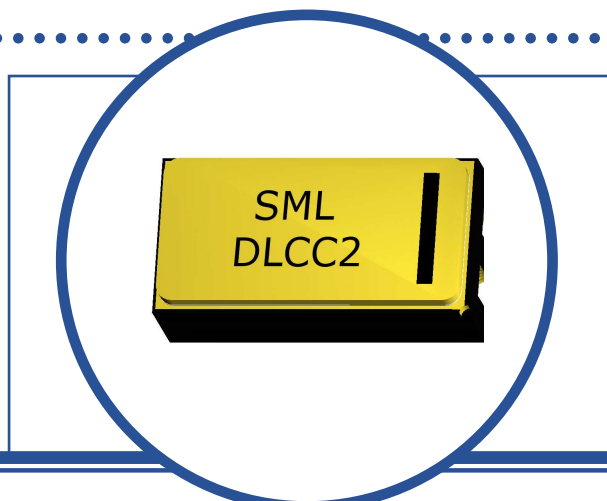


# 500mW ZENER DIODES

## 1N5221BD2A TO 1N5261BD2A

- DLCC2 Hermetic Ceramic Package Designed as a Drop-In Replacement for "D-5A"/ "A-MELF" Package
- Extensive Voltage Selection (2.4V – 47V)
- Standard Zener Voltage Tolerance of  $\pm 5\%$
- Regulation Over a Large Operating Current & Temperature Range
- 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	-55 to +175 $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-65 to +175 $^\circ\text{C}$
$T_{SP}$	Maximum Soldering Pad Temperature for 20s	260 $^\circ\text{C}$

### THERMAL PROPERTIES

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

(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

Semelab Limited reserves the right to change test conditions, parameter limits and package dimensions without notice. Information furnished by Semelab is believed to be both accurate and reliable at the time of going to press. However Semelab assumes no responsibility for any errors or omissions discovered in its use. Semelab encourages customers to verify that datasheets are current before placing an order.



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# 500mW ZENER DIODES

## 1N5221BD2A TO 1N5261BD2A

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

P/N	Nominal Zener Voltage	Test Current	Maximum Zener Impedance <sup>(1)</sup>		Maximum Reverse Leakage Current		Maximum Zener Voltage Coefficient <sup>(2)</sup>
	$V_Z @ I_{ZT}$	$I_{ZT}$	$Z_{ZT} @ I_{ZK}$	$Z_{ZT} @ I_{ZK} = 250\mu\text{A}$	$I_R$	@ $V_R$	$\alpha V_Z$
	V	mA	$\Omega$		$\mu\text{A}$	V	%/°C
1N5221	2.4	20	30	1200	100	1.0	-0.085
1N5222	2.5	20	30	1250	100		-0.085
1N5223	2.7	20	30	1300	75		-0.080
1N5224	2.8	20	30	1400	75		-0.080
1N5225	3.0	20	29	1600	50		-0.075
1N5226	3.3	20	28	1600	25		-0.070
1N5227	3.6	20	24	1700	15		-0.065
1N5228	3.9	20	23	1900	10		-0.060
1N5229	4.3	20	22	2000	5.0		$\pm 0.055$
1N5230	4.7	20	19	1900	5.0		2.0
1N5231	5.1	20	17	1600	5.0	3.0	$\pm 0.030$
1N5232	5.6	20	11	1600	5.0		+0.038
1N5233	6.0	20	7.0	1600	5.0	3.5	+0.038
1N5234	6.2	20	7.0	1000	5.0	4.0	+0.045
1N5235	6.8	20	5.0	750	3.0	5.0	+0.050
1N5236	7.5	20	6.0	500	3.0	6.0	+0.058
1N5237	8.2	20	8.0	500	3.0	6.5	+0.062
1N5238	8.7	20	8.0	600	3.0	6.5	+0.065
1N5239	9.1	20	10	600	3.0	7.0	+0.068
1N5240	10	20	17	600	3.0	8.0	+0.075
1N5241	11	20	22	600	2.0	8.4	+0.076
1N5242	12	20	30	600	1.0	9.1	+0.077
1N5243	13	9.5	13	600	0.5	9.9	+0.079
1N5244	14	9.0	15	600	0.1	10	+0.082
1N5245	15	8.5	16	600	0.1	11	+0.082
1N5246	16	7.8	17	600	0.1	12	+0.083
1N5247	17	7.4	19	600	0.1	13	+0.084
1N5248	18	7.0	21	600	0.1	14	+0.085
1N5249	19	6.6	23	600	0.1	14	+0.086
1N5250	20	6.2	25	600	0.1	15	+0.086
1N5251	22	5.6	29	600	0.1	17	+0.087
1N5252	24	5.2	33	600	0.1	18	+0.088
1N5253	25	5.0	35	600	0.1	19	+0.089
1N5254	27	4.6	41	600	0.1	21	+0.090
1N5255	28	4.5	44	600	0.1	21	+0.091
1N5256	30	4.2	49	600	0.1	23	+0.091
1N5257	33	3.8	58	700	0.1	25	+0.092
1N5258	36	3.4	70	700	0.1	27	+0.093
1N5259	39	3.2	80	800	0.1	30	+0.094
1N5260	43	3.0	93	900	0.1	33	+0.095
1N5261	47	2.7	105	1000	0.1	36	+0.095

