

Signal Generator Oscillator Multiplier

This is a handy little multifunctional little chip that I have been bread boarding or just dead bug wiring since 2007. I finally decided to make a PC board layout to make using it even simpler.

The attached schematic is multi-functional in nature and can be populated in several different ways.

As the circuit is presented it is configured to generate a 122.88MHz clock from a 19.6608MHz crystal [x 6.25]. The circuit and BOM reflect a low pass filter with a nominal cutoff of 154MHz and a 2db 50 ohm pad. This configuration can be used for injection into a double balanced mixer for a 2Meter converter or other types of converters that would use a source between approximately 120 – 150MHz. If you do not want either the LPF or the pad, a short jumper wire can be used, or different values can be substituted.

Two different crystal configurations are included in the layout. One on top side for a small footprint and the other on the bottom for the larger Epson unit used for 19.6608MHz. These footprints should allow almost any crystal to be used

If you wish to connect a “signal generator” instead of using a crystal just use input the signal to C9 and leave off the 2 10pf caps [C5 & 6] and the crystal. A “signal generator” can be square wave or sinusoidal, but must be higher than 2MHz for the majority of the multipliers. The fractional multipliers require a much higher frequency.

This is likely a good time to mention that you should acquire and read the datasheet for the ICS501. This is especially true if you want to use all of the capabilities of the device and not just have a simple crystal oscillator with a multiplied output.

Several other applications have recently come to mind as I find new projects.

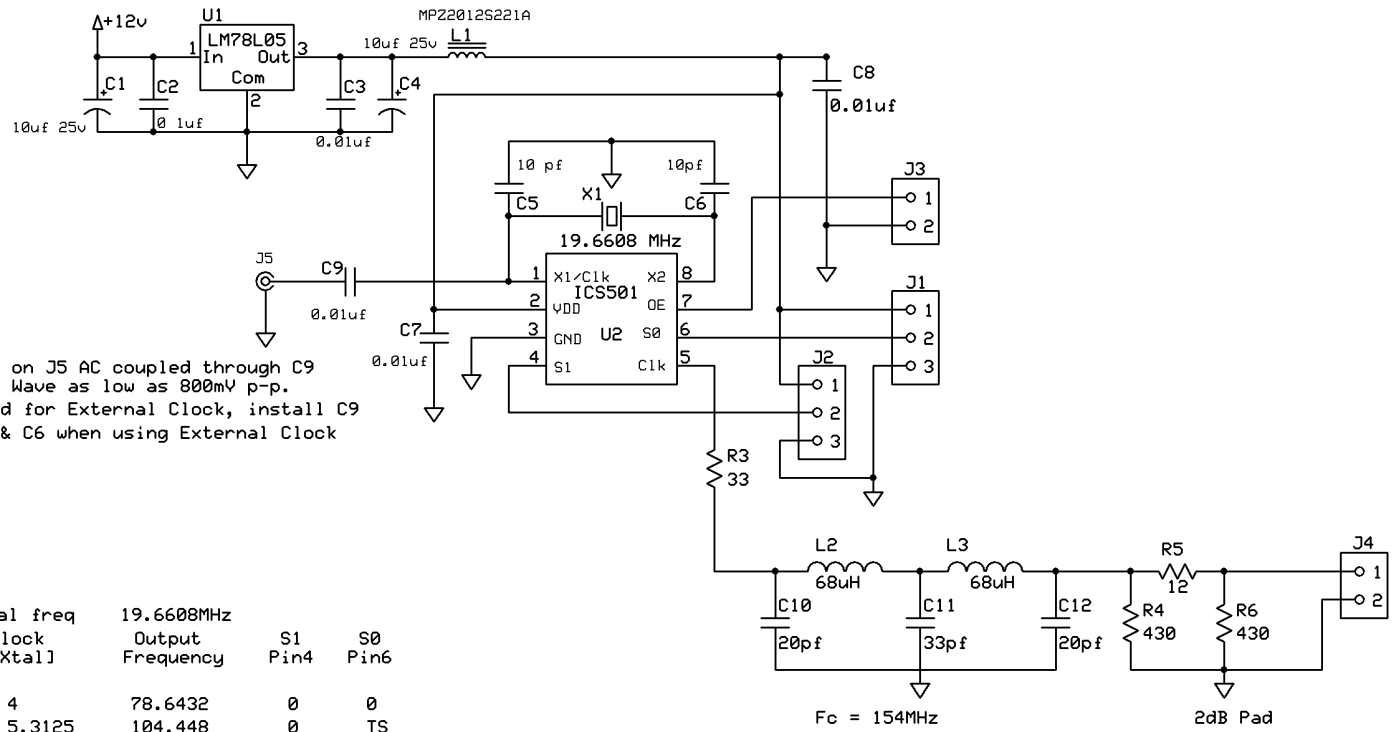
It is possible that this circuit can be used with PSHNA to extend the range of the generator to adapt to tuning the band pass filters on a 2M converter [ie 140 – 150MHz sweep]. It likely would require another circuit called a Leveler that uses an AD8367 Log Amp to provide a consistent leveled output.

