RADIO TEST REPORT

Test Report No. : 12551127S

Applicant	:	**NIHON KOHDEN CORPORATION**
Type of Equipment	:	**SDIO Wireless Module**
Model No.	:	**SX-SDMAN**
FCC ID	:	**B6BGZ-1XXP**
Test regulation	:	**FCC Part 15 Subpart E: 2018** **For Permissive Change**
Test item	:	**Maximum Conducted Output Power** *** U-NII-2C only**
Test Result	:	**Complied**

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2. The results in this report apply only to the sample tested.
3. This sample tested is in compliance with the limits of the above regulation.
4. The test results in this test report are traceable to the national or international standards.
5. This test report must not be used by the customer to claim product certification, approval, or endorsement by any agency of the Federal Government.
6. This test report covers Radio technical requirements.
   It does not cover administrative issues such as Manual or non-Radio test related Requirements. (if applicable)
7. The all test items in this test report are conducted by UL Japan, Inc. Shonan EMC Lab.
8. The opinions and the interpretations to the result of the description in this report are outside scopes where UL Japan has been accredited.
9. The module has been certified. (FCC ID: N6C-SDMAN, Test report for FCC part 15 subpart E: 12548845H-A-R1)

Date of test: November 8, 2018

Representative test engineer:

Yosuke Ishikawa
Engineer
Consumer Technology Division

Approved by:

Toyokazu Imamura
Leader
Consumer Technology Division

☐ The testing in which "Non-accreditation" is displayed is outside the accreditation scopes in UL Japan.
☒ There is no testing item of "Non-accreditation".

RTL02610

UL Japan, Inc.
Shonan EMC Lab.
1-22-3 Megumigaoka, Hiratsuka-shi, Kanagawa-ken, 259-1220 JAPAN
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REVISION HISTORY

Original Test Report No.: 12551127S

Revision	Test report No.	Date	Page revised	Contents
- (Original)	12551127S	December 14, 2018	-	-

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SECTION 1: Customer information

Company Name	:	NIHON KOHDEN CORPORATION
Address	:	1-31-4, Nishiochiai, Shinjuku-ku, Tokyo, 161-8560, Japan
Telephone Number	:	+81-3-5996-8354
Facsimile Number	:	+81-3-5996-8374
Contact Person	:	Soichi Maeno

SECTION 2: Equipment under test (E.U.T.)

2.1 Identification of E.U.T.

Type of Equipment	:	SDIO Wireless Module
Model No.	:	SX-SDMAN
Serial No.	:	Refer to Section 4, Clause 4.2
Rating	:	DC 3.3 V
Receipt Date of Sample	:	November 5, 2018
Country of Mass-production	:	Japan
Condition of EUT	:	Production model
Modification of EUT	:	No Modification by the test lab.

2.2 Product Description

Model: SX-SDMAN (referred to as the EUT in this report) is a SDIO Wireless Module.

General specification

Clock frequency(ies) in the system	:	26 MHz

Radio specification

Radio Type	:	Transceiver
Method of Frequency Generation	:	Synthesizer
Power Supply (inner)	:	DC1.2V

Specification of Wireless LAN (IEEE 802.11b/g/a/n-20)

Type of radio	IEEE802.11b	IEEE802.11g	IEEE802.11a	IEEE802.11n (20 M band)
Frequency of operation	2412 MHz - 2462 MHz	2412 MHz - 2462 MHz	5180 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz	2412 MHz - 2462 MHz 5180 MHz - 5320 MHz 5500 MHz - 5700 MHz 5745 MHz - 5825 MHz
Type of modulation	DSSS (CCK, DQPSK, DBPSK)	OFDM-CCK (64QAM, 16QAM, QPSK, BPSK)	OFDM (64QAM, 16QAM, QPSK, BPSK)	
Channel spacing	5 MHz		20 MHz	2.4 GHz band: 5 MHz 5 GHz band: 20 MHz
Antenna type	Mini-Nanoblade antenna: Laird Technologies Stand Alone antenna: Molex			
Antenna Gain	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)			
Antenna Connector type	U.FL connector			

