2 Watt Surface Mount Zener Diodes

SMBJ4733Ae3–SMBJ4753Ae3

Product Overview

The SMBJ47 is a family of surface mount 2 watt Zener diode equivalent to JEDEC registered 1N4733–1N4753 with identical electrical characteristics, however lower thermal resistance features allows it to be rated at 2.0W instead of 1.0W. Available in Zener Voltages of 5.1V–36V. The SMBJ J-bend design in the DO-214AA package allows for greater PC board mounting density. These plastic encapsulated Zeners have a moisture classification of “Level 1” with no dry pack required. They may be operated at high maximum dc currents with adequate heat sinking due to their comparatively low thermal resistance design. Microchip also offers numerous other Zener products to meet higher and lower power applications.

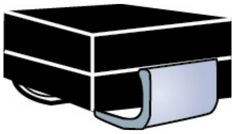
Features

- Ideal for high-density and low-profile mounting
- Enhanced reliability screening in reference to MIL-PRF-19500 is available
- Refer to High Reliability Up-Screened Plastic Products Portfolio for more details on the screening option
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020F
- Axial-lead equivalent package for thru-hole mounting is available as 1N4733–1N4753. Contact Microchip for other surface mount options.
- RoHS compliant devices with e3 suffix

Applications/Benefits

- Regulates voltage over broad operating current and temperature ranges
- Available in Zener Voltages V_Z 5.1, 13, 18, 36V, with V_Z tolerance of A = 5%
- Non-sensitive to ESD per MIL-STD-750 method 1020
- Withstands high surge stresses
- Minimal changes of voltage versus current
- High specified Maximum Zener Current (I_{ZM}) with adequate heat sinking

Figure 1. DO-214AA J-bend Package



Note: All SMB series are equivalent to prior SMS package identifications.

Table of Contents

1. Maximum Ratings at 25 °C Unless Otherwise Specified

Parameters/Test Conditions	Symbol	Value	Unit
Junction and Storage Temperature	T_J and T_{STG}	–65 to +150	°C
Thermal Resistance, Junction to Lead	$R_{ΘJL}$	35	°C/W
Thermal Resistance, Junction to Ambient (1)	$R_{ΘJA}$	100	°C/W
Off-State Power Dissipation (2)	P_D	2	W
Solder Temperature at 10 s	T_{SP}	260	°C

Notes:

1. When mounted on FR4 PC board (1 oz Cu) with recommended footprint (see 4.2. Pad Layout).
2. 2 watts at $T_L \leq 80$ °C, or 1.25 watts at $T_A = 25$ °C when mounted on the FR4 PC board with the recommended footprint (see Figure 3-1).

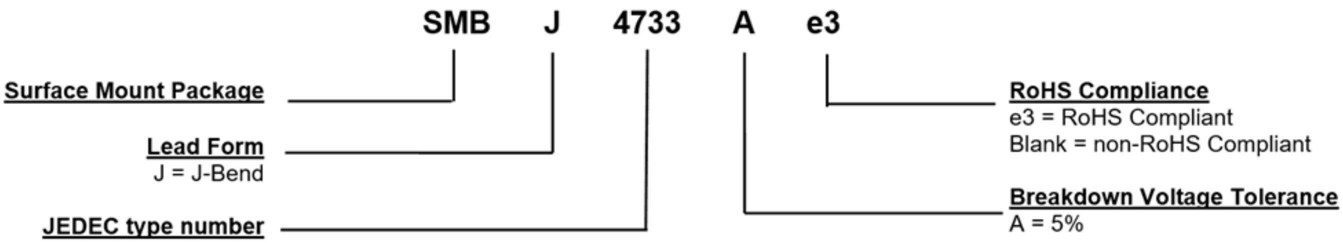
1.1. Mechanical and Packaging

- Case: Void-free transfer molded thermosetting epoxy body meeting UL94V-0 requirements.
- Terminals: Tin-lead or RoHS compliant annealed matte-tin plating readily solderable per MIL-STD-750, method 2026.
- Marking: Part number 47xx, Zener Voltage tolerance “A”, date code.
- Polarity: Cathode end banded.
- Tape and Reel option: Standard per EIA-481-1-A (add “TR” suffix to part number). Consult factory for quantities.
- Weight: Approximately 0.1 grams.

Note: See 4. Package Dimensions.

2. Part Nomenclature

Figure 2-1. Part Nomenclature



Note: See Electrical Characteristics.

2.1. Symbols and Definitions

Symbol	Definition
I_R	Reverse Current: The maximum reverse (leakage) current that will flow at the specified voltage and temperature.
I_Z , I_{ZT} , I_{ZK}	Regulator Current: The dc regulator current (I_Z), at a specified test point (I_{ZT}), near the breakdown knee (I_{ZK})
I_{ZM}	Maximum Regulator (Zener) Current: The maximum rated dc current for the specified power rating.
I_{ZSM}	Maximum Zener Surge Current: The non-repetitive peak value of Zener surge current at a specified wave form.
N_D	Noise Density: The noise generated over a specified frequency bandwidth usually specified in terms of mV/√Hz
V_R	Reverse Voltage: The reverse voltage dc value, no alternating component.
V_Z	Zener Voltage: The Zener voltage the device will exhibit at a specified current (I_Z) in its breakdown region.
Z_{ZT} or Z_{ZK}	Dynamic Impedance: The small signal impedance of the diode when biased to operate in its breakdown region at a specified rms current modulation (typically 10% of I_{ZT} or I_{ZK}) and superimposed on I_{ZT} or I_{ZK} respectively.

2.2. Electrical Characteristics at 25 °C

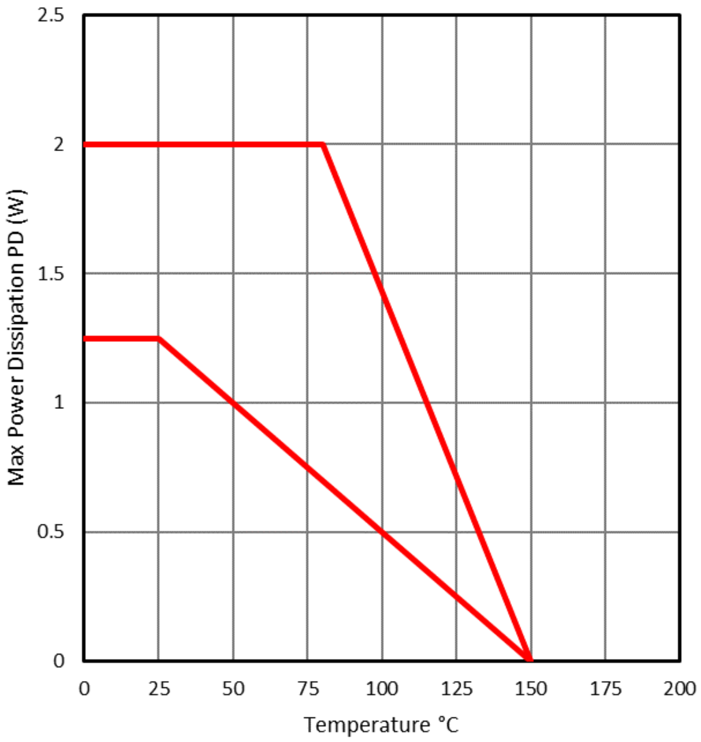
	Regulator Voltage [1] (V_Z @ I_{ZT}) V			Test Current (I_{ZT})	Max Dynamic Impedance [2] (Z_{ZT}@ I_{ZT})	Max Dynamic Knee Impedance[2] (Z_{ZK}@ I_{ZK})	Test Current (I_{ZK})	Maximum Reverse Leakage Current		Max Regulator Current (I_{ZM})	Max Surge Current [3] (I_{ZSM})
								I_R @ V_R	V_R		
Part Number	**Min**	**Nom**	**Max**	**mA**	**Ω**	**Ω**	**mA**	**µA**	**V**	**mA**	**mA**
SMBJ4733Ae3	4.85	5.1	5.36	49	7	550	1	10	1	178	890
SMBJ4743Ae3	12.35	13	13.65	19	10	700	0.25	5	9.9	69	344
SMBJ4746A	17.1	18	18.9	14	20	750	0.25	5	13.7	50	250
SMBJ4753Ae3	34.2	36	37.8	7	50	1000	0.25	5	27.4	25	125

Notes:

1. Zener voltage (V_Z) is measured at T_L = 25 °C (+8, –2 °C). Voltage measurement to be performed 40 ±10 millisecondsafter application of dc current.
2. The Zener impedance is derived from 60 Hz ac voltage resulting from an ac current modulation having an rms valueequal to 10% of the dc Zener current (I_{ZT} or I_{ZK}) superimposed on I_{ZT} or I_{ZK}. See MicroNote 202 for Zener impedance variation with different operating currents.
3. The surge current (I_{ZSM}) is specified as the maximum peak of a non-recurrent half-sine wave of 8.3 ms duration.
4. Forward voltage (V_F) is 1.2 volts maximum at 200 mA peak for 8.3 ms half-sine wave.

3. Graphs

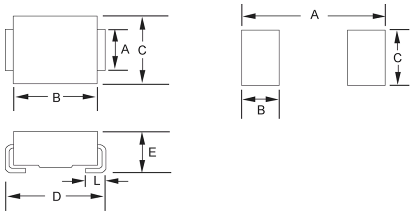
Figure 3-1. Power Derating Curve



4. Package Dimensions

4.1. SMBJ (DO-214AA)

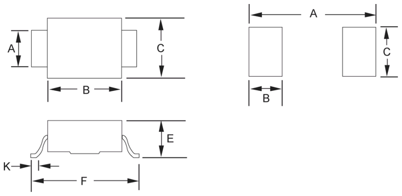
Figure 4-1. SMBJ (DO-214AA)



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

4.2. Pad Layout

Figure 4-2. Pad Layout



SMBJ (DO-214AA)		
Ltr	Inch	Millimeters
A	0.260	6.60
B	0.085	2.16
C	0.110	2.79

5. Revision History

Revision Level	Date	Description
A	4/2025	Initial version created in the Microchip template. Legacy document number is RF01309.

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