

The RF Line

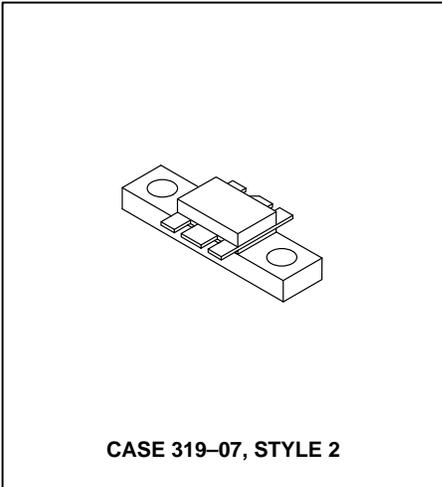
NPN Silicon

RF Power Transistor



The TP3034 is designed for 960 MHz cellular radio base stations in both analog and digital applications. It incorporates high value emitter ballast resistors, gold metallizations and offers a high degree of reliability and ruggedness.

- Specified 24 Volts, 960 MHz Characteristics
 - Output power — 35 Watts
 - Gain — 7 dB Min
 - Efficiency — 50% Min
- Class AB Operation
- Circuit board photomaster available upon request by contacting RF Tactical Marketing in Phoenix, AZ.



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CER}	40	Vdc
Collector–Base Voltage	V_{CBO}	48	Vdc
Emitter–Base Voltage	V_{EBO}	3.5	Vdc
Collector Current — Continuous	I_C	4	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	76 0.43	Watts W/ $^\circ\text{C}$
Storage Temperature Range	T_{stg}	– 65 to +150	$^\circ\text{C}$
Operating Junction Temperature	T_J	200	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.3	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 50\text{ mA}$, $R_{BE} = 75\ \Omega$)	$V_{(BR)CER}$	40	—	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 50\text{ mA}$)	$V_{(BR)CBO}$	48	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 6\text{ mA}$, $I_C = 0$)	$V_{(BR)EBO}$	3.5	—	—	Vdc
Collector–Emitter Leakage ($V_{CE} = 26\text{ V}$, $I_C = 1\text{ A}$, $R_{BE} = 75\ \Omega$)	I_{CER}	—	—	10	mA

ON CHARACTERISTICS

DC Current Gain ($I_C = 1\text{ Adc}$, $V_{CE} = 10\text{ Vdc}$)	h_{FE}	15	—	100	—
--	----------	----	---	-----	---

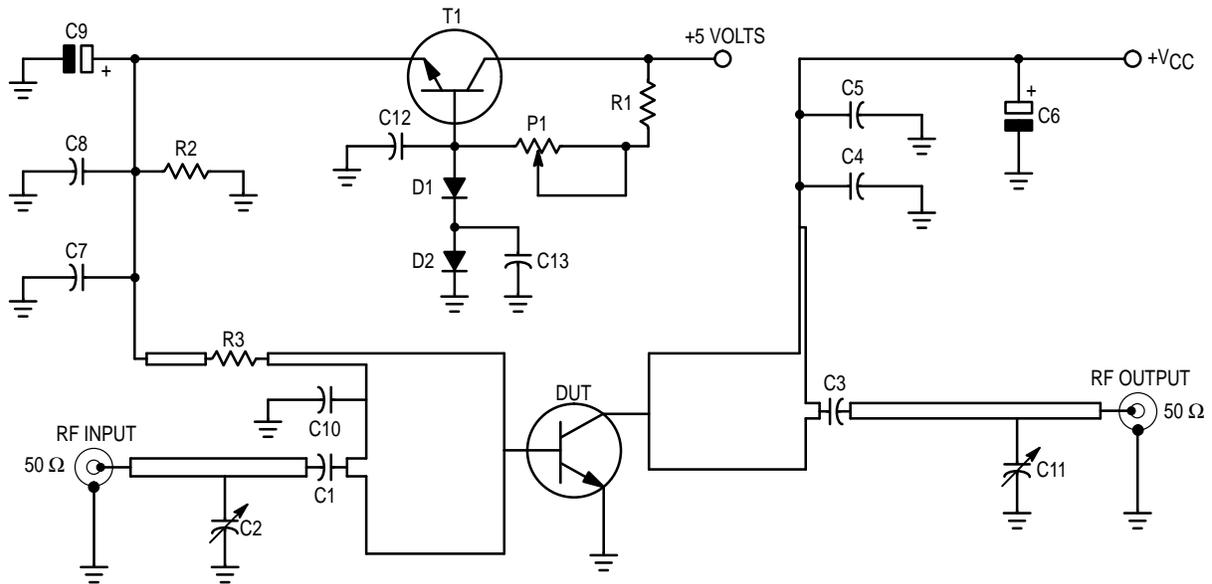
DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 24\text{ Vdc}$, $I_E = 0$, $f = 1\text{ MHz}$)	C_{ob}	—	40	—	pF
---	----------	---	----	---	----

