FCC RADIO TEST REPORT-BT
FCC ID: 2AFJH-ALPHA1S

Product： Alpha Intelligent Robot

Trade Name： N/A

Model Name： ALPHA 1S

Serial Model： N/A

Report No.： NTEK-2015NT05261824F2

Prepared for

SHENZHEN UNION BROTHER TECHNOLOGY CO.,LTD.

10th Floor-A2 Lilang New Generation Of Info-Tech Industry Park,Shenzhen Software Park No.31,Bulan Road,Longgang District,Shenzhen,China

Prepared by

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TEST RESULT CERTIFICATION

Applicant's name ..... : SHENZHEN UNION BROTHER TECHNOLOGY CO.,LTD.

Address ..... : 10th Floor-A2 Lilang New Generation Of Info-Tech Industry Park,Shenzhen Software Park No.31,Bulan Road,Longgang District,Shenzhen,China

Manufacture's Name..... : SHENZHEN UNION BROTHER TECHNOLOGY CO.,LTD.

Address ..... : 10th Floor-A2 Lilang New Generation Of Info-Tech Industry Park,Shenzhen Software Park No.31,Bulan Road,Longgang District,Shenzhen,China

Product description

Product name ..... : Alpha Intelligent Robot

Model and/or type reference : ALPHA 1S

Serial Model : N/A

Standards ..... : FCC Part15.247: 01 Oct. 2014

Test procedure ..... ANSI C63.10-2013

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

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Date of Test .....:

Date (s) of performance of tests .....: 26 May 2015 ~23 Jul. 2015

Date of Issue.....: 23 Jul. 2015

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

Testing Engineer : Eileen Liu.

(Eileen Liu)

Technical Manager : Brown Lu

(Brown Lu)

Authorized Signatory : Sam. Chen

(Sam Chen)

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

FCC Part15 (15.247) , 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

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

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement **y** ± **U**，where expended uncertainty **U** is based on a standard uncertainty multiplied by a coverage factor of **k=2**，providing a level of confidence of approximately **95** %。

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

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

<table>
<tr><td>Equipment</td><td>Alpha Intelligent Robot</td></tr>
<tr><td>Trade Name</td><td>N/A</td></tr>
<tr><td>Model Name</td><td>ALPHA 1S</td></tr>
<tr><td>Serial Model</td><td>N/A</td></tr>
<tr><td>Model Difference</td><td>N/A</td></tr>
<tr><td>Product Description</td><td>The EUT is a Alpha Intelligent Robot
<table>
<tr><td>Operation Frequency:</td><td>2402~2480 MHz</td></tr>
<tr><td>Modulation Type:</td><td>BT(1Mbps): GFSK
BT EDR(2Mbps): π/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>
</table></td></tr>
<tr><td>Channel List</td><td>Please refer to the Note 2.</td></tr>
<tr><td>Adapter</td><td>Adapter 1
Mode: RHD50W096500
Input: 100-240V~, 50/60Hz, 1.5A
Output:9.6V⎓, 5000mA
Adapter 2
Mode: DSA-20PFE-12FUS 096200
Input: 100-240V~, 50/60Hz, 0.7A
Output: 9.6V⎓, 2A</td></tr>
<tr><td>Battery</td><td>DC 7.4V, 2200mAh</td></tr>
<tr><td>Connecting I/O Port(s)</td><td>Please refer to the User's Manual</td></tr>
</table>

Note:

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

2.

Channel 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	1.84	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 3Mbps for radiated emission due to the highest RF output power.

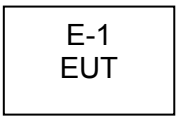
2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

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

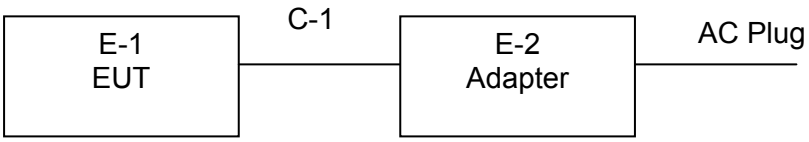
Test software Version	Test program: Broadcom		
Frequency	2402 MHz	2441 MHz	2480 MHz
Parameters(1/2/3Mbps)	DEF	DEF	DEF

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Radiated Spurious Emission Test



Conducted Emission Test



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	Alpha Intelligent Robot	N/A	ALPHA 1S	N/A	EUT
E-2	Adapter 1	N/A	RHD50W096500	N/A	
E-2	Adapter 2	N/A	DSA-20PFE-12FUS 096200	N/A	

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

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

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2015.07.06	2016.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2015.06.07	2016.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2015.07.06	2016.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.07	2016.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2015.06.07	2016.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2015.07.06	2016.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2015.07.06	2016.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2015.07.06	2016.07.05	1 year
12	Test Cable	N/A	R-01	N/A	2015.07.06	2016.07.05	1 year
13	Test Cable	N/A	R-02	N/A	2015.07.06	2016.07.05	1 year

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2014.07.06	2015.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2014.06.07	2015.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2014.07.06	2015.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2014.06.07	2015.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2014.06.07	2015.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2014.07.06	2015.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2014.07.06	2015.07.05	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2014.06.08	2015.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2014.07.06	2015.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2014.07.06	2015.07.05	1 year
12	Test Cable	N/A	R-01	N/A	2014.07.06	2015.07.05	1 year
13	Test Cable	N/A	R-02	N/A	2014.07.06	2015.07.05	1 year

Conduction Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2015.06.06	2016.06.05	1 year
2	LISN	R&S	ENV216	101313	2014.08.24	2015.08.23	1 year
3	LISN	EMCO	3816/2	00042990	2014.08.24	2015.08.23	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2015.06.07	2016.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2015.06.07	2016.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2015.06.08	2016.06.07	1 year
7	Test Cable	N/A	C01	N/A	2015.06.08	2016.06.07	1 year
8	Test Cable	N/A	C02	N/A	2015.06.08	2016.06.07	1 year
9	Test Cable	N/A	C03	N/A	2015.06.08	2016.06.07	1 year

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Test Receiver	R&S	ESCI	101160	2014.06.06	2015.06.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2014.06.07	2015.06.06	1 year
5	Passive Voltage Probe	R&S	ESH2-Z3	100196	2014.06.07	2015.06.06	1 year
6	Absorbing clamp	R&S	MOS-21	100423	2014.06.08	2015.06.07	1 year
7	Test Cable	N/A	C01	N/A	2014.06.08	2015.06.07	1 year
8	Test Cable	N/A	C02	N/A	2014.06.08	2015.06.07	1 year
9	Test Cable	N/A	C03	N/A	2014.06.08	2015.06.07	1 year

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

1	Attenuation	MCE	24-10-34	BN9258	2014.06.08	2015.06.07	1 year

3. EMC EMISSION TEST

3.1 CONDUCTED EMISSION MEASUREMENT

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

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

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

Note:

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

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

The following table is the setting of the receiver

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

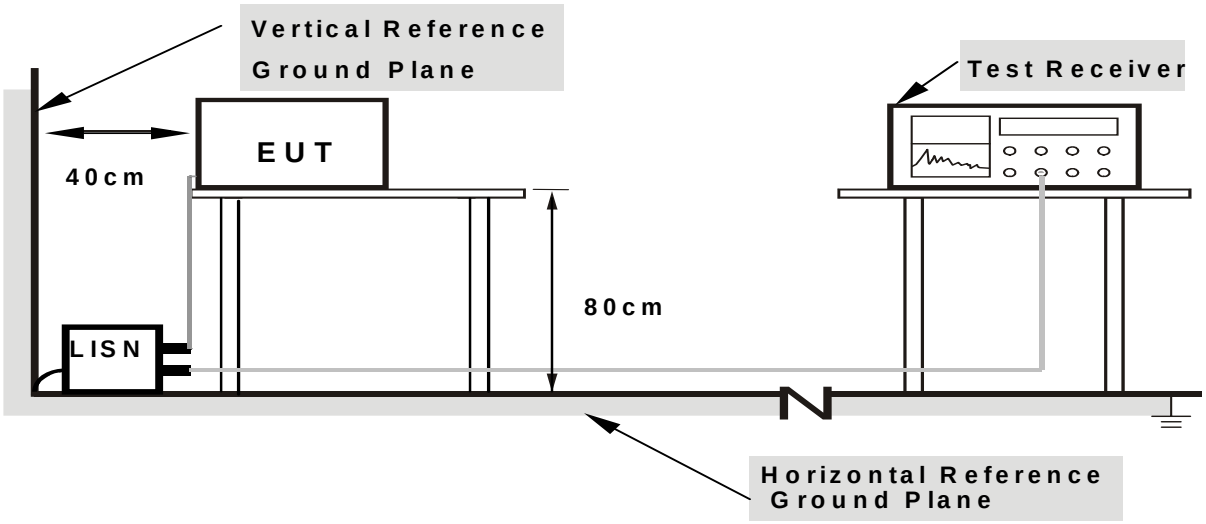
3.1.2 TEST PROCEDURE

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

3.1.3 DEVIATION FROM TEST STANDARD

No deviation

3.1.4 TEST SETUP



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

3.1.5 EUT OPERATING CONDITIONS

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

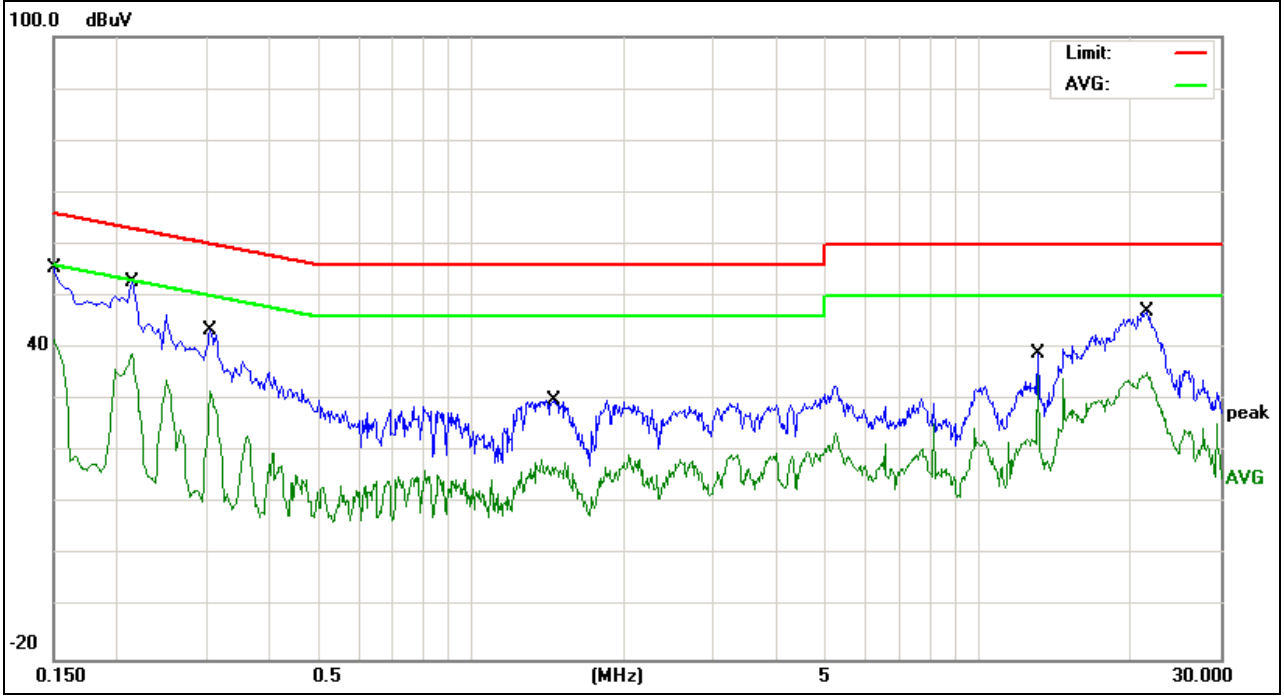
3.1.6 TEST RESULTS

EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 9.6V form Adapter AC 120V/60Hz	Test Mode：	Mode 4-Adapter 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1500	45.83	9.63	55.46	65.99	-10.53	QP
0.1500	32.03	9.63	41.66	55.99	-14.33	AVG
0.2140	43.22	9.63	52.85	63.04	-10.19	QP
0.2140	29.23	9.63	38.86	53.04	-14.18	AVG
0.3060	33.69	9.72	43.41	60.08	-16.67	QP
0.3060	22.01	9.72	31.73	50.08	-18.35	AVG
1.4540	20.23	9.70	29.93	56.00	-26.07	QP
1.4540	8.87	9.70	18.57	46.00	-27.43	AVG
13.0819	29.25	9.77	39.02	60.00	-20.98	QP
13.0819	25.08	9.77	34.85	50.00	-15.15	AVG
21.5220	37.22	9.95	47.17	60.00	-12.83	QP
21.5220	25.42	9.95	35.37	50.00	-14.63	AVG

Remark:

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

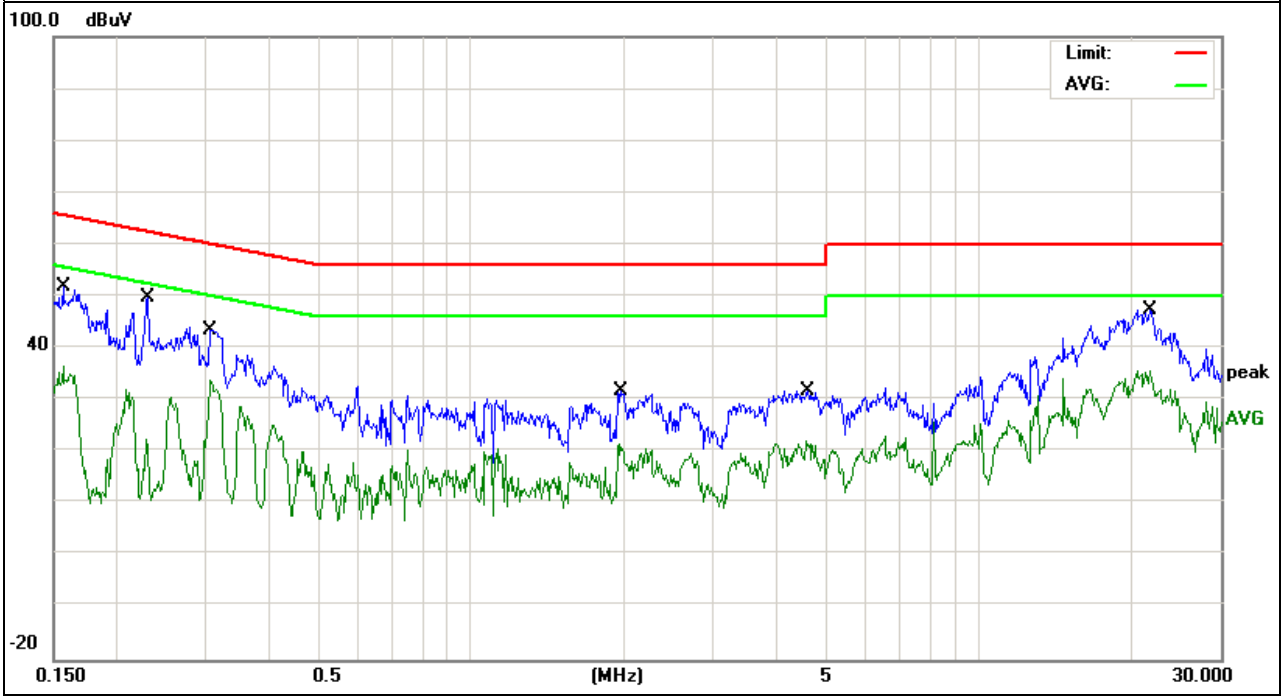


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 9.6V form Adapter AC 120V/60Hz	Test Mode：	Mode 4-Adapter 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1564	42.20	9.60	51.80	65.65	-13.85	QP
0.1564	27.00	9.60	36.60	55.65	-19.05	AVG
0.2303	40.09	9.61	49.70	62.44	-12.74	QP
0.2303	22.41	9.61	32.02	52.44	-20.42	AVG
0.3059	33.96	9.62	43.58	60.08	-16.50	QP
0.3059	24.25	9.62	33.87	50.08	-16.21	AVG
1.9778	22.16	9.54	31.70	56.00	-24.30	QP
1.9778	11.97	9.54	21.51	46.00	-24.49	AVG
4.5857	22.29	9.51	31.80	56.00	-24.20	QP
4.5857	12.63	9.51	22.14	46.00	-23.86	AVG
21.7257	37.63	9.87	47.50	60.00	-12.50	QP
21.7257	25.78	9.87	35.65	50.00	-14.35	AVG

Remark:

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

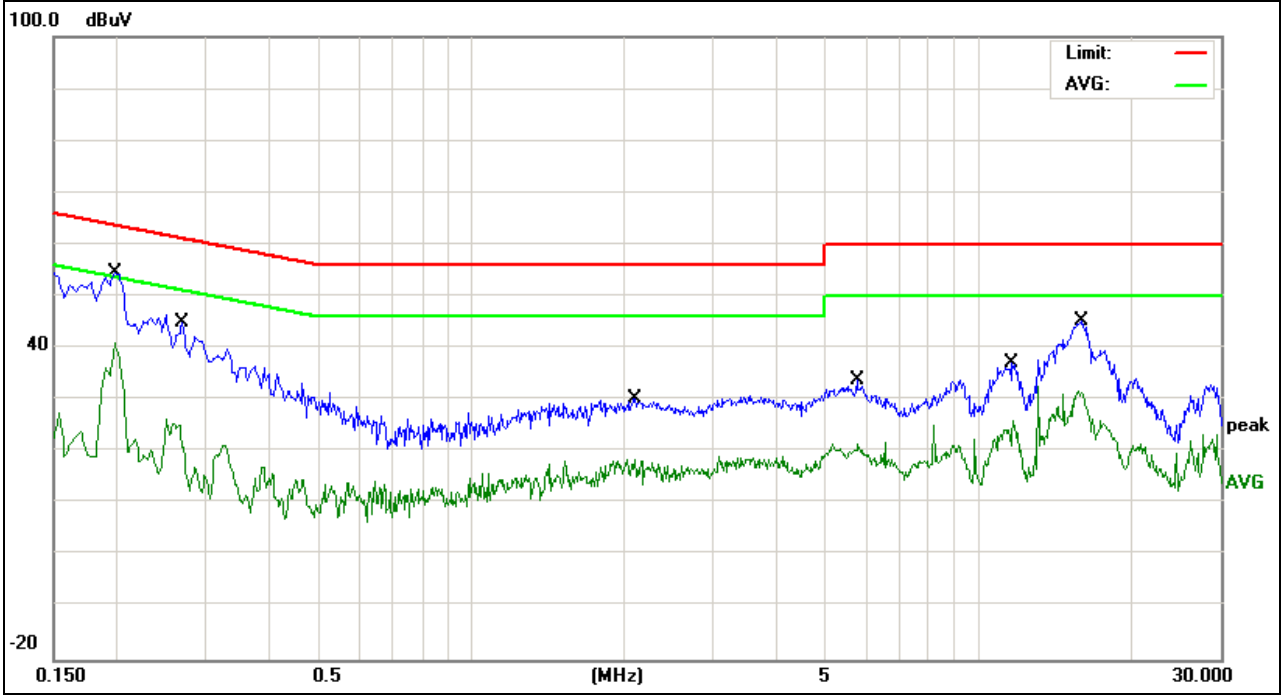


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 9.6V from adapter AC 240V/60Hz	Test Mode：	Mode 4-Adapter 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1980	44.87	9.60	54.47	63.69	-9.22	QP
0.1980	31.40	9.60	41.00	53.69	-12.69	AVG
0.2700	35.11	9.70	44.81	61.12	-16.31	QP
0.2700	16.78	9.70	26.48	51.12	-24.64	AVG
2.1020	20.71	9.65	30.36	56.00	-25.64	QP
2.1020	8.98	9.65	18.63	46.00	-27.37	AVG
5.7459	24.11	9.70	33.81	60.00	-26.19	QP
5.7459	11.82	9.70	21.52	50.00	-28.48	AVG
11.6779	27.27	9.75	37.02	60.00	-22.98	QP
11.6779	16.18	9.75	25.93	50.00	-24.07	AVG
15.9979	35.44	9.83	45.27	60.00	-14.73	QP
15.9979	21.85	9.83	31.68	50.00	-18.32	AVG

Remark:

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

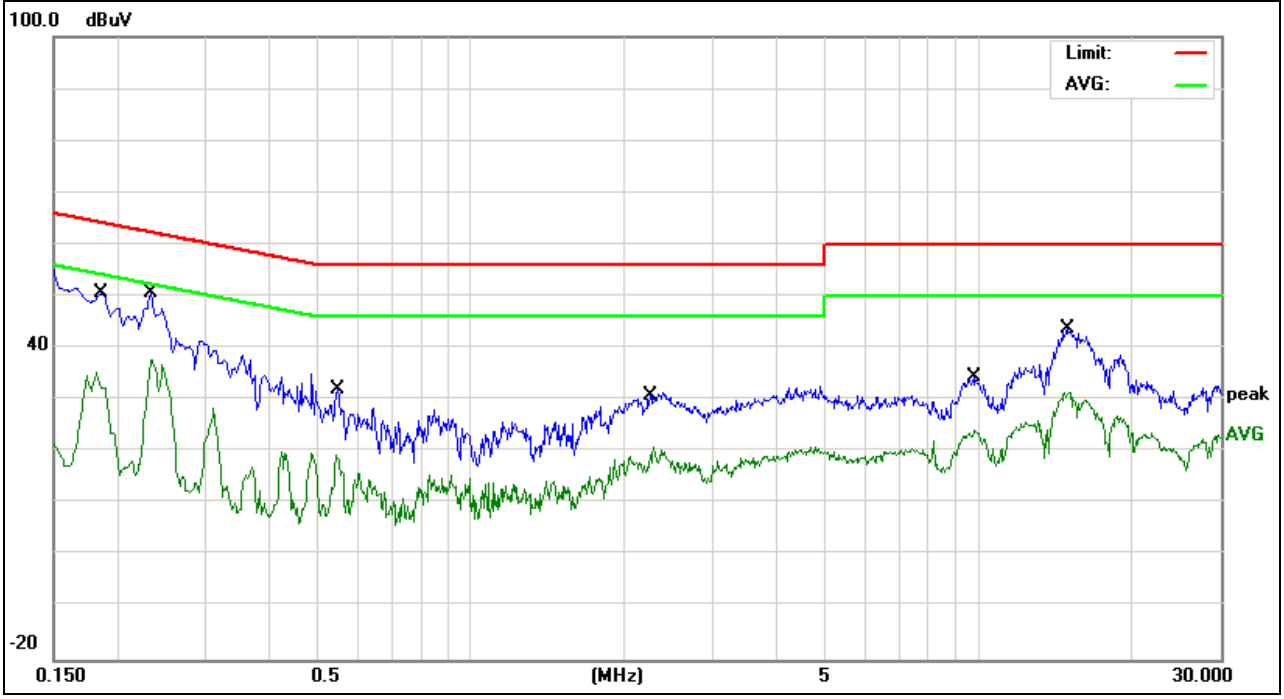


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 9.6V from adapter AC 240V/60Hz	Test Mode：	Mode 4-Adapter 1

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1860	41.11	9.61	50.72	64.21	-13.49	QP
0.1860	25.66	9.61	35.27	54.21	-18.94	AVG
0.2340	40.89	9.65	50.54	62.30	-11.76	QP
0.2340	28.24	9.65	37.89	52.30	-14.41	AVG
0.5460	22.22	9.77	31.99	56.00	-24.01	QP
0.5460	9.55	9.77	19.32	46.00	-26.68	AVG
2.2940	19.98	9.66	29.64	56.00	-26.36	QP
2.2940	11.19	9.66	20.85	46.00	-25.15	AVG
9.8219	24.75	9.72	34.47	60.00	-25.53	QP
9.8219	14.58	9.72	24.30	50.00	-25.70	AVG
14.9299	33.93	9.80	43.73	60.00	-16.27	QP
14.9299	21.68	9.80	31.48	50.00	-18.52	AVG

Remark:

