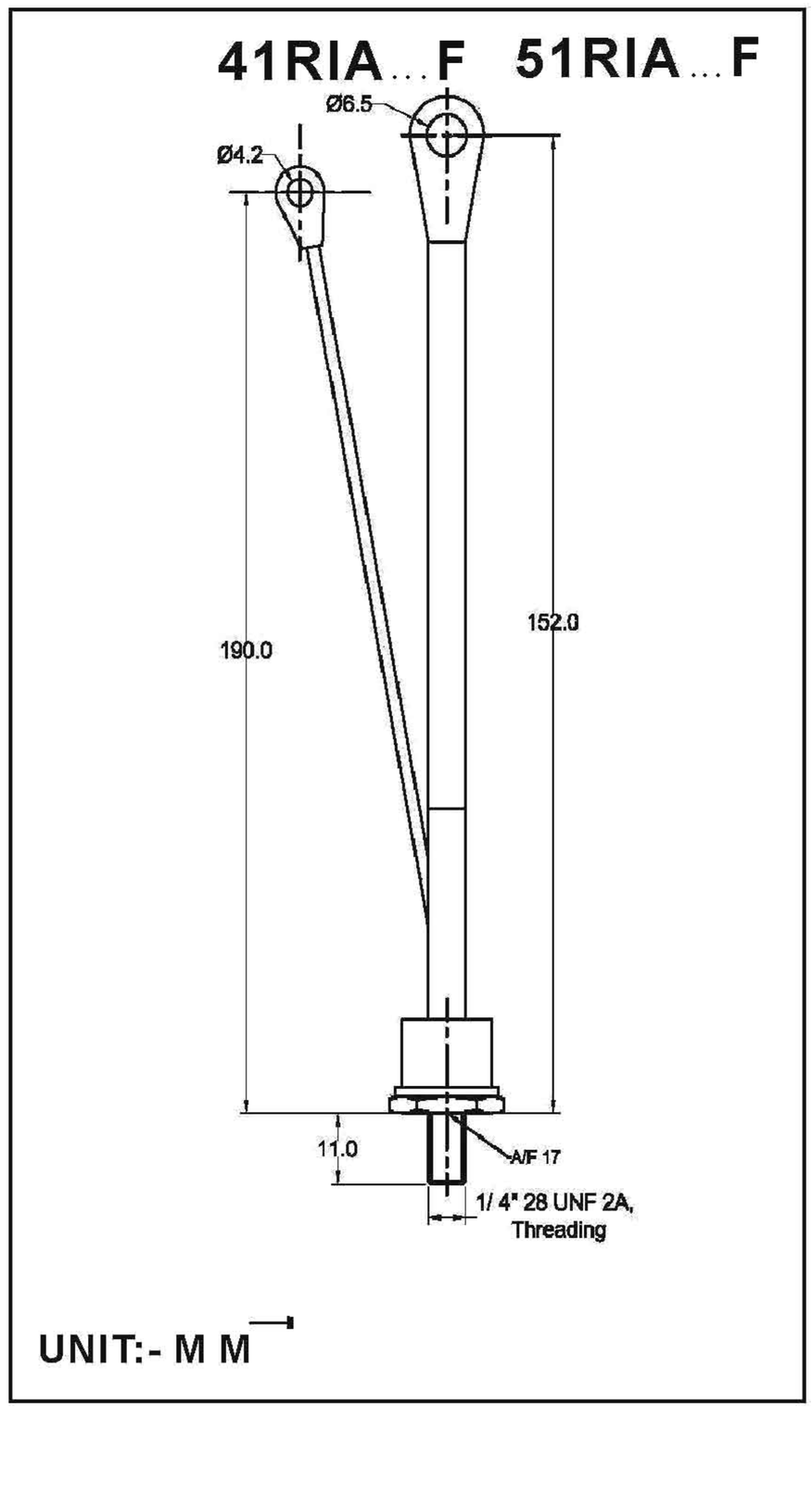
Ruttonsha International Rectifier Ltd.

RUTTONSHA

SILICON CONTROLLED RECTIFIERS (FAST)

41RIA, 51RIA...F SERIES
Fast Power Silicon Controlled Rectifiers

Types : 41RIA10F 41RIA120F 51RIA10F -51RIA120F



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°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.	
T_q	Max. turn-off time ITM=50A, di/dt=10A/us	40µs	
V_{FO}	Max, value of threshold voltage	1V	
rf	Max, value of forward slop resistance	7.9 mΩ	7.0 mΩ

ELECTRICAL RATINGS

TYPE	41RIA / 51RIA	10	20	40	60	80	100	120
V_{DRM}	Max. repetitive peak off state voltage (V)	100	200	400	600	800	1000	1200
V_{RRM}	Max. repetitive peak reverse voltage (V)	100	200	400	600	800	1000	1200
V_{RSM}	Max. non-repetitive peak reverse voltage (V)	150	300	500	700	900	1100	1300
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

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ELECTRICAL SPECIFICATIONS

	ON-STATE	41RIA	51RIA	Units	Conditions
$I_{T(RMS)}$	Max. RMS on-state current	63	79	A	
$I_{T(AV)}$	Max. average on-state current	40	50	A	T_C = 94°C max., 180°C sinusoidal conduction.
I_{TSM}	Max. peak one cycle non-repetitive surge current	700	1000	A	50 Hz half cycle sine wave or 6 ms rectangular pulse.
I^2t	Max. I^2t capability for fusing	2450	5000	A^2s	t = 10 ms initial T_J = 125°C
V_{TM}	Max. peak on-state voltage	2.4	2.0	V	T_J = 25°C, $I_{TM} = \pi \times I_{T(AV)}$
I_H	Max. holding current	200		mA	T_J = 25°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°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	40	μs	T_C = 25°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°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	40	μs	T_C = 125°C, 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

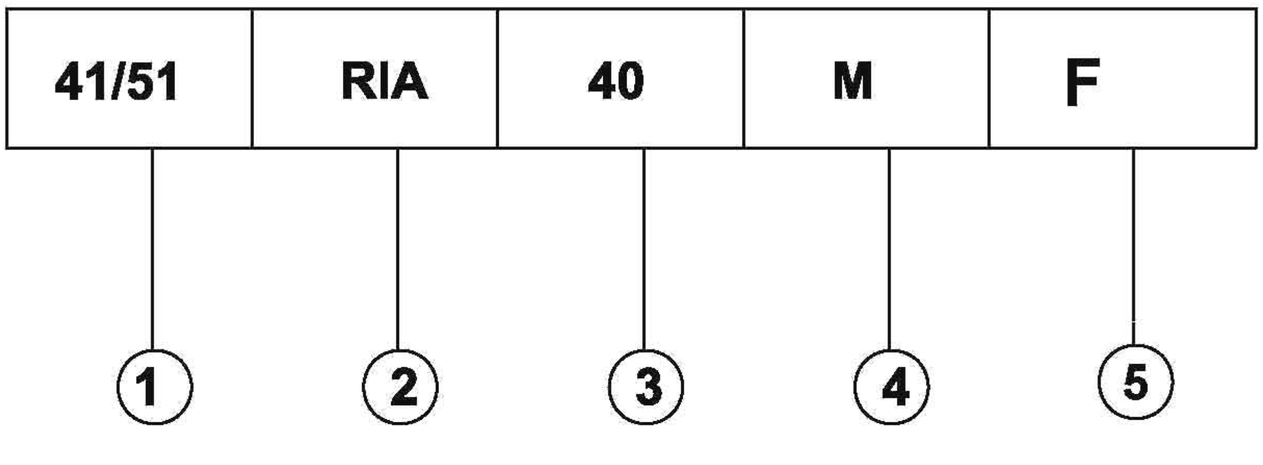
TRIGGERING

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	100	mA	T_J = 25°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°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°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°C V_{DRM} = rated voltage

FAST SILICON CONTROLLED RECTIFIERS

41 RIA, 51RIA ...F Series

ORDER INFORMATION TABLE



① - Current Code
40/50 - without external lead
with external lead

② - RIA - Essential part number

③ - Voltage Rating (See table)

④ - Non Stud 1/4" 28UNF 2A Threading
M - Stud M8 x 1.25P Metric Threading

⑤ - F - Inverter grade (fast)

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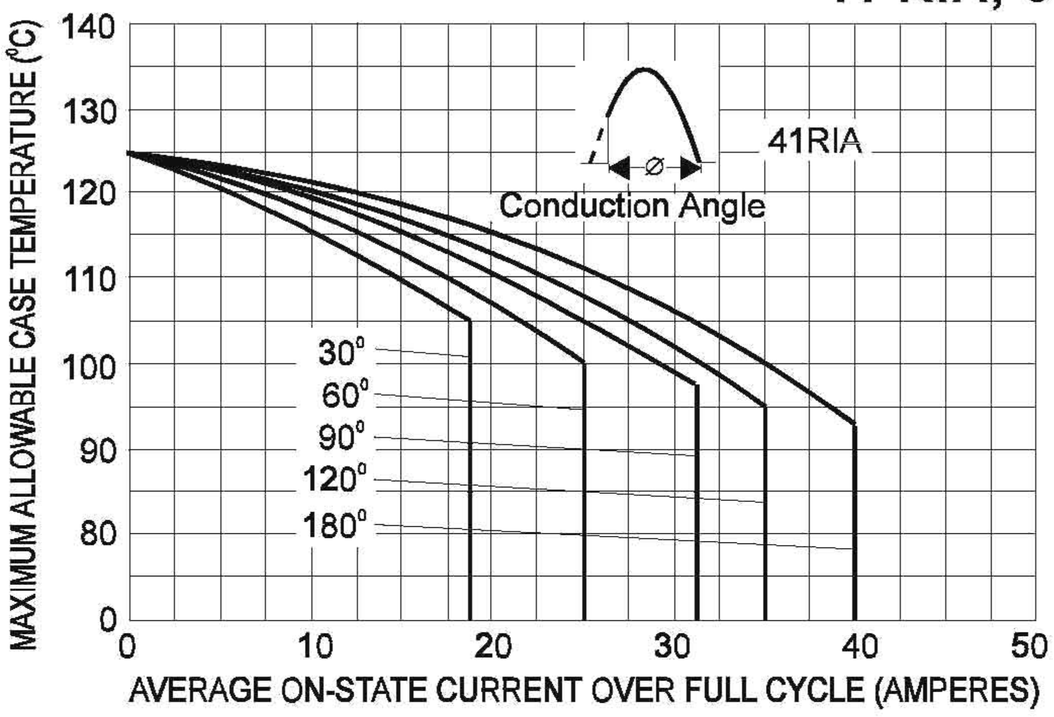

