Installation Manual of GCM4701NA

1. Introduction

This document describes the basic hardware features and behavior of GCM4701NA.

2. Hardware Architecture

Device Name	GCM4701NA
Module Type	PCIe M.2 TYPE 3042-D3-B
Module Size	30mm x 42mm
PCB Thickness	0.8mm
Total Thickness	3.65mm (D3)

2.1 Main Chipset Information

Item	Vendor	Part Number
LTE Modem	GCT Semiconductor	GDM7243A

2.2. Form Factor

- PCIe M.2 TYPE 3042-D3-B

2.3. Support LTE Band

- BAND: FDD B2/66, TDD B48/B54

2.4. Digital Interface

- USIM Class B & C(3.0V/1.8V) Supported
- eSIM(1.8V) supported
- USB2.0/USB3.0/RGMII/PCIE/UART

2.5. Module output power Setting information

Frequency	Max Power Setting
1670~1675MHz (Band 54)	23dBm
1850 ~1910MHz (Band 2)	23dBm
1710 ~1780MHz (Band 66)	23dBm
3550 ~3700MHz (Band 48)	23dBm

2.6. Module output power information

Frequency	Max output Power [1]
1670~1675MHz (Band 54)	23+/-2.7dBm

1850 ~1910MHz (Band 2)	23+/-2.7dBm
1710 ~1780MHz (Band 66)	23+/-2.7dBm
3550 ~3700MHz (Band 48)	23+/-2.7dBm

Note 1 : QPSK, when do not apply MPR.

3. Operational Description

3.1. Purpose

This device operates in LTE Band 54/2/66/48, providing high-speed wireless communication for private networks, particularly in critical infrastructure industries such as utilities.

3.2. Functionality

The device supports FDD and TDD, allowing flexible use of uplink and downlink slots to meet specific application requirements.

3.3. Applications:

- Smartphone-Type application,
- Fixed CPE-Type application
- Mobile Multi-Media Devises
- LTE Mobile router
- Other applications and devices

3.4. Hardware Features

- M.2 Module (10 layers PCB)
- Supports LTE Category 12 with high performance throughputs
- 3GPP Rel.12
- Peak TP : 600Mbps (4CA 256QAM)
- GPS
- Max TX power: +23dBm
- RoHS Compliant, Halogen Free
- Recommended operation condition : Vaux 3.3V

3.5. Transmission

- Support QPSK/16QAM/64QAM

3.6. Receiver

- Support QPSK/16QAM/64QAM/256QAM

3.7. Product Details

3.7.1. Support Band and Frequency

Band	Uplink(TX)	Downlink(RX)
B54	1670~1675MHz	1670~1675MHz
B2	1850~1910MHz	1930~1990MHz
B66	1710~1780MHz	2110~2200MHz
B48	3550~3700MHz	3550~3700MHz

3.7.2. Product Spec.

- **B54**

Parameter		Min	Typ.	Max	Unit
RF Characteristics					
RF Frequency	Tx	1670		1675	MHz
	Rx	1670		1675	MHz
Tx output power(at "23" setting)			23		dBm
Frequency Error Tolerance(+25℃)		-0.1		+0.1	ppm
2nd Harmonics(conducted)			-50		dBm
3nd Harmonics(conducted)			-60		dBm
Rx Sensitivity(BW5MHz, MCS5)			-103		dBm
Rx Spurious Emission(30MHz~12.75GHz)			TBD		dBm

- **B2**

Parameter		Min	Typ.	Max	Unit
RF Characteristics					
RF Frequency	Tx	1850		1910	MHz
	Rx	1930		1990	MHz
Tx output power(at "23" setting)			23		dBm
Frequency Error Tolerance(+25℃)		-0.1		+0.1	ppm
2nd Harmonics(conducted)			-65		dBm
3nd Harmonics(conducted)			-68		dBm
Rx Sensitivity(BW10MHz, MCS5)			-100		dBm
Rx Spurious Emission(30MHz~12.75GHz)			TBD		dBm

