

NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/464

Devices

2N5685

2N5686

Qualified Level

JAN
JANTX
JANTXV

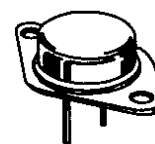
MAXIMUM RATINGS

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	@ $T_C = +25^{\circ}\text{C}$ ⁽¹⁾ @ $T_C = +100^{\circ}\text{C}$ ⁽¹⁾	300		W
		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	$^{\circ}\text{C/W}$

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



TO-3*
(TO-204AA)

*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 $V_{CE} = 30 \text{ Vdc}$ $V_{CE} = 40 \text{ Vdc}$	2N5685	I_{CEO}	500	μAdc
	2N5686		500	
Collector-Emitter Cutoff Current $V_{CE} = 60 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ $V_{CE} = 80 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$	2N5685	I_{CEX}	500	μAdc
	2N5686		500	
Collector-Base Cutoff Current $V_{CB} = 60 \text{ Vdc}$ $V_{CB} = 80 \text{ Vdc}$	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 ⁽²⁾

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	μs
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	μs

SAFE OPERATING AREA

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

(2) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.