

1. **Circuit Composition:**The circuit consists of Bluetooth, power amplifier, storage, communication interface, speaker interface, and USB port. See the PCB layout diagram for details.

2. **Bluetooth Electrical Parameters:**

蓝牙 Bluetooth	
VoltageInput	2.2-4.5V
GPIOInputVoltage	-0.3-(VDDIO+0.3)V
Loadingcurrent	4.2V—150ma
AmbientTemperature	-40-85C
Storagetemperature	-65-150C

1. **Bluetooth Transmit Characteristics (Basic Data Rate)**

Basic Data Rate

Table 2-8

Parameter		Min	Typ	Max	Unit	Test Conditions
RF Transmit Power			4	6	dBm	25℃, Power Supply VBAT=3.7V 2441MHz
RF Power Control Range			20		dB	
20dB Bandwidth			950		KHz	
Adjacent Channel	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
Transmit Power	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

Enhanced Data Rate

Table 2-9

Parameter		Min	Typ	Max	Unit	Test Conditions
Relative Power			-1		dB	25℃, Power Supply VBAT=3.7V 2441MHz
$\pi/4$ DQPSK Modulation Accuracy	DEVM RMS		6		%	
	DEVM 99%		10		%	
	DEVM Peak		15		%	
Adjacent Channel	+2MHz		-40		dBm	
	-2MHz		-38		dBm	
Transmit Power	+3MHz		-44		dBm	
	-3MHz		-35		dBm	

2. **Bluetooth Receive Characteristics (Basic Data Rate)**

Basic Data Rate**Table 2-10**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25°C, Power Supply VBAT=3.7V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
Interference Rejection	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

Enhanced Data Rate**Table 2-11**

Parameter		Min	Typ	Max	Unit	Test Conditions
Sensitivity			-90		dBm	25°C, Power Supply VBAT=3.7V 2441MHz
Co-channel Interference Rejection			-13		dB	
Adjacent Channel	+1MHz		+5		dB	
	-1MHz		+2		dB	
	+2MHz		+37		dB	
Interference Rejection	-2MHz		+36		dB	
	+3MHz		+40		dB	
	-3MHz		+35		dB	

3. Power Amplifier Section:

Parameter	Min	Max	Unit
Supply Voltage	2.8	5.5	V
Storage Temperature	-65	150	°C
Input Voltage	-0.3	VDD	V
ESD Voltage Tolerance		4000	V
Junction Temperature		150	°C
Operating Temperature	-40	85	°C
Recommended Operating Voltage	3.3	5.5	V

Thermal Resistance θ_{JC} (eSOP8)		20	°C/W
Thermal Resistance θ_{JA} (eSOP8)		80	°C/W
Soldering Temperature		220	°C

Operating Conditions (unless otherwise specified): TA = 25 °C, VDD = 5 V

Symbol	Parameter	Test Conditions	Min	typical	Max	Unit
VDD	Supply Voltage		3.3		5.5	V
I _{0D}	Quiescent Supply Current	VDD=3.6V, IN=0V, No Load		12		ma
		VDD=5.0V, IN=0V, No Load		18		ma
I _{5D}	Shutdown Leakage Current	V _{ctrl} =VDD		1	20	uA
V _{OS}	Output Offset Voltage			10	40	mv
R _O	Output Resistance				3	K
PSRR	Power Supply Rejection Ratio	217HZ			-80	dB
		20KHZ			-72	dB
CMRR	Common Mode Rejection Ratio			-70		dB
f _{SW}	Modulation Frequency	VDD=3.0V to 5.25V			450	KHZ
η	Efficiency	P _o =0.5W, R _L =4 Ω , VDD=3.6V			90	%
V _{IH}	Logic Control Input High Voltage	1.4	1.4			V
V _{IL}	Logic Control Input Low Voltage				0.4	V
TH _{CTRL}	One-Line Pulse High Time		1		12	uS
T _{LOC} TRL	One-Line Pulse Low Time		1		12	uS

