

## 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		$^{\circ}C$

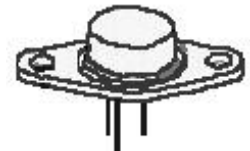
### THERMAL CHARACTERISTICS

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
-----------------	--------	------	------	------

### 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
---	----------------------------------	---------------	-----------	-----

**2N6350, 2N6351, 2N6352, 2N6353 JAN SERIES**

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics	Symbol	Min.	Max.	Unit
Emitter-Base Breakdown Voltage $I_{EB} = 12 \text{ mAdc}$ , Base 1 Open $I_{EB} = 12 \text{ mAdc}$ , Base 2 Open	$V_{(BR)EBO}$	6.0 12		Vdc
Collector-Emitter Cutoff Current $V_{EB1} = 2.0 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$ , $V_{CE} = 80 \text{ Vdc}$ 2N6350, 2N6352 $V_{EB1} = 2.0 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$ , $V_{CE} = 150 \text{ Vdc}$ 2N6351, 2N6353	$I_{CEX}$		1.0 1.0	$\mu\text{A dc}$

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

Forward-Current Transfer Ratio $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $R_{B2E} = 1.0 \Omega$ 2N6350, 2N6352 $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$ $I_C = 10 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$ $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $R_{B2E} = 1.0 \Omega$ 2N6351, 2N6353 $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$ $I_C = 10 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$	$h_{FE}$	2,000 2,000 400 1,000 1,000 200	10,000 10,000	
Collector-Emitter Saturation Voltage $I_C = 5.0 \text{ Adc}$ , $R_{B2E} = 100 \Omega$ , $I_{B1} = 5.0 \text{ mA dc}$ 2N6350, 2N6352 $I_C = 5.0 \text{ Adc}$ , $R_{B2E} = 100 \Omega$ , $I_{B1} = 10 \text{ mA dc}$ 2N6351, 2N6353	$V_{CE(sat)}$		1.5 2.5	Vdc
Base-Emitter Voltage $I_C = 5.0 \text{ Adc}$ , $V_{CE} = 5.0 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$	$V_{BE1(on)}$		2.5	Vdc

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0 \text{ Adc}$ , $V_{CE} = 10 \text{ Vdc}$ , $R_{B2E} = 100 \Omega$ ; $f = 10 \text{ MHz}$	$ h_{fe} $	5.0	25	
Output Capacitance $V_{CB1} = 10 \text{ Vdc}$ , $100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$ , Base 2 Open	$C_{obo}$		120	pF

**SWITCHING CHARACTERISTICS**

Turn-On Time $V_{CC} = 30 \text{ Vdc}$ ; $I_C = 5.0 \text{ Adc}$ (See fig 4 for 2N6350, 2N6352) (See fig 5 for 2N6350, 2N6352)	$t_{on}$		0.5	$\mu\text{s}$
Turn-Off Time $V_{CC} = 30 \text{ Vdc}$ ; $I_C = 5.0 \text{ Adc}$ (See fig 4 for 2N6350, 2N6352) (See fig 5 for 2N6350, 2N6352)	$t_{off}$		1.2	$\mu\text{s}$

**SAFE OPERATING AREA**

<b>DC Tests</b>	
$T_C = +100^\circ\text{C}$ , 1 Cycle, $t \geq 1.0 \text{ s}$ , $t_r + t_f = 10 \mu\text{s}$ , $R_{B2E} = 100 \Omega$ (See fig 6 for 2N6350, 2N6351)	
<b>Test 1</b> $V_{CE} = 1.5 \text{ Vdc}$ , $I_C = 3.3 \text{ Adc}$	2N6350, 2N6351
<b>Test 2</b> $V_{CE} = 30 \text{ Vdc}$ , $I_C = 167 \text{ mA dc}$	2N6350, 2N6351
<b>Test 3</b> $V_{CE} = 80 \text{ Vdc}$ , $I_C = 35 \text{ mA dc}$	2N6350
<b>Test 4</b> $V_{CE} = 150 \text{ Vdc}$ , $I_C = 13 \text{ mA dc}$	2N6351
$T_C = +100^\circ\text{C}$ , 1 Cycle, $t \geq 1.0 \text{ s}$ , $t_r + t_f = 10 \mu\text{s}$ , $R_{B2E} = 100 \Omega$ (See fig 7 for 2N6352, 2N6353)	
<b>Test 1</b> $V_{CE} = 5.0 \text{ Vdc}$ , $I_C = 5.0 \text{ Adc}$	2N6352, 2N6353
<b>Test 2</b> $V_{CE} = 10 \text{ Vdc}$ , $I_C = 2.5 \text{ Adc}$	2N6352, 2N6353
<b>Test 3</b> $V_{CE} = 80 \text{ Vdc}$ , $I_C = 95 \text{ mA dc}$	2N6352
<b>Test 4</b> $V_{CE} = 150 \text{ Vdc}$ , $I_C = 35 \text{ mA dc}$	2N6353

(6) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .