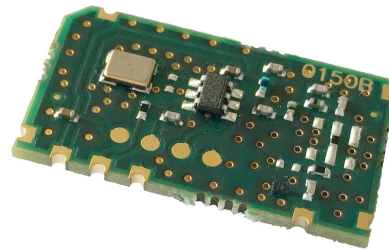
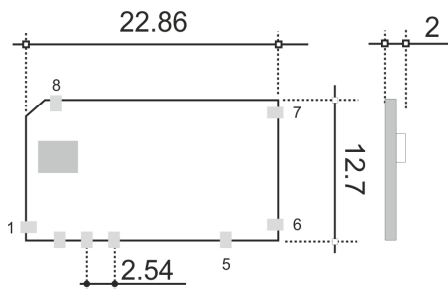


433 MHz ASK TRANSMITTER

SMT Transmitter, operating at 434 MHz in ASK modulation. Ideal to be integrated in Key fobs, small hardware and portable devices.

PIN-OUT



CONNECTIONS

Pin 1-4-6-7-8	GND	GND Connections. To be externally connected to a single ground plate.
Pin 2	+Vcc	Connection to the positive pole of supply.
Pin 3	TX Data	Data input with minimum 50 kΩ input resistance.
Pin 5	RF Output	RF output with a characteristic impedance of 50Ω.

Technical features TX 434 SMALL

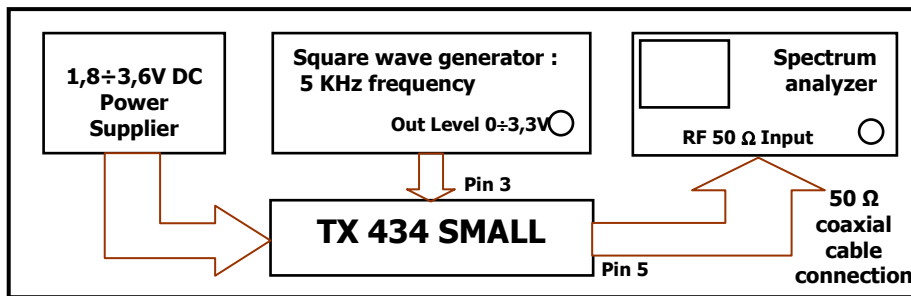
	Min	Typic	Max	Unit	Remarks
Carrier frequency	433.91	433.92	433.93	MHz	See notes 2 and 3
Supply voltage	1,8	3	3,6	V	
RF Output power (pin 5)		13		dBm	See note 2
RF output spurious up to 4GHz			-40	dBm	See note 2
Supply current in power-down mode			1	μA	
Supply current in TX		16		mA	See note 4
Supply current in TX RF carrier (pin.3 High)			32	mA	
Supply current in TX RF carrier (pin.3 Low)			5	mA	
Data input voltage	1,9	3	3,3	V	See note 1
Square wave modulation			10	Khz	
Switch on time power-down → TX			1,5	ms	

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Switch off time TX, after TX Data pin3 holding low for 20ms			20	ms	
Operating temperature	-20		+80	°C	

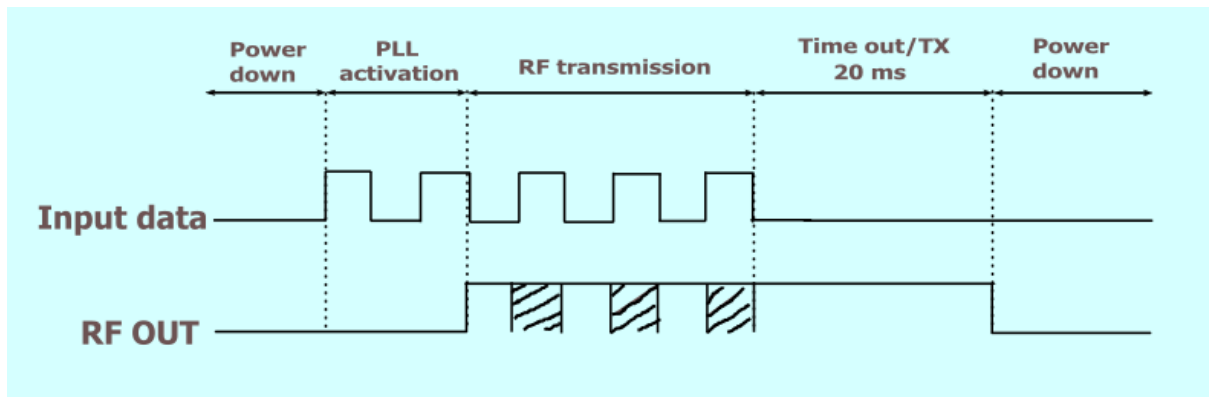
NOTE 1: It is recommended that the max voltage applied to data input pin is equal to voltage supply.
NOTE 2: Values have been obtained by applying the test system shown in Fig. 1 and maximum 3,6 V power supply.
NOTE 3: The minimum and maximum showed values are determined by the device's construction tolerance.
NOTE 4: Values are determined by means of an input signal with duty cycle 50%.

