Circuit Analysis of JAGUAR700M 800MHz Transmitter Block (TM-0266LL)

1. Transmitter Circuit

The Transmitter Circuit consists of one Class-A Amplifier TR601 and TR602, Pre-Driver IC101, PA Module IC102, RF Amplifier TR101, Automatic Power Control Circuit (TR104- TR106), Antenna Switch (CD103, CD105-CD108), Low Pass Filter (Micro Strip Line and C135-C144).

1-1. Class-A Amplifier

The 806-825MHz and 851-870MHz RF input from Synthesizer output of P302 is applied to attenuator of R332-R334 the through amplifier of TR305 through an Attenuator pad R301-R303. RF input level is about -4dBm, that is amplified to +4dBm by TR601. And TP101 (output of Attenuator (R617-R618)) is amplified by TR602 to +5dBm. Those amplifiers are controlled by TXENB+.

1-2. Pre-Driver

The output of TR602 is applied to the Pre-Driver IC101 through an attenuator R617-R619. The output of TP102 is also amplified to about 400mW by IC101. This is controlled by TXENB+. The Pre-Driver consists of three stages RF amplifier. The first and second stages in IC101 are operated in Class-B. The third stage in IC101 is operated in Class-C.

1-3. PA Modules

The output of IC101 is applied to the PA Module IC102 through an attenuator R102-R104. The output of TP104 is amplified to about 13W. The PA Module consists of three stages RF amplifier. Power control circuit controls the first stage power supply voltage. The second and third stage power supply voltages are supplied by B_A+ via TR107. The first and second RF amplifiers are operated in Class-B. The third RF amplifier is operated in Class-C.

1-4. POWER Amplifier

The input (about 13W) of the RF Amplifier is amplified to 35W.
Power Supply voltage for the RF Amplifier is connected with through L104.

1-5. Automatic Power Control

The Automatic Power Control circuit samples the output power to the antenna to maintain a constant power level across the band. Also, a Thermistor circuit (TR104 and RT101) senses the PA Transistor temperature to reduce the power level when the temperature is above +110°C. The Automatic Power Control circuit controls the supply voltage to the first stage in PA Module IC102. Directional coupler provides a sample of transmit power for diode CD102. Diode CD102 produces a positive DC voltage proportional to the transmitter circuit output power level. When above VSWR 3, reflect coupler provides a sample of reflection power for diode CD101. Diode CD101 and CD102 produce voltages are summed, then that is compared to APCREF (D/A Voltage) from by the amplifier TR104. The collector of TR104 is applied to DC amplifier TR105 and TR106, then the output voltage of TR106 controls to the first stage of PA Module.

1-6. Antenna Switch and Low Pass Filter

The Antenna Switch consists of CD103, CD105-CD108, and the Low Pass Filter consists of micro strip line and C135-C144. During transmit, TXENB+ line from SYSTEM CONTROL UNIT is high level. Transistor TR604 turns on supply +9VT to the Class-A Amplifier and Pre-Driver, Automatic Power Control circuit and PIN diode Antenna Switch CD103, CD105-CD108. When transmitting, the Antenna Switch diode is low impedance.