FCC RADIO TEST REPORT
FCC ID:2ALQL-A63D

Product：	Laser Pocketable Projector
Trade Mark：	APPOTRONICS
Model Name：	A63D
Serial Model：	A63C, A63S
Report No.：	NTEK-2017NT03302371F5

Prepared for

APPOTRONICS CO., LTD
4th Floor, SZICC, NO.1089, Chaguang Road, Nanshan District, Shenzhen, China

Prepared by

NTEK Testing Technology Co., Ltd.
1/F, Building E, Fenda Science Park, Sanwei Community,
Xixiang Street Bao'an District, Shenzhen 518126 P.R. China
Tel.: +86-755-6115 6588
Fax.: +86-755-6115 6599
Website:http://www.ntek.org.cn

TEST RESULT CERTIFICATION

Applicant's name ..... :	APPOTRONICS CO., LTD
Address ..... :	4th Floor, SZICC, NO.1089, Chaguang Road, Nanshan District, Shenzhen, China
Manufacturer's Name..... :	APPOTRONICS CO., LTD
Address ..... :	4th Floor, SZICC, NO.1089, Chaguang Road, Nanshan District, Shenzhen, China

Product description

Product name..... :	Laser Pocketable Projector
Model and/or type reference :	A63D
Serial Model ..... :	A63C, A63S
Standards ..... :	FCC Part15.407: 01 Oct. 2015
Test procedure	ANSI C63.10-2013 and KDB 789033 D02 General UNII Test Procedures New Rules v01r01 FCC KDB 662911 D01 Multiple Transmitter Output v02r01 FCC KDB 662911 D02 MIMO With Cross Polarized Antenna V01

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/ the Industry Canada 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..... 30 Mar. 2017 ~27 Apr. 2017

Date of Issue..... 27 Apr. 2017

Test Result..... **Pass**

Testing Engineer : Lebron Wang

(Lebron Wang)

Technical Manager : Jason Chen

(Jason Chen)

Authorized Signatory : Sam. Chen

(Sam Chen)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.407) , Subpart E			
Standard Section	Test Item	Judgment	Remark
15.207	AC Power Line Conducted Emissions	PASS	
15.209(a), 15.407 (b)(1) 15.407 (b)(4) 15.407 (b)(6)	Spurious Radiated Emissions	PASS	
15.407 (a)(1) 15.407 (a)(3) 15.1049	26 dB and 99% Emission Bandwidth	PASS	
15.407(e)	Minimum 6 dB bandwidth	PASS	
15.407 (a)(1) 15.407 (a)(3)	Maximum Conducted Output Power	PASS	
2.1051, 15.407(b)(1) 15.407(b)(4)	Band Edges	PASS	
15.407 (a)(1) 15.407 (a)(3)	Power Spectral Density	PASS	
2.1051, 15.407(b)	Spurious Emissions at Antenna Terminals	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 518126 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℃
7	Humidity	±2%

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Laser Pocketable Projector	
Trade Mark	APPOTRONICS	
Model Name	A63D	
Product Description	IEEE 802.11 WLAN Mode Supported	☒802.11a(20MHz channel bandwidth) ☒802.11n/AC(20MHz channel bandwidth) ☒802.11n/AC(40MHz channel bandwidth) ☒802.11AC(80MHz channel bandwidth)
	Data Rate	802.11 a: 6,9,12,18,24,36,48,54Mbps; 802.11n(HT20):MCS0-MCS15; 802.11n(HT40):MCS0-MCS15; 802.11AC: NSS1,MCS0-MCS9,NSS2,MCS0-MCS9;
	Modulation	OFDM with BPSK/QPSK/16QAM/64QAM/256QAM for 802.11a/n/ac;
	Operating Frequency Range	☒5180-5240MHz for 802.11a/n(HT20)/AC20; 5190-5230MHz for 802.11n(HT40)/AC40; 5210MHz for 802.11 AC80; ☒5745-5825 MHz for 802.11a/n(HT20)/AC20; 5755-5795 MHz for 802.11a/n(HT40)/AC40; 5775MHz for 802.11 AC80;
	Number of Channels	☒4 channels for 802.11a/N20/AC20 in the 5180-5240MHz band ; 2 channels for 802.11 N40/AC40 in the 5190-5230MHz band ; 1 channels for 802.11 AC80 in the 5210MHz band ; ☒5 channels for 802.11a/N20/AC20 in the 5745-5825MHz band ; 2 channels for 802.11 N40/AC40 in the 5755-5795MHz band ; 1 channels for 802.11 AC80 in the 5775MHz band ;
	Antenna Type	FPCB Antenna
	Smart system	☒SISO for 802.11a/n/ac
	Antenna Gain	See Table for Filed Antenna
	Based on the application, features, or specification exhibited in User's Manual, More details of EUT technical specification, please refer to the User's Manual.	
Ratings	DC 19V from Adapter.	
Adapter	Model:HKA06519034-8J Input:100-240V 50/60Hz 1.5A Output: DC 19V, 3.42A	
Battery	N/A	
Connecting I/O Port(s)	Please refer to the User's Manual	

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. Frequency and Channel list for 802.11 a/n/ac (20MHz) (5180-5240MHz):

802.11a/n/ac(20MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
36	5180	44	5220	-	-	-	-
40	5200	48	5240	-	-	-	-

Frequency and Channel list for 802.11 n /ac (40MHz) (5190-5230MHz):

802.11n /ac(40MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
38	5190	-	-	-	-	-	-
46	5230	-	-	-	-	-	-

802.11ac (80MHz) Carrier Frequency Channel	
Channel	Frequency (MHz)
42	5210

Frequency and Channel list for 802.11 a/n/ac (20 MHz) (5745-5825MHz):

802.11a/n/ac(20 MHz) Carrier Frequency Channel							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
149	5745	153	5765	157	5785	161	5805
165	5825	-	-	-	-	-	-

Frequency and Channel list for 802.11n/ac (40MHz) (5755-5795MHz):

802.11n/ac 40MHz Carrier Frequency Channel					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
151	5755	159	5795	-	-

802.11ac 80MHz Carrier Frequency Channel	
Channel	Frequency (MHz)
155	5775

The EUT has two types of antenna.

Tx Antenna

Antenna	Antenna Type	Antenna Gain(dBi)	
		2.4G	5.0G
A(main)	FPCB	1	1

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	Link Mode
Mode 2	802.11a / n/ ac 20 CH36/ CH40/ CH 48 802.11a /n/ ac 20 CH149/ CH157/ CH 165
Mode 3	802.11n/ ac40 CH38/ CH 46 802.11n/ ac40 CH 151 / CH 159
Mode 4	802.11 ac80 CH42/CH 155

For Radiated Emission	
Final Test Mode	Description
Mode 1	Link Mode
Mode 2	802.11a / n/ ac 20 CH36/ CH40/ CH 48 802.11a /n/ ac 20 CH149/ CH157/ CH 165
Mode 3	802.11n/ ac40 CH38/ CH 46 802.11n/ ac40 CH 151 / CH 159
Mode 4	802.11 ac80 CH42/CH 155

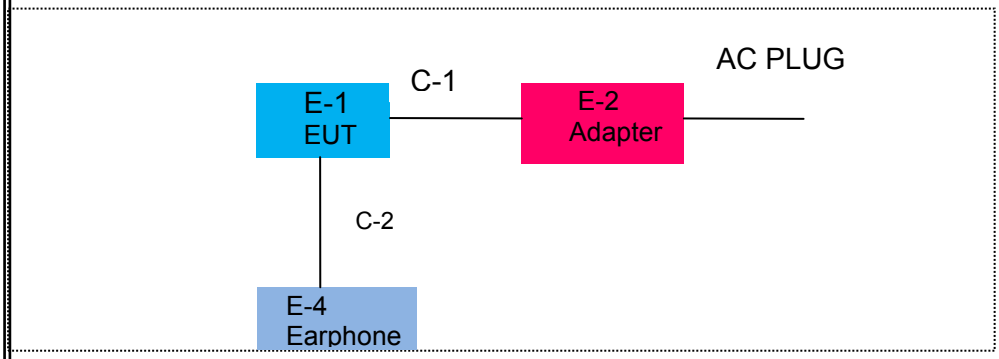
Note:

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

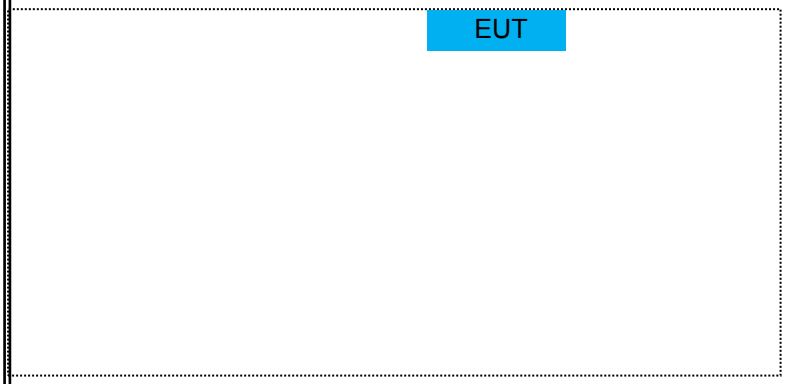
(2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

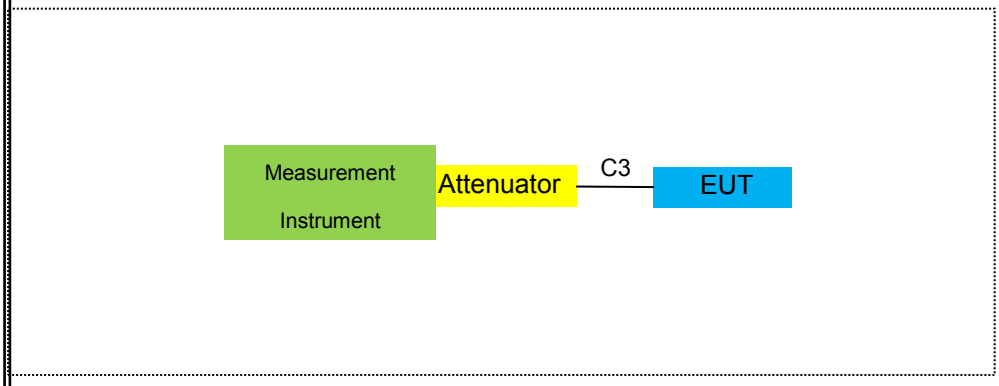
For AC Conducted Emission Mode



Radiated Spurious Emission Test



For Conducted Test Cases



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	Laser Pocketable Projector	APPOTRONICS	A63D	N/A	EUT
E-2	Adapter	N/A	HKA06519034-8J	N/A	Peripherals
E-3	Earphone	N/A	2688	N/A	Peripherals

Item	Cable Type	Shielded Type	Ferrite Core	Length	Note
C-1	Power Cable	NO	NO	1.0m	
C-2	Earphone Cable	NO	NO	0.8m	
C-3	RF Cable	NO	NO	0.5m	

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	2016.07.06	2017.07.05	1 year
2	Spectrum Analyzer	Agilent	N9020A	MY49100060	2016.07.06	2017.07.05	1 year
3	EMI Test Receiver	Agilent	N9038A	MY53227146	2016.07.06	2017.07.05	1 year
4	Test Receiver	R&S	ESPI	101318	2016.07.06	2017.07.05	1 year
5	Bilog Antenna	TESEQ	CBL6111D	31216	2016.07.06	2017.07.05	1 year
6	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2016.07.06	2017.07.05	1 year
7	Spectrum Analyzer	ADVANTEST	R3132	150900201	2016.07.06	2017.07.05	1 year
8	Horn Antenna	EM	EM-AH-10180	2011071402	2016.07.06	2017.07.05	1 year
9	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2016.07.06	2017.07.05	1 year
10	Amplifier	EM	EM-30180	060538	2016.12.22	2017.12.21	1 year
11	Amplifier	MITEQ	TTA1840-35-HG	177156	2016.07.06	2017.07.05	1 year
12	Loop Antenna	ARA	PLA-1030/B	1029	2016.07.06	2017.07.05	1 year
13	Power Meter	R&S	NRVS	100696	2016.07.06	2017.07.05	1 year
14	Power Sensor	R&S	URV5-Z4	0395.1619.05	2016.07.06	2017.07.05	1 year
15	Test Cable	N/A	R-01	N/A	2016.07.06	2017.07.05	1 year
16	Test Cable	N/A	R-02	N/A	2016.07.06	2017.07.05	1 year
17	High Test Cable(1G-40 GHz)	N/A	R-03	N/A	2016.07.06	2017.07.05	1 year
18	High Test Cable(1G-40 GHz)	N/A	R-04	N/A	2016.07.06	2017.07.05	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	2016.07.06	2017.07.05	1 year
2	LISN	R&S	ENV216	101313	2016.08.24	2017.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2016.07.06	2017.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2016.07.06	2017.07.05	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2016.07.06	2017.07.05	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2016.07.06	2017.07.05	1 year
7	Test Cable	N/A	C01	N/A	2016.06.08	2017.06.07	1 year
8	Test Cable	N/A	C02	N/A	2016.06.08	2017.06.07	1 year
9	Test Cable	N/A	C03	N/A	2016.06.08	2017.06.07	1 year

1	Attenuation	MCE	24-10-34	BN9258	2016.07.06	2017.07.05	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/ RSS-247
0.50 -5.0	73.00	60.00	56.00	46.00	FCC/ RSS-247
5.0 -30.0	73.00	60.00	60.00	50.00	FCC/ RSS-247

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

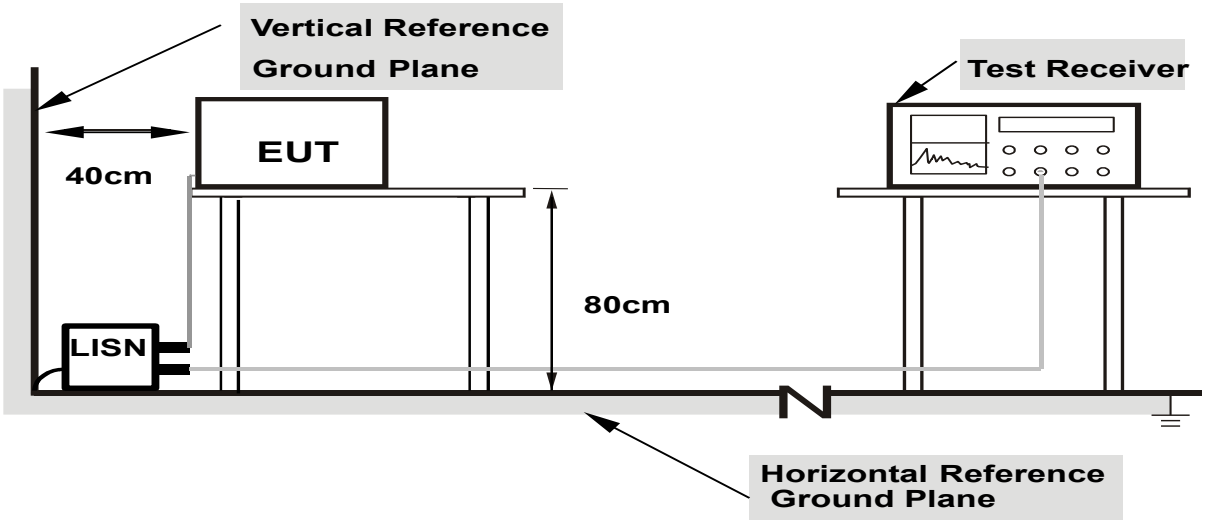
3.1.2 TEST PROCEDURE

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

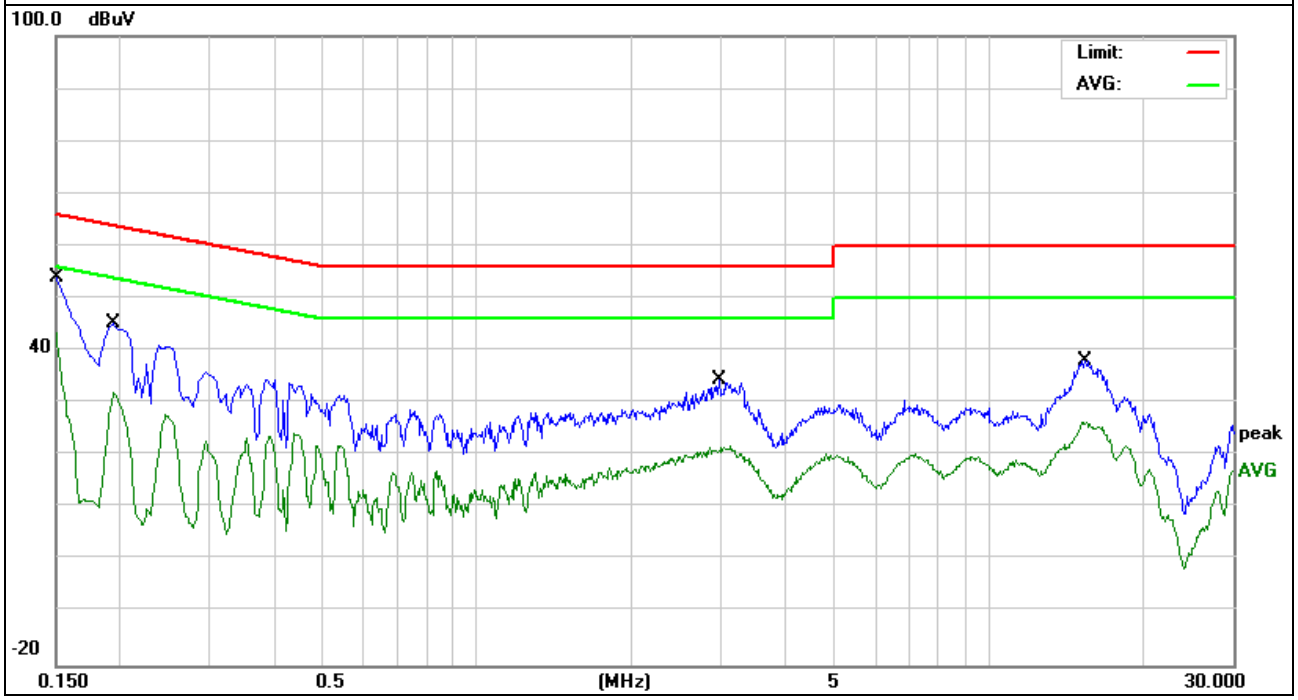
The EUT was configured for testing in a typical fashion (as a customer would normally use it). The EUT has been programmed to continuously transmit during test. This operating condition was tested and used to collect the included data.

3.1.6 TEST RESULTS

EUT：	Laser Pocketable Projector	Model Name. ：	A63D
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 19V from Adapter AC120V/60Hz	Test Mode：	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.15	53.9	0.16	54.06	65.99	-11.93	QP
0.15	43.16	0.16	43.32	55.99	-12.67	AVG
0.194	45.21	0.13	45.34	63.86	-18.52	QP
0.194	31.93	0.13	32.06	53.86	-21.8	AVG
2.97	34.36	0.2	34.56	56	-21.44	QP
2.97	21.67	0.2	21.87	46	-24.13	AVG
15.35	37.82	0.34	38.16	60	-21.84	QP
15.35	26.02	0.34	26.36	50	-23.64	AVG

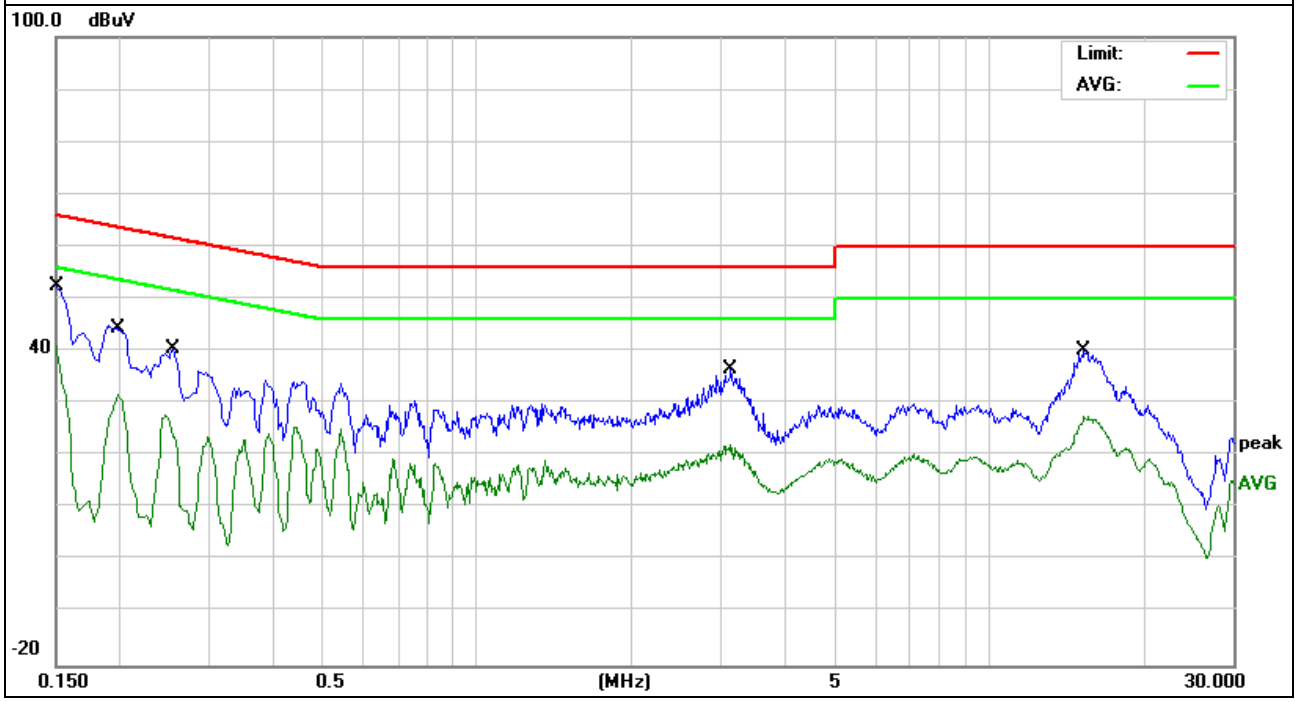
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Laser Pocketable Projector	Model Name. ：	A63D
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 19V from Adapter AC120V/60Hz	Test Mode：	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.15	52.38	0.14	52.52	65.99	-13.47	QP
0.15	40.97	0.14	41.11	55.99	-14.88	AVG
0.198	31.63	0.12	31.75	53.69	-21.94	QP
0.254	40.21	0.11	40.32	61.62	-21.3	AVG
3.138	36.28	0.21	36.49	56	-19.51	QP
3.138	21.86	0.21	22.07	46	-23.93	AVG
15.338	39.81	0.31	40.12	60	-19.88	QP
15.338	27.3	0.31	27.61	50	-22.39	AVG

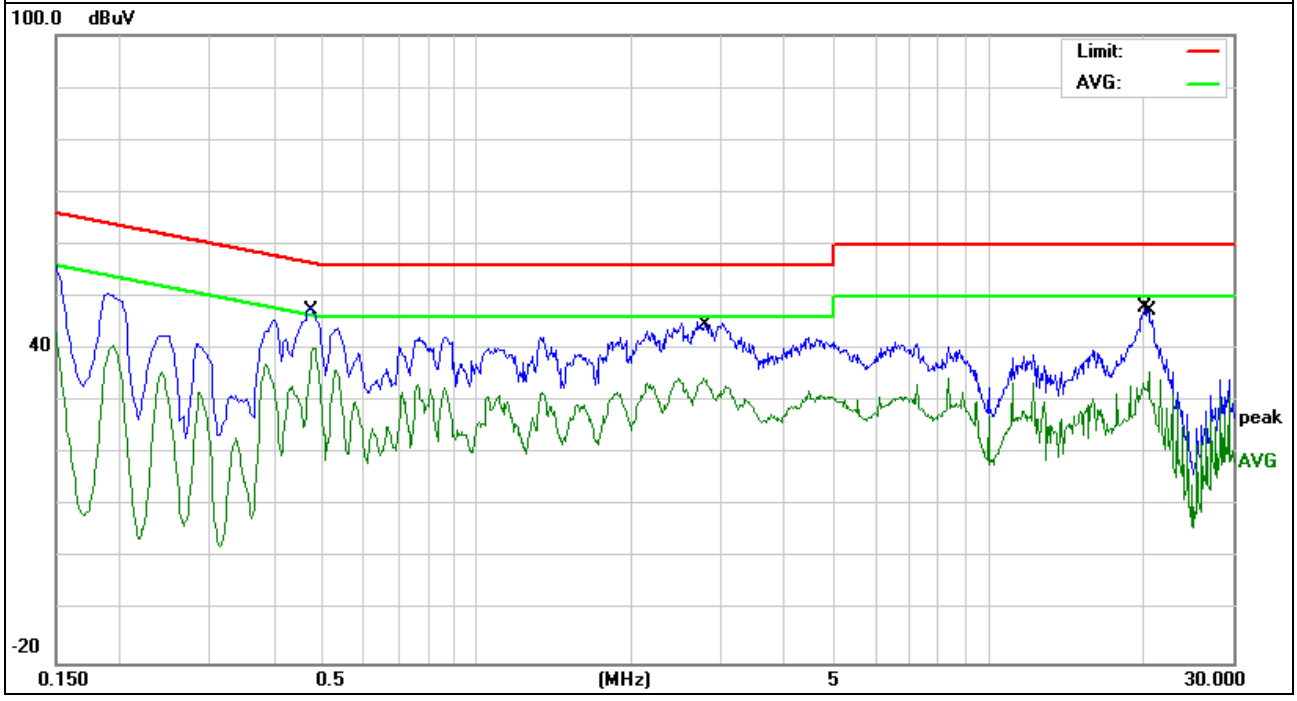
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Laser Pocketable Projector	Model Name. ：	A63D
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 19V from Adapter AC240V/60Hz	Test Mode：	Mode 1

