

# IMG3-VT User Manual

**Project Name:** IMG3-VT Module

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**Revision:** 0.2

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## Contact Information

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## Revision History

Rev. #	Author	Summary of Changes	Date
0.1	WNC	Draft release	2020/07/13
0.2	WNC	Add LTE antenna requirement	2020/7/29

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Preliminary

# 1. Introduction

The WNC IMG3-VT module includes the GCT GDM7243A baseband, a complete LTE RF front-end, memory, and required circuitry to fulfill requirements of 3GPP E-UTRA (Long Term Evolution - LTE, Rel-12 specifications). The IMG3 module provides a variety of interfaces including USB, SPI, UART, GPIO, , I2C, and USIM.

## 1.1. Features

Feature list:

- LTE 3GPP release 14
- 3GPP category support: LTE Cat.12 with 150Mbps for UL, 600 Mbps for DL
- LTE Support Bands:B2/4/5/13/66
- Power Class 3: 23dBm
- IPv4/IPv6-supported
- AT command set
- SMS over IMS
- Interfaces
- HS USB 2.0 with integrated PHY
- Dual UART interfaces (4 bit and 2 bit) for data transfer and diagnostic tools
- USIM interface
- GPIOs
- ADC

## 1.2. Architecture

The architecture of the IMG3-VT is presented in Figure 1-1 as an M.2 function block diagram.

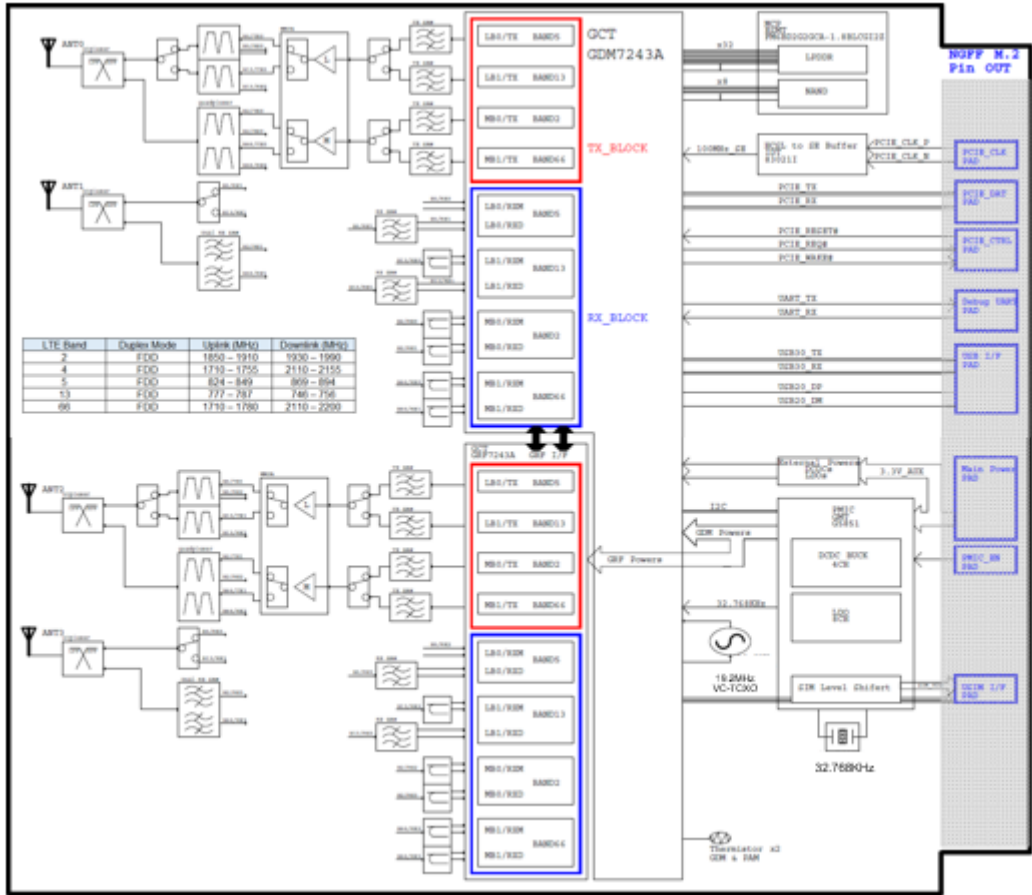


Figure 1-1. Function block diagram Connection Interface

The IMG3-VT module is LGA device. All electrical and mechanical connections are made through the 75 pads on the PCB.

### 1.3. Environmental Specifications and Certifications

#### 1.3.1. Environmental Specifications

The environmental specifications for both operating and storage conditions are defined in the Table below.

