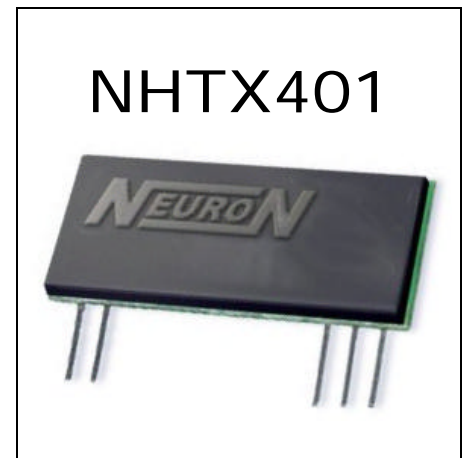


## HYBRID RADIO TRANSMITTER NHTX401

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### FEATURES

- 433.92MHz operating frequency
- Support data transmission rates up to 115.2 kbps without Manchester coding
- Transmission range up to 100m in open ground and up to 15m in-building
- 3.3V or 5.0V power supply voltage
- Low power consumption
  - o 15 mA @ 3.3V
  - o 11 mA @ 5.0 V
- Evaluation board available
- Trough hole and SMD mounting available



### APPLICATIONS

- Wireless communication / control systems
- Radio modems for PC
- Short range radio communications system
- Alarm systems

### GENERAL DESCRIPTION

NHTX401 is a low-power hybrid radio transmitter designed for short-range wireless control and serial data communication system with the data transmission rate up to 115.2kbps without any transmission coding (i.e. Manchester). The NHTX401 operates at 433.9MHz with Amplitude-Shift Keyed (ASK) modulated signal. The NHTX401 is compatible with NHRX401 radio receiver.

### ORDERING INFORMATION

PART	VCC SUPPLY VOLTAGE	MOUNTING
NHTX401-3.3V-D	from 3.0V to 4.0V,	trough hole
NHTX401-3.3V-S	from 3.0V to 4.0V,	SMD
NHTX401-5.0V-D	from 4.5V to 6.0V,	trough hole
NHTX401-5.0V-S	from 4.5V to 6.0V,	SMD

## HYBRID RADIO TRANSMITTER NHTX401

### PIN CONFIGURATION AND DIMENSIONS

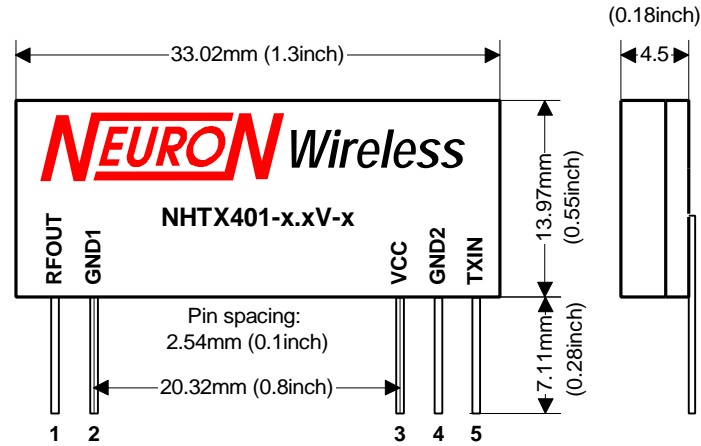


Figure 1. NHTX401 pin configuration

### ABSOLUTE MAXIMUM RATINGS

Rating	Value	Units
Power Supply Voltage (VCC to GND2)	-0.3 to +6.0	V
Transmit Input Signal (TXIN to GND2)	-0.3 to VCC+0.3	V
Storage temperature	-50 to +85	?C
Storage Humidity	85% non condensing	
Operating temperature	-40 to +85	?C
Lead temperature (soldering 7 sec)	260	?C

## HYBRID RADIO TRANSMITTER NHTX401

### ELECTRICAL CHARACTERISTICS

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Operating Frequency		433.72		434.12	MHz
Modulation type		ASK			
Data rate		9.6		115.2	kbps
Minimum TXIN input signal pulse		8.6			?S
Maximum TXIN input signal pulse				416.6	
Transmitter performance					
Peak output power			0.75		mW
2nd Harmonic emission				-36	dBm
3rd ? 10th Harmonic emission				-42	
Non-harmonic spurious emission				-50	
Supply voltage (VCC to GND2)	NHTX401-3.3V	3.0	3.3	4.0	V
	NHTX401-5.0V	4.5	5.0	6.0	
Supply current	VCC=3.3V; NHTX401-3.3V	10.7	15.1	17.5	mA
	VCC=5.0V; NHTX401-5.0V	8.9	11.0	12.2	
TXIN low-level input voltage	NHTX401-3.3V, VCC=3.3V	-0.3	-	0.8	V
	NHTX401-5.0V, VCC=5.0V				
TXIN high-level input voltage	NHTX401-3.3V, VCC=3.3V	1.8	-	VCC	
	NHTX401-5.0V, VCC=5.0V	2.0	-	VCC	
Operating ambient temperature		-10		+70	?C
Power up time to full RF			600		?s

Typical values at T = 25 ?C

### TYPICAL OPERATING CHARACTERISTICS

Typical operating characteristics will be prepared.

### ELECTROSTATIC DISCHARGE SENSITIVITY

Electrostatic discharge can cause damage ranging from subtle performance degradation to complete device failure. It is highly recommended that all modules be handled and stored using appropriate ESD protection methods.

## HYBRID RADIO TRANSMITTER NHTX401

### NHTX401 BLOCK DIAGRAM

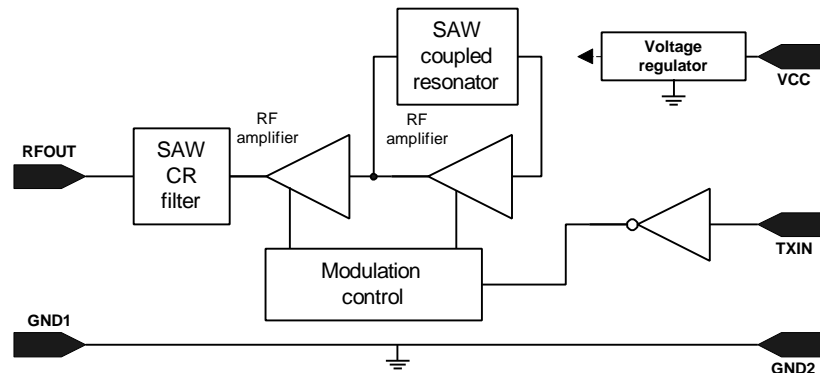


Figure 2. NHTX401 block diagram

### PIN DESCRIPTION

PIN	NAME	DESCRIPTION
1	GND1	GND1 is a transmitter RF ground pin. This pin should be connected to ground plane for antenna.
2	RFOUT	RF output pin for antenna. This pin is internal DC connected to GND1 for ESD protection (see antenna section for more information)
3	VCC	VCC is a positive supply voltage pin. For more information see electrical characteristic section.
4	GND2	GND2 is a power ground pin. GND2 is internally connected with GND1 and electromagnetic screen.
5	TXIN	This pin is transmitted data input. The TXIN is full compatible with the CMOS input gate (see fig.2). For more information about data format see section "Data Transmitting".

### DETAILED DESCRIPTION

The NHTX401 is a hybrid radio module designed to short-range wireless communication systems. The NHTX401 works with Amplitude-Shift Keyed modulation at 433.92MHz with serial data transfer up to 115.2kbps. The NHTX401 bases on unique amplifier-sequenced architecture and two stages SAW filtering to achieve excellent out-of-band rejection. The NHTX401 is available in the two power supply versions: NHTX401-3.3V with supply voltage VCC=3.3V and NHTX401-5.0V with supply voltage VCC=5.0V.

The NHTX401 have one digital data input that can be direct driven from any external CMOS gate or the Microcontroller port.

## HYBRID RADIO TRANSMITTER NHTX401

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### ANTENNAS

The RFOUT pin is internal DC connect to GND1 for ESD protection. For the best transmitting conditions a whip antenna is recommended. Optimum total length from pin RFOUT to end whip antenna is 17.2mm (1 wavelength). The transmitting parameters depend on PCB mounting, antenna positions and presence of the other metal part in the system. The different antenna types can be used; i.e. helical antenna, loop antenna or SMD chip antenna but whip 1 wavelength is most recommended.

### DATA TRANSMITTING

The NHTX401 hybrid is full compatible with NHRX401 receiver and is designed to work with RS-232 signal. The maximum data rate is equal 115200bps without any Manchester coding or any other similar process changing mark to space ratio. So the minimal time between next transmitting edge can be 8.6 $\mu$ s (i.e. one bit for 115.2kbps data rate). Maximum time between next transmitting edge can be 156.25 $\mu$ s (i.e. nine bits for 57.6kbps data rate). The NHTX401 works with ASK modulation, where a “1” logic pulse is represented by a higher power transmitted and a “0” logic level is represented by the lower power transmitted. The transmitting data should be formatted in packets (see figure 3).

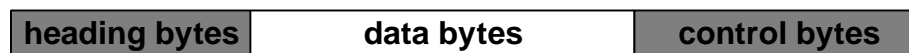


Figure 3. Sample transmitting data packet.

Heading bytes are used to synchronize receiver with start bits. For NHTX401 most recommendation is combination of 0xFF and 0x00 bytes. Control bytes are used to error checking of the transmission data (data bytes) and can be calculated from CRC or another error checking method.

## HYBRID RADIO TRANSMITTER NHTX401

### TYPICAL OPERATING CIRCUIT

The NHTX401 can be directly connected to any PC computer RS-232 port (see figure 4) or to the serial port in any Microcontroller (see figure 5).

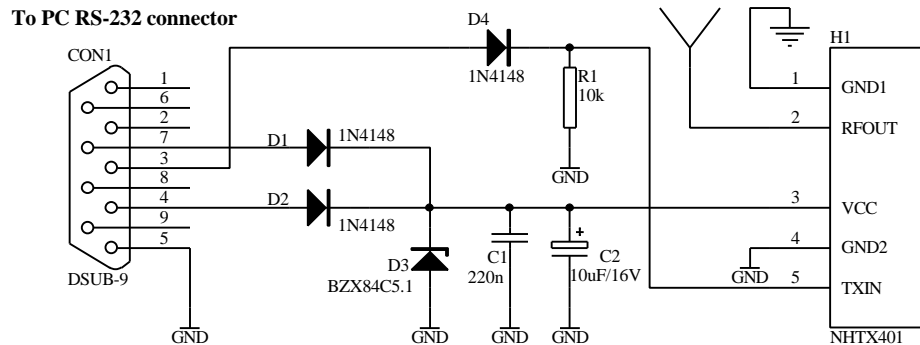


Figure 4. Direct connection NHTX401 to PC computer RS-232 port

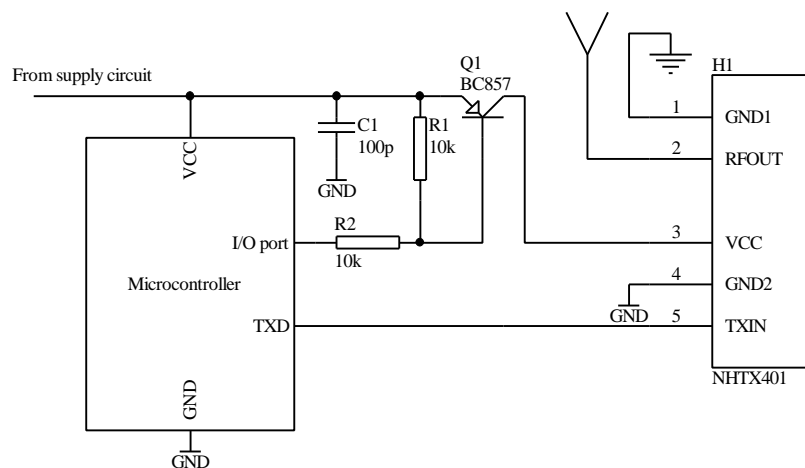


Figure 5. Direct connection NHTX401 to Microcontroller

## HYBRID RADIO TRANSMITTER NHTX401

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### PCB AND MOUNTING CONSIDERATIONS

The NHTX401 module can be mounted horizontally or vertically on area of ground plane preferably close to the antenna. Perpendicular to PCB plane mounting demands additional support for receiver to avoid pins leaning. Antenna should be kept away from any sources of interference. The NHTX401 is trough hole (NHTX401-xxV-D) mounting and SMD (NHTX401-xxV-S) mounting available.

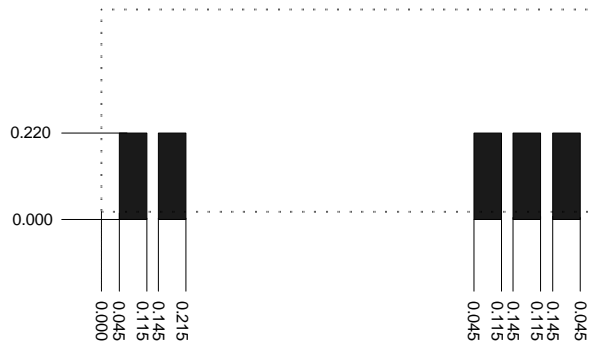


Figure 6. Foot prints for SMD mounting version (all dimensions in inch)

### NHTX401 EVALUATION KIT

The NHXX401-EVAL evaluation kit is fully assembled and tested transceiver circuit with NHRX401 receiver and NHTX401 transmitter. It is delivered common with software running under Windows® environment. See separate data sheet NHXX401.pdf.

### SUPPORT

More recent information about NHTX401 transmitter is available by using any internet browser attached to [www.neuron-ltd.com/wireless](http://www.neuron-ltd.com/wireless).

We also provide customer support by e-mail: [wireless@neuron.com.pl](mailto:wireless@neuron.com.pl).

### DOCUMENT VERSION

This document is a version 1.0 of the data sheet.

The document date is December 2000.

This document replaces the NHTX401-SEPT2000 document and all previous.

For more recent data sheet as well application notes see at [www.neuron-ltd.com/wireless](http://www.neuron-ltd.com/wireless)



## HYBRID RADIO TRANSMITTER NHTX401

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