
HFR Bluetooth Module

(SBM-2715-C2R)

User Manual

Revision History

Version	Descriptions	Author	Date
1.0	Initial version		Feb. 02. 2024

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1 Product Specification

1.1 Product Scope

SBM-2715-C2R is a module that meets Bluetooth Specification 5.0 and enables two-way data communication using SPP and can be used in base stations, repeaters, navigation, automotive, high-speed data communication, remote meter reading equipment, IoT, industrial equipment, etc.

1.2 Feature

- Bluetooth Specification 5.0 (BDR) / Class 2
- Qualcomm Bluetooth 5.0 Chipset
- 32M Flash Memory
- Output Power: +4 [dBm] Max
- Sensitivity: Typical -82[dBm] (0.1% BER)
- Profile: SPP
- Size: 27.1mm X 14.8mm X 3.0mm MAX (Shield Case Inclusive)
- Operating Temperature: -40 [°C] ~ +85 [°C]

1.3 Product Block Diagram

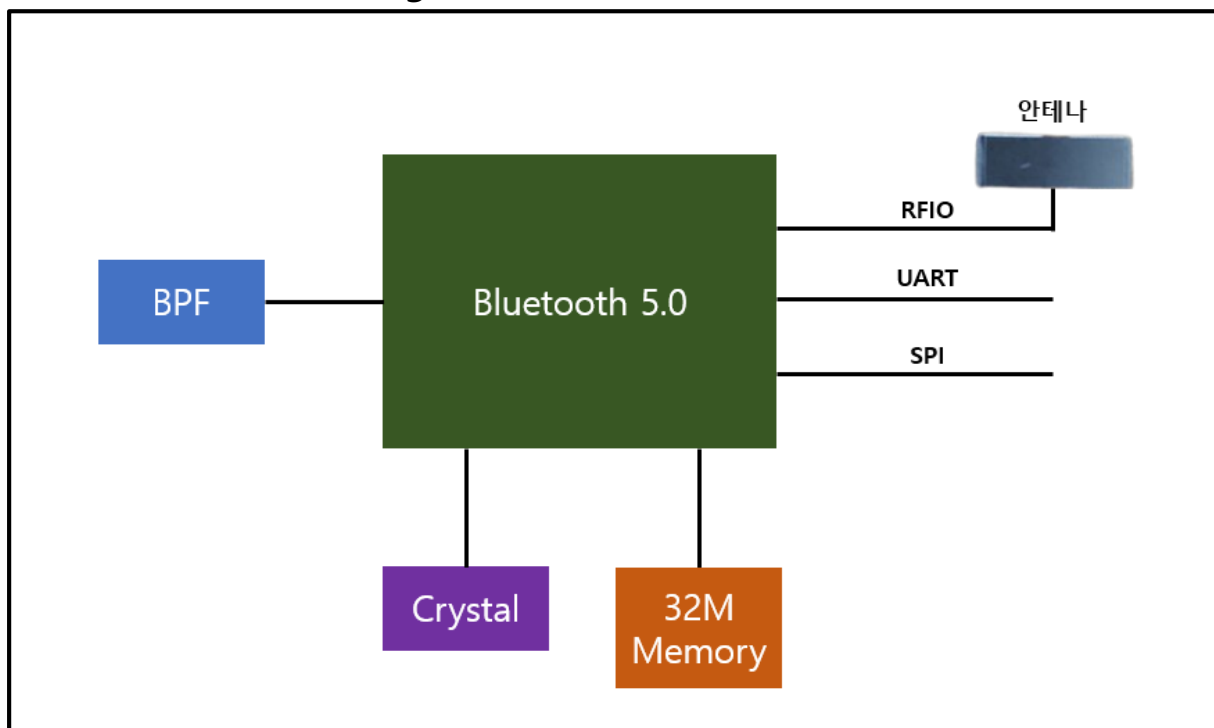


Figure 1. Structure of safety statements

2 Electrical Characteristics

2.1 Recommended Range of Operation

Ratings	Specifications				
	Min	Typical	Max	Unit	Conditions
VCC	3.0	3.3	3.6	V	
UART	1.65	1.8	1.92	V	
Operating Temperature	-40	+25	+85	°C	

2.2 Power Consumption Ranges

Ratings	Specifications			
Operating Mode	UART Rate (bps)	Max	Unit	Conditions
Inquiry and Page Scan	115200	30	[mA]	
Connected	115200	25	[mA]	

