No. HD-SH-GT140339

Specification

仕 様 書

Model Name
品 名　　　　GYSFDMAXB

太陽誘電株式会社　複合デバイス事業部　商品開発部

Control No. HD-AG- A140339	Title General Items 一般事項書	APPROVED	CHECKED	DRAWN	DESIGNED

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GPS用モジュール "GYSFDMAXB"
("本製品")に適用する

2.内容

①品　名　：　GYSFDMAXB

②機　能　：　GPSモジュール　　（GPS_L1: 1575.42MHz）

③用　途　：　一般民生機器

④構　造　：　シリコンゲルマニウム化合物、モノリシック半導体を用いた混成集積回路

　　　　　　　*RoHS指令(2002/95/EC)に適合しています。

Control No. HD-AM- A140339	Title Absolute maximum ratings 絶対最大定格書	APPROVED	CHECKED	DRAWN	DESIGNED

1.Maximum rating

Item	Symbol	MIN	TYP	MAX	Unit	Condition
Input voltage	VDD3V3	-0.3		4.3	V	Ta=25℃
	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	℃	Humidity =40%RH Note1
Storage temperature range	Tstg	-40	25	85	℃	Humidity =40%RH Note2

Notes:

1.動作温度範囲は短期的に製品の電気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、長期ご使用の場合の製品寿命につきましては
　信頼性条件をご参照願います。

2.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。

TAIYO YUDEN CO.,LTD.

Control No. HD-AE- A140339 （1／4）	Title Electrical characteristics 電気的特性書	APPROVED	CHECKED	DRAWN	DESIGNED

Electrical characteristics
DC Specifications

The Specification applies for Topr.= 25 degrees C

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

No.	Parameter	Condition	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Input Low Voltage	Rx, GIO/EINT, RESET	VIL28	-0.3		0.7	V	IO=2.8V
2	Input High Voltage		VIH28	2.1		3.6	V	IO=2.8V
3	Output Low Voltage	Tx, GIO/EINT	VOL28	-		0.4	V	IO=2.8V
4	Output High Voltage		VOH28	2.4		-	V	IO=2.8V
5	Current MAIN	VDD3V3 Current Consumption (Average)	Icc_Ac	-	19	35	mA	Acquisition
			Icc_Tr	-	16	35	mA	Tracking
6	Current BK	VDD3V3_BACKUP Current Consumption	Icc_bk1	-	6	60	uA	Backup (VDD3V3=0V) Note1
			Icc_bk2	-	24	200	uA	Other mode

TAIYO YUDEN CO.,LTD.

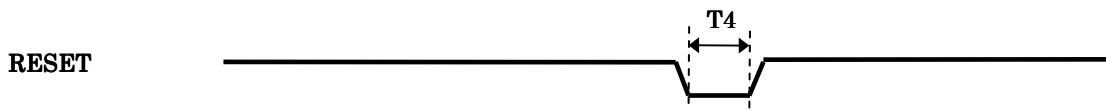| Control No.	Title		APPROVED	CHECKED	DRAWN	DESIGNED
HD-AE-A140339 (2／4)	Electrical characteristics 電気的特性書					

AC Specifications

The Specification applies for Topr.= 25 degrees C

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

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 High to Module Ready		T3			1500	ms	
3	RESET Pulse Width		T4	10			ms	After power on
4	Time from VDD3V3 fall (0.5V) to VDD3V3_BACKUP fall		T5	20			ms	
5	VDD3V3 fall time from 2.8V to 0.5V		T6	100			ms	
6	Inrush Current	VDD3V3	Icc_rush	-	-	400	mA	Note2

VDD3V3_BACKUP

T1

VDD3V3

T3

UART I/F

ACTIVE

Power-on Timing

T4
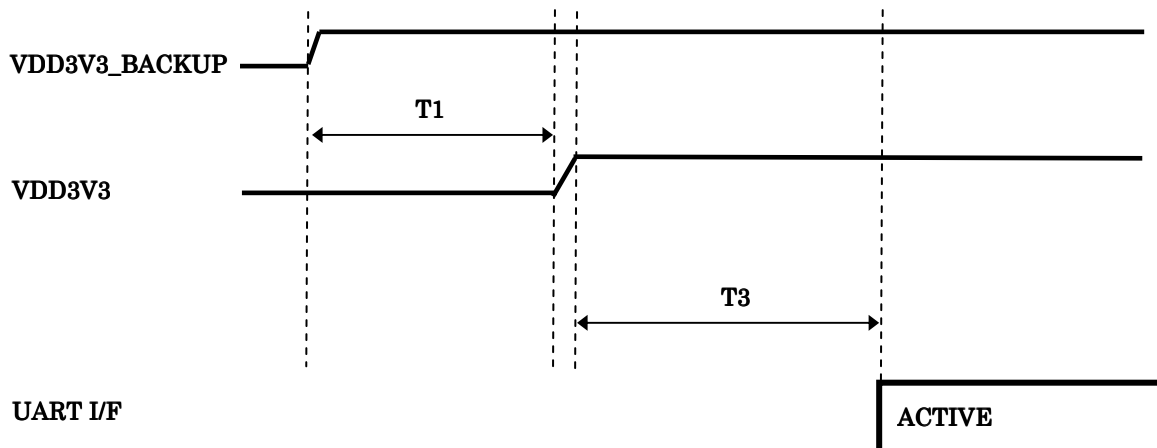
RESET

RESET Pulse Width

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

TAIYO YUDEN CO.,LTD.

