2 T828 Circuit Operation

This section provides a basic description of the circuit operation of the T828 power amplifier.

Refer to Section 5 where the parts lists, grid reference index and diagrams will provide detailed information on identifying and locating components.

The following topics are covered in this section.

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2.1 Introduction

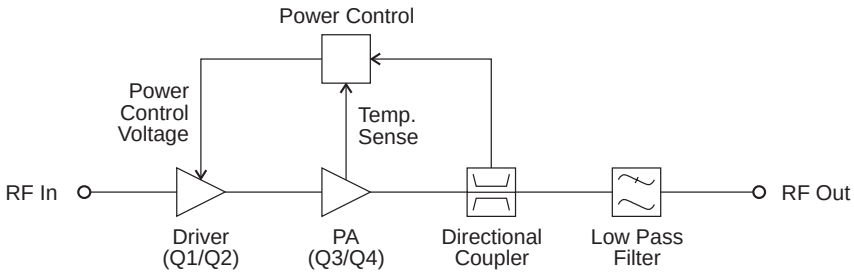

Figure 2.1 T828 High Level Block Diagram

The T828 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

(Refer to the RF section circuit diagram in Section 5.)

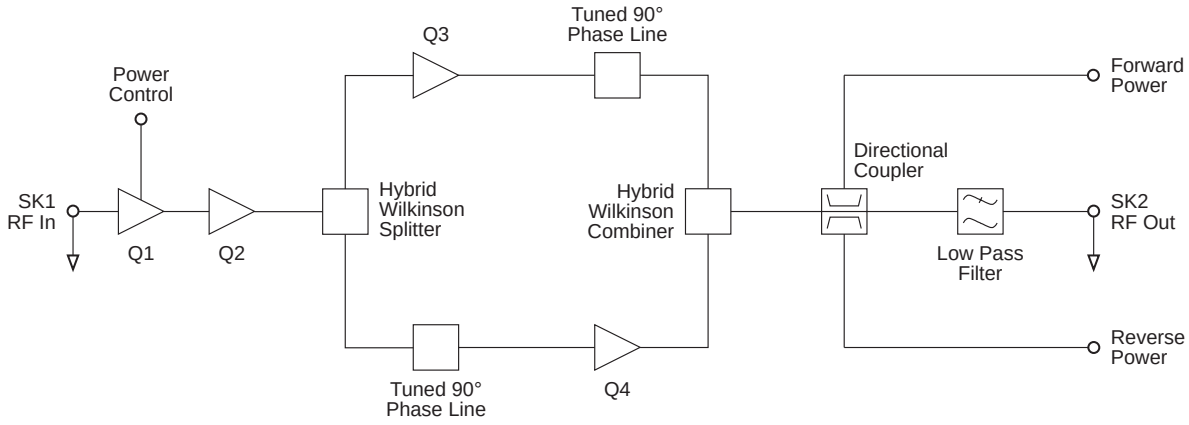

Figure 2.2 T828 RF Circuitry Block Diagram

The driver stage of the T828 consists of a two-stage transistor amplifier (Q1, Q2) which delivers 20W. This signal is split via a hybrid Wilkinson splitter (L220, L221) and used to drive the two final amplifiers (Q3, Q4). The outputs from the finals are combined with a hybrid Wilkinson combiner (L250, L251) and passed to the antenna socket via a directional coupler and a low pass filter.

The directional coupler senses forward and reflected power, which is rectified (D201, D200) and passed to the control circuitry for metering, alarm and power control purposes.

Power control is via a series pass transistor (Q16), which controls the supply voltage on the collector of the driver transistor (Q1).

2.3 Control Circuitry

(Refer to the control section circuit diagram in Section 5.)