(continued)

ELECTRICAL CHARACTERISTICS — continued ($T_C = 25^\circ\text{C}$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
FUNCTIONAL TESTS					
Common-Emitter Amplifier Gain ($P_{out} = 35\text{ W}$, $I_{CQ} = 60\text{ mA}$, $V_{CC} = 24\text{ V}$, $f = 960\text{ MHz}$)	G_{p1}	7	8	—	dB
Collector Efficiency ($P_{out} = 35\text{ W}$, $V_{CC} = 24\text{ V}$, $f = 960\text{ MHz}$)	η_{c1}	50	55	—	%
Load Mismatch ($P_{out} = 35\text{ W}$, $I_{CQ} = 60\text{ mA}$, $V_{CC} = 24\text{ V}$, $f = 960\text{ MHz}$, Load VSWR = 20:1, All Phase Angles at frequency of test)	ψ	—	No Degradation in Output Power		
Input Return Loss ($P_{out} = 35\text{ W}$, $I_{CQ} = 60\text{ mA}$, $V_{CC} = 24\text{ V}$, $f = 960\text{ MHz}$)	IRL	12	—	—	dB
Common-Emitter Amplifier Gain ($P_{out} = 15\text{ W}$, $I_{CQ} = 100\text{ mA}$, $V_{CC} = 25\text{ V}$, $f = 960\text{ MHz}$)	G_{p2}	8	—	—	dB
Collector Efficiency ($P_{out} = 15\text{ W}$, $I_{CQ} = 100\text{ mA}$, $V_{CC} = 25\text{ V}$, $f = 960\text{ MHz}$)	η_{c2}	40	—	—	%



- | | | | |
|------------------|---|--------|------------------------------|
| C1, C3 | 100 pF, ATC Chip Capacitor 100A | D1, D2 | Diode, Type BAS16 |
| C2, C11 | 0.5–20 pF, Trimmer Capacitor | P1 | 1 k Ω , Trimmer |
| C4, C7 | 330 pF, Chip Capacitor 0805 | R1 | 1 k Ω , Resistor 0805 |
| C5, C6, C12, C13 | 10 nF, Chip Capacitor 0805 | R2 | 56 Ω , Resistor 0805 |
| C6 | 4.7 μF , 50 Volts, Capacitor | R3 | 2.2 Ω , Resistor 0805 |
| C9 | 10 μF , 16 Volts, Capacitor | T1 | Transistor, NPN Type MJD31C |
| C10 | 5.6 pF, ATC Chip Capacitor 100A | | |

