Test Report

FCC Rules 47 CFR,
Part 90 (90.213)
Part 2 (2.1055)

for

Trade name: FURUNO
System: Marine Radar
Model: Transceiver
for RADAR SENSOR DRS12A-NXT
Type: RTR-125

Report no.: LIC 12-22-110

Date of issue: 29 August 2022

Labotech International Co., Ltd.
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Report Summary

LIC project number:	LIC 04-22-0283		
Test report number of initial issue:	LIC 12-22-110	Date of initial issue	29 August 2022
Test report number of revised/replaced issue:	--	Date of revised/replaced issue	--
Test report revision/ replacement history:	--		
Test standard(s)/ Test specifications:	FCC Rules 47 CFR, Sections: 2.1055 - Frequency stability 90.213 - Frequency stability (the latest version on the first day of the testing period)		
Customer:	FURUNO ELECTRIC CO., LTD. 9-52 Ashihara-cho, Nishinomiya City, Hyogo. 662-8580, Japan		
Manufacturer:	FURUNO ELECTRIC CO., LTD. 9-52 Ashihara-cho, Nishinomiya City, Hyogo. 662-8580, Japan		
Trade name:	FURUNO		
System:	Marine Radar		
Model:	Transceiver for RADAR SENSOR DRS12A-NXT		
Type:	RTR-125		
Product function and intended use:	Marine Radar operating in the band 9300-9500 MHz		
Number of samples tested:	One		
Serial number:	1001-2110-0138		
Power rating:	24 VDC, 5.6 A		
Modifications made to samples during testing:	None		
Date of receipt of samples:	27 July 2022		
Test period:	From 27July 2022 to 28 July 2022		
Place of test:	Labotech International Co., Ltd. - Nishinomiya Lab. FCC Test firm Designation Number: JP2010 FCC Test firm Registration #: 696248 9-52, Ashihara-cho, Nishinomiya-shi, Hyogo, 662-8580 Japan		
Test results/Compliance:	Passed. The test results of this report relate only to the samples tested.		
Tested by:	Atsushi Takagi		
Written by:	Arisa Ogino		
Verified by:	Tadayuki Ekawa		
Approved by:	Date: 29 August 2022 Name: Tadayuki Ekawa Title: Manager, Testing & Facilities Control Section, Technical Department, Labotech International Co., Ltd. Signature: 		

Disclaimer:

The test results of this report relate only to the samples tested.

LIC has no responsibility for the followings except for the requirements of test standards.

– The thing(s) in association with the test and information pertaining to it/them, which are provided by the customer; information described in Clause 1 and the information of the cable(s) used.

– The matter(s) specified by the customer; Test standard(s) applied, test item(s), test conditions, criteria, object(s) to be tested or excluded, operation mode(s) and connection/configuration.

Testing Laboratory Status

Labotech International Co., Ltd. (hereafter called “LIC”) has been holding the following status after having been assessed according to the provisions of ISO/IEC 17025 and/or the relevant rules:

(1) JAB Accredited Testing Laboratory:
- accredited by Japan Accreditation Board (JAB)
- Laboratory accreditation number: RTL03220 (Date of initial accreditation: 14 January 2011 (*))
- Scope of accreditation: Electrical testing - EMC, Climatic, Vibration and Radio tests

(2) Telefication Listed Testing Laboratory:
- listed by Telefication B. V., (The Netherlands)
- Laboratory assignment number: L116 (Date of initial listing: 26 July 1999 (*))
- for testing the following product categories/ test standards: EN 60945, IEC 61162-1/-2, IEC/EN 61162-450, IEC 62288, ETSI EN 301 843-1 / -2, ETSI EN 301 489-1 / -3 / -17

(3) TÜV Appointed EMC Test Laboratory:
- appointed by TÜV Rheinland Japan Ltd.
- Laboratory assignment number: UA 50046428 (Date of initial appointment: 21 December 1998 (*))
- for carrying out the tests of EMC emission and immunity

