

FCC Part 15C

Measurement And Test Report

For

FORTUNE LANE ELECTRONICS CO., LTD.

Bldg. B1, ZhenAn Hi-Tech Industrial Park, ZhenAn Rd., ChangAn Town,
Dongguan City, China

FCC ID: 2ACRUET-4

May. 10, 2014

This Report Concerns:	Equipment Type:
<input checked="" type="checkbox"/> Original Report	Multi-Functional Video Player
Report Number:	MTI140704004RF
Test Engineer:	David Chen
Reviewed By:	Tim Zhang
Approved & Authorized By:	Hebe Lee
Test Date:	Jul. 01- Jul.10,2014
Prepared By:	<p>Shenzhen Microtest Technology Co.,Ltd 6F, Zhongbao Building, Gushu, Bao'an District, Shenzhen, P.R.China Tel: +86-755-8885 0135 Fax: +86-755-8885 0136</p>



Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior written consent of Shenzhen Microtest Technology Co.,Ltd.

VERIFICATION OF COMPLIANCE

Applicant:	FORTUNE LANE ELECTRONICS CO., LTD.
Address	Bldg. B1, ZhenAn Hi-Tech Industrial Park, ZhenAn Rd., ChangAn Town, Dongguan City, China
Manufacturer Name:	FORTUNE LANE ELECTRONICS CO., LTD.
Address:	Bldg. B1, ZhenAn Hi-Tech Industrial Park, ZhenAn Rd., ChangAn Town, Dongguan City, China
Product Description:	Multi-Functional Video Player
Brand Name:	 WALI-G ®
Model Name:	ET-4
Test procedure	ANSI C63.4:2003, DA 00-705
Standards	FCC Part15.247:2012

Table of Contents

	Page
1 . SUMMARY OF TEST RESULTS	5
1.1 TEST FACILITY	6
1.2 MEASUREMENT UNCERTAINTY	6
2 . GENERAL INFORMATION	7
2.1 GENERAL DESCRIPTION OF EUT	7
2.2 DESCRIPTION OF TEST MODES	9
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING	9
2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED	10
2.5 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)	11
2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS	12
3 . EMC EMISSION TEST	13
3.1 CONDUCTED EMISSION MEASUREMENT	13
3.1.1 POWER LINE CONDUCTED EMISSION LIMITS	13
3.1.2 TEST PROCEDURE	14
3.1.3 DEVIATION FROM TEST STANDARD	14
3.1.4 TEST SETUP	14
3.1.5 EUT OPERATING CONDITIONS	14
3.1.6 TEST RESULTS	15
3.2 RADIATED EMISSION MEASUREMENT	17
3.2.1 RADIATED EMISSION LIMITS	17
3.2.2 TEST PROCEDURE	18
3.2.3 DEVIATION FROM TEST STANDARD	18
3.2.4 TEST SETUP	19
3.2.5 EUT OPERATING CONDITIONS	20
3.2.6 TEST RESULTS	21
4 . NUMBER OF HOPPING CHANNEL	28
4.1 APPLIED PROCEDURES / LIMIT	28
4.1.1 TEST PROCEDURE	28
4.1.2 DEVIATION FROM STANDARD	28
4.1.3 TEST SETUP	28
4.1.4 EUT OPERATION CONDITIONS	28
4.1.5 TEST RESULTS	29
5 . AVERAGE TIME OF OCCUPANCY	30
5.1 APPLIED PROCEDURES / LIMIT	30
5.1.1 TEST PROCEDURE	30
5.1.2 DEVIATION FROM STANDARD	30
5.1.3 TEST SETUP	31

Table of Contents	Page
5.1.4 EUT OPERATION CONDITIONS	31
5.1.5 TEST RESULTS	32
6 . HOPPING CHANNEL SEPARATION MEASUREMENT	38
6.1 APPLIED PROCEDURES / LIMIT	38
6.1.1 TEST PROCEDURE	38
6.1.2 DEVIATION FROM STANDARD	38
6.1.3 TEST SETUP	38
6.1.4 EUT OPERATION CONDITIONS	38
6.1.5 TEST RESULTS	39
7 . BANDWIDTH TEST	45
7.1 APPLIED PROCEDURES / LIMIT	45
7.1.1 TEST PROCEDURE	45
7.1.2 DEVIATION FROM STANDARD	45
7.1.3 TEST SETUP	45
7.1.4 EUT OPERATION CONDITIONS	45
7.1.5 TEST RESULTS	46
8 . PEAK OUTPUT POWER TEST	52
8.1 APPLIED PROCEDURES / LIMIT	52
8.1.1 TEST PROCEDURE	52
8.1.2 DEVIATION FROM STANDARD	52
8.1.3 TEST SETUP	52
8.1.4 EUT OPERATION CONDITIONS	52
8.1.5 TEST RESULTS	53
9 . 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE	59
9.1 DEVIATION FROM STANDARD	59
9.2 TEST SETUP	59
9.3 EUT OPERATION CONDITIONS	59
9.4 TEST RESULTS	60
10 . ANTENNA REQUIREMENT	64
10.1 STANDARD REQUIREMENT	64
10.2 EUT ANTENNA	64
11 . EUT TEST PHOTO	65
APPENDIX-PHOTOGRAPHS OF EUT CONSTRUCTIONAL DETAILS	

1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , Subpart C			
Standard Section	Test Item	Judgment	Remark
15.207	Conducted Emission	PASS	
15.247(a)(1)	Hopping Channel Separation	PASS	
15.247(b)(1)	Peak Output Power	PASS	
15.247(c)	Radiated Spurious Emission	PASS	
15.247(a)(iii)	Number of Hopping Frequency	PASS	
15.247(a)(iii)	Dwell Time	PASS	
15.247(a)(1)	Bandwidth	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 TEST FACILITY

Shenzhen Toby Technology Co., Ltd.

Add.: 10/F.,A Block,Jiada R&D Bldg.,No.5 Songpingshan, Road, Science&Technology Park,
Shenzhen, 518057

FCC Registration No.:811562

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, 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	$\pm 1.38\text{dB}$
2	RF power,conducted	$\pm 0.16\text{dB}$
3	Spurious emissions,conducted	$\pm 0.21\text{dB}$
4	All emissions,radiated(<1G)	$\pm 4.68\text{dB}$
5	All emissions,radiated(>1G)	$\pm 4.89\text{dB}$
6	Temperature	$\pm 0.5^\circ\text{C}$
7	Humidity	$\pm 2\%$

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	Multi-Functional Video Player																		
Trade Name																			
Model Name	ET-4																		
Serial Model	N/A																		
Model Difference	N/A																		
Product Description	<p>The EUT is a Multi-Functional Video Player</p> <table border="1"> <tr> <td>Operation Frequency:</td> <td>2402~2480 MHz</td> </tr> <tr> <td>Modulation Type:</td> <td>BT(1Mbps): GFSK BT EDR(2Mbps): $\pi/4$-DQPSK BT EDR(3Mbps): 8-DPSK</td> </tr> <tr> <td>Bit Rate of Transmitter</td> <td>1Mbps/2Mbps/3Mbps</td> </tr> <tr> <td>Number Of Channel</td> <td>79 CH</td> </tr> <tr> <td>Antenna Designation:</td> <td>Please see Note 3.</td> </tr> <tr> <td>Output Power(Conducted):</td> <td>BT(1Mbps): 3.628dBm BT EDR(2Mbps): 3.090dBm BT EDR(3Mbps): 3.191 dBm</td> </tr> <tr> <td colspan="2">Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.</td></tr> <tr> <td>Channel List</td> <td>Please refer to the Note 2.</td> </tr> <tr> <td>Adapter</td> <td>MODEL: FY1503000 INPUT: AC 100-240V, 50/60Hz, 0.6A OUTPUT: DC 15V, 3A</td> </tr> </table>	Operation Frequency:	2402~2480 MHz	Modulation Type:	BT(1Mbps): GFSK BT EDR(2Mbps): $\pi/4$ -DQPSK BT EDR(3Mbps): 8-DPSK	Bit Rate of Transmitter	1Mbps/2Mbps/3Mbps	Number Of Channel	79 CH	Antenna Designation:	Please see Note 3.	Output Power(Conducted):	BT(1Mbps): 3.628dBm BT EDR(2Mbps): 3.090dBm BT EDR(3Mbps): 3.191 dBm	Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.		Channel List	Please refer to the Note 2.	Adapter	MODEL: FY1503000 INPUT: AC 100-240V, 50/60Hz, 0.6A OUTPUT: DC 15V, 3A
Operation Frequency:	2402~2480 MHz																		
Modulation Type:	BT(1Mbps): GFSK BT EDR(2Mbps): $\pi/4$ -DQPSK BT EDR(3Mbps): 8-DPSK																		
Bit Rate of Transmitter	1Mbps/2Mbps/3Mbps																		
Number Of Channel	79 CH																		
Antenna Designation:	Please see Note 3.																		
Output Power(Conducted):	BT(1Mbps): 3.628dBm BT EDR(2Mbps): 3.090dBm BT EDR(3Mbps): 3.191 dBm																		
Based on the application, features, or specification exhibited in User's Manual, the EUT is considered as an ITE/Computing Device. More details of EUT technical specification, please refer to the User's Manual.																			
Channel List	Please refer to the Note 2.																		
Adapter	MODEL: FY1503000 INPUT: AC 100-240V, 50/60Hz, 0.6A OUTPUT: DC 15V, 3A																		
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.

Channel List					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457
02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	39	2441	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	78	2480
25	2427	52	2454		
26	2428	53	2455		

3.

Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
1	N/A	N/A	PCB Antenna	N/A	1.4	BT Antenna

2.2 DESCRIPTION OF TEST MODES

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

Pretest Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78
Mode 4	Normal Link

For Conducted Emission	
Final Test Mode	Description
Mode 4	Normal Link

For Radiated Emission	
Final Test Mode	Description
Mode 1	CH00
Mode 2	CH39
Mode 3	CH78

Note:

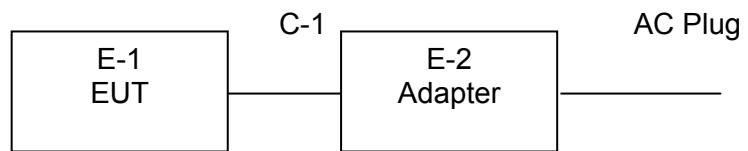
- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The EUT use new battery.
- (3)The data rate was set in 1Mbps for radiated emission due to the highest RF output power.

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of FHSS

Test software Version	Test program: Broadcom		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1/2/3Mbps)	DEF	DEF	DEF

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED



2.5 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	Mfr/Brand	Model/Type No.	Series No.	Note
E-1	Multi-Functional Video Player		ET-4	N/A	EUT
E-2	Adapter	N/A	FY1503000	N/A	

Item	Shielded Type	Ferrite Core	Length	Note
C-1	NO	NO	80cm	

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.
- (3) "YES" is means "shielded" "with core"; "NO" is means "unshielded" "without core".

2.6 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Mar. 20, 2014	Mar. 19, 2015
Spectrum Analyzer	Rohde & Schwarz	FSP30	DE25181	Aug. 10, 2013	Aug.09, 2014
EMI Test Receiver	Rohde & Schwarz	ESCI	101165	Aug. 10, 2013	Aug.09, 2014
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 07, 2014	Mar.06, 2015
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 07, 2014	Mar.06, 2015
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	11909A	185903	Mar. 07, 2014	Mar.06, 2015
Pre-amplifier	HP	8447B	3008A00849	Mar. 07, 2014	Mar.06, 2015
Cable	HUBER+SUHNE R	100	SUCOFLEX	Mar. 07, 2014	Mar.06, 2015
Signal Generator	Rohde & Schwarz	SML03	IKW682-054	Feb. 11, 2014	Feb.10, 2015
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A

Conduction Test equipment

Description	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due Date
EMI Test Receiver	ROHDE& SCHWARZ	ESCI	100321	2013-08-10	2014-08-09
50ΩCoaxial Switch	Anritsu	MP59B	X10321	2013-08-10	2014-08-09
L.I.S.N	Rohde & Schwarz	ENV216	101131	2013-08-10	2014-08-09
L.I.S.N	SCHWARZBECK	NNBL 8226-2	8226-2/164	2013-08-10	2014-08-09

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

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

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

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

Note:

- (1) The tighter limit applies at the band edges.
- (2) The limit of " * " marked band means the limitation decreases linearly with the logarithm of the frequency in the range.

The following table is the setting of the receiver

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

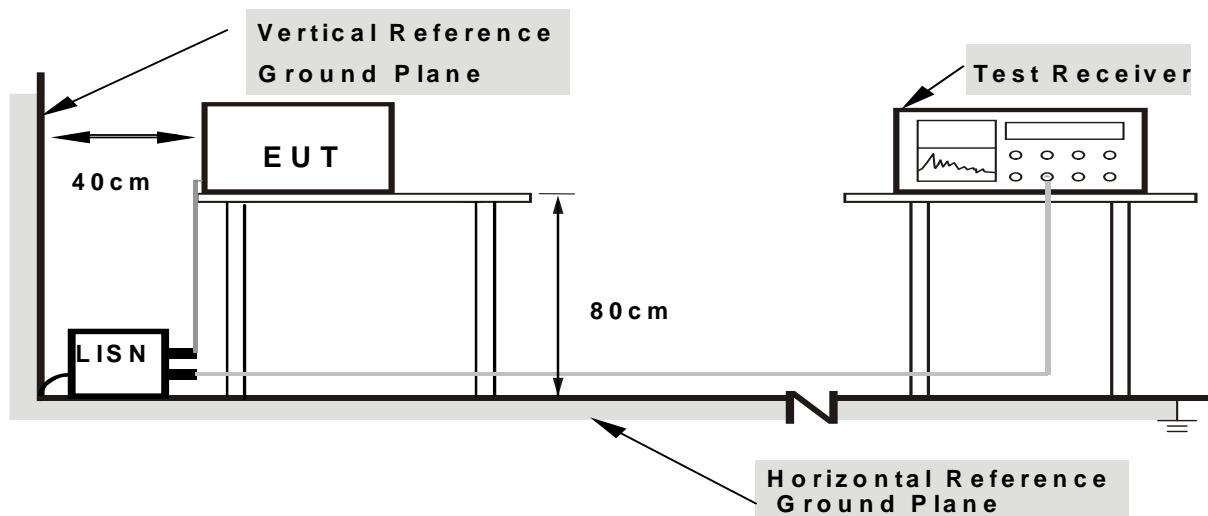
3.1.2 TEST PROCEDURE

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

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm 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.

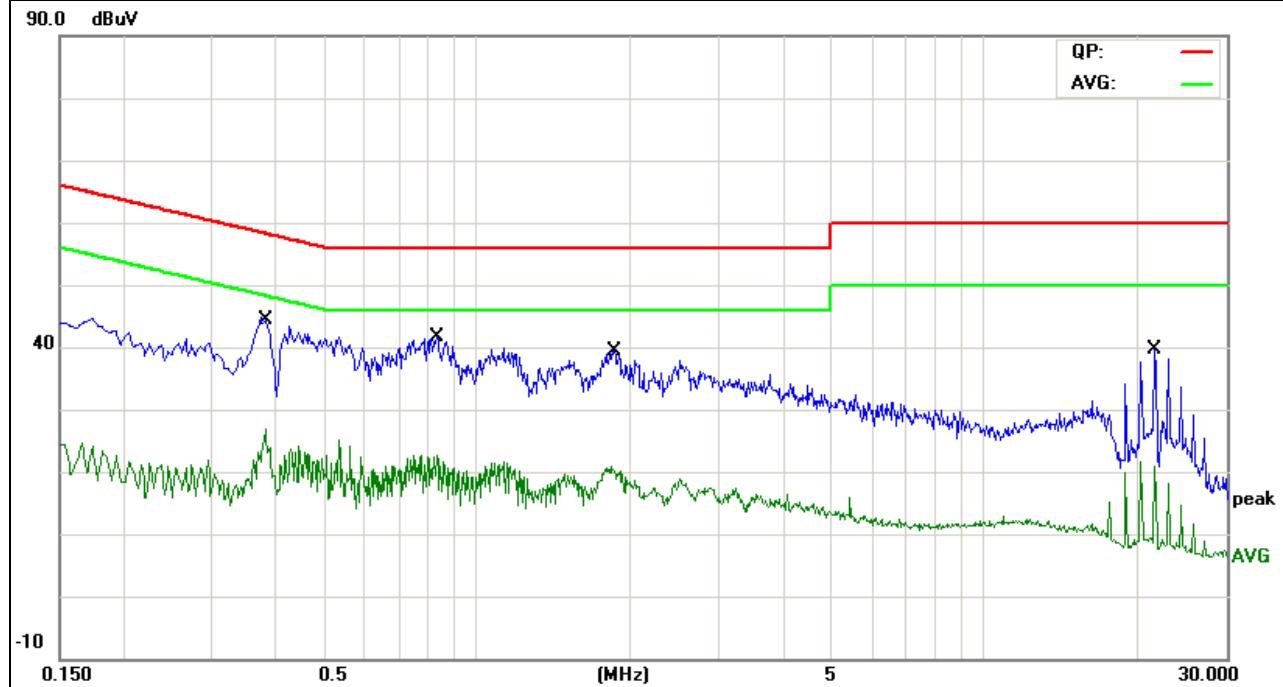
3.1.6 TEST RESULTS

EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	L
Test Voltage :	AC120V	Test Mode :	Mode 4

Frequency	Reading Level	Correct Factor	Measure-ment	Limits	Margin	Detector Type
(MHz)	(dB μ V)	(dB)	(dB μ V)	(dB μ V)	(dB)	
0.3820	30.62	10.06	40.68	58.23	-17.55	QP
0.3820	14.39	10.06	24.45	48.23	-23.78	AVG
0.8340	26.36	10.08	36.44	56.00	-19.56	QP
0.8340	10.37	10.08	20.45	46.00	-25.55	AVG
1.8620	24.01	10.07	34.08	56.00	-21.92	QP
1.8620	8.29	10.07	18.36	46.00	-27.64	AVG
21.7060	18.80	10.06	28.86	60.00	-31.14	QP
21.7060	3.95	10.06	14.01	50.00	-35.99	AVG

Remark:

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

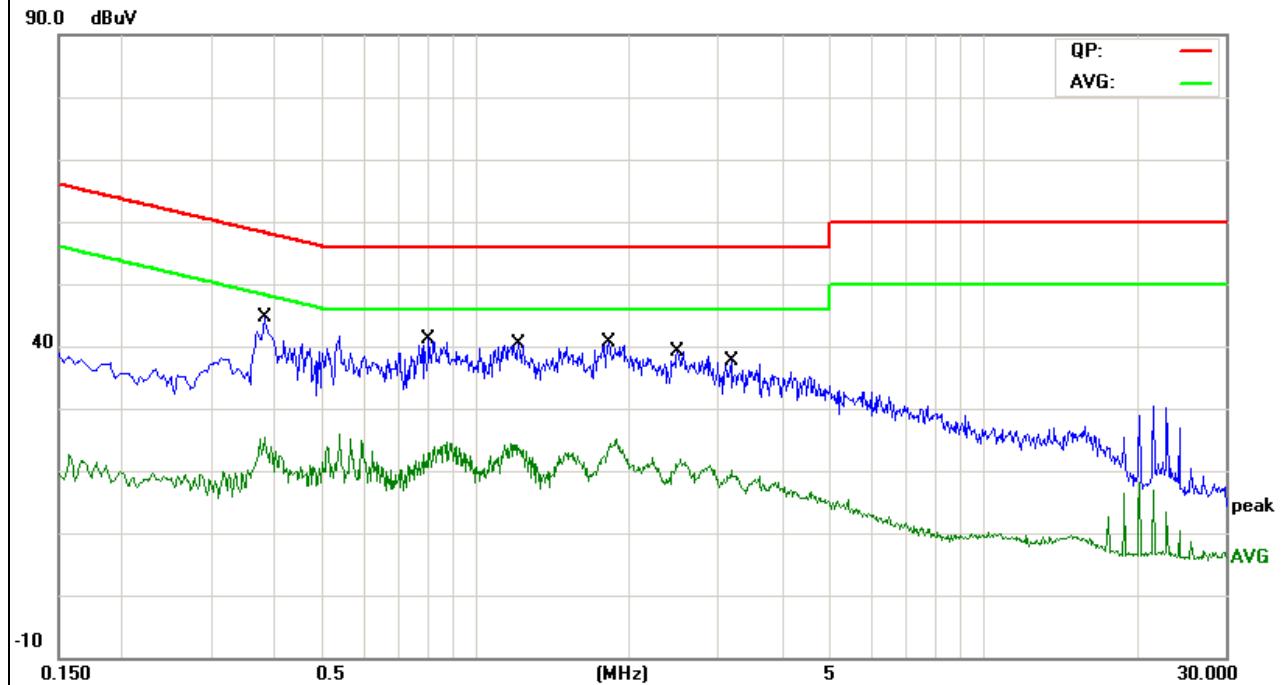


EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	26 °C	Relative Humidity :	54%
Pressure :	1010hPa	Phase :	N
Test Voltage :	AC120V	Test Mode :	Mode 4

Frequency (MHz)	Reading Level (dB μ V)	Correct Factor (dB)	Measure-ment (dB μ V)	Limits (dB μ V)	Margin (dB)	Detector Type
0.3820	27.62	10.02	37.64	58.23	-20.59	QP
0.3820	13.70	10.02	23.72	48.23	-24.51	AVG
0.8059	21.11	10.10	31.21	56.00	-24.79	QP
0.8059	10.65	10.10	20.75	46.00	-25.25	AVG
1.2140	23.28	10.06	33.34	56.00	-22.66	QP
1.2140	11.56	10.06	21.62	46.00	-24.38	AVG
1.8260	22.72	10.06	32.78	56.00	-23.22	QP
1.8260	11.56	10.06	21.62	46.00	-24.38	AVG
2.4940	20.11	10.04	30.15	56.00	-25.85	QP
2.4940	9.11	10.04	19.15	46.00	-26.85	AVG
3.1780	18.63	10.02	28.65	56.00	-27.35	QP
3.1780	7.54	10.02	17.56	46.00	-28.44	AVG

Remark:

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



3.2 RADIATED EMISSION MEASUREMENT

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

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

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

FREQUENCY (MHz)	Class A (dBuV/m) (at 3M)		Class B (dBuV/m) (at 3M)	
	PEAK	AVERAGE	PEAK	AVERAGE
Above 1000	80	60	74	54

Notes:

- (1) The limit for radiated test was performed according to FCC PART 15C.
- (2) The tighter limit applies at the band edges.
- (3) Emission level (dBuV/m)=20log Emission level (uV/m).

