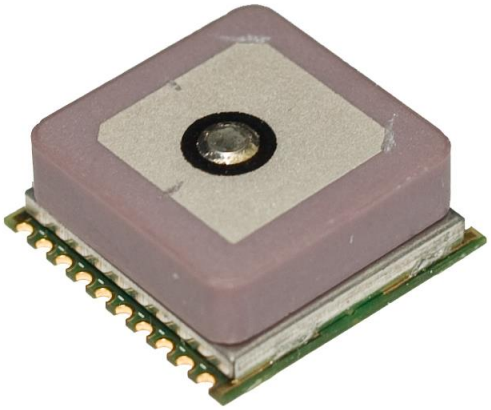
GP3906-TLP Data Sheet

Rev.A01

66-Channel GPS Module

with MTK Chipset



GP3906-TLP

Low power consumption version

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GP3906-TLP Data Sheet

Rev.A01

History		
Date	**Rev.**	**Description**
2014/06/20	**A00**	**First Release**
2014/07/02	**A01**	**Pin configuration and definition corrected**

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Rev.A01

Description

The GP3906-TLP is a POT (Patch on Top) GPS module which is special designed for ultra low power consumption purpose environment. It is a GPS receiver providing a solution that high position and speed accuracy performances as well as high sensitivity and tracking capabilities in urban conditions. The GPS chipsets inside the module are designed by **MediaTek Inc**., which is the world's leading digital media solution provider and largest fab-less IC company in Taiwan. The module can support up to **66 channels**. The GPS solution enables small form factor devices. They deliver major advancements in GPS performances, accuracy, integration, computing power and flexibility. They are designed to simplify the embedded system integration process.

Features

- Based on **MediaTek** Single Chip Architecture (MT3339).
- ARM7 based application processor
- High sensitivity: -165dBm tracking
- L1 frequency, C/A code
- Channels: 66 acquisition, 22 simultaneous tracking
- Low power consumption: 26mA @ acquisition, 20mA @ tracking
- Cold/Warm/Hot start time: <35/<33/<1 seconds
- Maximum update rate up to 10Hz
- GPS data interface: TTL level serial port
- Support NMEA 0183 standard V3.01 and backward compliance
- Support SBAS – WAAS, EGNOS, GAGAN and MSAS
- Dimension：**16mm x 16mm x 6.7mm**
- RoHS compliant
- Advanced software features
  - AlwaysLocate™ advanced location awareness technology
  - EPO™ orbit prediction
  - Supports logger function (LOCUS)

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Chipset Characteristics

General	
Chipset	MTK MT3339
Frequency	L1, 1575.42MHz
C/A Code	1.023 MHz
Channels	66 channels
SBAS	WAAS, EGNOS, GAGAN,MSAS Supported
Datum	WGS84(Default), Tokyo-M, Tokyo-A, User Define
CPU	ARM7EJ-S
Dimensions	
Length/Width/Height	16*16*6.7 mm
Weight	6g
Performance Characteristics	
Position Accuracy	Without aid：3.0m 2D-RMS
	< 3m CEP (50%) without SA (horizontal)
	DGPS (SBAS (WAAS, EGNOS, MSAS))：2.5m
Velocity Accuracy	Without aid：0.1 m/s
	DGPS (SBAS (WAAS, EGNOS, MSAS))：0.05m/s
Acceleration Accuracy	Without aid：0.1 m/s^2
	DGPS (SBAS (WAAS, EGNOS, MSAS))：0.05m/s^2
Timing Accuracy	10 ns RMS
Sensitivity	Acquisition：-148dBm (Cold Start)
	Reacquisition：-163dBm
	Tracking：-165dBm
Maximum Update Rate	Up to 10Hz(Default: 1Hz)
Acquisition (Open sky, stationary)	
Reacquisition Time	Less than 1 second
Hot start	1.0s (Typical)
Warm start	33s (Typical)
Cold start	35s (Typical)
Dynamic	

