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**ME1316A    GPS Receiver Module**

**Revision history**

Revision No.	Revision DATE	Issue	Note
1	30.JUN.2009	Draft 1.0	PCB : ME1316A1
		-	
		-	

# ME1316A GPS Receiver Module

## 1. Functional Description

Full self-contained GPS receiver

Fully shielded design

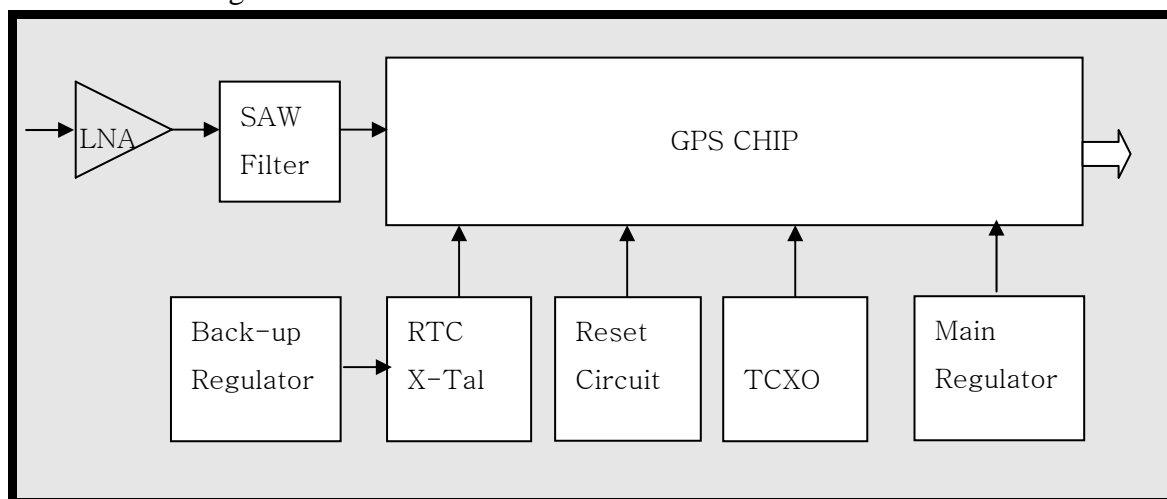
- High Performance GPS Single Chip  
GPS DSP with integrated real time clock(RTC) ARM7EJ-S CPU
- Built-in 4Mbit program memory, Low noise amplifier, SAW filter, TCXO, regulators (LDO)
- 1 UART and USB 2.0 output
- 2 GPIO

GPS receiver in a micro-component package

- Postage stamp type package
- Fully automatic assembly : Reflow solderable
- No RF connector
- Size : 13mm X 16mm X 2.7mm
- Weight : 1.0 grams

## 2. Block Diagram

### 1.2 Block Diagram



## ME1316A GPS Receiver Module

### 3. Output Protocols

Data format : WGS-84 NMEA 0183  
Activated message : GGA, GSA, GSV, RMC all with checksum enabled  
Signal format : Baud rate:9600, Byte:8, Parity:none, stop bit:1  
Up-date rate : 1 sec

### 4. Input Start Commands

MESSAGE	COMMANDS
FACTORY RESET	\$PSRF101,0,0,0,000,0,0,12,8*1C
COLD START	\$PSRF101,0,0,0,000,0,0,12,4*10
WARM START	\$PSRF101,0,0,0,000,0,0,12,2*16
HOT START	\$PSRF101,0,0,0,000,0,0,12,1*15

Time To First Fix (TTFF)

a) Cold Start 35sec (typical)

In a 'Cold Start' scenario, the receiver has no knowledge of position, time or the satellite constellation.

The receiver starts to search for signals blindly.

Cold start time is the longest startup for this module

b) Warm Start 34sec (typical)

In a 'Warm Start' scenario, due to a backup battery the receiver knows its last position, the approximate time and the constellation almanac.

Thanks to this it can quickly acquire satellites and get a position fix faster than in 'Cold Start' mode.

c) Hot Start 1.5sec (typical)

In a 'Hot Start' scenario, the receiver has been powered off for less than 2 hours since the last valid navigation solution.

The GPS uses its last Ephemeris data to calculate a position fix.

