HFA45HI60C

PD-20380D

Ultrafast, Soft Recovery Diode
Thru-Hole (TO-259AA)
600V, 45A

Features

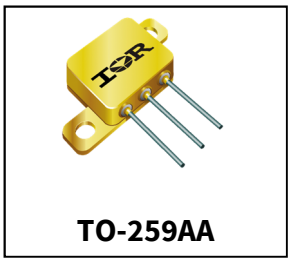
- Dual common cathode configuration
- Reduced RFI and EMI
- Reduced snubbing
- Extensive characterization of recovery parameters
- Hermetic package
- Ceramic eyelets

Product Summary

- **V_R (per leg):** 600V
- **V_F:** 1.47V
- **Q_{rr} :** 270nC
- **$di_{(rec)M}/dt$:** 400A/µs

Potential Applications

- DC-DC converter
- Motor drives



TO-259AA

Product Validation

Qualified according to MIL-PRF-19500 for space applications

Description

These ultrafast, soft recovery diodes are optimized to reduce losses and EMI/RFI in high frequency power conditioning systems. An extensive characterization of the recovery behavior for different values of current, temperature and di/dt simplifies the calculations of losses in the operating conditions. The softness of the recovery eliminates the need for a snubber in most applications. These devices are ideally suited for power converters, motor drives and other applications where switching losses are significant portion of the total losses.

Ordering Information

Table 1 Ordering options

Part number	Package	Screening Level
HFA45HI60C	TO-259AA	COTS
HFA45HI60CSCV	TO-259AA	JANTXV-equivalent
HFA45HI60CSCX	TO-259AA	JANTX-equivalent
HFA45HI60CSCS	TO-259AA	S-level

Table of contents

1 Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_R	Cathode to anode voltage (per leg)	600	V
$I_{F(AV)}$	Continuous forward current, T_C = 80°C [1]	45	A
I_{FSM}	Single pulse forward current, T_C = 25°C (per leg) [2]	225	A
P_D @ T_C = 25°C	Maximum power dissipation	104	W
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	°C
Wt	Weight	10.9 (Typical)	g

[1] DC = 50% rect. wave

[2] ½ sine wave, 60 Hz, Pulse width = 8.33 ms

2 Device Characteristics

2.1 Electrical Characteristics

Table 3 Electrical Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	600	—	—	V	I_R = 100µA
V_F	Forward Voltage Drop (Per Leg) See Fig. 1	—	—	1.37	V	I_F = 22A, T_J = -55°C
		—	—	1.47	V	I_F = 22A, T_J = 25°C
		—	—	1.81	V	I_F = 45A, T_J = 25°C
		—	—	1.37	V	I_F = 22A, T_J = 125°C
I_R	Reverse Leakage Current (Per Leg) See Fig. 2	—	—	10	µA	V_R = V_R Rated
		—	—	1.0	mA	V_R = 480V, T_J = 125°C
C_J	Junction Capacitance (Per Leg) See Fig. 3	—	—	65	pF	V_R = 200V
L_S	Series Inductance (Per Leg)	—	8.7	—	nH	Measured from anode lead to cathode lead , 6mm (0.025 in) from package

2.2 Dynamic Recovery Characteristics

Table 4 Dynamic Recovery Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions	
t_{rr}	Reverse Recovery Time (Per Leg)	—	—	97	ns	I_F = 22A, V_R = 200V, d_{if}/dt = 200A/µs	
t_{rr1}	Reverse Recovery Time (Per Leg) See Fig. 5	—	97	—	ns	T_J = 25°C	I_F = 45A V_R = 480V d_{if}/dt = 200 A/ µs
t_{rr2}		—	194	—		T_J = 125°C	
I_{RRM1}	Peak Recovery Current (Per Leg) See Fig. 6	—	7.5	—	A	T_J = 25°C	
I_{RRM2}		—	12	—		T_J = 125°C	
Q_{rr1}	Reverse Recovery Charge (Per Leg) See Fig. 7	—	270	—	nC	T_J = 25°C	
Q_{rr2}		—	1210	—		T_J = 125°C	
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During t_b (Per Leg) See Fig. 8	—	400	—	A/ µs	T_J = 25°C	
$di_{(rec)M}/dt_2$		—	100	—		T_J = 125°C	

