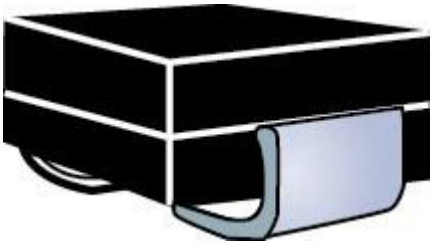
5 Watt Surface Mount Zener Diodes

SMBJ5340Be – SMBJ5348Ce3

Product Overview

The SMBJ53 is a family of surface mount 5 Watt Zener diode with Zener Voltages of 6V–11V, equivalent to JEDEC registered 1N5340–1N5348. 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.

Figure 1. DO-214AA J-Bend Package[1]



Note:

1. All SMB series are equivalent to prior SMS package identifications.

Features

- Ideal for high-density and low-profile mounting
- Moisture classification is Level 1 with no dry pack required per IPC/JEDEC J-STD-020F.
- RoHS compliant versions available
- Axial-lead equivalent package for thru-hole mounting is available as 1N5340–1N5348, contact Microchip for other surface mount options.

Applications/Benefits

- Regulates voltage over broad operating current and temperature ranges
- Available in Zener Voltages V_Z 6, 6.2, 6.8, 11V, with V_Z tolerance of B = 5%, or C = 2%
- 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

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1. Maximum Ratings

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

Parameters/Test Conditions	Symbol	Value	Unit
Junction and storage temperature	T_J and T_{STG}	–65 to +150	°C
Thermal resistance, junction to lead	$R_{\Theta JL}$	25	°C/W
Thermal resistance, junction to ambient [1]	$R_{\Theta JA}$	90	°C/W
Off-State power dissipation [2]	P_D	5	W
Solder temperature at 10 seconds	T_{SP}	260	°C

Notes:

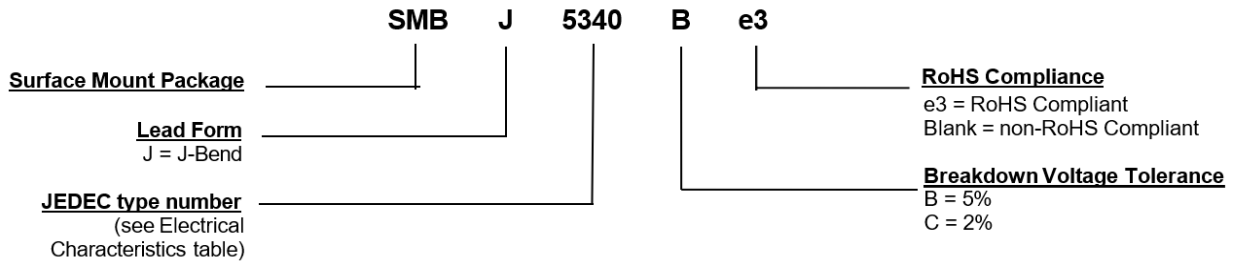
1. When mounted on FR4 PC board (1 oz Cu) with recommended footprint (see Pad Layout.)
2. 5 watts at $T_L \leq 25$ °C, or 1.38 watts at $T_A = 25$ °C when mounted on FR4 PC board with recommended footprint (also see Figure 4-1.)

1.1 Mechanical 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 53xx, Zener Voltage tolerance “B” or “C”, 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
- See Package Dimensions.

2. Part Nomenclature

Figure 2-1. Part Nomenclature



2.1 Symbols and Definitions

Table 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.

3. Electrical Characteristics

Table 3-1. Electrical Characteristics at 25 °C Unless Otherwise Stated[1–4]

Part Number	Regulator Voltage (V_Z at I_{ZT})			Test Current (I_{ZT})	Max Dynamic Impedance (Z_{ZT} at I_{ZT})	Max Dynamic Knee Impedance (Z_{ZK} at I_{ZK} = 1 mA)	Maximum Reverse Leakage Current		Max Regulator Current (I_{ZM})	Max Surge Current (I_{ZSM})
	V						I_R at V_R	V_R		
	Min.	Nom.	Max.	mA	Ω	Ω	µA	V	mA	A
SMBJ5340Be3	5.7	6	6.3	200	1	300	1	3	790	12.7
SMBJ5341B(e3)	5.89	6.2	6.51	200	1	200	1	3	765	12.4
SMBJ5342Ce3	6.66	6.8	6.94	175	1	200	10	5.2	720	11.5
SMBJ5348Ce3	10.78	11	11.22	125	2.5	125	5	8.4	445	8

Notes:

1. Zener voltage (V_Z) is measured at T_L = 25 °C (+8, –2 °C). Voltage measurement to be performed 40 ±10 milliseconds after application of dc current.
2. The Zener impedance is derived from 1 kHz ac voltage resulting from an ac current modulation having an rms value equal 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 1 amp peak for 8.3 ms half-sine wave.

