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# QRPme.com

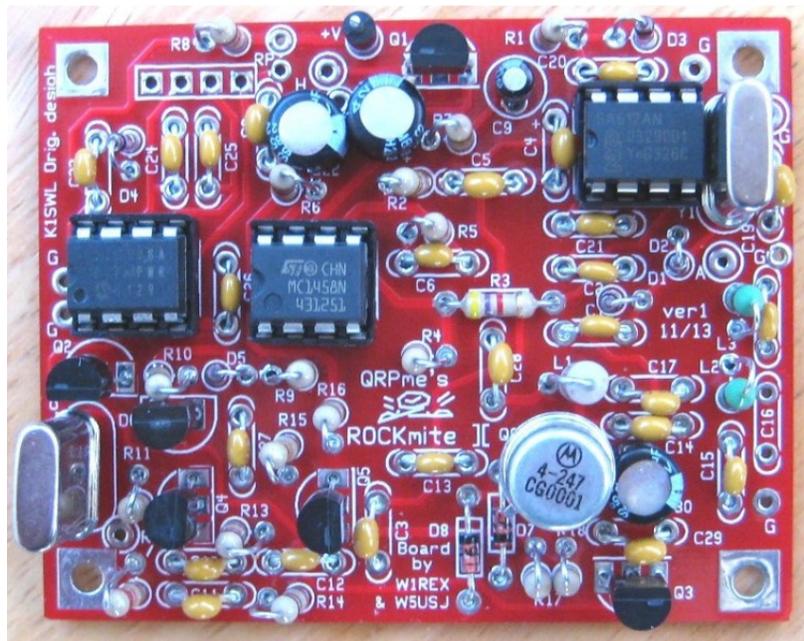
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## Rockmite ][ Transceiver

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By: Rex Harper, W1REX

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### *Rockmite ][ Builder's Guide*

# The Rockmite ][ a Simple Transceiver

## List of Material (LoM)

Qty.	Ref. Designator	Component	Description
3	<a href="#">C10, C11, C12</a>	<a href="#">Band Specific</a>	<a href="#">See page 2 Band Table</a>
2	<a href="#">C1, C2</a>	<a href="#">Band</a>	
4	C6,C24, C25, C26	100 pF disk or mono. cap	'101' or '101J'
2	<a href="#">C15, C19</a>	<a href="#">Band</a>	
1	<a href="#">C16</a>	<a href="#">Band</a>	<i>Optional</i>
1	<a href="#">C17</a>	<a href="#">Band</a>	
1	<a href="#">C18</a>	<a href="#">Band</a>	
5	C3, C13, C20, C21, C27	.01 uF disk cap	'103', ceramic
1	C4	.022 uF monolithic cap	'223', epoxy case
6	C5,C8,C14,C23,C28,C29	.1 uF monolithic	'104', epoxy case
1	C9	3.3 uF electrolytic cap	
2	C7,C22	47 uF electrolytic cap	
1	C30	47 uF electrolytic cap	low-profile case
4	D1,D2,D7,D8	1N4148 diode	Alt. 1N914
1	D9	1N5818	Polarity protection
2	<a href="#">D3,D4</a>	<a href="#">Band</a>	
1	<a href="#">D5</a>	<a href="#">Band</a>	
1	D6	MVAM-109 varicap diode	
1	HS1	TO-18 heat sink, anodized	<i>see text</i>
1	<a href="#">L1</a>	<a href="#">Band</a>	
2	<a href="#">L2,L3</a>	<a href="#">Band</a>	
2	R6,R18	10 ohm resistor	Brown-blk-blk-gold
3	R14,R16,R17	100 ohm resistor	Brown-blk-brn-gold
3	R1, R8, R13	1K ohm resistor	Brown-blk-red-gold
3	R2,R3,R9	4.7K ohm resistor	Ylw-violet-red-gold
1	R12	22K resistor	Red-red-org-gold
2	R11,R15	47K resistor	Ylw-violet-org-gold
2	R7,R10	100K resistor	Brown-blk-ylw-gold
2	R4,R5	1 M resistor	Brown-blk-green-gold
3	Q1,Q2,Q3	<b>2N7000 transistor</b>	(TO-92 package)
2	Q4,Q5	2N4401 transistor	(TO-92 package)
1	Q6	2N2222A TO-18 transistor	Alt. 2N3866 TO-5
1	U1	SA612/602AD IC	<i>in semiconductor bag</i>
1	U2	MC1458, LM1458 IC	8-pin DIP IC
1	U3 pre-programmed	<b>12F1840S keyer Chip</b>	8-pin DIP IC,
2	<a href="#">Y1, Y2</a>	<a href="#">Band</a>	Crystals
3	--	8-pin IC socket	
1	SIP socket strip	10-pin strip	Crystal, Q6 sockets +1
1	--	2-1/2" RG-174/U coax	
1	--	Printed circuit board	WIREX Ver 1 PCB

*Notes:* Items in gray shading are in antistatic bag and those 2 items *in bold (above) are static-sensitive.*

# LoM Continued

## Band Specific Components

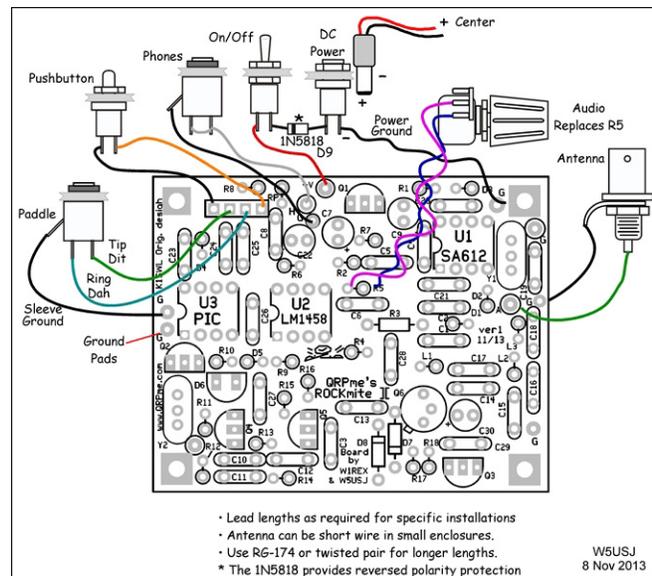
Ref.	Band Table			
	80	40	30	20
C1	47pF C0G Mono (470)	47pF C0G Mono (470)	33pF C0G Mono (330)	47pF C0G Mono (470)
C2	33pF C0G Mono (330)	47pF C0G Mono (470)	33pF C0G Mono (330)	47pF C0G Mono (470)
C10, C11	68pF C0G Mono (680)	68pF C0G Mono (680)	47pF C0G Mono (470)	39pF C0G Mono (390)
C12	47pF C0G Mono (470)	47pF C0G Mono (470)	33pF C0G Mono (330)	39pF C0G Mono (390)
C15, C19	560pF C0G Mono (561)	470pF C0G Mono (471)	330pF C0G Mono (331)	220pF C0G Mono (221)
C16	Future Option	Future Option	Future Option	Future Option
C17	1200pF C0G Mono (122)	1000pF C0G Mono (102)	680pF C0G Mono (681)	470pF C0G Mono (471)
C18	240pF C0G Mono (241)	120pF C0G Mono (121)	82pF C0G Mono (820)	68pF C0G Mono (680)
D3	1N5231B 5.1V Zener	1N5231B 5.1V Zener	1N5231B 5.1V Zener	1N5233B 6 V Zener
D4	1N5231B 5.1V Zener	1N5231B 5.1V Zener	1N5231B 5.1V Zener	1N5230B 4.7 V Zener
D5	Not Used	1N5236B 7.5V Zener	1N5231B 5.1V Zener	1N5230B 4.7 V Zener
L1	15 uH RF Choke	10 uH Choke	6.8 uH RF Choke	4.7 uH RF Choke
L2, L3	2.2 uH RF Choke	1 uH Choke	0.68 uH RF Choke	0.47 uH RF Choke
Y1, Y2	Standard 3.560, 3.579545 MHz crystals	Standard 7.030, 7.040 MHz crystals or specify from list	Standard 10.106, 10.116 MHz crystals	Standard 14.050, 14.060 MHz crystals
The following items, from the original Rock-Mites, are listed here for reference only				
Series Filter (Ref.)	330 pF + 5.6 uH RFC	150 pF + 3.3 uH RFC	82 pF + 3.3 uH RFC	82 pF + 1.5 uH RFC

The series filter values were used in the original SWL RMs to meet -43dB FCC spurious suppression requirements.