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Detector Type
0.4818	45.36	0.14	45.5	56.31	-10.81	QP
0.4818	40.09	0.14	40.23	46.31	-6.08	AVG
0.482	47.84	0.14	47.98	56.3	-8.32	QP
0.482	40.07	0.14	40.21	46.3	-6.09	AVG
2.774	45.04	0.2	45.24	56	-10.76	QP
2.774	34.36	0.2	34.56	46	-11.44	AVG
20.2458	47.44	0.39	47.83	60	-12.17	QP
20.5538	35.3	0.39	35.69	50	-14.31	AVG

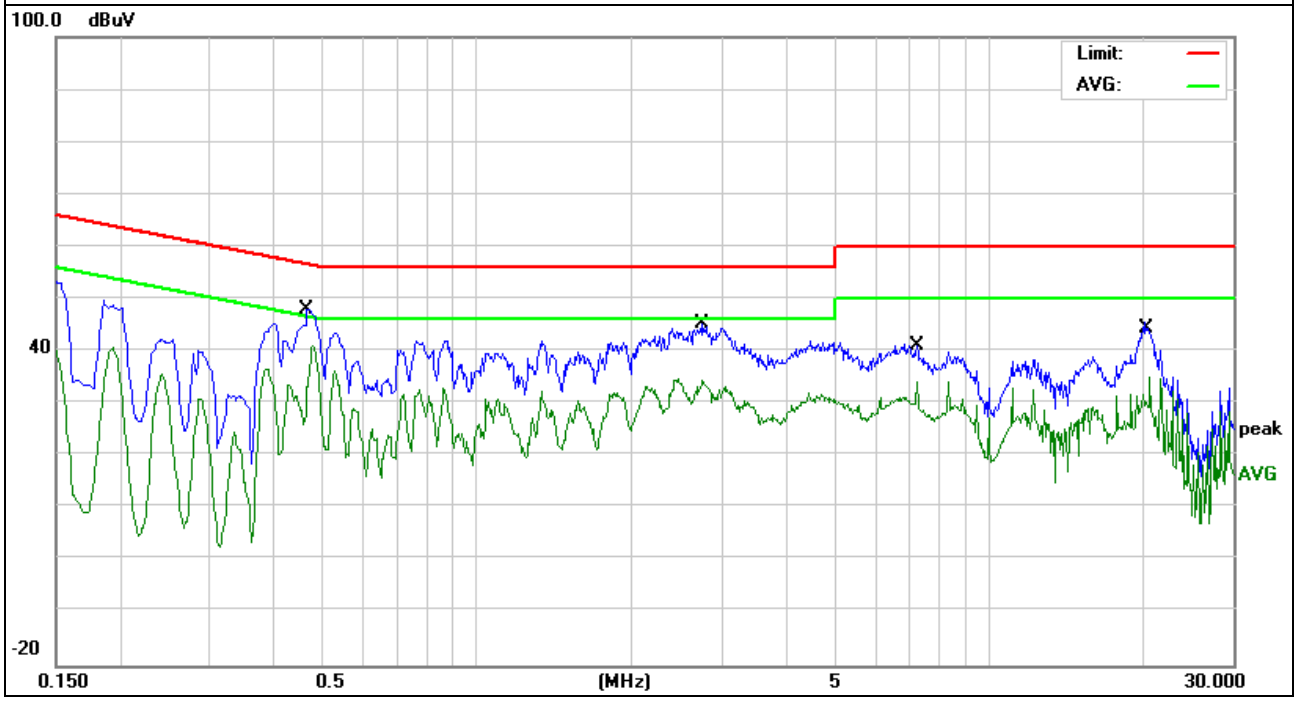
Remark:
1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss.



EUT：	Laser Pocketable Projector	Model Name. ：	A63D
Temperature：	26 ℃	Relative Humidity：	56%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 19V from Adapter AC240V/60Hz	Test Mode：	Mode 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.466	47.85	0.16	48.01	56.58	-8.57	QP
0.466	40.89	0.16	41.05	46.58	-5.53	AVG
2.754	44.95	0.22	45.17	56	-10.83	QP
2.754	34.45	0.22	34.67	46	-11.33	AVG
7.234	40.98	0.25	41.23	60	-18.77	QP
7.234	33.93	0.25	34.18	50	-15.82	AVG
20.598	45.11	0.37	45.48	60	-14.52	QP
20.598	34.66	0.37	35.03	50	-14.97	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 APPLICABLE STANDARD

According to FCC Part 15.407(d) and 15.209

3.2.2 CONFORMANCE LIMIT

According to FCC Part 15.407(b)(7): 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)).
According to FCC Part15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	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	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			

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.

Restricted Frequency(MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009~0.490	2400/F(KHz)	20 log (uV/m)	300
0.490~1.705	2400/F(KHz)	20 log (uV/m)	30
1.705~30.0	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Limits of Radiated Emission Measurement(Above 1000MHz)

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

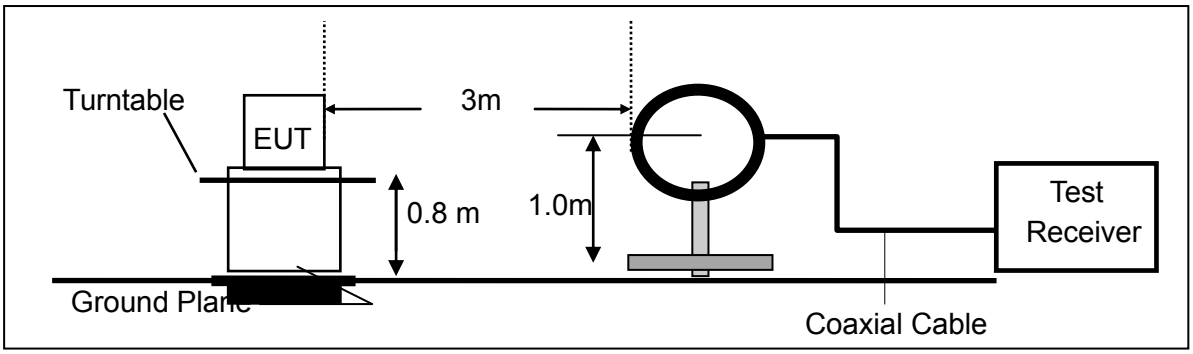
Remark :1. Emission level in dBuV/m=20 log (uV/m)
2. Measurement was performed at an antenna to the closed point of EUT distance of meters.
3. Distance extrapolation factor =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor.

3.2.3 MEASURING INSTRUMENTS

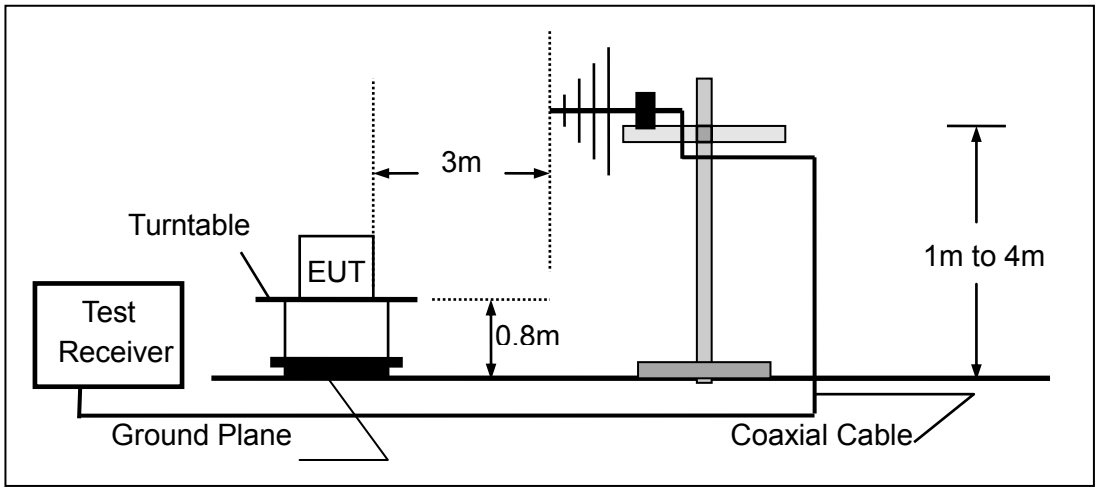
The Measuring equipment is listed in the section 6.3 of this test report.

3.2.4 TEST CONFIGURATION

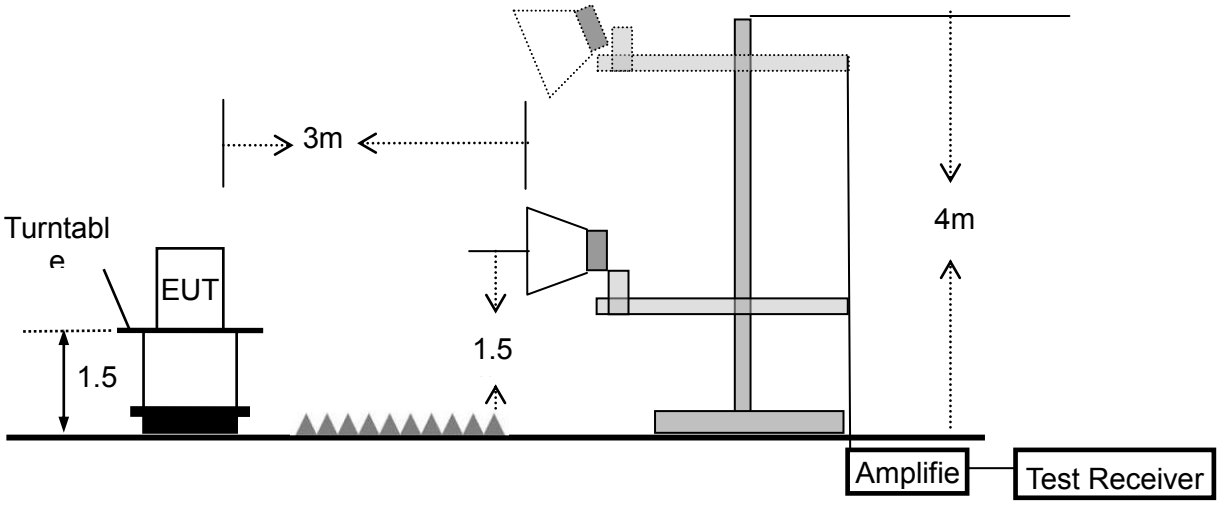
(a) For radiated emissions below 30MHz



(b) For radiated emissions from 30MHz to 1000MHz



(c) For radiated emissions above 1000MHz



3.2.5 TEST PROCEDURE

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10-2013. The test distance is 3m.The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.
This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT.
Use the following spectrum analyzer settings:

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

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. 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
	Average	1 MHz	10 Hz

Note: for the frequency ranges below 30 MHz, a narrower RBW is used for these ranges but the measured value should add a RBW correction factor (RBWCF) where RBWCF [dB] =10*lg(100 [kHz]/narrower RBW [kHz]). , the narrower RBW is 1 kHz and RBWCF is 20 dB for the frequency 9 kHz to 150 kHz, and the narrower RBW is 10 kHz and RBWCF is 10 dB for the frequency 150 kHz to 30 MHz.

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT：	Laser Pocketable Projector	Model Name. ：	A63D
Temperature：	20 ℃	Relative Humidtity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 19V from Adapter AC120V/60Hz
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.

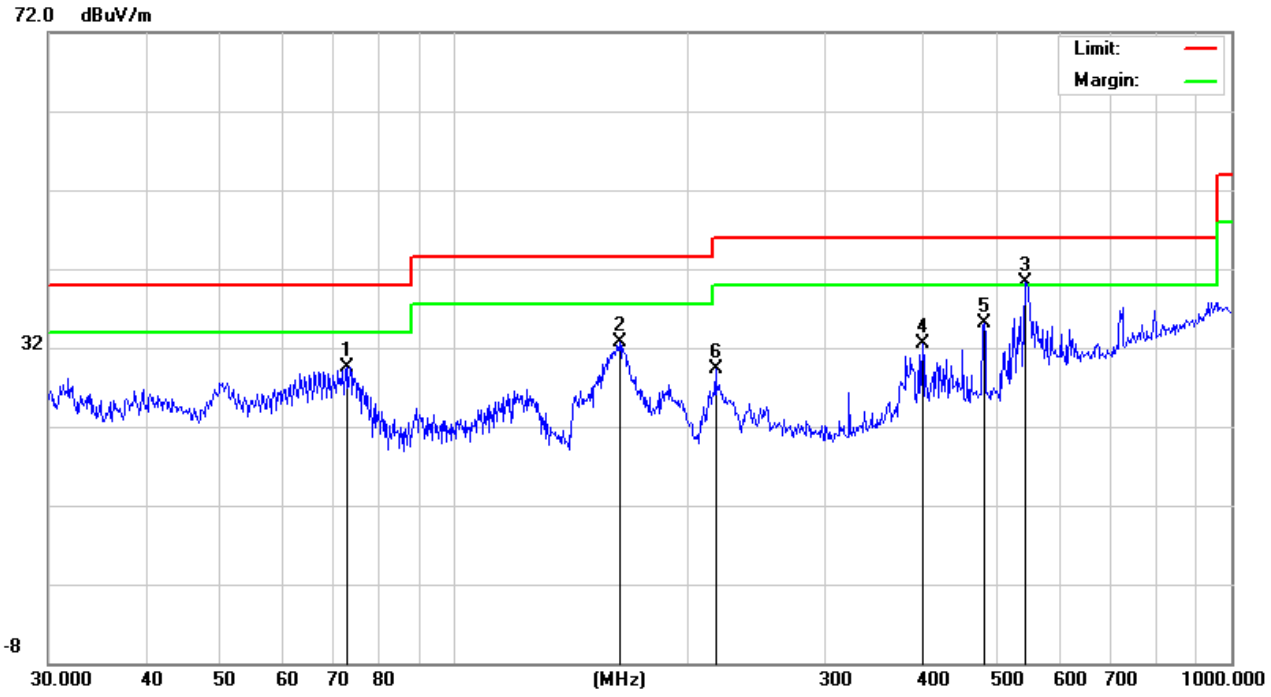
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 19V from Adapter AC120V/60Hz
Test Mode ：	TX- (5.2G)802.11a (High CH)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	72.5916	21.86	7.69	29.55	40	-10.45	QP
V	163.1818	20.8	11.98	32.78	43.5	-10.72	QP
V	543.2742	15.88	24.41	40.29	46	-5.71	QP
V	400.4318	12.22	20.23	32.45	46	-13.55	QP
V	480.5276	13.9	21.18	35.08	46	-10.92	QP
V	216.7828	17.37	12	29.37	46	-16.63	QP

Remark:

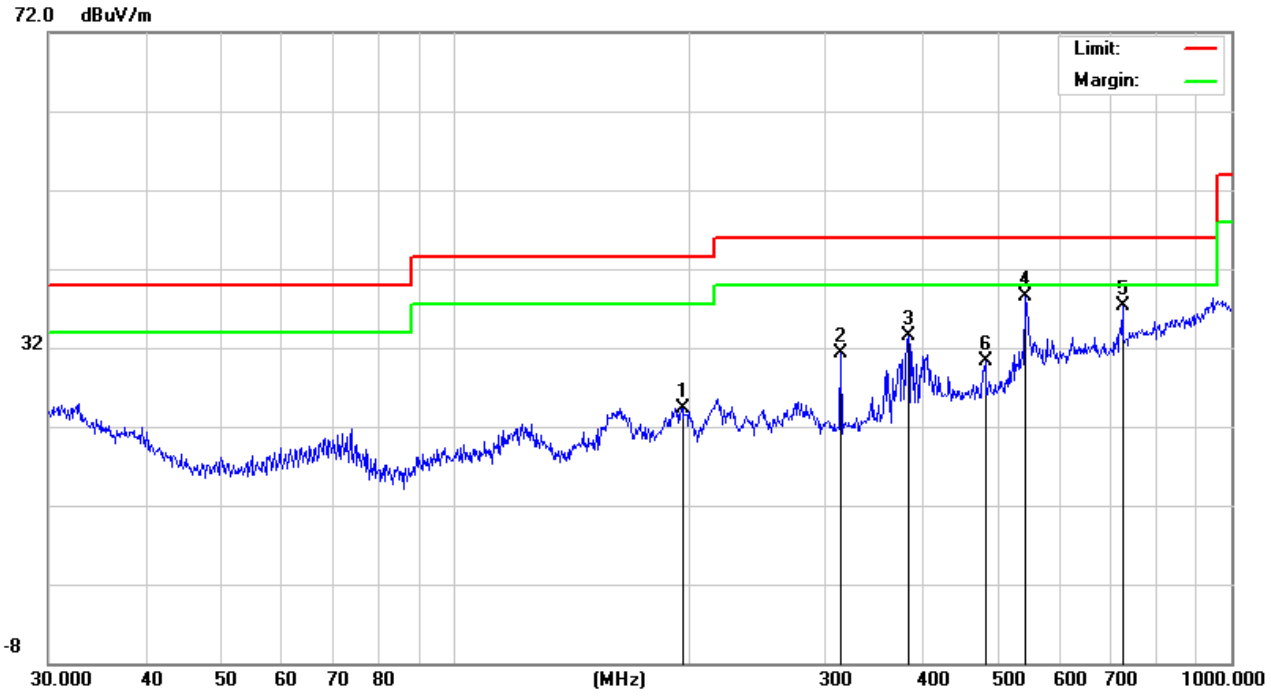
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	196.5098	14.04	10.34	24.38	43.5	-19.12	QP
H	314.3765	14.52	16.71	31.23	46	-14.77	QP
H	383.9318	14.1	19.45	33.55	46	-12.45	QP
H	543.2742	14.1	24.41	38.51	46	-7.49	QP
H	724.2611	10.77	26.57	37.34	46	-8.66	QP
H	482.2155	9.05	21.2	30.25	46	-15.75	QP

Remark:

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

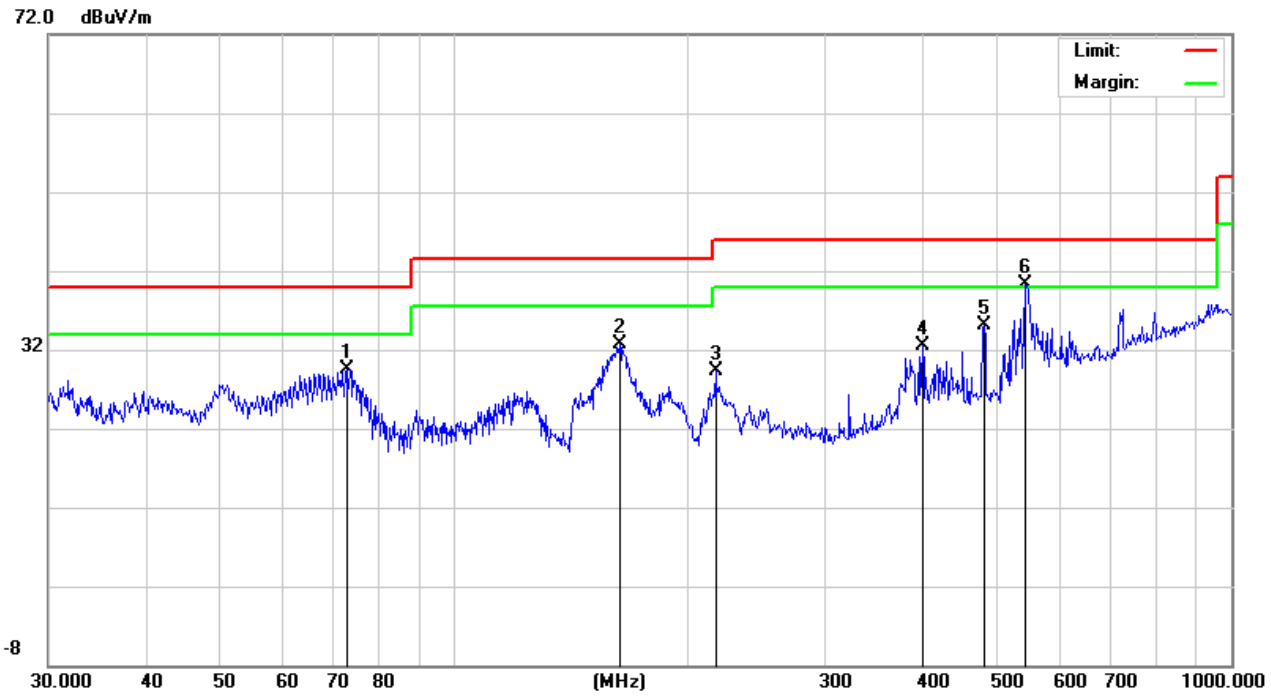


EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 19V from Adapter AC120V/60Hz
Test Mode ：	TX- (5.8G)802.11a (High CH)		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	72.5916	21.87	7.69	29.56	40	-10.44	QP
V	163.1818	20.82	11.98	32.8	43.5	-10.7	QP
V	216.7828	17.39	12	29.39	46	-16.61	QP
V	400.4318	12.25	20.23	32.48	46	-13.52	QP
V	480.5276	13.92	21.18	35.1	46	-10.9	QP
V	543.2742	15.89	24.41	40.3	46	-5.7	QP

Remark:

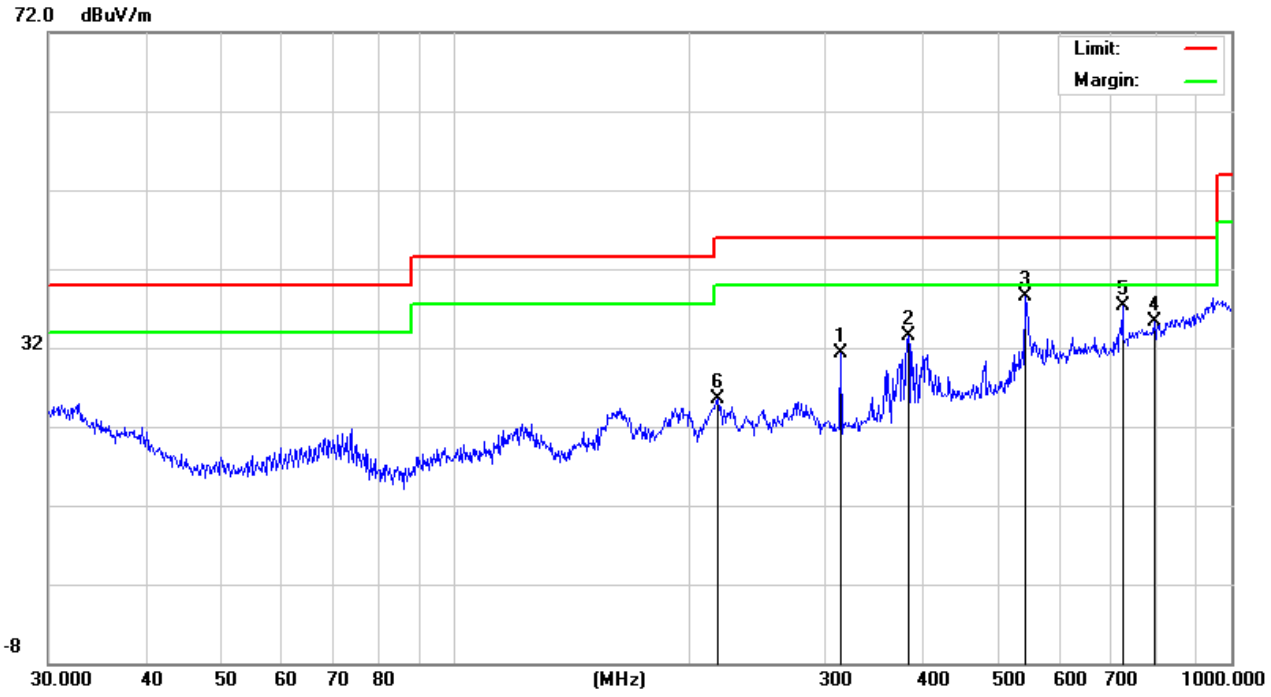
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	314.3765	14.54	16.71	31.25	46	-14.75	QP
H	383.9318	14.14	19.45	33.59	46	-12.41	QP
H	543.274	14.13	24.41	38.54	46	-7.46	QP
H	796.1829	7.38	28	35.38	46	-10.62	QP
H	724.2611	10.78	26.57	37.35	46	-8.65	QP
H	218.3085	13.34	12.17	25.51	46	-20.49	QP

