TEST REPORT

KOSTEC Co., Ltd. 28(175-20, Annyeong-dong) 406-gil sejaro, Hwaseong-si, Gyeonggi-do, Korea Tel:031-222-4251, Fax:031-222-4252	Report No.: KST-FCR-210028	KOSTEC Co., Ltd. http://www.kostec.org

1. Applicant

   • Name : Dogtra Co., Ltd.

   • Address : #715-2(146BL-3L) Gojan-dong, Namdong-gu, Incheon, Korea

2. Test Item

   • Product Name: Pathfinder2

   • Model Name: PT20U

   • Brand: None

   • FCC ID: SWN-PT20U

3. Manufacturer

   • Name : Dogtra Co., Ltd.

   • Address : #715-2(146BL-3L) Gojan-dong, Namdong-gu, Incheon, Korea

4. Date of Test : 2021. 12. 09. ~ 2021. 12. 17.

5. Test Method Used : FCC CFR 47, Part 95J

6. Test Result : Compliance

7. Note: None

Supplementary Information

The device bearing the brand name and FCC ID specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI/TIA-603-E-2016.

We attest to the accuracy of data and all measurements reported herein were performed by KOSTEC Co., Ltd. and were made under Chief Engineer's supervision. We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : Lee, Mi-Young (Signature)	Technical Manager Name : Park, Gyeong-Hyeon (Signature)

2021. 12. 22.

KOSTEC Co., Ltd.

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1. GENERAL INFORMATION

1.1 Test Facility

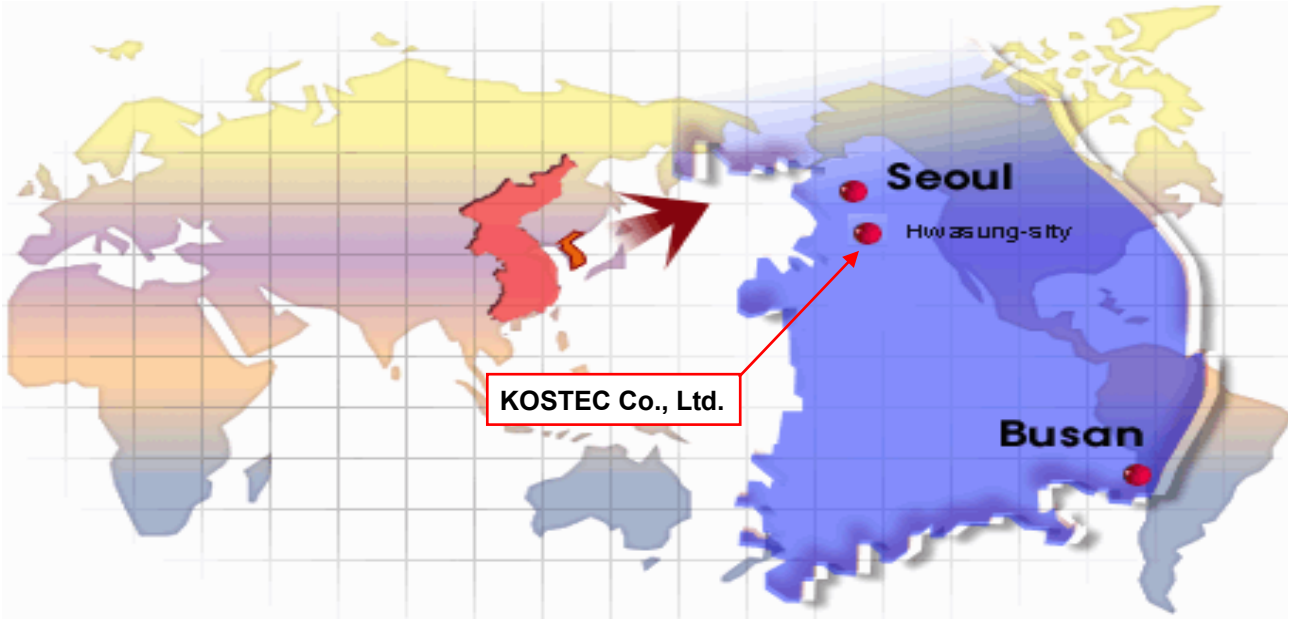
Test laboratory and address

KOSTEC Co., Ltd.
28(175-20,Annyeong-dong)406-gil sejaro, Hwaseong-si Gyeonggi-do, Korea
Telephone Number: 82-31-222-4251
Facsimile Number: 82-31-222-4252

Registration information

KOLAS No.: KT232
RRA (National Radio Research Agency): KR0041
FCC Designation No.: KR0041
IC Designation No.: KR0041
VCCI Membership No.: 2005

1.2 Location



1.3 Revision History of test report

Rev.	Revisions	Effect page	Reviewed	Date
-	Initial issue	All	Park, Gyeong-Hyeon	2021. 12. 22.

2. EQUIPMENT DESCRIPTION

The product specification described herein was declared by manufacturer. And refer to user's manual for the details.

Equipment Name	Pathfinder2
Model No	PT20U
Usage	MURS radio for dog collar
Serial Number	Proto type
Modulation type	FSK
Emission Type	F1D
Rated RF power output	31.03 dBm (1.27 W)
Operated Frequency	151.820 MHz ~ 154.600 MHz
Channel Number	5 ea
Operation temperature	-10 ℃ ~ 55 ℃
Power Source	Li-Po battery / DC 3.7 V / 8.88 Wh
Antenna Description	Helical antenna / RP-SMA type / gain : 0 dBi
Remark	1. The device was operating at its maximum output power for all measurements. 2. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case (X) is shown in the report. 3. The above DUT's information was declared by manufacturer. Please refer to the specifications or user manual for more detailed description.
FCC ID	SWN-PT20U

3. SYSTEM CONFIGURATION FOR TEST

3.1 Characteristics of equipment

MURS radio for dog collar

3.2 Used peripherals list

Description	Model No.	Serial No.	Manufacture	Remark
-	-	-	-	-
-	-	-	-	-

3.3 Product Modification

N/A

3.4 Operating Mode

Constantly transmitting with a modulated carrier at maximum power.

3.5 Test Setup of EUT

EUT
(Standalone)

3.6 Table Table for Carrier Frequencies

Channel	Freq. [MHz]
1*	151.820 (Low end of band)
2	151.880
3	151.940
4	154.570
5*	154.600 (High end of band)

Note: * mark is the frequencies for testing

3.7 Used Test Equipment List

No.	Instrument	Model	S/N	Manufacturer	Next Cal Date	Cal interval	used
1	T & H Chamber	PL-3J	15003623	ESPEC CORP	2022.11.04	1 year	☐
2	T & H Chamber	SH-662	93000067	ESPEC CORP	2022.08.27	1 year	☒
3	T & H Chamber	SH-641	92006831	ESPEC CORP	2022.03.29	1 year	☐
4	Spectrum Analyzer	8563EC	3046A00527	Agilent Technology	2022.01.19	1 year	☐
5	Spectrum Analyzer	FSV30	104029	Rohde & Schwarz	2022.08.30	1 year	☐
6	Spectrum Analyzer	FSV30	20-353063	Rohde & Schwarz	2022.01.19	1 year	☐
7	Spectrum Analyzer	FSV40	101727	Rohde & Schwarz	2022.07.19	1 year	☐
8	Signal Analyzer	FSW43	101294	Rohde & Schwarz	2022.02.18	1 year	☒
9	Signal Analyzer	FSW85	101602	Rohde & Schwarz	2022.06.30	1 year	☐
10	EMI Test Receiver	ESCI7	100823	Rohde & Schwarz	2022.01.20	1 year	☒
11	EMI Test Receiver	ESI	837514/004	Rohde & Schwarz	2022.08.30	1 year	☒
12	Vector Signal Analyzer	89441A	3416A02620	Agilent Technology	2022.01.20	1 year	☐
13	Network Analyzer	8753ES	US39172348	AGILENT	2022.08.31	1 year	☐
14	EPM Series Power meter	E4418B	GB39512547	Agilent Technology	2022.01.19	1 year	☐
15	RF Power Sensor	E9300A	MY41496631	Agilent Technology	2022.01.19	1 year	☐
16	Microwave Frequency Counter	5352B	2908A00480	Agilent Technology	2022.01.19	1 year	☐
17	Audio Analyzer	8903B	3514A16919	Agilent Technology	2022.01.19	1 year	☐
18	Audio Telephone Analyzer	DD-5601CID	520010281	CREDIX	2022.01.18	1 year	☐
19	Modulation Analyzer	8901A	3041A05716	H.P	2022.01.18	1 year	☐
20	Digital storage Oscilloscope	TDS3052	B015962	Tektronix	2022.08.30	1 year	☐
21	ESG-D Series Signal Generator	E4436B	US39260458	Agilent Technology	2022.01.18	1 year	☐
22	Vector Signal Generator	SMBV100A	257557	Rohde & Schwarz	2022.01.18	1 year	☐
23	GNSS Signal Generator	TC-2800A	2800A000494	TESCOM CO., LTD.	2022.01.19	1 year	☐
24	Signal Generator	SMB100A	179628	Rohde & Schwarz	2022.05.04	1 year	☒
25	Signal Generator	N5173B	MY57280148	KEYSIGHT	2022.06.11	1 year	☐
26	SLIDAC	None	0207-4	Myoung sung Ele.	2022.01.20	1 year	☐
27	DC Power supply	DRP-5030	9028029	Digital Electronic Co.,Ltd	2022.01.20	1 year	☐
28	DC Power supply	E3610A	KR24104505	Agilent Technology	2022.01.19	1 year	☐
29	DC Power supply	UP-3005T	68	Unicon Co.,Ltd	2022.01.20	1 year	☐
30	DC Power Supply	SM 3004-D	114701000117	DELTA ELEKTRONIKA	2022.01.19	1 year	☐
31	DC Power supply	6632B	MY43004005	Agilent Technology	2022.01.20	1 year	☒
32	DC Power Supply	6632B	MY43004137	Agilent Technology	2022.01.20	1 year	☐
33	Termination	1433-3	LM718	WEINSCHEL	2022.07.16	1 year	☐
34	Termination	1432-3	QR946	AEROFLEX/WEINSCHEL	2022.07.16	1 year	☐
35	Attenuator	24-30-34	BX5630	Aeroflex / Weinschel	2022.12.01	1 year	☐
36	Attenuator	8498A	3318A09485	HP	2022.01.19	1 year	☐
37	Step Attenuator	8494B	3308A32809	HP	2022.01.19	1 year	☐
38	RF Step Attenuator	RSP	100091	Rohde & Schwarz	2022.01.19	1 year	☐
39	Attenuator	18B50W-20F	64671	INMET	2022.01.19	1 year	☐
40	Attenuator	10 dB	1	Rohde & Schwarz	2022.05.04	1 year	☒
41	Attenuator	54A-10	74564	WEINSCHEL	2022.08.31	1 year	☐
42	Attenuator	56-10	66920	WEINSCHEL	2022.05.04	1 year	☐
43	Attenuator	48-30-33-LIM	BL5350	Weinschel Corp.	2022.07.16	1 year	☒
44	Power divider	11636B	51212	HP	2022.01.21	1 year	☐
45	3Way Power divider	KPDSU3W	00070365	KMW	2022.08.30	1 year	☐
46	4Way Power divider	70052651	173834	KRYTAR	2022.01.19	1 year	☐
47	3Way Power divider	1580	SQ361	WEINSCHEL	2022.05.04	1 year	☐
48	OSP	OSP120	101577	Rohde & Schwarz	2022.06.14	1 year	☐
49	White noise audio filter	ST31EQ	101902	SoundTech	2022.08.31	1 year	☐
50	Dual directional coupler	778D	17693	HEWLETT PACKARD	2022.01.19	1 year	☐
51	Dual directional coupler	772D	2839A00924	HEWLETT PACKARD	2022.01.19	1 year	☐

