

DESCRIPTION

2SC3104 is a silicon NPN epitaxial planar type transistor specifically designed for UHF power amplifier applications.

FEATURES

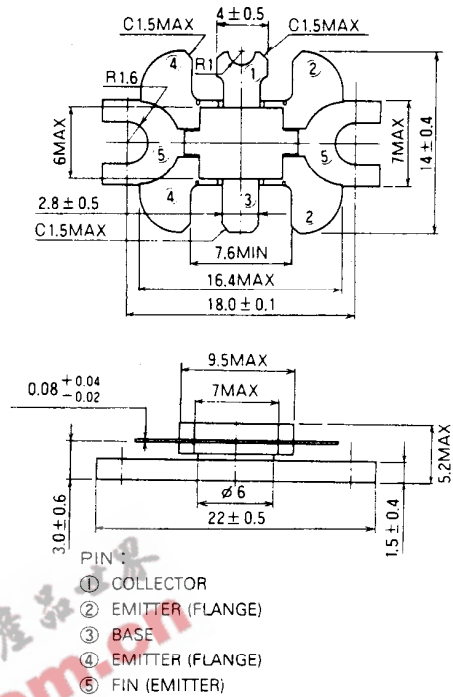
- High power gain: $G_{pe} \geq 4.7\text{dB}$
@ $V_{CC} = 7.2\text{V}$, $f = 520\text{MHz}$, $P_{in} = 2\text{W}$.
- Emitter ballasted construction.
- High ruggedness: Ability to withstand more than 20:1 load VSWR when operated at $V_{CC} = 9\text{V}$, $f = 520\text{MHz}$, $P_o = 6\text{W}$.
- Flange type ceramic package.
- $Z_{in} = 1.6 - j0.4 \Omega$, $Z_{out} = 3.5 - j1.0 \Omega$ at $V_{CC} = 7.2\text{V}$, $f = 520\text{MHz}$, $P_o = 6\text{W}$.

APPLICATION

For output stage of 5W power amplifiers in UHF band portable type radio set.

OUTLINE DRAWING

Dimensions in mm



T-31E

ABSOLUTE MAXIMUM RATINGS $(T_C = 25^\circ\text{C})$

Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector to base voltage		20	V
V_{EBO}	Emitter to base voltage		3.5	V
V_{CEO}	Collector to emitter voltage	$R_{BE} = \infty$	9	V
I_C	Collector current		3	A
P_C	Collector dissipation	$T_C = 25^\circ\text{C}$	20	W
T_J	Junction temperature		175	$^\circ\text{C}$
T_{stg}	Storage temperature		-55 to 175	$^\circ\text{C}$
R_{th-c}	Thermal resistance	Junction to case	7.5	$^\circ\text{C/W}$

Note. Above parameters are guaranteed independently.

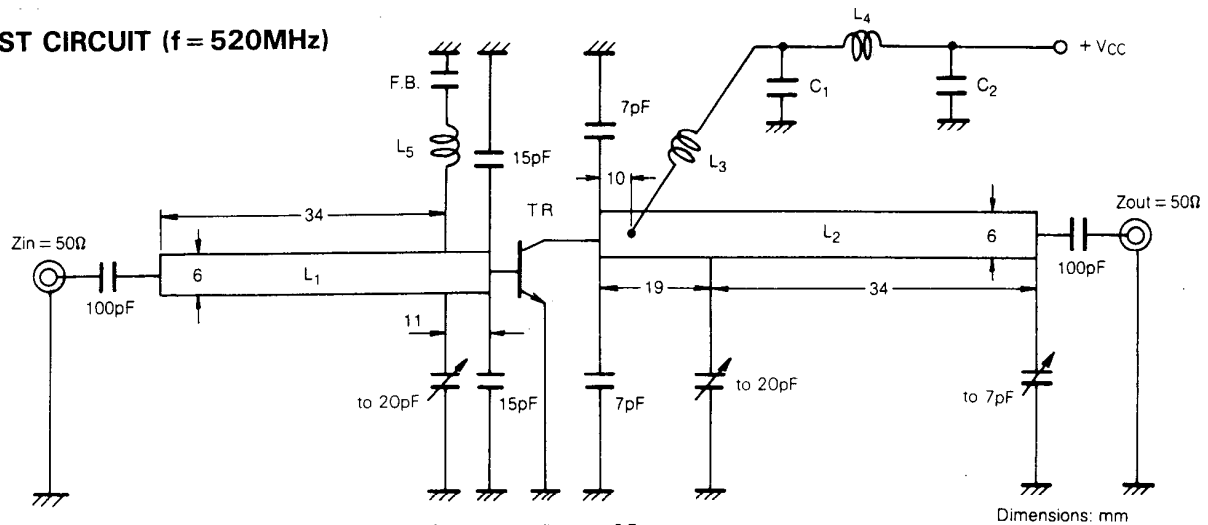
ELECTRICAL CHARACTERISTICS $(T_C = 25^\circ\text{C})$

