

TECHNICAL SPECIFICATIONS

Receiver Type	12 parallel channel, L1 C/A code
Accuracy	Position 5m CEP Velocity 0.1m/sec
Startup Time	< 10sec hot start < 35sec warm start < 45sec cold start
Signal Reacquisition	< 1s
Sensitivity	-137dBm acquisition -145dBm tracking
Update Rate	1Hz
Dynamics	4G (39.2m/sec ²)
Operational Limits	Altitude < 18,000m or velocity < 515m/sec (COCOM limit, either may be exceeded but not both)
Protocol	NMEA-0183 V3.01 GPGGA, GPGLL, GPGSA, GPGSV, GPRMC, GPVTG, GPZDA 4800 baud, 8, N, 1
Datum	Default WGS-84 User definable
RF Connector	MMCX
Bluetooth Interface	SPP compatible, version 1.1 compliant, class-2 operation, 4dBm output level Up to 10m of operation
LED Indicator	Blue - Bluetooth status Red - Battery low Green - Charging battery
Switch	Push button ON / OFF
Battery Connector	For BLC-2 type Li-ION rechargeable battery (Nokia 3310 NMH-5NX battery)
Connecting Cable	6cm
Input Voltage	5.0V
DC Input Connector	1.3mm MINI JACK (center pin positive, outer contact negative)
Operating Temperature	-40°C ~ +85°C
Humidity	5% ~ 95%

LI-ION BATTERY CHARGER OPERATION

While the LS-40BT is connected to the Li-ION rechargeable battery only, without the external 5V DC power source, the red battery-low LED indicator will turn ON when output voltage of the Li-ION falls below 3.45V.

When the 5V DC source is connected to charge the Li-ION battery, the green charging-battery LED indicator will turn ON. The battery will be charging at 48mA during the pre-charge phase until 2.93V is reached. Next, charge current changes to 480mA during the full-charge phase until 4.1V is reached. Afterwards, charge current will decrease gradually until 48mA is reached, and the charge current will fall to a very low value and remain in the trickle charge phase. The green charging-battery LED indicator remains ON until the 5V DC source is disconnected.

NMEA MESSAGES

The serial interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASCII interface specification. This standard is fully define in "NMEA 0183, Version 3.01" The standard may be obtained from NMEA, www.nmea.org

GGA - GPS FIX DATA

Time, position and position-fix related data (number of satellites in use, HDOP, etc.).

Format:

```
$GPGGA,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,M,<10>,M,<11>,<12>,*<13><CR><LF>
```

Example:

```
$GPGGA,104549.04,2447.2038,N,12100.4990,E,1,06,01.7,00078.8,M,0016.3,M,*5C<CR><LF>
```

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 - 235959.99
2	2447.2038	Latitude in ddm.mmm format Leading zeros transmitted
3	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
4	12100.4990	Longitude in dddmm.mmm format Leading zeros transmitted
5	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	1	Position fix quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode
7	06	Number of satellites in use, 00 - 12
8	01.7	Horizontal dilution of precision, 00.0 - 99.9
9	00078.8	Antenna height above/below mean sea level, -9999.9 - 17999.9
10	0016.3	Geoidal height, -999.9 - 9999.9
11		Age of DGPS data since last valid RTCM transmission in xxx format (seconds) NULL when DGPS not used
12		Differential reference station ID, 0000 - 1023 NULL when DGPS not used
13	5C	Checksum

Note: The checksum field starts with a '*' and consists of 2 characters representing a hex number. The checksum is the exclusive OR of all characters between '\$' and '*'.

GLL - LATITUDE AND LONGITUDE, WITH TIME OF POSITION FIX AND STATUS

Latitude and longitude of current position, time, and status.