Recently in a Softrock posting a reasonably priced GPS receiver was mentioned and it may be possible to generate a locked 10MHz signal from a 2MHz GPS locked source.

PC Boards were made at OSH Park [3 for \$5.85] and are shared with the following link.

https://oshpark.com/shared_projects/uz7pdyvl

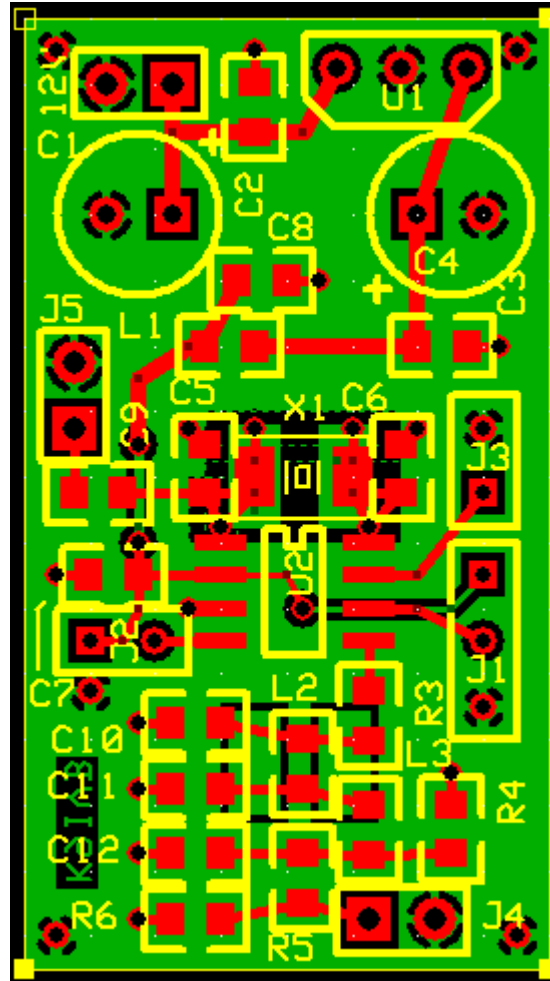
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External Clock on J5 AC coupled through C9
 Sine or Square Wave as low as 800mV p-p.
 When configured for External Clock, install C9
 Remove X1, C5 & C6 when using External Clock

Xtal freq Clock [Xtal]	19.6608MHz Output Frequency	S1 Pin4	S0 Pin6
4	78.6432	0	0
5.3125	104.448	0	TS
5	98.304	0	1
6.25	122.88	TS	0
2	39.3216	TS	TS
3.125	61.44	TS	1
6	117.9648	1	0
3	58.9824	0	TS
8	157.2864	1	1

TS = Tristate level or no connection
 0 = Gnd 1 = +5V



Component Placement

Signal Gen / Osc Multiplier BOM

Ref Des	Value	Description	Part Number	PAD	Mouser	Qty
C1, C4	10uf 25v			0.1" 2.5mm		2
C2	0 1uf	Multilayer Ceramic Capacitors MLCC - SMD/SMT 25volts 0.1uF X7R 10%		[0805]	80-C0805C104K3R	1
C3, C7, C8, C9	0.01uf	Multilayer Ceramic Capacitors MLCC - SMD/SMT 0805 0.01uF 100volts X7R 10% [10000pF]		[0805]	81-GRM21BR72A103K	4
C5, C6	10 pf	Multilayer Ceramic Capacitors MLCC - SMD/SMT 10pF 50volts COG 5%		[0805]	77-VJ0402A100JXAAC	2
C10, C12	20pf	Multilayer Ceramic Capacitors MLCC - SMD/SMT 20PF 100V COG 5%		[0805]	581-08051A200JAT2A	2
C11	33pf	Multilayer Ceramic Capacitors MLCC - SMD/SMT 100volts 33pF COG 5%		[0805]	80-C0805C330J1G	1
J1, J2	3 pin header			0.1" 2.5mm		2
J3, J4, J5	2 pin header			0.1" 2.5mm		3
L1	MPZ2012S221A	FERRITE CHIP 220 OHM 3A	MPZ2012S221A	[0805]	810-MPZ2012S221A	1
L2, L3	68uH	Fixed Inductors 68 nH 2%		[0805]	660-KQ0603TTE68NG	2
R3		33 33 ohm 1%		[0805]	660-RK73H2ATTD33R0F	1
R4, R6		430 430 ohm 1%		[0805]	660-RK73H2ATTD4300F	2
R5		12 12 Ohm 1%		[0805]	660-RK73H2ATTD12R0F	1
U1	LM78L05	Linear Voltage Regulators 0.1A Pos Volt Reg	LM78L05ACZ	TO-92	512-LM78L05ACZ	1
U2	ICS501	Sig gen ICS501	501MLFT	8pin SOIC	972-501MLFT	1
X1	19.6608 MHz	Crystall MA-506 Epson bottom SMT	19.6608 MHz 18 pF	SMD	[Digikey] 370-1170-1-ND	1
X		Crystal CX532 Series top SMD	20.0000MHZ 18 pF	SMD	[Digikey] SER2609CT-ND	