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Chengdu Ebyte Electronic Technology Co.,Ltd.

E74-2G4M02S Datasheet v1.0

Contents

1. Introduction

E74-2G4M02S is a small size (1.27mm between pins) SMD RF module designed by Chengdu Ebyte, its maximum transmitting power is 2dBm, with high performance PCB antenna, it operates at 2.402 ~ 2.480GHz with ultra-low active RF and MCU current and ultra-low current consumption in low power consumption mode.

E74-2G4M02S adopts the RFIC CC2640 of TI, which integrates 128KB intra-system programmable flash and 8KB buffer static RAM (SRAM), and it only supports Bluetooth low energy. With rich peripherals and the special built-in ultra-low power consumption sensor controller, it is suitable for connecting external sensors and collecting analog and digital data automatically when other parts are in sleep mode.

The module has been programmed with factory firmware, which supports high-speed connection, with multiple roles.

The module also supports secondary development. Users can write their own code to achieve the functions

2. Features

No.	Notes
Ultra-low power consumption	Receiving current is 2mA, in low power mode, the current is 0.1-150uA (the instant current for advertising is 130uA), it is 0.1uA in sleep. Can be powered via battery with outstanding performance in low power.
Transparent function	Transceiver with master and slave, supports data transparent transmission for the baud rate ranging from 1200-921600.
High-speed continuous transmission	The module supports the high-speed continuous transmission for baud rate below 19200.
Multiple roles	The module can be configured as multiple roles, it supports connection methods of multiple masters with one slave or multiple slaves with one master.
Parameter save	The module will automatically save the parameters set by the user, and the parameters will not get lost when power down, the module will operate with the parameters as previously set when re-powered. The module can also restore default settings via AT command.
Watchdog	Built-in watchdog has the accurate time layout. Once something happened, modules can restart within 0.107s and resume to work according to the previous parameter setting.
Secondary Development	All IO ports led out, supports secondary development
Custom development	If the current UART module cannot meet the customer's needs, Ebyte can customize the software and hardware according to the user's requirements.

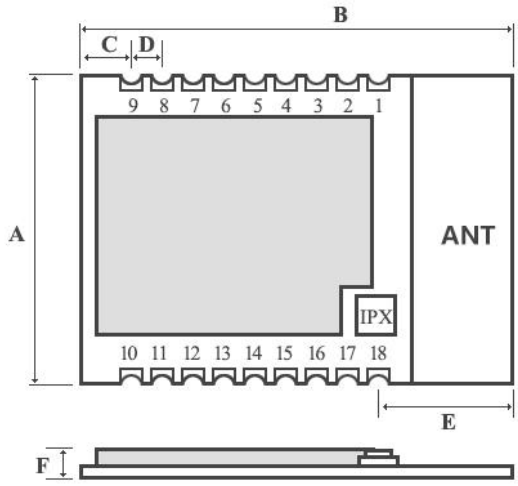
3. Electrical Parameter

No.	Item	Parameter details	Description
1	RFIC	CC2640	TI
2	Size	23*14mm	-
3	Weight	1.15g	Average weight
4	Frequency band	2402 ~ 2480MHz	Can be configured with software, it adopts 24MHz oscillator
5	PCB	4-layer PCB	Impedance-matching, lead-free, anti-interference with screening can
6	Connector	1.27mm	SMD
7	Operation voltage	1.8 ~ 3.8V	Recommended difference between supply voltage is less than 0.3V to lower power consumption
8	Communication level	0~ 3.8V	Note: the voltage higher than 4.1V is forbidden;
9	Operation Range	150m (PCB)	Test condition: clear and open area & 2dBm , PCB antenna, height: 2m; air data rate: 1Mbps
		300m(IPX)	Test condition: clear and open area & 2dBm, antenna gain: 5dBi , height: 2m , air data rate: 1Mbps
10	Transmitting power	Maximum 2dBm	About 1.6mW, can be configured to -21 ~ 2dBm
11	Air data rate	1Mbps	Bluetooth; please refer to IC datasheet
12	Shutdown current	1.0uA	Wake up on external events
13	Transmitting current	11mA@2dBm	≥50mA (recommended)
14	Receiving current	2mA	Average value
15	Communication interface	UART	UART, 8N1, 8E1 ,8O1, Eight kinds of UART baud rate, from 1200 to 921600 bps (default: 115200)
16	Transmitting length	128byts	Bluetooth 4.2
17	Receiving length	Limitless	Bluetooth 4.2
18	Antenna type	PCB / IPEX	50Ω characteristic impedance, selected from 0R resistor
19	Operating temperature	-40 ~ +85℃	-
20	Operating humidity	10% ~ 90%	Relative humidity, no condensation
21	Storage temperature	-40 ~ +125℃	-
22	Receiving sensitivity	-97dBm@1Mbps	Please refer to CC2640 datasheet

4. E74 Series

Model	RFIC	Frequency	Power dBm	Range m	Packing	Antenna
E74-2G4M02S	CC2640	2.4GHz	2	150	SMD	PCB/IPEX

5. Pin Definition

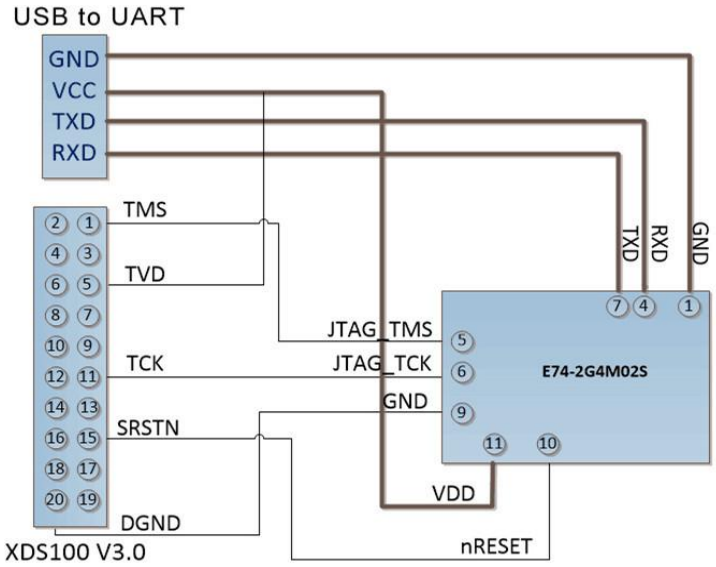


Units: mm

	MIN	NOR	MAX
A	13.80	14.00	14.20
B	22.80	23.00	23.20
C	2.36	2.46	2.56
D	1.27	1.27	1.27
E	10.28	10.38	10.48
F	4.75	4.78	4.80

No.	Pin item	Pin direction	Pin Application
1	GND	Input	Ground electrode, connect to power reference ground
2	DIO_0	Input /Output	High drive IO, sensor controller (refer to IC datasheet)
3	DIO_1	Input /Output	High drive IO, sensor controller (refer to IC datasheet)
4	DIO_2	Input /Output	High drive IO, sensor controller (refer to IC datasheet)
5	JTAG_TMS	Input /Output	JTAG_TMSC (refer to IC datasheet)
6	JTAG_TCK	Input /Output	JTAG_TCKC (refer to IC datasheet)
7	DIO_3	Input /Output	High drive IO, JTAG_TDO(refer to IC datasheet)
8	DIO_4	Input /Output	High drive IO, JTAG_TDI(refer to IC datasheet)
9	GND	Input	Ground electrode, connect to power reference ground
10	nRESET	Input	Reset, (refer to IC datasheet)
11	VDD	Input	Power supply, 1.8V ~ 3.8V
12	DIO_5	Input /Output	SLEEP pin, trigger and wake up
13	GND	Input	Ground, connect to the power reference ground
14	DIO_6	Input /Output	MRDY pin, trigger serial reception
15	DIO_7	Input /Output	SRDY pin, wake up external MCU
16	DIO_8	Input /Output	Connection, output low level
17	DIO_9	Input /Output	General IO, sensor controller, digital analog (refer to IC datasheet)
18	GND	Input	Ground electrode, connect to power reference ground
★ Please refer to “CC2640 Datasheet” of TI for pin definition, software drive and protocol ★			

6. Connect to MCU



No.	Brief description for connecting module to simulator XDS100V3.0
1	TMS, TCK, RESET and GROUND shall be connected between the module and simulator, and extra 3.3V power supply shall be added for simulator.
2	Connect the module with USB-TTL module, multiplex module serial port and IO interface, users can configure based on needs.
3	Grounding shall be good enough with large area of grounding and little power ripple, add filter capacitor close to module VCC and GND pins.

