



Enabling Industrial IoT



ZETA-xxP Series

LTE Cat 1 / LTE Cat 4 / LTE Cat M1 /
LTE Cat NB1 / UMTS / GSM
Ultra Low Power Modem

Hardware Manual

Rev 1.9



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Introduction

This document is intended to provide guidance when adding a modem from the ZETA-xxP series to your system.

The ZETA-xxP series of LTE Cat 1/LTE Cat 4/LTE Cat M1/LTE Cat NB1/UMTS/GSM Ultra Low Power modems are an advanced range of high performance modems developed for easy integration into existing systems and for embedded application development.

The ZETA-xxP modem range is based on the Telit xE910 GPRS/UMTS/LTE module series and is designed to be ultra low power for use in power sensitive applications. The modem manages the module power up sequence and can be programmed to perform additional custom tasks. In addition to offering 2G/GSM fallback the modem also provides access to the new LTE Cat M1 and LTE Cat NB1 networks for full future compatibility.

The modem family is also available with current LTE Cat 1 and LTE Cat 4 variants for high speed applications.

This document discusses the modems states and modes of operation in addition to the electrical characteristics of the modems interfaces.



About Siretta

Siretta is a wireless communications company located in Reading, United Kingdom manufacturing & supplying industrial IoT products since the early 2000s.

Siretta's product portfolio is made up of:

- » Antennas, plus their associated Cable Assemblies & Adapters,
- » Cellular Network Analysers
- » Industrial Modems
- » Industrial Routers
- » Associated Cloud Management

Siretta supplies products directly and via a worldwide network of distributors, into numerous markets and applications across the globe.

Siretta's distribution partners range from industrial IoT specialists through to global catalogue organisations.

Whether "off the shelf" or custom solutions are required, Siretta has a wide portfolio of products to fit many types of application.

Siretta's extensive knowledge and experience in the wireless market allows support of a wide range of customer applications, focusing on frequencies between 150 MHz to 6 GHz. These encompass modems, routers and antennas for:

- » Cellular technologies: GSM/GPRS/3G/UMTS/4G/LTE & 5G NR, plus LTE CAT 1, LTE CAT M & LTE CAT NB-IoT
- » Global positioning: GPS/GNSS
- » WLAN/Wi-Fi

Whilst providing the above products for the industrial cellular market, Siretta also has a number of antennas to cover applications for:

- » Bluetooth, Zigbee, ISM band, LoRa and Sigfox

With a heavy emphasis on design, Siretta has a team of dedicated Engineers and Product Managers, who specialise in wireless applications.

Siretta continually makes significant investment in R&D endeavouring to provide customers with market leading, future-proofed, wireless solutions. Siretta works closely with many technology partners to stay at the forefront of industrial IOT.



General Description

The ZETA-xxP range of LTE Cat 1/LTE Cat 4/LTE Cat M1/LTE Cat NB1/UMTS/GSM Ultra Low Power modems are amongst the most versatile modem series available today. The ZETA-xxP series offers a range of interface options including USB and RS232 serial port communication, for connection to existing legacy equipment and high speed USB interfaces.

The ZETA-xxP has been designed from the ground up to be very power efficient and incorporates some unique features to allow it to run in an ultra low power state when utilizing the standard AT+CFUN=5 low power mode.

The Siretta ZETA-xxP contains a powerful C development environment which reduces redundancy and optimizes the architecture of your solution and lowers system component costs. In a typical integration project, IoT device developers employ a microcontroller to manage the modem functionality and other device peripherals. The Siretta ZETA-xxP integrates Telit IoT AppZone which eliminates the requirement for an external controller, reducing cost and complexity, embedding application code right in the module.

The Siretta ZETA-xxP Includes a comprehensive set of high-level enabling functions allowing you to focus on the market-differentiating value-added features of your application software. Reduces time to market and project costs; and when you complete your development, reuse it across different products and technologies to expand your markets and opportunities.

Create a proof of concept in record time and with minimal investment. Leverage robust building blocks to shorten your development cycles through to mass deployment.



Specifications

Mechanical

Table 1. ZETA-xxP series mechanical specifications

Parameter	Description
Dimensions	93 x 67 x 28 mm
Weight	
ZETA-NLP/NSP	92.5 g
ZETA-NEP	92.8 g
ZETA-GEP	97.2 g
Case	Black ABS plastic
Operating Temperature	-40 to +85 °C
Antenna Connector(s)	SMA Female
USB Connector	Mini USB type B
RS232 Connector	Female 9-pin D-type with locknuts
Power Connector	RJ12
IO Connector (Enhanced order option)	10 way (2x5), 2 mm pitch

Interface

Table 2. ZETA-xxP series interfaces

Parameter	Description
Operating Voltage	7 to 42 V
Antenna Impedance	50 Ohm
USB Speed	USB 2.0 (High speed 480 Mbits/sec and full speed 12 Mbits/sec)
RS232 Signals	TX, RX, DCD, DTR, DSR, CTS, RTS and RI
RS232 Baud Rates	2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400
RS232 Connector	Female 9-pin D-type with locknuts
Power Connector	RJ12

Power Consumption

All power consumption figures are when powered from the recommended 12 V power supply, modem at default settings, and using the RS232 interface unless otherwise specified. All values are calculated rather than measured values.

Table 3. Power consumption of ZETA LTE Ultra Low Power versions

Mode (ZETA LTE Ultra Low Power Versions)	Typical Consumption
Switched off (using PWROFF_IN on the RJ12 connector)	0.9 mA
On, registered, no call in progress, AT+CFUN=1	11.1 mA
On, not registered, flight mode, AT+CFUN=4	10.7 mA
On, registered on LTE, no call in progress, 2.56 sec DRx cycle, AT+CFUN=5	1.5 mA
On, registered on LTE, no call in progress, 1.28 sec DRx cycle, AT+CFUN=5	1.6 mA
On, registered on UMTS, no call in progress, DRx8, AT+CFUN=5	1.4 mA
On, registered on UMTS, no call in progress, DRx7, AT+CFUN=5	1.5 mA
On, registered on GSM , no call in progress, DRx5, AT+CFUN=5	1.5 mA
On, registered on GSM , no call in progress, DRx2, AT+CFUN=5	1.7 mA
Operating on LTE, maximum transmit power	318 mA
Operating on LTE, minimum transmit power	112 mA
Operating on UMTS, maximum transmit power	231 mA
Operating on UMTS, minimum transmit power	84.6 mA
Operating on GSM, 900 MHz, maximum power	185 mA
Operating on GSM, 1800 MHz, minimum power	126 mA
GNSS active, Cellular connection idle	20.1 mA



Table 4. Power consumption of ZETA LTE Low Power versions

Mode (ZETA LTE Low Power Versions)	Typical Consumption
Switched off (using PWROFF_IN on the RJ12 connector)	0.9 mA
On, registered, no call in progress, AT+CFUN=1	11.6 mA
On, not registered, flight mode, AT+CFUN=4	11.2 mA
On, registered on LTE, no call in progress, 2.56 sec DRx cycle, AT+CFUN=5	7.1 mA
On, registered on LTE, no call in progress, 1.28 sec DRx cycle, AT+CFUN=5	7.2 mA
On, registered on UMTS, no call in progress, DRx8, AT+CFUN=5	7.0 mA
On, registered on UMTS, no call in progress, DRx7, AT+CFUN=5	7.1 mA
On, registered on GSM , no call in progress, DRx5, AT+CFUN=5	7.1 mA
On, registered on GSM , no call in progress, DRx2, AT+CFUN=5	7.3 mA
Operating on LTE, maximum transmit power	319 mA
Operating on LTE, minimum transmit power	113 mA
Operating on UMTS, maximum transmit power	231 mA
Operating on UMTS, minimum transmit power	85.1 mA
Operating on GSM, 900 MHz, maximum power	185 mA
Operating on GSM, 1800 MHz, minimum power	127 mA
GNSS active, Cellular connection idle	20.5 mA



Table 5. Power consumption of ZETA LTEM Ultra Low Power versions

Mode (ZETA LTEM Ultra Low Power Versions)	Typical Consumption
Switched off (using PWROFF_IN on the RJ12 connector)	0.9 mA
On, registered, no call in progress, AT+CFUN=1	10.1 mA
On, not registered, flight mode, AT+CFUN=4	9.7 mA
On, registered on LTE, no call in progress, 2.56 sec DRx cycle, AT+CFUN=5	1.0 mA
On, registered on LTE, no call in progress, 1.28 sec DRx cycle, AT+CFUN=5	1.1 mA
On, registered on LTE, no call in progress, 0.64 sec DRx cycle, AT+CFUN=5	1.6 mA
Operating on LTE Cat M1, maximum transmit power	73.8 mA
Operating on LTE Cat M1, minimum transmit power	46.3 mA
Operating on LTE Cat NB1, maximum transmit power	23.7 mA
Operating on LTE Cat NB1, minimum transmit power	16.4 mA
Operating on GSM, 900 MHz GPRS, maximum power	91.8 mA
Operating on GSM, 900 MHz GPRS, minimum power	46.3 mA
Operating on GSM, 900 MHz EDGE, maximum power	188.3 mA
Operating on GSM, 900 MHz EDGE, minimum power	52.8 mA
GNSS active, Cellular connection idle	16.4 mA



Table 6. Power consumption of ZETA LTEM Low Power versions

Mode (ZETA LTEM Low Power Versions)	Typical Consumption
Switched off (using PWROFF_IN on the RJ12 connector)	0.9 mA
On, registered, no call in progress, AT+CFUN=1	10.6 mA
On, not registered, flight mode, AT+CFUN=4	10.2 mA
On, registered on LTE, no call in progress, 2.56 sec DRx cycle, AT+CFUN=5	6.7 mA
On, registered on LTE, no call in progress, 1.28 sec DRx cycle, AT+CFUN=5	6.8 mA
On, registered on LTE, no call in progress, 0.64 sec DRx cycle, AT+CFUN=5	7.2 mA
Operating on LTE Cat M1, maximum transmit power	74.3 mA
Operating on LTE Cat M1, minimum transmit power	46.8 mA
Operating on LTE Cat NB1, maximum transmit power	24.2 mA
Operating on LTE Cat NB1, minimum transmit power	16.9 mA
Operating on GSM, 900 MHz GPRS, maximum power	92.3 mA
Operating on GSM, 900 MHz GPRS, minimum power	46.8 mA
Operating on GSM, 900 MHz EDGE, maximum power	188.8 mA
Operating on GSM, 900 MHz EDGE, minimum power	53.3 mA
GNSS active, Cellular connection idle	16.9 mA

NOTES:

- » An additional 0.5 mA of power is required for ZETA fitted with the IO connector (Enhanced order option) regardless of the power state on the ZETA. This does not include any current provided by any of the pins on the IO port and is with the RS232 debug connection inactive.
- » Power consumption does depend on network conditions that cannot be controlled by the ZETA or application in which it is used. It is possible to see both higher and lower power consumption values than those presented here.
- » 'Operating' is defined as connected to the network and sending data at the maximum data rate through the USB interface.
- » The transmit power level will normally be set automatically by the modem depending on network conditions. Maximum power will occur at low received signal strengths and minimum power at high received signal strengths.
- » GNSS power consumption does not include any power provided to power an active GNSS antenna



Ultra Low Power Option

The ultra low power option allows a ZETA with this option and using the RS232 interface to go into an ultra low power state where it will remain connected to the cellular network and automatically wake from this state if there is incoming cellular network activity detected. No network traffic will be lost.

This mode of operation is executed using the AT Command AT+CFUN=5.

ZETA without the ultra low power option can also use AT+CFUN=5 to enter a low power operation, but they do not contain the extra functionality to reduce the power consumption to the levels that the ultra low power option offers.

Network Support

Table 7. Network support for ZETA-xxP series

ZETA Version	GSM	UMTS	LTE Cat 1	LTE Cat 4	LTE Cat M1	LTE Cat NB1
LTE1 (EU)	✓	✓	✓			
LTE4 (EU)	✓	✓	✓	✓		
LTE1 (USA)		✓	✓			
LTE4 (USA)		✓	✓	✓		
LTE1 (AP)		✓	✓			
LTE4 (AP)		✓	✓	✓		
LTEM (GL)	✓				✓	✓



Frequency Band Support

Table 8. GSM frequency band support

GSM Band	Frequency	Common name	LTE (EU)	LTE (USA)	LTE (AP)	LTEM (GL)
B2	1900 MHz	PCS				✓
B3	1800 MHz	DCS	✓			✓
B5	850 MHz	Cellular				✓
B8	900 MHz	Extended GSM	✓			✓

Table 9. UMTS frequency band support

UMTS Band	Frequency	Common name	LTE (EU)	LTE (USA)	LTE (AP)	LTEM (GL)
B1	2100 MHz	IMT	✓		✓	
B2	1900 MHz	PCS		✓		
B3	1800 MHz	DCS	✓			
B4	1700 MHz	AWS-1		✓		
B5	850 MHz	Cellular		✓	✓	
B6	800 MHz	UMTS 800			✓	
B8	900 MHz	Extended GSM	✓		✓	
B19	850 MHz	Upper 800 (Japan)			✓	



