DS3416-1.2

DC2900 Series

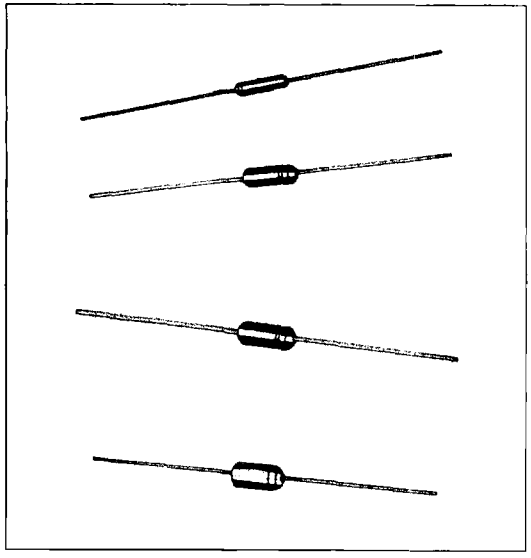
UHF/VHF PIN DIODES

These RF diodes form part of our extensive range of PIN diodes and have been especially designed with 'long minority carrier lifetime'. They also exhibit good linearity and low harmonic distortion at frequencies as low as 1MHz.

The low capacitance and series resistance of these devices impart high isolation and low insertion losses at frequencies up to and exceeding 1GHz. The thin passivated 'mesa' structure affords them very high breakdown voltages and minimum fringing capacitance.

The PIN diode is an extention of the conventional PN junction diode. It contains an intrinsic I layer of high restivity silicon sandwiched between the P and N layers. Varying the bias current through the diode controls the charge in the I region and hence the diode's RF resistance. It can be made to act almost as a pure resistor at RF frequencies.

The DC2900 Series are available in four packages - two 'C-Crimp' and two 'Double-Stud' devices in "Double-Stud" packages are capable of higher power dissipation and have a lower inductance. Devices in 'C-Crimp' packages have a lower capacitance. The larger the package size the better the power handling capability.



FEATURES

- **Long minority carrier lifetime**
- **Good linearity**
- **Low harmonic distortion**
- **Very high breakdown voltages**
- **Low capacitance and series resistance**
- **Low thermal impedance**
- **Choice of four packages**
- **Hard glass chip passivation for relaibility**

APPLICATIONS

DC2900 series diodes are designed for use as medium power current controlled resistors and on/off switches.

As switches they are ideal for antenna switching matrices, duplexers, digital phase shifters and time multiplex filters.

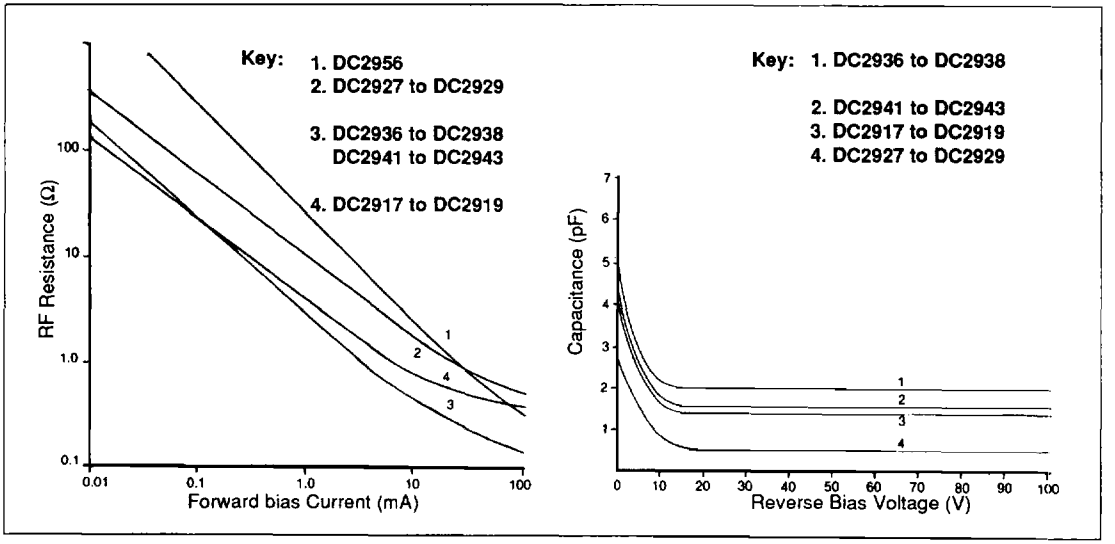
As current controlled resistors they are excellent in such applications as variable attenuators, AGC circuits, analog phase shifters and limiters.

