

HFA45HC60C

PD-20368C

Ultrafast, Soft Recovery Diode Thru-Hole (TO-258AA) 600V, 45A

Features

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

Product Summary

- **V_R (per leg):** 600V
- **V_F :** 1.47V
- **t_{rr} :** 97ns @ 22A
- **$di_{(rec)M}/dt$:** 400A/ 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
HFA45HC60C	TO-258AA	COTS
HFA45HC60CSCV	TO-258AA	JANTXV-equivalent
HFA45HC60CSCX	TO-258AA	JANTX-equivalent
HFA45HC60CSCS	TO-258AA	S-level

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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 (per leg)	600	V
$I_{F(AV)}$	Continuous forward current, $T_C = 80^\circ\text{C}$ ¹	45	A
I_{FSM}	Single pulse forward current, $T_C = 25^\circ\text{C}$ (per leg) ²	225	A
$P_D @ T_C = 25^\circ\text{C}$	Maximum power dissipation	104	W
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to 150	$^\circ\text{C}$
Wt	Weight	10.9 (Typical)	g

¹ DC = 50% rect. wave

² 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	600	—	—	V	$I_R = 100\mu\text{A}$
V_F	Forward Voltage Drop (Per Leg) See Fig. 1	—	—	1.37	V	$I_F = 22.5\text{A}$, $T_J = -55^\circ\text{C}$
		—	—	1.47	V	$I_F = 22.5\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	1.81	V	$I_F = 45\text{A}$, $T_J = 25^\circ\text{C}$
		—	—	1.37	V	$I_F = 22.5\text{A}$, $T_J = 125^\circ\text{C}$
I_R	Reverse Leakage Current (Per Leg) See Fig. 2	—	—	10	μA	$V_R = V_R$ Rated
		—	—	1	mA	$V_R = V_R$ Rated, $T_J = 125^\circ\text{C}$
C_J	Junction Capacitance (Per Leg) See Fig. 3	—	—	65	pF	$V_R = 200\text{V}$
L_S	Series Inductance (Per Leg)	—	8.7	—	nH	Measured from anode lead to cathode lead, 6mm (0.25 in) from package

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_{rr}	Reverse Recovery Time (Per Leg)	—	—	97	ns	$I_F = 22\text{A}$, $V_R = 200\text{V}$, $dI_F/dt = 200\text{A}/\mu\text{s}$
t_{rr1}	Reverse Recovery Time (Per Leg) See Fig. 5	—	74	—	ns	$T_J = 25^\circ\text{C}$
t_{rr2}		—	194	—		$T_J = 125^\circ\text{C}$
I_{RRM1}	Peak Recovery Current (Per Leg) See Fig. 6	—	7.5	—	A	$T_J = 25^\circ\text{C}$
I_{RRM2}		—	12	—		$T_J = 125^\circ\text{C}$
Q_{rr1}	Reverse Recovery Charge (Per Leg) See Fig. 7	—	270	—	nC	$T_J = 25^\circ\text{C}$
Q_{rr2}		—	1210	—		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt_1$	Peak Rate of Fall of Recovery Current During t_b (Per Leg) See Fig. 8	—	400	—	A/ μs	$T_J = 25^\circ\text{C}$
$di_{(rec)M}/dt_2$		—	100	—		$T_J = 125^\circ\text{C}$

2.3 Thermal-Mechanical Characteristics

Table 5 Thermal-Mechanical Characteristics

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

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Electrical Characteristics Curves

