

1. SCOPE

1.1 Scope. This specification covers the detail requirements for a silicon semiconductor diode (with removable adapter), types: 1N21WE (forward polarity); 1N21WEM (matched forward pair); 1N21WEMR (matched forward and reverse pair); for use as a mixer in S-band equipment. Ratings for the 1N21WE are applicable to the types having additional suffixes (see 3.5.1). This drawing may be used as a substitute for parts listed on MIL-S-19500/232 which has been cancelled (see 6.3).

1.2 Part or Identifying Number (PIN). The complete PIN shall be as follows:

<u>00005</u>	-	<u>1N21WE</u>
Drawing number		Device

1.2.1 Device types. The device type shall identify the polarity and voltage of the devices as follows:

<u>Device type</u>	<u>Figure number</u>
00005-1N21WE	1
00005-1N21WEM	1
00005-1N21WEMR	1

1.2 Ratings.

Types 1N21WE, 1N21WEM, 1N21WEMR	Z(IF)	L _c	NF _o	VSWR
	<u>Ohms</u>	<u>dB</u>	<u>dB</u>	<u>ratio</u>
Minimum	350		7.0	1.3
Maximum	450	5.5		

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2).

2.2 Order of Precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-19500 - Semiconductor Devices, General Specification for.

STANDARD

DEPARTMENT OF DEFENSE

MIL-STD-750 - Test Methods for Semiconductor Devices.

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2.3 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

C66058 DEFENSE ELECTRONICS SUPPLY CENTER, BURN-OUT TESTER FOR MICROWAVE DIODES.
(DEFENSE SUPPLY CENTER COLUMBUS, Alan Barone, DSCC-VAC, P.O.Box 3990, Columbus, OH 43216-5000).

2.4 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

ASTM-B16/B16M ROD, BRASS, FREE-CUTTING, BAR AND SHAPES FOR USE IN SCREW MACHINES.
(AMERICAN SOCIETY for TESTING and MATERIALS, 1100 Barr Harbor Drive, West Conshohocken PA 19428-2959).

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Defense Automated Printing Service, Building 4D (DPM-DODSSP), 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

3. REQUIREMENTS

3.1 General. The individual item requirements shall be in accordance with MIL-PRF-19500, and as specified herein.

3.2 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in MIL-PRF-19500 and as follows:

1/G Reciprocal of conductance (IF impedance).

SWR Standing wave ratio.

3.3 Interface and physical dimensions. The semiconductor diode shall be of symmetrical construction and shall consist of a cylindrical body having pins on both ends. The body outline with removable base adapter shall conform to figure 1. Organic package sealants may be used at the option of the manufacturer.

3.3.1 Base adapter. The base adapter shall be of the design, construction and physical dimensions shown on figure 2.

3.3.2 Plating. The diode and base adapter shall be plated as specified on figures 1 and 2.

3.4 Performance characteristics. Performance characteristics shall be in accordance with tables I, and II.

3.5 Marking. The marking shall be placed on each device in accordance with MIL-PRF-19500, except that the manufacturer's identification and country of origin may be omitted.

3.5.1 Matched diodes. The "M" suffix for matched diodes shall be omitted in the type designation on each device. Diodes meeting the matching requirements of this specification will be packaged with a statement to that effect (see 4.4.3 and 4.4.4).

3.6 Burnout single pulse. At the end of all manufacturing processes and prior to selecting samples for testing, all diodes shall be capable of meeting burnout by single pulse test in accordance with method 4146 of MIL-STD-750, using Drawing C66058 or equivalent, and E = 125 V dc, minimum. The device being tested shall be in the forward-direction operation.

3.7 Manufacturer eligibility. To be eligible to supply devices to this drawing, the manufacturer shall perform conformance inspection in accordance with procuring activity's requested first article testing requirements in accordance with 4.3 herein. Devices specified herein shall meet traceability and lot formation requirements of MIL-PRF-19500 except as modified by the procuring activity.

3.8 Submission of certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as a source of supply in 6.5. The certificate of compliance submitted to DSCC-VAC, prior to listing as a source of supply in 6.5, shall state that the manufacturer's product meets the applicable requirements of MIL-PRF-19500 and the requirements herein.

3.9 Certificate of conformance. A certificate of conformance shall be provided with each lot of devices delivered in accordance with this drawing.

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3.10 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.11 Workmanship. The semiconductor shall be uniform in quality and free from any defects that will affect life, serviceability, or appearance.

4. VERIFICATION

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-PRF-19500, and as specified herein.

4.2 Test conditions. Unless otherwise specified herein, the test conditions, when applicable, shall be as follows:

$$P = 0.5 \text{ mW} \pm 5 \text{ percent.}$$

$$f = 3060\text{MHz} \pm 5 \text{ MHz.}$$

$$F_i \geq 1.5 \text{ Db.}$$

$$Z_L = 400 \Omega \pm 1 \Omega.$$

4.3 Conformance inspection. Conformance inspection shall consist of the examinations and tests specified in groups A and B.

4.3.1 Group A inspection. Group A inspection shall consist of the inspections and tests specified in table I.

4.3.2 Group B inspection. Group B inspection shall consist of the inspections and tests specified in table II.

4.4 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows:

4.4.1 High-temperature operation. The semiconductor diode shall be placed in the mixer holder. The ambient temperature of the diode, with test conditions specified for the overall noise figure, shall be raised to +150°C min and shall be maintained at this temperature until equilibrium is reached. The NF_o shall then be determined and shall be less than 15 dB. The temperature shall then be returned to 25°C ± 3°C at which time NF_o shall be less than 12 dB.

4.4.2 Microwave parameters. The L_c , NR_o and NF_o parameters may be determined by any suitable combination of measured parameters selected from among the following: L_c , NR_o , $Nf_{if}(\text{actual})$, and $NF_o(\text{actual})$. A measurement of either L_c or NR_o , but not both is required. NF_o shall be determined for an assumed or actual intermediate-frequency noise figure (NF_{if}) of 1.5 ± 0.25 dB.

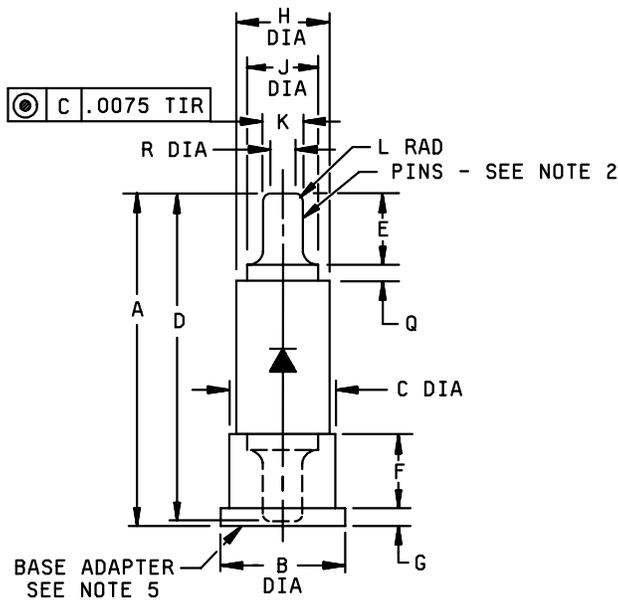
4.4.3 Matched pair, "M" suffix (forward polarity). The matched forward pair (M suffix) shall consist of two diodes, tested to requirements of subgroup 3, table I, having the cathode connected to the center conductor.

4.4.4 Matched pair, "MR" suffix (forward and reverse polarity). The matched forward pair (MR suffix) shall consist of two diodes, tested to requirements of subgroup 3, table I, one diode having the cathode connected to the center conductor (forward polarity) and the second diode having the anode connected to the center conductor (reverse polarity).