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

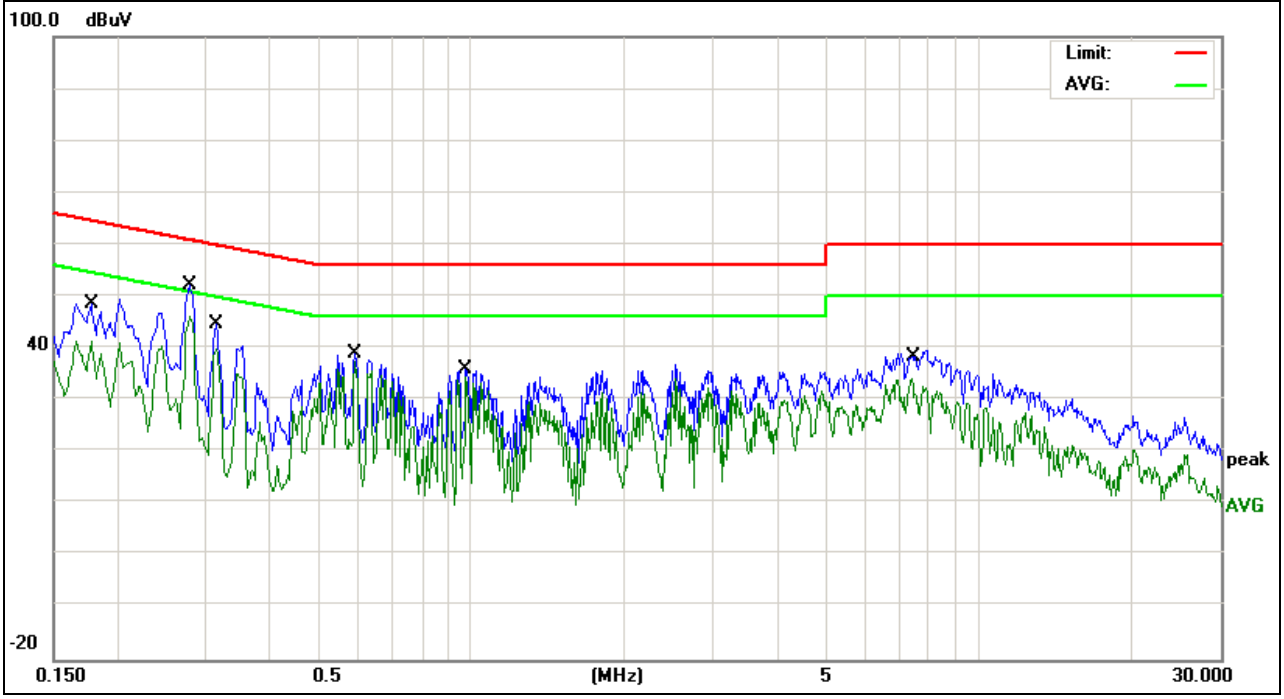


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 9.6V form Adapter AC 120V/60Hz	Test Mode：	Mode 4- Adapter 2

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1779	39.88	9.61	49.49	64.58	-15.09	QP
0.1779	31.85	9.61	41.46	54.58	-13.12	AVG
0.2779	42.65	9.61	52.26	60.88	-8.62	QP
0.2779	36.52	9.61	46.13	50.88	-4.75	AVG
0.3140	35.05	9.62	44.67	59.86	-15.19	QP
0.3140	30.09	9.62	39.71	49.86	-10.15	AVG
0.5899	29.35	9.66	39.01	56.00	-16.99	QP
0.5899	27.76	9.66	37.42	46.00	-8.58	AVG
0.9779	26.42	9.61	36.03	56.00	-19.97	QP
0.9779	24.85	9.61	34.46	46.00	-11.54	AVG
7.3779	29.89	9.53	39.42	60.00	-20.58	QP
7.3779	24.48	9.53	34.01	50.00	-15.99	AVG

Remark:

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

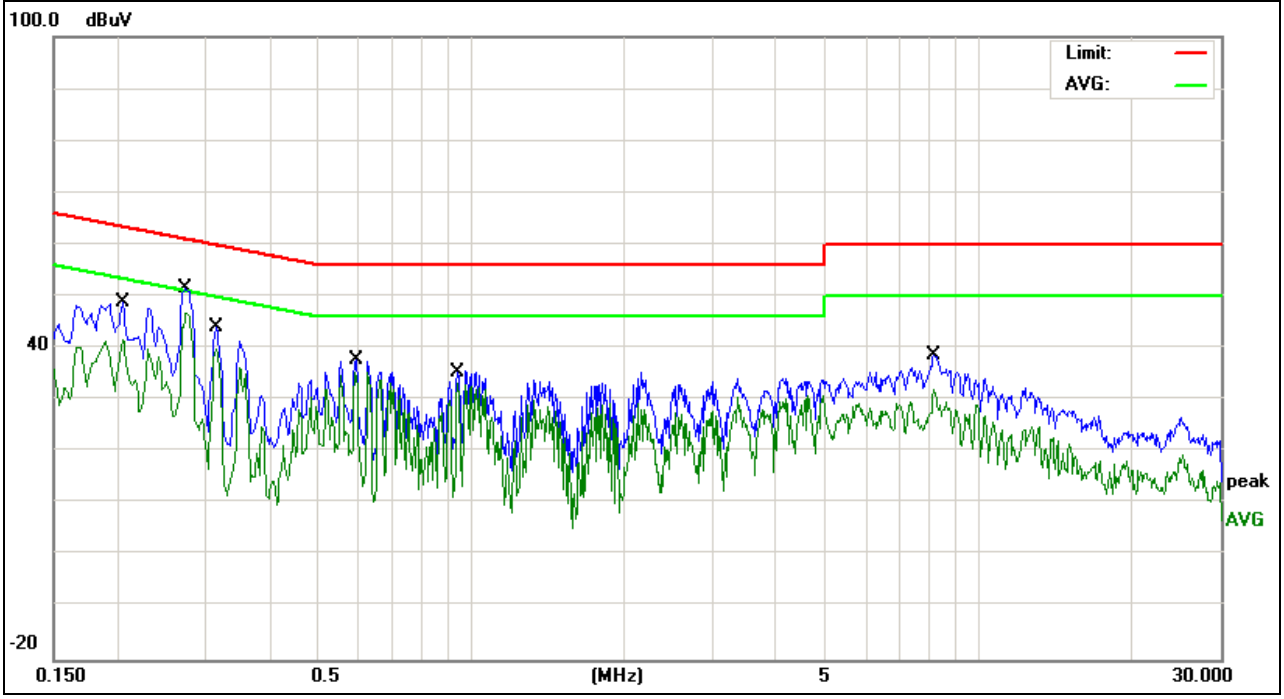


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 9.6V form Adapter AC 120V/60Hz	Test Mode：	Mode 4- Adapter 2

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.2059	39.29	9.61	48.90	63.37	-14.47	QP
0.2059	32.06	9.61	41.67	53.37	-11.70	AVG
0.2740	41.83	9.61	51.44	60.99	-9.55	QP
0.2740	37.23	9.61	46.84	50.99	-4.15	AVG
0.3140	34.42	9.62	44.04	59.86	-15.82	QP
0.3140	30.13	9.62	39.75	49.86	-10.11	AVG
0.5839	28.21	9.66	37.87	56.00	-18.13	QP
0.5899	25.81	9.66	35.47	46.00	-10.53	AVG
0.9419	25.89	9.62	35.51	56.00	-20.49	QP
0.9419	23.55	9.62	33.17	46.00	-12.83	AVG
8.1898	29.17	9.57	38.74	60.00	-21.26	QP
8.1898	22.57	9.57	32.14	50.00	-17.86	AVG

Remark:

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

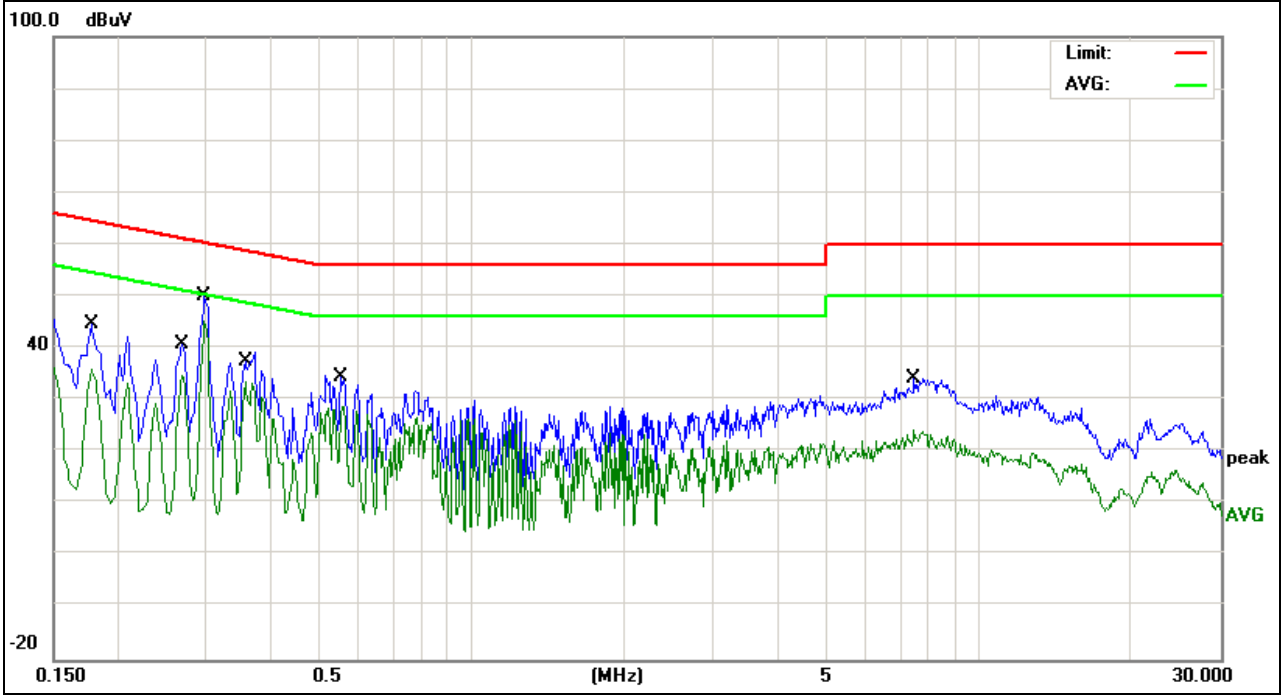


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	L
Test Voltage ：	DC 9.6V form Adapter AC 240V/60Hz	Test Mode：	Mode 4- Adapter 2

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1780	35.17	9.62	44.79	64.57	-19.78	QP
0.1780	26.37	9.62	35.99	54.57	-18.58	AVG
0.2700	31.10	9.70	40.80	61.12	-20.32	QP
0.2700	25.02	9.70	34.72	51.12	-16.40	AVG
0.2980	40.19	9.74	49.93	60.30	-10.37	QP
0.2980	35.63	9.74	45.37	50.30	-4.93	AVG
0.3580	29.59	9.52	39.11	58.77	-19.66	QP
0.3580	24.09	9.52	33.61	48.77	-15.16	AVG
0.5580	24.90	9.78	34.68	56.00	-21.32	QP
0.5580	18.93	9.78	28.71	46.00	-17.29	AVG
7.4699	24.41	9.70	34.11	60.00	-25.89	QP
7.4699	14.57	9.70	24.27	50.00	-25.73	AVG

Remark:

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

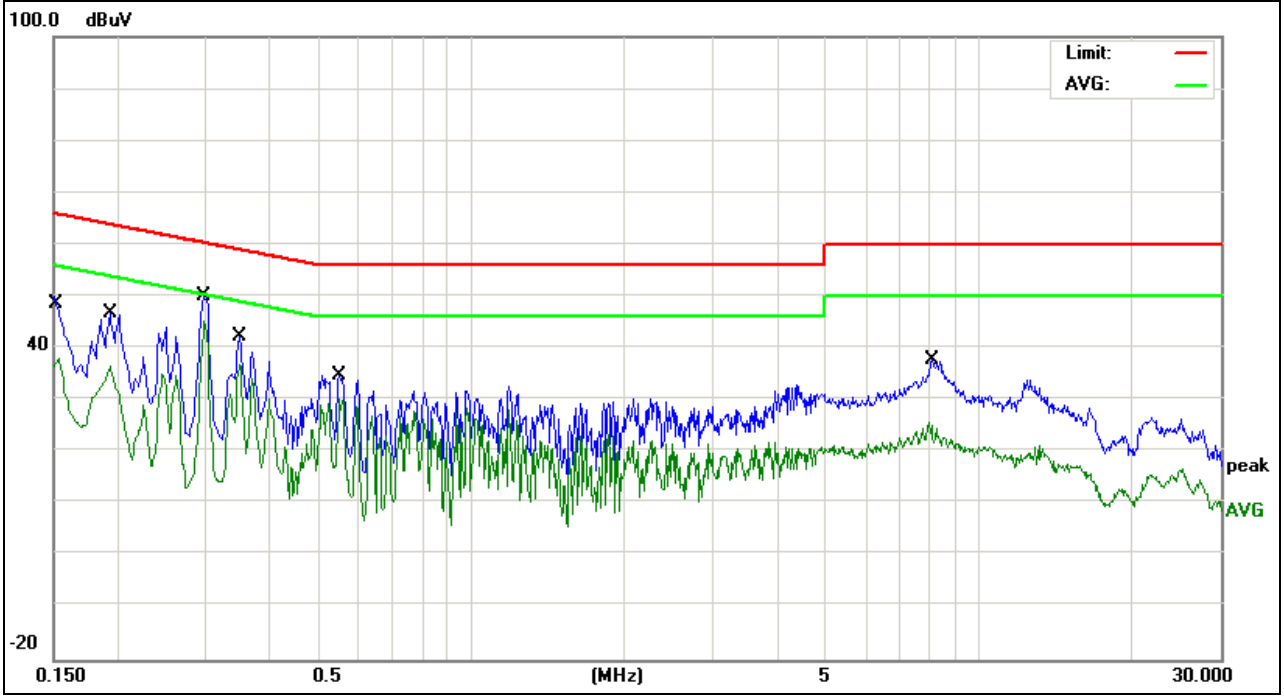


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Phase：	N
Test Voltage ：	DC 9.6V form Adapter AC 240V/60Hz	Test Mode：	Mode 4- Adapter 2

Frequency (MHz)	Reading Level (dBμV)	Correct Factor (dB)	Measure-ment (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1539	40.41	9.60	50.01	65.78	-15.77	QP
0.1539	28.33	9.60	37.93	55.78	-17.85	AVG
0.1940	37.06	9.61	46.67	63.86	-17.19	QP
0.1940	27.00	9.61	36.61	53.86	-17.25	AVG
0.2980	40.51	9.61	50.12	60.30	-10.18	QP
0.2980	35.77	9.61	45.38	50.30	-4.92	AVG
0.3500	32.76	9.63	42.39	58.96	-16.57	QP
0.3500	27.19	9.63	36.82	48.96	-12.14	AVG
0.5500	25.14	9.67	34.81	56.00	-21.19	QP
0.5500	20.63	9.67	30.30	46.00	-15.70	AVG
8.1178	28.25	9.56	37.81	60.00	-22.19	QP
8.1178	16.14	9.56	25.70	50.00	-24.30	AVG

Remark:

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



3.2 RADIATED EMISSION MEASUREMENT

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

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

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

LIMITS OF RADIATED EMISSION MEASUREMENT (Above 1000MHz)

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

Notes:

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

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

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

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	5th 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 m for below 1GHz and 1.5m for above 1GHz the ground at a 3 meter open area test site. The table was rotated 360 degrees to determine the position of the highest radiation.
c. The height of the equipment or of the substitution antenna shall be 0.8 m for below 1GHz and 1.5m for above 1GHz; the height of the test antenna shall vary between 1 m to 4 m. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
e. If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed.
f. For the actual test configuration, please refer to the related Item –EUT Test Photos.
Note:
Both horizontal and vertical antenna polarities were tested
and performed pretest to three orthogonal axis. The worst case emissions were reported

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

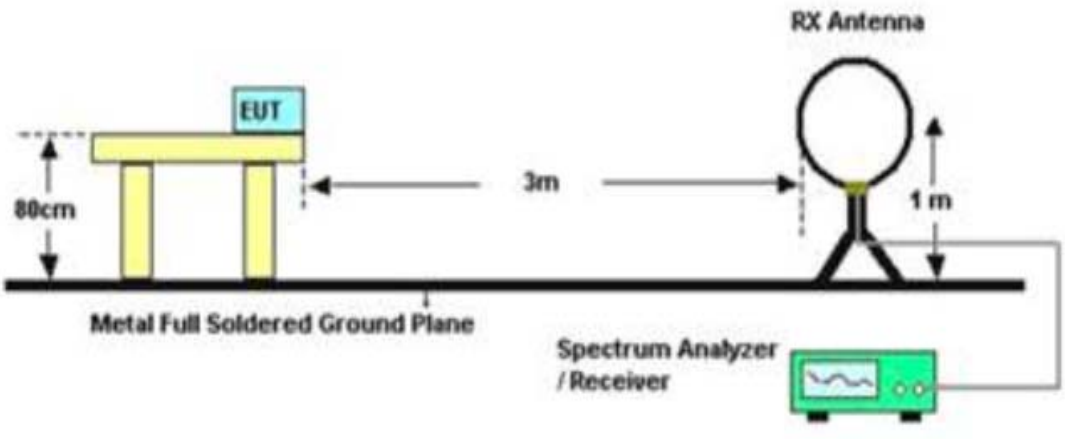
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Peak	1 MHz	10 Hz

3.2.3 DEVIATION FROM TEST STANDARD

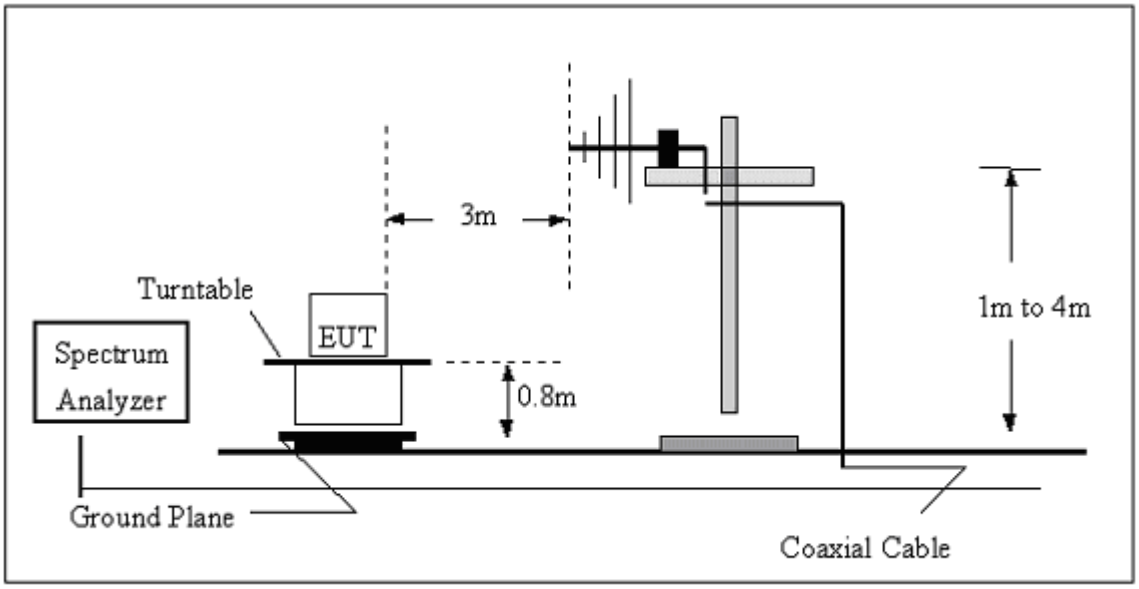
No deviation

3.2.4 TEST SETUP

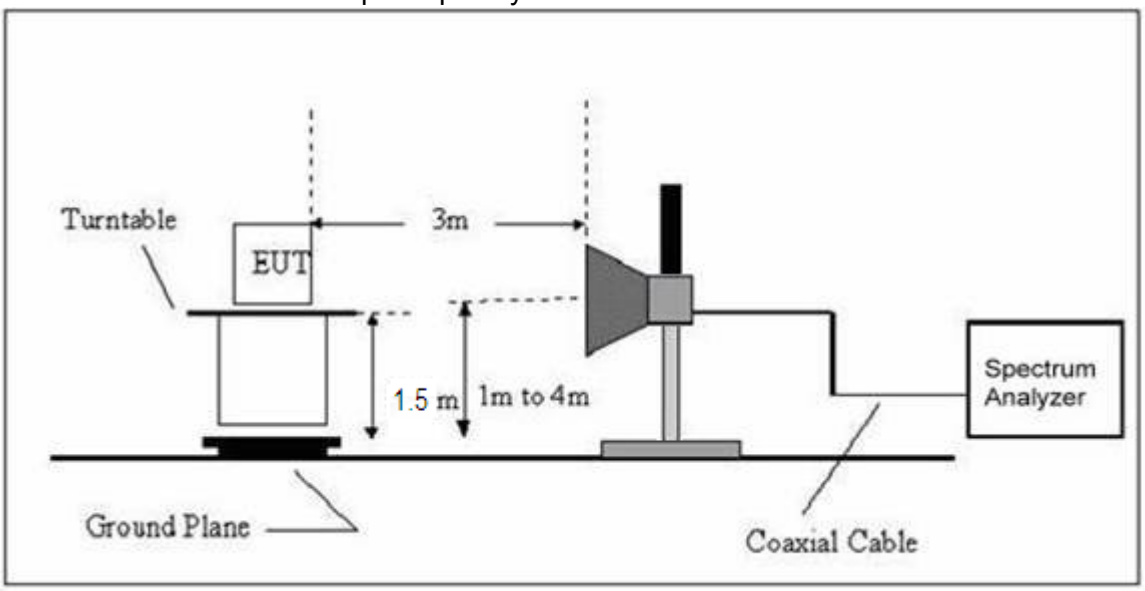
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



3.2.5 EUT OPERATING CONDITIONS

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

3.2.6 TEST RESULTS (BELOW 30 MHZ)

EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	TX	Polarization :	---

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

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 =20 log (specific distance/test distance)(dB);
Limit line = specific limits(dBuv) + distance extrapolation factor.

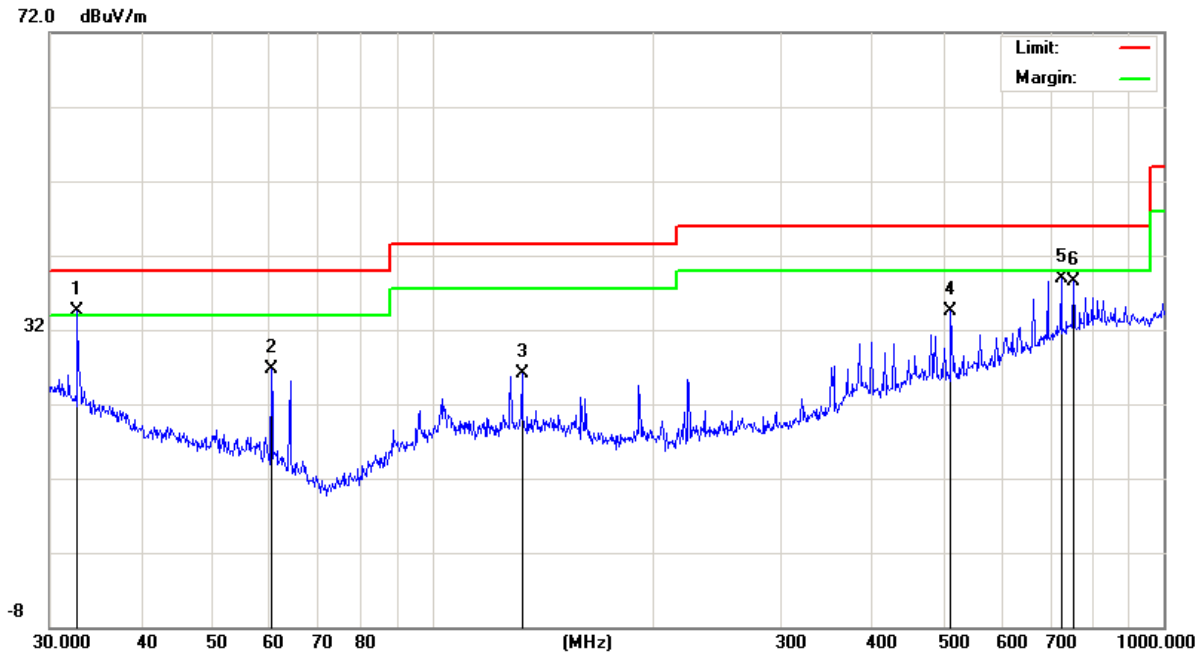
3.2.7 TEST RESULTS (BETWEEN 30M – 1000 MHZ)

EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010hPa	Test Mode：	TX
Test Voltage ：	DC 7.4V		

Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
V	32.7486	16.54	17.92	34.46	40.00	-5.54	QP
V	60.2801	18.91	7.77	26.68	40.00	-13.32	QP
V	132.6850	14.38	11.76	26.14	43.50	-17.36	QP
V	511.8351	14.04	20.54	34.58	46.00	-11.42	QP
V	724.2611	13.43	25.43	38.86	46.00	-7.14	QP
V	752.7432	12.27	26.17	38.44	46.00	-7.56	QP

Remark:

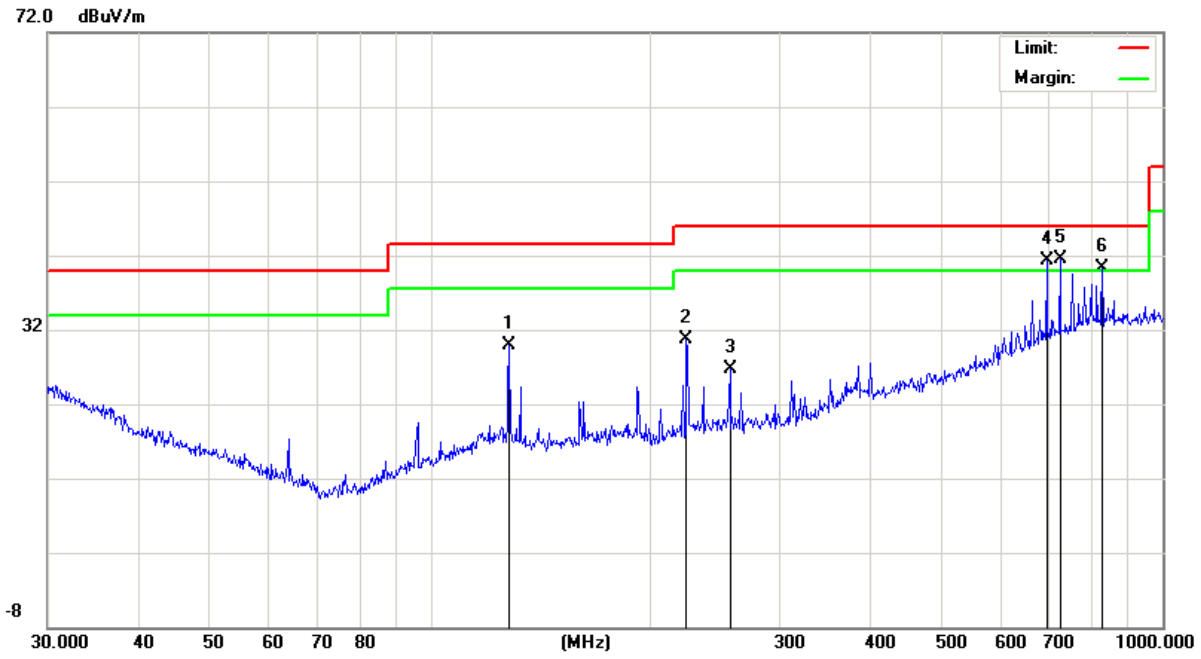
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency (MHz)	Meter Reading (dBuV)	Factor (dB)	Emission Level (dBuV/m)	Limits (dBuV/m)	Margin (dB)	Remark
H	128.1130	18.00	11.93	29.93	43.50	-13.57	QP
H	223.7334	18.24	12.38	30.62	46.00	-15.38	QP
H	256.5211	13.05	13.66	26.71	46.00	-19.29	QP
H	694.4174	16.65	24.65	41.30	46.00	-4.70	QP
H	724.2611	16.05	25.43	41.48	46.00	-4.52	QP
H	827.4934	13.02	27.31	40.33	46.00	-5.67	QP

Remark:

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



3.2.8 TEST RESULTS (ABOVE 1000 MHZ)

EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	20 ℃	Relative Humidity：	48%
Pressure：	1010hPa	Test Mode：	TX
Test Mode ：	DC 7.4V		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Remark	Comment
Low Channel (2402 MHz)-Above 1G							
4804.149	61.23	-3.64	57.59	74.00	-16.41	Pk	Vertical
4804.149	41.87	-3.64	38.23	54.00	-15.77	AV	Vertical
7206.267	58.96	-0.95	58.01	74.00	-15.99	Pk	Vertical
7206.267	40.15	-0.95	39.20	54.00	-14.80	AV	Vertical
4804.284	61.11	-3.64	57.47	74.00	-16.53	Pk	Horizontal
4804.284	43.66	-3.64	40.02	54.00	-13.98	AV	Horizontal
7206.356	59.89	-0.95	58.94	74.00	-15.06	Pk	Horizontal
7206.356	41.73	-0.95	40.78	54.00	-13.22	AV	Horizontal
Mid Channel (2441 MHz)-Above 1G							
4882.278	61.33	-3.68	57.65	74.00	-16.35	Pk	Vertical
4882.278	45.47	-3.68	41.79	54.00	-12.21	AV	Vertical
7323.577	62.52	-0.82	61.70	74.00	-12.30	Pk	Vertical
7323.577	42.77	-0.82	41.95	54.00	-12.05	AV	Vertical
4882.199	63.48	-3.68	59.80	74.00	-14.20	Pk	Horizontal
4882.199	44.91	-3.68	41.23	54.00	-12.77	AV	Horizontal
7323.203	59.67	-0.82	58.85	74.00	-15.15	Pk	Horizontal
7323.203	43.29	-0.82	42.47	54.00	-11.53	AV	Horizontal
High Channel (2480 MHz)- Above 1G							
4960.101	63.7	-3.59	60.11	74.00	-13.89	Pk	Vertical
4960.101	44.08	-3.59	40.49	54.00	-13.51	AV	Vertical
7440.213	57.42	-0.68	56.74	74.00	-17.26	Pk	Vertical
7440.213	42.56	-0.68	41.88	54.00	-12.12	AV	Vertical
4960.267	62.35	-3.59	58.76	74.00	-15.24	Pk	Horizontal
4960.267	43.11	-3.59	39.52	54.00	-14.48	AV	Horizontal
7440.188	59.62	-0.68	58.94	74.00	-15.06	Pk	Horizontal
7440.188	42.17	-0.68	41.49	54.00	-12.51	AV	Horizontal

Note: Mode 1Mbps is the worst mode.

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=100kHz
VB	VBW ≥ RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

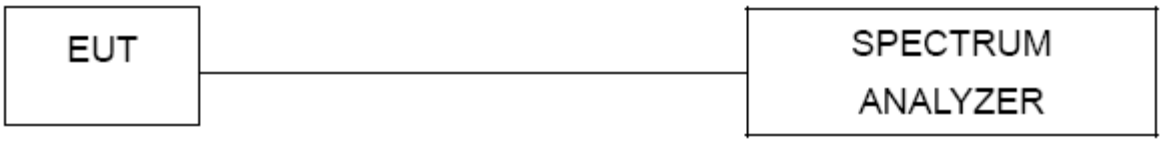
4.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 100kHz, VBW=100kHz, Sweep time = Auto.

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



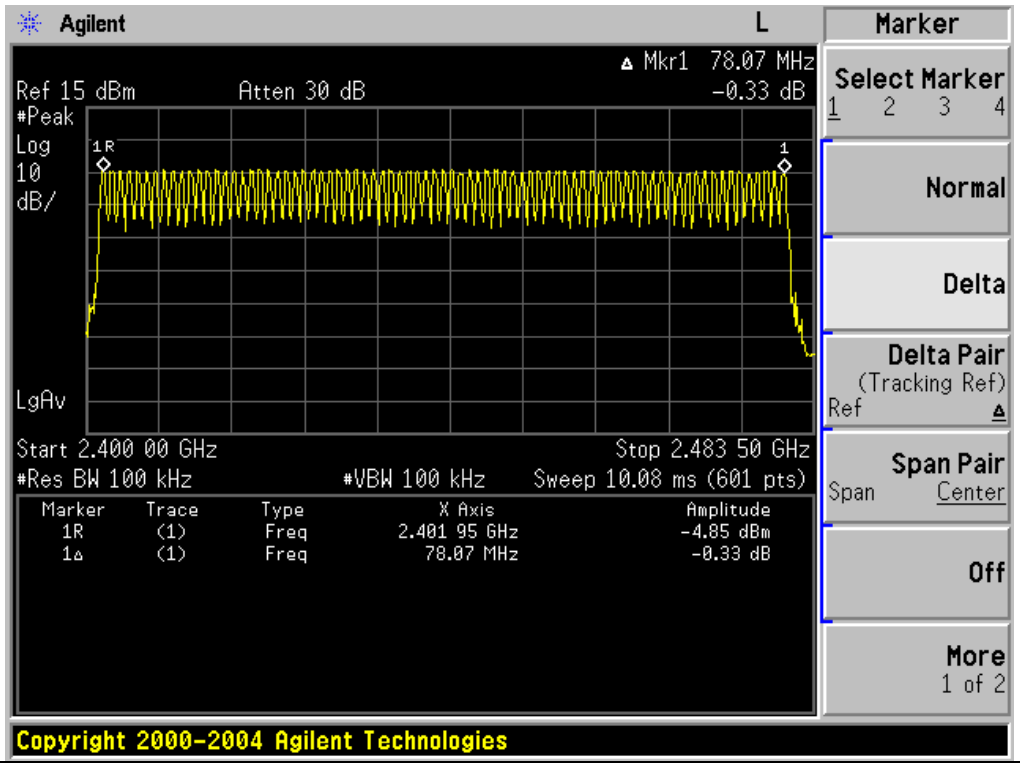
4.1.4 EUT OPERATION CONDITIONS

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：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1015 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	Hopping Mode-GFSK		

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

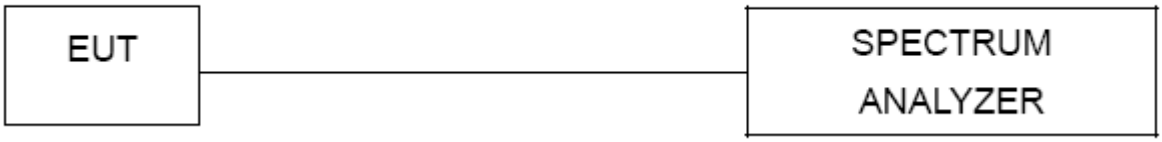
5.1.1 TEST PROCEDURE

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

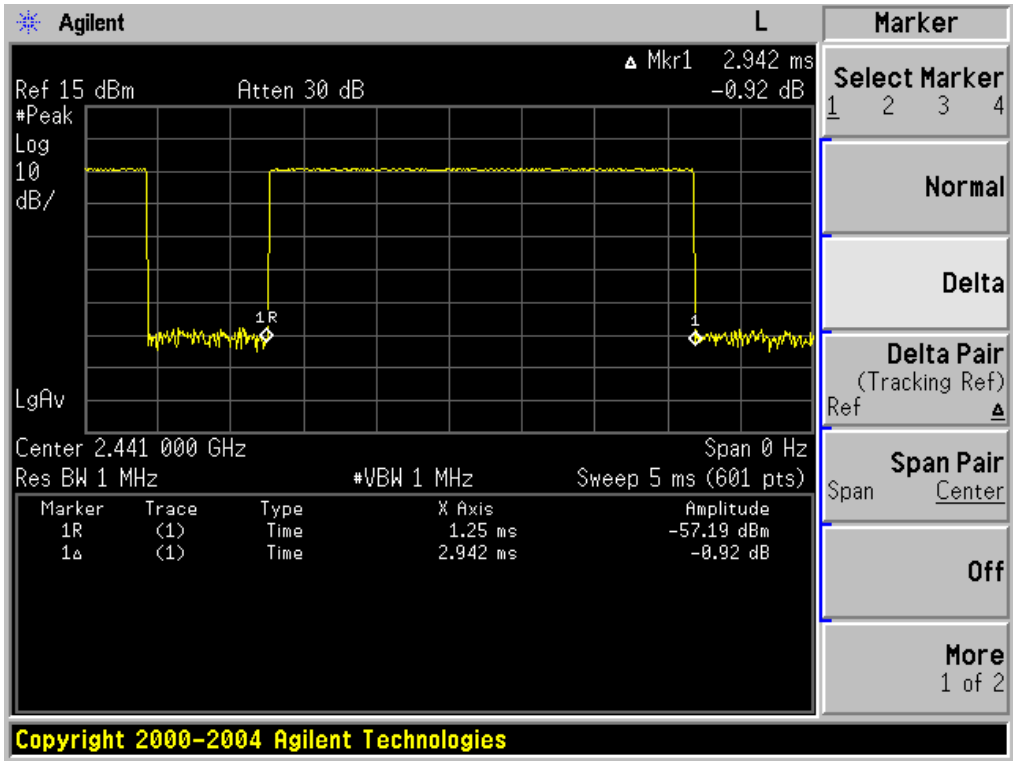
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.5 TEST RESULTS

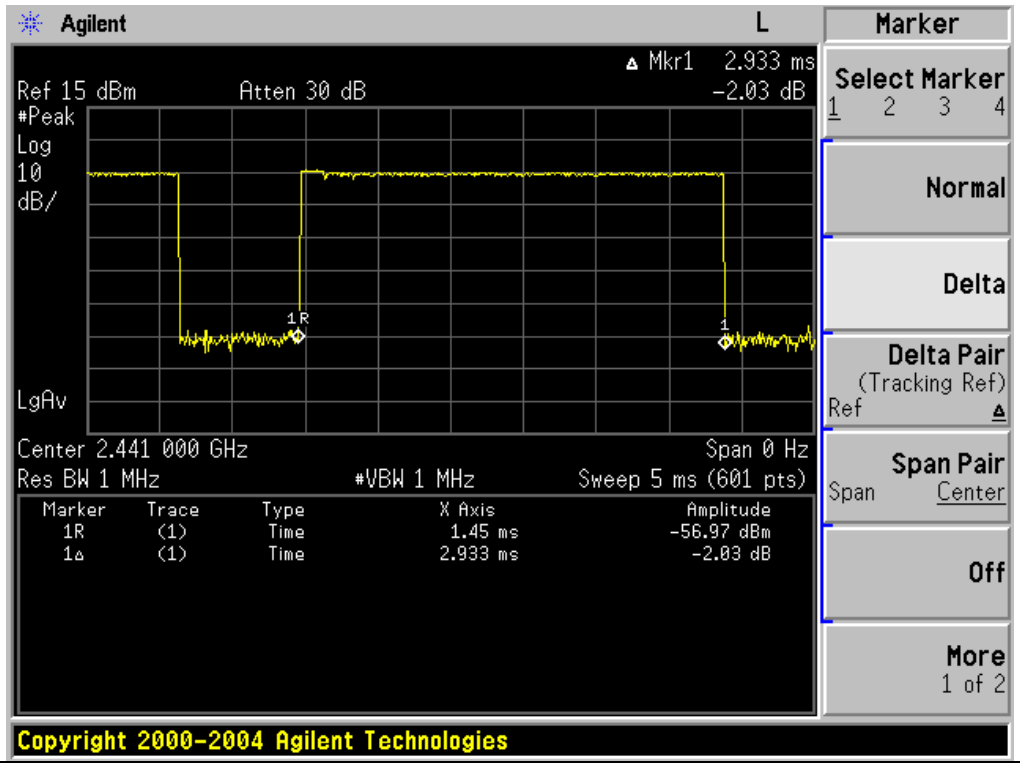
EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH39-DH5 ,2DH5,3DH5		

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits
		(ms)	(s)	(s)
DH5	2441 MHz	2.94	0.31	0.4
2DH5	2441 MHz	2.93	0.31	0.4
3DH5	2441 MHz	2.95	0.31	0.4

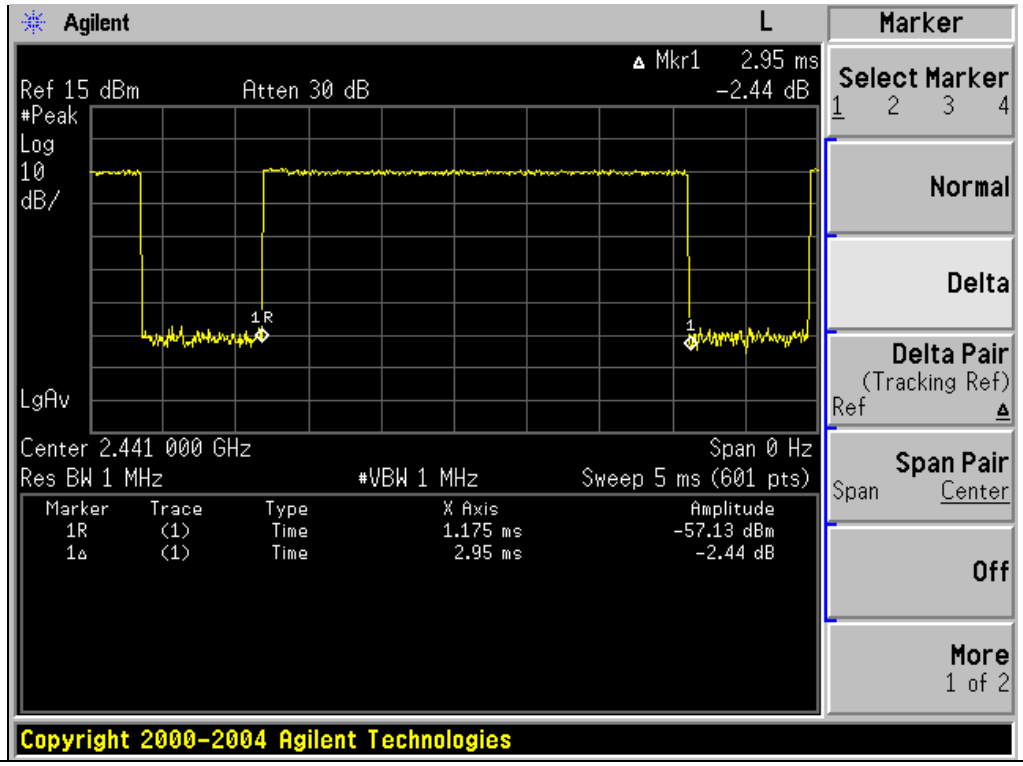
CH39-DH5



CH39-2DH5



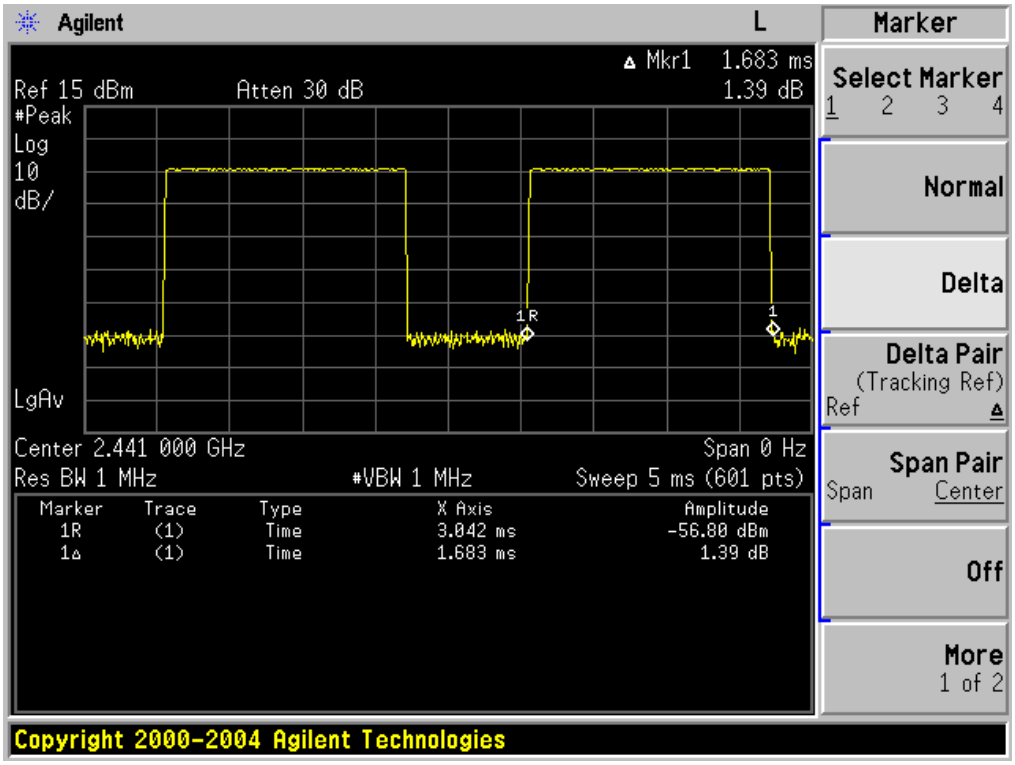
CH39-3DH5



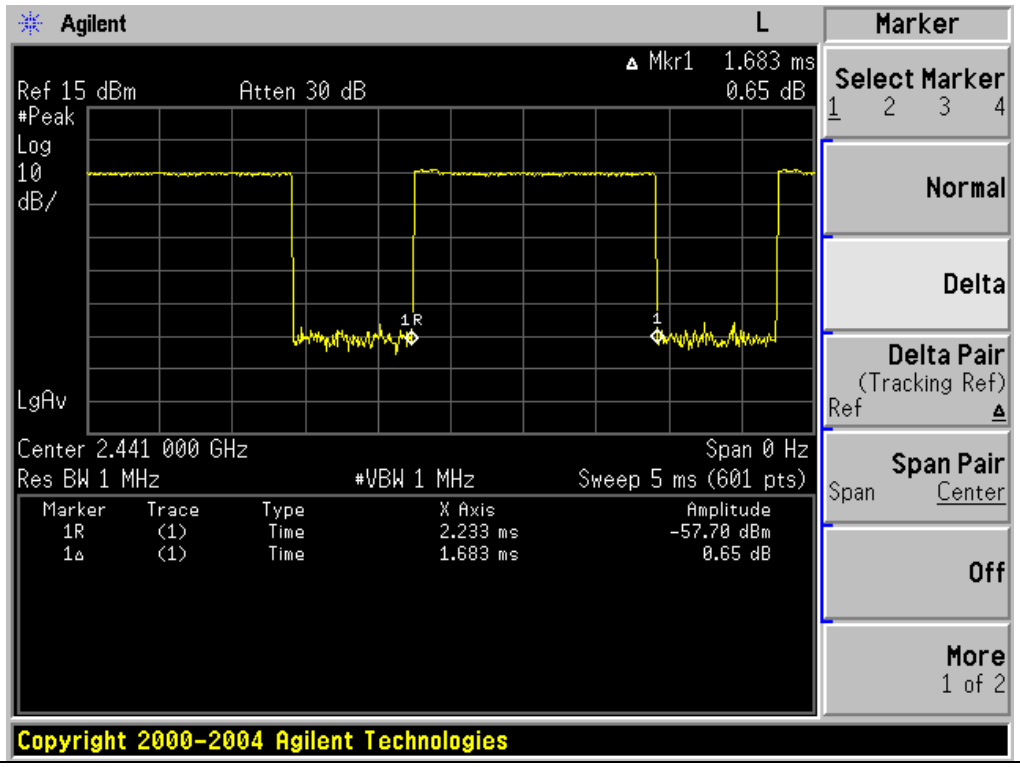
EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH39-DH3,2DH3,3DH3		

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits
		(ms)	(s)	(s)
DH3	2441 MHz	1.68	0.27	0.4
2DH3	2441 MHz	1.68	0.27	0.4
3DH3	2441 MHz	1.70	0.27	0.4

