

# 2N4237, 2N4238, 2N4239



## NPN Power Amplifier Silicon Transistor

Rev. V4

### Features

- Available in JAN, JANTX, and JANTXV per MIL-PRF-19500/581
- TO-39 (TO-205AD) Package
- Designed for Power Amplifier, Power Driver and Switching Power Supply Applications



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

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	$I_C = 100 \text{ mA dc}$ 2N4237 2N4238 2N4239	$V_{(BR)CEO}$	V dc	50 80 100	—
Collector - Emitter Cutoff Current	$V_{BE} = 1.5 \text{ V dc}$ $V_{CE} = 50 \text{ V dc}$ , 2N4237 $V_{CE} = 80 \text{ V dc}$ , 2N4238 $V_{CE} = 100 \text{ V dc}$ , 2N4239	$I_{CEX1}$	nA dc	—	100
Collector - Emitter Cutoff Current	$V_{CB} = 50 \text{ V dc}$ , 2N4237 $V_{CB} = 80 \text{ V dc}$ , 2N4238 $V_{CB} = 100 \text{ V dc}$ , 2N4239	$I_{CBO}$	nA dc	—	100
Emitter - Base Cutoff Current	$V_{BE} = 6.0 \text{ V dc}$	$I_{EBO}$	mA dc	—	0.5
Forward Current Transfer Ratio	$I_C = 100 \text{ mA dc}$ , $V_{CE} = 1.0 \text{ V dc}$ $I_C = 250 \text{ mA dc}$ , $V_{CE} = 1.0 \text{ V dc}$ $I_C = 500 \text{ mA dc}$ , $V_{CE} = 1.0 \text{ V dc}$	$h_{FE}$	-	30 30 30	150
Collector - Emitter Saturation Voltage	$I_C = 500 \text{ mA dc}$ , $I_B = 50 \text{ mA dc}$ $I_C = 1.0 \text{ A dc}$ , $I_B = 0.1 \text{ A dc}$	$V_{CE(sat)1}$ $V_{CE(sat)2}$	V dc	—	0.3 0.6
Base - Emitter Saturation Voltage	$I_C = 500 \text{ mA dc}$ , $I_B = 50 \text{ mA dc}$ $I_C = 1.0 \text{ A dc}$ , $I_B = 0.1 \text{ A dc}$	$V_{BE(sat)1}$ $V_{BE(sat)2}$	V dc	—	1.0 1.5
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{BE} = 1.5 \text{ V dc}$ $V_{CE} = 30 \text{ V dc}$ , 2N4237 $V_{CE} = 50 \text{ V dc}$ , 2N4238 $V_{CE} = 70 \text{ V dc}$ , 2N4239	$I_{CEX2}$	$\mu\text{A dc}$	—	25
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	
<b>Dynamic Characteristics</b>					
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = 100 \text{ mA dc}$ , $V_{CE} = 10 \text{ V dc}$ , $f = 10 \text{ MHz}$	$ h_{FE} $	-	3	—
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 noted)

Ratings	Symbol	Value
Collector - Emitter Voltage 2N4237 2N4238 2N4239	$V_{CE0}$	40 V dc 60 V dc 80 V dc
Collector - Base Voltage 2N4237 2N4238 2N4239	$V_{CBO}$	50 V dc 80 V dc 100 V dc
Emitter - Base Voltage	$V_{EBO}$	6.0 V dc
Collector Current	$I_C$	1.0 A dc
Base Current	$I_B$	0.5 A dc
Total Power Dissipation @ $T_A = +25^\circ\text{C}^2$ @ $T_C = +25^\circ\text{C}^3$	$P_T$	1.0 W 6.0 W
Operating & Storage Temperature Range	$T_J, T_{STG}$	$-65^\circ\text{C}$ to $+200^\circ\text{C}$

- Derate linearly @ 5.7 mW/ $^\circ\text{C}$  for  $T_A > +25^\circ\text{C}$ .
- Derate linearly @ 34 mW/ $^\circ\text{C}$  for  $T_C > +75^\circ\text{C}$ .

### Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}$	$18^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	$175^\circ\text{C/W}$

### Safe Operating Area

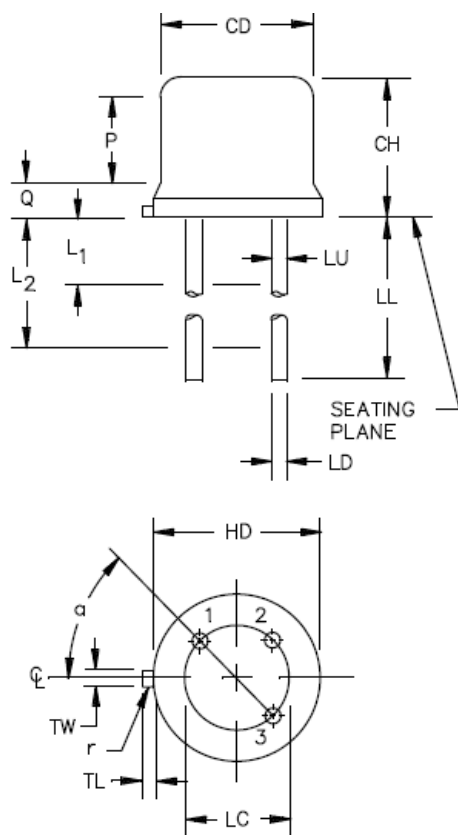
DC Tests:	$T_C = +25^\circ\text{C}$ , I Cycle, $t \geq 0.5$ s
Test 1:	$V_{CE} = 6$ V dc, $I_C = 1.0$ A dc
Test 2:	$V_{CE} = 12$ V dc, $I_C = 500$ mA dc
Test 3:	$V_{CE} = 30$ V dc, $I_C = 166$ mA dc 2N4237
	$V_{CE} = 50$ V dc, $I_C = 100$ mA dc 2N4238
	$V_{CE} = 70$ V dc, $I_C = 71$ mA dc, 2N4239

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### Outline Drawing



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	.305	.355	7.75	9.02	
CH	.240	.260	6.10	6.60	
HD	.335	.370	8.51	9.40	
LC	.200 TP		5.08TP		3
LD	.016	.021	0.41	0.53	4
LL	.500	.750	12.70	19.05	4
LU	.016	.019	0.41	0.48	4
L1		.050		1.27	4
L2	.250		6.35		4
TL	.029	.045	0.74	1.14	5
TW	.028	.034	0.71	0.86	6
P	.100		2.54		7
Q		.050		1.27	8
R		.010		0.25	9
$\alpha$	45° TP		45° TP		3
Notes	1, 2, 8, 9				

#### NOTES:

- Dimensions are in inches. Millimeters are given for general information only.
- Lead designation shall be as follows: Terminal 1 is the emitter, terminal 2 is the base, and terminal 3 is the collector. Lead number three is electrically connected to case.
- Leads at gauge plane .054 inch (1.37 mm) +.001 inch (0.03 mm) -.000 inch (0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) relative to tab. Device may be measured by direct methods or by gauge.
- Dimension LD applies between L1 and L2. Dimension LD applies between dimension L2 and LL minimum.
- Dimension TL is measured from dimension HD maximum.
- Beyond dimension r maximum, dimension TW shall be held for a minimum length of .011 inch (0.28 mm).
- Dimension CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
- Details of outline in this zone are optional.
- Dimension r applied to both inside corners of tab.
- In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.

FIGURE 1. Physical dimensions (TO-205AD formerly TO-39).

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