DATASHEET

OPUS ONE

mini*Ride*

32 Channel GPS / AGPS Receiver Module

mini*Ride* is a miniature high-sensitivity, low-power GPS/AGPS module that integrates e*Ride*'s hardware measurement platform (MP) into a single, compact and easy to integrate SMD device. Combined with e*Ride*'s powerful navigation software running on a host microprocessor, the module offers a complete high performance GPS receiver.

mini*Ride* is based on OPUS ONE technology and includes the Prelude ONE RF Receiver IC, OPUS ONE Baseband IC, a saw filter, the TCXO and various matching and peripheral components in a small form factor.

mini*Ride* has been engineered specifically for mobile and embedded applications such as Personal Navigation Devices or Smart Phones, where performance, time to market and real estate are prime considerations.
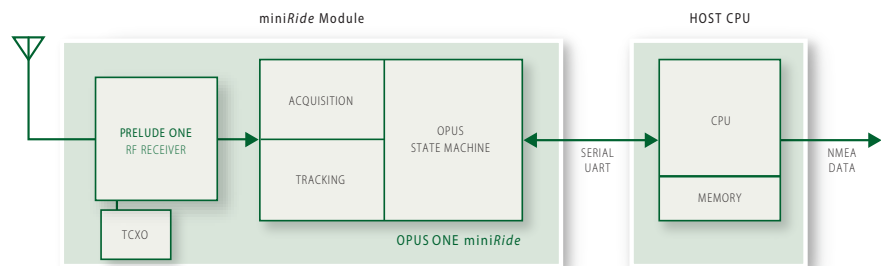

Figure 1: mini*Ride* Block Diagram

Features

- Supports GPS L1 band (1575.42 MHz) C/A code
- Highest indoor sensitivity of -157 dBm (typ) with active antenna achieving (both acquisition & tracking)
- 44,000 effective correlators very efficiently used to achieve fast TTFF and high sensitivity
- Fast TTFF of typically 2.5 secs when hot and 38 secs from cold
- Typical position accuracy of 3 m outdoors and 15 m indoors
- Works in both Autonomous mode and Assisted-GPS (MS-Based) mode
- Host interface via serial port
- Control software requires less than 6 MIPS and runs as a background process on the host CPU
- Update rate of 1 Hz (also can integrate for 2.5 secs when indoors)
- 3.0 V and 1.2 V Supply Voltages
- Typical power dissipation is 125 mW
- Small 10.9 x 9.1 x 1.4 mm footprint, surface mound type (LGA)
- Operating temperature: -40˚C to +85˚C
- Compatible with Pb-free solder processing

Target Applications

- Wireless Handheld Devices (Smart Phones, Personal trackers)
- Mobile Computing (PDA, PND, Car Navigation, Multimedia Players)
- Industrial Applications (Machine to Machine, Automatic Vehicle Locator, Marine, Timing)

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

Content List

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

Tables

Figures

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

Version History

Version	Contents Change	Date
00A	Initial Release	2007.08.24

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

1   Introduction

1.1   Product Features

- Supports GPS L1 band (1575.42 MHz) C/A code

- Highest indoor sensitivity of -157 dBm (typ) with active antenna achieving (both acquisition & tracking)

- 44,000 effective correlators very efficiently used to achieve fast TTFF and high sensitivity

- Fast TTFF of typically 2.5 secs when hot and 38 secs from cold

- Typical position accuracy of 3 m outdoors and 15 m indoors

- Works in both Autonomous mode and Assisted-GPS (MS-Based) mode

- Host interface via serial port

- Control software requires less than 6 MIPS and runs as a background process on the host CPU

- Update rate of 1 Hz (also can integrate for 2.5 secs when indoors)

- 3.0 V and 1.2 V Supply Voltages

- Typical power dissipation is 125 mW

- Small 10.9 x 9.1 x 1.4 mm footprint, surface mound type (LGA)

- Operating temperature: -40°C to +85°C

- Compatible with Pb-free solder processing

1.2   Block Level Diagram
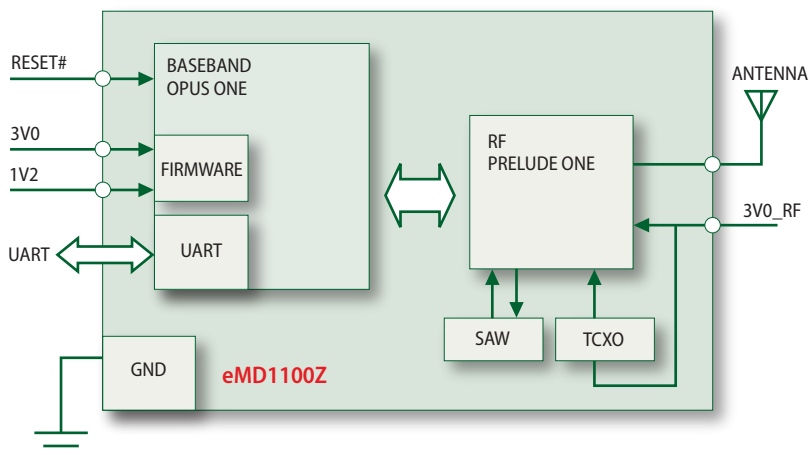
Figure 2: mini*Ride* Block Level Diagram

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

1.3   Module Floor Plan

Top View

Thermistor

RF SAW Filter

TCXO

9.1 mm

OPUS ONE Base band

Prelude ONE

10.9 mm

Bottom View

eMD1100Z
6900S 01
eRide

Figure 3: mini*Ride* Floor Plan

OPUS ONE

mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

2 Functional Description

2.1 Usage Modes

The following sections detail the target functionality and performance.

The mini*Ride* receiver can be set up to perform in two possible modes:

2.1.1 Autonomous Mode

In this mode, mini*Ride* will decode Navigation data from Satellites only. It therefore needs a good signal strength (to as low as -146 dBm) while decoding for first fix. TTFF in this mode is slowest as mini*Ride* decodes the complete ephemeris data at 50 bps (the rate at which the GPS satellites transmit its signal), which can take up to ~30 secs. Once mini*Ride* has received ephemeris and Almanac data (i.e. become hot), then it can go on to supply fix measurements indoors with sensitivity down to -157 dBm. An application/user may supply some time or location assistance, if available (e.g. handset time or approximate estimate of location currently in use), or may use previous run data (as long as the "off" time is not too long and the navigation data (ephemeris, valid 6 hours at most) has not expired), resulting in improved TTFF.

