2SC3022

NPN EPITAXIAL PLANAR TYPE

DESCRIPTION

2SC3022 is a silicon NPN epitaxial planar type transistor specifically designed for UHF high power amplifier applications.

FEATURES

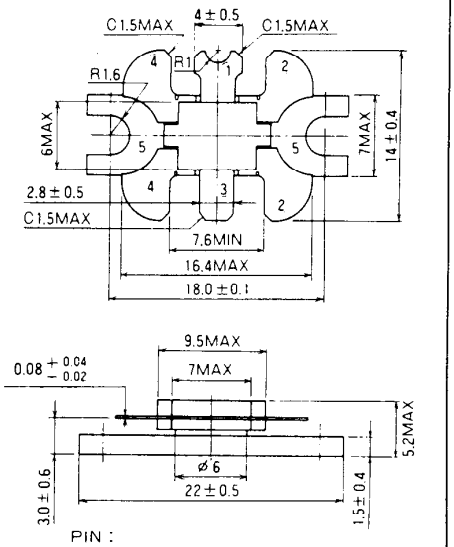
- High Power Gain: $G_{pe} \geqq 4.7$dB
  @$V_{CC} = 12.5$V, f = 520MHz, $P_{in} = 6$W.
- Emitter ballasted construction.
- High ruggedness: Ability to withstand more than 20:1 load VSWR when operated at $V_{CC} = 15.2$V, f = 520MHz, $P_O = 18$W.
- Frange type ceramic package.
- $Z_{in} = 1.5 + j2.0\Omega$, $Z_{out} = 2.8 + j1.0\Omega$.
  @$V_{CC} = 12.5$V, f = 520MHz, $P_O = 18$W.

APPLICATION

For output stage of 15W power amplifiers in UHF band.

OUTLINE DRAWING

Dimensions in mm



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

T-31E

ABSOLUTE MAXIMUM RATINGS ($T_C = 25°C$)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector to base voltage		35	V
V_{EBO}	Emitter to base voltage		4	V
V_{CEO}	Collector to emitter voltage	$R_{BE} = \infty$	17	V
I_C	Collector current		7	A
P_C	Collector dissipation	$T_C = 25°C$	50	W
T_j	Junction temperature		175	°C
Tstg	Storage temperature		−55 to 175	°C
Rth-a	Thermal resistance	Junction to ambient	50	°C/W
Rth-c		Junction to case	3	°C/W

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	$I_E = 10$mA, $I_C = 0$	4			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	$I_C = 10$mA, $I_E = 0$	35			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	$I_C = 0.1$A, $R_{BE} = \infty$	17			V
I_{CBO}	Collector cut off current	$V_{CB} = 15$V, $I_E = 0$			2.0	mA
I_{EBO}	Emitter cut off current	$V_{EB} = 3$V, $I_C = 0$			3.0	mA
h_{FE}	DC forward current gain *	$V_{CE} = 10$V, $I_C = 1$A	20	50	180	–
P_O	Power Output	$V_{CC} = 12.5$V, $P_{in} = 6$W, f = 520MHz	18	19		W
η_C	Collector efficiency		55	60		%

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

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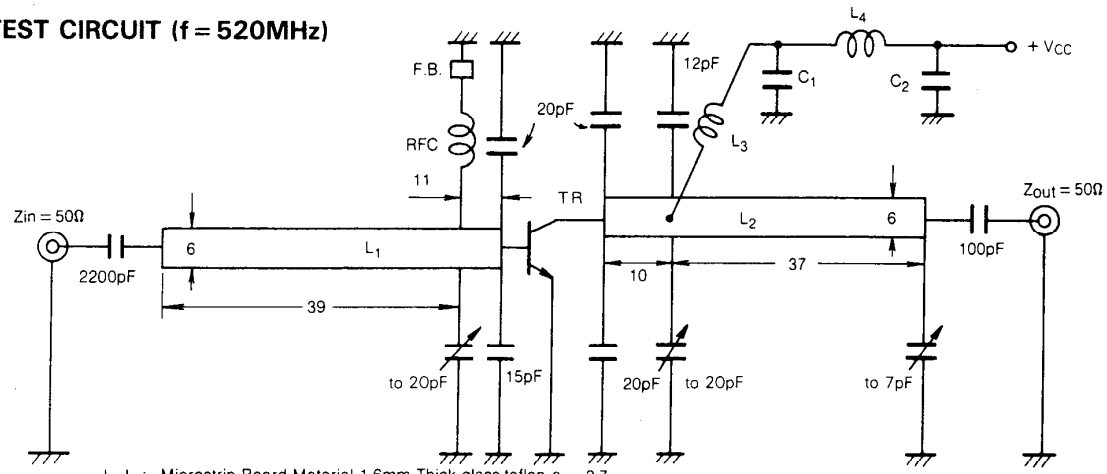
TEST CIRCUIT (f = 520MHz)

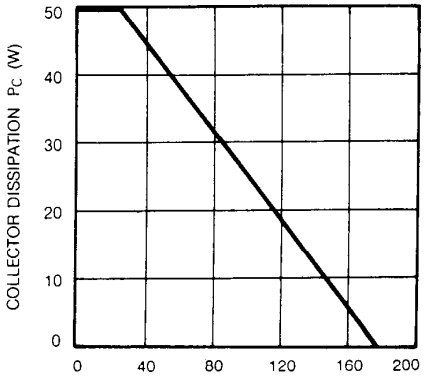


L_1,L_2: Microstrip Board Material 1.6mm Thick glass-teflon $\varepsilon_r = 2.7$
L_3: 3 Turns AWG #20, 8mm I.D.
L_4: 6 Turns AWG #20, 8mm I.D.
RFC: 8 Turns AWG #26 Enameled Wire on 4mm O.D., 14mm Length Bakelite.

