

SILICON CONTROLLED RECTIFIERS

41RIA, 51RIA SERIES

Power Silicon Controlled Rectifiers

64, 80 Amp RMS SCRs

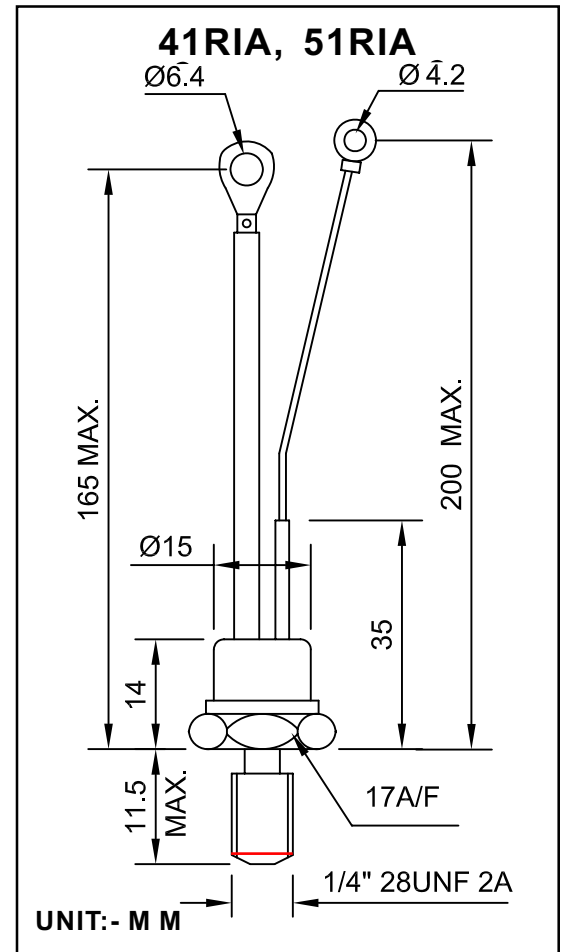
Types : 41RIA10-41RIA140, 51RIA10-51RIA140

FEATURES

- ⊕ All diffused series.
- ⊕ High di/dt and dv/dt capabilities.
- ⊕ Reliable blocking at elevated temperature.
- ⊕ High surge current rating.
- ⊕ High I^2t capability.
- ⊕ Excellent dynamic characteristics.

THERMAL MECHANICAL SPECIFICATIONS

R_{thjc}	Maximum thermal resistance junction-to-case	41RIA	51RIA
	DC operation	0.4°C/W	0.35°C/W
R_{thcs}	Contact thermal resistance case-to-sink	0.25°C/W	
T_J	Junction operating temp. range	-40°C to +125°C	
T_{stg}	Storage temperature range	-40°C to +125°C	
	Mounting torque (Non-lubricated threads)	0.4 M-Kg min. 0.6 M-Kg max.	
	Approximate weight	30 gms.	



ELECTRICAL RATINGS

TYPE	41RIA / 51RIA	10	20	40	60	80	100	120	140
V_{DRM}	Max. repetitive peak off state voltage (V)	100	200	400	600	800	1000	1200	1400
V_{RRM}	Max. repetitive peak reverse voltage (V)	100	200	400	600	800	1000	1200	1400
V_{RSM}	Max. non-repetitive peak reverse voltage (V)	150	300	500	700	900	1100	1300	1500
I_{RM} & I_{DM}	Max. peak reverse & off state current @ rated V_{DRM} & V_{RRM} 125°C -mA	15	15	15	15	15	15	15	15

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41 RIA, 51 RIA SERIES

ELECTRICAL SPECIFICATIONS

	ON-STATE	41RIA	51RIA	Units	Conditions	
$I_{T(RMS)}$	Max. RMS on-state current	65	80	A		
$I_{T(AV)}$	Max. average on-state current	40	50	A	$T_C = 94^\circ\text{C max.}, 180^\circ\text{C sinusoidal conduction.}$	
I_{TSM}	Max. peak one cycle non-repetitive surge current	1050	1200	A	50 Hz half cycle sine wave or 6 ms rectangular pulse.	Following any rated load conditions and with rated V_{RRM} applied following surge.
		1250	1430			Following any rated load condition and with no voltage reapplied following surge.
I^2t	Max. I^2t capability for fusing	5700	7200	A^2s	$t = 10 \text{ ms}$ Rated V_{RRM} applied following surge, initial $T_J = 125^\circ\text{C}$	
I^2t	Max. I^2t capability for individual device fusing (1)	8060	10180	A^2s	$t = 10 \text{ ms}$ V_{RRM} following surge = 0, initial $T_J = 125^\circ\text{C}$	
$I^2\sqrt{t}$	Max. $I^2\sqrt{t}$ capability for individual device fusing	80600	101800	$A^2\sqrt{s}$	$t = 0.1 \text{ to } 10 \text{ ms}$ V_{RRM} following surge = 0,, initial $T_J = 125^\circ\text{C}$	
V_{TM}	Max. peak on-state voltage	1.65	1.6	V	$T_J = 25^\circ\text{C}, I_{TM} = \pi \times I_{T(AV)}$	
I_H	Max. holding current	200		mA	$T_J = 25^\circ\text{C}, \text{anode supply} = 22\text{V}, \text{initial } I_T = 2.0\text{A}$	
I_L	Max. latching current	400		mA	Anode supply = 6V, resistive load.	

BLOCKING

(1) I^2t for time $t_x = I^2\sqrt{t} * \sqrt{t_x}$

dv/dt	Min. critical rate-of-rise of off-state voltage	200	V/ μs	$T_J = 125^\circ\text{C}$. Exponential to 100% rated V_{DRM} For 67% rated V_{DRM}	Zero gate bias voltage gate open circuited.
		500			

SWITCHING

t_d	Typical delay time	0.9	μs	$T_C = 25^\circ\text{C}, V_{DM} = \text{rated } V_{DRM}, I_{TM} = 10\text{A dc resistive circuit, Gate pulse } 10\text{V}, 15\Omega \text{ source } t_p = 20 \mu\text{S}$
di/dt	Max non-repetitive rate of rise of turned-on current $V_{RRM} = 700\text{-}1400 \text{ V}$ $50\text{-}600 \text{ V}$	100	A/ μs	$T_C = 125^\circ\text{C}, V_{DM} = \text{rated } V_{DRM}, I_{TM} = 2 \times \text{rated } di/dt$. Gate pulse 20V, 15 Ω , $t_p = 6 \mu\text{S}$, $t_r = 0.1 \mu\text{S max.}$
		200		
t_q	Typical turn-off time	110	μs	$T_C = 125^\circ\text{C}, I_{TM} = 50\text{A}, di/dt = 10 \text{ A}/\mu\text{S}, V_R$ during turn-off interval = 50 V min., reapplied $dv/dt = 20 \text{ V}/\mu\text{S}$ linear to rated V_{DRM} Gate bias : 0V, 100 Ω

TRIGGERING

P_{GM}	Max. peak gate power	10	W	$t_p \leq 5\text{ms}$	
$P_{G(AV)}$	Max. average gate power	2.5	W		
I_{GM}	Max. peak positive gate current	2.5	A		
$+V_{GM}$	Max. peak positive gate voltage	20	V		
$-V_{GM}$	Max. peak negative gate voltage	10	V		
I_{GT}	Max. required DC gate current to trigger	250	mA	$T_J = -40^\circ\text{C}$	Max. required gate trigger current is the lowest value which will trigger all units with +6V anode-to-cathode.
		100		$T_J = 25^\circ\text{C}$	
		50		$T_J = 125^\circ\text{C}$	
V_{GT}	Max. required DC gate voltage to trigger	3.5	V	$T_J = -40^\circ\text{C}$	Max. required gate trigger voltage is the lowest value which will trigger all units with +6V anode-to-cathode.
		2.5		$T_J = 25^\circ\text{C}$	
V_{GD}	Max. DC gate voltage not to trigger	0.2	V	$T_J = 125^\circ\text{C}$	Max. gate current or voltage not to trigger is the maximum value which will not trigger any unit with rated V_{DRM} anode-to-cathode.
I_{GD}	Max. DC gate current not to trigger	5.0	mA	$T_J = 125^\circ\text{C}$ $V_{DRM} = \text{rated voltage}$	