7.Operation Mode

No	Operation mode	Functional description
1	Low power consumption	The module enters low power mode after it powers on and the module keeps in advertising state. The serial port stops receiving any data while transparent output function of Bluetooth will not be affected, which means serial output function is still valid in this mode, data received by Bluetooth can output via serial ports.
2	Transparent transmission	In the low power consumption mode, the module enters the state of serial port receiving by pulling down DIO_6 pin. When the Bluetooth is not connected, it keeps in command reception status; When the Bluetooth is connected, it' s in transparent transmission mode, the data sent by the serial port to the Bluetooth module can be sent out via Bluetooth. By inputting character "+++", the module enters the instruction configuration mode and displays "CMD IN", meaning to enter the command mode; Inputting the character "+++" again, the module returns to command input mode and displays "CMD OUT".
3	Sleep	By giving the DIO_5 pin a low level of at least 300ms, the module goes into sleep mode and again triggers the pin, the module returns to low power mode.

8. Multiple Roles

This module can be configured as a multi-role mode through the instruction AT+ROLE=1. In this mode, each module can act as master or slave, one device supports three connections, as shown in figure 1.

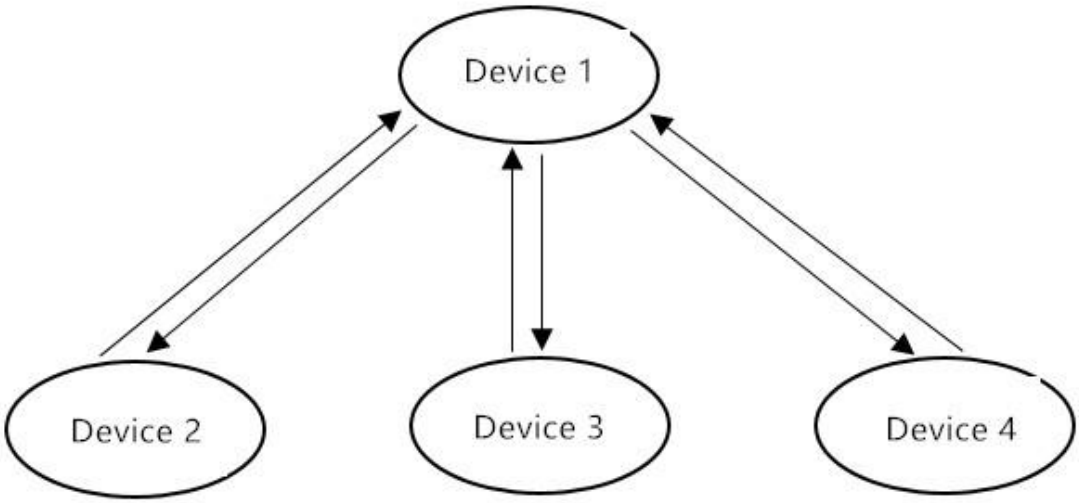


Figure 1

It refers to one master- multi slaves. device 1 can connect device 2, device 3 and device 4 at the same time. The data sent by device 1 can be received by other three devices simultaneously

