

## RF Generator Output Amplifier

for IFR 500 and 1200 series service monitors

Version 7

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### Description

This amplifier is designed to be used with the IFR 500, 1200, 1200A, 1200S and 1200 Super-S service monitors whenever more than -20 dBm (0.01 mW) is needed from the RF Generator function at the T/R port. This allows generating over-the-air signals into distant receivers and as a single-frequency generator for tuning deep notch filters. It amplifies the RF Generator signal by about 35 dB, giving an output of approximately +15 dBm (30 mW). It is similar to IFR's "Option 5" 30 dB Generate Amplifier but does not have the internal relay and antenna port connection of the IFR factory amplifier.

### Specifications

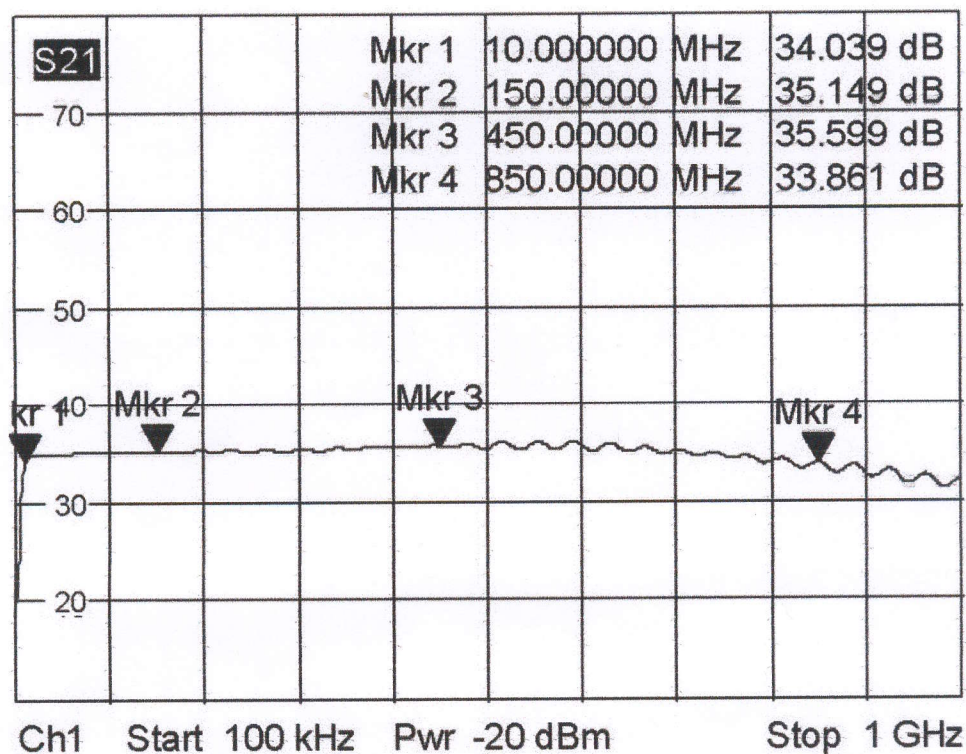
- Supply: 11-13VDC at about 130 mA
- Gain: 35 dB nominal
- P1dB: +17 dBm (if driven at greater than -20 dBm by something other than an IFR)
- Harmonics: About 35 dB down from the fundamental at -20 dBm input
- Freq. Range: 10 MHz to 1000 MHz

Thank you for purchasing this amplifier, I hope you find it as useful as I have. Please call me or email with any questions or comments. If you have any problems, I will be happy to repair or replace any units with manufacturing defects at no charge within 1 year of purchase if you call or email me first before shipping the amp to me.

Steve



Typical gain plot:



### Circuit Description

The amplifier is a very simple design consisting of two cascaded microwave “gain block” integrated circuits. These simple devices have 50Ω inputs and outputs, requiring no impedance matching. DC bias is supplied to each amplifier IC at its output pin through current-limiting resistors and a surface mount ferrite bead. Each amplifier IC is DC-isolated from the rest of the circuit with DC-blocking capacitors.

The +12 VDC input power from the banana plug goes through a 200 mA self-resetting fuse, which prevents damage to the IFR power supply in the event of a catastrophic failure in the amp.

RF Power into the amp's RF output jack (for example, when connected to an antenna with nearby transmitters) should be limited to no more than +20 dBm (100 mW) to prevent damage, although sample units have been tested to +26 dBm (400 mW) with no apparent damage.