Table 10. LTE frequency band support

LTE Band	Frequency	Common name	LTE (EU)	LTE (USA)	LTE (AP)	LTEM (GL)
B1	2100 MHz	IMT	✓		✓	✓
B2	1900 MHz	PCS		✓		✓
B3	1800 MHz	DCS	✓		✓	✓
B4	1700 MHz	AWS-1		✓		✓
B5	850 MHz	Cellular		✓	✓	✓
B7	2600 MHz	IMT-E	✓			
B8	900 MHz	Extended GSM	✓		✓	✓
B9*	1800 MHz	DCS			✓	
B12	700 MHz	Lower SMH		✓		✓
B13	700 MHz	Upper SMH		✓		✓
B14	700 MHz	Upper SMH		✓		
B18	850 MHz	Lower 800 (Japan)			✓	✓
B19	850 MHz	Upper 800 (Japan)			✓	✓
B20	800 MHz	Digital Dividend	✓			✓
B26	850 MHz	Extended Cellular			✓	✓
B28	700 MHz	APT			✓	✓
B28A**	700 MHz	APT	✓			
B66	1700 MHz	Extended AWS		✓		
B71	600 MHz	Digital Dividend (US)		✓		

*B9 was intended for use in Japan, but not deployed

**B28A is a subset of B28 using the lower duplexer frequencies
(Tx : 703-733 MHz / Rx : 758-788 MHz)



Data Transfer Rates

Table 11. Data transfer rates

Technology	Upload	Download
2G / GSM-EDGE*	236 kbps	296 kbps
3G / UMTS	5.76 Mbps (ZETA LTE1)	7.2 Mbps (ZETA LTE1)
3G / UMTS**	11.5 Mbps (ZETA LTE4)	42 Mbps (ZETA LTE4)
LTE Cat 1	5 Mbps	10 Mbps
LTE Cat 4	50 Mbps	150 Mbps
LTE Cat M1	375 kbps	300 kbps
LTE Cat NB1	62.5 kbps	21 kbps

*The ZETA supports EDGE. This is an enhanced (but backwardly compatible) version of GPRS, sometimes referred to as 2.75G. Not all networks can be assumed to support this, in which case the GPRS data rates will apply.

**DC-HSPA+ supported

NOTE: These data transfer rates are the data rates supported by the ZETA. Good network reception and a connected cell tower supporting these data rates is also required to get these transfer rates. To get the highest connection speeds, the USB interface of the ZETA must be used.

IO Connector (Enhanced order option)

The optional IP connector on the Enhanced ZETA supports the following functions:

- » 1x 3-wire RS232 debug port connected directly to the cellular module
- » 1x output voltage (to be used to power external interfaces and as a reference for the GPIO)
- » 1x 12-bit ADC (42 V tolerant)
- » 3x General purpose inputs (42 V tolerant)
- » 2x General purpose open collector outputs (Capable of sinking 1 A @ 42 V)



Diversity (Order option)

The ZETA may be ordered with a second antenna connection to improve radio sensitivity. The function is called Antenna Diversity. Diversity improves the input sensitivity by up to 2 dB, which could aid operation in low signal strength areas. Channel aggregation is not supported by this option.

Diversity is mutually exclusive with the GNSS option.

GNSS (Order option)

GNSS is mutually exclusive with the diversity option. The characteristics of the GNSS receiver are:

Table 12. GNSS receiver specifications

Parameters	Typical Measurement	Notes
Sensitivity		
Standalone or MS Based Tracking Sensitivity	-160.0 dBm	
Acquisition	-147.0 dBm	
Cold Start Sensitivity	-145.0 dBm	
TTFF		
Hot	1.1 s	GPS + Glonass Stimulator Test
Warm	22.1 s	GPS + Glonass Stimulator Test
Cold	29.94 s	GPS + Glonass Stimulator Test
Accuracy	0.8 m	GPS + Glonass Stimulator Test
Min Navigation Update Rate	1 Hz	
Dynamics	2 g	
Operation Limits	515 m/sec	
A-GPS	Supported	

These values are for a typical ZETA being used in typical environment and conditions. Device to device deviation is within 2 dB of the quoted sensitivity.



AT Commands

The ZETA-xxP range of wireless modems has a cellular engine at its heart which can be controlled via the serial interface using standard AT commands.

The AT command is an ATTENTION command and is used as a prefix to other parameters in a formatted string. The AT command combined with other parameters can be sent to the modem with your preferred terminal emulator package (TeraTerm/HyperTerminal) and typed in manually as a command line instruction.

The wireless module is compliant with the following AT command formats:

- 1) Hayes standard AT command set, in order to maintain the compatibility with existing SW programs.
- 2) 3GPP 27.007 AT command set for User Equipment (UE).
- 3) 3GPP 27.005 Data Circuit terminating Equipment (DTE - DCE) interface for Short Message Service (SMS) and Cell Broadcast Service (CBS).
- 4) Proprietary command set, the module family also supports a proprietary set of AT commands for special purposes outside of the standard AT specification.

To obtain the latest AT command reference guide* with a full list of supported AT commands, please contact your Siretta representative or alternatively visit:

www.siretta.com

NOTE - This following document refers to useful AT commands throughout and offers descriptions of how to use the AT commands with the ZETA-xxP wireless modems.

*For all LTE modems refer to the latest LTE AT Command Manual.



ZETA-xxP Interface

Standard Hardware Interfaces

The ZETA-NLP and ZETA-NSP modem series come complete with the following interfaces:

- » 1 x RS232 serial port interface for direct serial connection to module (9 wire interface)
- » 1 x RJ12 power connection with 2 power lines (7- 42 V) and 4 input interfaces
- » 1 x SMA female cellular antenna connector
- » 1 x SIM card reader (push-push)
- » 3 x external LED status indicators (Red, Green, Blue)
- » 1 x FS USB port

The ZETA-NEP modem series comes complete with the following interfaces:

- » 1 x RS232 serial port interface for direct serial connection to module (9 wire interface)
- » 1 x RJ12 power connection with 2 power lines (7- 42 V) and 4 input interfaces
- » 1 x SMA female cellular antenna connector
- » 1 x SIM card reader (push-push)
- » 3 x external LED status indicators (Red, Green, Blue)
- » 1 x FS USB port
- » 10-Way connector
 - 1 x wired (10-way) RS232 debug port for direct serial connection to module (3 wire interface)
 - 1 x wired (10-way) 3.3V power supply output interface
 - 1 x wired (10-way) 12-bit ADC interface (42 V tolerant)
 - 3 x wired (10-way) general purpose input interfaces (0-42 V)
 - 2 x wired (10-way) general purpose output interface (VCC @ 1 A)



The ZETA-GEP modem series comes complete with the following interfaces:

- » 1 x RS232 serial port interface for direct serial connection to module
- » 1 x RJ12 power connection with 2 power lines (7- 42 V) and 4 input interfaces
- » 1 x SMA female cellular antenna connector
- » 1 x SMA female GNSS antenna connector
- » 1 x SIM card reader (push-push)
- » 3 x external LED status indicators (Red, Green, Blue)
- » 1 x FS USB port
- » 10-Way connector
 - 1 x wired (10-way) RS232 debug port for direct serial connection to module (3 wire interface)
 - 1 x wired (10-way) 3.3V power supply output interface
 - 1 x wired (10-way) 12-bit ADC interface (42 V tolerant)
 - 3 x wired (10-way) general purpose input interfaces (0-42 V)
 - 2 x wired (10-way) general purpose output interface (VCC @ 1 A)

Optional Modem Features*

Optional Technologies

The ZETA-xxP series modems have the following optional technologies available:

- » GPRS (2G)
- » UMTS (3G)
- » LTE Cat 1 (4G)
- » LTE Cat 4 (4G)
- » LTE Cat M1
- » LTE Cat NB1

Optional Coverage

The ZETA-xxP series modems have the following coverage options available:

- » (EU) European Union
- » (USA) North America
- » (AP) Asia Pacific
- » (GL) Global

*To add optional features on your modem, see ordering Information on [page 23](#).

