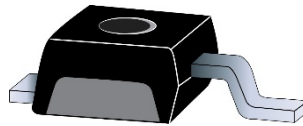


## Product Overview

The Microchip UPS115U–UPS160e3 in Powermite 1 package, high efficiency rectifiers offer optimized forward voltage characteristics with reverse blocking capabilities from 15–60 volts. They are ideal for surface mount applications that operate at high frequencies. They offer high current/power capabilities previously only found in much larger packages.

In addition to its size advantages, Powermite 1 package features include a full metallic bottom that eliminates possibility of solder flux entrapment during assembly and a unique locking tab acts as an efficient heat path from die to mounting plane for external heat sinking with very low thermal resistance junction to case (bottom). Its innovative design makes this device ideal for use with automatic insertion equipment. RoHS compliant versions are available.

**Figure 1.** DO-216AA Package



## Features

- Low thermal resistance DO-216AA package for higher current operation
- Efficient heat path with Integral locking bottom metal tab
- High current capability with low forward voltage
- Guard-ring die construction for transient protection
- Full metallic bottom eliminates flux entrapment
- Compatible with automatic insertion equipment
- Low profile-maximum height of 1.14 mm
- RoHS compliant versions available

## Applications

- Silicon Schottky (hot carrier) rectifier for minimal  $t_{rr}$  and minimal reverse recovery voltage
- Elimination of reverse-recovery oscillations to reduce need for EMI filtering.
- For use in high-frequency switching power supplies, inverters, free-wheeling diode applications, charge pump circuits, and polarity protection applications.
- Low forward power loss and high efficiency
- Reduces reverse recovery loss with low  $I_{RM}$
- Robust package configuration for pick-and-place handling
- Full-metallic bottom eliminates flux entrapment
- Ideal as an OR'ing diode
- Small foot print (See [Mounting Pad Dimensions](#) details)

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## 1. Maximum Ratings

**Table 1-1.** Maximum Ratings at 25 °C Unless Otherwise Specified

Parameters/Test Conditions		Symbol	Value	Unit
Storage Temperature		$T_{STG}$	-55 to +150	°C
Junction Temperature		$T_J$	-55 to +125	°C
Working Peak Reverse Voltage	UPS115U	$V_{RWM}$	15	V
Peak Repetitive Reverse Voltage	UPS120(E)	$V_{RRM}$	20	
DC Blocking Voltage	UPS130L	$V_R$	30	
	UPS140		40	
	UPS160		60	
Thermal Resistance Junction-to-ambient <sup>(1)</sup>		$R_{\theta JA}$	240	°C/W
Thermal Resistance Junction-to-case (bottom)		$R_{\theta JC}$	15	°C/W
Max Forward Surge Current (for 8.3 ms single half-sine wave)		$I_{FSM}$	50	A
Average Rectified Output Current (At rated $V_{RWM}$ , $T_C = 130$ °C)		$I_O$	1.0	A
Maximum Voltage Rate of Change		$dV/dt$	10,000	V/ $\mu$ s
Solder Temperature at 10 seconds		—	260	°C

**Note:**

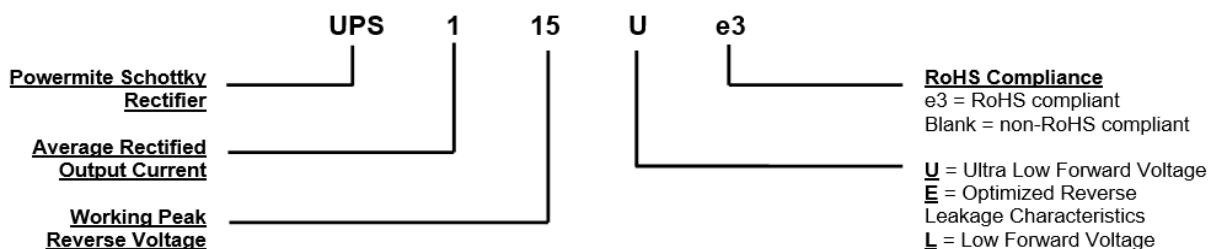
- When mounted on FR-4 PC board using 1 oz copper with recommended minimum footprint.

### 1.1. Mechanical and Packaging

- Case: Void-free transfer molded thermosetting epoxy compound meeting UL94V-0
- Terminals: Tin-lead or RoHS compliant annealed matte-tin plating. Solderable per MIL-STD-750, method 2026.
- Marking: Date code, See Electrical Characteristics: Device Marking
- Polarity: Cathode designated by Tab 1 (bottom)
- Tape and Reel Option: 12 mm tape per standard EIA-481-B. Consult factory for quantities.
- Weight: Approximately 0.016 gram
- See [Package Dimensions](#)

