

DIGITRON SEMICONDUCTORS

2N5441-2N5446, T6420 SERIES

40 AMP SILICON TRIACS

Available Non-RoHS (standard) or RoHS compliant (add PBF suffix).

Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.

MAXIMUM RATINGS (Sinusoidal supply voltage at frequency 50/60Hz and with resistive or inductive load)

Rating	Symbol	2N5441 2N5444 T6420B	2N5442 2N5445 T6420D	2N5443 2N5446 T6420M	Unit
Repetitive peak off-state voltage⁽¹⁾ Gate open, T _J = -65 to 100°C	V _{DROM}	200	400	600	V
RMS on-state current (Conduction angle = 360°) T _C = 70°C (press-fit type) T _C = 65°C (stud type) T _C = 60°C (isolated stud type)	I _{T(RMS)}		40 40 40		A
Peak surge (non-repetitive) on state current For one cycle of applied principal voltage 60Hz (sinusoidal) 50Hz (sinusoidal)	I _{TSM}		300 265		A
Rate of change of on-state current V _{DM} = V _{DROM} , I _{GT} = 200mA, t _r = 0.1μs	di/dt		100		A/μs
Fusing current T _J = -65° to 110°C, t = 1.25 to 10ms	I ² t		450		A ² s
Peak gate trigger current⁽²⁾ For 1μs maximum	I _{GTM}		12		A
Gate power dissipation Peak (for 10μs maximum, I _{GTM} ≤ 4A) Average	P _{G(M)} P _{G(AV)}		40 0.75		W
Storage temperature range	T _{stg}		-65 to 150		°C
Operating temperature range	T _C		-65 to 110		°C
Terminal temperature (during soldering) For 10 s maximum (terminals and case)	T _T		225		°C
Maximum stud torque	r _s		50		In. lb.

Note 1: For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1.

Note 2: For either polarity of gate voltage (V_G) with reference to main terminal 1.

ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Limits			Units
		For all types unless otherwise specified			
		Min	Typ	Max	
Peak off-state current⁽¹⁾ Gate open, T _J = 110°C, V _{DROM} = maximum rated value	I _{DROM}	-	0.2	4	mA
Maximum on-state voltage⁽¹⁾ I _T = 100A(peak), T _C = 25°C I _T = 56A(peak), T _C = 25°C	V _{TM}	- -	1.7 1.5	2 1.85	V
DC holding current⁽¹⁾ Gate open, initial principal current = 500mA(dc), V _D = 12V T _C = 25°C T _C = -65°C	I _{HO}	- -	25 -	60 100	mA
Critical rate of rise of commutation voltage⁽¹⁾ For V _D = V _{DROM} , I _{T(RMS)} = 40A, commutating di/dt = 22A/ms, gate unenergized T _C = 70°C (press fit type) T _C = 65°C (stud type) T _C = 60°C (isolated-stud types)	dv/dt	5 5 5	30 30 30	- - -	V/μs

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ELECTRICAL CHARACTERISTICS

Characteristic	Symbol	Limits			Units
		For all types unless otherwise specified			
		Min	Typ	Max	
Critical rate of rise of off-state voltage⁽¹⁾ For $V_D = V_{DROM}$, exponential voltage rise, gate open $T_C = 110^\circ\text{C}$: 2N5441, 2N5444, T6420B 2N5442, 2N5445, T6420D 2N5443, 2N5446, T6420M	dv/dt	50 30 20	200 150 100	- - -	V/ μs
DC trigger current $(V_D = 12\text{V}, R_L = 30\Omega, T_C = 25^\circ\text{C})$ MT2(+),G(+) MT2(-), G(-) MT2(+), G(-) MT2(-), G(+) $(V_D = 12\text{V}, R_L = 30\Omega, T_C = -65^\circ\text{C})$ MT2(+),G(+) MT2(-), G(-) MT2(+), G(-) MT2(-), G(+) 	I_{GT}	- - - - - - - -	15 20 30 40 - - - -	50 50 80 80 125 125 240 240	mA
DC gate trigger voltage⁽¹⁾⁽²⁾ $V_D = 12\text{V(d.c.)}, R_L = 30\Omega$ $T_C = 25^\circ\text{C}$ $T_C = -65^\circ\text{C}$ $V_D = V_{DROM}, R_L = 125\Omega, T_C = 110^\circ\text{C}$	V_{GT}	- - 0.2	1.35 1.80 -	2.5 3.4 -	V
Gate controlled turn on time (Delay time + rise time) $V_D = V_{DROM}, I_{GT} = 200\text{mA}, t_r = 0.1\mu\text{s}, I_T = 60\text{A(peak)}, T_C = 25^\circ\text{C}$	t_{gt}	-	1.7	3	μs
Thermal resistance, junction to case, steady state Press fit types Stud types Isolated stud types	$R_{\theta JC}$	- - -	- - -	0.8 0.9 1	$^\circ\text{C/W}$

Note 1: For either polarity of main terminal 2 voltage (V_{MT2}) with reference to main terminal 1.
 Note 2: For either polarity of gate voltage (V_G) with reference to main terminal 1.