➢ **B66**

Parameter		Min	Typ.	Max	Unit
RF Characteristics					
RF Frequency	Tx	1710		1780	MHz
	Rx	2110		2200	MHz
Tx output power(at "23" setting)			23		dBm
Frequency Error Tolerance(+25℃)		-0.1		+0.1	ppm
2nd Harmonics(conducted)			-48		dBm
3nd Harmonics(conducted)			-51		dBm
Rx Sensitivity(BW10MHz, MCS5)			-100		dBm
Rx Spurious Emission(30MHz~12.75GHz)			TBD		dBm

➢ **B48**

Parameter		Min	Typ.	Max	Unit
RF Characteristics					
RF Frequency	Tx	3550		3700	MHz
	Rx	3550		3700	MHz
Tx output power(at "23" setting)			23		dBm
Frequency Error Tolerance(+25℃)		-0.1		+0.1	ppm
2nd Harmonics(conducted)			-54		dBm
3nd Harmonics(conducted)			-62		dBm
Rx Sensitivity(BW10MHz, MCS5)			-100		dBm
Rx Spurious Emission(30MHz~12.75GHz)			TBD		dBm

4. Product power Spec.

Symbol	Parameter	Min	Typ.	Max	Unit
VDD	Power supply		3.3		V
Idd	current		500		mA

5. Product Temp. Spec.

Symbol	Parameter	Rating	Unit
Temp	Operating	-30~85	℃
TSTG	Storage Temperature	-50~TBD	℃

6. Install Guide

- PCIe M.2 TYPE 3042-D3-B
- Recommended operation condition : Vaux 3.3V
- USIM Class B & C(3.0V/1.8V) Supported
- eSIM(1.8V) supported
- USB2.0/USB3.0/RGMII/PCIE/UART
- GNSS

6.1. Pin Allocation

- Based on Socket 2 Key B PCIe/USB3.1 Gen1-based WWAN
- IO voltage level : 1.8V

Pin	Usage	Pin	Usage
1	CONFIG_3/JTAG_TCK	2	3.3V_M.2
3	GND	4	3.3V_M.2
5	GND	6	PWR_EN
7	USB2.0_DP	8	WLAN_DISABLE
9	USB2.0_DM	10	DS_IND#
11	GND	ADD-IN CARD KEY B	
ADD-IN CARD KEY B		20	RGMII_RXD2
21	CONFIG_0/JTAG_TMS	22	RGMII_RXD1
23	WAKEUP_GDM7243	24	RGMII_RXD3
25	P_GPF3[20]	26	RGMII_RXD0
27	GND	28	ETHERNET_EN
29	USB3.0_SSTX-	30	SIM1_RST_O
31	USB3.0_SSTX+	32	SIM1_CLK_O
33	GND	34	SIM1_DAT_O
35	USB3.0_SSRX-	36	SIM_VCC
37	USB3.0_SSRX+	38	PHY2MAC_125MHZ
39	GND	40	RGMII_RCTL
41	PCIE_TXDN	42	RGMII_TCTL
43	PCIE_TXDP	44	RGMII_MDIO
45	GND	46	RGMII_MDC
47	PCIE_RXDN	48	RGMII_TCLK
49	PCIE_RXDP	50	PCIE_RESET#
51	GND	52	PCIE_CLKREQ#

53	PCIE_REF_CLK_GDM	54	PCIE_WAKE#
55	NC	56	RGMII_RCLK
57	GND	58	RGMII_TXD3
59	UART4_RXD	60	RGMII_TXD2
61	UART4_TXD	62	UART0_RXD
63	UART4_CTS	64	UART0_TXD
65	UART4_RTS	66	RGMII_TXD1
67	RESET#_KEY	68	RGMII_TXD0
69	CONFIG_1/JTAG_TDI	70	3.3V_M.2
71	GND	72	3.3V_M.2
73	GND	74	3.3V_M.2

6.2. Module Figure

7. Equipment Description

- Equipment Type: LTE Module
- Model Number: GCM4701NA
- FCC ID: 2BGOOGCM4701NA

8. Manufacturer

- Company Name: CM PARTNER INC
- Contact Person: S.B.PYUN
- Phone Number: 82-31-329-1514
- Email: sales_ems@cmpartner.com
- Contact Address: 479-11, Gyeonggidong-ro, Namsa-myeon, Cheoin-gu, Yongin-si, Gyeonggi-do, 17121

1) FCC Statement

FCC Part 15.19 Statements:
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 Part 15.21 statement
Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

FCC Part 15.105 statement (Class B)
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.

