Title:	SX-NEWAH(US)

Drawing Type :	Product Specifications
Drawing No.:	JW205520AC
Date :	February 4, 2022

Rev.	Description	Date	Prepared	Checked	Approved
AX	First edition for mass production.（初版）	May. 12, 20	H.Nagahama	K.Hamada	Y.Shibuya
AA	§ 4.6 RF Transmitter Specifications Updated MCS5 Tx power of 1MHz band width	Sep. 10, 20	H.Nagahama	K.Hamada	Y.Shibuya
AB	§ 8.3. Recommended Antenna List Added X9000984-4GDSMB ※The model number of 9000984-XLPDNB has been changed due to the manufacturer's convenience. (9000984-XLPDNB and X9000984-4GDSMB are the same product)	Nov. 10, 20	T.Uno	H.Ichimaru	Y.Shibuya
AC	§ 13. Reliability test Thermal shock test 500cyc → 1000cyc	Feb. 4, 22	Y.Yoshimura	Y.Kuroda	Y.Shibuya

1. 適用 / Application

本書は SX-NEWAH(US)のハードウェア製品仕様を記したものです。

This document describes the detail of hardware specifications for the SX-NEWAH(US).

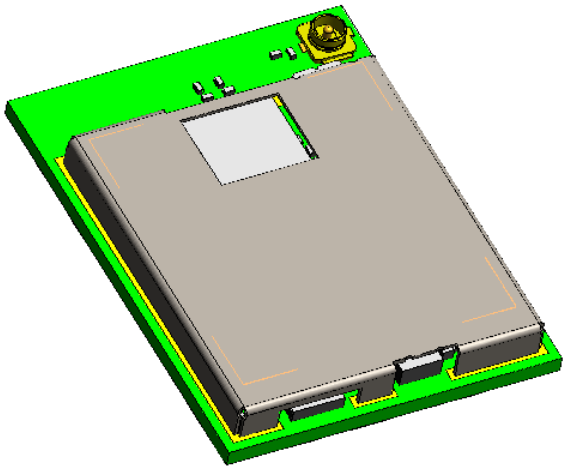
2. 概要 / Introduction

SX-NEWAH(US)は、NRC7292 (Newracom 社)を採用した、915MHz ISM band IEEE 802.11 ah 準拠の無線モジュールです。本モジュールは、MAC/BBP/RF/RF フロントエンド及び各種電源/クロックなどの外部回路を内蔵しています。SX-NEWAH(US)の製品形状は、表面実装型（SMT)で、アンテナ接続のインターフェイスは 50 ohm MHF コネクタです。

The SX-NEWAH(US) is a 915MHz ISM band IEEE802.11ah WLAN module based on Newracom NRC7292 chipset. This module includes MAC/BBP/RF/RF-Front-End, Power regulators and clock sources. Its form-factor is Surface Mount Technology (SMT) type, and it has 50ohm MHF antenna connector.

特徴（Features）

- IEEE802.11ah 準拠（915MHz ISM band / Region2)
  IEEE802.11ah compliant (915MHz ISM band / Region2)
- 1 スペーシャルデータストリームシステム（1T1R)
  1 spatial data stream system (1T1R)
- 変調帯域幅: 1, 2, 4 MHz (PHY データレート 150kbps to 15Mbps)
  Modulation Bandwidth: 1, 2, 4MHz (PHY datarate 150kbps to 15 Mbps)
- ホストインターフェイス: SPI
  Host Interface: SPI



3. 構成表 / Component composition List

Categories	Items	Product No.		Remarks
		ZXE04153	ZXE04199	
		SX-NEWAH(US)	SX-NEWAH-SP(US)	
基板 Board	基板(製品) Main Board	1	1	
ラベル Label	EMI Label	1	1	
	個装箱ラベル Packing Label	1/500	1/10	
	MSL 警告ラベル MSL Caution Label	1/500	1/10	
	集合箱ラベル Carton Label	1/2500	1/50	
付属品 Accessory	温度表示シート Humidity Indicator	1/500	1/10	
梱包 Packing	個装箱 Packing Box	1/500	1/10	
	集合箱 Carton Box	1/2500	1/50	
	アルミラミネート袋 Aluminum lamination bag	1/500	1/10	
	リール Reel Set	1/500	1/10	
	シリカゲル Silica gel	2/500	1/10	

4. 仕様一覧 / Specifications

4.1. 一般仕様 / General Specifications

区分/Items	内容/Description	Units	備考/Note
ホストボードへの接続方式 Connection with the host board	68-pin Land Grid Array (Direct solder)	-	
アンテナ端子 Antenna port	MHF1 connector x1	pcs	
アンテナ端子特性 Antenna port characteristics	50	Ω	SWR < 2.0
ホストインターフェイス Host interface	SPI	-	
無線接続方式 RF interface	IEEE802.11ah		
重さ Weight	3.0	g	
寸法 Dimensions	W x H x D : 20.5 x 27.0 x 3.1	mm	
MTTF	90,000	H	Min.
アンテナコネクタ着脱回数 Antenna connector Desorption number of times	10	Times	Max.
リフロー回数 Reflow number of times	1	Times	Max.
ESD 耐性 ESD resistance	+/- 2000	V	Max. Human body model at RF port

4.2. 環境条件 / Environmental Specifications

区分/Items	仕様/Specifications			Units	備考/Note
	Min	Typ	Max		
推奨動作温度 Recommended operating temperature	-40	-	+85	℃	周囲温度 Ambient temperature 実装後電源電圧印加時 After assembled with powered
推奨動作湿度 Recommended operating humidity	15	-	95	%	結露無きこと No condensing 実装後電源電圧印加時 After assembled with powered
推奨保存温度（実装後） Recommended storage temperature (After assembly)	-40	-	+85	℃	実装後電源電圧無印加時 After assembled with no-powered
推奨保存湿度（実装後） Recommended storage humidity (After assembly)	15	-	95	%	結露無きこと No condensing 実装後電源電圧無印加時 After assembled with no-powered
推奨保管温度 Recommended storage temperature (In the warehouse, before assembly)	+5	-	+35	℃	梱包時。開封後は MSL に従う。 Packaged. Apply MSL after unpackaged.
推奨保管湿度 Recommended storage temperature (In the warehouse, before assembly)	20	-	60	%	結露無きこと No condensing 梱包時。開封後は MSL に従う。 Packaged. Apply MSL after unpackaged.
Moisture Sensitivity Level (MSL)	3			-	IPC/JEDEC J-STD-020D 取り扱いについては下記を参照。 See standard for handling IPC/JEDEC J-STD-033C

4.3. 電気的仕様 / Electrical Specifications

4.3.1. 絶対最大定格 / Absolute maximum rating

区分/Items	仕様/Specifications			Units	備考/Note
	Min	Typ	Max		
VDD 主電源電圧 Main power supply	-0.5	-	+3.8	V	
VDDIO IO 電源電圧 IO power supply voltage	-0.5	-	+3.8	V	
VDDFEM RF FEM 電源電圧 RF FEM power supply voltage	-0.3	-	+5.0	V	

4.3.2. 推奨動作条件 / Recommended operating conditions

区分/Items	仕様/Specifications			Units	備考/Note
	Min	Typ	Max		
VDD33 主電源電圧 Main power supply	+3.0	+3.3	+3.6	V	
VDDIO IO 電源電圧 IO power supply voltage	+1.62	-	VDD33	V	※1 3.3V, 2.5V, 1.8V recommended
VDDFEM RF FEM 電源電圧 RF FEM power supply voltage	+3.0	-	+4.2	V	

※1：VDDIO には VDD33 を超える電圧を入れないようにする必要がある。
VDDIO must not have a voltage higher than VDD33.