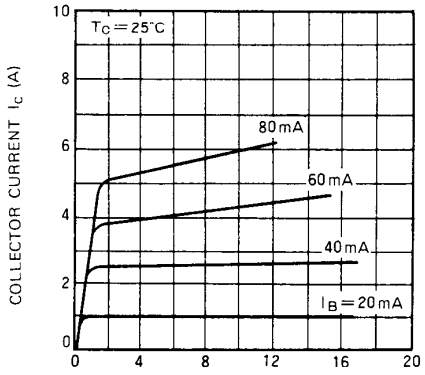
F.B.: Ferrite Bead
C_1: 68pF, 3300pF, 4700pF, 33μF in parallel
C_2: 3300pF, 4700pF, 33μF in parallel

TYPICAL PERFORMANCE DATA

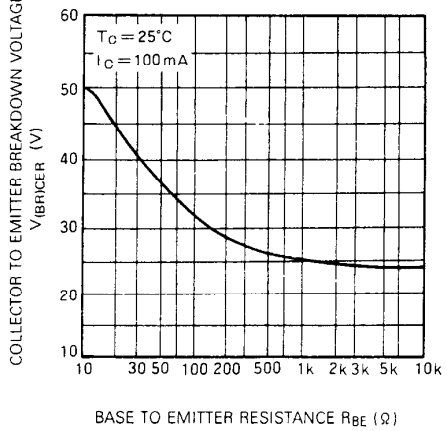
COLLECTOR DISSIPATION VS. CASE TEMPERATURE CHARACTERISTICS



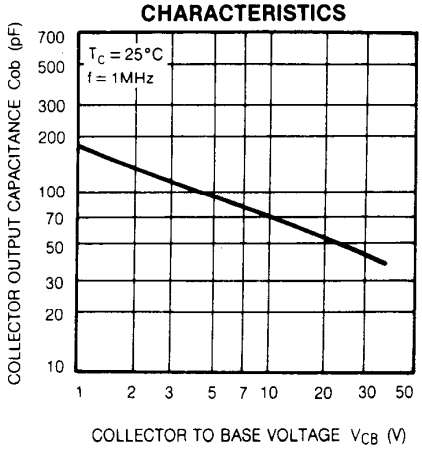
COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR TO EMITTER BREAKDOWN VOLTAGE VS. BASE TO EMITTER RESISTANCE



COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE CHARACTERISTICS



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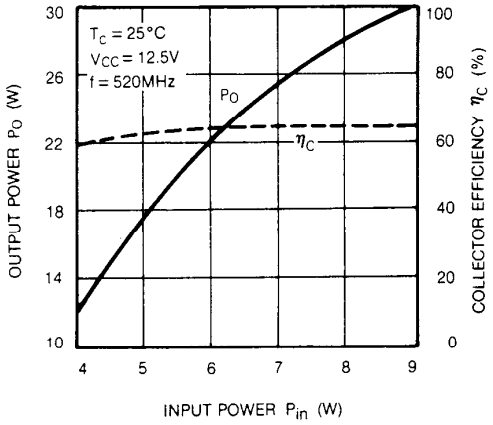
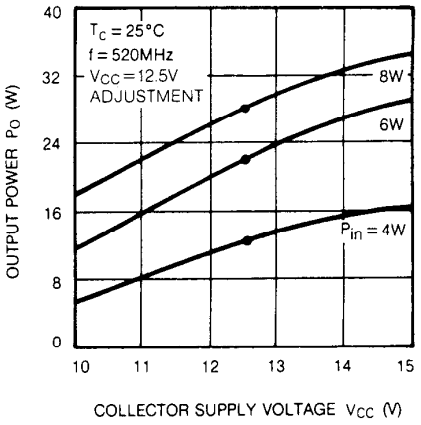
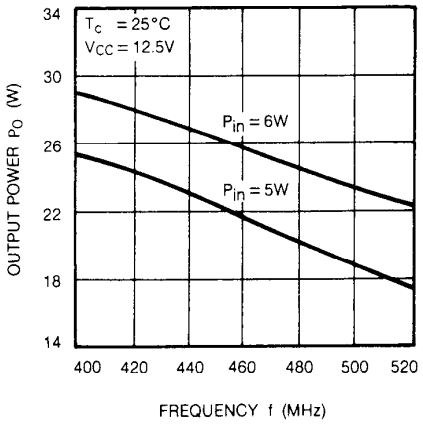
OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER CHARACTERISTICS



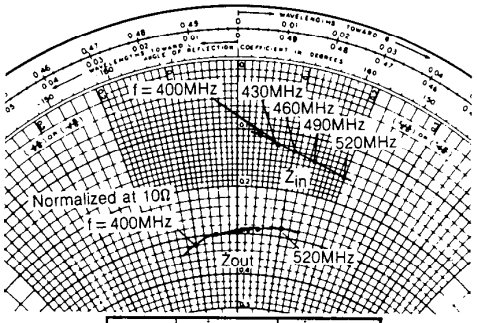
OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE CHARACTERISCTIS



OUTPUT POWER VS. FREQUENCY CHARACTERISTICS



SERIES INPUT AND OUTPUT IMPEDANCE VS. FREQUENCY CHARACTERISTICS



f(MHz)	Z_{in}(Ω)	Z_{out}(Ω)
400	1.10 + j0.5	3.2 − j1.0
430	1.15 + j0.75	3.0 − j0.5
460	1.25 + j1.0	2.95 ± j0.0
490	1.35 + j1.4	2.9 + j0.5
520	1.50 + j2.0	2.8 + j1.0

Conditions:
T_C = 25°C, V_{CC} = 12.5V, P_O = 18W

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.