RADIO TEST REPORT

Test Report No. 15653703S

Customer	**NIHON KOHDEN CORPORATION**
Description of EUT	**SDIO Wireless Module**
Model Number of EUT	**SX-SDMAC**
FCC ID	**B6BGZ-1XXP2**
Test Regulation	**FCC Part 15 Subpart E**
Test Result	**Complied**
Issue Date	**February 20, 2025**
Remarks	**Maximum Conducted Output Power only**

Representative Test Engineer	Approved By
K. Adachi	T. Imamura
Kenichi Adachi Engineer	Toyokazu Imamura Engineer

CERTIFICATE 1266.03

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan, Inc.

☒ There is no testing item of "Non-accreditation".

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REVISION HISTORY

Original Test Report No. 15653703S

Revision	Test Report No.	Date	Page Revised Contents
- (Original)	15653703S	February 20, 2025	-

Reference: Abbreviations (Including words undescribed in this report)

A2LA	The American Association for Laboratory Accreditation	IEC	International Electrotechnical Commission
AC	Alternating Current	IEEE	Institute of Electrical and Electronics Engineers
AFH	Adaptive Frequency Hopping	IF	Intermediate Frequency
AM	Amplitude Modulation	ILAC	International Laboratory Accreditation Conference
Amp, AMP	Amplifier	ISED	Innovation, Science and Economic Development Canada
ANSI	American National Standards Institute	ISO	International Organization for Standardization
Ant, ANT	Antenna	JAB	Japan Accreditation Board
AP	Access Point	LAN	Local Area Network
ASK	Amplitude Shift Keying	LIMS	Laboratory Information Management System
Atten., ATT	Attenuator	MCS	Modulation and Coding Scheme
AV	Average	MRA	Mutual Recognition Arrangement
BPSK	Binary Phase-Shift Keying	N/A	Not Applicable
BR	Bluetooth Basic Rate	NIST	National Institute of Standards and Technology
BT	Bluetooth	NS	No signal detect.
BT LE	Bluetooth Low Energy	NSA	Normalized Site Attenuation
BW	BandWidth	NVLAP	National Voluntary Laboratory Accreditation Program
Cal Int	Calibration Interval	OBW	Occupied Band Width
CCK	Complementary Code Keying	OFDM	Orthogonal Frequency Division Multiplexing
Ch., CH	Channel	OFDMA	Orthogonal Frequency Division Multiple Access
CISPR	Comite International Special des Perturbations Radioelectriques	P/M	Power meter
CW	Continuous Wave	PCB	Printed Circuit Board
DBPSK	Differential BPSK	PER	Packet Error Rate
DC	Direct Current	PHY	Physical Layer
D-factor	Distance factor	PK	Peak
DFS	Dynamic Frequency Selection	PN	Pseudo random Noise
DQPSK	Differential QPSK	PP	Preamble Puncturing
DSSS	Direct Sequence Spread Spectrum	PRBS	Pseudo-Random Bit Sequence
EDR	Enhanced Data Rate	PSD	Power Spectral Density
EIRP, e.i.r.p.	Equivalent Isotropically Radiated Power	QAM	Quadrature Amplitude Modulation
EMC	ElectroMagnetic Compatibility	QP	Quasi-Peak
EMI	ElectroMagnetic Interference	QPSK	Quadri-Phase Shift Keying
EN	European Norm	RBW	Resolution Band Width
ERP, e.r.p.	Effective Radiated Power	RDS	Radio Data System
EU	European Union	RE	Radio Equipment
EUT	Equipment Under Test	RF	Radio Frequency
Fac.	Factor	RMS	Root Mean Square
FCC	Federal Communications Commission	RSS	Radio Standards Specifications
FHSS	Frequency Hopping Spread Spectrum	Rx	Receiving
FM	Frequency Modulation	SA, S/A	Spectrum Analyzer
Freq.	Frequency	SG	Signal Generator
FSK	Frequency Shift Keying	SVSWR	Site-Voltage Standing Wave Ratio
GFSK	Gaussian Frequency-Shift Keying	TR	Test Receiver
GNSS	Global Navigation Satellite System	Tx	Transmitting
GPS	Global Positioning System	VBW	Video BandWidth
Hori.	Horizontal	Vert.	Vertical
ICES	Interference-Causing Equipment Standard	WLAN	Wireless LAN