System Diagram

The ZETA-xxP series is a versatile range of modems offering multiple communication channels and interfaces to connect into other systems. The system diagram below gives a visual representation of the ZETA-xxP interfaces available to the user and shows the various subsections which make up the complete ZETA-xxP modem.

Figure 1. ZETA-NLP / ZETA-NSP Block Diagram

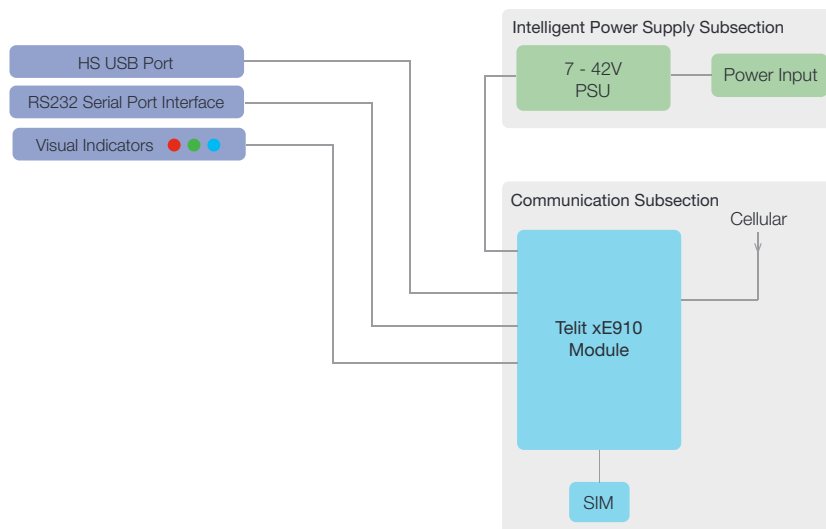


Figure 2. ZETA-NEP Block Diagram*

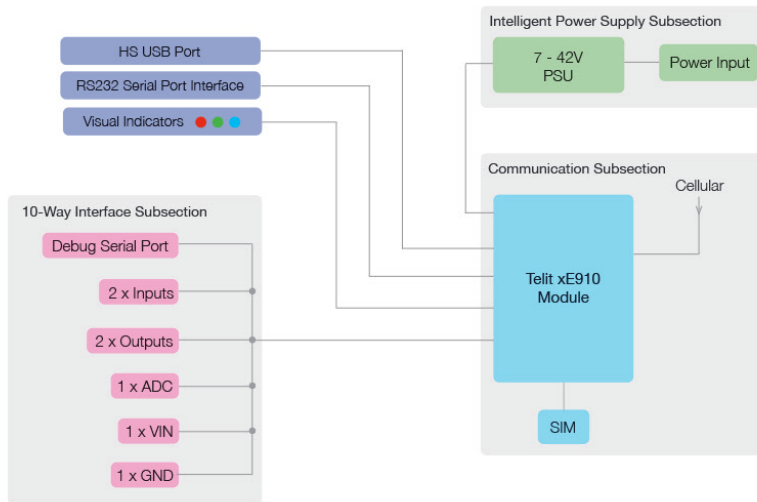
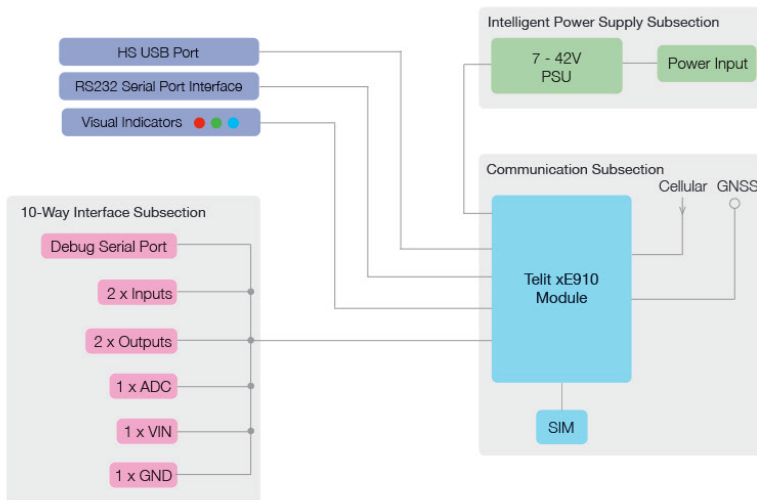


Figure 3. ZETA-GEP Block Diagram*



*Important information regarding pin 7 of the 10-Way connector:
Devices with batch code 44055 or greater output VIN on pin 7
Devices with batch code less than 44055 output 3.3 V on pin 7



System Overview

This ZETA-xxP can be used in a number of applications, some examples are shown below:

- » Low power cellular communication interface
- » Upgrade your estate with a low power solution which continues to operate on the existing cellular network
- » Future proof your applications today by installing a 4G/LTE compatible solution which operates with 2G/GSM fall back
- » Standard cellular modem attached to existing equipment (Windows / WinCE / Linux)*

*Appropriate Telit USB driver needs to be installed (if using USB port with USB cable). Device drivers can be downloaded from: <https://www.siretta.com/usb-drivers>

Appropriate USB driver needs to be installed (if using USB to RS232 cable). Device drivers can be downloaded from: <https://www.siretta.com/serialdrivers>

Typically connected devices are:

- » Windows / WinCE / Linux platforms for use as a dial-up modem
- » Embedded (connected directly to remote equipment without a PC attached)

Operating System Connected Modem

- » Internet enable a remote device with RS232 and/or USB connectivity over 2G/ GPRS, 3G/UMTS, LTE Cat M1, LTE Cat NB1, LTE Cat 1, LTE Cat 4. Internet connectivity can be retrofitted to end equipment without changing the software or configuration of the remote device.
- » Used in countries or places where broadband and WiFi is a less common method to connect to the internet or where services are unavailable. The ZETA-xxP modem can overcome this restriction by providing a mobile internet solution over the cellular network.

