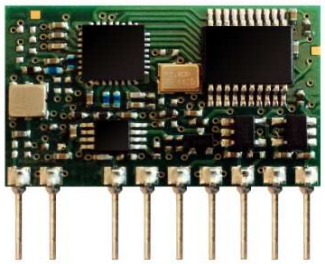
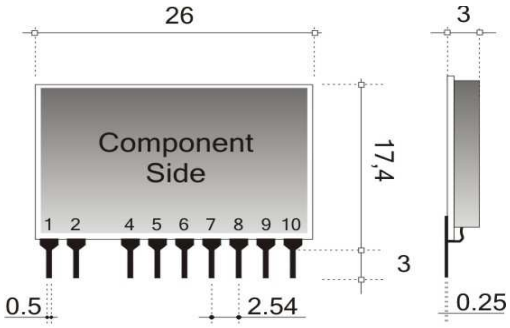
DESCRIPTION

RTX-MID-868 is RF digital transceiver working at 868,3MHz with FSK and OOK modulation.
The main features are: 10 mW Maximum of effective irradiated power , - 108 dBm of sensitivity in FSK and -109 dbm in OOK, compliant to the ETSI EN 300 220-1 V2.3.1 normative.
Versions available with alternative frequencies within the bandwidth 860-870MHz.

MECHANICAL DIMENSIONS and PIN-OUT





Pin-Out

1) RF INPUT/OUTPUT
2) GND
3) PIN NOT CONNECTED
4) INPUT DIGITAL DATA
5) TX/RX
6) ENABLE
7) GND
8) RSSI OUT
9) OUTPUT DIGITAL DATA
10) +Vcc

Absolute maximum values

Voltage Supply	-0,3V +6V
Input Voltage	-0,3V ÷ Vcc+0,6V
Output Voltage	0V ÷ Vcc
Input voltage pin. 6,8,11,12	-0,3 ÷ Vcc
Working temperature	-20°C ÷ +70°C

DESCRIPTION OF THE PIN-OUT

Pin 1	**RF INGRESSO/USCITA**	Antenna connection, impedance 50 ohm.
Pin 2	**GND**	Connection to GND
Pin 3	**PIN NOT CONNECTED**	
Pin 4	**INPUT DIGITAL DATA**	Input Digital Data for transmitter: Low logic level: 0 logic level High Logic Level: 1 logic level (For further details see paragraph "Transmission Mode")
Pin 5	**TX/RX**	0 or N.C = Receiver mode (Receiver ON, Transmitter OFF) 1 = Transmitter (Receiver OFF, Transmitter ON) NOTE: look at figure 2 for switching times Pin connected to pull down resistor
Pin 6	**ENABLE**	0 = PWDN (switched-off module with current consumption < 1uA) 1 = Active (switched-on module ready to receive and to transmit)
Pin 7	**GND**	Connection to GND.
Pin 8	**RSSI OUT**	Analogue output for test purpose. RSSI Output.
Pin 9	**DATA OUT**	Data Output of the Receiver
Pin 10	**+Vcc**	Connection to the positive voltage supply: +2,5V ÷ +6V

Technical Features

	Min	Typical	*Max*	*Unit*	Note
V_s Power supply	2.5	3-5	6	**V**	
Current consumption in power-down mode Pin 6 (ENABLE) = 0 Pin 10 (+Vcc) = 1			1	**uA**	
Current consumption RX = ON Pin 10 (+Vcc) = 1 Pin 6 (ENABLE) = 1 Pin 5 (TX/RX) = 0 oNC		6		**mA**	
Current consumption in "OOK Transmission" mode (duty cycle 50%): Pin 10 (+Vcc) = 1 Pin 6 (ENABLE) = 1 Pin 5 (TX/RX) = 1		20		**mA**	See note 1
Current consumption in "FSK Transmission" mode: Pin 10 (+Vcc) = 1 Pin 6 (ENABLE) = 1 Pin 5 (TX/RX) = 1		27		**mA**	See note 1
Frequency reception	868,29	868,3	868,31	**MHz**	
RF Sensitivity in FSK		-108		**dBm**	
RF Sensitivity in OOK		-109	-111	**dBm**	
RF irradiated power (OOK and FSK)	7	8,5	10	**dBm**	
FSK ΔF deviation		±25		**KHz**	See note 1
OOK Modulation		100		**%**	
Blocking test at ± 2MHz		To Be Defin.		**dB**	See note 3
Blocking test at ± 10MHz		To Be Defin.		**dB**	See note 3
Image frequency rejection		To Be Defin.		**dB**	See note 2
Output square wave	0,05	1	3	**KHz**	
Input square wave	0,01		3	**kHz**	
RSSI (pin 8)	0,3		1,4	**V**	
Output impedance RSSI (pin 8)		1		**Kohm**	
Logic output low level (pin 9)			gnd+0,4	**V**	See note 4
Logic output high level (pin 9)	V_{cc}-0,25			**V**	See note 4
Logic input high level (pin 4-5-6)	Vs-0,6		Vs+0,6	**V**	
Logic input low level (pin 4-5-6)			0,4	**V**	
Output impedance (pin 9) open collector		4,7		**kohm**	
Spurious RF emission in antenna			-60	**dBm**	
Switching-on time: PWRDN → TX-ON Setting: (pin 5) = 1 (pin 10) = 1 (pin 6) = 0 → 1		10	15	**ms**	
Switching-on time: PWRDN → RX-ON Setting: (pin 5) = 0 (pin 10) = 1 (pin 6) = 0 → 1		10	15	**ms**	See note 5
Switching times TX → RX		500		**us**	See note 5
Switching times RX → TX		500		**us**	See note 5

Working temperature	-20		+70	**°C**	
Dimensions	26 x 16,4 x 3 mm				

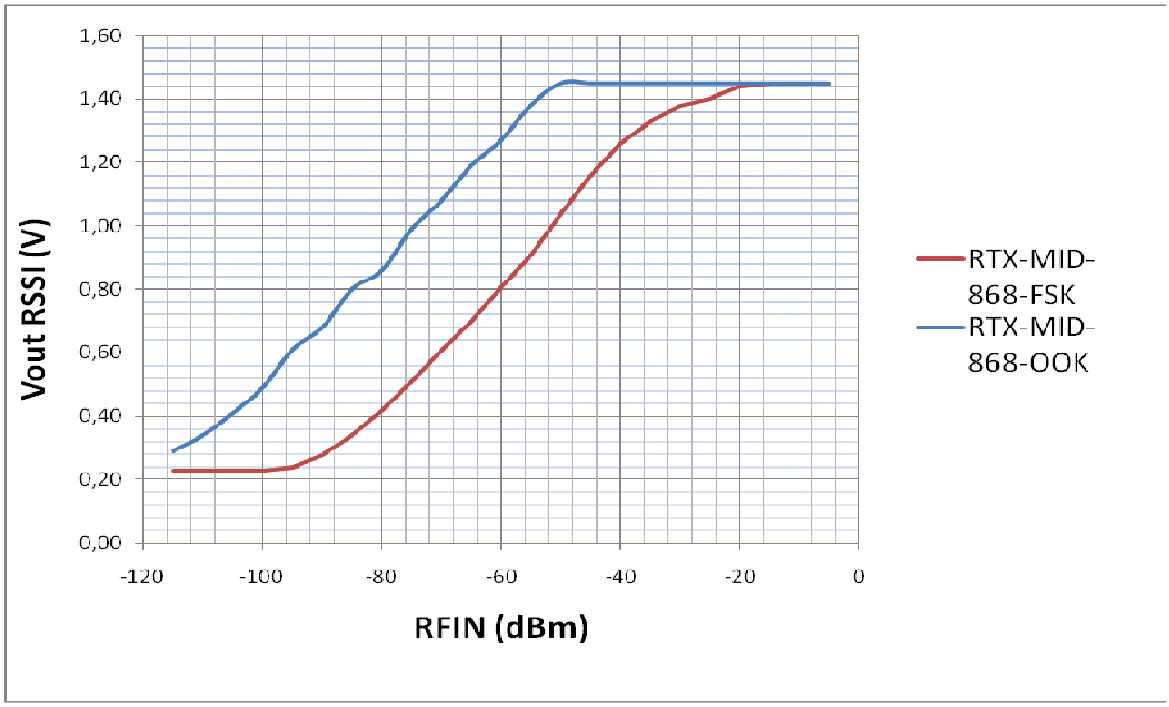
NOTE 1: FSK version cod.650201258G. OOK version cod.650201259G.
NOTE 2: Test carried out following steps on paragraph 8.5 of the normative ETSI EN 300 220-1 V2.3.1
NOTE 3: Test carried out following steps on paragraph 8.4 of the normative ETSI EN 300 220-1 V2.3.1
NOTE 4: Test obtained with 100KΩ of maximum load.
NOTE 5: Time required by the module to achieve the declared characteristics.

Power-down working mode:

POWER-DOWN mode: Pin 6 for the switching-on of the module, connected to the low logic level:
Pin 6 of the activation of the module, connected to low logic level:
Current consumption 1uA Maximum.

Pin.8 "RSSI" characteristic.

The Pin.8 RSSI provides an analog signal with behavior of the voltage proportional to the RF signal received. The voltage range generated is from 0 to 1.5 V maximum, output impedance of 1K and overall dynamics of the radio signal of 65 dB.
It is available with radio signals lasting for more than 5ms and value updated every 25ms.
In fig. 1 is shown graphically the behavior of voltage at the RSSI output function of the power of the input signal.
The diagram has been obtained experimentally by applying the RF input (pin 1) of the transceiver an RF generator FSK modulated by a square wave of 1 KHz with modulation index of 25KHz and in OOK with modulation index of 99%.



Picture 1: diagram of RF input(dBm) Vs. RSSI (Volts)

TBD

Picture 2: diagram of delta sensitivity (dB) Vs. temperature (°C)

Reception Freq. Vs Temp.

TBD

Temperature chart TBD

Usage of the module

To take advantage of the performances detailed in the Technical Specifications, and in order to comply with the operating conditions which characterize the Certification, the transceiver must be fitted on a printed circuit considering the followings:

DC Supply:

1. The transceiver must be supplied by a very low voltage source, safety protected against short circuits. Maximum voltage variations allowed: 2,1÷3,6V (RTX-MID-3V) and 4,5÷5,5V (RTX-MID-5V).
2. De-coupling, next to the transmitter, by means of a minimum 100.000 pF ceramic capacitor.
3. Are preferable low noise linear voltage regulator circuits. Eventual voltage regulators DC-DC or AC-DC can introduce disturbances on radio modules.

Ground:

It must surround the welding area of the receiver.
The circuit must be realized in double-side board with through holes on the ground area each 15 mm.
It must be sufficiently dimensioned in the antenna connection area, if it's applied a whip antenna(advised area 50 mm of radius).

50 Ohm line:

1. It must be the shorter possible.
2. Strip must be 2,7 mm wide for 1,6 mm thick FR4 printed circuits and 1,6 mm wide for 1 mm thick FR4 printed circuits.
3. It must be 2 mm away, on the same side, from the ground.
4. On the opposite side, it must be the presence of a ground area.

Antenna connection:

it can be used as a direct connection point for the radiating whip antenna. Please put an inductance of 100 nH from pin 1 to ground in order to protect the device from electrostatic discharge.
It can be used to connect the center conductor of a coaxial cable to 50 ohms.
Make sure that the braid is soldered to the ground in a close point.

Antenna

1. Must be connected to the RF Receiver a whip antenna, 8.5 cm long and diameter of about 1 mm, wire made of brass or copper.
2. The body of the antenna should be kept as straight as possible and it must be free from other circuits or metal parts (5 cm distance).
3. Can be used horizontally or vertically (recommended this last modality), provided that the connection point between antenna and receiver input is surrounded by a good ground plane.

N.B: As alternative to the antenna above mentioned, it's possible to use a standard antenna Aurel (see Data Sheet ed Application Notes on web site). Other antennas does not ensure the CE approval.

Other components:

Do not fit lines close to 50 ohm antenna connection.
Keep the transmitter separate from all other components of the circuit (more than 5 mm).
Keep particularly far away and shielded all microprocessors and their clock circuits.
If the Antenna Connection is directly used to connect a radiating whip, keep at least 5 cm radius free area.
In the case is used for the connection of coaxial cable is enough 5 mm.

Reference Rules

RTX-MID-3V and RTX-MID-5V transceivers comply with European set of rules **EN 300 220** in class 2, and **EN 301 489** in class 2.

The equipment has been tested according to rule EN 60950 and it can be utilized inside a special insulated housing that assures the compliance with the above mentioned rule. The transceiver must be supplied by a very low voltage safety source protected against short circuits.
The use of the transceiver module is foreseen inside housings that assure the overcoming of the provision EN 61000-4-2 not directly applicable to the module itself. In particular, it is at the user' s care the insulation of the external antenna connection, and of the antenna itself since the RF output of the receiver is not built to directly bear the electrostatic charges foreseen by the a.m. provision.