Fig. 1 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

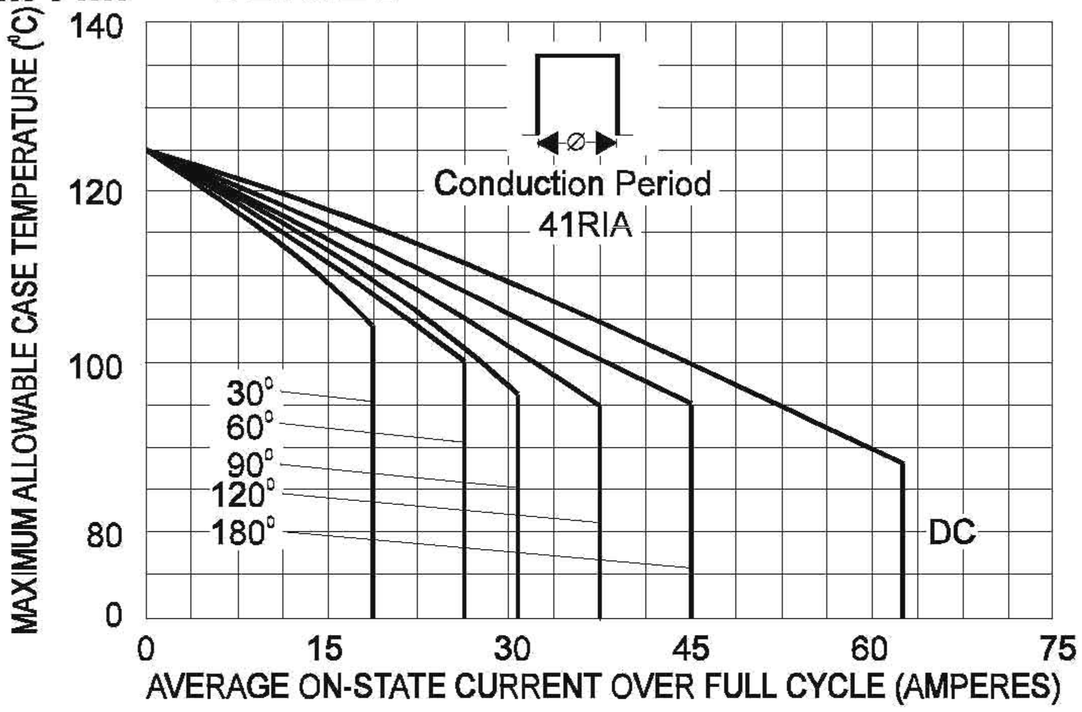

Fig. 2 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

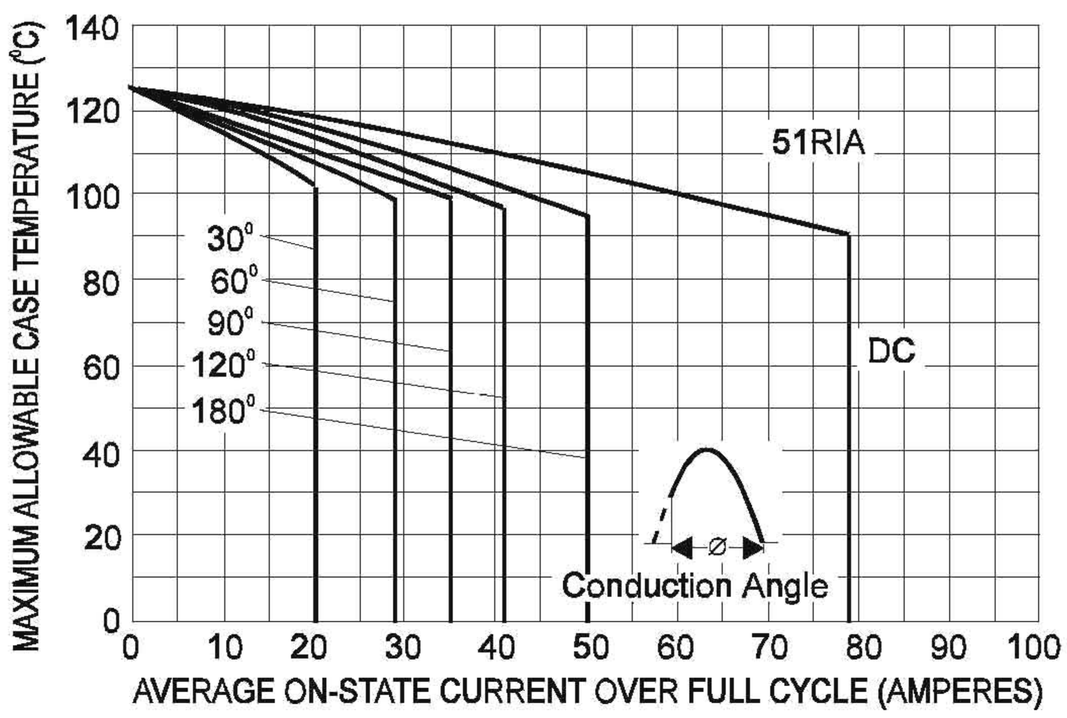

Fig. 3 - On-state Current Vs. Case Temperature (Sinusoidal Current Waveform, 50 to 400 Hz)

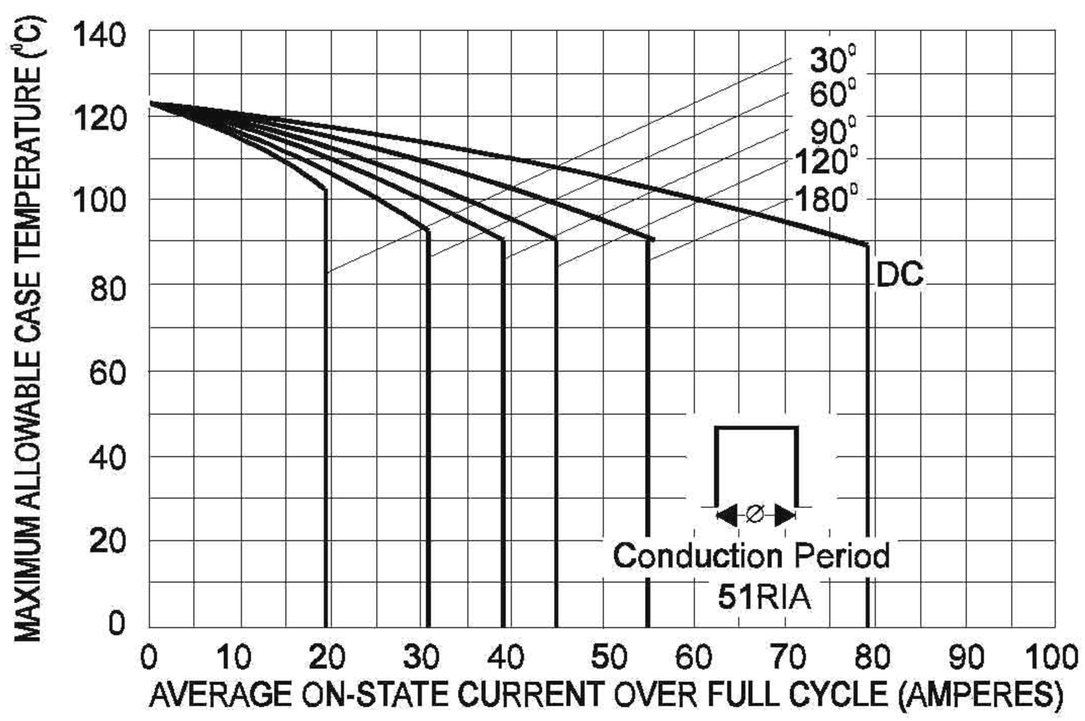

Fig. 4 - On-state Current Vs. Case Temperature (Rectangular Current Waveform, 50 to 400 Hz)

