

GPS Engine Board

Gstar—GS-92m-J



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Revision history

Revision No.	Revision DATE	Issue	Note
1	30.JUN.2009	Draft 1.0	PCB : GS-92m-J
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1. Functional Description

Full self-contained GPS receiver

Fully shielded design

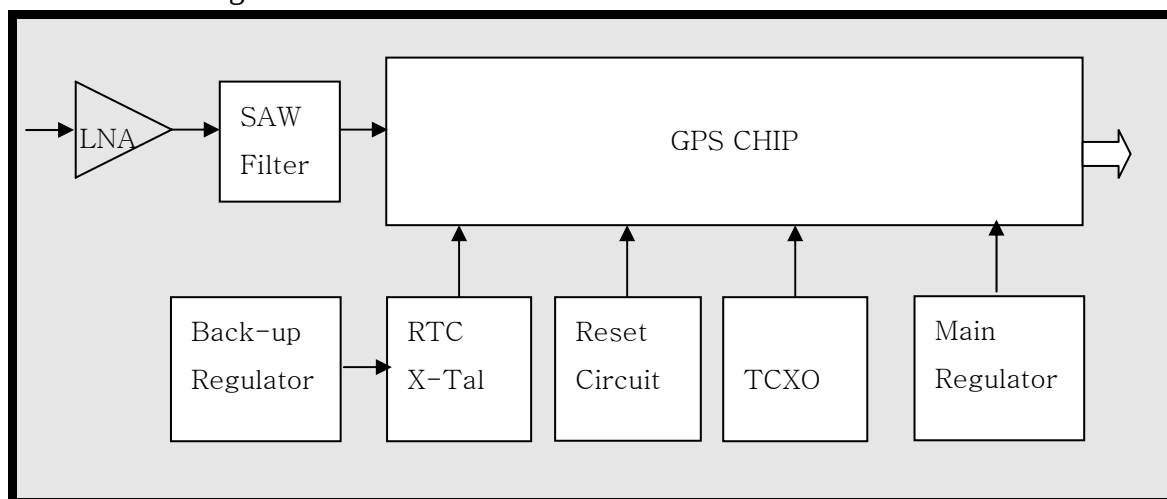
- High Performance GPS Single Chip
GPS DSP with integrated real time clock(RTC) ARM7EJ-S CPU
- Built-in 4Mbit program memory, Low noise amplifier, SAW filter, TCXO, regulators (LDO)
- 1 UART and USB 1.1 output
- 2 GPIO

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



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 60sec (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 40sec (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 < 1sec (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.

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	50 Ω (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

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	℃

IMPORTANT :

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

7. DC Characteristics (Test Temperature : 25℃ 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	℃

8. AC Characteristics

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

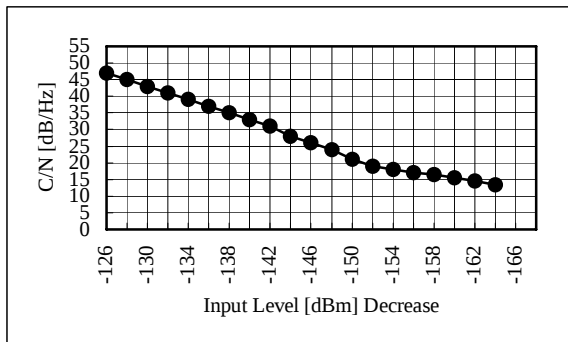
Parameter	Condition	Min	Typical	Max	Unit
RF_IN Input level				-40	dBm
RF_IN Input Impedance	Fo=1575.42MHz		50		Ω
Tracking Sensitivity (C/N)	3D (C/N avg. 15dB-Hz)		-164		dBm
Re- Tracking Sensitivity (C/N)	3D (C/N avg. 18dB-Hz)		-155		dBm
Cold start Sensitivity (C/N)	3D (SV 9EA in view)		-148		dBm
Cold 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