No.	Instrument	Model	S/N	Manufacturer	Next Cal Date	Cal interval	used
52	Band rejection filter	3TNF-0006	26	DOVER Tech	2022.01.19	1 year	☐
53	Band rejection filter	3TNF-0007	311	DOVER Tech	2022.01.19	1 year	☐
54	Band rejection filter	WTR-BRF2442-84NN	09020001	WAVE TECH Co.,LTD	2022.01.19	1 year	☐
55	Band rejection filter	WRCJV12-5695-5725-5825-5855-50SS	1	Wainwright Instruments GmbH	2022.05.04	1 year	☐
56	Band rejection filter	WRCJV12-5120-5150-5350-5380-40SS	4	Wainwright Instruments GmbH	2022.05.04	1 year	☐
57	Band rejection filter	WRCGV10-2360-2400-2500-2540-50SS	2	Wainwright Instruments GmbH	2022.05.04	1 year	☐
58	Band rejection filter	CTF-155M-S1	001	RF One Electronics	2022.08.30	1 year	☒
59	Band rejection filter	CTF-435M-S1	001	RF One Electronics	2022.08.30	1 year	☐
60	Band rejection filter	CTF-5890M-70MS1	1	RF One Electronics	2022.01.19	1 year	☐
61	Highpass Filter	WHJS1100-10EF	1	WAINWRIGHT	2022.01.19	1 year	☐
62	Highpass Filter	WHJS3000-10EF	1	WAINWRIGHT	2022.01.19	1 year	☐
63	Highpass Filter	WHNX6-5530-7000-26500-40CC	2	Wainwright Instruments GmbH	2022.05.04	1 year	☐
64	Highpass Filter	WHNX6-2370-3000-26500-40CC	4	Wainwright Instruments GmbH	2022.05.04	1 year	☐
65	WideBand Radio Communication Tester	CMW500	102276	Rohde & Schwarz	2022.01.19	1 year	☐
66	WideBand Radio Communication Tester	CMW500	117235	Rohde & Schwarz	2022.01.19	1 year	☐
67	WideBand Radio Communication Tester(with CMX500)	CMW500	167157	Rohde & Schwarz	2022.04.09	1 year	☐
68	Bluetooth Tester	TC-3000B	3000B6A0166	TESCOM CO., LTD.	2022.01.18	1 year	☐
69	Loop Antenna	6502	9203-0493	EMCO	2023.05.31	2 year	☐
70	Loop Antenna	FMZB1513	#374	Schwarzbeck	2023.02.26	2 year	☐
71	BiconiLog Antenna	3142B	1745	EMCO	2022.04.24	2 year	☐
72	Trilog-Broadband Antenna(R)	VULB 9168	9168-606	SCHWARZBECK	2022.09.21	2 year	☒
73	Biconical Antenna(T)	VUBA9117	9117-342	Schwarz beck	2022.03.24	2 year	☒
74	Horn Antenna	3115	9605-4834	EMCO	2022.03.06	2 year	☐
75	Horn Antenna	QMS-00208	21909	STEATITE ANTENNA	2022.12.04	2 year	☐
76	Horn Antenna(R)	3117	00135191	ETS-LINDGREN	2022.04.29	2 year	☐
77	Horn Antenna(T)	3115	2996	EMCO	2022.02.14	2 year	☐
78	Horn Antenna(R)	BBHA 9170	9170-722	SCHWARZBECK	2022.05.12	2 year	☐
79	Horn Antenna(T)	BBHA 9170	743	SCHWARZBECK	2023.01.21	2 year	☐
80	AMPLIFIER(A_10)	TK-PA6S	120009	TESTEK	2022.01.19	1 year	☐
81	AMPLIFIER(C_3)	TK-PA01S	200141-L	TESTEK	2022.08.31	1 year	☒
82	PREAMPLIFIER(C_3)	8449B	3008A02577	Agilent	2022.01.19	1 year	☐
83	RF PRE AMPLIFIER	SCU08F2	100762	Rohde & Schwarz	2022.12.01	1 year	☐
84	AMPLIFIER	TK-PA18	150003	TESTEK	2022.01.21	1 year	☐
85	AMPLIFIER	TK-PA1840H	160010-L	TESTEK	2022.01.21	1 year	☐
86	Horn Antenna	M19RH	T01	OML, Inc.	2022.05.29	2 year	☐
87	Horn Antenna	M19RH	R01	OML, Inc.	2022.05.29	2 year	☐
88	Horn Antenna	M12RH	T02	OML, Inc.	2022.05.29	2 year	☐
89	Horn Antenna	M12RH	R02	OML, Inc.	2022.05.29	2 year	☐
90	Horn Antenna	M08RH	T03	OML, Inc.	2022.05.29	2 year	☐
91	Horn Antenna	M08RH	R03	OML, Inc.	2022.05.29	2 year	☐
92	Horn Antenna	M05RH	T04	OML, Inc.	2022.05.29	2 year	☐
93	Horn Antenna	M05RH	R04	OML, Inc.	2022.05.29	2 year	☐
94	Horn Antenna	M03RH	T05	OML, Inc.	2022.05.29	2 year	☐
95	Horn Antenna	M03RH	R05	OML, Inc.	2022.05.29	2 year	☐
96	Harmonic Mixer	M12HWD	200529-1	OML, Inc.	2022.07.12	1 year	☐
97	Harmonic Mixer	M08HWD	200529-1	OML, Inc.	2022.07.12	1 year	☐
98	Harmonic Mixer	M05HWD	200529-1	OML, Inc.	2022.07.12	1 year	☐
99	Harmonic Mixer	M03HWD	200529-1	OML, Inc.	2022.07.12	1 year	☐
100	Source Module	S19MS-A	200529-1	OML, Inc.	2022.07.02	1 year	☐
101	Source Module	S12MS-A	200529-1	OML, Inc.	2022.07.02	1 year	☐
102	Source Module	S08MS-A	200529-1	OML, Inc.	2022.07.02	1 year	☐
103	Source Module	S05MS-A	200529-1	OML, Inc.	2022.07.02	1 year	☐
104	Source Module	S03MS-A	200529-1	OML, Inc.	2022.07.02	1 year	☐

4. SUMMARY TEST RESULTS

Description of Test	FCC Rule	Reference Clause	Used	Test Result
Transmitter power	Part 95.2767	Clause 5.1	☒	Compliance
Occupied Bandwidth	Part 95.2773	Clause 5.2	☒	Compliance
Emission Mask	Part 95.2779	Clause 5.3	☒	Compliance
Transmitter Radiated Unwanted Emissions	Part 95.2779	Clause 5.4	☒	Compliance
Frequency Stability	Part 95.2765	Clause 5.5	☒	Compliance
Compliance/pass : The EUT complies with the essential requirements in the standard. Not Compliance : The EUT does not comply with the essential requirements in the standard. N/A : The test was not applicable in the standard.				

Procedure Reference

FCC CFR 47, Part 95J
ANSI/TIA-603-E-2016
ANSI C63.26-2015
ANSI C63.4-2014

5. MEASUREMENT RESULTS

5.1 Transmitter power

5.1.1 Standard Applicable [FCC Part 95.2767]

Each MURS transmitter type must be designed such that the transmitter power output does not exceed 2 Watts under normal operating conditions.

5.1.2 Test Environment conditions

• Ambient temperature : (20 ~ 21) ℃ • Relative Humidity : (42 ~ 44) % R.H.

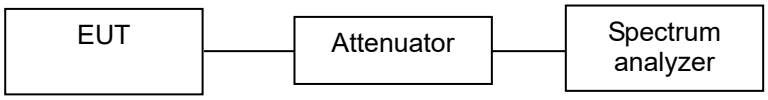
5.1.3 Measurement Procedure

The EUT was setup according to ANSI C63.26-2015 for compliance to FCC 47CFR part 95 requirements.

The transmitter output was connected to the spectrum analyzer with an attenuator. The maximum peak output power was measured and recorded with the spectrum analyzer. EUT was programmed to be in continuously transmitting mode.

The Spectrum Analyzer was set to the following:
RBW ≥ OBW ; 100 kHz
VBW ≥ 3 x RBW
Span ≥ 2 x RBW
Sweep time ≥ 10 x (number of points in sweep) x (transmission symbol period)
Detector = peak
Trace Mode = max hold

5.1.4 Test setup



5.1.5 Measurement Result

Channel	Frequency [MHz]	Conducted Power		Limit [W]	Test Results
		[dBm]	[W]		
1	151.820	31.03	1.27	2.0	Compliance
5	154.600	30.65	1.16	2.0	Compliance

5.2 Occupied Bandwidth

5.2.1 Standard Applicable [FCC Part 95.2773]

(a) The occupied bandwidth of emissions transmitted on the center frequencies 151.820 MHz, 151.880 MHz, and 151.940 MHz must not exceed 11.25 kHz.

(b) The occupied bandwidth of emissions transmitted on the center frequencies 154.570 MHz and 154.600 MHz must not exceed 20.0 kHz.

5.2.2 Test Environment conditions

• Ambient temperature : (20 ~ 21) ℃ • Relative Humidity : (42 ~ 44) % R.H.

5.2.3 Measurement Procedure

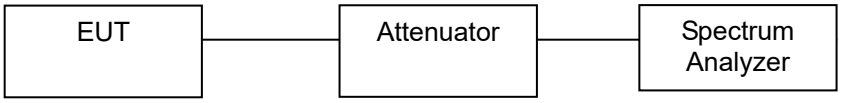
1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.

2. Measure the maximum width of the 99% occupied bandwidth is the frequency bandwidth of the signal power at the 99% channel power of occupied bandwidth.

The spectrum analyzer is set to the as follows :

- RBW : 300 Hz
- VBW : >3 x RBW
- Detector function : peak
- Trace : max hold

5.2.4 Test setup



5.2.5 Measurement Result

CH	Frequency [MHz]	99% Bandwidth [kHz]	Limit [kHz]	Test Results
1	151.820	8.74	11.25	Compliance
5	154.600	8.80	20.0	Compliance

5.2.6 Test Plot

(Ch1 : 151.820 MHz)

(Ch5 : 154.600 MHz)

5.3 Emission Mask

5.3.1 Standard Applicable [FCC Part 95.2779]

Emission masks. Emission masks applicable to transmitting equipment in the MURS are defined by the requirements in the following table. The numbers in the paragraphs column refer to attenuation requirement rule paragraph numbers under paragraph (b) of this section. The words “audio filter” refer to the audio filter described in §95.2775.

Channel center frequencies (MHz)	Paragraphs
151.820, 151.880 and 151.940	(1), (2).
154.570 & 154.600, with audio filter	(3), (4), (7).
154.570 & 154.600, without audio filter	(5), (6), (7).

(b) *Attenuation requirements.* The power of unwanted emissions must be attenuated below the transmitter output power in Watts (P) by at least:

(1) 7.27(f_d−2.88 kHz) dB on any frequency removed from the channel center frequency by a displacement frequency (f_d in kHz) that is more than 5.625 kHz, but not more than 12.5 kHz.

(2) 50 + 10 log (P) dB or 70 dB, whichever is the lesser attenuation, on any frequency removed from the channel center frequency by more than 12.5 kHz.

(5) 83 log (f_d ÷ 5) dB on any frequency removed from the center of the authorized bandwidth by a displacement frequency (f_d in kHz) that is more than 5 kHz, but not more than 10 kHz.

(6) 29 log (f_d^2 ÷ 11) dB or 50 dB, whichever is the lesser attenuation on any frequency removed from the channel center frequency by a displacement frequency (f_d in kHz) that is more than 10 kHz, but not more than 50 kHz.

(7) 43 + 10 log(P) dB on any frequency removed from the channel center frequency by more than 50 kHz.

5.3.2 Test Environment conditions

• Ambient temperature : (20 ~ 21) ℃ • Relative Humidity : (42 ~ 44) % R.H.

5.3.3 Measurement Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer.

The power of unwanted emissions in the frequency bands specified in paragraphs (b)(1) and (3) through (6) of this section is measured with a reference bandwidth of 300 Hz. The power of unwanted emissions in the frequency ranges specified in paragraphs (b)(2) and (7) of this section is measured with a reference bandwidth of at least 30 kHz.

