

## PNP DARLINGTON POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/527

### Devices

2N6648

2N6649

2N6650

### Qualified Level

JANTX  
JANTXV

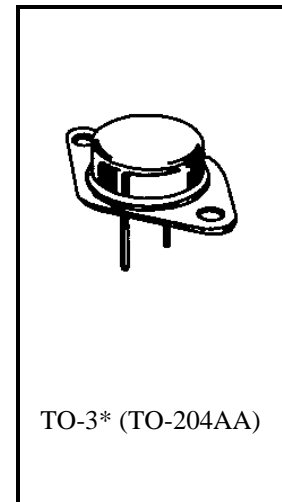
### MAXIMUM RATINGS

Ratings	Symbol	2N6648	2N6649	2N6650	Unit
Collector-Emitter Voltage	$V_{CEO}$	-40	-60	-80	Vdc
Collector-Base Voltage	$V_{CBO}$	-40	-60	-80	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0			Vdc
Base Current	$I_B$	-0.25			Adc
Collector Current	$I_C$	-10			Adc
Total Power Dissipation	$P_T$	@ $T_A = +25^{\circ}\text{C}$ <sup>(1)</sup>			W
		@ $T_C = +25^{\circ}\text{C}$ <sup>(2)</sup>			W
Operating & Storage Junction Temperature Range	$T_J, T_{stg}$	-65 to +175			$^{\circ}\text{C}$

### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance Junction-to-Case	$R_{\theta JC}$	1.76	$^{\circ}\text{C}/\text{W}$

- 1) Derate linearly 33.3 mW/ $^{\circ}\text{C}$  for  $T_A > +25^{\circ}\text{C}$
- 2) Derate linearly 567 mW/ $^{\circ}\text{C}$  for  $T_C > +25^{\circ}\text{C}$



\*See Appendix A for package outline

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

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

Collector-Emitter Breakdown Voltage $I_C = 200 \text{ mAdc}$	2N6648 2N6649 2N6650	$V_{(BR)CEO}$	-40 -60 -80	Vdc
Collector-Emitter Breakdown Voltage $I_C = 200 \text{ mAdc}, R_{BB} = 100 \Omega$	2N6648 2N6649 2N6650	$V_{(BR)CER}$	-40 -60 -80	Vdc
Collector-Base Cutoff Current $V_{CB} = -40 \text{ Vdc}$ $V_{CB} = -60 \text{ Vdc}$ $V_{CB} = -80 \text{ Vdc}$	2N6648 2N6649 2N6650	$I_{CBO}$	-1.0 -1.0 -1.0	mAdc

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics	Symbol	Min.	Max.	Unit
Emitter-Base Cutoff Current $V_{EB} = 5.0 \text{ Vdc}$	$I_{EBO}$		-10	mAdc
Collector-Emitter Cutoff Current $V_{CE} = -40 \text{ Vdc}$ 2N6648 $V_{CE} = -60 \text{ Vdc}$ 2N6649 $V_{CE} = -80 \text{ Vdc}$ 2N6650	$I_{CEO}$		-1.0 -1.0 -1.0	mAdc
Collector-Emitter Cutoff Current $V_{CE} = -40 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ 2N6648 $V_{CE} = -60 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ 2N6649 $V_{CE} = -80 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ 2N6650	$I_{CEX}$		-0.3 -0.3 -0.3	mAdc

**ON CHARACTERISTICS <sup>(3)</sup>**

Forward-Current Transfer Ratio $I_C = -1.0 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$ $I_C = -5.0 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$ $I_C = -10 \text{ Adc}, V_{CE} = 3.0 \text{ Vdc}$	$h_{FE}$	300 1,000 100	20,000	
Collector-Emitter Saturation Voltage $I_C = -5.0 \text{ Adc}, I_B = -10 \text{ mAdc}$ $I_C = -10 \text{ Adc}, I_B = -0.1 \text{ Adc}$	$V_{CE(sat)}$		-2.0 -3.0	Vdc
Base-Emitter Voltage $I_C = -5.0 \text{ Adc}, V_{CE} = -3.0 \text{ Vdc}$ $I_C = -10 \text{ Adc}, V_{CE} = -3.0 \text{ Vdc}$	$V_{BE(on)}$		-2.8 -4.5	Vdc

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = -1.0 \text{ Adc}, V_{CE} = -5.0 \text{ Vdc}, f = 1.0 \text{ MHz}$	$ h_{fe} $	50	400	
Output Capacitance $V_{CB} = 10 \text{ Vdc}, I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	$C_{obo}$		300	pF

**SWITCHING CHARACTERISTICS**

Turn-On Time $V_{CC} = -30 \text{ Vdc}; I_C = -5.0 \text{ Adc}; I_{B1} = -20 \text{ mAdc}$	$t_{on}$		2.5	$\mu\text{s}$
Turn-Off Time $V_{CC} = -30 \text{ Vdc}; I_C = -5.0 \text{ Adc}; I_{B1} = -I_{B2} = 20 \text{ mAdc}$	$t_{off}$		10	$\mu\text{s}$

**SAFE OPERATING AREA**

<b>DC Tests</b>				
$T_C = +25^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$				
<b>Test 1</b>				
$V_{CE} = -8.5 \text{ Vdc}, I_C = -10 \text{ Adc}$				
<b>Test 2</b>				
$V_{CE} = -25 \text{ Vdc}, I_C = -3.4 \text{ Adc}$				
<b>Test 3</b>				
$V_{CE} = -40 \text{ Vdc}, I_C = -0.9 \text{ Adc}$		2N6648		
$V_{CE} = -60 \text{ Vdc}, I_C = -0.3 \text{ Adc}$		2N6449		
$V_{CE} = -80 \text{ Vdc}, I_C = -0.14 \text{ Adc}$		2N6650		

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