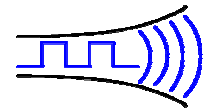


NEW

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TX2S/TX3S

UHF FM Data Transmitter Module

The TX2S module is a miniature PCB mounting UHF radio transmitter which enable the simple implementation of a data link at up to 40 kbps at distances up to 75 metres in-building and 300 metres open ground.

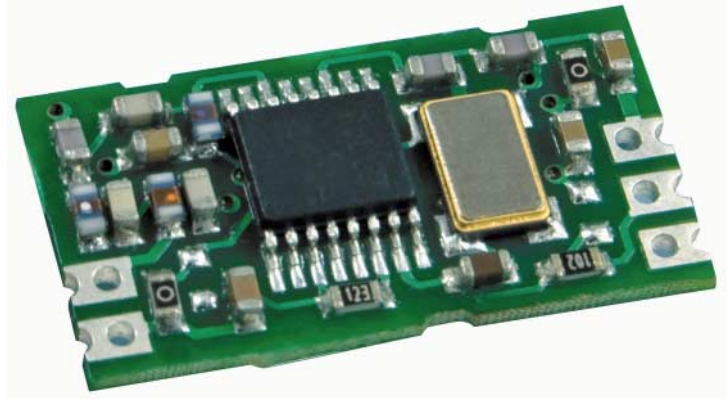


Figure 1: TX2S-433-40-3V-SM

Features

- Conforms to ETSI EN 300 220-3 (radio) and EN 301 489-3 (EMC) standards
- Data rates up to 40 kbps
- Usable range up to 300 m
- Versions available on 433.92MHz, 434.42MHz and 869.85 (TX3S)
- Small size: 20x10x2mm (without can), 20x10x2.6mm(with can)

Available for operation at 433.92MHz, 434.42MHz and 869.85MHz in Europe including the UK, both modules combine full internal filtering to ensure EMC compliance by minimising spurious radiations and susceptibilities. The TX2S/TX3S module 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 it's small size and low power requirements, it is ideal for use in portable, battery-powered wireless devices such as remote control key fob.

Technical Summary

- Crystal-locked PLL, FM modulated at up to 40kbps
- Operation from 2.2V to 4V
- Up to +4dBm (+10dBm variant on 433.92MHz)
- Improved frequency and deviation accuracy
- Harmonics @ <1GHz, -54dBm

Applications

- Remote control key fobs
- EPOS and inventory tracking
- Industrial telemetry and telecommand
- Data loggers
- In-building environmental monitoring and control
- Car and building security and fire alarms
- Vehicle data up/download

Evaluation Platform: Universal Evaluation kit +TX2S carrier
Matching Receiver: RX2G-xxx-15 or RX2G-xxx-64

Functional description

The TX2S transmitter module is a crystal based PLL controlled FM transmitter operating between 2.2V and 4V and is available on European licence exempt UHF frequencies. The TX2S module is type approved to EN 300 220-3 for European use and delivers nominally +0dBm at 7mA. The module measures 20 x 10 x 2 mm.

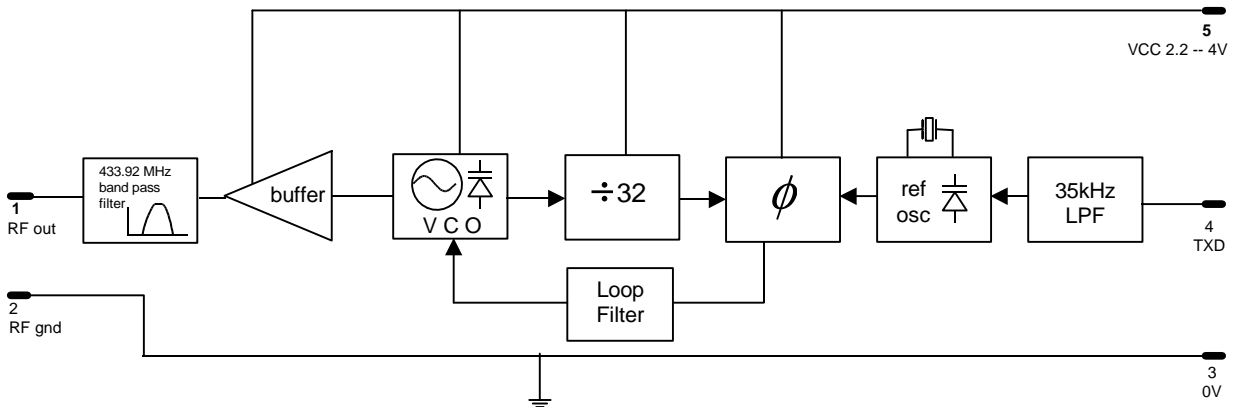


Fig. 2: TX2S block diagram

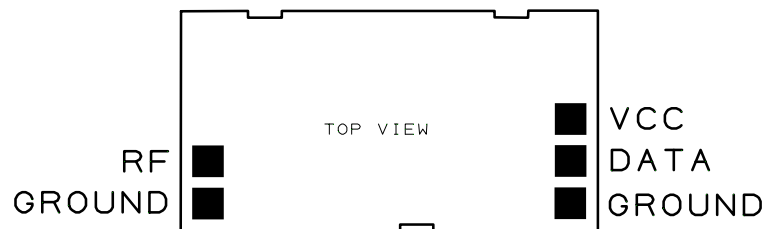


Fig. 3: TX2S pinout

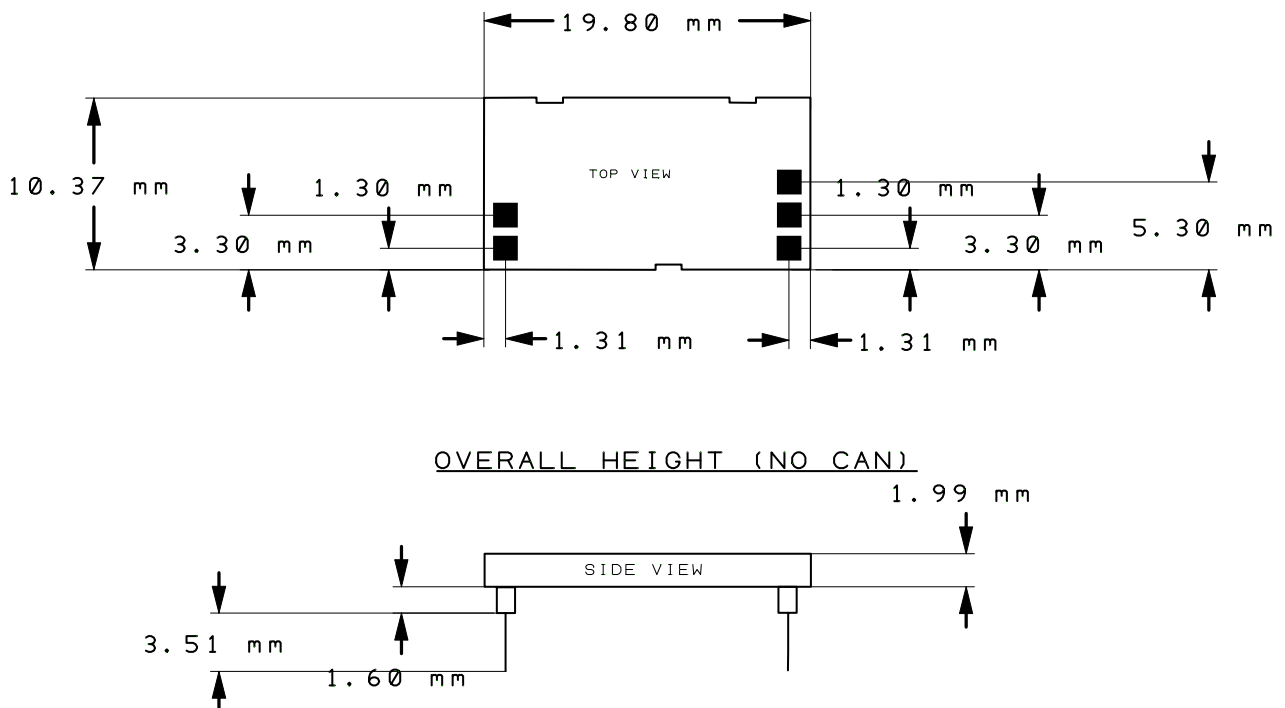


Fig. 4: physical dimensions

Pin description:

RF GROUND (pins 2)

RF ground, internally connected to the module screen and pin 3 (0V). These pins should be directly connected to the RF return path - e.g. coax braid, main PCB ground plane etc.

