

The RF Line NPN Silicon Power Transistor

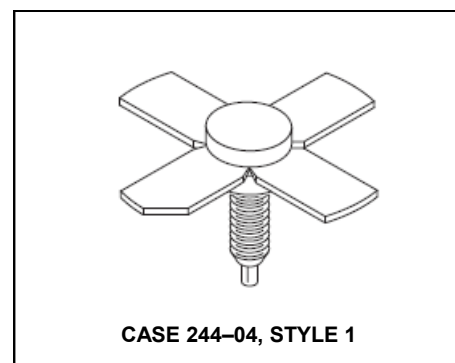
10W, 400MHz, 28V

Rev. V1

Designed primarily for wideband large-signal driver and predriver amplifier stages in 200–500 MHz frequency range.

- Guaranteed performance at 400 MHz, 28 Vdc
Output power = 10 W
Power gain = 12 dB min.
Efficiency = 50% min.
- 100% tested for load mismatch at all phase angles with 30:1 VSWR
- Gold metallization system for high reliability
- Computer-controlled wirebonding gives consistent input impedance

Product Image



MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CEO}	33	Vdc
Collector–Base Voltage	V_{CBO}	60	Vdc
Emitter–Base Voltage	V_{EBO}	4.0	Vdc
Collector Current — Continuous — Peak	I_C	1.1 1.5	Adc
Total Device Dissipation @ $T_A = 25^\circ\text{C}$ (1) Derate above 25°C	P_D	27 160	Watts mW/ $^\circ\text{C}$

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	6.4	$^\circ\text{C/W}$

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

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

OFF CHARACTERISTICS

Collector–Emitter Breakdown Voltage ($I_C = 20\text{ mAdc}$, $I_B = 0$)	$V_{(BR)CEO}$	33	—	—	Vdc
Collector–Emitter Breakdown Voltage ($I_C = 20\text{ mAdc}$, $V_{BE} = 0$)	$V_{(BR)CES}$	60	—	—	Vdc
Collector–Base Breakdown Voltage ($I_C = 20\text{ mAdc}$, $I_E = 0$)	$V_{(BR)CBO}$	60	—	—	Vdc
Emitter–Base Breakdown Voltage ($I_E = 2.0\text{ mAdc}$, $I_C = 0$)	$V_{(BR)EBO}$	4.0	—	—	Vdc
Collector Cutoff Current ($V_{CB} = 30\text{ Vdc}$, $I_E = 0$)	I_{CBO}	—	—	1.0	mAdc

ON CHARACTERISTICS

DC Current Gain ($I_C = 500\text{ mA}$, $V_{CE} = 5.0\text{ Vdc}$)	h_{FE}	20	—	80	—
--	----------	----	---	----	---

NOTE:

(continued)

- This device is designed for RF operation. The total device dissipation rating applies only when the device is operated as an RF amplifier.

The RF Line NPN Silicon Power Transistor

10W, 400MHz, 28V

Rev. V1

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

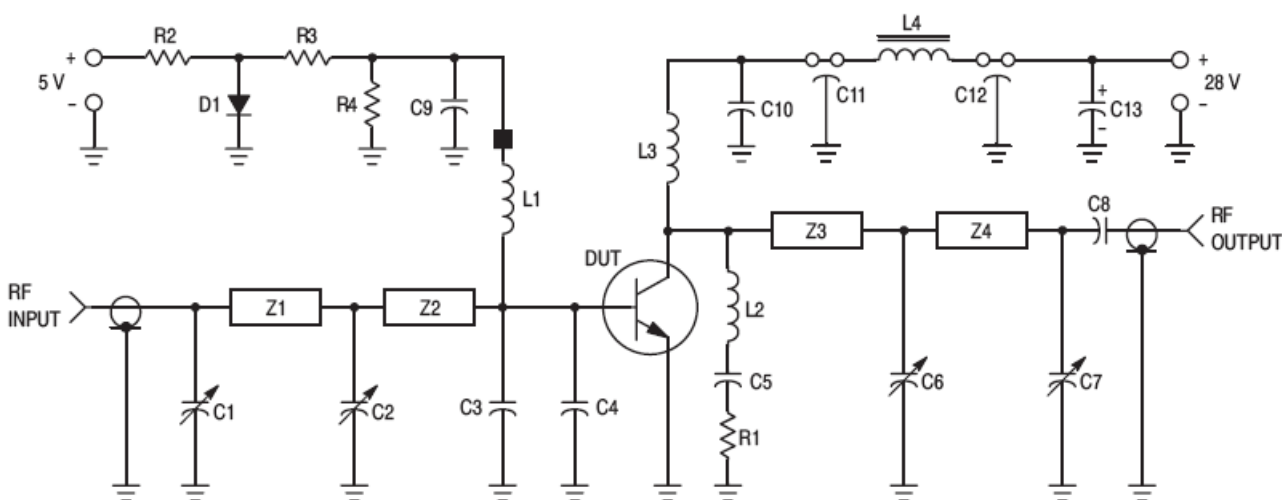
Characteristic	Symbol	Min	Typ	Max	Unit
----------------	--------	-----	-----	-----	------

DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 28\text{ Vdc}$, $I_E = 0$, $f = 1.0\text{ MHz}$)	C_{ob}	—	10	12	pF
---	----------	---	----	----	----

FUNCTIONAL TESTS (Figure 1)

Common-Emitter Amplifier Power Gain ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 10\text{ W}$, $f = 400\text{ MHz}$)	G_{pE}	12	13	—	dB
Collector Efficiency ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 10\text{ W}$, $f = 400\text{ MHz}$)	η	50	60	—	%
Load Mismatch ($V_{CC} = 28\text{ Vdc}$, $P_{out} = 10\text{ W}$, $f = 400\text{ MHz}$, VSWR = 30:1 all phase angles)	ψ	No Degradation in Output Power			



C1, C2, C3 — 1.0–20 pF Johanson Trimmer (JMC 5501)
 C3, C4 — 47 pF ATC Chip Capacitor
 C5, C10 — 0.1 μF Erie Redcap
 C7 — 0.5–10 pF Johanson Trimmer (JMC 5201)
 C8 — 0.018 μF Vitramon Chip Capacitor
 C9 — 200 pF UNELCO Capacitor
 C11, C12 — 680 pF Feedthru
 C13 — 1.0 μF , 50 Volt Tantalum Capacitor
 D1 — 1N4001
 L1 — 0.33 μH Molded Choke with Ferroxcube Bead
 (Ferroxcube 56–590–65/4B) on Ground End of Coil
 L2 — 4 Turns #20 Enamel, 1/8" ID

L3 — 6 Turns #20 Enamel, 1/4" ID
 L4 — Ferroxcube VK200–19/4B
 R1 — 5.1 Ω , 1/4 Watt
 R2 — 120 Ω , 1.0 Watt
 R3 — 20 Ω , 1/2 Watt
 R4 — 47 Ω , 1/2 Watt
 Z1 — Microstrip 0.1" W x 1.35" L
 Z2 — Microstrip 0.1" W x 0.55" L
 Z3 — Microstrip 0.1" W x 0.8" L
 Z4 — Microstrip 0.1" W x 1.75" L
 Board — Glass Teflon, $\epsilon_R = 2.56$, $t = 0.062"$
 Input/Output Connectors — Type N