4.4. 消費電流仕様　/ Current consumption specifications

Mode: Test Mode

VDD(3.3V)

modes	MCS	BW(MHz)	Freq(MHz)	TXP(dBm)	Current	
					Typ(mA)	Max(mA)
Tx	10	1	903.5	23	31	40
	0	2	905	23	31	40
	0	4	910	22	31	40
	7	1	903.5	14	31	40
	7	2	905	14	32	40
	7	4	910	14	33	40
Rx	-	-	-	-	33	40

VDDFEM(3.3V)/(4.0V)

modes	MCS	BW(MHz)	Freq(MHz)	TXP(dBm)	Current (3.3V)		Current (4.0V)	
					Typ(mA)	Max(mA)	Typ(mA)	Max(mA)
Tx	10	1	903.5	23	418	430	422	450
	0	2	905	23	405	430	415	450
	0	4	910	22	356	390	350	370
	7	1	903.5	14	184	210	192	210
	7	2	905	14	184	210	192	210
	7	4	910	14	184	210	191	210
Rx	-	-	-	-	6	10	6	10

VDDIO(3.3V)

Modes	MCS	BW(MHz)	Freq(MHz)	TXP(dBm)	VDD33	
					Typ(mA)	Max(mA)
Tx	10	1	903.5	23	2	6
	0	2	905	23	2	6
	0	4	910	22	2	6
	7	1	903.5	14	2	6
	7	2	905	14	2	6
	7	4	910	14	2	6
Rx	-	-	-	-	2	6

4.5. RF 機能仕様 / RF functional specifications

区分/Items	内容/Description	Units	備考/Note
Chipset	NRC7292	-	
国/Region	USA/Canada	-	
規格/Standard	IEEE802.11ah	-	
動作周波数 / Operating Frequency	BW1MHz: 903.5, 904.5, 905.5, 906.5, 907.5, 908.5, 909.5, 910.5, 911.5, 912.5, 913.5, 914.5, 915.5, 916.5, 917.5, 918.5, 919.5, 920.5, 921.5, 922.5, 923.5, 924.5, 925.5, 926.5 BW2MHz: 905, 907, 909, 911, 913, 915, 917, 919, 921, 923, 925 BW4MHz: 910, 914, 918, 922	MHz	
周波数間隔/Channel spacing	1, 2, 4	MHz	
データレート/Data rate	MCS10, 0, 1, 2, 3, 4, 5, 6, 7	-	
変調型/Modulation type	OFDM	-	
暗号化/Encryption	AES-CCMP	-	

4.6. RF 送信仕様 / RF Transmitter Specifications

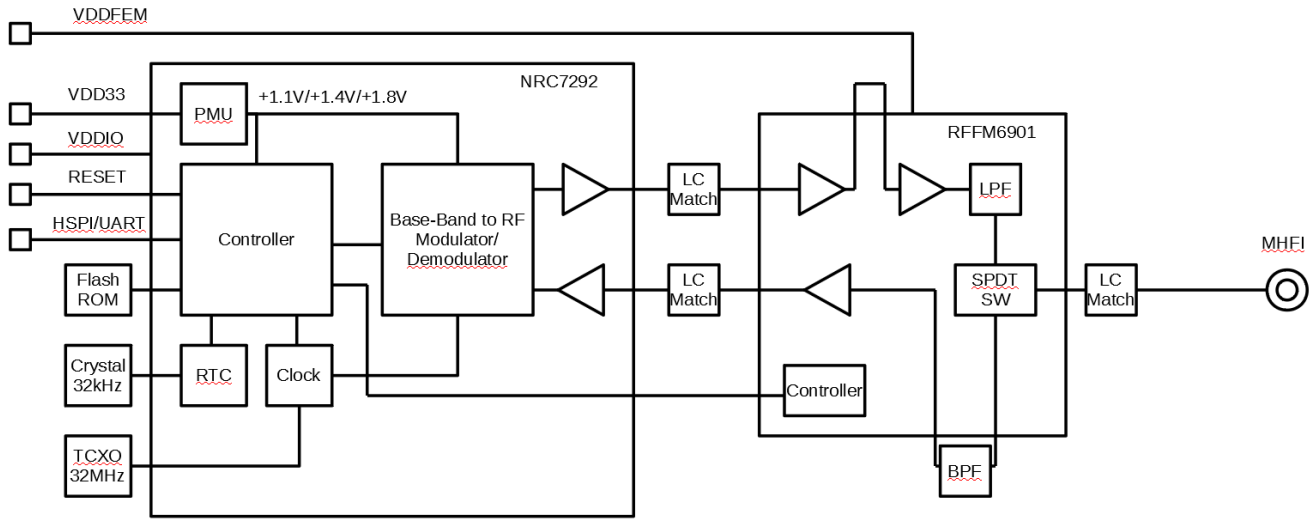
BW	Freq [MHz]	Data Rates	TX Power with IEEE 802.11 EVM at -40°C ~ +85°C			
		MCS	Min	Typical	Max	Units
1MHz	903.5 ~ 915.5	0, 1, 2, 3, 4, 10	20.5	23.0	25.5	dBm
		5	19.5	22.0	24.5	dBm
		6	15.5	18.0	20.5	dBm
		7	11.5	14.0	16.5	dBm
	916.5 ~ 926.5	0, 1, 2, 3, 4,10	19.5	22.0	24.5	dBm
		5	18.5	21.0	23.5	dBm
		6	15.5	18.0	20.5	dBm
		7	11.5	14.0	16.5	dBm
2MHz	905 ~ 917	0, 1, 2, 3, 4	20.5	23.0	25.5	dBm
		5	19.5	22.0	24.5	dBm
		6	12.5	15.0	17.5	dBm
		7	11.5	14.0	16.5	dBm
	919 ~ 925	0, 1, 2, 3, 4, 5	19.5	22.0	24.5	dBm
		6	12.5	15.0	17.5	dBm
		7	11.5	14.0	16.5	dBm
4MHz	910 ~ 922	0, 1, 2, 3, 4, 5	18.5	21.0	23.5	dBm
		6	12.5	15.0	17.5	dBm
		7	11.5	14.0	16.5	dBm

