



## NPN Darlington Power Silicon Transistor

Qualified per MIL-PRF-19500/472

*Qualified Levels:  
JAN, JANTX, and  
JANTXV*

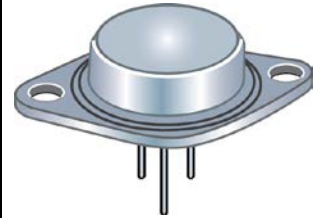
### DESCRIPTION

This high speed NPN transistor is military qualified up to the JANTXV level.

**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)



**TO-213AA  
(TO-66) Package**

### APPLICATIONS / BENEFITS

- Military and other high reliability applications
- High frequency response
- TO-213AA case with isolated terminals

### MAXIMUM RATINGS @ T<sub>C</sub> = +25 °C unless otherwise noted

Parameters/Test Conditions	Symbol	Value	Unit	
Junction and Storage Temperature	T <sub>J</sub> and T <sub>STG</sub>	-65 to +200	°C	
Thermal Resistance Junction-to-Case	R <sub>θJC</sub>	4.0	°C/W	
Collector-Emitter Voltage		2N6352	80	V
		2N6353	150	
Collector-Base Voltage		2N6352	80	V
		2N6353	150	
Emitter-Base Voltage		V <sub>EBO1</sub>	12	V
		V <sub>EBO2</sub>	6.0	
Total Power Dissipation		@ T <sub>A</sub> = +25 °C <sup>(1)</sup>	2.0	W
		@ T <sub>C</sub> = +100 °C <sup>(2)</sup>	25	
Base Current	I <sub>B</sub>	0.5	A	
Collector Current	I <sub>C</sub>	5	A	

- Notes:**
1. Derate linearly 11.4 mW/°C for T<sub>A</sub> > +25 °C
  2. Derate linearly 250 mW/°C for T<sub>C</sub> > +100 °C
  3. Applies for t<sub>p</sub> ≤ 10 ms, duty cycle ≤ 50 percent

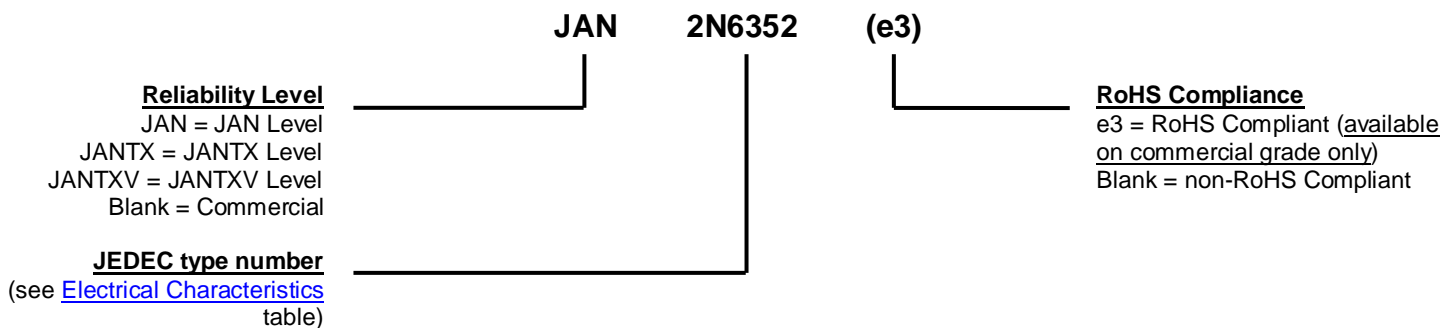
**MSC – Lawrence**  
6 Lake Street,  
Lawrence, MA 01841  
1-800-446-1158  
(978) 620-2600  
Fax: (978) 689-0803

**MSC – Ireland**  
Gort Road Business Park,  
Ennis, Co. Clare, Ireland  
Tel: +353 (0) 65 6840044  
Fax: +353 (0) 65 6822298

**Website:**  
[www.microsemi.com](http://www.microsemi.com)

**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 [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 @  $T_A = +25^\circ\text{C}$  unless otherwise noted**

Characteristics	Symbol	Min.	Max.	Unit
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**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 $I_E = 12\text{ mA}$ , base 1 open $I_E = 12\text{ mA}$ , 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	$\mu\text{A}$

**ON CHARACTERISTICS**

Forward-Current Transfer Ratio $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ , $R_{B2E} = 1\text{ k}\Omega$	2N6352 2N6353	hFE	2,000 1,000	
$I_C = 5.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ , $R_{B2E} = 100\ \Omega$	2N6352 2N6353		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 $I_C = 5.0\text{ A}$ , $I_B = 5\text{ mA}$ , $R_{B2E} = 100\ \Omega$ $I_C = 5.0\text{ A}$ , $I_B = 10\text{ mA}$ , $R_{B2E} = 100\ \Omega$		$V_{CE(sat)}$	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**