Remark:

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



3.2.8 TEST RESULTS (1GHz-18GHz)

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX (5.2G)-802.11N(20) 5180MHz~5240MHz		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5180 MHz)-Above 1G									
Vertical	4434.157	62.26	5.94	35.40	44.00	59.6	74.00	-14.4	Pk
Vertical	4434.157	46.61	5.94	35.40	44.00	43.95	54.00	-10.05	AV
Vertical	10370.36	60.45	8.46	39.75	44.50	64.16	74.00	-9.84	Pk
Vertical	10370.36	42.98	8.46	39.75	44.50	46.69	54.00	-7.31	AV
Vertical	15540.2	61.52	10.12	38.80	44.10	66.34	74.00	-7.66	Pk
Vertical	15540.2	37.6	10.12	38.80	42.70	43.82	54.00	-10.18	AV
Horizontal	4434.521	66.63	5.94	35.18	44.00	63.75	74.00	-10.25	Pk
Horizontal	4434.521	44.15	5.94	35.18	44.00	41.27	54.00	-12.73	AV
Horizontal	10370.62	59.01	8.46	38.71	44.50	61.68	74.00	-12.32	Pk
Horizontal	10370.62	41.07	8.46	38.71	44.50	43.74	54.00	-10.26	AV
Horizontal	10540.87	57	10.12	38.38	44.10	61.4	74.00	-12.6	Pk
Horizontal	10540.87	38.92	10.12	38.38	44.10	43.32	54.00	-10.68	AV
middle Channel (5200 MHz)-Above 1G									
Vertical	4592.093	60.29	6.48	36.35	44.05	59.07	74.00	-14.93	Pk
Vertical	4592.093	41.95	6.48	36.35	44.05	40.73	54.00	-13.27	AV
Vertical	10401.42	59.72	8.47	37.88	44.51	61.56	74.00	-12.44	Pk
Vertical	10401.42	42.78	8.47	37.88	44.51	44.62	54.00	-9.38	AV
Vertical	15600.22	56.56	10.12	38.8	44.10	61.38	74.00	-12.62	Pk
Vertical	15600.22	36.68	10.12	38.8	42.70	42.9	54.00	-11.1	AV
Horizontal	4592.691	59.9	6.48	36.37	44.05	58.7	74.00	-15.3	Pk
Horizontal	4592.691	43.15	6.48	36.37	44.05	41.95	54.00	-12.05	AV
Horizontal	10400.11	58.91	8.47	38.64	44.50	61.52	74.00	-12.48	Pk
Horizontal	10400.11	42.28	8.47	38.64	44.50	44.89	54.00	-9.11	AV
Horizontal	15600.19	59.9	10.12	38.38	44.10	64.3	74.00	-9.7	Pk
Horizontal	15600.19	38.82	10.12	38.38	44.10	43.22	54.00	-10.78	AV
High Channel (5240 MHz)-Above 1G									
Vertical	4739.246	61.27	7.10	37.24	43.50	62.11	74.00	-11.89	Pk
Vertical	4739.246	44.45	7.10	37.24	43.50	45.29	54.00	-8.71	AV
Vertical	10480.37	60.56	8.46	37.68	44.50	62.2	74.00	-11.8	Pk
Vertical	10480.37	40.36	8.46	37.68	44.50	42	54.00	-12	AV
Vertical	15720.36	61.78	10.12	38.8	44.10	66.6	74.00	-7.4	Pk
Vertical	15720.36	39.72	10.12	38.8	42.70	45.94	54.00	-8.06	AV
Horizontal	4739.352	62.28	7.10	37.24	43.50	63.12	74.00	-10.88	Pk
Horizontal	4739.352	43.31	7.10	37.24	43.50	44.15	54.00	-9.85	AV
Horizontal	10481.11	62.61	8.46	38.57	44.50	65.14	74.00	-8.86	Pk
Horizontal	10481.11	43.36	8.46	38.57	44.50	45.89	54.00	-8.11	AV
Horizontal	15720.36	60.78	10.12	38.38	44.10	65.18	74.00	-8.82	Pk
Horizontal	15720.36	42.3	10.12	38.38	44.10	46.7	54.00	-7.3	AV

Note:"802.11N(20)(5G)" mode is the worst mode. PK value is lower than the Average value limit, So average didn't record.

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

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

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX (5.8G) -802.11N(20) 5745MHz~5825MHz		

Polar	Frequency	Meter Reading	Cable loss	Antenna Factor	Preamp Factor	Emission Level	Limits	Margin	Detector Type
(H/V)	(MHz)	(dBuV)	(dB)	dB/m	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
Low Channel (5745 MHz)-Above 1G									
Vertical	4679.205	52.46	5.94	35.40	44.00	49.8	74.00	-24.2	Pk
Vertical	4679.205	45.3	5.94	35.40	44.00	42.64	54.00	-11.36	AV
Vertical	11490.562	60.2	8.46	39.75	44.50	63.91	74.00	-10.09	Pk
Vertical	11490.562	44.27	8.46	39.75	44.50	47.98	54.00	-6.02	AV
Vertical	17235.726	56.46	10.12	38.80	44.10	61.28	74.00	-12.72	Pk
Vertical	17235.726	40.28	10.12	38.80	42.70	46.5	54.00	-7.5	AV
Horizontal	4679.164	57.4	5.94	35.18	44.00	54.52	74.00	-19.48	Pk
Horizontal	4679.164	44.31	5.94	35.18	44.00	41.43	54.00	-12.57	AV
Horizontal	11490.159	59.52	8.46	38.71	44.50	62.19	74.00	-11.81	Pk
Horizontal	11490.159	44.39	8.46	38.71	44.50	47.06	54.00	-6.94	AV
Horizontal	17235.526	58.27	10.12	38.38	44.10	62.67	74.00	-11.33	Pk
Horizontal	17235.526	42.5	10.12	38.38	44.10	46.9	54.00	-7.1	AV
middle Channel (5785 MHz)-Above 1G									
Vertical	4592.157	58.62	6.48	36.35	44.05	57.4	74.00	-16.6	Pk
Vertical	4592.157	43.28	6.48	36.35	44.05	42.06	54.00	-11.94	AV
Vertical	11570.184	59.85	8.47	37.88	44.51	61.69	74.00	-12.31	Pk
Vertical	11570.184	43.88	8.47	37.88	44.51	45.72	54.00	-8.28	AV
Vertical	17355.24	57.27	10.12	38.8	44.10	62.09	74.00	-11.91	Pk
Vertical	17355.24	40.3	10.12	38.8	42.70	46.52	54.00	-7.48	AV
Horizontal	4592.485	59.8	6.48	36.37	44.05	58.6	74.00	-15.4	Pk
Horizontal	4592.485	43.38	6.48	36.37	44.05	42.18	54.00	-11.82	AV
Horizontal	11570.264	60.56	8.47	38.64	44.50	63.17	74.00	-10.83	Pk
Horizontal	11570.264	46.31	8.47	38.64	44.50	48.92	54.00	-5.08	AV
Horizontal	17355.764	59.73	10.12	38.38	44.10	64.13	74.00	-9.87	Pk
Horizontal	17355.764	44.39	10.12	38.38	44.10	48.79	54.00	-5.21	AV
High Channel (5825 MHz)-Above 1G									
Vertical	5039.124	58.79	7.10	37.24	43.50	59.63	74.00	-14.37	Pk
Vertical	5039.124	46.49	7.10	37.24	43.50	47.33	54.00	-6.67	AV
Vertical	11650.264	55.4	8.46	37.68	44.50	57.04	74.00	-16.96	Pk
Vertical	11650.264	42.26	8.46	37.68	44.50	43.9	54.00	-10.1	AV
Vertical	17475.407	59.51	10.12	38.8	44.10	64.33	74.00	-9.67	Pk
Vertical	17475.407	39.96	10.12	38.8	42.70	46.18	54.00	-7.82	AV
Horizontal	5039.26	66.69	7.10	37.24	43.50	67.53	74.00	-6.47	Pk
Horizontal	5039.26	42.31	7.10	37.24	43.50	43.15	54.00	-10.85	AV
Horizontal	11650.154	56.6	8.46	38.57	44.50	59.13	74.00	-14.87	Pk
Horizontal	11650.154	43.79	8.46	38.57	44.50	46.32	54.00	-7.68	AV
Horizontal	17475.289	59.88	10.12	38.38	44.10	64.28	74.00	-9.72	Pk
Horizontal	17475.289	44.36	10.12	38.38	44.10	48.76	54.00	-5.24	AV

Note:"802.11N(20)(5G)" mode is the worst mode. PK value is lower than the Average value limit, So average didn't record.

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value

has no need to be reported.

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

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

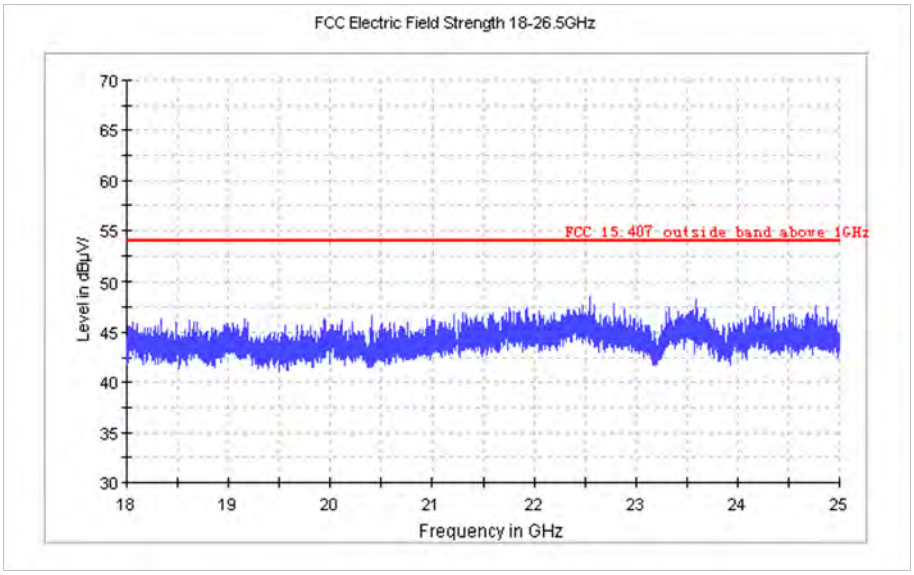
TEST RESULTS (18GHz-40GHz)

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX (5.2G)-802.11N(20) 5180MHz~5240MHz , TX (5.8G) -802.11N(20) 5745MHz~5825MHz		

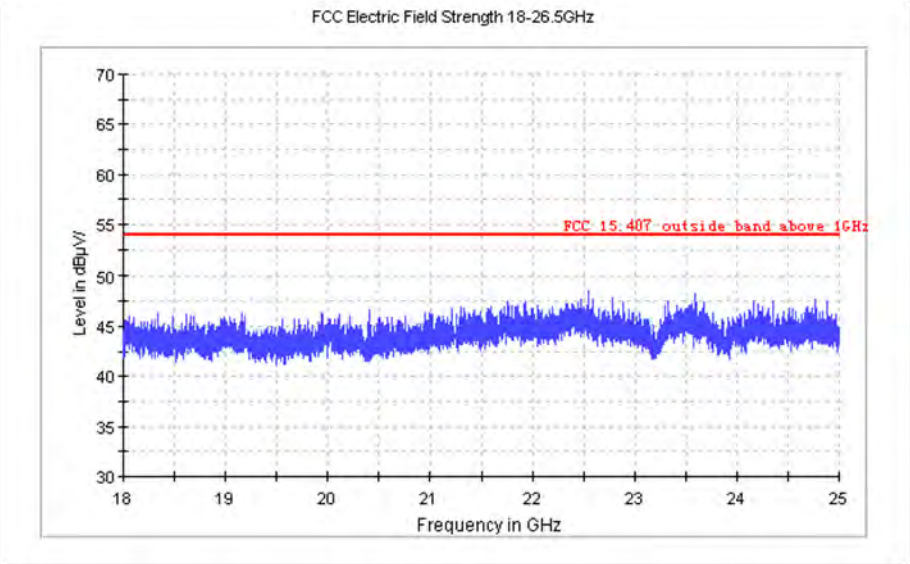
All the modulation modes have been tested, and the worst result was report as below:

Channel (5180 MHz) 18-26.5G

Horizontal

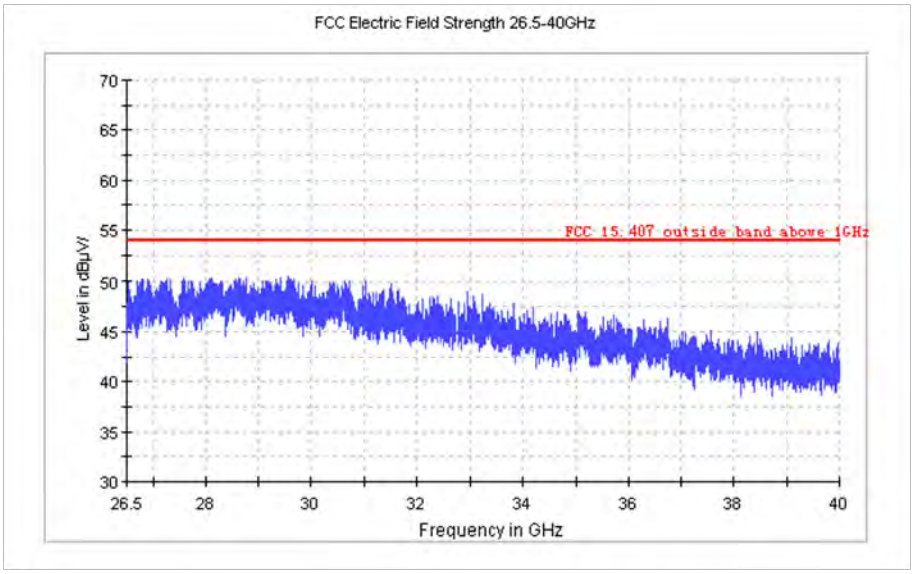


Vertical

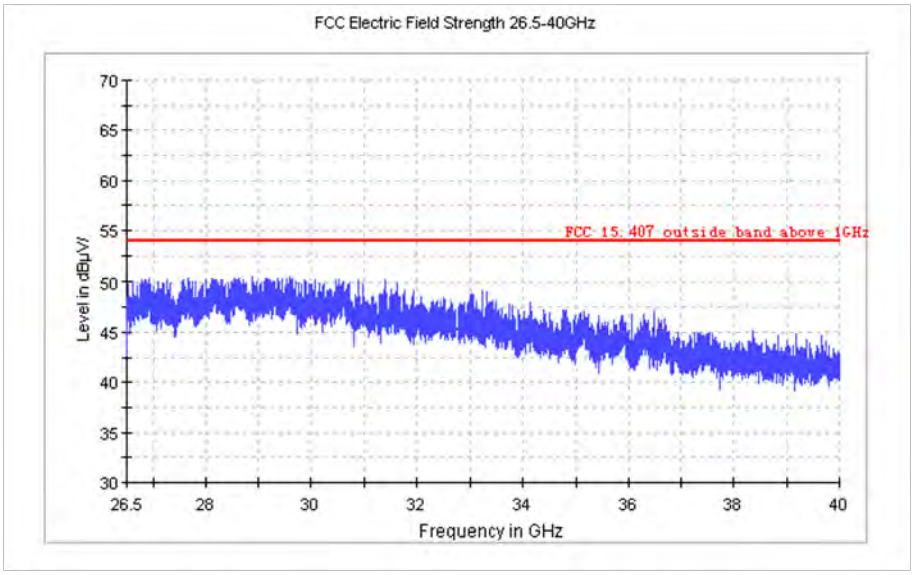


Channel (5180 MHz) 26.5-40G

Horizontal

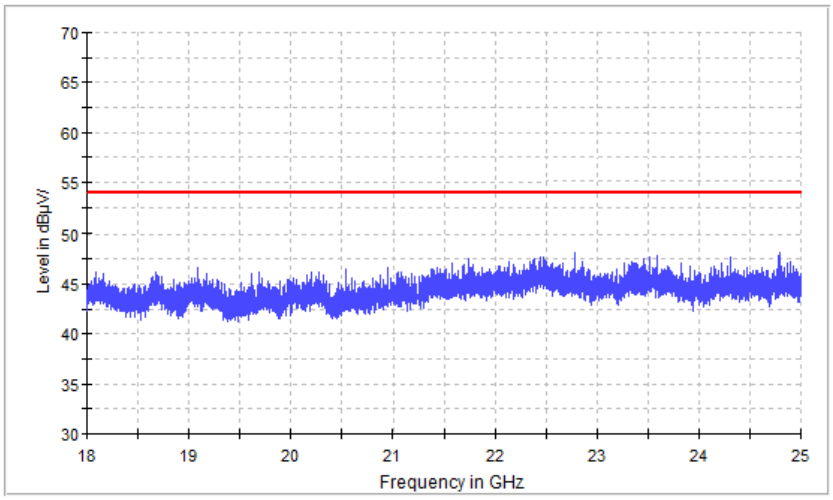


Vertical

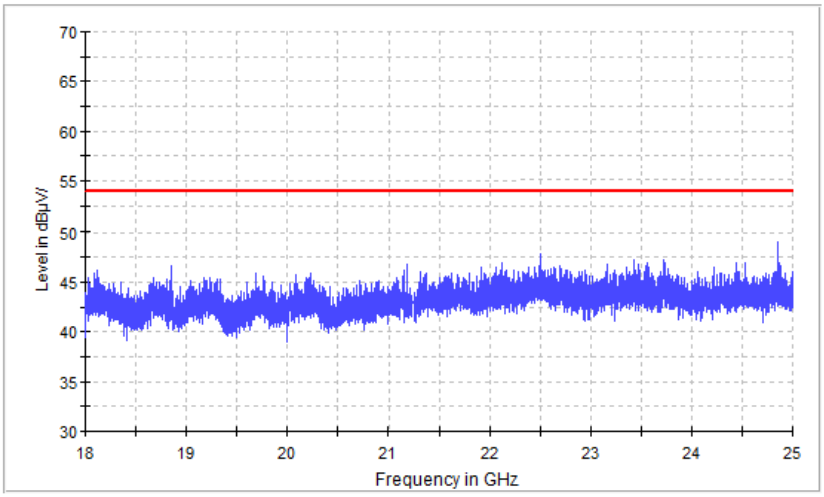


Channel (5745 MHz) 18-26.5G

Horizontal

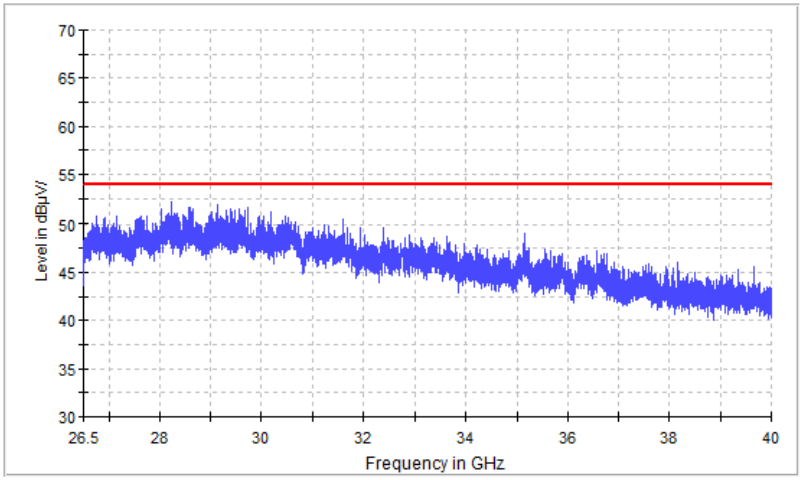


Vertical

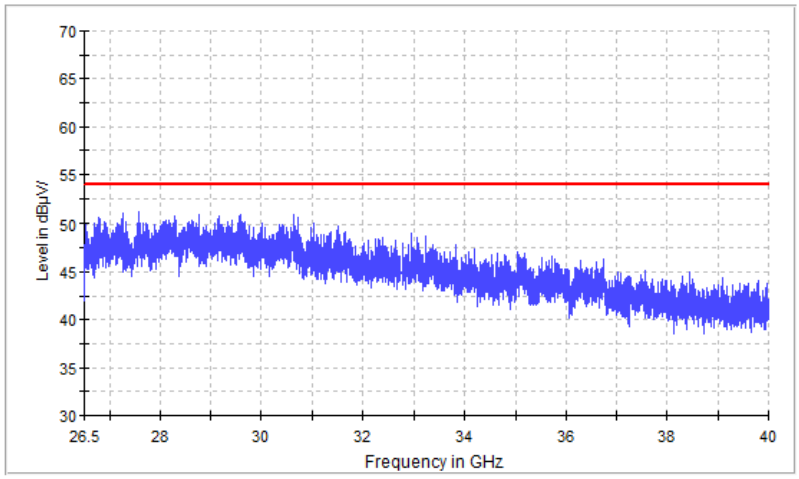


Channel (5745 MHz) 26.5-40G

Horizontal



Vertical



4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(a)(3)

For the band 5.15-5.25 GHz,

(i) For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).

(ii) For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(iii) For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

(iv) For mobile and portable client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

For the band 5.725-5.85 GHz

(3)For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

,

4.2 TEST PROCEDURE

For devices operating in the bands 5.15-5.25 GHz, 5.25-5.35 GHz, and 5.47-5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in § 15.407(a)(5). For devices operating in the band 5.725-5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, “provided that the measured power is integrated over the full reference bandwidth” to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 KHz bandwidth, the following adjustments to the procedures apply:

a) Set RBW ≥ 1/T, where T is defined in section II.B.I.a).

b) Set VBW ≥ 3 RBW.

c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 KHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.

d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10log(1MHz/RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.

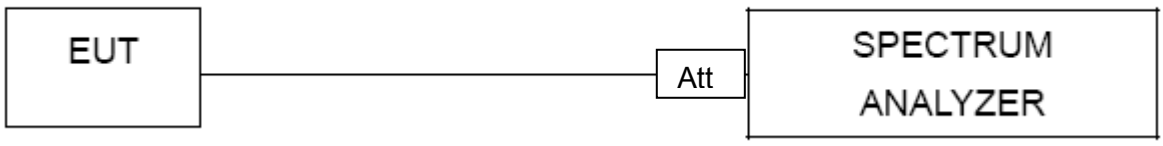
e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 KHz for the sections 5.c) and 5.d) above, since RBW=100 KHZ is available on nearly all spectrum analyzers.

4.3 DEVIATION FROM STANDARD

No deviation.

4.4 TEST SETUP



4.5 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.

