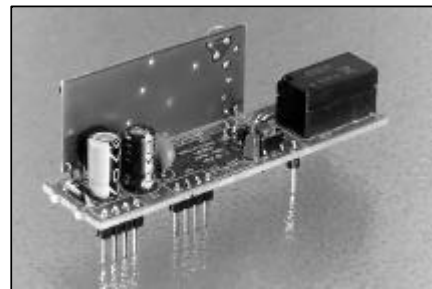
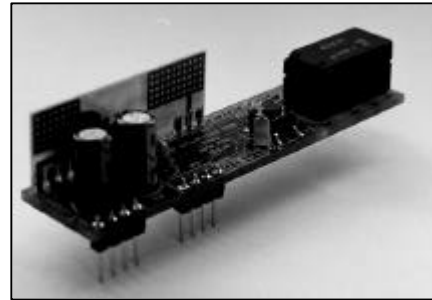


FEATURES

- MINIATURE RF RECEIVER /DECODER.
- 40 PIN DIP I/C PROFILE
- SINGLE RELAY OPTION AVAILABLE
- SUPPLIED AS AM OR FM COMPATIBLE.
- LED INDICATION OF DATA RECEPTION
- EASY LEARN TRANSMITTER FEATURE
- CMOS/TTL OUTPUTS, MOMENTARY OR LATCHING.
- SINGLE SUPPLY EITHER 5V OR 12V
- LOW POWER CONSUMPTION RELAY
- CONTACTS 2A @ 12V
- AVAILABLE AS 418 OR 433MHz
- REQUIRES NO RADIO LICENCE



APPLICATIONS

- GENERAL REMOTE CONTROL SYSTEMS.
- GARAGE DOOR OPENERS.
- CAR, CARAVAN, MOTORCYCLE ALARMS
- REMOTE SWITCHING.
- REMOTE GATES.
- PAGING.

DESCRIPTION

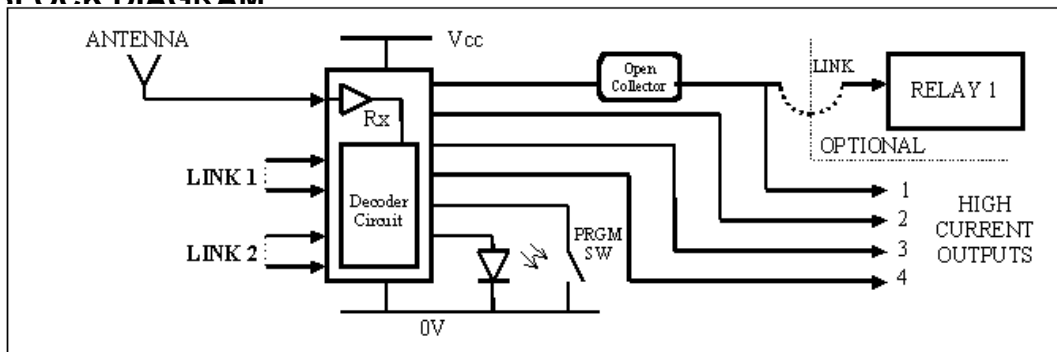
This range of miniature modules are complete four channel RF Receiver/Decoders that can be configured for many different, low power, short range telemetry applications.

All modules are plug-in Dual-in-Line (DIL) package, with the same profile as a standard 40pin DIL I/C for easy pcb mounting. A single relay option is an extended length module (removable) containing a BT/47 type relay.

Supplied as either AM or FM, the module requires connections to the power supply; 5Vdc or 12Vdc (mandatory for relay version), and data outputs only. An LED indicates data reception.

Each decoder is compatible with one of the RF Solutions Transmitter / Encoders (see page 2). The decoder has an easy-to-use 'LEARN' facility to allow the decoder to learn up to eight code Hopping or 16 standard transmitter/encoders.

BLOCK DIAGRAM



FEATURES OF AM VERSION

- RECEIVING RANGE 45 - 70 METRES.
- 1 - 3 DATA CHANNELS
- LEARNS UP TO 8 OR 16 TRANSMITTERS
- HIGH SECURITY COPE HOPPING AVAILABLE
- COMPLIANT TO ETSI300-339
- COMPATIBLE WITH RF SOLUTIONS AM TRANSMITTERS;



FEATURES OF FM VERSION

- RECEIVING RANGE UP TO 200 METRES.
- 1 - 4 DATA CHANNELS
- LEARNS UP TO 8 OR 16 TRANSMITTERS
- HIGH SECURITY CODE HOPPING AVAILABLE
- SUPERHETRODYNE RF RECEIVER
- COMPATIBLE WITH RF SOLUTIONS FM TRANSMITTERS/ENCODERS;



TRANSMITTER / ENCODER PART NUMBERING

Part No	Description
AM-TS1-XXX	1 Switch (standard)
AM-TS2-XXX	2 Switch (standard)
AM-TH1-XXX	1 Switch (hopping)
AM-TH2-XXX	2 Switch (hopping)

Part No	Description
FM-EH4-XXX	Encoder 4 Switch PCB only
FM-EH1C-XXX	Encoder 1 Switch in case
FM-EH2C-XXX	Encoder 2 Switch in case
FM-EH3C-XXX	Encoder 3 Switch in case
FM-EH4C-XXX	Encoder 4 Switch in case

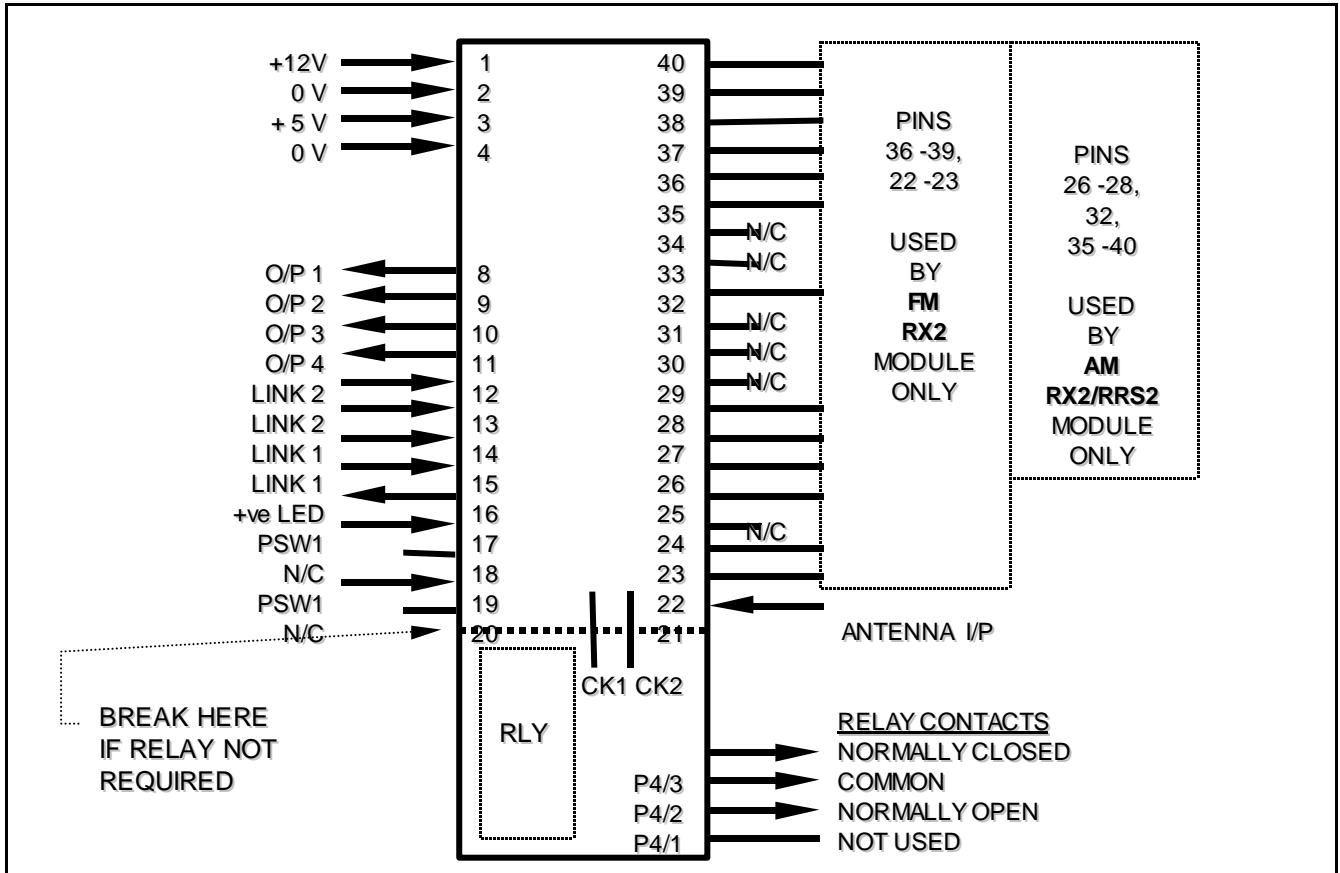
DECODER PART NUMBERING

PART No	DESCRIPTION
AM-DS0(L)-XXX	AM Decoder - 1-3 Ch, Standard code, 40 Pin module
AM-DH0(L)-XXX	AM Decoder - 1-3 Ch, Hopping code, 40 Pin module
AM-DS1(L)-XXX	AM Decoder - 1-3 Ch, Standard code, module with Relay option
AM-DH1(L)-XXX	AM Decoder - 1-3 Ch, Hopping code, module with Relay option

