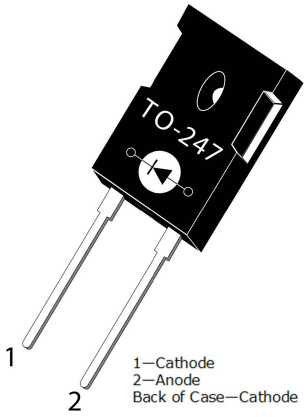
APT100S20BG High-Voltage Schottky Diode

1 Product Overview

This section outlines the product overview for the APT100S20BG device.



1.1 Features

The following are key features of the APT100S20BG device:

- Low forward voltage
- Low leakage current
- Ultrafast reverse recovery
- Avalanche energy rated
- RoHS compliant

1.2 Benefits

The following are benefits of the APT100S20BG device:

- High switching frequency
- Low switching losses
- Low noise (EMI) switching
- Higher reliability systems
- Increased system power density

1.3 Applications

The APT100S20BG device is designed for the following applications:

- Power supply and distribution
- Switch-mode power supply
- Inverter, converter, and industrial motor drivers
- High-speed rectifiers

2 Device Specifications

This section shows the device specifications for the APT100S20BG device.

2.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings for the APT100S20BG device. T_J = 25 °C unless otherwise specified.

Table 1 • Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_R	Maximum DC reverse voltage	200	V
V_{RRM}	Maximum peak repetitive reverse voltage		
V_{RWM}	Maximum working peak reverse voltage		
$I_{F(AV)}$	Maximum average forward current (T_C = 125 °C, duty cycle = 0.5)	120	A
$I_{F(RMS)}$	RMS forward current	318	
I_{FSM}	Non-repetitive forward surge current (T_J = 45 °C, 8.3 ms)	1000	
T_J , T_{STG}	Operating and storage temperature range	–55 to 150	°C
T_L	Lead temperature for 10 seconds	300	

The following table shows the thermal and mechanical characteristics of the APT100S20BG device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic/Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			0.18	°C/W
Wt	Package weight		0.22		oz
			6.2		g
	Maximum mounting torque, 6-32 or M3 screw			10	lbf-in
				1.1	N-m

2.2 Electrical Performance

The following table shows the static characteristics of the APT100S20BG device. T_J = 25 °C unless otherwise specified.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	I_F = 100 A		0.89	0.95	V
		I_F = 200 A		1.06		
		I_F = 100 A, T_J = 125 °C		0.76		
I_{RM}	Maximum reverse leakage current	V_R = 200 V			2	mA
		V_R = 200 V, T_J = 125 °C			40	
C_J	Junction capacitance	V_R = 200 V		470		pF

The following table shows the dynamic characteristics of the APT100S20BG device.

Table 4 • Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	I_F = 100 A di_F/dt = –200 A/µs V_R = 133 V T_J = 25 °C		70		ns
Q_{rr}	Reverse recovery charge			230		nC
I_{RRM}	Maximum reverse recovery current			6		A
t_{rr}	Reverse recovery time	I_F = 100 A di_F/dt = –200 A/µs V_R = 133 V T_J = 125 °C		110		ns
Q_{rr}	Reverse recovery charge			690		nC
I_{RRM}	Maximum reverse recovery current			11		A
t_{rr}	Reverse recovery time	I_F = 100 A di_F/dt = –700 A/µs V_R = 133 V T_J = 125 °C		95		ns
Q_{rr}	Reverse recovery charge			1750		nC
I_{RRM}	Maximum reverse recovery current			32		A

2.3 Typical Performance Curves

This section shows the typical performance curves for the APT100S20BG device.

Figure 1 • Maximum Transient Thermal Impedance

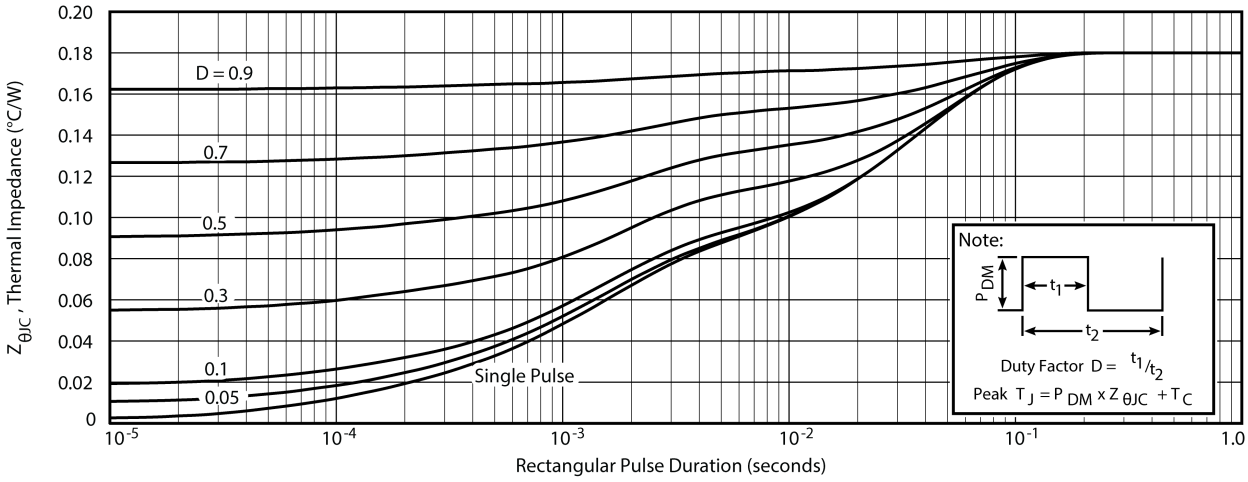


Figure 2 • Forward Current vs. Forward Voltage (V)

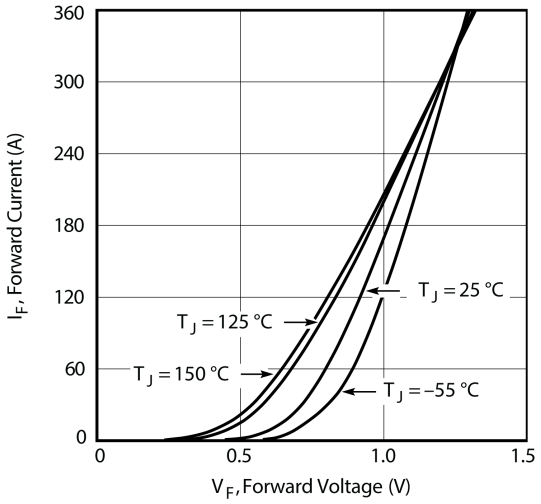


Figure 3 • RRT vs. Current Rate of Change

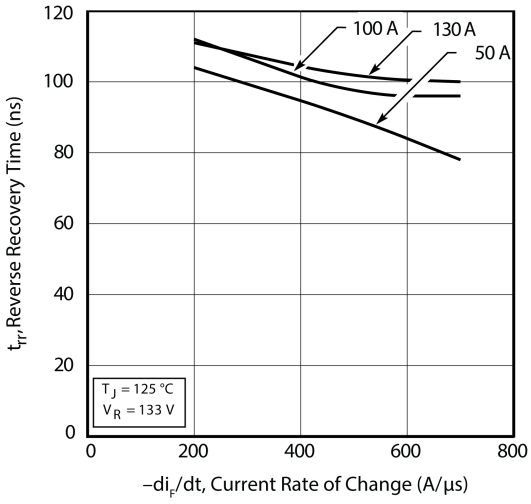


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

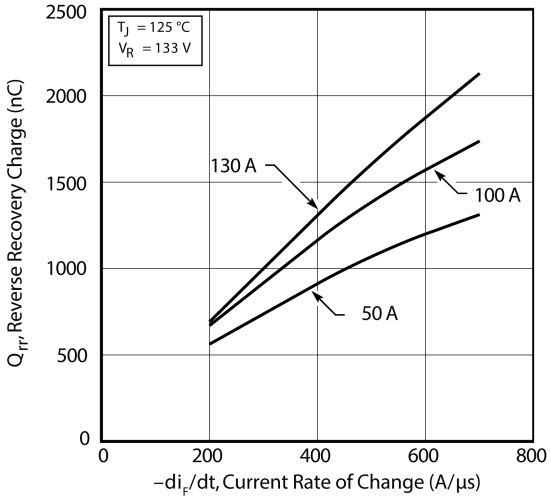


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

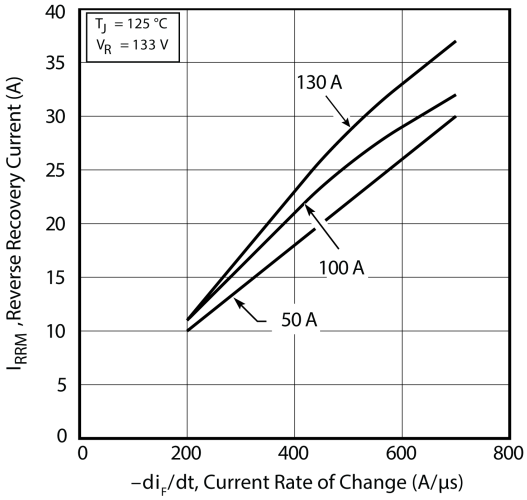


Figure 6 • Dynamic Parameters vs. Junction Temperature

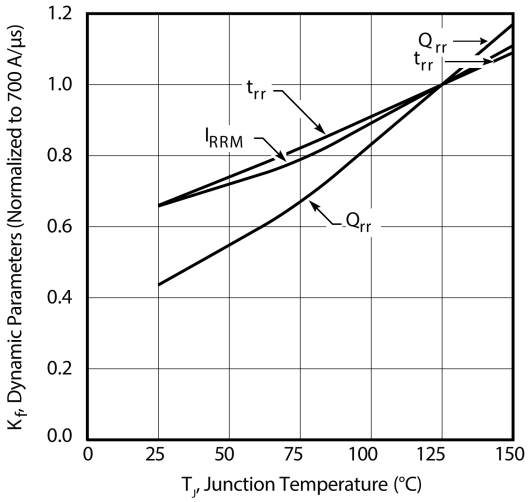


Figure 7 • Maximum Average Forward Current vs. Case Temperature

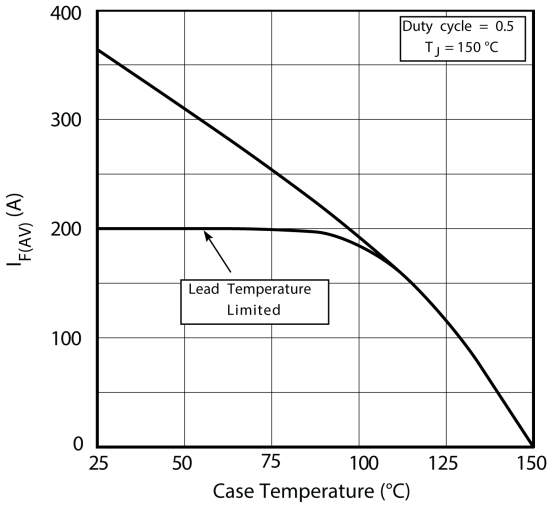


Figure 8 • Junction Capacitance vs. Reverse Voltage

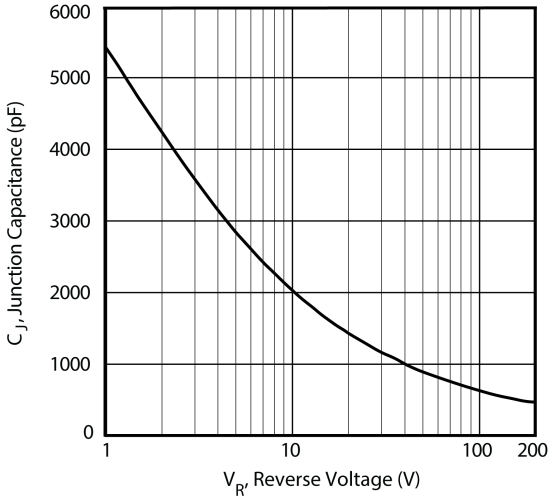
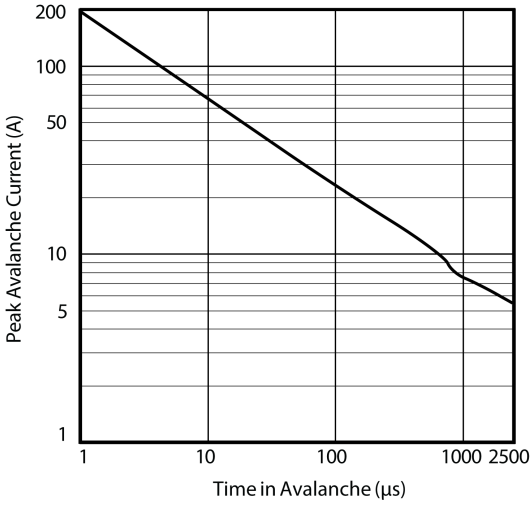


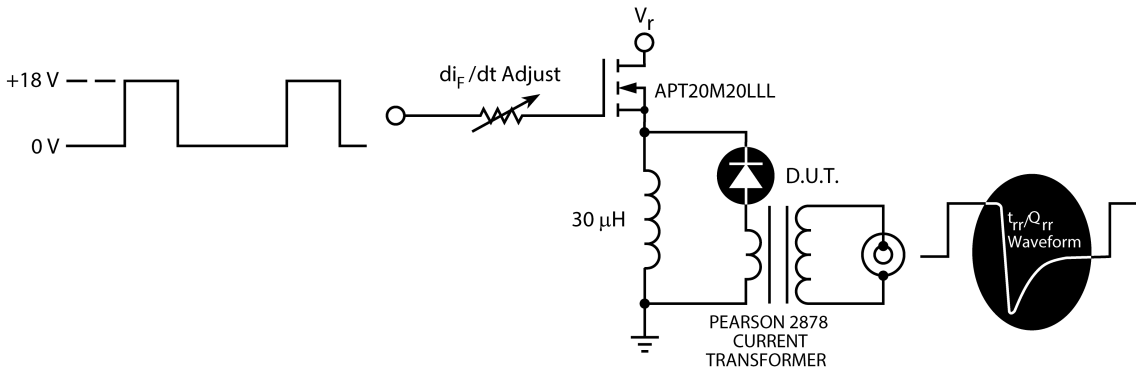
Figure 9 • Single Pulse UIS SOA



2.4 Reverse Recovery Overview

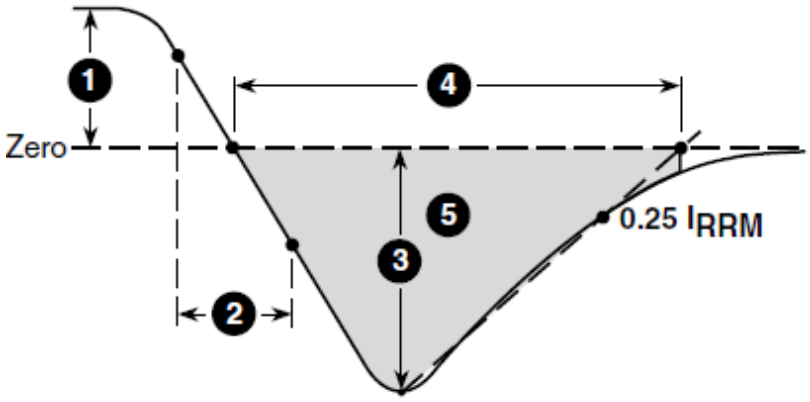
The following illustration shows the diode test circuit for the APT100S20BG device.

Figure 10 • Diode Test Circuit



The following illustration shows the diode reverse recovery waveform and definitions for the APT100S20BG device.

Figure 11 • Diode Reverse Recovery Waveform and Definitions



1. I_F—Forward conduction current
2. di_F/dt—Rate of diode current change through zero crossing
3. I_{RRM}—Maximum reverse recovery current
4. t_{rr}—Reverse recovery time, measured from zero crossing where diode current goes from positive to negative, to the point at which the straight line through I_{RRM} and 0.25•I_{RRM} passes through zero
5. Q_{rr}—Area under the curve defined by I_{RRM} and t_{rr}

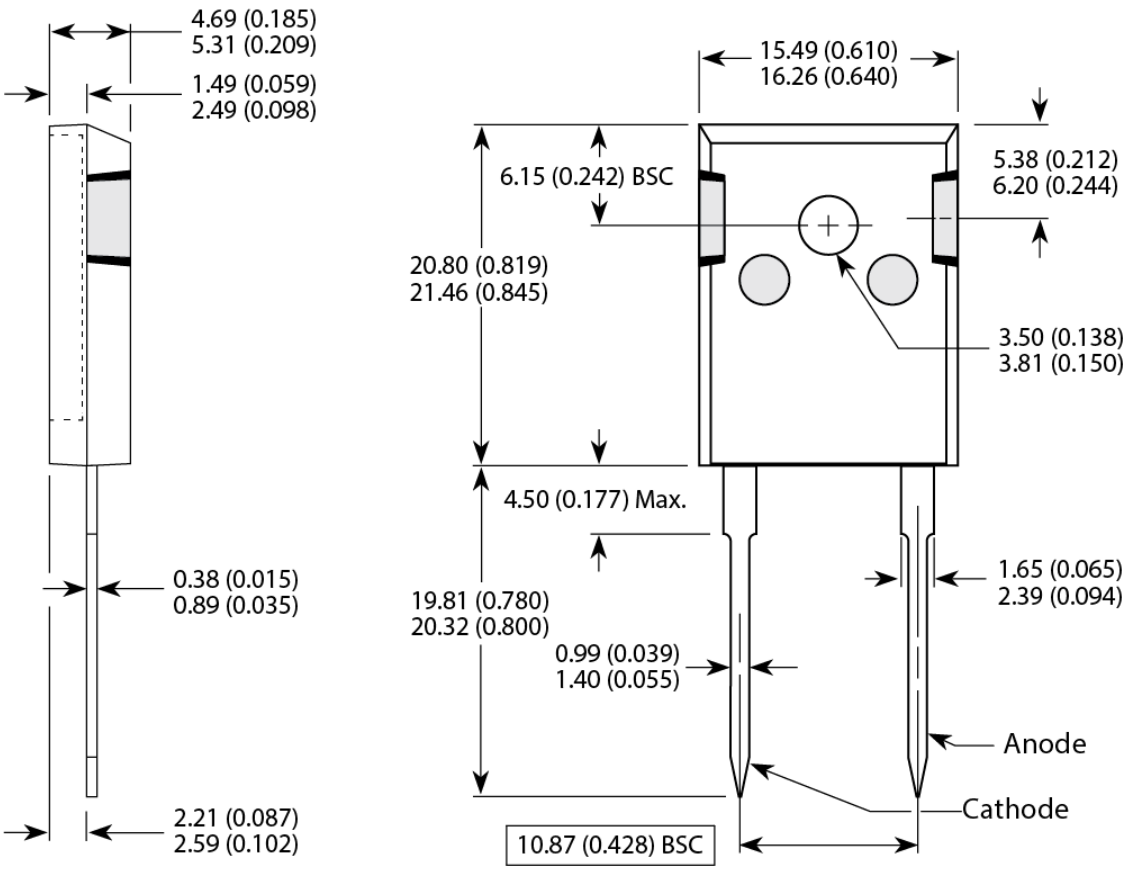
3 Package Specification

This section outlines the package specification for the APT100S20BG device.

3.1 Package Outline Drawing

The following figure shows the package outline drawing of the APT100S20BG device. Dimensions are in millimeters and (inches).

Figure 12 • Package Outline Drawing



Microsemi Headquarters
One Enterprise, Aliso Viejo,
CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Sales: +1 (949) 380-6136
Fax: +1 (949) 215-4996
Email: sales.support@microsemi.com
www.microsemi.com

© 2019 Microsemi. All rights reserved. Microsemi and the Microsemi logo are trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.

Microsemi, a wholly owned subsidiary of Microchip Technology Inc. (Nasdaq: MCHP), offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California, and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

053-6021 | February 2019 | Final