4.6 TEST RESULTS

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1015 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX Frequency (5150-5250MHz)		

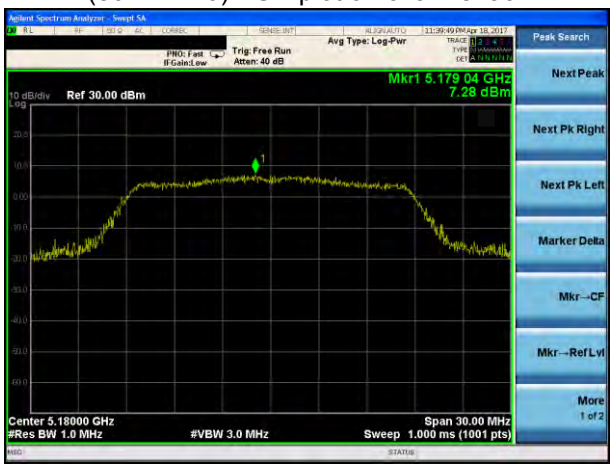
Mode	Frequency	Measured Power Density (dBm)	Limit (dBm)	Result
802.11 a	5185 MHz	8.18	11	PASS
	5200 MHz	7.03	11	PASS
	5240 MHz	7.09	11	PASS
802.11 n20	5185 MHz	7.28	11	PASS
	5200 MHz	6.46	11	PASS
	5240 MHz	7.51	11	PASS
802.11 n40	5190 MHz	3.62	11	PASS
	5230 MHz	3.37	11	PASS
802.11 AC20	5185 MHz	7.14	11	PASS
	5200 MHz	6.62	11	PASS
	5240 MHz	6.74	11	PASS
802.11 AC40	5190 MHz	4.87	11	PASS
	5230 MHz	4.041	11	PASS
802.11 AC80	5210 MHz	1.42	11	PASS

Note: 1.Calculate power density= Measured Power Density+10log(1MHz/RBW)

RBW=1MHz

(802.11a) PSD plot on channel 36

(802.11n20) PSD plot on channel 36

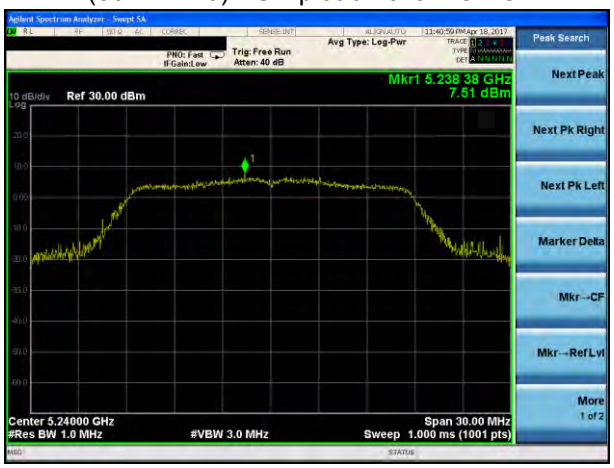


(802.11a) PSD plot on channel 40

(802.11n20) PSD plot on channel 40

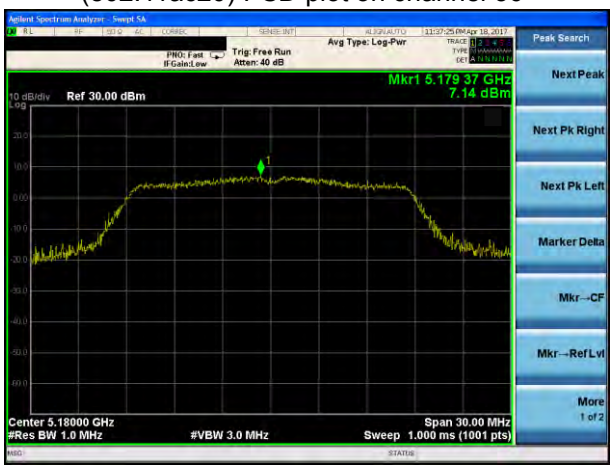
(802.11a) PSD plot on channel 48

(802.11n20) PSD plot on channel 48



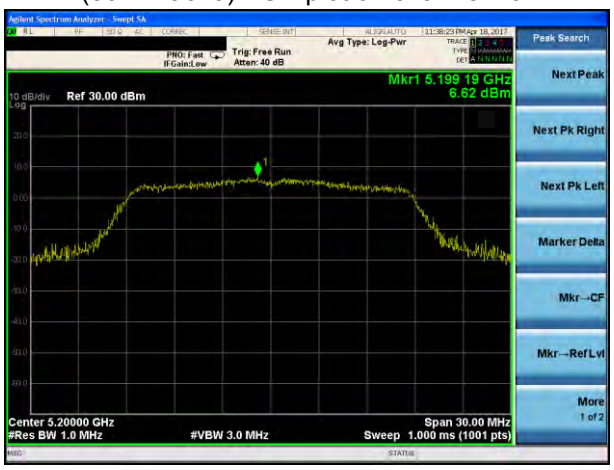
(802.11n40) PSD plot on channel 38

(802.11ac20) PSD plot on channel 36

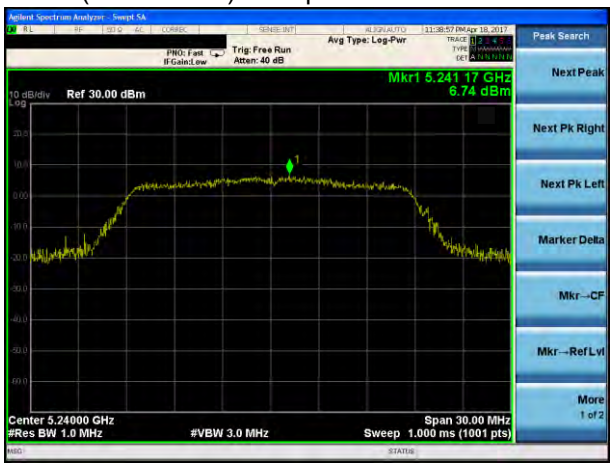


(802.11n40) PSD plot on channel 46

(802.11ac20) PSD plot on channel 40



(802.11ac20) PSD plot on channel 48



(802.11ac40) PSD plot on channel 38

(802.11ac80) PSD plot on channel 42

(802.11ac40) PSD plot on channel 46

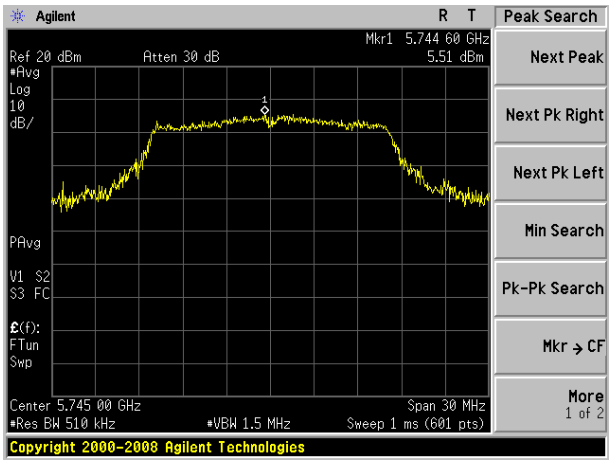
EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1015 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX Frequency (5725-5825MHz)		

Mode	Frequency	Measured Power Density(dBm)	Factor (dBm)	Calculate power density (dBm)	Limit (dBm)	Result
802.11 a	5745 MHz	5.51	2.924	8.434	30	PASS
	5785 MHz	5.71	2.924	8.634	30	PASS
	5825 MHz	4.66	2.924	7.584	30	PASS
802.11 n20	5745 MHz	5.37	2.924	8.294	30	PASS
	5785 MHz	5.22	2.924	8.144	30	PASS
	5825 MHz	4.80	2.924	7.724	30	PASS
802.11 n40	5755 MHz	2.88	2.924	5.804	30	PASS
	5795 MHz	2.22	2.924	5.144	30	PASS
802.11 AC20	5745 MHz	6.10	2.924	9.024	30	PASS
	5785 MHz	6.51	2.924	9.434	30	PASS
	5825 MHz	5.25	2.924	8.174	30	PASS
802.11 AC40	5755 MHz	3.27	2.924	6.194	30	PASS
	5795 MHz	2.57	2.924	5.494	30	PASS
802.11 AC80	5775 MHz	-1.48	2.924	1.444	30	PASS

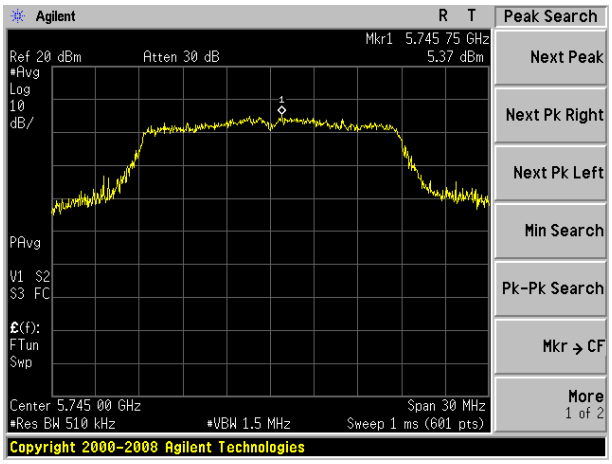
Note:

(1) Calculate power density= Measured Power Density+10log(1MHz/RBW)
RBW=0.51MHz

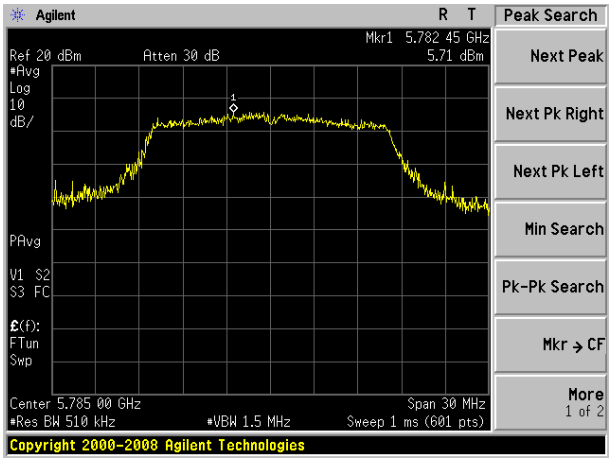
(802.11a) PSD plot on channel 149



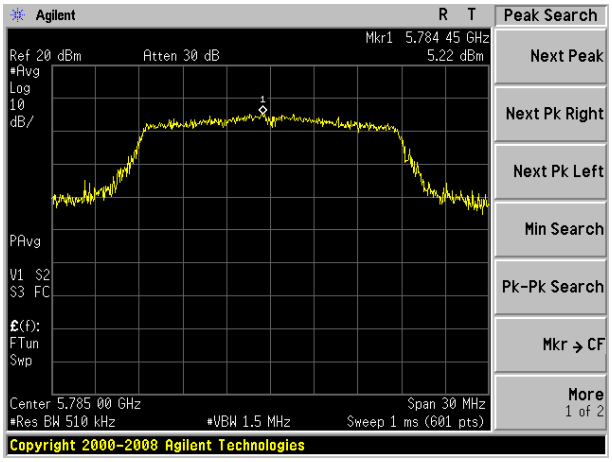
(802.11n20) PSD plot on channel 149



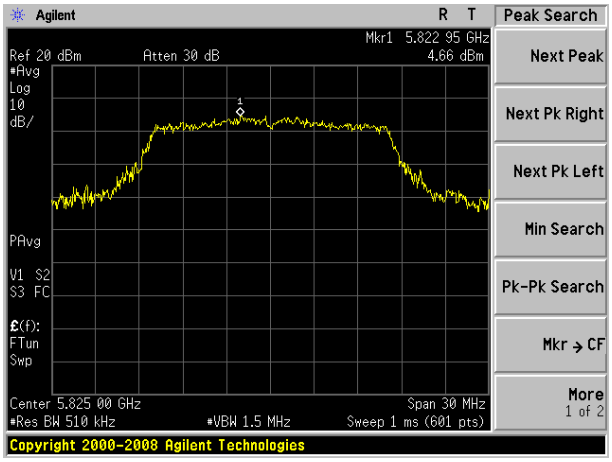
(802.11a) PSD plot on channel 157



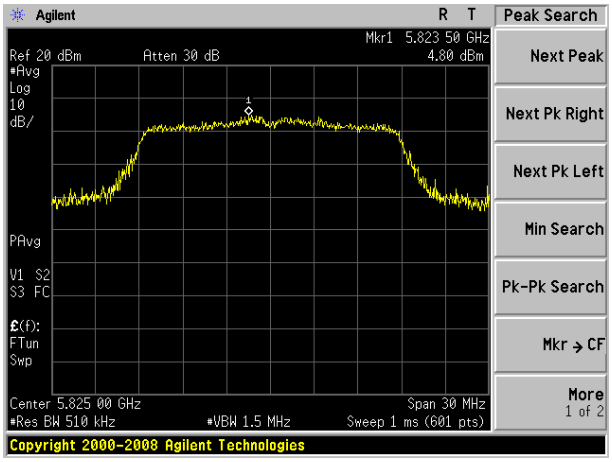
(802.11n20) PSD plot on channel 157



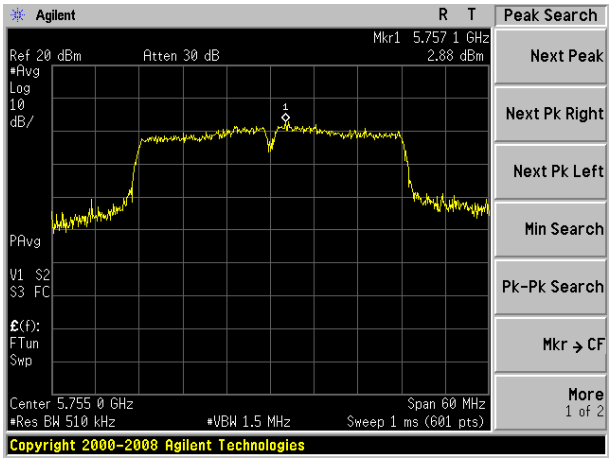
(802.11a) PSD plot on channel 165



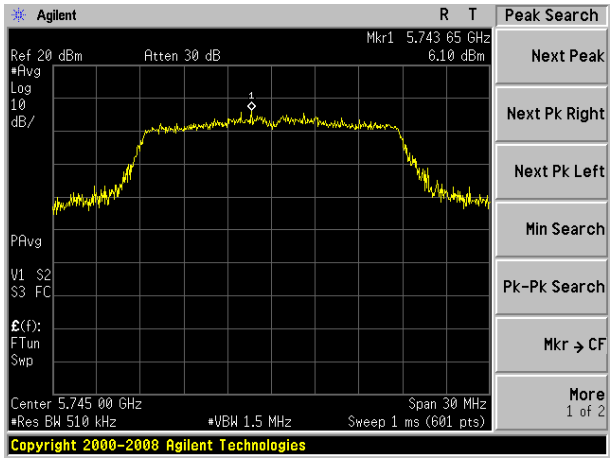
(802.11n20) PSD plot on channel 165



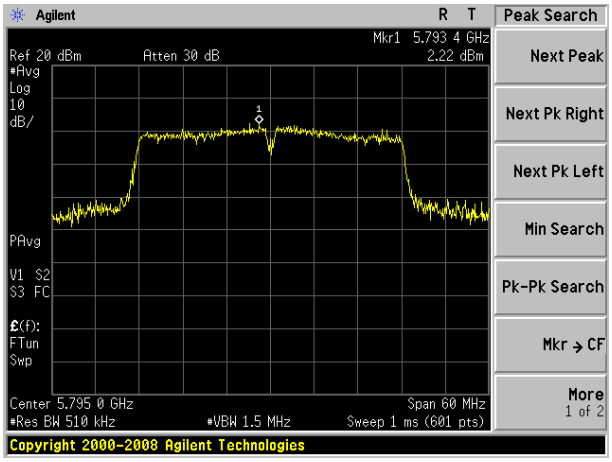
(802.11n40) PSD plot on channel 151



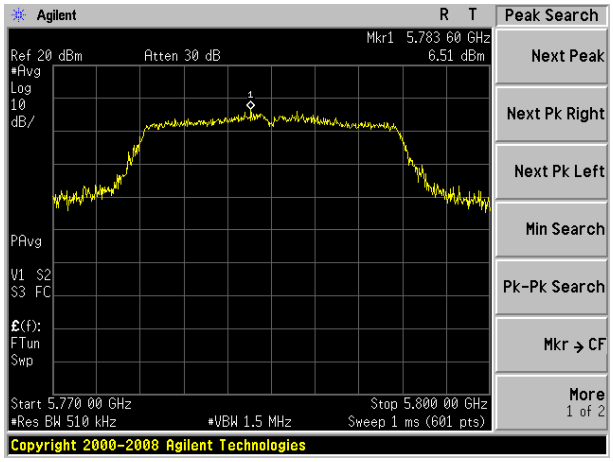
(802.11ac20) PSD plot on channel 149



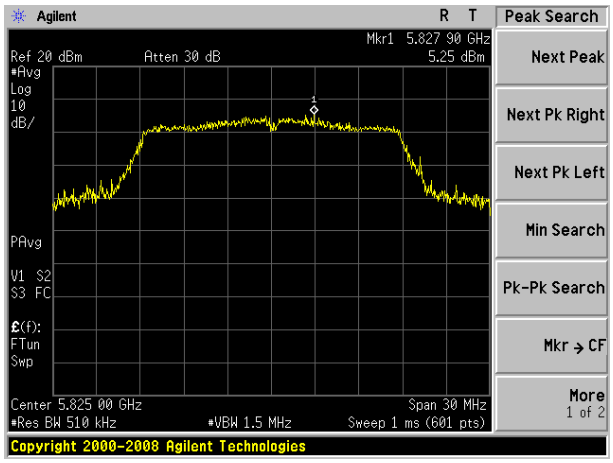
(802.11n40) PSD plot on channel 159



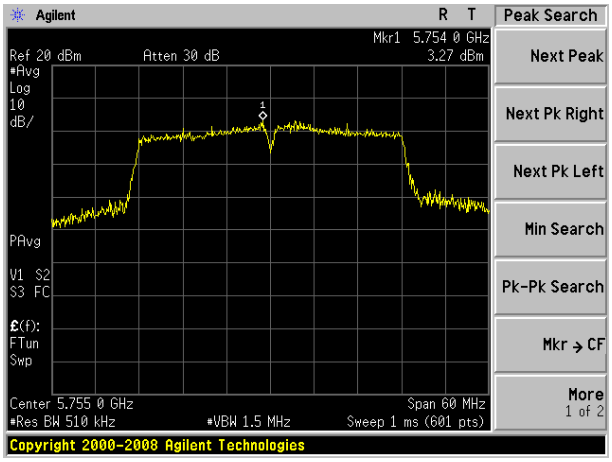
(802.11ac20) PSD plot on channel 157



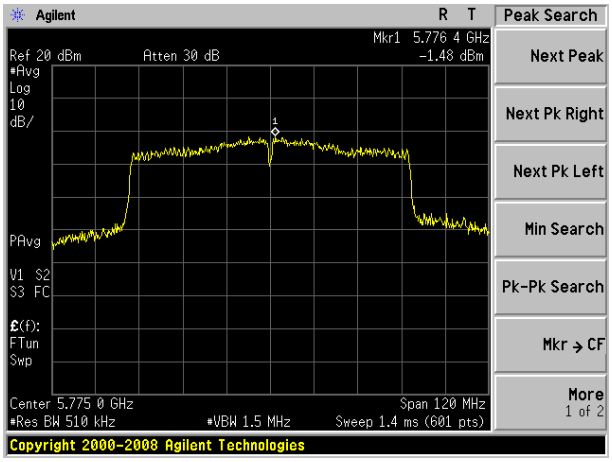
(802.11ac20) PSD plot on channel 165



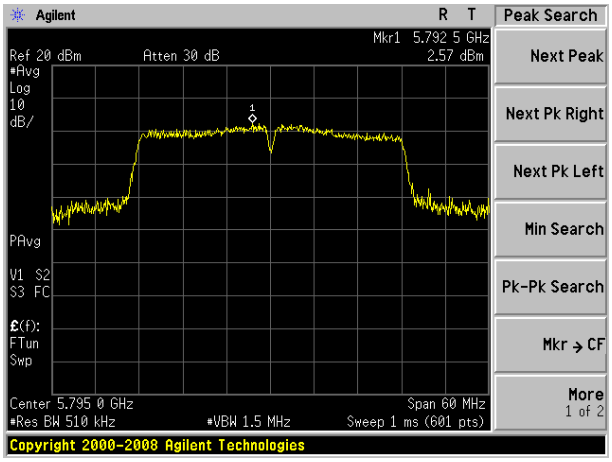
(802.11ac40) PSD plot on channel 151



(802.11ac80) PSD plot on channel 155



(802.11ac40) PSD plot on channel 159



5. 26 DB & 99% EMISSION BANDWIDTH

5.1 APPLIED PROCEDURES / LIMIT

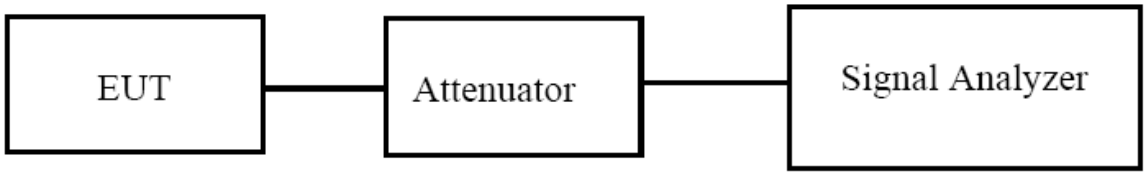
The maximum power spectral density is measured as a conducted emission by direct connection of a calibrated test instrument to the equipment under test. If the device cannot be connected directly, alternative techniques acceptable to the Commission may be used. Measurements in the 5.725-5.85 GHz band are made over a reference bandwidth of 500 kHz or the 26 dB emission bandwidth of the device, whichever is less. Measurements in the 5.15-5.25 GHz, 5.25-5.35 GHz, and the 5.47-5.725 GHz bands are made over a bandwidth of 1 MHz or the 26 dB emission bandwidth of the device, whichever is less. A narrower resolution bandwidth can be used, provided that the measured power is integrated over the full reference bandwidth.

5.2 TEST PROCEDURE

a) Set RBW = approximately 1% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the maximum of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

The following procedure shall be used for measuring (99 %) power bandwidth:

1. Set center frequency to the nominal EUT channel center frequency.
2. Set span = 1.5 times to 5.0 times the OBW.
3. Set RBW = 1 % to 5 % of the OBW
4. Set VBW ≥ 3 · RBW
5. Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
6. Use the 99 % power bandwidth function of the instrument (if available).
7. If the instrument does not have a 99 % power bandwidth function, the trace data points are recovered and directly summed in power units. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5 % of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5 % of the total is reached; that frequency is recorded as the upper frequency. The 99% occupied bandwidth is the difference between these two frequencies.



