

66-Channels GPS Dongle *with MTK Chipset*

FGPMMOUDG

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GlobalTop Tech Inc.

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FGPMMOUDG GPS Dongle

Rev.A06

History		
Date	Rev.	Description
2008/05/14	A00	First Release
2009/05/08	A01	Page 6: Update Tracking Sensitivity -165dBm Update Reacquisition Sensitivity -160dBm Update rate up to 10Hz
2009/7/10	A02	Modify Max. Update Rate 5Hz to upgrade 10Hz (By firmware customization) Update chipset sensitivity spec. to -165dbm
2010/03/23	A03	Add Packing and Handling Section
2010/04/30	A04	Page12: Modify for RMC Magnetic Variation data
2011/05/13	A05	Update company contact information Notice: SBAS only support under 5Hz Add Firmware Customization Services
2011/08/03	A06	Remove RTCM description

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Description

FGPMMOUDG is a USB GPS module. This USB GPS receiver provides a solution that is high in position and speed accuracy performances, with high sensitivity and tracking capabilities in urban conditions. The GPS chipset inside the module is designed by **MediaTek Inc.**, the world's leading digital media solution provider and the largest fab-less IC company in Taiwan. This module can support up to **66 channels**. The GPS solution enables small form factor devices. It delivers major advancements in GPS performances, accuracy, integration, computing power and flexibility. It is designed to simplify the embedded system integration process. The module is the best choice for you to design the GPS related products.

Features

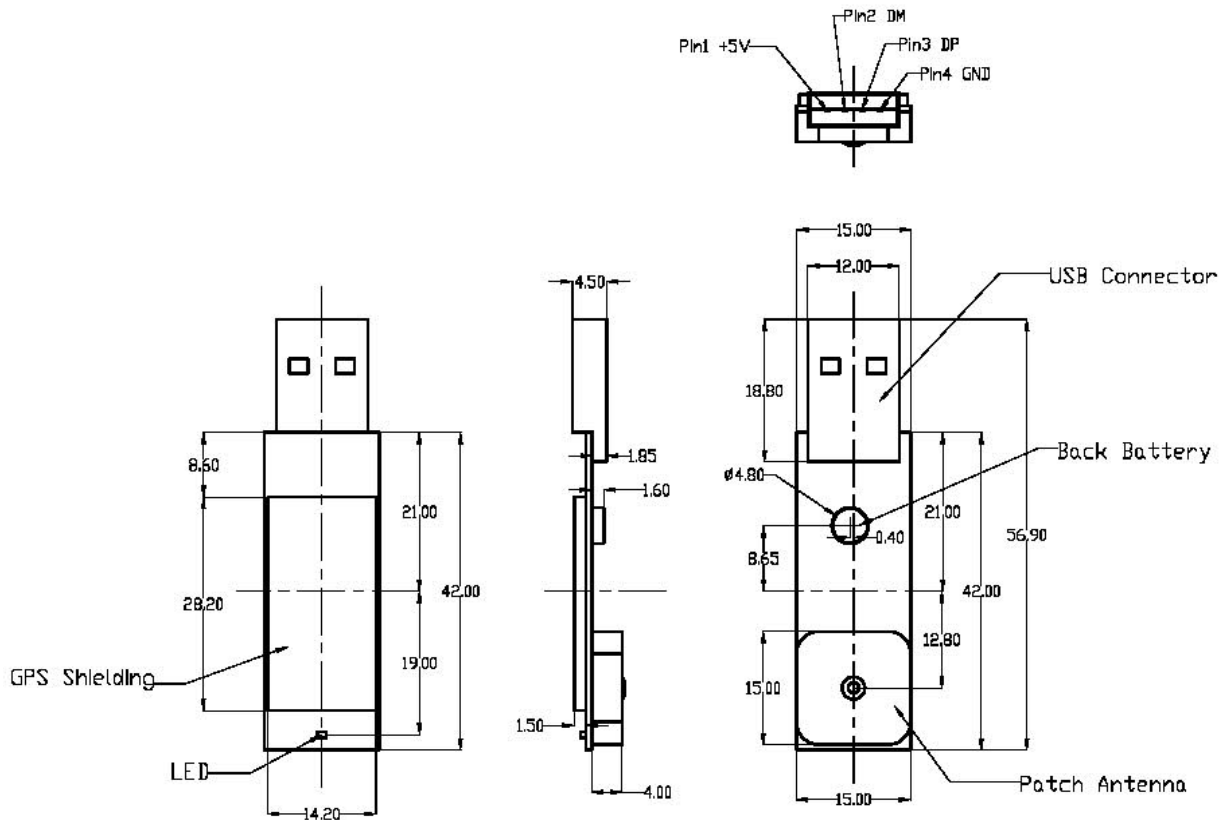
- MediaTek GPS technology
- L1 frequency, C/A code, 66-channel
- Embedded LNA and SAW filter
- Patch Antenna Size: 15mm x 15mm x 4mm
- High sensitivity: Up to -165dBm tracking, superior urban performance¹
- Position accuracy: Without aid: 3m 2D-RMS
DGPS (SBAS(WAAS, EGNOS, MASA)): 2.5m 2D-RMS
- Cold Start is under 35 seconds (Typical)¹
- Warm Start is under 34 seconds (Typical)¹
- Hot Start is under 1.0 second (Typical)¹
- Low power consumption: 48mA@ acquisition, 37mA@ tracking
- DGPS(WAAS, EGNOS, MSAS) support (optional by firmware)²
- Maximum update rate: up to 10Hz
- Operating systems: Windows 98/Me, 2000, XP, and Vista.
- RoHS compliant

