Ruttonsha International Rectifier Ltd.

RUTTONSHA

SILICON CONTROLLED RECTIFIERS

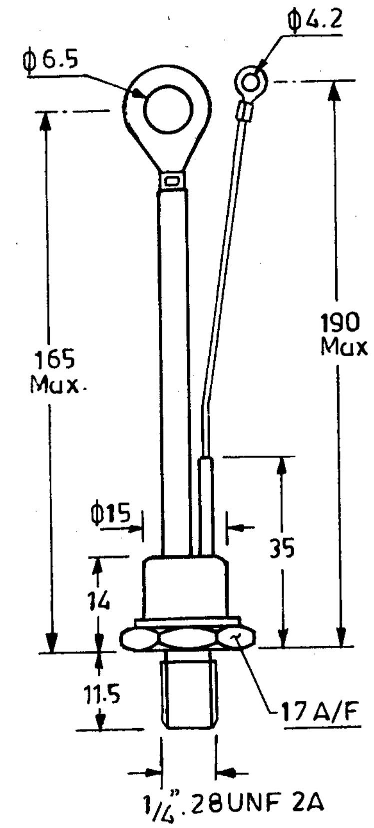
41RIA, 51RIA SERIES
Power Silicon Controlled Rectifiers
64, 80 Amp RMS SCRs

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.*

41RIA, 51RIA



UNIT:- M M

THERMAL MECHANICAL SPECIFICATIONS

R_{thjc}	Maximum thermal resistance junction-to-case	41RIA	51RIA
		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	-65°C to +125°C	
T_{stg}	Storage temperature range	-65°C to +150°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	20	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 = 94ºC max., 180ºC 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 ms	Rated V_{RRM} applied following surge, initial T_J = 125ºC
I^2t	Max. I^2t capability for individual device fusing (1)	8060	10180	A^2s	t = 10 ms	V_{RRM} following surge = 0, initial T_J = 125ºC
I^2t	Max. I^2t capability for individual device fusing	80600	101800	A^2s	t = 0.1 to 10 ms	V_{RRM} following surge = 0,, initial T_J = 125ºC
V_{TM}	Max. peak on-state voltage	1.65	1.6	V	T_J = 25ºC, $I_{TM} = \pi \times I_{T(AV)}$	
I_H	Max. holding current	200		mA	T_J = 25ºC, anode supply = 22V, initial I_T = 2.0A	
I_L	Max. latching current	400		mA	Anode supply = 6V, resistive load.	

(1) I^2t for time $t_x = I^2t * t_x$

BLOCKING

dv/dt	Min. critical rate-of-rise of off-state voltage	200	V/µs	T_J = 125ºC. Exponential to 100% rated V_{DRM}	Zero gate bias voltage gate open circuited.

SWITCHING

		41 / 51 RIA		
t_d	Typical delay time	0.9	µs	T_C = 25ºC, V_{DM} = rated V_{DRM}, I_{TM} = 10A dc resistive circuit, Gate pulse 10V, 15Ω source t_p = 20 µS
di/dt	Max non-repetitive rate of rise of turned-on current V_{RRM} = upto 1400 V	100	A/µs	T_C = 125ºC, V_{DM} = rated V_{DRM}, I_{TM} = 2 x rated di/dt. Gate pulse 20V, 15Ω, t_p = 6 µS, t_r = 0.1 µS max.
t_q	Typical turn-off time	110	µs	T_C = 125ºC, I_{TM} = 50A, di/dt = 10 A/µS, V_R during turn-off interval = 50 V min., reapllied dv/dt = 20 V/µS linear to rated V_{DRM} Gate bias : 0V, 100Ω

TRIGGERING

P_{GM}	Max. peak gate power	10	W	tp ≤ 5ms	
$P_{G(AV)}$	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 = -40ºC	Max. required gate trigger current is the lowest value which will trigger all units with + 6V anode-to-cathode.
		100		T_J = 25ºC	
		50		T_J = 125ºC	
V_{GT}	Max. required DC gate voltage to trigger	3.5	V	T_J = -40ºC	Max. required gate trigger voltage is the lowest value which will trigger all units with + 6V anode-to-cathode.
		2.5		T_J = 25ºC	
V_{GD}	Max. DC gate voltage not to trigger	0.2	V	T_J = 125ºC	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 = 125ºC V_{DRM} = rated voltage	

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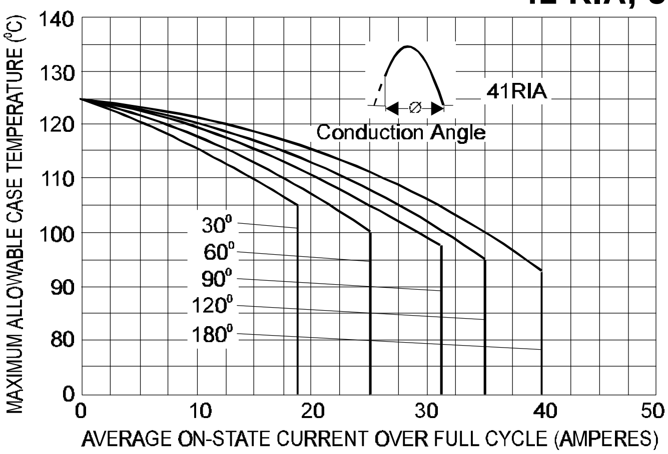

Fig. 1 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

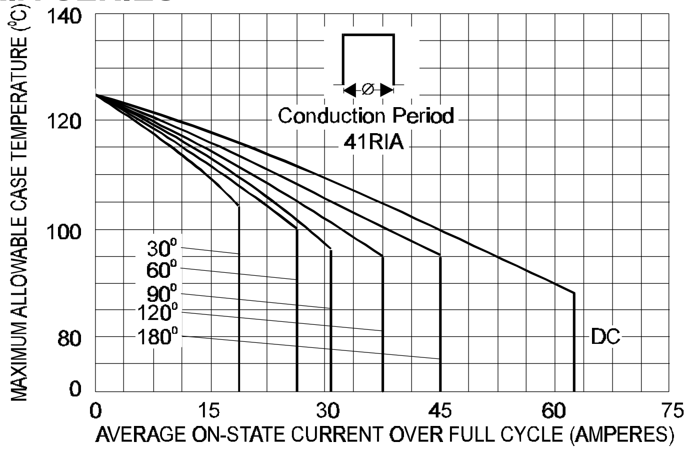

Fig. 2 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

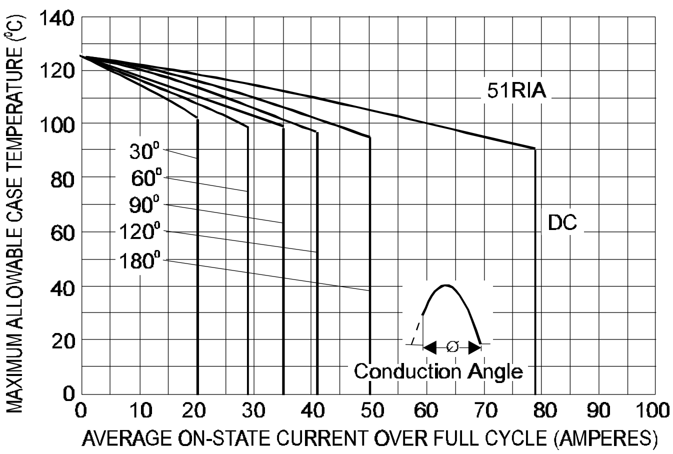

Fig. 3 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

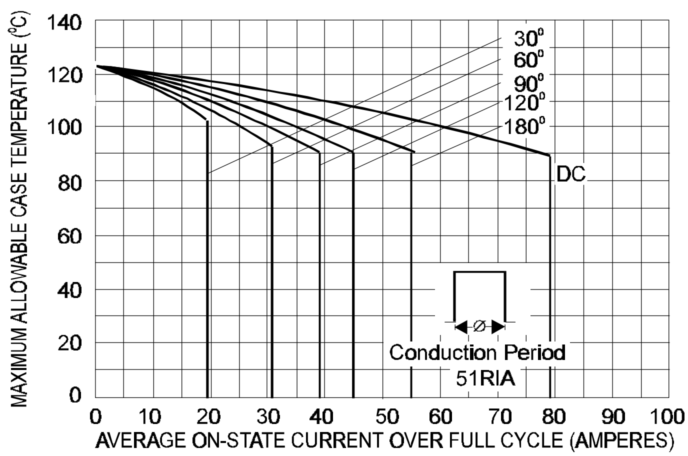

Fig. 4 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

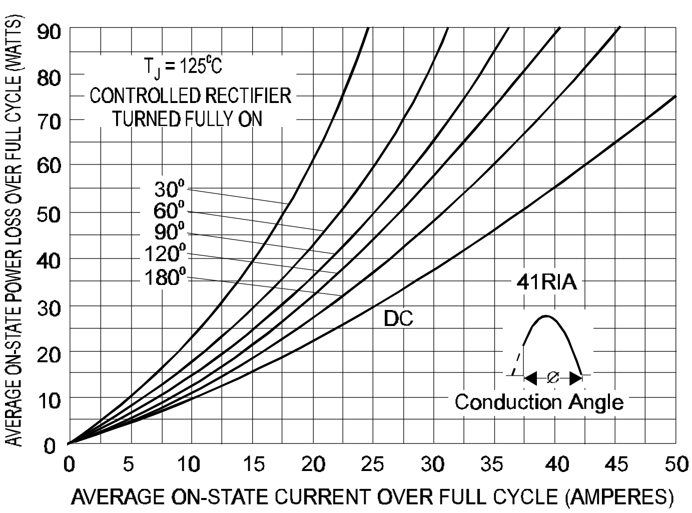

Fig. 5 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

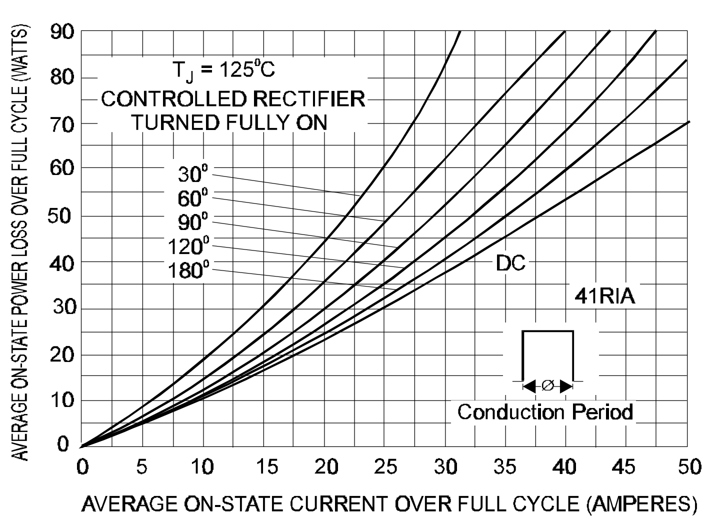

Fig. 6 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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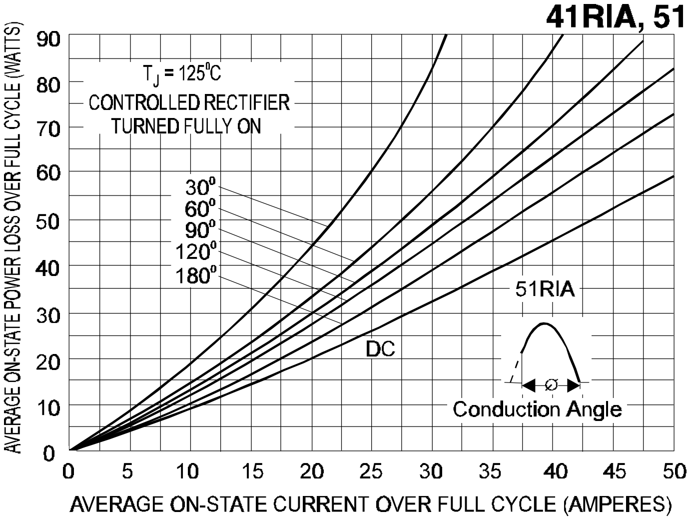

Fig. 7 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

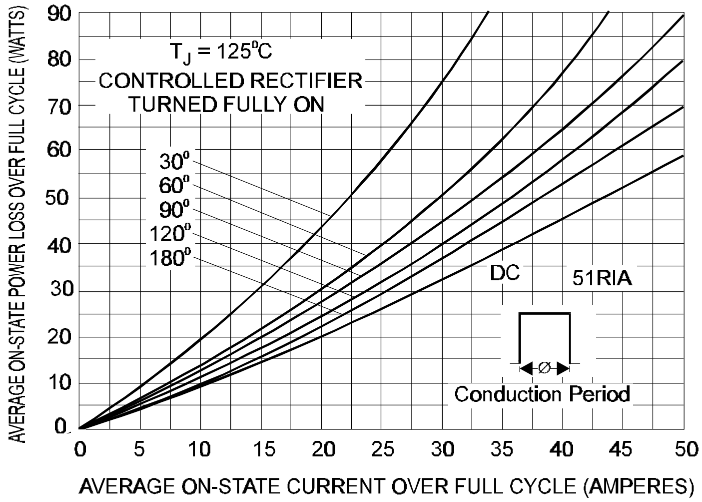

Fig. 8 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

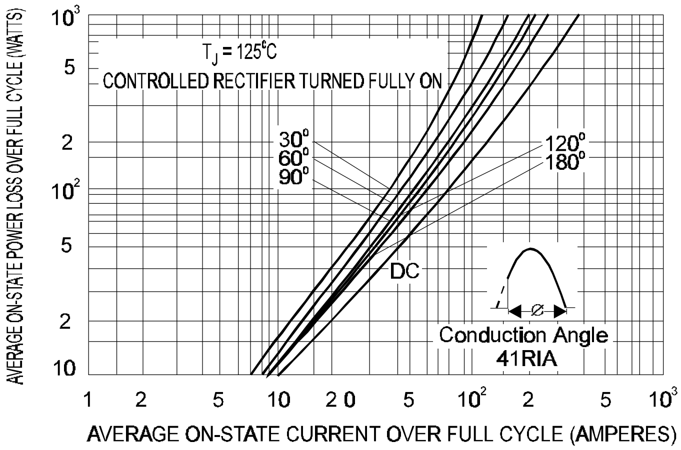

Fig. 9 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

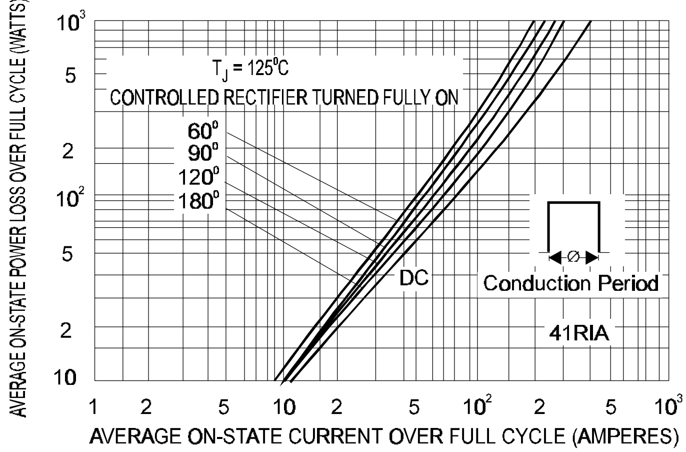

Fig. 10 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

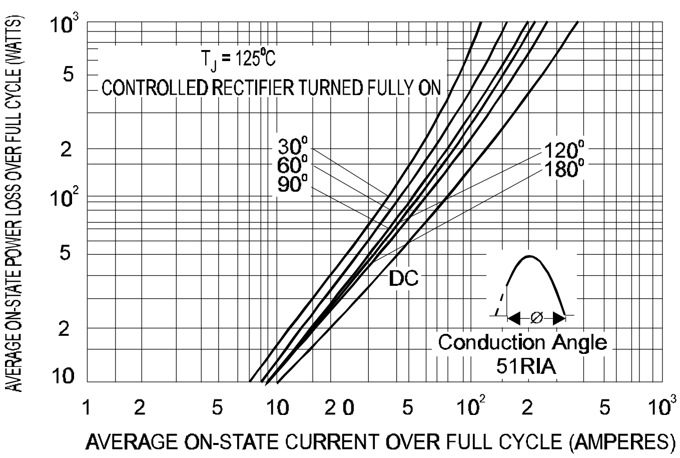

Fig. 11 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

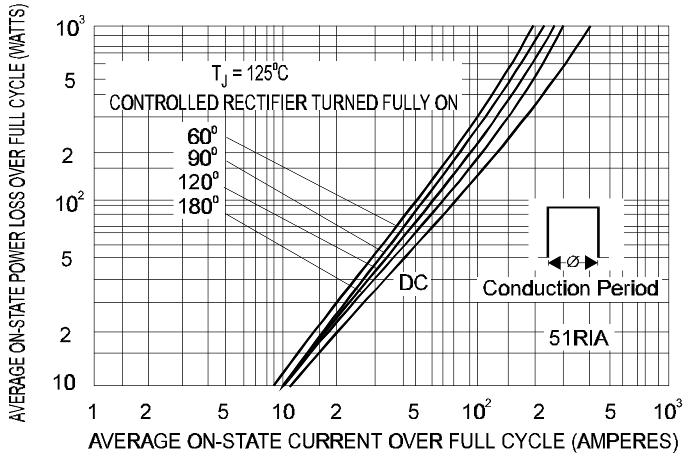

Fig. 12 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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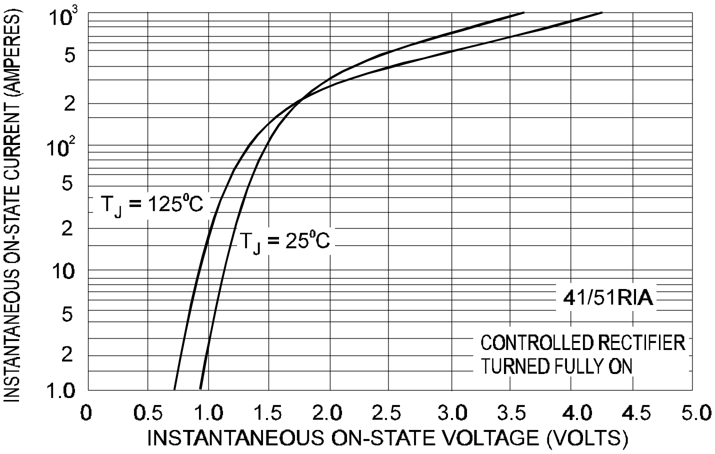

Fig. 13 - Maximum On-state Voltage Vs. Current

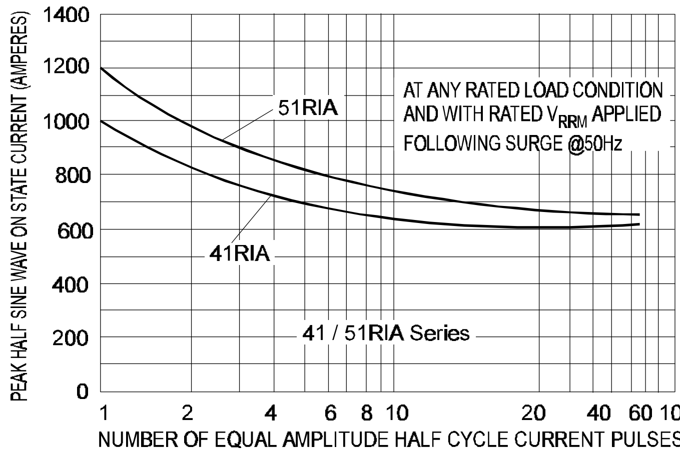

Fig. 14 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

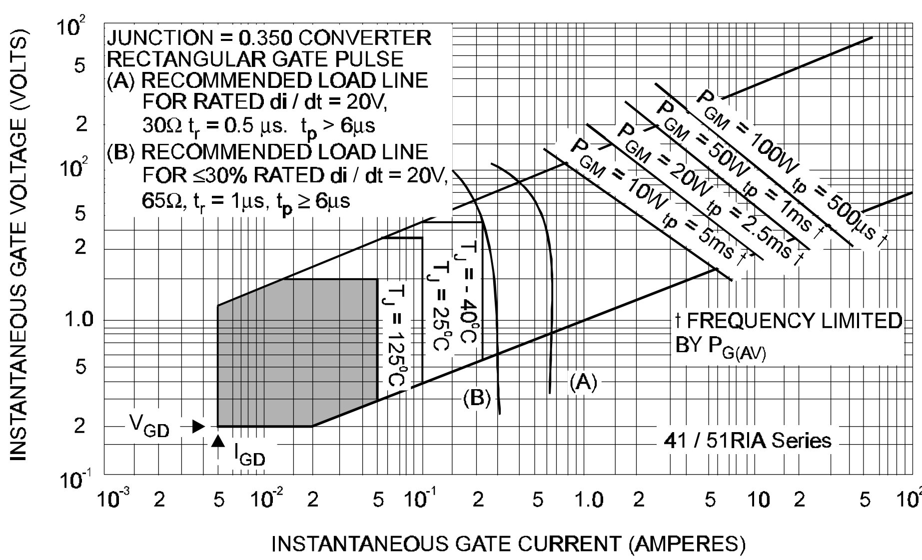

Fig. 15 - Gate Characteristics

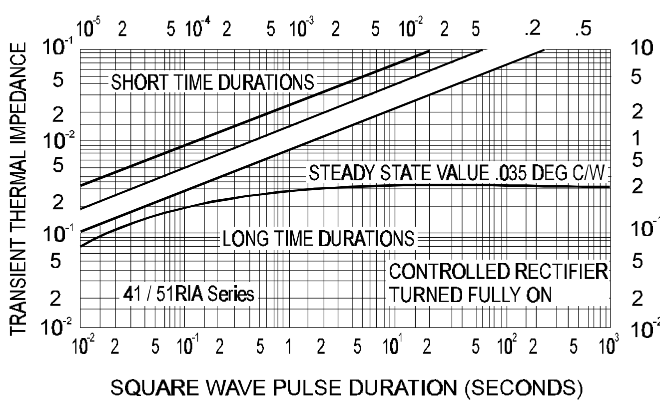

Fig. 16 - Maximum Transient Thermal Impedance, Junction To Case Vs Square Wave Pulse Duration

Last Update : July 2000