



User Manual
GCT SEMICONDUCTOR INC.

GCM7243iVZ _APB

CAT-M1

Ver 0.2

GCT Semiconductor Inc.
Confidential and Proprietary

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Version History

Version	Date	Description
Ver0.2	2019.05.13	FCC statement revised.
Ver0.1	2019.05.03	Preliminary Version

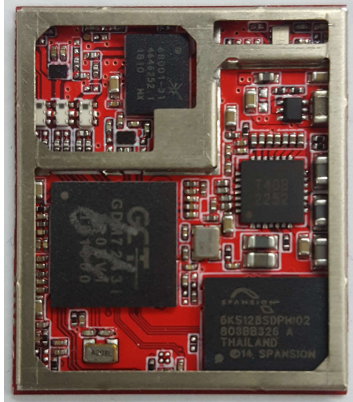


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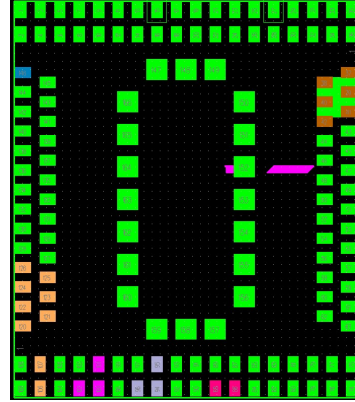
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1. Overview

1.1. Module Appearance



<Top View>



<Bottom View>

1.2. Feature Overview

- > Form Factor
 - ✓ LGA2522: 25mm x 21.8mm
- > RF
 - ✓ LTE BAND 13/Band4

2. Technology and Specification

- CAT-M1
- LGA Module (6 layers PCBs)
- RF, LTE modem, Processor, memory
- Support FDD Half duplex – LTE B13/ Band4
- Support UE 1TX/1RX
- Support USB2.0/I2C/I2S/UART0123/ADC/SDIO/JTAG/GPIOs
- Operating Temperature Range: -30° ~ +85°C
- Host interface voltage: 1.8V / 3.3V
- Max TX power: +23dBm
- RoHS Compliant, Halogen Free



3. Major Components

● **RF**

Part	Description	Vendor	Part Name
LTE SOC	GDM7243i (LTE RF/BB)	GCT	GDM7243i
PMIC	LTE PMIC	GMT	G2252
Flash	Quad-bit 128Mb serial-flash	MXIC	MX25U12835FM21-10G
FEM	Dual band PA & Switch	Skyworks	SKY68001-31

● **LTE Driver**

Module	Description	Vendor (owner)	Comment
RF driver	GDM7243i RF driver	GCT	
L1	PHY	GCT	
L2	MAC / RLC / PDCP	GCT	
L3	RRC	GCT	
NAS	EMM / ESM / PLMN	GCT	
UMM	UICC handling	GCT	
USAT	USAT handling	GCT	
SMS	SMS decoding /encoding	GCT	
LAPI	LTE API interface	GCT	
ATC	3GPP AT command handling	GCT	

● **SDK**

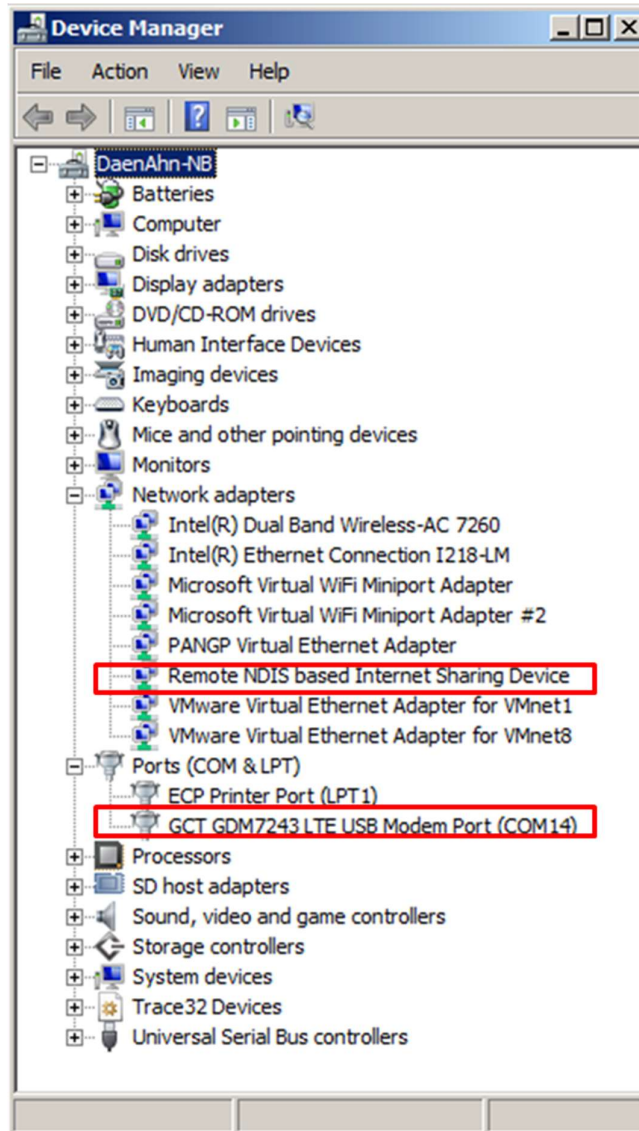
Module	Description	Vendor (owner)	Comment
LWM2M	OTA / FOTA client	Verizon	
BIP	BIP	GCT	
iCM	Tiny Connection Manager	GCT	
ATCM	AT command manager	GCT	
Device driver	Flash, PMIC, UICC, USB	GCT	

4. INSTRUCTION

Special Testing Instructions: *(Do Not Reference Another Document, All Special Testing Instructions Must Be Noted Here.)*

4.1. Description

- Use Win7 or higher version for Microsoft Windows PC/Notebook
- USB interface and drivers
 - USB RNDIS : network interface
 - Modem port : Host DM Interface



- External Power supply (5V DC or 3.3V) DC option

Diagnostic Tool Logging Instructions:

4.2. Diagnostic Tool

Text based CLI command and logging tool through UART and Wireshark based OTA message logging tool through RNDIS.

Refer to “GCT_LTE_Text_DM_Reference_Manual.pdf” and “GCT_LTE_WSDM_User_Manual.pdf”

4.3. AT Command Control Tool

User can enter 3GPP AT Command through “GCT GDM7243 LTE USB Monitor Port” interface and it can simply connected through generic UART console program such as “putty (<http://www.chiark.greenend.org.uk/~sgtatham/putty/>).

Software Upgrade Instructions (Module and Device):

4.4. Description

User can update boot loader or zephyr image for GDM7243i through UART as follows.

- **uboot**
 - Press Enter key for entering uboot prompt(GDM7243>)
 - GDM7243>run bootdn
 - Select uboot F/W by Y-modem
 - GDM7243>run bootsave
- **Zephyr**
 - Press Enter key for entering uboot prompt(GDM7243>)
 - GDM7243>run zpdn
 - Select Zephyr F/W by Y-modem
 - * Save command is not needed.

```
GDM7243> run bootdn
## Ready for binary (ymodem) download to 0x01020000 at 921600 bps...
CC
Upload Xmodem
u-boot-7243i_v0.14.bin
CxyzModem - CRC mode, 2(SOH)/152(STX)/0(CAN) packets, 5 retries
## Total Size      = 0x00025cd4 = 154836 Bytes
GDM7243> run bootsave
HF: 524288 bytes @ 0x50000000 Erased: OK
HF: 524288 bytes @ 0x50000000 Write: OK
GDM7243>

GDM7243> run zpdn
## Ready for binary (ymodem) download to 0x50400000 at 921600 bps...
CC
Upload Xmodem
zephyr.bin
CxyzModem - CRC mode, 6(SOH)/5488(STX)/0(CAN) packets, 11 retries
## Total Size      = 0x0055bf00 = 5619456 Bytes
GDM7243> _
```

< Firmware Update>

Programming Instructions

4.5. Accessing Device Information

To use AT command defined in 3GPP 27.007

AT+CGMI	Request manufacturer identification
AT+CGMM	Request model identification
AT+CGMR	Request revision identification
AT+CGSN	Request product serial number identification
AT+CSCS	Request TE character set
AT+CIMI	Request international mobile subscriber identity

