



**CONFIDENTIAL INFORMATION**

**CUSTOMER :** \_\_\_\_\_

**DATE :** 2021.03.26

## SPECIFICATIONS FOR APPROVAL

**PRODUCT :** EFR32BG22 BLE (Bluetooth Low Energy) Module

**MODEL NAME :** DBS22-11ST0

**CUSTOMER P/N :** \_\_\_\_\_

APPROVAL	REMARK

Revision
0.1 (21/01/17) - Initial release. 0.2 (21/03/26) – Mechanical Dimensions, Recommended PCB pattern

Designed	Checked	Approved	<b>DeviceDesign Co., Ltd.</b>	
Lee D.H	Hwang K.R	Choi Y.L	PAGE	REV 0.2 (1 / 20)

(CUSTOMER P/N : )

## 1. Introduction

DeviceDesign would like to announce a low-cost and low-power consumption module which has all of the Bluetooth Low Energy functionalities. The highly integrated module makes the possibilities of keyboards, remote controls, Sports and fitness sensors, heating control and lighting control application.

## 2. Purpose

This specification is applied to “DeviceDesign Bluetooth Low Energy module”.

## 3. Quality

Quality should meet each condition which mentioned on this specification. However, the items which are not mentioned on this specification follow the inspection agreements and standards which are agree with both companies.

## 4. Appearance and Characteristics

### 1) Appearance

Appearance should not contaminated by harmful materials and should not have cracks etc. Mechanical dimensions should meet the contents of clause 9.

### 2) Characteristics

Electrical characteristics should meet the contents of clause 11.

## 5. Application

DBS22-1XSTX is a Bluetooth Low Energy (v5.2) Module. But this module is not designed for Life Support Application. Also it is recommended that this module mounted by Reflow soldering.

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	0.2	2021.03.26	Mechanical Dimensions	DSGD	CHKD	APPD	DBS22-1XSTX
							DOCUMENT NO.
							DBS22-1XSTX SA

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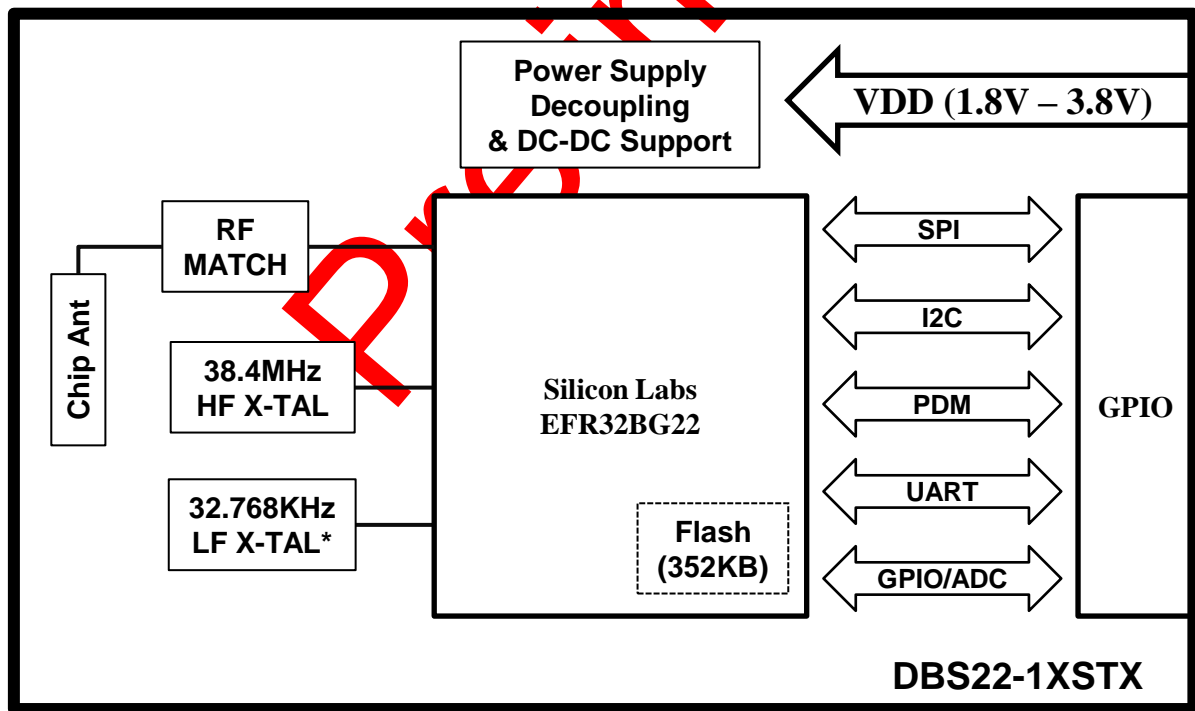
### 6. Absolute Maximum Rating

Parameter		Min.	Max.	Unit
Storage Temperature		-40	85	deg.C
Supply Voltage	VDD	-0.3	3.8	V

### 7. Test

Electrical characteristics are tested for every products. However, if there are any objection in judgment, it should be treated with agreements of both companies.

### 8. Block Diagram



\* Option : 32kHz can be removed for no critical precise time application.

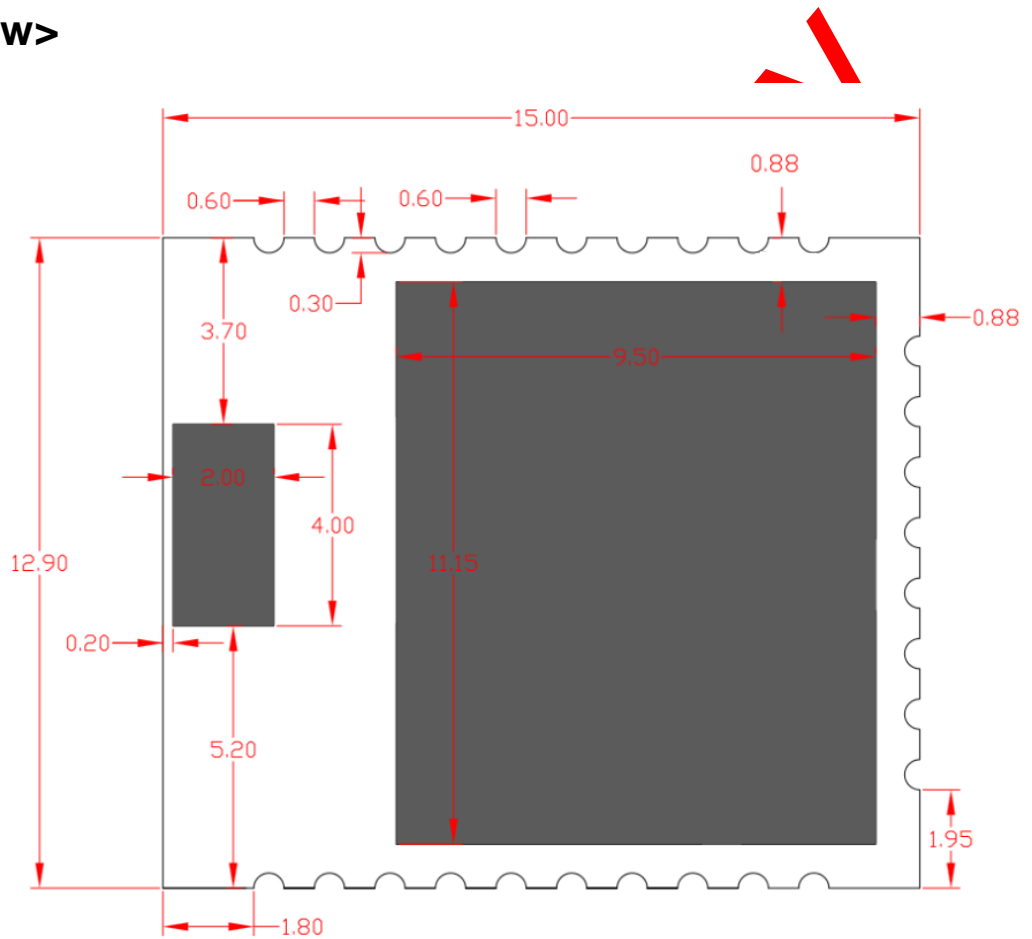
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**9. Mechanical Dimensions #1**

