Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832
Email & Skype: info@chipsmall.com Web: www.chipsmall.com
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China

Patents Pending
RoHS CE • ESTI
RFD21733 • FCC • IC
RFD21743 • FCC
Approved & Certified

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13715 Alton Pkwy • Irvine • CA • 92618
Tel: 949.610.0008 • www.RFdigital.com
Fast Answers: support@rfdigital.com

RFDP8 RF Module
RFD21733
RFD21735
RFD21737
RFD21738
RFD21739

RFDP8 RFDANT
RFD21742
RFD21743
RFD21772
RFD21773
KEYFOBs

Compliance Approved 2.4 GHz RF Transceiver Modules with Built-In RFDP8 Application Protocol

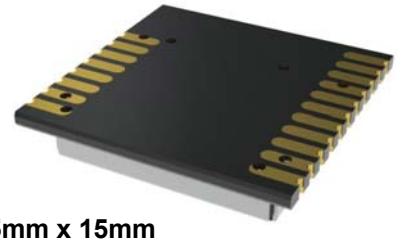
Complete Compliance Approved & Certified, READY-TO-USE, 2.4 GHz wireless solution with built-in RFDP8 interference-tolerant user application protocol. Includes RFID, 32 Bit ESN, Logic Switch Transmitter / Receiver, 9600-8N1 Serial UART Transceiver and many easy-to-use addressable network modes. No development required at all, no RF layout, no code writing, all features are built-in. Be up and running with a wireless solution in minutes.

RFD21733 IC & FCC APPROVED

CE • ESTI TESTED & COMPLIANT

500 Foot Range

Easy to solder 0.050 Inch SMT pads



15mm x 15mm
(0.600 x 0.600 Inch)

RFD21735

Optional Configuration

CE • ESTI
For use with any External Antenna

KEYFOBs & RFID

IC • FCC APPROVED
CE • ETSI Compliant
Standard & Custom

RFDANT • RFD21743 FCC APPROVED

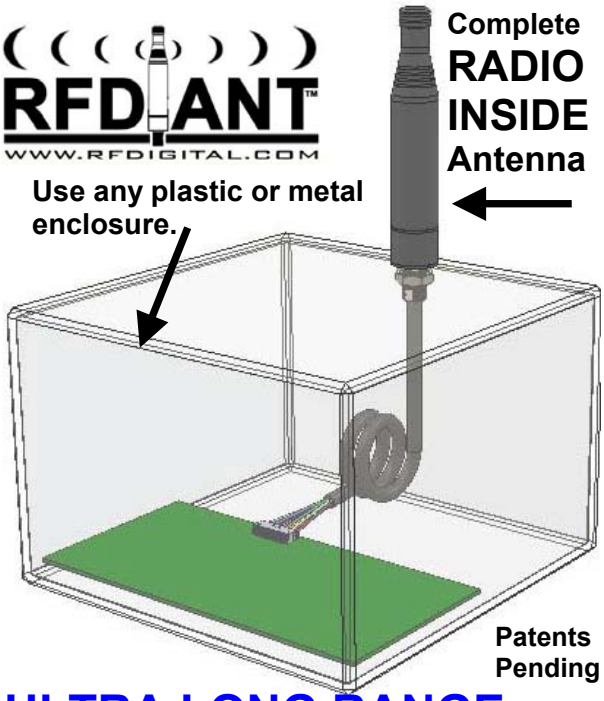
Simple Drill Hole Mount

CE • ESTI TESTED & COMPLIANT

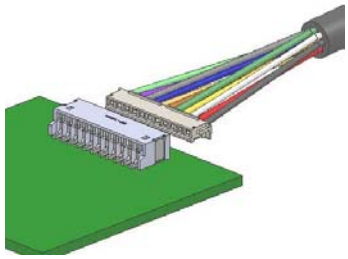
RFDANT™
WWW.RFDIGITAL.COM

Complete RADIO INSIDE Antenna

Use any plastic or metal enclosure.



Standard RFDP8 Interface



No Need for RF cables.
Only +3V • GND • Data.
1.5mm 11pin Connector.
Fits onto any PCB.
SMT or Through Hole.

Patents Pending

2,000 FOOT ULTRA LONG RANGE

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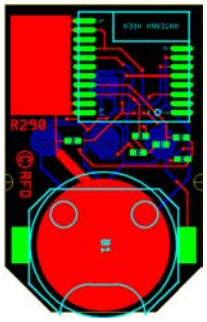
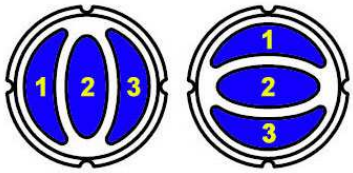
KEYFOBs

The RFD21733 Module with its RFID interval factory set to 30 seconds is inside of a KEYFOB enclosure with a CR2032 battery. The reference layout for this device is available through support@rfdigital.com if you want to build it yourself. However if you wish to purchase the ready-made KEYFOBs from RF Digital they are available, part numbers shown below.

There are two modes of use, one is in Active RFID mode were the KEYFOB automatically transmits its ESN once every 30 seconds. The other mode of use is SWITCH transmitter, which is available in 1, 2 or 3 buttons. The RFID versions also have 1, 2 or 3 buttons so they serve as an automatic RFID transmitter and in addition have the switch buttons in one KEYFOB.

If you do not need the automatic Active RFID feature, just use the Switch Button KEYFOBs.

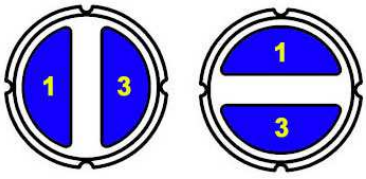




Rotatable Buttons

RFD21783	RFD21793
3 Button Switch Keyfob	3 Button RFID Keyfob

Pressing button 1, 2 or 3 will cause the output 1, 2 or 3 on the RFD21733 Module or RFD21743 / RFD21732 RFDANT to go high for the duration the button is pressed, when in one of the 4 switch modes. If in Serial UART mode, then you will receive 1 byte representing which button is pressed or if RFID transmission and 4 more bytes indicating the 32 bit unique ESN of the KEYFOB.



Rotatable Buttons

RFD21782	RFD21792
2 Button Switch Keyfob	2 Button RFID Keyfob

Pressing button 1 or 3 will cause the output 1 or 3 on the RFD21733 Module or RFD21743 / RFD21732 RFDANT to go high for the duration the button is pressed, when in one of the 4 switch modes. If in Serial UART mode, then you will receive 1 byte representing which button is pressed or if RFID transmission and 4 more bytes indicating the 32 bit unique ESN of the KEYFOB.

RFD21781	RFD21791
1 Button Switch Keyfob	1 Button RFID Keyfob

Pressing button 2 will cause the output 2 on the RFD21733 Module or RFD21743 / RFD21732 RFDANT to go high for the duration the button is pressed, when in one of the 4 switch modes. If in Serial UART mode, then you will receive 1 byte representing which button is pressed or if RFID transmission and 4 more bytes indicating the 32 bit unique ESN of the KEYFOB.

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RFDP8 RF Module	RFDP8 RFDANT
RFD21733	RFD21742
RFD21735	RFD21743
RFD21737	RFD21772
RFD21738	RFD21773
RFD21739	KEYFOBs

TYPICAL RANGE

Range results need to be tested for every application and scenario. RF Digital's range tests are done line-of-sight and outdoors in a typical city street setting. You should use these typical range test results as a point of reference, until you can conduct your own range tests in your own test environment. If you have any questions, always feel free to contact RF Digital Support at support@rfdigital.com

LONG RANGE

MODULE		MODULE
	500 FOOT RANGE ⟷ 150 Meters	
RFD21733		RFD21733

LONGER RANGE

MODULE		RFDANT
	1,000 FOOT RANGE ⟷ 300 Meters	
RFD21733		RFD21743
		RFD21742

ULTRA LONG RANGE

RFDANT		RFDANT
	2,000 FOOT RANGE ⟷ 600 Meters	
RFD21743		RFD21743
RFD21742		RFD21742

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RFDP8	RFDP8
RF Module	RFDANT
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RFD21735	RFD21743
RFD21737	RFD21772
RFD21738	RFD21773
RFD21739	KEYFOBs

TYPICAL APPLICATIONS

- Active RFID
- Long Range RFID
- Remote Control
- Light Controls
- Home Automation
- Alarm Security
- Keyless Entry
- Perimeter Monitoring
- PC Keyboard Security
- Wireless Keyboard
- Wireless Mouse
- TV Remote
- Home Stereo Remote
- Asset Tracking
- Wireless PTT
- Remote Switches
- Remote Terminals
- Wireless RS232 DB9
- Wireless RS485
- Temperature Control
- HV/AC
- Meter Reading
- Data Acquisition
- Inventory Control
- Keyfob Remotes
- Industrial Controls
- Vending Machines
- Pan-Tilt-Zoom Control
- Camera Flash Control
- Biometrics
- Seismic Monitoring
- M2M & many more…

LONG RANGE

KEYFOB / RFID	350 FOOT RANGE / 100 Meters	MODULE
		
RFD21783		RFD21733
RFD21782		
RFD21781		
RFD21793		
RFD21792		
RFD21791		

LONGER RANGE

KEYFOB / RFID	700 FOOT RANGE / 200 Meters	RFDANT
		
RFD21783		RFD21743
RFD21782		RFD21742
RFD21781		
RFD21793		
RFD21792		
RFD21791		

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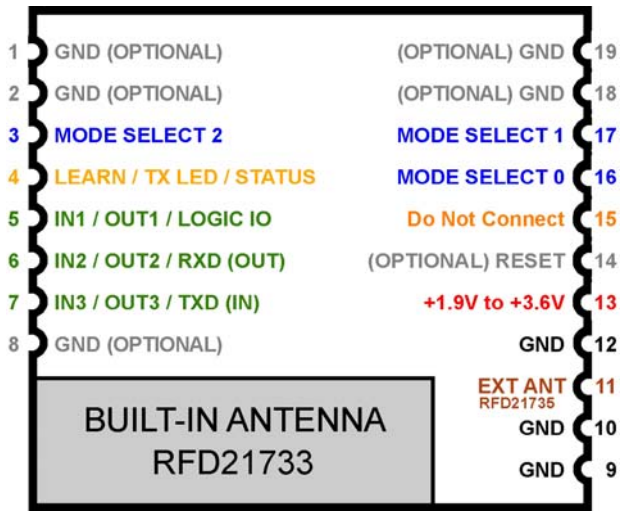
RFD21739	KEYFOBs

PINOUTs

There are 11 total active signal pins including power and ground for both MODULEs and RFDANTs. The MODULEs have 7 additional ground pins. Also the MODULES have one extra pin for a total of 19 pins, this is pin 11, which applies only to the RFD21735 which is for external antenna, however the RFD21733 pin 11 is a no-connect since it has a built-in antenna.

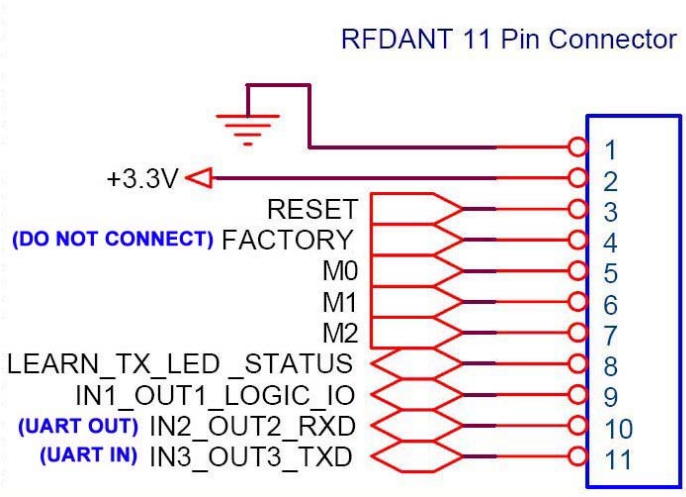
RFD21733 • RFD21735 MODULEs



RFD21733	RFD21735
	

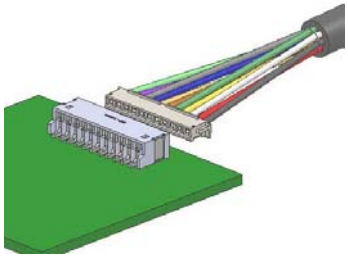
There are a total of 8 ground pins, you only need just one ground pin for an electrical connection to make the module function. The additional ground pins are for convenience and also performance with layout configurations. The pin 12, 10 and 9 are recommended to always be connected since they help provide some ground area for the module as well as on the opposing side of the antenna. However just one single ground out any of the 8 GND pins are adequate for proper function.

RFD21742 • RFD21743 RFDANTs



RFD21742	RFD21743
	

The black wire (ground) is pin #1, the red wire (+V) is pin #2, and so on. See pinout on left side.



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RFDP8 RF Module
RFD21733
RFD21735
RFD21737
RFD21738
RFD21739

RFDP8 RFDANT
RFD21742
RFD21743
RFD21772
RFD21773
KEYFOBs

FEATURES

- Runs on a single coin cell for years.
- WiFi interference tolerant.
- Heavy 2.4 GHz noise and interference tolerant.
- Motor noise and interference tolerant.
- Very low cost.
- No external parts required.
- No RF layout required.
- Easy and ready-to-use, hand-held, eval and application boards available.
- Ultra small 15mm x 15mm footprint (RFD21733/RFD21735)
- Fully contained, truly finished, ready to use module.
- CE / ETSI / IC & FCC Certified and Approved.
- Typical range: 500 feet (150 meters): RFD21733 MODULE.
- Typical range: 2,000 feet (600 meters): RFD21742 and RFD21743 RFDANTs.
- Worldwide 2.4GHz ISM band operation.
- User configurable without need for any programming.
- 2uA Ultra low power modes.
- Only 14mA current consumption at 0dbm TX and 17mA at RX.
- 16 bit CRC data accuracy verification built-in.
- 32 bit unique factory ESN in every module (4 billion combination security).
- Flexible network modes, including broadcast and individual addressing.
- Optional version available for use with external antenna (RFD21735).
- Switch on/off, logic, remote-control without the need for an external controller.
- Switch nodes individually addressable without the need for an external controller.
- Wide supply range +1.9V to +3.6V.
- Built-in, high performance internal miniature antenna (RFD21733).
- Peer to Peer (Ad-Hoc) networks and configurations.
- Point to Multi-Point networks and configurations.
- Multi-Point to Multi-Point networks and configurations.
- Selective addressing of any module by using factory built-in ESN.
- Fast-turn-around, minimal latency (20 millisecond).
- Patent pending RFDP8 interference tolerant protocol.
- Full application protocol runs transparent to the user.
- Easy to use, simple to design in.
- Stores up to 60 ESNs (Electronic Serial Numbers) for network modes.
- Many to one data modes ideal for multi-point data acquisition.
- Unlimited number of module nodes can communicate to each other.

CUSTOM Modules

RF Digital's RFDP8 application firmware loaded into the MODULEs or RFDANTs can be customized to fit application specific requirements.

RF Digital can design and manufacture fully custom modules to fit your needs.

If you do not find what you're looking for, feel free to contact RF Digital with your requirements. Email: support@rfdigital.com

FAST Support

For free RF layout design reviews, send color screen captures of your layout to support@rfdigital.com, you will save time and money before you fab your boards.

Our FAST RESPONSE Support Team welcomes your questions!

RFDP8 Application Protocol • Mode Selector Chart

RFDP8 Standard Mode Chart
© RF Digital Corp. 07.05.11 10:07 PM

Mode	Description	Mode Select Inputs 2	1	0				Learn / Status	
0	Active RFID Transmitter	0	0	0	IN 3	IN 2	IN 1	TX LED	
1	3 Input Switch Logic Transmitter	0	0	1	IN 3	IN 2	IN 1	TX LED	
2	Serial UART Transceiver, 9600, N, 8, 1	0	1	0	TXD IN	RXD OUT	LOGIC I/O	X	
3	Serial UART Transceiver, 9600, N, 8, 1	0	1	1	TXD IN	RXD OUT	LOGIC I/O	ESN LEARN	Network
4	3 Output Switch Logic Receiver - 500ms	1	0	0	OUT 3	OUT 2	OUT 1	X	
5	3 Output Switch Logic Receiver - 500ms	1	0	1	OUT 3	OUT 2	OUT 1	ESN LEARN	Network
6	3 Output Switch Logic Receiver - 20ms	1	1	0	OUT 3	OUT 2	OUT 1	X	
7	3 Output Switch Logic Receiver - 20ms	1	1	1	OUT 3	OUT 2	OUT 1	ESN LEARN	Network
	Module RFD21733 / RFD21735 Pin Number:	3	17	16	7	6	5	4	
	RFDANT RFD21742 / RFD21743 Pin Number:	7	6	5	11	10	9	8	

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RFDP8	RFDP8
RF Module	RFDANT
RFD21733	RFD21742
RFD21735	RFD21743
RFD21737	RFD21772
RFD21738	RFD21773
RFD21739	KEYFOBs

Choosing between RFD21733 Module or RFD21743 RFDANT

The RFD21733 RF Module and the RFD21742 / RFD21743 RFDANTs have the same electrical interface and are both embedded with the Patent Pending RFDP8 interference immunity protocol. They are pin for pin electrically compatible. Except for the different form factor, cost and range, they are basically the same. The RFDANTs have an 8 inch long 1.5mm, 11pin connector termination for its interface to your electronics, were the RFD21733 module has a 19 pin SMT interface and solders to your PCB. Only 11 out of the 19 pins are used for electrical interface.

The RFD21733 is only 15mm square and has a range of about 500 feet. The RFD21733 module is about one quarter the cost of the RFDANT. So why would you use the RFDANT? There are many reasons: The RFDANT is hermetically, fully potted and over-molded, has an industrial rugged enclosure and the full radio system and processing is all built into the Antenna structure itself. The RFDANTs mounting does not require a PCB at all, simply just drill a hole into your enclosure and feed the 8 inch cable through and apply a nut and your RFDANT is mounted and ready for use. The RFDANT does not have impacts from proximity effects from near-by metal enclosures and objects. The RFDANT has a perfect antenna pattern which provides extraordinary, consistent repeatable performance.

The RFDANT's Revolutionary Patent Pending design enables it to reach distances of 2,000 feet, while still being an Ultra Low Power device. This huge range is reached without any power amplifiers at all, it's unique design is responsible for it reaching these great distances without any extra battery drain or extra power. The RFDANT makes it easy for you to satisfy GREEN directives due to its unique design and ultra high performance.

The RFDANT fits in the palm of your hand and looks like an Antenna, but of course it is much more since it is the whole radio and processing system in one unit. There are no RF cables at all, simply connect +V, GND, and a few logic signal wires based on your application and you are done. There is no need for PCB layout either. You can directly connect to the 11 pin, 8 inch cable extending out of the bottom of the RFDANT.

The RFD21733 is an ideal partner with the RFD21743 or RFD21742 RFDANTs. They can communicate with each other using the RFDP8 protocol with switch logic IO or Serial UART. You can mix and match them as well, with using RFD21733 on one end of your system and an RFDANT on the other.

The RFD21733 is a perfect fit when you need ultra small size and ultra low cost, and the RFDANT is an ideal solution when you need ultra long range and do not want to place any parts onto your PCB.

Even if you will not be using the RFDANT for your application, it is still highly recommended to place the 11 pin connector footprint on your PCB for the RFD21733 so you can have the option to simply plug in the RFDANT for testing during your proto phases, or if you happen to have a customer come to you and ask for more range, you can simply give it to them by not soldering the RFD21733 and instead plugging in the RFD21742 or RFD21743 RFDANT.

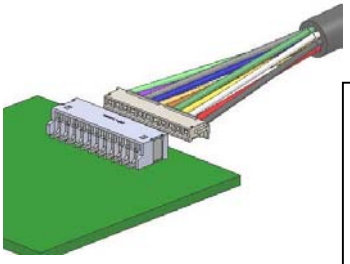
If you have further questions about the trade offs between the Modules and the RFDANTs, always feel free to contact support@rfdigital.com were you will find very quick and helpful answers to your questions.

RFD21733 Module

Solders to your PCB with its SMT pads.

RFD21742 or RFD21743 RFDANT

Plugs into your PCB using its 8 inch long cable.



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Differences between RFD21742 and RFD21743 RFDANTs

The RFD21742 and RFD21743 are 100% identical hardware, the only difference between the two is firmware loaded at the RF Digital factory.

The RFD21742 is in compliance with CE / ETSI emission requirements and is not for FCC.

The RFD21743 is in compliance with CE / ETSI emission requirements and is FCC Certified and Approved.

The high performance of the RFDANT for FCC requires it to work in a 50% duty cycle mode, which means that when you are running it in its 9600-8N1 UART mode, you can send up to 24 bytes in a row and then you must wait a minimum of 24 byte lengths which is about 24mS before you send up to another 24 bytes. For example you can also send 12 bytes, wait 12mS and then send 12 bytes again, effectively yielding a 50% duty cycle. Note this is only a transmit limitation with the RFDANT, it is not related to receive, so if you have a RFD21733 sending 100% duty cycle at full speed, you can receive that with either RFDANT and it will be fine. But when you go to transmit, if you are using the RFD21743 you will need to use a maximum of a 50% duty cycle for the USA and FCC. However when using the RFD21742 which is for Europe and the CE / ETSI markets, there is no duty cycle limitation.

That is the reason there are two part numbers for the RFDANT, the RFD21743 is 50% UART duty cycle for FCC and the RFD21742 is CE and ETSI with 100% duty cycle.

So if you plan on selling into the USA market place, then use the RFD21743, if you are Europe ONLY, then you can use the RFD21742. Also, of course you can use the RFD21743 for USA and Europe.

