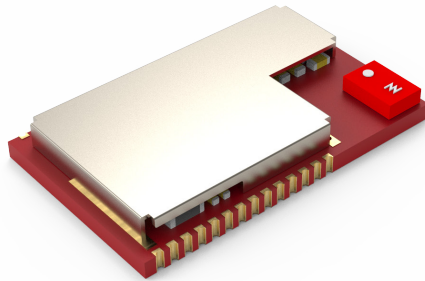


**CELIUM DEVICES**

**Short range radio modules**



**BE63**

Standalone Bluetooth 5.0 Dual mode Audio module

**DATASHEET**

REV01

## Document information

Product family	<b>BE</b>
Product name	<b>BE63</b>
Document type	<b>Datasheet</b>
Document number	<b>BE63- 002</b>
Document revision	<b>REV01</b>
Date	<b>13-04-2021</b>

This document applies to the following products

Product Name	Ext. Number	Firmware Version	Status
BE63	Nil	NA	Sampling

## Document history

Document Name	Revision	Date
BE63 Datasheet	REV01	13-04-2021

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# BE63

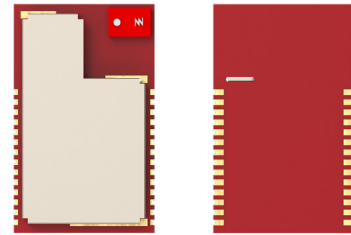
High performance, standalone Bluetooth 5.0 Dual mode Audio module

## 1. Overview

BE63 is a high performance, Bluetooth 5.0 dual mode module, targeted for audio applications where highly reliable wireless connection, High performance and ease of integration are the key requirements.

BE63 is a highly integrated Bluetooth Classic 2.1 + EDR and BLE 5.0 dual mode module. It is composed on an ARM core and an ultra-low power DSP core with high efficiency computing power, high performance Audio codec, power management unit, ADC, ultra-low current RF transceiver, and smart I/O distribution controller.

The module ships with an on board high performance antenna and all integrated peripherals.



## 2. Key features

Protocols	Bluetooth 5.0, Bluetooth 2.1+EDR	Audio	> Supports HFP 1.7, HSP 1.2, A2DP 1.3, AVRCP 1.6, SPP 1.2 and PBAB 1.0
Processor	32 Bit ARM Cortex-M4F		
RAM	16 KB X 8 data + 8KB X 2 cache		
ROM	786 KB		> Supports RWS
Flash	1 MB	Form factor	16 mm x 10 mm x 2 mm
Crystals	40 MHz	Footprint	Castellations 28
Antenna	Chip antenna	Certifications	CE (Pending)

## 3. Applications

- Mono headset
- Stereo headset
- Real Wireless Stereo (RWS) headset
- Mono speaker
- Stereo speaker

