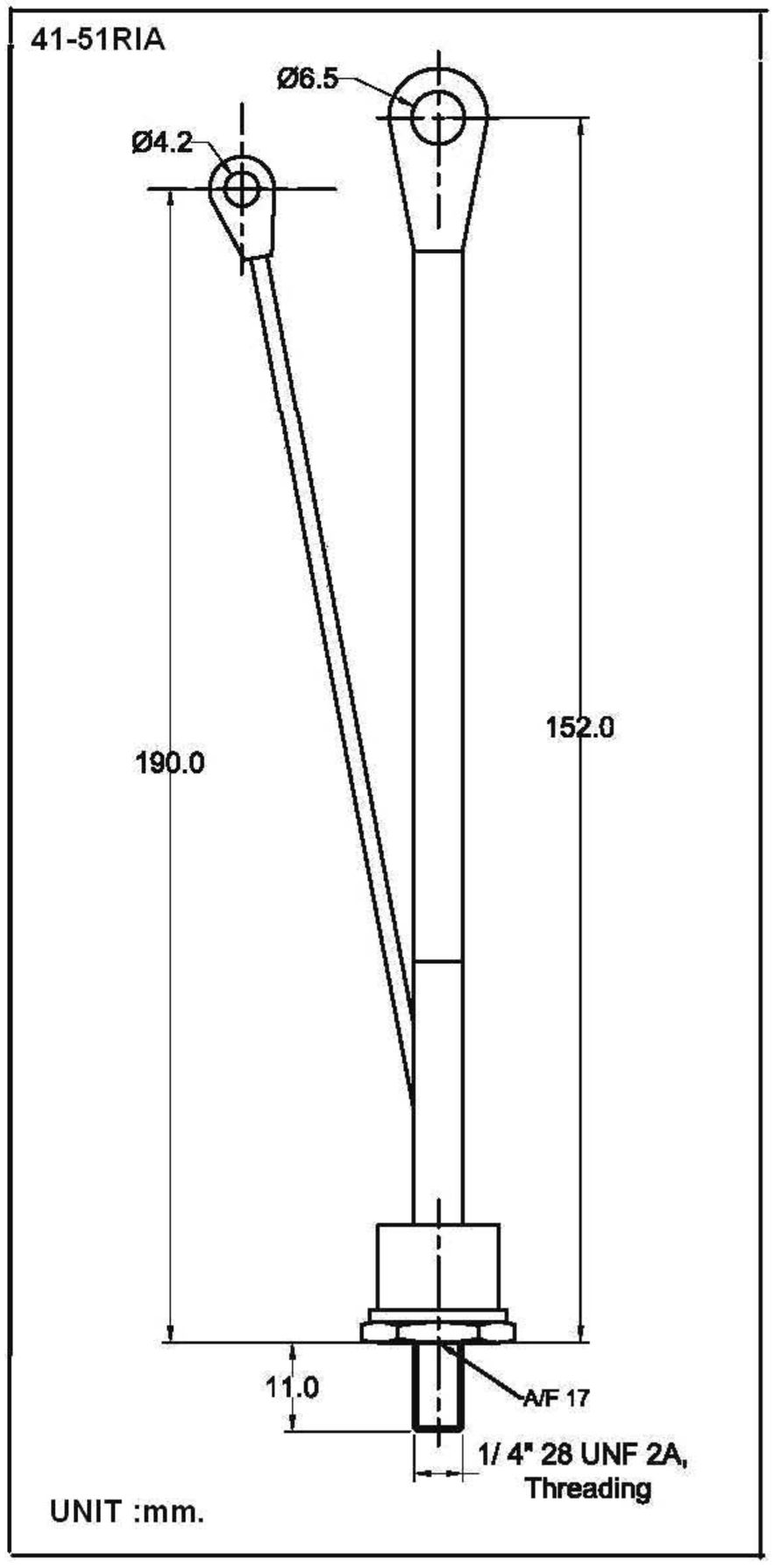
Ruttonsha International Rectifier Ltd.

RUTTONSHA

SILICON CONTROLLED RECTIFIERS

41RIA, 51RIA SERIES
Power Silicon Controlled Rectifiers

Types : 41RIA10-41RIA160, 51RIA10-51RIA160



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 DC operation	41RIA	51RIA
		$0.4^0C/W$	$0.35^0C/W$
R_{thcs}	Contact thermal resistance case-to-sink	$0.25^0C/W$	
T_J	Junction operating temp. range	-40^0C to $+125^0C$	
T_{stg}	Storage temperature range	-40^0C to $+125^0C$	
	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	160
V_{DRM}	Max. repetitive peak off state voltage (V)	100	200	400	600	800	1000	1200	1600
V_{RRM}	Max. repetitive peak reverse voltage (V)	100	200	400	600	800	1000	1200	1600
V_{RSM}	Max. non-repetitive peak reverse voltage (V)	150	300	500	700	900	1100	1300	1700
I_{RM} & I_{DM}	Max. peak reverse & off state current @ rated V_{DRM} & V_{RRM} 125^0C -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^{0}C max., 180^{0}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.
I^2t	Max. I^2t capability for fusing	5512	7200	A^2s	t = 10 ms initial T_J = 125^{0}C
$V_{T(TO)}$	Threshold Voltage	1.02	1.02	V	Tj=Tj max.
rT	Onstate slop resistance	4.78	4.78	mΩ	Tj=Tj max.
V_{TM}	Max. peak on-state voltage	1.65	1.6	V	T_J = 25^{0}C, I_{TM} = π x $I_{T(AV)}$
I_H	Max. holding current	200		mA	T_J = 25^{0}C, anode supply = 22V, initial I_T = 2.0A
I_L	Max. latching current	400		mA	Anode supply = 6V, resistive load.

BLOCKING

dv/dt	Min. critical rate-of-rise of off-state voltage	500	V/μs	T_J = 125^{0}C. Exponential to 100% rated V_{DRM} For 67% rated V_{DRM} Zero gate bias voltage gate open circuited.

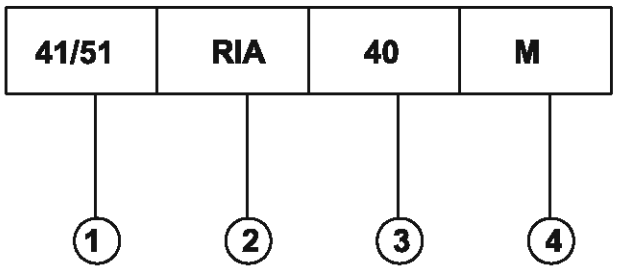
SWITCHING

t_d	Typical delay time	0.9	μs	T_C = 25^{0}C, 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} = 700- 1400 V 50 - 600 V	100	A/μs	T_C = 125^{0}C, 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 = 125^{0}C, I_{TM} = 50A, di/dt = 10 A/μS, V_R during turn-off interval = 50Vmin, reapllies dv/dt=20V/us 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	100	mA	T_J = 25^{0}C	Max. required gate trigger current is the lowest value which will trigger all units with + 6V anode-to-cathode.
V_{GT}	Max. required DC gate voltage to trigger	2.5	V	T_J = 25^{0}C	Max. required gate trigger voltage is the lowest value which will trigger all units with + 6V anode-to-cathode.
V_{GD}	Max. DC gate voltage not to trigger	0.2	V	T_J = 125^{0}C V_{DRM} = rated voltage	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		

ORDER INFORMATION TABLE



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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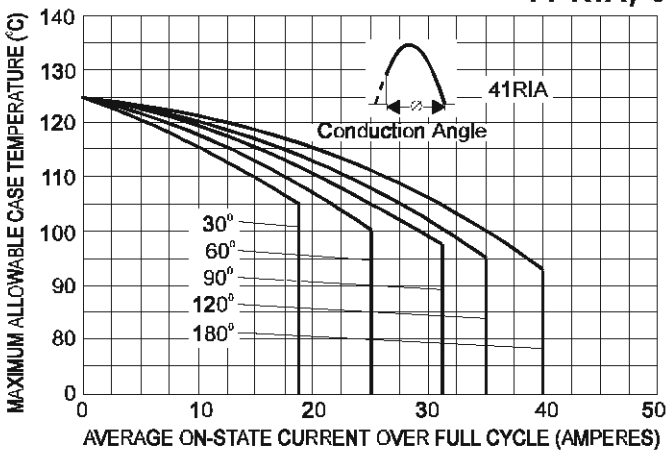

Fig. 1 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

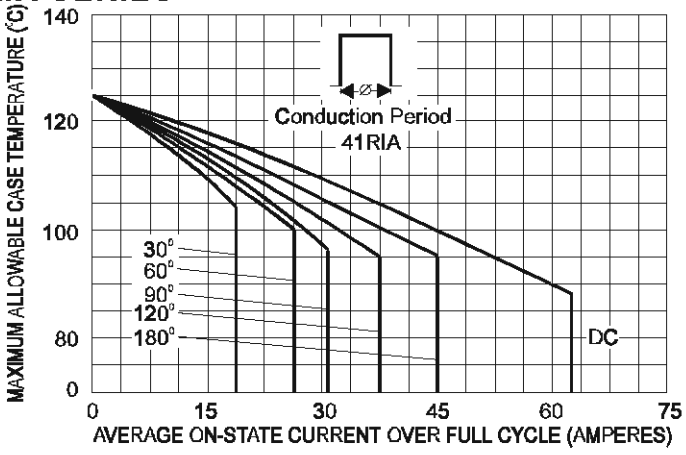

Fig. 2 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

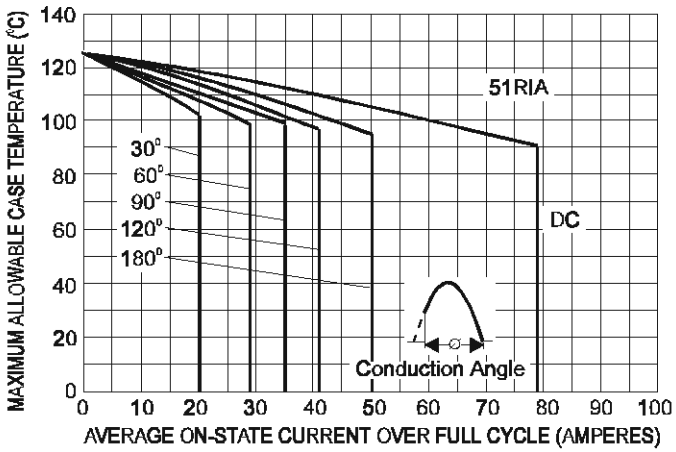

Fig. 3 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

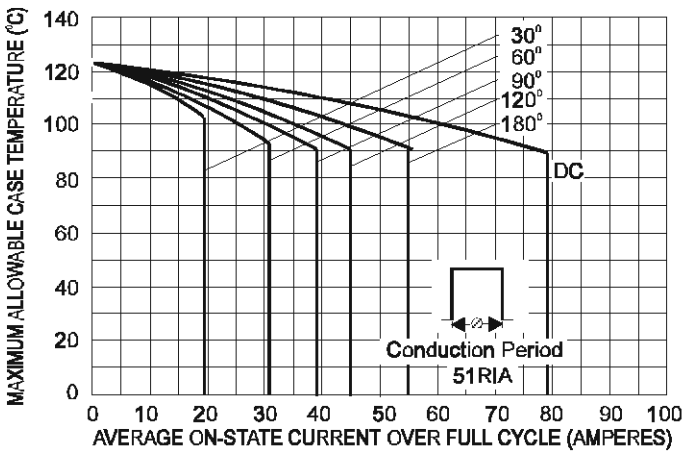

Fig. 4 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

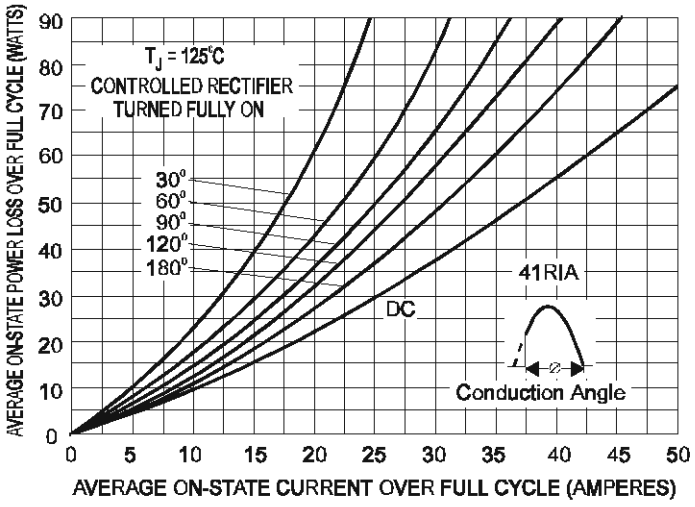

Fig. 5 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

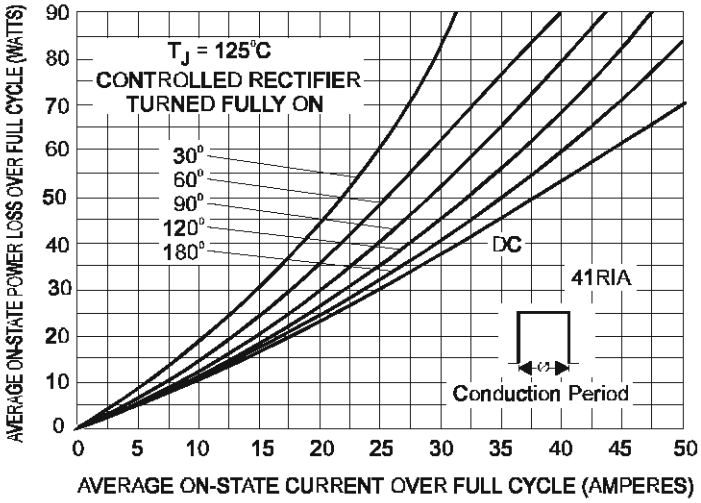

Fig. 6 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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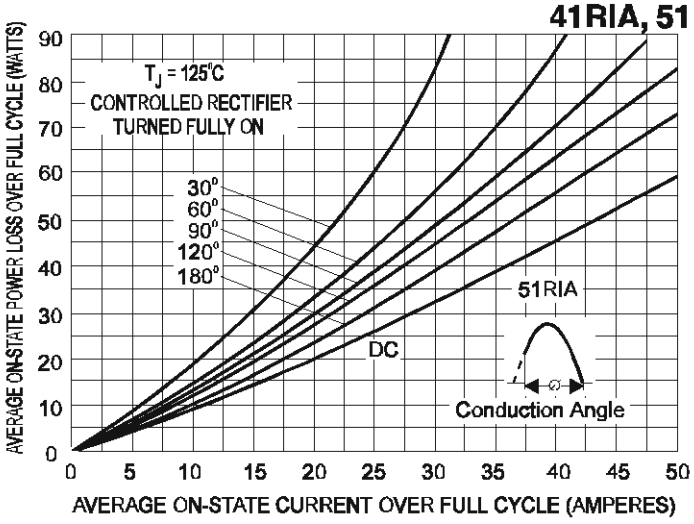

Fig. 7 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

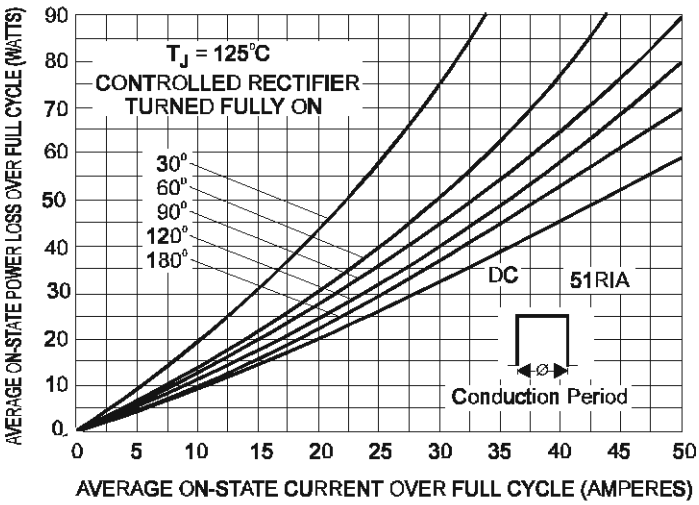

Fig. 8 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

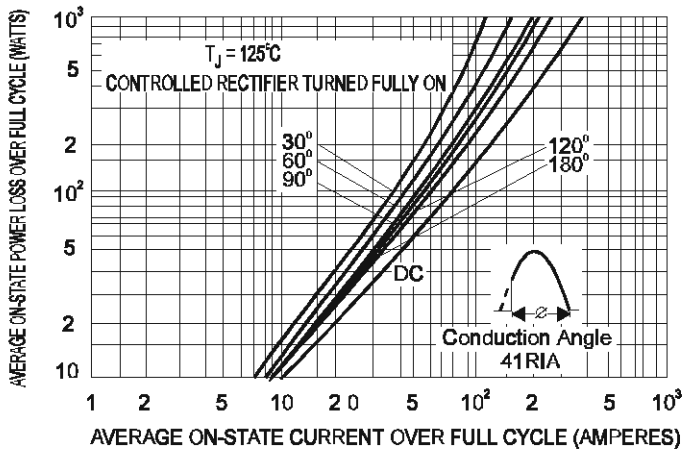

Fig. 9 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

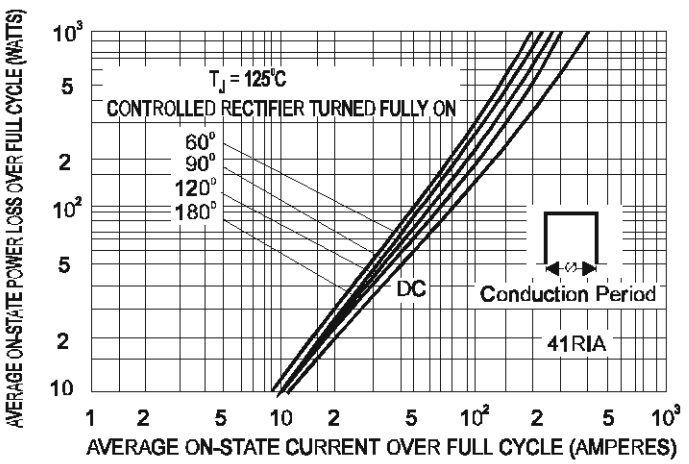

Fig. 10 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

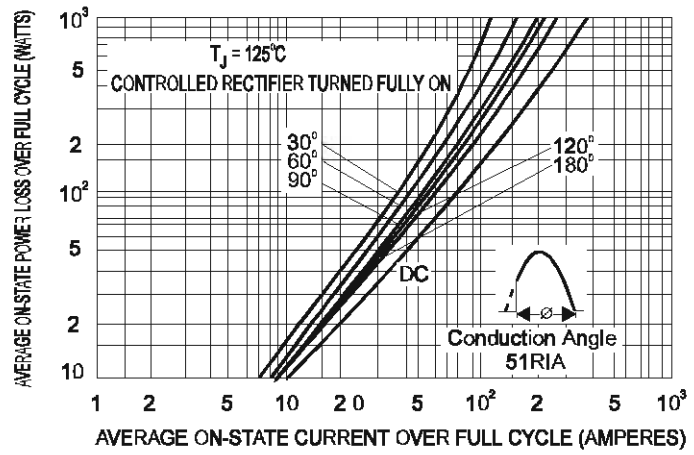

Fig. 11 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

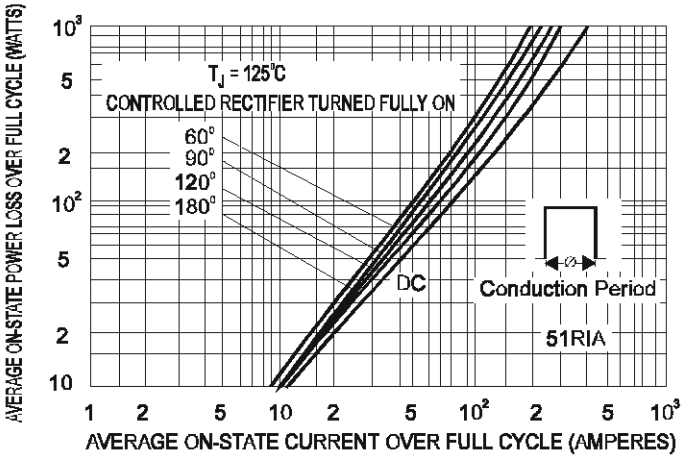

Fig. 12 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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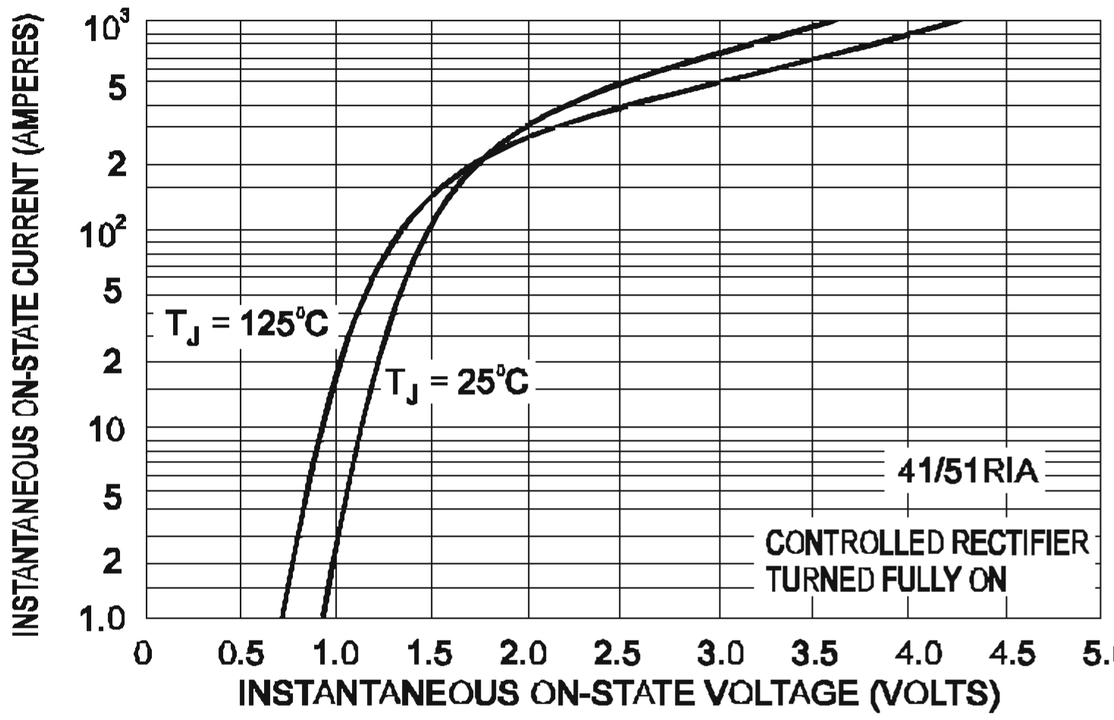

Fig. 13 - Maximum On-state Voltage Vs. Current

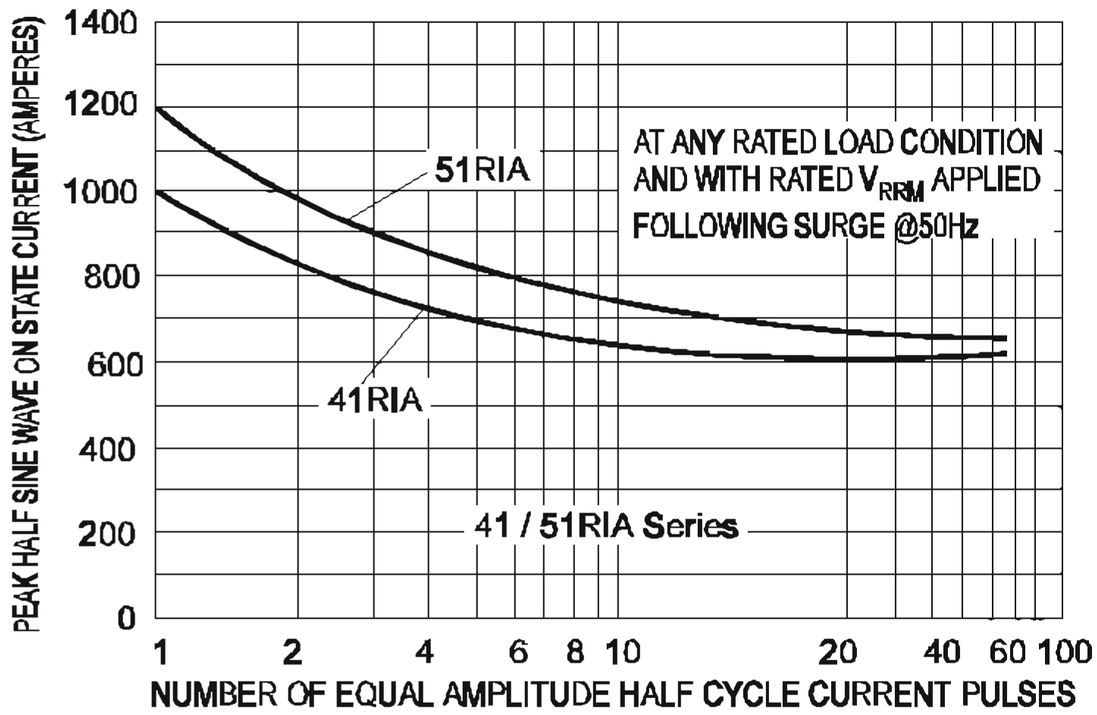

Fig. 14 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

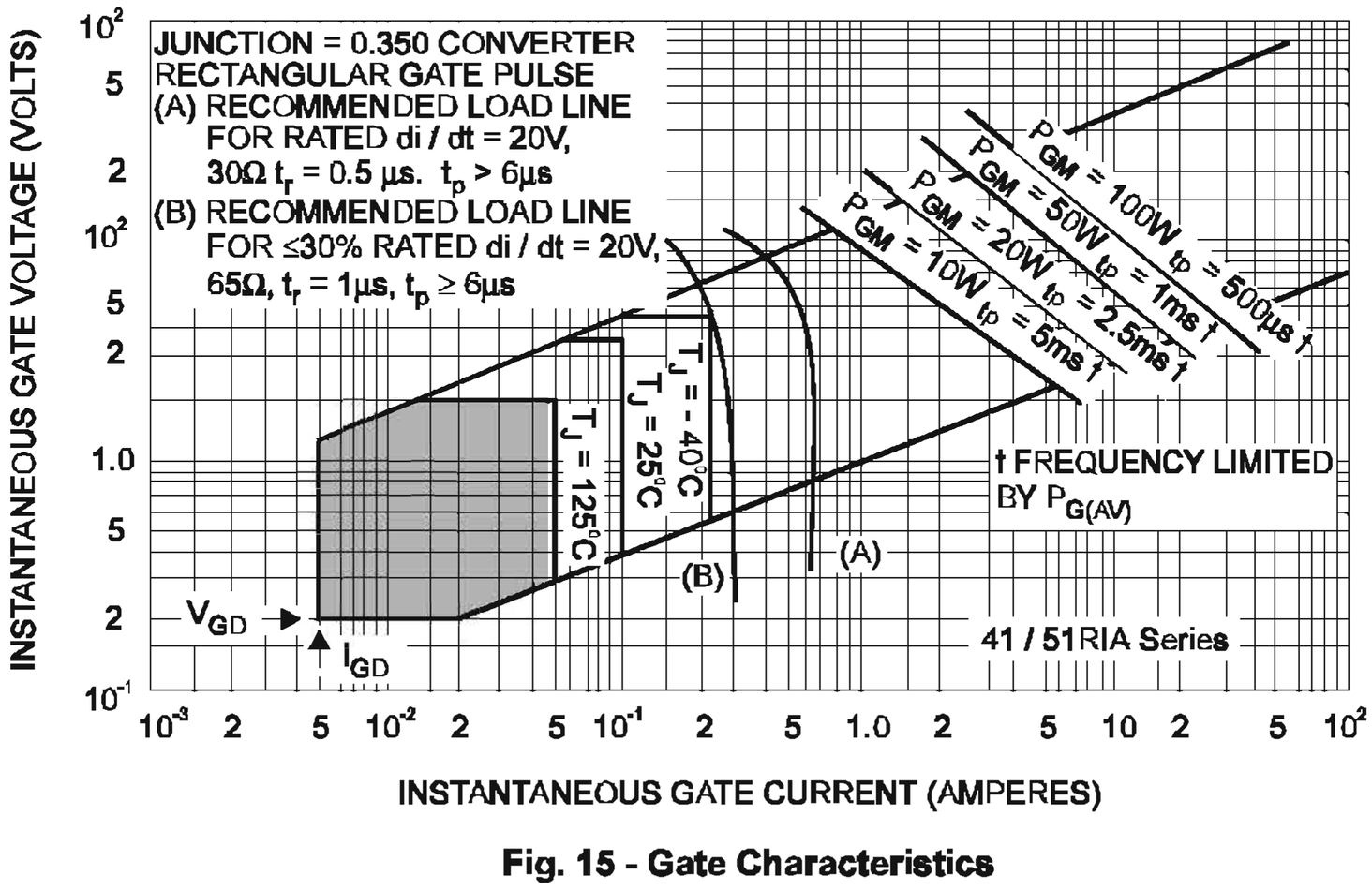

Fig. 15 - Gate Characteristics

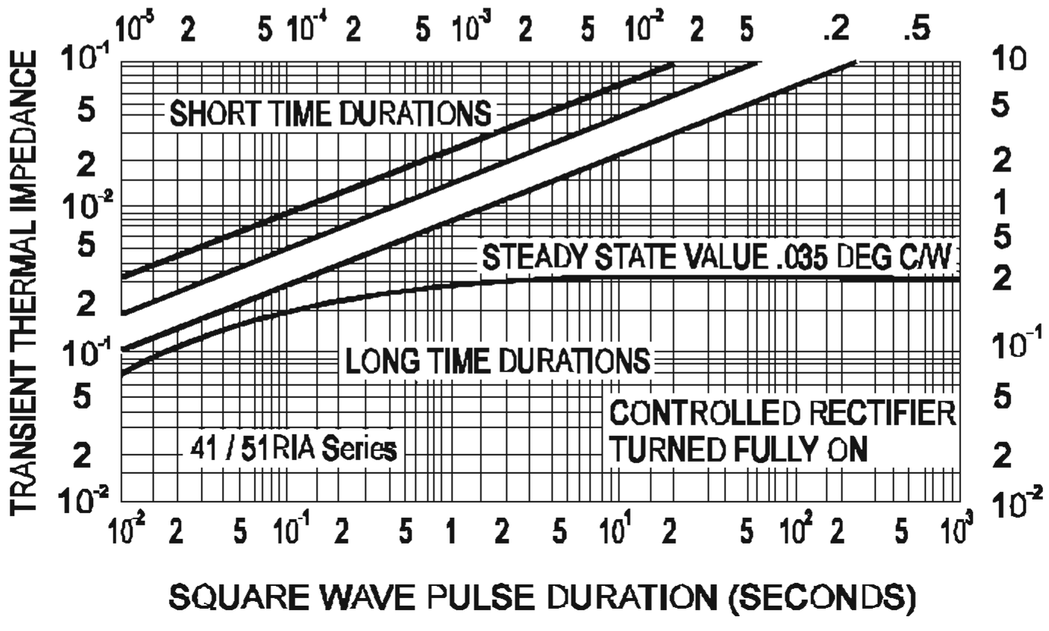

Fig. 16 - Maximum Transient Thermal Impedance, Junction To Case Vs Square Wave Pulse Duration