# SmartRadio Telemetry Module

Features

- 8 Channel transceiver module

- Range up to 1,000 metres

- 8 Digital input/outputs

- Receiver outputs mirror transmitter inputs

- Minimal external components

- Secure data protocol

- Ultra low power 1.8—3.6V

- CE compliant for licence free use

- Easy pairing process

- One to one and one to many operation

- 869.5MHz operating frequency

- +13dBm transmit power

- Single in line module
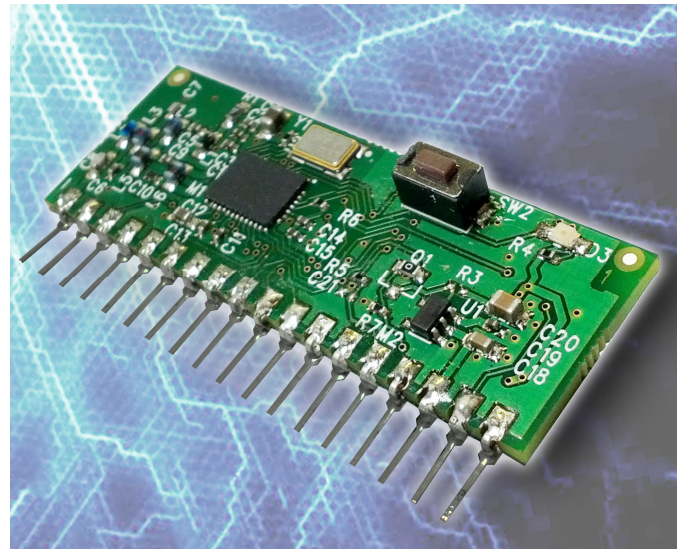
Applications

- Remote Control

- Remote Networking

- Remote Switching

- Remote Traffic Lights

The BRAVO-T telemetry module provides a reliable transceiver based industrial remote switch with up to 1,000 metres range. Two or more modules may be combined to provide a simple or complex network of radio switches.

Part No	Description
BRAVO-T868	Radio telemetry module SIL package

Pin out
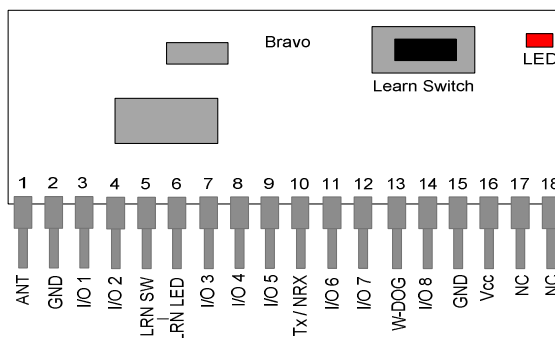
Pin Description

Pin No	Name	Direction	Description
1	ANT	In	Antenna input/output 50ohm impedance
2, 15	GND	In	Connect to ground
3, 4, 7, 8, 9, 11, 12 14	I/O1-8	In / Out	**When configured as transmitter:Active low** Digital inputs: high impedance inputs **When configured as receiver: Active High** Digital outputs: LVCMOS output drive
5	LRN SW	In	Learn switch input: connection to an external, optional learn switch. If on board switch or to be used this input can be left unconnected
6	LRN LED	Out	Optional LED drive output Mirrors on-board LED
10	TX/RX	In	Connect to Vcc : Module is a transmitter Connect to GND : Module is a receiver
13	W-DOG	In / Out	Transmitter= Input Connect to Vcc : Watchdog is disabled Connect to GND : Watchdog is enabled Receiver= Output High : Watchdog is healthy Low : Watchdog Fault!
16	Vcc	In	Supply voltage
17,18	N/C	N/A	Leave unconnected

General description of operation

Each module can be set to act as a ' transmitter' or 'receiver' A telemetry system is achieved when two modules are paired together, as transmitter (BRAVO-Tx) and receiver (BRAVO-Rx). Each time any input changes on the BRAVO-Tx, it will transmit the status of ALL inputs to the paired BRAVO-Rx(s). The BRAVO-Rx(s) which will set their outputs to match the BRAVO-Tx inputs. After each state change the modules will return to sleep mode.