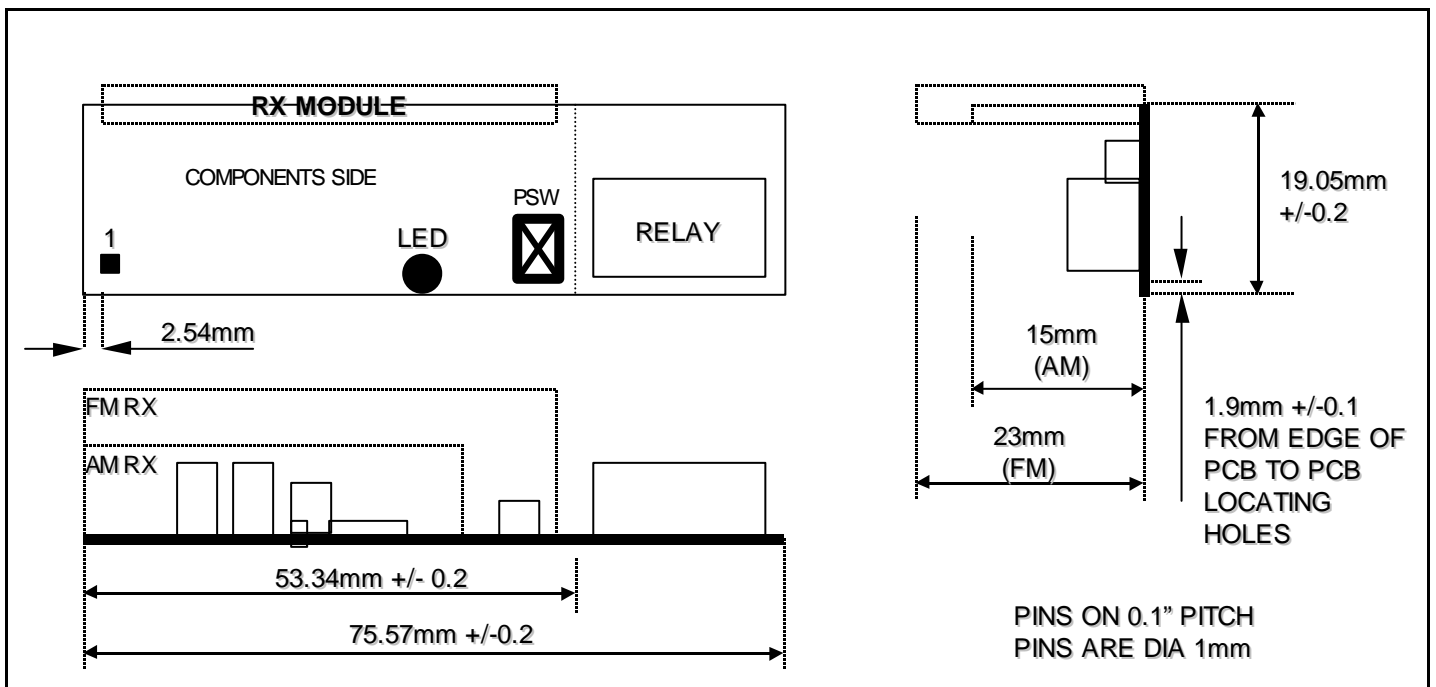
PART No	DESCRIPTION
FM-DH0-XXX	FM Decoder - 1-4 Ch, Hopping code, 40 Pin module
FM-DH1-XXX	FM Decoder - 1-4 Ch, Hopping code, module with Relay option

L = AM-RRS2 Receiver – Long Range XXX = 418 OR 433MHz

SIGNAL ALLOCATION (from plan view of module)



MECHANICAL DETAILS



PIN DESCRIPTION

Pin No	Name	Description
1	+12V	+12V Supply Voltage. Must be used for Relay operation
2	0 VOLT	Ground for +12V Supply.
3	+5V	+5V Supply Voltage. Alternative supply if 12v supply not used.
4	0 VOLT	Ground for +5V Supply.
8	O/P1	Data output channel 1. Open collector Transistor output. (This is used to drive the relay when fitted)
9	O/P2	Data output channel 2. CMOS/TTL with series 220 Ω resistor
10	O/P3	Data output channel 3. CMOS/TTL with series 220 Ω resistor
11	O/P4	Data output channel 4. CMOS/TTL with series 220 Ω resistor
12	LINK2	Connect to pin 13 to make "Link2"
13	LINK2	Connect to pin 12 to make "Link2"
14	LINK1	Connect to pin 15 to make "Link1"
15	LINK1	Connect to pin 14 to make "Link1"
16	+ve LED	External LED sink output, can be connected directly to cathode of external LED. Connect Anode of the LED to +5V. Indicates Data reception, and programming status.
17	PSW1	Programming Switch, This is used when learning new transmitters.
18	N/C	Not connected. Can be used as locating pin for mounting the module
19	PSW1	Connect to 17 to make "PSW1" switch.
20	N/C	Not connected. Can be used as locating pin for mounting the module
21	ANT I/P	Connect Antenna to this input
22 - 23		These pins are used by the module when configured as FM.
24 - 25	N/C	Not connected. Can be used as locating pin for mounting the module
26 - 28		These pins are used by the module when configured as AM.
29 - 31	N/C	Not connected. Can be used as locating pin for mounting the module
32		These pins are used by the module when configured as AM.
33 - 34	N/C	Not connected. Can be used as locating pin for mounting the module
35		These pins are used by the module when configured as AM.
36 - 40		These pins are used when configured as an AM or FM module.
P4/1	P4/1	Relay contacts Normally Open
P4/2	P4/2	Relay contacts Common
P4/3	P4/3	Relay contacts Normally Closed

NOTE

The module is designed to be powered from either 12v or 5v **not both!**

The 12v supply is necessary for relay operation.

Removal of Relay

If the relay is not required, remove the relay connecting links "CK1" & "CK2" . The pcb may then be carefully broken, along the score lines between the relay and the rest of the board. Digital output channel 1 is then driven by an open collector transistor output.

“STANDARD DATA FORMAT” DESCRIPTION (AM-DS0, AM-DS1)

The transmitter/encoders used in a standard system each have a unique signature code (pre-programmed at manufacture) from one in >16,000,000 combinations. Error checking techniques are also used to ensure data integrity.

These decoders are capable of learning 16 unique transmitter/Encoder signature codes.

“HOPPING DATA FORMAT” DESCRIPTION (AM-DH0, AM-DH1, FM-DH0, FM-DH1)

The transmitter/encoders used in a Code Hopping system each have a random number signature code, as in the standard format, and also transmit a unique signature code each time the switch is pressed. The number of possible codes is >16,000,000 combinations, the same code is never repeated, even if the batteries are changed.. Error checking techniques are also used to ensure data integrity.

These decoders are capable of learning 8 unique transmitter/Encoder signature codes.

LEARNING A NEW TRANSMITTER

1. Hold down the programming switch (PSW1).
2. Depress the transmitter once, LED on the decoder will flash. (PSW1 is still depressed).
3. Wait for LED to stop flashing.
4. Depress the transmitter again, LED will turn off. (PSW1 is still depressed).
5. Release the programming switch (PSW1).
6. This transmitter will now operate the system.
7. To completely erase the transmitters, press PSW1 on the decoder five times in succession, LED will remain on for approximately 5 seconds while the transmitter(s) are being erased.

SYNCHRONISATION (Hopping Models only)

This equipment requires the transmitter and receiver to be synchronised. If the transmitter has been pressed more than 50 times outside the range of the receiver, the receiver will lose synchronisation with the transmitter. To re-synchronise:

Press the transmitter key for two seconds within range of the receiver,

Release the key momentarily, and press the key again.

ANTENNA DESIGN

For 99% of applications a 16.5cm piece of wire is quite adequate. The range achieved from the system is dependant on the choice and position of the antenna. The space around the antenna is as important as the antenna itself. The optimum position is to locate the antenna so that it protrudes directly out the top of the transmitter box. If this is not possible due to other design constraints, try to keep the antenna away from other metal in the system such as transformers, batteries and PCB tracks, especially ground planes. In particular, the ‘HOT’ end of the antenna should be kept as far away as possible from these.

For further information on Antenna design please see our full product catalogue.

