

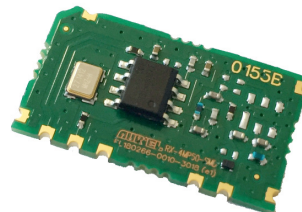
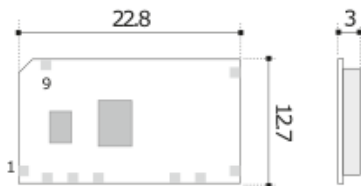
Band pass filtered Super Het Receiver 433.92MHz

Low cost OOK receiver working at 433,92MHz with band pass filter, compliant with RED (Radio Equipment Directive 2014/53/EU) and in particular with harmonics standards:

- EN 301 489-3 : V2.1.1 (final draft)
- EN 300 220-2 : V3.1.1

ESD antenna protection in compliance with EN610000-4-2.

PIN-OUT



CONNECTIONS

Pin 1-5-7-8-9	GND	GND Connections. To be externally connected to a single ground plate.
Pin 2	+Vcc	Connection to the positive pole of supply.
Pin 3	Data-Out	Data output from the receiver. Load higher than 1KΩ.
Pin 4	NC	Not connected
Pin 6	Antenna	Antenna input, impedance 50Ω.

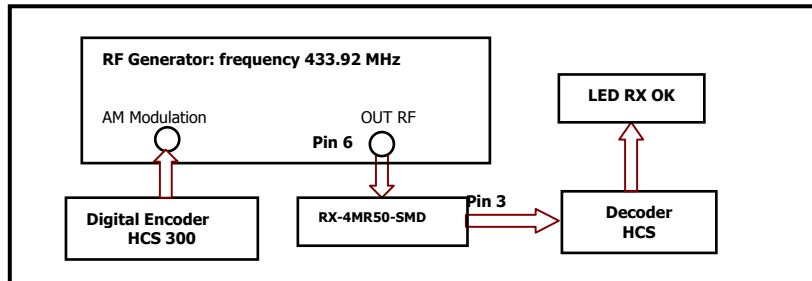
Technical features RX-4MR50

	Min	Typic	Max	Unit	Remarks
Supply voltage	3	5	5,5	Vdc	
Supply current	4,1	4,3	4,6	mA	
Reception frequency		433,92		MHz	
RF sensitivity		-112	-114	dBm	See note 1
IF Bandwidth -3dB		420		KHz	
RF power on 50Ω pin ant.			-60	dBm	
Square wave output	0,020	1	5	KHz	
Output high voltage	Vcc-0,6		Vcc-0,1	V	
Output low voltage	GND		GND+0,4	V	
Switch on time			4	ms	
Operating temperature range	-20		+85	°C	

NOTE 1: RF generator with 100% modulation.

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



Picture 1: Measurement of sensitivity

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. RX-4MR50-SMD must be supplied from very low voltage safety source protected against the short circuits. Maximum voltage variations allowed: $3 \div 5,5$ 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. Connect electrolytic capacitor 100uF, low ESR, close to pin 2 (+Vcc).

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 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).

Antenna:

1. A **whip** antenna, 16,5mm long and approximately 1mm dia, brass or copper wire made, must be connected to the RF input of the receiver (pin 6).
2. The antenna body must be kept straight as much as possible and it must be free from other circuits or metal parts (5cm 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.

50 Ohm line:

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

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Antenna connection:

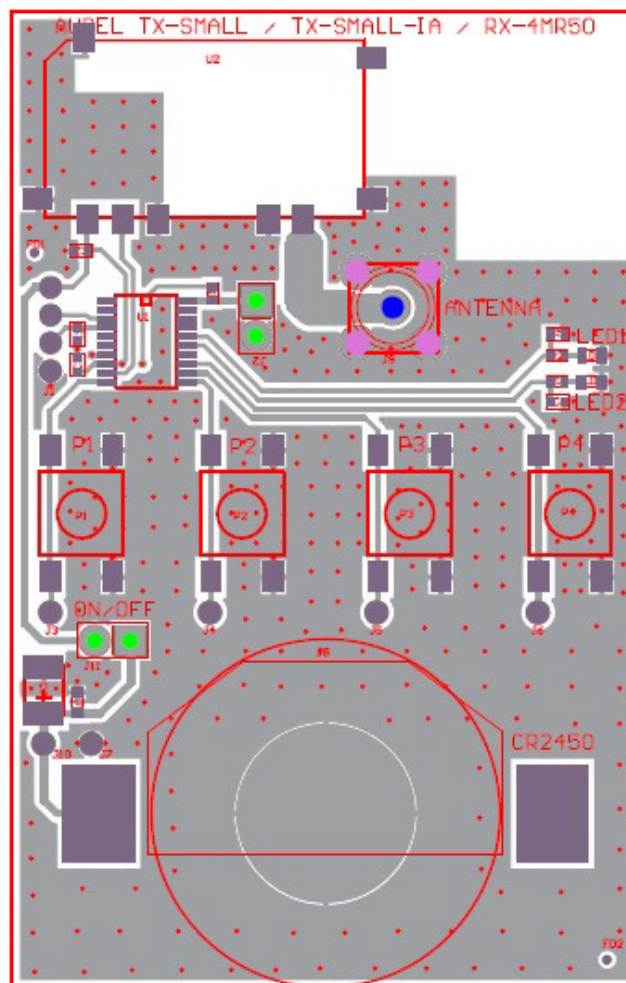
1. It may be utilized as the direct connection point for the radiating whip antenna.
2. It can bear the connection of the central wire of a 50 Ω coaxial cable. Be sure that the braid is welded to the ground in a close point.

N.B.: As an alternative to the a.m. antenna it is possible to utilize the whip model manufactured by Aurel (see related Data Sheet and Application Notes).

By fitting whips too different from the described ones, the EEC Certification is not assured.

Other components:

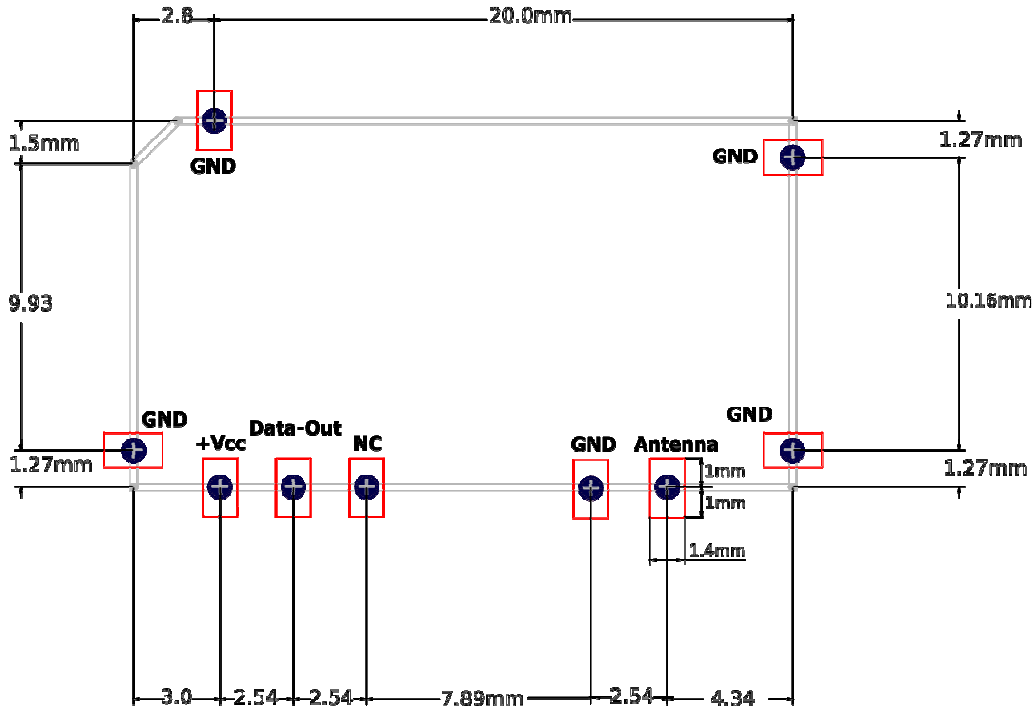
1. Keep the receiver separate from all other components of the circuit (more than 5mm).
 2. Keep particularly far away and shielded all microprocessors and their clock circuits.
 3. Do not fit components around the 50 Ω line. At least keep them at 5mm distance.
- If the antenna connection is directly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



Picture 2: Mounting layout example

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Soldering and assembling layout SMD



Picture 3: 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 > 150µm.

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"

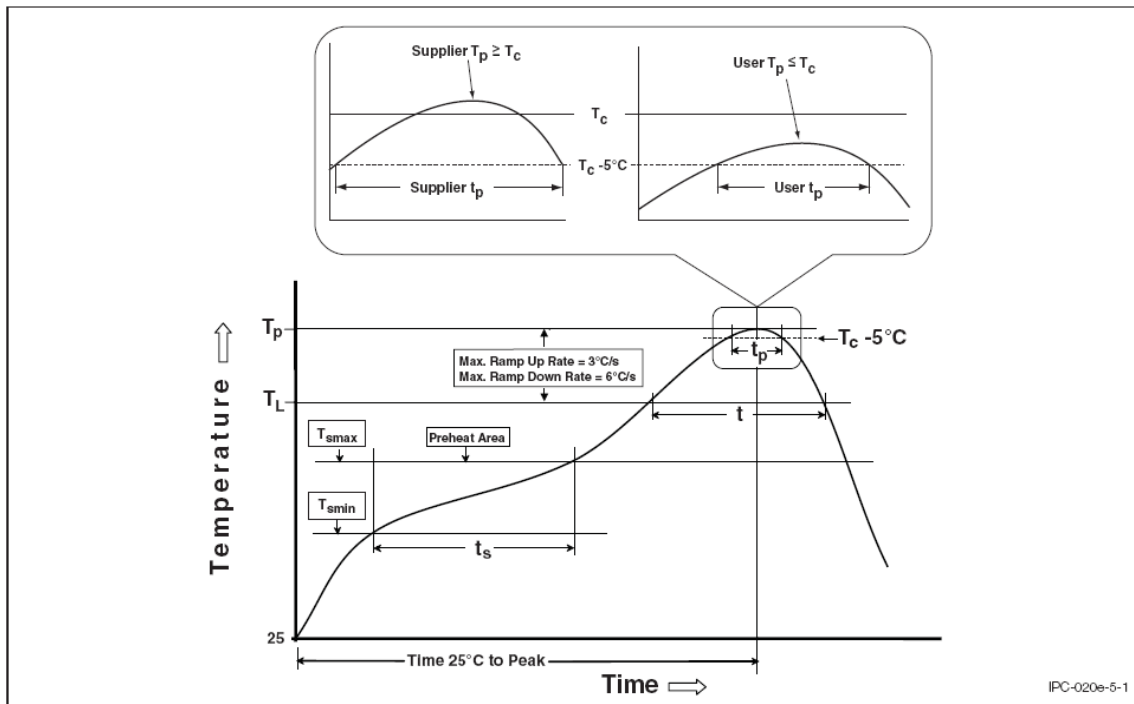
Standard Jedec "J-STD-020E" defines temperatures and exposure times, is attached below graph and profile table time / temperature recommended for the purpose.

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
Time (t_L) maintained above T_L	60-150 seconds
Peak package body temperature (T_P)	245°

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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.	

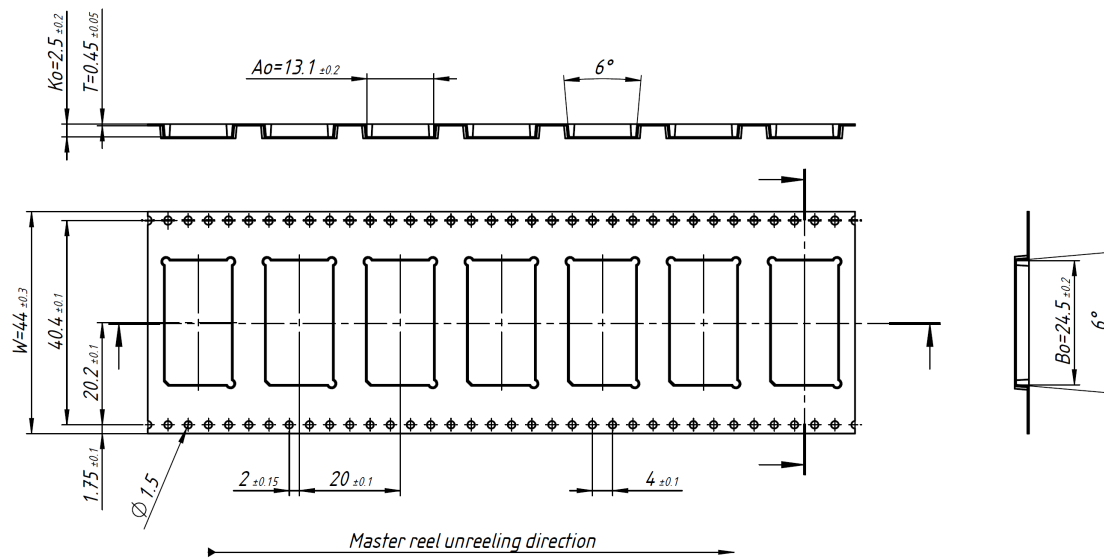
Table 1: Detailed time / temperatures profile for soldering RX-4MR50-SMD

Picture 4: Soldering profile for RX-4MR50-SMD

Specifications Packaging Tape and Reel

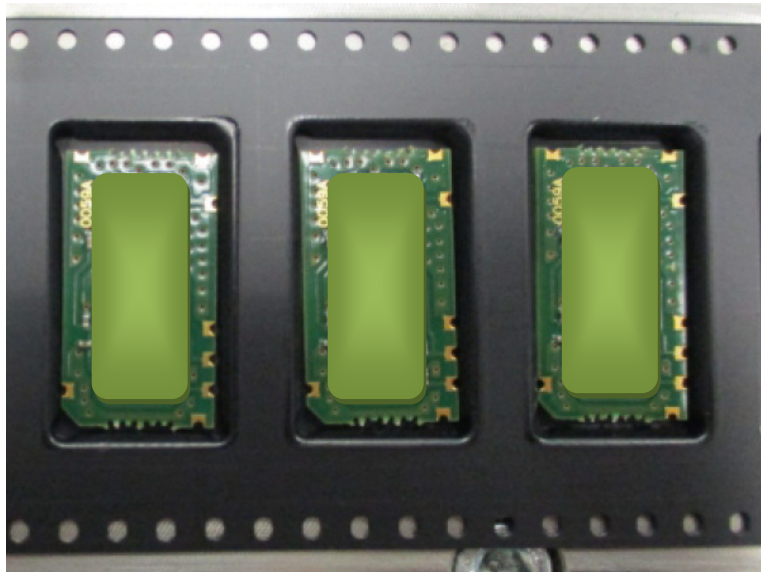
RX-4MR50-SMD is packed in Tape and Reel composed by an embossed carrier tape and antistatic cover tape.

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 5: Tape and Reel drawing (in mm)



Picture 6: External aspect of the embossed

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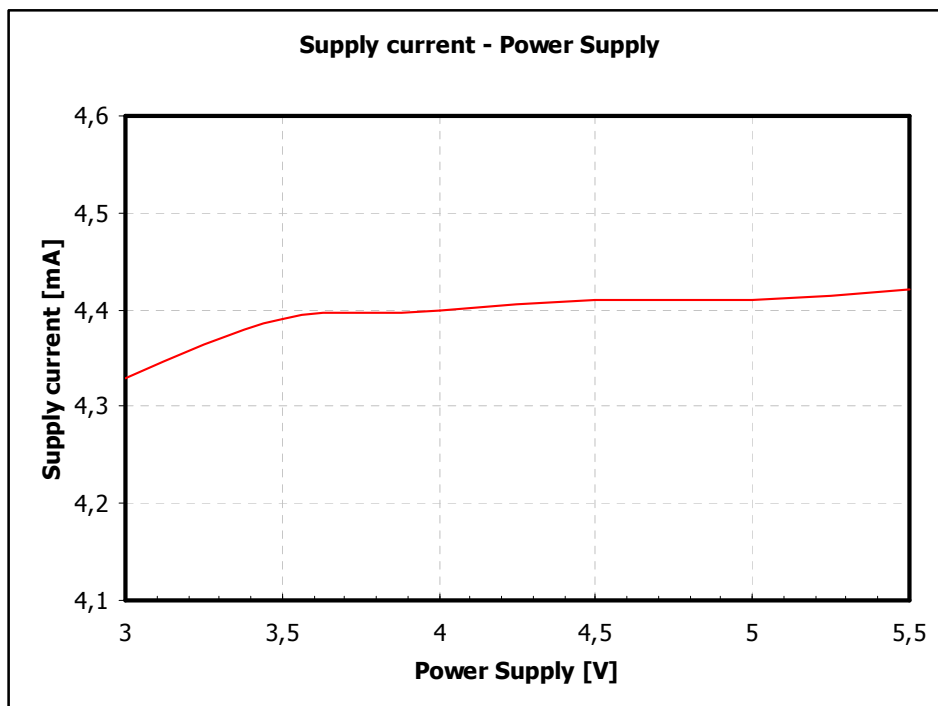
Reference Rules

RX-4MR50-SMD receiver is compliant with the European set of rules EN 300 220-2, and EN 301 489-3. The receiver 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.

