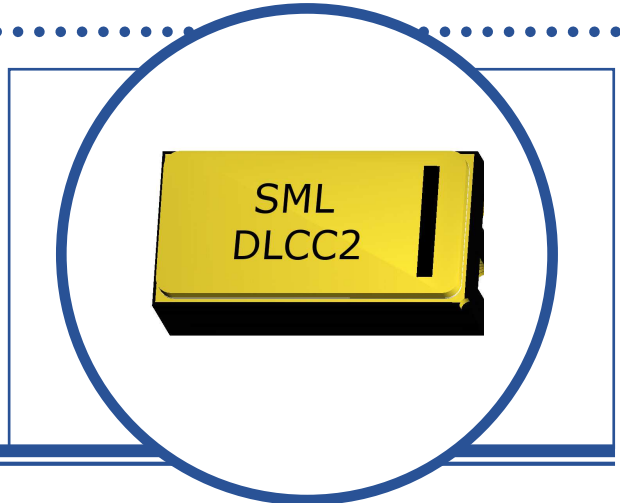


## 1N6309BD2A TO 1N6340BD2A

- DLCC2 Hermetic Ceramic Package Designed as a Drop-In Replacement for "D-5A"/"A-MELF" Package
- Standard Zener Voltage Tolerance of  $\pm 5\%$
- Space Level and High-Reliability Screening Options Available



### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise stated)

|           |   |                     |
|-----------|---|---------------------|
| $V_{ZM}$  | Reference Voltage                                   | See Reference Table |
| $I_{ZM}$  | Continuous DC Current                               | See Reference Table |
| $P_T$     | Total Power Dissipation at $T_A = 75^\circ\text{C}$ | 500mW               |
| $T_J$     | Junction Temperature Range                          | -65 to +175°C       |
| $T_{STG}$ | Storage Temperature Range                           | -65 to +175°C       |
| $T_{SP}$  | Maximum Soldering Pad Temperature for 20s           | 260°C               |

### THERMAL PROPERTIES

| Symbol                | Parameter                              | Max | Units |
|-----------------------|--|-----|-------|
| $R_{\theta JA}^{(1)}$ | Thermal Resistance Junction to Ambient | 300 | °C/W  |

(1) PCB = FR4 – 0.0625 Inch (1.59mm), 1 Layer, 1.0-Oz Cu, 0.007 Inch<sup>2</sup> (1.7mm x 2.76mm<sup>2</sup>) Pad Size, horizontal, in still air

# 500mW ZENER DIODES 1N6309BD2A TO 1N6340BD2A

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise stated)

