Product Approval Datasheet

P/N: FU-GT3-1010 Module

Functional Overview

The **FU-GT3-1010** designed by Dragon basing on the MT3339 is a new generation of GPS receiving module. It's up to 66 acquisition and 22 simultaneously tracking channel,ultra-high sensitive GPS receiving module. Based on new highly integrated MTK chips and meticulously integration key parts of Dragon. In the same chip specifications, this product has faster GPS signals ability to capture, lower power consumption, more strong anti-jamming performance and more wide working voltage range.

FU-GT3-1010 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.
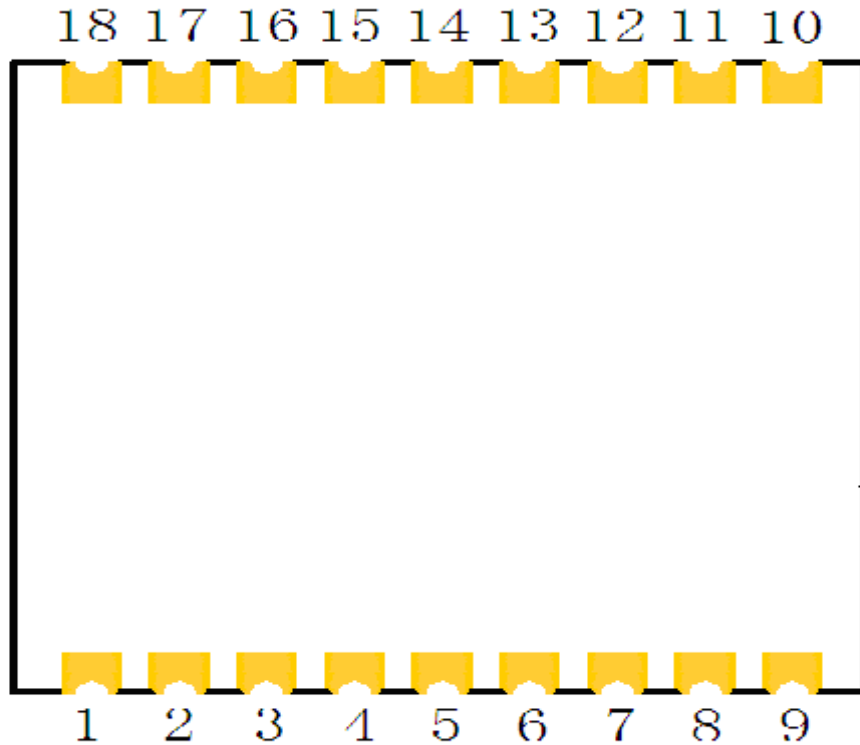
Applications

- Automotive navigation
- Personal positioning
- Fleet management
- Mobile phone navigation
- Marine navigation

Product Features

- MTK3339 high performance GPS Chipset
- Very high sensitivity (Tracking Sensitivity: -165 dBm)
- Extremely fast TTFF (Time To First Fix) at low signal level
- Support UART interface
- Built-in LNA(with in CHIP)
- Compact size (10.1mm x 9.7 mm x 2.0mm) suitable for space-sensitive application
- One size component, easy to mount on another PCB board
- Support NMEA 0183 V3.0 (GGA, GSA, GSV, RMC)
- Support OSP protocol
- MEMS Support: 3-axis Magnetometer for compass heading for "Point and Tell" feature
- MicroPower Mode (MPM) : Reduce MPM current consumption from <500 uA
- Support SBAS (WASS, EGNOS, MSAS, GAGAN)

Pin Assignment

Pin Description

Pin NO.	Pin Name	I/O	Remark
5.7.13.14 .1 5.16.17.18	NC		NC
4	1PPS	I/O	One pulse per second.
2	TX	O	This is the main transmits channel for outputting navigation and measurement data to user's navigation software or user written software. Output TTL level, 0V ~ 2.85V.
3	RX	I	This is the main receive channel for receiving software commands to the engine board from SiRFdemo software or from user written software.
9	RESET		Keep floating(System Reset,active low).
6	VBAT	I	This is the battery backup input that powers the SRAM and RTC, The battery voltage should be between 2.0v and
8	VCC	PW	Main power supply to the engine board.
11	RF IN	RF	GPS antenna input.
1.10.12	GND	G	Ground.

Electrical Characteristics

Absolute Maximum Rating

Parameter	Symbol	Min	Max	Units
Power Supply				
Power Supply Volt.	VCC	3.0	3.63	V
Backup Battery Volt	VBAT	3.0	3.63	V
Input Pins				
Input Pin Voltage I/O	RESET	-0.3	3.63	V
Input Pin Voltage I/O	RXA	-0.3	3.63	V
Antenna Bias DC Voltage	RF_IN	-0.3	5.0	V
Environment				
Storage Temperature	T_{stg}	-40	125	$^{\circ}$C
Peak Reflow Soldering Temperature	T_{peak}		260	$^{\circ}$C
Humidity			95	%

Note: Absolute maximum ratings are stress ratings only, and functional operation at the maxims is not guaranteed. Stress beyond the limits specified in this table may affect device reliability or cause permanent damage to the device. For functional operating conditions, refer to the operating conditions tables as follow.

Operating Condition

Parameter	Symbol	Condition	Min	Type	Max	Units
Power supply voltage	VCC	Relative to GND	3.0	3.3	3.6	V
Power supply voltage ripple	VCC_PP	Vcc=3.0V			30	mV
Consumption current	Icc	Vcc=3.0V		15	18	mA
Backup Battery voltage	VBAT	Relative to GND	3.0	3.3	3.6	V
Input high voltage	V_{IH}		2.0		3.6	V
Input low voltage	V_{IL}		-0.3		0.8	V
Output high voltage	V_{OH}		2.4		3.15	V
Output low voltage	V_{OL}		-0.3		0.4	V
Operating temperature	Topr		-40		85	$^{\circ}$C

Product Specifications

Parameter	Specification	
Chip	MTK3339	
Receiver Type	L1 frequency band 1575.42 MHz, C/A code, 12 Channels	
Sensitivity	Tracking	-165dBm
	Acquisition	-148dBm(cold)/-163dBm(hot)
Accuracy	Position < 5 M (Typical Open Sky)	
	Velocity 0.1m/s	
Acquisition Time	Cold Start	25s (Typical Open Sky)
	Warm Start	22s
	Hot Start	1s
Power Consumption	Tracking	18mA @3.3V Typical
	Acquisition	25mA @3.3V
Navigation Data Update Rate	1Hz	
Operational Limits	Altitude	Max 18,000m
	Velocity	Max 515m/s
	Acceleration	Less than 4g
Protocol Support	NMEA 0183 Ver.3.0 Default: 9600bps	
	1Hz: GGA,GSA,GSV,RMC	

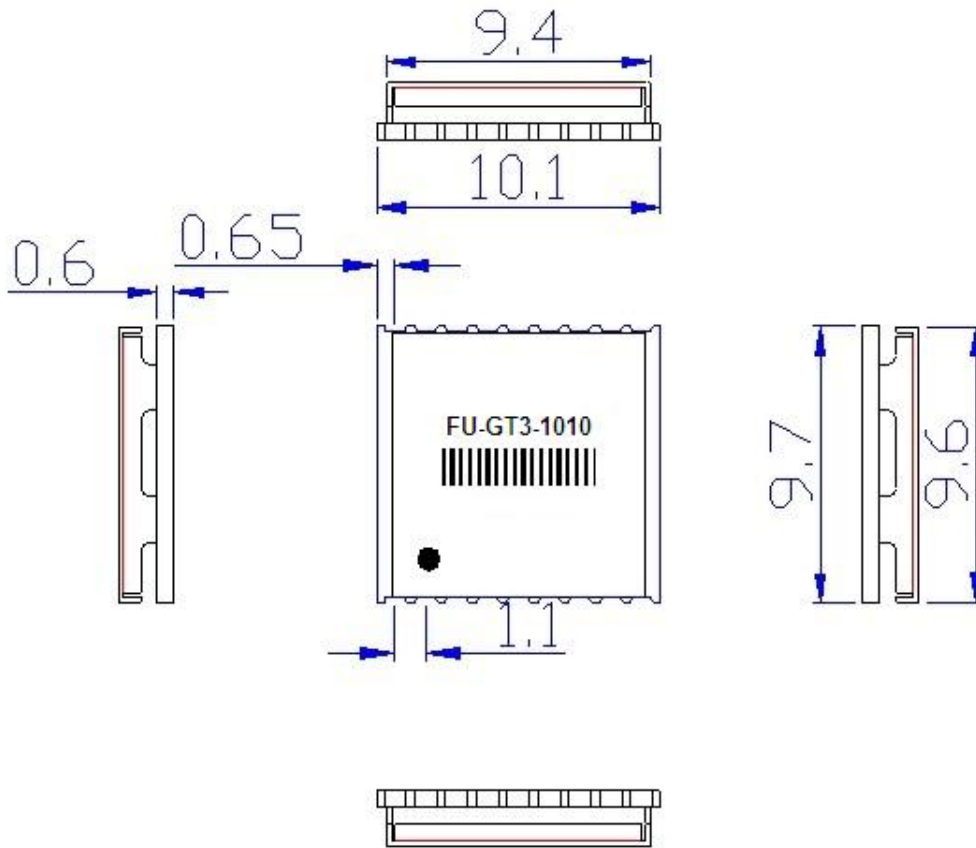## Mechanical Specification

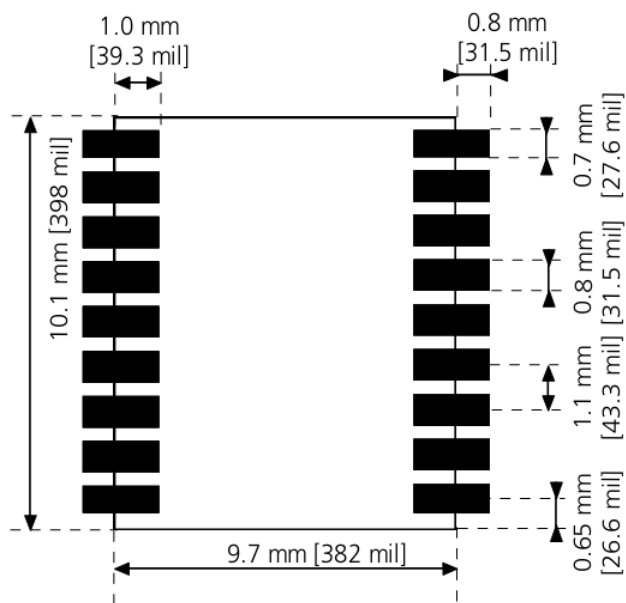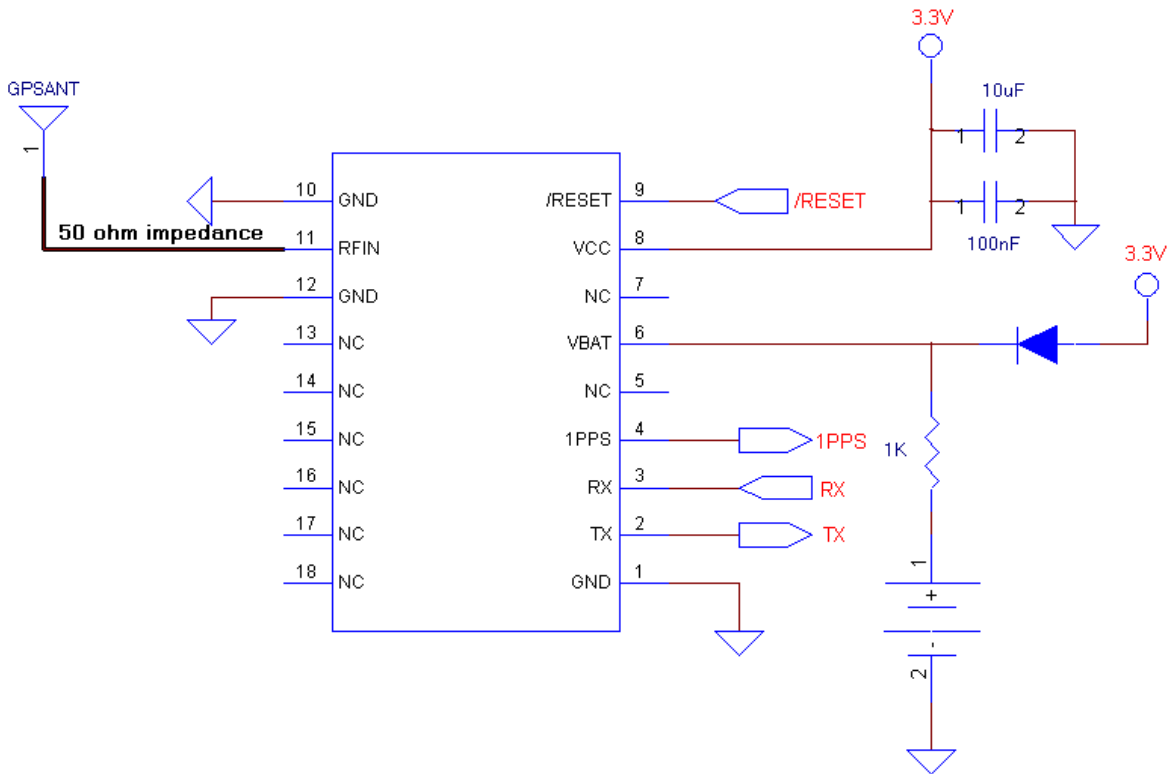**Figure 3: FU-GT3-1010 Dimensions   Unit: mm**

Recommended Layout PAD

Figure 4: FU-GT3-1010 PAD Style& Dimensions

Application

Application Circuit

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.)

OPERATING Description

TIMEMARK
This pin provides one pulse-per-second output from the board, which is synchronized to GPS time. This is not available in Trickle Power mode. If do not use it, Just NC.

Wake Up
System power controller, when **FU-GT3-1010** Power ON, this pin will output 3.3V$_{dc}$.

RF_IN
This pin receives signal of GPS analog via external active 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.

TX
This is the main transmits channel for outputting navigation and measurement data to user's navigation software or user written software. Output is TTL level, 0V ~ 3.3V.

RX
This is the main channel for receiving software commands from MTK demo software or from your proprietary software.

VBAT
This is the battery backup power input for the SRAM and RTC when main power is off. Without the external backup battery, **FU-GT3-1010** will always execute a cold star after turning on. To achieve the faster start-up offered by a hot or warm start, a battery backup must be connected. The battery voltage should be between 2.5V and 3.6V.

VCC
This is the main power supply to the engine board. (3.1Vdc to 3.6Vdc)

SOFTWARE COMMAND
NMEA Output Command

NMEA 0183 Protocol

The NMEA protocol is an ASCII-based protocol, Records start with a $ and with carriage return/line feed. GPS specific messages all start with $GPxxx where xxx is a three-letter identifier of the message data that follows. NMEA messages have a checksum, which allows detection of corrupted data transfers.

The **FU-GT3-1010** supports the following NMEA-0183 messages: GGA, GSA, RMC. The module default NMEA-0183 output is set up GGA, GSA, GSV, RMC and default baud rate is set up 9600bps.

Table 1: NMEA-0183 Output Messages

NMEA Record	DESCRIPTION
GGA	Global positioning system fixed data
GSA	GNSS DOP and active satellites
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data

GGA-Global Positioning System Fixed Data

Table 2 contains the values of the following example:

$GPGGA, 025438.000, 2232.8557,N, 1 1 3 5 5 . 7 4 3 8 ,E, 1,04,1.0, 65.5,M, ,M, ,0000*75

Table 2: GGA Data Format

Name	Example	Units	Description
Message ID	$GPGGA		GGA protocol header
UTC Time	025438.000		hhmmss.sss
Latitude	2232.8557		ddmm.mmmm
N/S indicator	N		N=north or S=south
Longitude	1 1 3 5 5 . 7 4 3 8		ddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	04		Range 00 to 12
HDOP	1.0		Horizontal Dilution of Precision
MSL Altitude	65.5	meters	Altitude above mean seal level
Units	M	meters	
Geoids Separation		meters	Separation from Geoids can be bank
Units	M	meters	
Age of Diff.Corr.		second	Null fields when DGPS is not Used
Diff.Ref.Station ID	0000		Null fields when DGPS is not Used
Checksum	*75		
<CR> <LF>			End of message termination(ASCII 13, ASCII 10)

Table 2-1: Position Fix Indicators

Value	Description
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3	GPS PPS Mode, fix valid

GSA-GNSS DOP and Active Satellites

Table 4 contains the values of the following example:

$GPGSA , A, 3, 07, 02, 26,27, 09, 04,15, , , , , ,1.8,1.0,1.5*33.

Table 4: GSA Data Format

Name	Example	Units	Description
Message	$GPGSA		GSA protocol header
Mode 1	A		See Table 4-2
Mode 2	3		See Table 4-1
Satellite Used	07		Sv on Channel 1
Satellite Used	02		Sv on Channel 2
…	…		…
Satellite Used			Sv on Channel 12
PDOP	1.8		Position Dilution of Precision
HDOP	1.0		Horizontal Dilution of Precision
VDOP	1.5		Vertical Dilution of Precision
Checksum	*33		
<CR> <LF>			End of message termination(ASCII 13, ASCII 10)

Table 4-1: Mode 1

Value	Description
1	Fix not available
2	2D
3	3D

Table 4-2: Mode 2

Value	Description
M	Manual-forced to operate in 2D or 3D mode
A	Automatic-allowed to automatically switch 2D/3D

GSV-GNSS Satellites in View

Table 5 contains the values of the following example:

$GPGSV , 2, 1, 07, 07, 79, 048, 42, 02, 51,062, 43, 26, 36,256, 42, 27, 27, 138,42*71

GPGSV , 2, 2, 07, 09, 23,313, 42, 04, 19, 159, 41, 15,12,041, 42*41.

Table 5: GSV Data Format

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Message	2		Range 1 to 3
Message Number	1		Range 1 to 3
Satellites in View	07		
Satellite ID	07		Channel 1(Range 1 to 32)
Elevation	79	degrees	Channel 1(Maximum 90)
Azinmuth	048	degrees	Channel 1(True, Range 0 to 359)
SNR(C/NO)	42	dBHz	Range 0 to 99,null when not tracking
…			…
Satellite ID	27		Channel 4(Range 1 to 32)
Elevation	27	degrees	Channel 4(Maximum 90)
Azimuth	138	degrees	Channel 4(True, Range 0 to 359)
SNR(C/NO)	42	dBHz	Range 0 to 99, null when not tracking
Checksum	*71		
<CR> <LF>			End of message termination(ASCII 13, ASCII 10)

Depending on the number of satellites tracked multiple messages of GSV data may be required.
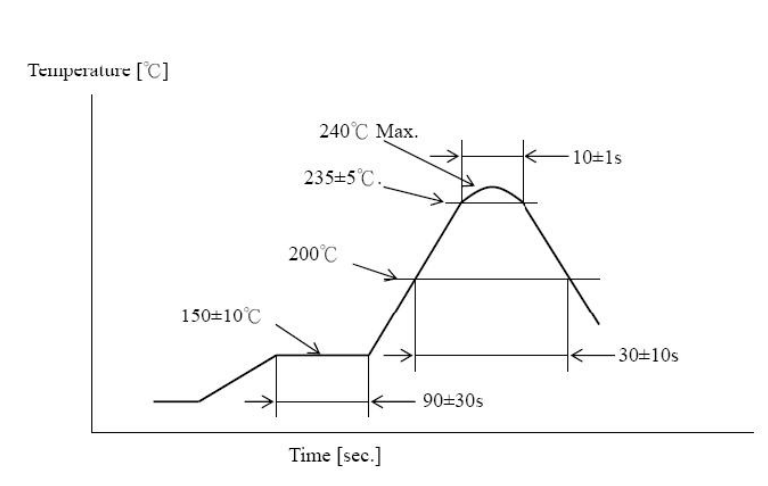
RMC-Recommended Minimum Specific GNSS Data

Table 6 contains the values of the following example:

$GPRMC, 025439.000, A, 2232.8557, N, 11355.7438, E, 0.13, 309.62, 031209, , *10

Table 6: RMC Data Format

Name	Example	Units	Description
Message ID	$GPRMC		RMC protocol header
UTC Time	025439.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2232.8557		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	11355.7438		Ddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.13	Knots	
Course Over Ground	309.62	Degrees	True
Date	031209		Dummy
Magnetic variation		Degrees	Not used
E/W indicator			Not used
Mode			Only NMEA0183 version 3.00 output
Checksum	*10	hexadecimal	
<CR> <LF>			End of message termination(ASCII 13, ASCII 10)

Recommended Reflow Profile:

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

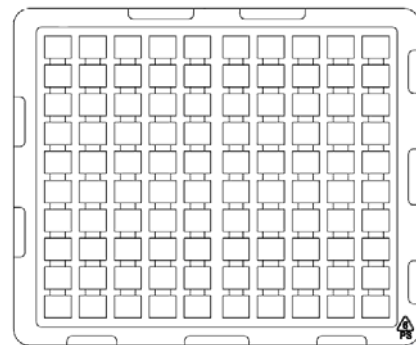Heating temperature: 235±5[℃]   Heating time: 10±1[sec.]

Peak temperature must not exceed 240 and the ℃ he duration of over 200℃ should be 30±10 Seconds.

The module package specification

The module package includes inner packing and outer packing,the accurate e-tray is used for inner packing,and the carton is used for outer packing.

Inner packing

- Size : 253(L) x 223(W) x 7(H) (mm)
- Packing unit : 100pcs of per tray
- Inner packing diagram

Outer packing

- Size : 262(L) x 223(W) x 86(H) (mm)
- Packing unit : 10 trays of per carton
- Quantity :   1000pcs of per carton
- Outer packing diagram