GPS Engine Board

Hardware Data Sheet

Product No : MT-5531

Version 1.0

Issue Date	APPR	CHECK	PREPARE
2014/03/26			Mason

Product Description

Product Description

MT-5531 is a compact, high performance, and low power consumption GPS engine board. The chipset is powered by MediaTek, it can provide you with superior sensitivity and performance even in urban canyon and dense foliage environment. The miniature size makes the module easy and the best choice to integrate into portable applications such as DSC, cellular phone, PMP, and gaming devices. MT-5531 is suitable for the following applications:
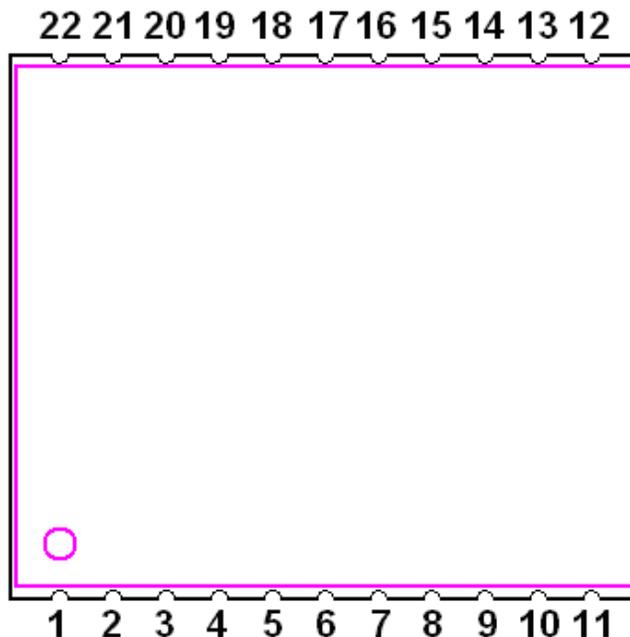
- Automotive navigation
- Personal positioning
- Fleet management
- Mobile phone navigation
- Marine navigation

Product Features

- MediaTek high sensitivity solution
- Support 22 tracking / 66 acquisition-channels GPS receiver
- Very high sensitivity (Tracking Sensitivity: chipset -165dBm)
- Extremely fast TTFF (Time To First Fix) at low signal level
- Support Serial port NMEA output.
- Built-in LNA
- Compact size (15.0mm x 13.0mm x 2.4mm) suitable for space-sensitive application
- One size component, easy to mount on another PCB board
- Support NMEA 0183 V4.0 (GGA, GSA, GSV, RMC, VTG, GLL, ZDA)
- Supports GPS, SBAS ranging(WASS/EGNOS/MSAS/GAGAN), QZSS

   Note: Features mentioned above are available depending on firmware versions. Please contact us first to specify which features you will require, before purchase

Product Pin Description

PIN Number(s)	Name	Type	Description	Note
1,2,8,14,15,16	Reserved		MT-5531 reserved pin, just NC.	
3	TIMEPULSE	O	When position is fixed, this pin provides one pulse-per-second output from the board, which is synchronized to GPS time. If do not use it, Just NC.	
4	TXD	O	This is the main transmits channel for outputting navigation and measurement data to user's navigation software or user written software. Baud rate based on firmware setting, Output TTL level 2.8V.	
5	RXD	I	This is the main receive channel for receiving software commands to the engine board from MTK software or from user written software. Baud rate based on firmware setting.	
7, 10,11,18	NC		MT-5531 NC pin, just NC.	
9	RESET	I	This pin is low active for system reset, default pull-up. This module has internal power on reset circuit. If do not use it, Just NC.	
13	VCC	P	This is the main power supply to the engine board. (3.3Vdc to 6Vdc)	
6,17,20,22	GND	P	Ground.	

12	VBAT	P	This is the power input for the SRAM and RTC. In operating mode, this pin connect to power is necessary and VBAT power input can not later than VCC. In backup mode, without the external power, MT-5531 will always execute a cold star after turning on. To achieve the faster start-up offered by a hot or warm start, a backup power must be connected. The power voltage should be between 2.0V and 4.3V.	
19	VCC_RF	O	VCC_RF can supply Active Antenna Bias voltage. This pin will supply Active Antenna power. Output voltage level referred VCC. If do not use it, Just NC.	
21	RF IN	RF	This pin receives signal of GPS analog via external antenna. It has to be a controlled impedance trace at 50ohm. Do not have RF traces closed the other signal path and routing it on the top layer. Keep the RF traces as short as possible.	

