



FCC RADIO TEST REPORT-BLE

FCC ID:2AFJH-ALPHA1S

Product : Alpha Intelligent Robot

Trade Name : N/A

Model Name : ALPHA 1S

Serial Model : N/A

Report No. : NTEK-2015NT05261824F1

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 ALPHA 1S
reference
Serial Model N/A

Standards FCC Part15.247: 01 Oct. 2014

Test procedure ANSI C63.10-2013 and KDB 558074: June 5, 2014

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

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Date of Test

Date (s) of performance of tests.....: 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)(2)	6dB Bandwidth	PASS	
15.247 (b)	Peak Output Power	PASS	
15.247 (c)	Radiated Spurious Emission	PASS	
15.247 (d)	Power Spectral Density	PASS	
15.205	Band Edge Emission	PASS	
15.203	Antenna Requirement	PASS	

NOTE:

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

1.1 TEST FACILITY

NTEK Testing Technology Co., Ltd

Add.:1/F, Building E, Fenda Science Park, Sanwei Community, Xixiang Street, Bao'an District, Shenzhen P.R. China.

FCC Registration No.:238937; IC Registration No.:9270A-1

CNAS Registration No.:L5516

1.2 MEASUREMENT UNCERTAINTY

The reported uncertainty of measurement $y \pm U$, where expanded 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	Alpha Intelligent Robot	
Trade Name	N/A	
Model Name	ALPHA 1S	
Serial Model	N/A	
Model Difference	N/A	
Product Description	The EUT is a Alpha Intelligent Robot	
	Operation Frequency:	2402~2480MHz
	Modulation Type:	GFSK
	Number Of Channel	40CH
	Antenna Designation:	Please see Note 3.
	Antenna Gain (dBi)	1.84dBi
Channel List	Please refer to the Note 2.	
Ratings	DC 7.4V	
Adapter	Adapter 1 Mode: RHD50W096500 Input: 100-240V~, 50/60Hz, 1.5A Output: 9.6V $\overline{\text{---}}$, 5000mA	
	Adapter 2 Mode: DSA-20PFE-12FUS 096200 Input: 100-240V~, 50/60Hz, 0.7A Output: 9.6V $\overline{\text{---}}$, 2A	
Battery	DC 7.4V, 2200mAh	
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	Frequency (MHz)
00	2402
01	2404
.....
.....
...	...
.....
38	2478
39	2480

3.

Table for Filed Antenna

Ant	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	NOTE
A	N/A	N/A	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	CH19
Mode 3	CH39
Mode 4	Link Mode

For Conducted Emission	
Final Test Mode	Description
Mode 4	Link Mode

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

Note:

- (1) The measurements are performed at the highest, middle, lowest available channels.
- (2) The measurements are performed at all Bit Rate of Transmitter, the worst data was reported

2.3 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Conducted Emission Test



Radiated Spurious Emission Test



2.4 DESCRIPTION OF SUPPORT UNITS(CONDUCTED MODE)

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

Item	Equipment	Brand	Model/Type No.	Series No.	Note
E-1	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.

2.5 EQUIPMENTS LIST FOR ALL TEST ITEMS

Radiation Test equipment

Item	Kind of Equipment	Manufacturer	Type No.	Serial No.	Last calibration	Calibrated until	Calibration period
1	Spectrum Analyzer	Agilent	E4407B	MY45108040	2015.07.06	2016.07.05	1 year
2	Test Receiver	R&S	ESPI	101318	2015.06.07	2016.06.06	1 year
3	Bilog Antenna	TESEQ	CBL6111D	31216	2015.07.06	2016.07.05	1 year
4	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2015.06.07	2016.06.06	1 year
5	Spectrum Analyzer	ADVANTEST	R3132	150900201	2015.06.07	2016.06.06	1 year
6	Horn Antenna	EM	EM-AH-10180	2011071402	2015.07.06	2016.07.05	1 year
7	Horn Ant	Schwarzbeck	BBHA 9170	9170-181	2015.07.06	2016.07.05	1 year
8	Amplifier	EM	EM-30180	060538	2014.12.22	2015.12.21	1 year
9	Loop Antenna	ARA	PLA-1030/B	1029	2015.06.08	2016.06.07	1 year
10	Power Meter	R&S	NRVS	100696	2015.07.06	2016.07.05	1 year
11	Power Sensor	R&S	URV5-Z4	0395.1619.05	2015.07.06	2016.07.05	1 year
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
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1	Attenuation	MCE	24-10-34	BN9258	2014.06.08	2015.06.07	1 year
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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

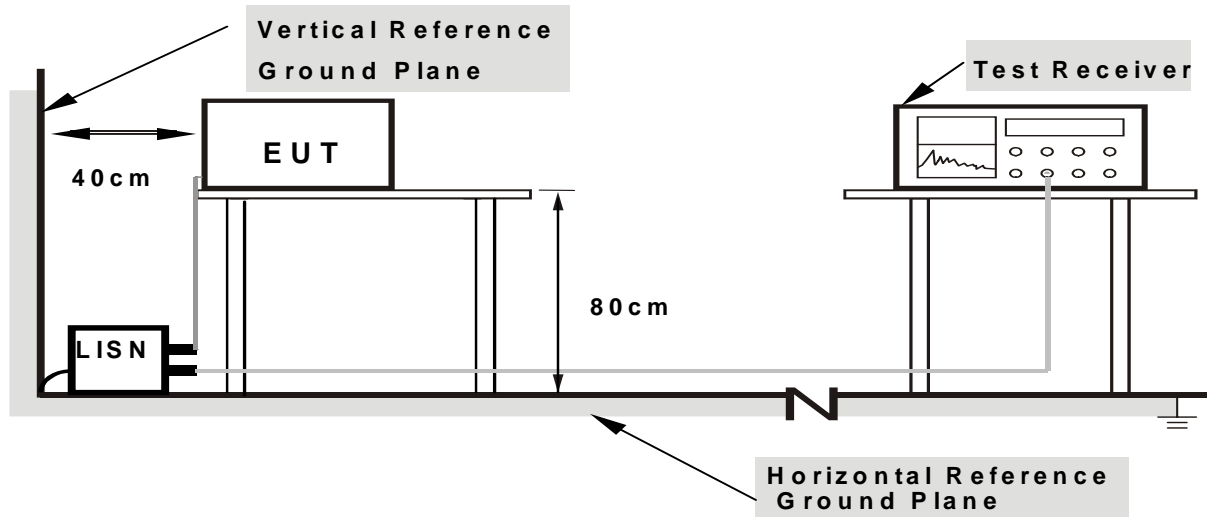
3.1.2 TEST PROCEDURE

- 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.
- 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.
- 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.
- LISN at least 80 cm from nearest part of EUT chassis.
- 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.

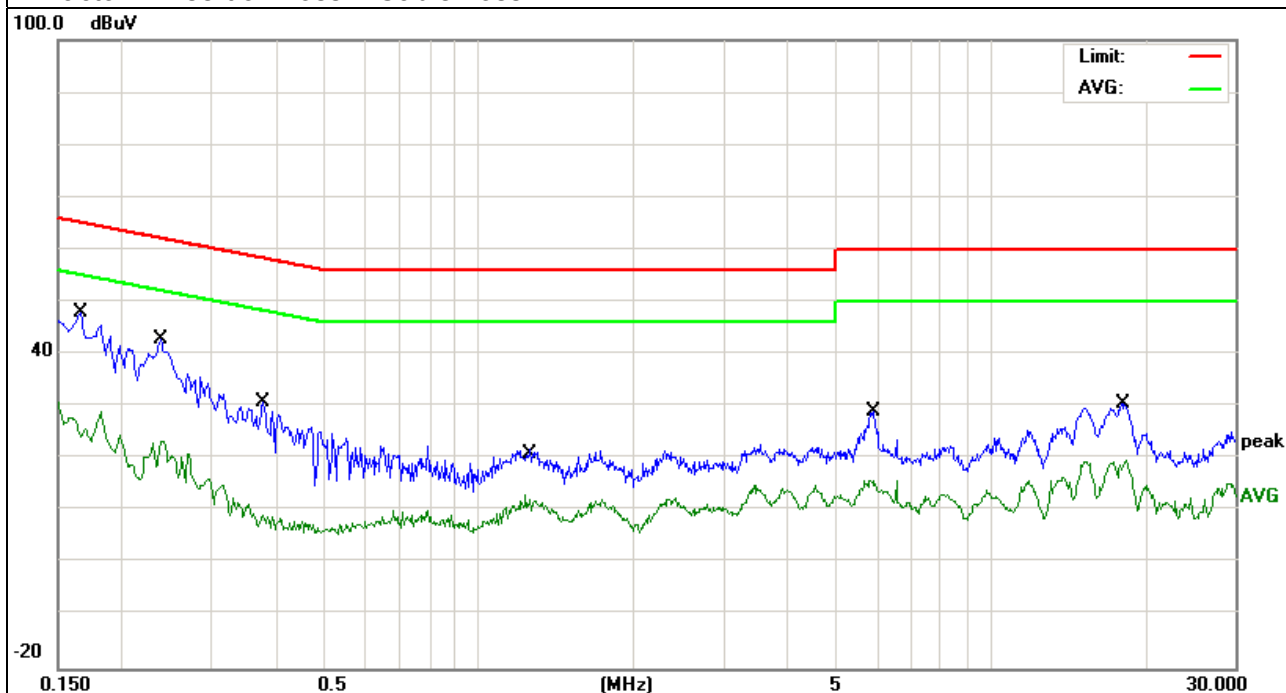
3.1.6 TEST RESULTS

EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 9.6V form Adapter AC 120V/60Hz	Test Mode :	Mode 4-Adapter 1

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Remark
0.1660	38.33	9.62	47.95	65.15	-17.20	QP
0.1660	21.28	9.62	30.90	55.15	-24.25	AVG
0.2380	33.17	9.66	42.83	62.16	-19.33	QP
0.2380	13.64	9.66	23.30	52.16	-28.86	AVG
0.3780	21.54	9.44	30.98	58.32	-27.34	QP
0.3780	1.91	9.44	11.35	48.32	-36.97	AVG
1.2300	12.02	9.71	21.73	56.00	-34.27	QP
1.2300	3.38	9.71	13.09	46.00	-32.91	AVG
5.8778	19.23	9.70	28.93	60.00	-31.07	QP
5.8778	6.21	9.70	15.91	50.00	-34.09	AVG
18.2299	20.62	9.91	30.53	60.00	-29.47	QP
18.2299	9.71	9.91	19.62	50.00	-30.38	AVG

Remark:

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

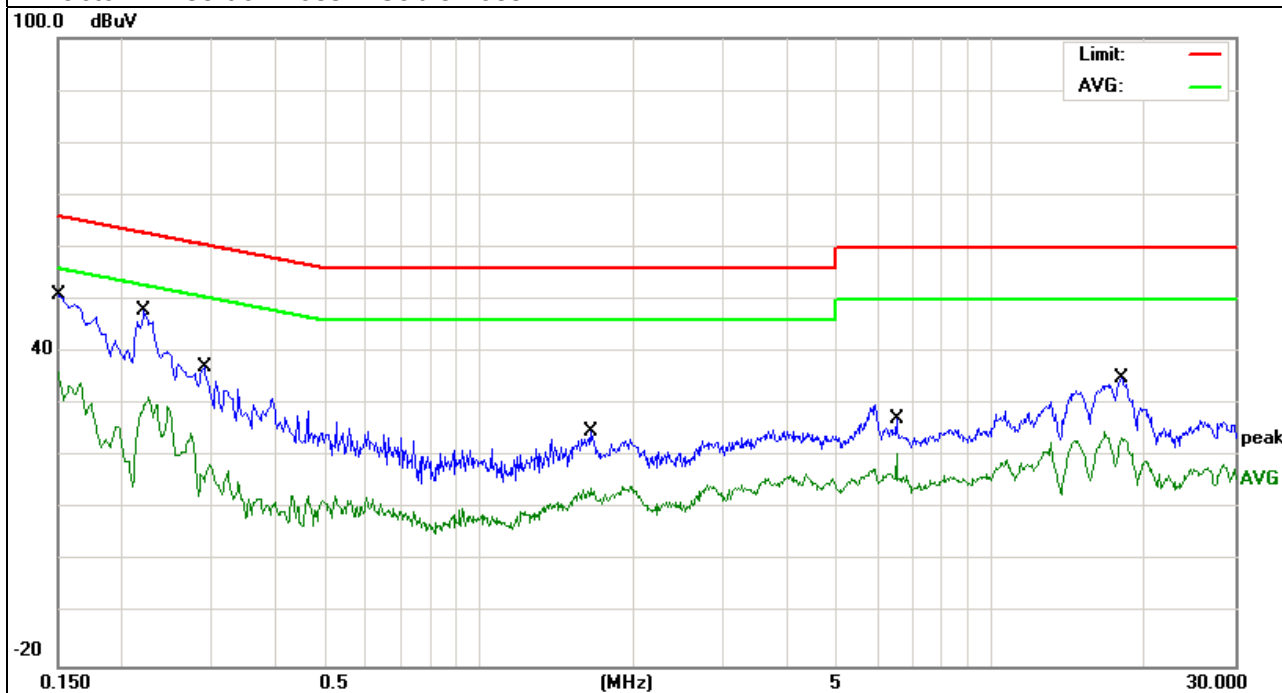


EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 9.6V form Adapter AC 120V/60Hz	Test Mode :	Mode 4-Adapter 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1500	41.21	9.63	50.84	65.99	-15.15	QP
0.1500	26.67	9.63	36.30	55.99	-19.69	AVG
0.2220	38.21	9.64	47.85	62.74	-14.89	QP
0.2220	21.77	9.64	31.41	52.74	-21.33	AVG
0.2900	27.50	9.73	37.23	60.52	-23.29	QP
0.2900	14.82	9.73	24.55	50.52	-25.97	AVG
1.6500	15.07	9.67	24.74	56.00	-31.26	QP
1.6500	4.52	9.67	14.19	46.00	-31.81	AVG
6.5459	20.18	9.70	29.88	60.00	-30.12	QP
6.5459	11.00	9.70	20.70	50.00	-29.30	AVG
18.0339	25.04	9.90	34.94	60.00	-25.06	QP
18.0339	14.94	9.90	24.84	50.00	-25.16	AVG

Remark:

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

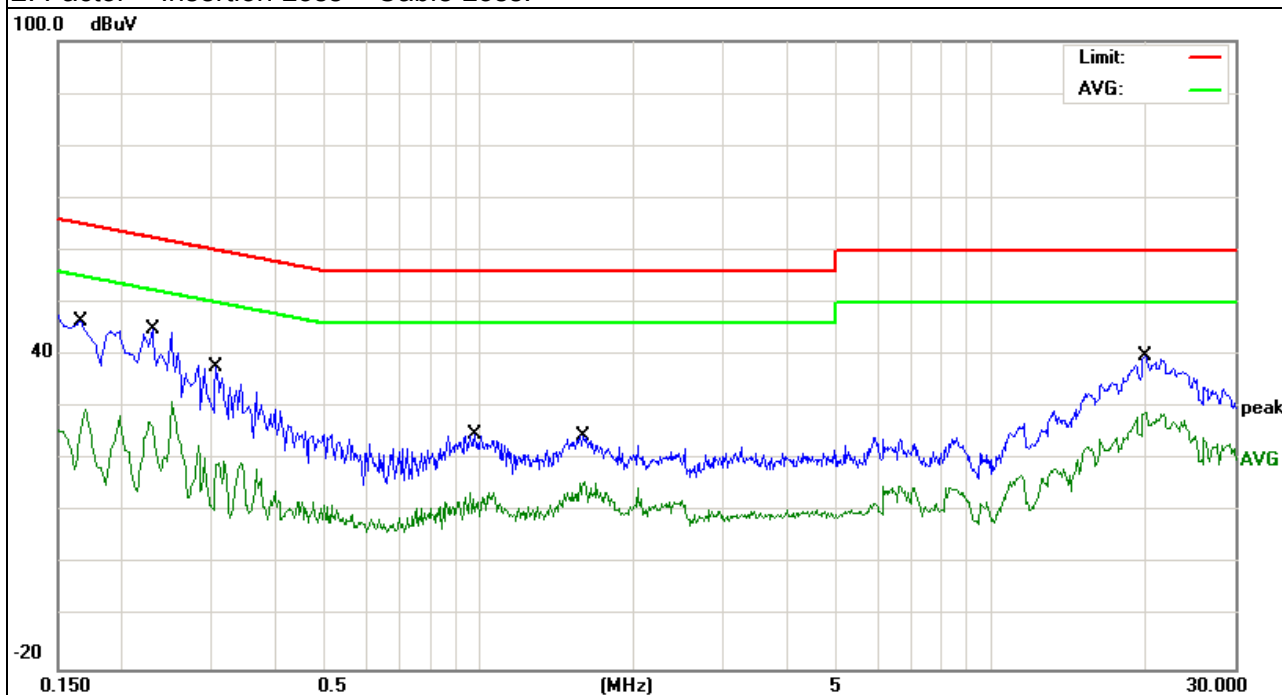


EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 9.6V form Adapter AC 240V/60Hz	Test Mode :	Mode 4-Adapter 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1660	36.95	9.62	46.57	65.15	-18.58	QP
0.1660	20.02	9.62	29.64	55.15	-25.51	AVG
0.2300	35.19	9.65	44.84	62.45	-17.61	QP
0.2300	21.60	9.65	31.25	52.45	-21.20	AVG
0.3060	27.99	9.72	37.71	60.08	-22.37	QP
0.3060	10.04	9.72	19.76	50.08	-30.32	AVG
0.9820	15.26	9.73	24.99	56.00	-31.01	QP
0.9820	4.04	9.73	13.77	46.00	-32.23	AVG
1.6100	14.85	9.68	24.53	56.00	-31.47	QP
1.6100	6.03	9.68	15.71	46.00	-30.29	AVG
19.9860	29.89	9.97	39.86	60.00	-20.14	QP
19.9860	19.18	9.97	29.15	50.00	-20.85	AVG

Remark:

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

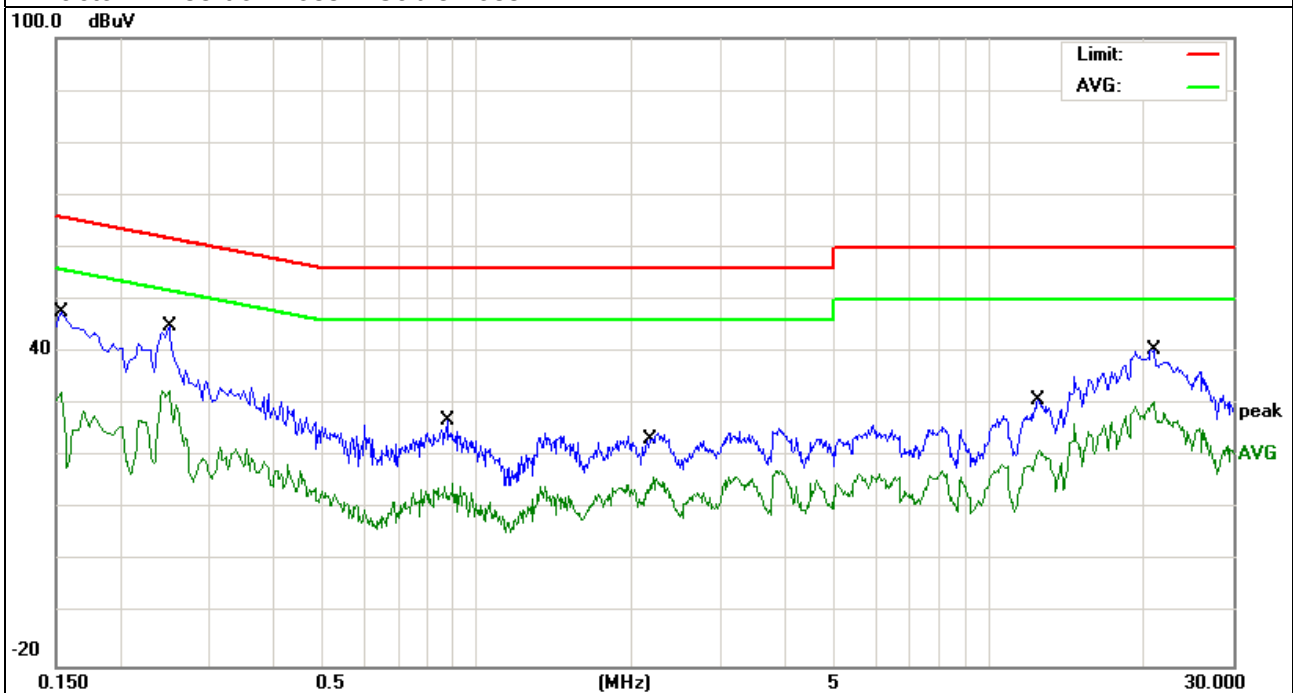


EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 9.6V form Adapter AC 240V/60Hz	Test Mode :	Mode 4-Adapter 1

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1539	38.05	9.60	47.65	65.78	-18.13	QP
0.1539	22.64	9.60	32.24	55.78	-23.54	AVG
0.2500	35.41	9.61	45.02	61.75	-16.73	QP
0.2500	23.07	9.61	32.68	51.75	-19.07	AVG
0.8739	17.24	9.63	26.87	56.00	-29.13	QP
0.8739	5.20	9.63	14.83	46.00	-31.17	AVG
2.2058	15.13	9.54	24.67	56.00	-31.33	QP
2.2058	6.65	9.54	16.19	46.00	-29.81	AVG
12.5299	21.04	9.71	30.75	60.00	-29.25	QP
12.5299	11.49	9.71	21.20	50.00	-28.80	AVG
20.9900	30.59	9.86	40.45	60.00	-19.55	QP
20.9900	20.70	9.86	30.56	50.00	-19.44	AVG

Remark:

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

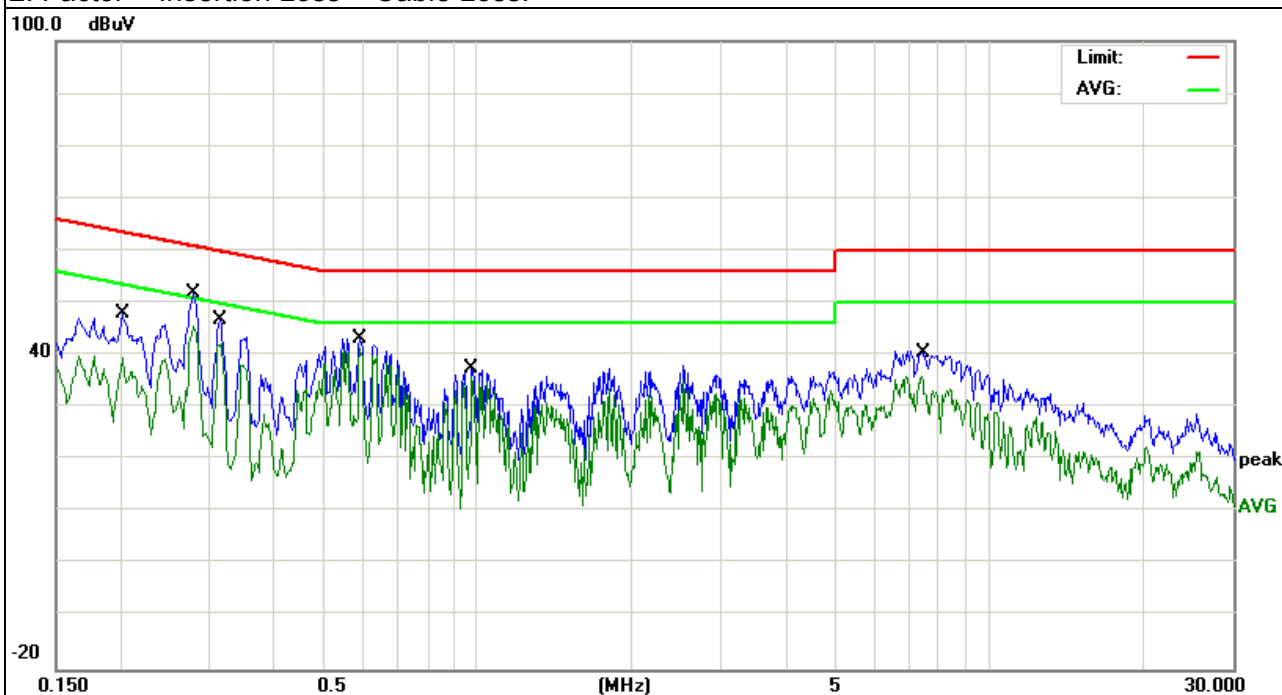


EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 9.6V form Adapter AC 120V/60Hz	Test Mode :	Mode 4- Adapter 2

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2020	38.38	9.61	47.99	63.52	-15.53	QP
0.2020	29.93	9.61	39.54	53.52	-13.98	AVG
0.2779	42.15	9.61	51.76	60.88	-9.12	QP
0.2779	36.02	9.61	45.63	50.88	-5.25	AVG
0.3149	37.05	9.62	46.67	59.84	-13.17	QP
0.3149	32.49	9.62	42.11	49.84	-7.73	AVG
0.5897	33.51	9.66	43.17	56.00	-12.83	QP
0.5897	31.76	9.66	41.42	46.00	-4.58	AVG
0.9778	27.92	9.61	37.53	56.00	-18.47	QP
0.9778	26.35	9.61	35.96	46.00	-10.04	AVG
7.3779	31.34	9.53	40.87	60.00	-19.13	QP
7.3779	26.48	9.53	36.01	50.00	-13.99	AVG

Remark:

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

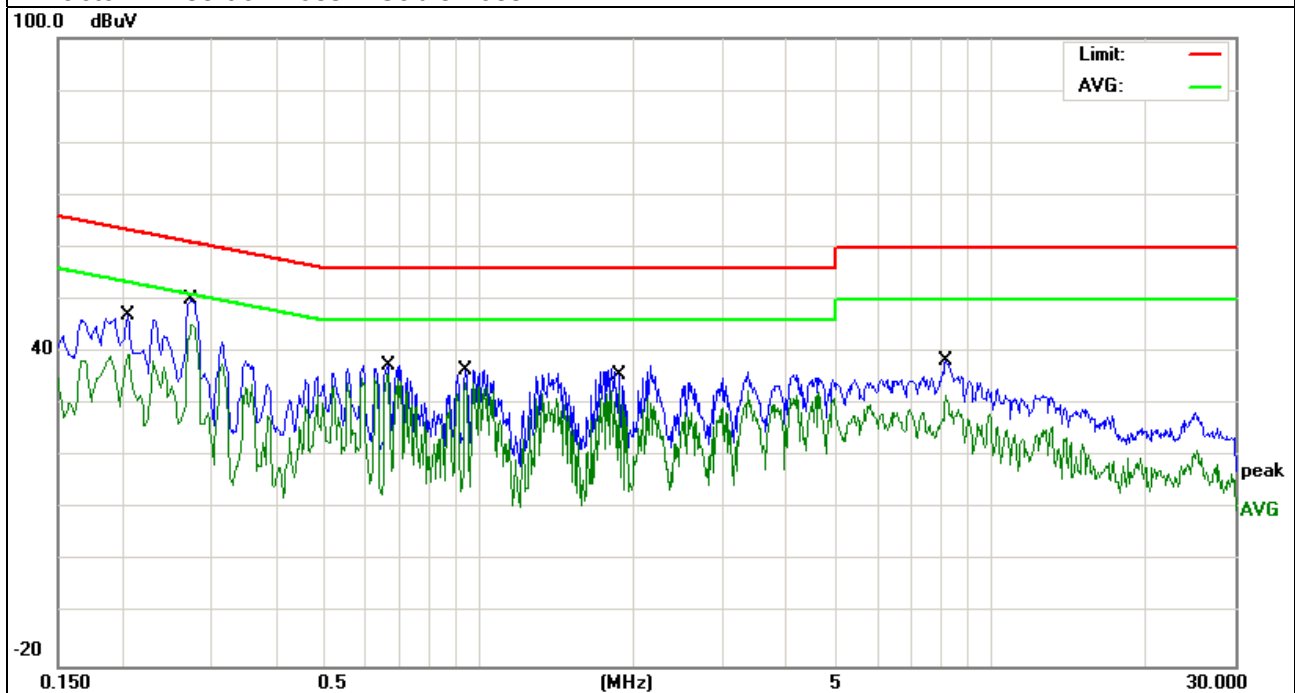


EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 9.6V form Adapter AC 120V/60Hz	Test Mode :	Mode 4- Adapter 2

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.2058	37.29	9.61	46.90	63.37	-16.47	QP
0.2058	30.06	9.61	39.67	53.37	-13.70	AVG
0.2740	40.33	9.61	49.94	60.99	-11.05	QP
0.2740	35.73	9.61	45.34	50.99	-5.65	AVG
0.6580	27.72	9.65	37.37	56.00	-18.63	QP
0.6580	26.23	9.65	35.88	46.00	-10.12	AVG
0.9415	26.89	9.62	36.51	56.00	-19.49	QP
0.9415	24.55	9.62	34.17	46.00	-11.83	AVG
1.8740	27.30	9.55	36.85	56.00	-19.15	QP
1.8740	23.25	9.55	32.80	46.00	-13.20	AVG
8.1897	28.67	9.57	38.24	60.00	-21.76	QP
8.1897	22.07	9.57	31.64	50.00	-18.36	AVG

Remark:

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

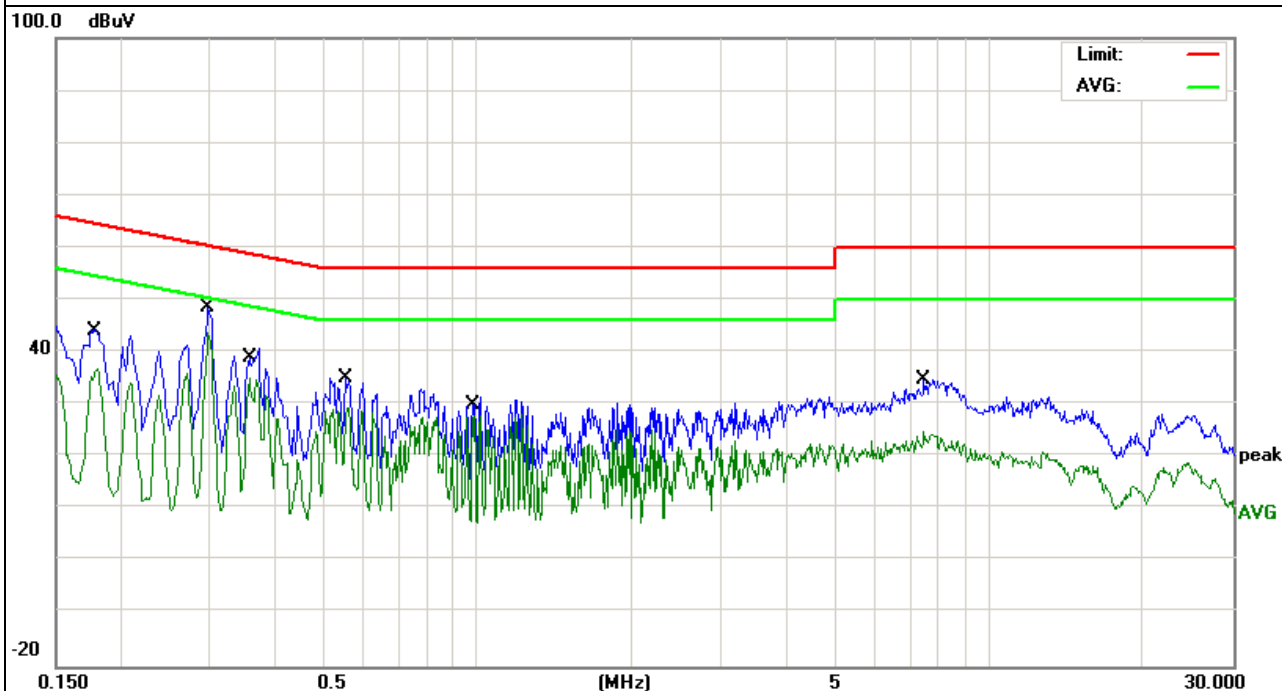


EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	L
Test Voltage :	DC 9.6V form Adapter AC 240V/60Hz	Test Mode :	Mode 4- Adapter 2

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1804	34.67	9.62	44.29	64.46	-20.17	QP
0.1804	27.27	9.62	36.89	54.46	-17.57	AVG
0.2977	38.69	9.74	48.43	60.30	-11.87	QP
0.2977	34.13	9.74	43.87	50.30	-6.43	AVG
0.3578	31.09	9.52	40.61	58.78	-18.17	QP
0.3578	25.59	9.52	35.11	48.78	-13.67	AVG
0.5580	25.40	9.78	35.18	56.00	-20.82	QP
0.5580	19.43	9.78	29.21	46.00	-16.79	AVG
0.9858	23.13	9.73	32.86	56.00	-23.14	QP
0.9858	17.97	9.73	27.70	46.00	-18.30	AVG
7.4698	24.91	9.70	34.61	60.00	-25.39	QP
7.4698	15.07	9.70	24.77	50.00	-25.23	AVG

Remark:

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

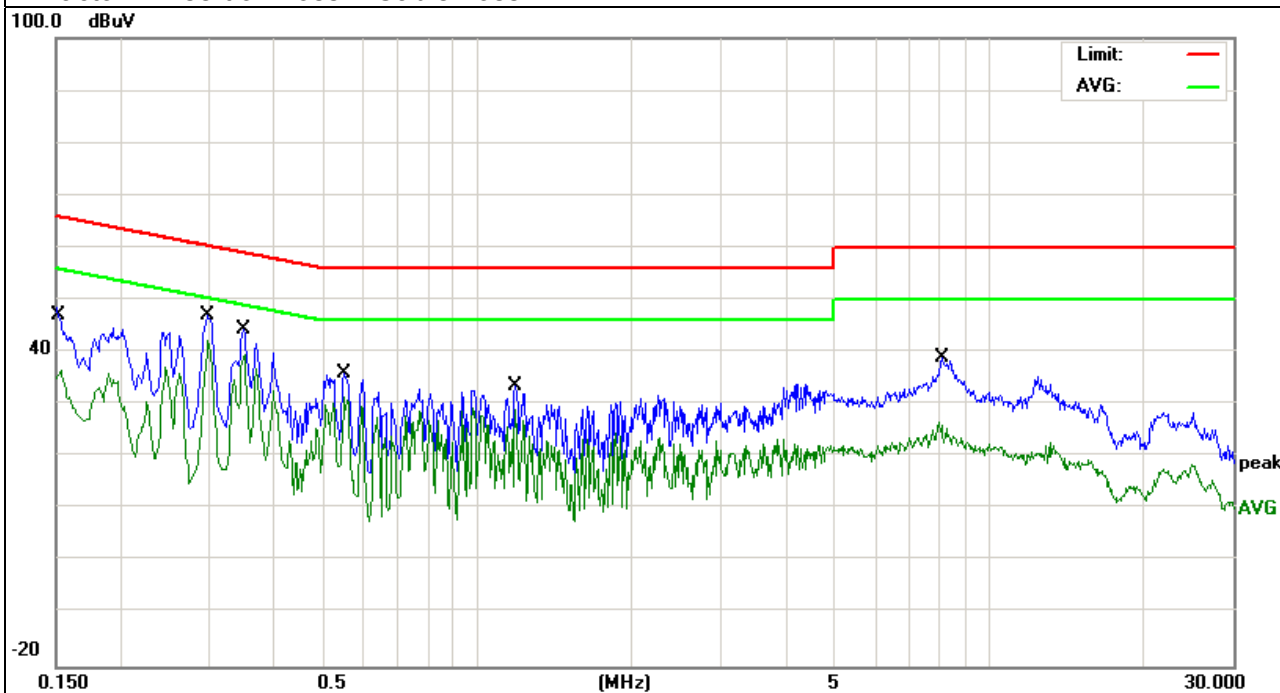


EUT :	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature :	26 °C	Relative Humidity :	56%
Pressure :	1010hPa	Phase :	N
Test Voltage :	DC 9.6V form Adapter AC 240V/60Hz	Test Mode :	Mode 4- Adapter 2

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
(MHz)	(dBμV)	(dB)	(dBμV)	(dBμV)	(dB)	
0.1539	38.91	9.60	48.51	65.78	-17.27	QP
0.1539	26.83	9.60	36.43	55.78	-19.35	AVG
0.2977	37.51	9.61	47.12	60.30	-13.18	QP
0.2977	32.77	9.61	42.38	50.30	-7.92	AVG
0.3501	34.76	9.63	44.39	58.96	-14.57	QP
0.3501	29.89	9.63	39.52	48.96	-9.44	AVG
0.5500	26.14	9.67	35.81	56.00	-20.19	QP
0.5500	21.63	9.67	31.30	46.00	-14.70	AVG
1.1896	24.05	9.60	33.65	56.00	-22.35	QP
1.1896	19.52	9.60	29.12	46.00	-16.88	AVG
8.1178	29.25	9.56	38.81	60.00	-21.19	QP
8.1178	17.14	9.56	26.70	50.00	-23.30	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).

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

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

3.2.2 TEST PROCEDURE

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

Note:

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

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

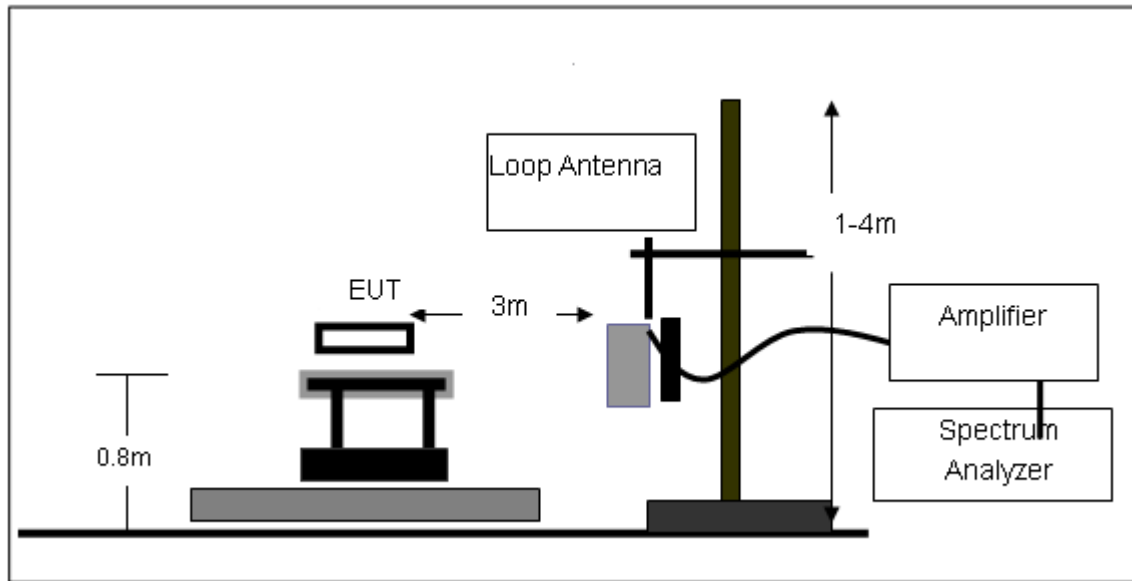
Frequency Band (MHz)	Function	Resolution bandwidth	Video Bandwidth
30 to 1000	QP	120 kHz	300 kHz
Above 1000	Peak	1 MHz	1 MHz
	Peak	1 MHz	10 Hz

3.2.3 DEVIATION FROM TEST STANDARD

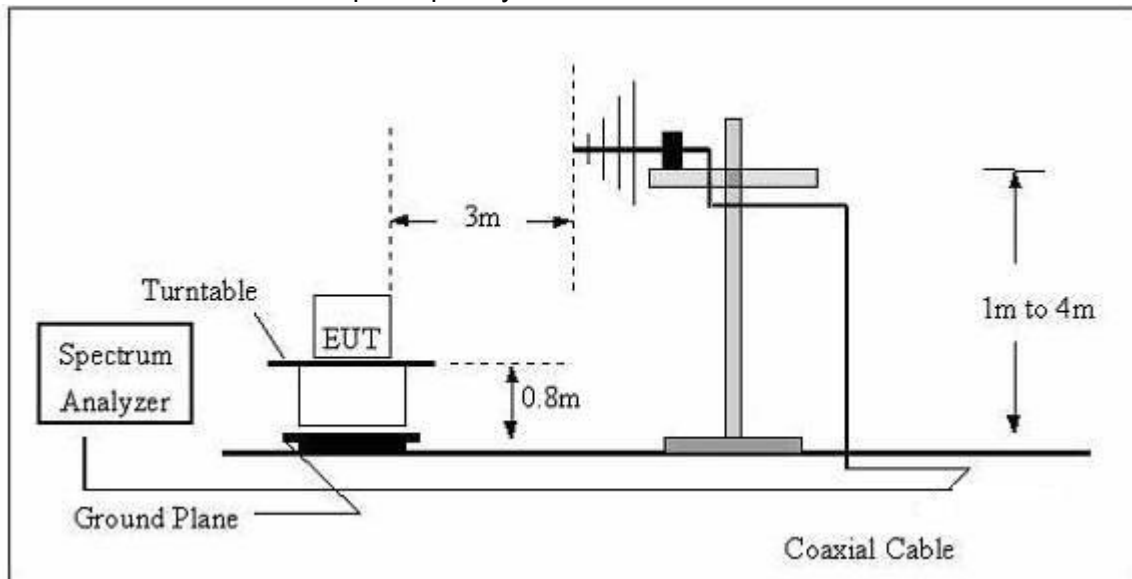
No deviation

3.2.4 TEST SETUP

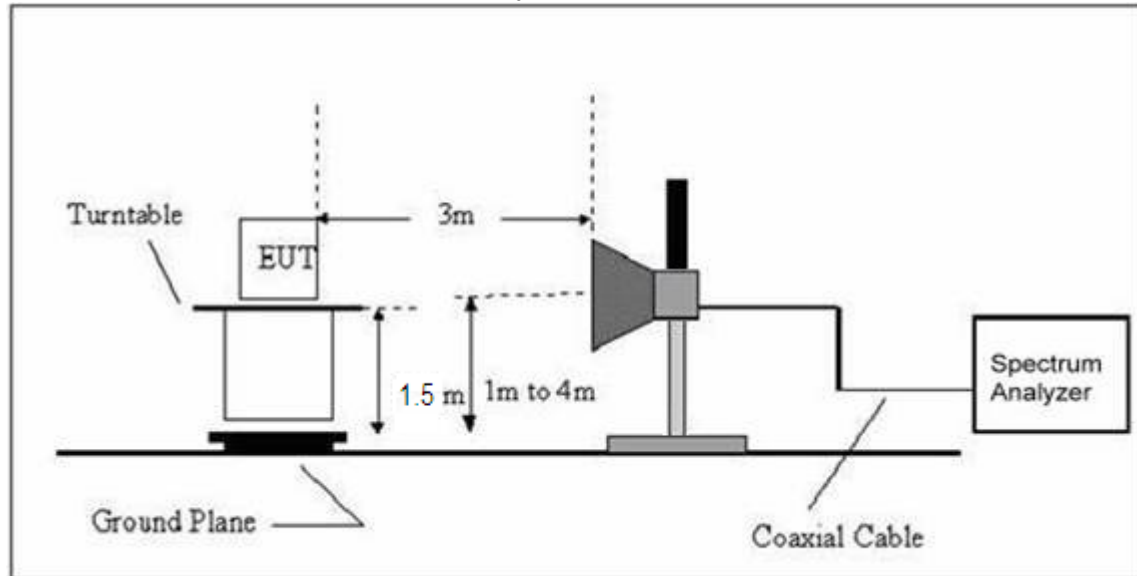
(A) Radiated Emission Test-Up Frequency Below 30MHz



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



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

**3.2.5 EUT OPERATING CONDITIONS**

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

3.2.6 TEST RESULTS (BETWEEN 9KHZ – 30 MHZ)

EUT:	Alpha Intelligent Robot	Model Name. :	ALPHA 1S
Temperature:	20 °C	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
--	--	--	--	N/A
--	--	--	--	N/A

NOTE:

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

Distance extrapolation factor = $40 \log (\text{specific distance/test distance})$ (dB);

Limit line = specific limits(dBuv) + distance extrapolation factor.