Note: All of the 8 channels are common to all modules in a system

Example: If you are using a system with two or many Bravo modules each channel be will common to all modules ie. if you change state on transmitter input 8, then all receiver output 8's will also change state.

BRAVO Configured as a TRANSMITTER

1.   Operation

When configured as a transmitter the BRAVO module will automatically default to low power sleep mode until any input state change takes place.

On receipt of an input state change the BRAVO-Tx will transmit a packet showing the state of all inputs at the time of the change (multiple input changes may take place simultaneously)
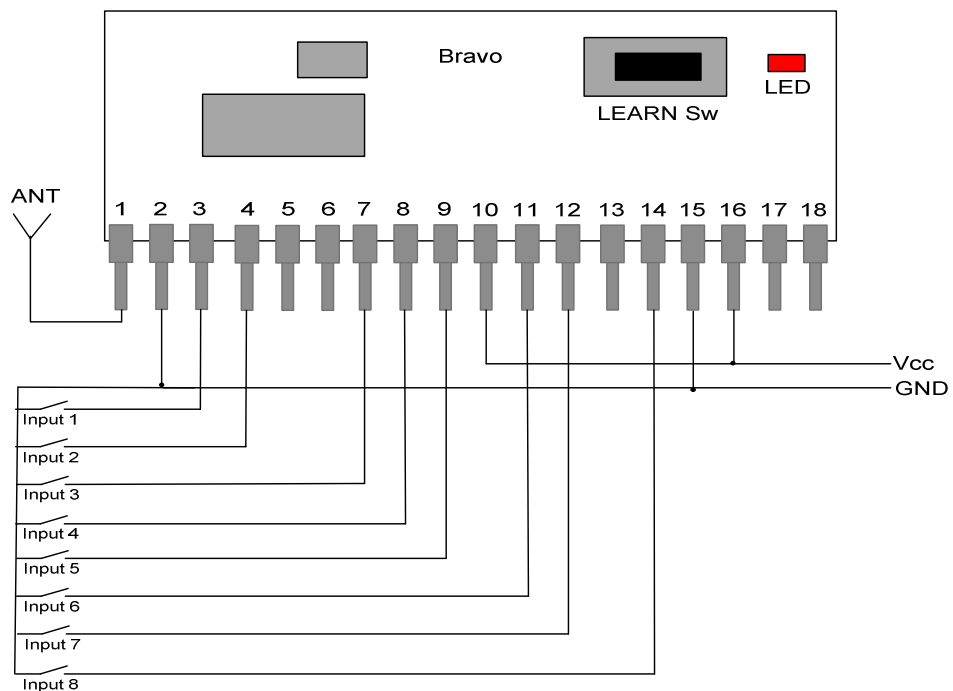
1.1   Watchdog

If watchdog is enabled the Bravo-Tx will transmit a background packet containing the current status of the inputs every 5 minutes.

1.2   Digital Inputs

High impedance inputs, LVCMOS / LVTTL compatible, 5V tolerant.

Can be connected directly to CMOS/TTL logic or switch inputs connected to 0V or VCC

A change on the input will cause the BRAVO-Tx to wake, read all inputs and initiate RF transmission.

Transmitter Application circuit example

Description:

This example shows a BRAVO module

configured as a transmitter with all 8 inputs connected and watchdog disabled.

Notes:

All input switches would need to be connected to GND to activate.

BRAVO Configured as a RECEIVER

1.   Operation

When configured as a receiver the BRAVO module will remain in a low power listening mode. When a valid packet is received it will wake and action any output state changes required.

2.   Watchdog enabled

If "watchdog" is enabled the BRAVO-Rx will await a signal from a paired BRAVO-Tx module. When the Watchdog signal is received OK then the watchdog output will be maintained active high.
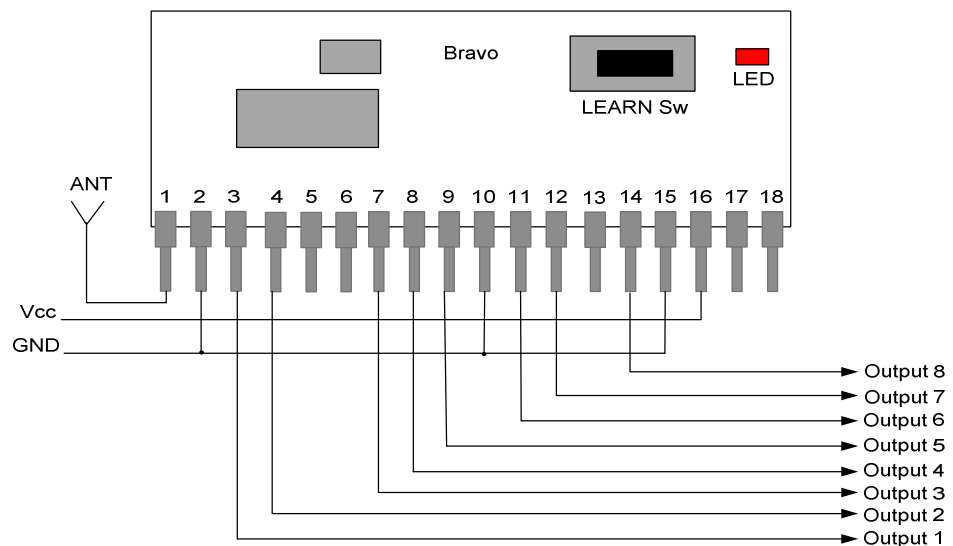
If no watchdog signal is received in any 30minute period then the BRAVO-Rx will drop the Watchdog output.

NOTE: watchdog must be enabled on BOTH Tx and Rx for it to work.

Digital outputs

Active high LVCMOS / LVTTL compatible outputs. Can be connected directly to CMOS/ TTL logic or drive.
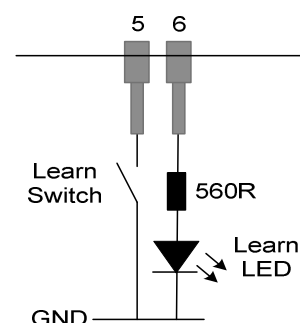
Receiver example application circuit

Description:

This example shows a BRAVO module configured as a receiver with all 8 outputs connected and watchdog disabled.

Note: The external learn switch and LED are also not fitted in this example.

Optional external learn switch and LED example circuit

Pairing Process Bravo-Tx to Bravo-RX

Each BRAVO module has a unique serial number identity. They may be paired together using the LEARN button/input so that they operate in systems in: one:one, one:many   and many:one formats. Each BRAVO-Rx can store 70 BRAVO-Tx identities.

Note: "watchdog" should not be enabled for many to one systems

3.1 Pairing process: Learn:
1.   Briefly press the "LEARN" switch (or activate LEARN input) on the BRAVO-Rx
2.   Briefly activate any input on the BRAVO-Tx

Paring process: Erase
1.   Press and Hold 'LEARN' switch (input) on the receiver for more than 10seconds.

