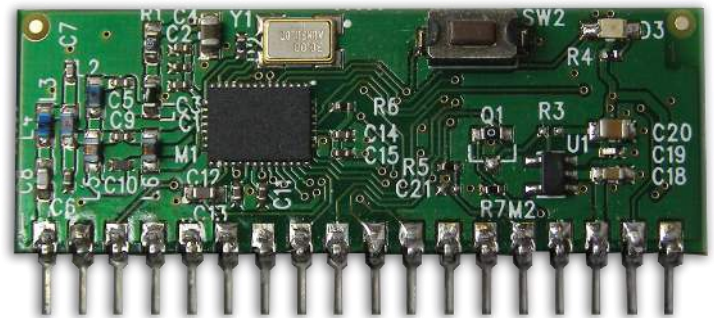


SmartRadio Telemetry Module

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
- Easy pairing process
- One to one and one to many operation
- 869.5 / 915MHz* operating versions
- +13dBm transmit power
- Single in line module
- Incorporates Self Test Mode
- CE compliant for licence free use
- FCC Approved for use in USA (TBC)*



Applications

- Remote Control
- Remote Networking
- Remote Switching
- Remote Traffic Lights

Description

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.

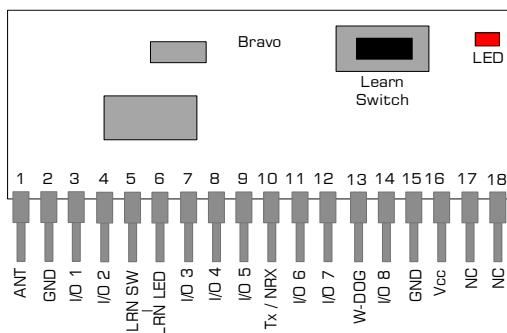
Ordering Information

Part No	Description
BRAVO-T868	Radio telemetry module SIL package 868MHz
BRAVO-T915 (TBC)*	Radio telemetry module SIL package 915MHz (TBC)*

BRAVO Telemetry Module



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: Normally 'high' momentary connect to Ground to enter Learn Mode. 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	N/C	N/A	Leave unconnected
18	NC	In	TX MODE ONLY
	MOM/LTCH	In	In RX MODE ONLY Momentary mode pull pin low - Connect to GND LATCH mode pull pin high - Connect to VCC

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 input status to the paired BRAVO -Rx(s). The BRAVO-Rx(s) which will set their outputs to match the BRAVO-Tx input. 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 changed input/s (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.