FREQUENCY RANGE OF RADIATED MEASUREMENT (For unintentional radiators)

Highest frequency generated or Upper frequency of measurement used in the device or on which the device operates or tunes (MHz)	Range (MHz)
Below 1.705	30
1.705 – 108	1000
108 – 500	2000
500 – 1000	5000
Above 1000	5 th harmonic of the highest frequency or 40 GHz, whichever is lower

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

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

3.2.2 TEST PROCEDURE

- a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
- b. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
- c. The height of the equipment or of the substitution antenna shall be 0.8 m; 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:

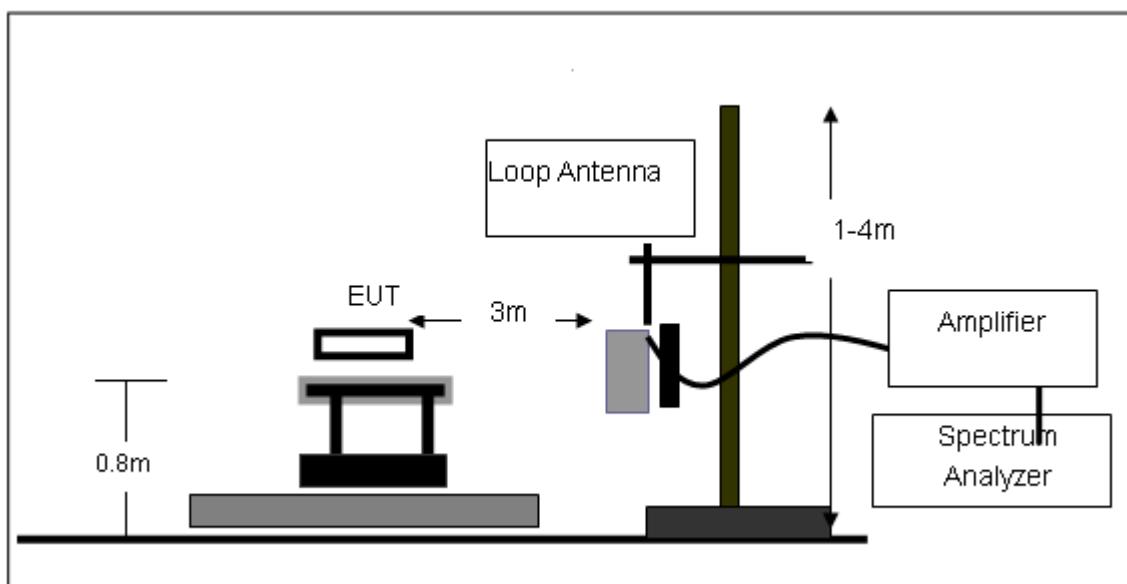
Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported

3.2.3 DEVIATION FROM TEST STANDARD

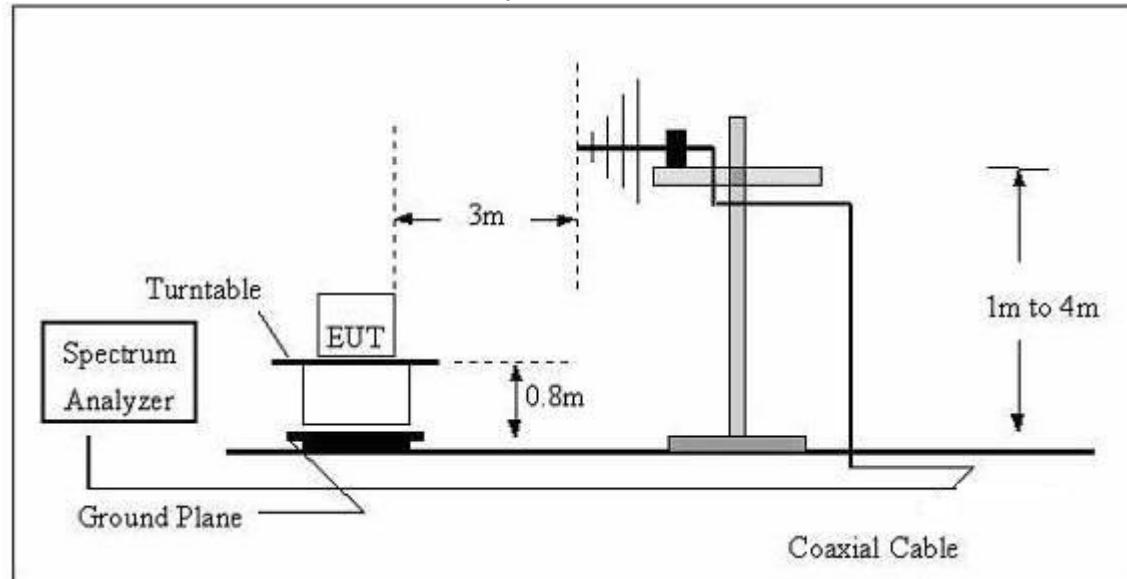
No deviation

3.2.4 TEST SETUP

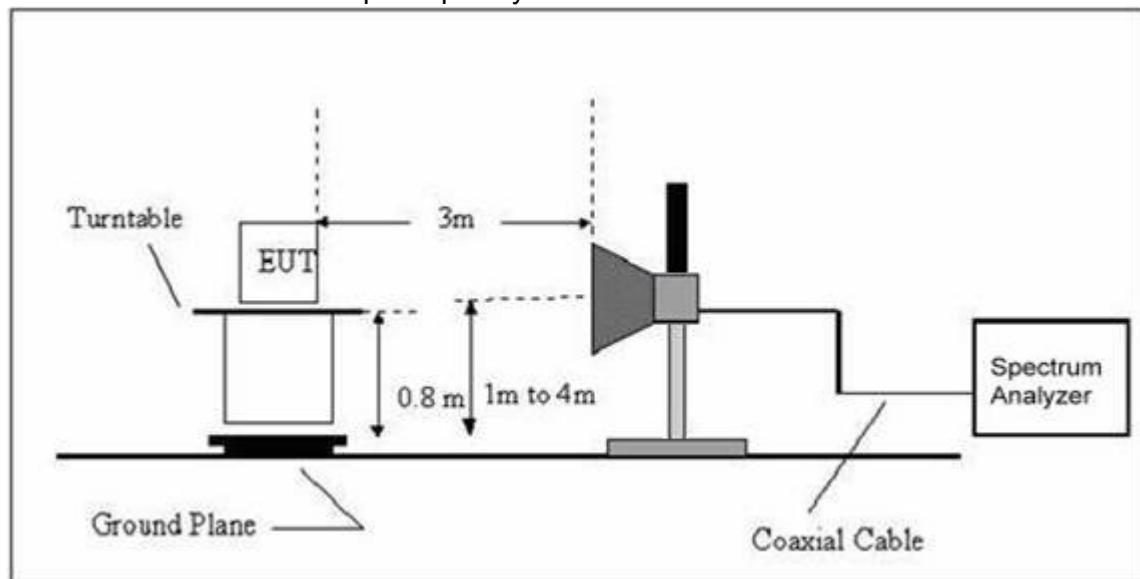
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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

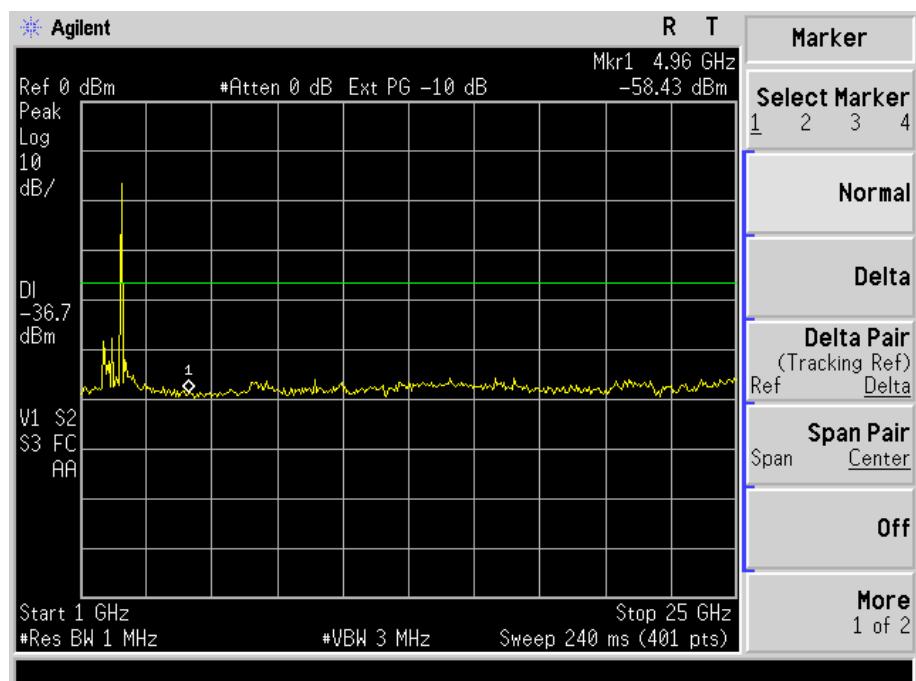
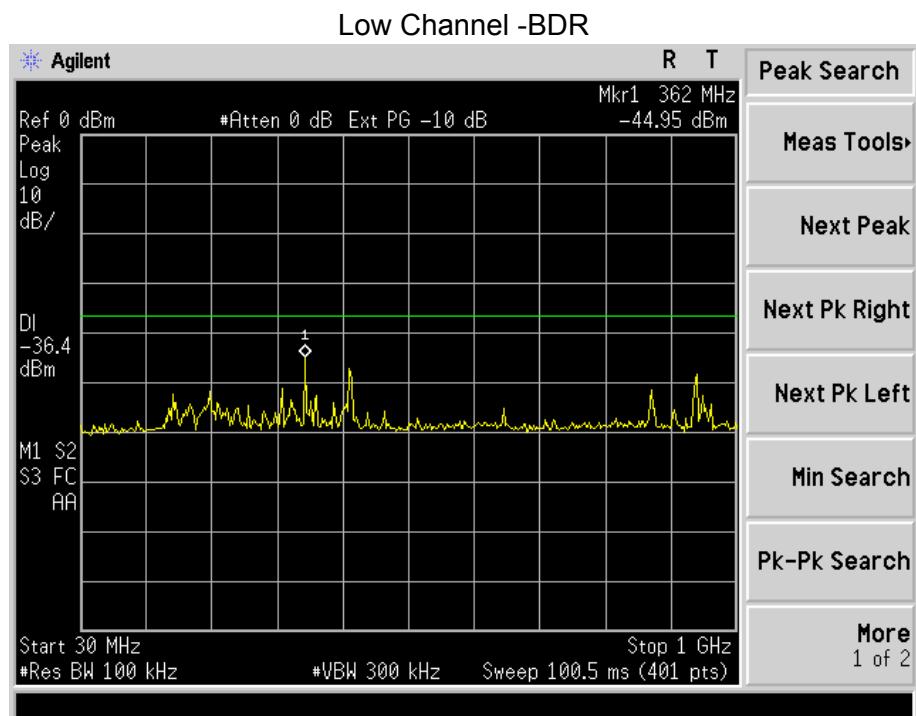


3.2.5 EUT OPERATING CONDITIONS

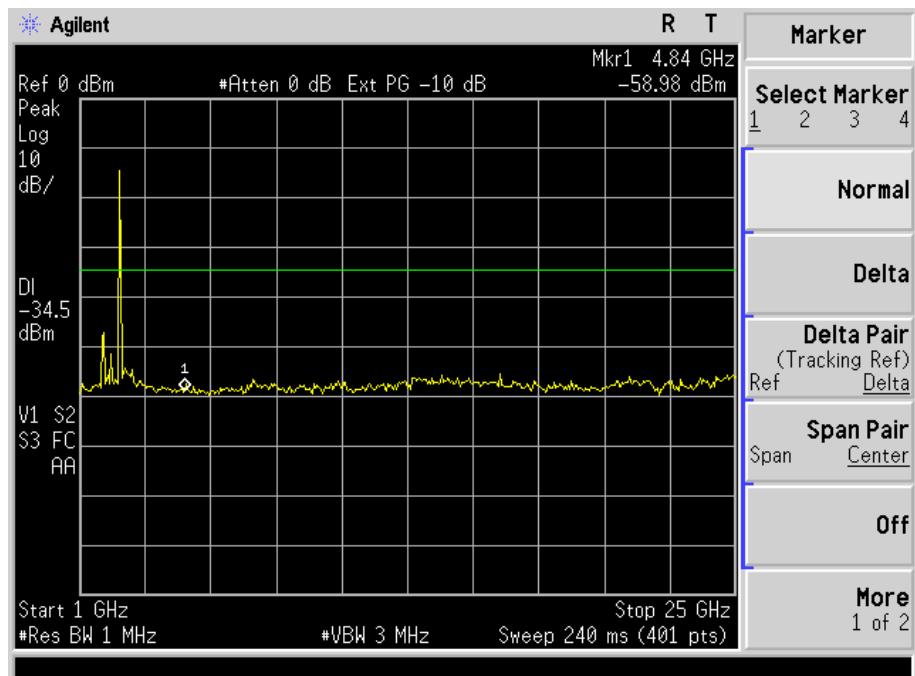
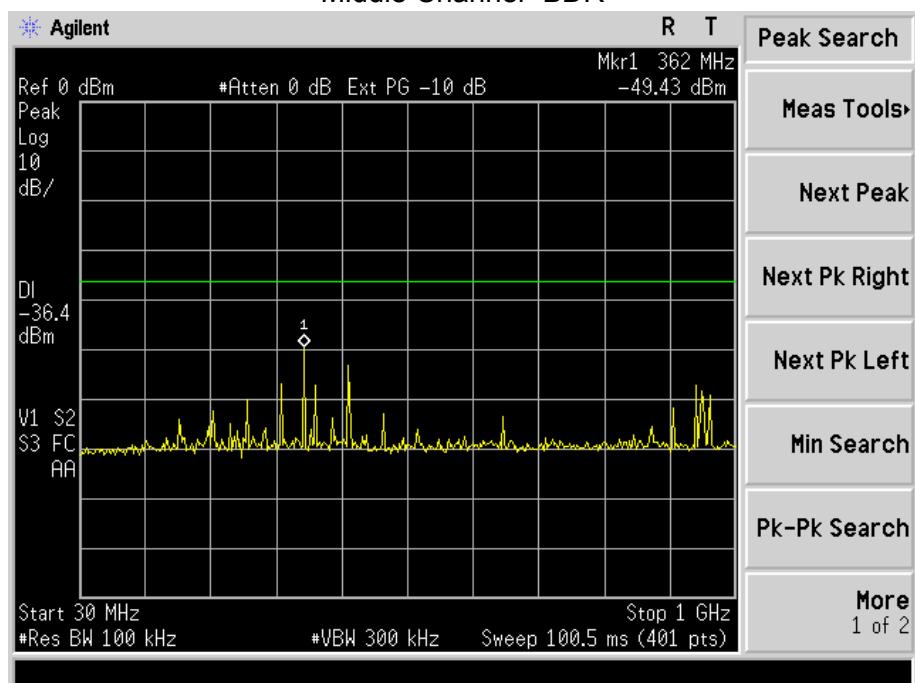
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

3.2.6 TEST RESULTS

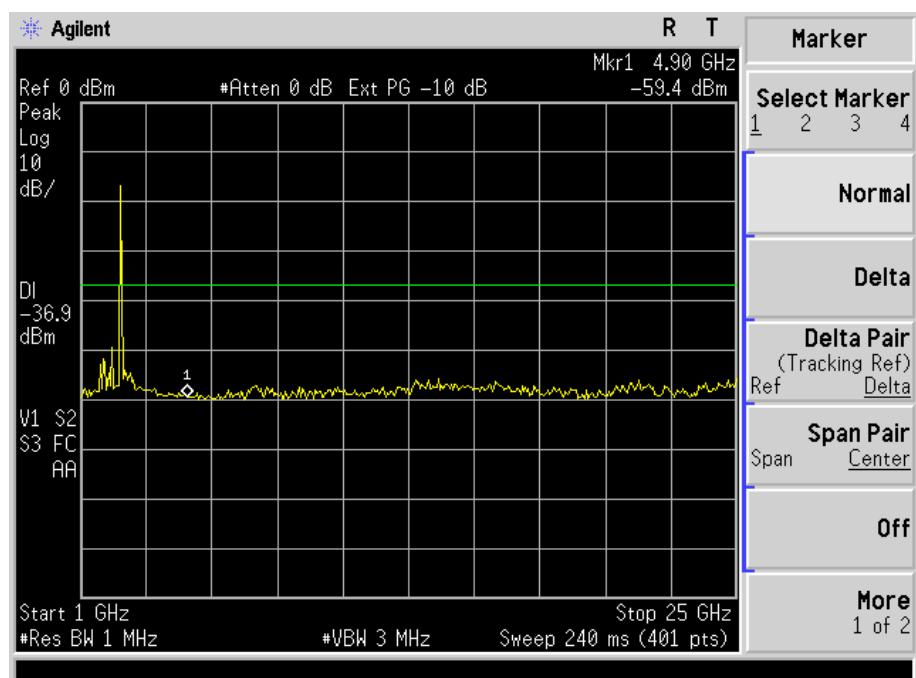
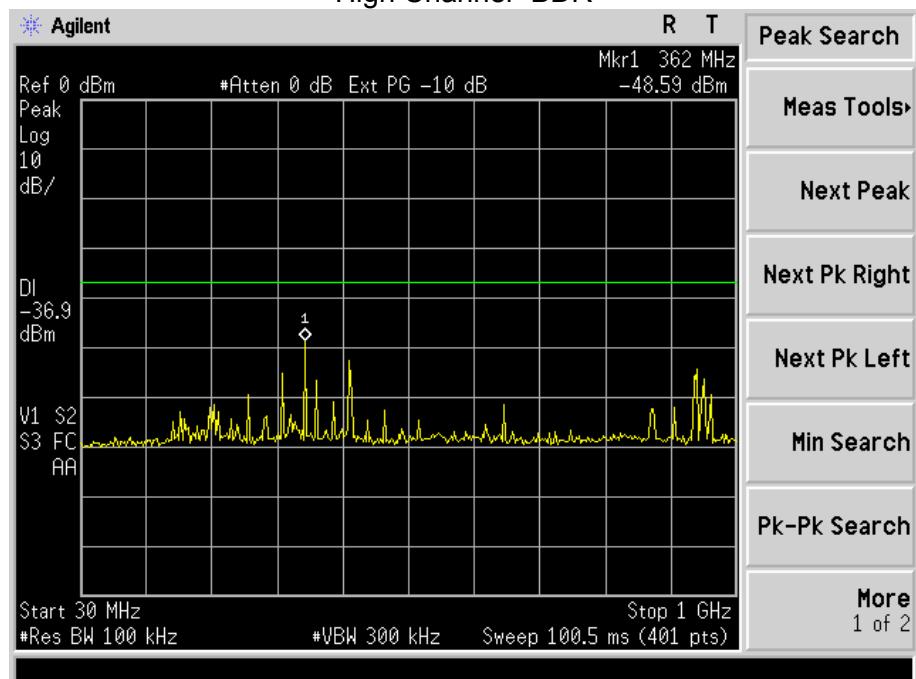
Conducted Spurious Emissions at Antenna Port:



Middle Channel -BDR



High Channel -BDR



3.2.7 TEST RESULTS (BELOW 30 MHZ)

EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	20 °C	Relative Humidity :	48%
Pressure :	1010 hPa	Polarization :	---
Test Voltage :	AC 120V		
Test Mode :	TX		

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

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 = $40 \log (\text{specific distance}/\text{test distance})$ (dB);
Limit line = specific limits(dBuV) + distance extrapolation factor.