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
V_{IBREBO}	Emitter to base breakdown voltage	$I_E = 5\text{mA}$, $I_C = 0$	3.5			V
V_{IBRCBO}	Collector to base breakdown voltage	$I_C = 10\text{mA}$, $I_E = 0$	20			V
$V_{IBRICEO}$	Collector to emitter breakdown voltage	$I_C = 50\text{mA}$, $R_{BE} = \infty$	9			V
I_{CBO}	Collector cut off current	$V_{CB} = 10\text{V}$, $I_E = 0$			500	μA
I_{EBO}	Emitter cut off current	$V_{EB} = 2\text{V}$, $I_C = 0$			500	μA
h_{FE}	DC forward current gain *	$V_{CE} = 5\text{V}$, $I_C = 0.1\text{A}$	10	50	180	—
P_O	Power Output	$V_{CC} = 7.2\text{V}$, $P_{in} = 2\text{W}$, $f = 520\text{MHz}$	6	7		W
η_C	Collector efficiency		60	65		%

Note. * Pulse test, $P_W = 150\mu\text{s}$, duty = 5%.

Above parameters, limits and conditions are subject to change.

TEST CIRCUIT ($f = 520\text{MHz}$)

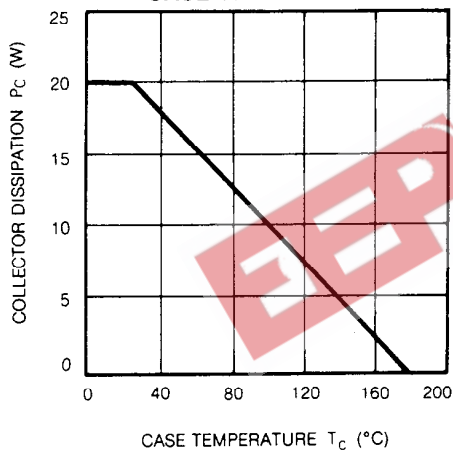


L_1, L_2 : Microstrip: Board Material 1.6mm Thick, glass-terfon $\epsilon_r = 2.7$
 L_3 : 3 Turns AWG #20, 5mm I.D.
 L_4 : 6 Turns AWG #20, 5mm I.D.
 L_5 : 10 Turns AWG #26 Enameled Wire on 4mm O.D., 14mm Length Bakelite.

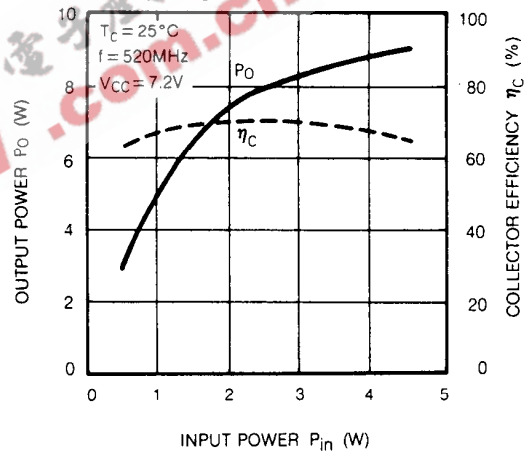
F.B.: Ferrite Bead
 C_1 : 82pF, 220pF, 4700pF, 10 μ F in parallel.
 C_2 : 82pF, 220pF, 10 μ F in parallel.