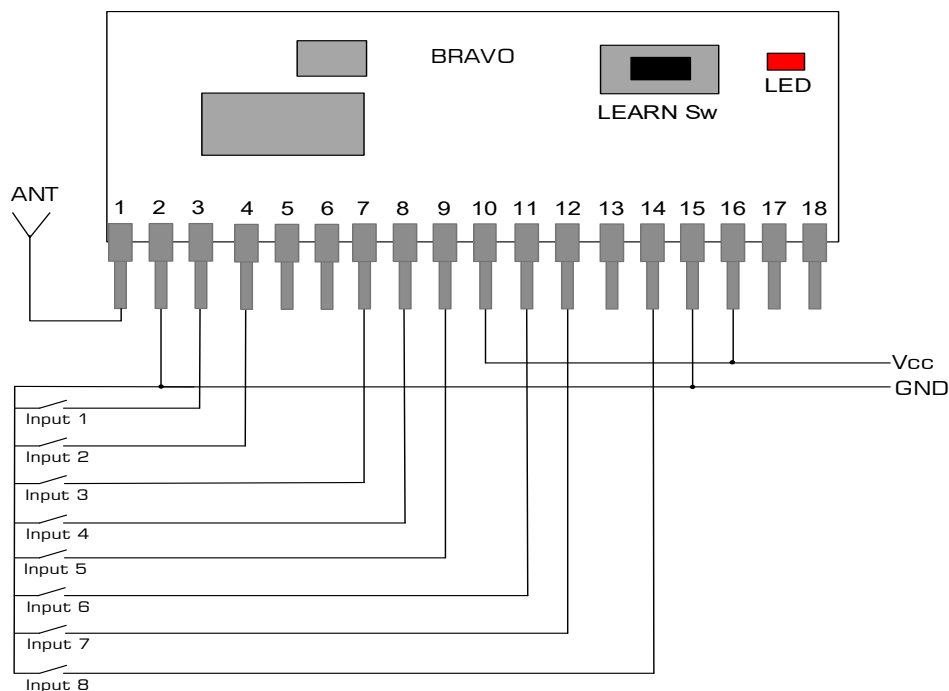
1.2 Digital Inputs

High impedance inputs, LVCMOS / LVTTTL 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 Telemetry Module



BRAVO Configured as a RECEIVER

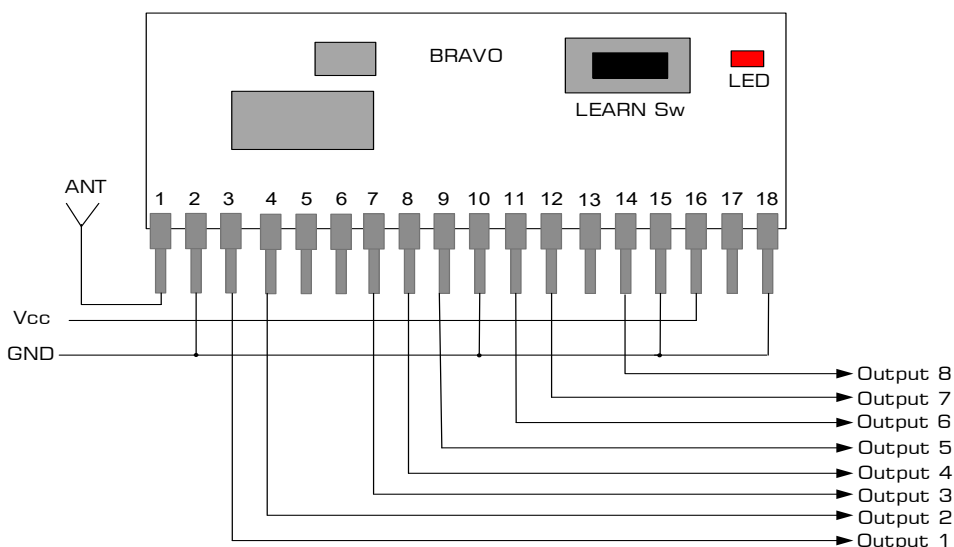
Watchdog

BRAVO-Rx will await a Watchdog signal from a paired BRAVO-Tx module. When the Watchdog signal is received, 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. Other outputs are unaffected.

Digital outputs

Active high LVCMOS / LVTTTL compatible outputs. Can be connected directly to CMOS/TTL logic or drive.

Receiver example application circuit

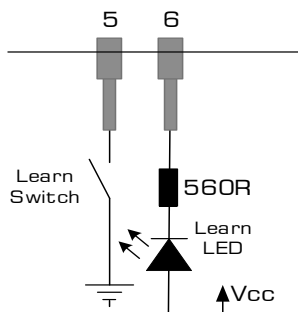


Description:

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



BRAVO Telemetry Module



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 :

1. Briefly press the "LEARN" switch (or activate LEARN input) on the BRAVO
2. After you release the learn button, the LEARN LED will flash once
3. This shows that output 1 is selected.
4. Press the LEARN button again, after it is released the Learn LED will flash twice, Continue in the same way to select outputs up to 8.
5. With your chosen output selected, briefly activate the input that you wish to pair.
6. The LEARN LED will flash quickly to show that pairing is complete.
7. Repeat the process to all required pairings

Pairing Process Bravo-RX to Handheld Transmitter

When pairing the BRAVO as a receiver to a handheld transmitter, such as our FOBBER or ELITE. The pairing process is completed manually (meaning you can pair any transmitter button, to any desired I/O).