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



Picture 1: Testing system

Device timing



Picture 2: Device timing

When TX DATA (pin.3) is connected to High level, the module goes in IDLE mode, the consumption is <1mA the PLL isn't locked. The transmission starts after 1,5ms from rising-up level of TX DATA, that means first bits are not transmitted.

After 20ms from the last transition from high to low level of TX DATA, the module goes to power-down mode and the current supply is < 1µA.

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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 taking into account the following.

Power Supply:

1. TX 434 SMALL must be supplied from very low voltage safety source protected against the short circuits. Maximum voltage variations allowed: $1,8 \div 3,6$ V. However it is preferable to maintain a stable voltage to a predetermined value in the range of voltage as specified above, using a "fast transient response" voltage regulator.
2. Decoupling, close to the transmitter, with a ceramic capacitor of minimum 100nF.
3. Connect electrolytic capacitor 100uF, low ESR, close to pin 2 (+Vcc).

Input pin interface:

Put 100pF capacitor close to the corresponding input pin 3, connected between them and the ground plane.

Ground:

The ground must surround at the best the welding area of the module and must also be realized in the lower face of the PCB in order to obtain the optimal result, with the through holes connecting the two ground planes.

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).

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.

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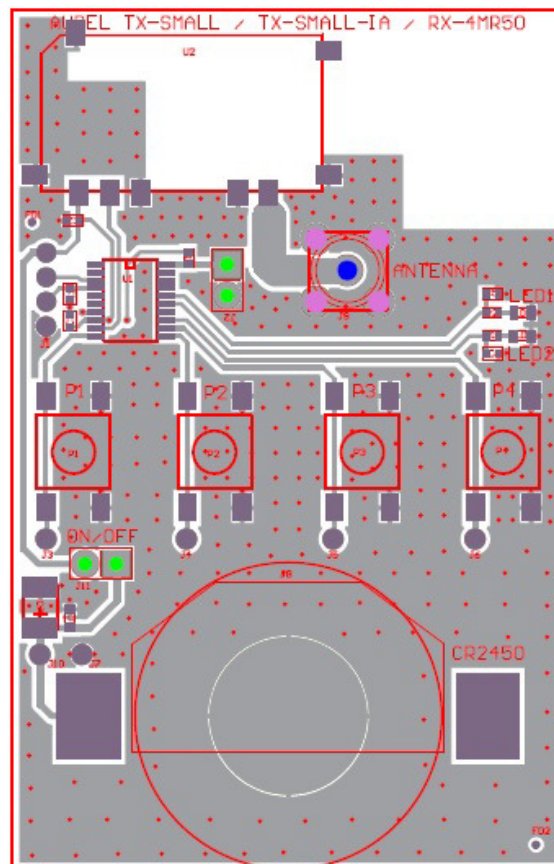
Antenna:

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 5).
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:

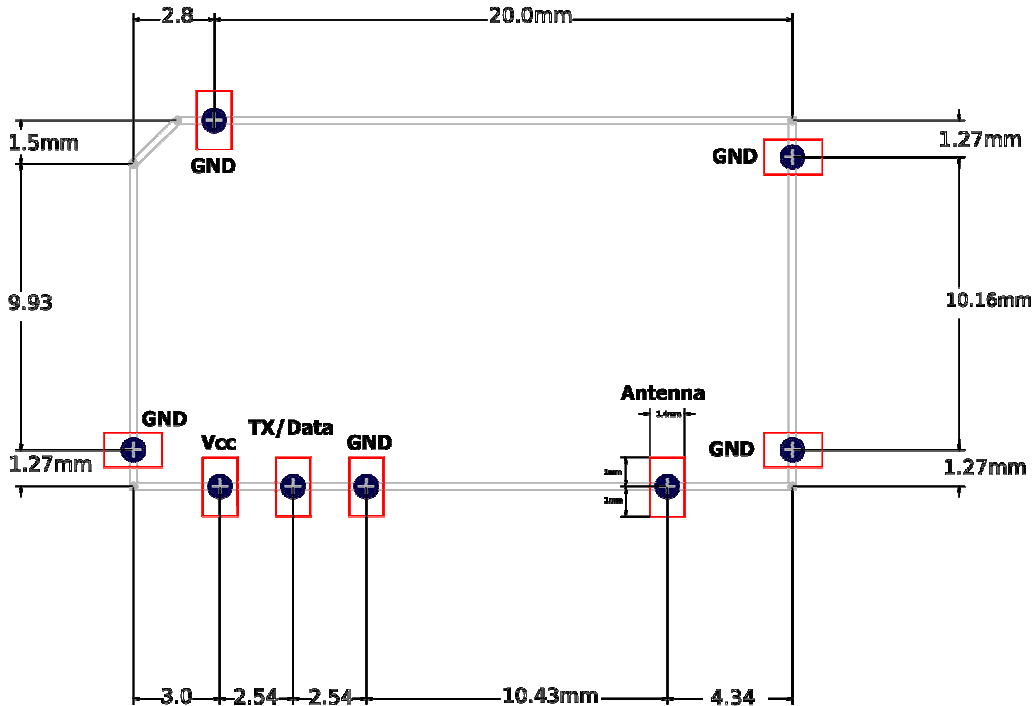
1. Keep the transmitter separate from all other components of the circuit (more than 5 mm).
2. Keep particularly far away and shielded all microprocessors and their clock circuits.
3. Do not fit components around the 50 Ohm line. Keep them at least at 5 mm distance.
4. If the Antenna Connection is directly 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.



Picture 3: Mounting Demoboard layout example

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Soldering and assembling layout SMD



Picture 4: Recommended layout for Host board

In order to ensure the correct assembly of the module you are required to apply a production process observing carefully the following recommendations:

Soldering paste: Use soldering paste as SAC305 (96,5% Sn, 3% Ag, 0,5% Cu), with a thickness > 150um.
 Assembly: the module can be assembled with automatic machine by using a suction cup tool, applied on bigger integrated circuit

Soldering: the module can be soldered on host board, through a reflow profile for Lead-free components. Jedec standard "J-STD-020E"

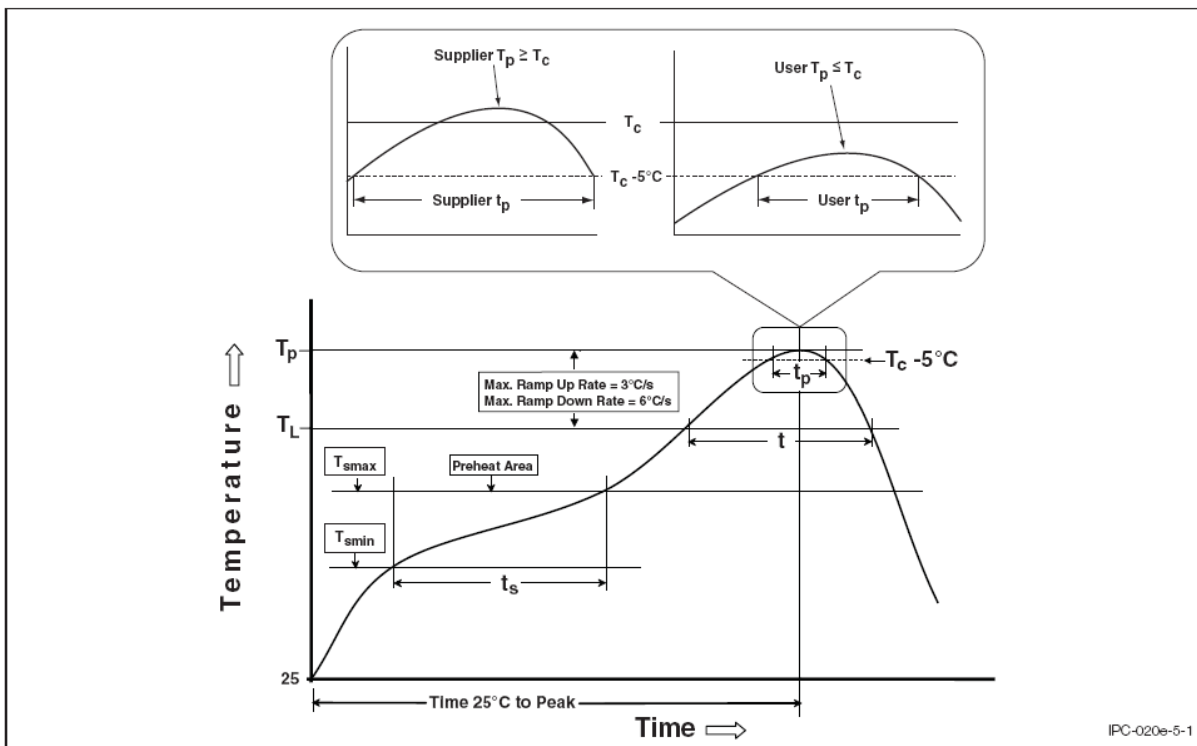
Standard Jedec "J-STD-020E" defines temperatures and exposure times, is attached below graph and profile table time / temperature recommended for the purpose.