(4) RMRS Recognized Testing Laboratory:
- recognized by Russian Maritime Register of Shipping (Russia)
- Laboratory recognition number: 17.13259.170 (Date of initial recognition: 27 January 2009 (*))
- for carrying out testing in the field of:
  Electrical measurements and tests, EMC tests, Mechanical measurements and tests, Equipment protection degree tests, and Climatic tests for Ship’s radio and navigational equipment and IEC 60945: 2002

(5) RRR Recognized Test Laboratory:
- recognized by Russian River Register (Russia)
- Certificate number: 131927 (Date of initial recognition: 31 May 2013 (*))
- for carrying out of tests of ships radio and navigation equipment

(6) DNV Recognized Environmental Test Laboratory:
- recognized by Det Norske Veritas AS
- Recognition certificate number: 262.1-015854-J-12 (Date of initial recognition: 12 July 2013 (*))
- Scope of recognition: Testing according to the standards IEC 60945, IEC 61162-1/-2/-450, IEC 62288, IEC 62388 and IEC 62252 Annex E
- Application: Provisions of Environmental, interface and safety testing

(7) CCS Recognized Test Agency:
- recognized by China Classification Society
- Recognition certificate number : DB13A00001 (Date of initial recognition : 29 January 2014 (*))
- Scope of recognition : Performance/Environmental/EMC/Special purpose/Safety precautions tests for Electrical & Electronic Product including Maritime Navigation and Radio-communication Equipment & Systems

(8) SABS EMC A-Lab program Laboratory:
- recognized by South African Bureau of Standards
- Assigned Lab number : SABS/A-LAB/0042/2018 (Date of initial recognition : 5 July 2018 (*))
- Approved List of EMC Standards : SANS 211 / 214-1 / 214-2 / 222 / 2332 / 2335, CISPR 11 / 14-1 / 14-2 / 22 / 32 / 35, SANS/IEC 60601-1-2, SANS/IEC 61326-1, IEC 61326-2-6, SANS/IEC 61000-3-2 / -3-3 / -4-2 / -4-3 / -4-4 / -4-5 / -4-6 / -4-8 / -4-11 / -6-1 / -6-2 / -6-3 / -6-4

(9) A2LA accredited Testing Laboratory:
- accredited by American Association of Laboratory Accreditation (A2LA)
- Certificate number: 5241.01 (Date of initial accreditation: 17 Jul 2019 (*))
- Scope of accreditation: Electrical testing - Emissions - Radiated and Conducted, Radio - Maritime Radio Systems, Stations in the maritime services, Private land mobile radio service, Radio / Intentional radiators, RF Exposure and EMC - Automotive Electronic Devices (AED), Machine and Vehicle

(*) The latest certification status may be found on the LIC website (https://www.labotech-intl.co.jp/).

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1 Principal Information

1.1 Equipment under test (EUT)

1.1.1 General

(a) Trade name: FURUNO

(b) Manufacturer: FURUNO ELECTRIC CO., LTD.
9-52 Ashihara-cho, Nishinomiya City, Hyogo. 662-8580, Japan

(c) Model: Transceiver for RADAR SENSOR DRS12A-NXT

Name	Type	Serial number	Note
RADAR SENSOR	DRS12A-NXT	1001-2110-0138	--
Scanner Unit	RSB-137-125		Antenna rotation rate: 24/36/48 rpm
Power Supply Board	03P9679(FDY-03)		--
Motor Drive Board	14DJ003		--
Transceiver Unit	RTR-125		--
Transceiver Board	03P9678		--
Signal Processing Board	03P9603		--

Associated units (AU)

Name	Type	Serial number	Manufacturer
MULTI FUNCTION DISPLAY	TZT12F	1001-1410-0121	FURUNO

Auxiliary Equipment (AE)

Name	Type	Serial number	Manufacturer
Ethernet hub	HUB-101	010050	FURUNO
Laptop PC	dynabook R63/DN	XK194168H	TOSHIBA
Power Supply Unit1	PLA100F-24	--	COSEL
Power Supply Unit2	PLA100F-24	--	COSEL

(d) FCC ID: ADB9ZWRTR125

(e) Primary function: Ship radar station operating in the band 9300–9500 MHz

(f) Frequency range: Fixed frequency, X-band (9380 - 9440 MHz)