3.1 Pairing process:

1. Briefly press the "LEARN" switch (or activate LEARN input) on the BRAVO
2. After you release the learn button, the LEARN LED will flash once
3. This shows that output 1 is selected.
4. Press the LEARN button again, after it is released the Learn LED will flash twice, Continue in the same way to select outputs up to 8.
5. With your chosen output selected, briefly press the button on the handset that you wish to pair.
6. The LEARN LED will flash quickly to show that pairing is complete.
7. Repeat the process to all required pairings.

3.2 Paring process: ERASE:

1. Press and Hold 'LEARN' switch (or input) on the BRAVO for more than 10 seconds.
2. The LEARN LED will start flashing to show that erase is complete
3. Release the **LEARN** switch.

Notes: The maximum number of pairings is 15. One pairing is counted as a single button output association Pairings can be on one or many handsets.

3.3 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

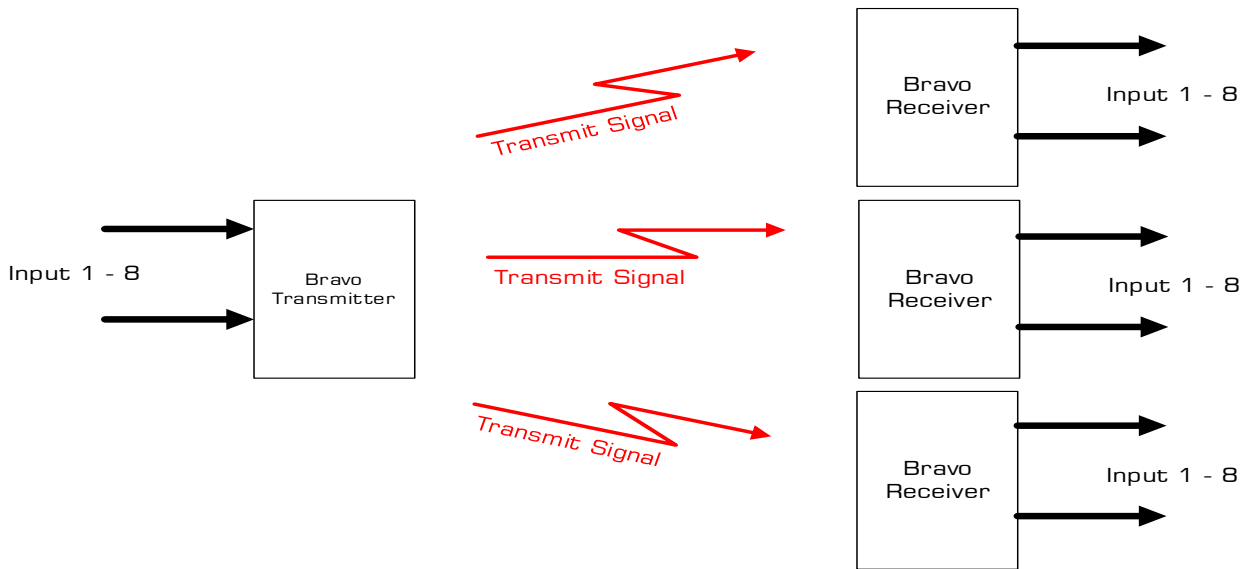
Operational application examples

Application example one:one operation



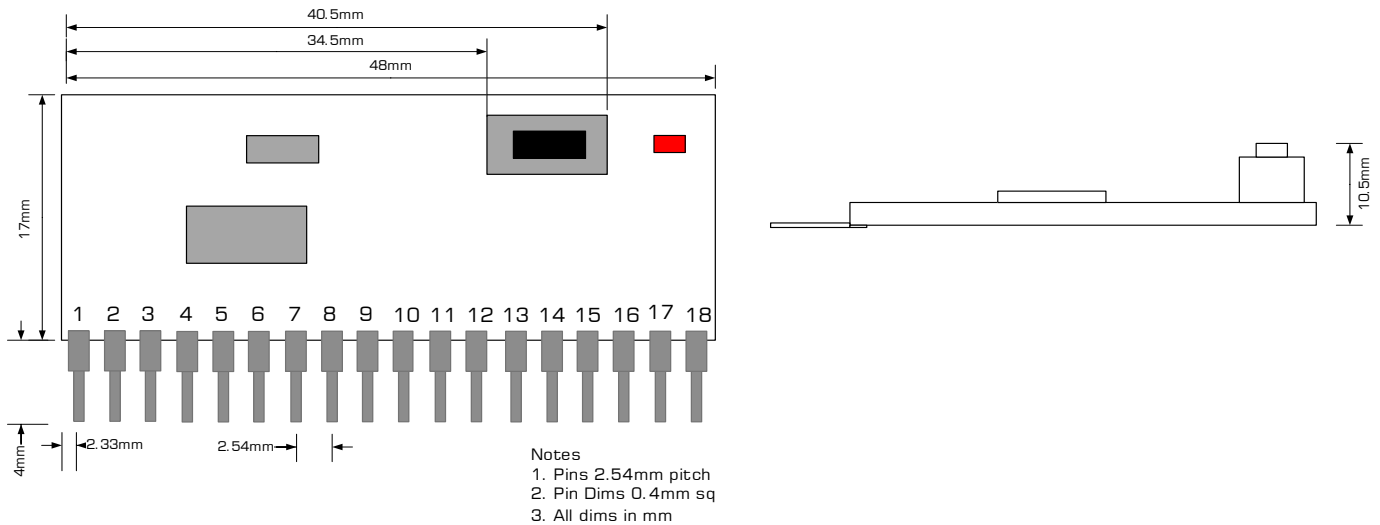
In this application the outputs at the receiver will match the inputs at the transmitter.

Application example: one:many operation



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

Mechanical Dimensions



Range Considerations

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.

Self Test Mode

The Bravo Module incorporates a self test which is initiated by applying power with the learn Button being held down.

The Bravo Module then performs the following functions;

1. All I/O are set to outputs and are operated
2. in a traffic light sequence 0 to 8 to 0 again.
3. 4 on 4 off sequence
4. Transmits a full power RF signal for 10 seconds and operates the Learn LED
5. Enters RSSI (Received signal Strength) mode where outputs 1-8 are activated as a bar graph type output according to the strength of a valid RF signal received (from any carrier operating at the appropriate frequency (869.50MHz or 915MHz)
6. A Reset will be required to Exit

BRAVO Telemetry Module



Technical Specifications

Absolute Maximums:

Temperature Range: Storage -50 to +125°C.

DC Characteristics

Parameter	Min	Max	Units
Supply Voltage	-0.3	3.6	V
Voltage on any Input	$V_{cc} > 2.2V$	5.8	V
	$V_{cc} < 2.2V$	$V_{cc}+3.6$	V
Max Input power (through RX antenna)		+5	dBm
Max Current Sourced / Sunk (Per I/O)		10	mA
Max Current Sourced / Sunk (Total)		20	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		6		uA
BRAVO- Rx Supply Current:				
When Receiving		24		mA

AC Characteristics

Parameter	Min	Typical	Max	Units
Operating Frequency		869.5		MHz
Operating Freq for 915Mhz version	915.00		915.27	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

Simplified Declaration of Conformity (RED)

BG - С настоящото RF Solutions Limited декларира, че този тип радиосъоръжение дефинирани в този документ е в съответствие с Директива 2014/53/EC. Цялостният текст на ЕС декларацията за съответствие може да се намери на следния интернет адрес: www.rfsolutions.co.uk

CS -Tímto RF Solutions Limited prohlašuje, že typ rádiového zařízení definované v tomto dokumentu je v souladu se směrnicí 2014/53/EU. Úplné znění EU prohlášení o shodě je k dispozici na této internetové adrese: www.rfsolutions.co.uk