DATA OUTPUTS

Output 1 is used to drive the on-board relay (if fitted), it is an open collector type output.

Outputs 2,3 & 4 are digital CMOS/TTL with a series 220 W protection resistor

The outputs are configured by Link 1 & 2

AM DECODER WITH 1 SWITCH AM TRANSMITTER

LINK1	LINK2	O/P 1	O/P 2
OPEN	OPEN	LATCH	LATCH
OPEN	CONNECTED	MOM	MOM
CONNECTED	OPEN	LATCH	MOM
CONNECTED	CONNECTED	MOM	LATCH

AM DECODER WITH A 2 SWITCH AM TRANSMITTER

LINK STATUS		TRANSMITTER SWITCH			
LINK1	LINK2	ANY	RH	LH	BOTH
		O/P 1	O/P 2	O/P 3	O/P 4
OPEN	OPEN	LATCH	LATCH	LATCH	LATCH
OPEN	CONNECTED	MOM	MOM	MOM	MOM
CONNECTED	OPEN	LATCH	MOM	LATCH	LATCH
CONNECTED	CONNECTED	MOM	LATCH	MOM	MOM

FM DECODER WITH A 4 SWITCH FM TRANSMITTER

LINK1	LINK2	O/P 1	O/P 2	O/P 3	O/P 4
OPEN	OPEN	LATCH	LATCH	LATCH	LATCH
OPEN	CONNECTED	MOM	MOM	MOM	MOM
CONNECTED	OPEN	MOM	MOM	LATCH	LATCH
CONNECTED	CONNECTED	LATCH	LATCH	MOM	MOM

ABSOLUTE MAXIMUM RATINGS (AM & FM)

Supply Voltage (+12Vcc to GND).....-0.3 to +17 Volts.
 Supply Voltage (+5Vcc to GND).....-0.3 to + 6 Volts.
 Storage Temperature.....-30 to +85o Celsius.
 Operating Temperature..... 0 to +55o Celsius.

TECHNICAL SPECIFICATION (AM & FM)

Ambient temperature = 25° Celsius.

ELECTRICAL CHARACTERISTICS	MIN	TYPICAL	MAX	DIMENSION	NOTE
Supply Voltage for +12 v	9	12.0	16.0	V	SINGLE SUPPLY ONLY!
Supply Voltage for +5 v	4.5	5.0	5.5	V	
Data output: (Ch 2, 3, & 4)					
Logic Low	0	0.2	0.8	V	I out = 10mA
Logic High	3.5	3.8	5	V	I out = 10mA
Data output: (Ch 2, 3, & 4)					
Logic Low			-25	mA	
Logic High			20	mA	
Data output :Ch 1 (open collector)			50	mA	Relay removed
Relay Rating			2	A	@ 12 V DC

ELECTRICAL CHARACTERISTICS UNIQUE TO AM DECODERS

ELECTRICAL CHARACTERISTICS	MIN	TYPICAL	MAX	UNIT
Operating Temperature Range	0		70	V
Supply Current (quiescent)		10		mA
Supply Current (operating relay)		50	70	mA
Working Frequency	200		450	MHz
Tuning Tolerance		+/- 0.2	+/- 0.5	MHz
-3dB Bandwidth		+/- 2	+/- 3	MHz
R.F Sensitivity (100% AM)	-100	-105		dBm
Level of Emitted Spectrum		-65	-60	dBm
EMC Compliance	Complies to ETS300-339			

ELECTRICAL CHARACTERISTICS UNIQUE TO FM DECODERS

ELECTRICAL CHARACTERISTICS	MIN	TYPICAL	MAX	UNIT
Supply Current (quiescent)		20		mA
Supply Current (operating relay)		40	75	mA
Overall Frequency Accuracy	-100	0	+100	KHz
Sensitivity for 20dB S/N	-	0.5	1.0	µV
IF Bandwidth		250		KHz

For more information or general enquiries, please call;

R. F. Solutions Ltd,
Unit 21, Cliffe Industrial Estate,
South Street,
Lewes,
E Sussex. BN8 6JL.
England.

Tel +44 (0)1273 898 000 Fax +44 (0)1273 480 661.

Web Page : <http://www.rfsolutions.co.uk>

Email : sales@rfsolutions.co.uk

RF Solutions is a member of the Low Power Radio Association.



Information contained in this document is believed to be accurate, however no representation or warranty is given and no liability is assumed by R.F. Solutions Ltd. with respect to the accuracy of such information. Use of R.F.Solutions as critical components in life support systems is not authorised except with express written approval from R.F.Solutions Ltd.