2.1.2 Assisted Mode

Either on wake-up from autonomous mode, or upon a request for a fix after current aiding data has expired (ephemeris is valid for 6 hours, and refreshed every two hours), mini*Ride* shall request Navigation data from the aiding server via the implemented interface (SMS, WAP, TCP/IP, RRLP, etc.) using any aiding-data format (3 GPP/2, IS801, etc.). mini*Ride* will continue to supply fixes and update it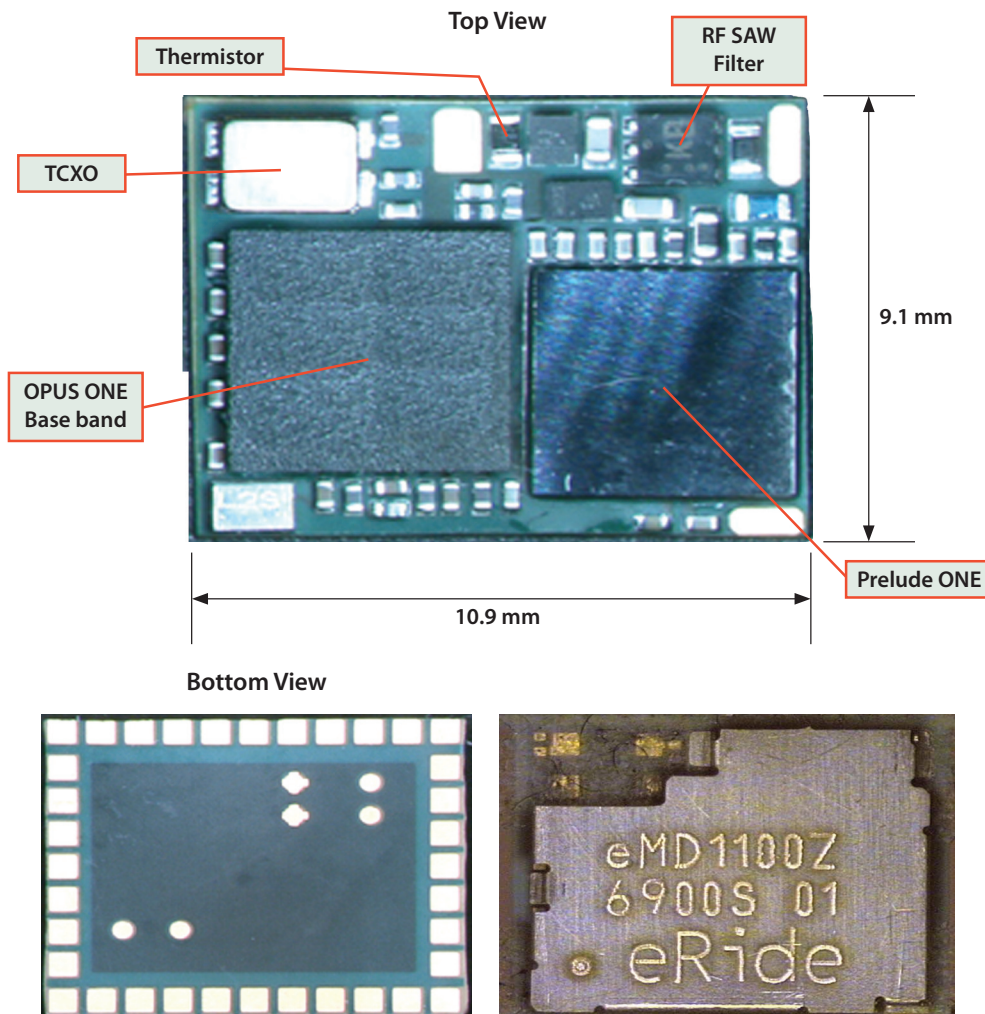s ephemeris/almanac as time permits and without further resource/help from the aiding server. Therefore assistance can be good for hours.

Assisted, MS-Based mode of operation achieves the fastest TTFF.

mini*Ride* aiding interface is independent of the aiding server. e*Ride* Inc. has a worldwide reference network and can supply the aiding server to any operator and/or infrastructure companies.

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

3 General Performance

3.1 Performance Summary

Receiver Type	OPUS ONE mini*Ride* 32 Channel L1, C/A Code 1 Hz Update Rate		
Accuracy		Outdoor[1] 3.0 m CEP	Indoor[2] 15.0 m CEP
Time to First Fix (TTFF)		Outdoor[1]	Indoor[2]
	Cold	38 s	N/A
	Warm	36 s	N/A
	Hot	2.5 s	9 s
Sensitivity	Cold Acquisition	-143 dBm	
	Warm Acquisition	-146 dBm	
	Hot Acquisition	-155 dBm	
	Tracking	-155 dBm	
Operational Limits[3]	Altitude	18,000 m	
	Velocity	515 m/s	

[1] Simulator test with all signals at -130 dBm
[2] Simulator test with all signals at -150 dBm
[3] Based on the CoCom specification

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

3.2 Time to First Fix and Sensitivity
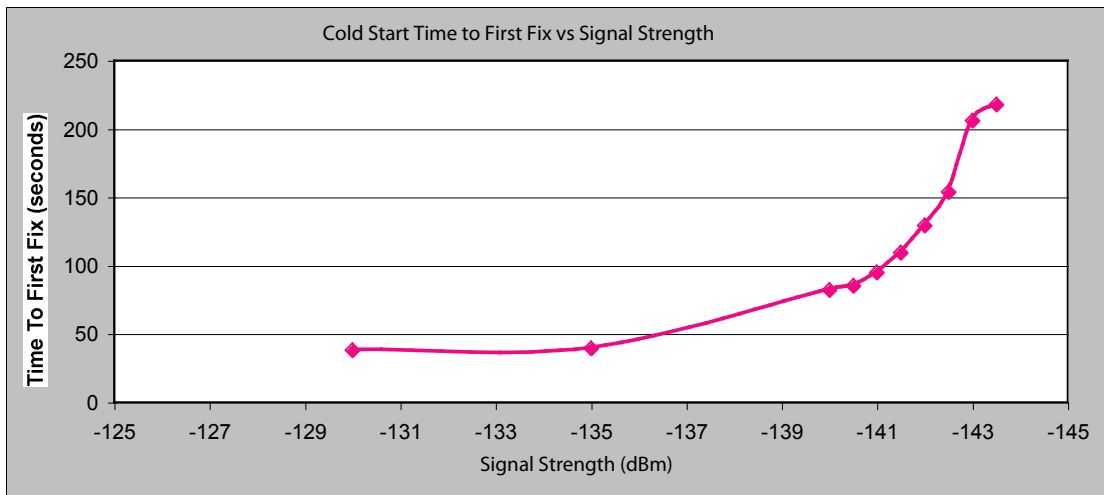
Figure 4: Cold Start Time to First Fix
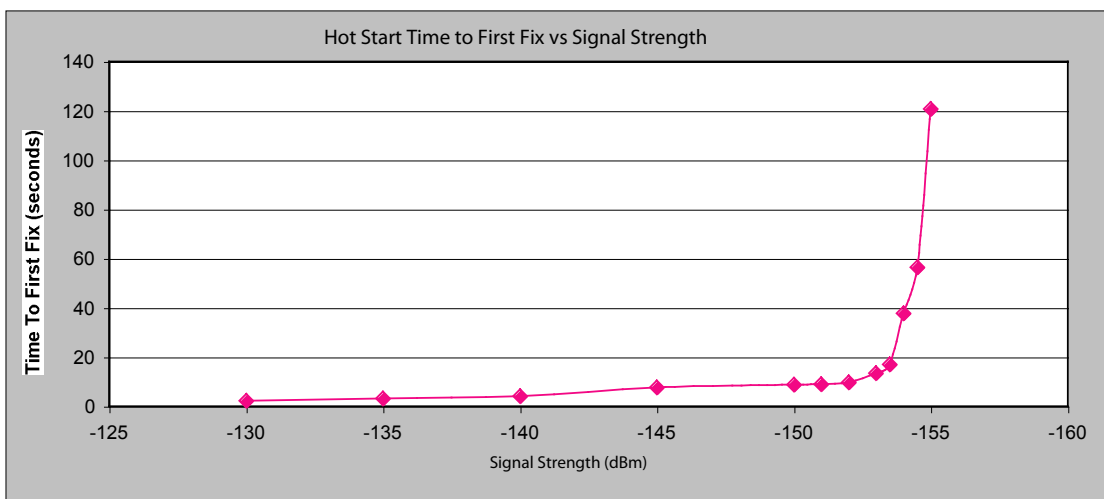
Figure 5: Hot Start Time to First Fix

