MITSUBISHI RF POWER TRANSISTOR

2SC2133

NPN EPITAXIAL PLANAR TYPE

DESCRIPTION

2SC2133 is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers in UHF band 24 to 28 volts operation applications.

FEATURES

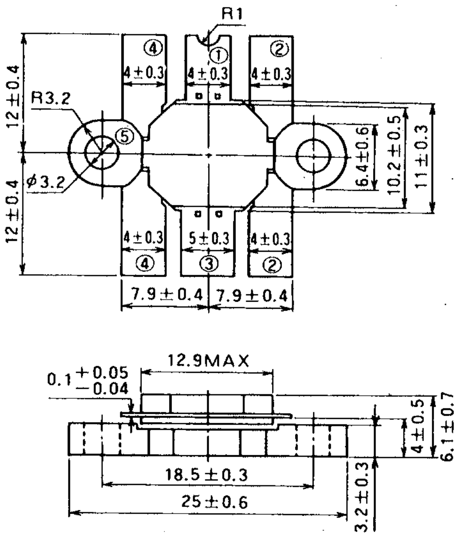
- High power gain: $G_{pe} \geq 8.2dB$ @V_{CC} = 28V, P_o = 30W, f = 220MHz
- Emitter ballasted construction and gold metallization for high reliability and good performances.
- Low thermal resistance ceramic package with flange.
- Ability of withstanding more than 20:1 load VSWR when operated at V_{CC} = 28V, P_o = 30W, f = 220MHz, T_C = 25°C.
- Equivalent input/output series impedance:
  Zin=12+j3.3Ω @Po=30W, Vcc=28V, f=220MHz
  Zout=4.7−j2.2Ω

APPLICATION

10 to 15 watts output linear power amplifiers such as TV transposer amplifiers in VHF band.

OUTLINE DRAWING

Dimensions in mm



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

T-40E

ABSOLUTE MAXIMUM RATINGS (T_C=25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CBO}	Collector to base voltage		55	V
V_{EBO}	Emitter to base voltage		4	V
V_{CEO}	Collector to emitter voltage	$R_{BE}=\infty$	35	V
I_C	Collector current		5	A
P_C	Collector dissipation	T_a=25°C	3.75	W
		T_C=25°C	75	W
T_j	Junction temperature		175	°C
Tstg	Storage temperature		−55 to 175	°C
Rth-a	Thermal resistance	Junction to ambient	40	°C/W
Rth-c		Junction to case	2	°C/W

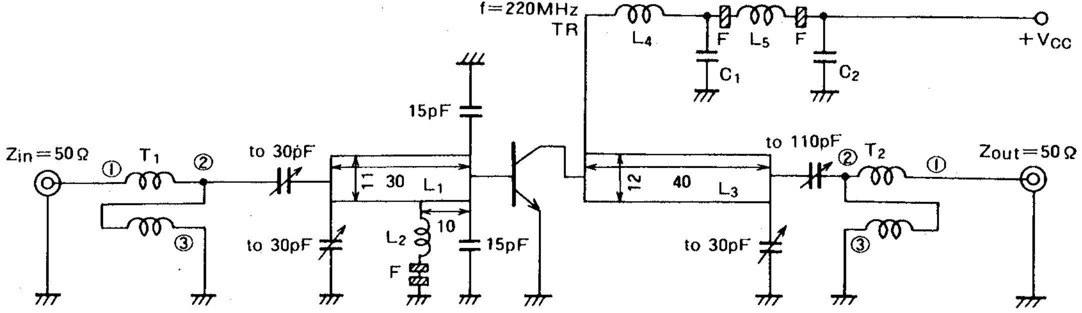
Note. Above parameters are guaranteed independently.

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

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter to base breakdown voltage	I_E=10mA, I_C=0	4			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	I_C=10mA, I_E=0	55			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	I_C=50mA, $R_{BE}=\infty$	35			V
I_{CBO}	Collector cutoff current	V_{CB}=35V, I_E=0			2	mA
I_{EBO}	Emitter cutoff current	V_{EB}=3V, I_C=0			1	mA
h_{FE}	DC forward current gain*	V_{CE}=25V, I_C=0.2A	20	50	110	—
P_O	Output power	V_{CC}=28V, Pin=4.5W, f=220MHz	30	34		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.

