

DESCRIPTION

2SC1946A is a silicon NPN epitaxial planar type transistor designed for RF power amplifiers on VHF band mobile radio applications.

FEATURES

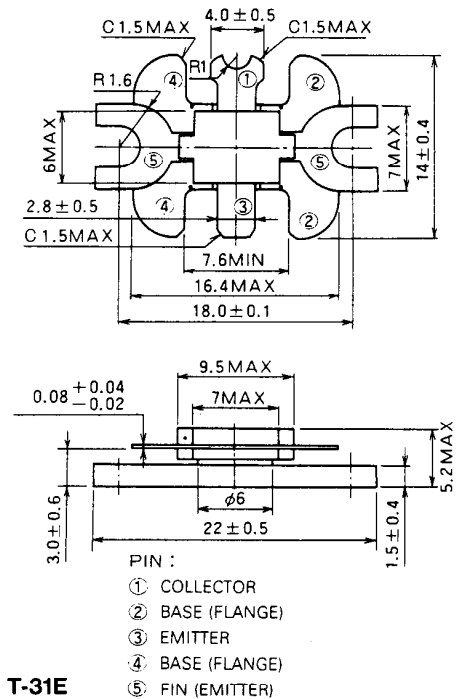
- High power gain: $G_{pe} \geq 10\text{dB}$
@ $V_{CC} = 13.5\text{V}$, $P_O = 30\text{W}$, $f = 175\text{MHz}$
- Emitter ballasted construction and gold metallization for high reliability and good performances.
- Low thermal resistance ceramic package with flange.
- Ability of withstanding more than 20:1 load VSWR when operated at $V_{CC} = 15.2\text{V}$, $P_O = 30\text{W}$, $f = 175\text{MHz}$.
- Equivalent input/output impedance at rated operating conditions: $Z_{in} = 0.65 + j1.4\Omega$
 $Z_{out} = 1.9 + j0.75\Omega$

APPLICATION

25 watts output power amplifiers in VHF band mobile radio applications.

OUTLINE DRAWING

Dimensions in mm

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

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	$T_a = 25^\circ\text{C}$	3	W
		$T_C = 25^\circ\text{C}$	50	W
T_j	Junction temperature		175	$^\circ\text{C}$
T_{stg}	Storage temperature		-55 to 175	$^\circ\text{C}$
R_{th-a}	Thermal resistance	Junction to ambient	50	$^\circ\text{C/W}$
R_{th-c}		Junction to case	3	$^\circ\text{C/W}$

Note: Above parameters are guaranteed independently.

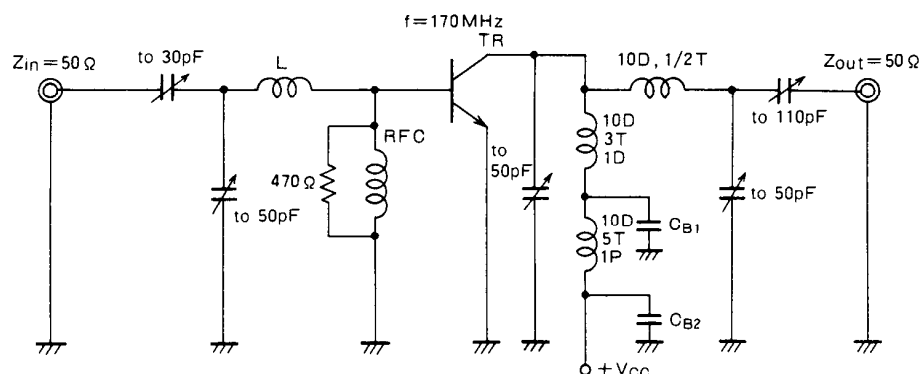
ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
$V_{(BR)EBO}$	Emitter to base breakdown voltage	$I_E = 10\text{mA}$, $I_C = 0$	4			V
$V_{(BR)CBO}$	Collector to base breakdown voltage	$I_C = 10\text{mA}$, $I_E = 0$	35			V
$V_{(BR)CEO}$	Collector to emitter breakdown voltage	$I_C = 0.1\text{A}$, $R_{BE} = \infty$	17			V
I_{CBO}	Collector cutoff current	$V_{CB} = 25\text{V}$, $I_E = 0$			2	mA
I_{EBO}	Emitter cutoff current	$V_{EB} = 3\text{V}$, $I_C = 0$			1	mA
h_{FE}	DC forward current gain *	$V_{CE} = 10\text{V}$, $I_C = 0.2\text{A}$	10	50	180	—
P_O	Output power	$V_{CC} = 13.5\text{V}$, $P_{in} = 3\text{W}$, $f = 175\text{MHz}$	30	35		W
η_C	Collector efficiency		60	70		%