(g) Type of emission: P0N/Q0N
(Emission designator)

(h) Occupied bandwidth:

Pulse type			S0	S1	S2	M1	M2	M3	L1	L2	L2
Occupied bandwidth (MHz)	ch1	P0N	57.5	50.6	39.9	29.4	21.2	16.9	15.6	15.8	16.2
		Q0N	18.2	18.2	14.8	8.5	6.6	5.3	5.2	3.8	3.8
	ch2	P0N	58.1	51.9	40.8	30.6	22.4	17.6	16.3	16.7	16.4
		Q0N	18.1	18.1	14.7	8.5	6.6	5.3	5.2	3.8	3.8
	ch3	P0N	57.2	52.3	41.1	31.1	23.1	18.1	16.6	16.9	16.7
		Q0N	18.1	18.1	14.8	8.5	6.6	5.3	5.2	3.8	3.8

(i) Size and mass: RADAR SENSOR: 360 mm (W) × 445 mm (H) × 330 m (D), 21 kg

(j) Power supply: 24 VDC, 5.6 A

1.1.2 Transceiver module

Type: RTR-125 (Contained in RADAR SENSOR)

1.1.2.1 Transmitter

(a) Assignable frequency band: Between 9300 and 9500 MHz (CFR Title 47 Sections: 90.103 (b))

(b) Type of RF generator:

- Type: Solid-state device (no magnetron)
- Peak output power: 100 W nominal

(c) Fundamental frequency:

ch1: P0N 9380 MHz / Q0N 9400 MHz
ch2: P0N 9400 MHz / Q0N 9420 MHz
ch3: P0N 9420 MHz / Q0N 9440 MHz

(d) Pulse characteristics:

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2
Pulse length (μs)	P0N	0.04	0.08	0.15	0.30	0.50	0.80	1.20	1.20	1.20
	Q0N	5.0	5.0	7.5	11	13	15	18	18	48
PRF(Hz)		2000	2000	2000	2000	2000	1100	1100	700	550

1.1.2.2 Receiver

(a) Passband

RF Stage: 300 MHz
IF Stage: 50 MHz

(b) Intermediate Frequency: P0N 83.75 MHz
Q0N 103.75 MHz

(c) Gain (overall): Approximately 40 dB

(d) Overall Noise figure: 4 dB (typical)

(e) Video Output voltage: Not available

(f) Features provided: Anti-clutter Sea, Anti-clutter Rain

(g) If receiver is tunable, describe method for adjusting frequency: Phase locked loop

1.1.3 Antenna and Scanner

(a) Antenna specifications

Antenna model		XN12A	XN13A
Length (mm)		1252	1791
Rotation diameter (mm)		1400	1940
Transmission frequency		ch1: P0N 9380 MHz / Q0N 9400 MHz	
		ch2: P0N 9400 MHz / Q0N 9420 MHz	
		ch3: P0N 9420 MHz / Q0N 9440 MHz	
Horizontal beam width (-3 dB)		1.9°	1.35°
Vertical beam width (-3 dB)		22°	22°
Side lobe (max.)	Less than ±20°	-24 dB	-28 dB
	Outside ±20°	-30 dB	-32 dB
Gain		28.0 dBi	29.5 dBi
Radiator		Slot array	
Polarization		Horizontal	
Type of beam		Vertical fan	

(b) Antenna Rotation ON-OFF Switch: Not provided

(c) Scanning (rotating or oscillating): Rotating over 360° continuously clockwise

(d) Antenna Rotation Rate: 24/36/48 rpm

(e) Sector Scan: Provided

(f) Rated Loss of Transmission Line per 100 Feet: Negligible (Transmission path is only in Radar Sensor.)