For host that provide more reflow cycles it is recommended to perform the soldering of the module at the end of the soldering cycle, taking care to limit excessive vibrations during the terminal phase of reflow soldering paste.

Profile Feature	Pb-Free Assembly
Preheat/Soak	
Temperature Min (T_{smin})	150 °C
Temperature Max (T_{smax})	200 °C
Time (t_s) from (T_{smin} to T_{smax})	60-140 seconds
Ramp-up rate (T_L to T_p)	2 °C/second max.
Liquidous temperature (T_L)	217 °C

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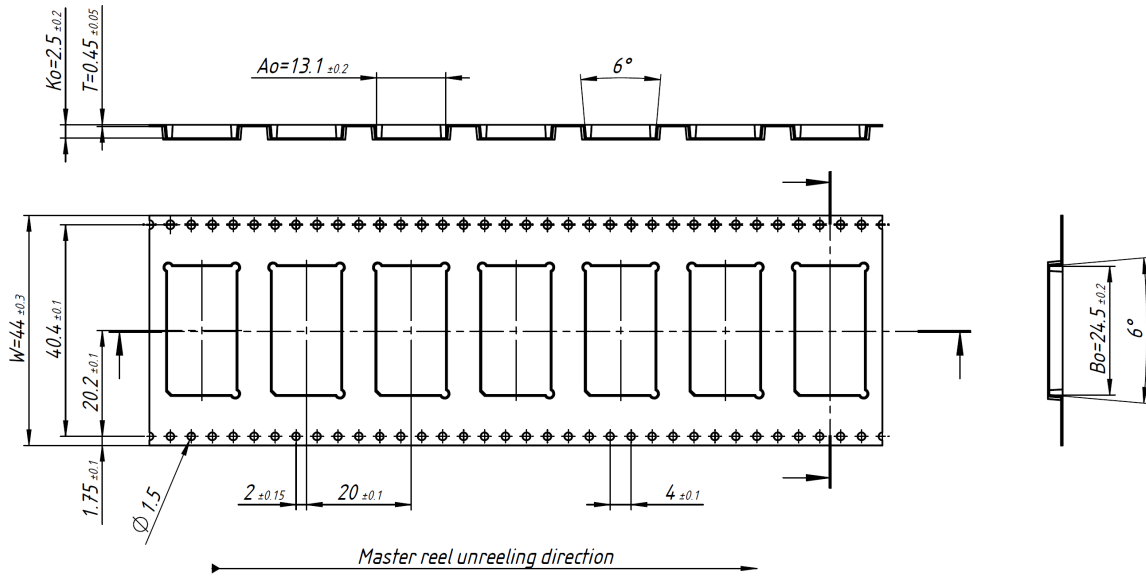
Time (t_L) maintained above T_L	60-150 seconds
Peak package body temperature (T_P)	245°
Time (t_p)* within 5 °C of the specified classification temperature (T_C), see Figure 9.	30* seconds
Ramp-down rate (T_P to T_L)	6 °C/second max.
Time 25 °C to peak temperature	5 minutes max.
* Tolerance for peak profile temperature (T_P) is defined as a supplier minimum and a user maximum.	

Table 1: Detailed time / temperatures profile for soldering TX-434-SMALL

Picture 5: Soldering profile for TX-434-SMALL

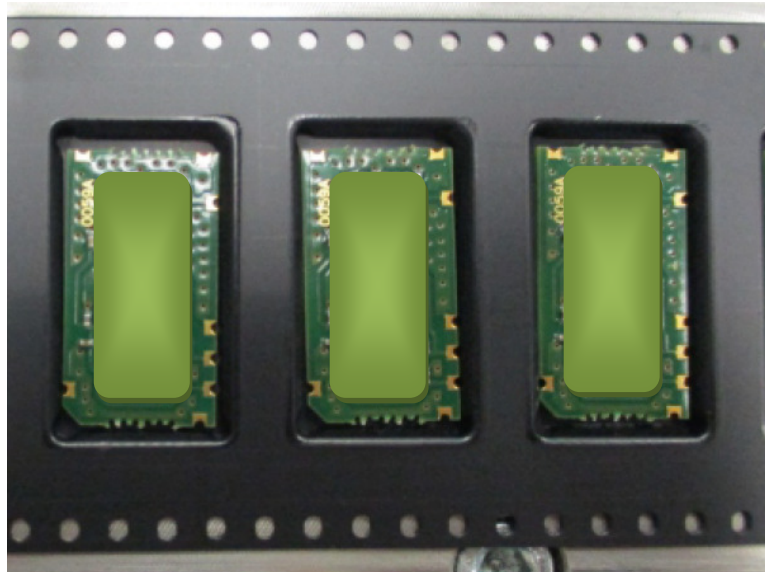
Specifications Packaging Tape and Reel

TX-434-SMALL is packed in Tape and Reel composed by an embossed carrier tape and antistatic cover tape. In this way the modules are ESD protected and can be handled by machines for the automatic assembly of SMD components.

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Picture 6: Tape and Reel drawing (in mm)



Picture 7: External aspect of the embossed

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Reference Rules

TX 434 SMALL transmitter is compliant with the European set of rules EN 300 220-2, and EN 301 489-3. The transmitter must be supplied by a very low voltage safety source protected against short circuits.

The usage of the module is foreseen inside enclosures that guarantee the EN 61000-4-2 normative not directly applicable to the module itself.

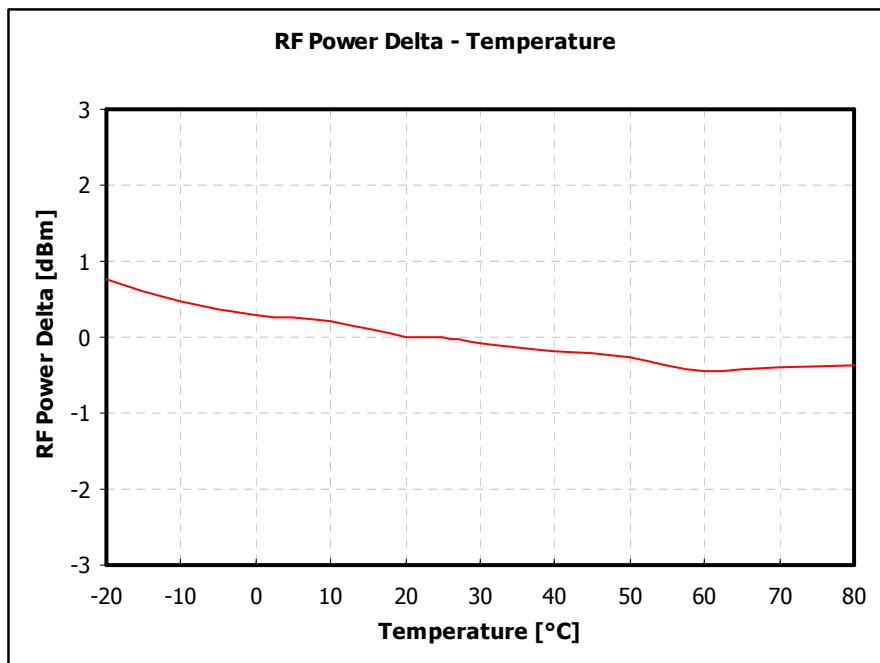
This device is compliant with EN 62479, connected to the electromagnetic field human exposition, if used with temporal duty cycle not higher than 10% like foreseen in CEPT 70-03 recommendation.

