

2N6058 & 2N6059



NPN Darlington Power Silicon Transistors

Rev. V3

Features

- Available in JAN, JANTX, JANTXV per MIL-PRF-19500/502
- TO-3 (TO-204AA) Package
- Designed for Use in High Gain Amplifier and Switching Applications



Electrical Characteristics ($T_A = +25^\circ\text{C}$ unless otherwise noted)

Parameter	Test Conditions	Symbol	Units	Min.	Max.
Collector - Emitter Breakdown Voltage	$I_C = 100 \text{ mA dc}$, 2N6058 $I_C = 100 \text{ mA dc}$, 2N6059	$V_{(BR)CEO}$	V dc	80 100	—
Collector - Emitter Cutoff Current	$V_{CE} = 40 \text{ V dc}$, 2N6058 $V_{CE} = 50 \text{ V dc}$, 2N6059	I_{CEO}	mA dc	—	1.0 1.0
Collector - Emitter Cutoff Current	$V_{CE} = 80 \text{ V dc}$; $V_{BE} = 1.5 \text{ V dc}$, 2N6058 $V_{CE} = 100 \text{ V dc}$; $V_{BE} = 1.5 \text{ V dc}$, 2N6059	I_{CEX1}	$\mu\text{A dc}$	—	10 10
Collector - Base Cutoff Current	$V_{EB} = 5 \text{ Vdc}$	I_{EBO}	mA dc	—	2.0
Forward Current Transfer Ratio	$I_C = 1 \text{ A dc}$; $V_{CE} = 3 \text{ V dc}$ $I_C = 6 \text{ A dc}$; $V_{CE} = 3 \text{ V dc}$ $I_C = 12 \text{ A dc}$; $V_{CE} = 3 \text{ V dc}$	h_{FE}	-	1,000 1,000 150	18,000
Collector - Emitter Saturation Voltage	$I_C = 12 \text{ A dc}$; $I_B = 120 \text{ mA dc}$ $I_C = 6 \text{ A dc}$; $I_B = 24 \text{ mA dc}$	$V_{CE(sat)1}$ $V_{CE(sat)2}$	Vdc	—	3.0 2.0
Base - Emitter Voltage	$I_C = 12 \text{ A dc}$; $I_B = 120 \text{ mA dc}$	$V_{BE(SAT)}$	Vdc	—	4.0
Base - Emitter Voltage	$I_C = 6 \text{ A dc}$; $V_{CE} = 3 \text{ Vdc}$	V_{BE}	Vdc	—	2.8
Collector - Emitter Cutoff Current	$T_A = +150^\circ\text{C}$ $V_{CE} = 80 \text{ V dc}$; $V_{BE} = 1.5 \text{ V dc}$, 2N6058 $V_{CE} = 100 \text{ V dc}$; $V_{BE} = 1.5 \text{ V dc}$, 2N6059	I_{CEX2}	mA dc	—	5.0 5.0
Collector - Emitter Saturation Voltage	$T_A = +150^\circ\text{C}$ $I_C = 6 \text{ A dc}$; $I_B = 24 \text{ mA dc}$	$V_{CE(sat)3}$	V dc	—	2.0
Forward - Current Transfer Ratio	$T_A = -55^\circ\text{C}$ $V_{CE} = 3 \text{ V dc}$; $I_C = 6 \text{ A dc}$	h_{FE4}		1,000	
Dynamic Characteristics					
Magnitude of Common Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = 5 \text{ A dc}$; $V_{CE} = 3 \text{ Vdc}$; $f = 1.0 \text{ MHz}$	$ h_{fe} $	-	10	250
Small-Signal Short-Circuit Forward Current Transfer Ratio	$I_C = 5 \text{ A dc}$; $V_{CE} = 3 \text{ Vdc}$; $f = 1 \text{ kHz}$	h_{fe}	-	1,000	—
Output Capacitance	$V_{CB} = 10 \text{ V dc}$; $I_E = 0$; $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$	C_{obo}	pF	—	300
Switching Characteristics					
Turn-On Time	$V_{CC} = 30 \text{ Vdc}$; $I_C = 5 \text{ A dc}$; $I_B = 20 \text{ mA dc}$	t_{on}	μs	—	2.0
Turn-Off Time	$V_{CC} = 30 \text{ Vdc}$; $I_C = 5 \text{ A dc}$; $I_{B1} = I_{B2} = 20 \text{ mA dc}$	t_{off}	μs	—	10