¹ Reference to GPS chipset specification

² SBAS can only be enabled when update rate is less than or equal to 5Hz.

Mechanical

Dimension:(Unit: mm)

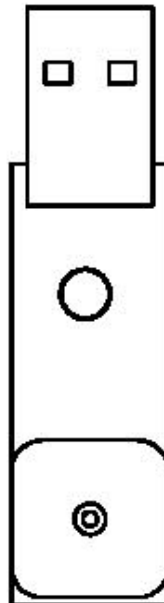
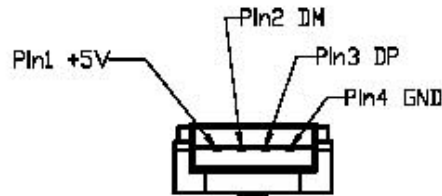


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Pin Configuration



Pin Definition

Pin	Name	I/O	Description
1	+5V	P	DC Supply Power Input
2	DM	I/O	USB Port D- Signal
3	DP	I/O	USB Port D+ Signal
4	GND	P	Ground

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FGPMMOUDG GPS Dongle

Rev.A06

Specification

General	
Chipset	MTK MT3329
Frequency	L1, 1575.42MHz
C/A Code	1.023 MHz
Channels	66 channels
SBAS	WAAS, EGNOS, MSAS Supported
Datum	WGS84(Default), Tokyo-M, Tokyo-A, User Define
CPU	ARM7EJ-S
Dimensions	
Length/Width/Height	59.9*15*6.3 mm
Weight	10g
Performance Characteristics	
Position Accuracy	Without aid: 3m 2D-RMS DGPS(SBAS(WAAS,EGNOS,MASA)):2.5m 2D-RMS
Velocity Accuracy	Without aid:0.1 m/s DGPS (SBAS (WAAS, EGNOS, MSAS)):0.05m/s
Acceleration Accuracy	Without aid:0.1 m/s ² DGPS (SBAS (WAAS, EGNOS, MSAS)):0.05m/s ²
Timing Accuracy	100 ns RMS
Sensitivity ¹	Acquisition:-148dBm (Cold Start) Reacquisition:-160dBm Tracking:-165dBm
Maximum Update Rate	Up to 10Hz (Default: 1Hz)
Acquisition (Open sky, stationary)	
Reacquisition Time ¹	Less than 1 second
Hot start ¹	1.0s (Typical)
Warm start ¹	34s (Typical)
Cold start ¹	35s (Typical)
Dynamic	
Altitude	Maximum 18,000m
Velocity	Maximum 515m/s

