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Geelead Technology Limited
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RoHS
Available

PNP Darlington Power Silicon Transistor

Qualified per MIL-PRF-19500/501

DESCRIPTION

This high speed PNP transistor is rated at 12 amps and is military qualified up to a JANTXV level. This TO-204AA isolated package features a 180 degree lead orientation.

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FEATURES

- JEDEC registered 2N6051 and 2N6052
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/501
- RoHS compliant versions available (commercial grade only)

APPLICATIONS / BENEFITS

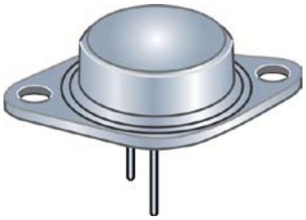
- Military, space and other high reliability applications
- High frequency response
- TO-204AA case with isolated terminals

MAXIMUM RATINGS @ T_C = +25 °C unless otherwise noted

Parameters/Test Conditions		Symbol	Value	Unit
Junction and Storage Temperature		T_J and T_{STG}	-55 to +175	°C
Thermal Resistance Junction-to-Case		$R_{\Theta JC}$	1.0	°C/W
Collector Current		I_C	-12	A
Collector-Emitter Voltage	2N6051	V_{CEO}	-80	V
	2N6052		-100	
Collector-Base Voltage	2N6051	V_{CBO}	-80	V
	2N6052		-100	
Emitter-Base Voltage		V_{EBO}	-5	V
Total Power Dissipation	@ T_C = +25 °C (1)	P_T	150	W
	@ T_C = +100 °C		75	

Notes: 1. Derate linearly 1.0 W/°C above $T_C > +25$ °C.

Qualified Levels:
JAN, JANTX, and
JANTXV



TO-204AA (TO-3)
Package

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Lawrence, MA 01841
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(978) 620-2600
Fax: (978) 689-0803

MSC – Ireland
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Ennis, Co. Clare, Ireland
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Website:
www.microsemi.com

MECHANICAL and PACKAGING

- CASE: Industry standard TO-204AA (TO-3), hermetically sealed, 0.040 inch diameter pins
- FINISH: Solder dipped tin-lead over nickel plated alloy 52 or RoHS compliant matte-tin plating. Solderable per MIL-STD-750 method 2026.
- POLARITY: PNP (see schematic)
- MOUNTING HARDWARE: Consult factory for optional insulator and sheet metal screws
- WEIGHT: Approximately 15 grams
- See package dimensions on last page.

PART NOMENCLATURE

JAN 2N6051 (e3)

Reliability Level
JAN = JAN Level
JANTX = JANTX Level
JANTXV = JANTXV Level
Blank = Commercial

JEDEC type number
(see Electrical Characteristics table)

RoHS Compliance
e3 = RoHS Compliant (available on commercial grade only)
Blank = non-RoHS Compliant

SYMBOLS & DEFINITIONS

Symbol	Definition
I_B	Base current: The value of the dc current into the base terminal.
I_C	Collector current: The value of the dc current into the collector terminal.
I_E	Emitter current: The value of the dc current into the emitter terminal.
T_C	Case temperature: The temperature measured at a specified location on the case of a device.
V_{CB}	Collector-base voltage: The dc voltage between the collector and the base.
V_{CBO}	Collector-base voltage, base open: The voltage between the collector and base terminals when the emitter terminal is open-circuited.
V_{CC}	Collector-supply voltage: The supply voltage applied to a circuit connected to the collector.
V_{CE}	Collector-emitter voltage: The dc voltage between the collector and the emitter.
V_{CEO}	Collector-emitter voltage, base open: The voltage between the collector and the emitter terminals when the base terminal is open-circuited.
V_{EB}	Emitter-base voltage: The dc voltage between the emitter and the base
V_{EBO}	Emitter-base voltage, collector open: The voltage between the emitter and base terminals with the collector terminal open-circuited.

