



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.



TO-213AA (TO-66) Package

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

FEATURES

- JEDEC registered 2N6352 and 2N6353
- 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-213AA 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}	-65 to +200	ပ
Thermal Resistance Junction-to-Cas	Rejc	4.0	°C/W	
Collector-Emitter Voltage	2N6352	V_{CEO}	80	V
	2N6353		150	
Collector-Base Voltage	2N6352	V_{CBO}	80	V
	2N6353		150	
Emitter-Base Voltage		V _{EBO1}	12	V
		V _{EBO2}	6.0	
Total Power Dissipation	@ $T_A = +25 ^{\circ}C^{(1)}$ @ $T_C = +100 ^{\circ}C^{(2)}$	P _T	2.0	W
	$@ T_C = +100 {}^{\circ}C {}^{(2)}$		25	
Base Current		I _B	0.5	Α
Collector Current		Ic	5	Α

Notes: 1. Derate linearly 11.4 mW/°C for T_A > +25 °C

- 2. Derate linearly 250 mW/°C for T_C > +100 °C
- 3. Applies for $t_p \le 10$ ms, duty cycle ≤ 50 percent

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MECHANICAL and **PACKAGING**

- CASE: Industry standard TO-213AA (3-pin TO-66), hermetically sealed
- FINISH: Solder dipped tin-lead over nickel plated alloy 52 or RoHS compliant matte-tin plating (on commercial grade only). Solderable per MIL-STD-750 method 2026.
- POLARITY: NPN (see schematic)
- MOUNTING HARDWARE: Consult factory for optional insulator and sheet metal screws
- · WEIGHT: Approximately 6 grams
- See <u>package dimensions</u> on last page.

PART NOMENCLATURE **JAN** 2N6352 (e3)**Reliability Level** RoHS Compliance JAN = JAN Level e3 = RoHS Compliant (available JANTX = JANTX Level on commercial grade only) JANTXV = JANTXV Level Blank = non-RoHS Compliant Blank = Commercial JEDEC type number (see Electrical Characteristics table)

SYMBOLS & DEFINITIONS				
Symbol	Definition			
I _B	Base current: The value of the dc current into the base terminal.			
Ic	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

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Characteristics		Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS					
Collector-Emitter Breakdown Voltage $I_C = 25 \text{ mA}$, $R_{B1E} = 2.2 \text{ k}\Omega$, $R_{B2E} = 100 \Omega$	2N6352 2N6353	$V_{(BR)CEO}$	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 $V_{CE} = 80 \text{ V}, V_{EB1} = 2 \text{ V}, R_{B2E} = 100 \Omega$ $V_{CE} = 150 \text{ V}, V_{EB1} = 2 \text{ V}, R_{B2E} = 100 \Omega$	2N6352 2N6353	I _{CEX}		1.0	μА
ON CHARACTERISTICS					
Forward-Current Transfer Ratio I_C = 1.0 A, V_{CE} = 5.0 V, R_{B2E} = 1 k Ω	2N6352 2N6353		2,000 1,000		
$I_C = 5.0 \text{ A}, V_{CE} = 5.0 \text{ V}, R_{B2E} = 100 \Omega$	2N6352 2N6353	hFE	2,000 1,000	10,000 10,000	
$I_C = 10.0 \text{ A}, V_{CE} = 5.0 \text{ V}, R_{B2E} = 100 \Omega$	2N6352 2N6353		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 $V_{CE} = 5.0 \text{ V}, I_{C} = 5.0 \text{ A}, R_{B2E} = 100 \Omega$		V_{BE}		2.5	V
DYNAMIC CHARACTERISTICS					
Magnitude of Common Emitter Small-Signal S Forward Current Transfer Ratio $I_C = 1.0 \text{ A}, V_{CE} = 10.0 \text{ V}, f = 10 \text{ MHz}, R_{B2E} =$		hfe	5	25	
Output Capacitance V _{CB} = 10 V, 100 kHz ≤ f ≤ 1 MHz, base 2 ope	Cobo		120	pF	



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

SWITCHING CHARACTERISTICS

Turn-On Time			
$V_{CC} = 30 \text{ V}, I_{C} = 5.0 \text{ A}$	t _{on}	0.5	μS
Turn-Off Time			
$V_{CC} = 30 \text{ V}, I_{C} = 5.0 \text{ A}$	t _{off}	1.2	μS

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

DC Tests

 $T_C = +100$ °C, $t \ge 1$ second, 1 Cycle; $t_r + t_f = 10 \mu s$, $R_{B2E} = 100 \Omega$

Test 1

 $V_{CE} = 5.0 \text{ V}, I_{C} = 5.0 \text{ A}$

V_{CE} =

 $V_{CE} = 10 \text{ V}, I_{C} = 2.5 \text{ A}$

Test 3

 $V_{CE} = 80 \text{ V}, I_{C} = 95 \text{ mA} (2N6352)$

Test 4

 $V_{CE} = 150 \text{ V}, I_{C} = 35 \text{ mA} (2N6353)$



SAFE OPERATING AREA

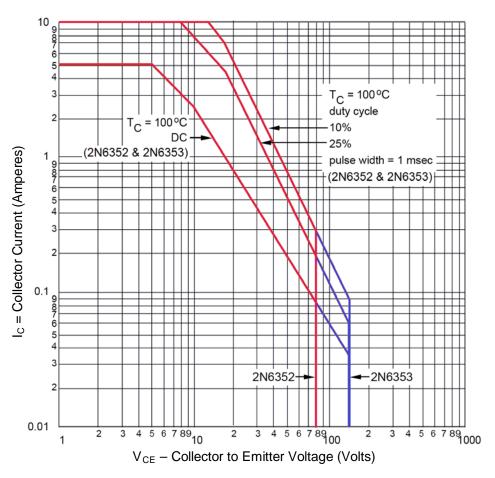


FIGURE 1

Maximum Safe Operating Area



SAFE OPERATING AREA (continued)

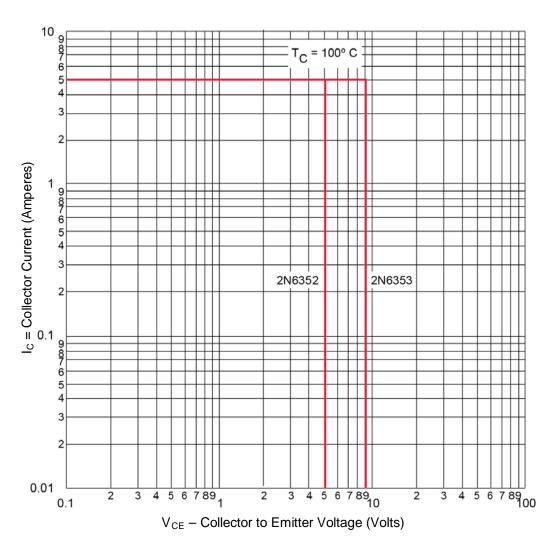
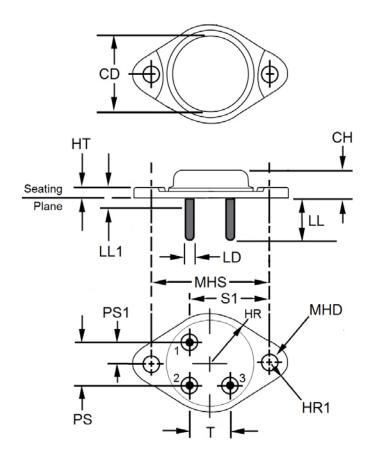


FIGURE 2
Safe Operating Area For Switching Between Saturation And Cutoff (unclamped inductive load)



PACKAGE DIMENSIONS



	Dimensions					
Ltr	Inches		Millin	Millimeters		
	Min	Max	Min	Max		
CD	-	0.620	-	15.75		
CH	0.250	0.340	6.35	8.64		
HR	-	0.350	-	8.89		
HR1	0.115	0.145	2.92	3.68		
HT	0.050	0.075	1.27	1.91	3	
LD	0.028	0.034	0.711	0.863	4	
LL	0.360	0.500	9.14	12.70	4	
LL1	-	0.050	-	1.27	4	
MHD	0.142	0.152	3.61	3.86		
MHS	0.958	0.962	24.33	24.43		
PS	0.190	0.210	4.83	5.33		
PS1	0.093	0.105	2.36	2.67		
S1	0.570	0.590	14.48	14.99		
T	0.190	0.210	4.83	5.33		
T1	Emitter					
T2	Base (B ₁)					
Т3	Base (B ₂)					
Case	Collector					

NOTES:

- 1. Dimensions are in inches. Millimeters are given for information only.
- 2. Internal resistance (typically 750 ohms). This resistor is optional.
- 3. The outline contour is optional.
- 4. Dimension does not include sealing flanges.
- All leads.
- 6. Terminal designation is as follows: 1 emitter, 2 base (B₁), 3 base (B₂). The collector shall be connected to the case.
- 7. Shape of capweld flange is optional and cannot extend beyond dimension HR.
- 8. In accordance with ASME Y14.5M, diameters are equivalent to Φx symbology.

SCHEMATIC

