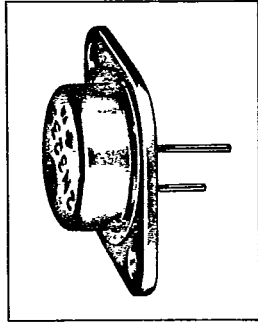


# Silicon Power Transistors JEDEC Type 2N3232-3235

For Switching, Amplifier and Regulator Applications  
7.5 to 15 Amperes, 115 Watts

Westinghouse



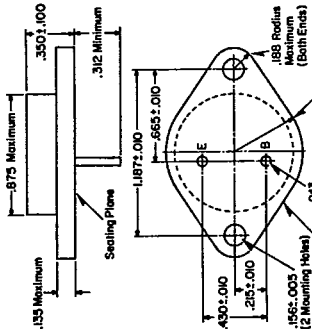
## Application

These Westinghouse JEDEC devices are NPN diffused transistors. These general-purpose transistors exhibit low saturation voltage, fast switching time, and high gain and frequency characteristics. They are particularly useful in industrial and commercial power-switching, amplifier, and regulator applications. The temperature range to 200°C permits reliable operation in high ambient, and the hermetically sealed TO-3 case insures maximum reliability and long life. All of these transistors carry the Westinghouse Lifetime Guarantee.

## Maximum Ratings

	JEDEC Number			
	2N3232	2N3233	2N3234	2N3235
Voltage				
Collector-Emitter, $V_{CE}$ , Volts.....	60	100	160	55
Collector-Base, $V_{CB}$ , Volts.....	80	110	160	65
Emitter-Base, $V_{EB}$ , Volts.....	6	6	6	7
Current				
Collector, I <sub>c</sub> , Amps.....	7.5	7.5	7.5	15
Base, I <sub>b</sub> , Amps.....	3	3	3	7
Temperature				
Junction, T <sub>j</sub> , °C.....	←	←	+200	←
Storage, T <sub>stg</sub> , °C, minimum.....	←	←	- 65	←
Storage, T <sub>stg</sub> , °C, maximum.....	←	←	+200	←
Thermal Characteristics				
Thermal Resistance, $\theta_{j-c}$ , °C/Watt, max.....	←	←	1.5	←
Power Dissipation, P <sub>t</sub> at 25°C, Watt, max.....	←	←	115	←

## Dimensions in Inches



## Guarantee

Westinghouse warrants to the original purchaser that it will correct any defects in workmanship, by repair or replacement i.o.b. factory, for any silicon power semiconductor bearing this symbol ⚡-TW during the life of the equipment in which it is originally installed, provided said device is used within manufacturer's published ratings and applied in accordance with good engineering practice. The foregoing warranty is exclusive and in lieu of all other warranties of quality whether written, oral, or implied (including any warranty of merchantability or fitness for purpose). Westinghouse shall not be liable for any consequential damages.

## Electrical Characteristics

$T_C = 25^\circ\text{C}$  unless otherwise specified

Parameter	Conditions	Symbol	Limits		Units
			Min.	Max.	
<b>2N3232 - 2N3234</b>					
*Collector-cutoff current	$V_{CE} = \text{Max. Rating}^{\text{①}}, V_{BE} = -1.5\text{V}$	$I_{CEV}$	...	1	ma
*Collector-cutoff current	$V_{CE} = \text{Max. Rating}^{\text{②}}, V_{BE} = -1.5\text{V}, T_C = 150^\circ\text{C}$	$I_{CEV}$	...	5	ma
*Emitter-cutoff current	$V_{EB} = 6\text{V}, I_C = 0$	$I_{EBO}$	...	1	ma
*Collector-emitter sustaining voltage <sup>③</sup>	$I_C = 100\text{ mA}, I_B = 0$	$V_{CEO}(\text{sus})$	...	...	V
*Dc Forward-current transfer ratio <sup>①</sup>	$I_C = 3\text{A}, V_{CE} = 10\text{V}$	$h_{FE}$	18	55	..
*Collector-emitter saturation voltage	$I_C = 3\text{A}, I_B = 0.2\text{A}$	$V_{CE}(\text{sat})$	...	2.5	V
*Base-emitter voltage	$I_C = 3\text{A}, V_{CE} = 10\text{V}$	$V_{BE}$	...	3.5	V
*Small-signal forward current transfer ratio	$I_C = 3\text{A}, V_{CE} = 10\text{V}, f = 1\text{ KHz}$	$h_{fe}$	10	...	..
<b>2N3235</b>					
*Collector-cutoff current	$V_{CE} = 90\text{V}, V_{BE} = -1.5\text{V}$	$I_{CEV}$	...	5	ma
*Collector-cutoff current	$V_{CE} = 45\text{V}, V_{BE} = -1.5\text{V}, T_C = 150^\circ\text{C}$	$I_{CEV}$	...	5	ma
*Emitter-cutoff current	$V_{EB} = 7\text{V}, I_C = 0$	$I_{EBO}$	...	5	ma
*Collector-emitter sustaining voltage <sup>③</sup>	$I_C = 100\text{mA}, I_B = 0$	$V_{CEO}(\text{sus})$	55	...	V
*Dc Forward-current transfer ratio <sup>①</sup>	$I_C = 4\text{A}, V_{CE} = 4\text{V}$	$h_{FE}$	20	70	..
*Collector-emitter saturation voltage	$I_C = 4\text{A}, I_B = 0.4\text{A}$	$V_{CE}(\text{sat})$	...	1.1	V
*Base-emitter voltage	$I_C = 4\text{A}, V_{CE} = 4\text{V}$	$V_{BE}$	...	1.8	V
*Small-signal forward current transfer ratio	$I_C = 4\text{A}, V_{CE} = 4\text{V}, f = 1\text{ KHz}$	$h_{fe}$	10	...	..