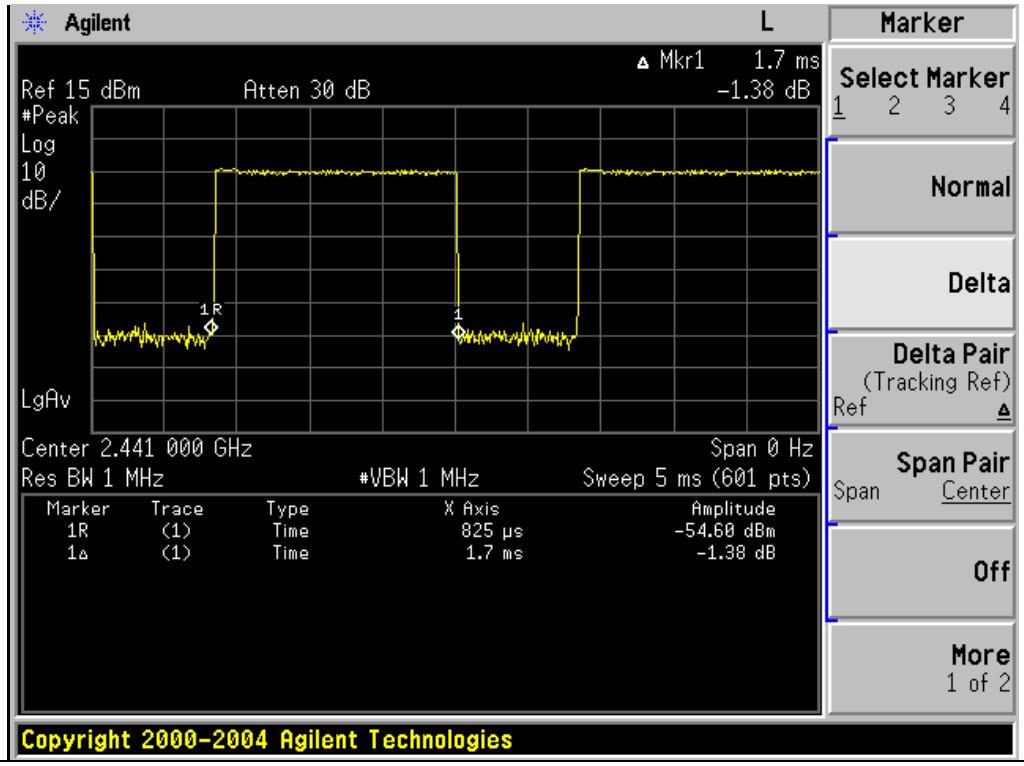
CH39-DH3



CH39-2DH3



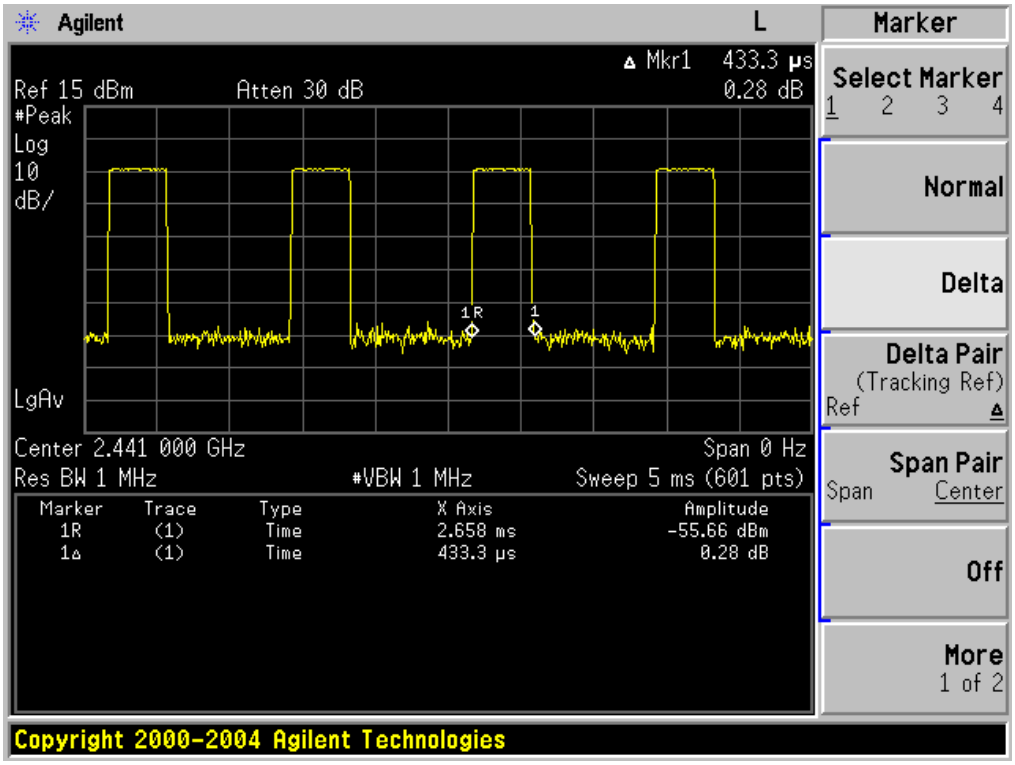
CH39-3DH3



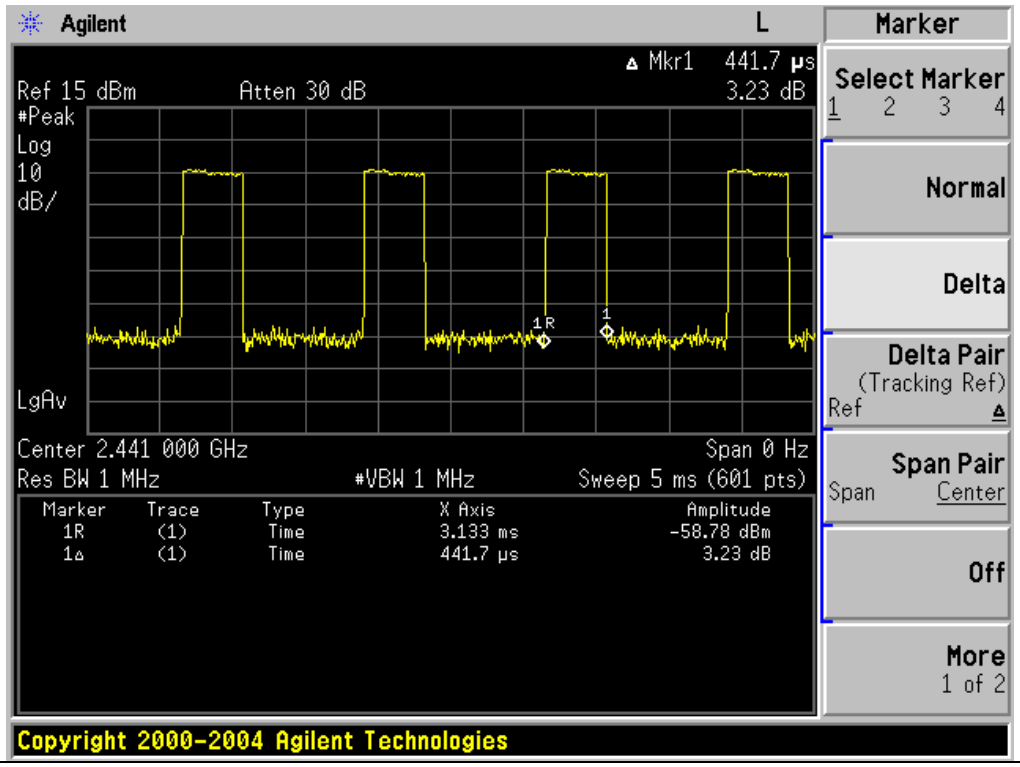
EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH39-DH1,2DH1,3DH1		

Data Packet	Frequency	Pulse Duration	Dwell Time	Limits
		(ms)	(s)	(s)
DH1	2441 MHz	0.43	0.14	0.4
2DH1	2441 MHz	0.44	0.14	0.4
3DH1	2441 MHz	0.44	0.14	0.4

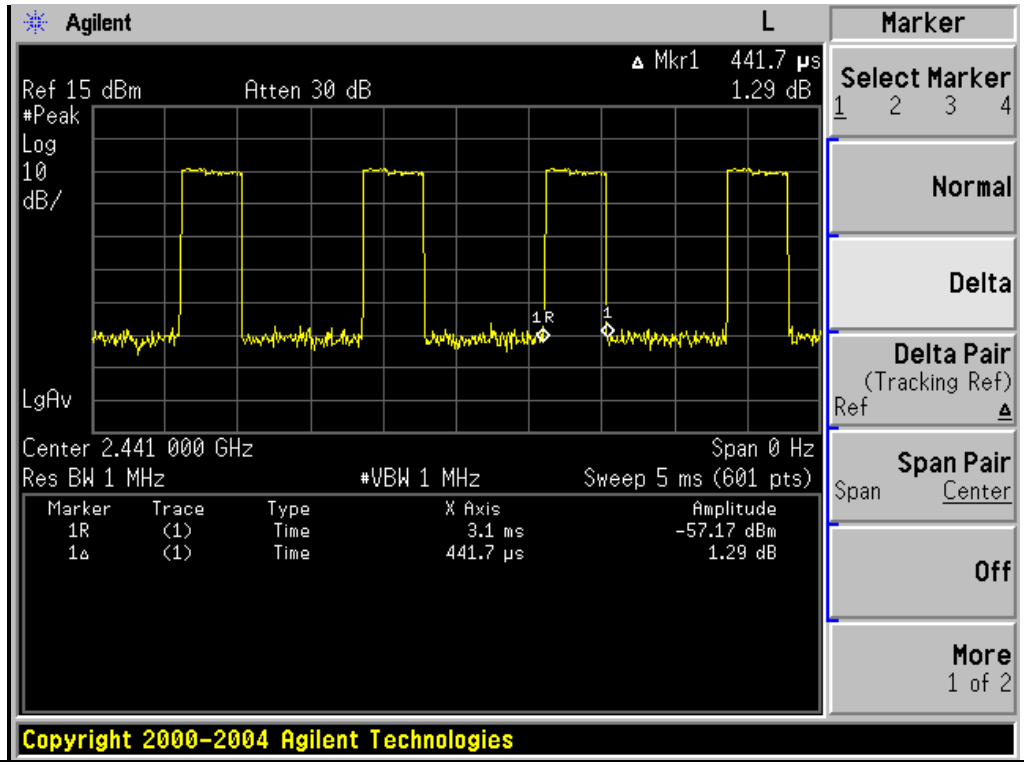
CH39-DH1



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	30 kHz (Channel Separation)
VB	100 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.1.1 TEST PROCEDURE

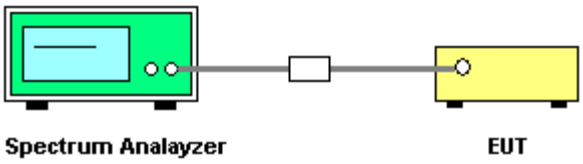
a. The transmitter output (antenna port) was connected to the spectrum analyser in peak hold mode.

b. The resolution bandwidth of 30 kHz and the video bandwidth of 100 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.

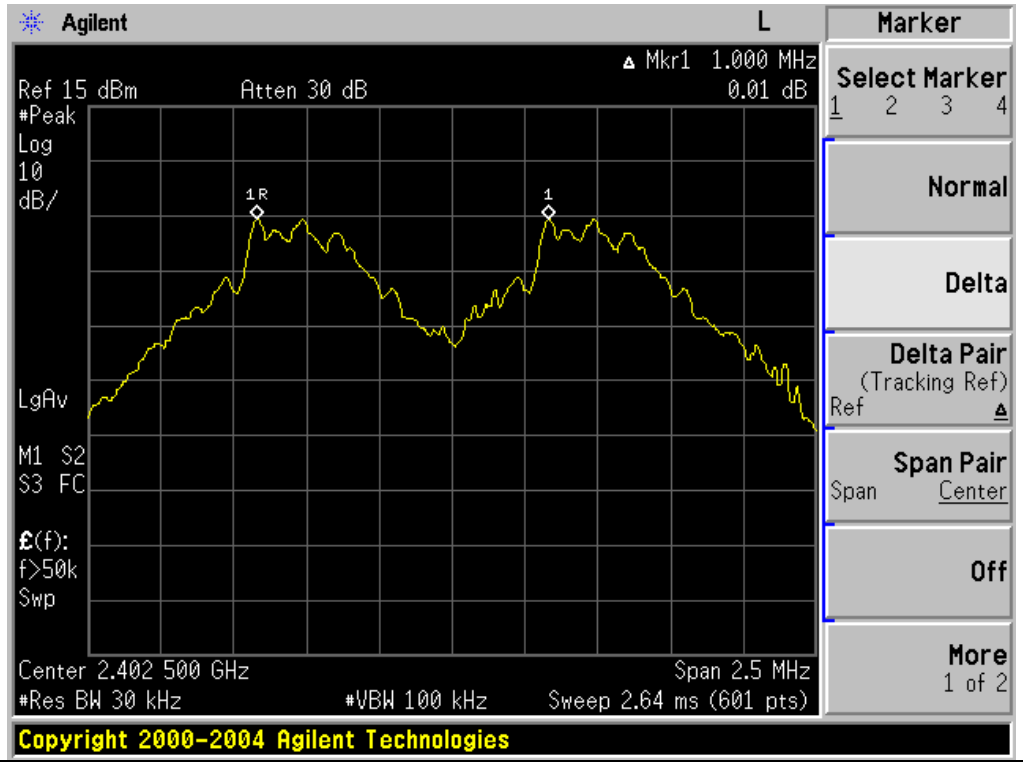
6.1.5 TEST RESULTS

EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00 / CH39 /CH78 (1Mbps Mode)		

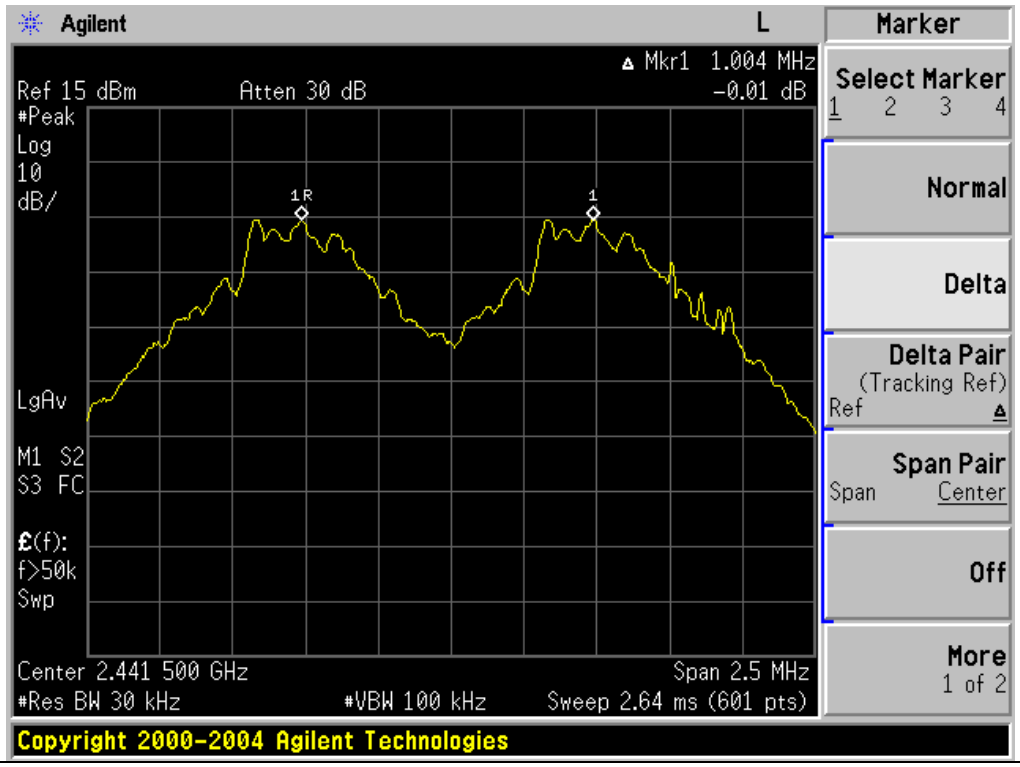
Frequency	Ch. Separation (MHz)	Result
2402 MHz	1.000	**Complies**
2441 MHz	1.004	**Complies**
2480 MHz	1.000	**Complies**

Ch. Separation Limits: > 20dB bandwidth

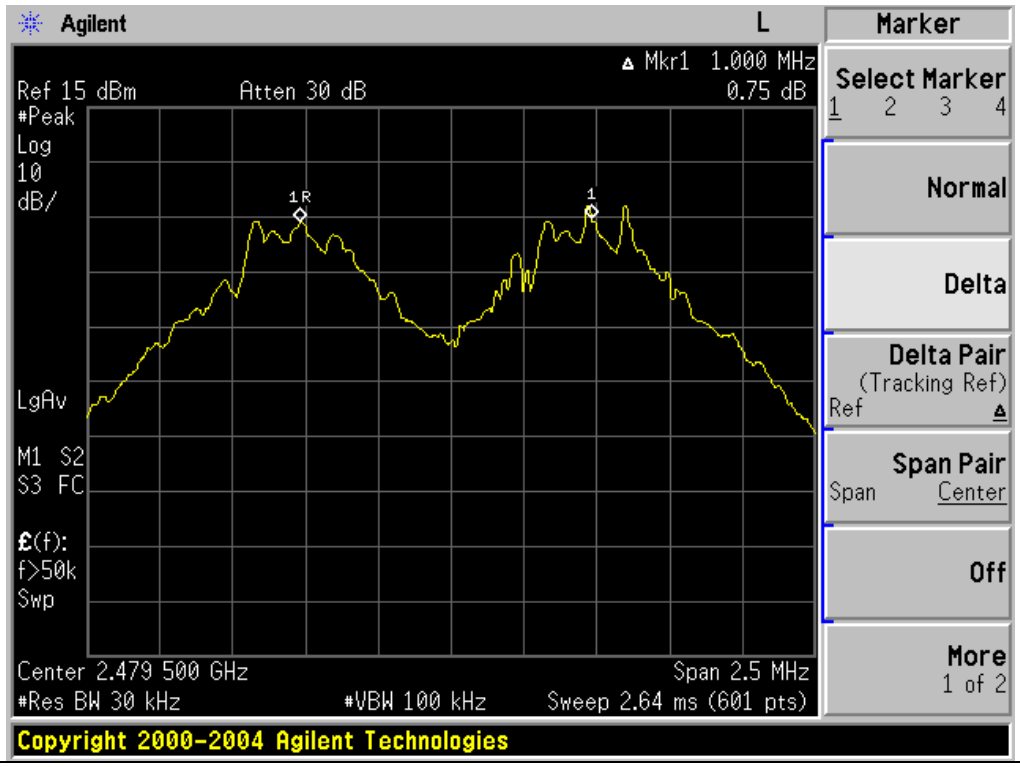
CH00 -1Mbps



CH39 -1Mbps



CH78 -1Mbps

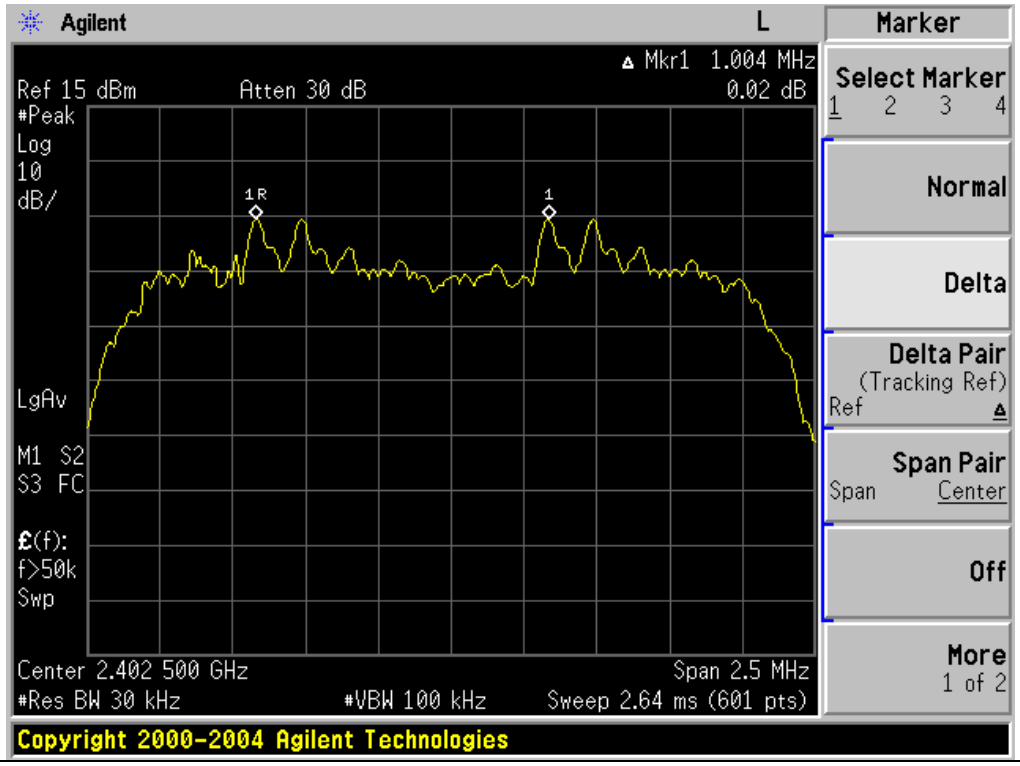


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00 / CH39 /CH78 (2Mbps Mode)		

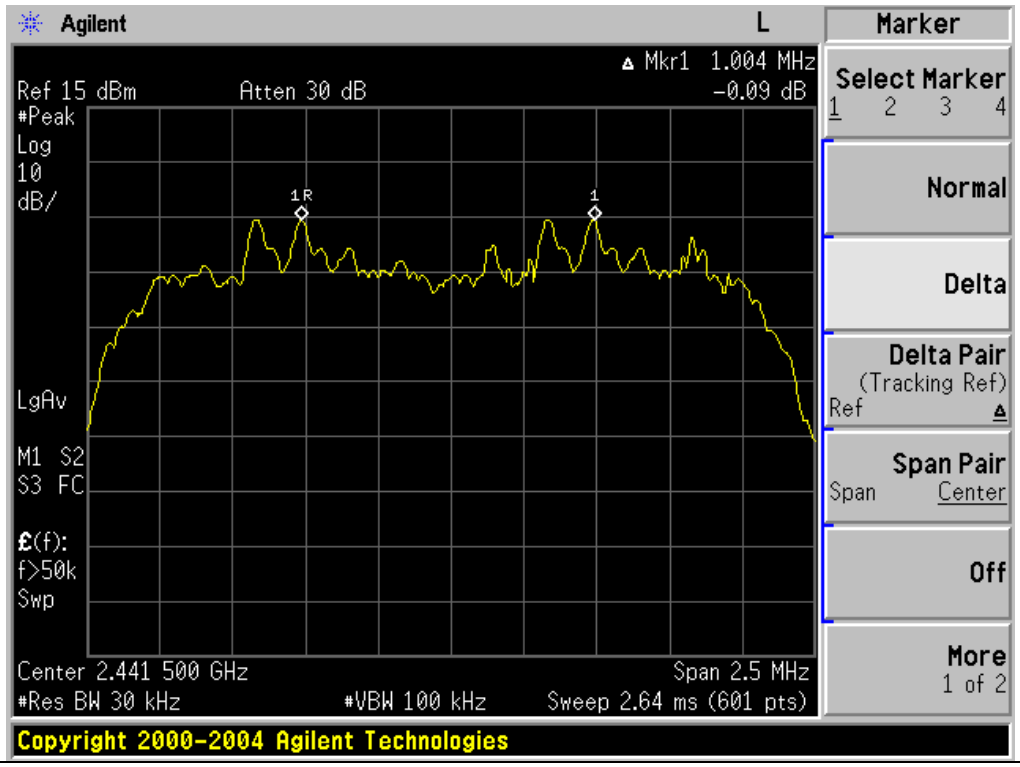
Frequency	Ch. Separation (MHz)	Result
2402 MHz	1.004	**Complies**
2441 MHz	1.004	**Complies**
2480 MHz	1.004	**Complies**

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

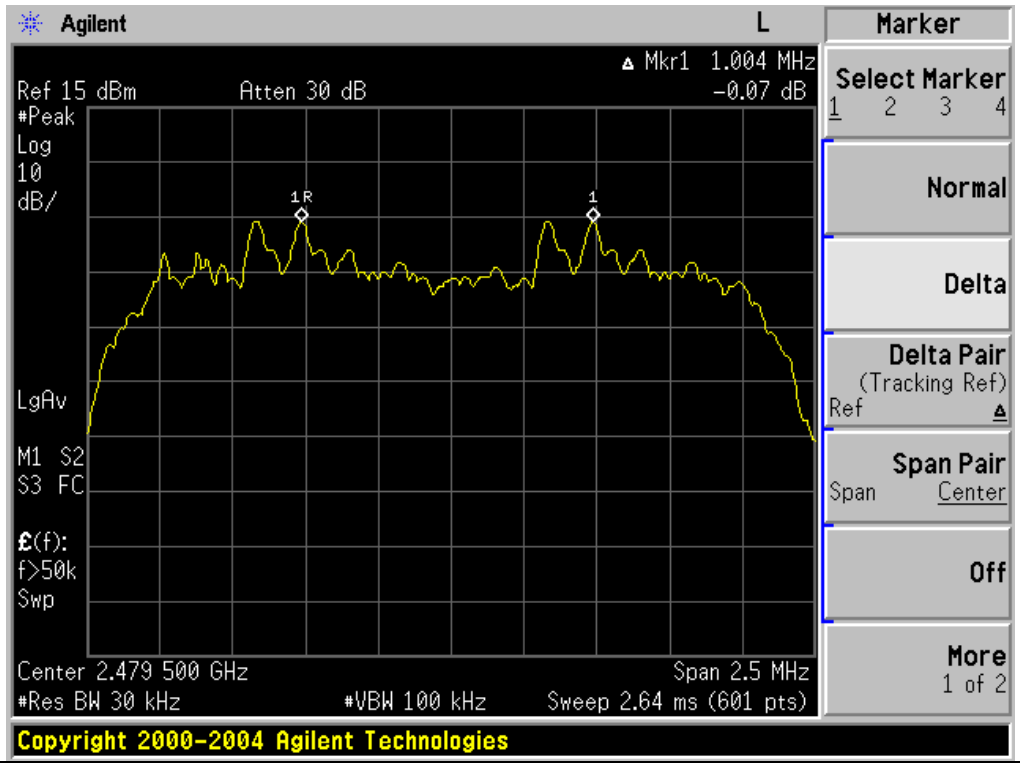
CH00 -2Mbps



CH39 -2Mbps



CH78 -2Mbps

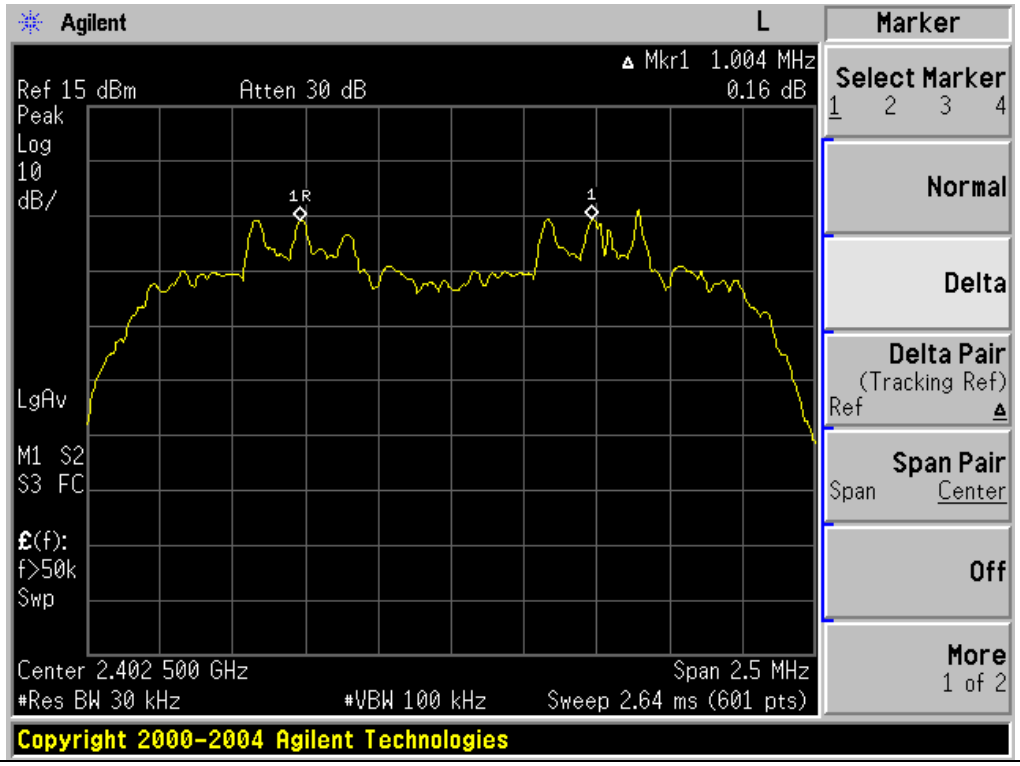


EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00 / CH39 /CH78 (3Mbps Mode)		

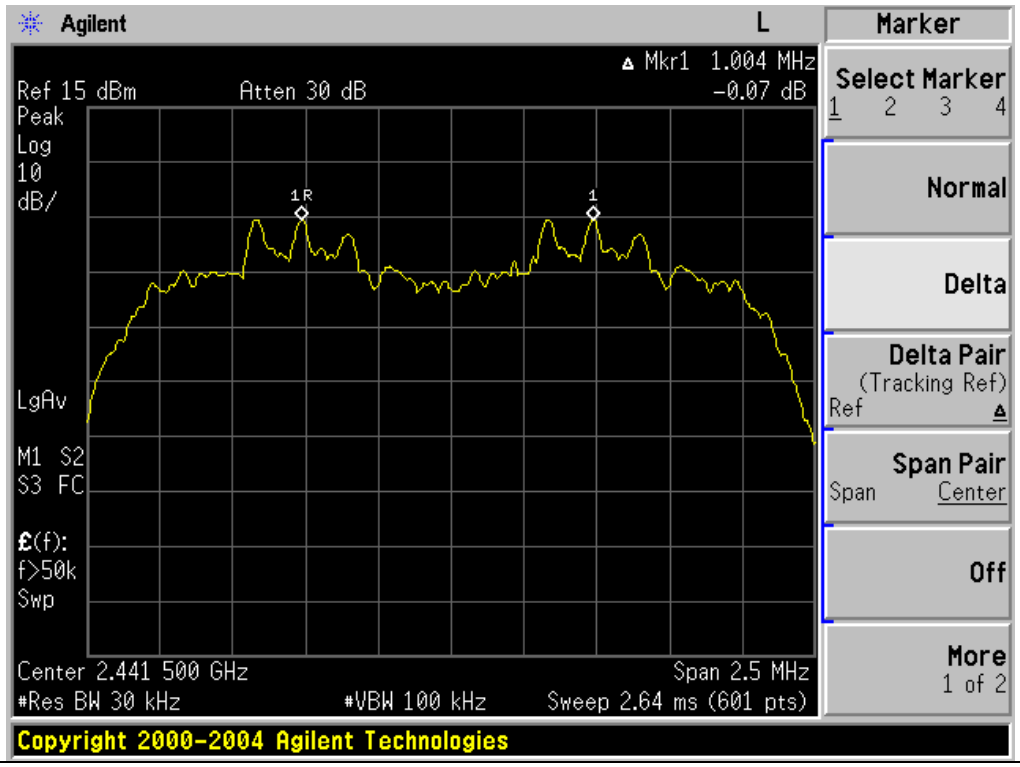
Frequency	Ch. Separation (MHz)	Result
2402 MHz	1.004	**Complies**
2441 MHz	1.004	**Complies**
2480 MHz	1.004	**Complies**

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

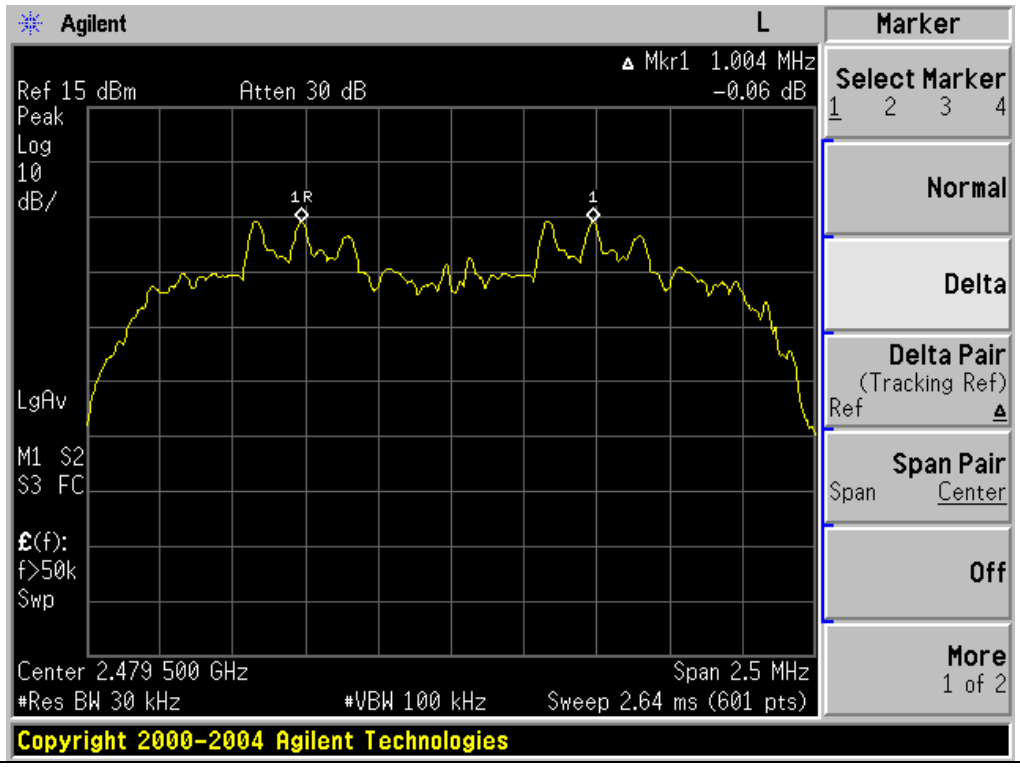
CH00 -3Mbps



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	30 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

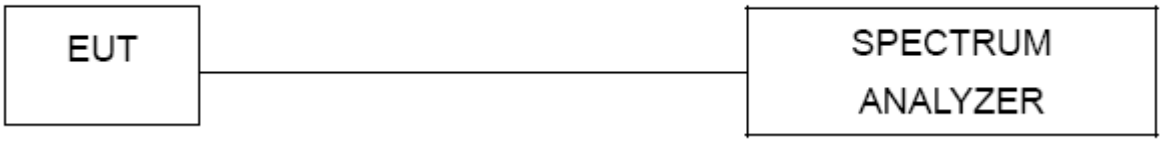
7.1.1 TEST PROCEDURE

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,
b. Spectrum Setting : RBW= 30KHz, VBW=100KHz, Sweep time = Auto.

7.1.2 DEVIATION FROM STANDARD

No deviation.

7.1.3 TEST SETUP



7.1.4 EUT OPERATION CONDITIONS

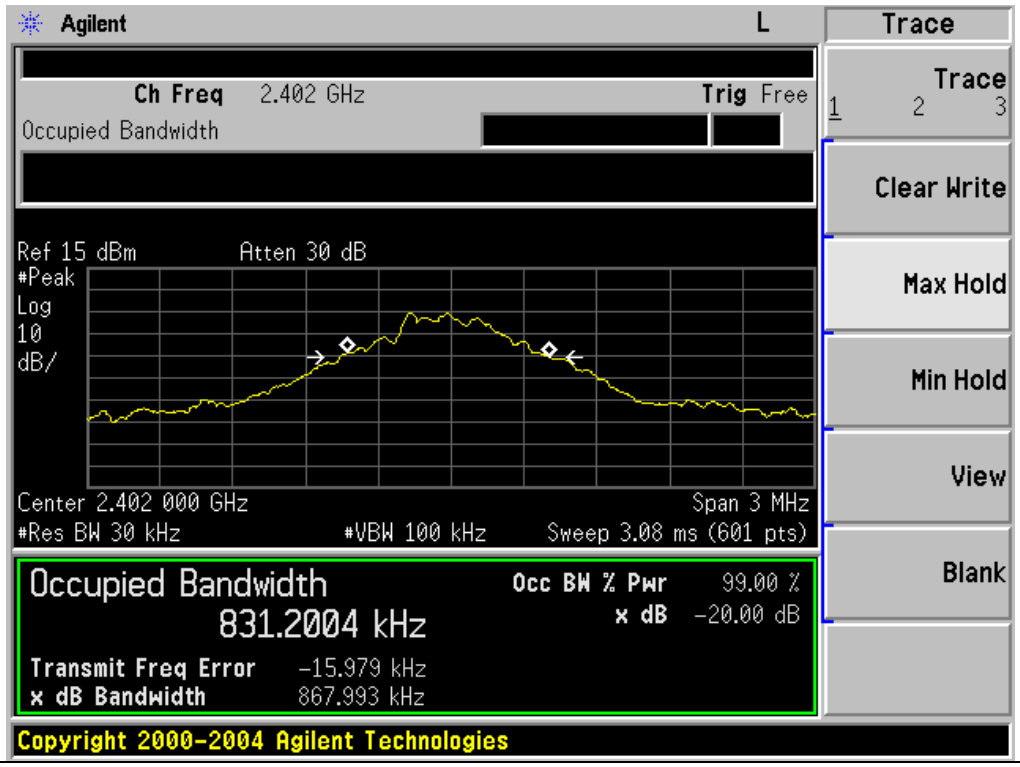
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

7.1.5 TEST RESULTS

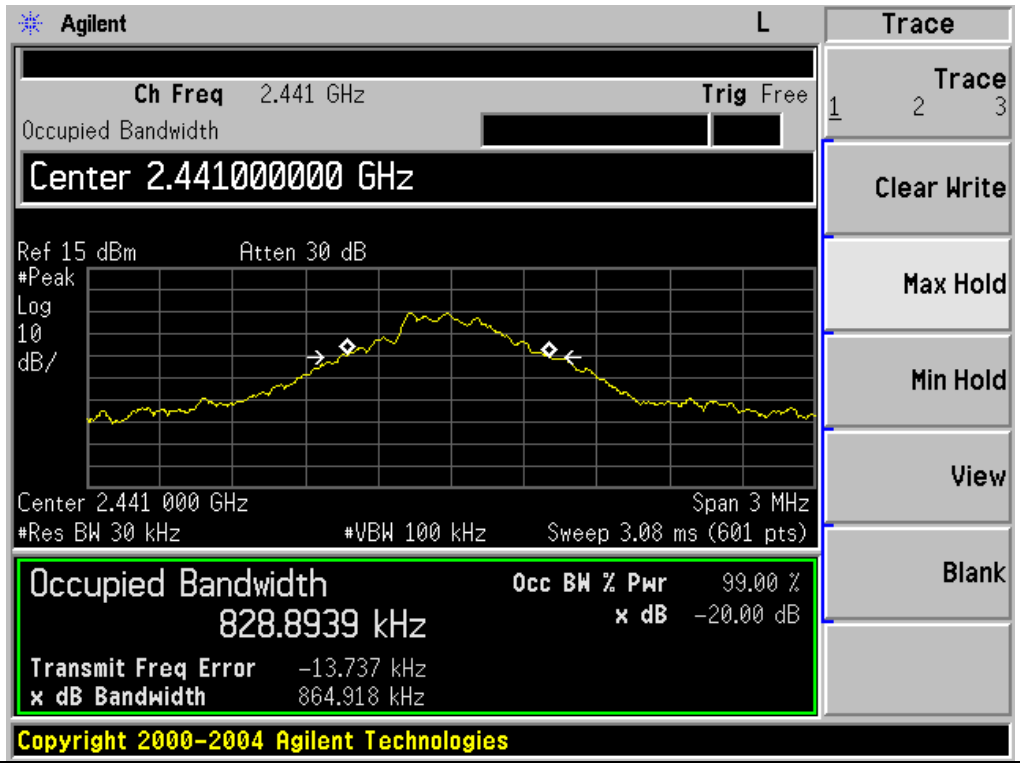
EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00 / CH39 /C78**(1Mbps)**		

Frequency	20dB Bandwidth (kHz)	Result
2402 MHz	867.993	**PASS**
2441 MHz	864.918	**PASS**
2480 MHz	862.262	**PASS**

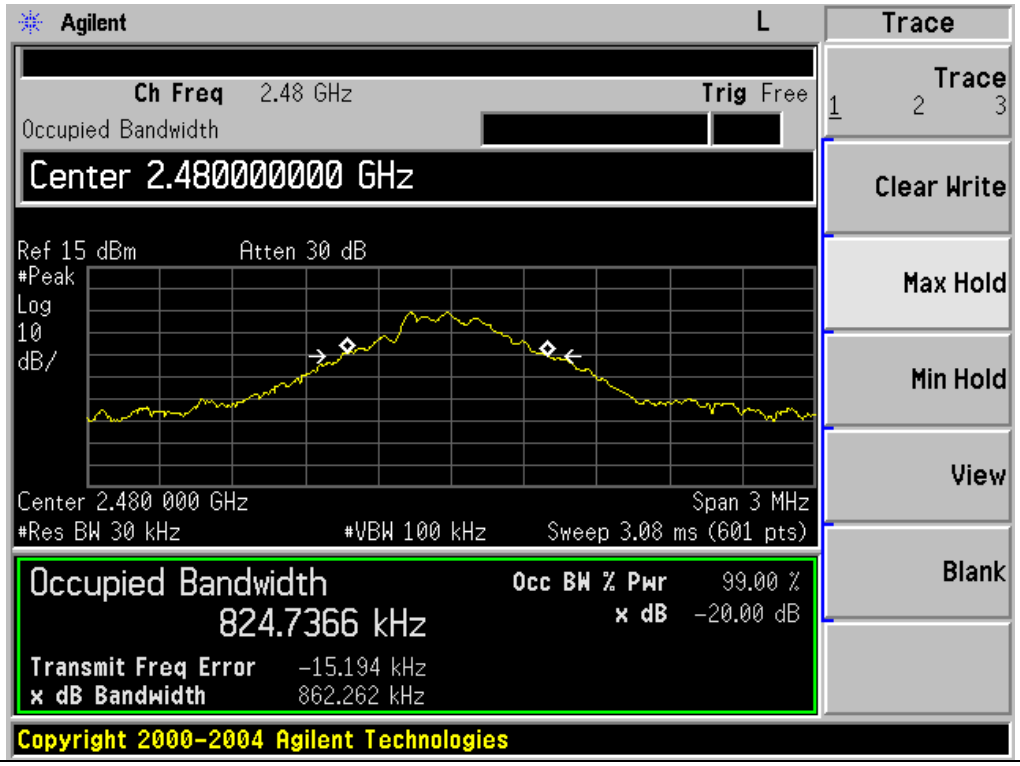
CH00-1Mbps



CH39 -1Mbps



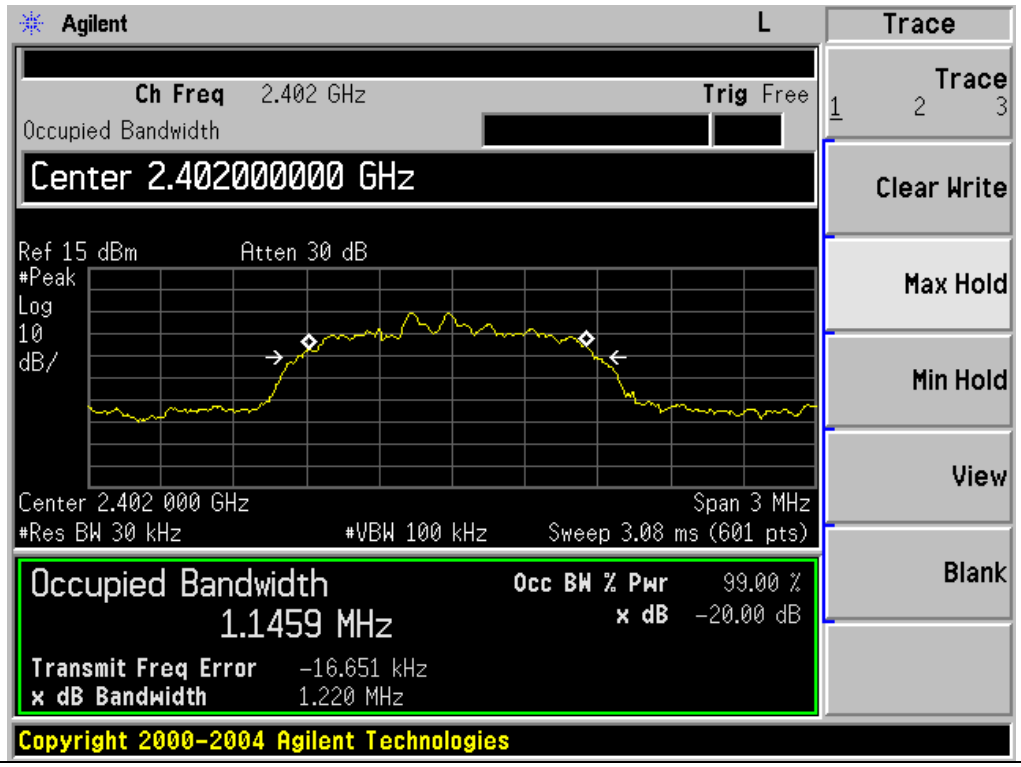
CH78 -1Mbps



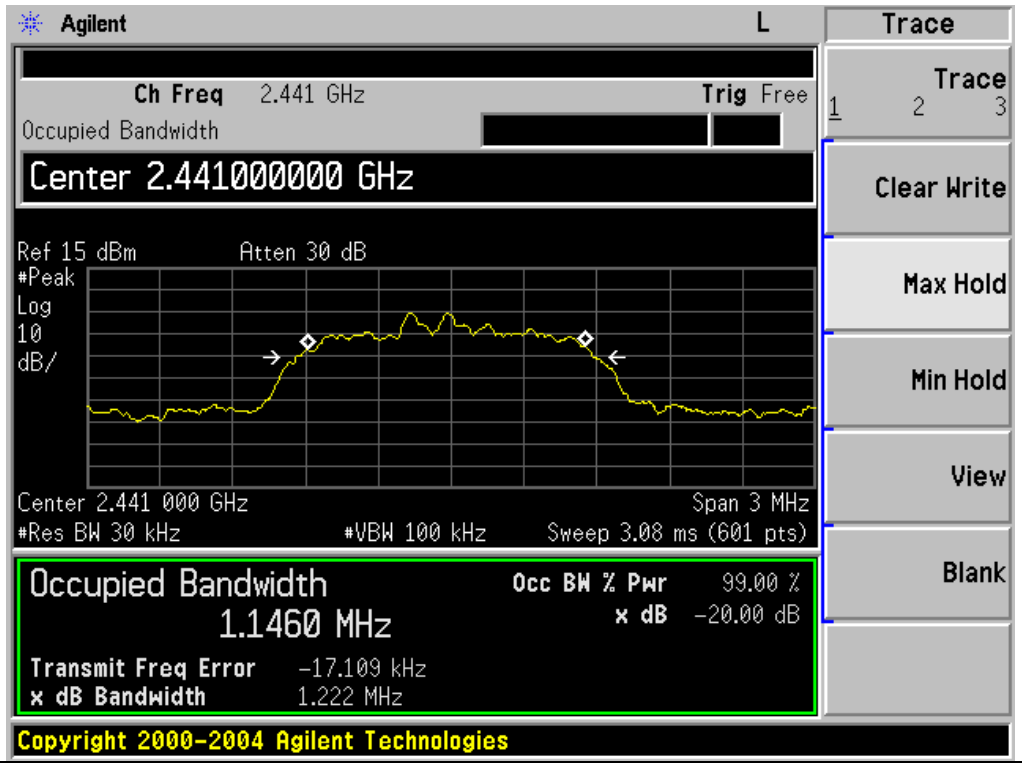
EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00 / CH39 /C78**(2Mbps)**		

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.220	**PASS**
2441 MHz	1.222	**PASS**
2480 MHz	1.223	**PASS**

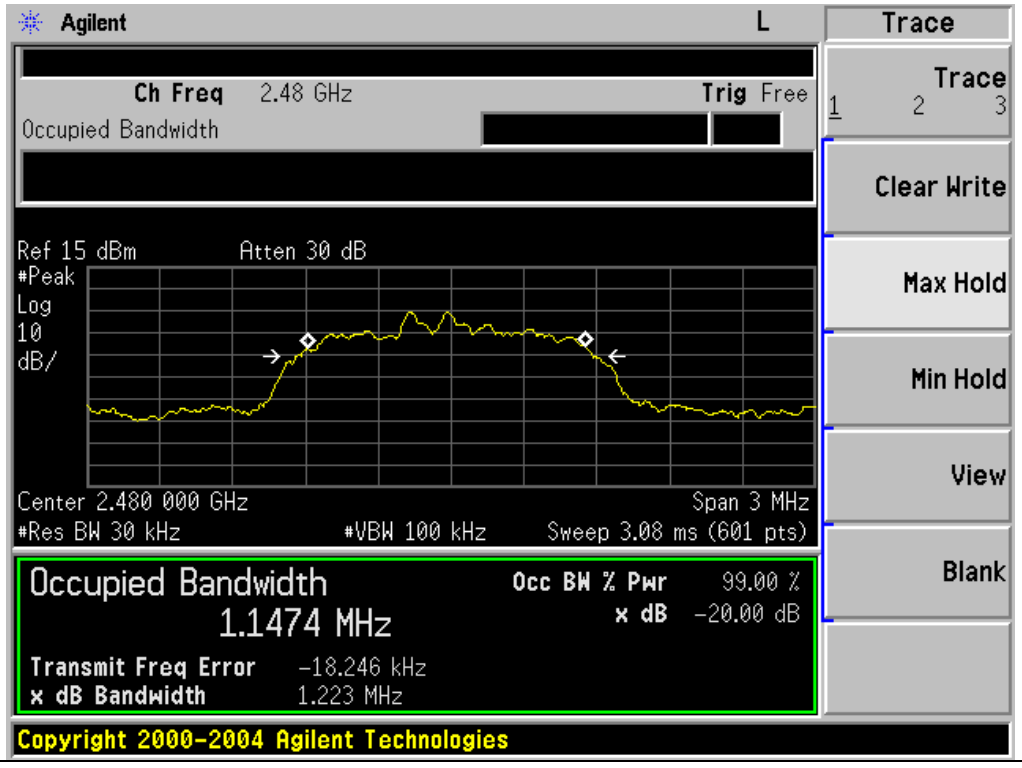
CH00 -2Mbps



CH39 -2Mbps



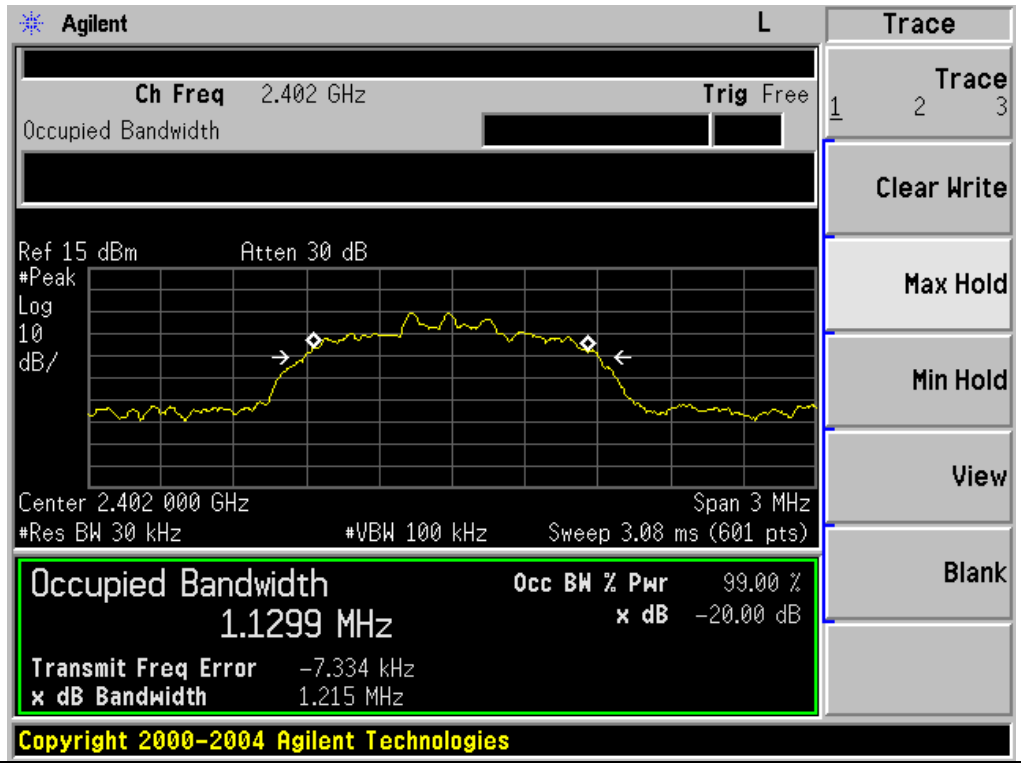
CH78 -2Mbps



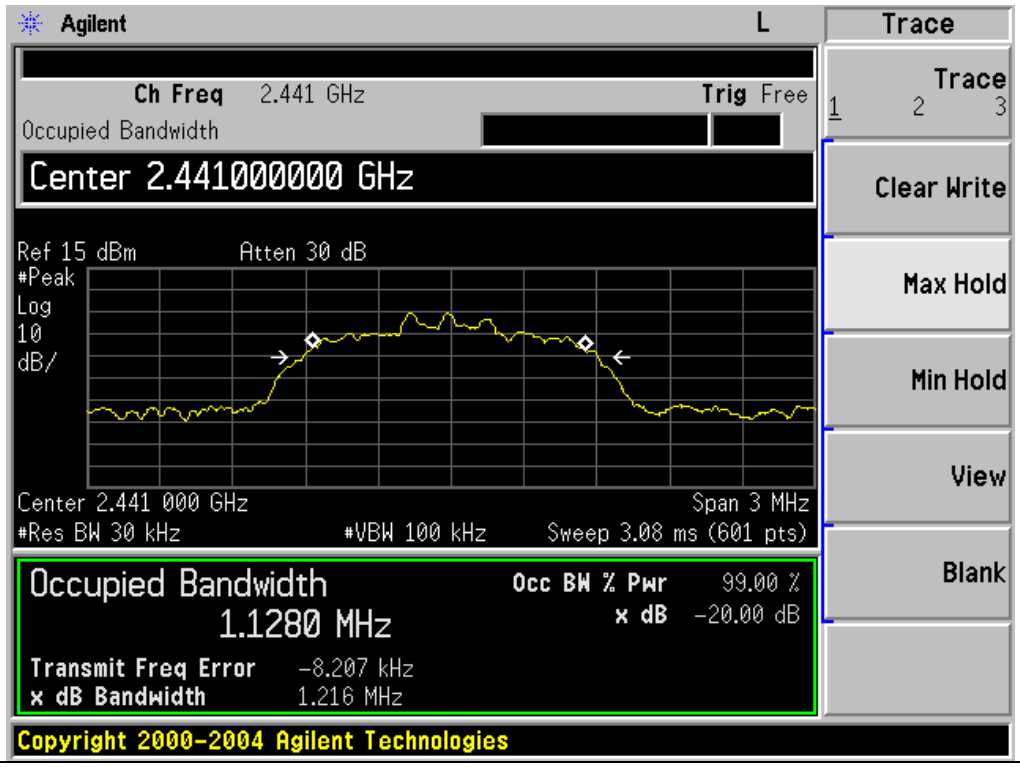
EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00 / CH39 /C78**(3Mbps)**		

Frequency	20dB Bandwidth (MHz)	Result
2402 MHz	1.215	**PASS**
2441 MHz	1.216	**PASS**
2480 MHz	1.214	**PASS**

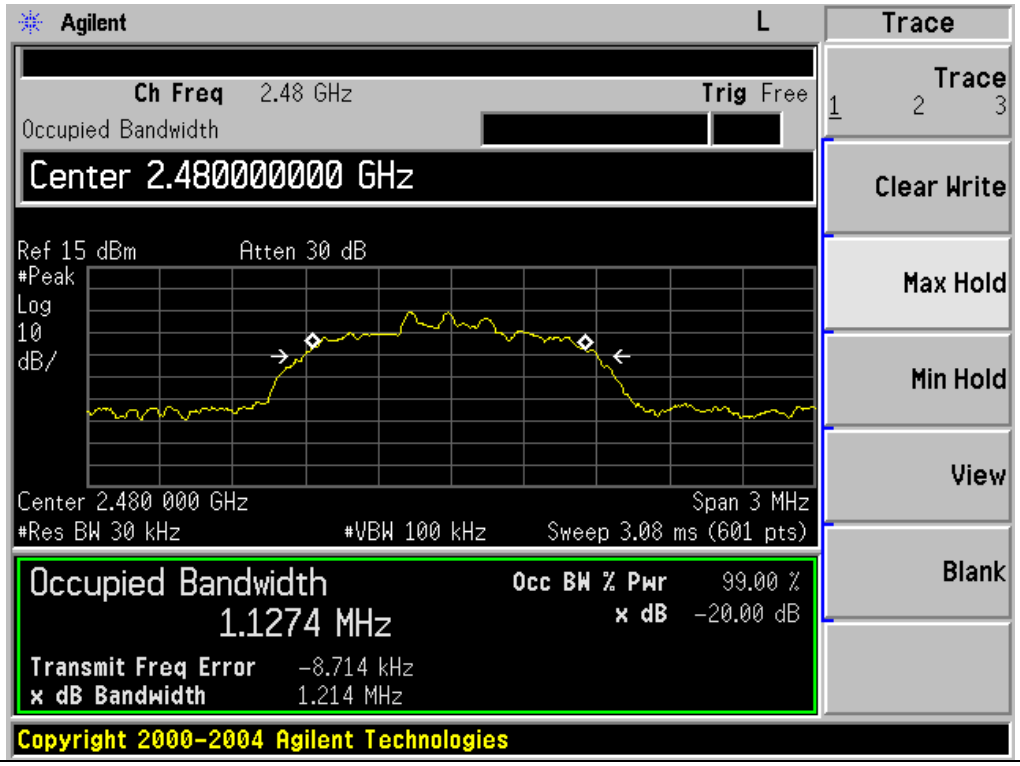
CH00 -3Mbps



CH39 -3Mbps



CH78 -3Mbps



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

a. The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram below,

b. 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 ≥ RBW

Sweep = auto

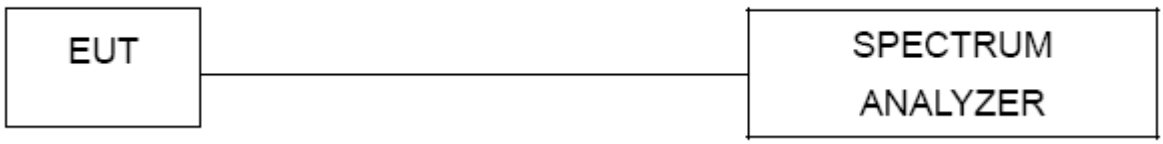
Detector function = peak

Trace = max hold

8.1.2 DEVIATION FROM STANDARD

No deviation.

8.1.3 TEST SETUP



8.1.4 EUT OPERATION CONDITIONS

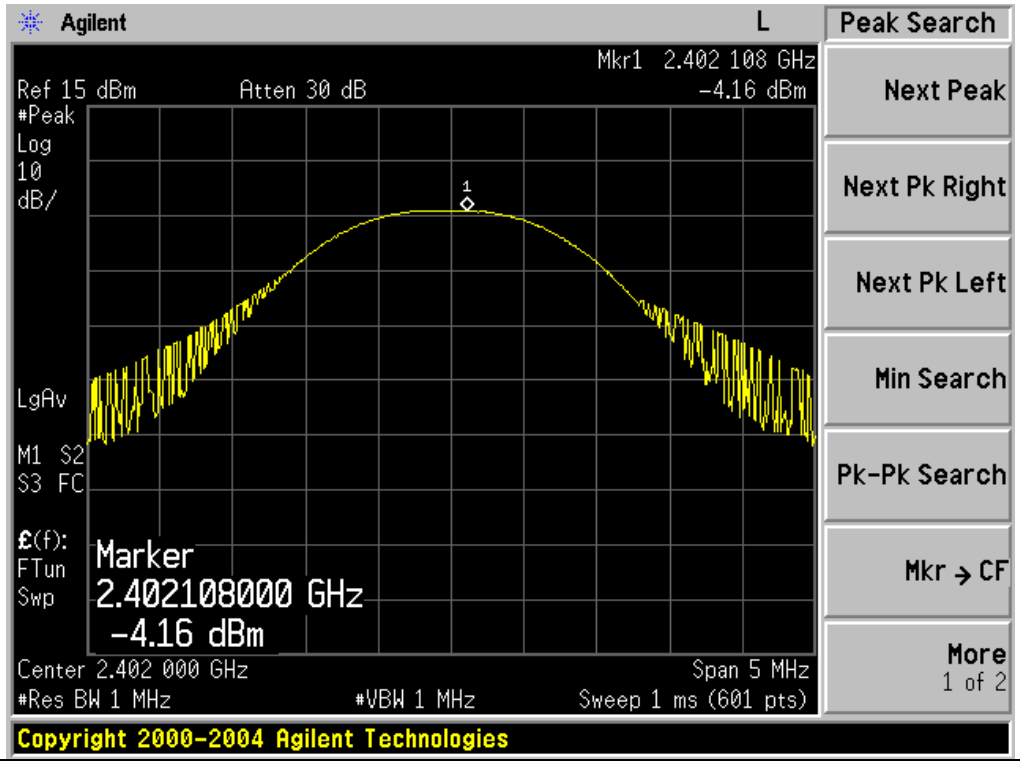
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

8.1.5 TEST RESULTS

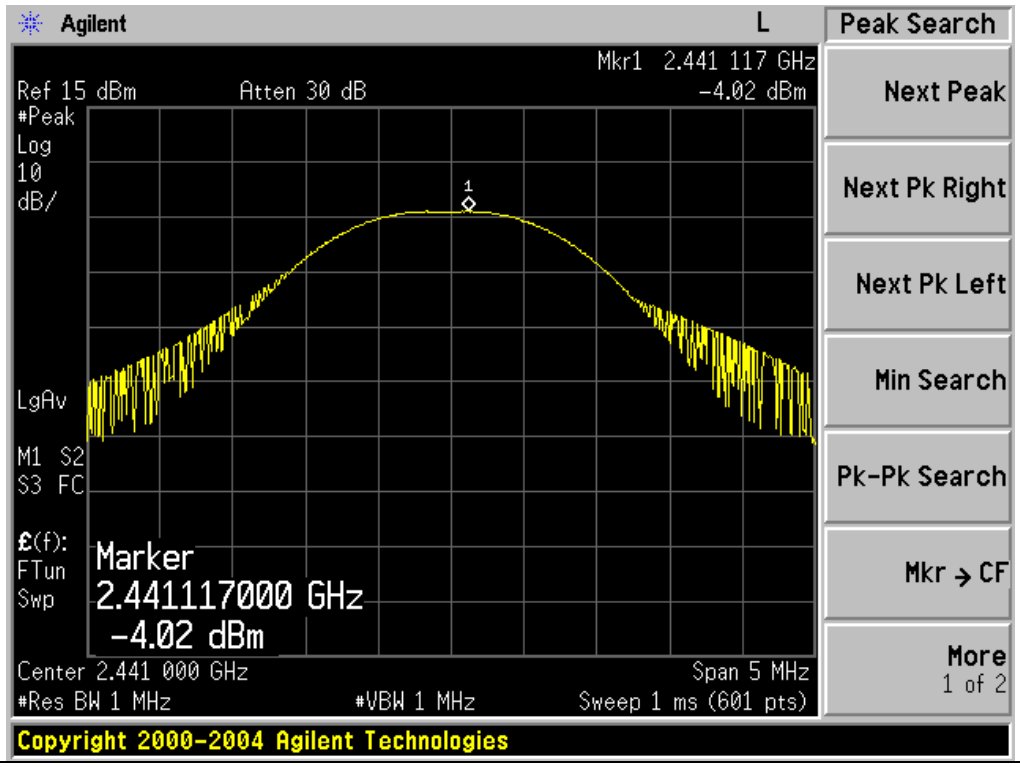
EUT：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00/ CH39 /CH78 (1M/2M/3Mbps Mode)		

1Mbps			
Test Channel	Frequency (MHz)	Peak Output Power (dBm)	LIMIT (dBm)
CH00	2402	-4.16	30
CH39	2441	-4.02	30
CH78	2480	-4.31	30
2Mbps			
CH00	2402	-4.10	20.96
CH39	2441	-3.94	20.96
CH78	2480	-4.21	20.96
3Mbps			
CH00	2402	-4.08	20.96
CH39	2441	-3.93	20.96
CH78	2480	-4.25	20.96

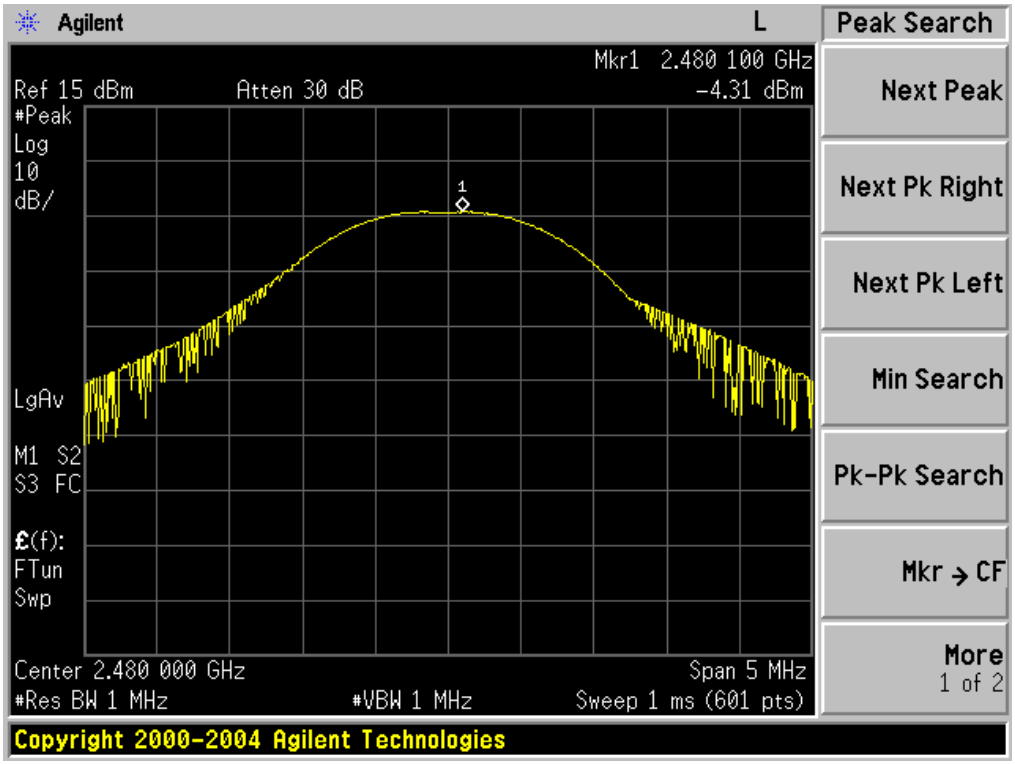
CH00 -1Mbps



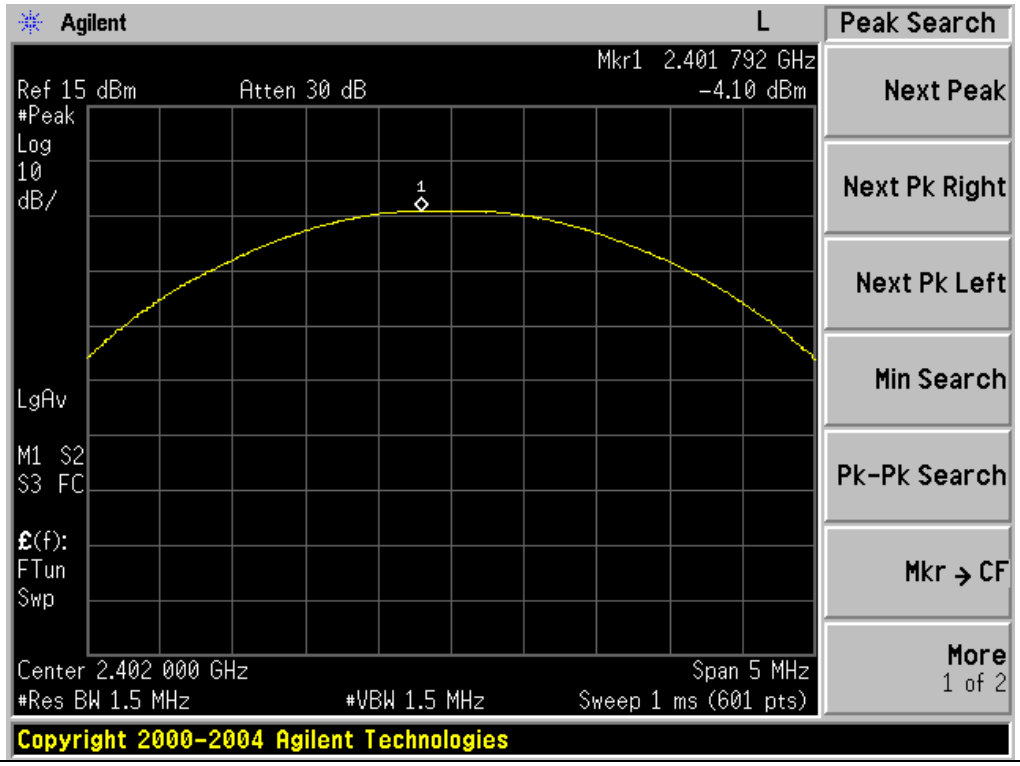
CH39 -1Mbps



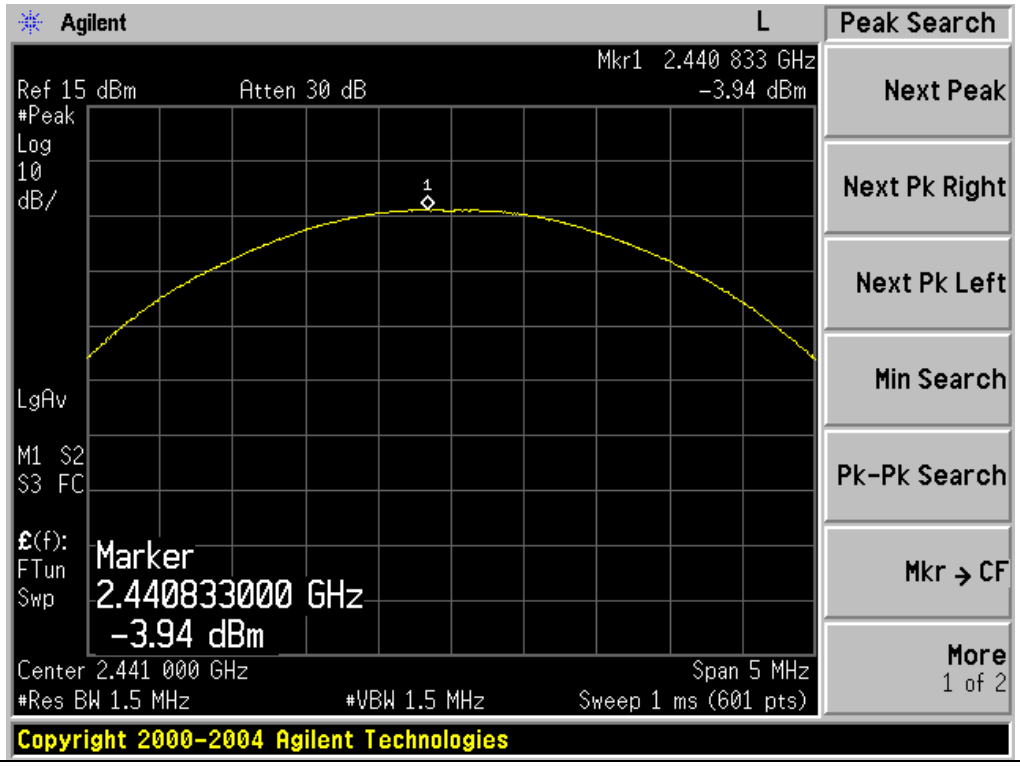
CH78 -1Mbps



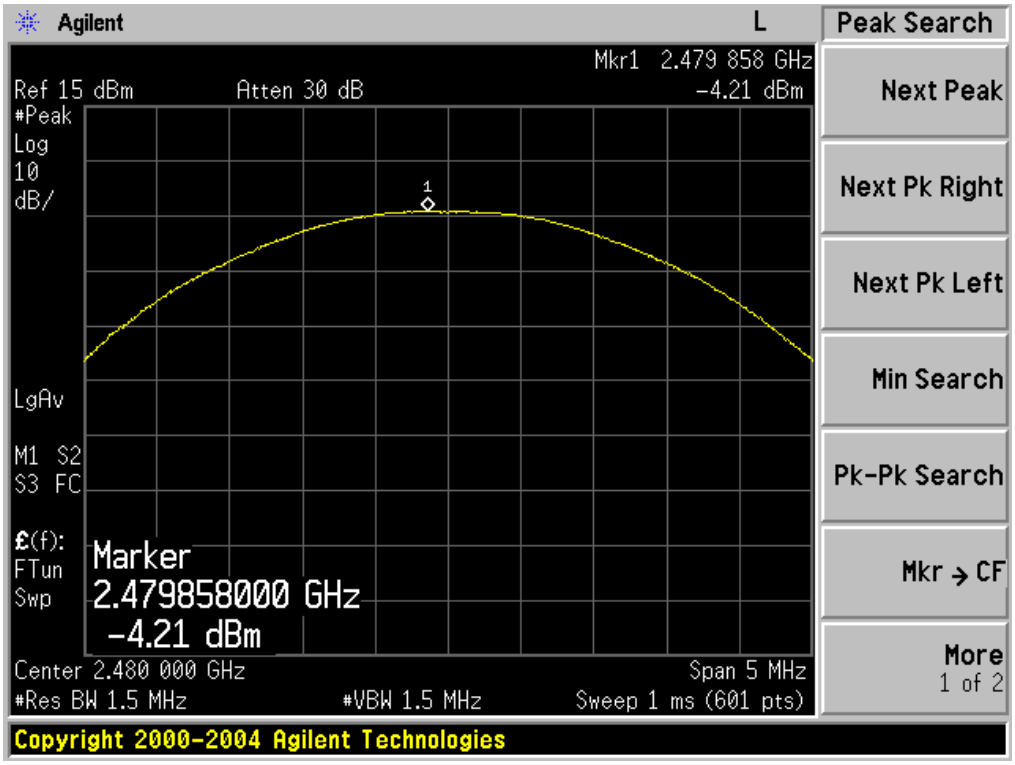
CH00 -2Mbps


Agilent
L
Peak Search
Mkr1 2.401 792 GHz
Ref 15 dBm
Atten 30 dB
-4.10 dBm
#Peak
Log
10
dB/
1
Next Peak
Next Pk Right
Next Pk Left
Min Search
LgAv
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Center 2.402 000 GHz
Span 5 MHz
#Res BW 1.5 MHz
#VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2004 Agilent Technologies