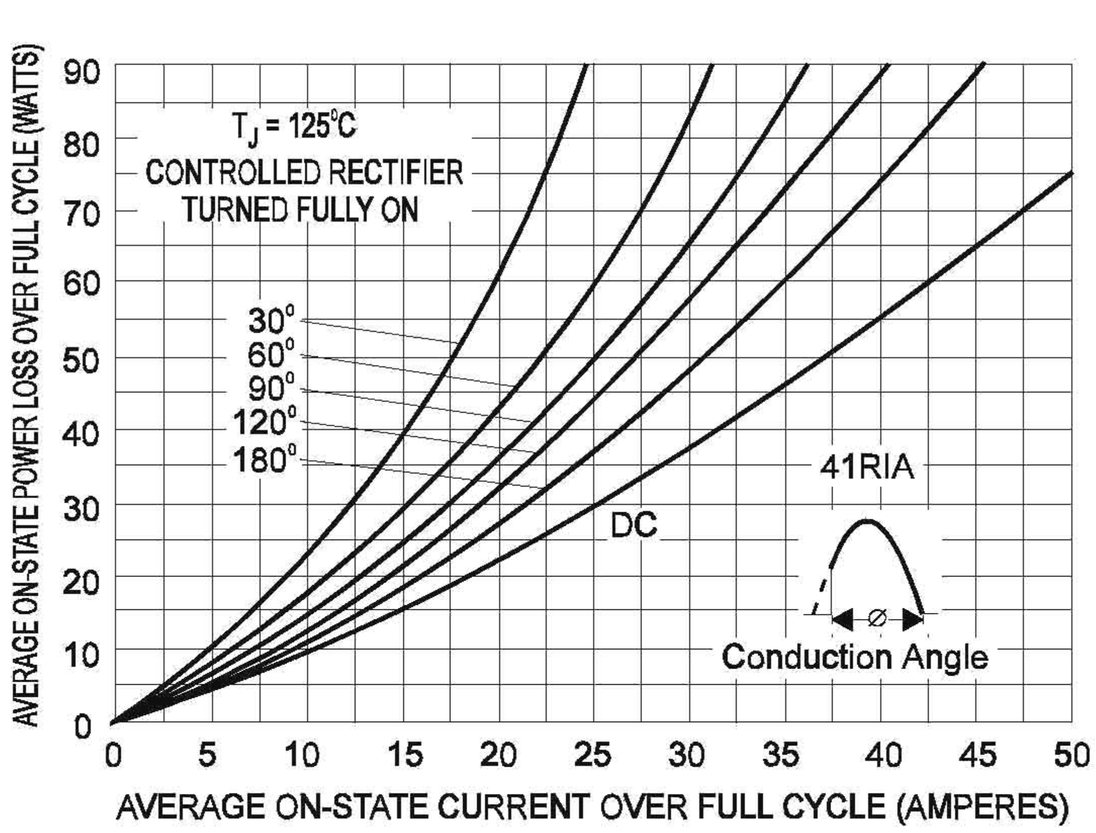

Fig. 5 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

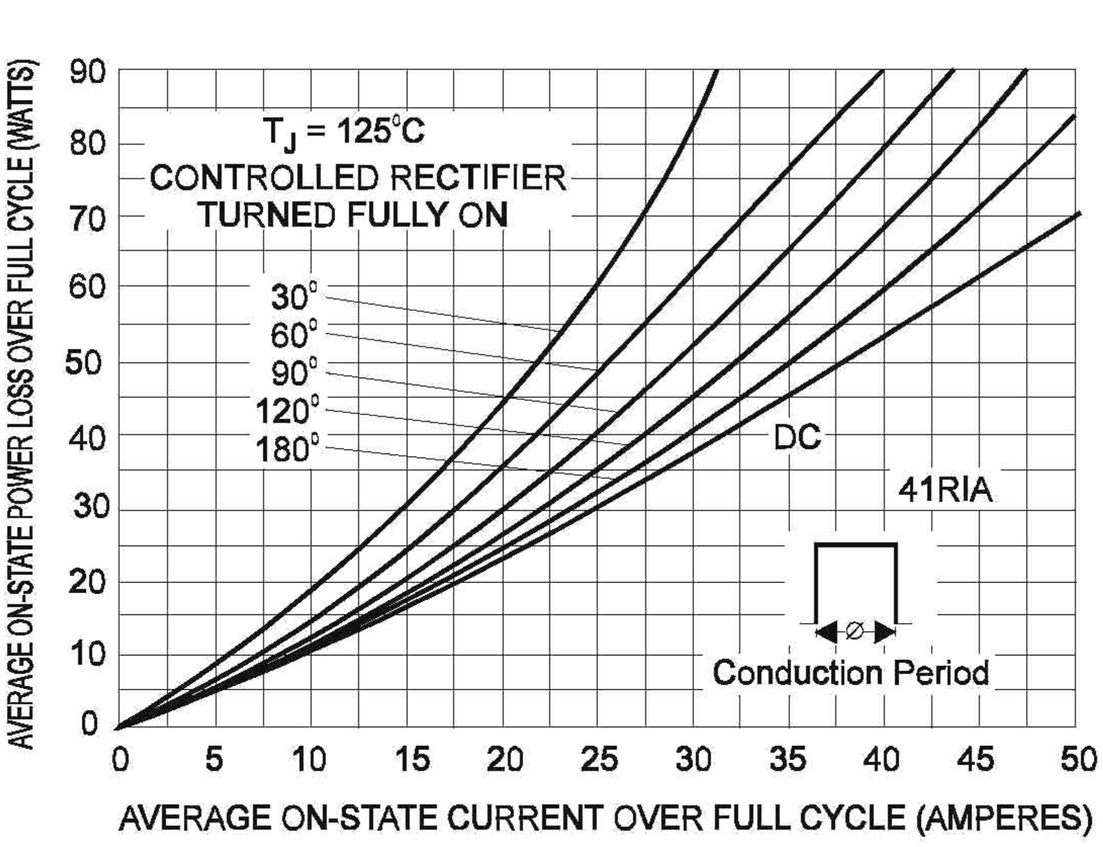

Fig. 6 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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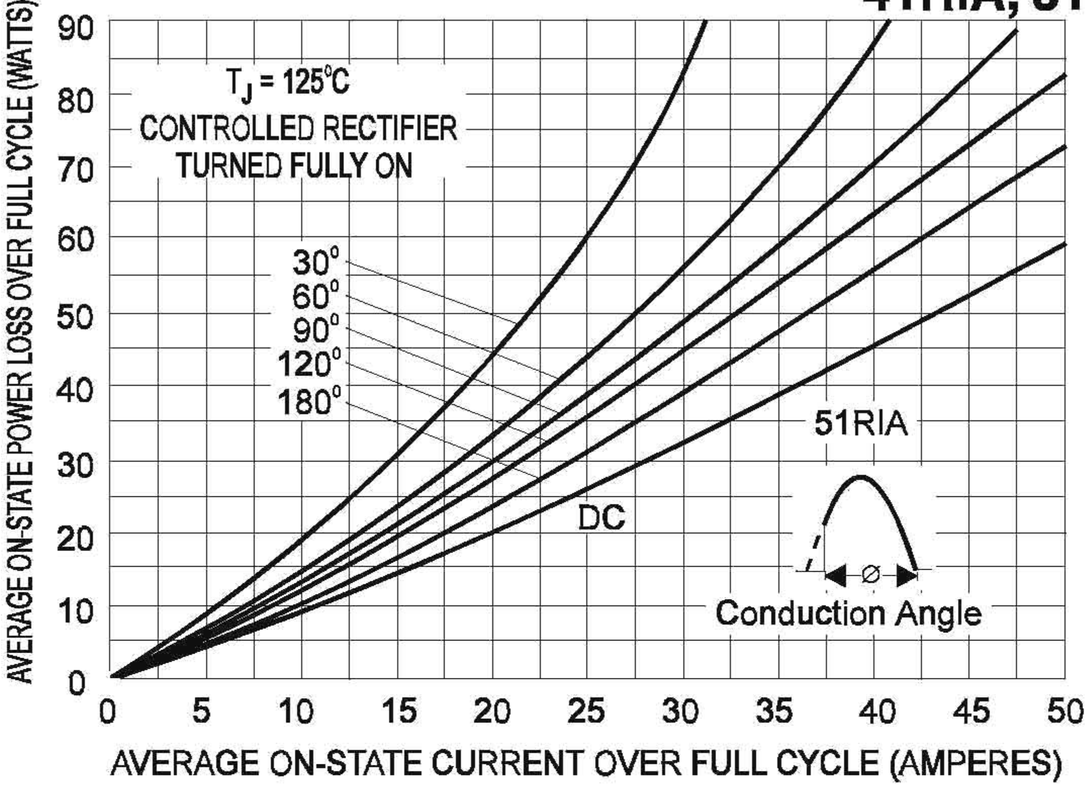