Dimension	12.9mm × 15.0mm × 2.61mm(Max.)
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**<Top View>**



**<Side View>**



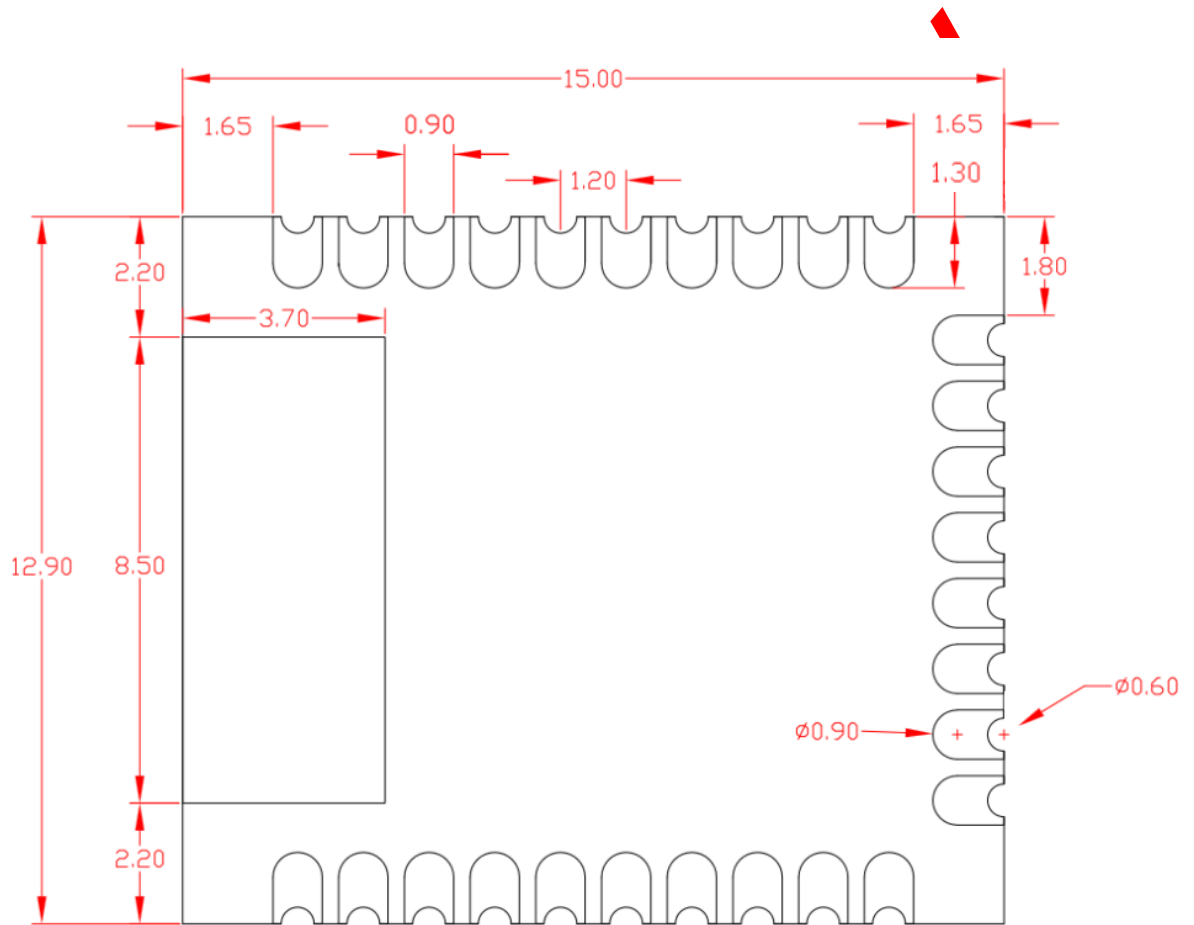
Unit : mm

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**9. Mechanical Dimensions #2**

**<Top Through View>**

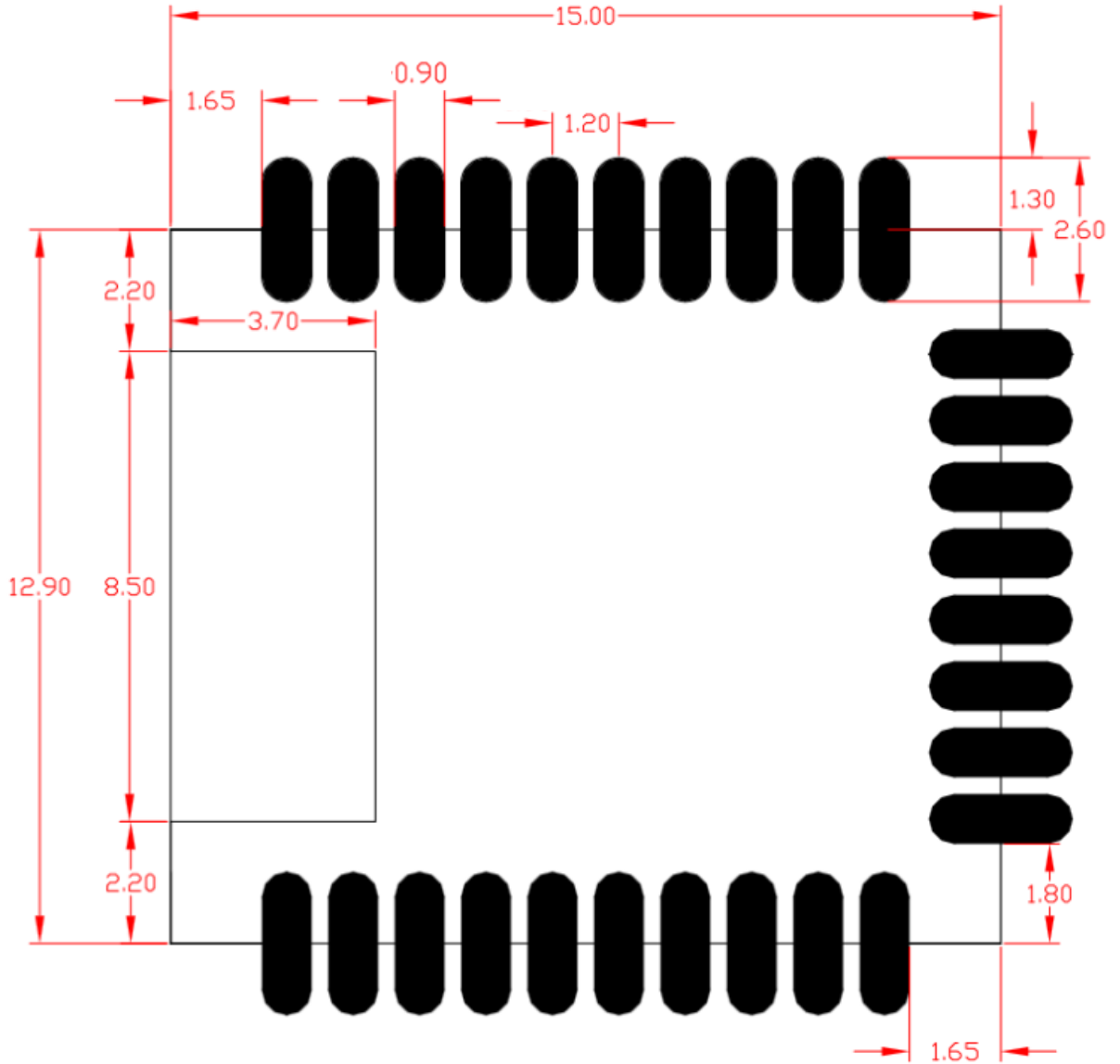


Unit : mm

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**10. Recommended PCB pattern**



Unit : mm

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**2) MCU Current Consumption with 3 V Supply**