Radiated Spurious Emission (Between 30MHz – 1GHz)

EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	26 °C	Relative Humidity :	54%
Pressure:	1010hPa	Test Voltage :	AC120V
Test Mode :	Mode 4		

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	199.2855	26.88	8.71	35.59	43.5	-7.91	QP
V	331.3546	24.23	14.97	39.2	46	-6.8	QP
V	394.8543	23.77	17.03	40.8	46	-5.2	QP
V	531.9633	18.85	19.76	38.61	46	-7.39	QP
V	793.3958	16.51	23.91	40.42	46	-5.58	QP
V	199.2855	26.88	8.71	35.59	43.5	-7.91	QP
H	199.2855	30.12	8.71	38.83	43.5	-4.67	QP
H	392.0951	25.41	16.93	42.34	46	-3.66	QP
H	531.9633	20.35	19.76	40.11	46	-5.89	QP
H	590.9737	14.71	20.79	35.5	46	-10.5	QP

Remark:

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

Radiated Spurious Emission (Above 1GHz)

Scan with GFSK, $\pi/4$ -DQPSK,8DPSK, the worst case is BDR Mode (GFSK)

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type	Comment
Low Channel (2402 MHz)							
4804.136	64.21	-3.64	60.57	74	-13.43	peak	Vertical
4804.136	49.46	-3.64	45.82	54	-8.18	AVG	Vertical
7206.125	56.54	-0.95	55.59	74	-18.41	peak	Vertical
7206.125	44.38	-0.95	43.43	54	-10.57	AVG	Vertical
4804.138	65.12	-3.64	61.48	74	-12.52	peak	Horizontal
4804.138	48.03	-3.64	44.39	54	-9.61	AVG	Horizontal
7206.119	56.4	-0.95	55.45	74	-18.55	peak	Horizontal
7206.119	43.29	-0.95	42.34	54	-11.66	AVG	Horizontal
Mid Channel (2441 MHz)							
4882.132	66	-3.68	62.32	74	-11.68	peak	Vertical
4882.132	47.25	-3.68	43.57	54	-10.43	AVG	Vertical
7323.118	57.65	-0.82	56.83	74	-17.17	peak	Vertical
7323.118	41.28	-0.82	40.46	54	-13.54	AVG	Vertical
4882.177	64.24	-3.68	60.56	74	-13.44	peak	Horizontal
4882.177	46.15	-3.68	42.47	54	-11.53	AVG	Horizontal
7323.149	56.45	-0.82	55.63	74	-18.37	peak	Horizontal
7323.149	41.51	-0.82	40.69	54	-13.31	AVG	Horizontal
High Channel (2480 MHz)							
4960.145	61.94	-3.59	58.35	74	-15.65	peak	Vertical
4960.145	47.87	-3.59	44.28	54	-9.72	AVG	Vertical
7440.129	55.05	-0.68	54.37	74	-19.63	peak	Vertical
7440.129	43.14	-0.68	42.46	54	-11.54	AVG	Vertical
4960.142	64.16	-3.59	60.57	74	-13.43	peak	Horizontal
4960.142	46.92	-3.59	43.33	54	-10.67	AVG	Horizontal
7440.11	55.93	-0.68	55.25	74	-18.75	peak	Horizontal
7440.11	41.04	-0.68	40.36	54	-13.64	AVG	Horizontal

Remark:

Factor = Antenna Factor + Cable Loss – Pre-amplifier.

Emission Level = Meter Reading + Factor

Margin = Emission Level - Limit

Radiated band edge:

Frequency (MHz)	Meter Reading (dB μ V)	Factor (dB)	Emission Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Detector Type	Comment
GFSK							
2400	48.22	-13.06	35.16	54	-18.84	peak	Vertical
2400	47.22	-13.06	34.16	54	-19.84	peak	Horizontal
2483.5	44.76	-12.78	31.98	54	-22.02	peak	Vertical
2483.5	45.43	-12.78	32.65	54	-21.35	peak	Horizontal
$\pi/4$-DQPSK							
2400	49.32	-13.06	36.26	54	-17.74	peak	Vertical
2400	51.23	-13.06	38.17	54	-15.83	peak	Horizontal
2483.5	48.12	-12.78	35.34	54	-18.66	peak	Vertical
2483.5	47.31	-12.78	34.53	54	-19.47	peak	Horizontal
8DPSK							
2400	48.32	-13.06	35.26	54	-18.74	peak	Vertical
2400	48.13	-13.06	35.07	54	-18.93	peak	Horizontal
2483.5	47.98	-12.78	35.2	54	-18.8	peak	Vertical
2483.5	48.45	-12.78	35.67	54	-18.33	peak	Horizontal

NOTE: The result(PK) less than AV limite, No need shown AV result.

4. NUMBER OF HOPPING CHANNEL

4.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Number of Hopping Channel	≥15	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	= the frequency band of operation
RB	$RBW \geq 1\%$ of the span
VB	$VBW \geq RBW$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : $RBW = 1\text{MHz}$, $VBW = 3\text{MHz}$, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



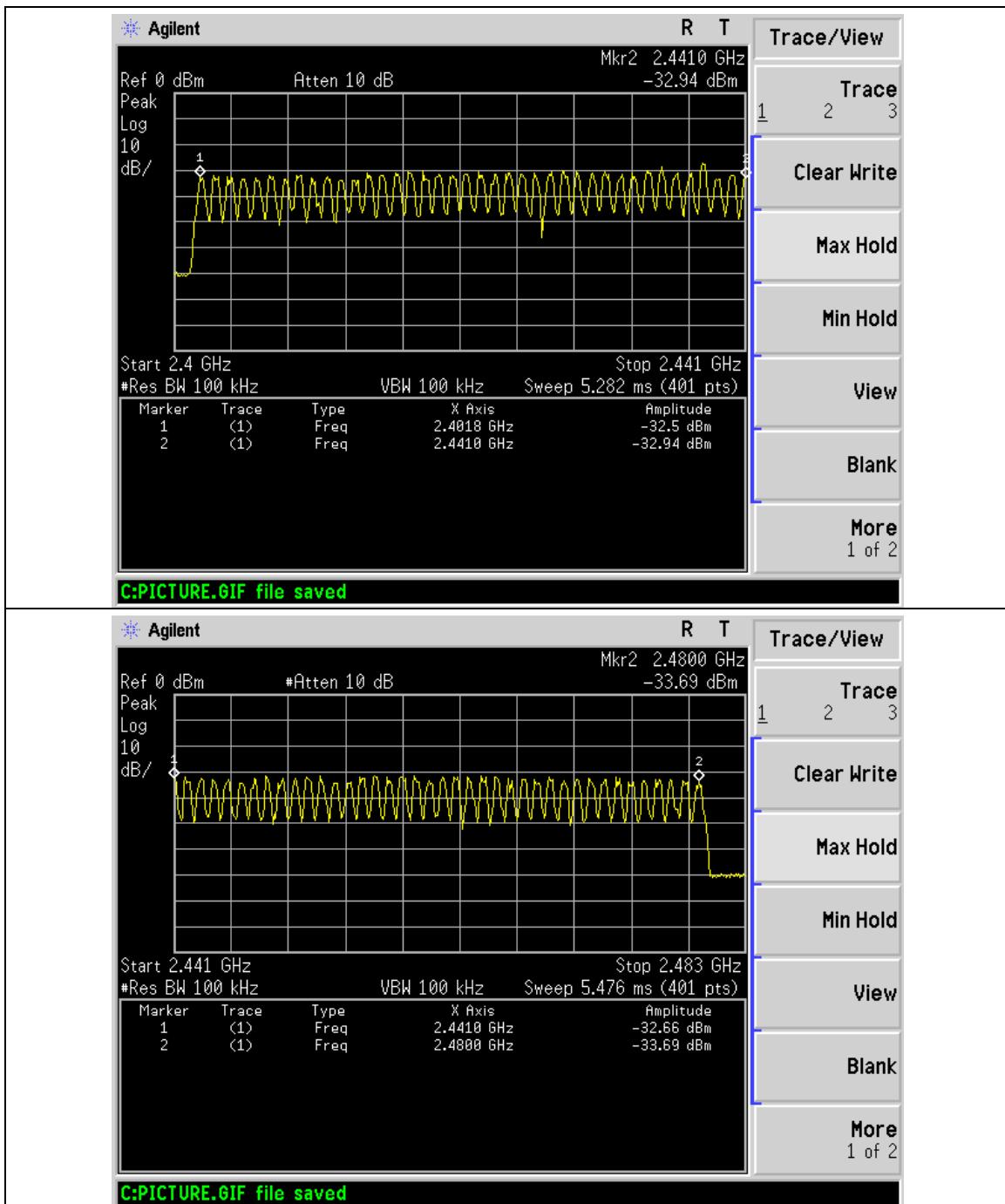
4.1.4 EUT OPERATION CONDITIONS

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

4.1.5 TEST RESULTS

EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1015 hPa	Test Voltage :	AC120V
Test Mode :	Hopping Mode		

Number of Hopping Channel	79
---------------------------	----



5. AVERAGE TIME OF OCCUPANCY

5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)(iii)	Average Time of Occupancy	0.4sec	2400-2483.5	PASS

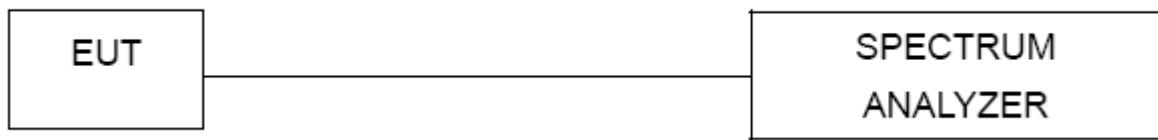
5.1.1 TEST PROCEDURE

- a. The transmitter output (antenna port) was connected to the spectrum analyzer
- b. Set RBW of spectrum analyzer to 1MHz and VBW to 1MHz.
- c. Use a video trigger with the trigger level set to enable triggering only on full pulses.
- d. Sweep Time is more than once pulse time.
- e. Set the center frequency on any frequency would be measure and set the frequency span to zero span.
- f. Measure the maximum time duration of one single pulse.
- g. Set the EUT for DH5, DH3 and DH1 packet transmitting.
- h. Measure the maximum time duration of one single pulse.
- i. A Period Time = (channel number)*0.4
DH1 Time Slot: Reading * (1600/2)*31.6/(channel number)
DH3 Time Slot: Reading * (1600/4)*31.6/(channel number)
DH5 Time Slot: Reading * (1600/6)*31.6/(channel number)

5.1.2 DEVIATION FROM STANDARD

No deviation.

5.1.3 TEST SETUP



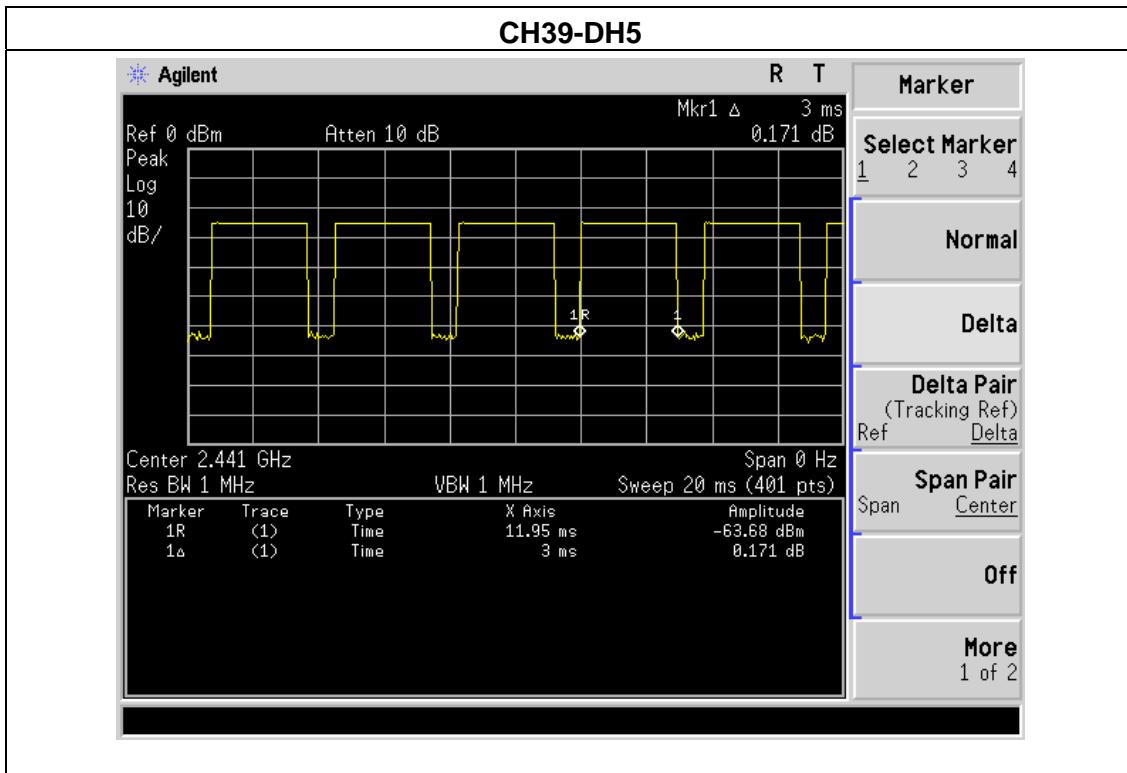
5.1.4 EUT OPERATION CONDITIONS

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

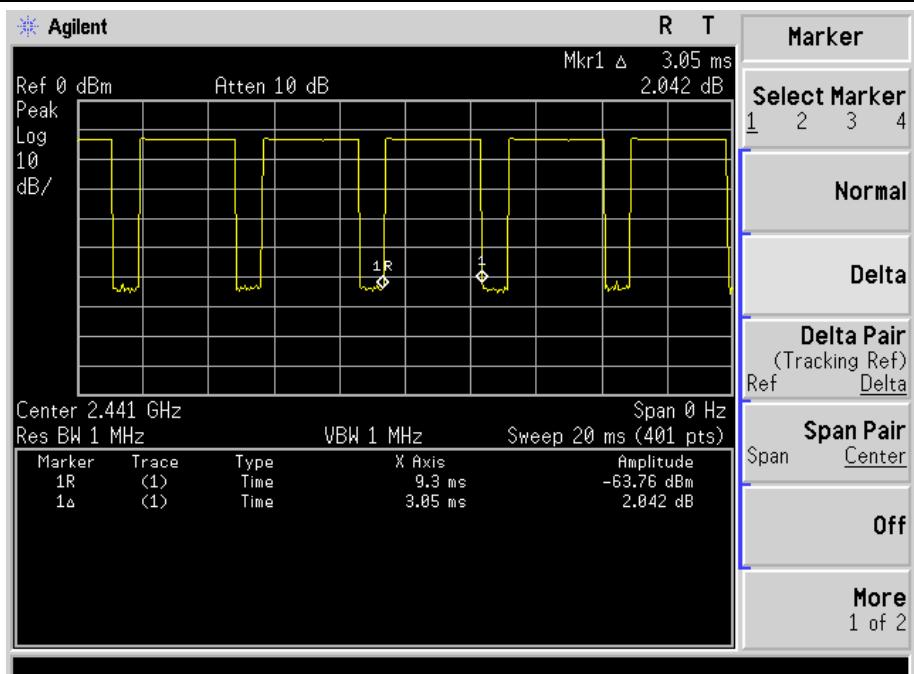
5.1.5 TEST RESULTS

EUT :	BlueFidelity Bluetooth Amplifier	Model Name :	Model 300
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH39-DH5 ,2DH5,3DH5		

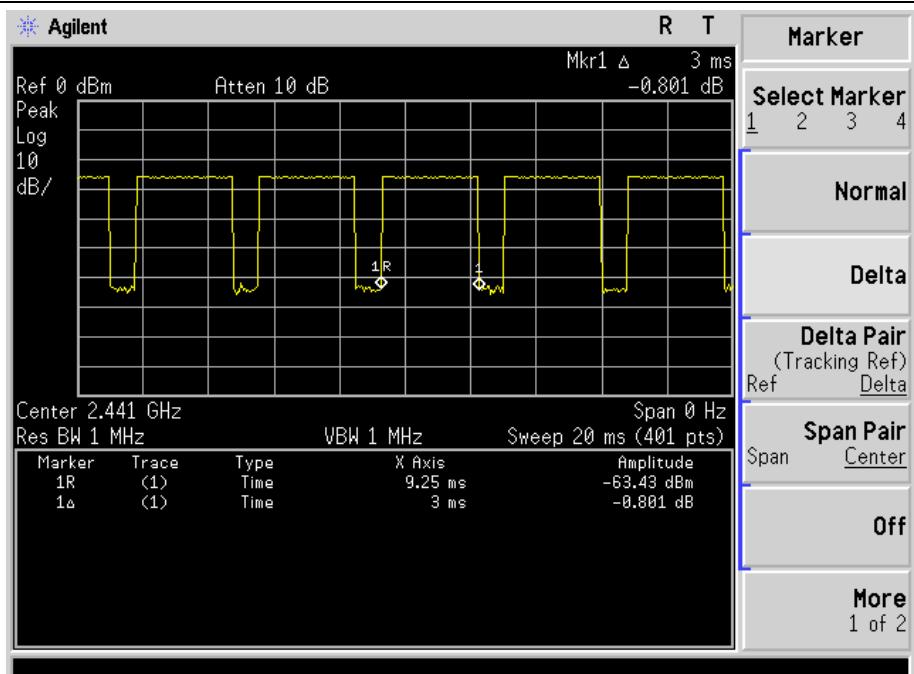
Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH5	2441 MHz	3.00	0.32	0.4
2DH5	2441 MHz	3.05	0.33	0.4
3DH5	2441 MHz	3.00	0.32	0.4



CH39-2DH5

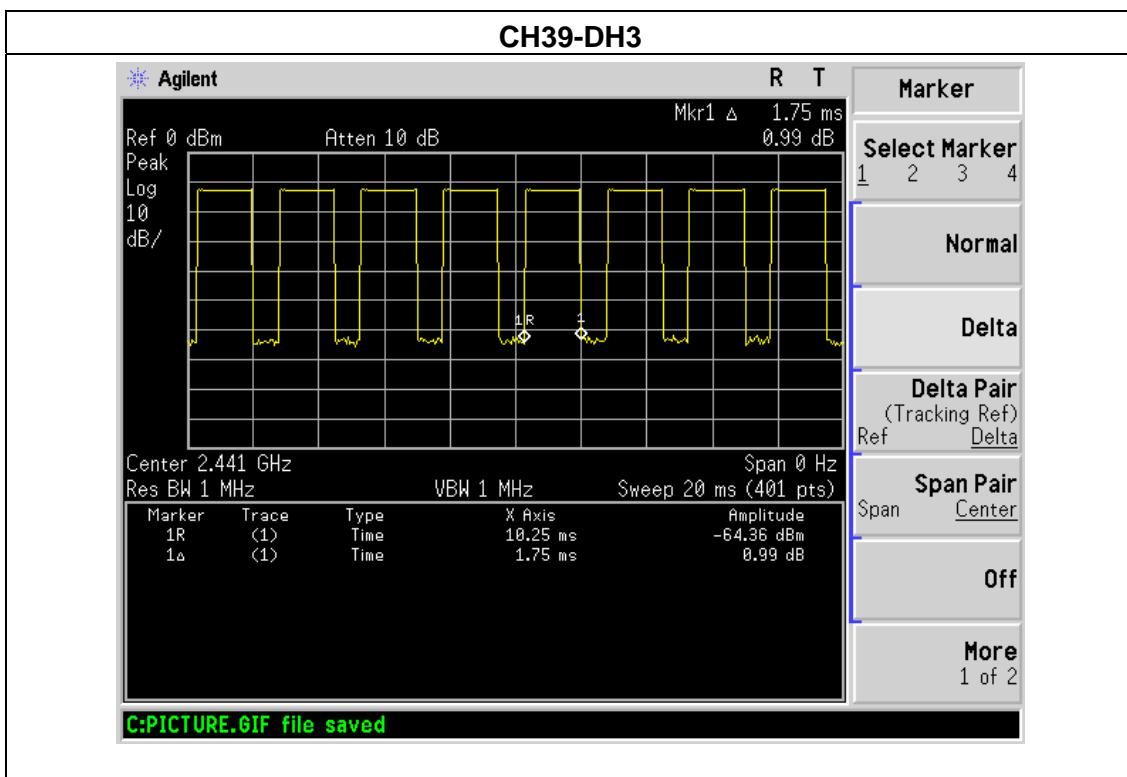


CH39-3DH5

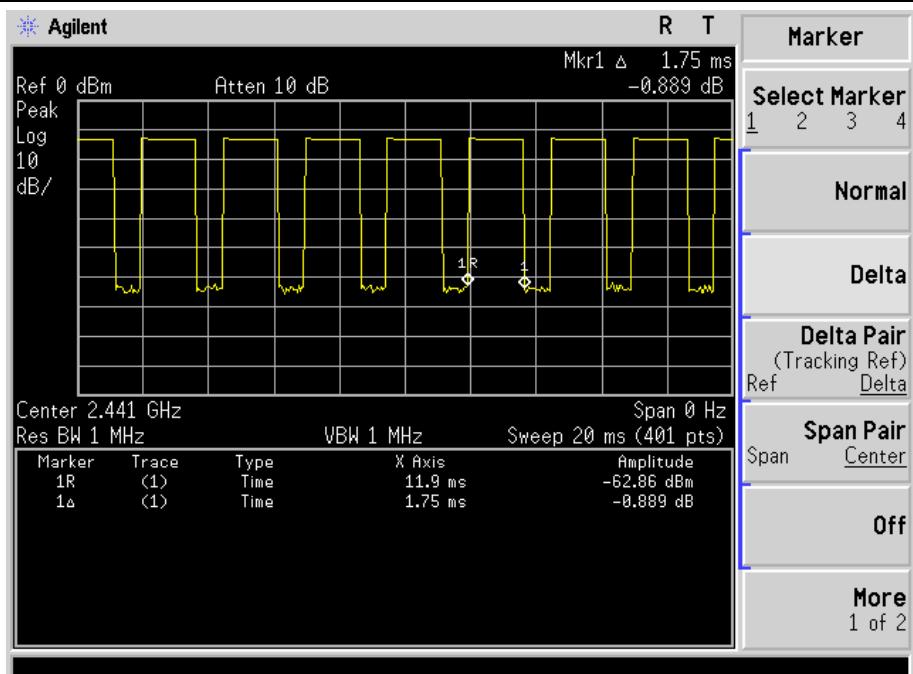


EUT :	BlueFidelity Bluetooth Amplifier	Model Name :	Model 300
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH39-DH3,2DH3,3DH3		

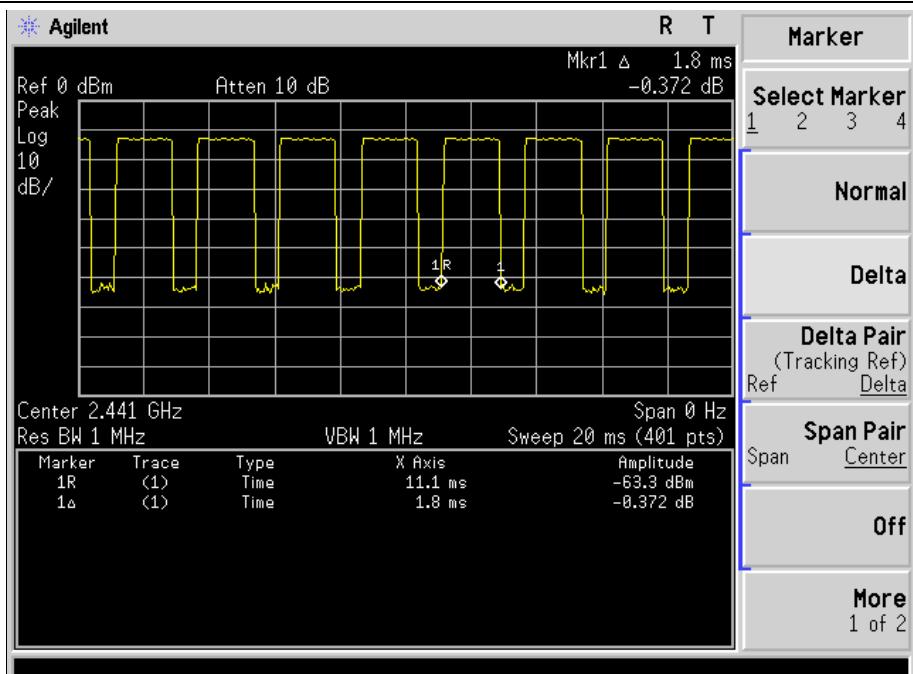
Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH3	2441 MHz	1.75	0.28	0.4
2DH3	2441 MHz	1.75	0.28	0.4
3DH3	2441 MHz	1.80	0.29	0.4



CH39-2DH3

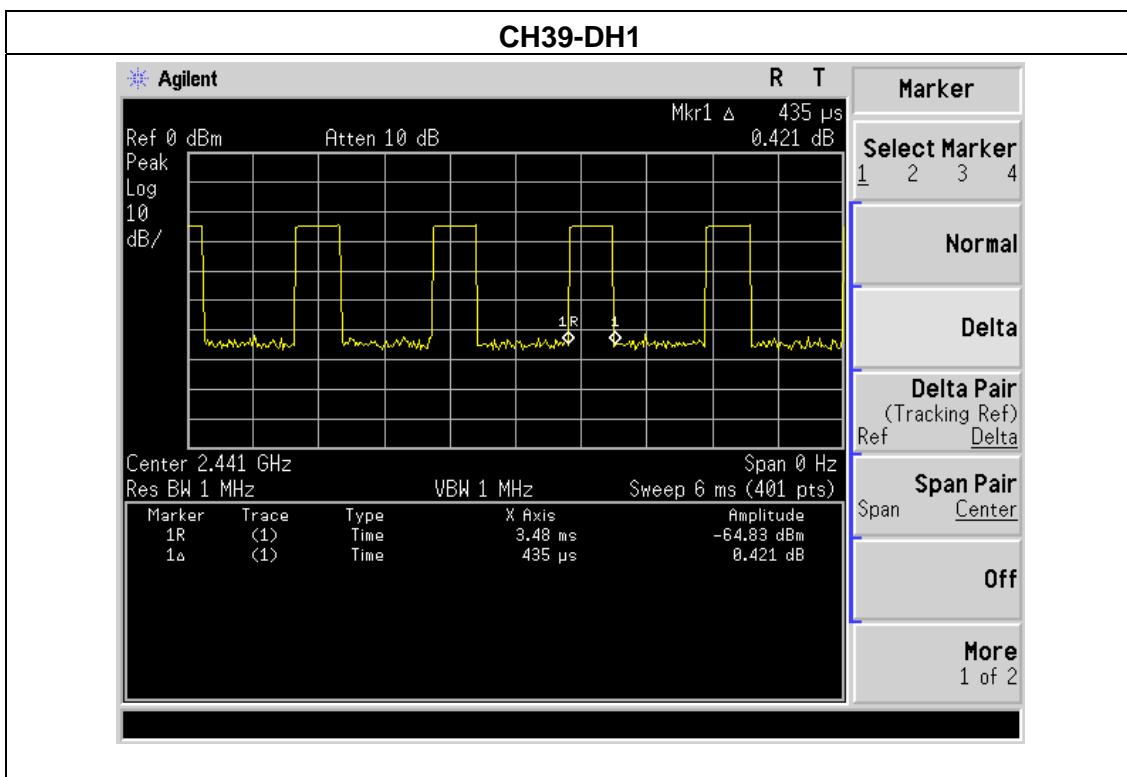


CH39-3DH3

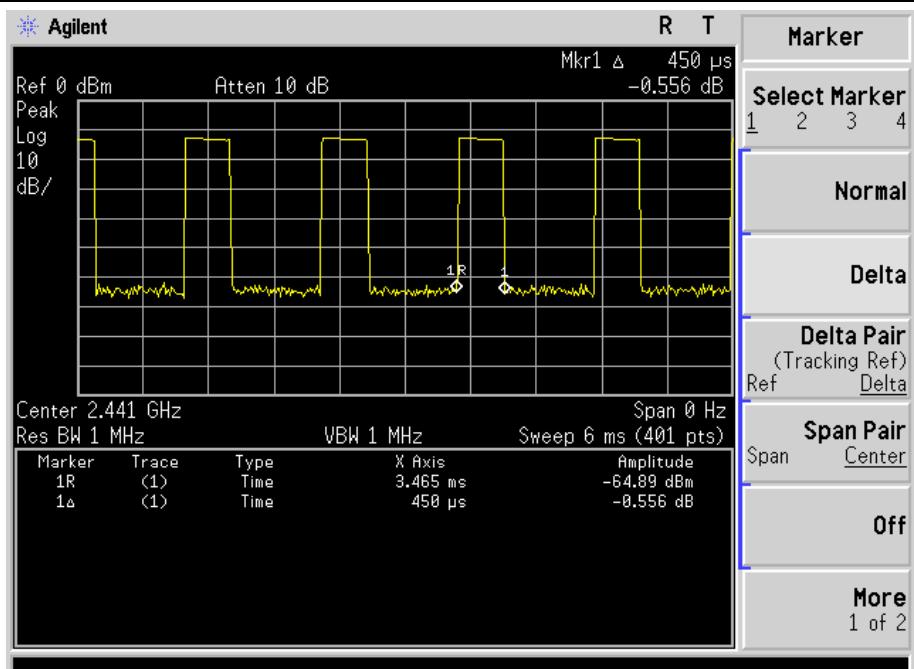


EUT :	BlueFidelity Bluetooth Amplifier	Model Name :	Model 300
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH39-DH1,2DH1,3DH1		

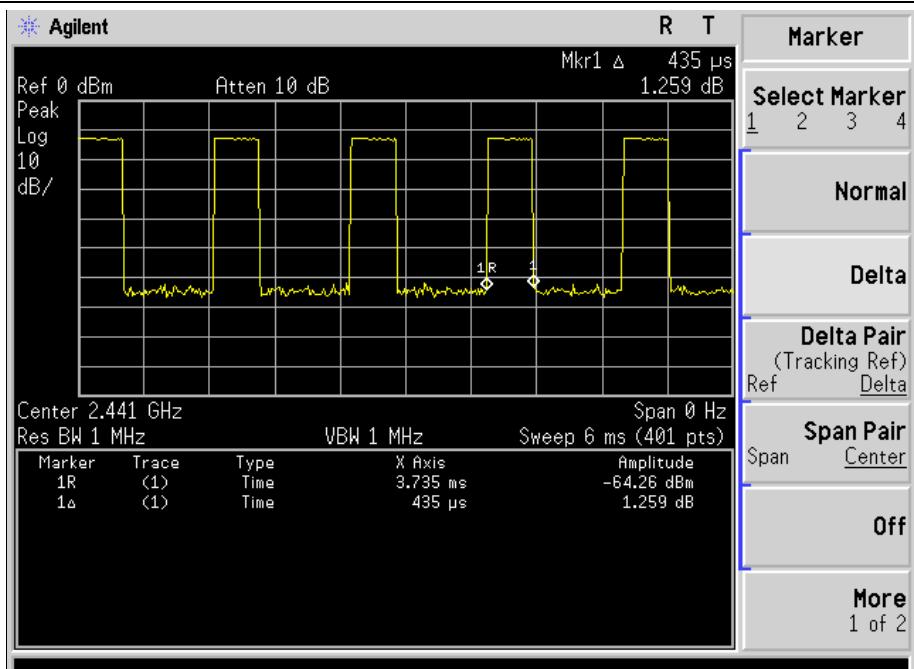
Data Packet	Frequency	Pulse Duration (ms)	Dwell Time (s)	Limits (s)
DH1	2441 MHz	0.435	0.14	0.4
2DH1	2441 MHz	0.450	0.14	0.4
3DH1	2441 MHz	0.435	0.14	0.4



CH39-2DH1



CH39-3DH1



6. HOPPING CHANNEL SEPARATION MEASUREMENT

6.1 APPLIED PROCEDURES / LIMIT

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (Channel Separation)
VB	300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

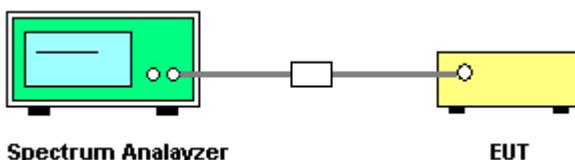
6.1.1 TEST PROCEDURE

- The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.
- The resolution bandwidth of 100 kHz and the video bandwidth of 300 kHz were utilised for channel separation measurement.

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

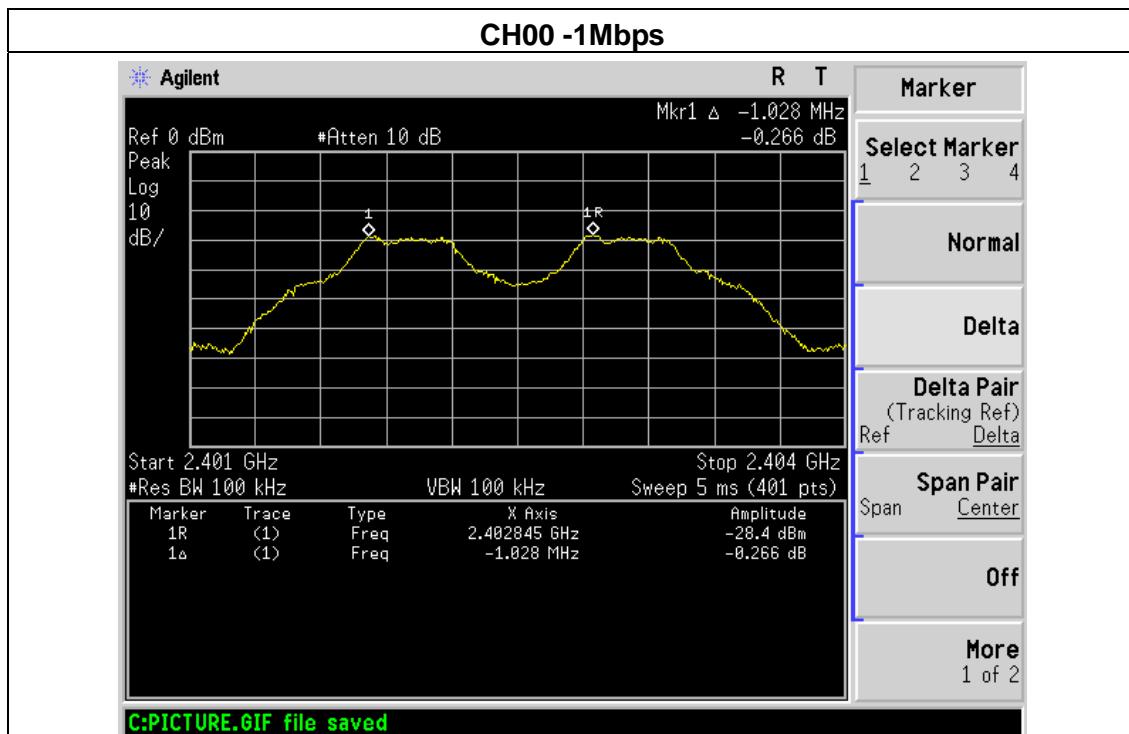
The EUT was programmed to be in continuously transmitting mode.

