NCC RADIO TEST REPORT

Product name	葫蘆機器人/KettyBot
Applicant	深圳市普渡科技有限公司
Manufacture	深圳市普渡科技有限公司
Rating(s)	DC29V from adapter or DC25.55V from battery
Trademark	PUDU
Model and/or type reference	PNT
Standard	LP0002:2020
Test Result	**Pass**

Date of receipt：07-09-2021 Signature：

Date of Issue： 08-06-2021

NCC RADIO TEST REPORT

Report Reference No.	M210809N3
Compiled by (+ signature)	Kevin Bothmann
Approved by (+ signature)	Jay Gandhi
Date of issue	2021-08-06

Applicant's name	深圳市普渡科技有限公司
Address	深圳市南山區西麗街道西麗社區打石一路深圳國際創新穀 1 棟 A 座 501
Manufacture's Name	深圳市普渡科技有限公司
Address	深圳市南山區西麗街道西麗社區打石一路深圳國際創新穀 1 棟 A 座 501

Test specification:

Standard	LP0002: 2020
Test procedure	EIA 603、ANSI、FCC/47 CFR/2.1046、2.1047、2.1049、2.1051、2.1053 and 2.1055
Non-standard test method……	N/A

Test item description

Product name ……:	葫蘆機器人/KettyBot
Brand name ……:	PUDU
Model and/or type reference ….:	PNT
Rating(s) ……:	DC29V from adapter or DC25.55V from battery

Testing Laboratory information

Testing Laboratory Name ……:	Electro Magnetic Test, Inc.
Address ……:	1547 Plymouth Street, Mountain View, CA 94043
CAB Identifier Number ……:	US0036
Tel……:	(650) 965-4000
Fax……:	(650) 965-3000
E-mail……:	jgandhi@emtlabs.com

Testing……

Date of receipt of test item	Jul. 09, 2021
Date (s) of performance of tests	Jul. 09~ Aug. 06, 2021
Date of Issue	Aug. 06, 2021
Test Result	**Pass**

GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Electro Magnetic Test, Inc., which is an independent testing and consulting firm. The test report is based on testing performed Electro Magnetic Test, Inc. personnel according to the measurement procedure described in the test specification given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced in any form unless done so in full.

This report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Federal Government.

Electro Magnetic Test, Inc. is recognized by the following agencies for performing EMI/EMC testing:

COUNTRY	AGENCY	IDENTIFYING #
USA	Federal Communications Commission (FCC) (EMT's test site is recognized by the FCC)	Registration Number: 90576
USA, Canada, Taiwan, Australia/New Zealand, European Community	National Voluntary Lab Accreditation Program (NVLAP) (EMT is accredited by NVLAP. A copy of the NVLAP Scope Of Accreditation is available upon request.)	Lab Code: 200147-0
Canada	Industry Canada	File No.: IC 2804
Japan	Voluntary Control Council For Interference (VCCI)	A-0118
	Open Field Test Site "A"	-
	Mains Conducted Emissions Test Site "A"	-
	Telecom Conducted Emissions Test Site "A"	-
	3 Meter Semi-Anechoic Chamber Site "E"	-
	3 Meter Semi-Anechoic Chamber Site "E" (1GHz – 6GHz)	-
	Mains Conducted Emissions Test Site "E"	-
	Telecom Conducted Emissions Test Site "E"	-
Korea	Ministry of Information and Communication's Radio Research Laboratory (RRL) under the Asia Pacific Economic Cooperation (APEC) Mutual Recognition Arrangement (A copy of the Scope Of Accreditation is available upon request)	US0036
Taiwan	Bureau Of Standards, Metrology and Inspection (BSMI)	Reference Number: SL2-IN-E-1024
Australia / New Zealand	Australian Communications Authority (AUSTEL)	*

***THESE AGENCIES DO NOT ISSUE AN IDENTIFYING NUMBER TO TEST LABS.**

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1. SUMMARY OF TEST RESULTS

Test procedures according to the technical standards:

LP0002 : 2020			
Standard Section	Test Item	Judgment	Remark
3.3	Conducted Emission	PASS	None
4.10.1.5/3.6	Radiated Spurious Emission	PASS	None
4.10.1.2	Peak Output Power	PASS	None
4.10.1.6	6dB Occupied Bandwith	PASS	None
4.10.1.6	Power Density	PASS	None
4.10.1.5/3.6	Restricted Bands	PASS	None
4.10.1.3	Antenna Requirement	PASS	None

NOTE:

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

1.1 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	Radiated Emission Test	3.17dB
3	RF power,conducted	0.16dB
4	Spurious emissions,conducted	0.21dB
5	All emissions,radiated(<1G)	4.68dB
6	All emissions,radiated(>1G)	4.89dB

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	葫蘆機器人/KettyBot
Brand Name	PUDU
Model Name	PNT
Serial Model Name	N/A
OEM Brand/Model Name	N/A
Product Description	The EUT is a PNT. Operation Frequency: 2402~2480 MHz Modulation Type: GFSK Bit Rate of Transmitter 1Mbps Number Of Channel 40 Antenna Designation: Please see Note 3. Antenna Gain(Peak) 3.5dBi Output Power: ESP32 Module: -0.025 dBm (Max.) AP6356S Module: 0.868 dBm (Max.)
Channel List	Please refer to the Note 2.
Power Rating	DC29V from adapter or DC25.55V from battery
Connecting I/O Port(s)	Please refer to the User's Manual
Products Covered	N/A
EUT Modification(s)	N/A
Model difference	N/A

Note:

1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
2. **Description of Channel:**

Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2402	21	2442
02	2404	22	2444
03	2406	23	2446
04	2408	24	2448
05	2410	25	2450
06	2412	26	2452
07	2414	27	2454
08	2416	28	2456
09	2418	29	2458
10	2420	30	2460
11	2422	31	2462
12	2424	32	2464
13	2426	33	2466
14	2428	34	2468
15	2430	35	2470
16	2432	36	2472
17	2434	37	2474
18	2436	38	2476
19	2438	39	2478
20	2440	40	2480

3. Table for Filed Antenna

Module	Trade Name	Model Name	Antenna Type	Connector	Gain (dBi)
ESP32	Shenzhen eyebook Technology Co., Ltd	PNT	FPCB Antenna	N/A	3.5 dBi
AP6356S	Shenzhen eyebook Technology Co., Ltd	PNT	FPCB Antenna	N/A	3.5 dBi

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	GFSK
Mode 2	RX
Mode 3	Charging Mode

For Conducted Emission	
Final Test Mode	Description
Mode 3	Charging Mode

For Radiated Emission	
Final Test Mode	Description
Mode 1	GFSK
Mode 2	RX

2.3 TABLE OF PARAMETERS OF TEXT SOFTWARE SETTING

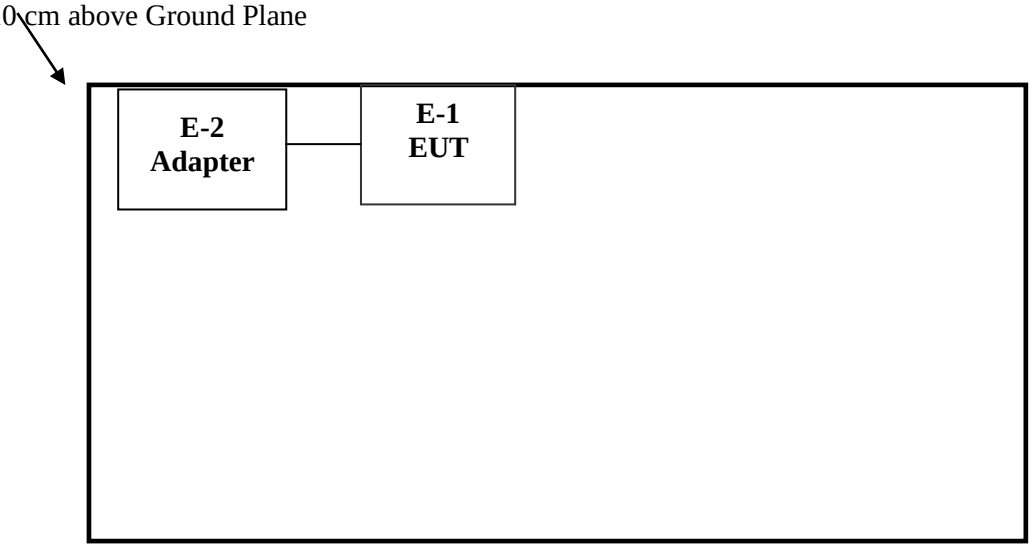
During testing channel & power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final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

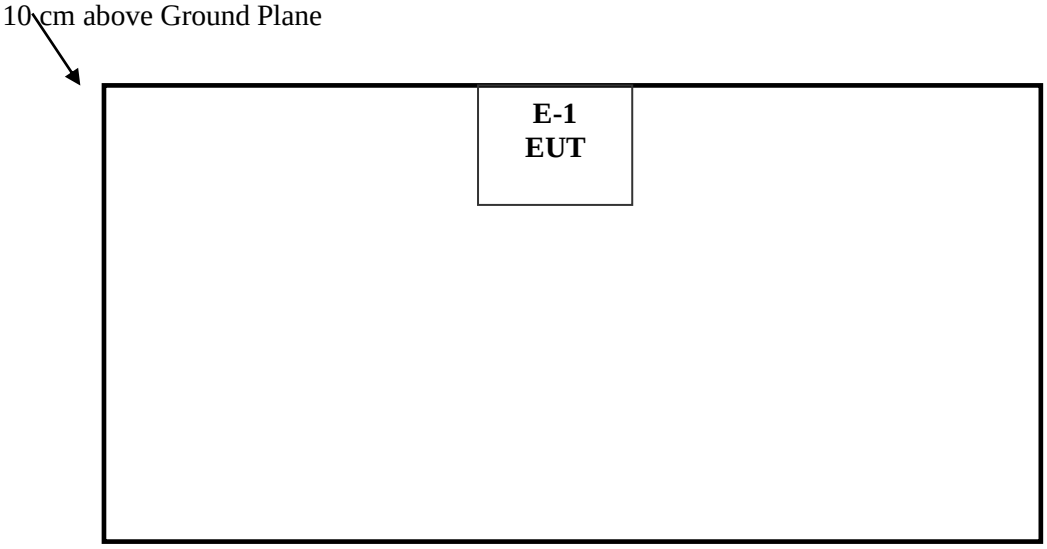
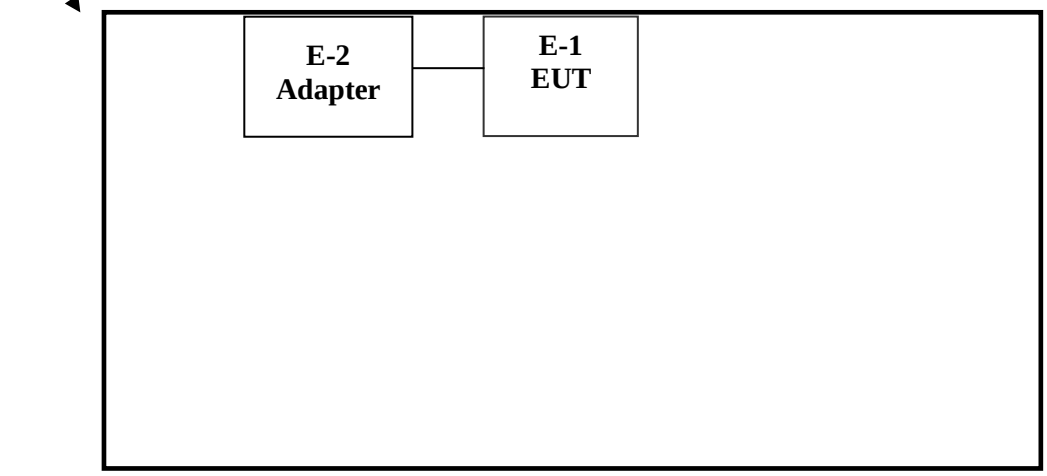
Power Set	5		
Test software Version	V2.1.2	Test program:	adb
Frequency	2402 MHz	2440 MHz	2480 MHz
Parameters(1Mbps)	Default	Default	Default

ESP32 Module:
1. Connect computer with USB cable, identify COM port, open espRFTool software.
2. Select ESP32, select COM port, baud rate select 115200 click triangle .
3. Select the channel and click Start .

AP6356S Module:
1. The PC is connected to HDMI port, Open the RFTestTool software in the monitor.
2. WIFI TEST: Click Wifi and the color will turn blue to success.
3. Click **FUNCTIONS** to enter test mode, Select the MODULATION.
4. Select the channel and click Start.

2.4 BLOCK DIGRAM SHOWING THE CONFIGURATION OF SYSTEM TESTED

Block diagram of EUT configuration
CONDUCTED EMISSION
Test mode: mode 3 Non-Conductive Table 10 cm above Ground Plane 

Block diagram of EUT configuration
RADIATED EMISSION
Test mode: mode 1, 2 Non-Conductive Table 10 cm above Ground Plane 
Test mode: mode 3 Non-Conductive Table 10 cm above Ground Plane 

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.	FCC ID	Series No.	Note
E-1	葫蘆機器人 /KettyBot	PUDU	PNT	N/A	N/A	EUT
E-2	Adapter	東莞市福洋電子有限公司	FY29008000	N/A	N/A	EUT

Item	Equipment	Mfr/Brand	Model/Type No.	Note
1	Rechargeable Li-ion Battery	XINYU GANFENG ELECTRONICS CO.,LTD	7S8P SDI 1865032E	EUT
2	鑰匙	PUDU	PNT	EUT

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" means "shielded" or "with ferrite core";"NO" means "unshielded" or"without ferrite core"
(4) "*": In this report, the applicant did not provide the accompanying accessories with the equipment. The accessories were provided by the laboratory (or the applicant) and inspected simultaneously.

2.5.1 EQUIPMENTS LIST FOR ALL TEST ITEMS

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
Spectrum Analyzer	Keysight	N9020A	MY53300466	April 29, 2021	1 Year
RF Preselector	Hewlett Packard	85685A	3010A01157	April 29, 2021	1 Year
Quasi-Peak Adapter	Hewlett Packard	85650	2521A00584	April 29, 2021	1 Year
Preamplifier	Com Power	PA-102	1482	April 29, 2021	1 Year
RF Attenuator	Mini-Circuits	CAT-10	Asset #1000	December 08, 2020	1 Year
LISN	Com Power	LI-200	12012	September 09, 2020	1 Year
LISN	Com Power	LI-200	12214	September 09, 2020	1 Year
LISN	Com Power	LI-200	1767	September 09, 2020	1 Year
LISN	Com Power	LI-200	1768	September 09, 2020	1 Year
Biconical Antenna	Com Power	AB-100	01557	December 29, 2020	1 Year
Log Periodic Antenna	Com Power	AL-100	16037	December 22, 2020	1 Year
Horn Antenna	Com Power	AHA-118	711054	December 22, 2020	1 Year
Antenna Mast	Com Power	AM-400	N/A	N/A	N/A
Turntable	Com Power	TT-100	N/A	N/A	N/A
Computer	Dell, Inc.	DHS	DNSV641	N/A	N/A

EMI Test Equipment (Continued)

EQUIPMENT TYPE	MANU-FACTURER	MODEL NUMBER	SERIAL NUMBER	CAL. DATE	CAL. CYCLE
EMI Receiver	Rohde & Schwarz	ESU40	100127	June 12, 2021	1 Year
BiConiLog Antenna	ETS-Lindgren	3142D	00102183	August 13, 2020	1 Year
Horn Antenna (1GHz-18GHz)	ETS-Lindgren	3117	00109294	May 6, 2021	1 Year
Horn Antenna (15GHz-40GHz)	SCHWARZBECK	BBHA 9170	BBHA9170242	May 6, 2021	1 Year
Preamplifier	Rohde & Schwarz	TS-PR18	100056	June 12, 2021	1 Year
Pre-Amplifier	Agilent	8449B	3008A00409	June 12, 2021	1 Year
Antenna Mast	ETS-Lindgren	2175	00095727	N/A	N/A
Turntable	ETS-Lindgren	2187-3.0	00118231	N/A	N/A
Computer	Acer	Aspire 8930	85100050123	N/A	N/A
Multi-Function Controller	ETS-Lindgren	2090	00102270	N/A	N/A
Loop Antenna	ARA	PLA-1030/B	1029	May 19, 2021	1 Year

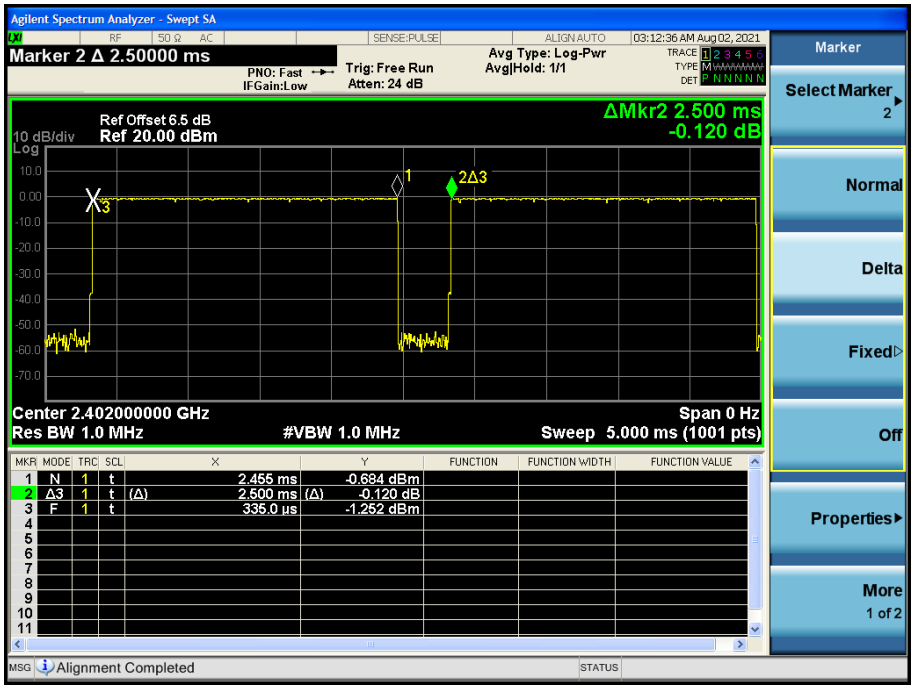
3. ON TIME, DUTY CYCLE AND MEASUREMENT METHODS

3.1 LIMITS

None; for reporting purposes only.

3.2 ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	10log(1/x)Duty Cycle Correction Factor (dB)	1/B Minimum VBW (kHz)
BLE	2.120	2.500	0.848	84.80	0.716	0.472



4. TRANSMITTER EMISSION TEST

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 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			66 - 56 *	56 - 46 *	CISPR
0.50 -5.0			56.00	46.00	CISPR
5.0 -30.0			60.00	50.00	CISPR

0.15 -0.5			66 - 56 *	56 - 46 *	LP0002
0.50 -5.0			56.00	46.00	LP0002
5.0 -30.0			60.00	50.00	LP0002

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

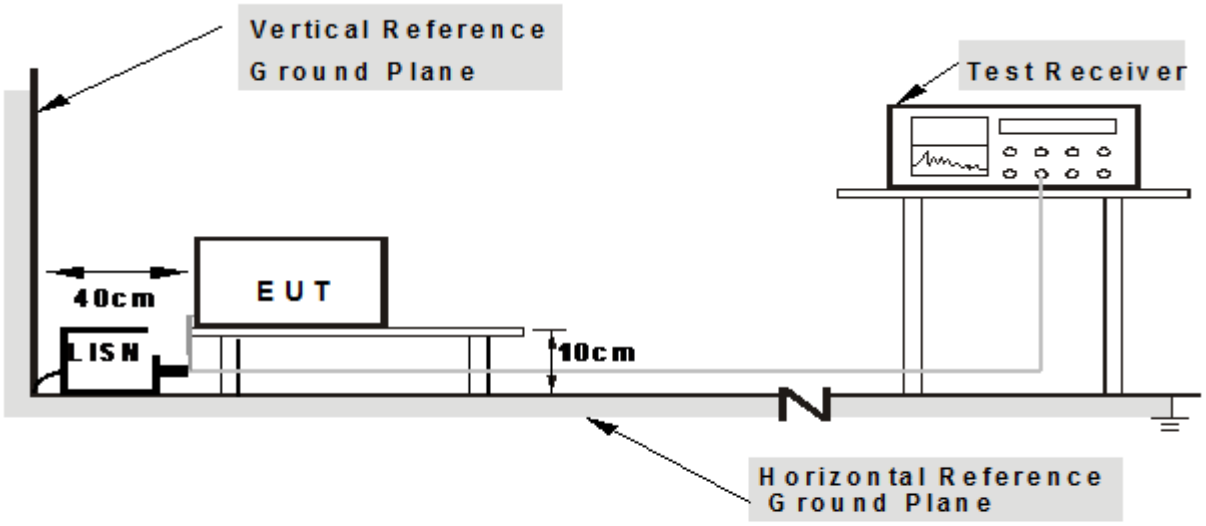
4.1.2 TEST PROCEDURE

a. The EUT was placed 0.4 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.

4.1.3 DEVIATION FROM TEST STANDARD

No deviation

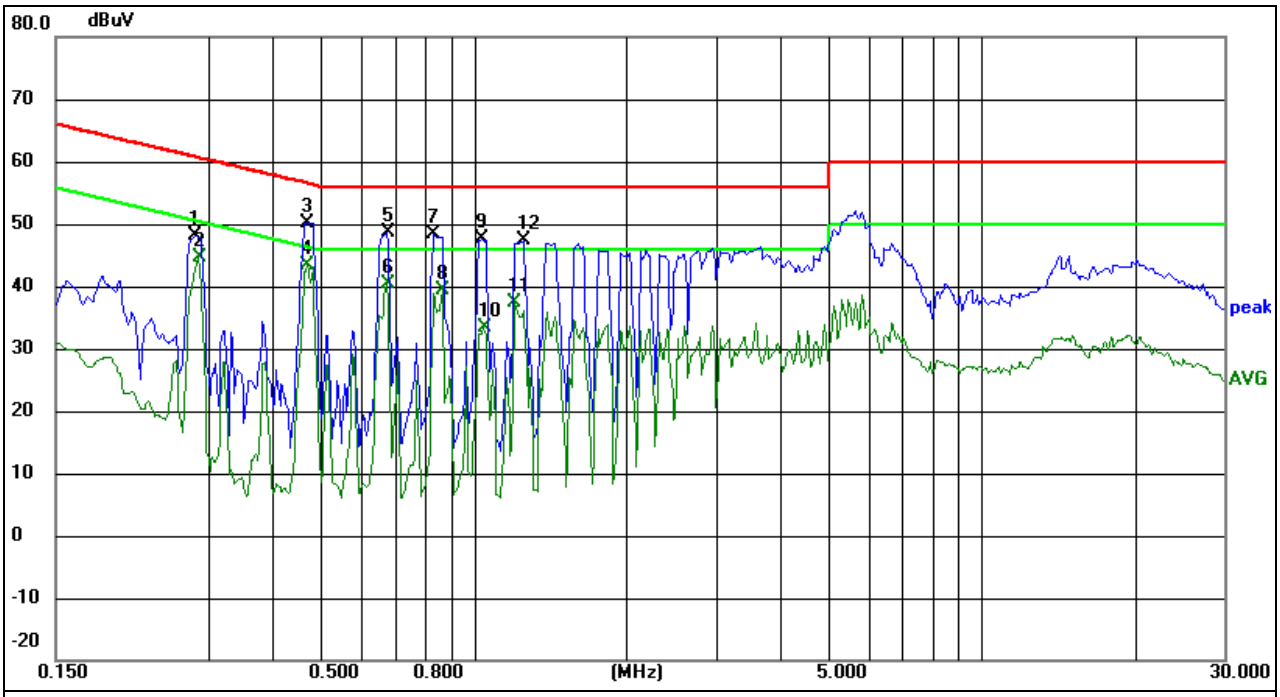
4.1.4 TEST SETUP



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

4.1.5 TEST RESULTS

EUT：	葫蘆機器人/KettyBot	Model Name. ：	PNT
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Date：	2021-07-27
Test Mode：	Mode 1	Phase：	L
Test Voltage ：	AC 110V/60Hz for Adapter		

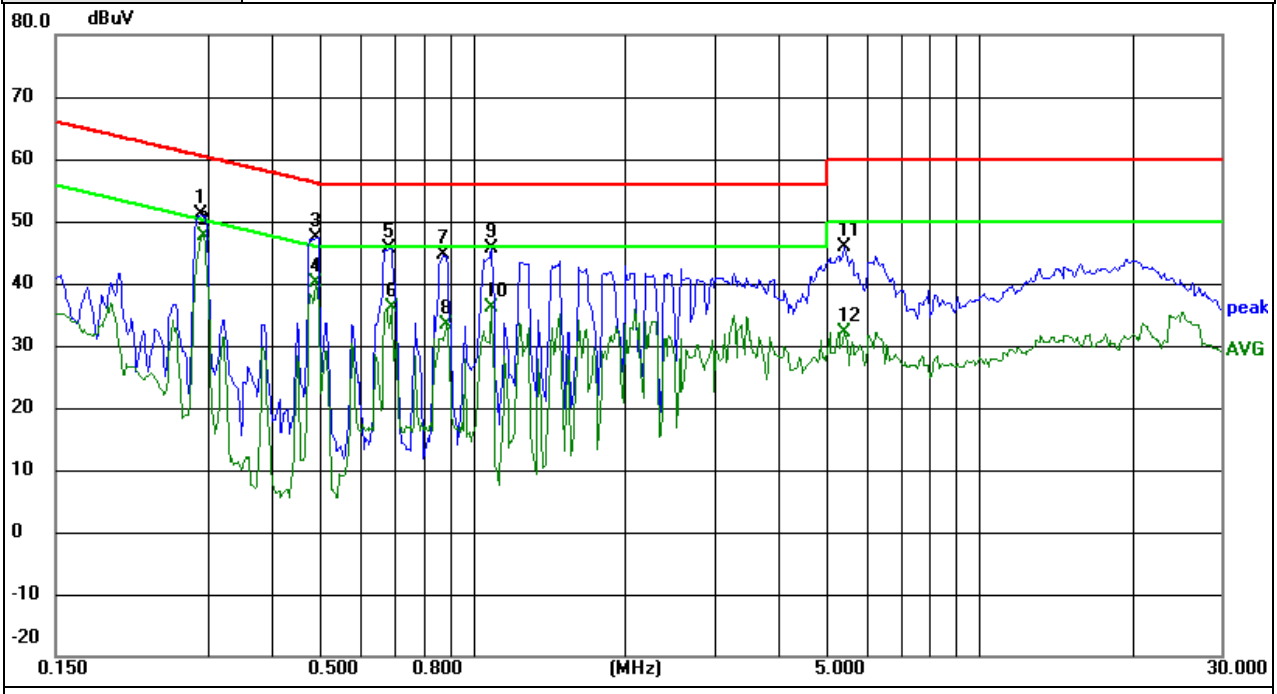


Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = LISN factor + Cable Loss + Pulse limiter.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2826	38.47	9.76	48.23	60.74	-12.51	peak	P
2	0.2864	34.87	9.76	44.63	50.63	-6.00	AVG	P
3	0.4697	40.48	9.77	50.25	56.52	-6.27	peak	P
4 *	0.4697	33.63	9.77	43.40	46.52	-3.12	AVG	P
5	0.6725	38.79	9.78	48.57	56.00	-7.43	peak	P
6	0.6725	30.61	9.78	40.39	46.00	-5.61	AVG	P
7	0.8325	38.50	9.78	48.28	56.00	-7.72	peak	P
8	0.8676	29.64	9.79	39.43	46.00	-6.57	AVG	P
9	1.0353	37.90	9.79	47.69	56.00	-8.31	peak	P
10	1.0430	23.57	9.79	33.36	46.00	-12.64	AVG	P
11	1.2030	27.50	9.79	37.29	46.00	-8.71	AVG	P
12	1.2536	37.48	9.79	47.27	56.00	-8.73	peak	P

EUT：	葫蘆機器人/KettyBot	Model Name. ：	PNT
Temperature：	26 ℃	Relative Humidity：	54%
Pressure：	1010hPa	Test Date：	2021-07-27
Test Mode：	Mode 1	Phase：	N
Test Voltage ：	AC 110V/60Hz for Adapter		



Remark:

1. All readings are Quasi-Peak and Average values.
2. Factor = LISN factor + Cable Loss + Pulse limiter.

No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.2903	41.28	9.76	51.04	60.52	-9.48	peak	P
2 *	0.2943	37.91	9.76	47.67	50.40	-2.73	AVG	P
3	0.4893	37.50	9.77	47.27	56.18	-8.91	peak	P
4	0.4893	30.25	9.77	40.02	46.18	-6.16	AVG	P
5	0.6843	35.81	9.78	45.59	56.00	-10.41	peak	P
6	0.6920	26.35	9.78	36.13	46.00	-9.87	AVG	P
7	0.8715	34.76	9.79	44.55	56.00	-11.45	peak	P
8	0.8870	23.59	9.79	33.38	46.00	-12.62	AVG	P
9	1.0938	35.89	9.79	45.68	56.00	-10.32	peak	P
10	1.0938	26.29	9.79	36.08	46.00	-9.92	AVG	P
11	5.4141	36.00	9.95	45.95	60.00	-14.05	peak	P
12	5.4141	22.28	9.95	32.23	50.00	-17.77	AVG	P

Test result: The unit does meet the NCC requirements.

4.2 RADIATED EMISSION MEASUREMENT

4.2.1 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 3.5, then the 3.6 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)	LIMITS (at 3M)	
	PEAK	AVERAGE
Above 1000	74	54

Notes:

(1) The limit for radiated test was performed according to LP0002.

(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)

Frequency measurement range:

1 The spectrum shall be measured from the lowest radio frequency signal generated in the device (without going below 9 kHz), and the upper limit of the measurement range shall be decided according to the maximum operating frequency.
1.1 Maximum operating frequency less than 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.
1.2 Maximum operating frequency between 10 GHz~30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower.
1.3 Maximum operating frequency over 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 200 GHz, whichever is lower.

2 Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

Spectrum Parameter	Setting		
Attenuation	Auto		
Start Frequency	1000 MHz		
Stop Frequency	10th carrier harmonic		
Measurement	Duty cycle	RBW	Video B/W
PK	Any	1MHz	3MHz
AV	≥98%	1MHz	10Hz
	＜98%	1MHz	1/T

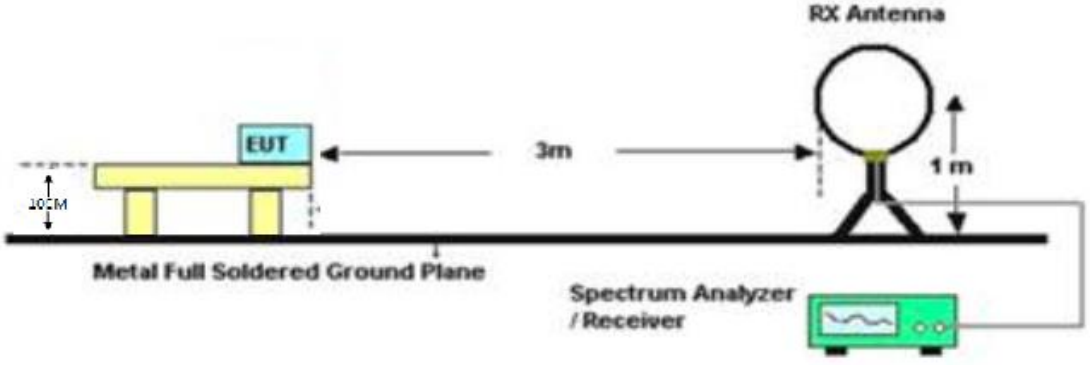
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.2.2 TEST PROCEDURE

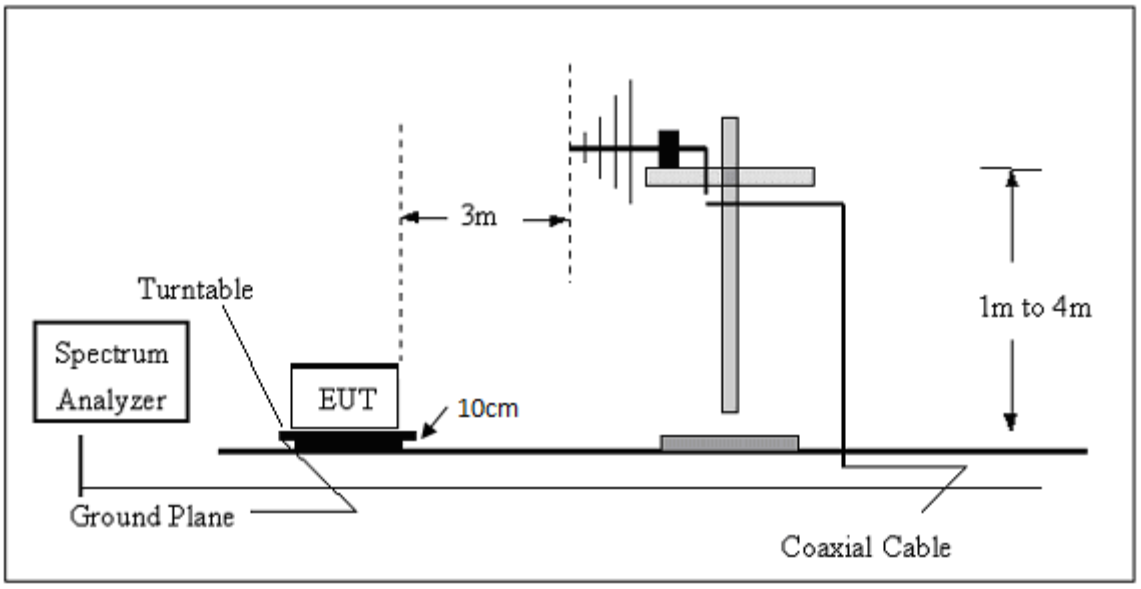
a. The measuring distance of at 3 m shall be used for measurements at frequency up to 1GHz. For frequencies above 1GHz, any suitable measuring distance may be used.
b. The EUT was placed on the top of a rotating table 0.8 meters (For frequencies above 1GHz, table 1.5 meters) above the ground at a 3 meter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

4.2.3 TEST SETUP

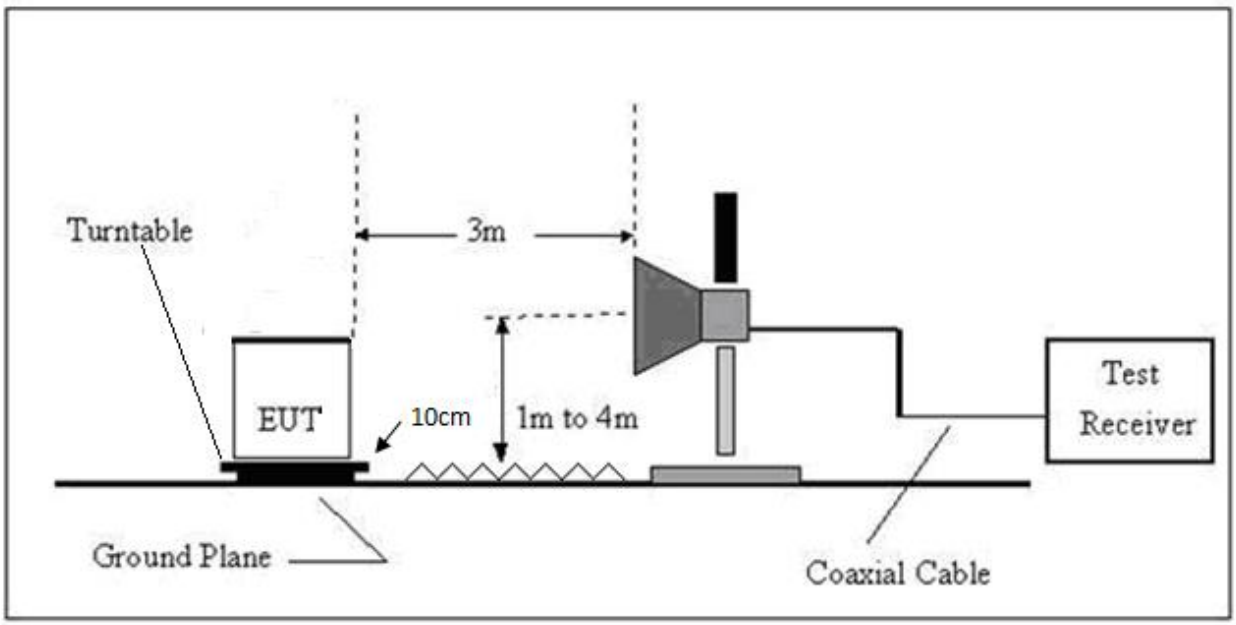
（A）Radiated Emission Test-Up Frequency Below 30MHz



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



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



4.2.4 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.

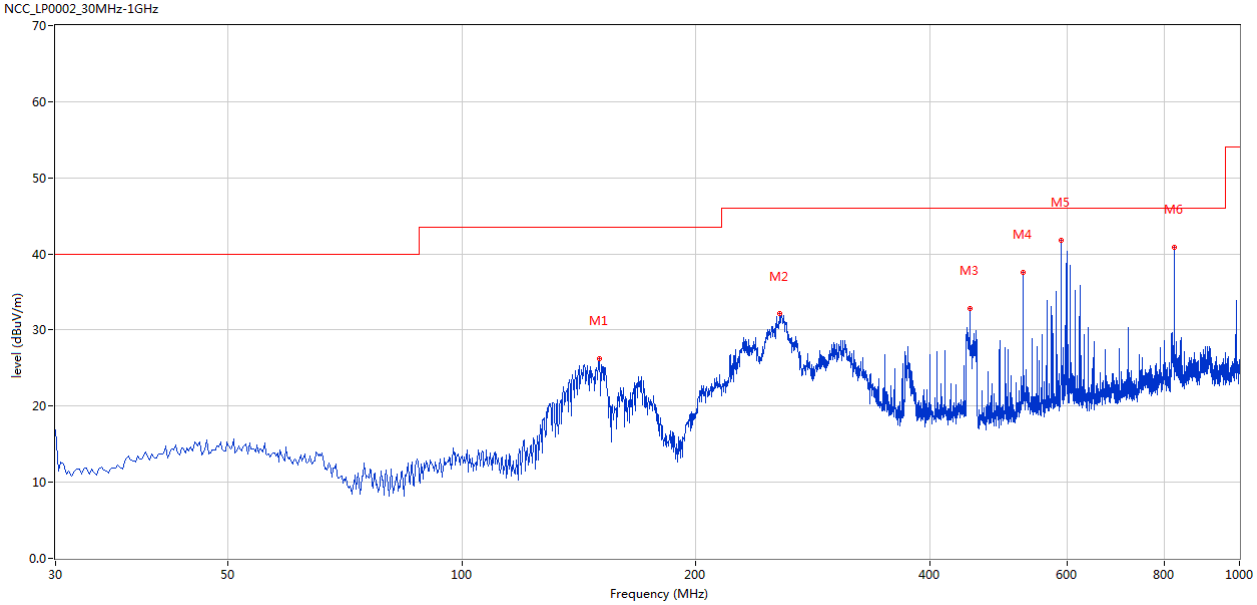
NOTE: Pretest ESP32 Module and AP6356S Module, The worst data is ESP32 Module, only shown ESP32 Module data.

4.2.5 TEST RESULTS (BLOW 30MHZ)

There is not detected blow 30MHz.

4.2.6 TEST RESULTS (BETWEEN30 – 1000 MHZ)

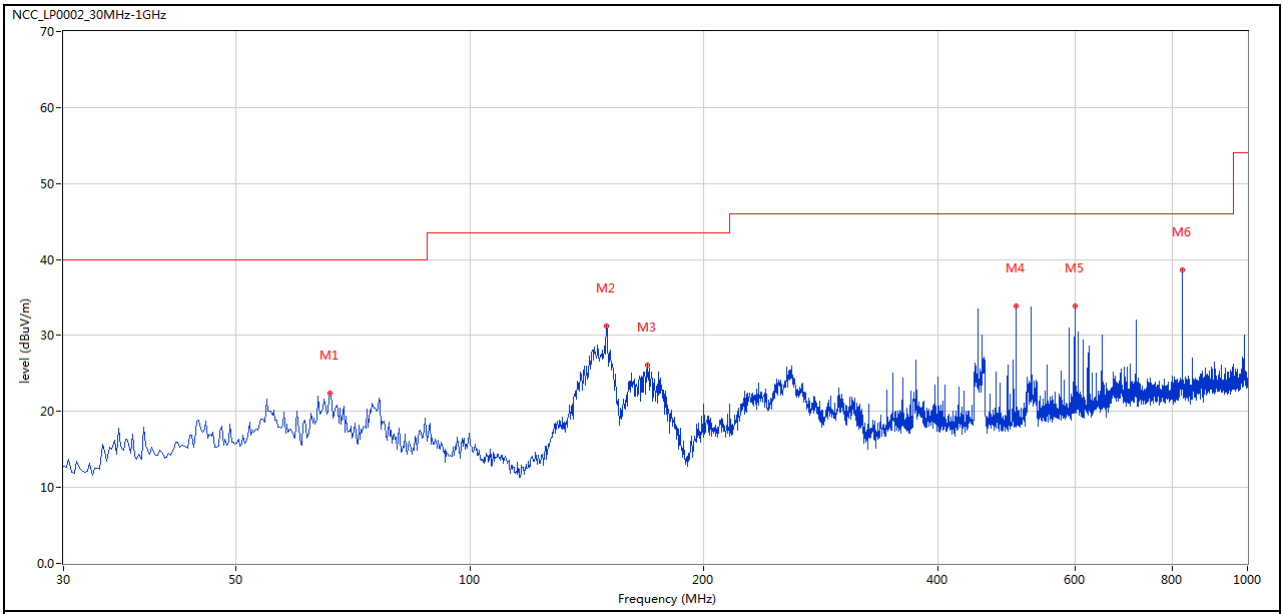
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	Mode 1(2402MHz)	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		



Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	ANT	Verdict
1	150.007	26.29	-17.03	43.5	-17.21	Peak	Horizontal	Pass
2	256.438	32.11	-12.01	46.0	-13.89	Peak	Horizontal	Pass
3	449.905	32.86	-8.01	46.0	-13.14	Peak	Horizontal	Pass
4	526.516	37.53	-6.55	46.0	-8.47	Peak	Horizontal	Pass
5	589.793	41.74	-5.08	46.0	-4.26	Peak	Horizontal	Pass
6	824.959	40.88	-2.91	46.0	-5.12	Peak	Horizontal	Pass

