

DESCRIPTION

2SC3804 is a silicon NPN epitaxial planar-type transistor specifically designed for power amplifiers in the 800 ~ 900MHz band range.

FEATURES

- High gain, high efficiency
 $P_O \geq 40W$, $G_{pe} \geq 3.0dB$, $\eta_C = 50\%$ (MIN)
 $@f = 850MHz$, $V_{CC} = 13.5V$, $P_{in} = 20W$
- Emitter ballasted by diffusion resistance.
- Gold metalization of transistor die for good reliability.
- The ability withstand infinite VSWR when operated at $P_O = 40W$, $V_{CC} = 15.2V$.
- High Input-Impedance Transistor (HI^2T); internal input matching network.
- Common-base type.

APPLICATION

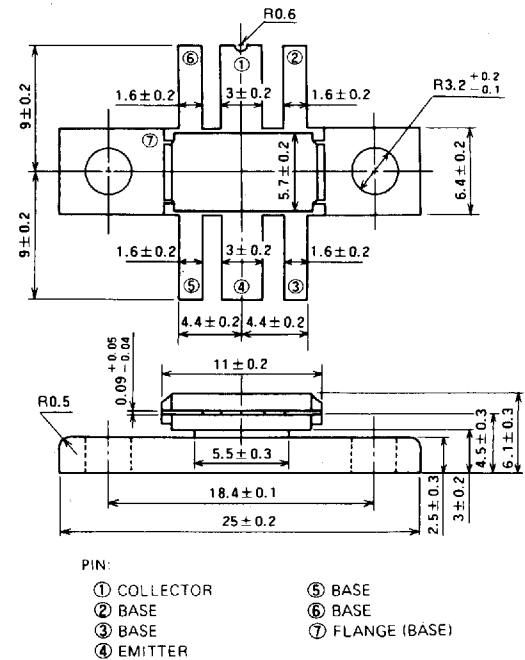
For RF power amplifiers in the 800 ~ 900MHz band range, especially suitable for mobile radio applications.

SERIES EQUIVALENT INPUT/OUTPUT IMPEDANCE

$Z_{in} = 1.4 - j2.4 (\Omega)$, $Z_{out} = 2.5 + j1.0 (\Omega)$ @ $f = 850MHz$,
 $V_{CC} = 13.5V$, $P_O = 40W$

OUTLINE DRAWING

Dimensions in mm



ABSOLUTE MAXIMUM RATINGS ($T_O = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector-to-base voltage		35	V
V_{EBO}	Emitter-to-base voltage		3	V
V_{CEO}	Collector-to-emitter voltage	$R_{BE} = \infty$	17	V
I_C	Collector current		12	A
P_C	Collector dissipation	$T_O = 25^\circ C$	100	W
T_j	Junction temperature		+ 175	$^\circ C$
T_{stg}	Storage temperature		-55 ~ + 175	$^\circ C$

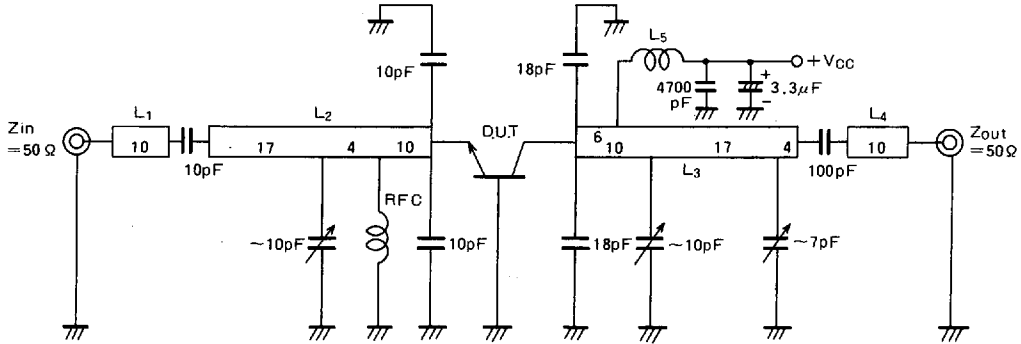
ELECTRICAL CHARACTERISTICS ($T_O = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter-to-base breakdown voltage	$I_E = 10mA$, $I_C = 0$	3			V
$V_{(BR)CBO}$	Collector-to-base breakdown voltage	$I_C = 10mA$, $I_E = 0$	35			V
$V_{(BR)CEO}$	Collector-to-emitter breakdown voltage	$I_C = 0.1A$, $R_{BE} = \infty$	17			V
I_{CBO}	Collector cutoff current	$V_{CB} = 15V$, $I_E = 0$			5	mA
I_{EBO}	Emitter cutoff current	$V_{EB} = 2V$, $I_C = 0$			5	mA
h_{FE}	DC forward current gain *	$V_{CE} = 10V$, $I_C = 1A$	10	40	120	—
P_O	Power output	$V_{CC} = 13.5V$, $P_{in} = 20W$, $f = 850MHz$	40	35		W
η_C	Collector efficiency		50	55		%

* Note: Pulse test, $P_w = 150\mu s$, duty = 5%

NPN EPITAXIAL PLANAR TYPE

TEST CIRCUIT ($f = 850\text{MHz}$)



$L_1 \sim L_4$: $W = 3\text{mm}$ STRIP-LINE

L_5 : 5D, 1T, 0P, 1.0φ SILVER PLATED COPPER WIRE.

