

TEST REPORT

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Hwaseong-si, Gyeonggi-do, Korea
Tel:031-222-4251, Fax:031-222-4252

Report No.: KST-FCR-220008



1. Applicant

- Name : HL Klemove Corp.
- Address : 224, Harmony -ro, Yeonsu-gu, Incheon, Republic of Korea

2. Test Item

- Product Name: Vehicle Radar
- Model Name: SRR30SB
- Brand: -
- FCC ID: 2A3OZ-SRR30SA • IC: 27992-SRR30SA

3. Manufacturer

- Name : HL Klemove Corp.
- Address : 224, Harmony -ro, Yeonsu-gu, Incheon, Republic of Korea

4. Date of Test : 2023. 07. 31. ~ 2023. 07. 31.

FCC CFR 47, Part 95. Subpart M

5. Test Method Used : RSS-251 issue 2, RSS-GEN issue 5
ANSI C 63.10-2013

6. Test Result : Compliance

7. Note: -

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 C 63.10-2013.

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 : Choo, Kwang-Yeol (Signature)	Technical Manager Name : Park, Gyeong-Hyeon (Signature)
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2023. 08. 01.

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	Gyeong Hyeon, Park	2023. 08. 01.

2. EQUIPMENT DESCRIPTION

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

Equipment Name	Vehicle Radar
Model No	SRR30SB
Usage	Vehicle Radar
Serial Number	Proto type
Modulation type	FMCW
Emission Type	886MF0N
Maximum output power(e.i.r.p)	28.655 dBm(PK), 27.60 dBm(AV)
Operated Frequency	76 GHz ~ 77 GHz
Channel Number	1
Operation temperature	-40 °C ~ 85 °C
Power Source	DC 12 V
Antenna Description	Patch Antenna(Fixed), gain : 13.7 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 (Y) 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	2A3OZ-SRR30SA
IC	27992-SRR30SA
PMN(Product Marketing Number)	SRR30SA
HVIN(Hardware Version Identification Number)	A.01
FVIN(Firmware Version Identification Number)	A.01
HMN(Host Marketing Name)	N/A

3. SYSTEM CONFIGURATION FOR TEST

3.1 Characteristics of equipment

The Equipment Under Test (EUT) contains the following capabilities: This equipment is Vehicle Radar. The detailed explanation is refer as user manual.

3.2 Used peripherals list

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

3.3 Product Modification

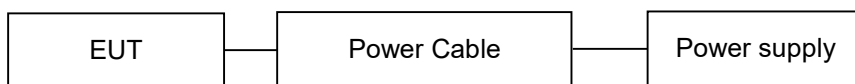
N/A

3.4 Operating Mode

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. Software used to control the EUT for staying in continuous transmitting mode was programmed. The worst case data rate is determined as the data rate with highest output power.

3.5 Test Setup of EUT

The measurements were taken in continuous transmit mode using the test mode. The cables were provided by the applicant.



3.6 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	2023.11.03	1 year	☐
2	T & H Chamber	SH-662	93000067	ESPEC CORP	2023.08.24	1 year	☐
3	T & H Chamber	SH-642	93011406	ESPEC CORP	2023.09.21	1 year	☐
4	Spectrum Analyzer	8563EC	3046A00527	Agilent Technology	2024.01.11	1 year	☐
5	Spectrum Analyzer	FSV30	104029	Rohde & Schwarz	2023.08.24	1 year	☐
6	Spectrum Analyzer	FSV30	20-353063	Rohde & Schwarz	2024.01.11	1 year	☐
7	Spectrum Analyzer	FSV40	101727	Rohde & Schwarz	2023.08.26	1 year	☐
8	Signal Analyzer	FSW43	101294	Rohde & Schwarz	2024.01.13	1 year	☐
9	Signal Analyzer	FSW85	101602	Rohde & Schwarz	2024.06.27	1 year	☐
10	EMI Test Receiver	ESCI7	100823	Rohde & Schwarz	2024.01.11	1 year	☐
11	EMI Test Receiver	ESPI	100488	Rohde & Schwarz	2024.01.10	1 year	☐
12	EMI Test Receiver	ESI	837514/004	Rohde & Schwarz	2023.09.28	1 year	☒
13	Vector Signal Analyzer	89441A	3416A02620	Agilent Technology	2024.01.13	1 year	☐
14	Network Analyzer	8753ES	US39170869	AGILENT	2023.08.24	1 year	☐
15	EPM Series Power meter	E4418B	GB39512547	Agilent Technology	2024.01.12	1 year	☐
16	RF Power Sensor	E9300A	MY41496631	Agilent Technology	2024.01.12	1 year	☐
17	Microwave Frequency Counter	5352B	2908A00480	Agilent Technology	2024.01.11	1 year	☐
18	Audio Analyzer	8903B	3514A16919	Agilent Technology	2024.01.11	1 year	☐
19	Audio Telephone Analyzer	DD-5601CID	520010281	CREDIX	2024.01.10	1 year	☐
20	Modulation Analyzer	8901A	3041A05716	H.P	2024.01.10	1 year	☐
21	Digital storage Oscilloscope	TDS3052	B015962	Tektronix	2023.08.25	1 year	☐
22	ESG-D Series Signal Generator	E4436B	US39260458	Agilent Technology	2024.01.12	1 year	☐
23	Vector Signal Generator	SMBV100A	257557	Rohde & Schwarz	2024.01.12	1 year	☐
24	GNSS Signal Generator	TC-2800A	2800A000494	TESCOM CO., LTD.	2024.01.11	1 year	☐
25	Signal Generator	SMB100A	179628	Rohde & Schwarz	2024.01.27	1 year	☒
26	Signal Generator	N5173B	MY57280148	KEYSIGHT	2024.05.31	1 year	☐
27	SLIDAC	None	0207-4	Myoung sung Ele.	2024.01.10	1 year	☐
28	DC Power supply	DDPS-3K	U03-109	Digitech Power	2024.01.18	1 year	☐
29	DC Power supply	E3610A	KR24104505	Agilent Technology	2024.01.10	1 year	☐
30	DC Power supply	UP-3005T	68	Unicon Co.,Ltd	2024.01.10	1 year	☒
31	DC Power Supply	SM 3400-D	114701000117	DELTAELEKTRONIKA	2024.01.10	1 year	☐
32	DC Power supply	6632B	MY43004005	Agilent Technology	2024.01.11	1 year	☐
33	DC Power Supply	6632B	MY43004137	Agilent Technology	2024.01.11	1 year	☐
34	Termination	1433-3	LM718	WEINSCHEL	2024.01.12	1 year	☐
35	Termination	1432-3	QR946	AEROFLEX/WEINSCHEL	2024.01.12	1 year	☐
36	Attenuator	8498A	3318A09485	HP	2024.01.11	1 year	☐
37	Step Attenuator	8494B	3308A32809	HP	2024.01.12	1 year	☐
38	RF Step Attenuator	RSP	100091	Rohde & Schwarz	2024.01.13	1 year	☐
39	Attenuator	18B50W-20F	64671	INMET	2024.01.12	1 year	☐
40	Attenuator	10 dB	1	Rohde & Schwarz	2024.01.12	1 year	☐
41	Attenuator	54A-10	74564	WEINSCHEL	2023.08.26	1 year	☐
42	Attenuator	56-10	66920	WEINSCHEL	2024.01.12	1 year	☐
43	Attenuator	48-40-33	BL5992	Weinschel Corp.	2023.12.27	1 year	☐
44	Attenuator	SA18N100-20	001	FAIRVIEW MICROWAVE	2023.09.22	1 year	☐
45	Attenuator	SA26B-10	33464/2134	FAIRVIEW MICROWAVE	2023.09.22	1 year	☐
46	Attenuator	SA4018-10	DC 2126	FAIRVIEW MICROWAVE	2023.09.22	1 year	☐
47	Power divider	11636B	51212	HP	2024.01.13	1 year	☐
48	3Way Power divider	KPDSU3W	00070365	KMW	2023.08.25	1 year	☐
49	4Way Power divider	70052651	173834	KRYTAR	2024.01.12	1 year	☐
50	3Way Power divider	1580	SQ361	WEINSCHEL	2024.01.13	1 year	☐
51	OSP	OSP120	101577	Rohde & Schwarz	2024.01.13	1 year	☐

No.	Instrument	Model	S/N	Manufacturer	Next Cal Date	Cal interval	used
52	White noise audio filter	ST31EQ	101902	SoundTech	2023.08.25	1 year	☐
53	Dual directional coupler	778D	17693	HEWLETT PACKARD	2024.01.11	1 year	☐
54	Dual directional coupler	772D	2839A00924	HEWLETT PACKARD	2024.01.11	1 year	☐
55	Band rejection filter	3TNF-0006	26	DOVER Tech	2024.01.11	1 year	☐
56	Band rejection filter	3TNF-0007	311	DOVER Tech	2024.01.11	1 year	☐
57	Band rejection filter	WTR-BRF2442-84NN	09020001	WAVE TECH Co.,LTD	2024.01.11	1 year	☐
58	Band rejection filter	WRCJV12-5695-5725-5825-5855-50SS	1	Wainwright Instruments GmbH	2024.01.11	1 year	☐
59	Band rejection filter	WRCJV12-5120-5150-5350-5380-40SS	4	Wainwright Instruments GmbH	2024.01.11	1 year	☐
60	Band rejection filter	WRCGV10-2360-2400-2500-2540-50SS	2	Wainwright Instruments GmbH	2024.01.11	1 year	☐
61	Band rejection filter	CTF-155M-S1	001	RF One Electronics	2023.08.24	1 year	☐
62	Band rejection filter	CTF-435M-S1	001	RF One Electronics	2023.08.24	1 year	☐
63	Band rejection filter	CTF-5890M-70MS1	1	RF One Electronics	2024.01.11	1 year	☐
64	Highpass Filter	WHJS1100-10EF	1	WAINWRIGHT	2024.01.12	1 year	☐
65	Highpass Filter	WHJS3000-10EF	1	WAINWRIGHT	2024.01.11	1 year	☐
66	Highpass Filter	WHNX6-5530-7000-26500-40CC	2	Wainwright Instruments GmbH	2024.01.12	1 year	☐
67	Highpass Filter	WHNX6-2370-3000-26500-40CC	4	Wainwright Instruments GmbH	2024.01.12	1 year	☐
68	WideBand Radio Communication Tester	CMW500	102276	Rohde & Schwarz	2024.01.10	1 year	☐
69	WideBand Radio Communication Tester	CMW500	117235	Rohde & Schwarz	2024.01.10	1 year	☐
70	WideBand Radio Communication Tester	MT8000A	6261987920	Anritsu	2024.01.13	1 year	☐
71	WideBand Radio Communication Tester	MT8821C	6262287695	Anritsu	2024.01.13	1 year	☐
72	Bluetooth Tester	TC-3000B	3000B6A0166	TESCOM CO., LTD.	2024.01.10	1 year	☐
73	Loop Antenna	6502	9203-0493	EMCO	2025.05.23	2 year	☐
74	Loop Antenna	FMZB1513	#374	Schwarzbeck	2025.02.21	2 year	☒
75	BiconiLog Antenna _(R)	3142C	35880	ETS-LINDGREN	2024.10.13	2 year	☒
76	Biconical Antenna _(T)	VUBA9117	9117-342	Schwarz beck	2024.01.24	2 year	☐
77	Horn Antenna	3115	9605-4834	EMCO	2024.03.06	1 year	☐
78	Horn Antenna	QMS-00208	21909	STEATITE ANTENNA	2024.05.04	1 year	☐
79	Horn Antenna _(R)	3117	00135191	ETS-LINDGREN	2024.04.03	1 year	☐
80	Horn Antenna _(T)	3115	2996	EMCO	2024.01.12	1 year	☐
81	Horn Antenna _(R)	BBHA 9170	9170-722	SCHWARZBECK	2024.01.12	1 year	☐
82	Horn Antenna _(T)	BBHA 9170	743	SCHWARZBECK	2024.01.18	1 year	☐
83	AMPLIFIER(A_10)	TK-PA01S	220109-L	TESTEK	2024.01.11	1 year	☐
84	AMPLIFIER(C_3)	TK-PA01S	200141-L	TESTEK	2023.08.24	1 year	☒
85	PREAMPLIFIER(C_3)	8449B	3008A02577	Agilent	2024.01.10	1 year	☐
86	RF PRE AMPLIFIER	SCU08F2	100762	Rohde & Schwarz	2023.11.29	1 year	☐
87	AMPLIFIER	TK-PA18	150003	TESTEK	2024.01.10	1 year	☐
88	AMPLIFIER	TK-PA1840H	160010-L	TESTEK	2024.01.12	1 year	☐
89	Horn Antenna	M19RH	T01	OML, Inc.	2024.04.05	1 year	☐
90	Horn Antenna	M12RH	T02	OML, Inc.	2024.04.07	1 year	☐
91	Horn Antenna	M08RH	T03	OML, Inc.	2024.04.07	1 year	☐
92	Horn Antenna	M05RH	T04	OML, Inc.	2024.04.06	1 year	☐
93	Horn Antenna	M03RH	T05	OML, Inc.	2024.04.06	1 year	☐
94	Harmonic Mixer	M12HWD	200529-1	OML, Inc.	2024.04.14	1 year	☐
95	Harmonic Mixer	M08HWD	200529-1	OML, Inc.	2024.04.17	1 year	☐
96	Harmonic Mixer	M05HWD	200529-1	OML, Inc.	2024.04.14	1 year	☐
97	Harmonic Mixer	M03HWD	200529-1	OML, Inc.	2024.04.14	1 year	☐
98	Source Module	S19MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
99	Source Module	S12MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
100	Source Module	S08MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
101	Source Module	S05MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐
102	Source Module	S03MS-A	200529-1	OML, Inc.	2024.04.13	1 year	☐