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

3.3 Static Position Accuracy
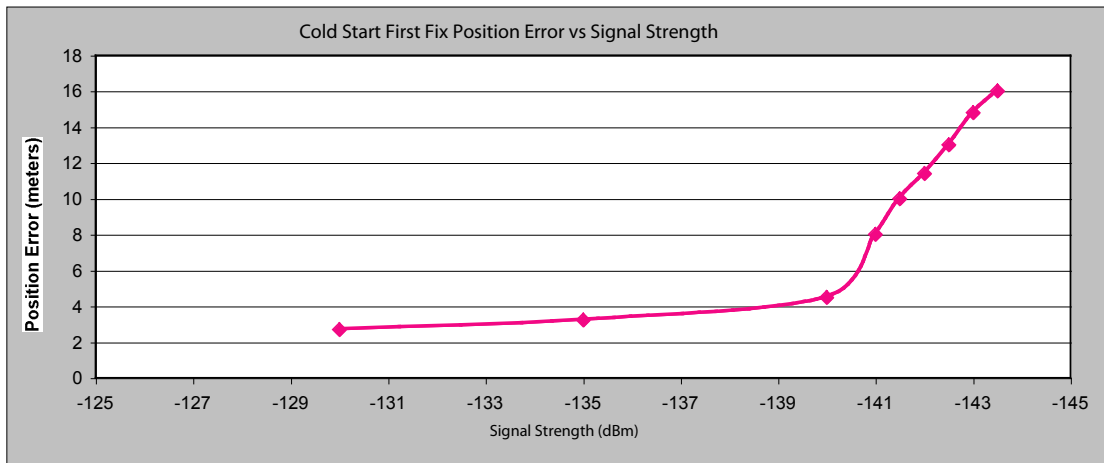
Figure 6: Cold Start First Fix Position Error
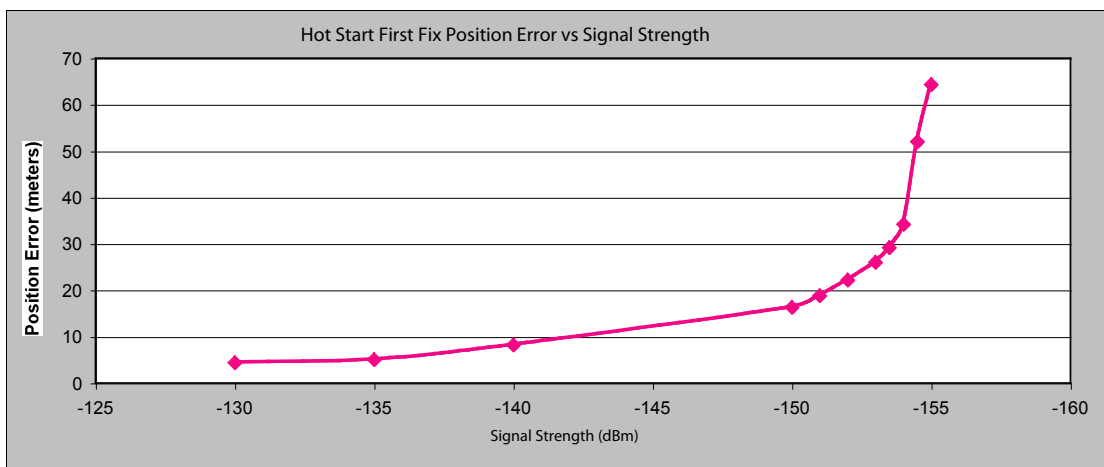
Figure 7: Hot Start First Fix Position Error

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

First Fix Outdoor[1] Position Accuracy

50 CEP: 3.00 meters   95 CEP: 7.07 meters
Number of First Fixes: 1020
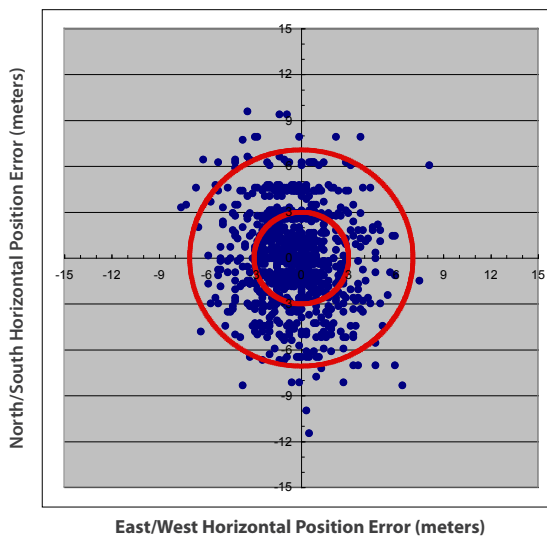
[1] Simulator test with all signals at -130 dBm

First Fix Indoor[1] Position Accuracy

50 CEP: 14.47 meters   95 CEP: 34.62 meters
Number of First Fixes: 1020
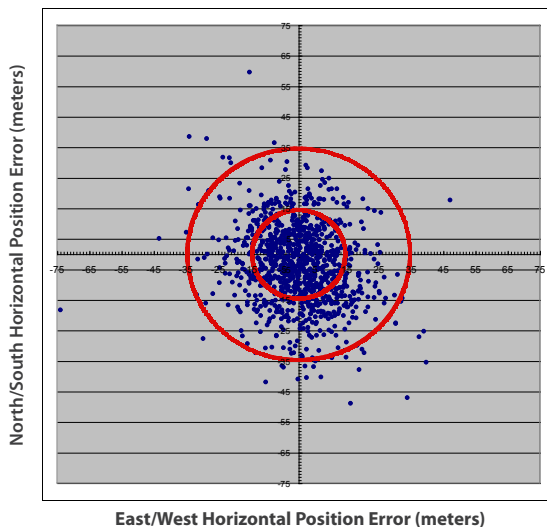
[1] Simulator test with all signals at -150 dBm

Figure 8: First Fix Outdoor and Indoor Position Accuracy

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

4   Electrical Characteristics

4.1   Pin Description

4.1.1   Pin Outline
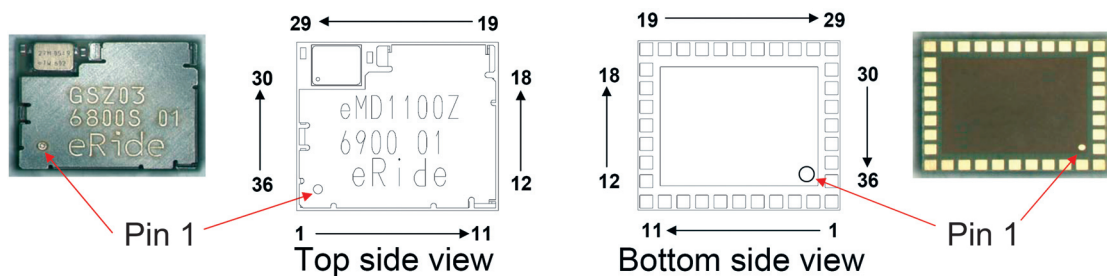
Figure 9: Pin Outline

4.1.2   Pin Assignment

No	Name	I/O	Function	External Connection
1	AGND	---	RF part ground	Ground
2	AGND	---	RF part ground	Ground
3	ANT	Input	RF input	Connect to Antenna
4	AGND	---	RF part ground	Ground
5	TEST	Output	Internal test	No Connect
6	CLK_ENABLE	Output	TCXO status-for diagnostics observability	No Connect/Test Point
7	TEST	---	Internal test	Connect to GND
8	TEST	Input	Internal test	No connect
9	TEST	Input	Internal test	No connect
10	TEST	---	Internal test	Connect to GND
11	AGND	---	Ground	Ground
12	RESERVE	Output	1 msec output	No connect
13	PPS	Output	Pulse per second output	No connect
14	RESERVE	Output	JTAG test pin (TDO)	JTAG TDO or No connect
15	RESERVE	Input	JTAG test pin (TCK)	JTAG TCK or No connect
16	RESERVE	Input	JTAG test pin (TDI)	JTAG TDI or No connect
17	RESERVE	Input	JTAG test pin (TRST)	JTAG TRST or Connect to GND
18	RESERVE	Input	JTAG test pin (TMS)	JTAG TMS or No connect

OPUS ONE

mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

No	Name	I/O	Function	External Connection
19	GND	---	Ground	Ground
20	TEST	---	Internal test	Connect to GND
21	TXD	Output	UART interface: Transmit signal to the Host CPU	Host UART RxD
22	RXD	Input	UART interface: Receive signal from the Host CPU	Host UART TxD
23	3V0	---	Supply voltage for I/O part of Base band	DC power supply
24	GND	---	Ground	Ground
25	1V2	---	Supply voltage for core part of Base band	DC power supply
26	GND	---	Ground	Ground
27	RESET#	Input	Power-on RESET (low for reset)	Power on reset circuit
28	TEST	Output	Internal test	No Connect
29	GND	---	Ground	Ground
30	3V0_TCXO	---	Supply voltage for TCXO	DC power supply
31	AGND	---	Ground	Ground
32	TEST	---	Internal test	No connect
33	TEST	---	Internal test	No connect
34	AGND	---	Ground	Ground
35	3V0_RF	---	Supply voltage for RF part	DC power supply
36	AGND	---	Ground	Ground

* All power supply via series regulator is recommended.