AA

4.7. RF 受信仕様/ RF Receiver Specifications

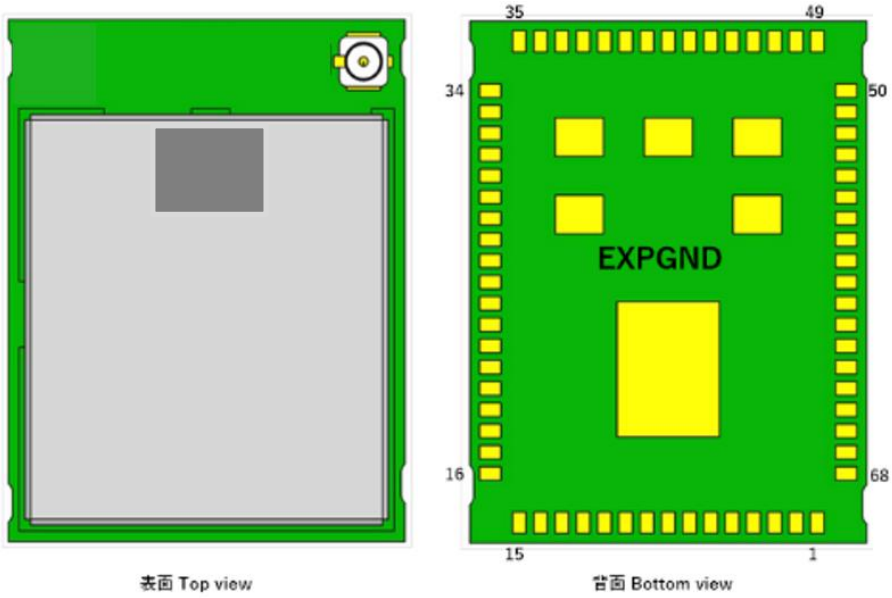
BW	Modulation	Data Rates	Rx input with IEEE 802.11 Rx Minimum Sensitivity at -40°C ~ +85°C			
		Index	Min	Typical	Max	Units
1MHz	BPSK	MCS10	-	-104	-98	dBm
	BPSK	MCS0	-	-102	-95	dBm
	QPSK	MCS1	-	-100	-92	dBm
	QPSK	MCS2	-	-95	-90	dBm
	16 QAM	MCS3	-	-92	-87	dBm
	16 QAM	MCS4	-	-88	-83	dBm
	64 QAM	MCS5	-	-88	-79	dBm
	64 QAM	MCS6	-	-86	-78	dBm
	64 QAM	MCS7	-	-85	-77	dBm
2MHz	BPSK	MCS0	-	-96	-92	dBm
	QPSK	MCS1	-	-96	-89	dBm
	QPSK	MCS2	-	-94	-87	dBm
	16 QAM	MCS3	-	-92	-84	dBm
	16 QAM	MCS4	-	-88	-80	dBm
	64 QAM	MCS5	-	-84	-76	dBm
	64 QAM	MCS6	-	-83	-75	dBm
	64 QAM	MCS7	-	-81	-74	dBm
4MHz	BPSK	MCS0	-	-92	-89	dBm
	QPSK	MCS1	-	-92	-86	dBm
	QPSK	MCS2	-	-92	-84	dBm
	16 QAM	MCS3	-	-88	-81	dBm
	16 QAM	MCS4	-	-85	-77	dBm
	64 QAM	MCS5	-	-81	-73	dBm
	64 QAM	MCS6	-	-80	-72	dBm
	64 QAM	MCS7	-	-78	-71	dBm

5. ブロック図 / Block Diagram



6. ホストインターフェイス仕様 / Host Interface Specifications

6.1. ピン配置 / Pin Locations



6.2. 信号仕様 / Signal Specifications

Pin	Signal	I/O	Description
1	GND	G	Ground
2	GP00	DO	Reserved
3	GP01	DI	Reserved
4	GP02	DO	Reserved
5	GND	G	Ground
6	VDDIO	P	3.3V or 1.8V Power for IO.
7	VDDIO	P	3.3V or 1.8V Power for IO.
8	GND	G	Ground
9	GND	G	Ground
10	GP03	DI	Reserved
11	GP04	DO	Reserved
12	GP05	DI	Reserved
13	GND	DIO	Ground
14	GP06	DO	UART Channel3 TX
15	GP07	DI	UART Channel3 RX
16	GP08	DIO	Reserved
17	GP09	DIO	Reserved
18	GP10	DIO	Reserved
19	GND	G	Ground
20	GP11	DIO	Reserved
21	GP12	DIO	Reserved
22	GP13	DIO	Reserved
23	GP14	DIO	Reserved
24	GP15	DIO	Reserved
25	GP16	DIO	Reserved
26	GP17	DIO	Reserved
27	RST	DI	System Reset, H: Reset L: Release This pin is internally pulled down with 200k ohm.
28	GND	G	Ground
29	JTAG_TRSTN	DIO	Reserved for JTAG
30	JTAG_TCK	DIO	Reserved for JTAG
31	JTAG_TDI	DIO	Reserved for JTAG
32	JTAG_TDO	DIO	Reserved for JTAG
33	JTAG_TMS	DIO	Reserved for JTAG
34	GND	G	Ground
35	GND	G	Ground
36	GND	G	Ground
37	GND	G	Ground
38	GND	G	Ground
39	GND	G	Ground
40	GND	G	Ground

41	RF_AXAD1	AI	ADC port of NRC7292
42	RF_AXAD2	AI	ADC port of NRC7292
43	RF_AXAD3	AI	ADC port of NRC7292
44	GND	G	Ground
45	GND	G	Ground
46	GND	G	Ground
47	GND	G	Ground
48	GND	G	Ground
49	GND	G	Ground
50	GND	G	Ground
51	GND	G	Ground
52	VDDFEM	P	3.0V to 4.2V RF FEM power
53	VDDFEM	P	3.0V to 4.2V RF FEM power
54	VDD33	P	3.3V power
55	VDD33	P	3.3V power
56	GND	G	Ground
57	MODE_00	DI	SW Define (When ROM BOOT)
58	MODE_01	DI	11: Internal SRAM BOOT
59	MODE_02	DI	0: ROM BOOT　1: XIP BOOT
60	MODE_03	DI	0: Cortex-M0 Master　1: Cortex-M3 Master
61	MODE_04	DI	0: One CPU　1: Two CPU
62	GND	G	Ground
63	HSPI_CSN	DI	CS signal, SPI IF for Host
64	HSPI_CLK	DI	CLK signal, SPI IF for Host
65	HSPI_MISO	DO	MISO signal, SPI IF for Host
66	HSPI_MOSI	DI	MOSI signal, SPI IF for Host
67	HSPI_EIRQ	DO	IRQ signal to host, SPI IF for Host
68	GND	G	Ground
E	GND	G	For exposed pad

Symbols	Descriptions
DIO	CMOS 双方向デジタル信号 CMOS bidirectional digital signal
DI	CMOS デジタルインプット CMOS digital input
DO	CMOS デジタルアウトプット CMOS digital output
AI	アナログインプット Analog input
P	電源 Voltage supply
G	グランド Ground

6.3. Boot モード設定 / Boot mode setting

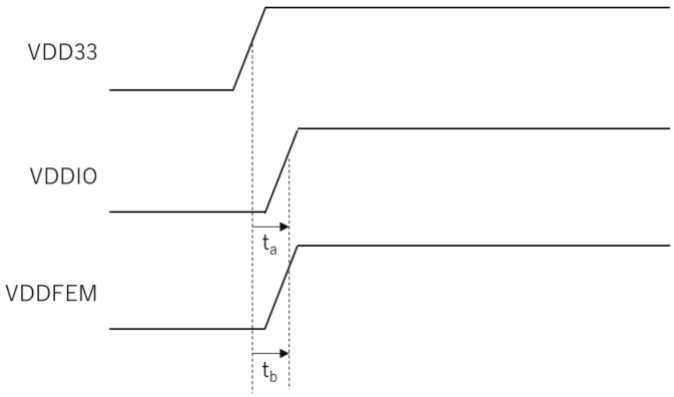
Pin57, 58, 59, 60, 61 の MODE_00 から MODE_04 までを使用して起動時の設定を行います。
下記表のように設定変更が可能です。

Make settings for startup using MODE_00 to MODE_04 of Pin57, 58, 59, 60, 61.
The settings can be changed as shown in the table below.

Signal	Hosted mode	Test mode
MODE_00	1	1
MODE_01	0	1
MODE_02	0	0
MODE_03	0	0
MODE_04	1	1

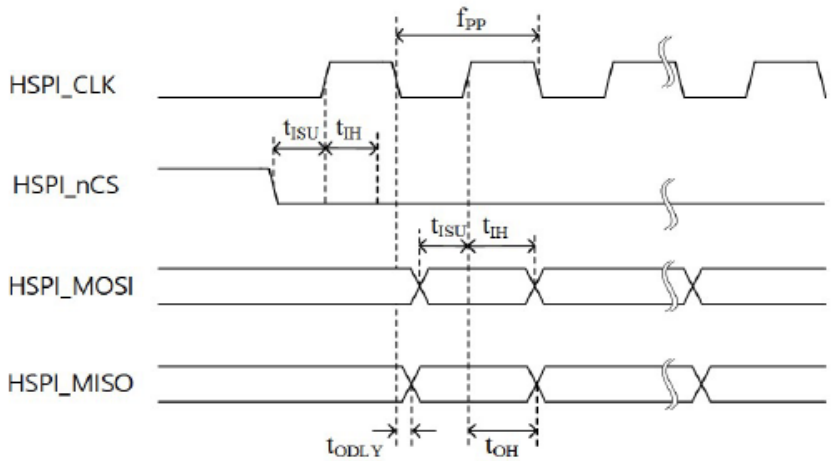
7. インターフェイス仕様 / Interface specifications

7.1. パワーオンシーケンス / Power on sequence



Symbol	Parameter	Min	Typ	Max	Unit
t_a	Time from VDD33 reaches high level to VDDIO reaches high level	0	-	-	ns
t_b	Time from VDD33 reaches high level to VDDFEM reaches high level	0	-	-	ns

7.2. HSPI インターフェイス仕様 / HSPI timing



Symbol	Parameter	Min	Typ	Max	Unit
f_{pp}	Frequency	-	-	25	MHz
t_{ODLY}	Output delay time	6	-	-	ns
t_{OH}	Output hold time	2	-	-	ns
t_{ISU}	Input setup time	14	-	-	ns
t_{IH}	Input hold time	2.5	-	-	ns

8. 適合規格 / Standards compliance

8.1. 適合規格 / Standards conformity

■ IEEE802.11ah

8.2. 適合法規 / Law Regulation compliance

■ FCC Part 15.247
ID: N6C-SXNEWAH

■ ISED RSS-247
ID: 4908A-SXNEWAH

8.3. 推奨アンテナリスト / Recommended Antenna List

Vender	Model No.	Antenna Type	Antenna Gain [dBi]
STAF	T16-062-1022	PCB	3.0
ethertronics	9000984-XLPDNB	ROD	3.4
	X9000984-4GDSMB (NOTE3)		
PSA (Walsin)	RFDPA131000SMRB801	ROD	3.01
Invax	AN0915-13D01BSM	ROD	2.00
SaemON Technology	SME–G0900DEN	ROD	1.26

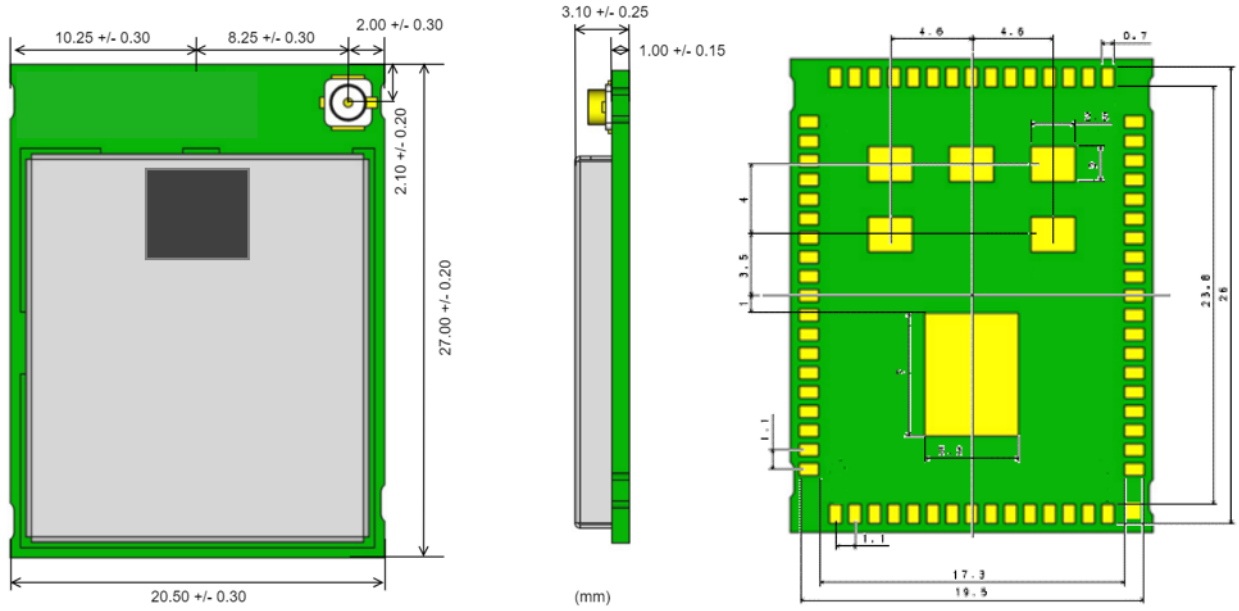
AB

NOTE1	適合している認証は silex 推奨アンテナでのみ有効です。 但し、silex の推奨アンテナを使用していたとしても最終製品の形態によっては再認証試験が必要になる可能性があります。 The above certification is effective only with the silex recommended antennas. However, the re-certification might be required in the case of the final product form even if the silex recommended antennas are used.
NOTE2	各国の EMC 認証は最終製品形態での試験が必要です。 EMC certification of each country might be required as the final product.
NOTE3	9000984-XLPDNB および、X9000984-4GDSMB は同一品である。 【メーカ管理上都合により、型番が 9000984-XLPDNB から X9000984-4GDSMB に変更となった】 9000984-XLPDNB and X9000984-4GDSMB are the same product. [The model number has been changed from 990984-XLPDNB to X9000984-4GDSMB due to manufacturer management reasons]

9. RoHS 指令 / RoHS Directive

本製品は EU の RoHS2 指令(2011/65/EU) ,(EU) 2015/863 に準拠しています。
This product is compliant with the EU's RoHS2 directive (2011/65/EU) and (EU) 2015/863

10. 外観 / Outside Drawing



厚み Thickness

Item	Thickness	Description
SMT (単体) SMT (A simple substance)	3.1mm +/- 0.25mm	

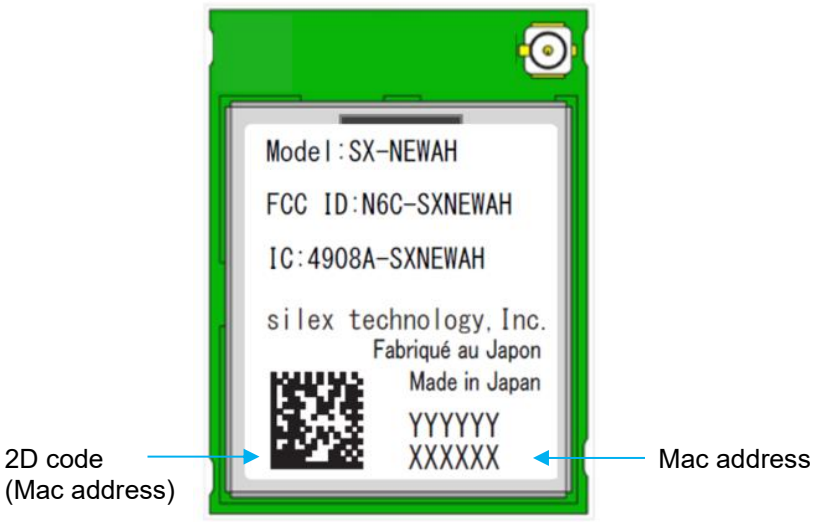
PCB 厚 PCB Thickness

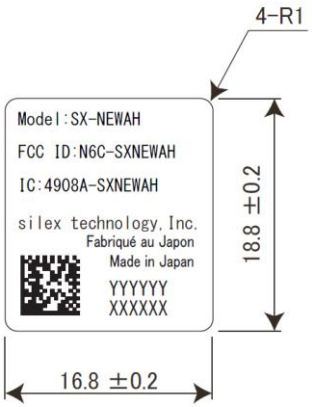
Item	Thickness	Description
SMT (PCB)	1.00 mm +/- 0.15 mm	

特に記載が無い場合、寸法公差は±0.15 mm

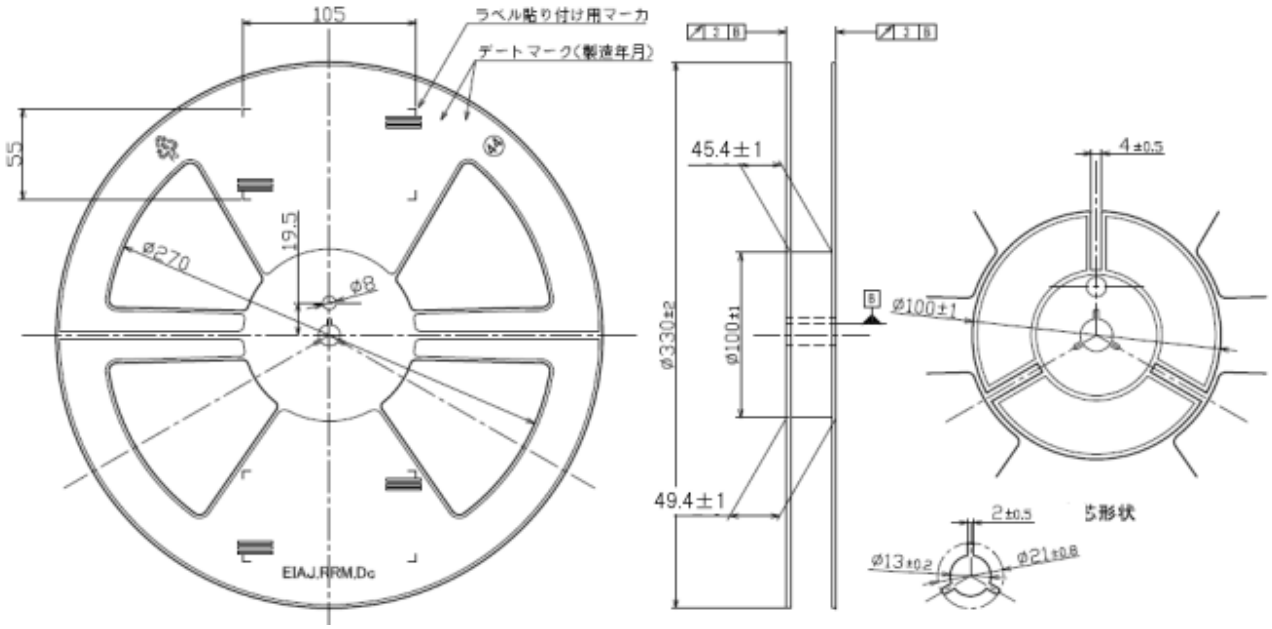
All dimension tolerances are ±0.15mm, unless otherwise specified.

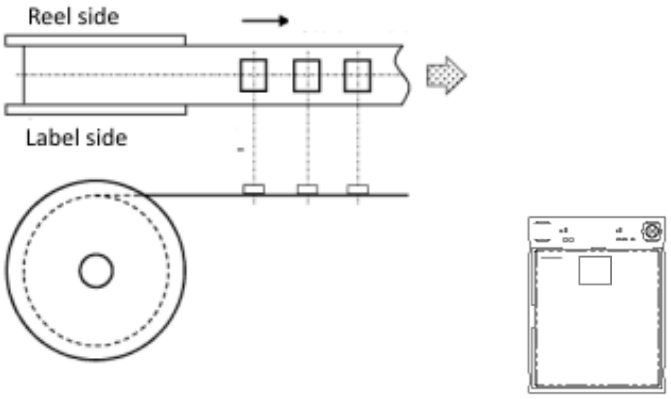
11. 表示仕様 / Indication specifications

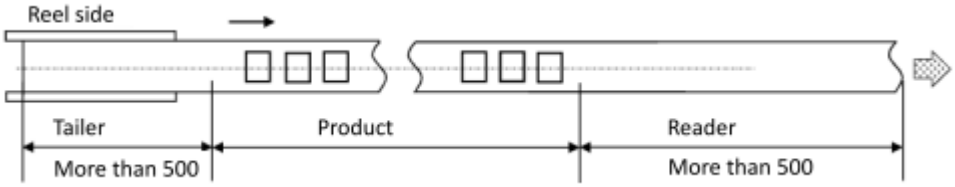




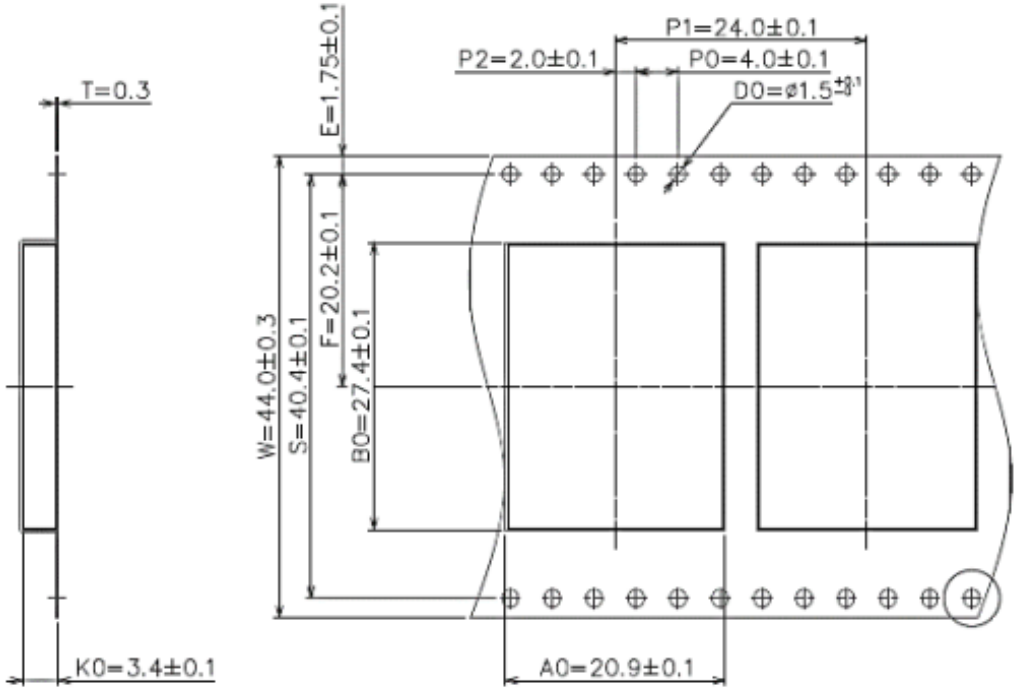
12. 梱包仕様 / Packing specifications

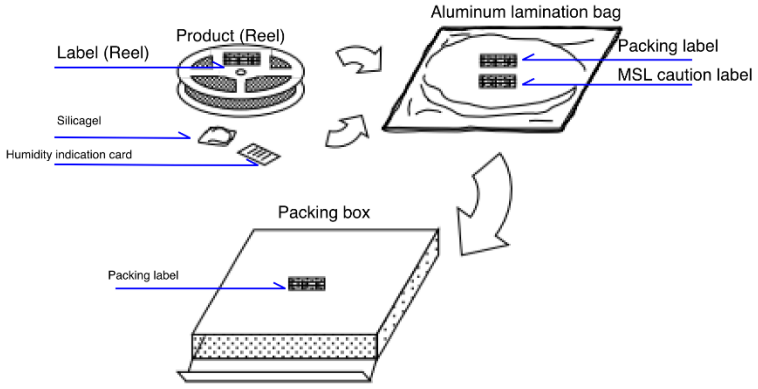


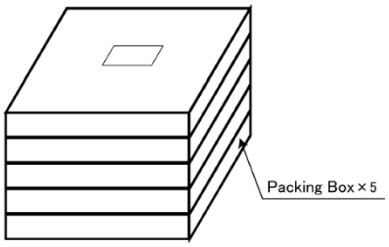


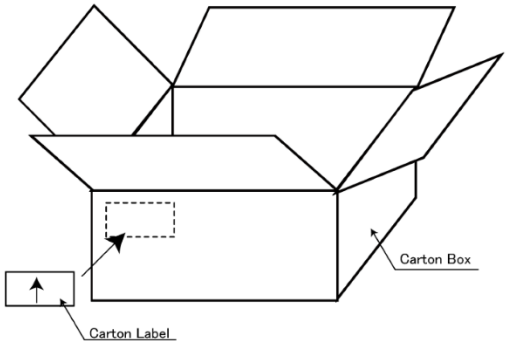


(mm)

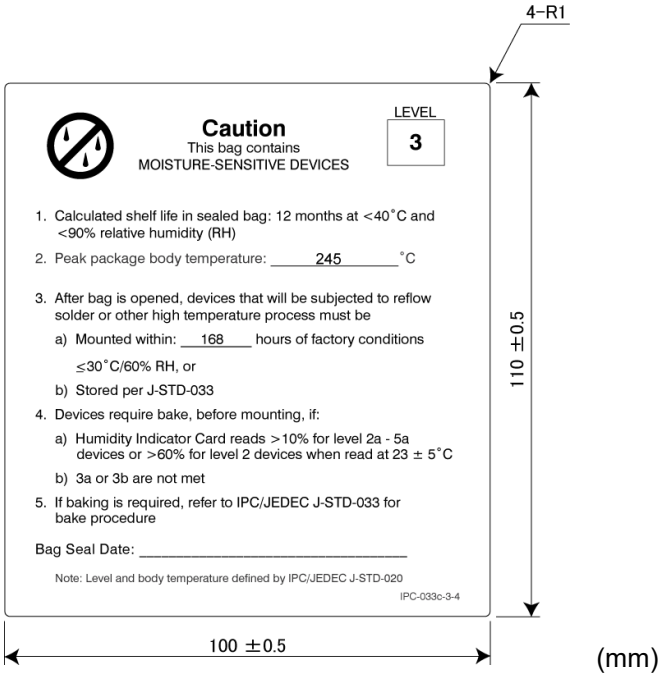

T=0.3
E=1.75±0.1
P1=24.0±0.1
P2=2.0±0.1
P0=4.0±0.1
D0=ø1.5
W=44.0±0.3
S=40.4±0.1
F=20.2±0.1
B0=27.4±0.1
K0=3.4±0.1
A0=20.9±0.1


Aluminum lamination bag
Product (Reel)
Label (Reel)
Packing label
MSL caution label
Silicagel
Humidity indication card
Packing box
Packing label


Packing Box × 5

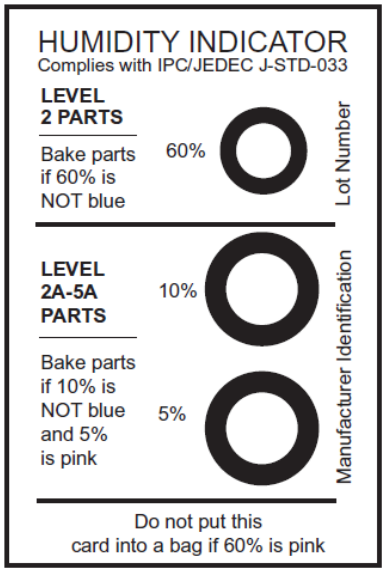

Carton Box
Carton Label

MSL 警告ラベル（MSL caution label）



(mm)