SECTION 3: Test results

3.1 Test result

KDB 447498D01 (v06) has the following exclusion for portable devices:

This device f = 5.7 GHz, distance = 5mm (minimum separation distance: 5 mm was used in the calculation) and the measured maximum average output power was 1 mW

So for this device:
1 mW [measured maximum average output power] / 5 mm [minimum separation distance] * ($\sqrt{}$ 5.7) = 0.5

This is less than 3.0, so no SAR is required.

Note: UL Japan's Work Procedures No. 13-EM-W0422.

3.2 Uncertainty

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)_SPM-06	0.48 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-06	0.66 dB
Power Measurement above 1 GHz (Average Detector)_SPM-07	0.47 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-07	0.64 dB
Power Measurement above 1 GHz (Average Detector)_SPM-13	0.90 dB
Power Measurement above 1 GHz (Peak Detector)_SPM-13	1.04 dB

3.3 Test Location

UL Japan, Inc. Shonan EMC Lab.
1-22-3, Megumigaoka, Hiratsuka-shi, Kanagawa-ken 259-1220 JAPAN
Telephone: +81 463 50 6400, Facsimile: +81 463 50 6401
JAB Accreditation No. RTL02610
FCC Test Firm Registration Number: 839876

Test site	IC Registration Number	Width x Depth x Height (m)	Size of reference ground plane (m) / horizontal conducting plane	Maximum measurement distance
No.1 Semi-anechoic chamber	2973D-1	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.2 Semi-anechoic chamber	2973D-2	20.6 x 11.3 x 7.65	20.6 x 11.3	10 m
No.3 Semi-anechoic chamber	2973D-3	12.7 x 7.7 x 5.35	12.7 x 7.7	5 m
No.4 Semi-anechoic chamber	-	8.1 x 5.1 x 3.55	8.1 x 5.1	-
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	-	-

3.4 Test data, Test instruments, and Test set up

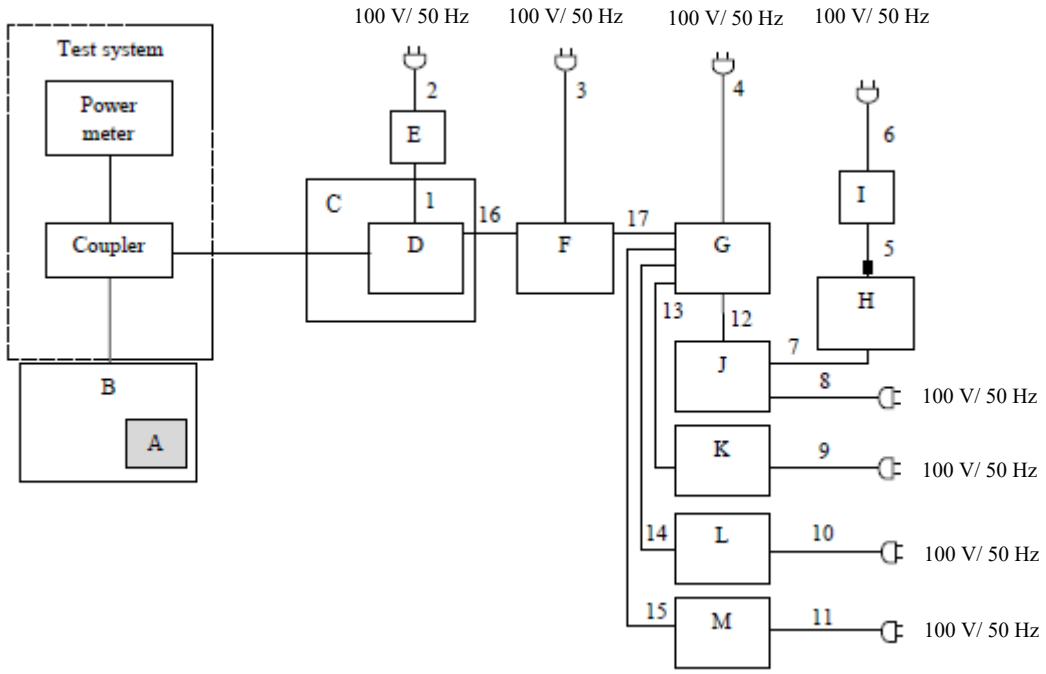
Refer to APPENDIX.

