Eclipse Series

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February 2005

PA350/500 Amplifier
Operation and Maintenance Manual

This manual is produced by RF Technology Pty Ltd
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Contents

WARNING

Changes or modifications not expressly approved by RF Technology could void your authority to operate this equipment. Specifications may vary from those given in this document in accordance with requirements of local authorities. RF Technology equipment is subject to continual improvement and RF Technology reserves the right to change performance and specification without further notice.

1 Operating Instructions

The PA350/500 is part of the Eclipse range of modular base station equipment. It is a broadband power amplifier capable of delivering 50 or 100 Watts (depending upon model) in the UHF frequency range. It is designed to complement the T350/T500 transmitter, and mounts in a standard Eclipse sub-rack.

1.1 Installation

There are no front panel controls. In normal circumstances no alignment or setup is required. If mounted in a sub-rack that has not previously been wired for a power amplifier, the rack connector must be wired according to the guidelines in section 1.1.1 below.

1.1.1 Sub-rack Wiring Guidelines

When installing an Eclipse Power Amplifier in an Eclipse sub-rack, observe the following guidelines for sub-rack installation:

- The sub-rack power supply must be capable of delivering the full current requirements for all modules fitted in the sub-rack, typically 20 Amperes for a 100W transmitter/amplifier.

- Owing to the current drain, power supply lines should be cabled to the power amplifier separately and using heavy gauge wire to minimise voltage drop and interference via the power supply of other modules in the rack.

- The ALC line from the power amplifier must be connected to the ALC input of the exciter. If this connection is not correctly made, no control of the output power level will be possible. This can result in excessive RF output power, and consequent breach of licensing authority regulations, or possible overload of the unit.

  With an Eclipse T500, join pin 8 on the exciter and the amplifier.

1.2 Front Panel Indicators

PWR LED The power (PWR) LED shows that the dc supply is connected to the transmitter.

RFO LED The RF output (RFO) LED indicates that the amplifier is being driven and that the forward output power is above a preset level. This preset indication level is generally set 1 - 3 dB below the preset output power level. The presetting potentiometer RV2 is not accessible without removal of the cover plate.

TEMP LED The temperature (TEMP) LED indicates (illuminates) should the amplifier's internal temperature become too high. The RF power is automatically reduced if the internal temperature rises above safe limits.

1.3 Internal Adjustments

All internal adjustments are factory set and should not need to be changed under normal conditions. A possible exception to this is the RF output power level which may need to be changed to comply with local licensing requirements. The low forward power warning circuit should be set at the same time as the forward power level.

WARNING

Ensure that the power setting complies with the requirements of your licensing authority. Failure to do so may result in penalties being imposed by the licensing authority.

Output Power The output power is set by RV2. This is nominally set to 50 Watts (+47dBm), but may be set to any value between 20 and 100 Watts depending upon local regulations in the destination country, and the model of power amplifier. RV2 determines the threshold affecting the ALC voltage that is fed back to the transmitter module to regulate RF output power.

RF Level Detector The forward RF power threshold associated with the RFO LED on the amplifier front panel is set by RV3. This is nominally set at half to three-quarters of the preset output power.

1.4 Amplifier I/O Connections

The PA350/500 has three connectors on the rear panel.

1.4.1 RF Input

The RF drive is delivered via a BNC connector. The absolute maximum power that should be applied to this connector is 25 Watts.

1.4.2 RF Output

The RF output signal is available from an N-type connector.

Pins	Function
1, 2, 14, 15	Positive supply
12, 13, 24, 25	Ground (negative supply)
8	ALC output

Table 1: Pin connections for the 25 pin "D" connector on the rear panel

Note: The amplifier is capable of delivering as much as 120 Watts continuously. In certain conditions[1] an RF power of 130 Watts or more can be available via this connector. This corresponds to peak voltages in excess of 100 while currents in excess of 2 Amperes may flow. Appropriate care should be taken when working on the PA350/500 to avoid making or breaking connections when the amplifier is operating, and to avoid RF burns through close proximity to live connections, etc.

1.4.3 25 Pin Connector

The 25-pin "D" connector provides connection to ground and dc power, and from the automatic level control (ALC) circuit. The pin connections are given in table 1. The ALC line floats high to approximately 7Vdc. Pulling this line low will reduce output power. Voltages below 0.5V will reduce the output by more than 20dB. A pull-down current of approximately 1mA is required.

2 Circuit Description

The following descriptions should be read as an aid to understanding the block and schematic diagrams shown in figures 1 - 4.

2.1 Amplifiers

The RF power amplification is provided by two single transistor amplifiers, Q1 and Q2. Each amplifier is rated at 50 watts output. The input and output impedances of the transistors is matched to 50Ω by broad band microstrip matching networks. The 50W models have only one amplifier fitted.

[1]Excessive powers may be available, for example, in the event of a failure of the ALC loop, such as may arise if the ALC feedback connection is broken.

Trimmer capacitors C10 and C24 are used on the input networks to optimize the input match at center of the desired frequency range. Similarly C58 and C59 on the output networks are used to optimize the output efficiency.

Since the design of the amplifiers allows them to be very broad band, they will not usually require re-adjustment unless changing frequency from one end of the band to the other.

The dc supply is fed to the amplifiers through resistors R27 and R28. This allows the collector current of each amplifier to be measured at the test socket.

2.2 Power Splitter / Combiners

In the 100W models, zero-degree hybrid power splitter / combiners are used to parallel the two amplifier stages. The hybrids consist of quarter-wave 70Ω transmission lines and 100Ω RF resistors CX1-4, R9 and R10. This configuration provides wider bandwidth and better balance than lower cost 90-degree hybrids.

2.3 Directional Coupler

The forward and reverse power components are measured through a coupled line directional coupler. The output of the coupled line is frequency compensated by R13, R14, C29 and C30 before being detected by D1 and D2.

The output of the detectors is proportional to the forward and reflected voltage components.

2.4 Low Pass Filter

A low pass filter consisting of L12 - L14 and C39 - C42 reduces the harmonic components to less than -80dBc. The filter uses a combination of lumped elements and printed microstrips to obtain the required harmonic attenuation.

2.5 Power Control Circuits

The forward and reverse voltages from the directional coupler are amplified and inverted by U1a and U1b. The amplified voltages are combined before connecting to the input of error amplifier U1d.

Error amplifier U1d compares the detected voltage with the dc reference voltage from output power trimpot RV1. The amplified difference at the output of U1d is supplied to the rear panel system connector for connection to the T500 ALC input.

Equipment Type	Key Specifications
Power Supply	13.8Vdc, 15A
RF Source	15 Watt (eg. T350/T500 exciter)
RF Load / Attenuator	50Ω, 50/100W, SWR<1.2:1
RF Power Meter	eg. HP437B or calibrated detector and voltmeter

Table 2: Standard test equipment for the PA350/500 Power Amplifier

2.6 RF Output Indicator

The forward power voltage is compared with the pre-set dc reference voltage from RV2 by U1c. The output of U1c is used to turn on the RFO LED and provide an output power logic signal to the test connector.

RV2 is normally set so that the RFO LED comes ON 1 - 3db below the nominal power output level.

2.7 Over Temperature Protection

Thermistor RT1 is mounted to the case of output transistor Q1. If the transistor case temperature rises above 90 Celsius the resistance of RT1 increases and Q5 is turned ON.

This causes the TEMP LED to come on and also reduces the dc reference voltage to the output power error amplifier U1d. The input power will then be reduced by the transmitter ALC circuits and the output transistor is kept within safe operating limits.

3 Field Alignment Procedures

3.1 Output Power Level

1. Set the unit up on a bench with the standard test equipment listed in table 2.

2. Set RV1 and RV2 both fully counter-clockwise.

3. Set the exciter to the desired operating frequency.

4. Adjust RV1 to set the output power on the meter to the level at which you want the RFO LED to illuminate.

5. Adjust RV2 until the RFO LED just goes out.

6. Adjust RV1 for the desired output power.

3.2 Tuning Procedure

Adjustment of the matching circuits is carried out with the aim of:

- ensuring that the specified power is available
- balancing the load reasonably equally between the power transistors, and
- obtaining acceptable efficiency in the power transistors.

Note that the factory alignment procedure is complicated, but allows a given unit to operate across a full 15% bandwidth, without further adjustment. Alignment without appropriate equipment can leave the amplifier unstable or otherwise unable to meet specification. However, the procedure below will usually provide adequate performance.

1. Disconnect the ALC line.
2. Set the RF source to deliver 15W at the highest frequency in the band over which the PA is specified.
3. Measuring the RF output power, adjust C10, C24, C58 and C59 to obtain maximum output.
4. On 100W models, measuring the collector currents of Q1 and Q2 at the test socket, adjust C58 and C59 to reduce and balance the currents, but keeping the power above the required level.
5. Proceed to carry out the power setting procedure in section 3.1.

4 Specifications

4.1 Description

The PA350/500 power amplifiers are designed for use with the T350/500 series transmitters to provide 50 or 100 Watts of RF output, depending upon model. Output power is regulated by connecting the ALC output to the ALC input of the driving exciter. The drive from the transmitter module is then automatically adjusted to maintain the required output.

The regulated power level can be preset over a wide guaranteed range from 25 to 100 Watts or more, depending on the available input power and the model.

Sensing circuits are provided to protect the output transistors from excessive temperature. If the heat sink temperature rises to 80C, the input drive will be reduced to prevent damage.

4.2 Physical Configuration

The power amplifier is designed to fit in an RF Technology sub-rack within a 19" rack frame. The installed height is 4 Rack Units (RU), or 178mm, and the depth is 350mm. The amplifier is 95.25mm or three Eclipse units wide. The amplifier uses an extruded aluminium heat sink with vertical fins. Heatsink temperature rise is typically 20C at 50W output.

4.3 Front Panel Indicators and Test Points

4.3.1 Indicators

Power: Green LED

RF Power: Yellow LED

Over Temperature: Red LED

4.3.2 Test Points

Forward Power: Voltage to ground, 0 - 4V, un-calibrated (pin 4 - Gnd)

Reverse Power: Voltage to ground, 0 - 4V, un-calibrated (pin 3 - Gnd)

Collector Currents: Voltage to positive supply, across 0.1Ω, ±10% (pins 7 - 1 and 8 - 1).

4.4 Electrical Specifications

4.4.1 Power Requirements

Operating Voltage: 10.5 - 16 Volts, with output power reduced below 12.5V

Current Drain: 8 Amperes maximum (7 typical) at 50 Watts and 13.5 Volts, 100mA maximum standby

Polarity: Negative Ground

4.4.2 Frequency Range

Model	Frequency Range
PA350A	360-380MHz
PA350B	375-400MHz
PA350C	330-360MHz
PA500A	400-450MHz
PA500B	450-512MHz

4.5 Antenna Impedance

Nominal load impedance is 50Ω SWR 1.5:1 or better. The PA350/500 will operate with a VSWR of 2:1 at all phase angles. The forward power will reduce as reverse power rises above acceptable limits, typically at an SWR of about 2.5:1.

4.6 Output Power

Nominally 50/100 Watts, preset adjustable from 15/25 to 50/100.
Gain is typically >5dB.

4.6.1 Transmit Duty Cycle

The transmitter is rated for 100% duty cycle (continuous operation) at 50W output for air temperature below 40C. De-rate linearly above 40C to 50% at 60C.

The transmitter is rated for 50% duty cycle at 100W output for air temperature below 40C. De-rate linearly above 40C to 5% at 70C.

4.7 Spurious and Harmonics

Less than 25 μW at any harmonic of the transmit frequency.

4.8 Heatsink Temperature

The heatsink temperature can rise to 80C without affecting operation, except for de-rating based on air-temperature as noted in section 4.6.1 above. Shutdown will occur at heatsink temperatures exceeding approximately 90C.

4.9 ALC Output

The ALC is intended for connection to the T500. It supplies a voltage which decreases with increasing power or temperature. Voltages below 6V should reduce drive power, at a rate of approximately 6~dB/Volt, with voltages below 1V producing a minimum of 25~dB attenuation.

