Title:

SX-PCEBE

Drawing Type :	製品仕様書 Product Specifications
Drawing No.:	JW208790XX
Date :	June 25, 2025

Rev.	Description	Date	Prepared	Checked	Approved
XX	The first edition	Jun. 25, 25	Y.Shibuya	T.Minobe	M.Kawabata

1. 製品概要 Product overview

SX-PCEBE は、QCC2076 (Qualcomm Atheros 社) SoC を採用した、2.4GHz/5GHz,6GHz Tri-Band IEEE 802.11 a/b/g/n/ac/ax/be、Bluetooth 5.4 BR/EDR/LE/2LE 準拠、PCI Express 3.0 with L1SS function 対応の無線モジュールです。本モジュールは、2.4 GHz + 5 GHz、または 2.4GHz + 6 GHz でのデュアルバンド同時動作をサポートしています。

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-PCEBE の製品形状は表面実装型 (SMT)の SX-PCEBE-SMT と M.2 Card Key E Type 型の SX-PCEBE-M2 があります。

SX-PCEBE is a wireless module that adopts the QCC2076 (Qualcomm Atheros) SoC, supporting 2.4GHz/5GHz/6GHz Tri-Band IEEE 802.11 a/b/g/n/ac/ax/be, Bluetooth 5.4 BR/EDR/LE/2LE compliance, and PCI Express 3.0 with L1SS function. This module supports simultaneous operation on 2.4 GHz + 5 GHz or 2.4GH + 6 GHz.

This module integrates external circuits such as MAC/BBP/RF/RF front end and various power/clock circuits. The product form factors for SX-PCEBE include Surface Mount Type (SMT) SX-PCEBE-SMT and M.2 Card Key E Type SX-PCEBE-M2.

特徴 Features

- IEEE 802.11a/b/g/n/ac/ax/be 準拠
  IEEE 802.11a/b/g/n/ac/ax/be compliant

- 2 スペーシャルデータストリームシステム (2T2R)
  2 spatial data stream system (2T2R)

- 5 GHz, 6GHz：20/40/80/160 MHz 帯域幅モード対応
  2.4 GHz：20/40 MHz 帯域幅モード対応
  5 GHz, 6GHz: Support 20/40/80/160 MHz bandwidth mode
  2.4 GHz: Support 20/40 MHz bandwidth mode

  PHY Data Rate
  - 802.11b/g 1-54 Mbps
  - 802.11a 6-54 Mbps
  - 802.11n 1Stream MCS0-7
  - 802.11n 2Stream MCS8-15
  - 802.11ac MCS0-9
  - 802.11ax MCS0-11
  - 802.11be MCS0-13

- Bluetooth 5.4 BR/EDR/LE 準拠。
  Bluetooth 1.x, 2.x, 3.0, 4.0, 4.1, 4.2, 5.0, 5.1, 5.2, 5.3 後方互換
  Bluetooth 5.4 BR/EDR/LE/2LE compatible.
  Backward compatible to Bluetooth 1.x, 2.x, 3.0, 4.0, 4.1, 4.2, 5.0, 5.1, 5.2, 5.3

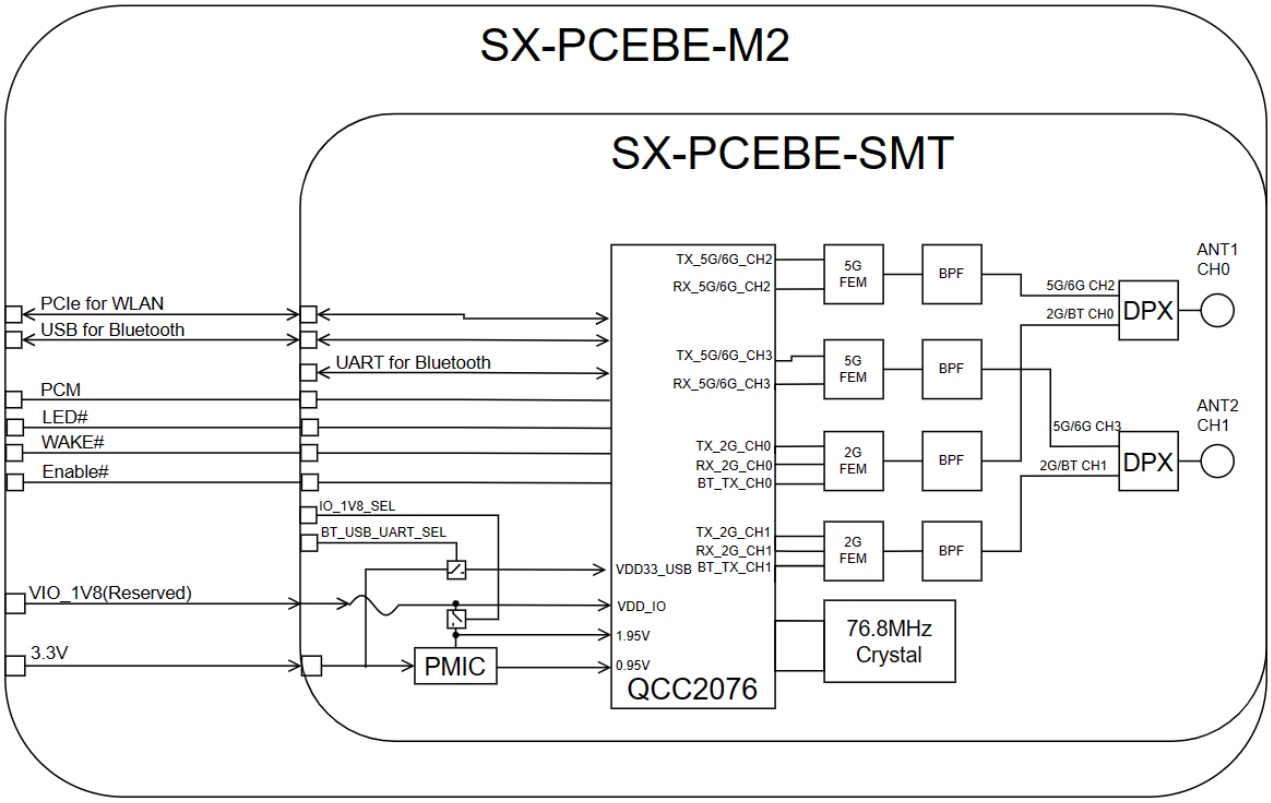
- Wireless LAN ホストインターフェイスとして PCI Express 3.0 with L1SS function 対応
  PCI Express 3.0 with L1SS function as the Wireless LAN host interface

- Bluetooth ホストインターフェイスとして USB 1.1 対応
  USB 1.1 as the Bluetooth host interface

- 主電源+3.3V
  +3.3V main power supply

- 本製品は、欧州の RoHS 指令 2011/65/EU ,(EU) 2015/863 に準拠しています。
  This product is compliant with the EU's RoHS directive 2011/65/EU and (EU) 2015/863.

2. ハードウェアブロック図 Hardware Block Diagram



3. 基板仕様 Board specifications

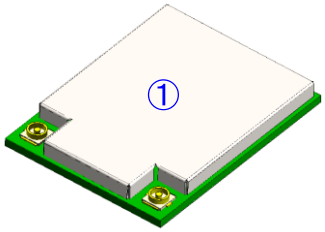
3.1. 一般仕様 General specifications

Items	Specifications	Units	Remarks
Package Type	QM.2 LGA Type 1620	–	SX-PCEBE-SMT
	M.2 Card type 2230-S3-E	–	SX-PCEBE-M2
Antenna ports	2	pcs	MHF4 connector
Antenna port's impedance	50	Ω	Nominal value
Interfaces	PCI Express 3.0 with L1SS function	–	For Wireless LAN
	USB 1.1	–	For Bluetooth
RF Interfaces	IEEE802.11a/b/g/n/ac/ax/be	–	IEEE802.11-2012 IEEE802.11ac-2013 IEEE802.11ax IEEE802.11be
	Bluetooth 5.4 BR/EDR/LE/2LE	–	
Dimensions	See §7.		
Weight	1.2	g	SX-PCEBE-SMT
	2.9	g	SX-PCEBE-M2
ESD resistance	+/- 2000	V	See §11.

3.2. 環境条件 Environmental specifications

Items	Specifications			Units	Remarks
	Min.	Typ.	Max.		
動作温度 Operating Temperature	-40	–	+85	℃	周囲温度 Ambient temperature 実装後電源電圧印加時 After assembled with powered NOTE 1, NOTE5,
動作湿度 Operating humidity	+5	–	+85	%RH	結露無きこと Non condensation 実装後電源電圧印加時 After assembled with powered
保存温度 Assembled storage temperature	-40	–	+85	℃	実装後電源電圧無印加時 After assembled with no-powered
保存湿度 Assembled storage humidity	+5	–	+85	%RH	結露無きこと Non condensation 実装後電源電圧無印加時 After assembled with no-powered
保管温度 Storage temperature	+5	–	+35	℃	梱包時。開封後は MSL に従う。 Packaged. Apply MSL after unpackaged. NOTE2
保管湿度 Storage humidity	+20	–	+60	%RH	結露無きこと Non condensing 梱包時。開封後は MSL に従う。 Packaged. Apply MSL after unpackaged.
Moisture Sensitivity Level	3			–	取り扱いについては下記を参照。 IPC/JEDEC J-STD-033 See below standard for handling. IPC/JEDEC J-STD-033 NOTE3

<table>
<tr><td>NOTE1</td><td>但し次に定義される部品のケース温度(表面接触温度)を超えないこと。
The case temperature (Tc), however, must not exceed below value.

<table><tr><th>Point</th><th>Tc (Max.)</th><th>Unit</th></tr><tr><td>①</td><td>+90</td><td>℃</td></tr></table>
  </td></tr>
<tr><td>NOTE2</td><td>部品倉庫などで長期間 (弊社出荷後 1 年間)保管する際の推奨条件です。ドライパック未開封状態の場合、この条件下でドライパック内の湿度が 10%RH 未満に保たれます。ドライパック内の湿度が 10%RH 以上となったかどうかの判断は、保管期間に関わらず、§10 に示す湿度表示シートでご確認ください。保管期間 1 年以上経過後や輸送時に保管条件を超えた可能性が有った場合は、製造前に湿度表示シートの確認やハンダ濡れ性の確認を実施することを推奨いたします。
This is the recommended condition for long-term storage (up to one year after shipment from our company) in facilities such as component warehouses. When stored in unopened dry packs, the humidity inside the dry pack is maintained below 10% RH under these conditions. To determine if the humidity inside the dry pack has exceeded 10% RH, please refer to the humidity indicator sheet as shown in §10, regardless of the storage period. If there is a possibility that the storage conditions were exceeded after one year of storage or during transportation, we recommend checking the humidity indicator sheet and solderability before manufacturing.</td></tr>
<tr><td>NOTE3</td><td>推奨ベーキング条件　(Recommended baking conditions)
基板単独 (Board only)：125℃+10/-0℃ 24 hours
リール状態 (With reel)：40℃+5/-0℃ ≦5%RH 13 days

ドライパック開封後 JEDEC J-STD-033 の取扱い条件下で≦30℃/60%RH でのフロアタイムが 168 時間を超えた場合ベーキングが必要です。ドライパック未開封時でも、§10 に示す湿度表示シートが 10%RH 以上の色に変色している場合ベーキングが必要です。
If the floor time exceeds 168 hours at ≤30°C/60%RH under the handling conditions of JEDEC J-STD-033 after opening the dry pack, baking is required. Even if the dry pack is unopened, baking is necessary if the humidity indicator sheet shown in §10 changes color to indicate a humidity level above 10% RH.</td></tr>
<tr><td>NOTE4</td><td>機能動作を保証する温度範囲となります。RF 特性の保証温度範囲は–10° C から+55° C です。
This is the temperature range guaranteed to ensure proper functionality.
The guaranteed temperature range for RF characteristics is from -10°C to +55°C.</td></tr>
<tr><td>NOTE5</td><td>EU/UK の無線認可レポートの温度範囲は–20° C から+70° C です。レポート流用する場合はこの範囲で使用してください。
The temperature range in the EU/UK radio certification report is –20°C to +70°C. If you divert the report, please use within this range.</td></tr>
</table>

3.3. 電気的仕様 Electrical specifications

絶対最大定格 Absolute Maximum Ratings

Items	Specifications			Units	Remarks
	Min.	Typ.	Max.		
主電源電圧 (3.3V) Main power supply voltage	-0.3	–	+3.63	V	
IO 電源電圧 (VIO_1V8) IO power supply voltage	-0.3		+1.98	V	

推奨動作条件 Recommended Operating Conditions

主電源 Main power supply

Items	Specifications			Units	Remarks
	Min.	Typ.	Max.		
主電源電圧 (3.3V) Main Power supply voltage	+3.135	+3.300	+3.465	V	
IO 電源電圧 (VIO_1V8) IO power supply voltage	+1.62	1.8	+1.98	V	

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

Parameters		Min.	Typ.	Max.	Units	Remarks
V_{IH}	High-level input voltage (hihys_en=HIGH)	2.145	–	3.465	V	
V_{IL}	Low-level input voltage (hihys_en=HIGH)	-0.3	–	0.99	V	
V_{OH}	High-level output voltage, CMOS	2.85	–	3.3	V	
V_{OL}	Low-level output voltage, CMOS	0.0	–	0.45	V	

3.4. 消費電流仕様 Power consumption specifications

WLAN operating

Band	Specifications					Units	Remarks
	Mode	Stream	Standard	Typ.	Peak.		
N/A	Standby	-	-	95	150	mA	
2.4GHz	Tx	2T2R	11n HT40 MCS7	500	589	mA	
			11ac VHT40 MCS11	612	674	mA	
	Rx	2T2R	11n HT40 MCS7	150	235	mA	
			11ac VHT40 MCS11	198	265	mA	
5GHz	Tx	2T2R	11ac VHT80 MCS9	607	663	mA	
			11ax HE80 MCS11	650	722	mA	
			11be EHT160 MCS13	698	786	mA	
	Rx	2T2R	11ac VHT80 MCS9	204	276	mA	
			11ax HE80 MCS11	268	334	mA	
			11be EHT160 MCS13	282	369	mA	
6GHz	Tx	2T2R	11ax HE80 MCS11	700	779	mA	
			11be EHT160 MCS13	714	796	mA	
	Rx	2T2R	11ax HE80 MCS11	270	358	mA	
			11be EHT160 MCS13	298	386	mA	

3.5. 無線 LAN 一般仕様 Wireless LAN general specifications

Items	Specifications				Units	Remarks
Chipset	QCC2076(Qualcomm Atheros)				–	
Country/Domain Code	Select by software				–	
Operating Center Frequency	Band	Modes	Min	Max		
	2.4GHz	11b	2412	2472	MHz	
		11g/n/ac/ax 20MHz	2412	2472	MHz	
		11n/ac/ax 40MHz	2422	2462	MHz	
	5GHz	11a/n/ac/ax 20MHz	5180	5885	MHz	
		11n/ac/ax 40MHz	5190	5875	MHz	
		11ac/ax 80MHz	5210	5855	MHz	
		11ac/ax 160MHz	5250	5815	MHz	
	6GHz	11ax 20MHz	5955	7115	MHz	
		11ax 40MHz	5965	7085	MHz	
		11ax 80MHz	5985	7025	MHz	
		11ax 160MHz	6025	6985	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			–	1Stream
		MCS 8,9,10,11,12,13,14,15			–	2Stream
	11ac	MCS 0,1,2,3,4,5,6,7,8,9			–	
	11ax	MCS 0,1,2,3,4,5,6,7,8,9,10,11			–	
	11be	MCS 0,1,2,3,4,5,6,7,8,9,10,11,12,13			–	
変調型 Modulation type	11b	DSSS(DBPSK,DQPSK,CCK)			–	
	11a/g/n	OFDM(BPSK,QPSK,16QAM,64QAM)			–	
	11ac	OFDM (BPSK,QPSK,16QAM,64QAM,256QAM)			–	
	11ax	OFDM (BPSK,QPSK,16QAM,64QAM,256QAM,1024QAM)			–	
	11be	OFDM(BPSK,QPSK,16QAM,64QAM, 256QAM,1024QAM,4096QAM)			–	
暗号化 Encryption	RC4	128			bits	
	AES	192			bits	

利用可能チャネルリスト Available channel list

2.4GHz

Channel	Fc (MHz)	20MHz	US/CA	EU/UK	JP
1	2412	20	Yes	Yes	Yes
2	2417	20	Yes	Yes	Yes
3	2422	20	Yes	Yes	Yes
4	2427	20	Yes	Yes	Yes
5	2432	20	Yes	Yes	Yes
6	2437	20	Yes	Yes	Yes
7	2442	20	Yes	Yes	Yes
8	2447	20	Yes	Yes	Yes
9	2452	20	Yes	Yes	Yes
10	2457	20	Yes	Yes	Yes
11	2462	20	Yes	Yes	Yes
12	2467	20	No	Yes	Yes
13	2472	20	No	Yes	Yes

Channel	Fc (MHz)	40MHz	US/CA	EU/UK	JP
3	2422	40	Yes	Yes	Yes
4	2427	40	Yes	Yes	Yes
5	2432	40	Yes	Yes	Yes
6	2437	40	Yes	Yes	Yes
7	2442	40	Yes	Yes	Yes
8	2447	40	Yes	Yes	Yes
9	2452	40	Yes	Yes	Yes
10	2457	40	No	Yes	Yes
11	2462	40	No	Yes	Yes

NOTE	日本、Canada、EU、United Kingdom では法令により 5.15-5.35GHz 帯域（W52, W53）を屋外で利用することは禁止されています。本製品を屋外で利用される場合は予め該当の電波を出さない様に設定してください。 In Japan, Canada, the EU, and the United Kingdom, it is prohibited by law to use the 5.15-5.35GHz band (W52, W53) outdoors. If you intend to use this product outdoors, please ensure that it is configured not to emit signals in the corresponding frequency bands.

5GHz

Channel	Fc (MHz)	20MHz	40MHz	80MHz	160MHz	US	CA	EU	UK	JP
36	5180	20	40	80	160	Yes	Yes	Yes	Yes	Yes
40	5200	20				Yes	Yes	Yes	Yes	Yes
44	5220	20	40			Yes	Yes	Yes	Yes	Yes
48	5240	20				Yes	Yes	Yes	Yes	Yes
52	5260	20	40	80		Yes	Yes	Yes	Yes	Yes
56	5280	20				Yes	Yes	Yes	Yes	Yes
60	5300	20	40			Yes	Yes	Yes	Yes	Yes
64	5320	20				Yes	Yes	Yes	Yes	Yes
100	5500	20	40	80	160	Yes	Yes	Yes	Yes	Yes
104	5520	20				Yes	Yes	Yes	Yes	Yes
108	5540	20	40			Yes	Yes	Yes	Yes	Yes
112	5560	20				Yes	Yes	Yes	Yes	Yes
116	5580	20	40	80		Yes	Yes	Yes	Yes	Yes
120	5600	20				Yes	No	Yes	Yes	Yes
124	5620	20	40			Yes	No	Yes	Yes	Yes
128	5640	20				Yes	No	Yes	Yes	Yes
132	5660	20	40	80	X	Yes	Yes	Yes	Yes	Yes
136	5680	20				Yes	Yes	Yes	Yes	Yes
140	5700	20	40			Yes	Yes	Yes	Yes	Yes
144	5720	20				Yes	Yes	No	Yes	Yes
149	5745	20	40	80	160	Yes	Yes	Yes	Yes	No
153	5765	20				Yes	Yes	Yes	Yes	No
157	5785	20	40			Yes	Yes	Yes	Yes	No
161	5805	20				Yes	Yes	Yes	Yes	No
165	5825	20	40	80		Yes	Yes	Yes	Yes	No
169	5845	20				Yes	No	No	No	No
173	5865	20	40			Yes	No	No	No	No
177	5885	20				Yes	No	No	No	No

NOTE	日本(LPI)、US、Canada、EU(LPI)、United Kingdom(LPI)では 6GHz 帯域を屋外で利用することは禁止されています。本製品を屋外で利用される場合は予め該当の電波を出さない様に設定してください。 In Japan (LPI), the US, Canada, the EU (LPI), and the United Kingdom (LPI), the use of the 6GHz band outdoors is prohibited. If you intend to use this product outdoors, please ensure that it is configured not to emit signals in the corresponding frequency bands.