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

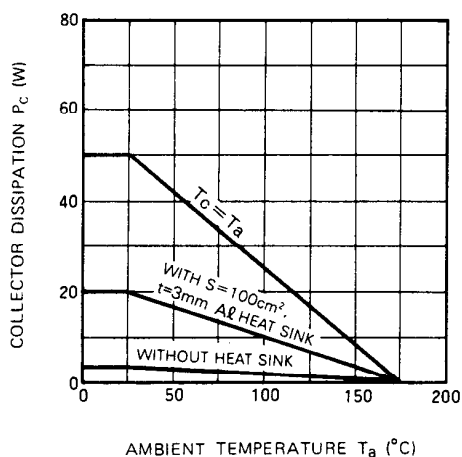
Above parameters, ratings, limits and conditions are subject to change.

TEST CIRCUIT



Notes: All coils are made from 1.5mm ϕ silver plated copper wire
Coil dimensions in milli-meter
D: Inner diameter of coil
T: Turn number of coil
P: Pitch of coil

COLLECTOR DISSIPATION VS. AMBIENT TEMPERATURE



Graph showing Collector Current I_C (A) versus Collector to Emitter Voltage V_{CE} (V) for a common-emitter BJT circuit at $T_C = 25^\circ\text{C}$. The curves are plotted for various base currents I_B (0, 10mA, 20mA, 30mA, 40mA, 50mA, 60mA). The curves show that I_C increases with V_{CE} and is approximately equal to I_B for $V_{CE} > 10\text{V}$.

Graph showing Collector to Emitter Breakdown Voltage $V_{(BR)CER}$ (V) versus Base to Emitter Resistance R_{BE} (Ω) for a 2N3866 JFET. The graph is plotted for $T_C = 25^\circ\text{C}$ and $I_C = 100\text{mA}$. The voltage decreases sharply as resistance increases from 10 Ω to 100 Ω , then levels off around 30V for resistances greater than 1k Ω .

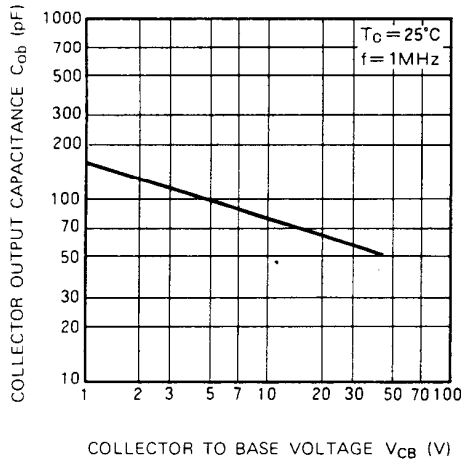
Base to Emitter Resistance R_{BE} (Ω)	Collector to Emitter Breakdown Voltage $V_{(BR)CER}$ (V)
10	55
20	55
30	50
50	45
100	40
200	38
500	34
1k	32
2k	31
5k	30
10k	30

Graph showing DC current gain h_{FE} versus collector current I_C (A) for a 2N3638 PNP transistor. The graph is plotted on a grid with I_C on a logarithmic scale and h_{FE} on a linear scale. The conditions are $T_C = 25^\circ\text{C}$ and $V_{CE} = 10\text{V}$.

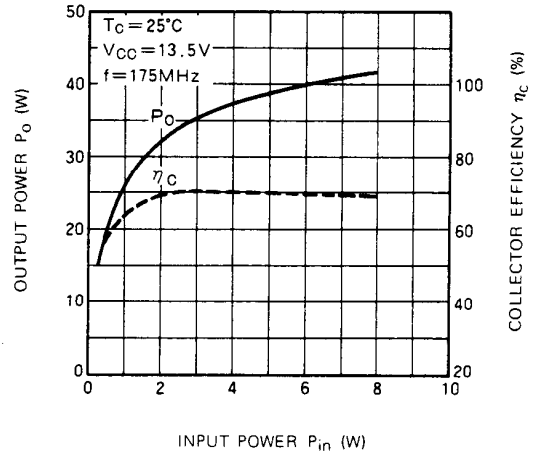
Collector Current I_C (A)	DC Current Gain h_{FE}
0.01	22
0.02	28
0.05	38
0.1	45
0.2	52
0.5	62
1	70
2	78
3	82
5	88
7	85

NPN EPITAXIAL PLANAR TYPE

**COLLECTOR OUTPUT CAPACITANCE VS.
COLLECTOR TO BASE VOLTAGE**



**OUTPUT POWER,
COLLECTOR EFFICIENCY
VS. INPUT POWER**



**OUTPUT POWER VS. COLLECTOR
SUPPLY VOLTAGE**