4.6. AT Commands Supported

27.007	Command
4.3 ITU-T Recommendation V.250 [14] TE-TA interface commands	
	E[<value>]
	Q[<value>]
	V[<value>]
5. General Command	
3GPP TS 27.007 (Sec. 5.1)	+CGMI
3GPP TS 27.007 (Sec. 5.2)	+CGMM
3GPP TS 27.007 (Sec. 5.3)	+CGMR
3GPP TS 27.007 (Sec. 5.4)	+CGSN
3GPP TS 27.007 (Sec. 5.5)	+CSCS
3GPP TS 27.007 (Sec. 5.6)	+CIMI
3GPP TS 27.007 (Sec. 5.9)	+WS46
6. Call control Commands and methods	
3GPP TS 27.007 (Sec. 6.10)	+CEER
7. Network Service related commands	
3GPP TS 27.007 (Sec. 7.1)	+CNUM
3GPP TS 27.007 (Sec. 7.3)	+COPS
3GPP TS 27.007 (Sec. 7.4)	+CLCK
3GPP TS 27.007 (Sec. 7.5)	+CPWD
3GPP TS 27.007 (Sec. 7.19)	+CPOL
3GPP TS 27.007 (Sec. 7.20)	+CPLS
3GPP TS 27.007 (Sec. 7.21)	+COPN
3GPP TS 27.007 (Sec. 7.38)	+CPSMS
3GPP TS 27.007 (Sec. 7.40)	+CEDRXS
3GPP TS 27.007 (Sec. 7.41)	+CEDRXRDP
3GPP TS 27.007 (Sec. 7.42)	+CCIOTOPT
8. Mobile Termination control and status commands	
3GPP TS 27.007 (Sec. 8.1)	+CPAS
3GPP TS 27.007 (Sec. 8.2)	+CFUN



3GPP TS 27.007 (Sec. 8.3)	+CPIN
3GPP TS 27.007 (Sec. 8.5)	+CSQ
3GPP TS 27.007 (Sec. 8.6)	+CMEC
3GPP TS 27.007 (Sec. 8.10)	+CMER
3GPP TS 27.007 (Sec. 8.15)	+CCLK
3GPP TS 27.007 (Sec. 8.17)	+CSIM
3GPP TS 27.007 (Sec. 8.18)	+CRSM
3GPP TS 27.007 (Sec. 8.37)	+CLAC
3GPP TS 27.007 (Sec. 8.40)	+CTZU
3GPP TS 27.007 (Sec. 8.41)	+CTZR
3GPP TS 27.007 (Sec. 8.43)	+CGLA
3GPP TS 27.007 (Sec. 8.44)	+CRLA
3GPP TS 27.007 (Sec. 8.45)	+CCHO
3GPP TS 27.007 (Sec. 8.46)	+CCHC
3GPP TS 27.007 (Sec. 8.62)	+CGPIAF
3GPP TS 27.007 (Sec. 8.65)	+CPINR
3GPP TS 27.007 (Sec. 8.69)	+CESQ
9. Mobile termination errors	
3GPP TS 27.007 (Sec. 9.1)	+CMEE
10. Commands for Packet Domain	
3GPP TS 27.007 (Sec. 10.1.1)	+CGDCONT
3GPP TS 27.007 (Sec. 10.1.2)	+CGDSCONT
3GPP TS 27.007 (Sec. 10.1.3)	+CGTFT
3GPP TS 27.007 (Sec. 10.1.9)	+CGATT
3GPP TS 27.007 (Sec. 10.1.10)	+CGACT
3GPP TS 27.007 (Sec. 10.1.11)	+CGCMOD
3GPP TS 27.007 (Sec. 10.1.12)	+CGDATA
3GPP TS 27.007 (Sec. 10.1.14)	+CGPADDR
3GPP TS 27.007 (Sec. 10.1.19)	+CGEREP
3GPP TS 27.007 (Sec. 10.1.21)	+CGSMS
3GPP TS 27.007 (Sec. 10.1.22)	+CEREG
3GPP TS 27.007 (Sec. 10.1.23)	+CGCONTRDP
3GPP TS 27.007 (Sec. 10.1.24)	+CGSCONTRDP
3GPP TS 27.007 (Sec. 10.1.25)	+CGTFTRDP
3GPP TS 27.007 (Sec. 10.1.26)	+CGEQOS
3GPP TS 27.007 (Sec. 10.1.27)	+CGEQOSRDP
3GPP TS 27.007 (Sec. 10.1.28)	+CEMODE
3GPP TS 27.007 (Sec. 10.1.31)	+CGAUTH
3GPP TS 27.007 (Sec. 10.1.32)	+CIPCA
3GPP TS 27.007 (Sec. 10.1.43)	+CSODCP
3GPP TS 27.007 (Sec. 10.1.44)	+CRTDCP
3GPP TS 27.007 (Sec. 10.1.45)	+CGAPNRC



