

参考資料

## **GNSS Module** **SMD type** (without Antenna)

# GYSFFMANC

【お願い】GNSS受信機キット、受信モジュール、各種ソフトウェア、技術資料等に関するご質問は、株式会社秋月電子通商にお問い合わせください。

お問い合わせ先: <https://akizukidenshi.com/catalog/contents2/contact.aspx/>

# GYSFFMANC

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Rev. record

11-Dec-2018 Ver.1.0

# GYSFFMANC

Control No. HD-AG-A171181	(1/3)	Control name 一般事項書
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## 一般事項書

### (1)適用

本仕様書は、太陽誘電株式会社(“弊社”)により製造される GNSS 用 モジュール “ GYSFFMANC ”(“本製品”)に適用する。

### (2)内 容

① 品名 : GYSFFMANC

### ② 機能・特徴 :

- GNSS モジュール(GPS L1:1575.42MHz)  
(GLONASS L1:1598.0625~1605.375MHz)
- 26ch tracking / 99ch acquisition – GPS/GLONASS/QZSS/SBAS レシーバー
- 12 multi-tone Active Interference Canceller(AIC)
- Support multi-GNSS, QZSS, SBAS(WAAS / EGNOS / MSAS / GAGAN )
- 付加機能
  - AlwaysLocate™ Advanced location awareness technology
  - EPO™ / HotStill™ orbit prediction
  - EASY™ self-generation orbit prediction
  - Logger function support
- インターフェース UART
- 低消費電力
- 高性能内蔵部品 LNA, TCXO, RTC, SAW\_FL

③ 用 途 : 一般コンシューマ用機器

④ 構 造 : シリコン半導体を用いた混成集積回路  
お客様での Pb フリー実装可否(本製品の耐熱性) : 可能

⑤ 外 形: 10.0(typ)×10.8(typ)×2.05(max) 46ピン リードレスチップキャリア

⑥ 表 示 : 金属ケース上に製品名、ロット No.を印字

⑦ 梱包形態 : テープ&リール(量産時)

# GYSFFMANC

Control No. HD-AG-A171181	(2/3)	Control name 一般事項書
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⑦ その他:

a. 保証

i) 本製品の保証使用条件は本仕様書の通りです。

本保証条件以外の条件で御使用になった結果発生した不良・不具合につきましては、弊社は責任を負い兼ねますので御了承下さい。また、過電圧等本保証条件以外の条件で御使用になった場合、ショートモードで破壊する場合があります。安全性の確保のために、フューズや過電流保護回路等の追加をお願い致します。

ii) 本製品はUSが運用するGPSシステムを利用した製品であり、本製品の用途が当該規格に従わない製品への使用の場合、弊社は第三者の知的財産権の侵害に基づきいかなる責任を負いません。また、弊社は本製品が本仕様書に準拠することのみを保証するもので、その他の応用についての保証等いかなる保証を行うものではありません。

iii) 本製品を構成する部材の一部について、代替品を使用する場合があります。代替使用は、本仕様書に記載された保証範囲(特性、外形、使用条件、信頼性、公的規格(電波法等))、および品質に照らし、弊社にて代替(完全な置換え)が可能と判断致しましたGPS IC以外の部材を対象とさせていただきます。尚、使用した部材種についての追跡性は製造ロット毎に確保されます。

b. 使用上の注意事項

i) 本製品は、耐放射線設計をしておりませんので、放射線のストレスを受ける環境下での使用は避けて下さい。

ii) 本製品の動作は、周囲の電波環境及び機器環境により確立又は維持し難くなることがあります。

iii) 本仕様書に記載されている本製品は、民生機器用として製造されております。従って、高度の安全性や信頼性が求められる医療用機器、宇宙用機器、あるいは防災機器等にお使いになる際には、本製品の適合性をお客様の独自の責任で十分に評価、検討され、判断下さい。又、一般機器において御使用になる場合にも、お客様の独自の責任で十分な安全性評価を実施され、必要に応じて設計時に保護回路等を追加してください。

c. サポート条件

i) 本製品の基本特性を確保・維持するためのファームウェアの書換えを弊社にて実施して頂く場合がございます。その際、お客様機器に組み込んだ状態でファームウェアの書換えができるよう、システム設計をお願い申し上げます。

ii) 弊社では、本製品に内蔵されているファームウェアについて十分な品質評価・検証を行っておりますが、お客様におかれましても本製品の量産開始前までに、内蔵ファームウェアに瑕疵やその他品質上の不具合、お客様の製品への組み込み上の不具合がない事を十分に評価され、お客様での本製品の使用用途に合致するものであることをご確認頂けますようお願い申し上げます。

# GYSFFMANC

Control No. HD-AG-A171181	(3/3)	Control name General Items
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- iii) 納入仕様書の取り交わし前に未検証であったバグ等に起因する不具合(お客様にて評価、承認の上、量産後に発生した不具合)に関しては、弊社の保証範囲外とさせていただきますので、何卒ご了承ください。
- iv) お客様の都合により、ハードウェアおよびファームウェアのカスタム対応が必要となった場合、弊社はお客様の依頼により、有償にて本対応を行います。但し、カスタムの内容によりましては、対応できない場合がありますので、予めご了承ください。
- v) お客様にて、量産適用前後を問わず、本製品に起因する問題が生じた場合、弊社は問題解決のために要因の検討を行います。この結果、問題の要因が弊社にないことが判明した後のお客様へのサポートにつきましては、一部有償とさせていただきますので、予めご了承願います。なお、この際のサポート費用につきましては、その都度両社協議の上、定めさせていただきます。
- vii) 本製品のハードウェア、及びファームウェアの変更は行わないで下さい。  
弊社の許可なく変更した場合に、その変更によって生じたすべての問題に対して弊社は一切責任を負いません。

#### d. 輸出注意事項

本製品は、日本国の「外国為替及び外国貿易法」(関連法令・規則を含む)及び／又は諸外国の輸出管理関連法規に基づく輸出(再輸出を含む)申請、承認又は許可の対象となる場合があります。本製品を輸出(再輸出)する場合には、必ず事前にこれら関連法規が定める手続をご確認頂き、必要な場合には、お客様の責任と費用において適切な承認・許可をお取りください。

**GYSFFMANC**

Control No. HD-AM-A171181	(1/1)	Control name 絶対最大定格
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**1.Maximum rating**

Item	Symbol	MIN	TYP	MAX	Unit	Condition
Input voltage	VDD 3V3	-0.3		4.3	V	Ta=25°C
	VDD_BACKUP	-0.3		4.3		
	RESET, GIO/EINT, RX	-0.3		3.6		

**2.Recommendation operating range**

Item	Symbol	MIN	TYP	MAX	Unit	Condition
Operating input voltage	VDD3V3	3.0	3.3	4.3	V	
	VDD_BACKUP	2.0	3.3	4.3		
Supply voltage ripple and spike noise	VDD3V3			40	mV/p-p	
	VDD_BACKUP			40		
Operating temperature range	Topr	-30	25	85	°C	Humidity Note1 =40%RH
Storage temperature range	Tstg	-40	25	85	°C	Humidity Note2 =40%RH

**Notes:**

- 動作温度範囲は短期的に製品の電气的特性を満足する温度範囲です。  
TYP 規格から大きく外れた条件で、長期間ご使用の場合、耐久性を充分にご確認の上、ご使用ください。
- 保存温度範囲は、輸送時や短期間の保管時の条件です。  
長期保管時は、取扱注意要領の条件に従って保管して下さい。

**GYSFFMANC**

Control No. HD-AE-A171181	(1/4)	Control name Electrical characteristics
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**Electrical characteristics****DC Specifications**

The Specification applies for Topr.= 25 degrees C, voltage=typical

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Input Low Voltage	Rx, GIO/EINT,	VIL18	-0.30	-	0.45	V	IO=1.8V
2	Input High Voltage	RESET	VIH18	1.35	-	2.10	V	IO=1.8V
3	Output Low Voltage	Tx, GIO/EINT	VOL18	-	-	0.27	V	IO=1.8V
4	Output High Voltage		VOH18	1.53	-	-	V	IO=1.8V
5	Input Low Voltage	Force ON	VIL11	-0.3	-	0.27		
6	Input High Voltage		VIH11	0.83	-	2.1		
7	Current MAIN (GPS+GLONASS)	VDD3V3 Current Consumption (Average)	Icc_Ac1	-	22	35	mA	Acquisition
			Icc_Tr1	-	18	35	mA	Tracking
9	Current BK	VDD3V3_BACKUP Current Consumption	Icc_bk1	-	6	15	uA	Backup (VDD3V3=0 V)
			Icc_bk2	-	24	200	uA	Other mode

## Note:

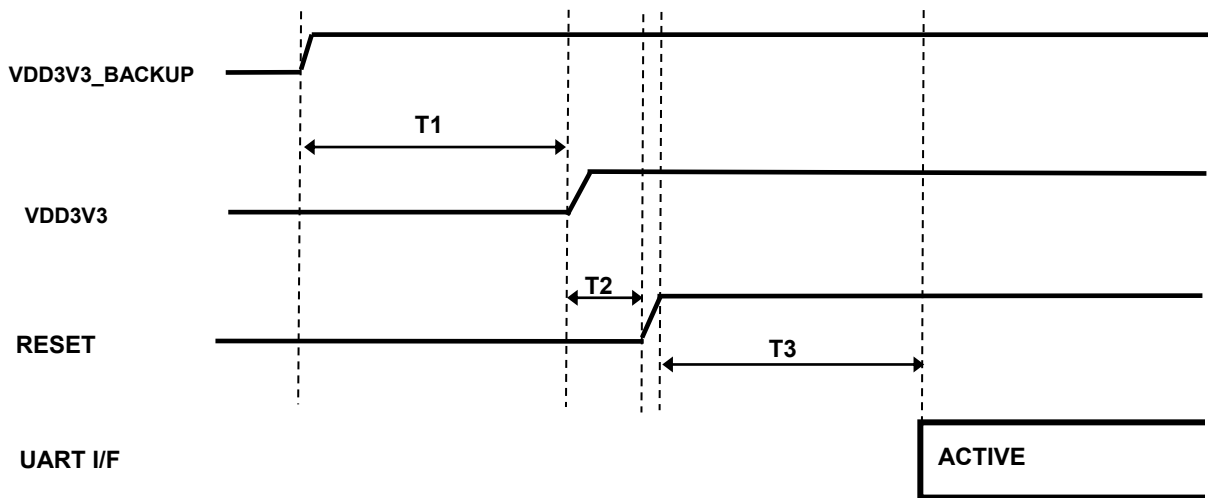
Please note that these electrical characteristics were measured under Taiyo Yuden evaluation environment.

Control No. HD-AE-A171181	(2/4)	Control name Electrical characteristics
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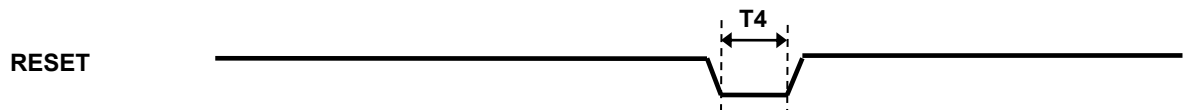
## AC Specifications

The Specification applies for Topr . =25 degrees C

No	Parameter	Condition	Symbol	Min	Typ	Max	Unit	Remark
1	Time from VDD3V3_BACKUP rise to VDD3V3 rise		T1	1000			ms	
2	Time from VDD3V3 rise to RESET rise		T2	100			ms	
3	Time from RESET High to Module Ready		T3			1500	ms	
4	RESET Pulse Width		T4	10			ms	After power on
5	Time from VDD3V3 fall (0.5V) to VDD3V3_BACKUP fall		T5	20			ms	
6	VDD3V3 fall time from 3.0V to 0.5V		T6	100			ms	
7	Time from RESET Low to VDD3V3 fall		T7	100			ms	
8	Inrush Current	VDD3V3	Icc_rush	-	-	400	mA	Note1



**Power on timing**



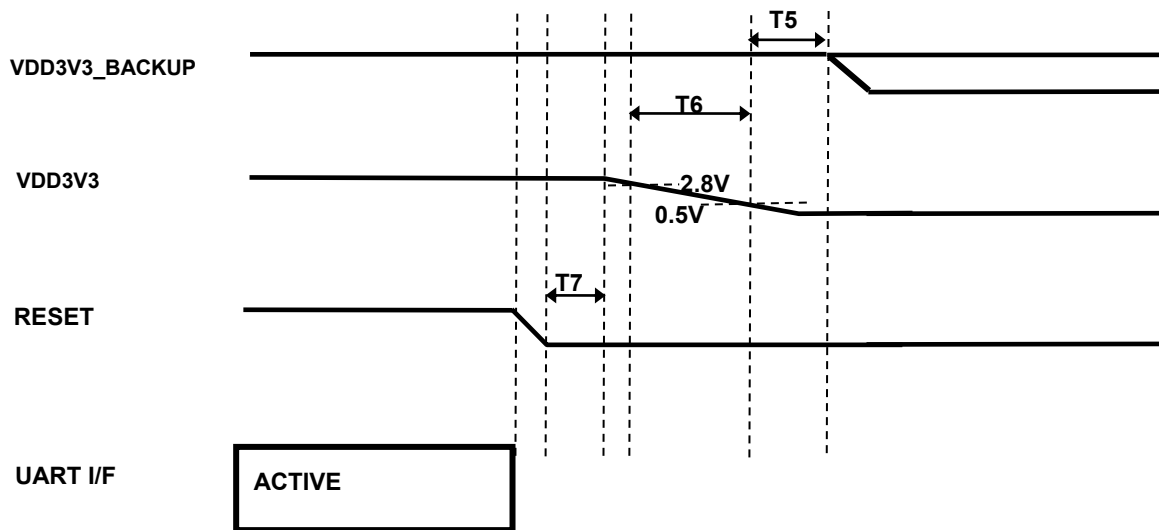
**RESET Pulse Width**

Note: UART I/F is not active during the assertion of RESET pin.