Electrical Specification

Absolute Maximums Ratings

Parameter	Min.	Typ.	Max.	Conditions	Unit
Power					
Power supply voltage(VCC)	3.3	3.3	6.0		V
Backup battery supply	2.0		4.3		V
VCC_RF output voltage		VCC			
Main power supply Current		23		3.3V	mA
Backup battery supply Current	4.5	5	5.5	3.3V	uA
RF Input					
Input Impedance		50			Ω
Operating Frequency		1.575			GHz

. DC Electrical characteristics

Parameter	Symbol	Min.	Typ.	Max.	Conditions	Units
I/O Low Level Output Voltage	V_{OL}			0.42		V
I/O High Level Output Voltage	V_{OH}	2.38				V
I/O Low Level Input Voltage	V_{IL}	-0.3		0.7		V
I/O High Level Input Voltage	V_{IH}	2.1		3.6		V
TXD Output Voltage	V_{TO}	2.52	2.8	3.08		V
RXD Input Voltage	V_{RI}			3.6		V
High Level Output Current	I_{OH}		2			mA
Low Level Output Current	I_{OL}		2			mA

Environmental Characteristics

Parameter	Min	Typ	Max	Unit
Humidity Range	5		95	% non-condensing
Operation Temperature	-40	25	85	℃
Storage Temperature	-40		85	℃

Receiver Performance

| Sensitivity	Chipset Tracking :	-165 dBm
	Chipset Autonomous acquisition :	-148 dBm
Time-To-First-Fix	Cold Start – Autonomous	< 35s
	Warm Start – Autonomous	< 35s
	Hot Start – Autonomous	< 1s
Horizontal Position Accuracy	Autonomous	< 3m (2D RMS)
	SBAS	<2.0m
Velocity Accuracy	Speed	< 0.01 m/s
	Heading	< 0.01 degrees
Reacquisition	0.1 second, average	
NMEA Update Rate	Output data format based on firmware setting	
Maximum Altitude	< 18,000 meter	
Maximum Velocity	< 515 meter/ second	
Maximum Acceleration	< 4G	

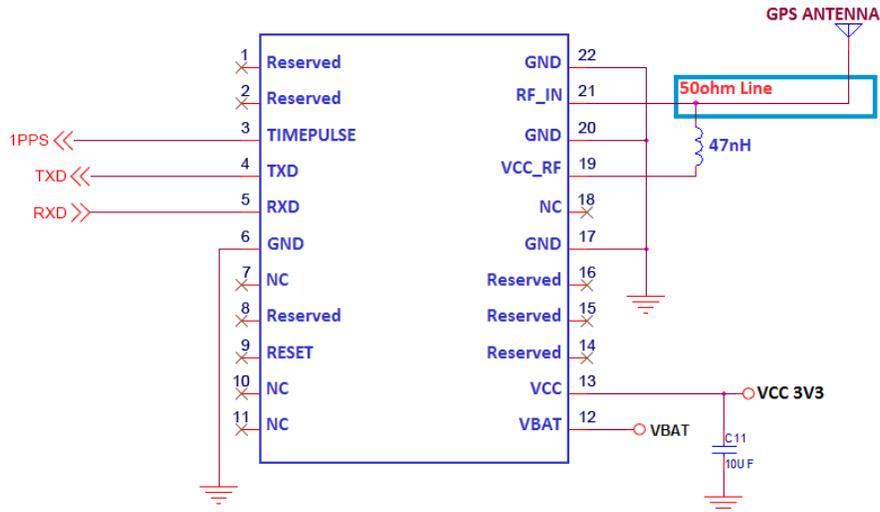## Package Dimensions

Unit: mm
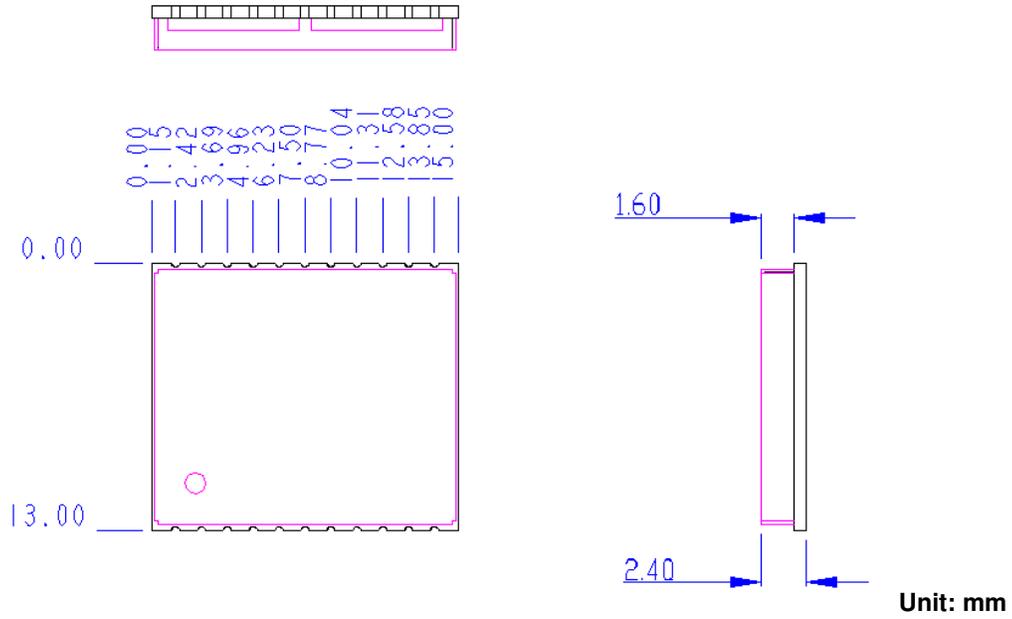
Type	22-pin stamp holes
Dimensions	15.0mm X 13.0mm X 2.4mm (±0.2mm)