6GHz

Channel	Fc (MHz)	20MHz	40MHz	80MHz	160MHz	US/CA (LPI)	EU/UK (LPI. VLP)	JP (LPI. VLP)
1	5955	20	40	80	160	Yes	Yes	Yes
5	5975	20				Yes	Yes	Yes
9	5995	20	40			Yes	Yes	Yes
13	6015	20				Yes	Yes	Yes
17	6035	20	40	80		Yes	Yes	Yes
21	6055	20				Yes	Yes	Yes
25	6075	20	40			Yes	Yes	Yes
29	6095	20				Yes	Yes	Yes
33	6115	20	40	80	160	Yes	Yes	Yes
37	6135	20				Yes	Yes	Yes
41	6155	20	40			Yes	Yes	Yes
45	6175	20				Yes	Yes	Yes
49	6195	20	40	80		Yes	Yes	Yes
53	6215	20				Yes	Yes	Yes
57	6235	20	40			Yes	Yes	Yes
61	6255	20				Yes	Yes	Yes
65	6275	20	40	80	160	Yes	Yes	Yes
69	6295	20				Yes	Yes	Yes
73	6315	20	40			Yes	Yes	Yes
77	6335	20				Yes	Yes	Yes
81	6355	20	40	80		Yes	Yes	Yes
85	6375	20				Yes	Yes	Yes
89	6395	20	40			Yes	Yes	Yes
93	6415	20				Yes	Yes	Yes

Channel	Fc (MHz)	20MHz	40MHz	80MHz	160MHz	US/CA (LPI)	EU/UK (LPI. VLP)	JP (LPI. VLP)
97	6435	20	40	80	160	Yes	No	No
101	6455	20				Yes	No	No
105	6475	20	40			Yes	No	No
109	6495	20				Yes	No	No
113	6515	20	40	80		Yes	No	No
117	6535	20				Yes	No	No
121	6555	20	40			Yes	No	No
125	6575	20				Yes	No	No
129	6595	20	40	80	160	Yes	No	No
133	6615	20				Yes	No	No
137	6635	20	40			Yes	No	No
141	6655	20				Yes	No	No
145	6675	20	40	80		Yes	No	No
149	6695	20				Yes	No	No
153	6715	20	40			Yes	No	No
157	6735	20				Yes	No	No
161	6755	20	40	80	160	Yes	No	No
165	6775	20				Yes	No	No
169	6795	20	40			Yes	No	No
173	6815	20				Yes	No	No
177	6835	20	40	80		Yes	No	No
181	6855	20				Yes	No	No
185	6875	20	40			Yes	No	No
189	6895	20				Yes	No	No
193	6915	20	40	80	160	Yes	No	No
197	6935	20				Yes	No	No
201	6955	20	40			Yes	No	No
205	6975	20				Yes	No	No
209	6995	20	40	80		Yes	No	No
213	7015	20				Yes	No	No
217	7035	20	40		X	Yes	No	No
221	7055	20				Yes	No	No
225	7075	20	40	X		Yes	No	No
229	7095	20				Yes	No	No
233	7115	20	X			Yes	No	No

3.6. 無線 LAN 送信仕様 Wireless LAN transmitter specifications

IEEE 802.11 規格に準拠した送信電力値を示すものです。
This shows transmitted power compliant with IEEE 802.11 standard.

NOTE1	各チャネルの最終的な送信電力値は、認証により制限を受けます。 仕向けにより制限された送信電力値は§15 に記載されています。 The final transmit power values for each channel are subject to limitations imposed by certification. The transmit power values restricted by destination are specified in §15.
NOTE2	送信電力は各アンテナ Chain 単独の値です。2 Data stream 時の総電力は+3.0dB されます。 The transmit power is the value for each antenna chain individually. The total power for 2 data streams is increased by +3.0dB.

2.4GHz (+25℃)

Standard	Modulation	Data Rates	2.4 GHz TX Power with IEEE 802.11 EVM and Spectral Mask			
		Index	802.11b/g	802.11n/ax/be 20 MHz	802.11n/ax/be 40 MHz	Units
			Typical	Typical	Typical	
802.11b	BPSK	1Mbps	18.0			dBm
	QPSK	2 Mbps	18.0			dBm
	CCK	5.5 Mbps	18.0			dBm
	CCK	11 Mbps	18.0			dBm
802.11g	BPSK	6 Mbps	18.0			dBm
	BPSK	9 Mbps	18.0			dBm
	QPSK	12 Mbps	18.0			dBm
	QPSK	18 Mbps	17.0			dBm
	16 QAM	24 Mbps	17.0			dBm
	16 QAM	36 Mbps	16.5			dBm
	64 QAM	48 Mbps	16.0			dBm
	64 QAM	54 Mbps	16.0			dBm
802.11n/ax	BPSK	MCS0		18.0	16.0	dBm
	QPSK	MCS1		18.0	16.0	dBm
	QPSK	MCS2		18.0	15.5	dBm
	16 QAM	MCS3		17.0	15.5	dBm
	16 QAM	MCS4		17.0	14.5	dBm
	64 QAM	MCS5		16.5	14.5	dBm
	64 QAM	MCS6		16.5	14.5	dBm
	64 QAM	MCS7		16.5	14.5	dBm
802.11ax	256 QAM	MCS8		16.0	14.5	dBm
	256 QAM	MCS9		16.0	14.5	dBm
	1024 QAM	MCS10		15.5	14.5	dBm
	1024 QAM	MCS11		15.5	14.5	dBm
802.11be	4096 QAM	MCS12		14.0	12.5	dBm
	4096 QAM	MCS13		14.0	11.5	dBm

5GHz (+25℃)

Standard	Modulation	Data Rates	5 GHZ TX Power with IEEE 802.11 EVM and Spectral Mask					
		Index	a	n/ac/ax/be 20 MHz	n/ac/ax/be 40 MHz	n/ac/ax/be 80 MHz	ac/ax/be 160 MHz	Units
			Typical	Typical	Typical	Typical	Typical	
802.11a	BPSK	6 Mbps	17.5					dBm
	BPSK	9 Mbps	17.5					dBm
	QPSK	12 Mbps	17.5					dBm
	QPSK	18 Mbps	17.5					dBm
	16 QAM	24 Mbps	17.0					dBm
	16 QAM	36 Mbps	17.0					dBm
	64 QAM	48 Mbps	16.5					dBm
	64 QAM	54 Mbps	16.0					dBm
802.11n/ac/ax	BPSK	MCS0		17.5	17.0	16.5	16.5	dBm
	QPSK	MCS1		17.5	17.0	16.5	16.5	dBm
	QPSK	MCS2		17.0	16.5	16.0	16.0	dBm
	16 QAM	MCS3		17.0	16.5	16.0	16.0	dBm
	16 QAM	MCS4		16.5	16.0	15.5	15.5	dBm
	64 QAM	MCS5		16.5	16.0	15.5	15.5	dBm
	64 QAM	MCS6		16.0	15.5	15.5	15.5	dBm
	64 QAM	MCS7		15.0	14.5	14.5	14.5	dBm
802.11ac/ax	256 QAM	MCS8		14.5	14.5	14.5	14.5	dBm
	256 QAM	MCS9		14.0	13.5	13.0	13.0	dBm
802.11ax	1024 QAM	MCS10		13.0	13.0	13.0	13.0	dBm
	1024 QAM	MCS11		13.0	12.5	12.5	12.5	dBm
802.11be	4096 QAM	MCS12		12.0	12.0	12.0	12.0	dBm
	4096 QAM	MCS13		12.0	12.0	12.0	12.0	dBm

6GHz (+25℃)

Standard	Modulation	Data Rates	6 GHZ TX Power with IEEE 802.11 EVM and Spectral Mask				
		Index	ax/be 20 MHz	ax/be 40 MHz	ax/be 80 MHz	ax/be 160 MHz	Units
			Typical	Typical	Typical	Typical	
802.11ax	BPSK	MCS0	16.5	16.0	15.5	15.5	dBm
	QPSK	MCS1	16.5	16.0	15.5	15.5	dBm
	QPSK	MCS2	16.0	15.5	15.0	15.0	dBm
	16 QAM	MCS3	16.0	15.5	15.0	15.0	dBm
	16 QAM	MCS4	15.5	15.0	14.5	14.5	dBm
	64 QAM	MCS5	15.5	15.0	14.5	14.5	dBm
	64 QAM	MCS6	15.0	14.5	14.5	14.5	dBm
	64 QAM	MCS7	14.0	13.5	13.5	13.5	dBm
	256 QAM	MCS8	13.5	13.5	13.5	13.5	dBm
	256 QAM	MCS9	13.0	12.5	12.0	12.0	dBm
	1024 QAM	MCS10	12.0	12.0	12.0	12.0	dBm
	1024 QAM	MCS11	12.0	11.5	11.5	11.5	dBm
802.11be	4096 QAM	MCS12	11.0	11.0	11.0	11.0	dBm
	4096 QAM	MCS13	11.0	11.0	11.0	11.0	dBm

送信パワーの不確かさ Transmit power uncertainty (-10℃ ~ +55℃)

Items	Specifications				Units	Remarks
	Modes	Min.	Typ.	Max.		
周囲環境条件による 送信パワーの不確かさ Power uncertainty due to environmental conditions ※温度、電源条件 Temperature, Power supply	All mode	-2.0	–	+2.0	dB	

周波数精度 Frequency accuracy (-20℃ ~ +85℃)

Item	Specifications				Unit	Remark
	Standards	Min.	Typ.	Max.		
周波数精度 Frequency accuracy	All mode	-20	0	+20	ppm	

3.7. 無線 LAN 受信仕様 Wireless LAN receiver specifications

2.4GHz (-10℃ ~ +55℃)

Items	Specifications					Units	Remarks
	Modes		Min.	Typ.	Max.		
最小受信感度 Receiver minimum Sensitivity	11b	1Mbps	–	-98	-80	dBm	FER<8%
		11Mbps	–	-91	-76		
	11g	6Mbps	–	-95	-82		PER<10%
		54Mbps	–	-77	-65		
	11n 20MHz	MCS0	–	-96	-82		
		MCS7	–	-76	-64		
	11ax 20MHz	MCS0	–	-95	-82		
		MCS11	–	-64	-52		
	11be 20MHz	MCS0	–	-95	-82		
		MCS13	–	-58	-46		
	11n 40MHz	MCS0	–	-93	-79		
		MCS7	–	-74	-61		
	11ax 40MHz	MCS0	–	-92	-79		
		MCS11	–	-62	-49		
	11be 40MHz	MCS0		-93	-79		
		MCS13		-56	-43		

5GHz (-10℃ ~ +55℃)

Items	Specifications					Units	Remarks
	Modes		Min.	Typ.	Max.		
最小受信感度 Receiver minimum Sensitivity	11a	6Mbps	–	-94	-82	dBm	PER<10%
		54Mbps	–	-76	-65		
	11n 20MHz	MCS0	–	-95	-82		
		MCS7	–	-76	-64		
	11ac 20MHz	MCS0	–	-95	-82		
		MCS9	–	-70	-57		
	11ax 20MHz	MCS0	–	-94	-82		
		MCS11	–	-64	-52		
	11be 20MHz	MCS0	–	-95	-82		
		MCS13	–	-58	-46		
	11n 40MHz	MCS0	–	-92	-79		
		MCS7	–	-73	-61		
	11ac 40MHz	MCS0	–	-92	-79		
		MCS9	–	-68	-54		
	11ax 40MHz	MCS0	–	-92	-79		
		MCS11	–	-61	-49		
	11be 40MHz	MCS0	–	-92	-79		
		MCS13	–	-55	-43		
	11ac 80MHz	MCS0	–	-89	-76		
		MCS9	–	-64	-51		
	11ax 80MHz	MCS0	–	-88	-76		
		MCS11	–	-58	-46		
	11be 80MHz	MCS0	–	-89	-76		
		MCS13	–	-52	-40		
	11ac 160MHz	MCS0	–	-86	-73		
		MCS9	–	-62	-48		
	11ax 160MHz	MCS0	–	-86	-73		
		MCS11	–	-55	-43		
	11be 160MHz	MCS0	–	-86	-73		
		MCS13	–	-49	-37		

6GHz (-10℃ ~ +55℃)

Items	Specifications					Units	Remarks
	Modes		Min.	Typ.	Max.		
最小受信感度 Receiver minimum Sensitivity	11ax 20MHz	MCS0	–	-93	-82	dBm	PER<10%
		MCS11	–	-63	-52		
	11be 20MHz	MCS0	–	-94	-82		
		MCS13	–	-57	-46		
	11ax 40MHz	MCS0	–	-91	-79		
		MCS11	–	-60	-49		
	11be 40MHz	MCS0		-91	-79		
		MCS13		-54	-43		
	11ax 80MHz	MCS0	–	-87	-76		
		MCS11	–	-57	-46		
	11be 80MHz	MCS0		-88	-76		
		MCS13		-51	-40		
	11ax 160MHz	MCS0	–	-85	-73		
		MCS11	–	-54	-43		
	11be 160MHz	MCS0		-85	-73		
		MCS13		-48	-37		

3.8. Bluetooth 一般仕様 Bluetooth general specifications

Items	Specifications			Units	Remarks
チップセット Chipset	QCC2076(Qualcomm Atheros)			–	
コア仕様 Core specification	Bluetooth 5.4			–	
動作周波数	Mode	Min	Max		
Operating Frequency range	BR/EDR/LE/2LE	2402	2480	MHz	
周波数間隔	BR/EDR	1		MHz	Ch.0-Ch.78
Frequency step	LE/2LE	2		MHz	Ch.0-Ch.39
変調方式	BR 1Mbps	GFSK		–	
Modulation type	EDR 2Mbps	Π/4 DQPSK		–	
	EDR 3Mbps	8DPSK		–	
	LE 1Mbps	GFSK		–	
	LE 2Mbps	GFSK		–	
暗号化	E0	128		bits	BR/EDR
Encryption	AES	128		bits	LE/2LE

3.9. Bluetooth 送信仕様 Bluetooth transmitter specifications

US/Canada/EU/UK (+25℃)

Items	Specifications						Units	Remarks
	Standards			Min.	Typ.	Max.		
最大送信電力 Maximum TX power	BR	Class 1	Ch.0-Ch.78	9.5	12.5	15.5	dBm	
	EDR	Class 1	Ch.0-Ch.78	5.5	8.5	11.5	dBm	
	LE/2LE		Ch.0-Ch.39	8.5	11.5	14.5	dBm	

Japan (+25℃)

Items	Specifications						Units	Remarks
	Standards			Min.	Typ.	Max.		
最大送信電力 Maximum TX power	BR	Class 1	Ch.0-Ch.78	10.0	13.0	16.0	dBm	
	EDR	Class 1	Ch.0-Ch.78	5.0	8.0	11.0	dBm	
	LE/2LE		Ch.0-Ch.39	1.0	4.0	7.0	dBm	

Frequency accuracy (-20℃ ~ +65℃)

Items	Specifications				Units	Remarks
	Standards	Min.	Typ.	Max.		
中心周波数精度 Center frequency accuracy	BR/EDR/LE/2LE	-20	–	+20	ppm	

3.10. Bluetooth 受信仕様 Bluetooth receiver specifications

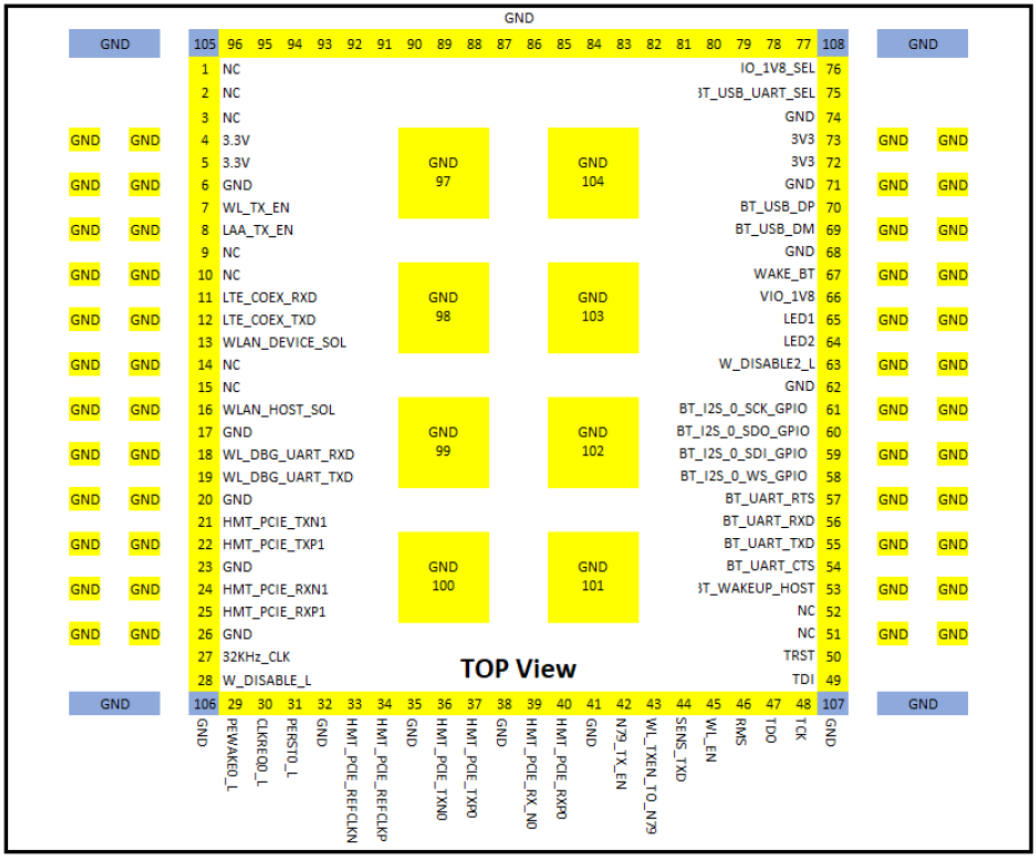
Bluetooth BR / EDR / LE / 2LE (-10℃ ~ +55℃)