# GYSFFMANC

Control No. HD-AE-A171181	(3/4)	Control name Electrical characteristics
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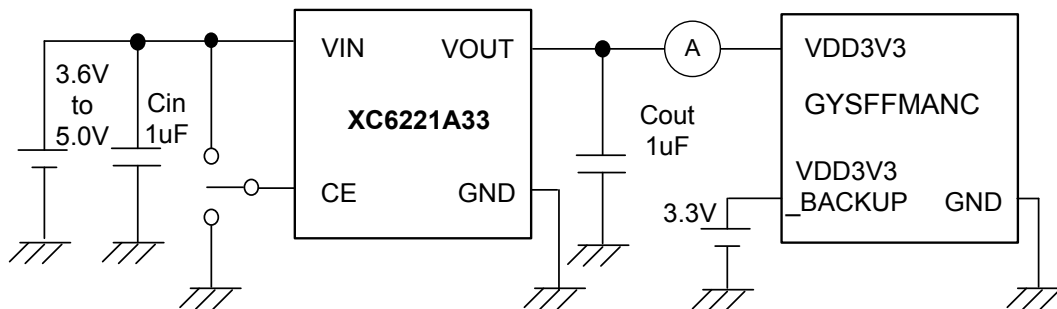


## Power-off Timing

### VDD3V3 供給電源用 推奨レギュレータ

XC6221(TOREX)(ディスチャージ機能なしタイプ、出力電圧 3.3V)

#### Note1 Inrush current test circuit

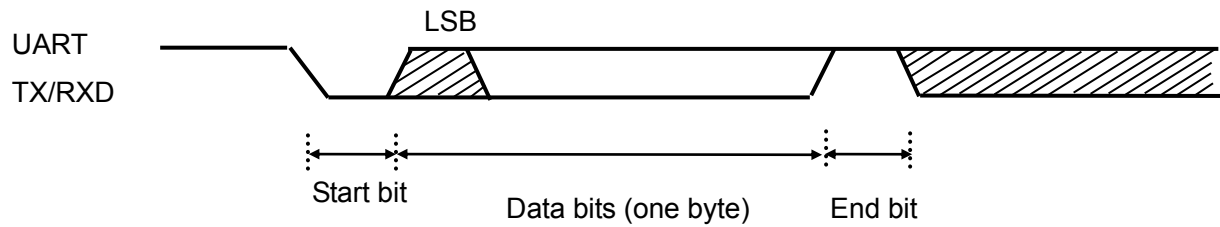


# GYSFFMANC

Control No. HD-AE-A171181	(4/4)	Control name Electrical characteristics
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## UART Interface AC Specifications

The Specification applies for Ta=25 degrees C



Baud Rate Required (bps)	Programmed Baud Rate (bps)
9600	9606

# GYSFFMANC

Control No. HD-AE-B171181	(1/1)	Control name Electrical characteristics
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## RF Specifications

The Specification applies for Topr.=25 degrees C

No	Parameter	Symbol	Spec			Unit	Remark
			Min	Typ	Max		
1	Frequency	Fc		1575.4		MHz	C/A code
2	Intermediate frequency	IF		13.2		MHz	
3	Image Rejection Ratio	IRR		30		dB	
4	VCO Oscillation Frequency	Fosc		3142.656		MHz	
5	Noise Figure	NF		1.0		dB	
6	Sensitivity	Hs1		-162		dBm	Hot start sensitivity
		Ws1		-146			Warm start sensitivity
		Cs1		-146			Cold start sensitivity
		Ts1		-164			Tracking sensitivity
7	TTFF	Ht1		1.0		sec	Hot start @-135dBm Note1
		Wt1		31			Warm start@-135dBm Note2
		Ct1		38			Cold start @-135dBm Note3
8	Accuracy	Ha1		2		m	Hot start @-135dBm
		Wa1		2			Warm start@-135dBm
		Ca1		2			Cold start @-135dBm

Note1 Hot start Almanac と Ephemeris、時間情報の Data を既に持っている状態での再 Start

Note2 Warm start Almanac data を持っている状態での再 Start

Note3 Cold start 全ての情報が無い場合での Start

# GYSFFMANC

Control No. HD-AE-C171181	(1/1)	Control name Electrical characteristics
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## ファームウェア

1. 内蔵ファームウェア: ファームウェア名  
AXN\_5.1.2\_3333\_17113000\_0013.bin

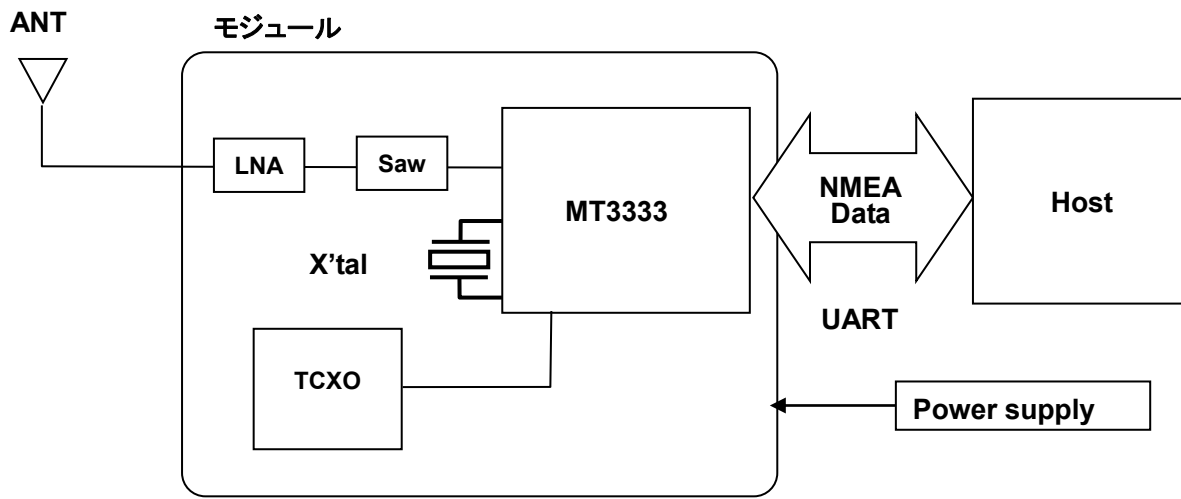
2. MTK NMEA Packet Format

別紙: 「NMEA Packet Format」をご参照願います。

# GYSFFMANC

Control No. HD-MC-A171181	(1/1)	Control name Circuit Schematic
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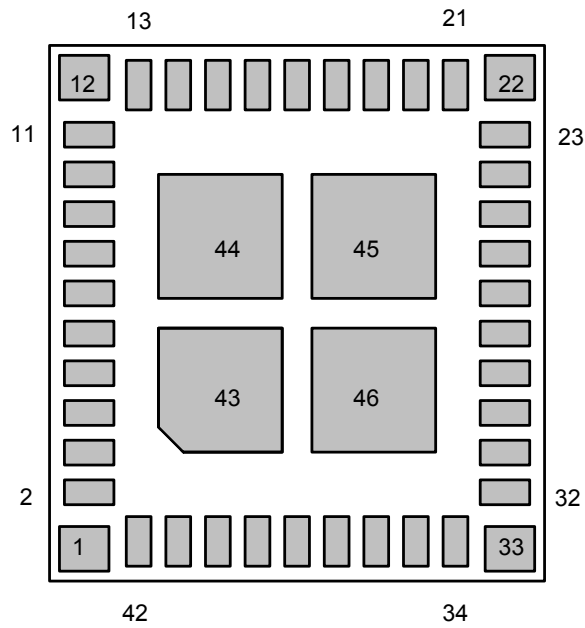
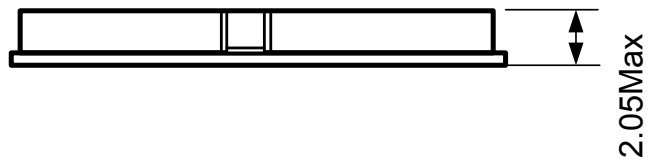
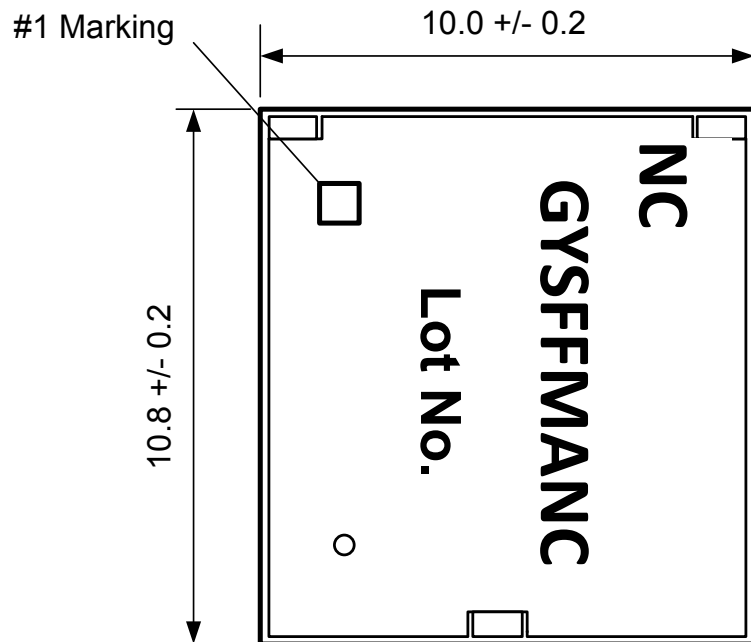
## モジュール ブロック図



# GYSFFMANC

Control No. HD-AD-A171181	(1/3)	Control name Outline/Appearance
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## Outline



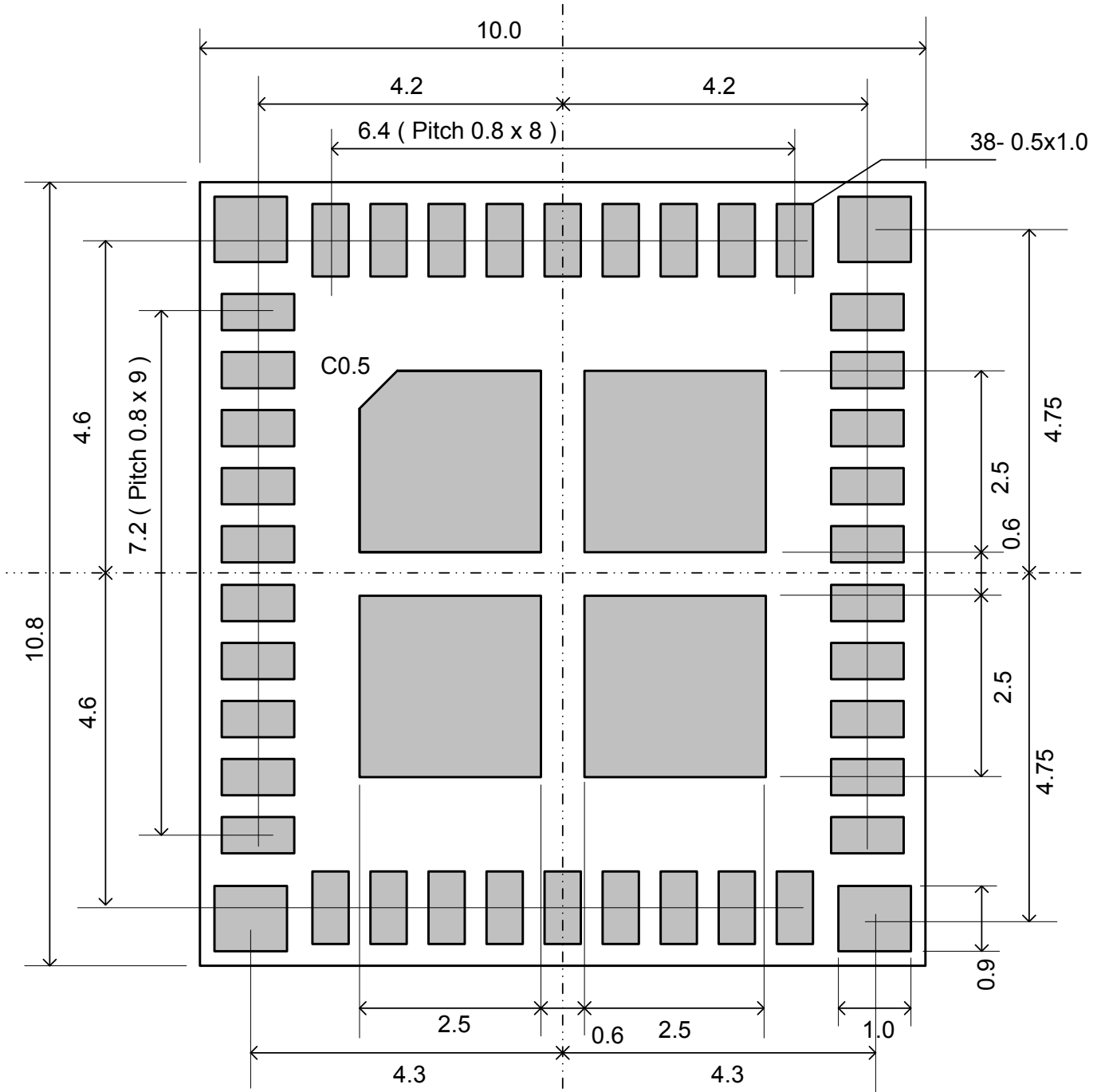
< Bottom View >

# GYSFFMANC

Control No. HD-AD-A171181	(2/3)	Control name Outline/Appearance
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推奨ランドパターン(モジュールのランド形状と同一)

