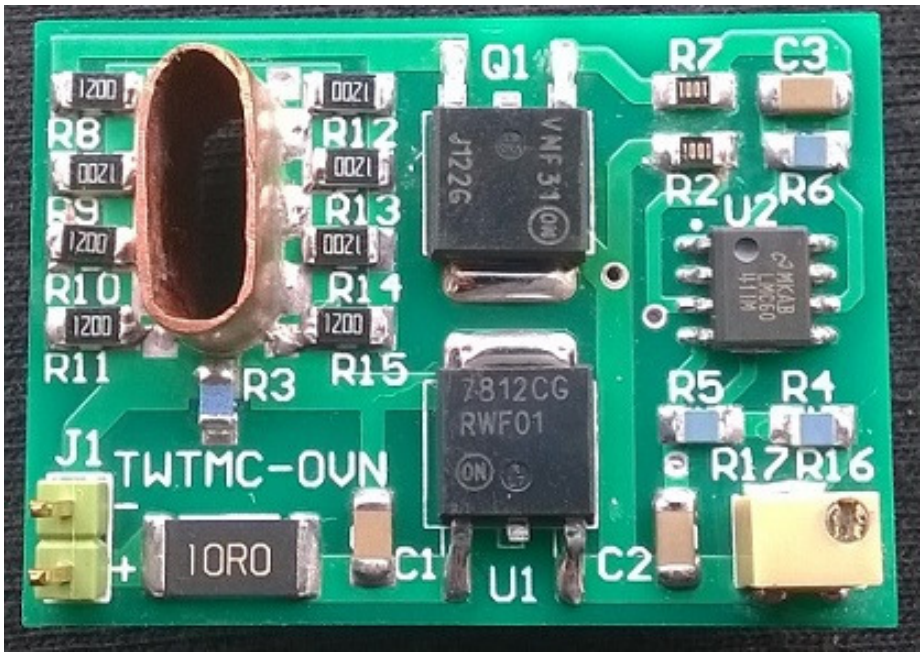
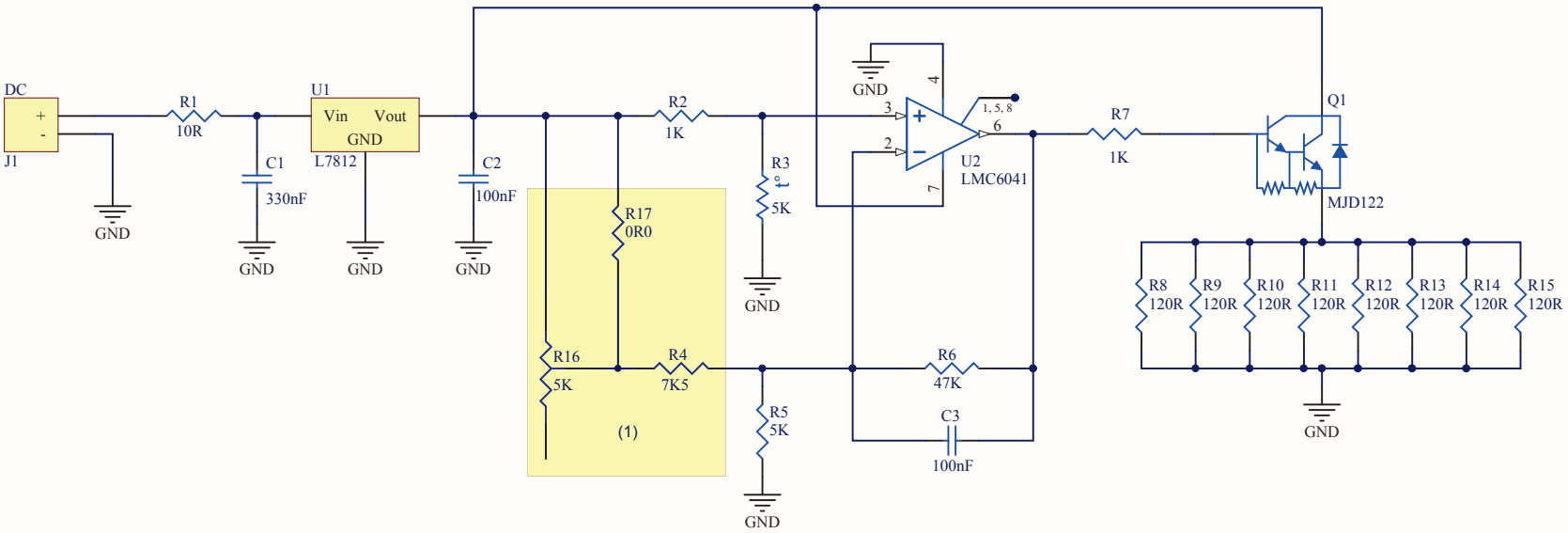
The Well Tempered Master Clock