Items	Specifications					Units	Remarks
	Standards	Packet Types	Min.	Typ.	Max.		
最小受信感度	BR	GFSK	−	-90	-70	dBm	BER<0.1%
Receiver	EDR 2Mbps	Π/4 DQPSK	−	-94	-70	dBm	BER<0.01%
minimum	EDR 3Mbps	8DPSK	−	-88	-70	dBm	
Sensitivity	LE 1Mbps	GFSK	−	-93	-70	dBm	PER<30%
	LE 2Mbps	GFSK	−	-90	-70	dBm	

4. 信号仕様 Signal pins specifications

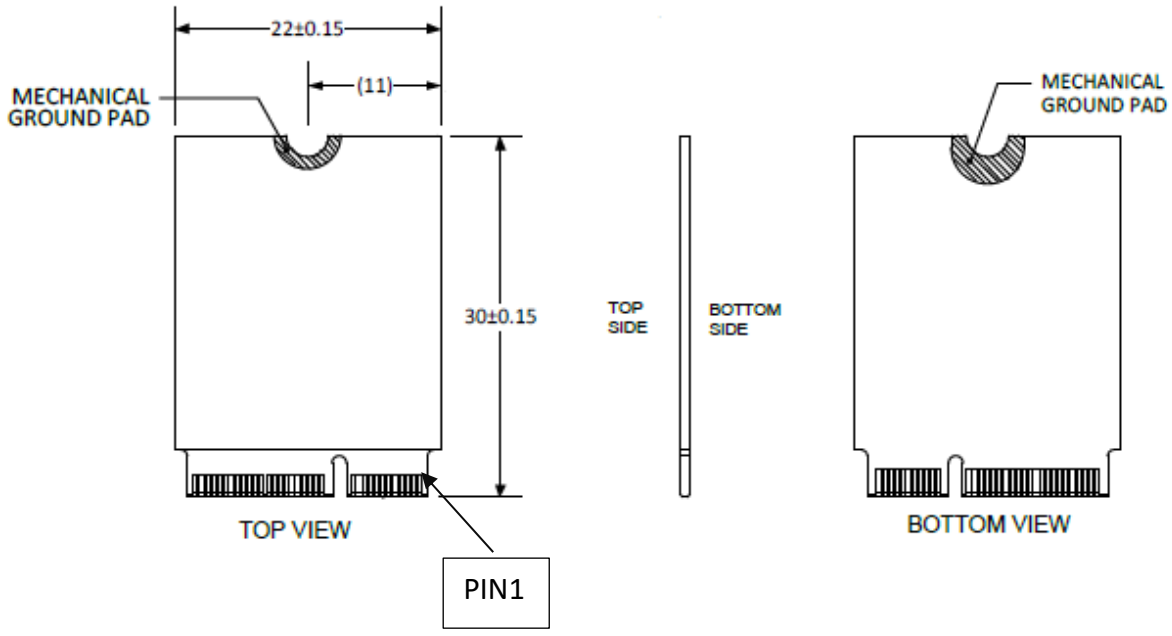
4.1. ピン配置 Pin locations

◆SX-PCEBE-SMT



◆SX-PCEBE-M2

TOP VIEW **BOTTOM VIEW**



4.2. 信号仕様 Signal descriptions

◆ **SX-PCEBE-SMT**

Pin	Pin Name	Type	Pad Voltage	Description
1	Reserved	NC	NA	NC
2	Reserved	NC	NA	NC
3	Reserved	NC	NA	NC
4	3.3V	POWER	3.3V	3.3V power input
5	3.3V	POWER	3.3V	3.3V power input
6	GND	GND		
7	Reserved (WL_TX_EN)	DO	1.8V	The QCC asserts this GPIO to high state, when either 5GHz chain0 or chain1 is set to transmit at power greater than certain power. When this GPIO is set high, the LAA receivers is placed in a protected state
8	Reserved (LAA_TX_EN)	DI	1.8V	This is an input from the SDR to QCC. The SDR sets GPIO high if LAA is transmitting above a prescribed RF power. GPIO is monitored by QCC. When it goes high, QCC places the 5GHz receiver in a protected state.
9	Reserved	NC	NA	NC
10	Reserved	NC	NA	NC
11	Reserved (LTE_COEX_RXD)	DI	1.8V	WSI interface for LTE co-existing interface with LTE modem to enable FW communication
12	Reserved (LTE_COEX_TXD)	DO	1.8V	WSI interface for LTE co-existing interface with LTE modem to enable FW communication
13	WLAN_DEVICE_SOL	DI	1.8V	Device sign of life
14	NC	NC	NA	NC
15	NC	NC	NA	NC
16	Reserved (WLAN_HOST_SOL)	DI	1.8V	HOST sign of life
17	GND	GND		
18	Reserved (WL_DBG_UART_RXD)	DI	1.8V	Debug interface (Host no need to connect)
19	Reserved (WL_DBG_UART_TXD)	DO	1.8V	Debug interface (Host no need to connect)
20	GND	GND		
21	HMT_PCIE_TXN1	AO	-	PCIe TX differential signal lane 1 shall be connected to receiver differential pair on the system board
22	HMT_PCIE_TXP1	AO	-	PCIe TX differential signal lane 1 shall be connected to receiver differential pair on the system board
23	GND	GND		
24	HMT_PCIE_RXN1	AI		PCIe RX differential signal lane 1 shall be connected to transmitter differential pair on the system board
25	HMT_PCIE_RXP1	AI		PCIe RX differential signal lane 1 shall be connected to transmitter differential pair on the system board
26	GND	GND		
27	Reserved (32KHz_CLK)	DI	1.8V	Suspend Clock is a 32.768KHz clock supply input that is provided by platform to enable WLAN to enter reduce

				power consumption mode. A pull-down resistor is required if this pin is not used.
28	Reserved (W_DISABLE_L)	DI	1.8V	It is an interrupt pin to WLAN. When WLAN detected interrupt, it turns off WLAN MAC/PHY/RF for power save application
29	Reserved (PEWAKE0_L)	DO	1.8V	WALN PCIe wake-up signal. It is an open-drain signal that requires an external pull-up
30	CLKREQ0_L	DI/DO	1.8V	WALN PCIe clock request signal. It is an open-drain signal that requires an external pull-up
31	PERST0_L	DI	1.8V	WLAN PCIe reset
32	GND	GND		
33	HMT_PCIE_REFCLKN	AI		WLAN PCIe reference clock input differential signals
34	HMT_PCIE_REFCLKP	AI		WLAN PCIe reference clock input differential signals
35	GND	GND		
36	HMT_PCIE_TXN0	AO		PCIe TX differential signal lane 0 shall be connected to receiver differential pair on the system board
37	HMT_PCIE_TXP0	AO		PCIe TX differential signal lane 0 shall be connected to receiver differential pair on the system board
38	GND	GND		
39	HMT_PCIE_RXN0	AI		PCIe RX differential signal lane 0 shall be connected to transmitter differential pair on the system board
40	HMT_PCIE_RXP0	AI		PCIe RX differential signal lane 0 shall be connected to transmitter differential pair on the system board
41	GND	GND		
42	Reserved (N79_TX_EN-)	DI		This is an input from the SDR to QCC. This GPIO is set high by the SDR when N79 transmits above a prescribed RF power. The QCC can be configured to respond to this GPIO when operating below a certain channel number, and to ignore this GPIO when operating above a certain channel number. When QCC responds to this GPIO, it places the 5GHz receivers in a protected state
43	Reserved (WL_TXEN_TO_N79)	DO		This is an output from the QCC to SDR. The QCC asserts this GPIO to high state when the 5GHz or 6GHz chains are transmitting above certain power, and below a configurable channel frequency. The intent of allowing the channel to be configured is to improve concurrency with N79, depending on the filter selected and used on the device
44	Reserved (SENS_TXD)	DO		Bluetooth 2-wire UART interfaces connect to the sensor block in the host
45	WL_EN	DI		WLAN enable signal. It is an input, active high to enable Bluetooth operation
46	Reserved	NC	NA	NC
47	Reserved	NC	NA	NC
48	Reserved	NC	NA	NC
49	Reserved	NC	NA	NC

50	Reserved	NC	NA	NC
51	Reserved	NC	NA	NC
52	Reserved	NC	NA	NC
53	Reserved (BT_WAKEUP_HOST)	DO	1.8V	Wakeup host via Bluetooth while receiving magic Packet frame
54	Reserved (BT_UART_CTS)	DI	1.8V	UART Clear to Send
55	Reserved (BT_UART_TXD)	DO	1.8V	UART Transmit Data The baud rate is 115200 as default and can be configured up to 3.125Mbps
56	Reserved (BT_UART_RXD)	DI	1.8V	UART Receive Data The baud rate is 115200 as default and can be configured up to 3.125Mbps
57	Reserved (BT_UART_RTS)	DO	1.8V	UART Ready to Send
58	Reserved (BT_I2S_0_WS_GPIO)	DI	1.8V	Bluetooth 4-wire I2S interface operated in slave mode. The clock rate is up to 2.048MHz. I2S word select
59	Reserved (BT_I2S_0_SDI_GPIO)	DI	1.8V	Bluetooth 4-wire I2S interface operated in slave mode. The clock rate is up to 2.048MHz. I2S data input
60	Reserved (BT_I2S_0_SDO_GPIO)	DO	1.8V	Bluetooth 4-wire I2S interface operated in slave mode. The clock rate is up to 2.048MHz. I2S data output
61	Reserved (BT_I2S_0_SCK_GPIO)	DI	1.8V	Bluetooth 4-wire I2S interface operated in slave mode. The clock rate is up to 2.048MHz. I2S continuous serial clock
62	GND	GND		
63	W_DISABLE2_L	DI	1.8V	3.3V tolerant input. It is an interrupt pin to BT. Active low to disable BT function
64	Reserved (LED2)	OD	1.8V	BT status indicator
65	Reserved (LED1)	OD	1.8V	Wi-Fi status indicator
66	VIO_1V8	POWER	1.8V	1.8V input for VDD_IO
67	Reserved (WAKE_BT)	DI	1.8V	Wakeup BT via HOST while sending an interrupt event
68	GND	GND		
69	BT_USB_DM	AI/AO	-	USB Data- differential serial data interface
70	BT_USB_DP	AI/AO	-	USB Data+ differential serial data interface
71	GND	GND		
72	3.3V	POWER	3.3V	3.3V power input
73	3.3V	POWER	3.3V	3.3V power input
74	GND	GND		
75	BT_USB_UART_SEL	DO	1.8V	Connect this pin to GND if platform is x86
76	IO_1V8_SEL	DO	1.8V	Connect this pin to GND if platform is x86
77~168	GND	GND		

◆**SX-PCEBE-M2**

Pin	Pin Name	Type	Pad Voltage	Description
74	3.3V	POWER	3.3V	3.3V power input
72	3.3V	POWER	3.3V	3.3V power input
70	Reserved	NC	NA	NC
68	Reserved	NC	NA	NC
66	Reserved	-	NA	I2C interface. Bluetooth GPIO pins.
64	Reserved	NC	NA	NC
62	Reserved	NC	NA	NC
60	Reserved	NC	NA	NC
58	Reserved	NC	NA	NC
56	Reserved	DI	1.8V	Active Low to disable WLAN radio operation
54	W_DISABLE2_L	DI	1.8V	3.3V tolerant input. Active Low to disable BT radio operation
52	PERST0_L	DI	1.8V	PCIe Reset is a functional reset to WLAN; Active Low
50	Reserved	NC	NA	NC
48	Reserved	NC	NA	NC
46	Reserved	NC	NA	NC
44	Reserved	NC	NA	NC
42	Reserved	NC	NA	NC
40	Reserved	NC	NA	NC
38	Reserved	NC	NA	NC
36	Reserved	DI	1.8V	BT_UART CTS(Clear to Send)
34	Reserved	DO	1.8V	BT_UART RTS (Ready to Send)
32	Reserved	DI	1.8V	BT_UART RXD (Receive Data)
				ADD-IN CARD KEY E
22	Reserved	DO	1.8V	BT_UART TXD (Transmit Data)
20	Reserved	DO	1.8V	UART_WAKE#(O)
18	GND	GND		
16	Reserved	OD	1.8V	LED2, Open drain, active low signal. BT status indicator
14	Reserved	DI	1.8V	PCM_IN/I2S_SD_IN(I)
12	Reserved	DO	1.8V	PCM_OUT/I2S_SD_OUT(O)
10	Reserved	I/O	1.8V	PCM_SYNC/I2S_WS(I/O)
8	Reserved	I/O	1.8V	PCM_CLK/I2S_SCK(I/O)
6	Reserved	OD	1.8V	LED1, Open drain, active low signal. WiFi status indicator
4	3.3V	POWER	3.3V	3.3V power input
2	3.3V	POWER	3.3V	3.3V power input

Pin	Pin Name	Type	Pad Voltage	Description
75	GND	GND		
73	Reserved	NC	NA	NC
71	Reserved	NC	NA	NC
69	GND	GND		
67	HMT_PCIE_TXN1	AO	-	WLAN PCIe transmit output differential signals lane 1
65	HMT_PCIE_TXP1	AO	-	WLAN PCIe transmit output differential signals lane 1
63	GND	GND		
61	HMT_PCIE_RXN1	AI	-	WLAN PCIe receive input differential signals lane 1
59	HMT_PCIE_RXP1	AI	-	WLAN PCIe receive input differential signals lane 1
57	GND	GND		
55	Reserved	DO	1.8V	PEWAKE0_L Request to service a function initiated wake event. An external pull-up resistor on the platform is required; Active Low
53	CLKREQ0_L	I/O	1.8V	Clock request is a reference clock request signal. An external pull-up resistor on the platform is required; Active Low
51	GND	GND		
49	HMT_PCIE_REFCLKN	AI	-	PCIe reference clock signals(100MHz)
47	HMT_PCIE_REFCLKP	AI	-	PCIe reference clock signals(100MHz)
45	GND	GND		
43	HMT_PCIE_TXN0	AO	-	PCIe TX differential signal shall be connected to receiver differential pair on the system board
41	HMT_PCIE_TXP0	AO	-	PCIe TX differential signal shall be connected to receiver differential pair on the system board
39	GND	GND		
37	HMT_PCIE_RXN0	AI	-	PCIe RX differential signal shall be connected to transmitter differential pair on the system board
35	HMT_PCIE_RXP0	AI	-	PCIe RX differential signal shall be connected to transmitter differential pair on the system board
33	GND	GND		
				ADD-IN CARD KEY E
23	Reserved	NC	NA	NC
21	Reserved	NC	NA	NC
19	Reserved	NC	NA	NC
17	Reserved	NC	NA	NC
15	Reserved	NC	NA	NC
13	Reserved	NC	NA	NC
11	Reserved	NC	NA	NC
9	Reserved	NC	NA	NC
7	GND	GND		
5	BT_USB_DM	AI/AO	-	USB Data- differential serial data interface
3	BT_USB_DP	AI/AO	-	USB Data+ differential serial data interface
1	GND	GND		

NOTE	W_DISABLE2_L を除き、PERST0_L、CLKREQ0_L、及び他の GPIO 信号は 1.8V 仕様です。ホストボードの信号電圧に注意してください。 PERST0_L, CLKREQ0_L and other GPIO signals are 1.8V IO except for W_DISABLE2_L. Please notice to the signal voltage of the host board.

4.3. 信号定義 Signal definitions

Symbols	Descriptions
AI	モジュールへのアナログインプット Analog input to module
AO	モジュールからのアナログアウトプット Analog output from module
OD	オープンドレインの出力信号 An output signal with open drain
DI	モジュールへのデジタルインプット Digital input to module
DO	モジュールからのデジタルアウトプット Digital output from module
PU	ウィークプルアップインプット信号 Input signal with weak pull-up.
PD	ウィークプルダウンインプット信号 Input signal with weak pull-down.
POWER	電源 Voltage supply
GND	グラウンド Ground
NC	未接続 No connection

4.4. Bluetooth interface configuration

◆SX-PCEBE-SMT

BT Interface	BT_USB_UART_SEL(Pin75)	IO_1V8_SEL(Pin76)
USB Interface	GND	GND
UART Interface[Note]	Floating	Floating

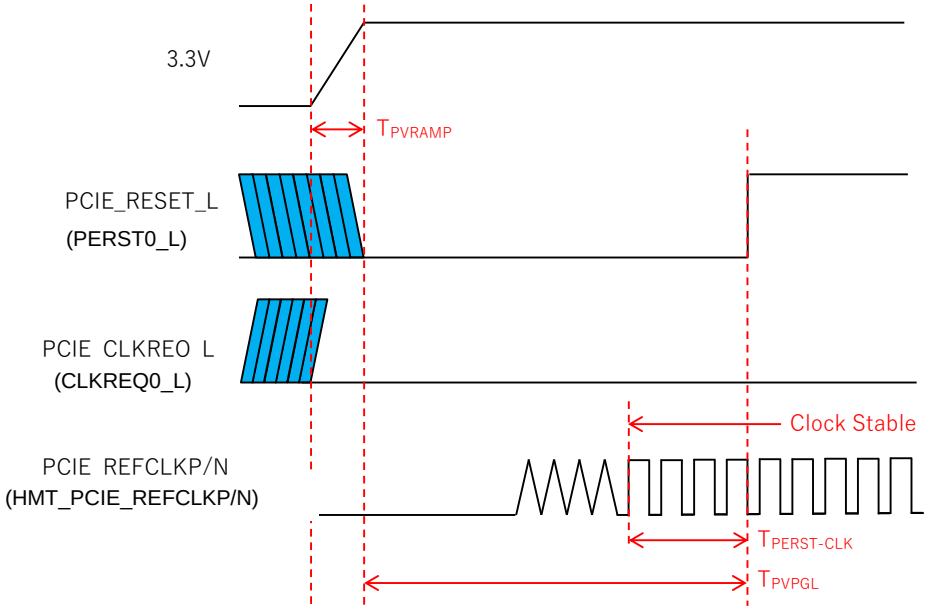
Note: UART Interface is reserved mode, not confirmed to work.

◆SX-PCEBE-M2

For the M2 board, the only Bluetooth interface is USB.

5. 起動シーケンス Power up sequence

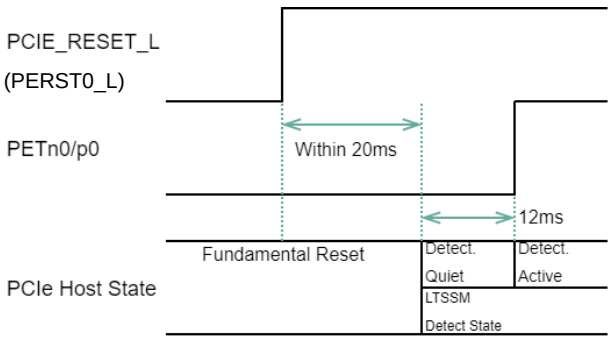
5.1. PCIe 起動シーケンスタイミング PCIe power up sequence timing



Symbols	Items	Specifications		Units
		Min.	Max.	
T_{PVRAMP}	Power Supply Ramp on 3.3V	–	100	msec
T_{PVPGL}	Power(3.3V) valid to PERST0_L Input inactive	50	–	Msec
$T_{PERST-CLK}$	REFCLK stable before PERST0_L inactive	100	–	µsec

*PCI ホストは PCIE_RESET_L リリース時（Fundamental Reset リリース時）、PCI ホストは 20msec 以内に LTSSM の Detect State に遷移しなければなりません。PCI ホストステートの詳細は PCI Express v1.1 規格を参照ください。

*When PCI host releases PCIE_RESET_L (Fundamental Reset release), the PCI host must transition to the LTSSM Detect State within 20msec. For details on PCI host states, please refer to the PCI Express v1.1 specification.