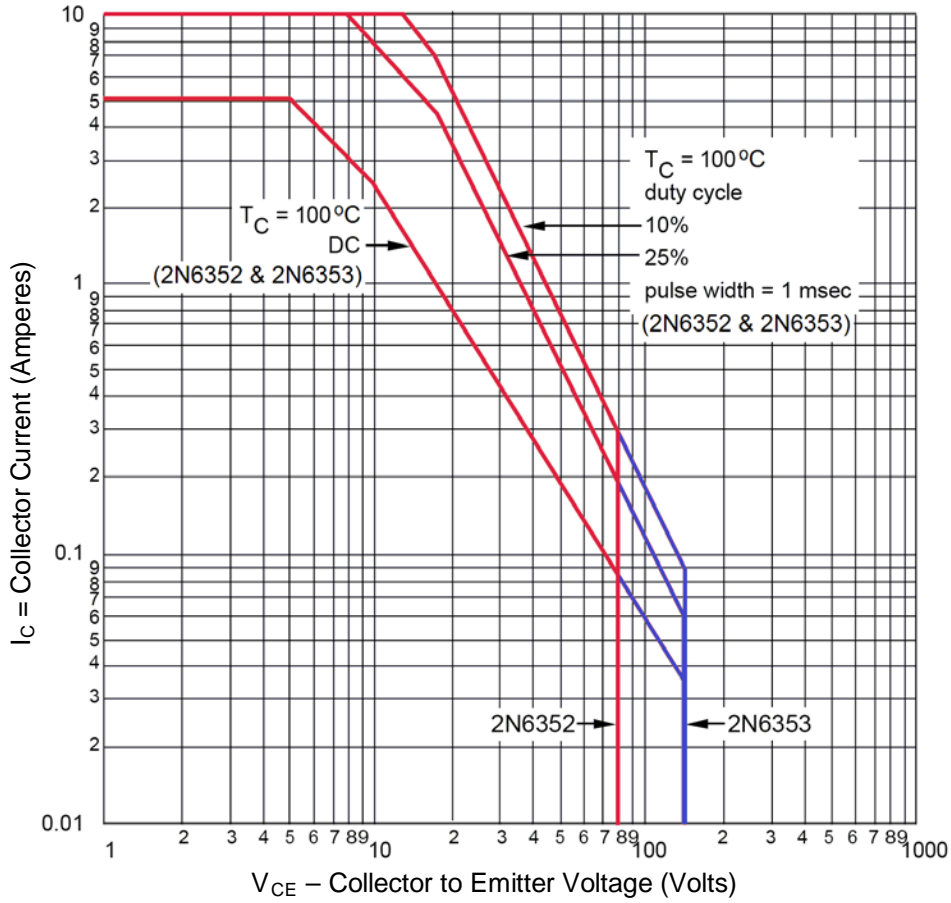
Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0\text{ A}$ , $V_{CE} = 10.0\text{ V}$ , $f = 10\text{ MHz}$ , $R_{B2E} = 100\ \Omega$	$ h_{fe} $	5	25	
Output Capacitance $V_{CB} = 10\text{ V}$ , $100\text{ kHz} \leq f \leq 1\text{ MHz}$ , base 2 open	Cobo		120	pF

**ELECTRICAL CHARACTERISTICS @  $T_C = 25^\circ\text{C}$  unless otherwise noted. (continued)**
**SWITCHING CHARACTERISTICS**

Turn-On Time $V_{CC} = 30\text{ V}, I_C = 5.0\text{ A}$	$t_{on}$		0.5	$\mu\text{s}$
Turn-Off Time $V_{CC} = 30\text{ V}, I_C = 5.0\text{ A}$	$t_{off}$		1.2	$\mu\text{s}$

