

NPN POWER SILICON TRANSISTOR

Qualified per MIL-PRF-19500/538

Devices

2N6676 2N6678 2N6691 2N6693

Qualified Level

JAN
JANTX
JANTXV

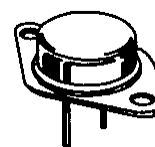
MAXIMUM RATINGS

Ratings	Symbol	2N6676 2N6691	2N6678 2N6693	Unit
Collector-Emitter Voltage	V_{CEO}	300	400	Vdc
Collector-Base Voltage	V_{CBO}	450	650	Vdc
Collector-Base Voltage	V_{CEX}	450	650	Vdc
Emitter-Base Voltage	V_{EBO}	8.0		Vdc
Base Current	I_B	5.0		Adc
Collector Current	I_C	15		Adc
		2N6676 2N6678	2N6691 2N6693	
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ @ $T_C = 25^\circ\text{C}^{(1)}$	P_T	6.0 ⁽²⁾	3.0 ⁽³⁾	W
		175	175	W
Operating & Storage Junction Temperature Range	$T_{op}; T_{stg}$	-65 to +200		$^\circ\text{C}$

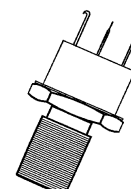
THERMAL CHARACTERISTICS

Characteristics	Symbol	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.0	$^\circ\text{C/W}$

- 1) Derate linearly 1.0 W/ $^\circ\text{C}$ for $T_C > 25^\circ\text{C}$
- 2) Derate linearly 34.2 mW/ $^\circ\text{C}$ for $T_A > 25^\circ\text{C}$
- 3) Derate linearly 17.1 mW/ $^\circ\text{C}$ for $T_A > 25^\circ\text{C}$



2N6676, 2N6678
TO-3 (TO-204AA)*



2N6691, 2N6693
TO-61*

* 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 $I_C = 200 \text{ mAdc}$	2N6676, 2N6691 2N6678, 2N6693	$V_{(BR)CEO}$	300 400	Vdc
Collector-Emitter Cutoff Current $V_{CE} = 450 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$ $V_{CE} = 650 \text{ Vdc}, V_{BE} = 1.5 \text{ Vdc}$	2N6676, 2N6691 2N6678, 2N6693	I_{CEX}	0.1 0.1	mAdc

ELECTRICAL CHARACTERISTICS (con't)

Characteristics	Symbol	Min.	Max.	Unit
Emitter-Base Cutoff Current $V_{EB} = 8.0 \text{ Vdc}$	I_{EBO}		2.0	mAdc
Collector-Base Cutoff Current $V_{CB} = 450 \text{ Vdc}$ $V_{CB} = 650 \text{ Vdc}$	I_{CBO}		1.0 1.0	mAdc

ON CHARACTERISTICS ⁽⁴⁾

Forward-Current Transfer Ratio $I_C = 1.0 \text{ Adc}; V_{CE} = 3.0 \text{ Vdc}$ $I_C = 15 \text{ Adc}; V_{CE} = 3.0 \text{ Vdc}$	h_{FE}	15 8.0	40 20	
Collector-Emitter Saturation Voltage $I_C = 15 \text{ Adc}; I_B = 3.0 \text{ Adc}$	$V_{CE(sat)}$		1.0	Vdc
Base-Emitter Saturation Voltage $I_C = 15 \text{ Adc}; I_B = 3.0 \text{ Adc}$	$V_{BE(sat)}$		1.5	Vdc

DYNAMIC CHARACTERISTICS

Small-Signal Short-Circuit Forward Current Transfer Ratio $I_C = 1.0 \text{ Adc}; V_{CE} = 10 \text{ Vdc}, f = 5 \text{ MHz}$	$ h_{fe} $	3.0	10	
Output Capacitance $V_{CB} = 10 \text{ Vdc}; I_E = 0, 100 \text{ kHz} \leq f \leq 1.0 \text{ MHz}$	C_{obo}	150	500	pF

SWITCHING CHARACTERISTICS

Delay Time	See Figure 3 of MIL-PRF-19500/538	t_d		0.1	μs
Rise Time		t_r		0.6	μs
Storage Time		t_s		2.5	μs
Fall Time		t_f		0.5	μs
Cross-Over Time		t_c		0.5	μs

SAFE OPERATING AREA**DC Tests** $T_C = +25^\circ\text{C}$, 1 Cycle, $t = 1.0 \text{ s}$ **Test 1** $V_{CE} = 11.7 \text{ Vdc}, I_C = 15 \text{ Adc}$ All Types**Test 2** $V_{CE} = 30 \text{ Vdc}, I_C = 5.9 \text{ Adc}$ 2N6676, 2N6678**Test 3** $V_{CE} = 100 \text{ Vdc}, I_C = 0.25 \text{ Adc}$ All Types**Test 4** $V_{CE} = 25 \text{ Vdc}, I_C = 7.0 \text{ Adc}$ 2N6691, 2N6693**Test 5** $V_{CE} = 300 \text{ Vdc}, I_C = 20 \text{ mAdc}$ 2N6676, 2N6691 $V_{CE} = 400 \text{ Vdc}, I_C = 10 \text{ mAdc}$ 2N6678, 2N6693**Clamped Switching** $T_A = 25^\circ\text{C}; V_{CC} = 15 \text{ Vdc}$ $I_C = 15 \text{ Adc}$; Clamped Voltage = 350 Vdc 2N6676, 2N6691 $I_C = 15 \text{ Adc}$; Clamped Voltage = 450 Vdc 2N6678, 2N6693(4) Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

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