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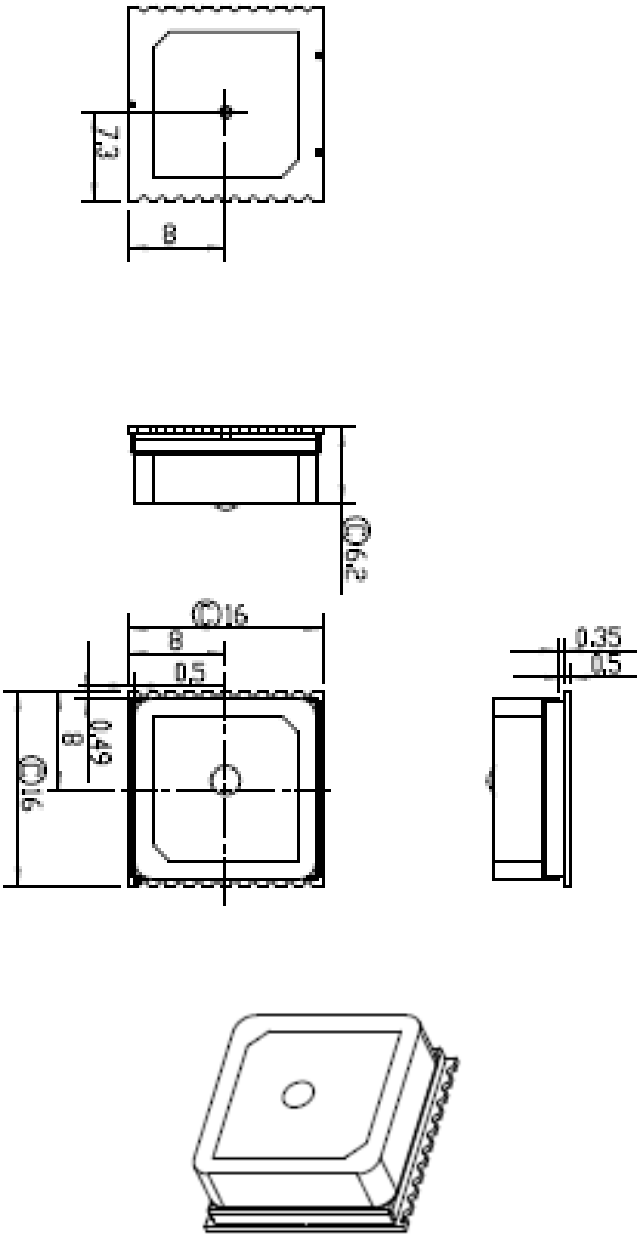
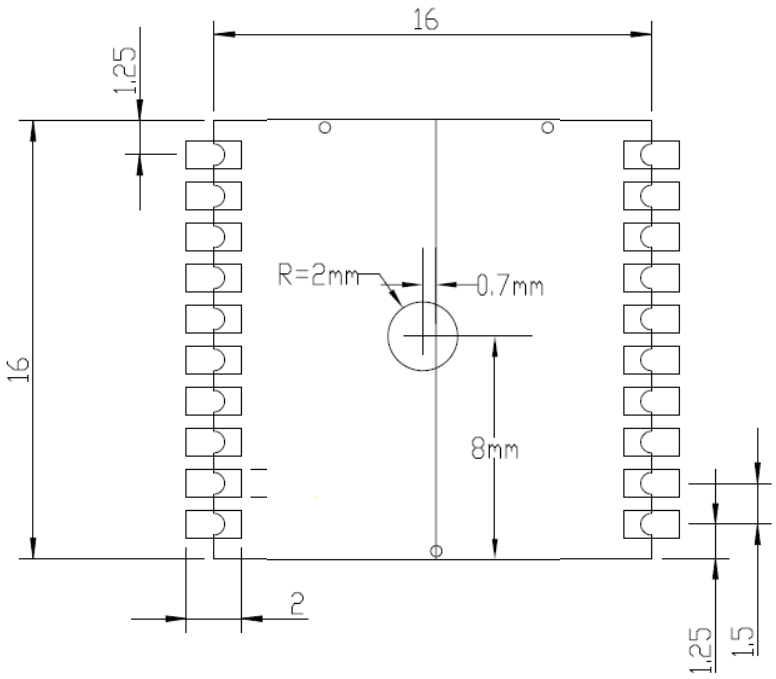
Altitude	Maximum 18,000m
Velocity	Maximum 515m/s
Acceleration	Maximum 4G
Power	
Input Voltage	DC 3.3V ±5%
Power Consumption @ 3.3V	Acquisition：30mA Typical
	Tracking：24mA Typical
VBACKUP	DC 3 to 4.3V
I/O	
Signal Output	UART, 8 data bits, no parity, 1 stop bit
Available Baud Rates	4800/9600/38400/57600/115200 bps(Default：9600)
Protocols	NMEA 0183 v3.01 (Default：GGA,GSA,GSV,RMC,VTG) MTK NMEA Command Network Assistance Messages
Data output Interface	
Protocol messages	9600 bps/8/N/1 (Default)
Output format	GGA(1sec),GSA(1sec),RMC(1sec),VTG(1sec), GSV(5sec) (Default)
Environment	
Operating Temperature	-30 ℃ to 85 ℃
Storage Temperature	-40 ℃ to 125 ℃
Operating Humidity	5% to 95% (no condensing)

Outline Dimension



Recommended PCB Layout



Note.

