GEC PLESSEY
SEMICONDUCTORS

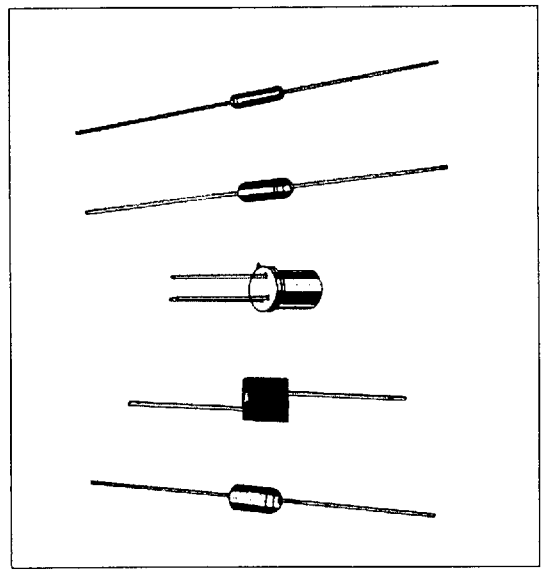
DS3414-1.2

DC4200 Series

SILICON VHF/UHF TUNING VARACTORS

DC4200 Series varactors are abrupt junction devices of planar-epitaxial construction. They are intended for electronic tuning and other frequency control applications in the VHF/UHF region. Device performance has been optimised by careful attention to processing techniques. The use of oxide/nitride passivation produces varactors with good stability and low leakage.

Low substrate resistance and optimised metal contact schemes help to minimise series resistance, resulting in high values of Q. Capacitance values (C_T - 4V) from 2.2 to 350pF are available in a range of appropriate packages.



FEATURES

- **High Q**
- **Large tuning range**
- **Designed for high reliability**
- **Wide range of capacitance values**
- **High capacitance tolerance**
- **Many special selections available**

DC4200 Series varactors are designed for high quality and high reliability applications. GEC Plessey Semiconductors has a proven record of supplying high reliability devices for military programmes. Devices are produced to meet the strict standards of U.K. Ministry of Defence approval to NATO AQAP-1(Edit.3).

In addition, DB4200 series varactors are available to CECC 50 077. To qualify, devices undergo severe mechanical and environmental testing* similar to that required to MIL 202. This is backed up by long term reliability testing.

MTBF's (Mean Time Before Failure) of $>10^7$ hours are typical. Special screening can be performed on most device types and can be tailored to meet specific requirements.

Contact our local representatives for further information.

*BS2011 and IEC 68 series test programme.

LIMITING CONDITIONS OF USE

Maximum Reverse Voltage (V_R)	60V
Storage Temperature Range	-55° to +150°C
Operating Temperature Range	-55° to +100°C

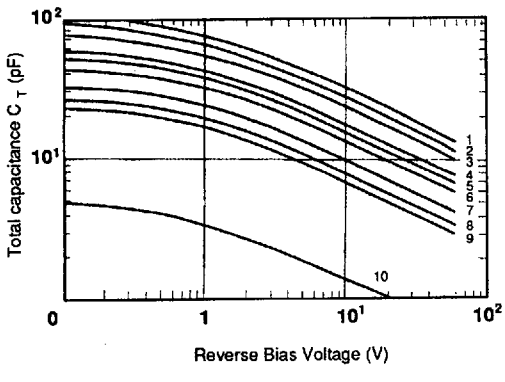
ELECTRICAL CHARACTERISTICS

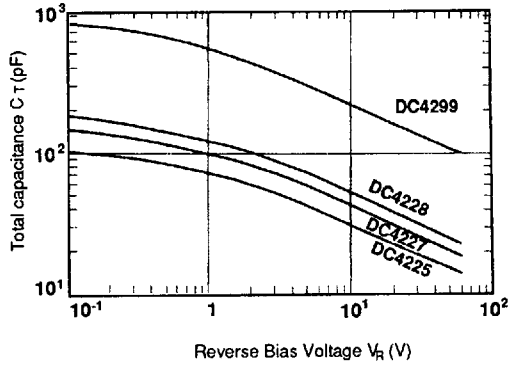
At T_{amb} = 25°C

The table of electrical characteristics gives an appreciation of the range of varactors available. However, the range can be extended to meet individual customer requirements. Special features available include:

- Tighter tolerance and matched sets
- 100% burn-in
- Choice of minimum breakdown voltage
- Special reliability testing
- Higher Q
- Wider bandwidth tuning

Type No.	Outline No.	Total Capacitance C_T ±10% (pF)	Capacitance Ratio (min)	Breakdown Voltage V_B (V) (min)	Quality Factor Q (min)	Test Frequency f (MHz)	Reverse Voltage V_R (V)
DC4255B	35	2.2	2.5	60	550	50	-4.0
DC4256B	35	3.3	2.7	60	450	50	-4.0
DC4257B	07	4.7	2.8	60	450	50	-4.0
DC4210B	07	6.8	2.9	60	450	50	-4.0
DC4211B	07	8.2	2.9	60	400	50	-4.0
DC4212B	07	10.0	3.0	60	350	50	-4.0
DC4213B	07	12.0	3.0	60	350	50	-4.0
DC4214B	07	15.0	3.1	60	300	50	-4.0
DC4215B	07	18.0	3.1	60	250	50	-4.0
DC4216B	07	22.0	3.2	60	250	50	-4.0
DC4217B	07	27.0	3.2	60	200	50	-4.0
DC4218B	07	33.0	3.2	60	200	50	-4.0
DC4224B	07	39.0	3.2	60	200	50	-4.0
DC4225B	07	47.0	3.2	60	200	50	-4.0
DC4226B	14	56.0	3.2	60	120	50	-4.0
DC4227B	14	68.0	3.2	60	120	50	-4.0
DC4228B	14	80.0	3.2	60	100	50	-4.0
DC4229D	14	80.0	3.2	100	200	50	-4.5
DC4229F	14	57.0*	3.85*	120	240	50	-15.0
DC4232B	18	100	3.2	60	200	10	-4.0
DC4233B	18	120	3.2	60	200	10	-4.0
DC4234B	18	150	3.2	60	200	10	-8.0
DC4298	10	200	3.2	100	200	25	-8.0
DC4299	10	335	3.2	100	200	25	-8.0
DC4244C	78	350	3.2	90	750	1	-4.0
Test Conditions		V = 4V f = 1MHz *V = 8V	4V to 60V f = 1MHz *4V = 85V	I_R = 10μA			





Key: 1 DC4225B 6 DC4215B
2 DC4224B 7 DC4214B
3 DC4218B 8 DC4213B
4 DC4217B 9 DC4212B
5 DC4216B 10 DC4255

Figure 1. Typical Capacitance vs. Tuning Voltage

CAPACITANCE LAW

The total capacitance C_T at an applied voltage V for a varactor is given by:

$C_T = A (V + \emptyset)^{-\gamma}$

where:

A = a constant relating to epilayer doping level and diode area
$\emptyset$ = built in junction potential (0.65V for silicon)
γ = 0.45 to 0.475

Q FACTOR

Q can be calculated from

$$Q = \frac{1}{2\pi fRC}$$

and is normally measured and specified at 50MHz for these diodes.

Q at any other frequency can be approximated by

$$Q(f_2) = \frac{f_1}{f_2} (Q_{(f_1)})$$

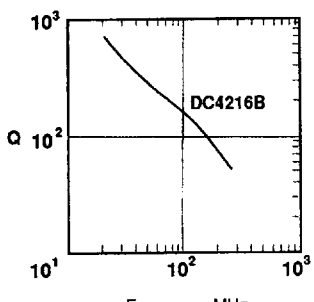


Figure 2. Typical Q vs. Frequency

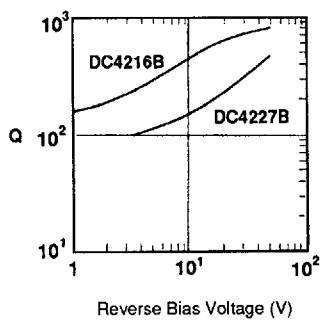


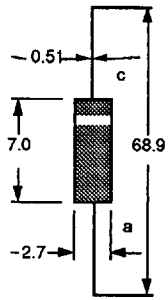
Figure 3. Typical Q vs. Reverse Bias Voltage

DC4200 Series

Dimensions in mm

British Standard SO-6
JEDEC DO-7

White indicates cathode



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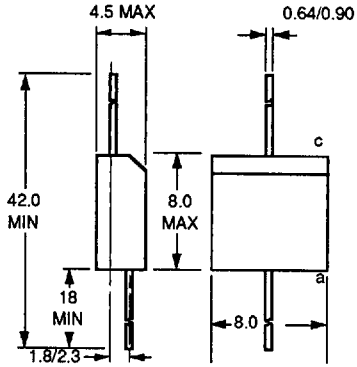

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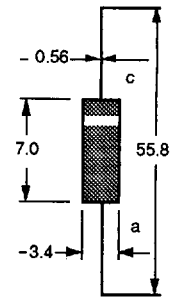

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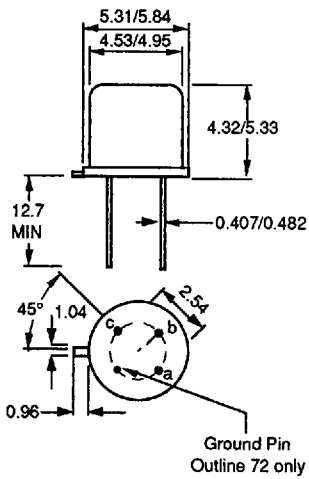

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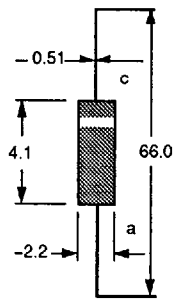
JEDEC DO-35



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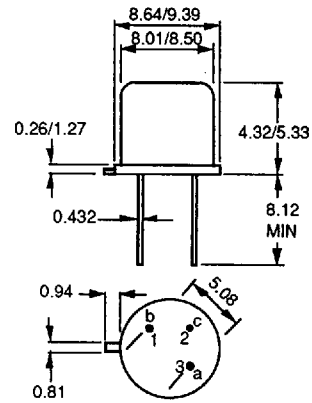

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