

HFB60HF20

PD-94067F

Ultrafast, Soft Recovery Diode Surface Mount (SMD-1) 200V, 60A

Features

- Dual common cathode configuration
- Reduced RFI and EMI
- Reduced snubbing
- Extensive characterization of recovery parameters
- Hermetic package
- Surface mount
- ESD Rating: Class 3B per MIL-STD-750, Method 1020

Product Summary

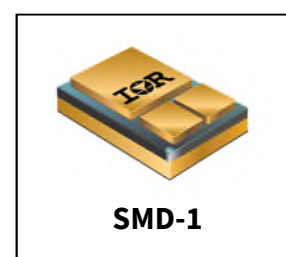
- V_R : 200V
- V_F : 1.08V
- t_{rr} : 50ns
- $di_{(rec)M}/dt$: 590A/ μ s

Potential Applications

- DC-DC converter
- Motor drives

Product Validation

Qualified according to MIL-PRF-19500 for space applications



Description

HEXFRED™ 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
HFB60HF20	SMD-1	COTS
HFB60HF20SCV	SMD-1	JANTXV-equivalent
HFB60HF20SCS	SMD-1	S-level

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FRED Ultrafast, Soft Recovery Diode

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Absolute Maximum Ratings

1 Absolute Maximum Ratings

Table 2 Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_R	Cathode to anode voltage	200	V
$I_{F(AV)}$	Continuous forward current, $T_C = 55^\circ\text{C}$ ¹	60	A
I_{FSM}	Single pulse forward current, $T_C = 25^\circ\text{C}$ ²	500	A
$P_D @ T_C = 25^\circ\text{C}$	Maximum power dissipation	70	W
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
Wt	Weight	2.6 (Typical)	g

¹ DC = 50% rectangle wave² 1/2 sine wave, 60 Hz, Pulse width = 8.33 ms

Device Characteristics

2 Device Characteristics

2.1 Electrical Characteristics

Table 3 Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{BR}	Cathode Anode Breakdown Voltage	200	—	—	V	$I_R = 100\mu\text{A}$
V_F	Max Forward Voltage Drop See Fig. 1	—	—	1.15	V	$I_F = 30\text{A}$, $T_J = -55^\circ\text{C}$
		—	—	0.97	V	$I_F = 30\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	1.08	V	$I_F = 60\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	1.30	V	$I_F = 120\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	0.8	V	$I_F = 30\text{A}$, $T_J = 125^\circ\text{C}$
I_R	Max Reverse Leakage Current See Fig. 2	—	—	50	μA	$V_R = V_R$ Rated
		—	—	1.0	mA	$V_R = V_R$ Rated, $T_J = 125^\circ\text{C}$
C_J	Junction Capacitance See Fig. 3	—	—	200	pF	$V_R = 200\text{V}$
L_S	Series Inductance	—	5.9	—	nH	Measured from center of cathode pad to center of anode pad

2.2 Dynamic Recovery Characteristics

Table 4 Dynamic Recovery Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
t_{rr1}	Reverse Recovery Time See Fig. 5	—	45	50	ns	$T_J = 25^\circ\text{C}$
t_{rr2}		—	71	—		$T_J = 125^\circ\text{C}$
I_{RRM1}	Peak Recovery Current See Fig. 6	—	5.3	—	A	$T_J = 25^\circ\text{C}$
I_{RRM2}		—	10.3	—		$T_J = 125^\circ\text{C}$
Q_{rr1}	Reverse Recovery Charge See Fig. 7	—	120	—	nC	$T_J = 25^\circ\text{C}$
Q_{rr2}		—	366	—		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During t_b See Fig. 8	—	590	—	A/ μs	$T_J = 25^\circ\text{C}$
$di_{(rec)M}/dt_2$		—	1290	—		$T_J = 125^\circ\text{C}$

2.3 Thermal-Mechanical Characteristics

Table 5 Thermal-Mechanical Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$	Junction to Case, See Fig. 4	—	1.76	$^\circ\text{C}/\text{W}$

