MITSUBISHI RF POWER TRANSISTOR

2SC2094

NPN EPITAXIAL PLANAR TYPE

DESCRIPTION

2SC2094 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in VHF band mobile radio applications.

FEATURES

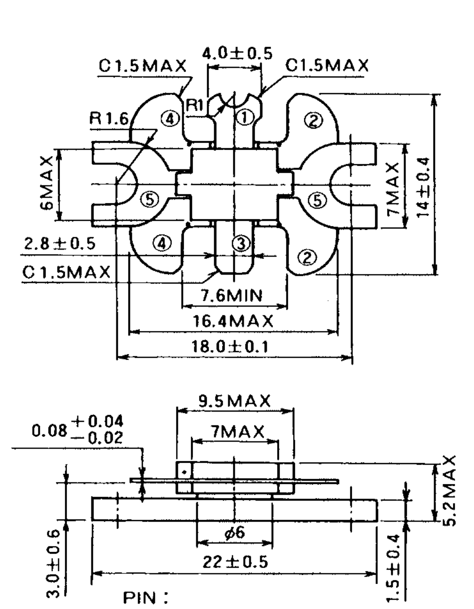
- High power gain: $G_{pe} \geq 8.8dB$ @V_{CC} = 13.5V, P_O = 15W, f = 175MHz
- Emitter ballasted construction and gold metallization for high reliability and good performances.
- Low thermal resistance ceramic package with flange.
- Ability of withstanding more than 20:1 load VSWR when operated at V_{CC} = 15.2V, P_O = 18W, f = 175MHz.
- Low intermodulation distortion: IMD−30dBc(typ) @15WPEP
- Equivalent input/output series impedance:
  Zin=2.2+j1.1Ω @Po=16W, Vcc=13.5V, f=175MHz
  Zout=4.5−j2.3Ω

APPLICATION

10 to 14 watts output linear power amplifiers in VHF 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 unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector to base voltage		40	V
V_{EBO}	Emitter to base voltage		4.5	V
V_{CEO}	Collector to emitter voltage	$R_{BE}=\infty$	17	V
I_C	Collector current		3.5	A
P_C	Collector dissipation	Ta=25°C	2	W
		T_C=25°C	30	W
T_j	Junction temperature		175	°C
Tstg	Storage temperature		−55 to 175	°C
Rth-a	Thermal resistance	Junction to ambient	75	°C/W
Rth-c		Junction to case	5	°C/W

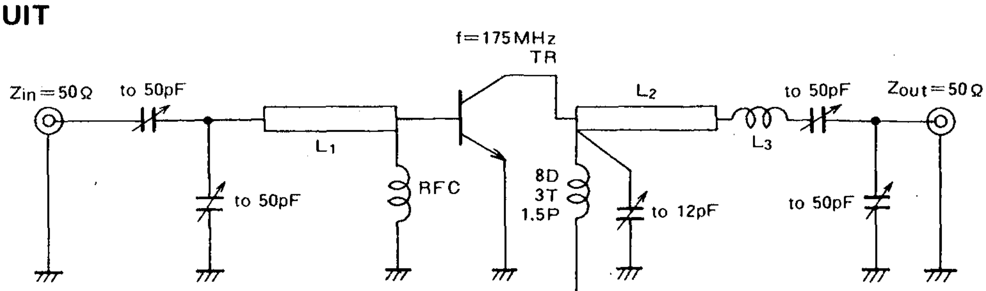
Note. Above parameters are guaranteed independently.

ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise specified)

Symbol	Parameter	Test conditions	Limits Min	Limits Typ	Limits Max	Unit
$V_{(BR)EBO}$	Emitter to base breakdown voltage	I_E=1mA, I_C=0	4.5			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	I_C=10mA, I_E=0	40			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}=25V, I_E=0			2	mA
I_{EBO}	Emitter cutoff current	V_{EB}=3V, I_C=0			0.5	mA
h_{FE}	DC forward current gain *	V_{CE}=10V, I_C=0.1A	10	50	180	—
P_O	Output power	V_{CC}=13.5V, Pin=2W, f=175MHz	15	16		W
η_C	Collector efficiency		60	70		%

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

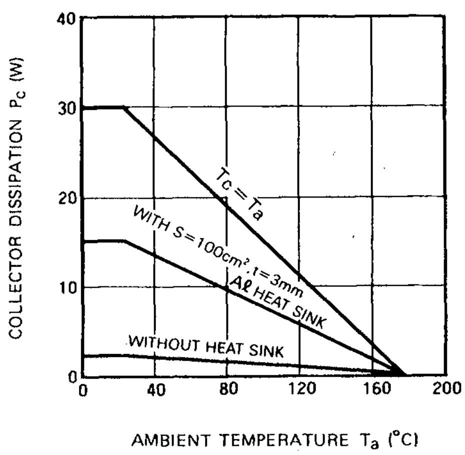
TEST CIRCUIT



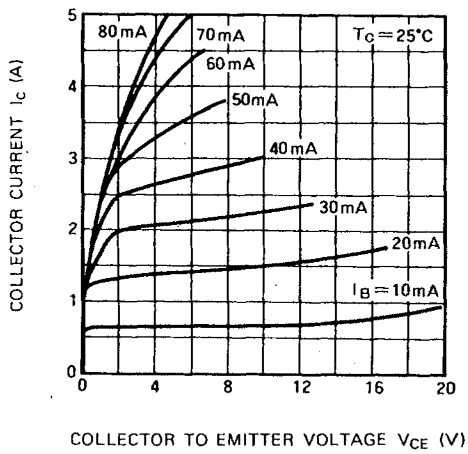
L_1: Width, 4mm, length 58mm, PCB (t = 1.6mm glass epoxy)
L_2: Width 4mm, length 42mm, PCB (t = 1.6mm glass epoxy)
L_3: 10D, 1T, 1.0mmφ silver plated copper wire
C_1: 220pF, 2200pF, 2200pF in parallel
C_2: 0.01μF, 1μF in parallel
Notes: All coil are made from 1.5 mmφ silver plated copper wire except L_1, L_2, L_3 & RFC
D: inner diameter of coil
T: Turn number of coil
P: Pitch of coil
Dimension in milli-meter

TYPICAL PERFORMANCE DATA

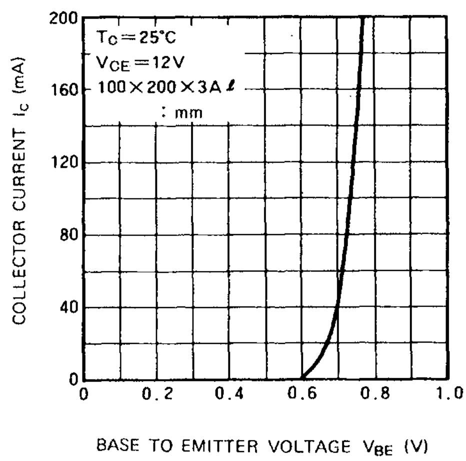
COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE



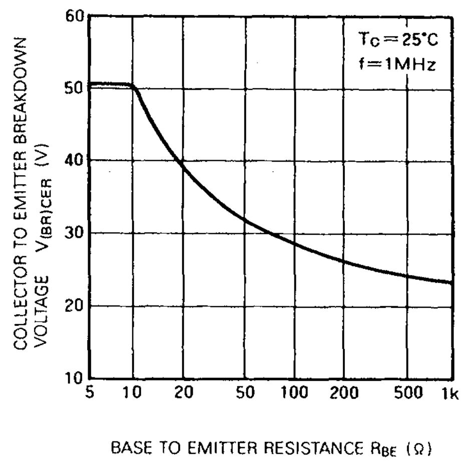
COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE



COLLECTOR CURRENT VS. BASE TO EMITTER VOLTAGE



COLLECTOR TO EMITTER BREAKDOWN VOLTAGE VS. BASE TO EMITTER RESISTANCE



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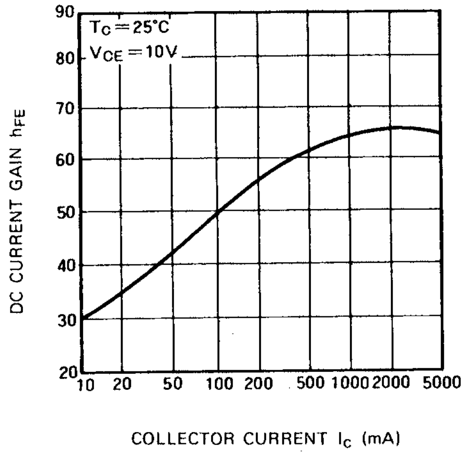
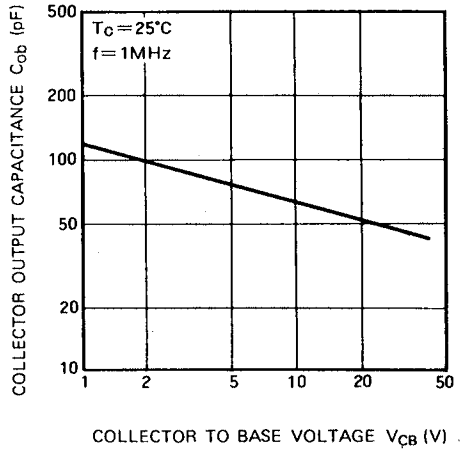
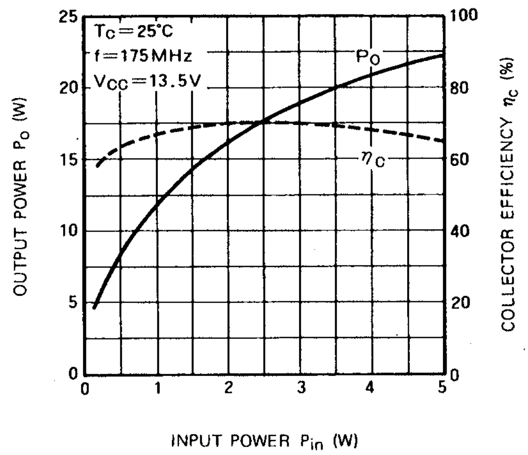
DC CURRENT GAIN VS. COLLECTOR CURRENT



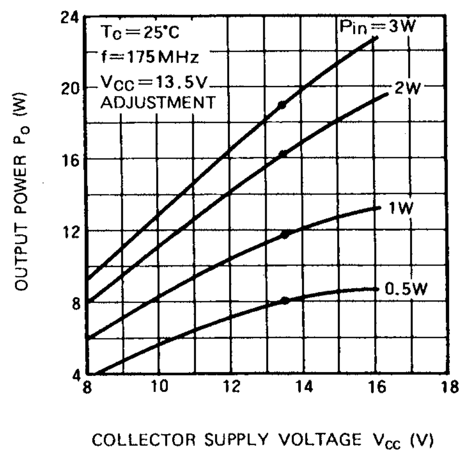
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE CHARACTERISTICS



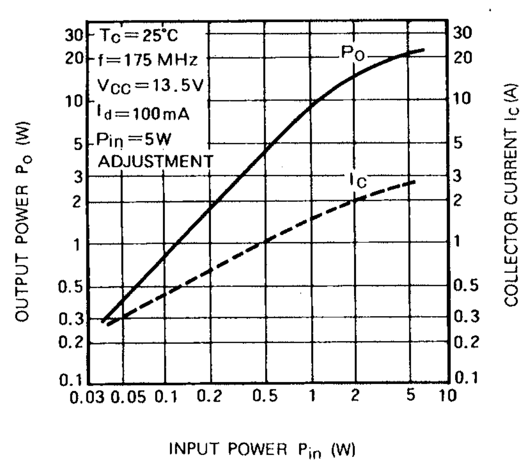
OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER



OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE



IN CASE AB OPERATING OUTPUT POWER, COLLECTOR CURRENT VS. INPUT POWER



THIRD ORDER INTERMODULATION DISTORTION VS. OUTPUT POWER