Bulletin I27116 rev. C 03/02

International
IOR Rectifier

SERIES
IRK.166, .196, .236

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STANDARD RECOVERY DIODES

NEW INT-A-pak Power Modules

Features

- High Voltage
- Electrically Isolated by DBC Ceramic (Al_2O_3)
- 3500 V_{RMS} Isolating Voltage
- Industrial Standard Package
- High Surge Capability
- Glass Passivated Chips
- Modules uses High Voltage Power diodes in four Basic Configurations
- Simple Mounting
- UL E78996 approved

165 A
195 A
230 A

Applications

- DC Motor Control and Drives
- Battery Charges
- Welders
- Power Converters

Major Ratings and Characteristics

Parameters	IRK.166..	IRK.196..	IRK.236..	Units
$I_{F(AV)}$	165	195	230	A
@ T_C	100	100	100	°C
$I_{F(RMS)}$	260	305	360	A
I_{FSM} @ 50Hz	4000	4750	5500	A
@ 60Hz	4200	4980	5765	A
I^2t @ 50Hz	80	113	151	KA^2s
@ 60Hz	73	103	138	KA^2s
$I^2\sqrt{t}$	798	1130	1516	$KA^2\sqrt{s}$
V_{RRM}	400 to 1600			V
T_J range	-40 to 150			°C

CASE STYLE NEW INT-A-PAK

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Electrical Specifications

Voltage Ratings

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Type number	Voltage Code	V_{RRM} , Maximum repetitive peak reverse voltage V	V_{RSM} , Maximum non-repetitive peak reverse voltage V	I_{RRM} 150°C m A
IRK.166	04	400	500	20
IRK.196	08	800	900	
IRK.236	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

Forward Conduction

	Parameter	IRK.166	IRK.196	IRK.236	Units	Conditions		
$I_{F(AV)}$	Max. average on-state current	165	195	230	A	180° conduction, half sine wave		
	@ Case temperature	100	100	100	°C			
$I_{F(RMS)}$	Max. RMS on-state current	260	305	360	A			
I_{FSM}	Maximum peak, one-cycle	4000	4750	5500	A	t = 10ms	No voltage	
	on-state, non-repetitive	4200	4980	5765		t = 8.3ms	reapplied	
	surge current	3350	4000	4630		t = 10ms	100% V_{RRM}	
		3500	4200	4850		t = 8.3ms	reapplied	Sine half wave,
I^2t	Maximum I^2t for fusing	80	113	151	KA^2s	t = 10ms	No voltage	Initial $T_J = T_J$ max.
		73	103	138		t = 8.3ms	reapplied	
		56	80	107		t = 10ms	100% V_{RRM}	
		52	73	98		t = 8.3ms	reapplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	798	1130	1516	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	0.73	0.69	0.7	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, @ T_J max.		
$V_{F(TO)2}$	High level value of threshold voltage	0.88	0.78	0.83		$(I > \pi \times I_{F(AV)})$, @ T_J max.		
r_{t1}	Low level value on-state slope resistance	1.5	1.3	1.2	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)})$, @ T_J max.		
r_{t2}	High level value on-state slope resistance	1.26	1.2	1.07		$(I > \pi \times I_{F(AV)})$, @ T_J max.		
V_{FM}	Maximum forward voltage drop	1.43	1.38	1.46	V	$I_{FM} = \pi \times I_{F(AV)}$, T_J = 25°C, 180°conduction Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$		

Blocking

I_{RRM}	Maximum peak reverse and off-state leakage current	20	mA	T_J = 150°C
V_{INS}	RMS isolation voltage	3500	V	50Hz, circuit to base, all terminals shorted, t = 1s

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Thermal and Mechanical Specifications

Parameter		IRK.166	IRK.196	IRK.236	Units	Conditions
T_J	Max. junction operating temperature range	-40 to 150			°C	
T_{stg}	Max. storage temperature range	-40 to 150			°C	
R_{thJC}	Max. thermal resistance, junction to case	0.2	0.16	0.14	K/W	DC operation, per junction
R_{thCS}	Max. thermal resistance, case to heatsink	0.05			K/W	Mounting surface smooth, flat and greased Per module
T	Mounting torque ± 10% IAP to heatsink	4 to 6			Nm	A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads.
	busbar to IAP	4 to 6				
wt	Approximate weight	200 (7.1)			g (oz)	
	Case Style	New Int-A-Pak				

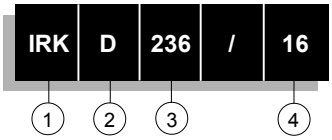
ΔR Conduction (per Junction)

(The following table shows the increment of thermal resistance R_{thJC} when devices operate at different conduction angles than DC)