Figure 1. 400 MHz Test Circuit Schematic

The RF Line NPN Silicon Power Transistor 10W, 400MHz, 28V

Rev. V1

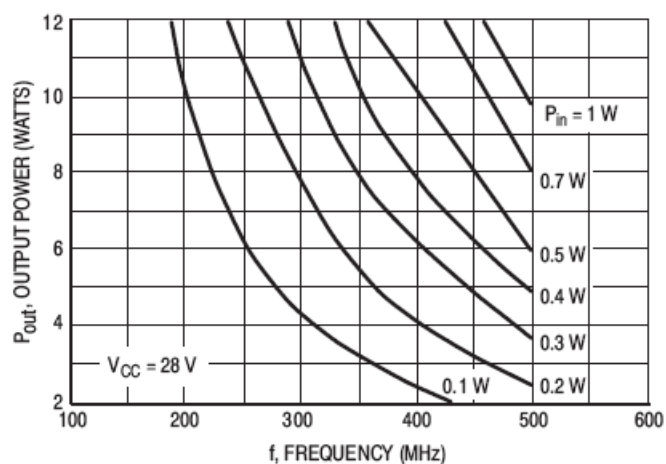


Figure 2. Output Power versus Frequency

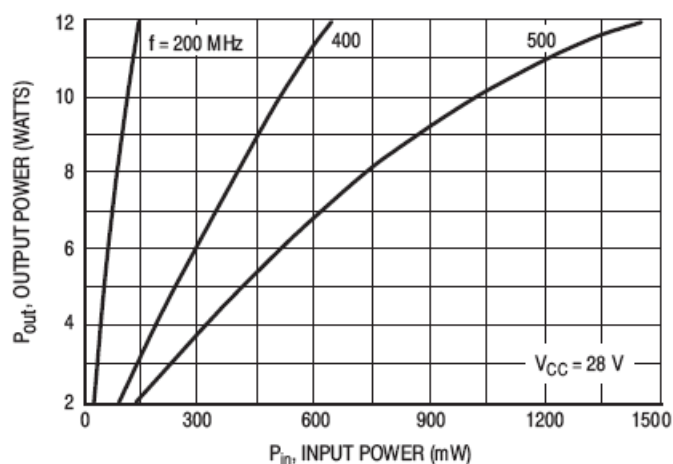


Figure 3. Output Power versus Input Power

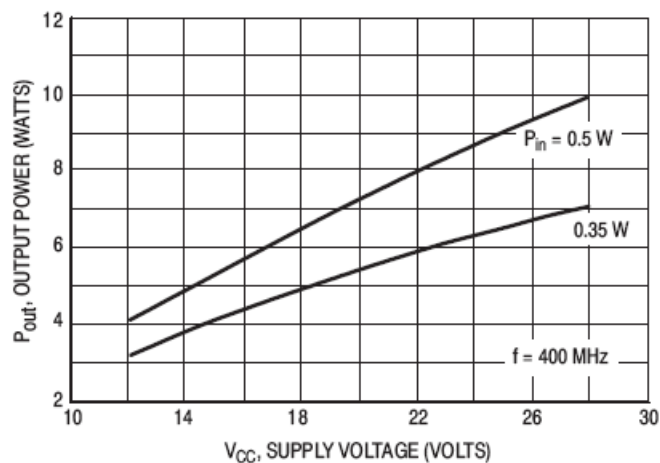


Figure 4. Output Power versus Supply Voltage

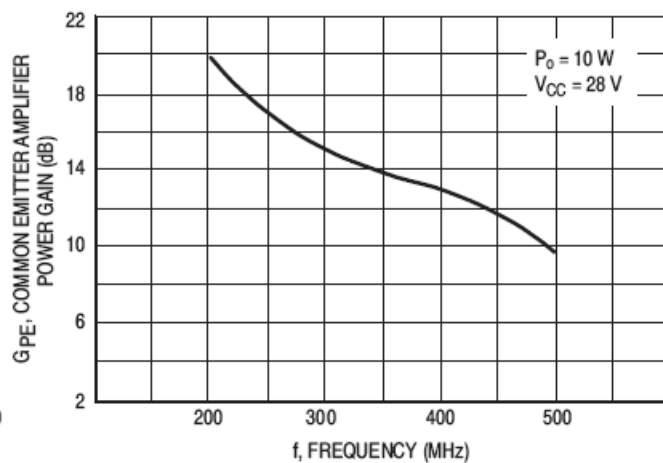


Figure 5. Power Gain versus Frequency

The RF Line NPN Silicon Power Transistor 10W, 400MHz, 28V

Rev. V1

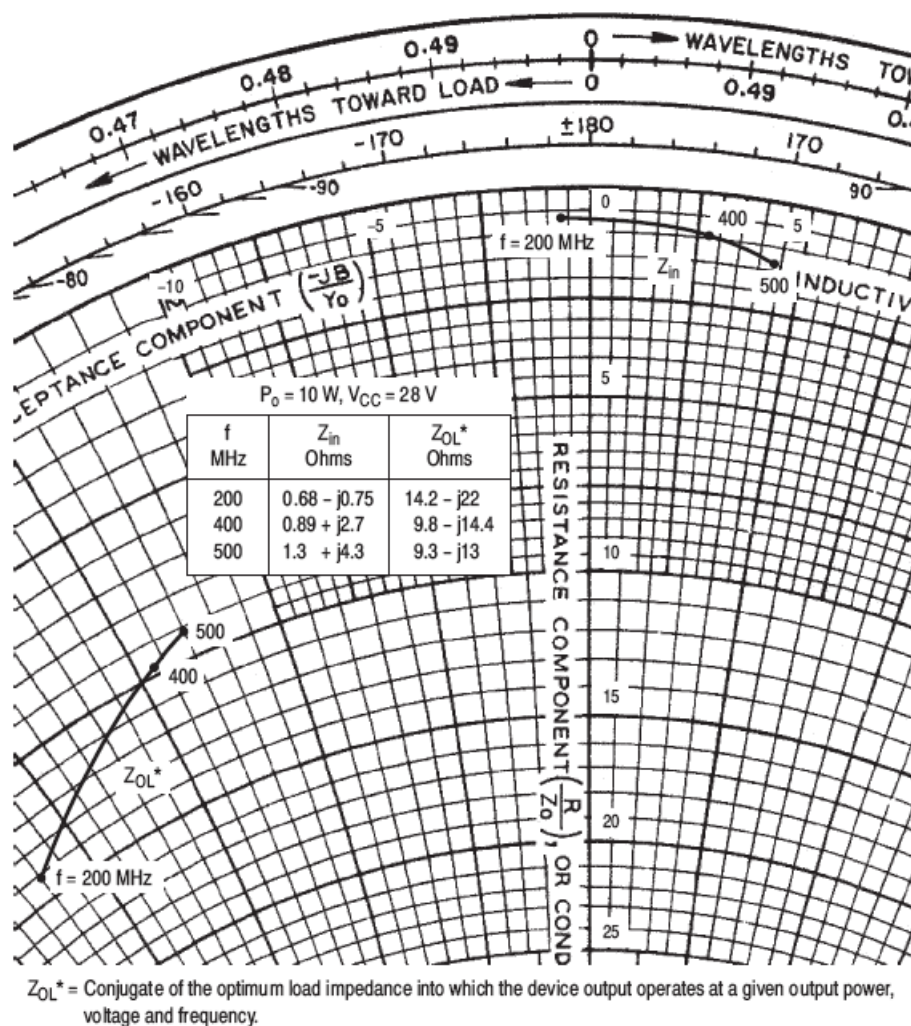
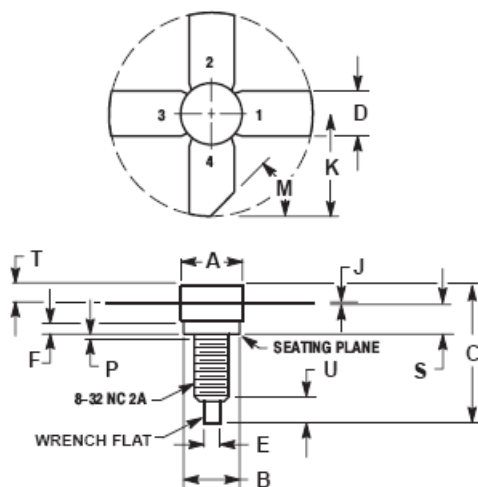


Figure 6. Series Equivalent Impedance

The RF Line NPN Silicon Power Transistor 10W, 400MHz, 28V

Rev. V1

PACKAGE DIMENSIONS



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	7.06	7.26	0.278	0.286
B	6.20	6.50	0.244	0.256
C	14.99	16.51	0.590	0.650
D	5.46	5.96	0.215	0.235
E	1.40	1.65	0.055	0.065
G	1.52	---	0.060	---
J	0.08	0.17	0.003	0.007
K	11.05	---	0.435	---
M	45° NOM		45° NOM	
P	---	1.27	---	0.050
S	3.00	3.25	0.118	0.128
T	1.40	1.77	0.055	0.070
U	2.92	3.68	0.115	0.145

STYLE 1:
PIN 1. EMITTER
2. BASE
3. EMITTER
4. COLLECTOR

CASE 244-04
ISSUE J

The RF Line NPN Silicon Power Transistor 10W, 400MHz, 28V

Rev. V1

M/A-COM Technology Solutions Inc. All rights reserved.