4.10 Connectors

4.10.1 RF Input

The RF drive is delivered via a BNC connector. The maximum power that should be applied to this connector is 15/32 Watts for single/dual transistor models.

4.10.2 RF Output

The RF output signal is available from an N-type connector.

4.10.3 25-Pin Connector

A 25-pin, D-shell ("D"') connector is mounted on the rear panel. It provides power connections and a connection from the automatic level control (ALC) circuit. The pin connections are given in table 1.

4.10.4 9-Pin Connector

A front-panel, 9-pin, D-shell connector provides analogue voltages for testing purposes.

A Engineering Diagrams

A.1 Block Diagram

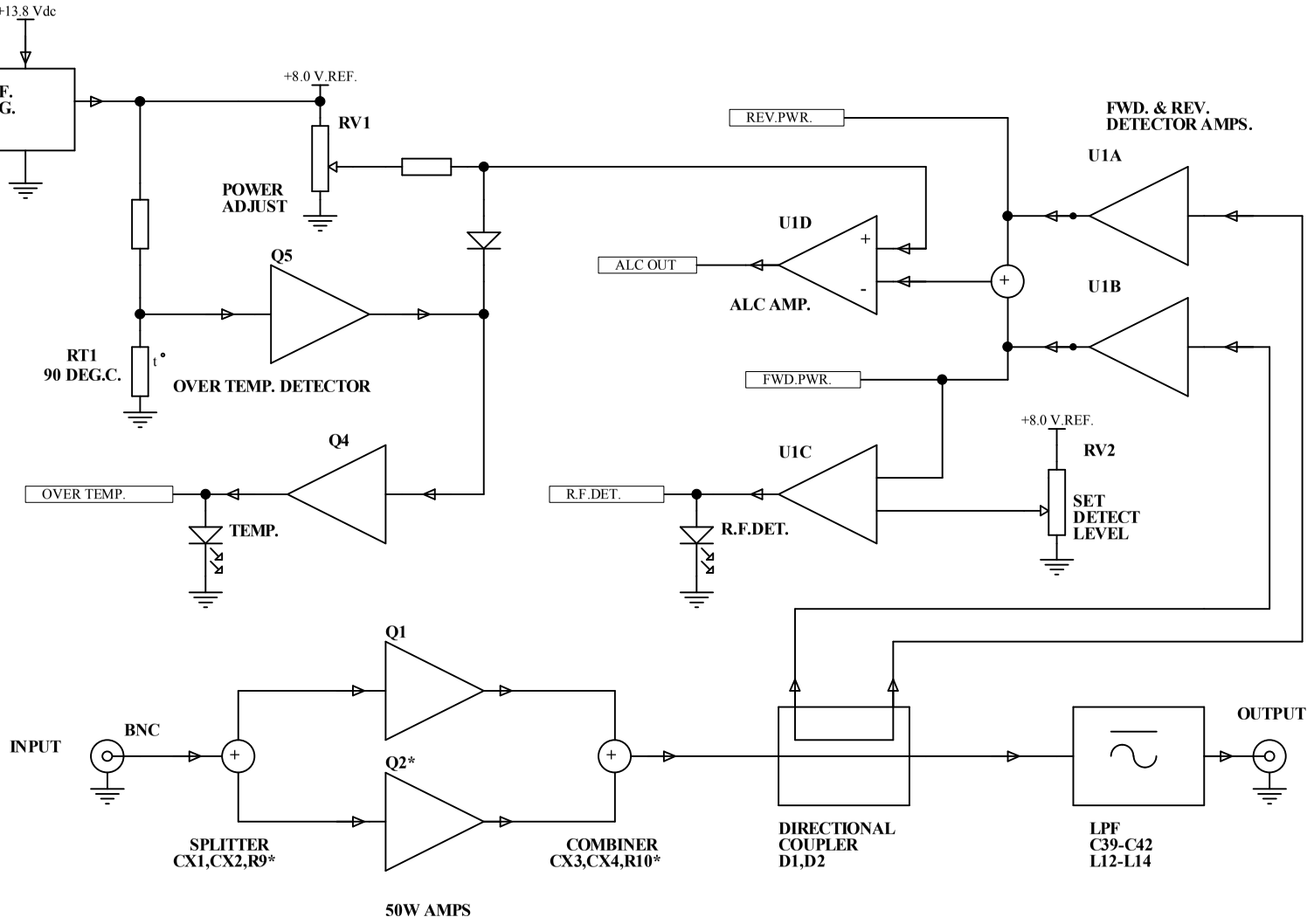
Figure 1 shows the block signal flow diagram of the PA350/500 amplifier.
Figure 2 shows the chassis wiring diagram of the PA350/500 amplifier.

A.2 Circuit Diagrams

Figure 3 shows the detailed circuit diagram of the single-stage version of the amplifier with component numbers and values. Figure 4 shows the circuit diagram for the parallel staged version.

A.3 Component Overlay Diagrams

Figures 5 and 6 show the PCB overlay guides for two versions of the amplifier with component positions.