4.2   Absolute Maximum Rating

Items	Symbol	Min	Max	Unit
Supply Voltage	1V2	-0.5	1.8	V
	3V0	-0.5	4.0	V
	3V0_RF	-0.5	4.0	V
	3V0_TCXO	-0.5	4.0	V
Signal Input Voltage	V_{IN} (*1)	-0.5	3V0 + 0.5	V
Signal Output Voltage	V_{OUT} (*2)	-0.5	3V0 + 0.5	V

*1 V_{IN} – corresponds to all pins specified as input

*2 V_{OUT} – corresponds to all pins specified as output

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

4.3 Recommended Operating Conditions

4.3.1 DC Supply

Items	Symbol	Min	Typ	Max	Unit
Supply Voltage	3V0	2.7	3.0	3.3	V
	3V0_TCXO	2.85	3.0	3.15	V
	3V0_RF	2.7	3.0	3.3	V
	1V2	1.15	1.2	1.25	V

4.3.2 Power Consumption

4.3.2.1 Module Power Consumption

3V0, 3V0_TCXO, 3V0_RF=3.29 V, 1V2=1.2 V, GND=0 V

Mode	Typ	Unit
Sleep	< 1	mW
Standby	20	mW
Search	180	mW
Track (outdoors)	125	mW
Track (indoors)	160	mW

4.3.2.2 Current Draw

Pin	Condition	Mode	Typ	Peak	Unit
1V2	@ 1.21 V, room temp	Sleep	0.001	1.0	mA
		Standby	6.7	10.0	mA
		Track (outdoor)	12.1	80.0	mA
		Search, Track (indoor)	60.0	90.0	mA
3V0	@ 3.29 V, room temp	Sleep	0.001	1.0	mA
		Standby, Search, Track (outdoor), Track (indoor)	4.8	10.0	mA
3V0_TCXO	@ 3.29 V, room temp	Sleep, Standby, Search, Track (outdoor), Track (indoor)	1.0	5.0	mA
3V0_RF	@ 3.29 V, room temp	Sleep	0.001	5.0	mA
		Standby	2.0	5.0	mA
		Search, Track (outdoor), Track (indoor)	33.9	40.0	mA

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

4.3.3   Power Mode Transitions

4.3.3.1   Power-On Sequence

Figure 10: Initial Power-On Sequence Diagram
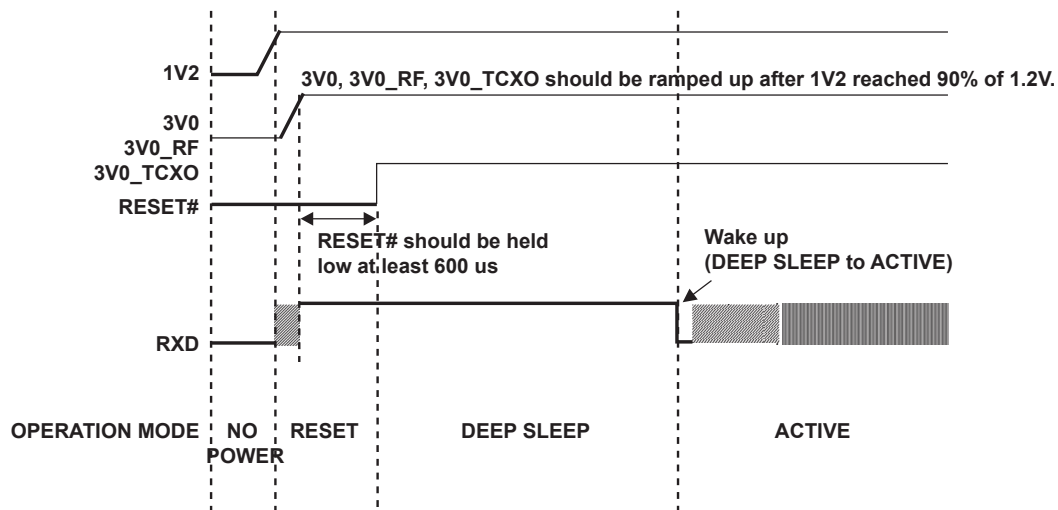
Power up of eMD1100Z is relatively simple and following this power sequence is recommended (see Figure 10).

1.   Apply 1V2

2.   Apply 3V0, 3V0_RF, and 3V0_TCXO

3.   Deassert RESET# signal

4.   Send serial commands on RXD

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A
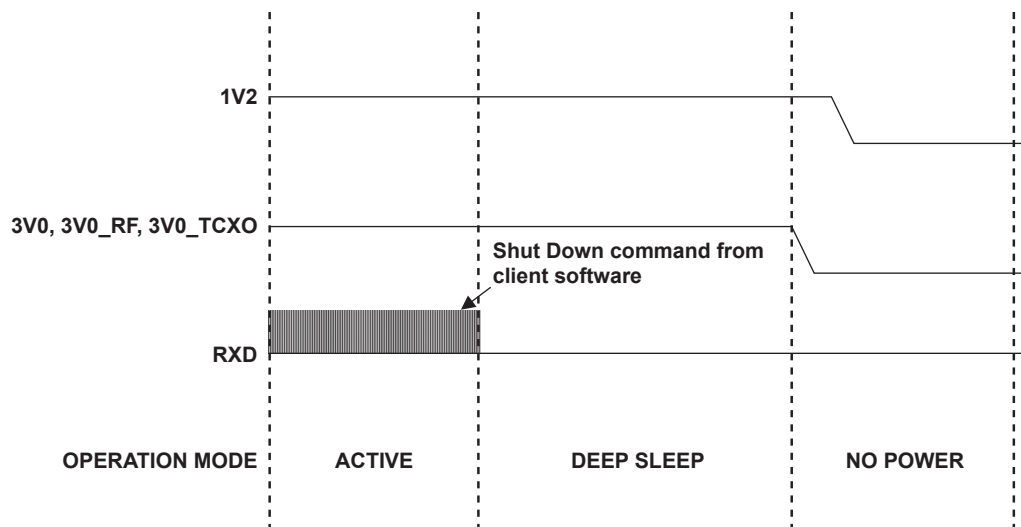
4.3.3.2   Power-Off Sequence

Figure 11: Power-Off Sequence Diagram

Power down of eMD1100Z should follow this power sequence (see Figure 11).

1.   Shutdown command sent by *eRide* Client software on RXD

2.   Remove 3V0, 3V0_RF, and 3V0_TCXO

3.   Remove 1V2

4.3.3.3   Other Power Mode Transitions

Transitioning between Active, Standby, and Deep Sleep modes is accomplished by serial commands from the *eRide* client software.

