

**Mars-900** is a GPS Mouse receiver build-in high performances -160dBm Atheros GPS chipset. **Mars-900** provides customer high position, velocity and time accuracy performances as well as high sensitivity and tracking capabilities. Customers benefit from the strength of both companies.

Thanks to the low power consumption technology, the GPS-Mouse receiver is ideal for many portable applications such as PDA, Tablet PC, smart phone etc.



## Features

- ◆ Built-in high performance Atheros GPS chipset.
- ◆ Current consumption 65mA
- ◆ 20 channels parallel.
- ◆ Average Cold Start in 35 seconds.
- ◆ -160 dBm sensitivity in tracking mode
- ◆ NMEA0183 compliant protocol
- ◆ Extreme fast TTFF at low signal level
- ◆ Water proof IPX6

## Applications

- ◆ Automotive
- ◆ Personal/Portable Navigation (PDA)
- ◆ Geographic Surveying
- ◆ Sports and Recreation
- ◆ Marine Navigation
- ◆ Fleet Management
- ◆ AVL and Location-Based Services

## Specifications

General		Accuracy	
GPS Chip	AR1511 Atheros GPS chip	Position	
Frequency	L1, 1575.42MHz	2.5 meters CEP	
C/A Code	1.023 MHz chip rate		0.1 m/sec
Channels	20 CH	Time	1us synchronized to GPS time
		Datum	
<b>Sensitivity</b>		WGS-84	
To – 160Bm Tracking, Superior Urban Canyon Performance		Dynamic Conditions	
		Altitude	<18,000 m (60,000 feet)
<b>Acquisition Rate</b>		Velocity	<515 m/sec (1,000 knots)
Cold Start	35 sec, average	Acceleration	<4g
Warm Start	33 sec, average	Motional Jerk	<20 m/sec
Hot Start	3.1 sec, average	GPS Protocol	
Reacquisition	0.1sec, average	Default: NMEA-0183,	
Accuracy	Snap start 2 sec, average	GGA(1), GSA(1), GSV(1), RMC(1),	
<b>Power</b>		Band rate 9600 bps,	
Operation Power	5.0 VDC+10%	Data bit : 8, stop bit : 1	
Current Consumption	65mA	Device Size	
		56.0x44.0x20.0 mm	
<b>Environmental</b>		Water Proof	
Operating Temperature	- 20 °C to + 80 °C	IPX6	
Relative Humidity	5% to 95% non-condensing		

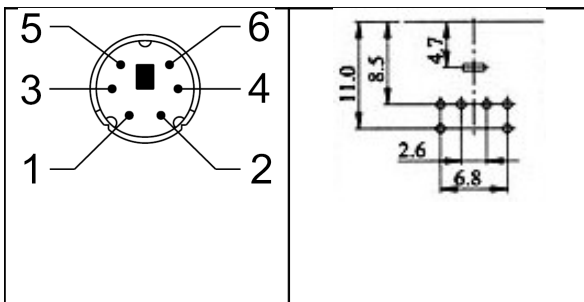
## Hardware Interface

The Mars-900 includes an antenna in a unique style waterproof gadget. We can manufacture variable connector cable to suit your demands. Like USB, PHR(JST), GHR(JST), Molex, PS2, RJ11, D-Sub 9..etc. You provide me specification, we manufacture the cable and connector.



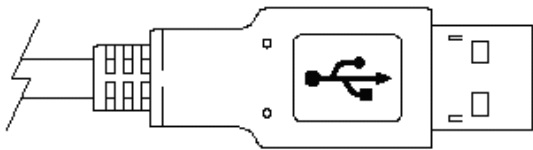
### Mars-900 Standard PIN OUT

- Pin Assignment of standard PS2 male Din Jack (figure 1)



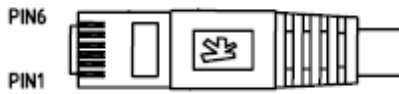
Pin	Signal
1	GND
2	VCC 5.0V
3	N.C.( RS-232 Rx on demand)
4	TTL RX
5	N.C.( RS-232 Tx on demand)
6	TTL TX

- Pin Assignment of A Type USB connector (figure 2)



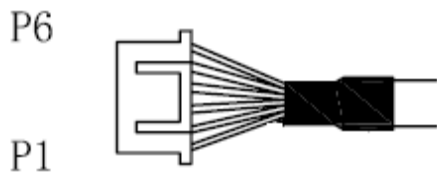
Pin	Signal
1	+5.0 VDC
2	D-
3	D+
4	GND

- Pin Assignment of RJ11 connector



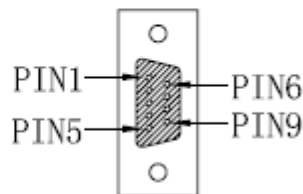
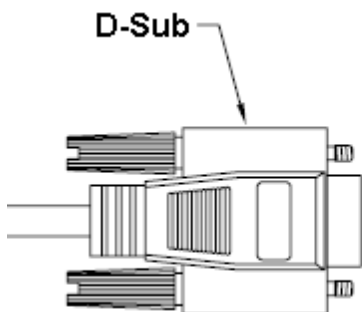
Pin	Signal
PIN1	VCC 5.0V
PIN2	RX (RS232)
PIN3	TX (RS232)
PIN4	GND
PIN5	N.C.
PIN6	N.C.

- Pin Assignment of PHR 6 PIN connector



Pin	Signal
PIN1	VCC 5.0V
PIN2	RX (RS232)
PIN3	TX (RS232)
PIN4	GND
PIN5	N.C.
PIN6	N.C.

- Pin Assignment of D-SUB 9 PIN Female connector



Pin	Signal
PIN1	N.C.
PIN2	TTL-TX
PIN3	TTL-RX
PIN4	N.C.
PIN5	GND
PIN6	VCC 5.0V
PIN7	N.C.
PIN8	N.C.
PIN9	N.C.

## Appendix A: NMEA output message

### ✧ NMEA-0183 Output message

NMEA record	Description
GGA	Global positioning system fixed data
GSA	GNSS DOP and active view
GSV	GNSS satellites in view
RMC	Recommended minimum specific GNSS data
GLL	Geographic position- latitude/longitude
VTG	Course over ground and ground speed

### **GGA--Global positioning system fixed data**

\$GPGGA,hhmmss.dd,xxmm.dddd,<N/S>,yyymm.dddd,<E/W>,v,ss,d.d,h.h,M,g.g,M,a.a,xxxx\*hh<CR><LF>

hhmmss.dd	UTC time of the fix. hh = hours. mm = minutes. ss = seconds. dd = decimal part of seconds.
xxmm.dddd	Latitude coordinate. xx = degrees. mm = minutes. dddd = decimal part of minutes.
<N/S>	Character denoting either N = North or S = South.
yyymm.dddd	Longitude coordinate. yyy = degrees. mm = minutes. dddd = decimal part of minutes.
<E/W>	Character denoting either E = East or W = West.
v	Fix valid indicator 0 = Fix not valid 1 = Fix is valid
ss	Number of satellites used in position fix, 00-12. Notice: Fixed length field of two letters.
d.d	HDOP – Horizontal Dilution Of Precision.
h.h	Altitude (mean-sea-level, geoid)
M	Letter M.
g.g	Difference between the WGS-84 reference ellipsoid surface and the mean-sea-level altitude.
M	Letter M.

a.a	NULL (not implemented)
xxxx	NULL (not implemented)
*hh	Check sum
<CR><LF>	End

Example :

\$GPGGA,084053.39,6016.3051,N,02458.3735,E,0,00,0.0,46.6,M,18.2,M,,\*5D

### **GSA--Geographic position- latitude/longitude**

\$GPGSA,a,b,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,p.p,h.h,v.v\*hh<CR><LF>

a	Mode: M = Manual, forced to operate in 2D or 3D mode. A = Automatic, allowed to automatically switch 2D/3D.
b	Mode: 1 = Fix not available, 2 = 2D, 3 = 3D,
xx	ID (PRN) numbers of GPS satellites used in solution
p.p	PDOP
h.h	HDOP
v.v	VDOP
*hh	Check sum
<CR><LF>	End

Example :

\$GPGSA,A,3,06,10,15,16,21,25,30,,,,,2.1,1.2,1.8\*38

### **GSV--GNSS satellites in view**

\$GPGSV,n,m,ss,xx,ee,aaa,cn,,,,,,,,,xx,ee,aaa,cn\*hh<CR><LF>

n	Total number of messages, 1 to 9
m	Message number, 1 to 9
ss	Total number of satellites in view
xx	Satellite ID (PRN) number
ee	Satellite elevation, degrees 90 max
aaa	Satellite azimuth, degrees True, 000 to 359
cn	Signal-to-noise ration (C/No) 00-99 dB-Hz. Value of zero means that the satellite is predicted to be on the visible sky but it isn't being tracked.
*hh	Check sum
<CR><LF>	End

Example :

\$GPGSV,4,1,14,03,66,207,50,08,09,322,44,11,01,266,42,14,00,155,00\*79

\$GPGSV,4,2,14,15,41,088,48,17,21,083,44,18,57,087,51,21,57,173,50\*78

\$GPGSV,4,3,14,22,05,203,00,23,52,074,49,26,17,028,44,27,00,300,00\*79

\$GPGSV,4,4,14,28,32,243,00,31,48,286,00\*70

### RMC--Recommended minimum specific GNSS data

\$GPRMC,hhmmss.dd,S,xxmm.dddd,<N/S>,yyymm.dddd,<E/W>,s.s,h.h,ddmmyy,d.d,<E/W>,M\*hh<CR><LF>

hhmmss.dd	UTC time of the fix. hh = hours. mm = minutes. ss = seconds. dd = decimal part of seconds.
S	Status indicator A = valid V = invalid
xxmm.dddd	Latitude coordinate. xx = degrees. mm = minutes. dddd = decimal part of minutes.
<N/S>	Character denoting either N = North or S = South.
yyymm.dddd	Longitude coordinate. yyy = degrees. mm = minutes. dddd = decimal part of minutes.
<E/W>	Character denoting either E = East or W = West.
s.s	Speed in knots.
h.h	Heading.
ddmmyy	UTC Date of the fix. dd = day of month mm = month yy = year
d.d	Magnetic variation in degrees, i.e. difference between geometrical and magnetic north direction.
<E/W>	Letter denoting direction of magnetic variation. Either E = East or W = West.
M	Mode indicator A=autonomous N=data not valid
*hh	Check sum
<CR><LF>	End

Example :

\$GPRMC,095035.91,A,6016.3066,N,02458.3832,E,1.08,210.6,131204,6.1,E,A\*0A

### GLL--Geographic position-latitude/longitude

\$GPGLL,xxmm.dddd,<N/S>,yyymm.dddd,<E/W>,hhmmss.dd,S,M\*hh<CR><LF>

xxmm.dddd	Latitude coordinate. xx = degrees. mm = minutes. dddd = decimal part of minutes.
<N/S>	Character denoting either N = North or S =South.
yyymm.dddd	Longitude coordinate. yyy = degrees. mm = minutes. dddd = decimal part of minutes.
<E/W>	Character denoting either E = East or W = West.
hhmmss.dd	UTC time of the fix. hh = hours. mm = minutes. ss = seconds. dd = decimal part of seconds.
S	Status indicator A = valid V = invalid
M	Mode indicator A=autonomous N=data not valid
*hh	Check sum
<CR><LF>	End

Example :

\$GPGLL,6016.3073,N,02458.3817,E,090110.10,A,A\*61

**VTG--Course over ground and ground speed**

\$GPVTG,h.h,T,m.m,M,s.s,N,s.s,K,M\*hh<CR><LF>

h.h	Heading in degrees.
T	Letter 'T' denoting True heading in degrees.
m.m	Magnetic heading in degrees.
M	Letter 'M' denoting Magnetic heading in degrees.
s.s	Speed in knots.
N	Letter 'N' denoting speed in knots.
s.s	Speed, km/h.
K	Letter 'K' denoting speed in km/h.
M	Mode indicator A=autonomous N=data not valid
*hh	Check sum
<CR><LF>	End

Example :

\$GPVTG,202.6,T,208.7,M,0.38,N,0.7,K,A\*0D