5.2. チップリセット条件 Chip reset condition

QCC2076 チップをリセットするには内部信号 WL_EN を Low レベルにするために、3.3V 電源を一度 OFF にして再度 ON する必要があります。PERST0_L 信号を Low レベルにすると QCC2076 チップの PCI Express Interface 部のみがリセットされ、QCC2076 チップはリセットされません。

To reset the QCC2076 chip, the internal signal WL_EN must be set to a low level, requiring the 3.3V power supply to be turned off and then on again. When the PERST0_L signal is set to a low level, only the PCI Express Interface portion of the QCC2076 chip is reset, while the QCC2076 chip itself is not reset.

6. 適合規格 Standards compliance

6.1. 規格一覧 Standards list

適合規格 Standards conformity

- IEEE802.11-2012 (a/b/g/n)
- IEEE802.11ac-2013
- IEEE802.11ax
- IEEE802.11be
- Bluetooth 5.4 BR/EDR/LE
  DID: D063900 [Qualcomm Technologies, Inc.]
  Reference information: QDID: 206419 [Qualcomm Technologies, Inc.]
- PCI Express 3.0 with L1SS function
- USB 1.1

適合法規制 Law regulation compliance

- 日本電波法 (MIC) NOTE4
  証明規則第 2 条第 1 項 第 19 号 (WLAN, Bluetooth)
  証明規則第 2 条第 1 項 第 19 号の 3 (W52/W53/W56 DFS master 対応) NOTE3
  証明規則第 2 条第 1 項第 79 号(VLP 子局)
  証明規則第 2 条第 1 項第 80 号(LPI 子局)
  Article 2 paragraph 1 item (19) (WLAN, Bluetooth)
  Article 2 paragraph 1 item (19)-3 (W52/W53/W56 with DFS master) NOTE3
  Article 2 paragraph 1 item (79) (VLP Client)
  Article 2 paragraph 1 item (80) (LPI Client)
  認証番号 Certification number: 003-240192

- FCC Part15
  Subpart C (2.4GHz WLAN, Bluetooth)
  Subpart E (U-NII-1/2A/2C/3/4 with DFS master, 6G Dual Client) NOTE1
  ID: N6C-PCEBE

- ISED
  RSS-247 (2.4GHz WLAN, Bluetooth)
  RSS-247 (U-NII-1/2A/2C/3 with DFS master)
  RSS-248 (6G Client) NOTE1
  ID: 4908A-PCEBE

- ETSI
  EN 300 328 (2.4GHz WLAN, Bluetooth)
  EN 301 893 (W52/W53/W56 with DFS master)
  EN 300 440 (5.8GHz)
  EN 303 687(Draft) (6G Client) NOTE2

- Ofcom
  EN 300 328 (2.4GHz WLAN, Bluetooth)
  EN 301 893 (W52/W53/W56 with DFS master)
  VNS 2030/8/3 (5.8GHz)
  EN 303 687(Draft) (6G Client) NOTE2

- CE RoHS Directive
- EN 62311
- IEC 62368-1:2014 (EN 62368-1:2014+A11:2017)

対応国 Supported countries

- Asia
  Japan

- North America
  US
  Canada

- EU NOTE2

- United Kingdom NOTE2

NOTE1	本製品の 6GHz 帯の認証取得クラス/カテゴリは US では 6CD (Dual Client)、Canada では Client Device です。他のクラス/カテゴリは未取得のため、6GHz 帯の Access Point としては使えません。 The certification class/category for the 6GHz band of this product is 6CD (Dual Client) in the US and Client Device in Canada. As other classes/categories are not acquired, it cannot be used as an Access Point in the 6GHz band.
NOTE2	EU で 6GHz 帯を使用する場合、EU の NB 検証を取得する必要があります。 United Kingdom で 6GHz 帯を使用する場合、United Kingdom の NB 検証を取得する必要があります。 If you intend to use the 6GHz band in the EU, you need to obtain EU's NB verification. If you plan to use the 6GHz band in the United Kingdom, you need to obtain United Kingdom's NB verification.
NOTE3	DFS の制限：Host の追加申請が必要 DFS restrictions: Additional application by the host is required.
NOTE4	日本電波法の認証番号は、必ず最終製品に表示してください。 Please make sure to display the certification number of the Japanese Radio Law on the final product without fail.
	その他、各国の法令に従って使用してください。 Additionally, please use the product in accordance with the regulations of each country.
用語説明 Further Note of Glossary	
Access Point	これは 6GHz 帯域での定義です。以下のいずれかに該当するものを指します。 - ピアツーピアのブリッジ接続をするもの - 優先と無線、それぞれのネットワークセグメント間を接続するもの - 無線ネットワークセグメント間のリレーをするもの This is a definition for the 6GHz band, referring to any of the following: - Devices that establish point-to-point bridge connections. - Devices that connect priority and wireless segments. - Devices that relay between wireless network segments.
Client	これは 6GHz 帯域での定義です。 クライアントデバイスは、送信がアクセスポイントか室内で従属する機器の制御下におかれている機器です。クライアントデバイスはネットワークを開始できません。 クライアントデバイスとは固定クライアントデバイス、ローパワークライアントデバイス、スタンダードクライアントデバイスを含みます。 This is a definition for the 6GHz band. A client device is a device that is under the control of either an access point or an indoor unit for transmission. A client device cannot initiate a network. A client device includes fixed client devices, low-power client devices, and standard client devices.

6.2. 推奨アンテナリスト Recommended antennas list

日本 (Japan) MIC

Antennas	Vendors	Type	2.4GHz (dBi)	5GHz (dBi)	6GHz (dBi)	No.19 2.4GHz	No.19-3 W52/53/56	No.79, 80 6GHz
2118907-8 (Include 150mm cable loss)	TE Connectivity	Monopole	+2.21	+2.16	+2.72	✓	✓	✓
AA258 (H2B1PC1A1C) (Include 50mm cable loss)	Unictron	Dipole	+2.67	+3.92	+3.59	✓	✓	✓
ANTDC-081A0/B0 (Exclude cable loss)	Sansei-Denki	Dipole	+2.0	+2.0	—	✓	✓	—
ANTDP-027A0 (Exclude cable loss)	Sansei-Denki	Dipole	+1.5	+2.1	—	✓	✓	—
AP02ML27******* (Include 300mm cable loss)	JAE	Dipole	+1.03	+2.74	+2.41	✓	✓	✓

アメリカ・カナダ (USA/Canada) FCC/ISED

Antennas	Vendors	Type	2.4GHz (dBi)	5GHz (dBi)					6GHz (dBi)				Sub. C RSS-247 2.4GHz	Sub. E RSS-247 5GHz	Sub. E RSS-248 6GHz
				B1	B2A	B2C	B3	B4	B5	B6	B7	B8			
2118907-8 (Include 150mm cable loss)	TE Connectivity	Monopole	+2.21	+1.22	+1.98	+2.16	+1.93	+1.35	+2.72	+3.58	+2.12	+1.92	✓	✓	✓

ヨーロッパ・イギリス (Europe・UK) ETSI/Ofcom

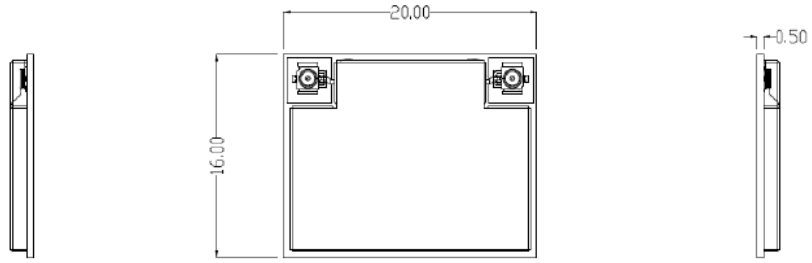
Antennas	Vendors	Type	2.4GHz (dBi)	5GHz (dBi)				6GHz (dBi)	300328	301893	300440 2030/8/3	303687
				B1	B2A	B2C	B3	B5				
2118907-8 (Include 150mm cable loss)	TE Connectivity	Monopole	+2.21	+1.22	+1.98	+2.16	+1.93	+2.72	✓	✓	✓	✓

Notice:

NOTE1	本製品は上記の法規制に適合していますが、認可内容の詳細や制限事項については認可証/認可レポートを十分にご確認ください。 This product complies with the above regulations, but please refer to the approval certificate/approval report for detailed information and restrictions regarding the authorization content.
NOTE2	これらの認証は silex 推奨アンテナ、silex 製ボードデータファイルと silex 製ドライバでのみ有効です。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、または silex 製ドライバ以外を使う場合は再認証試験が必要になる可能性があります。 These certifications are valid only when using silex-recommended antennas, silex-made board data files, and silex-made drivers. However, if the final product form differs from using silex-recommended antennas or if non-silex-made drivers are used, there may be a need for re-certification testing.
NOTE3	各国の EMC 認証は最終製品形態での試験が必要です。 EMC certifications in each country require testing in the final product form.

7. 機械的仕様 Mechanical specifications

◆SX-PCEBE-SMT

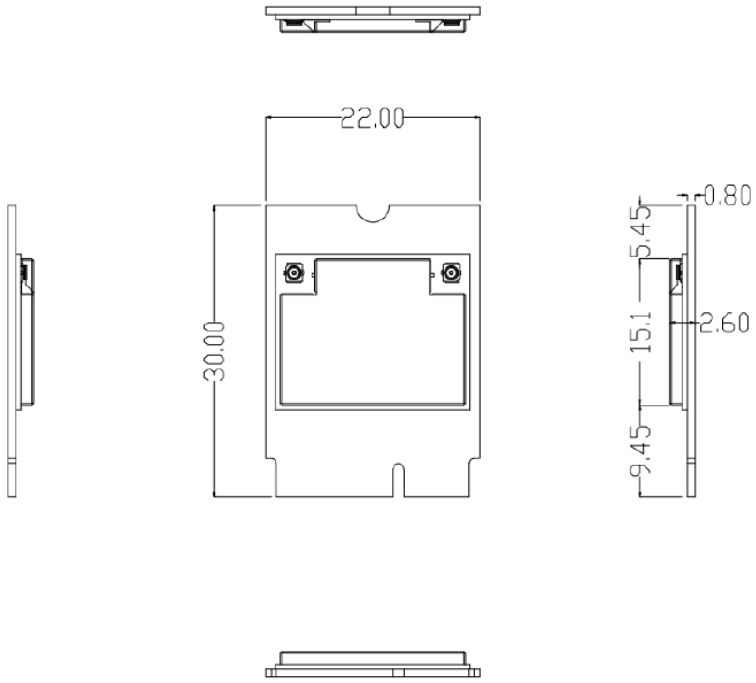


Tolerance: C

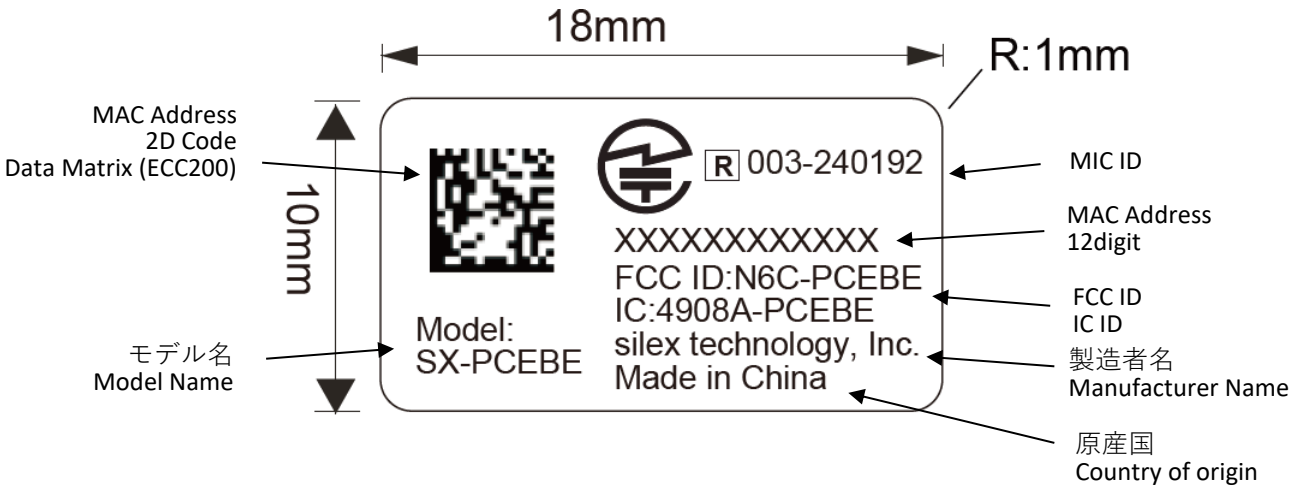
DIM \ DEG	A	B	C	D	ANGLE	
0-5	±0.05	±0.05	±0.10		0°-30°	±0.1°
5-10	±0.05	±0.10	±0.15		31°-60°	±0.5°
10-50	±0.10	±0.15	±0.20		61°-90°	±0.5°
50-100	±0.15	±0.20	±0.25			
100-	±0.15%	±0.20%	±0.25%			

Unit: mm

◆SX-PCEBE-M2



8. 表示仕様 Indication specifications



9. 構成リスト Components compositions

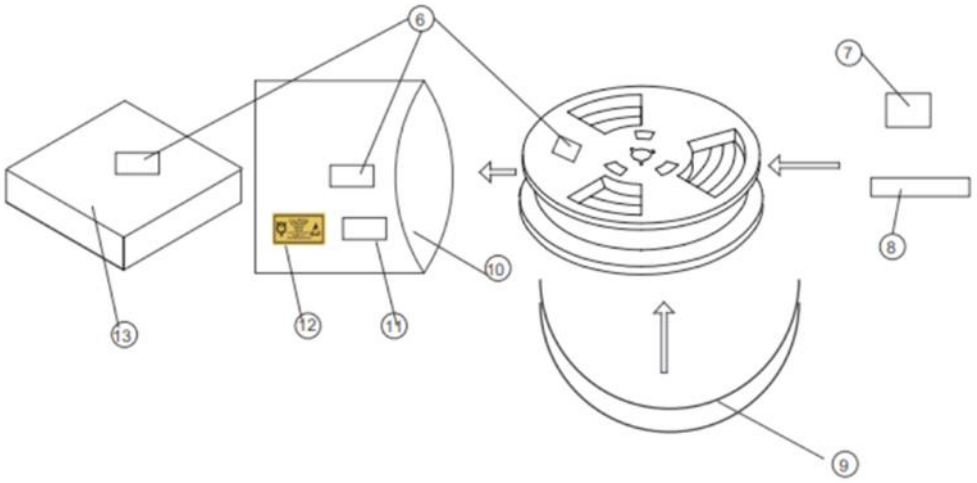
9.1. SX-PCEBE

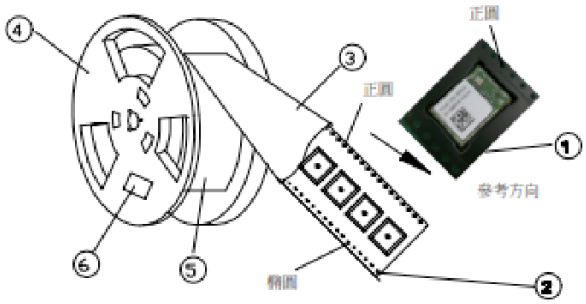
Categories	Items	Qty.				Units	Remarks
		ZXE04746 SX-PCEBE-SMT	ZXE04747 SX-PCEBE-SMT-SP	ZXE04777 SX-PCEBE-M2	ZXE04778 SX-PCEBE-M2-SP		
Board	Product	1	10	1	1	pcs	
Accessory	Antenna				2	pcs	TE Connectivity (2118907-8)
	Humidity Indicator Card	1/1000	1/10			pcs	
Label	Reel Bag Label	3/1000				pcs	
	Caution Label	1/1000	1/10			pcs	
	MSL Label		1/10			pcs	
	Packing Label	1/1000	1/10		1	pcs	
	Carton Label	1/2000	1/200	1/100	1/20	pcs	
Packing	Carton Sheet			1/100		pcs	
	Antistatic bag			1/100		pcs	
	Reel	1/1000				pcs	
	Dryer(Desiccants)	1/1000	1/10			pcs	
	AL Bag Anti-static	1/1000	1/10			pcs	
	Clamshell			11/100		pcs	
	Antistatic air cap Bag				2	pcs	
	Piza Box	1/1000				pcs	
	Packing Box		1/10		1	pcs	
	Carton Box	1/2000	1/200	1/100	1/20	pcs	

10. 梱包仕様 Packing specifications

10.1. SX-PCEBE-SMT

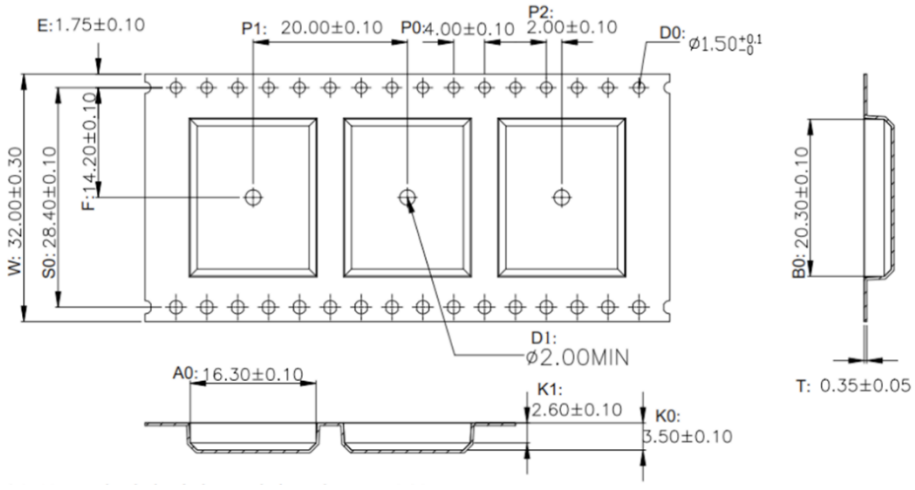
箱寸法/ Box size ：About W:400mm×D: 390mm×H: 58mm
重さ/ weight ：About 1.2kg(Net)
：About 8.5kg(Gross)

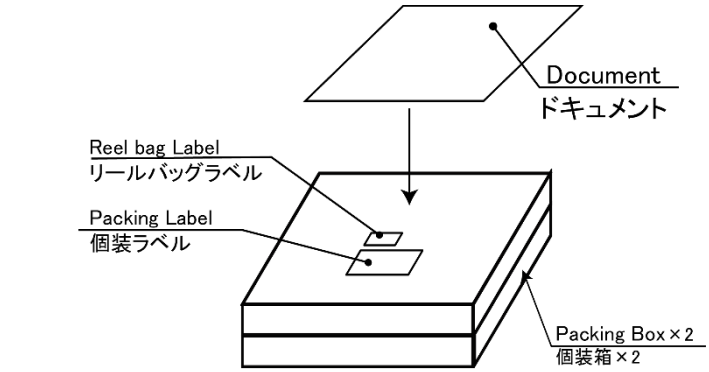


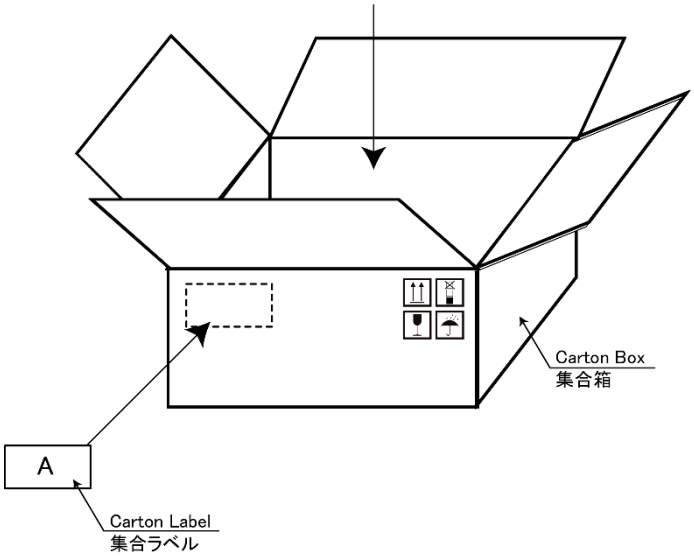


1	Product	1
2	32MM Tape Reel	23m/1000
3	32MM Reel cover	500m/21000
4	Reel Disc 15	2/1000
5	32MM Reel Axes	1/1000
6	Reel bag label	3/1000
7	30 G Dryer	1/1000
8	10%-60% Humidity Indicator Card	1/1000
9	32 Plastic strip	1/1000
10	AL Bag Anti-Static	1/1000
11	Caution. Label 72H	1/1000
12	ESD caveat	1/1000
13	Pizza box	1/1000

Do not put the module in the top 30 pcs and the last of 70 pcs by one reel

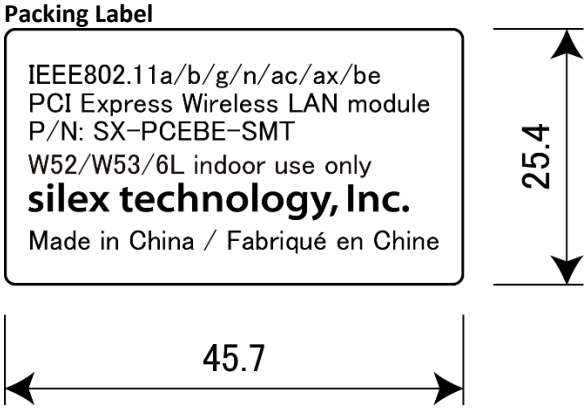




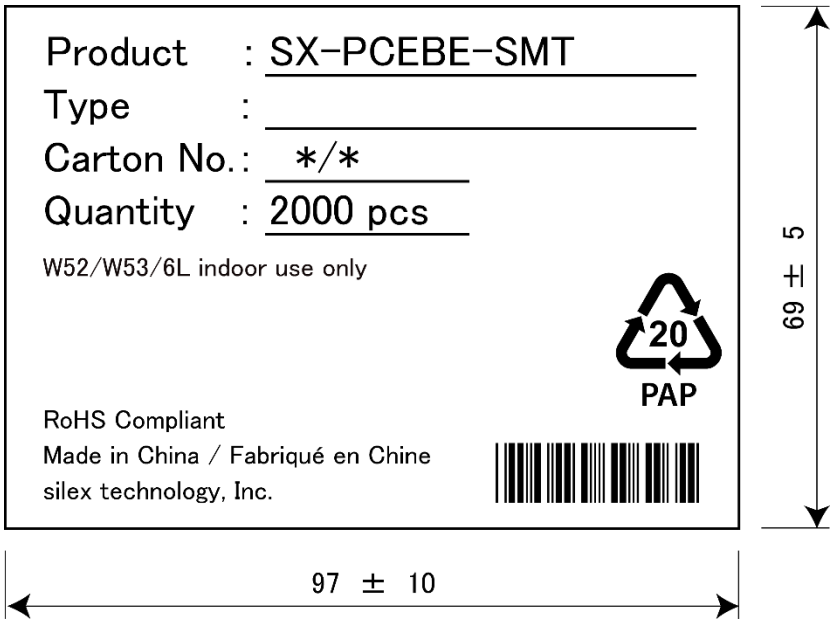


Reel bag Label

Packing Label



Carton Label



(mm)

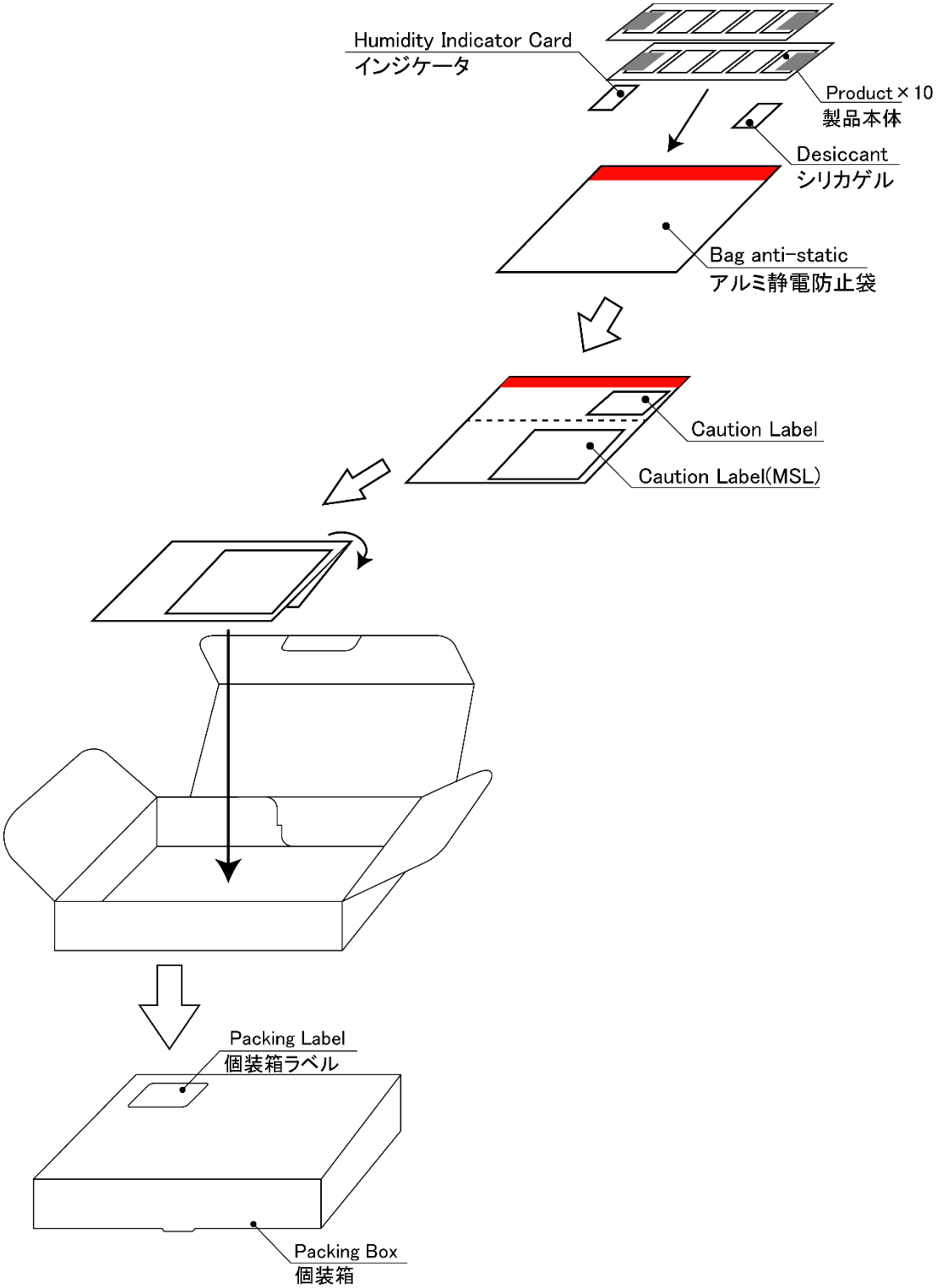
10.2. SX-PCEBE-SMT-SP

Packing

箱寸法/ Box size ：About W:139mm×D: 173mm×H: 33mm

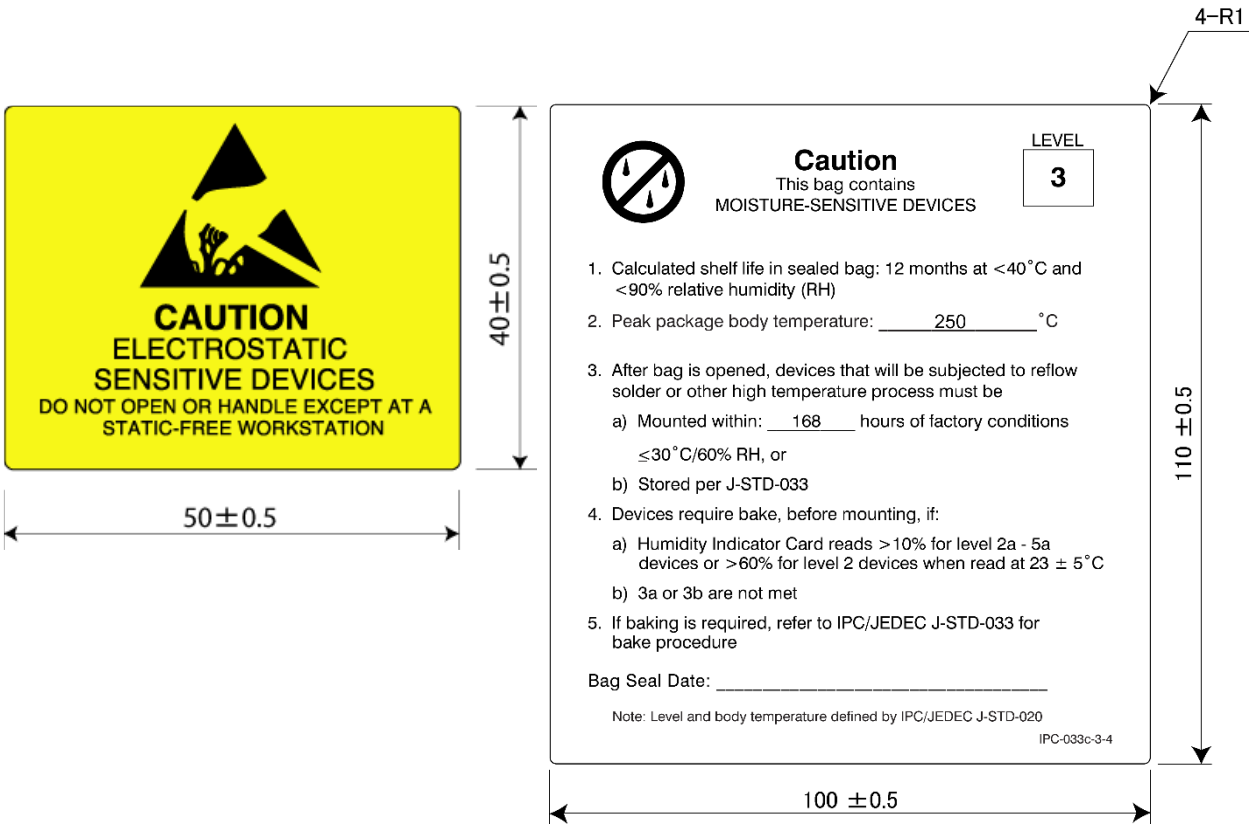
重さ/ weight ：About 12g(Net)

：About 85g(Gross)

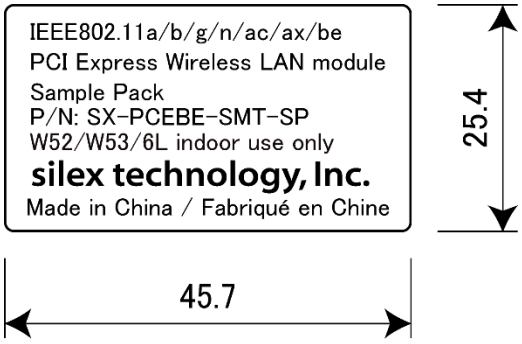


Caution Label

MSL Label



Packing Label



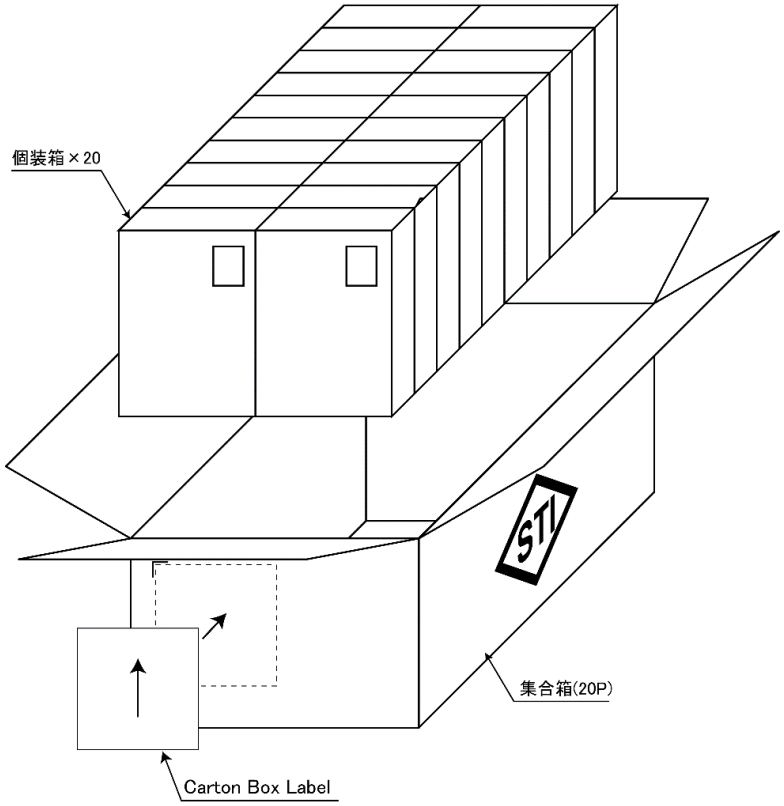
(mm)

Carton

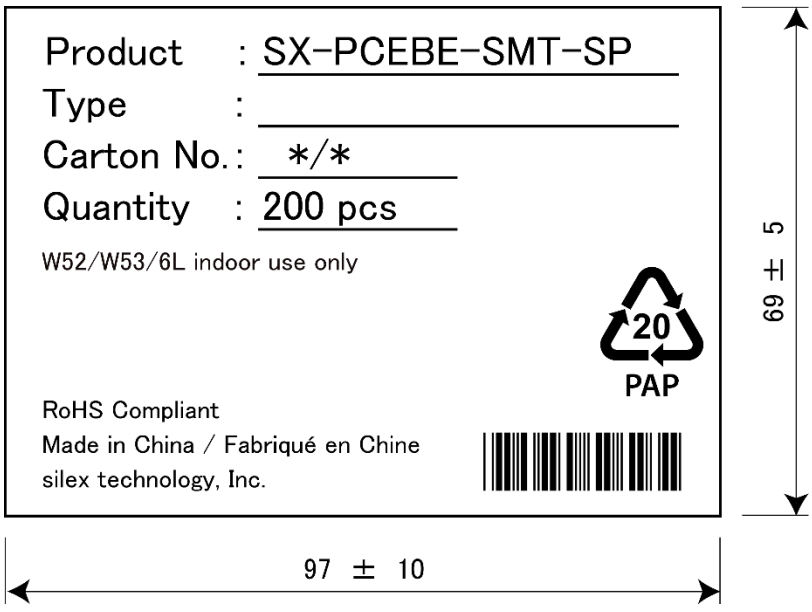
箱寸法/ Box size ：About W:300mm×D: 350mm×H: 205mm

重さ/ weight ：About 240g(Net)

：About 2.3kg(Gross)



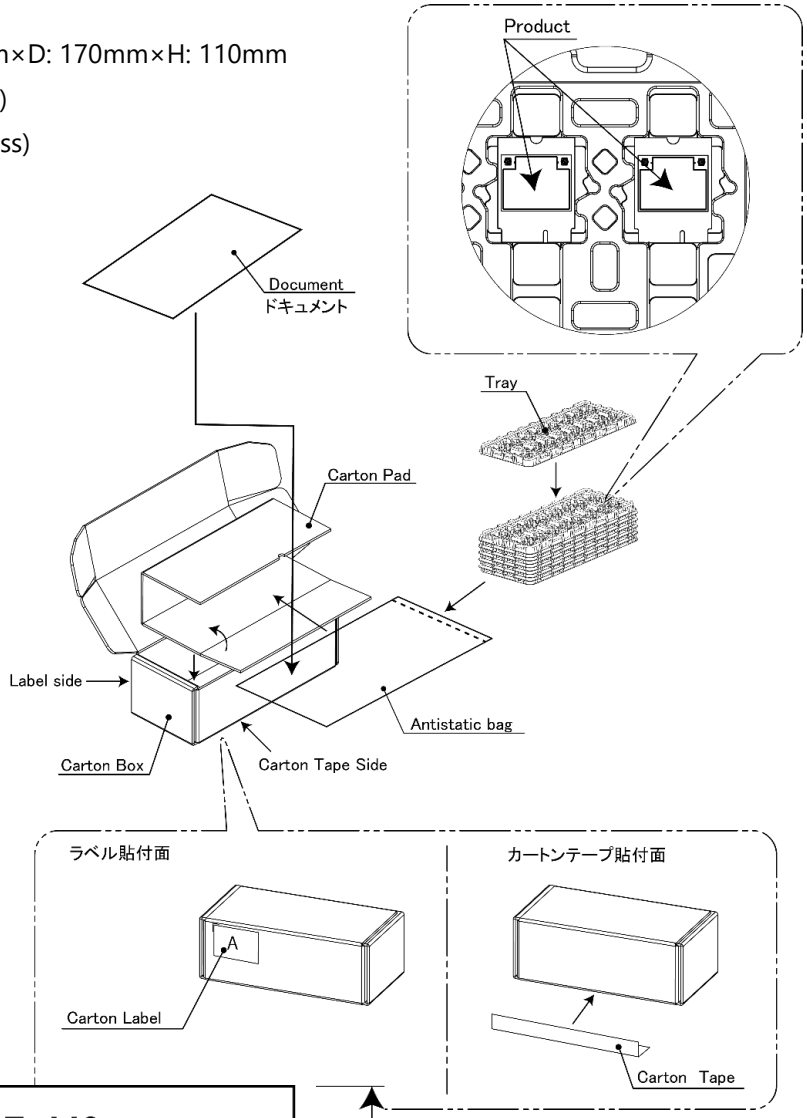
Carton Label



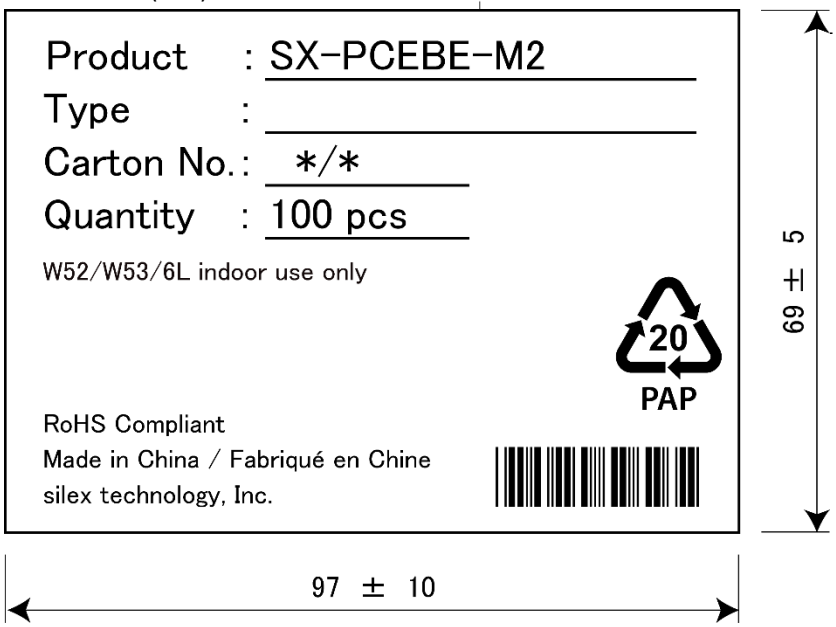
(mm)

