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# CHAPTER 1

## **GENERAL DESCRIPTION**

### **NT 20 Transmitter Exciter**

#### INTRODUCTION

The NT 20 FM Exciter is the latest in state of the art products available from Nicom. This Transmitter is designed with high reliability components and is intended to give many years of trouble free continuous service. This unit incorporates many features including a switching power supply and a PLL frequency synthesizer.

The latest SMD technology has allowed to make a more compact unit (only 1 rack spaces) and at the same time a very light unit (only 8 lbs).

#### INSTALLATION

After unpacking the module, check for any mechanical damage or loose parts inside. If there is any transportation damage, inform the supplier immediately and do not put the module into operation.

The voltage is applicable from 100 to 240 Volts without needing any change. Ensure that the station's ground system connections have a ground resistance of less than 5 ohms. The equipment's rack or cabinet must be effectively grounded.

Check that the transmitter's main switch is off.

Connect the power cord to the AC plug.

#### STARTING PROCEDURE

Connect the antenna cable to the 'N' connector on the back of the unit. The antenna system must be set up to operate at the transmitter's working frequency.

**General Warning:**

Antenna matching is extremely crucial for FM transmitters. Operate this unit only after verifying good matching. Mismatching will decrease the communication distance and unduly stress the semiconductors.

Turn on the transmitter.

After 1 or 2 seconds the green LED "PLL LOCK" should turn on. This indicates that the frequency is locked on the programmed value.

After 1 more second the "RF ENABLE" green LED will come on. This indicates that RF power is being delivered to the output connector on the back.

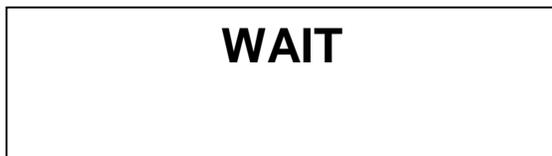
Now you can input modulation. For MONO operation connect your signal to the XLR connector following the connecting instructions printed on the back of the transmitter and then regulate the input level with the apposite trimmer. For stereo input, use the BNC connector labeled "MPX". Regulate the audio with the apposite trimmer.

**Note:** Be sure that the modulation level is close to but not more than 75KHz. 75KHz is 100% modulation. Lower modulation level will decrease the S/N value while over-modulation (>100%) will cause distortion at the receiver and it is against current regulations.

# NT 20 PROGRAMMING

Connect a 50 ohm load or 50 ohm antenna to the RF output, connect the equipment into a mains supply (100÷240 VAC). The equipment is factory pre-set to 10 W.

Switch ON the power and the yellow V POWER LED will light.  
The Display will show:



**PRO**

**SET**

After 3 seconds the green PLL LOCK led will light and the Display will show an increasing bar. After a further 5 seconds the green ENABLE LED will light and there will be output power

At this point the Display will show the next parameter

- Level Modulation (MOD >
- Forward Power (FRW 10W);
- Reflected Power (RFL 0.4W).



**PRO**

**SET**

The default frequency is 98.000 MHz.

To display the frequency push the SETTING key.

In order to display the parameter push the PROGRAM key.

**Display Password**

The Password mode is factory set to enable, and is not possible change this setting.

The default password is 1 2 3.

The way for changing the password is the following:

- Press the PROGRAM key for 3 seconds;

<b>PASSWORD</b> <b><u>0</u> 1 2 3 4 5 6 7 8 9</b>	<input type="checkbox"/> <b>PRO</b>
	<input type="checkbox"/> <b>SET</b>

- Press the PROGRAM key to move the underscore character position at the required digit, and press the SETTING key to confirm the digit.

Repeat the same for the two remaining dig

<b>CONFIRM (Y/N) ?</b> <b>N=SEL. Y=SET.</b>	<input type="checkbox"/> <b>PRO</b>
	<input type="checkbox"/> <b>SET</b>

- If the password is correct press the SETTING key to confirm, otherwise press the PROGRAM key to select again.

*If the password is not correct an error is displayed*

*After a few seconds the display will show the parameters again.*

*When the password is correct, the display will show*

*To change the password press the SETTING key.  
To change the frequency press the PROGRAM key.*

## CHANGE OF PASSWORD

**NEW PASS . = SET.  
NEW FREQ . = PRG**

**PRO**  
 **SET**

*The password is set at the factory and corresponds to the numbers 1 - 2 - 3.  
However it is possible to set a new custom password.  
The main purpose is to avoid somebody to enter your system and modify the main parameters of your settings.*

*Every new password has to be made with only three numbers.*

*It is very important that you write somewhere the new password, because once that has been set, it is not possible to change anymore or to make any change if the password is not entered.*

**VERY IMPORTANT:**

**KEEP TRACK OF YOUR NEW PASSWORD !!!!**

- For changing the password proceed with the same method for the required password:

The confirmation password will be required.

If the password is correct the display will show:

If the confirmation password is wrong the display will show:

**ERROR  
CONFIRMATION**

**PRO**

**SET**

**IMPORTANT NOTE**

**! BE CAREFUL !**

**Once the password is set, it must be remembered, otherwise neither the frequency nor the password can be reset and the unit has to be sent back to the factory.**

**Display Change of Frequency.**

- Press the PROGRAM key for 3 seconds and enter the correct password. At this point press again the SELECT key:

- Press the PROGRAM key to change the desired digit and press the SETTING key to confirm it.

The underscore character indicates which digit can be change.  
 To move the underscore character hit the PROGRAM key.

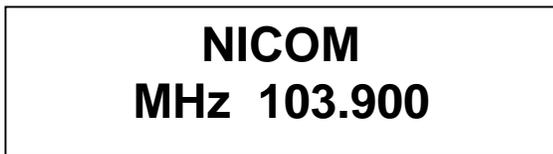
When the new frequency is chosen, then press

After a "WAIT CYCLE", the display will show th



- PRO
- SET

After 7 minutes the display light will switch off and the display will show:



- PRO
- SET

## CHAPTER 2

# ELECTRICAL SPECIFICATIONS

### **NT 20 TECHNICAL DATA**

<i>Power output:</i>	<i>2 to 20 Watts continuously variable</i>
<i>Frequency of operation:</i>	<i>Sinthesized with TXCO crystal reference</i>
<i>RF output connector/ Impedance:</i>	<i>Type "N" Female / 50 Ohms</i>
<i>Frequency Stability:</i>	<i>Better than 5ppm (<math>\pm</math> 500 Hz) , 0 to 50° C.</i>
<i>Frequency Range:</i>	<i>87.5 - 108 Mhz</i>
<i>Frequency programming:</i>	<i>Digitally in 25 Khz increments.</i>
<i>Modulation type:</i>	<i>Direct FM at the carrier frequency</i>
<i>S/N Ratio (ref. to 50 Khz / 1000 Hz):</i>	<i>Mono &gt; 70dB - Stereo &gt; 65 dB.</i>
<i>Distortion, THD:</i>	<i>&lt; 0.1 % , Typ. 0.05 %</i>
<i>Asynchronous AM S/N ratio:</i>	<i>65 dB below reference carrier with 100% AM modulation, 75 usec de-emphasis (no FM modulation present).</i>
<i>Synchronous AM S/N ratio:</i>	<i>60 dB below reference carrier with 100% AM modulation (FM modulation <math>\pm</math> 75 Khz).</i>

DC input power:	15 V VDC 3 A
AC input power:	Single phase 100 - 240 V
Ambient Temperature Range:	0° to 50° C (+32° to +122° F)
Spurious and Harmonic or Subharmonic Emissions:	< -80 dB or better
Stereo Separation	55 dB @ 1 Khz

### **COMPOSITE OPERATION**

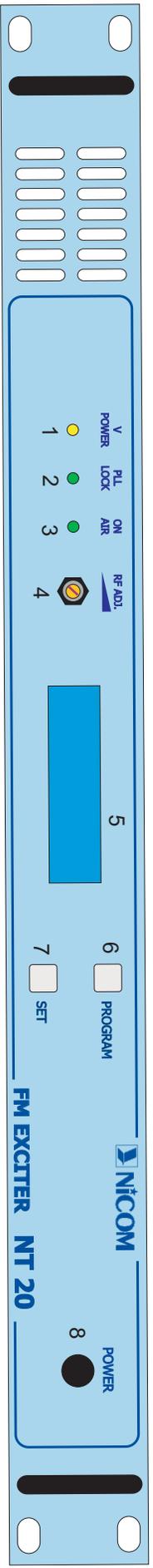
Composite inputs	four total, 1 for MPX and 3 for SCA
MPX input	1 unbalanced bnc connector
MPX input impedance	2 K ohms
MPX input level	3,5 V p-p (1,237 Vrms/3.64 dBm)
Composite FM unweighed S/N ratio	> 78 dB below $\pm 75$ Khz deviation at 400 Hz measured in a 30 Hz - 100Khz bandwidth with 75 usec de-emphasis (RMS) 0.05 % typical
Composite Total Harmonic Distortion	0.05 %, measured with a 1 Khz and a 1.3 Khz tone, 1:1 ratio, at 100% modulation
Composite Intermodulation Distortion	30 Hz - 60 Khz within 0.15 dB main to stereo subchannel and stereo subchannel to main > 55 dB ( 60 dB typical)
Baseband	3 unbalanced BNC connectors
Crosstalk	10 K Ohms
SCA Inputs	0 dBm (775 mV rms/ 2.2 V p-p) nominal for $\pm 75$ Khz deviation, adjustable
SCA Input Impedance	$\pm 0.8$ dB, 40 Khz to 100 Khz
SCA Input Levels	67 Khz SCA to main or to stereo subchannel >65dB 92 Khz SCA to main or to stereo subchannel >70 dB
SCA Amplitude Response	
Crosstalk	

### **MONOAURAL OPERATION**

Audio Input Impedance	600 Ohms balanced or unbalanced; 50 dB common mode suppression
Audio Input Level	0 dBm (775 mV rms/ 2.2 V p-p) nominal for $\pm 75$ Khz deviation, adjustable
FM S/N Ratio	> 70 dB below $\pm 75$ Khz deviation at 400 Hz measured in a 30 Hz - 20Khz bandwidth with 75 usec de-emphasis (RMS)
Audio Frequency Response	$\pm 0.8$ dB, 30 Hz to 15 Khz
Intermodulation Distortion	0.05 %, measured with a 1 Khz and a 1.3 Khz tone, 1:1 ratio, at 100% modulation

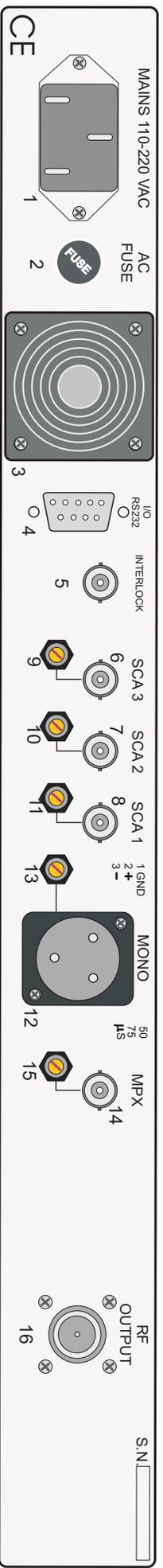
# MECHANICAL SPECIFICATIONS

Chassis Dimensions:	44 mm (1.7") H 326 mm (12.83")D 445 mm (17.51) W
Front panel dimensions:	483 mm (19") W 44 mm (1.7") H
Ambient operating temperature:	from 0 to + 50 C (+32 to +122 F)
Humidity:	90% maximum, non condensing.
Weight:	8 Lbs (3.5 Kg)
Shipping Dimensions:	22" x 23" x 8"