TWTMC-OVN



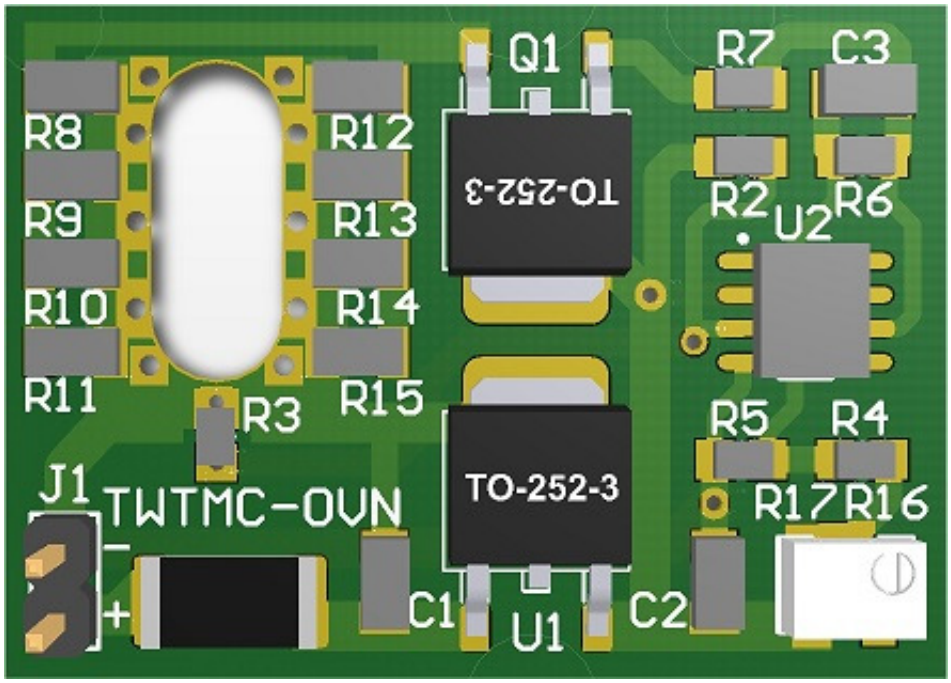
Oven for SC-Cut crystal oscillator



(1) R16 + R4 (7.5 K) for temp fine tuning - R17 + R4 (9.09K) for fixed temp

Title: TWTMC-OVN		
Size: A4	Number: 1	Revision: 0
Date: 24/05/2016		Sheet 1 of 1
File: C:\Users\..\TWTMC-OVN.SchDoc		Drawn By: Andrea Mori

PCB layout


Q1
R7
C3
R8
R12
TO-252-3
R9
R13
R2
U2
R6
R10
R14
R11
R3
R15
R5
R4
J1
TWTMC-OVN
TO-252-3
R17
R16
C1
U1
C2

BOM

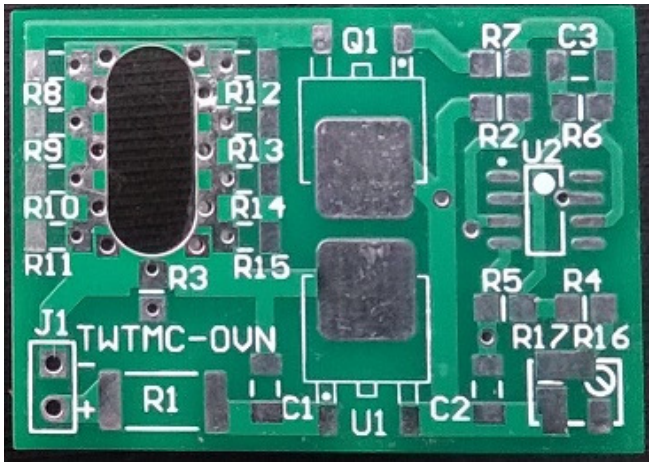
Label	Item	Pkg.	Manufacturer	Manufacturer part	Supplier	Supplier part	Q.ty	Note
C1	330nF X7R	1206	AVX	12065C334KAT2A	Mouser	581-12065C334K	1	
C2 C3	100nF X7R	1206	AVX	12065C104JAT2A	Mouser	581-12065C104J	2	
R1	10R 3W	2512	TE	352110RFT	Mouser	279-352110RFT	1	
R2 R7	1K 1/4W	0805	TE	1-2176092-8	Mouser	279-1-2176092-8	2	
R3	NTC 5K	0805	Vishay	NTHS0805N02N5001JE	Mouser	71-NTHS0805N2N5001JE	1	
R4							1	(1) fixed or fine tuning temp
R5	5K 1/4W	0805	IRC	PFC-W0805LF-03-4991-B	Mouser	66-PFC08LF4.99K-B	1	
R6	47K 1/4W	0805	IRC	PFC-W0805LF-03-4752-B	Mouser	66-PFC08LF47.5K-B	1	
R8-R15	120R 1/4W	1206	Yageo	RT1206FRE07120RL	Mouser	603-RT1206FRE07120RL	8	
R16								(2) fixed or fine tuning temp
R17								(3) fixed or fine tuning temp
Q1	MJD122	DPAK	On Semi	MJD122T4G	Mouser	863-MJD122T4G	1	
U1	MC7812	DPAK	On Semi	MC7812CDTG	Mouser	863-MC7812CDTG	1	
U2	LMC6041	SOIC-8	TI	LMC6041IMX/NOPB	Mouser	926-LMC6041IMX/NOPB	1	
J1	2 pin header		AMP	826646-2	Mouser	571-826646-2	1	

