GPS Engine Board

M-87
SPECIFICATION

HOLUX
THE PRO NAME IN GPS

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Version Change History

Version	Date	Revised Reason
0.1	2007/06/27	Official release

Outline

1. Introduction

1.1 General introductions

M-87 is an easy used 25.4 * 25.4 * 7 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-87** is your best choice to be embedded in your portable device design, like PND for GPS service.

1.2 Key Features

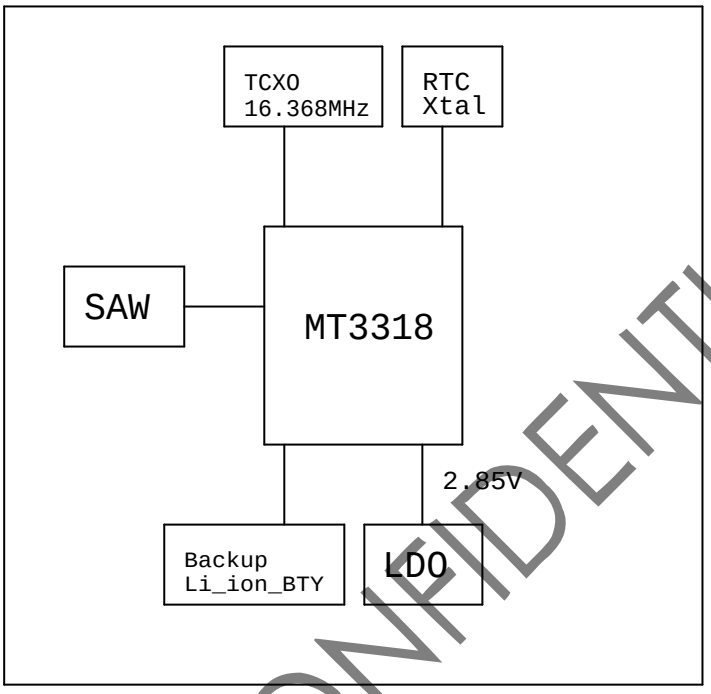
- small form factor: 25.4 * 25.4 * 7 mm
- RoHS/WEEE compliant
- High sensitivity -159dBm
- Searching up to 32 Channel of satellites
- Fast Position Fix
- Low power consumption
- RTCM-in ready.
- Built-in WAAS/EGNOS/MSAS Demodulator.
- Support NMEA0183 V 3.01 data protocol.
- Real time navigation for location based services.
- Embedded MMCX connector.
- 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

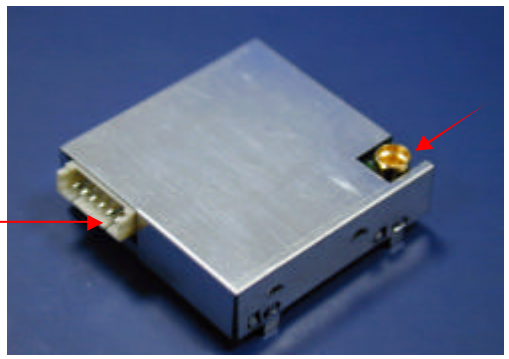
- Automotive and Marine Navigation
- Automotive Navigator Tracking
- Emergency Locator
- Geographic Surveying
- Personal Positioning
- Sporting and Recreation
- Embedded applications:
- UMPC, PND.

2 Technical Description

2.1 Block Diagram



2.2 Pin Definition



180 °MMCX Active Antenna connector

J1 Connector

Pin1

Pin	Pin Name	Type	Function description
1	***VCC_IN***	I	3.3 ~ 5 V supply input
2	***TXA***	O	Serial Data Output A
3	***RXA***	I	Serial Data input A
4	***RXB***	I	Serial Data input B
5	***GND***	O	Ground
6	***TIMEMARK/ RESET(OPTION)***	I/O	TIMEMARK:1PPS Time mark output RESET:Reset input(Active Low)(option function)

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	0.1 μs. 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,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 1% 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:60 mA@3.3V
Operation Current	Tracking:＜45mA@3.3V
Backup power	3V Rechargeable Lithium cell battery,up to 500 hours discharge
DC Input Range	VCC 3.3~5.0V
Processing Core	
Processor Type	ARM7EJ-S
Interface	CMOS 2.8 V Level
Temperature	
Operating Temperature	-10℃ to +60℃.
Storage Temperature	-20℃ to +85℃.
Operating Humidity	5% to 95%, Non condensing
Physical	
Dimension	25.4 * 25.4 * 7 mm.
Weight	7g.
Interface	Connector 6-pin straight male header,1.25mm pitch

NOTE: TIMEMARK 1PPS(default)/ RESET (option)

This pin default is provides 1 pulse per second output from the M-87 engine board, which is synchronized to within 1 microsecond of GPS time. The output is a CMOS 2.8V positive level signal. Only upon a situation of tracking or navigating will output once per second.

