GPS Engine Board

■ M-89

SPECIFICATION

HOLUX CONFIDENTIAL

HOLUX

THE PRO NAME IN GPS

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Version Change History

Version	Date	Revised Reason
0.1	2007/04/18	Draft release
1.0	2007/05/22	Official release
1.1	2007/06/27	Modify 6.2 reference design

Outline

1. Introduction

1.1 General introductions

M-89 is an ultra miniature 25.4 * 25.4 * 3 mm GPS engine board designed by low power consumption MTK GPS solution. It provides superior sensitivity up to -159dBm and fast Time-To-First-Fix in navigation application. The stable performance of **M-89** is your best choice to be embedded in your portable device design, like PDA　PND　mobile phone　Digital Camera for GPS service.

1.2 Key Features

small form factor: 25.4 * 25.4 * 3 mm

RoHS/WEEE compliant

High sensitivity -159dBm

Searching up to 32 Channel of satellites

Fast Position Fix

Low power consumption

RTCM-in ready.

Built-in WAAS/EGNOS/MSAS Demodulator.

Support NMEA0183 V 3.01 data protocol.

Real time navigation for location based services.

For Car Navigation, Marine Navigation, Fleet Management, AVL and Location-Based Services, Auto Pilot, Personal Navigation or touring devices, Tracking devices/systems and Mapping devices application

1.3 Applications

Automotive and Marine Navigation

Automotive Navigator Tracking

Emergency Locator

Geographic Surveying

Personal Positioning

Sporting and Recreation

Embedded applications:

Smart phone, UMPC, PND, MP4

2 Technical Description

2.1 Block Diagram
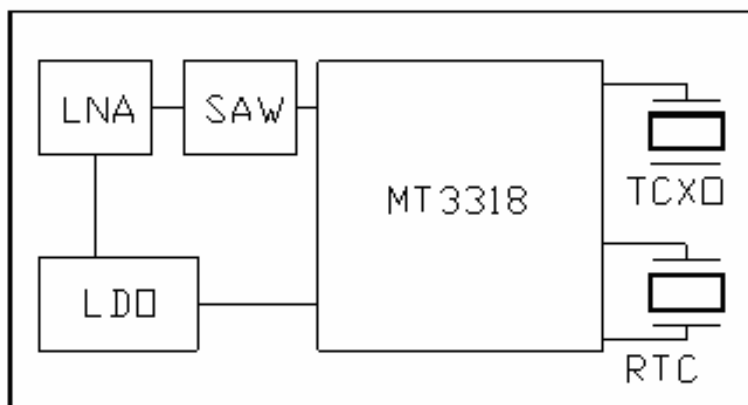
M-89

2.2 Pin Definition
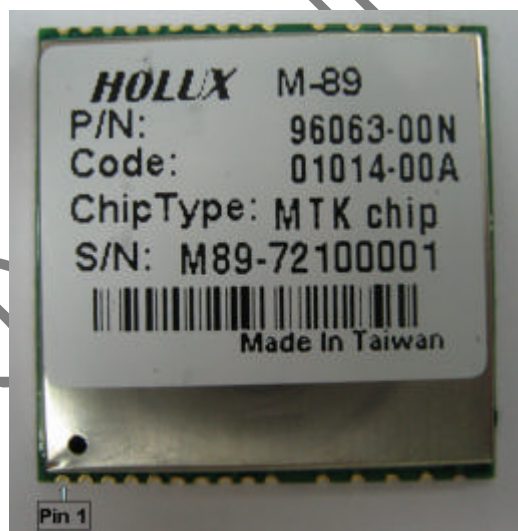
Pin	Pin Name	Type	Function description
1	*VCC_IN*	I	3.3 ~ 5 V supply input
2	*GND*	G	Ground
3	*NC*	I	NC
4	*RXDA*	I	Serial Data input A
5	*TXDA*	O	Serial Data Output A
6	*TXDB*	O	Serial Data Output B