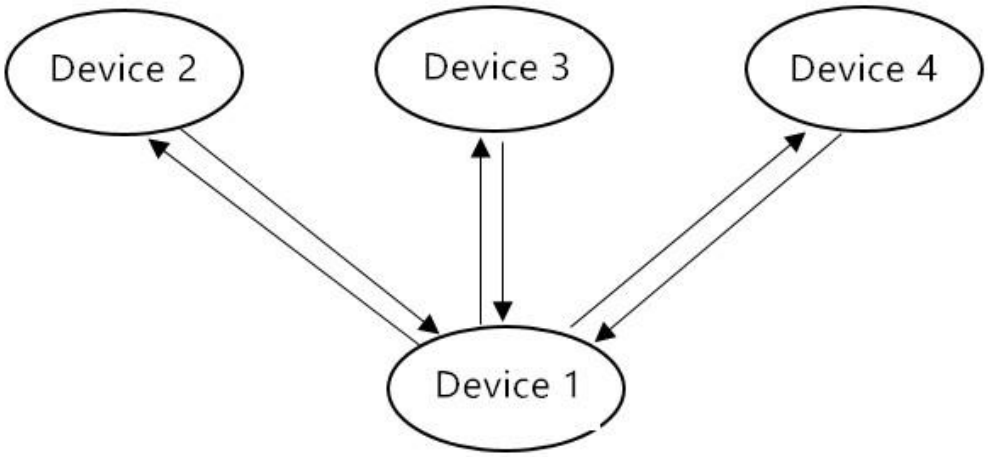


Figure 2

It refers to multi-masters-one slave. Device 1 can connect device 2, device 3 and device 4 at the same time. The data sent by device 1 can be received by other three devices simultaneously, the data sent by device 2, device 3 and device 4 can be received by device 1.

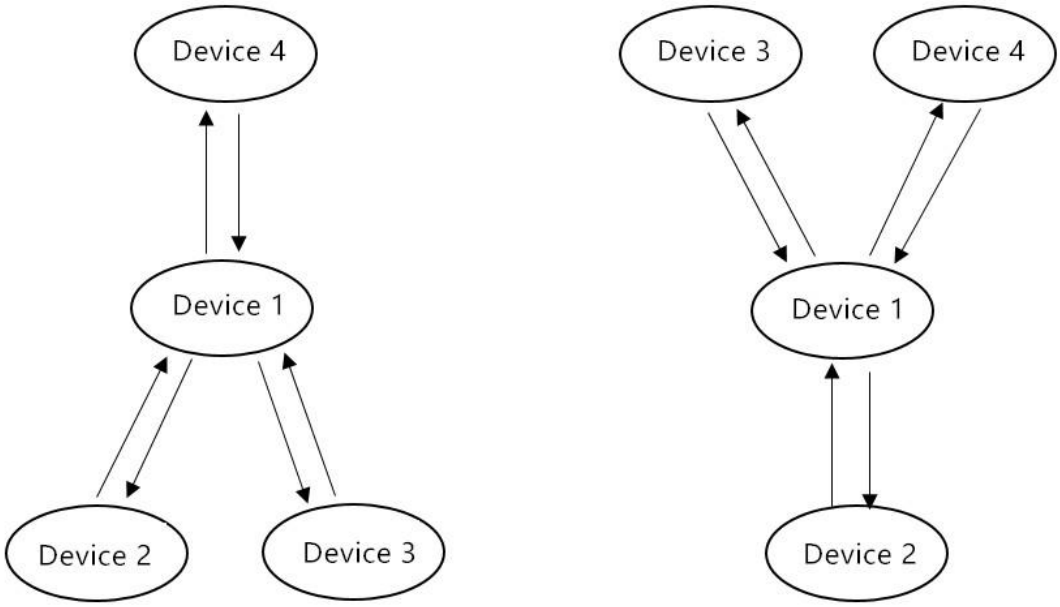


Figure 3

It refers to the topological structure of one master- multi slaves and multi masters- one slave.

In the left picture, device 1 can be scanned by device 4 after it connects equipment 2 and equipment 3 at a same time, the connection will be created. The data sent by equipment 1 can be simultaneously received by other three devices, the data sent by equipment 2, equipment 3 and equipment 4 can be received by equipment 1.

In the right picture, the device 1 can be scanned by device 3 and device 4 after it connects device 2, the connection will be created. The data sent by device 1 can be simultaneously received by other three devices, the data sent by device 2,device 3 and device 4 can be received by device 1.

9. Transparent Continuous Transmission

The module supports transparent continuous transmission, the maximum baud rate is 19200bps. When the baud rate of sender is no more than 19200bps and the baud rate of the receiver is not lower than its set value, there will be no lenet loss no matter how large the received packet is, even for continuous data flow

10. Instruction Operation

No	Command	Description
1	AT Instruction set	See more details in 4.11 AT command
2	Instruction format	All operating instruction formats are in the normal string input mode, no newline, no carriage return, non-hexadecimal For example, query baud rate, the format is AT+UART Set the baud rate in the format of AT + UART = 115200, 8, 1, 0

10.1 Command response

Returned value	Description
OK—AT+instruction	Query response return
PARA SET:	Set response return
CMD ERROR	Command error
RANG ERR	Configuration range error
PARA ERR	Parameter configuration error
PARITY ERR	Serial parity bit error
STOP ERR	Serial stop bit error
DATA ERR	Serial data bit error
BAUD ERR	Serial baud rate error

