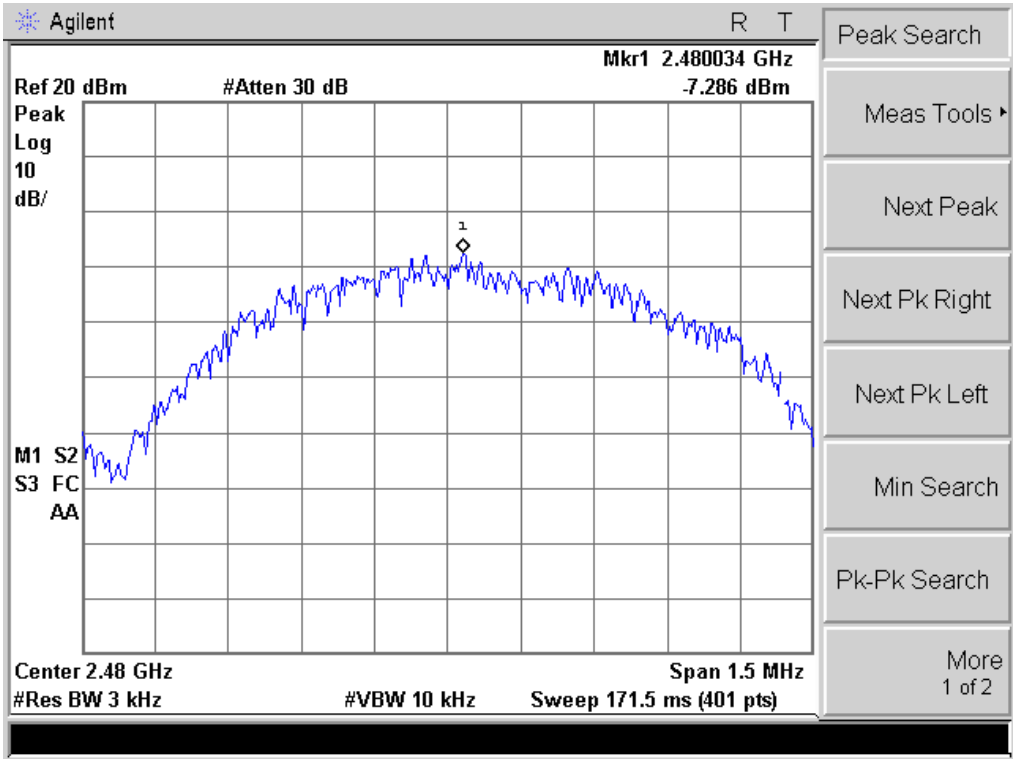
TX CH00



TX CH19



TX CH39



5. BANDWIDTH TEST

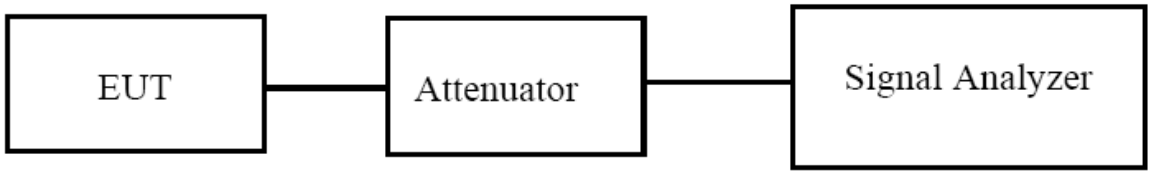
5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	>= 500KHz (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

