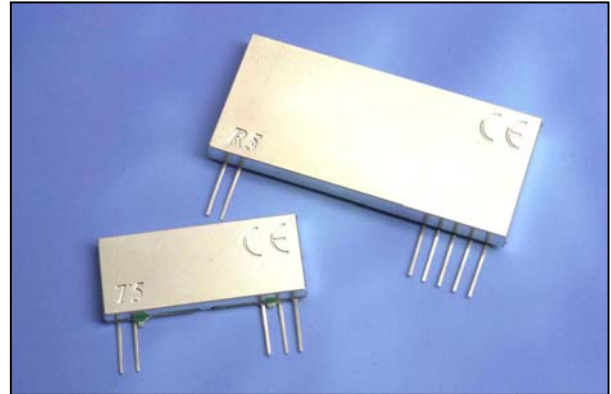


Features

- Miniature SIL package
- Fully shielded
- Data rates up to 128kbits/sec
- Range up to 300 metres
- Single supply voltage
- Industry pin compatible



T5-434

- Temp range -20°C to +55°C
- No adjustable components
- High shock resistance
- Temperature compensated RF output

R5-434

- High sensitivity
- Analogue / Digital Outputs
- Signal strength output (RSSI)
- On board AGC
- Single conversion FM Super-Het
- Double RF filtering (inc saw front end)

Applications

- Vehicle alarm systems
- Remote gate controls
- Garage door openers
- Domestic and commercial security

General Description

The T5 and R5 data link modules are miniature UHF radio modules, which enable the implementation of a simple telemetry link upto 300 metres, and at data rates of up to 128Kbit/s

The T5 and R5 modules will suit one-to-one and multi-node wireless links in applications including building and car security, remote industrial process monitoring and computer networking. The 'B' derivative parts offer a cost reduced version.

The receiver is based on the classical superhet single conversion architecture utilising a PLL xtal referenced oscillator which yields a highly stable IF frequency (10.7 MHz). This hence allows use of high Q bandpass filters offering excellent adjacent channel rejection and hence high interference Immunity.

Because of its small size and low power requirements, these modules are ideal for use in portable battery powered wireless applications.

Connection Diagram

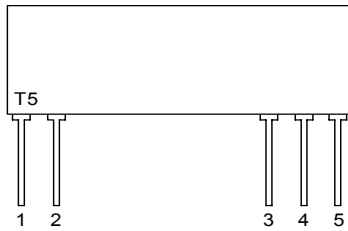


Figure 1: Transmitter

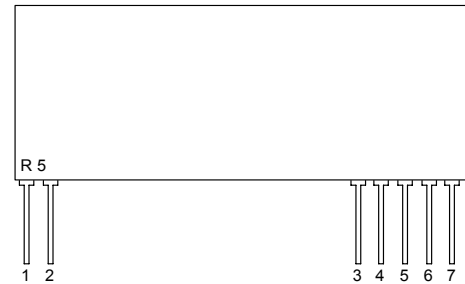


Figure 2: Receiver

Pin Descriptions:

RF GND (pin 1)

RF ground pin, internally connected to pin 4 (0V). This pin should ideally be connected to the nearest ground plane (e.g. coax braid, main PCB ground plane etc.)

RF OUT (pin2)

50Ω RF antenna output. To achieve best results the antenna impedance must match that of the module.

V_{CC} (pin 3)

+Ve supply pin (3.0 to 9.0 volts). The module will generate RF when V_{CC} is present. It is strongly recommended that a 100nF capacitor decouples the supply rail as close as possible to this pin.

GND (pin 4)

Supply and data ground connection, connected to pin 1.

Data IN (pin 5)

This input has an impedance of 47KΩ and should ideally be driven by a CMOS logic drive or compatible. The drive circuitry should be supplied with the same supply voltage as the Tx module.

Ordering Information:

| Part No | Description |
|--------------|---------------------------------|
| T5-434-9-20 | Tx 433.92MHz 9v 20Kbps |
| T5-434-5V | Tx 433.92MHz 5v 50Kbps |
| T5-434-5-20B | Tx 433.92MHz 5v 20Kbps 'B part' |
| T5-434-3V | Tx 433.92MHz 3v 50Kbps |
| T5-434-3-20B | Tx 433.92MHz 3v 20Kbps 'B part' |
| T5-434-128 | Tx 433.92MHz 5v 128Kbps |

RF IN (pin 1)

50Ω RF input from antenna, connect using shortest possible route. This input is isolated from the internal circuit using the air gap of the front end SAW RF filter

RF GND (pin 2)

RF ground connection, preferable connected to a solid plane.

RSSI (pin 3)

The Received Signal Strength Indicator provides a DC output voltage proportional to the RF input signal. The amplitude of the RSSI voltage increases with increasing RF signal strength.

GND (pin 4)

Connect to power supply ground.

V_{CC} (pin 5)

+Ve supply pin. Operation from a 5V supply able to source 6mA at less than V_{p-p} ripple.

AF (pin 6)

Audio frequency output.

DATA OUT (pin 7)

CMOS compatible output. This may be used to drive external decoders. To reduce any noise on this output add a 56pF cap from this pin to GND.

| Part No | Description |
|--------------|---------------------------------|
| R5-434-5-20 | Rx 433.92MHz 20Kbps |
| R5-434-5-20B | Rx 433.92MHz 20Kbps 'B part' |
| R5-434-5-50 | Rx 433.92MHz 5V 50Kbps |
| R5-434-5-50B | Rx 433.92MHz 5V 50Kbps 'B part' |
| R5-434-5-128 | Rx 433.92MHz 5V 128Kbps |



Absolute Maximum Ratings: Transmitter T5

| | |
|------------------------|-----------------------------------|
| Operating temperature: | -20°C to +55°C |
| Storage temperature: | -40°C to +100°C |
| Supply Voltage (pin 3) | 10V |
| Data input (pin 5) | 10V |
| RF Out (pin 2) | ±50V @ < 10MHz , +20dBm @ > 10MHz |

Electrical Characteristics: Transmitter T5

Please note that the 'B' devices are supplied without can shield.

| | pin | Min. | typ. | Max. | units | notes |
|---------------------------------------|-----|------|------|--------|--------|-------|
| DC LEVELS | | | | | | |
| Supply voltage 3V Versions | 3 | 2 | 3.0 | 4 | Volts | |
| Supply voltage 5V Versions | 3 | 4.5 | 5.0 | 5.5 | Volts | |
| Current & RF POWER | | | | | | |
| Standard T5 Devices | | | | | | |
| Supply current @ V _{CC} = 5V | 3 | | | 12 | mA | 1 |
| RF power | 2 | | 9 | +12 | dBm | 1 |
| T5'B' Devices | | | | | | |
| Supply current @ V _{CC} = 3V | 3 | 4 | 6 | 8 | mA | 1 |
| Supply current @ V _{CC} = 5V | 3 | 5.5 | 8 | 9.5 | mA | 1 |
| RF power @ V _{CC} = 3V | 2 | 3 | | +7 | dBm | 1 |
| RF power @ V _{CC} = 5V | 2 | 7 | | +10 | dBm | 1 |
| RF & Data | | | | | | |
| 2 nd harmonic | | | -50 | | dBc | 1 |
| Harmonics @ > 1GHz | | | -46 | | dBc | 1 |
| Initial frequency accuracy | | | ±50 | | KHz | |
| Overall frequency accuracy | | | ±75 | | KHz | |
| Modulation bandwidth @ -3dB | | | 10 | | KHz | |
| Modulation distortion (THD) | | | | | % | |
| Power up time to full RF | | | 10 | | µs | |
| Standard T5 Devices | | | | | | |
| Data rate Standard | | | | 50000 | bits/s | |
| Data pulse width | | 40 | | | µs | |
| T5'B' Devices | | | | | | |
| Data rate Standard | | | | 20,000 | bits/s | |
| Data pulse width | | 500 | | | µs | |

Notes

1. Measured into a 50Ω impedance
2. The limit for European spec EN300-220 is -36dBm



Absolute Maximum Ratings: Receiver R5

| | |
|------------------------|-----------------|
| Operating temperature: | -10°C to +55°C |
| Storage temperature: | -40°C to +100°C |
| Supply Voltage (pin 5) | 7V |
| RF Input (pin 1) | +20dBm |

Electrical Characteristics: Standard Receiver R5

| | min. | typ. | Max. | units | notes |
|---|------|-------|------|-------------------|--------------|
| DC LEVELS | | | | | |
| Supply voltage | 4.5 | 5.0 | 5.5 | Volts | |
| Supply current | | 6 | | mA | |
| Supply ripple | - | - | 10 | mV _{p-p} | |
| Data output high | | =>4.0 | | V | |
| Data output low | | <=0.5 | | V | |
| RF | | | | | |
| RF sensitivity | | -105 | | dBm | |
| IF Bandwidth | | 230 | | KHz | 1 |
| Initial signal accuracy | | ±25 | | KHz | |
| Max. RF input | | 20 | | dBm | |
| E.M.C | | | | | |
| Spurious responses upto 1GHz | | <60 | | dB | |
| LO leakage, conducted | | <60 | | dBm | |
| LO leakage, radiated | | <60 | | dBm | |
| Image Rejection | | 50 | | dBm | |
| Dynamic Timings | | | | | |
| Power up to stable data (With RF signal present) | | 30 | 35 | mS | 20Kbps Part |
| | | 5 | 7 | mS | 50Kbps Part |
| | | 5 | 7 | mS | 128Kbps Part |
| Signal to stable data (With power supply already on) | | | 2.5 | mS | 20Kbps Part |
| | | | 1 | mS | 50Kbps Part |
| | | 0.5 | 1 | mS | 128Kbps Part |
| Power up to valid RSSI (With RF signal present) | | | 1 | mS | All Versions |
| Data Pulse Widths (SeeNote 2) | 50 | | 6000 | uS | 20Kbps Part |
| | 20 | | 700 | US | 50Kbps Part |
| | 7 | | 300 | uS | 128Kbps Part |

1. IF bandwidth available down to 27KHz
2. The data slicer is optimised for a 50:50 duty cycle, hence for reliable communications data should be encoded using a suitable scheme such as Manchester Encoding, though pulse width modulation up to 30:70/70:30 can also be utilised.



Electrical Characteristics: Receiver R5 'B' Parts

Please note that the 'B' devices are supplied without can shield.

| | min. | typ. | Max. | units | notes |
|---|------|-------|------|-------------------|--------------|
| DC LEVELS | | | | | |
| Supply voltage | 4.5 | 5.0 | 5.5 | Volts | |
| Supply current | | 6 | | mA | |
| Supply ripple | - | - | 10 | mV _{p-p} | |
| Data output high | | =>4.0 | | V | |
| Data output low | | <=0.5 | | V | |
| RF | | | | | |
| RF sensitivity | | -103 | | dBm | |
| IF Bandwidth | | 230 | | KHz | 1 |
| Initial signal accuracy | | ±22 | | KHz | |
| Max. RF input | | 20 | | dBm | |
| E.M.C | | | | | |
| Spurious responses upto 1GHz | | <60 | | dB | |
| LO leakage, conducted | | <60 | | dBm | |
| LO leakage, radiated | | <60 | | dBm | |
| Image Rejection | | 60 | | dBm | |
| Dynamic Timings | | | | | |
| Power up to stable data (With RF signal present) | | 30 | 35 | mS | 20Kbps Part |
| | | 5 | 7 | mS | 64Kbps Part |
| Signal to stable data (With power supply already on) | | | 2.5 | mS | 20Kbps Part |
| | | | 1 | mS | 64Kbps Part |
| Power up to valid RSSI (With RF signal present) | | | 1 | mS | All Versions |
| Data Pulse Widths (SeeNote 2) | 50 | | 6000 | uS | 20Kbps Part |
| | 20 | | 700 | uS | 50Kbps Part |

3. IF bandwidth available down to 27KHz
4. The data slicer is optimised for a 50:50 duty cycle, hence for reliable communications data should be encoded using a suitable scheme such as Manchester Encoding, though pulse width modulation up to 30:70/70:30 can also be utilised.

Antenna Design

The design and positioning of the antenna is as crucial as the module performance itself in achieving a good wireless system range. The following will assist the designer in maximising system performance.

The antenna should be kept as far away from sources of electrical interference as physically possible. If necessary, additional power line decoupling capacitors should be placed close to the module.

The antenna 'hot end' should be kept clear of any objects, especially any metal as this can severely restrict the efficiency of the antenna to receive power. Any earth planes restricting the radiation path to the antenna will also have the same effect.

Best range is achieved with either a straight piece of wire, rod or PCB track @ $\frac{1}{4}$ wavelength (15.5cm @ 433.92MHz). Further range may be achieved if the $\frac{1}{4}$ wave antenna is placed perpendicular in the middle of a solid earth plane measuring at least 16cm radius. In this case, the antenna should be connected to the module via some 50 ohm characteristic impedance coax

RSSI Values:

The R5 RSSI output provides a DC output proportional to the RF input signal. The table below shows the typical RSSI value depending on the RF signal strength. The circuit diagram shows how a carrier detect can be obtained from the RSSI pin on the receiver module.

RF Signal Strength / dBm RSSI / V

| RF Signal Strength / dBm | RSSI / V |
|--------------------------|----------|
| -120 | 1.27 |
| -110 | 1.33 |
| -100 | 1.49 |
| -90 | 1.74 |
| -80 | 1.99 |
| -70 | 2.3 |
| -60 | 2.56 |
| -50 | 2.63 |
| -40 | 2.63 |

Carrier Detect circuit

The R5 RSSI output provides a DC output proportional to the RF input signal. In order to generate a Carrier Detect (as a logic level) The following circuit may be used.

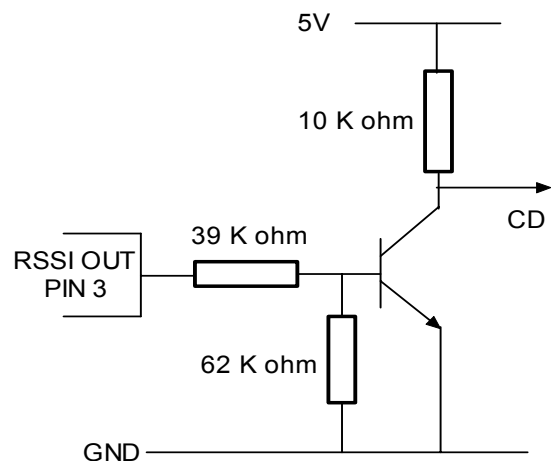
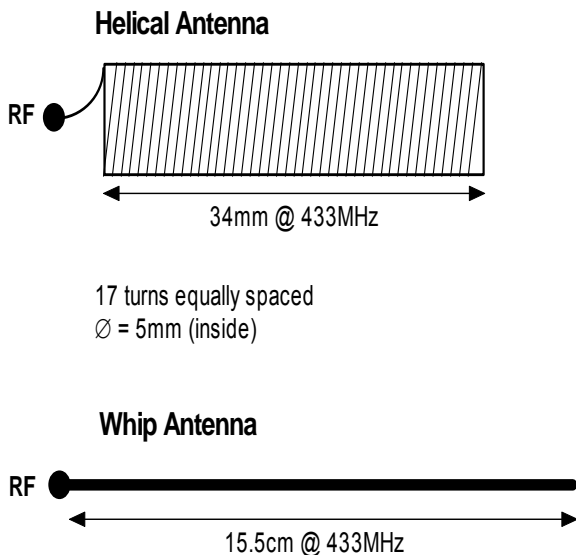
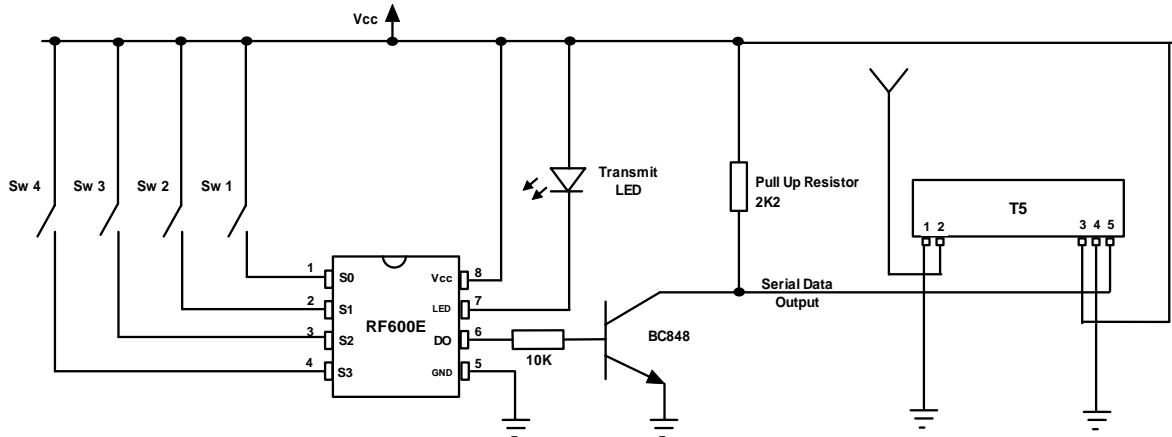


Figure 3: Antenna Configurations To Be Used With The T5 & R5 Modules

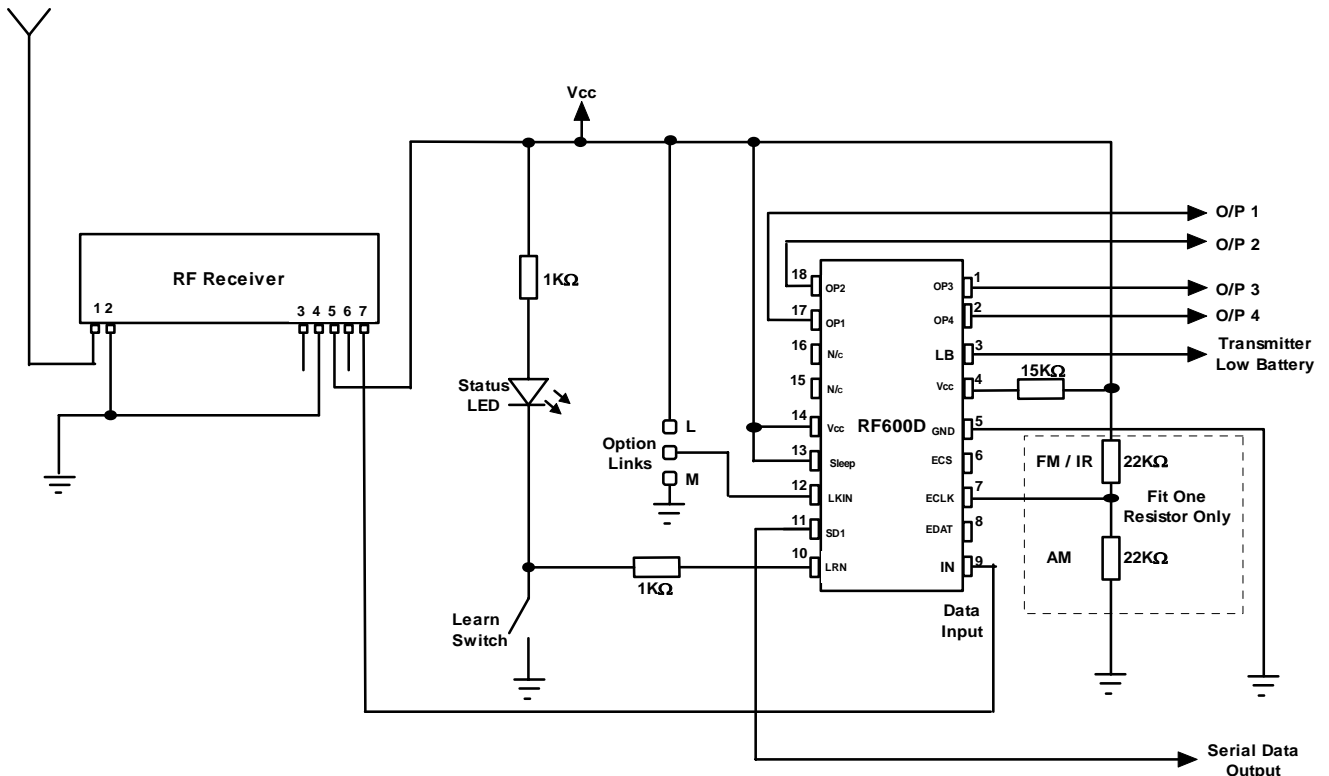
Application Circuits

The following circuits show a remote control system with 'self learning feature' for more information please see Datasheet DS600