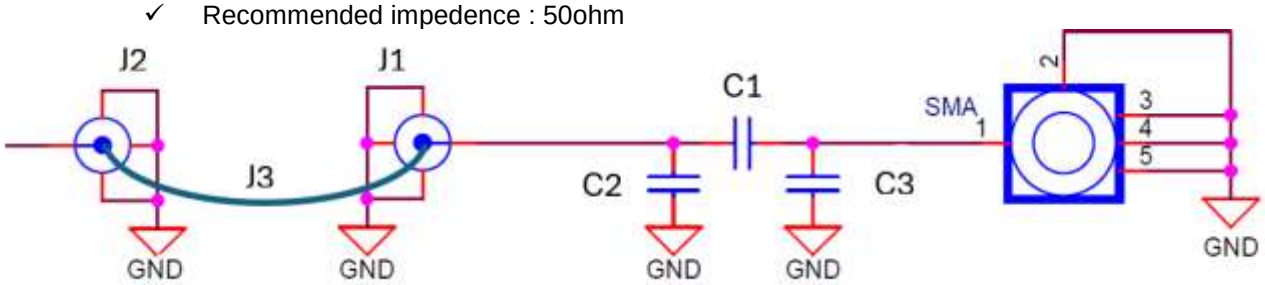
2) Regulatory notice to host manufacturer according to KDB 996369 D03 OEM Manual v01>

List of applicable FCC rules
This module has been granted modular approval as below listed FCC rule parts.
-FCC Rule parts 24, 27 and 96

Summarize the specific operational use conditions
-The OEM integrator should use equivalent antennas which is the same type and equal or less gain then an antenna listed below in this instruction manual.

Trace antenna designs
This module has been certified with the trace antenna designs explained this documents as required per KDB 996369 D02 Module Q&A Question 11.
The host manufacturer installed with this module should be followed following installation instruction for the trace antenna design to be compliance with FCC Requirements. Once finish the installation as this instruction, it is strongly recommended to perform the spot check testing to confirm the host product is still compliance with FCC`s each rules for each bands.

- Reference Circuit
  - ✓ Recommended impedence : 50ohm



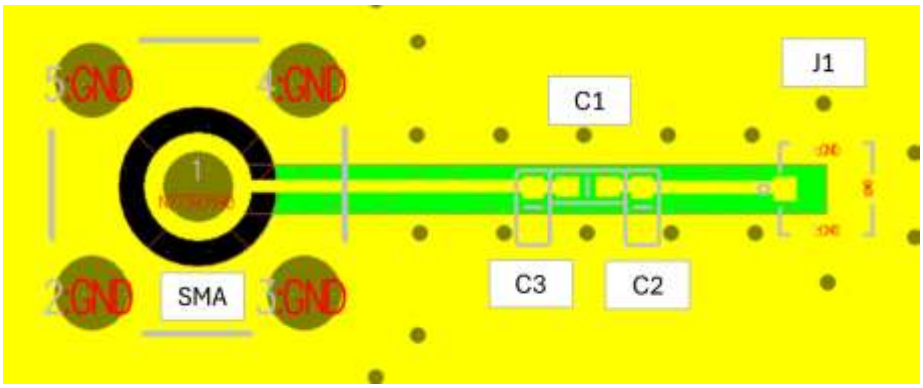
  - ✓ Component of reference circuit

J1, J2	Receptacle	K.FL2-R-SMT-1(800) or Compatible Products
J3	Coaxial RF cable	50ohm to 50ohm cable that matches with receptacle
C1	8pF	
C2	NC	

C3	NC	

- PCB layout of antenna in EVB board (6 layers)
  PCB have to be designed to meet 50ohm.