Unit:mm



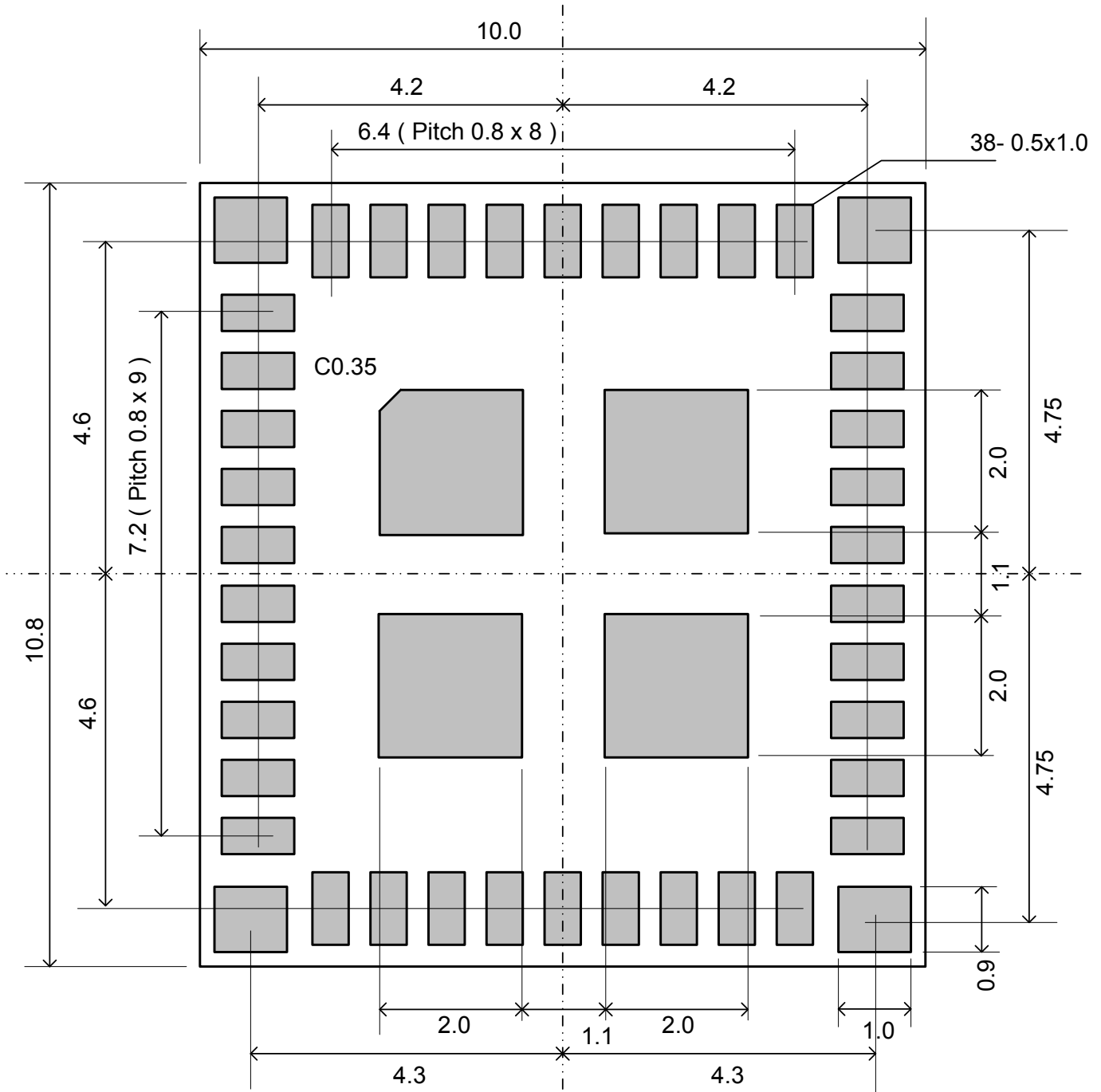
< Top View >

# GYSFFMANC

Control No. HD-AD-A171181	(3/3)	Control name Outline/Appearance
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## 推奨メタルマスク(半田マスク) 開口パターン

単位:mm



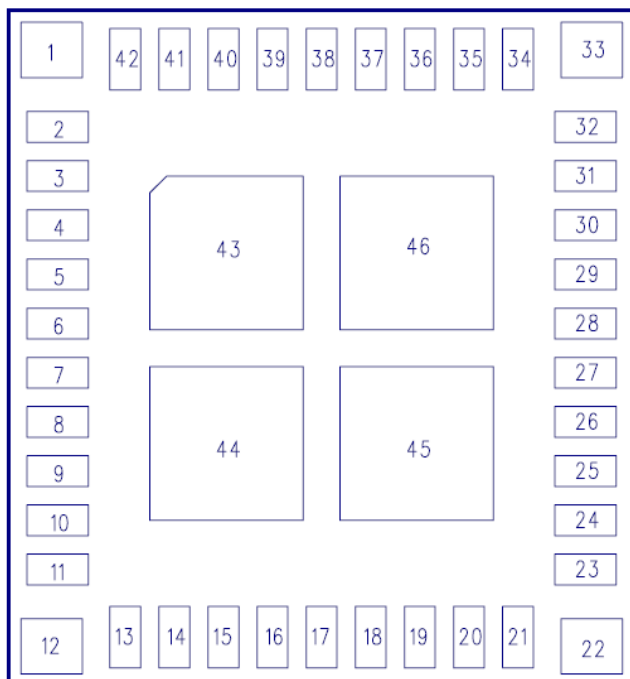
< Top View >



# GYSFFMANC

Control No. HD-BA-A171181	(1/2)	Control name Pin Layout
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## Pin Layout



(Top View)

## Descriptions

No.	Pin Name	Type	Block	I/O	Description
1	GND	Power	GND	-	GND
2	ANT	RF	RF	I	RF_IN Antenna port
3	GND	Power	GND	-	GND
4	VDD3V3	Power	RF & Digital	I	Power Supply voltage 3.3V   メイン電源
5	NC		-	-	接続しないでください
6	NC		-	-	接続しないでください
7	VDD2V8_OUT	Power	Digital	O	接続しないでください
8	GND	Power	GND	-	GND
9	NC		-	-	接続しないでください
10	GND	Power	GND	-	GND
11	NC	-	-	-	接続しないでください
12	GND	Power	GND	-	GND
13	NC		-	-	接続しないでください
14	VDD3V3_BACKUP	Power	Analog	I	Supply Voltage to RTC LDO.   バックアップ電源 * ボタン電池等で常時 ON
15	NC		-	-	接続しないでください
16	NC	-	-	-	接続しないでください
17	32KHZ_OUT	Debug	CLK	O	接続しないでください

## GYSFFMANC

Control No. HD-BA-A171181	(2/2)	Control name Pin Layout
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No.	Pin Name	Type	Block	I/O	Description
18	NC		-	-	接続しないでください
19	NC		-	-	接続しないでください
20	NC		-	-	接続しないでください
21	NC		-	-	接続しないでください
22	GND	Power	GND	-	GND
23	NC	-	-	-	接続しないでください
24	NC	-	-	-	接続しないでください
25	UART_RXD	CMOS	UART	I	Serial data input for the UART Interface. Internal 75kΩpull up.
26	UART_TXD	CMOS	UART	O	Serial data output for the UART Interface. Internal 75kΩpull up.
27	FORCE_ON	CMOS	Digital	I	BackupMode 時に、Hi 信号を入力し、強制起動させる
28	NC		-	-	接続しないでください
29	GIO_7 (1PPS)	CMOS	Digital	I/O	1pps 信号出力端子 3D_Fix 時のみ出力(ハルス幅: 100msec)
30	NC		-	-	接続しないでください
31	NC		-	-	接続しないでください
32	RESET	CMOS	Digital	I	RESET 端子 アクティブ LOW Internal 75kΩpull up
33	GND	Power	GND	-	GND
34	NC		-	-	接続しないでください
35	NC		-	-	接続しないでください
36	GND	Power	GND	-	GND
37	GND	Power	GND	-	GND
38	GND	Power	GND	-	GND
39	GND	Power	GND	-	GND
40	GND	Power	GND	-	GND
41	GND	Power	GND	-	GND
42	GND	Power	GND	-	GND
43	GND	Power	GND	-	GND
44	GND	Power	GND	-	GND
45	GND	Power	GND	-	GND
46	GND	Power	GND	-	GND

# GYSFFMANC

Control No. HQ-BA-523 (1/2)	Control name Handling Precaution
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本書類では特に実装時の 御願い・条件 について記載します。

御願い・条件

## (1) 使用・保管環境の管理

1. 弊社出荷時の防湿梱包状態で保管する場合、**40°C/90%RH**以下の環境で保管してください。
2. 工程の環境は **30°C/60%RH** 以下に管理してください。
3. モジュールを開梱状態で保管する(工程間の滞留含む)場合、**25±5°C/10%RH**以下の環境で保管してください。

## (2) 製品取扱時の御願い・条件

防湿梱包品入庫後、防湿袋に穴、裂け、キズ等のない事を確認してください。万が一異常があった場合、(2)-2項に従い、処置をお願い致します。

梱包に貼付のラベルをご参照ください。

1. 梱包日から **12ヶ月以内**に**全ての**実装(リフロー)作業(リワーク含む)を終了してください。
2. 防湿梱包開梱後、直ちに湿度インジケータにて梱包内の環境が **<10%RH** であることを確認してください。
3. 開封後 **168時間以内**に**全ての**実装作業(リワーク含むリフロー作業)を終了してください。  
本モジュール以外の実装作業含みます
4. (1)項、及び(2)-2・(2)-3の基準からはずれた場合、**125°C 24h**にてベーキングを行ってください。
5. (2)-4項記載の条件によるベーキングは1回を原則とします。

# GYSFFMANC

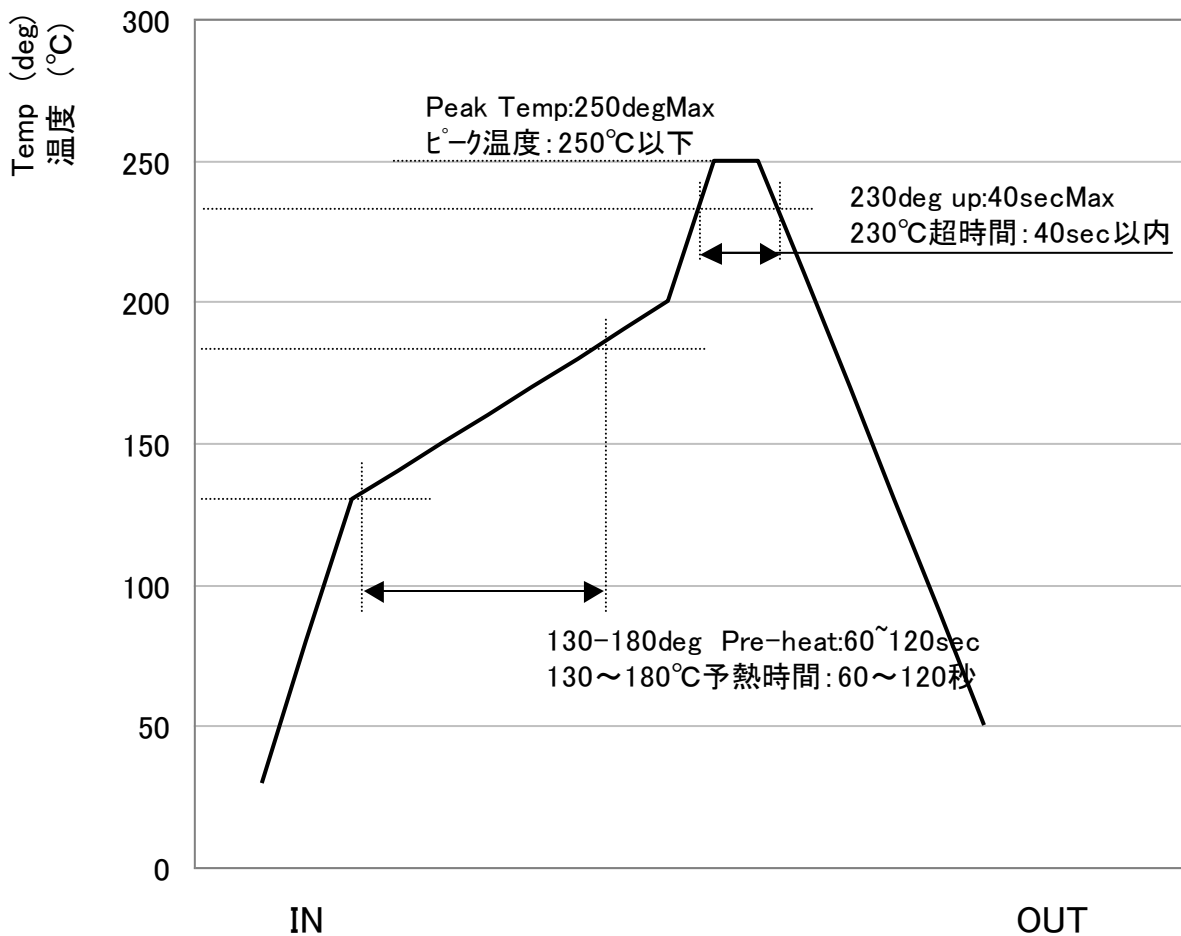
Control No.  
 HQ-BA-523

(2/2)