3.2 LED indication of the pairing process is given by:

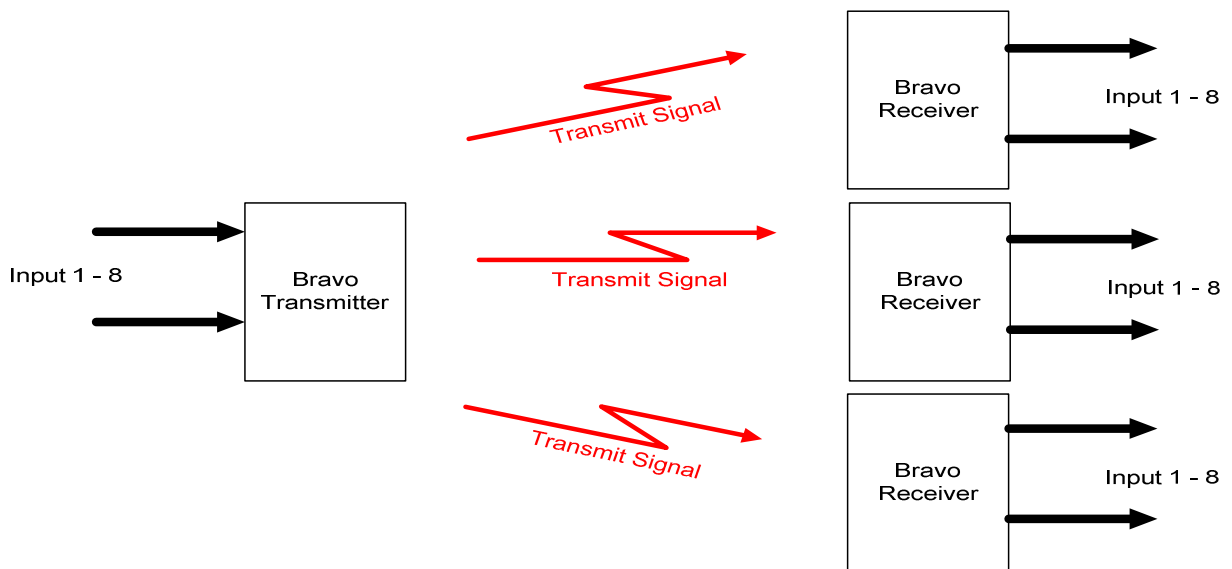| Mode	LED	Description
Normal operation	Flickering ON	Module is transmitting or receiving data
	OFF	No RF data is being transmitted/received
Learn mode (BRAVO-Rx only)	Flashing at low speed	BRAVO-RX Learn button pressed: module is searching for another to pair with. Learn mode times out after 10 seconds
	Flashing at high speed for 3secs	BRAVO-Rx pairing successful

Operational application examples

Application example one:one operation

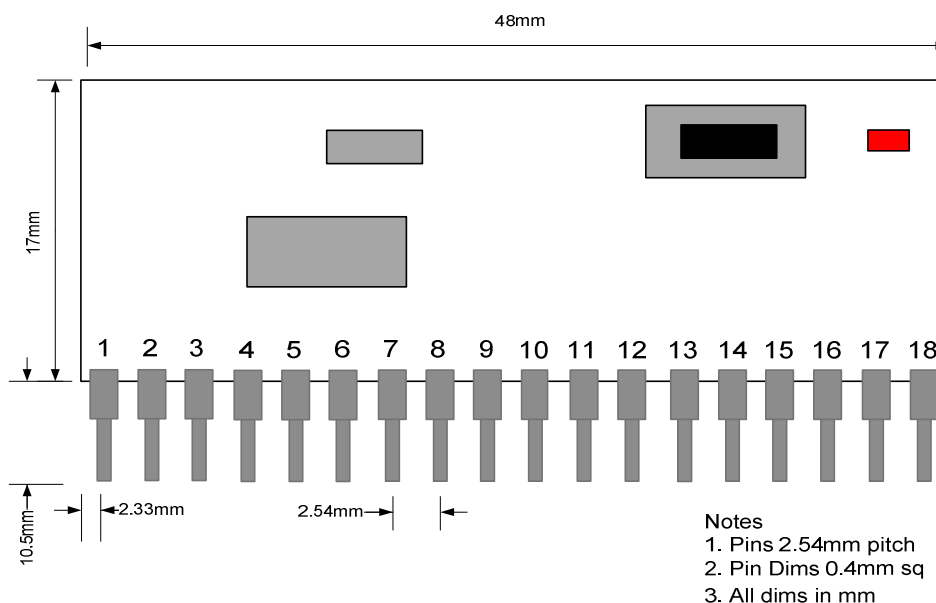**Input 1 - 8** → **Bravo Transmitter** → *Transmit Signal* → **Bravo Receiver** → **Output 1 - 8**

