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^2t		450		A^2s
Peak gate trigger current(2) For 1µs maximum	I_{GTM}		12		A
Gate power dissipation Peak (for 10µs maximum, $I_{GTM} \leq$ 4A Average	 P_{GM} $P_{G(AV)}$		 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 For all types unless otherwise specified			Units
		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°C:	dv/dt				V/µs
2N5441, 2N5444, T6420B		50	200	-	
2N5442, 2N5445, T6420D		30	150	-	
2N5443, 2N5446, T6420M		20	100	-	
DC trigger current					
(V_D = 12V, R_L = 30Ω, T_C = 25°C)					
MT2(+),G(+)		-	15	50	
MT2(-), G(-)		-	20	50	
MT2(+), G(-)		-	30	80	
MT2(-), G(+)	I_{GT}	-	40	80	mA
(V_D = 12V, R_L = 30Ω, T_C = -65°C)					
MT2(+),G(+)		-	-	125	
MT2(-), G(-)		-	-	125	
MT2(+), G(-)		-	-	240	
MT2(-), G(+)		-	-	240	
DC gate trigger voltage(1)(2)					
V_D = 12V(dc), R_L = 30Ω					
T_C = 25°C	V_{GT}	-	1.35	2.5	V
T_C = -65°C		-	1.80	3.4	
$V_D = V_{DROM}$, R_L = 125Ω, T_C = 110°C		0.2	-	-	
Gate controlled turn on time					
(Delay time + rise time)	t_{gt}	-	1.7	3	µs
$V_D = V_{DROM}$, I_{GT} = 200mA, t_r = 0.1µs, I_T = 60A(peak), T_C = 25°C					
Thermal resistance, junction to case, steady state					
Press fit types	$R_{\Theta JC}$	-	-	0.8	°C/W
Stud types		-	-	0.9	
Isolated stud types		-	-	1	

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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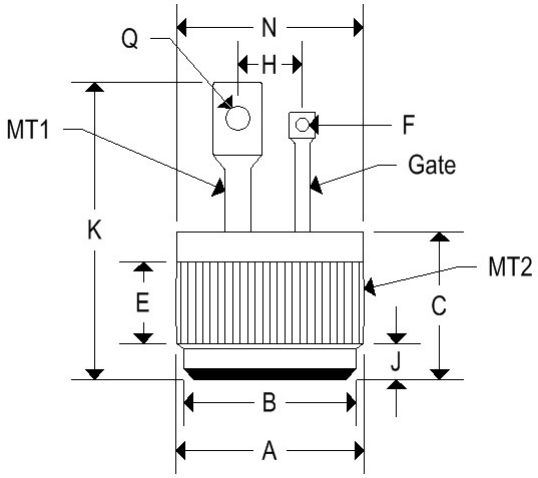
MECHANICAL CHARACTERISTICS

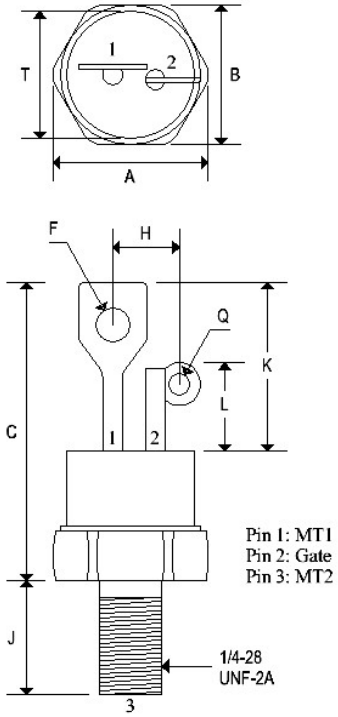
Case	Digi PF1 (2N5441-2N5443)
Marking	Alpha-numeric
Polarity	Cathode is stud



	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

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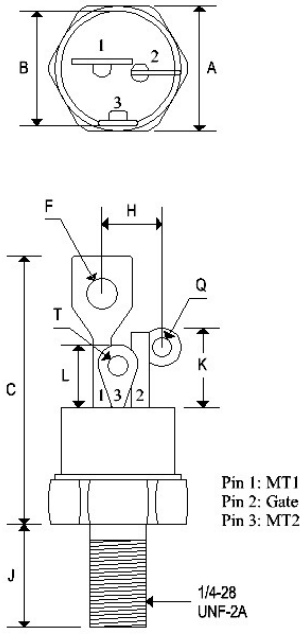
2N5441-2N5446, T6420 SERIES — 40 AMP SILICON TRIACS

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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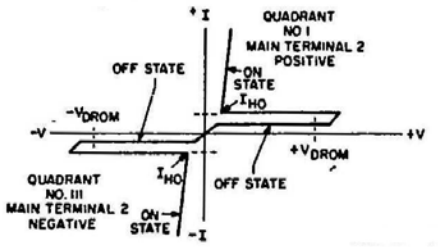

Fig. 1 - Principal voltage-current characteristic.