## ME1316A GPS Receiver Module

### 5. Pin Description

Pin No.	Name	Pin Description	I/O	Note
11	VDD	Supply Voltage	I	3.0V~4.2V
5	VDDRTC	Backup BATTERY for RTC and SRAM back_up POWER	I	1.5~4.2V
1	RFIN	GPS signal form antenna	I	50Ω (1.57542GHz) DC_OUT : 2.8V
27,31	RXA	Serial Port A	I	Leave unconnected if not used.
25,30	TXA	Serial Port A	O	Leave unconnected if not used.
18	USB+	USB POWER	I	Leave unconnected or GND if not used. DC Input : 3.3V
32	UDP	USB DATA PLUSE	O	Leave unconnected if not used.
34	UDM	USB DATA MINUS	O	Leave unconnected if not used.
16	GPIO	GPIO	O	Leave unconnected if not used.
20	PPS	PPS	O	Leave unconnected if not used.
13	RESET	RESET	I/O	Active LOW reset. Leave unconnected if not used
3	PRG	Module boots into flash memory program mode if VCC during reset	I	Leave unconnected if not used. Use only factory production
Other	GND			PIN2,3,4,6,8,9,10,12,14,15,17,19,21,22,23, 24,26,28,29,33,35,36

## ME1316A GPS Receiver Module

### 6. Absolute Maximum Ratings

Parameter	Min	Max	Unit
Power supply voltage(VDD)		5.0	V
Serial port Input pin voltage	-0.3	3.0	V
I/O port voltage	-0.3	3.0	V
I/O port current		±20	mA
Storage temperature	-40	85	°C

#### IMPORTANT :

This module is not protected against over voltage, reversed voltage or short current of RFIN port.

### 7. DC Characteristics ( Test Temperature : 25°C VDD = 3.3V)

Parameter	Condition	Min.	TYP	Max.	Unit
Operating supply voltage	VDD	3.0	3.3	4.5	V
Operating supply ripple voltage	VDD			50	mV
Sustained supply current (ex. : at 3D Fixed)	VDD=4.2V	26	27	33	mA
	VDD=3.8V	28	29	35	mA
	VDD=3.6V	29	30	36	mA
	VDD=3.3V	30	32	38	mA
Peak supply current (ex. : at GPS START operation)	VDD=3.3V		35	40	mA
USB+ port power	USB+	3.0	3.3	3.6	V
USB section operating current	USB+=3.3V	3	4	5	mA
VDDRTC Input voltage	VDDRTC	1.5	3.05	4.5	V
Standby "VDDRTC" Backup current	VDDRTC=3.0V	5.0	6.5	15	uA
I/O INPUT level	High		1.96	3.0	V
	Low		-0.2	0.84	V
I/O OUTPUT level	High	Ioh=2mA	2.4	2.8	V
	Low	Iol=2mA	0.1	0.4	V
"RFIN" DC output Voltage	20mA	2.6		2.8	V
Private output DC Current ("RFIN" + "GPIO" output)	VDD=4.2V			30	mA
	VDD=3.3V			40	mA
Operating temperature	VDD=3.3V	-30	25	+80	°C

## ME1316A GPS Receiver Module

### 8. AC Characteristics

( Test Temperature : 25°C VCC = 3.3V RF Input : Conducted )

Parameter	Condition	Min	Typical	Max	Unit
RF_IN Input level				-40	dBm
RF_IN Input Impedance	Fo=1575.42MHz		50		$\Omega$
Tracking Sensitivity (C/N)	3D (C/N avg. 15dB-Hz)		-165		dBm
Re- Tracking Sensitivity (C/N)	3D (C/N avg. 18dB-Hz)		-155		dBm
Cold start Sensitivity (C/N)	3D (SV 9EA in view)		-148		dBm
Cold start time(TTFF)	-130 dBm(2D) (SV 9EA)		50		sec
Hot start time	-130 dBm(2D) (SV 9EA)		1		sec
Re-acquisition time (5 sec)	-130 dBm(3D) (SV 9EA)		3		sec
Re-acquisition time (60 sec)	-130 dBm(3D) (SV 9EA)		3		sec
Position error (Latitude, Longitude)	-130 dBm(SV 9EA in View)		10		m
Position error (Elevation)	-130 dBm(SV 9EA in View)		50		m
Operational Limits	Altitude			18	Km
	Velocity			1,800	Km/h

