

## Smart Radio Telemetry Module

### Features

- Simple and low cost
- 4 channel receiver module
- 4 digital outputs
- Serial Data output
- Minimal external components
- Secure data protocol
- Ultra low power 1.8–3.6V
- Easy pairing process
- -121dBm Receive Sensitivity
- Range when used with:
  - *FOBBER* Keyfob up to 150metres
  - *TRAP* Handset up to 1000metres
  - *SABRE* Handset up to 2000metres
- SMT or SIL package
- Incorporates self test mode
- CE compliant for EU licence free use



### Applications

- Remote control
- Sensors
- I/O Telemetry devices
- Remote switching
- Remote traffic lights

### Description

The ZPT receiver module provides an easy “plug and Play” Remote Control feature for any application.

Compatible with many RF Solutions Transmitters the ZPT provides a serial and digital output when the transmitter is operated. When used with one of the many RF Solutions Transmitters a versatile secure radio Telemetry switch can be created.

### Ordering Information

Part No	Description
ZPT-4RD	Radio telemetry module DIL package 433MHz
ZPT-4RS	Radio telemetry module SMT package 433MHz
ZPT-8RD	Radio telemetry module DIL package 868MHz
ZPT-8RS	Radio telemetry module SMT package 868MHz

# ZPT Telemetry Receiver Module



## Compatible Transmitters

The ZPTmodule can be used with the transmitters below, The transmitter handset will affect the maximum achievable range of operation.

### FOBBER Keyfob

Copmact rugged handset Waterproof to IP68  
1,2,3,4,6,8 button Options  
Operating up to 150m



### TRAP Handset

A medium sized rugged handset available as  
1,2,3,4,6,8,16 buttons  
operating up to 1000m



### SABRE Handset

A rugged IP68 industrial handset  
1, 2, 3, 4, 8 buttons  
Operating up to 2000m.

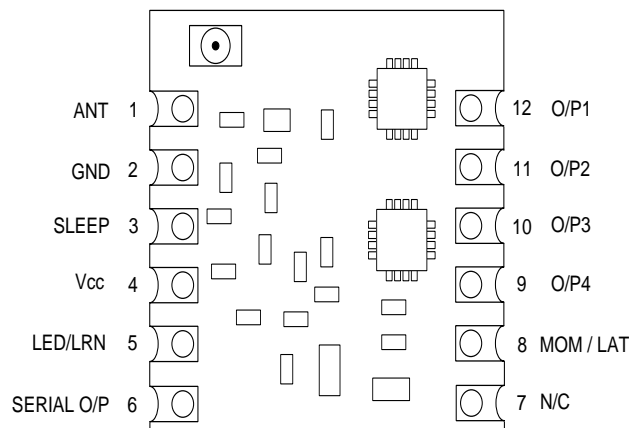


FM76316

# ZPT Telemetry Receiver Module



## Pin-out



## Pin Description

Pin No	Name	Direction	Description
1	ANT	In	Antenna input/output 50ohm impedance
2	GND	In	Connect to ground
3	SLEEP	In	to GND, Module active Connect to Vcc, Module Enters SLEEP
4	Vcc	In	Supply voltage
5	LED/LRN	Out/In	Learn switch input and LED output Learn switch input: normally 'high' momentarily connect to GND to enter Learn Mode.
6	SERIAL O/P	Out	Serial Data output to Host micro
7	N/C	-	No Connect
8	MOM/LATCH	In	Set outputs as momentary or latching in operation. Internally tied high. Connect to GND for momentary Disconnect for latching. Once status has been changed, the power must be cycled in order for the change to take effect.
9	O/P4	Out	Digital Output
10	O/P3	Out	Digital Output
11	O/P2	Out	Digital Output
12	O/P1	Out	Digital Output

# ZPT Telemetry Receiver Module



## Operation

The ZPT module will remain in a low power listening mode at all times when power is present and the Sleep Input is Low. When a valid RF signal is received ZPT will wake and process the RF packet.

if the received RF Packet is from a Transmitter that has been "Paired" to the ZPT module, the Digital Telemetry outputs are asserted **accordingly**.

