
Title:

SX-59HLS-EVK

Drawing Type :

製品仕様書

Product Specifications

Drawing No.:

JW205590XX

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Rev.	Description	Date	Prepared	Checked	Approved
XX	初版 The first edition	Jun. 06, 19	H.Nagahama	K.Hamada	Y.Shibuya

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1. 製品概要 Product overview

SX-59HLS-EVK は SX-59HLS の開発評価ボードです。
USB インターフェイスコネクタを持ちます。

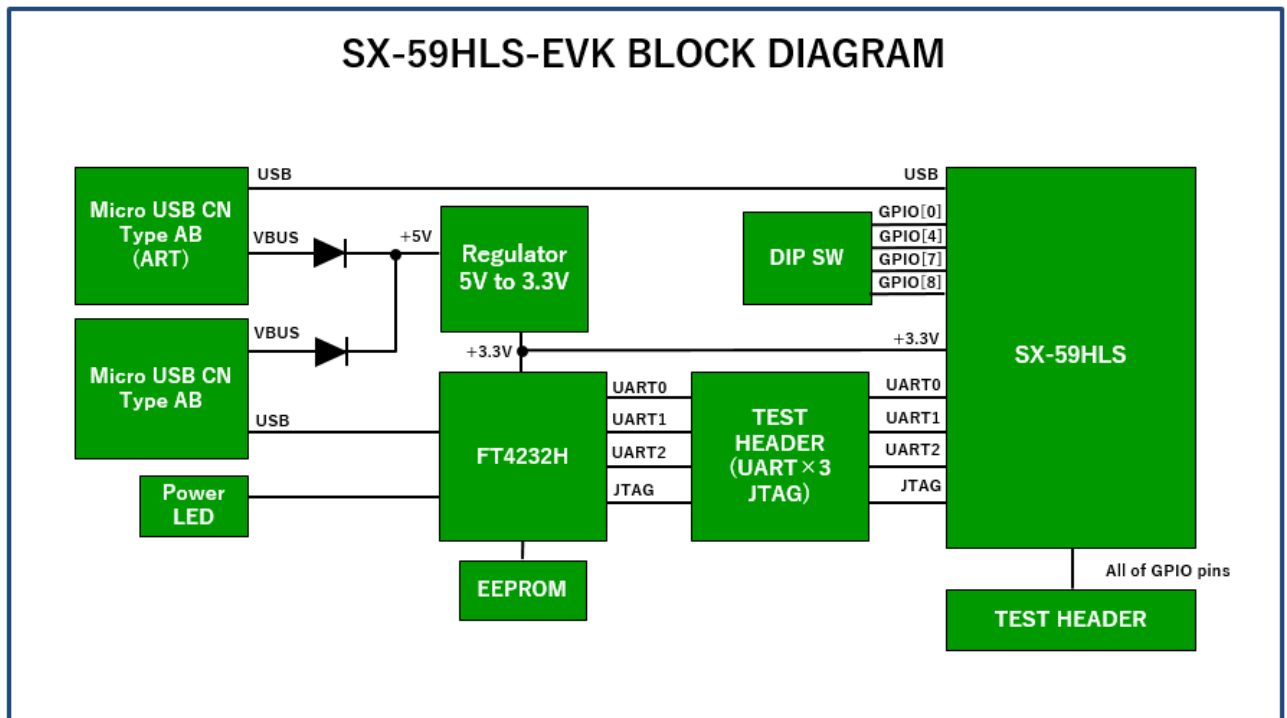
SX-59HLS-EVK is an evaluation board for SX-59HLS and has the USB interface.

