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1 Introduction

Easy Core Tech. introduces the pioneer of the Bluetooth 5.0 modules EM6Q525B which is a high performance, cost effective, low power and compact solution. The Bluetooth module provides a complete 2.4GHz Bluetooth system based on the QCC5125 BGA chipset which is a single
chip radio and baseband IC for Bluetooth 2.4GHz systems. This module is fully qualified single-chip dual mode Bluetooth@v5.0 system.

2 Key Features

EM6Q525B(QCC5125) Features

- Qualified to Bluetooth® v5.0 specification
- 120 MHz Qualcomm® Kalimba™ audio DSPs
- 32 MHz Developer Processor for applications
- Firmware Processor for system
- Flexible QSPI flash programmable platform
- Advanced audio algorithms
- High-performance 24-bit stereo audio interface
- Digital and analog microphone interfaces
- Active Noise Cancellation:Feedforward, Feedback,Hybrid
- Serial interfaces: UART, Bit Serializer (I^2C/SPI),USB 2.0
- Integrated PMU: Dual SMPS for system/digital circuits, Integrated Li-ion battery charger
- 20 PIOs, 5 LED pads with PWM

Application subsystem

- Dual core application subsystem 32 MHz operation
- 32-bit Firmware
  Processor:
  Reserved for
  system use
  Runs Bluetooth upper stack, profiles, house-keeping code
- 32-bit Developer Processor:Runs developer applications
- Both cores execute code from external flash memory using QSPI clocked at 32 MHz
- On-chip caches per core allow for optimized performance and power consumption

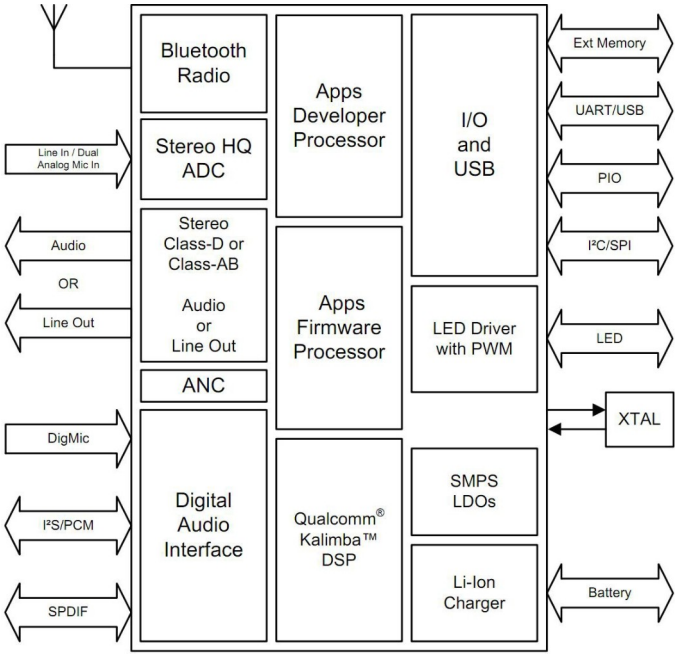
Bluetooth subsystem

- Qualified to Bluetooth v5.0 specification including 2 Mbps Bluetooth low energy (Production parts)
- Single ended antenna connection with on-chip balun and Tx/Rx switch
- Bluetooth, Bluetooth low energy, and mixed topologies supported
- Class 1 support

3 Applications

- Wired/wireless stereo headsets/headphones
- Qualcomm TrueWireless™ stereo earbuds
- USB to Bluetooth dongle

4 Block Diagram

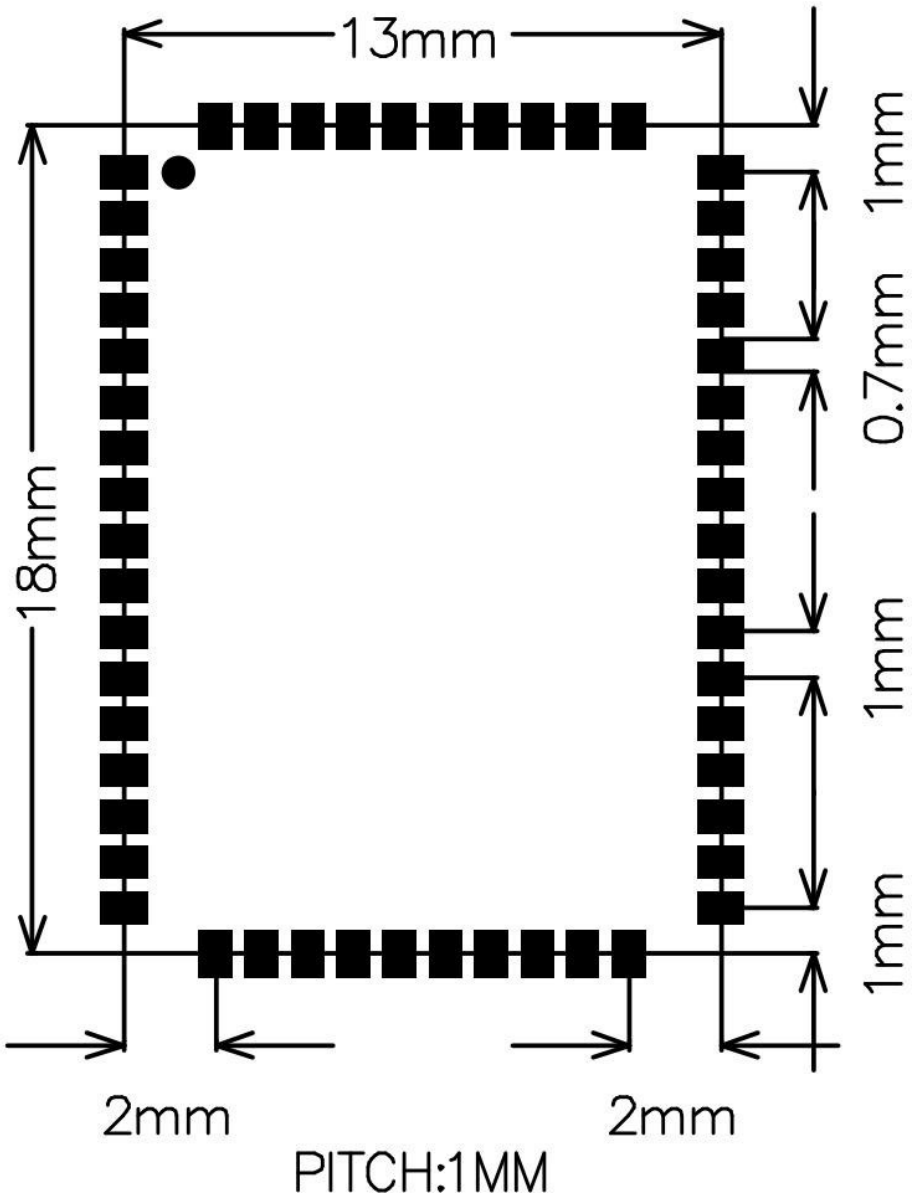


5 General specifications

Model Name	**EM6Q525B**
Product Description	**Bluetooth 5.0 Class2 Module**
Bluetooth Standard	Bluetooth 5.0
Chipset	QCC5125 BGA
Dimension	13mm x 18mm x 2.4mm
Operating Conditions	
Voltage	2.8~4.2V
Temperature	-10～+70℃
Storage Temperature	-40～+85℃
Electrical Specifications	
Frequency Range	2402～2480MHz
Maximum RF Transmit Power	9dBm
π/4 DQPSK Receive Sensitivity	-91dBm
8DPSK Receive Sensitivity	-81dBm

6 Module Package Information

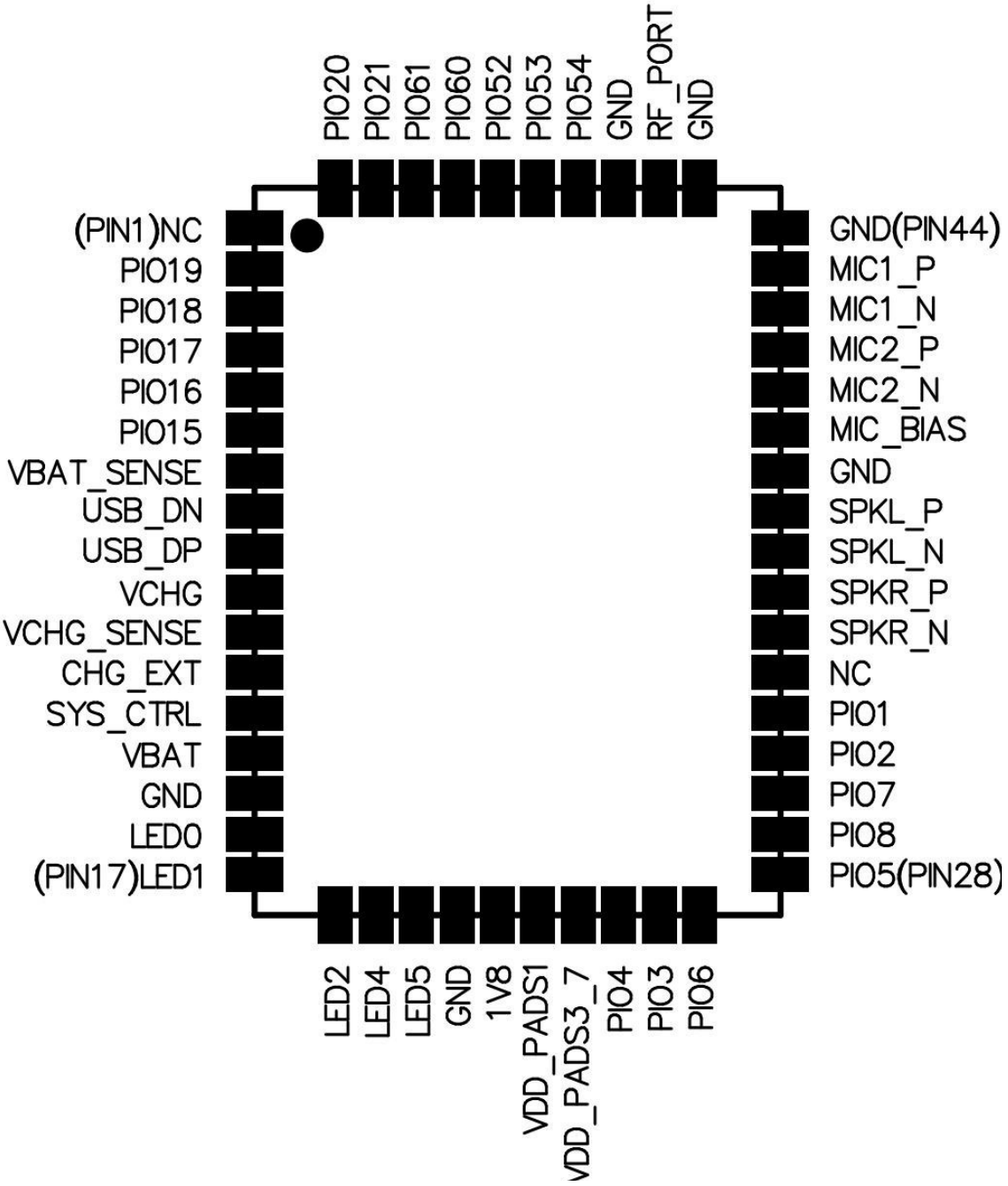
6.1 Pinout Diagram and package dimensions