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SECTION 1: Customer Information

Company Name	NIHON KOHDEN CORPORATION
Address	1-1-6, Kusunokidai, Tokorozawa-shi, Saitama 359-0037, Japan
Telephone Number	+81-3-5996-8354
Contact Person	Kazuyoshi Kitahara

The Information provided by the customer is as follows;
- Customer, Description of EUT, Model Number of EUT on the cover and other relevant pages
- Operating/Test Mode(s) (Mode(s)) on all the relevant pages
- SECTION 1: Customer Information
- SECTION 2: Equipment Under Test (EUT) other than the Receipt Date and Test Date
- SECTION 4: Operation of EUT during testing

SECTION 2: Equipment Under Test (EUT)

2.1 Identification of EUT

Description	SDIO Wireless Module
Model Number	SX-SDMAC
Serial Number	Refer to SECTION 4.2
Condition	Production model
Modification	No Modification by the test lab
Receipt Date	January 10, 2025
Test Date	January 10, 2025 to January 14, 2025

2.2 Product Description

General Specification

Rating	DC 3.3 V (Host equipment: DC 3 V)
Operating temperature	-40 deg. C to +85 deg. C

Radio Specification

This report contains data provided by the customer which can impact the validity of results. UL Japan, Inc. is only responsible for the validity of results after the integration of the data provided by the customer. The data provided by the customer is marked “a)” in the table below.

WLAN (IEEE802.11a/11b/11g/11n-20/11n-40)

Equipment Type	Transceiver	
Frequency of Operation	2412 MHz to 2462 MHz	
	5180 MHz to 5240 MHz	5190 MHz to 5230 MHz
	5260 MHz to 5320 MHz	5270 MHz to 5310 MHz
	5500 MHz to 5720 MHz	5510 MHz to 5710 MHz
	5745 MHz to 5825 MHz	5755 MHz to 5795 MHz
Type of Modulation	DSSS, OFDM	
Antenna Type	Mini-Nanoblade antenna: Laird Technologies Stand Alone antenna: Molex	
Antenna Gain [a)]	Mini-Nanoblade antenna: 2.5 dBi (2.4 GHz), 4.8 dBi (5 GHz) Stand Alone antenna: 3.0 dBi (2.4 GHz), 4.6 dBi (5 GHz)	

* The table shows the specification of the case that the EUT is installed in host device.
Rate of WLAN 11b mode is used between 5.5 Mbps and 11 Mbps (not used 1 Mbps and 2 Mbps) when the EUT is installed in host device.

SECTION 3: Test Specification, Procedures & Results

3.1 Test Specification

Test Specification	FCC Part 15 Subpart E The latest version on the first day of the testing period
Title	FCC 47 CFR Part 15 Radio Frequency Device Subpart E Unlicensed National Information Infrastructure Devices Section 15.407 General technical requirements

3.2 Procedures and Results

Item	Test Procedure	Specification	Worst Margin	Results	Remarks
Maximum Conducted Output Power	**FCC:** KDB Publication Number 789033	**KDB 447498 D01 v06** Section 4.3.1, 6.3	-	Complied	Conducted
	ISED: -	-			
Note: UL Japan, Inc.'s EMI Work Procedures: Work Instructions-ULID-003591 and Work Instructions-ULID-003593. * In case any questions arise about test procedure, ANSI C63.10: 2013 is also referred.					

3.3 Additions or Deviations to Standards

No addition, exclusion nor deviation has been made from the standard.

3.4 Uncertainty

Measurement uncertainty is not taken into account when stating conformity with a specified requirement.
Note: When margins obtained from test results are less than the measurement uncertainty, the test results may exceed the limit.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor k = 2.

Antenna terminal test	Uncertainty (+/-)
Power Measurement above 1 GHz (Average Detector)	1.3 dB
Power Measurement above 1 GHz (Peak Detector)	1.5 dB
Spurious Emission (Conducted) below 1 GHz	0.93 dB
Conducted Emissions Power Density Measurement 1 GHz to 3 GHz	0.93 dB
Conducted Emissions Power Density Measurement 3 GHz to 18 GHz	3.0 dB
Spurious Emission (Conducted) 18 GHz to 26.5 GHz	2.8 dB
Spurious Emission (Conducted) 26.5 GHz to 40 GHz	2.3 dB
Bandwidth Measurement	0.012 %
Duty Cycle and Time Measurement	0.27 %
Temperature	2.2 deg.C.
Humidity	3.4 %
Voltage	0.92 %