* NOT USED ON SINGLE TRANSISTOR AMPLIFIERS

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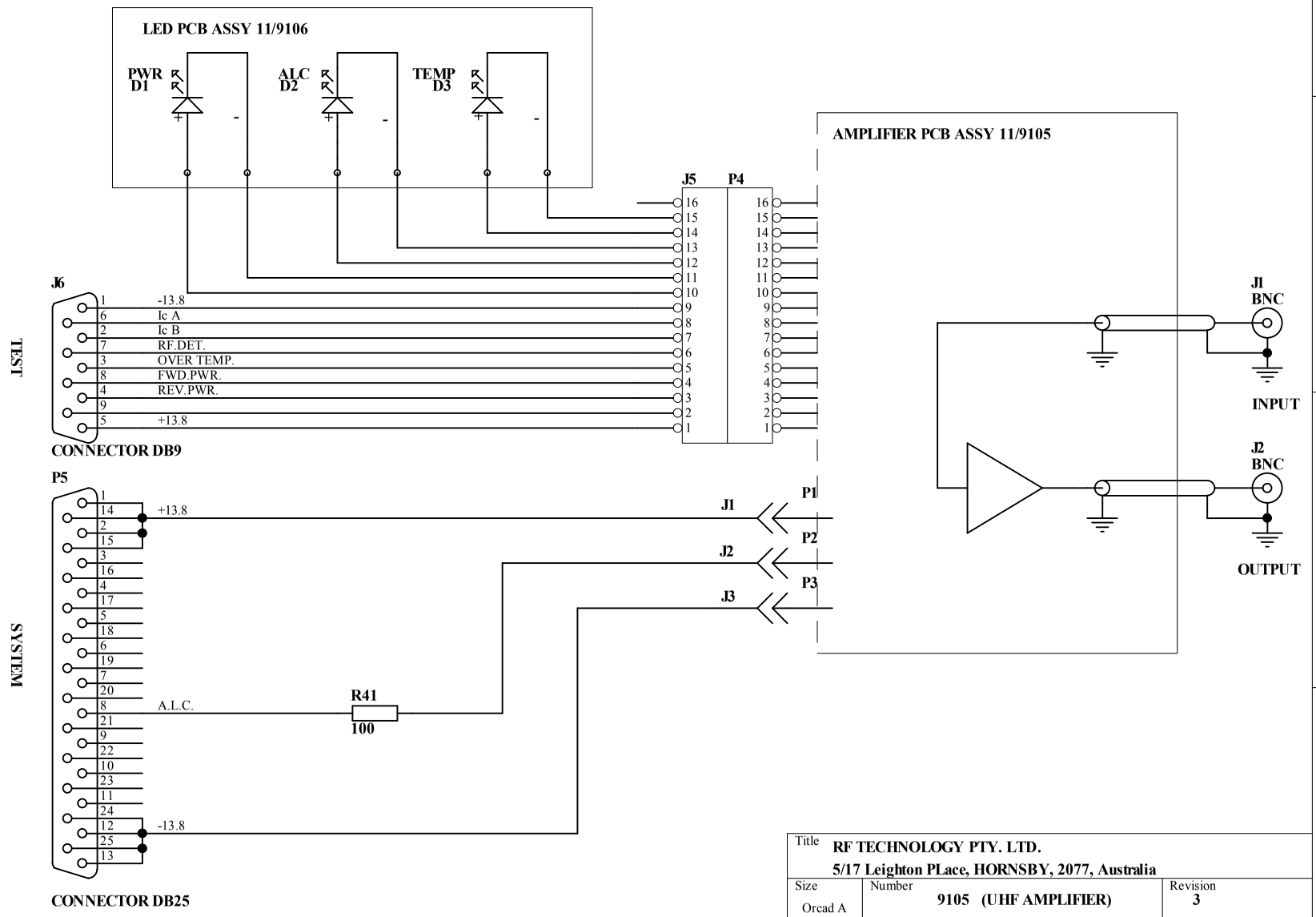

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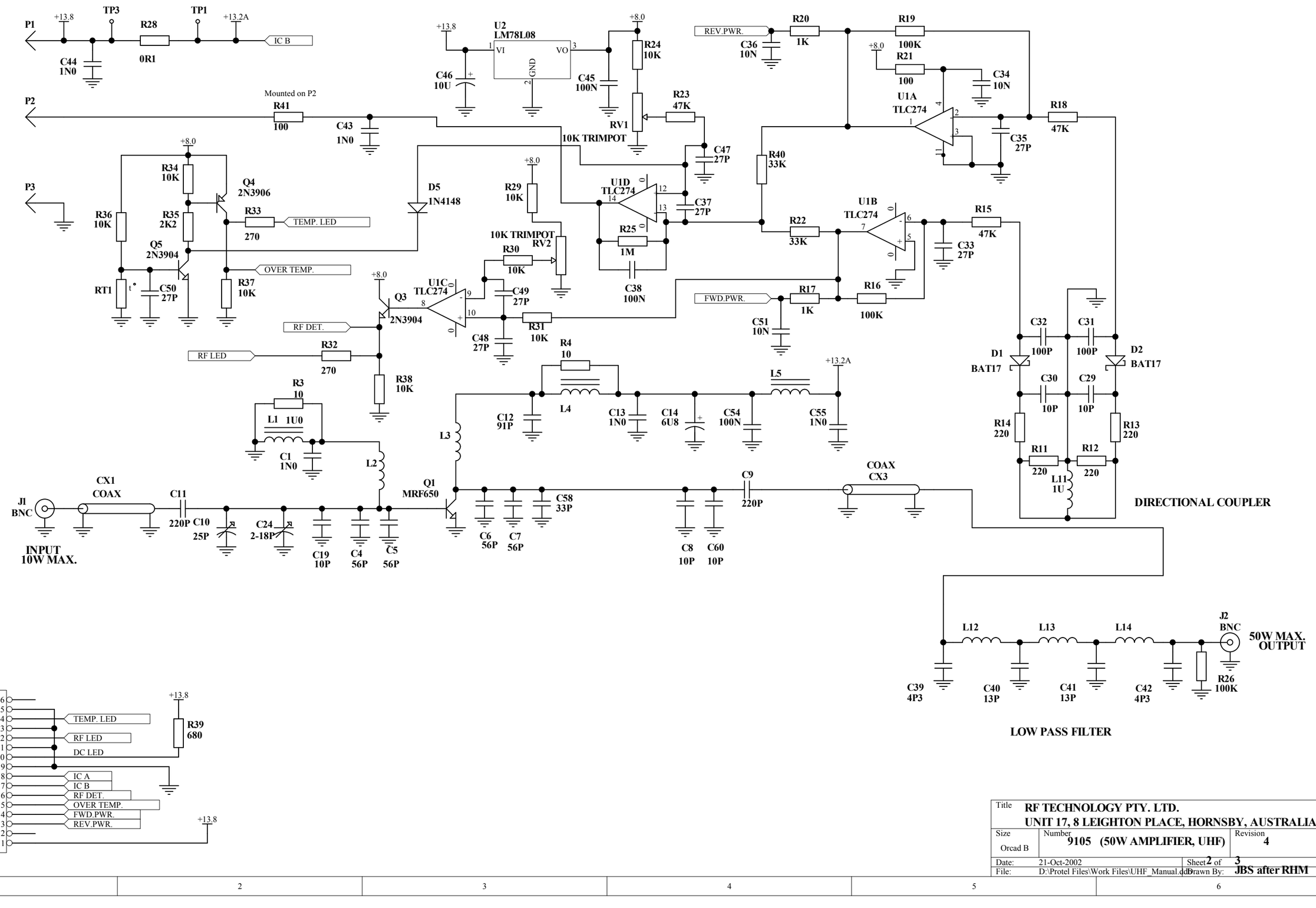

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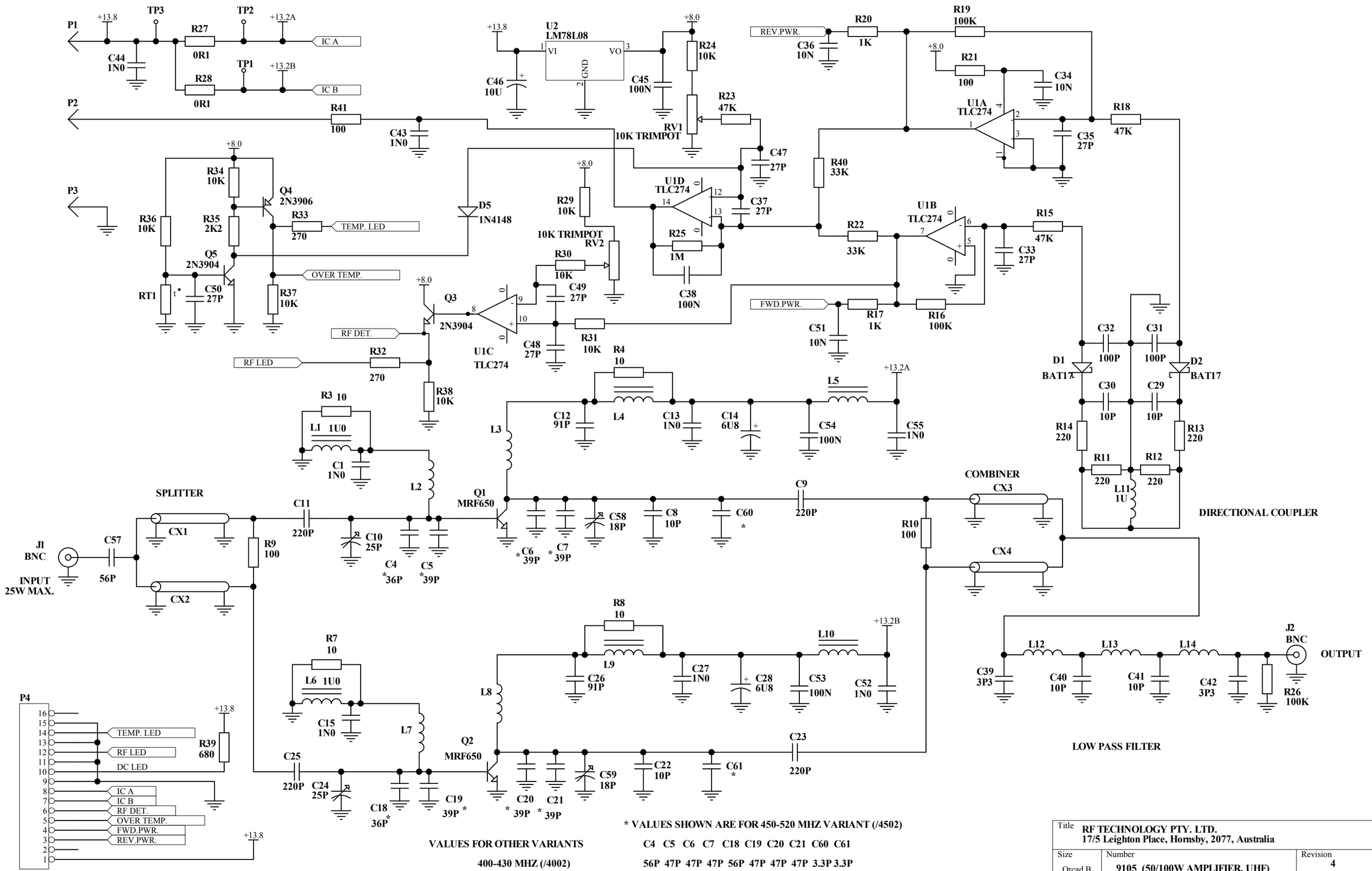
P1
+13.8
TP3
TP2
+13.2A
R27
0R1
IC A
C44
1N0
TP1
+13.2B
R28
0R1
IC B
P2
R41
100
C43
1N0
U2
LM78L08
VI
VO
GND
C46
10U
C45
100N
+8.0
R24
10K
RV1
10K TRIMPOT
R23
47K
C47
27P
REV.PWR.
R20
1K
C36
10N
R19
100K
R21
100
C34
10N
U1A
TLC274
R18
47K
C35
27P
R40
33K
P3
R34
10K
Q4
2N3906
D5
1N4148
R36
10K
R35
2K2
R33
270
TEMP. LED
Q5
2N3904
OVER TEMP.
RT1
t°
C50
27P
R37
10K
R29
10K
10K TRIMPOT
RV2
R30
10K
C49
27P
U1D
TLC274
R25
1M
C38
100N
C37
27P
U1B
TLC274
R22
33K
R15
47K
C33
27P
FWD.PWR.
C51
10N
R17
1K
R16
100K
Q3
2N3904
RF DET.
RF LED
R32
270
R38
10K
U1C
TLC274
C48
27P
R31
10K
R4
10
R3
10
L1
1U0
C1
1N0
L2
L3
C12
91P
L4
C13
1N0
C14
6U8
L5
C54
100N
C55
1N0
+13.2A
D1
BAT17
C32
100P
C31
100P
D2
BAT17
C30
10P
C29
10P
R14
220
R13
220
R11
220
R12
220
L11
1U
DIRECTIONAL COUPLER
COMBINER
CX3
CX4
SPLITTER
CX1
CX2
J1
BNC
INPUT
25W MAX.
C57
56P
C11
220P
C10