5.3 EUT OPERATION CONDITIONS

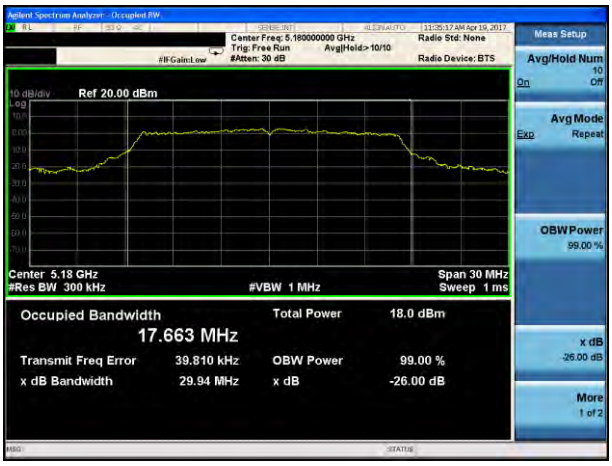
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.4 TEST RESULTS

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX Frequency (5150-5250MHz)		

Mode	Channel	Frequency (MHz)	99% bandwidth (MHz)	26dB bandwidth(MHz)	Result
802.11a	CH36	5180	17.663	29.94	Pass
	CH40	5200	17.979	29.99	Pass
	CH48	5240	17.916	30.00	Pass
802.11 n20	CH36	5180	18.430	29.85	Pass
	CH40	5200	18.519	29.98	Pass
	CH48	5240	18.467	29.87	Pass
802.11 n40	CH 38	5190	36.272	49.80	Pass
	CH 46	5230	36.283	49.92	Pass
802.11 AC20	CH36	5180	18.319	29.18	Pass
	CH40	5200	18.489	30.00	Pass
	CH48	5240	18.568	29.98	Pass
802.11 AC40	CH 38	5190	36.257	50.00	Pass
	CH 46	5230	36.293	49.98	Pass
802.11 AC80	CH 42	5210	75.759	100.0	Pass

(802.11a) -26dB&99% Bandwidth plot on channel 36



(802.11n20) -26dB&99% Bandwidth plot on channel 36

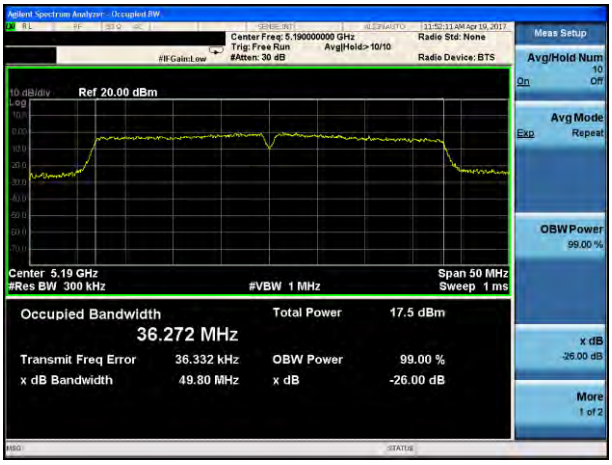
(802.11a) -26dB&99% Bandwidth plot on channel 40

(802.11n20) -26dB&99% Bandwidth plot on channel 40

(802.11a) -26dB&99% Bandwidth plot on channel 48

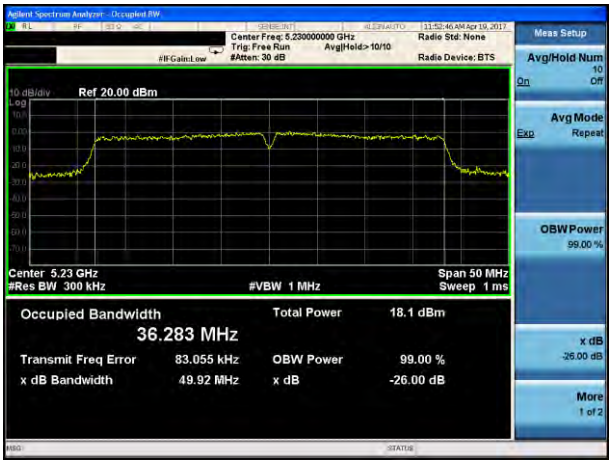
(802.11n20) -26dB&99% Bandwidth plot on channel 48

(802.11n40) -26dB&99% Bandwidth plot on channel 38



(802.11ac20) -26dB&99% Bandwidth plot on channel 36

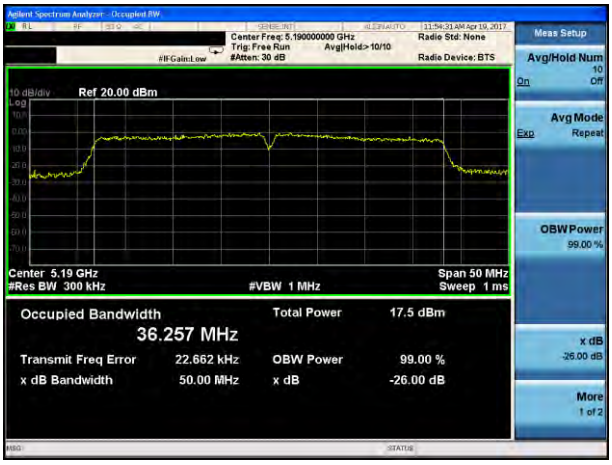
(802.11n40) -26dB&99% Bandwidth plot on channel 46



(802.11ac20) -26dB&99% Bandwidth plot on channel 40

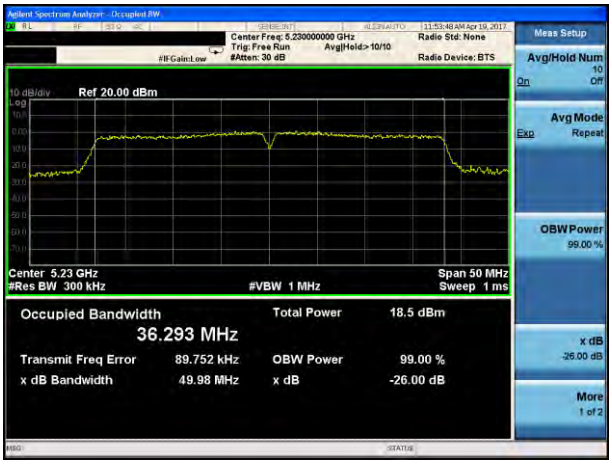
(802.11ac20) -26dB&99% Bandwidth plot on channel 48

(802.11ac40) -26dB&99% Bandwidth plot on channel 38



(802.11ac80) -26dB&99% Bandwidth plot on channel 42

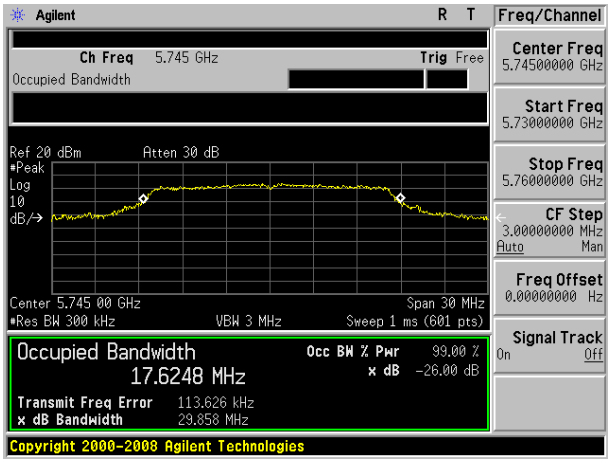
(802.11ac40) -26dB&99% Bandwidth plot on channel 46



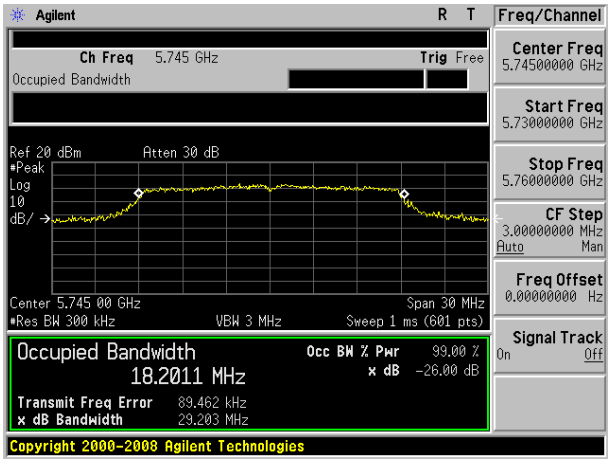
EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX Frequency (5745-5850MHz)		

Mode	Channel	Frequency (MHz)	99% bandwidth (MHz)	26dB bandwidth (MHz)	Result
802.11a	CH149	5745	17.6248	29.858	Pass
	CH157	5785	17.5623	29.024	Pass
	CH165	5825	17.4667	29.964	Pass
802.11 n20	CH149	5745	18.2011	29.203	Pass
	CH157	5785	18.2489	29.440	Pass
	CH165	5825	18.3067	29.514	Pass
802.11 n40	CH151	5755	36.5811	50.000	Pass
	CH159	5795	36.7275	49.973	Pass
802.11 AC20	CH149	5745	18.4410	29.874	Pass
	CH157	5785	18.2623	29.726	Pass
	CH165	5825	18.2764	29.622	Pass
802.11 AC40	CH151	5755	36.7308	50.000	Pass
	CH159	5795	36.6929	50.000	Pass
802.11 AC80	CH155	5775	75.3328	98.524	Pass

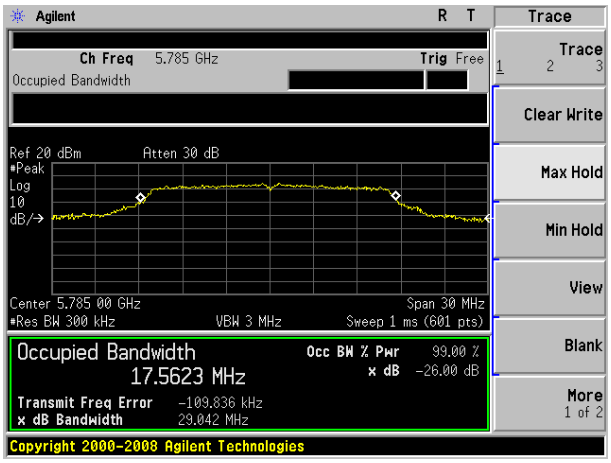
(802.11a) -26dB&99% Bandwidth plot on channel 149



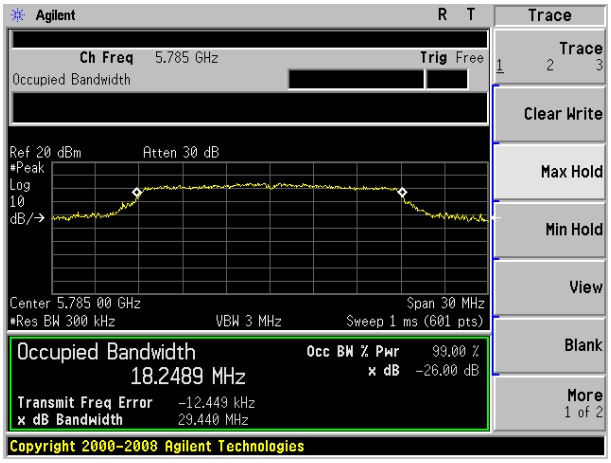
(802.11n20) -26dB&99% Bandwidth plot on channel 149



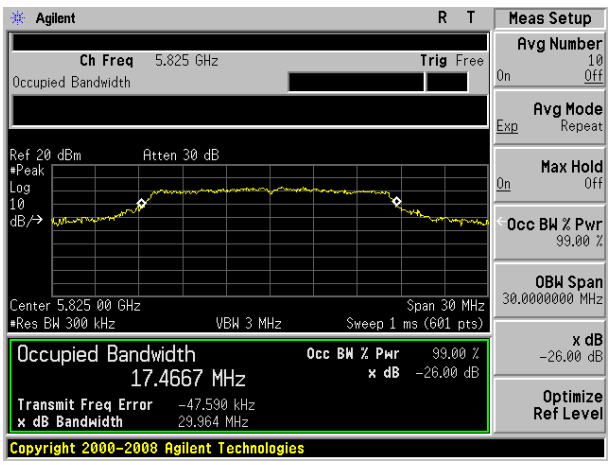
(802.11a) -26dB&99% Bandwidth plot on channel 157



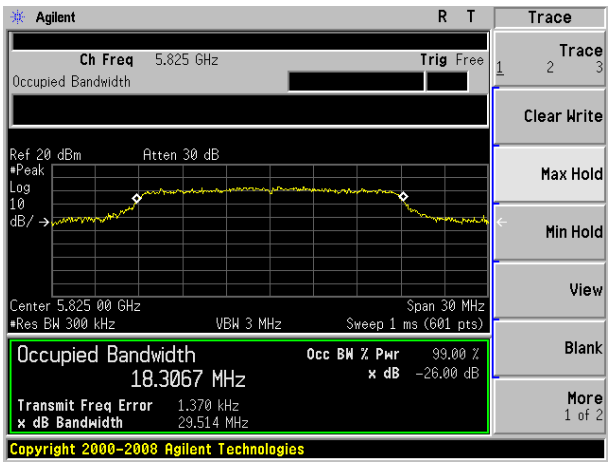
(802.11n20) -26dB&99% Bandwidth plot on channel 157



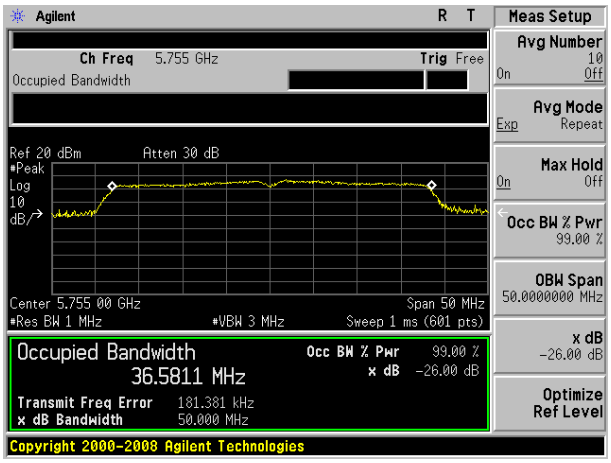
(802.11a) -26dB&99% Bandwidth plot on channel 165



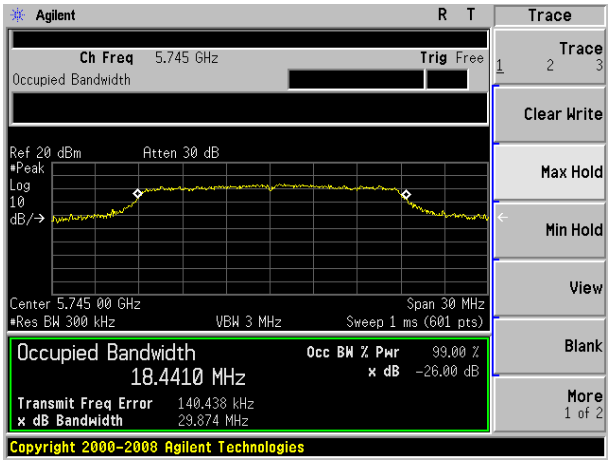
(802.11n20) -26dB&99% Bandwidth plot on channel 165



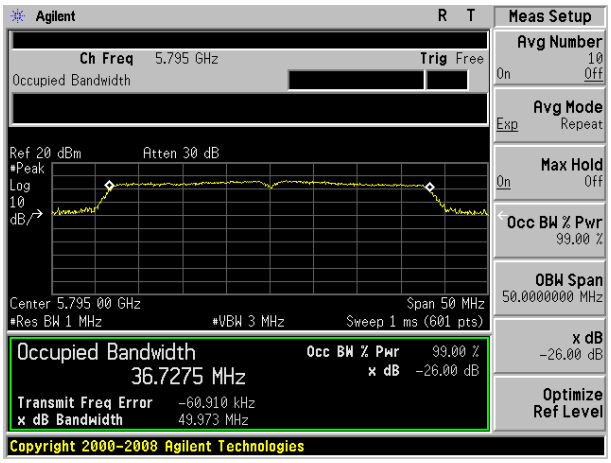
(802.11n40) -26dB&99% Bandwidth plot on channel 151



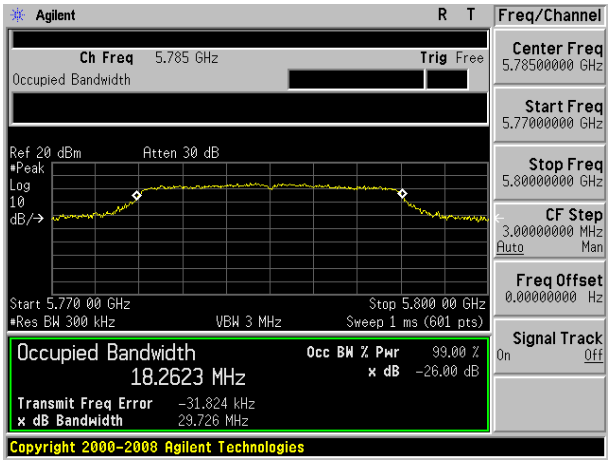
(802.11ac20) -26dB&99% Bandwidth plot on channel 149



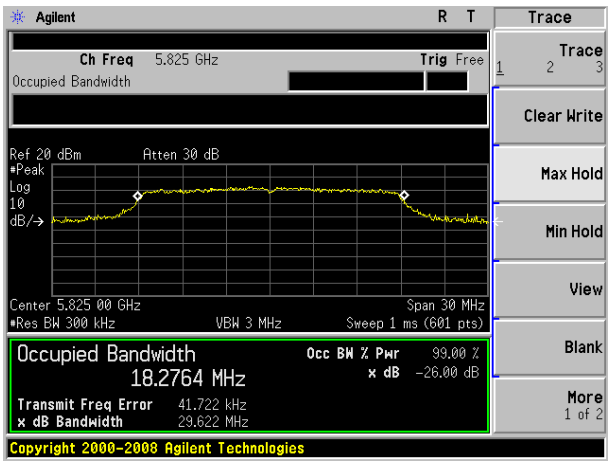
(802.11n40) -26dB&99% Bandwidth plot on channel 159



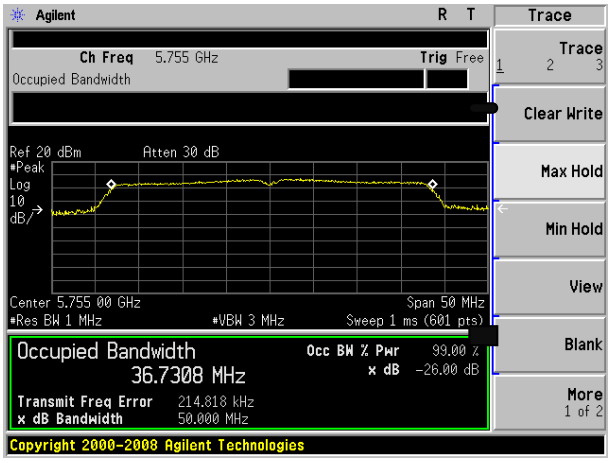
(802.11ac20) -26dB&99% Bandwidth plot on channel 157



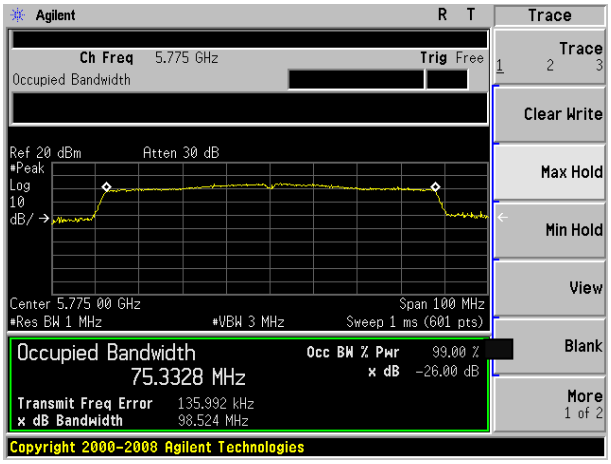
(802.11ac20) -26dB&99% Bandwidth plot on channel 165



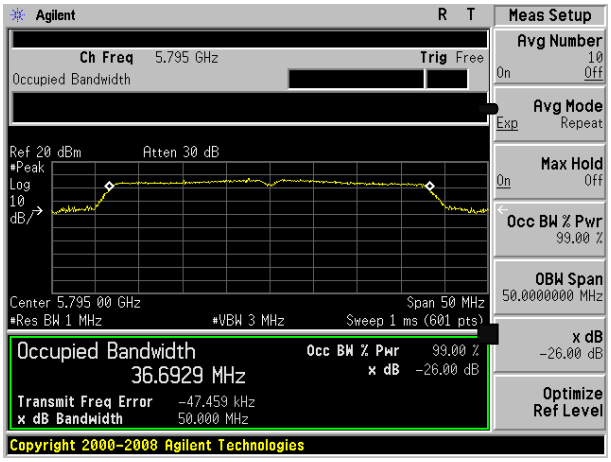
(802.11ac40) -26dB&99% Bandwidth plot on channel 151



(802.11ac80) -26dB&99% Bandwidth plot on channel 155



(802.11ac40) -26dB&99% Bandwidth plot on channel 159



6. MINIMUM 6DB BANDWIDTH

6.1 APPLIED PROCEDURES / LIMIT

According to FCC §15.407(e)
(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

6.2 TEST PROCEDURE

Section 15.407(e) specifies the minimum 6 dB emission bandwidth of at least 500 KHz for the band 5.715-5.85 GHz. The following procedure shall be used for measuring this bandwidth:

a) Set RBW = 100 kHz.

b) Set the video bandwidth (VBW) ≥ 3 × RBW.

c) Detector = Peak.

d) Trace mode = max hold.

e) Sweep = auto couple.

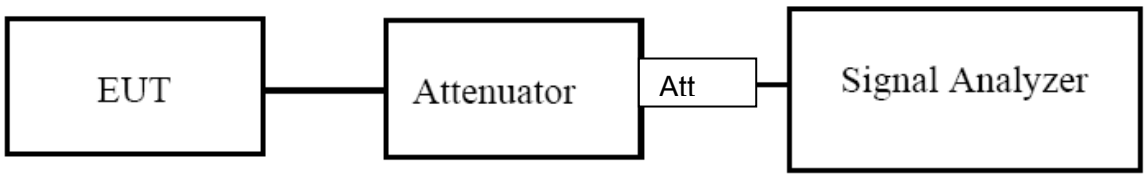
f) Allow the trace to stabilize.

g) 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 6 dB relative to the maximum level measured in the fundamental emission.

6.3 DEVIATION FROM STANDARD

No deviation.

6.4 TEST SETUP



6.5 EUT OPERATION CONDITIONS

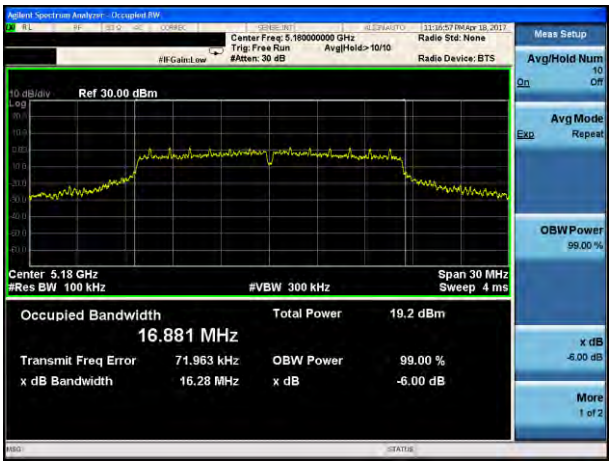
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

6.6 TEST RESULTS

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX Frequency (5150-5250MHz)		

Mode	Channel	Frequency (MHz)	-6dB bandwidth(MHz)	Result
802.11a	CH36	5180	16.28	Pass
	CH40	5200	16.29	Pass
	CH48	5240	16.30	Pass
802.11 n20	CH36	5180	16.94	Pass
	CH40	5200	16.89	Pass
	CH48	5240	16.90	Pass
802.11 n40	CH 38	5190	35.72	Pass
	CH 46	5230	36.02	Pass
802.11 AC20	CH36	5180	17.53	Pass
	CH40	5200	17.17	Pass
	CH48	5240	17.02	Pass
802.11 AC40	CH 38	5190	35.52	Pass
	CH 46	5230	35.67	Pass
802.11 AC80	CH 42	5210	75.17	Pass

(802.11a) -6dB Bandwidth plot on channel 36



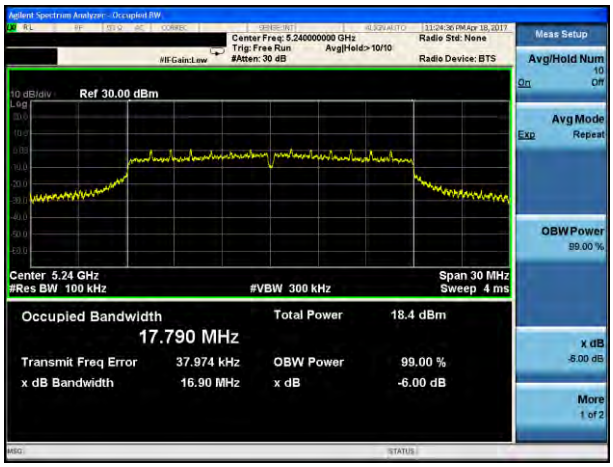
(802.11n20) -6dB Bandwidth plot on channel 36

(802.11a) -6dB Bandwidth plot on channel 40

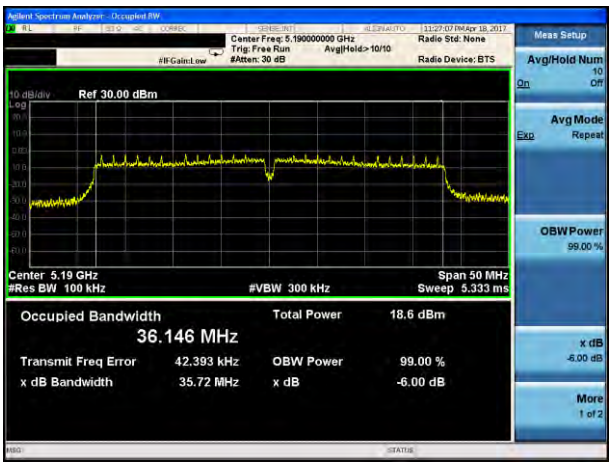
(802.11n20) -6dB Bandwidth plot on channel 40

(802.11a) -6dB Bandwidth plot on channel 48

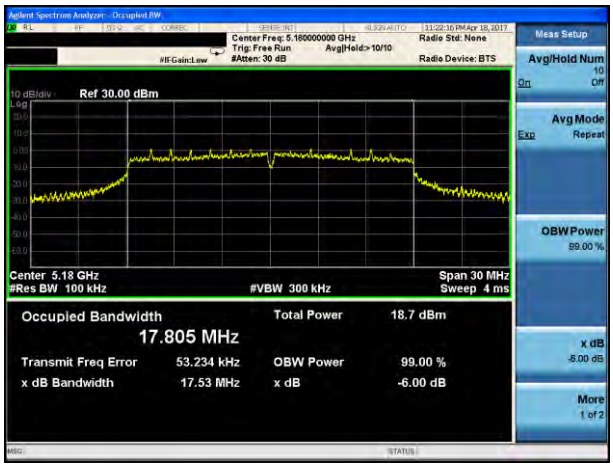
(802.11n20) -6dB Bandwidth plot on channel 48



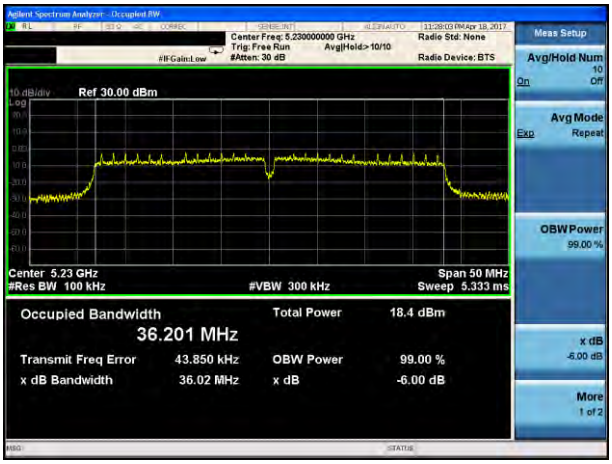
(802.11n40) -6dB Bandwidth plot on channel 38



