# TX-DFM-5V   Digital FM Transmitter Module

The **TX-DFM-5V** Digital FM (2FSK) transmitter module suitable for use with its companion **RX-DFM-5V** receiver modules is capable of directly transmitting RS232 data, without any further data encoding requirements !. In addition, there are no symbol (character) limitations or time limitations per transmission. The **TX-DFM-5V** is capable of baud rates up to 19200 bit/s and features fast start-up time of less than 500μs. **ETS 300 220** compatible.
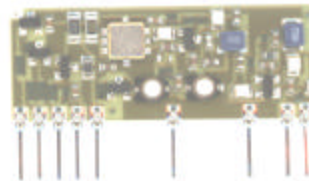

Technical Specification

- High-reliability SIL thick-film hybrid circuit ;
- Carrier frequency without modulation (pin 4 = 0.5V max): 433.85 MHz SAW stabilized
- 2FSK modulation with delta f = + 40 KHz (pin 4=+3÷5V);
- Maximum baud rate : 19200 bit/s ;
- Square wave modulation frequency: 10KHz max ;
- Dimensions : 40.6 x 19 x 3.5 mm. Pin pitch 2.54 mm ;
- Start-up time less than 500 μs ;
- RF output impedance : 50Ω;
- RF output power with 50Ω load : <10 mW (<+10 dBm) ;
- 15 mA (typical) consumption with TX enabled (pin 2 =+3÷5V) ;
- Supply : +5V ± 10% ;
- Zero consumption with TX disabled (pin 2 = 0.5V max) ;
- TX disable facility using a TTL or CMOS signal ;
- Auxiliary supply output (5V, max current 10mA) turned on by TX Enable (pin 2) ;

Pin-out

1	+5V
2	Tx-enable (+3÷5V)
3	Ground
4	Data input
5	Auxiliary output
9	Ground
13	Ground
15	RF Output
16	Ground

Block Diagram
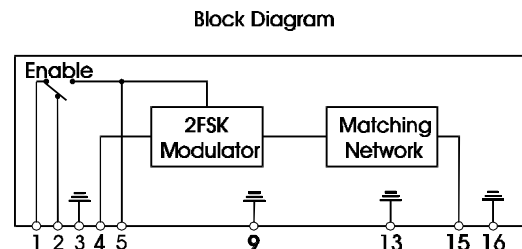
Application note

Pin Out

1-**Power Supply**. +5Vdc

2-**Tx Enable**. If set to a positive voltage (3 to 5V), supply to the entire device, including the AUX OUT pin is provided; if set to a low voltage (max 0.5V), the TX-DFM-5V will be switched off, drawing zero current.
When enabled and the data input pin is at 0V (max 0.5V), the TX-DFM-5V transmits the carrier at its nominal frequency of 433.85 MHz. When the data input pin is high (3-5V) the carrier frequency is shifted up to a higher frequency of about +40 KHz from the carrier. A maximum delay time of 500 µsec should be allowed from enabling time to the first digital data line state transition (from 0 to 1 or from 1 to 0).

3-**Ground**.

4-**Data input**. If at low voltage (max 0.5V), the carrier transmits at the nominal frequency value of 433.85 MHz; if voltage at this pin is high, the frequency deviates to a +40 KHz nominal higher value. Maximum modulation frequency is a 10 KHz square wave. The system operates with direct modulation, so there is no minimum modulation frequency limit and therefore operates down to 0Hz