| Type   | Nominal Zener Voltage @ $I_{Z2}$ ( $V_{Z2}$ ) | Minimum Zener Voltage @ $I_{Z1}$ 250 $\mu\text{A}$ ( $V_{Z1}$ ) | Test Current ( $I_{Z2}$ ) | Max Zener Impedance  |                                  | $I_{ZM}$ | Voltage Reg. <sup>(2)</sup> $V_{Z(\text{reg})}$ | Surge Current ( $I_{ZSM}$ ) | $V_R$ | Maximum Reverse Current @ $V_R$ |                                | Maximum Noise Density $N_D$ | Typical <sup>(3)</sup> Temp Coefficient $\alpha_{VZ}$ |
|--------|---|---|---------------------------|----------------------|----------------------------------|----------|---|-----------------------------|-------|---------------------------------|--------------------------------|-----------------------------|---|
|        |   |   |                           | @ $I_{Z2}$ ( $Z_Z$ ) | @ 250 $\mu\text{A}$ ( $Z_{ZK}$ ) |          |   |                             |       | @25 $^\circ\text{C}$ $I_{R1}$   | @150 $^\circ\text{C}$ $I_{R2}$ |                             |   |
|        | Volts   | Volts   | mA                        | $\Omega$             |                                  | mA       | V   | A                           | V     | $\mu\text{A}$                   |                                | $\mu\text{V}/\text{Hz}$     | %/ $^\circ\text{C}$                                   |
| 1N6309 | 2.4   | 1.1   | 20                        | 30                   | 1200                             | 177      | 1.5   | 2.5                         | 1.0   | 100                             | 200                            | 1.0                         | -0.085  |
| 1N6310 | 2.7   | 1.2   | 20                        | 30                   | 1300                             | 157      | 1.5   | 2.2                         | 1.0   | 60                              | 150                            | 1.0                         | -0.080  |
| 1N6311 | 3.0   | 1.3   | 20                        | 29                   | 1400                             | 141      | 1.5   | 2                           | 1.0   | 30                              | 100                            | 1.0                         | -0.075  |
| 1N6312 | 3.3   | 1.5   | 20                        | 27                   | 1400                             | 128      | 1.6   | 1.8                         | 1.0   | 5                               | 20                             | 1.0                         | -0.070  |
| 1N6313 | 3.6   | 1.8   | 20                        | 25                   | 1400                             | 117      | 1.6   | 1.65                        | 1.0   | 3                               | 12                             | 1.0                         | -0.065  |
| 1N6314 | 3.9   | 2   | 20                        | 23                   | 1700                             | 108      | 1.6   | 1.5                         | 1.0   | 2                               | 12                             | 1.0                         | -0.060  |
| 1N6315 | 4.3   | 2.4   | 20                        | 20                   | 1700                             | 99       | 0.9   | 1.4                         | 1.0   | 2                               | 12                             | 1.0                         | -0.045<br>+0.020                                      |
| 1N6316 | 4.7   | 2.8   | 20                        | 17                   | 1500                             | 90       | 0.5   | 1.27                        | 1.5   | 5                               | 12                             | 1.0                         | -0.028<br>+0.032                                      |
| 1N6317 | 5.1   | 3.3   | 20                        | 14                   | 1300                             | 83       | 0.4   | 1.17                        | 2     | 5                               | 12                             | 1.0                         | -0.020<br>+0.035                                      |
| 1N6318 | 5.6   | 4.3   | 20                        | 8                    | 1200                             | 76       | 0.4   | 1.1                         | 2.5   | 5                               | 10                             | 2                           | +0.050  |
| 1N6319 | 6.2   | 5.2   | 20                        | 3                    | 800                              | 68       | 0.3   | 0.97                        | 3.5   | 5                               | 10                             | 5                           | +0.060  |
| 1N6320 | 6.8   | 6.0   | 20                        | 3                    | 400                              | 63       | 0.35  | 1.23                        | 4     | 2                               | 50                             | 5                           | +0.062  |
| 1N6321 | 7.5   | 6.6   | 20                        | 4                    | 400                              | 57       | 0.4   | 1.16                        | 5     | 2                               | 30                             | 5                           | +0.068  |
| 1N6322 | 8.2   | 7.5   | 20                        | 5                    | 400                              | 52       | 0.4   | 1.07                        | 6     | 1.0                             | 10                             | 20                          | +0.075  |
| 1N6323 | 9.1   | 8.4   | 20                        | 6                    | 500                              | 47       | 0.5   | 0.97                        | 7     | 1.0                             | 10                             | 40                          | +0.076  |
| 1N6324 | 10  | 9.1   | 20                        | 6                    | 500                              | 43       | 0.5   | 0.89                        | 8     | 1.0                             | 10                             | 80                          | +0.079  |
| 1N6325 | 11  | 10  | 20                        | 7                    | 550                              | 39       | 0.5   | 0.83                        | 8.5   | 1.0                             | 10                             | 100                         | +0.082  |
| 1N6326 | 12  | 11  | 20                        | 7                    | 550                              | 35       | 0.55  | 0.77                        | 9     | 1.0                             | 10                             | 100                         | +0.083  |
| 1N6327 | 13  | 11.9  | 9.5                       | 8                    | 550                              | 33       | 0.55  | 0.71                        | 9.9   | 0.05                            | 10                             | 100                         | +0.083  |
| 1N6328 | 15  | 13.8  | 8.5                       | 10                   | 600                              | 28       | 0.7   | 0.62                        | 11    | 0.05                            | 10                             | 100                         | +0.084  |
| 1N6329 | 16  | 14.7  | 7.8                       | 12                   | 600                              | 27       | 0.75  | 0.58                        | 12    | 0.05                            | 10                             | 100                         | +0.084  |
| 1N6330 | 18  | 16.6  | 7                         | 14                   | 600                              | 24       | 0.85  | 0.52                        | 14    | 0.05                            | 10                             | 100                         | +0.085  |
| 1N6331 | 20  | 18.5  | 6.2                       | 18                   | 500                              | 21       | 0.95  | 0.47                        | 15    | 0.05                            | 10                             | 100                         | +0.086  |
| 1N6332 | 22  | 20.4  | 5.6                       | 20                   | 500                              | 19       | 1.05  | 0.43                        | 17    | 0.05                            | 10                             | 100                         | +0.087  |
| 1N6333 | 24  | 22.3  | 5.2                       | 24                   | 500                              | 18       | 1.15  | 0.39                        | 18    | 0.05                            | 10                             | 100                         | +0.088  |
| 1N6334 | 27  | 25.2  | 4.6                       | 27                   | 500                              | 16       | 1.3   | 0.35                        | 21    | 0.05                            | 10                             | 100                         | +0.090  |
| 1N6335 | 30  | 28  | 4.2                       | 32                   | 500                              | 14       | 1.45  | 0.31                        | 23    | 0.05                            | 10                             | 100                         | +0.091  |
| 1N6336 | 33  | 30.9  | 3.8                       | 40                   | 600                              | 13       | 1.6   | 0.28                        | 25    | 0.05                            | 10                             | 100                         | +0.092  |
| 1N6337 | 36  | 33.7  | 3.4                       | 50                   | 600                              | 12       | 1.75  | 0.26                        | 27    | 0.05                            | 10                             | 100                         | +0.093  |
| 1N6338 | 39  | 36.6  | 3.2                       | 55                   | 700                              | 11       | 1.9   | 0.24                        | 30    | 0.05                            | 10                             | 100                         | +0.094  |
| 1N6339 | 43  | 40.4  | 3                         | 65                   | 800                              | 9.9      | 2.1   | 0.22                        | 33    | 0.05                            | 10                             | 80                          | +0.095  |
| 1N6340 | 47  | 44.2  | 2.7                       | 75                   | 900                              | 9        | 2.25  | 0.2                         | 36    | 0.05                            | 10                             | 80                          | +0.095  |

