

Manual (TM04ANNABM0)

BEJ-TM04ANNABM0 [FCC ID]
2703H-TM04ANNABM0 [ISED ID]

1. Product Introduction

The **TM04ANNABM0** are designed for the automotive industry. They support LTE and WCDMA air Interface standards. The **TM04ANNABM0** are based on the Qualcomm MDM9250 wireless chipsets and support the following bands.

Table 1. Supported Band

Region		NA
Band	LTE	B1/B2/B3/B4/B5/B7/B10/B12/B13/B17 /B20/B25/B26/B29/B30/B41/B66/B71
	WCDMA	B1/B2/B3/B4/B5
	GSM	GSM850, GSM1900

LTE B29, B30 : Rx only

1.1 Block Diagram

Confidential

Figure 1.1. TM04ANNABM0 Block diagram

1.2 Environmental Specifications

The environmental specification for operating and storage of the **TM04ANNABM0** are defined in the the table below.

Table 2. Environmental Specifications

Parameter	Temperature Range
Operating Temperature	-40°C to 90°C (ecall 95°C)
Storage Temperature	-40°C to +95°C
Humidity	95% or less

1.3 Electrical Specifications

This section provides details for some of the key electrical specifications of the **TM04ANNABM0** embedded modules.

1.3.1 Absolute Maximum Rating and ESD Ratings

This section defines the Absolute Maximum and Electrostatic Discharge (ESD) Ratings of the **TM04ANNABM0** 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 **TM04ANNABM0** embedded modules are sensitive to Electrostatic Discharge. ESD countermeasures and handling methods must be used when handling the **TM04ANNABM0** devices.

1.3.2 Current Consumption

Table 4. **TM04ANNABM0** 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

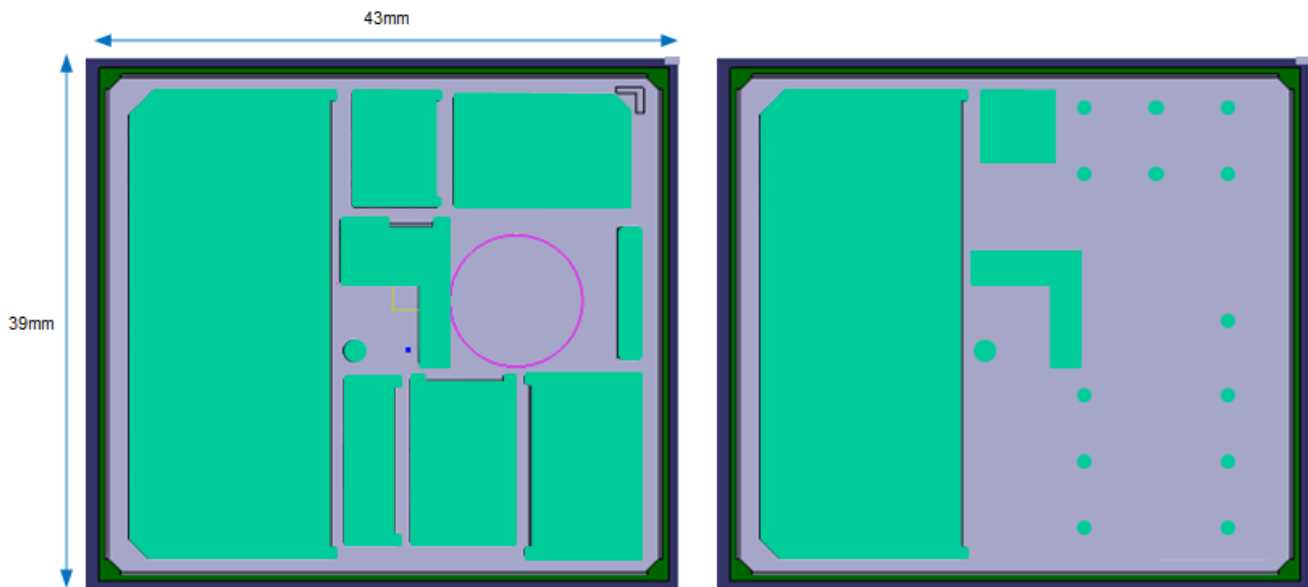
1.4.1 Physical Dimensions and Connection Interface

The **TM04ANNABM0** 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 **TM04ANNABM0** on the underside of the PCB.

Table5. **TM04ANNABM0** 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.

TM04ANNABM0 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 **TM04ANNABM0** are specified in the following table.