## 2. Part Nomenclature

Figure 2-1. Part Nomenclature



### 2.1. Symbols and Definitions

Table 2-1. Symbols and Definitions

Symbol	Definition
$C_T$	Total Capacitance: The total small signal capacitance between the diode terminals of a complete device.
$I_F$	Forward Current: The dc current flowing from the external circuit into the anode terminal
$I_{FSM}$	Surge Peak Forward Current: The forward current including all nonrepetitive transient currents but excluding all repetitive transients (ref JESD282-B)
$I_O$	Average Rectified Output Current: The Output Current averaged over a full cycle with a 50 Hz or 60 Hz sine-wave input and a 180 degree conduction angle.
$I_R$	Reverse Current: The dc current flowing from the external circuit into the cathode terminal at the specified voltage $V_R$
$V_{(BR)}$	Breakdown Voltage: A voltage in the breakdown region.
$V_F$	Forward Voltage: A positive dc anode-cathode voltage the device will exhibit at a specified forward current.
$V_R$	Reverse Voltage: A positive dc cathode-anode voltage below the breakdown region
$V_{R(RMS)}$	Reverse Voltage: Root-Mean-Square value of alternating component of a positive dc cathode-anode voltage
$V_{RRM}$	Repetitive Peak Reverse Voltage: The peak reverse voltage including all repetitive transient voltages but excluding all non-repetitive transient voltages.
$V_{RWM}$	Working Peak Reverse Voltage: The peak voltage excluding all transient voltages (ref JESD282-B). Also sometimes known historically as PIV.

### 3. Electrical Characteristics

**Table 3-1.** Electrical Characteristics ( $T_A = 25\text{ °C}$  Unless Otherwise Noted)

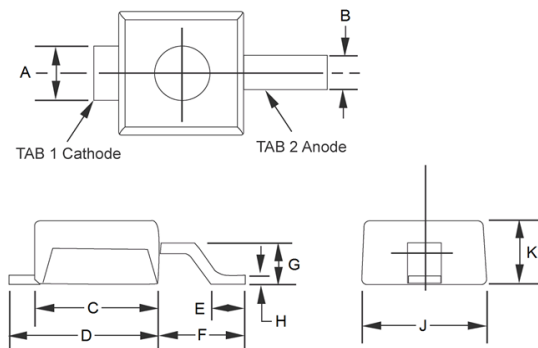
Part Number	Device Marking <sup>(1)</sup>	Working Peak Reverse Voltage	Max Reverse Current <sup>(2)</sup>		RMS Reverse Voltage	Max Forward Voltage <sup>(2)</sup>			Max Forward Voltage <sup>(2)</sup>			Typical Capacitance at $V_R = 5V$ at $f = 1\text{ MHz}$	
			$I_R$ at $V_{RWM}$			$V_{R(RMS)}$	$V_F$			$V_F$ <sup>(3)</sup>			
			V	mA			mA <sup>(3)</sup>	V	at 0.1A	at 1A	at 3A		at 0.1A
UPS115U	S15	15	10	—	10.5	—	0.31	—	—	—	—	150	
UPS120	S20	20	0.4	25	14	0.34	0.45	0.65	0.25	0.415	0.67	80	
UPS120E	S20E	20	0.01	1.6 <sup>(4)</sup>	14	0.455	0.53	0.595	0.36 <sup>(4)</sup>	0.455 <sup>(4)</sup>	0.54 <sup>(4)</sup>	25	
UPS130L	S30L	30	0.41	11	21	0.3	0.38	0.52	0.2	0.33	0.5	80	
UPS140	S40	40	0.4	—	28	0.36	0.45	0.75	—	—	—	70	
UPS160	S60	60	0.1	—	42	—	0.6	—	—	—	—	45 <sup>(5)</sup>	

**Notes:**

3. Include • in marking for e3 parts (for example, UPS120e3 and S20•)
4. Short duration test pulse used to minimize self-heating effect
5. At  $T_J = 85\text{ °C}$
6. At  $T_J = 100\text{ °C}$
7. At  $V_R = 4V$

## 4. Package Dimensions

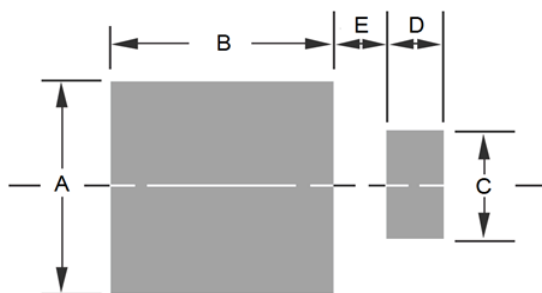
Figure 4-1. Package Dimensions



Ltr	Dimensions			
	Inch		Millimeters	
	Min.	Max.	Min.	Max.
A	0.029	0.039	0.73	0.99
B	0.016	0.026	0.40	0.66
C	0.070	0.080	1.77	2.03
D	0.087	0.097	2.21	2.46
E	0.020	0.030	0.50	0.76
F	0.051	0.061	1.29	1.54
G	0.021	0.031	0.53	0.78
H	0.004	0.008	0.10	0.20
J	0.070	0.080	1.77	2.03
K	0.035	0.045	0.89	1.14

### 4.1. Mounting Pad Dimensions

Figure 4-2. Pad Layout



Ltr	Dimensions	
	Inch	Millimeters
A	0.100	2.54
B	0.105	2.67
C	0.050	1.27
D	0.030	0.76
E	0.025	0.64

## 5. Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

Revision	Date	Description
A	05/2025	Document was converted to Microchip template and assigned literature number DS10001248.
Rev. A	12/2024	Microsemi document was created and assigned literature number RF01319.

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