TEST SETUP



5.1.2 EUT OPERATION CONDITIONS

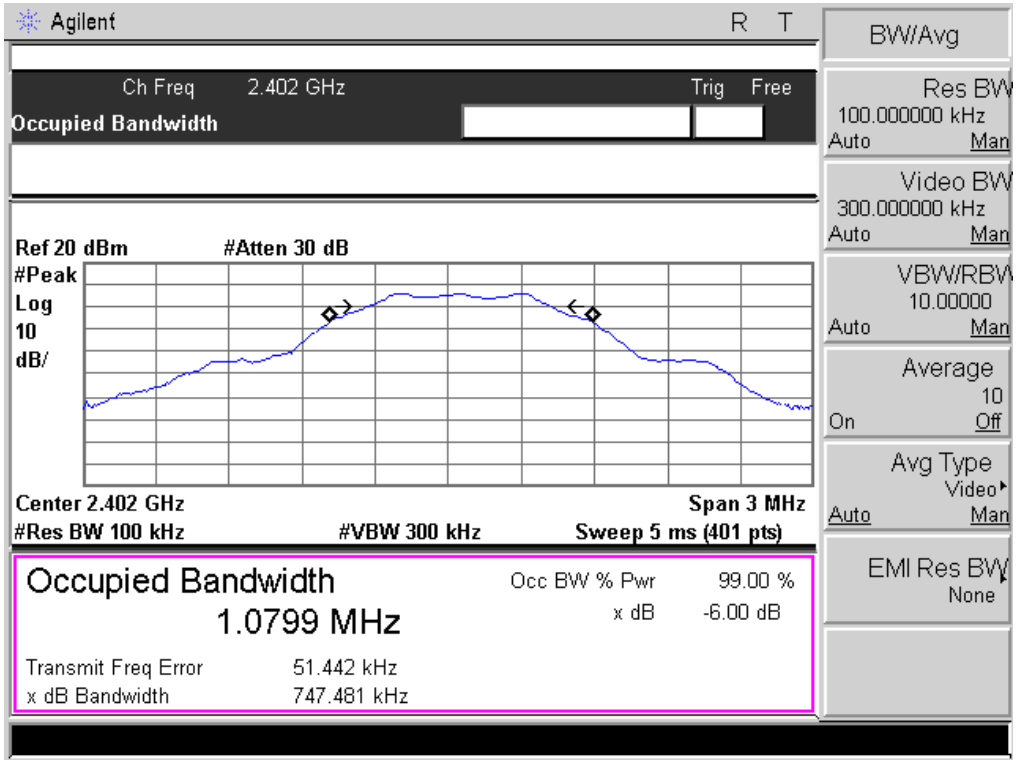
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.3 TEST RESULTS

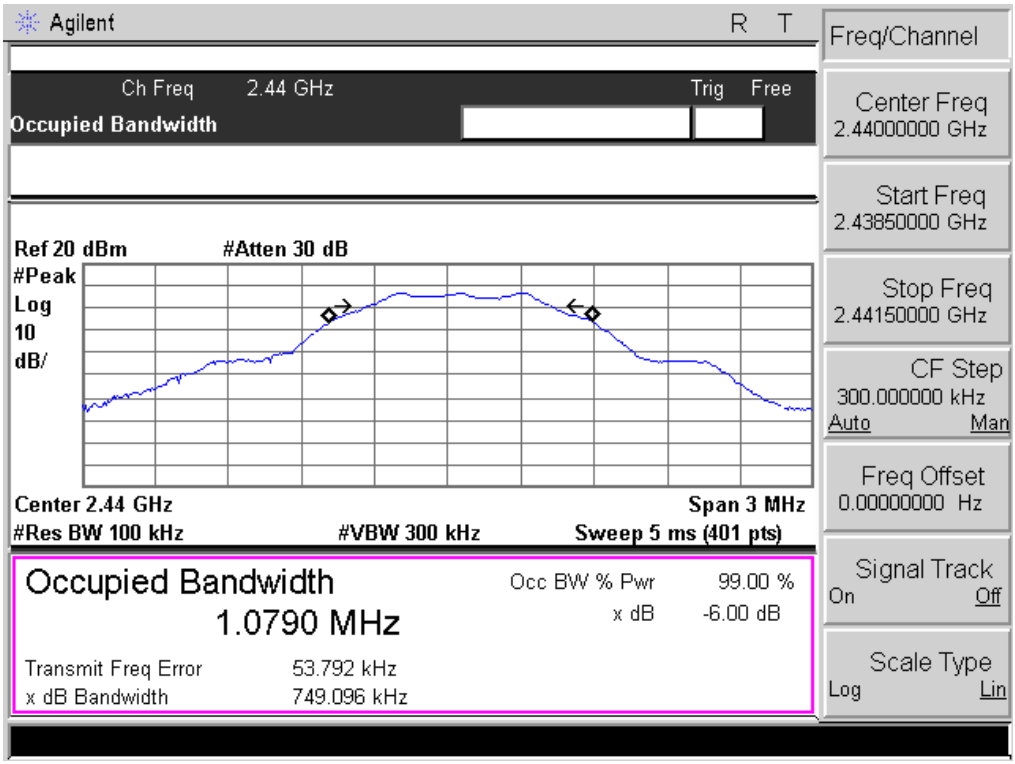
EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX Mode /CH00, CH19, CH39		