## Connection Hookup Components

- BNC Antenna Jack
- Coaxial Power Jack
- Coaxial Power Plug
- 1N5818 Polarity Diode (D9)
- Stereo Jacks, Paddle and Audio Knob (optional)
- Potentiometer, 1 meg (optional)
- Push Button Switch
- Power Wire
- 10-Conductor Ribbon – Hook up

## Crystal Grounding Option

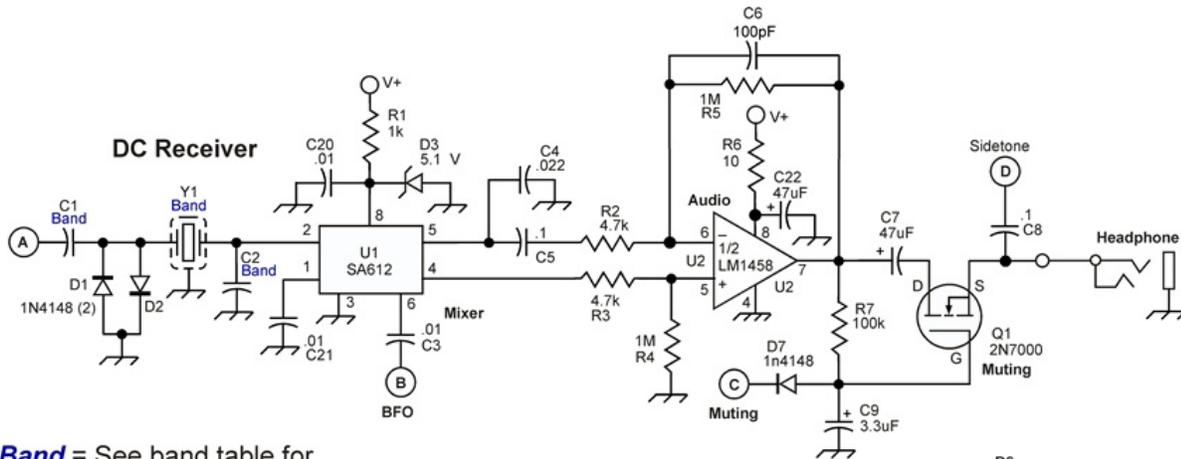


For easy frequency changing use 3-pin SIP sockets at Y1 and Y2.

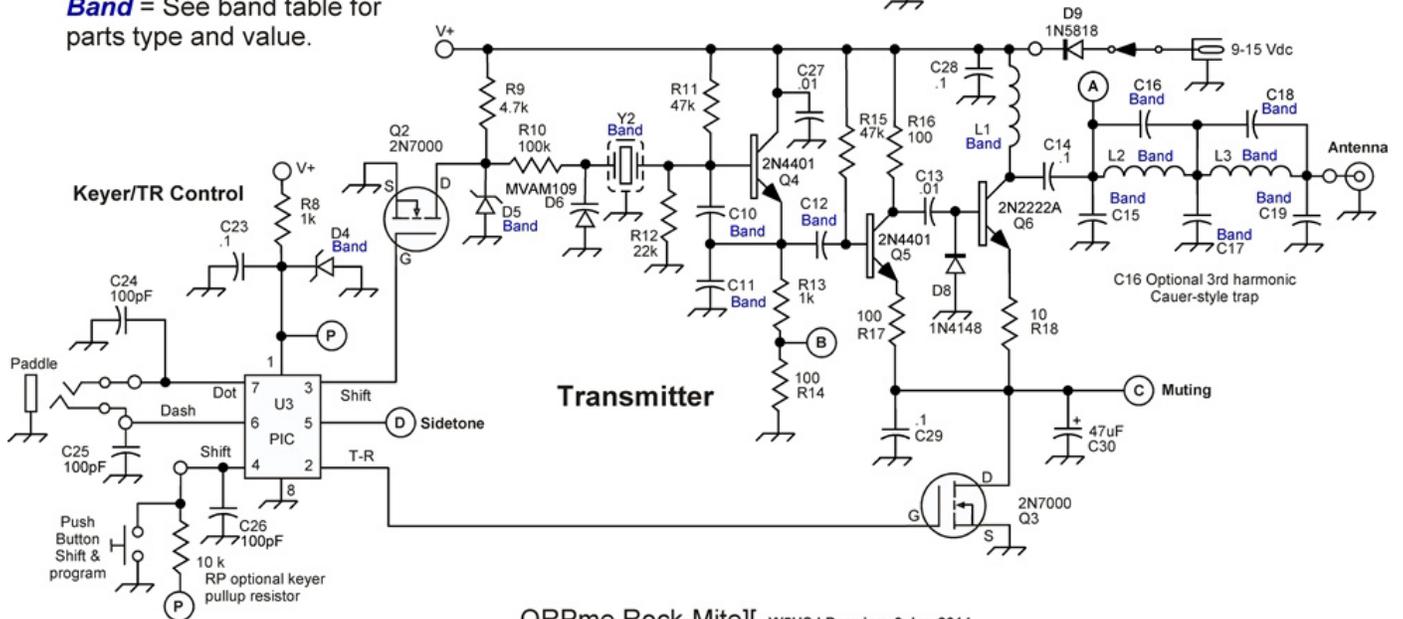
Add center ground lead to crystal as shown above. See **RM Helps pg 10**.

