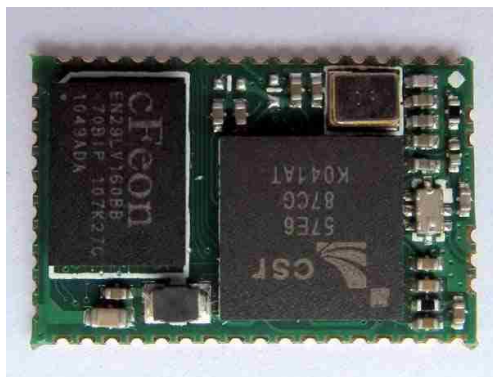


WKBT0204AR V3

Bluetooth Module MANUAL

25/09/2015 rev2



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1. Device Features

- Fully Qualified Bluetooth V2.1+EDR System
- Enhanced Data Rate(EDR) Compliant with v2.1 of specification for both 2Mbps and 3Mbps modulation modes
- 16-bit Internal Stereo CODEC -95dB SNR for DAC
- Low-power consumption, 3.3V I/O
- Integrated Switched-Mode Regulator, Integrated 1.5V and 1.8V Linear Regulators
- USB and UART with Dual Port Bypass Mode to 4Mbit/s
- Integrated 8Mbits or 16Mbits of Flash
- Integrated lithium battery charger
- Support for 802.11 Co-existence
- Class II type output power
- RoHS compliant

2. Applications

- High-End Stereo Wireless Headsets
- High-END Mono Headsets
- Hands-Free Car Kits
- Bluetooth-Enabled Automotive Dashboards
- Wireless Speakers
- VOIP handsets
- Analogue and USB Multimedia Dongles

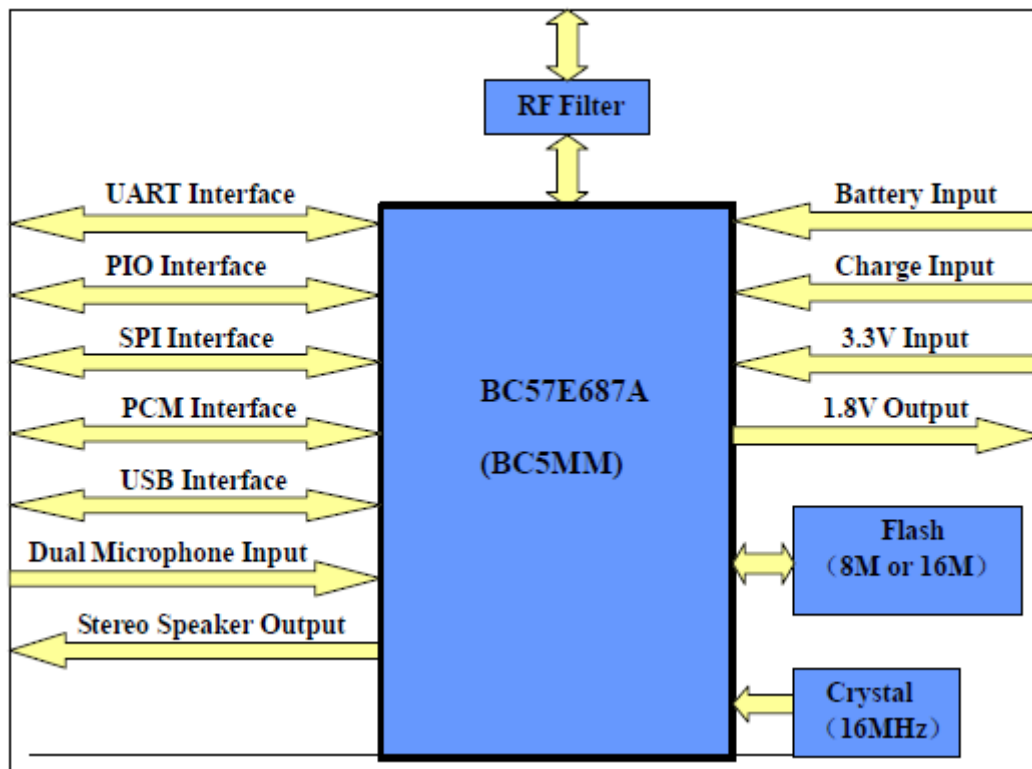
3. General Description

GLBT0204 is a module for Bluetooth 2.4GHz systems. Integrated BlueCore5-Multimedia External chip from CSR, With the on-chip CSR Bluetooth software stack,It provide a fully compliant Bluetooth system to V2.1+EDR of the specification for data and voice communications.

