

Technical Specification (TM13LNCAHK1)

History

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1.0	2018.06.12					

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1. Product Introduction

The **TM13LNCAHK1** are designed for the automotive industry. They support LTE and CDMA air Interface standards. The **TM13LNCAHK1** are based on the Qualcomm MDM9628 wireless chipsets and support the following bands.

Table 1. Supported Band

Region		US
Band	LTE	B2/B4/B5/B7/B12/B17
	WCDMA	B2/B5

1.1 Block Diagram

Block Diagram – Canada

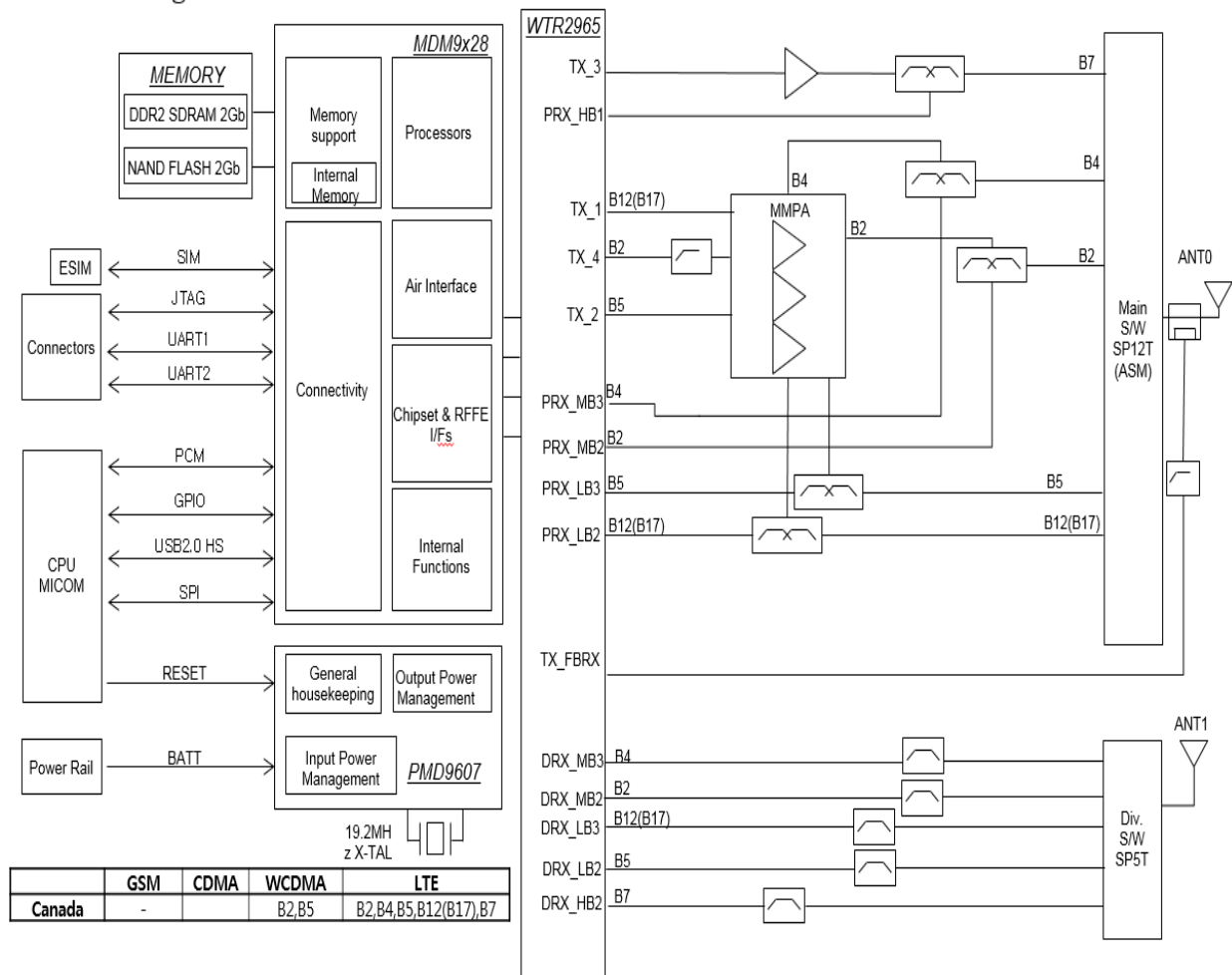


Figure 1.1. TM13LNCAHK1 Block diagram

1.2 Environmental Specifications

The environmental specification for operating and storage of the **TM13LNCAHK1** are defined in the the table below.

Table 2. Environmental Specifications

Parameter	Temperature Range
Operating Temperature	-40°C to 85°C
Storage Temperature	-40°C to +90°C
Humidity	95% or less

1.3 Electrical Specifications

This section provides details for some of the key electrical specifications of the **TM13LNCAHK1** embedded modules.

1.3.1 Absolute Maximum Rating and ESD Ratings

This section defines the Absolute Maximum and Electrostatic Discharge (ESD) Ratings of the **TM13LNCAHK1** 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
+4.0_VPWR	Power Supply Input	-	4.4V	V
VIN	Voltage on any digital input or output pin	-	VREG_MDME+0.5	V
ESD Ratings				
ESD ¹⁾	Primary, Diversity antenna pads - Contact		10	kV

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

Caution: The **TM13LNCAHK1** embedded modules are sensitive to Electrostatic Discharge. ESD countermeasures and handling methods must be used when handling the **TM13LNCAHK1** devices.

1.3.2 Current Consumption

Table 4. **TM13LNCAHK1** Current Consumption (TBD)

Mode	Parameter	Typical	Max	Units
LTE	Band2/4/7/12/17, Max TX Output /Full RB	600	650	mA
	Band5, Max TX Output /Full RB	550	600	
WCDMA	Band5	550	600	mA
	Band2	600	650	
LTE	Idle, Registered	1.8	2.2	mA
WCDMA	Idle, Registered	1.8	2.2	mA
LTE	Sleep Mode, Average Current	1.8	2.2	mA
WCDMA	Sleep Mode, Average Current	1.8	2.2	mA

1.4 Mechanical Specifications

1.4.1 Physical Dimensions and Connection Interface

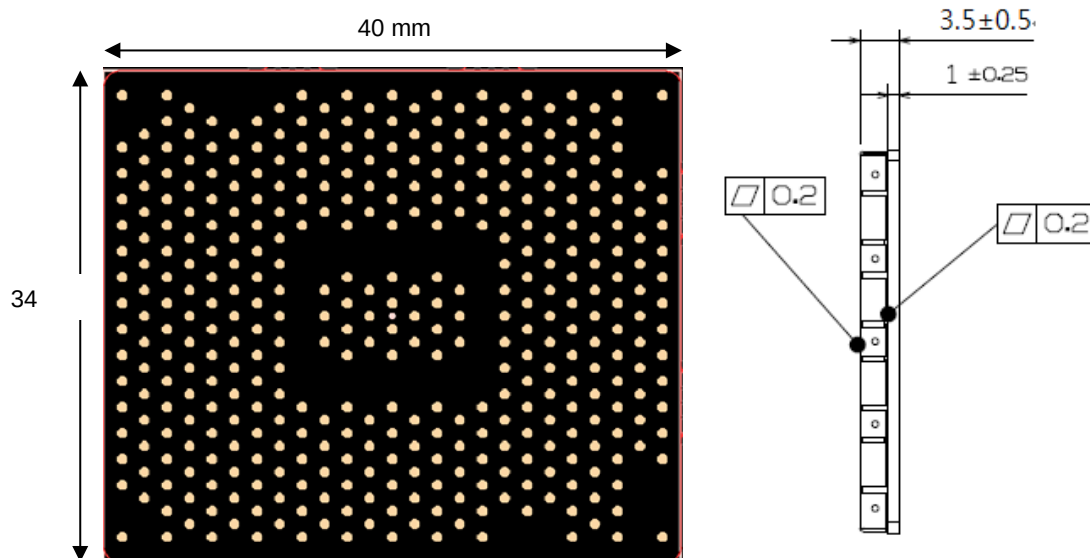
The **TM13LNCAHK1** embedded modules are a Land Grid Array (LGA) form factor device. The device does not have a System or RF connectors. All electrical and mechanical connections are made via the 323 pad **TM13LNCAHK1** on the underside of the PCB.

