MITSUBISHI RF POWER TRANSISTOR

2SC3404

NPN EPITAXIAL PLANAR TYPE

DESCRIPTION

2SC3404 is a silicon NPN epitaxial planar type transistor specifically designed for VHF power amplifier applications.

FEATURES

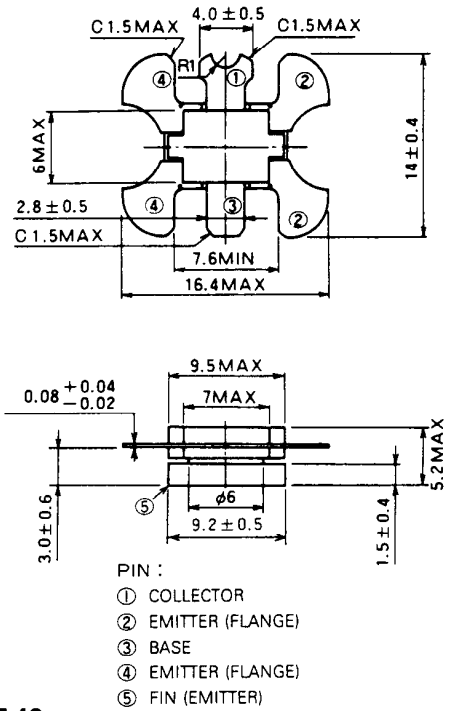
- High power gain: $G_{pe} \geqq 12.7$dB. @V_{CC} = 7.2V, f = 175MHz, P_{in} = 80mW.
- Emitter ballasted construction.
- High ruggedness: Ability to withstand more than 20:1 load VSWR when operated at V_{CC} = 9V, f = 175MHz, P_O = 1.5W, T_C = 25°C.
- Flange type ceramic package.

APPLICATION

For output stage of 1W power amplifiers in VHF band portable type radio sets.

OUTLINE DRAWING

Dimensions in mm



PIN :
① COLLECTOR
② EMITTER (FLANGE)
③ BASE
④ EMITTER (FLANGE)
⑤ FIN (EMITTER)

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ABSOLUTE MAXIMUM RATINGS (T_C = 25°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} = ∞	9	V
I_C	Collector current		1	A
P_C	Collector dissipation	T_C = 25°C	5	W
T_j	Junction temperature		175	°C
Tstg	Storage temperature		−55 to 175	°C

Note. Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS (T_C = 25°C)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter to base breakdown voltage	I_E = 1mA, I_C = 0	3.5			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	I_C = 10mA, I_E = 0	20			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	I_C = 10mA, R_{BE} = ∞	9			V
I_{CBO}	Collector cut off current	V_{CB} = 10V, I_E = 0			200	μA
I_{EBO}	Emitter cut off current	V_{EB} = 2V, I_C = 0			200	μA
h_{FE}	DC forward current gain *	V_{CE} = 5V, I_C = 0.1A	10	50	180	–
P_O	Power Output	V_{CC} = 7.2V, Pin = 80mW, f = 175MHz	1.5	1.7		W
η_C	Collector efficiency		55	60		%

Note. * Pulse test, P_W = 150μs, duty = 5%.
Above parameters, ratings, limits and conditions are subject to change.

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MITSUBISHI ELECTRIC

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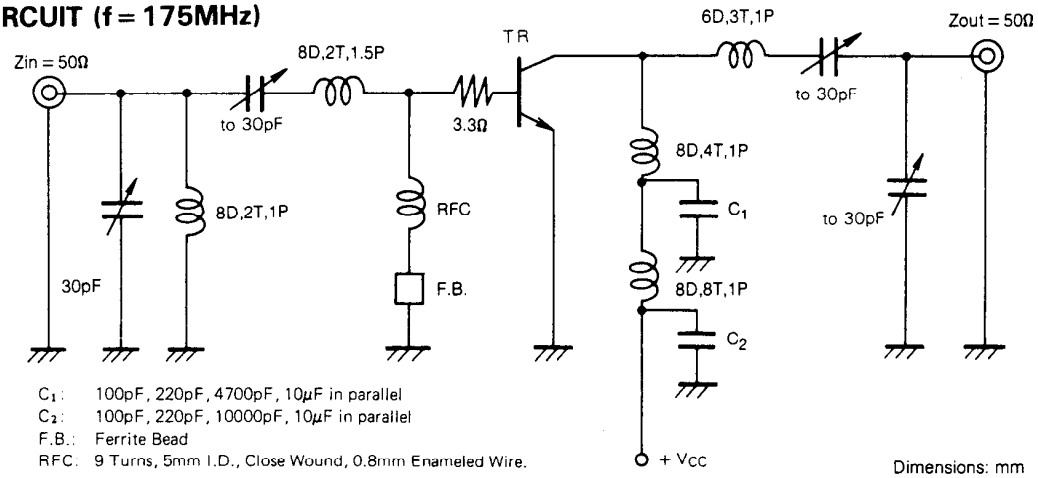
TEST CIRCUIT (f = 175MHz)



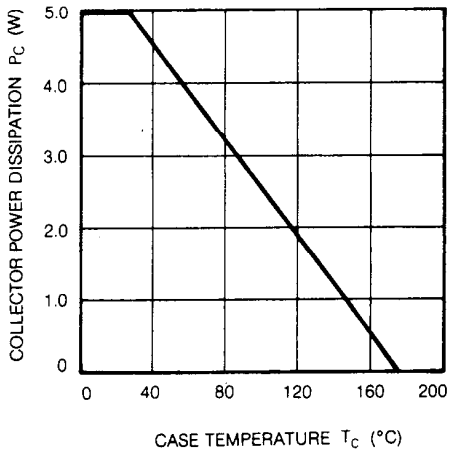
C_1: 100pF, 220pF, 4700pF, 10μF in parallel
C_2: 100pF, 220pF, 10000pF, 10μF in parallel
F.B.: Ferrite Bead
RFC: 9 Turns, 5mm I.D., Close Wound, 0.8mm Enameled Wire.