SECTION 4: Operation of E.U.T. during testing

4.1 Operating Mode(s)

Mode	Tested frequency	Worst data mode *1)	Tested antenna port *2)
Transmitting IEEE 802.11a	5500 MHz, 5580 MHz, 5700 MHz	6 Mbps	2
Transmitting IEEE 802.11n-20HT	5500 MHz, 5580 MHz, 5700 MHz	MCS 0	2
Test condition: Worst The EUT transmits vital signs to 4 monitors. The lowest rate was selected since ON time of transmitting is longest. Power setting: IEEE 802.11a: 14.0 dBm, IEEE 802.11n-20HT: 14.0 dBm *1) Software (Firmware): ver.02-10A (Worst data mode based on ver.02-10) *2) After the comparison between Antenna port 1 and Antenna port 2, test was performed with the antenna that had higher power as a representative. (See the report of 10393347S-D)			

4.2 Configuration and peripherals



Description of EUT and Support equipment

No.	Item	Model number	Serial number	Manufacturer	Remarks
A	SDIO Wireless Module	SX-SDMAN	84253F 269BA8	silex technology, Inc.	EUT
B	Vital sign telemeter	GZ-130P OPNo.30A	01204	Nihon Kohden	-
C	Shield tent	-	-	Sondecx	-
D	Wireless LAN access point	AIR-CAP3702E-A-K9	FTX18227609	Cisco Systems	-
E	AC adaptor	AA25480L	ALD02510FEW	Cisco Systems	-
F	Power injector	AIR-PWRINJ5	DCA171317VV	Cisco Systems	-
G	HUB	CO-BSW16TX	12129601403007 22 Rev.A3	Corega	-
H	LCD display unit	VL-611R	00617	Nihon Kohden	-
I	AC adaptor	HEMP100G-S120650 -7L	3316007801F0- H-1246-002E	HiTRON	-
J	Central monitor	CNS-6201	01871	Nihon Kohden	-
K	Central monitor	CNS-6201	00590	Nihon Kohden	-
L	Central monitor	CNS-6201	00589	Nihon Kohden	-
M	Central monitor	CNS-6201	01121	Nihon Kohden	-

List of cables used

No.	Name	Length (m)	Shield		Remarks
			Cable	Connector	
1	DC	1.8	Unshielded	Unshielded	-
2	AC	0.8	Unshielded	Unshielded	-
3	AC	1.5	Unshielded	Unshielded	-
4	AC	1.5	Unshielded	Unshielded	-
5	DC	1.0	Unshielded	Unshielded	-
6	AC	2.0	Unshielded	Unshielded	-
7	DVI	1.5	Shielded	Shielded	-
8	AC	2.0	Unshielded	Unshielded	-
9	AC	2.0	Unshielded	Unshielded	-
10	AC	2.0	Unshielded	Unshielded	-
11	AC	2.0	Unshielded	Unshielded	-
12	LAN	2.0	Unshielded	Unshielded	-
13	LAN	2.0	Unshielded	Unshielded	-
14	LAN	2.0	Unshielded	Unshielded	-
15	LAN	2.0	Unshielded	Unshielded	-
16	LAN	2.0	Unshielded	Unshielded	-
17	LAN	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 data : APPENDIX
Test result : Pass

APPENDIX 1: Test data

Maximum Conducted Output Power

Report No.	12551127S
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	November 8, 2018
Temperature / Humidity	28 deg. C / 37 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

