Bulletin I27140 rev. B 09/97

International
IOR Rectifier

IRK.56, .71 SERIES

STANDARD DIODES

NEW ADD-A-pak™ Power Modules

60 A
80 A

Features

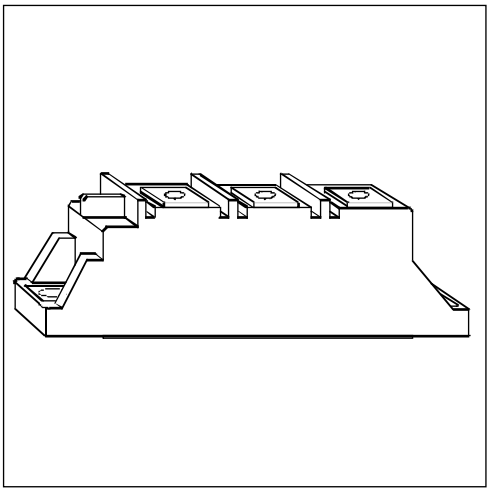
- Electrically isolated: DBC base plate
- 3500 V_{RMS} isolating voltage
- Standard JEDEC package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Wide choice of circuit configurations
- Large creepage distances
- UL E78996 approved

Description

These IRK series of NEW ADD-A-paks use power diodes in a variety of circuit configurations. The semiconductor chips are electrically isolated from the base plate, allowing common heatsinks and compact assemblies to be built. They can be interconnected to form single phase or three phase bridges. These modules are intended for general purpose high voltage applications such as battery chargers, welders and plating equipment

Major Ratings and Characteristics

Parameters	IRK.56	IRK.71	Units
$I_{F(AV)}$ @ 100°C	60	80	A
$I_{F(RMS)}$	94	126	A
I_{FSM} @ 50Hz	1600	1790	A
@ 60Hz	1680	1870	A
I^2t @ 50Hz	12.89	15.90	KA^2s
@ 60Hz	11.76	14.53	KA^2s
$I^2\sqrt{t}$	128.9	159	$KA^2\sqrt{s}$
V_{RRM} range	400 to 1600		V
T_J	-40 to 150		°C
T_{STG}	-40 to150		°C



ELECTRICAL SPECIFICATIONS

Voltage Ratings

Type number	Voltage Code	V_{RRM} , maximum repetitive peak reverse voltage V	V_{RSM} , maximum non-repetitive peak rev. voltage V	I_{RRM} max. @ 150°C mA
IRK.56/ .71	04	400	500	10
	06	600	700	
	08	800	900	
	10	1000	1100	
	12	1200	1300	
	14	1400	1500	
	16	1600	1700	

Forward Conduction

	Parameter	IRK.56	IRK.71	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	60	80	A	180° conduction, half sine wave		
	@ Case temperature	100	100	°C			
$I_{F(AV)}$	Max. average forward current	55	70	A	180° conduction, half sine wave		
	@ Case temperature	105	108	°C			
$I_{F(RMS)}$	Max. RMS forward current	94	126	A	DC @ 92°C case temperature		
I_{FSM}	Max. peak, one-cycle forward,	1600	1790	A	t = 10ms	No voltage	Sinusoidal half wave, Initial $T_J = T_J$ max.
	non-repetitive surge current	1680	1870		t = 8.3ms	reapplied	
		1350	1500		t = 10ms	100% V_{RRM}	
		1420	1570		t = 8.3ms	reapplied	
I^2t	Maximum I^2t for fusing	12.89	15.90	KA^2s	t = 10ms	No voltage	
		11.76	14.53		t = 8.3ms	reapplied	
		9.12	11.25		t = 10ms	100% V_{RRM}	
		8.32	10.23		t = 8.3ms	reapplied	
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	128.9	159.0	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	0.96	0.83	V	(16.7% x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ max.		
$V_{F(TO)2}$	High level value of threshold voltage	1.03	0.92		(I > x π x $I_{F(AV)}$), $T_J = T_J$ max.		
r_{f1}	Low level value of forward slope resistance	2.81	2.68	mΩ	(16.7% x π x $I_{F(AV)}$ < I < π x $I_{F(AV)}$), $T_J = T_J$ max.		
r_{f2}	High level value of forward slope resistance	2.48	2.40		(I > x π x $I_{F(AV)}$), $T_J = T_J$ max.		
V_{FM}	Max. forward voltage drop	1.51	1.50	V	I_{FM} = π x $I_{F(AV)}$, T_J = 25°C, t_p = 400µs square wave		

