



SILICON PLANAR EPITAXIAL TRANSISTORS

N-P-N transistors in TO-39 metal envelopes intended for use as amplifiers and in switching circuits.

QUICK REFERENCE DATA

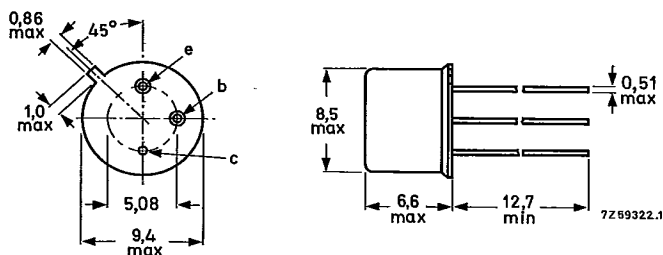
Collector-base voltage (open emitter)	V_{CBO}	max.	140	V
Collector-emitter voltage (open base)	V_{CEO}	max.	80	V
Collector current (d.c.)	I_C	max.	1	A
Total power dissipation	P_{tot}	max.	0,8	W
up to $T_{amb} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	5,0	W
up to $T_{case} = 25\text{ }^{\circ}\text{C}$	T_j	max.	200	$^{\circ}\text{C}$
Junction temperature				
D.C. current gain			2N3019	2N3020
$I_C = 150\text{ mA}; V_{CE} = 10\text{ V}$	h_{FE}	$>$	100	40
		$<$	300	120
Transition frequency at $f = 20\text{ MHz}$	f_T	$>$	100	80
$I_C = 50\text{ mA}; V_{CE} = 10\text{ V}$				MHz

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-39.

Collector connected to case



Maximum lead diameter is guaranteed only for 12,7 mm.

2N3019
2N3020

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RATINGS

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

Collector-base voltage (open emitter)	V_{CBO}	max.	140 V
Collector-emitter voltage (open base)	V_{CEO}	max.	80 V
Emitter-base voltage (open collector)	V_{EBO}	max.	7 V
Collector current (d.c.)	I_C	max.	1 A
Total power dissipation up to $T_{amb} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	0,8 W
up to $T_{case} = 25\text{ }^{\circ}\text{C}$	P_{tot}	max.	5,0 W
Storage temperature range	T_{stg}		-65 to +150 $^{\circ}\text{C}$
Junction temperature	T_j	max.	200 $^{\circ}\text{C}$

T-35-19

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	218 K/W
From junction to case	$R_{th\ j-c}$	=	35 K/W

CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Collector cut-off current

$I_E = 0; V_{CB} = 90\text{ V}$	I_{CBO}	<	10 nA
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$I_E = 0; V_{CB} = 90\text{ V}; T_{amb} = 150\text{ }^{\circ}\text{C}$	I_{CBO}	<	10 μA
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Emitter cut-off current

$I_C = 0; V_{EB} = 5\text{ V}$	I_{EBO}	<	10 nA
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Breakdown voltages

$I_E = 0; I_C = 100\text{ }\mu\text{A}$	$V_{(BR)CBO}$	>	140 V
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$I_B = 0; I_C = 30\text{ mA}$	$V_{(BR)CEO}$	>	80 V *
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$I_C = 0; I_E = 100\text{ }\mu\text{A}$	$V_{(BR)EBO}$	>	7 V
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Saturation voltages

$I_C = 150\text{ mA}; I_B = 15\text{ mA}$	V_{CEsat}	<	0,2 V
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	V_{BEsat}	<	1,1 V *
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$I_C = 500\text{ mA}; I_B = 50\text{ mA}$	V_{CEsat}	<	0,5 V *
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* Measured under pulse conditions: $t_p = 300\text{ }\mu\text{s}; \delta \leq 0,01$.

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			2N3019	2N3020
D.C. current gain *				
$I_C = 0,1 \text{ mA}; V_{CE} = 10 \text{ V}$	h_{FE}	$>$	50	30
		$<$	—	100
$I_C = 10 \text{ mA}; V_{CE} = 10 \text{ V}$	h_{FE}	$>$	90	40
		$<$	—	120
$I_C = 150 \text{ mA}; V_{CE} = 10 \text{ V}$	h_{FE}	$>$	100	40
		$<$	300	120
$I_C = 150 \text{ mA}; V_{CE} = 10 \text{ V}; T_{case} = -55 \text{ }^{\circ}\text{C}$	h_{FE}	$>$	40	—
$I_C = 500 \text{ mA}; V_{CE} = 10 \text{ V}$	h_{FE}	$>$	50	30
		$<$	—	100
$I_C = 1000 \text{ mA}; V_{CE} = 10 \text{ V}$	h_{FE}	$>$	15	15
Transition frequency at $f = 20 \text{ MHz}$				
$I_C = 50 \text{ mA}; V_{CE} = 10 \text{ V}$	f_T	$>$	100	80 MHz
Collector capacitance at $f = 1 \text{ MHz}$				
$I_E = I_C = 0; V_{CB} = 10 \text{ V}$	C_c	$<$	12	12 pF
Emitter capacitance at $f = 1 \text{ MHz}$				
$I_C = I_E = 0; V_{EB} = 0,5 \text{ V}$	C_e	$<$	60	60 pF
Feedback time constant at $f = 4 \text{ MHz}$				
$I_C = 10 \text{ mA}; V_{CB} = 10 \text{ V}$	$r_{bb'}C_{b'c}$	$<$	400	400 ps
Small-signal current gain at $f = 1 \text{ kHz}$				
$I_C = 1,0 \text{ mA}; V_{CE} = 5 \text{ V}$	h_{fe}	$>$	80	30
		$<$	400	200
Noise figure at $f = 1 \text{ kHz}$				
$I_C = 0,1 \text{ mA}; V_{CE} = 10 \text{ V}; R_S = 1 \text{ k}\Omega$	F	$<$	4	— dB

* Measured under pulse conditions: $t_p = 300 \mu\text{s}$; $\delta \leq 0,01$.