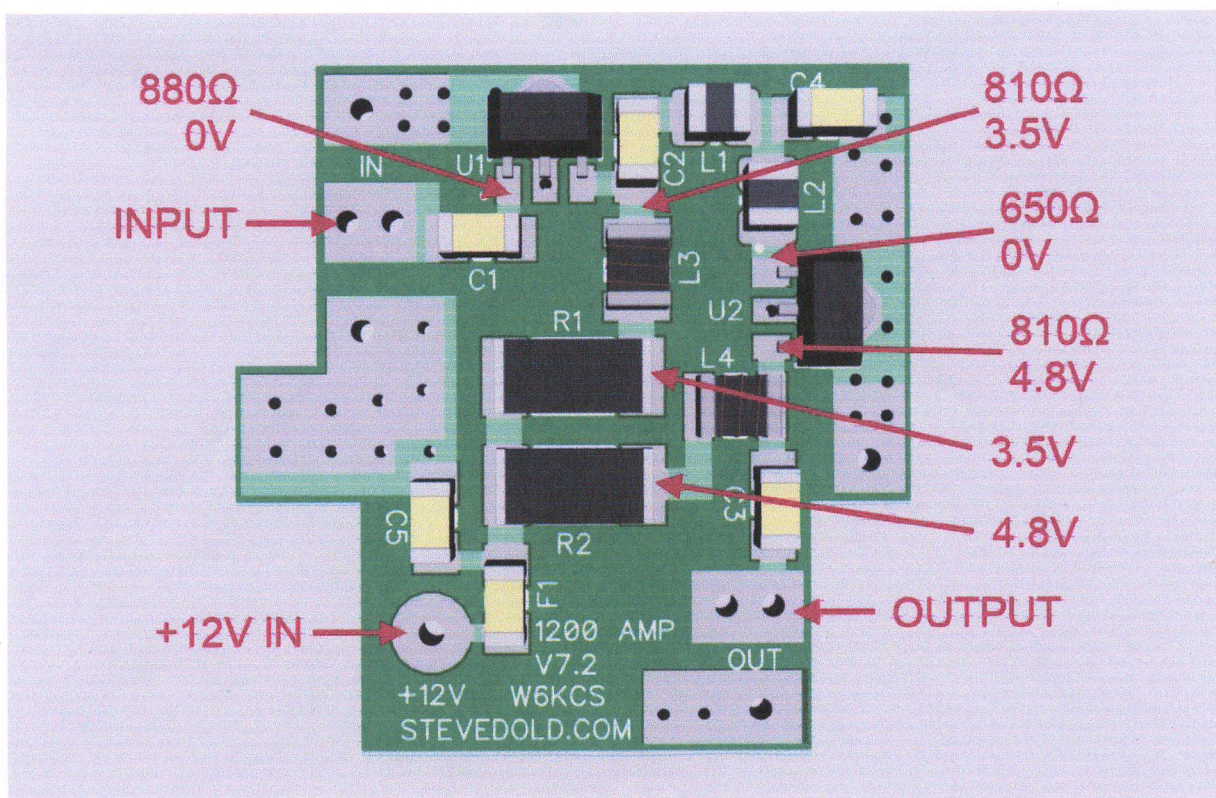
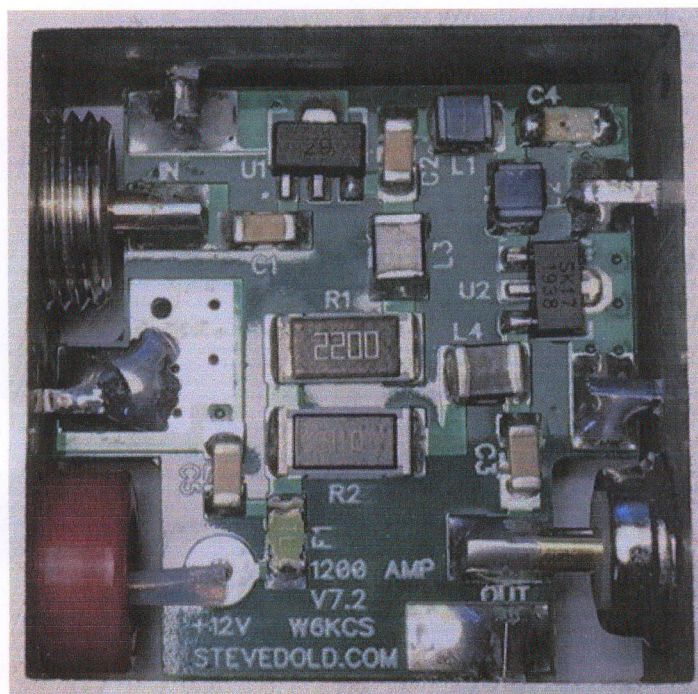
### Troubleshooting

If your amp fails and you would like to troubleshoot it yourself instead of (or prior to) sending it to me, the following information will be helpful. Use a Torx #10 driver to remove the top lid (the side with the label).

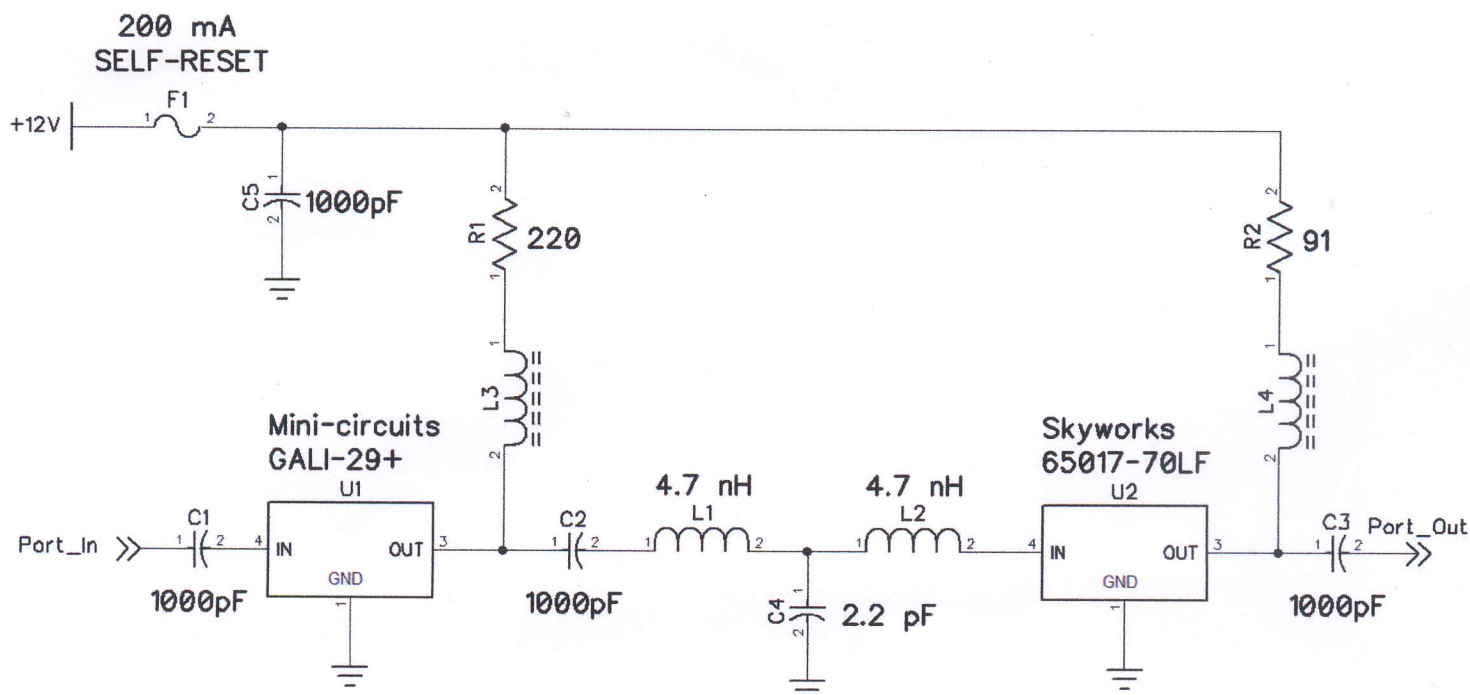
Troubleshooting is very easy; an ohmmeter and voltmeter check may be all that is needed. Measure resistance values with power disconnected. For voltage checks, use the IFR or a bench power supply to supply between 11.5 and 12.5 VDC to the input banana plug. This input voltage should be seen on both sides of the fuse, and at the input side of the 220Ω and 91Ω resistors. The other side of each resistor should be about 3.5 VDC (first stage) or 4.8 VDC (second stage), which should also be seen on the other side of the ferrite beads, on the IC output pins. The total current draw should be about 120 mA. It is normal for the resistors to feel very warm; they are 1W rated and are dissipating about 1/2W each.



The values at the points on the board layout below (measured to ground) are what I measured in the prototype. Your measurements should be within about 10% of these values. Anything significantly outside of this range is reason to suspect a problem such as a bad amplifier IC.







REF	QUAN	DESC	MFG	MFG P/N	SOURCE	SOURCE P/N
	8	Screw, 4-40, TRS, T10, 1/4"			Fastenal	SKU 0145042
P1	1	BNC Male, panel mt, rear nut	Amphenol	112420	Digi-Key	ACX1407-ND
P2	1	BNC Female, panel mt, rear nut	TE	5-1634523-1	Digi-Key	A97548-ND
R1	1	Resistor, 1W 220 Ohm	Stackpole	RMCF2512FT220R	Digi-Key	RMCF2512FT220RCT-ND
R2	1	Resistor, 1W 91 Ohm	Stackpole	RMCF2512JT91R0	Digi-Key	RMCF2512JT91R0CT-ND
U1	1	MMIC Amplifier, 12.5 dB	Mini Circuits	GALI-29+	Digi-Key	3157-GALI-29+CT-ND
U2	1	MMIC Amplifier, 19.2 dB	Skyworks	SKY65017-70LF	Digi-Key	863-1063-2-ND
L1, L2	2	Inductor, 4.7 nH	Abracon	AISC-1008-R0047J-T	Digi-Key	535-10526-1-ND
L3, L4	2	Ferrite Bead	Taiyo Yuden	FBMH3225HM601NTV	Digi-Key	587-3837-1-ND
C1-C3, C5	4	Capacitor, 1000pF	Wurth	885012208075	Digi-Key	732-8115-1-ND
C4	1	Capacitor, 2.2pF	Yageo	CC1206CRNPO9BN2R2	Digi-Key	311-1146-2-ND
P3	1	Banana Plug (M) red	Cinch	108-1722-103	Digi-Key	J158-ND
F1	1	Resettable fuse 200 mA	Eaton	PTS120624V020	Digi-Key	283-3136-1-ND

### VNA Plots for a typical unit