Blocking

	Parameter	IRK.56	IRK.71	Units	Conditions
I_{RRM}	Max. peak reverse leakage current	10		mA	T_J = 150°C
V_{INS}	RMS isolation voltage	3500 (1 sec)		V	50 Hz, circuit to base, all terminals shorted

Thermal and Mechanical Specifications

Parameter		IRK.56	IRK.71	Units	Conditions
T_J	Junction temperature range	-40 to 150		°C	
T_{stg}	Storage temperature range	-40 to 150		°C	
R_{thJC}	Max. thermal resistance, junction to case	0.5	0.4	K/W	Per junction, DC operation
R_{thCS}	Typical thermal resistance, case to heatsink	0.1		K/W	Mounting surface flat, smooth and greased Flatness < 0.03 mm; roughness < 0.02 mm
T	Mounting tourque ±10% to heatsink	5		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
	busbar	4			
wt	Approximate weight	83 (3)		g (oz)	
	Case style	TO-240AA			JEDEC

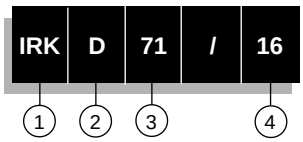
ΔR Conduction (per Junction)

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

Devices	Sine half wave conduction					Rect. wave conduction					Units
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
IRK.56	0.11	0.13	0.16	0.22	0.32	0.09	0.14	0.17	0.23	0.32	°C/W
IRK.71	0.06	0.08	0.11	0.14	0.21	0.06	0.09	0.11	0.15	0.21	

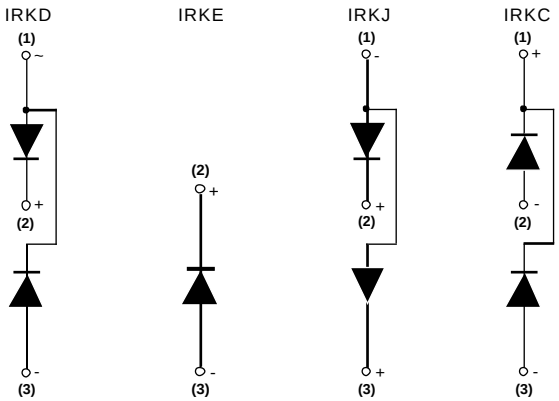
Ordering Information Table

Device Code



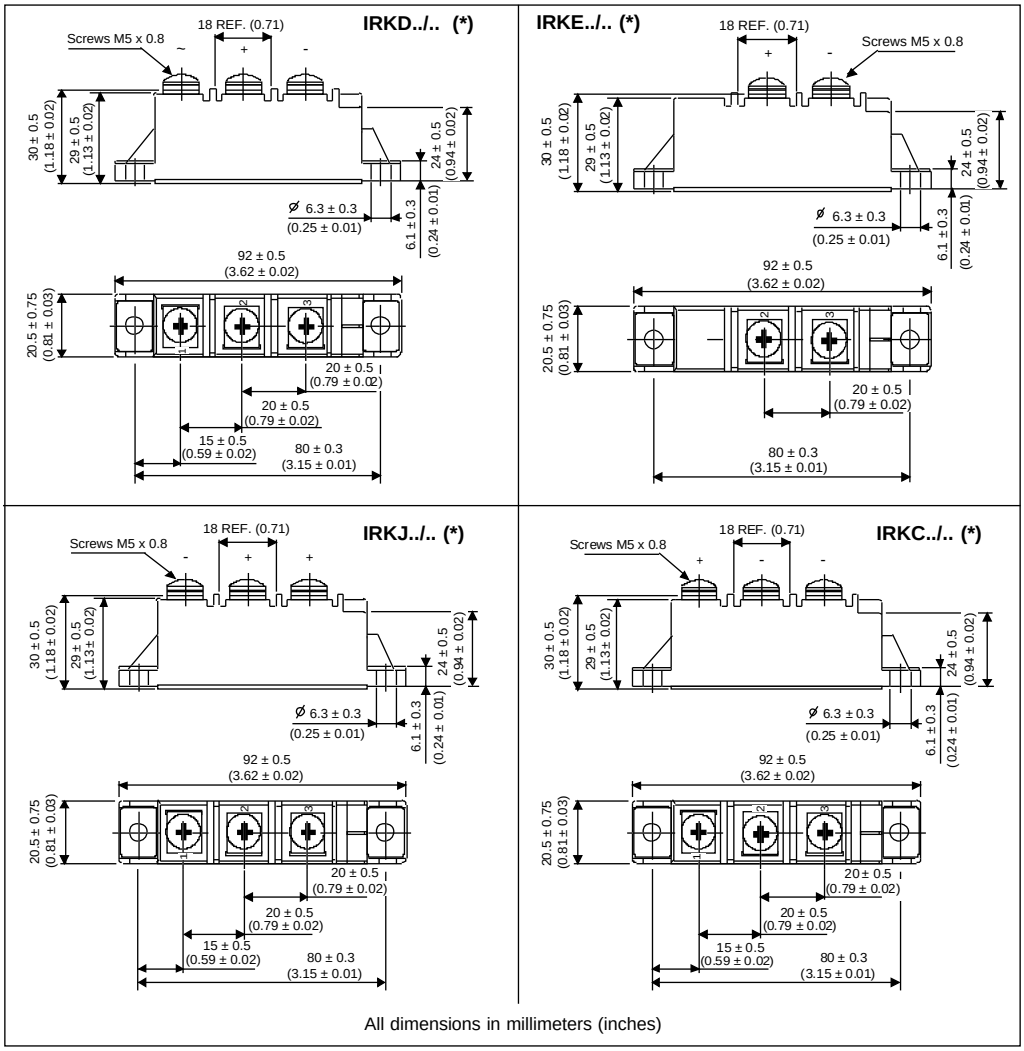
1 - Module type
2 - Circuit configuration (See Circuit Configuration Table)
3 - Current code
4 - Voltage code (See Voltage Ratings Table)

Circuit Configurations Table



D = 2 diodes in series
E = Single diode
J = 2 diodes/common anode
C = 2 diodes/common cathode

Outlines Table



(*) For terminals connections, see Circuit Configurations Table

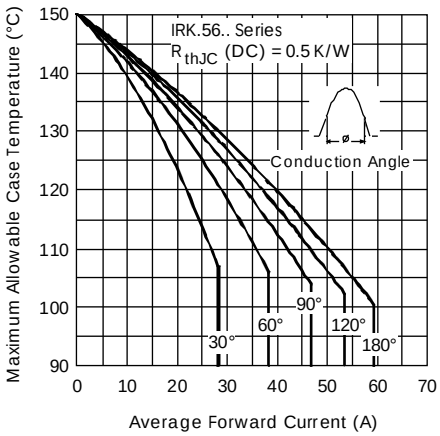


Fig. 1 - Current Ratings Characteristics

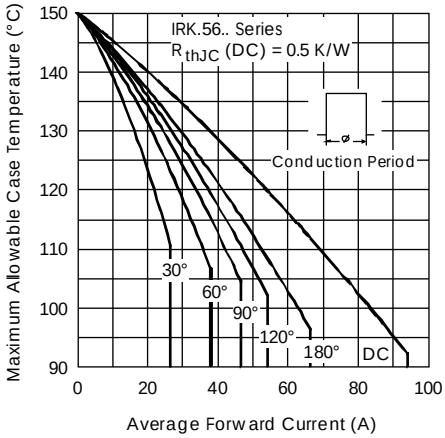


Fig. 2 - Current Ratings Characteristics

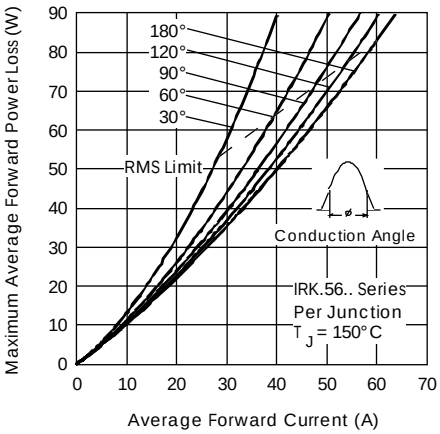


Fig. 3 - Forward Power Loss Characteristics

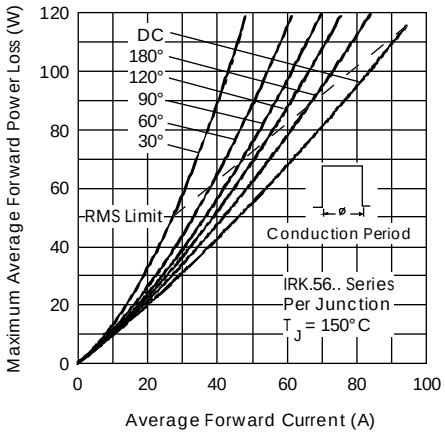


Fig. 4 - Forward Power Loss Characteristics

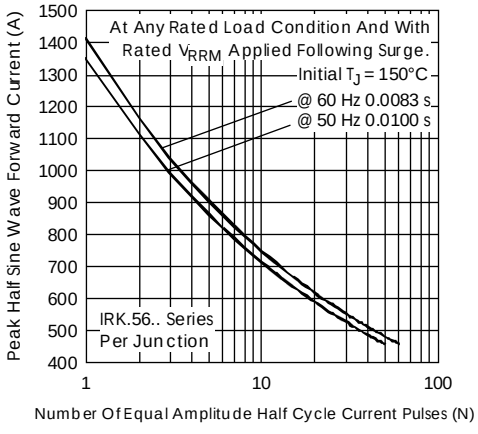