3.5 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 Japan
Telephone: +81-463-50-6400
A2LA Certificate Number: 1266.03
(FCC test firm registration number: 626366, ISED lab company number: 2973D / CAB identifier: JP0001)

Test room	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber (SAC1)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber (SAC2)	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber (SAC3)	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber (SAC4)	8.1 x 5.1 x 3.55	8.1 x 5.1	-
Wireless anechoic chamber 1 (WAC1)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
Wireless anechoic chamber 2 (WAC2)	9.5 x 6.0 x 5.4	9.5 x 6.0	3 m
No.1 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.2 Shielded room	6.8 x 4.1 x 2.7	6.8 x 4.1	-
No.3 Shielded room	6.3 x 4.7 x 2.7	6.3 x 4.7	-
No.4 Shielded room	4.4 x 4.7 x 2.7	4.4 x 4.7	-
No.5 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.6 Shielded room	7.8 x 6.4 x 2.7	7.8 x 6.4	-
No.8 Shielded room	3.45 x 5.5 x 2.4	3.45 x 5.5	-
No.1 Measurement room	2.55 x 4.1 x 2.5	-	-
No.2 Measurement room	4.5 x 3.5 x 2.5	-	-
Wireless shielded room 1	3.0 x 4.5 x 2.7	3.0 x 4.5	-
Wireless shielded room 2	3.0 x 4.5 x 2.7	3.0 x 4.5	-

3.6 Test Data, Test Instruments, and Test Set Up

Refer to APPENDIX.

SECTION 4: Operation of EUT During Testing

4.1 Operating Mode(s)

Test operating mode was determined as follows according to “Section 1 of 6 802.11 a/b/g/n testing - Managing Complex Regulatory Approvals -” of TCB Council Workshop October 2009.

Mode	Remarks
IEEE 802.11n 40 MHz BW (11n-40)	MCS 0 or MCS 1

*Power of the EUT was set by the software as follows;
Power Setting: Fixed
Software (Firmware): Ver.02-50 (Date: 2022.09.26, Storage location: EUT memory)

The EUT transmits vital signs to 4 monitors. The lowest rate was selected since ON time of transmitting is longest.