4. Key Features

Operating Frequency Band	2.402GHz -2.480GHz ISM band
Bluetooth Specification	V2.1 or V2.1+EDR
Theoretical range in open field	Bluetooth Class II
Main Chip	CSR BC57E687A
Transmitter Power	+4dBm (Typical)
Receive Sensitivity	-85dB at 0.1% BER (Typical)
Antenna	External
Antenna Impedance	50Ω
Power Supply	Li-ion battery voltage
Dimension	21mm(L) * 13.5mm(W) * 2.2 mm(H)

5. Block Diagram



6. Electrical Characteristic

6.1 Absolute Maximum ratings

Rating	Minimum	Maximum
Store temperature	-40℃	+100℃
Operation temperature	-30℃	+85℃
Power Supply, VDD_BAT(PIN17),VREG_H(PIN49)	-0.4V	+4.9V
Charge input, VDD_CHG(PIN48)	-0.4V	+6.5V

6.2 Recommend operation conditions

Rating	Minimum	Type	Maximum	Remark
Store temperature	-30℃	+20℃	+85℃	
Operation temperature	-20℃	+20℃	+70℃	
Power Supply, VDD_BAT(PIN17)	3.0V	3.7V	4.3V	Li-ion battery
Charge input, VDD_CHG(PIN48)	4.5V	5.V	6.3V	
Power Supply, 3V3(PIN20)	3.0V	3.3V	3.6V	

6.3 Stereo Audio Characteristics

6.3.1 Microphone input

Microphone Input	Min	Type	Max	Unit
Input full scale at maximum	-	4	-	mV rms
Input full scale at minimum gain(differential)	-	560	-	mV rms
Gain resolution	-	3	-	dB
Distortion at 1kHz	-	-	-74	dB
Input referenced rms noise in 15kHz bandwidth	-	8	-	uV rms
3dB Bandwidth	-	17	-	kHz
Input impedance	-	5.6	-	K ohm
THD+N(microphone input)@30mV rms input	-	-66	-	dB

6.3.2 Speaker output

Loudspeaker Driver		Min	Type	Max	Unit
Output voltage full scale swing(differential)		-	2.0	-	V Pk-Pk
Output current drive at full scale swing		-	62	-	mA
Allow Load	Resistive	16(8)	-	-	ohm
	Capacitive	-	-	500	pF
THD 100Kohm load		-	-	0.01	%
THD 16ohm load		-	-	0.1	%
SNR (-1dB FS relative to digital silence)		-	92	-	dB