7	*RXDB*	I	Serial Data input B
8	*GPIO0*	I/O	General purpose I/O. flash at 1Hz when position is fixed.
9	*INT1*	I/O	General purpose I/O
10	*GND*	G	Ground
11	*GND*	G	Ground
12	*GND*	G	Ground
13	*GND*	G	Ground
14	*GND*	G	Ground
15	*GND*	G	Ground
16	*GND*	G	Ground
17	*RF_IN*	I	GPS signal input
18	*GND*	I	Ground
19	*V_ANT_IN*	I	Antenna power supply input,3V
20	*VCC_RF_O*	O	Antenna power supply, 2.8V
21	*V_BAT*	I	RTC and backup SRAM power, 2.6 ~ 3.6 VDC.
22	*HRST*	I	Reset, active low
23	*GPIO1*	I/O	General purpose I/O
24	*GPIO2*	I/O	General purpose I/O
25	*GPIO3*	I/O	General purpose I/O
26	*GPIO4*	I/O	General purpose I/O
27	*GPIO5*	I/O	General purpose I/O
28	*GPIO6*	I/O	General purpose I/O
29	*PPS*	O	1 PPS output, synchronized with GPS time. TIME_MARK 1 PPS output, 1us/s
30	*GND*	G	Ground

2.3 Specification

General	
GPS technology	MTK GPS chipset
Frequency	L1,1575.42MHZ
C/A Code	1.023MHZ chip rate
Channels	32 channels all in view searching
Sensitivity	Better than -159dBm
Receiver Accuracy	(Follow MTK chip specification)
Position	Without aid:3.0 M 2D-RMS DGPS(WAAS, EGNOS, MSAS, RTCM):2.5 M
Velocity	Without aid:0.1 M/sec
Time	0.1μ s. Sync GPS time
Datum	
Datum	WGS84(Default) total 219 datum's
Time to First Fix	(Follow MTK chip specification)
Hot start	1 sec. average
Warm start	33 sec. average
Cold start	36 sec. average
Reacquisition	1sec.
Protocol	
GPS Output Data	NMEA0183(v3.1)- GGA,GLL,GSA,GSV,RMC,VTG Support Baud rate 4800/9600/…./115200 bps (default 4800), Data bit:8,Stop bit:1, No parity.
Update Rata	1Hz(default)
Protocol Support	NMEA-0183
1PPS	Enable(1Hz pulse 10% duty cycle)
Limitations	(Follow MTK chip specification)
Acceleration Limit	4G
Altitude Limit	18000 meters
Velocity Limit	515 M/sec
Jerk Limit	20 M/sec^3
Power	
Operation Current	Acquisition:65 mA@3.3V
Operation Current	Tracking: 35mA@3.3V

DC Input Range	VCC 3.0~5.0V
	VBAT 3.0~5.0V
Processing Core	
Processor Type	ARM7EJ-S
Processor Speeds	48 MHz
Integrated program Flash	4 MHz
Interface	CMOS 2.8 V Level
Temperature	
Operating Temperature	-40℃ to +85℃.
Storage Temperature	-40℃ to +85℃.
Operating Humidity	5% to 95%, Non condensing
Physical	
Dimension	25.4 * 25.4 * 3 mm.
Weight	3g.