## SERIES ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise)

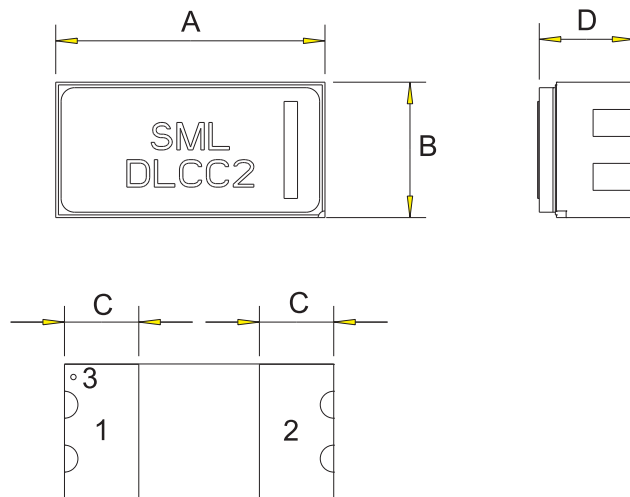
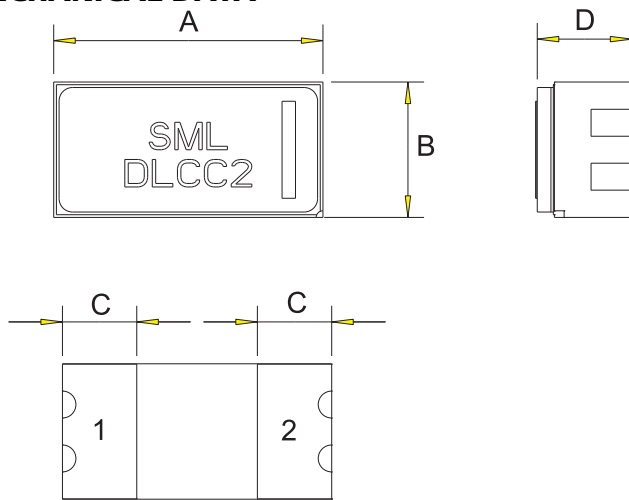
| Symbol | Parameters      | Test Conditions      | Max | Units |
|--------|-----------------|----------------------|-----|-------|
| $V_F$  | Forward Voltage | $I_F = 200\text{mA}$ | 1.5 | V     |