Fig. 5 - Maximum Non-Repetitive Surge Current

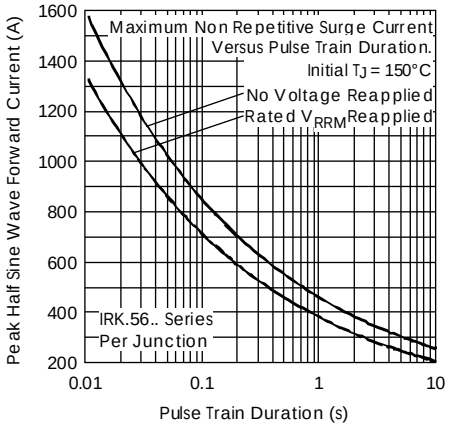


Fig. 6 - Maximum Non-Repetitive Surge Current

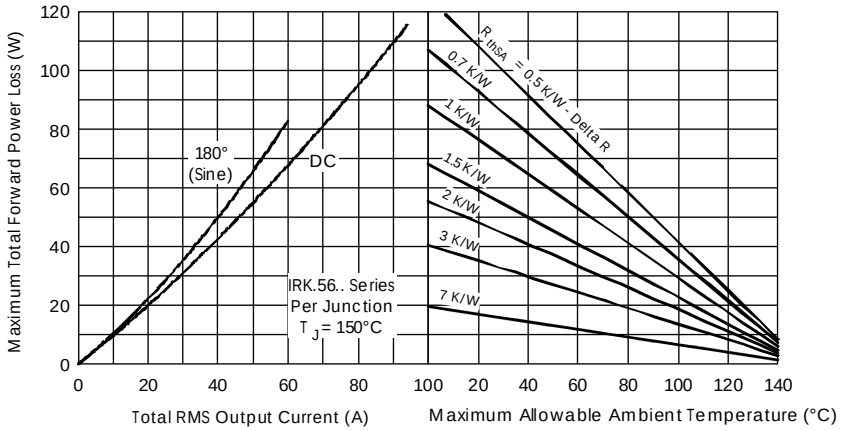


Fig. 7 - Forward Power Loss Characteristics

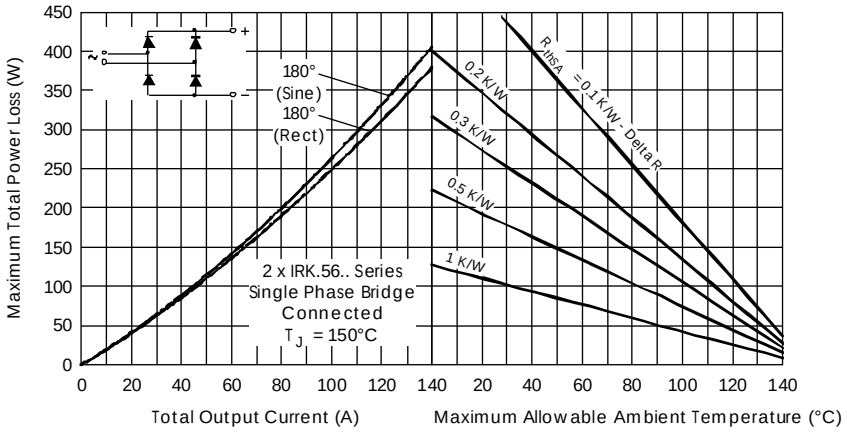


Fig. 8 - Forward Power Loss Characteristics

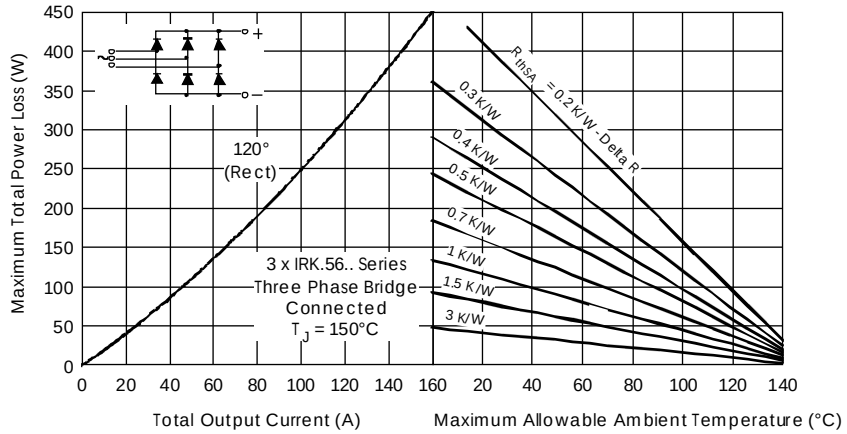


Fig. 9 - Forward Power Loss Characteristics

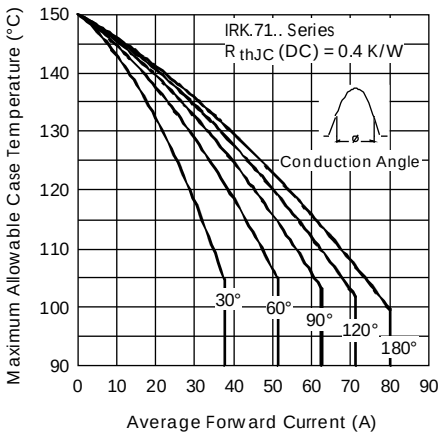


Fig. 10 - Current Ratings Characteristics

