

# PACKAGED DETECTOR MODULES

## DB3031 Germanium Backward Diode Detector Modules

- 0.1–18 GHz frequency range
- High sensitivity at zero bias
- High dynamic range >45dB
- Low video impedance
- Excellent temperature stability
- Output variation <math>\pm 1\text{dB}</math> over 0.1–18 GHz

### LIMITING CONDITIONS OF USE

Operating temperature range	-65°C to +115°
Storage temperature range	-65°C to +125°
RF power (+25°C)	+17dBm†
Soldering temperature	230°C for 5 seconds

### ELECTRICAL CHARACTERISTICS

Electrical Characteristics 0.1–18GHz Device ( $T_{\text{amb}} = 25^\circ\text{C}$ )

Parameter	Typical Value	Test Conditions
Output sensitivity	650 mV/mW	$f = 2\text{--}18\text{GHz}$ , $P_{\text{in}} \pm 20\text{dBm}$ , $R_L = \infty$
Tangential sensitivity	-49dBm	$f = 9\text{GHz}$ , $R_L = 1\text{M}\Omega$ , $\text{NF} = 4\text{dB}$ , $\text{BW} = 1\text{MHz}$
Voltage standing Wave Ratio	2.5 : 1*	$f = 2\text{--}18\text{GHz}$ , $P_{\text{in}} = -20\text{dBm}$
Output flatness	<math>\pm 0.8\text{dB}</math>	$f = 2\text{--}18\text{GHz}$ , $P_{\text{in}} = -20\text{dBm}$
Output variation with Temperature	<math>\pm 0.3\text{dB}</math>	$f = 10\text{GHz}$ , -40 to +70°C, $P_{\text{in}} = 20\text{dBm}$
1dB compression point	-2.5dBm	$R_L = 430\Omega$ , $f = 2\text{--}18\text{GHz}$
RF/video Isolation	20dB	$P_{\text{in}} = -20\text{dBm}$ , $f = 2\text{--}18\text{GHz}$
Video resistance ( $R_v$ )	160 $\Omega$	$P_{\text{in}} = -20\text{dBm}$ , $f = 1\text{kHz}$
Video capacitance	20pF	$f = 1\text{MHz}$

\*VSWR <math>< 2:1</math> can be obtained with a slightly reduced output sensitivity  
†Derate 0.5mW/°C above +25°C

NOTES: 1 These devices are available also on microstrip tiles  
2 Outline number 161 — refer page 19.

# PACKAGED VARACTOR DIODES

## Silicon Abrupt Tuning Varactors DC4200 Series

- High Q
- High reliability
- Wide range of capacitance values
- High capacitance tolerance
- Glass or ceramic packages
- Large tuning range

LIMITING CONDITIONS	
Operating temperature range	- 55°C to + 100°C
Storage temperature range	- 55°C to + 150°C

The following table indicates the range of devices currently available. Customised devices can be supplied to specific requirements.

ELECTRICAL CHARACTERISTICS at $T_{amb} = 25^{\circ}\text{C}$							
Type number	Outline number	Minimum breakdown voltage (V)	Total capacitance $C_T$ (pF)	Minimum capacitance ratio $C_{4V}/C_{60V}$	Minimum Quality Factor		
					Q	Test frequency (MHz)	Reverse voltage (V)
DC4255B	35	60	2.2	2.5	550	50	-4.0
DC4256B	35	60	3.3	2.7	450	50	-4.0
DC4266B	00	60	3.3	2.7	500	50	-4.0
DC4286B	06A	60	3.3	2.7	500	50	-4.0
DC4257B	07	60	4.7	2.8	450	50	-4.0
DC4210B	07	60	6.8	2.9	450	50	-4.0
DC4211B	07	60	8.2	2.9	400	50	-4.0
DC4212B	07	60	10.0	3.0	350	50	-4.0
DC4213B	07	60	12.0	3.0	350	50	-4.0
DC4214B	07	60	15.0	3.1	300	50	-4.0
DC4215B	07	60	18.0	3.1	250	50	-4.0
DC4216B	07	60	22.0	3.2	250	50	-4.0
DC4217B	07	60	27.0	3.2	200	50	-4.0
DC4218B	07	60	33.0	3.2	200	50	-4.0
DC4224B	07	60	39.0	3.2	200	50	-4.0
DC4225B	07	60	47.0	3.2	200	50	-4.0
DC4226B	14	60	56.0	3.2	120	50	-4.0
DC4227B	14	60	68.0	3.2	120	50	-4.0
DC4228B	14	60	80.0	3.2	100	50	-4.5
DC4229D	14	100	86.0	3.2	200	50	-4.5
DC4229F	14	120	57.0	3.85	240	50	-15
DC4232B	18	60	100	3.2	200	10	-4.0
DC4233B	18	60	120	3.2	200	10	-4.0
DC4234B	18	60	150	3.2	200	10	-4.0
DC4298	10	100	200	3.2	200	25	-8.0
DC4299	10	100	335	3.2	200	25	-8.0
DC4244C	78	90	350	3.2	750	1	-4.0
DC4265B	00	60	2.2	2.5	550	50	-4.0
DC4285B	06A	60	2.2	2.5	550	50	-4.0
DC4266B	00	60	3.3	2.7	500	50	-4.0
DC4286B	06A	60	3.3	2.7	500	50	-4.0
DC4267B	00	60	4.7	2.8	450	50	-4.0
DC4287B	06A	60	4.7	2.8	450	50	-4.0
Test conditions	—	$I_R = 10\mu\text{A}$	$f = 1\text{MHz}$	$f = 1\text{MHz}$			