湿度表示カード例（Example of humidity indication card）



13. 信頼性試験 / Reliability test

<table>
<tr><th rowspan="2">Test items</th><th rowspan="2">Standards</th><th rowspan="2">Description</th><th colspan="2">Requirements</th></tr>
<tr><th>Electricity</th><th>Appearance</th></tr>
<tr><td>温湿度電圧
サイクル試験
Temperature/
Humidity
cycle
test</td><td>—</td><td>下記条件で動作確認を行う。
・通信の停止が起こらないことを確認する。
Check to work with below conditions.
・Check no transaction stop.
《Humidity and temperature chamber setup》
<table>
<tr><td>Step</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr>
<tr><td>[℃]</td><td>25</td><td>-40</td><td>-40</td><td>-40</td><td>-40</td><td>85</td><td>85</td><td>85</td><td>25</td></tr>
<tr><td>[%]</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>--</td><td>--</td></tr>
<tr><td>温度勾配</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td></tr>
<tr><td>湿度勾配</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td><td>OFF</td><td>OFF</td></tr>
<tr><td>time[h:m]</td><td>0:05</td><td>0:30</td><td>1:00</td><td>1:00</td><td>2:00</td><td>1:00</td><td>2:00</td><td>6:00</td><td>1:00</td></tr>
<tr><td>retry</td><td>number</td><td>start</td><td>finish</td></tr>
<tr><td></td><td>1</td><td>4</td><td>7</td></tr>
</table></td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>高温連続試験
Functional
hot temp</td><td>—</td><td>+85°Cの環境下で8H以上動作すること。
Workable at +85°C over 8 hours</td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>低温連続試験
Functional
cold temp</td><td>—</td><td>-40°Cの環境下で4H以上動作すること。
Workable at -40°C over 4 hours</td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>低温・高温起
動試験
Low temp
and High tem
start-up test</td><td>—</td><td>下記条件で動作確認を行う
・電源起動を行い、通信ができること
Check to work with below conditions.
・ Power on and check no transaction stop.
Temp: -40°C/+85°C
Standing time: 2H(No electricity)
30 minutes after the second
Number of times: 5 times each</td><td>動作確認
Workable</td><td>NA</td></tr>
<tr><td>温度衝撃試験
Thermal
shock
test</td><td>JEDEC
JESD22-
A106B
Test
Condition C
(Fluid Air)</td><td>熱衝撃を加えた後、動作確認を行う。
・Step 1 (高温) / Step 3 (低温)を繰り返す。
・1000 Cycleで動作確認を実施する。
Check to work after heat shocking
・Repeat Step 1 (High temp.) / Step 3 (Low temp.)
・Check to work after 1000 Cycles
Steps per 1 Cycle [⇨: Ramp]
<table>
<tr><td>Steps</td><td>1</td><td>2</td><td>3</td><td>4</td></tr>
<tr><td>Temperature</td><td>+80
+10/-
0°C</td><td>⇨</td><td>-40
+0/-
10°C</td><td>⇨</td></tr>
<tr><td>Time</td><td>5min</td><td>＜10sec</td><td>5min</td><td>＜10sec</td></tr>
<tr><td>Power</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
</table></td><td>動作可能
Workable</td><td>損傷無し
No
damage</td></tr>
</table>

Test items	Standards	Description	Requirements	
			Electricity	Appearance
衝撃試験 Mechanical shock test	JIS C60068-2-27	衝撃を加えた後、動作確認を行う。 10G / 6msec / vertical / half sine pulse ・方向と回数：X1/2 (+ /-), Y1/2 (+ /-), Z1/2 (+ /-) 各1000回（計6000回） 30G / 11msec / vertical ・方向と回数：X1/2 (+ /-), Y1/2 (+ /-), Z1/2 (+ /-) 各10回(計60回) ・衝撃を加えた後も破損/故障/RF性能が劣化しないことを確認する。 Check to work after shocking. 10G / 6msec / vertical / half sine pulse ・Axis and number of times： X1/2 (+ /-), Y1/2 (+ /-), Z1/2 (+ /-) 1000 times per direction (Total 6000 times) 30G / 11msec / vertical ・Axis and number of times： X1/2 (+ /-), Y1/2 (+ /-), Z1/2 (+ /-) 10 times per direction (Total 60 times) ・Damage/Defect/RF degradation is not observed after shock.	動作可能 Workable	損傷無し No damage
振動試験 Mechanical vibration test	JIS C600678-2-6	振動を加えた後、動作確認を行う。 10~150Hz / 2G / sine ・方向と回数：X-Y-Z 各10サイクル （計30サイクル） ・振動を加えた後も破損/故障/RF性能が劣化しないことを確認する。 Check to work after vibrating. 10~150Hz / 2G / sine ・Axis and number of times： X-Y-Z 10 cycles (Total 30 cycles) ・Damage/Defect/RF degradation is not observed after vibration.	検査仕様適合 Test spec in	損傷無し No damage
静電気放電試験 Electrostatic discharge test	JEDEC JESD22-A114F	アンテナ芯線へのESD印加試験を行う。 ・放電容量=100pF/放電抵抗=1.5kΩ ・アンテナコネクタ芯線：+/-2kV ・正極、負極各3回ずつの印加。 ・印加した後も故障/RF性能が劣化しないことを確認する。 Add ESD to the center pin of antenna connector. ・Discharging capacitance=100pF, Discharging resistance=1.5kΩ ・ESD level for the center pin：+/-2kV ・3 times per each plus pulse and minus pulse. ・Check no damage and no RF performance degradation after testing.	動作可能 Workable	NA

Criteria	Description
損傷無し No damage	試験後外観に損傷が無いこと。 No damage on the appearance after test.
検査仕様適合 Test spec in	RF 検査仕様を満たすこと。 Meet to RF test specifications
動作可能 Workable	試験中動作が確認できること。 Can confirm to work during test.

NOTE1	全ての項目のサンプル数は 3 台 Sample numbers for all test is 3 units.

14. 注意事項 / Notifications

▪本製品の仕様は§8. Standards compliance に掲げる法規制に適合していますが、以下の場合は仕様が変更になる可能性があります。
Specifications of this module are compliant to law regulations of §8. Standards Compliance, but this shall not apply with below cases.

・§8. Standards Compliance に掲げる国以外で使う場合。
In case this module is used in the different country from the list of §8. Standards Compliance.

・認可の更新が必要な場合。
In case the certification must be renewed.

▪本製品は915MHz 帯の電波を媒体とする無線通信機です。
This module uses 915MHz band radio.

▪本製品は一般電子機器への組込みを目的に設計された物であり、航空機器，原子力制御，高信頼性医療器，高信頼性セキュリティ器等、極めて高い水準の信頼性・品質を要求される機器への組込みを意図した物ではありません。**医療機器に組込む際は医療機器クラスに関係なく弊社営業までお問い合わせください。**
This module is designed for embedded purpose into the general electric devices, and is not designed for high reliability demands like aircraft instruments, nuclear control instruments, high reliability medical instruments (Class III, IV), high reliability security instruments or any other devices required extremely high reliability and quality.
In the case embedded into the medical instrument, please ask to silex despite the medical class.

▪本製品は電波を媒体として通信を行いますので、第三者への情報漏洩を防ぐ為にもセキュリティに関する設定を実施いただく事を強く推奨します。
As this module communicates by radio wave, it is strongly recommended to use some security system to prevent unexpected information leakage to others.

▪本製品は組込みを意図した無線装置です。本製品の機能、特性をご理解の上，組込み最終製品での評価をお願いいたします。又、本無線装置単品でのEMC 測定は実施しておりませんので、本無線装置を組み込んだ製品形態でのEMC 試験の実施、及び認可申請を行う必要があります。
This module is a radio module for embedded purpose. Please understand functions and features of this module, and evaluate as the final product which has this module embedded. Also, as evaluation of EMC conformity of this module has not been performed, EMC conformity evaluation and application must be performed with the final product which this module is embedded.

▪本製品が使用する無線帯域において、同一周波数帯を利用する装置への影響又は装置からの影響を受ける場合があります。設置においては事前に環境の調査を実施してください。

This module will effect to some other device or be affected by the some other device using the same frequency band.

Please investigate the environment to use this module beforehand.

▪本製品について分解や改造を行うと電波法に基づいた処罰を受ける事があります。

Disassembling or modifying the radio module leads to punishment based on radio law.

▪本製品は端子や部品が露出した組込み用モジュールです。製品組込み時には静電気（本製品には静電気に弱い高周波デバイスを使用しております）や水滴，その他粉塵等には十分注意願います。

This module is the embedded module that has the exposed connectors or some devices. Please be careful for electro static, condensing, and other dusts.

▪周辺で同一周波数帯を使う他の無線機器を使う場合、特に注意してください。(IEEE802.11-2012 参照)

In the case using the other wireless devices using same frequency band around this product, please take care below.