Control name  
 Handling Precaution

6. 本モジュールは内部に半導体を有するため、取扱中には静電気に留意してください。(100V 以下)  
 必要に応じて、導電マット・アースバンド・静電靴・イオナイザー等を用いて、  
 静電気の対策を講じてください。
7. 機械的振動、衝撃を極力少なくし、落下させないでください。
8. モジュールを実装する際には、裏面の電極を認識してください。
9. 本製品本体は洗浄しないで下さい。
10. モジュールのリフロー時温度条件は、下記の範囲内で行って下さい。

リフロー回数は最大2回として下さい。



# GYSFFMANC

Control No.  
HD-BB-A171181

(1/3)

Control name  
Packaging Specification

## Packaging Specification

梱包仕様

### (1) Packaging Material 梱包材料

Name 部材名	Outline 概要	Materials 材質	Note 備考
Emboss エンボス	24mm wide - 16mmPitch 24mm幅 - 16mmピッチ	Conductive PS 導電性 PS	
Cover Tape カバーテープ			
Reel リール	φ 330 mm	Conductive PS 導電性 PS	
Desiccant 乾燥剤	30g×1		
Humidity indicator card 湿度インジケータ			
Aluminum moisture barrier bag アルミ防湿袋	420×460(mm)	(AS)PET/AL/NY/PE(AS)	
Label ラベル			
Corrugated cardboard box(Inner) 個装箱	340×352×77(mm)		
Corrugated cardboard box(Outer) 外装箱	380×380×250(mm)		

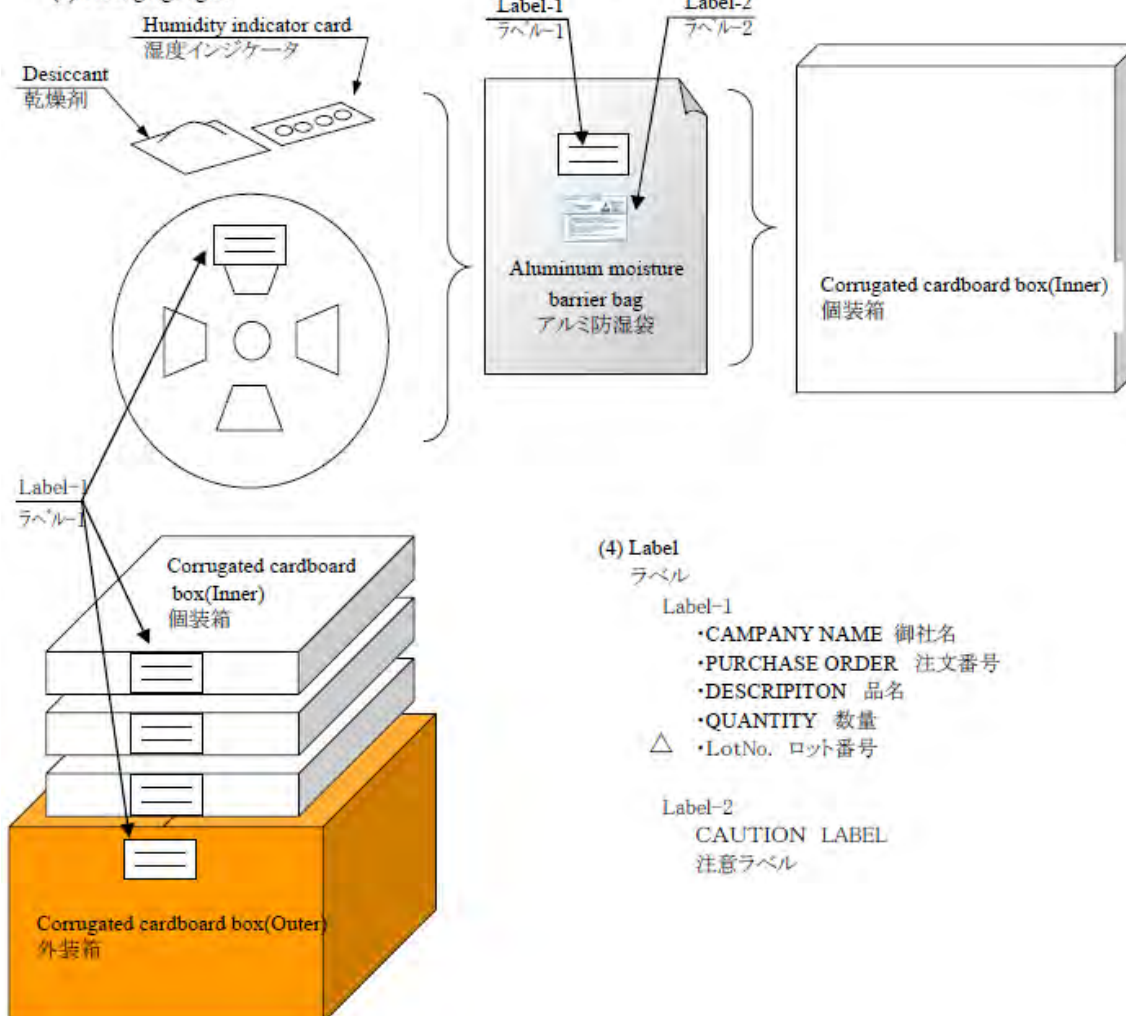
### (2) Packaging Unit

梱包数量

Max 1000 pieces/Reel

Max 3000 pieces/Box(Outer)

### (3) Packaging Figure



### (4) Label

ラベル

Label-1

- COMPANY NAME 御社名
- PURCHASE ORDER 注文番号
- DESCRIPTION 品名
- QUANTITY 数量
- △ •LotNo. ロット番号

Label-2

CAUTION LABEL  
注意ラベル

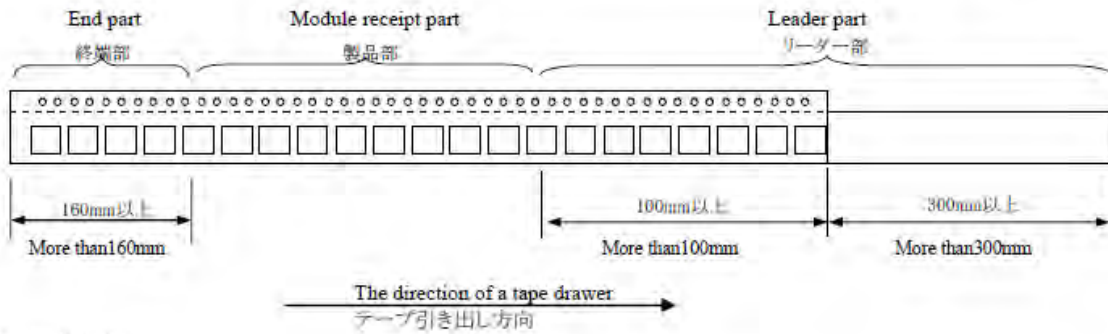
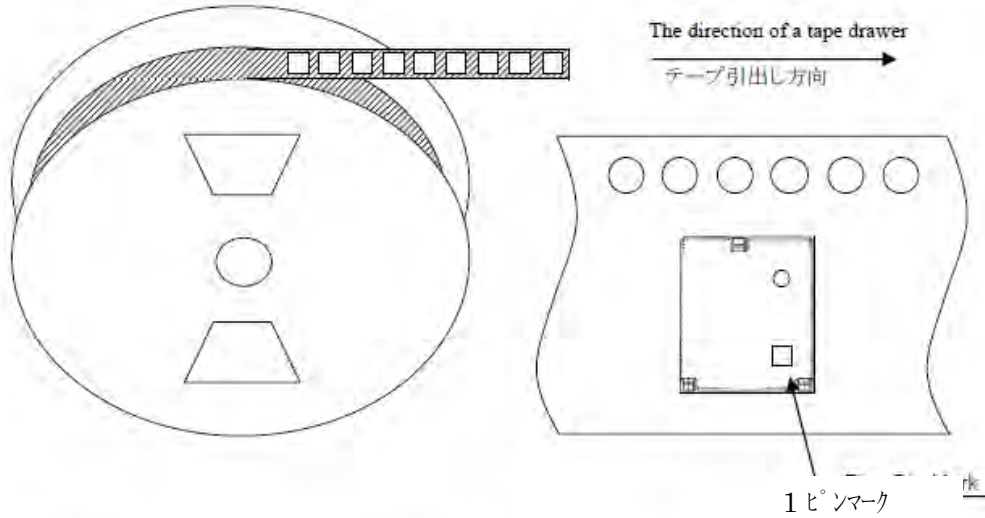
# GYSFFMANC

Control No.  
 HD-BB-A171181

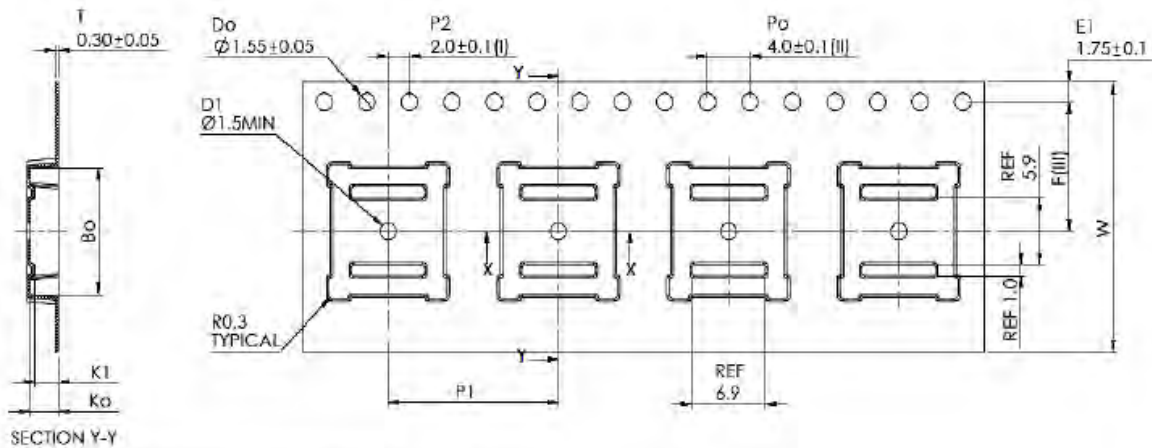
(2/3)

Control name  
 Packaging Specification

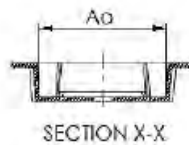
Tape specification  
 テープ引込仕様



キャリアエンボス図面



Ao	10.40 $\pm 0.1$
Bo	11.20 $\pm 0.1$
Ko	2.65 $\pm 0.1$
K1	2.25 $\pm 0.1$
F	11.50 $\pm 0.1$
P1	16.00 $\pm 0.1$
W	24.00 $\pm 0.3$



# GYSFFMANC

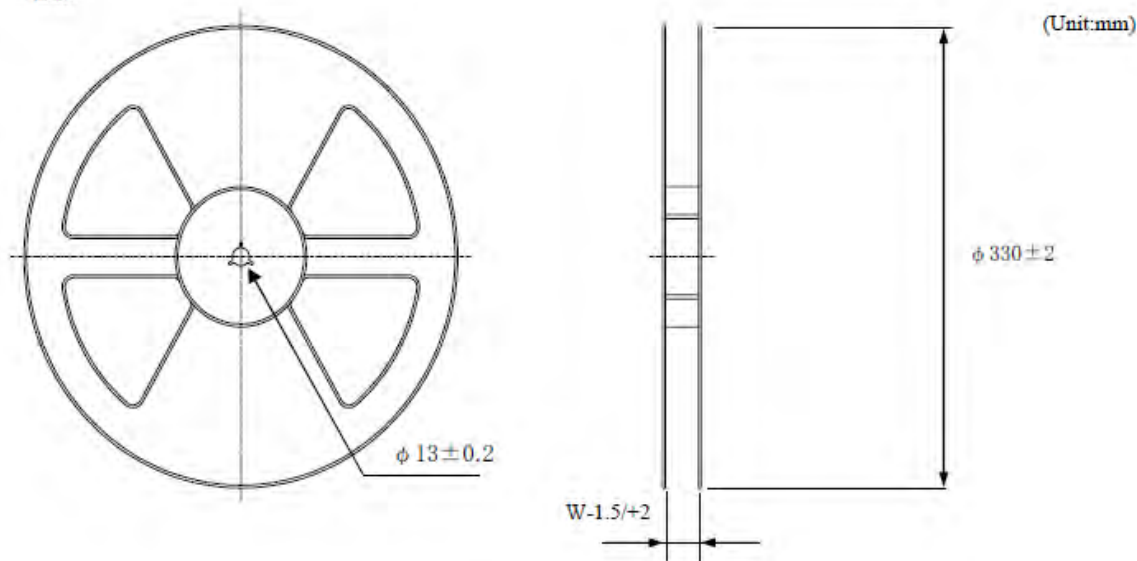
Control No.  
 HD-BB-A171181

(3/3)

Control name  
 Packaging Specification

## Reel specification

リール仕様



Tape wide	8mm	12mm	16mm	24mm	32mm	44mm
W	9.4mm	13.4mm	17.4mm	25.4mm	33.4mm	45.4mm

## Taping performance

テーピング性能

Both of an embossing tape top cover tape bear this, when the power of 10N is applied in the direction of a drawer.

