RoHS Available

NPN Darlington Power Silicon Transistor

Qualified per MIL-PRF-19500/539

Qualified Levels: JAN, JANTX, and JANTXV

DESCRIPTION

This high speed NPN transistor is rated at 8 amps and is military qualified up to a JANTXV level. This TO-213AA isolated package features a 180 degree lead orientation.

TO-213AA (TO-66) Package

Important: For the latest information, visit our website http://www.microsemi.com.

FEATURES

- JEDEC registered 2N6300 and 2N6301
- Hermetically sealed
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/539
- RoHS compliant versions available (commercial grade only)

APPLICATIONS / BENEFITS

- Convenient package
- Mechanically rugged
- Military, space and other high reliability applications

MAXIMUM RATINGS @ T_C = 25 ºC unless otherwise stated

Parameters/Test Conditions		Symbol	Value	Unit
Junction and Storage Temperature		T_J and T_{STG}	-55 to +200	°C
Thermal Resistance Junction-to-Case		$R_{\Theta JC}$	2.66	°C
Collector-Base Voltage	2N6300 2N6301	V_{CBO}	60 80	V
Collector-Emitter Voltage	2N6300 2N6301	V_{CEO}	60 80	V
Emitter-Base Voltage		V_{EBO}	5	V
Continuous Operating Collector Current		I_C	8	A
Base Current		I_B	120	mA
Total Power Dissipation (1)	@ T_C = 0 ºC @ T_C = 100 ºC	P_T	75 37	W

NOTES: 1. Derate linearly at 0.428 W/ºC above T_C > 0 ºC.

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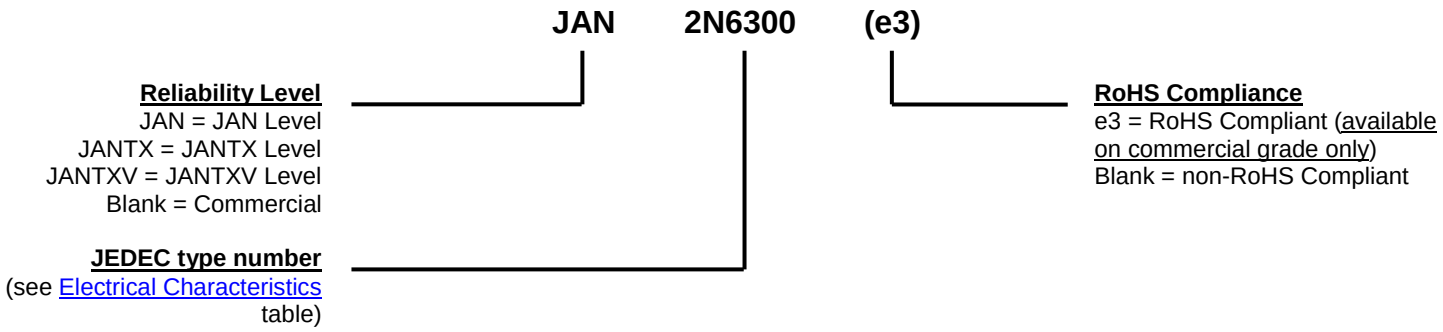
MECHANICAL and PACKAGING

- CASE: Hermetic, TO-213AA package. Nickel plate with nickel cap.
- TERMINALS: Solder dipped (Sn63/Pb37) over nickel plated alloy 52. RoHS compliant matte-tin plating is also available on commercial grade only.
- MARKING: MSC, part number, date code, polarity symbol
- WEIGHT: Approximately 5.7 grams
- See Package Dimensions on last page.

PART NOMENCLATURE



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 @ 25 ºC unless otherwise stated

Parameters / Test Conditions		Symbol	Min.	Max.	Unit
ON CHARACTERISTICS					
Collector-Emitter Breakdown Voltage I_C = 100 mA	2N6300 2N6301	$V_{(BR)CEO}$	60 80		V
Collector-Emitter Cutoff Current V_{CE} = 60 V_{BE} = 1.5 V V_{CE} = 80 V_{BE} = 1.5 V	2N6300 2N6301	I_{CEX}		10	µA
Collector-Emitter Cutoff Current, Base Open V_{CE} = 30 V V_{CE} = 40 V	2N6300 2N6301	I_{CEO}		0.5	mA
Emitter-Base Cutoff Current V_{EB} = 5 V		I_{EBO}		2.0	mA
Forward Current Transfer Ratio I_C = 1 A, V_{CE} = 3 V I_C = 4 A, V_{CE} = 3 V I_C = 8 A, V_{CE} = 3 V		h_{FE}	500 750 100	18000	
Collector-Emitter Saturation Voltage I_C = 4.0 A, I_B = 16 mA I_C = 8.0 A, I_B = 80 mA		$V_{CE(sat)}$		2.0 3.0	V
Base-Emitter Saturation Voltage V_{CE} = 3.0 V, I_C = 4 A I_C = 8.0 A, I_B = 80 mA		$V_{BE(sat)}$		2.8 4.0	V

