



2008

### Introduction:

360° Test Labs has been retained to evaluate the functional performance of Alpha Industries SMV1229-011 Varactor Diodes, as shown to the right.

### Supplied:

200 Alpha Industries type SMV1229-011 surface-mount varactor diodes on un-reeled tape (Lot 254313-020 D/C: 2004). At the client's request, 360° Test Labs performed a reduced sampling plan of 13 pieces. Tested samples were removed randomly throughout the whole tape.

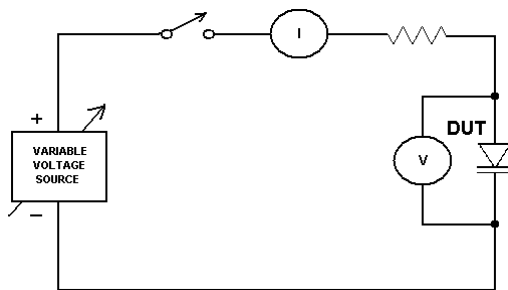


### Parameters:

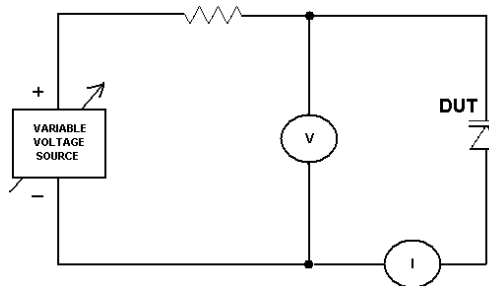
Using calibrated Agilent test instruments, 360° tested 13 random samples for the following parameters:

- $V_F$  (forward voltage) at 1 milliampere current
- $I_R$  (current with voltage reversed)
- $V_B @ 10$  microamperes (minimum reverse breakdown voltage)
- $C_T @ 4V$  (varactor capacitance at 4 volts)
- $C_T @ 20V$  (varactor capacitance at 20 volts)

360° Test Labs used the test methods and setups shown in MIL-STD 750E for each test, diagrams of which are shown below.

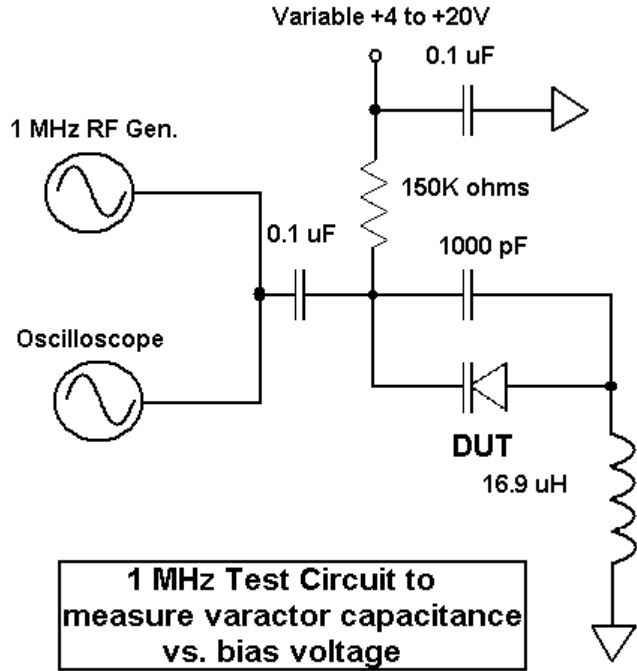


MIL-STD 750E Method 4011.4



MIL-STD 750E Method 4016.4 & 4021.2

Varactor capacitance was measured at about 1 MHz using the following test circuit.



As a backup capacitance measurement, a B&K Precision model 885 LCR meter was used to confirm the measured capacitance values; the B&K yielded capacitance values within 1% of the test circuit at its highest measurement frequency of 10 kHz.

360° found all 13 varactor samples to meet specifications except every sample appeared to have a minimum capacitance that was several picofarads lower than the specification; see the data table below. The green-shaded boxes indicate a **PASS** whereas rose color is a **FAIL**. The minimum-measured capacitance is still within 19% of the specification, however.

Spec.	0.6 - 1.0	< 50 nA	> 20V	100 – 120 pF	16 – 20 pF	> 5.2
Sample #	V <sub>f</sub> (per MIL-STD 750E, method 4011)	I <sub>r</sub> (per MIL-STD 750E, method 4016)	V <sub>B</sub> (per MIL-STD 750E, method 4021)	Varactor Capacitance, pF @ 4V	Varactor Capacitance, pF @ 20V	T <sub>R</sub> (C <sub>T</sub> (4V)/C <sub>T</sub> (20V))
1	0.63	<1 nA	> 20V	111	14	7.9
2	0.62	1 nA	> 20V	116	13	8.9
3	0.63	1 nA	> 20V	117	13	9.0
4	0.63	<1 nA	> 20V	108	14	7.7
5	0.63	<1 nA	> 20V	113	13	8.7
6	0.62	<1 nA	> 20V	110	13	8.5
7	0.63	<1 nA	> 20V	113	14	8.1
8	0.63	1 nA	> 20V	109	13	8.4
9	0.63	1 nA	> 20V	103	14	7.4
10	0.63	1 nA	> 20V	112	13	8.6
11	0.63	1 nA	> 20V	111	14	7.9
12	0.63	1 nA	> 20V	110	13	8.5
13	0.62	<1 nA	> 20V	115	14	8.2