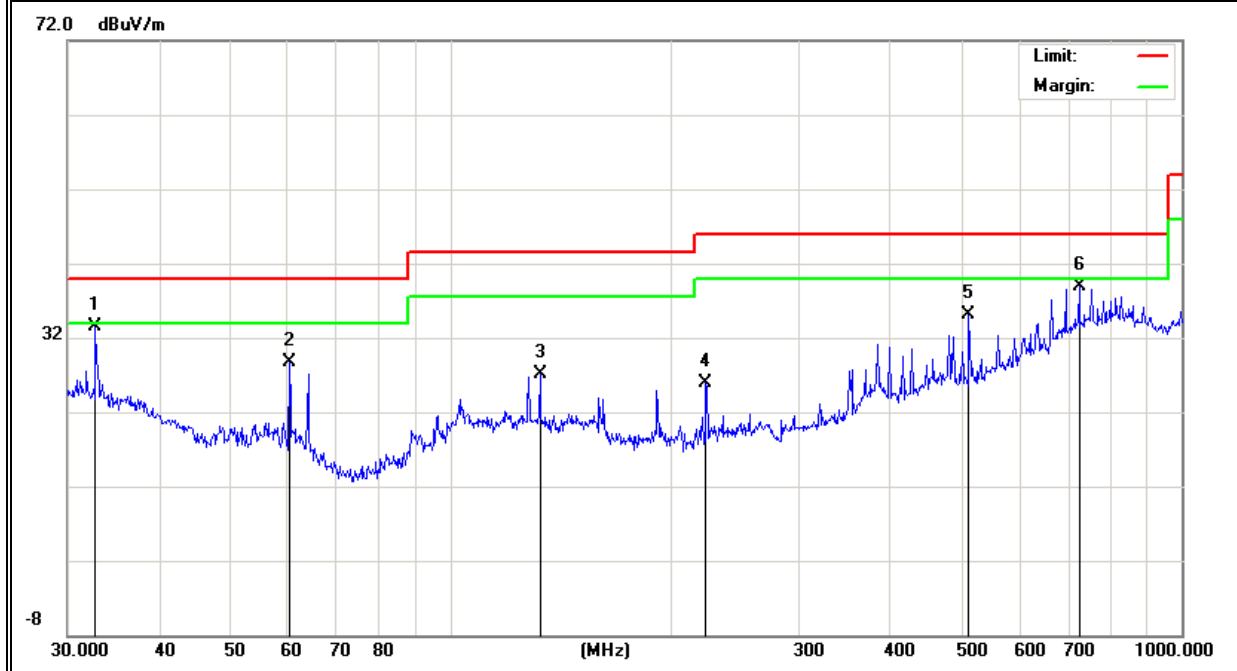
3.2.7 TEST RESULTS (BETWEEN 30MHZ – 1GHZ)

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

Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
V	32.7486	15.54	17.92	33.46	40.00	-6.54	QP
V	60.2800	20.91	7.77	28.68	40.00	-11.32	QP
V	132.6850	15.38	11.76	27.14	43.50	-16.36	QP
V	223.7333	13.44	12.38	25.82	46.00	-20.18	QP
V	511.8351	14.54	20.54	35.08	46.00	-10.92	QP
V	724.2611	13.43	25.43	38.86	46.00	-7.14	QP

Remark:

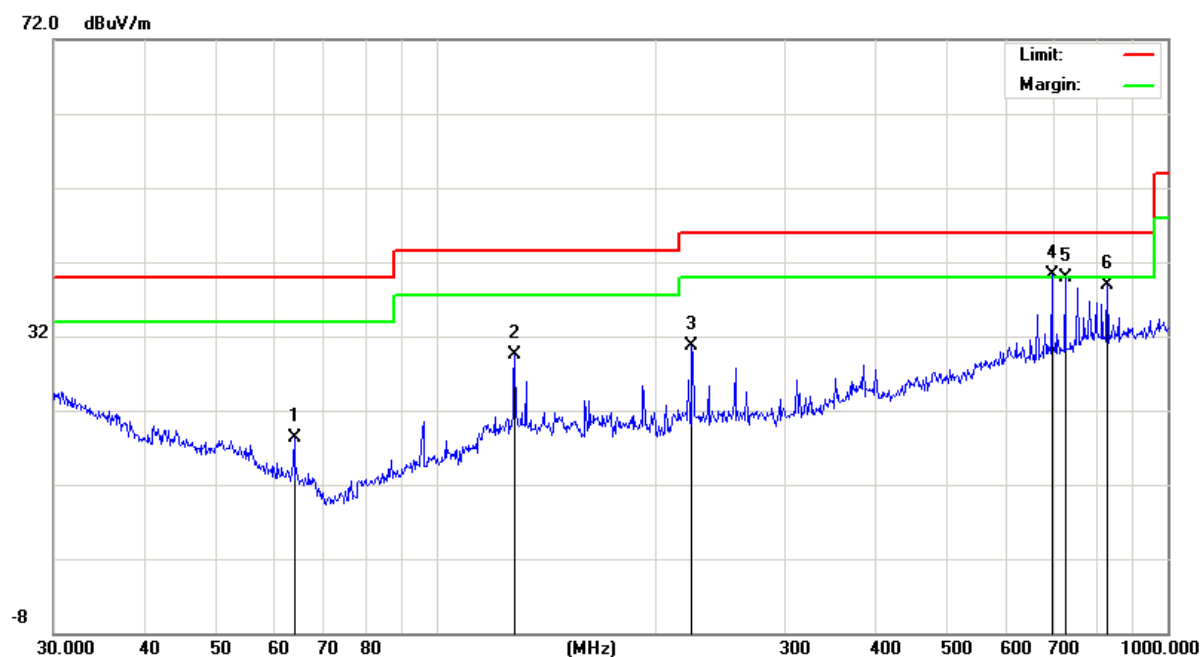
Absolute Level= ReadingLevel+ Factor, Margin= Absolute Level - Limit



Polar (H/V)	Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Remark
	(MHz)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	
H	63.9827	11.32	6.93	18.25	40.00	-21.75	QP
H	128.1127	17.50	11.93	29.43	43.50	-14.07	QP
H	223.7333	18.24	12.38	30.62	46.00	-15.38	QP
H	694.4174	15.65	24.65	40.30	46.00	-5.70	QP
H	724.2611	14.55	25.43	39.98	46.00	-6.02	QP
H	827.4932	11.52	27.31	38.83	46.00	-7.17	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 °C	Relative Humidity :	48%
Pressure:	1010 hPa	Test Voltage :	DC 7.4V
Test Mode :	TX		

Frequency (MHz)	Reading (dBμV)	Factor (dB)	Corrected Amplitude (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Remark	Polar (H/V)
Low Channel (2402 MHz)-Above 1G							
4804.093	60.03	-3.64	63.67	74.00	-10.33	Pk	Vertical
4804.093	41.24	-3.64	44.88	54.00	-9.12	AV	Vertical
7206.324	63.07	-0.95	64.02	74.00	-9.98	Pk	Vertical
7206.324	40.78	-0.95	41.73	54.00	-12.27	AV	Vertical
4804.196	60.03	-3.64	63.67	74.00	-10.33	Pk	Horizontal
4804.196	40.92	-3.64	44.56	54.00	-9.44	AV	Horizontal
7206.432	59.56	-0.95	60.51	74.00	-13.49	Pk	Horizontal
7206.432	41.25	-0.95	42.20	54.00	-11.80	AV	Horizontal
Mid Channel (2440 MHz)-Above 1G							
4880.121	60.89	-3.68	64.57	74.00	-9.43	Pk	Vertical
4880.121	40.94	-3.68	44.62	54.00	-9.38	AV	Vertical
7320.233	60.39	-0.82	61.21	74.00	-12.79	Pk	Vertical
7320.233	41.21	-0.82	42.03	54.00	-11.97	AV	Vertical
4880.214	61.13	-3.68	64.81	74.00	-9.19	Pk	Horizontal
4880.214	40.97	-3.68	44.65	54.00	-9.35	AV	Horizontal
7320.411	60.01	-0.82	60.83	74.00	-13.17	Pk	Horizontal
7320.411	39.77	-0.82	40.59	54.00	-13.41	AV	Horizontal
High Channel (2480MHz)- Above 1G							
4960.295	58.54	-3.59	62.13	74.00	-11.87	Pk	Vertical
4960.295	42.05	-3.59	45.64	54.00	-8.36	AV	Vertical
7440.184	59.31	-0.68	59.99	74.00	-14.01	Pk	Vertical
7440.184	41.18	-0.68	41.86	54.00	-12.14	AV	Vertical
4960.286	59.47	-3.59	63.06	74.00	-10.94	Pk	Horizontal
4960.286	41.11	-3.59	44.70	54.00	-9.30	AV	Horizontal
7440.117	62.29	-0.68	62.97	74.00	-11.03	Pk	Horizontal
7440.117	40.22	-0.68	40.90	54.00	-13.10	AV	Horizontal

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

4. POWER SPECTRAL DENSITY TEST

4.1 APPLIED PROCEDURES / LIMIT

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

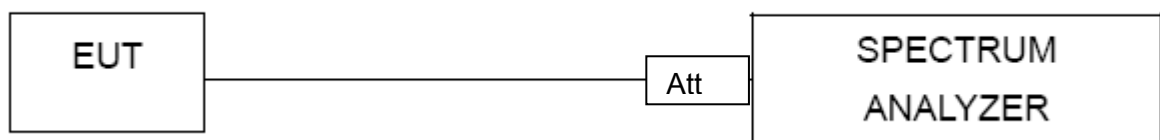
4.1.1 TEST PROCEDURE

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

4.1.2 DEVIATION FROM STANDARD

No deviation.