製品番号 SKU	品名 Product Name
ZXE04104	SX-59HLS-EVK

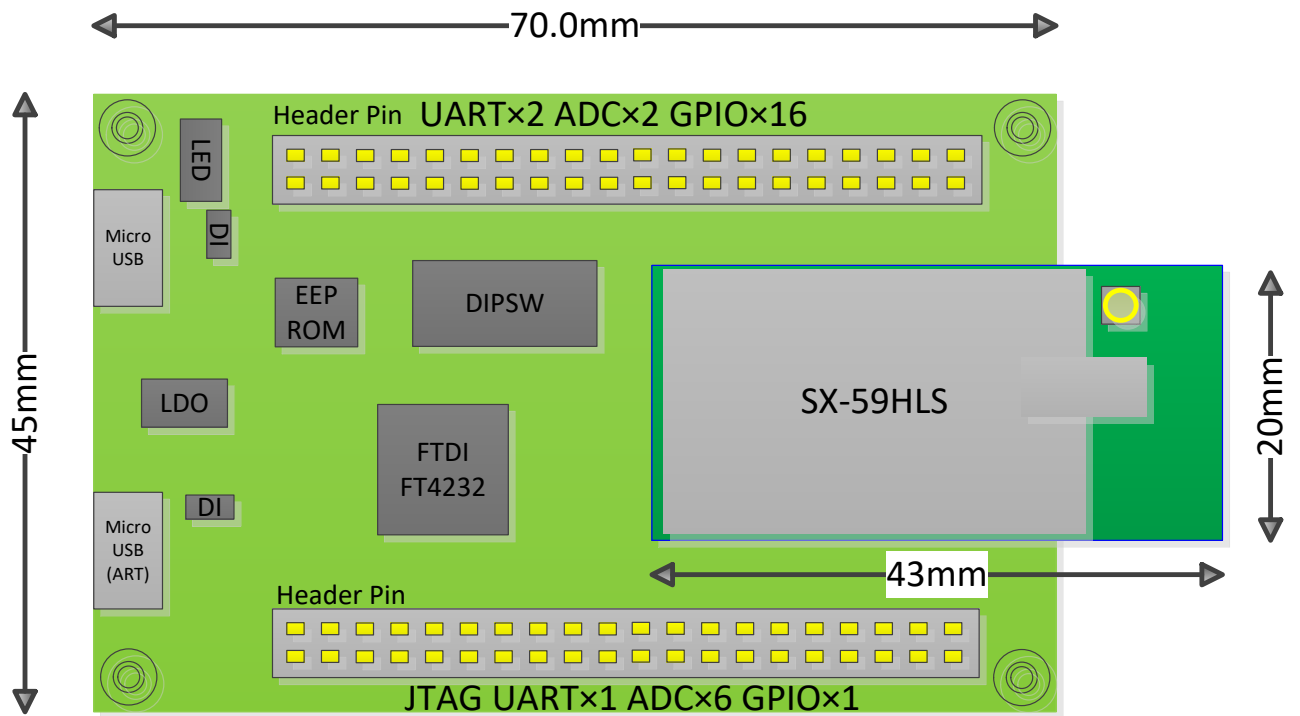
2. 構成リスト Component List

名称 Name	数量 Qty.	備考 Remarks
実装基板 PCBA	1	
セットアップドキュメント Setup document	1	
個装箱 Packing box ・ 緩衝材 cushion ・ 個装箱ラベル Packing Label ・ 静電防止袋 Anti-static Bag ・ 付属品袋 Accessories Bag	1	
集合箱 Carton box ・ 集合箱ラベル Carton box Label	1/20	

3. ハードウェアブロック Hardware block diagram



4. 外觀図 Appearance



SX-59HLS-EVK

5. 基板仕様 Board specifications

5.1. 一般仕様 General specifications

項目 Items	仕様 Specifications	単位 Units	備考 Remarks
インターフェイス Interfaces	USB	-	Micro USB Connector typeAB
重さ Weight	23.3	g	Typ.
寸法 Dimensions	70 x 45 x 18(mm) 公差 ±0.15 Tolerance ±0.15	mm	W x H x D Excluding short plugs

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

**USB Connector
Type AB : ZX62-AB-5PA**

CN1,CN2

Pin	Signal name	Level	Description
1	VBUS	Power	5V ± 5%
2	D-	I/O	Zdiff=90
3	D+	I/O	Zdiff=90
4	ID	-	
5	GND	Ground	

Header pin for SX-59HLS

CN3

Pin	Signal name	Level	Description
1	GPIO26	I/O	
2	GPIO25	I/O	
3	GPIO20	I/O	
4	GPIO17	I/O	
5	GPIO16	I/O	
6	GPIO18	I/O	
7	GPIO19	I/O	
8	GPIO14	I/O	
9	GPIO11	I/O	
10	GPIO9	I/O	
11	GPIO1	I/O	
12	GPIO40	I/O	
13	GPIO31	I/O	

14	GPIO30	I/O	
15	GPIO33	I/O	
16	GPIO32	I/O	
17	NC		
18	NC		
19	3.3V	Power	
20	GND	Ground	

CN4

Pin	Signal name	Level	Description
1	ADC_0	I/O	
2	ADC_1	IA	
3	ADC_2	IA	
4	ADC_3	IA	
5	ADC_4	IA	
6	ADC_5	IA	
7	GPIO27	IA	
8	NC	-	
9	3.3V	Power	
10	GND	Ground	
11	WAKEUP	I	keep open
12	GND	Ground	
13	32K_OSC_OUT	OA	32 KHz crystal oscillator output
14	NC	-	
15	32K_OSC_IN	IA	32 KHz crystal oscillator input
16	NC	-	
17	CHIP_PWD_L	I	pull-up on the module 100kohm
18	GND	Ground	
19	3.3V_FT	Power	
20	NC	-	

To connect FT4232HL and SX-59HLS for JTAG/UART

CN5

必要に応じて pin1 と pin2、pin3 と pin4・・・をショートさせて使用。

Pin	Signal name	Level	Description
1	UART1_CTS	I/O	connect FT4232HL
2	GPIO22_UART1_RTS	I/O	connect SX-59HLS
3	UART1_RTS	I/O	connect FT4232HL
4	GPIO21_JTAG_RST/ UART1_CTS	I/O	connect SX-59HLS
5	UART1_RX	I/O	connect FT4232HL
6	GPIO23_UART1_TX	I/O	connect SX-59HLS
7	UART1_TX	I/O	connect FT4232HL
8	GPIO24_UART1_RX	I/O	connect SX-59HLS
9	JTAG_RST	I/O	connect FT4232HL
10	GPIO21_JTAG_RST/ UART1_CTS	I/O	connect SX-59HLS
11	JTAG_TMS	I/O	connect FT4232HL
12	GPIO10_JTAG_TMS	I/O	connect SX-59HLS
13	JTAG_TDO	I/O	connect FT4232HL
14	GPIO13_JTAG_TDO	I/O	connect SX-59HLS
15	JTAG_TDI	I/O	connect FT4232HL
16	GPIO6_JTAG_TDI	I/O	connect SX-59HLS
17	JTAG_TCK	I/O	connect FT4232HL
18	GPIO12_JTAG_TCK	I/O	connect SX-59HLS
19	3.3V	Power	
20	GND	Ground	