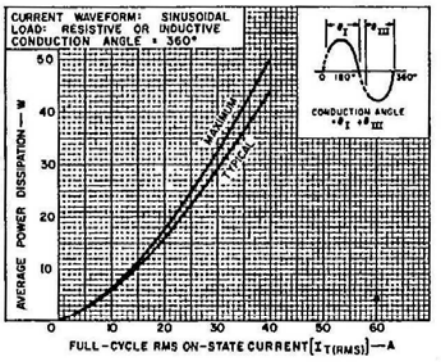

Fig. 2 - Power dissipation vs. on-state current.

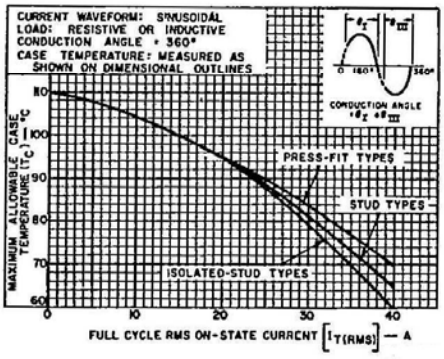

Fig. 3 - Maximum allowable case temperature vs. on-state current.

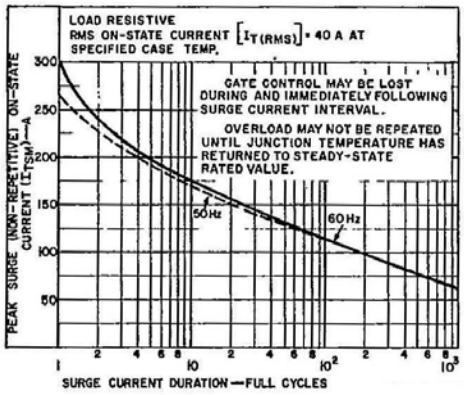

Fig. 4 - Peak surge on-state current vs. surge current duration.

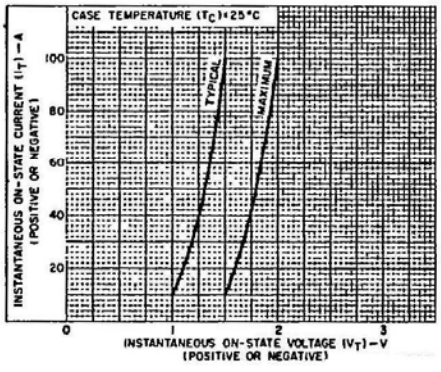

Fig. 5 - On-state current vs. on-stage voltage.

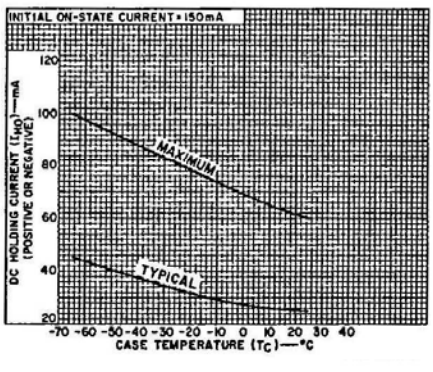

Fig. 6 - DC holding current vs. case temperature.

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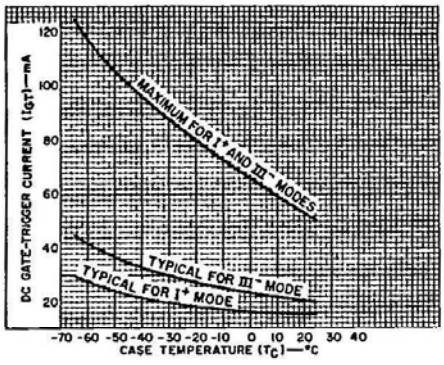

Fig. 7 - DC gate-trigger current vs. case temperature (I^+ & III^- modes).

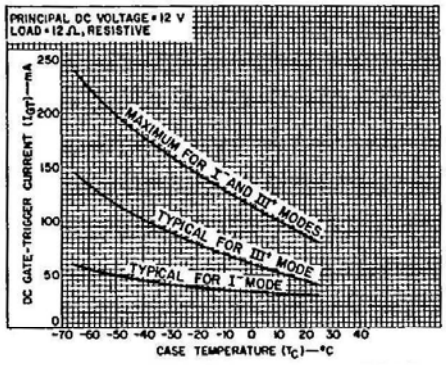

Fig. 8 - DC gate-trigger current vs. case temperature (I^- & III^- modes).