Unit：MM

Recommended PCB layout footprint

6.2 Module Pin descriptions



Pin#	Pin Name	Pin type	Description
1	NC	NC	NC
2	PIO[19]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 19. Alternative function: PCM_DIN[0]
3	PIO[18]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 18. Alternative function:PCM_DOUT[0]
4	PIO[17]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 17. Alternative function:PCM_SYNC
5	PIO[16]	Digital: Bidirectional with programmable	Programmable I/O line 16. Alternative function:PCM_CLK

		strength internal pull- up/pull-down	
6	PIO[15]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 15.Alternative function:MCLK_OUT
7	VBAT_SENSE	Analog	Battery voltage sense input.
8	USB_DN	Digital	USB Full Speed device D- I/O. IEC-61000-4-2 (device level) ESD Protection
9	USB_DP	Digital	USB Full Speed device D+ I/O. IEC-61000-4-2 (device level) ESD Protection
10	VCHG	Supply	Charger input to Bypass regulator.
11	VCHG_SENSE	Analog	Charger input sense pin after external mode sense-resistor. High impedance. NOTE If using internal charger or no charger, connect VCHG_SENSE direct to VCHG.
12	CHG_EXT	Analog	External charger transistor current control. Connect to base of external charger transistor as perapplication schematic.
13	SYS_CTRL	Digital input	Typically connected to an ON/OFF push button. Boots device in response to a button press when power is still present from battery and/or charger but software has placed the device in the OFF or DORMANT state. Additionally useable as a digital input in normal operation. No pull. Additional function:PIO[0] input only
14	VBAT	Supply	Battery voltage input.
15	GND	Ground	Ground
16	AIO[0]/LED[0]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
17	AIO[1]/LED[1]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
18	AIO[2]/LED[2]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
19	AIO[4]/LED[4]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
20	AIO[5]/LED[5]	Analog or digital input/ open drain output.	General-purpose analog/digital input or open drain LED output.
21	GND	Ground	Ground
22	1V8	Supply	1.8V voltage output.
23	VDD_PADS1	Supply	1.8 V/3.3 V PIO supply.
24	VDD_PADS3_7	Supply	1.8 V/3.3 V PIO supply.
25	PIO[4]	Digital: Bidirectional with programmable strength internalpull- up/pull-down	Programmable I/O line 4. Alternative function:TBR_MOSI[1]
26	PIO[3]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 3. Alternative function:TBR_MISO[2]
27	PIO[6]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 6. Alternative function:TBR_MOSI[0]
28	PIO[5]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 5. Alternative function:TBR_MISO[1]
29	PIO[8]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 8. Alternative function: TBR_CLK

30	PIO[7]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 7. Alternative function:TBR_MISO[0]
31	PIO[2]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 2. Alternative function:TBR_MISO[3]
32	PIO[1]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Automatically defaults to RESET# mode when the device is unpowered, or in off modes. Reconfigurable as a PIO after boot. Alternative function:Programmable I/O line 1
33	NC	NC	NC
34	AUDIO_HPR_N/ SPKR_N	Analog	Headphone/speaker differential right output, negative. Alternative function:Differential right line output, negative
35	AUDIO_HPR_P/ SPKR_P	Analog	Headphone/speaker differential right output, positive. Alternative function:Differential right line output, positive
36	AUDIO_HPL_N/ SPKL_N	Analog	Headphone/speaker differential left output, negative. Alternative function:Differential left line output, negative
37	AUDIO_HPL_P/ SPKL_P	Analog	Headphone/speaker differential left output, positive. Alternative function:Differential left line output, positive
38	GND	Ground	Ground
39	AUDIO_MIC_BIAS	Analog	Mic bias output.
40	AUDIO_MIC2_N/ LINEIN_R_N	Analog	Microphone differential 2 input, negative. Alternative function:Differential audio line input right, negative
41	AUDIO_MIC2_P/ LINEIN_R_P	Analog	Microphone differential 2 input, positive. Alternative function:Differential audio line input right, positive
42	AUDIO_MIC1_N/ LINEIN_L_N	Analog	Microphone differential 1 input, negative. Alternative function:Differential audio line input left, negative
43	AUDIO_MIC1_P/ LINEIN_L_P	Analog	Microphone differential 1 input, positive. Alternative function:Differential audio line input left, positive
44	GND	Ground	Ground
45	GND	Ground	Ground
46	BT_RF	RF	Bluetooth transmit/receive.
47	GND	Ground	Ground
48	PIO[54]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 54. Alternative function:SDIO_D[0]
49	PIO[53]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 53. Alternative function: SDIO_CMD
50	PIO[52]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 52. Alternative function:SDIO_CLK
51	PIO[60]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 60.
52	PIO[61]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 61.
53	PIO[21]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 21. Alternative function:PCM_DOUT[2]