## 4. Block diagram

### 4.1 BE63

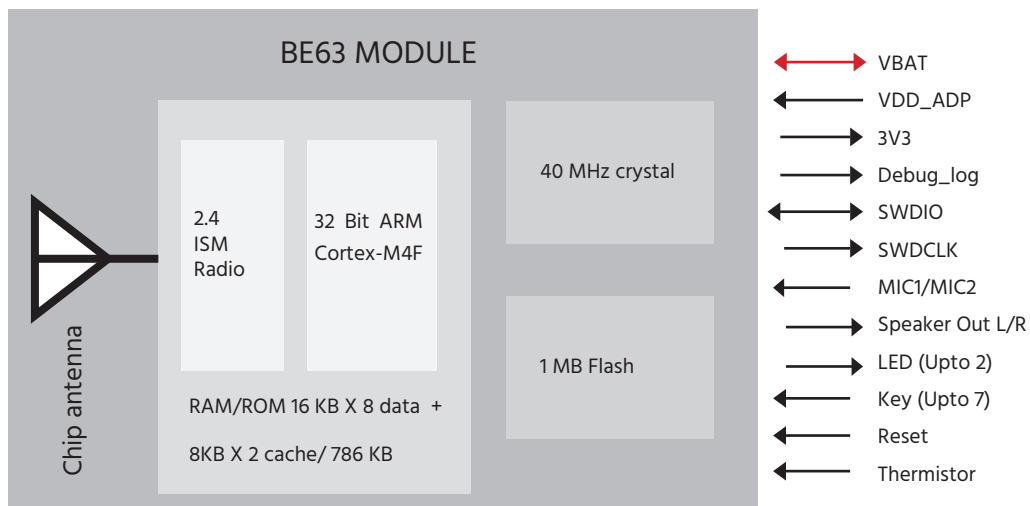


Figure 4.1: Block diagram

## 5. Specifications

### 5.1 Specification table

#### Module FEATURES

- Bluetooth 5.0 specification compliant
- Supports HFP 1.7, HSP 1.2, A2DP 1.3, AVRCP 1.6, SPP 1.2 and PBAB 1.0
- Supports Bluetooth Classic (BDR/EDR)
- Real Wireless Stereo (RWS)
- Supports USB Type-C Audio
- Supports High resolution audio codec upto 24 Bits.
- Supports Dual analog MIC, AUX-IN, I2S digital audio, analog output
- Supports High Speed UART
- Supports USB BC1.2 battery charging with integrated dual switch mode power regulators, and battery charger; charging current upto 255 mA
- DSP Audio processing with 24 bit DSP core
- Noise suppression and echo cancellation
- SBC, and AAC-LC audio codecs supported for BT audio streaming

**BE63**

Table 5.1: Specifications table

## 5.2 Radio specifications

### 5.2.1 Frequency

- 2400~2500 MHz

### 5.2.2 Reception Sensitivity

- -94 dBm @ 2Mbps EDR
- -97 dBm @ BLE
- -106.5 dBm @ 125 K BLE Long range

### 5.2.3 Output (TX) Power

- 10 dBm Max. for Bluetooth Classic
- 10 dBm Max. for Bluetooth BLE
- +4 dBm Max. for BLE Low power TPM mode