\* JEDEC registered parameters.

<sup>①</sup> Pulse; pulse duration 300  $\mu\text{sec}$ ; duty cycle  $\leq 2\%$ .

<sup>③</sup>  $V_{CEO}$  (sus) and  $V_{CE}$  (max) for 2N3232, 60V; for 2N3233, 100V; for 2N3234, 160V.

### Typical Characteristics, 2N3232-2N3234

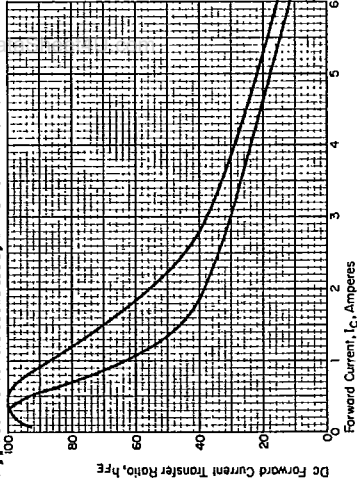


Figure 1. Dc forward current transfer ratio vs. collector current.

### Typical Characteristics, 2N3235

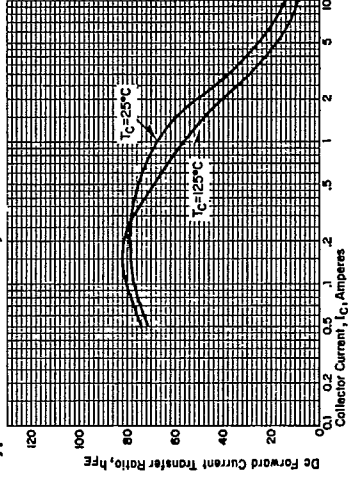


Figure 4. Dc forward current transfer ratio vs. collector current.

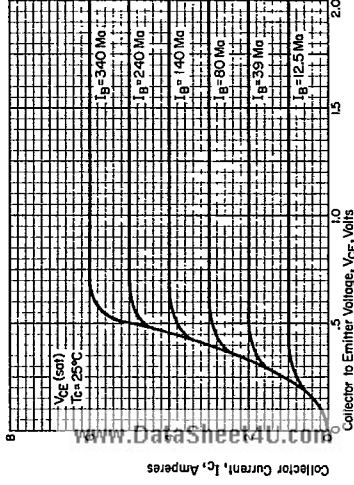


Figure 2. Output characteristics.

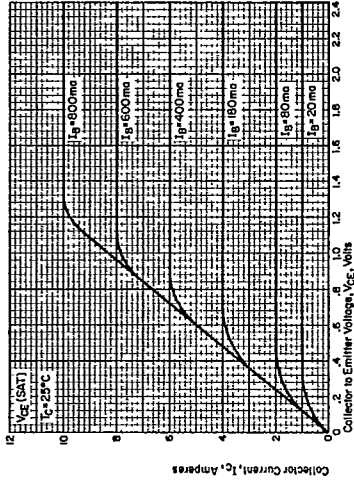


Figure 5. Output characteristics.

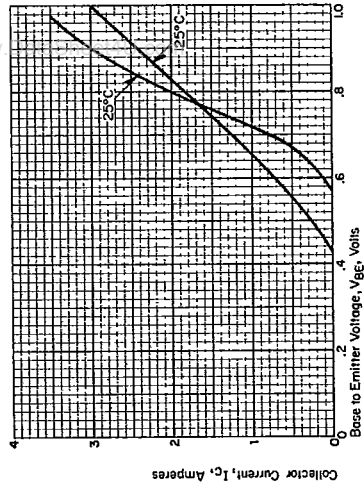


Figure 3. Transconductance characteristics.

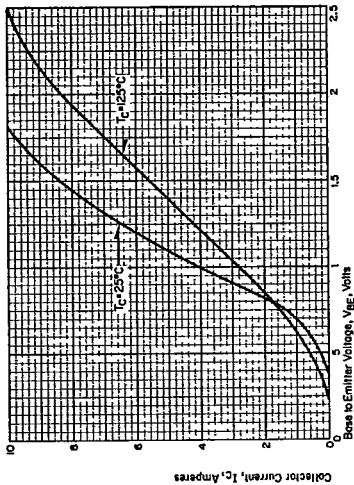


Figure 6. Transconductance characteristics.