Table5. **TM13LNNAHK1** Embedded Module Dimensions

Parameter	Nominal	Max	Units
Overall Dimension	34 x 40	34.35 x 40.35	mm
Overall Module Height	3.5	3.85	mm
PCB Thickness	1.0	1.1	mm
Flatness Specification		0.1	mm
Weight	12	TBD	g

1.4.2 Mechanical Drawing

1.4.2.1 Module PCB

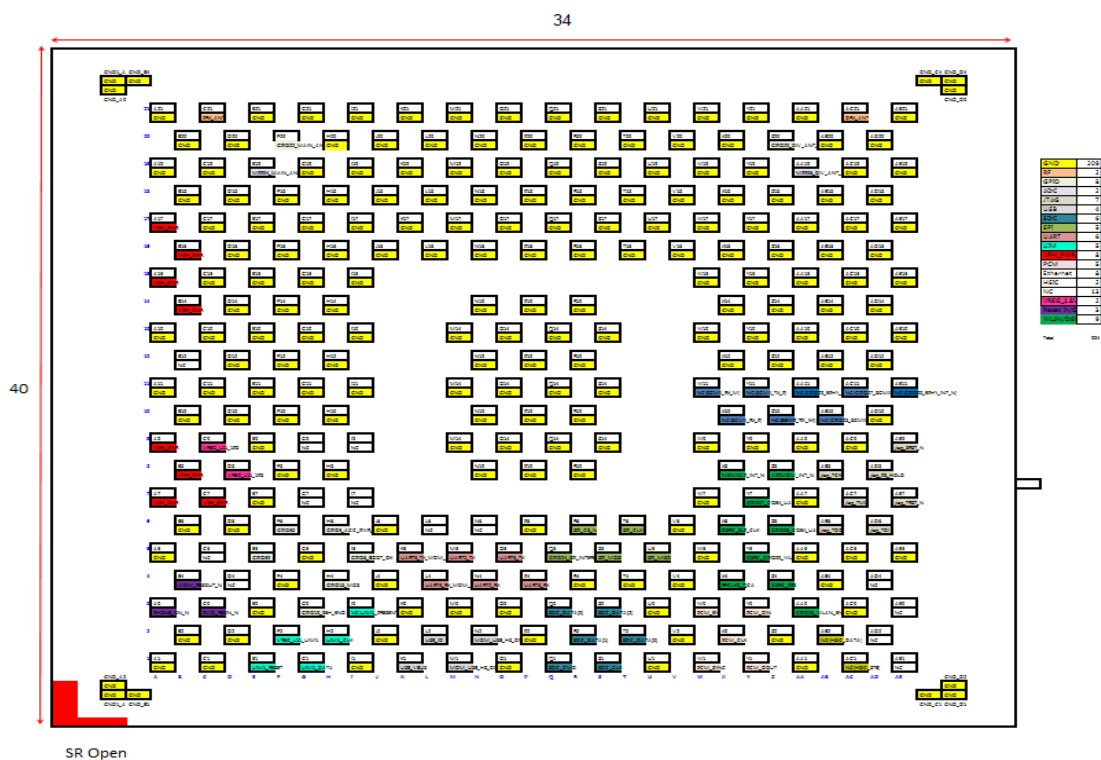


2. Pin Definitions



HMC_MDM9628
module_Pinmap.xls

2.1 PIN Definitions



3. RF Specification

The specifications for the LTE and CDMA interfaces are defined.

TM13LNCAHK1 is designed to be compliant with the standard shown in the table below.

Table20. Standards Compliance

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

3.1 LTE B2,B4,B5,B7,B12,B17 Specification

3.1.1 LTE TX Output Power

The Maximum / Minimum Transmitter Output Power of the **TM13LNCAHK1** are specified in the following table.