The RF Packet Data is always presented at the Serial data output to the host.

## Pairing Process

This process creates a paired link between an input button on a transmitter with one of the ZPT Digital Telemetry outputs. Any input from any transmitter can be paired to any output of the ZPT module.

1. Briefly GND Pin 5, the LED will flash once - this shows OP1 is selected
2. GND Pin 5 again after release the LED will flash twice to show OP2 is selected
3. Repeat above process to select OP3 or 4
4. With the desired output selected (and before a 10sec timeout)
5. Press the button or activate the input on the transmitter to be paired.
6. This will complete the pairing and the LED will flash twice to confirm

**Memory: maximum storage is 30 pairings.**

## Erase

To erase the ZPT memory and remove all stored transmitter input pairings you must connect the Learn Pin (5) to Ground for 10 seconds.

The Learn LED will illuminate while the pin is grounded and after it is disconnected will flash 3 times to Confirm memory erase has been completed.

Mode	LED	Description
Normal operation	OFF	No RF data is being transmitted/received
	Flickering	Module is receiving data
Learn and erase	ON	While input is connected to GND (i.e. during button press).
	Flashes	Flashes to show output selection and pairing success Learn mode times out after 10 seconds
	Flashing twice	ZPT pairing successful
	Flashes three times	ERASE successful

## Outputs

Outputs are LVTTTL / LVCMOS at Vcc and are Active high.

## Momentary or Latching Function

ZPT actions transmitter button state change only, therefore momentary mode requires receipt of a "button down/input active" packet and a "button up/input not active" packet from a transmitter. In momentary mode on receiving a "button down" the ZPT will hold its output active until a "button up" is received. In latching mode ZPT must see "button down" then "button up" in order to make a state change to assert or relax an output.

# ZPT Telemetry Receiver Module



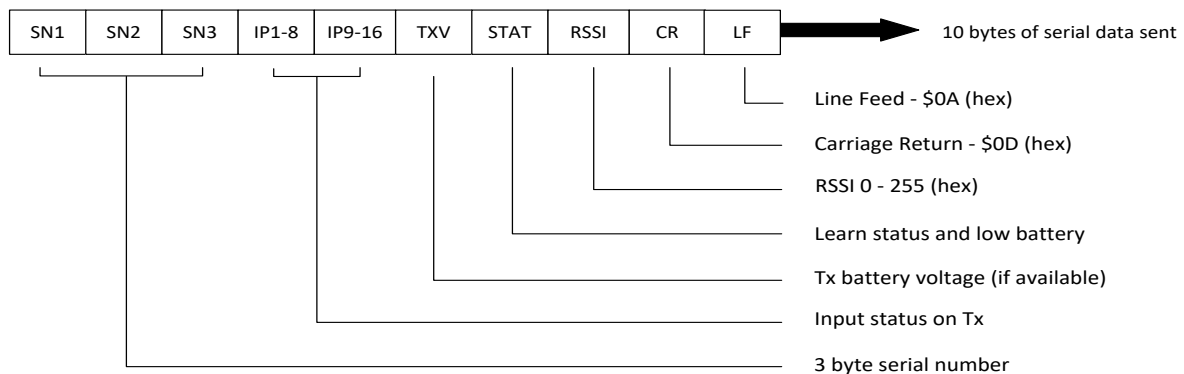
## ZPT Receiver module serial data output

The ZPT outputs the serial number, button and battery status of the transmitter encoder. This data may be fed directly to a microcontroller or RS232 type driver circuit which may then be fed directly to a PC serial port. Serial data is output on every packet receipt - this equates to every 1/4 second whilst a button is held down/ input active. This data output is valid regardless of whether the Transmitter/Encoder has been learnt or not. The serial data packet contains a learn bit to show if an encoder input is learnt.

### Serial data configuration

Baud Rate: 19,200  
Data bits: 8  
Parity: none  
Stop bits: 1  
Handshaking: none

### Serial data format:



### Serial number [SN1 SN2 SN3]:

Made up of three 8-bit bytes where the most significant byte is transmitted first.  
Example: 12ABAA (hexadecimal) or 0001 0010 1010 1011 1010 1010 (binary)

### Tx inputs [IP1-8 IP9-16]:

made up of two 8-bit bytes.  
The low order byte is sent first representing inputs 8 down to 1 where the MSB is input 8 and the LSB is input 1. The high order byte is sent next representing inputs 16 down to 9 where the MSB is input 16 and the LSB is input 9.

A bit at state 1 represents an encoder input as active.

Using this method inputs can be multiplexed giving maximum versatility.

Example: 00000000 00010000 Shows input 13 active.  
10000000 00000000 Shows input 8 active  
10000001 10000000 Shows inputs 16, 8 and 1 active

### Learn status and low battery:

One 8 bit byte:

Bit0 shows low battery on Tx - where 1 = Low battery

Bit1 shows learn status of Tx - where 1 = Learnt

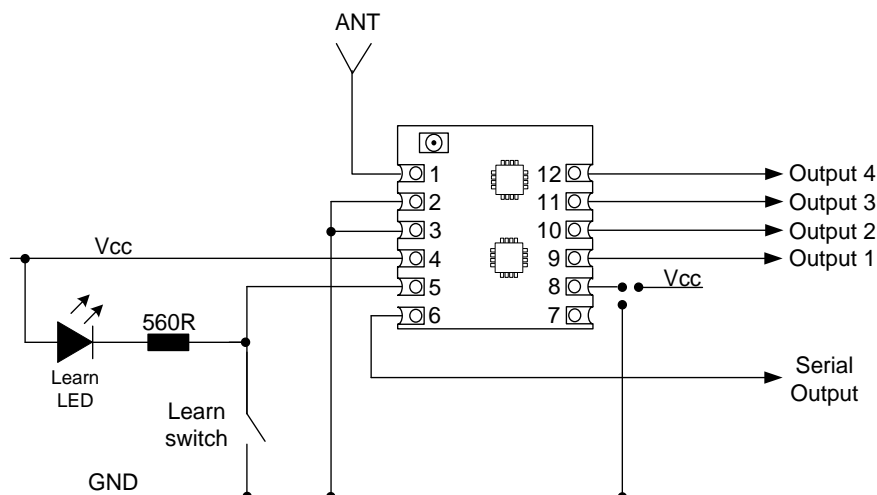
### RSSI

Received Signal Strength Indication.

### Bespoke versions

Customised versions of the all transmitters, receivers and chipsets are available to provide a bespoke remote chipset for OEM

## ZPT example application circuit

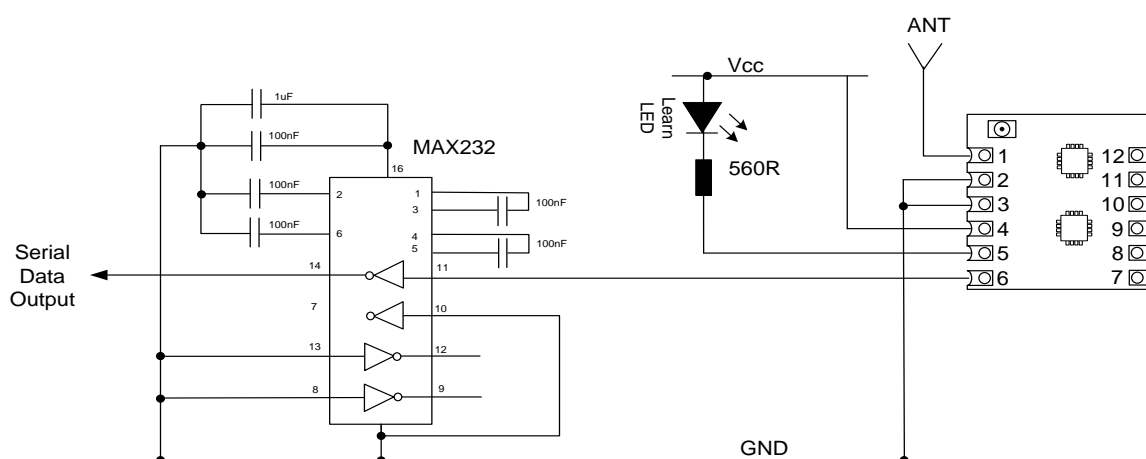


### Description:

This example shows a ZPT module receiver with all 4 outputs connected.

**Note:** The external learn switch and learn LED are both shown connected in this example.

## ZPT connected with Serial data output via MAX232



## Self Test Mode

ZPT module incorporates a self test which is initiated by applying power with the learn button held down.

The module then performs the following functions:

1. All outputs operate in turn ON/OFF twice
2. All outputs flash ON/OFF 5 times - 1&3 and then 2&4
3. Transmits a full power RF signal for 5 seconds while flashing the learn LED
4. Enters RSSI (Received Signal Strength Indication) mode where outputs 1-4 are activated as a bar graph type output according to the strength of a valid RF signal received (from any carrier operating at the appropriate frequency (869.50MHz). 4 Outputs on being maximum strength.
5. To exit RSSI mode cycle power to the module.

## Range Considerations

The antenna choice and position directly affects the system range, keep it clear of any large metal parts. The best position is protruding vertically from the top of the product. This is often not desirable for practical reasons and thus a compromise may be needed. Note that the space around the antenna is as important as the antenna itself. All radio systems are dependent on a radio signal being received through airspace.

The range quoted is the optimal in direct line of sight without obstacles and in good atmospheric conditions.

Range is affected by many things, for example local environmental conditions, atmospheric conditions, interference from other radio transmitters. For evaluating the local environment please see our RF Meter (DS006).

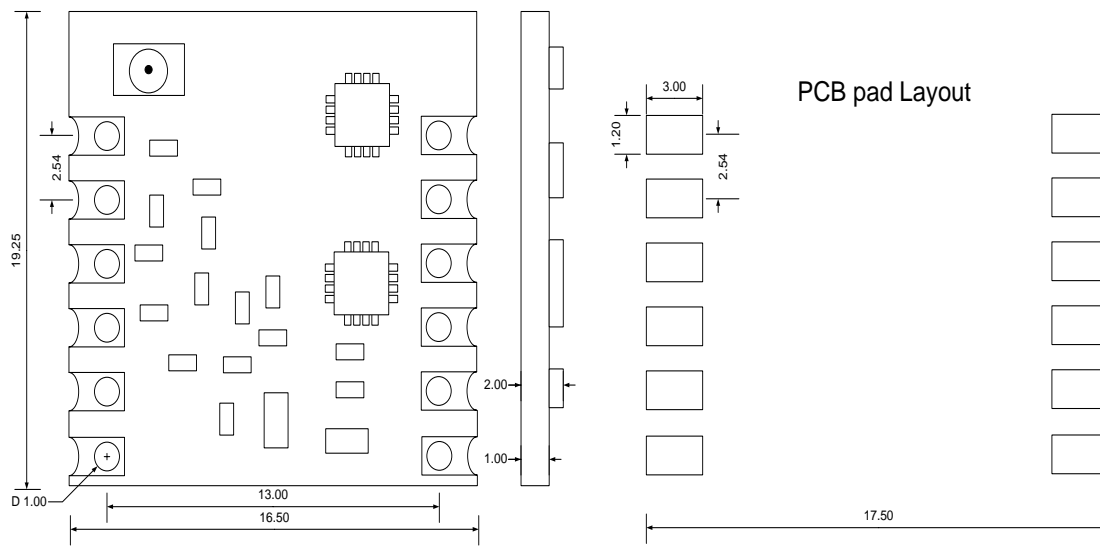
In very worse case applications the range quoted may be reduced dramatically below the optimal range stated.

# ZPT Telemetry Receiver Module

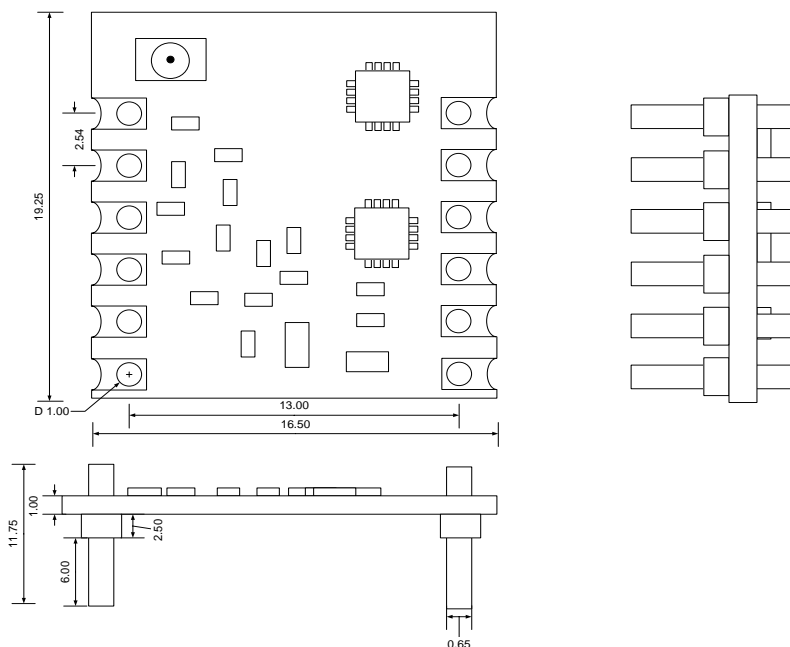


## Mechanical dimensions

### Surface Mount Package



### D Package

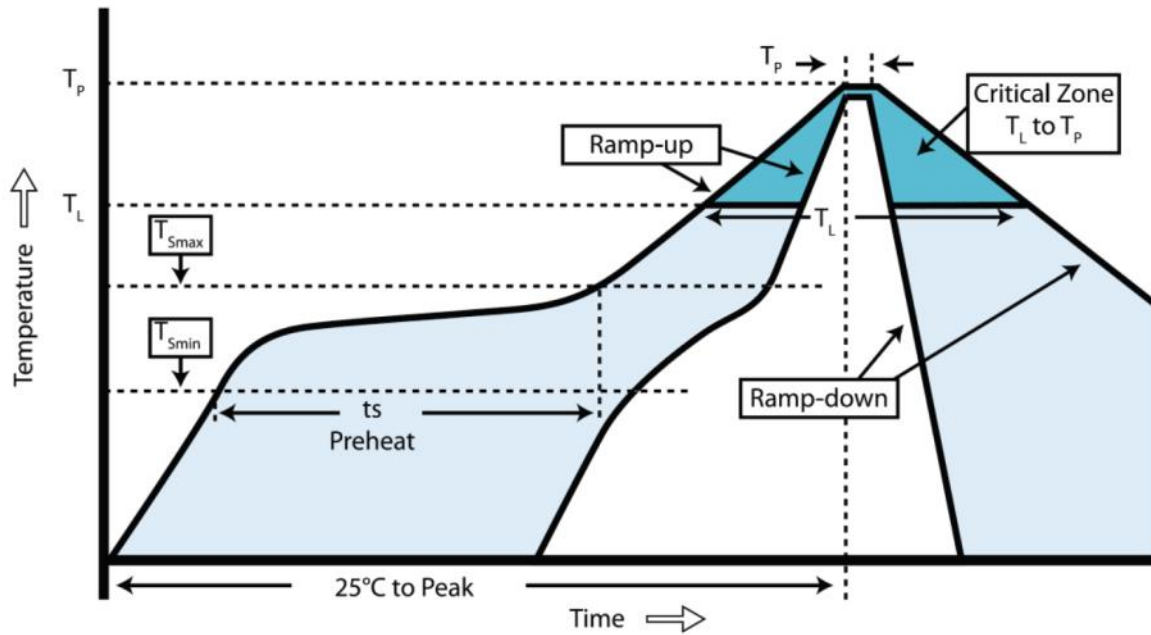




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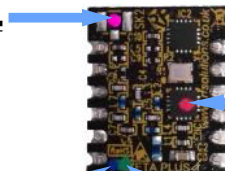
## ZPK module re-flow guide



Profile feature	Value (lead free)
Ramp up rate	3°C /s
Pre-heat temperature	
- Temperature Min ( $T_{Smin}$ )	150°C
- Temperature Max ( $T_{Smax}$ )	200°C
- Pre-heat time	60-100s
Peak temperature ( $T_p$ )	240°C
Time at $T_p$	10-20sec
Ramp down rate	6°C/s
Time from 25°C to peak	8 mins max.