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Acceleration	Maximum 4G
Power	
Input Voltage	DC 5.0V \pm 10%
Power Consumption @ 5.0V	Acquisition:48mA Typical
	Tracking:37mA Typical
I/O	
Signal Output	8 data bits, no parity, 1 stop bit
Available Baud Rates	4800/9600/38400/57600/115200 bps (Default:9600 bps)
Protocols	NMEA 0183 v3.01 (Default:GGA,GSA,GSV,RMC,VTG) RTCM MTK NMEA Command Network Assistance Messages
Data output Interface	
USB Interface	Logo certified USB 2.0 full-speed compatible
Environment	
Operating Temperature	-30 °C to 85 °C
Storage Temperature	-40 °C to 125 °C
Operating Humidity	5% to 95% (no condensing)

¹ Reference to GPS chipset specification

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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,011528.000,2307.1203,N,12016.4430,E,1,7,1.11,18.3,M,17.8,M,,*6F

GGA Data Format		Table-2	
Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Time	011528.000		hhmmss.sss
Latitude	2307.1203		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4430		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table-3
Satellites Used	7		Range 0 to 14
HDOP	1.11		Horizontal Dilution of Precision
MSL Altitude	18.3	meters	Antenna Altitude above/below mean-sae-level
Units	M	meters	Units of antenna altitude
Geoidal Separation	17.8	meters	
Units	M	meters	Units of geoidal separation
Age of Diff. Corr.		second	Null fields when DGPS is not used
Checksum	*6F		
<CR> <LF>			End of message termination

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Position Fix Indicator		Table-3
Value	Description	
0	Fix not available	
1	GPS fix	
2	Differential GPS fix	

GSA—GNSS DOP and Active Satellites

Table-4 contains the values for the following example:

\$GPGSA,A,3,23,05,13,04,17,12,10,,,,,1.44,1.11,0.92*0F

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	23		SV on Channel 1	
Satellite Used	05		SV on Channel 2	
....	
Satellite Used			SV on Channel 12	
PDOP	1.44		Position Dilution of Precision	
HDOP	1.11		Horizontal Dilution of Precision	
VDOP	0.92		Vertical Dilution of Precision	
Checksum	*0F			
<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)	

GSV—GNSS Satellites in View

Table-7 contains the values for the following example:

\$GPGSV,2,1,08,17,52,126,47,04,49,015,49,10,40,238,46,13,34,071,46*7A

\$GPGSV,2,2,08,12,20,299,43,23,13,046,45,05,12,304,44,02,,,48*4A

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GSV Data Format

Table-7

Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Number of Messages	2		Range 1 to 3 <i>(Depending on the number of satellites tracked, multiple messages of GSV data may be required.)</i>
Message Number1	1		Range 1 to 3
Satellites in View	08		
Satellite ID	17		Channel 1 (Range 1 to 32)
Elevation	52	degrees	Channel 1 (Maximum 90)
Azimuth	126	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	47	dBHz	Range 0 to 99, (null when not tracking)
....
Satellite ID	13		Channel 4 (Range 1 to 32)
Elevation	34	degrees	Channel 4 (Maximum 90)
Azimuth	071	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	46	dBHz	Range 0 to 99, (null when not tracking)
Checksum	*7A		
<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,011528.000,A,2307.1203,N,12016.4430,E,0.21,198.97,170407,3.05,W,A*5A

RMC Data Format		Table-8	
Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	011528.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2307.1203		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4430		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.21	knots	
Course Over Ground	198.97	degrees	True
Date	170407		ddmmyy
Magnetic Variation	3.05, W	degrees	E=east or W=west (Need GlobalTop Customization Service)
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*5A		
<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,198.97,T,,M,0.21,N,0.39,K,A*3D

VTG Data Format		Table-9	
Name	Example	Units	Description
Message ID	\$GPVTG		VTG protocol header
Course	198.97	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic (Need Global Top customization service)
Speed	0.21	knots	Measured horizontal speed
Units	N		Knots
Speed	0.39	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*3D		
<CR> <LF>			End of message termination

MTK NMEA Command Protocol

Packet Type:

103 PMTK_CMD_COLD_START

Packet Meaning:

Cold Start: Don't use Time, Position, Almanacs and Ephemeris data at re-start.