5.3.4 Test setup

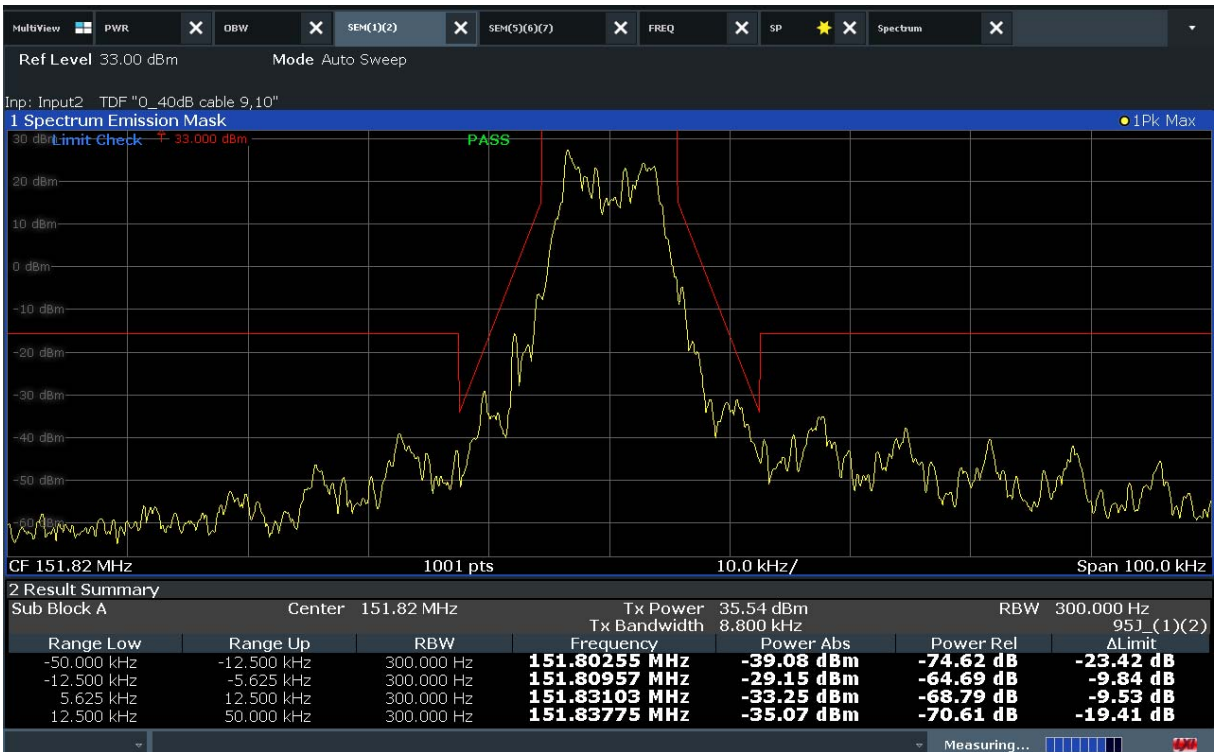
Please refer 5.2.4

5.3.5 Measurement Result

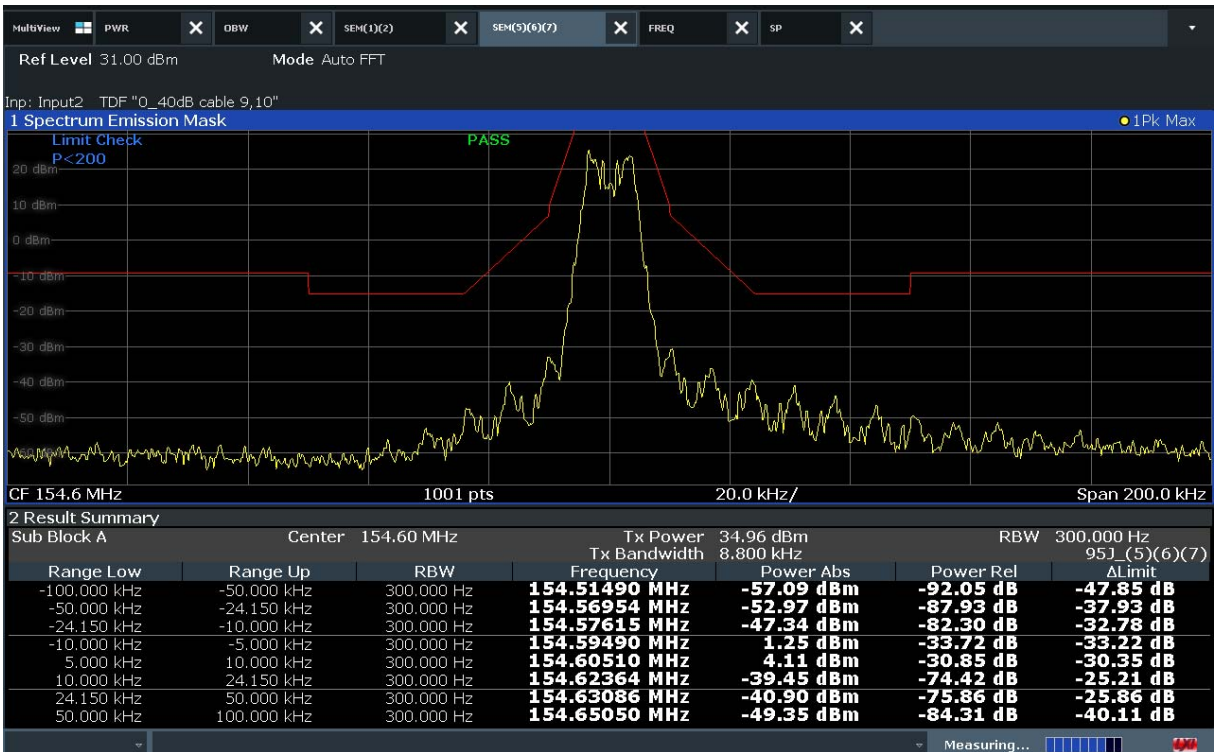
please refer 5.3.6 for details

5.3.6 Test Plot

(Ch1 : 151.820 MHz)



(Ch5 : 154.600 MHz)



5.4 Transmitter Radiated Unwanted Emissions

5.4.1 Standard Applicable [FCC Part 95.2779]

According to FCC section 95.2779, the unwanted emission should be attenuated below TP(transmitter power) by at least 50+10 log (TP) dB for 151.820 MHz and at least 43+10log(TP) dB for 154.600 MHz.

5.4.2 Test Environment conditions

• Ambient temperature : (20 ~ 21) ℃ • Relative Humidity : (42 ~ 44) % R.H.

5.4.3 Measurement Procedure

Conducted: The transmitter output (antenna port) was connected to the spectrum analyzer. The RBW set for 100 kHz and the reference level was adjusted to ensure the system had sufficient dynamic range to measure spurious emissions. The frequency range from 30 MHz to the 10th harmonic of the fundamental transmitter was observed and plotted.

Radiated;

As a below test procedure (①~⑬), The result value of measurement is performed to condition of the below; The EUT will operate in continuous transmission mode during the time necessary to perform the measured of the frequency. Substitution method was performed to determine the actual P_{erp}(or P_{eirp}) emission levels of the EUT.

The following test procedure as below;

The test is performed in a fully pyramidal chamber to determine the accurate frequencies, after maximum emissions level will be checked on a test chamber and measuring distance is 3 m from EUT to test antenna.

① The EUT was set on with continuous transmission mode and placed on a high non-conductive table on the chamber.

② The test antenna is used on Bi-Log antenna at above 30 MHz, and used on Horn antenna at 1 GHz and then the measurements are repeated with the test antenna for vertical and horizontal polarization. The output of the test antenna will be connected to a measuring receiver, and it is set to tuned over the required standard measuring frequency range.

③ At each frequency at which a relevant spurious component is detected, the test antenna will be raised and lowered through the specified range of heights until an maximum signal level is detected on the measuring receiver.

④ The EUT is position x, y, z axis on rotating through 360 degrees in the horizontal plane, until the Max. signal level is detected by the measuring receiver.

⑤ The receiver is scanned from requested measuring frequency band and then the maximum meter reading is recorded. The radiated emissions were measured with requested standard specification (detector and resolution bandwidth etc.)

⑥ The EUT was then removed and replaced with substitution antenna .The center of the antenna was approximately at the same location as the center of the EUT, and calibrated for the frequency of the spurious component detected.

⑦ Signal generator output port connected with substitution antenna input port. If necessary, may use shield cable between signal generator and substitution antenna

⑧ The frequency of the calibrated signal generator is set to frequency of the spurious component detected, and the input attenuator setting of the measuring receiver was adjust in order to increase the sensitivity of the measuring receiver, if necessary

⑨ The test antenna was raised and lowered through the specified range of heights to ensure that maximum signal is received.

⑩ The input signal to the substitution antenna was be adjusted until an equal or a known related level to that detected from the transmitter is obtained on the measuring receiver.

⑪ The input signal to the substitution antenna was be recorded as a power level and corrected for any change of input attenuator setting of the measuring receiver

⑫ The measure of P_{erp}(or P_{eirp}) the spurious components is the larger of the two power levels recorded for each spurious component at the input to the substitution antenna, corrected for the gain of the substitution antenna, if necessary.

