2 T838 Circuit Operation

This section provides a basic description of the circuit operation of the T838 power amplifier.

The following topics are covered in this section.

2.1 Introduction

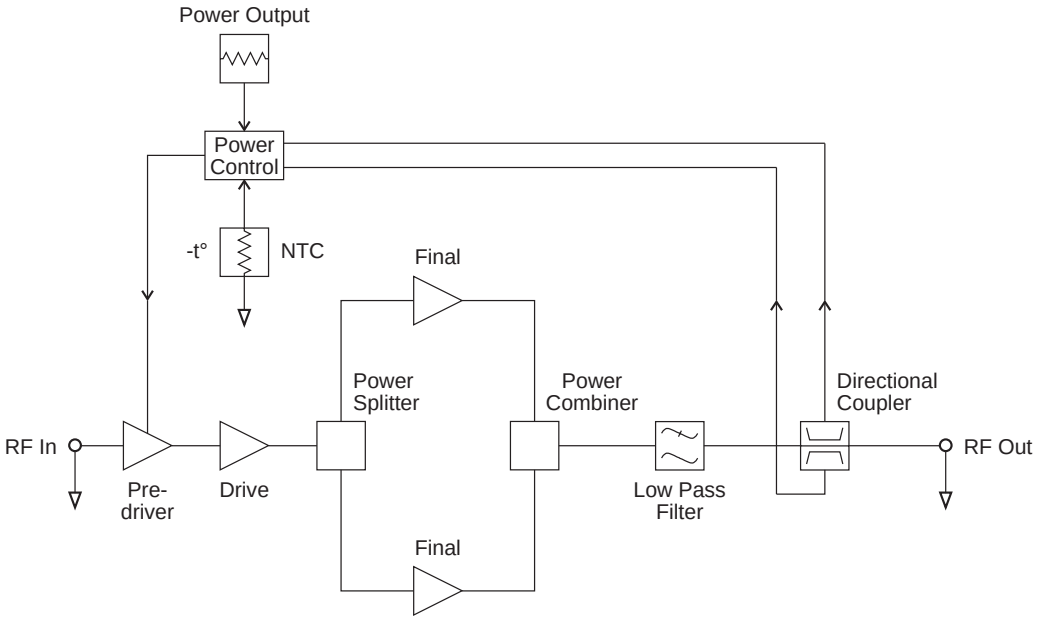

Figure 2.1 T838 High Level Block Diagram

The T838 comprises a four-stage RF power amplifier, the final two stages of which are combined, and extensive control circuitry.

The configuration of each of the main circuit blocks may be seen on a functional level in Figure 2.1.

2.2 RF Circuitry

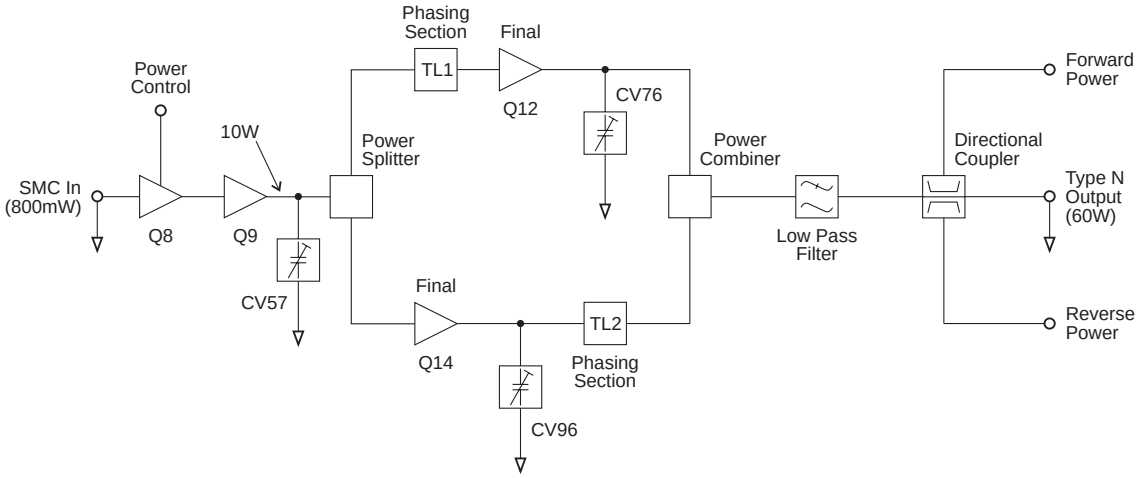

Figure 2.2 T838 RF Circuitry Block Diagram

The RF from the exciter (approximately 800mW) is fed to the power controlled stage Q8. The following stage, Q9, boosts the power to greater than 10W. A power divider network feeds the two final devices, Q12 and Q14. The outputs of these devices are combined and passed via a harmonic filter to a 'wire-line' directional coupler. The final stages incorporate phasing sections to optimise intermodulation performance.