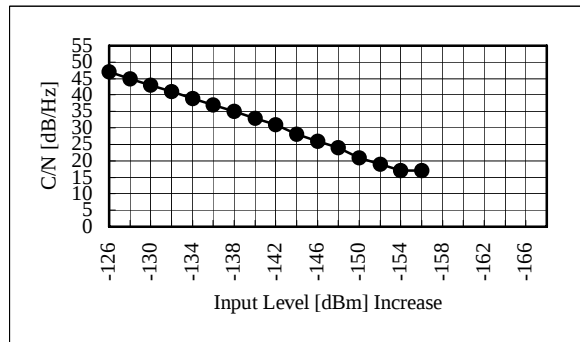
Parameter	Condition
Frequency	1575.42MHz
Polarization	RHCP
V.S.W.R	Less than 2.0
Impedance	50Ω
LNA Gain	24dB±2dB
Noise Figure	1.5dB(Max)
Band Attenuation	20dB(Min) @Fo±50MHz
Voltage	DC 2.7V(±10%)
Current	20mA(Max)

10. Performance Specification

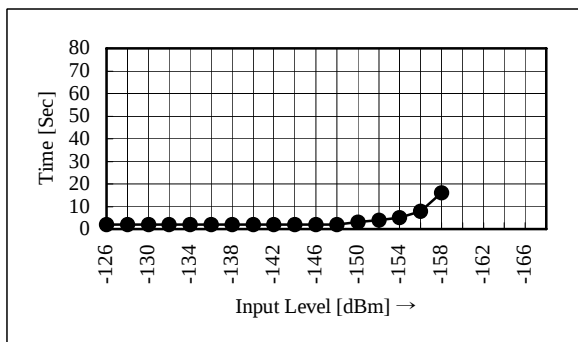
3D Tracking Sensitivity



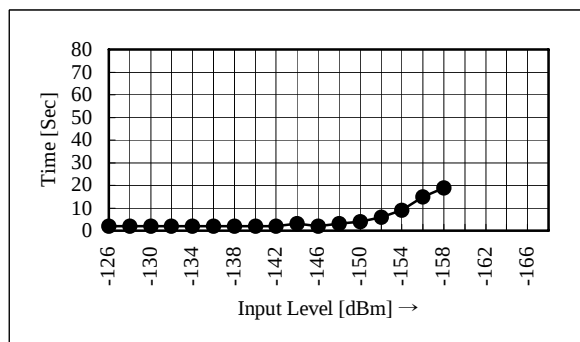
3D Re-Tracking Sensitivity



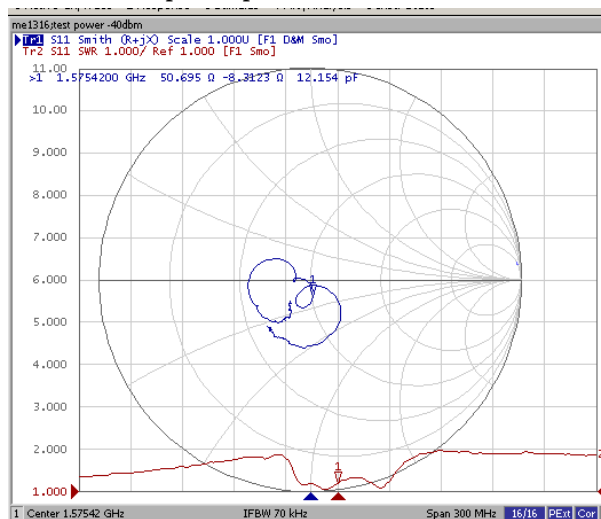
Re-Acquisition Time (After 5Sec)



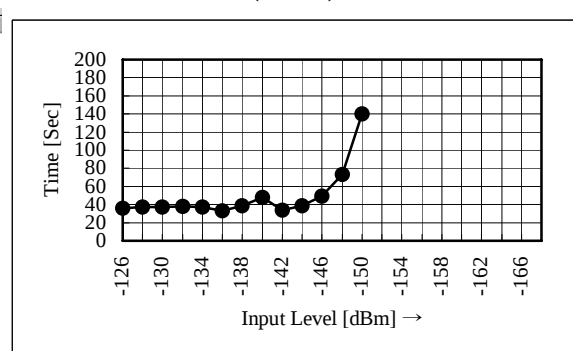
Re-Acquisition Time (After 60Sec)