・エンボステープ、トップカバーテープともに、引き出し方向に10Nの力を加えた場合に、これに耐えること。

The exfoliation adhesion of a top cover tape is the intensity of 0.1~1.3N.

(The angle to pull is 165~180 degrees. The speed to pull is 300 mm/min.)

・トップカバーテープの剥離強度は、角度165~180度に保ち、300mm/minのスピードでトップカバーテープを引っ張ったとき、0.1~1.3Nとする。

## Note

備考

△ Lack of the parts in 1 reel is with two or less pieces.

1リール中の部品の欠落は2個までとします。(ラベル表示数量と梱包数は同じです。欠落とはテープ内でのモジュール抜けが2個まで許容させていただくという意味になります。)

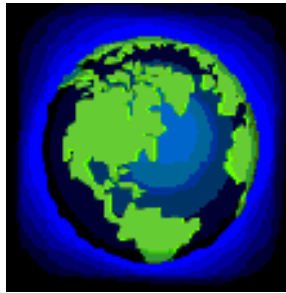
MSL Level 3 Under control

MSL はレベル3 で管理しています。





# NMEA Packet Format (For GYSFFMANC)



【お願い】GNSS受信機キット、受信モジュール、各種ソフトウェア、技術資料等に関するご質問は、株式会社秋月電子通商にお問い合わせください。  
お問い合わせ先: <https://akizukidenshi.com/catalog/contents2/contact.aspx/>

TAIYO YUDEN

Rev. record

11-Dec.-2018> Ver.1.0 Release

**TAIYO YUDEN**

# GYSFFMANC

Control No. HD-AE-E171181	(1/35)	Control Name
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## NMEA Packet Format

Preamble	Talker ID	Packet Type	Data Field	*	CHK1	CHK2	CR	LF
----------	-----------	-------------	------------	---	------	------	----	----

### Packet Length:

The maximum length of each packet is restricted to 255 bytes.

### Packet Contents:

**Preamble:** 1 byte character. '\$'

**Talker ID:** 4 bytes character string. "PMTK"

**Packet Type:** 3 bytes character string. From "000" to "999"

**Data Field:** The Data Field has variable length depending on the packet type.

A comma symbol ',' must be inserted ahead each data field to help the decoder process the Data Field.

**\***: 1 byte character. '\*\*'

The start symbol is used to mark the end of Data Field.

**CHK1, CHK2:** 2 bytes character string. CHK1 and CHK2 are the checksum of data between Preamble and '\*\*'.

**CR, LF:** 2 bytes binary data. (0x0D, 0x0A)

The 2 bytes are used to identify the end of a packet.

Sample Packet: \$PMTK000\*32<CR><LF>

## NMEA Packet Protocol

In order to inform the sender whether the receiver has received the packet, an acknowledge packet PMTK\_ACK should return after the receiver receives a packet.

# GYSFFMANC

Control No. HD-AE-E171181	(2/35)	Control Name
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**NMEA Packet Type List:**

- 000 PMTK\_TEST
- 001 PMTK\_ACK
- 010 PMTK\_SYS\_MSG
- 011 PMTK\_TXT\_MSG
  
- 101 PMTK\_CMD\_HOT\_START
- 102 PMTK\_CMD\_WARM\_START
- 103 PMTK\_CMD\_COLD\_START
- 104 PMTK\_CMD\_FULL\_COLD\_START
- 120 PMTK\_CMD\_CLEAR\_FLASH\_AID
- 127 PMTK\_CMD\_CLEAR\_EPO
- 161 PMTK\_CMD\_STANDBY\_MODE
  
- 183 PMTK\_LOCUS\_QUERY\_STATUS
- 184 PMTK\_LOCUS\_ERASE\_FLASH
- 185 PMTK\_LOCUS\_STOP\_LOGGER
- 186 PMTK\_LOCUS\_LOG\_NOW
- 187 PMTK\_LOCUS\_CONFIG
  
- 220 PMTK\_SET\_POS\_FIX
- 223 PMTK\_SET\_AL\_DEE\_CFG
- 225 PMTK\_SET\_PERIODIC\_MODE
- 251 PMTK\_SET\_NMEA\_BAUDRATE
- 253 PMTK\_SET\_OUTPUT\_FMT
- 257:PMTK\_SET\_TUNNEL\_SCENARIO
- 262:PMTK\_SET\_FLP(Fitness Low Power)\_MODE
- 285 PMTK\_SET\_PPS\_CONFIG\_CMD
- 286 PMTK\_SET\_AIC\_CMD
- 300 PMTK\_API\_SET\_FIX\_CTL
- 301 PMTK\_API\_SET\_DGPS\_MODE
- 311 PMTK\_API\_SET\_ELEVATION\_MASK
- 313 PMTK\_API\_SET\_SBAS\_ENABLED
- 314 PMTK\_API\_SET\_NMEA\_OUTPUT
- 330 PMTK\_API\_SET\_DATUM

# GYSFFMANC

Control No.	Control Name
HD-AE-E171181 (3/35)	

331 PMTK\_API\_SET\_DATUM\_ADVANCE  
335 PMTK\_API\_SET\_RTC\_TIME  
351 PMTK\_API\_SET\_SUPPORT\_QZSS\_NMEA  
352 PMTK\_API\_SET\_STOP\_QZSS  
353 PMTK\_API\_SET\_GNSS\_SEARCH\_MODE  
356 PMTK\_API\_SET\_HDOP\_THRESHOLD  
357 PMTK\_API\_GET\_HDOP\_THRESHOLD  
386 PMTK\_API\_SET\_STATIC\_NAV\_THD  
389 PMTK\_API\_SET\_TCXO\_DEBUG  
  
400 PMTK\_API\_Q\_FIC\_CTL  
401 PMTK\_API\_Q\_DGPS\_MODE  
411 PMTK\_API\_Q\_ELEVATION\_MASK  
413 PMTK\_API\_Q\_SBAS\_ENABLED  
414 PMTK\_API\_Q\_NMEA\_OUTPUT  
430 PMTK\_API\_Q\_DATUM  
431 PMTK\_API\_Q\_DATUM\_ADVANCE  
435 PMTK\_API\_Q\_RTC\_TIME  
449 PMTK\_API\_Q\_EPHEMERIS\_STATUS  
  
500 PMTK\_DT\_FIX\_CONTROL  
605 PMTK\_Q\_RELEASE  
607 PMTK\_Q\_EPO\_INFO  
622 PMTK\_Q\_LOCUS\_DATA  
660 PMTK\_Q\_AVAILABLE\_SV\_EPH  
661 PMTK\_Q\_AVAILABLE\_SV\_ALM  
667 PMTK\_Q\_UTC\_CORRECTION\_DATA  
705 PMTK\_DT\_RELEASE  
740 PMTK\_DT\_UTC  
741 PMTK\_DT\_POS  
869 PMTK\_EASY\_ENABLE

# GYSFFMANC

Control No. HD-AE-E171181	(4/35)	Control Name
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## 000 PMTK\_TEST

Packet Meaning: Test Packet.  
 Data Field: None  
 Example: \$PMTK000\*32<CR><LF>

## 001 PMTK\_ACK

Packet Meaning: Acknowledge of PMTK command.  
 Data Field: Cmd: The command / packet type the acknowledge responds.  
 Flag: '0' = Invalid command / packet.  
       '1' = Unsupported command / packet.  
       '2' = Valid command / packet, but action failed.  
       '3' = Valid command / packet, and action succeeded.  
 Example: \$PMTK001,604,3\*32<CR><LF>

## 010 PMTK\_SYS\_MSG

Packet Meaning: Output system message.  
 Data Field: Msg: The system message.  
             '0' = UNKNOWN  
             '1' = STARTUP  
             '2' = Notification : Notification for the host aiding EPO.  
             '3' = Notification: Notification for the transition to Normal mode is  
                     successfully done  
 Example: \$PMTK010,001\*2E<CR><LF>

## 011 PMTK\_TXT\_MSG

Packet Meaning: Output system message.  
 Data Field: Message of this is MTK GPS  
 Example: \$PMTK011,MTKGPS\*08<CR><LF>

## 01 PMTK\_CMD\_HOT\_START

Packet Meaning: Hot Restart.  
                     Use all available data in the NV Store.  
 Data Field: None  
 Example: \$PMTK101\*32<CR><LF>

# GYSFFMANC

Control No. HD-AE-E171181	(5/35)	Control Name
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## 102 PMTK\_CMD\_WARM\_START

Packet Meaning: Warm Restart. Don't use Ephemeris at re-start.  
 Data Field: None  
 Example: \$PMTK102\*31<CR><LF>

## 103 PMTK\_CMD\_COLD\_START

Packet Meaning: Cold Restart.  
 Don't use Time, Position, Almanacs and Ephemeris data at re-start.  
 Data Field: None  
 Example: \$PMTK103\*30<CR><LF>

## 104 PMTK\_CMD\_FULL\_COLD\_START

Packet Meaning: Full Cold Restart. It's essentially a Cold Restart, but additionally clear system/  
 user configurations at re-start. That is, reset the receiver to the factory status.  
 Data Field: None  
 Example: \$PMTK104\*37<CR><LF>

## 120 PMTK\_CMD\_CLEAR\_FLASH\_AID

Packet Meaning: Erase aiding data stored in the flash memory.  
 Data Field: None  
 Example: \$PMTK120\*31<CR><LF>

## 127 PMTK\_CMD\_CLEAR\_EPO

Packet Meaning: Erase EPO data stored in the flash memory.  
 Data Field: None  
 Example: \$PMTK127\*36<CR><LF>

## 161 PMTK\_CMD\_STANDBY\_MODE

Packet Meaning: Enter standby mode for power saving.  
 Data Field: **PMTK161,Type**  
Type: Standby type  
 '0' = Stop mode  
 '1' = Sleep mode  
 Example: \$PMTK161,0\*28<CR><LF>

# GYSFFMANC

Control No. HD-AE-E171181	(6/35)	Control Name
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## 183 PMTK\_LOCUS\_QUERY\_STATUS

Packet Meaning: Query Logging status.

Data Field: None

Return:

\$PMTKLOG,Serial#,Type,Mode,Content,Interval,Distance,Speed,Status,Log number,Percent\*CH

Serial#: Logging serial number: 0~65535

Type: Logging type -0: Overlap, 1: FullStop

Mode: Logging mode – 0x08: Interval logger

Content: Logging contents of configuration

Interval: Logging interval setting (valid when interval mode is selected)

Distance: Logging distance setting (valid when interval mode is selected)

Speed: Logging speed setting (valid when interval mode is selected)

Status: Logging status -1: Stop Logging, 0: Logging

Percent: Logging life used percentage

Example:

Input: \$PMTK183\*38<CR><LF>

Output: \$PMTKLOG,32,1,b,31,1,0,0,0,8032,100\*2F<CR><LF>

## 184 PMTK\_LOCUS\_ERASE\_FLASH

Packet Meaning: Erase Logger Flash.

Data Field: **\$PMTK184, Type**

Type: Erase type

'1' = erase all logger internal flash data

Example: Input: \$PMTK184,1\*22<CR><LF>

Output : \$PMTK001,184,3\*3D<CR><LF>

## 185 PMTK\_LOCUS\_STOP\_LOGGER

Packet Meaning: Stop logging data.

Data Field: **\$PMTK185, Status**

Status: Stop logging

'0' = Start logging

'1' = Stop logging

Example: Input: \$PMTK185,1\*23<CR><LF>

Output: \$PMTK001,185,3\*3C<CR><LF>



# GYSFFMANC

Control No. HD-AE-E171181	(7/35)	Control Name
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## 186 PMTK\_LOCUS\_LOG\_NOW

Packet Meaning: Snapshot write log.  
 Data Field: ***\$PMTK186, Type***  
 Type: Type:  
           '1' = means snapshot log data  
 Example: Input: \$PMTK186,1\*20<CR><LF>  
           Output: \$PMTK001,186,3\*3F<CR><LF>

## 187 PMTK\_LOCUS\_CONFIG

Packet Meaning: Configure Locus setting by command.  
 Data Field: ***\$PMTK187, Mode,Setting***  
 Mode\_Setting '1' = means interval mode.(1sec≤interval≤12hours)  
           Setting:  
           New setting instead of the original configuration  
           (e.g. change to 5 seconds interval as the example below)  
 Example: Input: \$PMTK187,1,5\*38<CR><LF>  
           Output: \$PMTK001,187,3\*3E<CR><LF>

## 220 PMTK\_SET\_POS\_FIX

Packet Meaning: Position fix interval.  
 Data Field: Interval: Position fix interval[msec]...[Range:100~10000]  
 Example: \$PMTK220,1000\*1F<CR><LF>

## 223 PMTK\_SET\_AL\_DEE\_CFG

Packet Meaning:  
 Data Field: ***\$PMTK223,SV, SNR., Extension threshold, Extension gap***  
 Below parameters can be modified by Hos command message  
           SV: 1~4 (Default value = 1)  
           SNR: 25~30 (Default value = 30)  
           Extension threshold: 40000~180000msec (Default value = 180000)  
           Extension gap: 0~3600000msec (Default value = 60000)  
 (Extension gap is the limitation between neighbor DEE)

## 225 PMTK\_SET\_PERIODIC\_MODE

Control No. HD-AE-E171181	(8/35)	Control Name
------------------------------	--------	--------------

Packet Meaning: Periodic Power Saving Mode Setting.

