



GTS-4E GPS Module Datasheet

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Revision History

Version	Date	Remarks
V1.0.0	2011-01-21	Initial Release

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Abstract

Technical data sheet describing the cost effective, high-performance GTS-4E series of GPS modules. Features include low power consumption, FiboSense Indoor GPS providing best-in-class acquisition and tracking sensitivity, precision timing and an innovative jamming-resistant RF architecture. The compact 17.0 x 22.4 mm form factor of the highly successful GTS-4E series is maintained, enabling easy migration. The GTS-4E series supports passive and active antennas.

This module is a true system-on-chip architecture built on a low-power RF CMOS single-die, incorporating the baseband, integrated navigation solution, software, ARM7 processor, and RF

functions that form a complete standalone internal ROM-based or Aided-GPS engine.

ARM®

	<p>Products marked with this lead-free symbol on the product label comply with "Directive 2002/95/EC of the European Parliament and the Council on the Restriction Use of certain Hazardous Substances in Electrical and Electronic Equipment" (RoHS).</p>
	<p>This is an Electrostatic Sensitive Device (ESD). Observe precautions for handling.</p>

1 Functional Description

1.1 Overview

The GTS-4E designed by FIBOCOM basing on the SIRF-IV is a new generation of GPS receiving modules, and also in price competitive advantage. It's a new 48-channel ultra-high sensitive GPS receiving module. Based on new highly integrated SIRF-IV chips and meticulously integration key parts of FIBOCOM, casting a brand-new GTS - 4E products, in the same chip specifications, product has faster GPS signals ability to capture, lower power consumption, more strong anti-jamming performance and more wide working voltage range.

GTS - 4E module designed with industrial requirements, using stamps package, can adapt to wet high temperature, electromagnetic interference etc odiously working environment. It is widely used in monitoring, positioning, mapping, navigation, security applications such as the ideal platform.

FIBOCOM provide a free SiRFLive tool, to provide you with convenient module learning, evaluation, commissioning, diagnostic platform, simple multifarious development work of engineers, greatly accelerated the development cycle.

1.2 Highlights and Partnumber

Highlights

- 48-channel SIRF-IV engine
- <1 second Time To First Fix for Hot and Aided Starts(for GTS-4E-1x)
- -160dBm FiboSense sensitivity
- Up to three serial interfaces: 1 UART, 1 DDC (I2C compliant), 1 SPI (where available)
- 1 Hz position update rate
- FiboSense Indoor GPS with best-in-class acquisition and tracking sensitivity
- Supports AssistNow Online A-GPS service; OMA SUPL compliant (for GTS-4E-1x)
- SBAS engine(for GTS-4E-1x)
- Stationary Mode for GPS timing operation
- RoHS compliant

Naming rule of Part Number

Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Serials number:			Reserve	Reserve	0: NO EEPROM	0: NO ESD	0:UART
000:Base use(No DGPS and AGPS)					1: EEPROM ON	1: ESD ON	1:SPI
001:With DGPS and AGPS							
Other reserved							

Part Number in common use:

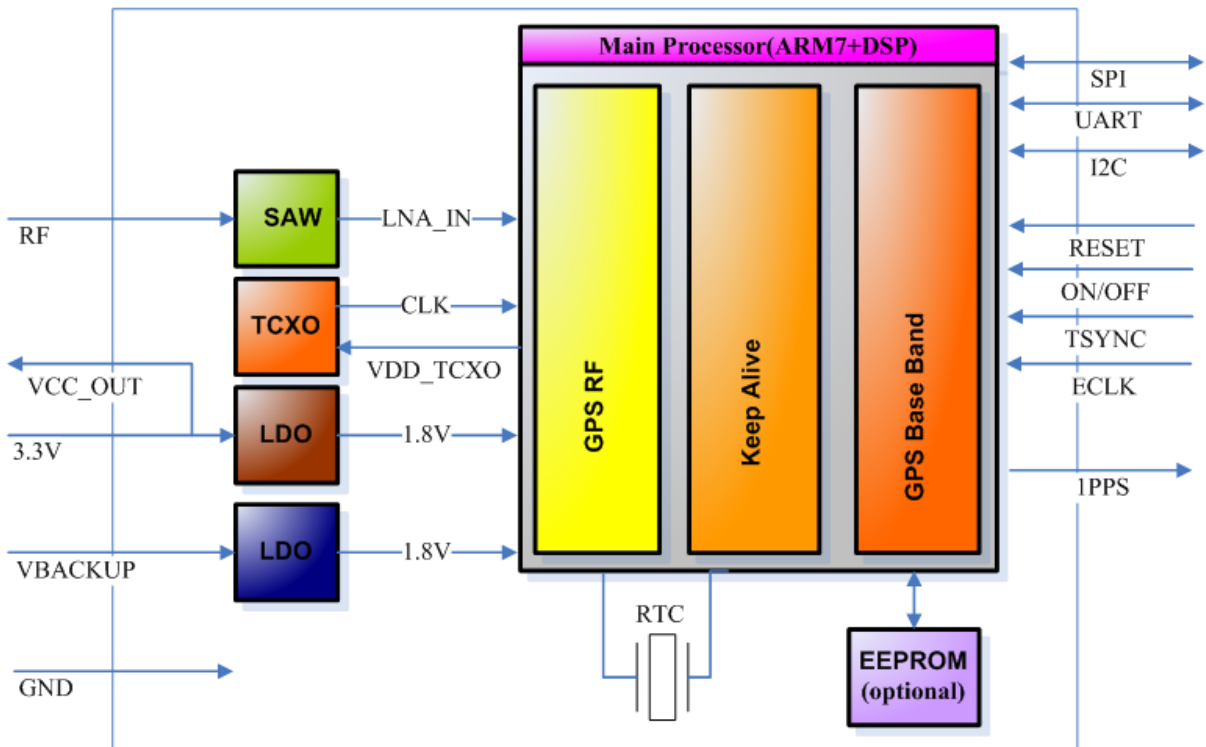
	UART	SPI	ESD	EEPROM	AGPS	DGPS	Lowpower
GTS-4E-00	●						●
GTS-4E-01		●					●
GTS-4E-02	●		●				●
GTS-4E-03		●	●				●
GTS-4E-08	●						●
GTS-4E-20	●				●	●	●
GTS-4E-21		●			●	●	●
GTS-4E-22	●		●		●	●	●
GTS-4E-23		●	●		●	●	●
GTS-4E-24	●			●	●	●	●
GTS-4E-26	●		●	●	●	●	●
GTS-4E-2E	●		●	●	●	●	●

1.3 GPS Performance

Parameter	Description	Performance			
		Min	Typ	Max	Unit
Horizontal Position accuracy	Autonomous	-	<2.5	-	m
Velocity Accuracy(b)	Speed	-	<0.01	-	m/s
	Heading	-	<0.01	-	°
Time To First Fix(c)	Hot start: Autonomous(d)	-	<1	-	s
	Warm start: Autonomous(e)	-	<35	-	s
	Cold start: Autonomous	-	<35	-	s
	MS Based: GSM coarse time	-	<4.7	-	s
	MS Assisted: GSM coarse time	-	<4.7	-	s
Sensitivity	Autonomous acquisition	-	-148	-	DB
	GSM / UMTS coarse time aided	-	-148	-	DB
	CDMA precise time aided	-	-160	-	DB
	Tracking	-	-163	-	DB
	Navigation	-	-160	-	DB
Receiver	Tracking L1, CA Code	-	-	-	-
	Channels	-	48	-	-
	Update rate	-	-	1	Hz
	Altitude	-	-	<18288	m
	Velocity	-	-	<1000	knots

	Protocol support NMEA,OSP	-	-	-	-
Power(f)	Continuous tracking	-	99	-	mW
	TricklePower: 1 Hz(200:1)	-	13	-	mW
	Hibernate current(Cut Off Main Power)	-	<600	-	μA
	Hibernate current(ON_OFF)	-	<190	-	μA

1.4 Block Diagram



Hardware Block Schematic

1.5 FiboSense Indoor GPS

GTS-4E come with FiboSense, providing ultra-fast acquisition/reacquisition and exceptional tracking sensitivity. FiboSense enables best-in-class tracking and navigation in difficult signal environments such as urban canyons or indoor locations.