Figure 1. 960 MHz Electrical Schematic

TYPICAL CHARACTERISTICS

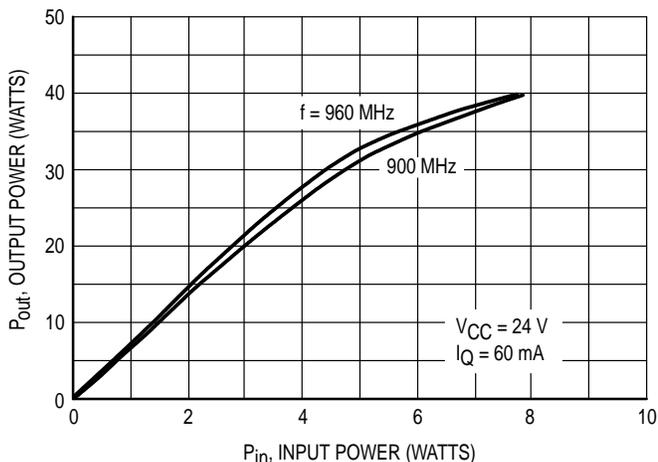


Figure 2. Output Power versus Input Power

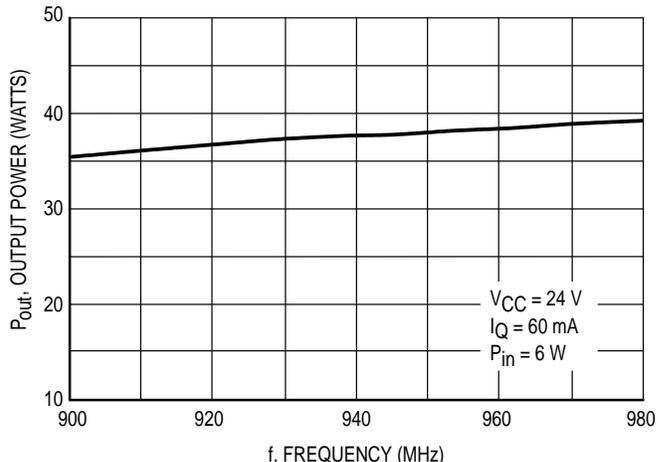


Figure 3. Output Power versus Frequency

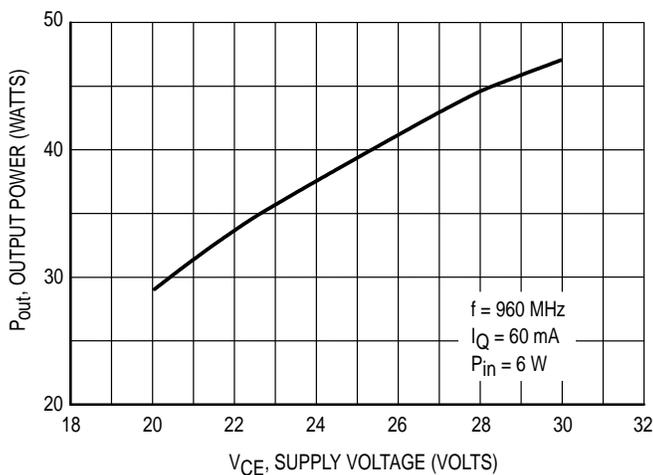
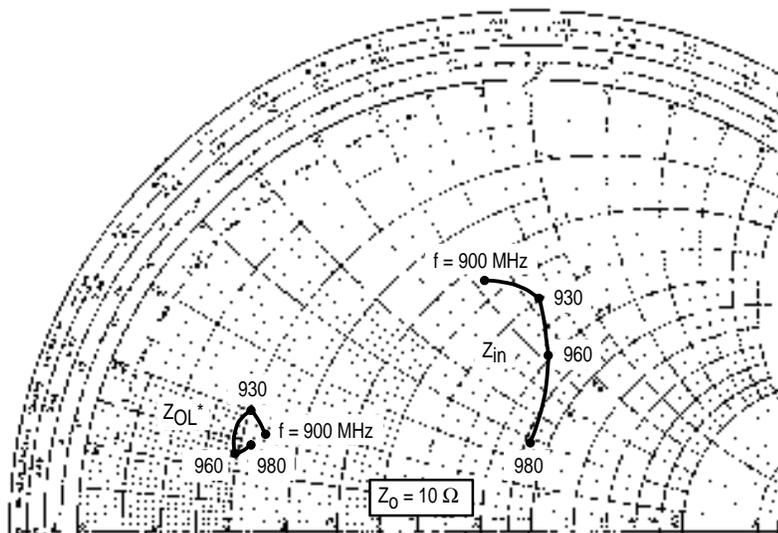


Figure 4. Output Power versus Supply Voltage



V _{CE} = 24 V		P _{out} = 35 W
f (MHz)	Z _{in} (Ω)	Z _{OL} * (Ω)
900	4.5 + j7.4	2.4 + j1.7
930	5.8 + j8.4	2 + j2
960	7.9 + j7.2	2 + j1.3
980	9.4 + j3.8	2.2 + j1.5

Z_{OL}* = Conjugate of optimum load impedance into which the device operates at a given output power, voltage, current and frequency.

Figure 5. Series Equivalent Input and Output Impedances