Control No. HD-AE- A140339 （3／4）	Title Electrical characteristics 電気的特性書	APPROVED	CHECKED	DRAWN	DESIGNED

T5

VDD3V3_BACKUP

T6

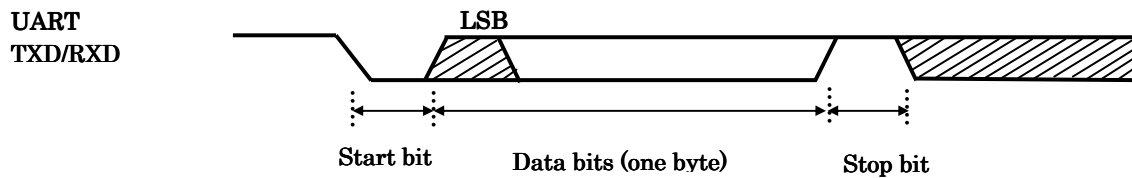VDD3V3 .... 2.8V

0.5V

UART I/F   ACTIVE
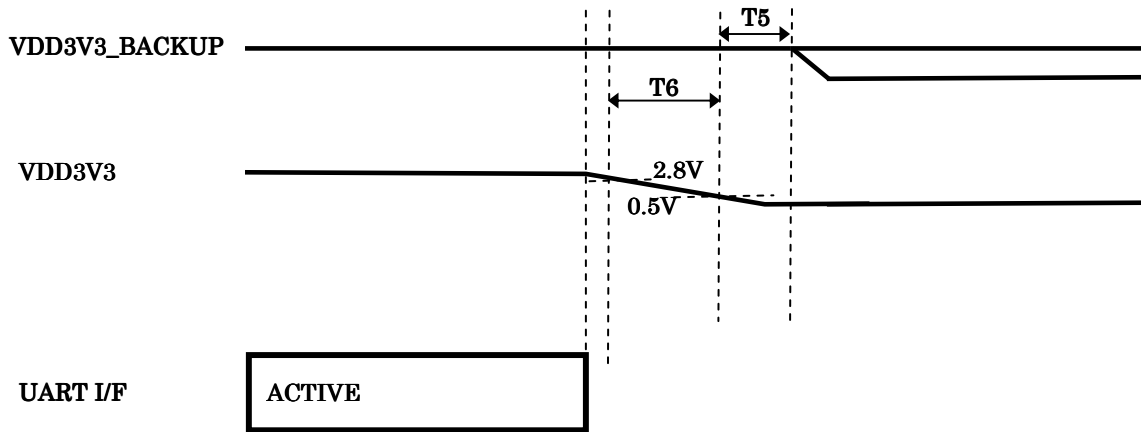
Power-off Timing

Note: RESET端子をオープンで使用する場合、Power-on/off時の制御の必要はありません。

UART Interface AC Specifications

The Specification applies for Ta=25 degrees C

UART
TXD/RXD

LSB

Start bit   Data bits (one byte)   Stop bit

Data bit： 8bit
Stop bit： 1bit
パリティチェック：　なし
フロー制御：　　なし

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

TAIYO YUDEN CO.,LTD.

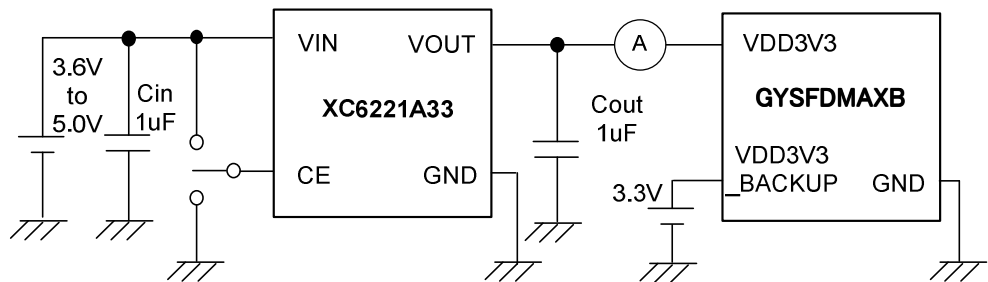| Control No.	Title		APPROVED	CHECKED	DRAWN	DESIGNED
HD-AE- A140339 （4／4）	Electrical characteristics 電気的特性書					