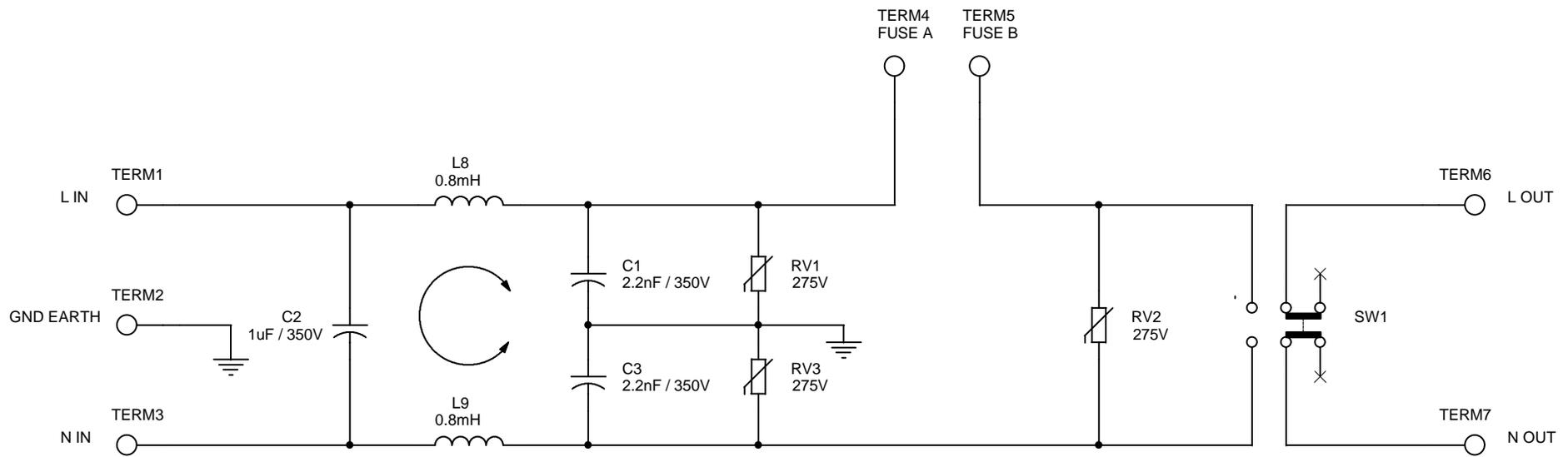
- 1 - POWER STAGE SUPPLY CORRECT OPERATION YELLOW INDICATOR
- 2 - PLL LOCK FREQUENCY CONTROL CORRECT OPERATION CIRCUIT GREEN INDICATOR
- 3 - PRESENCE OF RF POWER AT FREQUENCY SET ON OUTPUT CONNECTOR GREEN INDICATOR
- 4 - RF OUTPUT POWER ADJUSTING FROM 0 TO OVER 20W
- 5- LCD MULTIMETER DISPLAY SHOWING:
  - operational frequency
  - modulation
  - forward rf power
  - reflected power
- 6 - 7 - THESE PUSH BUTTONS ALLOW TO TO SELECT ON LCD DISPLAY THE FOLLOWING MENU:
  - display parameter
  - password
  - change of operational frequency
- 8 - MAINS SWITCH

NICOM USA	
TITLE NT 20 FM EXCITER front panel layout	
DATE Aug 2005	DRAWING NO. NT20 - frontpan1.cdr

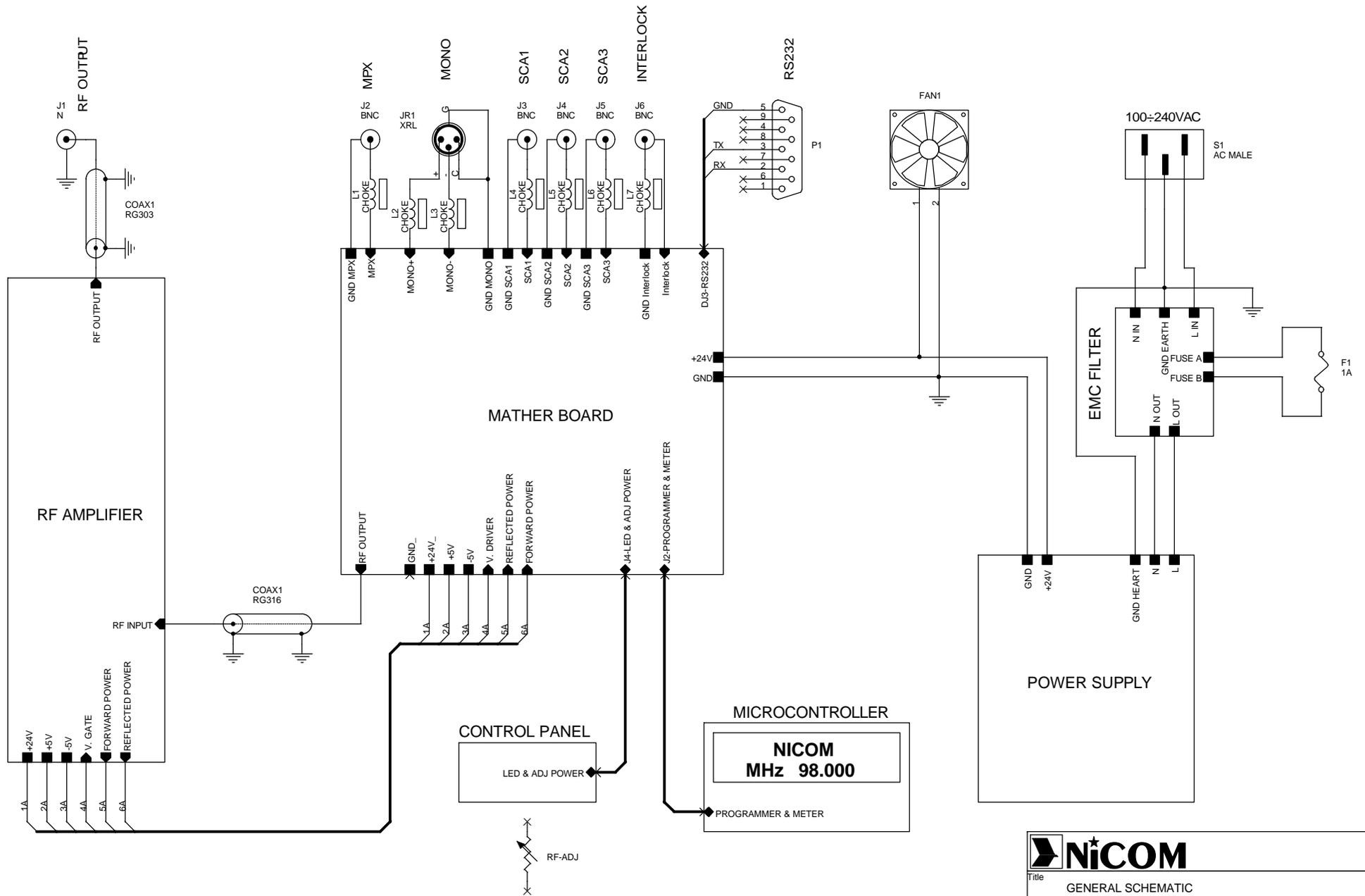


- 1 - MAIN SUPPLY CONNECTOR
- 2 - AC FUSE 1A
- 3 - FAN
- 4 - DB 9 PIN INPUT / OUTPUT CONNECTOR FOR TELEMETRY ( opt.01 )
- 5 - BNC FEMALE FOR CONNECTION OF THE INTERLOCK LOOP - A CONNECTION TO GROUND INHIBIT RF POWER
- 6-7-8- BNC FEMALES FOR SUBCARRIERS GENERATORS INPUTS
- 9-10-11- SCA INPUT ADJUSTING LEVELS
- 12 - XLR FEMALE BALANCED MODE MONO AUDIO INPUT
- 13 - MONO INPUT ADJUSTING LEVEL
- 14 - BNC FEMALE FOR THE COMPOSITE MPX INPUT
- 15 - MPX INPUT ADJUSTING LEVEL
- 16 - N FEMALE FOR RF OUTPUT POWER

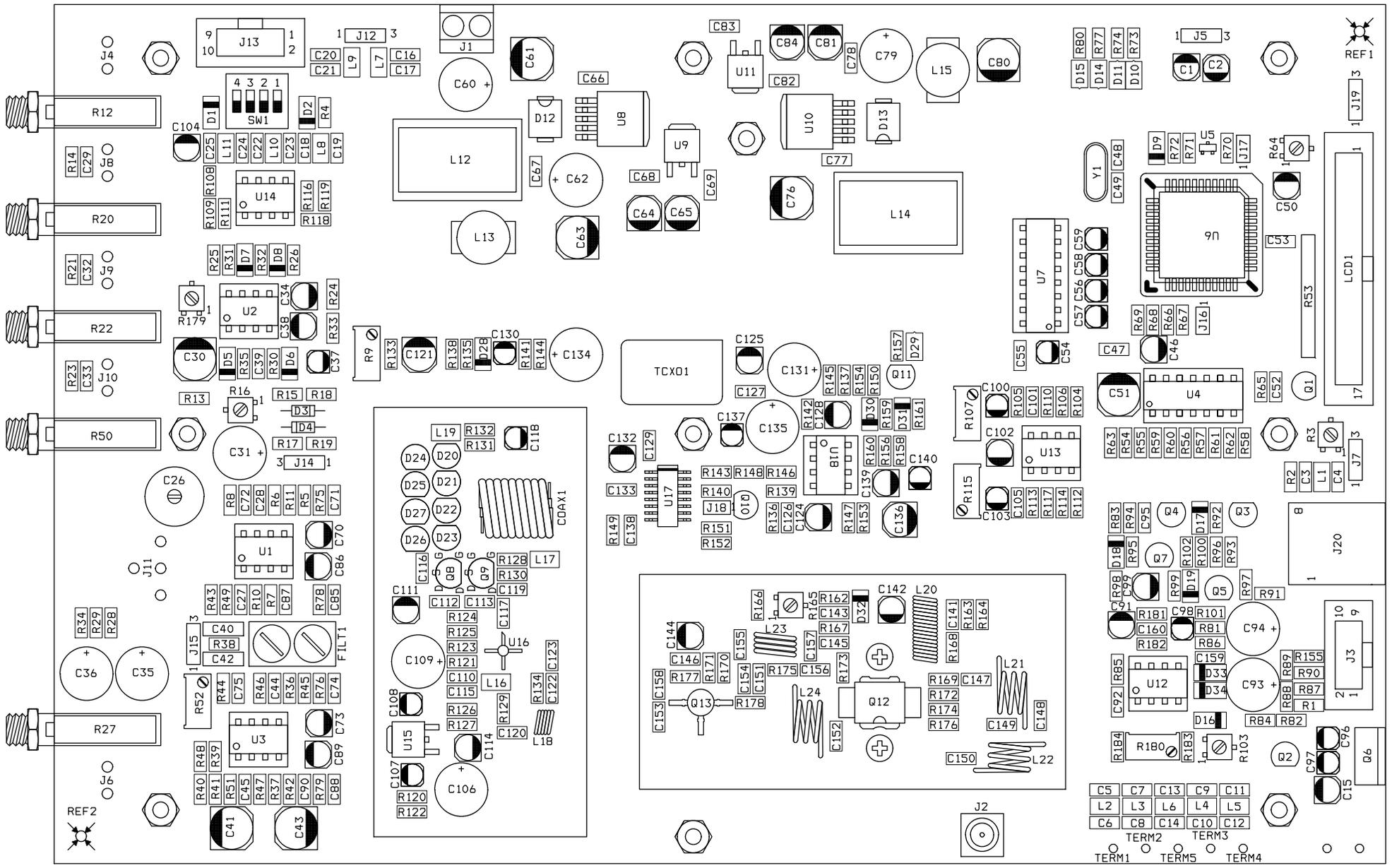
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DATE	Aug 2005
DRAWING NO.	NT20 - rearpan1.cdr



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Date:	Thursday, February 21, 2002	Sheet	1 of 1



