

NPN POWER SILICON TRANSISTOR
Qualified per MIL-PRF-19500/464

DEVICES

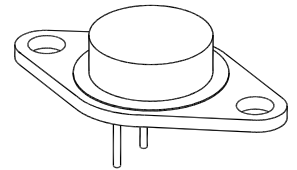
2N5685 2N5686

LEVELS

**JAN
 JANTX
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ABSOLUTE MAXIMUM RATINGS ($T_C = +25^\circ\text{C}$ unless otherwise noted)

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


TO-3 (TO-204AE)
THERMAL CHARACTERISTICS

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

Note:

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

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
OFF CHARACTERISTICS ⁽¹⁾				
Collector-Emitter Breakdown Voltage $I_C = 100\text{mA}$	2N5685	$V_{(BR)CEO}$	60	Vdc
	2N5686		80	
Collector-Emitter Cutoff Current $V_{CE} = 30\text{Vdc}$	2N5685	I_{CEO}	500	μA
	2N5686			
Collector-Emitter Cutoff Current $V_{CE} = 60\text{Vdc}, V_{BE} = 1.5\text{Vdc}$	2N5685	I_{CEX}	10	μA
	2N5686			
Collector-Base Cutoff Current $V_{CE} = 60\text{Vdc}$	2N5685	I_{CBO}	2.0	mA
	2N5686			
Emitter-Base Cutoff Current $V_{EB} = 5.0\text{Vdc}$		I_{EBO}	1.0	mA

ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, unless otherwise noted)

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
ON CHARACTERISTICS ⁽²⁾				
Forward-Current Transfer Ratio $I_C = 5.0\text{A dc}$, $V_{CE} = 2.0\text{V dc}$ $I_C = 25\text{A dc}$, $V_{CE} = 2.0\text{V dc}$ $I_C = 50\text{A dc}$, $V_{CE} = 5.0\text{V dc}$	h_{FE}	30 15 5.0	60	
Collector-Emitter Saturation Voltage $I_C = 25\text{A dc}$, $I_B = 2.5\text{A dc}$ $I_C = 50\text{A dc}$, $I_B = 10\text{A dc}$	$V_{CE(sat)}$		1.0 5.0	Vdc
Base-Emitter Saturation Voltage $I_C = 25\text{A dc}$, $I_B = 2.5\text{A dc}$	$V_{BE(sat)}$		2.0	Vdc
Base-Emitter Voltage $I_C = 25\text{A dc}$, $V_{CE} = 2.0\text{A dc}$	$V_{BE(ON)}$		2.0	Vdc

DYNAMIC CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Magnitude of Common Emitter Small-Signal Short-Circuit, Forward Current Transfer Ratio $I_C = 5.0\text{A dc}$, $V_{CE} = 10\text{V dc}$, $f = 1.0\text{MHz}$	$ h_{fe} $	2.0	20	
Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 10\text{A dc}$, $V_{CE} = 5.0\text{V dc}$, $f = 1.0\text{kHz}$	h_{fe}	15		
Output Capacitance $V_{CB} = 10\text{V dc}$, $I_E = 0$, $0.1\text{MHz} \leq f \leq 1.0\text{MHz}$	C_{obo}		1200	pF

SWITCHING CHARACTERISTICS

Parameters / Test Conditions	Symbol	Min.	Max.	Unit
Turn-On Time $V_{CC} = 30\text{V dc}$; $I_C = 25\text{A dc}$; $I_{B1} = 2.5\text{A dc}$	t_{on}		1.5	μs
Turn-Off Time $V_{CC} = 30\text{V dc}$; $I_C = 25\text{A dc}$; $I_{B1} = -I_{B2} = 2.5\text{A dc}$	t_{off}		3.0	μs

SAFE OPERATING AREA

DC Tests

$T_C = +25^\circ\text{C}$, 1 Cycle, $t = 1.0\text{s}$

Test 1

$V_{CE} = 6.0\text{V dc}$, $I_C = 50\text{A dc}$

Test 2

$V_{CE} = 30\text{V dc}$, $I_C = 10\text{A dc}$

Test 3

$V_{CE} = 50\text{V dc}$, $I_C = 560\text{m dc}$ 2N5685

$V_{CE} = 60\text{V dc}$, $I_C = 640\text{m dc}$ 2N5686

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