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International
IOR Rectifier

IRK.L240 SERIES

FAST RECOVERY DIODES **MAGN-A-pak™ Power Modules**

250A

Features

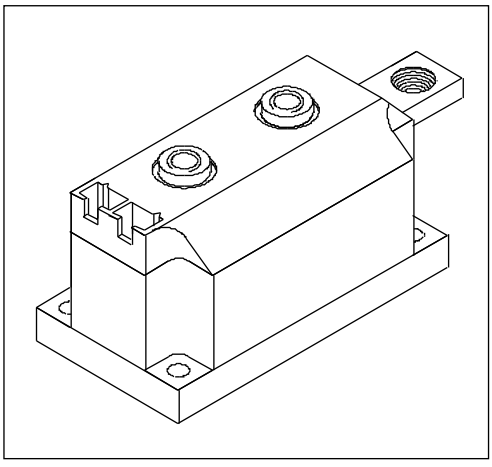
- Fast recovery time characteristics
- Electrically isolated base plate
- Industrial standard package
- Simplified mechanical designs, rapid assembly
- High surge capability
- Large creepage distances
- 3000 V_{RMS} isolating voltage
- UL E78996 approved

Description

The IRK.L240 Series of MAGN-A-paks uses fast recovery power diodes in four basic configurations. The semiconductors are electrically isolated from the metal base, allowing common heatsinks and compact assemblies to be built. Application includes power supplies, battery chargers, welders, motor controls and general industrial current rectification. These modules are intended for those applications where fast recovery characteristics are required.

Major Ratings and Characteristics

Parameters		IRK.L240 S10/S20	IRK.L240 S30	Units
$I_{F(AV)}$		250	240	A
	@ T_C	100	100	°C
$I_{F(RMS)}$		392	377	A
I_{FSM}	@ 50Hz	8000	7500	A
	@ 60Hz	8400	7850	A
I^2t	@ 50Hz	322	280	KA^2s
	@ 60Hz	294	256	KA^2s
$I^2\sqrt{t}$		3220	2800	$KA^2\sqrt{s}$
V_{RRM}		up to 2500		V
T_J	range	-40 to 150		°C



ELECTRICAL SPECIFICATIONS

Voltage Ratings

Typenumber	Voltage Code	t_{rr} Code	V_{RRM}, maximum repetitive peak reverse voltage V	V_{RSM}, maximum non-repetitive peak reverse voltage V	I_{RRM} max. @ 150°C mA
IRK.L240	06	S10	600	700	50
	10	S10	1000	1100	
	12	S20	1200	1300	
	14	S20	1400	1500	
	20	S30	2000	2100	
	25	S30	2500	2600	

Forward Conduction

	Parameter	IRK.L240 S10/S20	IRK.L240 S30	Units	Conditions		
$I_{F(AV)}$	Max. average forward current	250	240	A	180° conduction, half sine wave		
	@ Case temperature	100	100	°C			
$I_{F(RMS)}$	Max. RMS forward current	392	377	A	as AC switch		
I_{FSM}	Max. peak, one-cycle forward, non-repetitive surge current	8000	7500	A	t = 10ms	No voltage reapplied	Sinusoidal half wave, Initial $T_J = T_J$ max
		8400	7850		t = 8.3ms		
		6750	6300		t = 10ms	100% V_{RRM} reapplied	
		7100	6600		t = 8.3ms		
I^2t	Maximum I^2t for fusing	322	280	KA^2s	t = 10ms	No voltage reapplied	
		294	256		t = 8.3ms		
		228	198		t = 10ms	100% V_{RRM} reapplied	
		208	181		t = 8.3ms		
$I^2\sqrt{t}$	Maximum $I^2\sqrt{t}$ for fusing	3220	2800	$KA^2\sqrt{s}$	t = 0.1 to 10ms, no voltage reapplied		
$V_{F(TO)1}$	Low level value of threshold voltage	0.98	0.98	V	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}) T_J = T_J$ max		
$V_{F(TO)2}$	High level value of threshold voltage	1.31	1.31	V	$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
r_{f1}	Low level value of forward slope resistance	0.75	0.97	mΩ	$(16.7\% \times \pi \times I_{F(AV)} < I < \pi \times I_{F(AV)}) T_J = T_J$ max		
r_{f2}	High level value of forward slope resistance	0.41	0.60	mΩ	$(I > \pi \times I_{F(AV)})$, $T_J = T_J$ max.		
V_{FM}	Max. forward voltage drop	1.57	1.75	V	I_{FM} = 800, T_J = 150 °C tp = 10 ms Av. power = $V_{F(TO)} \times I_{F(AV)} + r_f \times (I_{F(RMS)})^2$		

