


FAST DIODES

SUPER MAGN-A-pak™ Power Modules

Features

- High power FAST recovery diode series
- High current capability
- 3000 V_{RMS} isolating voltage with non-toxic substrate
- High surge capability
- High voltage ratings up to 2500V
- Industrial standard package
- UL E78996 approved 
- RoHS Compliant

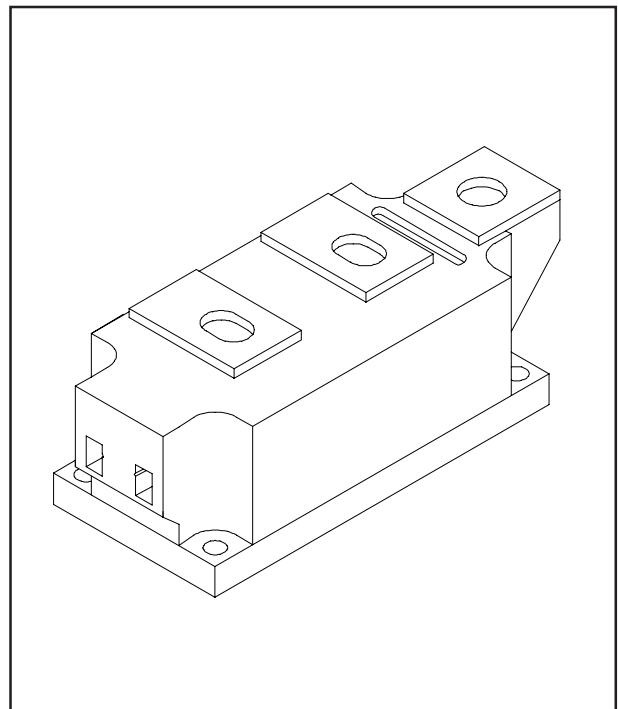
460 A

Typical Applications

- Snubber for large GTO
- Snubber for large IGBT

Major Ratings and Characteristics

Parameters	IRKDL450..S20	Units	
$I_{F(AV)}$	460	A	
@T _C	82	°C	
$I_{F(RMS)}$	720	A	
@T _C	82	°C	
I_{FSM}	@50Hz	13.0	KA
	@60Hz	13.8	KA
I^2t	@50Hz	845	KA ² s
	@60Hz	790	KA ² s
$I^2\sqrt{t}$		8450	KA ² √s
V _{RRM} range	1600 to 2500	V	
t _{rr}	4.0	μs	
T _{STG} range	-40 to 150	°C	
T _J range	-40 to 150	°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. @ T _J max. mA
IRKDL450..S20	16	1600	1700	50
	20	2000	2100	
	25	2500	2600	

Forward Conduction

Parameter	IRKDL450..	Units	Conditions
I _{F(AV)} Maximum average forward current @ Case temperature	460	A	180° conduction, half sine wave
	82	°C	
I _{F(RMS)} Maximum RMS forward current	720	A	180° conduction, half sine wave @ T _C = 82°C
I _{FSM} Maximum peak, one-cycle forward, non-repetitive surge current	13.0	KA	t = 10ms No voltage
	13.8		t = 8.3ms reappplied
	11.1		t = 10ms 100% V _{RRM}
	11.8		t = 8.3ms reappplied
I ² t Maximum I ² t for fusing	845	KA ² s	t = 10ms No voltage
	790		t = 8.3ms reappplied
	616		t = 10ms 100% V _{RRM}
	578		t = 8.3ms reappplied
I ² /t Maximum I ² /t for fusing	8450	KA ² √s	t = 0.1 to 10ms, no voltage reappplied
V _{F(TO)1} Low level value of threshold voltage	1.16	V	(16.7% × π × I _{F(AV)}) < I < π × I _{F(AV)} , T _J = T _J max.
V _{F(TO)2} High level value of threshold voltage	1.62		(I > π × I _{F(AV)}), T _J = T _J max.
r _{f1} Low level value of forward slope resistance	0.68	mΩ	(16.7% × π × I _{F(AV)}) < I < π × I _{F(AV)} , T _J = T _J max.
r _{f2} High level value of forward slope resistance	0.41		(I > π × I _{F(AV)}), T _J = T _J max.
V _{FM} Maximum forward voltage drop	2.20	V	I _{pk} = 1800A, T _J = 25°C, t _p = 10ms sine pulse