Notes:

1. VDD3V3_BACKUP電源はGPS IC（MT3339）のRTC回路 とNVRAM（SRAM）回路用の
電源となっています。
NVRAMを初期化してSleep stateに入れるためには、一旦VDD3V3メイン電源をON
する必要があります。VDD3V3メイン電源のONが1度も無い状態では、NVRAMは
その内部の状態によってリーク電流が異なります。
このときはGPS ICが不安定な状態となります。
従いまして、Current BK（Icc_bk1）はPower on timingに従いVDD3V3_BACKUP電源、
VDD3V3メイン電源の両方を起動し、その後VDD3V3メイン電源のみOFF（0V）にした
状態（正常なSleep stateになっている状態）の規定となります。

2. Inrush current test circuit

   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）

TAIYO YUDEN CO.,LTD.

Control No. HD-AE- B140339	Title Electrical characteristics 電気的特性書	APPROVED	CHECKED	DRAWN	DESIGNED

RF Specifications

The Specification applies for Topr.= 25 degrees C

No.	Parameter	Symbol	Min.	Typ.	Max.	Unit	Remark
1	Frequency	Fc_p		1575.42		MHz	C/A code
2	Intermediate frequency	IF		4.092		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 1	Hs1		-161		dBm	Hot start sensitivity
		Ws1		-146			Warm start sensitivity
		Cs1		-146			Cold start sensitivity
		Ts1		-164			Tracking sensitivity
7	TTFF 1	Ht1		1.0		sec	Hot start@-135dBm Note1
		Wt1		34			Warm start@-135dBm Note2
		Ct1		42			Cold start @-135dBm Note3
8	Accuracy 1	Ha1		2		m	Hot start @-135dBm
		Wa1		2			Warm start@-135dBm
		Ca1		2			Cold start @-135dBm

Notes:
1.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
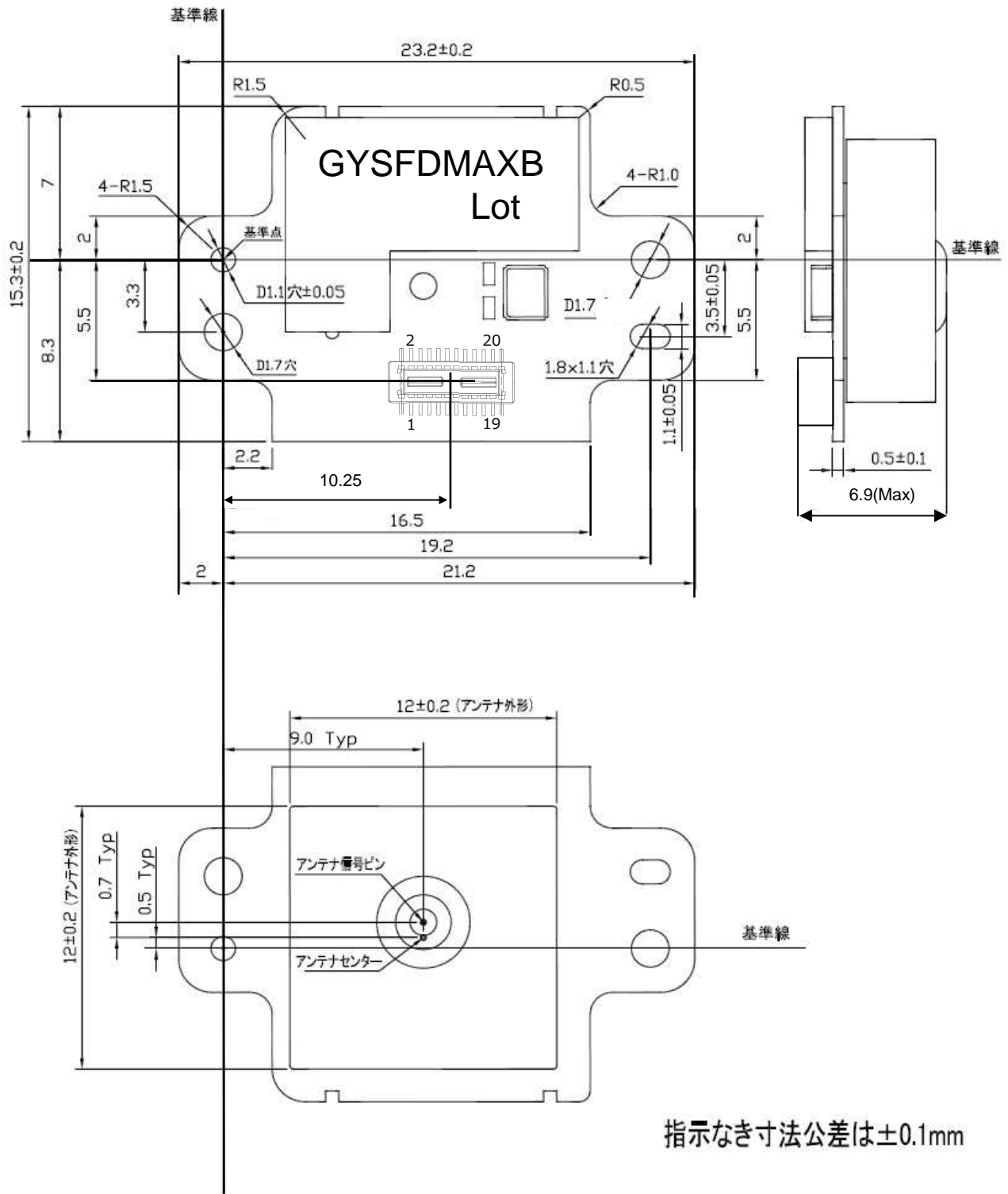2.Warm start： Almanac dataを持っている状態での再Start
3.Cold start： 全ての情報が無い場合でのStart