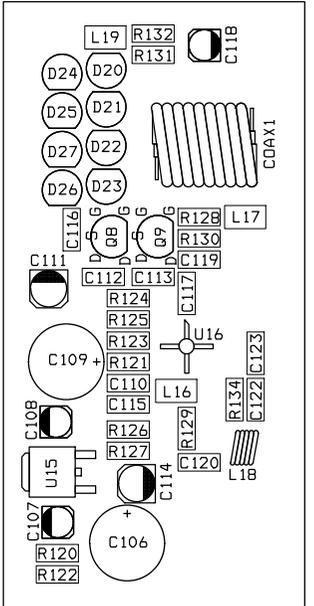
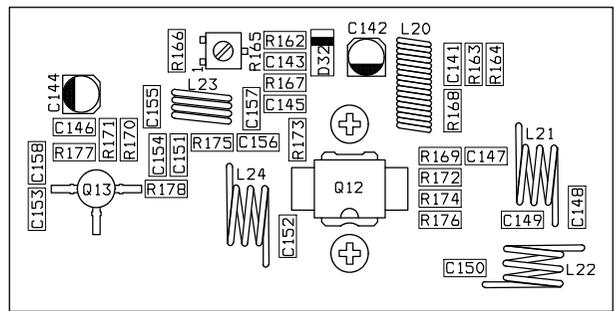
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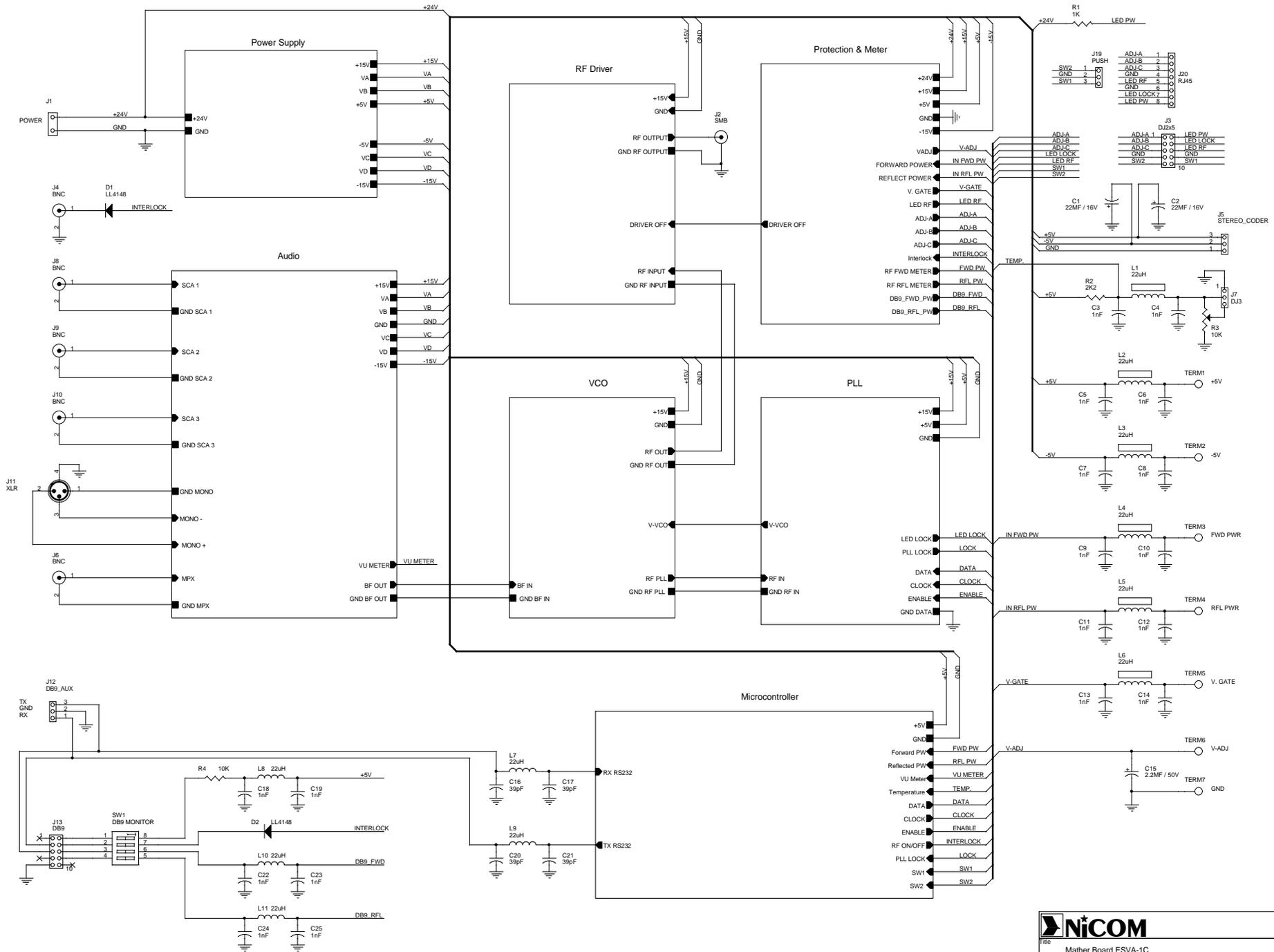


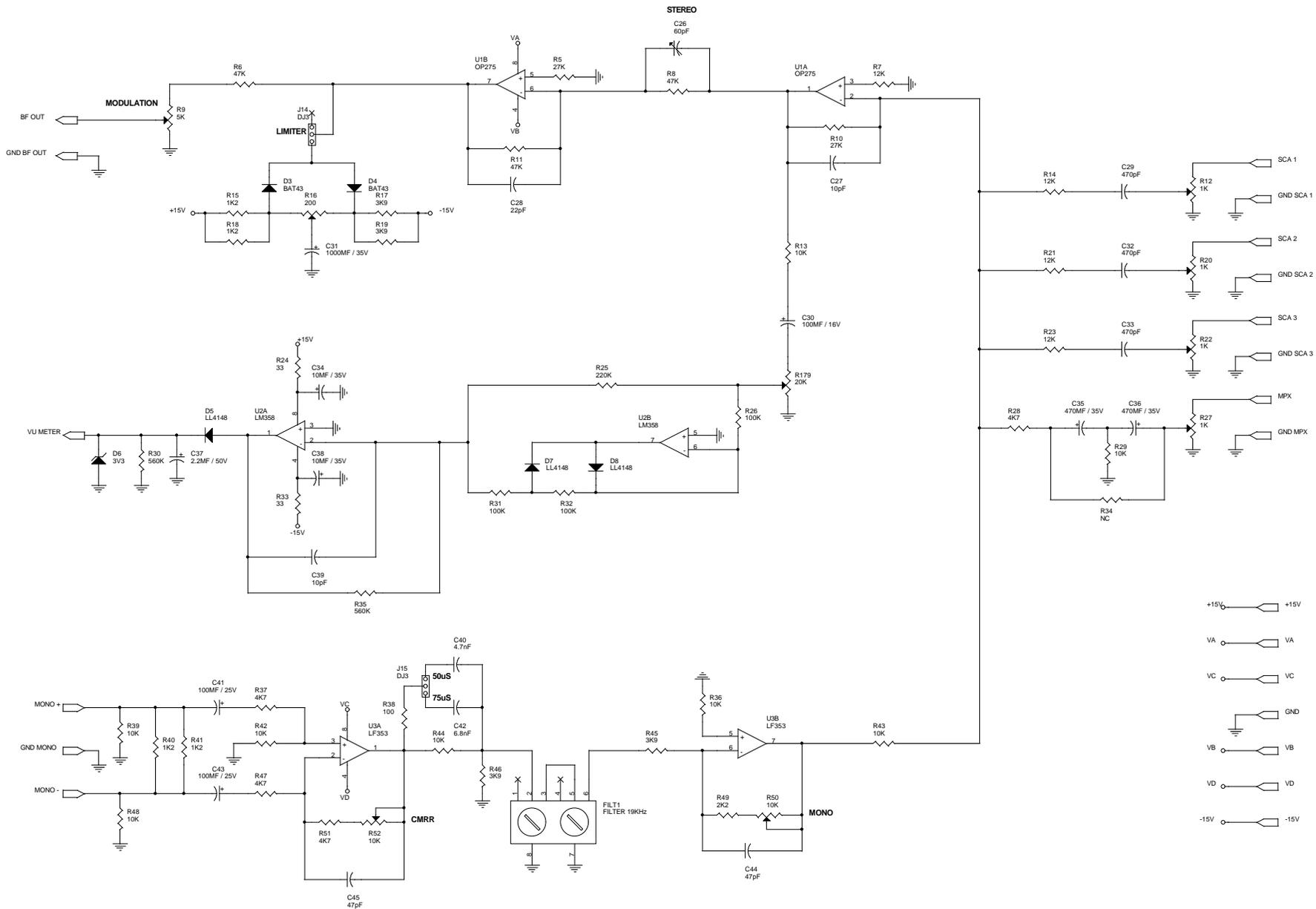
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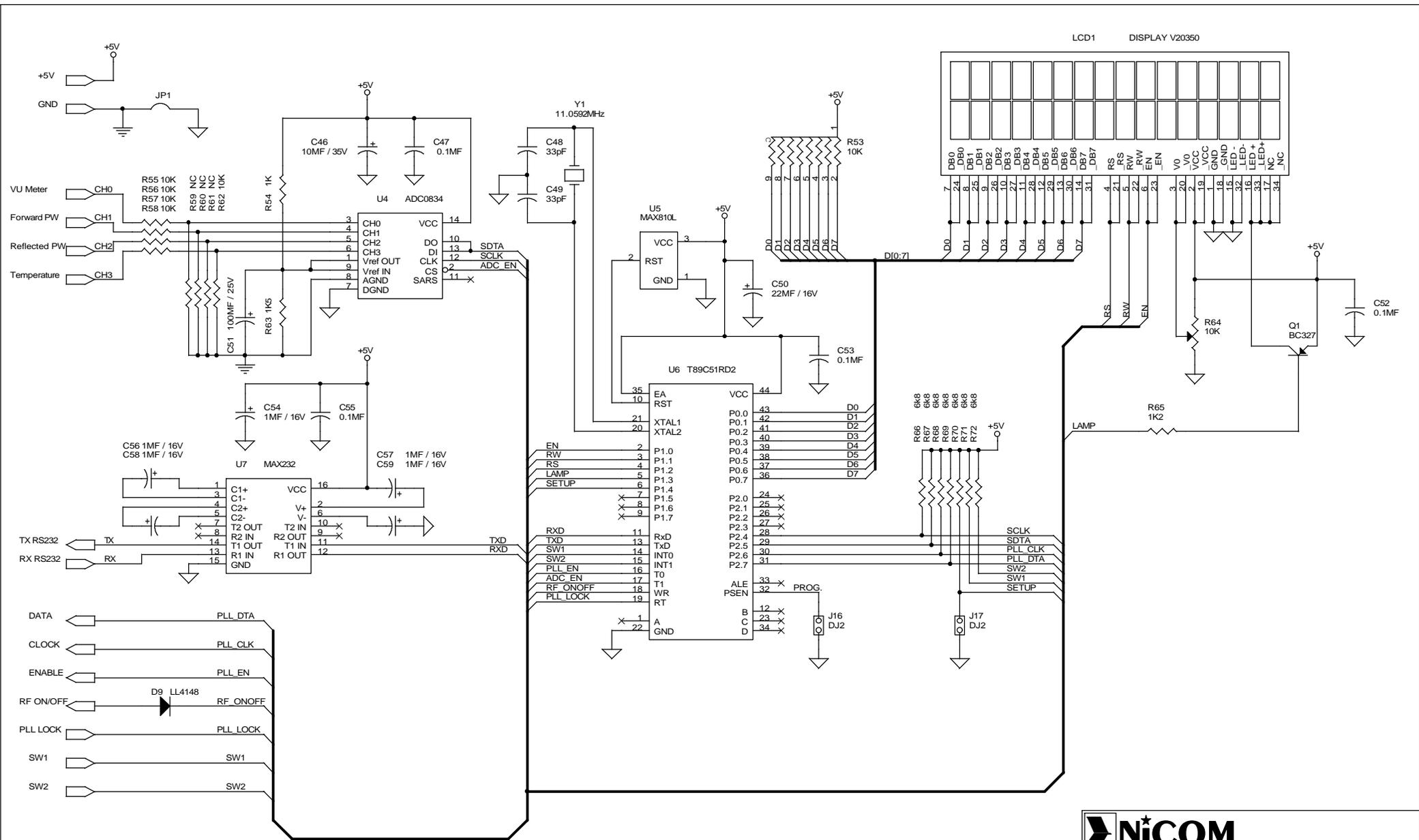
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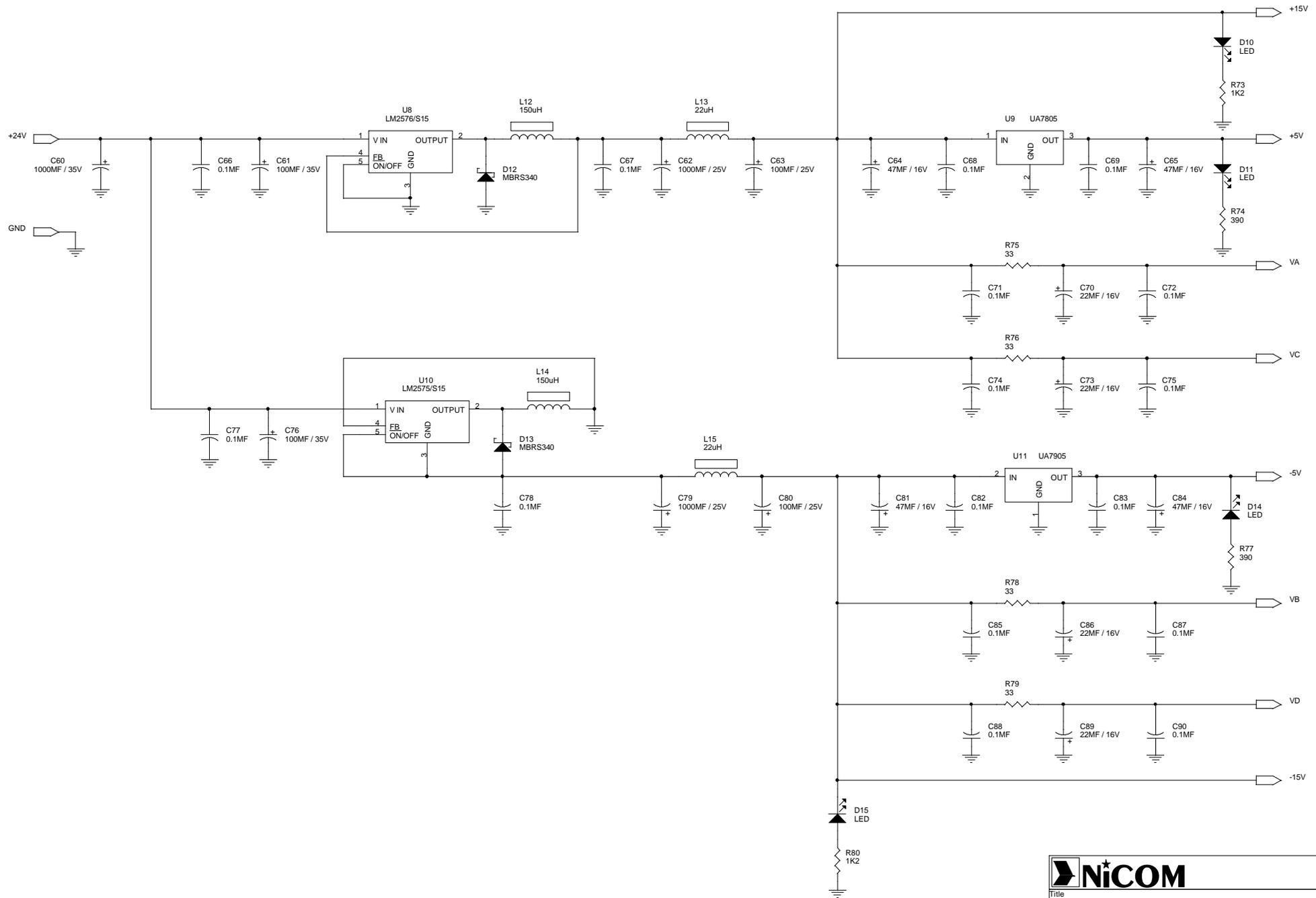
TERM1  
TERM2  
TERM3  
TERM4  
TERM5