If you are sending in switch mode using the RFD21742, it will send a new packet every 16mS and the hang time for a switch receiver in mode 6 or 7 is 50mS. Where with the RFD21743 it will send a new packet every 24mS to work within the 50% duty cycle limit for FCC and IC.

If you require Canada (IC) Approval for the RFD21743, please contact sales@rfdigital.com.

The impact with switch mode is hardly even noticed between the RFD21743 and RFD21742.

Most common applications are typically with burst data less then 24 bytes per burst, so the difference between the RFD21743 and RFD21742 is negligible, nevertheless the choice is still available for you and they are pin for pin compatible.

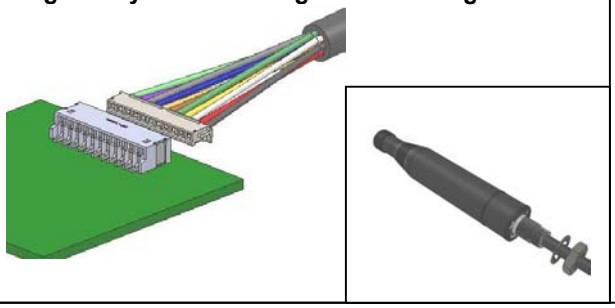
Once you test an RFDANT, you will be truly amazed with its performance.

FCC

CE • ETSI

RFD21743 RFDANT

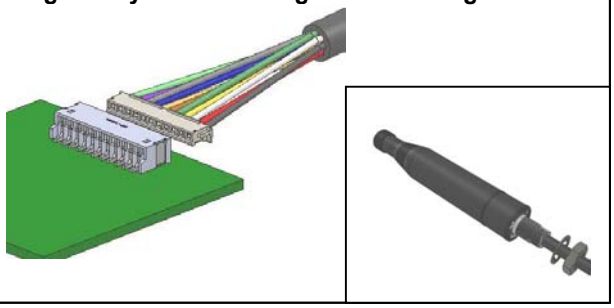
Plugs into your PCB using its 8 inch long cable.



CE • ETSI

RFD21742 RFDANT

Plugs into your PCB using its 8 inch long cable.



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Revolutionary RFDANT Advantages

The RFD21743 and RFD21743 RFDANT are full 2.4 GHz radio transceivers including the RFDP8 protocol, completely built into an antenna form factor allowing the entire radio transceiver to be outside your product, where only the power and signal cable will extend into your product enclosure to then be connected to your PCB with a simple 1.5mm SMT or THROUGH HOLE connector.

The RFD21742 and RFD21743 is functionally identical to the RFD21733 module and the RFD21772 and RFD21733 Eval Boards work just like the RFD21737 Eval Board except it has an 11 pin 1.5mm connector on it so the RFD21742 or RFD21743 RFDANT can plug into it. The RFD21772 is the Eval board for the RFD21742 and the RFD21773 is the Eval board for the RFD21743. The RFD21772 and RFD21773 each include one RFDANT. You need a pair for a complete system.

The RFD21742 and RFD21743 RFDANTs have been range tested at 2,000 feet which is 4x the range of the RFD21733 which is at 500 feet. No special PCB layout is needed for the RFD21742 or RFD21743 RFDANT, simply just put a connector on your PCB and you are done . All this substantial range increase is achieved all without any increase in current or battery consumption.

The RFDANT is RF Digital's Patent Pending Radio Inside Antenna product, which is a complete radio transceiver and antenna mounted inside of an antenna enclosure, suitable for mounting to virtually any type of end-product, regardless if the enclosure is plastic, metal, glass, really any material.

The entire radio transceiver is mounted inside the antenna enclosure, so there is no loss of RF power to the antenna from the module, and results in the most effective power transfer ratio possible, providing lowest power consumption possible to achieve a specific range.

The radio being inside of the antenna and outside the enclosure allows for more room inside the enclosure for the designers application electronics.

Minimal interference with the internal electronics of the enclosure results in better range and performance of the wireless system.

The actual effective antenna is pushed away from the enclosure, which reduces the effect of holding the enclosure, therefore improving the performance, range and predictability of the users wireless system.

Logic level signals are communicated through an unshielded cable (not coax) to the RFDANT, which can be run for long distances without any loss to the performance of the wireless transceiver.

By the antenna and module being fully outside allows for easy retrofit of nearly any product due to it not consuming any internal space inside the enclosure, drill a hole and screw it in, add a nut inside to secure it and wire the logic level signals to your electronics.

Mount on metal or plastic enclosures with no worry about ground effects.

Stable Antenna Pattern providing substantial, well-distributed, passive-gain for transmit and receive, results longer repeatable range from your wireless system.

For free Schematic and Layout design reviews, send color screen captures or PDFs of your schematic and layout to support@rfdigital.com. RF Digital's Support and Application Engineers are ready to help you get your wireless application running to today. Just send your application questions to support@rfdigital.com and receive direct, fast and accurate answers. We look forward to helping you!!!

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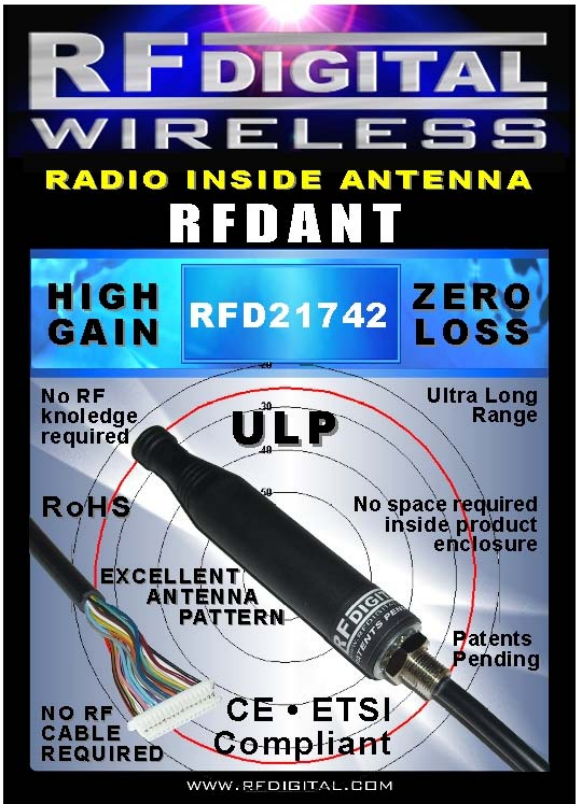
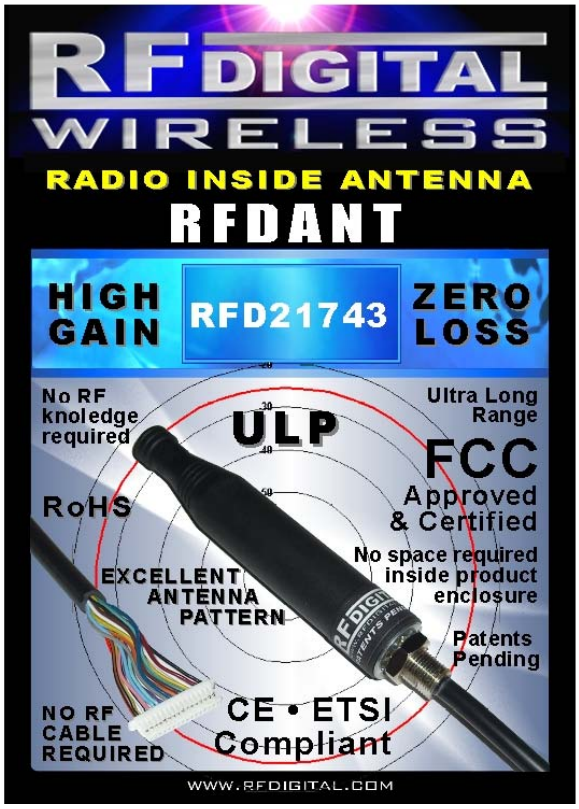
RFDANT • RFD21742 • RFD21743 • Compliance Approved





RFDANT • RFD21742 • RFD21743 • Mating Connectors

Mating connectors for the 11 pin RFDANT can be found at Digikey in the USA at: http://www.digikey.com or at any other JST distributor. They are standard connectors and you may use other manufacturers.

1) Top Entry, Through Hole Type, 11 pos
a. Digikey P/N 455-1666-ND
b. Manufacturer P/N: B11B--ZR

2) Side Entry, Through Hole Type, 11 pos
a. Digikey P/N 455-1678-ND
b. Manufacturer P/N: S11B--ZR

3) Top Entry, SMT Type, 11 pos
a. Digikey P/N 455-1690-2-ND
b. Manufacturer P/N: B11B—ZR-SM4-TF

4) Side Entry, SMT Type, 11 pos
a. Digikey P/N 455-1701-2-ND
b. Manufacturer P/N: S11B—ZR-SM4-TF

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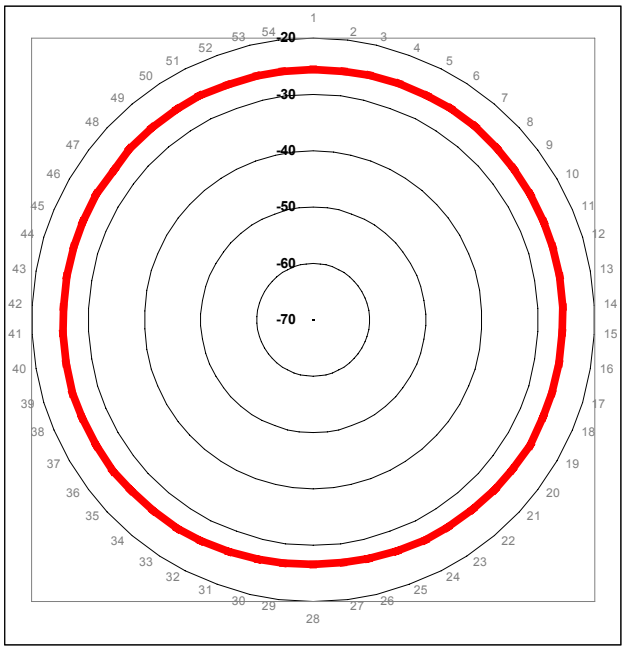
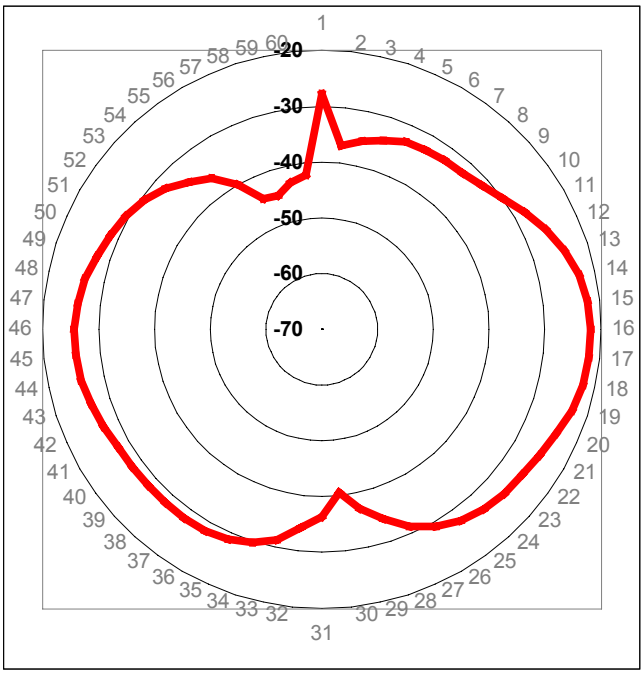
RFDANT • EXCELLENT ANTENNA PATTERNS



Horizontal Antenna Pattern



Vertical Antenna Pattern

RFDANT RFD21742 and RFD21743 high performance antenna patterns are easily achieved without any RF considerations or knowledge because the 11 pin cable and connector only carries power and data signals so NO RF cable loss at all. RF Digital's Patent Pending RFDANT design is the only device in industry which can achieve this outstanding performance.