TAIYO YUDEN CO.,LTD.

Control No.	Title		APPROVED	CHECKED	DRAWN	DESIGNED
HD-AE- C140339	Electrical characteristics 電気的特性書					

ファームウェア

    1. 内蔵ファームウェア: AXN_2.10_3339_12051401,0012,Taiyo_9600bps

    2. NMEA Packt Format: HD-AE-E1211064, Ver1.0

Control No.	Title					
HD-AE- C140339	Electrical characteristics 電気的特性書					

Control No.	Title	APPROVED	CHECKED	DRAWN	DESIGNED
HD-AD-A140339 (1／1)	Outline・Appearance 外形・外観図				

Unit：mm

基準線

23.2±0.2

R1.5　　R0.5

GYSFDMAXB Lot

4-R1.5　　4-R1.0

7

15.3±0.2

2

3.3

5.5

8.3

基準点

D1.1穴±0.05

D1.7

D1.7穴

2　　20

1　　19

1.8×1.1穴

2

3.5±0.05

5.5

1.1±0.05

基準線

0.5±0.1

6.9(Max)

2.2

10.25

16.5

19.2

21.2

2

12±0.2（アンテナ外形）

9.0 Typ

12±0.2（アンテナ外形）

0.7 Typ

0.5 Typ

アンテナ信号ピン

アンテナセンター

基準線

指示なき寸法公差は±0.1mm

パッチアンテナ外観基準（アンテナ素体の欠損）
1.0mm以下は可とする。
＊アンテナの特性を満足すること

TAIYO YUDEN CO.,LTD.

Control No.	Title		APPROVED	CHECKED	DRAWN	DESIGNED
HD-MC- A140339 （1／1）	Circuit schematic 内部回路図					

1.ブロック図

モジュール

UART

ANT

NMEA
data

| LNA | SAW | MT3339 |

X'tal

TCXO

Host

Power supply

TAIYO YUDEN CO.,LTD.
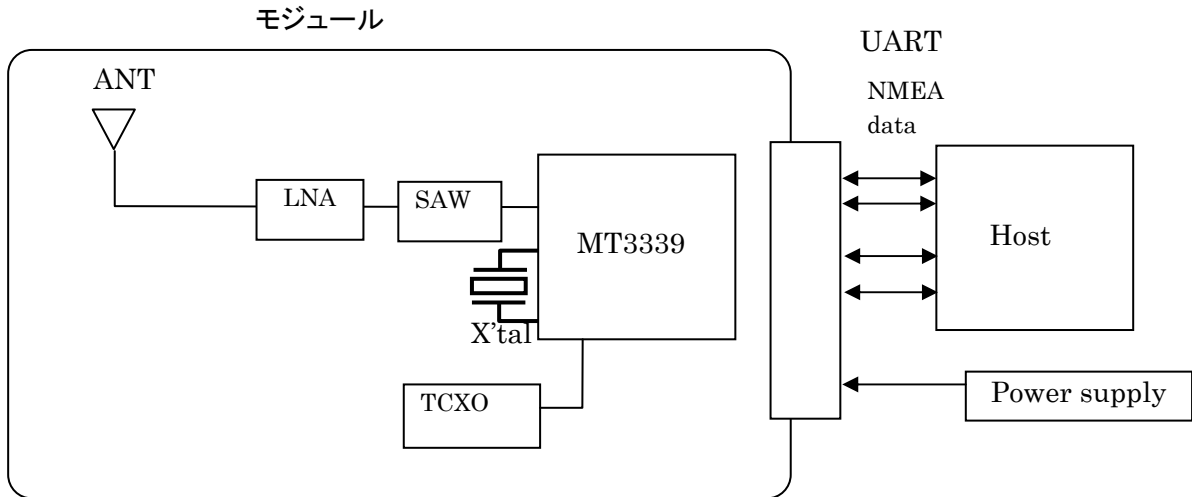
Control No. HD−BA− A140339	Title	Pin layout ピンレイアウト図	APPROVED	CHECKED	DRAWN	DESIGNED