Condition	Temperature Range	Remark
Normal operating temperature range	-10 °C to 55 °C	Fully functional and in compliance with 3GPP specifications

Extended operating temperature range	-30 °C to 85 °C	RF performance may be affected outside the normal range, but the module will still function.
Storage	-40 °C to 85 °C	

Table 1-2. Temperature range

Note: All temperatures above refer to ambient temperatures.

### 1.3.2. Certifications

The IMG3-VT module is certified to be compliant with PTCRB, GCF, FCC, regulations and standards.

## 2. Pin Definitions

### 2.1. NGFF/M.2 Module Pin Diagram

The IMG3-VT LGA module pin layout is illustrated below.

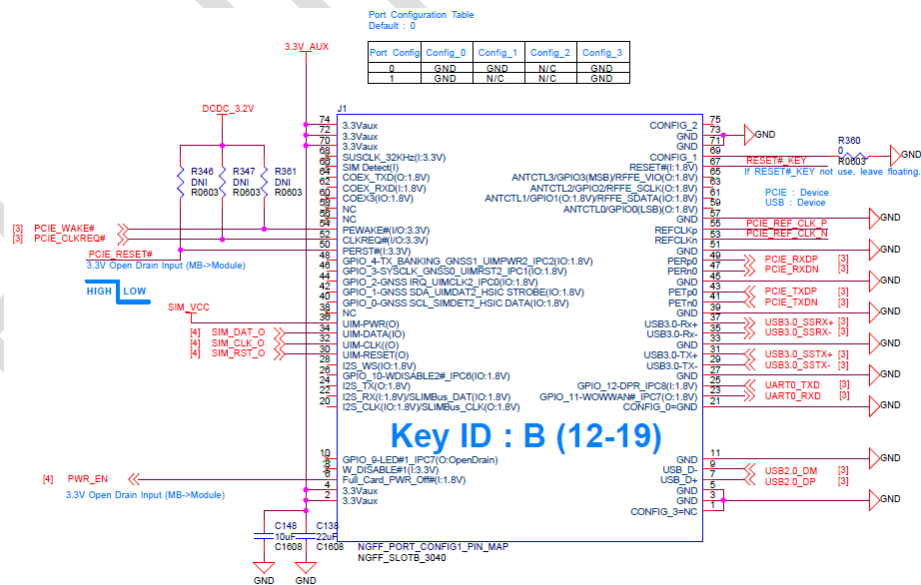


Figure 2-1. M.2/NGFF pad diagram



## 3. Electrical Specifications

### 3.1. Power supply

The IMG3-VT module receives and supplies power with the following potentials:

	Direction	Vmin	Typical	Vmax
Power	In	3.0V	3.3 V	3.6 V
UIM_VCC	Out	1.71 V	1.8 V	1.89 V

Table 3-1. Power supply

### 3.2. RF Specifications

#### 3.2.1. Band support

LTE CAT 12	Uplink (MHz)	Downlink (MHz)
LTE Band 2	1,850–1,910	1,930–1,990
LTE Band 4	1,710–1,755	2,110–2,155
LTE Band 5	869–894	824–849
LTE Band 13	777-787	746-756
LTE Band 66	1,710–1,780	2110–2200

Table 3-2. Band support

#### 3.2.2. Bandwidth support

Band	Bandwidth					
	1.4 MHz	3 MHz	5 MHz	10 MHz	15 MHz	20 MHz
LTE Band 2	✓	✓	✓	✓	✓	✓

LTE Band 4	✓	✓	✓	✓	✓	✓
LTE Band 5	✓	✓	✓	✓	-	-
LTE Band 13	-	-	✓	✓	-	-
LTE Band 66	✓	✓	✓	✓	✓	✓

Table 3-3. LTE CAT-M1 Bandwidth support

**3.2.3. RF transmit specifications**

LTE CAT 12	Items	Parameter	Unit	Min.	Typ.	Max.
LTE Band 2	Max. TX Power	10 MHz 4 RBs/QPSK	dBm	20.3	23	25.7
LTE Band 4	Max. TX Power	10 MHz 4 RBs/QPSK	dBm	20.3	23	25.7
LTE Band 5	Max. TX Power	10 MHz 4 RBs/QPSK	dBm	20.3	23	25.7
LTE Band 13	Max. TX Power	10 MHz 4 RBs/QPSK	dBm	20.3	23	25.7
LTE Band 66	Max. TX Power	10 MHz 4 RBs/QPSK	dBm	20.3	23	25.7

Table 3-4. Conductive Tx output power

- Note: 1. RF transmitter specifications are defined at the LGA pad.  
 2. The IMG3-VT meets 3GPP TS 36.521-1/TS 51.010-1 test standards.  
 3. Antenna requirement to pass FCC.

The maximum antenna gain shall not be greater than 7.31 dBi in LTE Band 2.

The maximum antenna gain shall not be greater than 5.70 dBi in LTE Band 5.

The maximum antenna gain shall not be greater than 5.46 dBi in LTE Band 13.

The maximum antenna gain shall not be greater than 4.30 dBi in LTE Band 4/66.

## 4. Software Interface

### 4.1. Support tools

The IMG3-VT module is compatible with the following support diagnostic tools:

- G2DM

### 4.2. USB interface

The IMG3-VT module supports 3GPP's standard AT commands and proprietary AT commands.

## 5. Mechanical

### 5.1. PCBA Form Factor

The IMG3-VT module has the same dimensions as the PCBA:

63 mm (typ.) × 63 mm (typ.) × 3.3 mm (typ.)

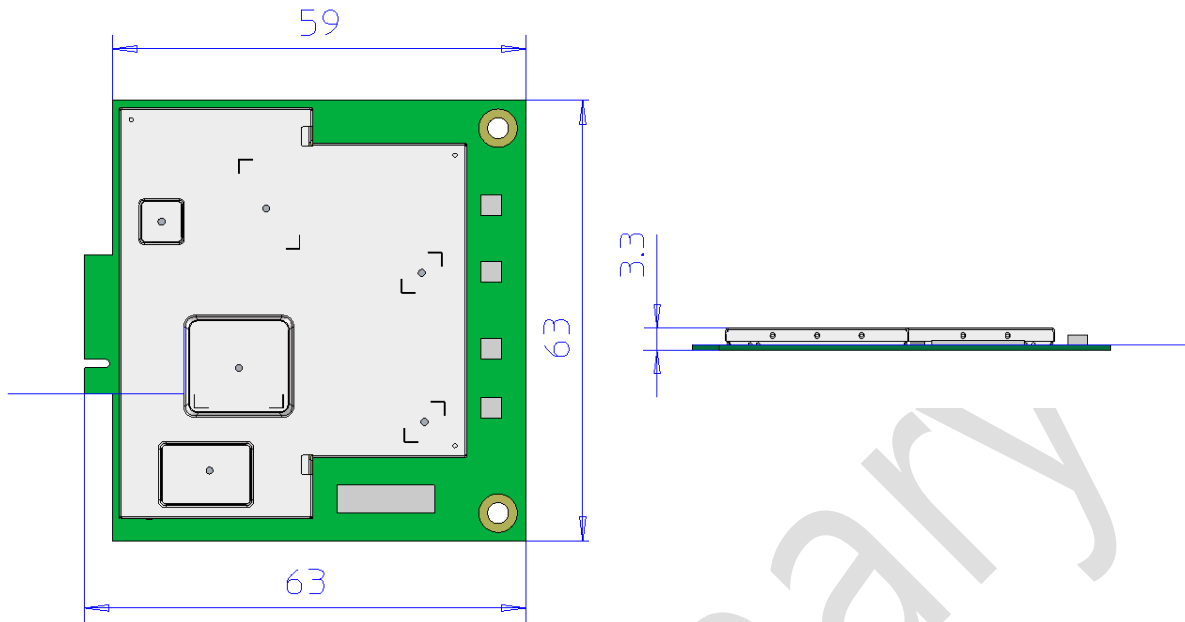


Figure 5-1. PCBA dimensions

## 5.2. RF connection

The IMG3-VT module has Four IPEX RF Connectors; developers must connect them via 50  $\Omega$  coaxial cable to the main board.