Example:

\$PMTK103*30<CR><LF>

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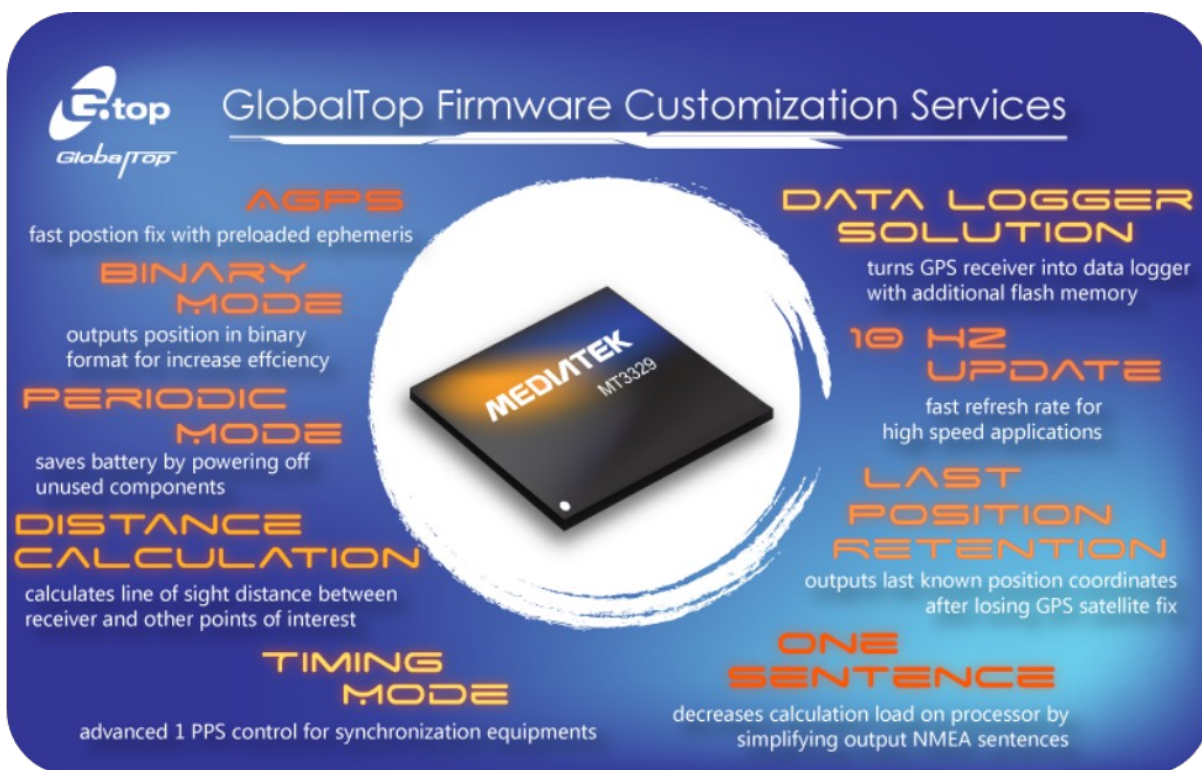
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Firmware Customization Services

GlobalTop also offers flexible, value-adding GPS firmware customization services that maximizes the over system efficiencies and power consumptions. Latest functions like Binary Mode, 1-Sentence Output, Geo-fencing and Last Position Retention, please see our website at www.gtop-tech.com under Products / GPS Modules / Software Services for more details.