3 Electrical Characteristics Curves

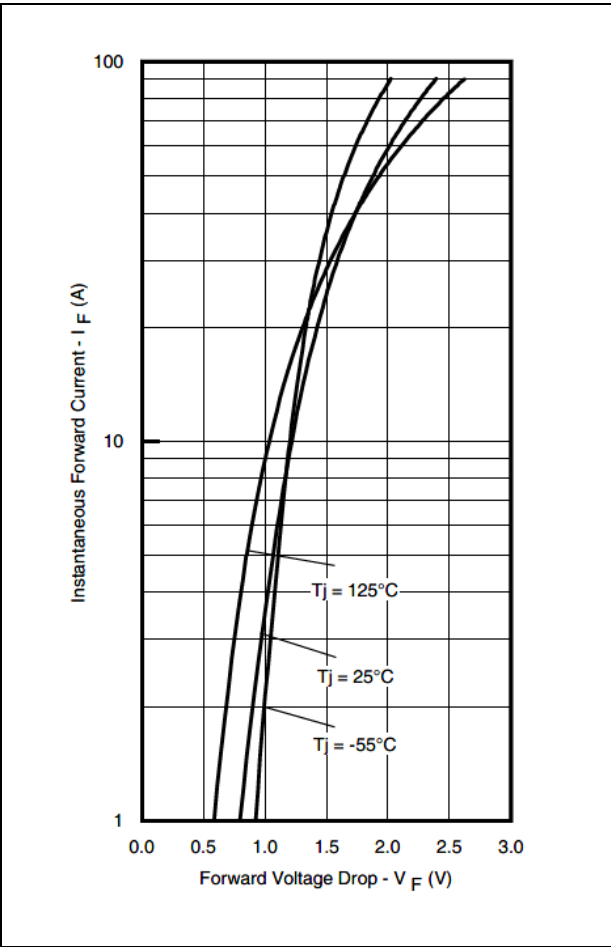


Figure 1 Maximum Forward Voltage Drop Characteristics (Per Leg)

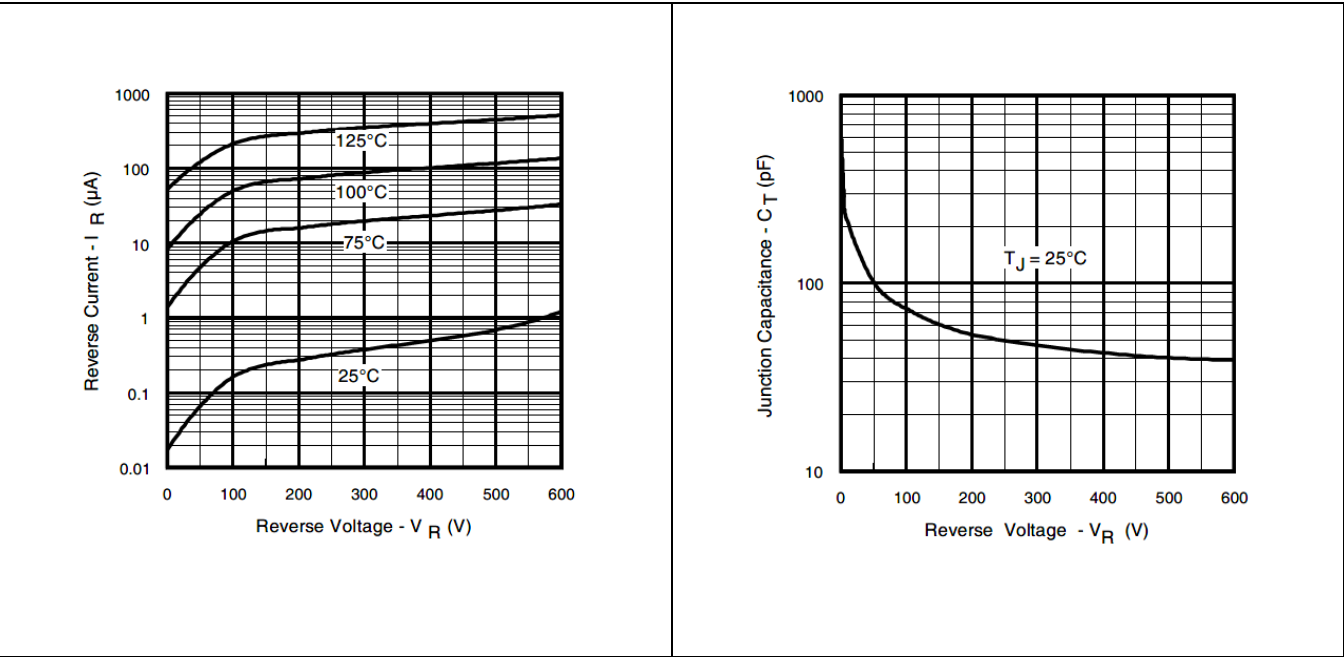


Figure 2 Typical Values of Reverse Current Vs. Reverse Voltage (Per Leg)

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

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Electrical Characteristics Curves

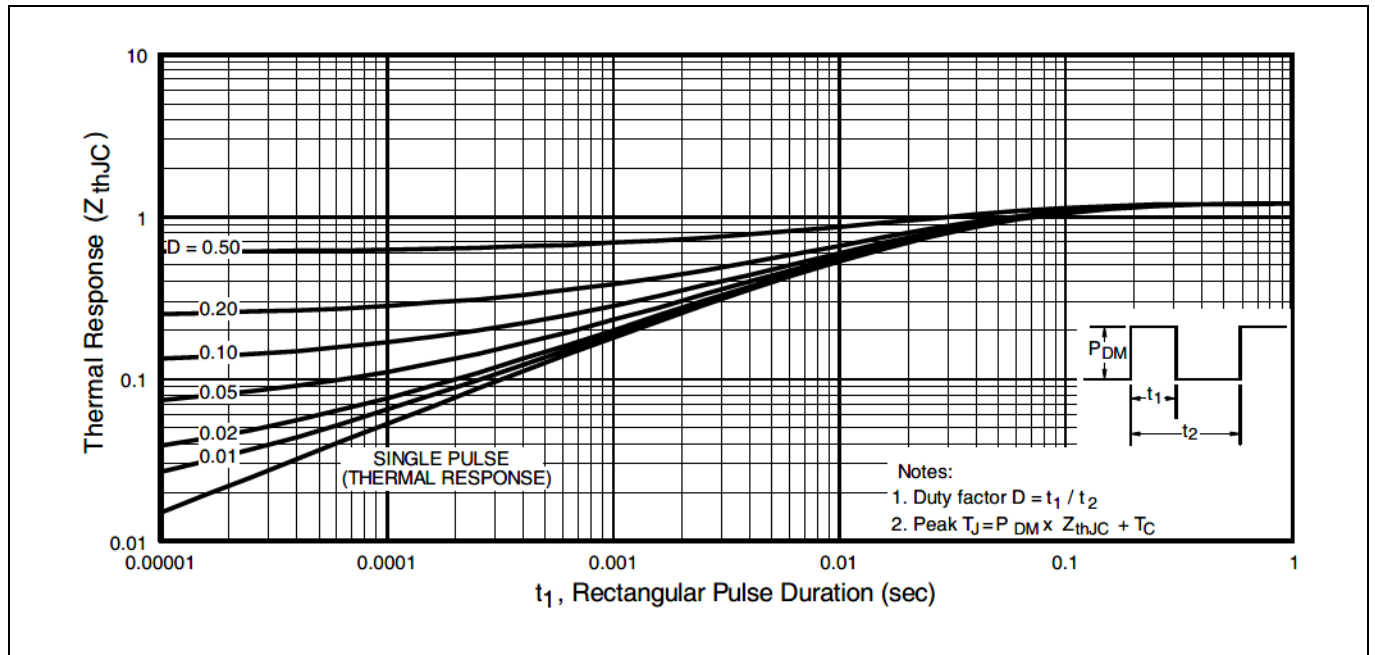


Figure 4 Maximum Thermal Impedance Z_{thJC} Characteristics (Per Leg)

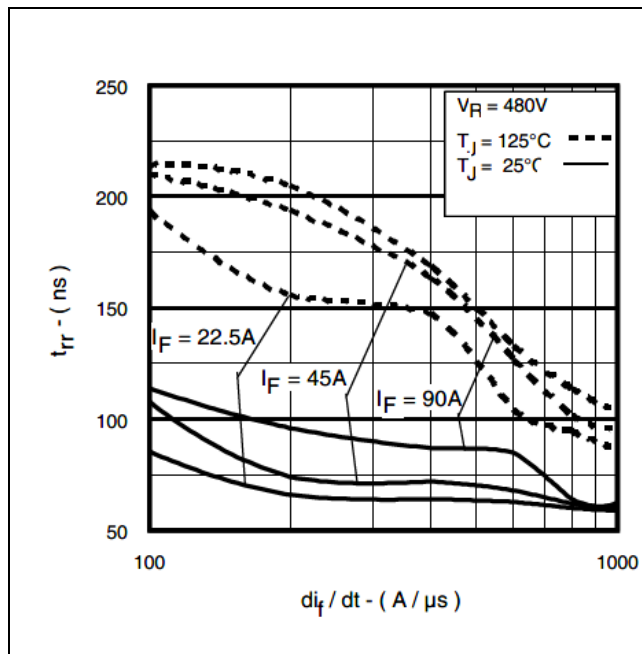


Figure 5 Typical Reverse Recovery Vs. dI_F/dt (Per Leg)

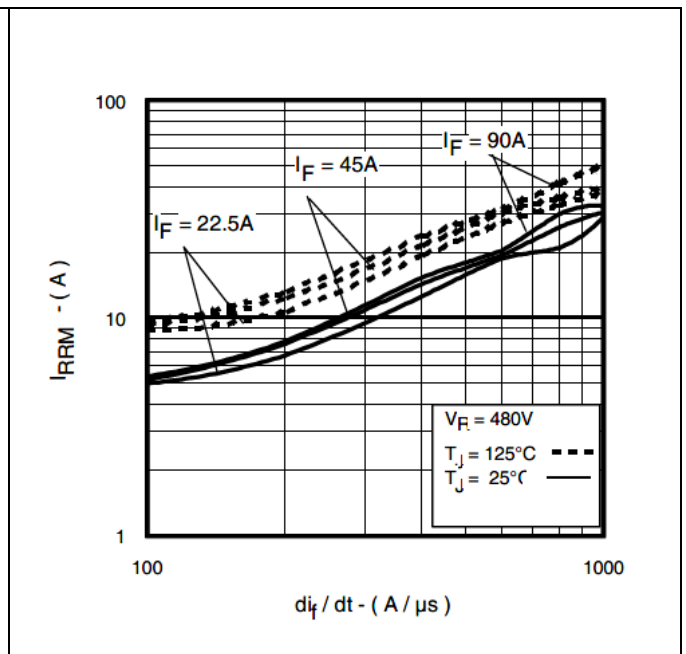


Figure 6 Typical Recovery Current Vs. dI_F/dt (Per Leg)

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Electrical Characteristics Curves

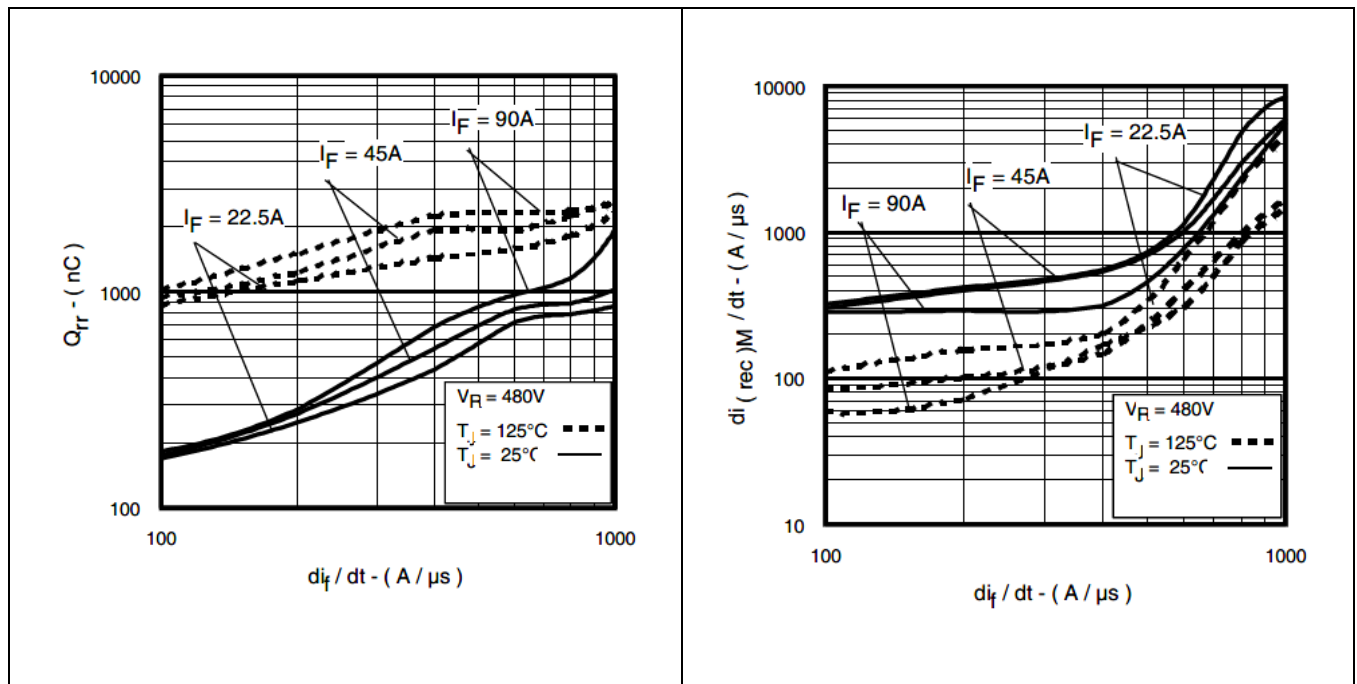


Figure 7 Typical Stored Charge Vs. di/dt (Per Leg)