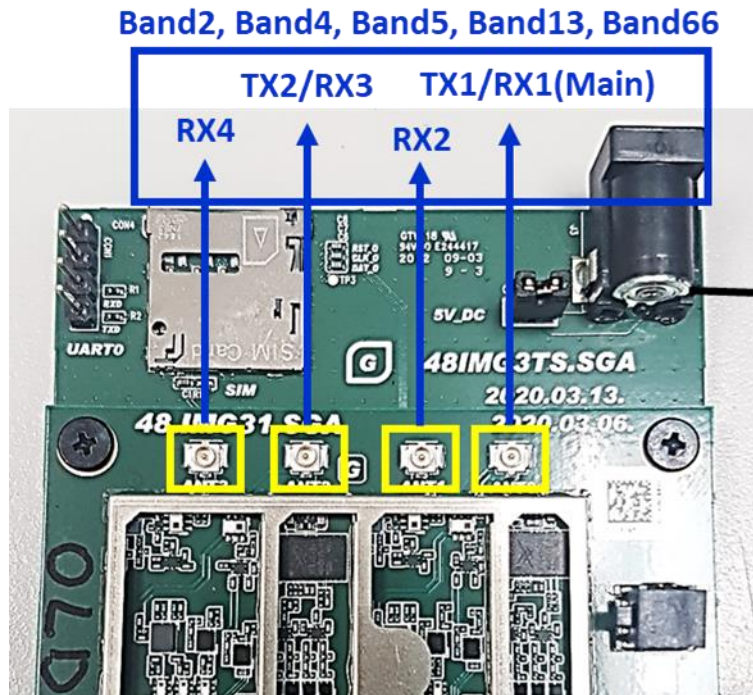


Figure 5-2. RF pad layout suggestion

## 6. Labeling and Packaging

### 6.1. Labeling

Here is the label drawing of IMG3-VT module.

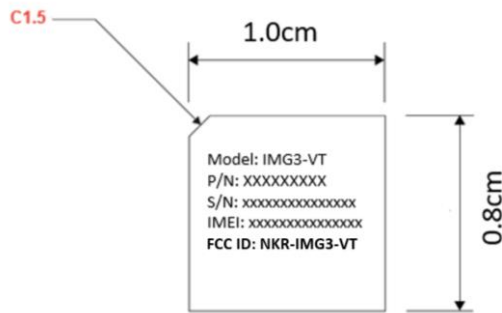


Figure 6-1. Label Drawing

Label location shows as following

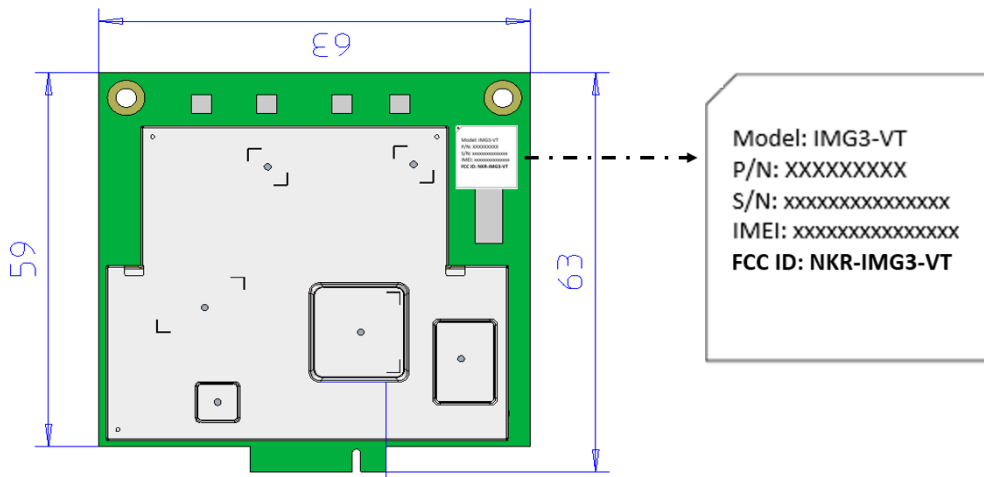


Figure 6-2. Label Location

## 6.2. Packaging

The modules will be delivered in tray for internal testing and assembly before whole 5G CPE system testing.

## 7. Safety Recommendation

Be sure the use of this product is allowed in the country and in the environment required. The use of this product may be dangerous and must be avoided in the following areas:

- Where it can interfere with other electronic devices in environments such as hospitals, airports, and aircraft
- Where there is a risk of explosion such as gasoline stations and oil refineries

It is the responsibility of the user to comply with his or her country's regulations and any specific environmental regulations.

Do not disassemble the product; any mark of tampering will compromise the warranty's validity.

We recommend following the instructions of the hardware user guides to correctly wire the product. The product must be supplied with a stabilized voltage source, and the wiring must conform to all relevant security and fire-prevention regulations.

This product must be handled with care; avoid any contact with the pins because electrostatic discharge may damage the product. The same caution must be taken regarding the UIM card; carefully check the instructions for its use. Do not insert or remove the UIM when the product is in power-saving mode.

The system integrator is responsible for the functioning of the final product; therefore, care must be taken for external components of the module as well as for project or installation issues—there may be a risk of disturbing the GSM network or external devices or of having an impact on device security. If you have any doubts, please refer to the technical documentation and the relevant regulations in force.

Every module must be equipped with a proper antenna with specific characteristics. The antenna must be installed with care in order to avoid any interference with other electronic devices.

#### **FCC Statement:**

##### **FEDERAL COMMUNICATIONS COMMISSION INTERFERENCE STATEMENT**

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 module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated. Additional testing and certification may be necessary when multiple modules are used.

#### RF exposure warning

This equipment must be installed and operated in accordance with provided instructions and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provide with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

**CAUTION:** The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

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.