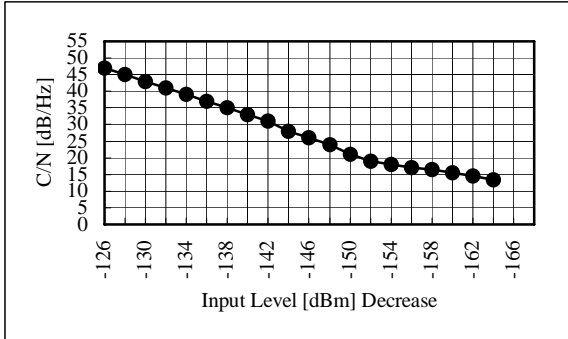
### 9. Active Antenna Selection Guide Recommend

Parameter	Condition
Frequency	1575.42MHz
Polarization	RHCP
V.S.W.R	Less than 2.0
Impedance	50 $\Omega$
LNA Gain	24dB $\pm$ 2dB
Noise Figure	1.5dB(Max)
Band Attenuation	20dB(Min) @F <sub>0</sub> $\pm$ 50MHz
Voltage	DC 2.7V( $\pm$ 10%)
Current	20mA(Max)

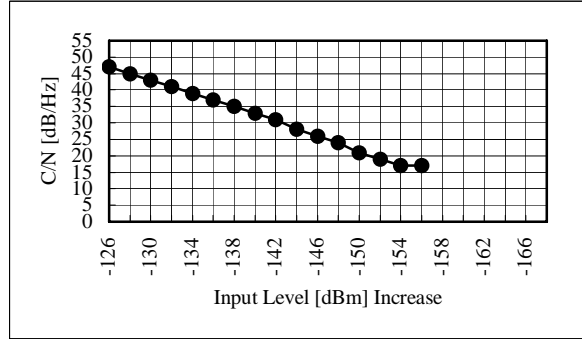


## 10. Performance Specification

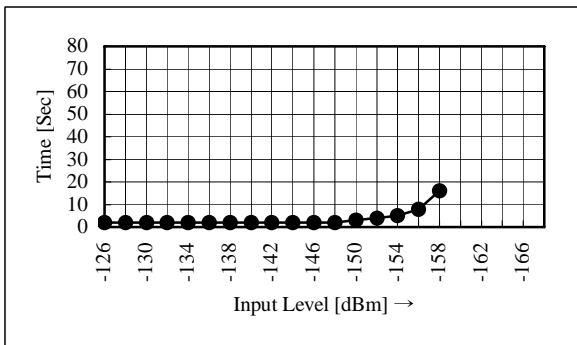
3D Tracking Sensitivity



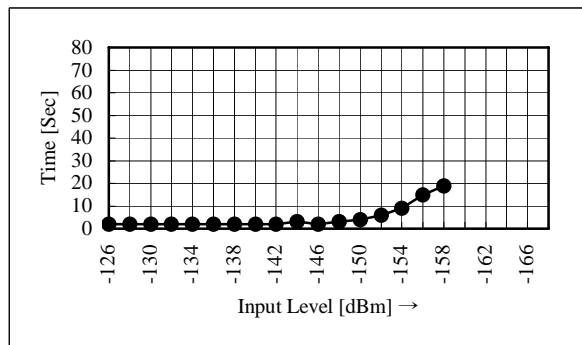
3D Re-Tracking Sensitivity



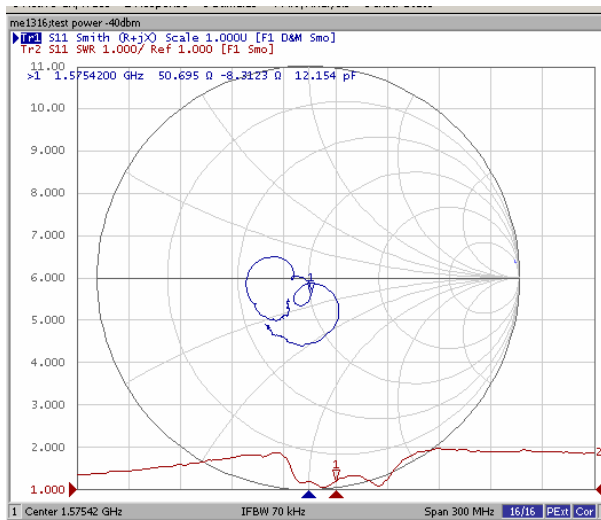
Re-Acquisition Time (After 5Sec)