1.1.4 Operational Features

(a) Is positive means provided to indicate whether or not the overall operation of the equipment is such that it may be relied upon to provide effective operation in accordance with its primary function: Yes (Hardware alarms)

(b) Is the equipment for continuous operation: Yes

(c) Is provision made for operation with shore based radar beacons (RACONS): Yes (RACONS)

1.1.5 Construction Features

(a) Does equipment embody replacement units with chassis type assembly: Yes

(b) Are fuse alarms provided: No

(c) State units that are weatherproof: Antenna Unit (IEC 60529 – IP56)

(d) If all units are not housed in a single container, indicate number and give description of individual units: See Clause 1.1.1 (c) of this report.

(e) Approximate space required for installation excluding Antenna Unit: Not applicable.

1.2 Observation and comments

As per the customer's instructions, the frequency stability was measured only at -30°C and +20°C.

2 Test Results Summary

Clause No. of this report	47 CFR Section	Item	Result	Test engineer
3.1	2.1055 (a)(1),(d)(1),(d)(3) 90.213	Frequency stability	Passed.	A. Takagi

3 Test Results

3.1 Frequency stability – temperature & voltage (FCC Rule 47 CFR, 2.1055(a)(1)/(d)(1)/(d)(3) and 90.213)

3.1.1 Test conditions:

(1) Radar transmitter: All TX (S0/S1/S2/M1/M2/M3/L1/L2/L2) pulses
(2) Ambient temperature: -30°C and +20°C
(3) Power supply voltage: 85/100/115% of nominal voltage
24 VDC
V_L: 20.4 VDC / V_{nom}: 24 VDC / V_H: 27.6 VDC

3.1.2 Test setup:

See Clause 4.

3.1.3 Frequency tolerance limits (FCC Rule 47 CFR 2.1055 (a) (1), 90.213(a)):

ch1, P0N

Pulse type	S0	S1	S2	M1	M2	M3	L1	L2	L2
Pulse length T (μs)	0.0400	0.0730	0.1450	0.2950	0.4970	0.7950	1.1950	1.1950	1.1950
Guard Band f(1.5/T) (MHz) (*1)	37.5	20.5	10.3	5.1	3.0	1.9	1.2	1.3	1.3
Upper limit (MHz) (*2)	9462.5	9479.5	9489.7	9494.9	9497.0	9498.1	9498.8	9498.7	9498.7
Lower limit (MHz) (*2)	9337.5	9320.5	9310.3	9305.1	9303.0	9301.9	9301.2	9301.3	9301.3

ch1, Q0N

Pulse type	S0	S1	S2	M1	M2	M3	L1	L2	L2
Pulse length T (μs)	4.9776	4.9776	7.4576	10.9780	13.0180	14.9780	18.0980	47.9000	47.9000
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.0	0.0
Upper limit (MHz) (*2)	9499.7	9499.7	9499.8	9499.9	9499.9	9499.9	9499.9	9500.0	9500.0
Lower limit (MHz) (*2)	9300.3	9300.3	9300.2	9300.1	9300.1	9300.1	9300.1	9300.0	9300.0

(*1) Guard Band is specified to be equal to 1.5/T MHz, where "T" is the pulse length in microseconds.
(CFR Title 47 Sections: 80.209 (b))
(*2) Upper limit frequency, f(U) =9500 -1.5/T
Lower limit frequency, f(L) = 9300 +1.5/T

ch2, P0N

Pulse type	S0	S1	S2	M1	M2	M3	L1	L2	L2
Pulse length T (μs)	0.0404	0.0722	0.1446	0.2936	0.4976	0.7976	1.1936	1.1936	1.1936
Guard Band f(1.5/T) (MHz) (*1)	37.1	20.8	10.4	5.1	3.0	1.9	1.3	1.3	1.3
Upper limit (MHz) (*2)	9462.9	9479.2	9489.6	9494.9	9497.0	9498.1	9498.7	9498.7	9498.7
Lower limit (MHz) (*2)	9337.1	9320.8	9310.4	9305.1	9303.0	9301.9	9301.3	9301.3	9301.3

ch2, Q0N

Pulse type	S0	S1	S2	M1	M2	M3	L1	L2	L2
Pulse length T (μs)	4.9682	4.9682	7.5082	10.9880	12.9880	14.9880	17.9880	47.9900	47.9900
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.0	0.0
Upper limit (MHz) (*2)	9499.7	9499.7	9499.8	9499.9	9499.9	9499.9	9499.9	9500.0	9500.0
Lower limit (MHz) (*2)	9300.3	9300.3	9300.2	9300.1	9300.1	9300.1	9300.1	9300.0	9300.0

