

## Radio On A Chip 860-928 MHz Frequency Agile With SPI Bus Interface

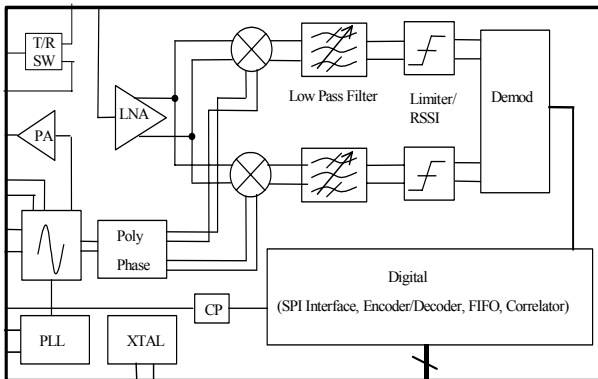
### Features

- High Integration Minimizes System Cost
- Data Rates from 4 to 128.8 Kbits/Sec
- Direct Connection To Microprocessor
- Integrated Antenna Switch
- Adjustable detection bandwidths, data rates
- Adjustable gain, detection level/ hysteresis
- Low and high beta FSK detection modes
- Integrated Manchester coding/decoding
- 6 Prog. Power Levels, Freq. And Tx/Rx/Standby Modes
- Operates From Single 2.5V Power Supply
- Surface Mount Leadless Plastic Packaging

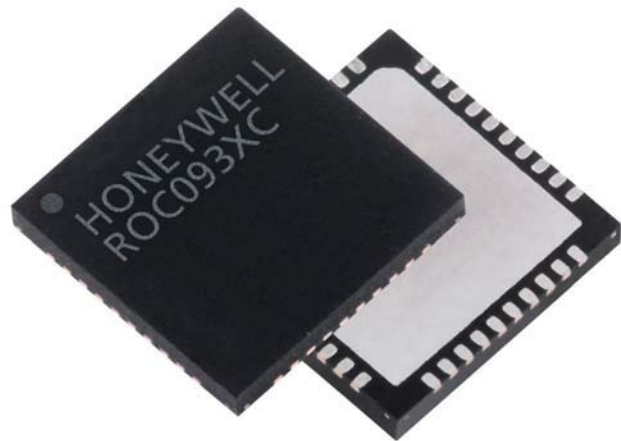
### Description

The Honeywell HRF-ROC093XC is a half-duplex transceiver for use in wireless communication and data applications. Direct microprocessor connection for control and data transfer, eliminate the need for additional ICs, while integrated data encode/decode reduces the instruction set requirements on the microprocessor. The HRF-ROC093XC is ideally suited for use in battery powered wireless applications in conjunction with microprocessors for voice and data communication. Adjustable data rates, filter bandwidths and detection levels allow the IC to be used in a wide variety of high sensitivity / high EMI environments.

### Functional Schematic



### Product Photo



HRF-ROC093XC Wireless Transceiver

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## RF Electrical Specifications @ + 25°C

| Parameter          | Test Condition   | Frequency             | Minimum | Typical | Maximum | Units |
|--------------------|--|-----------------------|---------|---------|---------|-------|
| Rx Sensitivity     |  | 860– 928 MHz          |         | -95     |         | dBm   |
| 1db Compression    | V <sub>dd</sub> = 2.5V   | 860– 928 MHz          |         | +5      |         | dBm   |
| Tx Output Power    | V <sub>dd</sub> = 2.5V   | 860– 928 MHz          |         | +3      |         | dBm   |
| Tx Power Control   |  |                       |         | 18      |         | dB    |
| Data Rate, Tx / Rx | Continuous Data  |                       |         | 128     |         | Kbps  |
| Channel Rejection  | Adjacent Channels  | F <sub>c</sub> + 1MHz |         | 50      |         | dB    |
| Max Detection BW   | IQ Baseband FilterPassband   |                       |         | 250     |         | KHz   |
| Control/Data I/O   | Serial Peripheral Interface (SPI). Direct Connection To Microcontroller/Microprocessor |                       |         | 10      |         | MHz   |

## DC Electrical Specifications @ + 25°C

| Parameter  | Minimum | Typical | Maximum         | Units |
|--|---------|---------|-----------------|-------|
| V <sub>DD</sub> Power Supply Voltage                             | 2.4     | 2.5     | 2.6             | V     |
| Power Supply Current During Tx, Output Power Dependant (915 MHz) | 16      | 26      |                 | mA    |
| Power Supply Current (I <sub>DD</sub> ) During Rx (915MHz)       |         | 35      |                 | mA    |
| Sleep Mode Current Consumption                                   |         | <1      |                 | uA    |
| CMOS Logic Level (0)   | 0       |         | 0.7             | V     |
| CMOS Logic Level (1)   | 1.7     |         | V <sub>DD</sub> | V     |

## Absolute Maximum Ratings<sup>1</sup>

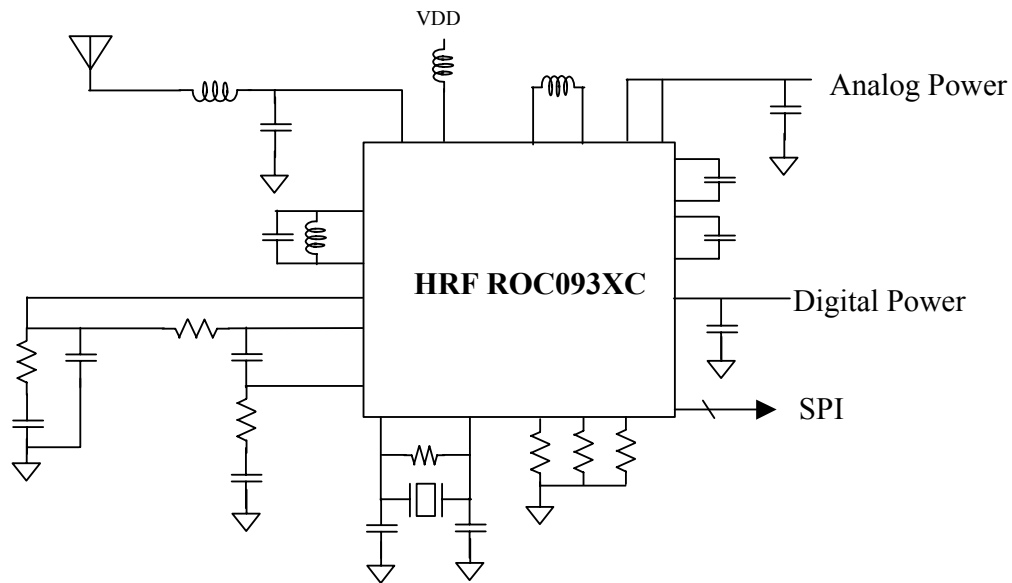
| Parameter                      | Absolute Maximum | Units     |
|--------------------------------|------------------|-----------|
| Maximum Input Power            | -                | -         |
| V <sub>DD</sub>                | + 2.8            | V         |
| ESD Voltage (Human Body Model) | 200              | V         |
| Operating Temperature          | - 40 to + 85     | Degrees C |
| Storage Temperature            | - 40 to + 150    | Degrees C |

(Note 1) Operation Of The HRF-ROC093XC Beyond Any Of These Parameters May Cause Permanent Damage.

**ESD Protection:** The HRF-ROC093XC Contains reduced ESD Protection Circuitry for sensitive RF I/O. Precautions Should Be Taken During Handling/Assembly Until Protected By External Circuitry or Housings

# HRF-ROC093XC

## Typical Application

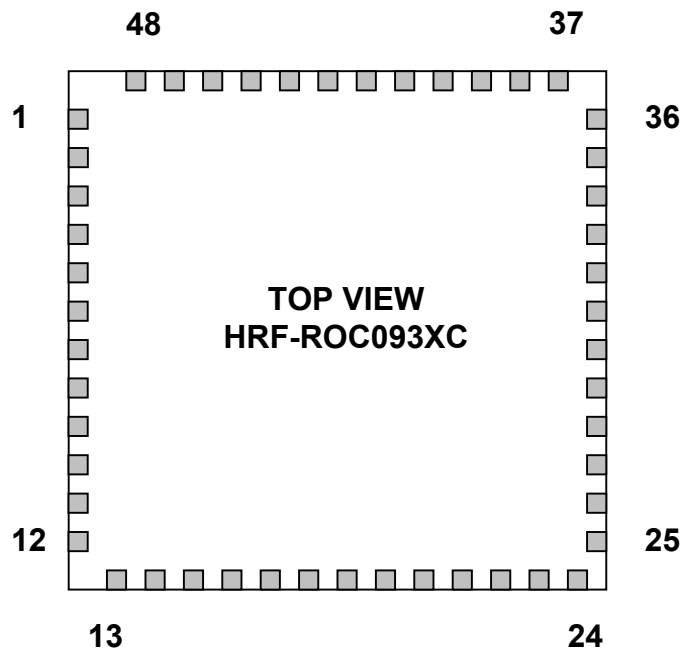


## Package Outline

7mm x 7mm

48 pin Leadless

Plastic Chip Carrier



Low inductance RF/DC ground connection required below part as bottom ground pad is used for all device grounding. Additionally, this connection provides a direct connection to the die for enhanced thermal dissipation. **Package shown not to scale.**

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# HRF-ROC093XC



Advance Information

## Pin Configuration

### HRF-ROC093XC 48 Pin LPMC™ (7 mm X 7 mm) Package Pin List

\* RF/Digital ground is provided through backside slug pad.

| Pin | Name         | Function  | Pin | Name          | Function  |
|-----|--------------|---|-----|---------------|---|
| 1   | SWITCH TX    | Optional connection – PA AC OUT to SWITCH ANTENNA | 25  | SPI CLK IN    | SPI Clock   |
| 2   | PA AC OUT    | AC-coupled PA output – 10 pf series cap           | 26  | SPI SSN IN    | SPI Slave Select                                  |
| 3   | VP PA        | Positive supply for PA                            | 27  | DIG DATA IN   | Digital Section Rx Text Input, Ext. digital data  |
| 4   | PA DC OUT    | PA Direct Connection for output bias              | 28  | SPI DATA IN   | SPI Serial Data input                             |
| 5   | VCO TANK2    | VCO external tank connection                      | 29  | RESET N       | Digital Section Reset                             |
| 6   | VCO TANK1    | VCO external tank connection                      | 30  | MIXER REF     | Mixer Ref Voltage Filter                          |
| 7   | VP VCO       | Positive supply for VCO                           | 31  | SCHM TRIG LEV | Detection level monitor/filtering                 |
| 8   | VMOD LG      | VCO varactor input, high deviation                | 32  | PRE TRIG DATA | RX Analog Data, pre-detection                     |
| 9   | VMOD SM      | VCO varactor input, low deviation                 | 33  | V CM REF      | Common mode voltage filtering                     |
| 10  | TX MOD DATA  | Data charge pump output                           | 34  | VP BB         | Positive supply for Baseband Filter               |
| 11  | VP PLL       | Positive supply for PLL                           | 35  | Q FILT BW N   | BB Filter BW Control                              |
| 12  | REXT PLL     | PLL bias resistor                                 | 36  | Q FILT BW P   | BB Filter BW Control                              |
| 13  | PD OUT       | Phase Detector charge pump output                 | 37  | I FILT BW N   | BB Filter BW Control                              |
| 14  | CRYSTAL 1    | Reference crystal                                 | 38  | I FILT BW P   | BB Filter BW Control                              |
| 15  | CRYSTAL 2    | Reference crystal                                 | 39  | Q MIX ADJ     | Dynamic Range Adjust                              |
| 16  | RTEST OUT    | PLL R-counter out                                 | 40  | I MIX ADJ     | Dynamic Range Adjust                              |
| 17  | PTEST OUT    | PLL N-counter output                              | 41  | VP MIX        | Positive supply for Mixer                         |
| 18  | SQUELCH 1    | Bit 1, 4-level window Select                      | 42  | VP LNA        | Positive supply for LNA                           |
| 19  | SQUELCH 2    | Bit 1, 4-level window Select                      | 43  | RF GAIN       | LNA Gain Control: open – low, ground – high       |
| 20  | VP DIG       | Positive supply for DIG                           | 44  | VP LNA        | Positive supply for LNA                           |
| 21  | RX OUT       | Demodulated Rx data                               | 45  | LNA INPUT     | LNA input   |
| 22  | TX DATA V    | Logic level Tx data                               | 46  | LNA BIAS ADJ  | DC Bias Resistor                                  |
| 23  | SPI INT OUT  | SPI Interrupt output                              | 47  | SWITCH RX     | Optional connection – LNA INPUT to SWITCH ANTENNA |
| 24  | SPI DATA OUT | SPI Serial Data output                            | 48  | SW ANTENNA    | Switch connection to Antenna                      |
|     |              |   |     |               |   |

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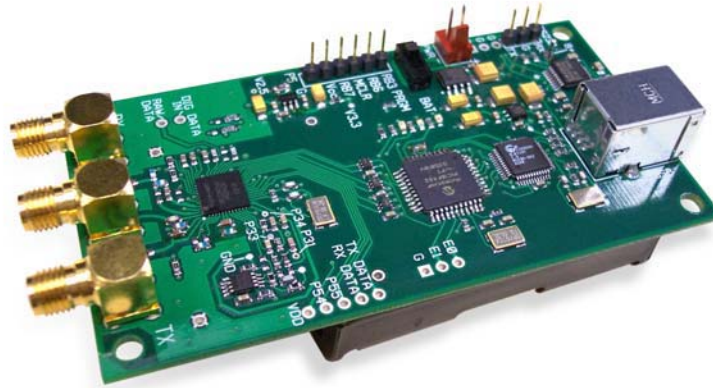
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Advance Information

## Customer Demonstration Board



The Customer Demonstration Board provides the ROC093XC radio with a PIC microcontroller that interfaces to a PC through a USB connection. Using the software provided and a PC, the user can send files and perform range tests. For a more complete understanding of the operation of the radio, the user can also control the operating frequency, power levels and all internal registers for early product development/prototyping. The board operates from a USB power source, three "AA" batteries or an external power supply. Single antenna operation is attained through the internal RF switch. Separate Tx/Rx/ ports are also available.

A kit is available, HRF-ROC093XC-K, which includes two boards, antennas, USB cable, documentation and control software.

## Ordering Information

| Ordering Number | Product                                 |
|-----------------|---|
| HRF-ROC093XC -T | Delivered On Tape And Reel <sup>2</sup> |
| HRF-ROC093XC -K | Engineering Evaluation Kit              |

Note 2: Contact Honeywell for details

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