1 Amp Ultra-Fast Recovery Rectifiers

UFS105J–UFS180J
UFS160G, UFS180G

Product Overview

The Microchip UFS105J–UFS180Ge3 in SMB package, ultra-fast recovery rectifiers offer optimized forward voltage characteristics with reverse blocking capabilities from 50–800 volts. They are ideal for surface mount applications that operate at high frequencies.

The SMBG Gull-wing design in the DO-215AA package is ideal for visible solder connections. The SMBJ J-bend design in the DO-214AA package allows for greater PC board mounting density. RoHS compliant versions are available.

Figure 1. DO-215AA Gull-Wing Package

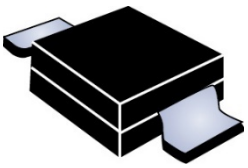
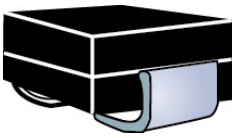


Figure 2. DO-214AA J-Bend Package



Features

- Ultra-fast recovery
- 175 °C junction temperature
- 1 amp current rating
- UFS105–UFS120:
  - V_{RWM} 50 to 200 volts
  - t_{rr} 30nS max
- UFS130–UFS150:
  - V_{RWM} 300 to 500 volts
  - t_{rr} 50nS max
- UFS160–UFS180:
  - V_{RWM} 600 to 800 volts
  - t_{rr} 60nS max

Table of Contents

1. Maximum Ratings

Table 1-1. Maximum Ratings

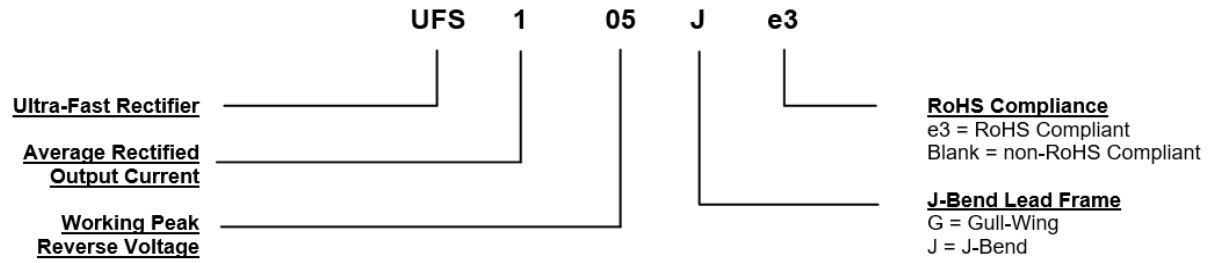
Parameters/Test Conditions	Symbol	Value			Unit
		UFS105–UFS120	UFS130–UFS150	UFS160–UFS180	
Junction Temperature	T_J	–55 to +175			°C
Storage Temperature	T_{STG}	–55 to +175			°C
Thermal Resistance Junction-to-Lead DO-214BA (J)	$R_{\Theta JL}$	15			°C/W
Thermal Resistance Junction-to-Lead DO-215AA (G)	$R_{\Theta JL}$	—	—	25	°C/W
Average Rectified Output Current (square wave , $R_{\Theta JL}$ = 15°C/W) – J	I_O	1 (T_L = 145 °C)	1 (T_L = 143 °C)	1 (T_L = 140 °C)	A
Average Rectified Output Current (square wave, $R_{\Theta JL}$ = 25°C/W) – G	I_O	—	—	1 (T_L = 135 °C)	A
Solder Temperature at 10 seconds	—	260			°C

1.1. Mechanical 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: See Electrical Characteristics: Device Marking, RoHS compliance, Date code
- Polarity: Cathode end banded
- Tape and Reel Option: 13 mm tape per standard EIA-481-B. Consult factory for quantities.
- Weight: Approximately 0.1 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.
$I_{R(REC)}$	Reverse Recovery Current: The transient reverse current associated with a change from forward current to a reverse condition.
trr	Reverse Recovery Time: The time interval between the instant the current passes through zero when changing from the forward direction to the reverse direction and a specified decay point after a peak reverse current occurs.
$V_{(BR)}$	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_{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 at 25 °C Unless Otherwise Stated

Part Number	Device Marking	Working Peak Reverse Voltage [1]	Max Reverse Current [2]	Max Forward Voltage [2]		Max Forward Surge Current [3]	Capacitance at V_R = 10 V	Reverse Recovery Time at I_F = 0.5A at I_R = 1.0A at $I_{R(REC)}$ = 0.25 A
		V_{RWM}	I_R at V_{RWM}	V_F at I_F = 0.1A	V_F at I_F = 1A	I_{FSM}	C_T	t_{rr}
		V	µA	V	V	A	pF	ns
UFS105J(e3)	U105	50	5	0.75	0.95	35	10	30
UFS110J(e3)	U110	100	5	0.75	0.95	35	10	30
UFS115J(e3)	U115	150	5	0.75	0.95	35	10	30
UFS120J(e3)	U120	200	5	0.75	0.95	35	10	30
UFS130J(e3)	U130	300	10	0.8	1.1	30	5.5	50
UFS140J(e3)	U140	400	10	0.8	1.1	30	5.5	50
UFS150J(e3)	U150	500	10	0.8	1.1	30	5.5	50
UFS160(J/G)(e3)	U160	600	20	0.89	1.2	25	5.5	60
UFS170J(e3)	U170	700	20	0.89	1.2	25	5.5	60
UFS180(J/G)(e3)	U180	800	20	0.89	1.2	25	5.5	60

Notes:

1. Working Peak Reverse Voltage (V_{RWM}), Peak Repetitive Reverse Voltage (V_{RRM}), DC Blocking Voltage (V_R)
2. Short duration test pulse width 300 µs (Duty cycle 2%) used to minimize self-heating effect.
3. 8.3 ms single half sine wave superimposed on Rated Load at T_L = 175 °C

4. Graphs

UFS105–UFS120

Figure 4-1. Typical Forward Characteristics

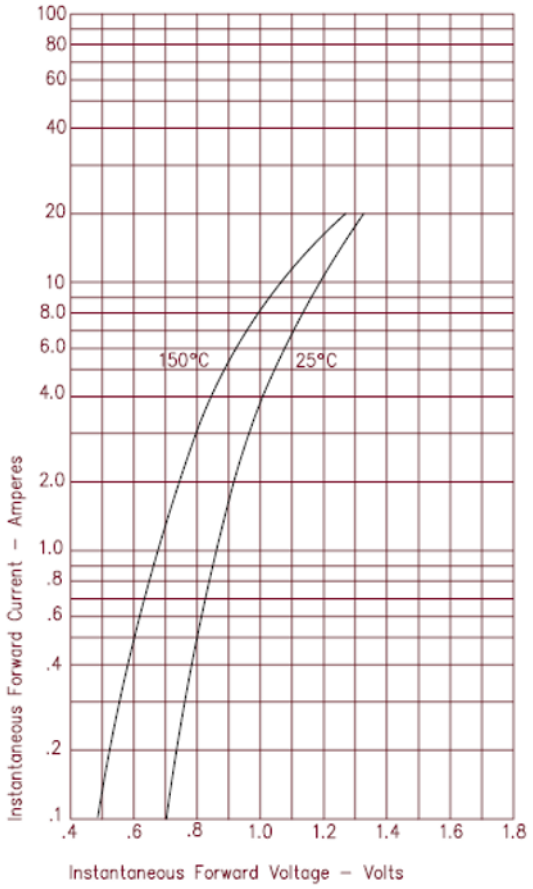


Figure 4-2. Typical Reverse Characteristics

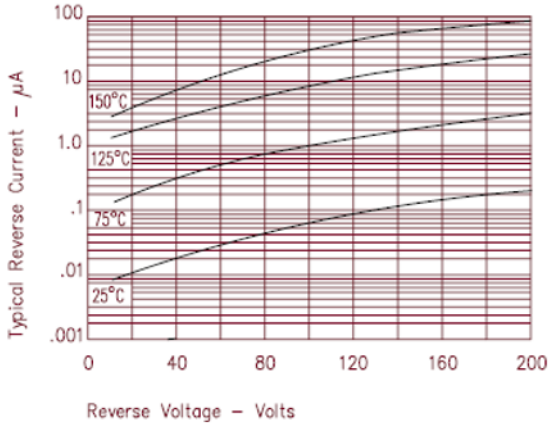
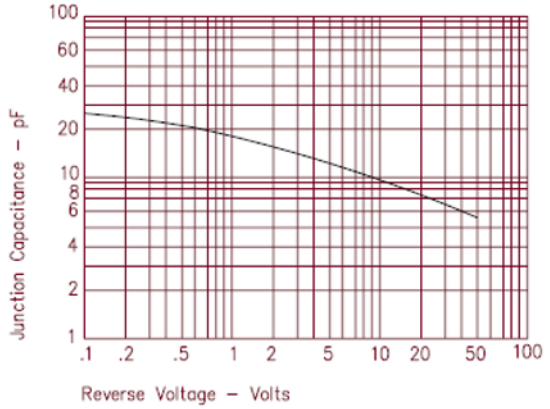


Figure 4-3. Typical Junction Capacitance



UFS130–UFS150

Figure 4-4. Typical Forward Characteristics

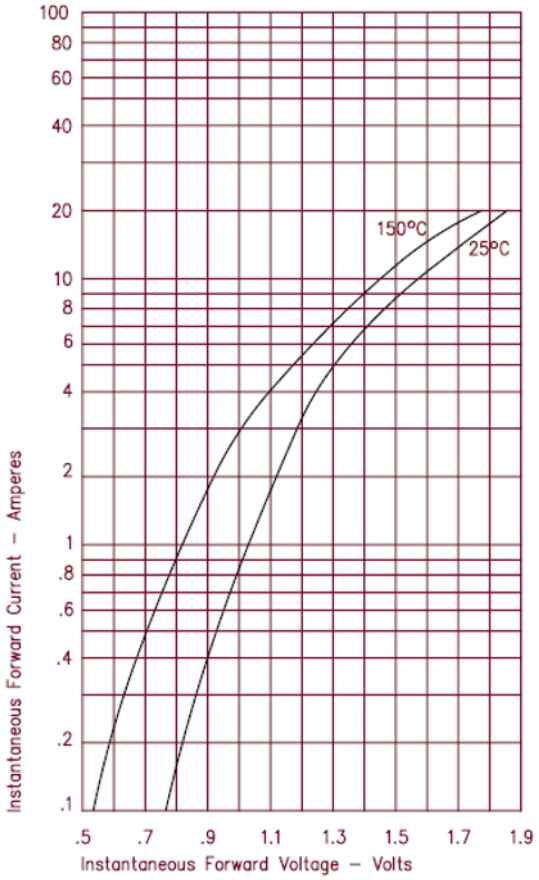


Figure 4-5. Typical Reverse Characteristics

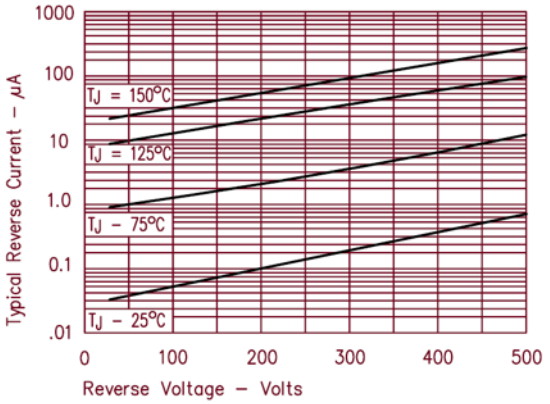
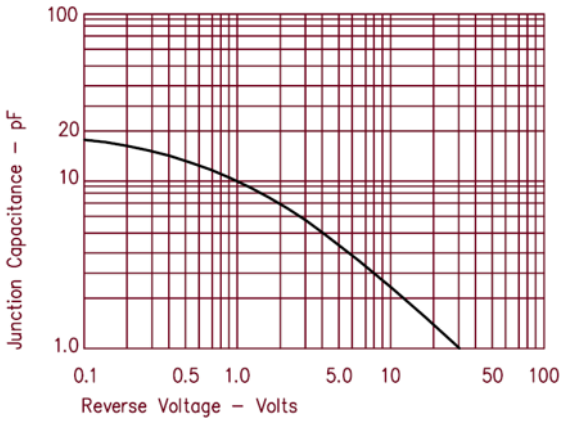