Application

Application circuit with passive antenna
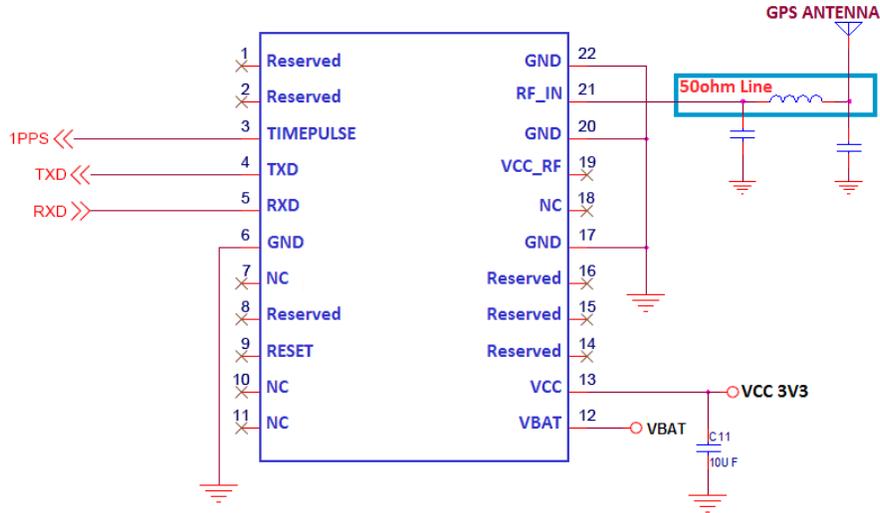
Application circuit with active antenna


GPS Active Antenna Specifications (Recommendation)

Frequency:	1575.42 + 2MHz	Amplifier Gain:	18~22dB Typical
Axial Ratio:	3 dB Typical	Output VSWR:	2.0 Max.
Output Impedance:	50Ω	Noise Figure:	2.0 dB Max
Polarization:	RHCP	Antenna Input Voltage:	3.3V (Typ.)

NOTE:

1. RESET: Low Active, when MT-5531 is accepted this single, than MT-5531 will execute system reset.

PCB Layout Recommend

Recommended Layout PAD
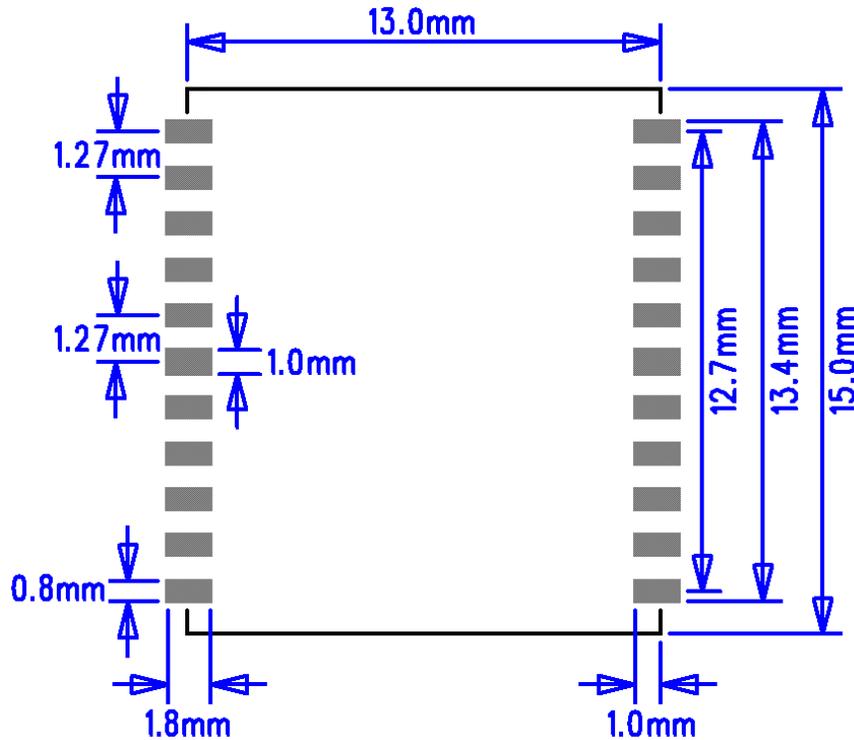
Unit: mm

Tolerance: 0.1mm

PCB Layout Recommendations

Do not routing the other signal or power trace under the engine board.