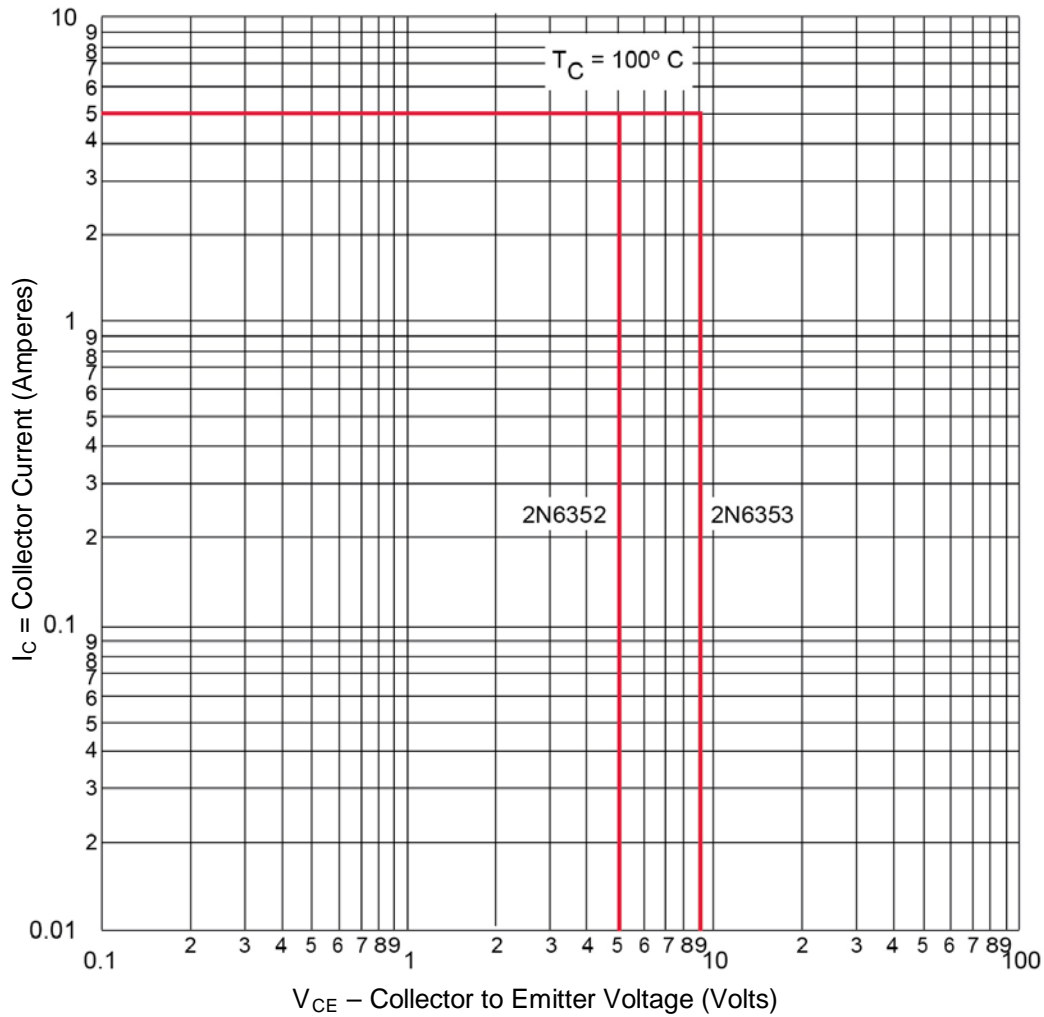
**SAFE OPERATING AREA (See [Figures 1 and 2](#) and [MIL-STD-750, Test Method 3053](#))**
**DC Tests**
 $T_C = +100^\circ\text{C}, t \geq 1\text{ second}, 1\text{ Cycle}; t_r + t_f = 10\ \mu\text{s}, R_{B2E} = 100\ \Omega$ 
**Test 1**
 $V_{CE} = 5.0\text{ V}, I_C = 5.0\text{ A}$ 
**Test 2**
 $V_{CE} = 10\text{ V}, I_C = 2.5\text{ A}$ 
**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**



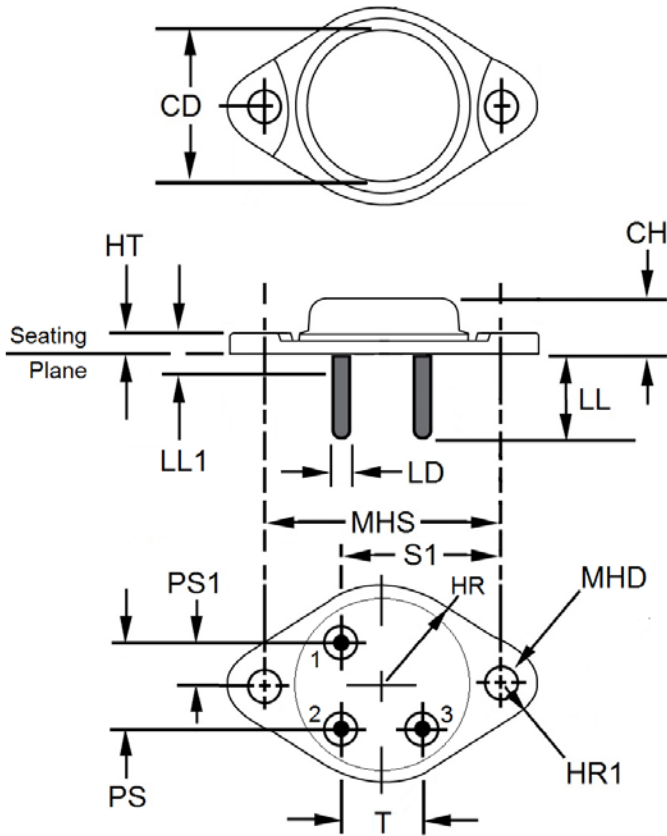
**FIGURE 1**  
Maximum Safe Operating Area

**SAFE OPERATING AREA (continued)**



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

PACKAGE DIMENSIONS



Ltr	Dimensions				Notes
	Inches		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 <sub>1</sub> )				
T3	Base (B <sub>2</sub> )				
Case	Collector				

NOTES:

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

SCHEMATIC

