RoHS
Available on commercial versions

NPN Darlington Power Silicon Transistor

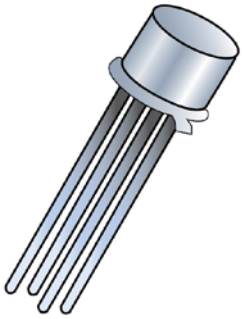
Qualified per MIL-PRF-19500/472

Qualified Levels:
JAN, JANTX, and JANTXV

DESCRIPTION

This high speed NPN transistor is military qualified up to the JANTXV level. This TO-33 leaded top-hat has three isolated terminals with terminal four, the collector terminal, tied to the case.

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



TO-33 Package

FEATURES

- JEDEC registered 2N6350 and 2N6351
- JAN, JANTX, and JANTXV qualifications are available per MIL-PRF-19500/472
  (See part nomenclature for all available options)
- RoHS compliant versions available (commercial grade only)

APPLICATIONS / BENEFITS

- Military and other high reliability applications
- High frequency response
- TO-33 leaded top-hat

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

Parameters/Test Conditions		Symbol	Value	Unit
Junction and Storage Temperature		T_J and T_{STG}	-65 to +200	°C
Thermal Resistance Junction-to-Case		$R_{\Theta JC}$	20	°C/W
Collector-Emitter Voltage	2N6350 2N6351	V_{CEO}	80 150	V
Collector-Base Voltage	2N6350 2N6351	V_{CBO}	80 150	V
Emitter-Base Voltage		V_{EBO}	12 6.0	V
Total Power Dissipation	@ T_A = +25 °C (1) @ T_C = +100 °C (2)	P_T	1.0 5.0	W
Base Current		I_B	0.5	A
Collector Current		I_C	5	A

Notes: 1. Derate linearly 5.72 mW/°C for T_A > +25 °C
2. Derate linearly 50 mW/°C for T_C > +100 °C

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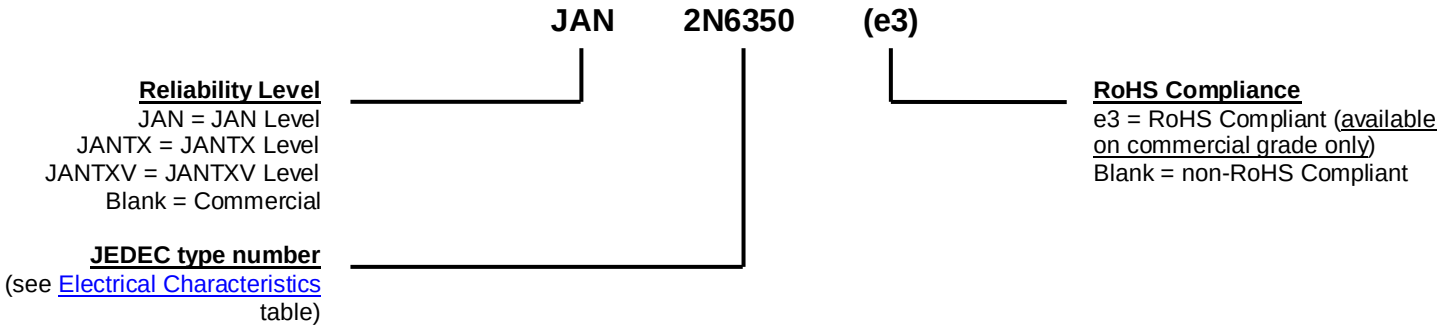
MECHANICAL and PACKAGING

- CASE: Hermetically sealed, kovar base, nickel cap.
- TERMINALS: Solder dip (Sn63/Pb37), RoHS compliant matte-tin plating available on commercial grade only.
- MARKING: Part number, date code, manufacturer's ID and serial number
- WEIGHT: Approximately 1.2 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_{CEO}	Collector-emitter voltage, base open: The voltage between the collector and the emitter terminals when the base terminal is open-circuited.
V_{CE}	Collector-emitter voltage: The dc voltage between the collector and the emitter.
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 = 25 mA , R_{B1E} = 2.2 kΩ, R_{B2E} = 100 Ω	2N6350 2N6351	$V_{(BR)CEO}$	80 150		V
Collector-Emitter Breakdown Voltage I_E = 12 mA, base 1 open I_E = 12 mA, base 2 open		$V_{(BR)EBO}$	6.0 12		V
Collector-Emitter Cutoff Current V_{CE} = 80 V, V_{EB1} = 2 V, R_{B2E} = 100 Ω V_{CE} = 150 V, V_{EB1} = 2 V, R_{B2E} = 100 Ω	2N6350 2N6351	I_{CEX}		1.0	µA
ON CHARACTERISTICS					
Forward-Current Transfer Ratio I_C = 1.0 A, V_{CE} = 5.0 V, R_{B2E} = 1 kΩ	2N6350 2N6351	h_{FE}	2,000 1,000		
I_C = 5.0 A, V_{CE} = 5.0 V, R_{B2E} = 100 Ω	2N6350 2N6351		2,000 1,000	10,000 10,000	
I_C = 10.0 A, V_{CE} = 5.0 V, R_{B2E} = 100 Ω	2N6350 2N6351		400 200		
Collector-Emitter Saturation Voltage I_C = 5.0 A, I_B = 5 mA, R_{B2E} = 100 Ω I_C = 5.0 A, I_B = 10 mA, R_{B2E} = 100 Ω		$V_{CE(sat)}$		1.5 2.5	V
Base-Emitter Voltage Non-saturated V_{CE} = 5.0 V, I_C = 5.0 A, R_{B2E} = 100 Ω		V_{BE}		2.5	V
DYNAMIC CHARACTERISTICS					
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio I_C = 1.0 A, V_{CE} = 10.0 V, f = 10 MHz, R_{B2E} = 100 Ω		|hfe|	5	25	
Output Capacitance V_{CB} = 10 V, 100 kHz ≤ f ≤ 1 MHz, base 2 open		Cobo		120	pF

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

SWITCHING CHARACTERISTICS

Turn-On Time V_{CC} = 30 V, I_C = 5.0 A	t_{on}		0.5	µs
Turn-Off Time V_{CC} = 30 V, I_C = 5.0 A	t_{off}		1.2	µs

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

DC Tests

T_C = +100 ºC, t ≥ 1 second, 1 Cycle; $t_r + t_f$ = 10 µs, R_{B2E} = 100 Ω

Test 1

V_{CE} = 1.5 V, I_C = 3.3 A

Test 2

V_{CE} = 30 V, I_C = 167 mA

Test 3

V_{CE} = 80 V, I_C = 35 mA (2N6350)

Test 4

V_{CE} = 150 V, I_C = 13 mA (2N6351)

SAFE OPERATING AREA

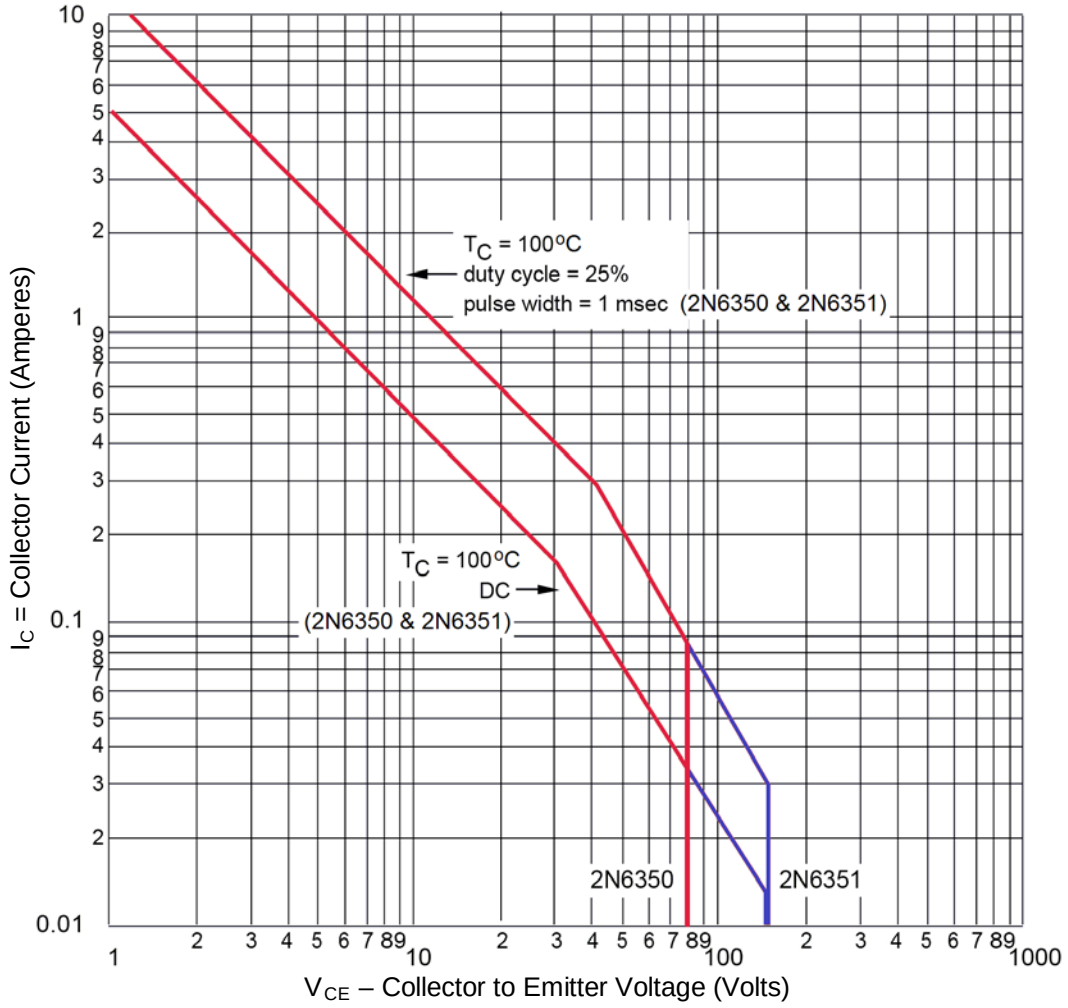


FIGURE 1
Maximum Safe Operating Area

SAFE OPERATING AREA (continued)

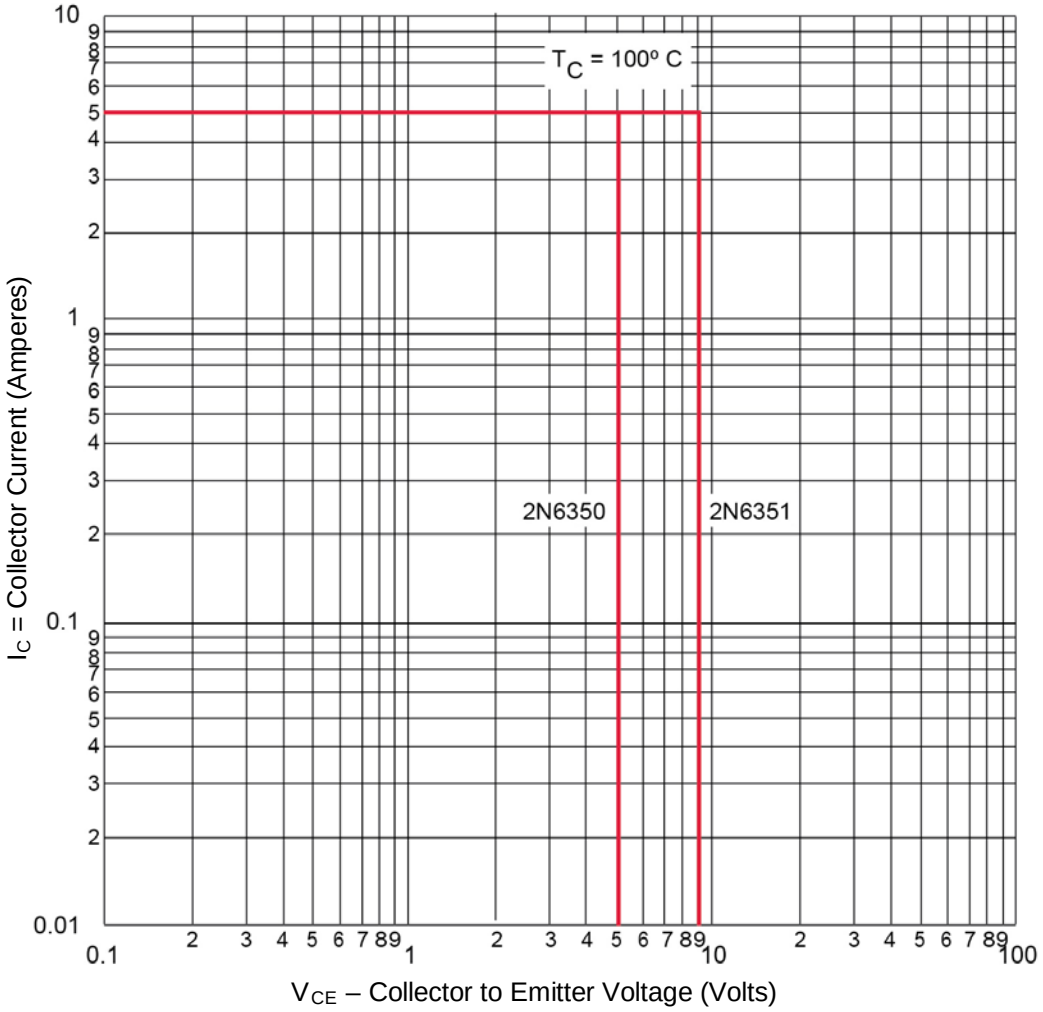
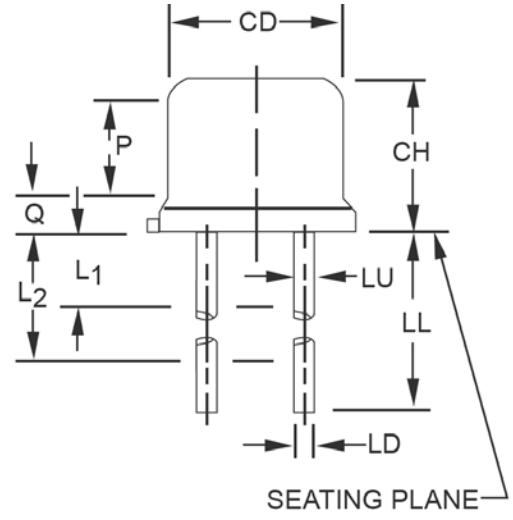
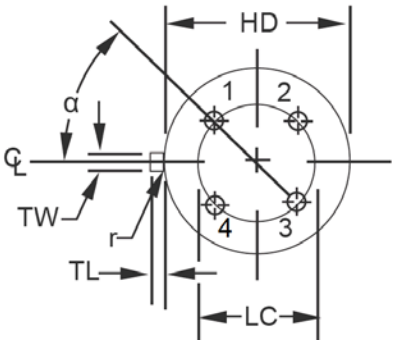


FIGURE 2
Safe Operating Area For Switching Between Saturation And Cutoff
(unclamped inductive load)

PACKAGE DIMENSIONS





Symbol	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
CD	0.305	0.335	7.75	8.51	3
CH	0.240	0.260	6.10	6.60	
HD	0.335	0.370	8.51	9.40	
LC	0.200 TP		5.08 TP		4
LD	0.016	0.021	0.41	0.53	5, 6
LL	1.500	1.750	38.10	44.45	5, 6
LU	0.016	0.019	0.41	0.48	5, 6
L_1	-	0.050	-	1.27	5, 6
L_2	0.250	-	6.35	-	5, 6
Q	-	0.050	-	1.27	9
TL	0.029	0.045	0.74	1.14	7
TW	0.028	0.034	0.71	0.86	8
r	-	0.010	-	0.25	10
α	45° TP		45° TP		4
P	0.100	-	2.54	-	3

NOTES:

1. Dimensions are in inches. Millimeters are given for information only.
2. Internal resistance (typically 750 ohms). This resistor is optional.
3. Dimension CD shall not vary more than 0.010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling.
4. Leads at gauge plane 0.054 +0.001 –0.000 inch (1.37 +0.03 –0.00 mm) below seating plane shall be within 0.007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC. The device may be measured by direct methods.
5. Dimension LU applies between dimension L1 and dimension L2. Dimension LD applies between L2 and LL minimum. Diameter is uncontrolled in dimension L1 and beyond dimension LL minimum.
6. All terminals.
7. Dimension TL measured from maximum HD.
8. Beyond r (radius) maximum, dimension TW shall be held for a minimum length of 0.011 inch (0.28 mm).
9. Outline in this zone is not controlled.
10. The radius (dimension r) applies to both inside corners of the tab.
11. Terminal designation is as follows: 1 – emitter, 2 – base (B2), 3 – base (B1), 4 – collector. The collector shall be connected to the case.
12. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

See schematic on next page

SCHEMATIC