4.1.3 TEST SETUP



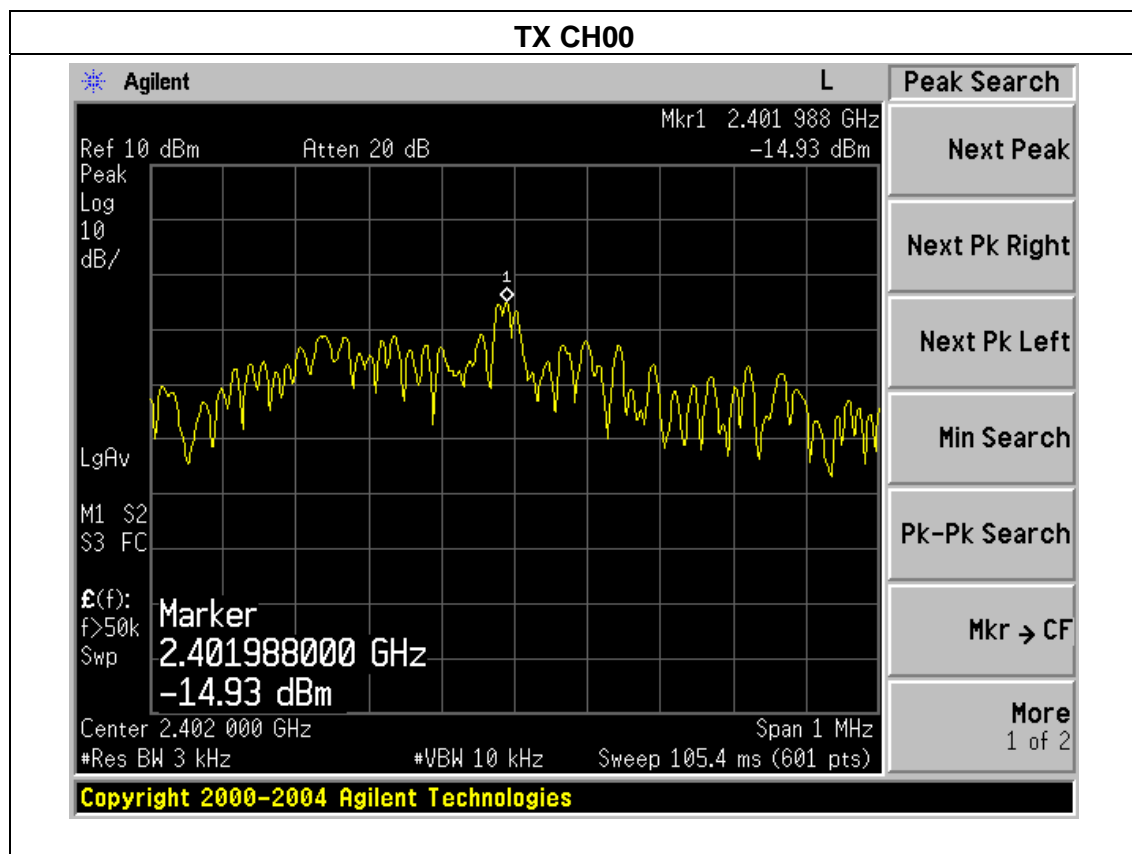
4.1.4 EUT OPERATION CONDITIONS

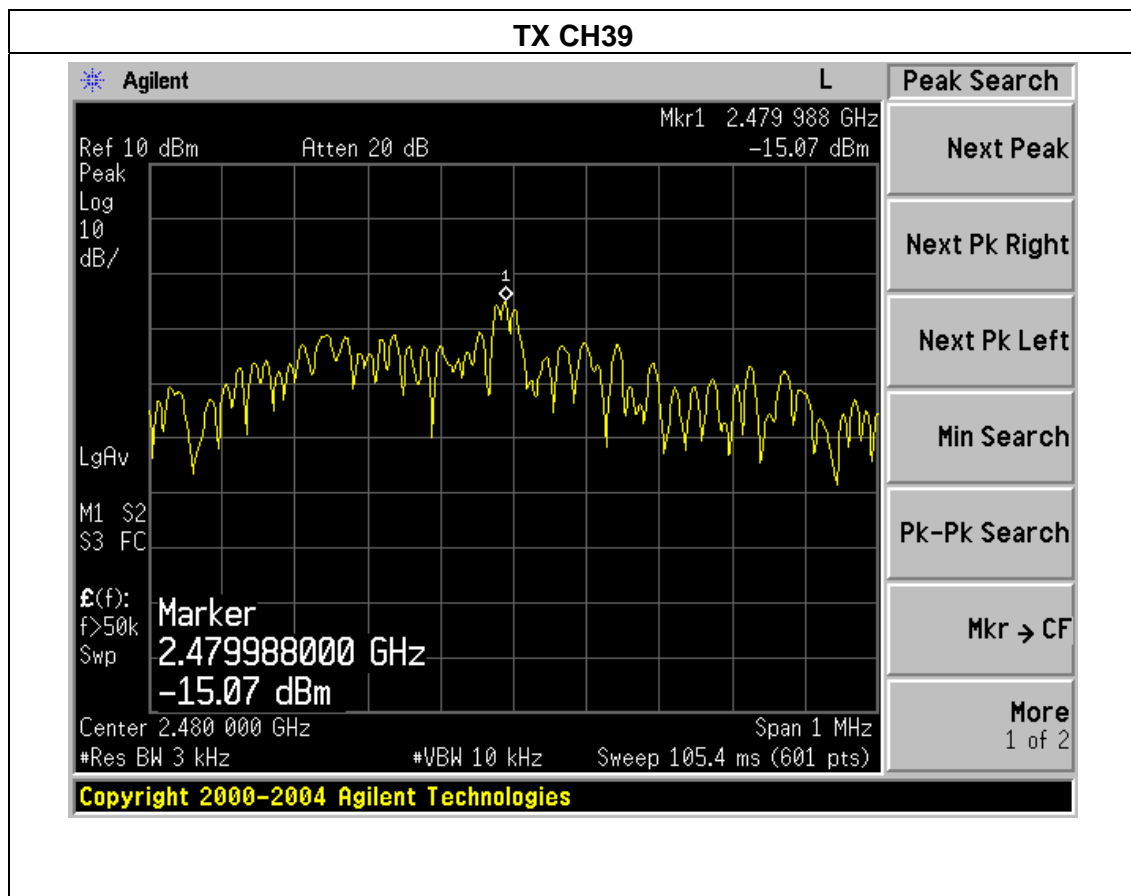
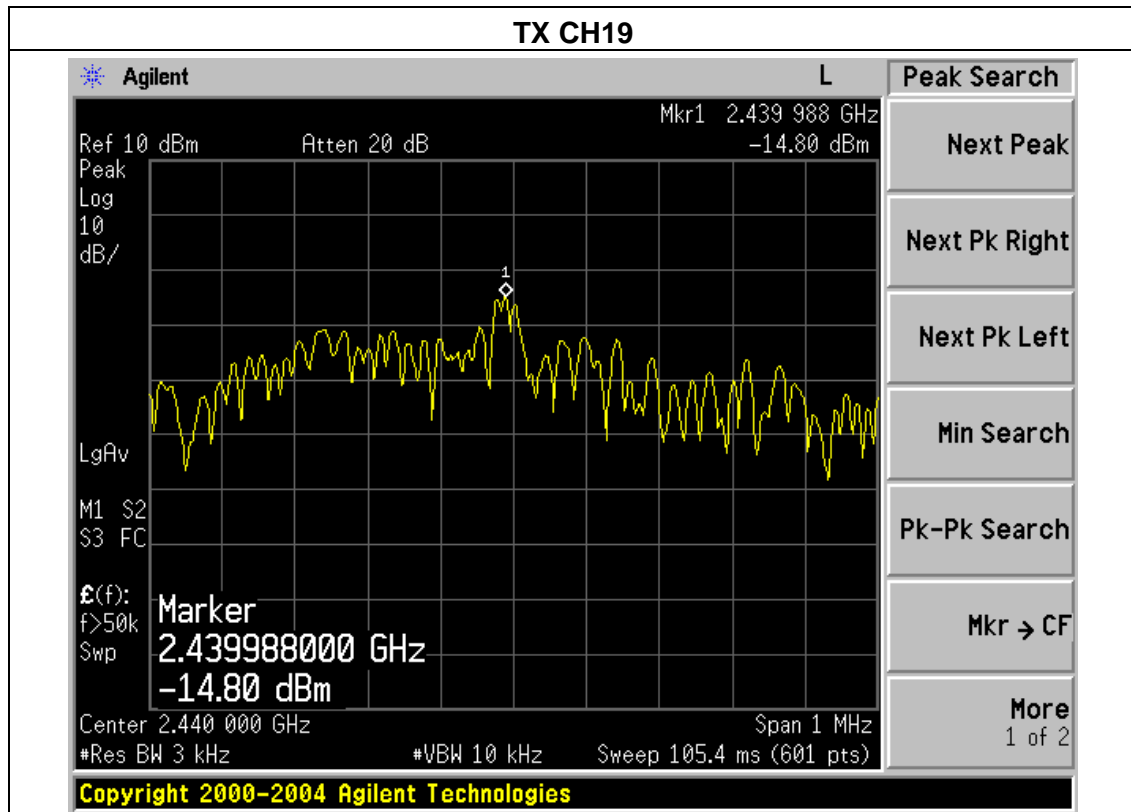
The EUT tested system was configured as the statements of 2.1 Unless otherwise a special operating condition is specified in the follows during the testing.

4.1.5 TEST RESULTS

EUT :	Alpha Intelligent Robot	Model Name :	ALPHA 1S
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1015 hPa	Test Voltage :	DC 7.4V
Test Mode :	TX Mode /CH00, CH19, CH39		

Frequency	Power Density (dBm)	Limit (dBm)	Result
2402 MHz	-14.93	8	PASS
2440 MHz	-14.80	8	PASS
2480 MHz	-15.07	8	PASS





5. BANDWIDTH TEST

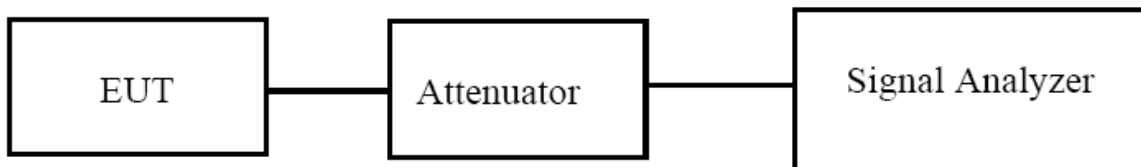
5.1 APPLIED PROCEDURES / LIMIT

FCC Part15 (15.247) , Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	Result
15.247(a)(2)	Bandwidth	$\geq 500\text{KHz}$ (6dB bandwidth)	2400-2483.5	PASS