6.1.5 TEST RESULTS

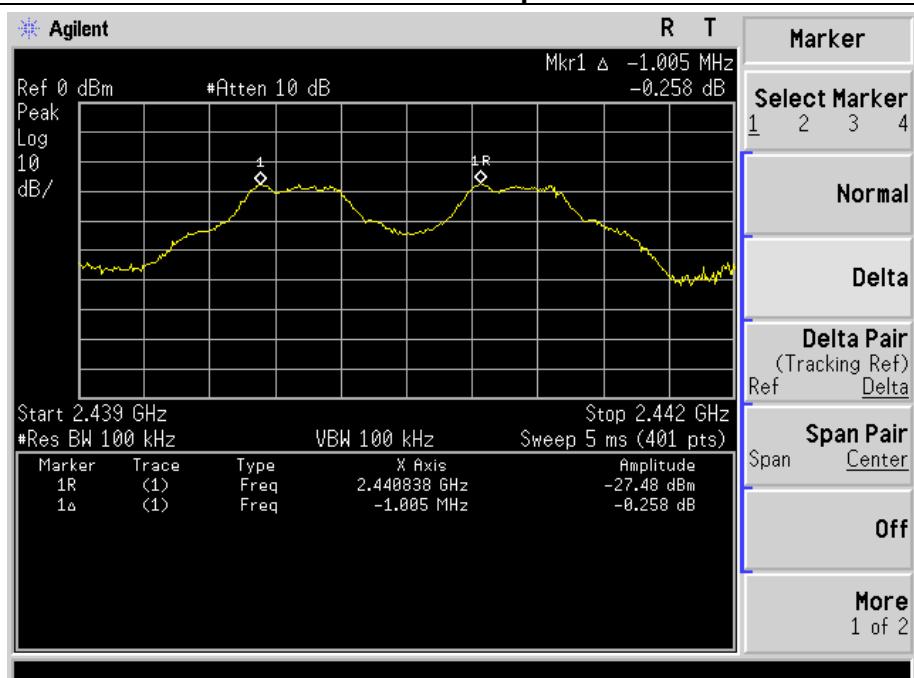
EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	CH00 / CH39 /CH78 (1Mbps Mode)		

Frequency	Ch. Separation (MHz)	Result
2402 MHz	1.028	Complies
2441 MHz	1.005	Complies
2480 MHz	0.990	Complies

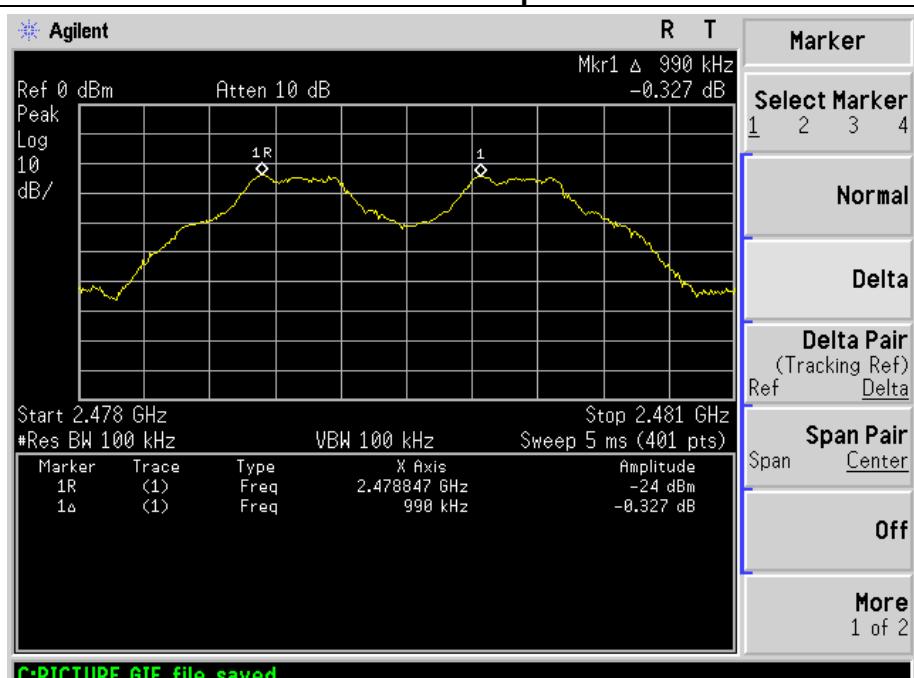
Ch. Separation Limits: >20dB bandwidth



CH39 -1Mbps



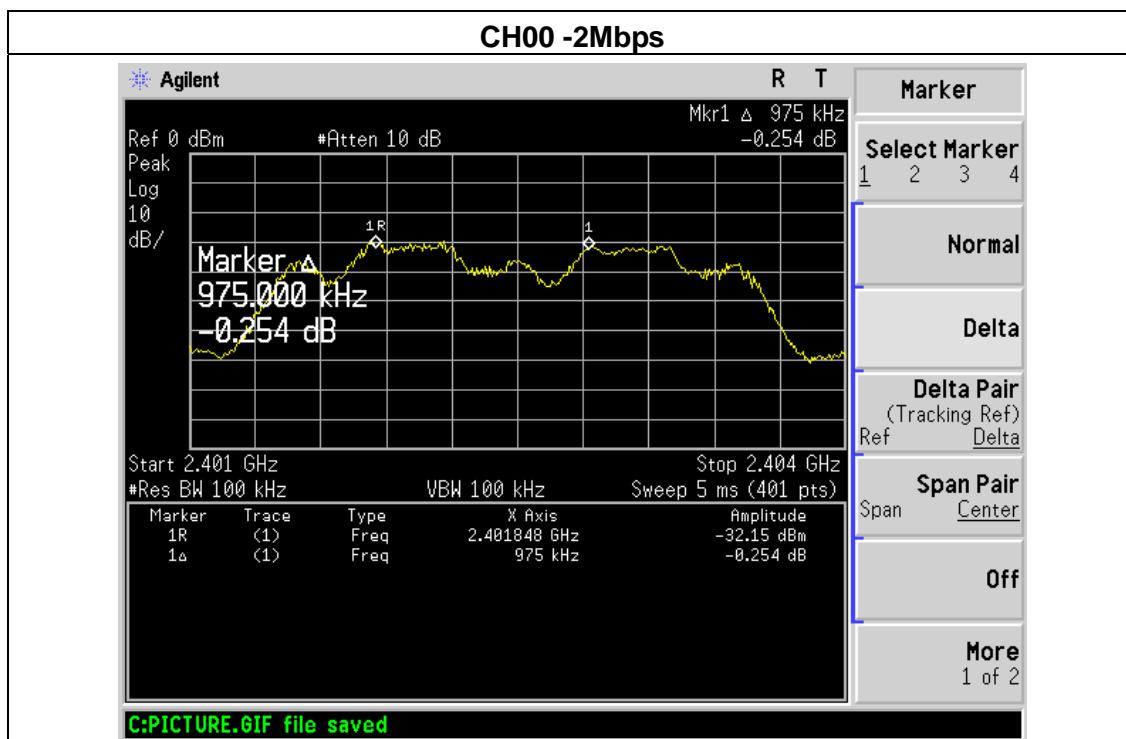
CH78 -1Mbps



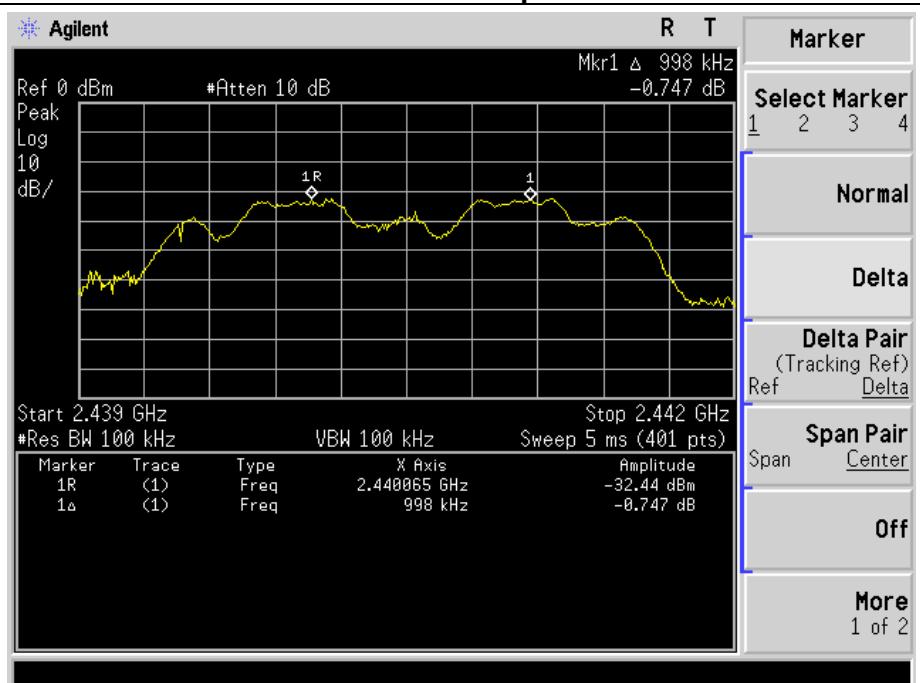
EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	CH00 / CH39 /CH78 (2Mbps Mode)		

Frequency	Ch. Separation (MHz)	Result
2402 MHz	0.975	Complies
2441 MHz	0.998	Complies
2480 MHz	1.005	Complies

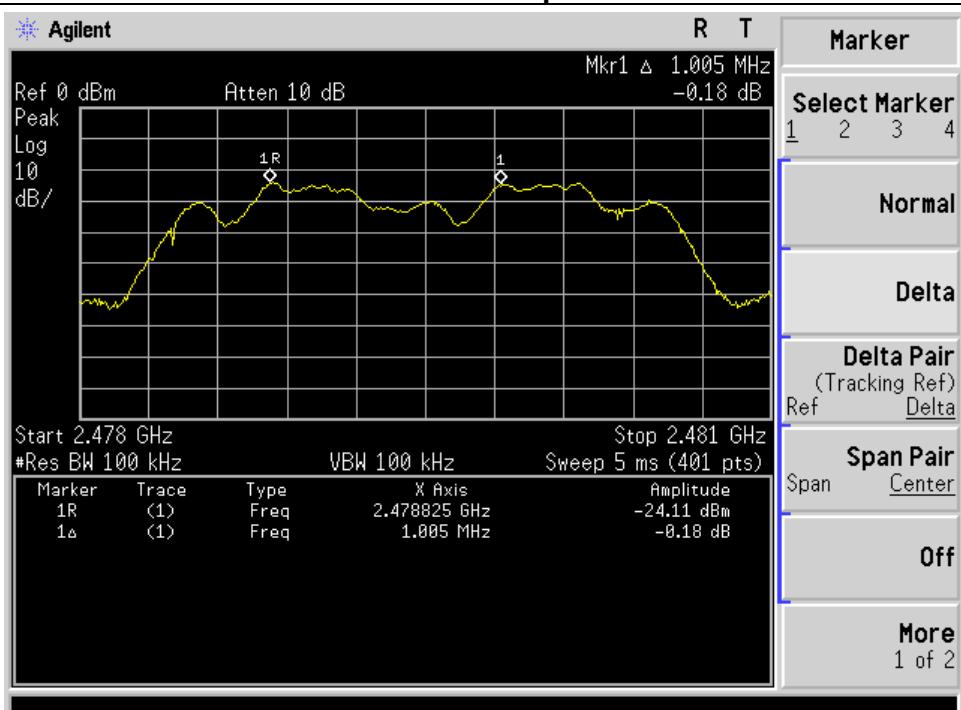
Ch. Separation Limits: >2/3 of 20dB bandwidth



CH39 -2Mbps



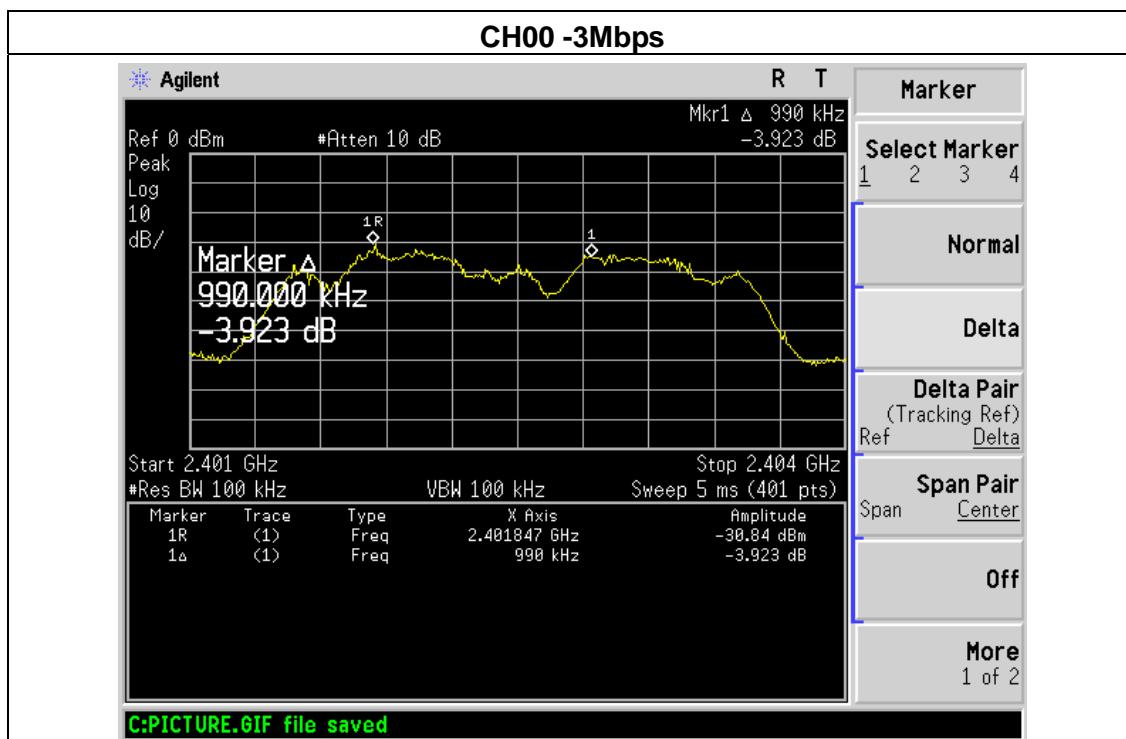
CH78 -2Mbps



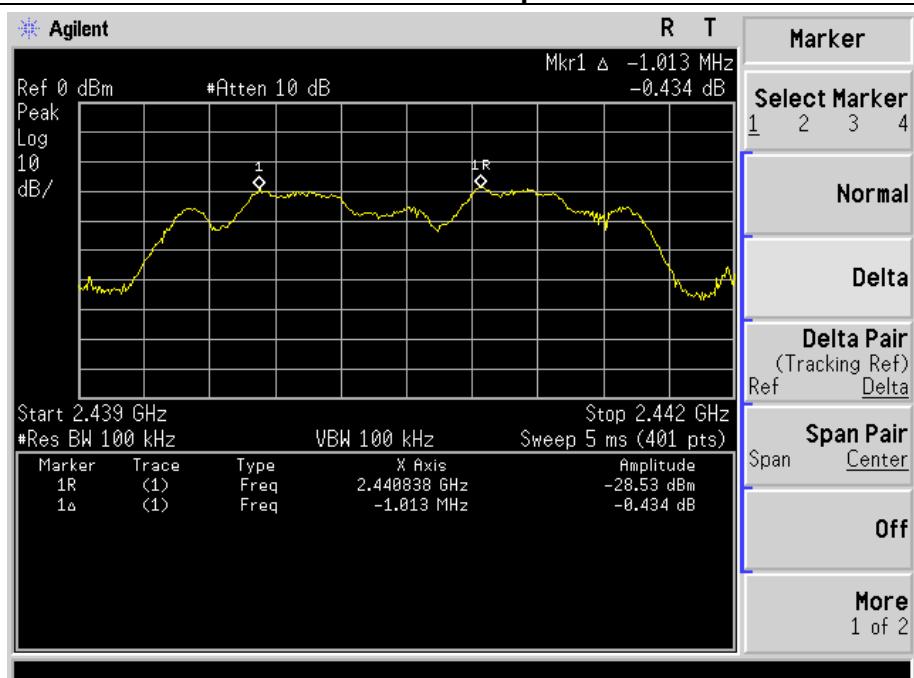
EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	CH00 / CH39 /CH78 (3Mbps Mode)		

Frequency	Ch. Separation (MHz)	Result
2402 MHz	0.990	Complies
2441 MHz	1.013	Complies
2480 MHz	0.990	Complies

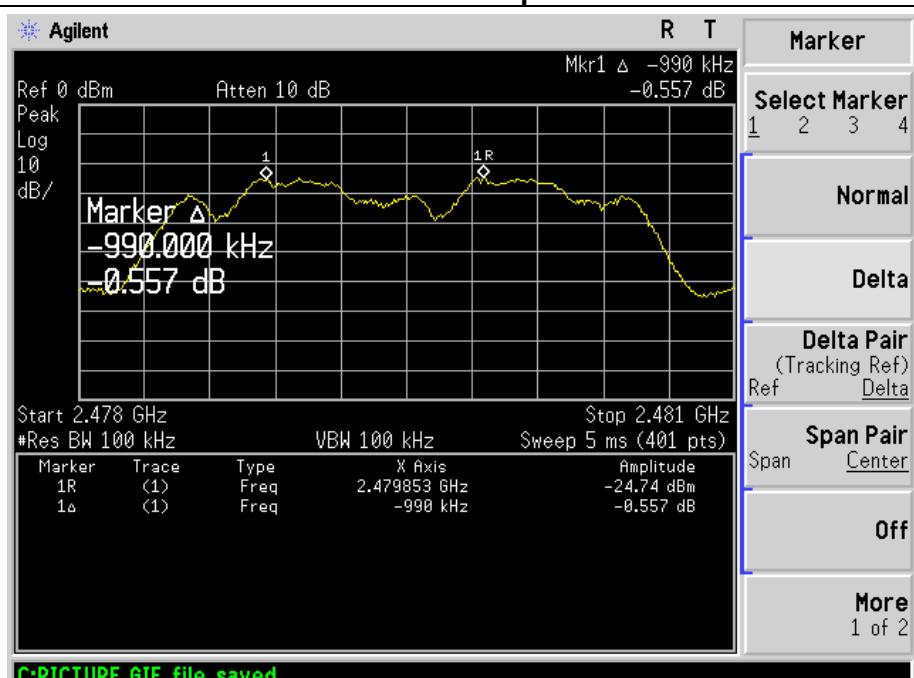
Ch. Separation Limits: >2/3 of 20dB bandwidth



CH39 -3Mbps



CH78 -3Mbps



7. BANDWIDTH TEST

7.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (a)(1)	Bandwidth	(20dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	1% of the 20 dB bandwidth
VB	\geq RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

7.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW= 1% of the 20 dB bandwidth, VBW \geq RBW, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