Examples:

- » Vending machine where the head office would poll for drinks remaining/money taken etc. This would be an on-demand pull to obtain results in real time.
- » Monitoring AMR/temperature/equipment in a home, i.e. Interrogate lights etc.
- » Remote entry system, i.e. Send a message to the modem to open a gate/door to allow access.
- » Streaming live data from remote system to a central location
- » Remote printing applications (remotely print over the cellular network)
- » Polling remote devices for information to prevent an engineer callout



Modes of Operation

USB Interface

This is a USB standard Communication Device Class (CDC) device. A device driver is available for Windows OS. Linux uses standard CDC ACM drivers.

Appropriate Telit USB driver needs to be installed (if using USB port with USB cable).
Device drivers can be downloaded from: <https://www.siretta.com/usb-drivers>



Ordering Information

ZETA - XXX - XXXX (XX)

Modem Identifier

ZETA = Siretta Low Power Modem

Module Type

N = Without GNSS

G = With GNSS (GPS, Glonass, Beidou, Galileo, QZSS)

LP = Ultra Low Power

SP = Low Power

EP = Enhanced Low Power

ED = Enhanced Low Power with Diversity

SD = Low Power with Diversity

Product Module Version

LTE1 = LTE Cat 1 Technology

LTE4 = LTE Cat 4 Technology

LTEM = LTE Cat M1 / LTE Cat NB1 Technology

Coverage Options

(EU) = European Coverage of 2G / GSM, 3G / UMTS and 4G / LTE

(USA) = North America Coverage of 3G / UMTS and 4G / LTE

(GL) = Global Coverage of 2G / GSM and 4G / LTE

(AP) = Asia Pacific Coverage of 3G / UMTS and 4G / LTE

Part Numbering Examples

- » ZETA-NLP-LTEM (GL) = Ultra Low Power Global Coverage LTE Cat M1 / LTE Cat NB1 Modem
- » ZETA-NSP-LTE1 (EU) = Low Power European Coverage LTE Cat 1 Modem
- » ZETA-GEP-LTE4 (EU) = Low Power European Coverage LTE Cat 4 Modem with GPIO and GNSS

Accessories

- » 60942 - 12V, 1A mains power supply adapter
- » 61064 - RJ12 to open end cable, 1m, to connect to DC power

Dimensions

All dimensions are shown in mm.

Figure 4. ZETA-NLP and ZETA-NSP modem variants
Side view showing LED indicators and SIM card holder slot

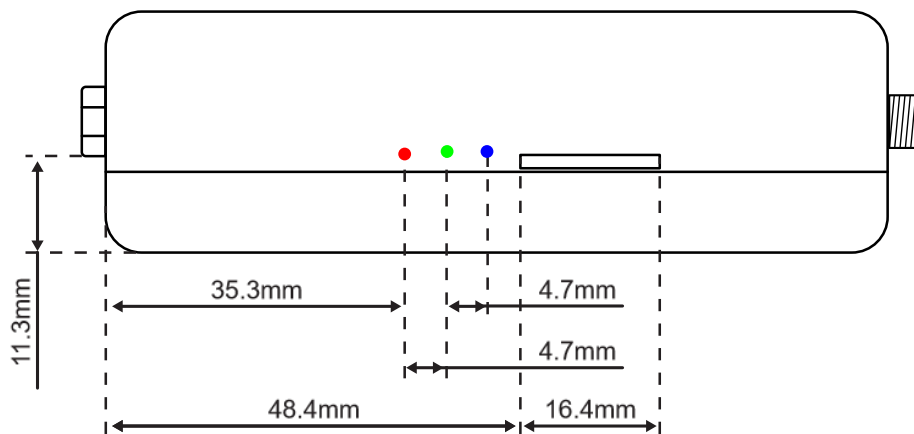


Figure 5. ZETA-NEP and ZETA-GEP modem variants
Side view showing 10-Way IO Header, LED indicators and SIM card holder slot