10.3. SX-PCEBE-M2

箱寸法/ Box size ：About W:380mm×D: 170mm×H: 110mm
重さ/ weight ：About 330g(Net)
：About 930g(Gross)



Carton Label (mm)



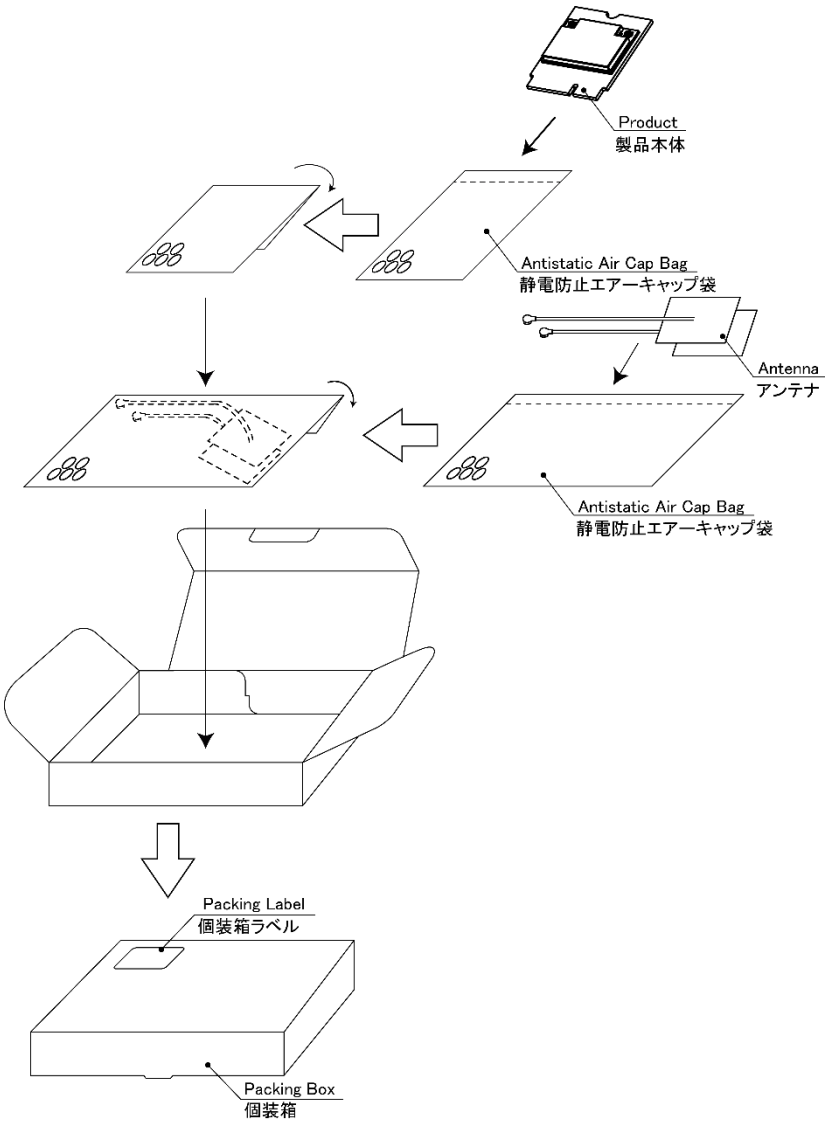
10.4. SX-PCEBE-M2-SP

Packing

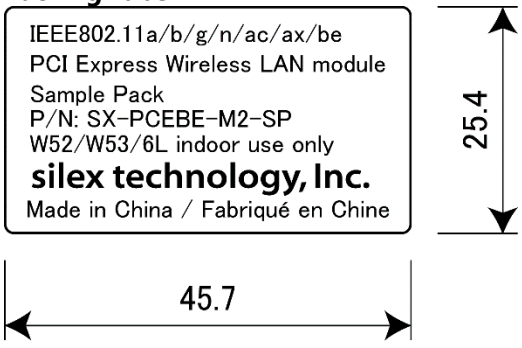
箱寸法/ Box size ：About W:139mm×D: 173mm×H: 33mm

重さ/ weight ：About 3.3g(Net)

：About 59g(Gross)



Packing Label



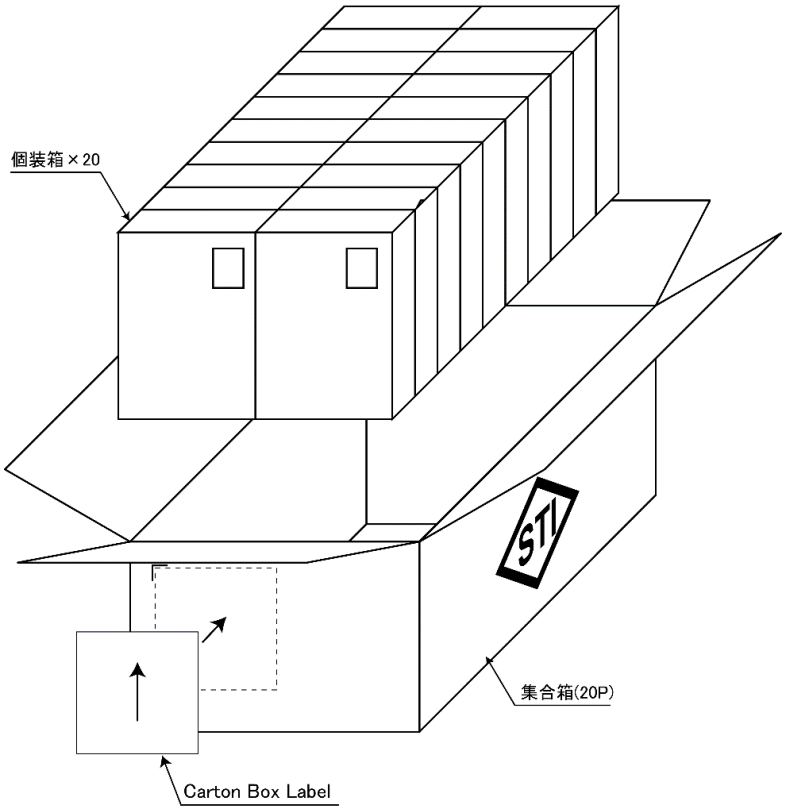
(mm)

Carton

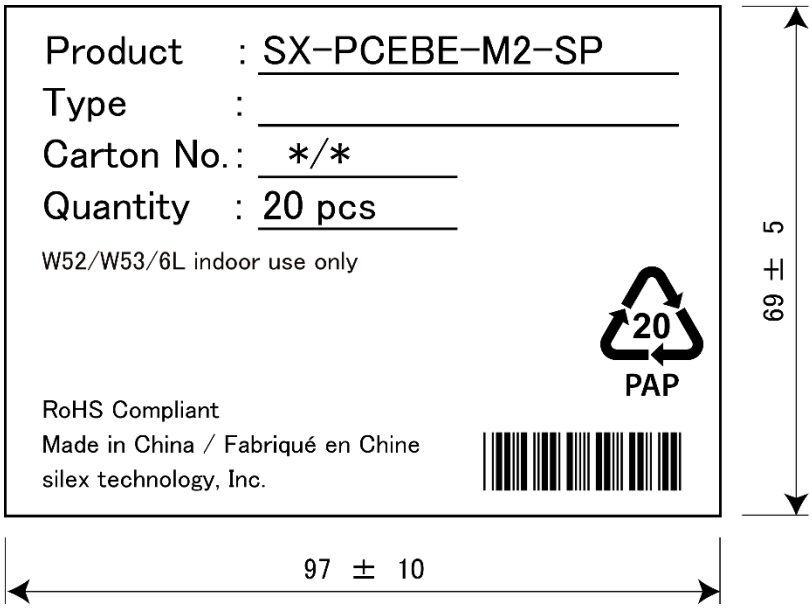
箱寸法/ Box size ：About W:300mm×D: 350mm×H: 205mm

重さ/ weight ：About 66g(Net)

：About 1.5kg(Gross)



Carton Label



(mm)

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>DC 電圧試験
DC voltage test</td><td>—</td><td>電源電圧+3.13V ~ +3.47 V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 +3.13 ~ +3.47V voltage range.
・Check no transaction stop.</td><td>動作可能
Workable</td><td>NA</td></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.
Standard test[⇨: Ramp] (Hr:Min)
<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><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td></tr>
<tr><td>℃</td><td>+25</td><td>⇨</td><td>-40</td><td>⇨</td><td>+85</td><td>⇨</td><td>-40</td><td>⇨</td><td>+85</td><td>+85</td><td>⇨</td><td>+85</td><td>⇨</td><td>25</td></tr>
<tr><td>%RH</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>95</td><td>⇨</td><td>15</td><td>⇨</td><td>30</td></tr>
<tr><td>Time</td><td>0:05</td><td>0:30</td><td>4:00</td><td>1:00</td><td>2:00</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><td>1:00</td><td>1:00</td><td>0:00</td></tr>
</table></td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>低温起動試験
Low temperature boot-up test</td><td>—</td><td>低温状態での起動を確認する。
・1回目は-40℃で2時間放置後に電源をONにし、起動することを確認する。
・2回目以降は30分放置し電源をONとし、起動することを確認する。
・試行回数5回。
Check to boot-up with low temperature.
・1st boot-up check is performed after 2 hours exposure at -40℃.
・2nd boot-up or later boot-up check is performed after 30 minutes exposure at -40℃.
・Total number of checking times are 5 times.</td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>温度衝撃試験
Thermal shock</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。
・500 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 500 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℃</td><td>⇨</td><td>-40
+0/-10℃</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>検査仕様適合
Test spec in</td><td>損傷無し
No damage</td></tr>
</table>

Test items	Standards	Description	Requirements	
			Electricity	Appearance
衝撃試験 Mechanical shock	JIS C60068-2-27	50G / 11msec / half sine pulse X1/2 (+ /-), Y1/2 (+ /-), Z1/2 (+ /-) Each 3 times (18 times in total) 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。 Damage/Defect/RF degradation shall not be observed after shock.	検査仕様適合 Test spec in	損傷無し No damage
振動試験 Mechanical vibration	JEDEC JESD22-B103	20~2000Hz / 20G ※1 / sine pulse Sweep time : 4min/way (8min both ways) Test time : 4times/Axis (32min for each X-Y-Z, 96min total) ※1：20 to 82.2 Hz: both 1.5mm amplitude, 82.2 to 2000 Hz 20G acceleration 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。 Damage/Defect/RF degradation shall not be observed after vibration.	検査仕様適合 Test spec in	損傷無し No damage
梱包落下試験 Drop with package	ISO 4180 (JIS Z0200 Level I)	梱包箱状態で 80cm の高さより木の板に落下させる。(6 面、3 辺、1 稜) Drop with the package from 80cm height to the wood board. (6 faces, 3 edges, 1 corner).	動作可能 Workable	損傷無し No damage
静電気試験 ESD test	JEDEC JESD22-A114F Class 2	アンテナ芯線とGND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：+/-4kV ・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 and GND ring of antenna connector. ・Discharging capacitance=100pF, Discharging resistance=1.5kΩ ・ESD level for the center pin：+/-4kV ・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	以下を除く全ての項目のサンプル数は 3 台 ・温度衝撃試験：20 台 Sample numbers for all test except below is 3 units. ・Thermal shock test：20 units

11. 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>DC 電圧試験
DC voltage test</td><td>—</td><td>絶対最大定格の電源電圧+3.63V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 the absolute maximum rated voltage of +3.63V.
・Check no transaction stop.</td><td>動作可能
Workable</td><td>NA</td></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.
Standard test[⇨: Ramp] (Hr:Min)
<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>+85</td><td>+85</td><td>-40</td><td>-40</td><td>+85</td><td>+85</td></tr>
<tr><td>%RH</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
<tr><td>Time</td><td>0:30</td><td>1:00</td><td>04:00</td><td>01:00</td><td>02:00</td><td>01:30</td><td>02:00</td><td>01:00</td><td>02:00</td></tr>
<tr><td>Power</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>
</table>
<table>
<tr><td>Step</td><td>10</td><td>11</td><td>12</td><td>13</td></tr>
<tr><td>℃</td><td>+85</td><td>+85</td><td>+85</td><td>+25</td></tr>
<tr><td>%RH</td><td>95</td><td>15</td><td>15</td><td>30</td></tr>
<tr><td>Time</td><td>06:00</td><td>01:00</td><td>01:00</td><td>01:00</td></tr>
<tr><td>Power</td><td>ON</td><td>ON</td><td>ON</td><td>ON</td></tr>
</table></td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>高温起動試験
High temperature
boot-up test</td><td>—</td><td>高温状態での起動を確認する。
・1回目は+90℃で2時間放置後に電源をONにし、起動することを確認する。
・2回目以降は30分放置し電源をONとし、起動することを確認する。
・試行回数5回。
Check to boot-up with high temperature.
・1st boot-up check is performed after 2 hours exposure at +90℃.
・2nd boot-up or later boot-up check is performed after 30 minutes exposure at +90℃.
・Total number of checking times are 5 times.</td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>低温起動試験
Low temperature
boot-up test</td><td>—</td><td>低温状態での起動を確認する。
・1回目は-40℃で2時間放置後に電源をONにし、起動することを確認する。
・2回目以降は30分放置し電源をONとし、起動することを確認する。
・試行回数5回。
Check to boot-up with low temperature.
・1st boot-up check is performed after 2 hours exposure at -40℃.
・2nd boot-up or later boot-up check is performed after 30 minutes exposure at -40℃.
・Total number of checking times are 5 times.</td><td>動作可能
Workable</td><td>NA</td></tr>
<tr><td>温度衝撃試験
Thermal shock</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。
・500 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 500 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>+100
+10/-0℃</td><td>⇨</td><td>-20
+0/-10℃</td><td>⇨</td></tr>
<tr><td>Time</td><td>5min</td><td>< 6min</td><td>5min</td><td>< 6minsec</td></tr>
<tr><td>Power</td><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td></tr>
</table></td><td>検査仕様適合
Test spec in</td><td>損傷無し
No damage</td></tr>
</table>

Test items	Standards	Description	Requirements	
			Electricity	Appearance
梱包振動試験 Packaging vibration	ISO 4180 (JIS Z0200 Level I)	振動の種類 / Vibration Type ：ランダム振動 / Random Vibration 振動方向 / Vibration direction ：Z 周波数 / Frequency ：2～200Hz 加速度 / Acceleration ：2.97 m/s² {0.303 G}, 5.926 m/ s² {0.604 G} 時間 / Time ：100min, 20min 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。 Damage/Defect/RF degradation shall not be observed after vibration.	検査仕様適合 Test spec in	損傷無し No damage
梱包落下試験 Drop with package	ISO 4180 (JIS Z0200 Level I)	梱包箱状態で 80cm の高さより木の板に落下させる。(6 面、3 辺、1 稜) Drop with the package from 80cm height to the wood board. (6 faces, 3 edges, 1 corner).	動作可能 Workable	損傷無し No damage
静電気試験 ESD test	EN301489-1	EN61000-4-2に準拠した試験手順で実施。 ・Discharge Impedance: 330ohm / 150pF ・Discharge Level: ±2kV, ±4kV ・Air – Direct: 10 discharges per location (each polarity) ・Contact – Direct & Indirect: 10 discharges per location (each polarity) ・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	以下を除く全ての項目のサンプル数は 3 台 ・温度衝撃試験：20 台 Sample numbers for all test except below is 3 units. ・Thermal shock test：20 units

12. 使用上の注意 Notifications

✧ 本製品の仕様は、§6. 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。
The specifications of this product comply with the regulations listed in §6. However, there is a possibility of specification changes in the following cases.

1) §6.1 に掲げる国以外で使う場合。
If used in countries other than those listed in §6.1.
2) §6.2 に掲げるアンテナ以外を使う場合。
If antennas other than those listed in §6.2 are used.
3) 認可の更新が必要な場合。
If renewal of certification is required.

✧ 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 product is designed for incorporation into general electronic equipment and is not intended for incorporation into equipment that requires extremely high levels of reliability and quality, such as aircraft equipment, nuclear control systems, high-reliability medical devices, and high-reliability security equipment. **If you intend to incorporate it into medical devices, please contact our sales department regardless of the medical device 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。
Since this product communicates using radio waves, we strongly recommend implementing security settings to prevent information leakage to third parties.

✧ 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。
Upon understanding the functions and characteristics of this product, we kindly request evaluation in the final embedded product. Additionally, EMC testing has not been conducted on this standalone wireless device. Therefore, it is necessary to conduct EMC testing and certification application for products incorporating this wireless device.

✧ 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。
In the wireless band used by this product, there may be cases where it is affected by or affects devices using the same frequency band. Prior to installation, please conduct an environmental survey.

✧ 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。
Disassembly or modification of this product may result in penalties under the 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 product is an embedded module with exposed terminals and components. When integrating the product, please exercise caution regarding static electricity (as high-frequency devices sensitive to static electricity are used in this product), water droplets, and other dust particles.

✧ 周辺で同一周波数帯を使う他の無線機器を使う場合、以下に特に注意してください。
(IEEE802.11-2012 及び IEEE802.11ac-2013 参照)

When using other wireless devices in the vicinity that operate on the same frequency band, please pay special attention to the following: IEEE802.11-2012 and IEEE802.11ac-2013

1) 2.4GHz 帯では、本モジュールの中心周波数から+/- 25MHz (5Ch) 以上の間隔をあけて使用することが推奨されます。

In the 2.4GHz band, it is recommended to use a frequency spacing of more than +/- 25MHz (5 channels) from the center frequency of this module.

2) 隣接チャネル及び非隣接チャネルの信号入力には十分注意して、混信を避ける環境を設定してください。

Please pay close attention to signals from adjacent and non-adjacent channels, and set up an environment to avoid interference.