4. Graphs

Figure 4-1. Power Derating Curve

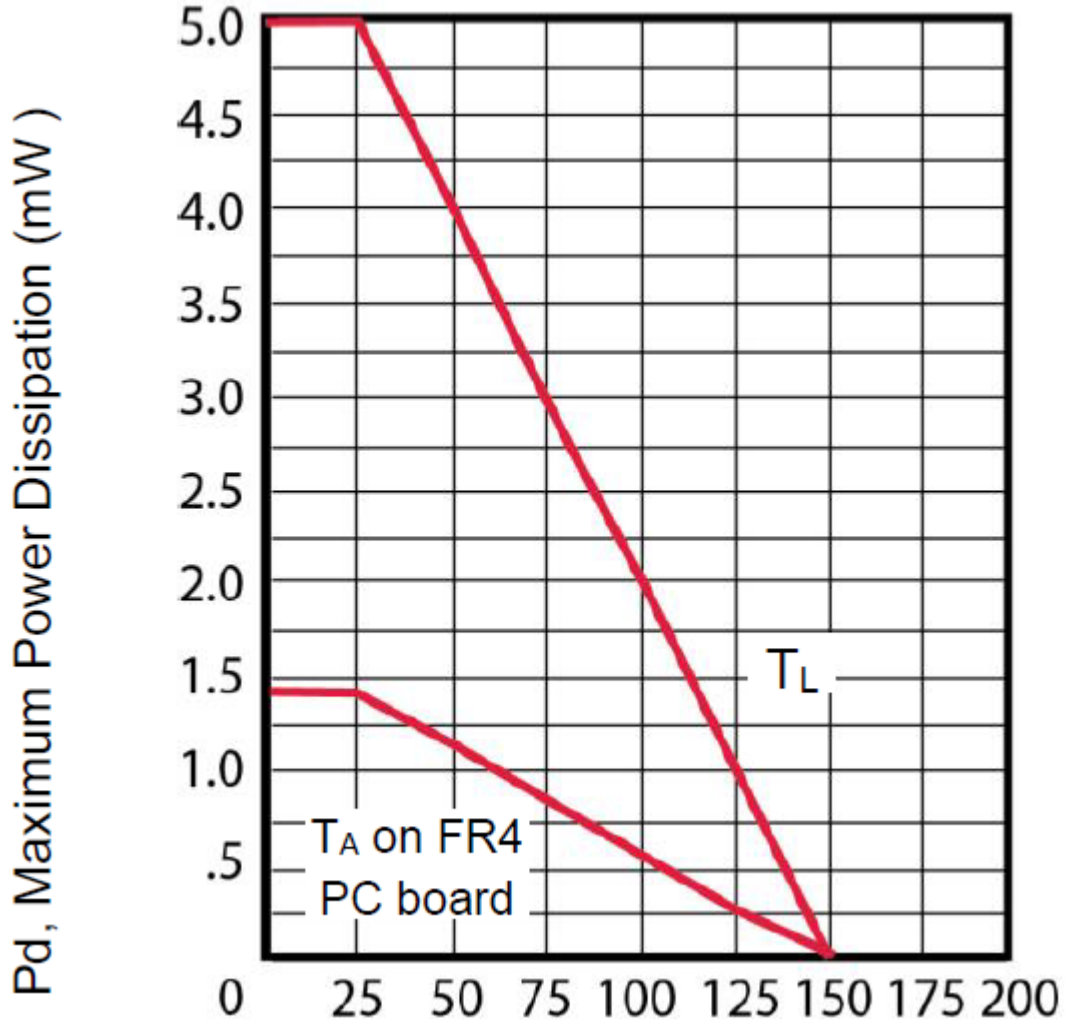
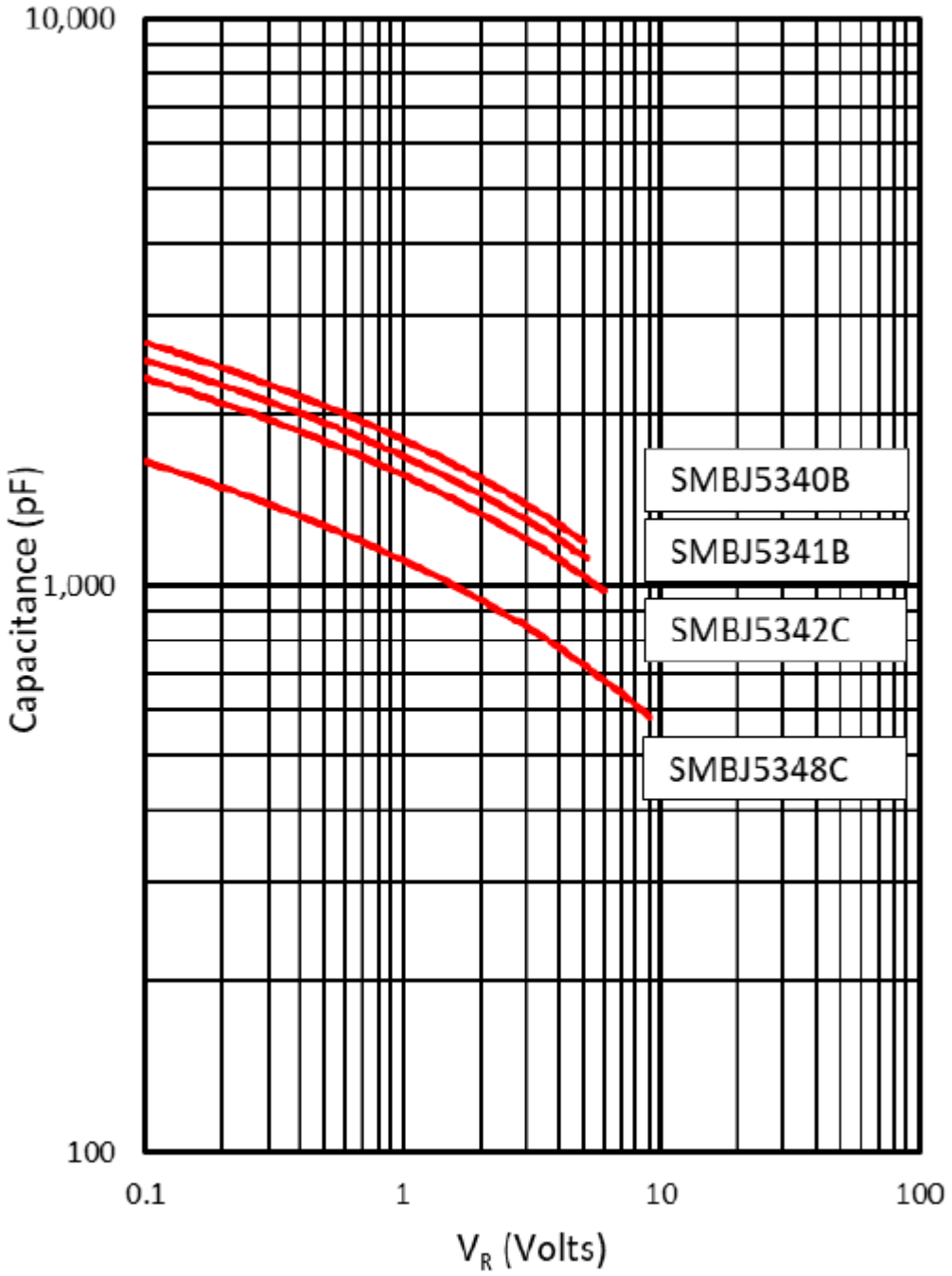