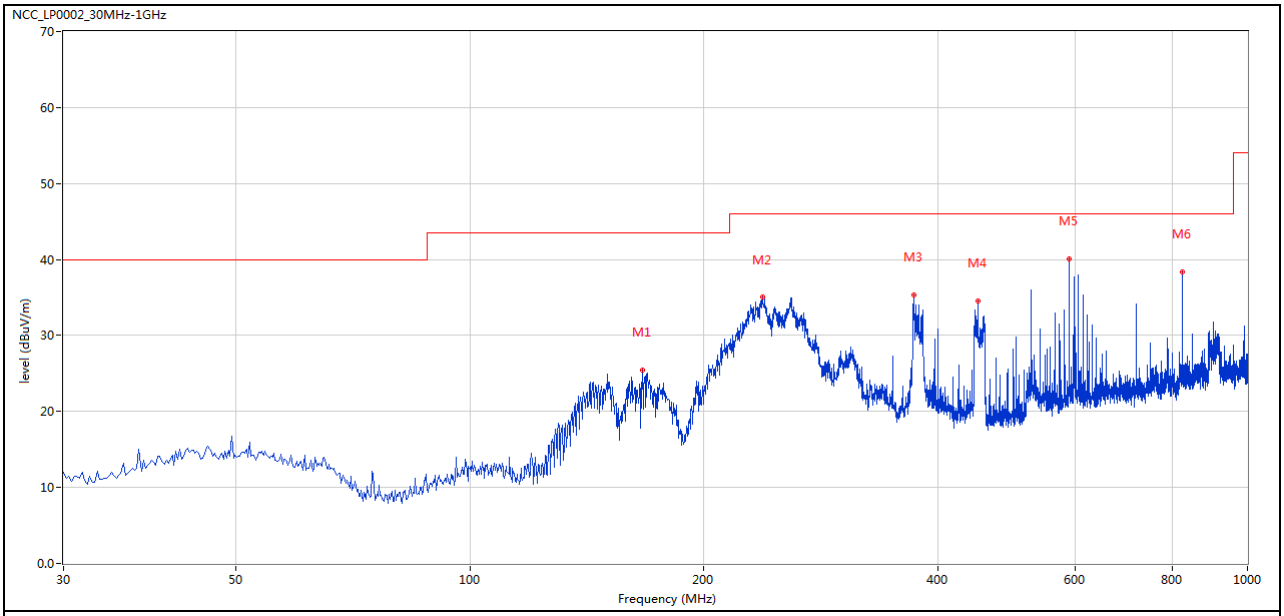
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	Mode 1(2402MHz)	Polarization：	Vertical
Test Power ：	DC25.55V from battery		



Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	ANT	Verdict
1	66.123	22.36	-13.97	40.0	-17.64	Peak	Vertical	Pass
2	149.765	31.29	-17.05	43.5	-12.21	Peak	Vertical	Pass
3	168.918	26.09	-16.11	43.5	-17.41	Peak	Vertical	Pass
4	503.969	33.88	-7.05	46.0	-12.12	Peak	Vertical	Pass
5	599.975	33.94	-4.95	46.0	-12.06	Peak	Vertical	Pass
6	824.959	38.65	-2.91	46.0	-7.35	Peak	Vertical	Pass

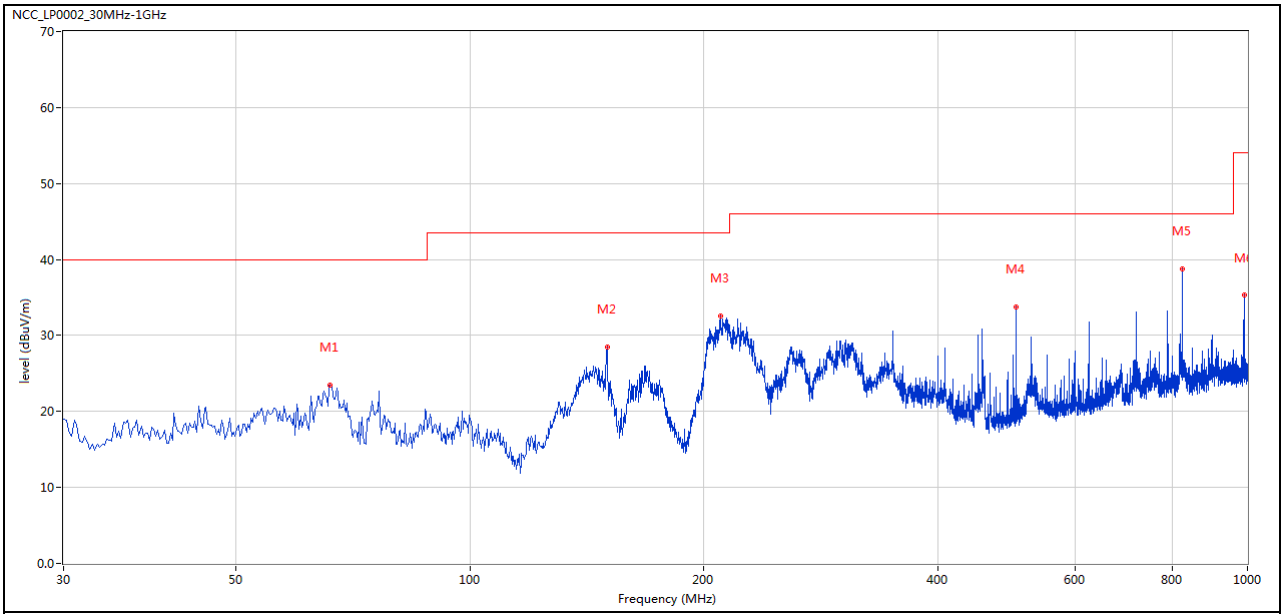
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	RX	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		



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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	ANT	Verdict
1	166.736	25.43	-16.06	43.5	-18.07	Peak	Horizontal	Pass
2	237.771	35.01	-12.44	46.0	-10.99	Peak	Horizontal	Pass
3	372.324	35.38	-9.48	46.0	-10.62	Peak	Horizontal	Pass
4	449.905	34.59	-8.01	46.0	-11.41	Peak	Horizontal	Pass
5	589.793	40.05	-5.08	46.0	-5.95	Peak	Horizontal	Pass
6	824.959	38.34	-2.91	46.0	-7.66	Peak	Horizontal	Pass

EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	RX	Polarization：	Vertical
Test Power ：	DC25.55V from battery		



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

No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	ANT	Verdict
1	66.123	23.53	-13.97	40.0	-16.47	Peak	Vertical	Pass
2	150.007	28.47	-17.03	43.5	-15.03	Peak	Vertical	Pass
3	209.890	32.58	-13.56	43.5	-10.92	Peak	Vertical	Pass
4	503.969	33.77	-7.05	46.0	-12.23	Peak	Vertical	Pass
5	824.959	38.77	-2.91	46.0	-7.23	Peak	Vertical	Pass
6	989.818	35.27	-1.36	54.0	-18.73	Peak	Vertical	Pass

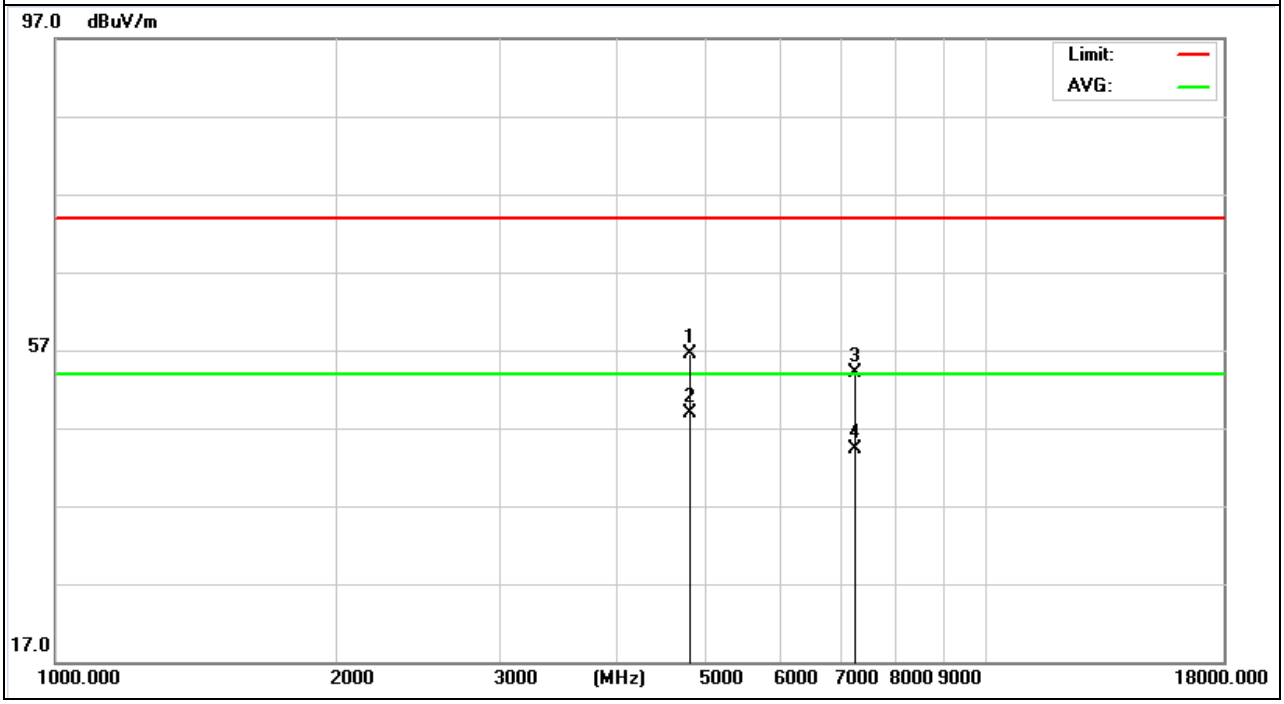
Test result: The unit does meet the NCC requirements.

4.2.7 TEST RESULTS (ABOVE 1000 MHZ)

EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2402MHz)	Polarization：	Vertical
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804.000	51.28	5.06	56.34	74.00	-17.66	peak
4804.000	43.76	5.06	48.82	54.00	-5.18	AVG
7206.000	46.88	7.03	53.91	74.00	-20.09	peak
7206.000	37.88	7.03	44.91	54.00	-9.09	AVG

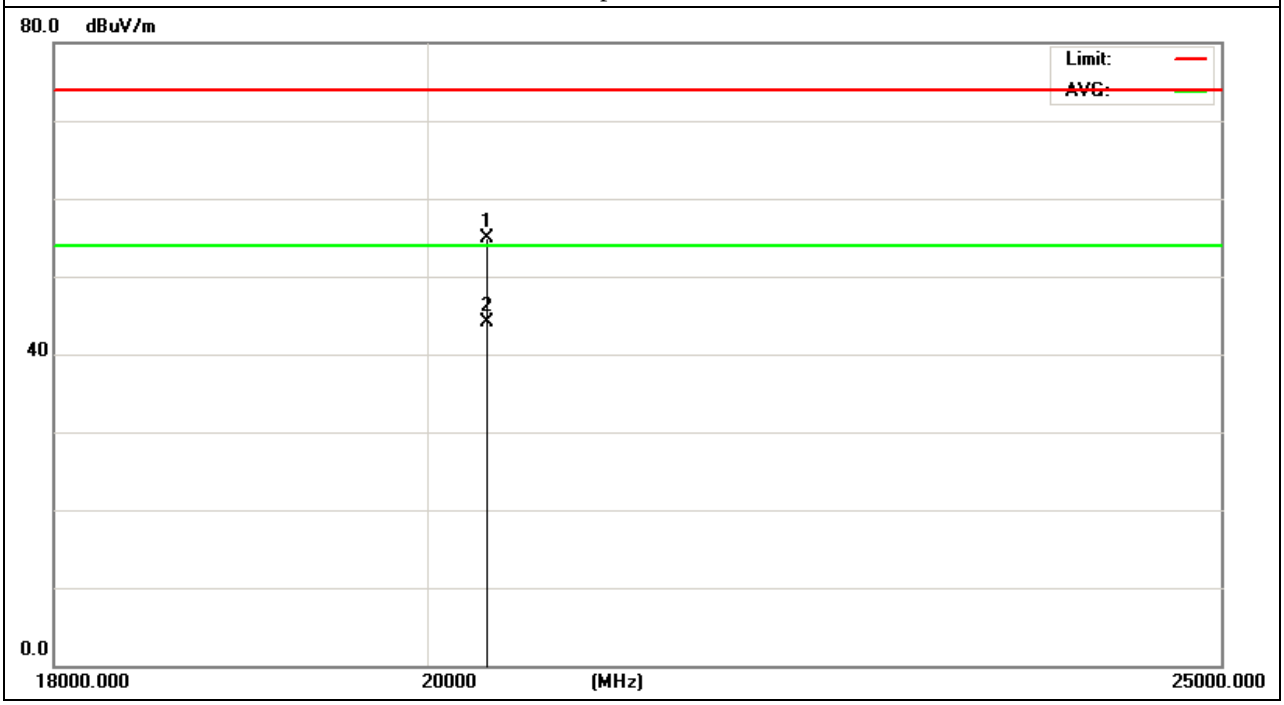
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2402MHz)	Polarization：	Vertical
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
20322.00	38.35	16.67	55.02	74.00	-18.98	peak
20322.00	27.62	16.67	44.29	54.00	-9.71	AVG

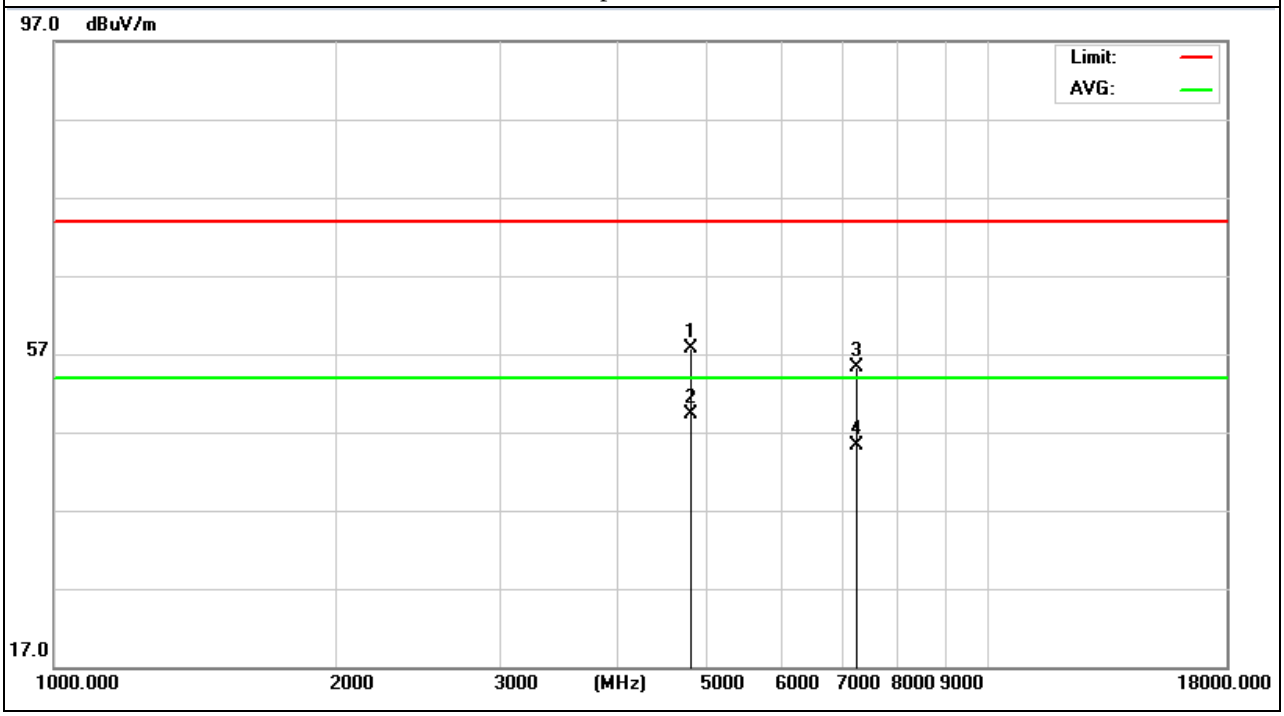
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2402MHz)	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4804.000	53.40	5.06	58.46	74.00	-15.54	peak
4804.000	44.42	5.06	49.48	54.00	-4.52	AVG
7206.000	47.25	7.03	54.28	74.00	-19.72	peak
7206.000	38.27	7.03	45.30	54.00	-8.70	AVG

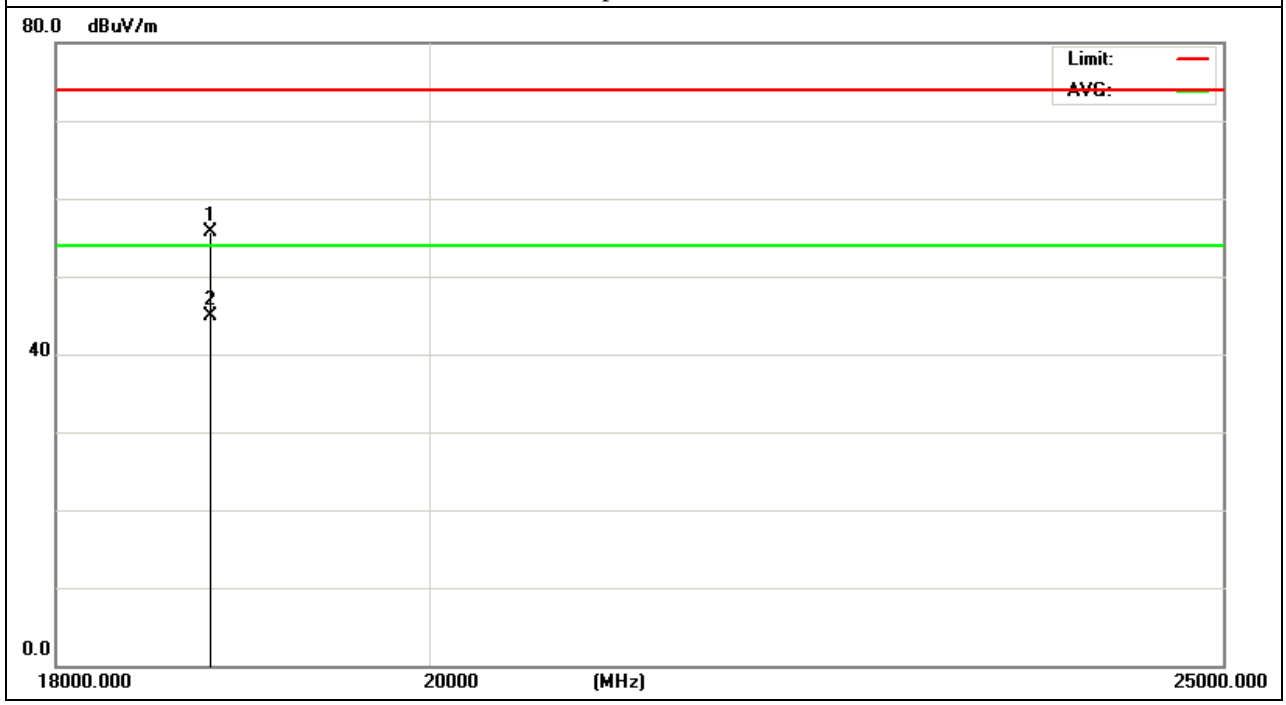
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2402MHz)	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
18790.00	39.43	16.20	55.63	74.00	-18.37	peak
18790.00	28.62	16.20	44.82	54.00	-9.18	AVG

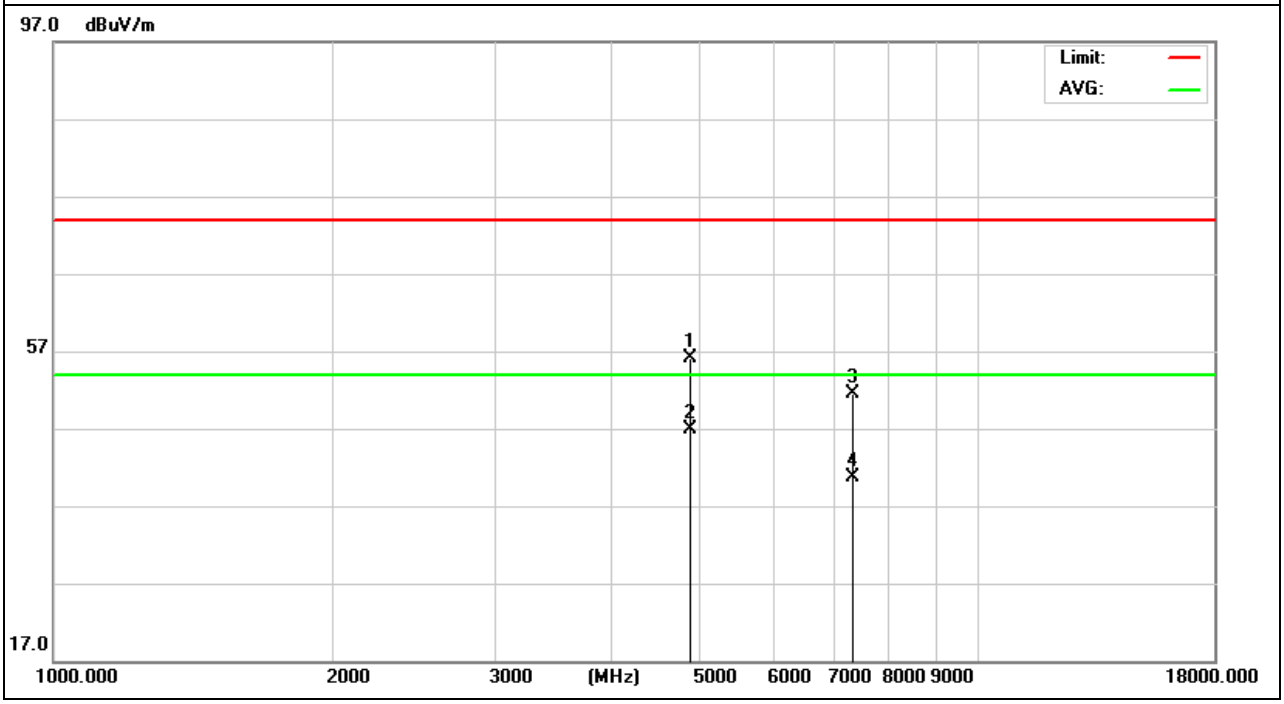
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2440MHz)	Polarization：	Vertical
Test Power ：	DC25.55V from battery		

Frequency (MHz)	Meter Reading (dBμV)	Factor (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)	Detector Type
4880.000	50.27	5.14	55.41	74.00	-18.59	peak
4880.000	41.90	5.14	47.04	54.00	-6.96	AVG
7320.000	43.77	7.52	51.29	74.00	-22.71	peak
7320.000	33.06	7.52	40.58	54.00	-13.42	AVG

