

2N4234, 2N4235, 2N4236



PNP Silicon Power Transistor

Rev. V4

Features

- Available in JAN, JANTX, and JANTXV per MIL-PRF-500/580
- TO-39 (TO-205AD) Package
- Designed for Use in High Reliability Power Amplifier and Switching Circuit Applications



Electrical Characteristics ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	$I_C = 100 \text{ mA dc}$ 2N4234 2N4235 2N4236	$V_{(BR)CEO}$	V dc	-40 -60 -80	—
Collector - Emitter Cutoff Current	$V_{CB} = -30 \text{ V dc}$, 2N4234 $V_{CB} = -40 \text{ V dc}$, 2N4235 $V_{CB} = -60 \text{ V dc}$, 2N4236	I_{CEO}	mA dc	—	-1.0
Collector - Emitter Cutoff Current	$V_{CB} = -40 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N4234 $V_{CB} = -60 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N4235 $V_{CB} = -80 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N4236	I_{CEX1}	nA dc	—	-100
Collector - Base Cutoff Current	$V_{CB} = -40 \text{ V dc}$, 2N4234 $V_{CB} = -60 \text{ V dc}$, 2N4235 $V_{CB} = -80 \text{ V dc}$, 2N4236	I_{CBO}	nA dc	—	-100
Emitter - Base Cutoff Current	$V_{BE} = -7 \text{ V dc}$	I_{EBO}	mA dc	—	-0.5
Forward Current Transfer Ratio	$I_C = -100 \text{ mA dc}$, $V_{CE} = -1.0 \text{ V dc}$ $I_C = -250 \text{ mA dc}$, $V_{CE} = -1.0 \text{ V dc}$ $I_C = -500 \text{ mA dc}$, $V_{CE} = -1.0 \text{ V dc}$	h_{FE}	-	40 30 20	150
Collector - Emitter Saturation Voltage	$I_C = -1.0 \text{ A dc}$, $I_B = -100 \text{ mA dc}$ $I_C = -500 \text{ mA dc}$, $I_B = -50 \text{ mA dc}$	$V_{CE(sat)1}$ $V_{CE(sat)2}$	Vdc	—	-0.6 -0.4
Base - Emitter Saturation Voltage	$I_C = -500 \text{ mA dc}$, $I_B = -50 \text{ mA dc}$ $I_C = -1.0 \text{ A dc}$, $I_B = -100 \text{ mA dc}$	$V_{BE(sat)1}$ $V_{BE(sat)2}$	Vdc	—	-1.1 -1.5
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{CE} = -30 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N4234 $V_{CE} = -40 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N4235 $V_{CE} = -60 \text{ V dc}$, $V_{BE} = +1.5 \text{ V dc}$, 2N4236	I_{CEX2}	mA dc	—	-1.0
Forward Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $I_C = -250 \text{ mA dc}$, $V_{CE} = -1.0 \text{ V dc}$	h_{FE4}	-	15	
Dynamic Characteristics					
Magnitude of Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = -100 \text{ mA dc}$, $V_{CE} = -10 \text{ V dc}$, $f = 1 \text{ MHz}$	$ h_{FE} $	-	3	
Open Circuit Output Capacitance	$V_{CB} = -10 \text{ V dc}$, $I_E = 0$, $f = 100 \text{ kHz}$	C_{obo}	pF	—	100

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Absolute Maximum Ratings ($T_A = +25^\circ\text{C}$ unless otherwise specified)

Ratings	Symbol	Value
Collector - Emitter Voltage 2N4234 2N4235 2N4236	V_{CEO}	-40 V dc -60 V dc -80 V dc
Collector - Base Voltage 2N4234 2N4235 2N4236	V_{CBO}	-40 V dc -60 V dc -80 V dc
Emitter - Base Voltage	V_{EBO}	-7.0 V dc
Collector Current	I_C	-1.0 A dc
Base Current	I_B	-0.5 A dc
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ ⁽¹⁾ @ $T_C = +25^\circ\text{C}$ ⁽²⁾	P_T	1.0 W 6.0 W
Operating & Storage Temperature Range	T_J, T_{STG}	-65°C to +200°C

Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case ⁽³⁾	$R_{\theta JC}$	29°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	175°C/W

(1) Derate linearly @ 5.7 mW/°C for $T_A > +25^\circ\text{C}$.

(2) Derate linearly @ 34 mW/°C for $T_C > +25^\circ\text{C}$.

(3) See figure 2 of MIL-PRF-19500/580.

Safe Operating Area

DC Tests:	$T_C = +25^\circ\text{C}$, 1 Cycle, $t \geq 0.5$ s
Test 1:	$I_C = -1.0$ A dc, $V_{CE} = -6$ V dc
Test 2:	$I_C = -500$ mA dc, $V_{CE} = -12$ V dc
Test 3:	$I_C = -166$ mA dc, $V_{CE} = -30$ V dc 2N4234 $I_C = -100$ mA dc, $V_{CE} = -50$ V dc 2N4235 $I_C = -71$ mA dc, $V_{CE} = -70$ V dc 2N4236

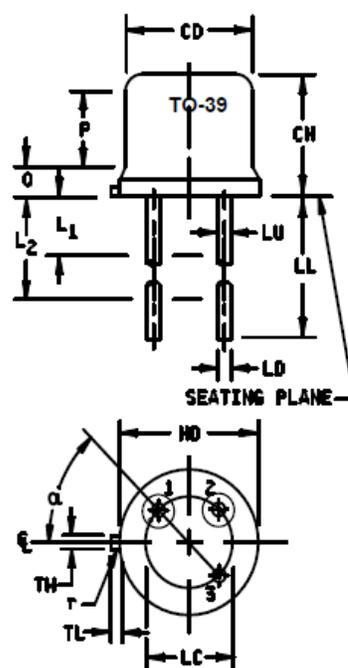
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Outline Drawing (TO-39)

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.335	7.75	8.51	
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	
LC	.200 TYP		5.08 TYP		7
LD	.016	.021	0.41	0.53	8, 9
LL	.500	.750	12.70	19.05	
LU	.016	.019	0.41	0.48	8, 9
L1		.050		1.27	8, 9
L2	.250		6.35		8, 9
P	.100		2.54		7
Q		.050		1.27	5
r		.010		0.254	10
TL	.029	.045	0.74	1.14	3, 4
TW	.028	.034	0.71	0.86	3
α	45° TP		45° TP		7
Term 1	Emitter				
Term 2	Base				
Term 3	Collector				



NOTES:

- Dimensions are in inches.
- Millimeters are given for general information only.
- Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
- Dimension TL measured from maximum HD.
- Body contour optional within zone defined by HD, CD, and Q.
- CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 -0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
- Dimension LU applies between L₁ and L₂. Dimension LD applies between L₂ and LL minimum. Diameter is uncontrolled in L₁ and beyond LL minimum.
- All three leads.
- The collector shall be internally connected to the case.
- Dimension r (radius) applies to both inside corners of tab.
- In accordance with ASME Y14.5M, diameters are equivalent to ϕ x symbology.
- Lead 1 = emitter, lead 2 = base, lead 3 = collector.

FIGURE 1. Physical dimensions (TO-39).

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