Fig. 7 - Maximum Low-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

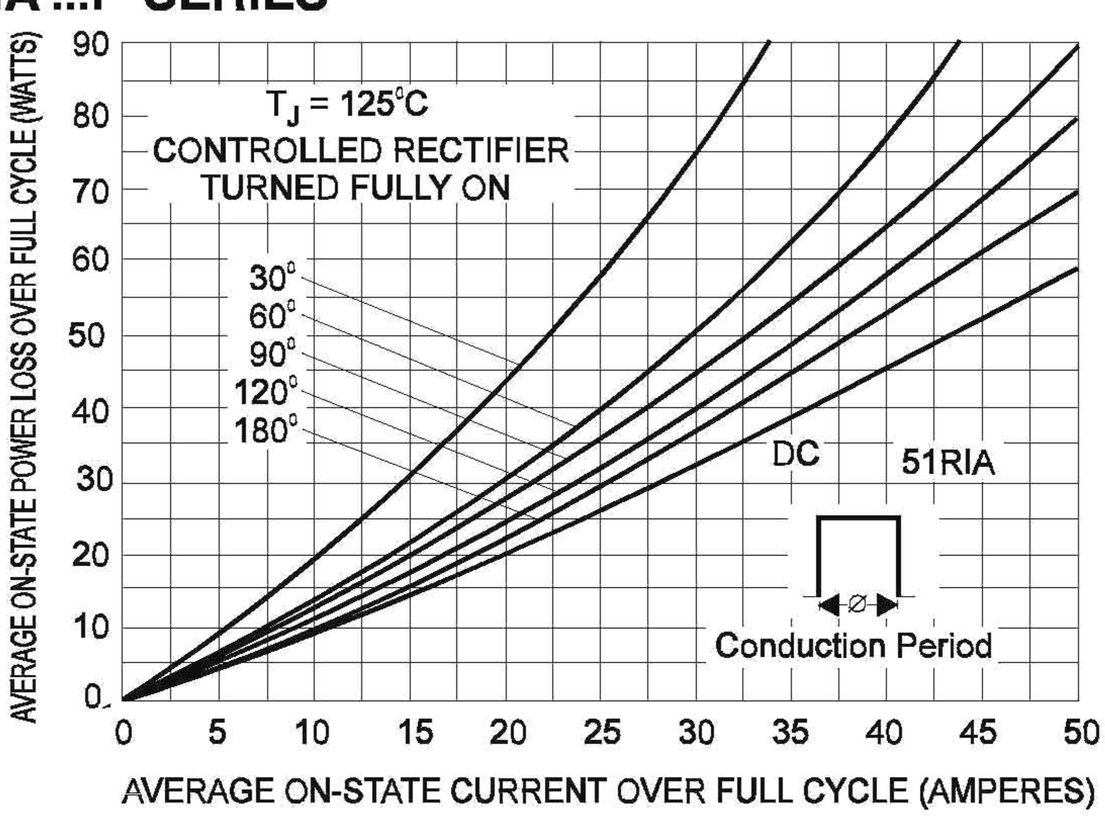

Fig. 8 - Maximum Low-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

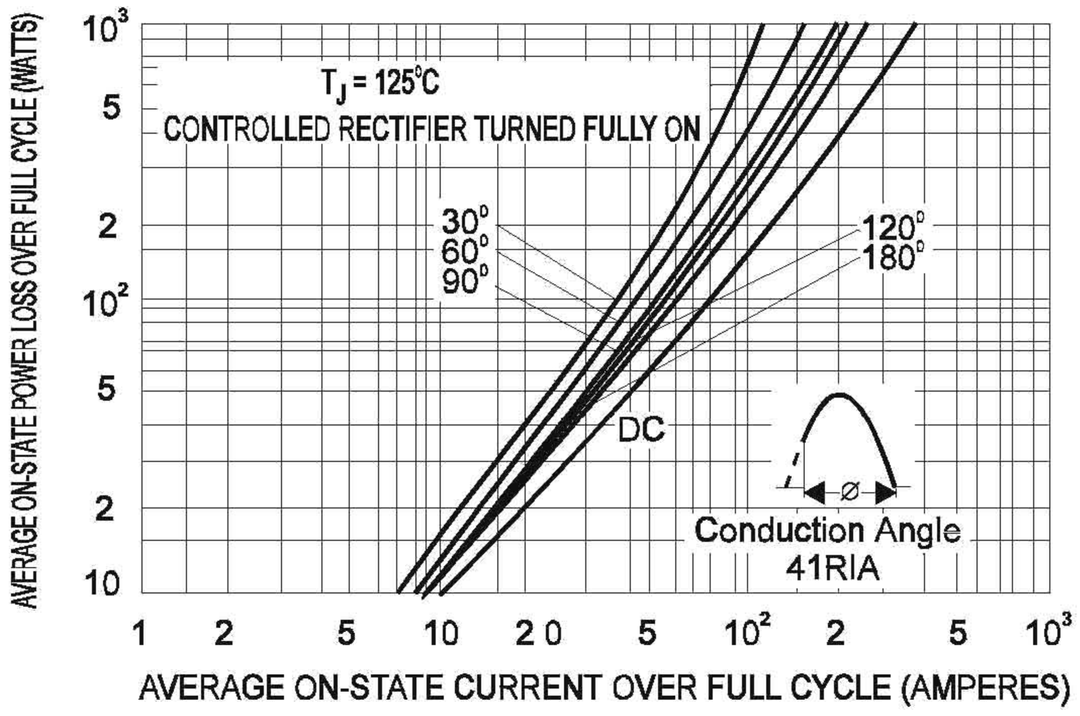

Fig. 9 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

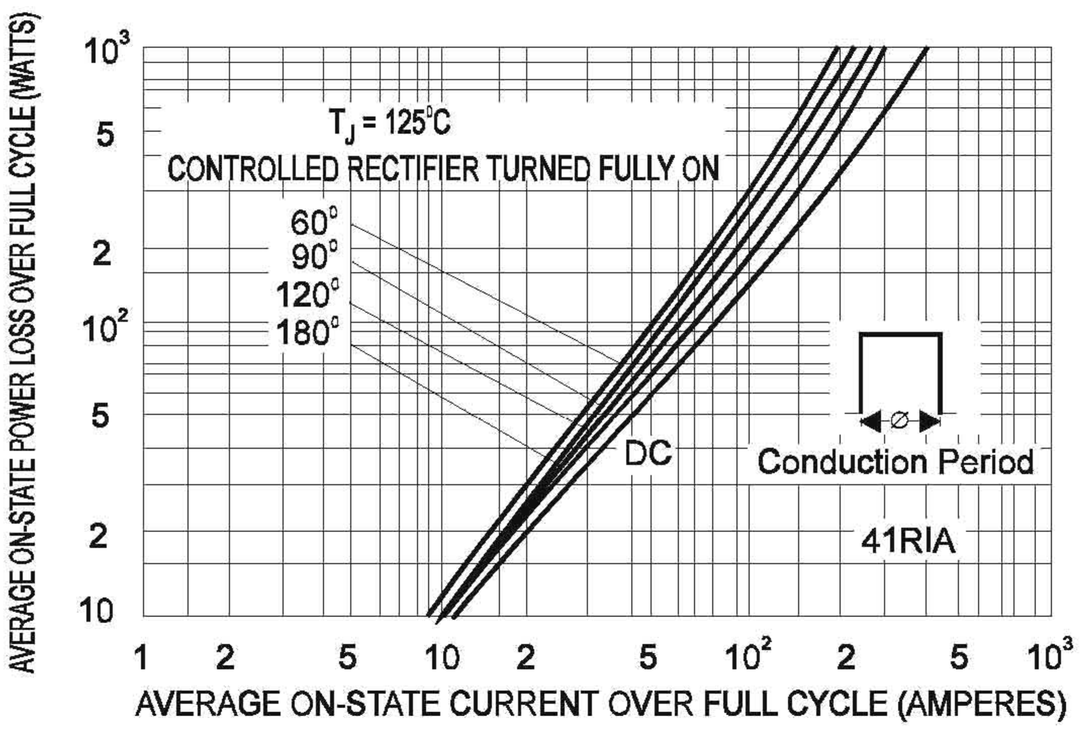

Fig. 10 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

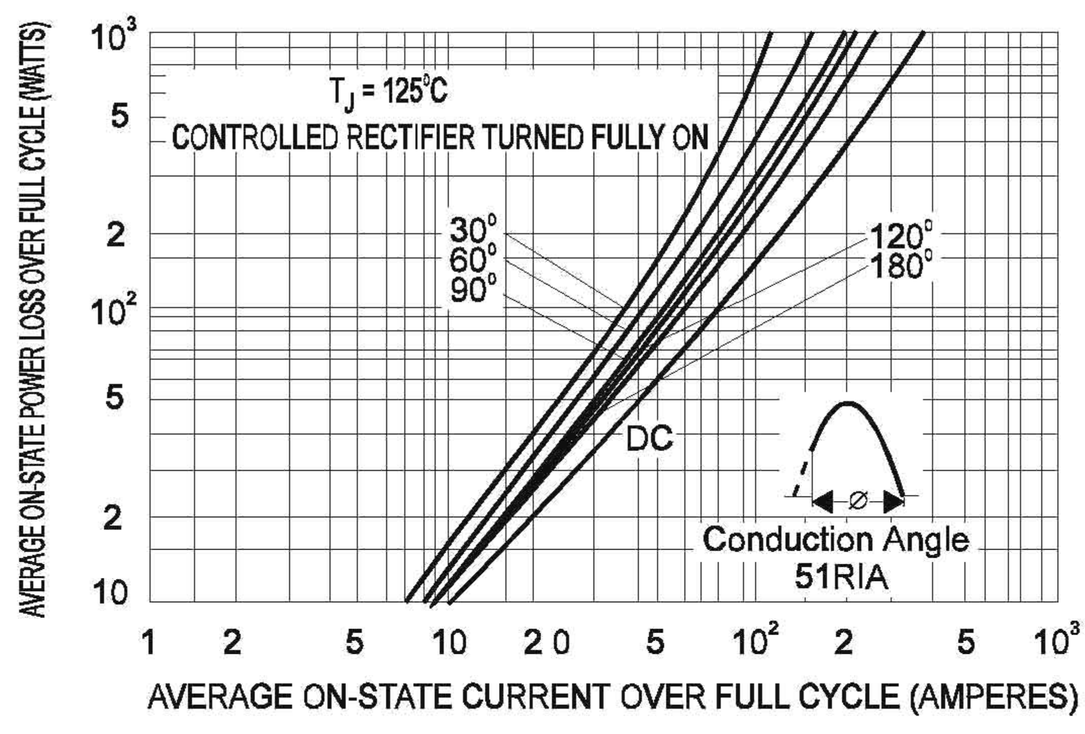

Fig. 11 - Maximum High-Level On-state Power Loss Vs. Current (Sinusoidal Current Waveform)