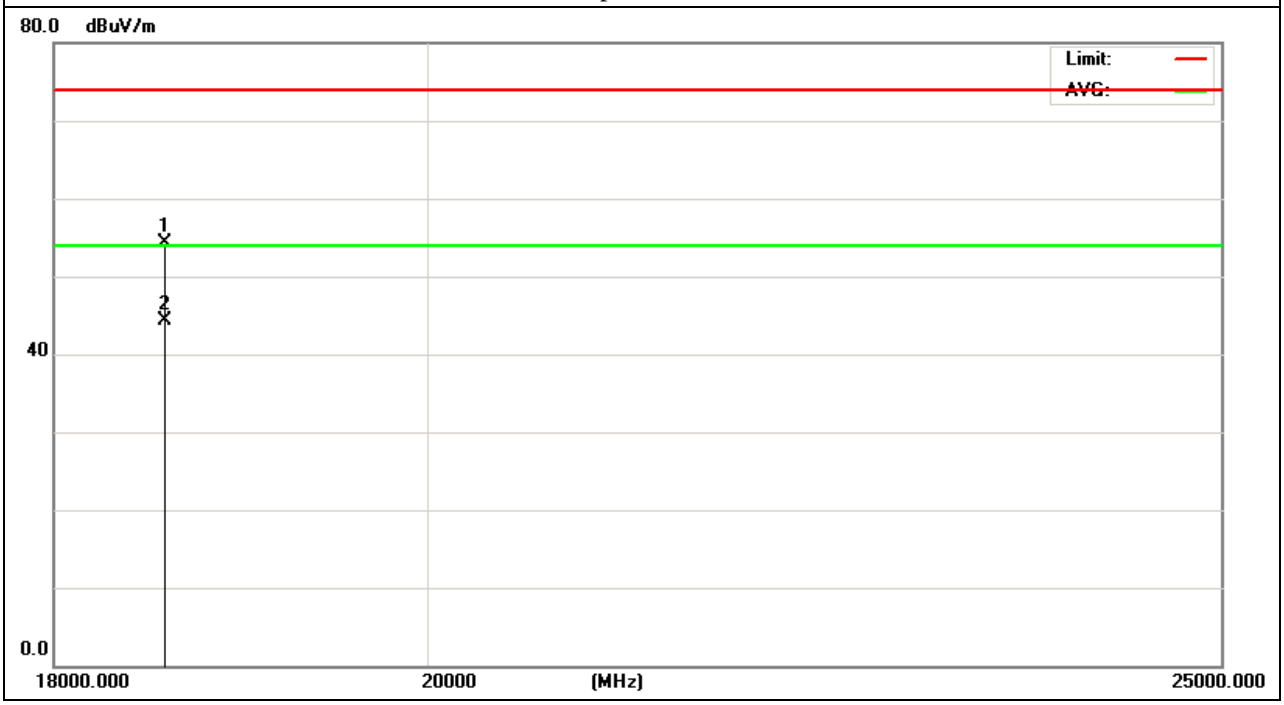
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2440MHz)	Polarization：	Vertical
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
18568.00	39.76	15.97	55.73	74.00	-18.27	peak
18568.00	29.26	15.97	45.23	54.00	-8.77	AVG

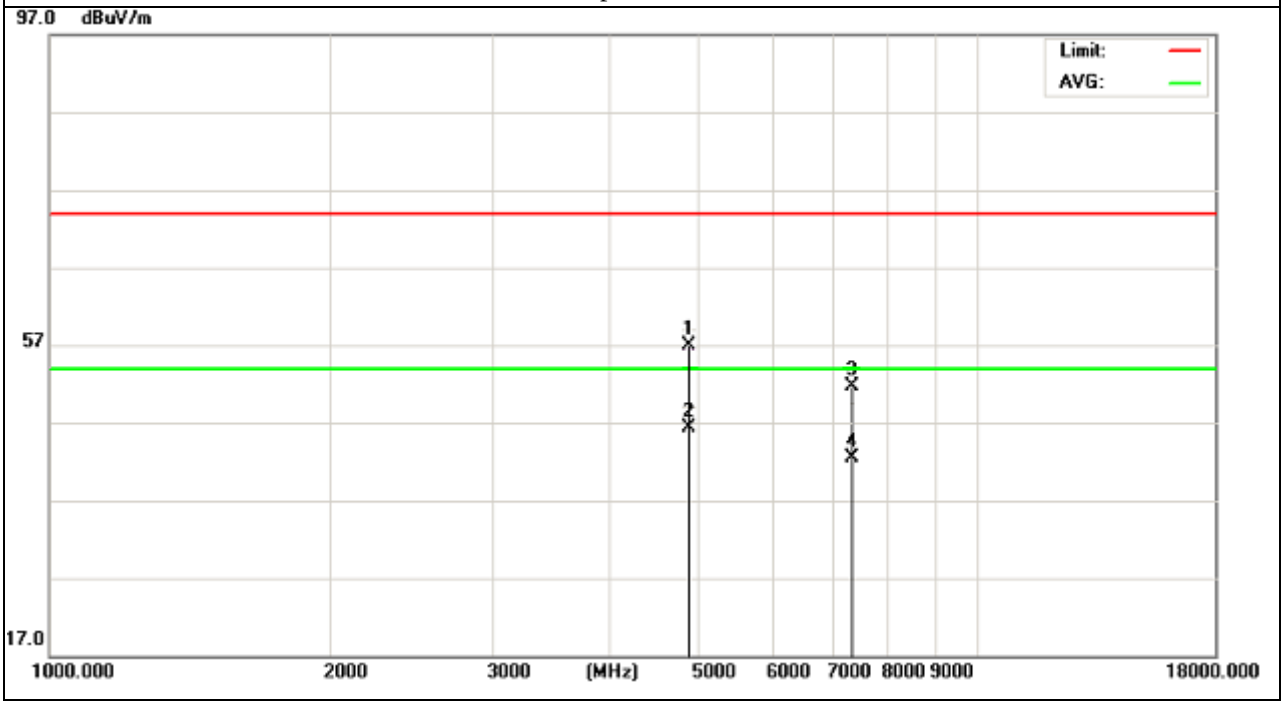
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2440MHz)	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4880.000	53.39	5.14	58.53	74.00	-15.47	peak
4880.000	41.47	5.14	46.61	54.00	-7.39	AVG
7320.000	44.18	7.52	51.7	74.00	-22.3	peak
7320.000	34.79	7.52	42.31	54.00	-11.69	AVG

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2440MHz)	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		

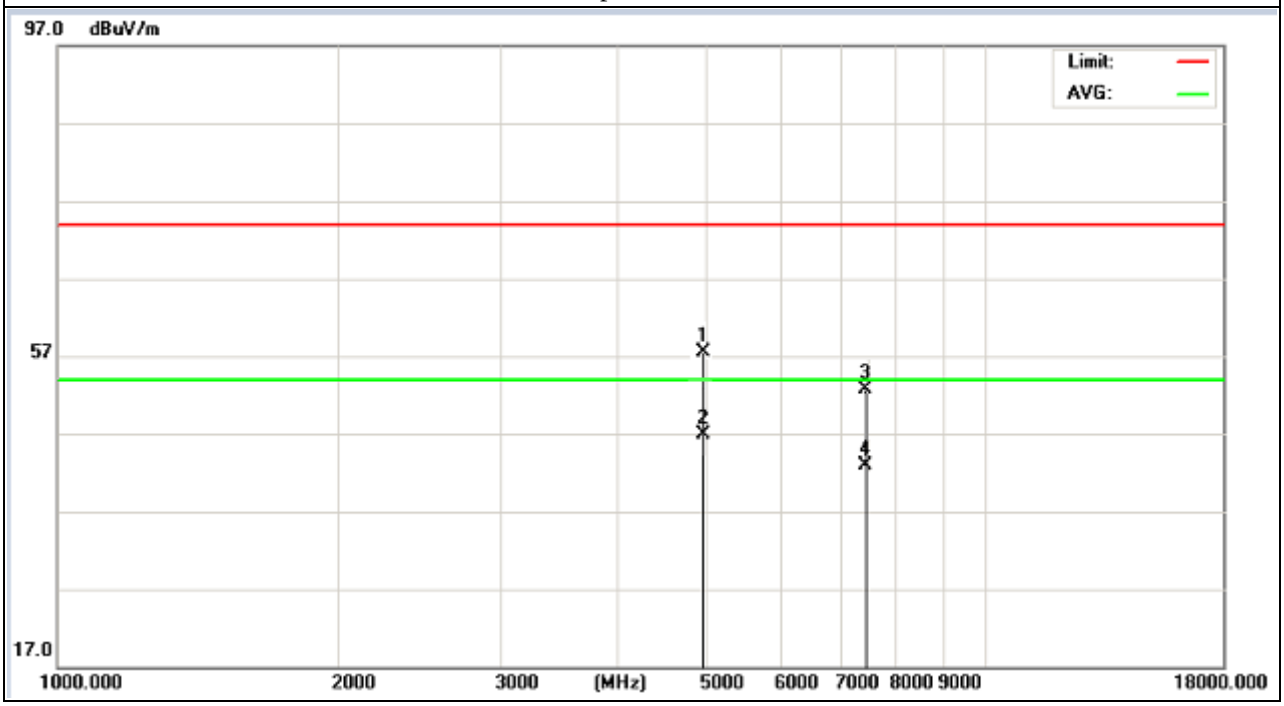
Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19930.00	38.78	16.58	55.36	74.00	-18.64	peak
19930.00	28.57	16.58	45.15	54.00	-8.85	AVG

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.

EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2480MHz)	Polarization：	Vertical
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4960.000	51.94	5.22	57.16	74.00	-16.84	peak
4960.000	42.35	5.22	47.57	54.00	-6.43	AVG
7440.000	45.17	8.06	53.23	74.00	-20.77	peak
7440.000	36.49	8.06	44.55	54.00	-9.45	AVG

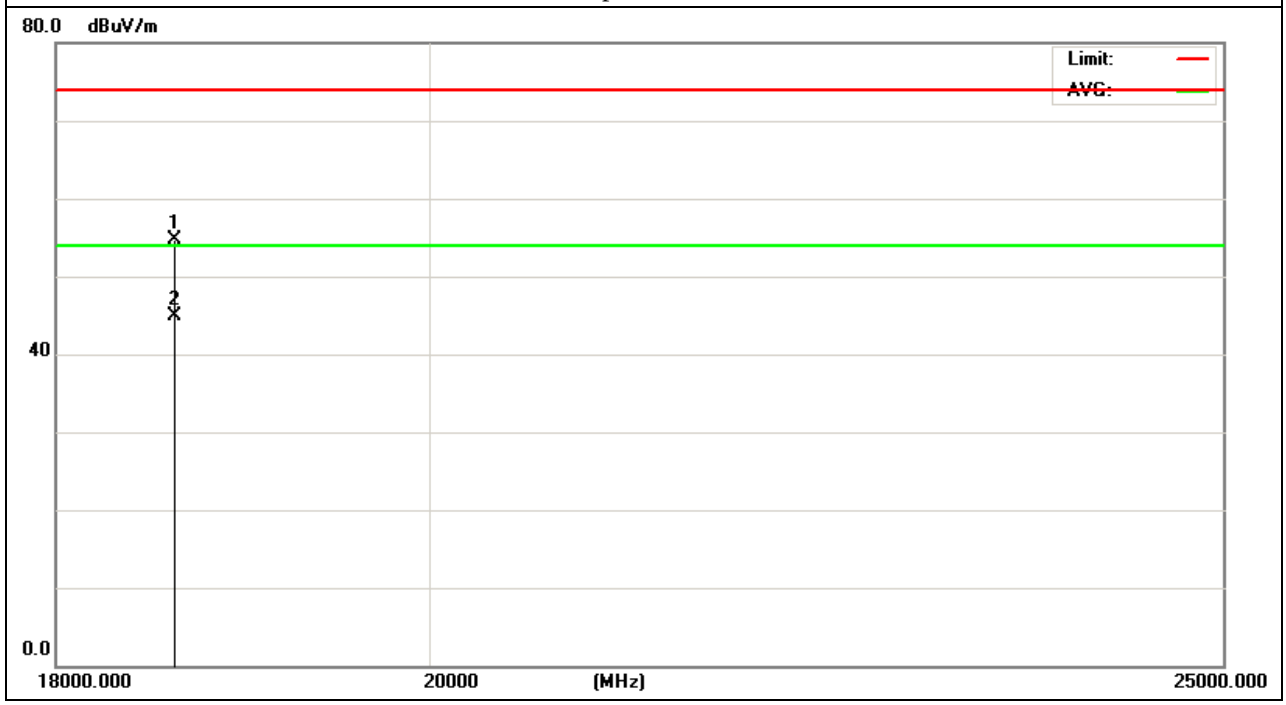
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2480MHz)	Polarization：	Vertical
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
18622.00	38.59	16.01	54.60	74.00	-19.40	peak
18622.00	28.96	16.01	44.97	54.00	-9.03	AVG

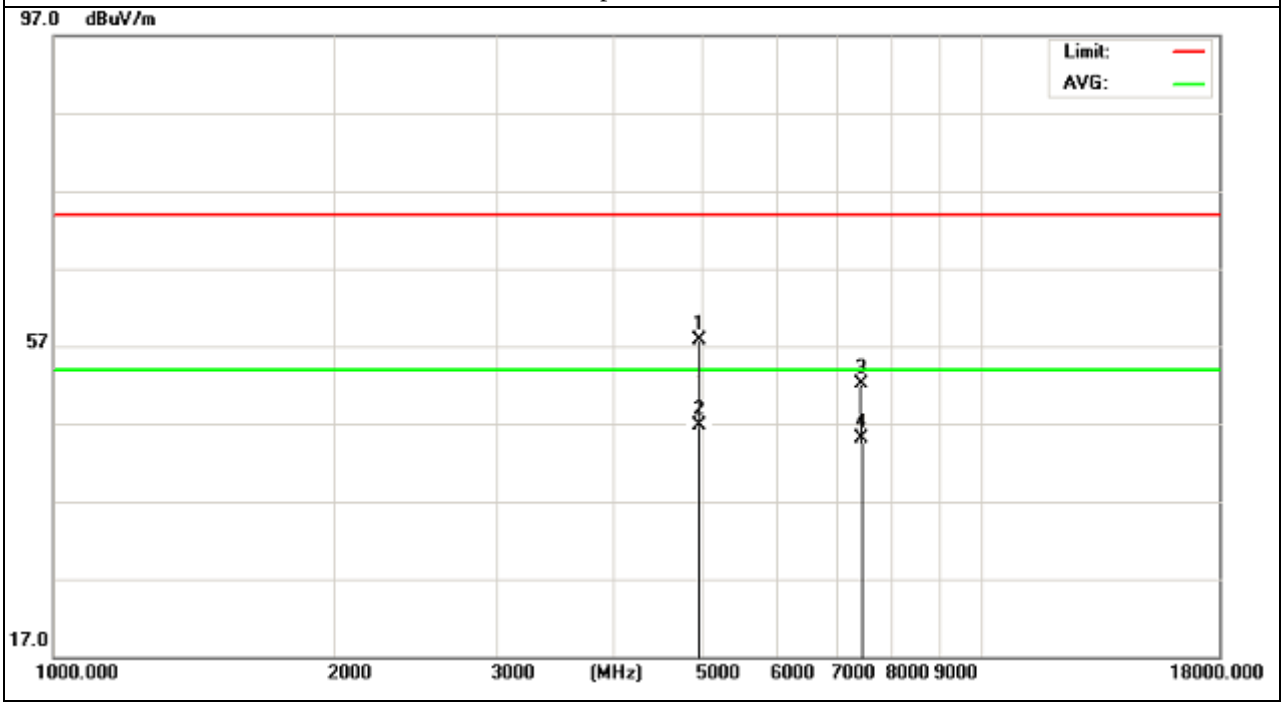
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2480MHz)	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
4960.000	51.68	5.22	56.9	74.00	-17.1	peak
4960.000	41.29	5.22	46.51	54.00	-7.49	AVG
7440.000	44.55	8.06	52.61	74.00	-21.39	peak
7440.000	38.05	8.06	46.11	54.00	-7.89	AVG

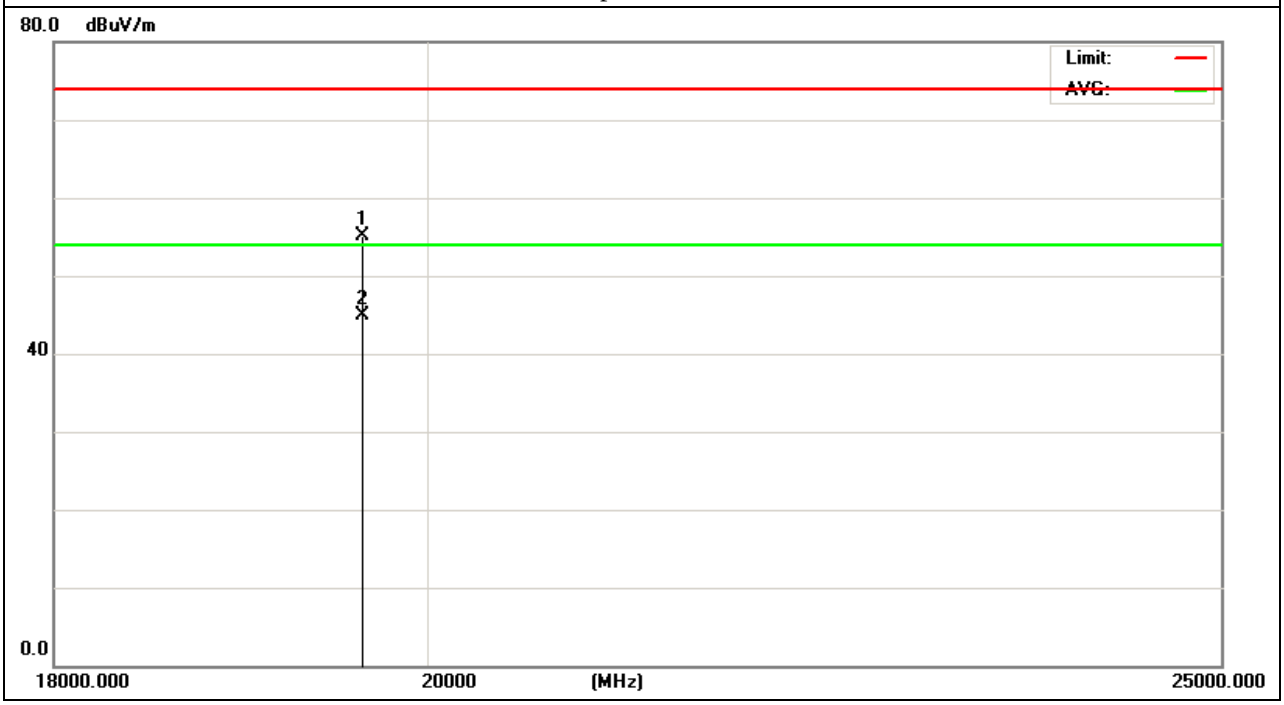
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	TX Mode1(2480MHz)	Polarization：	Horizontal
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19634.00	38.35	16.53	54.88	74.00	-19.12	peak
19634.00	29.84	16.53	46.37	54.00	-7.63	AVG

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Remark:

All the modes had been tested, but only the worst data recorded in the report.

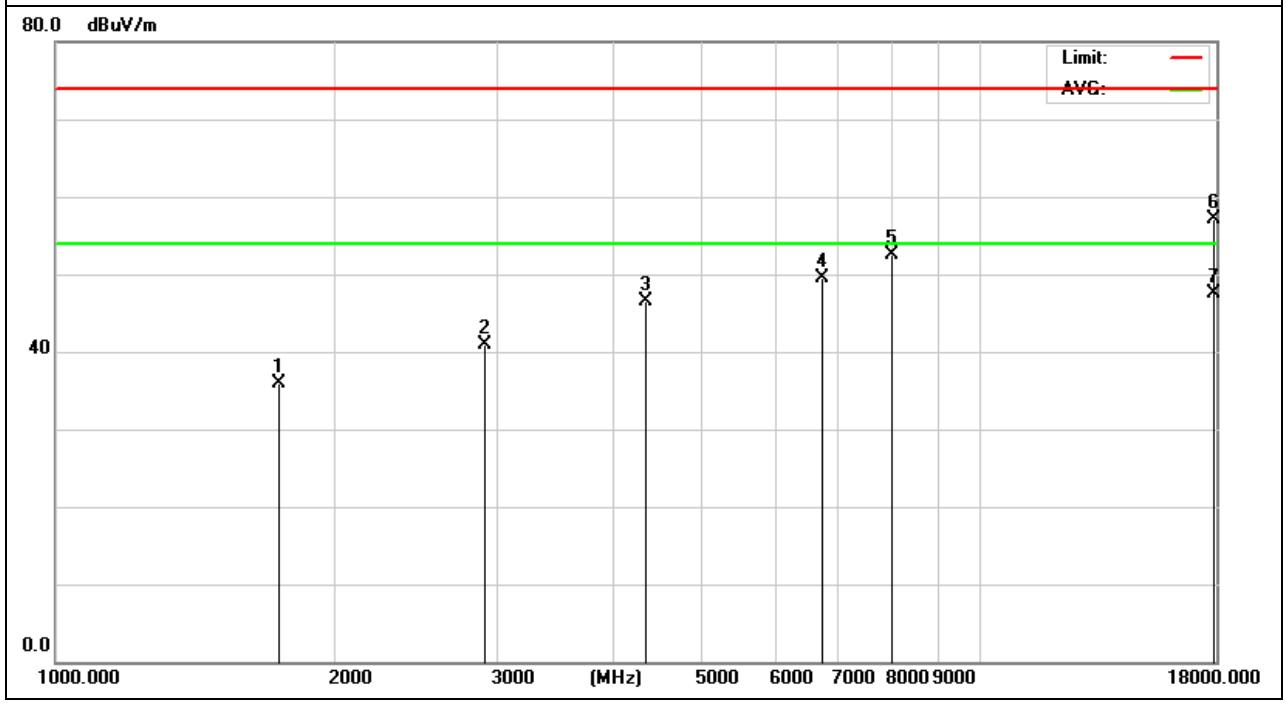
No any other emissions detected which are tested to compliance with the limit. No recording in the test report.

Test result: The unit does meet the NCC requirements.

EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	RX (worst case)	Polarization：	Vertical
Measurement Distance	3 m	Frenqucy Range	1GHz to 18GHz
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1746.244	46.98	-9.50	37.48	74.00	-36.52	peak
2912.547	43.09	-2.29	40.8	74.00	-33.2	peak
4353.006	41.82	4.44	46.26	74.00	-27.74	peak
6721.858	43.57	6.00	49.57	74.00	-24.43	peak
8009.473	42.91	10.4	53.31	74.00	-20.69	peak
17856.69	31.98	24.78	56.76	74.00	-17.24	peak
17856.69	22.94	24.78	47.72	54.00	-6.28	AVG

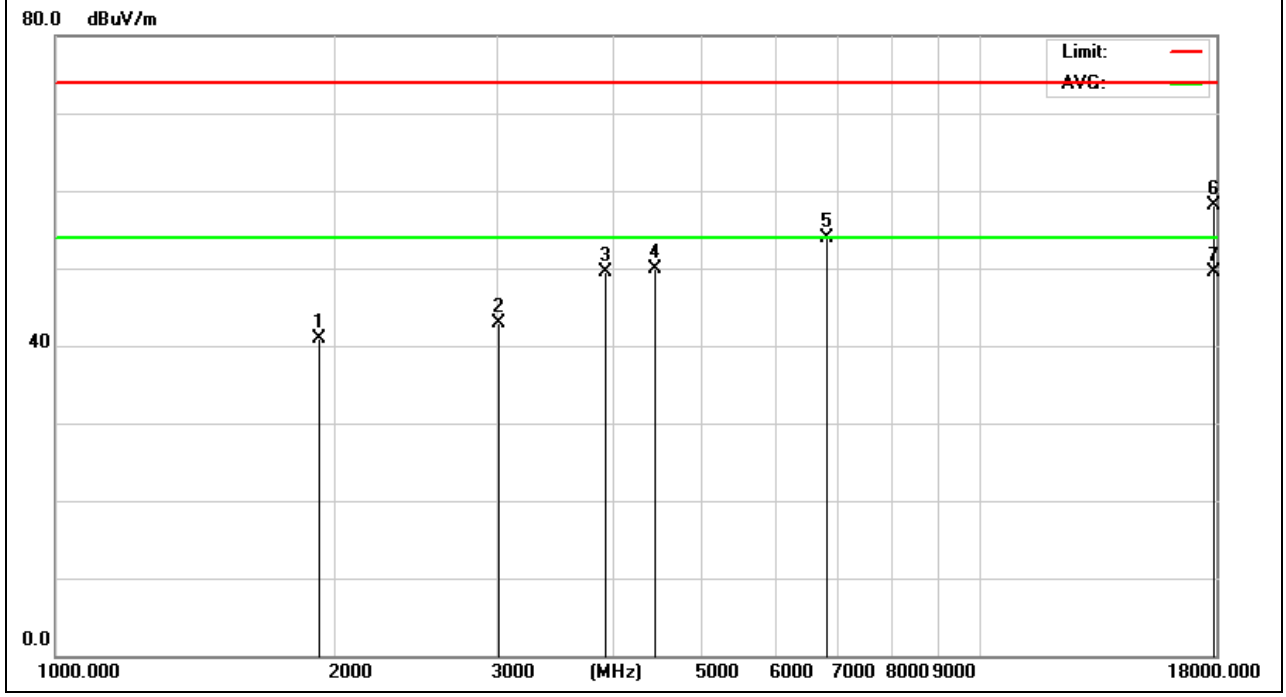
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	RX (worst case)	Polarization：	Horizontal
Measurement Distance	3 m	Frenqucy Range	1GHz to 18GHz
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
1925.993	49.72	-9.40	40.32	74.00	-33.68	peak
3011.470	44.39	-1.65	42.74	74.00	-31.26	peak
3925.559	45.44	3.28	48.72	74.00	-25.28	peak
4453.178	45.13	4.69	49.82	74.00	-24.18	peak
6825.922	47.27	6.06	53.33	74.00	-20.67	peak
17856.51	33.34	24.78	58.12	74.00	-15.88	peak
17856.51	24.63	24.78	49.41	54.00	-4.59	AVG

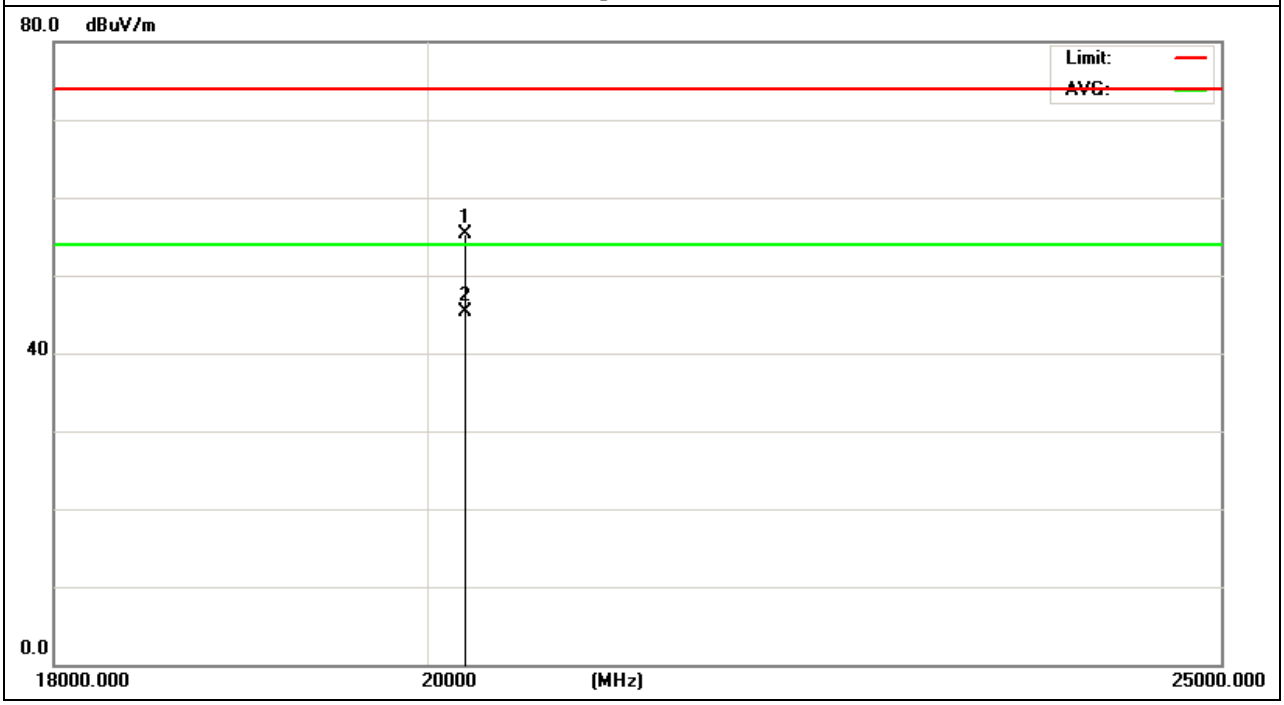
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	RX (worst case)	Polarization：	Vertical
Measurement Distance	3 m	Frenqucy Range	18GHz to 25GHz
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
20218.00	39.85	16.64	56.49	74.00	-17.51	peak
20218.00	28.42	16.64	45.06	54.00	-8.94	AVG

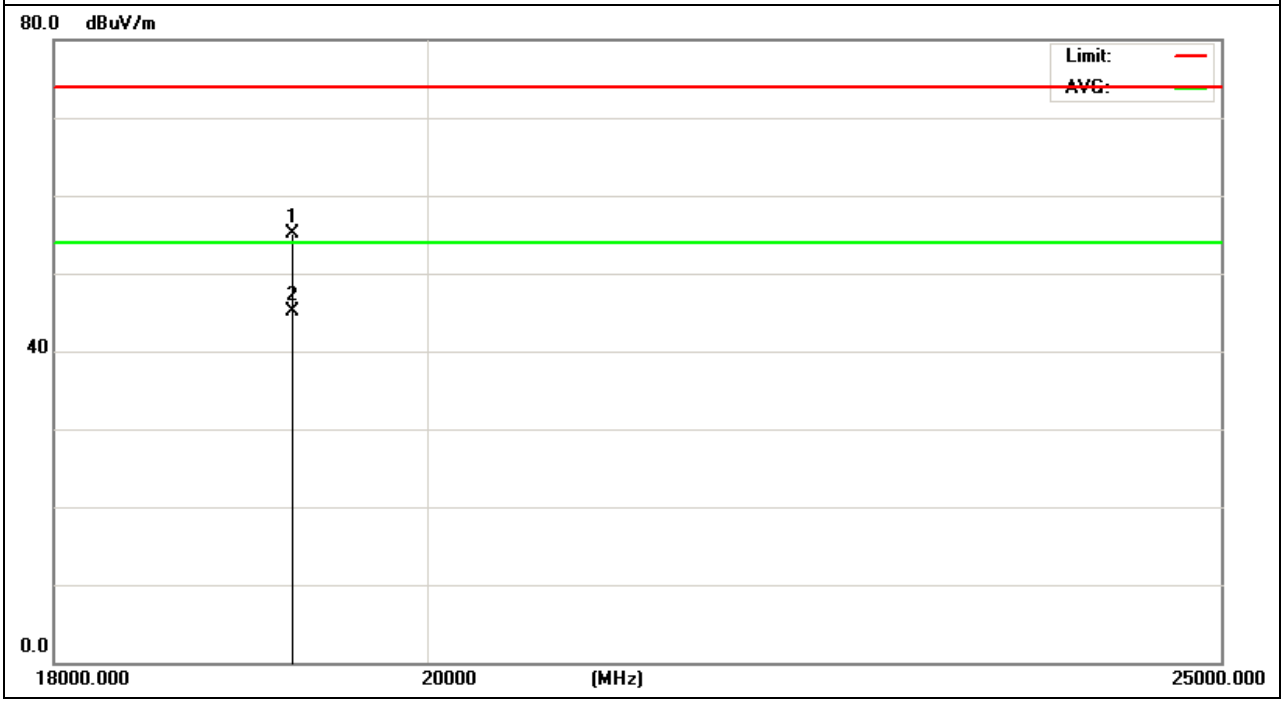
Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	54%
Pressure：	1010 hPa	Test Date：	2021-07-27
Test Mode ：	RX (worst case)	Polarization：	Horizontal
Measurement Distance	3 m	Frenqucy Range	18GHz to 25GHz
Test Power ：	DC25.55V from battery		

Frequency	Meter Reading	Factor	Emission Level	Limits	Margin	Detector Type
(MHz)	(dBμV)	(dB)	(dBμV/m)	(dBμV/m)	(dB)	
19266.00	39.97	16.45	56.42	74.00	-17.58	peak
19266.00	28.76	16.45	45.21	54.00	-8.79	AVG

Remark:
1. Factor = Antenna Factor + Cable Loss – Pre-amplifier.



Remark:

All the modes had been tested, but only the worst data recorded in the report.

No any other emissions detected which are tested to compliance with the limit. No recording in the test report.

Test result: The unit does meet the NCC requirements.

4.2.8 TEST RESULTS (RESTRICTED BANDS REQUIREMENTS)

EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Test Data	2021-07-27
Pressure：	1010 hPa	Relative Humidity：	54%
Test Mode ：	Mode 1	Test Voltage ：	DC25.55V from battery
Note：	1. The transmitter was setup to transmit at the lowest channel. Then the field strength was measured at 2310-2390 MHz. 2. The transmitter was setup to transmit at the highest channel. Then the field strength was measured at 2483.5-2500 MHz. 3. The data of 2390MHz and 2483.5MHz was the worst.		

Test Mode	Ant.Pol. H/V	Freq. (MHz)	Reading		Ant/CF CF(dB)	Act		Limit	
			Peak (dBuv)	AV (dBuv)		Peak (dBuv/m)	AV (dBuv/m)	Peak (dBuv/m)	AV (dBuv/m)
Mode 1	H	2390.00	42.43	--	-5.79	36.64	--	74.00	54.00
	V	2390.00	41.24	--	-5.79	35.45	--	74.00	54.00
	H	2483.50	40.79	--	-4.98	35.81	--	74.00	54.00
	V	2483.50	40.80	--	-4.98	35.82	--	74.00	54.00

Remark：

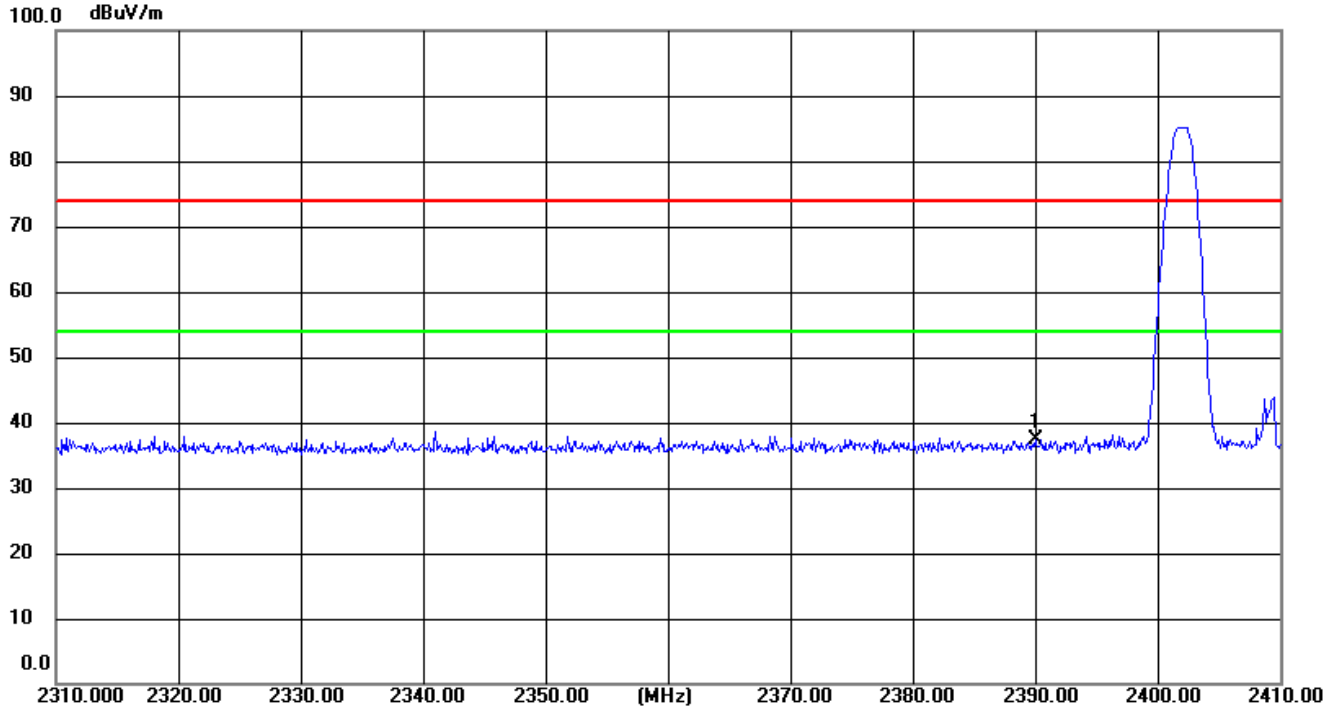
(1) Radiated emissions measured in frequency range above 1000MHz were made with an instrument using Peak detector mode

(2) EUT Orthogonal Axis：
"X" - denotes Laid on Table；"Y" - denotes Vertical Stand；"Z" - denotes Side Stand

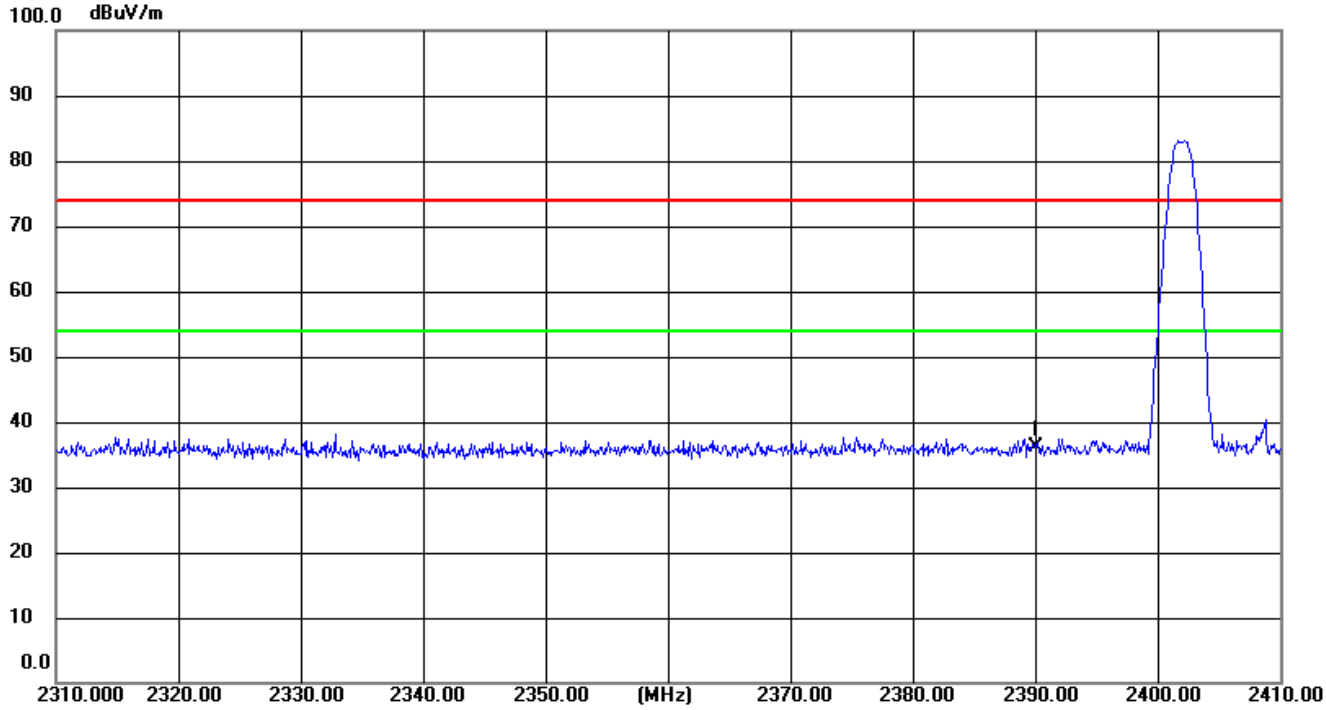
(3) During the measurements above 1 GHz it is taken care of that the EUT is always within the 3 dB cone of radiation BW of the used antenna

(4) Corr.Factor = Antenna Factor + Cable Loss – Pre-amplifier.

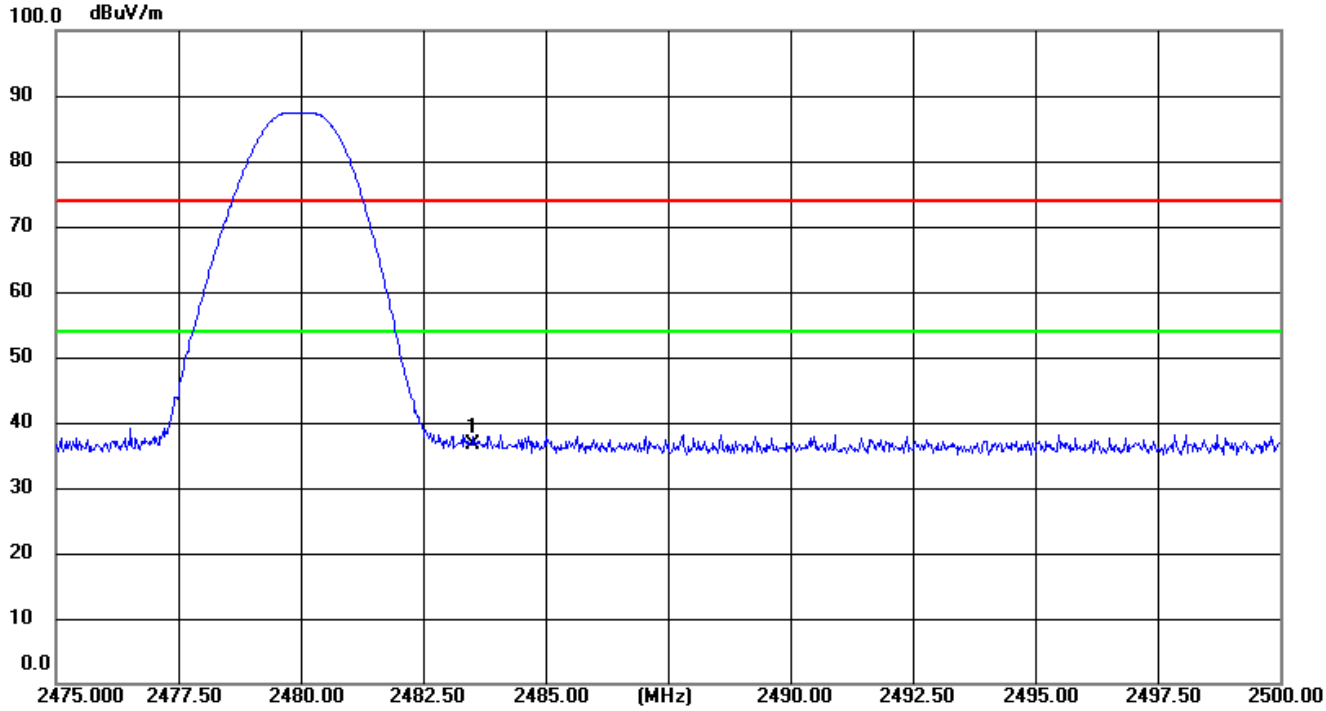
Horizontal



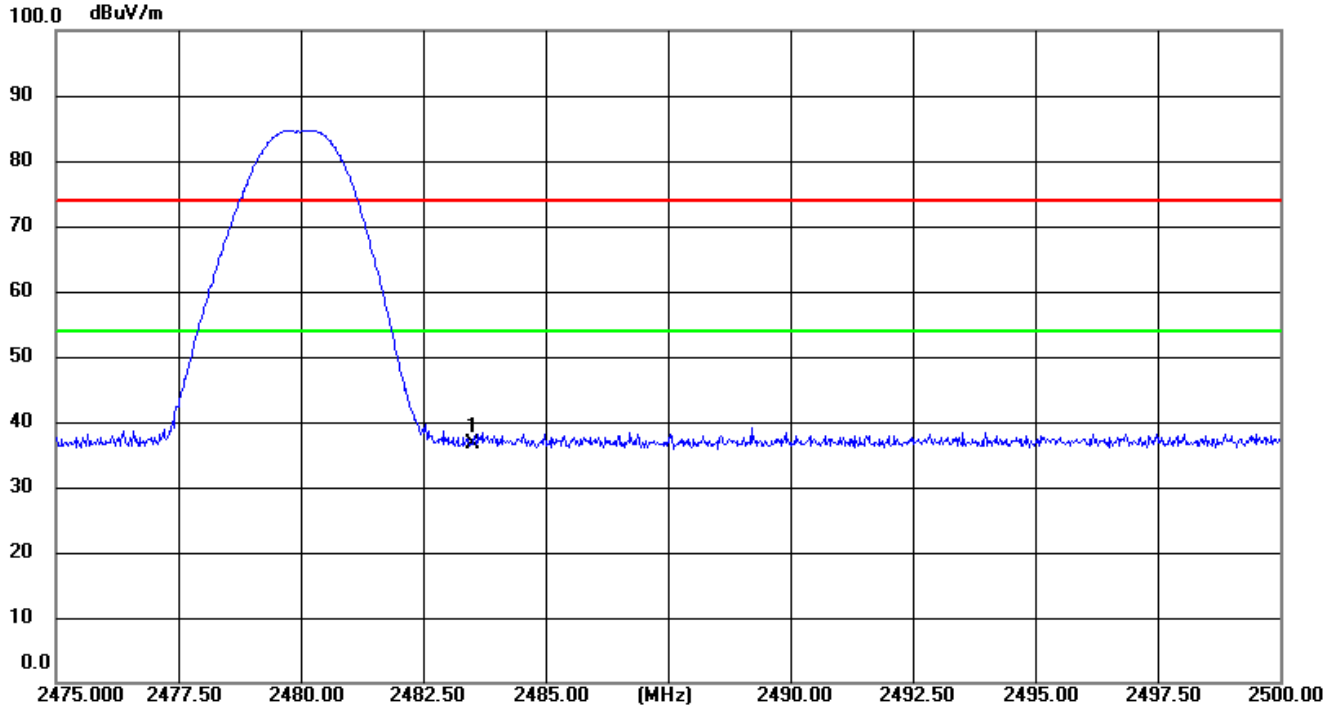
Vertical



Horizontal



Vertical



Test result: The unit does meet the NCC requirements.