Format:

\$GPGLL,<1>,<2>,<3>,<4>,<5>,<6>,<7>*<8><CR><LF>

Example:

\$GPGLL,2447.2073,N,12100.5022,E,104548.04,A,A*65<CR><LF>

Field	Example	Description
1	2447.2073	Latitude in ddmn.mmmm format Leading zeros transmitted
2	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
3	12100.5022	Longitude in dddmn.mmmm format Leading zeros transmitted
4	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
5	104548.04	UTC time in hhmmss.ss format, 000000.00 - 235959.99
6	A	Status, 'A' = valid position, 'V' = navigation receiver warning
7	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
8	65	Checksum

GSA - GPS DOP AND ACTIVE SATELLITES

GPS receiver operating mode, satellites used for navigation, and DOP values.

Format:

\$GPGSA,<1>,<2>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<4>,<5>,<6>*<7><CR><LF>

Example:

\$GPGSA,A,3,26,21,..,09,17,..,10.8,02.1,10.6*07<CR><LF>

Field	Example	Description
1	A	Mode, 'M' = Manual, 'A' = Automatic
2	3	Fix type, 1 = not available, 2 = 2D fix, 3 = 3D fix
3	26,21,..,09,17,..	PRN number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	10.8	Position dilution of precision, 00.0 to 99.9
5	02.1	Horizontal dilution of precision, 00.0 to 99.9
6	10.6	Vertical dilution of precision, 00.0 to 99.9
7	07	Checksum

GSV - GPS SATELLITE IN VIEW

Number of satellites in view, PRN number, elevation angle, azimuth angle, and C/No. Only up to four satellite details are transmitted per message. Additional satellite in view information is sent in subsequent GSV messages.

Format:

\$GPGSV,<1>,<2>,<3>,<4>,<5>,<6>,<7>,...,<4>,<5>,<6>,<7> *<8><CR><LF>

Example:

\$GPGSV,2,1,08,26,50,016,40,09,50,173,39,21,43,316,38,17,41,144,42*7C<CR><LF>

\$GPGSV,2,2,08,29,38,029,37,10,27,082,32,18,22,309,24,24,09,145,*7B<CR><LF>

Field	Example	Description
1	2	Total number of GSV messages to be transmitted
2	1	Number of current GSV message
3	08	Total number of satellites in view, 00 - 12
4	26	Satellite PRN number, GPS: 01 - 32, SBAS: 33 - 64 (33 = PRN120)
5	50	Satellite elevation number, 00 - 90 degrees
6	016	Satellite azimuth angle, 000 - 359 degrees
7	40	C/No, 00 - 99 dB Null when not tracking
8	7C	Checksum

RMC - RECOMMENDED MINIMUM SPECIFIC GPS/TRANSIT DATA

Time, date, position, course and speed data.

Format:

\$GPRMC,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>*<13><CR><LF>

Example:

\$GPRMC,104549.04,A,2447.2038,N,12100.4990,E,016.0,221.0,250304,003.3,W,A*22<CR><LF>

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 - 235959.99
2	A	Status, 'V' = navigation receiver warning, 'A' = valid position
3	2447.2038	Latitude in dddmm.mmmm format Leading zeros transmitted
4	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
5	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
6	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
7	016.0	Speed over ground, 000.0 - 999.9 knots
8	221.0	Course over ground, 000.0 - 359.9 degrees
9	250304	UTC date of position fix, dddmmyy format
10	003.3	Magnetic variation, 000.0 - 180.0 degrees
11	W	Magnetic variation direction, 'E' = East, 'W' = West
12	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
13	22	Checksum

VTG - COURSE OVER GROUND AND GROUND SPEED

Velocity is given as course over ground (COG) and speed over ground (SOG).