Note: Not all firmware customization services listed below are supported by Gmm-u5j. Please contact GlobalTop Sales or Technical Support for more details.



GlobalTop **GlobalTop Firmware Customization Services**

AGPS
fast position fix with preloaded ephemeris

BINARY MODE
outputs position in binary format for increase efficiency

PERIODIC MODE
saves battery by powering off unused components

DISTANCE CALCULATION
calculates line of sight distance between receiver and other points of interest

TIMING MODE
advanced 1 PPS control for synchronization equipments

DATA LOGGER SOLUTION
turns GPS receiver into data logger with additional flash memory

10 HZ UPDATE
fast refresh rate for high speed applications

LAST POSITION RETENTION
outputs last known position coordinates after losing GPS satellite fix

ONE SENTENCE
decreases calculation load on processor by simplifying output NMEA sentences

MEDIATEK MT3329



GlobalTop **GlobalTop Firmware Customization Services**

AGPS
fast position fix with preloaded ephemeris

BINARY MODE
outputs position in binary format for increase efficiency

PERIODIC MODE
saves battery by powering off unused components

DISTANCE CALCULATION
calculates line of sight distance between receiver and other points of interest

TIMING MODE
advanced 1 PPS control for synchronization equipments

DATA LOGGER SOLUTION
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MEDIATEK MT3329

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Packing and Handling

GPS modules, like other electronic components, are sensitive electrostatic discharges and temperature. By following the standards outlined in this document for GlobalTop GPS module storage and handling, it is possible to reduce the chances of them being damaged during production set-up. This document will go through the basics on how GlobalTop packages its modules to ensure they arrive at their destination without any damages and deterioration to performance quality.

⚠ Please read the sections II to V carefully to avoid damages permanent damages due to moisture intake

⚠ GPS receiver modules contain highly sensitive electronic circuits and are electronic sensitive devices and improper handling without ESD protections may lead to permanent damages to the modules. Please read section VI for more details.

Packing

GlobalTop GPS modules are packed in such a way to ensure the product arrives to SMD factory floor without any damages.

GPS modules are placed individually on to the packaging tray. The trays will then be stacked and packaged together.

Included are:

1. Two packs of desiccant for moisture absorption
2. One moisture level color coded card for relative humidity percentage.

Each package is then placed inside an antistatic bag (or PE bag) that prevents the modules from being damaged by electrostatic discharge.



Figure 1: One pack of GPS modules

Each bag is then carefully placed inside two levels of cardboard carton boxes for maximum protection.



Figure 2: Box protection

The moisture color coded card provides an insight to the relative humidity percentage (RH). When the GPS modules are taken out, it should be around or lower than 30% RH level.

Outside each electrostatic bag is a caution label for moisture sensitive device.