Unless otherwise indicated, typical conditions are: Module supply voltage = 3.0 V. Voltage scaling level = VSCALE1. TA = 25 °C. Minimum and maximum values in this table represent the worst conditions across process variation at TA = 25 °C.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Current consumption in EM0 mode with all peripherals disabled	I <sub>ACTIVE</sub>	76.8 MHz HFRCO w/ DPLL referenced to 38.4 MHz crystal, CPU running while loop from flash, VSCALE2	-	27	-	µA/MHz
		76.8 MHz HFRCO w/ DPLL referenced to 38.4 MHz crystal, CPU running CoreMark loop from flash, VSCALE2	-	37	-	µA/MHz
		38.4 MHz crystal, CPU running Prime from flash	-	28	-	µA/MHz
		38.4 MHz crystal, CPU running while loop from flash	-	26	-	µA/MHz
		38.4 MHz crystal, CPU running CoreMark loop from flash	-	38	-	µA/MHz
		38 MHz HFRCO, CPU running while loop from flash	-	22	-	µA/MHz
		76.8 MHz HFRCO w/ DPLL referenced to 38.4 MHz crystal, CPU running Prime from flash, VSCALE2	-	28	-	µA/MHz
Current consumption in EM1 mode with all peripherals disabled	I <sub>EM1</sub>	76.8 MHz HFRCO w/ DPLL referenced to 38.4 MHz crystal, VSCALE2	-	17	-	µA/MHz
		38.4 MHz crystal	-	17	-	µA/MHz
		38 MHz HFRCO	-	13	-	µA/MHz
Current consumption in EM2 mode, VSCALE0	I <sub>EM2_VS</sub>	Full RAM retention and RTC running from LFXO	-	1.4	-	µA
		Full RAM retention and RTC running from LFRCO	-	1.4	-	µA
		Full RAM retention and RTC running from LFRCO in precision mode	-	1.75	-	µA
		24 kB RAM retention and RTC running from LFXO	-	1.32	-	µA
		24 kB RAM retention and RTC running from LFRCO in precision mode	-	1.66	-	µA
		8 kB RAM retention and RTC running from LFXO	-	1.21	-	µA
		8 kB RAM retention and RTC running from LFRCO	-	1.2	-	µA
Current consumption in EM3 mode, VSCALE0	I <sub>EM3_VS</sub>	8 kB RAM retention and RTC running from ULFRCO	-	1.05	-	µA
Current consumption in EM4 mode	I <sub>EM4</sub>	No BURTC, No LF Oscillator, DCDC bypassed	-	0.17	-	µA
Additional current in EM2 or EM3 when any peripheral in PD0B is enabled <sup>1</sup>	I <sub>PD0B_VS</sub>		-	0.37	-	µA

Note :  
 1. Extra current consumed by power domain. Does not include current associated with the enabled peripherals. See for a list of the peripherals in each power domain.

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**3) RF General Characteristics for the 2.4 GHz Band**

Unless otherwise indicated, typical conditions are: TA = 25 °C, VDD = 3.0V. RF center frequency 2.45 GHz.

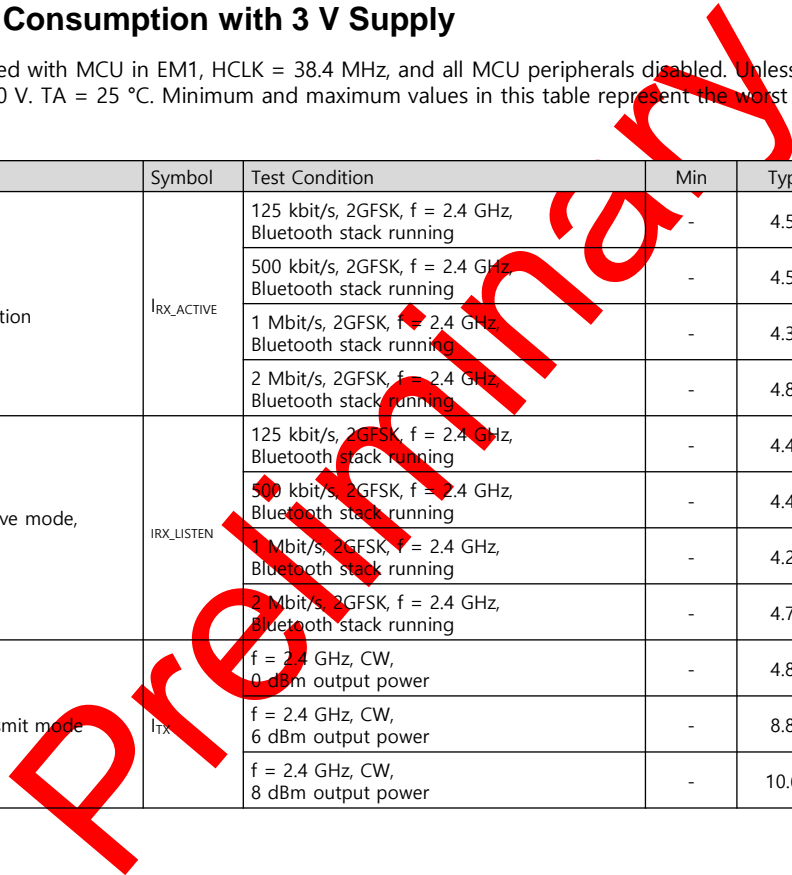
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
RF tuning frequency range	F <sub>RANGE</sub>		2400	-	2483.5	MHz

**4) Radio Current Consumption with 3 V Supply**

RF current consumption measured with MCU in EM1, HCLK = 38.4 MHz, and all MCU peripherals disabled. Unless otherwise indicated, typical conditions are: VDD = 3.0 V. TA = 25 °C. Minimum and maximum values in this table represent the worst conditions across process variation at TA = 25 °C.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
System current consumption in receive mode, active packet reception	I <sub>RX_ACTIVE</sub>	125 kbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.5	-	mA
		500 kbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.5	-	mA
		1 Mbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.3	-	mA
		2 Mbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.8	-	mA
System current consumption in receive mode, listening for packet	I <sub>RX_LISTEN</sub>	125 kbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.4	-	mA
		500 kbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.4	-	mA
		1 Mbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.2	-	mA
		2 Mbit/s, 2GFSK, f = 2.4 GHz, Bluetooth stack running	-	4.7	-	mA
System current consumption in transmit mode	I <sub>TX</sub>	f = 2.4 GHz, CW, 0 dBm output power	-	4.8	-	mA
		f = 2.4 GHz, CW, 6 dBm output power	-	8.8	-	mA
		f = 2.4 GHz, CW, 8 dBm output power	-	10.6	-	mA

Note :  
 1. Extra current consumed by power domain. Does not include current associated with the enabled peripherals. See for a list of the peripherals in each power domain.



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**5) RF Transmitter General Characteristics for the 2.4 GHz Band**

Unless otherwise indicated, typical conditions are: TA = 25 °C, VDD = 3.0V. RF center frequency 2.45 GHz.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
RF tuning frequency range	FRANGE		2400	-	2483.5	MHz
Maximum TX power1	P <sub>OUTMAX</sub>	8 dBm output power	-	8	-	dBm
		6 dBm output power	-	6	-	dBm
		0 dBm output power	-	0	-	dBm

**6) RF Receiver Characteristics for Bluetooth Low Energy in the 2.4 GHz Band**

Unless otherwise indicated, typical conditions are: TA = 25 °C, VDD = 3.0V. RF center frequency 2.45 GHz.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Max usable receiver input level	SAT	Signal is reference signal <sup>1</sup>	-	10	-	dBm
Sensitivity (1Mbps Data Rate)	SENS	Signal is reference signal, 37 byte payload <sup>2</sup>	-	-98.9	-	dBm
Sensitivity (2Mbps Data Rate)	SENS	Signal is reference signal, 37 byte payload <sup>2</sup>	-	-96.2	-	dBm

- Note :
- 0.017% Bit Error Rate.
  - 0.1% Bit Error Rate.

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**7) High-Frequency Crystal**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Crystal frequency	$f_{HFXTAL}$			38.4		MHz
Initial calibrated accuracy	$ACC_{HFXTAL}$		-10	-	10	ppm
Temperature drift	$DRIFT_{HFXTAL}$	Across specified temperature range	-20	-	20	ppm

**8) Low-Frequency Crystal**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Crystal frequency <sup>1</sup>	$f_{LFXTAL}$			32.768	-	kHz
Temperature drift	$DRIFT_{LFXTAL}$	-40 °C to +85 °C	-200	-	200	ppm

Note :

1. Nominal frequency tolerance of the crystal is ± 20 ppm.

**9) Precision Low Frequency RC Oscillator (LFRCO)**

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Nominal oscillation frequency	$F_{LFRCO}$		-	32.768	-	kHz
Frequency accuracy	$F_{LFRCO\_ACC}$	Normal mode	-3	-	3	%
		Precision mode <sup>1</sup> , across operating temperature range <sup>2</sup>	-500	-	500	ppm
Startup time	$t_{STARTUP}$	Normal mode	-	204	-	µs
		Precision mode <sup>1</sup>	-	11.7	-	ms
Current consumption	$I_{LFRCO}$	Normal mode	-	175	-	nA
		Precision mode <sup>1</sup> , T = stable at 25°C <sup>3</sup>	-	655	-	nA

Note :

1. The LFRCO operates in high-precision mode when CFG\_HIGHPRECEN is set to 1. High-precision mode is not available in EM4.
2. Includes ± 40 ppm frequency tolerance of the HFXO crystal.
3. Includes periodic re-calibration against HFXO crystal oscillator.

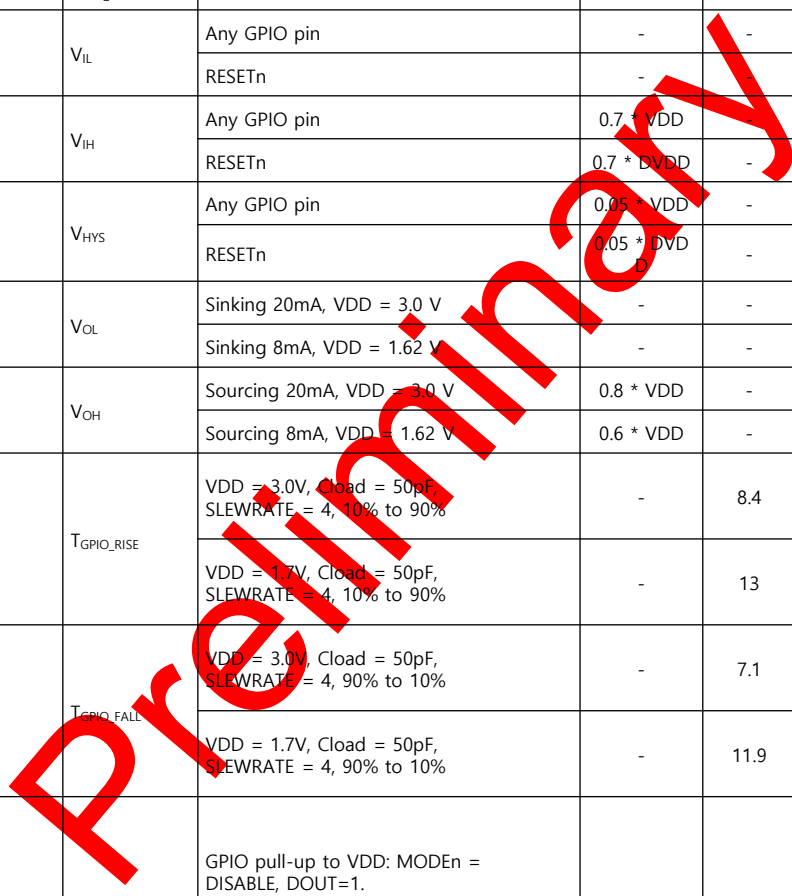
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**10) GPIO Pins**

Unless otherwise indicated, typical conditions are: VDD = 3.0 V.

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Leakage current	I <sub>LEAK_IO</sub>	MODEx = DISABLED, VDD = 3.0 V	-	2.5	-	nA
Input low voltage <sup>1</sup>	V <sub>IL</sub>	Any GPIO pin	-	-	0.3 * VDD	V
		RESETn	-	-	0.3 * DVDD	V
Input high voltage <sup>1</sup>	V <sub>IH</sub>	Any GPIO pin	0.7 * VDD	-	-	V
		RESETn	0.7 * DVDD	-	-	V
Hysteresis of input voltage	V <sub>HYS</sub>	Any GPIO pin	0.05 * VDD	-	-	V
		RESETn	0.05 * DVDD	-	-	V
Output low voltage	V <sub>OL</sub>	Sinking 20mA, VDD = 3.0 V	-	-	0.2 * VDD	V
		Sinking 8mA, VDD = 1.62 V	-	-	0.4 * VDD	V
Output high voltage	V <sub>OH</sub>	Sourcing 20mA, VDD = 3.0 V	0.8 * VDD	-	-	V
		Sourcing 8mA, VDD = 1.62 V	0.6 * VDD	-	-	V
GPIO rise time	T <sub>GPIO_RISE</sub>	VDD = 3.0V, Cload = 50pF, SLEWRATE = 4, 10% to 90%	-	8.4	-	ns
		VDD = 1.7V, Cload = 50pF, SLEWRATE = 4, 10% to 90%	-	13	-	ns
GPIO fall time	T <sub>GPIO_FALL</sub>	VDD = 3.0V, Cload = 50pF, SLEWRATE = 4, 90% to 10%	-	7.1	-	ns
		VDD = 1.7V, Cload = 50pF, SLEWRATE = 4, 90% to 10%	-	11.9	-	ns
Pull up/down resistance	R <sub>PULL</sub>	GPIO pull-up to VDD: MODEn = DISABLE, DOUT=1. GPIO pulldown to VSS: MODEn = WIREDORPULLDOWN, DOUT = 0. RESETn pin pull-up to DVDD.	35	44	55	kΩ
Maximum filtered glitch width	T <sub>GF</sub>	MODE = INPUT, DOUT = 1	-	27	-	ns



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### 13. Microcontroller Peripherals

The MCU peripherals set available in DBS22-1XSTX modules includes:

- ADC: 12-bit at 1 Msps, 16-bit at 76.9 ksps
- 16-bit and 32-bit Timers/Counters
- 24-bit Low Energy Timer for waveform generation
- 32-bit Real Time Counter
- USART (UART/SPI/SmartCards/IrDA/I2S)
- EUART (UART/IrDA)
- I2C peripheral interfaces
- PDM interface
- 12 Channel Peripheral Reflex System

