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°C unless otherwise specified)

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

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Absolute Maximum Ratings (T_A = +25°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°C (1) @ T_C = +25°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

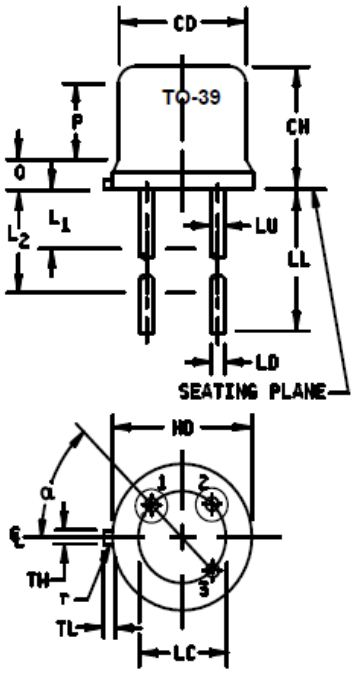
Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case (3)	$R_{\theta JC}$	29°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	175°C/W

(1) Derate linearly @ 5.7 mW/°C for T_A >+25°C.
(2) Derate linearly @ 34 mW/°C for T_C >+25°C.
(3) See figure 2 of MIL-PRF-19500/580.

Safe Operating Area	
DC Tests:	T_C = +25°C, I Cycle, t ≥ 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

Outline Drawing (TO-39)

Ltr	Dimensions				
	Inches		Millimeters		Notes
	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:
1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Beyond r (radius) maximum, TW shall be held for a minimum length of .011 (0.28 mm).
4. Dimension TL measured from maximum HD.
5. Body contour optional within zone defined by HD, CD, and Q.
6. CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
7. 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.
8. Dimension LU applies between L_1 and L_2. Dimension LD applies between L_2 and LL minimum. Diameter is uncontrolled in L_1 and beyond LL minimum.
9. All three leads.
10. The collector shall be internally connected to the case.
11. Dimension r (radius) applies to both inside corners of tab.
12. In accordance with ASME Y14.5M, diameters are equivalent to ϕx symbology.
13. Lead 1 = emitter, lead 2 = base, lead 3 = collector.

FIGURE 1. Physical dimensions (TO-39).