5.1.1 TEST PROCEDURE

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

TEST SETUP



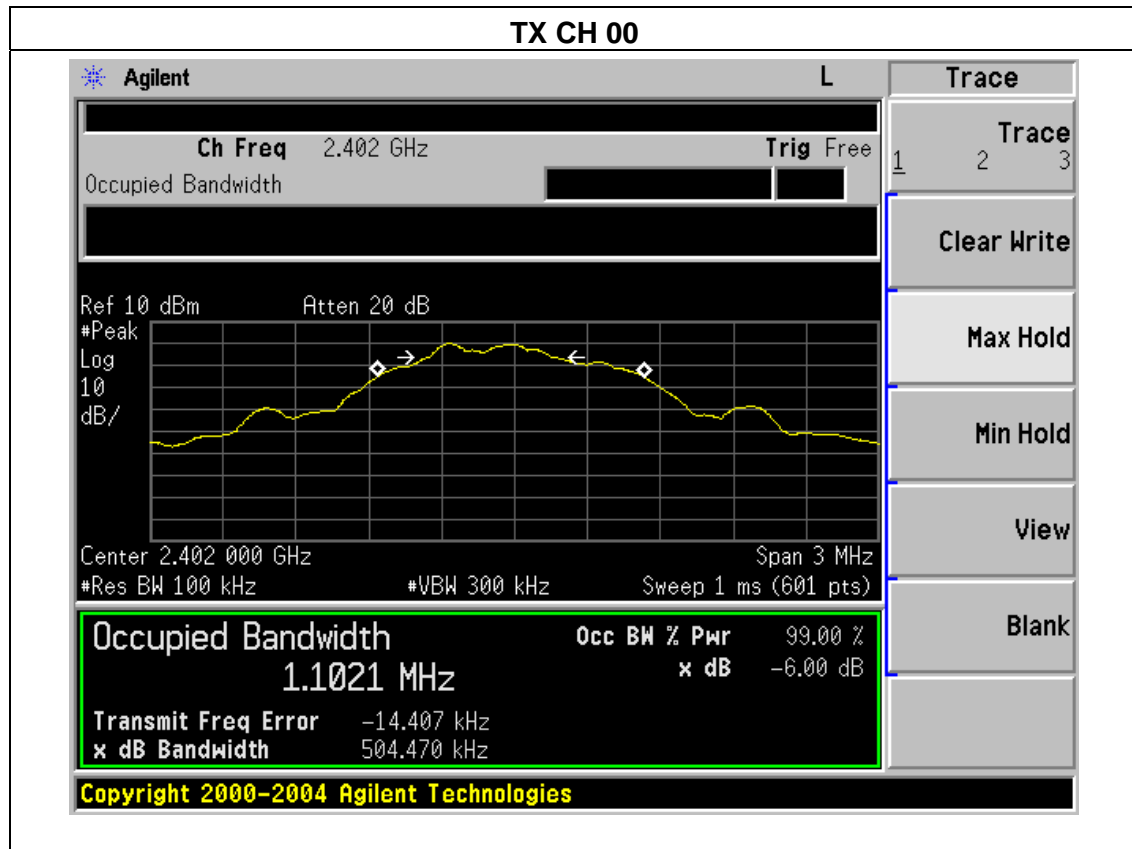
5.1.2 EUT OPERATION CONDITIONS

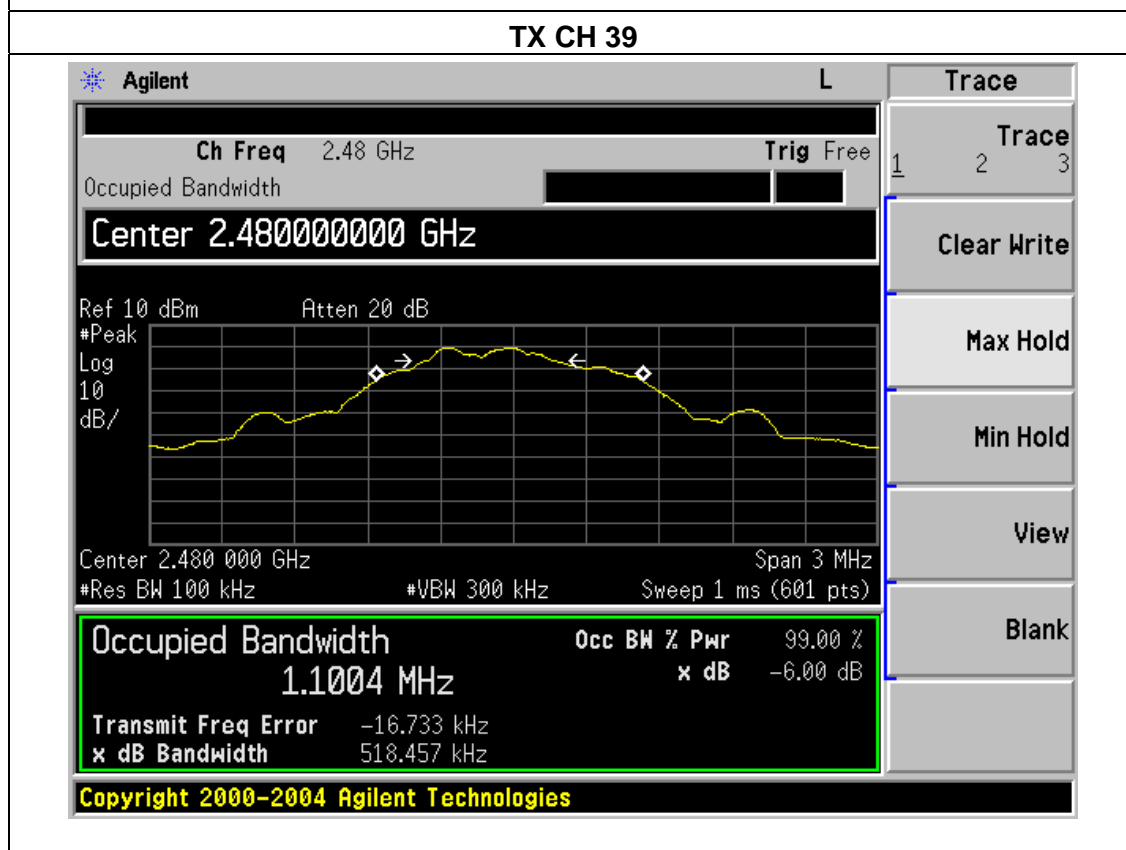
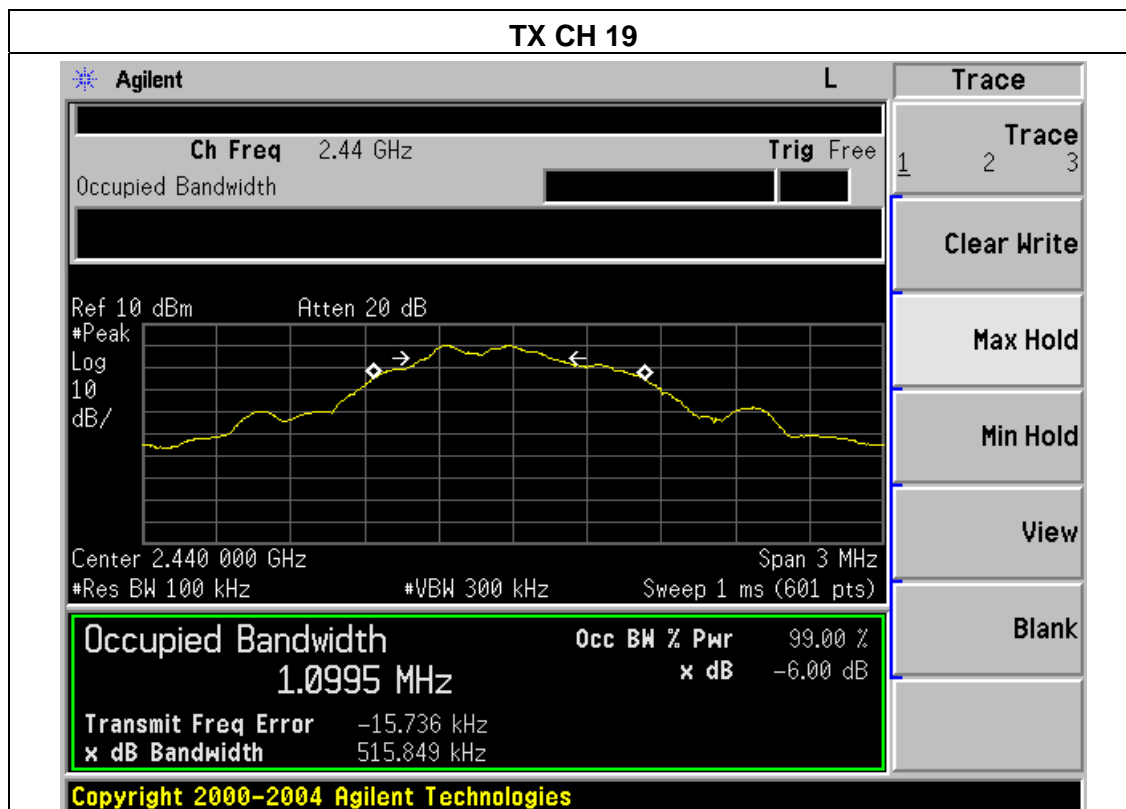
The EUT tested system was configured as the statements of 2.4 Unless otherwise a special operating condition is specified in the follows during the testing.

5.1.3 TEST RESULTS

EUT :	Alpha Intelligent Robot	Model Name :	ALPHA 1S
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 7.4V
Test Mode :	TX Mode /CH00, CH19, CH39		

Channel	Frequency (MHz)	6dB bandwidth (kHz)	Limit (kHz)	Result
Low	2402	504.470	500	Pass
Middle	2440	515.849	500	Pass
High	2480	518.457	500	Pass





6. PEAK OUTPUT POWER TEST

6.1 APPLIED PROCEDURES / LIMIT

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

6.1.1 TEST PROCEDURE

- a. The EUT was directly connected to the Power meter

6.1.2 DEVIATION FROM STANDARD

No deviation.

6.1.3 TEST SETUP



6.1.4 EUT OPERATION CONDITIONS

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

6.1.5 TEST RESULTS

EUT :	Alpha Intelligent Robot	Model Name :	ALPHA 1S
Temperature :	25 °C	Relative Humidity :	60%
Pressure :	1012 hPa	Test Voltage :	DC 7.4V
Test Mode :	TX Mode		

Test Channel	Frequency	Maximum Conducted Output Power(PK)	LIMIT
	(MHz)	(dBm)	(dBm)
CH01	2402	3.02	30
CH20	2440	3.43	30
CH39	2480	2.98	30

7. 100 KHZ BANDWIDTH OF FREQUENCY BAND EDGE

APPLICABLE STANDARD

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

TEST PROCEDURE

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

7.1 DEVIATION FROM STANDARD

No deviation.

7.2 TEST SETUP



7.3 EUT OPERATION CONDITIONS

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

7.4 TEST RESULTS

EUT :	Alpha Intelligent Robot	Model Name :	ALPHA 1S
Temperature :	25 °C	Relative Humidity :	56%
Pressure :	1012 hPa	Test Voltage :	DC 7.4V

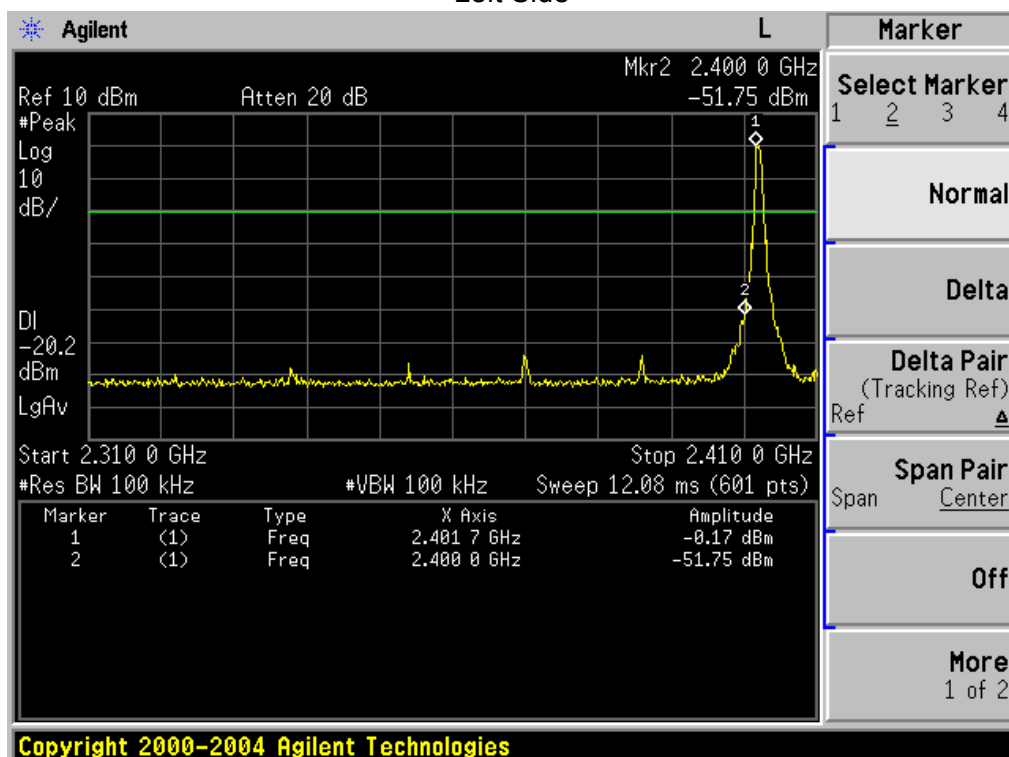
Frequency Band	Delta Peak to band emission (dBc)	> Limit (dBc)	Result
2400	51.58	20	Pass
2483.5	65.59	20	Pass