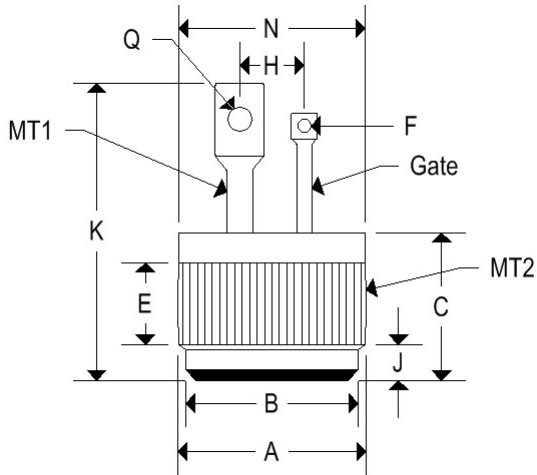
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MECHANICAL CHARACTERISTICS

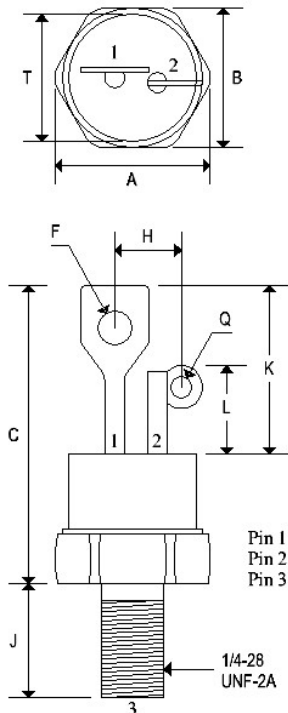
Case	Digi PF1 (2N5441-2N5443)
Marking	Alpha-numeric
Polarity	Cathode is stud



	DIGI PF1			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.501	0.505	12.730	12.830
F	-	0.160	-	4.060
G	0.085	0.095	2.160	2.410
H	0.060	0.070	1.520	1.780
J	0.300	0.350	7.620	8.890
K	-	1.050	-	26.670
L	-	0.670	-	17.020
Q	0.055	0.085	1.400	2.160

MECHANICAL CHARACTERISTICS

Case	TO-48 (2N5444-2N5446)
Marking	Alpha-numeric
Polarity	Cathode is stud



	TO-48			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.604	0.614	15.340	15.600
B	0.551	0.559	14.000	14.200
C	1.050	1.190	2.670	30.230
F	0.135	0.160	3.430	4.060
H	-	0.265	-	6.730
J	0.420	0.455	10.670	11.560
K	0.620	0.670	15.750	17.020
L	0.300	0.350	7.620	8.890
Q	0.055	0.085	1.400	2.160
T	0.501	0.505	12.730	12.830

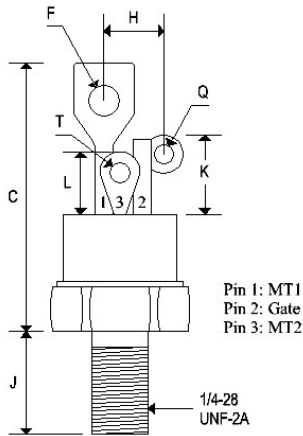
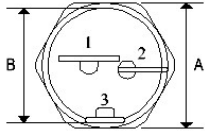
DIGITRON SEMICONDUCTORS

2N5441-2N5446, T6420 SERIES

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MECHANICAL CHARACTERISTICS

Case	TO-48 ISO (T6420 Series)
Marking	Alpha-numeric
Polarity	Cathode is stud



	TO-48 ISO			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.551	0.559	14.000	14.200
B	0.501	0.505	12.730	12.830
C	-	1.280	-	32.510
F	-	0.160	-	4.060
H	-	0.265	-	6.730
J	0.420	0.455	10.670	11.560
K	0.300	0.350	7.620	8.890
L	0.255	0.275	6.480	6.990
Q	0.055	0.085	1.400	2.160
T	0.135	0.150	3.430	3.810

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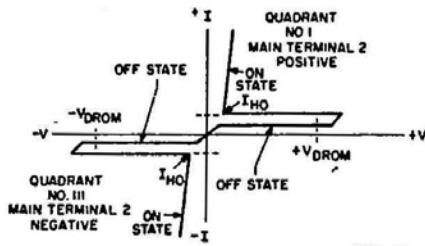


Fig. 1 - Principal voltage-current characteristic.