⑬ It is correction to signal generator's offset value. In this case of P_{erp}(or P_{eirp}) shall calculated as follow as formula ;

• P_{erp}(or P_{eirp}) = Signal generator level (dBm) – Cable loss(dB)

The compliance limit was calculated as the following table:

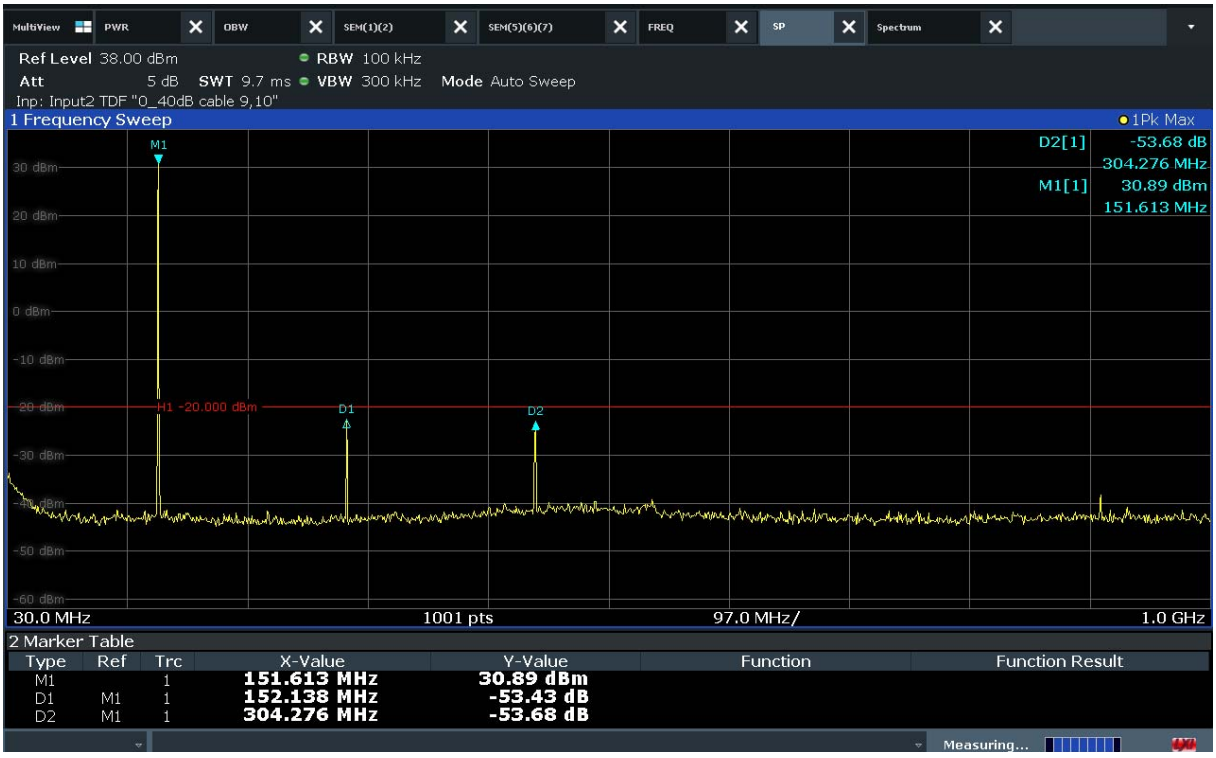
CH	Freq [MHz]	Max output power [dBm]	Required attenuation [dBc]	dBc to dBm
1	151.820	31.03	50 + 10log(1.27) = 51.0	-20 dBm
5	154.600	30.65	43 + 10log(1.16) = 43.6	-13 dBm

5.4.4 Measurement Result

(Conducted)

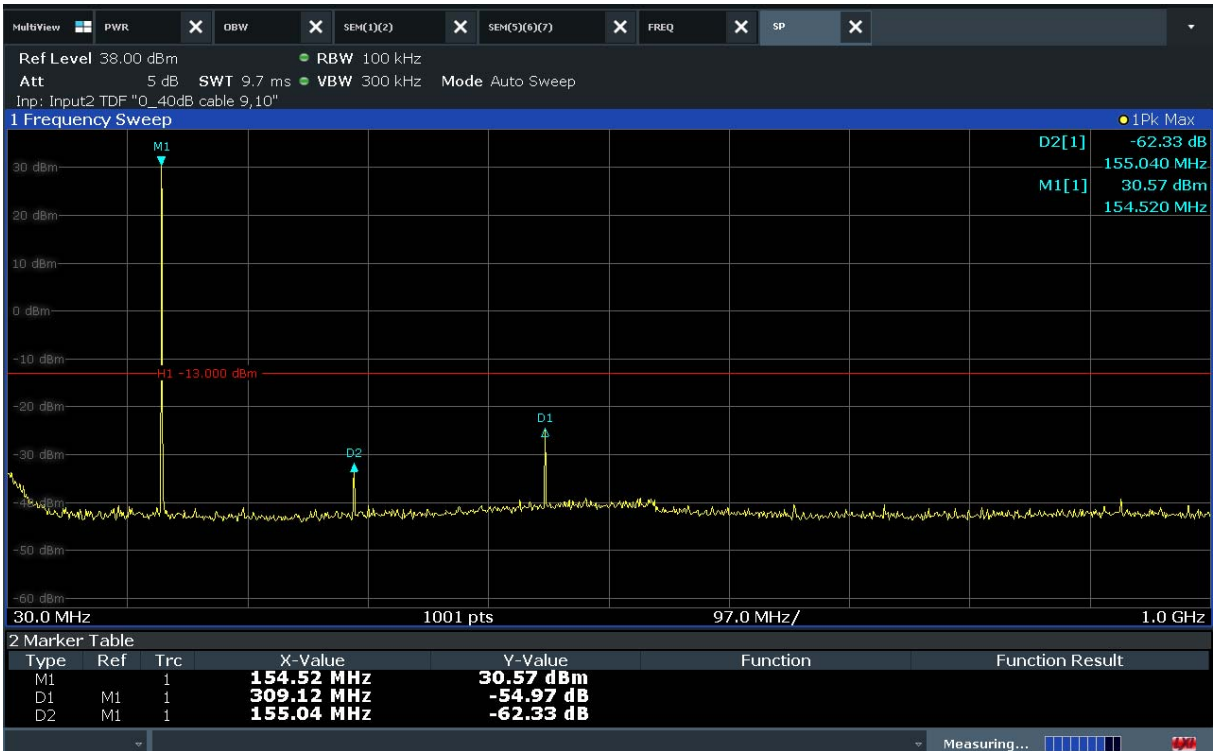
(Ch1 : 151.820 MHz)