54	PIO[20]	Digital: Bidirectional with programmable strength internal pull- up/pull-down	Programmable I/O line 20. Alternative function:PCM_DOUT[1]

7 Electrical Characteristics

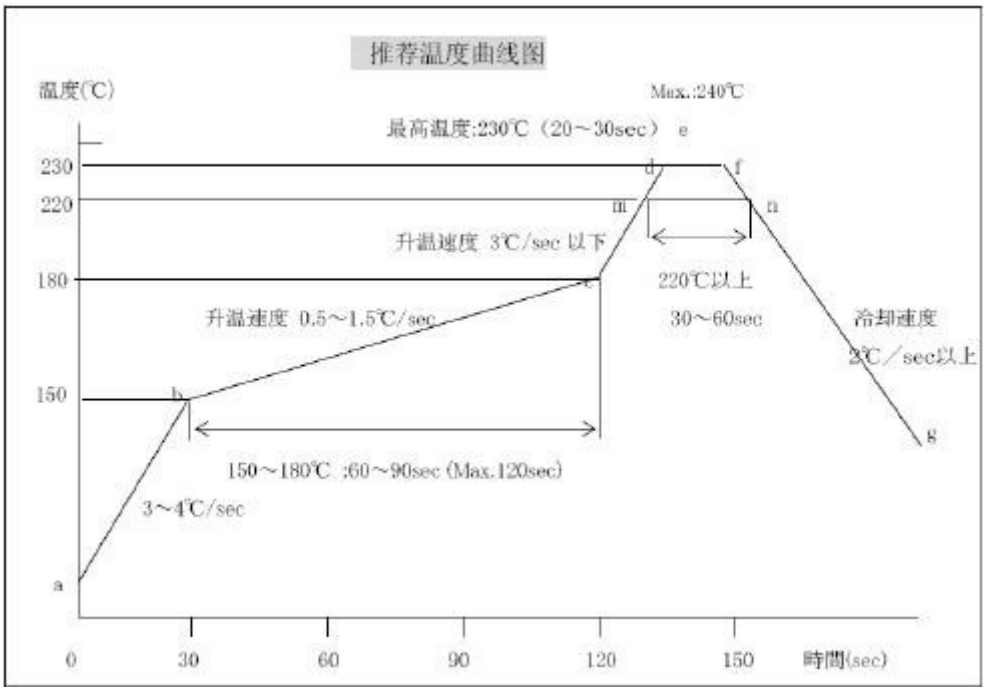
7.1 Absolute Maximum Ratings

Rating	Minimum	Maximum
Storage temperature	-40℃	+85℃

7.2 Recommended Operating Conditions

Operating Condition	Minimum	Maximum
Operating temperature range	-10℃	+70℃
Supply voltage: VBAT	+2.8V	+4.2V

8 Recommended reflow temperature profile



The module Must go through 125℃ baking for at least 9 hours before SMT AND IR reflow process!

Record of Changes

Data	Revision	Description
2018-08-10	V1.0	Original publication of this document.
2018-10-12	V1.1	Fix PIN definition.
2020-04-23	V1.2	Fix PIN definition.
2020-06-29	V1.3	Update product model.

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