SILICON CONTROLLED RECTIFIERS

ORDER INFORMATION TABLE

41/51	RIA	40	M
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① ② ③ ④

- ① - Current Code
40/50 - without external lead
41/51 - with external lead
- ② - RIA - Essential part number
- ③ - Voltage Rating (See table)
- ④ - None - Stud 1/4" 28UNF 2A Threading
M - Stud M8 x 1.25P Metric Threading

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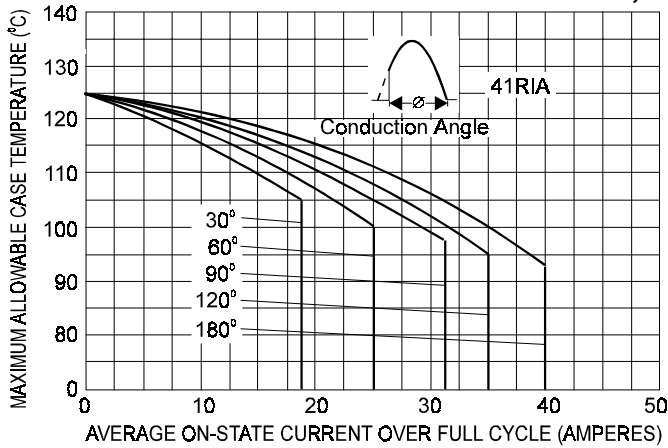