4.3.4   Operating Power Modes

	3V0_TCXO	3V0	3V0_RF	RESET#
Active	Y	Y	Y	NOT ASSERTED
Standby	Y	Y	N	NOT ASSERTED
Deep Sleep	Y	Y	N	NOT ASSERTED
RESET	Y	Y	N	ASSERTED
CLK OFF	N	Y	N	X
No Power	N	N	N	X

NOT ASSERTED = H,   ASSERTED = L

OPUS ONE

mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

4.3.5 DC Characteristic of I/O Cells

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input	V_{IL}	–	-0.3	–	0.8	V
	V_{IH}	–	2.0	–	3V0+0.3	V
Output	V_{OL}	3.3 V output IOL=100 uA	0	–	0.2	V
	V_{OH}	3.3 V output IOH=-100 uA	3V0–0.2	–	3V0	V

4.4 RF Section

(Ta=25°C)

Item	Symbol	Specification			Unit	Notes
		Min	Typ	Max		
RF input frequency	f_{RFin}	–	1575.42	–	MHz	
Input impendance	Zin	–	50	–	Ω	
DC Supply	3V0_RF		3.0		V	

To achieve optimal sensitivity performance for the mini*Ride* module it's necessary to use an active antenna or add an external LNA in front of the GPS receiver.

4.5 Interface Section

Figure 12: Interface Section

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

5 Mechanical Specifications

5.1 Package Outline

Unit : [mm]
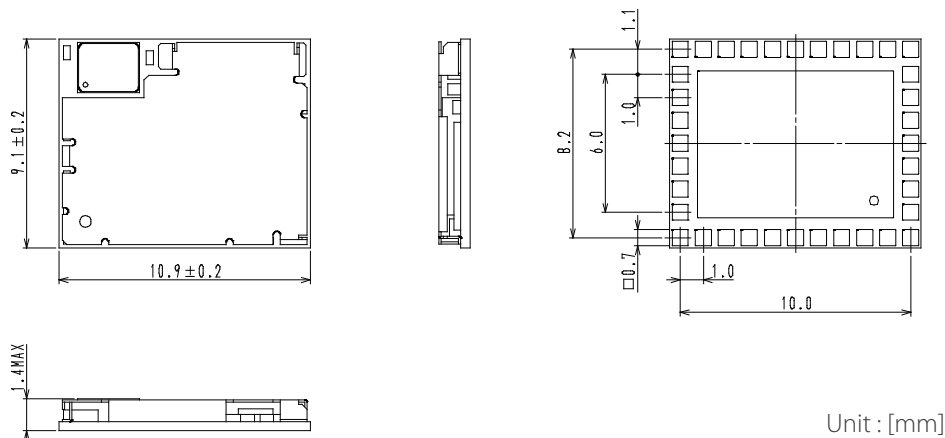
Figure 13: Package Outline

5.2 Marking Description

The example of marking

(1) Product code

(2) Lot number

(3) Revision number (01~)

eMD11000Z : customer part number

6 9 00 S

Sample

Serial number (00 ~ FE : Hexadecimal

Month (Jan ~ Sep: 1 ~ 9, Oct : X, Nov : Y, Dec : Z

Production year (the last digit of year)

Figure 14: Marking Description

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A
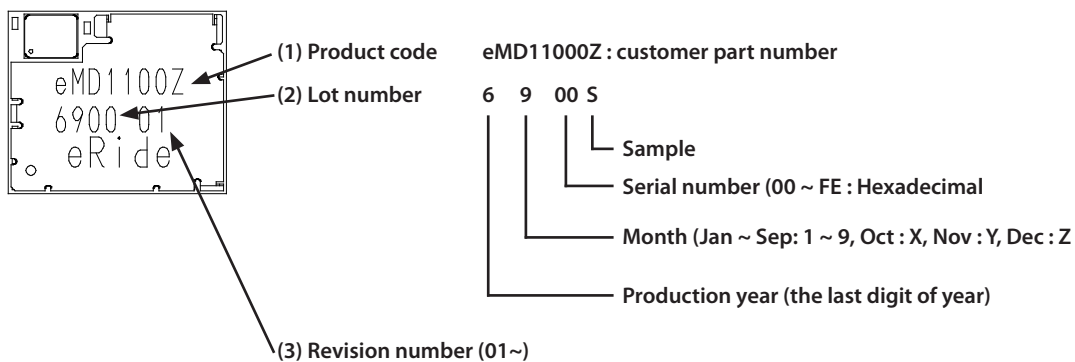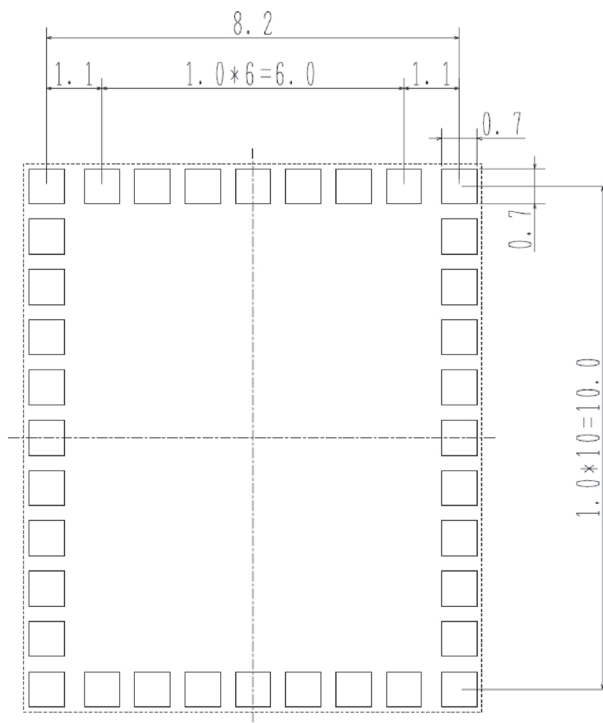
5.3   Recommended Layout

Figure 15: Recommended Layout

6   Software Specifications

6.1   Control Software
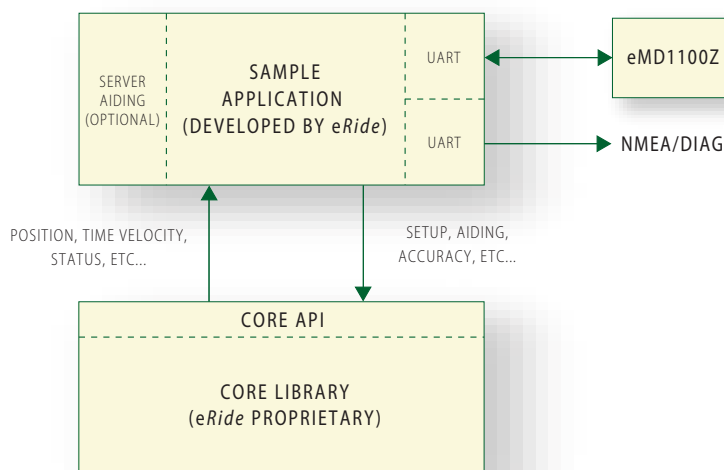
Figure 16: Control Software Block Diagram

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

6.1.1   Core Library

eRide's core library is an OS independent C library that contains all the functionality of the GPS client layer. The library is shipped with the product and is to be installed on the host CPU. The software runs as a single-threaded background process that requires no real-time interrupts, host libraries or RTOS from the host.

The core library contains the software required to control the mini*Ride* module and compute position, velocity, and time (PVT) from the data received from the module. The library interfaces with the user's application and operating system through the Core Functional API. This interface allows the application to configure the core to start/stop, and which run/stop mode to be in (e.g. hot start, standby mode, etc). The interface also passes PVT and satellite information from the core to the application.

Although the core library is OS independent, certain functionality is assumed and required on the platform. Specifically, the functionality includes:

1.   Receiving of data from eMD1100Z via interrupt-driven UART

2.   Sending of data to the UART connected to the eMD1100Z

3.   Sleep for a specified time (specified in milliseconds)

4.   Sending of data to the UART connected to the debug port, or to file (optional)

5.   Reading of a system timer (optional)

6.1.2   Sample Application

Along with the core library, each mini*Ride* module is shipped with a sample application. This application runs on the host CPU as an event-driven background process. The sample application serves as an interface between the user and the core library, and between the core library and the operating system. The application will convert the PVT information from the core (via Core Functional API) into standard NMEA[1] and output standard NMEA sentences[2] back to the user.

While the sample application contains most of the functionality required to run the core, and output NMEA data, the user is required to make any changes to allow the Sample Application to run on the host operating system. This typically includes correctly configuring serial ports and user-desired parameters.

eRide OPUS ONE GPS Library API, Application Programming Interface/Developer's Guide eTM-1100B0001 clearly explains the proprietary APIs in detail and *eRide* can provide this upon request.

[1] NMEA specification 0183 compliant
[2] GSA, GGA, RMC, GSV, GLL, and GSA sentences generate

OPUS ONE

mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

6.1.3   Diagnostic Feature

The core library provides a facility to output GPS diagnostic data via either a debug port or write to a file by a compile-time configuration in the sample application. The purpose of the diagnostic feature is to allow the customer to collect information e*Ride* can use to replicate the user's GPS session. This powerful tool allows e*Ride* and the user to diagnose problems, make library improvements (enhancements, bug fixes, configuration changes, etc.), or gain visibility into any problem scenario.

Once the feature is enabled, the user can collect the diagnostic data by configuring the application to output the diagnostic data through a serial port (separate serial port from user interface port suggested) and storing the output to a file, or by writing the data directly to a file in the application. The user should then send the data, along with a description of the problem to eRide customer support for diagnosis.

6.2   System Requirements
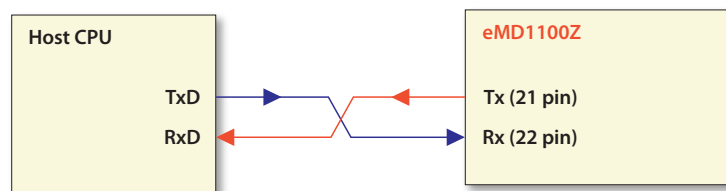
6.2.1   UART Configuration

Figure 17: UART Connection Diagram

The eMD1100Z is configured to use the Universal Asynchronous Receiver Transmitter (UART) transport layer interface. The following table contains the required configuration:

Parameter	Value
Baud Rate	57.6 Kbps
Flow Control	None
Parity	Odd
Stop Bits	1
Data Bits	8
Logic Level High	3.0 V
Logic Level Low	0.0 V
Required Buffer Size	2048 Bytes[3]

Table 1: Required UART configuration for communication with eMD1100Z

[3]   Software buffer size assuming UART interrupt is serviced by host processor and application/core is allowed 6 Mips or more

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

6.2.2 Code, Data, Processor Requirements

Parameter	Minimum Value	Comment
ROM Available	256K	Usage estimated. Actual value depends on core library version, compiler, and target platform.
RAM Available	128K	Usage estimated. Actual value depends on core library version, compiler, and target platform.
MIPS Allocated	6 Mips	Usage estimated. Actual value depends on core library version, compiler, and target environment.
UART Driver	1 UART 2048 Kbyte storage	See table 5.2a for detailed requirements.
Flash Memory[4]	4K byte	Contains previous run information during device power-off

Table 2: Minimum system requirements for guaranteed performance

[4] Not required for system operation, but provides additional performance benefits

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

7 Application Circuit and Reference Design

7.1 Application Circuit

Figure 18a: Application Circuit

OPUS ONE
mini*Ride* Datasheet
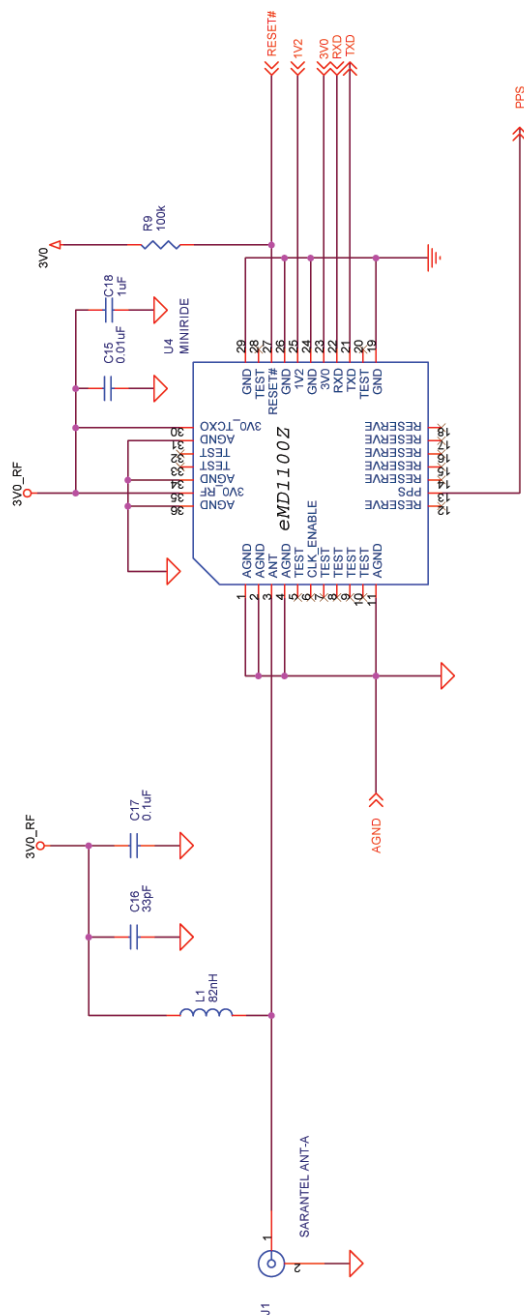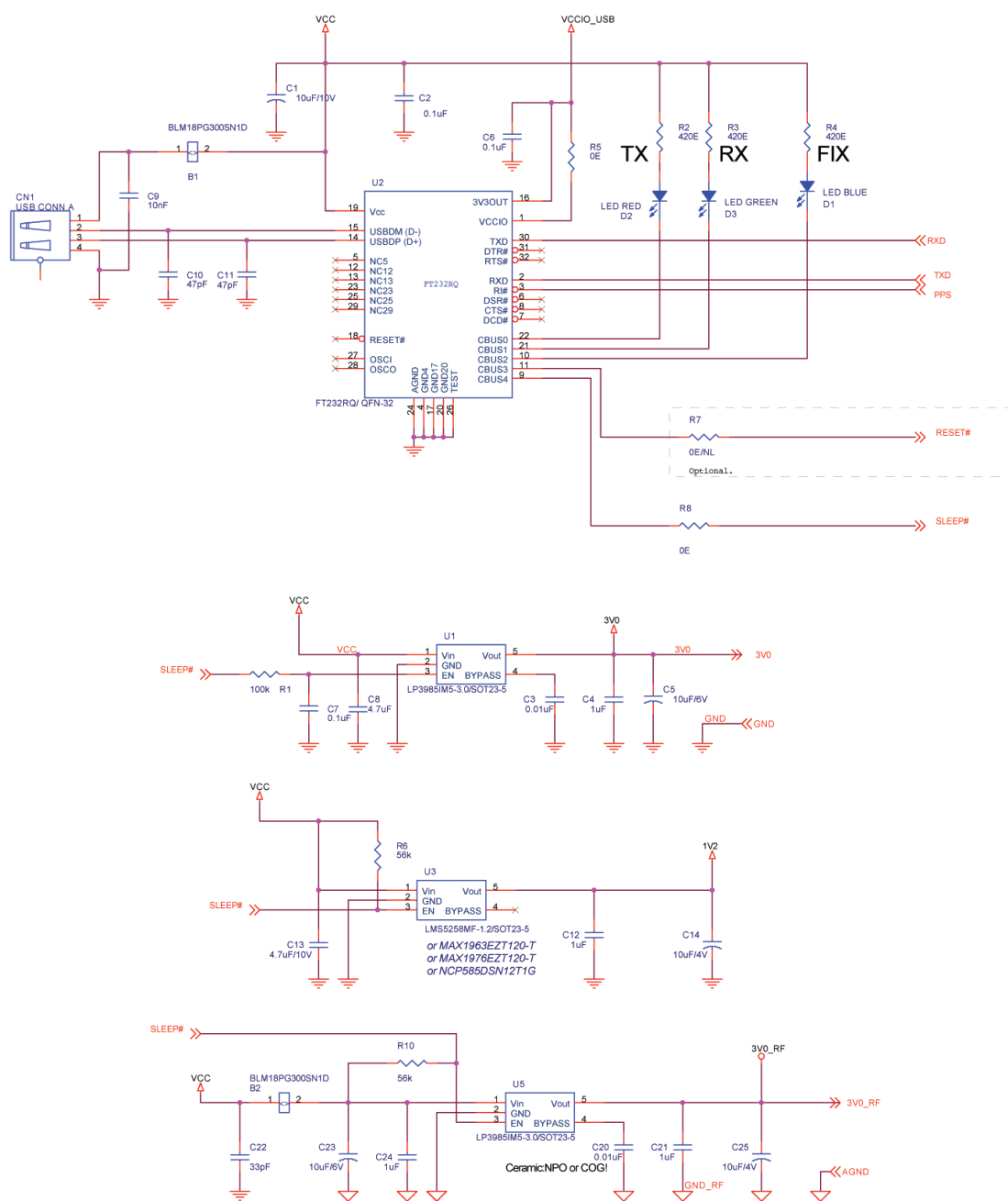32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

Figure 18b: Application Circuit Continued

Note 1: The DC power supplies to 3V0, 1V2, and 3V0_RF must conform to the electrical characteristics specified in Sections 4.2 and 4.3 for minimum, maximum, and typical voltages, stability, and maximum current supply capability. Components meeting these specifications are recommended in the following section.

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

7.2 Recommended Components

Component	Purpose	Approved Vendor List	
		Part Number	**Manufacturer**
3.0 V Regulators	OPUS Power Supply RF Power Supply	LP3985IM5-3.0/SOT23-5	National Semiconductor
1.2 V Regulator	OPUS Power Supply	LMS5258MF-1.2/SOT23-5	National Semiconductor
Ferrite Bead	Noise Suppression	BLM18PG300SN1D	Murata

7.3 Application Reference Design

A complete application reference design package, consisting of the following items, is available from e*Ride* by requesting part number eRD-1100ZA001.

• Schematics

• PCB layout

• BOM/AVL

• DataSheets

OPUS ONE

mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

8 Environmental Specifications

8.1 Temperature Range

Items	Symbol	Min	Typ	Max	Unit
Storage Temperature	T_{stg}	-40		+85	℃
Operating Temperature	T_{opr}	-40	25	+85	℃

8.2 Reliability Test Summary

No.	Test Item	Test Condition	Test Samples (pcs)	Fails (pcs)	Judgment	Notes
1	High temperature storage	+85˚C, 500 h	10	0	Pass	
2	Low temperature storage	-40˚C, 500 h	10	0	Pass	
3	Temperature cycle	-40˚C (30 min) ~ +85˚C (30 min), 100 cycles	20	0	Pass	
4	Temperature and humidity cycle	-10˚C ~ +65˚C, 80 ~ 86% RH 24 h/cycle, 10 cycles	10	0	Pass	
5	Thermal humidity bias	85˚C, 85% RH, burn-in, 1000 h	20	0	Pass	
6	Vibration	10 ~ 2000 ~ 10 Hz, 1.5 mm or 196 m/s^2 (20G) Max 4 min/sweep, X, Y, Z each 4 times	5	0	Pass	(*1)
7	Shock	980 m/s2 (100G), 6 ms X1, X2, Y1, Y2, Z1, Z2 each 3 times	5	0	Pass	(*1)
8	Bending	Distortion 3 mm, Hold 5 s, 5 times	5	0	Pass	(*1)
9	Drop	1.5 m drop on the concrete, 150 g Load X1, X2, Y1, Y2, Z1, Z2 each 3 times	5	0	Pass	

OPUS ONE

mini*Ride* Datasheet

32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

9   Packing and Product Handling

9.1   Carrier Tape and Reel Dimensions
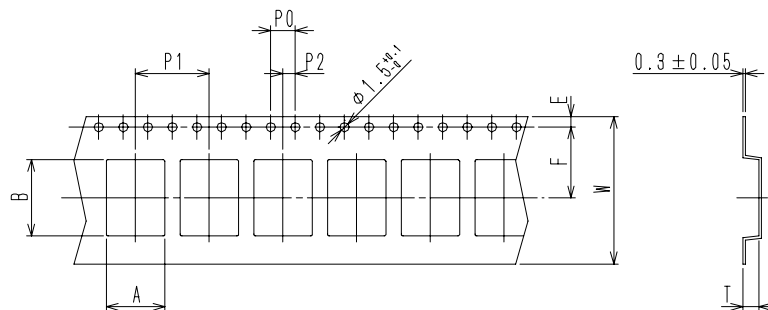
Figure 19: Carrier Tape

	A	B	W	F	E	P0	P1	P2	T
Dimensions	9.5	12.4	24.0	11.5	1.75	4.0	12.0	2.0	2.2
Tolerance	+/-0.1	+/-0.1	+/-0.3	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1	+/-0.1

(unit: mm)

OPUS ONE

mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A
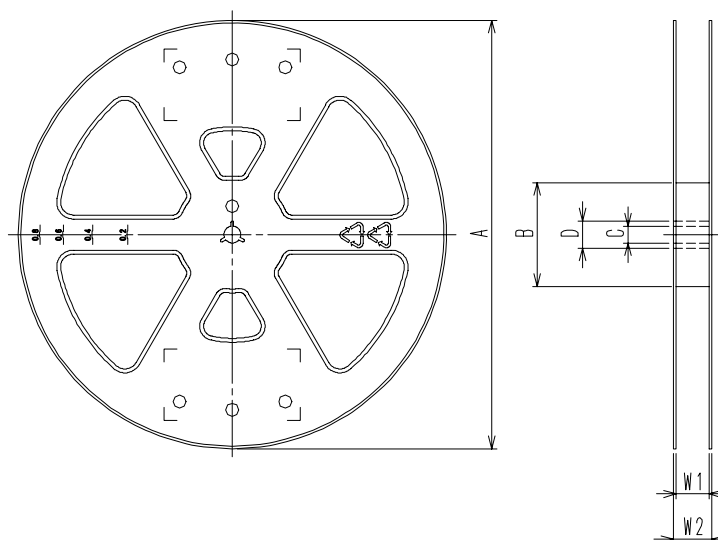
Figure 20: Reel Dimensions

	A	B	C	D	W1	W2
Dimensions	330.0	80.0	13.0	21.0	25.4	29.4
Tolerance	+/-2.0	+/-1.0	+/-0.2	+/-0.8	+/-1.0	+/-1.0

(unit: mm)

Weight breakdown of 2,000 ea
Module: 0.5 g x 2,000 = 1,000 g (c. 2.20 pounds)
Empty Reel: 300 g (c.10.58 ounces)
Carrier Tape: 300 g (   )
Total net weight: 1,600 g (c. 3.52 pounds)
Gross weight: 2,500 g (c. 5.51 pounds)
(Export package)

9.2   Component Orientation for Tape and Reel
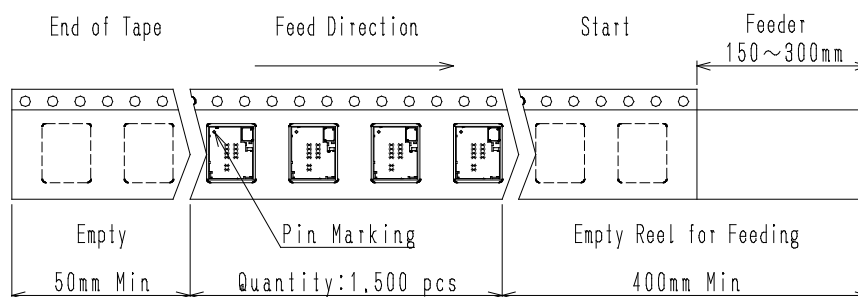
Figure 21: Component Orientation for Tape and Reel

