DIGITRON™ Semiconductors

High-reliability discrete products and engineering services since 1977

2N5441-2N5446 T6420 SERIES

40A SILICON TRIACS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS

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.

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ELECTRICAL CHARACTERISTICS @ 25°C unless otherwise noted

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
Critical rate of rise of off-state voltage[1] For $V_D = V_{DROM}$, exponential voltage rise, gate open T_C = 110°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 = 12V, R_L = 30Ω, T_C = 25°C) MT2(+),G(+) MT2(-), G(-) MT2(+), G(-) MT2(-), G(+) (V_D = 12V, R_L = 30Ω, T_C = -65°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 = 12V(dc), R_L = 30Ω T_C = 25°C T_C = -65°C $V_D = V_{DROM}$, R_L = 125Ω, T_C = 110°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} = 200mA, t_r = 0.1µs, I_T = 60A(peak), T_C = 25°C	t_{gt}	-	1.7	3	µs

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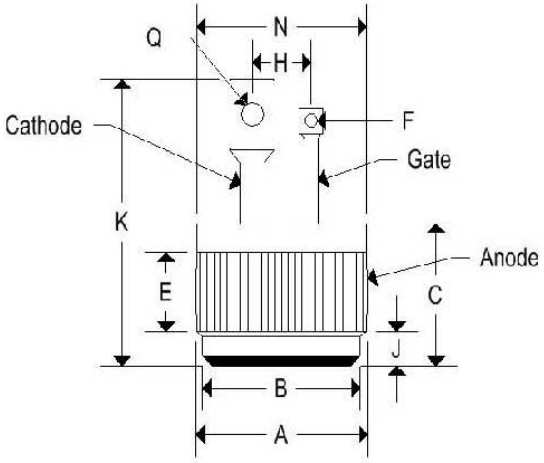
Thermal resistance, junction to case, steady state					
Press fit types	$R_{\Theta JC}$	-	-	0.8	°C/W
Stud types		-	-	0.9	
Isolated stud types		-	-	1	

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.

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

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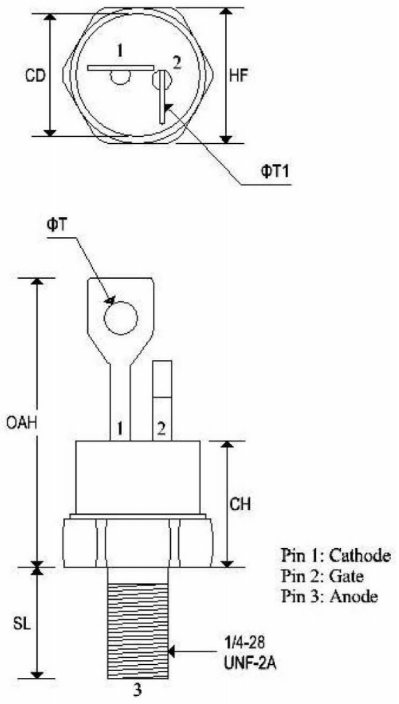
MECHANICAL CHARACTERISTICS

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



	TO-48			
	Inches		Millimeters	
	Min	Max	Min	Max
CD	-	0.543	-	13.793
CH	-	0.550	-	13.970
HF	0.544	0.563	13.817	14.301
OAH	-	1.193	-	30.303
SL	0.422	0.453	10.718	11.507
ΦT	0.125	0.165	3.175	4.191
ΦT_1	0.060	0.075	1.524	1.905

Note: Contour and angular orientation of terminals 1 and 2 with respect to hex portion and to each other are optional.

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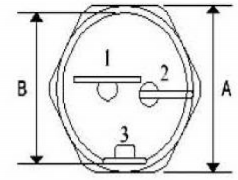
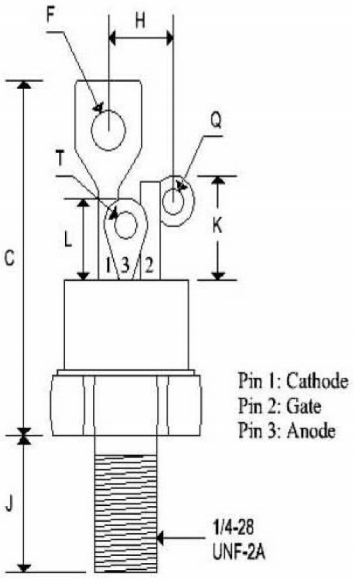
MECHANICAL CHARACTERISTICS

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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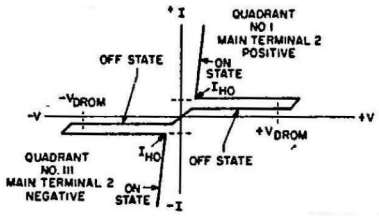

Fig. 1 - Principal voltage-current characteristic.

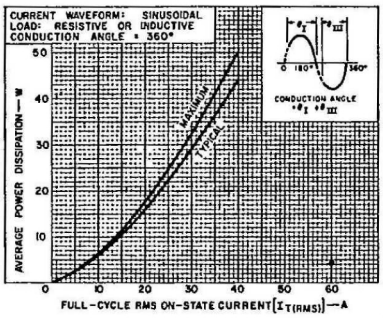

Fig. 2 - Power dissipation vs. on-state current.

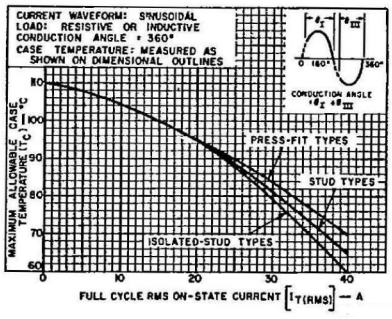

Fig. 3 - Maximum allowable case temperature vs. on-state current.

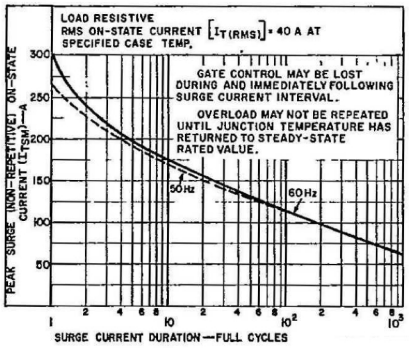

Fig. 4 - Peak surge on-state current vs. surge current duration.

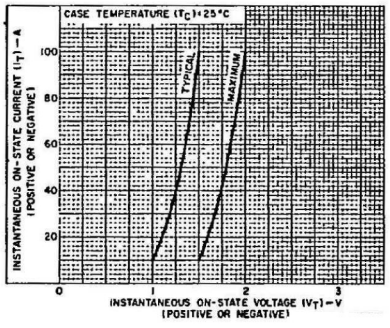

Fig. 5 - On-state current vs. on-stage voltage.

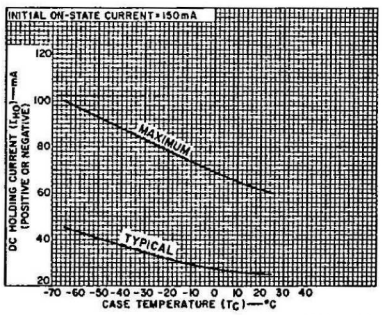

Fig. 6 - DC holding current vs. case temperature.

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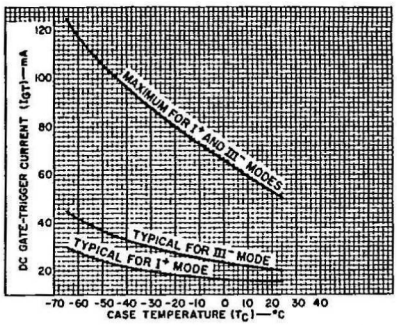

Fig. 7 - DC gate-trigger current vs. case temperature (I^+ & III^- modes).

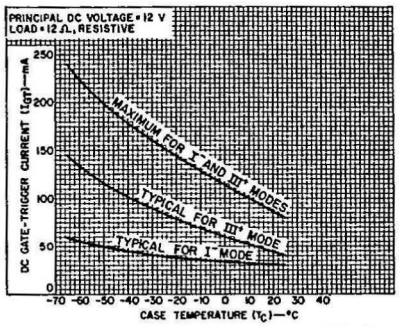

Fig. 8 - DC gate-trigger current vs. case temperature (I^- & III^- modes).