# PACKAGED VARACTOR DIODES

## GaAs Hyperabrupt Tuning Varactors DC4600 & DC4700 Series

- Millimetre wave applications
- Constant gamma for linear tuning
- Wide bandwidth tuning
- Range of packages
- Molecular beam epitaxy material
- High Q
- Custom devices available

LIMITING CONDITIONS OF USE	
Maximum reverse voltage	20
Operating temperature range	-55°C to +150°C
Storage temperature range	-55°C to +175°C

TYPICAL ELECTRICAL CHARACTERISTICS at $T_{amb} = 25^\circ\text{C}$ unless otherwise specified		
Parameter	Range of values available	Test conditions
Capacitance $C_T$ (pF)	from < 0.5 to 10	$f = 1 \text{ MHz}$ and $V_R = -4\text{V}$
Minimum Q	from 1000 to >4000	$f = 50 \text{ MHz}$ and $V_R = -4\text{V}$
Breakdown Voltage $V_B$	> 20V	$I_R = 10\mu\text{A}$
Capacitance ratio $\frac{C_J \text{ when } V_R = 2\text{V}}{C_J \text{ when } V_R = 20\text{V}}$	from 3.0 to 10.0	$f = 1 \text{ MHz}$
Nominal tuning range (V)	2 to 20	
Gamma value $\gamma$	available in 2 ranges: constant gamma = 1.0 (DC4600 series) constant gamma = 1.25 (DC4700 series)	extrapolated from C-V plot

DC4600 SERIES — CONSTANT GAMMA VALUE 1.0					
Type number	DC4601-4	DC4602-3	DC4603-2	DC4605-2	Test conditions
Outline Number	00	00			
Quality factor Q	138	94	73	61	$V_R = -4\text{V}$ $f = 1 \text{ GHz}$
Quality factor Q	2700	1800	1400	1200	$V_R = -4\text{V}$ $f = 50 \text{ MHz}$
Breakdown voltage $V_B$ (V)	>20	>20	>20	>20	$I_R = 10\mu\text{A}$
Total capacitance $C_J$ when $V_R = 4\text{V}$	0.86	1.30	2.2	3.5	$f = 1 \text{ MHz}$ $V_R = -4\text{V}$
Gamma value $\gamma$	1.0	1.0	1.0	1.0	from C-V plot
Capacitance ratio $\frac{C_J \text{ when } V_R = 2\text{V}}{C_J \text{ when } V_R = 20\text{V}}$	7.8	7.8	7.8	7.8	$f = 1 \text{ MHz}$ $V_R = -4\text{V}$

