LTD-VL4000

User Manual

FCC ID: YZP-VL4000
IC Certification: 7414C-VL4000

LG Innotek

Summary

This Document describes the technical specification of module which includes the interface, the mechanical specification, and the electrical characteristics.

1. Product Introduction

This is a mobile communication module that supports various interfaces like USB and UART.

The module is designed for the automotive industry.

It also supports carrier aggregation as per 3GPP, which is dependent on carrier and chipset support.

1.2 Key Features

Feature	Implementation
General	
Frequency bands	Please refer to the RF Specification
Output power	Class 3 (20.3~25.7dBm) for WCDMA & LTE
Power supply 4G/5G DCDC	Operating conditions : 3.9V < VPH_PWR_CH1 < 4.1V (Typ. 4.0V) Absolute maximum ratings : 0V < VPH_PWR < +5.0V
Powe Supply PMIC	Operating conditions : 3.9V < VPH_PWR_PMIC < 4.1V (Typ. 4.0V) Absolute maximum ratings : 0V < VPH_PWR < +5.0V
Operating temperature	Normal operation : -20°C to +70°C (Class A) Extended operation : -40~-20°C, +70~+85°C (Class B)
Physical	Dimensions : 50mm x 50mm x 3.5mm Weight : Max 18.0 grams
RoHS	All hardware components fully compliant with EU RoHS Directive
Interfaces	
Module Interfaces	Surface mount device with solderable connection pads (SMT application interface).
Antenna	50 Ohms. LTE main antenna, LTE Diversity/MIMO antenna
USB	USB 3.0 SuperSpeed and high-speed(for backward compatibility)
UIM interface	Support two ports. including dual-voltage options
Memory	8Gb NAND Flash / 8Gb LPDDR4x SDRAM

1.3 Environmental Specifications

The environmental specification for both operating and storage temperature of modules are defined in the below table.

Parameter	Temperature Range	Operating Class
Ambient Operating Temperature	From -20°C to +70°C	Class A
	From -40~-20°C, +70~+85°C	Class B
Ambient Storage Temperature	From -40°C to +85°C	
Ambient Humidity	95% or less	

Table 1.0 : Environmental Specifications

Note.
: The customer must design the heat dissipation not to exceed the junction temperature of the main components at 85°C.(Refer to Design Guide for junction temperature)

Class A is defined as the operating temperature ranges that the device:

- Shall exhibit normal function during and after environmental exposure.
- Shall meet the minimum requirements of 3GPP or appropriate wireless standards.

Class B is defined as the operating temperature ranges that the device:

- Shall remain fully functional during and after environmental exposure
- Shall exhibit the ability to establish a voice, SMS or DATA call (emergency call) at all times even when one or more environmental constraint exceeds the specified tolerance.
- Unless otherwise stated, full performance should return to normal after the excessive constraint(s) have been removed.

1.4 Mechanical Specifications

This module is a Land Grid Array (LGA) form factor device that does not have any System or RF connectors. All electrical and mechanical connections are made via the 581 pads LGA on the underside of the PCB.

Parameter	Nominal	Tolerance	Units
Overall Dimension[1)]	50.0 x 50.0	±0.15	mm
Overall Module Height (Excluding ball thickness)	3.5	±0.2	mm
Final coplanarity (including warpage)	-	230	mm
Weight (Max)	17		g

Table 1.1 : Module Dimensions

- Note.
: [1)] Overall Dimension refers to the size excluding the routing area.
There should be no other components within 500um of the product outer edge.

1.5 LGA moisture sensitivity level

- MSL 3 Level (Floor Life Time : 168Hrs. / Condition : ≤30°C, 60% RH)

- Standard : IPC / JEDEC J-STD-020C

1.6. Communication Specification

1) Receiver

- Bandwidth : 5MHz
- Frequency : B2(1930~1990 MHz), B5(869~894 MHz)
- RF to Baseband Direct conversion (Zero IF)
- Modulation method : QPSK and 16QAM
- receiving sensitivity : B2, B5 ≤-104.0dBm (BER=<0.1%)
  3GPP TS 34.121-1 Table 6.2.2