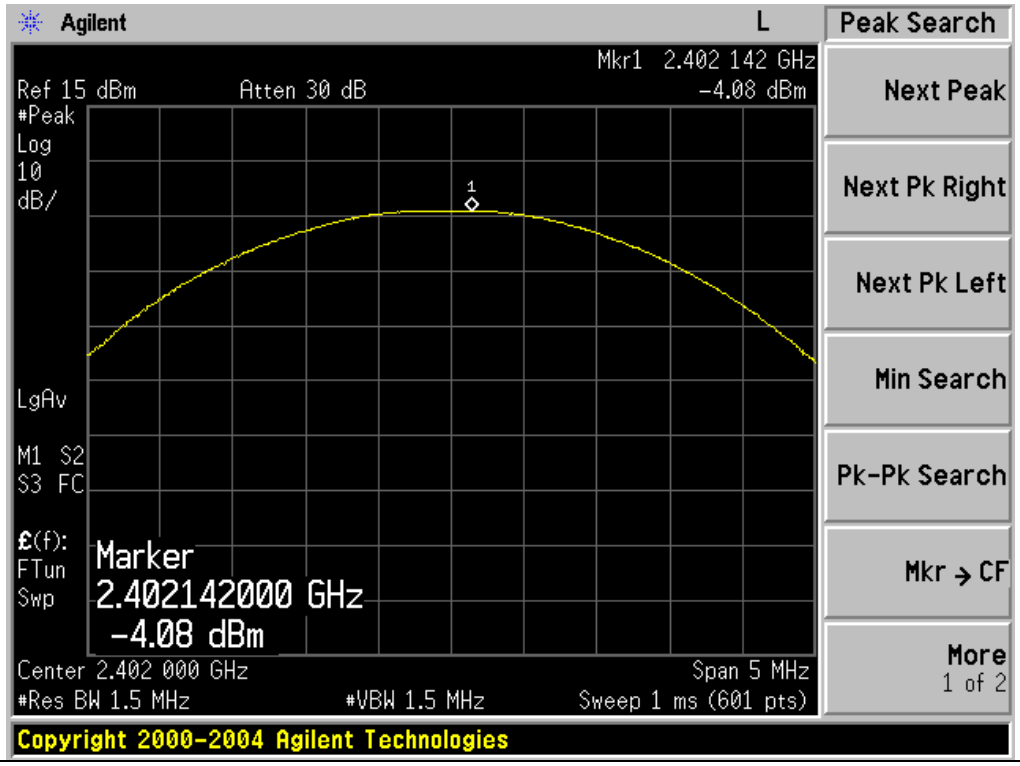
CH39 -2Mbps



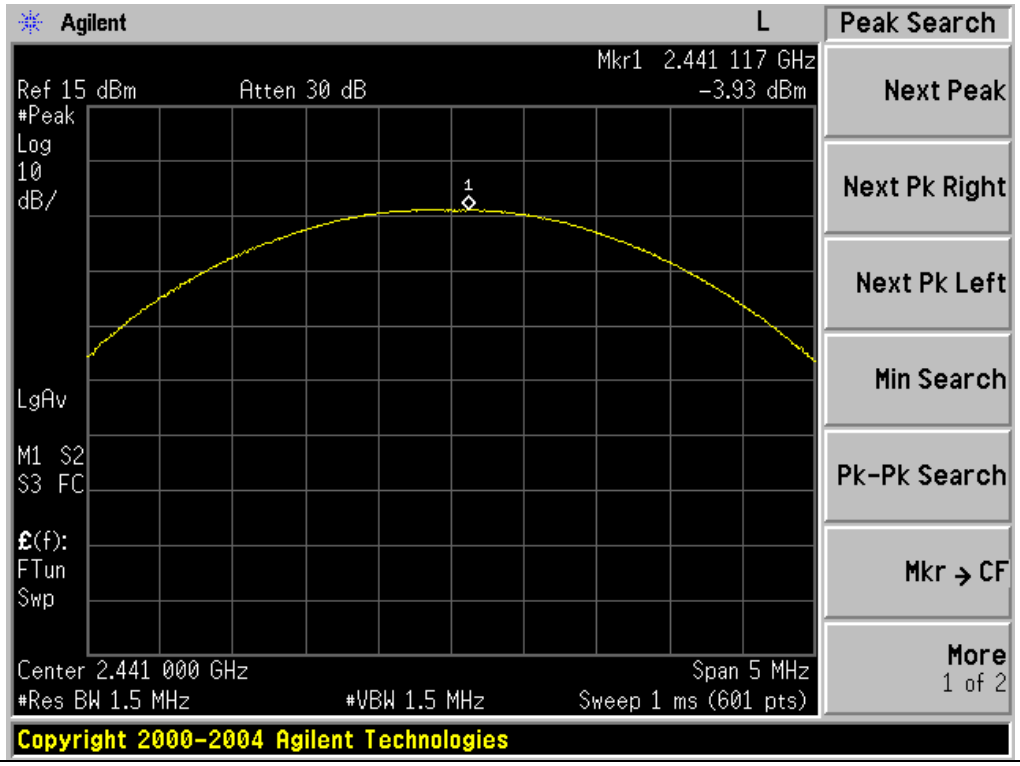
CH78 -2Mbps



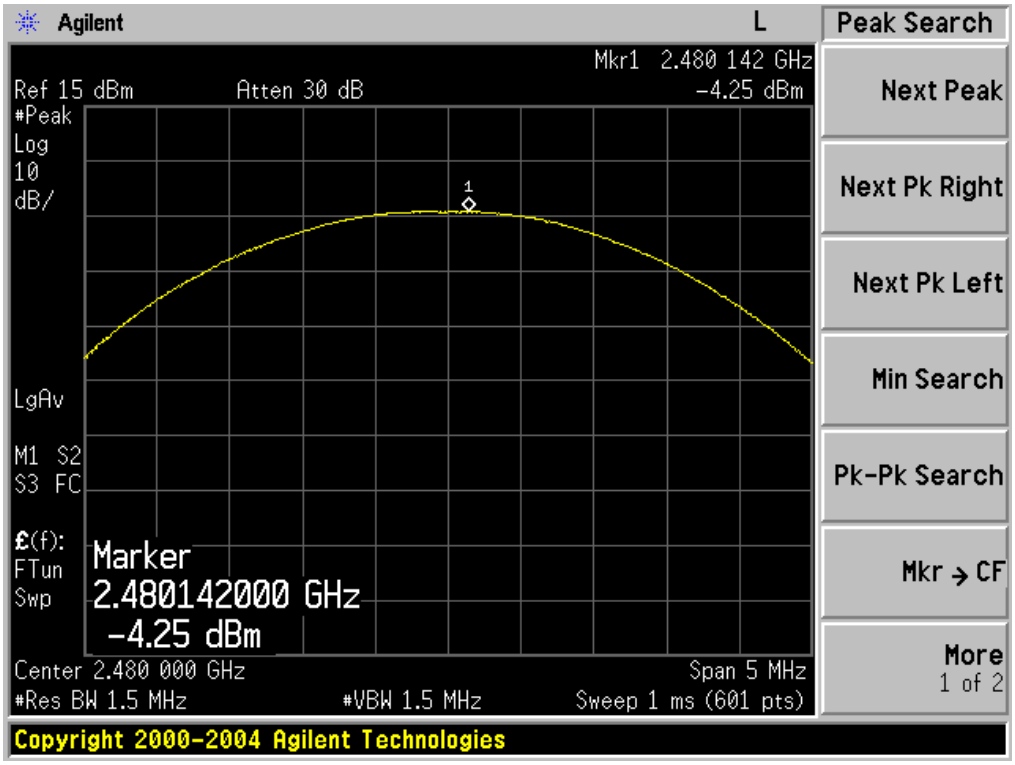
CH00 -3Mbps


Agilent
L
Peak Search
Mkr1 2.402 142 GHz
Ref 15 dBm
Atten 30 dB
-4.08 dBm
#Peak
Log
10
dB/
Next Peak
Next Pk Right
Next Pk Left
Min Search
LgAv
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
2.402142000 GHz
-4.08 dBm
Mkr → CF
Center 2.402 000 GHz
Span 5 MHz
More
1 of 2
#Res BW 1.5 MHz
#VBW 1.5 MHz
Sweep 1 ms (601 pts)
Copyright 2000-2004 Agilent Technologies

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)).

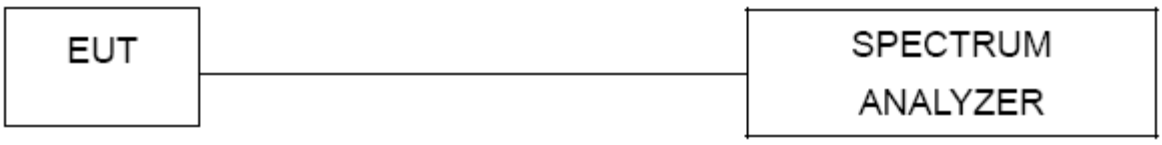
TEST PROCEDURE

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：	Alpha Intelligent Robot	Model Name ：	ALPHA 1S
Temperature：	25 ℃	Relative Humidity：	60%
Pressure：	1012 hPa	Test Voltage ：	DC 7.4V
Test Mode ：	CH00/ CH78 (1M/2M/3Mbps Mode)		

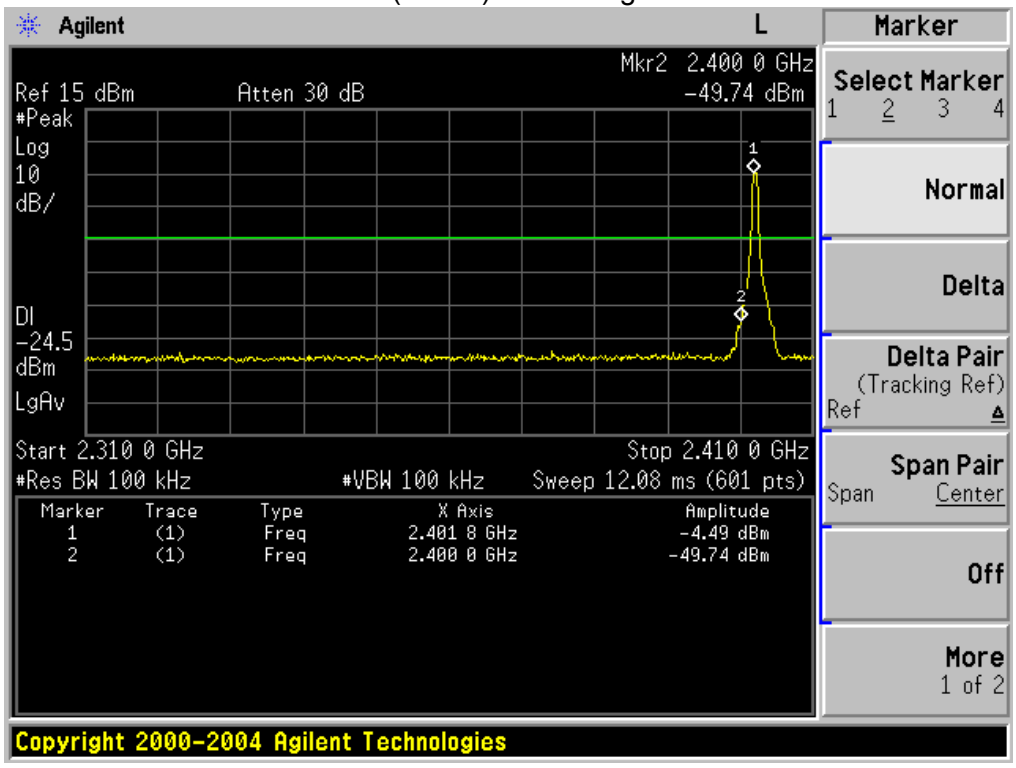
Frequency Band MHz	Delta Peak to band emission (dBc)	＞Limit (dBc)	Result
1Mbps Non-hopping			
2400	45.25	20	Pass
2483.5	56.07	20	Pass
2Mbps Non-hopping			
2400	49.77	20	Pass
2483.5	55.66	20	Pass
3Mbps Non-hopping			
2400	50.31	20	Pass
2483.5	56.07	20	Pass
1Mbps hopping			
2400	49.76	20	Pass
2483.5	56.76	20	Pass
2Mbps hopping			
2400	53.15	20	Pass
2483.5	56.04	20	Pass
3Mbps hopping			
2400	53.16	20	Pass
2483.5	55.29	20	Pass

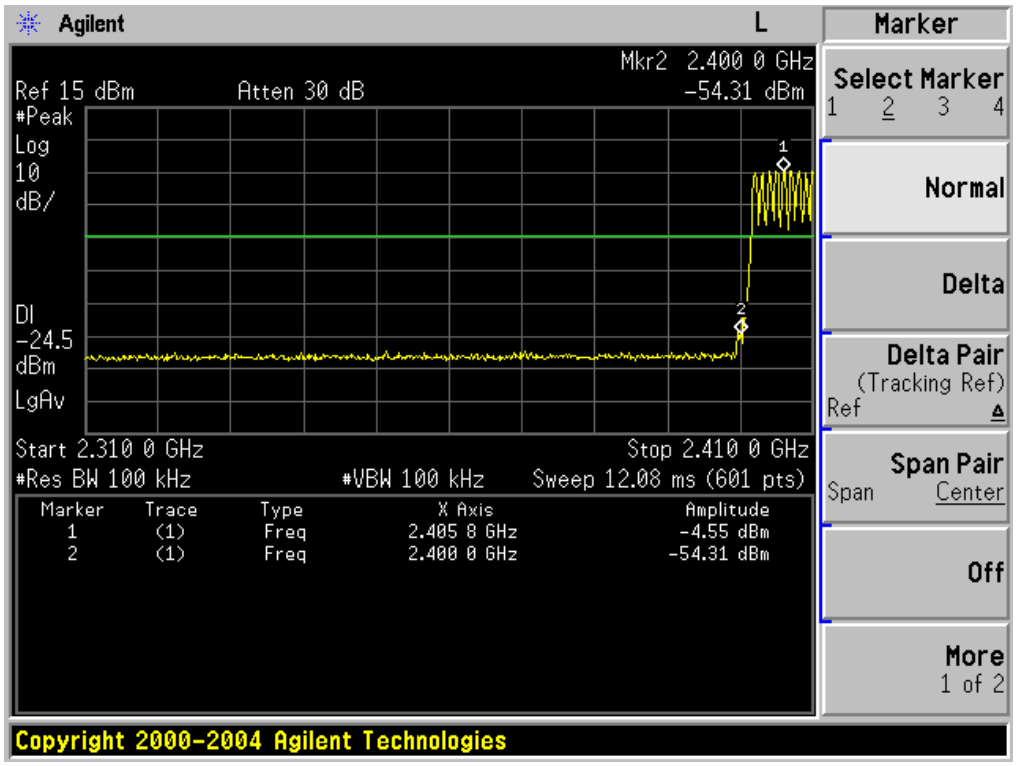
Radiated band edge:

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
1Mbps Non-hopping							
2390	67.29	-13.06	54.23	74	-19.77	peak	Vertical
2390	64.34	-13.06	51.28	74	-22.72	peak	Horizontal
2483.5	66.16	-12.78	53.38	74	-20.62	peak	Vertical
2483.5	62.98	-12.78	50.2	74	-23.8	peak	Horizontal
1Mbps hopping							
2390	67.58	-13.06	54.52	74	-19.48	peak	Vertical
2390	61.94	-13.06	48.88	74	-25.12	peak	Horizontal
2483.5	62.05	-12.78	49.27	74	-24.73	peak	Vertical
2483.5	61.23	-12.78	48.45	74	-25.55	peak	Horizontal
2Mbps Non-hopping							
2390	63.01	-13.06	49.95	74	-24.05	peak	Vertical
2390	63.34	-13.06	50.28	74	-23.72	peak	Horizontal
2483.5	65.59	-12.78	52.81	74	-21.19	peak	Vertical
2483.5	62.12	-12.78	49.34	74	-24.66	peak	Horizontal
2Mbps hopping							
2390	64.58	-13.06	51.52	74	-22.48	peak	Vertical
2390	63.07	-13.06	50.01	74	-23.99	peak	Horizontal
2483.5	66.69	-12.78	53.91	74	-20.09	peak	Vertical
2483.5	59.01	-12.78	46.23	74	-27.77	peak	Horizontal
3Mbps Non-hopping							
2390	64.22	-13.06	51.16	74	-22.84	peak	Vertical
2390	65.77	-13.06	52.71	74	-21.29	peak	Horizontal
2483.5	67.78	-12.78	55	74	-19	peak	Vertical
2483.5	66.4	-12.78	53.62	74	-20.38	peak	Horizontal
3Mbps hopping							
2390	66.07	-13.06	53.01	74	-20.99	peak	Vertical
2390	62.97	-13.06	49.91	74	-24.09	peak	Horizontal
2483.5	64.32	-12.78	51.54	74	-22.46	peak	Vertical
2483.5	65.21	-12.78	52.43	74	-21.57	peak	Horizontal

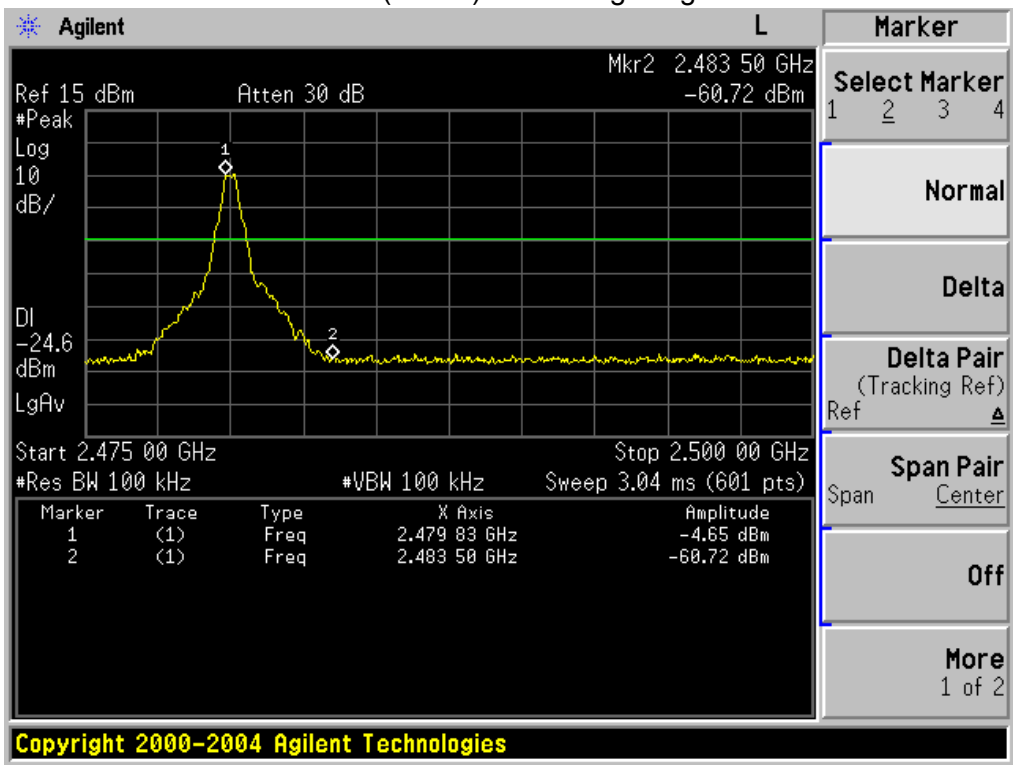
Note: Refer to chapter 3.2 test method, When PK value is lower than the Average value limit, average didn't record.