ELECTRICAL CHARACTERISTICS @ T_A = +25 °C unless otherwise noted

Characteristics		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage $I_C = -100$ mA	2N6051 2N6052	$V_{(BR)CEO}$	-80 -100		V
Collector-Emitter Cutoff Current $V_{CE} = -40$ V $V_{CE} = -50$ V	2N6051 2N6052	I_{CEO}		-1.0 -1.0	mA
Collector-Emitter Cutoff Current $V_{CE} = -80$ V, $V_{BE} = 1.5$ V $V_{CE} = -100$ V, $V_{BE} = 1.5$ V	2N6051 2N6052	I_{CEX}		-0.01 -0.01	mA
Emitter-Base Cutoff Current $V_{BE} = -5.0$ V		I_{EBO}		-2.0	mA
ON CHARACTERISTICS					
Forward-Current Transfer Ratio $I_C = -1.0$ A, $V_{CE} = 3.0$ V $I_C = -6.0$ A, $V_{CE} = 3.0$ V $I_C = -12$ A, $V_{CE} = 3.0$ V		h_{FE}	1,000 1,000 150	18,000	
Collector-Emitter Saturation Voltage $I_C = -12$ A, $I_B = -120$ mA $I_C = -6.0$ A, $I_B = -24$ mA		$V_{CE(sat)}$		-3.0 -2.0	V
Base-Emitter Saturation Voltage $I_C = -12$ A, $I_B = -120$ mA		$V_{BE(sat)}$		-4.0	V
Base-Emitter Voltage Non-saturated $V_{CE} = -3.0$ V, $I_C = -6$ A		V_{BE}		-2.8	V
DYNAMIC CHARACTERISTICS					
Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = -5$ A, $V_{CE} = -3.0$ V, f = 1 kHz		h_{fe}	1,000		
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = -5$ A, $V_{CE} = -3.0$ V, f = 1 MHz		$\|h_{fe}\|$	10	250	
Output Capacitance $V_{CB} = 10$ V, $I_E = 0$, f = 100 kHz $\leq f \leq$ 1 MHz		C_{obo}		300	pF

ELECTRICAL CHARACTERISTICS @ T_C = 25 °C unless otherwise noted. (continued)

SWITCHING CHARACTERISTICS

Turn-On Time V_{CC} = -30 V, I_C = -5 A; I_{B1} = -20 mA	t_{on}		2.0	µs
Turn-Off Time V_{CC} = -30 V, I_C = -5 A; I_{B1} = I_{B2} = -20 mA	t_{off}		10	µs

SAFE OPERATING AREA (See Figures 1 and 2 and MIL-STD-750,Test Method 3053)

DC Tests

T_C = +25 °C, +10 ºC, -0 ºC, t ≥ 1 second, 1 Cycle

Test 1

V_{CE} = -12.5 V, I_C = -12 A

Test 2

V_{CE} = -30 V, I_C = -5 A

Test 3

V_{CE} = -70 V, I_C = -200 mA (2N6051)
V_{CE} = -90 V, I_C = -155 mA (2N6052)