CEPT 70-03 Recommendation

TX 434 SMALL recommendation is referred to the 433.05 - 434.79 MHz harmonized bandwidth and therefore, in order to comply with local regulations, the device must be used on the time scale with maximum duty-cycle time of 10% (equivalent to 6 minutes of usage on 60 minutes).

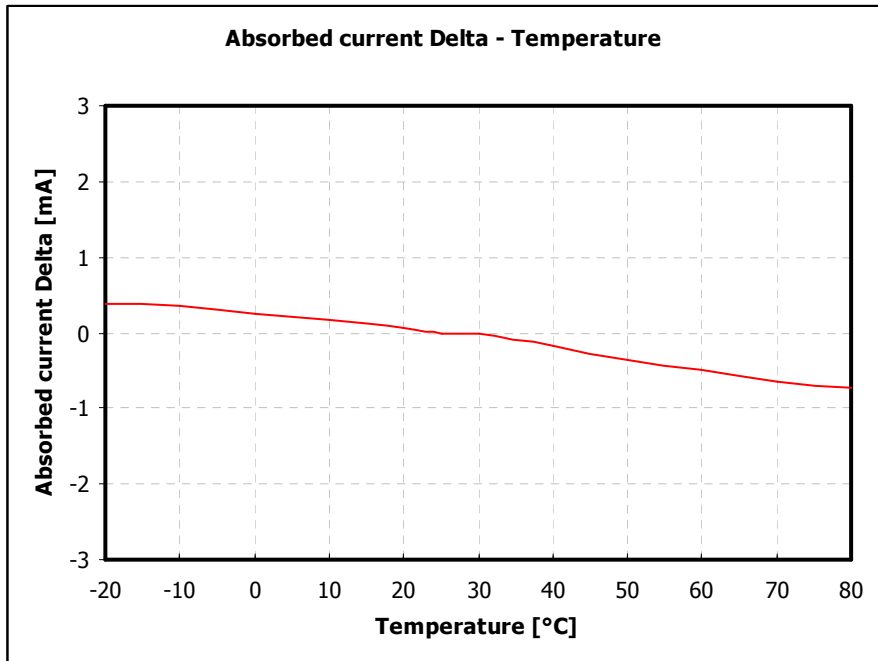
Reference curves

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

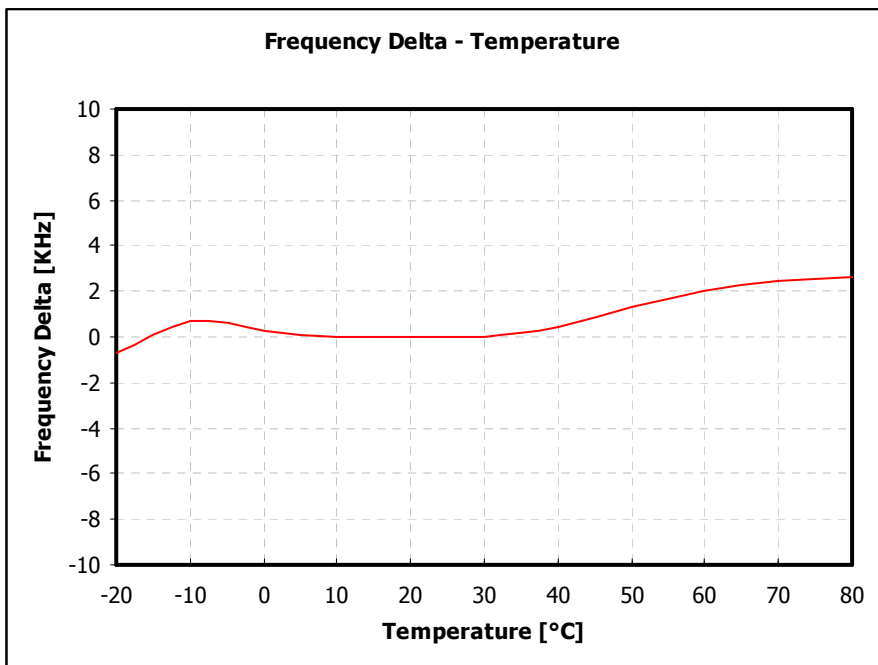


Picture 8: RF Power Delta Vs Temperature

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Picture 9: Absorbed Current Delta Vs Temperature in TX-MODE



Picture 10: Delta Carrier frequency Vs Temperature

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User manual revision summary

Release date	Revision user manual	Changes from the previous revision
19/09/2018	1.0	First Release

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