2). Transceiver

- Frequency : B2(1850~1910 MHz), B5(824~849 MHz)
- Maximum RF Output : Power class 3, 20.3dBm ~ 25.7dBm
- Modulation method : QPSK
- Baseband to RF Direct conversion (Zero IF)

1.7. LTE

1). Receiver

- Bandwidth : 3GPP TS 36.521-1 Table 5.4.2.1-1
- Frequency : B2(1930~1990 MHz), B4(2110~2155 MHz)
  B5(869~894 MHz), B7(2620~2690 MHz), B12(729~746 MHz)
  B13(746~756 MHz), B17(734~746 MHz), B66(2110~2200 MHz)
- RF to Baseband Direct conversion (Zero IF)
- Modulation method : QPSK, 16QAM and 64QAM
- receiving sensitivity : B2, B5, B7 (≤-94.3dBm) / B4 (≤-96.3dBm)
  B12, B13, B17 (≤-93.3dBm) / B66 (≤-95.8dBm)
  @QPSK, Channel bandwidth=10MHz
  3GPP TS 36.521-1 Table 7.3.5-1

2). Transceiver

- Frequency : B2(1850~1910 MHz), B4(1710~1755 MHz)
  B5(824~849 MHz), B7(2500~2570 MHz) ,B12(699~716 MHz)
  B13(777~787 MHz),B17(704~716 MHz), B66(1710~1780 MHz)
- Maximum RF Output : Power class 3, 20.3dBm ~ 25.7dBm
- Modulation method : QPSK and 16QAM
- Baseband to RF Direct conversion (Zero IF)

Integration Guide

Changes or modifications to this equipment may cause harmful interference unless the modifications are expressly approved in the instruction manual. Users may lose the authority to operate this equipment if an unauthorized change or codification is made.

Note:
If this module is intended for use in a portable device, additional testing will be required to satisfy the RF exposure and SAR requirements of FCC Part 2.1093 and RSS-102.

OEM Manual

The List of applicable FCC rules

FCC : Part 22, Part 24, Part 27

Summarize the specific operational use conditions

The module is designed for vehicle only, and has to be tested additional if insert in other host.

Limited module procedures

N/A

Trace antenna designs

N/A

RF exposure considerations

RF Exposure evaluation was performed with very specific installation condition at 20 cm. Any other installation condition may require additional test and permissive change procedure.

Antennas

Dipole Antenna is used for testing, with unique antenna conector. The maximum antenna gain including cable loss in a mobile-only exposure condition must not exceed the values listed in the following table.

Band	Antenna Gain (dBi)
WCDMA Band 2	5.97
WCDMA Band 5	2.18
LTE Band 2	5.97
LTE Band 4	4.13
LTE Band 5	2.18
LTE Band 7	3.97
LTE Band 12	-1.74
LTE Band 13	-0.24
LTE Band 17	-1.74
LTE Band 66	4.13

Label and compliance information

To satisfy the labeling requirements, the following text must appear on the exterior of the end product.
Contains FCC ID : YZP-VL4000

Information on test modes and additional testing requirements

If additional module is inserted in the host, test modes should take into consideration different operational conditions for a standalone modular transmitter in a host.

Additional testing, Part 15 Subpart B disclaimer

According to § 15.103 Exempted devices, (a), this module is exempted due to utilized exclusively in transportation vehicle.

User Manual Notice

FCC
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.

This module complies with FCC radiation exposure limits set forth for uncontrolled environments. This module must be installed and operated with minimum distance of 20 cm between the radiating element and the user. This module must not be co-located with any other transmitters or antennas.

ISED
This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-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.

Ce dispositif contient des émetteurs/récepteurs exempts de licence qui sont conformes aux RSS exempts de licence d'Innovation, Sciences et Développement économique Canada. 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 module complies with ISED radiation exposure limits set forth for uncontrolled environments. This module must be installed and operated with minimum distance of 20 cm between the radiating element and the user. This module must not be co-located with any other transmitters or antennas.
Ce module est conforme aux limites d'exposition au rayonnement fixées par ISED pour les environnements non contrôlés. Ce module doit être installé et actionné à une distance minimale de 20 cm entre l'élément rayonnant et l'utilisateur. Ce module ne doit pas être situé avec d'autres émetteurs ou antennes.