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio V_{CE} = 3.0 V, I_C = 3.0 A, f = 1 MHz	$\|h_{fe}\|$	25	350	
Common Emitter Small-Signal Short-Circuit Forward Current Trans-Ratio V_{CE} = 3 V, I_C = 3 A, f = 1 kHz	h_{fe}	300		
Common Base Output V_{CB} = 10 V, I_E = 0 A, 100 kHz ≤ f ≤ 1 MHz	C_{obo}		200	pF

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

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On time V_{CC} = 30 V, I_C = 4 A, I_{B1} = 16 mA	t_{on}		2.0	µs
Turn-Off time V_{CC} = 30 V, I_C = 4 A, I_{B1} = -I_{B2} = 16 mA	t_{off}		8.0	µs

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

DC Tests

T_C = +25 °C, t = 1 second, duty cycle ≤ 10%

Test 1

V_{CE} = 8 V, I_C = 8 A

Test 2

V_{CE} = 20 V, I_C = 2.0 A

Test 3

V_{CE} = 60 V, I_C = 100 mA (2N6300)

V_{CE} = 80 V, I_C = 100 mA (2N6301)

SAFE OPERATING AREA

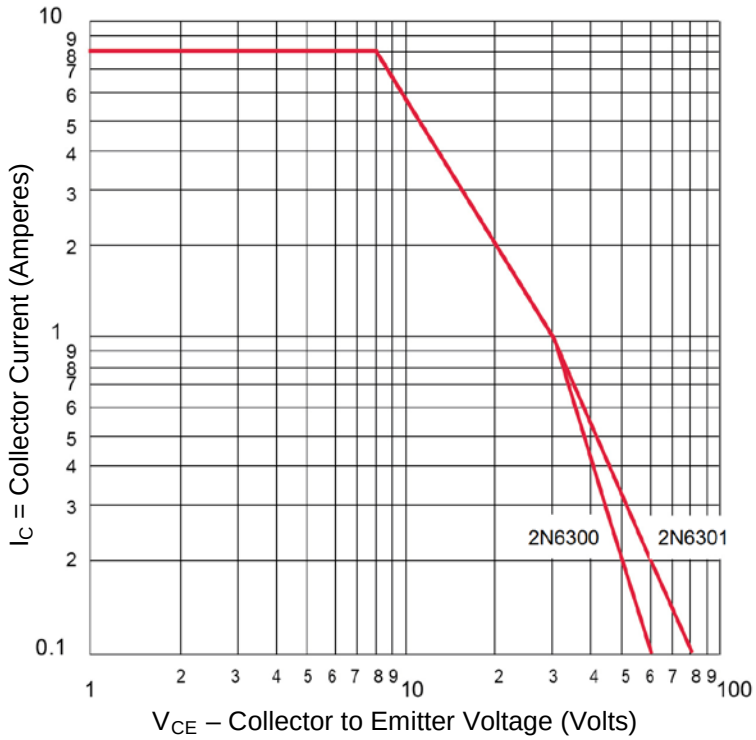


FIGURE 1 – Maximum Safe Operating Area (dc)

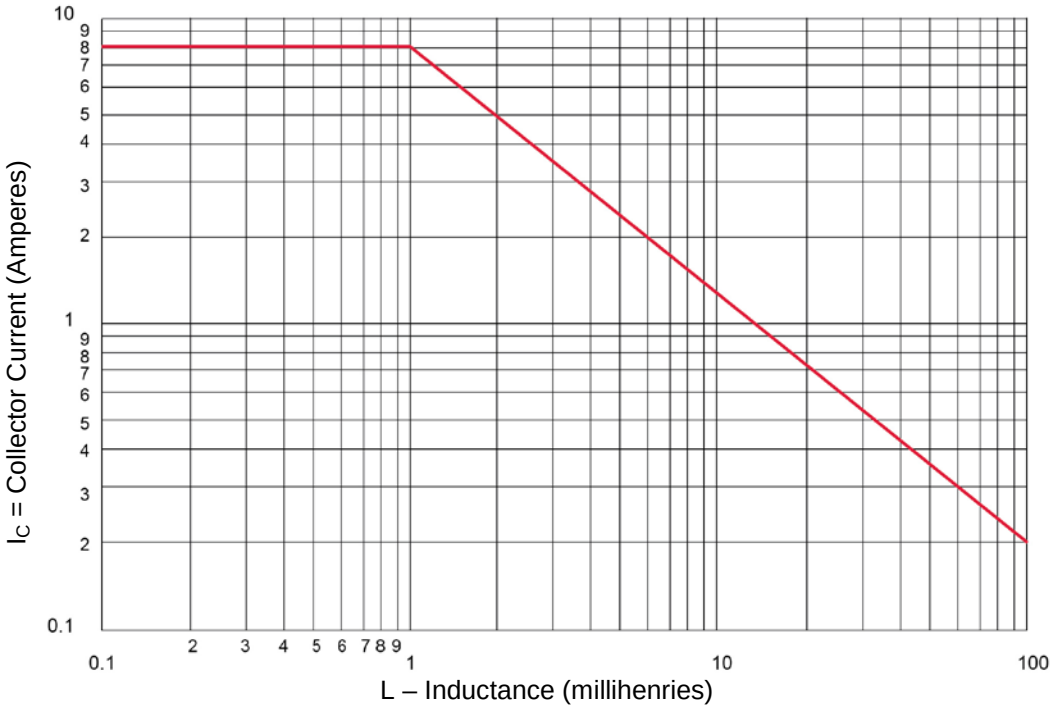
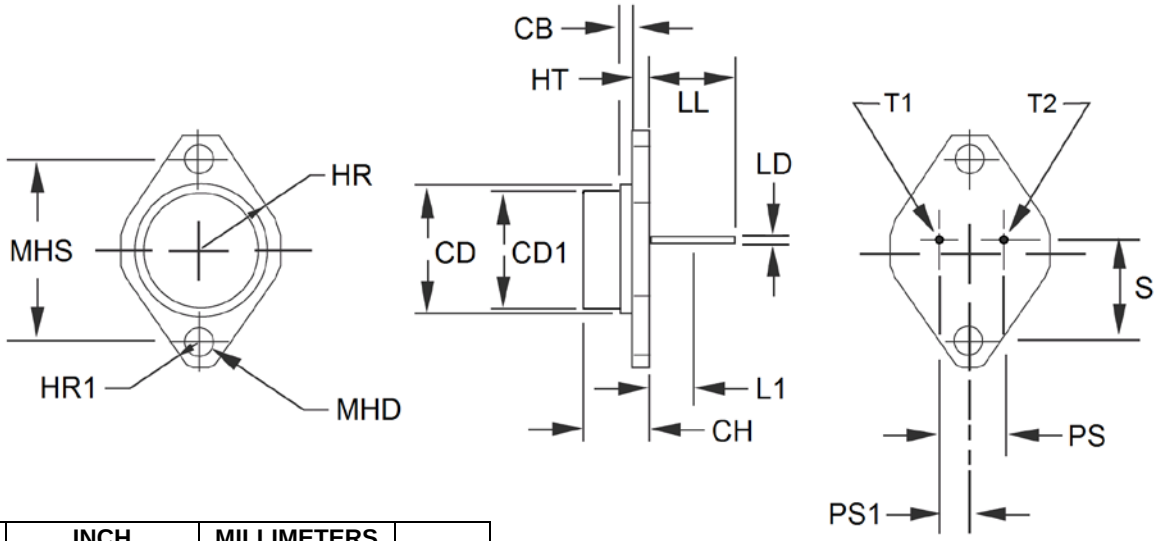


FIGURE 2 – Safe Operating Area for switching between saturation and cutoff (unclamped inductive load)

PACKAGE DIMENSIONS



DIM	INCH		MILLIMETERS		Notes
	MIN	MAX	MIN	MAX	
CB	0.470	0.500	11.94	12.70	
CD	-	0.620	-	15.76	
CH	0.250	0.340	6.35	8.64	
HR	-	0.350	-	8.89	
HT	0.050	0.075	1.27	1.91	
HR1	0.115	0.145	2.92	3.68	4
LD	0.028	0.034	0.71	0.86	4, 6
LL	0.360	0.500	9.14	12.70	
L1	-	0.050	-	1.27	6
MHD	0.142	0.152	3.61	3.86	4
MHS	0.958	0.962	24.33	24.43	
PS	0.190	0.210	4.83	5.33	3
PS1	0.093	0.107	2.36	2.73	3
S	0.570	0.590	14.48	14.99	
T1	Base				
T2	Emitter				
Case	Collector				

NOTES:
1. Dimensions are in inches.
2. Millimeters are given for information only.
3. These dimensions should be measured at points 0.050 inch (1.27 mm) +0.005 inch (0.13 mm) -0.000 inch (0.00 mm) below seating plane. When gauge is not used, measurement will be made at the seating plane.
4. Two places.
5. The seating plane of the header shall be flat within 0.001 inch (0.03 mm) concave to 0.004 inch (0.10 mm) convex inside a 0.930 inch (23.62 mm) diameter circle on the center of the header and flat within 0.001 inch (0.03 mm) concave to 0.006 inch (0.15 mm) convex overall.
6. Lead diameter shall not exceed twice LD within L1.
7. Lead number 1 is the emitter, lead 2 is the base, case is the collector.
8. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

SCHEMATIC