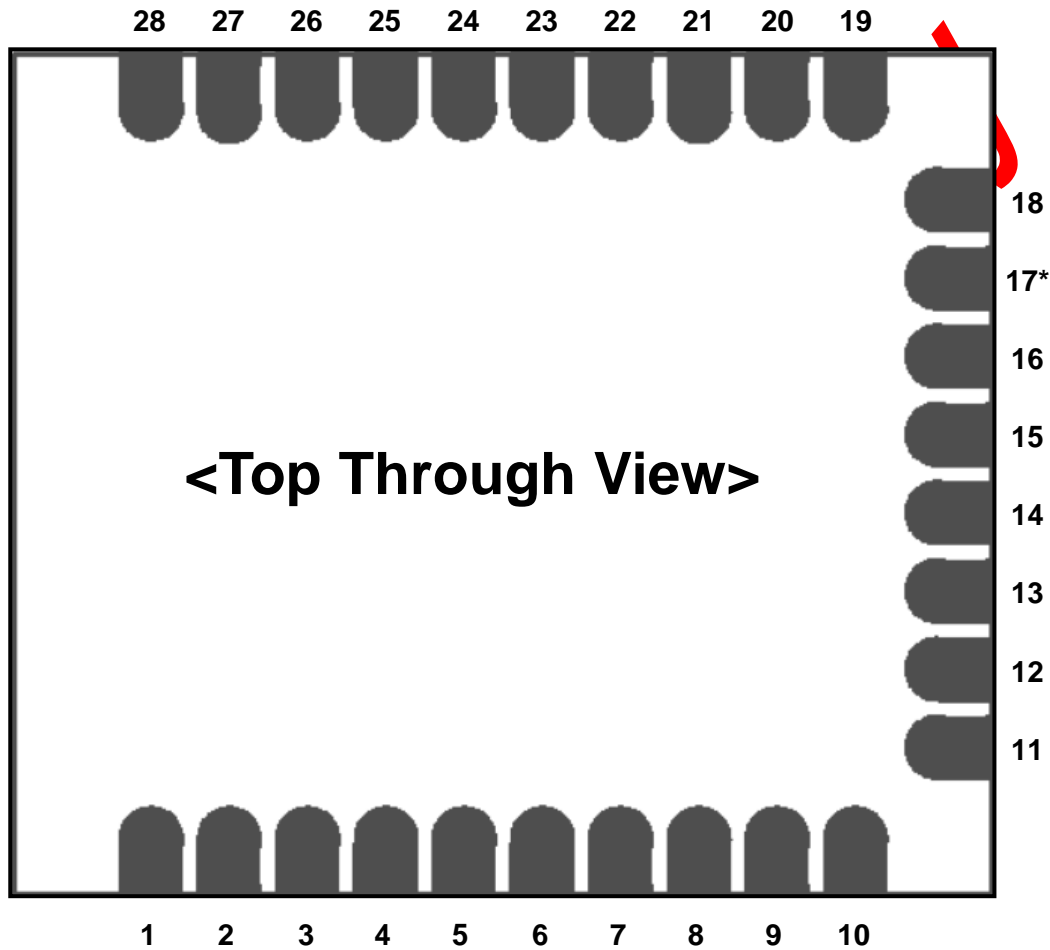
For details on their electrical performance, consult the relevant portions of Section 4 in the SoC datasheet. To learn which GPIO ports provide access to every peripheral, consult Analog Peripheral Connectivity and Digital Peripheral Connectivity.

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**14. Pin Assignment (Top Through View, Bottom Layout)**



\* Pin 17 is only available on module with Precision LFRCO Device (Not embedded 32kHz xtal Module)

\* Pin 17 should be N.C for module with LF Crystal Device (Embedded 32kHz xtal Module)

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### 16. Alternate Function Table

A wide selection of alternate functionality is available for multiplexing to various pins. The following table shows what functions are available on each device pin.

GPIO	Alternate Function		
PB01	GPIO.EM4WU3		
PB00	IADC0.VREFN		
PA00	IADC0.VREFP		
PA01	GPIO.SWCLK		
PA02	GPIO.SWDIO		
PA03	GPIO.SWV	GPIO.TDO	GPIO.TRACEDATA0
PA04	GPIO.TDI	GPIO.TRACECLK	
PA05	GPIO.EM4WU0		
PD02	GPIO.EM4WU9		
PC00	GPIO.EM4WU6	GPIO.THMSW_EN	
PC05	GPIO.EM4WU7		
PC07	GPIO.EM4WU8		

### 17. Analog Peripheral Connectivity

Many analog resources are routable and can be connected to numerous GPIO's. The table below indicates which peripherals are available on each GPIO port. When a differential connection is being used Positive inputs are restricted to the EVEN pins and Negative inputs are restricted to the ODD pins. When a single ended connection is being used positive input is available on all pins. See the device Reference Manual for more details on the ABUS and analog peripherals.

Peripheral	Signal	PA		PB		PC		PD	
		EVEN	ODD	EVEN	ODD	EVEN	ODD	EVEN	ODD
IADC0	ana_neg	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	ana_pos	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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### 18. Digital Peripheral Connectivity #1

Many digital resources are routable and can be connected to numerous GPIO's.  
The table below indicates which peripherals are available on each GPIO port.

Peripheral.Resource	PORT			
	PA	PB	PC	PD
CMU.CLKIN0			Available	Available
CMU.CLKOUT0			Available	Available
CMU.CLKOUT1			Available	Available
CMU.CLKOUT2	Available	Available		
EUART0.CTS	Available	Available	Available	Available
EUART0.RTS	Available	Available	Available	Available
EUART0.RX	Available	Available	Available	Available
EUART0.TX	Available	Available	Available	Available
FRC.DCLK			Available	Available
FRC.DFRAME			Available	Available
FRC.DOUT			Available	Available
I2C0.SCL	Available	Available	Available	Available
I2C0.SDA	Available	Available	Available	Available
I2C1.SCL			Available	Available
I2C1.SDA			Available	Available
LETIMER0.OUT0	Available	Available		
LETIMER0.OUT1	Available	Available		
MODEM.ANT0	Available	Available	Available	Available
MODEM.ANT1	Available	Available	Available	Available
MODEM.ANT_ROLL_OVER			Available	Available
MODEM.ANT_RR0			Available	Available
MODEM.ANT_RR1			Available	Available
MODEM.ANT_RR2			Available	Available
MODEM.ANT_RR3			Available	Available
MODEM.ANT_RR4			Available	Available
MODEM.ANT_RR5			Available	Available
MODEM.ANT_SW_EN			Available	Available
MODEM.ANT_SW_US			Available	Available
MODEM.ANT_TRIG			Available	Available
MODEM.ANT_TRIG_STOP			Available	Available
MODEM.DCLK	Available	Available		



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**18. Digital Peripheral Connectivity #2**

Peripheral.Resource	PORT			
	PA	PB	PC	PD
MODEM.DIN	Available	Available		
MODEM.DOUT	Available	Available		
PDM.CLK	Available	Available	Available	Available
PDM.DAT0	Available	Available	Available	Available
PDM.DAT1	Available	Available	Available	Available
PRS.ASYNCH0	Available	Available		
PRS.ASYNCH1	Available	Available		
PRS.ASYNCH10			Available	Available
PRS.ASYNCH11			Available	Available
PRS.ASYNCH2	Available	Available		
PRS.ASYNCH3	Available	Available		
PRS.ASYNCH4	Available	Available		
PRS.ASYNCH5	Available	Available		
PRS.ASYNCH6			Available	Available
PRS.ASYNCH7			Available	Available
PRS.ASYNCH8			Available	Available
PRS.ASYNCH9			Available	Available
PRS.SYNCH0	Available	Available	Available	Available
PRS.SYNCH1	Available	Available	Available	Available
PRS.SYNCH2	Available	Available	Available	Available
PRS.SYNCH3	Available	Available	Available	Available
TIMER0.CC0	Available	Available	Available	Available
TIMER0.CC1	Available	Available	Available	Available
TIMER0.CC2	Available	Available	Available	Available
TIMER0.CDTI0	Available	Available	Available	Available
TIMER0.CDTI1	Available	Available	Available	Available
TIMER0.CDTI2	Available	Available	Available	Available
TIMER1.CC0	Available	Available	Available	Available
TIMER1.CC1	Available	Available	Available	Available
TIMER1.CC2	Available	Available	Available	Available
TIMER1.CDTI0	Available	Available	Available	Available
TIMER1.CDTI1	Available	Available	Available	Available
TIMER1.CDTI2	Available	Available	Available	Available
TIMER2.CC0	Available	Available		
TIMER2.CC1	Available	Available		
TIMER2.CC2	Available	Available		

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**18. Digital Peripheral Connectivity #3**

Peripheral.Resource	PORT			
	PA	PB	PC	PD
TIMER2.CDTI0	Available	Available		
TIMER2.CDTI1	Available	Available		
TIMER2.CDTI2	Available	Available		
TIMER3.CC0			Available	Available
TIMER3.CC1			Available	Available
TIMER3.CC2			Available	Available
TIMER3.CDTI0			Available	Available
TIMER3.CDTI1			Available	Available
TIMER3.CDTI2			Available	Available
TIMER4.CC0	Available	Available		
TIMER4.CC1	Available	Available		
TIMER4.CC2	Available	Available		
TIMER4.CDTI0	Available	Available		
TIMER4.CDTI1	Available	Available		
TIMER4.CDTI2	Available	Available		
USART0.CLK	Available	Available	Available	Available
USART0.CS	Available	Available	Available	Available
USART0.CTS	Available	Available	Available	Available
USART0.RTS	Available	Available	Available	Available
USART0.RX	Available	Available	Available	Available
USART0.TX	Available	Available	Available	Available
USART1.CLK	Available	Available		
USART1.CS	Available	Available		
USART1.CTS	Available	Available		
USART1.RTS	Available	Available		
USART1.RX	Available	Available		
USART1.TX	Available	Available		