2.3 Thermal-Mechanical Characteristics

Table 5 Thermal-Mechanical Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Junction to Case, Single Leg Conducting	—	1.2	°C/W

3 Electrical Characteristics Curves

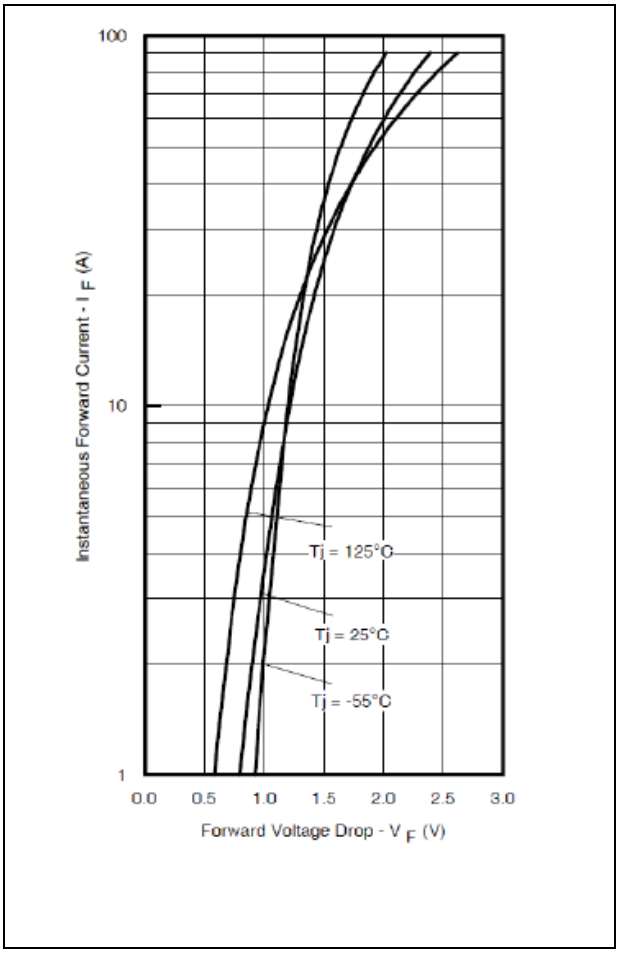


Figure 1 Maximum Forward Voltage Drop Characteristics (Per Leg)

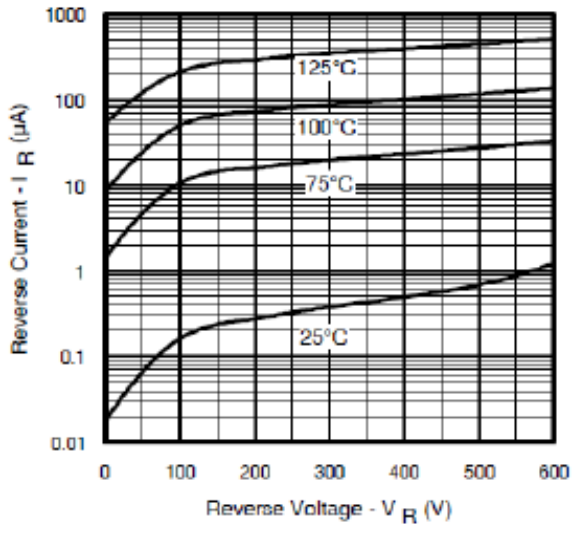


Figure 2 Typical Values of Reverse Current Vs. Reverse Voltage (Per Leg)

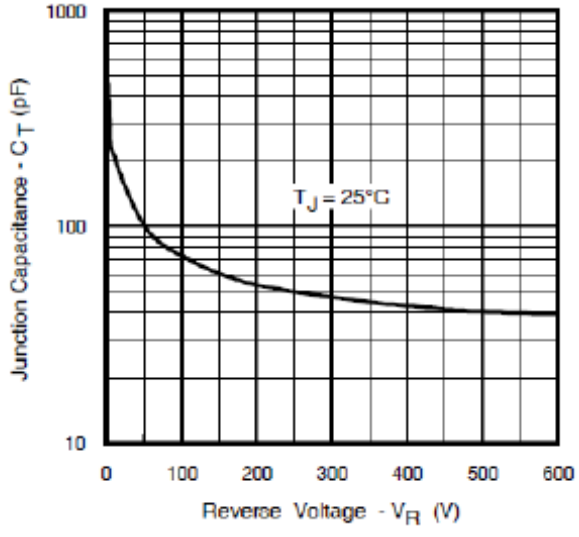


Figure 3 Typical Junction Capacitance Vs. Reverse Voltage (Per Leg)

Electrical Characteristics Curves

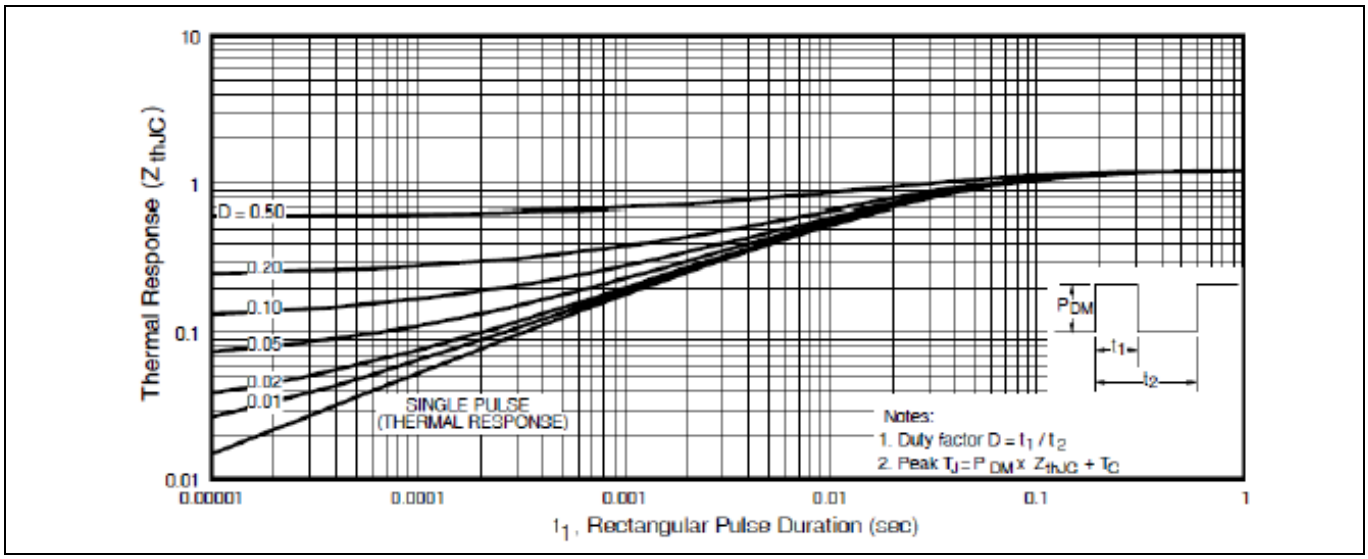


Figure 4 Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

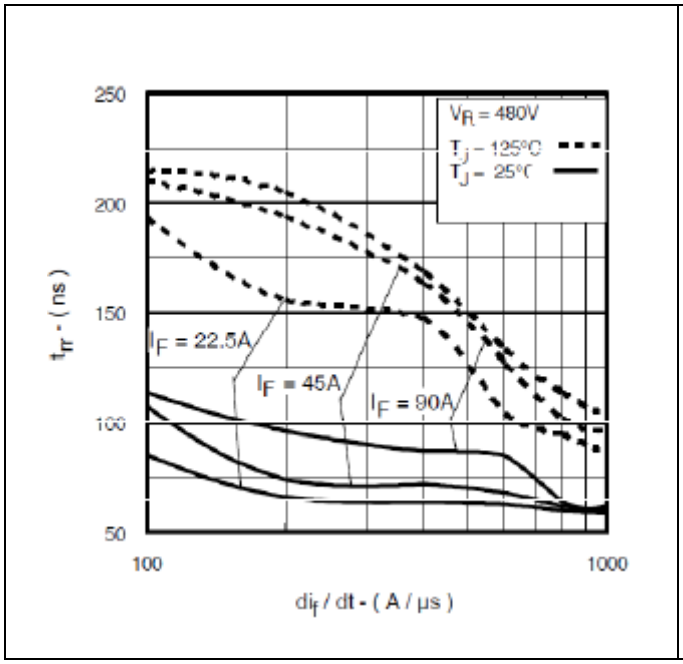


Figure 5 Typical Reverse Recovery Vs. di_f/dt (Per Leg)

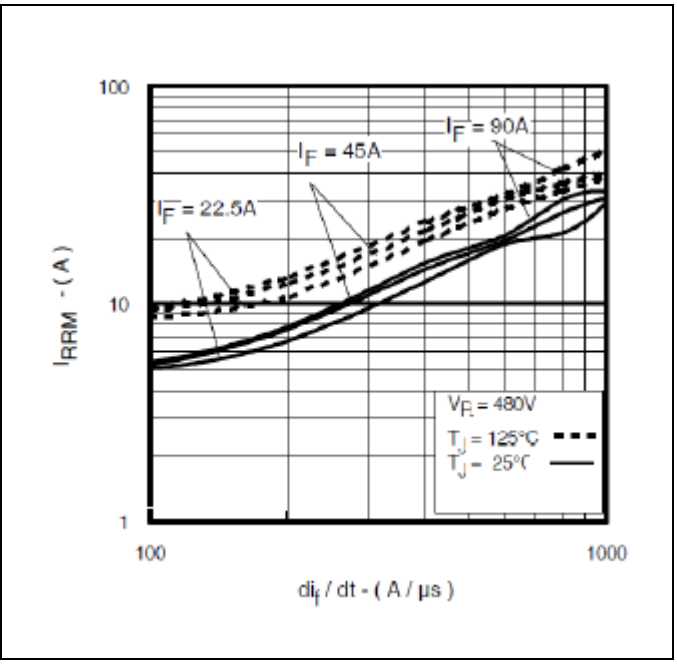


Figure 6 Typical Recovery Current Vs. di_f/dt (Per Leg)

Electrical Characteristics Curves

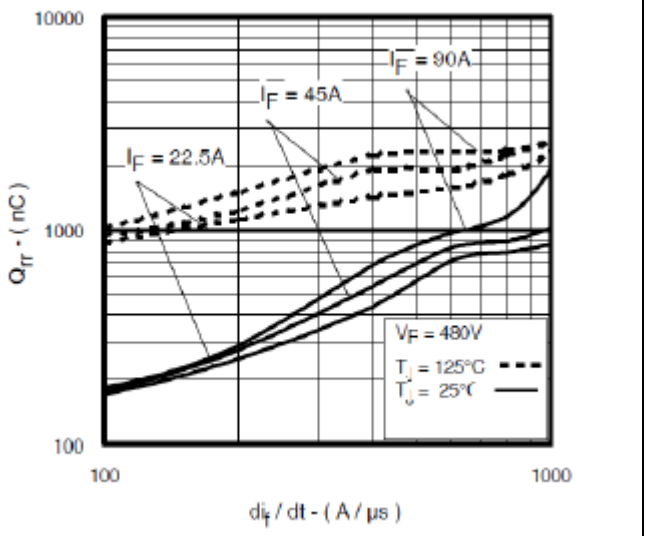


Figure 7 Typical Stored Charge Vs. di_f/dt (Per Leg)

