M13 Device description

Version 0.1 – APR 7th 2009

Part 15.21 statement

" Change or Modifications that are not expressly approved by the manufacturer could void the user's authority to operate the equipment. “

Part 15.105 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 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.

Part 15 Class B Compliance

This device and its accessories comply with part15 of FCC rules.

Operation is subject to the following two conditions:

(1) This device & its accessories may not cause harmful interference.

(2) This device & its accessories must accept any interference received,

including interference that may cause undesired operation.

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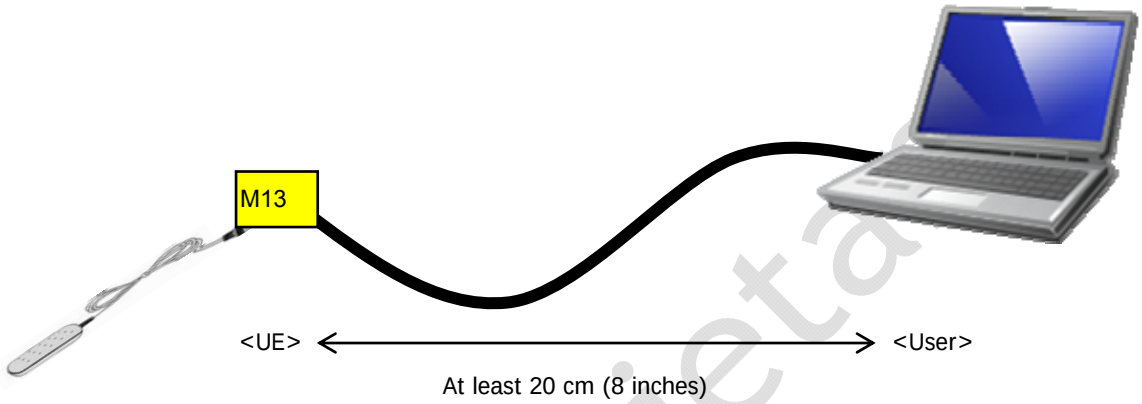
Caution

To comply with FCC RF exposure compliance requirements, a separation distance of at least 20 cm (8 inches) between the equipment and the body must be maintained.



About This Document

Revision History

Version	Date	Comment	Author
0.1	2009-04-07	Initial Draft	Sang Ha Park

References

1 General Description

1.1 Feature

This document describes briefly the board level operations, key features and the environment of the M13 Platform. The purpose of this platform is the verification of LG LTE ASIC, namely 'L1000', and the evaluation of LG UE system performance. The further details about the characteristics and functions of L1000 are available on other documents. M13 consists of a CDMA main board, a LTE sub board.

<Table 1. M13 Device Feature>

Specification				**LTE only**	**Remark**
SW Date				**31-May-30**	
HW	**General**	Interface Spec.	LTE	USB 2.0 High Speed	
			CDMA	USB 2.0 Full Speed	
		External port		Micro USB 1 Port	
		Standard(SW ver.)	LTE	3GPP Rel. 8 (Dec. 2008)	
			CDMA	N/A	
		Band support	LTE	3GPP Band 13 (700 MHz Upper C block)	
			CDMA	N/A	
		Main chipset	LTE	L1000 (by LGE)	
			CDMA	MSM6800A (by QCT)	
		Max. Data rate	LTE	DL 50Mbps / UL 25Mbps (Category2)	
			CDMA	N/A	
		GPS		Not Support	
		Battery		Support	
	Transmitter	Tx Diversity	LTE	Not support	UE Antenna Selection will not be supported
		Max. Tx Power	LTE	23 dBm	At antenna port
		Band Width	LTE	10MHz	