### Note

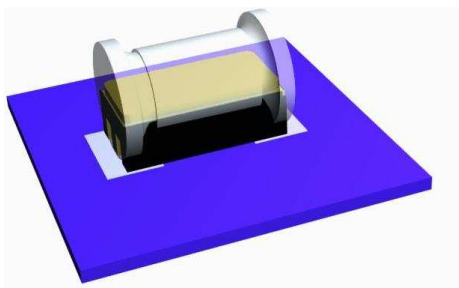
- (2) Voltage regulation  $V_{Z(\text{reg})}$  is the measured voltage change at thermal equilibrium between the current of 10% and 50% of Maximum Zener current  $I_{ZM}$  when the pad temperature is maintained at  $25^\circ\text{C} \pm 8^\circ\text{C}$ ,  $-2^\circ\text{C}$ . Not a production test.
- (3) Temp Coefficient is applicable to space product -  $I_Z$  stabilised at =  $I_{Z2}$  rated,  $T_1 = +25^\circ\text{C} \pm 5^\circ\text{C}$ ;  $T_2 = +125^\circ\text{C}$

# 500mW ZENER DIODES 1N6309BD2A TO 1N6340BD2A

## MECHANICAL DATA



DLCC2/ D-5A MELF OVERLAY



### DLCC2 Variant A (D2A)

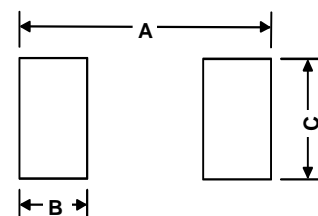
| PAD 1     | ANODE      |              |
|-----------|------------|--------------|
| PAD 2     | CATHODE    |              |
|           |            |              |
| DIMENSION | mm         | Inches       |
| A         | 5.00 ±0.10 | 0.197 ±0.004 |
| B         | 2.61 ±0.10 | 0.103 ±0.004 |
| C         | 1.08 ±0.10 | 0.043 ±0.004 |
| D         | 1.76 ±0.10 | 0.069 ±0.004 |

### DLCC2 Variant B (D2B)

| PAD 1     | ANODE                 |              |
|-----------|-----------------------|--------------|
| PAD 2     | CATHODE               |              |
| PAD 3     | LID CONTACT TO ANODE* |              |
|           |                       |              |
| DIMENSION | mm                    | Inches       |
| A         | 5.00 ±0.10            | 0.197 ±0.004 |
| B         | 2.61 ±0.10            | 0.103 ±0.004 |
| C         | 1.08 ±0.10            | 0.043 ±0.004 |
| D         | 1.76 ±0.10            | 0.069 ±0.004 |

### SOLDER PAD LAYOUT D-5A

| DIMENSION | mm   | Inches |
|-----------|------|--------|
| A         | 6.25 | 0.246  |
| B         | 1.70 | 0.067  |
| C         | 2.67 | 0.105  |



\* The additional contact provides a connection to the lid in the application. Connecting the metal lid to a known electrical potential stops deep dielectric discharge in space applications; see the Space Weather link [www.semelab.co.uk/dlcc2.html](http://www.semelab.co.uk/dlcc2.html) on the Semelab web site. Package variant to be specified at order.

Other Package Outlines may be available – Contact Semelab Sales to Enquire

# 500mW ZENER DIODES 1N6309BD2A TO 1N6340BD2A

## SCREENING OPTIONS

Space Level (JQRS/ESA) and High Reliability options are available in accordance with the [High Reliability and Screening Options Handbook](#) available for download from the from the TT electronics Semelab web site.

ESA Quality Level Products are based on the testing procedures specified in the generic ESCC 5000 and in the corresponding part detail specifications.