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

9.3   Packaging and Delivery
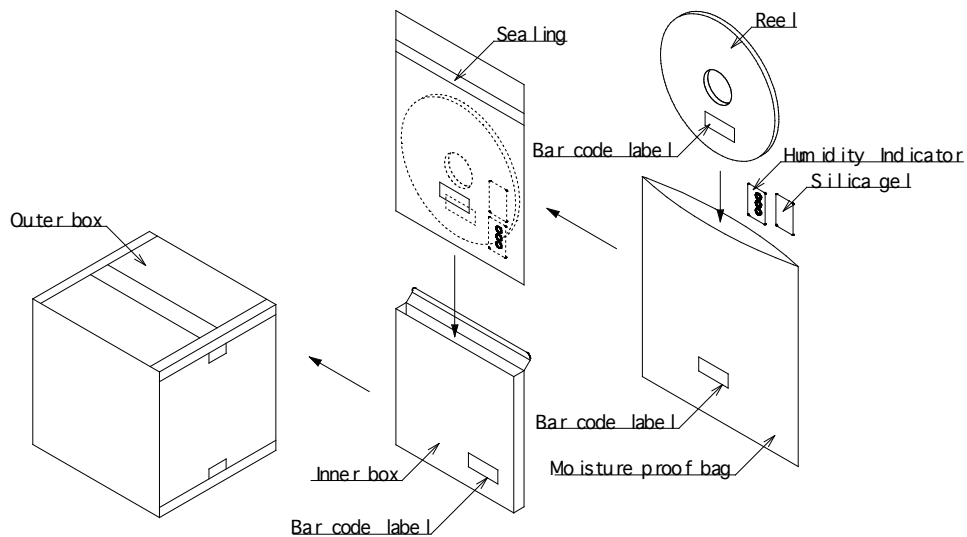
Carrier tape	Polystyrene+Styrenebutadiene
Caver tape	Polyester
Reel	Polystyrene+Carbon
Humidity Indicator	Paper
Moisture proof bag	PET/Al/PE 3Layer bag
Inner box	cardboard
Outer box	cardboard

* maximum 10 inner boxes per outer box

Figure 22: Packaging and Delivery

OPUS ONE

mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

9.4 Reflow Profile

Profile Feature	Pb-Free Assembly
Average ramp-up rate (Tsmaxto Tp	3°C/second max.
Preheat • Temperature Min (Tsmin) • Temperature Max (Tsmax) • Time (Tsminto Tsmax) (ts)	 150 °C 200 °C 60-180 seconds
Time maintained above: • Temperature (T_L) • Time (t_L)	 217 °C 60-150 seconds
Peak Temperature (Tp)	See Table 1
Time within 5°C of actual Peak Temperature (tp)[2]	20-40 seconds
Ramp-down Rate	6 °C/second max.
Time 25°C to Peak Temperature	8 minutes max.

Note 1: All temperatures refer to topside of the package, measured on the package body surface.

Note 2: Time within 5 °C of actual peak temperature (tp) specified for the reflow profiles is a "supplier" minimum and "user" maximum.
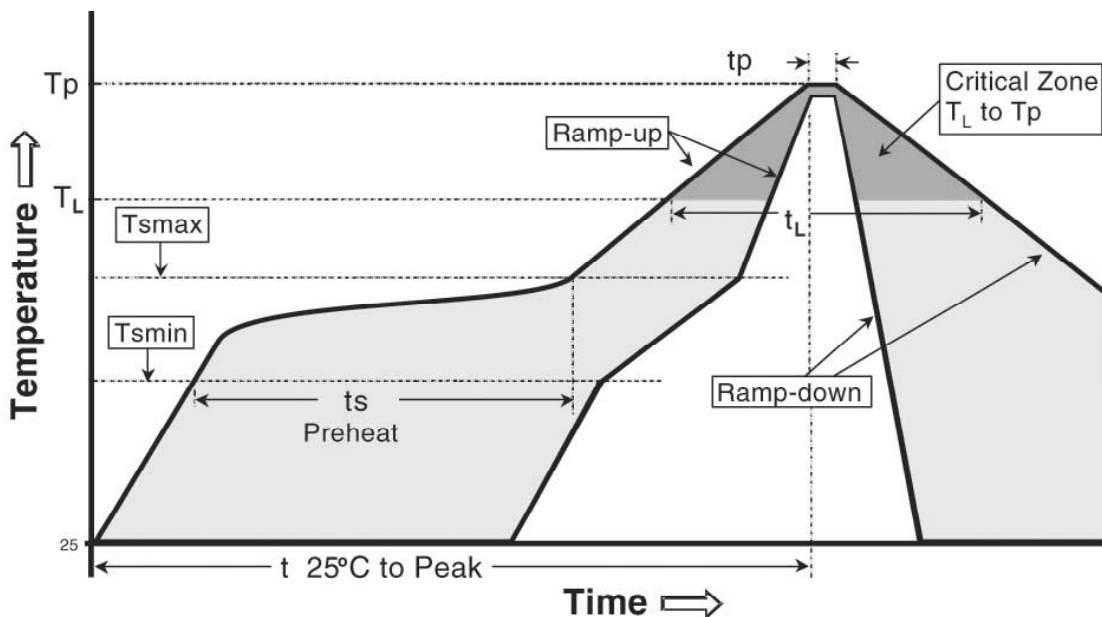
Table 3: Pb-free Process - Package Peak Reflow Temperatures

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

Package Thickness	Volume mm$_3$ < 350	Volume mm$_3$ 350 - 2000	Volume mm$_3$ > 2000
< 1.6 mm	260 °C *	260 °C *	260 °C *
1.6 mm - 2.5 mm	260 °C *	250 °C *	245 °C *
> 2.5 mm	250 °C *	245 °C *	245 °C *
* Tolerance: The device manufacturer/supplier shall assure process compatibility up to and including the stated classification temperature at the rated MSL level			

Extracted from IPC/JEDEC J-STD-020C, reference full specification for more details.

9.5   ESD Sensitivity

Follow guidelines as per IPC/JEDEC J-STD-020C.

9.6   RoHS Compliance

products are compliant with the European Union Directive 2002/95/EC Restriction on the Use of Hazardous Substances (RoHS). All designated products have Pb-free terminals.

OPUS ONE
mini*Ride* Datasheet
32 Channel GPS / AGPS Receiver Module

Part# eMD1100Z
August 24, 2007
eDS-1100Z0001-00A

10   Ordering Information

Part Number	Package	Supplying Form
eMD1100Z	10.9 x 9.1 x 1.4 mm 36 pins fully assembled QFN module	• 24 mm wide embossed Tapping • Pin one indicates opposed direct of pull out of Tape • Quantity: 2 K pieces/reel

10.1   Worldwide Sales Offices

USA
eRide Headquarters
Tel: +1 (415) 848-7800
One Letterman Drive
Building C, Suite 310
San Francisco, CA
94129-1492, USA
Contact@e*Ride*.com

Japan
eRide Asia Pacific limited,
Tel: +81 (3) 5730-7880
Fax: +81 (3) 5730-7881
Sumitomo Mita Bldg. 1F
Shiba 5-37-8, Minato-ku
Tokyo, 108-0014, Japan
InfoJapan@e*Ride*.com

Europe
eRide Europe GmbH
Tel: +49 (89) 92861570
Fax: +49 (89) 928615722
Dornacher Strasse 3e
85622 Feldkirchen bei München, Germany
InfoEurope@e*Ride*.com

Korea
eRide Korea Co, Ltd.
Tel: +82 (2) 577-9151
Fax:+82 (2) 577-9130
#601, Bethel B/D., 324-1
Yangjae-Dong, Seocho-ku
Seoul, 137-897, Korea
InfoKorea@e*Ride*.com

www.e*Ride*.com