### Zetaplus telemetry module version identification

Pink dot indicates ZPT module



**Frequency of Operation**  
 Red 433MHZ  
 Blue 868MHZ  
 Brown 915MHZ

**Test**  
 Green Pass

**ZPT Firmware Version**

Brown ver 1  
 Red ver 2  
 Orange ver 3  
 Yell ver 4  
 Green Ver 5  
 Blue ver 6  
 Violet ver 7  
 Grey ver 8  
 White ver 9

# ZPT Telemetry Receiver Module



## Electrical Characteristics

Parameter	Symbol	Notes	Min	Typ.	Max	Unit
Ambient Temperature	$T_A$		-20		85	°C
Supply Voltage	$V_{DD}$		1.8		3.6	V
I/O Drive Voltage	$V_{GPIO}$		1.8		3.6	V
Operating Frequency		868MHz version 915MHz version	915.0 0	896.500	915.2 7	MHz
RX Sensitivity				-121		dBm

## DC characteristics

Parameter	Symbol	Test condition	Min	Typ.	Max	Unit
Supply voltage range	$V_{CC}$		1.8	3.3	3.6	V
Power saving modes	$I_{Sleep}$	Module asleep with shutdown pin active. Note all outputs are disabled	—		<1	uA
RX mode current	$I_{RX}$	Module is in RF Data receive mode	—	16	—	mA

## AC Characteristics

Parameter	Symbol	Test Condition	Min	Typ.	Max	Unit
RX channel bandwidth	BW			60		kHz
Image rejection	$I_{m_{REJ}}$	Rejection at the image frequency IF = 468kHz	—	-35	—	dB
Spurious emissions	$P_{OB\_RX1}$	Measured at RX pins	—	-54	—	dBm

# ZPT Telemetry Receiver Module



## RF Meter

RF Multi Meter is a versatile handheld test meter checking Radio signal strength or interference in a given area. The Multi-Meter can both transmit and receive signals making it possible to test an installation location for suitability before installing equipment. The Multi-Meter is very hard wearing, long lasting and simple to use. It has 4 selectable frequencies, changeable at the touch of a button. It also has an auto shut off feature for battery saving.



### Important European compliance information

This RF Solutions radio module meets the essential requirements of the European Radio Equipment Directive 2014/53/EU and has been tested to European Harmonised Standards and CE marked where space allows. A copy of the EU Declaration of Conformity can be located on the RF Solutions Website, [www.rfsolutions.co.uk/certification-i59](http://www.rfsolutions.co.uk/certification-i59).

When using the module in an end product, continued compliance can only be assured by incorporating the module in accordance with RF Solutions specific installation instructions and in accordance with the published information on the RF Solutions product data sheet.

Article 3.1a and 3.1b of the EU Radio Equipment Directive 2014/53/EU should be assessed in the final product.

Failure to follow this guidance may result in a non-compliant product being placed on the European Market, for which RF Solutions cannot accept any responsibility.

Further guidance may be obtained from RF Solutions Technical Support.

### RF Solutions Ltd. Recycling Notice

Meets the following EC Directives:



#### DO NOT

Discard with normal waste, please recycle.

#### ROHS Directive 2002/95/EC

Specifies certain limits for hazardous substances.

#### WEEE Directive 2002/96/EC

Waste electrical & electronic equipment. This product must be disposed of through a licensed WEEE collection point. RF Solutions Ltd., fulfills its WEEE obligations by membership of an approved compliance scheme.



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