Radiated band edge:

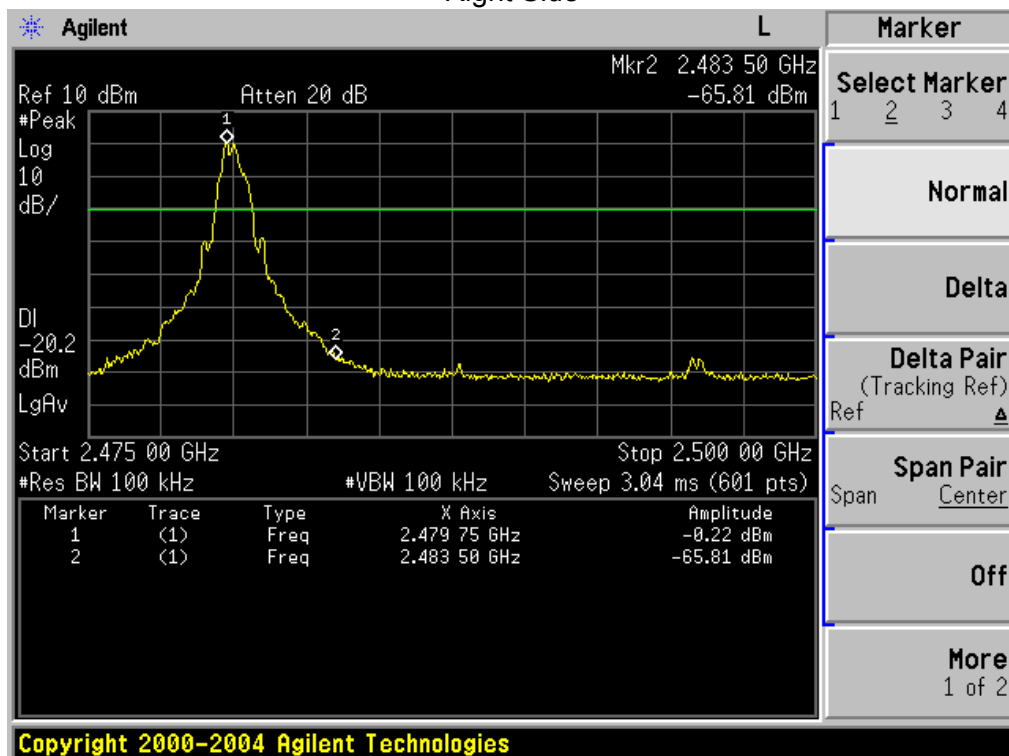
Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type	Comment
2390	60.03	-13.06	46.97	74	-27.03	peak	Vertical
2390	58.33	-13.06	45.27	74	-28.73	peak	Horizontal
2483.5	60.62	-12.78	47.84	74	-26.16	peak	Vertical
2483.5	60.89	-12.78	48.11	74	-25.89	peak	Horizontal

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

Left Side



Right Side



8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

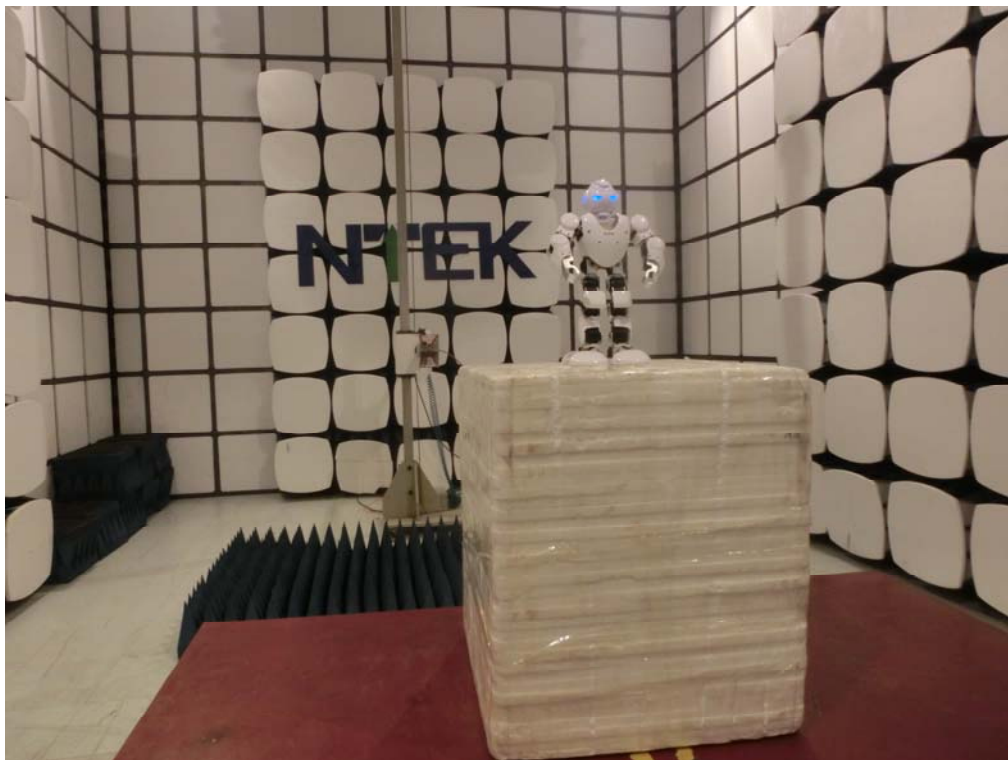
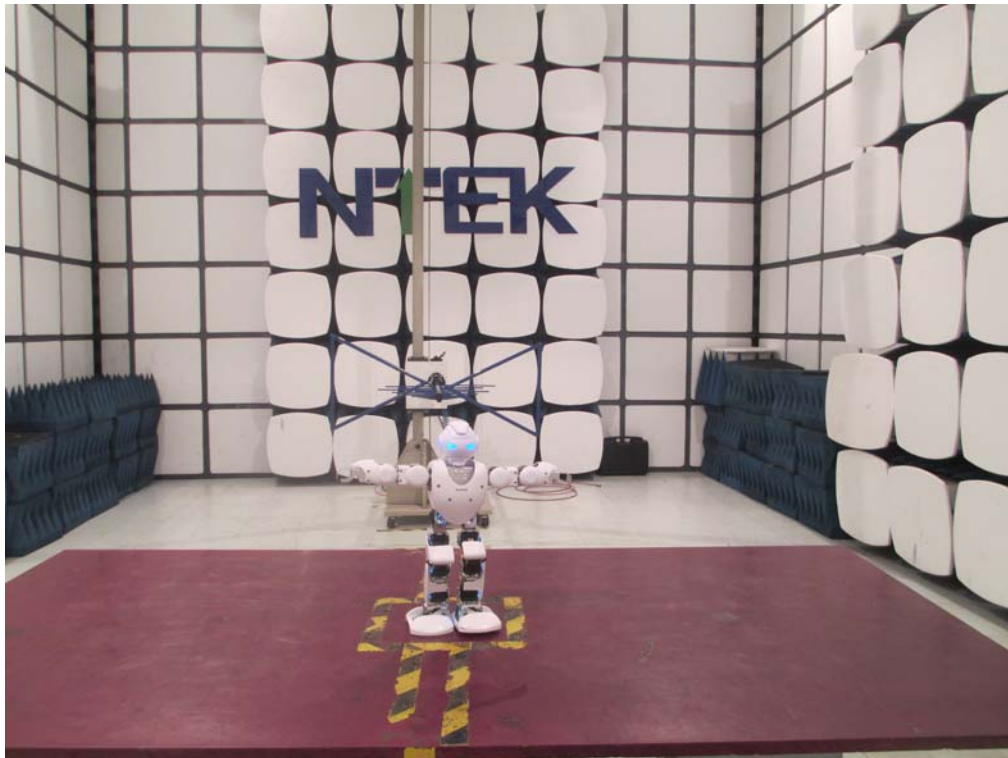
15.203 requirement: For intentional device, according to 15.203: an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

8.2 EUT ANTENNA

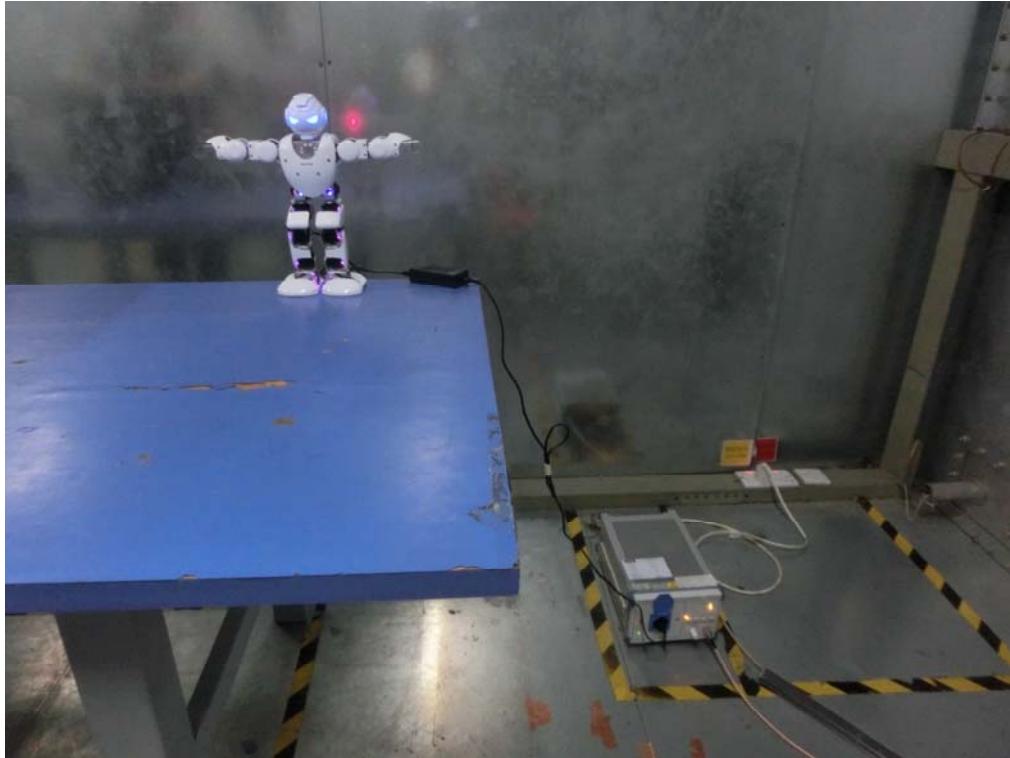
The EUT antenna is permanent attached antenna. It comply with the standard requirement.

9. EUT TEST PHOTO

Radiated Measurement Photos



CONDUCTED EMISSION Photos Adapter 1



Adapter 2