Recovery Characteristics

Code	T _J = 25°C typical t _{rr} @ 25% I _{RRM} (μs)	Testconditions			Max. values @ T _J = 150°C			
		I _{pk} Square Pulse (A)	di/dt (A/μs)	V _r (V)	t _{rr} @ 25% I _{RRM} (μs)	Q _{rr} (μC)	I _{rr} (A)	
S20	2.0	1000	100	-50	4.0	400	180	

Blocking

Parameter	IRKDL450..	Units	Conditions
V _{INS} RMS isolation voltage	3000	V	t = 1 s
I _{RRM} Maximum peak reverse and off-state leakage current	50	mA	T _J = T _J max., rated V _{RRM} applied

Thermal and Mechanical Specifications

Parameter	IRKDL450..	Units	Conditions
T _J Max. junction operating temperature range	- 40 to 150	°C	
T _{stg} Max. storage temperature range	- 40 to 150		
R _{thJC} Max. thermal resistance, junction to case	0.065	K/W	Per junction, DC operation
R _{thC-hs} Max. thermal resistance, case to heatsink	0.02	K/W	
T Mounting torque ± 10%SMAP to heatsink busbar to SMAP	6 - 8	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
	12 - 15		
wt Approximate weight	1500	g	
Case style	SUPERMAGN-A-pak		See outline table

ΔR_{thJC} Conduction

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

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.009	0.006	0.015	K/W T _J = T _J max.
120°	0.011	0.011		
90°	0.014	0.014		
60°	0.021	0.021		
		30°	0.037	0.038

Ordering Information Table

Device Code

IRK	D	L	450	-	25	S20
①	②	③	④		⑤	⑥

- 1 - Module type
- 2 - Circuit configuration D = 2 diodes in series
- 3 - Fast recovery
- 4 - Current rating
- 5 - Voltage code: Code x 100 = V_{RRM} (See Voltage Ratings Table)
- 6 - t_{rr} code (see Recovery Characteristics table)