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## 19. Reliability Test

### 1) Environment Test

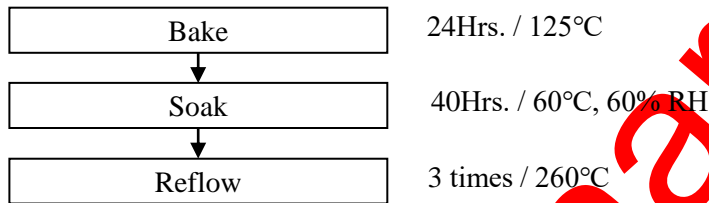
NO	ITEM	Condition	Characteristics
1	High Temperature and Humidity Load Test	Initial value measured at standard test condition. <b>Test Conditions:</b> 35°C, 90%RH, 50hr <b>Supply Voltage Condition:</b> standard ± 5% In standard test condition, take measurements within 3hr.	- No electrical problem
2	High Temp. Load Test	Initial value measured at standard test condition. <b>Test Conditions:</b> 85°C, 50hr <b>Supply Voltage Condition:</b> standard ± 5% In standard test condition, take measurements within 3hr.	- No electrical problem
3	Low Temp. Load Test	Initial value measured at standard test condition. <b>Test Conditions:</b> -30°C, 50hr <b>Supply Voltage Condition:</b> standard ± 5% In standard test condition, take measurements within 3hr.	- No electrical problem
4	High Temp. Storage Test	Initial value measured at standard test condition. <b>Test Conditions:</b> 85°C, 100hr In standard test condition, take measurements within 3hr.	- No electrical problem
5	Low Temp. Storage Test	Initial value measured at standard test condition. <b>Test Conditions:</b> -30, 100hr In standard test condition, take measurements within 3hr.	- No electrical problem
6	Temperature Cycling	Initial value measured at standard test condition. <b>Test Conditions:</b> 20°C → 85°C (1hr) 85°C → 20°C (1hr) 20°C → -30°C (1hr) -30°C → 20°C (1hr) - Test cycle : 25 cycles, Test Times : 100 Hr In standard test condition, take measurements within 3hr.	- No electrical problem
7	Drop Test	Initial value measured at standard test condition. <b>Test Conditions:</b> - Test height: 100 cm - Test times: 10 times Drop the module onto a 2mm metal plate. In standard test condition, take measurements within 3hr.	- No mechanical damage - No electrical problem

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**2) JEDEC MSL(Moisture Sensitivity Level) Test**

- MSL 3 Level (Floor Life Time : 168Hrs. / Condition : ≤30°C, 60% RH)
- Standard : IPC / JEDEC J-STD-020C



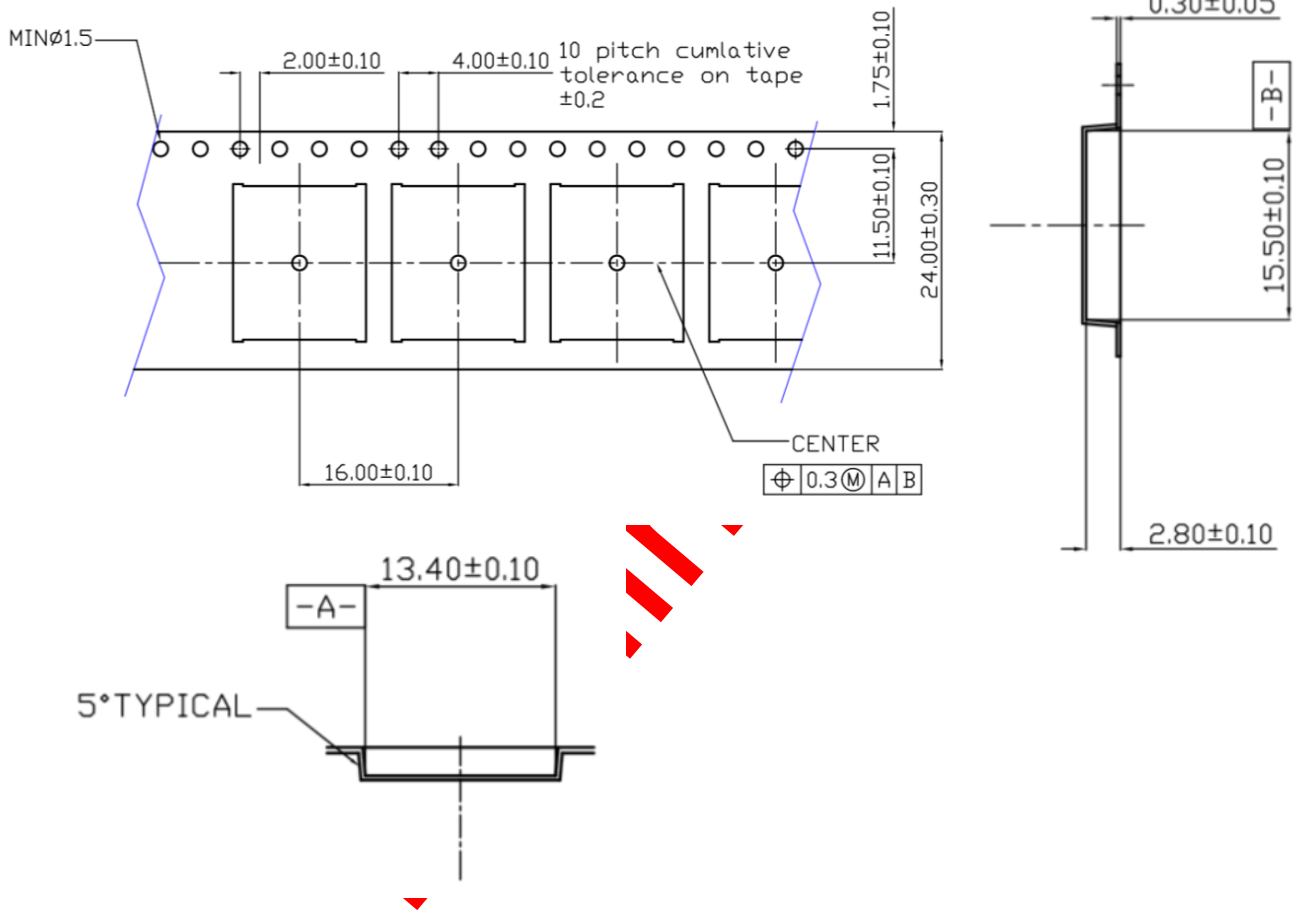
Preliminary

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## 20. Packing Information

### 1) Carrier Tape Dimension



**Unit : mm**

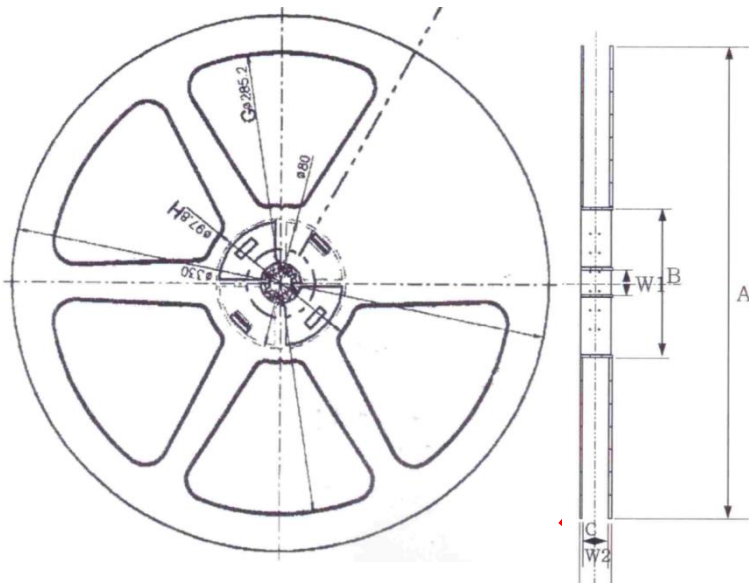
A0	15.40 ± 0.20	E	1.75 ± 0.10
B0	18.40 ± 0.20	F	14.20 ± 0.10
K0	3.50 ± 0.20	t	0.30 ± 0.05
S	28.40 ± 0.10	w	32.00 ± 0.30

