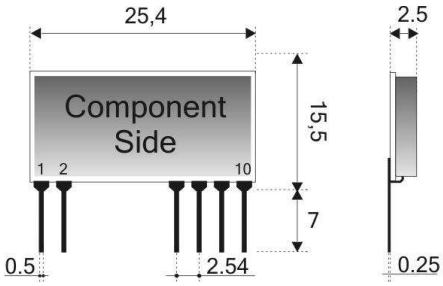
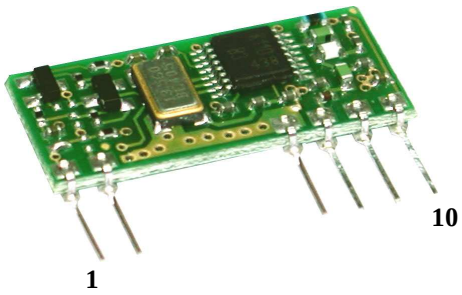
TX-FM-MID

TX-FM-MID digital FSK data transmitter with external antenna.

PIN-OUT





CONNECTIONS

Pin 1	**TX Dati**	Data input with minimum 50 kΩ input resistance.
Pin 2-7-9	**Ground**	GND Connections. To be externally connected to a single ground plate.
Pin 8	**RF Output**	RF output with a characteristic impedence of 50Ω
Pin 10	**+V**	Connection to the positive pole of the supply

Technical features TX-FM-MID

	Min	Tipico	Max	Unità	Annotazioni
Working frequency centre	433.82	433.92	434.02	MHz	See notes 2 and 3
Voltage supply (Vs)	2,1	3	3,6	V	
Absorbed current - Power down		< 1	1	uA	See fig. 2
Absorbed current – PLL active		4	5	mA	See fig. 2
Supply current	11	14	16	mA	See fig. 2
RF output power (E.R.P.)	7	10	12	dBm	Vedi nota 2
Output impedance pin 8		50		Ω	
RF spurious emissions		-40		dBm	See note 2
Modulation frequency	0,05	5	20	KHz	
Deviation		±20		KHz	
Input high logic level	2,1	3	3,6	V	See note 1
Input low logic level	0V		0,2	V	
Working temperature	-20		+80	°C	
Dimensions	25,4 x 15,5 x 2,5 mm				

NOTE 1: *It is opportune that the max voltage applied to data input pin is equal to voltage supply.*
NOTE 2: *Values have been obtained by applying the test system shown in Fig. 1 and maximum 3,6 V power supply.*
NOTE 3: *The minimum and maximum showed values are determined by the device's construction tolerance.*

Le caratteristiche tecniche possono subire variazioni senza preavviso.
La soc. AUR°EL S.p.A non si assume la responsabilità di danni causati dall'uso improprio del dispositivo.

The declared technical features have been obtained by applying the following testing system:

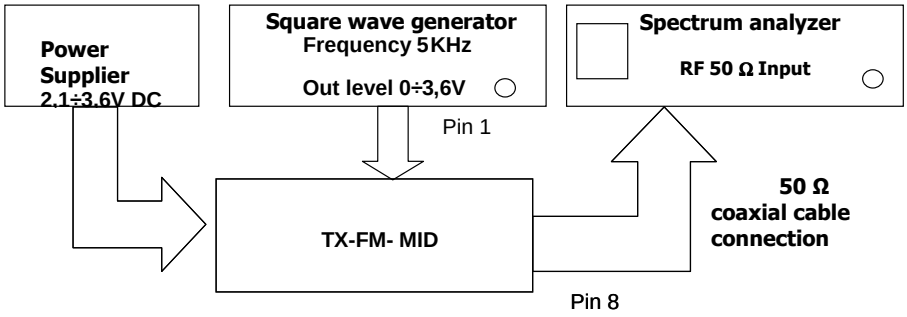


Fig.1

Device Timing

Device present the following switch-on timing:

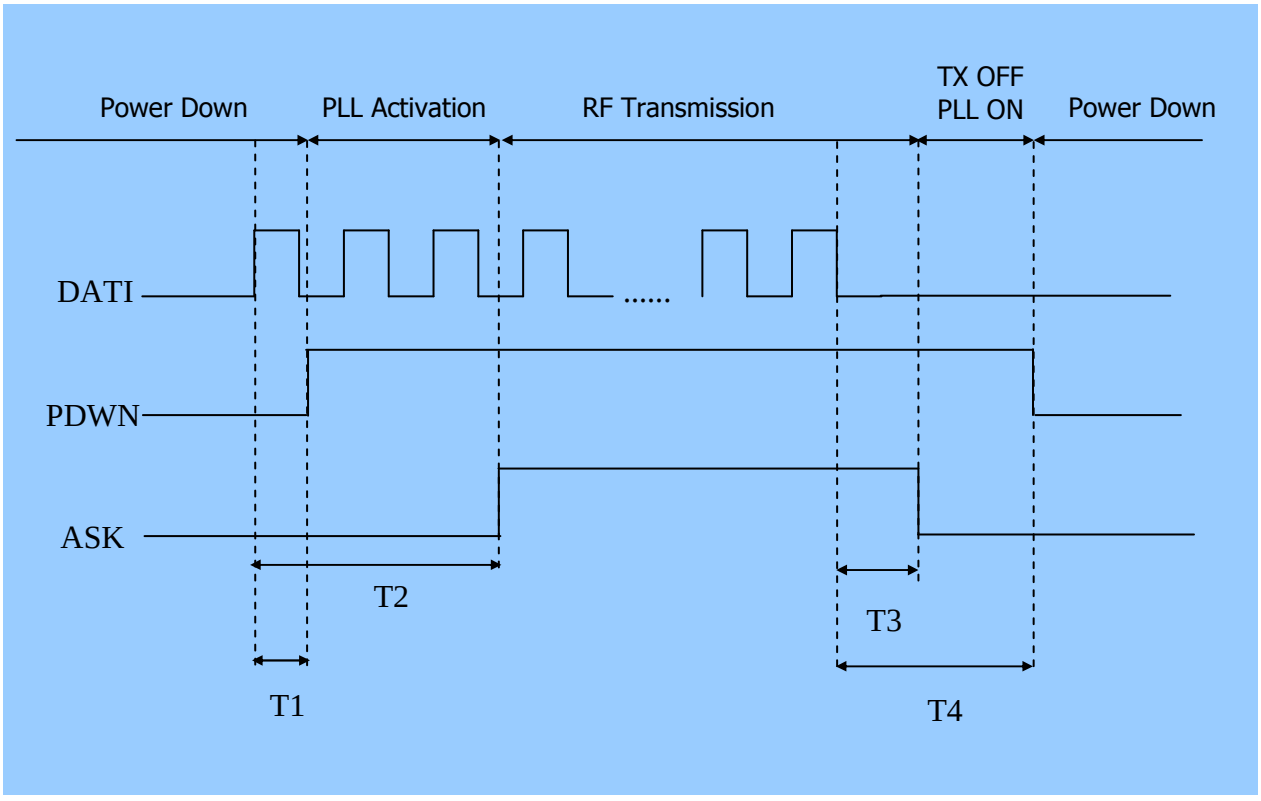


Fig.2

Timings are different due different power supply used.
Data imput must have same amplitude of power supply

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Here following are reported switch-on timing in function of voltage supply :

Voltage Supply (V)	T1	T2	T3	T4
2,1	500µs	2.2ms	20ms	30ms
3	350µs	1.4ms	25ms	40ms
3,6	300µs	1ms	27ms	42ms

Tab. 1

RF transmission start only in case PDWN and ASK are High.
In case PDWN high and ASK low, PLL is active but there is no transmission. ASK becomes High 1ms then the PDWN to permit PLL to lock in frequency preventing in such phase to occupy the RF spectrum.
Transmission start 1,4ms after first data coming so first bits are not transmitted.
In the first phase of decommissioning is sent down the ASK (After T3 from last data), inhibit transmission while keeping the device turned on and PLL locked, finally (After T4) keeps Trasmitter in PDWN
Stages of decommissioning are kept deliberately long (25ms and 40ms respectively at 3V) so that, even using encodings with long pauses between one frame and the subsequent
Integrated remain in Transmission (or, if not in transmission, coupled with the PLL) and then the arrival of the new frame is being transmitted across (and not so lost the first bit as the first frame).

NOTE: only the signal DATA is available to pin 1 of the module, while the signals and ASK PWDN highlighted in the diagram time (Fig 2) are internal to the module, thus not available from the pins of the module itself, have been incorporated for the sole purpose of clarifying the timing and the sorption of the various stages of operation

Device usage

In order to obtain the performances described in the technical specifications and to comply with the operating conditions, which characterize the Certification, the transmitter has to be mounted on a printed circuit, and keep into consideration what follows:

Supply :

1. The transmitter must be supplied by a very low voltage source, safely protected against short circuits. Maximum voltage variations allowed: 2,1÷4V.
2. De-coupling, next to the transmitter, by means of a minimum 100.000 pF ceramic capacitor.

Ground:

It must surround at the best the welding area of the transmitter. The circuit must be double layer, with throughout vias to the ground planes, approximately each 15 mm.
It must be properly dimensioned, especially in the antenna connection area, in case a radiating whip antenna is fitted in it (an area of approximately 50 mm radius is suggested).

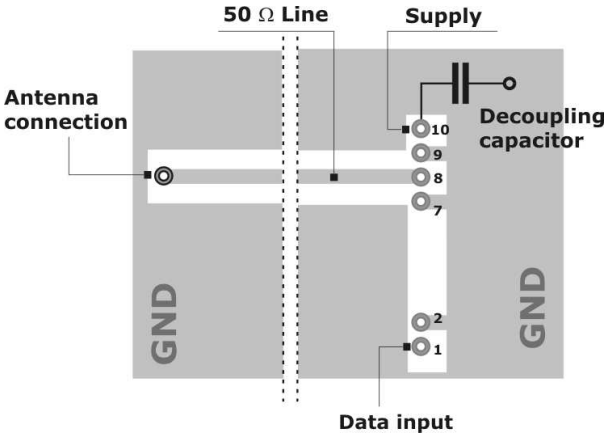

Fig.3 – Suggested Lay-out to obtain the good performances described

50 Ohm line:

1. It must be the shortest as possible.
2. 1,8 mm wide for 1 mm thick FR4 printed circuits and 2,9 mm wide for 1,6 mm thick FR4 printed circuits. It must be kept 3 mm away from the ground circuit on the same side.
3. On the opposite side a ground circuit area must be present.

Antenna connection:

1. It may be utilized as the direct connection point for the radiating whip antenna.
2. It can bear the connection of the central wire of a 50 Ω coaxial cable. Be sure that the braid is welded to the ground in a close point.

Antenna

1. A **whip** antenna, 16,5 mm long and approximately 1 mm dia, brass or copper wire made, must be connected to the RF output of the transmitter (pin 8), (see fig. 2).
2. The antenna body must be keep straight as much as possible and it must be free from other circuits or metal parts (5 cm minimum suggested distance.)
3. It can be utilized either vertically or horizontally, provided that a good ground plane surrounds the connection point between antenna and transmitter output.

N.B: As an alternative to the a.m. antenna it is possible to fit the whip model manufactured by **AUR°EL** (see related Data Sheet and Application Notes).
By fitting whips too different from the described ones, the EEC Certification is not assured.

Other components:

1. Keep the transmitter separate from all other components of the circuit (more than 5 mm).
2. Keep particularly far away and shielded all microprocessors and their clock circuits.
3. Do not fit components around the 50 Ohm line. Keep them at least at 5 mm distance.
4. If the Antenna Connection is directly used for a radiating whip connection, keep at least 5 cm radius free area. In case a 50 Ω impedance coaxial cable is connected, then 5 mm radius will suffice.

Normativa di riferimento

TX-FM-MID transmitter complies with the EU Rules EN 300-220 and EN 301-489, with a 3,5V max. supply. The equipment has been tested according to rule EN 60950 and it can be utilized inside a special insulated housing that assures its compliance with the above mentioned rule. The transmitter must be supplied by a very low voltage source, safely protected against short circuits.

The use of the transmitter module is foreseen inside housings that assure the overcoming of the rules EN 61000 not directly applicable to the module itself. In particular, it is left at the User's care, the insulation of the external antenna connection, and of the antenna itself, since the RF output of the transmitter is not built to directly bear the electrostatic charges foreseen by the EN 61000-4-2 rules.