1.6 Assisted GPS (A-GPS)

Supply of aiding information like ephemeris, almanac, rough last position and time and satellite status and an optional time synchronization signal will reduce time to first fix significantly and improve the acquisition sensitivity. GTS-4E-1x modules support the AssistNow Online and AssistNow Offline

A-GPS services and are OMA SUPL compliant.

1.7 Protocols

Protocol	Type
NMEA	NMEA 0183 ASCII, (Version 3.01, January 1, 2002)
OSP	SiRF Binary Protocol

Both protocols are available on UART and SPI. For specification of the various protocols see the GSD4e NMEA Manual .pdf and GSD4e OSP Manual .pdf.

1.8 Antenna

GTS-4E modules are designed for use with passive and active antennas.

Parameter	Specification
Antenna Type	Passive and active antenna
Antenna Supply	Using VCC_RF or external voltage source
Active Antenna Recommendations	Minimum gain 15 - 20 dB (to compensate signal loss in RF cable)
	Maximum noise figure 1.5 dB
	Maximum gain 50 dB

1.9 External Serial EEPROM

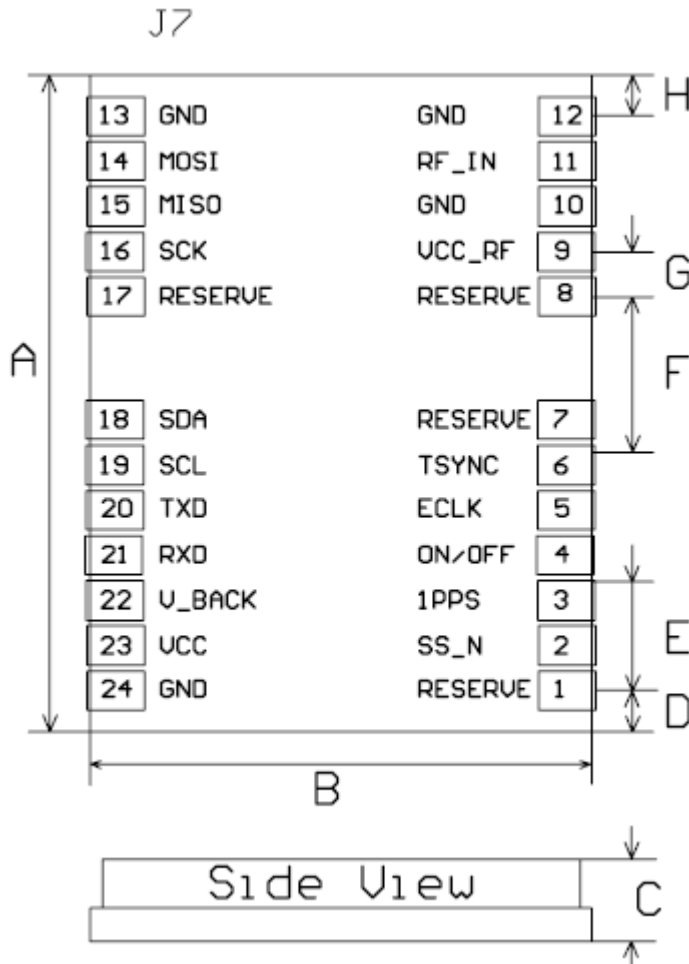
GTS-4E modules provide an I2C compliant DDC interface to connect an optional external serial EEPROM to store power-up configuration settings.

1.10 Work Mode

GTS-4E support four modes: Adaptive TricklePower(ATP), Push-to-Fix(PTF) , Advanced Power management (APM).

