

REVISIONS			
LTR	DESCRIPTION	DATE	APPROVED

Devices on this drawing may be used as a substitute for MIL-S-19500/186 which has been inactivated for new design.

Prepared in accordance with ASME-14.100

Selected item drawing

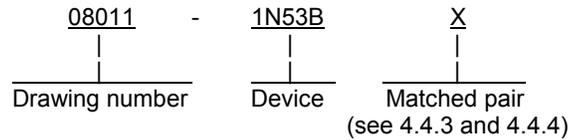
REV STATUS OF PAGES	REV																
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PMIC N/A	PREPARED BY Roger Kissel		DEFENSE SUPPLY CENTER, COLUMBUS COLUMBUS, OH http://www.dsccl.dla.mil/programs/milspec/docsearch.asp														
Original date of drawing: 11 August 2008	CHECKED BY Jason Hochstetler		TITLE SEMICONDUCTOR DEVICE, DIODE, SILICON, RF MIXER, TYPES 1N53B,1N53BR, 1N53BM, 1N53BMR														
	APPROVED BY Thomas M. Hess																
	SIZE A	CODE IDENT. NO. 037Z3	DWG NO. 08011														
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1. SCOPE

1.1 Scope. This drawing describes the requirements for silicon semiconductor diodes, types: 1N53B (forward polarity); 1N53BR (reverse polarity); 1N53BM (matched forward pair); and 1N53BMR (matched forward and reverse), for use as a mixer (first detector) in a K-band receiver. This drawing supersedes MIL-S-19500/186.

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



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>
08011-1N53B	1
08011-1N53BR	1
08011-1N53BM	1
08011-1N53BMR	1

1.3 Ratings.

Type 1N53B <u>1/</u>	Z(IF) ohms	L _c	NF _o	VSWR	TOP and T _{STG}
		dB	dB	Ratio	
Minimum	500				-65 ° to +150°C
Maximum	700	6.5	10	1.6	

1/ Ratings for type 1N53B are applicable to all types having additional suffixes.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

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

DEPARTMENT OF DEFENSE STANDARDS

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

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch> or <http://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Order of precedence. Unless otherwise noted herein or in the contract, 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.

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3. REQUIREMENTS

3.1 Interface and physical dimensions. Interface and physical dimensions shall be as specified in MIL-PRF-19500, and on figure 1.

3.1.1 Plating. Finish shall be .0001 in. (0.003 mm) gold plate over .0001 in. (0.003 mm) nickel flash, or solder over .0001 in. (0.003 mm) nickel flash. Tin content of components and solder shall not exceed 97 percent, by mass. Tin shall be alloyed with a minimum of 3 percent lead, by mass.

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

- L_C - Conversion loss.
- NF_O - Overall noise figure.
- NR_O - Output noise ratio.
- Z_(IF) - Intermediate frequency (IF) impedance.

3.3 Marking. The marking shall be placed on each device in accordance with MIL-PRF-19500.

3.3.1 Matched diodes. Diodes meeting the matching requirements shown in 1.2.1 of this drawing shall be marked in accordance with MIL-PRF-19500 and as specified herein (see 4.4.3 and 4.4.4). The "M" suffix marking for matched diodes shall be omitted in the type designation on each device. Diodes meeting the matching requirements of this drawing shall be packaged with a statement to that effect (see 4.4.3 and 4.4.4).

3.4 Burn-out by single pulse. At the end of all manufacturing processes, and prior to selecting samples for testing, all diodes shall be subjected to 100 percent burn-out by single pulse test which shall be performed in accordance with method 4146 of MIL-STD-750 and E = 50 V dc, minimum.

3.5 Manufacturer eligibility. To be eligible to supply devices to this drawing, the manufacturer shall perform conformance testing 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. It is prohibited for a manufacturer not listed as an approved source to mark devices with this drawing number.

3.6 Certificate of compliance. A certificate of compliance shall be required from manufacturers requesting to be an approved 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.

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

3.8 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.

3.9 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. Unless otherwise specified, sampling and inspection shall be performed 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:

- a. $f = 34,860 \text{ MHz} \pm 140 \text{ MHz}$.
- b. $P = 1.0 \text{ mW} \pm 5 \text{ percent}$.
- c. $R_L = 100 \Omega \pm 1 \Omega$.
- d. $Z_m = 500 \Omega \pm 10 \Omega, + j\omega \Omega$.

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4.3 Conformance inspection. Conformance inspection shall consist of the inspections and tests specified in 4.3.1 and 4.3.2 herein.

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 Microwave parameters. The L_C , NF_O , and NR_O parameters may be determined by any suitable combination of measured parameters selected from among the following: L_C , NF_{IF} (actual), NF_O (actual), and NR_O . 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.

4.4.2 Output noise ratio NR_O . The plunger in the noise measuring apparatus shall be set at a position which delivers the maximum power as evidenced by maximum diode current to an average diode, from a group of diodes, that meet initial conversion loss, IF impedance, and VSWR limits.

4.4.3 Matched pair, "M" suffix (forward polarity). The matched forward pair (M suffix) shall consist of two diodes, tested to requirements of table I, subgroup 3, herein, 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 table I, subgroup 3, herein, 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).

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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 <u>2/</u>	VSWR		1.6	
Overall noise figure	4126	Test condition A; SCL-5679/1 <u>2/</u> (see 4.4.1)	NF _O		10	dB
<u>Subgroup 3</u>						
Conversion loss	4101	SCL-5679/1 <u>2/</u> (see 4.4.1)	L _C		6.5	dB
IF impedance	4116	SCL-5679/1 <u>2/</u>	Z(IF)	500	700	ohms
Output noise ratio	4121	SCL-5679/1 <u>2/</u> (see 4.4.1)	NR _O		2.0	times
Matched pair requirements		(see 4.4.3 and 4.4.4)				
Conversion loss unbalance	4101		ΔL _C		0.3	dB
IF impedance unbalance	4116		ΔZ(IF)		25	ohms

1/ For sampling plan, see MIL-PRF-19500.

2/ SCL-5679/1 - Crystal mixer SAGE 221 or equivalent.

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TABLE II. Group B inspection.

Inspection 1/	MIL-STD-750		Symbol	Limits		Unit
	Method	Conditions		Min	Max	
<u>Subgroup 1</u>						
Physical dimensions	2066	Dimensions A, C, E, and G (see figure 1); dimensions C and H (see figure 1, note 2)				
<u>Subgroup 2</u>						
Thermal shock (temperature cycling)	1051	Test condition A; $T_{(high)} = +150^{\circ}\text{C} +5^{\circ}\text{C}, -0^{\circ}\text{C};$ $T_{(low)} = -65^{\circ}\text{C} +0^{\circ}\text{C}, -5^{\circ}\text{C}$				
Moisture resistance	1021	Omit initial conditioning				
End points: Overall noise figure	4126	Test condition A; (see 4.4.2)	NF _O		11.0	dB
<u>Subgroup 3</u>						
Burn-out by repetitive pulsing	4141	$e_0 = 5 \text{ V}, R_G = 50 \text{ ohms};$ 60,000 pulses minimum, $t_p = 1.0 \mu\text{s},$ PRF optional				
End points		See table I, subgroup 2				
<u>Subgroup 4</u>						
Shock	2016	500 G; $t \cong 1 \text{ ms}$ 5 blows in each orientation: $X_1,$ $Y_1,$ and Y_2				
Vibration, variable frequency	2056	15 G; 50 to 2,000 Hz				
Constant acceleration	2006	10,000 G; $X_1, Y_1,$ and Y_2 orientations				
End points		See table I, subgroup 2				
<u>Subgroup 5</u>						
High temperature operation		$T_A = 150^{\circ}\text{C} +5^{\circ}\text{C}, -0^{\circ}\text{C}$				
Conversion loss	4101	See 4.4.1	LC		8.5	dB
<u>Subgroup 6</u>						
High temperature life (nonoperating)	1031	$T_A = 150^{\circ}\text{C} +5^{\circ}\text{C}, -0^{\circ}\text{C}$				
End points		See table I, subgroup 2				

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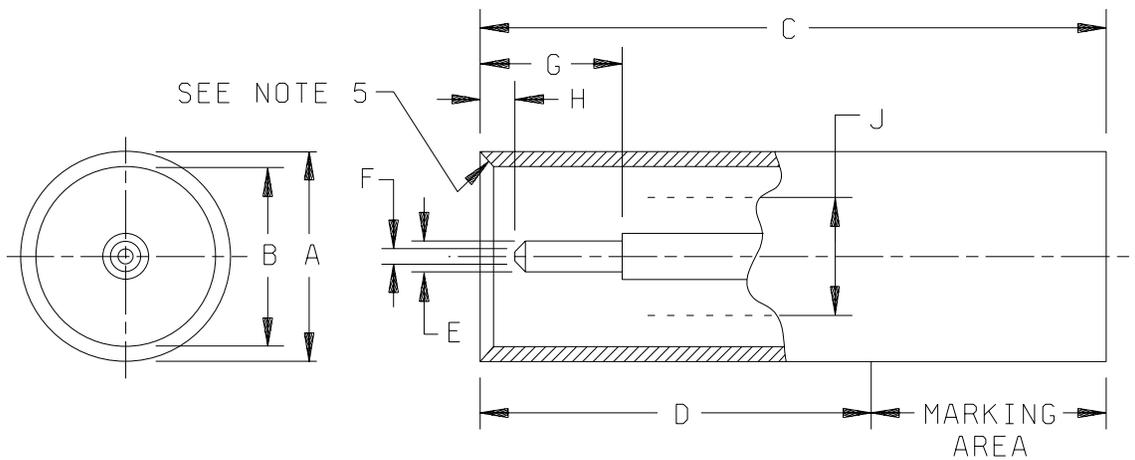
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Ltr	Dimensions				NOTE
	Inches		Millimeters		
	Min	Max	Min	Max	
A	.158	.162	4.01	4.11	4
B	.123	.127	3.12	3.23	
C	.545	.555	13.84	14.10	
D	.281		7.14		4
E	.044	.046	1.12	1.17	
F	.019	.021	0.48	0.53	
G	.099		2.51		
H	.010	.018	0.25	0.46	
J	.082		2.08		6

NOTES:

1. Finish: .0001 in. (.003 mm) gold plate or .0001 in. (.003 mm) silver plate.
2. Axis of center conductor shall not deviate from axis of outer conductor, referred to its outside diameter, more than .002 in. (0.051 mm).
3. Standard units shall have the cathode connected to the center conductor. Reversed units shall have the anode connected to the center conductor.
4. Outside diameter, .215 in. (5.46 mm) to .220 in. (5.58 mm) applies for length of dimension D.
5. This edge to be sharp and free from burrs.
6. Space for matching transformer when used.
7. Dimensions are in inches. Millimeters are given for general information only.
8. In accordance with ASME Y14.5M, diameters are equivalent to Φ x symbology.

FIGURE 1. Semiconductor device, diode types 1N53B, 1N53BR, 1N53BM, and 1N53BMR.

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5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. 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.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

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

6.2 Acquisition requirements. The acquisition requirements 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 shall replace the same generic device covered by a contractor-prepared specification or drawing. This drawing supersedes MIL-S-19500/186.

6.4 Comments. Comments on this drawing should be directed to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990 or emailed to Semiconductor@dsccl.dla.mil.

6.5 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have agreed with this drawing and have submitted a certificate of compliance (see 3.6 herein) to Defense Supply Center, Columbus, ATTN: DSCC-VAC, P.O. Box 3990, Columbus, OH 43218-3990 or emailed to Semiconductor@dsccl.dla.mil.

DSCC drawing PIN (1)	Vendor similar designation or type number	Vendor name and address	Vendor CAGE code
08011-1N53B 08011-1N53BR 08011-1N53BM 08011-1N53BMR	UXAN1N53B UXAN1N53BR UXAN1N53BM UXAN1N53BMR	Semi-General, Inc 360 Route 101 Unit 12B Bedford, NH 03110	3BBY6

(1) Parts must be purchased to this DSCC PIN to assure that all performance requirements and tests are met.

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