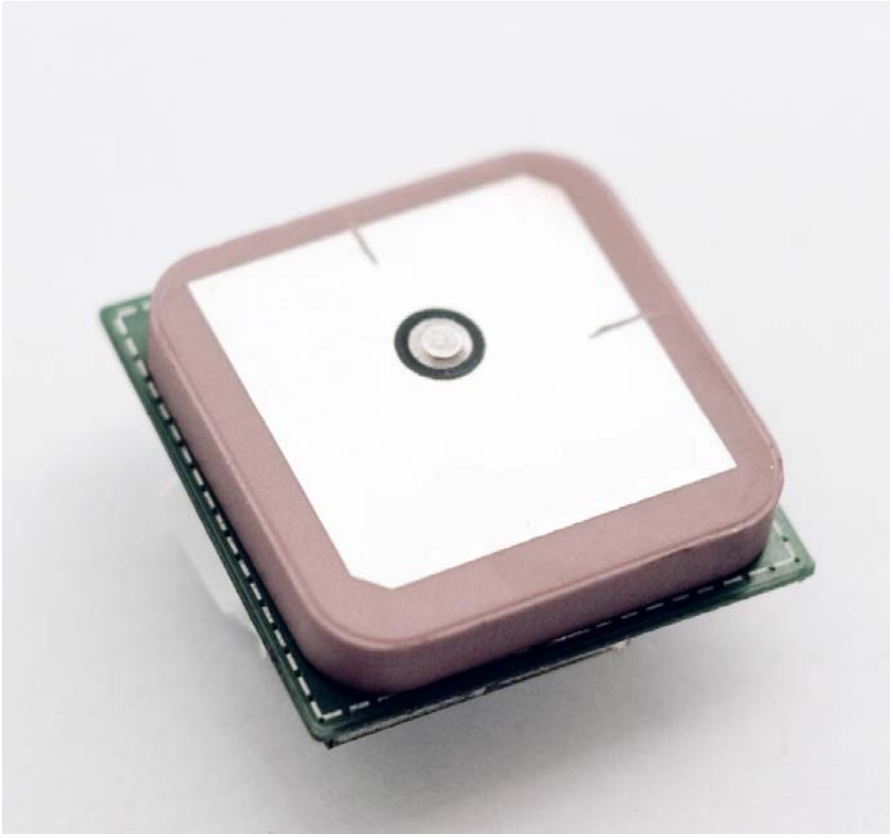
48-Channel GPS POT Module

with SiRFstarIV™ Chipset



FSP04

ftech Corporation
16 Nan-ke 9th Rd Science-based Industrial Park, Tainan 741, Taiwan, R.O.C.
Tel:+886-6-6008999 Fax:+886-6-5050826 http://www.f-tech.com.tw email: sales@f-tech.com.tw

History		
Date	**Rev.**	**Description**
2011/04/06	**A00**	**First Release**
2013/10/24	**A01**	**Information update**

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Description

The FSP04 is a POT (Patch on Top) GPS receiver module and include a complete navigation processor. The processor is designed by **SiRF Technology, Inc**., which is a pioneer of GPS chip for consumer applications. This GPS receiver can tracks to -163dBm, providing high sensibility, accuracy and availability. The embedded CGEE (Client Generated Extended Ephemeris) can capture ephemeris data from satellites locally and predicts ephemeris out to 3 days. So if the module was off within 3 days, it could complete positioning process less than 15 seconds. This GPS solution is designed for a small form and extensive applications. It delivers major advancements in GPS performances, accuracy, integration, computing power and flexibility. It is also designed to simplify the embedded system integration process.

Features

- Based on **SiRFstarIV™** GPS engine with SiRFaware™ technology
- ARM7 based application processor
- High sensitivity: -163dBm (tracking)
- Channels: 48 track verification channels
- Active Jammer Remover: Removes in-band jammers up to 80 dB-Hz, tracks up to 8 CW jammers
- Low power consumption: 55mA @ acquisition, 42mA @ tracking
- Embedded free CGEE technology for fast location fix
- Maximum update rate up to 5Hz
- GPS data interface: TTL level serial port (Optional RS232 port)
- Support NMEA 0183 standard / SiRF binary OSP
- Support SBAS – WAAS, EGNOS, MSAS, GAGAN
- Dimension：**26mm x 26mm x 11.7mm**
- RoHS compliant

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Chipset Characteristics

General	
Chipset	SiRF star IV GSD4e
Frequency	L1, 1575.42MHz
C/A Code	1.023 MHz
Channels	48 channels
SBAS	WAAS, EGNOS, MSAS, GAGAN Supported
Datum	WGS84
CPU	ARM7
Dimensions	
Length/Width/Height	26*26*11.7 mm
Weight	12 g
Performance Characteristics	
Position Accuracy	< 2.5m CEP (50%) without SA (horizontal)
	DGPS (SBAS (WAAS, EGNOS, MSAS, GAGAN))：2m
Velocity Accuracy	Speed < 0.01 m/s
	Heading < 0.01°
Sensitivity	Acquisition：-147dBm (Cold Start)
	Reacquisition：-160dBm
	Tracking：-163dBm
Maximum Update Rate	Up to 5Hz
Acquisition (Open sky, stationary)	
Reacquisition Time	Less than 1 second
Hot start	1.0s (Typical)
Warm start	35s (Typical)
Cold start	35s (Typical)
Dynamic	