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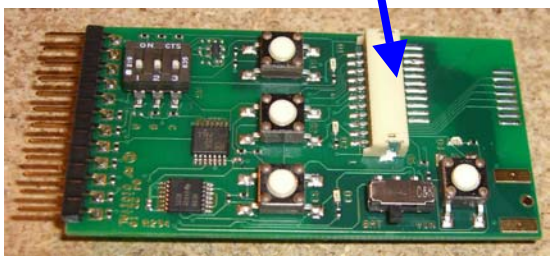
RFD21772 & RFD21773 Eval Boards for RFDANT

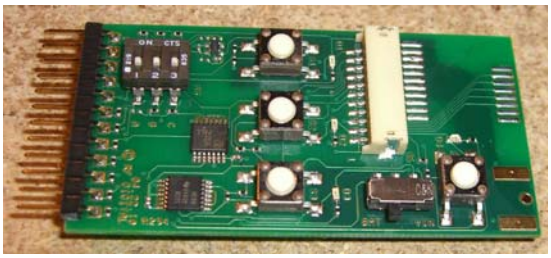
RFD21772 / RFD21773 Eval board with RFDANT 11 pin connector.



RFD21772 / RFD21773 Eval board with RFDANT cable plugged into the 11 pin connector.

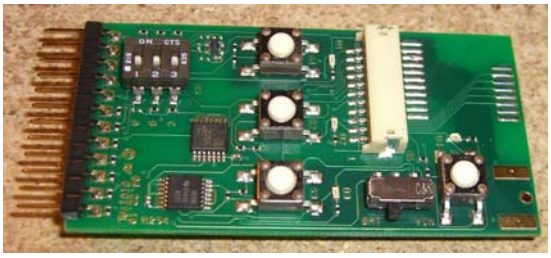
RFD21772 Eval Board for RFD21742 RFDANT

When ordering part number RFD21772, you receive an RFDANT eval board pictured below AND you also receive an RFD2142 RFDANT. For Eval board usage instructions, see sections below.



RFD21773 Eval Board for RFD21743 RFDANT

When ordering part number RFD21773, you receive an RFDANT eval board pictured below AND you also receive an RFD2143 RFDANT. For Eval board usage instructions, see sections below.



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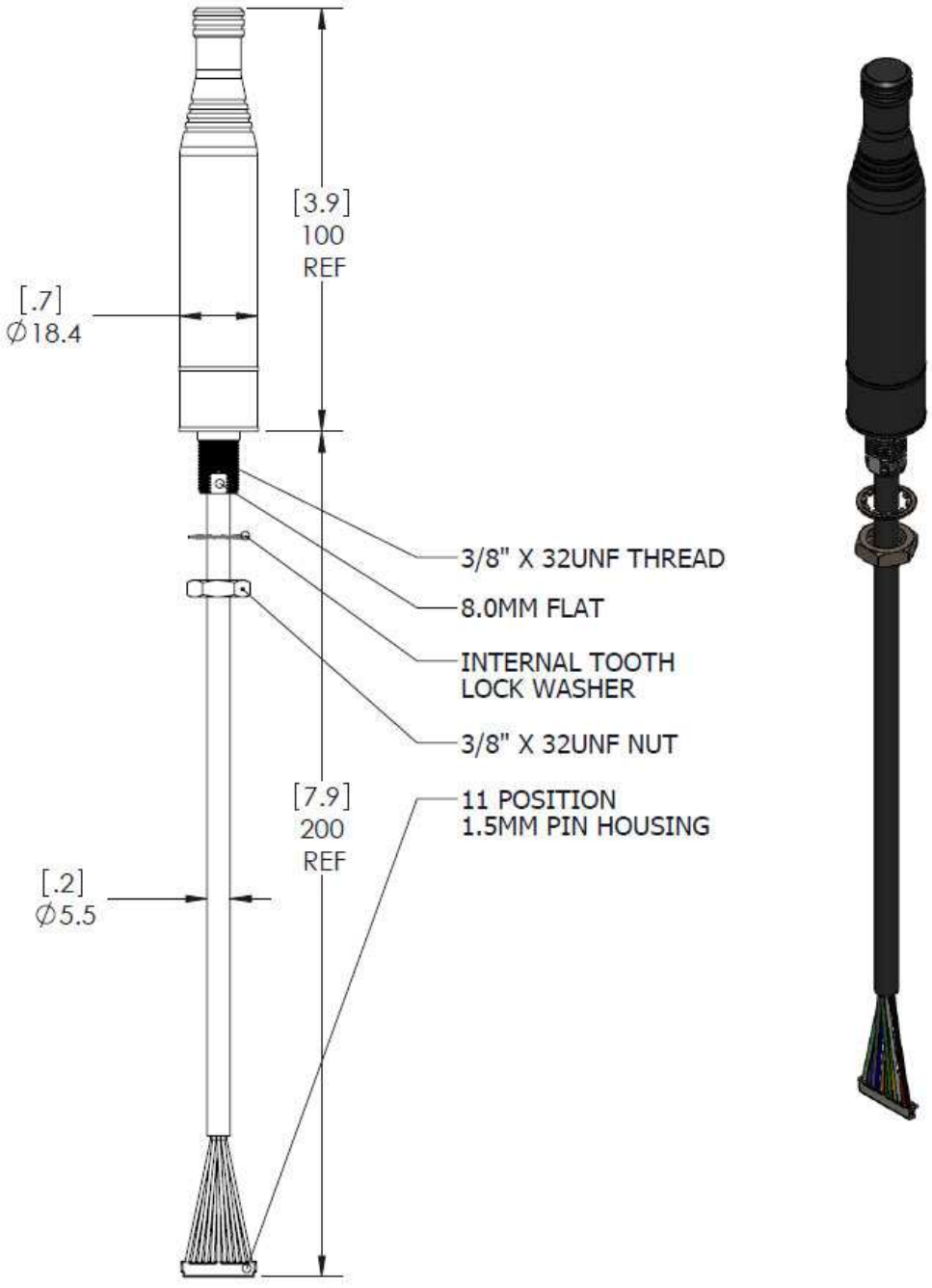
RFD21773 • RFD21743 • RFDANT • Dimensions

Flexible RFDANT cable does not have any shielding due to its revolutionary design and therefore does not need it. The 11 conductor cable is flexible and can easily confirm to fit your enclosure. Simply drill hole into your enclosure, insert the RFDANT and you have instant excellent range performance.



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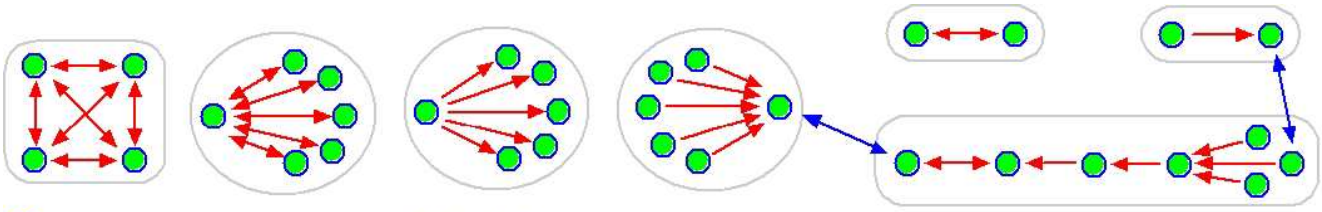
RFDP8	RFDP8
RF Module	RFDANT
RFD21733	RFD21742
RFD21735	RFD21743
RFD21737	RFD21772
RFD21738	RFD21773
RFD21739	KEYFOBs

RFD21733 • RFD21735 • RFD21742 • RFD21743 • Usage Examples

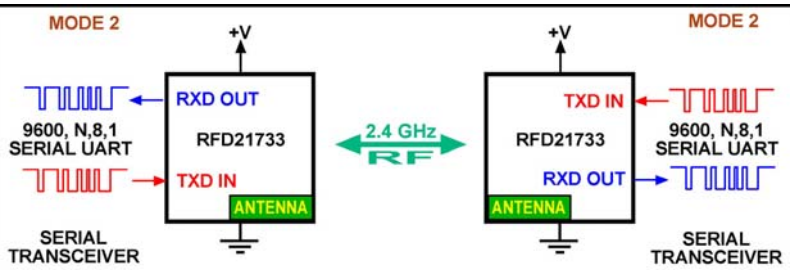


MODULE or RFDANT

Unlimited number of nodes and configurations with and without network mode.

RFD21733 • RFD21735 • RFD21742 • RFD21743 • Applications

Bidirectional serial transceiver normally sits in receive mode, receiving and outputting serial bytes out of the RXD pin, as they come in. When user sends data into TXD pin it automatically switches to transmit.



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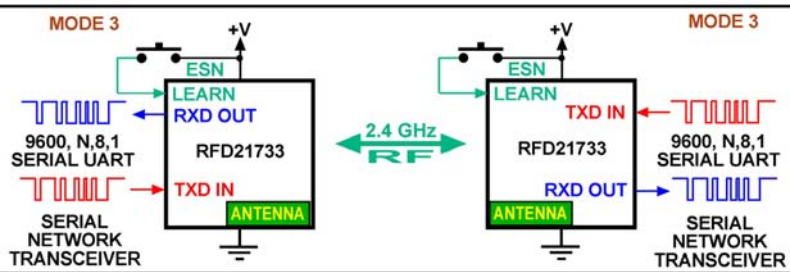
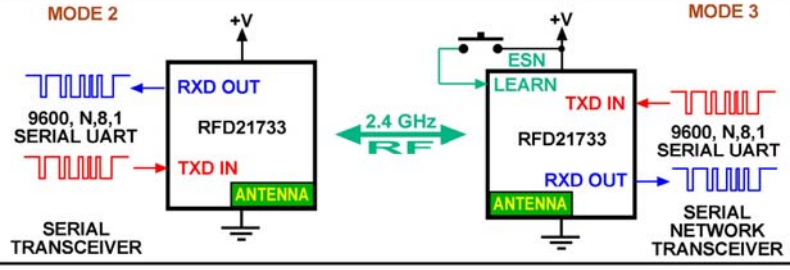
Bidirectional serial transceiver normally sits in receive mode, receiving and outputting serial bytes out of the RXD pin, as they come in. When user sends data into TXD pin it automatically switches to transmit. The receiver will only respond to transmitters if it has learned their ESNs.



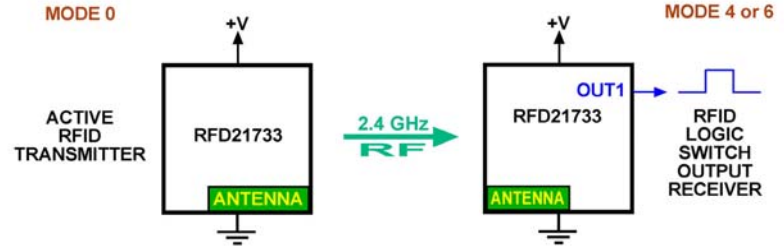
Bidirectional serial transceiver normally sits in receive mode, receiving and outputting serial bytes out of the RXD pin, as they come in. When user sends data into TXD pin it automatically switches to transmit. The receiver will only respond to a transmitters if it has learned their ESNs.

Bi-directional serial transceiver normally sits in receive mode, receiving and outputting serial bytes out of the RXD pin, as they come in. When user sends data into TXD pin it automatically switches to transmit.



Bi-directional serial transceiver normally sits in receive mode, receiving and outputting serial bytes out of the RXD pin, as they come in. When user sends data into TXD pin it automatically switches to transmit. The receiver will only respond to transmitters if it has learned their ESNs.

In this mode, simply apply 1.9 to 3.6 VDC (typically 3V), and the RFD21733 and it will automatically transmit once every 2 seconds as an RFID transmitter. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



Once every 2 seconds, depending on the configured mode, OUT1 will output a level high signal for a duration of 20 or 500 milliseconds. The idle state is low.

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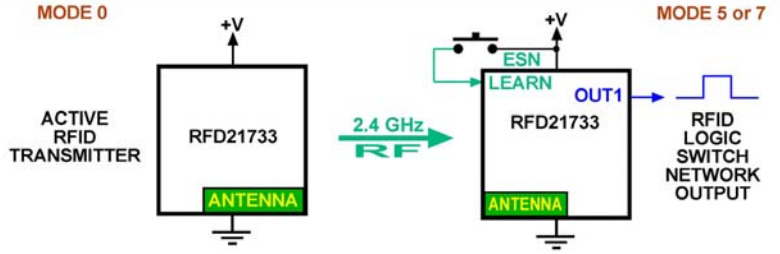
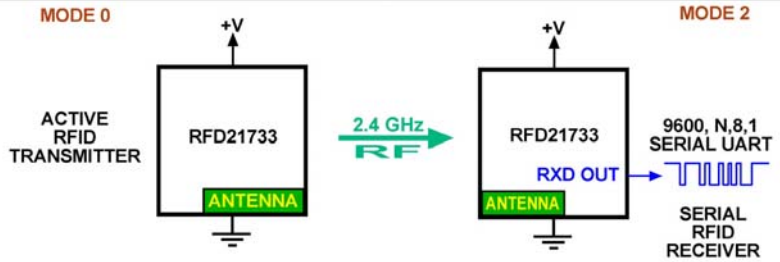
RFD21733 • RFD21735 • RFD21742 • RFD21743 • Applications

In this mode, simply apply 1.9 to 3.6 VDC (typically 3V), and the RFD21733 and it will automatically transmit once every 2 seconds as an RFID transmitter. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



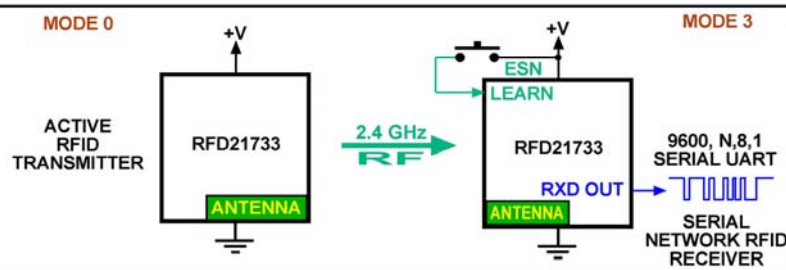
Once every 2 seconds, depending on the configured mode, OUT1 will output a level high signal for a duration of 20 or 500 milliseconds. The idle state is low. The receiver will only respond to transmitters if it has learned their ESNs.

In this mode, simply apply 1.9 to 3.6 VDC (typically 3V), and the RFD21733 and it will automatically transmit once every 2 seconds as an RFID transmitter. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



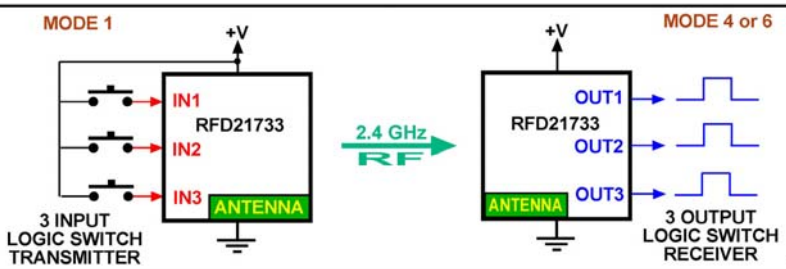
Once every 2 seconds, the RXD pin will output 5 bytes. Byte 1 will have bit 4 and bit 1 set, and bytes 2-5 are the 32 bit ESN of the RFID transmitter.

In this mode, simply apply 1.9 to 3.6 VDC (typically 3V), and the RFD21733 and it will automatically transmit once every 2 seconds as an RFID transmitter. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



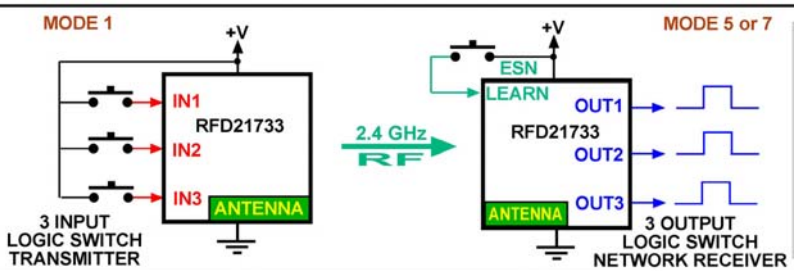
Once every 2 seconds, the RXD pin will output 5 bytes. Byte 1 will have bit 4 and bit 1 set, and bytes 2-5 are the 32 bit ESN of the RFID transmitter. The receiver will only respond to transmitters if it has learned their ESNs.

The RFD21733 stays in (2 uA) deep sleep, until any combination of the 3 buttons are pressed, then it will transmit the state of all 3 inputs. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



OUT1, OUT2 or OUT3 (follow) output any transmission received by the transmitter switch states IN1, IN2 or IN3. Depending on the configured mode there is a 20 or 500 millisecond hang time.

The RFD21733 stays in (2 uA) deep sleep, until any combination of the 3 buttons are pressed, then it will transmit the state of all 3 inputs. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



OUT1, OUT2 or OUT3 (follow) output any transmission received by the transmitter switch states IN1, IN2 or IN3. Depending on the configured mode there is a 20 or 500 millisecond hang time. The receiver will only respond to transmitters if it has learned their ESNs.

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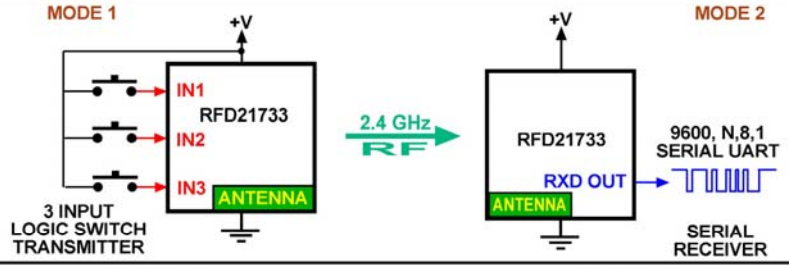
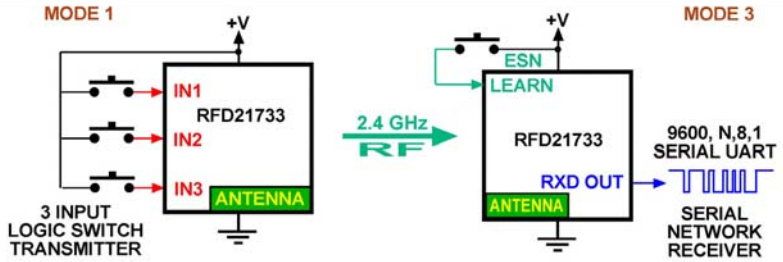
RFD21733 • RFD21735 • RFD21742 • RFD21743 • Applications

The RFD21733 stays in (2 uA) deep sleep, until any combination of the 3 buttons are pressed, then it will transmit the state of all 3 inputs. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



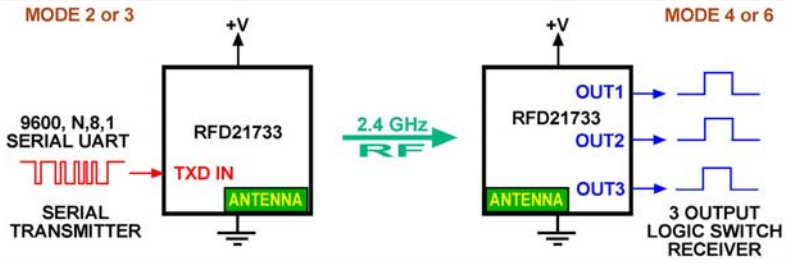
When a transmission is received. The RXD pin outputs 5 bytes. Byte 1 (bit 4,5,6) are the transmitter input states IN1, IN2, IN3. Bytes 2-5 are the 32 bit ESN of the switch transmitter.

The RFD21733 stays in (2 uA) deep sleep, until any combination of the 3 buttons are pressed, then it will transmit the state of all 3 inputs. With every transmission it also sends it's unique 32 BIT ESN (Electronic Serial Number).



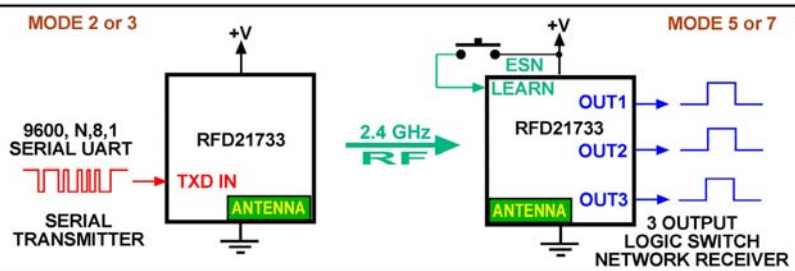
When a transmission is received. The RXD pin outputs 5 bytes. Byte 1 (bit 4,5,6) are the transmitter input states IN1, IN2, IN3. Bytes 2-5 are the 32 bit ESN of the switch transmitter. The receiver will only respond to transmitters if it has learned their ESNs.

Apply a single byte into the TXD pin to control the states of the switch receiver. Bit position 4,5,6 represent OUT1, OUT2, OUT3 on the receiver, all other bits must be zero. The receivers outputs states can not be updated any faster then once every 20 milliseconds.



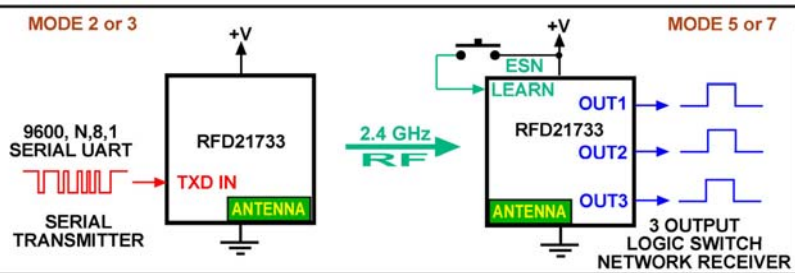
When a byte is received by the serial transmitter, OUT1, OUT2, OUT3, follow the states in bit position 4,5,6. Depending on the configured mode there is a 20 or 500 millisecond hang time.

Apply a single byte into the TXD pin to control the states of the switch receiver. Bit position 4,5,6 represent OUT1, OUT2, OUT3 on the receiver, all other bits must be zero. After sending the single byte, wait at least 20 milliseconds before sending again.



When a byte is received by the serial transmitter, OUT1, OUT2, OUT3, follow the states in bit position 4,5,6. Depending on the configured mode there is a 20 or 500 millisecond hang time. The receiver will only respond to transmitters if it has learned their ESNs.

To address a specific switch receiver, apply 5 bytes into the TXD pin. Byte 1, bit position 4,5,6 represent OUT1, OUT2, OUT3 on the receiver, all other bits must be zero. Byte 2-5 is the specific receiver's ESN. After sending the 5 bytes, wait at least 20 milliseconds before sending again.



When 5 bytes are received in a row from a serial transmitter, OUT1, OUT2, OUT3, follow the states in Byte1, bit position 4,5,6. Depending on the configured mode there is a 20 or 500 millisecond hang time. The receiver will only respond if byte 2-5 contains it's ESN.

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Differences Between Module Eval Boards

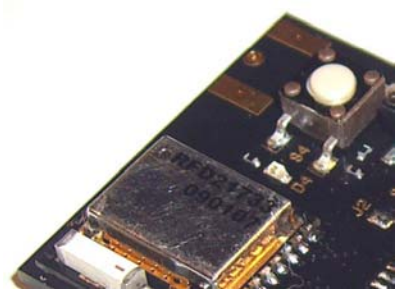
RFD21737

The RFD21733 RF Module with built-in chip antenna is soldered onto the RFD21737 eval board. The antenna is self-contained within the module.

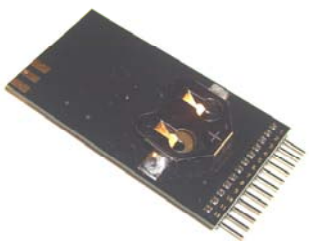
This eval board is self-contained and does not require an external antenna.

RFD21737

RFD21737



RFD21737

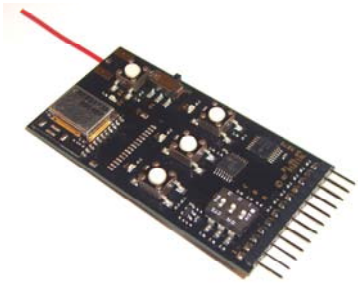


RFD21738

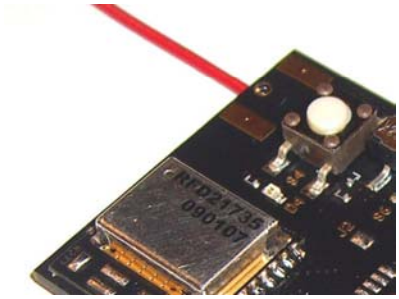
The RFD21735 RF Module is soldered onto the RFD21738 eval board. There is a 1.2 inch wire antenna soldered onto the RFD21738 which connects to the RFD21735 external antenna pin through RF strip-line within the PCB layers.

This eval board is self-contained and does not require an external antenna.

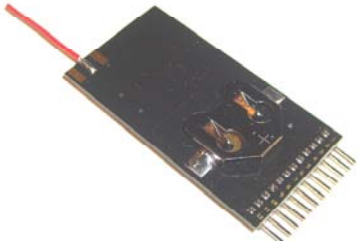
RFD21738



RFD21738



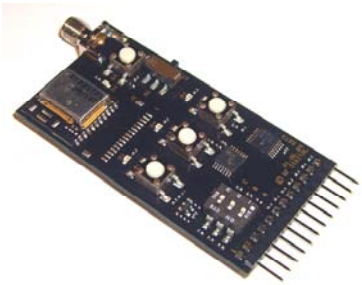
RFD21738



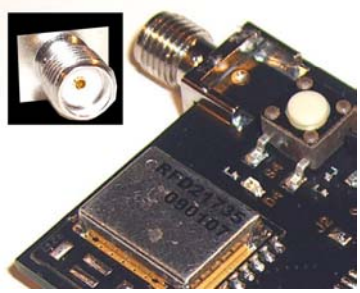
RFD21739

The RFD21735 RF Module is soldered onto the RFD21738 eval board. There is a FEMALE SMA connector soldered onto the RFD21738 which allows the user to connect to an external 2.4 GHz antenna of their choice. The RFD21735 external antenna pin is routed to the SMA connector through strip-line within the PCB layers. This eval board requires a user supplied 2.4 GHz antenna with a MALE SMA connector.
ANTENNA NOT INCLUDED

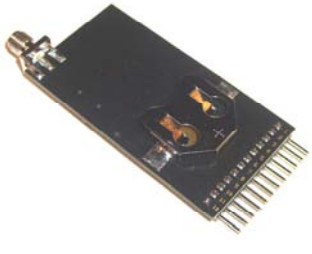
RFD21739



RFD21739



RFD21739



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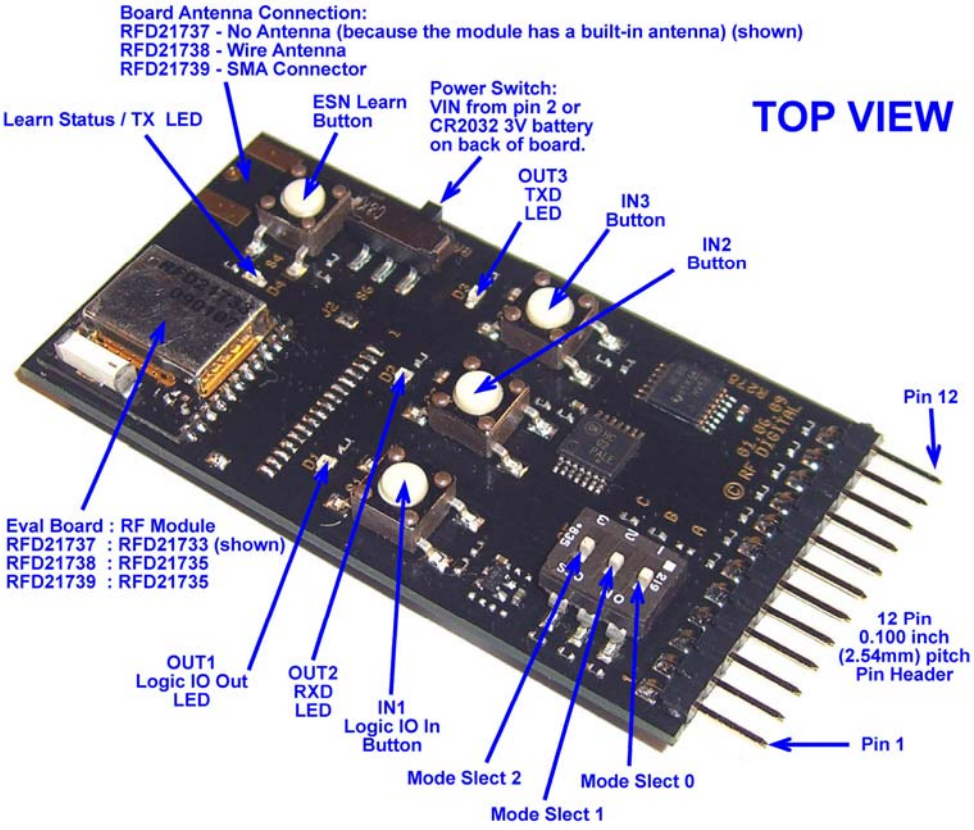
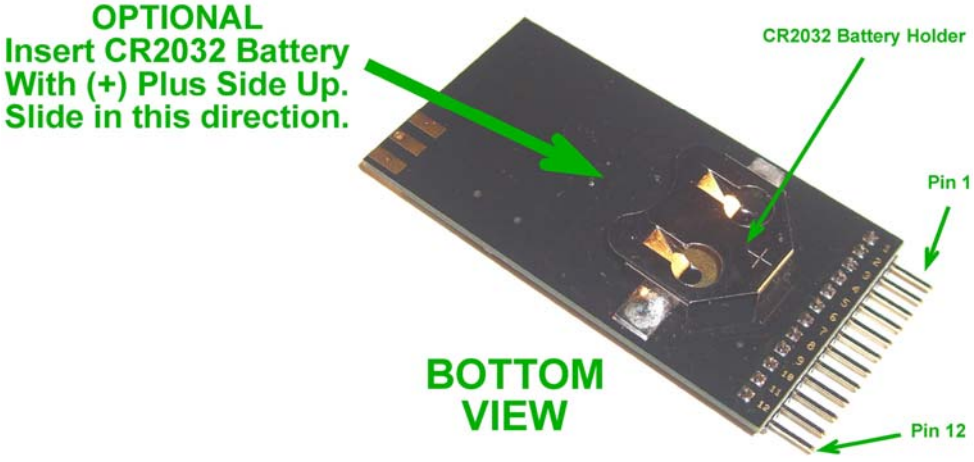
Eval Board Top and Bottom Labeled Views

All 5 Eval Boards, including the RFDANT boards can be powered from their on-board CR2032 3V battery or through the 12 pin 0.100 inch (2.54mm) pitch header, which can plug into directly into standard solderless breadboards or connect to mating a 0.100 inch (2.54mm) mating socket. The Eval Boards can work as stand-alone or can be wired to your application. The RFDANT Eval Boards have an RFDANT 11 pin connector instead of a Module.





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RFDP8 RF Module	RFDP8 RFDANT
RFD21733	RFD21742
RFD21735	RFD21743
RFD21737	RFD21772
RFD21738	RFD21773
RFD21739	KEYFOBs

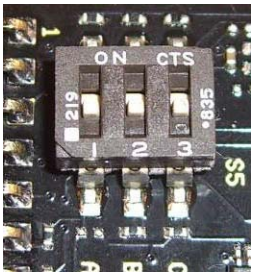
RFDP8 Mode Selector Switch for all 5 Eval Boards

The 8 different modes of the RFDP8 Application Protocol are selected using the 3-position dip-switch S5 shown in the examples below. The 3 inputs have resistor pull-downs to ground, so when the switch is in its OFF (open) position, there is a low (0) on the input. When the switch is in its ON (closed) position, it connects the input to +V, which produces a high (1).

The proper way to read binary is MSB on the left and LSB on the right. Switch manufacturers label the switches from left to right and furthermore they commonly start with 1 rather then 0. So careful attention needs to be given to identify the switch positions. The binary is read from MSB to LSB, rather than LSB to MSB as shown in the examples below. To remove all doubt, only follow the examples shown below.

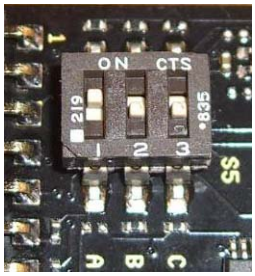
Mode 0
Active RFID Transmitter

OFF	OFF	OFF



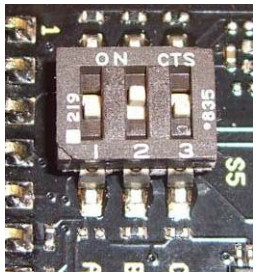
Mode 1
3-Input Switch Logic Transmitter

ON		
	OFF	OFF



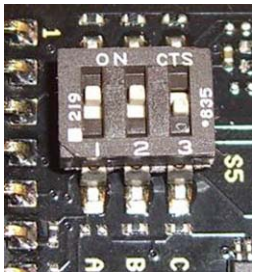
Mode 2
Serial UART Transceiver 9600-8N1

	ON	
OFF		OFF



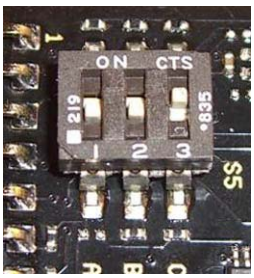
Mode 3
Serial UART Transceiver 9600-8N1 Network

ON	ON	
		OFF



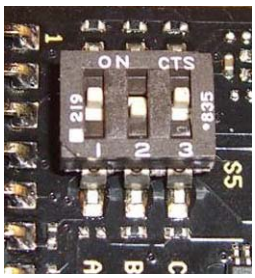
Mode 4
3-Output Switch Logic Receiver 500ms Hang Time

		ON
OFF	OFF	



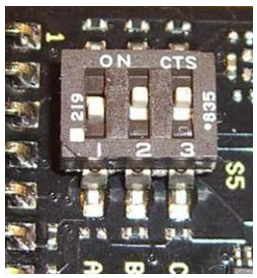
Mode 5
3-Output Switch Logic Receiver 500ms Hang Time Network

ON		ON
	OFF	



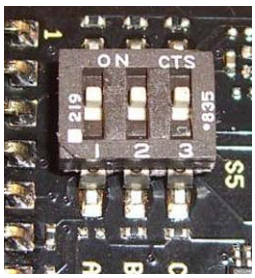
Mode 6
3-Output Switch Logic Receiver 20ms Hang Time

	ON	ON
OFF		



Mode 7
3-Output Switch Logic Receiver 20ms Hang Time Network

ON	ON	ON



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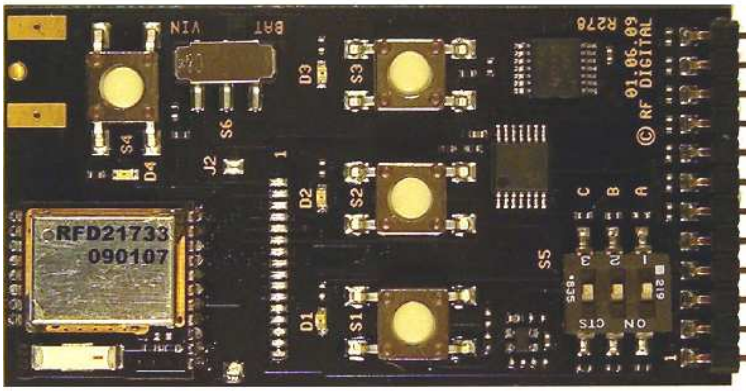
RFDP8 RF Module	RFDP8 RFDANT
RFD21733	RFD21742
RFD21735	RFD21743
RFD21737	RFD21772
RFD21738	RFD21773
RFD21739	KEYFOBs

Eval Board Top and Bottom View Pinout for All Eval Boards

TOP VIEW



12 IN3 / OUT3 / TXD
11 IN2 / OUT2 / RXD
10 IN1 / OUT1 / LOGIC IO
9 LEARN / TX LED / STATUS
8 M2 (do not connect, use S5 dipswitch)
7 M1 (do not connect, use S5 dipswitch)
6 M0 (do not connect, use S5 dipswitch)
5 RESET (optional)
4 FACTORY (must be open)
3 POWER ON (Tie to +V)
2 +V (+3V to +5V)
1 GND

BOTTOM VIEW

1 GND
2 +V (+3V to +5V)
3 POWER ON (Tie to +V)
4 FACTORY (must be open)
5 RESET (optional)
6 M0 (do not connect, use S5 dipswitch)
7 M1 (do not connect, use S5 dipswitch)
8 M2 (do not connect, use S5 dipswitch)
9 LEARN / TX LED / STATUS
10 IN1 / OUT1 / LOGIC IO
11 IN2 / OUT2 / RXD
12 IN3 / OUT3 / TXD

Eval Board Power Supply and Logic Levels - Important

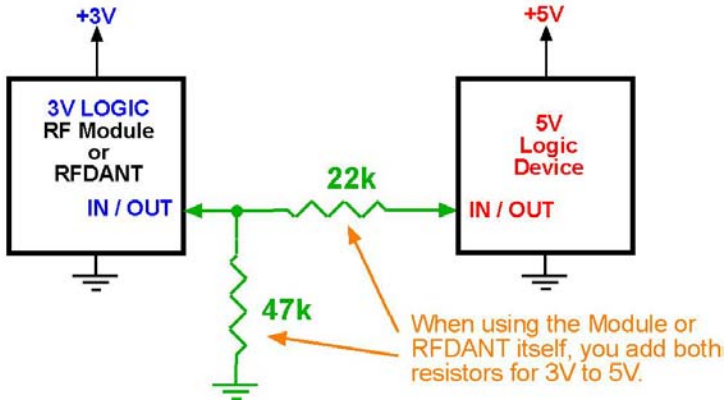
There is an internal 3.3 Volt (LDO) on the eval boards. At the (pin 2) +V input pin, you can supply 2.1VDC minimum and a maximum of 3.6VDC. When your supplied voltage is between 3.4V and 3.6V the internal regulator is in regulation and the internal supply to all parts will be 3.3V, and all signals on pins 9-12 will be at 3.3V logic. When 2.1V to 3.4V is supplied the internal 3.3V regulator is of regulation and tracks the input voltage (minus about 100mv overhead). If you supply 2.5V your logic will be at 2.4V, and if you supply 2.1V your logic will be at 2.0V. The internal 3.3V regulator accept up to a 5V supply input, but at 5V supply, your logic levels on pins 9-12 will be at 3.3V, SO USE CAUTION. So you will need to use 3.3V to 5V logic level shifters to run properly at 5V or you will cause damage to the module. When using a 5V supply, a very quick 5V level shifter method (not to be used for production) just for testing, which works in some cases would be to use a 22K resistor in series between the eval boards 3.3V logic and your 5V logic. There is a 47k pull down resistor internal to the Eval Boards ONLY (NOT THE MODULE or RFDANT) on pin 9-12 and this is just enough to switch the logic levels in both directions for a quick and dirty level shifter. There are NO 47k pull down resistors on the Modules or RFDANTs, so you must add your own pull-downs or pull-ups accordingly.

RF Modules and RFDANTs run on 3V Logic Levels (1.9V to 3.6V)

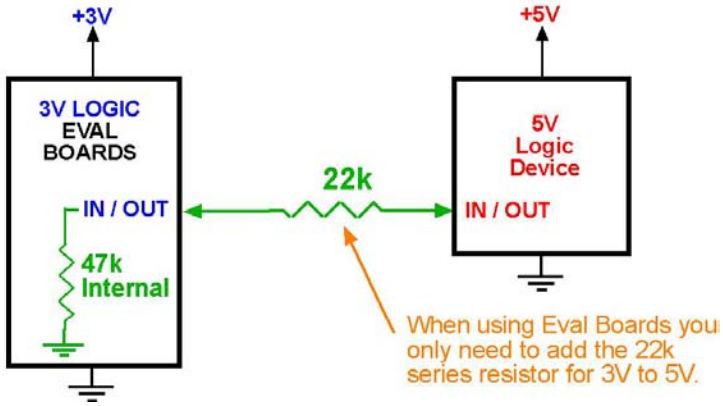
The RFD21733, RFD21735, RFD21742 and RFD21743 all run on a supply of 1.9V to 3.6V. They have an internal voltage regulator which is set to 1.8V and it is an LDO so you only need about 100mV of overhead to keep it in regulation. Most circuits which will interface with these devices will be 3V or 3.3V typical, so we will use those voltages for reference in this section. If your circuit runs on 2.5V, 3V or 3.3V, then no problem, you can directly apply supply voltage of 2.5V, 3V or 3.3V to the Module or RFDANT and all your logic signals will be at 2.5V, 3V or 3.3V for a direct interface with your hardware. However if your circuit is running at a higher voltage such as 5V, then you need to use a level shifter IC or a circuit which will translate the Module or RFDANT signals from 3V to 5V for your circuit, and also the 5V from your circuit to the 3V for the Module or RFDANT. Of course you will also need a regulator to drop from 5V down to 3V for the Module or RFDANT.

Simple 5V to 3V Logic Level Shifter for prototyping ONLY.