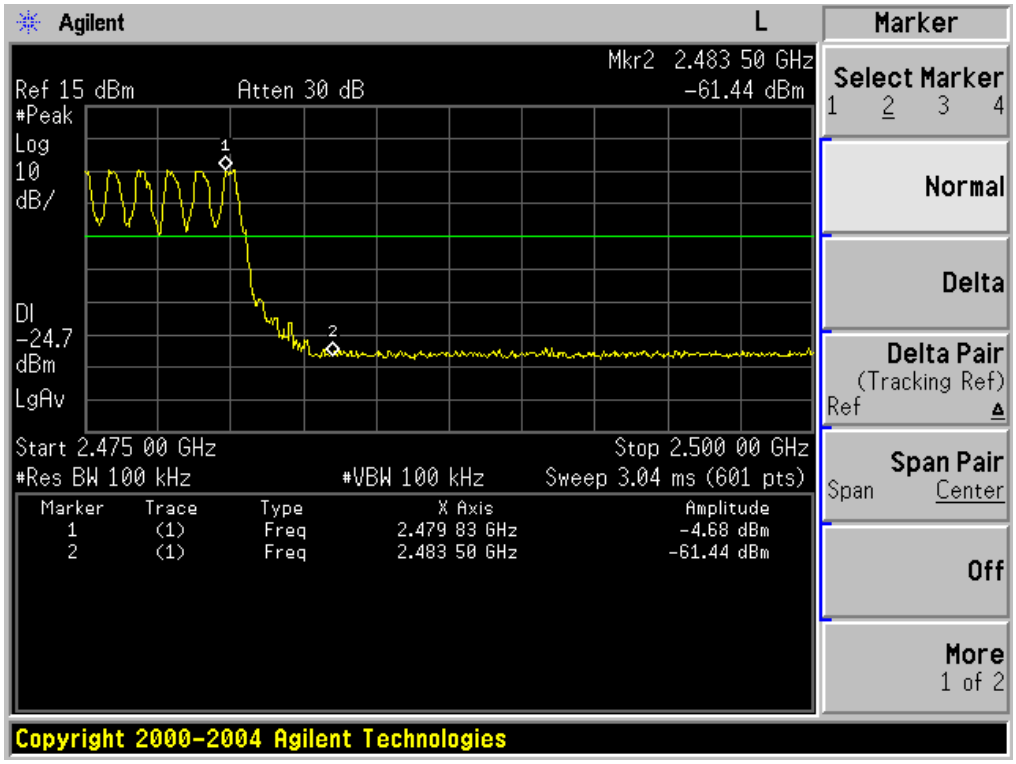
BDR mode (GFSK): Band Edge-Left Side



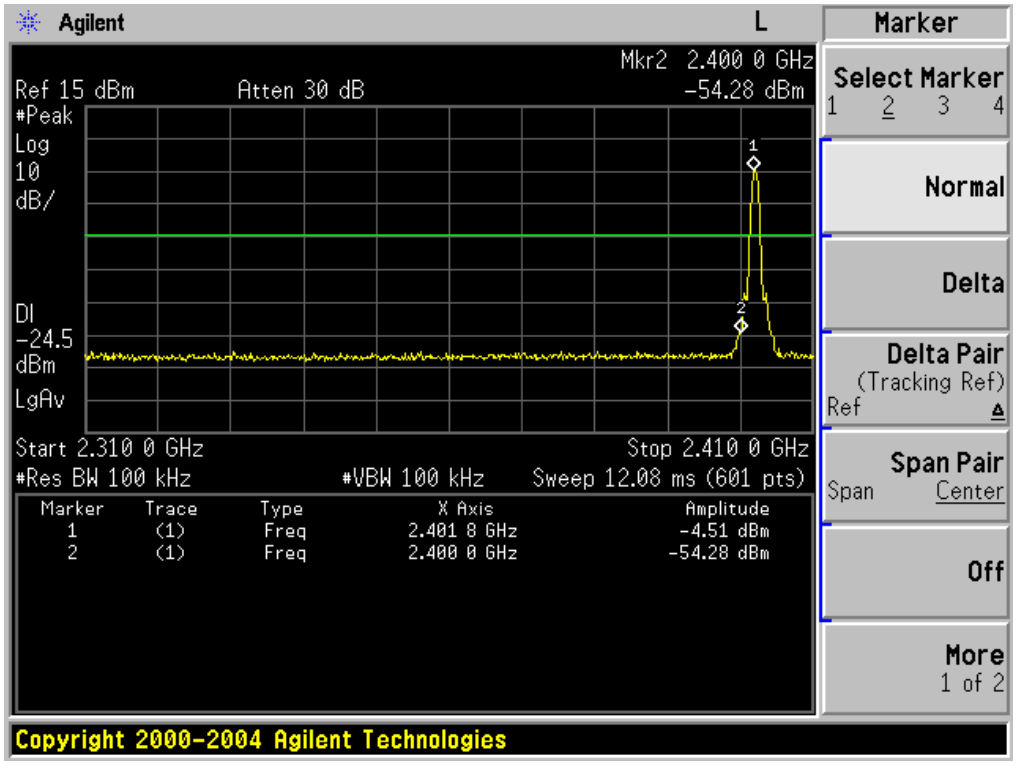


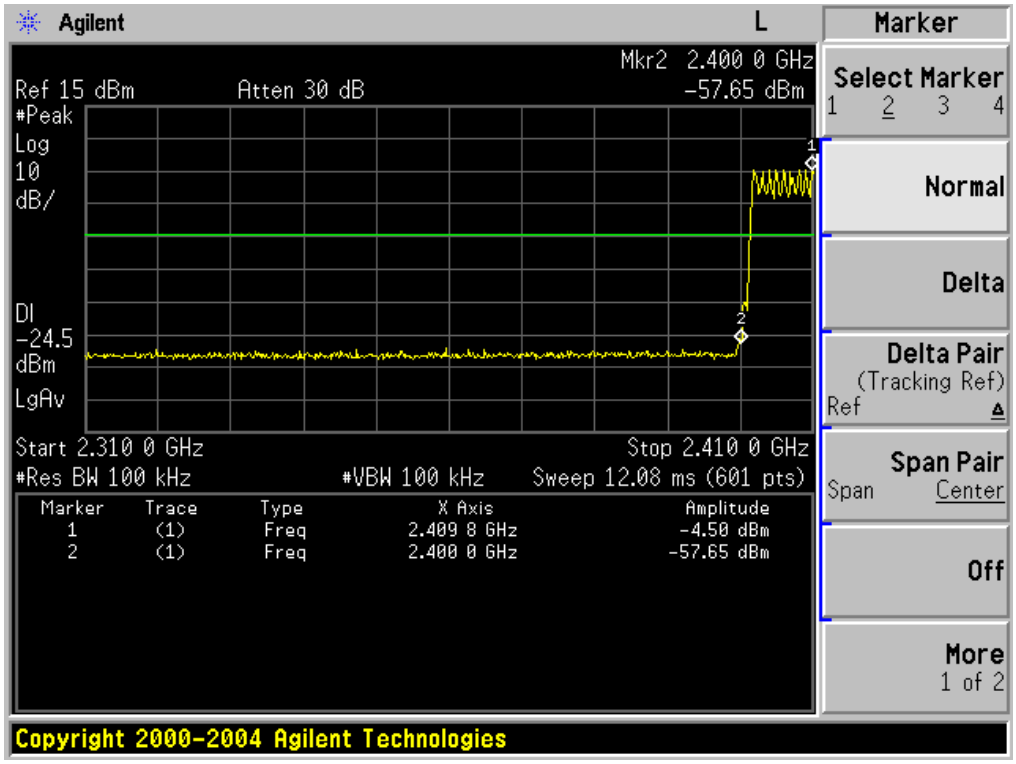
BDR mode (GFSK): Band Edge-Right Side



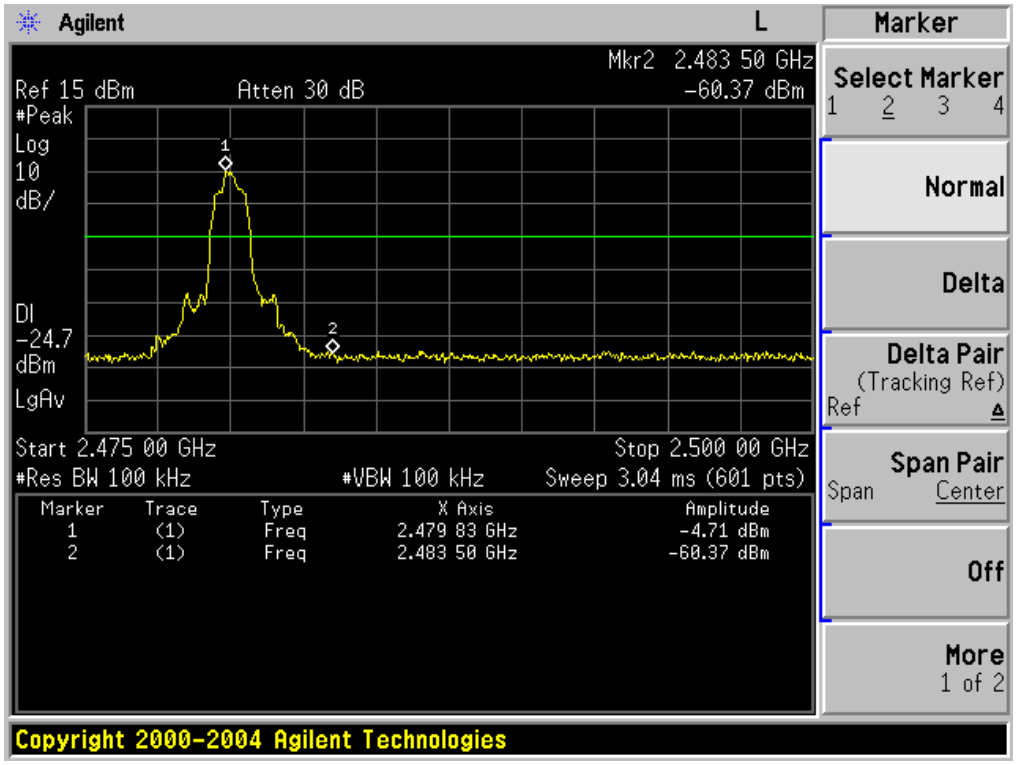


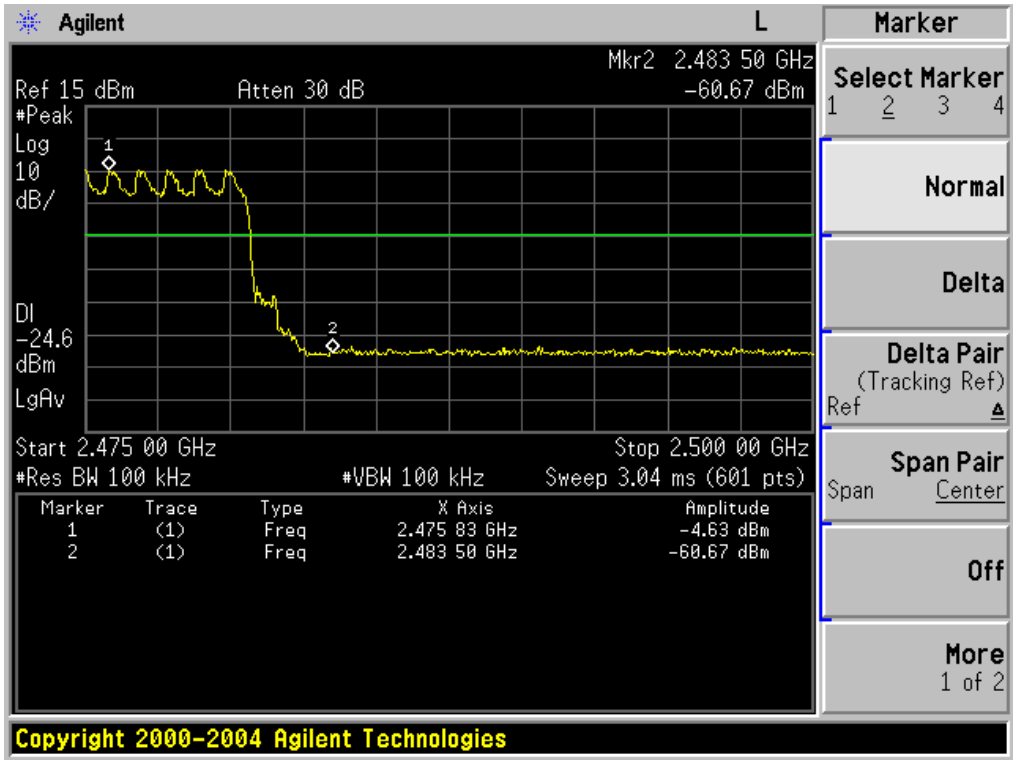
EDR mode (π /4-DQPSK): Band Edge-Left Side



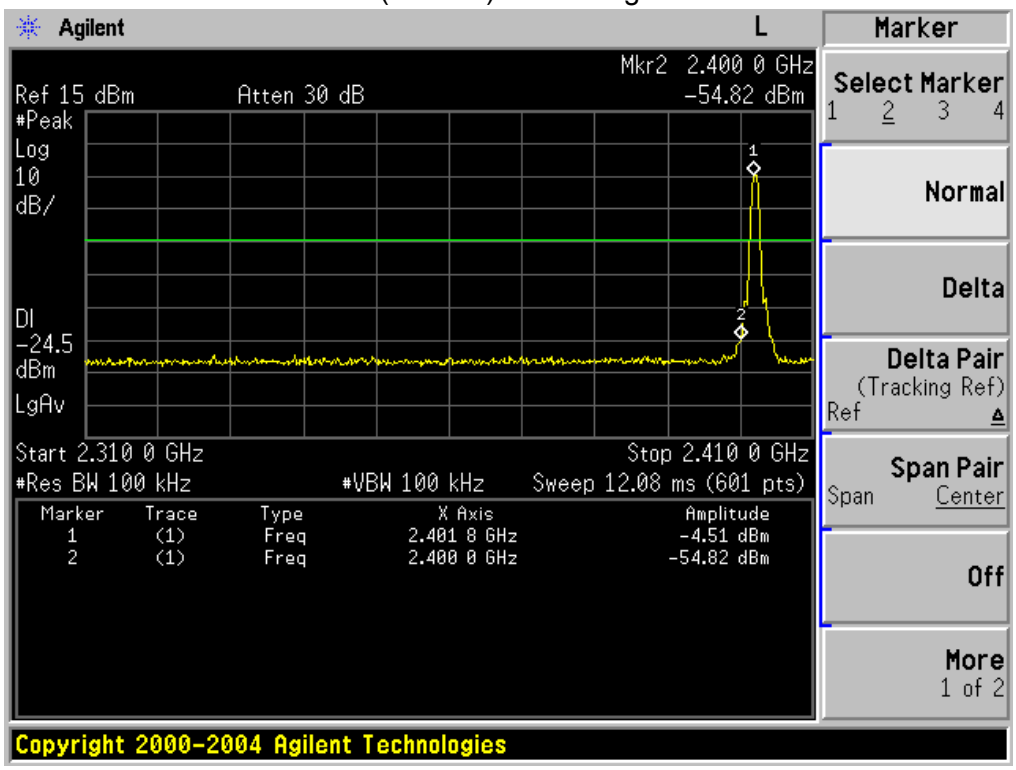


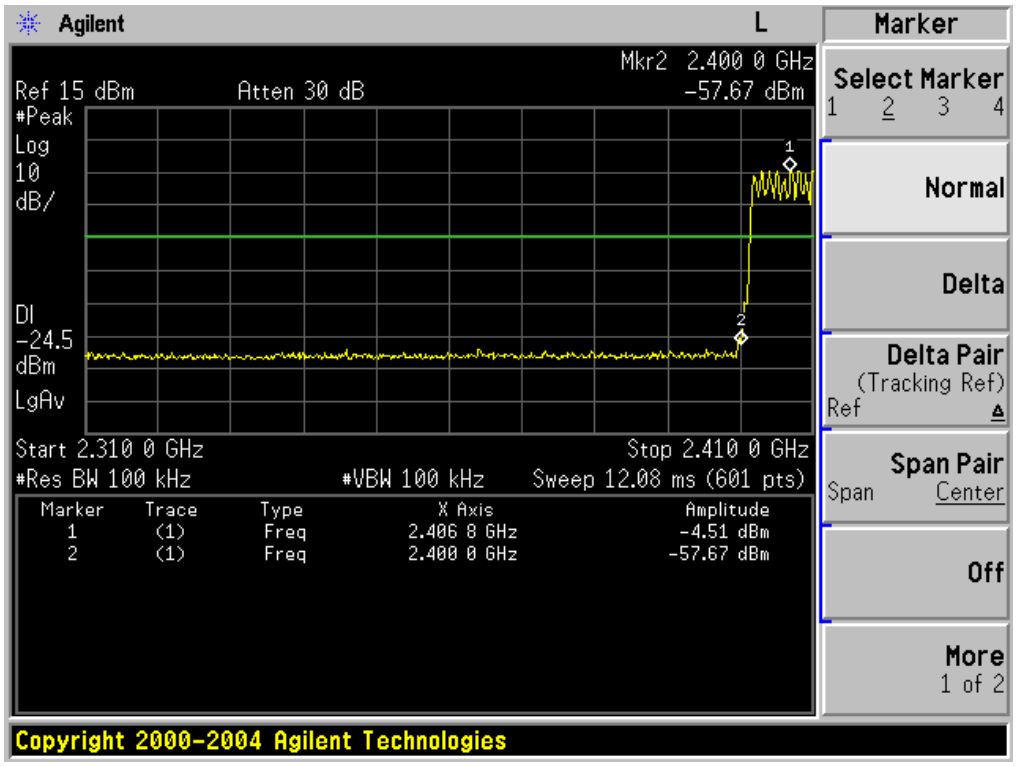
EDR mode (π /4-DQPSK): Band Edge- Right Side



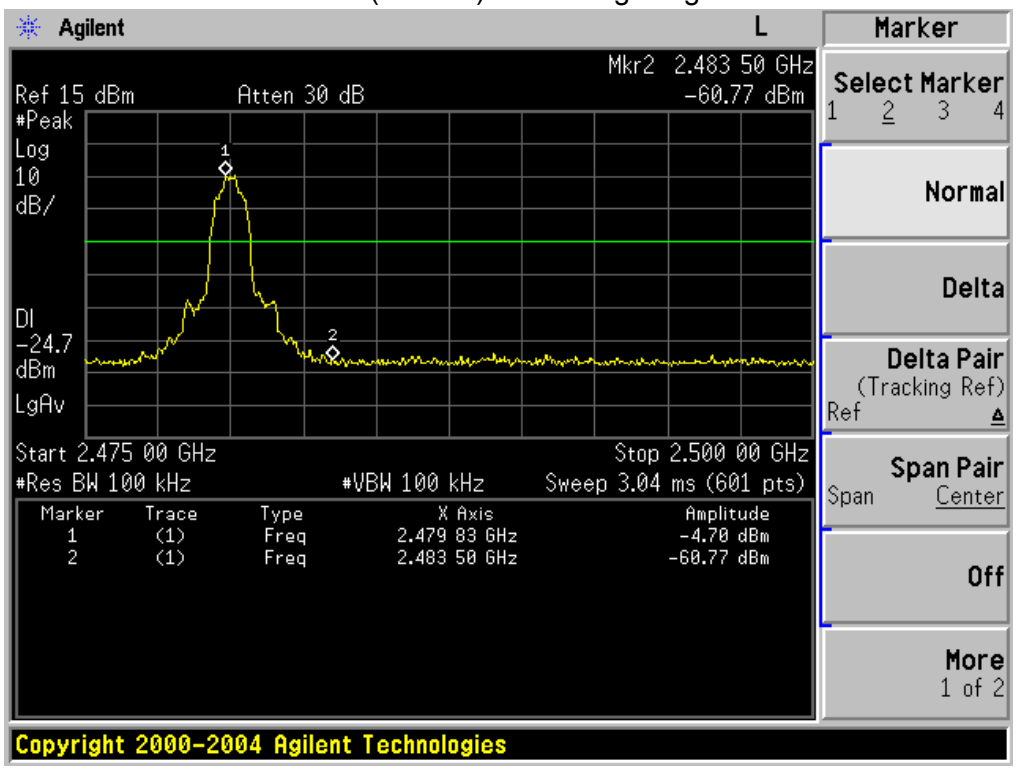


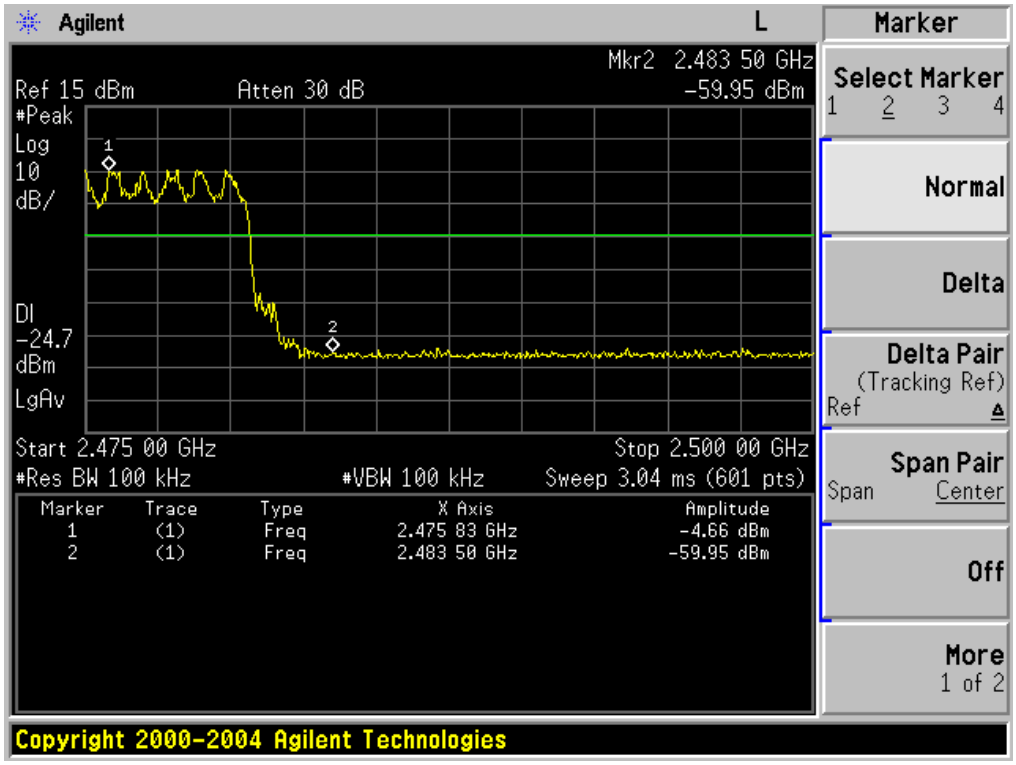
EDR mode(8DPSK): Band Edge-Left Side





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





NOTE: Hopping enabled and disabled have evaluated,and the wortest data was reported

10. ANTENNA REQUIREMENT

10.1 STANDARD REQUIREMENT

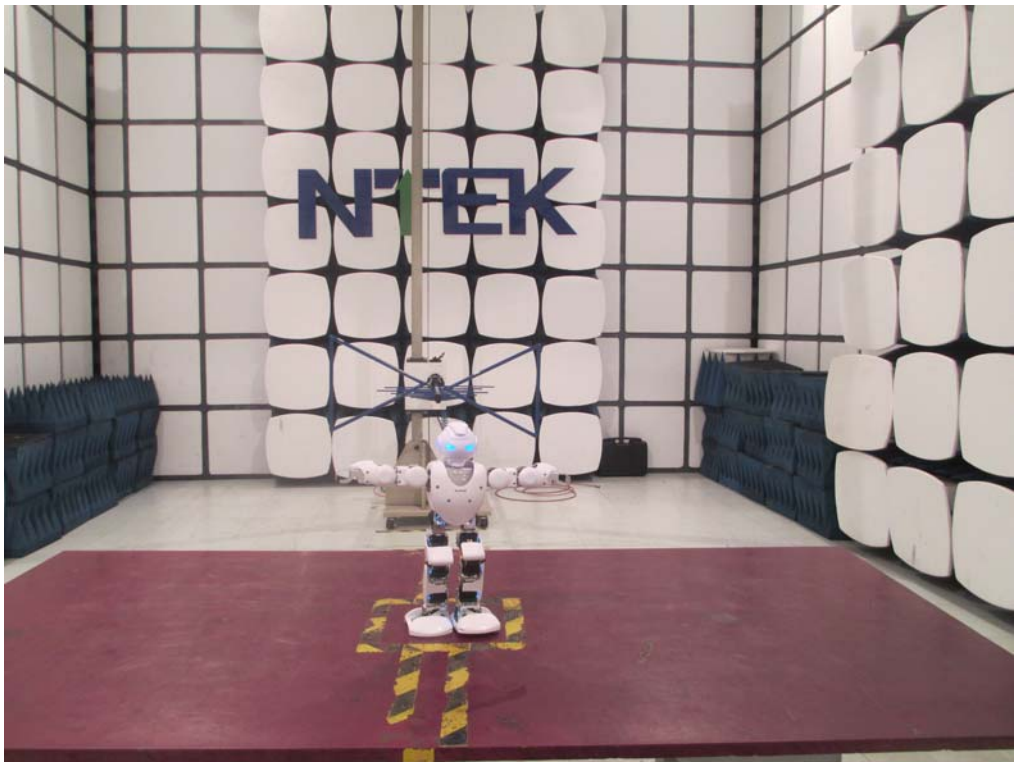
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

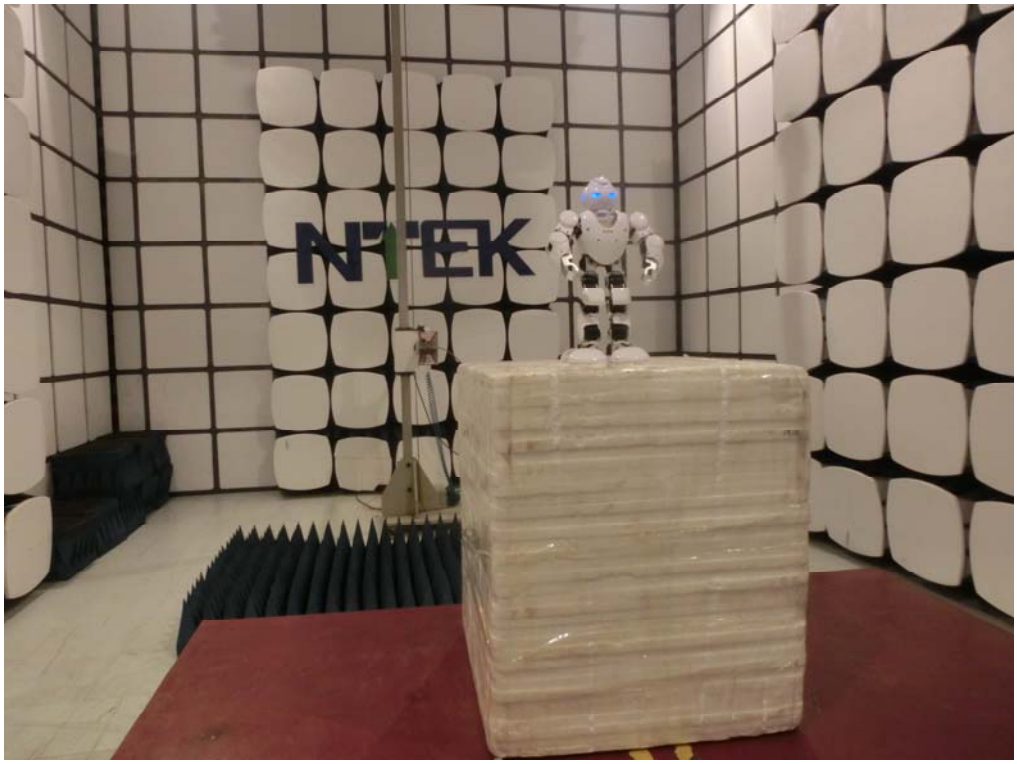
10.2 EUT ANTENNA

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

11. EUT TEST PHOTO

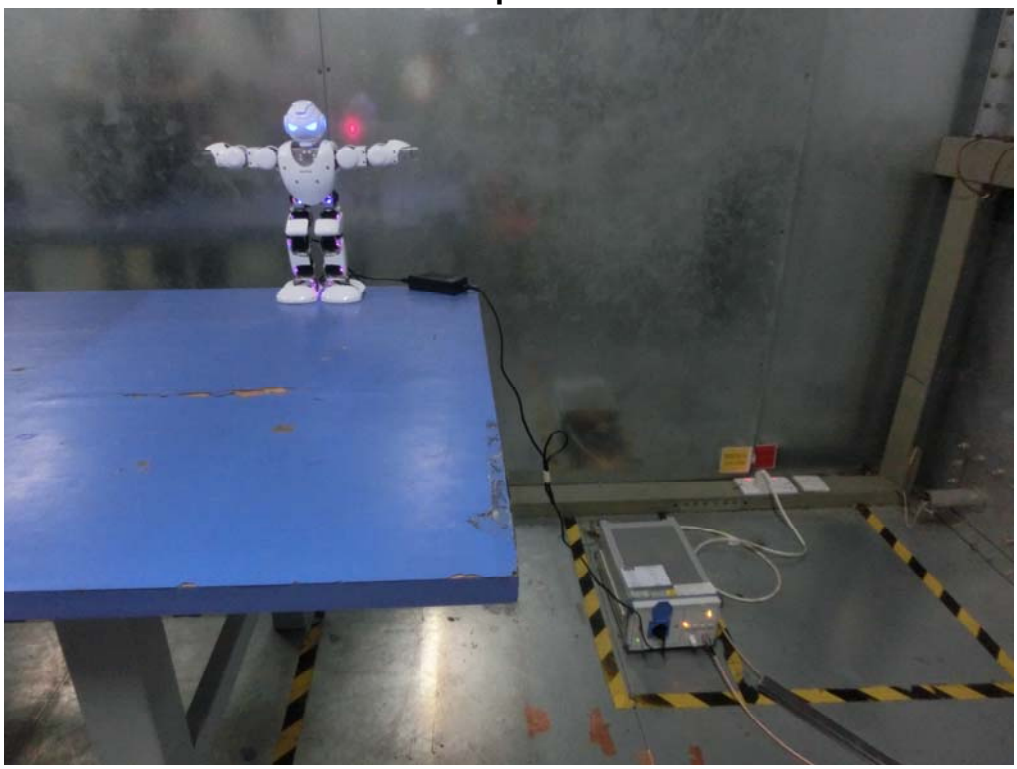
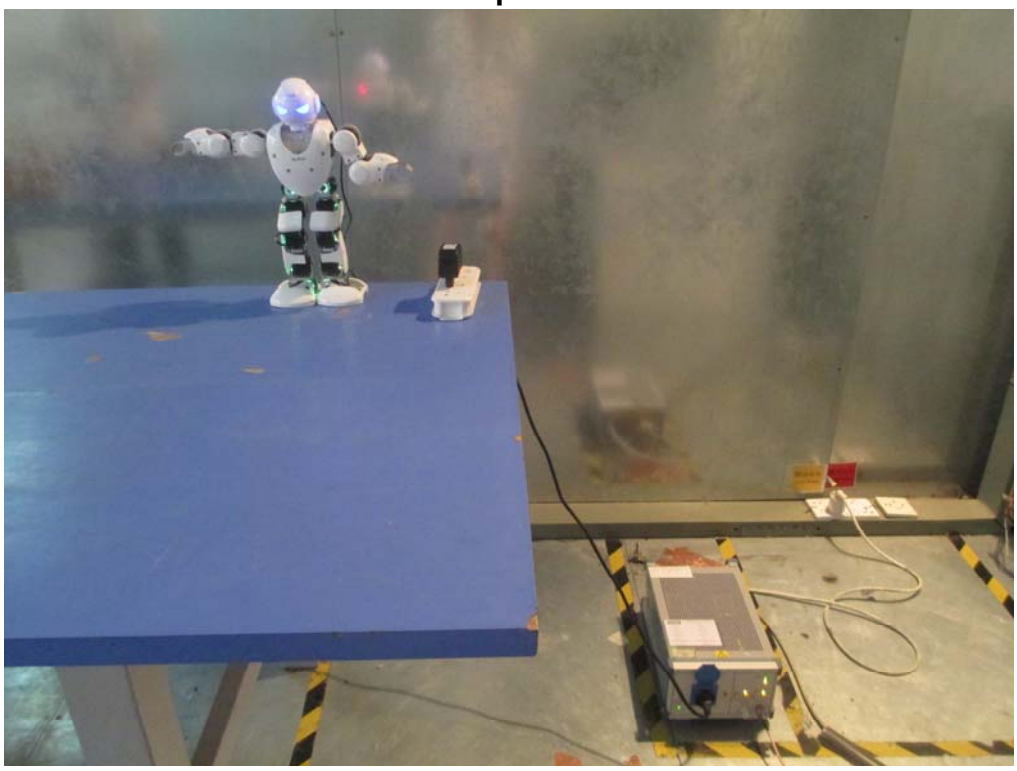
Radiated Measurement Photos





CONDUCTED EMISSION Photos

Adapter 1



Adapter 2