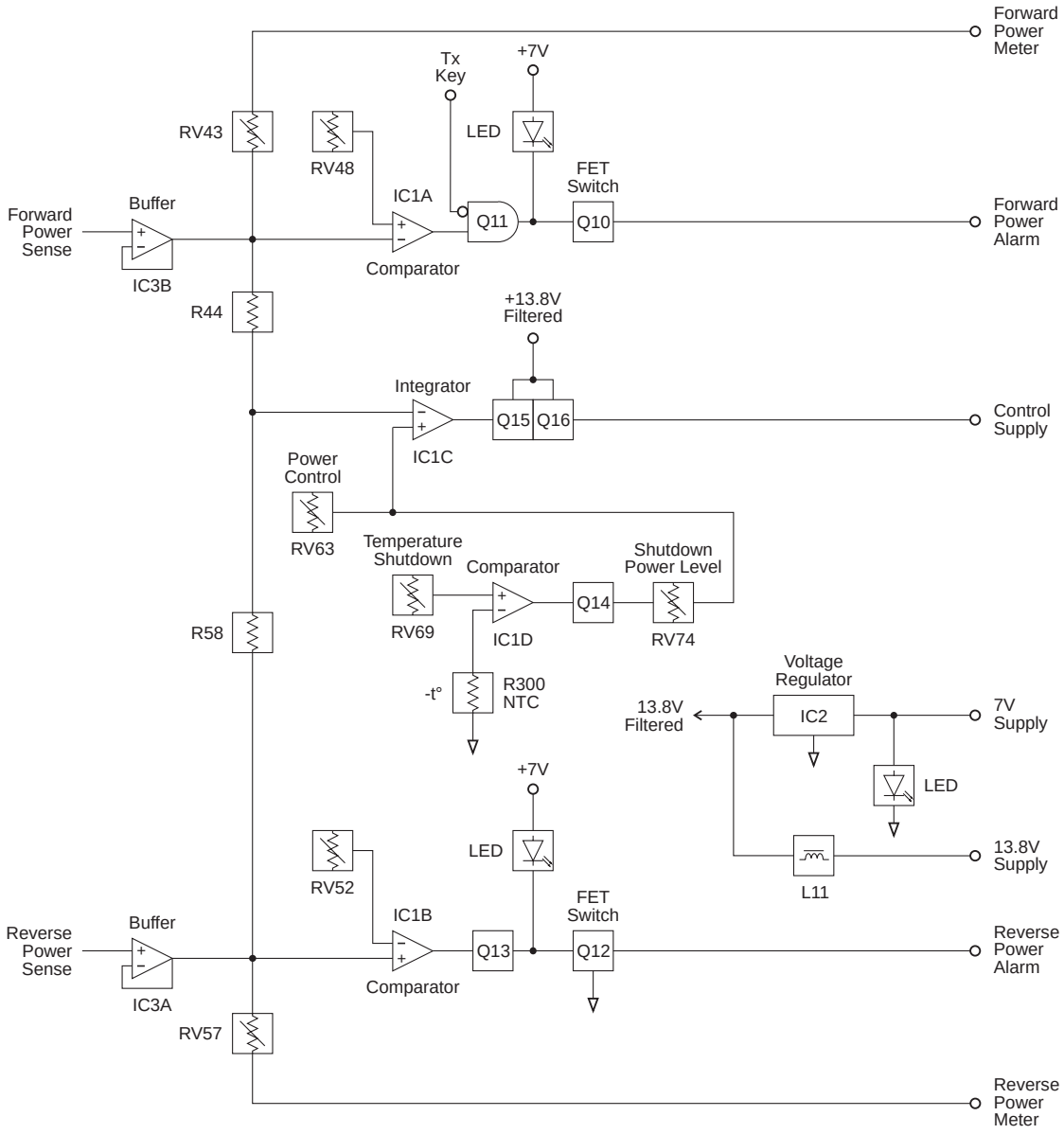

Figure 2.3 T828 Control Circuitry Block Diagram

2.3.1 Power Control

The DC voltages from the directional coupler representing forward and reflected power are buffered by the voltage followers IC3b and IC3a respectively. Their outputs are summed at an integrator (IC1c), which drives the series pass control element (Q16).

Forward and reflected power are summed so that, under high output VSWR, the power control turns the PA down. This is because the control loop adjusts for the same DC voltage from the directional coupler that would have been present if there were no reflected power.

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.

A thermistor controlled voltage divider (R68, R300) applies a voltage to a comparator with hysteresis (IC1d). The threshold of the comparator is independently set by RV69. This sets the shutdown temperature.

The output from the comparator and driver Q14 is summed into the power control network via RV74 so that the power level to which the PA must turn down may 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 alarm outputs are open drain configuration and are low under normal conditions (i.e. forward and reverse power levels are normal).

IC1a and IC1b form comparators with thresholds adjusted via RV48 (forward power) and RV52 (reverse power) respectively. The inputs are from the forward and reverse power signals from the directional coupler, buffered by IC3b and IC3a. Thus, the power levels at which the forward and reverse power alarms are triggered are defined by RV48 and RV52 respectively.

2.3.4 Forward And Reverse Power Metering

Forward and reverse power signals from buffers IC3b and IC3a are available for metering purposes. The output currents are adjustable via RV43 (forward power) and RV57 (reverse power).