In Run stage, the GPS receiver measures and calculates positions.

In SLEEP stage, the GPS receiver may enter two different power saving modes.

One is "Periodic Standby Mode", and another is "Periodic Backup Mode". Due to hardware limitation, the maximum power down duration (SLEEP) is 2047 seconds. If the configured "SLEEP" interval is larger than 2047 seconds, GPS firmware will automatically extend the interval by software method. However, GPS system will powered on for the interval extension and powered down again after the extension is done.

Data Field: ***\$PMTK225, Type, Run time, Sleep time, Second run time, Second sleep time***

Type: Set operation mode of power saving.

'0' = Back to normal mode.

'1' = Periodic backup Mode.

'2' = Periodic standby Mode.

'8' = AlwaysLocate standby Mode.

'9' = AlwaysLocate backup Mode.

Run Time: Duration [msec] to fix for (or attempt to fix for) before switching from running mode back to minimum power sleep mode.

'0' = Disable

>= '1000' = Enable [Range: 1000~518400000]

Sleep Time: Interval [msec] to come out of a minimum power sleep mode and start running in order to get a new position fix.

[Range: 1000~518400000]

Second Run Time: Duration [msec] to fix for (or attempt to fix for) before switching from running mode back to minimum power sleep mode.

'0' = Disable

>= '1000' = Enable [Range: 1000~518400000]

Second Sleep Time: Interval [msec] to come out of a minimum power sleep mode and start running in order to get a new position fix.

[Range: 1000~518400000]

\*Note the Second run time should larger than First run time when non-zero value.

Example: **How to enter Periodic modes.**

# GYSFFMANC

Control No. HD-AE-E171181	(9/35)	Control Name
------------------------------	--------	--------------

Periodic Backup mode

PMTK225,0

PMTK223,1,25,180000,60000

\$PMTK225,1,3000,12000,18000,72000

Periodic Standby mode

\$PMTK225,0

\$PMTK223,1,25,180000,60000

\$PMTK225,2,3000,12000,18000,72000

**How to enter AlwaysLocate modes.**

AlwaysLocate Standby

\$PMTK225,0

\$PMTK225,8

AlwaysLocate Backup

\$PMTK225,0

\$PMTK225,9

## 251 PMTK\_SET\_NMEA\_BAUDRATE

Packet Meaning: Set NMEA port baud rate. Using PMTK251 command to setup baud rate setting, the setting will be back to default value in the two conditions.

1, Full start command is issued.

2, Enter standby mode

Data Field: ***\$PMTK251,Baudrate***

Baud rate: Baud rate setting

'0' = default setting

"9600" = 9600bps

"14400" = 14400bps

"19200" = 19200bps

"38400" = 38400bps

"57600" = 57600bps

"115200" = 115200bps

Example: \$PMTK251,38400\*27<CR><LF>

## 253 PMTK\_SET\_OUTPUT\_FMT

# GYSFFMANC

Control No. HD-AE-E171181	(10/35)	Control Name
------------------------------	---------	--------------

Packet Meaning: Set data output format for current port.

Data Field: **\$PMTK253,Flag**  
 Flag(unsigned 1byte): 0-nmea mode  
 1-binary mode

Example: \$PMTK253,1\*2B<CR><LF>  
 //Change output format from NMEA mode to binary mode

Note: When you switch form binary mode to NMEA mode, you will receive a binary ACK after the command is processed. When you switch from NMEA mode to binary mode, NO ACK will be sent.

## 257 PMTK\_SET\_TUNNEL\_SCENARIO

Packet Meaning: Enable fast TTFF or high accuracy function when out of the tunnel or garage.

Data Field: **\$PMTK257,Funcnality**  
 Funcnality: 0=Enable fast TTFF when out of the tunnel or garage.  
 1=Enable high accuracy when out of the tunnel or garage.

Example: \$PMTK257,1\*2F<CR><LF>

## 262 PMTK\_SET\_FLP(Fitness\_Low\_Power)\_MODE

Packet Meaning: Enable or disable FLP(Fitness Low Power) mode.

Data Field: **\$PMTK262,Enabled**  
 Functionality: 0=Disable FLP mode.  
 1=Enable FLP mode.

Example: \$PMTK262,1\*29<CR><LF>

## 285 PMTK\_SET\_PPS\_COFIG\_CMD

Packet Meaning: Config PPS setting:

Data Field: **\$PMTK285, PPSType , PPS Pulse Width**  
 PPS Type: Availabilty  
 '0' = Disable  
 '1' = After the first fix  
 '2' = 3D fix only  
 '3' = 2D/3D fix only  
 '4' = Always  
 PPS Pulse Width: PPS Pulse Width (Unit:msec)

# GYSFFMANC

Control No. HD-AE-E171181	(11/35)	Control Name
------------------------------	---------	--------------

Example: \$PMTK285,2,100\*23<CR><LF>

## 286 PMTK\_SET\_AIC\_CMD

Packet Meaning: Enable or disable active interference cancellation function.

Data Field: **\$PMTK286, Enabled**

Enabled: Enable or disable

'0' = Disable

'1' = Enable

Example: \$PMTK286,1\*23<CR><LF>

## 300 PMTK\_API\_SET\_FIX\_CTL

Packet Meaning: Set Fix interval.

Data Field: **\$PMTK300, Fixinterval,0,0,0,0**

Fix interval: Unit is milliseconds [Range:100~10000]

Example: \$PMTK300,1000,0,0,0,0 .....Set fix interval to 1000milliseconds

Return: \$PMTK001,300,3

## 301 PMTK\_API\_SET\_DGPS\_MODE

Packet Meaning: DGPS correction data source mode.

Data Field: **\$PMTK301,Mode**

Mode: DGPS data source mode.

'0' = No DGPS source

'1' = RTCM

'2' = SBAS(include WAAS/EGNOS/GAGAN/MSAS)

Example: \$PMTK301,1\*2D<CR><LF>

## 311 PMTK\_API\_SET\_ELEV\_MASK

Packet Meaning: API\_Set\_Elevation\_Mask. Set satellite elevation mask.

Data Field: **\$PMTK311,Degree**

Degree: Satellite elevation mask.

Example: \$PMTK311,5\*28<CR><LF>

## 313 PMTK\_API\_SET\_SBAS\_ENABLED

Packet Meaning: Enable to search a SBAS satellite or not.

Data Field: Enabled: Enable or disable.

# GYSFFMANC

Control No. HD-AE-E171181	(12/35)	Control Name
------------------------------	---------	--------------

'0' = Disable

'1' = Enable

Example: \$PMTK313,1\*2E<CR><LF>

## 314 PMTK\_API\_SET\_NMEA\_OUTPUT

Packet Meaning: Set NMEA sentence output frequencies.

Data Field: There are totally 10 data fields that present output frequencies for the 10 supported NMEA sentences individually.

### Supported NMEA Sentences

- 0 NMEA\_SEN\_GLL, // GPGLL interval-Geographic position-Latitude longitude
- 1 NMEA\_SEN\_RMC, // GPRMC interval-Recommended Minimum Specific GNSS sentence
- 2 NMEA\_SEN\_VTG, // GPVTG interval-Course Over Ground and Ground Speed
- 3 NMEA\_SEN\_GGA, // GPGGA interval-GPS Fix data
- 4 NMEA\_SEN\_GSA, // GPGSA interval- GNSS DOPS and Active satellites
- 5 NMEA\_SEN\_GSV, // GPGSV interval- GNSS Satellites in View
- 6 NMEA\_SEN\_GRS, //GPGRS interval-GNSS Range Residuals.
- 7 NMEA\_SEN\_GST, // GPGST interval- GNSS Pseudorange erros statics
- 17 NMEA\_SEN\_ZDA, //GPZDA interval-Time & Data
- 18 NMEA\_SEN\_MCHN, //PMTKCHN interval-GNSS channel status

### Supported Frequency Setting

- 0 Disabled or not supported sentence.
- 1 Output once every one position fix.
- 2 Output once every two position fixes.
- 3 Output once every three position fixes.
- 4 Output once every four position fixes.
- 5 Output once every five position fixes.

Example: **\$PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,1,1\*2C<CR><LF>**

This command set GLL output frequency to be outputting once every 1 position fix, and RMC to be outputting once every 1 position fix, and so on.

You can also restore the system default setting via issue.

# GYSFFMANC

Control No. HD-AE-E171181	(13/35)	Control Name
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\$PMTK314,-1\*04<CR><LF>

\*Note: Settings of GST and GRS are valid only when firmware supports GST/GRS sentences.

### 330 PMTK\_API\_SET\_DATUM

Packet Meaning: Set default datum.

Data Field: **\$PMTK330,Datum**

Datum:

'0' = WGS84

'1' = TOKYO-M

'2' = TOKYO-A

Example: \$PMTK330,0\*2E<CR><LF>

\*Support 219 different datums. The total datums list in the Appendix A.

### 331 PMTK\_API\_SET\_DATUM\_ADVANCE

Packet Meaning: Set user defined datum.

Data Field: **\$PMTK331,majA,eec,dX,dY,dZ**

majA: User defined datum semi-major axis [m] [Range:0~7000000]

ecc: User defined datum datum eccentric [m] [Range:0~330]

dX: User defined datum to WGS84 X axis offset [m]

dY: User defined datum to WGS84 Y axis offset [m]

dZ: User defined datum to WGS84 Z axis offset [m]

Example: \$PMTK331,6377397.155,299.1528128,-148.0,507.0,685.0\*16<CR><LF>

### 335 PMTK\_API\_SET\_RTC\_TIME

Packet Meaning: This command set RTC UTC time. To be noted, the command doesn't update the GPS time which maintained by GPS receiver. After setting, the RTC UTC time finally may be updated by GPS receiver with more accurate time after 60 seconds

Data Field: **\$PMTK335,Year,Month,Day,Hour,Min,Sec**

Year: XXXX

Month: 1 ~ 12

Day: 1 ~ 31

Hour: 0 ~ 23

Min: 0 ~ 59

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Sec: 0 ~ 59

Example: \$PMTK335,2007,1,1,0,0,0\*02<CR><LF>

## 351 PMTK\_API\_SET\_SUPPORT\_QZSS\_NMEA

Packet Meaning: The receiver support new NMEA format for QZSS. The command allow user enable or disable QZSS NMEA format.

(Default is disable QZSS NMEA format (use NMEA 0183 V3.01))

Data Field: **\$PMTK351,Enabled**

Enabled: '0': Disable

'1': Enable

Example: \$PMTK351,0\*29<CR><LF> :Disable QZSS NMEA format

\$PMTK351,1\*28<CR><LF> :Enable QZSS NMEA format

## 352 PMTK\_API\_SET\_STOP\_QZSS

Packet Meaning: Since QZSS is regional positioning service. The command allow user enable or disable QZSS function. Default is enable QZSS function.

Data Field: **\$PMTK352, Enabled**

Enabled: '0': Enable

'1': Disable

Example: \$PMTK352,0\*2B<CR><LF> :Enable QZSS function

\$PMTK352,1\*2A<CR><LF> :Disable QZSS function

## 353 PMTK\_API\_SET\_GNSS\_SEARCH\_MODE

Packet Meaning: This command is used to configure the receive to start searching of which satellite system.

Data Field: GPS\_Enabled:

'0' = Disable (Do Not search GPS satellites)

'1' = or non-ZERO : search GPS satellites

GLONASS\_Enabled:

'0' = Disable (Do Not search GLONASS satellites)

'1' = or non-ZERO : search GLONASS satellites

Example: \$PMTK353,0,1\*36<CR><LF> : Search GLONASS only

\$PMTK353,1,0\*36<CR><LF> : Search GPS only

\$PMTK353,1,1\*37<CR><LF> : Search GPS and GLONASS



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## 356 PMTK\_API\_SET\_HDOP\_THRESHOLD

Packet Meaning: This command is to set the HDOP threshold. If the HDOP value is larger than this threshold value, the position will not be fixed. .

Data Field: ***\$PMTK356, HDOP Threshold Set ok!***

HDOP Thresholed:

'0': Disable this function

Other value: Enable set the HDOP threshold

Example: \$PMTK356,0.8

Return: \$PMTK356,0.8 Set OK!\*5F

## 357 PMTK\_API\_GET\_HDOP\_THRESHOLD

Packet Meaning: This command is to get the HDOP threshold. .

Data Field: ***\$PMTK357, HDOP Threshold***

HDOP Thresholed:

'0': Disable

Other value: Enable

Example: \$PMTK357

Return: \$PMTK357,0.8 \*39

## 386 PMTK\_API\_SET\_STATIC\_NAV\_THD

Packet Meaning: Set the speed threshold for static navigation. If the actual speed is below the threshold, output position will keep the same and output speed will be zero. If threshold value is set to 0, this function is disabled.

Data Field: ***\$PMTK386, speed\_threshold***

Speed\_threshold: 0~2m/sec

'0' = disable

>'0' = speed threshold in m/s.(The minimum is 0.1m/sec,the max is 2.0m/sec)

Example: \$PMTK386,0.4\*19<CR><LF>

## 389 PMTK\_API\_SET\_TCXO\_DEBUG

Packet Meaning: Set the switch of showing TCXO clock drift at every fix.