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

Ratings	Symbol	Value
Collector - Emitter Voltage 2N6058 2N6059	V_{CEO}	80 V dc 100 V dc
Collector - Base Voltage 2N6058 2N6059	V_{CBO}	80 V dc 100 V dc
Emitter - Base Voltage	V_{EBO}	5 V dc
Collector Current	I_C	12 A dc
Base Current	I_B	0.2 A dc
Total Power Dissipation @ $T_C = +25^\circ\text{C}$ ¹ @ $T_C = +100^\circ\text{C}$	P_T	150 W 75 W
Operating & Storage Temperature Range	T_J, T_{STG}	-55°C to $+175^\circ\text{C}$

(1) Derate linearly @ 1.00 W/ $^\circ\text{C}$ above $T_C > +25^\circ\text{C}$.

Thermal Characteristics

Characteristics	Symbol	Max. Value
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1°C/W

Safe Operating Area

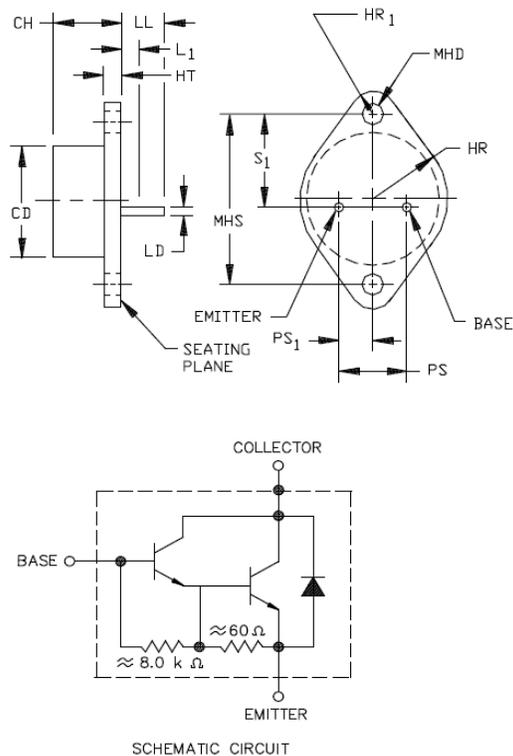
DC Tests:	$T_C = +25^\circ\text{C}, +10^\circ\text{C}, -0^\circ\text{C}$, 1 Cycle, $t \geq 1\text{s}$; 1 cycle
Test 1:	$V_{CE} = 12.5\text{ Vdc}$, $I_C = 12\text{ Adc}$
Test 2:	$V_{CE} = 30\text{ Vdc}$, $I_C = 5\text{ Adc}$
Test 3:	$V_{CE} = 70\text{ Vdc}$, $I_C = 200\text{ mAdc}$, 2N6058 $V_{CE} = 90\text{ Vdc}$, $I_C = 155\text{ mAdc}$, 2N6059

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Outline Drawing (TO-3)



Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD		.875		22.23	
CH	.250	.328	6.35	8.33	
HR	.495	.525	12.57	13.34	
HR ₁	.131	.188	3.33	4.78	3
HT	.060	.135	1.52	3.43	
LD	.038	.043	0.97	1.09	4, 5
LL	.312	.500	7.92	12.7	4
L ₁		.050		1.27	4, 5
MHD	.151	.161	3.84	4.09	6
MHS	1.177	1.197	29.90	30.40	
PS	.420	.440	10.67	11.18	7, 8
PS ₁	.205	.225	5.21	5.72	7, 4, 8
S ₁	.655	.675	16.64	17.15	7

FIGURE 1. Physical dimensions and schematic circuit (TO-204AA, similar to TO-3).