Devices	Sinusoidal conduction @ T_J max.					Rectangular conduction @ T_J max.					Units
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
IRK.166	0.025	0.03	0.038	0.055	0.089	0.018	0.031	0.041	0.057	0.089	K/W
IRK.196	0.016	0.019	0.024	0.034	0.053	0.012	0.02	0.026	0.035	0.054	
IRK.236	0.009	0.010	0.014	0.018	0.025	0.008	0.012	0.015	0.019	0.025	

Ordering Information Table

Device Code



1 - Module Type
2 - Circuit Configuration
3 - Current Rating: $I_{F(AV)}$
4 - Voltage Code: Code x 100 = V_{RRM}

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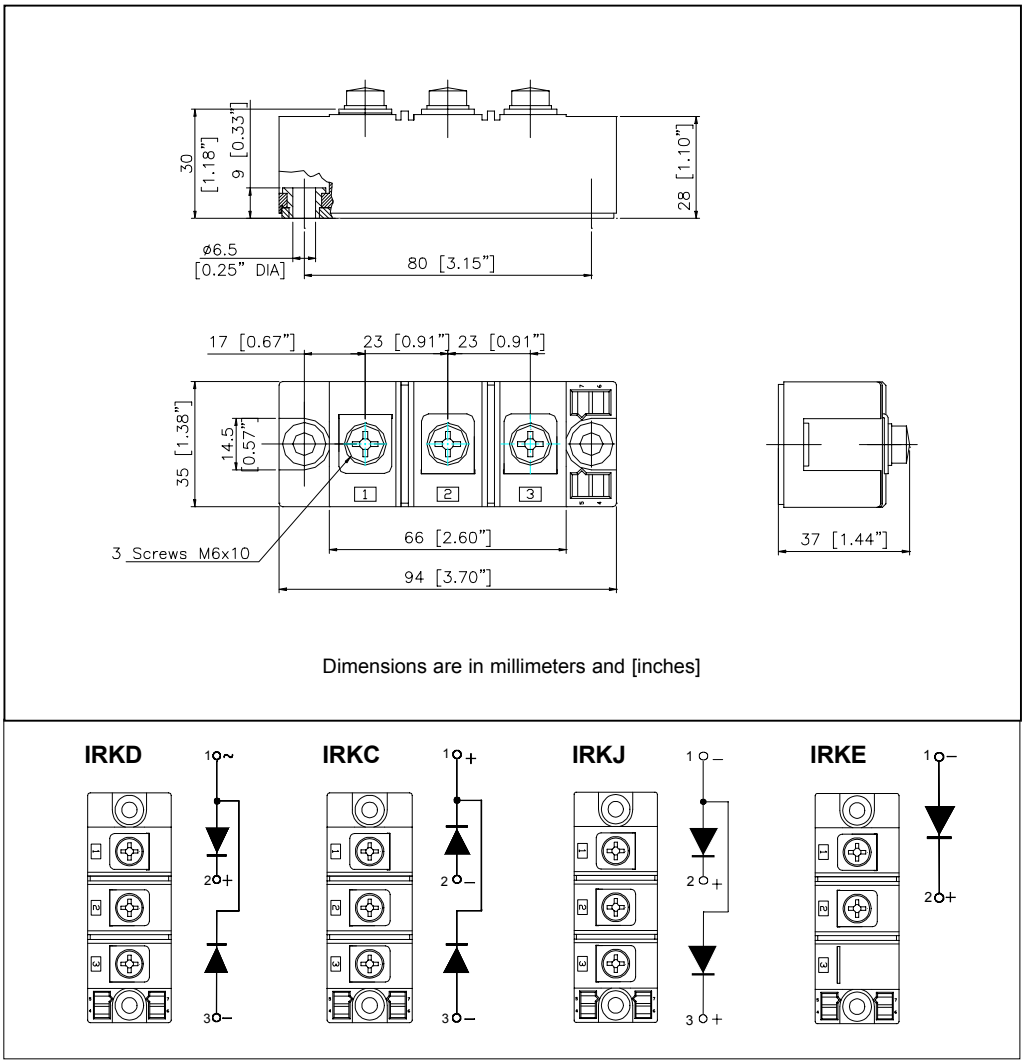
Outline Table



Dimensions are in millimeters and [inches]

NOTE: To order the Optional Hardware see Bulletin I27900

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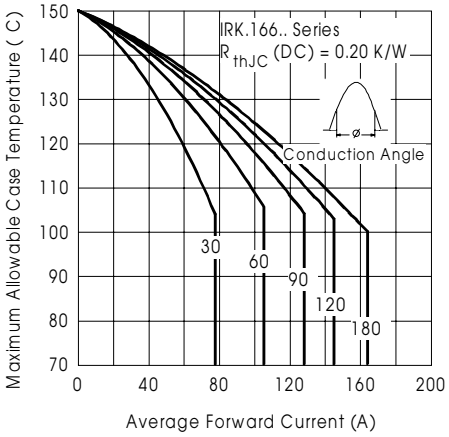