Fig. 1 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

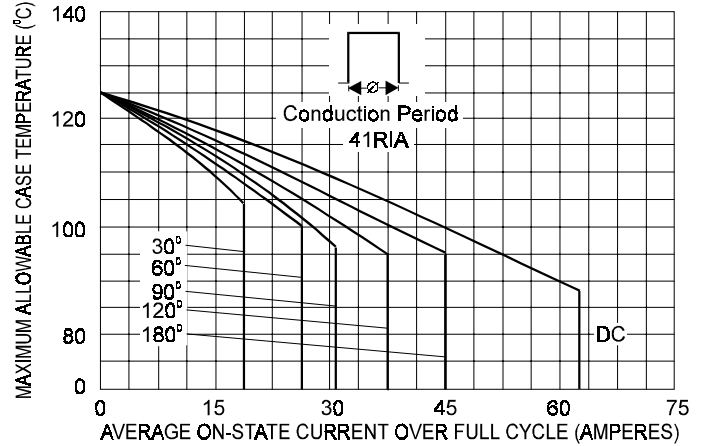


Fig. 2 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

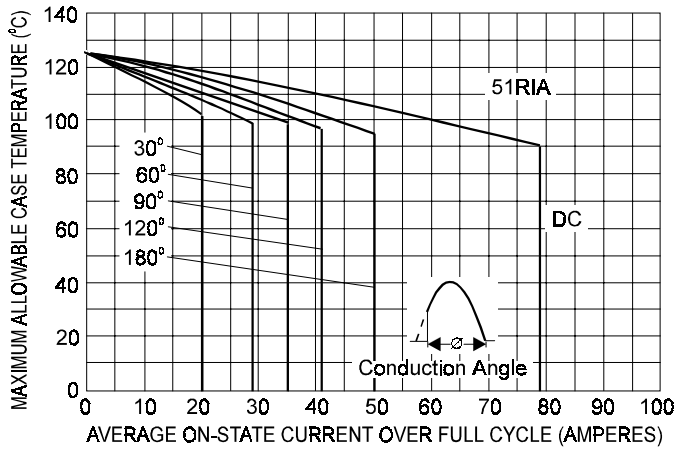


Fig. 3 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

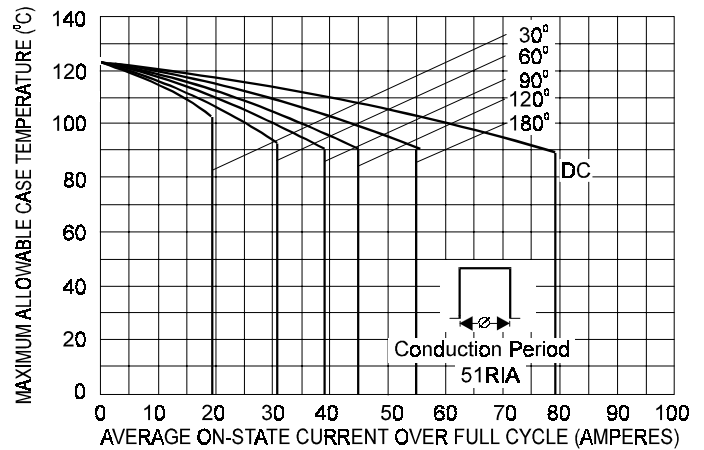