2.3 UART Interface

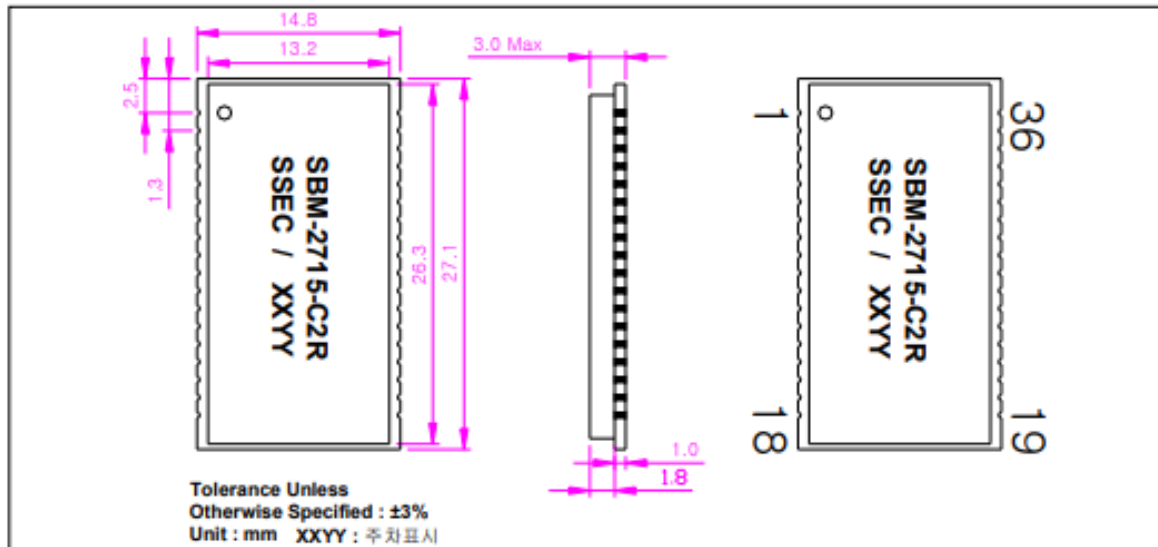
- Baud Rate: 115200 [bps]
- Flow Control: None
- Parity: None
- Number of stop bit: 1
- Bit per Channel: 8

2.4 Reset Interface

- Power on Reset
- A reboot function is also available under software control (AT Command: ATZ)
- Automatic reset protection
- The Qualcomm Bluetooth Chipset applied in the SBM-2715-C2R includes an automatic protection circuit. If something unexpected happens (e.g., an ESD strike), the reset protection circuit can reset the module and activate the program to restore the previous operation.

3 Physical Specifications

3.1 Dimensions



3.2 Case separation prevention bonding



- XXY Parking Management (EX. 1923: Produced in Week 23, 2019)
- Maintain flatness below 0.1mm
- Case separation prevention Epoxy Bonding applied (Nr. 1 / Nr. 18 / Nr. 19)

4 Pin Assignment

No.	Name	In/Out	Voltage	Specifications
1,	GND	-	-	Ground
2	GND	-	-	Ground
3	PVCC	In	+3.3[V]	Main Power Supply
4	NC	-	-	N/A
5	NC	-	-	N/A
6	NC		-	N/A
7	UART_RX	In	+1.8[V]	UART data input
8	UART_TX	Out	+1.8[V]	UART data output
9	NC	-	-	N/A
10	NC	-	-	N/A
11	NC	-	-	N/A
12	NC	-	-	N/A
13	NC	-	-	N/A
14	NC	-	-	N/A
15	NC	-	-	N/A
16	+3.3[V]	In	+3.3[V]	Main Power Supply
17	GND	-	-	Ground
18	NC	-	-	N/A
19	GND	-	-	Ground
20	SPI_MOSI	-	-	N/A
21	SPI_CLK	-	-	N/A
22	SPI_CSB	-	+1.8[V]	N/A
23	SPI_MISO	-	-	N/A
24	PIO_6	-	-	N/A
25	PIO_7	-	-	N/A
26	NC	-	-	N/A
27	NC	-	-	N/A
28	NC	-	-	N/A
29	NC	-	-	N/A
30	NC	-	-	N/A
31	NC	-	-	N/A
32	NC	-	-	N/A

33	NC	-	-	N/A
34	GND	-	-	N/A
35	GND	-	-	N/A
36	RF_IO	In/Out	-	Transmitter Output / Receiver Input

5 RF Specifications

5.1 Basic Rate Transmitter Performance

RF Characteristics		MIN	TYP	MAX	Bluetooth Specification	Unit
Maximum Transmit power		0	2	4	-6 to 4	[dBm]
RF Power variation over temperature range			±1			[dB]
20 dB Bandwidth for modulated carrier			920	1000	≤1000	KHz
ACP	$F=F_0 \pm 2\text{MHz}$		-36	-20	≤-20	[dBm]
	$F=F_0 \pm 3\text{MHz}$		-42	-36	≤-40	[dBm]
	$F=F_0 \pm >3\text{MHz}$		-65	-40	≤-40	[dBm]
$\Delta f_{1\text{avg}}$ Maximum modulation		140	165	175	$140 < \Delta f_{1\text{avg}} < 175$	KHz
$\Delta f_{2\text{max}}$ Minimum modulation		115	142		≥115	KHz
$\Delta f_{2\text{avg}} / \Delta f_{1\text{avg}}$		0.8	0.9		≥0.8	-
ICFT		-75	5	75	±75	KHz
Drift rate			5	20	≤20	KHz/50us
Drift (Single slot packet)			6	25	≤25	KHz
Drift (five slot packet)			6	40	≤40	KHz
2 nd harmonic content			-27			[dBm]
3 rd harmonic content			-26			[dBm]

5.2 Basic Rate Receiver Performance

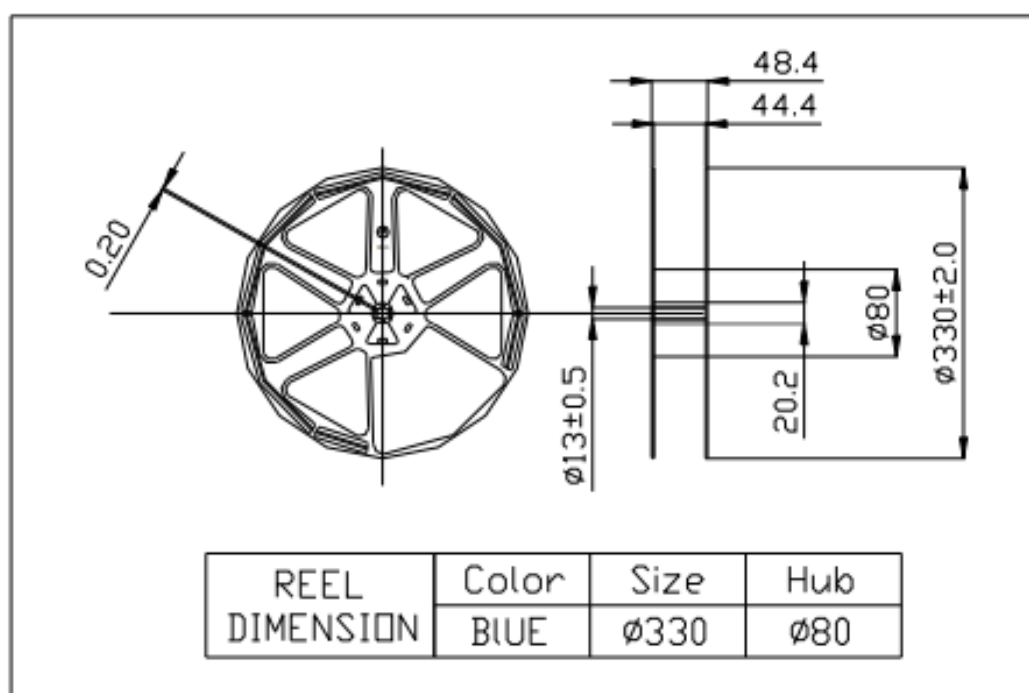
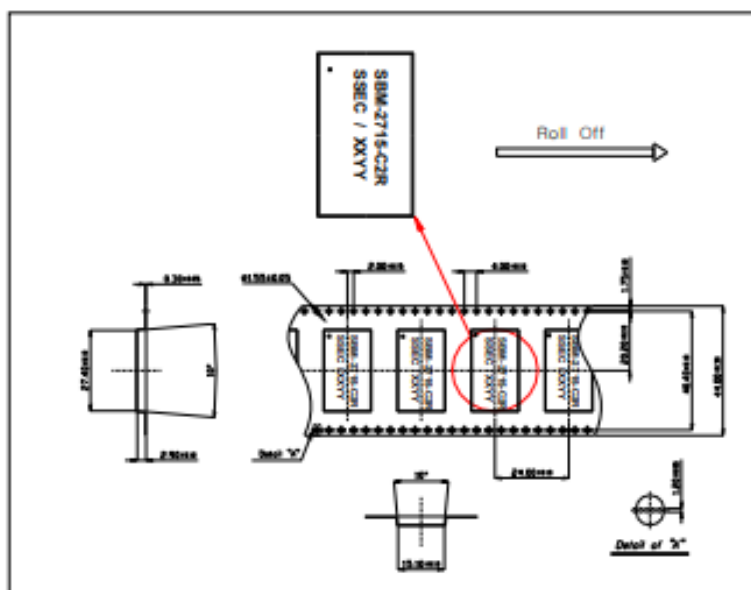
RF Characteristics	Frequency(GHz)	MIN	TYP	MAX	Bluetooth Specification	Unit
Sensitivity at 0.1 % BER for all basic rate Packet type	2.402		-82	-80	≤ -70	[dBm]
	2.441		-87	-84		
	2.480		-87	-84		
Maximum received signal at 0.1% BER		-20	> -10	> -10	≥ -20	[dBm]
Continuous power required to block Bluetooth reception (For input power of -67 dBm With 0.1% BER)	0.030-2.000	-10	> 1		-10	[dBm]
	2.000-2.400	-27	-7		-27	
	2.500-3.000	-27	-6		-27	
	3.000-12.75	-10	> 3		-10	
C/I-Co-channel			5	11	≤ 11	[dB]
Adjacent channel Selectivity C/I	F=F0+1MHz		-5	0	≤ 0	[dB]
	F=F0-1MHz		-3	0	≤ 0	
	F=F0+2MHz		-40	-30	≤ -30	
	F=F0-2MHz		-32	-20	≤ -20	
	F=F0-3MHz		-47	-40	≤ -40	
	F=F0-5MHz		-48	-40	≤ -40	
	F=F image		-31	-9	≤ -9	
Maximum level of intermodulation interferers		-39	-15		≥ -39	[dBm]
Spurious output level			-155			dBm / Hz