SAFE OPERATING AREA

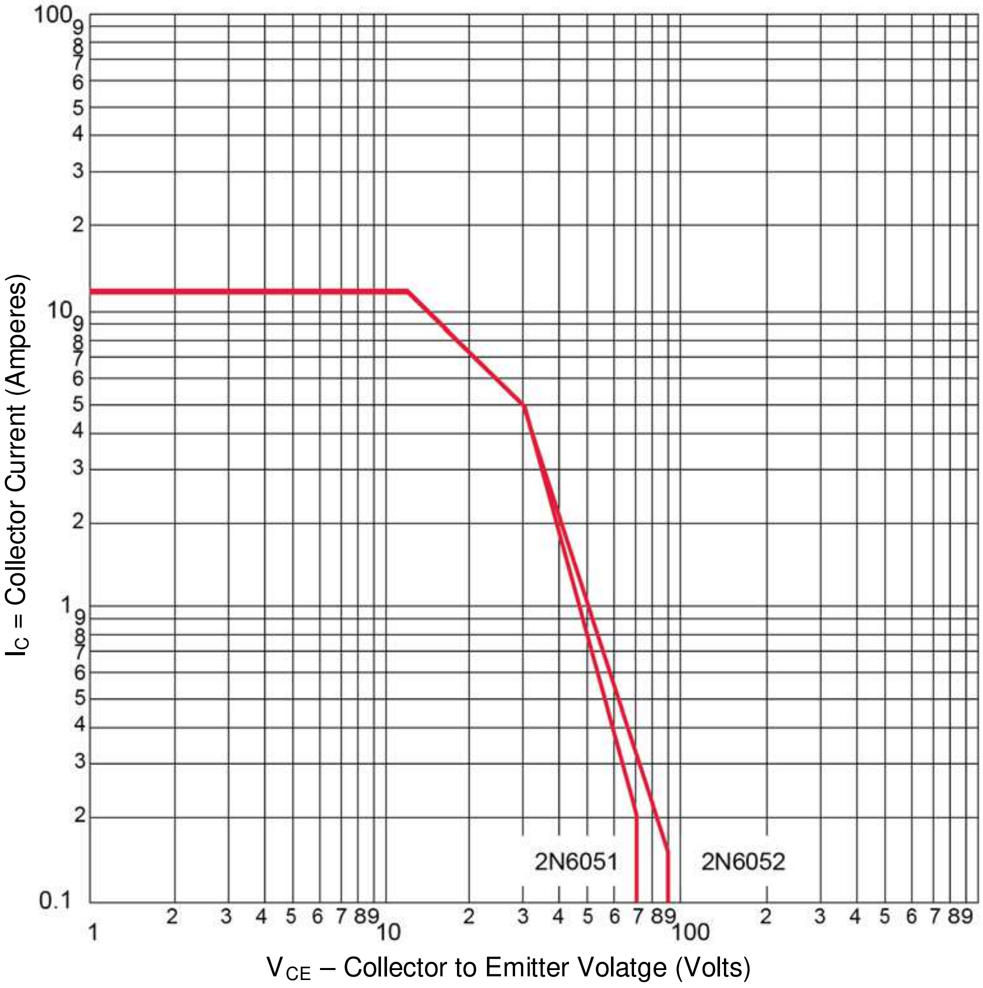


FIGURE 1

Maximum Safe Operating Area

(continuous dc)

SAFE OPERATING AREA (continued)