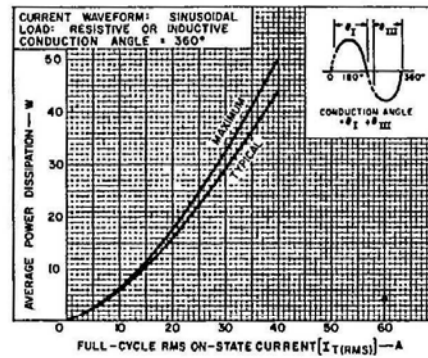


Fig. 2 - Power dissipation vs. on-state current.

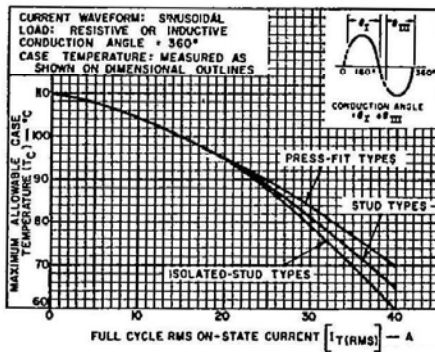


Fig. 3 - Maximum allowable case temperature vs. on-state current.

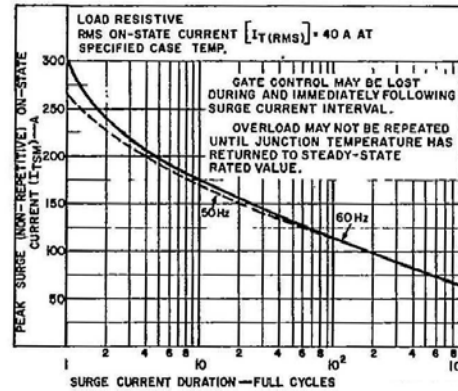


Fig. 4 - Peak surge on-state current vs. surge current duration.

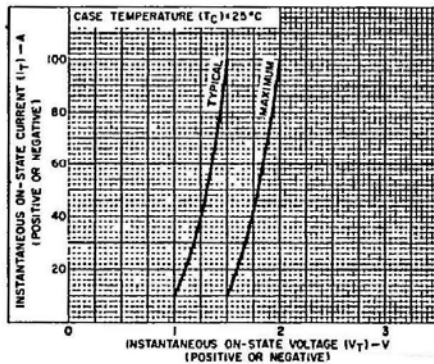


Fig. 5 - On-state current vs. on-state voltage.

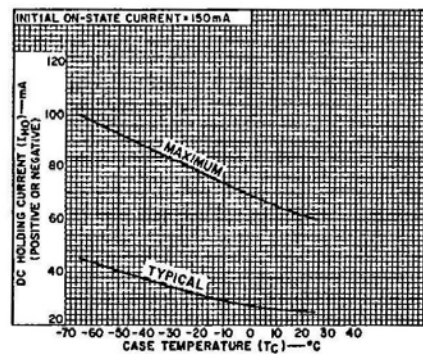


Fig. 6 - DC holding current vs. case temperature.

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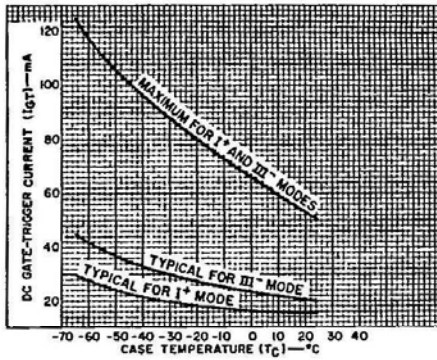


Fig. 7 - DC gate-trigger current vs. case temperature (I+ & III+ modes).

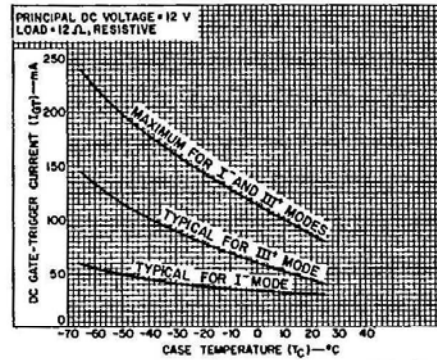


Fig. 8 - DC gate-trigger current vs. case temperature (I- & III- modes).