27.005	Command
3. Text Mode	
3GPP TS 27.005 (Sec. 3.2.1)	+CSMS
3GPP TS 27.005 (Sec. 3.2.2)	+CPMS
3GPP TS 27.005 (Sec. 3.2.3)	+CMGF
3GPP TS 27.005 (Sec. 3.3.1)	+CSCA
3GPP TS 27.005 (Sec. 3.3.2)	+CSMP
3GPP TS 27.005 (Sec. 3.3.3)	+CSDH
3GPP TS 27.005 (Sec. 3.3.5)	+CSAS
3GPP TS 27.005 (Sec. 3.3.6)	+CRES
3GPP TS 27.005 (Sec. 3.4.1)	+CNMI
3GPP TS 27.005 (Sec. 3.4.2)	+CMGL
3GPP TS 27.005 (Sec. 3.4.3)	+CMGR
3GPP TS 27.005 (Sec. 3.5.1)	+CMGS
3GPP TS 27.005 (Sec. 3.5.2)	+CMSS
3GPP TS 27.005 (Sec. 3.5.3)	+CMGW
3GPP TS 27.005 (Sec. 3.5.4)	+CMGD
3GPP TS 27.005 (Sec. 3.5.5)	+CMGC

Verizon Specific Command	
LTE AT Commands for Test automation REQ.pdf	+VZWAPNE
LTE AT Commands for Test automation REQ.pdf	+VZWRSRP
LTE AT Commands for Test automation REQ.pdf	+VZWRSRQ

4.7. USAT Proactive Commands Supported

ENVELOPE Command
SMS-PP Data Download
Timer Expiration
MO short Message Control

PROACTIVE Command
REFRESH
MORE TIME
POLL INTERVALL
POLLING OFF
SEND SHORT MESSAGE
PROVIDE LOCAL INFORMATION
SETUP EVENT LIST
TIMER MANAGEMENT
OPEN CHANNEL
RECEIVE DATA



SEND DATA
GET CHANNEL STATUS

4.8. Enable/Disable Radio

To use AT command defined in 3GPP 27.007

AT+CFUN=[<fun>[,<rst>]

-<fun>: integer type

1 full functionality

0 Minimal functionality

-<rst>: integer type

0 do not reset the MT before setting it to <fun> power level

1 reset the MT before setting it to <fun> power level

5. Ordering Information (25.0x22.0mm²)

<Ordering Information>

Device Name	Package			Order Number (Part Number)
	Type	Size	Shipment Method	
GCM7243iVZ_APB	LGA	25.0x22.0x0.6(max) mm	Tape and Reel	GCM7243iVZ_APBT



Federal Communication Commission Interference Statement

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 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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

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.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:

FCC Radiation Exposure Statement:

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.



User Manual

Integration instructions for host product manufacturers Applicable FCC rules to module

FCC Part 27

Summarize the specific operational use conditions

The module must be installed in mobile device.

This device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization. The OEM integrator 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 show in this manual.

Limited module procedures

Not applicable

Trace antenna designs

Refer to trace antenna design document.

RF exposure considerations

20 cm separation distance and co-located issue shall be met as mentioned in "Summarize the specific operational use conditions".

Product manufacturer shall provide below text in end-product manual

"This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Antennas

B4(1710 MHz – 1755 MHz) Dipole antenna with 1.49 dBi gain, SMA connector.

B13(777 MHz – 787 MHz) Dipole antenna with -0.15 dBi gain, SMA connector.

The maximum antenna gain including cable loss must not exceed 5.5 dBi in band 4 and 11.16 dBi in Band 13.

Label and Compliance Information

Product manufacturers need to provide a physical or e-label stating
"Contains FCC ID: 2AL1Y-GCM7243I" with finished product.

Information on Test Modes and Additional Testing Requirements

Simulator is required to link up and set the module to transmit at specific frequency, output power level under operation mode.

Additional Testing, Part 15 Subpart B Disclaimer

The module is only FCC authorized for the specific rule parts listed on the grant, 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. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.



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