2.3 Control Circuitry

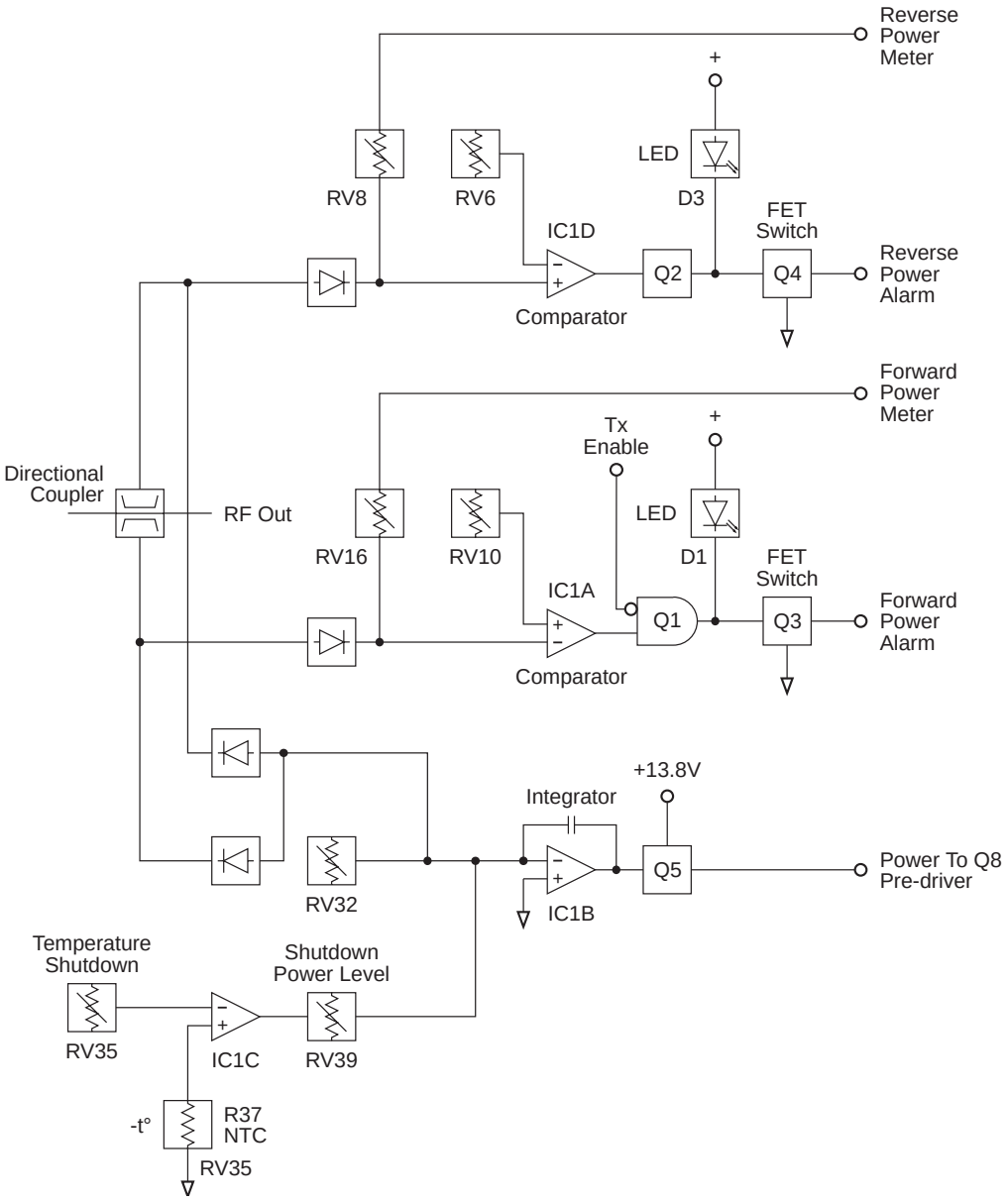

Figure 2.3 T838 Control Circuitry Block Diagram

2.3.1 Power Control

Output power is maintained at a constant level via a power control loop. The forward and reverse power levels are sensed by the 'wire-line' directional coupler and summed at an integrator (IC1b, pin 6). This drives Q5 as a series pass to supply a control voltage to the pre-driver, Q8.

Forward and reflected power are summed so that, under high output VSWR, the power control will turn the PA down.

2.3.2 Thermal Protection

At excessively high temperatures the output power will automatically reduce to a preset level, thus preventing the PA from overheating.

An NTC (R37), being part of a voltage divider (R36, R37), senses the internal temperature of the PA close to the output balance resistor (R69) and applies a voltage to a comparator (IC1c, pin 9). The threshold of the comparator is set by RV35, which sets the shutdown temperature.

The output from the comparator is summed into the power control network by RV39 so that the power level to which the PA will turn down can be set.

2.3.3 Forward And Reverse Power Alarms

If forward power drops below, or reverse power rises above, presettable limits, alarms may be triggered.

The output from the 'wire-line' directional coupler is applied to the comparators (IC1a, pin 4 & IC1d, pin 11), with thresholds adjusted by RV10 and RV6 respectively. When activated, the comparators trigger the output stages (Q3 & Q4), which are open drain with 500mA sink capability (providing the internal power dissipation is kept below 500mW). Internal diode protection makes them suitable for driving relays.

To prevent damage to the unit, the maximum externally applied voltage must not exceed 50V.

Tx enable is applied to the forward power alarm stage to prevent an alarm indicating when the transmitter is not keyed.

2.3.4 Forward And Reverse Power Metering

The levels of forward and reverse power applied to the comparators (IC1a, pin 4 and IC1d, pin 11) are available via RV16 and RV8 at the D-range connector for metering purposes.