25P
R9
100
C4
*36P
C5
*39P
Q1
MRF650
C6
*39P
C7
*39P
C58
18P
C8
10P
C60
*
C9
220P
R10
100
R8
10
L9
C26
91P
C27
1N0
C28
6U8
L10
C53
100N
C52
1N0
+13.2B
J2
BNC
OUTPUT
L12
L13
L14
C39
3P3
C40
10P
C41
10P
C42
3P3
R26
100K
LOW PASS FILTER
R7
10
L6
1U0
C15
1N0
L7
L8
C25
220P
C24
25P
C18
36P*
C19
39P*
Q2
MRF650
C20
*39P
C21
*39P
C59
18P
C22
10P
C61
*
C23
220P
P4
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
TEMP. LED
RF LED
DC LED
IC A
IC B
RF DET.
OVER TEMP.
FWD.PWR.
REV.PWR.
+13.8
R39
680
+13.8
* VALUES SHOWN ARE FOR 450-520 MHZ VARIANT (/4502)
VALUES FOR OTHER VARIANTS
C4 C5 C6 C7 C18 C19 C20 C21 C60 C61
400-430 MHZ (/4002)
56P 47P 47P 47P 56P 47P 47P 47P 3.3P 3.3P
Title
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17/5 Leighton Place, Hornsby, 2077, Australia
Size
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Number
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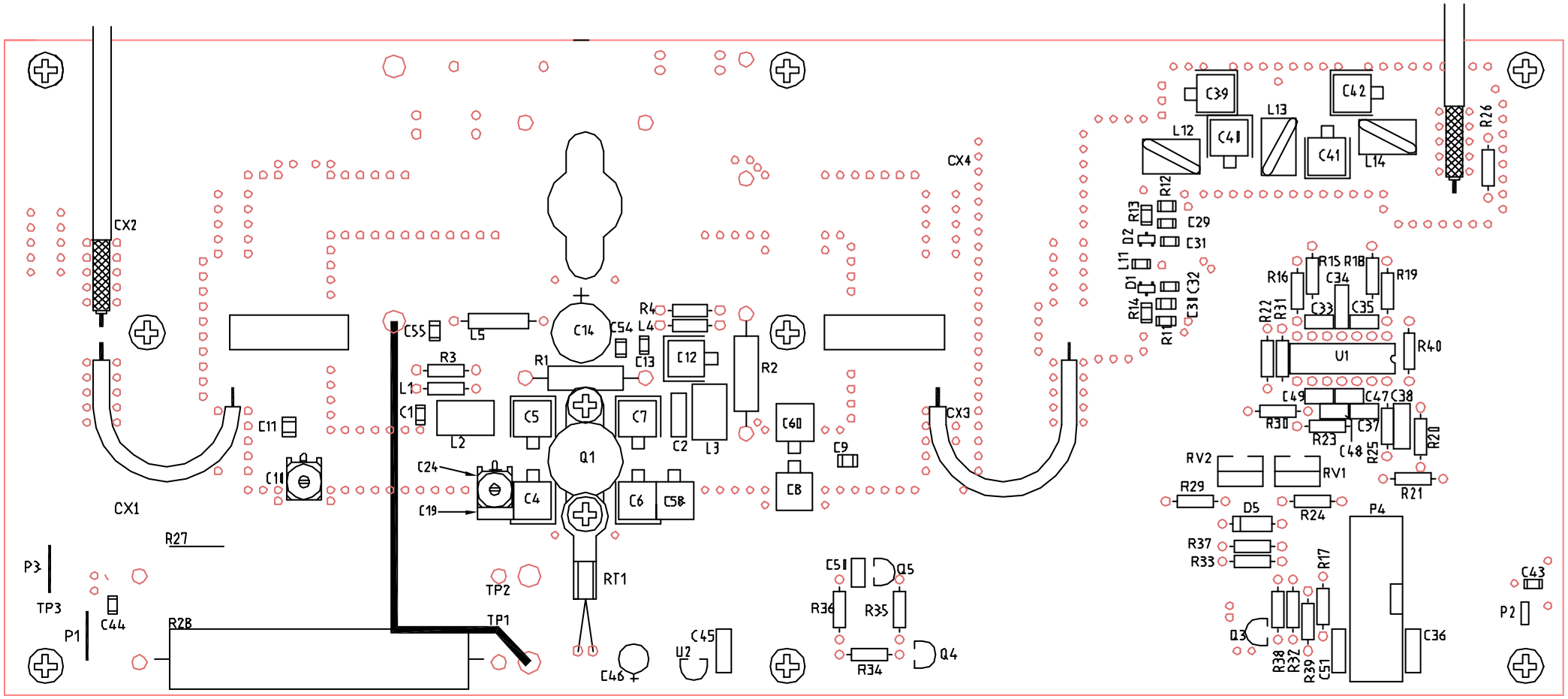