10.2 AT Command

+++	Mode switching instruction
AT+RESET	Reset instruction
AT+FACTORY	Restore default settings
AT+VER	Query version information
AT+MAC	Query MAC address
AT+NAME	Query /Set device’ s name
AT+UART	Query baud rate
AT+ROLE	Query/Set device’ s role
AT+ADVIN	Query/Set advertising interval
AT+CONIN	Query/Set connection interval
AT+ADVON	Open advertising
AT+ADVOFF	Close advertising
AT+TXPWR	Query/Set power
AT+RSSI	Acquire the RSSI of connected device
AT+DISCONN	Disconnection
AT+UUID	Query/Set UUID
AT+ADVDATA	Query/Set advertising data
AT+IBEACON	Query/Set IBEACON data
AT+SCAN	Scan advertising device
AT+CONNECT	Connect to specified device

10.3 Mode switching

Command	Description	Echo
+++	Mode switching	CMD IN，CMD OUT
When connected, execute +++, module will enter command mode; When execute +++ again, module will return to normal mode.		

10.4 Reset

Command	Description	Echo
AT+RESET	System Reset	Null
Execute AT+RESET Function: System Reset		

10.5 Restore the default settings

Command	Description	Echo
AT+ FACTORY	Restore the default settings	OK--AT+FACTORY: Factory Mode SUCCESS
Execute AT+ FACTORY, Function: the execution of this command will reset all parameters saved in flash, and restore the factory default settings of the module.		

10.6 Query version information

Command	Description	Echo
AT+ VER	Query version information	OK--AT+VER: HV: V1.0，SV: V1.0
Execute AT+ VER， Function: Information about the hardware version Information about the software version		

10.7 Query MAC address

Command	Description	Echo
AT+ MAC	Query MAC address	Example: OK--AT+MAC: 0x98072D8E79DE
Execute AT+ MAC, Function: when succeed, return to MAC address.		

10.8 Query / Set device's name

Command	Description	Echo
AT+ NAME	Query/Set device's name	Example：OK--AT+NAME: CdEbyte_MultiRole
Execute AT+NAME=CdEbyte_MultiRole, Function: set the module name (no more than 20 characters). When succeed, return to PARA SET: CdEbyte_MultiRole		

10.9 Query/Set UART configuration

Command	Description	Echo
AT+UART	Query/Set UART Configuration	Example：OK--AT+UART: 115200,8,1,0
Execute AT+UART=115200,8,1,0 Function: Set UART configuration, return to PARA SET: 115200,8,1,0 UART baud rate: 1200，2400，4800，9600，19200，38400，57600，115200，128000，230400，256000，460800，921600 Data bits: 6: 6-bit data 7: 7-bit data 8: 8-bit data Stop bits: 0:None 1: 1-bit stop bit Parity bit 0: None 1: Even 2: Odd		

10.10 Query/Set device's role

Command	Description	Echo
AT+ROLE	Query/Set device's role	Example：OK--AT+ROLE: Normal
Execute AT+ROLE=0, Function: when succeed, return to PARA SET: Normal Execute AT+ROLE=1 Function：when succeed, return to PARA SET: MultiRole		

10.11 Query/Set advertising interval

Command	Description	Echo
AT+ADVIN	Query/Set advertising interval	Example：OK--AT+ADVIN: 160
Execute AT+ADVIN=160, Function: when succeed, return to PARA SET: AT+ADVIN=160 The advertising interval=setting parameter*0625ms, Example: the parameter is 160, then the advertising interval is 160*0625ms=100ms. Parameter range: 12 ~ 16000.		