Figure 4-6. Typical Junction Capacitance



UFS160–UFS180

Figure 4-7. Typical Forward Characteristics

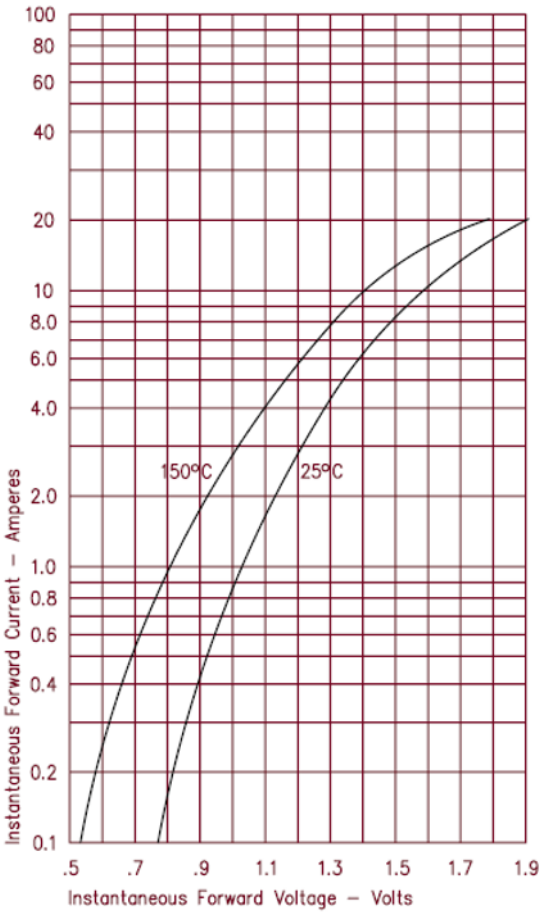


Figure 4-8. Typical Reverse Characteristics

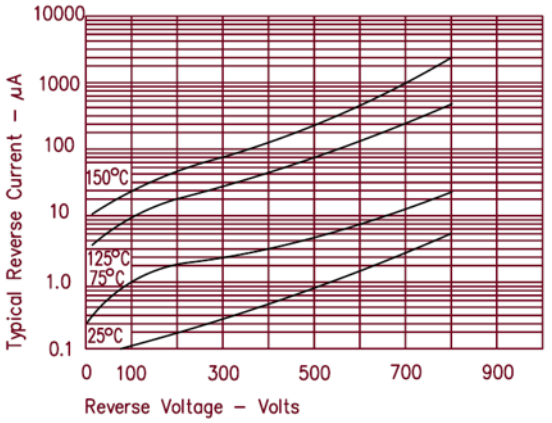
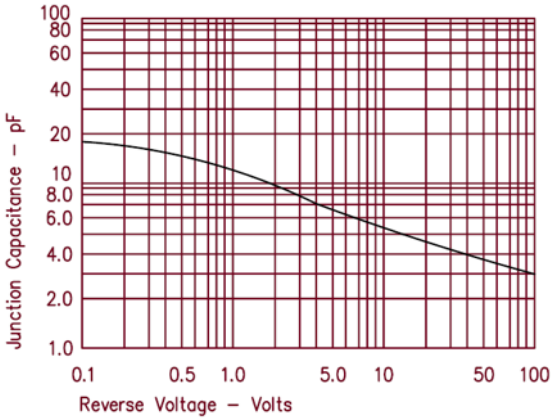
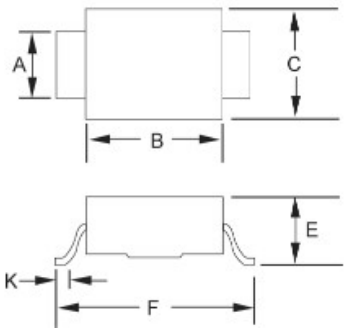


Figure 4-9. Typical Junction Capacitance



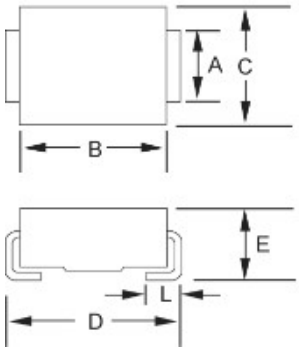
5. Package Dimensions

Figure 5-1. SMBG (DO-215AA)



Ltr	Dimensions			
	Inch		Millimeters	
	Min.	Max.	Min.	Max.
A	0.077	0.083	1.96	2.10
B	0.160	0.180	4.06	4.57
C	0.130	0.155	3.30	3.94
E	0.077	0.104	1.95	2.65
F	0.235	0.255	5.97	6.48
K	0.015	0.030	0.381	0.762

Figure 5-2. SMBJ (DO-214AA)



Ltr	Dimensions			
	Inch		Millimeters	
	Min.	Max.	Min.	Max.
A	0.077	0.083	1.96	2.10
B	0.160	0.180	4.06	4.57
C	0.130	0.155	3.30	3.94
D	0.205	0.220	5.21	5.59
E	0.077	0.104	1.95	2.65
L	0.030	0.060	0.760	1.52

5.1. Pad Layout

Figure 5-3. Pad Layout

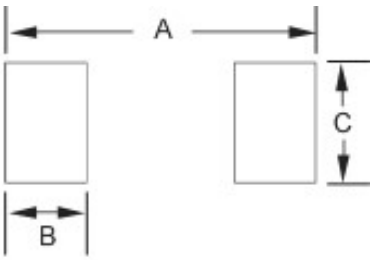


Table 5-1. SMBG (DO-215AA)

Ltr	Inch	Millimeters
A	0.320	8.13
B	0.085	2.16
C	0.110	2.79

Table 5-2. SMBJ (DO-214AA)

Ltr	Inch	Millimeters
A	0.260	6.60
B	0.085	2.16
C	0.110	2.79

6. 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	04/2025	Document was converted to Microchip template and assigned literature number DS00005910.
Rev. B	01/2025	Microsemi document was created and assigned literature number RF01286.

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