CN6

必要に応じて pin1 と pin2、pin3 と pin4・・・をショートさせて使用。

Pin	Signal name	Level	Description
1	3.3V_FT	Power	
2	3.3V	Power	
3	3.3V_FT	Power	
4	3.3V	Power	
5	UART2_RX	I/O	connect FT4232HL
6	GPIO2_UART2_TX	I/O	connect SX-59HLS
7	UART2_TX	I/O	connect FT4232HL
8	GPIO3_UART2_RX	I/O	connect SX-59HLS
9	UART2_CTS	I/O	connect FT4232HL
10	GPIO4_UART2_RTS	I/O	connect SX-59HLS
11	UART2_RTS	I/O	connect FT4232HL
12	GPIO5_UART2_CTS	I/O	connect SX-59HLS
13	UART0_RX	I/O	connect FT4232HL
14	ADC_6_UART0_TX	I/O	connect SX-59HLS
15	UART0_TX	I/O	connect FT4232HL
16	ADC_7_UART0_RX	I/O	connect SX-59HLS
17	DDBUS2	I/O	connect FT4232HL
18	GND	Ground	
19	DDBUS3	I/O	connect FT4232HL
20	NC	-	

5.3. 電氣的仕様 Electrical specifications

絶対最大定格 Absolute Maximum Ratings

項目 Items	仕様 Specifications			単位 Units	備考 Remarks
	Min.	Typ.	Max.		
主電源電圧(5V) Main supply voltage	-0.30	—	+5.25	V	

推奨動作条件 Recommended Operating Conditions

項目 Items	仕様 Specifications			単位 Units	備考 Remarks
	Min.	Typ.	Max.		
主電源電圧(5V) Main supply voltage	+4.75	+5.0	+5.25	V	

デジタル論理信号レベル Digital logic signal level

項目 Items	パラメータ Parameters	仕様 Specifications			単位 Units	備考 Remarks
		Min.	Typ.	Max.		
V_{IH}	Input High Voltage	+1.80	+3.30	+3.46	V	
V_{IL}	Input Low Voltage	-0.30	0	+0.30	V	
V_{OH}	Output High Voltage	+2.20	—	+3.30	V	
V_{OL}	Output Low Voltage	0	—	+0.40	V	

5.4.無線 LAN 一般仕様 (Wireless LAN general specifications)

Items	Specifications				Units	Remarks
チップセット Chipset	QCA4012-2 (Qualcomm Atheros)				—	
国/地域コード Country/Domain code	US/CA	80000348		—	デフォルト Default	
	JP	80000188		—		
	EU	80000114		—		
動作周波数 Operating frequency range	2.4GHz	Band	Modes	Min	Max	
		11b		2412	2472	MHz
			11g/n 20MHz	2412	2472	MHz
	11n 40MHz	2422	2462	MHz		
	5GHz	11a/n 20MHz	5180	5825	MHz	
		11n 40MHz	5190	5795	MHz	
周波数間隔 Frequency steps	2.4GHz	11b/g/n	5		MHz	
	5GHz	11a/n 20MHz	20		MHz	
		11a/n 40MHz	40		MHz	
リンクデータレート Link Data Rate	11b	1,2,5.5L,5.5S,11L,11S			Mbps	
	11a/g	6,9,12,18,24,36,48,54			Mbps	
	11n	MCS 0,1,2,3,4,5,6,7			—	
変調型 Modulation type	11b	DSSS(DBPSK,DQPSK,CCK)			—	
	11a/g/n	OFDM(BPSK,QPSK,16QAM,64QAM)			—	
暗号化 Encryption	RC4	128			bits	
	AES	128			bits	

利用可能チャネルリスト Operatable channel list

2.4GHz	US/CA	20MHz	Ch.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
		40MHz	Ch.3, 4, 5, 6, 7, 8, 9
	JP	20MHz	Ch.1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13
		40MHz	Ch.3, 4, 5, 6, 7, 8, 9, 10, 11
5GHz	US	20MHz	Ch.36,40,44,48,52,56,60,64,100,104,108,112,116,120,124,128,132,136,140,149,153,157,161,165
		40MHz	Ch.38,46,54,62,102,110,118,126,134,151,159
	CA	20MHz	Ch.36,40,44,48,52,56,60,64,100,104,108,112,116,132,136,140,149,153,157,161,165
		40MHz	Ch.38,46,54,62,102,110,134,151,159
	JP	20MHz	Ch.36,40,44,48,52,56,60,64,100,104,108,112,116,120,124,128,132,136,140
		40MHz	Ch.38,46,54,62,102,110,118,126,134

5.5.無線 LAN 送信仕様 (Wireless LAN transmitter specifications)