Outline Table

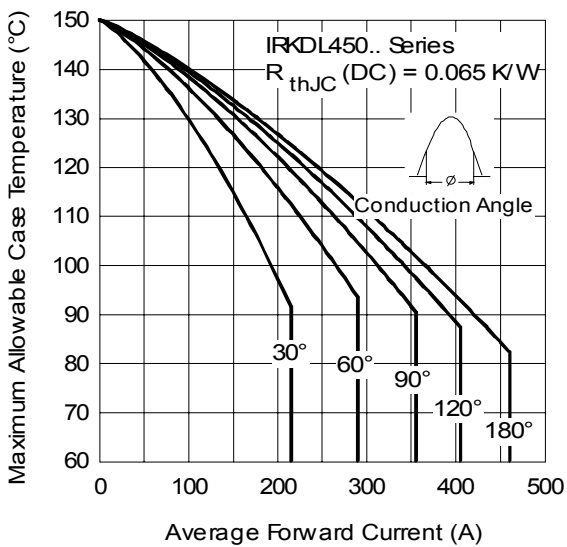
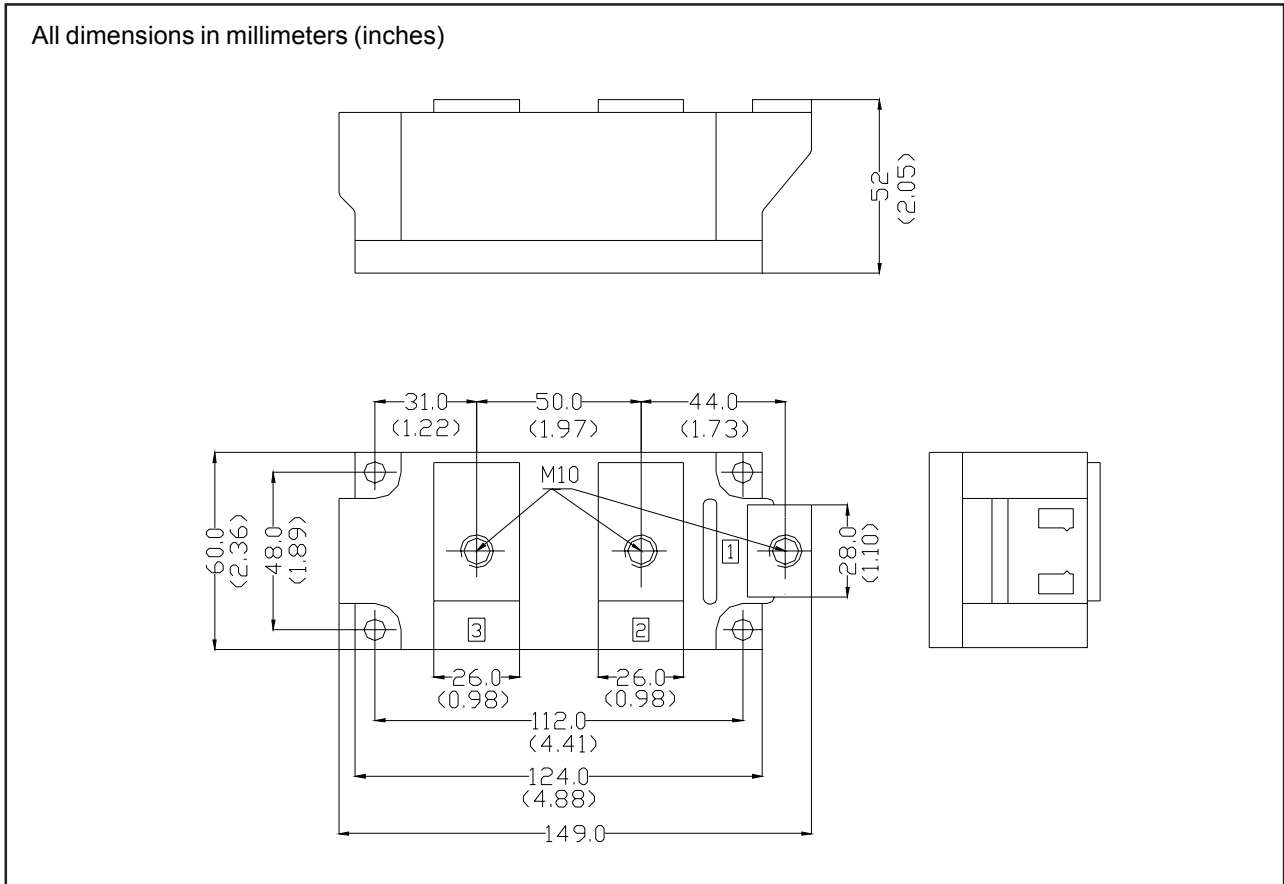


Fig. 1 - Current Ratings Characteristics

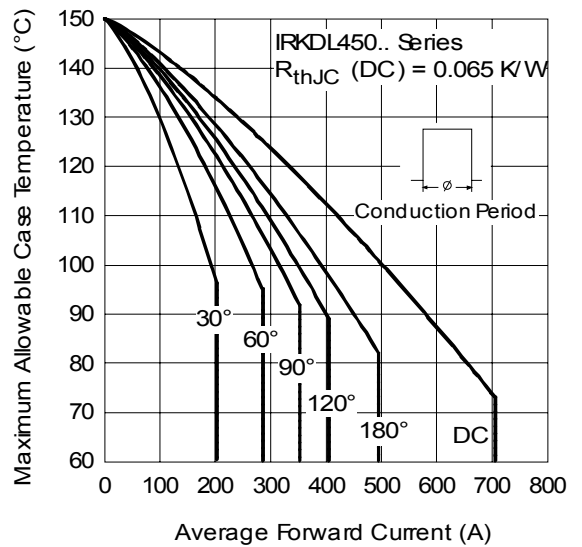


Fig. 2 - Current Ratings Characteristics

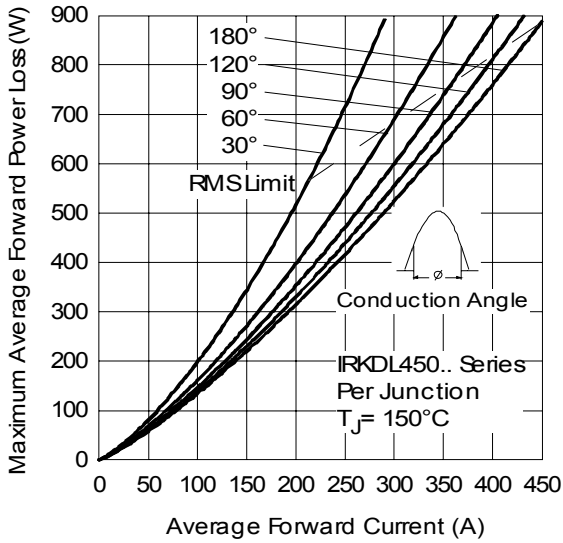


Fig. 3 - Forward Power Loss Characteristics

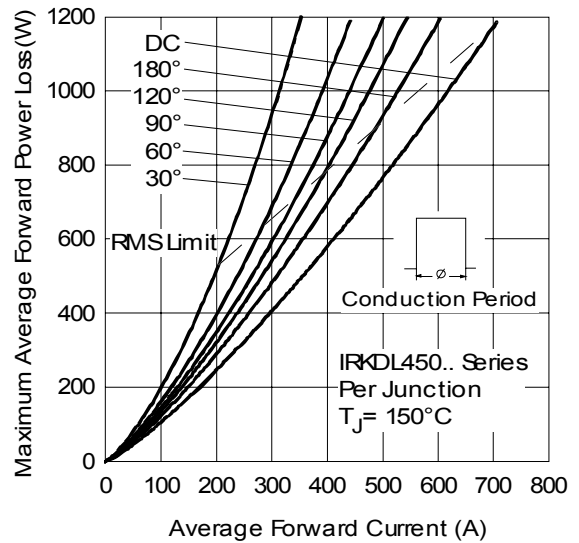


Fig. 4 - Forward Power Loss Characteristics