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

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Test Circuit

4 Test Circuit

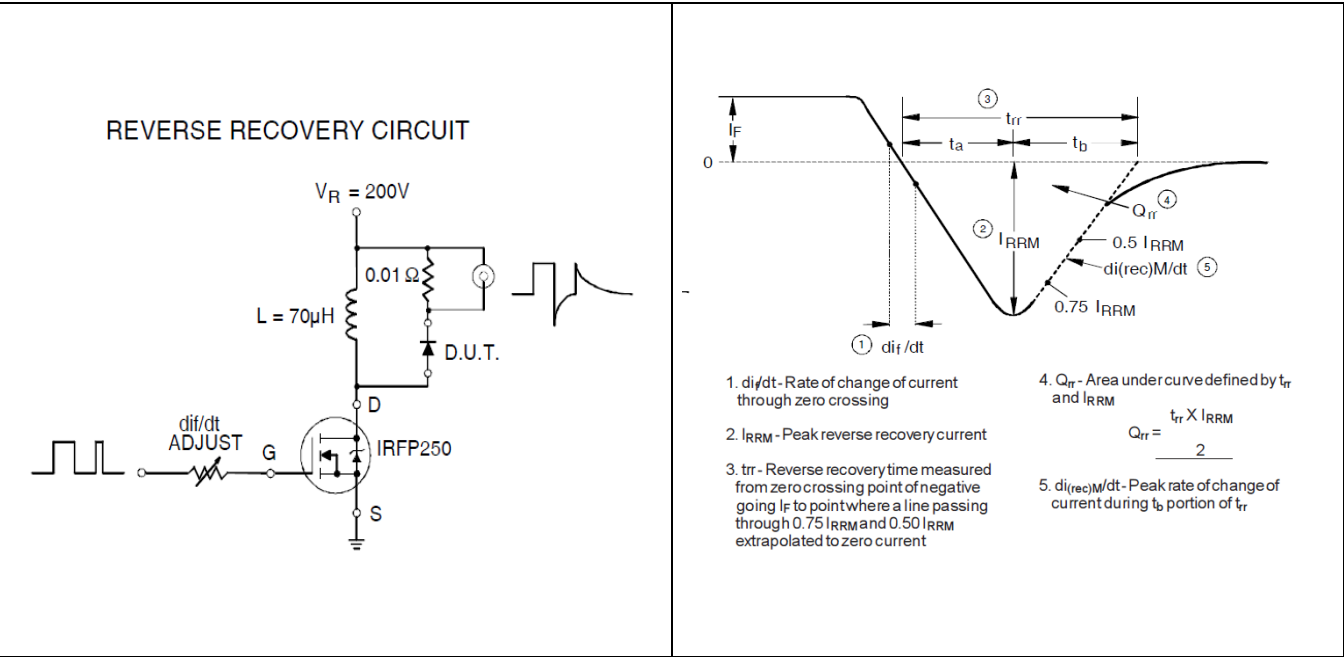


Figure 9 Reverse Recovery Parameter Test Circuit

Figure 10 Reverse Recovery Waveform and Definitions

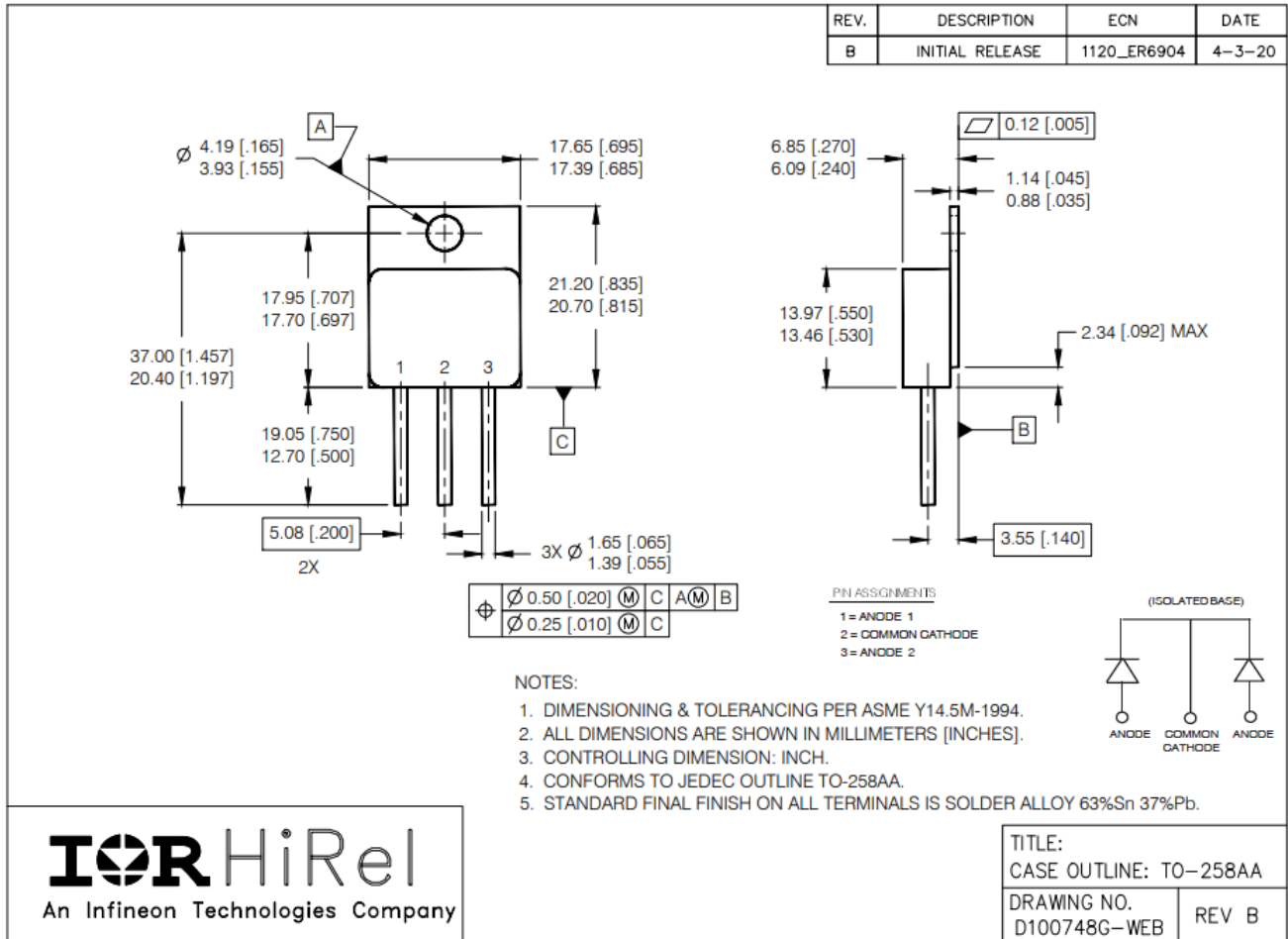
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Package Outline

5 Package Outline

Note: For the most updated package outline, please see the website: [TO-258AA](https://www.infineon.com/toc/TO-258AA)



Revision history**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
Rev C	08/02/2023	Updated per ECN-1120-09610

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