Emission Frequency [MHz]	Level below Carrier [dBc]	Margin [dB]	Limit [dBc]	Test Results
303.8	53.43	2.43	51.0	Compliance
455.9	53.68	2.68	51.0	Compliance



(Ch5 : 154.600 MHz)

Emission Frequency [MHz]	Level below Carrier [dBc]	Margin [dB]	Limit [dBc]	Test Results
309.6	62.33	18.73	43.6	Compliance
463.6	54.97	11.37	43.6	Compliance



(Radiated)

(Ch1 : 151.820 MHz)

Emission Frequency [MHz]	Ant Pol	Level below Carrier [dBc]	Margin [dB]	Limit [dBc]	Test Results
303.8	V	58.92	7.92	51.0	Compliance
303.8	H	60.83	9.83	51.0	Compliance

(Ch5 : 154.600 MHz)

Emission Frequency [MHz]	Ant Pol	Level below Carrier [dBc]	Margin [dB]	Limit [dBc]	Test Results
463.6	V	60.15	16.55	43.6	Compliance
463.6	H	61.33	17.73	43.6	Compliance

5.5 Frequency Stability

5.5.1 Standard Applicable [FCC Part 95.2765]

(a) MURS transmitters that operate with an emission bandwidth of 6.25 kHz or less must be designed such that the carrier frequencies remain within ±2.0 parts-per-million (ppm) of the channel center frequencies specified in §95.2763 during normal operating conditions.
(b) MURS transmitters that operate with an emission bandwidth greater than 6.25 kHz must be designed such that the carrier frequencies remain within ±5.0 ppm of the channel center frequencies specified in §95.2763 during normal operating conditions.

5.5.2 Test Environment conditions

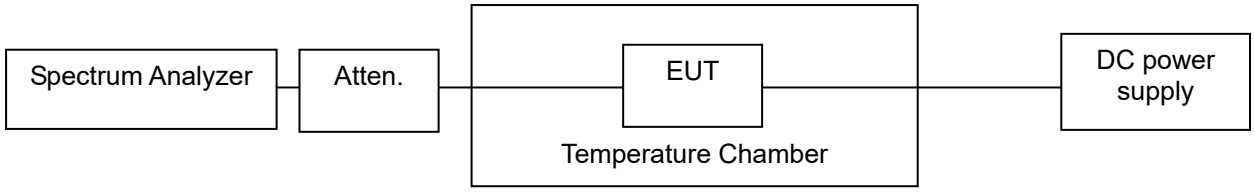
• Ambient temperature : (20 ~ 21) ℃ • Relative Humidity : (42 ~ 44) % R.H.

5.5.3 Measurement Procedure

EUT connect to Spectrum analyzer, test is performed in T&H chamber.
These measurements shall also be performed at normal and extreme test conditions.

▪ Test Method : ANSI/TIA-603-E-2016 for frequency stability tests
-Frequency stability with respect to ambient temperature (-30 °C to 50 °C)
-Frequency stability when varying supply voltage (85 % to 115 %)

5.5.4 Test setup



5.5.5 Measurement Result

(Ch1 : 151.820 MHz)

Temp(℃)	Power Supply	Measured Freq(Hz)	Freq Drift(ppm)
50	DC 3.7 (Vnom)	151,820,155	1.02
40	DC 3.7 (Vnom)	151,820,160	1.05
30	DC 3.7 (Vnom)	151,820,149	0.98
20	DC 3.7 (Vnom)	151,820,154	1.01
10	DC 3.7 (Vnom)	151,820,154	1.01
0	DC 3.7 (Vnom)	151,820,150	0.99
-10	DC 3.7 (Vnom)	151,820,111	0.73
-20	DC 3.7 (Vnom)	151,820,100	0.66
-30	DC 3.7 (Vnom)	151,820,103	0.68
Nom Temperature	DC 3.15 (Vmin)	151,820,154	1.01
Nom Temperature	DC 4.26 (Vmax)	151,820,149	0.98
Limit		±2.0 ppm	
Test Results		Compliance	

(Ch5 : 154.600 MHz)

Temp(℃)	Power Supply	Measured Freq(Hz)	Freq Drift(ppm)
50	DC 3.7 (Vnom)	154,600,157	1.02
40	DC 3.7 (Vnom)	154,600,161	1.04
30	DC 3.7 (Vnom)	154,600,133	0.86
20	DC 3.7 (Vnom)	154,600,136	0.88
10	DC 3.7 (Vnom)	154,600,122	0.79
0	DC 3.7 (Vnom)	154,600,102	0.66
-10	DC 3.7 (Vnom)	154,600,100	0.65
-20	DC 3.7 (Vnom)	154,600,105	0.68
-30	DC 3.7 (Vnom)	154,600,099	0.64
Nom Temperature	DC 3.15 (Vmin)	154,600,135	0.87
Nom Temperature	DC 4.26 (Vmax)	154,600,137	0.89
Limit		±2.0 ppm	
Test Results		Compliance	