Pin Descriptions

Pin No.	Pin Name	I/O	Note
1	GND	-	GND
2	GND	-	GND
3	RX	I	Serial input UART RX (75k pull up IC内部)
4	RESET	I	RESET端子　アクティブLOW
5	TX	O	Serial output UART TX (75k pull up IC内部)
6	1PPS		1pps信号出力端子 出力は、3D_Fix時のみ(パルス幅：100msec)
7	GND	-	GND
8	N.C	-	N.C(接続しないで下さい)
9	N.C	-	N.C(接続しないで下さい)
10	GND	-	GND
11	N.C	-	N.C(接続しないで下さい)
12	GND	-	GND
13	N.C	-	N.C(接続しないで下さい)
14	VDD3V3_BACKUP	I	RTC　Backup電源
15	N.C	-	N.C(接続しないで下さい)
16	VDD3V3	I	メイン電源
17	N.C	-	N.C(接続しないで下さい)
18	N.C	-	N.C(接続しないで下さい)
19	GND	-	GND
20	GND	-	GND

GYSFDMAXB

X 2 4 6 8 12 14 16 18 20 X

X 1 3 5 7 9 11 13 15 17 19 X

（X: 未使用）

対応レセプタクル

20 18 16 14 12 10 8 6 4 2

19 17 15 13 11 9 7 5 3 1
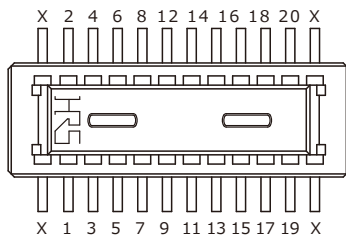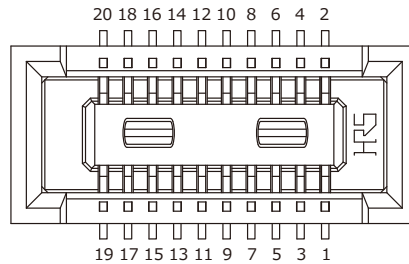
DF40C-20DS-0.4V(51)(Hirose)

TAIYO YUDEN CO.,LTD.

Control No. HQ-BA-518	Control name Handling Precaution 取扱注意要領	APPROVED	CHECKED	DRAWN	PREPARED

This document describes the handling instructions for modules.
本書類では特に取扱い時の注意事項について記載します。

1. The storage condition for module
本製品の保管条件

1) Store the components at 5~30deg / 40~60%RH.
温度5～30℃　湿度40～60%RHで保管して下さい。

2) Store the components where no poison gas occurred and less dust .
特に有害なガスの発生がなく、塵埃の少ない雰囲気で保管して下さい。

3) Please make sure that dew condensation of moisture should not occurred
due to a rapid temperature change and so on.
保管時、急激な温度変化等により、水分の結露が起きないようにして下さい。

2. Shipping condition for this module and handling condition for unit (case) of module and etc.
本商品の運送条件、及び、本商品組入れユニット等の輸送条件

1) Please make sure that there are lessen mechnical vibration and shock for this module, and do not drop it.
機械的振動、衝撃を極力少なくし、落下させない様にして下さい。

2) The worker (human body) who handles grounds through high resistance (1M-100Mohm),
and please discharge static electricity .
取り扱う作業者(人体)は高抵抗(1M～100MΩ)を介して接地し、静電気を放電させておいて下さい。

3. Use Conditions for this module
   本製品の使用条件

   1) Please do not use this product except for the absolute maximum rating and use of specification described.
      本製品は本仕様書記載の用途、絶対最大定格、以外ではご使用に成らないで下さい。

   2) Please do not use it under the conditions that moisture, ionic substances,dew condensation water
      and dust are sticked to.
      また、結露水・ほこり等の水分・イオン性物質の付着する条件下ではご使用に成らないで下さい。

   3) This module should not be cleaned.
      本製品本体は洗浄しないで下さい。

   4) This module is the products for general electric devices.
      (For example,   AV equipment, general household-electric-appliances, and office apparatus, information,
      communication apparatus, etc.)

      Even if you use it for general electric device in demand of safely, equipment of highly reliability requested,
      circuit and others, please operate the evaluation safely enough and add a protection circuit and others
      if it's necessary.