(See IEEE802.11-2012)

▪強い電波入力が有る場合は混信する可能性が有るため、周辺の無線機器は十分距離を離してご使用ください。

The module is possibly interfered when strong signal is input. The other wireless system should be enough far from this module

▪対向機からの入力は、アンテナゲインを含み-10dBm 以下としてください。

Input level from the opponent device must be -10dBm or less with including antenna gain.

▪本製品のファームウェアは事前通知の上更新されることが有ります。ファームウェアの更新についてご要望がございます場合、購買契約前に弊社までお問い合わせください。

Firmware of this product shall be updated with the advance notice. If you have special request on firmware updating, you can contact to silex before purchase contracting.

FCC Notice

This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

List of applicable FCC rules

This device complies with below part 15 of the FCC Rules.
Part 15 Subpart C

Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification.
The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Summarize the specific operational use conditions

This module designed for mounting inside of the end product by end product manufacturer professionally.
Therefore, it complies with the antenna and transmission system requirements of § 15.203.

RF exposure considerations

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

Co-Location Rule

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

Label and compliance information

Following information must be indicated on the host device of this module.

Contains Transmitter Module FCC ID：N6C-SXNEWAH

Or

Contains FCC ID：N6C-SXNEWAH

FCC CAUTION

The following statements must be described on the user manual of the host device of this module;

FCC CAUTION **Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.**

Antenna List

Vender	Model No.	Antenna Type	Antenna Gain [dBi]
STAF	T16-062-1022	PCB	3.0
ethertronics	9000984-XLPDNB X9000984-4GDSMB (※1)	ROD	3.4
PSA (Walsin)	RFDPA131000SMRB801	ROD	3.01
Invax	AN0915-13D01BSM	ROD	2.00
SaemON Technology	SME–G0900DEN	ROD	1.26

（※1）9000984-XLPDNB and X9000984-4GDSMB are the same product.
[The model number has been changed from 990984-XLPDNB to X9000984-4GDSMB due to manufacturer management reasons]

Limited module procedures

This module needs to supply a regulated voltage to VDDFEM from host device.

ISED Notice

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:
1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :
1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Label and compliance information

The following information must be indicated on the host device of this module.

Contains Transmitter Module IC: 4908A-SXNEWAH

Or

Contains IC: 4908A-SXNEWAH

RF exposure considerations

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the ISED radio frequency (RF) Exposure rules. This equipment should be installed and operated keeping the radiator at least 20cm or more away from person's body.

Cet équipement est conforme aux limites d'exposition aux rayonnements énoncées pour un environnement non contrôlé et respecte les règles d'exposition aux fréquences radioélectriques (RF) CNR-102 de l'ISDE. Cet équipement doit être installé et utilisé en gardant une distance de 20 cm ou plus entre le radiateur et le corps humain.

Antenna Type

This radio transmitter (4908A-SXNEWAH) has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Antenna Type	Gain	Impedance
Rod Antenna	3.4dBi	50ohms
PCB Antenna	3.0dBi	50ohms

Le présent émetteur radio (4908A-SXNEWAH) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué pour tout type figurant sur la liste, sont strictement interdits pour l'exploitation de l'émetteur.

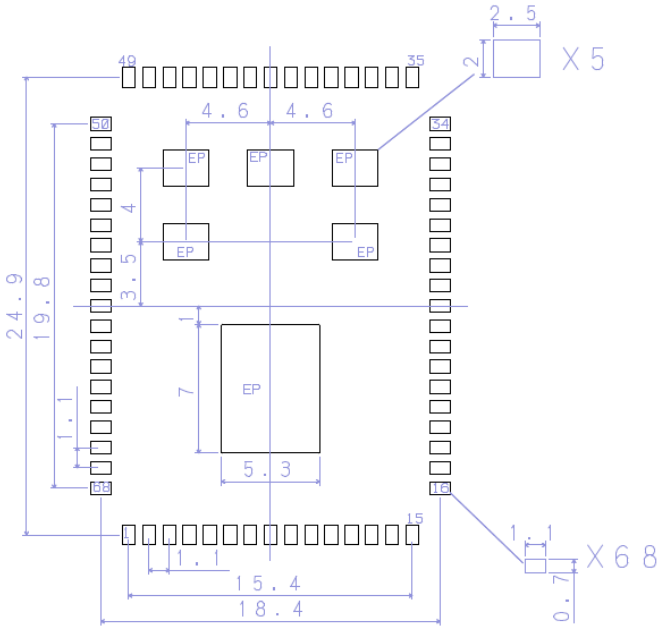
Type d'antenne	Gain	Impedance
Antenne à tige	3.4dBi	50ohms
Antenne PCB	3.0dBi	50ohms

Limited module procedures

This module needs to supply a regulated voltage to VDDFEM from host device.

Ce module doit fournir une tension régulée à VDDFEM à partir du périphérique hôte.

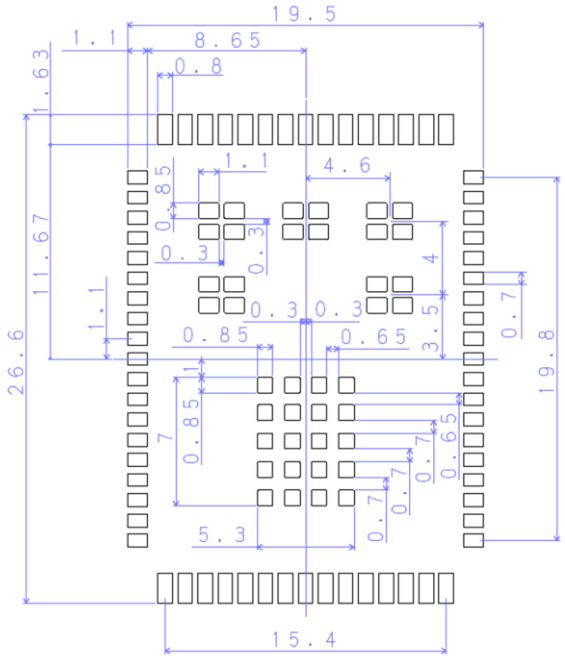
15. 付録 A　参考ランド設計 / Appendix-A　Reference land design



(mm)

Top view

（reference stencil design）



16. 付録 B SMT リフロー条件 / Appendix -B SMT reflow profiles

本推奨条件は、Sn/Ag/Cu Pb-フリーハンダを使用した場合のものです。使用するハンダの種類によって最適化することを推奨します。

This recommended condition assumes Sn/Ag/Cu/Pb-free solder. This condition should be optimized per using solder type.

Sn/Ag/Cu Pb-Free Assembly

Profile Feature	Parametric	Conditions			
		Min.	Typ.	Max.	Units
Average ramp-up rate	T_L to T_p	0	–	3.0	°C/Sec
Preheat	Temperature Ts_{min}	150	–	–	°C
	Temperature Ts_{max}	–	–	200	°C
	Time t_s	60	–	120	Sec
Time maintained above	Temperature T_L	220	–	–	°C
	Time t_L	50	–	70	Sec
Peak Temperature	T_p	230	–	250	°C
Time within 5°C of Actual Peak Temperature	t_p	–	–	20	Sec
Average ramp-down rate	–	0	–	6	°C/Sec
Time 25°C to Peak Temperature	–	–	–	6	Min