RFC: 5D, 1/2T, 1.0φ SILVER PLATED COPPER WIRE.

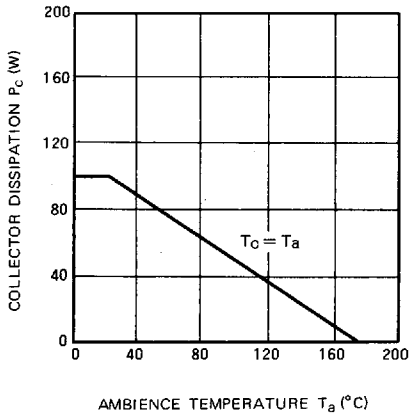
NOTE: BOARD MATERIAL-GLASS TEFLON. $\epsilon_s = 2.6$, $t = 0.8\text{mm}$.

D: INNER DIAMETER. T: TURN NUMBER. P: PITCH.

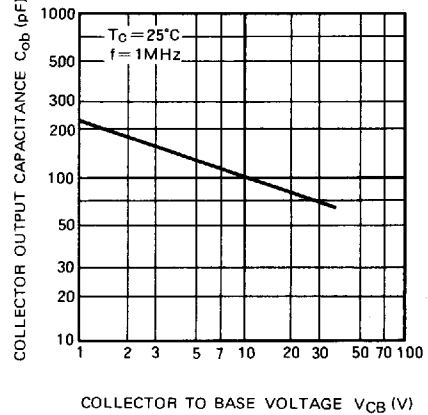
ALL DIMENSIONS IN mm.

TYPICAL PERFORMANCE DATA

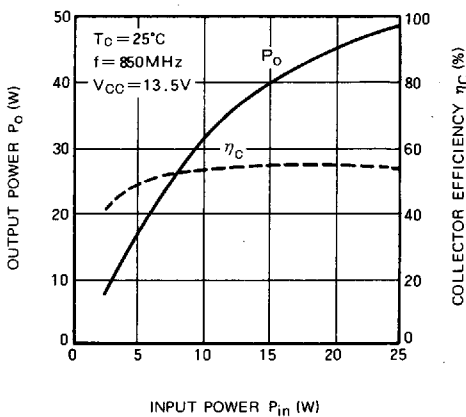
COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE



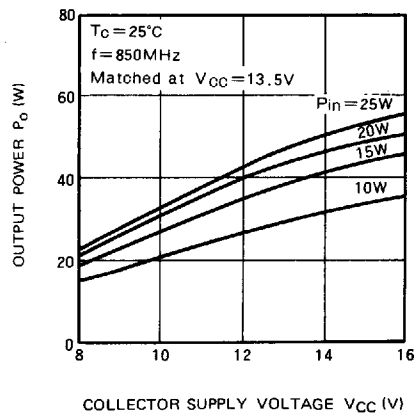
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE



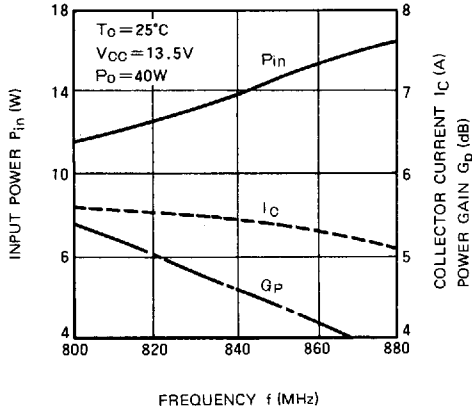
OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER



OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE



**INPUT POWER, POWER GAIN,
COLLECTOR CURRENT VS. FREQUENCY**



RECOMMENDATION AND PRECAUTION ON THE USE OF DEVICE

1. MOUNTING METHOD TO THE HEAT SINK

Mounting the device to the heat sink should be given a special consideration as follows.

Optimum distance between the centers of the installing bolt holes is 18.3 mm, and optimum diameter of this hole is 3.5 mm.

Apply a thin coat of thermal compound to every portions relating with the thermal conduction such as the flange bottom, the installing bolt holes etc.

Optimum tightening torque is 5 to 6 kg-cm.

Prevent the upward stress to the leads.

Soldering should be conducted at the temperature of 250°C or lower and within 8 seconds.

2. OPERATING JUNCTION TEMPERATURE $T_{j(op)}$

When designing the circuit, the thermal design should be performed so that the operating junction temperature $T_{j(op)}$ will be 130°C or lower even under the ambient temperature of 60°C .

3. BASE TO EMITTER BIAS RESISTANCE

Where a bias resistor is inserted between the base and the emitter for the device to operate in AB or C class, make the resistance's value as small as possible, (normally 5Ω or less). If the value is excessively large, reverse voltage will be applied to the emitter-base junction by this resistor when the drive power is large, and the emitter-base junction may be brought to avalanche breakdown by the drive power, resulting in the degradation of h_{FE} and output power.

4. GUARANTEED CHARACTERISTICS

All the graphic characteristics illustrated in this catalog are typical examples. The characteristics of individual device specified in Maximum ratings and Electrical characteristics are guaranteed under specified conditions.

5. DISPOSAL OF UNUSED DEVICES

The ceramic body of this transistor contains beryllium oxide (BeO). The dust or the vapor of BeO 's porcelain is hazardous if inhaled, so don't crush, grind or abrade this portion. And don't treat the package in the high temperature (over 800°C) damp atmosphere.