ch3, P0N

Pulse type	S0	S1	S2	M1	M2	M3	L1	L2	L2
Pulse length T (μs)	0.0400	0.0726	0.1446	0.2936	0.4976	0.7976	1.1976	1.1976	1.1976
Guard Band f(1.5/T) (MHz) (*1)	37.5	20.7	10.4	5.1	3.0	1.9	1.3	1.3	1.3
Upper limit (MHz) (*2)	9462.5	9479.3	9489.6	9494.9	9497.0	9498.1	9498.7	9498.7	9498.7
Lower limit (MHz) (*2)	9337.5	9320.7	9310.4	9305.1	9303.0	9301.9	9301.3	9301.3	9301.3

ch3, Q0N

Pulse type	S0	S1	S2	M1	M2	M3	L1	L2	L2
Pulse length T (μs)	4.9682	4.9682	7.4682	10.9880	13.0280	14.9880	17.9880	47.9900	47.9900
Guard Band f(1.5/T) (MHz) (*1)	0.3	0.3	0.2	0.1	0.1	0.1	0.1	0.0	0.0
Upper limit (MHz) (*2)	9499.7	9499.7	9499.8	9499.9	9499.9	9499.9	9499.9	9500.0	9500.0
Lower limit (MHz) (*2)	9300.3	9300.3	9300.2	9300.1	9300.1	9300.1	9300.1	9300.0	9300.0

(*1) Guard Band is specified to be equal to 1.5/T MHz, where "T" is the pulse length in microseconds.
(CFR Title 47 Sections: 80.209 (b))
(*2) Upper limit frequency, f(U) =9500 -1.5/T
Lower limit frequency, f(L) = 9300 +1.5/T

3.1.4 Test Results:

Complied.

(1) Temperature test at the rated supply voltage of 24 VDC:

ch1, P0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	-30°C	9381.3	9380.4	9380.2	9380.0	9379.9	9379.9	9379.9	9379.9	9379.9	Complied.
	+20°C	9380.6	9380.0	9380.0	9379.9	9380.0	9379.9	9379.9	9379.9	9380.0	Complied.

ch1, Q0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	-30°C	9399.7	9399.7	9399.6	9399.8	9399.8	9400.0	9400.0	9399.9	9399.9	Complied.
	+20°C	9400.0	9399.9	9400.1	9399.9	9399.7	9399.8	9399.8	9399.8	9399.6	Complied.

ch2, P0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	-30°C	9400.3	9399.8	9399.8	9400.1	9400.0	9400.0	9400.0	9400.1	9400.0	Complied.
	+20°C	9401.0	9399.8	9400.2	9400.2	9400.1	9400.1	9400.1	9400.1	9400.1	Complied.

ch2, Q0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	-30°C	9419.9	9419.9	9420.0	9420.0	9420.1	9420.0	9420.0	9420.0	9420.1	Complied.
	+20°C	9420.4	9420.3	9420.1	9420.1	9420.6	9421.0	9420.8	9420.8	9420.4	Complied.

ch3, P0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	-30°C	9419.6	9419.5	9419.9	9420.0	9420.0	9420.0	9420.0	9420.0	9420.0	Complied.
	+20°C	9419.5	9420.2	9419.7	9420.0	9420.1	9420.0	9420.1	9420.1	9420.1	Complied.

ch3, Q0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	-30°C	9440.2	9440.2	9440.4	9439.9	9440.0	9439.9	9439.9	9440.0	9440.1	Complied.
	+20°C	9440.0	9440.2	9439.8	9439.8	9439.9	9439.8	9440.0	9439.9	9439.4	Complied.