Blocking

I_{RRM}	Max. peak reverse leakage current	50	mA	T_J = 150 °C, leakage current
V_{INS}	RMS isolation voltage	3000	V	50Hz, circuit to base, all terminals shorted, 25°C, t = 1s

Thermal and Mechanical Specifications

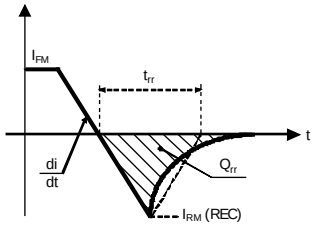
T_J	Max. junction operating temperature	-40 to 150	°C	
T_{stg}	Max. storage temperature range	-40 to 150	°C	
R_{thJ-C}	Max. internal thermal resistance junction to case	0.125	K/W	Per junction, DC operation
R_{thC-S}	Thermal resistance, case to heatsink	0.02	K/W	Mounting surface flat, smooth and greased Per module
T	Mounting torque ±10% MAP to heatsink	4 to 6	Nm	A mounting compound is recommended and the torq should be rechecked after a period of about 3 hours to allow for the spread of the compound
	Busbar to MAP	8 to 10	Nm	
wt	Approximate weight	850(30)	g(oz)	
	Case style	MAGN-A-pak		

ΔR Conduction (per Junction)

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

Conduction angle	Sinusoidal conduction	Rectangular conduction	Units	Conditions
180°	0.008	0.007	K/W	$T_J = T_J$ max.
120°	0.010	0.011	K/W	
90°	0.013	0.015	K/W	
60°	0.019	0.020	K/W	
30°	0.032	0.033	K/W	

Recovery Characteristics

Code	Test conditions			Typ. values @ T_J = 150°C		
	I_{pk} (A)	di/dt (A/µs)	V_r (V)	Q_{rr} (µC)	I_{rr} (A)	
S10	500	100	50	135	100	
S20	"	"	"	250	145	
S30	"	"	"	360	200	

Ordering Information Table

Device Code

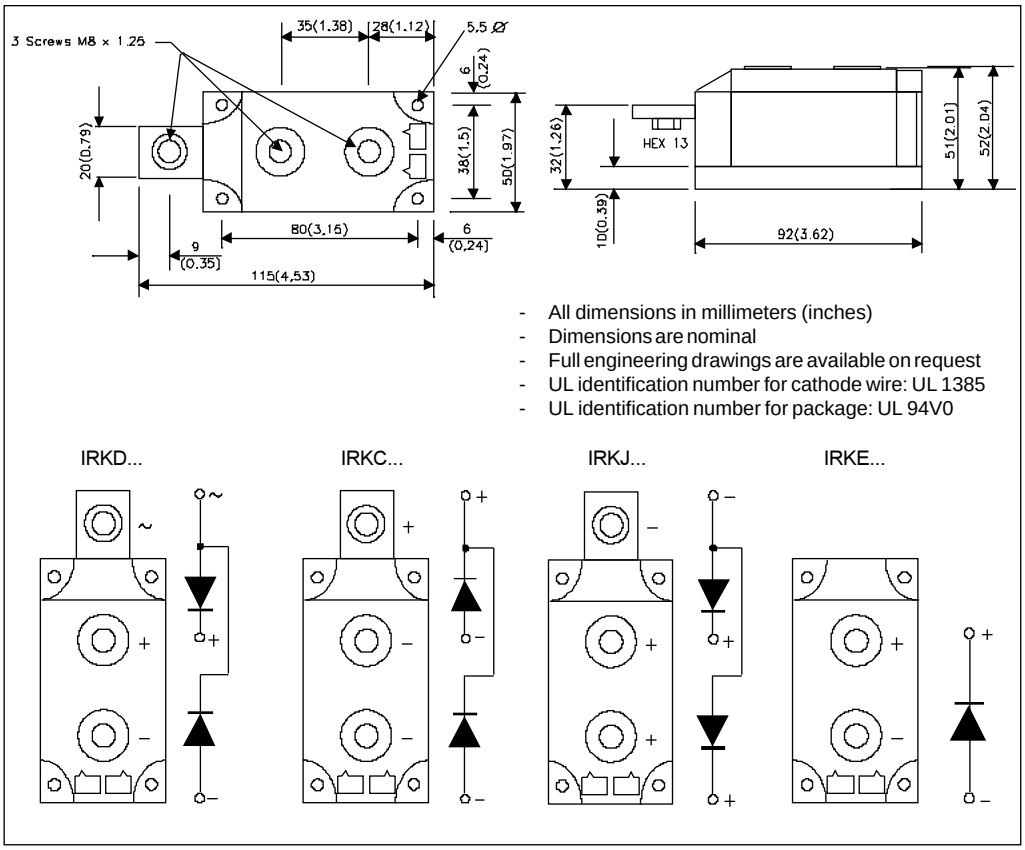
IRK	D	L	240	-	25	S30	N
1	2	3	4		5	6	7

1 - Module type
2 - Circuit configuration (See Outline Table)
3 - L = Fast recovery diode
4 - Current rating
5 - Voltage code: Code x 100 = VRRM (See Voltage Ratings Table)
6 - trr code (See Recovery Characteristics Table)

S10 = 1000 ns
S20 = 2000 ns
S30 = 3000 ns

7 - None = Standard devices
N = Aluminum Nitrade substrate

Outline Table



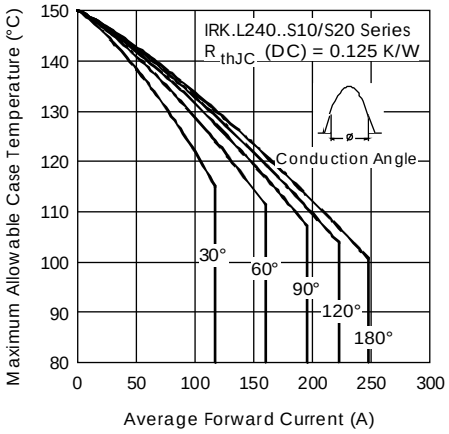


Fig. 1 - Current Ratings Characteristics

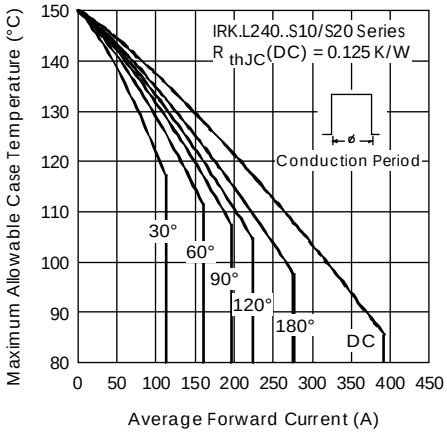


Fig. 2 - Current Ratings Characteristics

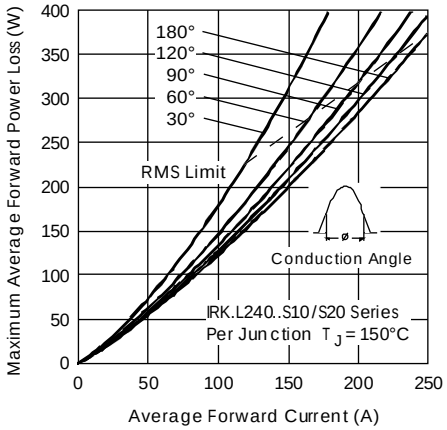


Fig.3-ForwardPowerLossCharacteristics

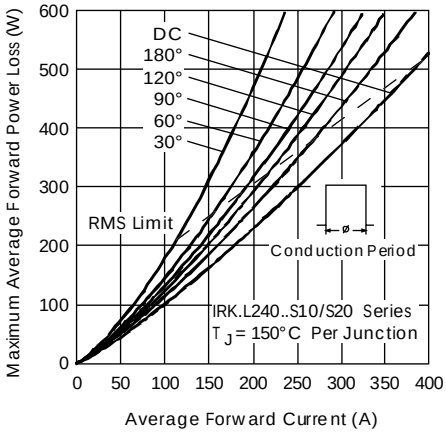


Fig.4-ForwardPowerLossCharacteristics

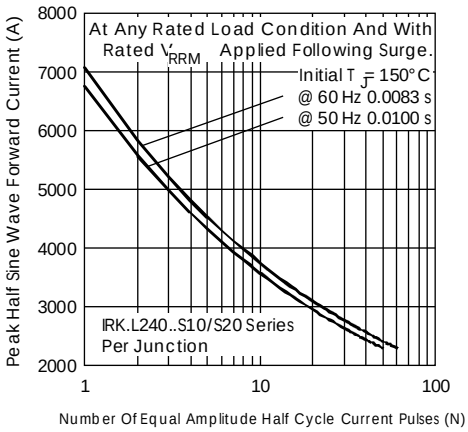


Fig.5-MaximumNon-RepetitiveSurgeCurrent

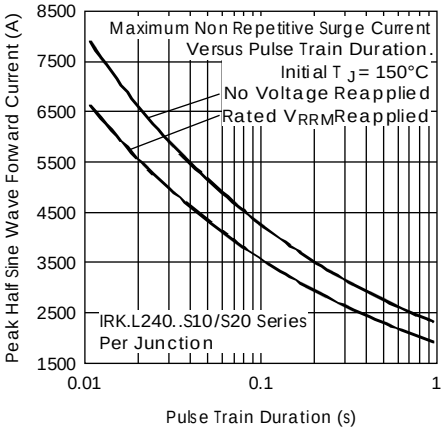


Fig.6-MaximumNon-RepetitiveSurgeCurrent

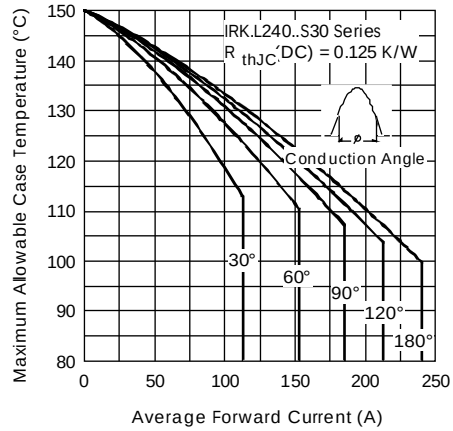


Fig.7-CurrentRatingsCharacteristics

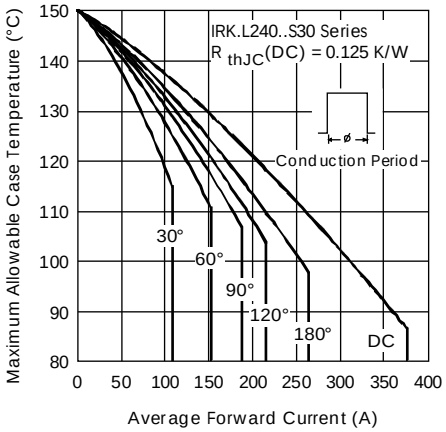


Fig.8-CurrentRatingsCharacteristics

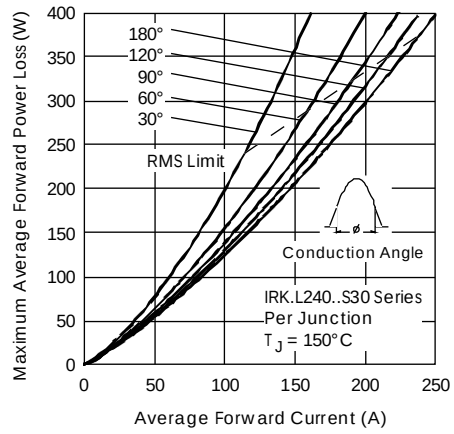


Fig.9-ForwardPowerLossCharacteristics

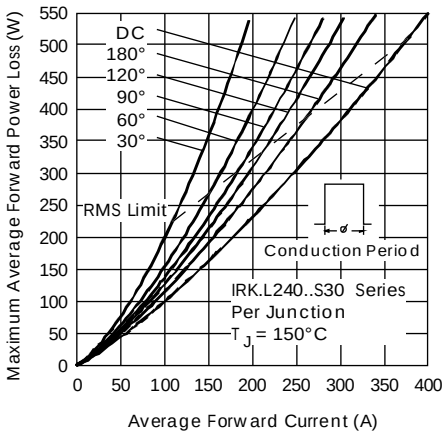


Fig.10-ForwardPowerLossCharacteristics

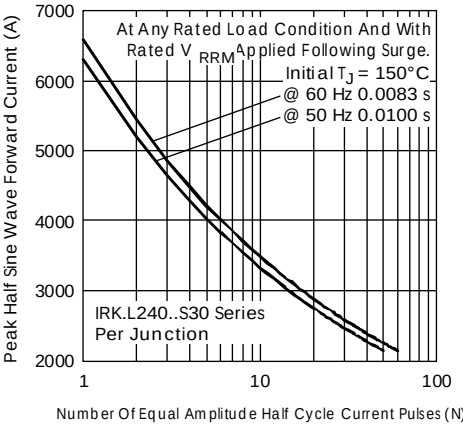


Fig.11-MaximumNon-RepetitiveSurgeCurrent

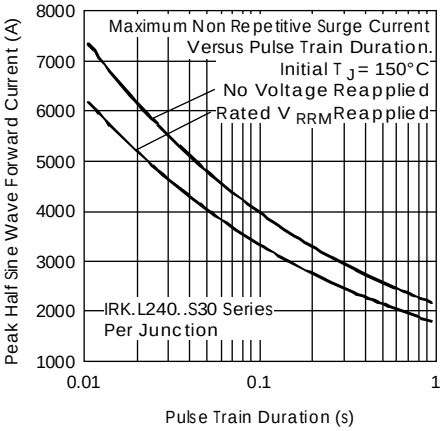


Fig.12-MaximumNon-RepetitiveSurgeCurrent

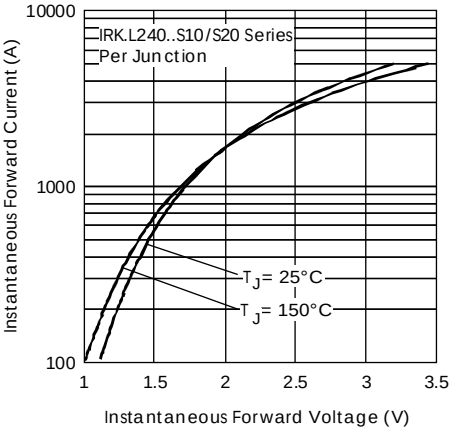


Fig.13-ForwardVoltageDropCharacteristics

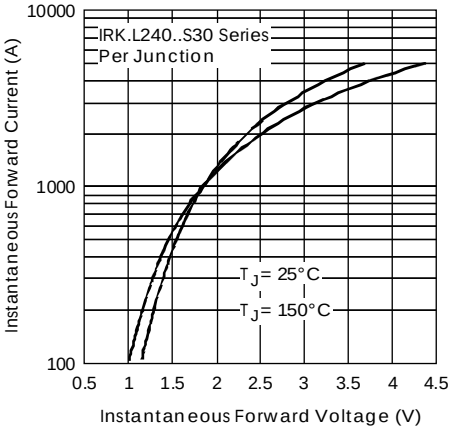


Fig.14-ForwardVoltageDropCharacteristics

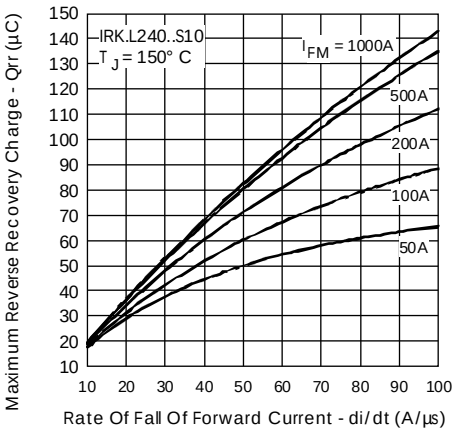


Fig.15-ReverseRecoveryChargeCharacteristics

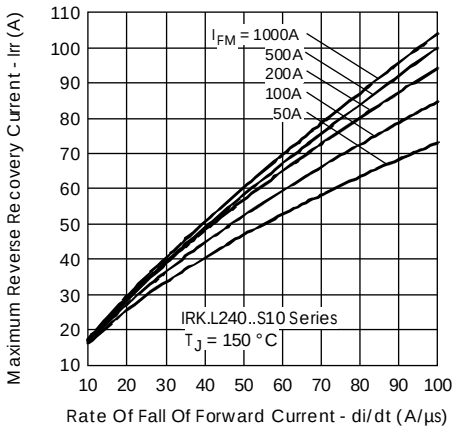


Fig.16-ReverseRecoveryCurrentCharacteristics