Data Field: ***\$PMTK389, on\_off***

on\_off:

'0' = off

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'1' = on (turn on \$PMTK589 output at every fix)

Example: \$PMTK389,1\*2D<CR><LF>

## 400 PMTK\_API\_Q\_FIX\_CTL

Packet Meaning: API\_Query\_Fix\_Ctl

Data Field: None

Return: \$PMTK\_DT\_FIC\_CTL

(e.g.: \$PMTK500,1000,0,0,0,0,0,0\*1A.....Position fix interval=1000msec)

Example: \$PMTK400\*36<CR><LF>

## 401 PMTK\_API\_Q\_DGPS\_MODE

Packet Meaning: API\_Query\_DGPS\_Mode

Data Field: None

Return: \$PMTK\_DT\_DGPS\_MODE

(e.g.: \$PMTK501,2\*28.....DGPS data source mode)

'0': No DGPS source

'1': RTCM

'2': WAAS

Example: \$PMTK401\*37<CR><LF>

## 411 PMTK\_API\_Q\_ELEV\_MASK

Packet Meaning: API\_Query\_Elevation\_Mask

Query satellite elevation mask.

Example: \$PMTK511\*36<CR><LF>

Return: \$PMTK511,Degree

## 413 PMTK\_API\_Q\_SBAS\_ENABLED

Packet Meaning: API\_Query\_Sbas\_Enabled

Data Field: None

Return: PMTK\_DT\_SBAS\_ENABLED

(e.g.: \$PMTK513,1\*28.....Enable to search a SBAS satellite or not)

'0': Disable

'1': Enable

Example: \$PMTK413\*34<CR><LF>

## 414 PMTK\_API\_Q\_NMEA\_OUTPUT

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Packet Meaning: API\_Query\_NMEA\_Out  
 Data Field: None  
 Return: PMTK\_DT\_SBAS\_ENABLED  
 (e.g.: \$PMTK514,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,1,0\*2F.....See packet type:314)  
 Example: \$PMTK414\*33<CR><LF>

## 430 PMTK\_API\_Q\_DATUM

Packet Meaning: API\_Query\_Datum  
 Data Field: None  
 Return: PMTK\_DT\_DATUM  
 (e.g.: \$PMTK530,0\*28.....See packet type:330)  
                   '0' = WGS84  
                   '1' = TOKYO-M  
                   '2' = TOKYO-A  
 \*Support 219different datums. The total datums list in the Appendix A.  
 Example: \$PMTK430\*35<CR><LF>

## 431 PMTK\_API\_Q\_DATUM\_ADVANCE

Packet Meaning: API\_Query\_Datum\_Advance  
                   Query user defined datum  
 Data Field: None  
 Return: PMTK\_DT\_DATUM  
 (e.g.: \$PMTK514,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,1,0\*2F.....See packet type:331)  
 Example: \$PMTK431\*34<CR><LF>

## 435 PMTK\_API\_Q\_RTC\_TIME

Packet Meaning: API\_Query\_RTC\_Time  
                   Query current RTC UTC time  
 Data Field: None  
 Return: PMTK\_API\_DT\_RTC\_TIME  
 (e.g.: \$PMTK535,2014,3,19,0,0,10\*0C.....See packet type:335)  
 Example: \$PMTK435\*30<CR><LF>

## 449 PMTK\_API\_Q\_EPH\_STATUS

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Packet Meaning: This command is to query the current status of ephemeris downloading.  
 Example: PMTK449\*3B  
 Return: \$PMTK001,449,3,1\*24 : The ephemeris downloading is finished.  
 \$PMTK001,449,3,0\*24 : The ephemeris downloading is not finished yet.

## 500 PMTK\_DT\_FIC\_CTL

Packet Meaning: This parameters show the rate of position fixing activity.  
 Data Field: Fixinterval: Position fix interval(msec). [Range:100~10000]  
 Example: \$PMTK500,1000,0,0,0,0\*1A<CR><LF>

## 605 PMTK\_Q\_RELEASE

Packet Meaning: Query the firmware release information.  
 Data Field: None  
 Return: PMTK\_DT\_RELEASE  
 (e.g.: \$PMTK705,AXN\_2.10\_3339\_12051401,0011,Taiyo\_STD,\*7B)  
 Example: \$PMTK605\*31<CR><LF>

## 607 PMTK\_Q\_EPO\_INFO

Packet Meaning: EPO Data Valid day check.  
 Data Field: None  
 Return: PMTK\_DT\_EPO\_INFO  
 (e.g.: \$PMTK707,0,0,0,0,0,0,0,0\*2E)  
 Example: \$PMTK607\*33<CR><LF>

## 622 PMTK\_Q\_LOCUS\_DATA

Packet Meaning: Dump LOCUS flash data  
 (LOCUS = Logging data)  
 Data Field: \$PMTK622  
Case1: \$PMTK622, type  
 Type:  
 '0' : Dump full LOCUS flash data  
 '1' : Dump partial in used LOCUS flash data  
Case2:\$PMTK622, type, offset, size  
 Type :



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Control No. HD-AE-E171181	(20/35)	Control Name
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Packet Meaning: Support PMTK661 which report valid Almanac SV

(a)Host -> MT33\*\*:  
 A PMTK661 command to request the Almanac info, together with a time interval parameter (for example, 30 days).

(b)MT33\*\* -> Host:  
 Reply 32-bit flags of 32SV to indicate which Almanac will be available after the specified time interval.

Data Field: ***\$PMTK661, Time interval***

Time Interval:  
 Set the time interval for MT33\*\* to reply 32-bit flags of 32SV.  
 Note that the Time interval > 0 and <= 365 (1year for maximum)

Example: \$PMTK661,30\*1C<CR><LF>

Indicate which Almanac will be available after 30 days

Return: \$PMTK001,661,3,fec0bfff\*49<CR><LF>

Note the Hex fec0bfff means 1111 1110 1100 0000 1011 1111 1111 1111 and the Valid SV's numbers are 1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,23,24,26,27,28,29,30,31,32.

## 667 PMTK\_Q.UTC\_CORRECTION\_DATA

Packet Meaning: Get UTC correction data.

Data Field: ***\$PMTK001,667,36,A0,A1,dtLS,Tot,WNLSF,DN,dtLSF\*CS<CR><LF>***

Name	Unit	Description
PMTK667		Reference UTC correction
Action flag		'3' means UTC correction data are available. '2' means UTC correction data are not available.
A0	(Seconds)/(2 <sup>^</sup> -30)	UTC parameter A0
A1	(Seconds/Seconds)/(2 <sup>^</sup> -50)	UTC parameter A1
dtLS	Seconds	UTC time difference due to leap seconds before event.
Tot	Seconds	UTC reference time of week
WNt	Weeks	UTC reference week number
WNLSF	Weeks	UTC week number when next leap second event occurs.
DN	Days	UTC day of week when next leap second event occurs
dtLSF	Seconds	UTC time difference due to leap seconds after event
CS		Checksum

Example: \$PMTK667

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Return: If UTC correction data are available, the receiver returns  
 \$PMTK001,667,3,0,0,16,507904,237,237,3,17\*0A<CR><LF>  
 If UTC correction data are not available, the receiver returns  
 \$PMTK001,667,2

## 705 PMTK\_DT\_RELEASE

Packet Meaning: Firmware release information.  
 Data Field: Release\_Str: Firmware release name and version  
 Build\_ID: Build ID  
 Product\_Model: Product Model Name  
 SDK\_Version: Showing SDK version if the firmware is used for SDK  
 Example: \$PMTK705,AXN\_0.2,1234,ABCD,\*14<CR><LF>

## 740 PMTK\_DT\_UTC

Packet Meaning: The packet contains current UTC time. Please do not use local time, which has time-zone offset. To have faster TTFF, the accuracy of reference UTC shall be better less than 3 seconds.  
 Data Field: YYYY: year > 1980  
 MM: month 1 – 12  
 DD: day 1 – 31  
 hh: hour 0 – 23  
 mm: minute 0 – 59  
 ss: second 0 – 59  
 Example: \$PMTK740,2010,2,10,9,0,58\*05<CR><LF> (2010/Feb/10 09:00:58)

## 741 PMTK\_DT\_POS

Packet Meaning: The packet contains reference location for the GPS receiver. To have faster TTFF, the accuracy of the location shall be better than 30km.  
 Data Field: Lat: degree -90.0 – 90.0: WGS84 geodetic latitude.  
 NOTE: suggest to express this value in floating-point with 6 decimal points  
 Minus: south, Plus: north  
 Long: degree -180.0 – 180.0: WGS84 geodetic longitude.  
 NOTE: suggest express this value in floating-point with 6 decimal points

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		Minus: west; Plus: east
Alt: m	---	WGS84 ellipsoidal altitude.
YYYY: year	> 1980	Reference UTC time: year n 4 digits
MM: month	1 – 12	Reference UTC time: month
DD: day	1 – 31	Reference UTC time: day
hh: hour	0 – 23	Reference UTC time: hour
mm: minute	0 – 59	Reference UTC time: minute
ss: second	0 – 59	Reference UTC time: second

Example: \$PMTK741,24.772816,121.022636,160,2011,8,1,08,00,00  
 The packet indicates that the GPS receiver is at latitude 24.772816 degrees, and latitude 160 m.

## 869 PMTK\_EASY\_ENABLE

Packet Meaning: Enable or disable EASY function. Query if EASY is enabled or disabled.

Data Field: \$PMTK869,CmdType,[Enable], [Extension Day]

**CmdType:** Set or Query

'0' : Query

'1' : Set

'2' : Result for Query operation

**Enable:** Enable or disable

'0' : Disable

'1' : Enable

Extension Day: Finished extension day.

Example: Case1: To enable 'EASY', use  
 \$PMTK869,1,1\*35<CR><LF>

Case2: To disable 'EASY', use  
 \$PMTK869,1,0\*36<CR><LF>

Case3: To query if 'EASY' is enabled or disabled, use  
 \$PMTK869,0\*29<CR><LF>

1)If 'EASY' is disabled, the receiver returns



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\$PMTK869,2,0,0,\*37<CR><LF>

2)If 'EASY' is enabled and is not finished yet, the receiver may returns

\$PMTK869,2,1,0\*2A<CR><LF>

3)If 'EASY' is enabled and is finished 1-day extension, the receiver may returns

\$PMTK869,2,1,1\*2B<CR><LF>

4)If 'EASY' is enabled and is finished 2-day extension, the receiver may returns

\$PMTK869,2,1,2\*28<CR><LF>

5)If 'EASY' is enabled and is finished 3-day extension, the receiver may returns

\$PMTK869,2,1,3\*29<CR><LF>

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Control No. HD-AE-E171181 (24/35)		Control Name
No.	Datum	Region
0	WGS1984	International
1	Tokyo	Japan
2	Tokyo	Mean For Japan, South Korea
3	User Setting	User Setting
4	Adindan	Burkina Faso
5	Adindan	Cameroon
6	Adindan	Ethiopia
7	Adindan	Mali
8	Adindan	Mean For Ethiopia, Sudan
9	Adindan	Senegal
10	Adindan	Sudan
11	Afgooye	Somalia
12	Ain El Abd1970	Bahrain
13	Ain El Abd1970	Saudi Arabia
14	American Samoa 1962	American Samoa Islands
15	Anna 1 Astro 1965	Cocos Island
16	Antigua island Astro 1943	Antigua (Leeward Islands)
17	Arc1950	Botswana
18	Arc1950	Burunai
19	Arc1950	Lesotho
20	Arc1950	Malawi
21	Arc1950	Mean For Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe
22	Arc1950	Swaziland
23	Arc1950	Zaire
24	Arc1950	Zambia
25	Arc1950	Zimbabwe
26	Arc1960	Mean For Kenya, Tanzania
27	Arc1960	Kenya
28	Arc1960	Tanzania
29	Ascension Island 1958	Ascension Island
30	Astro Beacon E 1945	Iwo Jima

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Control No. HD-AE-E171181 (25/35)		Control Name
No.	Datum	Region
31	Astro Dos 71/4	St Helena Island
32	Astro Term Island (FRIG) 1961	Term Island
33	Astronomical Station 1952	Marcus Island
34	Australian Geodetic 1966	Australia, Tasmania
35	Australian Geodetic 1984	Australia, Tasmania
36	Ayabelle Lighthouse	Djibouti
37	Bellevue (IGN)	Efate and Erromango Islands
38	Bermuda 1957	Bermuda
39	Bissau	Guinea-Bissau
40	Bogota Observatory	Colombia
41	Bukit Rimpah	Indonesia (Bangka and Belitung Ids)
42	Camp Area Astro	Antarctica (McMurdi Camp Area)
43	Campo Inchauspe	Argentina
44	Canton Astro 1966	Phoenix Island
45	Cape	South Africa
46	Cape Canaveral	Bahamas, Florida
47	Carthage	Tunisia
48	Chatham Island Astro 1971	New Zealand (Chatham Island)
49	Chua Astro	Paraguay
50	Corrego Alegre	Brazil
51	Dabola	Guinea
52	Deception Island	Deception Island, Antarctica
53	Djakarta (Batavia)	Indonesia (Sumatra)
54	Dos 1968	New Georgia Islands (Gizo Island)
55	Easter Island 1967	Easter Island
56	Estonia Coordinate System 1937	Estonia
57	European 1950	Cyprus
58	European 1950	Egypt
59	European 1950	England, Channel Islands, Scotland, Shetland Islands
60	European 1950	England, Ireland, Scotland, Shetland Islands
61	European 1950	Finland, Norway

