

## NPN DARLINGTON POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/472

### Devices

**2N6350          2N6351          2N6352          2N6353**

### Qualified Level

**JAN  
JANTX  
JANTXV**

### MAXIMUM RATINGS

Ratings	Symbol	2N6350 2N6352	2N6351 2N6353	Units
Collector-Emitter Voltage	$V_{CER}$	80	150	Vdc
Collector-Base Voltage	$V_{CBO}$	80	150	Vdc
Emitter-Base Voltage	$V_{EBO}$	12 6.0		Vdc Vdc
Base Current	$I_B$	0.5		Adc
Collector Current	$I_C$	5.0 10 <sup>(1)</sup>		Adc Adc
		<b>2N6350 2N6351</b>	<b>2N6352 2N6353</b>	
Total Power Dissipation @ $T_A = 25^{\circ}C$ @ $T_C = 100^{\circ}C$	$P_T$	1.0 <sup>(2)</sup> 5.0 <sup>(3)</sup>	2.0 <sup>(4)</sup> 25 <sup>(5)</sup>	W W
Operating & Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +200		$^{\circ}C$

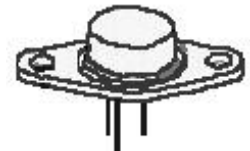
### THERMAL CHARACTERISTICS

Characteristics	Symbol	2N6350 2N6351	2N6352 2N6353	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	20	4.0	$^{\circ}C/W$

- 1) Applies for  $t_p \leq 10$  ms, Duty cycle  $\leq 50\%$
- 2) Derate linearly @  $5.72$  mW/ $^{\circ}C$  above  $T_A > 25^{\circ}C$
- 3) Derate linearly @  $50$  mW/ $^{\circ}C$  above  $T_C > 100^{\circ}C$
- 4) Derate linearly @  $11.4$  mW/ $^{\circ}C$  above  $T_A > 25^{\circ}C$
- 5) Derate linearly @  $250$  mW/ $^{\circ}C$  above  $T_C > 100^{\circ}C$



2N6350, 2N6351  
TO-33\*



2N6352, 2N6353  
TO-24\* (TO-213AA)

\*See Appendix A for package outline

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 25$ mAdc, $R_{B1E} = 2.2$ k $\Omega$ , $R_{B2E} = 100$ $\Omega$	2N6350, 2N6352 2N6351, 2N6353	$V_{(BR)CER}$	80 150	Vdc
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**2N6350, 2N6351, 2N6352, 2N6353 JAN SERIES**

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics	Symbol	Min.	Max.	Unit
Emitter-Base Breakdown Voltage I <sub>EB</sub> = 12 mA <sub>dc</sub> , Base 1 Open I <sub>EB</sub> = 12 mA <sub>dc</sub> , Base 2 Open	V <sub>(BR)EBO</sub>	6.0 12		V <sub>dc</sub>
Collector-Emitter Cutoff Current V <sub>EB1</sub> = 2.0 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω, V <sub>CE</sub> = 80 V <sub>dc</sub> 2N6350, 2N6352 V <sub>EB1</sub> = 2.0 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω, V <sub>CE</sub> = 150 V <sub>dc</sub> 2N6351, 2N6353	I <sub>CEX</sub>		1.0 1.0	μA <sub>dc</sub>