**Note:** SIP sockets will raise the height of the crystals and may limit use in mint tins and the MityBox. Leaving the leads long, the crystals can be bent over to fit the enclosures. Also, QRPme has some short, HC49S, crystal frequencies.

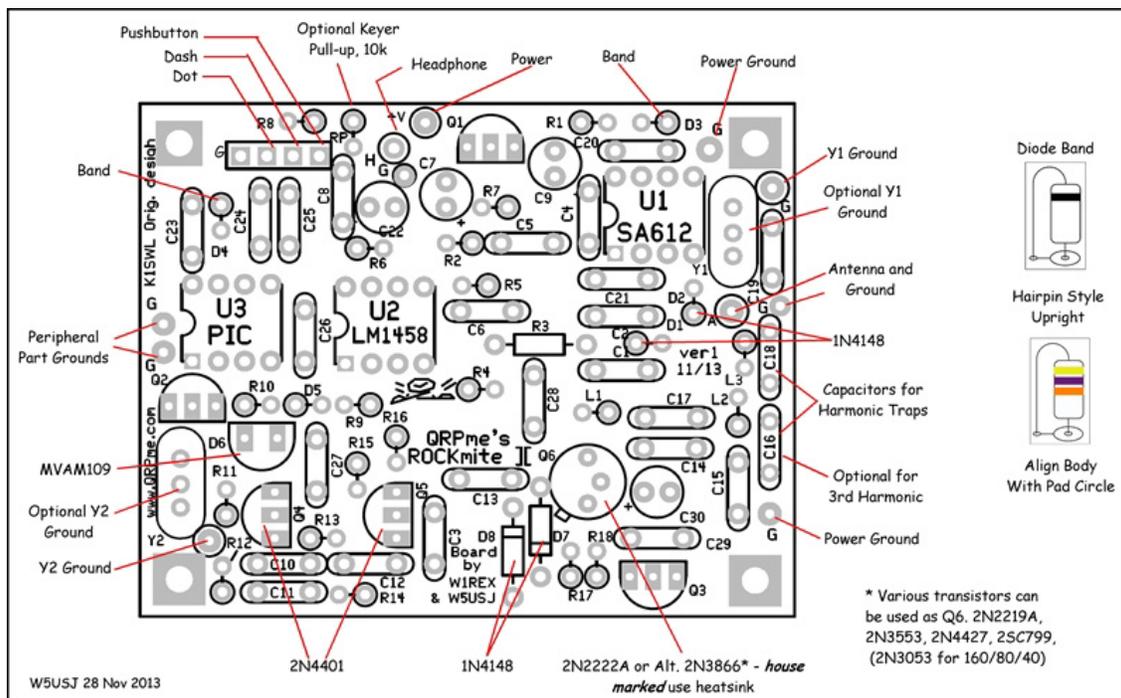
# Schematic Drawing



**Band** = See band table for parts type and value.



QRPme Rock-Mite][ W5USJ Drawing 3 Jan 2014



## Assembly Sequence:

- **Download and print the RM Builder's Help supplement:** <http://qrpme.com/docs/RM>[%20Builders%20Help.pdf]
- **IC Sockets:** (see the [RM Builders Help supplement](#) ). See *Addendum U1-5 to C4/C5 Trace Mod* pg11.
- **C30 Installation:** There are 3- 47 uF electrolytic capacitors in this kit. Install the short one at C30.
- **Q6 Installation:** Install the supplied heat sink HS1 on the 2N2222A (or alt. 2N3866 house marked) before installation on the board. Q6 installation should be done late in the assembly to facilitate installation of shorter components nearby. Ensure that the heat sink does not touch the leads of any nearby components.
- **Resistors and diodes:** Most of the resistors and diodes and the RF chokes are mounted 'hairpin'-fashion. **Diodes are orientation-critical**- be sure to match the banded end of the diode to the wire bend as shown above at upper right, and follow the installation orientation shown on the pictorial above. Resistors are non-critical- their orientations shown above need not be strictly observed.
- **Crystals:**

If no future frequency change is intended install crystals as described below. Otherwise, refer to the grounding option, page 2.