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Control No. HD-AE-E171181 (26/35)		Control Name
No.	Datum	Region
62	European 1950	Greece
63	European 1950	Iran
64	European 1950	Italy (Sardinia)
65	European 1950	Italy (Sicily)
66	European 1950	Malta
67	European 1950	Mean For Austria, Belgium, Denmark, Finland, France, Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
68	European 1950	Mean for Austria, Denmark, France, Germany, Netherland, Switzerland
69	European 1950	Mean for Iraq, Israel, Jordan, Lebanon, Kuwait, Saudi Arabia, Syria
70	European 1950	Portugal, Spain
71	European 1950	Tunisia
72	European 1979	Mean For Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzerland
73	Fort Thomas 1955	Nevis St Kitts (Leeward Islands)
74	Gan 1970	Republic Of Maldives
75	Geodetic Datum 1970	New Zealand
76	Graciosa Base SW1948	Azores (Faial, Graciosa, Pico, Sao, Jorge, Terceira)
77	Guam 1963	Guam
78	Gunung Segara	Indonesia (Kalimantan)
79	Guxi Astro	Guadalcanal Island
80	Heart North	Afghanistan
81	Hermannskogel Datum	Croatia-Serbia, Bosnia-Herzegovina
82	Hjorsey 1955	Iceland
83	Hongkong 1963	Hongkong
84	Hu Tzu Shan	Taiwan
85	Indian	Bangladesh
86	Indian	India, Nepal
87	Indian	Bangladesh

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Control No. HD-AE-E171181 (27/35)		Control Name
No.	Datum	Region
88	Indian 1954	Thailand
89	Indian 1960	Vietnam (Con Son Island)
90	Indian 1980	Vietnam (Near 16 deg N)
91	Indian 1975	Thailand
92	Indonesian 1974	Indonesian
93	Ireland 1965	Ireland
94	ISTS 061 Astro 1968	South Georgia Islands
95	ISTS 073 Astro 1969	Diego Garcia
96	Johnston Island 1961	Johnston Island
97	Kandawala	Sri Lanka
98	Kerguelen Island 1949	Kerguelen Island
99	Kertau 1948	West Malaysia and Singapore
100	Kusaie Astro 1951	Caroline Islands
101	Korean Geodetic System	South Korea
102	LC5 Astro 1961	Cayman Brac Island
103	Leigon	Ghana
104	Liberia 1964	Liberia
105	Luzon	Philippines (Excluding Mindanao)
106	Luzon	Philippines (Mindanao)
107	M'Poraloko	Gabon
108	Mahe 1971	Mahe Island
109	Massawa	Ethiopia (Eritrea)
110	Merchich	Morocco
111	Midway Astro 1961	Midway Islands
112	Minna	Cameroon
113	Minna	Nigeria
114	Montserrat Island Astro 1958	Montserrat (Leeward Island)
115	Nahrwan	Oman (Masirah Island)
116	Nahrwan	Saudi Arabia
117	Nahrwan	United Arab Emirates
118	Naparima BWI	Trinidad and Tobago
119	North American 1927	Alaska (Excluding Aleutian Ids)

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Control No. HD-AE-E171181		(28/35)	Control Name
No.	Datum	Region	
120	North American 1927	Alaska (Aleutian Ids East of 180 degW)	
121	North American 1927	Alaska (Aleutian Ids West of 180 degW)	
122	North American 1927	Bahamas (Except San Salvador Islands)	
123	North American 1927	Bahamas (San Salvador Islands)	
124	North American 1927	Canada (Alberta, British Columbia)	
125	North American 1927	Canada (Manitoba, Ontario)	
126	North American 1927	Canada (New Brunswick, Newfoundland, Nova Scotia, Quebec)	
127	North American 1927	Canada (Northwest Territories, Saskatchewan)	
128	North American 1927	Canada (Yukon)	
129	North American 1927	Canal Zone	
130	North American 1927	Cuba	
131	North American 1927	Greenland (Hayes Peninsula)	
132	North American 1927	Mean For Antigua, Barbados, Barbuda, Caicos Islands, Cuba, Dominican, Grand Cayman, Jamaica, Turks Islands	
133	North American 1927	Mean For Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua	
134	North American 1927	Mean For Canada	
135	North American 1927	Mean For Conus	
136	North American 1927	Mean For Conus (East of Mississippi, River Including Louisiana, Missouri, Minnesota)	
137	North American 1927	Mean For Conus (West of Mississippi, River Excluding Louisiana, Missouri, Minnesota)	
138	North American 1927	Mexico	
139	North American 1983	Alaska (Excluding Aleutian Ids)	
140	North American 1983	Aleutian Ids	
141	North American 1983	Canada	
142	North American 1983	Conus	
143	North American 1983	Hahawii	
144	North American 1983	Mexico, Central America	
145	North American 1983	Algeria	

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Control No. HD-AE-E171181 (29/35)		Control Name
No.	Datum	Region
146	Observatorio Meteorogico 1939	Azores (Corvo and Flores Islands)
147	Old Egyptian 1907	Egypt
148	Old Hawaiian	Hawaii
149	Old Hawaiian	Kauai
150	Old Hawaiian	Maui
151	Old Hawaiian	Mean For Hawaii, Kauai, Maui, Oahu
152	Old Hawaiian	Ohau
153	Oman	Oman
154	Ordnance Survey Great Britain 1936	England
155	Ordnance Survey Great Britain 1936	England, Isle of Man, Wales
156	Ordnance Survey Great Britain 1936	Mean For England, Isle of Man, Scotland, Shetland Island, Wales
157	Ordnance Survey Great Britain 1936	Scotland, Shetland Islands
158	Ordnance Survey Great Britain 1936	Wales
159	Pico de las Nieves	Canary Islands
160	Pitcairn Astro 1967	Pitcairn Island
161	Point 58	Mean For Burkina Faso and Niger
162	Pointe Noire 1948	Congo
163	Porto Santo 1936	Porto Santo, Madeira Islands
164	Provisional South American 1956	Bolivia
165	Provisional South American 1956	Chile (Northern Near 19 deg S)
166	Provisional South American 1956	Chile (Southern Near 43 deg S)
167	Provisional South American 1956	Colombia
168	Provisional South American 1956	Ecuador
169	Provisional South American 1956	Guyana
170	Provisional South American 1956	Mean For Bolivia Chile, Colombia, Ecuador, Guyana, Peru, Venezuela
171	Provisional South American 1956	Peru
172	Provisional South American 1956	Venezuela
173	Provisional South American 1963	Chile (Near 53 deg S) (Hito XVIII)
174	Puerto Rico	Puerto Rico, Virgin Islands
175	Pulkovo 1942	Russia

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Control No. HD-AE-E171181		(30/35)	Control Name
No.	Datum	Region	
176	Qatar National	Qatar	
177	Qomoq	Greenland (South)	
178	Reunion	Mascarene Island	
179	Rome 1940	Italy (Sardinia)	
180	S-42 (Pulkovo 1942)	Hungary	
181	S-42 (Pulkovo 1942)	Poland	
182	S-42 (Pulkovo 1942)	Czechoslovakia	
183	S-42 (Pulkovo 1942)	Latvia	
184	S-42 (Pulkovo 1942)	Kazakhstan	
185	S-42 (Pulkovo 1942)	Albania	
186	S-42 (Pulkovo 1942)	Romania	
187	S-JTSK	Czechoslovakia (Prior 1 Jan 1993)	
188	Santo (Dos) 1965	Espirito Santo Island	
189	Sao Braz	Azores (Sao Miguel, Santa Maria Ids)	
190	Sapper Hill 1943	East Falkland Island	
191	Schwarzeck	Namibia	
192	Selvagem Grande 1938	Salvage Islands	
193	Sierra Leone 1960	Sierra Leone	
194	South American 1969	Argentina	
195	South American 1969	Bolivia	
196	South American 1969	Brazil	
197	South American 1969	Chile	
198	South American 1969	Colombia	
199	South American 1969	Ecuador	
200	South American 1969	Ecuador (Baltra, Galapagos)	
201	South American 1969	Guyana	
202	South American 1969	Mean For Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, Venezuela	
203	South American 1969	Paraguay	
204	South American 1969	Peru	
205	South American 1969	Trinidad and Tobago	



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No.	Datum	Region	
206	South American 1969	Venezuela	
207	South Asia	Singapore	
208	Tananarive Observatory 1925	Madagascar	
209	Timbalai 1948	Brunei, E Malaysia (Sabah Sarawak)	
210	Tokyo	Japan	
211	Tokyo	Mean For Japan, South Korea, Okinawa	
212	Tokyo	Okinawa	
213	Tokyo	South Korea	
214	Tristan Astro 1968	Tristam Da Cunha	
215	Viti Levu 1916	Fiji (Viti Levu Island)	
216	Voirol 1960	Algeria	
217	Wake Island Astro 1952	Wake Atoll	
218	Wake-Eniwetok 1960	Algeria	
219	WGS 1972	Global Definition	
220	WGS 1984	Global Definition	
221	Yacare	Uruguay	
222	Zanderij	Suriname	

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## Appendix B: NMEA-0183 format

### <Ex. NMEA-0183 file>

```
$GPGGA,090730.000,3619.3591,N,13901.1175,E,1,12,0.78,107.1,M,38.5,M,1383.2,0129*6F
$GPGLL,3619.3591,N,13901.1175,E,090730.000,A,A*5F
$GPGSA,A,3,23,16,19,18,09,21,22,04,26,27,11,07,1.05,0.78,0.70*01
$GPGSV,4,1,16,19,66,281,24,27,66,016,23,16,58,074,20,07,33,311,13*70
$GPGSV,4,2,16,26,33,102,31,04,30,192,20,11,24,215,26,22,11,104,25*74
$GPGSV,4,3,16,09,10,260,18,18,09,072,22,21,08,039,29,23,07,231,23*74
$GPGSV,4,4,16,01,07,202,,30,06,322,,193,,43,,*42
$GPRMC,090730.000,A,3619.3591,N,13901.1175,E,0.40,72.14,280415,04.1,E,D*56
$GPVTG,72.14,T,,M,0.40,N,0.74,K,A*0A
$GPZDA,090730.000,28,04,2015,,*53
```

### <Description>

#### [GGA]

```
$GPGGA,090730.000,3619.3591,N,13901.1175,E,1,12,0.78,107.1,M,38.5,M,1383.2,0129*6F
```



- 1, 測位時刻(UTC)
- 2, 緯度
- 3, 経度
- 4, GPSのクオリティ      0= 受信不能  
1=単独測位  
2=DGPS
- 5, 受信衛星数
- 6, HDOP
- 7, 平均海水面からのアンテナ高度(m)
- 8, WGS-84楕円体からの平均海水面の高度差(m)
- 9, DGPSデータのエイジ(秒)
- 10, DGPS基準局のID
- 11, チェックサム

# GYSFFMANC

Control No. HD-AE-E171181	(33/35)	Control Name
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## [GLL]

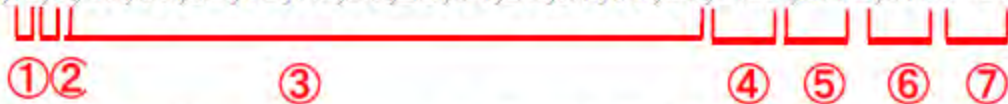
\$GPGLL,3619.3591,N,13901.1175,E,090730.000,A,D\*5F



- 1, 緯度
- 2, 経度
- 3, 測位時刻(UTC)
- 4, ステータス A:有効、V:無効
- 5, モード:  
A: 単独測位  
D: DGPS
- 6, チェックサム

## [GSA]

\$GPGSA,A,3,23,16,19,18,09,21,22,04,26,27,11,07,1.05,0.78,0.70\*01



- 1, 測位モード  
A:2D/3D自動選択  
M:2D/3D手動選択
- 2, 測位モード  
1=受信不能  
2=2D  
3=3D
- 3, 受信衛星数
- 4, PDP
- 5, HDOP
- 6, VDOP
- 7, チェックサム

# GYSFFMANC

Control No. HD-AE-E171181	(34/35)	Control Name
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## [GSV]

\$GPGSV,4,2,16,26,33,102,31,04,30,192,20,11,24,215,26,22,11,104,25\*74



- 1, 全メッセージ数
- 2, メッセージ番号
- 3, 受信可能衛星数
- 4, 衛星番号、仰角(度)、方位(度)、SNR(デシベル)
- 5, 衛星番号、仰角(度)、方位(度)、SNR(デシベル)
- 6, 衛星番号、仰角(度)、方位(度)、SNR(デシベル)
- 7, 衛星番号、仰角(度)、方位(度)、SNR(デシベル)
- 8, チェックサム

## [RMC]

\$GPRMC,090730.000,A,3619.3591,N,13901.1175,E,0.40,72.14,280415,04.1,E,D\*56



- 1, 測位時刻(UTC)
- 2, ステータス A:有効、V:無効
- 3, 緯度
- 4, 経度
- 5, 対地速度(ノット)
- 6, 進行方向(度、真北)
- 7, 日付(UTC)
- 8, 地磁気の偏角
- 9, モード:  
A: 単独測位  
D: DGPS
- 10, チェックサム

# GYSFFMANC

Control No. HD-AE-E171181	(35/35)	Control Name
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## [VTG]

\$GPVTG,72.14,T,015.7,M,0.40,N,0.74,K,D\*0A



- 1, 真北に対する進行方向(度)
- 2, 磁北に対する進行方向(度)
- 3, 対地速度(ノット)
- 4, 対地速度(km/h)
- 5, モード:  
A: 単独測位  
D: DGPS
- 6, チェックサム

## [ZDA]

\$GPZDA,090730.000,28,04,2015,.,\*53



- 1, 測位時刻(UTC)
- 2, 日(UTC)
- 3, 月(UTC)
- 4, 西暦(UTC)
- 5, チェックサム