TEST CIRCUIT

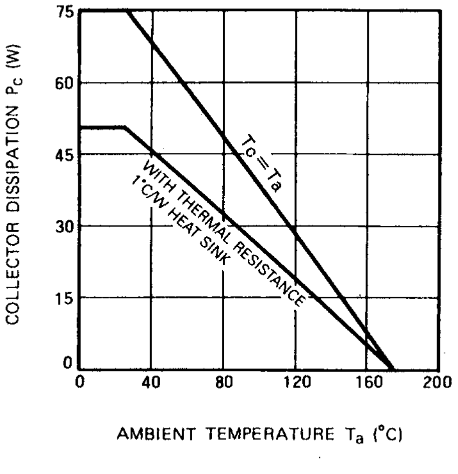


L1, L3 : Thickness 0.2mm copper plate
L2 : 10D, 7T, 2P, φ1.0 silver plated copper wire
L4 : 12D, 3T, 3P, φ1.6 silver plated copper wire
L5 : 10D, 15T, φ1.0 enameled wire
T1 : 4:1 transformer
T2 : 1:4 transformer
F : Ferrite Sealed Bead
C1 : 330pF, 1000pF, 4700pF, 0.01μF, 0.1μF, 4.7μF in parallel
C2 : 330pF, 1000pF, 4700pF, 0.01μF, 0.1μF, 47μF in parallel

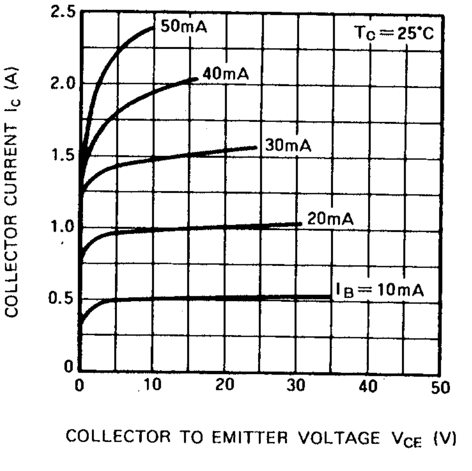
Note:
D : Inner diameter of coil
T : Turn number of coil
P : Pitch of coil
Dimension in milli-meter

TYPICAL PERFORMANCE DATA

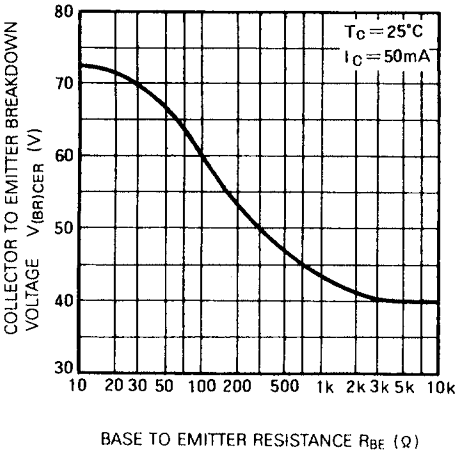
COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE



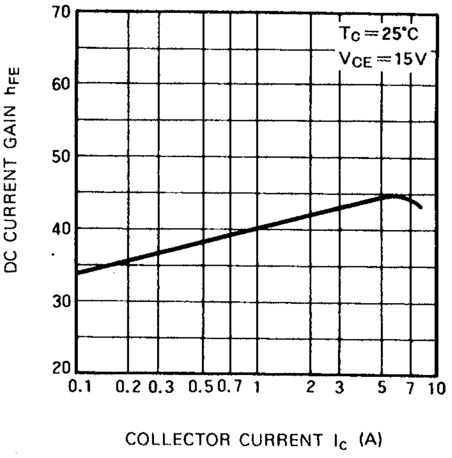
COLLECTOR CURRENT VS. COLLECTOR TO EMITTER VOLTAGE