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**2) Carrier Tape Dimension**

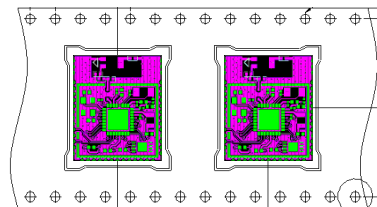
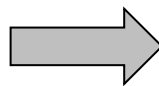
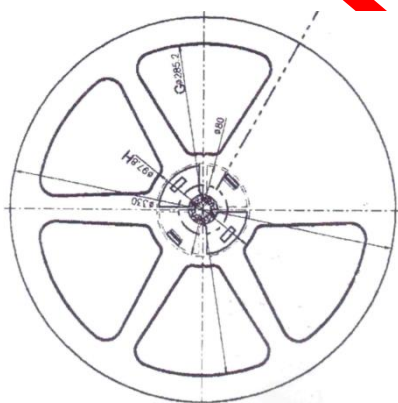
**Unit : mm**



항 목	A	B	C
SPEC	330±1	80±1	13±0.5

EIAJ - RRM Ø330							
RRM08D - 56D							
품명	08D	12D	16D	24D	32D	44D	56D
규격	08	12	16	24	32	44	56
c(±0.5)	9	13	17	25	33	44.8	57
W2(±1)	13	17.5	21	29	37	49	61

**3) User direction of feed**



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**21. Packing Box information**

**1) Inner Box**

<b>Inner Box</b>		
Spec.	350 x 335 x 65 (mm)	
1Box (S)	1,480 EA	

**2) Out Box**

<b>Out Box</b>		
Spec.	365 x 340 x 350 (mm)	
1Box (S)	5Box(S) = 7,400 EA	

Prelim

Note1) Recommendation : 72 hours floor time ( $\leq 30^{\circ}\text{C}$  / 60% RH)

Note2) Recommendation: The time between opening and Chip Mount should be within 72 hours.

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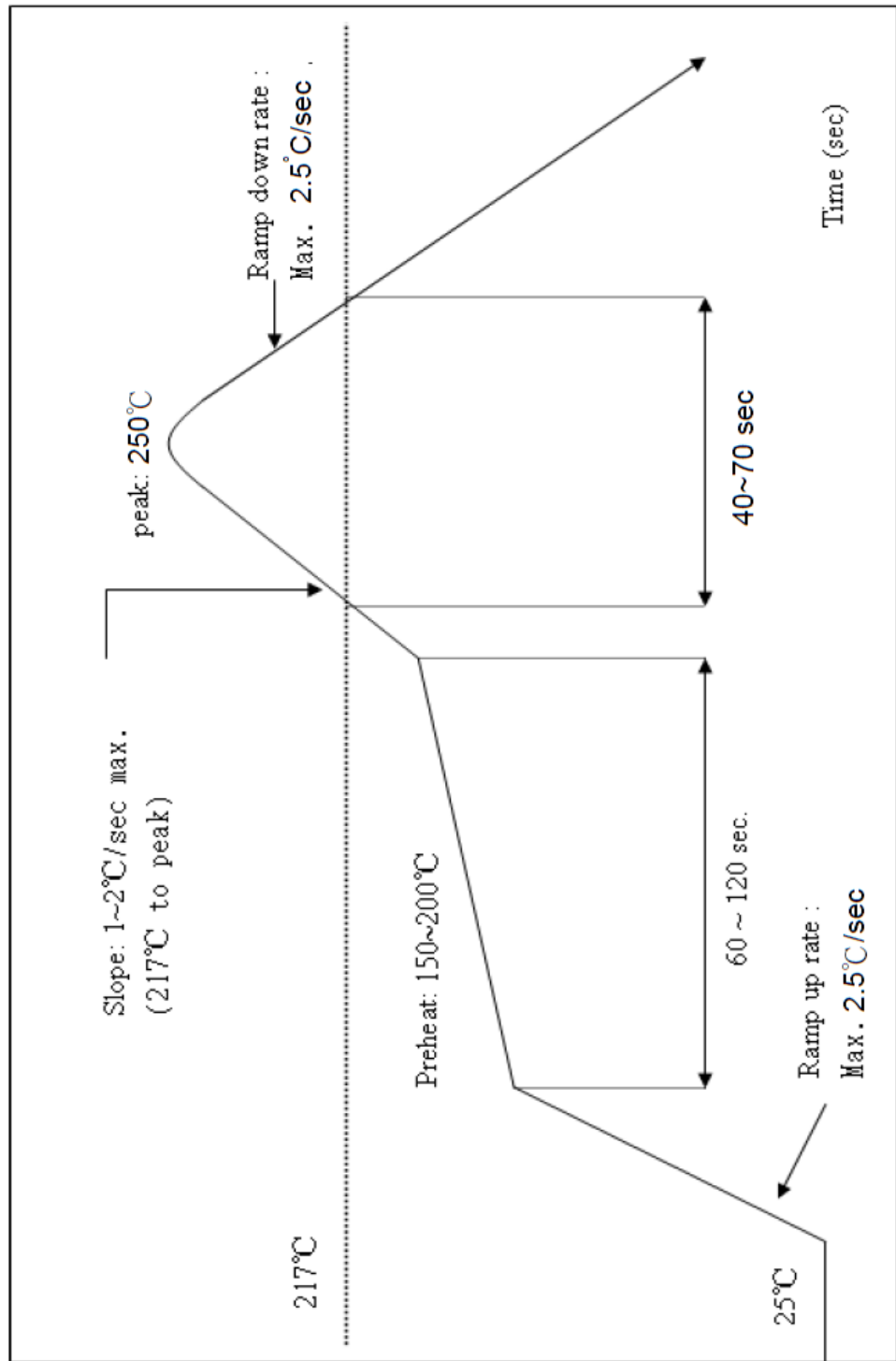
(CUSTOMER P/N : )

## 22. Reflow Profile

Referred to IPC/JEDEC standard.