(2) Voltage variation test at the temperature of +20°C:

ch1, P0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	V_L	9380.4	9380.5	9379.9	9380.0	9379.9	9380.0	9379.9	9380.0	9379.9	Complied.
	V_{nom}	9380.6	9380.0	9380.0	9379.9	9380.0	9379.9	9379.9	9379.9	9380.0	Complied.
	V_H	9380.4	9379.9	9379.9	9379.9	9379.9	9379.9	9380.0	9380.0	9380.0	Complied.

ch1, Q0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	V_L	9400.0	9399.8	9399.7	9399.6	9399.7	9399.7	9399.4	9399.7	9399.4	Complied.
	V_{nom}	9400.0	9399.9	9400.1	9399.9	9399.7	9399.8	9399.8	9399.8	9399.6	Complied.
	V_H	9399.9	9400.1	9400.0	9399.9	9399.6	9399.6	9399.5	9399.6	9400.5	Complied.

ch2, P0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	V_L	9400.0	9399.9	9400.1	9400.1	9400.1	9400.1	9400.1	9400.1	9400.1	Complied.
	V_{nom}	9401.0	9399.8	9400.2	9400.2	9400.1	9400.1	9400.1	9400.1	9400.1	Complied.
	V_H	9400.9	9400.2	9400.0	9400.1	9400.1	9400.1	9400.1	9400.1	9400.1	Complied.

ch2, Q0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	V_L	9420.3	9420.2	9420.4	9420.5	9420.7	9420.8	9420.9	9420.8	9420.3	Complied.
	V_{nom}	9420.4	9420.3	9420.1	9420.1	9420.6	9421.0	9420.8	9420.8	9420.4	Complied.
	V_H	9420.3	9420.3	9420.4	9420.7	9420.7	9420.7	9420.9	9420.8	9419.8	Complied.

ch3, P0N

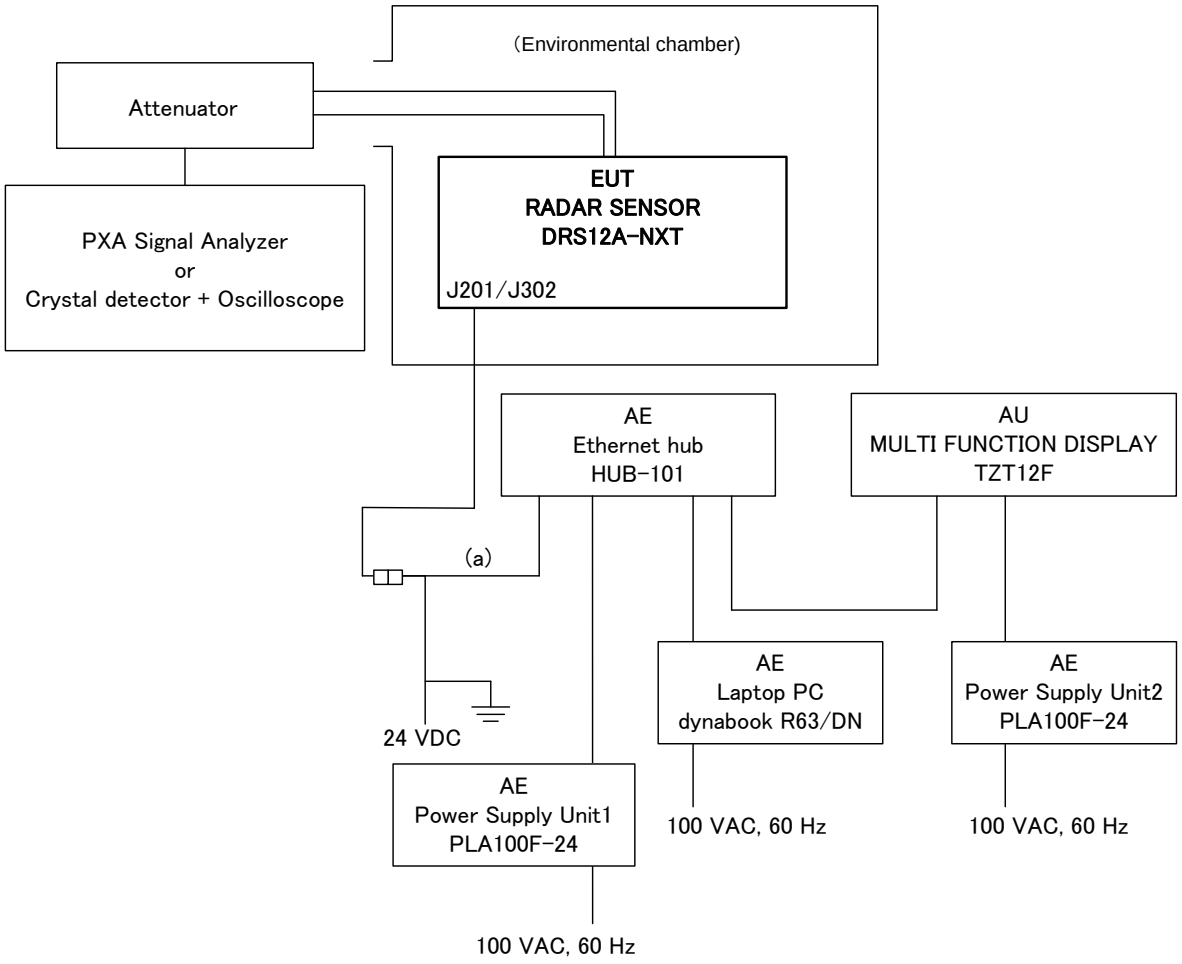
Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	V_L	9419.6	9420.0	9419.9	9420.0	9420.0	9420.1	9420.1	9420.1	9420.1	Complied.
	V_{nom}	9419.5	9420.2	9419.7	9420.0	9420.1	9420.0	9420.1	9420.1	9420.1	Complied.
	V_H	9419.8	9420.1	9420.0	9420.1	9420.1	9420.1	9420.1	9420.1	9420.1	Complied.

ch3, Q0N

Pulse type		S0	S1	S2	M1	M2	M3	L1	L2	L2	Result
Frequency at maximum emission (MHz)	V_L	9439.9	9440.0	9439.7	9439.9	9439.6	9439.4	9439.3	9439.2	9440.3	Complied.
	V_{nom}	9440.0	9440.2	9439.8	9439.8	9439.9	9439.8	9440.0	9439.9	9439.4	Complied.
	V_H	9440.0	9439.9	9439.9	9439.8	9440.3	9440.5	9439.8	9439.3	9439.9	Complied.

Environmental conditions observed: On 27 July 2022, 23°C to 23°C, 59%RH to 55%RH
On 28 July 2022, 23°C to 23°C, 55%RH to 55%RH

4 Test Setup for Measurements



Cable designations

No.	Category	Name	Type	Length (m)	Number of cables used	Cable shielded
a	Power/Signal	Power/Signal cable	FRU-2P5S-FF-30M	30	1	Yes

5 Measuring Equipment List

Measuring/Test instruments have been appropriately calibrated/maintained according to the LIC programs/ procedures and ISO/IEC 17025. Measuring/Test instruments used for the tests are listed below.

C/N	Instrument	Type	S/N	Manufacturer	Date of last calibration	Calibration interval
HT415	Climatic chamber (Small)	PL-4KP	14004204	Espec	8 July 2022	1 year
HT724	Paperless recorder/ Dual communication logger	FX106-4-1	S5JA01450	Yokogawa	Not applicable.	--
HT1223	Attenuator	8495B	MY42148137	Agilent	7 March 2022	1 year
HT654	Attenuator	8494B	MY42148134	Agilent	7 March 2022	1 year
HT653	Attenuator	8491B	MY39264135	Agilent	7 March 2022	1 year
HT1317	PXA Signal Analyzer	N9030B	SG57142024	KEYSIGHT	9 March 2022	1 year
HT972	Oscilloscope	MSO4054B	C030483	TEKTRONIX	11 March 2022	1 year
HT1221	Crystal detector	423B	MY51342422	Agilent	5 March 2022	1 year
HT461	Digital multi-meter	111	78410077	Fluke	6 January 2022	1 year
--	Attenuator	66-30-43	CD4013	Aeroflex/ Weinschel	--	--
--	Adaptor	X281A	--	HP	--	--

End of text