The secondary option function is provides an active-low reset input to the engine board. It causes the engine board to reset and start searching for satellites. (This second function setting need contact factory).

2.4 Configuration Information

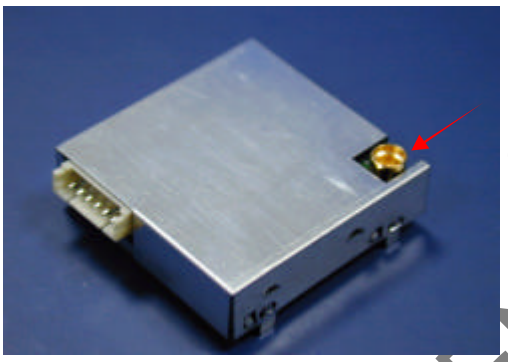
M-87 provide 4 configurations because of the different angle of MMCX connector and different RF interface output voltage.

Model No.	Output Level (CMOS 3V)	RF interface output voltage (V)	Back-up battery (Rechargeable Lithium)	RF Connector Type
M-87-T0A	CMOS 3V	2.85	Y	MMCX(180 °)
M-87-T0B	CMOS 3V	2.85	Y	MMCX(90 °)
M-87-T0C	CMOS 3V	VCC_IN	Y	MMCX(180 °)
M-87-T0D	CMOS 3V	VCC_IN	Y	MMCX(90 °)