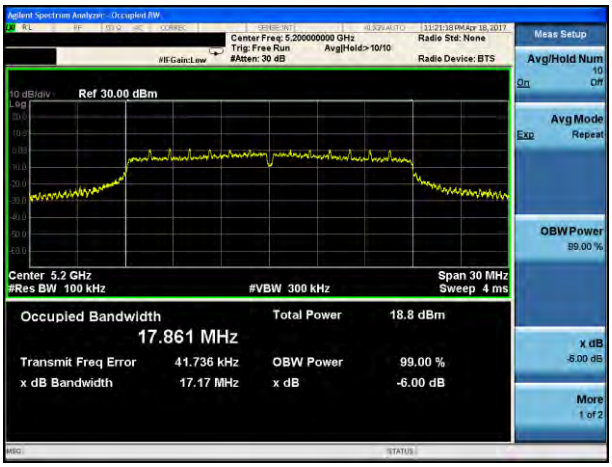
(802.11ac20) -6dB Bandwidth plot on channel 36



(802.11n40) -6dB Bandwidth plot on channel 46

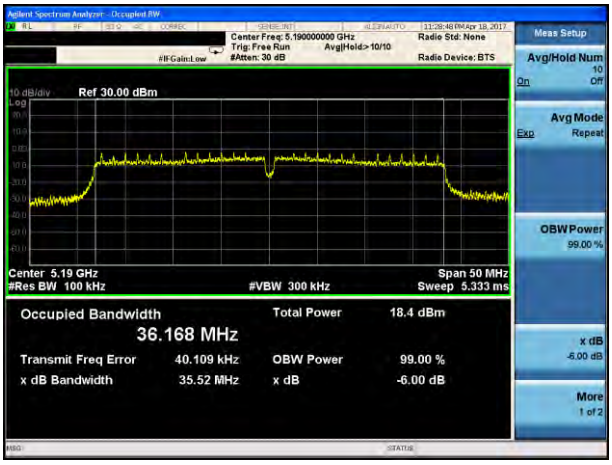


(802.11ac20) -6dB Bandwidth plot on channel 40



(802.11ac20) -6dB Bandwidth plot on channel 48

(802.11ac40) -6dB Bandwidth plot on channel 38



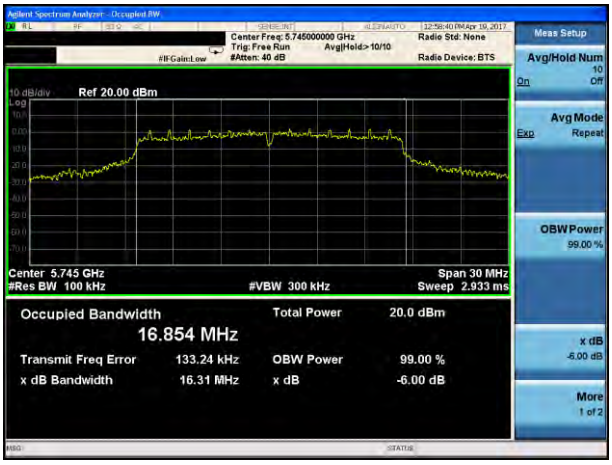
(802.11ac80) -6dB Bandwidth plot on channel 42

(802.11ac40) -6dB Bandwidth plot on channel 46

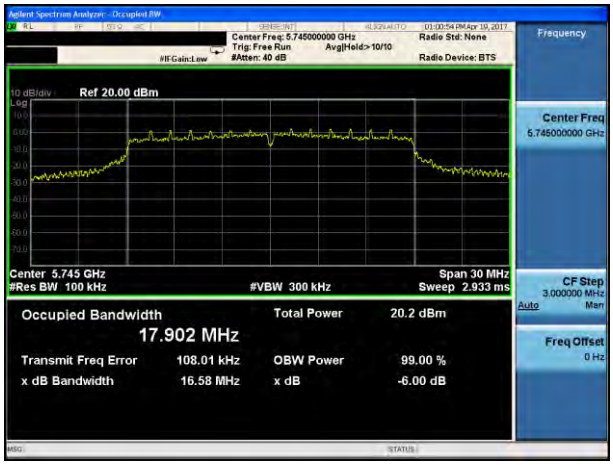
EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX (5G) Mode Frequency (5725-5825MHz)		

Mode	Channel	Frequency (MHz)	-6dB bandwidth(MHz)	Limit (KHz)	Result
802.11a	149	5745	16.31	500	Pass
	157	5785	16.09	500	Pass
	165	5825	16.33	500	Pass
802.11 n20	149	5745	16.58	500	Pass
	157	5785	16.93	500	Pass
	165	5825	17.23	500	Pass
802.11 n40	151	5755	35.73	500	Pass
	159	5795	35.75	500	Pass
802.11 AC20	149	5745	16.93	500	Pass
	157	5785	16.89	500	Pass
	165	5825	16.92	500	Pass
802.11 AC40	149	5745	35.54	500	Pass
	157	5785	35.55	500	Pass
802.11 AC80	155	5775	75.26	500	Pass

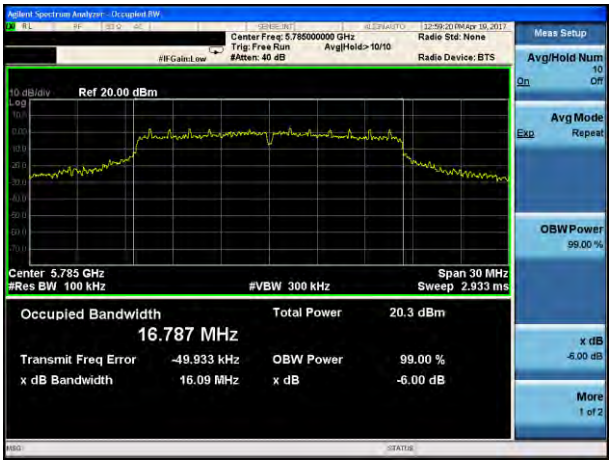
(802.11a) -6dB Bandwidth plot on channel 149



(802.11n20) -6dB Bandwidth plot on channel 149



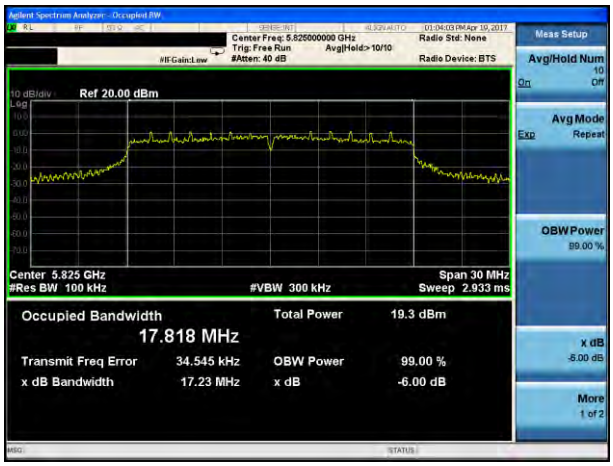
(802.11a) -6dB Bandwidth plot on channel 157



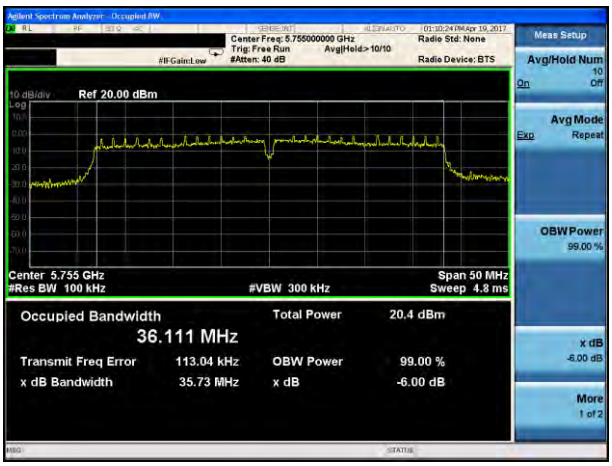
(802.11n20) -6dB Bandwidth plot on channel 157

(802.11a) -6dB Bandwidth plot on channel 165

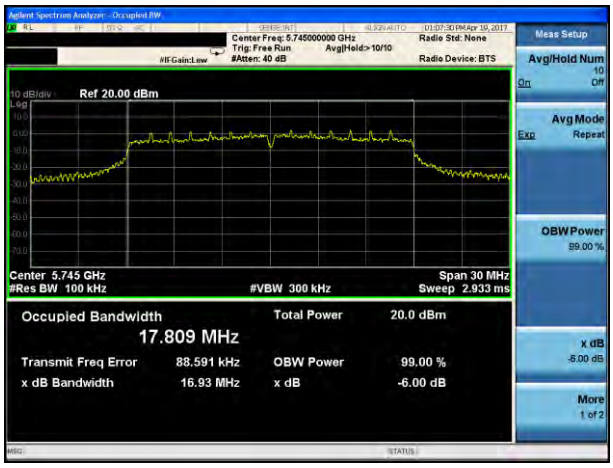
(802.11n20) -6dB Bandwidth plot on channel 165



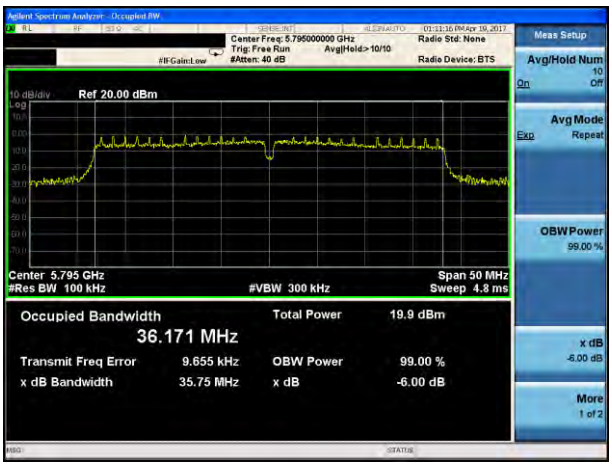
(802.11n40) -6dB Bandwidth plot on channel 151



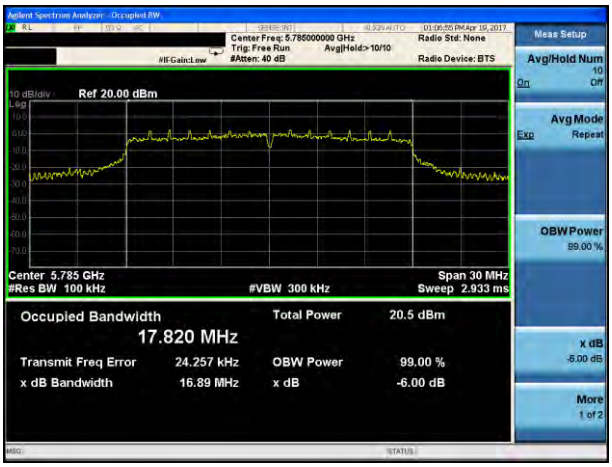
(802.11ac20) -6dB Bandwidth plot on channel 149



(802.11n40) -6dB Bandwidth plot on channel 159



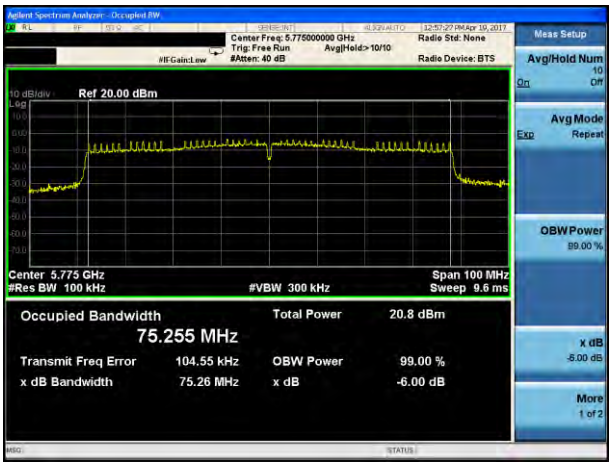
(802.11ac20) -6dB Bandwidth plot on channel 157



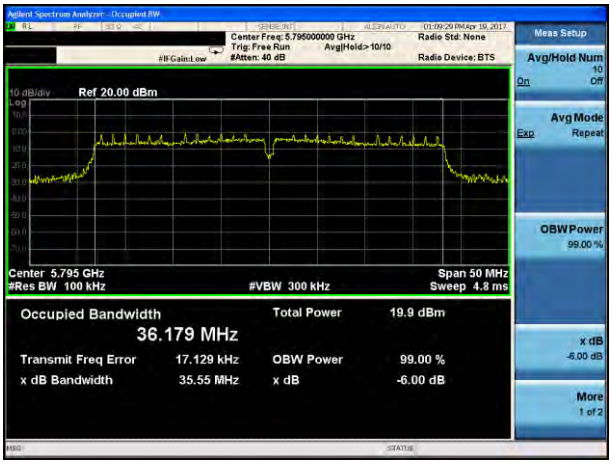
(802.11ac20) -6dB Bandwidth plot on channel 165

(802.11ac40) -6dB Bandwidth plot on channel 151

(802.11ac80) -6dB Bandwidth plot on channel 155



(802.11ac40) -6dB Bandwidth plot on channel 159



7. MAXIMUM CONDUCTED OUTPUT POWER

7.1 PPLIED PROCEDURES / LIMIT

According to FCC §15.407

According to FCC §15.407

The maximum conduced output power should not exceed:

Frequency Band(MHz)	Limit
5150~5250	250mW
5725~5850	1W

The maximum e.i.r.p should not exceed:

Frequency Band(MHz)	Limit
5150~5250	200mW or 10dBm +10logB whichever is less
5725~5850	N/A

Note: Where “B” is the 99% emission bandwidth in MHz

7.2 TEST PROCEDURE

· Maximum conducted output power may be measured using a spectrum analyzer/EMI receiver or an RF power meter.

1. Device Configuration

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level (see section II.B.).

a) The intent is to test at 100 percent duty cycle; however a small reduction in duty cycle (to no lower than 98 percent) is permitted if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

b) If continuous transmission (or at least 98 percent duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level with the transmit duration as long as possible and the duty cycle as high as possible.

2. Measurement using a Spectrum Analyzer or EMI Receiver (SA)

Measurement of maximum conducted output power using a spectrum analyzer requires integrating the spectrum across a frequency span that encompasses, at a minimum, either the EBW or the 99-percent occupied bandwidth of the signal.1 However, the EBW must be used to determine bandwidth dependent limits on maximum conducted output power in accordance with § 15.407(a).

a) The test method shall be selected as follows: (i) Method SA-1 or SA-1 Alternative (averaging with the EUT transmitting at full power throughout each sweep) shall be applied if either of the following conditions can be satisfied:

• The EUT transmits continuously (or with a duty cycle ≥ 98 percent).

• Sweep triggering or gating can be implemented in a way that the device transmits at the maximum power control level throughout the duration of each of the instrument sweeps to be averaged. This condition can generally be achieved by triggering the instrument's sweep if the duration of the sweep (with the analyzer configured as in Method SA-1, below) is equal to or shorter than the duration T of each transmission from the EUT and if those transmissions exhibit full power throughout their durations.

(ii) Method SA-2 or SA-2 Alternative (averaging across on and off times of the EUT transmissions, followed by duty cycle correction) shall be applied if the conditions of (i) cannot be achieved and the transmissions exhibit a constant duty cycle during the measurement duration. Duty cycle will be considered to be constant if variations are less than ± 2 percent.

(iii) Method SA-3 (RMS detection with max hold) or SA-3 Alternative (reduced VBW with max hold) shall be applied if the conditions of (i) and (ii) cannot be achieved.

b) Method SA-1 (trace averaging with the EUT transmitting at full power throughout each sweep): (i) Set span to encompass the entire emission bandwidth (EBW) (or, alternatively, the entire 99% occupied bandwidth) of the signal.

(ii) Set RBW = 1 MHz.

(iii) Set VBW ≥ 3 MHz.

(iv) Number of points in sweep ≥ 2 Span / RBW. (This ensures that bin-to-bin spacing is ≤ RBW/2, so that narrowband signals are not lost between frequency bins.)

(v) Sweep time = auto.

(vi) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.

(vii) If transmit duty cycle < 98 percent, use a video trigger with the trigger level set to enable triggering only on full power pulses. Transmitter must operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ≥ 98 percent, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to "free run".

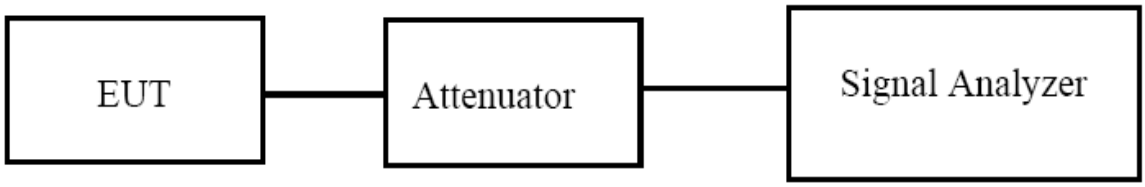
(viii) Trace average at least 100 traces in power averaging (i.e., RMS) mode.

(ix) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument's band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum

7.3 DEVIATION FROM STANDARD

No deviation.

7.4 TEST SETUP



7.5 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.

7.6 TEST RESULTS

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX (5G) Mode Frequency (5150-5250MHz)		

Test Channel	Frequency	Maximum output power. Antenna port (AV)	LIMIT	Result
	(MHz)	(dBm)	dBm	
TX 802.11a Mode				
CH36	5180	11.6	23.98	Pass
CH40	5200	11.1	23.98	Pass
CH48	5240	11.1	23.98	Pass
TX 802.11 n20M Mode				
CH36	5180	11.5	21.42	Pass
CH40	5200	11.1	21.42	Pass
CH48	5240	10.9	21.42	Pass
TX 802.11 n40M Mode				
CH38	5190	10.9	21.42	Pass
CH46	5230	10.5	21.42	Pass
TX 802.11 AC20M Mode				
CH36	5180	11.5	21.42	Pass
CH40	5200	11.1	21.42	Pass
CH48	5240	11.1	21.42	Pass
TX 802.11 AC40M Mode				
CH38	5190	10.9	21.42	Pass
CH46	5230	10.5	21.42	Pass
TX 802.11 AC80M Mode				
CH42	5210	10.4	21.42	Pass

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX (5G) Mode Frequency (5725-5825MHz)		

Test Channel	Frequency	Maximum output power. Antenna port (AV)	LIMIT	Result
	(MHz)	(dBm)	dBm	
TX 802.11a Mode				
CH 149	5745	10.8	30	Pass
CH 157	5785	11.2	30	Pass
CH 165	5825	10.7	30	Pass
TX 802.11 n20M Mode				
CH 149	5745	10.4	27.44	Pass
CH 157	5785	11.0	27.44	Pass
CH 165	5825	10.6	27.44	Pass
TX 802.11 n40M Mode				
CH 151	5755	10.5	27.44	Pass
CH 159	5795	11.2	27.44	Pass
TX 802.11 AC20M Mode				
CH 149	5745	10.4	27.44	Pass
CH 157	5785	11.1	27.44	Pass
CH 165	5825	10.7	27.44	Pass
TX 802.11 AC40M Mode				
CH 151	5755	10.5	27.44	Pass
CH 159	5795	11.1	27.44	Pass
TX 802.11 AC80M Mode				
CH 155	5775	10.7	27.44	Pass

8. OUT OF BAND EMISSIONS

8.1 APPLICABLE STANDARD

According to FCC §15.407(b)

Undesirable emission limits. Except as shown in paragraph (b)(7) of this section, the maximum emissions outside of the frequency bands of operation shall be attenuated in accordance with the following limits:

(1) For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

(2) For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

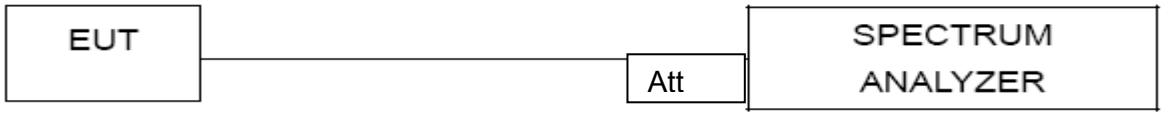
8.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. 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.
3. Set RBW of spectrum analyzer to 1 MHz with a convenient frequency span.
4. 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.
5. Repeat above procedures until all measured frequencies were complete.

8.3 DEVIATION FROM STANDARD

No deviation.

8.4 TEST SETUP



8.5 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.

8.6 TEST RESULTS

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	56%
Pressure：	1012 hPa	Test Voltage ：	DC 19V from Adapter

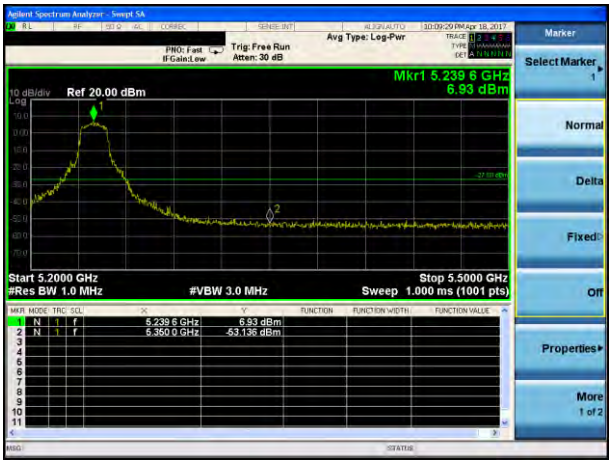
5.2G

5.15~5.25 GHz

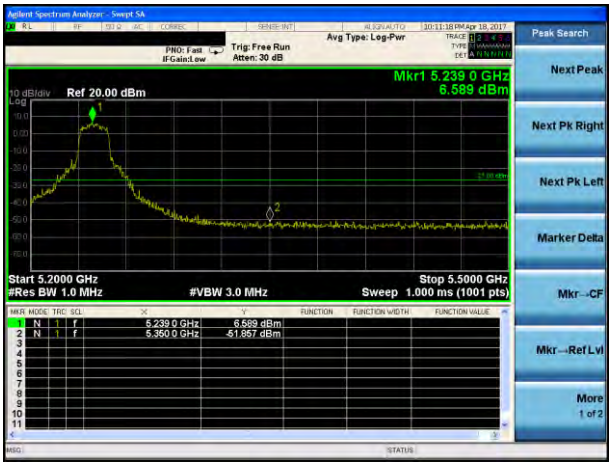
(802.11a) Band Edge, Left Side

(802.11n20) Band Edge, Left Side

(802.11a) Band Edge, Right Side



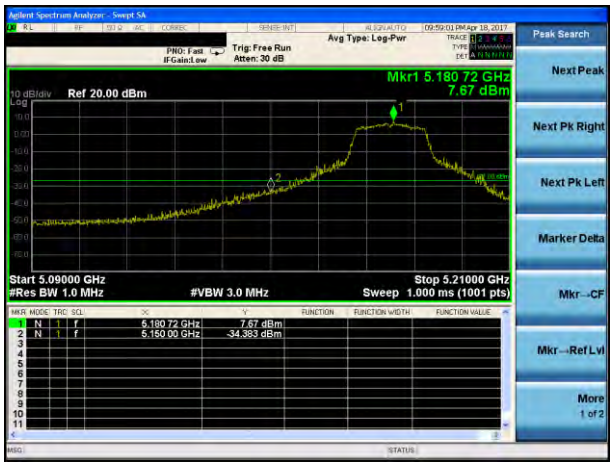
(802.11n20) Band Edge, Right Side



5.15~5.25 GHz

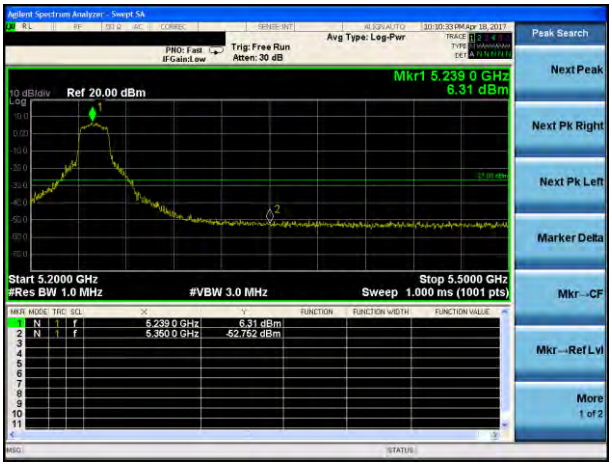
(802.11n40) Band Edge, Left Side

(802.11ac20) Band Edge, Left Side



(802.11n40) Band Edge, Right Side

(802.11ac20) Band Edge, Right Side



5.15~5.25 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge, Left Side

(802.11ac40) Band Edge, Right Side

(802.11ac80) Band Edge, Right Side

5.8G

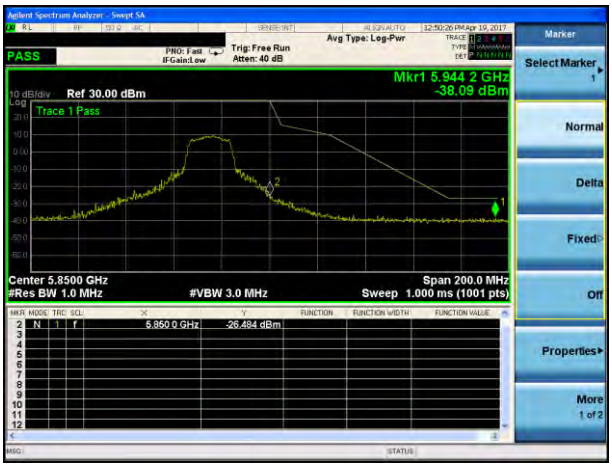
5.725-5.85 GHz

(802.11a) Band Edge, Left Side

(802.11n20) Band Edge, Left Side

(802.11a) Band Edge, Right Side

(802.11n20) Band Edge, Right Side



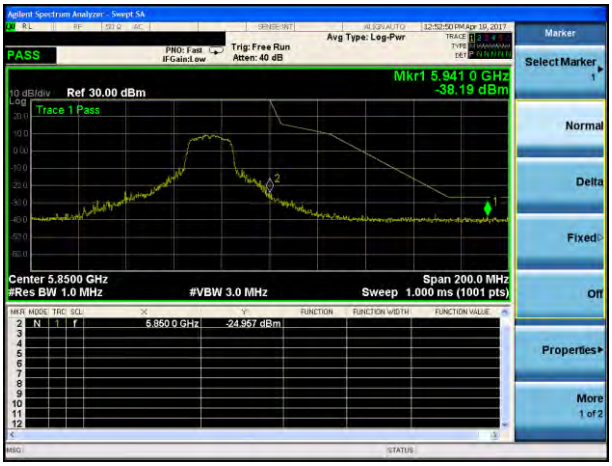
5.725-5.85 GHz

(802.11n40) Band Edge, Left Side

(802.11ac20) Band Edge, Left Side

(802.11n40) Band Edge, Right Side

(802.11ac20) Band Edge, Right Side



5.725-5.85 GHz

(802.11ac40) Band Edge, Left Side

(802.11ac80) Band Edge, Left Side

(802.11ac40) Band Edge, Right Side

(802.11ac80) Band Edge, Right Side

9.SPURIOUS RF CONDUCTED EMISSIONS

9.1CONFORMANCE LIMIT

1. Below -20dB of the highest emission level in operating band.
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

9.2MEASURING INSTRUMENTS

The Measuring equipment is listed in the section 6.3 of this test report.