5. OCCUPIED BANDWIDTH TEST

5.1 APPLIED PROCEDURES / LIMIT

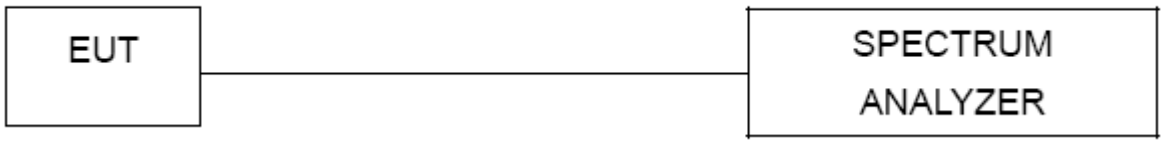
LP0002				
Section	Test Item	Limit	Frequency Range (MHz)	Result
4.10.1(6.2.1)	Bandwidth	>= 500kHz (6dB bandwidth)	2400-2483.5	PASS

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> Measurement Bandwidth or Channel Separation
RB	100 kHz (6dB Bandwidth) / 100 kHz (Channel Separation)
VB	300 kHz (6dB Bandwidth) / 300 kHz (Channel Separation)
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

5.1.1 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=300kHz, Sweep time = Auto.

5.1.2 TEST SETUP



5.1.3 EUT OPERATION CONDITIONS

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

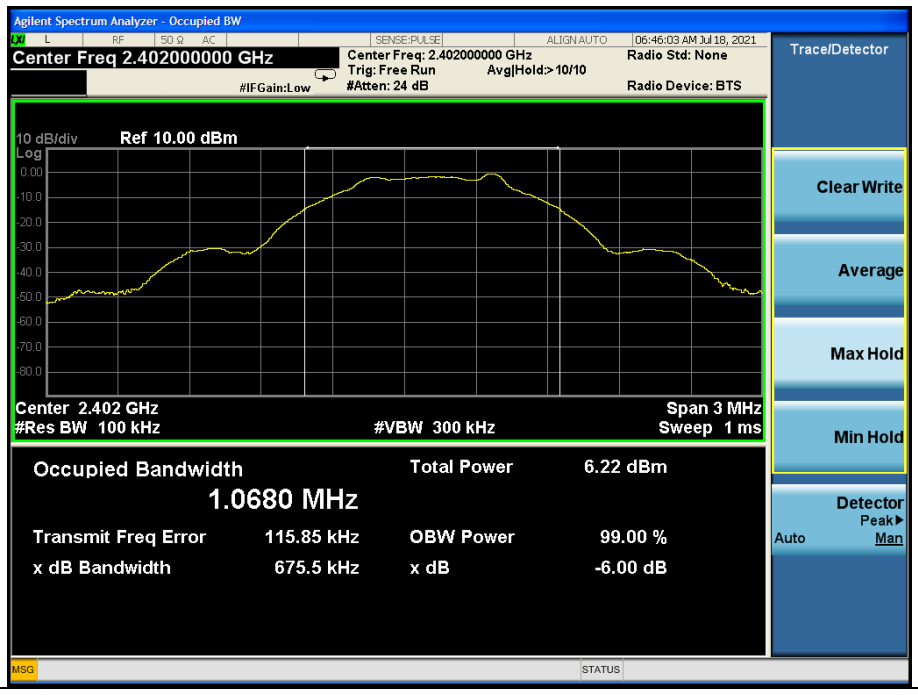
5.1.4 TEST RESULTS

Modul mode: AP6356S

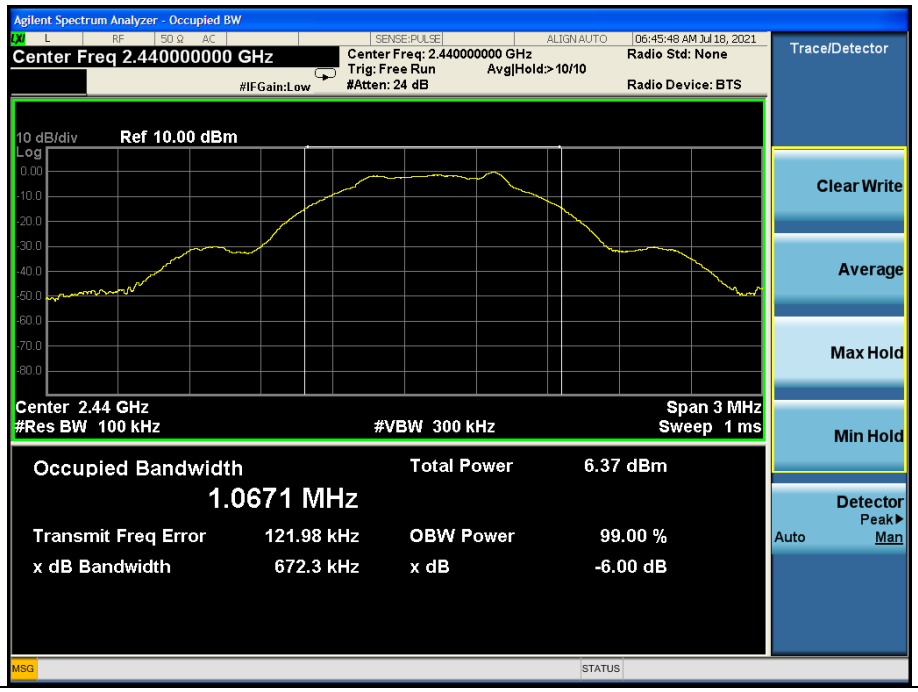
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Power ：	DC25.55V from battery
Test Mode ：	Mode 1		
Test Date：	2021-07-18		

Test Mode	Test Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Limit （kHz）
Mode 1	CH01	2402	675.5	≧500
	CH20	2440	672.3	≧500
	CH40	2480	672.3	≧500

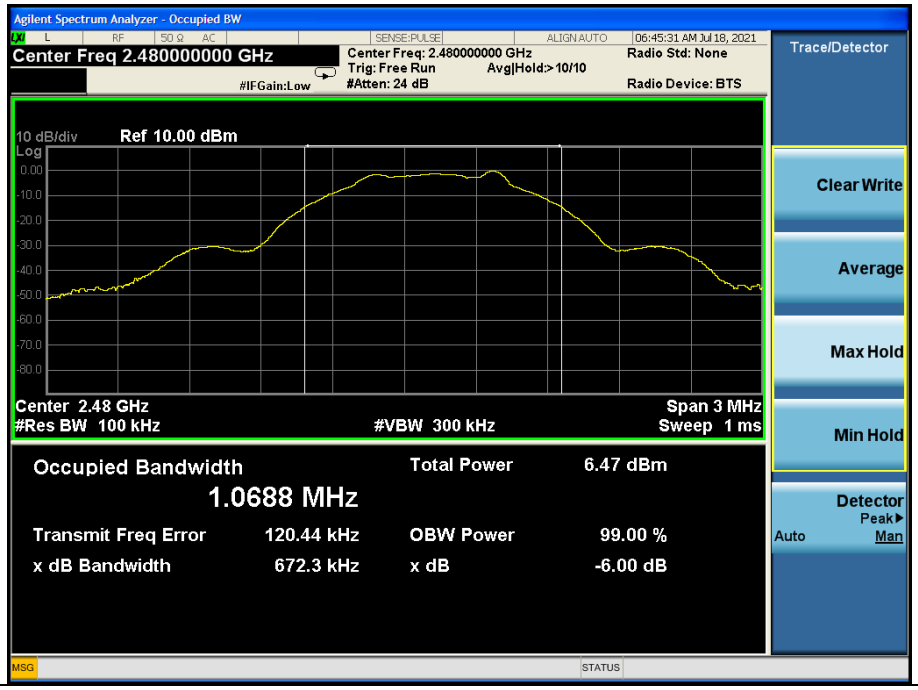
CH01 2402MHz



CH20 2440MHz



CH40 2480MHz

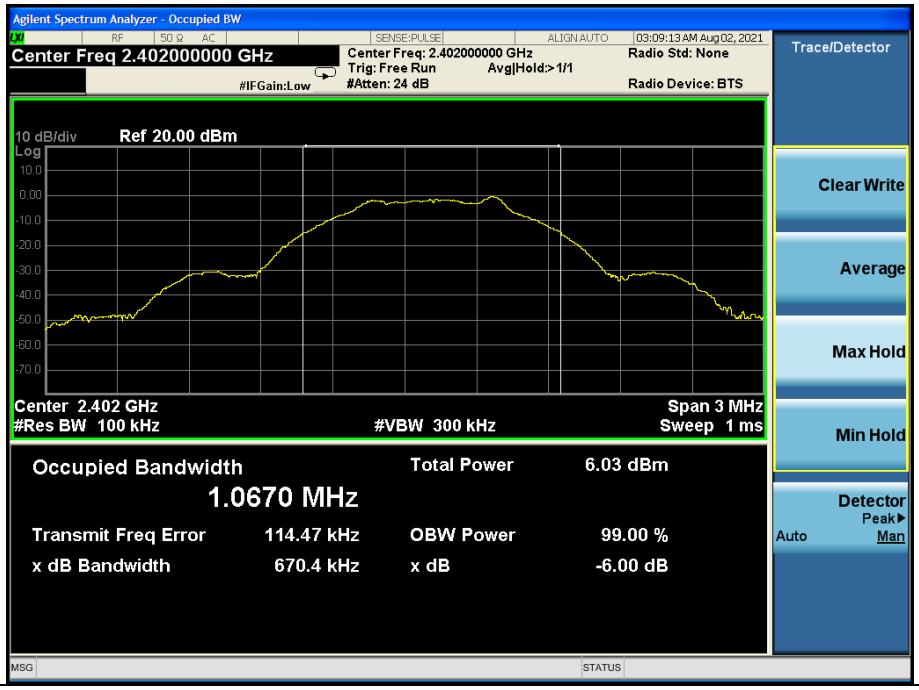


Modul mode: ESP32

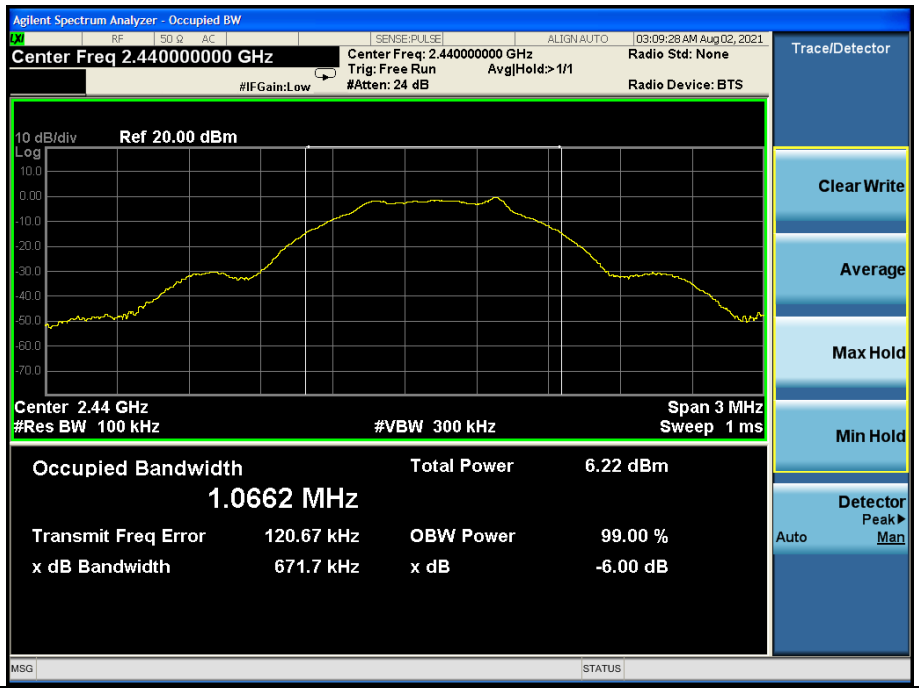
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity:	53%
Pressure：	1010 hPa	Test Power ：	DC25.55V from battery
Test Mode ：	Mode 1		
Test Date：	2021-08-02		

Test Mode	Test Channel	Frequency (MHz)	6 dB Bandwidth (kHz)	Limit （kHz）
Mode 1	CH01	2402	670.4	≧500
	CH20	2440	671.7	≧500
	CH40	2480	676.1	≧500

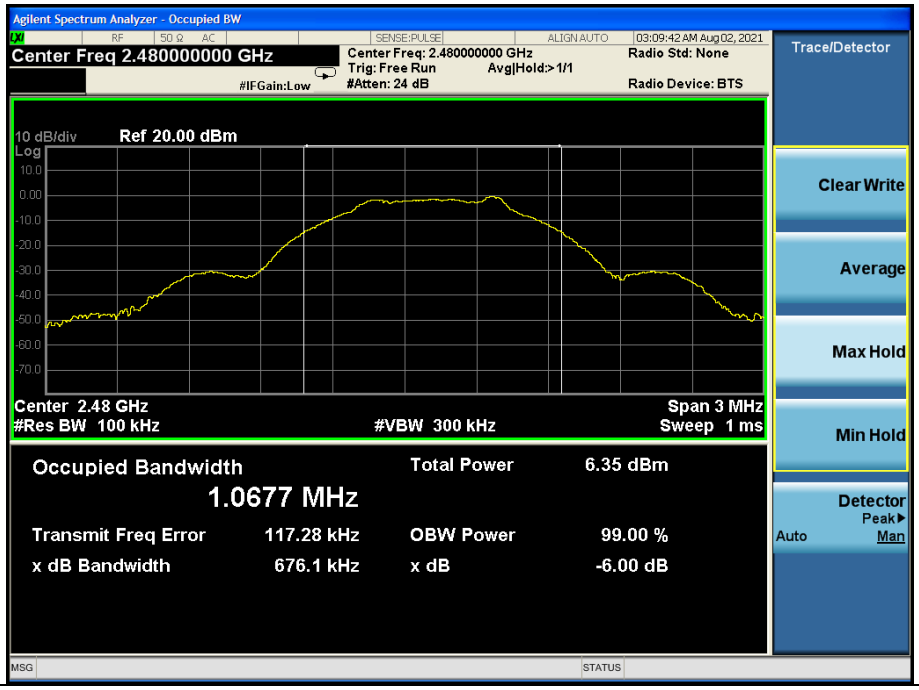
CH01 2402MHz



CH20 2440MHz



CH40 2480MHz



6. POWER DENSITY

6.1 APPLIED PROCEDURES / LIMIT

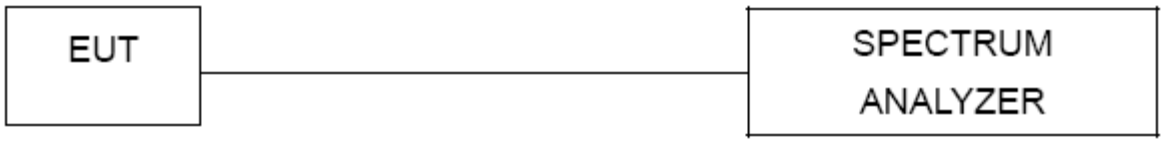
LP0002				
Section	Test Item	Limit	Frequency Range (MHz)	Result
4.10.1(6.2.2)	Power density	8dBm	2400-2483.5	PASS

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	1.5 times the DTS bandwidth
RB	3 kHz
VB	10 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

6.1.1 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= 3kHz, VBW=10kHz.

6.1.2 TEST SETUP



6.1.3 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.

6.1.4 TEST RESULTS

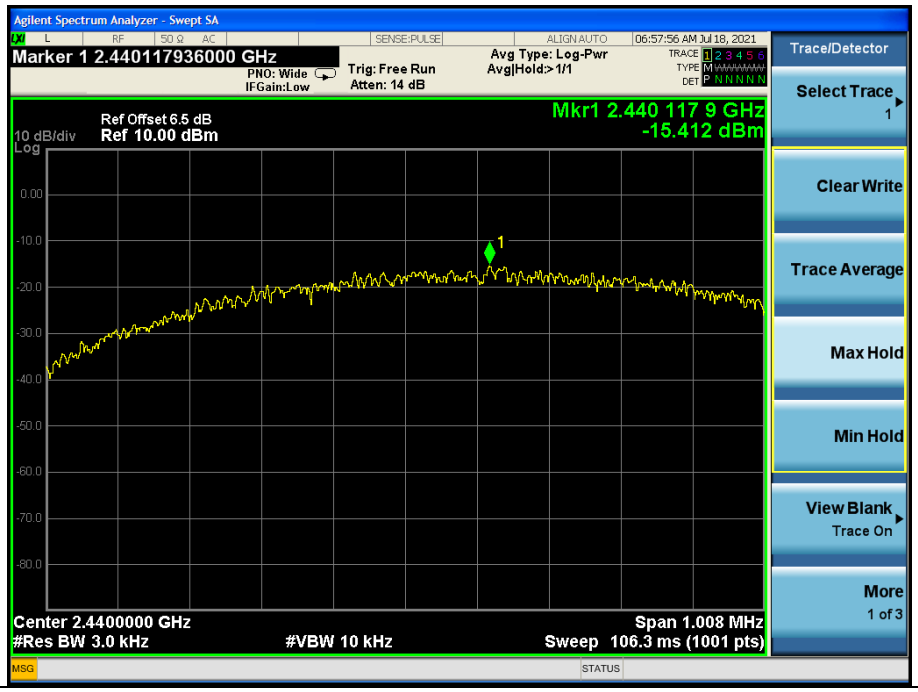
Modul mode: AP6356S

EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Voltage ：	DC25.55V from battery
Test Mode ：	Mode 1		
Test Date：	2021-07-18		

Test Channel	Frequency(MHz)	Power Density(dBm)	LIMIT(dBm)
CH01	2402 MHz	-15.788	8.00
CH20	2440 MHz	-15.412	8.00
CH40	2480 MHz	-15.716	8.00