Table21. Conducted TX (Transmit) Max output Power Tolerances – LTE Bands

BAND	Method (UL CH)	Specification
BAND2 UE Maximum Output Power	Measure Max and Min and Min Transmit Power of Low Channel (18650)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of Mid Channel (18900)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of High Channel (19150)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
BAND4 UE Maximum Output Power	Measure Max and Min and Min Transmit Power of Low Channel (20000)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of Mid Channel (20175)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of High Channel (20350)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
BAND5 UE Maximum Output Power	Measure Max and Min and Min Transmit Power of Low Channel (20450)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of Mid Channel (20525)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of High Channel (20600)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
BAND7 UE Maximum Output Power	Measure Max and Min and Min Transmit Power of Low Channel (20800)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of Mid Channel (21100)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of High Channel (21400)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
BAND12 UE Maximum Output Power	Measure Max and Min and Min Transmit Power of Low Channel (23060)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of Mid Channel (23095)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of High Channel (23130)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm

BAND17 UE Maximum Output Power	Measure Max and Min and Min Transmit Power of Low Channel (23780)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of Mid Channel (23790)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm
	Measure Max and Min Transmit Power of High Channel (23800)	Max Power : 20.3~25.7dBm Min Power : ≤ -39 dBm

3.1.2 LTE RX Sensitivity

The Receiver Sensitivity of the **TM13LNCAHK1** are specified in the following table.

Table22. Conducted RX (Receive) Sensitivity – LTE Bands

BAND	Method (DL CH)	Specification
BAND2 Reference sensitivity level(DUAL)	Measure BLER of Low Channel (650)	sensitivity : ≤ -95 BLER : $\leq 5\%$
	Measure BLER of Mid Channel (900)	sensitivity : ≤ -95 BLER : $\leq 5\%$
	Measure BLER of High Channel (1150)	sensitivity : ≤ -95 BLER : $\leq 5\%$
BAND4 Reference sensitivity level(DUAL)	Measure BLER of Low Channel (2000)	sensitivity : ≤ -97 BLER : $\leq 5\%$
	Measure BLER of Mid Channel (2175)	sensitivity : ≤ -97 BLER : $\leq 5\%$
	Measure BLER of High Channel (2350)	sensitivity : ≤ -97 BLER : $\leq 5\%$
BAND5 Reference sensitivity level(DUAL)	Measure BLER of Low Channel (2450)	sensitivity : ≤ -95 BLER : $\leq 5\%$
	Measure BLER of Mid Channel (2525)	sensitivity : ≤ -95 BLER : $\leq 5\%$
	Measure BLER of High Channel (2600)	sensitivity : ≤ -95 BLER : $\leq 5\%$
BAND7 Reference sensitivity level(DUAL)	Measure BLER of Low Channel (2800)	sensitivity : ≤ -95 BLER : $\leq 5\%$
	Measure BLER of Mid Channel (3100)	sensitivity : ≤ -95 BLER : $\leq 5\%$
	Measure BLER of High Channel (3400)	sensitivity : ≤ -95 BLER : $\leq 5\%$
BAND12 Reference sensitivity level(DUAL)	Measure BLER of Low Channel (5060)	sensitivity : ≤ -94 BLER : $\leq 5\%$
	Measure BLER of Mid Channel (5095)	sensitivity : ≤ -94 BLER : $\leq 5\%$
	Measure BLER of High Channel (5130)	sensitivity : ≤ -94 BLER : $\leq 5\%$
BAND17 Reference sensitivity level(DUAL)	Measure BLER of Low Channel (5780)	sensitivity : ≤ -94 BLER : $\leq 5\%$
	Measure BLER of Mid Channel (5790)	sensitivity : ≤ -94 BLER : $\leq 5\%$
	Measure BLER of High Channel (5800)	sensitivity : ≤ -94 BLER : $\leq 5\%$

3.2 WCDMA B2/B5 Specification

3.2.1 WCDMA TX Output Power

The Maximum Transmitter Output Power of the **TM13LNCAHK1** are specified in the following table.