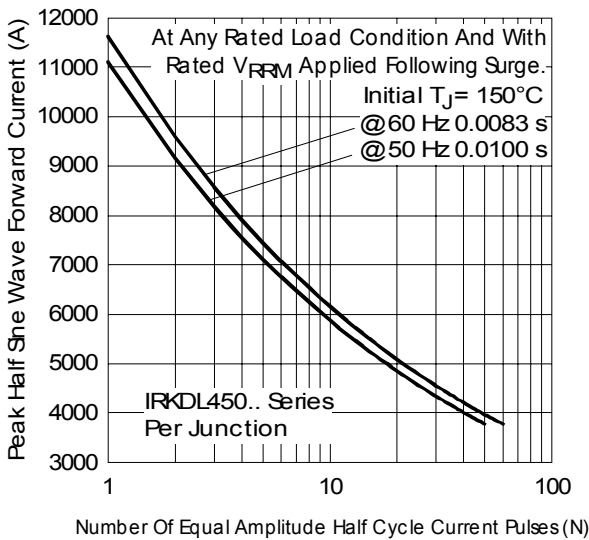


Fig. 5 - Maximum Non-Repetitive Surge Current

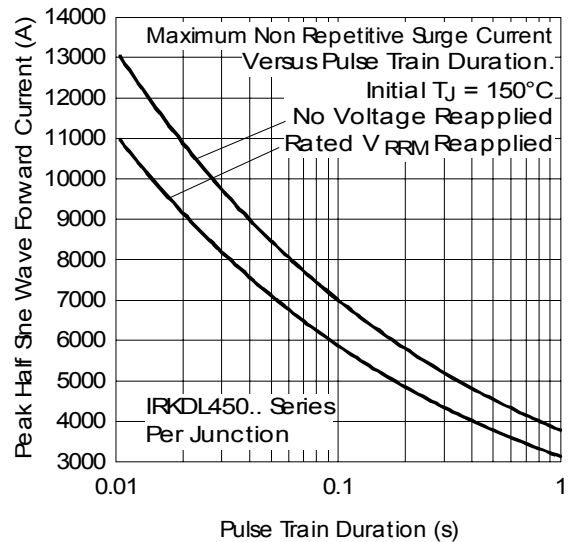


Fig. 6 - Maximum Non-Repetitive Surge Current

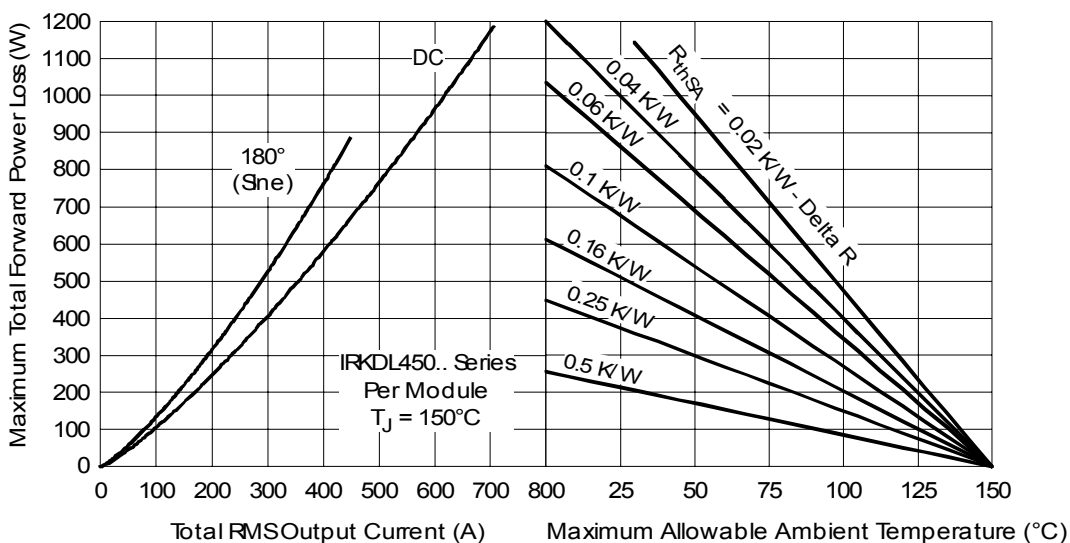


Fig. 7 - Forward Power Loss Characteristics

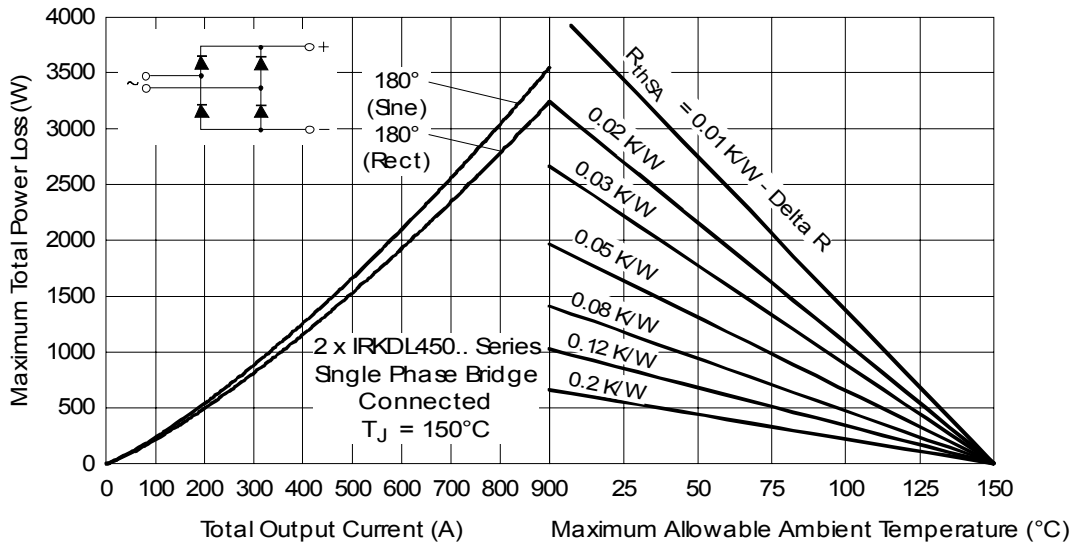


