

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 ⁽¹⁾		Adc Adc
		2N6350 2N6351	2N6352 2N6353	
Total Power Dissipation @ $T_A = 25^{\circ}C$ @ $T_C = 100^{\circ}C$	P_T	1.0 ⁽²⁾ 5.0 ⁽³⁾	2.0 ⁽⁴⁾ 25 ⁽⁵⁾	W W
Operating & Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200		$^{\circ}C$

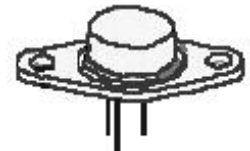
THERMAL CHARACTERISTICS

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 Ω , $R_{B2E} = 100$ Ω	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 $I_{EB} = 12 \text{ mAdc}$, 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	μAdc

ON CHARACTERISTICS ⁽⁶⁾

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 $I_C = 5.0 \text{ Adc}$, $R_{B2E} = 100 \Omega$, $I_{B1} = 5.0 \text{ mAdc}$ 2N6350, 2N6352 $I_C = 5.0 \text{ Adc}$, $R_{B2E} = 100 \Omega$, $I_{B1} = 10 \text{ mAdc}$ 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	μs
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	μs

SAFE OPERATING AREA

DC Tests	
$T_C = +100^\circ\text{C}$, 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)	
Test 1	$V_{CE} = 1.5\text{Vdc}$, $I_C = 3.3 \text{ Adc}$ 2N6350, 2N6351
Test 2	$V_{CE} = 30 \text{ Vdc}$, $I_C = 167 \text{ mAdc}$ 2N6350, 2N6351
Test 3	$V_{CE} = 80 \text{ Vdc}$, $I_C = 35 \text{ mAdc}$ 2N6350
Test 4	$V_{CE} = 150 \text{ Vdc}$, $I_C = 13 \text{ mAdc}$ 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)	
Test 1	$V_{CE} = 5.0\text{Vdc}$, $I_C = 5.0 \text{ Adc}$ 2N6352, 2N6353
Test 2	$V_{CE} = 10 \text{ Vdc}$, $I_C = 2.5 \text{ Adc}$ 2N6352, 2N6353
Test 3	$V_{CE} = 80 \text{ Vdc}$, $I_C = 95 \text{ mAdc}$ 2N6352
Test 4	$V_{CE} = 150 \text{ Vdc}$, $I_C = 35 \text{ mAdc}$ 2N6353

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