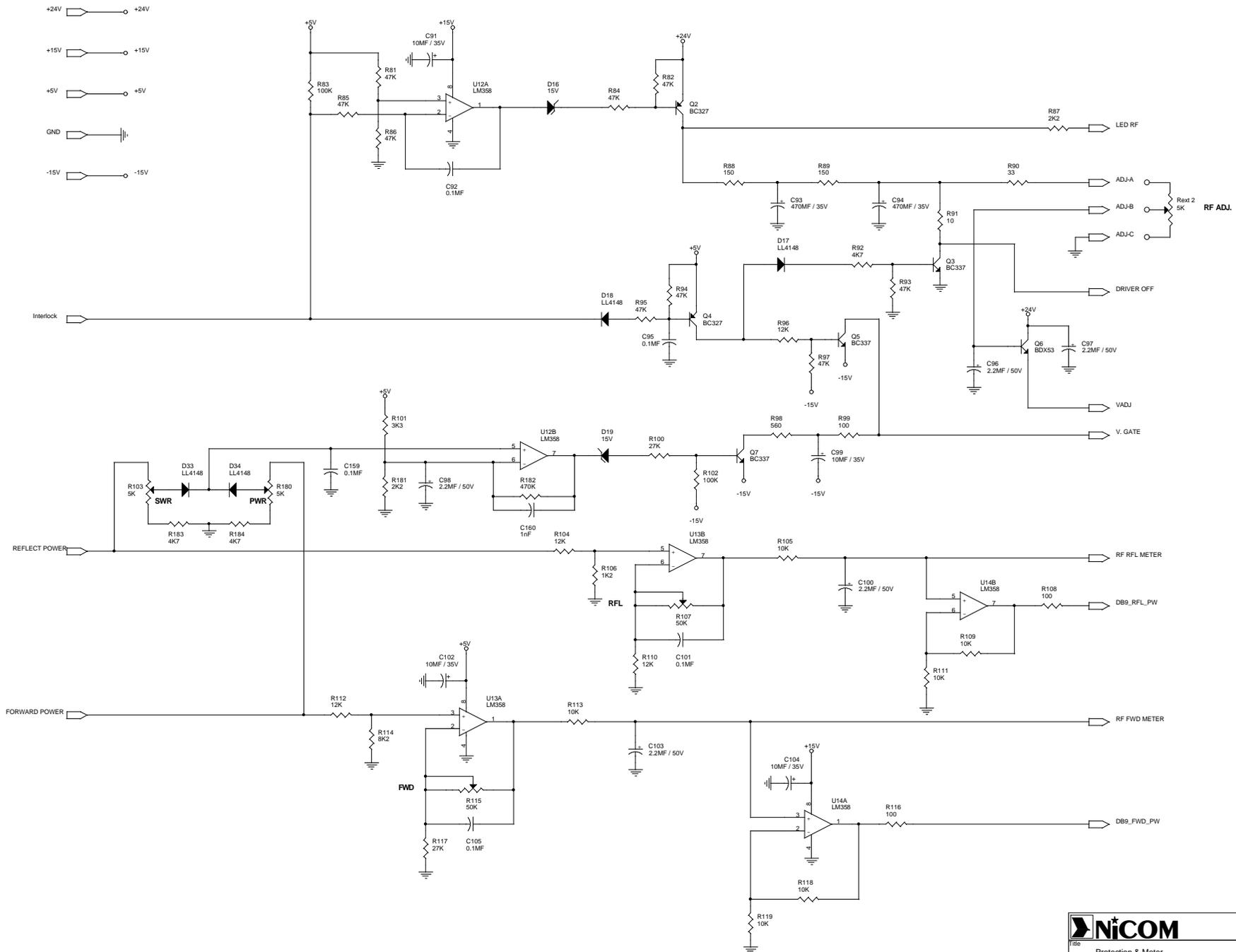


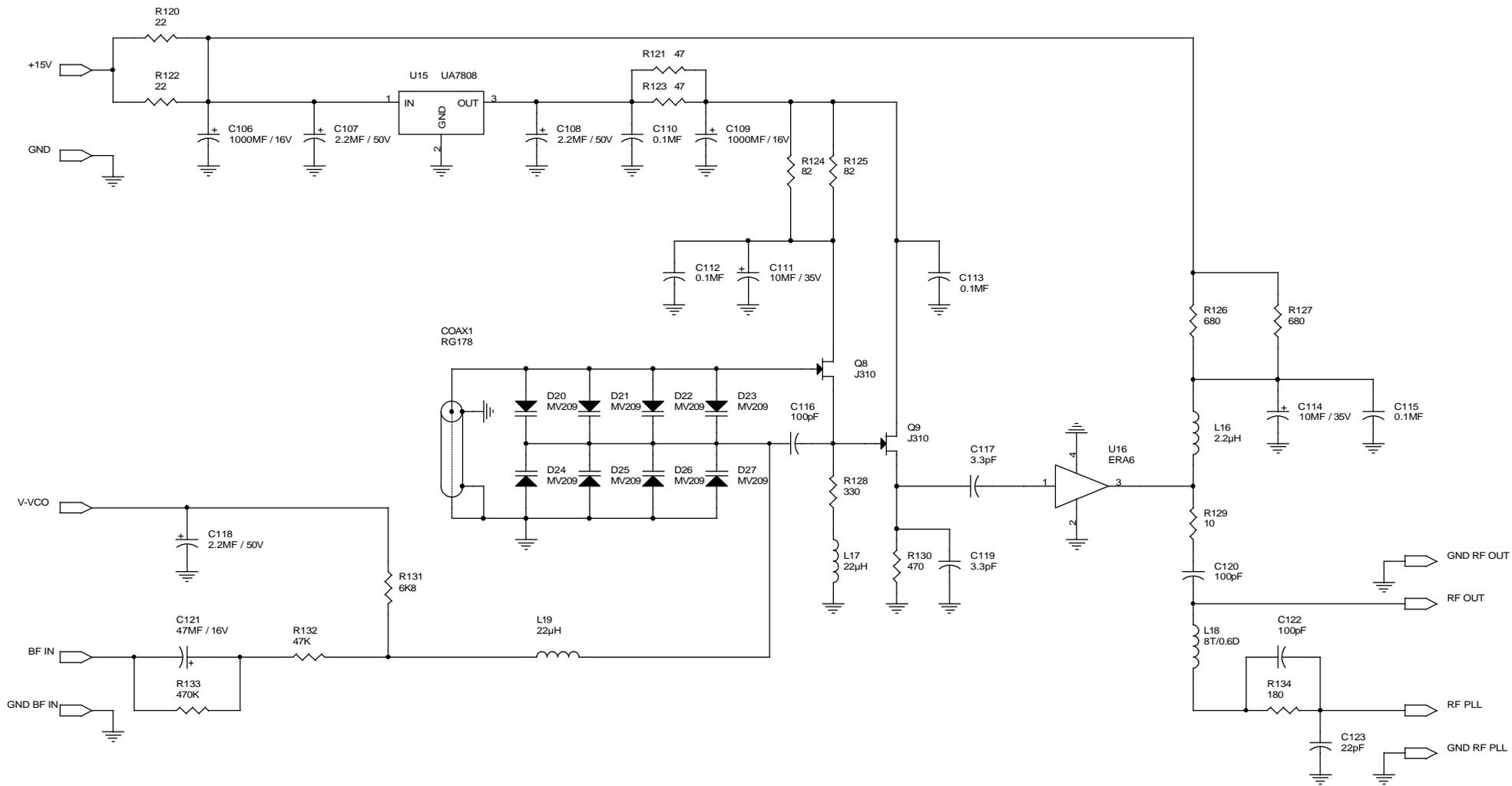






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Date: Thursday, October 23, 2003 Sheet 1 of 1		



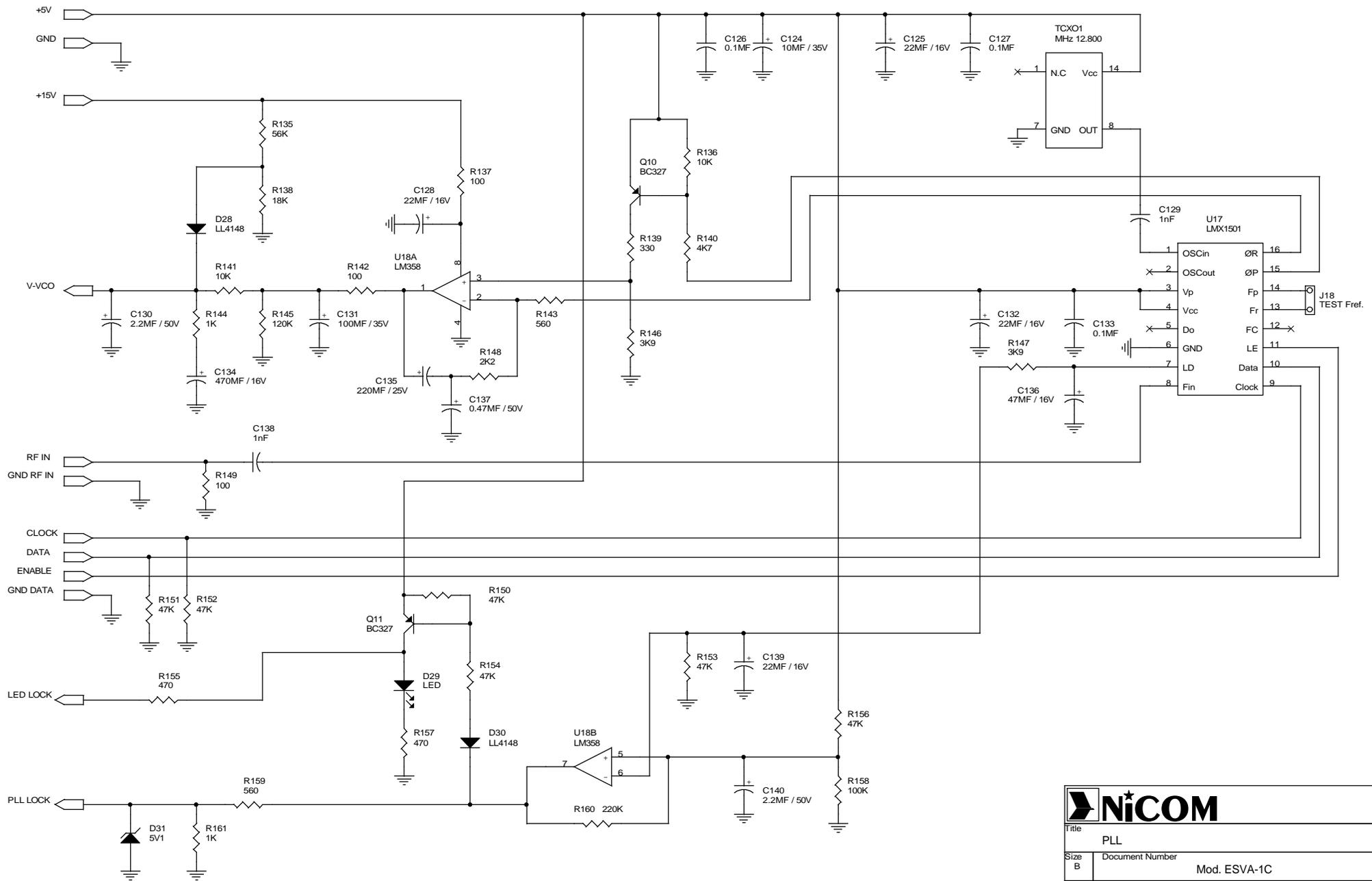


**NiCOM**

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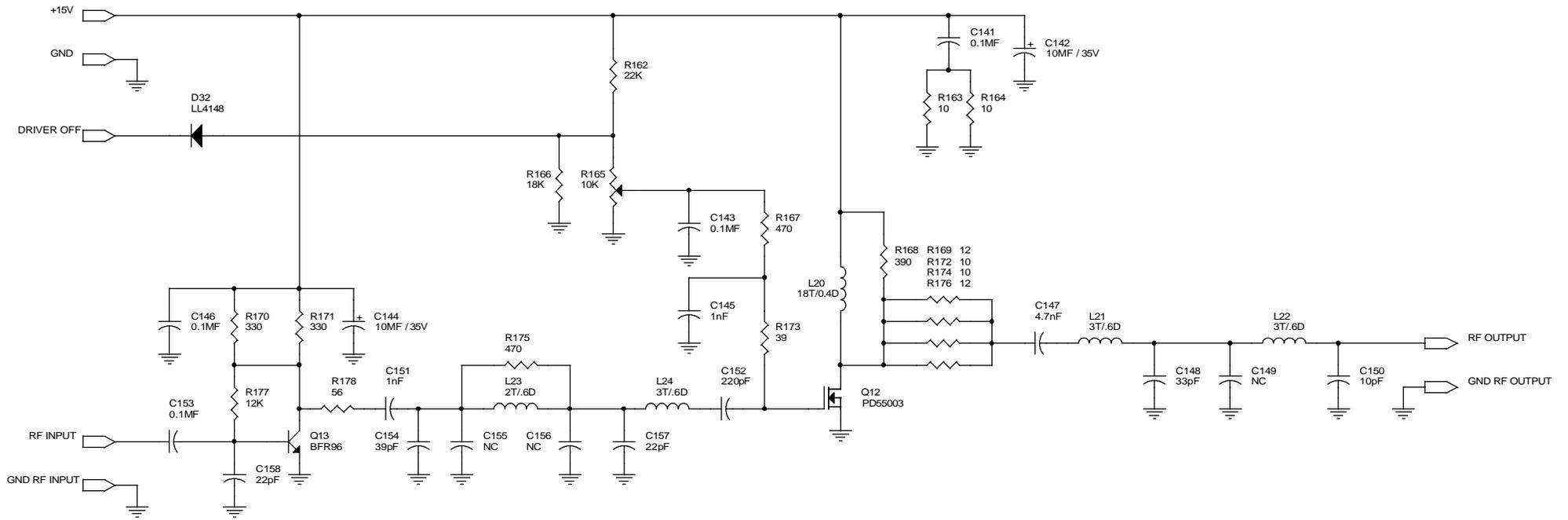
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**NiCOM**

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Date:		Thursday, October 23, 2003	Sheet 1 of 1



<b>NiCOM</b>			
Title RF Driver			
Size B	Document Number	Mod. ESVA-1C	Rev 1.0
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# NICOM

Rif.	Value	Remarks	Description	Code
C103	2.2MF / 50V		SMD Aluminium Electrolytic Capacitor	
C104	10MF / 35V		SMD Aluminium Electrolytic Capacitor	
C105	0.1MF		SMD Multilayer Ceramic Capacitor	
C106	1000MF / 16V		Aluminium Electrolytic Capacitor	
C107	2.2MF / 50V		SMD Aluminium Electrolytic Capacitor	
C108	2.2MF / 50V		SMD Aluminium Electrolytic Capacitor	
C109	1000MF / 16V		Aluminium Electrolytic Capacitor	
C110	0.1MF		SMD Multilayer Ceramic Capacitor	
C111	10MF / 35V		SMD Aluminium Electrolytic Capacitor	
C112	0.1MF		SMD Multilayer Ceramic Capacitor	
C113	0.1MF		SMD Multilayer Ceramic Capacitor	
C114	10MF / 35V		SMD Aluminium Electrolytic Capacitor	
C115	0.1MF		SMD Multilayer Ceramic Capacitor	
C116	100pF		SMD Multilayer Ceramic Capacitor	
C117	3.3pF		SMD Multilayer Ceramic Capacitor	
C118	2.2MF / 50V		SMD Aluminium Electrolytic Capacitor	
C119	3.3pF		SMD Multilayer Ceramic Capacitor	
C120	100pF		SMD Multilayer Ceramic Capacitor	
C121	47MF / 16V		SMD Aluminium Electrolytic Capacitor	
C122	100pF		SMD Multilayer Ceramic Capacitor	
C123	22pF		SMD Multilayer Ceramic Capacitor	
C124	10MF / 35V		SMD Multilayer Ceramic Capacitor	
C125	22MF / 16V		SMD Aluminium Electrolytic Capacitor	
C126	0.1MF		SMD Multilayer Ceramic Capacitor	
C127	0.1MF		SMD Multilayer Ceramic Capacitor	
C128	22MF / 16V		SMD Aluminium Electrolytic Capacitor	
C129	1nF		SMD Multilayer Ceramic Capacitor	
C130	2.2MF / 50V		SMD Aluminium Electrolytic Capacitor	
C131	100MF / 35V		Aluminium Electrolytic Capacitor	
C132	22MF / 16V		SMD Aluminium Electrolytic Capacitor	
C133	0.1MF		SMD Multilayer Ceramic Capacitor	
C134	470MF / 16V		Aluminium Electrolytic Capacitor	
C135	220MF / 25V		Aluminium Electrolytic Capacitor	
C136	47MF / 16V		SMD Aluminium Electrolytic Capacitor	
C137	0.47MF / 50V		SMD Aluminium Electrolytic Capacitor	
C138	1nF		SMD Multilayer Ceramic Capacitor	
C139	22MF / 16V		SMD Aluminium Electrolytic Capacitor	
C140	2.2MF / 50V		SMD Aluminium Electrolytic Capacitor	
C141	0.1MF		SMD Multilayer Ceramic Capacitor	
C142	10MF / 35V		SMD Aluminium Electrolytic Capacitor	
C143	0.1MF		SMD Multilayer Ceramic Capacitor	
C144	10MF / 35V		SMD Aluminium Electrolytic Capacitor	
C145	1nF		SMD Multilayer Ceramic Capacitor	
C146	0.1MF		SMD Multilayer Ceramic Capacitor	
C147	4.7nF		SMD Multilayer Ceramic Capacitor	
C148	33pF		SMD Multilayer Ceramic Capacitor	
C149	NC			
C150	10pF		SMD Multilayer Ceramic Capacitor	
C151	1nF		SMD Multilayer Ceramic Capacitor	
C152	220pF		SMD Multilayer Ceramic Capacitor	
C153	0.1MF		SMD Multilayer Ceramic Capacitor	
C154	39pF		SMD Multilayer Ceramic Capacitor	
C155	NC			

# NICOM

Rif.	Value	Remarks	Description	Code
C156	NC			
C157	22pF		SMD Multilayer Ceramic Capacitor	
C158	22pF		SMD Multilayer Ceramic Capacitor	
C159	0.1MF		SMD Multilayer Ceramic Capacitor	
C160	1nF		SMD Multilayer Ceramic Capacitor	
L1	22uH		SMD Inductor	
L2	22uH		SMD Inductor	
L3	22uH		SMD Inductor	
L4	22uH		SMD Inductor	
L5	22uH		SMD Inductor	
L6	22uH		SMD Inductor	
L7	22uH		SMD Inductor	
L8	22uH		SMD Inductor	
L9	22uH		SMD Inductor	
L10	22uH		SMD Inductor	
L11	22uH		SMD Inductor	
L12	150uH		Toroidal Inductor	
L13	22uH		Suppression Choke	
L14	150uH		Toroidal Inductor	
L15	22uH		Suppression Choke	
L16	2.2uH		SMD Inductor	
L17	22uH		SMD Inductor	
L18	8T/0.6D		Enamelled Copper Wire	
L19	22uH		SMD Inductor	
L20	18T/0.4D		Enamelled Copper Wire	
L21	3T/6D		Tinned Copper Wire	
L22	3T/6D		Tinned Copper Wire	
L23	2T/6D		Enamelled Copper Wire	
L24	3T/6D		Tinned Copper Wire	
R1	1K	1/4W	SMD Thick Film Resistor	
R2	2K2	1/4W	SMD Thick Film Resistor	
R3	10K	1/4W	SMD Cermet Skeleton Trimmer Resistor	
R4	10K	1/4W	SMD Thick Film Resistor	
R5	27K	1/4W	SMD Thick Film Resistor	
R6	47K	1/4W	SMD Thick Film Resistor	
R7	12K	1/4W	SMD Thick Film Resistor	
R8	47K	1/4W	SMD Thick Film Resistor	
R9	5K	1/4W	SMD Thick Film Resistor	
R10	27K	1/4W	SMD Thick Film Resistor	
R11	47K	1/4W	SMD Thick Film Resistor	
R12	1K	1/4W	Multi Turn Cermet Trimmer Resistor Panel Mount	
R13	10K	1/4W	SMD Thick Film Resistor	
R14	12K	1/4W	SMD Thick Film Resistor	
R15	1K2	1/4W	SMD Thick Film Resistor	
R16	200	1/4W	SMD Cermet Skeleton Trimmer Resistor	
R17	3K9	1/4W	SMD Thick Film Resistor	
R18	1K2	1/4W	SMD Thick Film Resistor	
R19	3K9	1/4W	SMD Thick Film Resistor	
R20	1K	1/4W	Multi Turn Cermet Trimmer Resistor Panel Mount	
R21	12K	1/4W	SMD Thick Film Resistor	
R22	1K	1/4W	Multi Turn Cermet Trimmer Resistor Panel Mount	

# NICOM

Rif.	Value	Remarks	Description	Code
R23	12K	1/4W	SMD Thick Film Resistor	
R24	33	1/4W	SMD Thick Film Resistor	
R25	220K	1/4W	SMD Thick Film Resistor	
R26	100K	1/4W	SMD Thick Film Resistor	
R27	1K	1/4W	Multi Turn Cermet Trimmer Resistor Panel Mount	
R28	4K7	1/4W	SMD Thick Film Resistor	
R29	10K	1/4W	SMD Thick Film Resistor	
R30	560K	1/4W	SMD Thick Film Resistor	
R31	100K	1/4W	SMD Thick Film Resistor	
R32	100K	1/4W	SMD Thick Film Resistor	
R33	33	1/4W	SMD Thick Film Resistor	
R34	NC	1/4W	SMD Thick Film Resistor	
R35	560K	1/4W	SMD Thick Film Resistor	
R36	10K	1/4W	SMD Thick Film Resistor	
R37	4K7	1/4W	SMD Thick Film Resistor	
R38	100	1/4W	SMD Thick Film Resistor	
R39	10K	1/4W	SMD Thick Film Resistor	
R40	1K2	1/4W	SMD Thick Film Resistor	
R41	1K2	1/4W	SMD Thick Film Resistor	
R42	10K	1/4W	SMD Thick Film Resistor	
R43	10K	1/4W	SMD Thick Film Resistor	
R44	10K	1/4W	SMD Thick Film Resistor	
R45	3K9	1/4W	SMD Thick Film Resistor	
R46	3K9	1/4W	SMD Thick Film Resistor	
R47	4K7	1/4W	SMD Thick Film Resistor	
R48	10K	1/4W	SMD Thick Film Resistor	
R49	2K2	1/4W	SMD Thick Film Resistor	
R50	10K	1/4W	Multi Turn Cermet Trimmer Resistor Panel Mount	
R51	4K7	1/4W	SMD Thick Film Resistor	
R52	10K	1/4W	Multi Turn Cermet Trimmer Resistor	
R53	10K	1/4W	SMD Thick Film Resistor	
R54	1K	1/4W	SMD Thick Film Resistor	
R55	10K	1/4W	SMD Thick Film Resistor	
R56	10K	1/4W	SMD Thick Film Resistor	
R57	10K	1/4W	SMD Thick Film Resistor	
R58	10K	1/4W	SMD Thick Film Resistor	
R59	NC			
R60	NC			
R61	NC			
R62	10K	1/4W	SMD Thick Film Resistor	
R63	1K5	1/4W	SMD Thick Film Resistor	
R64	10K	1/4W	SMD Cermet Skeleton Trimmer Resistor	
R65	1K2	1/4W	SMD Thick Film Resistor	
R66	6k8	1/4W	SMD Thick Film Resistor	
R67	6k8	1/4W	SMD Thick Film Resistor	
R68	6k8	1/4W	SMD Thick Film Resistor	
R69	6k8	1/4W	SMD Thick Film Resistor	
R70	6k8	1/4W	SMD Thick Film Resistor	
R71	6k8	1/4W	SMD Thick Film Resistor	
R72	6k8	1/4W	SMD Thick Film Resistor	
R73	1K2	1/4W	SMD Thick Film Resistor	
R74	390	1/4W	SMD Thick Film Resistor	
R75	33	1/4W	SMD Thick Film Resistor	

# NICOM

Rif.	Value	Remarks	Description	Code
R76	33	1/4W	SMD Thick Film Resistor	
R77	390	1/4W	SMD Thick Film Resistor	
R78	33	1/4W	SMD Thick Film Resistor	
R79	33	1/4W	SMD Thick Film Resistor	
R80	1K2	1/4W	SMD Thick Film Resistor	
R81	47K	1/4W	SMD Thick Film Resistor	
R82	47K	1/4W	SMD Thick Film Resistor	
R83	100K	1/4W	SMD Thick Film Resistor	
R84	47K	1/4W	SMD Thick Film Resistor	
R85	47K	1/4W	SMD Thick Film Resistor	
R86	47K	1/4W	SMD Thick Film Resistor	
R87	2K2	1/4W	SMD Thick Film Resistor	
R88	150	1/4W	SMD Thick Film Resistor	
R89	150	1/4W	SMD Thick Film Resistor	
R90	33	1/4W	SMD Thick Film Resistor	
R91	10	1/4W	SMD Thick Film Resistor	
R92	4K7	1/4W	SMD Thick Film Resistor	
R93	47K	1/4W	SMD Thick Film Resistor	
R94	47K	1/4W	SMD Thick Film Resistor	
R95	47K	1/4W	SMD Thick Film Resistor	
R96	12K	1/4W	SMD Thick Film Resistor	
R97	47K	1/4W	SMD Thick Film Resistor	
R98	560	1/4W	SMD Thick Film Resistor	
R99	100	1/4W	SMD Thick Film Resistor	
R100	27K	1/4W	SMD Thick Film Resistor	
R101	3K3	1/4W	SMD Thick Film Resistor	
R102	100K	1/4W	SMD Thick Film Resistor	
R103	5K	1/4W	SMD Cermet Skeleton Trimmer Resistor	
R104	12K	1/4W	SMD Thick Film Resistor	
R105	10K	1/4W	SMD Thick Film Resistor	
R106	1K2	1/4W	SMD Thick Film Resistor	
R107	50K	1/4W	SMD Thick Film Resistor	
R108	100	1/4W	SMD Thick Film Resistor	
R109	10K	1/4W	SMD Thick Film Resistor	
R110	12K	1/4W	SMD Thick Film Resistor	
R111	10K	1/4W	SMD Thick Film Resistor	
R112	12K	1/4W	SMD Thick Film Resistor	
R113	10K	1/4W	SMD Thick Film Resistor	
R114	8K2	1/4W	SMD Thick Film Resistor	
R115	50K	1/4W	SMD Thick Film Resistor	
R116	100	1/4W	SMD Thick Film Resistor	
R117	27K	1/4W	SMD Thick Film Resistor	
R118	10K	1/4W	SMD Thick Film Resistor	
R119	10K	1/4W	SMD Thick Film Resistor	
R120	22	1/4W	SMD Thick Film Resistor	
R121	47	1/4W	SMD Thick Film Resistor	
R122	22	1/4W	SMD Thick Film Resistor	
R123	47	1/4W	SMD Thick Film Resistor	
R124	82	1/4W	SMD Thick Film Resistor	
R125	82	1/4W	SMD Thick Film Resistor	
R126	680	1/4W	SMD Thick Film Resistor	
R127	680	1/4W	SMD Thick Film Resistor	
R128	330	1/4W	SMD Thick Film Resistor	

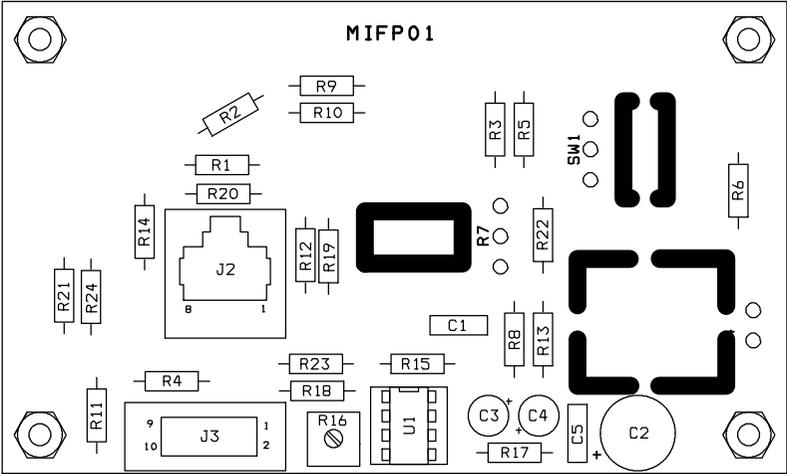
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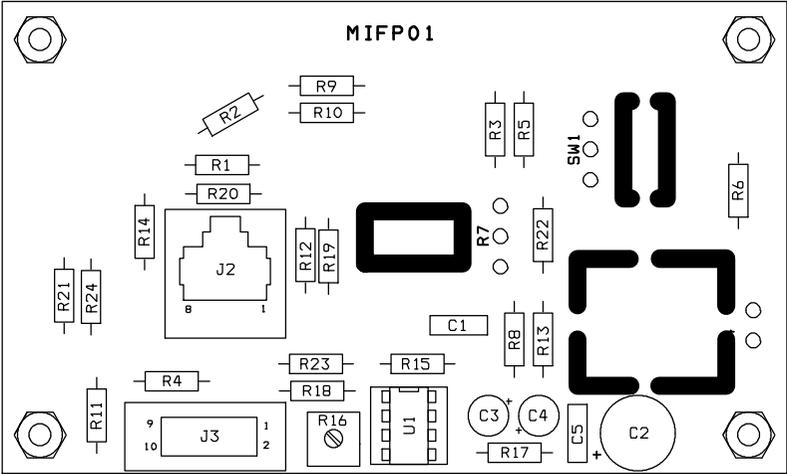
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R129	10	1/4W	SMD Thick Film Resistor	
R130	470	1/4W	SMD Thick Film Resistor	
R131	6K8	1/4W	SMD Thick Film Resistor	
R132	47K	1/4W	SMD Thick Film Resistor	
R133	470K	1/4W	SMD Thick Film Resistor	
R134	180	1/4W	SMD Thick Film Resistor	
R135	56K	1/4W	SMD Thick Film Resistor	
R136	10K	1/4W	SMD Thick Film Resistor	
R137	100	1/4W	SMD Thick Film Resistor	
R138	18K	1/4W	SMD Thick Film Resistor	
R139	330	1/4W	SMD Thick Film Resistor	
R140	4K7	1/4W	SMD Thick Film Resistor	
R141	10K	1/4W	SMD Thick Film Resistor	
R142	100	1/4W	SMD Thick Film Resistor	
R143	560	1/4W	SMD Thick Film Resistor	
R144	1K	1/4W	SMD Thick Film Resistor	
R145	120K	1/4W	SMD Thick Film Resistor	
R146	3K9	1/4W	SMD Thick Film Resistor	
R147	3K9	1/4W	SMD Thick Film Resistor	
R148	2K2	1/4W	SMD Thick Film Resistor	
R149	100	1/4W	SMD Thick Film Resistor	
R150	47K	1/4W	SMD Thick Film Resistor	
R151	47K	1/4W	SMD Thick Film Resistor	
R152	47K	1/4W	SMD Thick Film Resistor	
R153	47K	1/4W	SMD Thick Film Resistor	
R154	47K	1/4W	SMD Thick Film Resistor	
R155	470	1/4W	SMD Thick Film Resistor	
R156	47K	1/4W	SMD Thick Film Resistor	
R157	470	1/4W	SMD Thick Film Resistor	
R158	100K	1/4W	SMD Thick Film Resistor	
R159	560	1/4W	SMD Thick Film Resistor	
R160	220K	1/4W	SMD Thick Film Resistor	
R161	1K	1/4W	SMD Thick Film Resistor	
R162	22K	1/4W	SMD Thick Film Resistor	
R163	10	1/4W	SMD Thick Film Resistor	
R164	10	1/4W	SMD Thick Film Resistor	
R165	10K	1/4W	SMD Cermet Skeleton Trimmer Resistor	
R166	18K	1/4W	SMD Thick Film Resistor	
R167	470	1/4W	SMD Thick Film Resistor	
R168	390	1/4W	SMD Thick Film Resistor	
R169	12	1/4W	SMD Thick Film Resistor	
R170	330	1/4W	SMD Thick Film Resistor	
R171	330	1/4W	SMD Thick Film Resistor	
R172	10	1/4W	SMD Thick Film Resistor	
R173	39	1/4W	SMD Thick Film Resistor	
R174	10	1/4W	SMD Thick Film Resistor	
R175	470	1/4W	SMD Thick Film Resistor	
R176	12	1/4W	SMD Thick Film Resistor	
R177	12K	1/4W	SMD Thick Film Resistor	
R178	56	1/4W	SMD Thick Film Resistor	
R179	20K	1/4W	SMD Cermet Skeleton Trimmer Resistor	
R180	5K	1/4W	Multi Turn Cermet Trimmer Resistor	
R181	2K2	1/4W	SMD Thick Film Resistor	

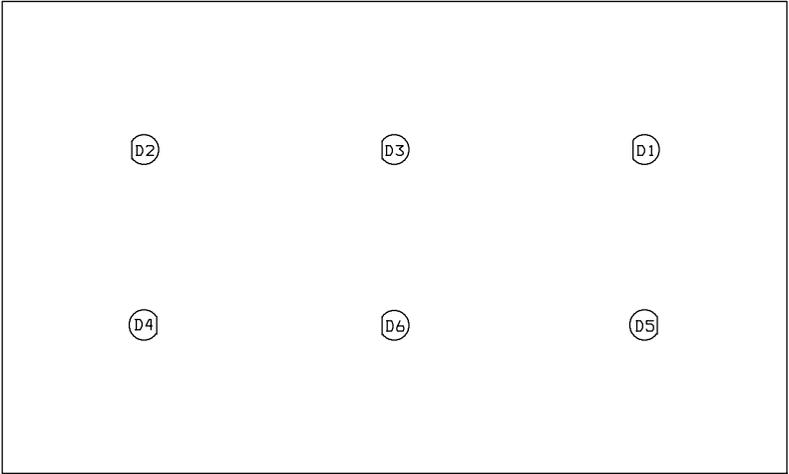
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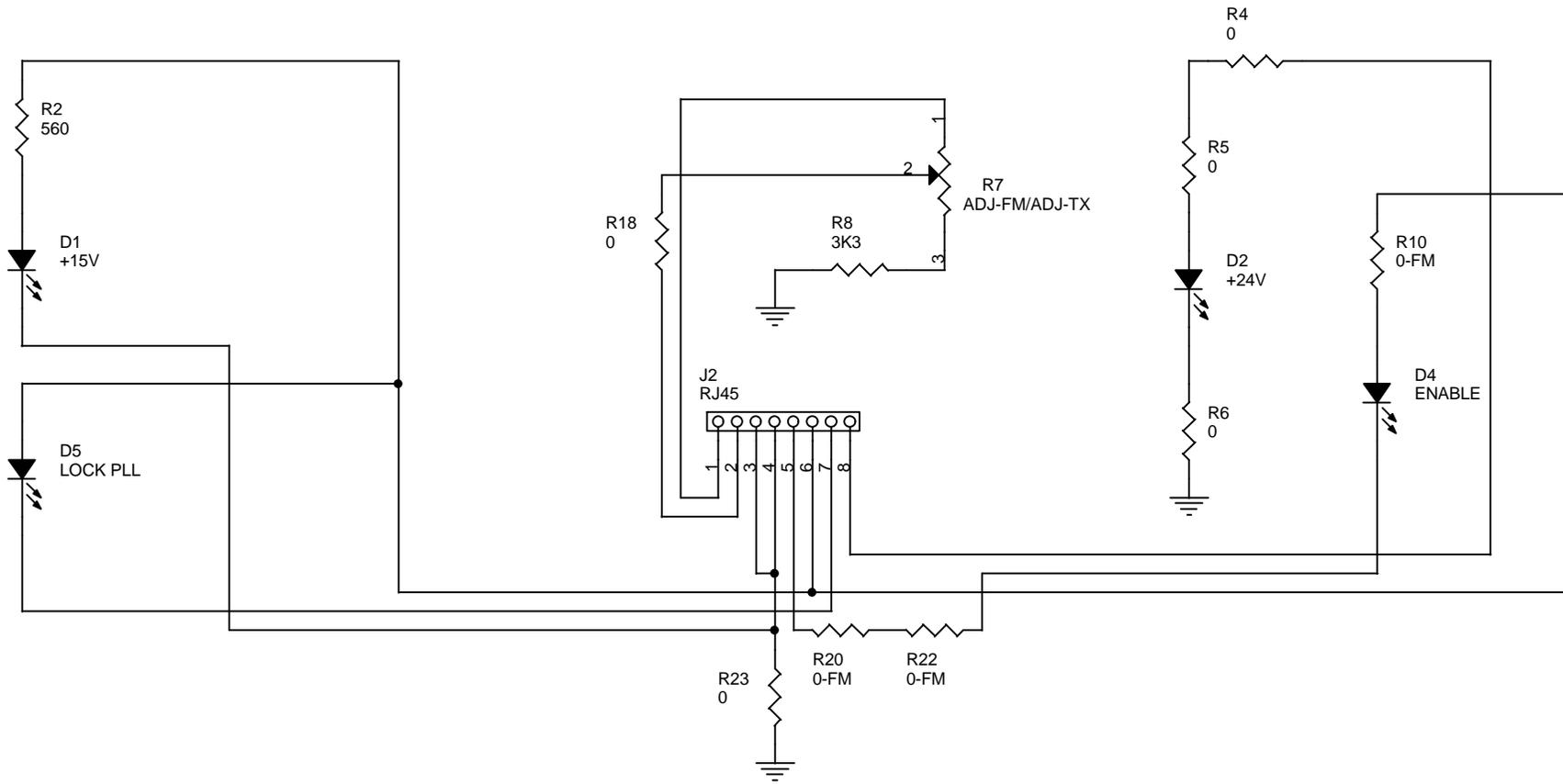
Rif.	Value	Remarks	Description	Code
R182	470K	1/4W	SMD Thick Film Resistor	
R183	4K7	1/4W	SMD Thick Film Resistor	
R184	4K7	1/4W	SMD Thick Film Resistor	
D1	LL4148		SMD Low Power Signal Diode	
D2	LL4148		SMD Low Power Signal Diode	
D3	BAT43		Diode Schottky	
D4	BAT43		Diode Schottky	
D5	LL4148		SMD Low Power Signal Diode	
D6	3V3		SMD Diode Zener	
D7	LL4148		SMD Low Power Signal Diode	
D8	LL4148		SMD Low Power Signal Diode	
D9	LL4148		SMD Low Power Signal Diode	
D10	LED	YELLOW	SMD Light Emitting Diode	
D11	LED	YELLOW	SMD Light Emitting Diode	
D12	MBRS340		SMD Diode Schottky	
D13	MBRS340		SMD Diode Schottky	
D14	LED	YELLOW	SMD Light Emitting Diode	
D15	LED	YELLOW	SMD Light Emitting Diode	
D16	15V		SMD Diode Zener	
D17	LL4148		SMD Low Power Signal Diode	
D18	LL4148		SMD Low Power Signal Diode	
D19	15V		SMD Diode Zener	
D20	MV209		Tuning Diode	
D21	MV209		Tuning Diode	
D22	MV209		Tuning Diode	
D23	MV209		Tuning Diode	
D24	MV209		Tuning Diode	
D25	MV209		Tuning Diode	
D26	MV209		Tuning Diode	
D27	MV209		Tuning Diode	
D28	LL4148		SMD Low Power Signal Diode	
D29	LED	GREEN	SMD Light Emitting Diode	
D30	LL4148		SMD Low Power Signal Diode	
D31	5V1		SMD Diode Zener	
D32	LL4148		SMD Low Power Signal Diode	
D33	LL4148		SMD Low Power Signal Diode	
D34	LL4148		SMD Low Power Signal Diode	
Q1	BC327		Low Power Bipolar Transistor	
Q2	BC327		Low Power Bipolar Transistor	
Q3	BC337		Low Power Bipolar Transistor	
Q4	BC327		Low Power Bipolar Transistor	
Q5	BC337		Low Power Bipolar Transistor	
Q6	BDX53		Medium Power Bipolar Transistor	
Q7	BC337		Low Power Bipolar Transistor	
Q8	J310		JFET	
Q9	J310		JFET	
Q10	BC327		Low Power Bipolar Transistor	
Q11	BC327		Low Power Bipolar Transistor	
Q12	PD55003		LDMOS	
Q13	BFR96		RF Bipolar Transistor	





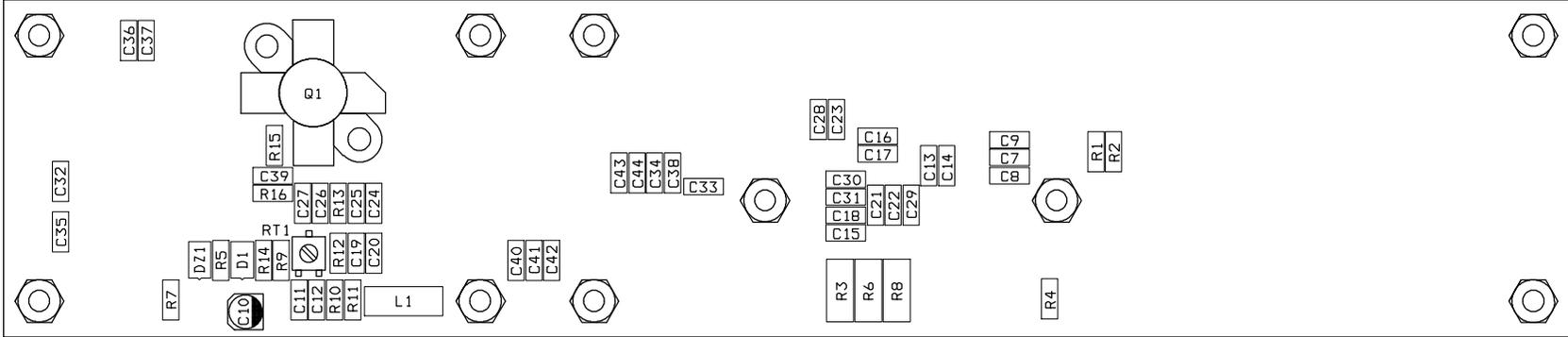


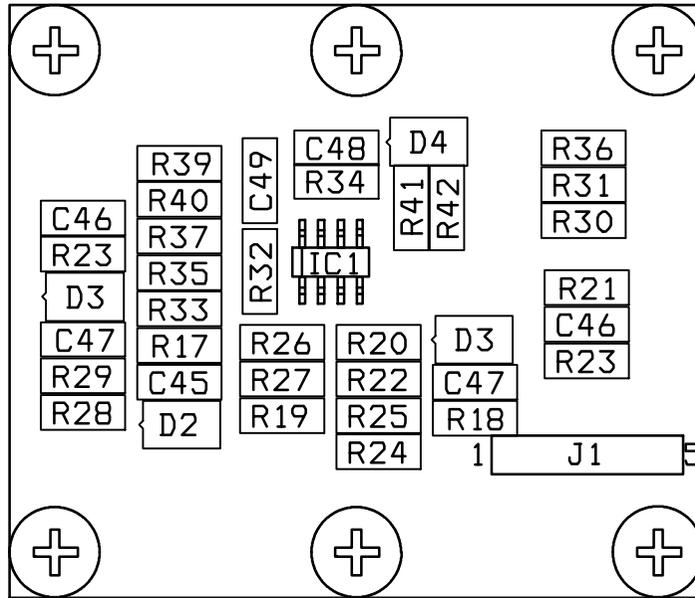


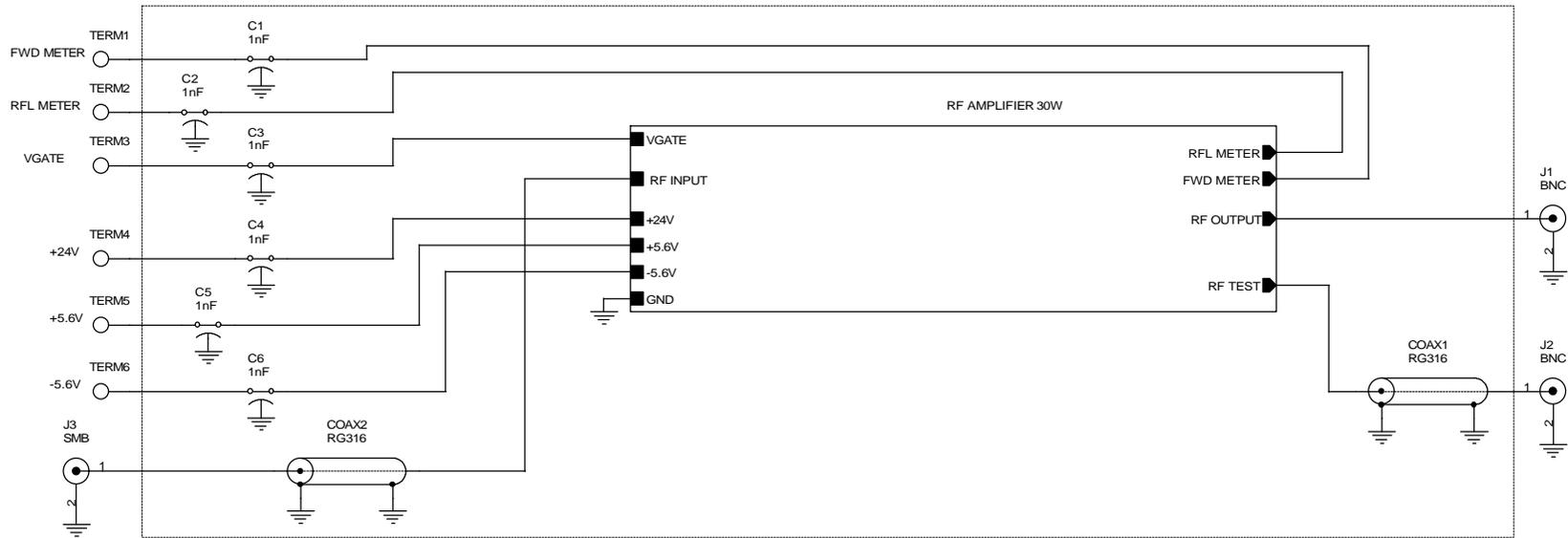


		
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A	Mod. MIFP01	1.0
Date: Thursday, October 23, 2003		
Sheet 1 of 1		