Fig. 8 - Forward Power Loss Characteristics

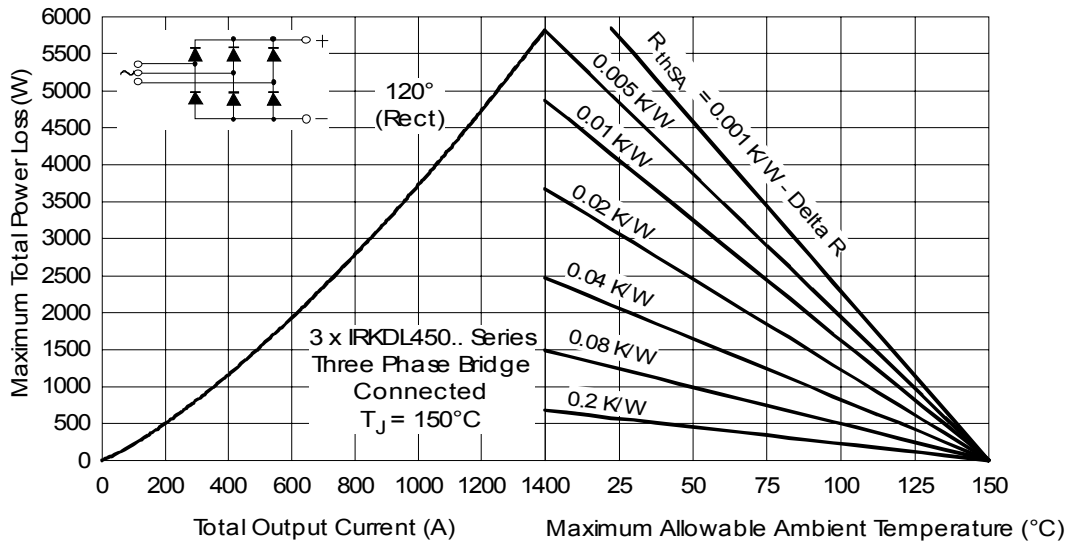


Fig. 9 - Forward Power Loss Characteristics

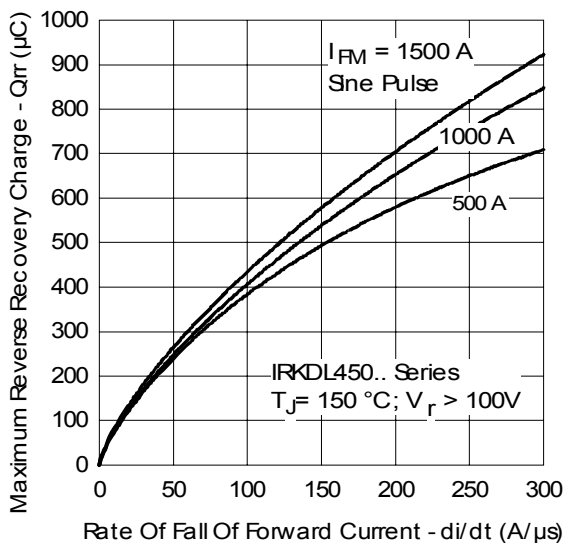


Fig. 10 - Recovery Charge Characteristics

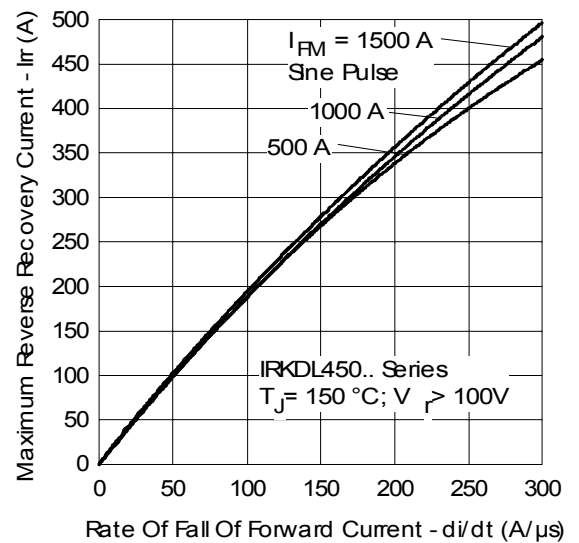


Fig. 11 - Recovery Current Characteristics