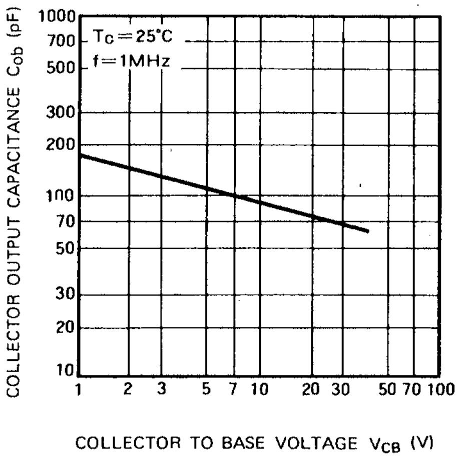
COLLECTOR TO EMITTER BREAKDOWN VOLTAGE VS. BASE TO EMITTER RESISTANCE



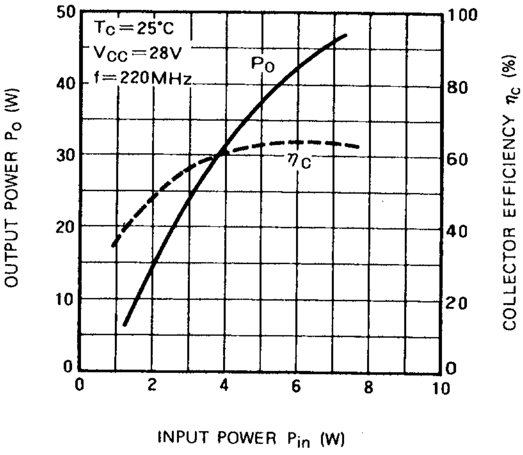
DC CURRENT GAIN VS. COLLECTOR CURRENT



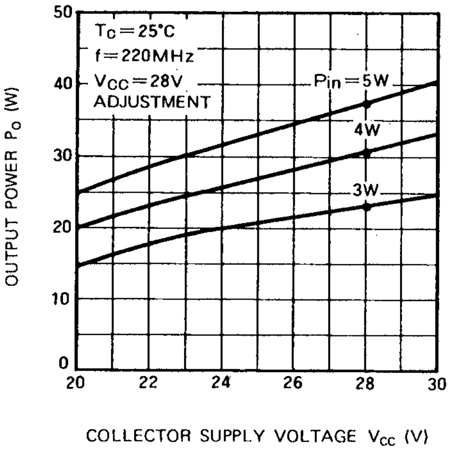
COLLECTOR OUTPUT CAPACITANCE VS. COLLECTOR TO BASE VOLTAGE



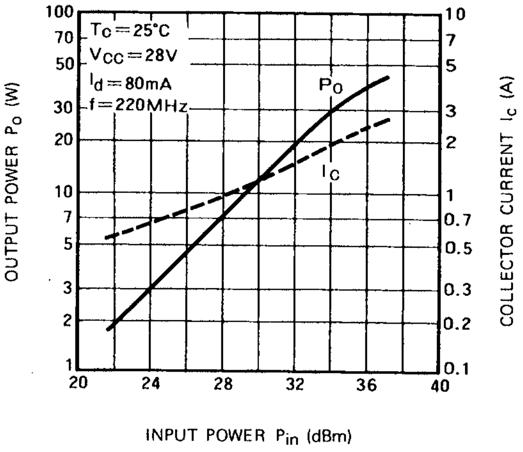
OUTPUT POWER, COLLECTOR EFFICIENCY VS. INPUT POWER



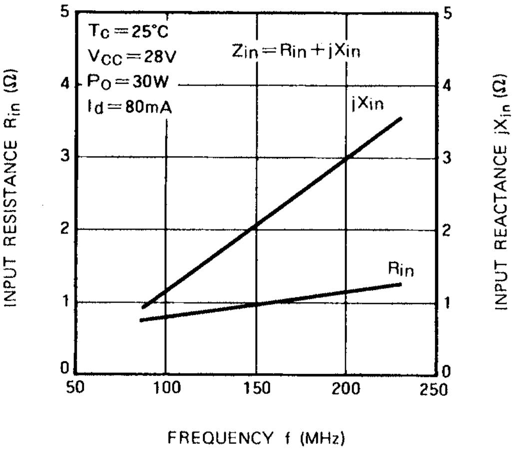
OUTPUT POWER VS. COLLECTOR SUPPLY VOLTAGE



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



INPUT IMPEDANCE VS. FREQUENCY



OUTPUT IMPEDANCE VS. FREQUENCY