DA - Hermed erklærer RF Solutions Limited, at radioudstyrstypen defineret i dette dokument er i overensstemmelse med direktiv 2014/53/EU. EU-overensstemmelseserklæringens fulde tekst kan findes på følgende internetadresse: www.rfsolutions.co.uk

DE - Hiermit erklärt RF Solutions Limited, dass der Funkanlagentyp in diesem Dokument definiert der Richtlinie 2014/53/EU entspricht. Der vollständige Text der EU-Konformitätserklärung ist unter der folgenden Internetadresse verfügbar: www.rfsolutions.co.uk

EL - Με την παρούσα ο/η RF Solutions Limited, δηλώνει ότι ο ραδιοεξοπλισμός ορίζεται σε αυτό το έγγραφο πληροί την οδηγία 2014/53/ΕΕ. Το πλήρες κείμενο της δήλωσης συμμόρφωσης ΕΕ διατίθεται στην ακόλουθη ιστοσελίδα στο διαδίκτυο: www.rfsolutions.co.uk

EN - Hereby, RF Solutions Limited declares that the radio equipment type defined within this document is in compliance with Directive 2014/53/EU. The full text of the EU declaration of conformity is available at the following internet address: www.rfsolutions.co.uk

ES - Por la presente, RF Solutions Limited declara que el tipo de equipo radioeléctrico definido dentro de este documento es conforme con la Directiva 2014/53/UE. El texto completo de la declaración UE de conformidad está disponible en la dirección Internet siguiente: www.rfsolutions.co.uk

ET -Käesolevaga deklareerib RF Solutions Limited, et käesolev raadioseadme tüüp määratletud selles dokumendis vastab direktiivi 2014/53/EL nõuetele. ELi vastavusdeklaratsiooni täielik tekst on kättesaadav järgmisel internetiaadressil: www.rfsolutions.co.uk

FI -RF Solutions Limited vakuuttaa, että radiolaitetyyppi määriteltä selles dokumendis on direktiivin 2014/53/EU mukainen. EU-vaatimustenmukaisuusvakuutuksen täysimittainen teksti on saatavilla seuraavassa internetosoitteessa: www.rfsolutions.co.uk

FR - Le soussigné, RF Solutions Limited, déclare que l'équipement radioélectrique du type défini dans ce document est conforme à la directive 2014/53/UE. Le texte complet de la déclaration UE de conformité est disponible à l'adresse internet suivante: www.rfsolutions.co.uk

HR - RF Solutions Limited ovime izjavljuje da je radijska oprema tipa definirani u ovom dokumentu u skladu s Direktivom 2014/53/EU. Cjeloviti tekst EU izjave o skladnosti dostupan je na sljedećoj internetskoj adresi: www.rfsolutions.co.uk

HU - RF Solutions Limited igazolja, hogy a dokumentumban meghatározottak szerint típusú rádióberendezés megfelel a 2014/53/EU irányelvnek. Az EU-megfelelőségi nyilatkozat teljes szövege elérhető a következő internetes címen: www.rfsolutions.co.uk

IT - Il fabbricante, RF Solutions Limited, dichiara che il tipo di apparecchiatura radio definito all'interno di questo documento è conforme alla direttiva 2014/53/UE. Il testo completo della dichiarazione di conformità UE è disponibile al seguente indirizzo Internet: www.rfsolutions.co.uk

LT - Aš, RF Solutions Limited, patvirtinu, kad radijo įrenginių tipas apibrėžta šiame dokumente atitinka Direktyvą 2014/53/ES. Visas ES atitikties deklaracijos tekstas prieinamas šiuo interneto adresu: www.rfsolutions.co.uk

LV - Ar šo RF Solutions Limited deklarē, ka radioiekārta kas definēts šajā dokumentā atbilst Direktīvai 2014/53/ES. Pilns ES atbilstības deklarācijas teksts ir pieejams šādā interneta vietnē: www.rfsolutions.co.uk