Items	Specifications						Units	Remarks	
	Modes			Min.	Typ.	Max.			
2.4GHz@+25°C Transmit Power Typ.=Target Power	11b	US Ch.1-Ch.11	1-11Mbps	+14.5	+17.0	+19.5	dBm		
		JP Ch.1-Ch.11	1-11Mbps	+12.5	+15.0	+17.5	dBm		
		EU Ch.1-Ch.13	1-11Mbps	+11.0	+13.5	+16.0	dBm		
	11g	US Ch.1	6-48Mbps	+11.0	+13.5	+16.0	dBm		
			54Mbps	+10.5	+13.0	+15.5	dBm		
		US Ch.2-Ch.10 JP Ch.1-Ch.13	6-24Mbps	+14.5	+17.0	+19.5	dBm		
			36Mbps	+12.5	+15.0	+17.5	dBm		
			48Mbps	+11.5	+14.0	+16.5	dBm		
			54Mbps	+10.5	+13.0	+15.5	dBm		
		US Ch.11	6-36Mbps	+12.5	+15.0	+17.5	dBm		
			48Mbps	+11.5	+14.0	+16.5	dBm		
			54Mbps	+10.5	+13.0	+15.5	dBm		
		11ng 20MHz	US Ch.1	MCS0-6	+10.5	+13.0	+15.5	dBm	
				MCS7	+9.0	+12.0	+14.5	dBm	
			US Ch.2-Ch.10 JP Ch.1-Ch.13	MCS0	+14.5	+17.0	+19.5	dBm	
	MCS1-3			+13.5	+16.0	+18.5	dBm		
	MCS4			+12.5	+15.0	+17.5	dBm		
	MCS5			+11.5	+14.0	+16.5	dBm		
	MCS6			+10.5	+13.0	+15.5	dBm		
	MCS7			+9.5	+12.0	+14.5	dBm		
	US Ch.11		MCS0-4	+12.5	+15.0	+17.5	dBm		
			MCS5	+11.5	+14.0	+16.5	dBm		
			MCS6	+10.5	+13.0	+15.5	dBm		
			MCS7	+9.5	+12.0	+14.5	dBm		
	EU Ch.1-Ch.13		MCS0-6	+10.5	+13.0	+15.5	dBm		
		MCS7	+9.5	+12.0	+14.5	dBm			
	11ng 40MHz	US Ch.3-Ch.9	MCS0-4	+10.0	+12.5	+15.0	dBm		
			MCS5	+9.5	+12.0	+14.5	dBm		
			MCS6-7	+8.5	+11.0	+13.5	dBm		
		JP Ch.3-Ch.11	MCS0	+12.5	+15.0	+17.5	dBm		
MCS1-3			+11.5	+14.0	+16.5	dBm			
MCS4			+10.5	+13.0	+15.5	dBm			
MCS5			+9.5	+12.0	+14.5	dBm			
MCS6-7			+8.5	+11.0	+13.5	dBm			
EU Ch.3-Ch.11		MCS0-3	+11.0	+13.5	+16.0	dBm			
		MCS4	+10.5	+13.0	+15.5	dBm			
		MCS5	+9.5	+12.0	+14.5	dBm			
		MCS6-7	+8.5	+11.0	+13.5	dBm			

Items	Specifications						Units	Remarks	
	Modes			Min.	Typ.	Max.			
5GHz @+25°C Transmit Power Typ.=Target Power	11a	US Ch.36-Ch.165	6-24Mbps	+8.5	+11.0	+13.5	dBm		
			EU Ch.36-Ch.140	36Mbps	+6.5	+9.0	+11.5	dBm	
				48Mbps	+4.5	+7.0	+9.5	dBm	
				54Mbps	+3.5	+6.0	+8.5	dBm	
		JP Ch.36-Ch.60		6-24Mbps	+10.5	+13.0	+15.5	dBm	
			36Mbps	+6.5	+9.0	+11.5	dBm		
			48Mbps	+4.5	+7.0	+9.5	dBm		
			54Mbps	+3.5	+6.0	+8.5	dBm		
		JP Ch.64	6-24Mbps	+11.0	+13.5	+16.0	dBm		
			36Mbps	+6.5	+9.0	+11.5	dBm		
			48Mbps	+4.5	+7.0	+9.5	dBm		
			54Mbps	+3.5	+6.0	+8.5	dBm		
		JP Ch.100-Ch.140	6-24Mbps	+9.5	+12.0	+14.5	dBm		
			36Mbps	+6.5	+9.0	+11.5	dBm		
			48Mbps	+4.5	+7.0	+9.5	dBm		
			54Mbps	+3.5	+6.0	+8.5	dBm		
	11na 20MHz	US Ch.36-Ch.165	MCS0	+8.5	+11.0	+13.5	dBm		
			EU Ch.36-Ch.140	MCS1-3	+7.5	+10.0	+12.5	dBm	
				MCS4	+6.5	+9.0	+11.5	dBm	
				MCS5	+5.5	+8.0	+10.5	dBm	
				MCS6	+4.5	+7.0	+9.5	dBm	
		MCS7	+3.5	+6.0	+8.5	dBm			
		JP Ch.36-Ch.60	MCS0	+9.5	+12.0	+14.5	dBm		
			MCS1-3	+7.5	+10.0	+12.5	dBm		
			MCS4	+6.5	+9.0	+11.5	dBm		
			MCS5	+5.5	+8.0	+10.5	dBm		
			MCS6	+4.5	+7.0	+9.5	dBm		
		JP Ch.64	MCS0	+9.0	+12.5	+15.0	dBm		
			MCS1-3	+7.5	+10.0	+12.5	dBm		
			MCS4	+6.5	+9.0	+11.5	dBm		
			MCS5	+5.5	+8.0	+10.5	dBm		
			MCS6	+4.5	+7.0	+9.5	dBm		
JP Ch.100-Ch.140		MCS0	+8.5	+11.0	+13.5	dBm			
		MCS1-3	+7.5	+10.0	+12.5	dBm			
		MCS4	+6.5	+9.0	+11.5	dBm			
		MCS5	+5.5	+8.0	+10.5	dBm			
		MCS6	+4.5	+7.0	+9.5	dBm			
			MCS7	+3.5	+6.0	+8.5	dBm		