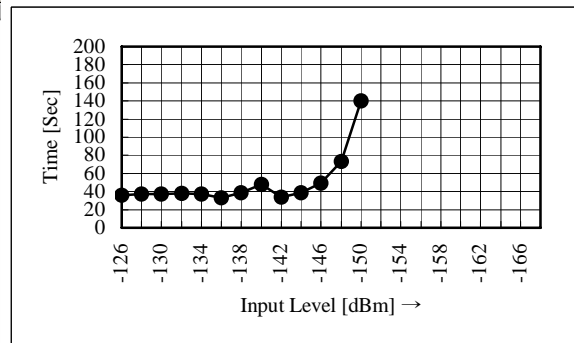
Re-Acquisition Time (After 60Sec)



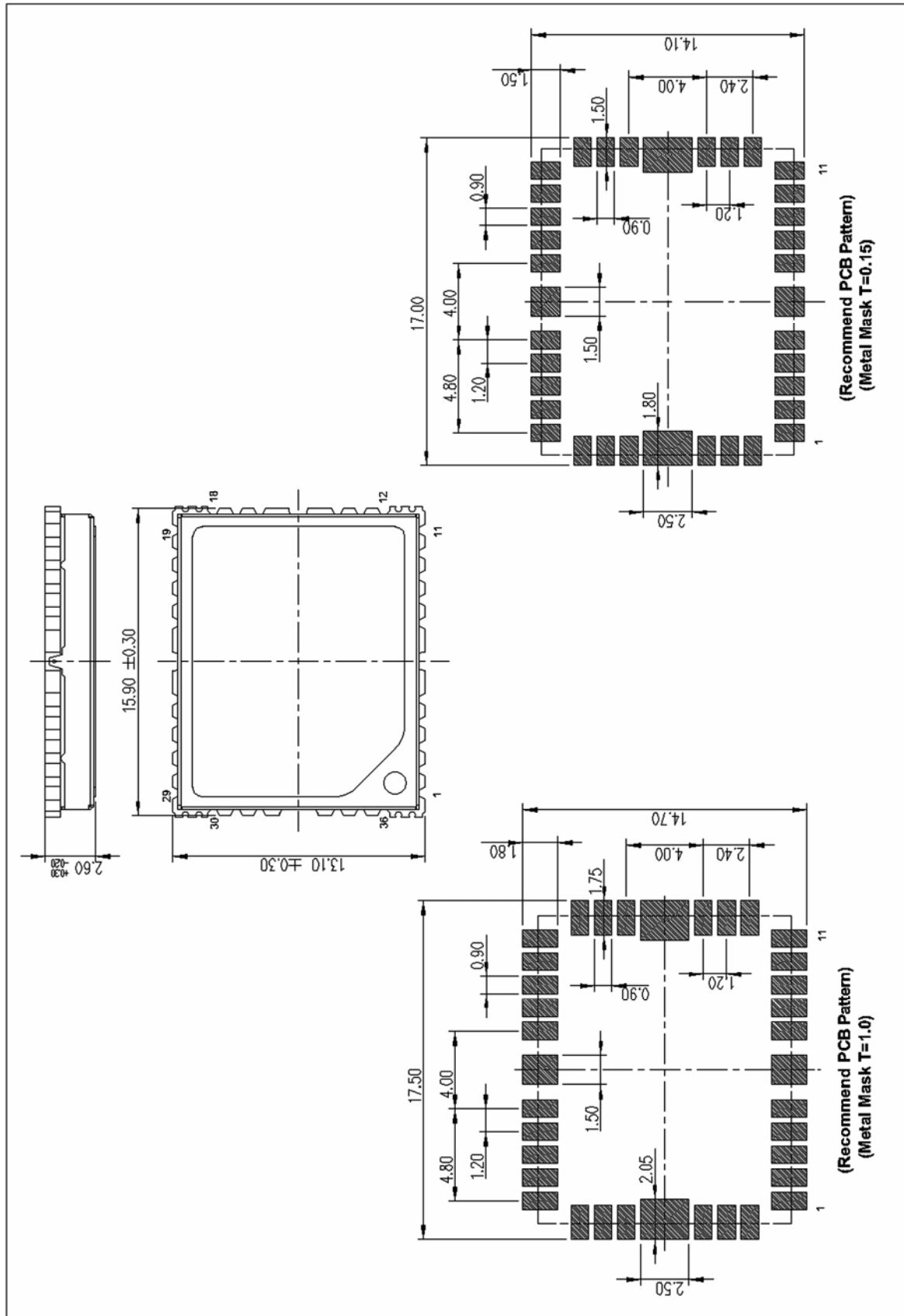
RF-IN Input Impedance



Cold Start Time (TTFF)

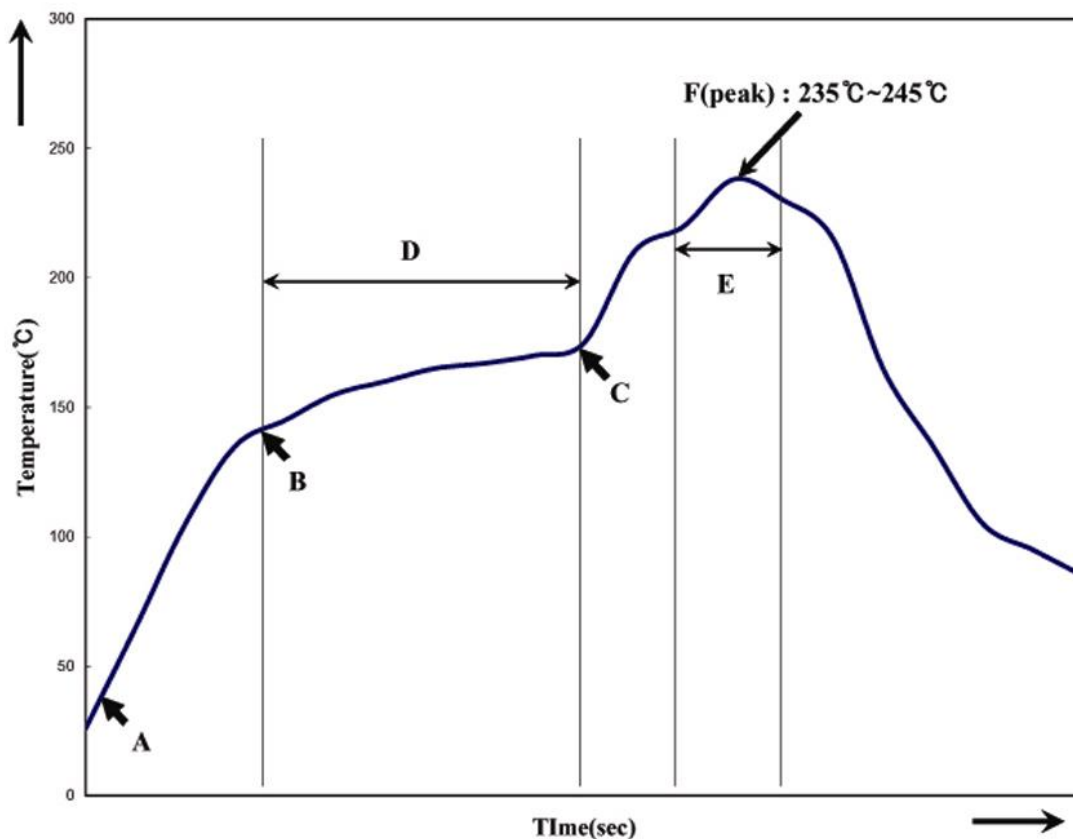


**11. Mechanical Specification & PCB PAD**



## 12. Reflow Profile

Recommendable Temperature Profile



Setting temperature

A : 20~30°C, B : 130~140°C, C : 180~190°C, F(peak): 235~245°C

Setting time

A ⇒ B : 40~60sec

B ⇒ C(D Section) : 80~120sec

Over 220°C : 40~60sec

Slope

A ⇒ B : 2~4°C/sec

C ⇒ F : 1~3°C/sec

**13. Packing**

**14. Application note 1**

