R1 Single Frequency Repeater Specification

DMR   SFR

To customers

Thank you very much for your favor of our products! The purpose of this specification is to let you quickly grasp the use of this product and understand the detailed functions and operation of the product. In order to avoid bodily injury or property damage caused by improper operation, please read this product carefully before using it.

This datasheet applies to the following products:
R1 single frequency repeater

This product is based on a professional-grade RF chipset and is of reliable quality.

Camel Radio, promote the technological progress of the industry!

disclaimer

We strive for completeness and accuracy in the preparation of the manual, but we do not accept any responsibility for errors or omissions that may occur.

RF radiation information

Radio frequency refers to the electromagnetic frequency that can be radiated to space, which is a technology widely used in communication, and the product will produce a certain amount of radio frequency radiation during use.

Meet the metrics

This product complies with ETSI-TS102 361-1. The indicators are in accordance with CE & FCC specifications.

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Feature description

This product is a single frequency repeater that compatible with handsets from MOTOROLA and Hytera. Developed for scenarios such as drone mounting, wall-mounted installation, etc., with obvious advantages in size and weight. Based on the DMR dual-slot physical layer, only one frequency is needed to complete the call repeating work, 1 slot for RX and the other for TX, which saves half of the frequency resources compared with the traditional differential frequency repeater. At the same time, the restriction of the TX and RX frequency of the duplexer is eliminated, and it can work in all frequency from 400MHz to 470MHz. The frequency of TX and RX is independently adjustable, which can be the same or different. The user only needs to find a suitable high point, install the power supply and antenna to work.

Work function

Slot A	Slot B	Slot A	Slot B	Slot A

Time
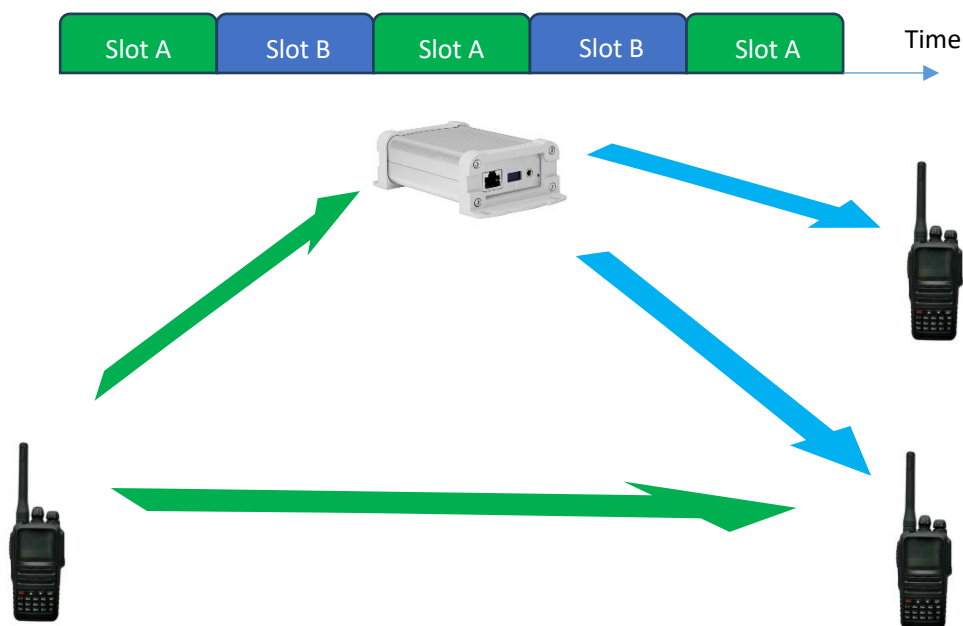
The repeater can configure the transceiver frequency according to the needs of the scenario, and the transceiver frequency does not affect each other. The repeater has a radius of 4-5 kilometers (outdoor), which can expand the communication area of ordinary handsets by 2 times. Depending on the scenario, the repeater can be placed at a high center to cover the whole world or at a tunnel bend to connect the two ends, and the repeater will forward the legitimate call to other devices after receiving the legitimate call (as shown on the left side of the

figure).
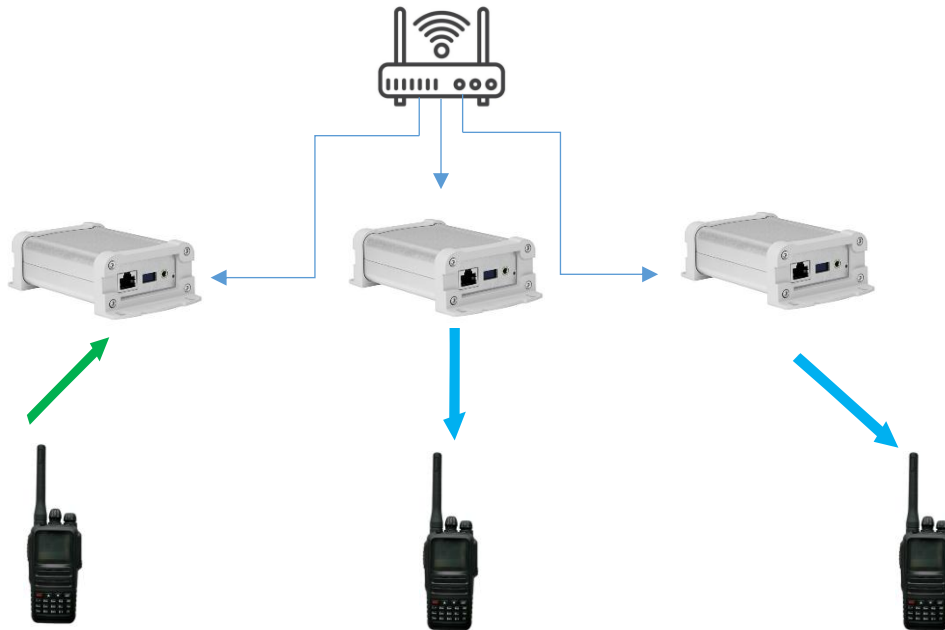
Multiple repeaters(SPECIAL version) can be attached to the LAN. For example, 1 repeater is placed on each floor of a building. When a handset initiates a call, the voice will be transmitted to the entire LAN through the network and forwarded by other repeaters, so as to complete the signal coverage of the entire building. The special feature of this machine is that the entire building can be covered with only one frequency point.

Product Advantages:

1. The circuit adopts the classical superheterodyne architecture, with voltage controlled bandpass filter, dedicated receiver, dedicated PLL, and crystal IF filter. All RF components come from TI, AKM, SKYWORKS, KDS and other international first-class suppliers. The performance is better than that of zero-IF integrated RF solutions.
2. The all-aluminum body and good thermal design ensure long-term high-load operation.
3. 400-470 full section work. Compatible with Motorola and Hytera machines.
4. Optimized for small mounting scenarios, strong anti-interference; leading standby power consumption and weight.
5. Digital signal transmission is used in the whole process of audio forwarding to avoid the loss of sound quality caused by analog audio forwarding.

6. Compared with the traditional frequency repeater, this product does not need to reprogram the handset, and still works in DMO mode. Even if the repeater signal range is out of range or the repeater fails, the call between the handset is still valid – making the communication more reliable.

Typical spec

Main feature			
Frequency range	400-470MHz	Channel capacity	5600
protocol	DMR	Operating voltage	7.4-9V
current	230mA @ DMR idle 1200mA @ TX	Ambient temperature	-20℃～ +60℃
Antenna impedance	50Ω	interface	UART/Audio
LCD	0.49 inches	weight	280g
size	113*79*42mm		
transmitter			
Channel bandwidth	12.5KHz	Modulation frequency offset	2.5KHz@12.5KHz
Frequency accuracy	±1.0ppm	Idle power	TDMA≦-57dBm
Transmit power	UHF:4W/0.5W	Audio response	+1dB~-3dB
Audio quality	16bit digital HD	DMR FSK error	≦5%
EMI	-36dBm@<1GHz - 30dBm@>1GHz	Digital Protocol	ETSI TS 102 361

		Specification	
Adjacent channel power	−60dB	Digital modulation	12.5KHz:7K60FXW
Receiver			
Channel bandwidth	12.5KHz	Frequency accuracy	±0.5ppm
Co-channel suppression	−12dB	Forwarding delay	90ms
Blocking	90dB	Digital sensitivity	−116dBm @ BER=1%
Spurious signal anti-interference	93dB	selectivity	65dB
Intermodulation	65dB	Audio quality	16bit digital HD

Arcitecture

79mm

113mm

42mm

125m

60mm

interface

serial number	Pin name	attribute	specification	remark
1	Audio monitoring	O	8 ohms 1W	
2	LCD	O	0.49 inches	
3	Write frequency port	I	RJ45	Dedicated programming cable
4	Reset key	I	Compression reset	
5	RF port	I/O	50 Ohm	
6	Power port	I	7.4V	Capacity> 2A

Remark:

① Only the first channel plays a role when programming. The user only needs to configure the RX frequency, TX frequency and color code, and the rest will be processed automatically. It is recommended to enable the transmission timeout (TOT) for 60 seconds, which can be configured according to the situation and should not be too large.
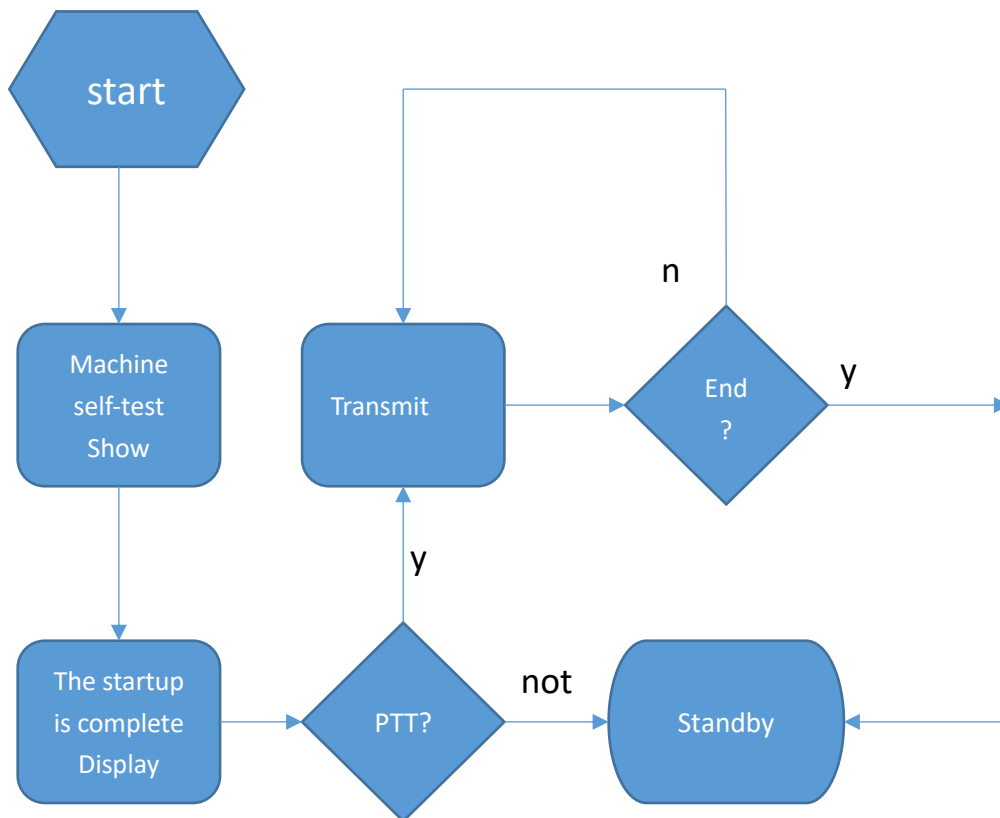
Screen display

The LCD is divided into two rows. The left side of the upper row shows the RX frequency of the unit in KHz. The right side of the top shows the call status, if there is a call, it will show '#'(or '*' for remote call), and if there is no call, there will be no display. The color code is displayed on the left side of the lower row, and the color code is represented by the two decimal numbers after the beginning of CC. For example:

```
469075              #
CC 01
```

Workflow diagram

As long as the repeater receives a call that matches the receiving frequency and color code of the SFR, it will repeat it. When repeating, the caller's ID, call address, and call type are transparently transmitted.

```
           ┌─────────────────────────────┐
  ┌──────┐ │                             │
  │ start│ │                             │
  └──┬───┘ │                             │
     │     ▼                             │
┌────────┐ ┌──────────┐    ┌─────────┐
│Machine │ │ Transmit │───▶│  End    │──y──▶
│self-test│ │          │    │   ?     │
│ Show   │ └────▲─────┘    └────┬────┘
└───┬────┘      │          n    │
    │           y               │
┌────────┐ ┌─────────┐ not ┌─────────┐
│The startup│─▶│  PTT?  │──▶│ Standby │◀──
│is complete│  │        │   │         │
│ Display │   └─────────┘   └─────────┘
└────────┘
```

Refer to the documentation

Programming User Manual