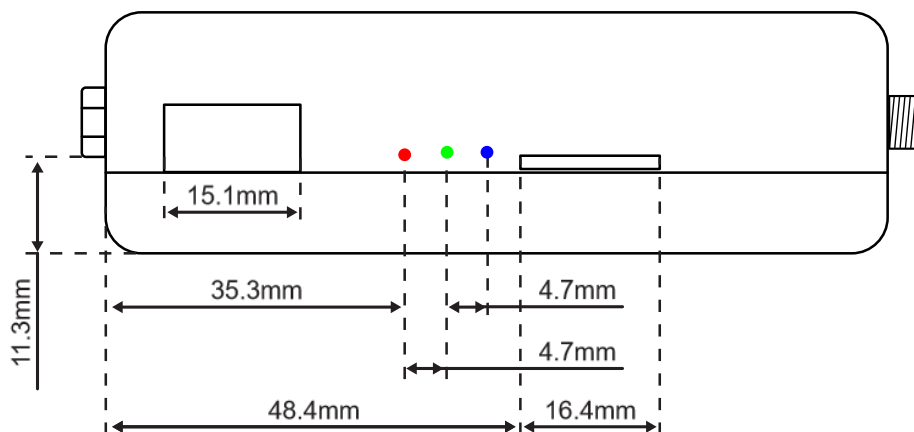


Figure 6. ZETA-xxP modem variants
End view showing RS232 and USB connectors

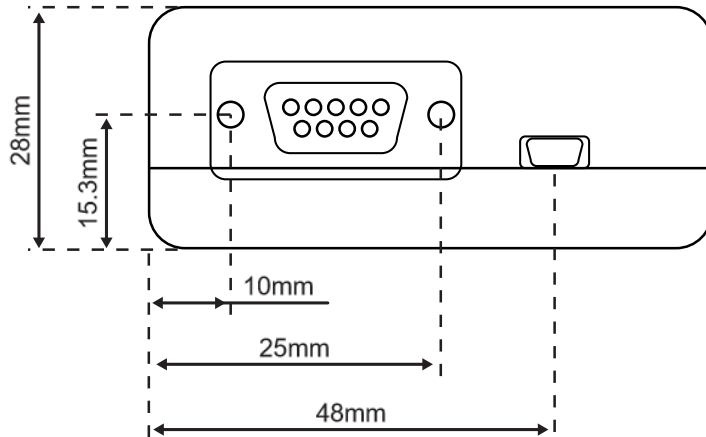


Figure 7. ZETA-NxP modem variant
End view showing antenna and power connectors

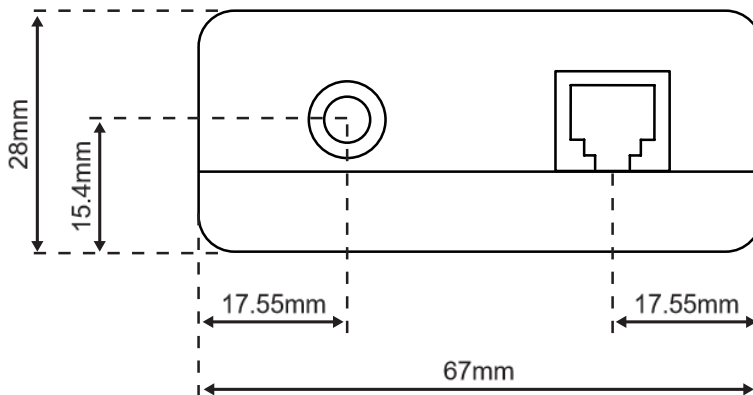


Figure 8. ZETA-GxP modem variant
End view showing antenna and power connectors

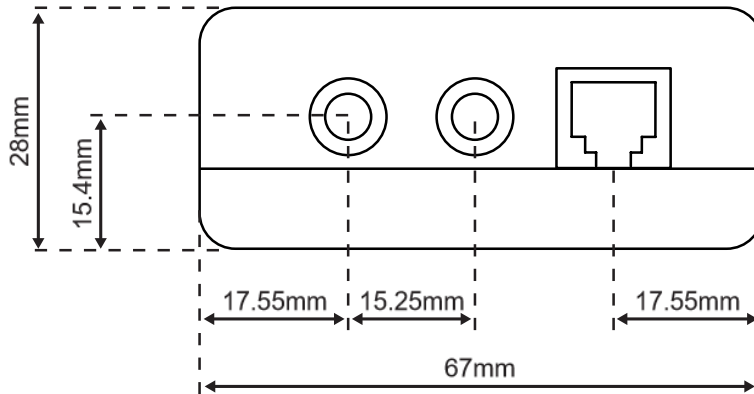
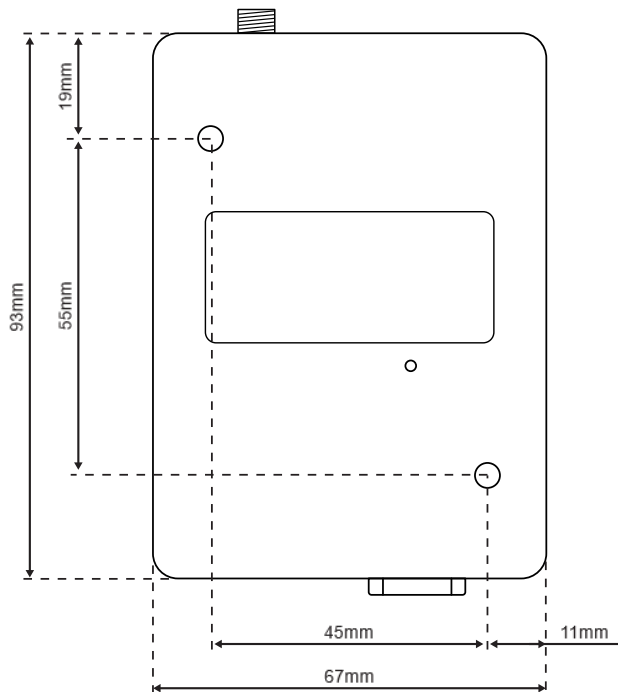


Figure 9. ZETA-GxP modem variant
End view showing antenna and power connectors



ZETA-xxP Series Images

Figure 10. ZETA-NLP, ZETA-NSP and ZETA-NEP



Figure 11. ZETA-GEP



Figure 12. 3D view of the ZETA-NLP and ZETA-NSP



Figure 13. 3D view of the ZETA-NEP and ZETA-GEP



LED Indicators

There are 3 LED outputs on the ZETA-xxP modem coloured Red, Green and Blue. By default, these show the functional/operational state of the modem. However, these may also be configured using software control by the user for other indication purposes. Table 13 describes the functions of the LEDs.

Figure 14. ZETA-NLP and ZETA-NSP LEDs

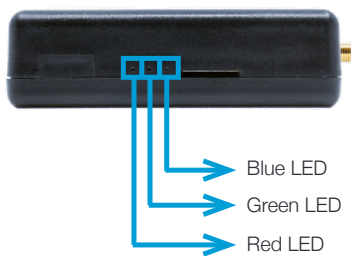


Figure 15. ZETA-NEP and ZETA-GEP LEDs

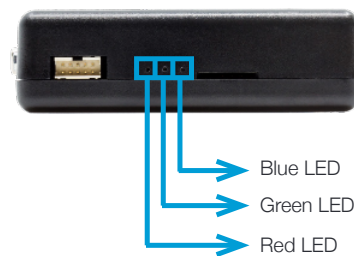


Table 13. LEDs

LED	At power up or PWRON_IN / PWROFF_IN control	After power up
Red	Undefined state	Network registration state / call indication
Green	Rapid blink during power on, otherwise off	Off / User defined
Blue	Rapid blink during power off, otherwise off	Off / User defined

Power Up LED States

On initial application of power, all LEDs will briefly illuminate. During power up, the green and blue LEDs are controlled directly by the ZETA-xxP power management controller, and the red LED is controlled by the embedded modem module. While the ZETA-xxP is in the power up state the green LED will flash rapidly (500 mS on, 500 mS off) and the Blue LED will be off until the power up process is complete.

ZETA-NLP Variants

After the power on process has completed, red, green and blue LED's are disabled completely to save power whilst it is in an operating state. The green LED will briefly flash once every 30 seconds to indicate that the modem is in the on.

ZETA-NSP, ZETA-NEP and ZETA-GEP Variants

After the power on process has completed, red, green and blue LED's are controlled directly by the module using the standard set of AT commands seen below.

Red LED User Control (Only available on ZETA-NSP, ZETA-NEP and ZETA-GEP variants)

ZETA-NSP, ZETA-NEP and ZETA-GEP AT Command to set network registration status

AT#GPIO=1,0,2

Turn on LED permanently

AT#GPIO=1,1,1

Turn off LED permanently

AT#GPIO=1,0,0

Green and Blue LED User Control (Not available on Ultra Low Power ZETA-NLP variants)

The green LED is connected to GPIO3 of the module and the blue to GPIO2. Both LEDs may be independently controlled as outputs using AT commands. The default setting is that these LEDs are off. **Table 14** shows the commands for changing the LED states. These settings are volatile and are lost when power is removed. More recent firmware releases have options to allow this setting to be made permanent.*

Table 14. Green and blue LED AT commands

LED	ON	OFF
Green	AT#GPIO=2,1,1	AT#GPIO=2,0,0
Blue	AT#GPIO=3,1,1	AT#GPIO=3,0,0

*Please read about the AT#GPIO command in the AT Commands Reference Guide for more information.



PWRON_IN Power On Procedure LED Indicators

PWRON_IN is the power on signal (pin 4 of the RJ12 power connector). Taking PWRON_IN high will turn the ZETA-xxP on (assuming there is power applied, but that the unit has been turned off using PWROFF_IN pin).

During power up, the green and blue LEDs are controlled directly by the ZETA-xxP power management process, and the red LED is controlled by the embedded modem module. While the ZETA-xxP is in the powering up process, the Green LED will flash rapidly (500 mS on, 500 mS off) and the Blue LED will be off until the power up process is complete.

ZETA-NLP Variants

After the power on process has completed, the red, green and blue LED's are disabled completely to save power whilst it is in an operating state. The green LED will briefly flash once every 30 seconds to indicate that the modem is on.

ZETA-NSP, ZETA-NEP and ZETA-GEP Variants

After the power on process has completed the red, green and blue LED's are controlled directly by the module using the standard set of AT commands described on [page 29](#).

PWROFF_IN Power Off Procedure LED Indications

PWROFF_IN is the power off signal on pin 3 of the RJ12 power connector. Taking PWROFF_IN high will turn a powered ZETA-xxP off.

During power off, the green and blue LEDs are controlled directly by the ZETA-xxP, and the red LED is controlled by the embedded modem module. While the ZETA-xxP is transitioning through the power off state the Blue LED will flash rapidly (500 mS on, 500 mS off) and the Green LED will be off until the power off process is complete when all LEDs will be off. In this state, PWRON_IN may be used to turn the unit on again.

ZETA-NLP Variants

After the power off process has completed, the Red, Green and Blue LED's are disabled completely. The blue LED will briefly flash once every 30 seconds to indicate that the modem is in the off state.

ZETA-NSP, ZETA-NEP and ZETA-GEP Variants

After the power off process has completed the Red, Green and Blue LED's are off.

Interfaces

RS232 Serial Port Interface

This connector provides a serial RS232 communication between the ZETA-xxP modem and the connected equipment. The modem can be configured via the RS232 connection using AT commands as specified in the AT command manual.

Figure 16. RS232 serial port



Figure 17. Pin numbering

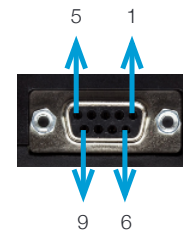


Table 15. Pin usage

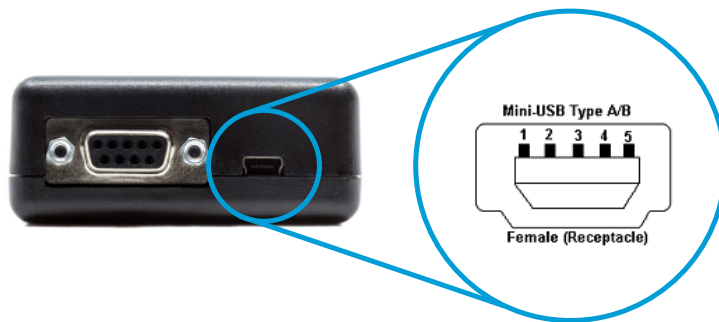
Pin	Name	Usage	Status	Direction
1	DCD	Output from UART that indicates the carrier is present	Connected	OUT
2	RXD	Output transmit line of UART	Connected	OUT
3	TXD	Input receive line of UART	Connected	IN
4	DTR	Input to UART and controls DTE ready condition	Connected	IN
5	GND	Ground	Connected	IN
6	DSR	Output from UART that indicates the module is ready	Connected	OUT
7	RTS	Request to Send - Input line of UART that controls hardware flow control	Connected	IN
8	CTS	Clear to Send - Output line of UART that controls hardware flow control	Connected	OUT
9	RI	Ring Indicator - Output line of UART that indicates the incoming call condition	Connected	OUT

Supported baudrates

» 2400	» 38400
» 4800	» 57600
» 9600	» 115200
» 19200	» 230400

USB Serial Port Interface

Figure 18. ZETA-xxP USB Connector



A mini USB type B connector is provided for USB serial connection. ESD protection to +/-4 KV contact discharge and +/-8 KV air discharge is provided. Pins on this connector are shown in **table 16** below.

Table 16. Mini USB Connectors

Pin	Name	Direction	Description	Low Level	Nominal	High Level
1	VBUS	Input	USB Power VBUS	4.75 V	5 V	5.25 V
2	D-	Differential	Data Minus	4.75 V	5 V	5.25 V
3	D+	Differential	Data Plus	4.75 V	5 V	5.25 V
4	-	-	-	-	-	-
5	GND	Input	Signal Ground	-	0 V	-



USB Interface Drivers

The ZETA-xxP series modems support a standard USB 2.0 device interface compatible with USB 2.0 specifications and supporting the USB low-speed [1.5 Mb/s] and full-Speed (12 Mb/s) modes. The USB port can be used to send AT-commands, reprogram the modems and view debug output. The maximum baud rate available to communicate with the ZETA-xxP series modems is up to 12 Mbit/s.

Drivers are required to use the USB port and are available for several operating systems including Windows/Linux. Please contact Siretta for more information.

In high speed LTE modes of operation, the downlink data speed rates can be higher than the maximum RS232 serial data rate. To achieve this network data rate using the ZETA-xxP, integrators need to interface the ZETA-xxP to their applications in full-speed (12 Mb/s) mode.

The device driver creates up to 6 virtual COM ports on the system for access to the module. 4 of these ports can be configured for use as general purpose AT command communication ports.

- USB0 → Configurable port *
- USB1 → Configurable port *
- USB2 → Configurable port *
- USB3 → Configurable port *
- USB4 → Configurable port *
- USB5 → Configurable port *

The ZETA-xxP series modems do not support autobauding. Integrators have to set the correct speed for serial communication before device initialization. If the right speed is set, the device responds with OK to any valid AT command.

The default baudrate is 115200.

To change the baudrate:

- » Send command AT+IPR=<rate><cr>
- » Wait for 'OK' response

*Please see the following command 'AT#PORTCFG' to configure these ports on your modem.

Supported baudrates

» 300	» 115200
» 600	» 230400
» 1200	» 460800
» 2400	» 921600
» 4800	» 2900000
» 9600	» 3200000
» 19200	» 3686400
» 38400	» 4000000
» 57600	

GPIO 10-Way Connector

This connector provides a general purpose multi-way interface for the user to access additional functionality within the ZETA modem. This convenient interface allows connections to be made to the modems peripheral connections such as the trace / debug RS232 serial port, GPIO interface and ADC. Recommended mating connector: FCI 89947-710LF Receptacle Connector - IDC 2mm 2 x 5 - 10-way.