- 2.4GHz 隣接チャネル：中心周波数+/-25MHz(5Ch), 非隣接チャネル：中心周波数 +/-30MHz(6Ch)以上
  2.4GHz: Center frequency +/-25MHz (5Ch), Non Adjacent channel: Further than Center frequency +/-30MHz (6Ch)
- 5/6GHz HT20 隣接チャネル：中心周波数+/-20MHz(4Ch), 非隣接チャネル：中心周波数 +/-40MHz(8Ch)以
  5/6GHz HT20: Center frequency +/-20MHz (4Ch), Non Adjacent channel: Further than Center frequency +/-40MHz (8Ch)
- 5/6GHz HT40 隣接チャネル：中心周波数+/-40MHz(8Ch), 非隣接チャネル：中心周波数 +/-80MHz(16Ch)以上
  5/6GHz HT40 Adjacent channel: Center frequency +/-40MHz (8Ch), Non Adjacent channel: Further than Center frequency +/-80MHz (16Ch)
- 5/6GHz HT80 隣接チャネル：中心周波数+/-80MHz(16Ch), 非隣接チャネル：中心周波数 +/-160MHz(32Ch)以上
  5/6GHz HT80 Adjacent channel: Center frequency +/-80MHz (16Ch), Non Adjacent channel: Further than Center frequency +/-160MHz (32Ch)
- 5/6GHz HT160 隣接チャネル：中心周波数+/-160MHz(32Ch), 非隣接チャネル：中心周波数 +/-320MHz(64Ch)以上
  5/6GHz HT160 Adjacent channel: Center frequency +/-160MHz (32Ch), Non Adjacent channel: Further than Center frequency +/-160MHz (64Ch)

※上記の条件外であっても、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。

Even outside the above conditions, there is a possibility of interference if there is strong radio frequency input. Therefore, please use wireless devices in the vicinity at a sufficient distance.

✧ 対向機からの入力は、アンテナゲインを含み 2.4GHz 帯で-20dBm 以下、5/6GHz 帯で-30dBm 以下としてください。

The input from the opposing device, including antenna gain, should be -20dBm or lower at 2.4GHz and -30dBm or lower at 5/6GHz.

Federal Communication Commission Interference Statement

This device complies with Part 15 of the 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.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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

Operations in the 5.15-5.25GHz band are restricted to indoor usage only.
This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

Radiation Exposure Statement:
The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01 rule sections:

2.2 List of applicable FCC rules

This module has been tested for compliance to FCC Part 15

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) or being used in a portable condition will need a separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable.

2.5 Trace antenna designs

Not applicable.

2.6 RF exposure considerations

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

The following antennas have been certified for use with this module; antennas of the same type with gains within the peak and minimum gain range may also be used with this module. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

Brand	Model	Antenna Type	2.4GHz Gain		5GHz Gain		6GHz Gain	
			peak	Min.	peak	Min.	peak	Min.
HONGBO	260-25094	PIFA	+3.53dBi	+3.53dBi	+4.81dBi	+3.06dBi	-	-
HONGBO	260-25083	PIFA	-	-	-	-	+5.16dBi	+5.09dBi
HONGBO	260-25084	Monopole	+3.22dBi	+3.22dBi	+4.77dBi	+3.35dBi	+4.81dBi	+4.29dBi

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: “Contains FCC ID: **N6C-PCEBE**”.
The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) or portable use will require a separate class II permissive change re-evaluation or new certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment

Prohibited for control of or communications with unmanned aircraft systems, including drones.

Industry Canada statement:

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d' ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement:

The product comply with the Canada portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual. The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

Déclaration d'exposition aux radiations:

Le produit est conforme aux limites d'exposition pour les appareils portables RF pour les Etats-Unis et le Canada établies pour un environnement non contrôlé.
Le produit est sûr pour un fonctionnement tel que décrit dans ce manuel. La réduction aux expositions RF peut être augmentée si l'appareil peut être conservé aussi loin que possible du corps de l'utilisateur ou que le dispositif est réglé sur la puissance de sortie la plus faible si une telle fonction est disponible.

This device is intended only for OEM integrators under the following conditions: (For module device use)

1) The transmitter module may not be co-located with any other transmitter or antenna.
As long as **1** conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

1) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.
Tant que les **1** conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE:

In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.

NOTE IMPORTANTE:
Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

End Product Labeling
This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains IC: 4908A-PCEBE”.

Plaque signalétique du produit final
Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l’antenne peut être installée et utilisée à plus de 20 cm entre l’antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 4908A-PCEBE ".

Manual Information To the End User
The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.
The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final
L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.
Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

Caution :
(i) the device for operation in the band 5150-5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems;
(ii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit;
(iii) for devices with detachable antenna(s), the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits as appropriate;
(iv) where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

Avertissement:
Le guide d’utilisation des dispositifs pour réseaux locaux doit inclure des instructions précises sur les restrictions susmentionnées, notamment :

(i) les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l’intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;
(ii) pour les dispositifs munis d’antennes amovibles, le gain maximal d’antenne permis pour les dispositifs utilisant les bandes de 5 250 à 5 350 MHz et de 5 470 à 5 725 MHz doit être conforme à la limite de la p.i.r.e;
(iii) pour les dispositifs munis d’antennes amovibles, le gain maximal d’antenne permis (pour les dispositifs utilisant la bande de 5 725 à 5 850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée, selon le cas;
(iv) lorsqu’il y a lieu, les types d’antennes (s’il y en a plusieurs), les numéros de modèle de l’antenne et les pires angles d’inclinaison nécessaires pour rester conforme à l’exigence de la p.i.r.e. applicable au masque d’élévation, énoncée à la section 6.2.2.3, doivent être clairement indiqués

For 6G statement

a. Operation shall be limited to indoor use only; and

b. Operation on oil platforms, cars, trains, boats and aircraft shall be prohibited except for on large aircraft flying above 10,000 ft.

a. Utilisation limitée à l'intérieur seulement;

b. Utilisation interdite à bord de plateformes de forage pétrolier, de voitures, de trains, de bateaux et d'aéronefs, sauf à bord d'un gros aéronef volant à plus de 10 000 pieds d'altitude.

DETACHABLE ANTENNA USAGE

This radio transmitter [IC: **4908A-PCEBE**] 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.

Le présent émetteur radio [IC: **4908A-PCEBE**] 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.

Antenna Type	Gain			Impedance
	2.4GHz	5GHz	6GHz	
PIFA Antenna	3.53dBi	4.81dBi	5.16dBi	50ohms
Monopole Antenna	3.22dBi	4.77dBi	4.81dBi	50ohms

The antenna-to-user separation distance must be greater than 15 mm.
La distance de séparation antenne-utilisateur doit être supérieure à 15 mm.

To ensure compliance with the Radio Frequency (RF) exposure guidelines, this device must be used at least 15 mm away from your body or nearby persons. Failure to observe this warning could result in the RF exposure levels exceeding the applicable limits.
Pour garantir la conformité aux directives d'exposition aux radiofréquences (RF), cet appareil doit être utilisé à au moins 15 mm de votre corps ou des personnes à proximité. Le non-respect de cet avertissement peut entraîner des niveaux d'exposition RF dépassant les limites applicables.

The distance between each antenna should more than 50 mm when integrated in the host to ensure the simultaneous transmission compliance.
La distance entre chaque antenne doit être supérieure à 50 mm lorsqu'elle est intégrée à l'hôte pour assurer la conformité de la transmission simultanée.

13. 付録 A 仕向け毎の送信電力 Appendix-A TX power for each region

NOTE1	送信電力表は 25℃での Typ.値(dBm)を示します。Max. = Typ. +2.5dB, Min. = Typ. -2.5dB になります。 The transmit power table shows the Typ. values (dBm) at 25℃. Max. = Typ. +2.5dB, Min. = Typ. -2.5dB.
NOTE2	送信電力は各アンテナ Chain 単独の値です。2 Data stream 時の総電力は+3.0dB されます。 The transmit power is the value for each antenna chain individually. The total power for 2 data streams is increased by +3.0dB.
NOTE3	初期状態では、Canada (CA) low power を使用します。 Canada (CA) high power を使用する場合は、BDF を差し替えて対応してください。 In the initial state, use Canada (CA) low power. If using Canada (CA) high power, please replace the BDF accordingly.
NOTE4	Canada (CA)は ch.120, ch124, ch128 は使用できません。 It is unable to use channel 120 to 128 in Canada (CA).

13.1. US/Canada

Channel	Fc MHz	11b	11g	11g	11n 20, 11ax 20, 11be 20				
		1M-11M	6M-36M	48M-54M	M0-M4	M5-M7	M8-M9	M10—M11	M12-M13
1	2412	16.5	16.5	16.0	12.5	12.5	12.5	12.5	12.5
2	2417	16.5	16.5	16.0	15.0	15.0	15.0	15.0	14.0
3	2422	16.5	16.5	16.0	15.0	15.0	15.0	15.0	14.0
4	2427	16.5	16.5	16.0	17.0	16.5	16.0	15.5	14.0
5	2432	16.5	16.5	16.0	17.0	16.5	16.0	15.5	14.0
6	2437	16.5	16.5	16.0	17.0	16.5	16.0	15.5	14.0
7	2442	16.5	16.5	16.0	17.0	16.5	16.0	15.5	14.0
8	2447	16.5	16.5	16.0	17.0	16.5	16.0	15.5	14.0
9	2452	16.5	16.5	16.0	15.0	15.0	15.0	15.0	14.0
10	2457	16.5	16.5	16.0	15.0	15.0	15.0	15.0	14.0
11	2462	16.5	15.5	16.0	12.5	12.5	12.5	12.5	12.5

Channel	Fc MHz	11n 40, 11ax 40, 11be 40			
		M0-M3	M4-M11	M12	M13
3	2422	12.5	12.5	12.5	11.5
4	2427	12.5	12.5	12.5	11.5
5	2432	15.5	14.5	12.5	11.5
6	2437	15.5	14.5	12.5	11.5
7	2442	15.5	14.5	12.5	11.5
8	2447	13.0	13.0	12.5	11.5
9	2452	12.0	12.0	12.5	11.5

	Channel	Fc MHz	11a	11n20,11ac20, 11ax20,11be20			11ac20, 11ax20,11be20		11ax20,11be20	11be20
			6M-54M	M0-M5	M6	M7	M8	M9	M10-M11	M12-M13
US	36	5180	15.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
US	40	5200	15.5	16.0	16.0	15.0	14.5	14.0	13.0	12.0
US	44	5220	15.5	16.0	16.0	15.0	14.5	14.0	13.0	12.0
US	48	5240	15.5	16.0	16.0	15.0	14.5	14.0	13.0	12.0
CA	36	5180	9.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5
CA	40	5200	9.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5
CA	44	5220	9.0	9.5	9.5	9.5	9.5	9.5	9.5	9.5
CA	48	5240	9.0	9.0	9.0	9.0	9.0	9.0	9.0	9.0
US/CA High	52	5260	15.5	16.5	16.0	15.0	14.5	14.0	13.0	12.0
US/CA High	56	5280	15.5	16.5	16.0	15.0	14.5	14.0	13.0	12.0
US/CA High	60	5300	15.5	16.5	16.0	15.0	14.5	14.0	13.0	12.0
US/CA High	64	5320	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
CA Low	52	5260	13.5	14.0	14.0	14.0	14.0	14.0	13.0	12.0
CA Low	56	5280	13.5	14.0	14.0	14.0	14.0	14.0	13.0	12.0
CA Low	60	5300	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
CA Low	64	5320	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
US/CA	100	5500	15.0	14.5	14.5	14.5	14.5	14.0	13.0	12.0
US/CA	104	5520	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US/CA	108	5540	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US/CA	112	5560	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US/CA	116	5580	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US	120＊	5600	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US	124＊	5620	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US	128＊	5640	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US/CA	132	5660	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US/CA	136	5680	15.0	15.0	15.0	15.0	14.5	14.0	13.0	12.0
US/CA	140	5700	15.0	12.5	12.5	12.5	12.5	12.5	12.5	12.0
US/CA	144	5720	15.0	15.5	15.5	15.0	14.5	14.0	13.0	12.0
US/CA	149	5745	15.0	15.5	15.5	15.0	14.5	14.0	13.0	12.0
US/CA	153	5765	15.0	15.5	15.5	15.0	14.5	14.0	13.0	12.0
US/CA	157	5785	15.0	15.5	15.5	15.0	14.5	14.0	13.0	12.0
US/CA	161	5805	15.0	15.5	15.5	15.0	14.5	14.0	13.0	12.0
US/CA	165	5825	15.0	15.5	15.5	15.0	14.5	14.0	13.0	12.0
US	169	5845	11.5	12.5	12.5	12.5	12.5	12.5	12.5	12.0
US	173	5865	12.0	12.5	12.5	12.5	12.5	12.5	12.5	12.0
US	177	5885	11.5	11.5	11.5	11.5	11.5	11.5	11.5	11.5

	Channel	Fc MHz	11n40, 11ac40, 11ax40, 11be40			11ac40, 11ax40, 11be40	11ax40, 11be40		11be40
			M0-M5	M6	M7-M8	M9	M10	M11	M12-M13
US	36	5180	13.5	13.5	13.5	13.5	13.0	12.5	12.0
US	40	5200							
US	44	5220	15.5	15.5	14.5	13.5	13.0	12.5	12.0
US	48	5240							
CA	36	5180	13.0	13.0	13.0	13.0	13.0	12.5	12.0
CA	40	5200							
CA	44	5220	13.0	13.0	13.0	13.0	13.0	12.5	12.0
CA	48	5240							
US/CA High	52	5260	15.5	15.5	14.5	13.5	13.0	12.5	12.0
US/CA High	56	5280							
US/CA High	60	5300	13.5	13.5	13.5	13.5	13.0	12.5	12.0
US/CA High	64	5320							
CA Low	52	5260	14.0	14.0	14.0	14.0	13.0	12.5	12.0
CA Low	56	5280							
CA Low	60	5300	13.5	13.5	13.5	13.5	13.0	12.5	12.0
CA Low	64	5320							
US/CA	100	5500	13.0	13.0	13.0	13.0	13.0	12.5	12.0
US/CA	104	5520							
US/CA	108	5540	16.0	15.5	14.5	13.5	13.0	12.5	12.0
US/CA	112	5560							

US	116	5580	15.0	15.0	14.5	13.5	13.0	12.5	12.0
US	120＊	5600							
US	124＊	5620	15.0	15.0	14.5	13.5	13.0	12.5	12.0
US	128＊	5640							
US/CA	132	5660	15.0	15.0	14.5	13.5	13.0	12.5	12.0
US/CA	136	5680							
US/CA	140	5700	15.5	15.5	14.5	13.5	13.0	12.5	12.0
US/CA	144	5720							
US/CA	149	5745	15.0	15.0	14.5	13.5	13.0	12.5	12.0
US/CA	153	5765							
US/CA	157	5785	15.0	15.0	14.5	13.5	13.0	12.5	12.0
US/CA	161	5805							
US	165	5825	15.5	15.5	14.5	13.5	13.0	12.5	12.0
US	169	5845							
US	173	5865	13.0	13.0	13.0	13.0	13.0	12.5	12.0
US	177	5885							

	Channel	Fc MHz	11ac80,11ax80, 11be80		11ax80, 11be80		11be80	11ac160,11ax160, 11be160
			M0-M6	M7-M8	M9-M10	M11	M12-M13	M0-M13
US/CA	36	5180	12.5	12.5	12.5	12.5	12.0	10.5
US/CA	40	5200						
US/CA	44	5220						
US/CA	48	5240						
US/CA	52	5260	12.0	12.0	12.0	12.0.	12.0	
US/CA	56	5280						
US/CA	60	5300						
US/CA	64	5320						
US/CA	100	5500	12.5	12.5	12.5	12.5	12.0	10.0
US/CA	104	5520						
US/CA	108	5540						
US/CA	112	5560						
US/CA	116	5580	15.0	14.5	13.0	12.5	12.0	
US	120＊	5600						
US	124＊	5620						
US	128＊	5640						
US/CA	132	5660	15.0	14.5	13.0	12.5	12.0	X
US/CA	136	5680						
US/CA	140	5700						
US/CA	144	5720						
US/CA	149	5745	14.0	14.0	13.0	12.5	12.0	11.0
US/CA	153	5765						
US/CA	157	5785						
US/CA	161	5805						
US	165	5825	15.5	14.0	13.0	12.5	12.0	
US	169	5845						
US	173	5865						
US	177	5885						

Channel	Fc MHz	11ax20, 11be20	11ax20, 11be20					11be20
		LPI	SP					
		M0-M13	M0-M6	M7	M8	M9	M10-M11	M12-M13
1	5955	-2.5	15.0	14.0	13.5	12.5	11.5	11.0
5	5975	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
9	5995	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
13	6015	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
17	6035	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
21	6055	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
25	6075	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
29	6095	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
33	6115	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
37	6135	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
41	6155	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
45	6175	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
49	6195	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
53	6215	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
57	6235	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
61	6255	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
65	6275	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
69	6295	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
73	6315	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
77	6335	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
81	6355	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
85	6375	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
89	6395	-4.5	14.5	14.0	13.5	12.5	11.5	11.0
93	6415	-4.0	14.5	14.0	13.5	12.5	11.5	11.0
97	6435	-2.5	X	X	X	X	X	X
101	6455	-2.5	X	X	X	X	X	X
105	6475	-2.5	X	X	X	X	X	X
109	6495	-3.0	X	X	X	X	X	X
113	6515	-3.0	X	X	X	X	X	X
117	6535	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
121	6555	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
125	6575	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
129	6595	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
133	6615	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
137	6635	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
141	6655	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
145	6675	-3.5	15.0	14.0	13.5	12.5	11.5	11.0
149	6695	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
153	6715	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
157	6735	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
161	6755	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
165	6775	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
169	6795	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
173	6815	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
177	6835	-3.0	15.0	14.0	13.5	12.5	11.5	11.0
181	6855	-3.0	14.5	14.0	13.5	12.5	11.5	11.0
185	6875	-3.0	X	X	X	X	X	X
189	6895	-3.0	X	X	X	X	X	X
193	6915	-3.0	X	X	X	X	X	X
197	6935	-3.0	X	X	X	X	X	X
201	6955	-3.0	X	X	X	X	X	X
205	6975	-3.0	X	X	X	X	X	X
209	6995	-2.5	X	X	X	X	X	X
213	7015	-2.5	X	X	X	X	X	X
217	7035	-2.5	X	X	X	X	X	X
221	7055	-2.5	X	X	X	X	X	X
225	7075	-2.5	X	X	X	X	X	X
229	7095	-2.5	X	X	X	X	X	X
233	7115	-14.5	X	X	X	X	X	X