LIMITING CONDITIONS OF USE

CW power Dissipation at 25°C	See Selection Table
Storage Temperature Range	-55° to +200°C
Operating Temperature Range	-55° to +200°C

ELECTRICAL CHARACTERISTICS - PROVISIONAL DATA

Type No.	Outline No.	Min Breakdown Voltage V_B (V)	Max Total Capacitance C_T (pF)	Max Series Resistance R_S (Ω)	Min Minority Carrier Lifetime τ_L (μS)	Maximum CW Power Dissipation (W) Amb. Rated	Maximum CW Power Dissipation (W) Case* Rated
DC2916	32	200	2.0	0.60 @ 10mA	0.5	2.30	3.10
DC2917	33	200	2.0	0.60 @ 10mA	0.5	0.75	1.00
DC2918	07	200	2.0	0.60 @ 10mA	0.5	0.50	1.00
DC2919	35	200	2.0	0.60 @ 10mA	0.5	0.35	0.48
DC2926	32	200	1.2	0.94 @ 10mA	0.6	2.30	3.10
DC2927	33	200	0.8	0.94 @ 10mA	0.6	0.75	1.00
DC2928	07	200	0.7	0.94 @ 10mA	0.6	0.50	1.00
DC2929	35	200	0.7	0.94 @ 10mA	0.6	0.35	0.48
DC2929-2	35	200	0.7	0.70 @ 10mA	0.5	0.35	0.48
DC2936	32	200	1.7	0.50 @ 10mA	1.5	2.30	3.10
DC3636-1	32	200	1.7	0.50 @ 10mA	0.5	2.30	3.10
DC2936-2	32	200	2.0	0.50 @ 10mA	0.6	2.30	3.10
DC2937	33	200	1.7	0.50 @ 10mA	1.5	0.75	1.00
DC2938	07	200	1.7	0.50 @ 10mA	1.5	0.50	1.00
DC2939	35	200	1.7	0.50 @ 10mA	1.5	0.35	0.48
DC2941	32	200	2.5	0.25 @ 80mA	1.5	2.30	3.10
DC2943	07	200	2.5	0.25 @ 80mA	1.5	0.50	1.00
DC2956	32	200	1.2	0.45 @ 80mA	2.0	2.30	3.10
DC2956-1	32	400	1.2	0.45 @ 80mA	2.0	2.30	3.10
DC2957	14	200	1.4	0.50 @ 50mA	6.0	0.50	1.00
DC2958	07	200	1.0	0.50 @ 100mA	2.0	0.50	1.00
DC2958-2	07	500	0.95	0.45 @ 100mA	2.0	0.50	1.00
DC2962	33	200	1.5	0.55 @ 10mA	0.5	0.75	1.00
DC2972	33	100	2.0	0.50 @ 10mA	0.5	0.75	1.00
Test Conditions		I_R < 10μA	V_R = 100V f = 1MHz	f = 100MHz	I_F = 10mA I_R = -6mA	*Infinite heatsink mounted 5mm from diode body	



Graph 1. Typical RF Resistance vs Forward Bias

Graph 2. Typical Capacitance vs Reverse Voltage

MINORITY CARRIER LIFETIME (τ_L)

τ_L is the average time of recombination of electrons and holes within the I region and reflects a PIN diode's ability to store charge. It is important for characterising PIN diodes since it defines the minimum frequency ($f_O = 1/2\tau\pi_L$) for linear behavior of the diode. Operation of the diode below this frequency results in considerable harmonic distortion, although this is not important for switching applications. DC2900 series diodes are relatively long lifetime types and can be used down to 1 MHz without significant distortion.