3. Mechanical Dimension

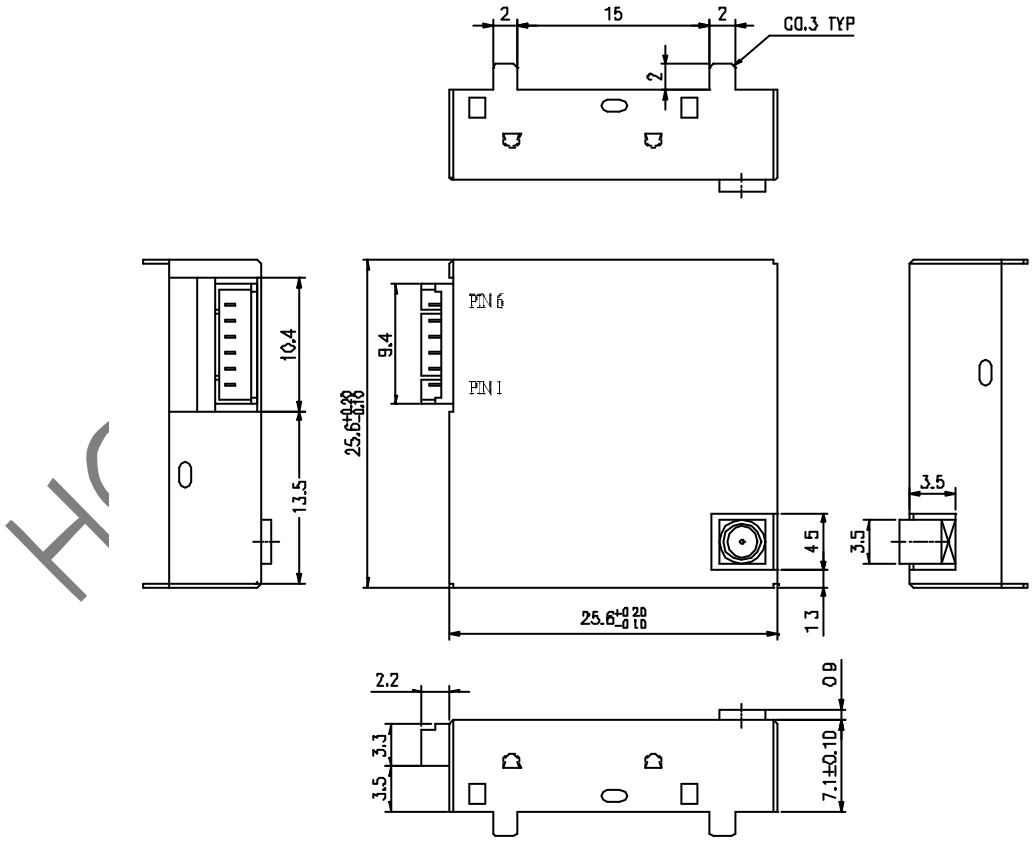
3.1 M-87-T0A, M-87-T0C outline

- **Picture**



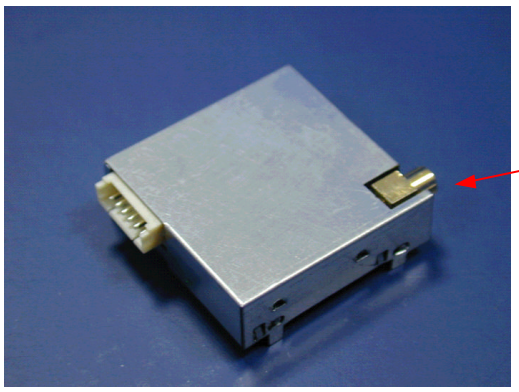
180 °MMCX Active Ant connector

- **Design Layout Diagram:(unit mm)**

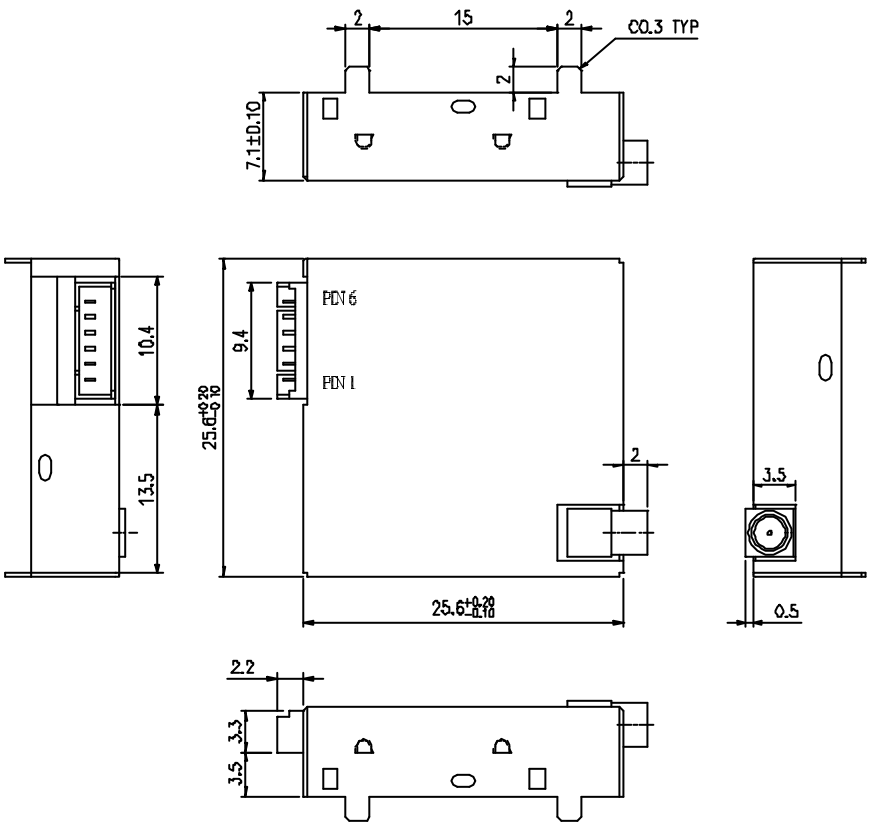


3.2 M-87-T0B, M-87-TOD outline

- **Picture**



- **Design Layout Diagram:(unit mm)**



4. Package

4.1 Packing

EPE Tray dimension : 370*312*20mm,
Standard Content Qty : 50 pcs.

Carton dimension : 376*322*255mm, 10 trays are packed,
Standard Content Qty : 500 pcs。

5. User Interface

M-87 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-87 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-87 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