MT - B'dan, RF Solutions Limited, niddikjara li dan it-tip ta' tagħmir tar-radju definit f'dan id-dokument huwa konformi mad-Direttiva 2014/53/UE. It-test kollu tad-dikjarazzjoni ta' konformità tal-UE huwa disponibbli f'dan l-indirizz tal-Internet li ġej: www.rfsolutions.co.uk

NL - Hierbij verklaar ik, RF Solutions Limited, dat het type radioapparaatuur gedefinieerd in dit document conform is met Richtlijn 2014/53/EU. De volledige tekst van de EU-conformiteitsverklaring kan worden geraadpleegd op het volgende internetadres: www.rfsolutions.co.uk

PL - RF Solutions Limited niniejszym oświadczam, że typ urządzenia radiowego zdefiniowane w tym dokumencie jest zgodny z dyrektywą 2014/53/UE. Pełny tekst deklaracji zgodności UE jest dostępny pod następującym adresem internetowym: www.rfsolutions.co.uk

PT - O(a) abaixo assinado(a) RF Solutions Limited declara que o presente tipo de equipamento de rádio definido neste documento está em conformidade com a Diretiva 2014/53/UE. O texto integral da declaração de conformidade está disponível no seguinte endereço de Internet: www.rfsolutions.co.uk

RO - Prin prezenta, RF Solutions Limited declară că tipul de echipamente radio definit în acest document este în conformitate cu Directiva 2014/53/UE. Textul integral al declarației UE de conformitate este disponibil la următoarea adresă internet: www.rfsolutions.co.uk

SK - RF Solutions Limited týmto vyhlasuje, že rádiové zariadenie typu definované v tomto dokumente je v súlade so smernicou 2014/53/EÚ. Úplné EÚ vyhlásenie o zhode je k dispozícii na tejto internetovej adrese: www.rfsolutions.co.uk

SL - RF Solutions Limited potrjuje, da je tip radijske opreme opredeljeno v tem dokumentu skladen z Direktivo 2014/53/EU. Celotno besedilo izjave EU o skladnosti je na voljo na naslednjem spletnem naslovu: www.rfsolutions.co.uk

SV - Härmed försäkrar RF Solutions Limited att denna typ av radioutrustning definieras i detta dokument överensstämmer med direktiv 2014/53/EU. Den fullständiga texten till EU-försäkran om överensstämmelse finns på följande webbadress: www.rfsolutions.co.uk

RF Solutions Ltd. Recycling Notice

Meets the following EC Directives:

DO NOT Discard with normal waste, please recycle.

ROHS Directive 2011/65/EU and amendment 2015/863/EU

Specifies certain limits for hazardous substances.

WEEE Directive 2012/19/EU

Waste electrical & electronic equipment. This product must be disposed of through a licensed WEEE collection point.

RF Solutions Ltd., fulfills its WEEE obligations by membership of an approved compliance scheme, environment agency registration number **WEEJB0104WV**.



Disclaimer:

Whilst the information in this document is believed to be correct at the time of issue, RF Solutions Ltd does not accept any liability whatsoever for its accuracy, adequacy or completeness. No express or implied warranty or representation is given relating to the information contained in this document. RF Solutions Ltd reserves the right to make changes and improvements to the product(s) described herein without notice. Buyers and other users should determine for themselves the suitability of any such information or products for their own particular requirements or specification(s). RF Solutions Ltd shall not be liable for any loss or damage caused as a result of user's own determination of how to deploy or use RF Solutions Ltd's products. Use of RF Solutions Ltd products or components in life support and/or safety applications is not authorised except with express written approval. No licences are created, implicitly or otherwise, under any of RF Solutions Ltd's intellectual property rights. Liability for loss or damage resulting or caused by reliance on the information contained herein or from the use of the product (including liability resulting from negligence or where RF Solutions Ltd was aware of the possibility of such loss or damage arising) is excluded. This will not operate to limit or restrict RF Solutions Ltd's liability for death or personal injury resulting from its negligence.