Format:

GPVTG,<1>,T,<2>,M,<3>,N,<4>,K,<5>*<6><CR><LF>

Example:

\$GPVTG,221.0,T,224.3,M,016.0,N,0029.6,K,A*1F<CR><LF>

Field	Example	Description
1	221.0	True course over ground, 000.0 - 359.9 degrees
2	224.3	Magnetic course over ground, 000.0 - 359.9 degrees
3	016.0	Speed over ground, 000.0 - 999.9 knots
4	0029.6	Speed over ground, 0000.0 - 1800.0 kilometers per hour
5	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
6	1F	Checksum

ZDA TIME AND DATE

Format:

GPZDA,<1>,<2>,<3>,<4>,<5>,<6>*<7><CR><LF>

Example:

\$GPZDA,104548.04,25,03,2004,.,*6C<CR><LF>

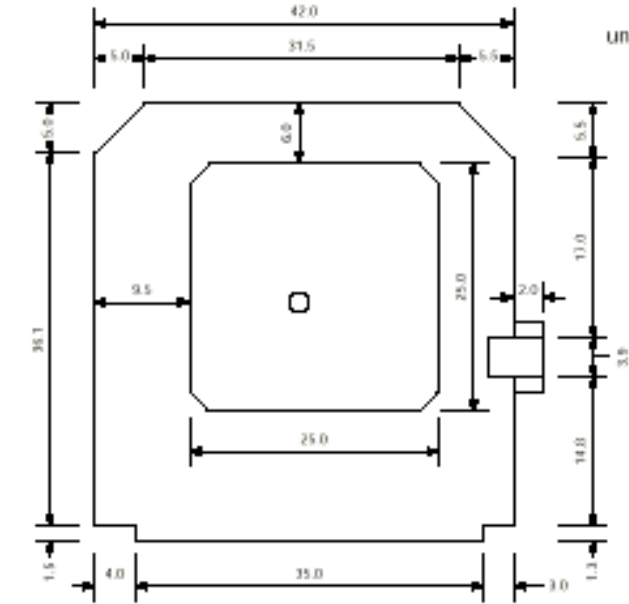
Field	Example	Description
1	104548.04	UTC time in hhmmss.ss format, 000000.00 - 235959.99
2	25	UTC time: day (01 ... 31)
3	03	UTC time: month (01 ... 12)
4	2004	UTC time: year (4 digit year)
5		Local zone hour Not being output by the receiver (NULL)
6		Local zone minutes Not being output by the receiver (NULL)
7	6C	Checksum

Binary Messages

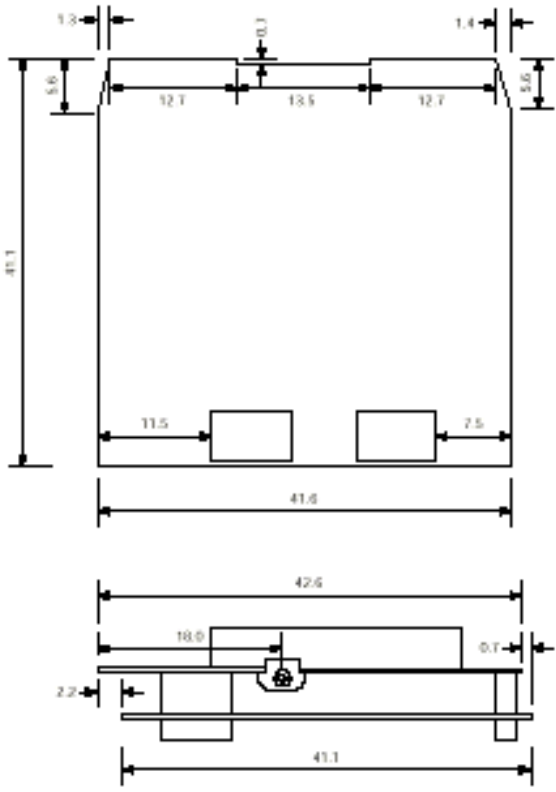
See *Binary Message Protocol User's Guide* for detailed descriptions.

MECHANICAL CHARACTERISTICS

RF Board



Digital Board



Bluetooth / Power / Charger Board