6.4 Radio characteristics – Basic data rate

6.4.1. Transmitter

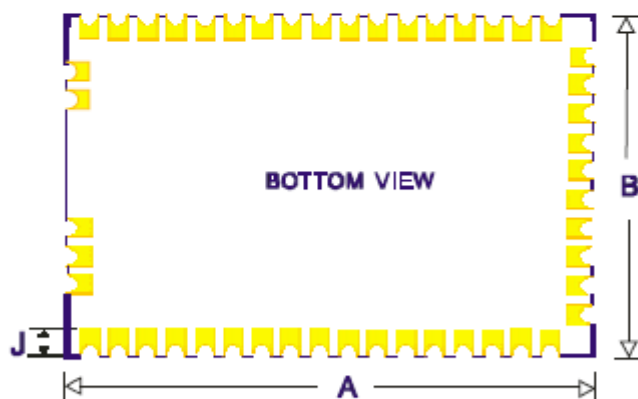
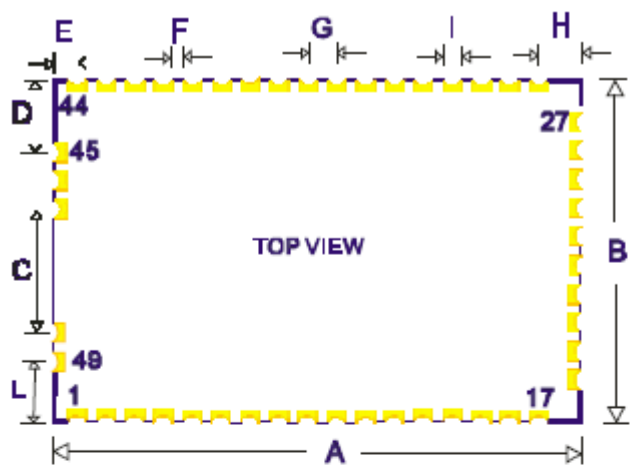
Radio characteristics Temperature=+20℃					
Parameter	Min	Type	Max	Bluetooth specification	Unit
Maximum RF transmit power	-	4	-	-6 to +4	dBm
Variation in RF power over temperature range with compensation disabled	-	2.5	-	-	dB
Variation in RF power over temperature range with compensation enable	-	1.5	-	-	dB
RF power control range	-	35	-	≥16	dB
RF power range control resolution	-	0.5	-		dB
20dB bandwidth for modulated carrier	-	780	-	≤1000	kHz
Adjacent channel transmit power F=F0±2MHz	-	-35	-	≤-20	dBm
Adjacent channel transmit power F=F0±3MHz	-	-45	-	≤-40	dBm
Δf1 avg maximum modulation	-	165	-	140 < Δf1 avg < 175	kHz
Δf2 max minimum modulation	-	155	-	≥115	kHz

$\Delta f_{2avg}/\Delta f_{1avg}$	-	0.99	-	≥ 0.80	-
Initial carrier frequency tolerance	-	8	-	± 75	kHz
Drift rate	-	7	-	≤ 20	kHz/50us
Drift(single slot packet)	-	8	-	≤ 25	kHz
Drift(five slot packet)	-	9	-	≤ 40	kHz
2 nd Harmonic content	-	-45	-	≤ -30	dBm
3 rd Harmonic content	-	-50	-	≤ -30	dBm

6.4.2. Receive

Radio characteristics Temperature=+20°C						
	Frequency(GHz)	Min	Type	Max	Bluetooth specification	Unit
Sensitivity at 0.1 % BER for all packet types	2.402	-	-85	-	≤ -70	dBm
	2.441	-	-85	-		
	2.480	-	-85	-		
Maximum received signal at 0.1% BER		-	>10	-	-20	dBm
Continuous power required to block Bluetooth receipt(for sensitivity of -67dBm with 0.1%BER) measured at the antenna port	0.03-2.00	-	>0	-	-10	dBm
	2.0-2.40	-	>-10	-	-27	
	2.50-3.00	-	>0	-	-27	
	3.00-3.30	-	>3	-	-10	
C/I co-channel		-	8	-	≤ 11	dB
Adjacent channel selectivity C/I F=F0+1MHz		-	-5	-	≤ 0	dB
Adjacent channel selectivity C/I F=F0-1MHz		-	-4	-	≤ 0	dB
Adjacent channel selectivity C/I F=F0+2MHz		-	-38	-	≤ -30	dB
Adjacent channel selectivity C/I F=F0-2MHz		-	-22	-	≤ -20	dB
Adjacent channel selectivity C/I F=F0+3MHz		-	-48	-	≤ -40	dB
Adjacent channel selectivity C/I F=F0-5MHz		-	-45	-	≤ -40	dB
Adjacent channel selectivity C/I F=Fimage		-	-23	-	≤ -9	dB
Maximum level of intermodulation interface		-	-30	-	≥ -39	dBm
Spurious output level		-	≤ -160	-	-	dBm/Hz