Information in this document is provided in connection with M/A-COM Technology Solutions Inc ("MACOM") products. These materials are provided by MACOM as a service to its customers and may be used for informational purposes only. Except as provided in MACOM's Terms and Conditions of Sale for such products or in any separate agreement related to this document, MACOM assumes no liability whatsoever. MACOM assumes no responsibility for errors or omissions in these materials. MACOM may make changes to specifications and product descriptions at any time, without notice. MACOM makes no commitment to update the information and shall have no responsibility whatsoever for conflicts or incompatibilities arising from future changes to its specifications and product descriptions. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document.

THESE MATERIALS ARE PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, RELATING TO SALE AND/OR USE OF MACOM PRODUCTS INCLUDING LIABILITY OR WARRANTIES RELATING TO FITNESS FOR A PARTICULAR PURPOSE, CONSEQUENTIAL OR INCIDENTAL DAMAGES, MERCHANTABILITY, OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT. MACOM FURTHER DOES NOT WARRANT THE ACCURACY OR COMPLETENESS OF THE INFORMATION, TEXT, GRAPHICS OR OTHER ITEMS CONTAINED WITHIN THESE MATERIALS. MACOM SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, LOST REVENUES OR LOST PROFITS, WHICH MAY RESULT FROM THE USE OF THESE MATERIALS.

MACOM products are not intended for use in medical, lifesaving or life sustaining applications. MACOM customers using or selling MACOM products for use in such applications do so at their own risk and agree to fully indemnify MACOM for any damages resulting from such improper use or sale.