

Technical Specification (TM04ANNABM2)

History

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

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The **TM04ANNABM2** are designed for the automotive industry. They support LTE and WCDMA air Interface standards. The **TM04ANNABM2** are based on the Qualcomm MDM9250 wireless chipsets and support the following bands.

Region		NA
Band	LTE	B2/B4/B5/B7/B10/B12/B13/B17/B25 /B29(Rx)/B30(Rx)/B41/B66/B71
	WCDMA	B2/B4/B5
	GSM	GSM850, GSM1900

2. NAD Architecture (X-WAVE, NA Variant)



The environmental specification for operating and storage of the **TM04ANNABM2** are defined in the the table below.

Table 2. Environmental Specifications

Parameter	Temperature Range
Operating Temperature	-10°C to 85°C (ecall 85°C)
Storage Temperature	-10°C to +85°C
Humidity	95% or less

1.3 Electrical Specifications

This section provides details for some of the key electrical specifications of the **TM04ANNABM2** embedded modules.

1.3.1 Absolute Maximum Rating and ESD Ratings

This section defines the Absolute Maximum and Electrostatic Discharge (ESD) Ratings of the **TM04ANNABM2** 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 **TM04ANNABM2** embedded modules are sensitive to Electrostatic Discharge. ESD countermeasures and handling methods must be used when handling the **TM04ANNABM2** devices.

1.3.2 Current Consumption

Table 4. **TM04ANNABM2** 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

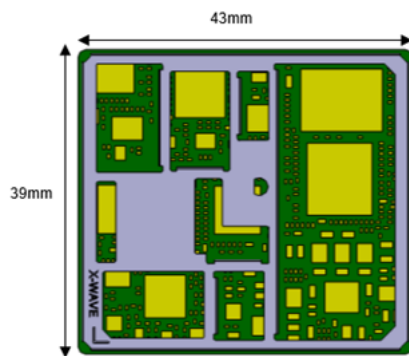
1.4.1 Physical Dimensions and Connection Interface

The **TM04ANNABM2** 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 **TM04ANNABM2** on the underside of the PCB.

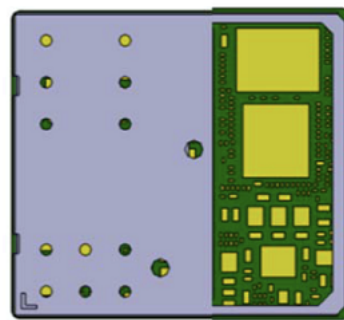
Table5. **TM04ANNABM2** Embedded Module Dimensions

Parameter	Nominal	Max	Units
Overall Dimension	39 x 43	39.35 x 43.35	mm
Overall Module Height	3.6	3.85	mm
PCB Thickness	1.0	1.1	mm
Flatness Specification		0.1	mm
Weight	TBD		g

1.4.2 Mechanical Drawing



[TOP View without shield can cover]



[TOP View with shield can cover]

1.4.2.1 NAD PCB



[Side View_With shield Can cover]

2. RF Specification

The specifications for the LTE and WCDMA interfaces are defined.

TM04ANNABM2 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
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2.1 LTE Specification

2.1.1 LTE RX Sensitivity

The Receiver Sensitivity of the **TM04ANNABM2** 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 : $\leq 5\%$
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 25 Reference sensitivity level(DUAL)	Measure BLER of Mid Channel (8365) in Band25	sensitivity : ≤ -92.8 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 **TM04ANNABM2** 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% @ ≤ -106.7 dBm
BAND4 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=1675) in Band4.	0.1% @ ≤ -106.7 dBm
BAND5 BER(Bit Error Rate)	Measure BER of Middle Channel (CH=4400) in Band5	0.1% @ ≤ -106.7 dBm

2.3 GSM Specification

The Receiver Sensitivity of the TM04ANNABM2 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 4.7cm between the radiating element of this device and the user.

Notice

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment.

This equipment should be installed and operated with minimum distance 4.7 cm between the radiator & your body.

NOTE: THE MANUFACTURER IS NOT RESPONSIBLE FOR ANY RADIO OR TV INTERFERENCE CAUSED BY UNAUTHORIZED MODIFICATIONS TO THIS EQUIPMENT. SUCH MODIFICATIONS COULD VOID THE USER'S AUTHORITY TO OPERATE THE EQUIPMENT.

Avis d'Industrie Canada sur l'exposition aux rayonnements

Cet appareil est conforme aux limites d'exposition aux rayonnements d'Industrie Canada pour un environnement non contrôlé.

Il doit être installé de façon à garder une distance minimale de 4.7 centimètres entre la source de rayonnements et votre corps.

REMARQUE: LE FABRICANT N'EST PAS RESPONSABLE DES INTERFÉRENCES RADIOÉLECTRIQUES CAUSÉES PAR DES MODIFICATIONS NON AUTORISÉES APPORTÉES À CET APPAREIL. DE TELLES MODIFICATIONS POURRAIT ANNULER L'AUTORISATION ACCORDÉE À L'UTILISATEUR DE FAIRE FONCTIONNER L'APPAREIL.

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'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.

KDB 996369 D03 OEM Manual

2.2 List of Applicable FCC Rules

Part 22, 24, 27

2.3 Summarize the specific operational use conditions

Limited module, designated enclosure that contains specific antenna inside. Professional installation equipment. Vehicle-use only. Only vehicle manufacturer can use/install this device on their vehicle.

2.4 Limited module procedure

Limited module, only specific host equipment can be used with this module. Applying this module to other host equipment may require additional test and permissive change procedure. RF Exposure was evaluated with specific host and certain condition.

2.5 Trace antenna designs

N/A

2.6 RF Exposure consideration

RF Exposure evaluation was performed with very specific installation condition at 45 mm. Any other installation condition may require additional test and permissive change procedure.

2.7 Antennas

Radiated emission test was performed with internal antenna configuration. Any other antenna may require additional test and permissive change procedure.

2.8 Label and compliance information

Host equipment shall have compliance information and label information 'Contains FCC ID' with FCC ID: BEJTM04ANNABM2