Technical Specification
(TM04ANNABM1)

History

Ver.	Date	Contents	Written by	Checked by	Approved by	Note
1.0	2020. 12.28					

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1. Product Introduction

The **TM04ANNABM1** are designed for the automotive industry. They support LTE and WCDMA air Interface standards. The **TM04ANNABM1** are based on the Qualcomm MDM9250 wireless chipsets and support the following bands.

Table 1. Supported Band

Region		**NA**
Band	LTE	B2/B4/B5/B7/B10/B12/B17 /B66
	WCDMA	B2/B4/B5
	GSM	GSM850, GSM1900

1.1 Block Diagram

Confidential

Figure 1.1. TM04ANNABM1 Block diagram

1.2 Environmental Specifications

The environmental specification for operating and storage of the **TM04ANNABM1** are defined in the the table below.

Table 2. Environmental Specifications

Parameter	**Temperature Range**

Operating Temperature	-10℃ to 85℃ (ecall 85℃)
Storage Temperature	-10℃ to +85℃
Humidity	95% or less

1.3 Electrical Specifications

This section provides details for some of the key electrical specifications of the **TM04ANNABM1** embedded modules.

1.3.1 Absolute Maximum Rating and ESD Ratings

This section defines the Absolute Maximum and Electrostatic Discharge (ESD) Ratings of the **TM04ANNABM1** embedded modules.

Warning: If these parameters are exceeded, even momentarily, damage may occur to the device.

Table 3. Absolute Maximum Ratings

Parameter		**Min**	**Max**	**Units**
VDD	Power Supply Input	-	6	V
VIN	Voltage on any digital input or output pin	-	VDD+0.5	V
ESD Ratings				
ESD[1)]	Primary, Diversity antenna pads - Contact		1	kV

1) The ESD Simulator configured with 330pF, 2000Ω.

Caution: The TM04ANNABM1 embedded modules are sensitive to Electrostatic Discharge. ESD countermeasures and handling methods must be used when handling the TM04ANNABM1 devices.

1.3.2 Current Consumption

Table 4. **TM04ANNABM1** Current Consumption (@12.5V TBD)

Mode	**Parameter**	**Typical**	**Max**	**Units**
LTE	Max TX Output /Full RB	450	550	mA
WCDMA	Max TX Output /Full RB	450	550	mA
LTE	Idle, Registered	2	-	mA
WCDMA	Idle, Registered	2	-	mA

1.4 Mechanical Specifications

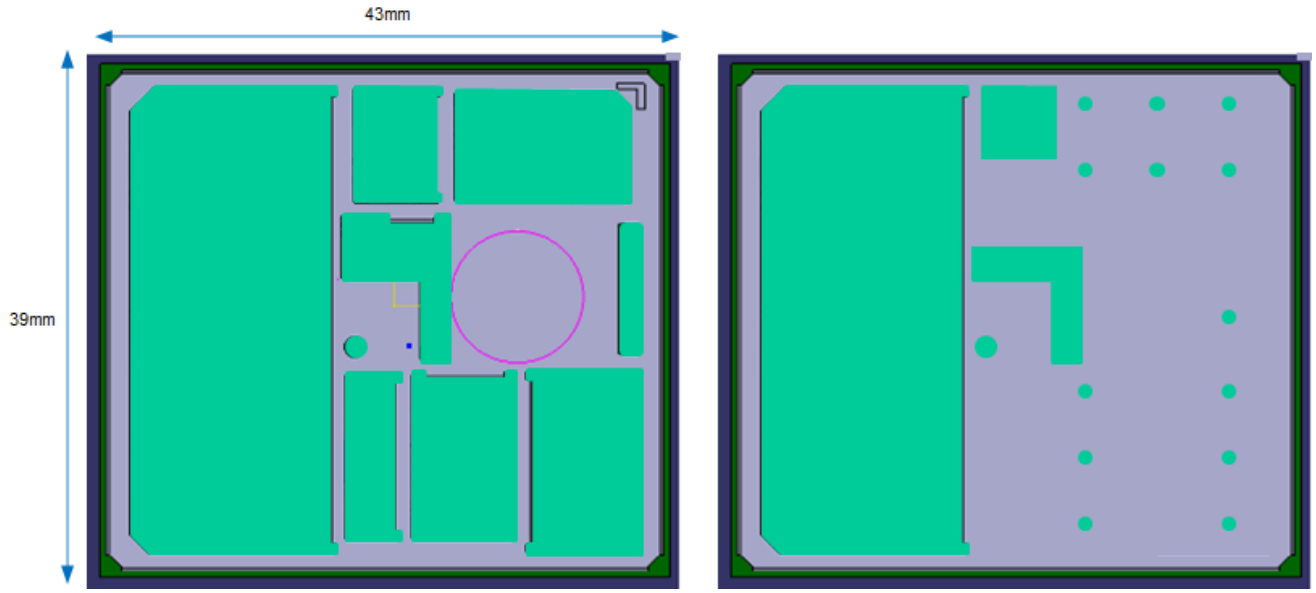
1.4.1 Physical Dimensions and Connection Interface

The **TM04ANNABM1** embedded modules are a Land Grid Array (LGA) form factor device. The device does not have a System or RF connectors. All electrical and mechanical connections are made via the 387 pad **TM04ANNABM1** on the underside of the PCB.

Table5. **TM04ANNABM1** Embedded Module Dimensions

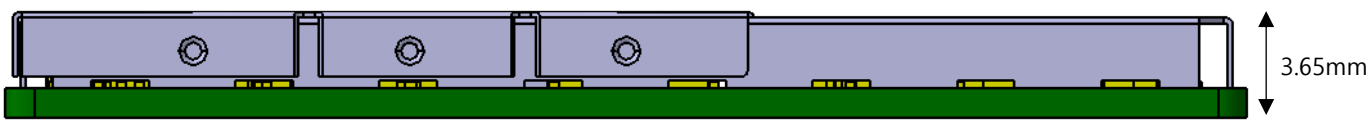
Parameter	Nominal	Max	Units
Overall Dimension	39 x 43	39.35 x 43.35	mm
Overall Module Height	3.65	3.85	mm
PCB Thickness	1.0	1.1	mm
Flatness Specification		0.1	mm
Weight	TBD		g

1.4.2 Mechanical Drawing



1.4.2.1 NAD PCB

[TOP View_Without shield Can cover] [TOP View_With shield Can cover]



[SIDE View_With shield Can cover]

2. RF Specification

The specifications for the LTE and WCDMA interfaces are defined.
TM04ANNABM1 is designed to be compliant with the standard shown in the table below.

Table6. Standards Compliance

Technology	Standards
LTE	• 3GPP Release 11
WCDMA	• 3GPP Release 9
GSM	• 3GPP Release 8

2.1 LTE Specification

2.1.1 LTE RX Sensitivity

The Receiver Sensitivity of the **TM04ANNABM1** are specified in the following table.

Table7. Conducted RX (Receive) Sensitivity – LTE Bands

BAND	**Method (DL CH)**	**Specification**
BAND 2 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (900) in Band2	sensitivity : ≤-94.3 BLER : ≤ 5%
BAND 4 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (2175) in Band4	sensitivity : ≤-96.3 BLER : ≤ 5%
BAND 5 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (2525) in Band5	sensitivity : ≤-94.3 BLER : ≤ 5%
BAND 7 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (3100) in Band7	sensitivity : ≤-94.3 BLER : ≤ 5%
BAND 10 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (4450) in Band10	sensitivity : ≤-96.3 BLER : ≤ 5%
BAND 12 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (5095) in Band12	sensitivity : ≤-93.3 BLER : ≤ 5%
BAND 17 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (5790) in Band17	sensitivity : ≤-93.3 BLER : ≤ 5%

BAND 66 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (66886) in Band66	sensitivity : ≤-95.8 BLER : ≤ 5%

2.2 WCDMA Specification

2.2.1 WCDMA RX Sensitivity

The Receiver Sensitivity of the **TM04ANNABM1** are specified in the following table.

Table8. Conducted RX (Receive) Sensitivity – WCDMA Bands

Item	Method (DL CH)	Specification
BAND2 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=9800) in Band2	0.1% @≤-106.7dBm
BAND4 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=1675) in Band4.	0.1% @≤-106.7dBm
BAND5 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=4400) in Band5	0.1% @≤-106.7dBm

2.3 GSM Specification

The Receiver Sensitivity of the TM04ANNABM1 are specified in the following table.

BAND	Method (DL CH)	Specification
GSM850 Reference sensitivity level	Measure BER of Middle Channel (CH=190)	0~2.439%@-102dBm
GSM1900 Reference sensitivity level	Measure BER of Middle Channel (CH=660)	0~2.439%@-102dBm

Notice

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the 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.

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.

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment. This device should be installed and operated with minimum distance 3.5cm between the radiating element of this device and the user.