      本製品は一般電子機器（AV機器、一般家電、事務機器、情報、通信機器等）向け商品となって
      おります。
      尚、一般電子機器においても安全性や信頼性の要求が高い機器、回路等にご使用になる場合は、
      十分な安全性評価を実施され、必要に応じて保護回路等を追加して下さい。

Control No	Control Name	APPROVED	CHECKED	DRAWN	DESIGNED
RT5991-048A	The Terms of Reliability Tests 信頼性条件書	7.Dec.'11	7.Dec.'11		7.Dec.'11

Tests 試験項目	Testing Methods 試験条件	Judgment criteria 判定基準
High Temperature Test (Non Biased) 高温保存	After being placed in high temperature (100deg-C) environment for 100 hours, devices are left for 2~24 hours in the normal temperature and humidity while no voltage is applied during this term. 100℃の雰囲気中に100時間放置後、取り出して常温常湿中に2～24時間放置後測定。	Devices should show no abnormal electrical performance. 電気的特性に異常ないこと。
Low Temperature Test (Non Biased) 低温保存	After being placed in a low temperature (-30deg-C) environment for 100 hours, devices are left for 2~24 hours in the normal temperature and humidity while no voltage is applied during this term. −30℃の雰囲気中に100時間放置後、取り出して常温常湿中に2～24時間放置後測定。	Devices should show no abnormal electrical performance. 電気的特性に異常ないこと。
Humidity Test (Non Biased) 高温高湿保存	After being exposed to 85% humidity at 85deg-C for 100 hours, devices are left for 2~24 hours in the normal temperature and humidity, while no voltage is applied during this term. 85℃、85％RHの雰囲気中に100時間放置後、取り出して常温常湿中に2～24時間放置後測定。	Devices should show no abnormal electrical performance. 電気的特性に異常ないこと。
Thermal Shock Test (Air) 温度サイクル	After being placed at two different temperature (-30~+85deg-C) in the atmosphere for 30 minutes respectively, devices are left for 2~24 hours in the normal temperature and humidity. This cycle is repeated 100 times. 気中で、−30℃(30分)⇔常温10秒以内⇔85℃(30分)に順次入れこれを100サイクル繰り返した後、常温常湿中に2～24時間放置後測定。	Devices should show no abnormal electrical performance. 電気的特性に異常ないこと。
High Temperature Test (Biased) 高温連続動作	After being placed in a high temperature (85deg-C) environment for 100 hours, devices are left for 2~24 hours in the normal temperature and humidity, with device operated during this term. 85℃の雰囲気中で100時間動作後、取り出して常温常湿中に2～24時間放置後測定。	Devices should show no abnormal electrical performance. 電気的特性に異常ないこと。
Humidity Test (Biased) 高温高湿バイアス	After being exposed to 95% humidity at 60deg-C for 100 hours, devices are left for 2~24 hours in the normal temperature and humidity, with device operated during this term. 60℃、95％RHの雰囲気中で100時間動作後、取り出して常温常湿中に2～24時間放置後測定。	Devices should show no abnormal electrical performance. 電気的特性に異常ないこと。
ESD (Machine Model) 静電気耐圧（マシンモデル）	C=200pF,R=0 ohm, ±200V,each 5 times 200pF, 0Ω, ±200V　各5回実施後測定。	Devices should show no abnormal electrical performance. 電気的特性に異常ないこと。

Part No: GPS Module with patch Antenna　　　　　　　**7.Dec.2011**

TAIYO YUDEN CO.,LTD.

NMEA Packet Format

Control No.		Control Name
HD-AE-E1211064	(1/21)	Electrical characteristics

Rev. record

18-Dec.-2012> Ver.0.3 Draft

18-Jan.-2013> Ver.0.7 Draft

02-May.-2013> Ver.0.9 Draft

28-Jan. -2016> Ver.1.0 Newly issued

Control No. HD-AE-E1211064	(2/21)	Control Name Electrical characteristics

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.

Control No. HD-AE-E1211064 (3/21)	Control Name Electrical characteristics

NMEA Packet Type List:

000 PMTK_TEST

001 PMTK_ACK

010 PMTK_SYS_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

161 PMTK_CMD_STANDBY_MODE

183 PMTK_LOCUS_QUERY_STATUS

184 PMTK_LOCUS_ERASE_FLASH

185 PMTK_LOCUS_STOP_LOGER

186 PMTK_LOCUS_LOG_NOW

223 PMTK_SET_AL_DEE_CFG

225 PMTK_SET_PERIODIC_MODE

251 PMTK_SET_NMEA_BAUDRATE

300 PMTK_API_SET_FIX_CTL

301 PMTK_API_SET_DGPS_MODE

313 PMTK_API_SET_SBAS_ENABLED

314 PMTK_API_SET_NMEA_OUTPUT

330 PMTK_API_SET_DATUM

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

386 PMTK_API_SET_STATIC_NAV_THD

389 PMTK_API_SET_TCXO_DEBUG

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

705 PMTK_DT_RELEASE

740 PMTK_DT_UTC

741 PMTK_DT_POS

869 PMTK_EASY_ENABLE

Control No. HD-AE-E1211064	(4/21)	Control Name Electrical characteristics

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: '0' = UNKNOWN
	'1' = STARTUP
Example:	$PMTK010,001*2E<CR><LF>

101 PMTK_CMD_HOT_START

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

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..
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>

161 PMTK_CMD_STANDBY_MODE

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

183 PMTK_LOCUS_QUERY_STATUS

Packet Meaning: Query Logging status.