Table23. Conducted TX (Transmit) Max output Power Tolerances – WCDMA Bands

Item	Method (DL CH)	Specification
WCDMA B2 Power Level	Measure Max Transmit Power of Low Channel (CH= 9263)	Max Power : 20.3~25.7dBm
	Measure Max Transmit Power of Middle Channel (CH= 9400)	Max Power : 20.3~25.7dBm
	Measure Max Transmit Power of High Channel (CH= 9537)	Max Power : 20.3~25.7dBm
WCDMA B5 Power Level	Measure Max Transmit Power of Low Channel (CH=4133)	Max Power : 20.3~25.7dBm
	Measure Max Transmit Power of Middle Channel (CH=4175)	Max Power : 20.3~25.7dBm
	Measure Max Transmit Power of High Channel (CH=4232)	Max Power : 20.3~25.7dBm

3.2.2 WCDMA RX Sensitivity

The Receiver Sensitivity of the **TM13LNCAHK1** are specified in the following table.

Table24. Conducted RX (Receive) Sensitivity –WCDMA Bands

Item	Method (DL CH)	Specification
WCDMA B2 Power Level	Measure BER of Low Channel (CH= 9663)	0.1% @≤-106dBm
	Measure BER of Low Channel (CH= 9800)	0.1% @≤-106dBm
	Measure BER of Low Channel (CH= 9937)	0.1% @≤-106dBm
WCDMA B5 Power Level	Measure BER of Low Channel (CH=4358)	0.1% @≤-106dBm
	Measure BER of Low Channel (CH=4400)	0.1% @≤-106dBm
	Measure BER of Low Channel (CH=4457)	0.1% @≤-106dBm

FCC Warning Statement

FCC Part 15.19

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

Any changes or modifications (including the antennas) to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment.

Please notice that if the FCC identification number is 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. This exterior label can use wording such as the following: "Contains FCC ID : BEJTM13LNCAHK1" any similar wording that expresses the same meaning may be used.

Manual Information to the End User

The module is limited to OEM installation ONLY.

The OEM integrator is responsible for ensuring that the end-user has no manual instruction to remove or install module.

The module is limited to installation in mobile application;

A separate approval is required for all other operating configurations, including portable configurations with respect to Part 2.1093 and difference antenna configurations.

There is requirement that the grantee provide guidance to the host manufacturer for compliance with Part 15B requirements.

Industry Canada Statement

This device complies with Industry Canada licence-exempt RSS standard(s).

Operation is subject to the following two conditions:

(1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie 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, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Please notice that if the IC identification number is 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. This exterior label can use wording such as the following: "Contains IC: 2703H-TM13LNCAHK1 any similar wording that expresses the same meaning may be used.

L'étiquette d'homologation d'un module d'Innovation, Sciences et Développement économique Canada devra être posée sur le produit hôte à un endroit bien en vue, en tout temps. En l'absence d'étiquette, le produit hôte doit porter une étiquette sur laquelle figure le numéro d'homologation du module d'Innovation, Sciences et Développement économique Canada, précédé du mot « contient », ou d'une formulation similaire allant dans le même sens et qui va comme suit :

Contient IC : 2703H-TM13LNCAHK1 est le numéro d'homologation du module

Manual Information to the End User

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 shown in this manual.

FCC and IC RF Radiation Exposure Statement: This equipment complies with FCC and IC RF Radiation exposure limits set forth for an uncontrolled environment. This device and its antenna must not be co-located or operating in conjunction with any other antenna or transmitter.

This equipment should be installed and operated with a minimum distance of 20 cm between the radiator and your body.

RF du FCC et IC d'exposition aux radiations: Cet équipement est conforme à l'exposition de FCC et IC rayonnements RF limites établies pour un environnement non contrôlé. L'antenne pour ce transmetteur ne doit pas être même endroit avec d'autres émetteur sauf conformément à FCC et IC procédures de produits Multi-émetteur.

Cet équipement doit être installé et utilisé avec une distance minimale de 20 cm entre le radiateur et votre corps.