## 6. Pin assignment

### 6.1 Pin diagram

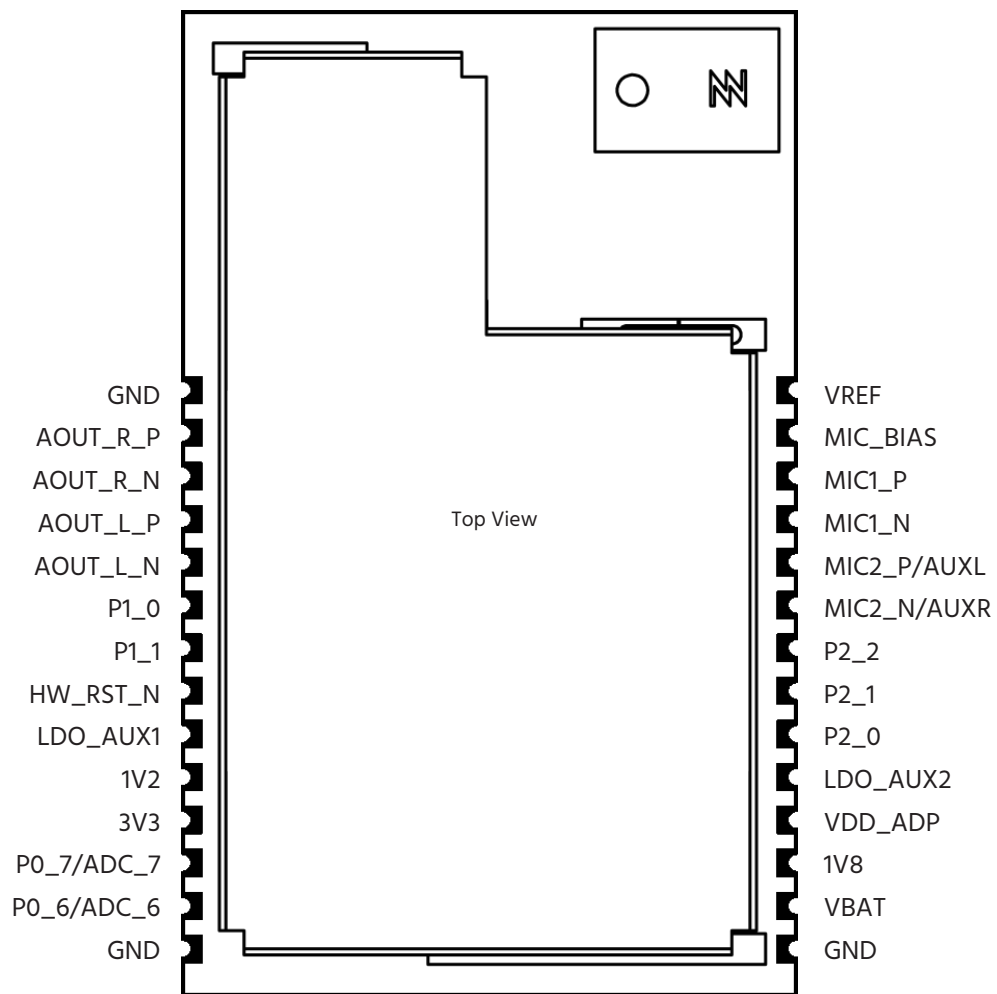


Figure 6.1: BE63 Pin diagram

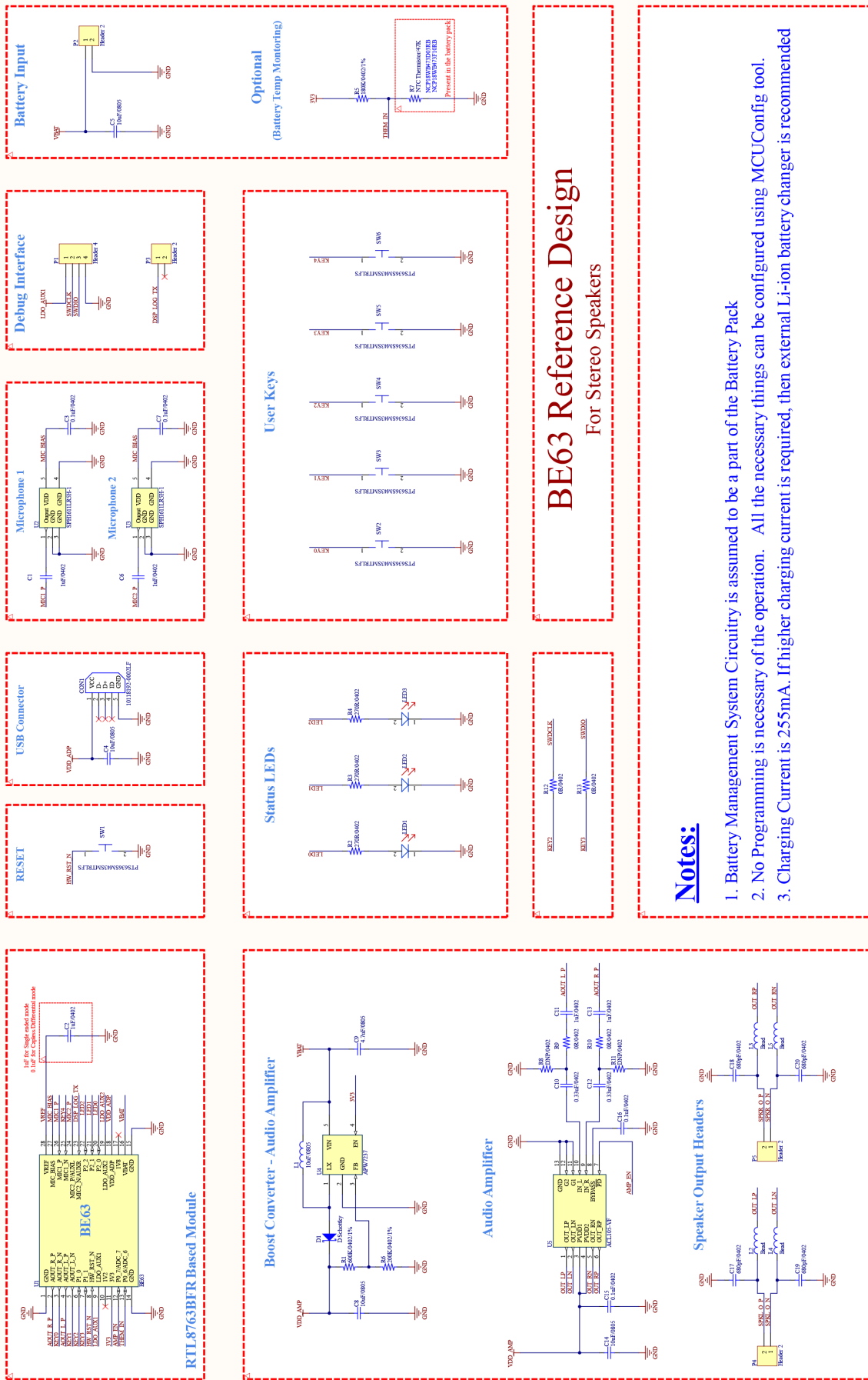
## 6.2 Pin description

Pin No.	Pin name	Description
1	GND	Ground
2	AOUT_R_P	Right channel speaker output positive
3	AOUT_R_N	Right channel speaker output negative
4	AOUT_L_P	Left channel speaker output positive
5	AOUT_L_N	Left channel speaker output negative
6	P1_0	Programmable GPIO
7	P1_1	Programmable GPIO
8	HW_RST_N	Hardware Reset Pin, Active Low
9	LDO_AUX1	Programmable linear regulator output for I/O
10	1V2	Test Pin. Do Not Connect
11	3V3	3.3V Output
12	P0_7/ADC_7	Programmable GPIO. Can be programmed as ADC input
13	P0_6/ADC_6	Programmable GPIO. Can be programmed as ADC input
14	GND	Ground
15	GND	Ground
16	VBAT	Power Supply, 2.8V – 4.35V
17	1V8	Test Pin. Do Not Connect
18	VDD_ADP	Adapter input for battery charger
19	LDO_AUX2	Programmable linear regulator output for I/O
20	P2_0	Programmable GPIO. HCI mode selection. High: APP mode Low: HCI mode
21	P2_1	Programmable GPIO.
22	P2_2	Programmable GPIO.
23	MIC2_N/AUXR	MIC2 input negative pad. Used as 2nd MIC in dual MIC application. AUX input right channel.
24	MIC2_P/AUXL	MIC2 input positive pad. Used as 2nd MIC in dual MIC application. AUX input left channel.
25	MIC1_N	MIC1 input negative pad. Used as main MIC in dual MIC application
26	MIC1_P	MIC1 input positive pad. Used as main MIC in dual MIC application
27	MIC_BIAS	Microphone bias output
28	VREF	Codec Bandgap reference output, add a 1uF/0.1uF cap.

Table 6.2: BE63 Pin description



# 7. Reference design



## BE63 Reference Design For Stereo Speakers

- Notes:**
1. Battery Management System Circuitry is assumed to be a part of the Battery Pack
  2. No Programming is necessary of the operation. All the necessary things can be configured using MCUConfig tool.
  3. Charging Current is 255mA. If higher charging current is required, then external Li-ion battery charger is recommended

## 8. Operating conditions

This section provides an overview of the operating and storage conditions of WE20D module.

Operating temperature	-40 C to 85 C
Storage temperature	-40 C to 125 C
Operating supply voltage	2.8 V to 4.35 V