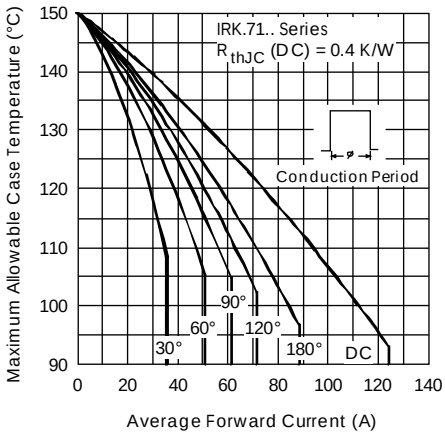


Fig. 11 - Current Ratings Characteristics

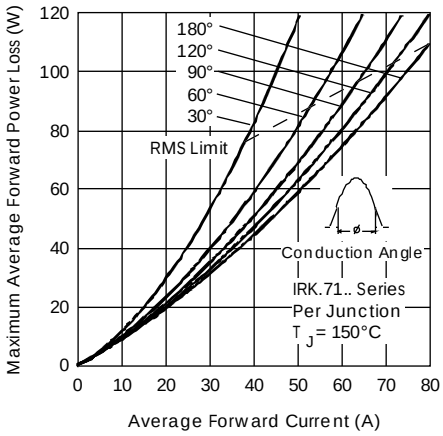


Fig. 12 - Forward Power Loss Characteristics

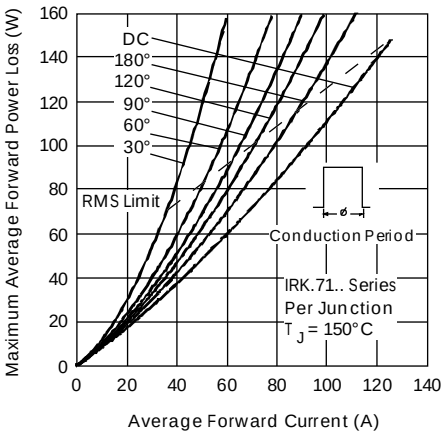


Fig. 13 - Forward Power Loss Characteristics

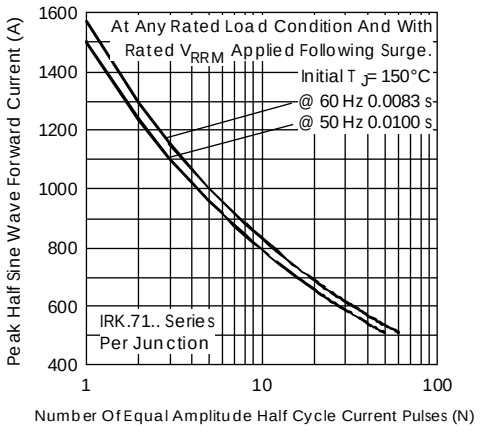


Fig. 14 - Maximum Non-Repetitive Surge Current

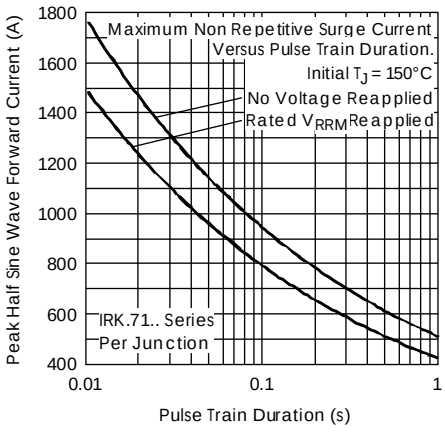


Fig. 15 - Maximum Non-Repetitive Surge Current

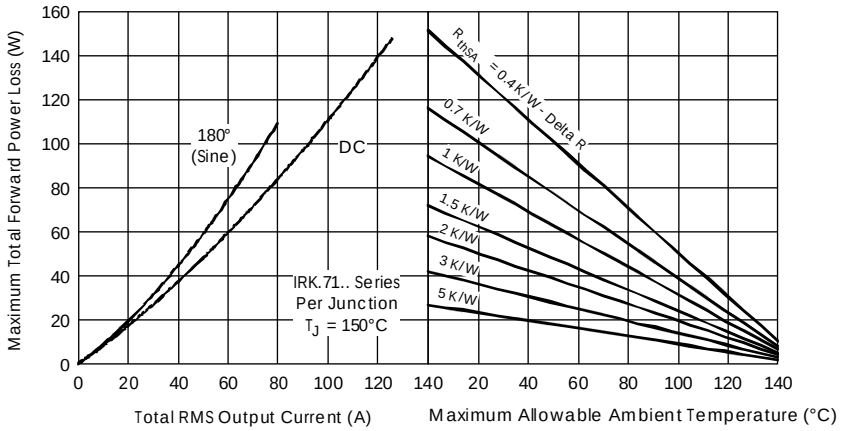