5-**Aux Out**. Auxiliary supply output pin: voltage will be present when Tx is enabled. This pin is available to feed external devices under the same transmitter enabling control line. Maximum current sourcing is 10 mA.
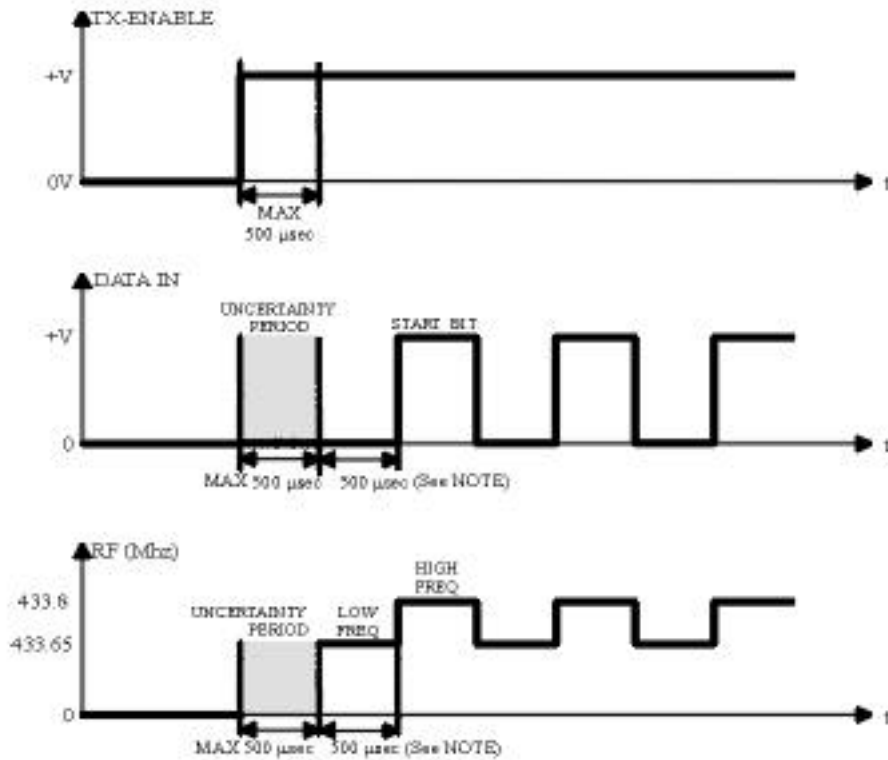
9-**Ground**.

13-**Ground**.

15-**RF Output**. RF power available is less than 10mW into a 50Ω load.

16-**Ground**.

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START-UP SEQUENCE

NOTES

If the transmitter is used together with the companion **RX-DFM-5V** receiver module, it is recommended to wait for at least the specified time interval, prior to transmitting the start bit; this will ensure the best timing of data out of the receiver. The above timing diagrams assume that the receiver is already enabled before the start of the sequence: 500μsec is the maximum time delay for the RX-DFM-5V receiver module's Carrier Detect line to transition to a logic high upon receipt of the RF carrier signal.

These notes relate to using the **TX-DFM-5V** transmitter module with its companion **RX-DFM-5V** receiver module and are not covered in the receiver application notes.

Both the Data Input and TX enable input lines use positive logic: 3 to 5V are required to set them to active status ie active high. These inputs should be mutually considered to ensure the correct On-Off timing of the data strings to be trasmitted. Timing details are fully described in the receiver application note.The above timing diagrams show how best to interface the transmitter with the the **RX-DFM-5V** receiver modules.

Transmitter start-up sequence (with a receiver already On) can be summarized as follows:

- Enable pin 2 (TX enable = 3 to 5V)
- Wait for a 1 msec minimum delay time prior to transmitting the data Start Bit: this is useful for the receiver Carrier Detect to stabilize around the logic high level, indicating that the RF signal has been detected. As stated in the receiver application note, in addition to the few millisecond delay time, software algorithms can also be implemented to improve RFI immunity.
- Modulate pin 4 (Data Input) with transmission data sequence at requested data rate.
- At the end of the data transmission string, leave pin 4 (Data Input) at 0V level (No modulation) for few milliseconds prior to disabling pin 2 (TX enable).
- This procedure helps the receiver to perform the correct closing sequence without loss of data.

The specified delays (other than the start-up delay which must be at least 1msec) are only indicative, since they are dependant on the chosen baud rate. As a rule of thumb, delays should be at least twice the time required to transmit a single data byte; at a 9600 baud data rate, a 2msec delay is acceptable.