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Altitude	Maximum 18,000m
Velocity	Maximum 515m/s
Power	
Input Voltage	DC 3.3V Typical
Power Consumption @ 3.3V	Acquisition：55mA Typical
	Tracking：42 mA Typical
I/O	
Signal Output	TTL level, 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) SiRF binary OSP
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)

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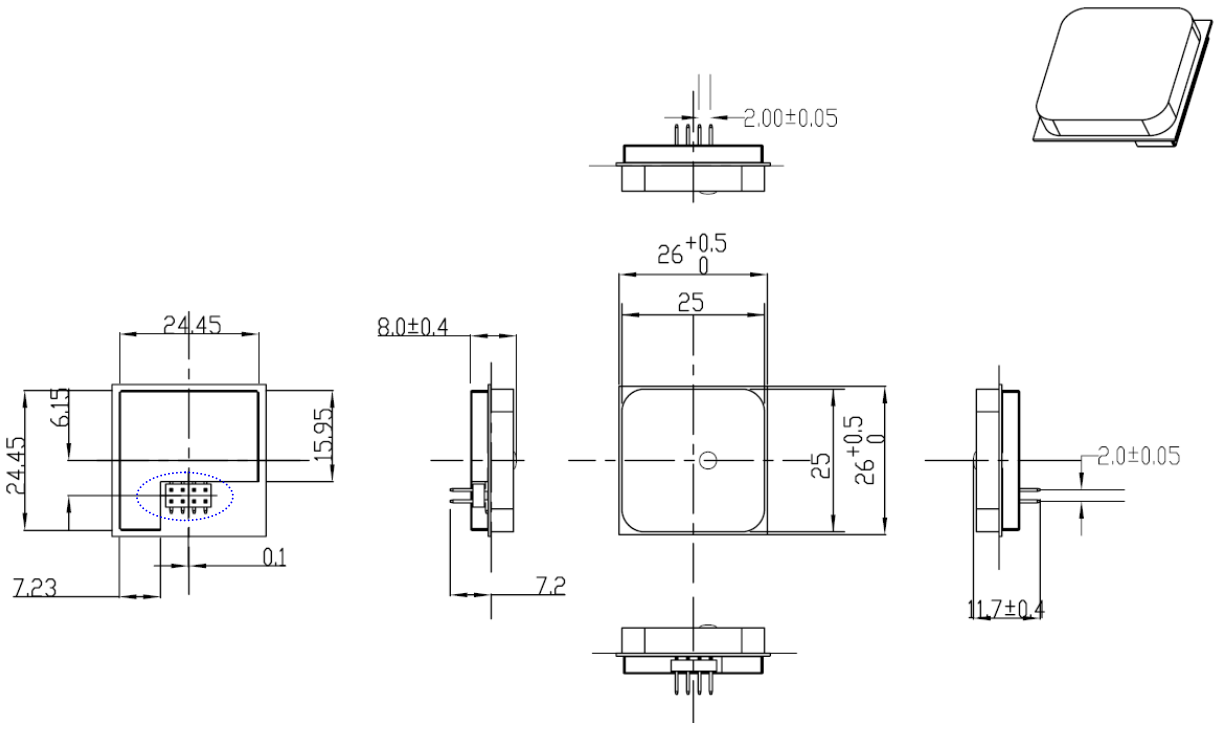
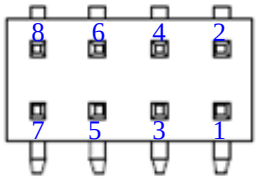
Mechanic Dimension





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Pin Definition

Pin	Name	I/O	Description
1	VCC	P	3.3V ± 5% DC Power Supply Input
2	GND	P	Ground
3	RX	I	Serial Data Input
4	TX	O	Serial data Output
5	3D_FIX	O	3D_FIX Indicator
6	GND	P	Ground
7	NSRESET	I	System Reset. Active low
8	EXANT	I	External Antenna Input

Description of I/O Pin

VCC (Pin1)

3.3V ± 5% DC power supply input.

GND (Pin2, 6)

The ground of the module.

RX (Pin3)

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

TX (Pin4)

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

NSRESET (Pin7)

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

EXANT (Pin8)

External Antenna Input.

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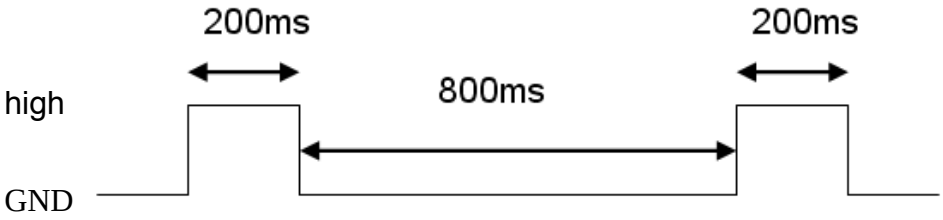
3D_FIX (Pin5)

The fix flag output. If not used, keep this pin floating.

- After 3D Fix

  The 3D_FIX should continuously output 200ms high-level with 800ms low-level signal.



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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.

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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 12
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
Geoid Separation	17.8	meters	Ellipsoid alt.=MSL alt. + Geoid sep.
Units	M	meters	Units of Geoid 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 SPS mode, fix valid
2	Differential GPS fix
6	Dead reckoning, fix valid

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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

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)

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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

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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 *(SiRF does not support magnetic declination)*
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*65		
<CR> <LF>			End of message termination

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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 *(SiRF 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

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