RF:

This pin receives signal of GPS analog via external active antenna .It has to be a controlled impedance trace at 50ohm.
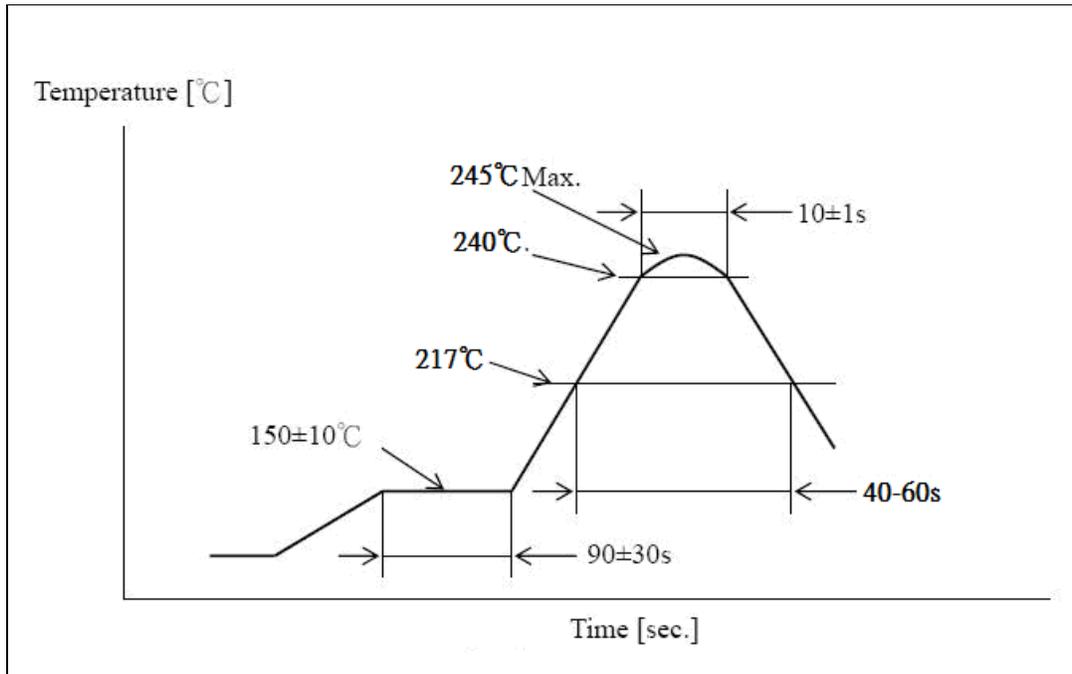
Do not place the RF traces close to the other signal path and not routing it on the top layer.

Keep the RF traces as short as possible.

Antenna:

Keep the active antenna on the top of your system and confirm the antenna radiation pattern、axial ratio、power gain、noise figure、VSWR are correct when you Setup the antenna in your case.

Recommended Reflow Profile:

Pre heating temperature: 150±10[℃]   Pre heating time: 90±30[sec.]

Heating temperature: 240±5[℃]   Heating time: 10±1[sec.]

Peak temperature must not exceed 245℃ and the duration of over 217℃ should be 40-60 Seconds.

Appendix

Label Artwork

A: Brand: GlobalSat
B: MODULE Model: MT-5531
B-1:
    G = GLONASS
    B = BDS
    C = Single Type
C: CHIP Type: MTK
D: Bar code
E: Serial Number:

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Product NO (HEX)
Place of origin, **T= Taiwan, **C=China
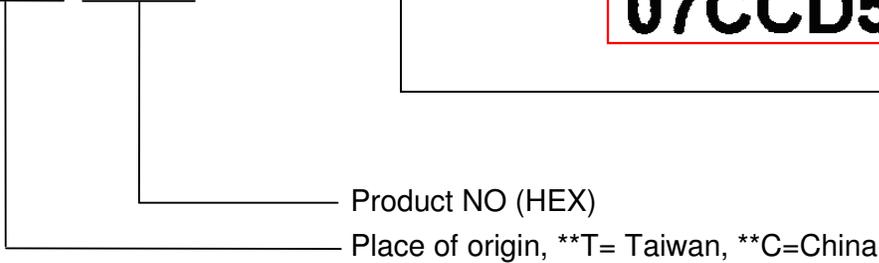
Reversion history

Reversion	Date	Name	Status / Comments
V1.0	20140326	Mason	Initial Version