Figure 19. 10-way connector



Figure 20. Pin numbering

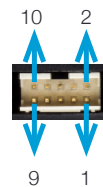


Figure 21. FCI 89947-710LF



Table 17. 10-way connector*

Pin	Name	Direction	Description	Low Level	Nominal	High Level
1	GND	Input	Signal Ground	-	0 V	-
2	Output 2	Output	General Purpose Output 2	0 - 0.5 V	12 V	VCC
3	Debug RX	Input	Debug Serial Receive (TTL)	-	+/- 3.3 V	-
4	Output 1	Output	General Purpose Output 1	0 - 0.5 V	12 V	VCC
5	Debug TX	Output	Debug Serial Transmit (TTL)	-	+/- 3.3 V	-
6	Input 3	Input	General Purpose Input 3	0 - 0.5 V	12 V	42 V
7	VIN_OUT	Output	Power Supply Voltage Output		VIN	
8	Input 2	Input	General Purpose Input 2	0 - 0.5 V	12 V	42 V
9	ADC 1	Input	Analogue to Digital Converter 1	0 - 0.5 V	12 V	42 V
10	Input 1	Input	General Purpose Input 1	0 - 0.5 V	12 V	42 V

*Important information regarding 10-Way connector, pin 7:
Devices with batch code 44055 or greater output VIN on pin 7
Devices with batch code less than 44055 output 3.3 V on pin 7

The batch code can be found on the silver label on the back of the ZETA-xxP modem.

SIM Socket

The ZETA-xxP modem supports fixed SIMs locked to a network and roaming SIMs which can operate on more than one network within the home country. This allows for least cost routing for roaming mobile data and machine to machine applications where signal strength is variable in any given area and network selection is required.

The ZETA-xxP also supports global roaming SIMs which will work with any network it can detect, at home or abroad and can be chosen for best performance.

Figure 22. ZETA-NLP and ZETA-NSP - SIM holder



SIM Requirements

SIM services available for the ZETA-xxP-LTE series include:

- » 2G GSM (850 MHz, 900 MHz, 1800 MHz, 1900 MHz)
- » LTE Cat M1 / NB1 (700 MHz, 800 MHz, 850 MHz, 900 MHz, 1700 MHz, 1800 MHz, 1900 MHz, 2100 MHz)
- » 4G LTE (700 MHz, 800 MHz, 900 MHz, 1800 MHz, 2100 MHz, 2600 MHz)
- » SMS
- » GPRS
- » CSD (optional on GSM/UMTS)

Digital Functions

The ZETA-xxP maximum current drive on the outputs and current consumption on the inputs are shown below in **table 18**.

Table 18. Input/Output voltages

Signal Name	Parameter	Voltage Level	Current Source / Sink
Input 1	Input current	VCC	0.31 mA
Input 2	Input current	VCC	0.31 mA
Input 3	Input current	VCC	0.31 mA
Output 1	Current sink	VCC	1.0 A
Output 2	Current sink	VCC	1.0 A
ADC	Input current	VCC	4.2 mA
3.3V Output	Power supply	3.3 V	100 mA

Digital Output

- » See **table 18** above for maximum output current
- » Under full control of AT command/embedded application

The following commands can be used to initialise and to set the digital output functionality:

AT#GPIO=4,1,1 (switch general purpose output 1 on, Pin 4 on function header)

AT#GPIO=4,0,1 (switch general purpose output 1 off, Pin 4 on function header)

AT#GPIO=5,1,1 (switch general purpose output 2 on, Pin 2 on function header)

AT#GPIO=5,0,1 (switch general purpose output 2 off, Pin 2 on function header)



Digital Input

» Under full control of embedded application

The following AT commands can be used to initialise and to read the status of the general purpose inputs:

AT#GPIO=6,2,0 (read general purpose input 1, Pin 10 on function header)

AT#GPIO=7,2,0 (read general purpose input 2, Pin 8 on function header)

AT#GPIO=8,2,0 (read general purpose input 3, Pin 6 on function header)

Configuration Switch (Emergency Boot)

NOTE: This mode of operation is not required for normal operation. Emergency boot mode should only ever be attempted when the modem is in a non working state and appears to be unrecoverable using the normal firmware update process. In this scenario please use the emergency boot process to get the modem in to a special baseline firmware programming state.

The status of the configuration switch is detected when power is applied. Pressing the switch after power has been applied has no effect. It will take a second or so between applying power and the switch press being detected. Indication that the ZETA-xxP modem has detected the emergency boot switch press is shown in the device manager with a new base device called 'QDLoader' appearing in the device list. Press the switch using the supplied 'Siretta Function Pin Tool'.

Once emergency boot mode has been selected, the module will remain in this idle emergency boot state until one of the following actions is taken:

- » Firmware Update: Run the firmware update procedure to reflash the firmware running on the module. Allow the entire update procedure to complete before powering down the module.
- » Device Reboot: Power down the module and reboot. If the device has entered a non working state then the emergency boot mode may be required to allow you to be able to reflash the device firmware correctly.

This emergency boot mode is equivalent to a device reset state. Normal modem operation will not be possible when the modem has entered this state and the modem must be reflashed or rebooted for normal operation to be available. Please contact your Siretta representative for more information.

Figure 23. Configuration switch (Emergency boot)

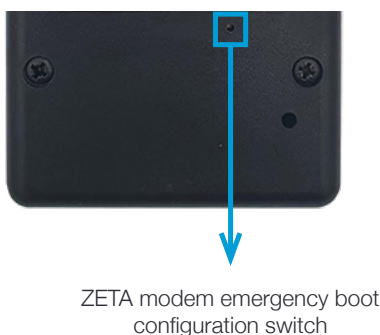


Figure 24. Siretta Function Pin Tool



Antenna Connectors

Figure 25. ZETA-NxP Antenna Connectors

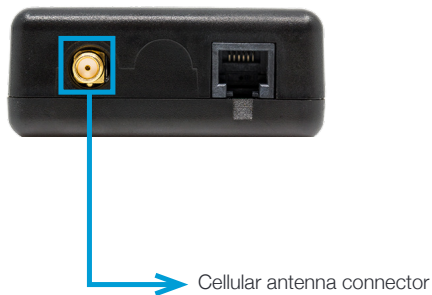
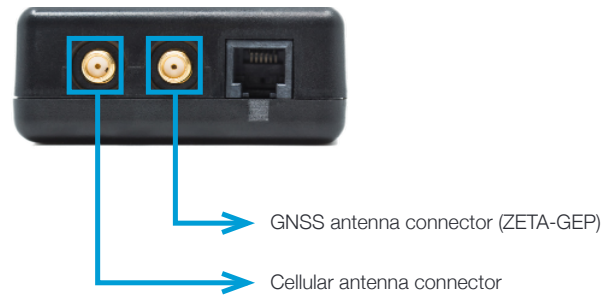


Figure 26. ZETA-GEP Antenna Connectors



Antenna Placement

When in service the antenna should be placed away from electronic devices or other antennas. The recommended minimum distance between adjacent antennas, operating on a similar radio band, is at least 50 cm. The antenna should not be placed inside a metal box.

Please read the antenna manufacturers installation instructions carefully - some antennas require a ground plane.

If getting good reception is a problem, try raising the height at which the antenna is installed. Increasing the elevation is usually the best way to improve the received signal strength.

Antenna Connection Cable

If a cable is used to connect the modem to the antenna this cable must be a high quality low loss cable. The cable and any connectors used should have 50 ohms impedance.