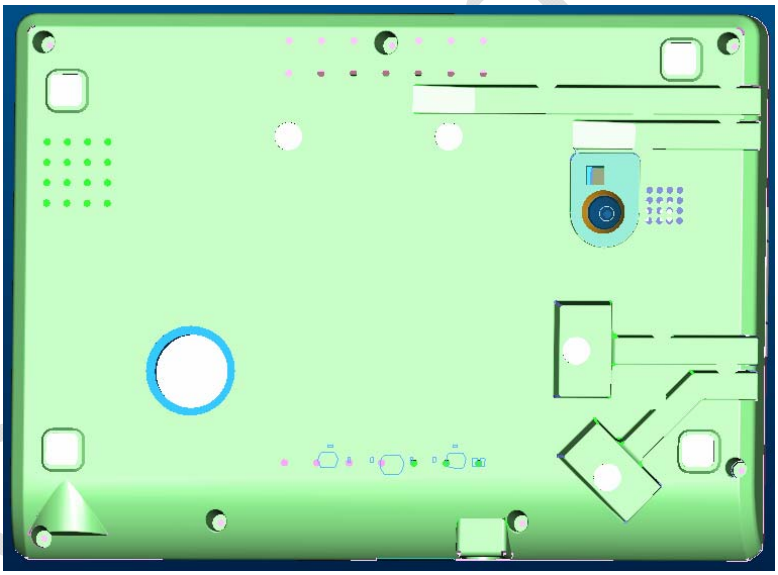
		Modulation Method	LTE	Up to 16QAM	
	Receiver	Rx Diversity	LTE	Support	
		MIMO	LTE	2x2 MIMO	Adaptive switching between downlink Transmit Diversity and SU MIMO
		Band width	LTE	10MHz	
		Modulation Method	LTE	Up to 64QAM	
SW	**Interface**	Interface protocol	LTE	USB Ethernet	
			CDMA	N/A	
		USB Driver	LTE	3 Ports (Data, DM, Control)	
			CDMA	3 Ports (Data, DM, Control)	
		Downloading Tool		Support	Downloading tool for field upgrade through USB port
		DM (Diagnostic Monitor)		Support	LGE tool for LTE
	System selection	Prefered system selection		Support 'LTE only' mode	LTE only' 'LTE preferred' 'eHRPD only'
		Support System		LTE only	
		PRL/PLMN List	LTE	Support PLMN	
			CDMA	N/A	
	Authentication & Identity	User Identity Module (IMSI)	LTE	Device	
			CDMA	N/A	
		Authentication	LTE	Not Support	
			CDMA	N/A	
		Numbering & Identities		NAI based upon the IMSI 11digit MDN	
	IP support	IPv4/6 dual IP stack	LTE	Support for IPv4/6 (need to test with Network)	
			CDMA	N/A	
		DHCP	LTE	N/A	

			CDMA	N/A	
		IP Mobility	LTE	Proxy mobile IPv4/6	
			eHRPD	N/A	
	QoS	QoS	LTE	Support	
			CDMA	N/A	
	IRAT handoff	Active handoff		N/A	Non optimized handover
		Idle handoff		N/A	Non optimized handover
		IRAT measurement		N/A	
Mechanical	**Mechanical**	Dimensions (W xD xH)		185 x 133.9 x 22.8 mm	
		Weight		420g	
		Antenna		Internal Antenna (MIMO)	

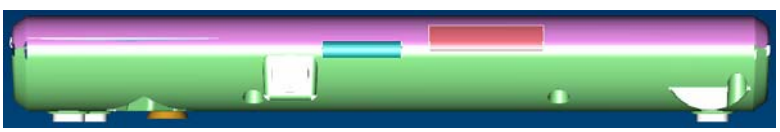
2 Mechanical description

2.1 Front / Rear / Side View

<Fig 4-1. M13 Mechanical Part Top View>



<Fig 4-2. M13 Mechanical Part Bottom View>



<Fig 4-3. M13 Mechanical Part Side 1 View>

<Fig 4-4. M13 Mechanical Part Side 2 View>

2.2 Dimension

M13 Mechanical dimension is 133.9 x 185 x 22.8mm.

3 Functional description

3.1 Functional Key description

LTE trial device picture is below.

<Fig 5.1 LTE & eHRPD LTE Trial Product Picture>

This product has some key to operate LTE trial device.

Send key  : This key is used to call.

Clear key  : This key is used to erase character or number.

End key  : This key is used to disconnect a call and stop to function.

3.2 External connector description

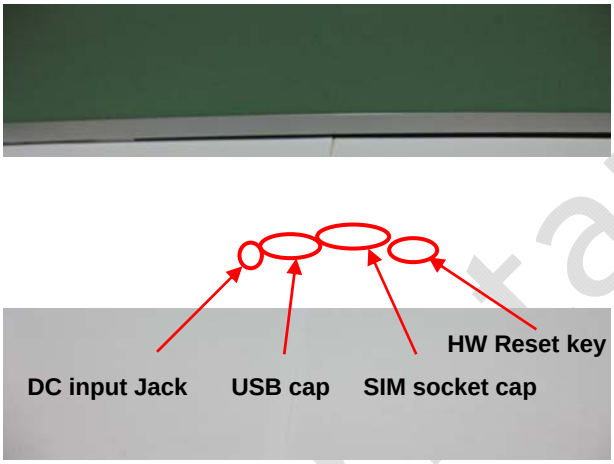
Our LTE Trail device has several external connectors.

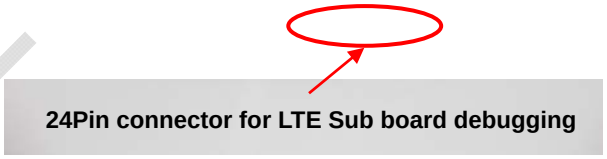
DC input jack connector: External Power source, 5V TA

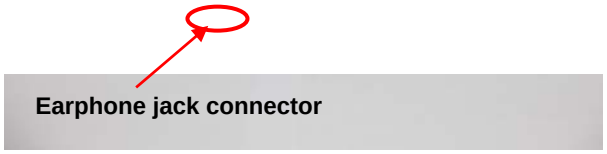
USB connector: USB Connect to Host (PC)