Items	Specifications						Units	Remarks	
	Modes			Min.	Typ.	Max.			
5GHz@+25°C Transmit Power Typ.=Target Power	11na 40MHz	US Ch.38-Ch.159	MCS0	+7.5	+10.0	+12.5	dBm		
			EU Ch.38-Ch.134	MCS1-3	+6.5	+9.0	+11.5	dBm	
				MCS4	+5.5	+8.0	+10.5	dBm	
		JP Ch.38-Ch.54	MCS5	+4.5	+7.0	+9.5	dBm		
			MCS6	+3.5	+6.0	+8.5	dBm		
			MCS7	+2.5	+5.0	+7.5	dBm		
	JP Ch.38-Ch.54		MCS0	+9.5	+12.0	+14.5	dBm		
			MCS1-3	+6.5	+9.0	+11.5	dBm		
		MCS4	+5.5	+8.0	+10.5	dBm			
	JP Ch.62	MCS5	+4.5	+7.0	+9.5	dBm			
		MCS6	+3.5	+6.0	+8.5	dBm			
		MCS7	+2.5	+5.0	+7.5	dBm			
		JP Ch.102-Ch.134	MCS0	+10.0	+12.5	+15.0	dBm		
			MCS1-3	+6.5	+9.0	+11.5	dBm		
	MCS4		+5.5	+8.0	+10.5	dBm			
	JP Ch.102-Ch.134	MCS5	+4.5	+7.0	+9.5	dBm			
		MCS6	+3.5	+6.0	+8.5	dBm			
		MCS7	+2.5	+5.0	+7.5	dBm			
		JP Ch.102-Ch.134	MCS0	+8.5	+11.0	+13.5	dBm		
			MCS1-3	+6.5	+9.0	+11.5	dBm		
MCS4	+5.5		+8.0	+10.5	dBm				
JP Ch.102-Ch.134	MCS5	+4.5	+7.0	+9.5	dBm				
	MCS6	+3.5	+6.0	+8.5	dBm				
	MCS7	+2.5	+5.0	+7.5	dBm				

Items	Specifications				Units	Remarks
	Standards	Min.	Typ.	Max.		
Frequency accuracy Operating temperature	11b/11g/11ng /11a/11na	-20	0	+20	ppm	

5.6.無線 LAN 受信仕様 (Wireless LAN receiver specifications)

2.4GHz (Operating temperature)

Items	Specifications					Units	Remarks
	Modes		Min.	Typ.	Max.		
最小受信感度 Receiver minimum Sensitivity	11b (FER<8%)	1Mbps	–	-94	-80	dBm	
		11Mbps	–	-88	-76	dBm	
	11g (PER<10%)	6Mbps	–	-92	-82	dBm	
		54Mbps	–	-75	-65	dBm	
	11ng 20MHz (PER<10%)	MCS0	–	-92	-82	dBm	
		MCS7	–	-72	-64	dBm	
	11ng 40MHz (PER<10%)	MCS0	–	-89	-79	dBm	
		MCS7	–	-70	-61	dBm	

5GHz (Operating temperature)

Items	Specifications					Units	Remarks
	Modes		Min.	Typ.	Max.		
最小受信感度 Receiver minimum Sensitivity	11a (PER<10%)	6Mbps	–	-91	-82	dBm	
		54Mbps	–	-72	-65	dBm	
	11na 20MHz (PER<10%)	MCS0	–	-92	-82	dBm	
		MCS7	–	-70	-64	dBm	
	11na 40MHz (PER<10%)	MCS0	–	-88	-79	dBm	
		MCS7	–	-66	-61	dBm	

6. 適合規格 Standards Compliance

6.1. 規格一覧 Standard list

適合規格 :
Standards conformity

- IEEE802.11-2012

適合法規制 (子機) :
Law regulation compliance (Station mode)

- 日本電波法 (MIC)
証明規則第 2 条第 1 項第 19
証明規則第 2 条第 1 項第 19 の 3
証明規則第 2 条第 1 項第 19 の 3 の 2
Japan Radio Law (MIC)
Article 2 Section 1 Number 19
Article 2 Section 1 Number 19-3
Article 2 Section 1 Number 19-3-2

Certification number: **007-AG0138**

- FCC Part15 (Subpart C, Subpart E (UNII-1/2/2Ext/3))
ID: **N6C-SXSP242**

- IC RSS (UNII-1/2/2Ext/3)
ID: **4908A-SXSP242**

- ETSI (EN 300 328, EN 301 893)

- CE RoHS Directive

対応国 :
Countries

- Asia
 - ・ Japan(JP)
- North America
 - ・ United States(US)
 - ・ Canada(CA)
- EU