TYPICAL PERFORMANCE DATA

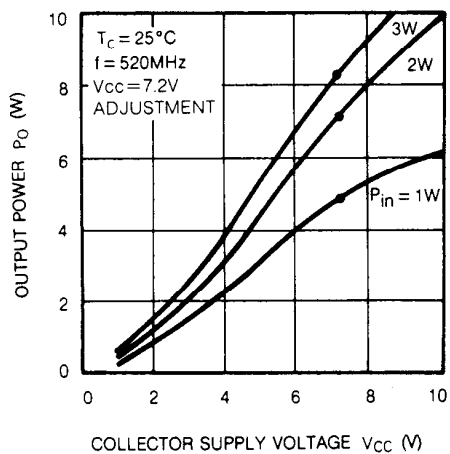
COLLECTOR DISSIPATION VS. CASE TEMPERATURE



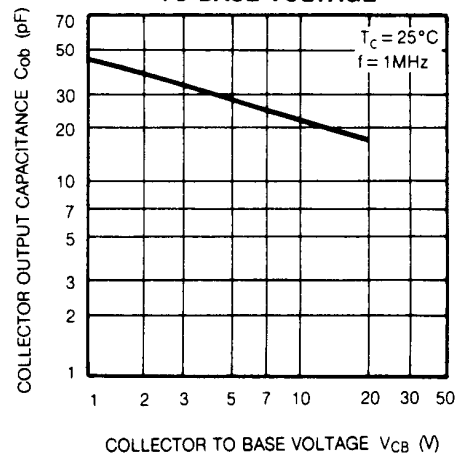
OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER



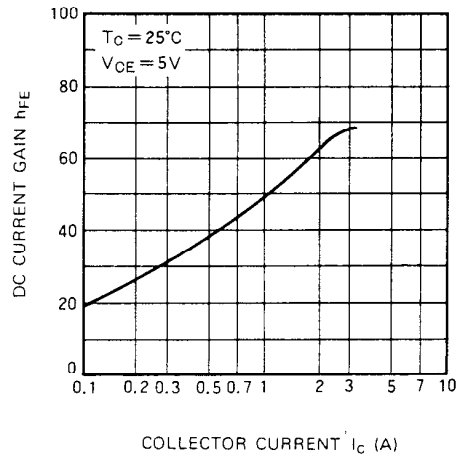
OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE



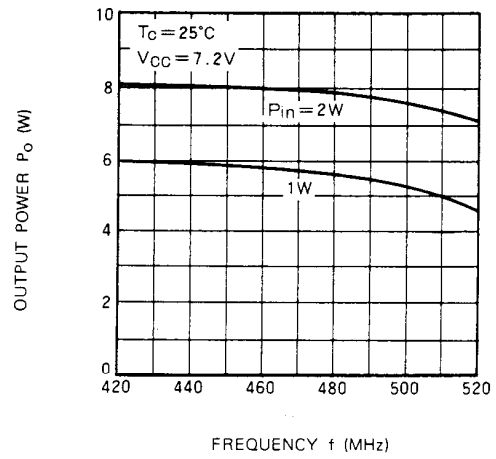
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE



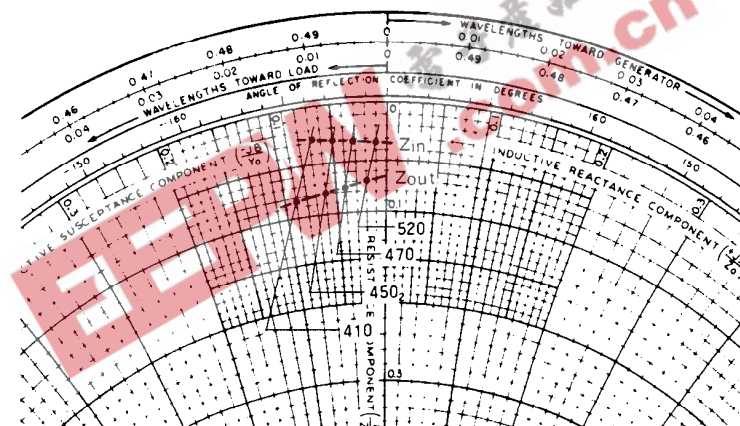
**DC CURRENT GAIN VS.
COLLECTOR CURRENT**



**OUTPUT POWER VS.
FREQUENCY**



INPUT/OUTPUT IMPEDANCE



f (MHz)	$Z_{in}(\Omega)$	$Z_{ot}(\Omega)$
410	$1.4 - j3.0$	$4.0 - j4.4$
450	$1.4 - j2.2$	$3.8 - j3.0$
470	$1.5 - j1.5$	$3.6 - j2.0$
520	$1.6 - j0.4$	$3.5 - j1.0$

$V_{CC} = 7.2\text{V}$, $P_o = 6\text{W}$