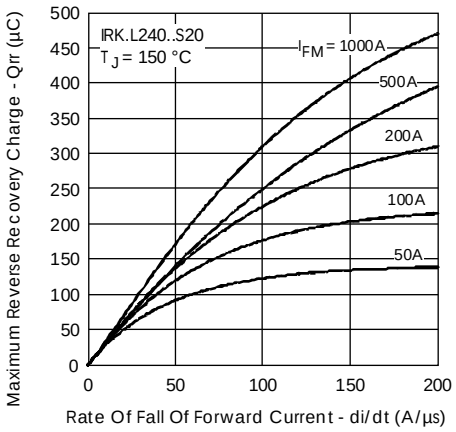


Fig.17-ReverseRecoveryChargeCharacteristics

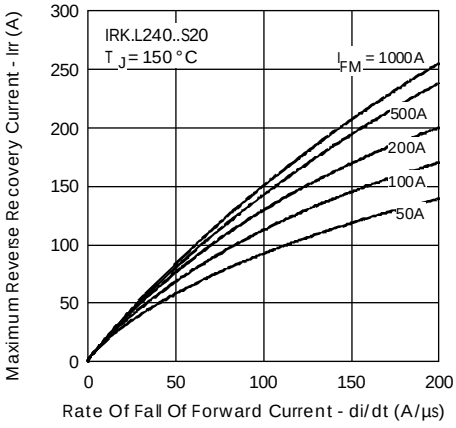


Fig.18-ReverseRecoveryCurrentCharacteristics

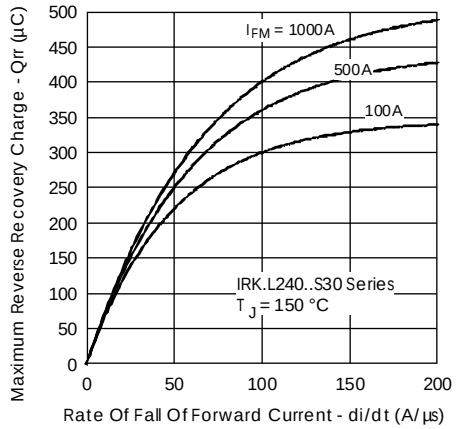


Fig.19-ReverseRecoveryChargeCharacteristics

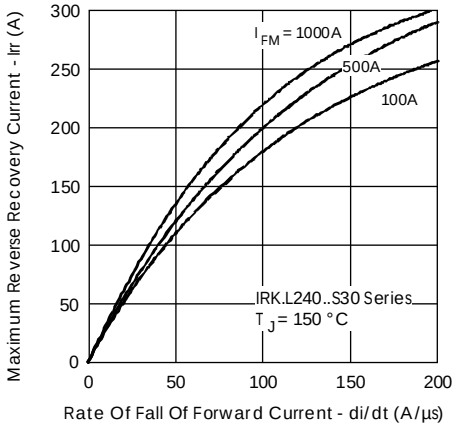


Fig.20-ReverseRecoveryCurrentCharacteristics

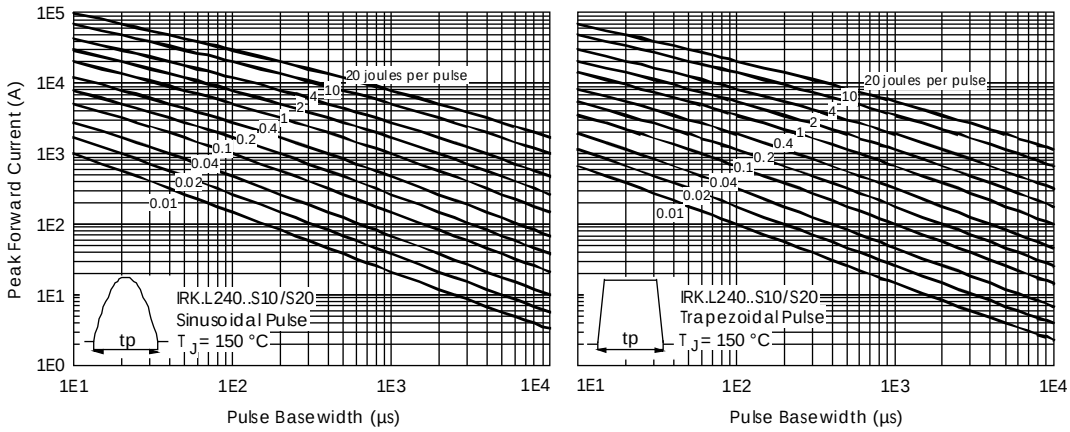


Fig.21-MaximumForwardEnergyPowerLossCharacteristics

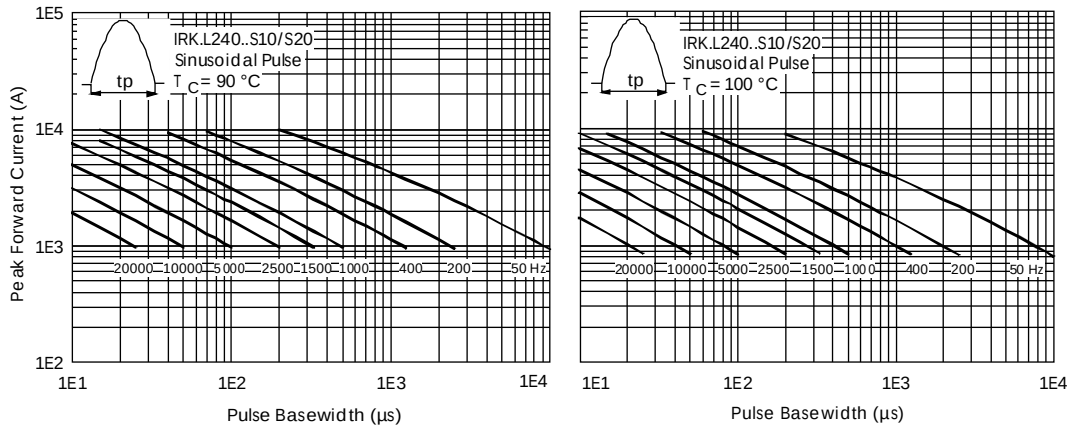