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

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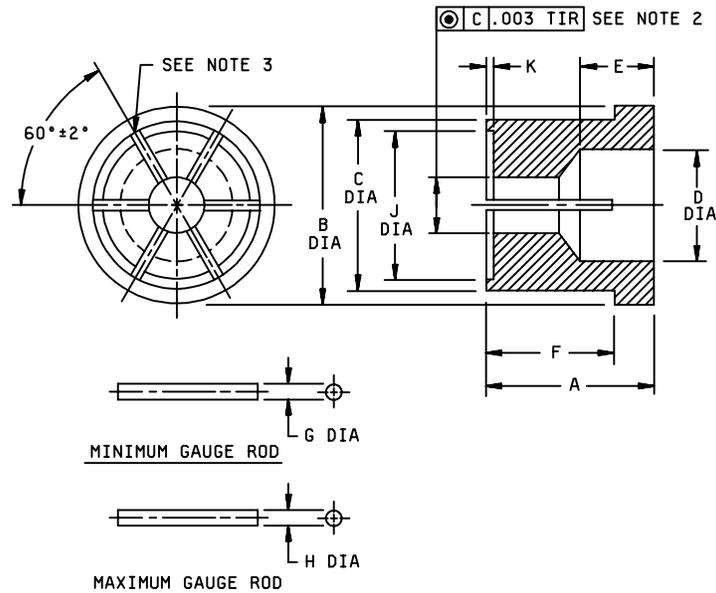
Ltr	Dimensions				Notes
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.800	.840	20.32	21.34	
B	.292	.296	7.42	7.52	
C	.246	.250	6.25	6.35	
D	.766	.792	19.46	20.12	
E	.180	.190	4.57	4.83	6
F	.195	.199	4.95	5.05	
G	.047	.057	1.19	1.45	
H	.222	.240	5.64	6.10	
J	.195	.215	4.95	5.46	5
K	.092	.094	2.34	2.39	2, 5, 7
L	.030	.046	.76	1.17	5
Q	.020	.030	.51	.76	5
R		.030		.76	5

NOTES:

1. Metric equivalents are given for general information only.
2. The ends of both pins shall be smooth with no burrs or sharp edges. Within the diameter R, a recess is allowed on both ends of the pins.
3. Metal parts shall be plated 10 msi minimum.
4. The polarity shall be indicated by an arrow, with the arrow pointing in the direction of easier current flow.
5. Applies to both pins.
6. Removable base adapter shall establish the forward or reverse polarity.
7. Eccentricity between both pins and the base dimension 'C' should not exceed 0.0075 inches.
8. Metal parts shall be gold plated 10 msi minimum.

FIGURE 1. Semiconductor device, diode types 1N21WE, 1N21WEM, and 1N21WEMR.

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Ltr	Dimensions			
	Inches		Millimeters	
	Min	Max	Min	Max
A	.242	.256	6.15	6.50
B	.292	.296	7.42	7.52
C	.246	.250	6.25	6.35
D		.187		4.75
E		.100		2.54
F	.195	.199	4.95	5.05
G	.0915	.0920	2.32	2.34
H	.0940	.0945	2.39	2.40
J	.216	.221	5.49	5.61
K	.031	.036	.79	.91

NOTES:

1. Metric equivalents (to nearest .01 mm) are given for general information only.
2. This diameter should be .100 (2.54 mm) max diameter before closing jaws. This diameter shall then be sufficiently closed and the adapter so tempered that it will fit on the minimum gage rod and maximum gage rod, in each case with a snug fit (for hand assembly).
3. Each slot shall be .013 (.330 mm) min, .017 (.132 mm) max wide by .185 (4.70 mm) deep before closing. The six slots are equally spaced.
4. The material for the adapter shall be brass in accordance with ASTM-B16/B16M, or equivalent.
5. Metal parts shall be gold plated 10 msi minimum.
6. All burrs and sharp edges shall be removed.

FIGURE 2. Removable base adapter, included as a part of types 1N21WE, 1N21WEM, and 1N21WEMR.

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TABLE I. Group A inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Visual and mechanical examination	2071					
<u>Subgroup 2</u>						
Voltage standing wave ratio	4136	SCL-5679/1	VSWR		1.3	
Overall noise figure (see 4.4.2)	4126	Test condition A; SCL-5679/1	Nfo		7.0	dB
<u>Subgroup 3</u>						
Conversion loss (see 4.4.2)	4101	SCL-5679/1 <u>2/</u>	LC		5.5	dB
IF impedance	4116	SCL-5679/1 <u>2/</u>	Z(IF)	350	450	ohms
Output noise ratio (see 4.4.2)	4121	SCL-5679/1 <u>2/</u>	NR _o		1.5	
Matched pair requirements (see 4.4.3 and 4.4.4)						
Conversion loss unbalance	4101		Δ LC		0.3	dB
IF impedance unbalance	4116		Δ Z(IF)		25	ohms

1/ For sample size, see MIL-PRF-19500.

2/ SCL-5679/1 – Crystal mixer SAGE 221.

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TABLE II. Group B inspection.

Inspection <u>1/</u>	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Physical dimensions	2066	(See figure 1) Dimensions A, C, D, and F; Dimensions B and H				
<u>Subgroup 2</u>						
Thermal shock (temperature cycling)	1051	Test condition B; T(high) = +150°C +5°C, -0°C				
Moisture resistance	1021	Omit initial conditioning				
End points: Overall noise figure (see 4.4.2)	4126	Test condition A; SCL-5679/1	NF ₀		12.0	dB
<u>Subgroup 3</u>						
Burnout by repetitive pulsing <u>2/</u>	4141	e ₀ = 10 V, R _g = 50 ohms; 60,000 pulses minimum, t _p = 1.0 μs, PRF optional				
End points: (same as for group A subgroup 2)						
<u>Subgroup 4</u>						
Shock	2016	500 G; t ≅ 1 ms 5 blows in each orientation: X ₁ , Y ₁ , and Y ₂				
Vibration, variable frequency	2056	15 G; 50 to 2,000 cps				
Constant acceleration	2006	10,000 G; X ₁ , Y ₁ , and Y ₂ orientations				
End points: (same as for group A subgroup 2)						
<u>Subgroup 5</u>						
High temperature operation (see 4.4.1)		T _A = 150°C +5°C, -0°C				
<u>Subgroup 6</u>						
High-temperature life (nonoperating)	1031	T _A = 150°C +5°C, -0°C				
End points: (same as for group A subgroup 2)						

1/ For sample size, see MIL-PRF-19500.

2/ Shall only be capable of passing this test.

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6. NOTES

6.1 Intended use. Devices conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. This drawing is intended exclusively to prevent the proliferation of duplicate specifications, drawings, and stock number listings.

6.2 Ordering data. The contract or purchase order should specify the following:

- a. Complete PIN (see 1.2).
- b. Requirements for delivery of one copy of the conformance inspection data or certificate of compliance that parts have passed conformance inspection with each shipment of parts by the manufacturer.
- c. Requirements for packaging and packing.

6.3 Replaceability. Devices covered by this drawing may be used as a substitute for MIL-S-19500/232.

DSCC drawing PIN	Military part number	Vendor part number
00005-1N21WE 00005-1N21WEM 00005-1N21WEMR	JAN1N21WE JAN1N21WEM JAN1N21WEMR	UXAN1N21WE UXAN1N21WEM UXAN1N21WEMR

6.4 Comments. Comments on this drawing should be directed to contact Defense Supply Center, Columbus, ATTN: DSCC-VAC, Post Office Box 3990, Columbus, OH 43216-5000.

6.5 Suggested sources of supply. Suggested sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have concurred with this drawing and have submitted a certificate of compliance (see 3.8 herein) to DSCC-VAC.

DSCC drawing PIN	Vendor similar designation or type number ^{1/}	Vendor CAGE	Vendor name and address
00005-1N21WE 00005-1N21WEM 00005-1N21WEMR	UXAN1N21WE UXAN1N21WEM UXAN1N21WEMR	0EFF4	Micrometrics, Inc. 136 Harvey Road Building B Londonderry NH 03053

^{1/} CAUTION: Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

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