✓ Layer 1



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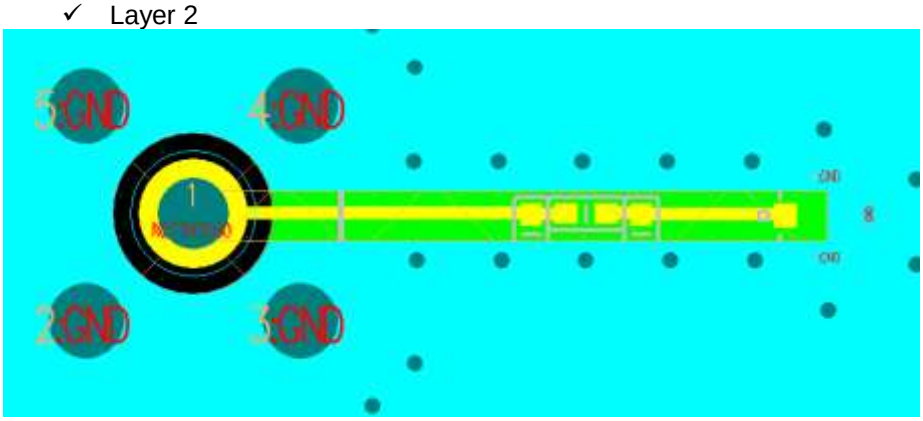

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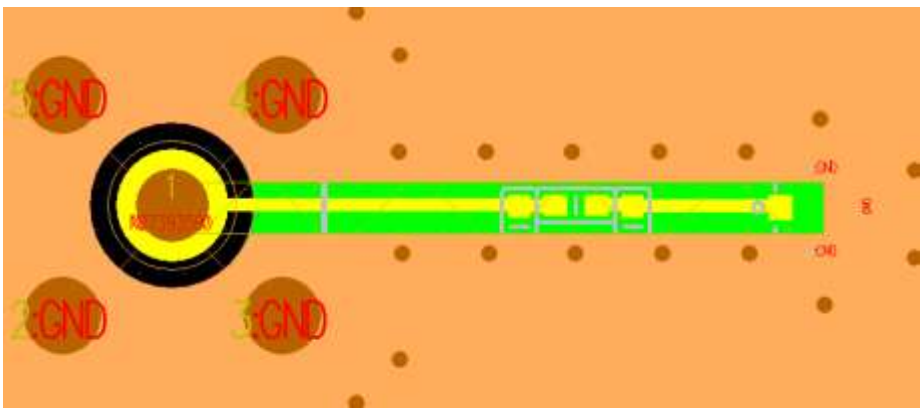

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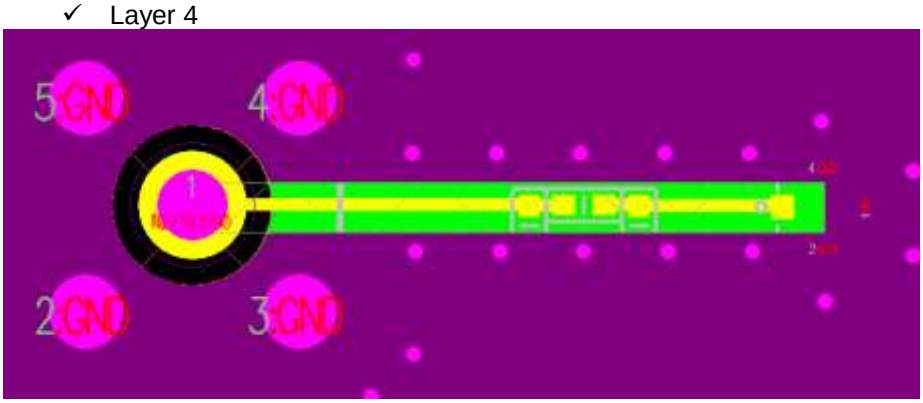