Fig. 4 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

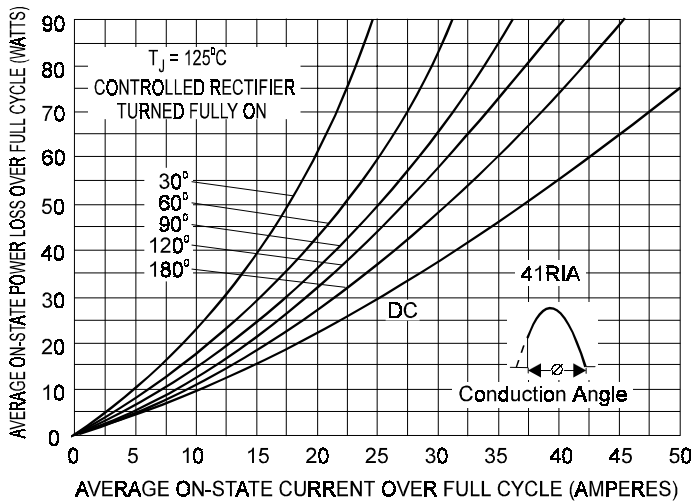


Fig. 5 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

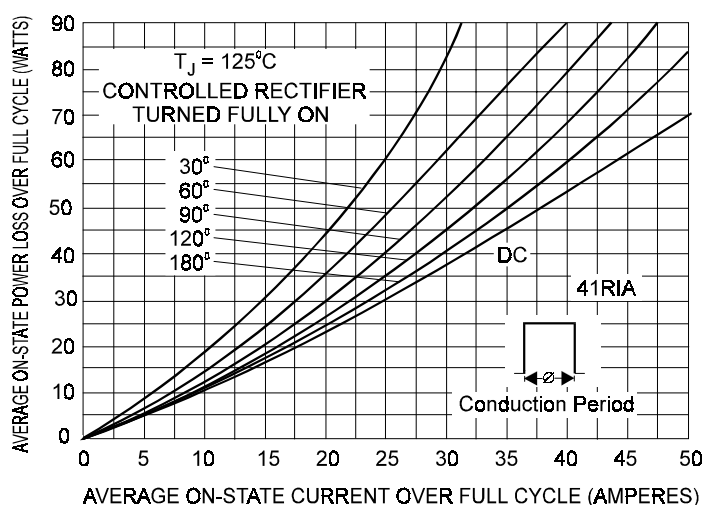


Fig. 6 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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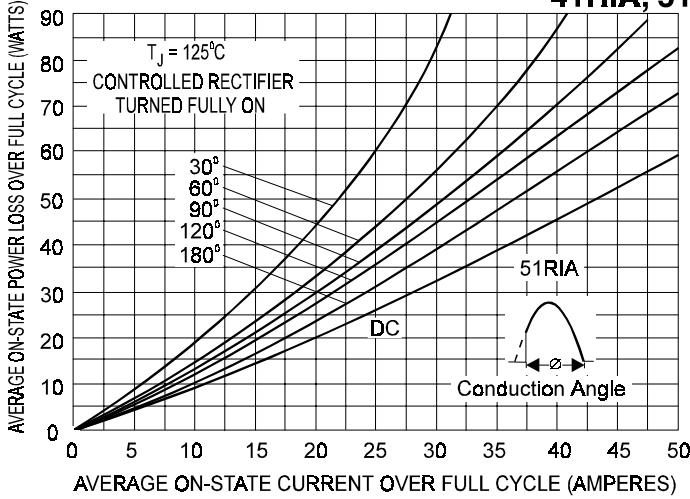


Fig. 7 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

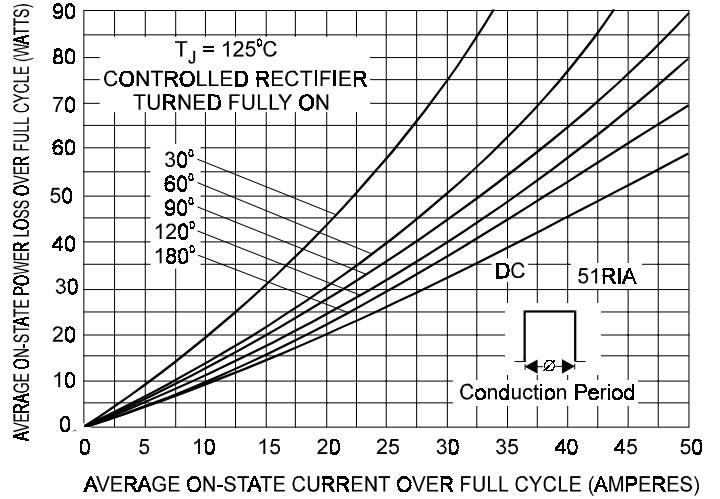


Fig. 8 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

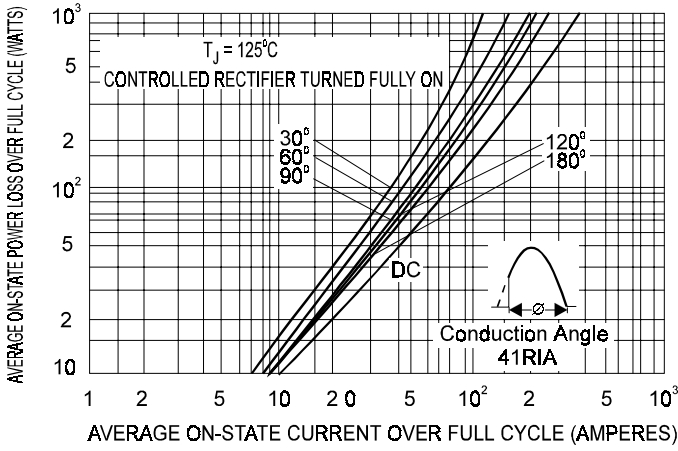


Fig. 9 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

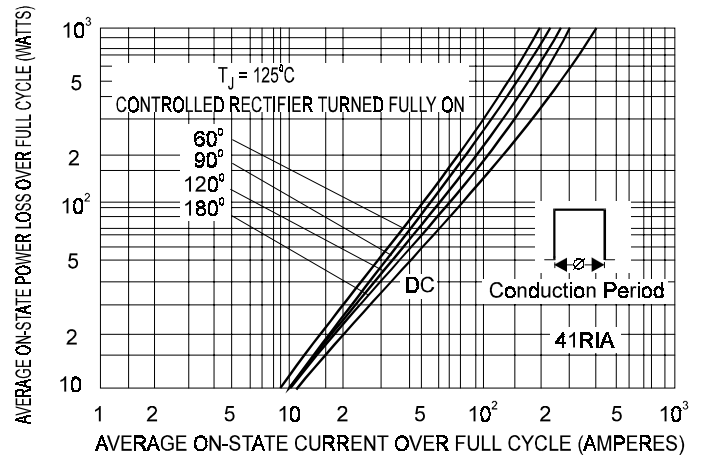


Fig. 10 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

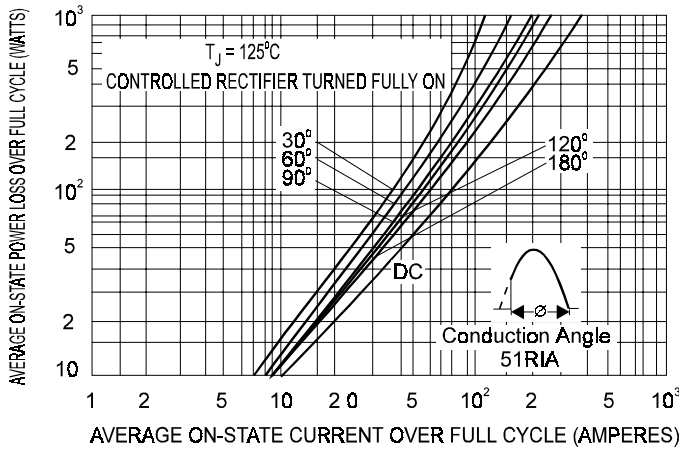


Fig. 11 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

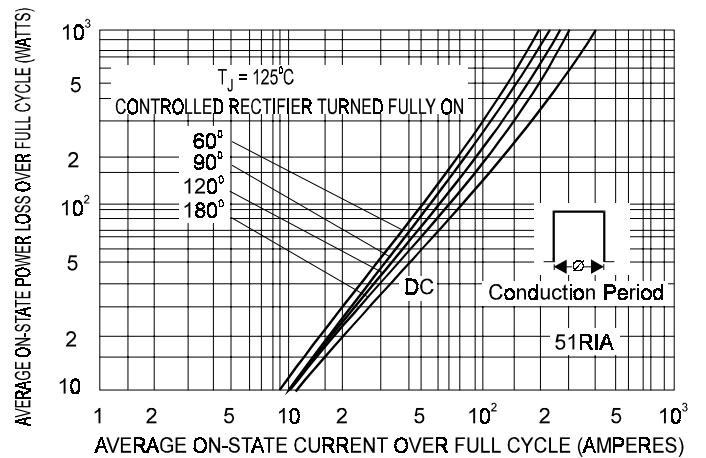


Fig. 12 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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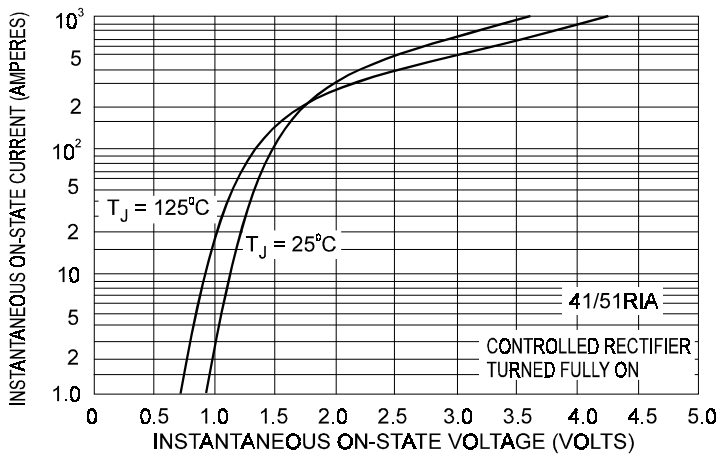