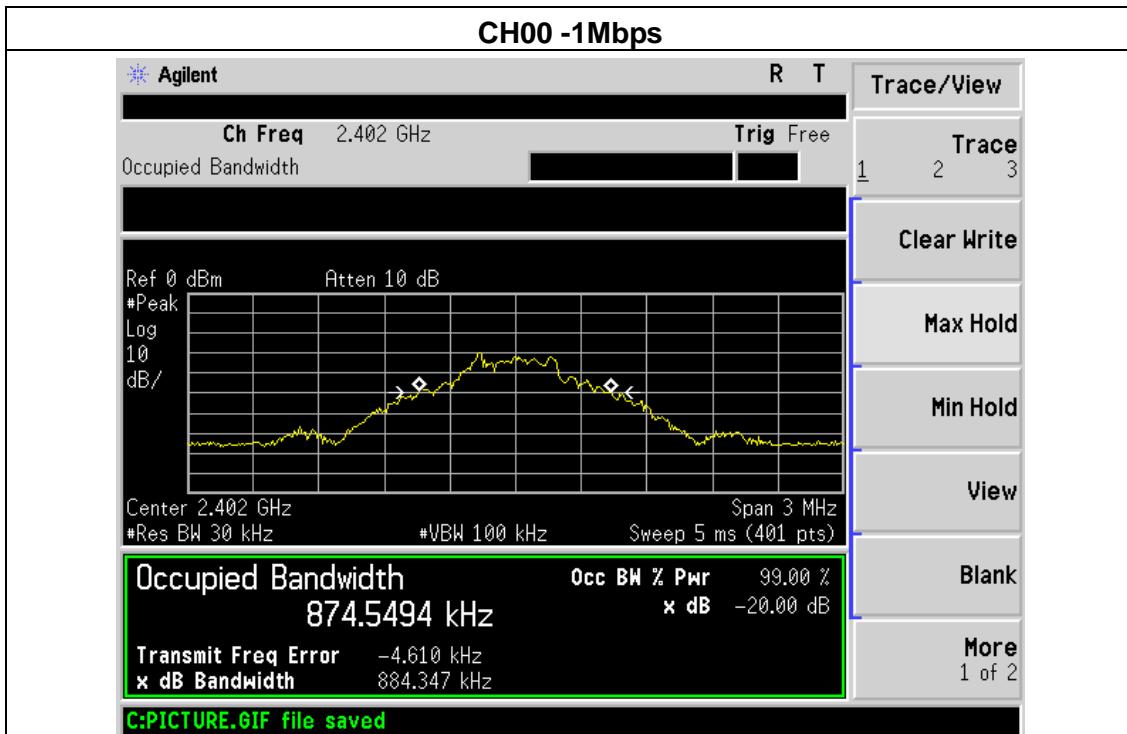
7.1.4 EUT OPERATION CONDITIONS

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

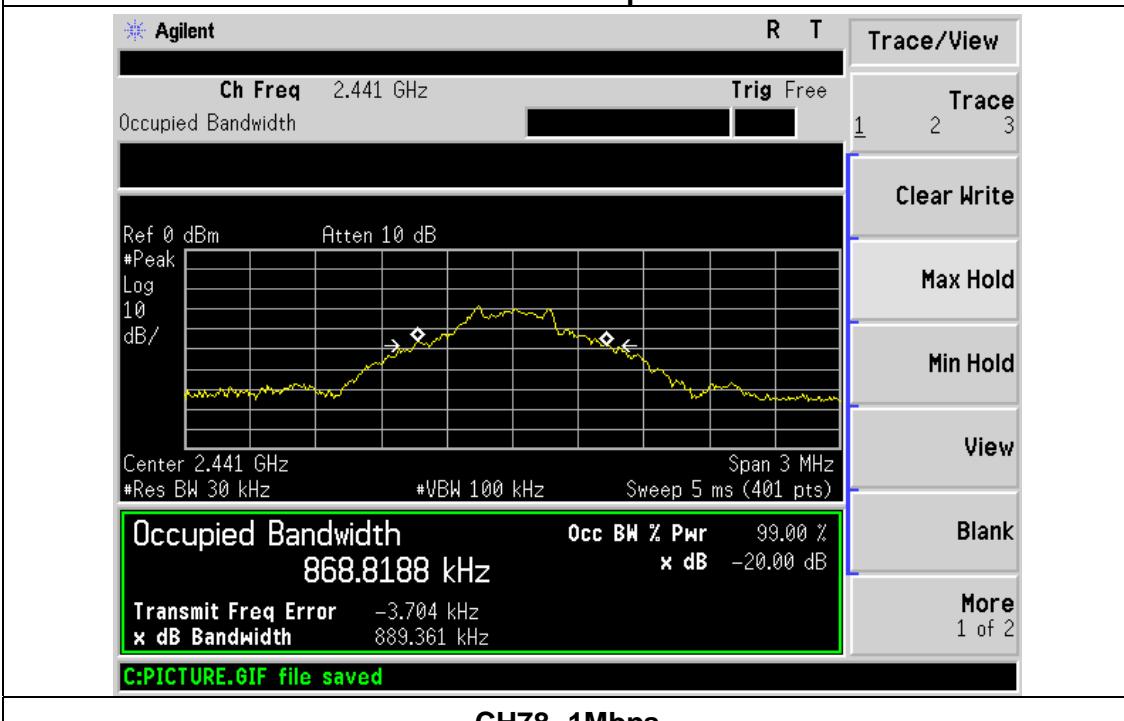
7.1.5 TEST RESULTS

EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	CH00 / CH39 /C78(1Mbps)		

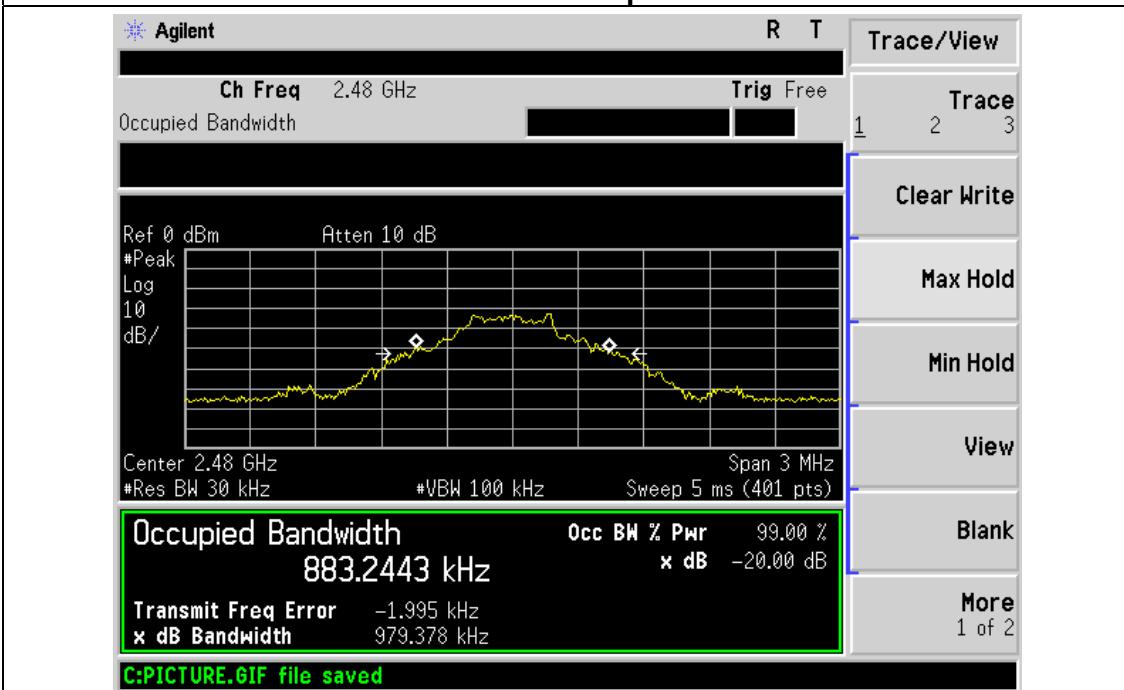
Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	0.935	PASS
2441 MHz	0.889	PASS
2480 MHz	0.827	PASS



CH39 -1Mbps

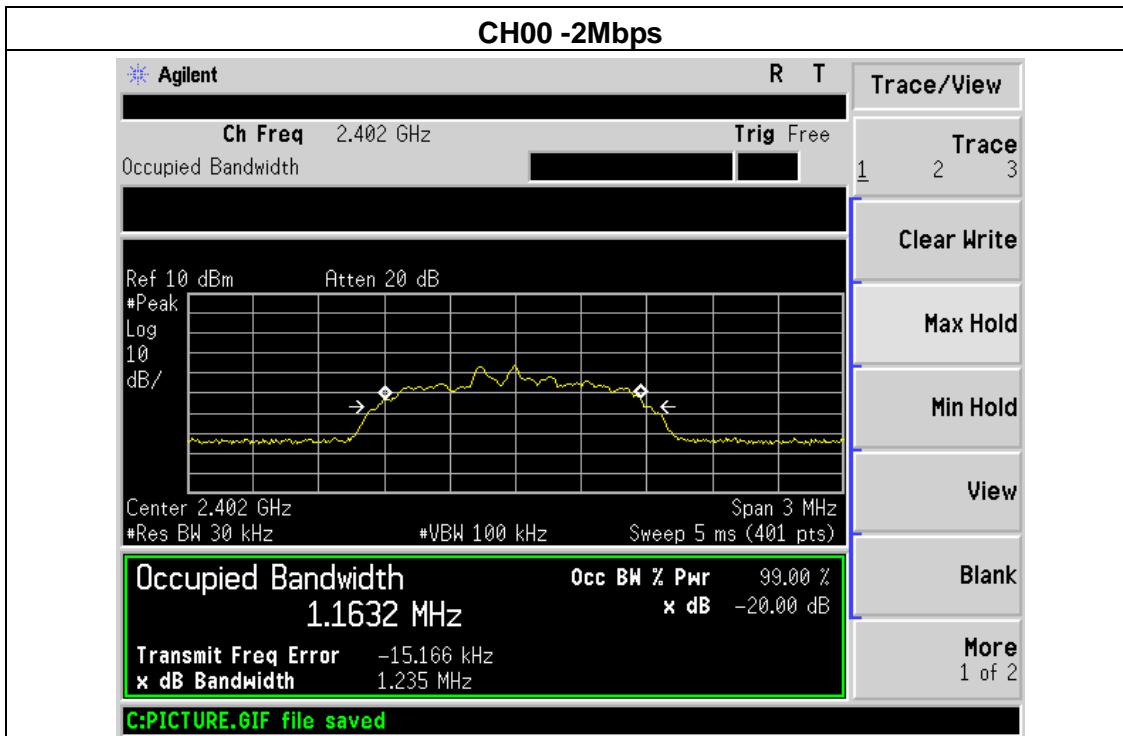


CH78 -1Mbps

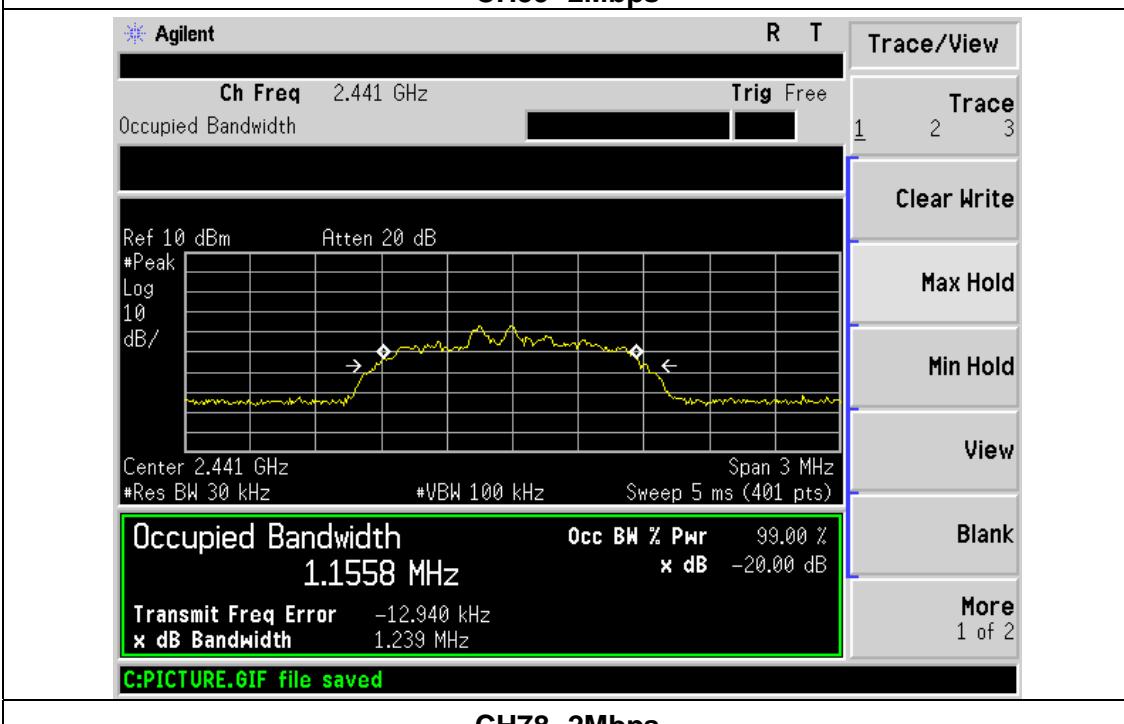


EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /C78(2Mbps)		

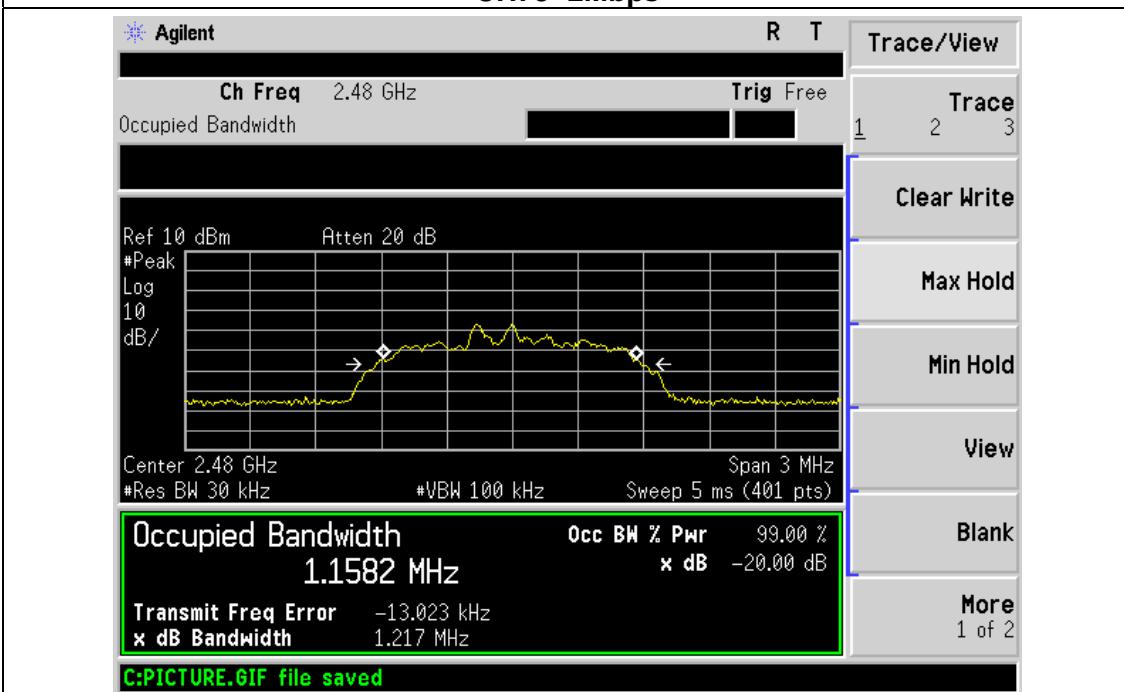
Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.235	PASS
2441 MHz	1.239	PASS
2480 MHz	1.217	PASS



CH39 -2Mbps

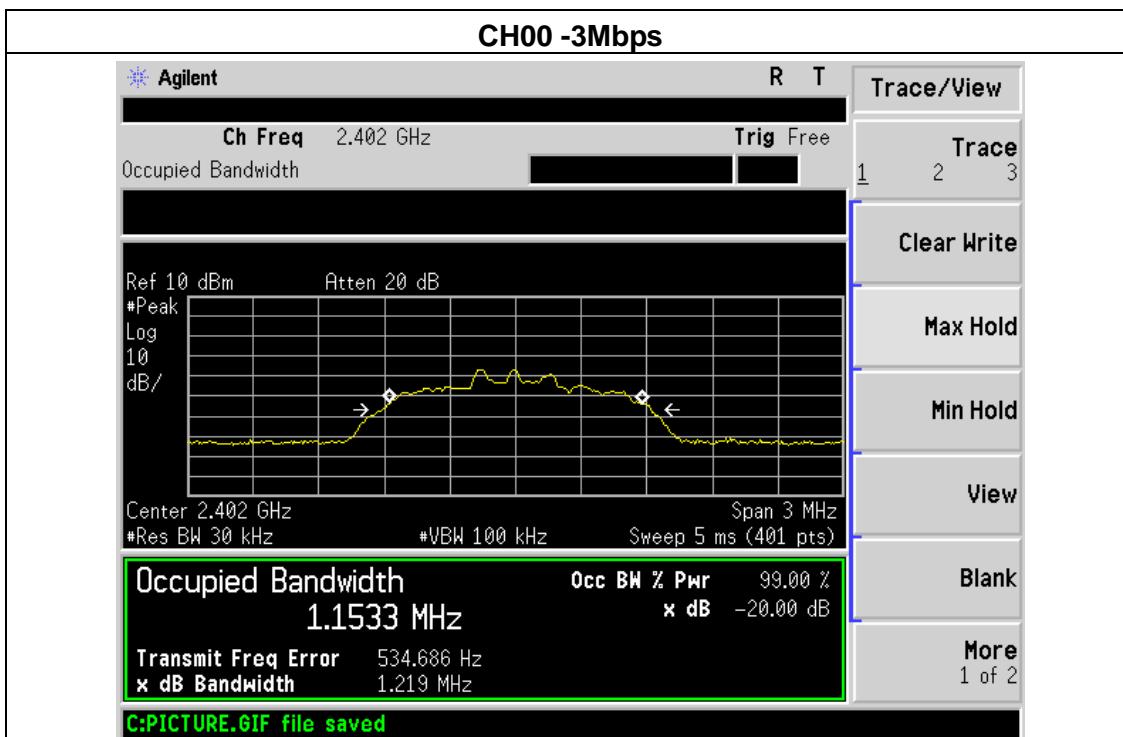


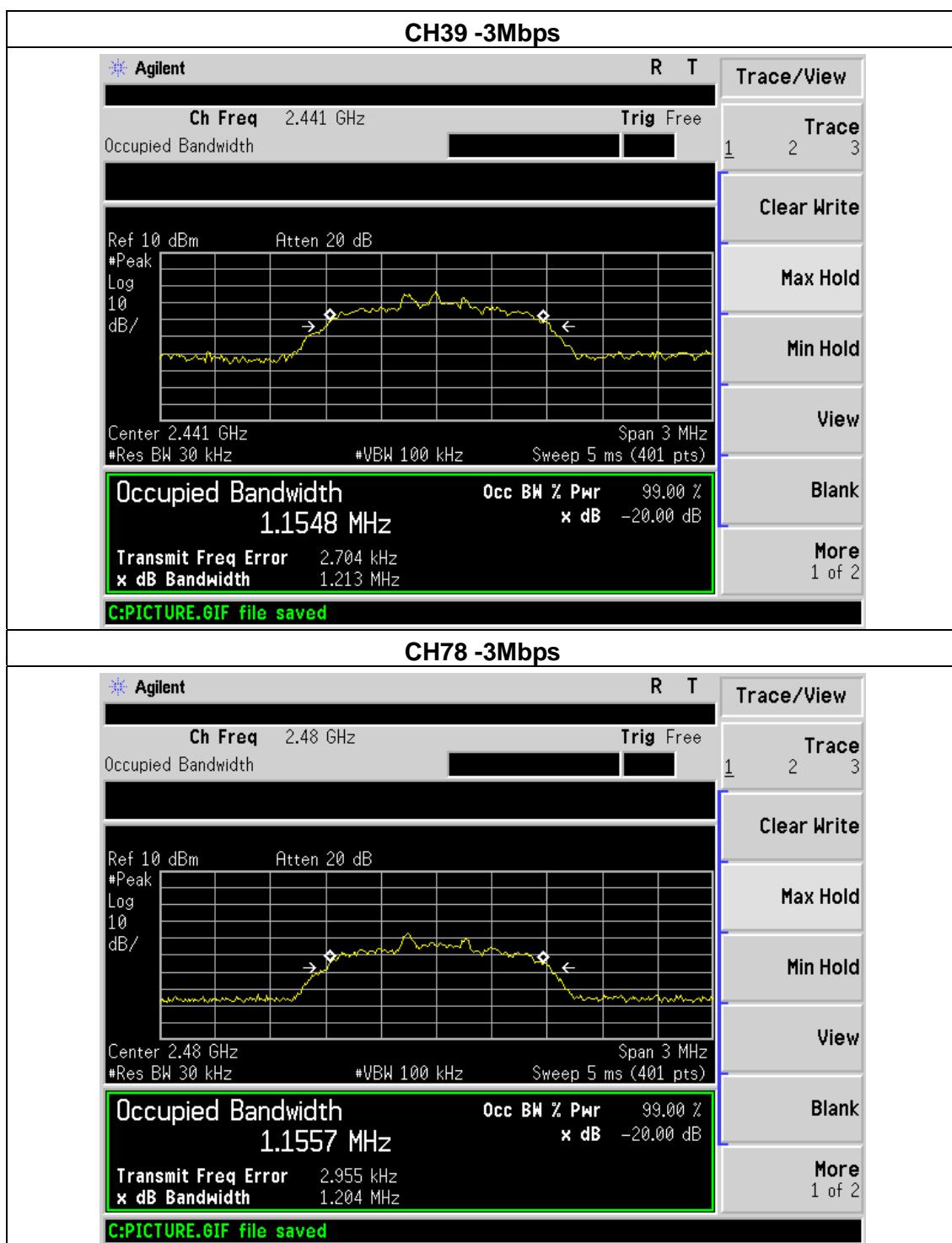
CH78 -2Mbps



EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 3.7V
Test Mode :	CH00 / CH39 /C78(3Mbps)		

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.219	PASS
2441 MHz	1.213	PASS
2480 MHz	1.204	PASS





8. PEAK OUTPUT POWER TEST

8.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247 (b)(i)	Peak Output Power	0.125 w or 20.96dBm	2400-2483.5	PASS

8.1.1 TEST PROCEDURE

- The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
- Spectrum Setting : RBW > the 20 dB bandwidth of the emission being measured

Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel

VBW \geq RBW

Sweep = auto

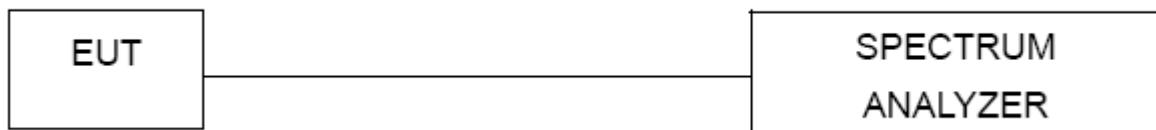
Detector function = peak

Trace = max hold

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



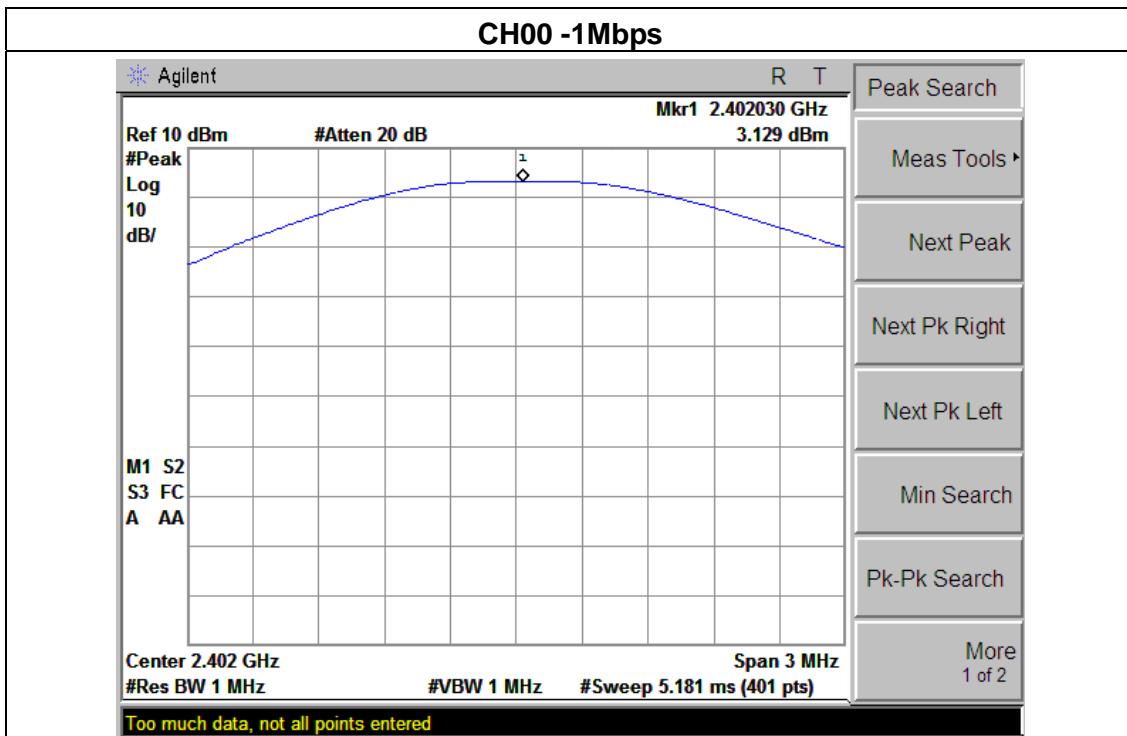
8.1.4 EUT OPERATION CONDITIONS

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

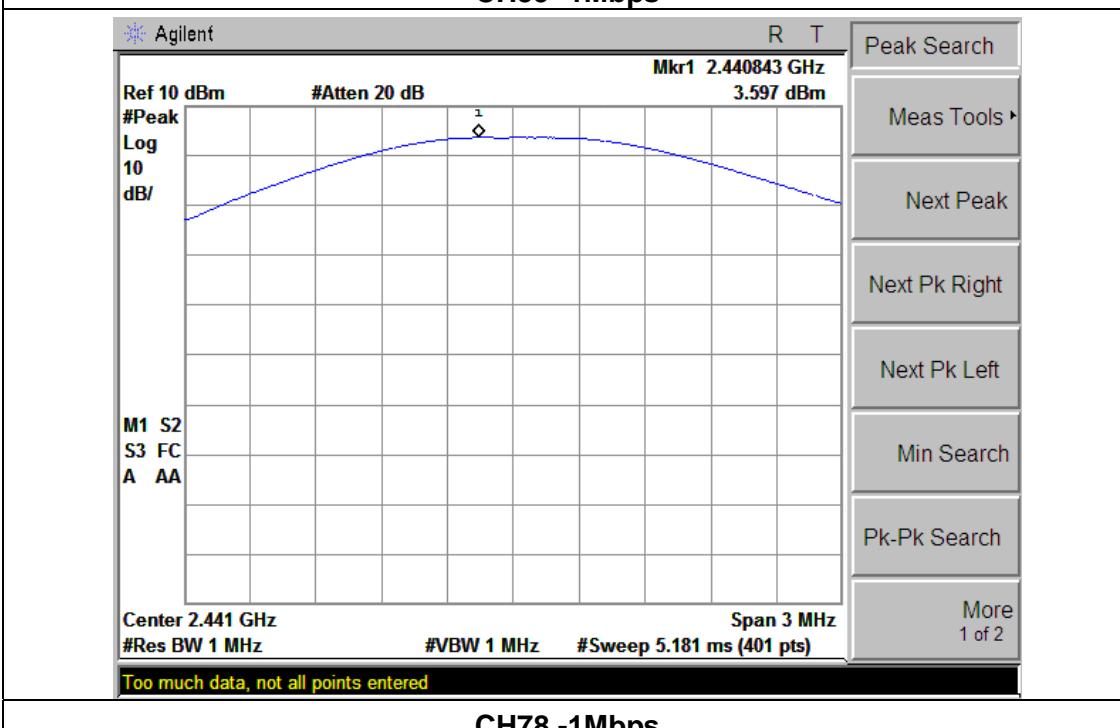
8.1.5 TEST RESULTS

EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	CH00/ CH39 /CH78 (1M/2M/3Mbps Mode)		

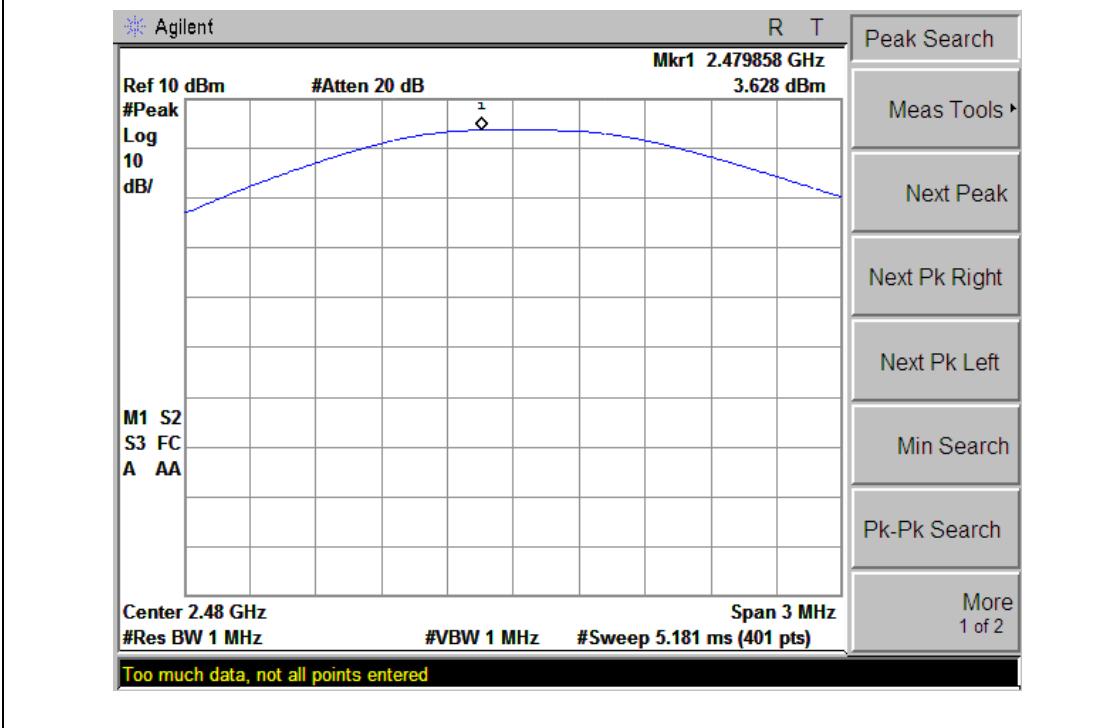
1Mbps			
Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	3.129	20.96
CH39	2441	3.597	20.96
CH78	2480	3.628	20.96
2Mbps			
Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	2.653	20.96
CH39	2441	3.090	20.96
CH78	2480	2.787	20.96
3Mbps			
Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	2.661	20.96
CH39	2441	3.191	20.96
CH78	2480	2.997	20.96

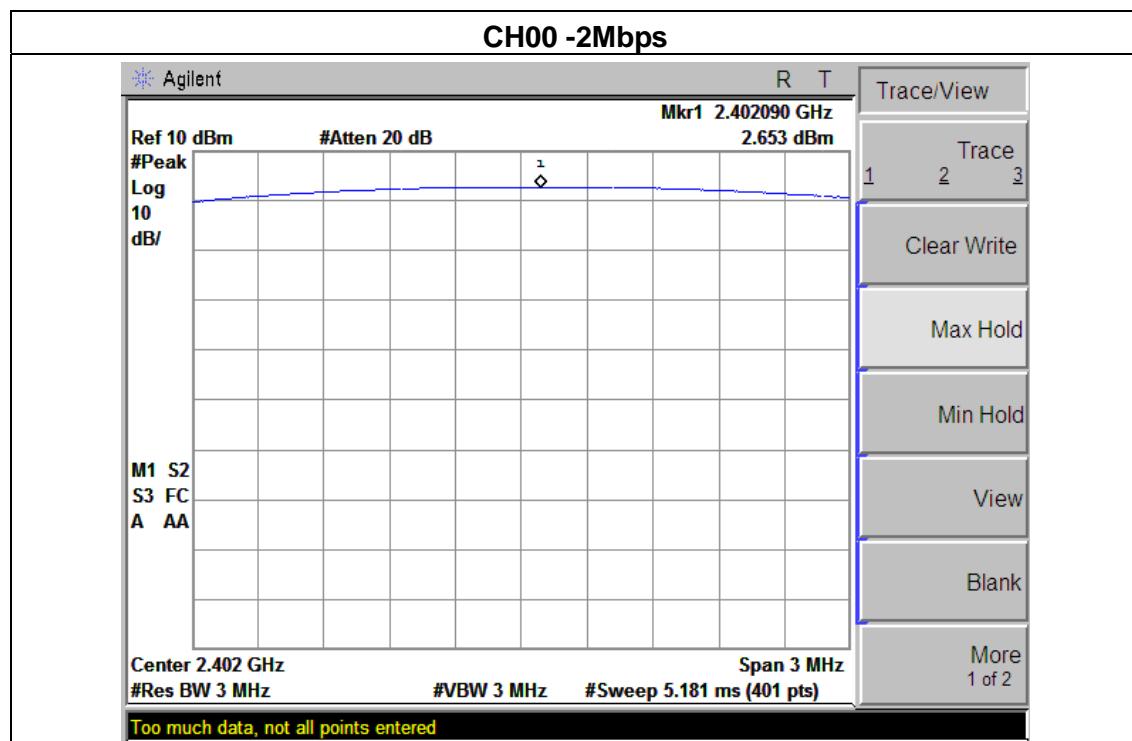


CH39 -1Mbps

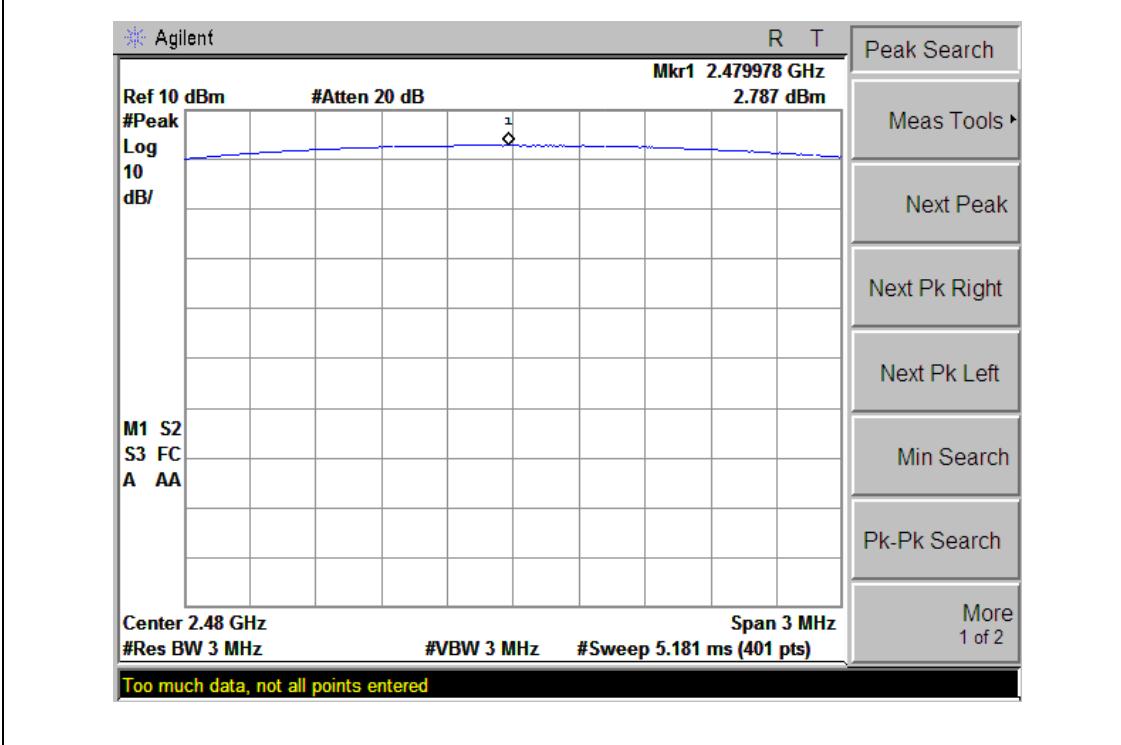
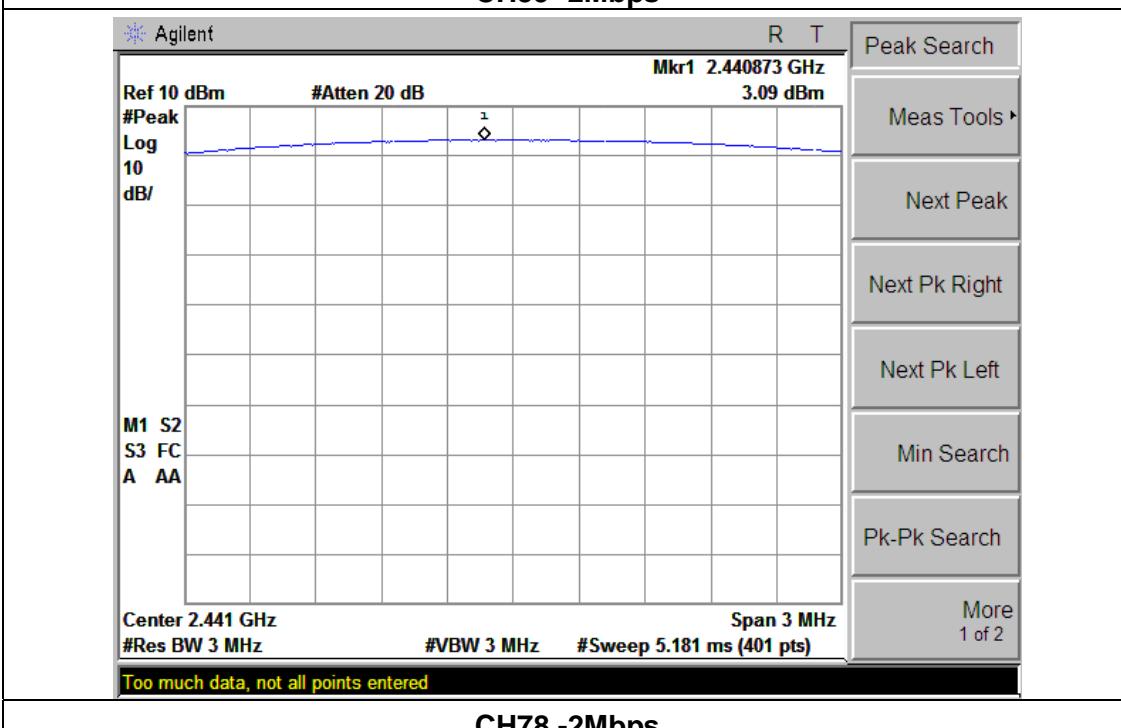