10.12 Query/Set connection interval

Command	Description	Echo
AT+CONIN	Query/Set connection interval	Example：OK--AT+CONIN: 200,200,0,1000
Execute AT+CONIN=200,200,0,1000 Function: when succeed, return to PARA SET: 200,200,0,1000。 First data: 200 Minimum connection interval: 6 ~ 3200, The connection interval=setting parameter*1.25ms, Example: The parameter is 200, then the connection interval is 200 * 1.25ms = 250ms. Second data: 200 Maximum connection interval: 6 ~ 3200, The connection interval=setting parameter*1.25ms, Example: The parameter is 200, then the connection interval is 200 * 1.25ms = 250ms. Third data: 0 Slave Latency: 0 ~ 499 Fourth data: 1000 Time out: 10~ 3200		

10.13 Open advertising

Command	Description	Echo
AT+ADVON	Open Adverting	Example: OK--AT+ADVON: Advertising...
Execute AT+ADVON, the module will open advertising Function: in normal mode, if this device is already connected, it will not be advertised after executing this command; in Multi-Role mode, if there are 3 devices connected to this device, it will not be advertised after executing this command.		

10.14 Close advertising

Command	Description	Echo
AT+ADVOFF	Close advertising	Example：OK--AT+ADVOFF: Advert closeing...
Execute AT+ADVOFF, the module will close advertising		

10.15 Query/Set power

Command	Description	Echo
AT+TXPWR	Query/Set power	Example：OK--AT+TXPWR: 0dBm
Execute AT+TXPWR=2dBm, Function: when succeed, return to PARA SET: AT+TXPWR=2dBm Power range: 2dBm, 1dBm, 0dBm, -3dBm, -6dBm, -9dBm, -18dBm, -12dBm, -15dBm, -21dBm		

10.16 Acquire the RSSI of connected devices

Command	Description	Echo
AT+RSSI	Acquire the RSSI of connected devices	Example：OK--AT+RSSI: -64dBm
Execute AT+RSSI, Function: the module will return to the RSSI of connected devices. This command is invalid until the device is connected.		

10.17 Disconnection

Command	Description	Echo
AT+DISCONN	Disconnection	Example：PARA SET: Connected to: 0 Disconnected!
Execute AT+DISCONN Function: the module will disconnect.		

10.18 Query/Set UUID

Command	Description	Echo
AT+UUID	Query UUID	Example：OK--AT+UUID: 0,0xFFF0 1,0xFFF1 2,0xFFF2 3,0xFFF3
Execute AT+UUID=0, FFF0, Function: when succeed, return to PARA, SET:, AT+UUID=0, FFF0 First parameter: UUID number, Range 0 ~ 3 Second parameter: UUID Please refer to the Bluetooth specification protocol to set the corresponding UUID		

10.19 Query/Set advertising data

Command	Description	Echo
AT+ADVDATA	Query/Set advertising data	Example：OK--AT+ADVDATA: 0x0A00010203040506070809
Execute AT+ADVDATA=0A00010203040506070809, Function: when succeed, return to PARA SET: 0x0A00010203040506070809 0A refers to data length, 00010203040506070809 refers to data to input, 00 refers to 0x00, 01 refers to 0x01, 02 refers to 0x02. Data length is no more than 23 bytes.		

10.20 Query/Set IBEACON data

	Description	Echo
AT+IBEACON	Query /Set IBEACON data	Example：OK--AT+ADVOFF: Advert closeing...
Execute AT+IBEACON Function: when succeed, return to PARA SET: 0x020106061AFF4C000215B9407F30F5F8466EAFF925556B57FE6D0049000AC5. Data length is no more than 31 bytes.		

10.21 Scan advertising device

Command	Description	Echo
AT+SCAN	Scan advertising device	Example：OK--AT+SCAN: Discovering with AT_SCAN... Device 1: 0xDE798E2D0798
If a device is advertising, it will list the MAC address of scanned device.		

10.22 Connect to specified device

Command	Description	Echo
AT+CONNECT=1	Connect to specified device	CONNECT OK,
Execute AT+CONNECT=1, Function: when succeed, return to CONNECT OK, When connected, IOID_8 pin will be set as low level, when disconnected, DIO_8 will be set as high level.		

11. About us

Chengdu Ebyte Electronic Technology Co., Ltd. (Ebyte) is specialized in wireless solutions and products.

- We research and develop various products with diversified firmware;
- Our catalogue covers WiFi, Bluetooth, Zigbee, PKE, wireless data transceivers & etc.;
- With about one hundred staffs, we have won tens of thousands customers and sold millions of products;
- Our products are being applied in over 30 countries and regions globally;
- We have obtained ISO9001 QMS and ISO14001 EMS certifications;
- We have obtained various of patents and software copyrights, and have acquired FCC, CE, RoHs & etc.