Fig. 1 - Current Ratings Characteristics

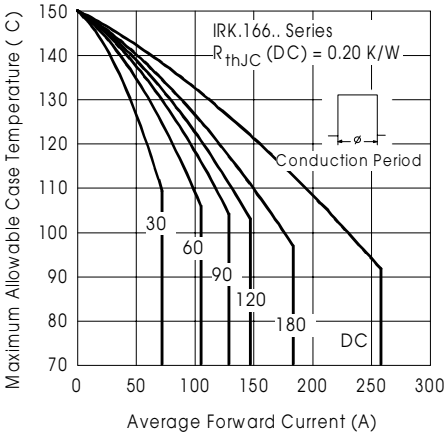

Fig. 2 - Current Ratings Characteristics

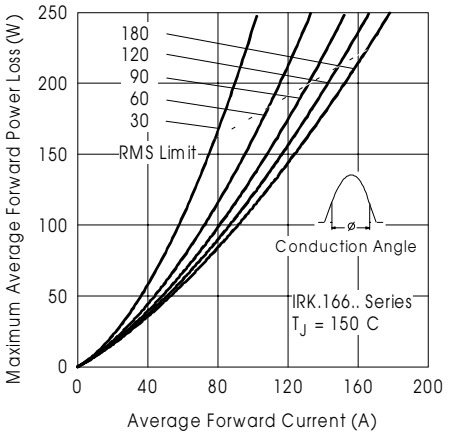

Fig. 3 - On-State Power Loss Characteristics

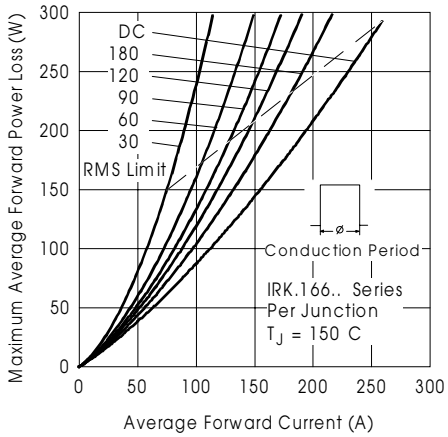

Fig. 4 - On-State Power Loss Characteristics

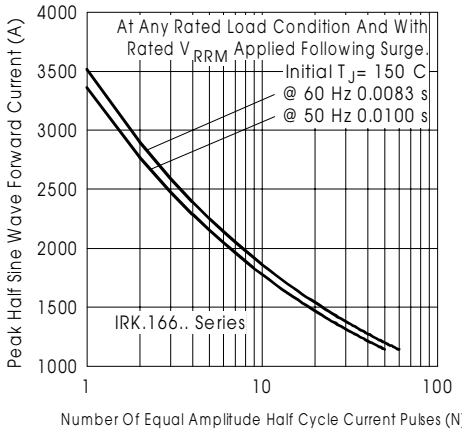

Fig.5 - Maximum Non-Repetitive Surge Current

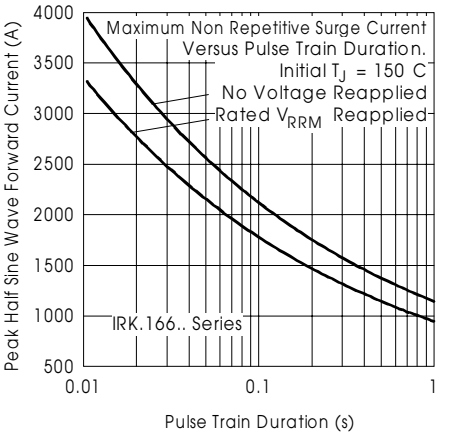

Fig. 6 - Maximum Non-Repetitive Surge Current

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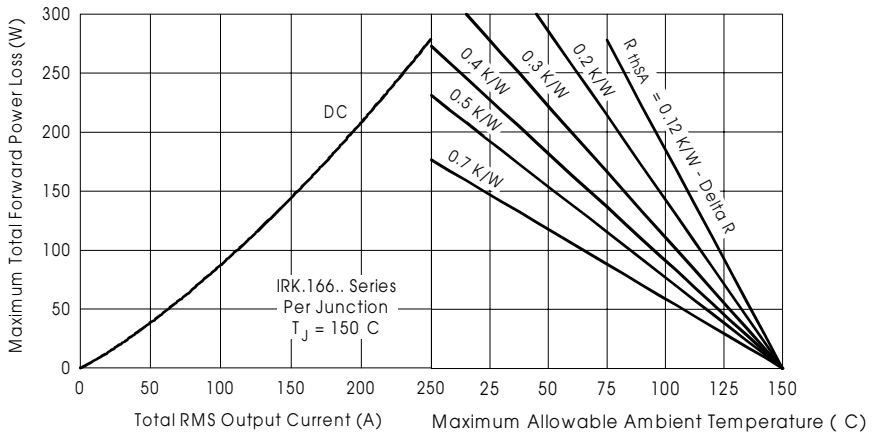