11a 6 Mbps antenna port: 2 (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]
5500	-16.31	5.07	9.59	4.80	-1.65	0.68	3.15	2.07
5580	-16.40	5.09	9.62	4.80	-1.69	0.68	3.11	2.05
5700	-16.20	4.94	9.67	4.80	-1.59	0.69	3.21	2.09

Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the Directional Coupler) + Atten. Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

11n-20 MCS0 antenna port: 2 (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]
5500	-15.47	5.07	9.59	4.80	-0.81	0.83	3.99	2.51
5580	-15.26	5.09	9.62	4.80	-0.55	0.88	4.25	2.66
5700	-14.85	4.94	9.67	4.80	-0.24	0.95	4.56	2.86

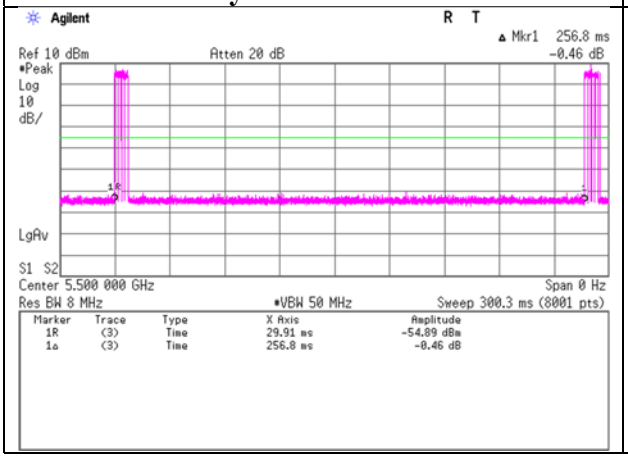
Sample Calculation:
Conducted Power Result = Reading + Cable Loss (including the Directional Coupler) + Atten. Loss
e.i.r.p. Result = Conducted Power Result + Antenna Gain

Duty Cycle

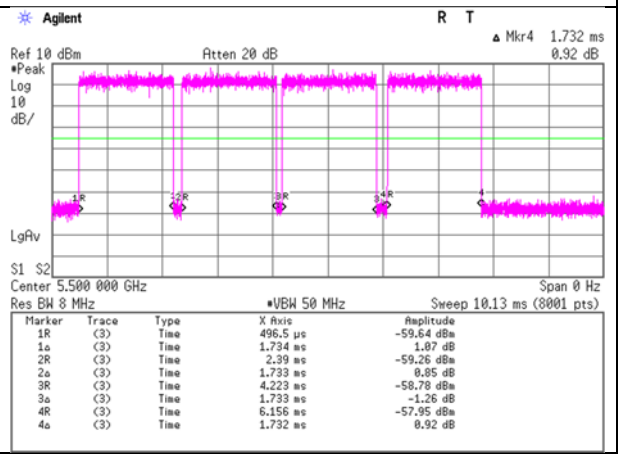
Report No.	12551127S
Test place	Shonan EMC Lab. No.6 Shielded Room
Date	November 8, 2018
Temperature / Humidity	28 deg. C / 37 % RH
Engineer	Yosuke Ishikawa
Mode	Tx