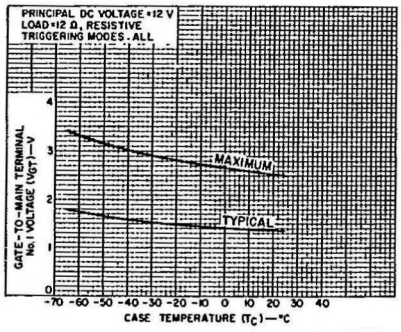

Fig. 9 - DC gate trigger voltage vs. case temperature.

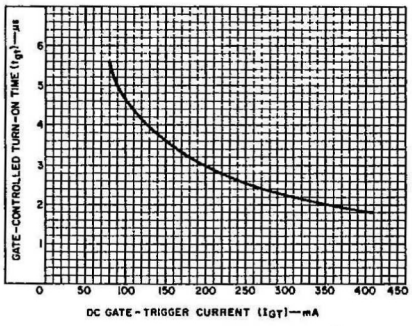

Fig. 10 - Turn-on time vs. gate-trigger current.

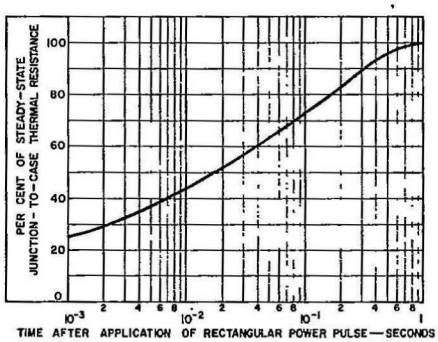

Fig. 11 - Transient junction-to-case thermal reistance vs. time for press-fit and stud types.

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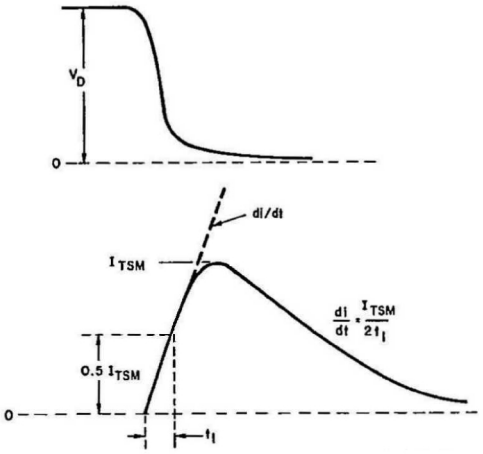

Fig. 12 - Rate of change of on-state current with time (defining di/dt).

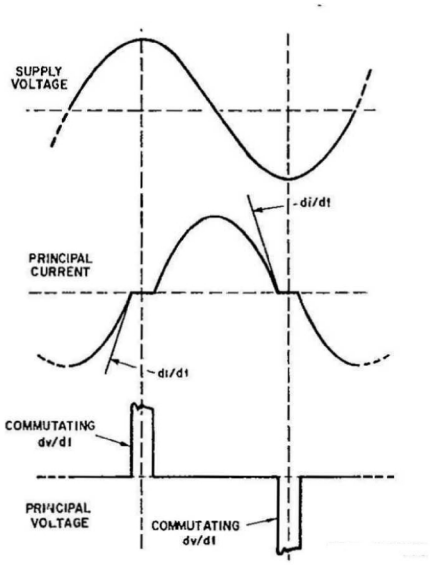

Fig. 13 - Relationship between supply voltage and principal current (inductive load) showing reference points for definition of commutating voltage (dv/dt).

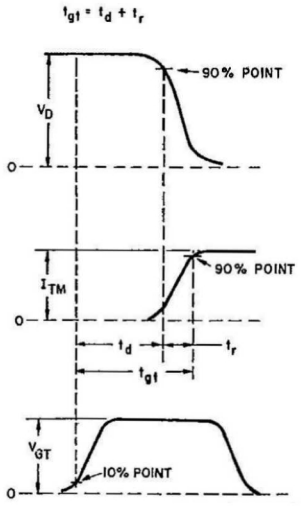

Fig. 14 - Relationship between off-state voltage, on-state current, and gate-trigger voltage showing reference points for definition of turn-on time (t_{gt}).