Note: The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.

Especially, all antenna(Up to 40 GHz) for measurement is calibrated in accordance with the requirements of C 63.5.

3.7 Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of $k = 2$ to indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the UCISPR measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Measurement uncertainty
Radiated Disturbance(Below 1 GHz)	3.80 dB (CL: Approx 95 %, $k=2$)
Radiated Disturbance(1 GHz ~ 40 GHz)	3.42 dB (CL: Approx 95 %, $k=2$)
Radiated Disturbance(Above 40 GHz)	5.14 dB (CL: Approx 95 %, $k=2$)

4. SUMMARY TEST RESULTS

Description of Test	FCC Rule	ISED	Reference Clause	Used	Test Result
Unwanted emissions	95.3379(a)	RSS-GEN Section 6.13, RSS-251 Section 10	Clause 5.2	☒	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 95. Subpart M

RSS-GEN Issue 5, RSS-251 Issue 2

KDB 653005 D01 76-81 GHz Radars v01r01

ANSI C 63.10-2013

5. MEASUREMENT RESULTS

5.1 Unwanted Emissions

5.1.1 Standard Applicable [FCC §95.3379(b), RSS-251 10, RSS-GEN 6.13, 7]

FCC

(a) The power density of any emissions outside the 76-81 GHz band shall consist solely of spurious emissions and shall not exceed the following:

(1) Radiated emissions below 40 GHz shall not exceed the field strength as shown in the following emissions table.