Data Field: None

Return: $PMTKLOG,Serial#,Type,Mode,Content,Interval,Reserve,Status,Percent*CH

Serial#:	Logging serial number: 0~65535
Type:	Logging type -1: Overlap, 2: FullStop
Mode:	Logging mode – 0x10: Interval logger
Content:	Logging status -1: Stop Logging, 2: Logging
Interval:	
Status:	Logging status -1: Stop Logging, 2: Logging
Percent:	Logging life used percentage

Example:	Input:	$PMTK183*38<CR><LF>
	Output:	$PMTKLOG,7,1,10,A,15,0,0,0,38,57*20<CR><LF>

184 PMTK_LOCUS_ERASE_FLASH

Packet Meaning:	Erase Logger Flash.
Data Field:	Type: Erase type.
	'1' = erase all logger internal flash data
Example:	$PMTK184,1*22<CR><LF>

Control No. HD-AE-E1211064	(6/21)	Control Name Electrical characteristics

185 PMTK_LOCUS_STOP_LOGGER

Packet Meaning:	Stop logging data.
Data Field:	Status: Stop logging
	'1' = Stop logging
	'0' = Start logging
Example:	$PMTK185,1*23<CR><LF>

186 PMTK_LOCUS_LOG_NOW

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

223 PMTK_SET_AL_DEE_CFG

Packet Meaning:	
Data Field:	SV: 1~4 (Default value = 1)
	SNR: 25~30 (Default value = 30)
	Extension threshold: 40000~180000 msec (Default value = 180000)
	Extension gap: 0~3600000 msec (Default value = 60000)
	(Extension gap is the limitation between neighbor DEE)
Example:	Input: $PMTK186,1*20<CR><LF>
	Output: $PMTK001,186,3*3F<CR><LF>

225 PMTK_SET_PERIODIC_MODE

Packet Meaning:	Periodic Power Saving Mode Setting.
Data Field:	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]

Control No. HD-AE-E1211064	(7/21)	Control Name Electrical characteristics

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.

Periodic Backup mode

$PMTK225,0*2B<CR><LF>

$PMTK225,1,25,180000,60000*0E<CR><LF>

$PMTK225,1,3000,12000,18000,72000*16<CR><LF>

Periodic Standby mode

$PMTK225,0*2B<CR><LF>

$PMTK225,2,25,180000,60000*0D<CR><LF>

$PMTK225,2,3000,12000,18000,72000*15<CR><LF>

How to enter AlwaysLocate modes.

AlwaysLocate Standby

$PMTK225,0*2B<CR><LF>

$PMTK225,8*23<CR><LF>

AlwaysLocate Backup

$PMTK225,0*2B<CR><LF>

$PMTK225,9*22<CR><LF>

251 PMTK_SET_NMEA_BAUDRATE

Packet Meaning:　　　Set NMEA port baudrate.

Data Field:　　　　　Baud rate

'0' = default setting

"4800" = 4800bps

"9600" = 9600bps

"14400" = 14400bps

"19200" = 19200bps

"38400" = 38400bps

"57600" = 57600bps

"115200" = 115200bps

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

300 PMTK_API_SET_FIX_CTL

Packet Meaning: This command controls the rate of position fixing activity.

Data Field: Fixinterval: Position fix interval [msec]. Must be larger than 100.

                     0,0,0,0

Example: $PMTK300,1000,0,0,0,0*1C<CR><LF>

301 PMTK_API_SET_DGPS_MODE

Packet Meaning: DGPS correction data source mode.

Data Field: Mode: DGPS data source mode.

                        '0' = No DGPS source

                        '1' = RTCM

                        '2' = WAAS

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

313 PMTK_API_SET_SBAS_ENABLED

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

Data Field: Enabled: Enable or disable.

                        '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 19 data fields that present output frequencies for the 19 supported

                     NMEA sentences individually.

                     Supported NMEA Sentences

                      0 NMEA_SEN_GLL,   // GPGLL interval

                      1 NMEA_SEN_RMC,   // GPRMC interval.

                      2 NMEA_SEN_VTG,   // GPVTG interval.

                      3 NMEA_SEN_GGA,   // GPGGA interval.

                      4 NMEA_SEN_GSA,   // GPGSA interval.

Control No. HD-AE-E1211064	(9/21)	Control Name Electrical characteristics

5 NMEA_SEN_GSV,   // GPGSV interval.

17 NMEA_SEN_ZDA,   // GPZDA interval.

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: $PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,0,1,0*2D<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.

$PMTK314,-1*04<CR><LF>

330 PMTK_API_SET_DATUM

Packet Meaning: Set default datum.

Data Field: Datum:

'0' = WGS84

'1' = TOKYO-M

'2' = TOKYO-A

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

331 PMTK_API_SET_DATUM_ADVANCE

Packet Meaning: Set user defined datum.