Semelabs QR216 and QR217 processing specifications (JQRS), in conjunction with the companies ISO 9001:2000 approval present a viable alternative to the American MIL-PRF-19500 space level processing.

QR217 (Space Level Quality Conformance) is based on the quality conformance inspection requirements of MIL-PRF-19500 groups A (table V), B (table VIa), C (table VII) and also ESA / ESCC 5000 (chart F4) lot validation tests.

QR216 (Space Level Screening) is based on the screening requirements of MIL-PRF-19500 (table IV) and also ESA /ESCC 5000 (chart F3).

JQRS parts are processed to the device data sheet and screened to QR216 with conformance testing to Q217 groups A and B in accordance with MIL-STD-750 methods and procedures.

Additional conformance options are available, for example Pre-Cap Visual Inspection, Buy-Off Visit or Data Packs. These are chargeable and must be specified at the order stage (See Ordering Information). Minimum order quantities may apply.

Alternative or additional customer specific conformance or screening requirements would be considered. Contact Semelab sales with enquiries.

## MARKING DETAILS

Parts can be laser marked with approximately 7 characters on two lines and always includes cathode identification. Typical marking would include part or specification number, week of seal or serial number subject to available space and legibility.

Customer specific marking requirements can be arranged at the time of order.

Example Marking:



## ORDERING INFORMATION

Part numbers are built up from Type, Package Variant, and screening level. The part numbers are extended to include the additional options as shown below.

Type – See Electrical Characteristics Table  
Package Variant – See Mechanical Data  
Screening Level – See Screening Options (ESA / JQRS)

Additional Options:

|  |                   |
|--|-------------------|
| Customer Pre-Cap Visual Inspection         | .CVP              |
| Customer Buy-Off visit                     | .CVB              |
| Data Pack                                  | .DA               |
| Solderability Samples                      | .SS               |
| Scanning Electron Microscopy               | .SEM              |
| Radiography (X-ray)                        | .XRAY             |
| Total Dose Radiation Test                  | .RAD              |
| MIL-PRF-19500 (QR217)                      |                   |
| Group B charge                             | .GRPB             |
| Group B destructive mechanical samples     | .GBDM (12 pieces) |
| Group C charge                             | .GRPC             |
| Group C destructive electrical samples     | .GCDE (12 pieces) |
| Group C destructive mechanical samples     | .GCDM (6 pieces)  |
| ESA/ESCC                                   |                   |
| Lot Validation Testing (subgroup 1) charge | .LVT1             |
| LVT1 destructive samples (environmental)   | .L1DE (15 pieces) |
| LVT1 destructive samples (mechanical)      | .L1DM (15 pieces) |
| Lot Validation Testing (subgroup 2) charge | .LVT2             |
| LVT2 endurance samples (electrical)        | .L2D (15 pieces)  |
| Lot Validation Testing (subgroup 3) charge | .LVT3             |
| LVT3 destructive samples (mechanical)      | .L3D (5 pieces)   |

Additional Option Notes:

- 1) All 'Additional Options' are chargeable and must be specified at order stage.
- 2) When Group B,C or LVT is required, additional electrical and mechanical destructive samples must be ordered
- 3) All destructive samples are marked the same as other production parts unless otherwise requested.

Example ordering information:

The following example is for the 1N6309B part with package variant A, JQRS screening, additional Group C conformance testing and a Data pack.

Part Numbers:

1N6309BD2A-JQRS (Include quantity for flight parts)  
1N6309BD2A-JQRS.GRPC (chargeable conformance option)  
1N6309BD2A-JQRS.GCDE (charge for destructive parts)  
1N6309BD2A-JQRS.GCDM (charge for destructive parts)  
1N6309BD2A-JQRS.DA (charge for Data pack)

Customers with any specific requirements (e.g. marking or screening) may be supplied with a similar alternative part number (there is maximum 20 character limit to part numbers). Contact Semelab sales with enquiries.

High Reliability and Screening Options Handbook link: [http://www.semelab.co.uk/pdf/misc/documents/hirel\\_and\\_screening\\_options.pdf](http://www.semelab.co.uk/pdf/misc/documents/hirel_and_screening_options.pdf)