9.3TEST SETUP

Please refer to Section 6.1 of this test report.

9.4TEST PROCEDURE

The Spurious RF conducted emissions compliance of RF radiated emission should be measured by following the guidance in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW=100kHz and VBW= 300KHz to measure the peak field strength , and mwasure frequeny range from 9KHz to 26.5GHz.

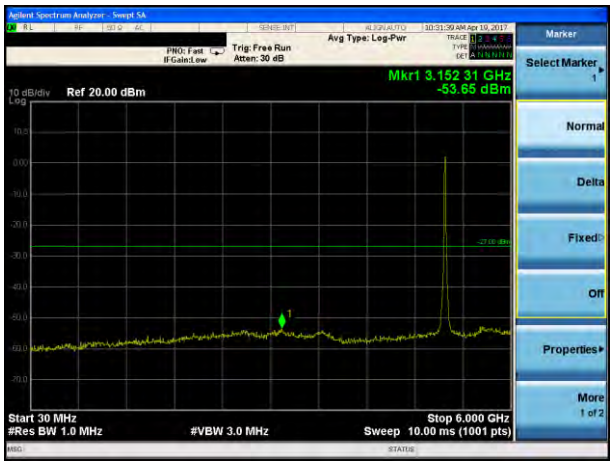
9.5TEST RESULTS

Remark: The measurement frequency range is from 9KHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the spurious emissions and bandege measurement data.