CH01 2402MHz

CH20 2440MHz



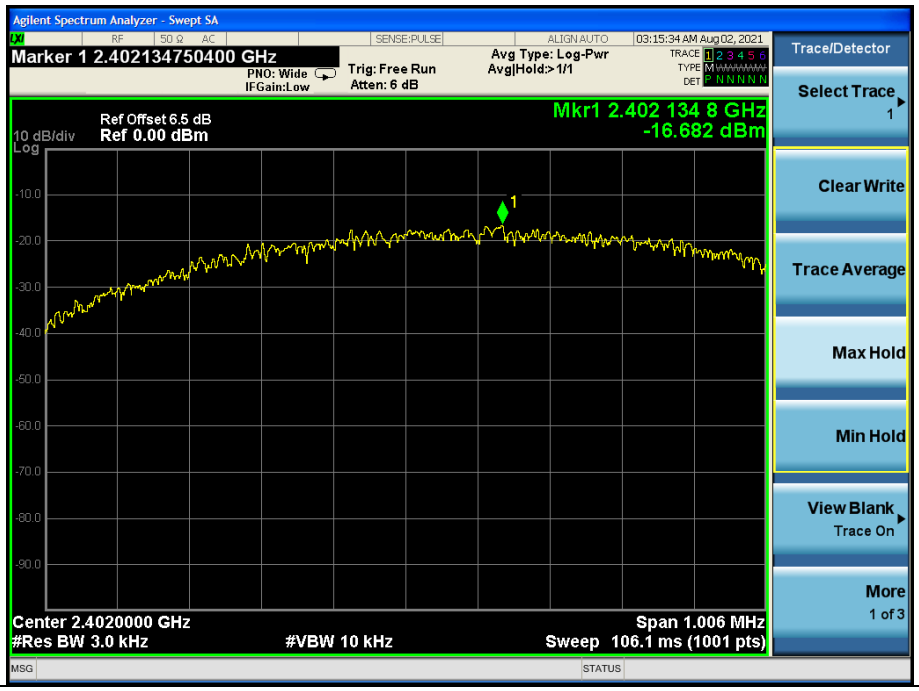
CH40 2480MHz

Modul mode: ESP32

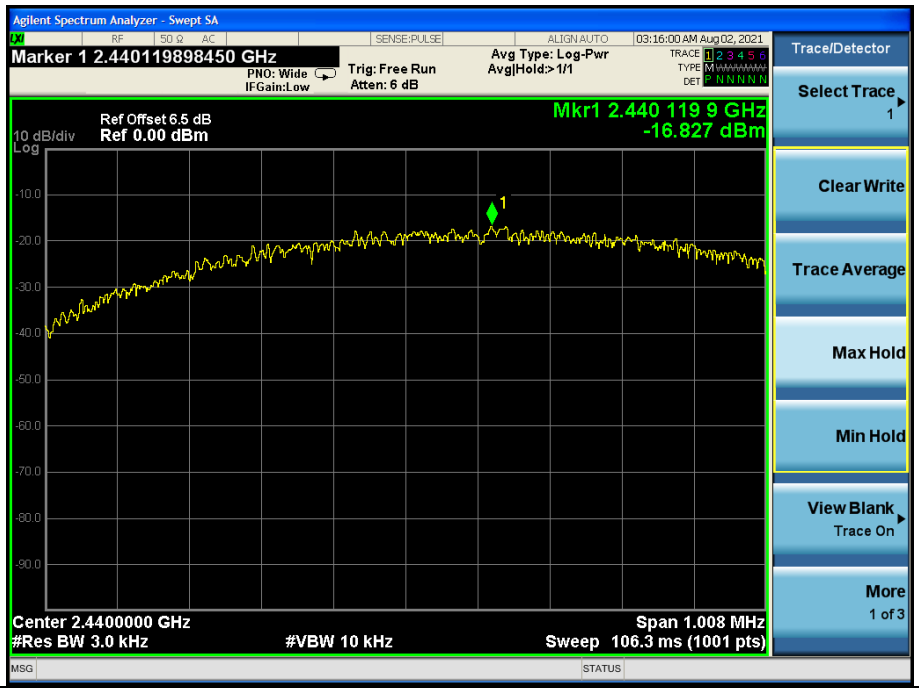
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Voltage ：	DC25.55V from battery
Test Mode ：	Mode 1		
Test Date：	2021-08-02		

Test Channel	Frequency(MHz)	Power Density(dBm)	LIMIT(dBm)
CH01	2402 MHz	-16.682	8.00
CH20	2440 MHz	-16.827	8.00
CH40	2480 MHz	-17.097	8.00

CH01 2402MHz



CH20 2440MHz



CH40 2480MHz

7. OUTPUT POWER TEST

7.1 APPLIED PROCEDURES / LIMIT

LP0002				
Section	Test Item	Limit	Frequency Range (MHz)	Result
4.10.1(2)	Peak Output Power	1 watt or 30dBm	2400-2483.5	PASS

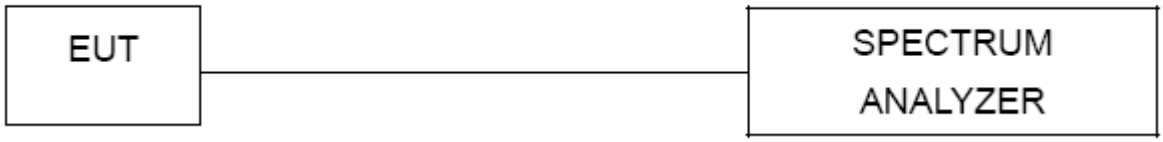
7.1.1 TEST PROCEDURE

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= 1 MHz, VBW= 3 MHz, Span=3MHz,Detector=Peak,Trace mode= Max Hold ,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.

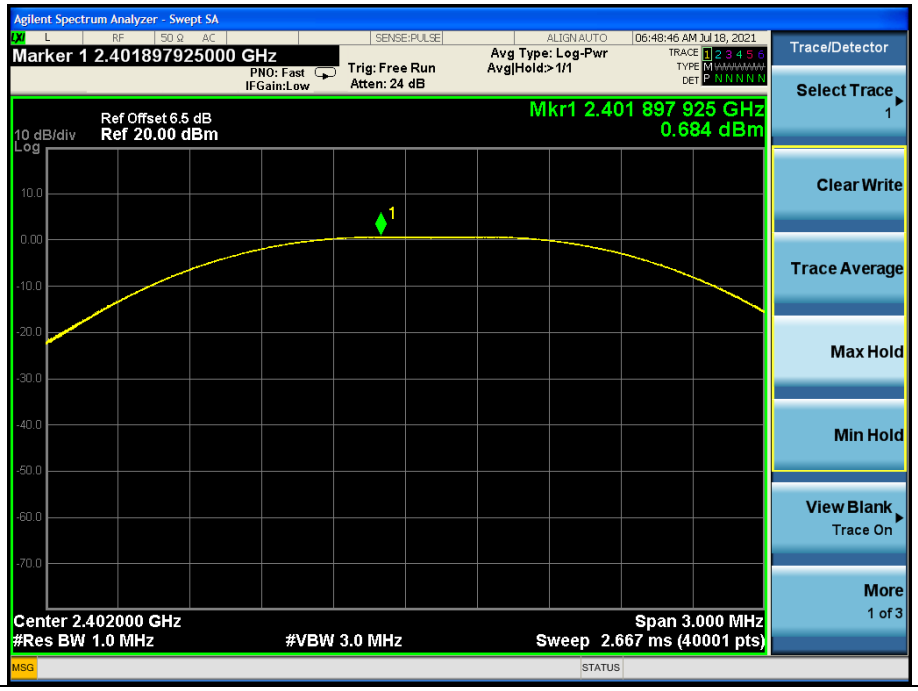
7.1.5 TEST RESULTS

Modul mode: AP6356S

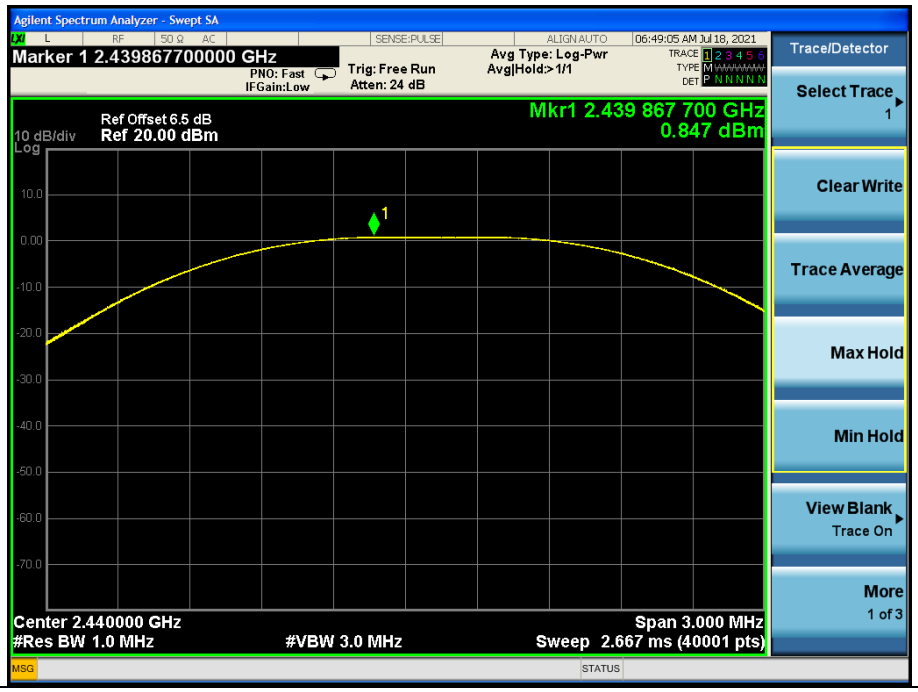
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Voltage ：	DC25.55V from battery
Test Mode ：	Mode 1		
Test Date：	2021-07-18		

Test Channel	Frequency (MHz)	Output Power (dBm)	Limit(dBm)	Result
CH01	2402 MHz	0.684	30	PASS
CH20	2440MHz	0.847	30	PASS
CH40	2480 MHz	0.868	30	PASS

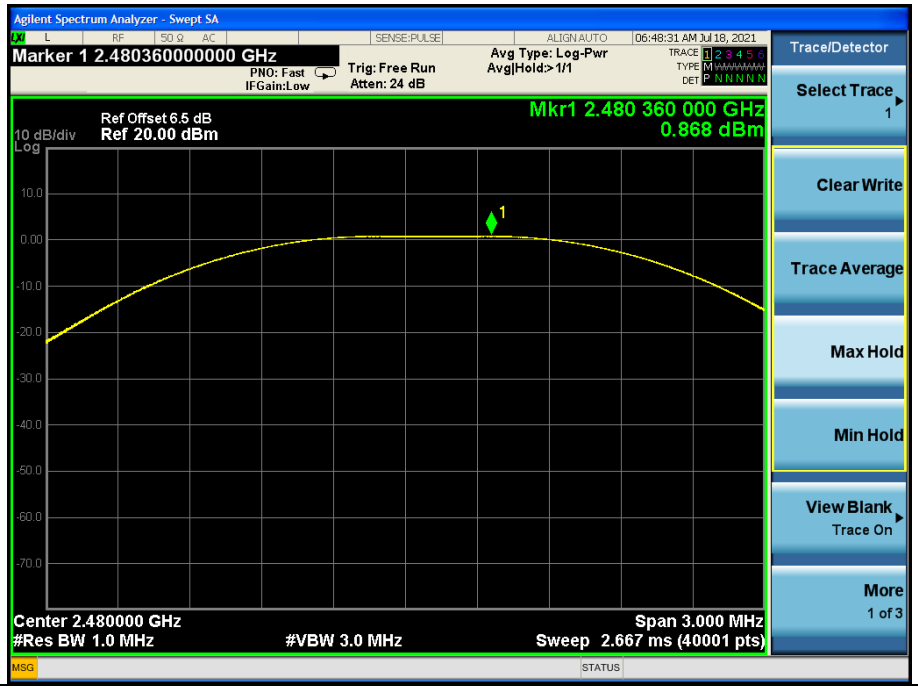
CH01 2402MHz



CH20 2440MHz



CH40 2480MHz

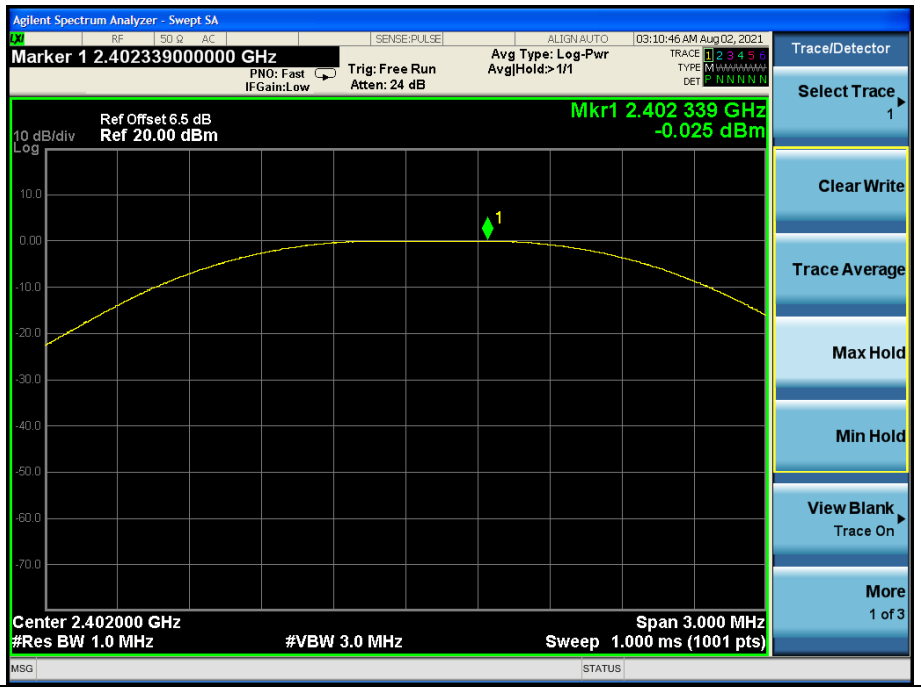


Modul mode: ESP32

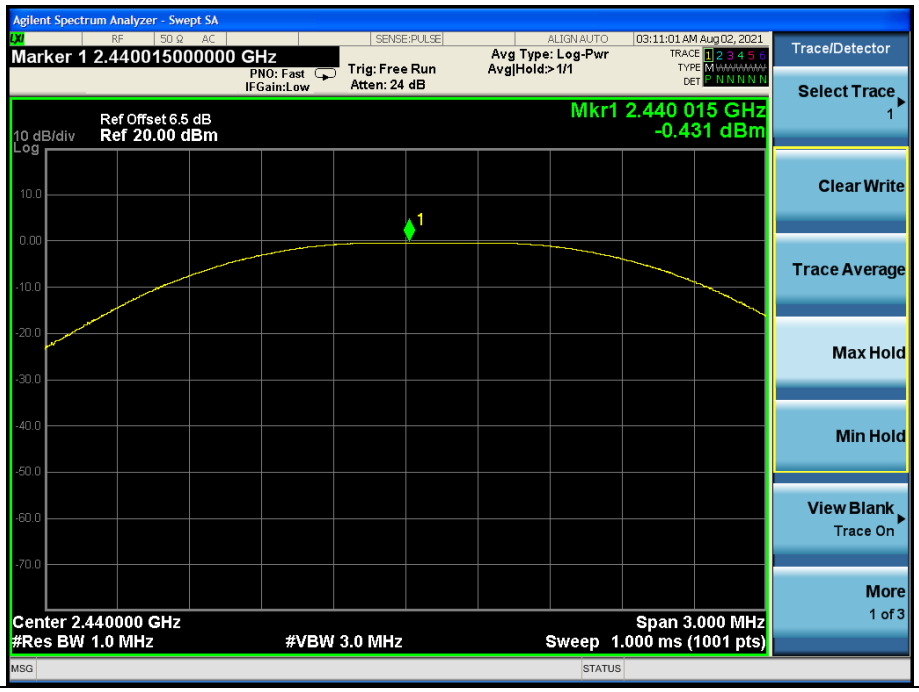
EUT：	葫蘆機器人/KettyBot	Model Name ：	PNT
Temperature：	24 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Voltage ：	DC25.55V from battery
Test Mode ：	Mode 1		
Test Date：	2021-08-02		

Test Channel	Frequency (MHz)	Output Power (dBm)	Limit(dBm)	Result
CH01	2402 MHz	-0.025	30	PASS
CH20	2440MHz	-0.431	30	PASS
CH40	2480 MHz	-0.572	30	PASS

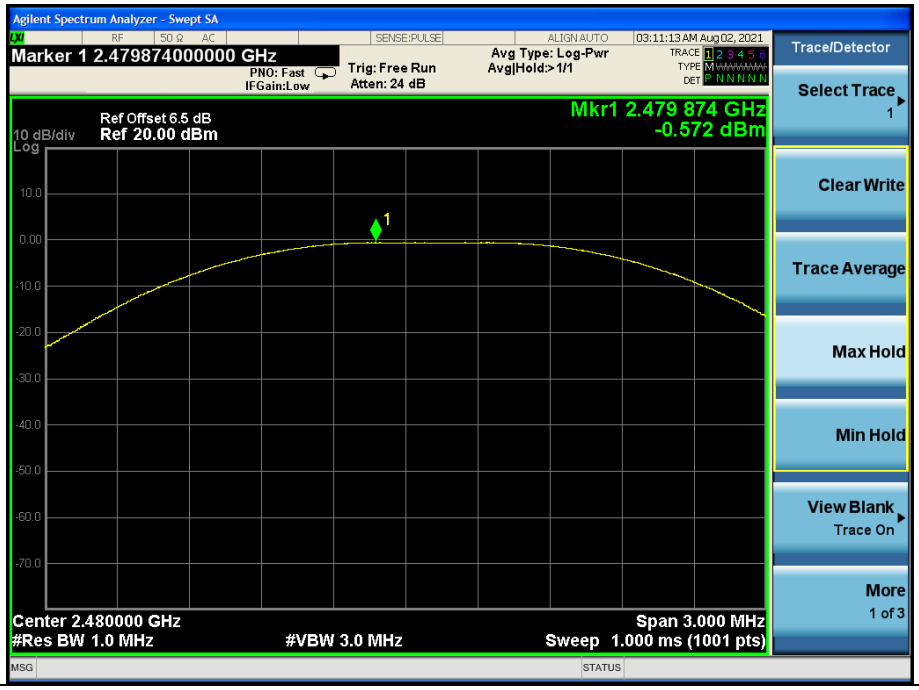
CH01 2402MHz



CH20 2440MHz



CH40 2480MHz



8. ANTENNA CONDUCTED SPURIOUS EMISSION

8.1 APPLIED PROCEDURES / LIMIT

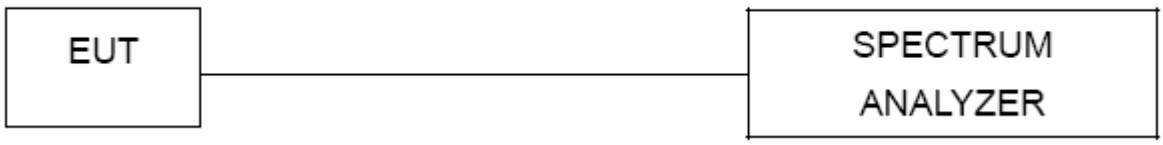
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the modulation products of the spreading sequence, the information sequence and the carrier frequency shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power or shall not exceed the general levels specified in Section 3.6.

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

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= 100kHz, VBW=300kHz, Sweep time = Auto.

8.1.2 TEST SETUP



8.1.3 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.

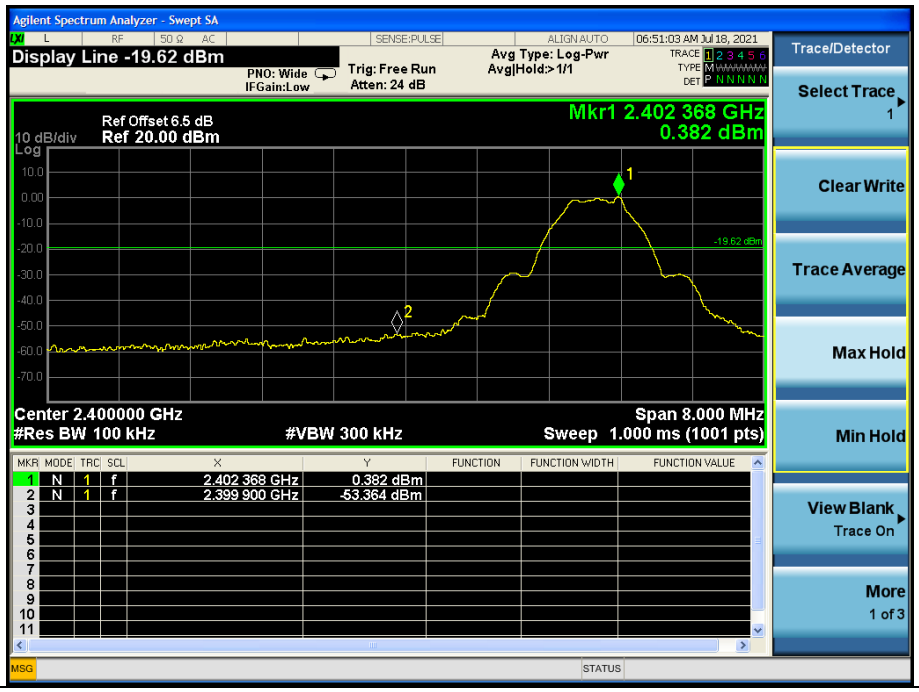
8.1.4 TEST RESULTS

Modul mode: AP6356S

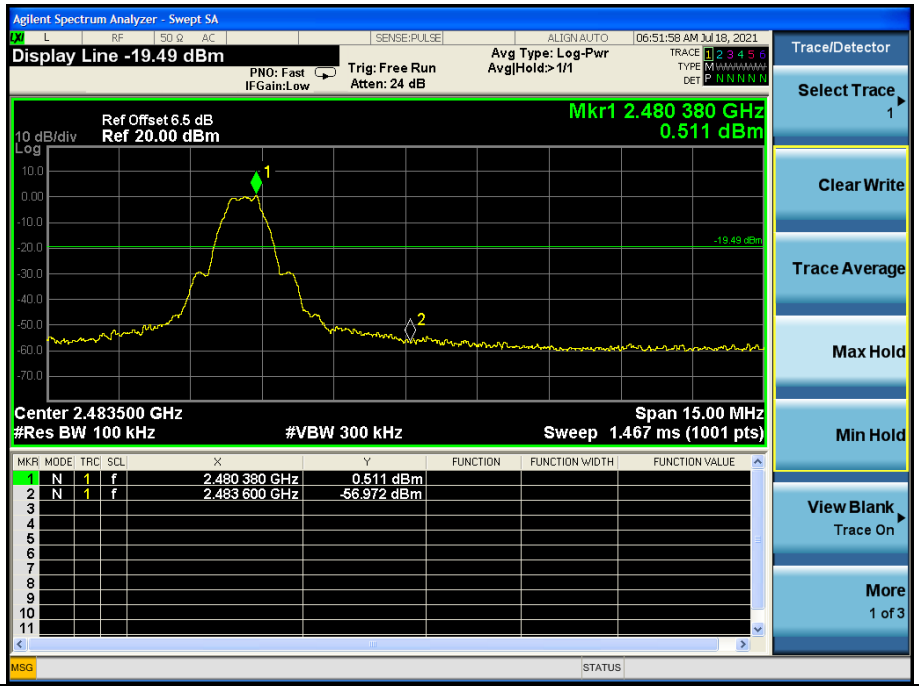
EUT：	PNT	Model Name ：	PNT
Temperature：	25 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Voltage ：	DC25.55V from battery
Test Mode:	Mode 1		
Test Date：	2021-07-18		

in any 100kHz bandwidth outside the low frequency band	in any 100 kHz bandwidth outside the high frequency band
Pass	Pass
Result	
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.	