Tx 11a 6Mbps with antenna port 2

1 cycle = 256.8 ms

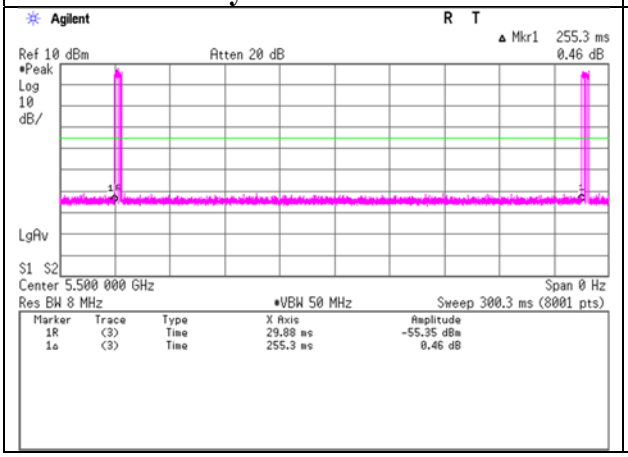


On Time = 6.932 ms

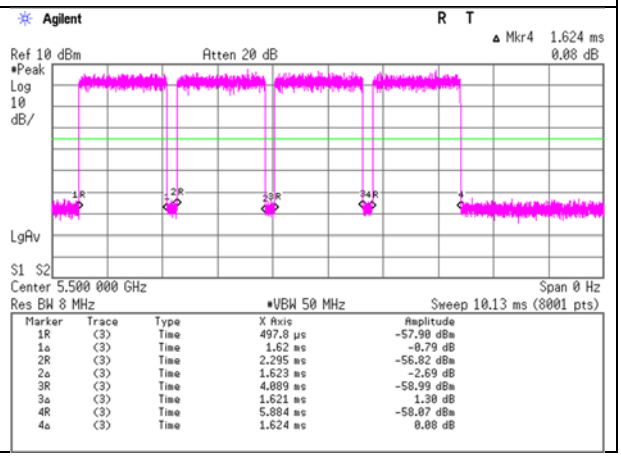


Tx 11n-20 MCS0 with antenna port 2

1 cycle = 255.3 ms



On Time = 6.488 ms



APPENDIX 2: Test instruments

Test Instruments

Test Item	LIMS ID	Description	Manufacturer	Model	Serial	Last Calibration Date	Calibration Due Date	Cal Int
AT	145089	Spectrum Analyzer	AGILENT	E4446A	MY46180525	2018/10/7	2019/10/31	12
AT	146319	Humidity Indicator	A&D	AD-5681	4064561	2018/10/25	2019/10/31	12
AT	146310	Power sensor	AGILENT	N1923A	MY5326009	2018/7/13	2019/7/31	12
AT	145166	Coaxial Cable	Suhner	SUCOFLEX 102	31599/2	2018/3/19	2019/3/31	12
AT	145175	Coaxial Cable	Suhner	SUCOFLEX 102	31600/2	2018/3/19	2019/3/31	12
AT	145042	Coaxial Cable	Junkosha	MWX241-01000KMSKMS	OCT-08-13-046	2018/4/20	2019/4/30	12
AT	145183	Coaxial Cable	Junkosha	MWX241-02000KMSKMS	OCT-09-13-005	2017/11/22	2018/11/30	12
AT	144995	Microwave cable	RS Pro	R-132G7210100CO	-	2018/4/4	2019/4/30	12
AT	144996	Microwave cable	RS Pro	R-132G7210100CO	-	2018/4/4	2019/4/30	12
AT	171616	Terminator	WEINSCHEL	M1459A	89025	2018/7/10	2019/7/31	12
AT	145132	Attenuator	Weinschel Corp.	54A-10	W5692	2017/11/22	2018/11/30	12
AT	167151	Step Attenuator	KEYSIGHT	8494B	MY42157639	2018/2/7	2019/2/28	12
AT	167152	Step Attenuator	KEYSIGHT	8496B	MY42151198	2018/2/7	2019/2/28	12
AT	145439	Directional Coupler	Mini-Circuits	ZGDC35-93HP+	210	2018/7/30	2019/7/31	12
AT	146247	Power Meter	AGILENT	8990B	MY5100272	2018/7/13	2019/7/31	12

***Hyphens for Last Calibration Date, Calibration Due 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.
All equipment is calibrated with valid calibrations. Each measurement data is traceable to the national or international standards.

As for some calibrations performed after the tested dates, those test equipment have been controlled by means of an unbroken chains of calibrations.

Test item:

AT: Antenna Terminal Conducted test