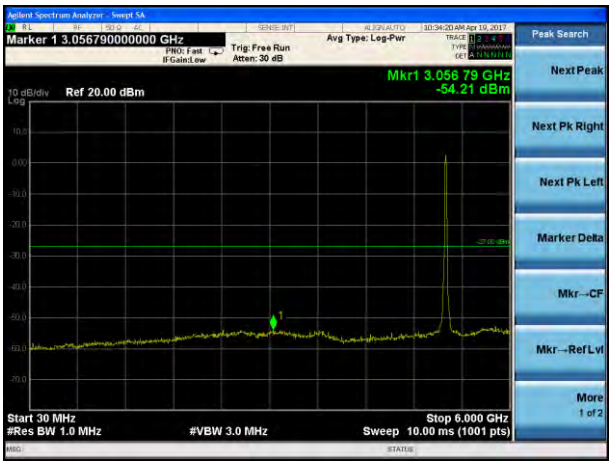
5.2G

Test Plot

802.11a on channel 36



802.11a on channel 40

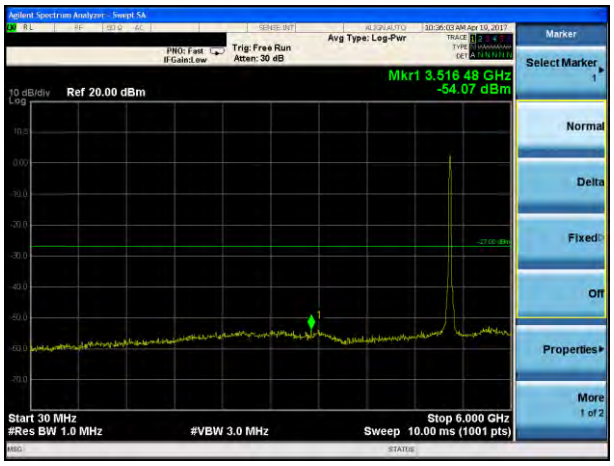


802.11a on channel 36

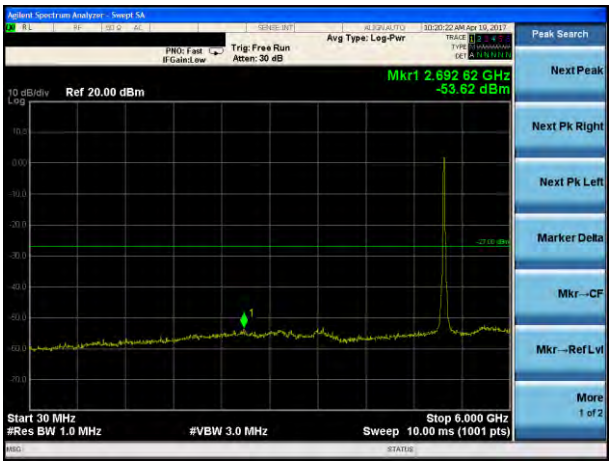
802.11a on channel 40

Test Plot

802.11a on channel 48



802.11n20 on channel 36

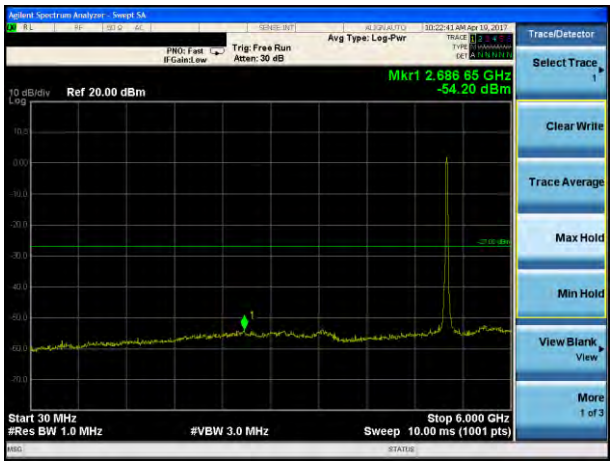


802.11a on channel 48

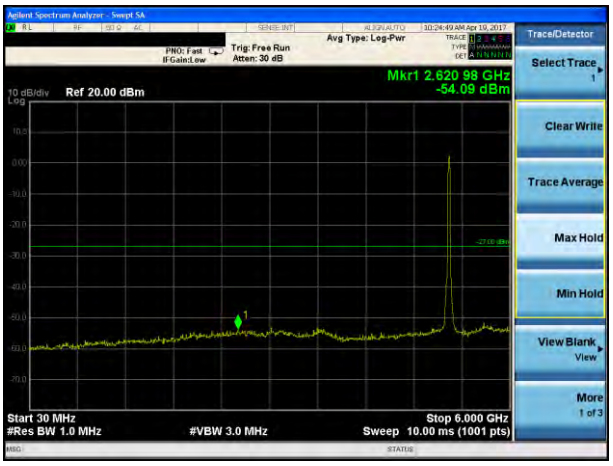
802.11n20 on channel 36

Test Plot

802.11n20 on channel 40



802.11n20 on channel 48

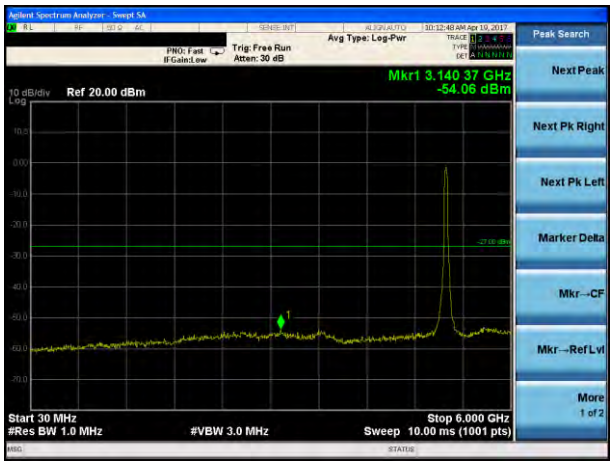


802.11n20 on channel 40

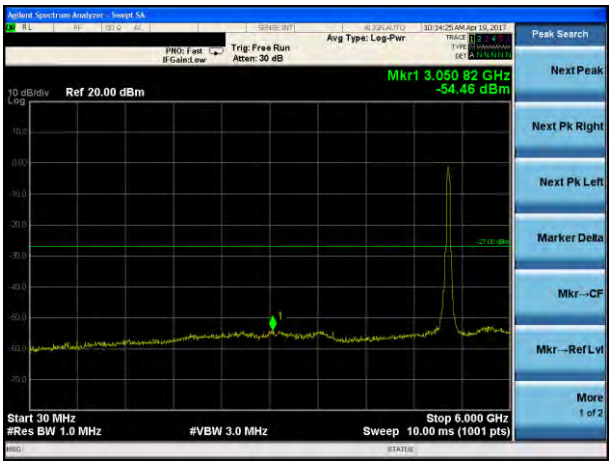
802.11n20 on channel 48

Test Plot

802.11n40 on channel 38



802.11n40 on channel 46



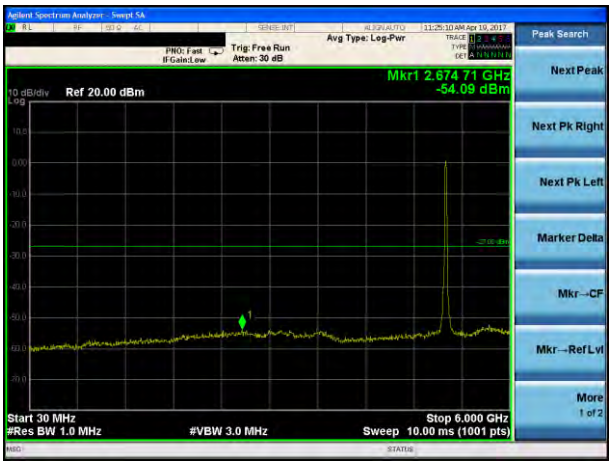
802.11n40 on channel 38

802.11n40 on channel 46

Test Plot

802.11ac20 on channel 36

802.11ac20 on channel 40

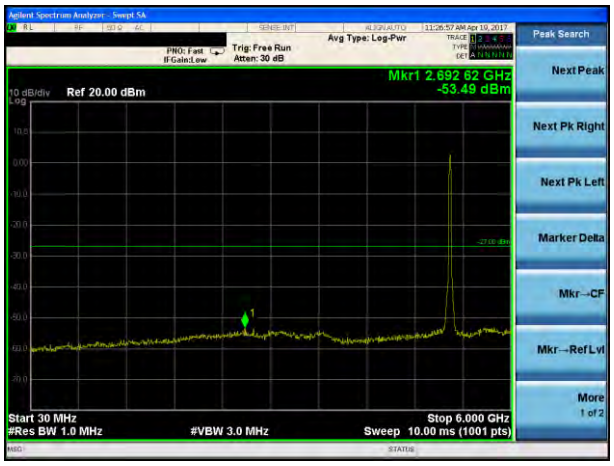


802.11ac20 on channel 36

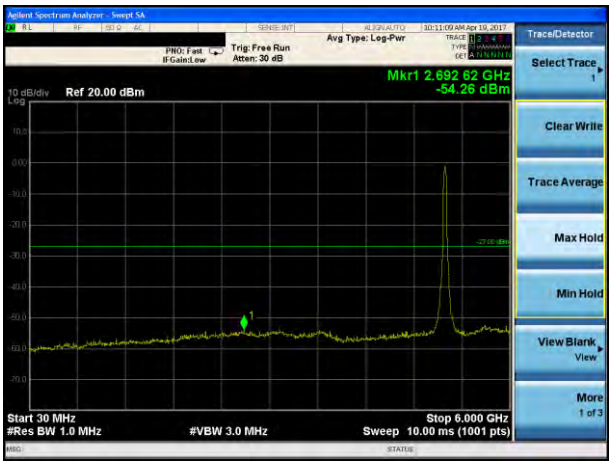
802.11ac20 on channel 40

Test Plot

802.11ac20 on channel 48



802.11ac40 on channel 38



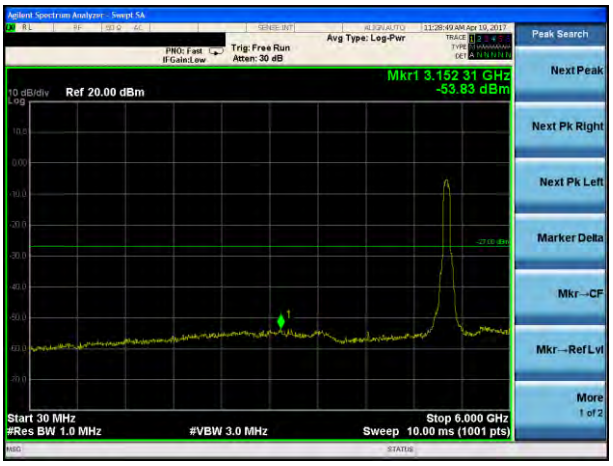
802.11ac20 on channel 48

802.11ac40 on channel 38

Test Plot

802.11ac40 on channel 46

802.11ac80 on channel 42



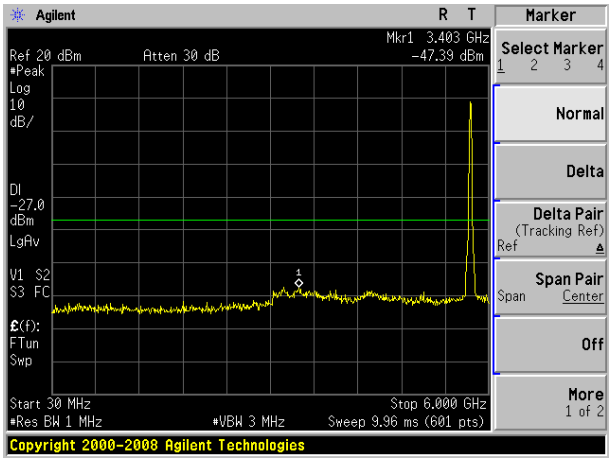
802.11 ac40 on channel 46

802.11 ac80 on channel 42

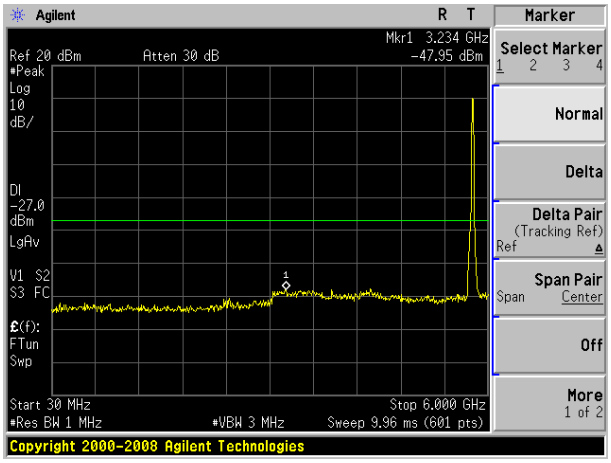
5.8G

Test Plot

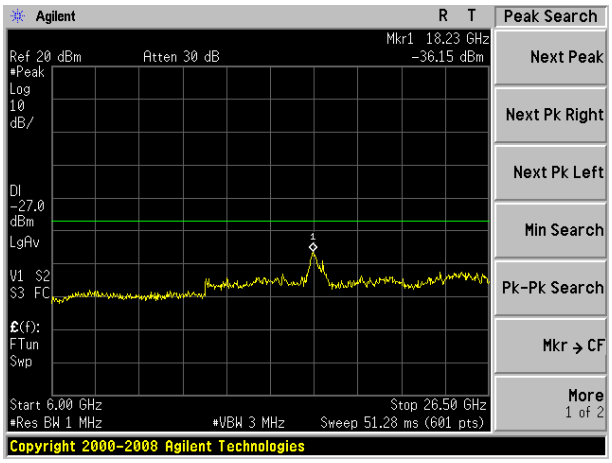
802.11a on channel 149



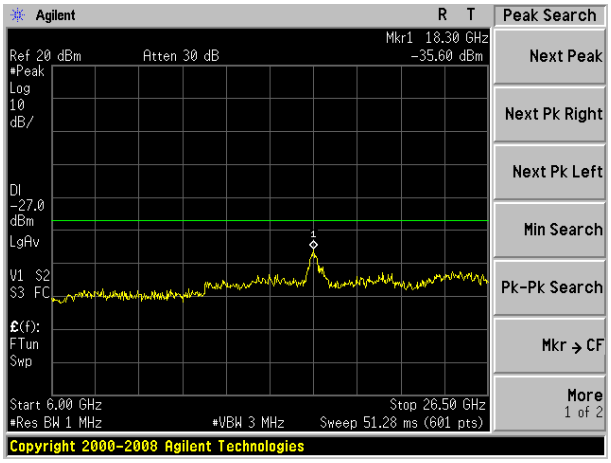
802.11a on channel 157



802.11a on channel 149

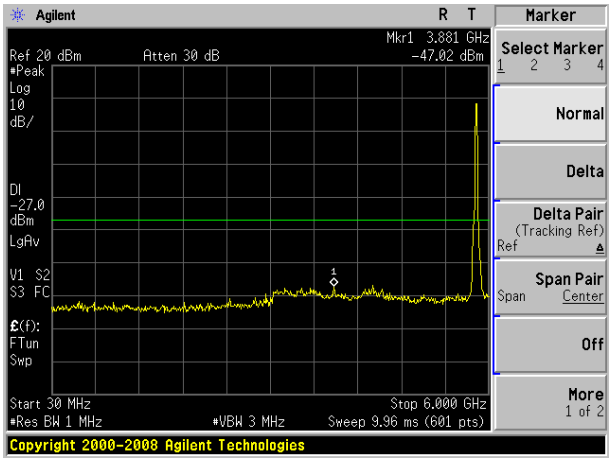


802.11a on channel 157

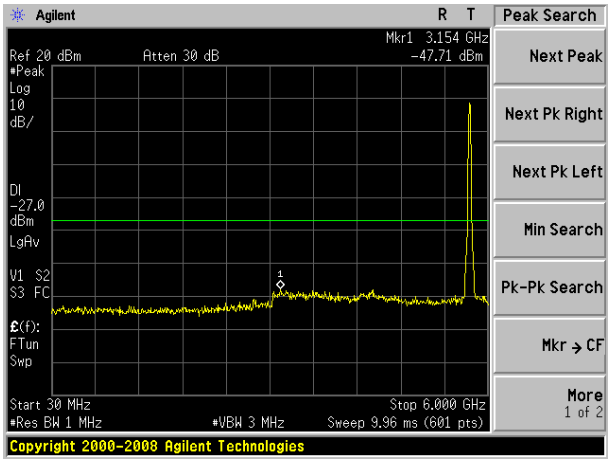


Test Plot

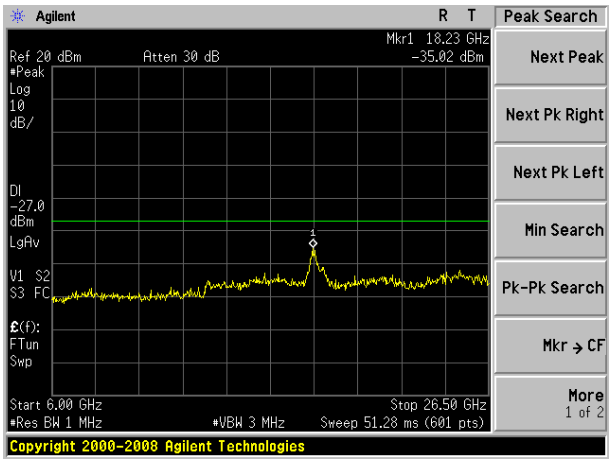
802.11a on channel 165



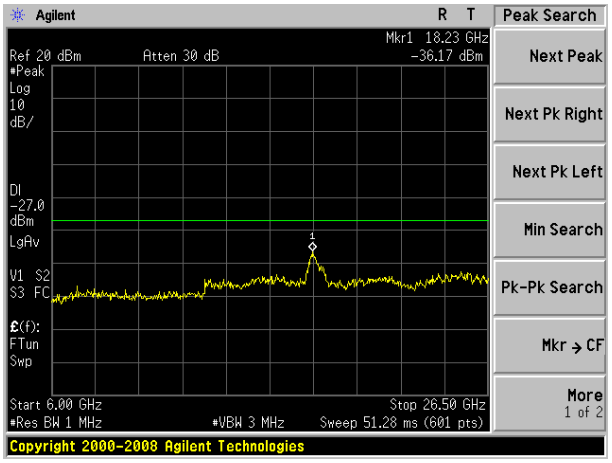
802.11n20 on channel 149



802.11a on channel 165

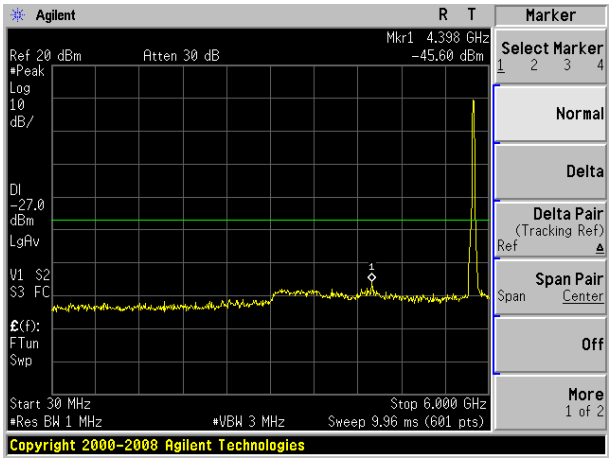


802.11n20 on channel 149

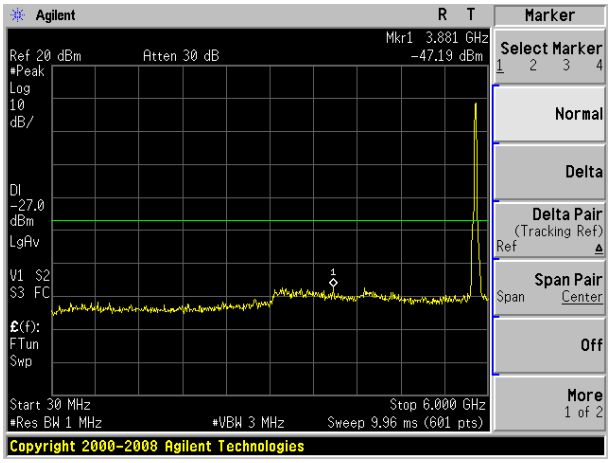


Test Plot

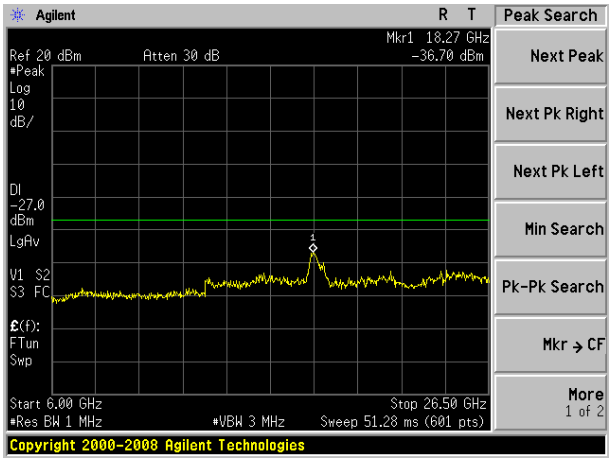
802.11n20 on channel 157



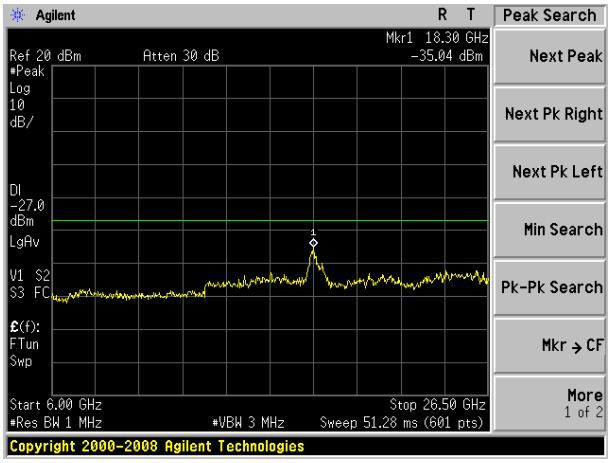
802.11n20 on channel 165



802.11n20 on channel 157

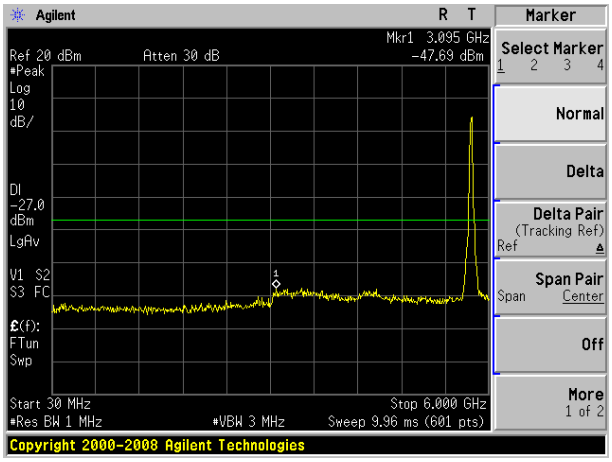


802.11n20 on channel 165

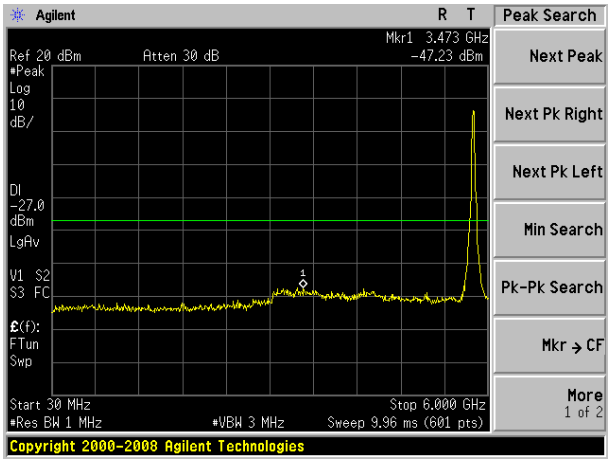


Test Plot

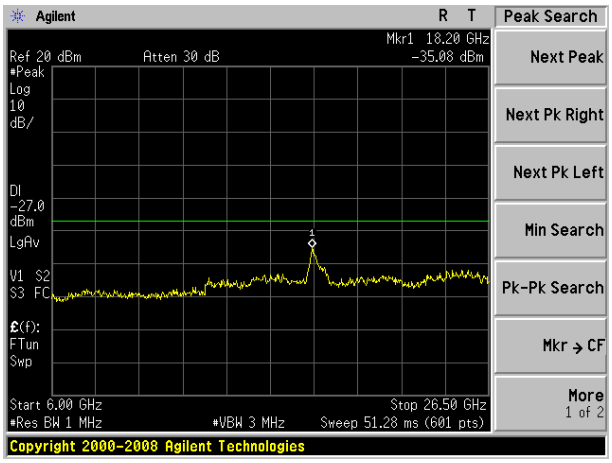
802.11n40 on channel 151



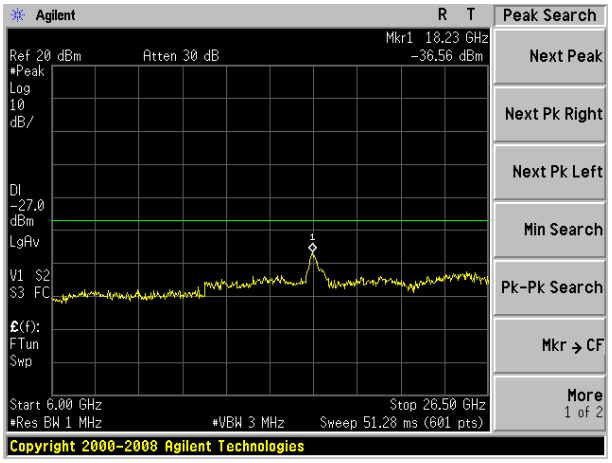
802.11n40 on channel 159



802.11n40 on channel 151

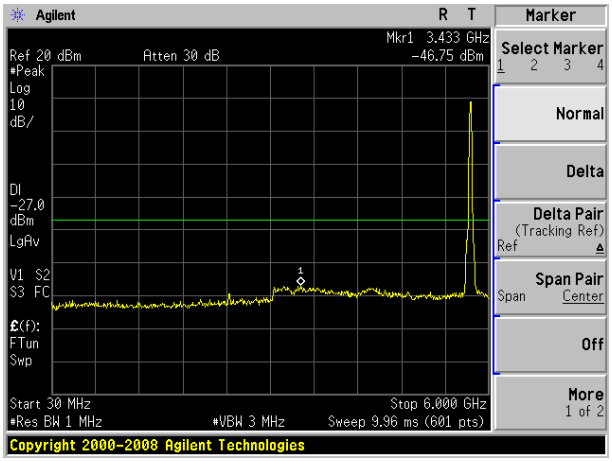


802.11n40 on channel 159

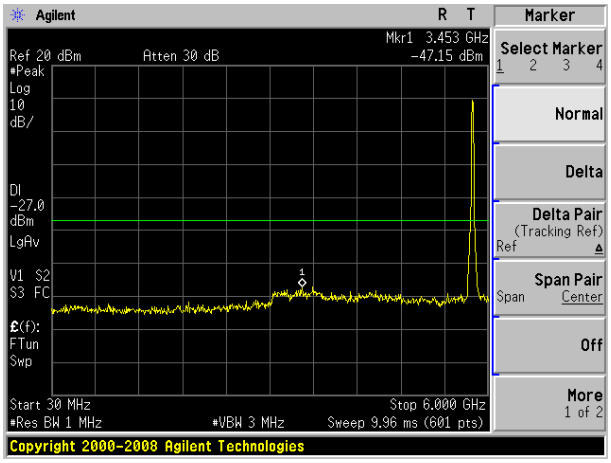


Test Plot

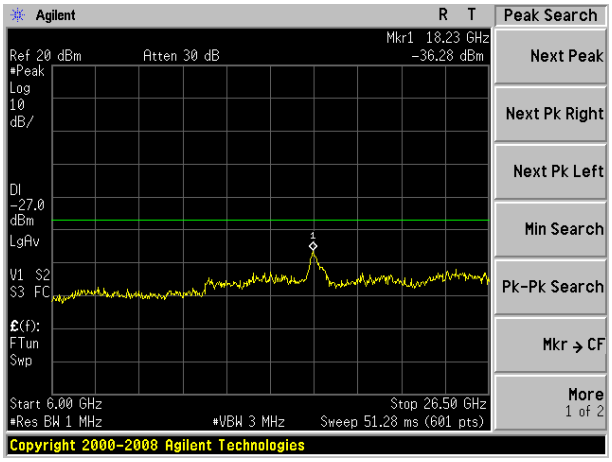
802.11ac20 on channel 149



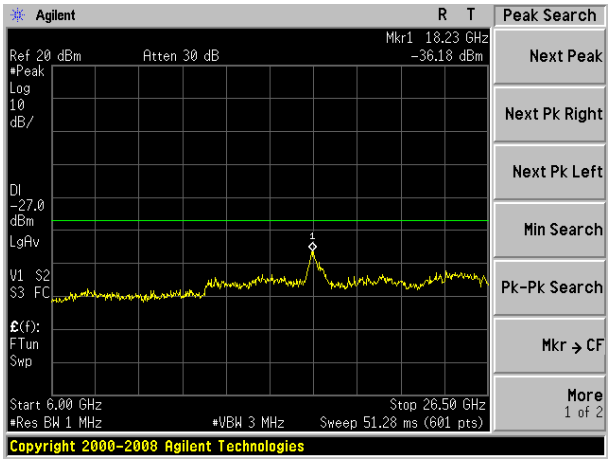
802.11ac20 on channel 157



802.11ac20 on channel 149

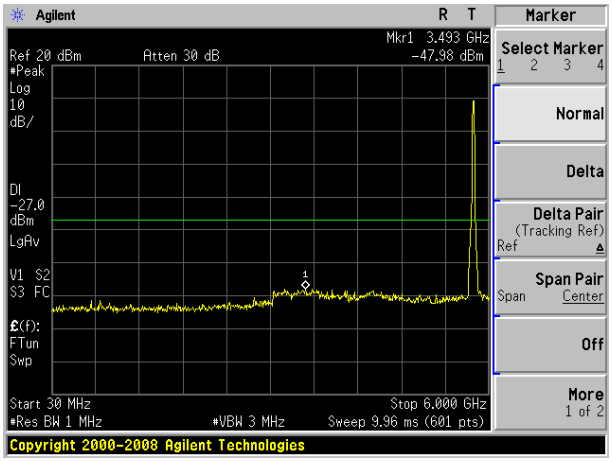


802.11ac20 on channel 157

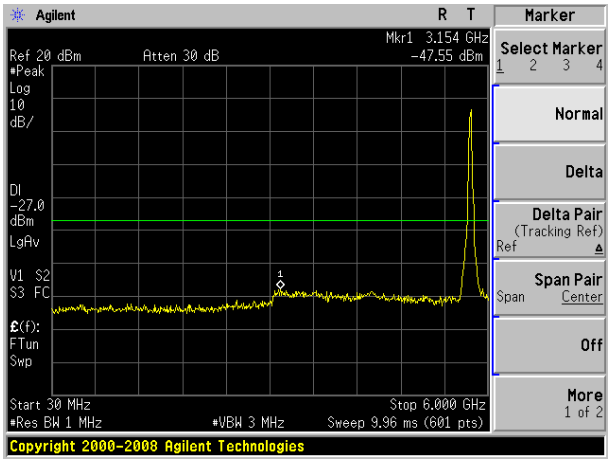


Test Plot

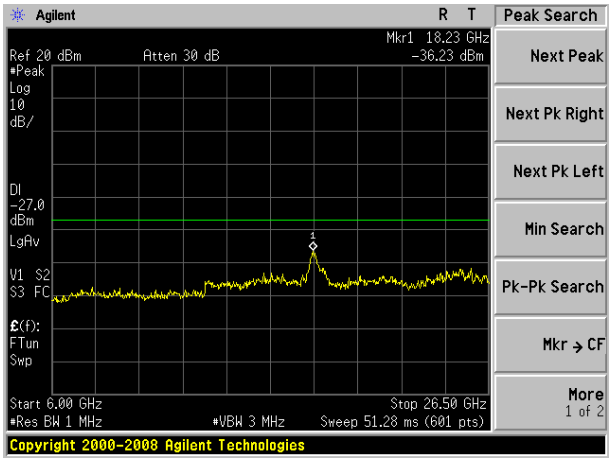
802.11ac20 on channel 165



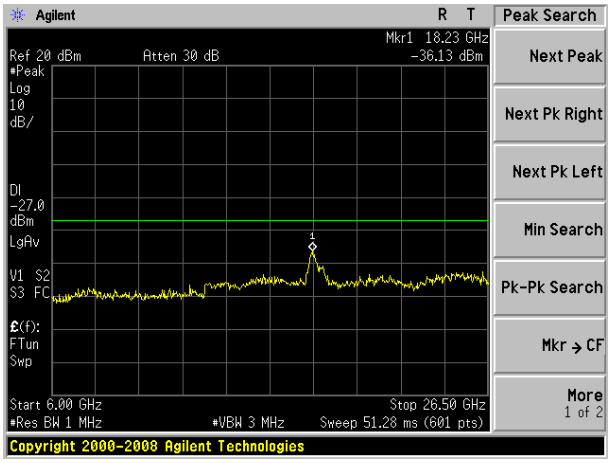
802.11ac40 on channel 151



802.11ac20 on channel 165

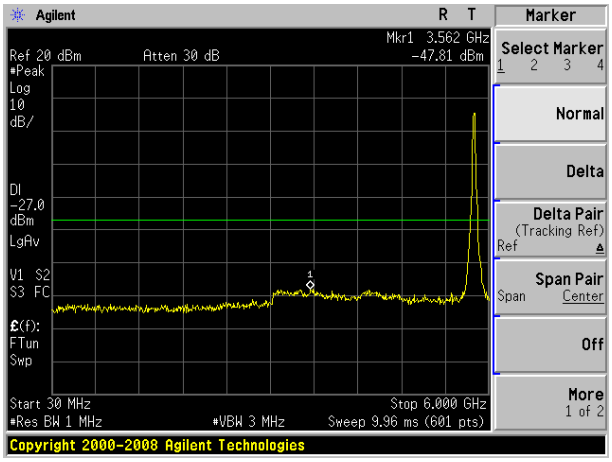


802.11ac40 on channel 151

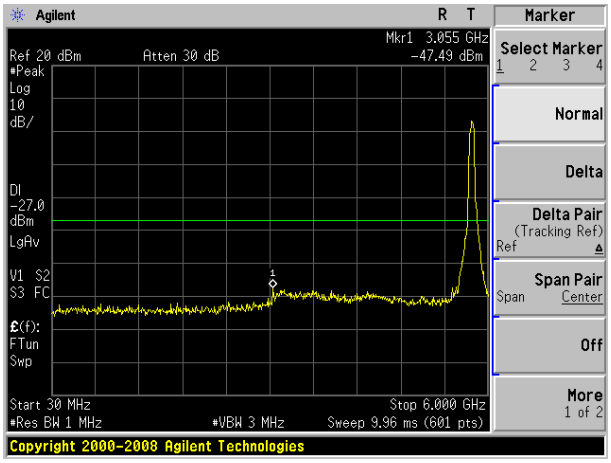


Test Plot

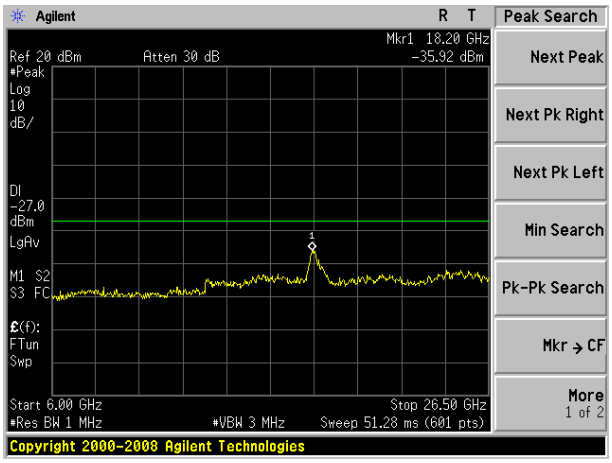
802.11ac40 on channel 159



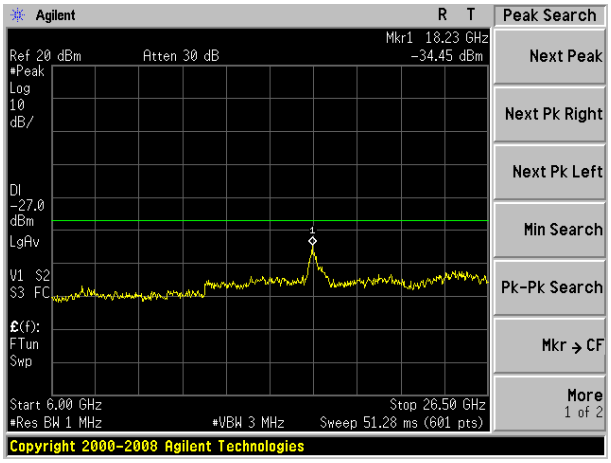
802.11ac80 on channel 155



802.11 ac40 on channel 159



802.11 ac80 on channel 155



10. Frequency Stability Measurement

10.1 LIMIT

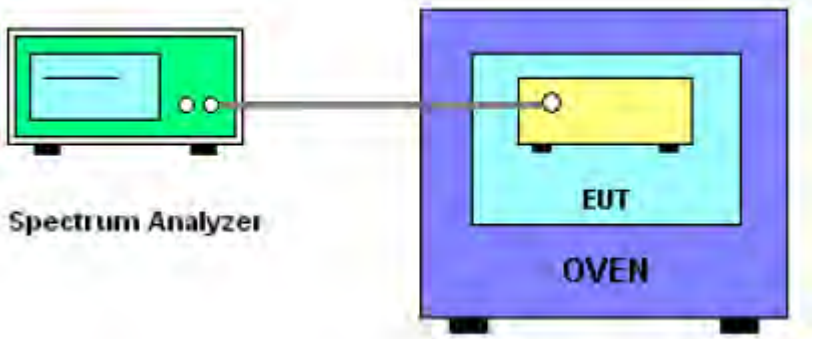
Manufactures of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

10.2 TEST PROCEDURES

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10_6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -20°C~70°C.

10.3 TEST SETUP LAYOUT



10.4 EUT OPERATION DURING TEST

The EUT was programmed to be in continuously un-modulation transmitting mode.

10.5 TEST RESULTS

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX Frequency(5150-5250MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	19.00	5180.0531	5180	0.0531	-10.2510
		V max (V)	21.85	5180.0336	5180	0.0336	-6.4865
		V min (V)	16.15	5180.0251	5180	0.0251	-4.8456
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5180MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	19	T (°C)	-20	5180.0069	5180	0.0069	-1.3320
		T (°C)	-10	5180.0117	5180	0.0117	-2.2587
		T (°C)	0	5180.0335	5180	0.0335	-6.4672
		T (°C)	10	5180.0395	5180	0.0395	-7.6255
		T (°C)	20	5180.0308	5180	0.0308	-5.9459
		T (°C)	30	5180.0223	5180	0.0223	-4.3050
		T (°C)	40	5180.0133	5180	0.0133	-2.5676
		T (°C)	50	5180.0107	5180	0.0107	-2.0656
		T (°C)	60	5180.0427	5180	0.0427	-8.2432
		T (°C)	70	5180.0705	5180	0.0705	-13.6100
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	19.00	5200.0261	5200	0.0261	-5.0192
		V max (V)	21.85	5200.0435	5200	0.0435	-8.3654
		V min (V)	16.15	5200.0704	5200	0.0704	-13.5385
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5200MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	19	T (°C)	-20	5200.0642	5200	0.0642	-12.3462
		T (°C)	-10	5200.0539	5200	0.0539	-10.3654
		T (°C)	0	5200.0447	5200	0.0447	-8.5962
		T (°C)	10	5200.0933	5200	0.0933	-17.9423
		T (°C)	20	5200.0643	5200	0.0643	-12.3654
		T (°C)	30	5200.0134	5200	0.0134	-2.5769
		T (°C)	40	5200.0749	5200	0.0749	-14.4038
		T (°C)	50	5200.0428	5200	0.0428	-8.2308
		T (°C)	60	5200.0336	5200	0.0336	-6.4615
		T (°C)	70	5200.0431	5200	0.0431	-8.2885
Limits				± 20 ppm			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	19.00	5240.0142	5240	0.0142	-2.7099
		V max (V)	21.85	5240.0427	5240	0.0427	-8.1489
		V min (V)	16.15	5240.0105	5240	0.0105	-2.0038
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5240MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	19	T (°C)	-20	5240.0102	5240	0.0102	-1.9466
		T (°C)	-10	5240.0044	5240	0.0044	-0.8397
		T (°C)	0	5240.0157	5240	0.0157	-2.9962
		T (°C)	10	5240.0862	5240	0.0862	-16.4504
		T (°C)	20	5240.0121	5240	0.0121	-2.3092
		T (°C)	30	5240.0136	5240	0.0136	-2.5954
		T (°C)	40	5240.0079	5240	0.0079	-1.5076
		T (°C)	50	5240.0084	5240	0.0084	-1.6031
		T (°C)	60	5240.0068	5240	0.0068	-1.2977
		T (°C)	70	5240.011	5240	0.0110	-2.0992
Limits				± 20 ppm			

EUT：	Laser Pocketable Projector	Model Name ：	A63D
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 19V from Adapter
Test Mode ：	TX Frequency(5745-5850MHz)		

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	19.00	5745.04250	5745	0.04250	-7.3977
		V max (V)	21.85	5745.05460	5745	0.05460	-9.5039
		V min (V)	16.15	5745.06540	5745	0.06540	-11.3838
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5745MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	19	T (°C)	-20	5745.01690	5745	0.01690	-2.9417
		T (°C)	-10	5745.02170	5745	0.02170	-3.7772
		T (°C)	0	5745.04350	5745	0.04350	-7.5718
		T (°C)	10	5745.04950	5745	0.04950	-8.6162
		T (°C)	20	5745.04080	5745	0.04080	-7.1018
		T (°C)	30	5745.03230	5745	0.03230	-5.6223
		T (°C)	40	5745.02330	5745	0.02330	-4.0557
		T (°C)	50	5745.02070	5745	0.02070	-3.6031
		T (°C)	60	5745.05270	5745	0.05270	-9.1732
		T (°C)	70	5745.08050	5745	0.08050	-14.0122
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	19.00	5785.03610	5785	0.03610	-6.2403
		V max (V)	21.85	5785.05350	5785	0.05350	-9.2481
		V min (V)	16.15	5785.08040	5785	0.08040	-13.8980
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5785MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	19	T (°C)	-20	5785.07420	5785	0.07420	-12.8263
		T (°C)	-10	5785.06390	5785	0.06390	-11.0458
		T (°C)	0	5785.05470	5785	0.05470	-9.4555
		T (°C)	10	5785.08330	5785	0.08330	-14.3993
		T (°C)	20	5785.07430	5785	0.07430	-12.8436
		T (°C)	30	5785.02340	5785	0.02340	-4.0449
		T (°C)	40	5785.08490	5785	0.08490	-14.6759
		T (°C)	50	5785.05280	5785	0.05280	-9.1271
		T (°C)	60	5785.04360	5785	0.04360	-7.5367
		T (°C)	70	5785.05310	5785	0.05310	-9.1789
Limits				± 20 ppm			
Result				Complies			

Voltage vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
T nom (°C)	20	V nom (V)	19.00	5825.02420	5825	0.02420	-4.1545
		V max (V)	21.85	5825.05270	5825	0.05270	-9.0472
		V min (V)	16.15	5825.02050	5825	0.02050	-3.5193
Limits				± 20 ppm			
Result				Complies			

Temperature vs. Frequency Stability

TEST CONDITIONS				Reference Frequency：5825MHz			
				f	fc	Max. Deviation (MHz)	Max. Deviation (ppm)
V nom (V)	19	T (°C)	-20	5825.02020	5825	0.02020	-3.4678
		T (°C)	-10	5825.01440	5825	0.01440	-2.4721
		T (°C)	0	5825.02570	5825	0.02570	-4.4120
		T (°C)	10	5825.08620	5825	0.08620	-14.7983
		T (°C)	20	5825.02210	5825	0.02210	-3.7940
		T (°C)	30	5825.02360	5825	0.02360	-4.0515
		T (°C)	40	5825.01790	5825	0.01790	-3.0730
		T (°C)	50	5825.01840	5825	0.01840	-3.1588
		T (°C)	60	5825.01680	5825	0.01680	-2.8841
		T (°C)	70	5825.02100	5825	0.02100	-3.6052
Limits				± 20 ppm			
Result				Complies			

11. ANTENNA REQUIREMENT

11.1 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.

11.2 EUT ANTENNA

The EUT antenna is permanent attached FPCB antenna((Gain:1dBi). It comply with the standard requirement.

END OF REPORT