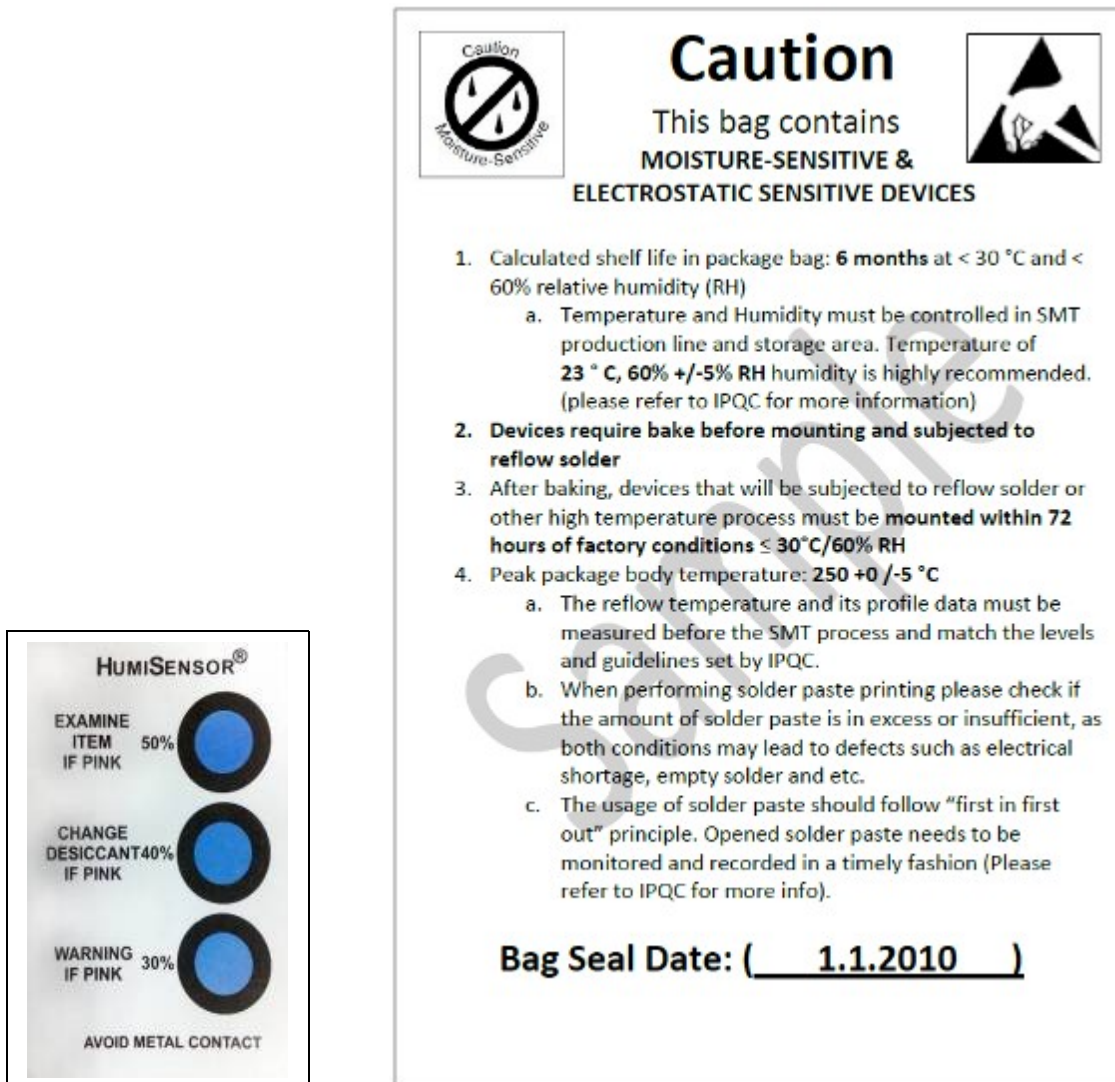


Figure 3: Example of moisture color coded card and caution label

Storage and Floor Life Guideline

The approximate shelf life for GlobalTop GPS modules packages is 6 months from the bag seal date, when store in a non-condensing storage environment (<30°C/60% RH)

▲ It is important to note that it is a required process for GlobalTop GPS modules to undergo pre-baking procedures, regardless of the storage condition.

ESD Handling

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Please carefully follow the following precautions to prevent severe damage to GPS modules.

GlobalTop GPS modules are sensitive to electrostatic discharges, and thus are Electrostatic Sensitive Devices (ESD). Careful handling of the GPS modules and in particular to its patch antenna (if included) and RF_IN pin or connector, must follow the standard ESD safety practices:

- ✓ Unless there is a galvanic coupling between the local GND and the PCB GND, then the first point of contact when handling the PCB shall always be between the local GND and PCB GND.
- ✓ Before working with RF_IN pin or connector, please make sure the GND is connected
- ✓ When working with RF_IN pin or connector, do not contact any charges capacitors or materials that can easily develop or store charges such as patch antenna, coax cable, soldering iron.
- ✓ Please do not touch the mounted patch antenna to prevent electrostatic discharge from the RF input.

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