Frequency (MHz)	Field strength (microvolts/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

(i) In the emissions table in paragraph (a)(1) of this section, the tighter limit applies at the band edges.

(ii) The limits in the table in paragraph (a)(1) of this section are based on the frequency of the unwanted emissions and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(iii) The emissions limits shown in the table in paragraph (a)(1) of this section are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9.0-90.0 kHz, 110.0-490.0 kHz, and above 1000 MHz. Radiated emissions limits in these three bands are based on measurements employing an average detector with a 1 MHz RBW.

(2) The power density of radiated emissions outside the 76-81 GHz band above 40.0 GHz shall not exceed the following, based on measurements employing an average detector with a 1 MHz RBW:

(i) For radiated emissions outside the 76-81 GHz band between 40 GHz and 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 600 pW/cm² at a distance of 3 meters from the exterior surface of the radiating structure.

(ii) For radiated emissions above 200 GHz from field disturbance sensors and radar systems operating in the 76-81 GHz band: 1000 pW/cm² at a distance of 3 meters from the exterior surface of the radiating structure.

(3) For field disturbance sensors and radar systems operating in the 76-81 GHz band, the spectrum shall be investigated up to 231.0 GHz.

ISED

RSS-251, 10 Unwanted emissions

Emission frequency range	Limit	Applicable detector
Below 40 GHz	RSS-Gen general field strength limits for licence-exempt radio apparatus	RSS-Gen requirements
40-162 GHz *	-30 dBm/MHz (e.i.r.p.)	RMS detector

Note:

* For radar devices that operate solely in the 76-77 GHz band (i.e. the occupied bandwidth is entirely contained in the 76-77 GHz band), an unwanted emissions limit of 0 dBm/MHz shall apply for the unwanted emission that fall in the 73.5-76 GHz band. Outside of the 73.5-76 GHz band, the unwanted emission limits prescribed in table 1 shall apply.

RSS GEN 7.3 Receiver radiated emission limits

Radiated emission measurements shall be performed with the receiver antenna connected to the receiver antenna ports. The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least five times the highest tunable or local oscillator frequency, whichever is higher, without exceeding 40 GHz.

Spurious emissions from receivers shall not exceed the radiated emissions limits shown in table 3.

Table 3 – Receiver radiated emissions limits	
Frequency (MHz)	Field strength ($\mu\text{V}/\text{m}$ at 3 metres) ^{Note 1}
30-88	100
88-216	150
216-960	200
Above 960	500

Note 1: Measurements for compliance with the limits in table 3 may be performed at distances other than 3 metres, in accordance with section 6.6.