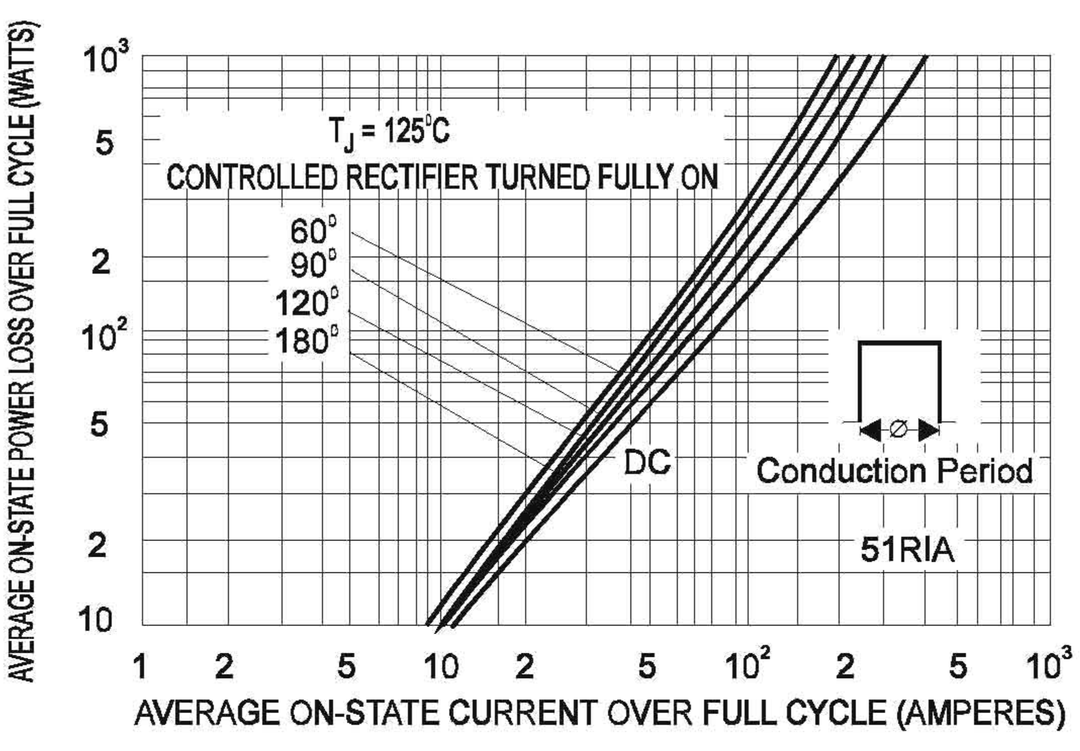

Fig. 12 - Maximum High-Level On-state Power Loss Vs. Current (Rectangular Current Waveform)

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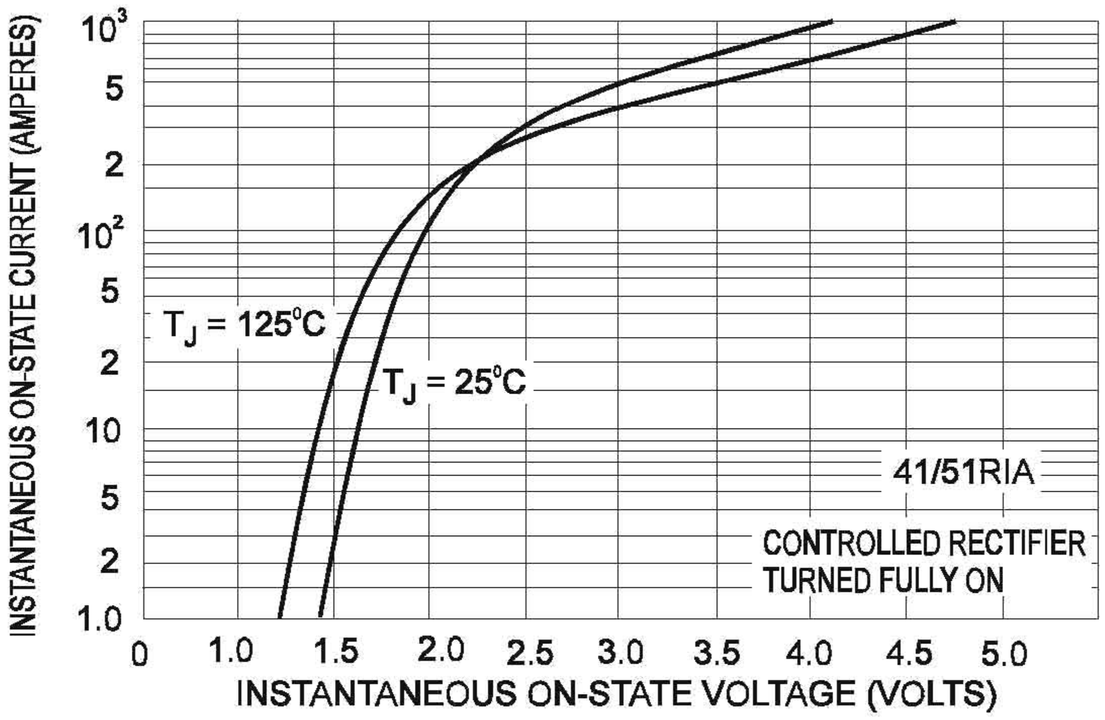