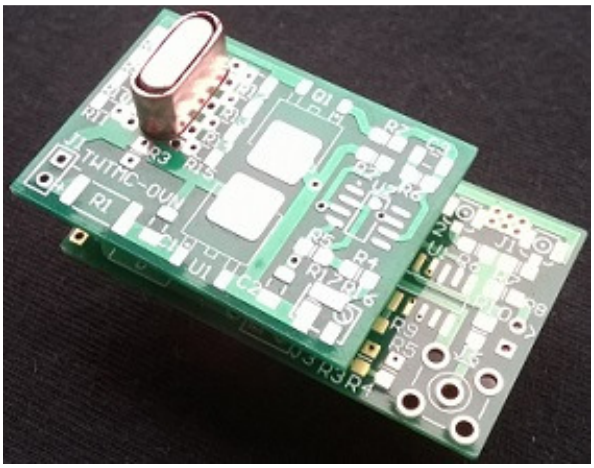
(1)								
Fixed	9K09 1/4W	0805	IRC	PFC-W0805LF-03-9091-B	Mouser	66-PFC08LF9.09K-B	1	
Fine tuning	7K5 1/4W	0805	IRC	PFC-W0805LF-03-7501-B	Mouser	66-PFC08LF7.5K-B	1	

(2)								
Fixed	None							
Fine tuning	5K trimmer	4mm	Bourns	3224W-1-502E	Mouser	652-3224W-1-502E	1	

(3)								
Fixed	0R0 jumper	0805	Panasonic	ERJ-S060R00V	Mouser	667-ERJ-S060R00V	1	
Fine tuning	None							

Assembly guide





The TWTMC-OVN is the oven to use with SC-Cut crystal oscillators.

The board fits the crystal and keeps it at a constant temperature around 82°C.

It needs 1 external power supply: unregulated +16V. The TWTMC-D&D daughter board provides the power supply for the oven (see TWTMC-D&D Assembly Guide).

The are two options to set the temperature: using a fixed resistor or a trimmer resistor for fine tuning.

The crystal fits inside a copper tube soldered to the PCB. It acts as the heater coupling of the oven to the crystal. You can build it starting from a piece of 3/8" copper pipe used in conditioning.

You have to press it in a vise until you reach the suitable shape to fit in the PCB. The slot hole in the PCB is 195 mil x 470 mil (4.95 mm x 11.93 mm). The height of the tube should be 452 mil (11.48 mm) to entirely cover the height of the crystal.

Some components depend on the chosen option to set the right constant temperature. See the following table:

Option	R4	R16	R17
Fixed *	9K09	none	0R0 jumper
Fine tuning	7K5	5K trimmer	none

***** Due to the tolerance of the components the fixed temp option is not recommended. While you get a constant temperature, it's not sure you reach the right temp of 82°C. **The second option is strongly recommended.**

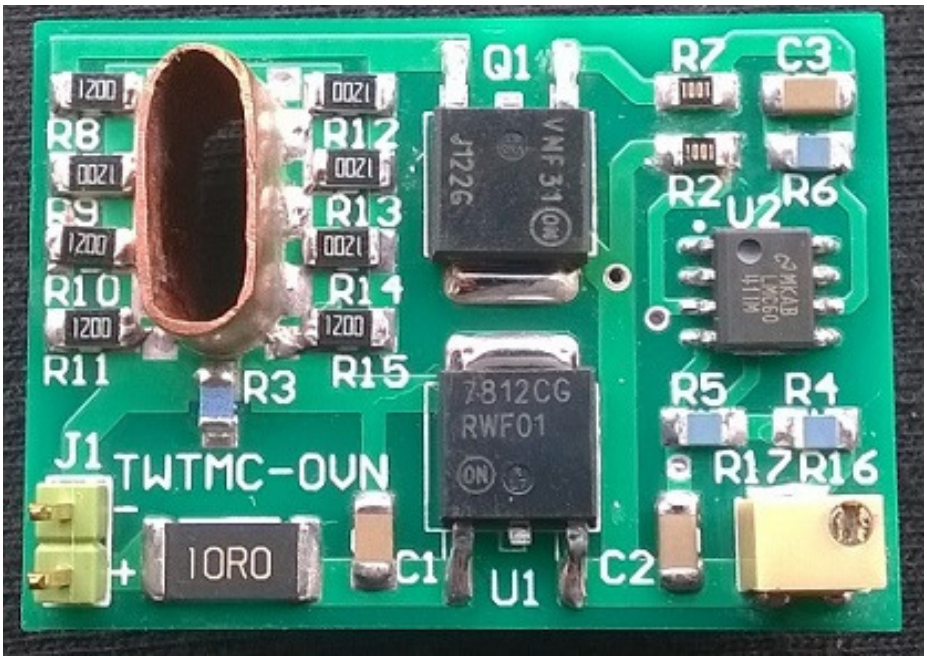
Firstly you have to fit and solder the copper tube to the PCB. To do the job you have to heat the copper tube before soldering. Put the copper tube in place, the PCB should stay at around half the height of the tube. Heat the copper tube then apply the tin around it.

