

# 2N6338, 2N6341



## NPN High Power Silicon Transistor

Rev. V2

### Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/509
- TO-3 (TO-204AA) Package
- Designed for Use in Hi-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	$I_C = 50 \text{ mA dc}$ , 2N6338 $I_C = 50 \text{ mA dc}$ , 2N6341	$V_{(BR)CEO}$	V dc	100 150	—
Collector - Emitter Cutoff Current	$V_{CE} = 50 \text{ V dc}$ , 2N6338 $V_{CE} = 75 \text{ V dc}$ , 2N6341	$I_{CEO}$	$\mu\text{A dc}$	—	50 50
Emitter - Base Cutoff Current	$V_{EB} = 6.0 \text{ Vdc}$	$I_{EBO}$	$\mu\text{A dc}$	—	100
Collector - Emitter Cutoff Current	$V_{CE} = 100 \text{ V dc}$ ; $V_{BE} = -1.5 \text{ V dc}$ , 2N6338 $V_{CE} = 150 \text{ V dc}$ ; $V_{BE} = -1.5 \text{ V dc}$ , 2N6341	$I_{CEX1}$	$\mu\text{A dc}$	—	10 10
Collector - Base Cutoff Current	$V_{CB} = 120 \text{ V dc}$ , 2N6338 $V_{CB} = 180 \text{ V dc}$ , 2N6341	$I_{CBO}$	$\mu\text{A dc}$	—	10 10
Forward Current Transfer Ratio	$V_{CE} = 2.0 \text{ V dc}$ ; $I_C = 0.5 \text{ A dc}$ $V_{CE} = 2.0 \text{ V dc}$ ; $I_C = 10 \text{ A dc}$ $V_{CE} = 2.0 \text{ V dc}$ ; $I_C = 25 \text{ A dc}$	$h_{FE}$	-	40 30 12	120
Collector - Emitter Saturation Voltage	$I_B = 1.0 \text{ A dc}$ ; $I_C = 10 \text{ A dc}$ $I_B = 2.5 \text{ A dc}$ ; $I_C = 25 \text{ A dc}$	$V_{CE(sat)1}$ $V_{CE(sat)2}$	V dc	—	1.0 1.8
Base - Emitter Saturation Voltage	$I_B = 1.0 \text{ V dc}$ ; $I_C = 10 \text{ A dc}$	$V_{BE(sat)}$	V dc	—	1.8
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{CE} = 100 \text{ V dc}$ ; $V_{BE} = -1.5 \text{ V dc}$ , 2N6338 $V_{CE} = 150 \text{ V dc}$ ; $V_{BE} = -1.5 \text{ V dc}$ , 2N6341	$I_{CEX2}$	$\text{mA dc}$	—	1.0 1.0
Forward Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $V_{CE} = 2.0 \text{ V dc}$ ; $I_C = 10 \text{ A dc}$	$h_{FE4}$	-	10	
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio	$V_{CE} = 10 \text{ V dc}$ ; $I_C = 1.0 \text{ A dc}$ ; $f = 10 \text{ MHz}$	$ h_{FE} $		4.0	12
Open Capacitance, Open Circuit	$V_{CB} = 10 \text{ V dc}$ ; $I_E = 0$ ; $0.1 \text{ MHz} \leq f \leq 1 \text{ MHz}$	$C_{obo}$	pF	—	450

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

Ratings	Symbol	Value
Collector - Emitter Voltage 2N6338 2N6341	$V_{CEO}$	100 V dc 150 V dc
Collector - Base Voltage 2N6338 2N6341	$V_{CBO}$	120 V dc 180 V dc
Emitter - Base Voltage	$V_{EBO}$	6.0 V dc
Base Current	$I_B$	10 A dc
Collector Current	$I_C$	25 A dc
Total Power Dissipation @ $T_A = +25^\circ\text{C}$ <sup>(1)(2)</sup> @ $T_C = +25^\circ\text{C}$ <sup>(1)(2)</sup> @ $T_C = +100^\circ\text{C}$	$P_T$	3.5 W 200 W 112 W
Operating & Storage Temperature Range	$T_{OP}, T_{STG}$	$-65^\circ\text{C}$ to $+200^\circ\text{C}$

### Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case <sup>(3)</sup>	$R_{\theta JC}$	$0.875^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	$50^\circ\text{C/W}$

(1) Between  $T_C = +25^\circ\text{C}$  and  $T_C = +200^\circ\text{C}$ , linear derating factor (average) =  $1.14 \text{ W}^\circ\text{C}$ .

(2) Maintain voltage and current according to the safe operating area as shown on figures 2 and 3 and appropriate mounting conditions.

(3) See figure 4 for thermal impedance graphs.