Table 8.0: Operating conditions

## 9. Physical dimensions

### 9.1 Module dimensions

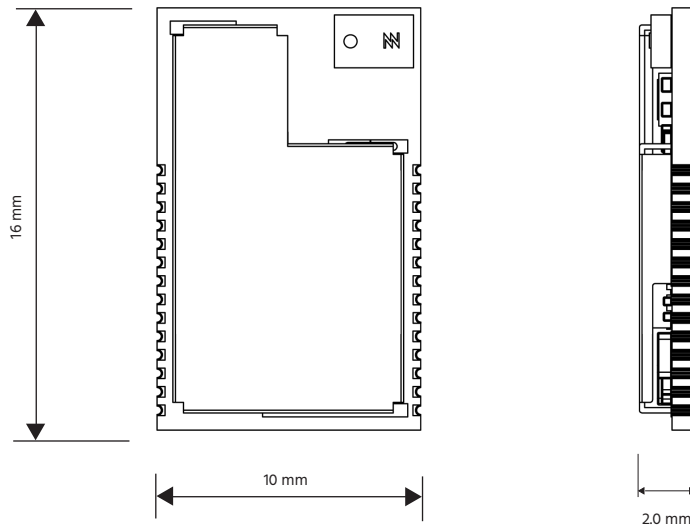


Figure 9.1: BE63 dimensions

### 9.2 PCB Footprint

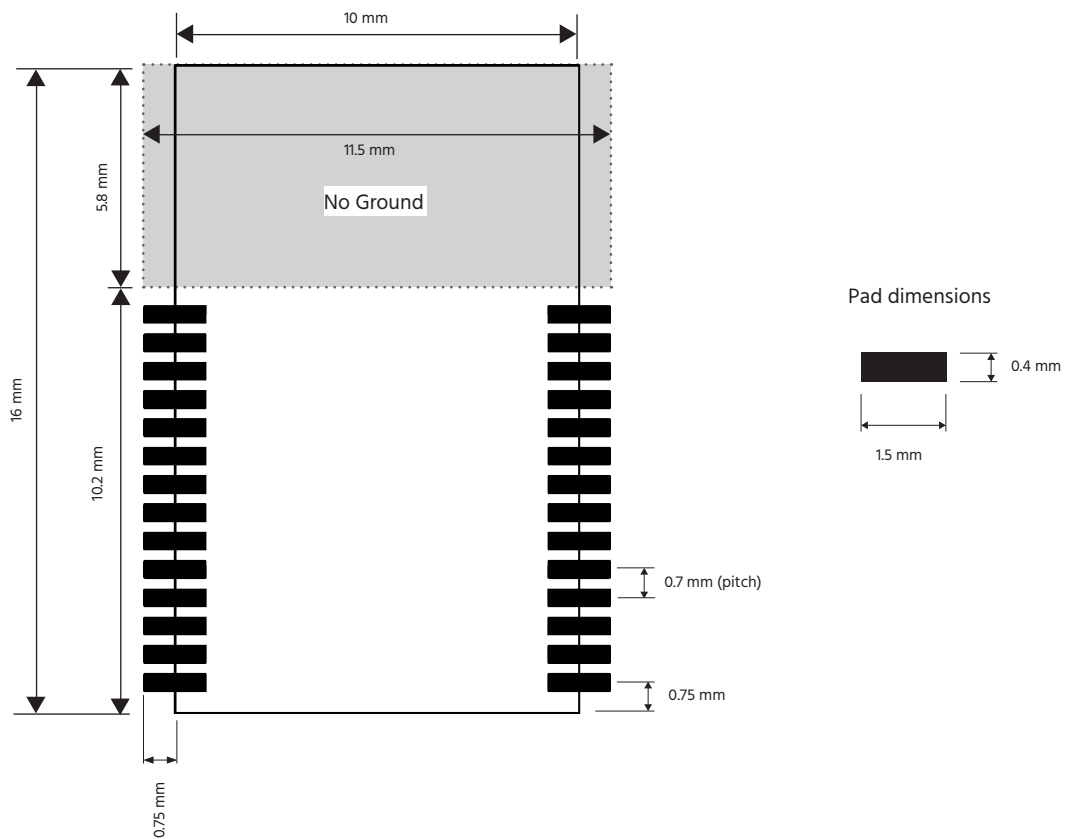


Figure 9.2: BE63 PCB Footprint

## 10. Module placement

Any wireless systems require proper placement on host PCBs for optimum RF performance. For BE63 module, we recommend that the area underneath the antenna on host PCB should not contain any copper on the top, inner and bottom layers. The module should be placed in such way that it should be away for at least 3 mm from any metals, electrolytic capacitors, inductors and other RF systems.

Recommended placements for optimum placements are shown below.