Fig. 13 - Maximum On-state Voltage Vs. Current

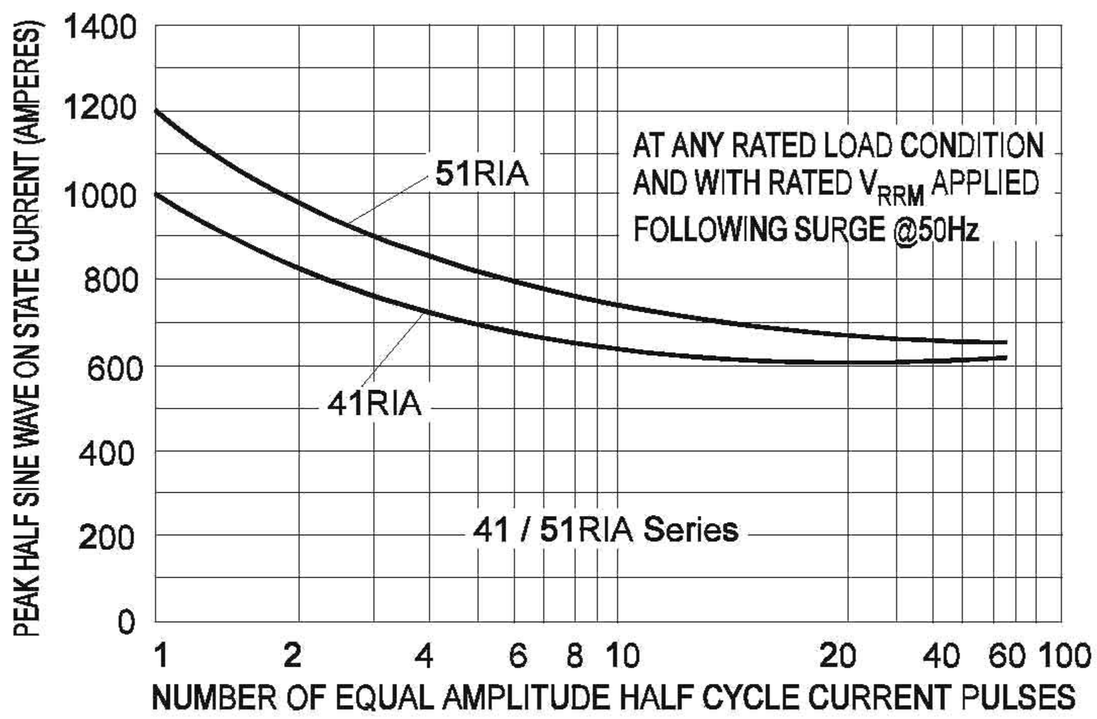

Fig. 14 - Maximum Non-Repetitive Surge Current Vs. Number of Current Pulses

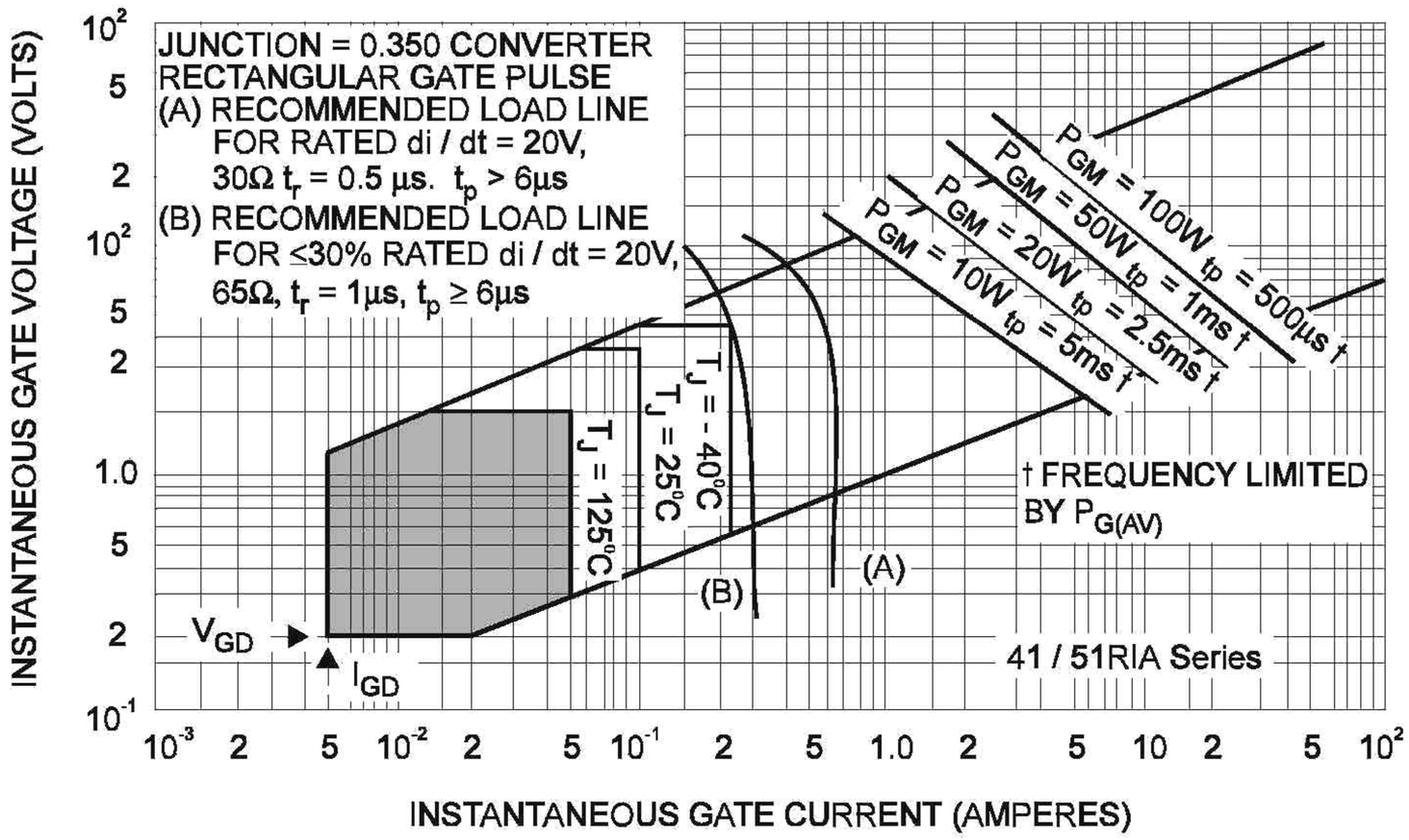

Fig. 15 - Gate Characteristics

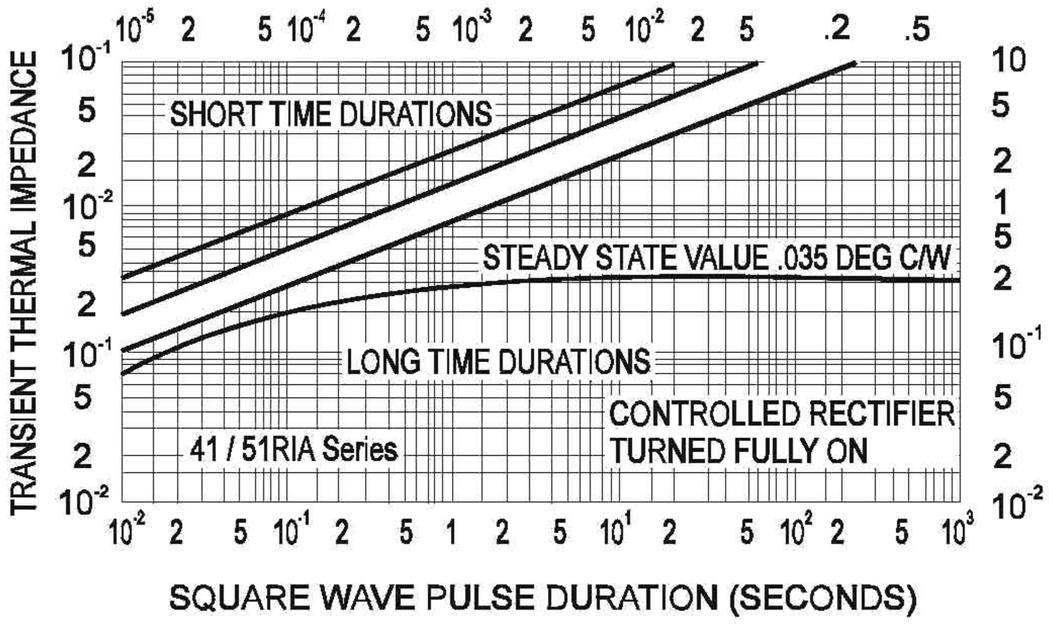

Fig. 16 - Maximum Transient Thermal Impedance, Junction To Case Vs Square Wave Pulse Duration

Last Update :June. 2009