Note: 1.5mmϕ. Silvered Wire without FRC.
D: Inner diameter of coil, T: Turn number of coil, P: Pitch of coil

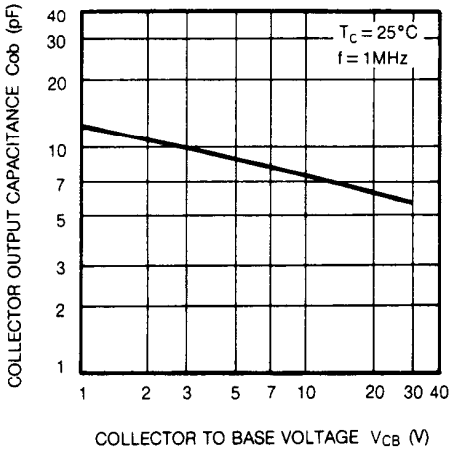
Dimensions: mm

TYPICAL PERFORMANCE DATA

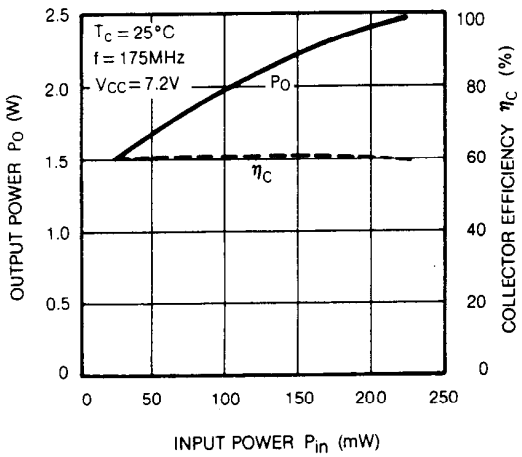
COLLECTOR POWER DISSIPATION VS. CASE TEMPERATURE



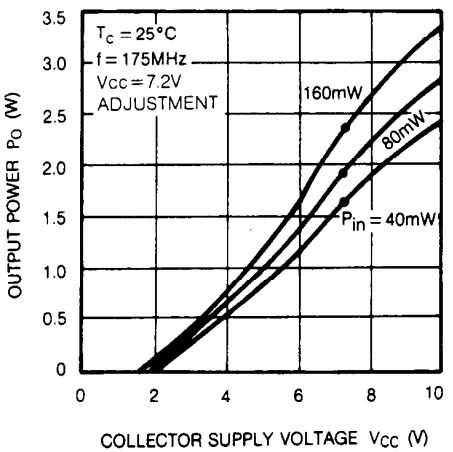
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE



OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER



OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE



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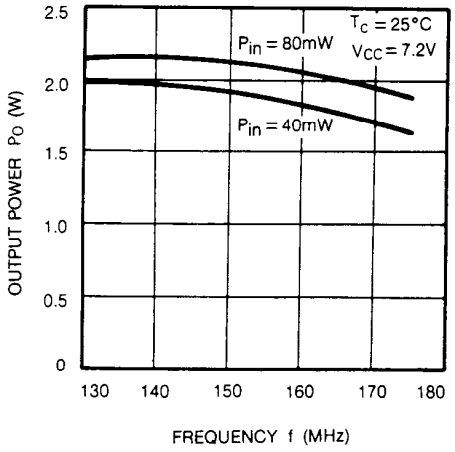
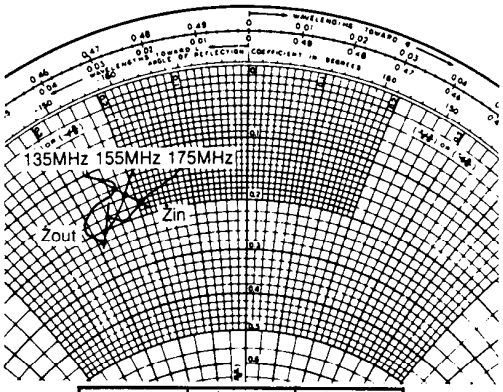
OUTPUT POWER VS. FREQUENCY



INPUT/OUTPUT IMPEDANCE VS. FREQUENCY



f(MHz)	$Z_{in}(\Omega)$	$Z_{out}(\Omega)$
135	7.0−j11.1	11−j14.1
155	7.8−j10.5	10−j13.5
175	8.5−j9.8	9.3−j13
V_{CC} = 7.2V, P_O = 1.5W		

PRECAUTIONS FOR MOUNTING HIGH-FREQUENCY HIGH-OUTPUT TRANSISTOR FOR MOBILE RADIO EQUIPMENT

When mounting high-frequency, high-output transistors for mobile radio equipment (flange screw fastening part cut package), care should be taken to the following points.

1. When mounting the device to the heat sink, silicon compound should be applied to the heat sink and device heat radiating fin and apply the device to the heat sink using a proper fastening tool.
2. If the device is soldered directly to heat sink, excessive thermal stress will result in deteriorating the reliability. Do not use this mounting method.
3. Care should be taken, if the device is applied to the heat sink, the force of soldering the leads to the printed circuit board results in continual mechanical stress, deteriorating the reliability and performance of the system.
4. Refer to Mitsubishi's DATABOOK or manuals for transistors, small-signal diodes and integrated circuit modules for mounting and handling of the device.