Brief description

The TXM is designed to work with the matching SILRX receiver. 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).

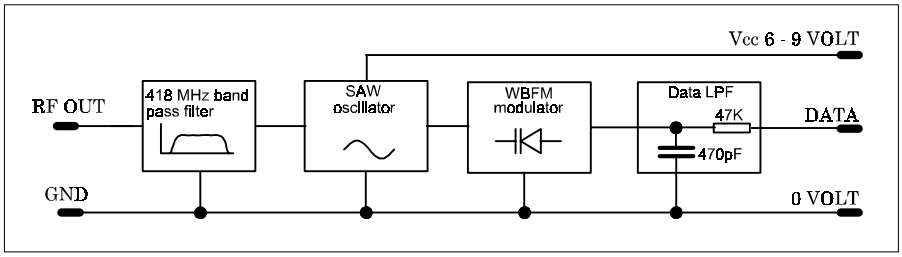

figure 1: TXM's block diagram

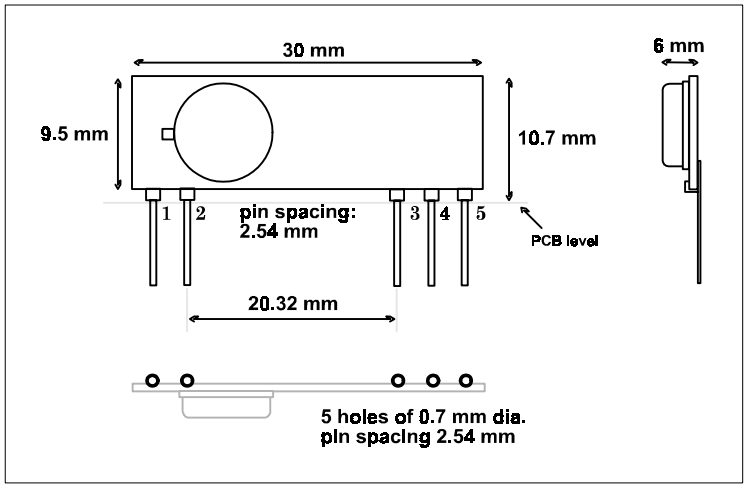

figure 2: mechanical dimensions

Pin Description

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

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.

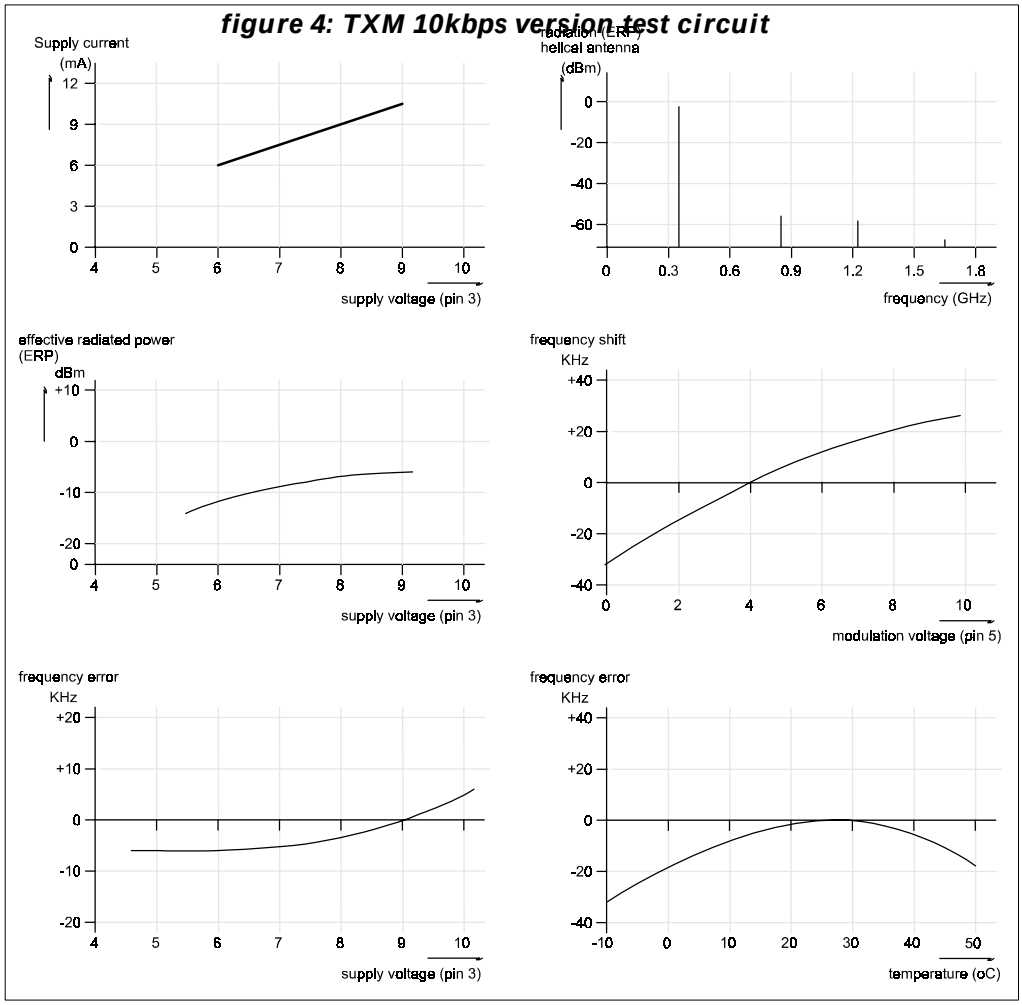

figure 5: Typical performance curves

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 therefor 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 use 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**
	helical	***loop***	***whip***
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.