

## PNP medium power transistors

2N4031; 2N4033

## FEATURES

- High current (max. 1 A)
- Low voltage (max. 80 V).

## APPLICATIONS

- Audio frequency applications for industrial service.

## DESCRIPTION

PNP medium power transistor in a TO-39 metal package.

## PINNING

PIN	DESCRIPTION
1	emitter
2	base
3	collector, connected to case

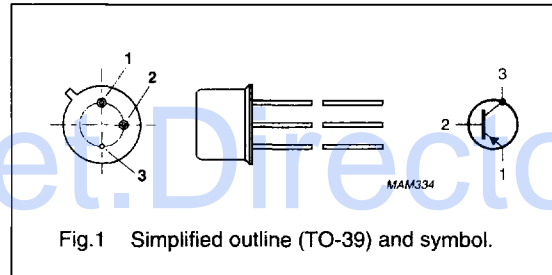


Fig.1 Simplified outline (TO-39) and symbol.

## QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–80	V
$V_{CEO}$	collector-emitter voltage	open base	–	–80	V
$I_{CM}$	peak collector current		–	–1.5	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ }^{\circ}\text{C}$	–	0.8	W
$h_{FE}$	DC current gain	$I_C = -500\text{ mA}; V_{CE} = -5\text{ V}$			
	2N4031		25	–	
	2N4033		70	–	
$f_T$	transition frequency	$I_C = -50\text{ mA}; V_{CE} = -10\text{ V}; f = 100\text{ MHz}$			
	2N4031		100	400	MHz
	2N4033		150	500	MHz

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**LIMITING VALUES**

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{CBO}$	collector-base voltage	open emitter	–	–80	V
$V_{CEO}$	collector-emitter voltage	open base	–	–80	V
$V_{EBO}$	emitter-base voltage	open collector	–	–5	V
$I_C$	collector current (DC)		–	–1	A
$I_{CM}$	peak collector current		–	–1.5	A
$I_{BM}$	peak base current		–	–0.2	A
$P_{tot}$	total power dissipation	$T_{amb} \leq 25\text{ °C}$	–	0.8	W
		$T_{case} \leq 25\text{ °C}$	–	4	W
$T_{stg}$	storage temperature		–65	+150	°C
$T_j$	junction temperature		–	200	°C
$T_{amb}$	operating ambient temperature		–65	+150	°C

**THERMAL CHARACTERISTICS**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient	in free air	218	K/W
$R_{th\ j-c}$	thermal resistance from junction to case		44	K/W

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## CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$I_{CBO}$	collector cut-off current	$I_E = 0; V_{CB} = -60\text{ V}$	-	-50	nA
		$I_E = 0; V_{CB} = -60\text{ V}; T_{amb} = 150\text{ }^{\circ}\text{C}$	-	-50	$\mu\text{A}$
$I_{EBO}$	emitter cut-off current	$I_C = 0; V_{EB} = -5\text{ V}$	-	-10	$\mu\text{A}$
$h_{FE}$	DC current gain 2N4031	$V_{CE} = -5\text{ V}$			
		$I_C = -100\text{ }\mu\text{A}$	30	-	
		$I_C = -100\text{ mA}$	40	120	
		$I_C = -100\text{ mA}; T_{amb} = -55\text{ }^{\circ}\text{C}$	15	-	
		$I_C = -500\text{ mA}$	25	-	
$h_{FE}$	DC current gain 2N4033	$V_{CE} = -5\text{ V}$			
		$I_C = -100\text{ }\mu\text{A}$	75	-	
		$I_C = -100\text{ mA}$	100	300	
		$I_C = -100\text{ mA}; T_{amb} = -55\text{ }^{\circ}\text{C}$	40	-	
		$I_C = -500\text{ mA}$	70	-	
$V_{CEsat}$	collector-emitter saturation voltage	$I_C = -150\text{ mA}; I_B = -15\text{ mA}$	-	-150	mV
		$I_C = -500\text{ mA}; I_B = -50\text{ mA}$	-	-500	mV
$V_{BEsat}$	base-emitter saturation voltage	$I_C = -150\text{ mA}; I_B = -15\text{ mA}; \text{note 1}$	-	-900	mV
$V_{BE}$	base-emitter voltage	$I_C = -500\text{ mA}; V_{CE} = -0.5\text{ V}; \text{note 1}$	-	-1.1	V
$C_c$	collector capacitance	$I_E = I_B = 0; V_{CB} = -10\text{ V}; f = 1\text{ MHz}$	-	20	pF
$C_e$	emitter capacitance	$I_C = I_C = 0; V_{EB} = -0.5\text{ V}; f = 1\text{ MHz}$	-	110	pF
$f_T$	transition frequency 2N4031 2N4033	$I_C = -50\text{ mA}; V_{CE} = -10\text{ V}; f = 100\text{ MHz}$	100	400	MHz
			150	500	MHz
<b>Switching times (between 10% and 90% levels)</b>					
$t_{on}$	turn-on time	$I_{Con} = 500\text{ mA}; I_{Bon} = -50\text{ mA};$ $I_{Boff} = 50\text{ mA}$	-	100	ns
$t_{off}$	turn-off time		-	400	ns

## Note

1. Pulse test:  $t_p \leq 300\text{ }\mu\text{s}$ ;  $\delta \leq 0.01$ .