SKM2105DR-35MXT datasheet

GNSS GMouse

Serial model No: SKM2105DR-35M3T

SKM2105DR-35M5T

SKM2105DR-35M8T

Document Information		
Tiltle	SKM2105DR-35MXT GNSS GMouse datasheet	
Document Type	datasheet	
Document Number	SL-21050179	
Version & Date	V1.02	15-July-2022
Classify	Public	

Revision History

Revision	Description	Approved	Date
V1.01	Initial Release	George	20210515
V1.02	修改线材线径为 3.0/ Modify the wire wire diameter to 3.0	Wendy	20220715

content

1 Product introduction

Skylab SKM2105DR-35MXTseries has an embedded GNSS antenna, which can achieve high-performance navigation in the most stringent applications, and even achieve reliable positioning in the harsh GNSS visible environment. It is a high-performance GNSS single chip based on a single chip architecture, - 165dbm tracking sensitivity extends location coverage to urban canyons and dense foliage environments. The design of standard connection plug is the simplest and most convenient solution for communication with other electronic devices.

Figure 1：SKM2105DR-35MXT Top View

2 Applications

- LBS (Location Based Service)
- PND (Portable Navigation Device)
- Vehicle navigation system

3 Features

- Only GPS or only BDS or GPS+BDS or GPS+GLONASS Multi-system reception
- Ultra high sensitivity：-165dBm
- NMEA agreement（default：9600Pcs bps）
- Internal back-up battery
- Embedded patch antenna 35 x 35 x 4.0 mm or 25 x 25 x 4.0mm
- Advanced features: Always Locate; AIC; EPO; EASY
- Operating temperature range: -40 to 85℃
- FCC,CE compliance
- Size：50.7* 48.5* 18.5mm

4 Pin Assignment

RS232

1 RXD
2 GND
3 TXD
4 VCC

Note：

RXD: Serial Data Input To SKM2105
TXD: Serial Data Output From SKM2105

Micro-Fit 3.0 Connector
Figure 2：SKM2105DR-35MXT Pin Name

5 Interface description

Power supply: SKM2105DR-35MXT series input voltage VCC range is 3.5V ~ 5.5V, current requirement is more than 100mA. Place decoupling capacitors (10uF and 1uF) near the interface power supply.

UART port: The SKM2105DR-35MXT family supports a full duplex family of channel UART.

RS232 Level: THE SKM2105DR-35MXT series USES single-chip RS232 to UART Bridge, which is 3.3V driven EIA/TIA-232 and V.28/V.24.

Pin No	Pin name	I/O	Description	Remark
Micro-Fit 3.0 Connector				
1	RXD	I	UART Serial Data Input To SKM2105DR-35MXT	RS232
2	GND	G	Power Ground	Reference Ground
3	TXD	O	UART Serial Data Output From SKM2105DR-35MXT	RS232
4	VCC	P	Power Supply	VCC:3.5V~5.5V

6 Performance Specification

Parameter	Specification	
GPS receiver		
Sensitivity	Tracking Acquisition	-165dBm -148dBm
Accuracy	Position Velocity	3.0m CEP50 without SA(Typical Open Sky) 0.1m/s without SA
Acquisition Time	Cold Start Warm Start Hot Start Re-Acquisition	23s 2~3s 1s <1s
Power Consumption	Tracking Acquisition	31~50mA @5V Typical 45~66mA @5V

Navigation Data Update Rate	1Hz	
Operational Limits	Altitude Velocity Acceleration	Max 18,000m Max 515m/s Less than 4g
Antenna Specifications		
Outline Dimension	25 x 25 x 4.0mm or 35 x35 x4.0mm	
Frequency	1555 -1620 MHz	
Bandwidth		
Impedance	50±5 Ω	
Axial Ratio	3 dB max	
Polarization	RHCP	
Mechanical requirements		
Dimension	50.7* 48.5 * 18.5mm	
Weight		
Power consumption		
VCC	3.5V~5.5V	
Current	35mA(typical)	
Environment		
Operating temperature	-40 ~ +85 ℃ (w/o backup battery)	
Storage temperature	-40 ~ +105 ℃	
Humidity	≦95%	

7 Mechanical Specification

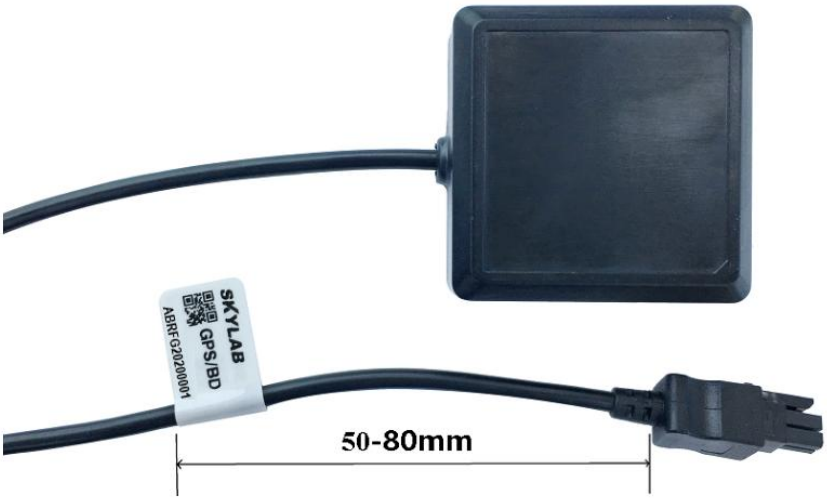
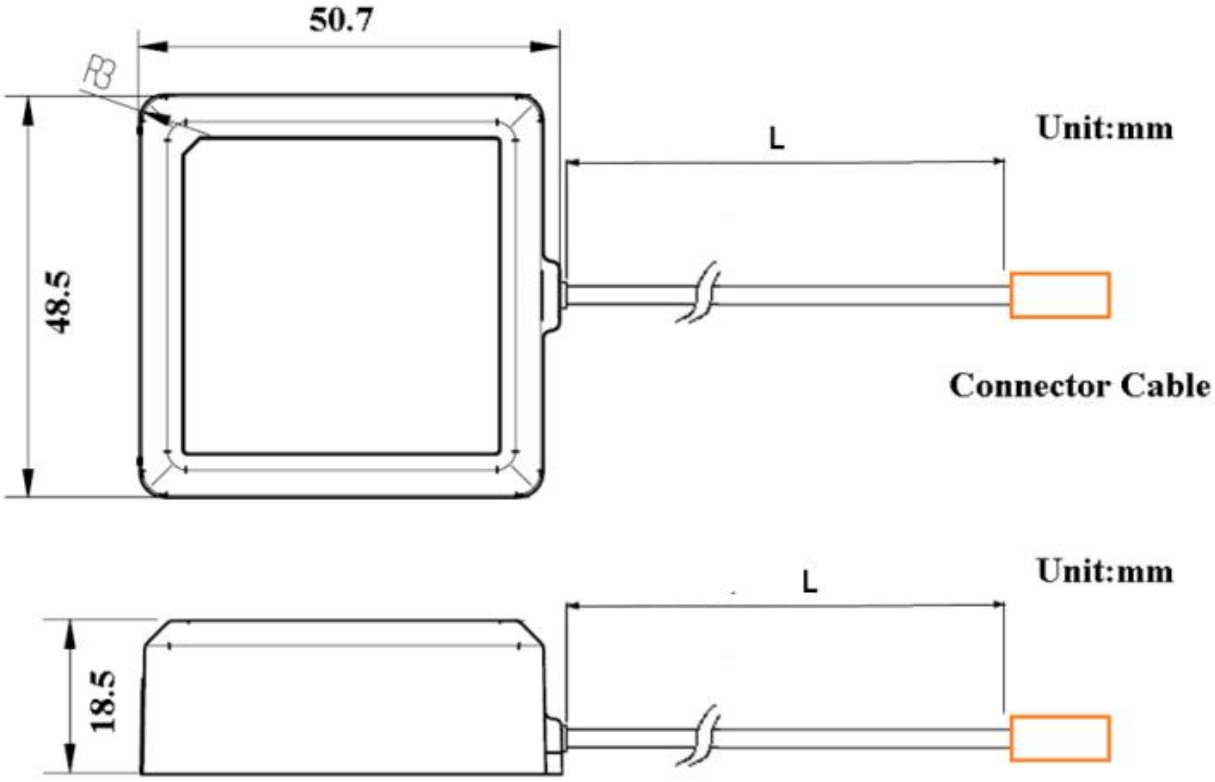


Figure 3 SKM2105DR-35MXT Log Label



Cable	**Length**（mm）	**wire diameter**（mm）	**Cable temperature range**
L	3000±50	3.0	-40 ~ +105 ℃
L	5000±50		
L	8000±50		

Figure 4：SKM2105DR-35MXT Cable Length

8 Software Protocol

8.1 NMEA-0183Protocol

The NMEA protocol is an ASCII-based protocol, Records start with a $ and with carriage return/line feed. GPS specific messages all start with $GNxxx where xxx is a three-letter identifier of the message data that follows. NMEA messages have a checksum, which allows detection of corrupted data transfers.

The Skylab SKM2105DR-35MXT supports the following NMEA-0183 messages: GGA, GLL, GSA, GSV, RMC VTG, ZDA. The module default NMEA-0183 output is set up GGA、GSA、RMC、GSV , and default baud rate is set up 9600bps.

Table 1: NMEA-0183 Output Messages

NMEA Record	Description	Default
GNGGA	Global positioning system fixed data	Y
GNGLL	Geographic position—latitude/longitude	N
GPGSA	GNSS DOP and active satellites for GPS	Y
BDSGSA	Beidou DOP and active satellites for BD	Y
GPGSV	GNSS satellites in view for GPS	Y
BDSGSV	Beidou satellites in view for BD	Y
GNRMC	Recommended minimum specific GNSS data	Y
GNVTG	Course over ground and ground speed	N
GNZDA	Date and Time	N

8.2 GGA-Global Positioning System Fixed Data

This sentence contains the position, time and quality of the navigation fix.

See RMC for Fix Status, Fix Mode, Fix Date, Speed, and True Course.

See GSA for Fix Type, PDOP, and VDOP.

$GNGGA,021514.000,2232.1799,N,11401.1823,E,1,6,1.25,84.0,M,-2.2,M,,*6A

Table 2: GGA Data Format

Name	Example	Units	Description
Message ID	$GNGGA		GGA protocol header
UTC Position	021514.000		hhmmss.sss
Latitude	2232.1799		ddmm.mmmm
N/S indicator	N		N=north or S=south
Longitude	11401.1823		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table 2-1
Satellites Used	6		Range 0 to 12
HDOP	1.25		Horizontal Dilution of Precision
MSL Altitude	84.0	meters	Altitude (referenced to the Ellipsoid)
AltUnit	M	meters	Altitude Unit
GeoSep	-2.2	meters	Geoidal Separation
GeoSepUnit	M	meters	Geoidal Separation Unit
Age of Diff.Corr.	<Null>	second	Null fields when it is not Used
Diff.Ref.Station ID	<Null>		Null fields when it is not Used
Checksum	*6A		
EOL	<CR> <LF>		End of message termination

Table 2-1: Position Fix Indicators

Value	Description
0	Fix not available or invalid
1	fix valid
2	Differential GPS, fix valid

8.3 GLL-Geographic Position – Latitude/Longitude

This sentence contains the fix latitude and longitude.

$GNGLL,2232.1799,N,11401.1824,E,021513.000,A,A*4E

Table 3: GLL Data Format

Name	Example	Units	Description
Message ID	$GNGLL		GLL protocol header
Latitude	2232.1799		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	11401.1824		dddmm.mmmm
E/W Indicator	E		E=east or W=west
UTC Position	021513.000		hhmmss.sss
Fix Status	A		A=data valid or V=data not valid
Fix Mode	A		A=autonomous, N = No fix, D=DGPS, E=DR
Checksum	*4E		
EOL	<CR> <LF>		End of message temination

8.4 GSA-GNSS DOP and Active Satellites

This sentence contains the mode of operation, type of fix, PRNs of the satellites used in the solution as well as PDOP, HDOP and VDOP.

GPS GSA message: $GPGSA,……

$GPGSA,A,3,28,20,04,17,10,193,08,,,,,,1.14,0.75,0.85*31

$GLGSA,A,3,67,81,80,66,82,79,,,,,,,1.14,0.75,0.85*11

BD GSA message: $BDGSA,……

$BDGSA,A,3,10,,,,,,,,,,,,1.54,1.26,0.88*17

Table 4: GSA Data Format

Name	Example	Units	Description
Message	$GPGSA		GSA protocol header
Mode 1	A		See Table 4-2
Mode 2	3		See Table 4-1
ID of satellite used	28		Sv on Channel 1
ID of satellite used	20		Sv on Channel 2

…	…		…
ID of satellite used	<Null>		Sv on Channel 12 (Null fields when it is not Used)
PDOP	1.14		Position Dilution of Precision
HDOP	0.75		Horizontal Dilution of Precision
VDOP	0.85		Vertical Dilution of Precision
Checksum	*31		
EOL	<CR> <LF>		End of message termination

Table 4-1: Mode 2

Value	Description
1	Fix not available
2	2D Fix
3	3D Fix

Table 4-2: Mode 1

Value	Description
M	Manual-forced to operate in 2D or 3D mode
A	Automatic-allowed to automatically switch 2D/3D

8.5 GSV-Satellites in view

This sentence contains the PRNs, azimuth, elevation, and signal strength of all satellites in view.

GPS GSV message: $GPGSV,……

$GPGSV,4,1,14,28,86,009,35,193,70,056,38,04,44,258,29,17,44,338,44*48

$GLGSV,3,1,10,79,42,239,15,66,40,076,31,67,37,143,29,81,33,025,14*66

BD GSV message: $BDGSV,……

$BDGSV,1,1,03,10,46,329,31,08,43,161,,09,40,217,*52

Table 5: GSV Data Format

Name	Example	Units	Description
Message ID	$GPGSV		GSV protocol header
Number of Message	4		Total number of GSV sentences (Range 1 to 3)
Message Number	1		Sentence number of the total (Range 1 to 3)
Satellites in View	14		Number of satellites in view
Satellite ID	28		Channel 1
Elevation	86	degrees	Channel 1(Range 00 to 90)
Azinmuth	009	degrees	Channel 1(Range 000 to 359)
SNR(C/NO)	35	dB-Hz	Channel 1(Range 00 to 99, null when not tracking)
…			…
Satellite ID	17		Channel 4
Elevation	44	degrees	Channel 4(Range 00 to 90)
Azimuth	338	degrees	Channel 4(Range 000 to 359)
SNR(C/NO)	44	dB-Hz	Channel 4(Range 00 to 99, null when not tracking)
Checksum	*48		
EOL	<CR> <LF>		End of message termination

Depending on the number of satellites tracked multiple messages of GSV data may be required.

8.6 RMC-Recommended Minimum Specific GNSS Data

This sentence contains the recommended minimum fix information.

See GGA for Fix Quality, Sats Used, HDOP, Altitude, Geoidal Separation, and DGPS data.

See GSA for Fix Type, PDOP and VDOP.

$GNRMC,023345.000,A,2232.1767,N,11401.1953,E,0.18,151.55,100410,,,A*76

Table 6: RMC Data Format

Name	Example	Units	Description
Message ID	$GNRMC		RMC protocol header
UTS Position	023345.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2232.1767		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	11401.1953		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.18	Knots	
Course Over Ground	151.55	Degrees	True Course
Date(UTC)	100410		ddmmyy
Magnetic variation	<Null>	Degrees	Null fields when it is not Used
Magnetic Variation Direction	<Null>		E=east or W=west (Null fields when it is not Used)
Fix Mode	A		A=autonomous, N = No fix, D=DGPS, E=DR
Checksum	*76		
EOL	<CR> <LF>		End of message termination

8.7 VTG-Course Over Ground and Ground Speed

$GNVTG,148.81,T,,M,0.13,N,0.24,K,A*23

Table 7: VTG Data Format

Name	Example	Units	Description
Message ID	$GPVTG		VTG protocol header
Tcourse	148.81	Degrees	True Course
Reference	T		T = True
Mcourse	<Null>	Degrees	Magnetic Course (Null fields when it is not Used)
Reference	M		M = Magnetic (Null fields when it is not Used)
Speed over ground	0.13	Knots	Nautical Miles per Hour
Units	N		Knots
Speed over ground	0.24	Km/hr	in Kilometers per Hour

Units	K		Kilometer per hour
Mode	A		A=Autonomous, N=No fix, D=DGPS, E=DR
Checksum	*23		
EOL	<CR> <LF>		End of message termination

8.8 ZDA-Date and Time

This sentence contains UTC date & time, and local time zone offset information.

$GNZDA,023345.000,10,04,2010,,*4D

Table 8: ZDA Data Format

Name	Example	Units	Description
Message ID	$GPZDA		ZDA protocol header
UTC Time	023345.000		hhmmss.sss
Day	10		UTC time: day (01 ... 31) dd
Month	04		UTC time: month (01 ... 12) mm
Year	2010		UTC time: year (4 digit year) yyyy
local zone hours	<null>		Local Time Zone Offset Hours (Null fields when it is not Used)
local zone minutes	<null>		Local Time Zone Offset Minutes (Null fields when it is not Used)
Checksum	*4D		
EOL	<CR> <LF>		End of message termination

8.9 CMDList

Table 9: CMD List

CMD TYPE	CMD Example:
Hot Restart	$PMTK101*32<CR><LF>
Warm Restart	$PMTK102*31<CR><LF>
Cold RestartC	$PMTK103*30<CR><LF>
Full Cold Restart	$PMTK104*37<CR><LF>
Search GPS satellites only	$PMTK353,1,0,0,0,0*2A<CR><LF>
Search GPS and GLONASS satellites	$PMTK353,1,0,0,0,1*2B<CR><LF>
Search GPS and BEIDOU satellites	$PMTK353,1,1,0,0,0*2B<CR><LF>

9 Order Information

Module No.	GNSS Receiver	I/O Level	Connector	Cable(mm)
SKM2105DR-35M3T	GPS/BDS	RS232	Micro-Fit 3.0	3000
SKM2105DR-35M5T	GPS/BDS	RS232	Micro-Fit 3.0	5000
SKM2105DR-35M8T	GPS/BDS	RS232	Micro-Fit 3.0	8000

10 Contact Information

Skylab M&C Technology Co., Ltd.

深圳市天工测控技术有限公司

Address: 6 Floor, No.9 Building, Lijincheng Scientific & Technical park, Gongye East Road, Longhua District, Shenzhen, Guangdong, China

电话: 86-755 8340 8210（Sales Support）

电话: 86-755 8340 8510（Technical Support）

传真: 86-755-8340 8560

邮箱: technicalsupport@skylab.com.cn

网站: www.skylab.com.cn　　www.skylabmodule.com