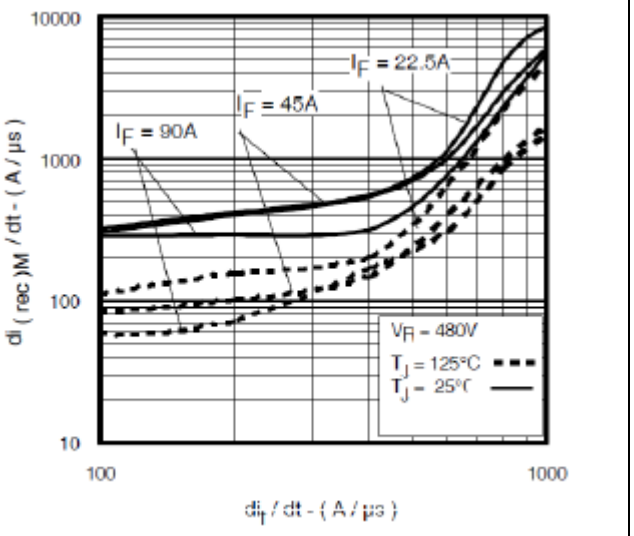


Figure 8 Typical $di_{(rec)M}/dt$ Vs. di_f/dt (Per Leg)

4 Test Circuit

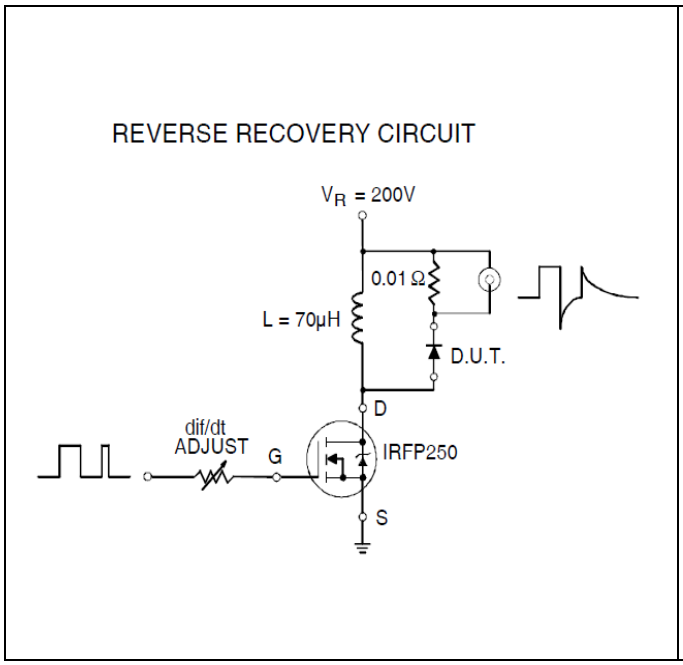


Figure 9 Reverse Recovery Parameter Test Circuit

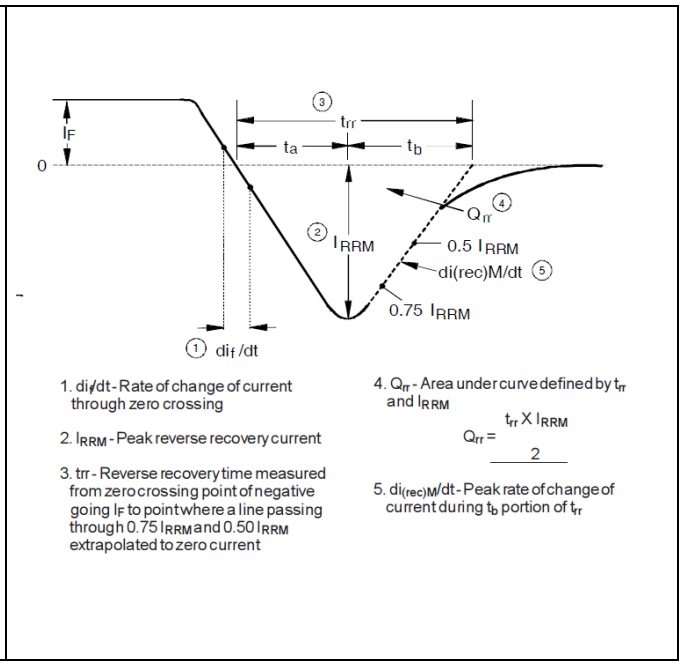
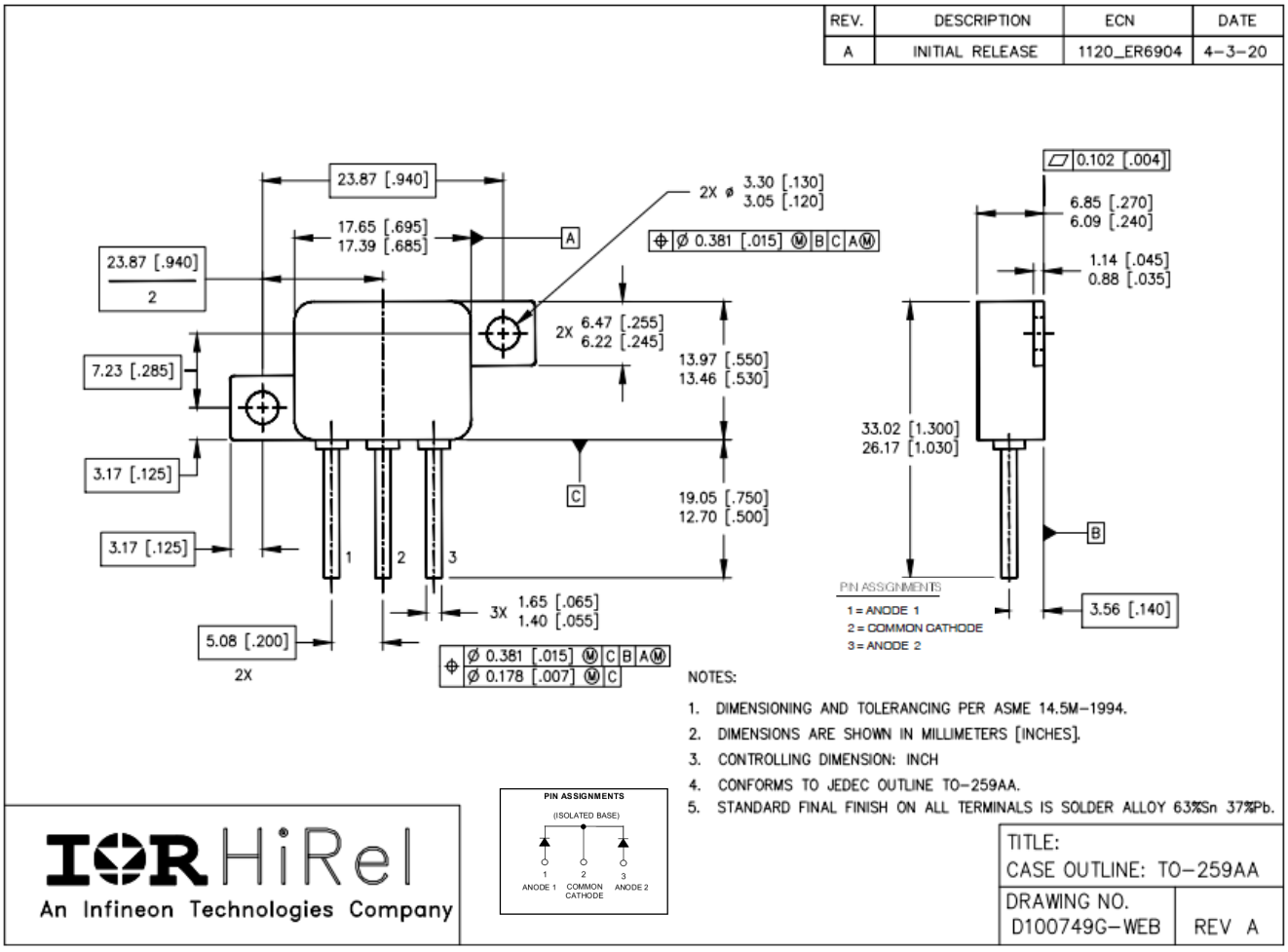


Figure 10 Reverse Recovery Waveform and Definitions

5 Package Outline

Note: For the most updated package outline, please see the website: TO-259AA



Revision history

Document version	Date of release	Description of changes
	04/17/2001	Final datasheet (PD-20368)
Rev A	03/07/2013	Updated per ECN-1120_00911
Rev B	06/02/2022	Updated per ECN-1120-08972

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Edition 2022-06-02

Published by

International Rectifier HiRel Products, Inc.

An Infineon Technologies company

El Segundo, California 90245 USA

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Document reference

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