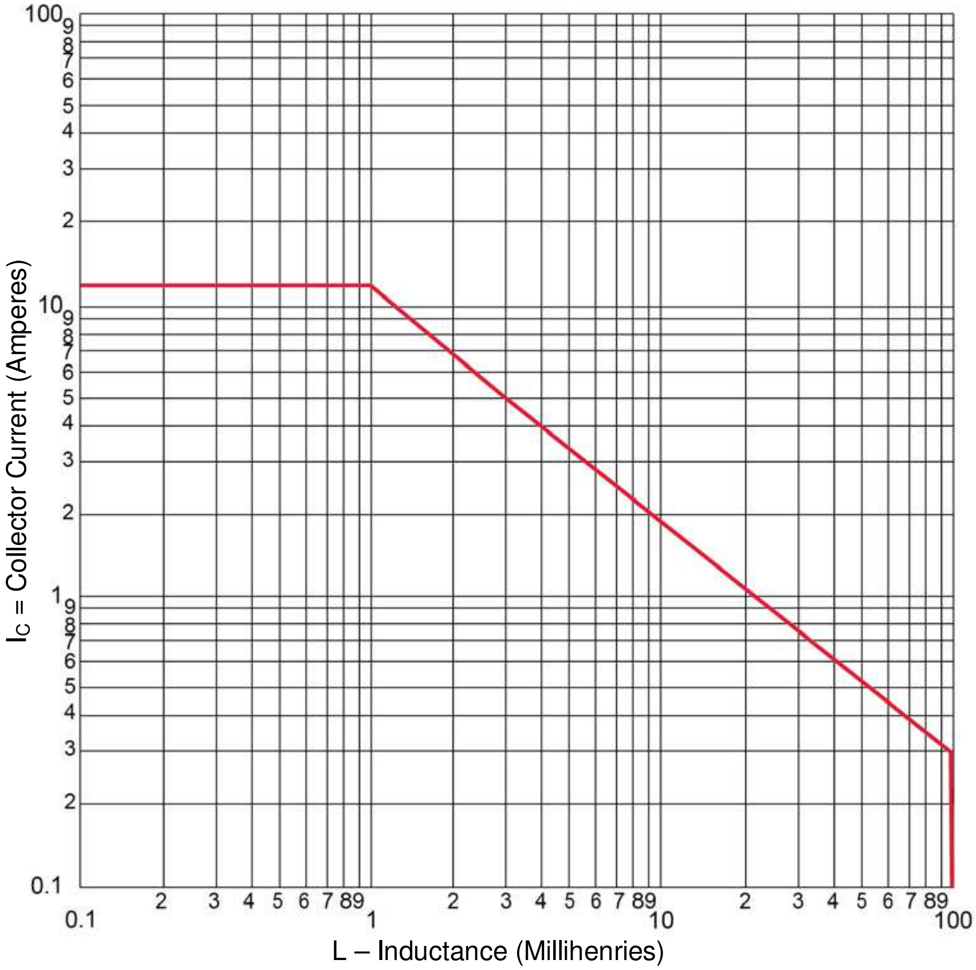
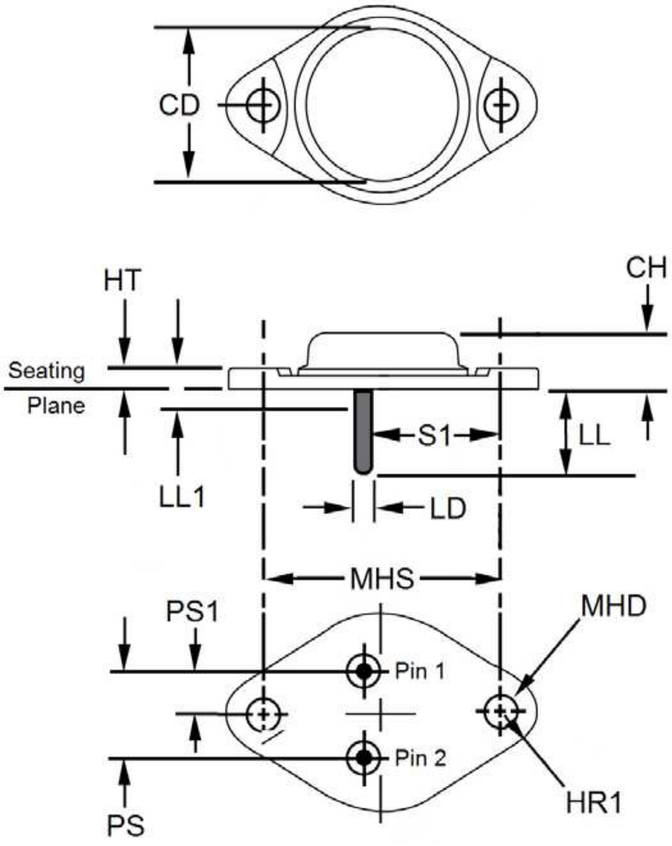


FIGURE 2
Safe Operating Area for Switching Between Saturation and Cutoff
(unclamped inductive load).

PACKAGE DIMENSIONS



Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	-	0.875	-	22.23	3
CH	0.250	0.328	6.35	8.33	
HR	0.495	0.525	12.57	13.34	
HR1	0.131	0.188	3.33	4.78	6
HT	0.060	0.135	1.52	3.43	
LD	0.038	0.043	0.97	1.09	4, 5, 9
LL	0.312	0.500	7.92	12.70	4, 5, 9
LL1	-	0.050	-	1.27	5, 9
MHD	0.151	0.161	3.84	4.09	7
MHS	1.177	1.197	29.90	30.40	
PS	0.420	0.440	10.67	11.18	
PS1	0.205	0.225	5.21	5.72	5
S1	0.655	0.675	16.64	17.15	

NOTES:

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

SCHEMATIC