7. Mechanical Dimensions



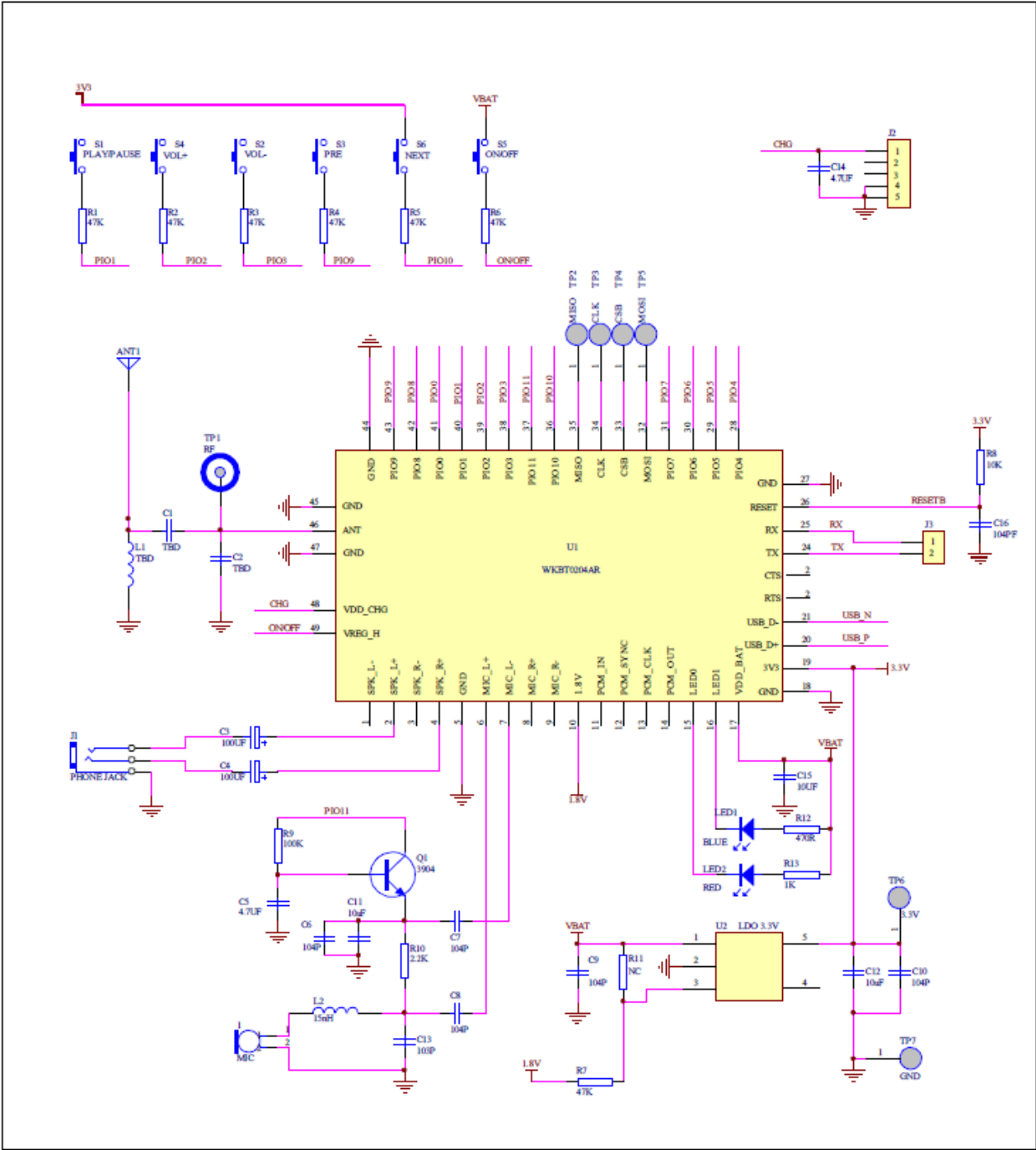
Dimension Limits (Units: mm)		
Symbol	Value	Error
A	20.0	± 0.2
B	13.0	± 0.2
C	4.35	± 0.1
D	2.7	± 0.1
E	0.9	± 0.1
F	0.4	-
G	1.1	-
H	1.5	± 0.1
I	0.7	-
J	0.75	± 0.05
K	2.2	Max
L	2.65	± 0.1

8. Pin Definition Descriptions

Pin NO.	Pin Name	Pin Descriptions
1	SPK_L_N	Speaker output left negative
2	SPK_L_P	Speaker output left positive
3	SPK_R_N	Speaker output right negative
4	SPK_R_P	Speaker output right positive
5	GND	Power Ground
6	MIC_L_P	Microphone (L) positive pole input
7	MIC_L_N	Microphone (L) negative pole input
8	MIC_R_P	Microphone (R) positive pole input
9	MIC_R_N	Microphone (R) negative pole input
10	1.8V	1.8V output
11	PCM_IN	Synchronous data input, with weak internal pull-down
12	PCM_SYNC	Synchronous data sync, with weak internal pull-down
13	PCM_CLK	Synchronous data clock, with weak internal pull-down
14	PCM_OUT	Synchronous data output, with weak internal pull-down
15	LED0	LED0 driver
16	LED1	LED1 driver
17	VDD_BAT	Lithium ion/polymer battery positive terminal. Battery charger output and input to switch-mode regulator
18	GND	Power Ground
19	3.3V	Power supply voltage 3.3V
20	USB_P	Blue USB data plus with selectable internal 1.5K Ω pull-up resistor
21	USB_N	Blue USB data minus
22	UART_RTS	UART request to send active low
23	UART_CTS	UART clear to send active low
24	UART_TX	UART data output active High

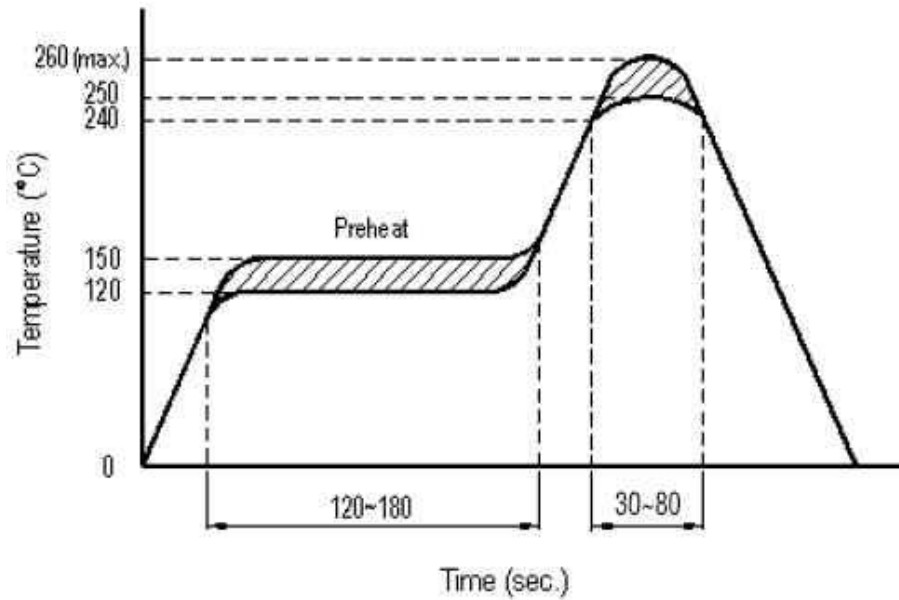
25	UART_RX	UART data input active High
26	RESETB	Reset if low. Input debounced so must be low for >5ms to cause a reset.
27	GND	Power Ground
28	PIO4	Programmable input/output line
29	PIO5	Programmable input/output line
30	PIO6	Programmable input/output line
31	PIO7	Programmable input/output line
32	SPI_MOSI	Serial peripheral interface data input
33	SPI_CSB	Chip select for serial peripheral interface, active low
34	SPI_CLK	Serial peripheral interface clock
35	SPI_MISO	Serial peripheral interface data output
36	PIO10	Programmable input/output line
37	PIO11	Programmable input/output line
38	PIO3	Programmable input/output line
39	PIO2	Programmable input/output line
40	PIO1	Programmable input/output line
41	PIO0	Programmable input/output line
42	PIO8	Programmable input/output line
43	PIO9	Programmable input/output line
44	GND	Power Ground
45	GND	Power Ground
46	ANT	Blue antenna
47	GND	Power Ground
48	VDD_CHG	Lithium ion/polymer battery charger input
49	VREG_H	Switch-mode regulator enable, active high