Fig.7 - On State Power Loss Characteristics

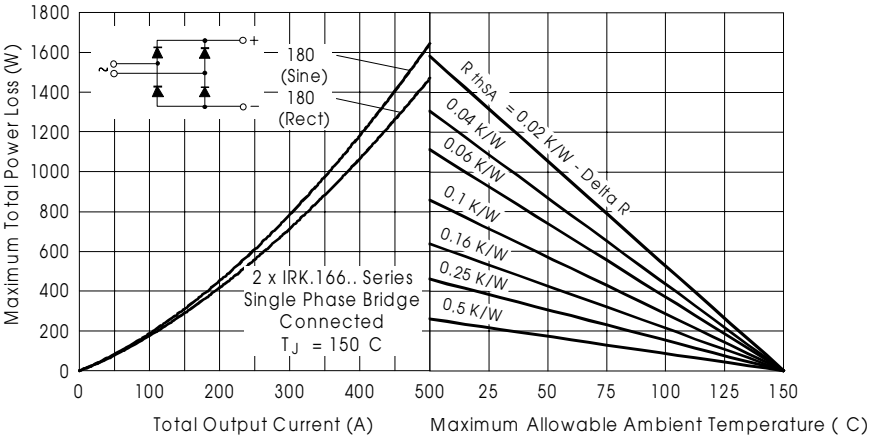

Fig.8 - On State Power Loss Characteristics

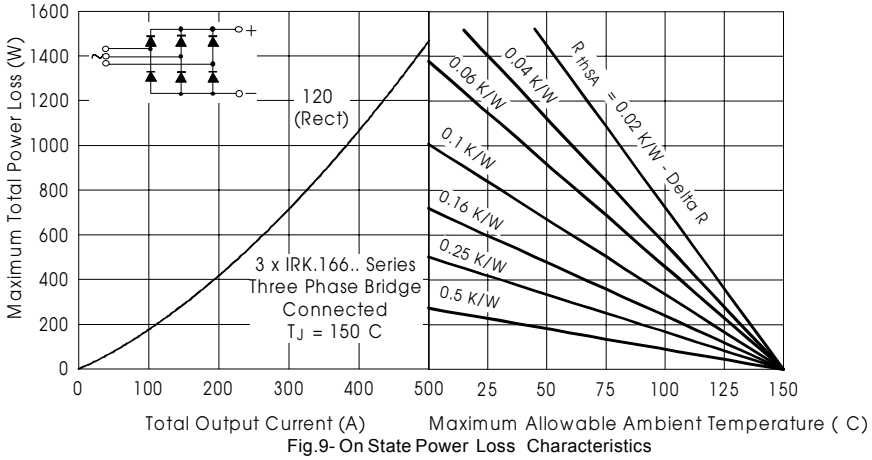

Fig.9- On State Power Loss Characteristics

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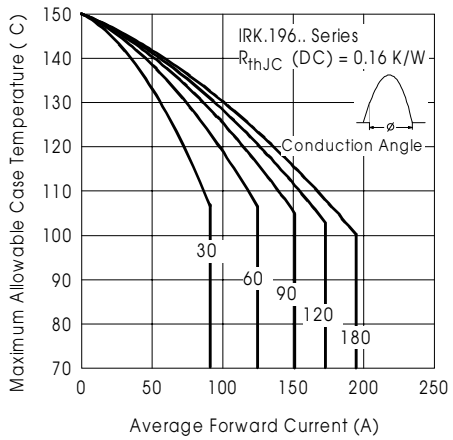

Fig. 10 - Current Ratings Characteristics

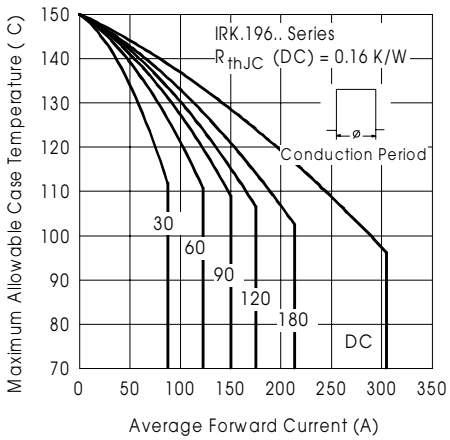

Fig. 11 - Current Ratings Characteristics

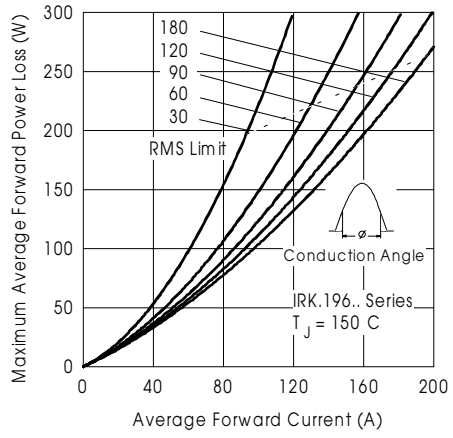

Fig. 12 - On-State Power Loss Characteristics

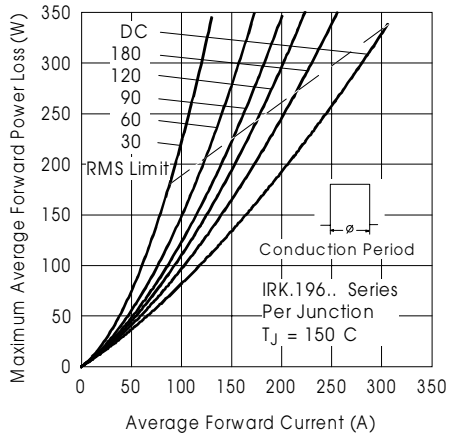

Fig. 13 - On-State Power Loss Characteristics

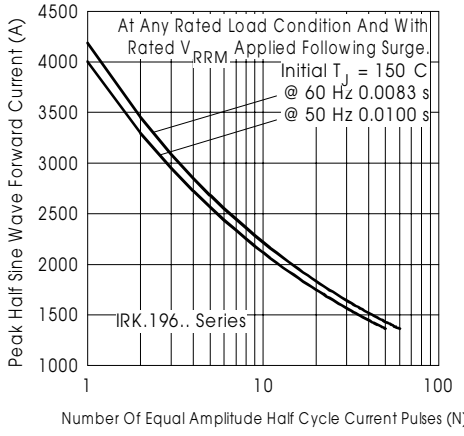

Fig.14 - Maximum Non-Repetitive Surge Current

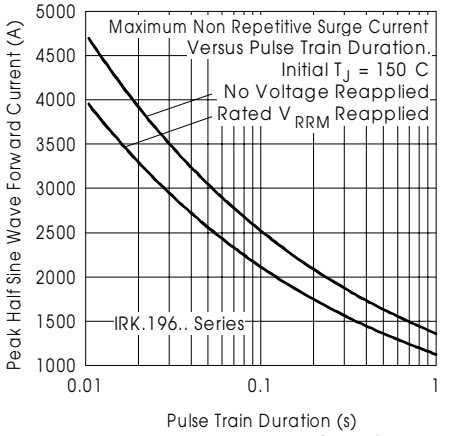

Fig. 15 - Maximum Non-Repetitive Surge Current

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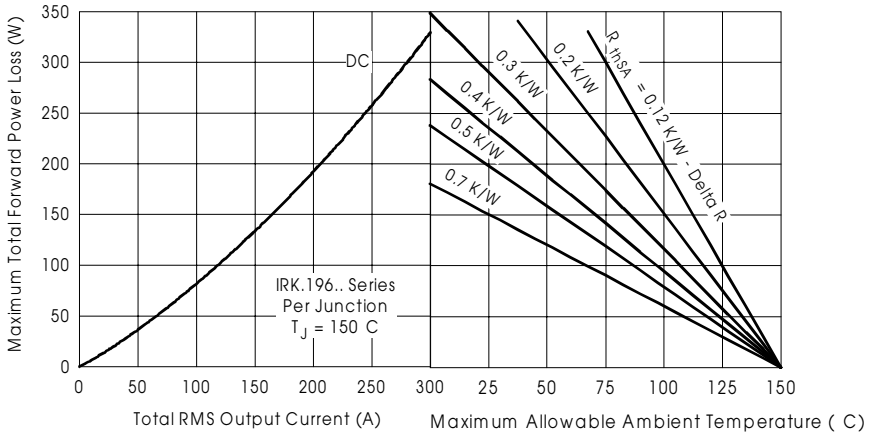