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3. Mechanical Dimension

3.1 Mechanical Dimension

Top View

$3^{+0.2}_{0}$

25.4 ± 0.2

0.8

16   15

30   1

25.4 ± 0.2
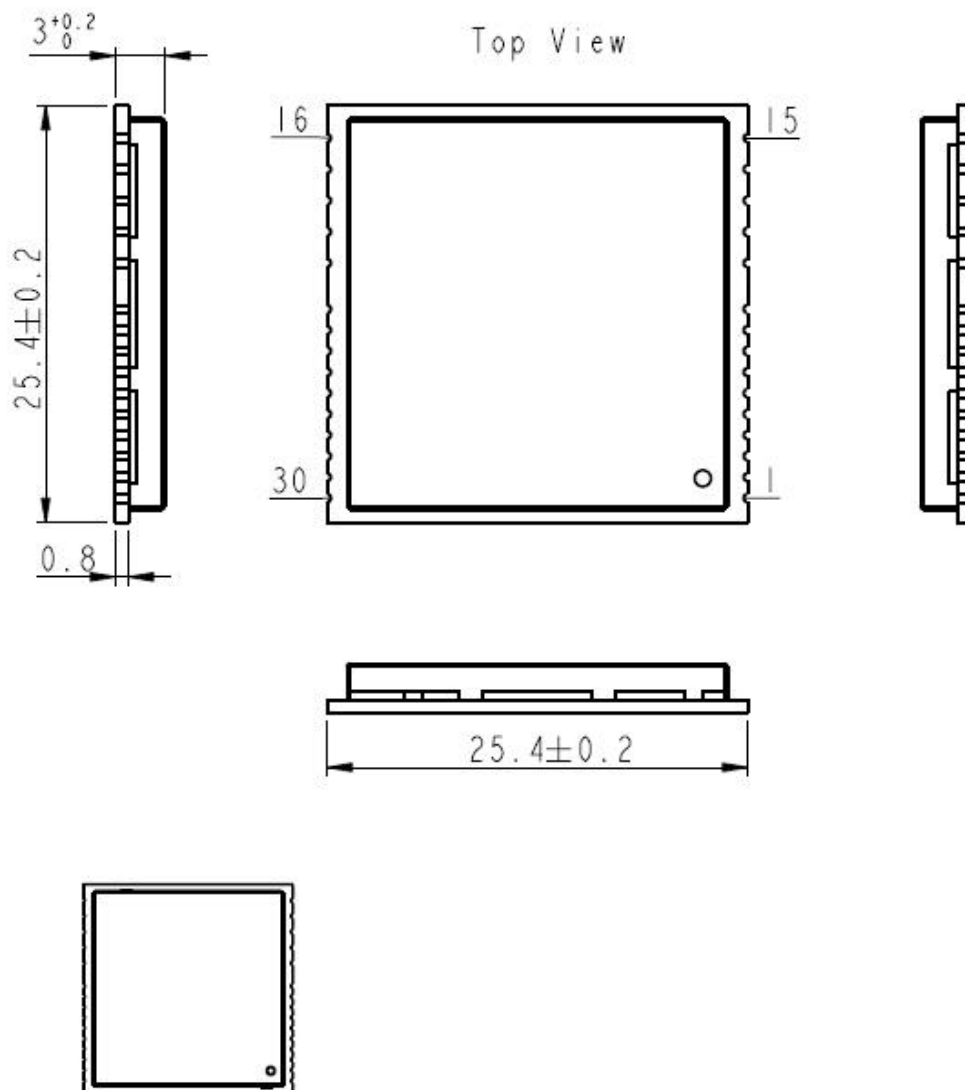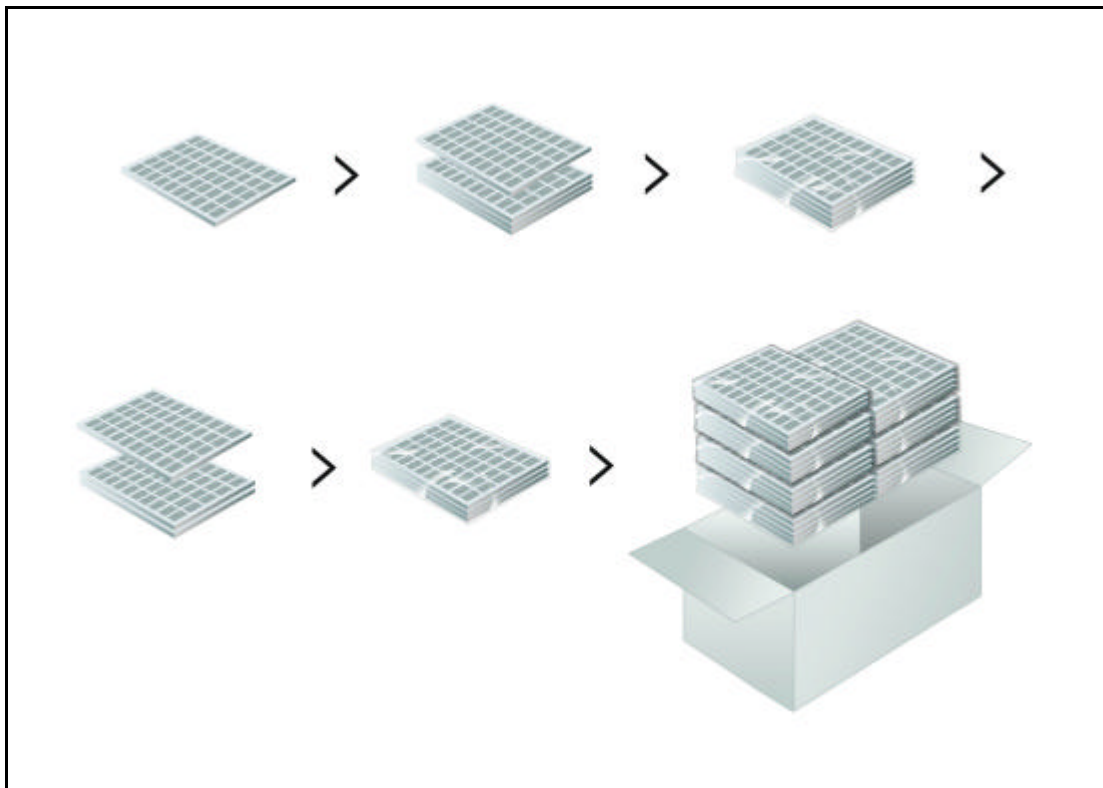
Scale 1.000

4. Package

4.1 Packing

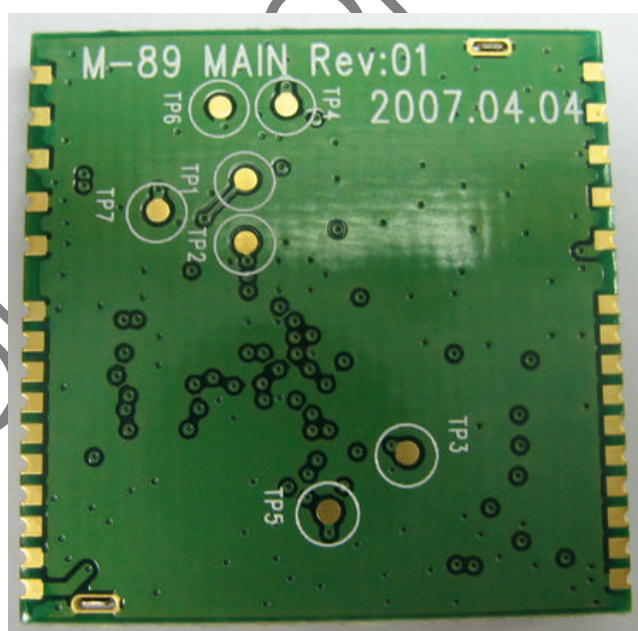Tray dimension : 370*312*15mm   Standard Content Qty : 50 pcs.

Carton dimension : 370*312*15mm   Standard Content Qty : 1,000 pcs

4.2 Reference Product photo

Top side :

Bottom side

5. User Interface

M-89 provides 2-wire digital UART port for communication of GPS position data using NMEA protocol or MTK extension protocol. UART port is capable of 4800 to 115200 baud rate.

5.1 Protocol

M-89 is default to support standard NMEA-0183 protocol. In addition, a series of MTK extensions (PMTK messages) have been developed that can be used to provide extended capabilities common to many applications.

5.2 NMEA Protocol

M-89 is capable of supporting following NMEA formats:

NMEA RECORD	Description
GGA	GPS fix data
GLL	Geographic
GSA	GNSS DOP and active satellite
GSV	GNSS Satellites in view
RMC	Recommended minimum specific GNSS data
VTG	Course Over Ground and Ground Speed
ZDA	Time&Data

5.3 MTK NMEA Packet Format

Preamble	TalkerID	PktType	Datafield	*	CHK1	CHK2	CR	LF

Maximum packet length is restricted to 255 bytes

| Field	Length	Type	D
Preamble	1 byte	Character	" $"
TalkerID	4 byte	Character string	" PMTK"
PktType	3 byte	Character string	" 000" to " 999", an identifier used to tell the decoder how to decode the packet
DataField	Variable		" ," must be inserted ahead each data filed to help the decoder process the Data Field
*	1 byte	Character	The star symbol is used to mark the end of Data Field
CHK1 CHK2	2 byte	Character string	checksum of the data between Preamble " ," and " *"
CR, LF	2 byte	Binary data	used to identify the end of a packet

6. Reference design

6.1 Reference circuit

Fig A-1 is M-89 connects to RS-232 transceiver solutions intended for portable or hand-held applications such as notebook and palmtop computers.