9. Reference Application Schematic

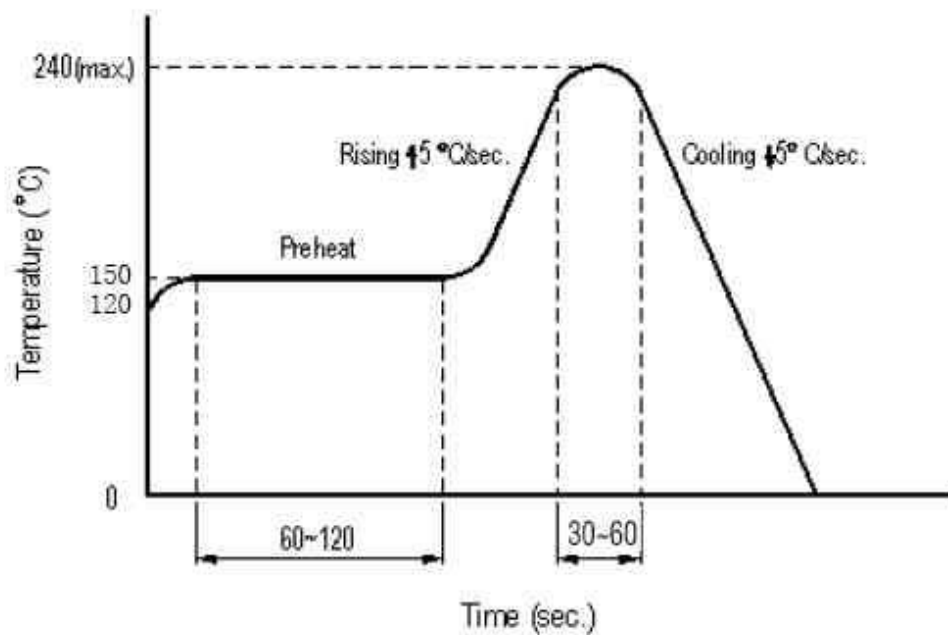


10. SMT Reflow Profile

10.1 Reliability solder temperature chart



10.2 Reflow temperature chart



11. FCC certification

This module has been tested and found to comply with the FCC part 15 rules. 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 may not occur in a particular installation.

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.

Modifications or changes to this equipment not expressly approved by EFFEGIBI S.r.l. may render void the user's authority to operate this equipment.

FCC ID: 2AFJMESS-SSY

In accordance with FCC part 15, the WKBT0204AR V3 is listed as a modular transmitter device.

This module is certified for use in authorised Effegibi hosts. Finished products incorporating multiple transmitters must comply with collocation and RF exposure requirements in accordance with FCC multi-transmitter product procedures.

11.1 Labeling instructions

When integrating the WKBT0204AR V3 into the final product a statement must be included on the exterior of the final product which indicates the product includes a certified module. The label should state the following:

Contains FCC ID: 2AFJMESS-SSY

Moreover the following statements on the exterior of the final product unless the product is too small (e.g. less than 4 x 4 inches):

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 any interference that may cause undesired operation.

11.2 Product manual instructions

The final products manual, containing the WKBT0204AR V3 module, must contain the following statement:

WARNING: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. (Part. 15.21)

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.*

The two-part statements shown in FCC 15.19 need to appear on the host, or in the host's manual.

In the case where an OEM seeks the lesser category of a Class A digital device for the final product, the following statement must be included in the final product manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his expense.