TOFF	CTRL Shutdown Time		100			uS
Output Power (Class AB)	THD=1%, f=1KHz, RL=2Ω			3.9		W
	THD=1%, f=1KHz, RL=4Ω			2.1		W
	THD=10%, f=1KHz, RL=2Ω			4.7		W
	THD=10%, f=1KHz, RL=4Ω			2.9		W
Output Power (Class D)	THD=1%, f=1KHz, RL=2Ω			4		W
	THD=1%, f=1KHz, RL=4Ω			2.6		W
	THD=10%, f=1KHz, RL=2Ω			5		W
	THD=10%, f=1KHz, RL=4Ω			3.1		W
	THD (Distortion)	f=1KHz, Class D, RL=2Ω/4Ω, P0=0.5W		0.1%		
	SNR (Signal-to-Noise Ratio)	RL=2Ω, P0=0.5W		85		dB

4. Storage Section:

Supply Voltage	2.7-3.6V
Static Current Consumption	1uA
Storage Temperature	-40-85C
Capacity	16Mbyte
Data Retention Time	20 year

5. **Communication Interface:** BLE communicates with the motherboard
6. **USB Interface:** Program burning port
7. **Speaker Interface:** Connects to 5W 8R speaker
8. **Module Physical Dimensions:** 60 x 37 mm. Supply Voltage: 5V. Maximum Output Power: 5W x 2.

9. The module has passed relevant EMC and EMI certification tests

FCC Statement

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.

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.

Note: The Grantee is not responsible for any changes or modifications not expressly approved by the party responsible for compliance. Such modifications could void the user's authority to operate the equipment.

The device has been evaluated to meet general RF exposure requirement.

To maintain compliance with FCC's RF exposure guidelines, the distance must be at least 20 cm between the radiator and your body, and fully supported by the operating and installation configurations of the transmitter and its antenna(s).

Integration instructions for host product manufacturers according to KDB 996369
D03OEM Manual v01

2.2 List of applicable FCC rules FCC Part 15 Subpart C 15.247

2.3 Specific operational use conditions

The module can be used for mobile applications with a maximum 1.68dBi antenna. The host manufacturer installing this module into their product must ensure that the final composite product complies with the FCC requirements by a technical assessment or evaluation to the FCC rules, including the transmitter operation. The host manufacturer 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 shown in this manual

2.4 Limited module procedures

The device is a Single module and complies with the requirement of FCC Part 15.212

2.5 Trace antenna designs

Not applicable, The module has its own antenna, and does not need a host printed board micro strip trace antenna etc

2.6 RF exposure considerations

The device has been evaluated to meet general RF exposure requirement. The device can be used in portable exposure condition without restriction, and if RF exposure statement or module layout is changed, then the host product manufacturer required to take responsibility of the module through a change in FCC ID or new application. The FCC ID of the module cannot be used on the final product. In these circumstances, the host manufacturer will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization

2.7 Antennas

Antenna Specification are as follows.

Type of antenna: PCB Antenna

Gain of antenna: 2.4GHz@ 1.68dBi Max.

This device is intended only for host manufacturers under the following conditions: The transmitter module may not be co-located with any other transmitter or antenna, The module shall be only used with the internal antenna(s) that has been originally tested and certified with this module. The antenna must be either permanently attached or employ a "unique" antenna coupler. As long as the conditions above are met, further transmitter test will not be required. However, the host manufacturer 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)

2.8 Label and compliance information

Host product manufacturers need to provide a physical or e-label stating " Contains FCC ID:2BX5S-BEF4BLE1 "with their finished product

2.9 Information on test modes and additional testing requirements

Host manufacturer must perform test of radiated & conducted emission and spurious emission, e.t.c according to the actual test modes for a stand-alone modular transmitter in a host, as well as for multiple simultaneously transmitting modules or other transmitters in a host product.

Only when all the test results of test modes comply with FCC requirements, then the endproduct can be sold legally.

2.10 Additional testing, Part 15 Subpart B disclaimer

The modular transmitter is only FCC authorized for FCC Part 15 Subpart C 15.247 and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. If the grantee markets their product as being Part 15 Subpart B compliant (when it also contains unintentional-radiator digital circuit), then the grantee shall provide a notice stating that the final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed