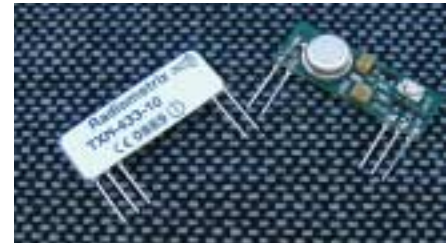


UHF Radio Telemetry Transmit Module

The TXM-433-5 and TXM-433-10 integrate a low power FM UHF radio transmitter on a small module. Together with the matching RX2-433-14 or RX2-433-40 receiver a one-way radio data link can be achieved over a distance up to 200 metres on open ground.



TXM-433-10 transmitter (back & front view)

Typical features include:

- CE Certified by independent Notified Body
- Verified to comply with harmonised radio standard ETSI EN 300 220-3 and EMC standard ETSI EN 301 489-3 by accredited Test Laboratory
- PCB Mounting, space saving SIL style
- SAW controlled wide band FM transmission
- High data rates, 5kbps and 10kbps versions
- Analogue or Digital data input
- Wide supply range 2.7V-4.0 or 6.0V-9.0V @ <17mA

The transmitter modules are most commonly employed in Wireless Security systems. The transmitter and the matching receiver (RX2) are approved to harmonised radio standard ETSI EN 300 220-3 and EMC standard ETSI EN 301 489-3. The TXM and RX2 modules will suit one-to-one and multi-node wireless links in applications including car and building security, EPOS and inventory tracking, remote industrial process monitoring and computer networking. Because of their small size and low power requirements, both modules are ideal for use in portable, battery-powered applications such as hand-held terminals.

Typical applications include :-

- Domestic and commercial security
- Guard patrol / lone worker protection
- Medical Alert / Nurse Call systems
- Mobile panic attack
- Computer networking
- Remote industrial process monitoring
- Data transfer through hazardous environments
- Lighting control, Garage door openers
- Fire alarms
- Picture / antique protection alarms
- Remote control, Access control

Brief description

The TXM-418 is designed to work with the matching receiver (SILRX-418). With the addition of simple antenna the pair may be used to transfer serial data up to 200m. The range of the radio link is very variable and depends upon many factors, principally, the type of antenna employed and the operating environment. The 200m quoted range is a reliable operating distance over open ground using 1/4 whip antenna at both ends of the link at 1.5m above ground. Smaller antenna, interference or obstacles (e.g. building etc.) will reduce the reliable working range (down to 30m in extreme cases). Increased antenna height, slow data or a larger receive antenna will increase the range (our best is 3km). We recommend that the module evaluation kit, EVAL-418-A, can be used to assess the reliable working range under the anticipated conditions of use.

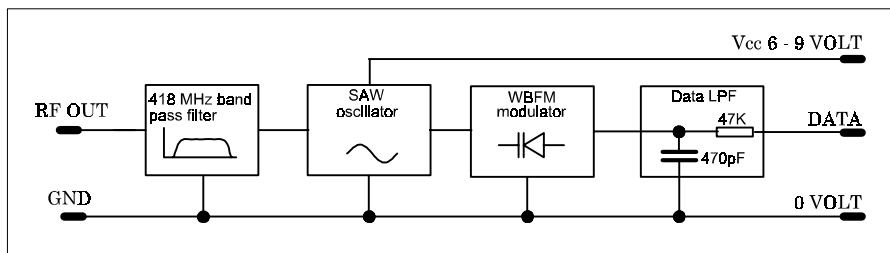


figure 1: TXM's block diagram

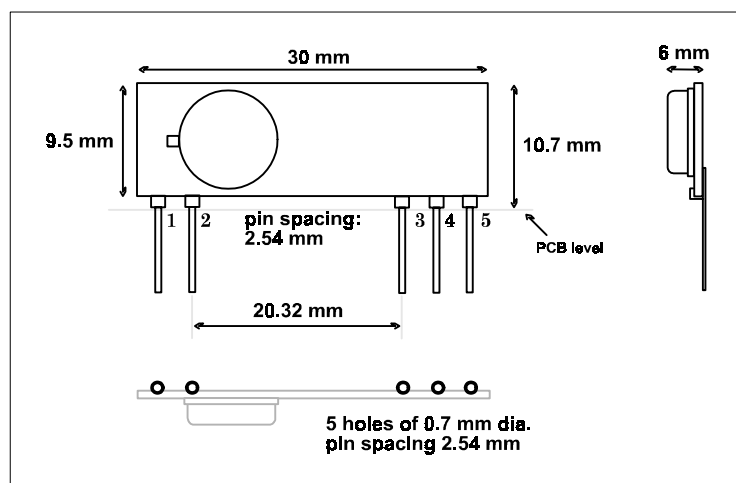


figure 2: mechanical dimensions

Pin Description

- | | | |
|--------------|---------|---|
| <i>pin 1</i> | RF GND | This pin should be connected to the ground plane against which the integral antenna radiates. It is internally connected to pin 4 . |
| <i>pin 2</i> | RF OUT | Connects to the integral antenna. Output impedance is 50Ω. |
| <i>pin 3</i> | Vcc | Positive supply , supply voltages from +6V to +9V may be used. |
| <i>pin 4</i> | Vss | 0V connection for the modulation and supply. |
| <i>pin 5</i> | DATA IN | Should be driven directly by a CMOS logic device running on the same supply voltage as the module. |

Performance data TXM-433-5

Absolute Maximum Ratings:

Supply voltage Vcc	pin 3	-0.7V	to	+ 12V
Modulation input	pin 5	-0.7V	to	+ 9V
Operating temperature		-10 °C	to	+ 55 °C
Storage temperature		-40 °C	to	+ 100 °C

Performance Data:

ambient temperature:	20°C
supply voltage:	+8.0V, unless noted otherwise
test circuit:	figure 3

Parameter	Min	Typical	Max	Units	Notes	
Operating supply range (Vcc)	6.0	-	9.0	V	-	
Supply current,	Vcc = 6.0V	3.0	6.0	10.0	mA	-
	Vcc = 9.0V	5.0	10.0	17.0	mA	-
Radiated power (ERP)	Vcc = 6.0V	-16	-10	-7	dBm	1
	Vcc = 9.0V	-13	-8	-5	dBm	1
Transmit frequency (Frf)		418.00 / 433.92		MHz	-	
Initial frequency accuracy	-80	-	+80	kHz	-	
Overall frequency accuracy	-95	-	+95	kHz	2	
Spurious radiation	Meets the EN300 220-1 standard				3	
FM deviation (+/-)	15	25	40	kHz	4	
Modulation Bandwidth (-3dB) analogue	DC	-	10	kHz	4	
Modulation digital pulse width	100	-	-	µs	5	

Notes

1. Module on 50mm square ground plane, helical antenna
2. Supply 6V to 9V, temp -10°C to +55°C.
3. <-54 dBm in bands 41-68, 87.5-118, 162-230 & 470-862 MHz
<-36 dBm else where below 1GHz , <-30dBm above 1GHz
4. Standard modulation: 2kHz square wave, 0 to Vcc
5. High or Low pulse.

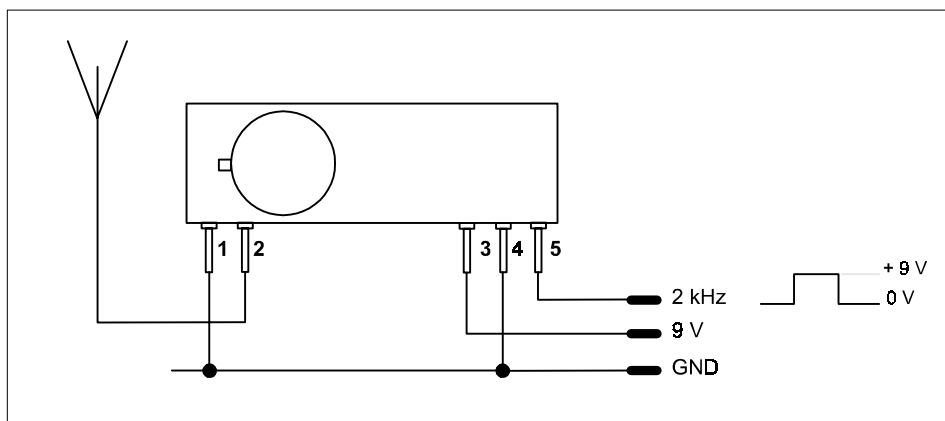


figure 3: TXM 5kbps version test circuit

Performance data TXM-418-10 and TXM-433-10

Absolute Maximum Ratings:

Supply voltage Vcc	pin 3	-0.7	to	+ 6V
Modulation input	pin 5	-0.7	to	+ 13V
Operating temperature		-10°C	to	+ 55°C
Storage temperature		-40°C	to	+ 100°C

Performance Data:

ambient temperature:	20 °C
supply voltage:	3.0V, unless noted otherwise
test circuit:	figure 4

Parameter	Min	Typical	Max	Units	Notes
Operating supply range (Vcc)	2.7	3.2	4	V	-
Supply current, Vcc = 2.7V	3.0	6.0	13.0	mA	-
Vcc = 4.0V	5.0	10.0	17.0	mA	-
Conducted power in to 50 Ω, Vcc = 2.7V	-	-5	-	dBm	1
Vcc = 3.6V	-	0	-	dBm	1
Transmit frequency (Frf)		433.92		MHz	-
Initial frequency accuracy	-85	0	+85	kHz	-
Overall frequency accuracy	-95	0	+95	kHz	1
Spurious radiation					2
FM deviation (+/-)	15	25	40	kHz	3
Modulation Bandwidth (-3dB) analogue	DC	-	20	kHz	3
Modulation digital pulse width	50	-	-	µs	4

Notes

1. Supply 2V to 3.6V, temp -10°C to +55°C.
2. <-54 dBm in bands 41-68, 87.5-118, 162-230 & 470-862 MHz
<-36 dBm else where below 1GHz , <-30dBm above 1GHz
3. Standard modulation: 2kHz square wave, 0 to Vcc
4. High or Low pulse.

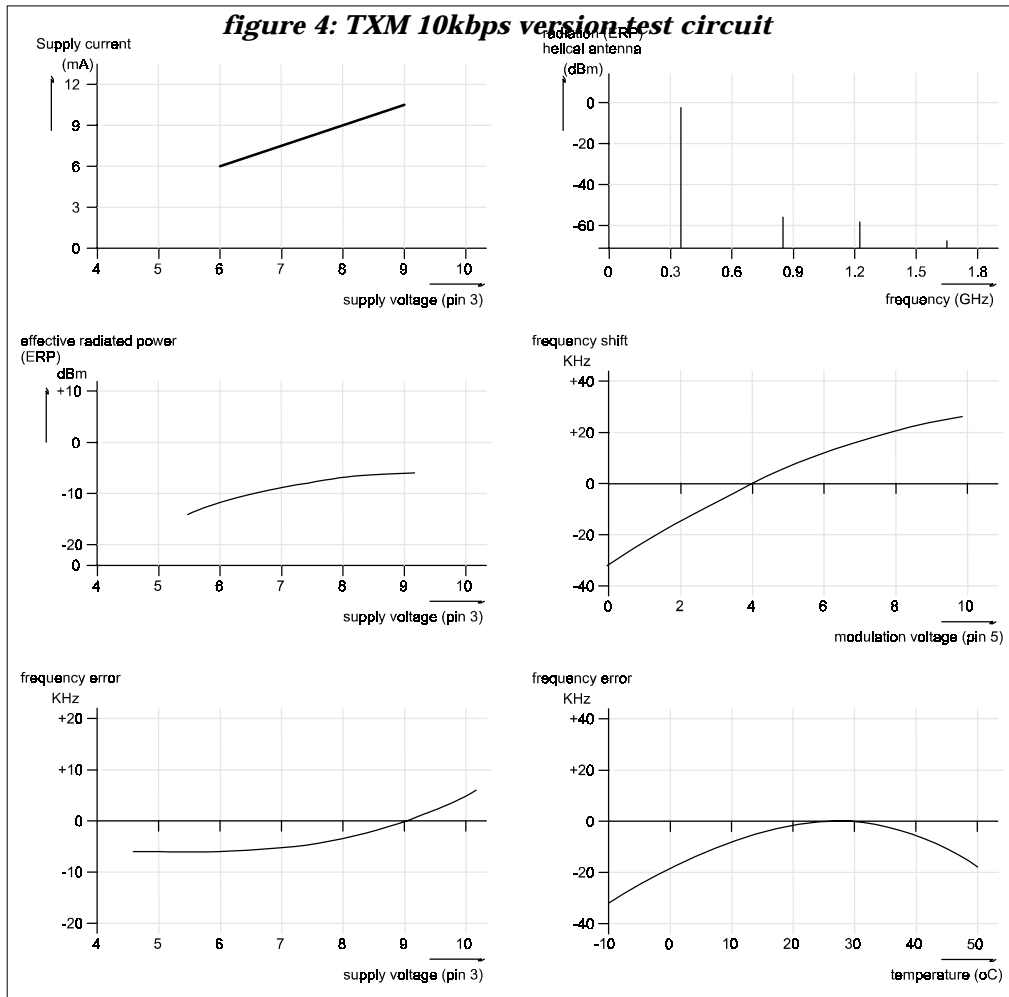


figure 5: Typical performance curves

The TXM-UHF transmitter requires only a data modulation input, supply, ground and an antenna.

Power supply requirements

- The module will operate over the range 6V to 9V and is typically powered by either 9 Volt 'PP3'.
- The module is not reverse polarity protected. Reverse supply voltages higher than 2V will cause damage and must therefore be externally protected against.

Modulation requirements

- The TXM-UHF transmitter has a DC to 10kHz modulation bandwidth and will accept direct analogue (AFSK) or digital data. A modulation low-pass filter (10kHz @ -6dB, 1st order) is used internally.
- Although the modulation bandwidth of the transmitter extends down to DC as does the AF output of the receivers, it is not possible to pass data with a DC component due to frequency errors & drifts between the transmitter and receiver. Frequency differences between the transmitter and receiver will produce a DC offset error which causes the data slicer in the receiver module to give errors on long high or low pulses which exceed the maximum pulse width, see the receiver's data sheet for more detailed information.

- Data Input, pin 5, is normally driven directly by CMOS logic levels from a data encoder IC. There is a wide range of encoder/decoder IC's available which may be used with the modules:

MM57C200, 57410	National Semiconductor
UM3750	UMC
HT12 series	Holtek
MC14026	Motorola
AS2787	Austria Systeme International GmbH
- The encoder normally being run on the same supply voltage as the transmitter. Analogue drive eg. 2 tone FSK, is also possible, the pk to pk level should be between 5V and 9V peak to peak and must not drive pin 5 below 0V. There will be some 2nd harmonic distortion due to the varactor modulator (typ. <15%), this may be reduced if necessary by predistortion of the analogue waveform

Antenna requirements

Three types of integral antenna are recommended and approved for use with the module:

- A) Helical: Wire coil, connected directly to pin 2, open circuit at other end. This antenna is very efficient given it's small size (20mm x 4mm dia.). The helical is a high Q antenna, trim the wire length or expand the coil for optimum results. The helical de-tunes badly with proximity to other conductive objects.
- B) Loop, A loop of PCB track tuned by a fixed or variable capacitor to ground at the 'hot' end and fed from pin 2 at a point 20% from the ground end. Loops have high immunity to proximity de-tuning.
- C) Whip This is a wire, rod ,PCB track or combination connected directly to pin 2 of the module. Optimum total length is 17cm (1/4 wave @ 418MHz) Keep he open circuit (hot) end well away from metal components to prevent serious de-tuning. Whips are ground plane sensitive and will benefit from internal 1/4 wave earthed radial(s) if the product is small and plastic cased

Antenna selection chart

	A	B	C
	<i>helical</i>	<i>loop</i>	<i>whip</i>
Ultimate performance	**	*	***
Easy of design set-up	**	*	***
Size	***	**	*
Immunity proximity effects	**	***	*
Range open ground to similar antenna	80m	50m	120m

The antenna choice and position directly controls the system range. Keep it clear of other metal in the system, particularly the 'hot' end. The best position by far, is sticking out the top of the product. This is often not desirable for practical/ergonomic reasons thus a compromise may need to be reached. If an internal antenna must be used try to keep it away from other metal components, particularly large ones like transformers, batteries and PCB tracks/earth plane. The space around the antenna is as important as the antenna itself.

