MediaTek GPS Chipset
NMEA Packet User Manual

Rev.A01

Date: 2013/03/11

Title: This document is described the MTK NMEA Packet Format

Content:

MTK NMEA Packet Format

Preamble	TalkerID	PktType	DataField	*	CHK1	CHK2	CR	LF

Packet Length:

The maximum length of each packet is restricted to 255 bytes

Packet Contents:

Preamble:	One byte character, “$”
TalkerID:	Four bytes character string, “PMTK”
PktType:	Three bytes character string, from “000” to “999”
DataField:	The DataField has variable length depending on the packet type. A comma symbol “,” must be inserted ahead each data field to help the decoder process the DataField. The “*” symbol is used to mark the end of DataField.
CHK1, CHK2:	Two bytes character string. CHK1, CHK2 are the checksum of the data between Preamble and “*”.
CR, LF:	Two bytes binary data. <CR> = 0x0D, <LF> = 0x0A

MTK 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 receivers a packet.

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Packet 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
161	PMTK_CMD_STANDBY_MODE
251	PMTK_SET_NMEA_BAUDRATE
300	PMTK_API_SET_FIX_CTL
301	PMTK_API_SET_DGPS_MODE
313	PMTK_APE_SET_SBAS_ENABLED
314	PMTK_API_SET_NMEA_OUTPUT
330	PMTK_APE_API_SET_DATUM
331	PMTK_API_SET_DATUM_ADVANCE
400	PMTK_API_Q_FIX_CTL
401	PMTK_API_Q_DGPS_MODE
413	PMTK_API_Q_SBAS_ENABLED
414	PMTK_API_Q_NMEA_OUTPUT
430	PMTK_API_Q_DATUM
431	PMTK_API_Q_DATUM_ADVANCE
605	PMTK_Q_RELEASE
705	PMTK_DT_RELEASE

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Packet Type: 000 PMTK_TEST

Packet Meaning:

Test Packet.

Data Field:

None

Example:

$PMTK000*32<CR><LF> (Return package: $PMTK001,0,3*30<CR><LF>)

Packet Type: 001 PMTK_ACK

Packet Meaning:

Acknowledge of PMTK command.

Data Field:

PMTK001,*Cmd*,*Flag*

Cmd: The command / packet type the acknowledge responds.

Flag: '0' = Invalid command / packet
'1' = Unsupported command / packet type
'2' = Valid command / packet, but action failed
'3' = Valid command / packet, and action succeeded

Example:

$PMTK001,300,3*33<CR><LF>

Packet Type: 010 PMTK_SYS_MSG

Packet Meaning:

Output system message

Data Field:

Msg: The system message.

'0': Unknown

"1": Startup

Example:

$PMTK010,001*2E<CR><LF>

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Packet Type: 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>

Packet Type: 102 PMTK_CMD_WARM_START

Packet Meaning:

Warm Restart: Don't use Ephemeris at re-start.

Data Field:

None

Example:

$PMTK102*31<CR><LF>

Packet Type: 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>

Packet Type: 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>

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Packet Type: 161 PMTK_CMD_STANDBY_MODE

Packet Meaning:

Leave and enter standby mode by PMTK command.

Data Field:

PTMK161, *ctrl*

ctrl:

0: let GPS receiver to enter standby mode

1: wake up GPS receiver

Example:

$PMTK161,1*29<CR><LF>

Packet Type: 251 PMTK_SET_NMEA_BAUDRATE

Packet Meaning:

Set NMEA port baud rate

Data Field:

Baud rate:

0 – default

4800

9600

14400

19200

38400

57600

115200

Example:

$PMTK251,38400*27<CR><LF> // baud rate: 38400

$PMTK251,0*28<CR><LF> // system default setting

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Packet Type: 300 PMTK_API_SET_FIX_CTL

Packet Meaning:

This parameter controls the rate of position fixing activity

Data Field:

PMTK300,*FixInterval*,0,0,0,0

FixInterval: Position fix interval [msec]

Example:

$PMTK300,200,0,0,0,0*2F<CR><LF> // 5Hz update rate

$PMTK300,100,0,0,0,0*2C<CR><LF> // 10Hz update rate

Packet Type: 301 PMTK_API_SET_DGPS_MODE

Packet Meaning:

DGPS correction data source mode.

Data Field:

PMTK301,*Mode*

Mode: DGPS data souce mode

‘0 ‘: No DGPS source

‘1 ‘: RTCM

‘2’ : WAAS

Example:

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

Packet Type: 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>

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Packet Type: 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 – Geographic Position
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 Errors Statistics
13	NMEA_SEN_MALM,	//	PMTKALM interval – GPS almanac information
14	NMEA_SEN_MEPH,	//	PMTKEPH interval – GPS ephemeris information
15	NMEA_SEN_MDGP,	//	PMTKDGP interval – GPS differential correction information
16	NMEA_SEN_MDBG,	//	PMTKDBG interval – MTK debug information
17	NMEA_SEN_ZDA,	//	GPZDA interval – Time & Date
18	NMEA_SEN_MCHN,	//	PMTKCHN interval – GPS channel status

Supported Frequency Setting

0 – Disable 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

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Example:

$PMTK314,1,1,1,1,1,5,1,1,1,1,1,1,0,1,1,1,1,1,1*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:

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

Packet Type: 330 PMTK_API_SET_DATUM

Packet Meaning:

Set default datum.

Data Field:

PMTK330,*Datum*

Datum:

'0' : WGS84

'1' : TOKYO-M

'2' : TOKYO-A

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

Example:

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

Packet Type: 331 PMTK_API_SET_DATUM_ADVANCE

Packet Meaning:

Set user defined datum.

Data Field:

PMTK331, *majA, ecc, dX, dY, dZ*

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

ecc: User defined datum eccentric [m]

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

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

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

Example:

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

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Packet Type: 400 PMTK_API_Q_FIX_CTL

Packet Meaning:

Query the current fix interval setting.

Data Field:

None

Return:

PMTK_DT_FIX_CTL

Example:

$PMTK400*36<CR><LF>

Packet Type: 401 PMTK_API_Q_DGPS_MODE

Packet Meaning:

Query the current DGPS mode.

Data Field:

None

Return:

PMTK_DT_DGPS_MODE

Example:

$PMTK401*37<CR><LF>

Packet Type: 413 PMTK_API_Q_SBAS_ENABLED

Packet Meaning:

Query the current SBAS setting.

Data Field:

None

Return:

PMTK_DT_SBAS_ENABLED

Example:

$PMTK413*34<CR><LF>

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Packet Type: 414 PMTK_API_Q_NMEA_OUTPUT

Packet Meaning:

Query the current NMEA sentence output frequencies.

Data Field:

None

Return:

PMTK_DT_NMEA_OUTPUT

Example:

$PMTK414*33<CR><LF>

Packet Type: 430 PMTK_API_Q_DATUM

Packet Meaning:

Query the default datum

Data Field:

None

Return:

PMTK_DT_DATUM

Example:

$PMTK430*35<CR><LF>

Packet Type: 431 PMTK_API_Q_DATUM_ADVANCE

Packet Meaning:

Query the user defined datum.

Data Field:

None

Return:

PMTK_DT_DATUM

Example:

$PMTK431*34<CR><LF>

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Packet Type: 605 PMTK_Q_RELEASE

Packet Meaning:

Query the firmware release information.

Data Field:

None

Return:

PMTK_DT_RELEASE

Example:

$PMTK605*31<CR><LF>

Packet Type: 705 PMTK_DT_RELEASE

Packet Meaning:

The firmware release information.

Data Field:

PMTK705,*ReleaseStr*,*Build_ID*,*Product_Mode*,(*SDK_Version*,)

ReleaseStr: Firmware release name and version.

3318: Mcore_x.x

3329: AXN_x.x

Build_ID: Build ID set in CoreBuilder for firmware version control.

Product_Mode: Product Model set in CoreBuilder for product identification.

SDK_Version: Showing SDK version if the firmware is used for SDK

Example:

$PMTK705,AXN_1.30,1006,FMP04,*7C<CR><LF>

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Appendix A: Datum List

No	Datum	Region
0	WGS1984	International
1	Tokyo	Japan
2	Tokyo	Mean for Japan, South Korea, Okinawa
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 Abd 1970	Bahrain
13	Ain EI Abd 1970	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	Burundi
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	Arc1950	Mean for Kenya Tanzania
27	Arc1950	Kenya
28	Arc1950	Tam zamia

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29	Ascension Island 1958	Ascension Island
30	Astro Beacon E 1945	Lwo Jima
31	Astro Dos 71/4	St Helena Island
32	Astro Tern Island (FRIG) 1961	Tern 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

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59	European 1950	England, Channel Islands, Scotland, Shetland Islands
60	European 1950	England, Ireland, Scotland, Shetland Islands
61	European 1950	Finland, Norway
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, W Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland
68	European 1950	Mean for Austria, Denmark, France, W Germany, Netherland, Switzerland
69	European 1950	Mean for Iran 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 SW 1984	Azores (Faial, Graciosa, Pico, Sao, Jorge, Terceira)
77	Guam 1963	Guam
78	Gunung Segara	Indonesia (Kalimantan)
79	Gux I Astro	Guadalcanal Island
80	Heart North	Afghanistan
81	Hermannskogel Datum	Croatia-Serbia, Bosnia-Herzegovina
82	Hjorsey 1955	Iceland
83	Hongkong 1963	Hong Kong

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84	Hu Tzu Shan	Taiwan
85	Indian	Bangladesh
86	Indian	India, Nepal
87	Indian	Pakistan
88	Indian 1954	Thailand
89	Indian 1960	Vietnam (Con Son Island)
90	Indian 1960	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)

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116	Nahrwan	Saudi Arabia
117	Nahrwan	United Arab Emirates
118	Naparima BWI	Trinidad and Tobago
119	North American 1927	Alaska (Excluding Aleutian Ids)
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, Rive Excluding Louisiana, Minnesota, Missouri)
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

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143	North American 1983	Hawaii
144	North American 1983	Mexico, Central America
145	North Sahara 1959	Algeria
146	Observatorio Meteorologico 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	Oahu
153	Oman	Oman
154	Ordnance Survey Great Britian 1936	England
155	Ordnance Survey Great Britian 1936	England, Isle of Man, Wales
156	Ordnance Survey Great Britian 1936	Mean for England, Isle of Man, Scotland, Shetland Island, Wales
157	Ordnance Survey Great Britian 1936	Scotland, Shetland Islands
158	Ordnance Survey Great Britian 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	Point 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)

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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 Chilean 1963	Chile (Near 53 deg S) (Hito XVIII)
174	Puerto Rico	Puerto Rico, Virgin Island
175	Pulkovo 1942	Russia
176	Qatar National	Qatar
177	Qornoq	Greenland (South)
178	Reunion	Mascarene Island
179	Rome 1940	Italy
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
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

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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
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	Tristan 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	Marshall Islands
219	WGS1972	Global Definition
220	WGS 1984	Global Definition
221	Yacare	Uruguay

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222	Zanderij	Suriname

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