5.1.2 Test Environment conditions

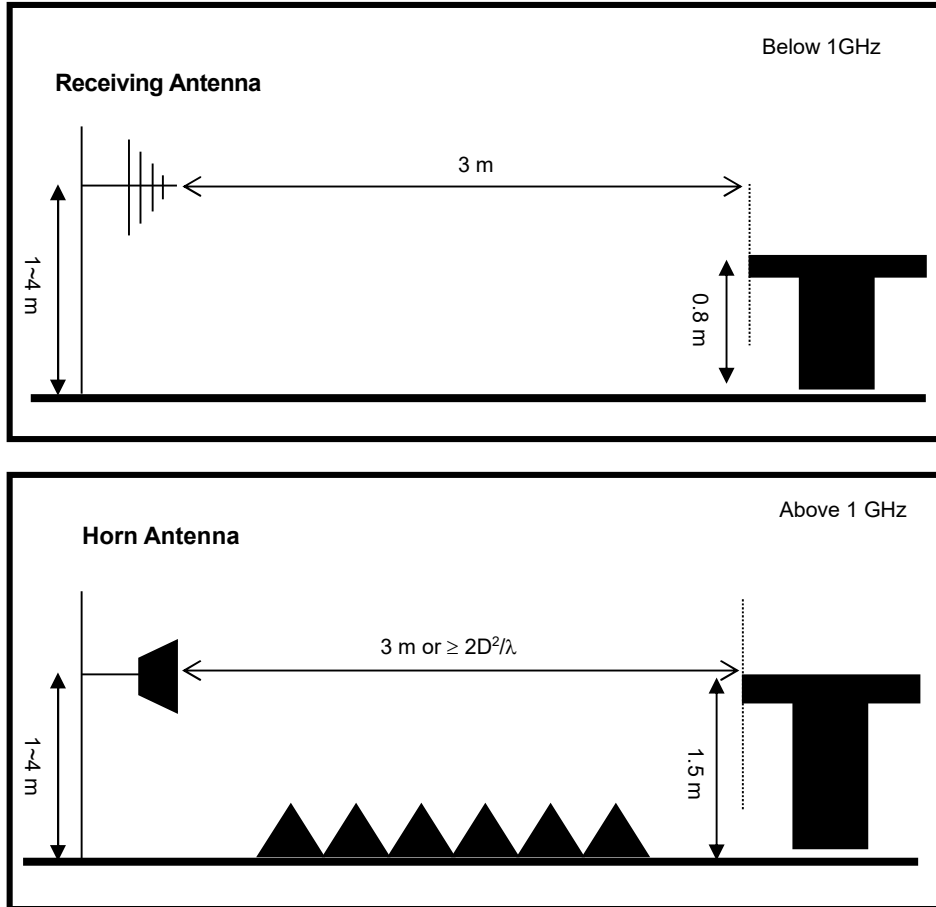
- Ambient temperature : (22 ~ 23) °C • Relative Humidity : (52 ~ 55) % R.H.

5.1.3 Measurement Procedure

The measurements procedure of the Spurious RF Radiated emissions is as following describe method.

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
4. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
5. Repeat above procedures until the measurements for all frequencies are complete.

5.1.4 Test setup



All tests is performed by radiated measurement and applied below conditions.(EIRP, OBW)

$$\text{Wavelength} = \text{Speed of light} / \text{Measurement frequency} = 30 / 7\,700 = 0.0038$$

$$(2 * (\text{Max antenna length of EUT})^2) / \text{Wavelength} = (2 * (0.0206)^2) / 0.0038 = 0.218 \text{ m}$$

5.1.5 Measurement Result

■ Below 1 GHz

Freq. (MHz)	Reading (dB μ V/m)	Antenna			CL (dB)	AMP (dB)	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Result
		Height (m)	Pol. (H/V)	Fctr. (dB/m)						
51.18	21.85	1.5	V	14.00	0.84	46.47	21.85	40.00	18.15	Compliance
54.13	16.79	1.0	H	13.62	0.86	46.47	16.79	40.00	23.21	Compliance
133.08	16.33	1.5	V	13.10	1.64	46.48	16.33	43.50	27.17	Compliance
163.16	17.98	1.0	H	15.05	1.86	46.44	17.98	43.50	25.52	Compliance
286.27	20.65	1.0	H	18.70	2.45	46.29	20.65	46.00	25.35	Compliance
458.40	23.33	1.5	V	23.20	3.04	46.16	23.33	46.00	22.67	Compliance
938.71	31.75	1.0	H	29.58	4.43	45.49	31.75	46.00	14.25	Compliance
952.00	32.32	1.5	V	29.60	4.48	45.46	32.32	46.00	13.68	Compliance

Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver, Table (Deg) : Directional degree of Turn table
 Antenna (Height, Pol, Fctr) : Antenna Height, Polarization and Factor, Cbl(dB) : Cable loss, Pre AMP(dB) : Preamplicifier gain(dB)
 Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna factor.(dB/m) + CL(dB) - Pre AMP(dB)
 Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m)

- The transmitter radiated spectrum was investigated from 9 kHz to 1 GHz.

5.2.6 Plots

*The worst case only.

- Below 1 GHz