Transmitter Circuit



Receiver Circuit



Mechanical Dimensions

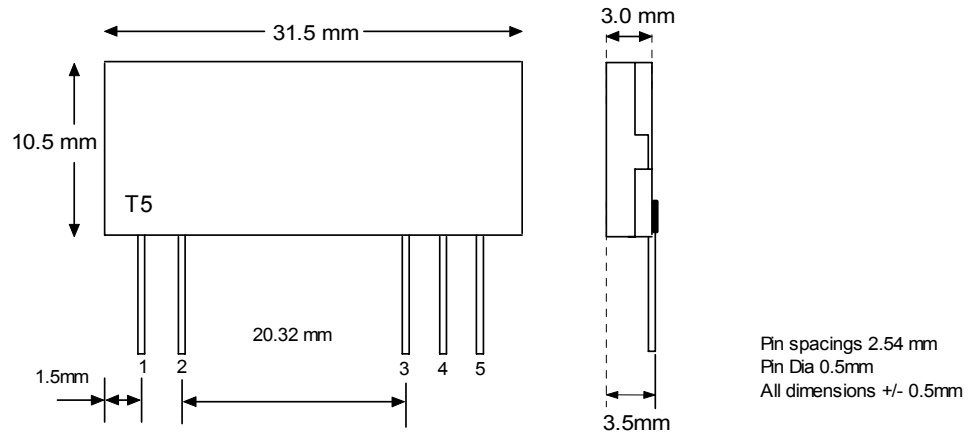


Figure 6: Transmitter

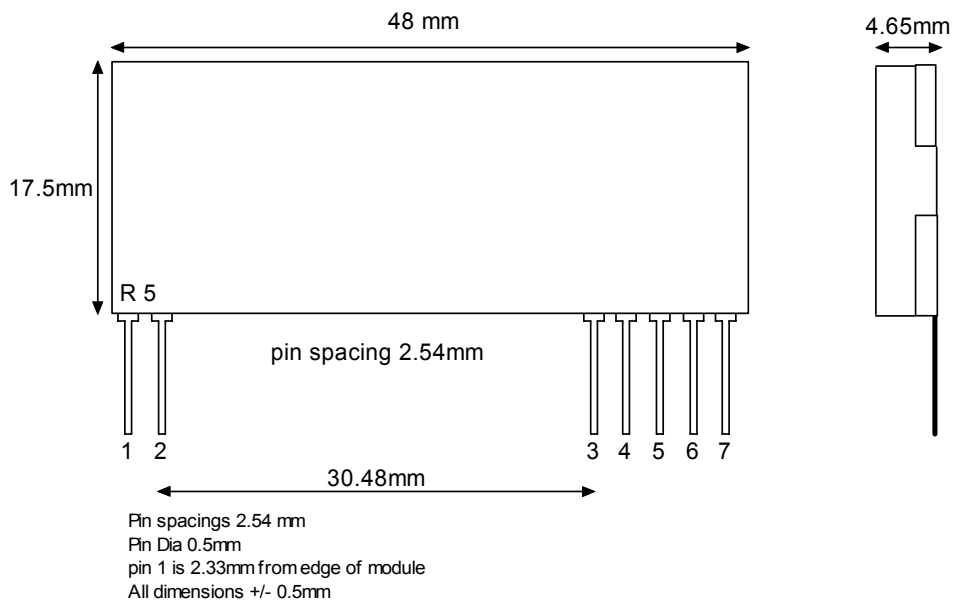


Figure 7: Receiver

Should you require further assistance please contact :

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