RF OUT (pin 1)

50Ω RF output to the antenna. Internally DC-isolated. See antenna section of apps notes for details of suitable antennas.

VCC (pin 5)

+2.2V to +4V DC supply. Max ripple content 0.1V_{P-P}.

GROUND (pin 3)

DC supply ground. Internally connected to pins 2 & 3.

DATA (pin 4)

DC-coupled modulation input. Accepts serial digital data at 0V to 4V levels.

Absolute maximum ratings

Survival Maximums:

Exceeding the values given below may cause permanent damage to the module.

Operating temperature- -20°C to +70°C
Storage temperature -40°C to +100°C

TX2S, all variants

Vcc (pin 5) -0.3V to +4.0V
Data input (pin 4) -0.3V to +4.0V
RF out (pin 1) ±50V DC 10dBm RF

Performance Specifications: TX2S transmitter.

(Temperature = 20C unless stated)

	pin	min.	typ.	max.	units	notes
<i>DC LEVELS</i>						
supply voltage	5	2.2	3.0	4.0	V	
<i>CURRENT & RF POWER</i>						
<i>TX2S-433-40-3V</i>						
Supply current @ Vcc = 3V	5	6	7	10	mA	
RF power @ Vcc = 3V	1	0	+2	+4	dBm	1
<i>RF</i>						
harmonics @ < 1GHz	1	-	-60	-54	dBm	1
harmonics @ > 1GHz	1	-	-40	-30	dBm	1
initial frequency accuracy	-	-20	+/-10	+20	kHz	
overall frequency accuracy	-	-25	+/-10	+25	kHz	
FM deviation (+/-)	-	20	27	35	kHz	
Modulation bandwidth @ -3dB	-	DC	-	20	kHz	
modulation distortion (THD)	-	-	5	10	%	
power up time to full RF	-	-	1	1.5	ms	

Note: 1. Measured into a 50Ω load.

Power supply requirement

The ripple/noise on the supply rail should be below 10mVp-p to avoid problems. If the quality of the supply is in doubt, it is recommended that a 10 μ F low-ESR tantalum or similar capacitor be added between the module supply pin (Vcc) and ground, together with a 10 Ω series feed resistor between the Vcc pin and the supply rail.

The TX2S incorporates a low voltage shutoff circuit, which prevents any possibility of erratic operation by disabling the RF output if the supply voltage drops below 2.2V (\pm 5%). This feature is self-resetting, i.e. restoring the supply to greater than 2.2V will immediately restore full RF output from the module.

TX2S modulation requirements

The module will produce the specified FM deviation with a TXD input to pin 4 of 2 to 4V amplitude, i.e. 0V "low", 4V "high. Where standard 2-level digital data is employed with a logic "low" level of 0V \pm 0.2V, the logic "high" level applied to TXD may be any value between +2V and +4V for correct operation.

Module mounting considerations

Good RF layout practice should be observed – in particular, any ground return required by the antenna or feed should be connected directly to the RF GND pin at the antenna end of the module, and not to the 0V pin which is intended as a DC ground only. All connecting tracks should be kept as short as possible to avoid any problems with stray RF pickup.

If the connection between module and antenna does not form part of the antenna itself, it should be made using 50 Ω microstrip line or coax or a combination of both. It is desirable (but not essential) to fill all unused PCB area around the module with ground plane.