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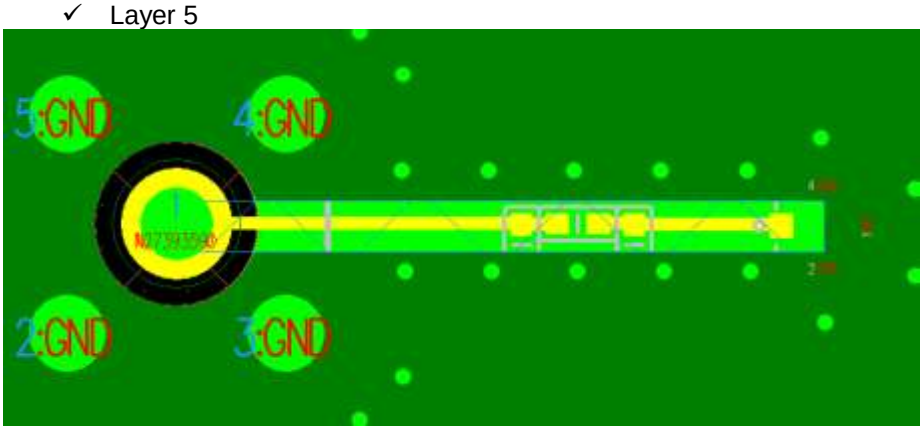

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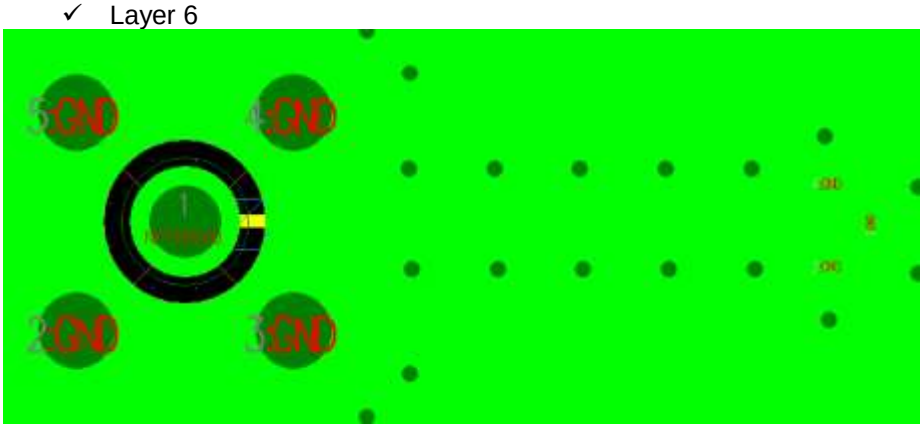

RF exposure considerations

The module has been certified for integration into products only by OEM integrators under the following condition:

-The antenna(s) must be installed such that a minimum separation distance of at least 20 cm is maintained between the radiator (antenna) and all persons at all times.

-The transmitter module must not be co-located or operating in conjunction with any other antenna or transmitter except in accordance with FCC multi-transmitter product procedures.

-Mobile use

If the host product installed with this module is used in a portable exposure condition, which mean that user separation distance is closer than 20 cm and battery powered, then additional authorization to update the RF Exposure condition as the portable device is required.

As long as the three conditions above are met, further transmitter testing will not be required.
OEM integrators should provide the minimum separation distance to end users in their end-product manuals.

Antennas list

The host manufacturer must not use an antenna with a gain that exceeds the values listed for each respective band.

Frequency	Allowed Peak Antenna gain
B54 (1670~1675MHz)	10.3 dBi
B2 (1850 ~1910MHz)	7.3 dBi
B66 (1710 ~1780MHz)	4.3 dBi
B48 (3550 ~3700MHz)	-2.7 dBi

Label and compliance information

End Product Labeling

The module is labeled with its own FCC ID. If the FCC ID are not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

“Contains FCC ID: 2BGOOGCM4701NA

Information on test modes and additional testing requirements
-OEM integrator 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, additional transmitter in the host, etc.).

Additional testing, Part 15 Subpart B disclaimer
-The final host product also requires Part 15 subpart B compliance testing with the modular transmitter installed to be properly authorized for operation as a Part 15 digital device.
Note EMI Considerations
Note that a host manufacture is recommended to use D04 Module Integration Guide recommending as "best practice" RF design engineering testing and evaluation in case non-linear interactions generate additional non-compliant limits due to module placement to host components or properties

For standalone mode, reference the guidance in D04 Module Integration Guide and for simultaneous mode; see D02 Module Q&A Question 12, which permits the host manufacturer to confirm compliance.

How to make changes
Since only Grantees are permitted to make permissive changes, when the module will be used differently than granted, please contact the module manufacture on below contact information.
-. Contact information: (email/phone) sales_ems@cmpartner.com / +82-31-329-1514