Channel	Frequency (MHz)	6dB bandwidth (kHz)	Limit (kHz)	Result
Low	2402	747.481	500	Pass
Middle	2440	749.096	500	Pass
High	2480	745.731	500	Pass

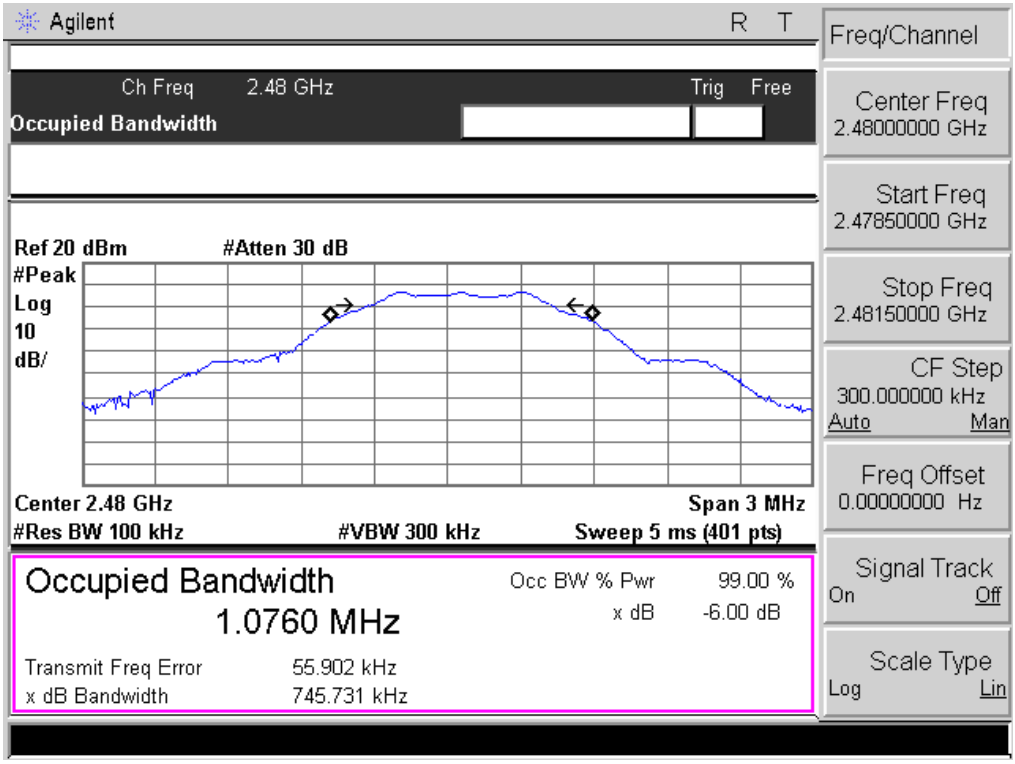
TX CH 00



TX CH 19



TX CH 39



6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(b)(3)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

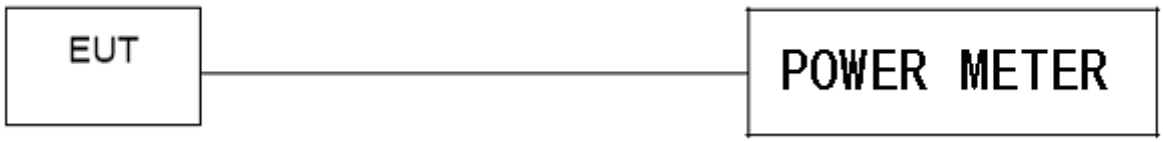
6.1.1 TEST PROCEDURE

a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.1.5 TEST RESULTS

EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V
Test Mode ：	TX Mode		

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	(dBm)
CH01	2402	7.25	30
CH20	2440	7.36	30
CH39	2480	7.12	30

7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

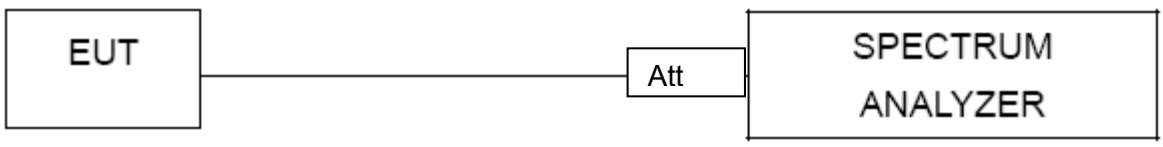
TEST PROCEDURE

a) Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
b) Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
c) Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
d) Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
e) Repeat above procedures until all measured frequencies were complete.

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 EUT OPERATION CONDITIONS

The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.4 TEST RESULTS

EUT：	Intelligent micro laser projection	Model Name ：	L1
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 3.7V

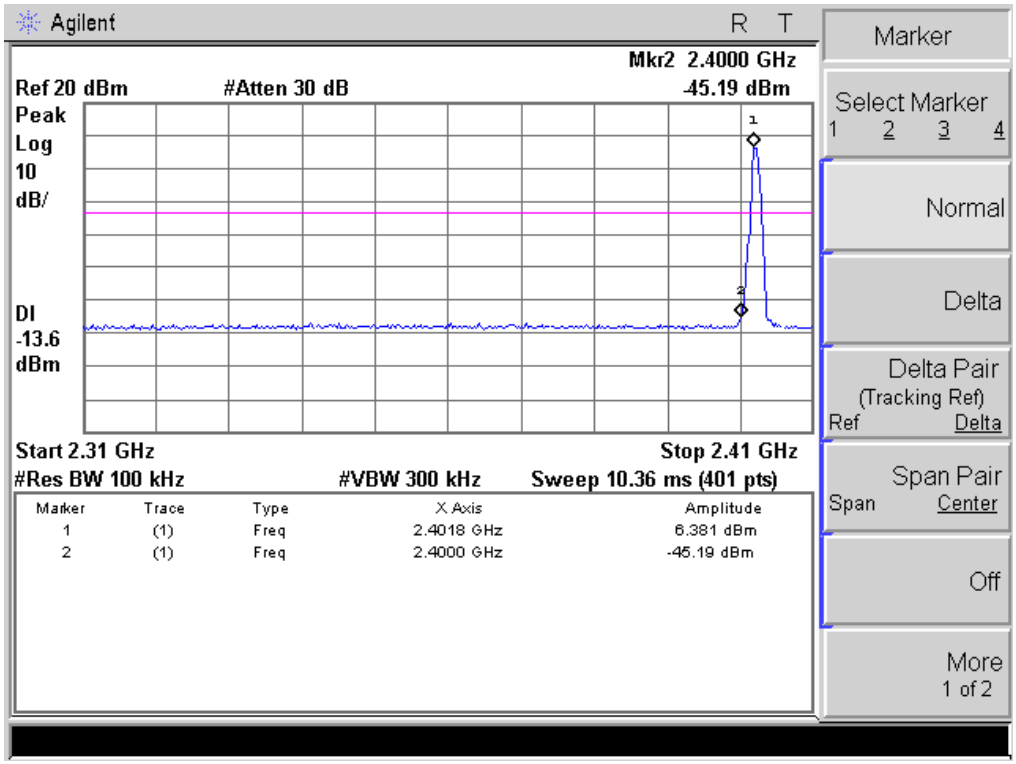
Frequency Band	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
2400	51.57	20	Pass
2483.5	53.88	20	Pass

Radiated band edge:

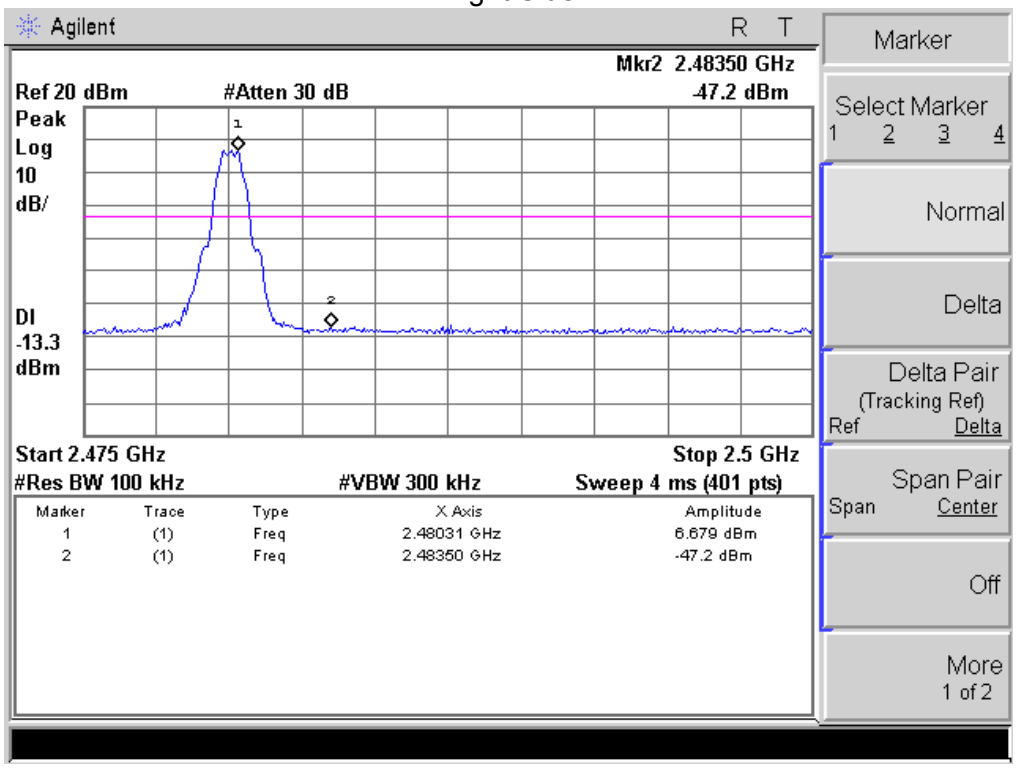
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
2390	54.23	-13.06	41.17	74	-32.83	peak	Vertical
2390	55.17	-13.06	42.11	74	-31.89	peak	Horizontal
2483.5	57.06	-12.78	44.28	74	-29.72	peak	Vertical
2483.5	57.18	-12.78	44.4	74	-29.60	peak	Horizontal

Note: Test method to see chapter 3.2 . When PK value is lower than the Average value limit, average not record.

Left Side



Right Side



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

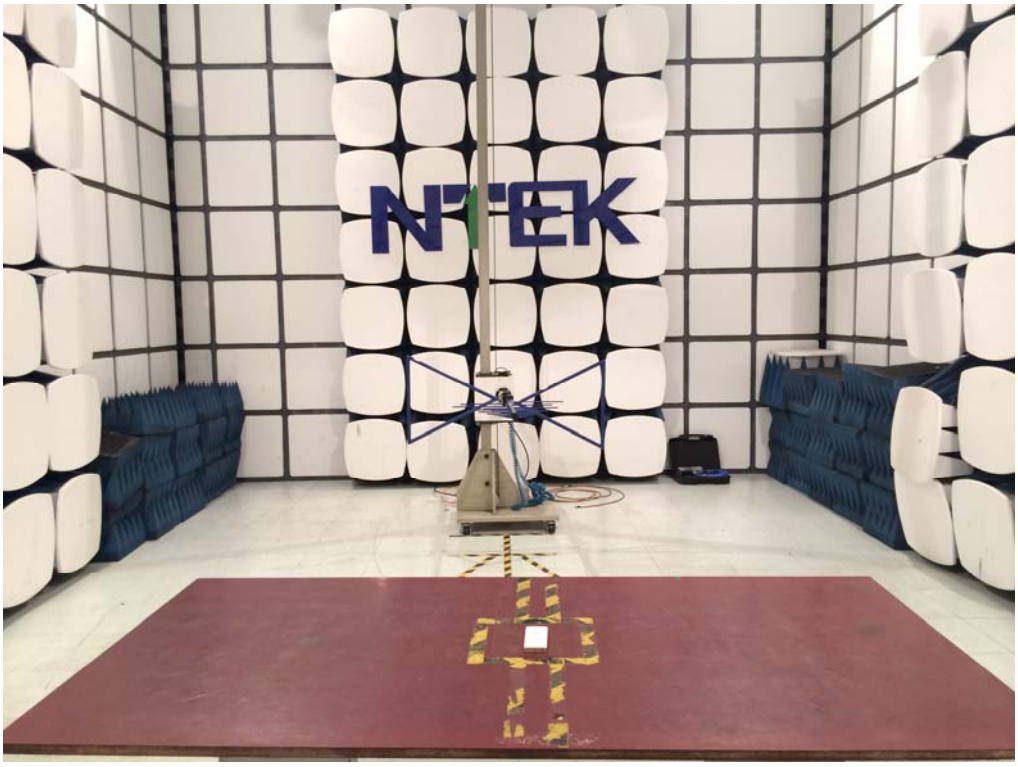
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

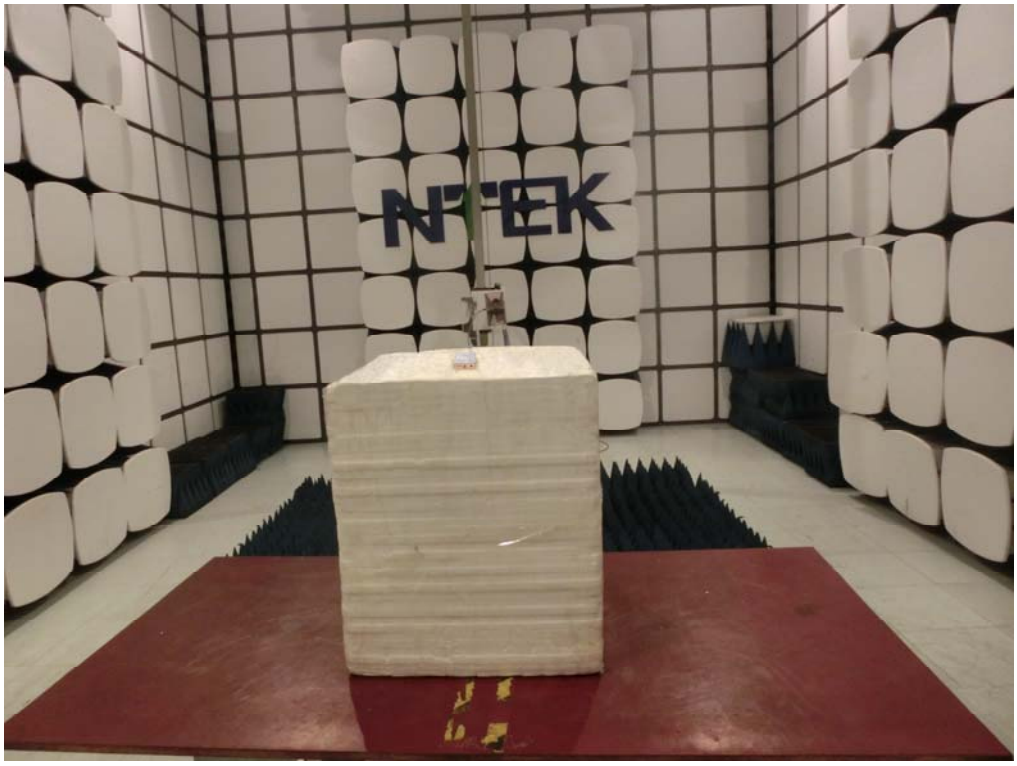
8.2 EUT ANTENNA

The EUT antenna is permanent attached antenna. It comply with the standard requirement.

9. EUT TEST PHOTO

Radiated Measurement Photos





CONDUCTED EMISSION Photos