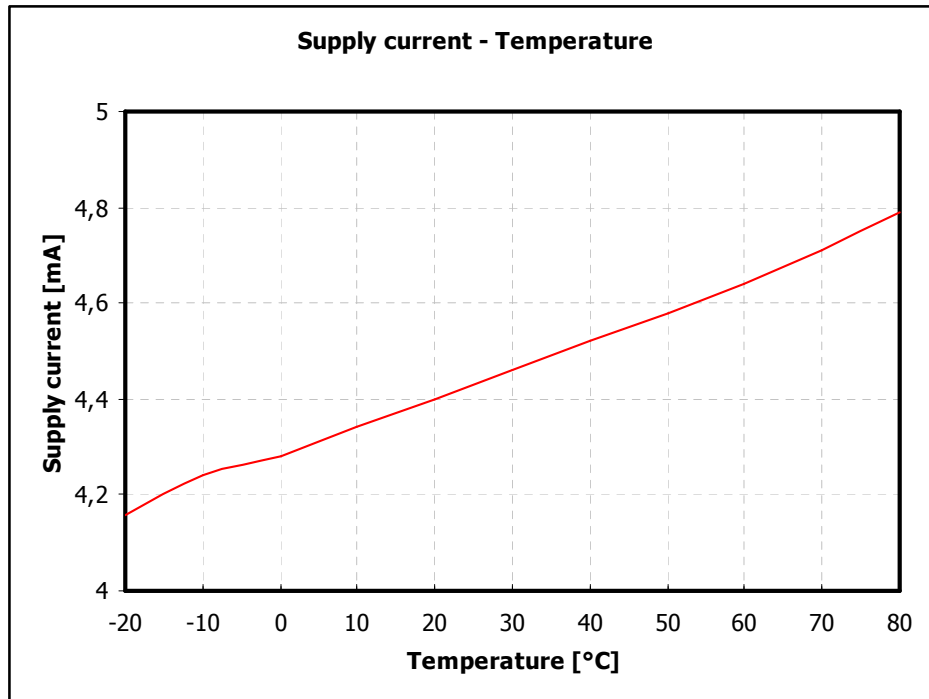
This device is compliant with EN 62479, connected to the electromagnetic field human exposition, if used with temporal duty cycle not higher than 10% like foreseen in CEPT 70-03 recommendation.

Reference curves

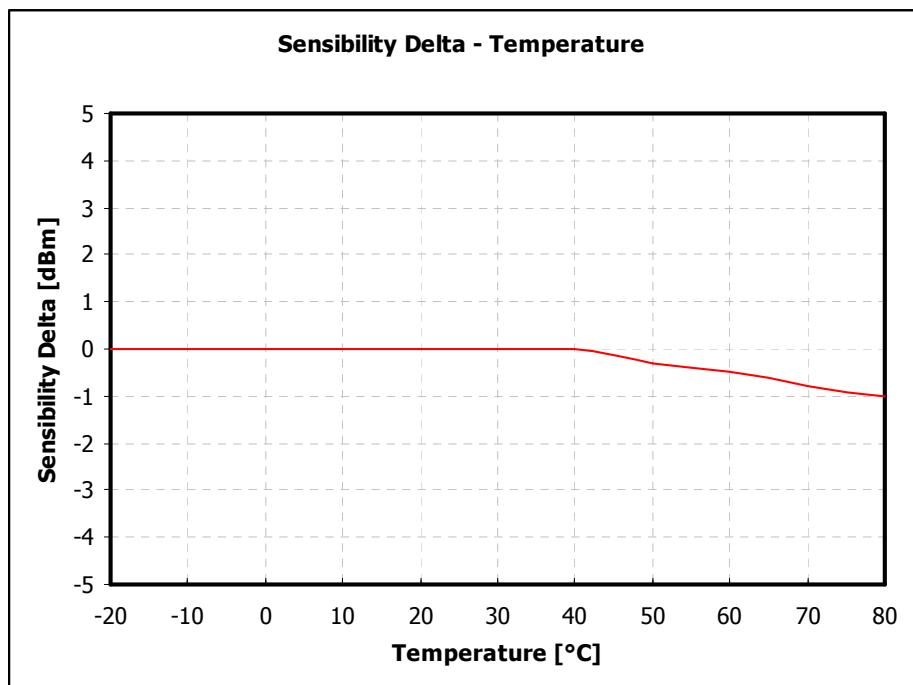


Picture 7: Supply current – Power supply

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Picture 8: Supply current - Temperature



Picture 9: Sensitivity - 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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