Fig. 13 - Maximum On-state Voltage Vs. Current

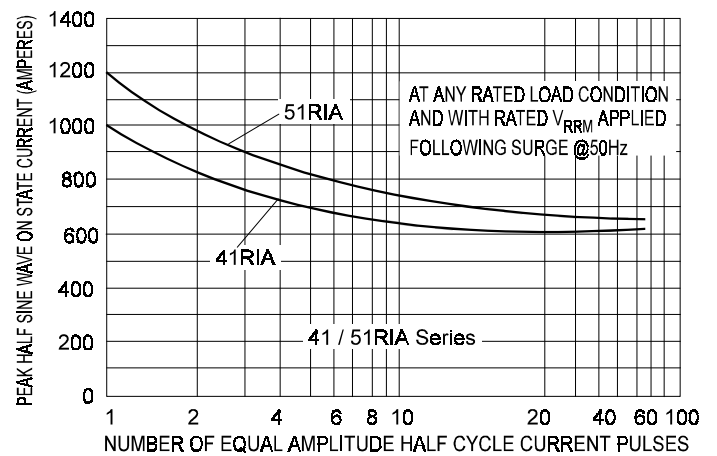


Fig. 14 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

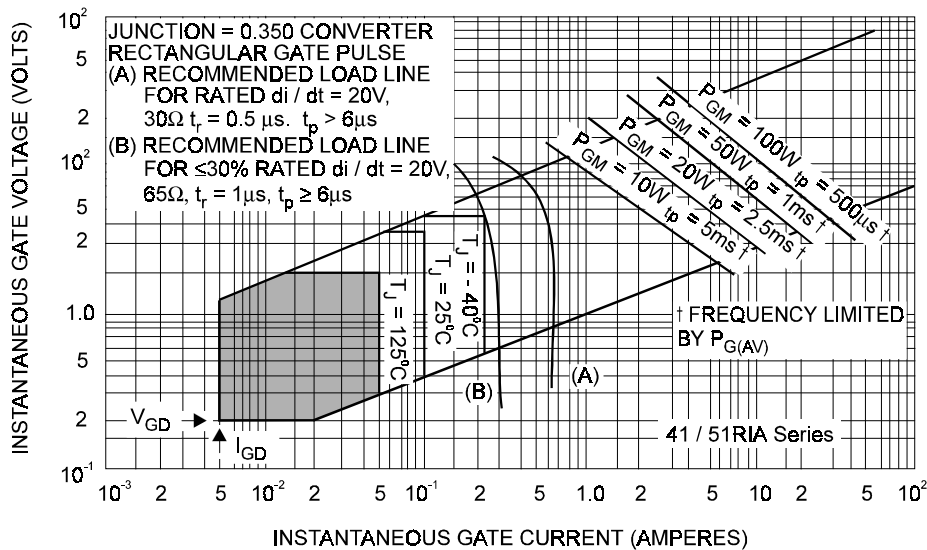


Fig. 15 - Gate Characteristics

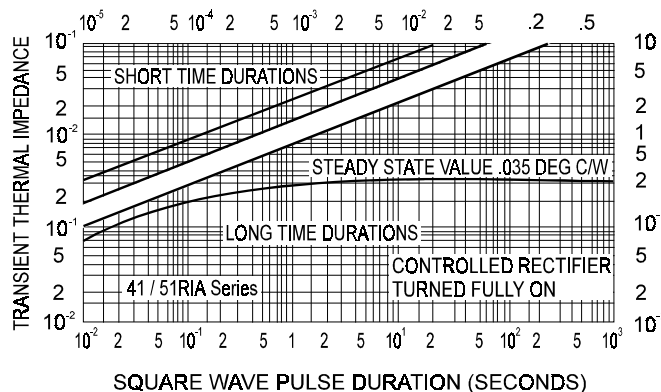


Fig. 16 - Maximum Transient Thermal Impedance, Junction To Case Vs Square Wave Pulse Duration