Warning: *DO NOT wash the module. It is not hermetically sealed.*

Antenna requirements

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

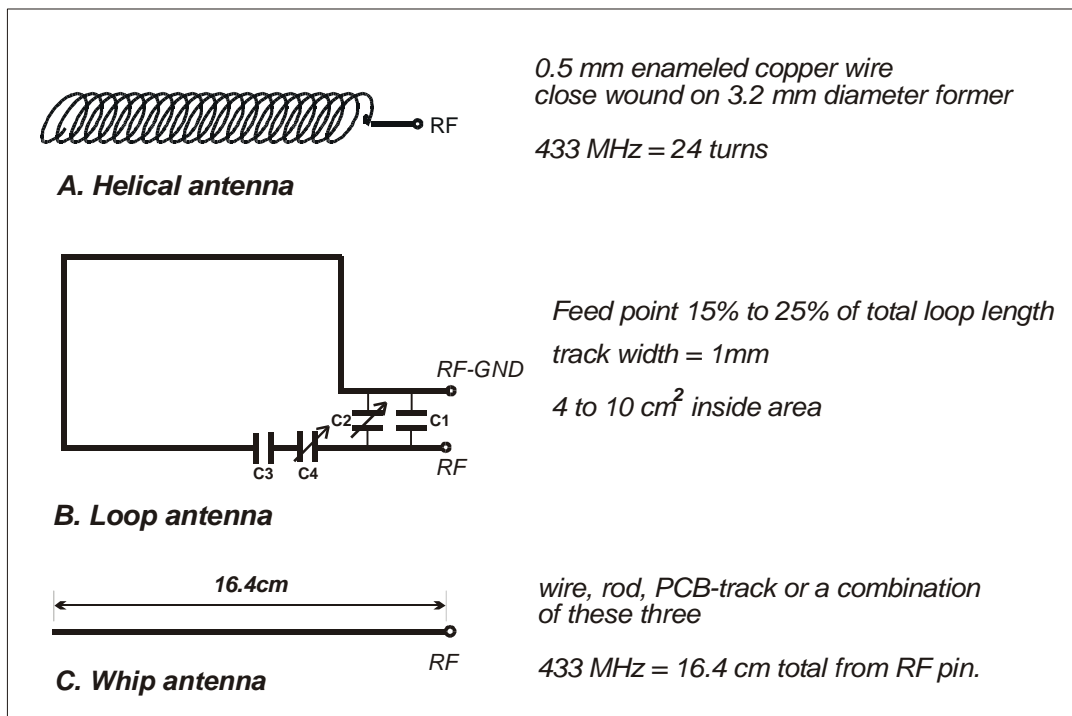


Fig.5: Antenna

	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 (for TX2S-433-40-3V & RX2G-433-15)	200m	100m	300m

Antenna selection chart

- 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 15.5cm (1/4 wave @ 433MHz). Keep the 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

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

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 TX2S-433 is an 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 TX2S-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 TX2S-433 into their product. It should be noted that the stated Duty Cycle must not be exceeded otherwise any approval granted for the TX2S-433 will be invalidated.

Variants and ordering information

The TX2S is manufactured in several variants depending on their operating frequency:

The standard frequency is 433.92MHz.

TX2S-433-40-3V	433.92MHz
TX2S-434-40-3V	434.42MHz
TX3S-869-40-3V	869.85MHz

The standard TX2S is supplied with mounting pins but without the metal shield. A version without mounting pins, suitable for surface mount assembly, is also available. For other variants, please contact sales department.

Matching receivers:

RX2G-433-15	433.92MHz, 15kb/s
RX2G-433-64	433.92MHz, 64kb/s
RX2A-433-10	433.92MHz, 10kb/s
RX2A-433-64	433.92MHz, 64kb/s
RX2G-434-15	434.42MHz, 15kb/s
RX2G-434-64	434.42MHz, 64kb/s
RX2A-434-10	434.42MHz, 10kb/s
RX2A-434-64	434.42MHz, 64kb/s
RX3G-869.85-15	869.85MHz, 15kb/s
RX3G-869.85-64	869.85MHz, 64kb/s
RX3A-869.85-10	869.85MHz, 10kb/s
RX3A-869.85-64	869.85MHz, 64kb/s

Evaluation Platform: Universal Evaluation kit +TX2S carrier

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The Intrastat commodity code for all our wireless radio 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 The Office of Communications (Ofcom) web site:

<http://www.ofcom.org.uk/radiocomms/ifi/>

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