Data Field: majA: User defined datum semi-major axis [m]

ecc: User defined datum datumeccentric [m]

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

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

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

Example: $PMTK331.6377397,155,299.1528128,-148.0,507.0,685.0*16<CR><LF>

Control No.		Control Name
HD-AE-E1211064	(10/21)	Electrical characteristics

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:	Year: XXXX
	Month: 1 ~ 12
	Day:　1 ~ 31
	Hour:　0 ~ 23
	Min:　0 ~ 59
	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:	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:	Enabled:
	'0': Enable
	'1': Disable
Example:	$PMTK352,0*2B<CR><LF> :Enable QZSS function
	$PMTK352,1*2A<CR><LF> :Disable QZSS function

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: on_off:

      '0' = off

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

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

605 PMTK_Q_RELEASE

Packet Meaning: Query the firmware release information.

Data Field: None

Example: $PMTK605*31<CR><LF>

607 PMTK_Q_EPO_INFO

Packet Meaning: EPO Data Valid day check.

Data Field: $PMTK607

Example: $PMTK607*33<CR><LF>

622 PMTK_Q_LOCUS_DATA

Packet Meaning: LOCUS logging data dump out.

Data Field: $PMTK622

Example: Please refer LOCUS library document.

660 PMTK_Q_AVAILABLE_SV_EPH

Packet Meaning: Support PMTK660 which report valid Ephemeris SV

(a) Host -> MT33**: A PMTK660 command to request the EPH info, together with a time interval parameter (for example, 1800sec).

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

Data Field: Time Interval:

Set the time interval for MT33** to reply 32-bit flags of 32SV. Note that the Time Interval > 0 and <= 7200 (2 hours)

Example: $PMTK660,1800*17<CR><LF>

Indicate which EPHs will be available after 1800 seconds

Control No. HD-AE-E1211064	(12/21)	Control Name Electrical characteristics

Return: $PMTK001,660,3,400449464*17<CR><LF>

Note the Hex 40449464 means 0100 0000 0100 0100 1001 0100 0110 0100 and the Valid SV's numbers are 3,6,7,11,13,16,19,23,31

661 PMTK_Q_AVAILABLE_SV_ALM

Packet Meaning: Support PMTK661 which report valid Almanac SV

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

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

Data Field: Time Interval:

et the time interval for GPS_reciever to reply 32-bit flags of 32SV. Note that the Time Interval > 0 and <= 365

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

Indicate which Al,anac 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.

705 PMTK_DT_RELEASE

Packet Meaning: Firmware release information.

Data Field: ReleaseStr: 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 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: CmdType: Set or Query

        '0' : Query

        '1' : Set

        '2' : Result for Query operation

    Enable: Enable or disable

        '0' : Disable

        '1' : Enable

Example: $PMTK869,1,1*35<CR><LF>

                $PMTK869,1,0*34<CR><LF>

Control No. HD-AE-E1211064 (14/21)	Control Name Electrical characteristics

Appendix A: Datum List

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 EI Abd1970	Bahrain
13	Ain EI 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

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	Guuinea-Bissau
40	Bogota Observatory	Colombia
41	Bukit Rimpah	Indonesia (Bangka and Belitung Ids)
42	Camp Area Astro	Antarctica (McMurdi Camp Area)
43	Campo Inchauspe	Argentia
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, Antarctia
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

Control No. HD-AE-E1211064	(16/21)	Control Name Electrical characteristics

No.	Datum	Region
62	European 1950	Greece
63	European 1950	Iran
64	European 1950	Italy (Sardinia)
65	European 1950	Italy (Slcily)
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, Debnmark, France, Germany, Netherland, Swizerland
69	European 1950	Mean for Iraq, Israel, Jordan, Lebanon, Kuwait, SuadiArabia, Syria
70	European 1950	Portugal, Spain
71	European 1950	Tunisia
72	European 1979	Mean For Austria, Finland, Netherlands, Norway, Spain, Sweden, Switzland
73	Fort Thomas 1955	Nevis St Kitts (Leeward Islands)
74	Gan 1970	Republic Of Maldives
75	Geodetic Dataum 1970	New Zeland
76	Graciosa Base SW1948	Azores (Faial, Graciosa, Pico, Sao, Jorge, Terceria)
77	Guam1963	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

Control No.		Control Name
HD-AE-E1211064	(17/21)	Electrical characteristics

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)

Control No.		Control Name
HD-AE-E1211064	(18/21)	Electrical characteristics

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, EI 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

Control No.		Control Name
HD-AE-E1211064	(19/21)	Electrical characteristics

No.	Datum	Region
146	Observatario 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

Control No.		Control Name
HD-AE-E1211064	(20/21)	Electrical characteristics

No.	Datum	Region
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
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	Brazial
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

Control No. HD-AE-E1211064	(21/21)	Control Name Electrical characteristics

No.	Datum	Region
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
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