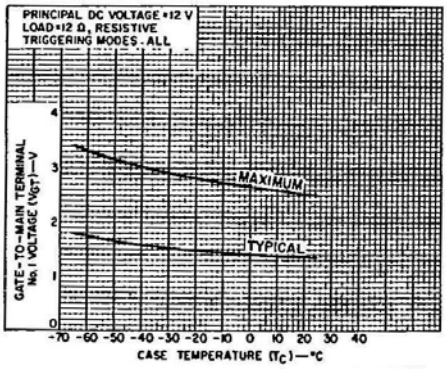

Fig. 9 - DC gate trigger voltage vs. case temperature.

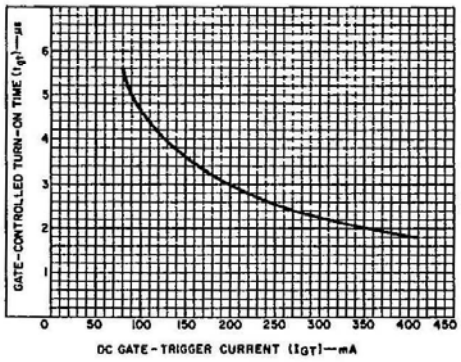

Fig. 10 - Turn-on time vs. gate-trigger current.

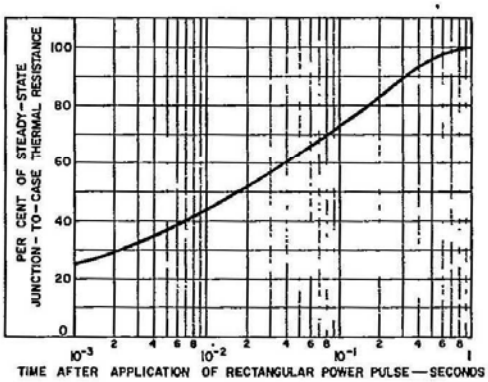

Fig. 11 - Transient junction-to-case thermal reistance vs. time for press-fit and stud types.

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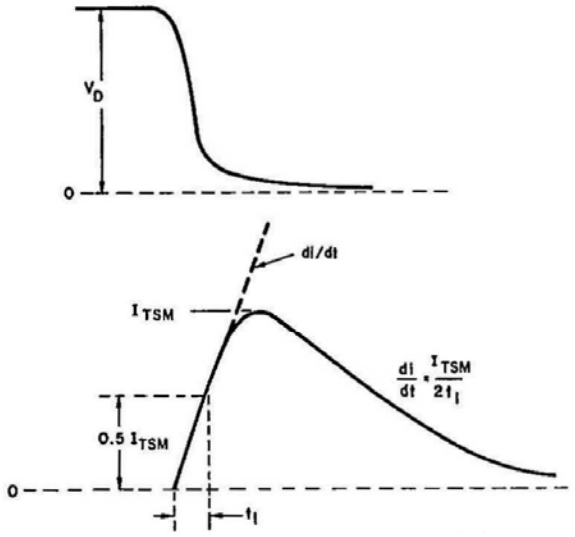

Fig. 12 - Rate of change of on-state current with time (defining di/dt).

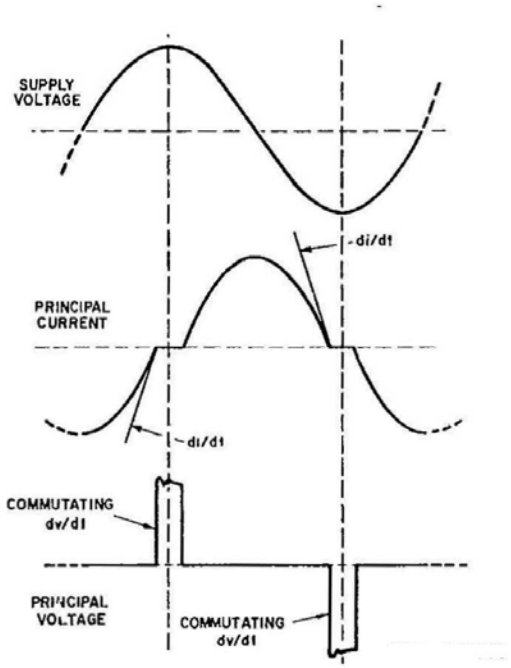

Fig. 13 - Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).

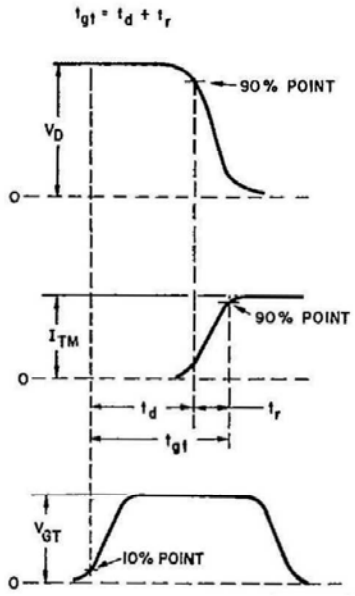

Fig. 14 - Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time (t_{gt}).

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