3 Electrical Characteristics Curves

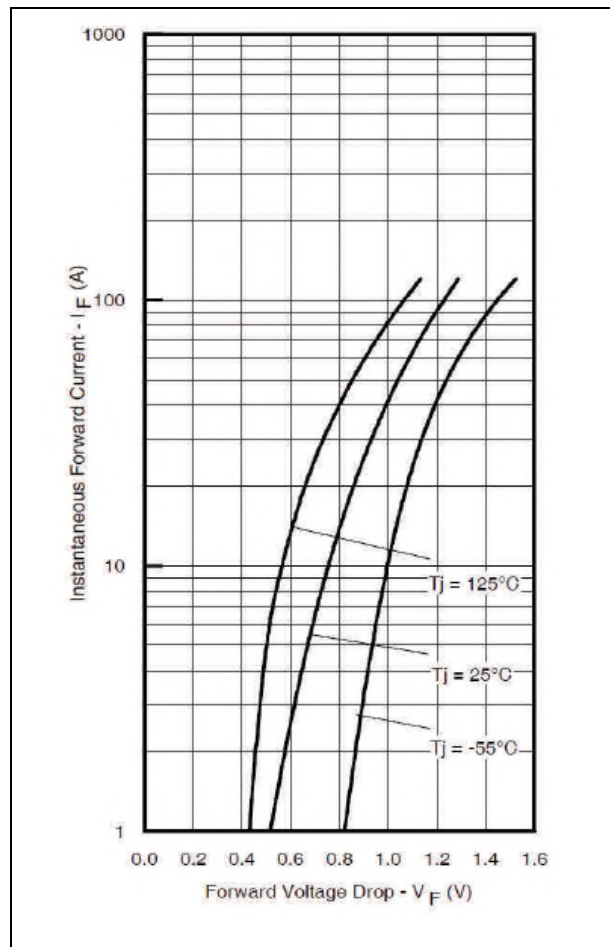


Figure 1 Maximum Forward Voltage Drop Characteristics

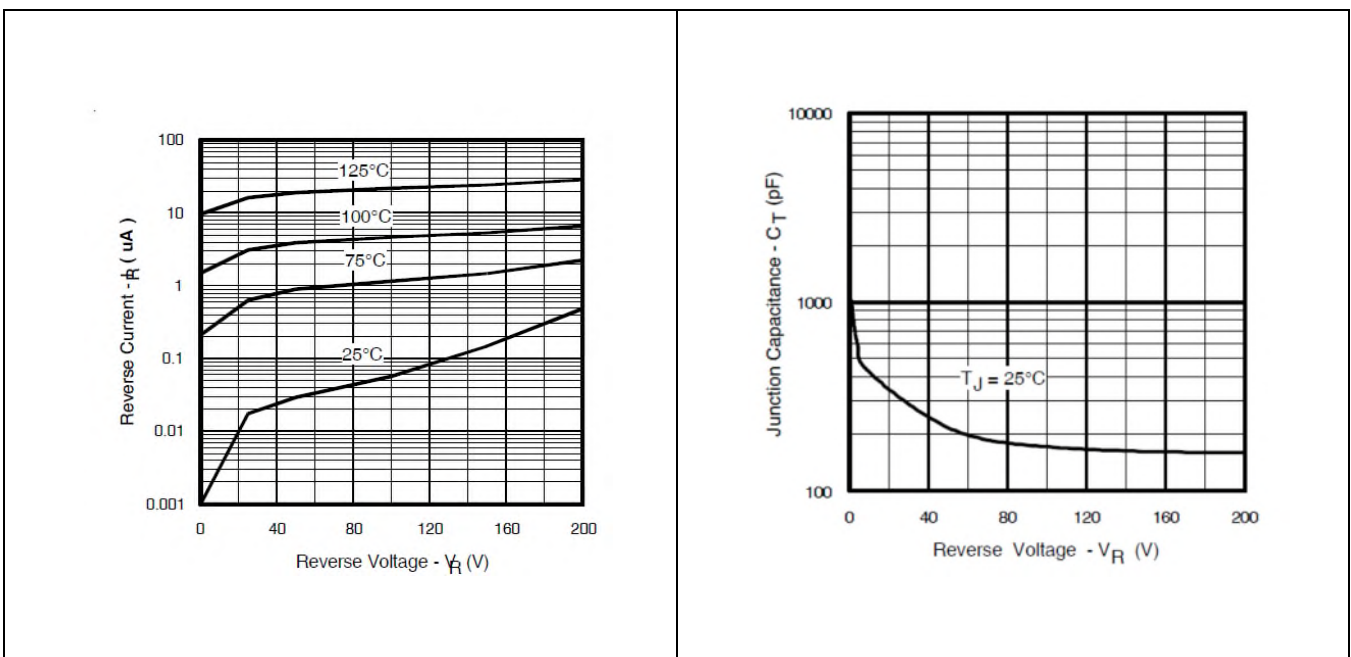


Figure 2 Typical Values of Reverse Current Vs. Reverse Voltage

Figure 3 Typical Junction Capacitance Vs. Reverse Voltage

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Electrical Characteristics Curves

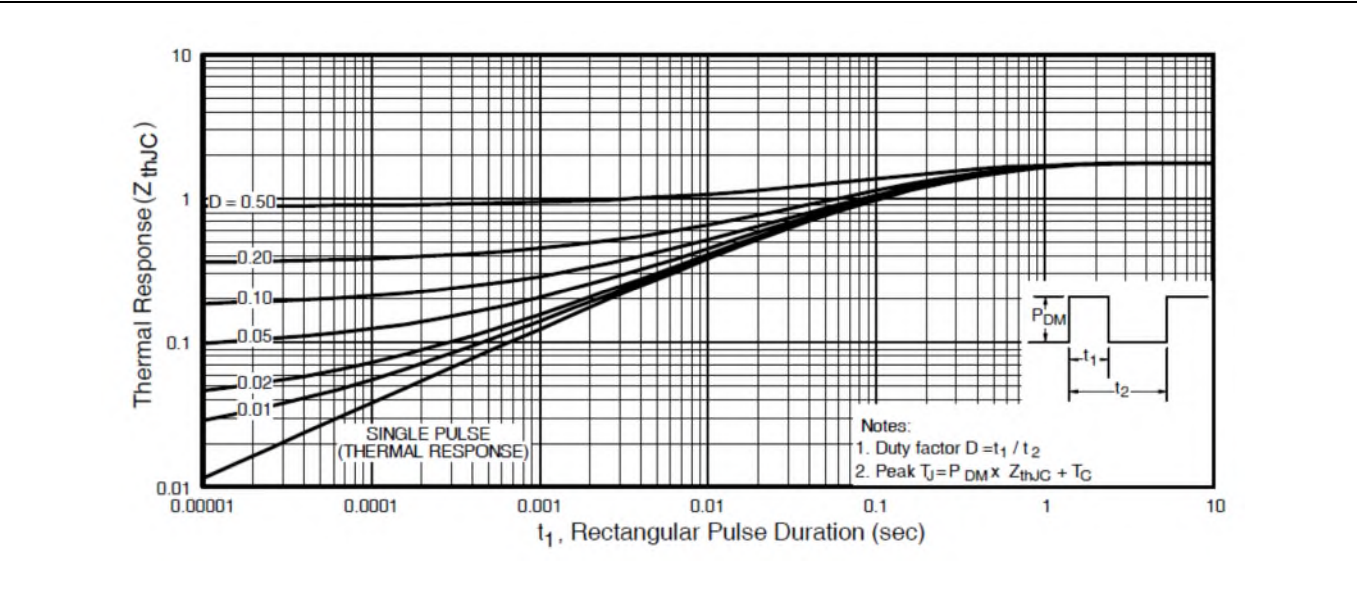


Figure 4 Maximum Thermal Impedance Z_{thJC} Characteristics

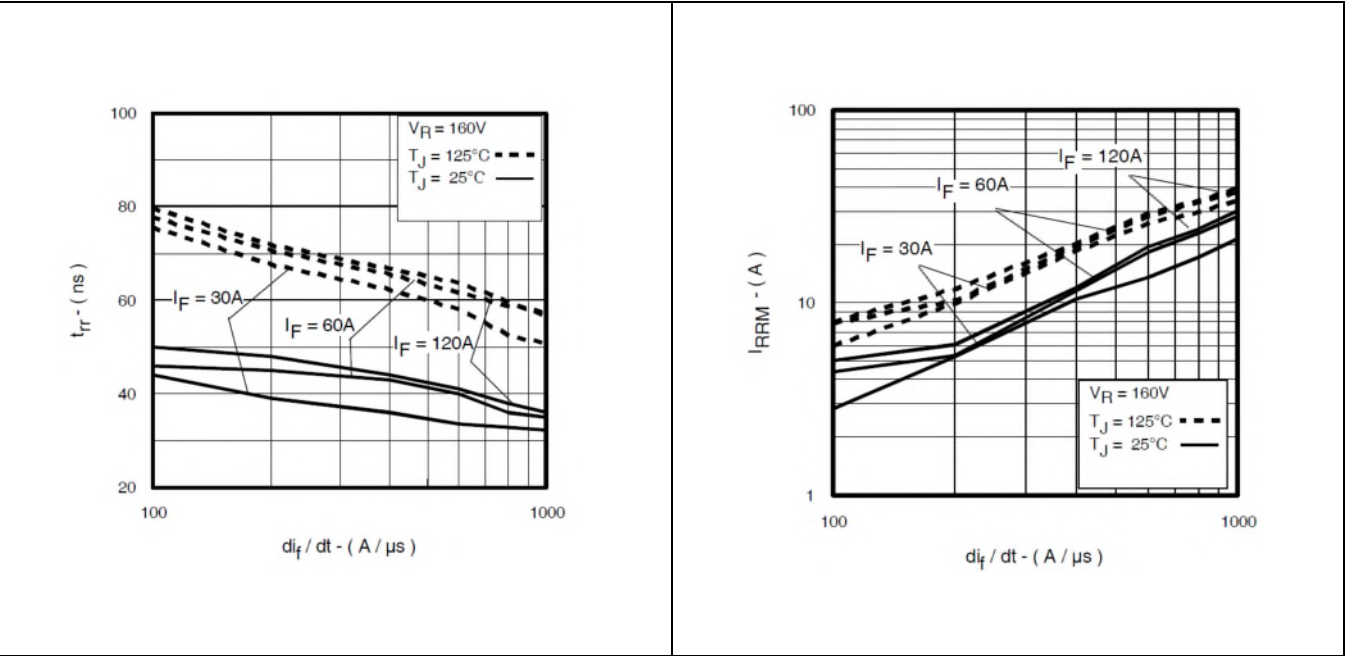


Figure 5 Typical Reverse Recovery Vs. dI_T/dt

Figure 6 Typical Recovery Current Vs. dI_T/dt

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Electrical Characteristics Curves

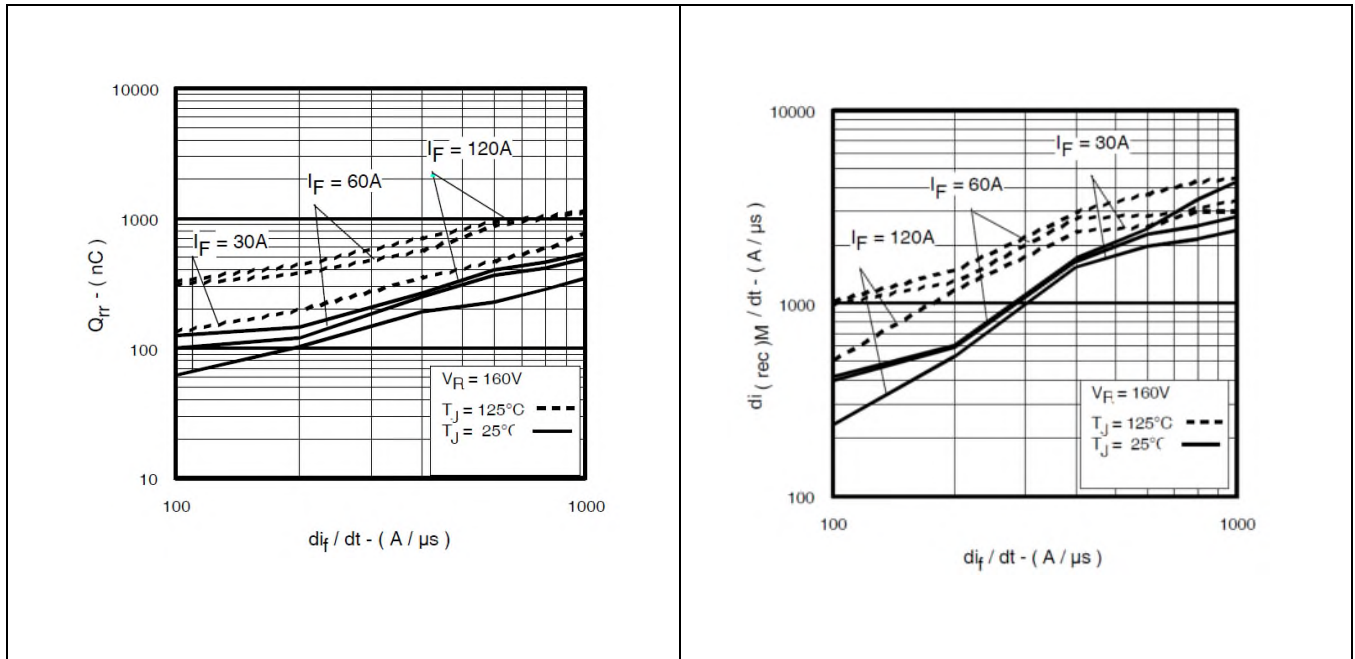


Figure 7 Typical Stored Charge Vs. di_f/dt

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

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Test Circuit

4 Test Circuit

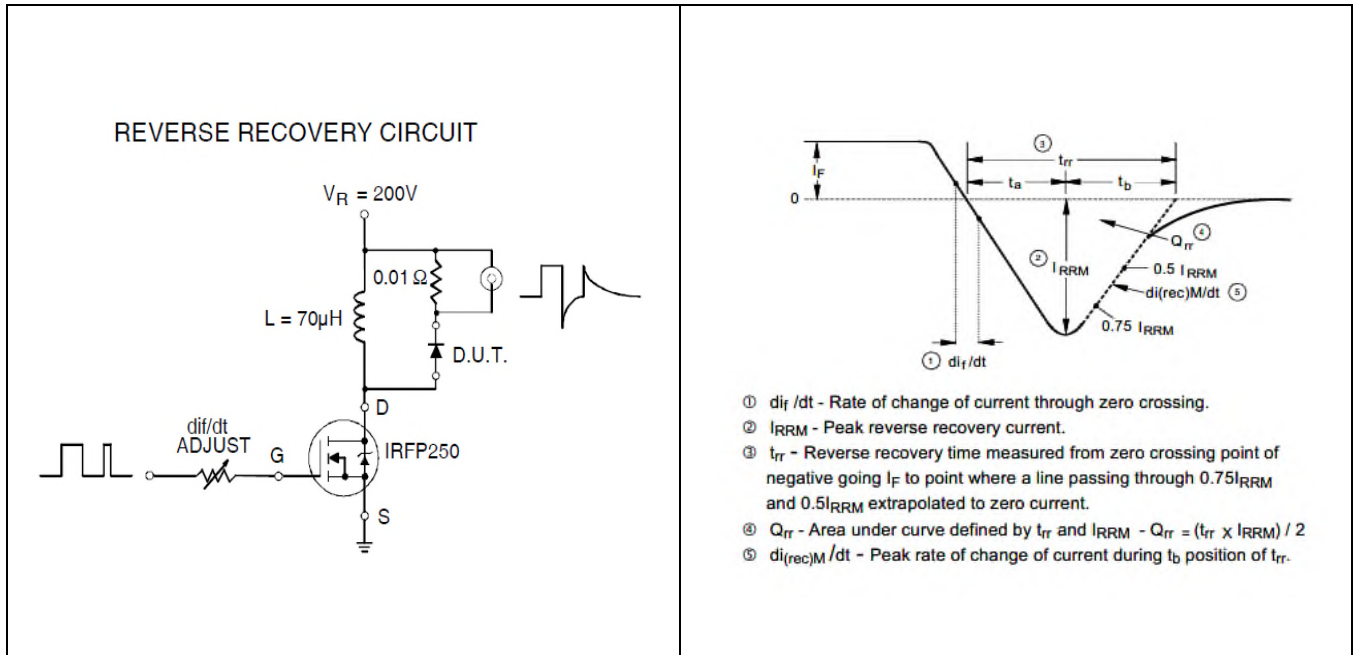


Figure 9 Reverse Recovery Parameter Test Circuit

Figure 10 Reverse Recovery Waveform and Definitions

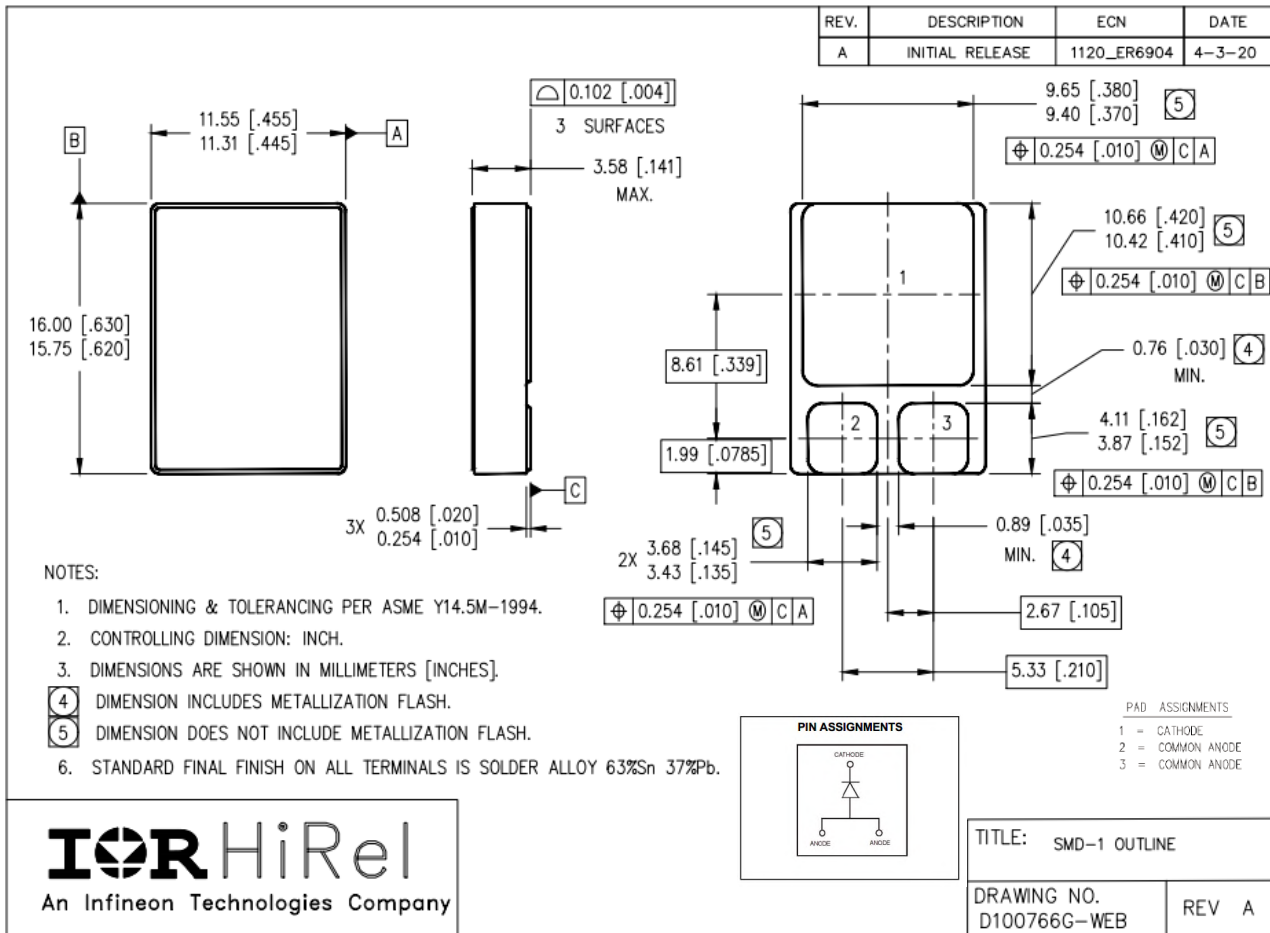
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Package Outline

5 Package Outline

Note: For the most updated package outline, please see the website: [SMD-1](#)



Revision history

Document version	Date of release	Description of changes
	03/08/2001	Final datasheet (PD-94067)
Rev A	03/12/2001	Updated Ir test condition from 125c to 100c
Rev B	03/23/2001	Updated fig 3 Y axis to Log from Linear
Rev C	07/10/2001	Updated Vf max @ -55c and 125c
Rev D	04/08/2013	Updated per ECN-1120-01228
Rev E	08/13/2019	Updated per ECN-1120-07208
Rev F	05/02/2023	Updated per ECN-1120-09532

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