

MILITARY SPECIFICATION
 SEMICONDUCTOR DEVICE, DIODE, GERMANIUM, MIXER

TYPE JAN-1N263

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for a germanium semiconductor diode for use as a mixer (first detector) in an X-band receiver.

1.2 Ratings.

	Z(IF)	L_0 (190±10 ohms)	MF ₀	VSWR	T _{stg}	T _{op}
	Ohms	db	db		°C	°C
Minimum -	140	—	—	—	-65	-65
Maximum -	210	6.0	7.50	1.3	+100	+100

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

Military

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

STANDARDS

Military

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

DRAWINGS

108-JAN - Burn Out Tester For Crystal Rectifier 1N21B, 1N23B, 1N23C, 1N23CR, 1N26, 1N28, 1N53, and 1N78.

114-JAN - Crystal Rectifier Resistor Cartridge for Testing 1N21C, 1N23B, 1N23C, 1N23CR, 1N25, 1N26 and 1N78.

180-JAN - High Impact (Flyweight) Shock Machine For Electronic Devices.

254-JAN - Drop Tester.

266-JAN - Mixer Holder, Narrow Band, For 1N263.

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 General - Requirements for semiconductor diodes shall be in accordance with Specification MIL-S-19500, and as specified herein.

3.2 Abbreviations and symbols. - The abbreviations and symbols used herein are defined in Specification MIL-S-19500, and as follows:

I_{rect} - Rectified current
Z(IF) - IF impedance

3.3 Design and construction. JAN-1N263 semiconductor diode shall be of symmetrical construction and shall consist of a cylindrical body having pins at both ends. The base adapter is shown in dash lines. The assembly of the body shall conform to figure 1.

3.3.1 Base adapter will be supplied only when it is specified in the contract and it shall be of the design, construction, and physical dimensions shown in figure 2.

3.4 Performance characteristics. Performance characteristics shall be as specified in tables I and II.

3.5 Marking. The following marking shall be placed on the device:

- (a) "JAN" prefix. (the prefix "J" may be used)
- (b) Type designation.
- (c) Polarity.
- (d) Qualification designation code. (first letter "C" may be omitted)
- (e) Acceptance date and inspection lot identification.

3.5.1 The manufacturer, at his option, may include the following marking:

- (a) Manufacturer's identification.
- (b) Country of origin.

3.5.2 All of the above markings, except polarity, shall be placed on the unit package.

4. QUALITY ASSURANCE PROVISIONS

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

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

P_T = 1.0 mW
I_{rect} = 1.8±0.05 mA_{dc}
Bias = +0.15±0.01 V_{dc}
f = 9,375±5mμ
T_A = 25°C

4.3 Qualification inspection. Qualification inspection shall consist of the examinations and tests specified in tables I and II.

4.4 Acceptance inspection. Acceptance inspection shall consist of groups A and B.

4.4.1 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table I.

4.4.2 Group B inspection. Group B inspection shall consist of the examinations and tests specified in table II.

4.5 Methods of examination and test. Methods of examination and test shall be as specified in tables I and II, and as follows:

4.5.1 High temperature operation. The semiconductor diode shall be placed in the mixer holder. Conditions shall be set at an ambient of 25°C for the overall-noise-figure test specified in Table I. The temperature of the diode shall then be raised to +100°C minimum and maintained at this temperature until equilibrium is reached. The NF_o shall then be determined and shall be less than the specified limit. The temperature shall then be returned to 25°C and at which time NF_o shall be less than the specified limit.

Table I Group A Inspection.

Examination or test	MIL-STD-750		L T P D	Min Rej No.	Symbol	Limits		
	Method	Details ^{1/}				Min	Max	Unit
<u>Subgroup 1</u> Visual and mechanical examination.	2071		7	4	---	---	---	---
<u>Subgroup 2</u> Burnout by single pulse.	4146	Dwg 108-JAN; $V_R = 100$ Vdc min	5	4	---	---	---	---
Voltage standing wave ratio	4136	Dwg 266-JAN			VSWR	---	1.3	---
Overall noise figure ^{2/}	4126	Test cond A $Z_M = 190 \pm 10$ ohms			NF_o	---	7.5	db
<u>Subgroup 3</u> IF impedance	4116	Dwg 266-JAN;	5	4	$Z(IF)$	110	210	Ohms
Conversion loss ^{2/}	4101	Dwg-266-JAN $Z_M = 190 \pm 10$ ohms $R_L = 100 \pm 1$ ohms			L_o	---	6.0	db
Output noise ratio ^{2/}	4121	Dwg 114-JAN and 266-JAN $R_e = 190 \pm 10$ ohms			NR_o	---	1.4	Times

^{1/} See paragraph 4.2 for test conditions.

^{2/} L_o , NR_o , and NE_o may be determined by any suitable combination of measured parameters selected from among the following: L_o , NR_o , and NF_{if} (actual), and NF_o (actual). A measurement of either L_o or NR_o , but not both, is required. NF_o shall be determined for an assumed or actual NF_{if} of 1.5 ± 0.25 db.

Table II Group B Inspection.

Examination or test	MIL-STD-750		L T P D	Min Ref No.	Symbol	Limits		
	Method	Details 1/				Min	Max	Unit
<u>Subgroup 1</u> Physical dimensions	2066	Dim. C and K; Dim. A, B, D, E, F, G, H, J, L, M, N, P, and Q; (Note 3 of Fig. 1 and 2 is for qualification only.)	7 20	2 7	---	---	---	---
<u>Subgroup 2</u> Burnout by repetitive pulsing. 2/	4141	v = 10v; R _G = 50 ohms; t _p = 0.05 usec	15	4	---	---	---	---
Temperature cycling	1051	Test cond B T(high) = +100°C			---	---	---	---
Moisture resistance 4/5/	1021				---	---	---	---
End point: Overall noise Figure 3/	4126	Test cond A			NF ₀	---	8.5	db
<u>Subgroup 3</u> Shock 4/	2016	Dwg 254-JAN or 180-JAN; 500 G; 1 msec; 5 blows ea in orienta- tions X, Y ₁ , and Y ₂	15	4	---	---	---	---
Constant acceleration	2006	20,000 G; orientations X, Y ₁ , and Y ₂			---	---	---	---
Vibration, variable frequency.	2056	15 G; 50 to 2,000 cps;						
End points: (Same as subgroup 2)								
<u>Subgroup 4</u> Terminal strength: 4/			15	4	---	---	---	---
Tension	2036	Test cond A; 1 lb; t=60 sec			---	---	---	---
Torque	2036	Test cond D; 1.5 lb. in. t=60 sec			---	---	---	---
End point: (Same as subgroup 2)								
<u>Subgroup 5</u> High-temperature operation: (See 4.5.1.) Overall noise figure 3/	4126	Test cond A T _A =100°C, Min	λ=10	5	NF ₀	---	10.5'	db
End points: (Same as subgroup 2)								

Examination or test	MIL-STD-750		L T P D	Min Ref No.	Symbol	Limits		
	Method	Details				Min	Max	Unit
<u>Subgroup 6</u> High-temperature life (nonoperating) End points: (Same as subgroup 2)	1031	$T_A = 100^\circ\text{C}$, min	$\lambda = 15$	5	---	---	---	---

1/ See paragraph 4.2 for test conditions.

2/ "v" is the open-circuit voltage of the pulse generator; "R₀" is the internal resistance; "tp" is the pulse width in usec. The number of pulses shall be 60,000 (minimum) at any pulse repetition frequency. After burnout by pulsing, only the post environmental test end points shall apply.

3/ L₀, NR₀, and NF₀ may be determined by any suitable combination of measured parameters selected from among the following: L_c, NR₀, NF_{1.f.} (actual), and NF₀ (actual). A measurement of either L_c or NR₀, but not both is required. NF₀ shall be determined for an assumed or actual intermediate-frequency noise figure (NF_{1.f.}) of 1.5 ± 0.25 db.

4/ Destructive test.

5/ Omit initial conditioning.

5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery. Preparation for delivery shall be in accordance with Specification MIL-S-19500.

6. NOTES

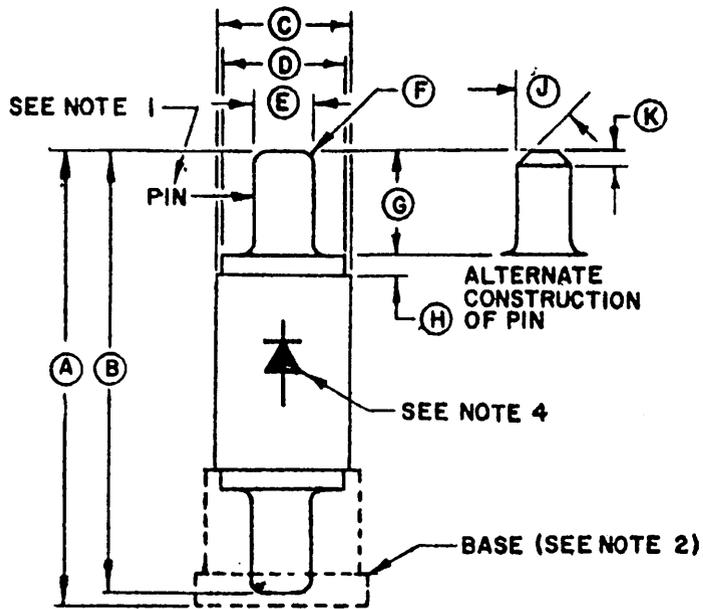
6.1 Notes. In addition to the notes specified herein, the notes specified in Specification MIL-S-19500 are applicable to this specification.

6.2 Handling precautions. The following handling precautions should be observed:

- (a) Ground all equipment.
- (b) Handle the unit by the base only. Make contact to the equipment through this end before touching the top, and maintain hand contact with the equipment until the unit is in place.
- (c) Keep units in metal shields until they are inserted in the equipment or until necessary to remove for test.

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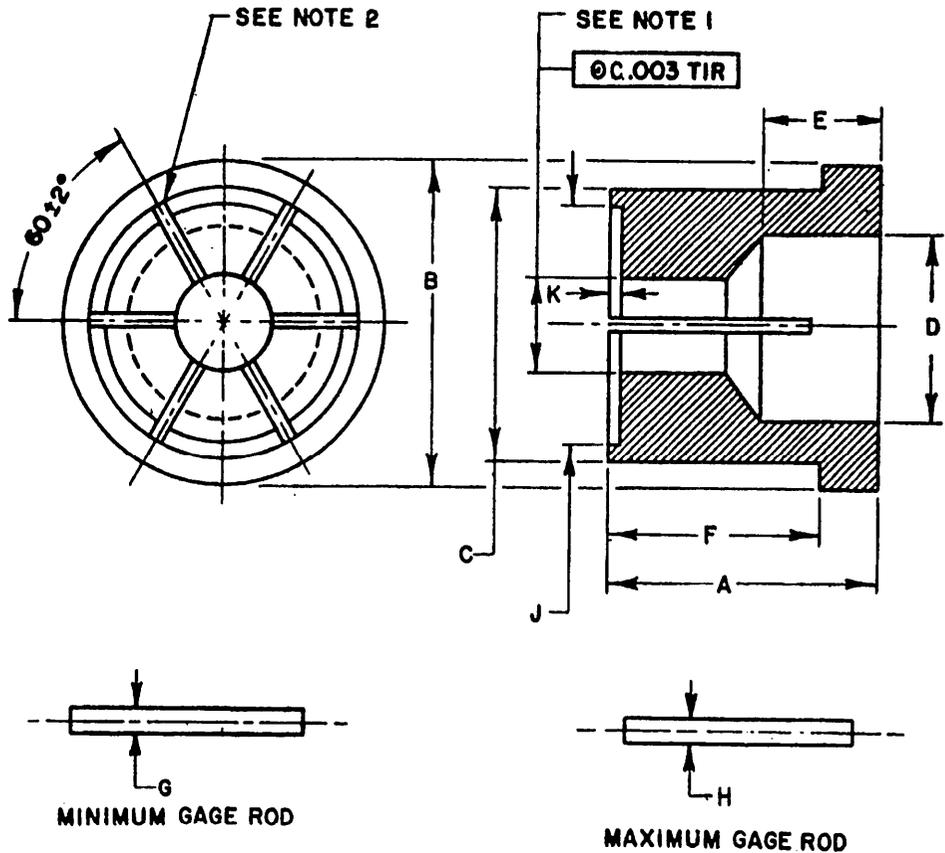


DIM	DIMENSIONS					
	INCHES			MILLIMETERS		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.800		0.840	20.32		21.33
B	0.753		0.792	19.13		19.92
C			0.240			6.09
D	0.195		0.215	4.96		5.46
E	0.092		0.094	2.34		2.38
F	0.030		0.046	0.77		1.16
G	0.180		0.190	4.58		4.82
H			0.030			0.76
J	10°		45°			
K	0.010		0.030	0.26		0.76

NOTES:

1. Both pins must have convex ends.
2. Eccentricity between pin and base shall not exceed 0.0075.
3. Metal parts shall be silver plated min 20 milligrams per square inch (msi) or gold plated min 10 msi.
4. The polarity shall be indicated by an arrow pointing in the direction of easier current flow.
5. Base adapter details are shown in Figure 2. (See para 3.3.1)
6. Metric equivalents are for information only and are based upon 1 inch = 25.4 mm.

Figure 1. Semiconductor device, diode, type JAN-1N263.



DIMENSIONS					
DIM	INCHES		MILLIMETERS		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	.246	.254	6.25	6.35	
B	.292 dia	.296 dia	7.42	7.51	
C	.246 dia	.250 dia	6.25	6.35	
D	---	.187	---	4.75	
E	---	.100	---	2.54	
F	.195	.199	4.96	5.05	
G	.0915 dia	.0920 dia	2.324	2.336	
H	.0940 dia	.0945 dia	2.387	2.400	
J	.216 dia	.221 dia	5.48	5.61	
K	.012	.018	0.30	0.40	

NOTES:

1. This diameter should be 0.095(2.41) min, 0.097(2.46) 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 also on the maximum gage rod, in each case with a snug fit (for hand assembly).
2. Each slot shall be 0.008 (0.20) min, 0.012(0.30) max wide by 0.185(4.70) deep before closing. The 6 slots are equally spaced.
3. The material for the adapter shall be beryllium copper and the finish is gold plated 10 msi minimum.
4. All burrs and sharp edges shall be removed.
5. See para. 3.3.1.

Figure 2. Removable adapter for type JAN-1N263.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

OMB Approval
No. 22-R255

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