DC4700 SERIES — CONSTANT GAMMA VALUE 1.25			
Type number	DC4702-3	DC4703-3	Test conditions
Outline Number	00	00	
Quality factor Q	80	74	$V_R = -4\text{V}$ $f = 1 \text{ GHz}$
Quality factor Q	1000	1500	$V_R = -4\text{V}$ $f = 50 \text{ MHz}$
Breakdown voltage $V_B$ (V)	>20	>20	$I_R = 10\mu\text{A}$
Total capacitance $C_J$ when $V_R = 4\text{V}$	1.0	1.5	$f = 1 \text{ MHz}$ $V_R = -4\text{V}$
Gamma value $\gamma$	1.25	1.25	from C-V plot
Capacitance ratio $\frac{C_J \text{ when } V_R = 2\text{V}}{C_J \text{ when } V_R = 20\text{V}}$	9.9	9.9	$f = 1 \text{ MHz}$ $V_R = -4\text{V}$

TBA = To be advised

# PACKAGED RF PIN DIODES

## RF PIN Diodes DC2900 Series

- Good linearity and low harmonic distortion
- Long minority carrier lifetime
- Low capacitance and resistance
- Very high breakdown voltages
- Wire-ended and surface mount versions available.

LIMITING CONDITIONS	
CW power dissipation at 25°C	See selection table
Operating temperature range	-55°C to +200°C
Storage temperature range	-55°C to +200°C

SELECTION TABLE — PROVISIONAL DATA													
Type number	Outline number	Breakdown voltage $V_B$ (V)		Total capacitance $C_T$ (pF)		Series resistance $R_S$ ( $\Omega$ )				Minority carrier lifetime $\tau_L$ ( $\mu$ S)		Maximum CW power dissipation (W)	
		Min.	Typical	Max.	Typical	Max.	Typical	Max.	Typical	Min.	Typical	Amb. rated	Case* rated
DC2916	32/119	200	340	2.0	1.8	0.60	0.53	—	0.38	0.5	1.6	2.30	3.10
DC2917	33/120	200	TBA	2.0	TBA	0.60	TBA	—	TBA	0.5	TBA	TBA	TBA
DC2918	07	200	TBA	2.0	TBA	0.60	TBA	—	TBA	0.5	TBA	0.50	1.00
DC2919	35	200	340	2.0	1.3	0.60	0.53	—	0.38	0.5	1.6	0.35	0.48
DC2926	32/119	200	370	1.2	1.1	0.94	0.88	—	0.41	0.6	1.3	2.30	3.10
DC2927	33/120	200	TBA	0.8	TBA	0.94	TBA	—	TBA	0.6	TBA	TBA	TBA
DC2928	07	200	TBA	0.7	TBA	0.94	TBA	—	TBA	0.6	TBA	0.50	1.00
DC2929	35	200	250	0.7	0.6	0.94	0.75	—	0.48	0.6	2.1	0.35	0.48
DC2927-1	33/120	200	TBA	0.8	TBA	1.00	TBA	—	TBA	0.5	TBA	TBA	TBA
DC2936	32/119	200	352	1.7	1.6	0.50	0.37	—	0.19	1.5	2.2	2.30	3.10
DC2937	33/120	200	TBA	1.7	TBA	0.50	TBA	—	TBA	1.5	TBA	TBA	TBA
DC2938	07	200	381	1.7	1.3	0.50	0.36	—	0.21	1.5	2.3	0.50	1.00
DC2939	35	200	TBA	1.7	TBA	0.50	TBA	—	TBA	1.5	TBA	0.35	0.48
DC2937-1	33/120	200	TBA	2.0	TBA	0.50	TBA	—	TBA	1.0	TBA	TBA	TBA
DC2941	32/119	200	400	2.5	2.2	—	0.32	0.25	0.14	1.5	2.2	2.30	3.10
DC2943	07	200	360	2.5	1.7	—	0.34	0.25	0.17	1.5	2.3	0.50	1.00
DC2956	32/119	200	550	1.2	0.9	—	0.99	0.45	0.41	2.0	2.1	2.30	3.10
Test conditions		$I_R < 10\mu A$		$V_R = 50V$ $f = 1MHz$		$I_F = 10mA$ $f = 40MHz$		$I_F = 80mA$ $f = 40MHz$		$I_F = 10mA$ $I_R = -6mA$		*Infinite heat-sink mounted 5mm from diode body	

TBA = To be advised

# PACKAGED GUNN DIODES

## Low Power Gunn Diodes DC1200 Series

- Low cost
- Low noise
- High reliability

LOW POWER GUNN DIODES		
Polarity The heat sink is positive. The diode will be destroyed if the polarity is reversed. A low impedance constant voltage supply is required		
Maximum operating voltage $V_O$ (V)		Notes
DC1203, DC1233	16	—
DC1201, DC1231	10	—
DC1202, DC1232, DC1205, DC1222	8	—
Reverse voltage, i.e. top flange positive $V_R$ (V)	1	—
Input power $P_{in}$ (W)	3	—
Operating temperature range (stud) $T_C$ (°C)	-20 to +70	4.7
Storage temperature range $T_{stg}$ (°C)	-55 to +150	—

Type no.	Outline no. see page 18-19	Frequency band (GHz) (note 1)	Minimum output power (mW) (note 2)	Typical operating voltage (V)	Typical operating current (mA) (note 3)
DC1203A	00	4-8	5	12	100
DC1203B	00	4-8	10	12	120
DC1203C	00	4-8	15	12	130
DC1203D	00	4-8	20	12	140
DC1203E	00	4-8	30	12	180
DC1233A	40	4-8	5	12	100
DC1233B	40	4-8	10	12	120
DC1233C	40	4-8	15	12	130
DC1233D	40	4-8	20	12	140
DC1233E	40	4-8	30	12	180
DC1201A	00	8-12	5	8	145
DC1201B	00	8-12	10	8	145
DC1201C	00	8-12	15	8	150
DC1201D	00	8-12	20	8	160
DC1201E	00	8-12	30	8	200
DC1231A	40	8-12	5	8	145
DC1231B	40	8-12	10	8	145
DC1231C	40	8-12	15	8	150
DC1231D	40	8-12	20	8	160
DC1231E	40	8-12	30	8	200
DC1202A	00	12-18	5	6.5	140
DC1202B	00	12-18	10	6.5	160
DC1202C	00	12-18	15	6.5	170
DC1202D	00	12-18	20	6.5	180
DC1202E	00	12-18	30	6.5	200
DC1232A	40	12-18	5	6.5	140
DC1232B	40	12-18	10	6.5	160
DC1232C	40	12-18	15	6.5	170
DC1232D	40	12-18	20	6.5	180
DC1232E	40	12-18	30	6.5	200
DC1222A	86	12-18	5	6.5	140
DC1222B	86	12-18	10	6.5	160
DC1222C	86	12-18	15	6.5	170
DC1222D	86	12-18	20	6.5	180
DC1222E	86	12-18	30	6.5	200
DC1225A	86	18-26	5	6	150
DC1225B	86	18-26	10	6	170
DC1225C	86	18-26	15	6	180
DC1225D	86	18-26	20	6	190

See page 17 for notes

# PACKAGED GUNN DIODES

## High Power Gunn Diodes DC1200 Series

- Low cost
- High reliability
- Output power up to 500 mW available
- Custom devices available

### HIGH POWER GUNN DIODES

Polarity The heat sink is negative. The diode will be destroyed if the polarity is reversed. A low impedance constant voltage supply is required

Maximum operating voltage $V_O$ (V)		Notes
DC1253, DC1283	16	—
DC1251, DC1281	10	—
DC1252, DC1282	8	—
Reverse voltage, i.e. top flange negative $V_R$ (V)	1	—
Operating temperature range (stud) $T_C$ (°C)	-20 to +70	4 and 5
Storage temperature range $T_{stg}$ (°C)	-55 to +150	—

Type no.	Outline no. see page 18-19	Frequency band (GHz) (note 1)	Minimum output power (mW) (note 2)	Typical operating voltage (V)	Typical operating current (mA) (note 3)
DC1253F	00	4-8	50	14	400
DC1253G	00	4-8	100	14	600
DC1253H	00	4-8	200	14	900
DC1283F	40	4-8	50	14	400
DC1283G	40	4-8	100	14	600
DC1283H	40	4-8	200	14	600
DC1251F	00	8-12	50	10	300
DC1251G	00	8-12	100	10	400
DC1251H	00	8-12	200	10	800
DC1251J	00	8-12	300	10	1200
DC1251K	00	8-12	400	10	1600
DC1251L	00	8-12	500	10	2000
DC1281F	40	8-12	50	10	200
DC1281G	40	8-12	100	10	400
DC1281H	40	8-12	200	10	800
DC1281J	40	8-12	300	10	1200
DC1252F	00	12-18	50	7.0	400
DC1252G	00	12-18	100	7.0	600
DC1252H	00	12-18	200	7.0	900
DC1252J	00	12-18	300	7.0	1300
DC1282F	40	12-18	50	6.5	400
DC1282G	40	12-18	100	6.5	600
DC1282H	40	12-18	200	6.5	900
DC1275F	86	18-26	50	6.0	500
DC1275G	86	18-26	100	6.0	700
DC1275H	86	18-26	200	6.0	1000
DC1276F	106	26-40	50	5.0	700
DC1276G	106	26-40	100	5.0	1200

#### NOTES

- The required operating frequency within this band must be specified when ordering. The standard test frequencies within the three frequency bands are 60, 95 and 150 GHz respectively. Diodes operating over 18-26 GHz and 26-40 GHz do not have a standard test frequency.
- The diodes are tested in a half wavelength low Q coaxial cavity. Diodes can be tested in other cavities to special order.
- The power supply must be capable of supplying an adequate saturation current. A value of 1.5 times the operating current as a maximum power supply rating will give an adequate margin.
- An adequate heat sink must be provided so that the rated stud temperature is not exceeded.  
The temperature coefficient of frequency for a low Q coaxial cavity is typically 1 MHz/°C. In a high Q cavity it is almost directly dependent on cavity expansion and in a waveguide cavity with a Q of about 200 the temperature coefficient of frequency will be about 300 KHz/°C.  
The variation of power with temperature will depend initially on the relative change of the match of the diode to the cavity but a reduction of up to 3dB can be expected at +70°C.
- Diodes for wider temperature ranges can be supplied to special order.

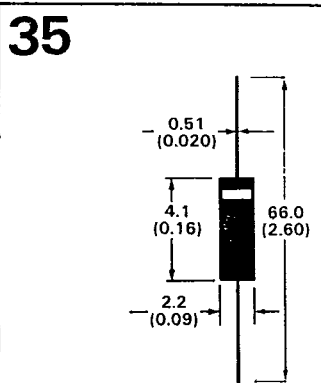
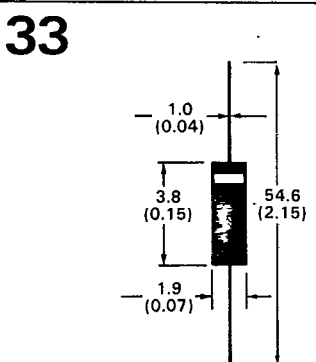
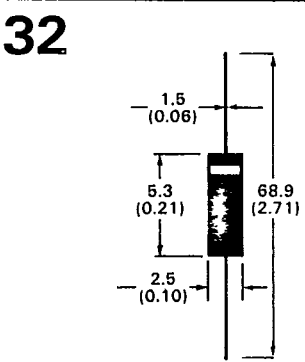
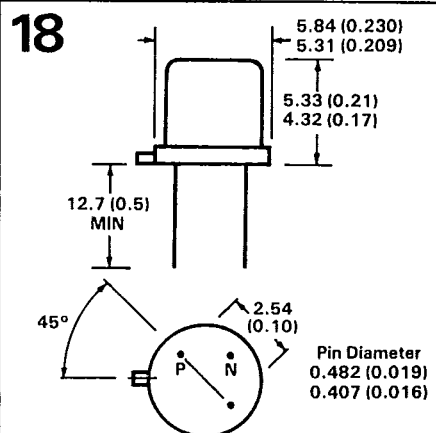
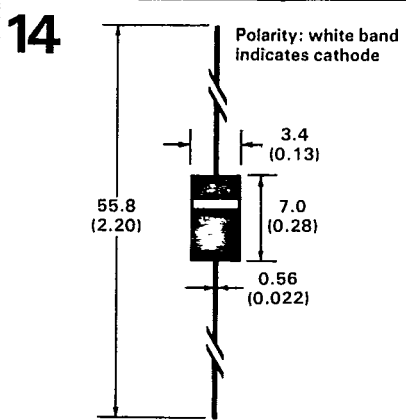
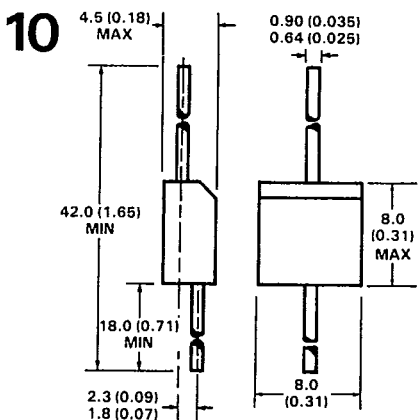
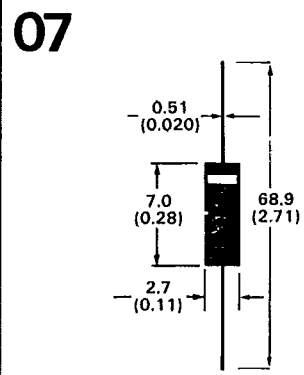
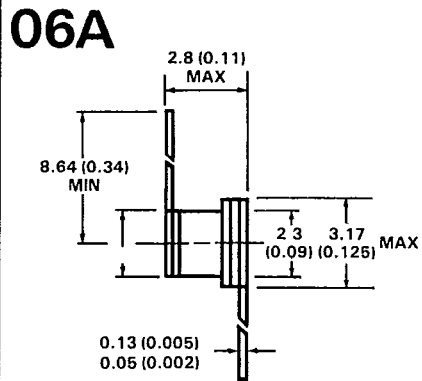
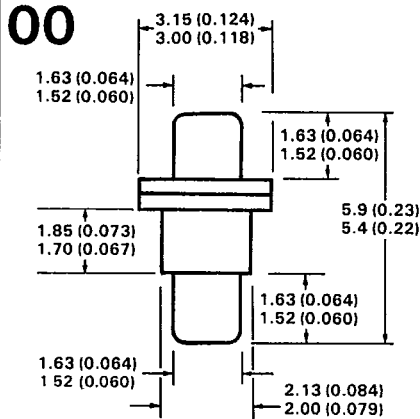
PACKAGED DEVICES

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**PACKAGED  
DEVICES**

**Outline  
Drawings**

**Dimensions in mm (inches)**



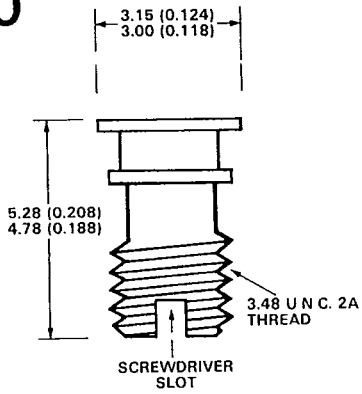
**PACKAGED DEVICES**

**Outline Drawings**

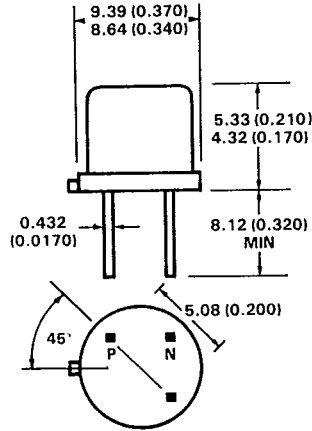
PACKAGED DEVICES

Dimensions in mm (inches)

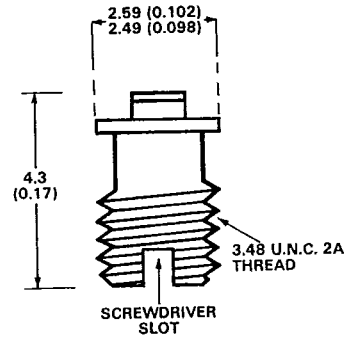
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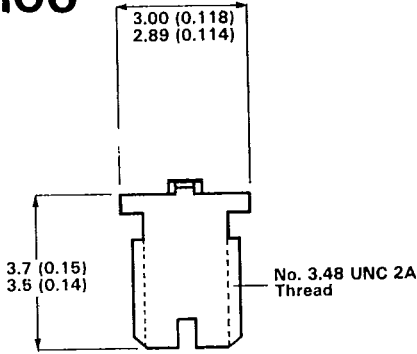
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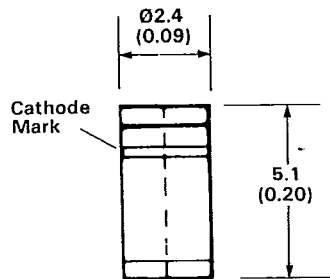
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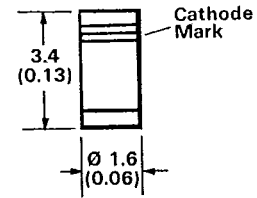
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**120**



**161**