6.2. 推奨アンテナリスト The list of recommended Antennas

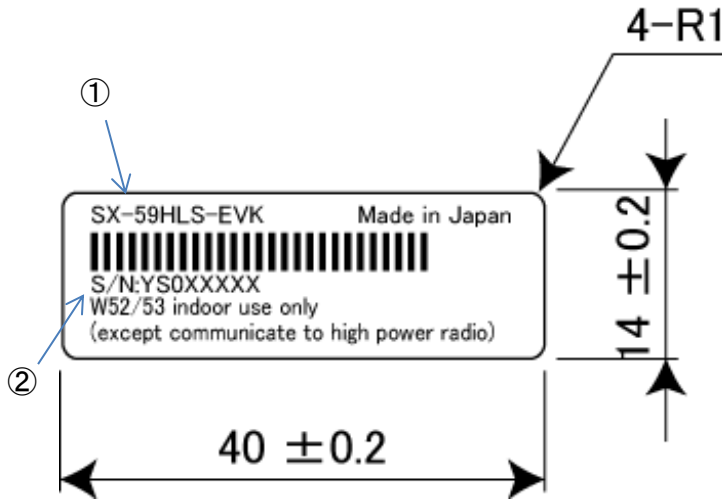
日本 (JP) MIC

Antennas	Vendors	Antenna Type	2.4GHz Gain	5GHz Gain	No.19 2.4GHz	No.19-2 2.484GHz	No.19-3 W52/53	No.19-3-2 W56
AA258 (H2B1PC1A1C) (Exclude cable loss)	Unictron	PCB	+2.9dBi	+4.4dBi	✓	—	✓	✓
AA222 (H2B1PD1A1C) (Exclude cable loss)	Unictron	PCB	+2.8dBi	+4.2dBi	✓	—	✓	✓
146153 (Exclude cable loss)	Molex	PCB	+3.25dBi	+5.0dBi	✓	—	✓	✓
GRF1762/GRF1802 (Exclude cable loss)	VSO	Rod	+2.0dBi	+2.0dBi	✓	—	✓	✓
GRF1763 (Exclude cable loss)	VSO	Rod	+1.5dBi	+2.1dBi	✓	—	✓	✓
ANTDC-081A0/B0 (Exclude cable loss)	Sansei-Denki	Rod	+2.0dBi	+2.0dBi	✓	—	✓	✓
ANTDP-027A0 (Exclude cable loss)	Sansei-Denki	Rod	+1.5dBi	+2.1dBi	✓	—	✓	✓
QCASP242-Ant	QCA	PCB On board	+1.72dBi	+1.91dBi	✓	—	✓	✓

アメリカ・カナダ・ヨーロッパ (US/CA) FCC/IC

Antennas	Vendors	Antenna Type	2.4GHz Gain	5GHz W52/53 Gain	5GHz W56/58 Gain	FCC Subpart-C 2.4GHz	FCC Subpart-E W52/53/56/58
81-EBJ15.005 (Include cable loss)	WNC	PIFA	+3.62dBi	+4.76dBi	+3.08dBi	✓	✓
QCASP242-Ant	QCA	PCB On board	+1.72dBi	+1.91dBi	+1.91dBi	✓	✓

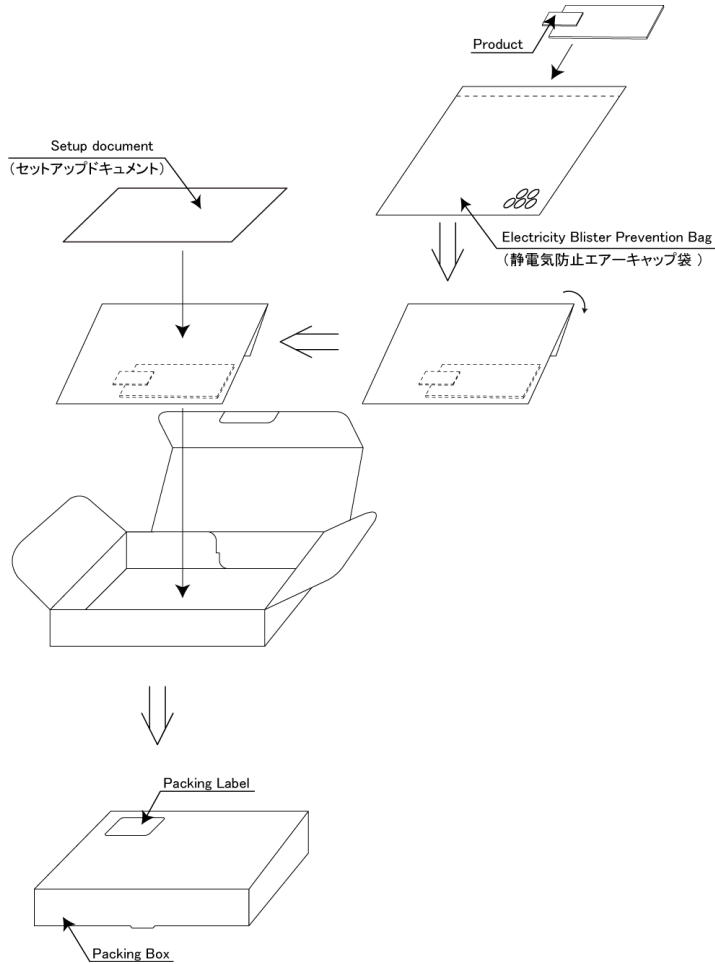
7. ラベル仕様 Label specifications



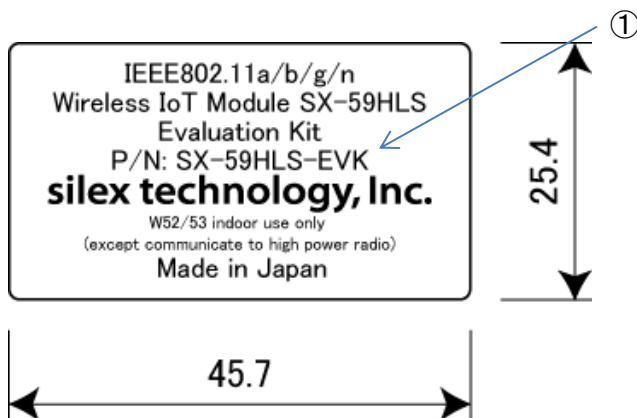
SKU #	①Name	②Model No
ZXE04104	SX-59HLS-EVK	S0
XXXXX : Serial No		
Y : Year No D 2019 : E 2020...		