Fig. 22 - Frequency Characteristics

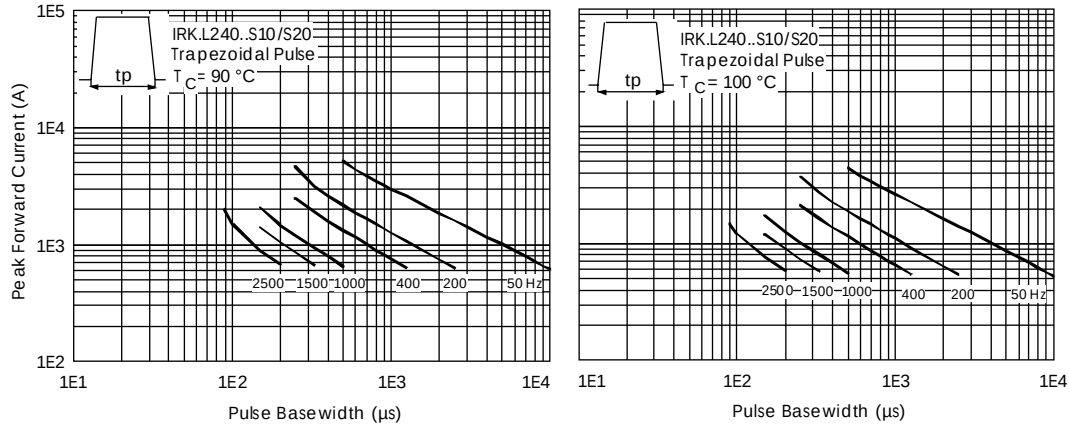


Fig. 23 - Frequency Characteristics

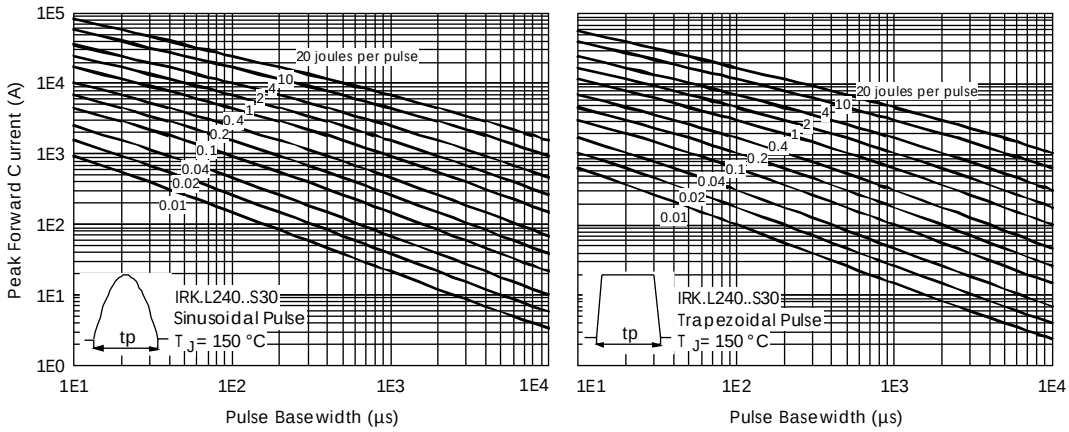


Fig. 24 - Maximum Forward Energy Power Loss Characteristics

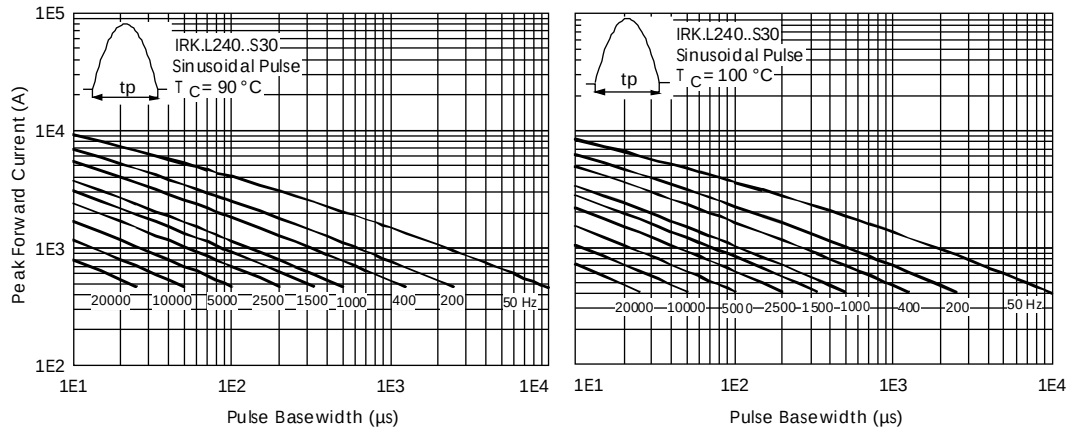


Fig.25-FrequencyCharacteristics

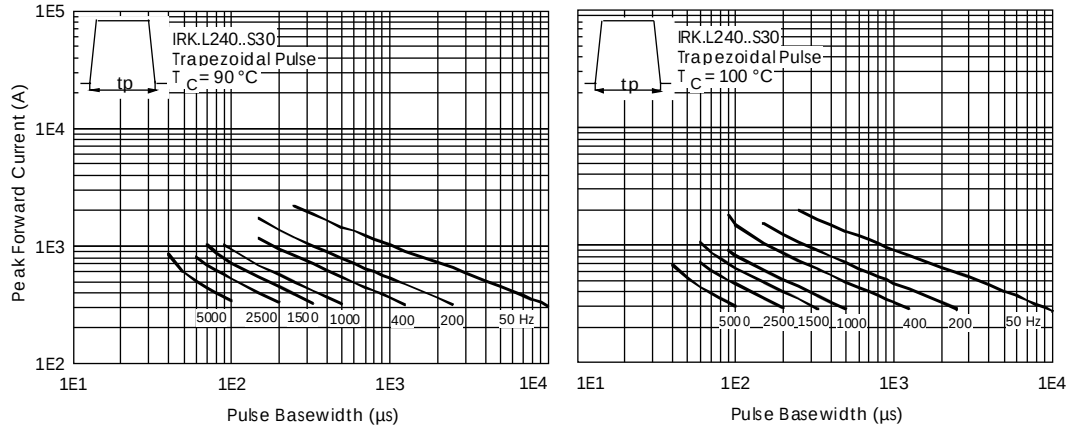


Fig.26-FrequencyCharacteristics

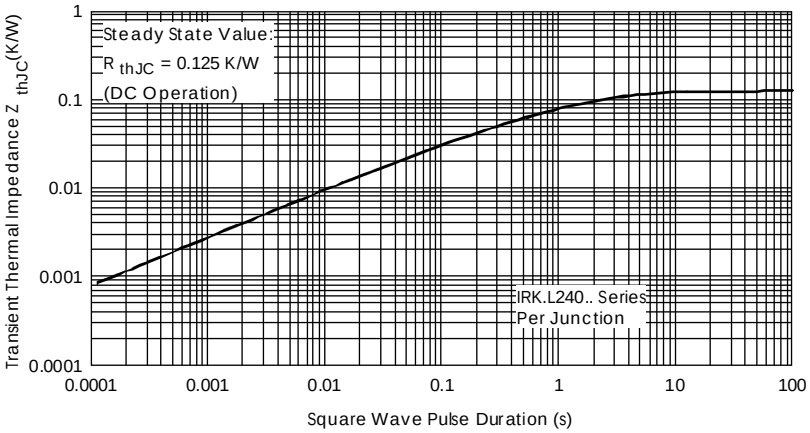


Fig. 27 - Thermal Impedance Z_{thJC} Characteristics