Peak Temperature : <250°C

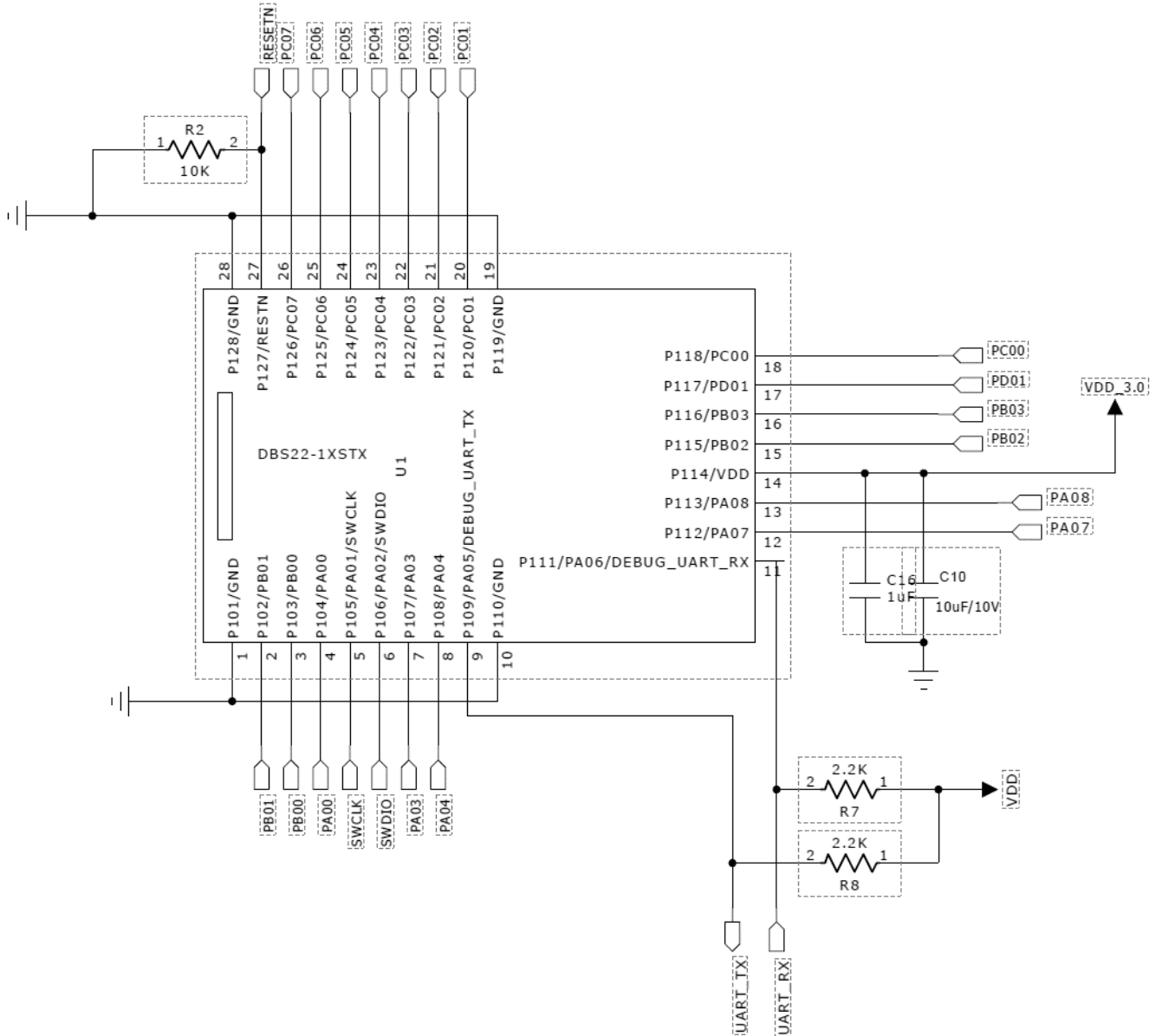
Number of Times : ≤2 times



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### 23. Application Circuit

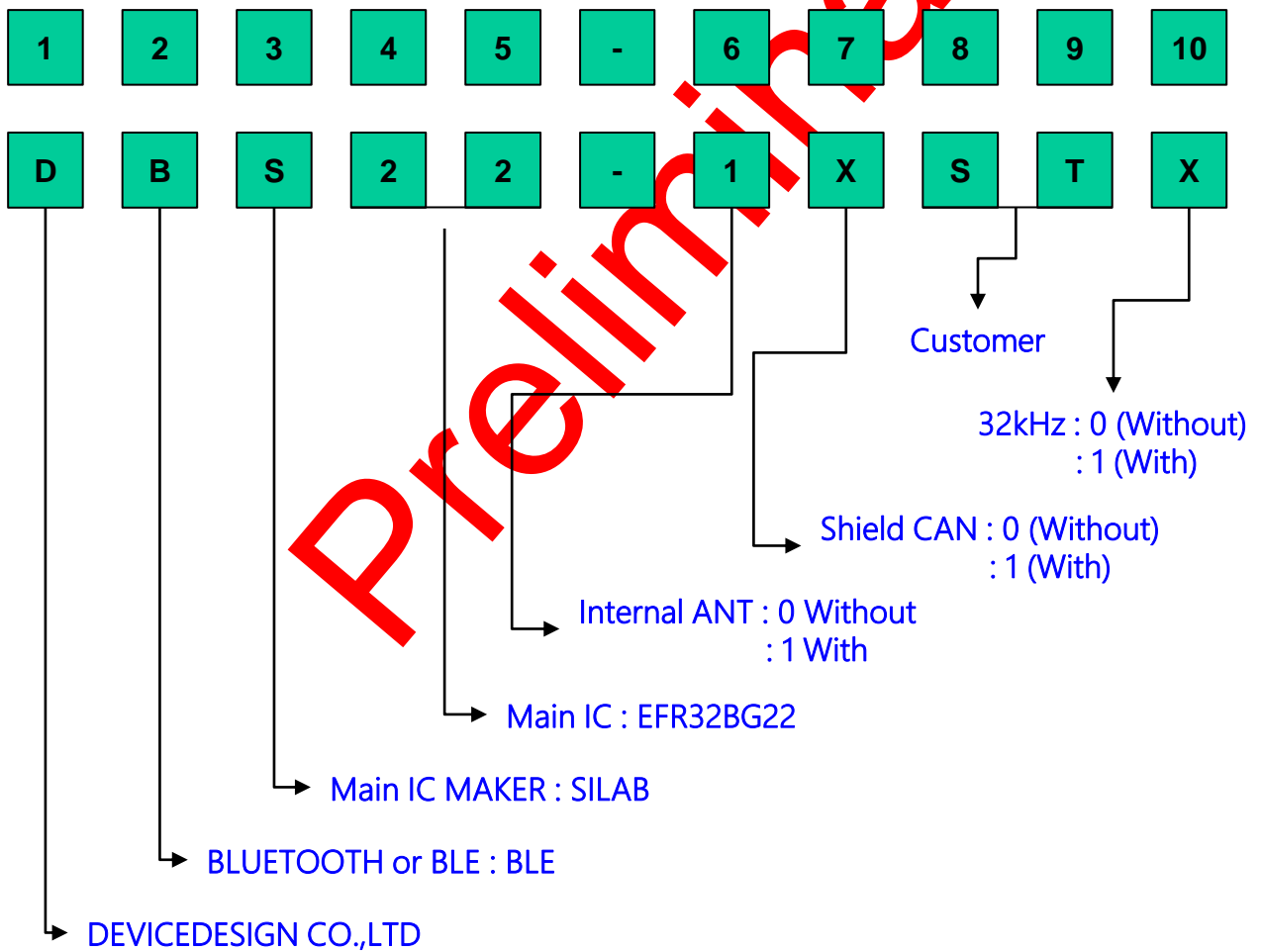


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**24.Odering Information**

MODEL	Shield CASE	32kHz Xtal
DBS22-10ST0	X	X
DBS22-11ST0	O	X
DBS22-10ST1	X	O
DBS22-11ST1	O	O



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## **FCC MODULAR APPROVAL INFORMATION EXAMPLES for Manual**

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.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

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

**NOTE:** 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 or more 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 Radiation Exposure Statement:**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator & your body.

### **OEM INTEGRATION INSTRUCTIONS:**

This device is intended only for OEM integrators under the following conditions:

The module must be installed in the host equipment such that 20 cm is maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna. The module shall be only used with the internal on-board antenna that has been originally tested and certified with this module. External antennas are not supported. As long as these 3 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 (for example, digital device emissions, PC peripheral requirements, etc.). The end-product may need Verification testing, Declaration of Conformity testing, a Permissive Class II Change or new Certification. Please involve a FCC certification specialist in order to determine what will be exactly applicable for the end-product.

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**Validity of using the module certification:**

In the event that these conditions cannot be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization for this module in combination with the host equipment is no longer considered valid and the FCC ID of the module cannot 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. In such cases, please involve a FCC certification specialist in order to determine if a Permissive Class II Change or new Certification is required.

**Upgrade Firmware:**

The software provided for firmware upgrade will not be capable to affect any RF parameters as certified for the FCC for this module, in order to prevent compliance issues.

**End product labeling:**

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCCID: 2APDI-BCM-DA100-AS" .

**Information that must be placed in the end user manual:**

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.