SIM socket: for LTE Authentification

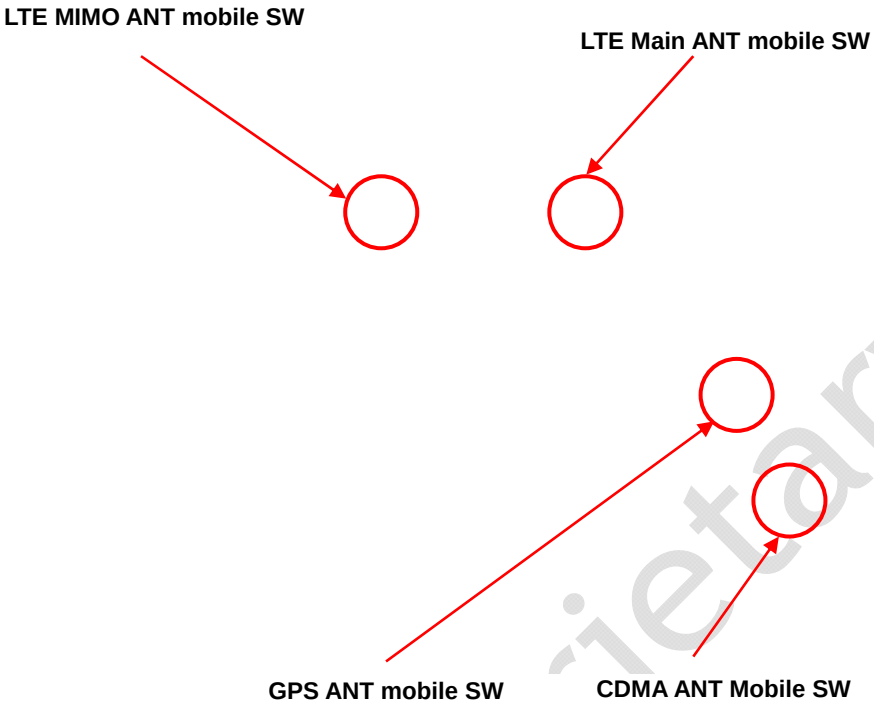
24Pin connector: For debug LTE Sub board







3.3 External RF connector description



LTE Trial device has 4 external RF connectors in order to measure wired RF performance characteristic.

It is configured that LTE ant part is two external ANT port; LTE main ANT mobile switch and LTE MIMO ANT mobile switch, and CDMA ANT mobile.

If you want to test LTE RF performance, you can use this external ANT port.

3.4 Antenna description (LTE & CDMA)

3.4.1 CDMA Antenna description

M13 Device LTE Antenna: Dual band, Single Feeding Antenna

Type: Carrier & PIFA

Directive: Omni-directiona

Ant. : 1TX and 1RX

CDMA 3D Gain: TX:--5.9dB, RX: -3.7dB

USPCS 3D Gain: TX: -6.1dB, RX: -5.1dB

Max Power: 2W (Maximum)

Band Support

	CDMA	USPCS
Tx (MHz)	824 ~ 849	1850 ~ 1910
Rx (MHz)	869 ~ 894	1930 ~ 1990

3.4.2 LTE Antenna description

M13 Device LTE Antenna: MIMO Antenna

Type: Carrier & PIFA

Directive: Omni-directional

LTE Band 13 Support: UL; 777~787(MHz), DL;746~768(MHz)

Antenna Band: 740 ~ 800 (MHz)

Max power: 2W(Maximum)

Primary Ant. : 1TX and 1RX

Secondary Ant.: 1RX

3D Primary Antenna Gain: -1.32dB(Average)

3D Secondary Antenna Gain: -1.34(Average)

3.5 External Power description

To operate and charge the battery, plug the AC Adapter into a standard wall outlet and connect it to the LTE trial device via the DC input jack Connector.

External power supply is DC input jack or TA. This power supply specification is below.

Input Voltage & Current

	Min.	Normal	Max.
Input Voltage	90Vac	100-240Vac	264Vac
Input Frequency	47Hz	50/60Hz	63Hz

Output Voltage & Current

3.1.1	5.0Vdc	Min. Value	Typical	Max. Value	
3.1.2	Output Voltage	4.7Vdc	5.0Vdc	5.3Vdc	0 ~ 3.0A Loading
3.1.3	Output Load	0.0A	—	3.0A	

3.6 Battery description

Our LTE Trial device has a two Battery. One is used for operating CDMA modem part, and another is used for operating LTE modem part.

Battery Capacity for used in CDMA part is 1100mAh.

But in order to operating fully LTE performance, it is need to larger battery capacity. And then we selected 2400mAh cylindrical battery.

Total Battery capacity is 3600mAh

If the battery's charge is completely run down, it takes 6 to 7 hours to fully recharge.

But this battery capacity is not enough to operate LTE capability; you should external power supply, which is TA (Travel Adaptor). The mandatory power supply of the LTE UE is supplied by TA which is distributed by the LGE.