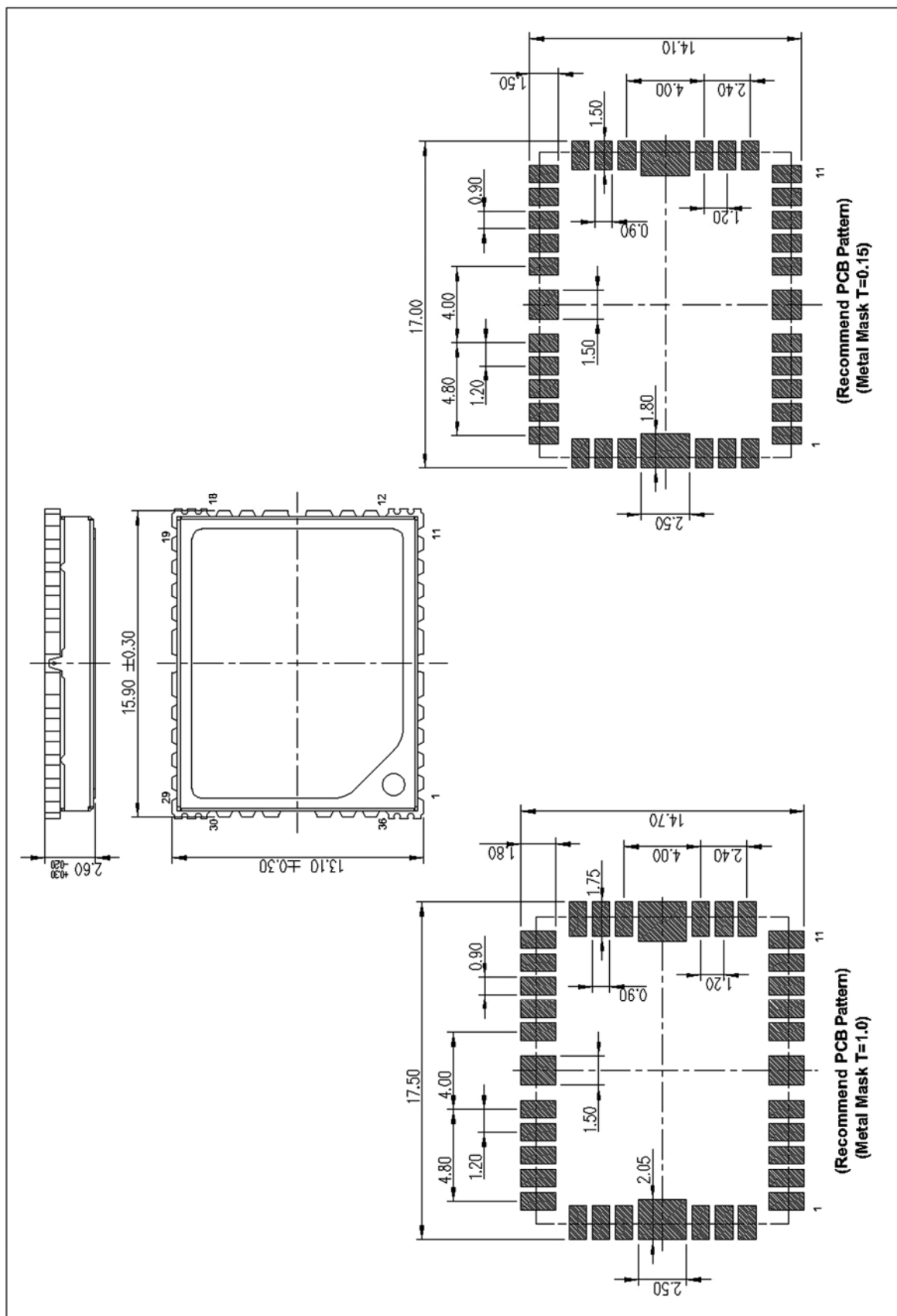
RF-IN Input Impedance



Cold Start Time (TTFF)