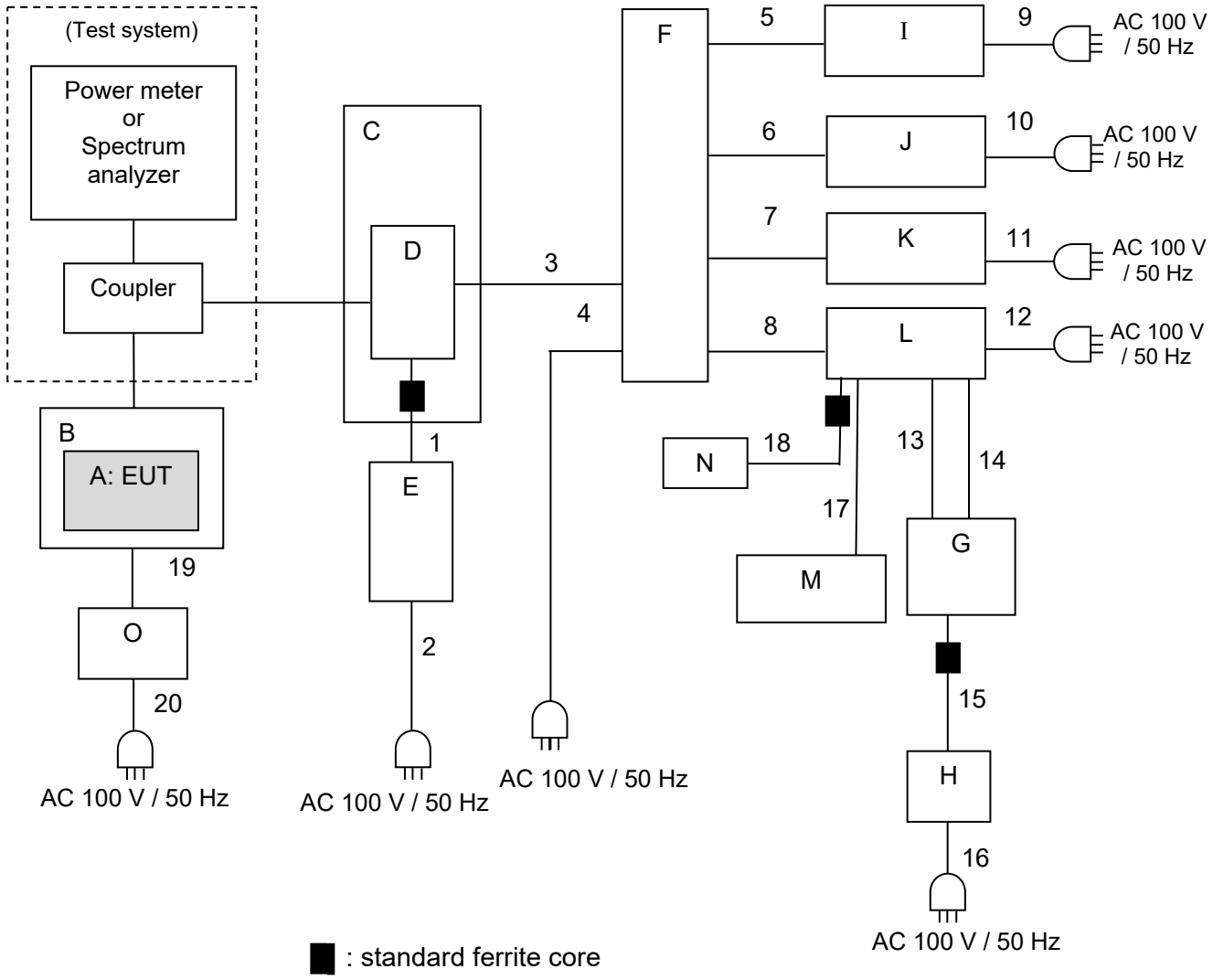
After the pre-check of Antenna port 1 and Antenna port 2, the test was performed with the antenna that had higher power as a representative.

*This setting of software is the worst case.
Any conditions under the normal use do not exceed the condition of setting.
In addition, end users cannot change the settings of the output power of the product.

*The Details of Operation Mode(s)

Test Item	Operating Mode	Tested Antenna	Tested Frequency			
			Lower Band	Middle Band	Additional Band	Upper Band
Maximum Conducted Output Power	Tx 11n-40	1	5190 MHz 5230 MHz	5270 MHz 5310 MHz	5510 MHz 5550 MHz 5670 MHz	5755 MHz 5795 MHz
Duty cycle	Tx 11n-40	1	5190 MHz	-	-	-

4.2 Configuration and Peripherals



Description of EUT and Support Equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	SDIO Wireless Module	SX-SDMAC	84 25 3F F6 8A 82	silex technology, Inc.	EUT
B	Vital sign telemeter	GZ-130P OP No.30A	06587	Nihon Kohden	-
C	Shield Box	MAB101	182899	Microwave Factory	-
D	Wireless LAN access point	AIR-CAP3702E-A-K9	FTX18227609	Cisco Systems	-
E	AC adaptor	AA25480L	ALD02510FEW	Cisco Systems	-
F	HUB	X230-18GP	000155G232900213	Allied Telesis	-
G	LCD display unit	VL-611R	00649	Nihon Kohden	-
H	AC adaptor	HEMP100G-S120650-7L	3316001803F0-H-126R-0183	HiTRON	-
I	Central monitor main unit	PU-621RA	12X001260	Nihon Kohden	-
J	Central monitor main unit	PU-621RA	12X001225	Nihon Kohden	-
K	Central monitor main unit	PU-621RA	143002708	Nihon Kohden	-
L	Central monitor main unit	PU-621RA	163005368	Nihon Kohden	-
M	Keyboard	BSKBU12BK	A20801	BUFFALO	-
N	Mouse	MSK-1113(B)	91705-523-6962264	Microsoft	-
O	DC power supply	PW8-5ADPS	14086035	TEXIO	-