Table7. Conducted RX (Receive) Sensitivity – LTE Bands

BAND	Method (DL CH)	Specification
BAND 1 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (300) in Band1	sensitivity : ≤ -96.3 BLER : $\leq 5\%$
BAND 2 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (900) in Band2	sensitivity : ≤ -94.3 BLER : $\leq 5\%$
BAND 3 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (1250) in Band3	sensitivity : ≤ -93.3 BLER : $\leq 5\%$
BAND 4 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (2175) in Band4	sensitivity : ≤ -96.3 BLER : $\leq 5\%$
BAND 5 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (2525) in Band5	sensitivity : ≤ -94.3 BLER : $\leq 5\%$
BAND 7 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (3100) in Band7	sensitivity : ≤ -94.3 BLER : $\leq 5\%$
BAND 10 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (4450) in Band10	sensitivity : ≤ -96.3 BLER : $\leq 5\%$

BAND 12 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (5095) in Band12	sensitivity : ≤ -93.3 BLER : $\leq 5\%$
BAND 13 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (5230) in Band13	sensitivity : ≤ -93.3 BLER : $\leq 5\%$
BAND 17 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (5790) in Band17	sensitivity : ≤ -93.3 BLER : $\leq 5\%$
BAND 20 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (6300) in Band20	sensitivity : ≤ -93.3 BLER : $\leq 5\%$
BAND 25 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (8365) in Band25	sensitivity : ≤ -92.8 BLER : $\leq 5\%$
BAND 26 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (8865) in Band26	sensitivity : ≤ -94.5 BLER : $\leq 5\%$
BAND 29 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (9715) in Band29	CA operation
BAND 30 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (9820) in Band30	CA operation
BAND 41 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (40620) in Band41	sensitivity : ≤ -94.3 BLER : $\leq 5\%$
BAND 66 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (66886) in Band66	sensitivity : ≤ -95.8 BLER : $\leq 5\%$
BAND 71 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (68761) in Band71	sensitivity : ≤ -93.5 BLER : $\leq 5\%$

2.2 WCDMA Specification

2.2.1 WCDMA RX Sensitivity

The Receiver Sensitivity of the **TM04ANNABM0** are specified in the following table.

Table8. Conducted RX (Receive) Sensitivity – WCDMA Bands

Item	Method (DL CH)	Specification
BAND1 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=10700) in Band1	0.1% @≤-106.7dBm
BAND2 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=9800) in Band2	0.1% @≤-106.7dBm
BAND3 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=1338) in Band3.	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 **TM04ANNABM0** 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

3. Antenna requirement [WWLAN]

This device contains BEJ-TM04ANNABM0 [FCC ID], 2703H-TM04ANNABM0 [ISED ID] as WWAN module. All the configuration related to the module comply module requirement with following antenna gain.

- An antenna may be connected to connector within following condition.
- This product has been tested with antenna and cable configuration listed below.

Host manufacturer shall use antenna and cable that has gain less or equal to the configuration.

- Antenna gain calculated with cable loss and gain shall not be greater than final antenna gain listed below.

Band	Frequency-Range UL [MHz]	Max Tx Gain [dBi]
GSM 850	824 – 849	-1.9
GSM 1900	1850 –1910	2.0
UMTS B. 2	1850 –1910	2.0
UMTS B. 4	1710 –1755	2.6
UMTS B. 5	824 – 849	-1.9
LTE 2	1850- 1910	2.0
LTE 4	1710 - 1755	2.6
LTE 5	824 - 849	-1.9
LTE 7	2500 - 2570	2.7
LTE 12	699 - 716	-2.1
LTE 13	777 - 787	-0.1
LTE 17	704 - 716	-2.1
LTE 25	1850 - 1915	2.1
LTE 26	814 - 849	-1.1
LTE 41	2496 - 2690	2.7
LTE 66	1710- 1780	2.6
LTE 71	663 - 698	-4.2

4. Label Requirement

OEM host manufacturer must label “Contains FCC ID: BEJ-TM04ANNABM0”,

“Contains IC: 2703H-TM04ANNABM0”.

4. Warning Statement

FCC Warning

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 20cm between the radiating element of this device and the user.

ISED Warning

This device contains license-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's license-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

This equipment complies with ISED radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter unless authorized to do so by the ISED.

Cet appareil est conforme aux limites d'exposition aux rayonnements de l'ISDE pour un environnement non contrôlé.

L'antenne doit être installée de façon à garder une distance minimale de 20 centimètres entre la source de rayonnements et votre corps.

L'émetteur ne doit pas être colocalisé ni fonctionner conjointement avec à autre antenne ou autre émetteur, à moins d'y être autorise par l'ISDE.