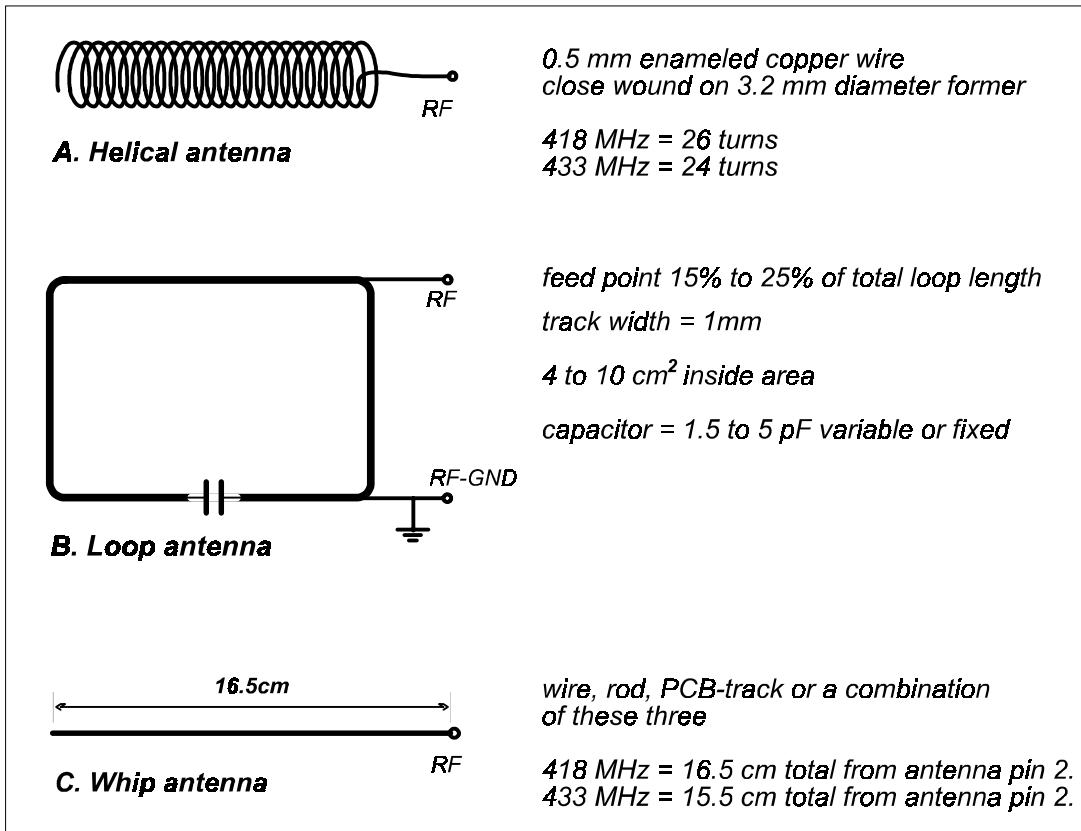


figure 6: Antenna configurations

Duty Cycle requirements

The duty cycle is defined as the ratio, expressed as a percentage, of the maximum transmitter “on” time on one or more carrier frequencies, relative to a one hour period. Where an acknowledgement message is required, the additional transmitter “on” time shall be included.

There is a 10% duty cycle restriction on 433.050-434.790 MHz band in most of the EU member states.

The TXM-433 is a RF module intended to be incorporated into a wide variety of applications and finished products, Radiometrix has no control over the end use of the TXM-433. The harmonised band 433.050 to 434.790 MHz as detailed in Annex 1 Band E of CEPT/ERC Recommendation 70-03 (which can be downloaded at <http://www.ero.dk/scripts/docmanag98/dm.dll/QueryDoc?Cat=Recommendation>) has list of countries where Duty Cycle restriction apply.

Module users should, therefore, ensure that they comply with the stated Duty Cycle requirements of the version of CEPT/ERC Recommendation 70-03 in place at the time of incorporation of the TXM-433 into their product. It should be noted that the stated Duty Cycle must not be exceeded otherwise any approval granted for the TXM-433 will be invalidated.

Ordering information

The following are standard:

TXM-433-5	5kbps data rate Transmitter
RX2-433-14-5V	14kbps data rate matching Receiver
RX2-433-40-5V	40kbps data rate matching Receiver
SILRX-433-5	5kbps data rate matching Receiver

TXM-433-10	10kbps data rate Transmitter
RX2-433-14-5V	14kbps data rate matching Receiver
RX2-433-40-5V	40kbps data rate matching Receiver
SILRX-433-10	10kbps data rate matching Receiver

3V versions of the RX2 receivers are available and should be ordered with a -3V suffix on the part number. (e.g. RX2-433-14-3V is set-up for 3V to 4V operation)

All modules are available in a 418MHz version for UK use.

All Radiometrix's products are designed and manufactured in England

CE Certificate of TXM and its variants



Radio Frequency Investigation Ltd

NOTIFIED BODY OPINION RFI/NBCB2/42627JD01

Applicants Details

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Contact Name: Mr G Sharples

Manufacturers Details

Manufacturer's Company Name: Radiometrix Ltd
Address: Hartcran House, Gibbs Couch, Carpenders Park, Watford, Herts.,
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Contact Name: Mr G Sharples

Product Details

Product Name: TXM-433
Model Number(s): TXM-433-5
TXM-433-10
TXM-433-TR
TCF Reference Number: RM/TXM/DTD
Standard(s): EN 300 220-1 V1.3.1 (2000-09) according to the requirements of EN
300 220-3 V1.1.1 (2000-09)
Description: UHF Radio Telemetry Transmit Module

In the opinion of RFI, the Technical Construction File demonstrates that the Apparatus to which it relates conforms to the essential requirements of Article 3.2 of Council Directive 1999/5/EC on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

Authorised Signatory:

A handwritten signature in black ink, appearing to read 'N Cobb', is written over a horizontal line.

Mr N Cobb

08-11-01

Date



Notified Body Number - 0889

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The Intrastat commodity code for all our modules is: 8542 6000

R&TTE Directive

After 7 April 2001 the manufacturer can only place finished product on the market under the provisions of the R&TTE Directive. Equipment within the scope of the R&TTE Directive may demonstrate compliance to the essential requirements specified in Article 3 of the Directive, as appropriate to the particular equipment.

Further details are available on Radiocommunications Agency (RA) web site:

<http://www.radio.gov.uk/topics/conformity/conform-index.htm>

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