NOTES:

1. Dimensions are in inches. Millimeters are given for general information only.
2. Body contour is optional within zone defined by dimension CD.
3. At both ends.
4. Both terminals.
5. Dimension LD applies between dimension L₁ and LL. Lead diameter shall not exceed twice dimension LD within dimension L₁. Diameter is uncontrolled in dimension L₁.
6. Two holes.
7. These dimensions shall be measured at points .050 inch (1.27 mm) to .055 inch (1.40 mm) below the seating plane. When gauge is not used, measurement shall be made at seating plane.
8. 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.
9. The collector shall be electrically connected to the case.
10. In accordance with ASME Y14.5M, diameters are equivalent to ϕ symbology.

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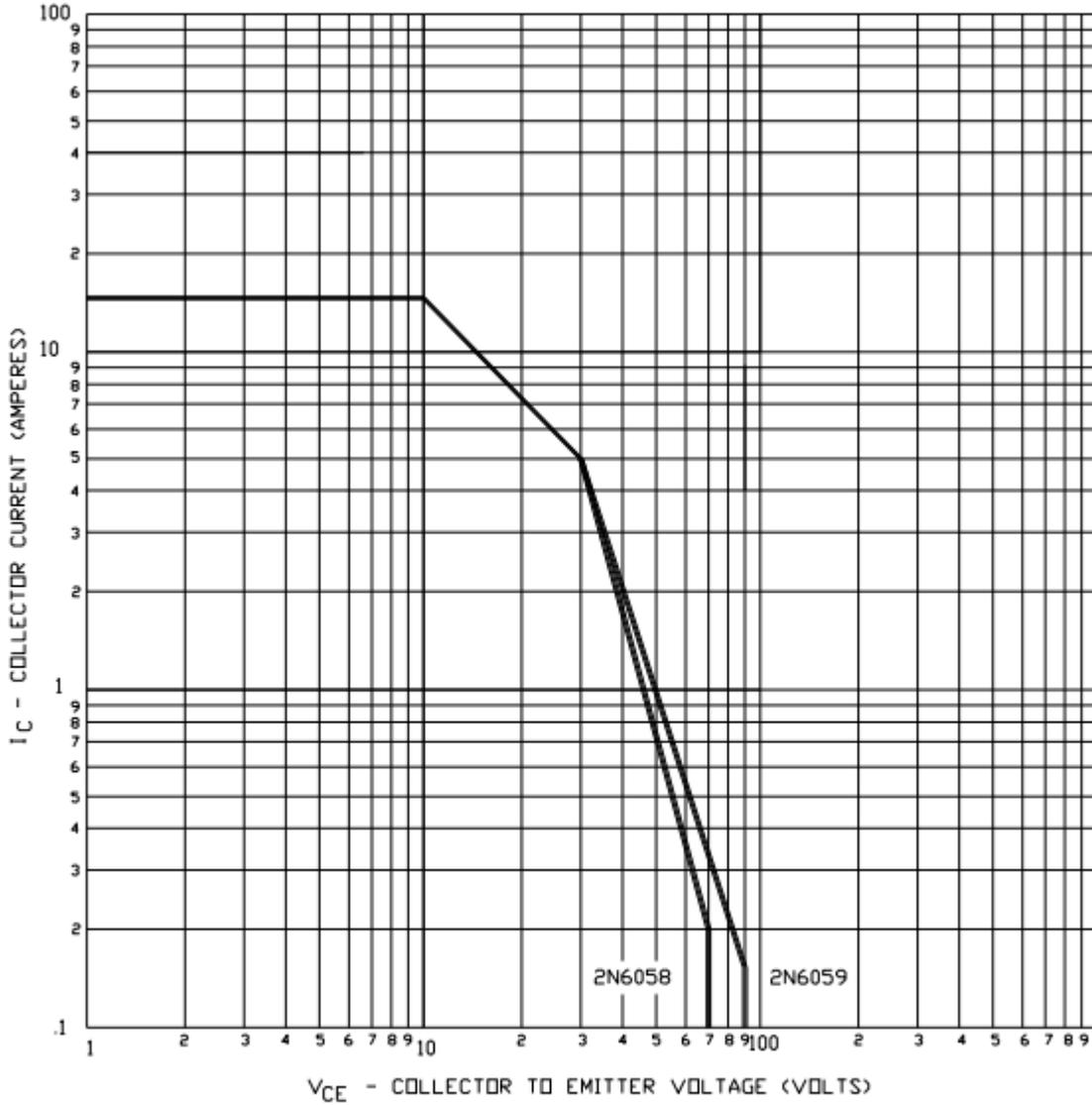


FIGURE 3. Maximum safe operating area graph (continuous dc).