- Do not place any pad, via or high current power line within the area under this module.
- Place a R=1.2 to 2mm N-PTH hole under this module for the antenna pad.

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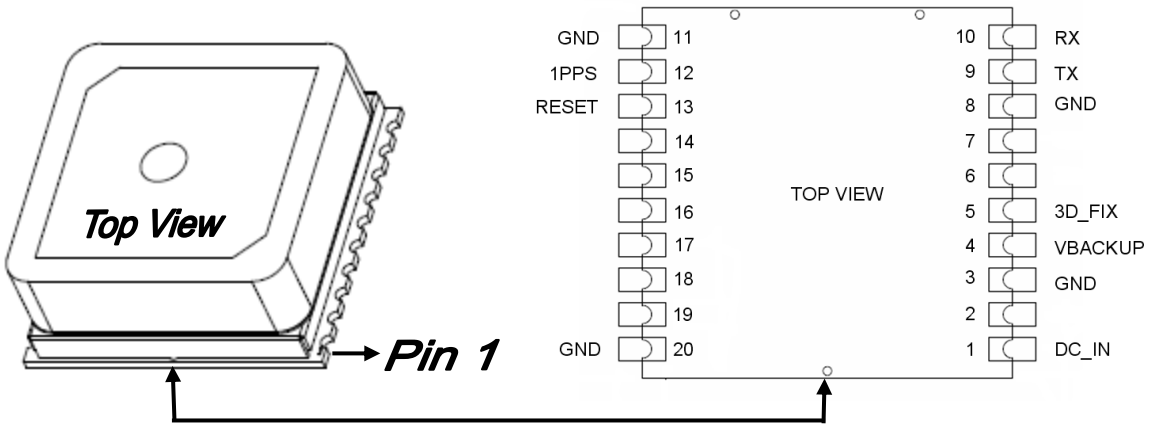
Pin Configuration



Pin Definition

Pin	Name	I/O	Description
1	DC_IN	P	3.3V ± 5% DC Power Supply Input
2	NC		
3	GND	I	Ground
4	VBACKUP	P	RTC Backup Power Input
5	3D_FIX	O	3D_Fix Indicator
6	NC		
7	NC		
8	GND	P	Ground
9	Tx	O	Serial data Output
10	Rx	I	Serial Data Input
11	GND	P	Ground
12	1PPS	O	1 pulse-per-second GPS time reference
13	RESET	I	System Reset. Low Active
14	NC		
15	NC		
16	NC		
17	NC		
18	NC		
19	NC		
20	GND	P	Ground

Description of I/O Pin

DC_IN (Pin1)

3.3V ± 5% DC power supply input.

GND (Pin3, Pin8, Pin11,20)

The ground of the module.

VBACKUP (Pin4)

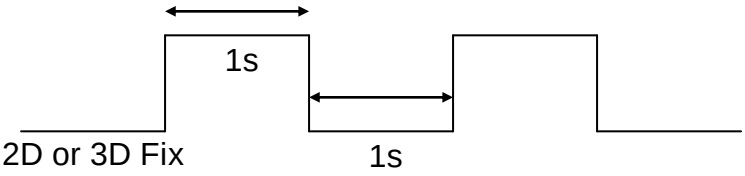
This is the backup power for GPS chipset to keep RTC running when main power is removed. For normal operation, the input voltage must be kept from 2.0V to 4.3V.

3D_FIX (Pin5)

The fix flag output. If not used, keep this pin floating and do not put this pin in high level when the module starting up.

- Before 2D Fix

  The 3D_FIX should continuously output one-second high-level with one-second low-level signal.



- After 2D or 3D Fix

  The 3D_FIX should continuously output high-level signal.

Tx (Pin9)

This is the UART transmitter of the module. It outputs the GPS information for application.

Rx (Pin10)

This is the UART receiver of the module. It is used to receive software commands and firmware update.

1PPS (Pin12)

1 pulse-per-second GPS time reference output

RESET (Pin13)

With a low level, it causes the module to reset. If not used, keep floating.

NMEA Output Sentence

Table-1 lists each of the NMEA output sentences specifically developed and defined by MTK for use within MTK products

NMEA Output Sentence **Table-1**

Option	Description
GGA	Time, position and fix type data.
GSA	GPS receiver operating mode, active satellites used in the position solution, and DOP values.
GSV	The number of GPS satellites in view satellite ID numbers, elevation, azimuth, and SNR values.
RMC	Time, date, position, course and speed data. Recommended Minimum Navigation Information.
VTG	Course and speed information relative to the ground.

GGA—Global Positioning System Fixed Data. Time, Position and fix related data for a GPS receiver

Table-2 contains the values for the following example：

$GPGGA,064951.000,2307.1256,N,12016.4438,E,1,8,0.95,39.9,M,17.8,M,,*65

GGA Data Format **Table-2**

Name	Example	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	064951.000		hhmmss.sss
Latitude	2307.1256		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See **Table-3**
Satellites Used	8		Range 0 to 14
HDOP	0.95		Horizontal Dilution of Precision
MSL Altitude	39.9	meters	Antenna Altitude above/below mean-sae-level
Units	M	meters	Units of antenna altitude
Geoidal Separation	17.8	meters	
Units	M	meters	Units of geoidal separation
Age of Diff. Corr.		second	Null fields when DGPS is not used
Checksum	*65		
<CR> <LF>			End of message termination

Position Fix Indicator **Table-3**

Value	Description
0	Fix not available
1	GPS fix
2	Differential GPS fix

GSA—GNSS DOP and Active Satellites

Table-4 contains the values for the following example：

$GPGSA,A,3,29,21,26,15,18,09,06,10,,,,,2.32,0.95,2.11*00

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GSA Data Format			**Table-4**
Name	**Example**	**Units**	**Description**
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See **Table-5**
Mode 2	3		See **Table-6**
Satellite Used	29		SV on Channel 1
Satellite Used	21		SV on Channel 2
....	….	….	....
Satellite Used			SV on Channel 12
PDOP	2.32		Position Dilution of Precision
HDOP	0.95		Horizontal Dilution of Precision
VDOP	2.11		Vertical Dilution of Precision
Checksum	*00		
<CR> <LF>			End of message termination

Mode 1	**Table-5**
Value	**Description**
M	Manual—forced to operate in 2D or 3D mode
A	2D Automatic—allowed to automatically switch 2D/3D

Mode 2	**Table-6**
Value	**Description**
1	Fix not available
2	2D (＜4 SVs used)
3	3D (≧4 SVs used)

GSV—GNSS Satellites in View

Table-7 contains the values for the following example：

$GPGSV,3,1,09,29,36,029,42,21,46,314,43,26,44,020,43,15,21,321,39*7D

$GPGSV,3,2,09,18,26,314,40,09,57,170,44,06,20,229,37,10,26,084,37*77

$GPGSV,3,3,09,07,,,26*73

GSV Data Format **Table-7**

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages	3		Range 1 to 3 *(Depending on the number of satellites tracked, multiple messages of GSV data may be required.)*
Message Number1	1		Range 1 to 3
Satellites in View	09		
Satellite ID	29		Channel 1 (Range 1 to 32)
Elevation	36	degrees	Channel 1 (Maximum 90)
Azimuth	029	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, (null when not tracking)
....	….	….	....
Satellite ID	15		Channel 4 (Range 1 to 32)
Elevation	21	degrees	Channel 4 (Maximum 90)
Azimuth	321	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	39	dBHz	Range 0 to 99, (null when not tracking)
Checksum	*7D		
<CR> <LF>			End of message termination

RMC—Recommended Minimum Navigation Information

Table-8 contains the values for the following example：

$GPRMC,064951.000,A,2307.1256,N,12016.4438,E,0.03,165.48,260406,,,A*55

RMC Data Format **Table-8**

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	064951.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2307.1256		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.03	knots	
Course Over Ground	165.48	degrees	True
Date	260406		ddmmyy
Magnetic Variation		degrees	E=east or W=west *(MTK does not support magnetic declination)*
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*65		
<CR> <LF>			End of message termination

VTG—Course and speed information relative to the ground.

Table-9 contains the values for the following example：

$GPVTG,165.48,T,,M,0.03,N,0.06,K,A*37

VTG Data Format **Table-9**

Name	Example	Units	Description
Message ID	$GPVTG		VTG protocol header
Course	165.48	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic *(MTK does not support magnetic declination.)*
Speed	0.03	knots	Measured horizontal speed
Units	N		Knots
Speed	0.06	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*06		
<CR> <LF>			End of message termination