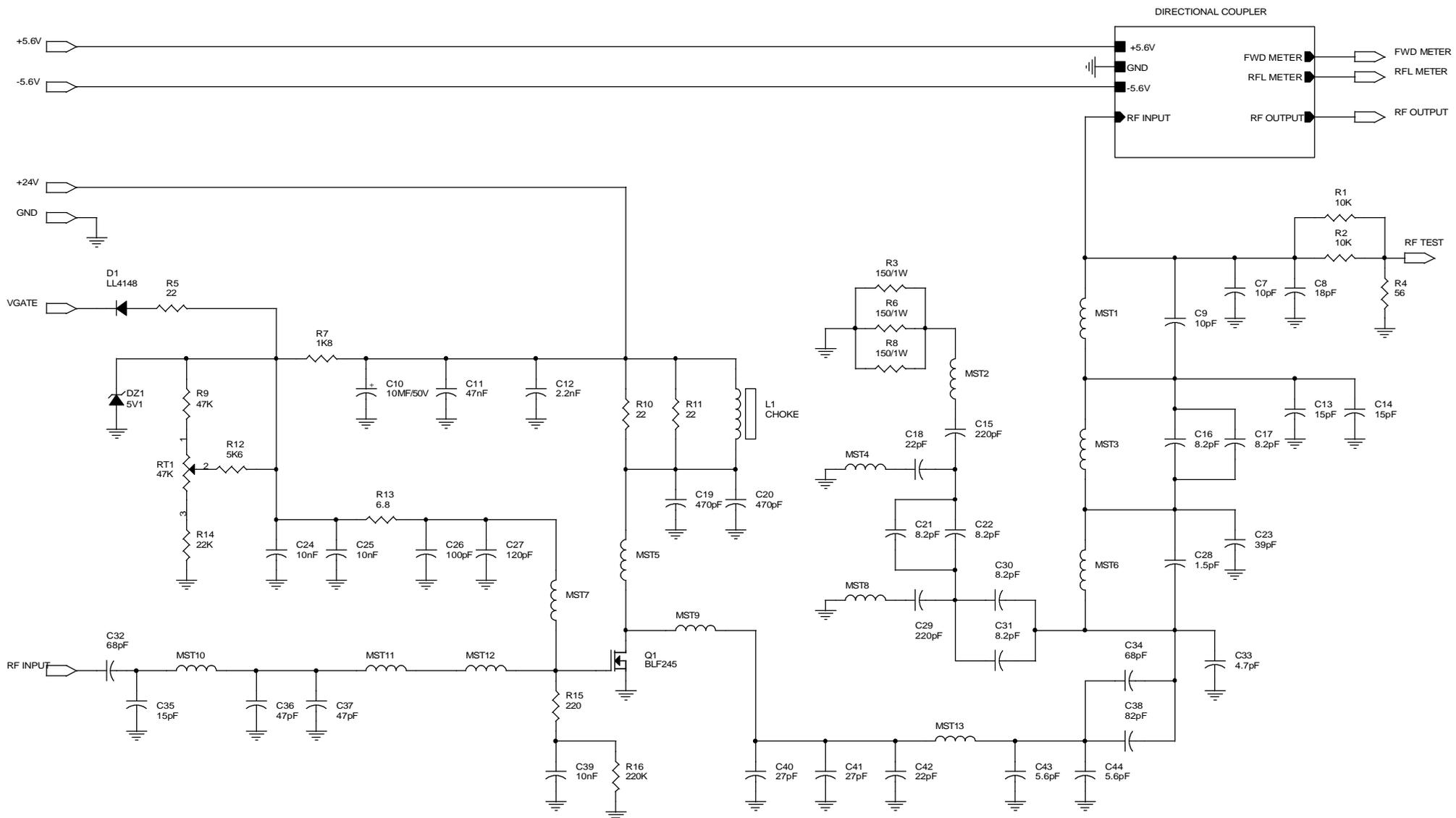








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Size B	Document Number Module RFAMP20W	Rev 1.0
Date:	Thursday, October 23, 2003	Sheet 1 of 1

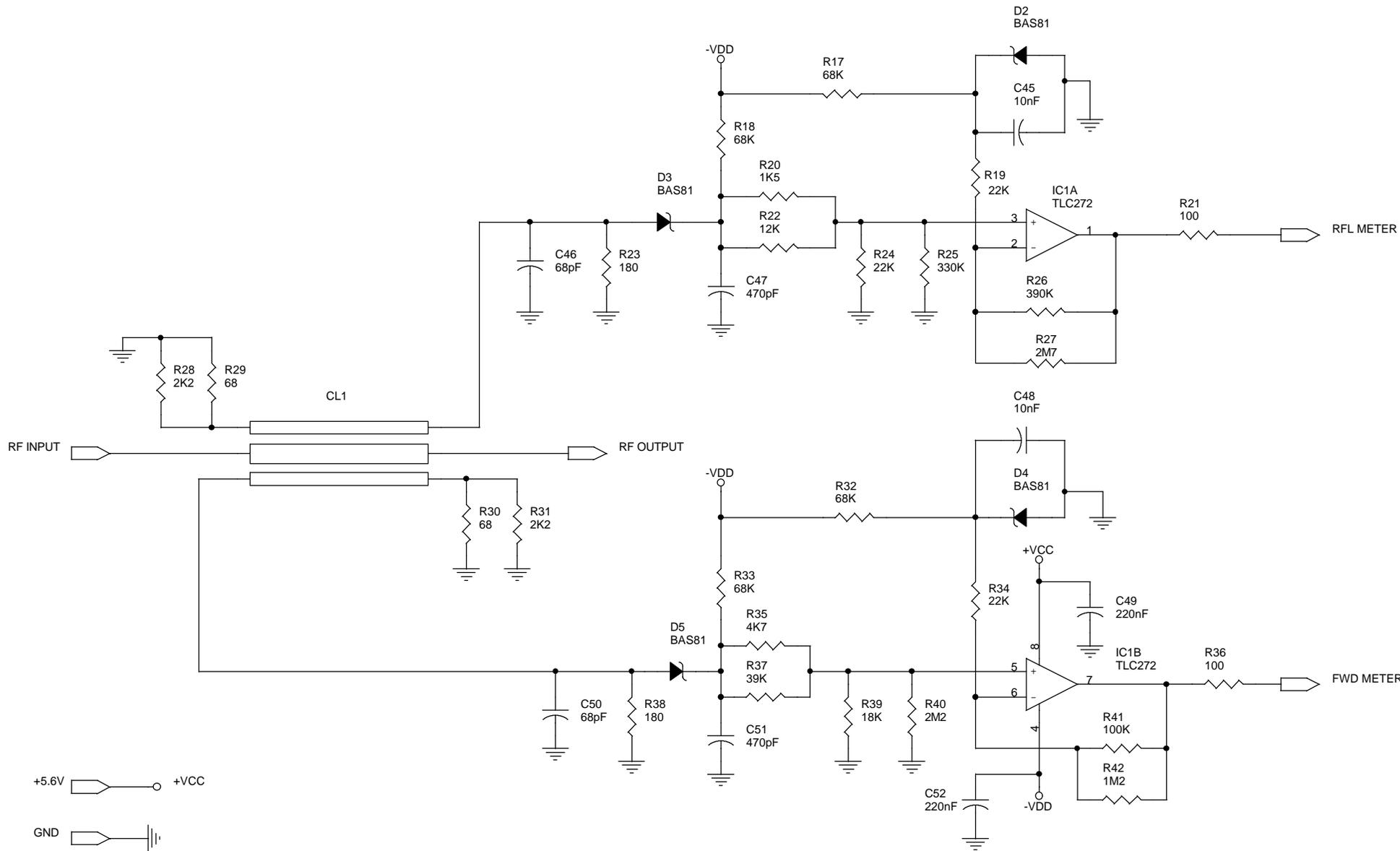


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Title: RF AMPLIFIER 20W

Size B	Document Number	Rev 1.0
	Mod. RFAMP20W	

Date: Thursday, October 23, 2003 Sheet 1 of 1



+5.6V +VCC

GND

-5.6V -VDD



Title		
DIRECTIONAL COUPLER		
Size	Document Number	Rev
A4	Mod. RFAMP20W	1.0
Date:	Thursday, October 23, 2003	Sheet 1 of 1

# NICOM

## Part List Schematic : RFAMP20W

Rif.	Value	Remarks	Description	Code
C1	1nF		Ceramic Lead Through Capacitor	
C2	1nF		Ceramic Lead Through Capacitor	
C3	1nF		Ceramic Lead Through Capacitor	
C4	1nF		Ceramic Lead Through Capacitor	
C5	1nF		Ceramic Lead Through Capacitor	
C6	1nF		Ceramic Lead Through Capacitor	
C7	10pF		SMD Multilayer Ceramic Capacitor	
C8	18pF		SMD Multilayer Ceramic Capacitor	
C9	10pF		SMD Multilayer Ceramic Capacitor	
C10	10MF	50V	SMD Aluminium Electrolytic Capacitor	
C11	47nF		SMD Multilayer Ceramic Capacitor	
C12	2.2nF		SMD Multilayer Ceramic Capacitor	
C13	15pF		SMD Multilayer Ceramic Capacitor	
C14	15pF		SMD Multilayer Ceramic Capacitor	
C15	220pF		SMD Multilayer Ceramic Capacitor	
C16	8.2pF		SMD Multilayer Ceramic Capacitor	
C17	8.2pF		SMD Multilayer Ceramic Capacitor	
C18	22pF		SMD Multilayer Ceramic Capacitor	
C19	470pF		SMD Multilayer Ceramic Capacitor	
C20	470pF		SMD Multilayer Ceramic Capacitor	
C21	8.2pF		SMD Multilayer Ceramic Capacitor	
C22	8.2pF		SMD Multilayer Ceramic Capacitor	
C23	39pF		SMD Multilayer Ceramic Capacitor	
C24	10nF		SMD Multilayer Ceramic Capacitor	
C25	10nF		SMD Multilayer Ceramic Capacitor	
C26	100pF		SMD Multilayer Ceramic Capacitor	
C27	120pF		SMD Multilayer Ceramic Capacitor	
C28	1.5pF		SMD Multilayer Ceramic Capacitor	
C29	220pF		SMD Multilayer Ceramic Capacitor	
C30	8.2pF		SMD Multilayer Ceramic Capacitor	
C31	8.2pF		SMD Multilayer Ceramic Capacitor	
C32	68pF		SMD Multilayer Ceramic Capacitor	
C33	4.7pF		SMD Multilayer Ceramic Capacitor	
C34	68pF		SMD Multilayer Ceramic Capacitor	
C35	15pF		SMD Multilayer Ceramic Capacitor	
C36	47pF		SMD Multilayer Ceramic Capacitor	
C37	47pF		SMD Multilayer Ceramic Capacitor	
C38	82pF		SMD Multilayer Ceramic Capacitor	
C39	10nF		SMD Multilayer Ceramic Capacitor	
C40	27pF		SMD Multilayer Ceramic Capacitor	
C41	27pF		SMD Multilayer Ceramic Capacitor	
C42	22pF		SMD Multilayer Ceramic Capacitor	
C43	5.6pF		SMD Multilayer Ceramic Capacitor	
C44	5.6pF		SMD Multilayer Ceramic Capacitor	
C45	10nF		SMD Multilayer Ceramic Capacitor	
C46	68pF		SMD Multilayer Ceramic Capacitor	
C47	470pF		SMD Multilayer Ceramic Capacitor	
C48	10nF		SMD Multilayer Ceramic Capacitor	
C49	220nF		SMD Multilayer Ceramic Capacitor	

# NICOM

Rif.	Value	Remarks	Description	Code
C50	68pF		SMD Multilayer Ceramic Capacitor	
C51	470pF		SMD Multilayer Ceramic Capacitor	
C52	220nF		SMD Multilayer Ceramic Capacitor	
L1	CHOKE		Beads Ferroxcube Core	
MST1	INDUCTOR		Microstrip Inductor	
MST2	INDUCTOR		Microstrip Transmission Line	
MST3	INDUCTOR		Microstrip Inductor	
MST4	INDUCTOR		Microstrip Inductor	
MST5	INDUCTOR		Microstrip Transmission Line	
MST6	INDUCTOR		Microstrip Inductor	
MST7	INDUCTOR		Microstrip Transmission Line	
MST8	INDUCTOR		Microstrip Inductor	
MST9	INDUCTOR		Microstrip Transmission Line	
MST10	INDUCTOR		Microstrip Transmission Line	
MST11	INDUCTOR		Microstrip Transmission Line	
MST12	INDUCTOR		Microstrip Transmission Line	
MST13	INDUCTOR		Microstrip Transmission Line	
R1	10K	1/4W	SMD Thick Film Resistor	
R2	10K	1/4W	SMD Thick Film Resistor	
R3	150	1W	SMD Thick Film Resistor	
R4	56	1/4W	SMD Thick Film Resistor	
R5	22	1/4W	SMD Thick Film Resistor	
R6	150	1W	SMD Thick Film Resistor	
R7	1K8	1/4W	SMD Thick Film Resistor	
R8	150	1W	SMD Thick Film Resistor	
R9	47K	1/4W	SMD Thick Film Resistor	
R10	22	1/4W	SMD Thick Film Resistor	
R11	22	1/4W	SMD Thick Film Resistor	
R12	5K6	1/4W	SMD Thick Film Resistor	
R13	6.08	1/4W	SMD Thick Film Resistor	
R14	22K	1/4W	SMD Thick Film Resistor	
R15	220	1/4W	SMD Thick Film Resistor	
R16	220K	1/4W	SMD Thick Film Resistor	
R17	68K	1/4W	SMD Thick Film Resistor	
R18	68K	1/4W	SMD Thick Film Resistor	
R19	22K	1/4W	SMD Thick Film Resistor	
R20	1K5	1/4W	SMD Thick Film Resistor	
R21	100	1/4W	SMD Thick Film Resistor	
R22	12K	1/4W	SMD Thick Film Resistor	
R23	180	1/4W	SMD Thick Film Resistor	
R24	22K	1/4W	SMD Thick Film Resistor	
R25	330K	1/4W	SMD Thick Film Resistor	
R26	390K	1/4W	SMD Thick Film Resistor	
R27	2M7	1/4W	SMD Thick Film Resistor	
R28	2K2	1/4W	SMD Thick Film Resistor	
R29	68	1/4W	SMD Thick Film Resistor	
R30	68	1/4W	SMD Thick Film Resistor	
R31	2K2	1/4W	SMD Thick Film Resistor	
R32	68K	1/4W	SMD Thick Film Resistor	