CEPT 70-03 Recommendation

In order to comply with such rule, the device must be used only for a 10% of an hourly duty-cycle, (that means 6 minutes of utilisation over 60). The device utilisation inside the italian territory is governed by the *Codice Postale* and *Telecomunicazioni* rules in force (art. no. 334 and subsequents)

Reference Curves

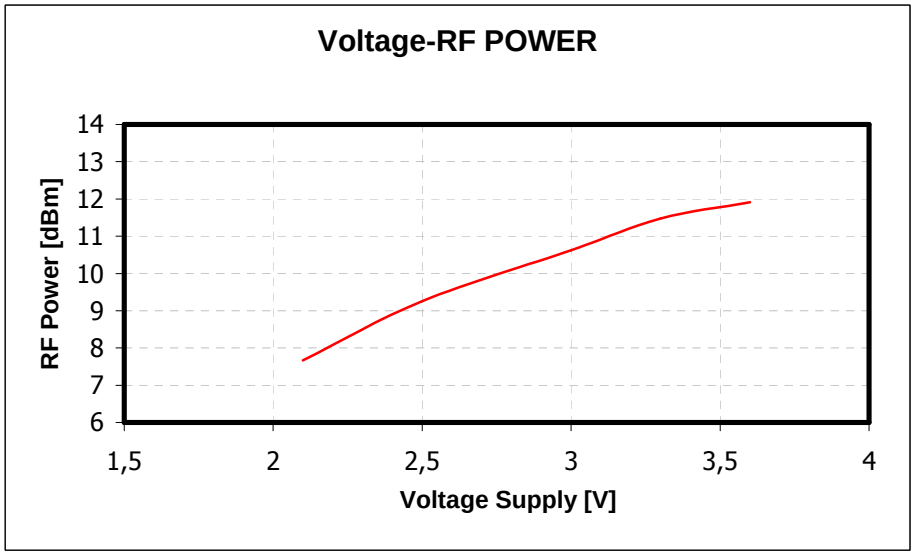

Fig. 4 - RF Power Vs Voltage Supply