9105 1Q Overlay Drawing

B - PA350/PA500 Parts List

Main PCB Assembly Parts
Denotes location not used in PA350

Ref.	Description	Part Number
C1	Capacitor 1NO 5% 63V NPO SM1206	46/3300/01NO
C8	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C9	Capacitor Ceramic 220P 5% 500V 100B	46/3100/220P
C10	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
C11	Capacitor Ceramic 220P 5% 500V 100B	46/3100/220P
C12	Capacitor 91P 5% 250V MC Mica	48/3002/091P
C13	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C14	Capacitor 6.8U 20% 25V Solid AL	41/2225/06U8
C15 *	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C22 *	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C23 *	Capacitor Ceramic 220P 5% 500V 100B	46/3100/220P
C24	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
C25 *	Capacitor Ceramic 220P 5% 500V 100B	46/3100/220P
C26 *	Capacitor 91P 5% 250V MC Mica	48/3002/091P
C27 *	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C28 *	Capacitor 6.8U 20% 25V Solid AL	41/2225/06U8
C29	Capacitor 10P 5% 63V NPO SM1206	46/3300/010P
C30	Capacitor 10P 5% 63V NPO SM1206	46/3300/010P
C31	Capacitor 100P 5% 63V NPO 1206	46/3300/100P
C32	Capacitor 100P 5% 63V NPO 1206	46/3300/100P
C33	Capacitor 27P 2% 100V NPO Rad.1	45/2680/027P
C34	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C35	Capacitor 27P 2% 100V NPO Rad.1	45/2680/027P
C36	Capacitor 10N 10% 50V X7R Rad.2	46/2001/010N
C37	Capacitor 27P 2% 100V NPO Rad.1	45/2680/027P
C43	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C44	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C45	Capacitor 100N 10% 50V X7R RD.2	46/2001/100N
C46	Capacitor 10U 35V Rad Electro	41/2001/010U
C47	Capacitor 27P 2% 100V NPO Rad.1	45/2680/027P
C48	Capacitor 27P 2% 100V NPO Rad.1	45/2680/027P
C49	Capacitor 27P 2% 100V NPO Rad.1	45/2680/027P
C50	Capacitor 27P 2% 100V NPO Rad.1	45/2680/027P
C51	Capacitor 10N 10% 50V X7R Rad.2	46/2001/010N
C52 *	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C53 *	Capacitor 100N 10% 63V X7R 1206	46/3310/100N
C54	Capacitor 100N 10% 63V X7R 1206	46/3310/100N
C55	Capacitor 1N0 5% 63V NPO SM1206	46/3300/01N0
C57 *	Capacitor Ceramic 56P 5% 500V 100B	46/3100/056P
C59 *	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
D1	Diode Schottkey BAT17 SOT23	21/3030/0017
D2	Diode Schottkey BAT17 SOT23	21/3030/0017
D5	Diode Silicon 1N4148	21/1010/4148
L1	Inductor 1uH Axial	37/2021/001U
L2	Inductor Moulded 7.5 Turn	37/2021/0007
L3	Inductor Moulded 7.5 Turn	37/2021/0007
L4	Ferrite Bead 3x4x1 4S2	37/1022/0001
L5	Inductor 6 Hole Ferrite RFC	37/1021/0001
L6 *	Inductor 1uH Axial	37/2021/001U
L7 *	Inductor Moulded 7.5 Turn	37/2021/0007
L8 *	Inductor Moulded 7.5 Turn	37/2021/0007

Ref.	Description	Part Number
L9 *	Ferrite Bead 3x4x1 4S2	37/1022/0001
L10 *	Inductor 6 Hole Ferrite RFC	37/1021/0001
L11	Inductor 1U0 10% Choke SM1206	37/3320/01U0
P1	6.35mm QC Tab Vertical PCB MT	35/0635/0001
P3	6.35mm QC Tab Vertical PCB MT	35/0635/0001
P4	Connector 16 Way Shrouded Header	35/2502/0016
Q1	Transistor NPN 50W RF MRF650	27/3020/MRF650
Q2 *	Transistor NPN 50W RF MRF650	27/3020/MRF650
Q3	Transistor GP NPN 2N3904 TO92	27/2020/3904
Q4	Transistor GP PNP 2N3906 TO92	27/2010/3906
Q5	Transistor GP NPN 2N3904 TO92	27/2020/3904
R3	Resistor 10R 5% 0.25W Axial	51/1040/0010
R4	Resistor 10R 5% 0.25W Axial	51/1040/0010
R7 *	Resistor 10R 5% 0.25W Axial	51/1040/0010
R8 *	Resistor 10R 5% 0.25W Axial	51/1040/0010
R9 *	Resistor 100 Ohm 40W RF	51/RF40/0100
R10 *	Resistor 100 Ohm 40W RF	51/RF40/0100
R11	Resistor 220R 5% 0.25W SM1206	51/3380/0220
R12	Resistor 220R 5% 0.25W SM1206	51/3380/0220
R13	Resistor 220R 5% 0.25W SM1206	51/3380/0220
R14	Resistor 220R 5% 0.25W SM1206	51/3380/0220
R15	Resistor 47K 5% 0.25W Axial	51/1040/047K
R16	Resistor 100K 5% 0.25W Axial	51/1040/100K
R17	Resistor 1K0 5% 0.25W Axial	51/1040/01K0
R18	Resistor 47K 5% 0.25W Axial	51/1040/047K
R19	Resistor 100K 5% 0.25W Axial	51/1040/100K
R20	Resistor 1K0 5% 0.25W Axial	51/1040/01K0
R21	Resistor 100R 5% 0.25W Axial	51/1040/0100
R23	Resistor 47K 5% 0.25W Axial	51/1040/047K
R24	Resistor 10K 5% 0.25W Axial	51/1040/010K
R25	Resistor 1M0 5% 0.25W Axial	51/1040/01M0
R26	Resistor 100K 5% 0.25W Axial	51/1040/100K
R27 *	Resistor 0.1R 5% 10W ASW 10	51/0010/00R1
R28	Resistor 0.1R 5% 10W ASW 10	51/0010/00R1
R29	Resistor 10K 5% 0.25W Axial	51/1040/010K
R30	Resistor 10K 5% 0.25W Axial	51/1040/010K
R31	Resistor 10K 5% 0.25W Axial	51/1040/010K
R32	Resistor 270R 5% 0.25W Axial	51/1040/0270
R33	Resistor 270R 5% 0.25W Axial	51/1040/0270
R34	Resistor 10K 5% 0.25W Axial	51/1040/010K
R35	Resistor 2K2 5% 0.25W Axial	51/1040/02K2
R36	Resistor 10K 5% 0.25W Axial	51/1040/010K
R37	Resistor 10K 5% 0.25W Axial	51/1040/010K
R38	Resistor 10K 5% 0.25W Axial	51/1040/010K
R39	Resistor 680R 5% 0.25W Axial	51/1040/0680
R40	Resistor 33K 5% 0.25W Axial	51/1040/033K
R41(P2)	Resistor 100R 5% 0.25W Axial	51/1040/100R
RT1	Thermistor	54/0400/0080
RV1	Trimpot 10K 1 Turn Vertical	53/1020/010K
RV2	Trimpot 10K 1 Turn Vertical	53/1020/010K
U1	IC Quad OP Amplifier TLC274	25/2050/274C
U2	IC Volt Regulator 78L08 TO92M	25/2040/78L08