Fig.16 - On State Power Loss Characteristics

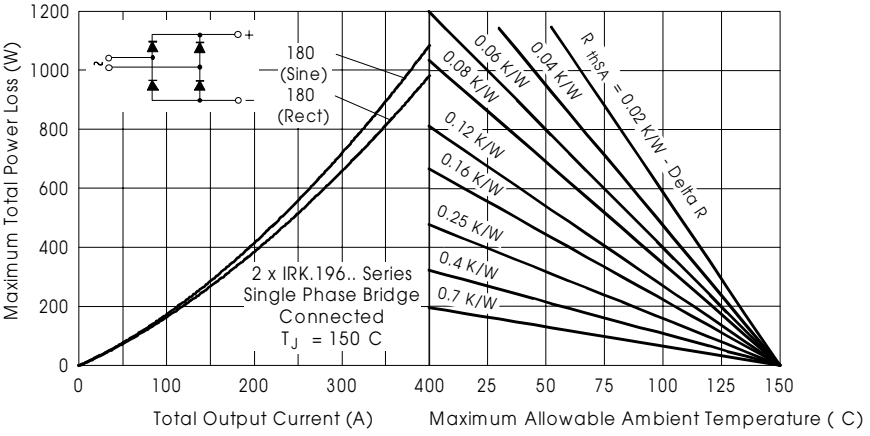

Fig.17 - On State Power Loss Characteristics

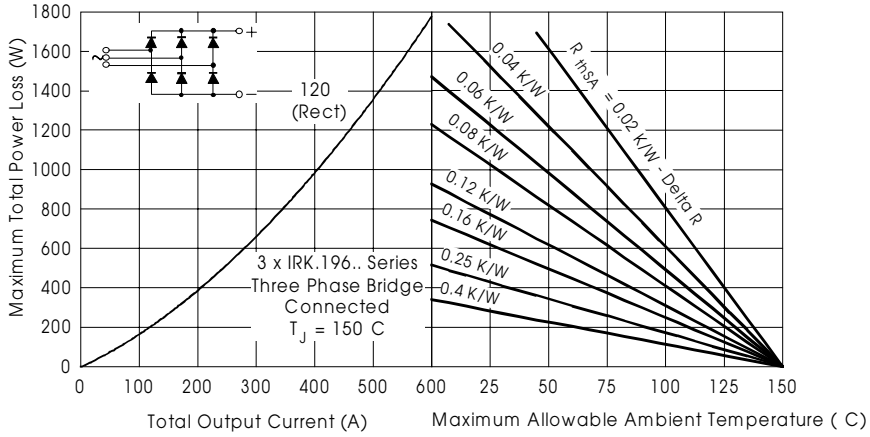

Fig.18- On State Power Loss Characteristics

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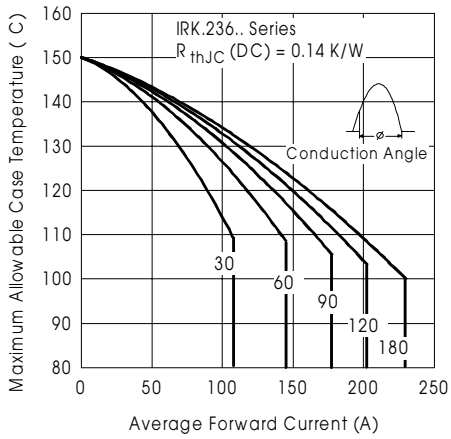

Fig. 19 - Current Ratings Characteristics

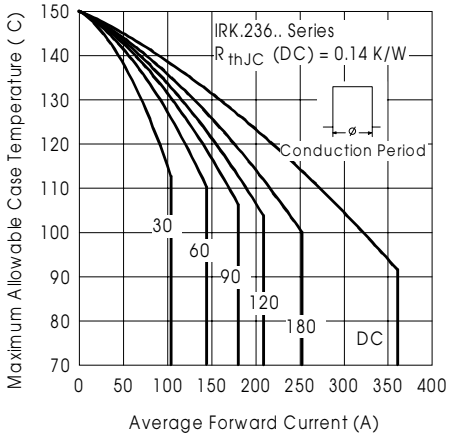

Fig. 20 - Current Ratings Characteristics

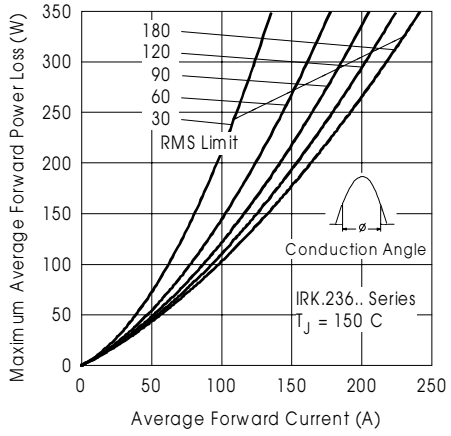

Fig. 21 - On-State Power Loss Characteristics

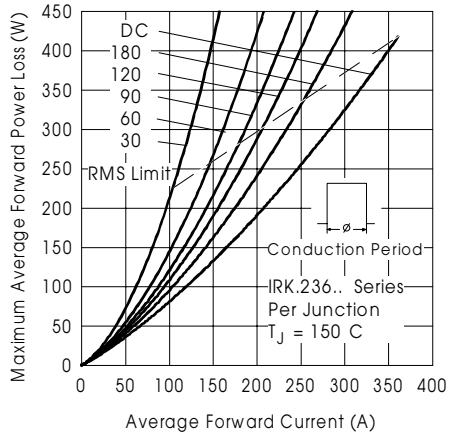

Fig. 22 - On-State Power Loss Characteristics

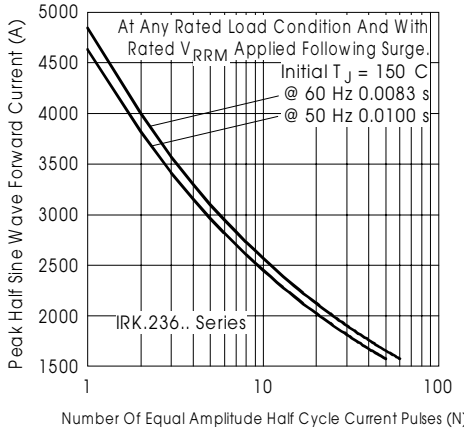

Fig.23 - Maximum Non-Repetitive Surge Current

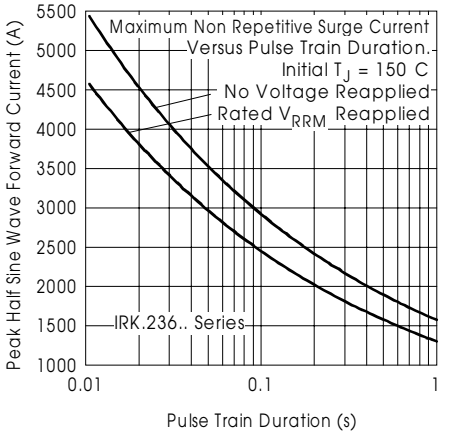

Fig. 24 - Maximum Non-Repetitive Surge Current

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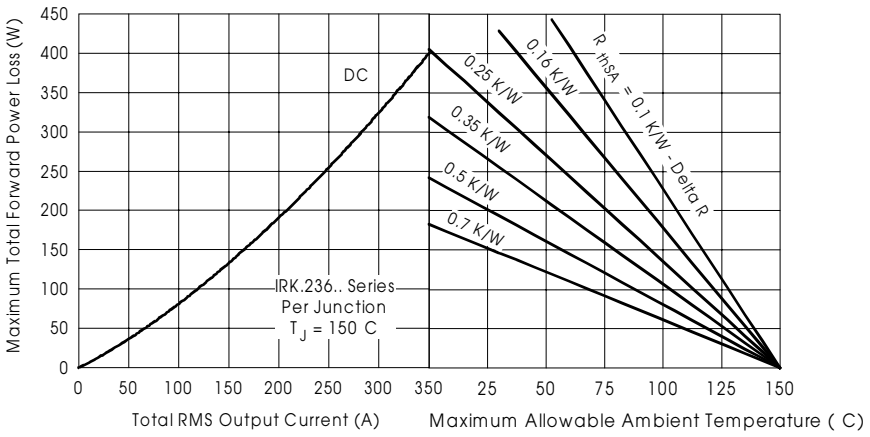