Channel	Fc MHz	11ax40, 11be40	11ax40, 11be40						11be40
		LPI	SP						
		M0-M13	M0-M5	M6	M7-8	M9	M10	M11	M12-M13
1	5955	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
5	5975								
9	5995	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
13	6015								
17	6035	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
21	6055								
25	6075	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
29	6095								
33	6115	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
37	6135								
41	6155	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
45	6175								
49	6195	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
53	6215								
57	6235	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
61	6255								
65	6275	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
69	6295								
73	6315	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
77	6335								
81	6355	0.5	15.0	14.5	13.5	12.5	12.0	11.5	11.0
85	6375								
89	6395	-0.5	14.5	14.5	13.5	12.5	12.0	11.5	11.0
93	6415								
97	6435	-0.5	X	X	X	X	X	X	X
101	6455		X	X	X	X	X	X	X
105	6475	0.0	X	X	X	X	X	X	X
109	6495		X	X	X	X	X	X	X
113	6515	0.0	X	X	X	X	X	X	X
117	6535		X	X	X	X	X	X	X
121	6555	0.0	15.0	14.5	13.5	12.5	12.0	11.5	11.0
125	6575								
129	6595	0.0	14.5	14.5	13.5	12.5	12.0	11.5	11.0
133	6615								
137	6635	0.0	14.5	14.5	13.5	12.5	12.0	11.5	11.0
141	6655								
145	6675	0.0	14.5	14.5	13.5	12.5	12.0	11.5	11.0
149	6695								
153	6715	-0.5	14.5	14.5	13.5	12.5	12.0	11.5	11.0
157	6735								
161	6755	-0.5	14.5	14.5	13.5	12.5	12.0	11.5	11.0
165	6775								
169	6795	-0.5	14.5	14.5	13.5	12.5	12.0	11.5	11.0
173	6815								
177	6835	-0.5	14.5	14.5	13.5	12.5	12.0	11.5	11.0
181	6855								
185	6875	0.0	X	X	X	X	X	X	X
189	6895		X	X	X	X	X	X	X
193	6915	0.0	X	X	X	X	X	X	X
197	6935		X	X	X	X	X	X	X
201	6955	0.0	X	X	X	X	X	X	X
205	6975		X	X	X	X	X	X	X
209	6995	0.0	X	X	X	X	X	X	X
213	7015		X	X	X	X	X	X	X

217	7035	0.0	X	X	X	X	X	X	X
221	7055		X	X	X	X	X	X	X
225	7075	0.0	X	X	X	X	X	X	X
229	7095		X	X	X	X	X	X	X

Channel	Fc MHz	11ax80, 11be80	11ax80, 11be80					
		LPI	SP					
		M0-M13	M0-M3	M4-M6	M7-8	M9-M10	M11	M12-M13
1	5955	2.5	15.0	14.5	13.5	12.0	11.5	11.0
5	5975							
9	5995							
13	6015							
17	6035	2.5	15.0	14.5	13.5	12.0	11.5	11.0
21	6055							
25	6075							
29	6095							
33	6115	2.0	14.0	14.0	13.5	12.0	11.5	11.0
37	6135							
41	6155							
45	6175							
49	6195	2.0	14.0	14.0	13.5	12.0	11.5	11.0
53	6215							
57	6235							
61	6255							
65	6275	2.0	14.0	14.0	13.5	12.0	11.5	11.0
69	6295							
73	6315							
77	6335							
81	6355	1.5	13.5	13.5	13.5	12.0	11.5	11.0
85	6375							
89	6395							
93	6415							
97	6435	3.0	X	X	X	X	X	X
101	6455		X	X	X	X	X	X
105	6475		X	X	X	X	X	X
109	6495		X	X	X	X	X	X
113	6515	2.5	X	X	X	X	X	X
117	6535		X	X	X	X	X	X
121	6555		X	X	X	X	X	X
125	6575							
129	6595	2.5	14.5	14.5	13.5	12.0	11.5	11.0
133	6615							
137	6635							
141	6655							
145	6675	2.0	14.0	14.0	13.5	12.0	11.5	11.0
149	6695							
153	6715							
157	6735							
161	6755	2.0	14.0	14.0	13.5	12.0	11.5	11.0
165	6775							
169	6795							
173	6815							
177	6835	2.0	X	X	X	X	X	X
181	6855							
185	6875		X	X	X	X	X	X
189	6895		X	X	X	X	X	X

193	6915	3.0	X	X	X	X	X	X
197	6935		X	X	X	X	X	X
201	6955		X	X	X	X	X	X
205	6975		X	X	X	X	X	X
209	6995	2.5	X	X	X	X	X	X
213	7015		X	X	X	X	X	X
217	7035		X	X	X	X	X	X
221	7055		X	X	X	X	X	X

Channel	Fc MHz	11ax160, 11be160	11ax160,				
		LPI	SP				
		M0-M13	M0-M6	M7-M8	M9-M10	M11	M12-M13
1	5955	6.5	13.5	13.5	12.0	11.5	11.0
5	5975						
9	5995						
13	6015						
17	6035						
21	6055						
25	6075						
29	6095						
33	6115	6.0	14.5	13.5	12.0	11.5	11.0
37	6135						
41	6155						
45	6175						
49	6195						
53	6215						
57	6235						
61	6255						
65	6275	5.5	14.0	13.5	12.0	11.5	11.0
69	6295						
73	6315						
77	6335						
81	6355						
85	6375						
89	6395						
93	6415						
97	6435	6.5	X	X	X	X	X
101	6455		X	X	X	X	X
105	6475		X	X	X	X	X
109	6495		X	X	X	X	X
113	6515		X	X	X	X	X
117	6535		X	X	X	X	X
121	6555		X	X	X	X	X
125	6575						
129	6595	6.5	14.5	13.5	12.0	11.5	11.0
133	6615						
137	6635						
141	6655						
145	6675						
149	6695						
153	6715						
157	6735						
161	6755	5.5	X	X	X	X	X
165	6775						
169	6795						
173	6815						
177	6835		X	X	X	X	X
181	6855						
185	6875		X	X	X	X	X
189	6895		X	X	X	X	X
193	6915	6.5	X	X	X	X	X
197	6935		X	X	X	X	X
201	6955		X	X	X	X	X

205	6975		X	X	X	X	X
209	6995		X	X	X	X	X
213	7015		X	X	X	X	X
217	7035		X	X	X	X	X
221	7055		X	X	X	X	X

13.2. EU/UK

Channel	Fc MHz	11b	11g	11n 20, 11ax 20, 11be 20,	11n 40, 11ax 40, 11be 40,
		1M-11M	6M-54M	M0-M13	M0-M13
1	2412	9.5	11.5	11.5	X
2	2417	9.5	11.5	11.5	X
3	2422	9.5	11.5	11.5	11.0
4	2427	9.5	11.5	11.5	11.0
5	2432	9.5	11.5	11.5	11.0
6	2437	9.5	11.5	11.5	11.0
7	2442	9.5	11.5	11.5	11.0
8	2447	9.5	11.5	11.5	11.0
9	2452	9.5	11.5	11.5	11.0
10	2457	9.5	11.5	11.5	11.0
11	2462	9.5	11.5	11.5	11.0
12	2467	9.5	11.5	11.5	X
13	2472	9.5	11.5	11.5	X

	Channel	Fc MHz	11a	11n20,11ac20, 11ax20,11be20	11n40,11ac40, 11ax40,11be40	11ac40, 11ax40,11be40	11ax40,11be40		11be40
			6M-54M	M0-M13	M0-M8	M9	M10	M11	M12-M13
EU/UK	36	5180	11.5	12.0	14.0	13.5	13.0	12.5	12.0
EU/UK	40	5200	11.5	12.0					
EU/UK	44	5220	11.5	12.0	14.0	13.5	13.0	12.5	12.0
EU/UK	48	5240	11.5	12.0					
EU/UK	52	5260	11.5	12.0	14.0	13.5	13.0	12.5	12.0
EU/UK	56	5280	11.5	12.0					
EU/UK	60	5300	11.5	12.0	14.0	13.5	13.0	12.5	12.0
EU/UK	64	5320	11.5	12.0					
EU/UK	100	5500	10.0	10.5	13.0	13.0	13.0	12.5	12.0
EU/UK	104	5520	10.0	10.5					
EU/UK	108	5540	10.0	10.5	13.0	13.0	13.0	12.5	12.0
EU/UK	112	5560	10.0	10.5					
EU/UK	116	5580	10.0	10.5	13.0	13.0	13.0	12.5	12.0
EU/UK	120	5600	10.0	10.5					
EU/UK	124	5620	10.0	10.5	13.0	13.0	13.0	12.5	12.0
EU/UK	128	5640	10.0	10.5					
EU/UK	132	5660	10.0	10.5	13.0	13.0	13.0	12.5	12.0
EU/UK	136	5680	10.0	10.5					
EU/UK	140	5700	10.0	10.5	13.0	13.0	13.0	12.5	12.0
EU/UK	144	5720	10.0	10.5					
UK	149	5745	10.0	10.5	13.0	13.0	13.0	12.5	12.0
UK	153	5765	10.0	10.5					
UK	157	5785	10.0	10.5	13.0	13.0	13.0	12.5	12.0
UK	161	5805	10.0	10.5					
UK	165	5825	10.0	10.5	X	X	X	X	X
EU	149	5745	4.0	4.0	4.0	4.0	4.0	4.0	4.0
EU	153	5765	4.0	4.0					
EU	157	5785	4.0	4.0	4.0	4.0d	4.0	4.0	4.0
EU	161	5805	4.0	4.0					
EU	165	5825	4.0	4.0	X	X	X	X	X

	Channel	Fc MHz	11ac80,11ax80, 11be80	11ax80, 11be80		11be80	11ac160,11ax160, 11be160	11ax160,11be160		11be160
			M0-M8	M9-M10	M11	M12-M13	M0-M8	M9-M10	M11	M12-M13
EU/UK	36	5180	14.0	13.0	12.5	12.0	14.0	13.0	12.5	12.0
EU/UK	40	5200								
EU/UK	44	5220								
EU/UK	48	5240								
EU/UK	52	5260	14.0	13.0	12.5	12.0				
EU/UK	56	5280								
EU/UK	60	5300								
EU/UK	64	5320								
EU/UK	100	5500	12.5	12.5	12.5	12.0	13.0	13.0	12.5	12.0
EU/UK	104	5520								
EU/UK	108	5540								
EU/UK	112	5560								
EU/UK	116	5580	12.0	12.0	12.0	12.0				
EU/UK	120	5600								
EU/UK	124	5620								
EU/UK	128	5640								
EU/UK	132	5660	13.0	13.0	12.5	12.0	X	X	X	X
EU/UK	136	5680								
EU/UK	140	5700								
EU/UK	144	5720								
UK	149	5745	13.0	13.0	12.5	12.0				
UK	153	5765								
UK	157	5785								
UK	161	5805								
EU	149	5745	4.0	4.0	4.0	4.0	X	X	X	X
EU	153	5765								
EU	157	5785								
EU	161	5805								

Channel	Fc MHz	11ax20, 11be20	11ax20, 11be20	11ax40, 11be40					11ax40, 11be40
		LPI	VLP	LPI					VLP
		M0-M13	M0-M13	M0-M8	M9	M10	M11	M12-M13	M0-M13
1	5955	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
5	5975	11.0	1.5						
9	5995	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
13	6015	11.0	1.5						
17	6035	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
21	6055	11.0	1.5						
25	6075	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
29	6095	11.0	1.5						
33	6115	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
37	6135	11.0	1.5						
41	6155	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
45	6175	11.0	1.5						
49	6195	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
53	6215	11.0	1.5						
57	6235	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
61	6255	11.0	1.5						
65	6275	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
69	6295	11.0	1.5						
73	6315	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
77	6335	11.0	1.5						
81	6355	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.5
85	6375	11.0	1.5						
89	6395	11.0	1.5	13.0	12.5	12.0	11.5	11.0	3.0
93	6415	11.0	1.5						

Channel	Fc MHz	11ax80, 11be80				11ax80, 11be80	11ax160, 11be160				11ax160, 11be160
		LPI				VLP	LPI				VLP
		M0-M8	M9-M10	M11	M12-M13	M0-M13	M0-M8	M9-M10	M11	M12-M13	M0-M13
1	5955	12.5	12.0	11.5	11.0	3.5	13.0	12.0	11.5	11.0	3.5
5	5975										
9	5995										
13	6015										
17	6035	12.5	12.0	11.5	11.0	3.5					
21	6055										
25	6075										
29	6095										
33	6115	12.5	12.0	11.5	11.0	3.5	13.0	12.0	11.5	11.0	3.5
37	6135										
41	6155										
45	6175										
49	6195	12.5	12.0	11.5	11.0	3.5					
53	6215										
57	6235										
61	6255										
65	6275	12.5	12.0	11.5	11.0	3.5	13.0	12.0	11.5	11.0	4.0
69	6295										
73	6315										
77	6335										
81	6355	12.5	12.0	11.5	11.0	3.0					
85	6375										
89	6395										
93	6415										

13.3. Japan

Channel	Fc MHz	11b	11g	11n 20, 11ax 20, 11be 20			
		1M-11M	6M-54M	M0-M7	M8-M9	M10-M11	M12-M13
1	2412	12.5	15.5	16.5	16.0	15.5	14.0
2	2417	12.5	15.5	16.5	16.0	15.5	14.0
3	2422	12.5	15.5	16.5	16.0	15.5	14.0
4	2427	12.5	15.5	16.5	16.0	15.5	14.0
5	2432	12.5	15.5	16.5	16.0	15.5	14.0
6	2437	12.5	15.5	16.5	16.0	15.5	14.0
7	2442	12.5	15.5	16.5	16.0	15.5	14.0
8	2447	12.5	15.5	16.5	16.0	15.5	14.0
9	2452	12.5	15.5	16.5	16.0	15.5	14.0
10	2457	12.5	15.5	16.5	16.0	15.5	14.0
11	2462	12.5	15.5	16.5	16.0	15.5	14.0
12	2467	12.5	15.5	16.5	16.0	15.5	14.0
13	2472	12.5	15.5	16.5	16.0	15.5	14.0

Channel	Fc MHz	11n 40,11ax 40, 11be 40				
		M0-M1	M2-M3	M4-M11	M12	M13
3	2422	16.0	15.5	14.5	12.5	11.5
4	2427	16.0	15.5	14.5	12.5	11.5
5	2432	16.0	15.5	14.5	12.5	11.5
6	2437	16.0	15.5	14.5	12.5	11.5
7	2442	16.0	15.5	14.5	12.5	11.5
8	2447	16.0	15.5	14.5	12.5	11.5
9	2452	16.0	15.5	14.5	12.5	11.5
10	2457	16.0	15.5	14.5	12.5	11.5
11	2462	16.0	15.5	14.5	12.5	11.5

Channel	Fc MHz	11a			11n20,11ac20, 11ax20,11be20				11ac20, 11ax20,11be20		11ax20,11be20	11be20
		6M-36M	48M	54M	M0-M3	M4-M5	M6	M7	M8	M9	M10-M11	M12-M13
36	5180	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
40	5200	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
44	5220	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
48	5240	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
52	5260	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
56	5280	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
60	5300	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
64	5320	13.5	13.5	13.5	14.0	14.0	14.0	14.0	14.0	14.0	13.0	12.0
100	5500	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
104	5520	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
108	5540	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
112	5560	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
116	5580	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
120	5600	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
124	5620	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
128	5640	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
132	5660	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
136	5680	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
140	5700	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0
144	5720	17.0	16.5	16.0	17.0	16.5	16.0	15.0	14.5	14.0	13.0	12.0

Channel	Fc MHz	11n40,11ac40, 11ax40,11be40					11ac40, 11ax40,11be40	11ax40,11be40		11be40
		M0-M1	M2-M3	M4-M5	M6	M7-M8	M9	M10	M11	M12-M13
36	5180	14.0	14.0	14.0	14.0	14.0	13.5	13.0	12.5	12.0
40	5200									
44	5220	14.0	14.0	14.0	14.0	14.0	13.5	13.0	12.5	12.0
48	5240									
52	5260	14.0	14.0	14.0	14.0	14.0	13.5	13.0	12.5	12.0
56	5280									
60	5300	14.0	14.0	14.0	14.0	14.0	13.5	13.0	12.5	12.0
64	5320									
100	5500	17.0	16.5	16.0	15.5	14.5	13.5	13.0	12.5	12.0
104	5520									
108	5540	17.0	16.5	16.0	15.5	14.5	13.5	13.0	12.5	12.0
112	5560									
116	5580	17.0	16.5	16.0	15.5	14.5	13.5	13.0	12.5	12.0
120	5600									
124	5620	17.0	16.5	16.0	15.5	14.5	13.5	13.0	12.5	12.0
128	5640									
132	5660	17.0	16.5	16.0	15.5	14.5	13.5	13.0	12.5	12.0
136	5680									
140	5700	17.0	16.5	16.0	15.5	14.5	13.5	13.0	12.5	12.0
144	5720									

Channel	Fc MHz	11ac80,11ax80, 11be80					11ax80, 11be80	11be80	11ac160,11ax160, 11be160				11ax160,11be160		11be160
		M0-M1	M2-M3	M4-M6	M7-M8	M9-M10	M11	M12-M13	M0-M1	M2-M3	M4-M6	M7-M8	M9-M10	M11	M12-M13
36	5180	14.0	14.0	14.0	14.0	13.0	12.5	12.0	14.0	14.0	14.0	14.0	13.0	12.5	12.0
40	5200														
44	5220														
48	5240														
52	5260	14.0	14.0	14.0	14.0	13.0	12.5	12.0							
56	5280														
60	5300														
64	5320														
100	5500	16.5	16.0	15.5	14.5	13.0	12.5	12.0	16.5	16.0	15.5	14.5	13.0	12.5	12.0
104	5520														
108	5540														
112	5560														

116	5580	16.5	16.0	15.5	14.5	13.0	12.5	12.0						
120	5600													
124	5620													
128	5640													
132	5660	16.5	16.0	15.5	14.5	13.0	12.5	12.0	X	X	X	X	X	X	X
136	5680													
140	5700													
144	5720													

Channel	Fc MHz	11ax20, 11be20		11ax20, 11be20	11ax40, 11be40					11ax40, 11be40
		LPI		VLP	LPI					VLP
		M0-M11	M12-M13	M0-M13	M0-M8	M9	M10	M11	M12-M13	M0-M13
1	5955	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
5	5975	12.0	11.0	3.5						
9	5995	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
13	6015	12.0	11.0	3.5						
17	6035	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
21	6055	12.0	11.0	3.5						
25	6075	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
29	6095	12.0	11.0	3.5						
33	6115	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
37	6135	12.0	11.0	3.5						
41	6155	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
45	6175	12.0	11.0	3.5						
49	6195	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
53	6215	12.0	11.0	3.5						
57	6235	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
61	6255	12.0	11.0	3.5						
65	6275	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
69	6295	12.0	11.0	3.5						
73	6315	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
77	6335	12.0	11.0	3.5						
81	6355	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
85	6375	12.0	11.0	3.5						
89	6395	12.0	11.0	3.5	12.5	12.5	12.0	11.5	11.0	3.5
93	6415	12.0	11.0	3.5						

Channel	Fc MHz	11ax80, 11be80				11ax80, 11be80	11ax160, 11be160				11ax160, 11be160
		LPI				VLP	LPI				VLP
		M0-M8	M9-M10	M11	M12-M13	M0-M13	M0-M8	M9-M10	M11	M12-M13	M0-M13
1	5955	12.5	12.0	11.5	11.0	3.5	12.5	12.0	11.5	11.0	3.5
5	5975										
9	5995										
13	6015										
17	6035	12.5	12.0	11.5	11.0	3.5					
21	6055										
25	6075										
29	6095										
33	6115	12.5	12.0	11.5	11.0	3.5	12.5	12.0	11.5	11.0	3.5
37	6135										
41	6155										
45	6175										
49	6195	12.5	12.0	11.5	11.0	3.5					
53	6215										
57	6235										
61	6255										
65	6275	12.5	12.0	11.5	11.0	3.5	12.5	12.0	11.5	11.0	3.5
69	6295										
73	6315										
77	6335										
81	6355	12.5	12.0	11.5	11.0	3.5					
85	6375										
89	6395										
93	6415										