If you want a quick an dirty, temporary solution to interface the 3V RF Module or RFDANT to your 5V logic circuit, then you can use a simple resistive divider to get your prototype up and running quickly with just a couple resistors. First, you must supply a regulated 3V or 3.3V to the RF Module or RFDANT using a voltage regulator. Now regarding the logic signals, you can connect a 47k pull down resistor to the logic lines on the following 6 signals, Mode Select 1, Mode Select 2, Learn / Status, IN1 / OUT 1 / LOGIC IO, IN2 / OUT2 / RXD, IN3 / OUT3 / TXD. The RESET has an internal 3.3K pull up and does not apply to this option, and the Mode Select 0, at power up has an internally switched 13k resistor and also does not apply to this option. After connecting the 47k pull down resistor on the Module or RFDANT pins, then use a 22k series resistor to connect the six Module or RFDANT logic pins mentioned above to your 5V device. That will create a 2/3 voltage divider from your 5V device to the 3V RF Module or RFDANT when the 5V device is driving 3V device. When the 3V device is driving the 5V device, there is no divider in that direction, only a 22k series resistor into a high-Z input on the 5V side, so the 5V side will see the full 3V logic, and that is in most cases, just enough to cause a logic high for a 5V logic input. Note this is not a production solution, its just a quick-and-dirty way to get a 5V logic circuit to work with a 5V logic circuit for prototyping. Of course once you have hooked this up and if it does not work for you, do measure the logic levels using a scope on both 5V and 3V nodes to make sure they are actually at sufficient levels to meet the minimums for logic levels for the specific device. Note if you do not have a high-Z input on the 5V side, this will not work. At first chance, when possible, use a proper level shifter capable of sinking and sourcing current and able to do fast switching as this circuit is very limited with its scope of value and use. The Eval Boards have a 47k pull down resistor mounted on the above six referenced pins, so if you are using an Eval Board then all you need is the series 22K resistor (don't add an additional 47k resistor or it will not work), but if you are using the RF Module or the RFDANT WITHOUT the Eval Board, then you will need to add the 47k resistors.

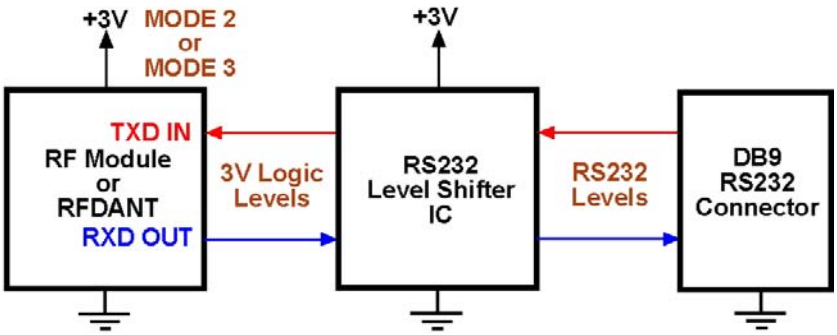


Eval Board Example with internal 47k resistor.



RS232 Level Shifter Interface

To connect to an RS232 port (9600-8N1), you must use a level shifter to shift the voltage levels from RS232 levels to 3V or 3.3V logic. There are many ICs which can perform that task all in one chip. For example the MAX232, MAX202 or the ICL3321. If you want to connect to a PC you can use this method or you can use a USB port and connect through a virtual communication port shown in the next section. You can use this same interface when connecting to the Eval Boards. Very important, make sure you pull down the Logic IO signal to ground through a 47k resistor if it is not in use, note it is bi-directional so you must use a pull down.



FTDI USB Virtual Communication Interface

FTDI manufactures a 3.3V Logic Serial Interface cable which plugs into a USB port and shows up as a COMM port on your PC, through which you can connect to PC terminal programs like Hyper Terminal, RealTerm and others.

You can purchase the FTDI cable from Digikey.com or other distributors. The manufacturer part number is TTL-232R-3V3 and the Digikey Part Number is 768-1016-ND (picture shown below). For international orders, if you want to save on shipping, you can ask for this item to be packed in with your order to RF Digital.

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When using the FTDI USB Interface Cable TTL-232R-3V3, the connections to the RFD21737, RFD21738, RFD21739, RFD21772, RFD21773 Eval Boards are very simple. You only need 4 wires and the Eval Board is also powered from the USB port through the cable.

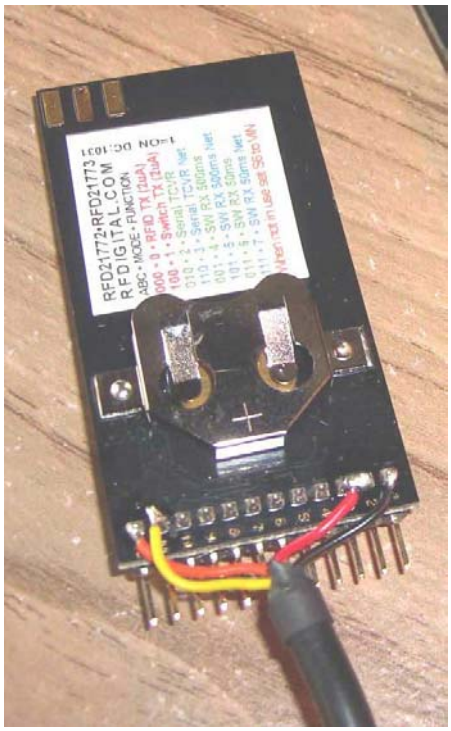
The 3V3 part of the part number for the cable means that the logic levels of the cable are 3.3V.

IMPORTANT:
The RED wire supplies +5V, and can ONLY be connected to the Eval Boards since the Eval Boards have an on-board 3.3V regulator. You can NOT connect +5V to the Module or RFDANT directly. This is ONLY intended for the Eval Board.

The 4 wires you need from the cable are:
RED is +5V
BLACK is GROUND
YELLOW is TXD Data Input to the PC USB Port.
ORANGE is RXD Data Output from the PC USB Port.

FTDI Cable to RFD Eval Boards:
RED – connect to RFD Eval Board Pin 2 and Pin 3 (Pin 2 is power on. Short pin 2 and pin 3.).
BLACK – connect to RFD Eval Board Pin 1.
YELLOW – connect to RFD Eval Board Pin 11, which is the RXD Data Output of the Eval Board.
ORANGE – connect to RFD Eval Board Pin 12, which is the TXD Data Input of the Eval Board.

FTDI TTL-232R-3V3 USB Cable wired to RFD Eval Board



FTDI TTL-232R-3V3 USB Cable

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FCC Compliance Information

The RFD21733 is IC and FCC Modular Approved and Certified, therefore for use of the RFD21733 module in your product does not require further IC or FCC testing. Detail instructions and IC and FCC notices shown later in this data sheet. Any modifications made to the RFD21733 will void the IC and FCC Approval and Certification. The RFD21733 has an integrated on-board chip antenna. You simply include the RFD21733 in your product and follow the IC and FCC notices and information below and place the appropriate label on your product to indicate that it includes an IC and FCC approved module and no further testing would be required for the module.

The RFD21735 is NOT IC or FCC Approved. However it is exactly the same as the RFD21733 except it does not have an internal antenna and is built to allow a user to apply their own antenna of choice. Any type of 2.4 GHz antenna may be used. Once you include the RFD21735 into your product and your chosen antenna is connected, then your whole product is tested by an approved IC or FCC compliance laboratory and you receive your own grant for your whole product which includes the RFD21735. This procedure is somewhat costly and time consuming and therefore the RFD21733 is the primary choice by many engineers. The RFD21735 is typically used if you must have an external antenna, however we always recommend first looking at the RFD21743 which already has an FCC Approval and is in the form of an external antenna.

The RFD21743 is FCC Modular Approved and Certified, therefore for use of the RFD21743 module in your product does not require further FCC testing. Detail instructions and FCC notices shown later in this data sheet. Any modifications made to the RFD21743 will void the FCC Approval and Certification. The RFD21743 has an integrated antenna. You simply include the RFD21743 in your product and follow the FCC notices and information below and place the appropriate label on your product to indicate that it includes an FCC approved module and no further testing would be required for the module.

The RFDANT RFD21743 is a great alternative to needing to get your own FCC approval with the RFD21735 combined with your own antenna. The RFD21743 has an excellent antenna pattern which provides about 4 times more range than a RFD21733 and does not require mounting to your PCB since it has its own antenna enclosure. More details about it below in this data sheet. It should be considered before starting your design with an RFD21735 and your own external antenna, since it accomplishes the same task without the need for further compliance approvals.

CE, ETSI Compliance Information

The RFD21733, RFD21735, RFD21742 and RFD21743 are CE (ETSI) Tested. See declaration of conformity later in this document.

RFDP8 Firmware

RF Digital offers firmware for the RFD21733, RFD21735, RFD21742, RFD21743 which meet many common user requirements. The firmware and a unique identifier are pre-programmed and tested at the factory. The programmed module is therefore immediately ready for use upon delivery.

The RFDP8 firmware use the 3 mode select inputs to select the operating mode. These inputs are sampled when the module powers-on.

Some of the operating modes have additional options which are described in the section for that mode.

The RFDP8 firmware cannot be modified by the user. For applications that require alternative functionality, contact RF Digital for information about custom firmware to fit your specific requirements.

RFDP8 Interference Immunity Algorithm

RF Digital's RFDP8 proprietary patent-pending frequency agility protocol operates in the internationally accepted 2.4 GHz band. The RFDP8's leading-edge advanced algorithm is not burdened by a heavy-weight stack as is BlueTooth, ZigBee, WLAN and other protocols, which are well suited for cross-manufacturer interoperability. The RFDP8 protocol is highly robust and effective where there is a need to penetrate through a high saturation of RF noise which is common in nearly all environments today. It is especially effective and can easily coexist in heavy WiFi environments, which very few technologies can do successfully without the need of excessive processing power. The protocol strategically changes channels frequently to deliver its payload to the destination device reliably, yet not too excessively as to demand too much internal processing power which allows it to run with a very low current consumption profile and fast start up times allowing substantial flexibility with implementation. The RFDP8 protocol reduces the amount of on-air traffic and unnecessary chatter due to its unique and highly efficient design, which does not require bilateral registration and association as do many other technologies today. The RFDP8 does not require ack-nacks to complete a packet delivery, its unique technique of packet delivery, recovery and correction allows it to work as a one-way link, hence drastically simplifying users' applications which always results in more a robust wireless system. The RFDP8 protocol combined with RF Digital's leading-edge RF Module hardware delivers a highly robust method of delivering user data from point to point, point to multi-point or multi-point to multi-point, transmitter-receiver, transceiver, serial or switch on/off data modes. The protocol is designed to work seamlessly with RF Digital's hardware modules, the combination results in ultra long range at ultra low currents without concern for compliance approvals since modules such as the RFD21733 come with IC and FCC Approval and Certification for USA and have passed CE - ETSI emission testing for European requirements. The RFDP8 protocol adds several dB of range gain passively through it's advanced data recovery technique which pulls valid data out of a noisy environment adding effective gain which results in more range, delivering the net result, which is a very robust wireless system. All of this is built into the overhead of the RFDP8 protocol and RF Digital modules, so it's all done behind the scenes, allowing the user to focus on building their application and simply putting data into the radio device as a wireless pipe and easily receiving it on the other end.

Electronic Serial Number

Every RF Digital Module has its own 32-bit unique identifier (over 4 billion unique values), known as the Electronic Serial Number, or ESN. This value is assigned at the factory and cannot be changed by the user.

The ESN is included in every packet that is transmitted, as part of the protocol overhead and is transparent to the user.

The user does not ordinarily need to know what the ESN is. However, in certain cases it is helpful to know the serial number, and so a mechanism has been provided to read out the ESN. This method is documented in the UART section below.