In this application the outputs at the receiver will match the inputs at the transmitter.

Application example: one:many operation

Input 1 - 8 → **Bravo Transmitter**

Transmit Signal → **Bravo Receiver** → **Input 1 - 8**

Transmit Signal → **Bravo Receiver** → **Input 1 - 8**

Transmit Signal → **Bravo Receiver** → **Input 1 - 8**

In this application the outputs at each of the receivers will track the inputs at the transmitter.

Mechanical Dimensions

48mm

17mm

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |

2.33mm   2.54mm

10.5mm

Notes
1. Pins 2.54mm pitch
2. Pin Dims 0.4mm sq
3. All dims in mm

Range

The antenna choice and position directly affects the system range, keep it clear of any large metal parts . The best position is protruding vertically from the top of the product. This is often not desirable for practical reasons and thus a compromise may be needed. Note that the space around the antenna is as important as the antenna itself. All radio systems are dependent on a radio signal being received through airspace.

The range quoted is the optimal in direct line of sight without obstacles and in good atmospheric conditions.

Range is affected by many things, for example local environmental conditions, atmospheric conditions, interference from other radio transmitters. For evaluating the local environment please see our RF Meter (DS006)

In very worse case applications the range quoted may be reduced dramatically below the optimal range stated.

Recommended Antenna 868MHz

We have a range of antennas on 868Mhz that are suitable for use with the Bravo modules.

To view our range please visit our website:

http://www.rfsolutions.co.uk/acatalog/868MHz_Antenna.html
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Technical Specifications

Absolute Maximums:
Temperature Range: Storage –50 to +125°C.

Parameter		Min	Max	Units
Supply Voltage		-0.3	4.0	V
Voltage on any Input	Vcc > 2.2V		5.8	V
	Vcc < 2.2V		Vcc+3.	V
Max Input power (through RX antenna)			+5	dBm
Max Current Sourced / Sunk (Per I/O)			100	mA
Max Current Sourced / Sunk (Total)			200	mA

DC Characteristics

Parameter	Min	Typical	Max	Units
Supply Voltage	1.8		3.6	V
Operating Temperature	-40		+85	°C
BRAVO- Tx Supply Current:				
When Transmitting		30		mA
When sleeping		11		uA
BRAVO- Rx Supply Current:				
When Receiving		18.5		mA

AC Characteristics

Parameter	Min	Typical	Max	Units
Operating Frequency		869.5		MHz
Operating Temperature	-40		+85	°C
BRAVO- Tx Output Power			+13	dBm
BRAVO- Tx—Rx FSK Raw RF Data Rate			9.6	Kbps
BRAVO- Rx Sensitivity		-121		dBm

Reader Response

It is our intention to provide you with the best documentation possible to ensure successful use of your RF Solutions product.

If you wish to provide your comments on organisation, clarity, subject matter, and ways in which our documentation can better serve you, please email us your comments to the Technical Publications Manager

Application:

Would you like a reply? Y / N

Datasheet: DS-BRAVO-T-1

Questions:

1. What are the best features of this document?

2. How does this document meet your hardware and software development needs?

3. Do you find the organization of this document easy to follow? If not, why?

4. What additions to the document do you think would enhance the structure and subject?

5. What deletions from the document could be made without affecting the usefulness?

6. Is there any incorrect or misleading information (what and where)?

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