Switching Characteristics	Symbol	Max. Value
$V_{CC} = 80 \text{ V}; I_C = 10 \text{ A dc}; I_{B1} = 1.0 \text{ A dc}$	$t_{on}$	$0.5 \mu\text{s}$
$V_{CC} = 80 \text{ V}; I_C = 10 \text{ A dc}; I_{B1} = I_{B2} = 1.0 \text{ A dc}$	$t_{off}$	$1.25 \mu\text{s}$
$V_{CC} = 80 \text{ V}; I_C = 10 \text{ A dc}; I_{B1} = I_{B2} = 1.0 \text{ A dc}$	$t_s$	$1.0 \mu\text{s}$

### Safe Operating Area

DC Tests:  $T_C = +25^\circ\text{C}; 1\text{Cycle}; t = 1.0 \text{ s}$

Test 1:  $I_C = 25 \text{ A dc}; V_{CE} = 8 \text{ V dc}$

Test 2:  $I_C = 14 \text{ A dc}; V_{CE} = 14 \text{ V dc}$

Test 3:  $I_C = 100 \text{ mA dc}; V_{CE} = 100 \text{ V dc}$  2N6338

Test 3:  $I_C = 66 \text{ mA dc}; V_{CE} = 150 \text{ V dc}$  2N6341

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## Outline Drawing (TO-3)

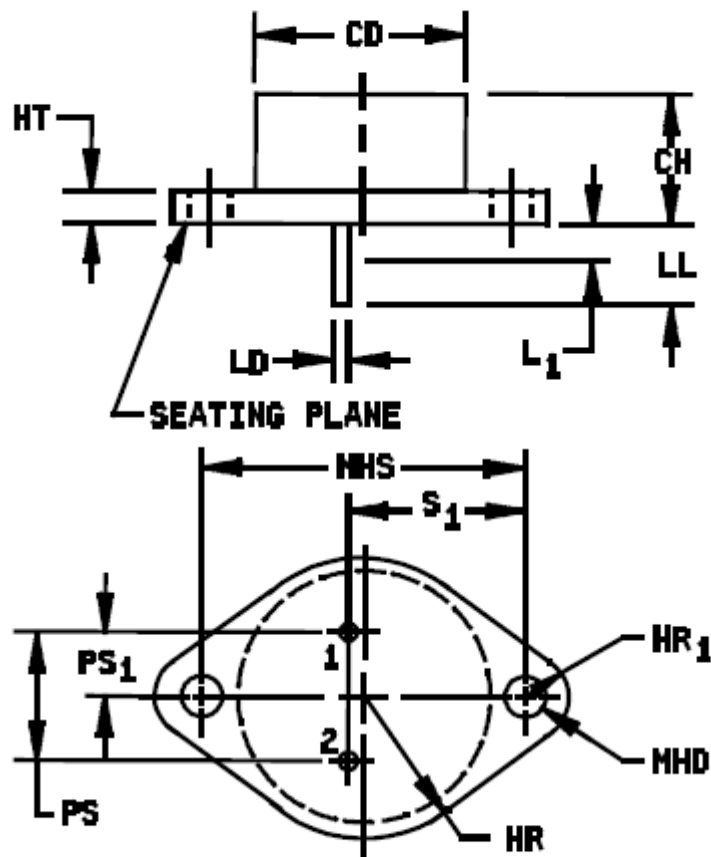


FIGURE 1. Physical dimensions (similar to TO-204AA formerly TO-3).

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### Outline Drawing (TO-3)

Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.23	
CH	.250	.360	6.35	9.14	
HR	.495	.525	12.57	13.33	4
HR <sub>1</sub>	.131	.188	3.33	4.78	4
HT	.060	.135	1.52	3.43	
LD	.038	.043	0.97	1.09	4, 6
LL	.312	.500	7.92	12.7	
L <sub>1</sub>		.050		1.27	6
MHD	.151	.165	3.83	4.19	4
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	3
PS <sub>1</sub>	.205	.225	5.21	5.72	3
S <sub>1</sub>	.655	.675	16.64	17.15	
Notes	1, 2, 5, 7		1, 2, 5, 7		

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. These dimensions should be measured at points .050 inch (1.27 mm) +.005 inch (0.13 mm) -.000 inch (0.00 mm) below seating plane. When gauge is not used, measurement will be made at the seating plane.
4. Two places.
5. The seating plane of the header shall be flat within .001 inch (0.03 mm) concave to .004 inch (0.10 mm) convex inside a .930 inch (23.62 mm) diameter circle on the center of the header and flat within .001 inch (0.03 mm) concave to .006 inch (0.15 mm) convex overall.
6. Lead diameter shall not exceed twice LD within L<sub>1</sub>.
7. Lead designation shall be as follows:

Lead Number	
1	Emitter
2	Base
Case	Collector

FIGURE 1. Physical dimensions (similar to TO-204AA formally TO-3) - Continued.

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