Place the following components: C1, C2, C3, R1, R2, R3, R5, R6, R7, Q1, U1, U2.

If you have chosen the fixed temp option, solder R4 and R17. Otherwise, solder R4 and R16 (trimmer resistor) as in the above table.

Now you have to solder the heater resistors R8 to R15.

Finally solder J1.

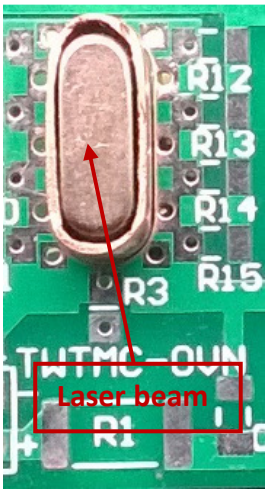


Apply +16V at J1. **Pay attention to the polarity of the power supply.**

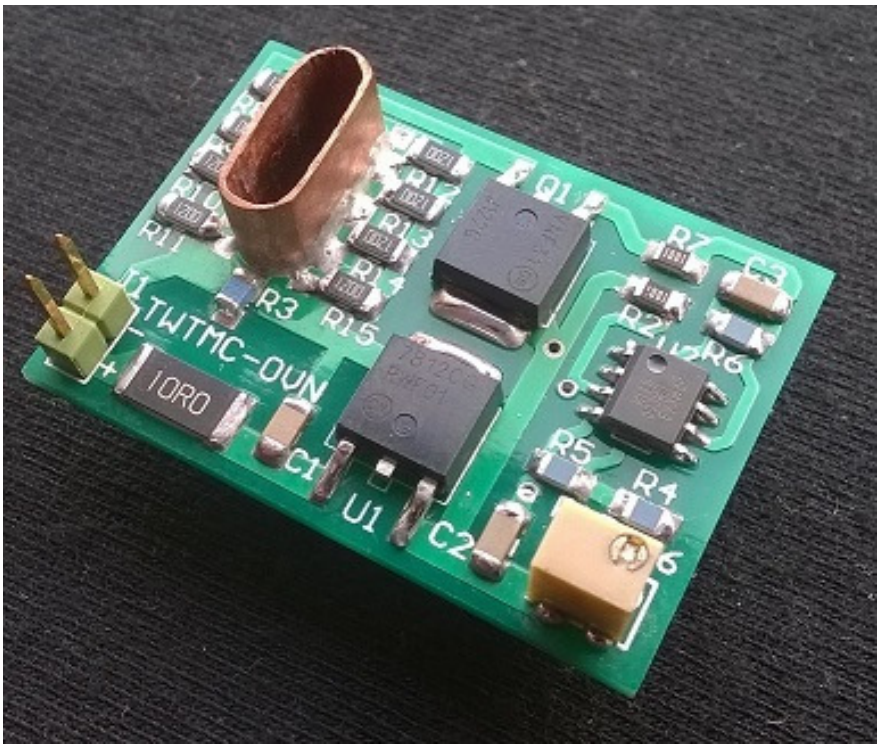
For better thermal coupling between the crystal and the oven you should use a thermal paste. The thermal paste holds the crystal inside the oven and helps conducting the heat from the copper tube to the crystal.

If you have chosen the temp fine tuning option you have to adjust the resistor trimmer R16 to set the right constant temperature at 82℃. To do the job you need a Laser Infrared Digital Temperature Thermometer like the one in the following picture. You can find it on eBay for less than 10 USD.

Point the laser beam to the upper side of the crystal and read the temperature. Turn the trimmer resistor R16 until you get 82℃. The oven takes at least a couple of minutes to reach a constant temperature.



Finished oven board.



OCXO with oven board.