Y1 and Y2 should be stood slightly (0.5 to 1mm) above the printed-circuit board to prevent shorts from case to PC-board traces. Install short lengths of leftover resistor lead from the bottom end of both crystal cases to the nearest ground point. [The crystal cases are tinned and will accept solder readily- use a minimum of heat.] *You'll find it easiest to stand the wire lead up in its mounting hole and solder it first, then cut the wire short, bend it over to the crystal case and solder that end.*

Spare ground pads are provided next to Y1 and Y2. Lay the board down on a flat surface and stand a leftover component lead upright in each hole. Solder on the top side of the board and trim the lead length to 4-5 mm. Bend this 'flying' lead over to the crystal cans and solder to the crystal. Use minimum heat, hot iron, quick solder connection. Get it done quickly.

- Remaining parts may be installed without regard to sequence. It may be helpful to note the tight clusters of parts and install those first. Install ICs in the sockets as shown above- see the supplement for orientation info.

## **Rockmite ][ operation:**

The Rockmite ][, using parallel resonant crystals, operates on approximately **0.5 to 1.5 kHz lower** than the crystal's marked frequency. The microcontroller provides a 'shift' signal to the local oscillator. This signal changes state upon key-down and key-up and provides approximately 700 Hz frequency shift (FSK). For series resonant crystals, the opposite is true.

The Rockmite ][ includes a supplied Iambic Keyer, U3. Refer to the Picokeyer-RM ][ manual for detailed operating instructions

If either the Dot or Dash inputs is grounded upon power-up, the keyer function is bypassed and the other input accepts a straight-key or external keyer. This is achieved automatically by the use of a 3-conductor jack and 2-conductor (monaural) plug. Alternately, refer to the Straight Key Mode in the keyer manual.

Third Party Keyers:

RMK from Jackson Harbor <http://wb9kzy.com/rmk.htm> A keyer chip with basic features and functions

PicoKeyerRM from HamGadgets

[http://www.hamgadgets.com/index.php?main\\_page=product\\_info&cPath=21&products\\_id=48](http://www.hamgadgets.com/index.php?main_page=product_info&cPath=21&products_id=48)

A full-featured keyer chip with extended features and functions.

Visit the respective website for a copy of the manual describing the features and functions of these two keyers.

## 'Pushbutton' Input

- A brief (<250 ms) closure to ground on the 'switch' input reverses the offset to provide a second operating frequency.  
**Frequency selection:** When you wish to work another station, use this function to select the higher of the two pitches on a received signal. Note that the pitch at the other setting is a measure of how close to zero-beat you are; ideally it would be just a low-frequency 'thump'. If the two selections yield 'high' and 'higher' you probably won't be able to work the other station.
- For the original SWL Rock-Mite keyer chip only (12C508A), a longer (>250 ms) closure to ground on the 'switch' input puts the keyer in a speed-adjustment mode. The Rockmite ][ outputs a Morse code "S" to acknowledge entry into this mode. Tapping (or holding) the dot paddle speeds up the keyer; the same operations on the dash paddle slow it down. The default (power-up) speed is approximately 16 WPM and the upper and lower limits are ~40 WPM/5WPM. If no dot/dash inputs are received over an interval of ~1.5 seconds, the Rockmite ][ outputs a lower-frequency tone and reverts to normal operation. *The Morse "S" and subsequent tones are not transmitted on the air.*

*Design modifications may be found in the Rockmite ][ Builder's Help and on-line at the URLs below.*

### **On-Line Resources:**

Modifications and tips: <http://www.qsl.net/n0rc/rm/>

Yahoo Rockmite Group:

[http://groups.yahoo.com/neo/groups/Rock-Mite\\_Group/](http://groups.yahoo.com/neo/groups/Rock-Mite_Group/) Approval with Valid Call and Real Name only.

Missing Parts : Rex Harper W1REX [tunacankits@gmail.com](mailto:tunacankits@gmail.com)

This document is based on the original Rock-Mite Instructions by Dave Benson, K1SWL.

Edited by: Chuck Carpenter, W5USJ

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## Errata