Ref.	Description	Part Number
PA350A 360 - 380 MHz Parts		
C4	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C5	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C6	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C7	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C19	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C38	Capacitor 10N 5% 50V MKT Rad.2	47/2007/10N
C39	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C40	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C41	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C42	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C58	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
C60	Capacitor Trim 2-10P HI-TMP FLM	49/3001/010P
CX1	RFT CoaxialResonator	37/9105/0001
CX3	RFT CoaxialResonator	37/9105/0001
R22	Resistor 47K 5% 0.25W Axial	51/1040/047K
L12	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L13	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L14	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
PA350B 375 - 400 MHz Parts		
C4	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C5	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C6	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C7	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C38	Capacitor 10N 5% 50V MKT Rad.2	47/2007/10N
C39	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C40	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C41	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C42	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C58	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
C60	Capacitor Trim 2-10P HI-TMP FLM	49/3001/010P
CX1	RFT CoaxialResonator	37/9105/0001
CX3	RFT CoaxialResonator	37/9105/0001
R22	Resistor 47K 5% 0.25W Axial	51/1040/047K
L12	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L13	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L14	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
PA350C 330 - 365 MHz Parts		
C4	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C5	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C6	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C7	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C19	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C38	Capacitor 10N 5% 50V MKT Rad.2	47/2007/10N
C39	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C40	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C41	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C42	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C58	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
C60	Capacitor Trim 2-10P HI-TMP FLM	49/3001/010P
CX1	RFT CoaxialResonator	37/9105/0001
CX3	RFT CoaxialResonator	37/9105/0001
R22	Resistor 47K 5% 0.25W Axial	51/1040/047K
L12	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L13	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L14	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO

Ref.	Description	Part Number
PA350D 300 - 330 MHz Parts		
C4	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C5	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C6	Capacitor 47P 5% 250V MC Mica	48/3002/047P
C7	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C19	Capacitor 33P 5% 250V MC Mica	48/3002/033P
C38	Capacitor 10N 5% 50V MKT Rad.2	47/2007/10N
C39	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C40	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C41	Capacitor 13P 5% 250V MC Mica	48/3002/013P
C42	Capacitor 4P3 5% 250V MC Mica	48/3002/04P3
C58	Capacitor 36P 5% 250V MC Mica	48/3002/036P
C60	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
CX1	RFT CoaxialResonator	37/9105/0001
CX3	RFT CoaxialResonator	37/9105/0001
R22	Resistor 47K 5% 0.25W Axial	51/1040/047K
L12	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L13	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
L14	Hairpin, 7.4Dx 20Lx 1.0	37/3002/20DO
PA500A 400 - 430 MHz Parts		
C4	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C5	Capacitor 47P 5% 250V MC Mica	48/3002/047P
C6	Capacitor 47P 5% 250V MC Mica	48/3002/047P
C7	Capacitor 47P 5% 250V MC Mica	48/3002/047P
C18	Capacitor 56P 5% 250V MC Mica	48/3002/056P
C19	Capacitor 47P 5% 250V MC Mica	48/3002/047P
C20	Capacitor 47P 5% 250V MC Mica	48/3002/047P
C21	Capacitor 47P 5% 250V MC Mica	48/3002/047P
C38	Capacitor 100N 5% 50V MKT Rad.2	47/2007/100N
C39	Capacitor 3P3 5% 250V MC Mica	48/3002/03P3
C40	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C41	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C42	Capacitor 3P3 5% 250V MC Mica	48/3002/03P3
C58	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
C60	Capacitor 3P3 5% 250V MC Mica	48/3002/03P3
C61	Capacitor 3P3 5% 250V MC Mica	48/3002/03P3
CX1	70 Ohm Coaxial Assembly A400	12/0002/A400
CX2	70 Ohm Coaxial Assembly A400	12/0002/A400
CX3	70 Ohm Coaxial Assembly A400	12/0002/A400
CX4	70 Ohm Coaxial Assembly A400	12/0002/A400
L12	Hairpin, 7.4Dx 15Lx 1.0	37/3002/15DO
L13	Hairpin, 7.4Dx 15Lx 1.0	37/3002/15DO
L14	Hairpin, 7.4Dx 15Lx 1.0	37/3002/15DO
R22	Resistor 33K 5% 0.25W Axial	51/1040/033K
PA500B 450 - 520 MHz Parts		
C4	Capacitor 36P 5% 250V MC Mica	48/3002/036P
C5	Capacitor 39P 5% 250V MC Mica	48/3002/039P
C6	Capacitor 39P 5% 250V MC Mica	48/3002/039P
C7	Capacitor 39P 5% 250V MC Mica	48/3002/039P
C18	Capacitor 36P 5% 250V MC Mica	48/3002/036P
C19	Capacitor 39P 5% 250V MC Mica	48/3002/039P
C20	Capacitor 39P 5% 250V MC Mica	48/3002/039P
C21	Capacitor 39P 5% 250V MC Mica	48/3002/039P
C38	Capacitor 100N 5% 50V MKT Rad.2	47/2007/100N

Ref.	Description	Part Number
C39	Capacitor 3P3 5% 250V MC Mica	48/3002/03P3
C40	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C41	Capacitor 10P 5% 250V MC Mica	48/3002/010P
C42	Capacitor 3P3 5% 250V MC Mica	48/3002/03P3
C58	Capacitor Trim 2-18P HI-TMP FLM	49/3001/018P
CX1	70 Ohm Coaxial Assembly A450	12/0002/A450
CX2	70 Ohm Coaxial Assembly A450	12/0002/A450
CX3	70 Ohm Coaxial Assembly A450	12/0002/A450
CX4	70 Ohm Coaxial Assembly A450	12/0002/A450
L12	Hairpin, 7.4Dx 15Lx 1.0	37/3002/15DO
L13	Hairpin, 7.4Dx 15Lx 1.0	37/3002/15DO
L14	Hairpin, 7.4Dx 15Lx 1.0	37/3002/15DO
R22	Resistor 33K 5% 0.25W Axial	51/1040/033K