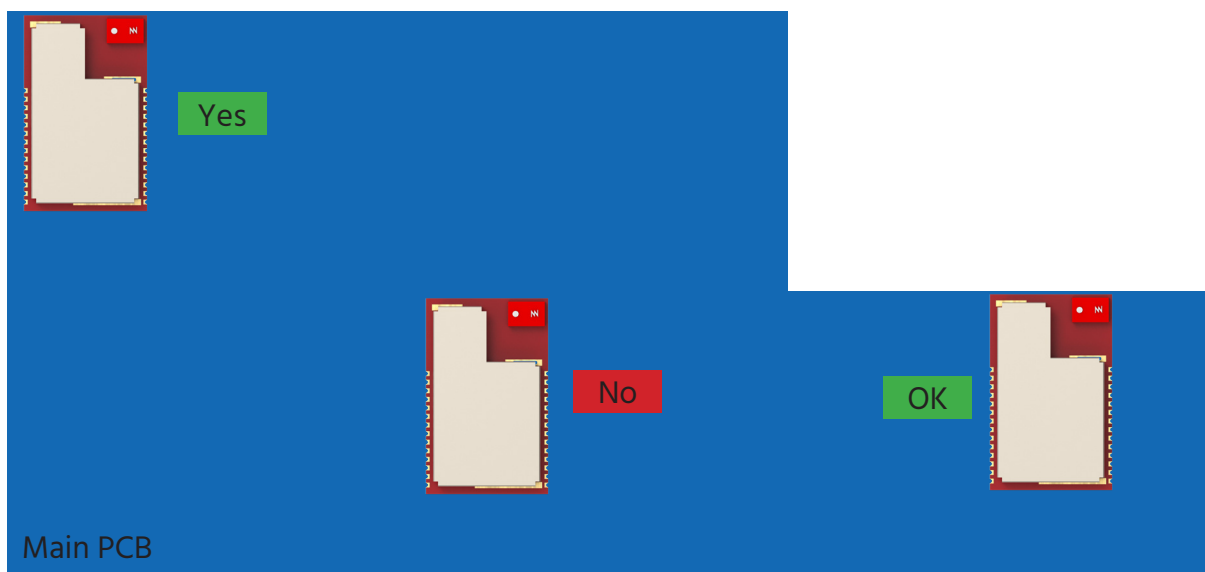


Figure 10.0: Recommended module placement

# 11. Reflow profile

BE63 is highly recommended to be assembled using a standard lead-free reflow profile, IPC/JEDEC J-STD-020. It can be soldered to host PCB by using the standard leaded and lead-free solder reflow profile as per below details.

Profile feature	Pb-Free assembly
Avg ramp up rate ( $T_{s_{max}}$ to $T_p$ )	3°C/second max
Preheat:	
- Temperature Min ( $T_{s_{min}}$ )	150°C
- Temperature Max ( $T_{s_{max}}$ )	200°C
- Time ( $T_{s_{min}}$ to $T_{s_{max}}$ ) (ts)	60 - 180 sec
Time maintained above:	
- Temperature (T)	217 °C
- Time (t)	60 - 150 sec
Peak temperature ( $T_p$ )	260 +5 °C
Time within 5°C of actual peak temperature ( $t_p$ ) <sup>2</sup>	20 - 40 seconds
Ramp-down rate	6°C/second max
Time - 25°C to peak temperature	8 minutes max

Table 11.0: Pb-free reflow profile

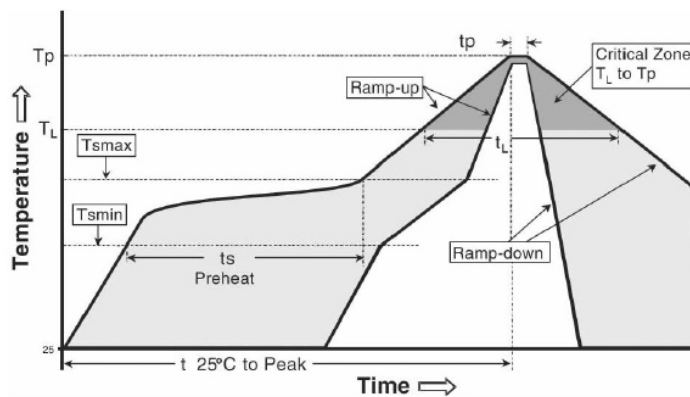


Figure 11.0: Pb-free reflow profile

Note 1: All temperatures refer to topside of the package, measured on the package body surface.  
 Note 2: Time within 5 °C of actual peak temperature ( $t_p$ ) specified for the reflow profiles is a “supplier” minimum and “user” maximum.

## 12. Ordering information

Table below provides the ordering information for the BE63 module.

Sl. No	Device	Description	Version	Shield	Antenna	Ordering Number
1	BE63	High performance Dual mode Bluetooth audio module	Audio Config Firmware	Yes	Integrated chip	BE63

Mail us at [sales@celium.world](mailto:sales@celium.world) for the latest pricing and distributor information.

Table 12.0 : Ordering information

## 13. Additional resources

1. BE63 Reference design document

## 14. Contact information

Worldwide Sales and Support

<b>For general support</b>	support@celium.world
<b>For technical support</b>	technical@celium.world
<b>For sales</b>	sales@celium.world

## **15. Appendix**

### 15.1 Document history

REV01

Initial release of datasheet - Date 13-04-2021