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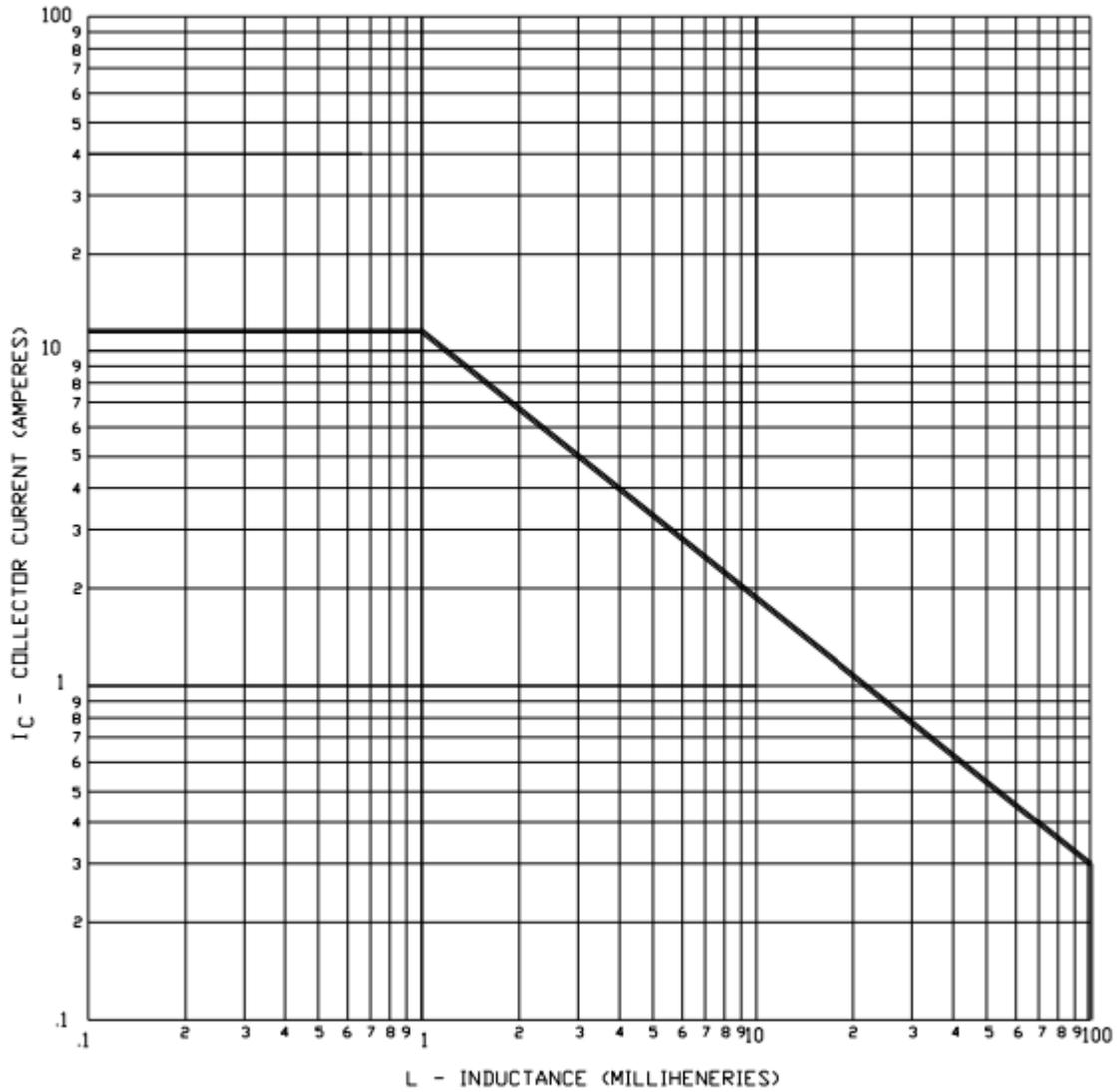


FIGURE 4. Safe operating area for switching between saturation and cutoff (unclamped inductive load).

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