

## NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/464

### Devices

2N5685

2N5686

### Qualified Level

JAN  
JANTX  
JANTXV

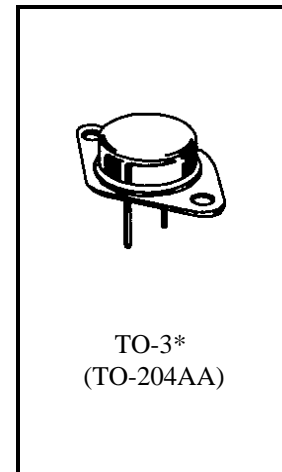
### MAXIMUM RATINGS

Ratings	Symbol	2N5685	2N5686	Units
Collector-Emitter Voltage	$V_{CEO}$	60	80	Vdc
Collector-Base Voltage	$V_{CBO}$	60	80	Vdc
Emitter-Base Voltage	$V_{EBO}$	5.0		Vdc
Base Current	$I_B$	15		Adc
Collector Current	$I_C$	50		Adc
Total Power Dissipation	@ $T_C = +25^{\circ}\text{C}$ <sup>(1)</sup>	300		W
	@ $T_C = +100^{\circ}\text{C}$ <sup>(1)</sup>	171		W
Operating & Storage Junction Temperature Range	$T_J, T_{stg}$	-55 to +200		$^{\circ}\text{C}$

### THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	.0584	$^{\circ}\text{C}/\text{W}$

1) Derate linearly 1.715 W/ $^{\circ}\text{C}$  between  $T_C = 25^{\circ}\text{C}$  and  $T_C = 200^{\circ}\text{C}$



\*See appendix A for package outline

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Min.	Max.	Unit
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### OFF CHARACTERISTICS

Collector-Emitter Breakdown Voltage $I_C = 100 \text{ mAdc}$	2N5685	$V_{(BR)CEO}$	60	Vdc
	2N5686		80	
Collector-Emitter Cutoff Current $V_{CE} = 30 \text{ Vdc}$	2N5685	$I_{CEO}$	500	$\mu\text{Adc}$
	2N5686		500	
Collector-Emitter Cutoff Current $V_{CE} = 60 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$	2N5685	$I_{CEX}$	500	$\mu\text{Adc}$
	2N5686		500	
Collector-Base Cutoff Current $V_{CB} = 60 \text{ Vdc}$	2N5685	$I_{CBO}$	2.0	mAdc
	2N5686		2.0	

**ELECTRICAL CHARACTERISTICS (con't)**

Characteristics	Symbol	Min.	Max.	Unit
Emitter-Base Cutoff Current $V_{EB} = 5.0 \text{ Vdc}$	$I_{EBO}$		1.0	mAdc

**ON CHARACTERISTICS <sup>(2)</sup>**

Forward-Current Transfer Ratio $I_C = 5.0 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ $I_C = 25 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$ $I_C = 50 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}$	$h_{FE}$	30 15 5.0	60	
Collector-Emitter Saturation Voltage $I_C = 25 \text{ Adc}, I_B = 2.5 \text{ Adc}$ $I_C = 50 \text{ Adc}, I_B = 10 \text{ Adc}$	$V_{CE(sat)}$		1.0 5.0	Vdc
Base-Emitter Saturation Voltage $I_C = 25 \text{ Adc}, I_B = 2.5 \text{ Adc}$	$V_{BE(sat)}$		2.0	Vdc
Base-Emitter Voltage $I_C = 25 \text{ Adc}, V_{CE} = 2.0 \text{ Vdc}$	$V_{BE(on)}$		2.0	Vdc

**DYNAMIC CHARACTERISTICS**

Magnitude of Common Emitter Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 5.0 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f = 1.0 \text{ MHz}$	$ h_{fe} $	2.0	20	
Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 10 \text{ Adc}, V_{CE} = 5.0 \text{ Vdc}, f = 1.0 \text{ kHz}$	$h_{fe}$	15		
Output Capacitance $V_{CB} = 10 \text{ Vdc}, I_E = 0, 0.1 \text{ MHz} \leq f \leq 1.0 \text{ MHz}$	$C_{obo}$		1200	pF

**SWITCHING CHARACTERISTICS**

Turn-On Time $V_{CC} = 30 \text{ Vdc}; I_C = 25 \text{ Adc}; I_{B1} = 2.5 \text{ Adc}$	$t_{on}$		1.5	$\mu\text{s}$
Turn-Off Time $V_{CC} = 30 \text{ Vdc}; I_C = 25 \text{ Adc}; I_{B1} = -I_{B2} = 2.5 \text{ Adc}$	$t_{off}$		3.0	$\mu\text{s}$

**SAFE OPERATING AREA**

<b>DC Tests</b>				
$T_C = +25^\circ\text{C}, 1 \text{ Cycle}, t = 1.0 \text{ s}$				
<b>Test 1</b>				
$V_{CE} = 6.0 \text{ Vdc}, I_C = 50 \text{ Adc}$				
<b>Test 2</b>				
$V_{CE} = 30 \text{ Vdc}, I_C = 10 \text{ Adc}$				
<b>Test 3</b>				
$V_{CE} = 50 \text{ Vdc}, I_C = 560 \text{ mAdc}$				2N5685
$V_{CE} = 60 \text{ Vdc}, I_C = 640 \text{ mAdc}$				2N5686

(2) Pulse Test: Pulse Width = 300 $\mu\text{s}$ , Duty Cycle  $\leq 2.0\%$ .