6 Reliability test specifications



- High Temp Test : $85^{\circ}\text{C} \pm 2^{\circ}\text{C}$ / 72h
- Low Temp Test : $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ / 72h
- Humidity Test : $60^{\circ}\text{C} \pm 2^{\circ}\text{C}$, RH85% / 72h
- Operating Temp Test : $-40^{\circ}\text{C} \sim 85^{\circ}\text{C}$

7 Packaging Specifications



FCC Statement	
1. FCC Part 15.19 Statements:	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.
2. FCC Part 15.105 statement(Class B)	<p>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.</p> <p>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:</p> <ul style="list-style-type: none"> - 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.
3. FCC Part 15.21 statement	Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This device must not be co-located or operating in conjunction with any other antenna or transmitter.
4. Responsible Party 정보 (HCT 의 US Agent 사용할 경우, 해당 정보 추가될 예정)	<p>Supplier's Declaration of Conformity 47 CFR § 2.1077 Compliance Information</p> <p>Unique Identifier: (e.g., Trade Name, Model Number) Responsible Party – U.S. Contact Information</p> <p>Americas Compliance Consulting, LLC dba iCertifi 1001 SW Disk Drive, Suite 250, Bend, Oregon 97702 fccagent@icertifi.com</p>
5. Modular Approval Statement	<p>Regulatory notice to host manufacturer according to KDB 996369 D03 OEM Manual</p> <p>This module has been granted modular approval as below listed FCC rule parts. -FCC Rule parts 15C(15.247)</p> <p>Summarize the specific operational use conditions -The OEM integrator should use equivalent antennas which is the same type and equal or less gain then an antenna listed below this instruction manual. - This module is using Trace Antenna Design. Module integration guidelines must be closely followed. Compliance of host integrations of the module is limited to hosts adaptation designs which are identical to HFR, Inc.'s reference design. Host integrations with adaption designs deviating from HFR, Inc.'s reference design require either class 2 permissive change to this modular approval or a separate host approval with different FCC-ID</p> <p>Limited module procedures This module, along with new antenna trace, has been tested in a specific host device (Model name: flexAU10-3.55G-4TW). So, this module along with new antenna trace can be equipped into similar types* of host devices only. If this module is to be installed in any other types of host device, additional authorization is required with additional RF Exposure and radiation testing consideration.</p> <p>RF exposure considerations</p>

	<p>-The module has been certified for integration into products only by OEM integrators under the following condition:</p> <ul style="list-style-type: none"> -The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times. -The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures. -Mobile use <p>As long as the three conditions above are met, further transmitter testing will not be required.</p> <p>OEM integrators should provide the minimum separation distance to end users in their end-product manuals.</p> <p>Antennas list</p> <p>This module is certified with the following integrated antenna.</p> <p>-. Max. Antenna gain: 1.9 dBi / Ant. Type: Chip antenna</p> <p>Any new antenna type, higher gain than listed antenna should be met the requirements of FCC rule 15.203 and 2.1043 as permissive change procedure.</p>
	<p>End Product Labeling</p> <p>The module is labeled with its own FCC ID. If the FCC ID are not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:</p> <p>“Contains FCC ID: 2BEQ9HFRBTSBM2715</p>
	<p>Information on test modes and additional testing requirements</p> <ul style="list-style-type: none"> -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, additional transmitter in the host, etc.). <p>Additional testing, Part 15 Subpart B disclaimer</p> <ul style="list-style-type: none"> -The final host product also requires Part 15 subpart B compliance testing with the modular transmitter installed to be properly authorized for operation as a Part 15 digital device.