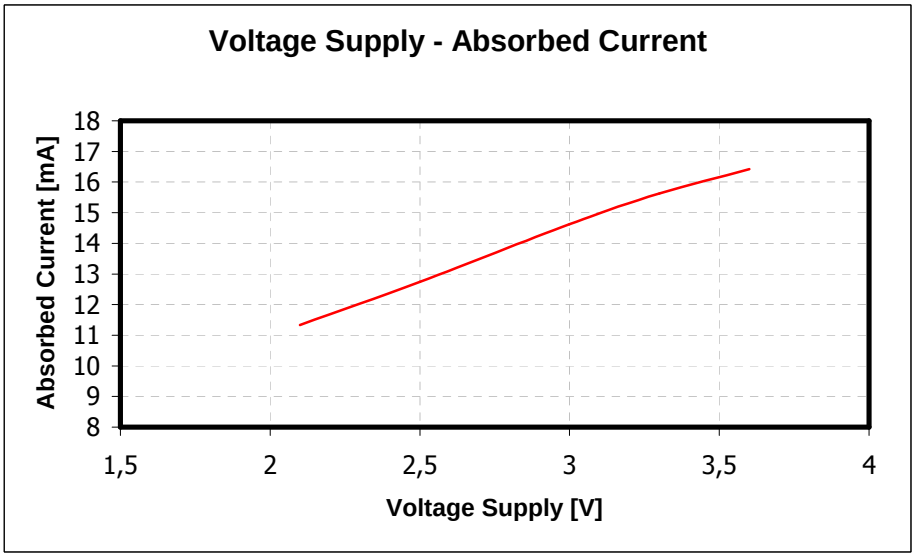

Fig. 5 - Absorbed Current Vs Voltage Supply

Reference thermal curves

The thermal curves have been obtained by the testing system shown in Fig.1

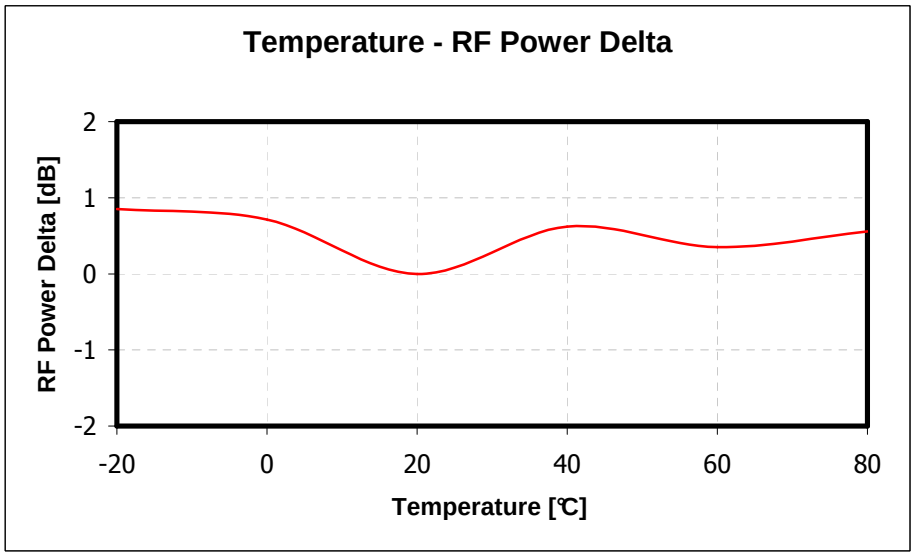

Fig. 6 - RF Power Delta Vs Temperature.

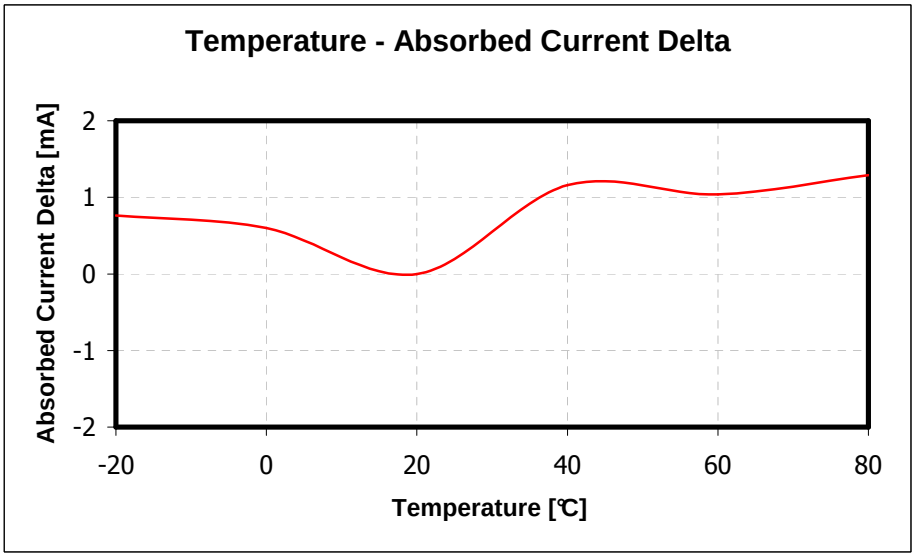

Fig. 7 - Absorbed current Delta Vs Temperature.

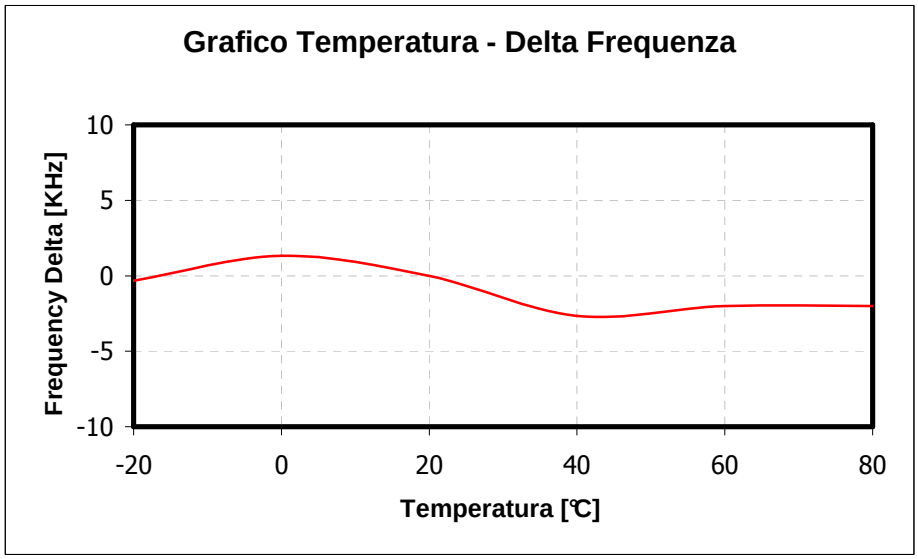

Fig. 8 - Frequency Delta Vs Temperatrure