梱包仕様 Packing specifications

7.1. 個装梱包仕様 Packing box specifications

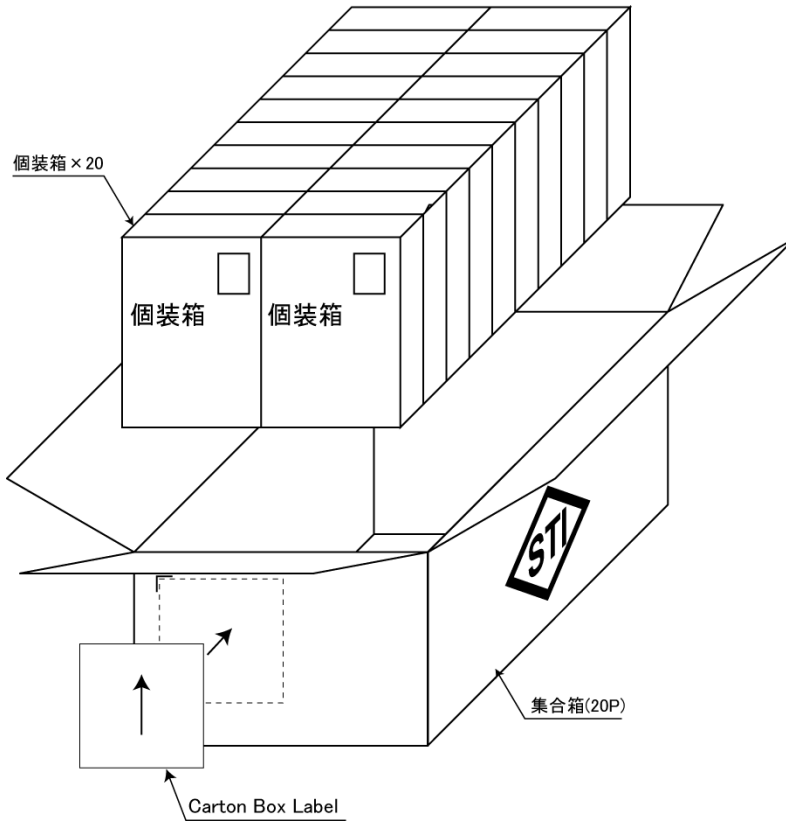


7.2. 個装箱ラベル Packing box label



SKU #	①Name
ZXE04104	SX-59HLS-EVK

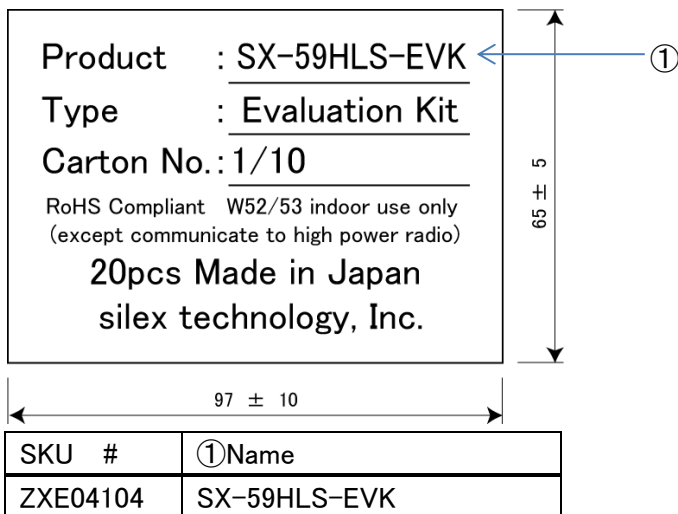
7.3. 集合梱包仕様 Carton box specifications



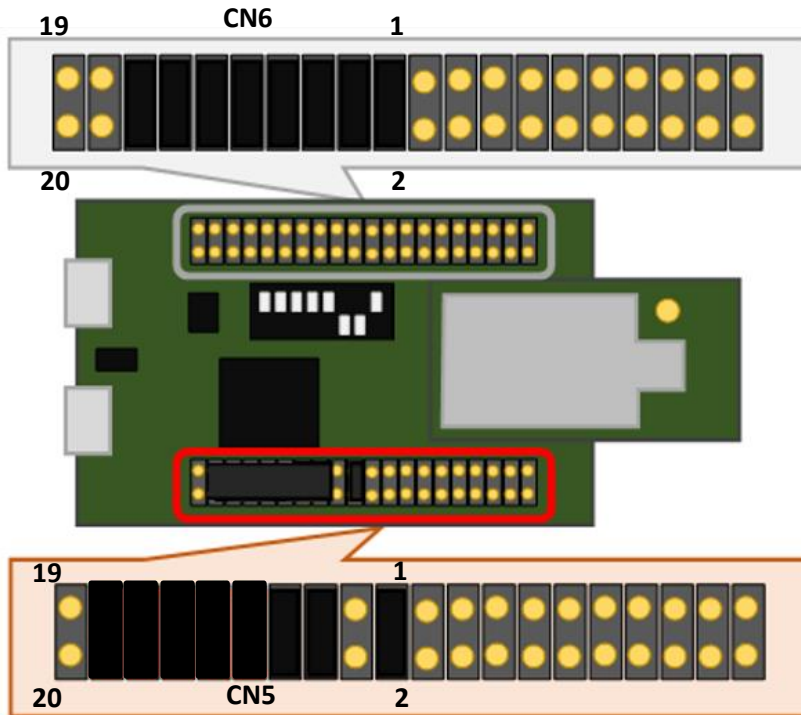
総重量 Gross weight

SX-59HLS-EVK
約 2.0kg

7.4. 集合箱ラベル Carton box label



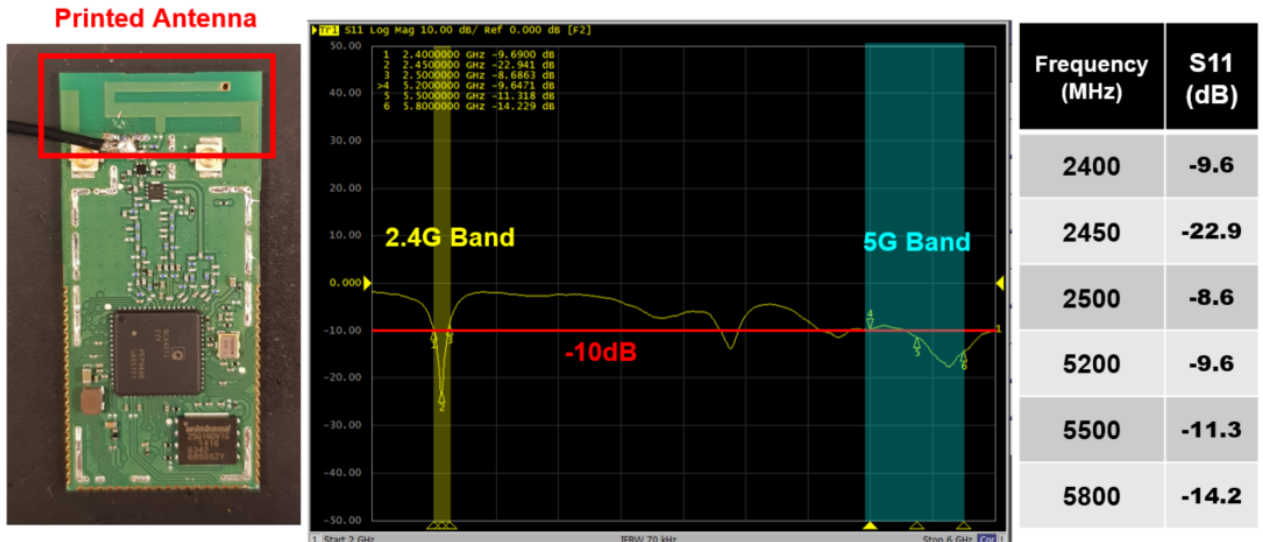
8. ショートプラグ初期設定 Short plug initialization



	1,2	3,4	5,6	7,8	9,10	11,12	13,14	15,16	17,18	19,20