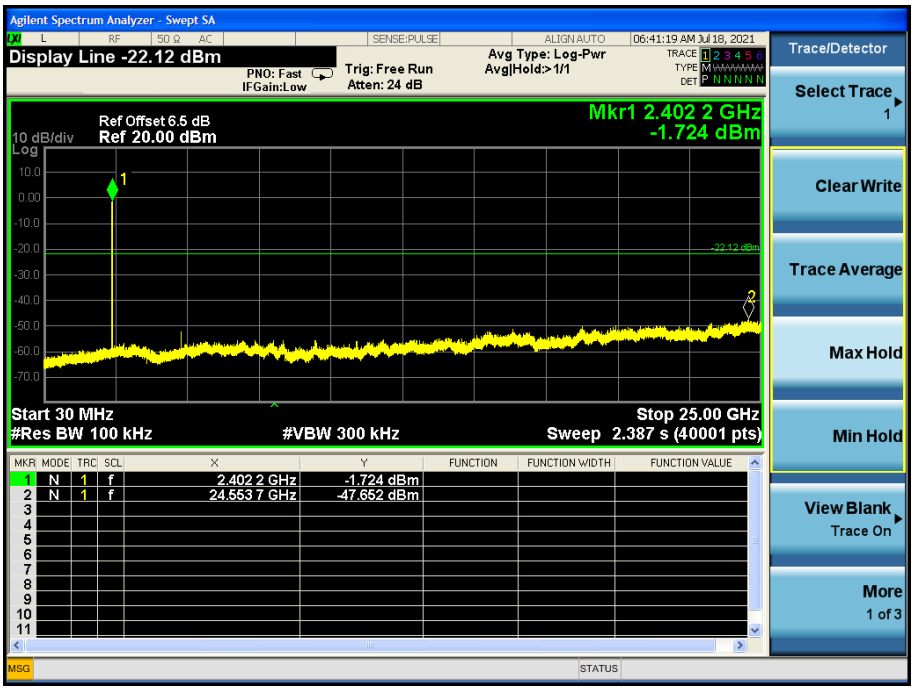
CH01 (Lower)



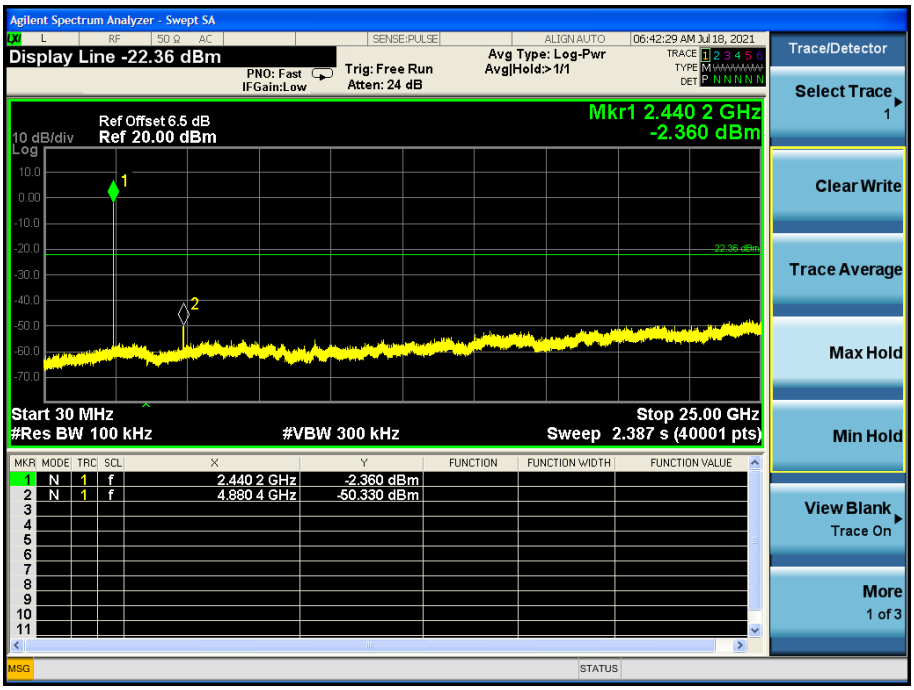
CH40 (Upper)



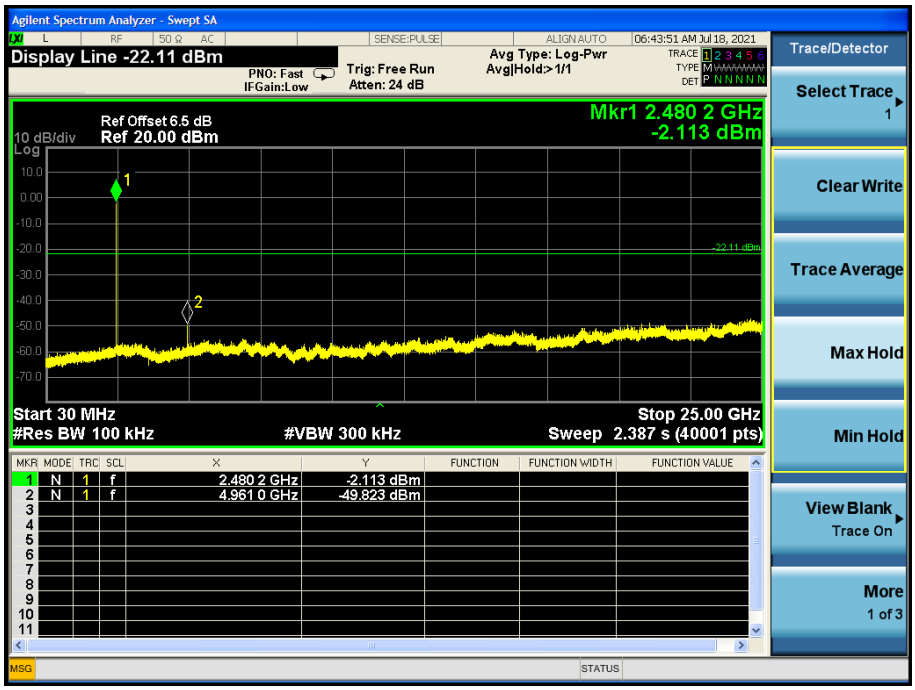
CH01


Agilent Spectrum Analyzer - Swept SA
Display Line -22.12 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
06:41:19 AM Jul 18, 2021
Ref Offset 6.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.402 2 GHz
-1.724 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.402 2 GHz -1.724 dBm
2 N 1 f 24.553 7 GHz -47.652 dBm
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

CH20


Agilent Spectrum Analyzer - Swept SA
Display Line -22.36 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
06:42:29 AM Jul 18, 2021
Ref Offset 6.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.440 2 GHz
-2.360 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.440 2 GHz -2.360 dBm
2 N 1 f 4.880 4 GHz -50.330 dBm
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

CH40

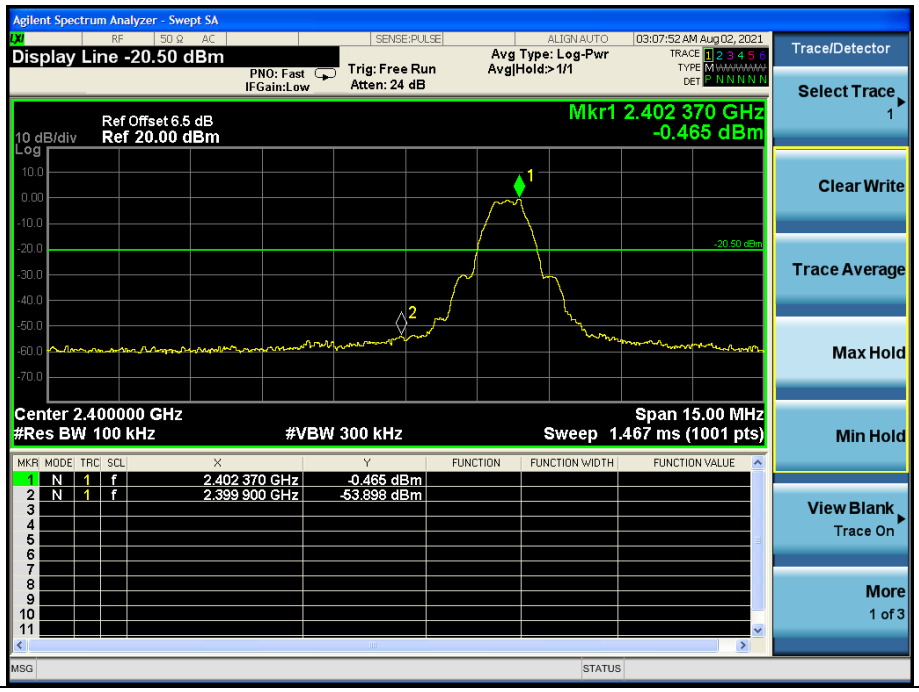

Agilent Spectrum Analyzer - Swept SA
Display Line -22.11 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
06:43:51 AM Jul 18, 2021
Ref Offset 6.5 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.480 2 GHz
-2.113 dBm
-22.11 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.00 GHz
Sweep 2.387 s (40001 pts)
1 N 1 f 2.480 2 GHz -2.113 dBm
2 N 1 f 4.961 0 GHz -49.823 dBm
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

Modul mode: ESP32

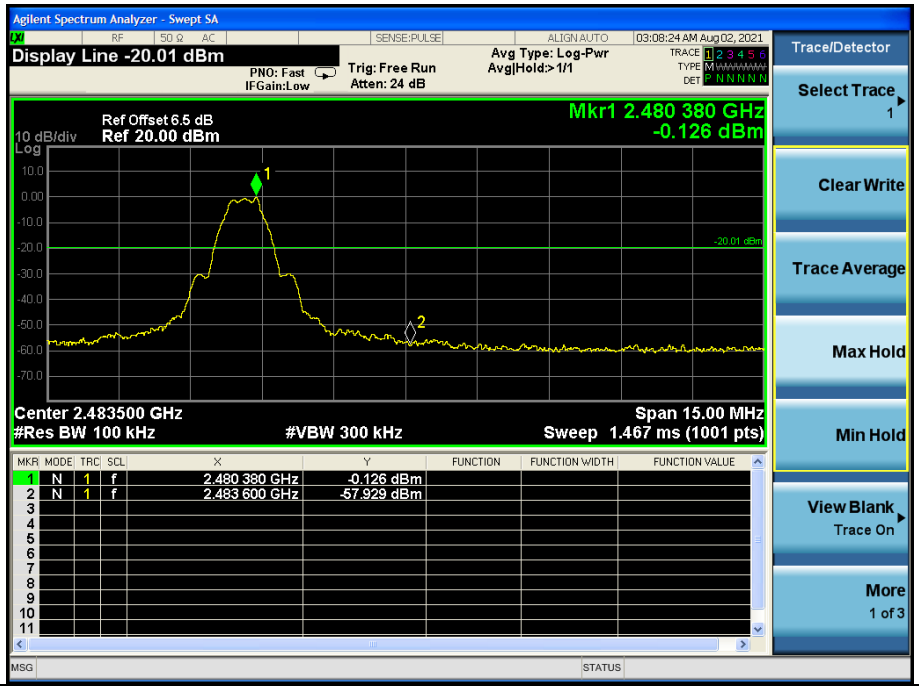
EUT：	PNT	Model Name ：	PNT
Temperature：	25 ℃	Relative Humidity：	53%
Pressure：	1010 hPa	Test Voltage ：	DC25.55V from battery
Test Mode:	Mode 1		
Test Date：	2021-08-02		

in any 100kHz bandwidth outside the low frequency band	in any 100 kHz bandwidth outside the high frequency band
Pass	Pass
Result	
In any 100kHz bandwidth outside the frequency band, the radio frequency power is at least 20dB below that in the 100kHz bandwidth within the band that contains the highest lever of the desired power.	

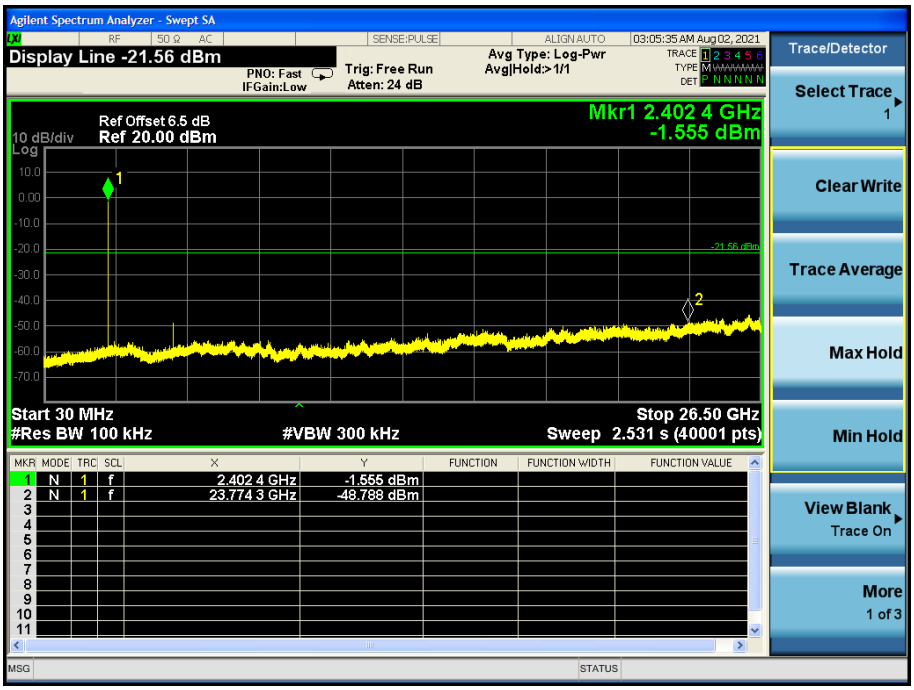
CH01 (Lower)



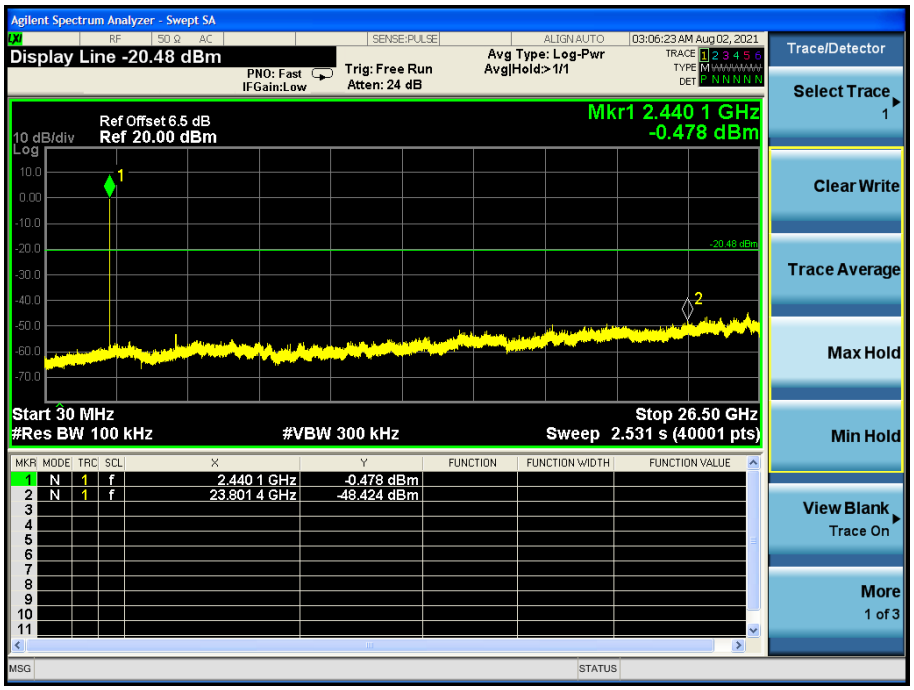
CH40 (Upper)



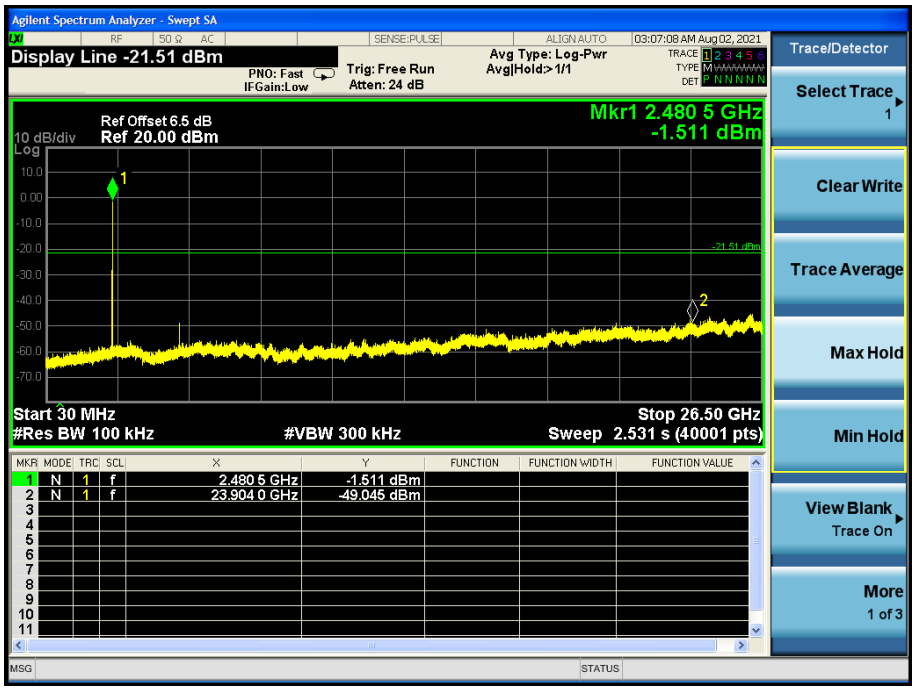
CH01


Agilent Spectrum Analyzer - Swept SA
Display Line -21.56 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
03:05:35 AM Aug 02, 2021
Ref Offset 6.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.402 4 GHz
-1.555 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.531 s (40001 pts)
1 N 1 f 2.402 4 GHz -1.555 dBm
2 N 1 f 23.774 3 GHz -48.788 dBm
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

CH20


Agilent Spectrum Analyzer - Swept SA
Display Line -20.48 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
03:06:23 AM Aug 02, 2021
Ref Offset 6.5 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.440 1 GHz
-0.478 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.531 s (40001 pts)
1 N 1 f 2.440 1 GHz -0.478 dBm
2 N 1 f 23.801 4 GHz -48.424 dBm
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

CH40


Agilent Spectrum Analyzer - Swept SA
Display Line -21.51 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 24 dB
Avg Type: Log-Pwr
Avg|Hold:>1/1
03:07:08 AM Aug 02, 2021
Ref Offset 6.5 dB
10 dB/div
Log
Ref 20.00 dBm
Mkr1 2.480 5 GHz
-1.511 dBm
Start 30 MHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 26.50 GHz
Sweep 2.531 s (40001 pts)
1 N 1 f 2.480 5 GHz -1.511 dBm
2 N 1 f 23.904 0 GHz -49.045 dBm
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank Trace On
More 1 of 3

8. ANTENNA REQUIREMENT

8.1 STANDARD REQUIREMENT

4.10.3.1.1 requirement: Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

8.2 EUT ANTENNA

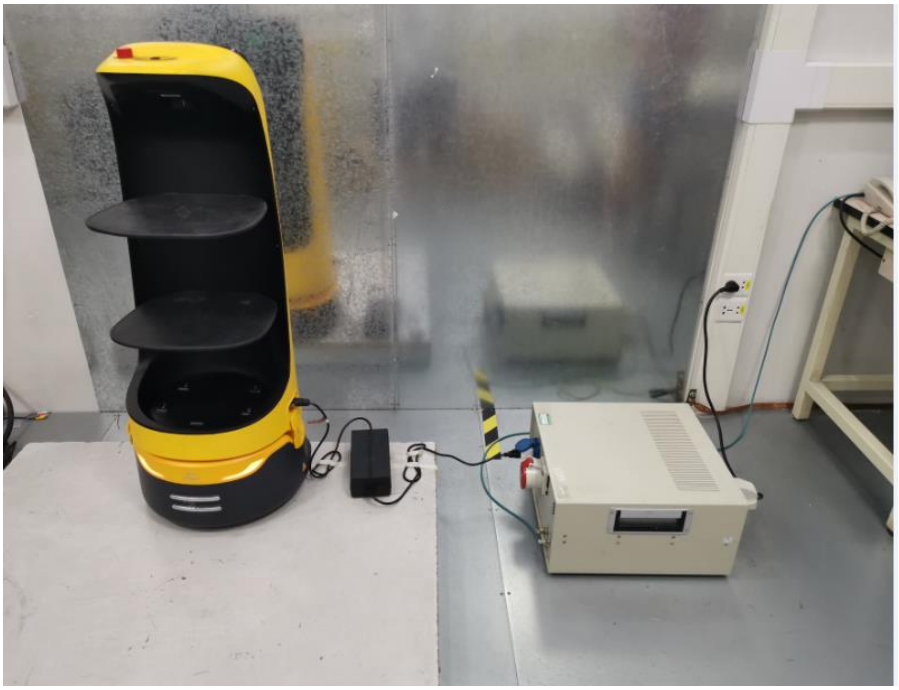
The antenna is a FPCB antenna and no consideration of replacement. Antenna max gain is 3.5 dBi from 2.4GHz to 2.5GHz.

9. EUT TEST PHOTO

Radiated Measurement Photos
30MHz-1GHz

Radiated Measurement Photos
Above 1GHz

Conducted Measurement Photos



10. APPENDIX-Photographs of EUT Constructional Details

Please refer to **APPENDIX**.

****End of the report****