2 Mechanical Specifications

Parameter	Specification
A	16.0 +0.6/-0.1mm [628.8 +24/-4mil]
B	12.2 ±0.1mm [479.5 ±4mil]
C	3.0 ±0.2mm [117.9 ±8mil]
D	1.0 +0.3/-0.1mm [39.3 +18/-4mil]
E	1.1 ±0.1mm [43.2 ±4mil]
F	3.0 ±0.1mm [117.9 ±4mil]
G	1.1 ±0.1mm [43.2 ±4mil]
H	1 +0.3/-0.01mm [39.3 +18/-4mil]]
Weight	1.6g



For information regarding the Paste Mask and Footprint see the ***GTS-4E Hardware Integration Manual***.

2.1 Pin Assignment

No.	Name	I/O	Description
1	RESERVE		Do not connect
2	SS_N	I	SPI Slave Select
3	TIMEPULSE	O	Time pulse (1PPS)
4	ON/OFF	I	External ON/OFF Signal
5	ECLK	I	ECLK clock input for frequency aiding applications
6	TSYNC	I	TSYNC is the time transfer strobe input used in AGPS precise time aiding. Edges on this pin latch ACQCLK counter values, this helps message data to transfer time information between systems.
7	RESERVE		Do not connect
8	RESERVE		Do not connect
9	VCC_RF	O	Output Voltage RF section
10	GND	I	Ground
11	RF_IN	I	GPS signal input
12	GND	I	Ground
13	GND	I	Ground
14	MOSI	I	SPI MOSI
15	MISO	O	SPI MISO
16	SCK	I	SPI Clock
17	RESERVE		Do not connect
18	SDA	I/O	DDC Data
19	SCL	I/O	DDC Clock
20	TxD	O	Serial Port 1
21	RxD	I	Serial Port 1
22	V_BACK	I	Backup voltage supply
23	VCC	I	Supply voltage
24	GND	I	Ground

Pins designated Reserved should only be used with caution. For more information about Pinouts see the ***GTS-4E Hardware Integration Manual***

3 Electrical Specifications

3.1 Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Units
Power supply voltage (VCC)	Vcc	-0.5	5.5	V
Backup battery voltage (V_BCKP)	V_BACK	-0.5	5.5	V
Input pin voltage		-0.5	3.6	V
Storage temperature	Tstg	-40	85	°C

3.2 Operating Condition

Parameter	Symbol	Min	Typ	Max	Units
Power supply voltage (VCC)	Vcc	2.7	3.0	5.5	V
Sustained supply current					
Backup battery voltage	V_BACK	1.8	3.0	5.5	V
Backup battery current(Cut Main Power)	I_BACK	50	550	600	uA
Backup battery current(By ON/OFF)		50	130	150	
Input pin low voltage	Vil	-0.4	-	0.45	V
Input pin high voltage	Vih	1.26	-	3.6	V
Output pin low voltage for TXD	Voh	VCC-0.1	-	VCC	V
Output pin low voltage	Vol	-	-	0.40	V
Output pin high voltage	Voh	1.35	1.8	1.8	V
Antenna gain					
Receiver Chain Noise Figure	SEN	2.1	3.1	3.6	dB
AGC at minimum gain setting	-	-	-	62	dBm
AGC at mid gain setting	-	73.5	85.0	96.5	dB
Operating temperature	Topr	-40	-	85	°C

4 Default Settings

Interface	Settings
Serial Port 1 Output	4800 Baud, 8 bits, no parity bit, 1 stop bit Configured to transmit both NMEA and OSP protocols, but only following NMEA and no OSP messages have been activated at start-up: GGA, GSA, GSV, RMC
Serial Port 1 Input	4800 Baud, 8 bits, no parity bit, 1 stop bit Automatically accepts following protocols without need of explicit configuration: OSP, NMEA The GPS receiver supports interleaved OSP and NMEA messages.
TIMEPULSE (1Hz Nav)	1 pulse per second, synchronized at rising edge, pulse length 100ms
Power Mode	Full Power Mode

Related Documents

1. GSD4e NMEA Manual .pdf
2. GSD4e OSP Manual .pdf
3. GTS-4E_HardwareIntegrationManual