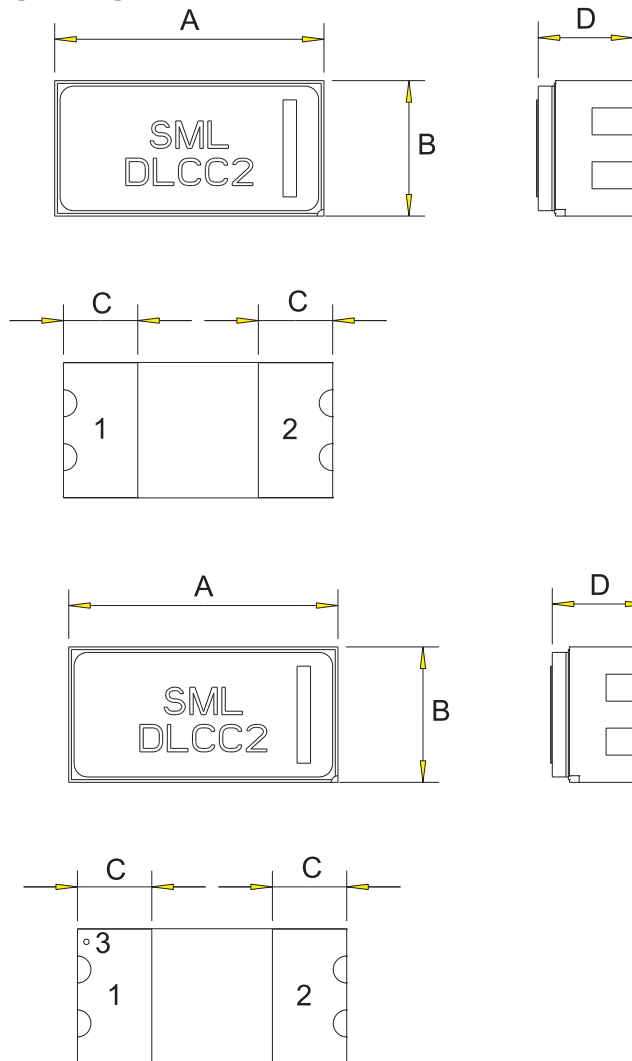
- Notes:
- Zener Impedance is measured to ensure a sharp knee characteristic on the breakdown curve. Derived from 50Hz ac voltage from ac current of 10% rms of  $I_{ZT}$  (or  $I_{ZK}$ ) superimposed on DC  $I_{ZT}$  (or  $I_{ZK}$ )
  - Temperature Coefficient test conditions:
    - $I_{ZT} = 7.5\text{mA}$ ,  $T_1 = 25^\circ\text{C}$ ,  $T_2 = 125^\circ\text{C}$  (1N5221 through to 1N5242)
    - $I_{ZT} = \text{Rated } I_{ZT}$ ,  $T_1 = 25^\circ\text{C}$ ,  $T_2 = 125^\circ\text{C}$  (1N5243 through to 1N5261)
- DUT temperature stabilised with constant current for  $\alpha V_Z$  measurement @  $T_1, T_2$

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

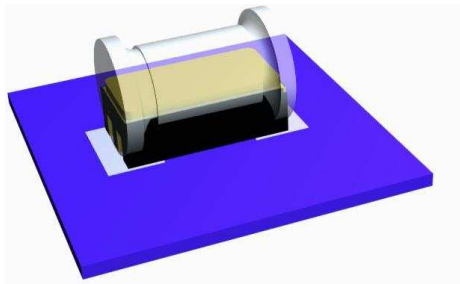
Symbol	Parameters	Test Conditions	Max	Units
$V_F$	Forward Voltage	$I_F = 200\text{mA}$	1.5	V

# 500mW ZENER DIODES 1N5221BD2A TO 1N5261BD2A

## MECHANICAL DATA



DLCC2/ D-5A MELF OVERLAY



### DLCC2 Variant A (D2A)

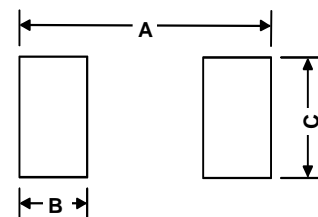
PAD 1	ANODE	
PAD 2	CATHODE	
DIMENSION	mm	Inches
A	5.00 ±0.10	0.197 ±0.004
B	2.61 ±0.10	0.103 ±0.004
C	1.08 ±0.10	0.043 ±0.004
D	1.76 ±0.10	0.069 ±0.004

### 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 1N5221BD2A TO 1N5261BD2A

## 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 1N5245B part with package variant A, JQRS screening, additional Group C conformance testing and a Data pack.

Part Numbers:

1N5245BD2A-JQRS (Include quantity for flight parts)  
1N5245BD2A.GRPC (chargeable conformance option)  
1N5245BD2A.GCDE (charge for destructive parts)  
1N5245BD2A.GCDM (charge for destructive parts)  
1N5245BD2A.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)