Fig.25 - On State Power Loss Characteristics

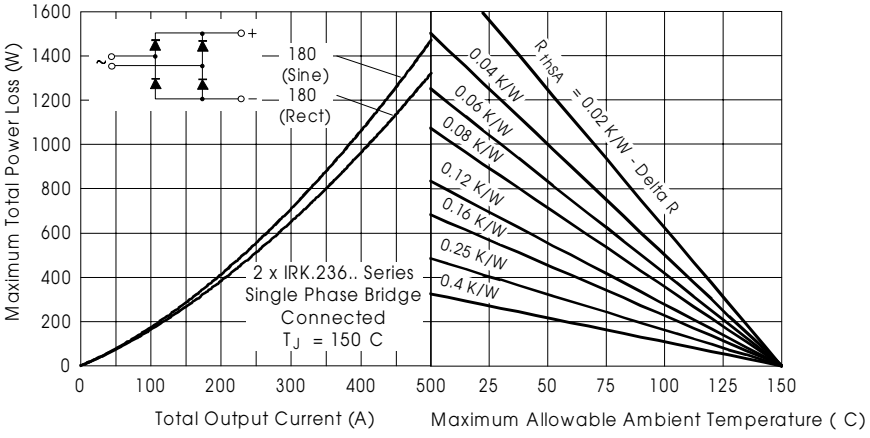

Fig.26 - On State Power Loss Characteristics

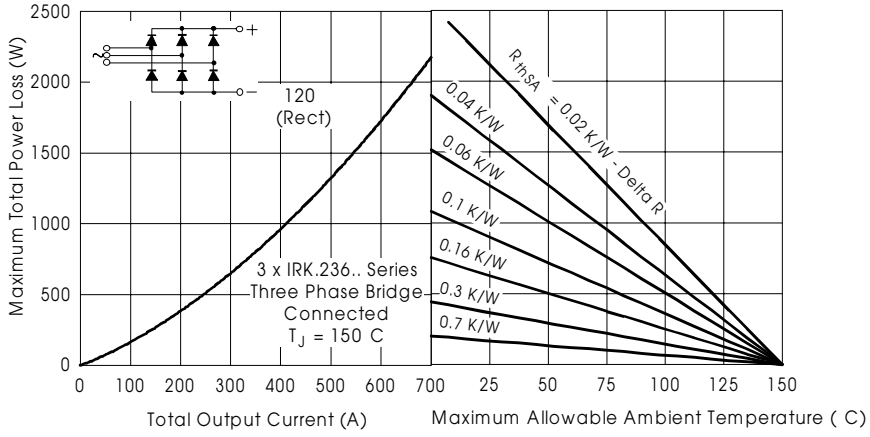

Fig.27- On State Power Loss Characteristics

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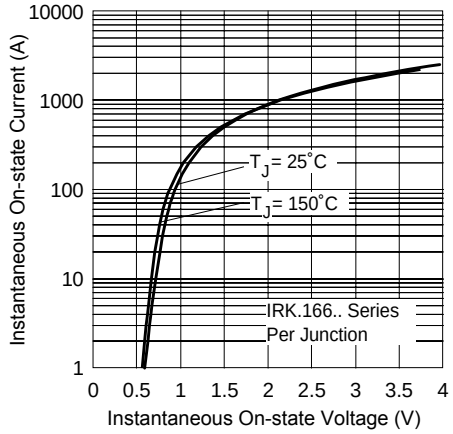

Fig.28 - On State Voltage Drop Characteristics

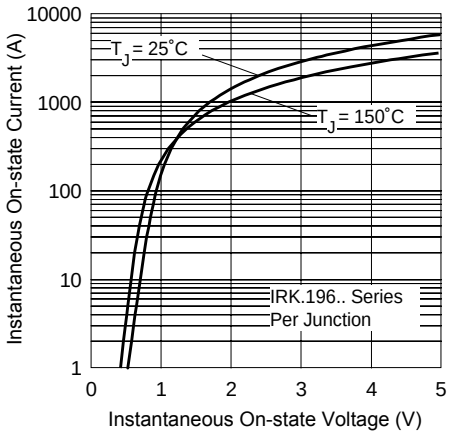

Fig.29 - On State Voltage Drop Characteristics

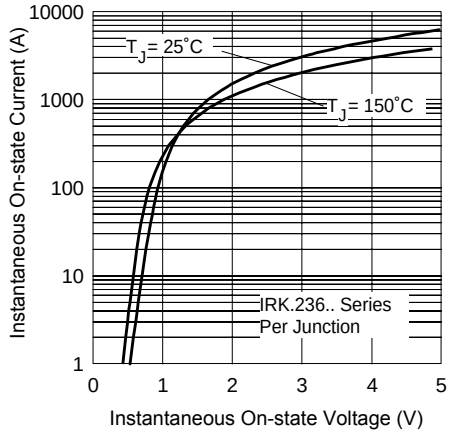

Fig.30 - On State Voltage Drop Characteristics

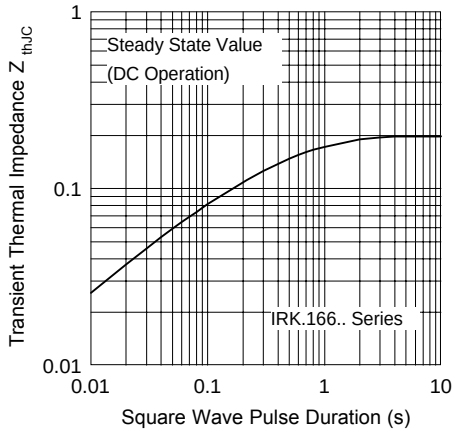

Fig.31 - Thermal Impedance Z_{thJC} Characteristics

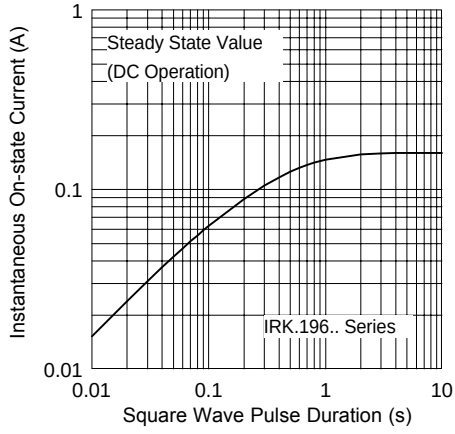

Fig.32 - Thermal Impedance Z_{thJC} Characteristics

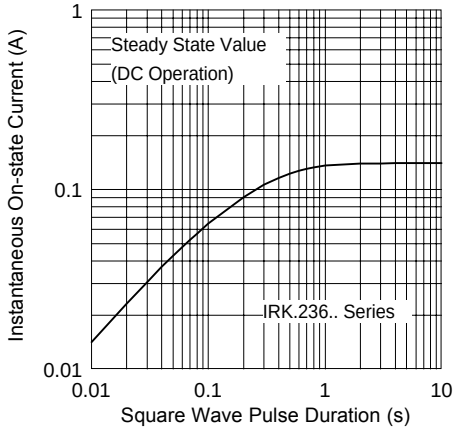

Fig.33 - Thermal Impedance Z_{thJC} Characteristics

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Data and specifications subject to change without notice.
This product has been designed and qualified for Multiple Level.
Qualification Standards can be found on IR's Web site.

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