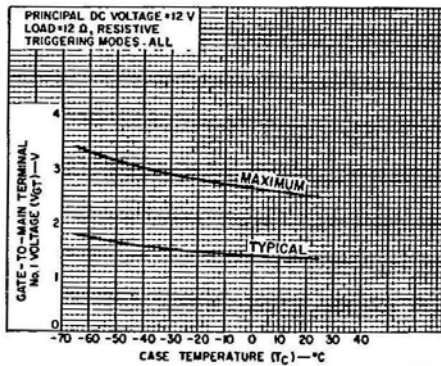


Fig. 9 - DC gate trigger voltage vs. case temperature.

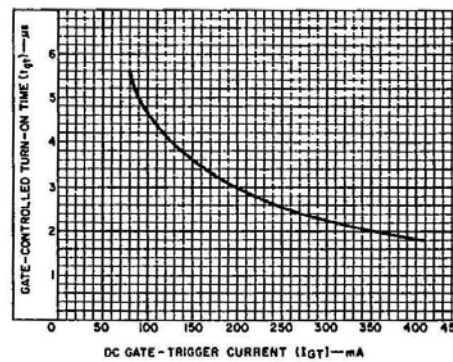


Fig. 10 - Turn-on time vs. gate-trigger current.

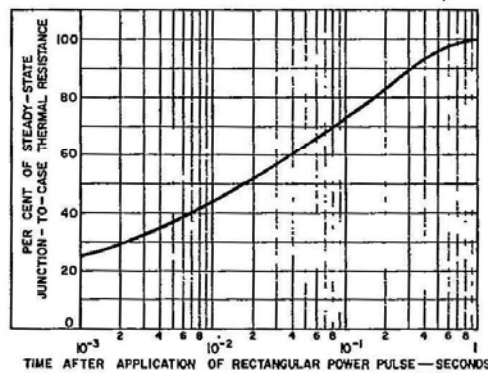


Fig. 11 - Transient junction-to-case thermal resistance vs. time for press-fit and stud types.

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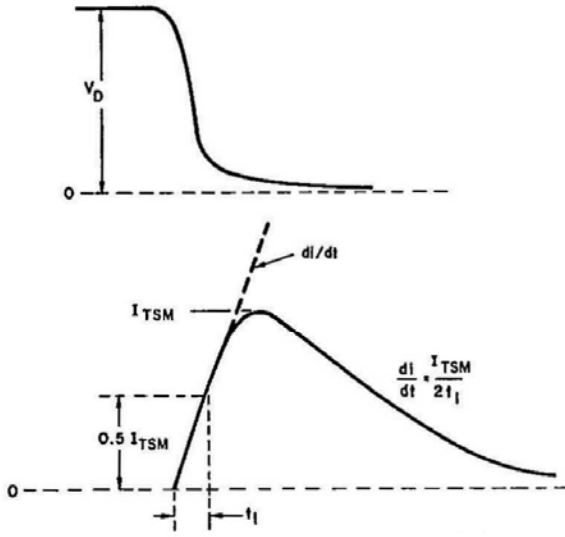


Fig. 12 - Rate of change of on-state current with time (defining di/dt).

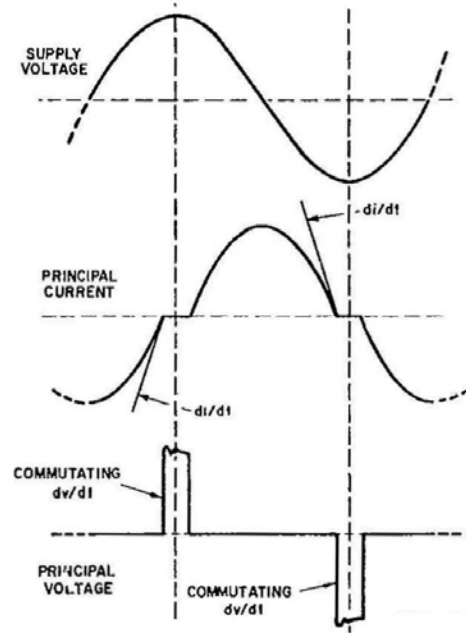


Fig. 13 - Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).

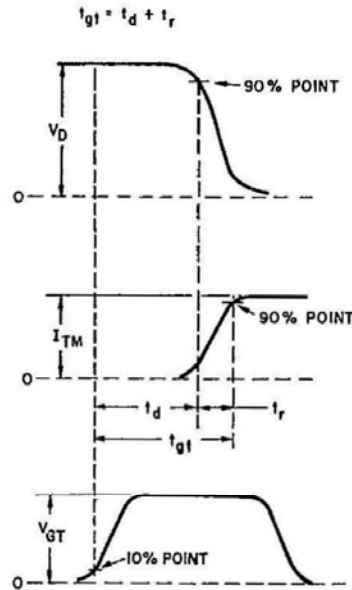


Fig. 14 - Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time (t_{gt}).