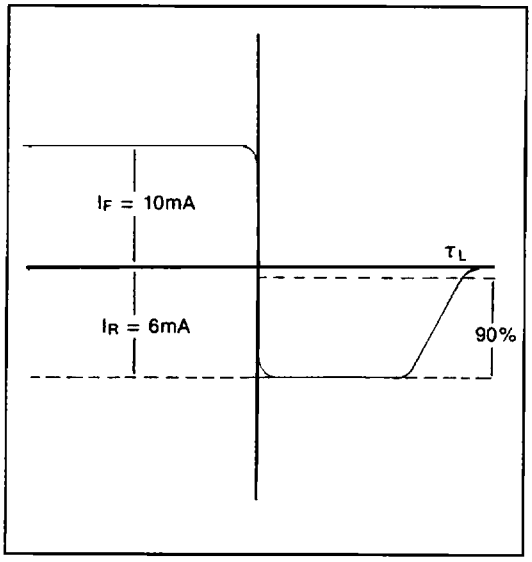


Figure 2

To measure τ_L, a known charge is stored in the I region by applying a forward bias current of 10mA, and this is extracted by applying a negative pulse so that a reverse current of peak value 6mA flows through the diode. A measure of τ_L is obtained by defining the time taken to extract charge to a predefined level. τ_L is then specified at 90% decay of the reverse current. (Figure 2).

ADDITIONAL SCREENING

All diodes will be subject to the screening procedure below prior to testing:

1. Rapid change of temperature BS2011Na
   5 cycles -55° to +150°C
2. High temperature storeage BS2011Ba
   48hrs. 150°C

REVERSE BREAKDOWN VOLTAGE (V_B)

VB is the value of reverse voltage at which current flow increases dramatically due to impact ionization. It is characterised by the sharp knee in plot (Figure 1). In practice there is a small reverse leakage current due to surface contaminants, (minimised by oxide and glass passivation of the diode). For this reason V_B is measured with I_R = 10 μA.

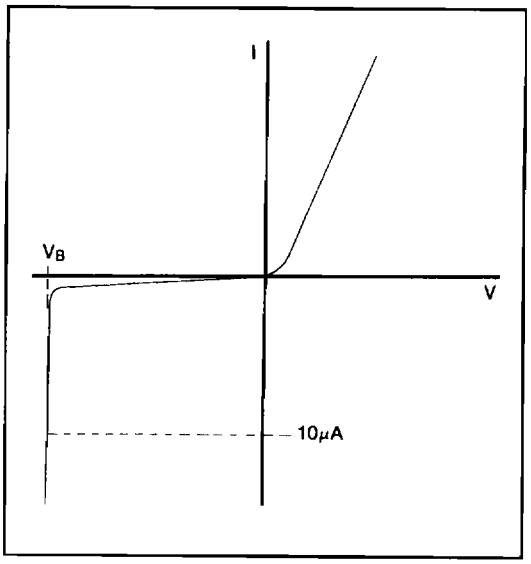


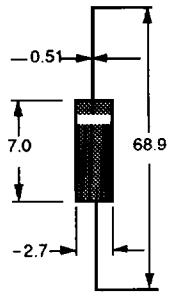
Figure 1

TOTAL CAPACITANCE (C_T)

The values given represent the total capacitance of the packaged diode.

Typical capacitance/reverse voltage characteristics of DC2900 series diodes are shown in Graph 2. Practical Intrinsic material contains a small number of charge carriers and at zero bias the I region of a PIN diode is only partially depleted of charge. When a reverse bias is applied the width of the'depletion layer' increases and the capacitance decreases. Eventually at the 'punch through' voltage (V_{PT}) the layer is fully depleted and the capacitance reaches its minimum value. Capacitance is measured beyond 'punch through' at V_R = 50V to ensure that the I layer is fully depleted.

British Standard SO-6
JEDEC DO-7



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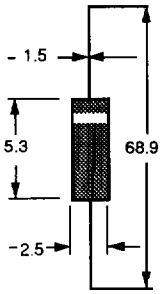

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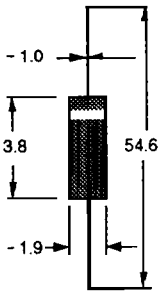

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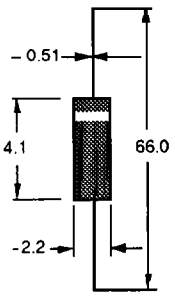
JEDEC DO-35



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1. All dimensions are in mm.
2. White band indicates cathode.
3. Outline numbers shown correspond to catalogue No. M08 and M15
4. Chip versions and surface mount versions in MELF and Mini MELF are available. Details on request.