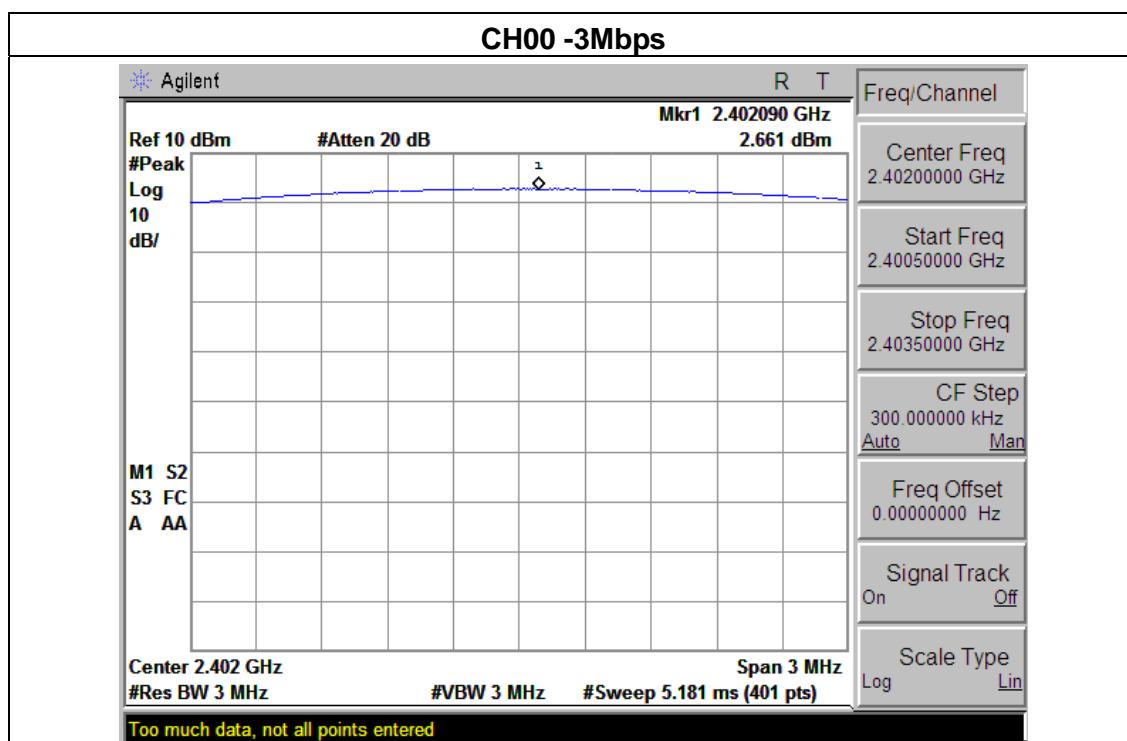
CH78 -1Mbps



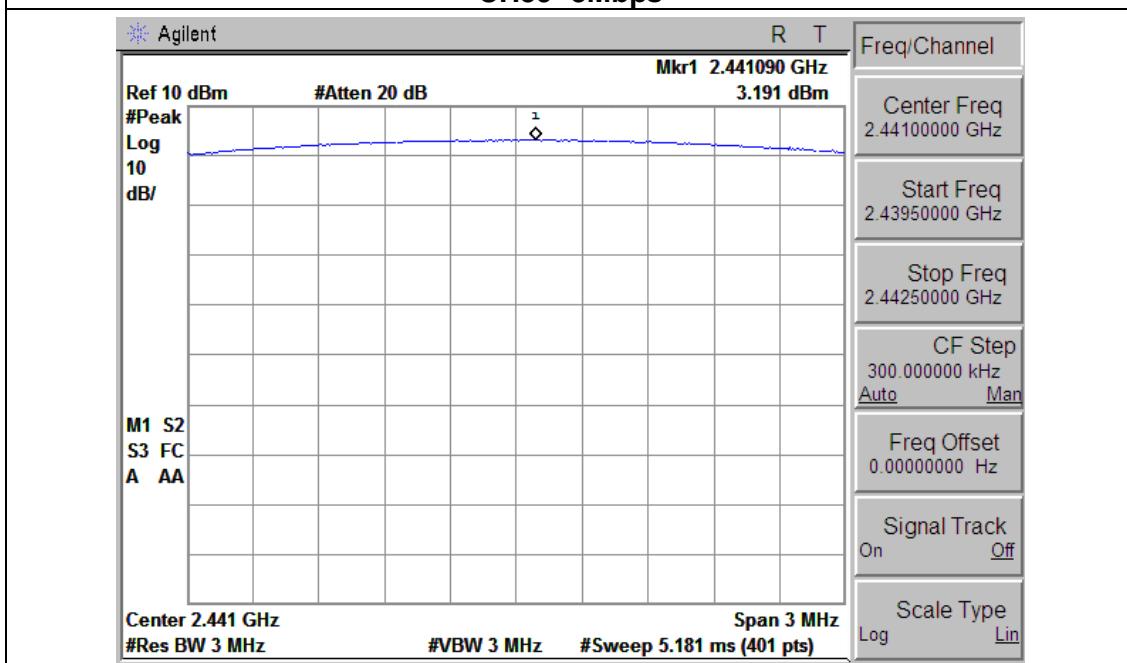


CH39 -2Mbps

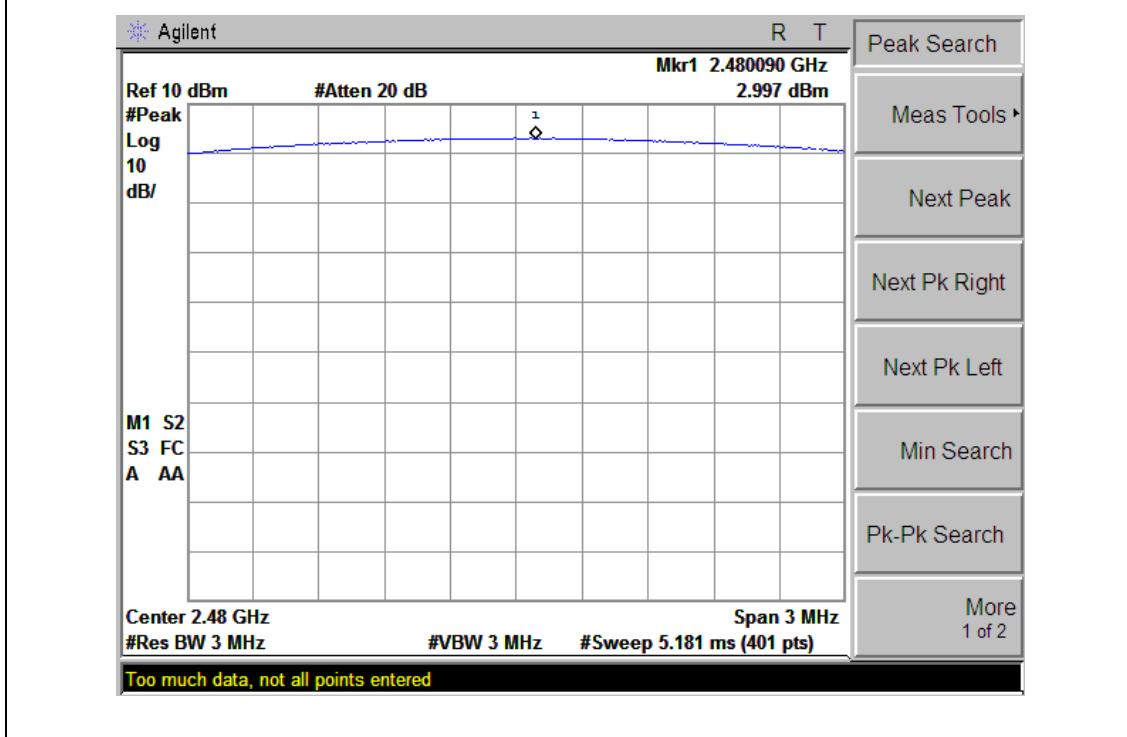




CH39 -3Mbps



CH78 -3Mbps



9. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

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

TEST PROCEDURE

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

9.1 DEVIATION FROM STANDARD

No deviation.

9.2 TEST SETUP



9.3 EUT OPERATION CONDITIONS

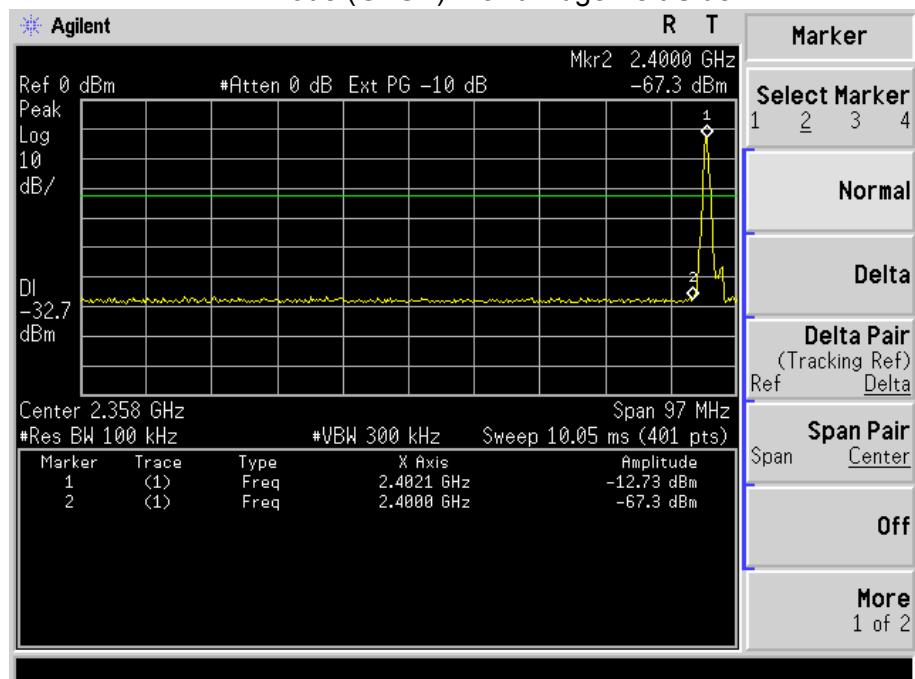
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

9.4 TEST RESULTS

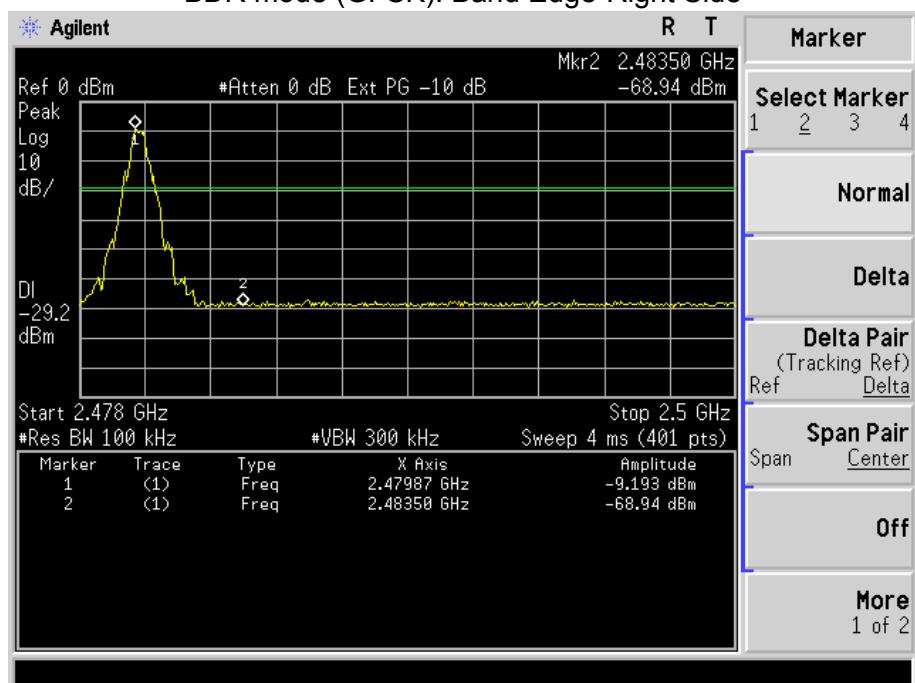
EUT :	Multi-Functional Video Player	Model Name :	ET-4
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	AC120V
Test Mode :	CH00/ CH78 (1M/2M/3Mbps Mode)		

Frequency Band	Delta Peak to band emission (dBc)	>Limit (dBc)	Result
BDR mode (GFSK)			
Left-band	54.57	20	Pass
Right-band	59.74	20	Pass
EDR mode ($\pi/4$ -DQPSK)			
Left-band	51.86	20	Pass
Right-band	54.82	20	Pass
EDR mode(8DPSK)			
Left-band	53.80	20	Pass
Right-band	55.04	20	Pass

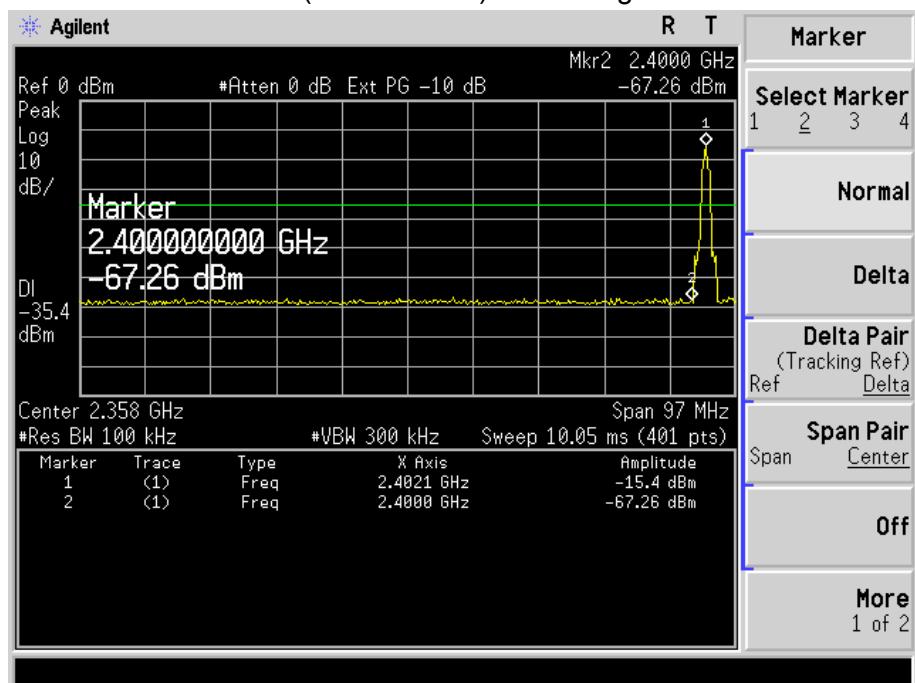
BDR mode (GFSK): Band Edge-Left Side



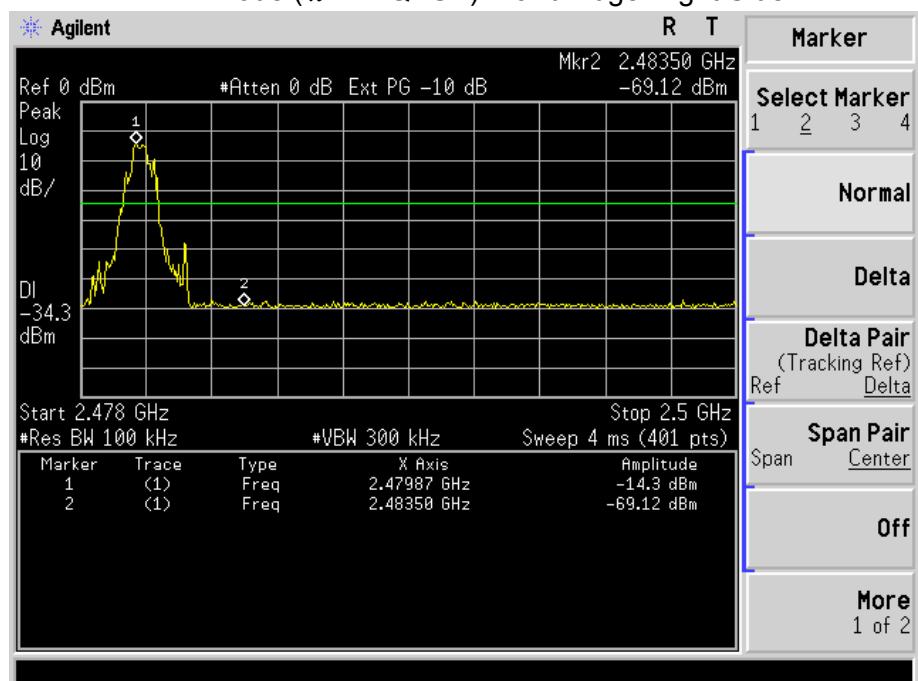
BDR mode (GFSK): Band Edge-Right Side



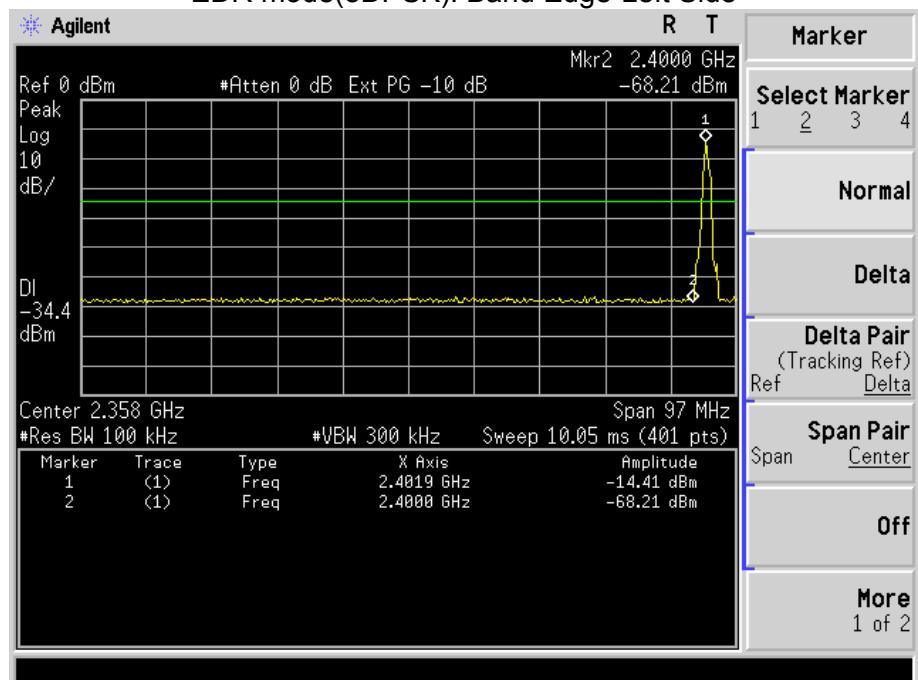
EDR mode ($\pi/4$ -DQPSK): Band Edge-Left Side



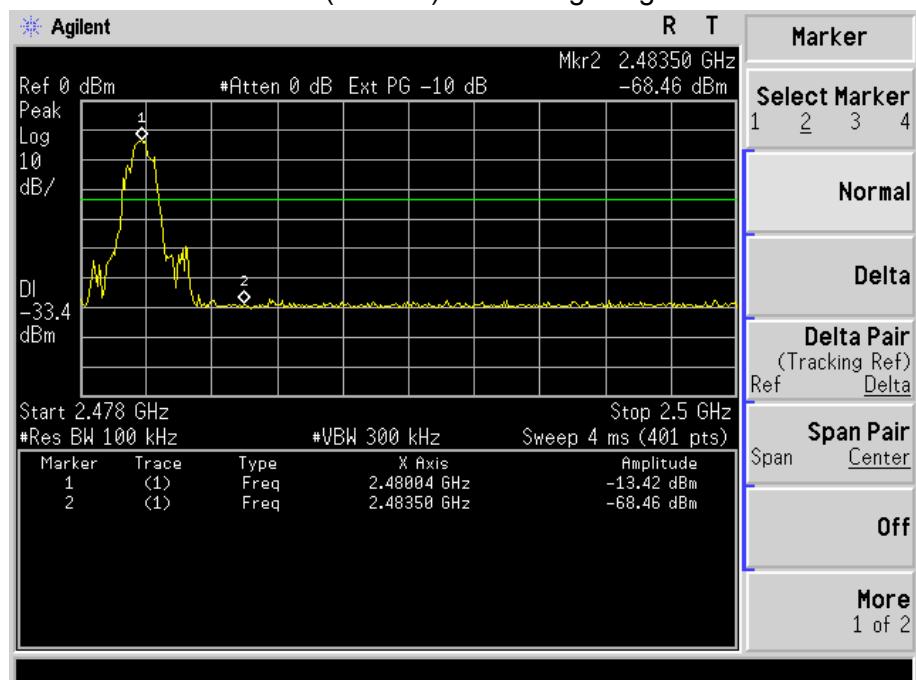
EDR mode ($\pi/4$ -DQPSK): Band Edge-Right Side



EDR mode(8DPSK): Band Edge-Left Side



EDR mode(8DPSK): Band Edge-Right Side



10. ANTENNA REQUIREMENT

10.1 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.

10.2 EUT ANTENNA

The EUT antenna is PCB antenna. It comply with the standard requirement.

11. EUT TEST PHOTO

Radiated Measurement Photos



CONDUCTED EMISSION Photos