Fig. 16 - Forward Power Loss Characteristics

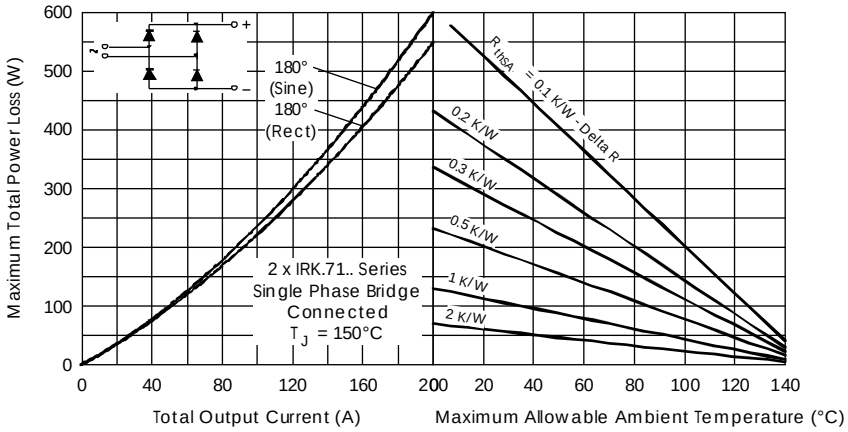


Fig. 17 - Forward Power Loss Characteristics

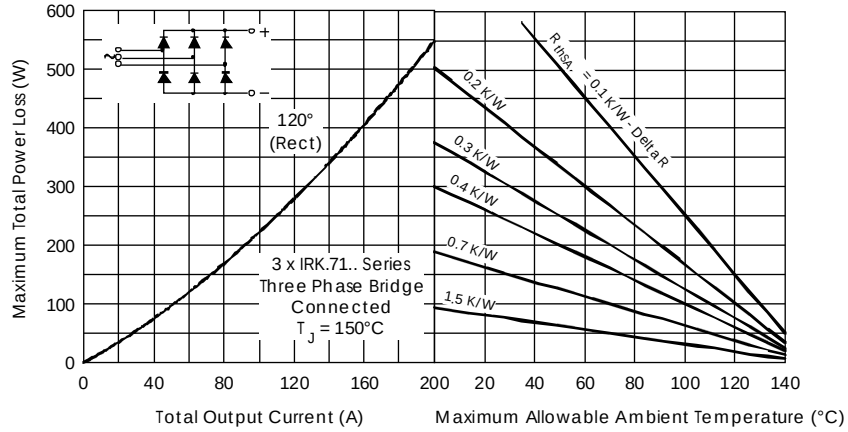


Fig. 18 - Forward Power Loss Characteristics

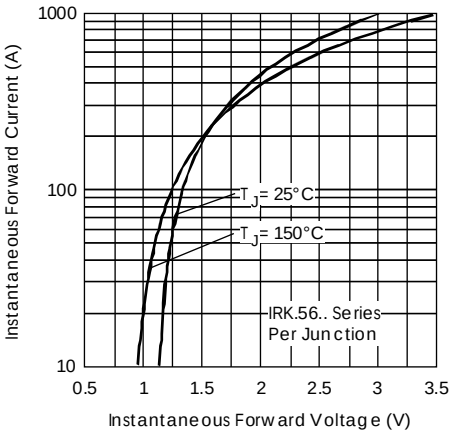


Fig. 19 - Forward Voltage Drop Characteristics

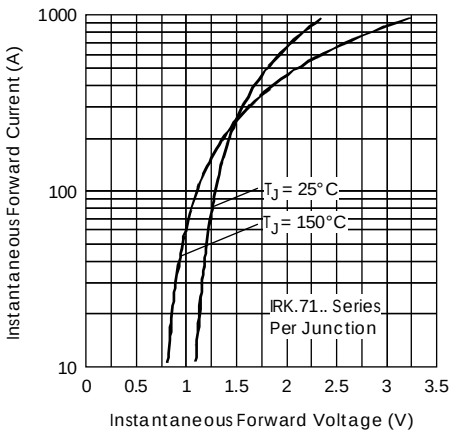


Fig. 20 - Forward Voltage Drop Characteristics

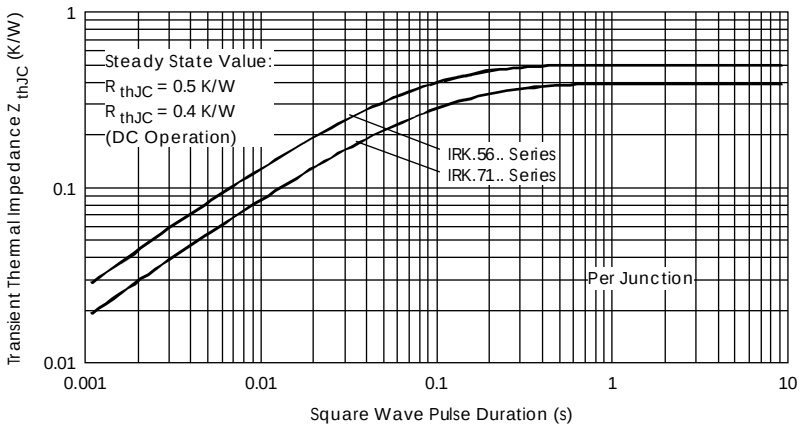


Fig. 21 - Thermal Impedance Z_{thJC} Characteristic