RS232 Interface   M-89 Engine Board   RF_IN
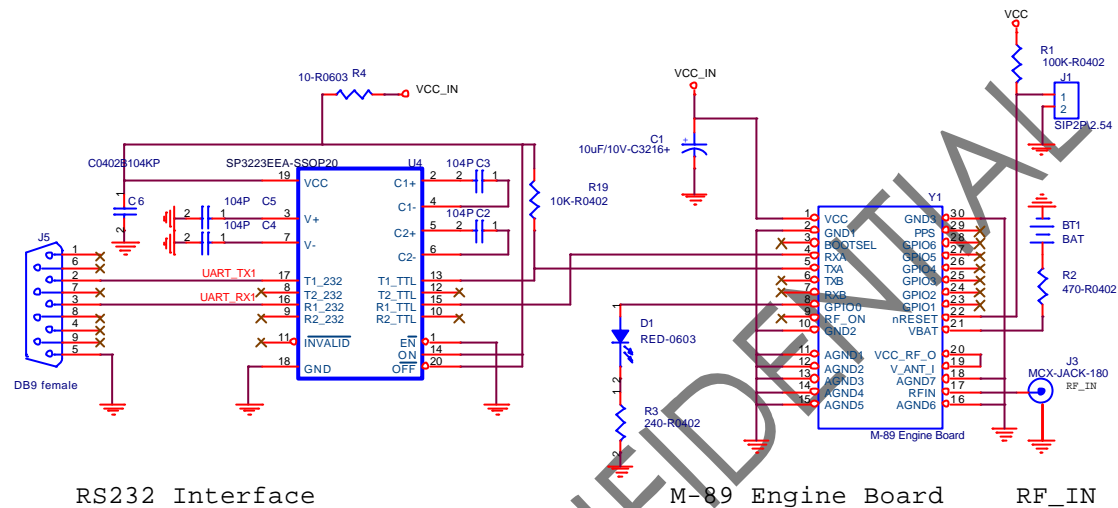
6.2 Reference PCB pattern
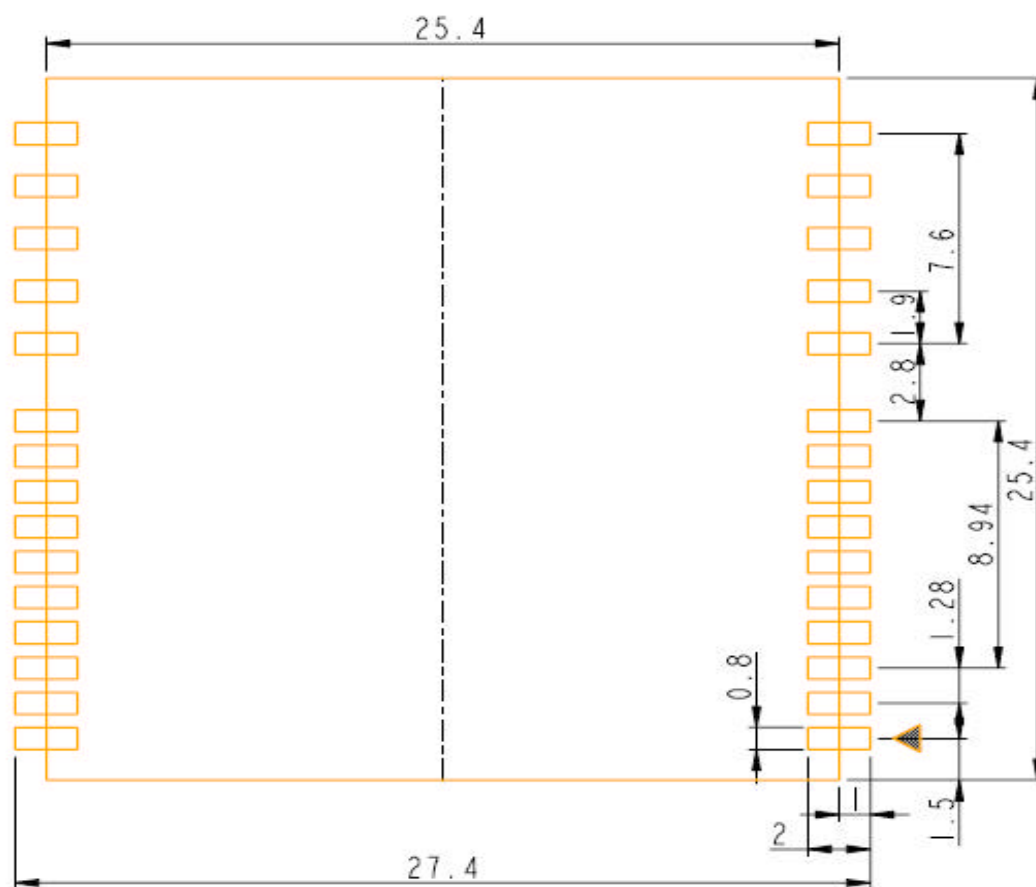
RECOMMENDED P.C.B LAYOUT (Component Side)

6.3 Recommendation reflow profile

1. We strongly recommend that this module should be designed to mount on top side of motherboard with main chip together which process the final reflow.

2. The maximum frequency of this module to pass reflow process should be no more than twice, including repair operation, otherwise it may cause side effect to the performance.

3. Below is the recommend reflow profile referred to Main chip MT3318.