List of Cables Used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.8	Unshielded	Unshielded	-
2	AC	1.7	Unshielded	Unshielded	-
3	LAN	2.0	Unshielded	Unshielded	-
4	AC	2.2	Unshielded	Unshielded	-
5	LAN	2.0	Unshielded	Unshielded	-
6	LAN	1.0	Unshielded	Unshielded	-
7	LAN	0.9	Unshielded	Unshielded	-
8	LAN	0.9	Unshielded	Unshielded	-
9	AC	2.5	Unshielded	Unshielded	-
10	AC	2.3	Unshielded	Unshielded	-
11	AC	2.5	Unshielded	Unshielded	-
12	AC	2.5	Unshielded	Unshielded	-
13	USB	2.5	Shielded	Shielded	-
14	DVI	2.5	Shielded	Shielded	-
15	DC	0.9	Unshielded	Unshielded	-
16	AC	1.7	Unshielded	Unshielded	-
17	USB	2.1	Shielded	Shielded	-
18	USB	1.8	Shielded	Shielded	-
19	DC	0.04 + 1.9	Unshielded	Unshielded	-
20	AC	2.0	Unshielded	Unshielded	-

SECTION 5: Antenna Terminal Conducted Tests

Test Procedure

The tests were made with below setting connected to the antenna port.

Test	Span	RBW	VBW	Sweep time	Detector	Trace	Instrument Used
Maximum Conducted Output Power	-	-	-	Auto	Average	-	Power Meter (Sensor: 50 MHz BW)
Duty cycle	Zero	8 MHz	50 MHz	-	Peak	-	Spectrum analzyer

* The test method was also referred to KDB 789033 D02 General UNII Test Procedures New Rules v02r01 "Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E".

The test results and limit are rounded off to two decimals place, so some differences might be observed.
The equipment and cables were not used for factor 0 dB of the data sheets.

Test Data : APPENDIX
Test Result : Pass

APPENDIX 1: Test Data

Maximum Conducted Output Power

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 14, 2025
Temperature / Humidity	20 deg. C / 48 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-40

11n-40 MCS 0 or MCS 1 antenna port: 1 (Time averaging power)

Tested Frequency	Power Meter Reading	Cable Loss	Atten. Loss	Antenna Gain	Conducted Power Result		e.i.r.p. Result	
[MHz]	[dBm]	[dB]	[dB]	[dBi]	[dBm]	[mW]	[dBm]	[mW]
5190	-19.46	4.60	0.00	4.80	-14.86	0.0327	-10.06	0.0986
5230	-16.56	4.64	0.00	4.80	-11.92	0.0643	-7.12	0.1941
5270	-16.37	4.66	0.00	4.80	-11.71	0.0675	-6.91	0.2037
5310	-16.95	4.70	0.00	4.80	-12.25	0.0596	-7.45	0.1799
5510	-17.04	4.85	0.00	4.80	-12.19	0.0604	-7.39	0.1824
5550	-15.67	4.86	0.00	4.80	-10.81	0.0830	-6.01	0.2506
5670	-16.47	4.86	0.00	4.80	-11.61	0.0690	-6.81	0.2084
5755	-16.92	4.86	0.00	4.80	-12.06	0.0622	-7.26	0.1879
5795	-16.70	4.86	0.00	4.80	-11.84	0.0655	-7.04	0.1977

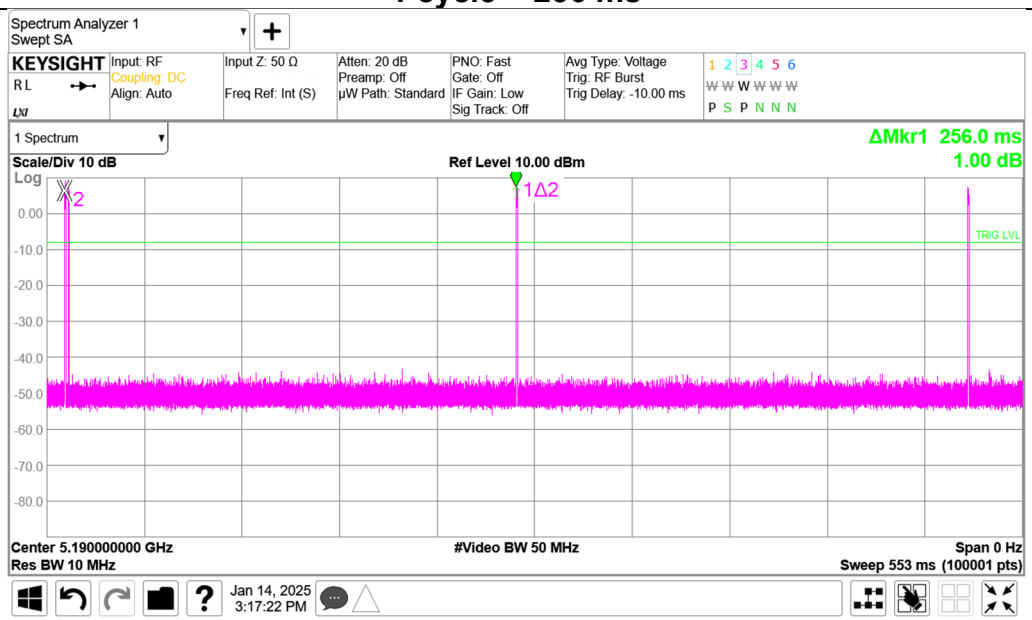
Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the Directional Coupler) + Atten. Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain
Conducted Power Limit (5250 MHz-5350 MHz, 5470 MHz-5725 MHz) = 250 mW or (11 + 10logB) dBm, whichever is lower
Conducted Power Limit (5725 MHz-5850 MHz) = 1 W