**ON CHARACTERISTICS <sup>(6)</sup>**

Forward-Current Transfer Ratio I <sub>C</sub> = 1.0 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>B2E</sub> = 1.0 Ω    2N6350, 2N6352 I <sub>C</sub> = 5.0 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω I <sub>C</sub> = 10 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω  I <sub>C</sub> = 1.0 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>B2E</sub> = 1.0 Ω    2N6351, 2N6353 I <sub>C</sub> = 5.0 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω I <sub>C</sub> = 10 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω	h <sub>FE</sub>	2,000 2,000 400  1,000 1,000 200	10,000   10,000	
Collector-Emitter Saturation Voltage I <sub>C</sub> = 5.0 A <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω, I <sub>B1</sub> = 5.0 mA <sub>dc</sub> 2N6350, 2N6352 I <sub>C</sub> = 5.0 A <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω, I <sub>B1</sub> = 10 mA <sub>dc</sub> 2N6351, 2N6353	V <sub>CE(sat)</sub>		1.5 2.5	V <sub>dc</sub>
Base-Emitter Voltage I <sub>C</sub> = 5.0 A <sub>dc</sub> , V <sub>CE</sub> = 5.0 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω	V <sub>BE1(on)</sub>		2.5	V <sub>dc</sub>

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I <sub>C</sub> = 1.0 A <sub>dc</sub> , V <sub>CE</sub> = 10 V <sub>dc</sub> , R <sub>B2E</sub> = 100 Ω; f = 10 MHz	h <sub>fe</sub>	5.0	25	
Output Capacitance V <sub>CB1</sub> = 10 V <sub>dc</sub> , 100 kHz ≤ f ≤ 1.0 MHz, Base 2 Open	C <sub>obo</sub>		120	pF

**SWITCHING CHARACTERISTICS**

Turn-On Time V <sub>CC</sub> = 30 V <sub>dc</sub> ; I <sub>C</sub> = 5.0 A <sub>dc</sub> (See fig 4 for 2N6350, 2N6352) (See fig 5 for 2N6350, 2N6352)	t <sub>on</sub>		0.5	μs
Turn-Off Time V <sub>CC</sub> = 30 V <sub>dc</sub> ; I <sub>C</sub> = 5.0 A <sub>dc</sub> (See fig 4 for 2N6350, 2N6352) (See fig 5 for 2N6350, 2N6352)	t <sub>off</sub>		1.2	μs

**SAFE OPERATING AREA**

<b>DC Tests</b>	
T <sub>C</sub> = +100°C, 1 Cycle, t ≥ 1.0 s, t <sub>r</sub> + t <sub>f</sub> = 10 μs, R <sub>B2E</sub> = 100 Ω (See fig 6 for 2N6350, 2N6351)	
<b>Test 1</b>	V <sub>CE</sub> = 1.5V <sub>dc</sub> , I <sub>C</sub> = 3.3 A <sub>dc</sub> 2N6350, 2N6351
<b>Test 2</b>	V <sub>CE</sub> = 30 V <sub>dc</sub> , I <sub>C</sub> = 167 mA <sub>dc</sub> 2N6350, 2N6351
<b>Test 3</b>	V <sub>CE</sub> = 80 V <sub>dc</sub> , I <sub>C</sub> = 35 mA <sub>dc</sub> 2N6350
<b>Test 4</b>	V <sub>CE</sub> = 150 V <sub>dc</sub> , I <sub>C</sub> = 13 mA <sub>dc</sub> 2N6351
T <sub>C</sub> = +100°C, 1 Cycle, t ≥ 1.0 s, t <sub>r</sub> + t <sub>f</sub> = 10 μs, R <sub>B2E</sub> = 100 Ω (See fig 7 for 2N6352, 2N6353)	
<b>Test 1</b>	V <sub>CE</sub> = 5.0V <sub>dc</sub> , I <sub>C</sub> = 5.0 A <sub>dc</sub> 2N6352, 2N6353
<b>Test 2</b>	V <sub>CE</sub> = 10 V <sub>dc</sub> , I <sub>C</sub> = 2.5 A <sub>dc</sub> 2N6352, 2N6353
<b>Test 3</b>	V <sub>CE</sub> = 80 V <sub>dc</sub> , I <sub>C</sub> = 95 mA <sub>dc</sub> 2N6352
<b>Test 4</b>	V <sub>CE</sub> = 150 V <sub>dc</sub> , I <sub>C</sub> = 35 mA <sub>dc</sub> 2N6353

(6) Pulse Test: Pulse Width = 300μs, Duty Cycle ≤ 2.0%.

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