

N-P-N SILICON PLANAR TRANSISTOR

N-P-N transistors in TO-18 metal envelopes with the collector connected to the case.

These devices are primarily intended for use in high performance, low-level, low-noise amplifier applications both for direct current and for frequencies of up to 100 MHz.

QUICK REFERENCE DATA

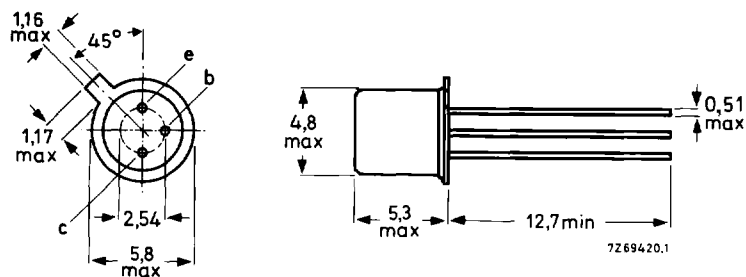
Collector-base voltage (open emitter)	V_{CBO}	max.	45 V
Collector-emitter voltage (open base)	V_{CEO}	max.	45 V
Collector current (peak value)	I_{CM}	max.	60 mA
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	300 mW
Junction temperature	T_j	max.	175 $^{\circ}\text{C}$
D.C. current gain at $T_j = 25\text{ }^{\circ}\text{C}$ $I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$	h_{FE}	>	100
		<	300
$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$	h_{FE}	>	150
		<	600
Transition frequency $I_C = 0,5\text{ mA}; V_{CE} = 5\text{ V}$	f_T	typ.	80 MHz
Noise figure at $R_S = 10\text{ k}\Omega$ $I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$ $f = 10\text{ Hz to }15\text{ kHz}$	F	typ.	2 dB
		<	3 dB

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-18.

Collector connected to case.



2N930

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

Collector-base voltage (open emitter)	V_{CBO}	max.	45 V
Collector-emitter voltage (open base)	V_{CEO}	max.	45 V
Collector-emitter voltage at $V_{EB} = 0$	V_{CES}	max.	45 V
Emitter-base voltage (open collector)	V_{EBO}	max.	5 V
Collector current (d.c. or average over any 50 ms period)	I_C	max.	30 mA
Collector current (peak value)	I_{CM}	max.	60 mA
Emitter current (d.c. or average over any 50 ms period)	$-I_E$	max.	35 mA
Emitter current (peak value)	$-I_{EM}$	max.	70 mA
Total power dissipation up to $T_{amb} = 25\text{ }^\circ\text{C}$	P_{tot}	max.	300 mW
Storage temperature range	T_{stg}		-65 to + 150 $^\circ\text{C}$
Junction temperature	T_j	max.	175 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0,5 K/mW
From junction to case	$R_{th\ j-c}$	=	0,25 K/mW

CHARACTERISTICS $T_j = 25\text{ }^\circ\text{C}$ unless otherwise specified

Collector cut-off current

$I_E = 0; V_{CB} = 45\text{ V}$

$I_{CBO} < 10\text{ nA}$

$I_B = 0; V_{CE} = 5\text{ V}$

$I_{CEO} < 2\text{ nA}$

$V_{EB} = 0; V_{CB} = 45\text{ V}$

$I_{CES} < 10\text{ nA}$

Emitter cut-off current

$I_C = 0; V_{EB} = 5\text{ V}$

$I_{EBO} < 10\text{ nA}$

Emitter-base voltage

$-I_E = 0,5\text{ mA}; V_{CB} = 5\text{ V}$

$-V_{EB} \quad 0,6\text{ to }0,8\text{ V}$

Saturation voltages

$I_C = 10\text{ mA}; I_B = 0,5\text{ mA}$

$V_{CEsat} < 1\text{ V}$

$V_{BEsat} \quad 0,6\text{ to }1\text{ V}$

D.C. current gain

$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$

$h_{FE} \quad 100\text{ to }300$

$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; T_j = -55\text{ }^\circ\text{C}$

$h_{FE} > 20$

$I_C = 500\text{ }\mu\text{A}; V_{CE} = 5\text{ V}$

$h_{FE} > 150$

$I_C = 10\text{ mA}; V_{CE} = 5\text{ V}$

$h_{FE} \quad 150\text{ to }600$

Collector capacitance at $f = 1\text{ MHz}$

$I_E = I_e = 0; V_{CB} = 5\text{ V}$

$C_c < 8\text{ pF}$

Transition frequency

$I_C = 0,5\text{ mA}; V_{CE} = 5\text{ V}$

$f_T > 50\text{ MHz}$

Cut-off frequency

$I_C = 0,5\text{ mA}; V_{CE} = 5\text{ V}$

$f_{hfe} > 100\text{ kHz}$

Noise figure ($f = 10\text{ Hz to }15\text{ kHz}$)

$I_C = 10\text{ }\mu\text{A}; V_{CE} = 5\text{ V}; R_S = 10\text{ k}\Omega$

$F \quad \text{typ. } 2\text{ dB}$

$< 3\text{ dB}$

h parameters at $f = 1\text{ kHz}$

$I_C = 1\text{ mA}; V_{CE} = 5\text{ V}$

Input impedance

$h_{ie} \quad \text{typ. } 10,0\text{ k}\Omega$

Reverse voltage transfer

$h_{re} \quad \text{typ. } 5,5 \cdot 10^{-4}$

Small signal current gain

$h_{fe} \quad \text{typ. } 350$

$150\text{ to }600$

Output admittance

$h_{oe} \quad \text{typ. } 25\text{ }\mu\text{S}$