Duty cycle

Test place	Shonan EMC Lab. No.5 Shielded Room
Date	January 14, 2025
Temperature / Humidity	20 deg. C / 48 % RH
Engineer	Kenichi Adachi
Mode	Tx 11n-40

11n-40, MCS 0 or MCS 1 with antenna port 1

1 cycle = 256 ms



On time = 3.37 ms (Duty cycle: 1.3 %)

3.3687[ms]=0.7547[ms]+0.05498[ms]+2.559[ms]

	Mode	Trace	Scale	X	Y	Function	Function Width	Function Value
1	Δ2	3	t	(Δ) 754.7 µs	(Δ) 0.70 dB			
2	F	3	t	497.5 µs	-61.92 dBm			
3	Δ4	3	t	(Δ) 54.98 µs	(Δ) 0.22 dB			
4	F	3	t	2.452 ms	-64.94 dBm			
5	Δ6	3	t	(Δ) 2.559 ms	(Δ) -1.73 dB			
6	F	3	t	2.579 ms	-62.51 dBm			

* Since the burst rate is not different between the channels, the data has been obtained on the representative channel.

APPENDIX 2: Test Instruments

Test Equipment

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Cal Int
AT	145175	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	2024/12/03	12
AT	245175	Coaxial Cable	Hayashi-Repic co., Ltd.	KMS020B-GL140sE-KMS020B-2.0m	49334-01-02	2024/02/14	12
AT	245177	Coaxial Cable	Hayashi-Repic co., Ltd.	KMS020B-GL140sE-KMS020B-2.0m	49334-01-04	2024/02/14	12
AT	146212	Digital Hitester	HIOKI E.E. CORPORATION	3805-50	80997828	2024/09/24	12
AT	145439	Directional Coupler	Mini-Circuits	ZGDC35-93HP+	210	2024/07/02	12
AT	236377	Microwave cable	RS Pro	R-132G7210 100CO	-	2024/04/10	12
AT	246102	Microwave cable	RS Pro	R-132G7210 100CO	-	2024/03/12	12
AT	146267	Power Meter	Anritsu Corporation	ML2495A	850009	2024/05/14	12
AT	146309	Power sensor	Anritsu Corporation	MA2411B	917063	2024/05/14	12
AT	176472	Shield Box	Microwave Factory Co., Ltd.	MAB101	182899	-	-
AT	240499	Spectrum Analyzer	Keysight Technologies Inc	N9020B	MY59050557	2024/10/08	12
AT	249682	Terminator	To-Conne Co., Ltd.	SMA50-SP 1W	-	-	-
AT	249684	Terminator	To-Conne Co., Ltd.	SMA50-SP 1W	-	-	-
AT	175822	Thermo-Hygrometer	CUSTOM. Inc	CTH-201	-	2024/08/11	12
AT	145693	Wireless LAN access point	Cisco Systems, Inc.	AIR-CAP3702E-A-K9	FTX18227609	-	-

***Hyphens for Last Calibration Date and Cal Int (month) are instruments that Calibration is not required (e.g. software), or instruments checked in advance before use.**

The expiration date of the calibration is the end of the expired month.
As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

Test item:

AT: Antenna Terminal Conducted test