CN5	●		●	●	●	●	●	●	●	
CN6	●	●	●	●	●	●	●	●		

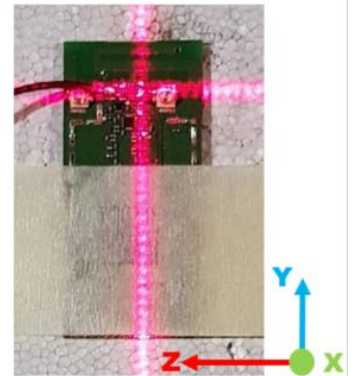
9. アンテナ放射パターン Antenna Radiation Pattern

Antenna test: Check printed antenna s-parameters.



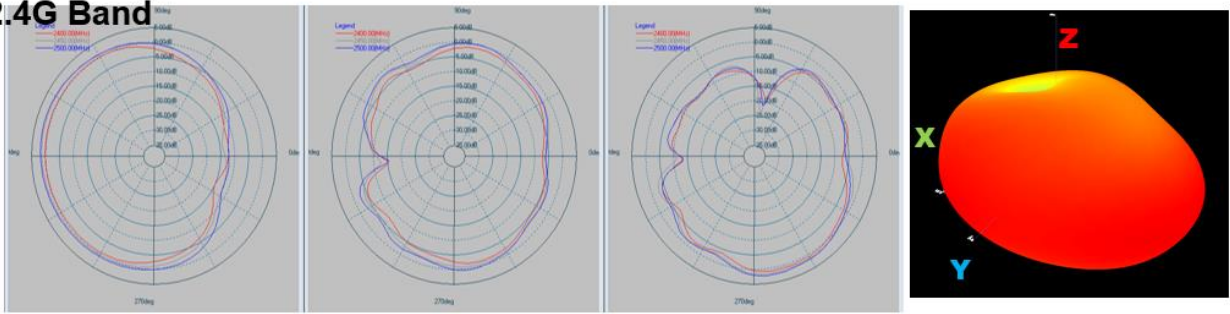
Antenna test: Check printed antenna efficiency & gain.

Frequency (MHz)	Efficiency (%)		Peak Gain (dBi)	
	2.4G	5G	2.4G	5G
L	50%	58%	0.8	2.4
M	52%	61%	0.9	2.3
H	41%	65%	-0.4	2.7



Antenna test: Check printed antenna radiation pattern.

2.4G Band



5G Band