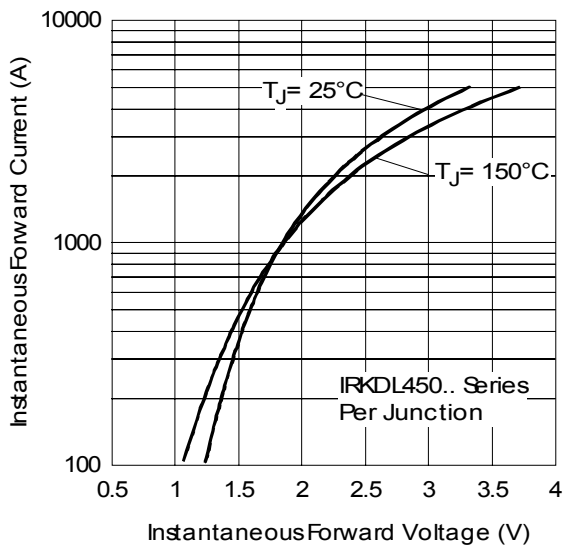


Fig. 12 - Forward Voltage Drop Characteristics

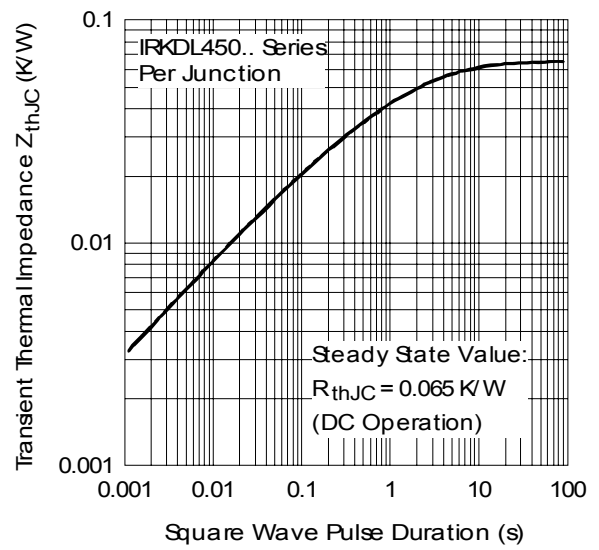


Fig. 13 - Thermal Impedance Z_{thJC} Characteristic

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



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