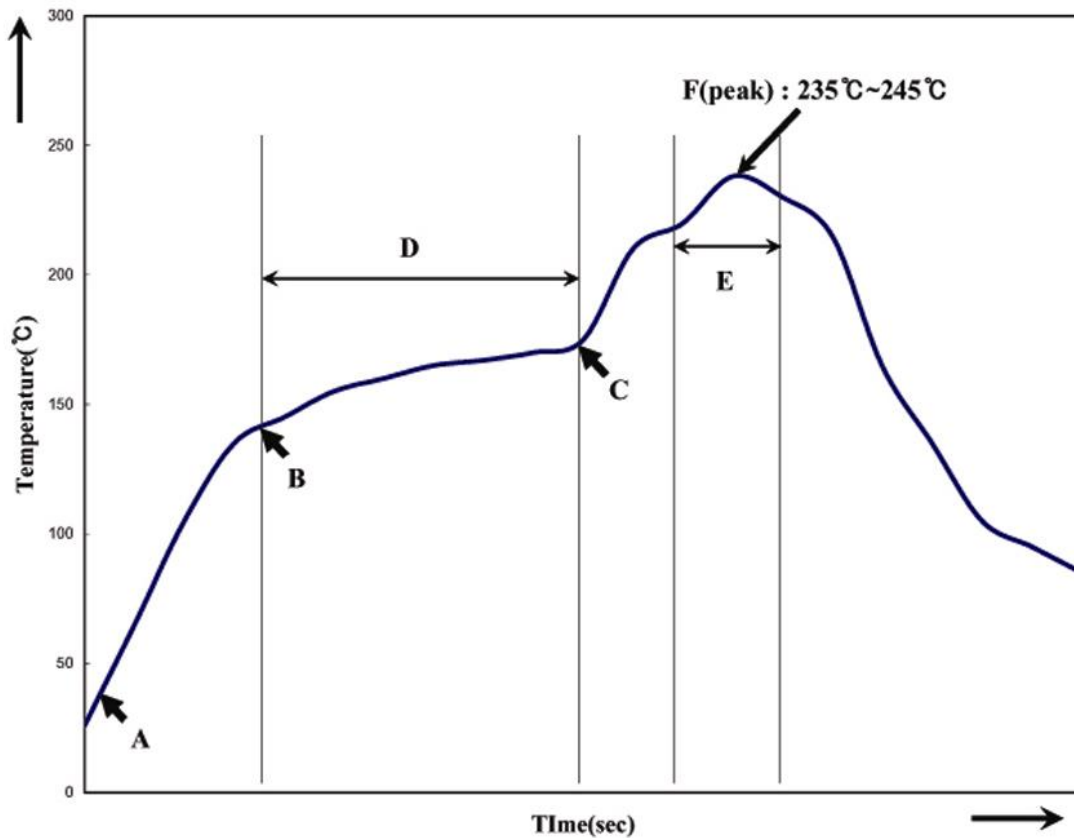


11. Mechanical Specification & PCB PAD



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

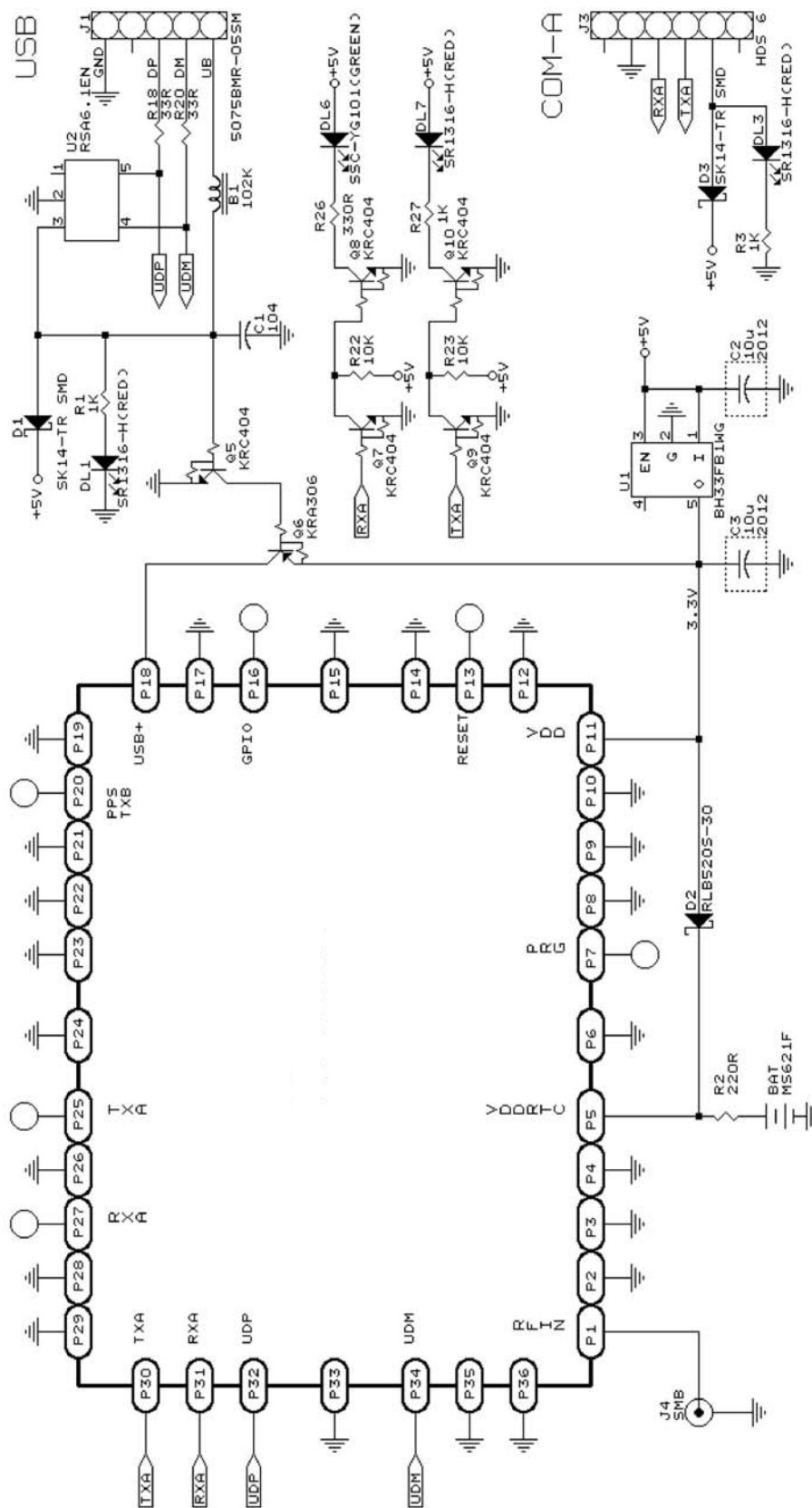
Slope

A ⇒ B : 2~4°C/sec

C ⇒ F : 1~3°C/sec

13. Packing

14. Application note 1



15. Order Information Sheet

Model name : GS-92m-J
Buyer name : _____
Order Date : _____
Quantity : _____

Buadrate COM_A : [_____] (ex) NONE,4800,9600,19200,38400,57600,115200

Buadrate COM_B : [_____] (ex) NONE/PPS,4800,9600,19200,38400,57600,115200

NMEA Massage : GGA[___], GLL[___], GSA[___], GSV[___], RMC[___], VTG[___]

(ex) 0: No Output Message, 1~10: Interval time(sec)

If buadrate is 4800bps that GSV Interval time is 5 sec

Special : _____

Default

Buadrate COM_A : [9600bps]

Buadrate COM_B : [NONE/PPS]

NMEA Massage : GGA[1], GLL[0], GSA[1], GSV[1], RMC[1], VTG[0]

Last 3D : on