Figure 4-2. Typical Capacitance Vs. Reverse Voltage for 5 Watt Zener



5. Package Dimensions

Figure 5-1. Package Dimensions

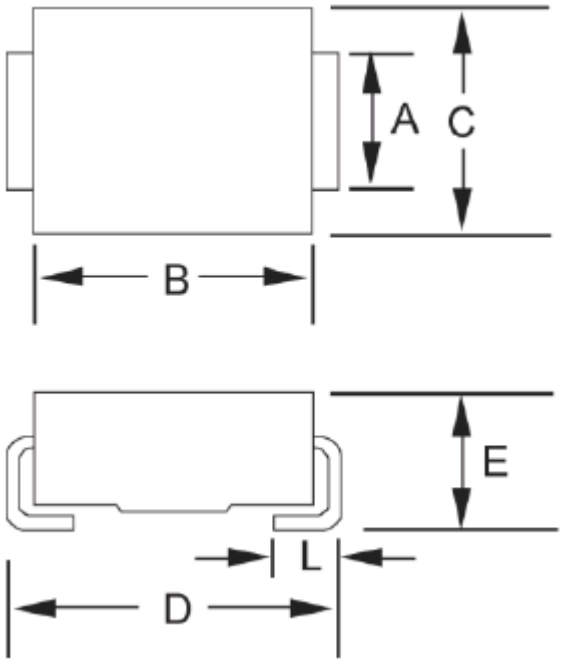


Table 5-1. SMBJ (DO-214AA)

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	.760	1.52

5.1 Pad Layout

Figure 5-2. Pad Layout

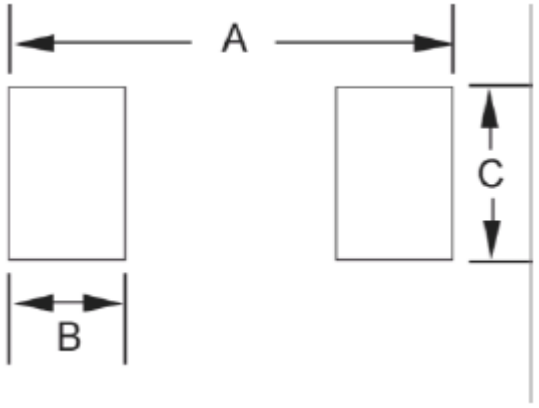


Table 5-2. SMBJ (DO-214AA)

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	01/2025	Converted to Microchip template and assigned literature number DS00005766.
Rev. A	10/2024	Microsemi document was created and assigned literature number RF01308.

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