

INCH-POUND

MIL-DTL-85/3D  
27 April 2012  
SUPERSEDING  
MIL-DTL-85/3C  
17 October 2005

DETAIL SPECIFICATION SHEET

WAVEGUIDES, RIGID, RECTANGULAR (MILLIMETER WAVELENGTH)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the waveguide described herein shall consist of this specification sheet and MIL-DTL-85.

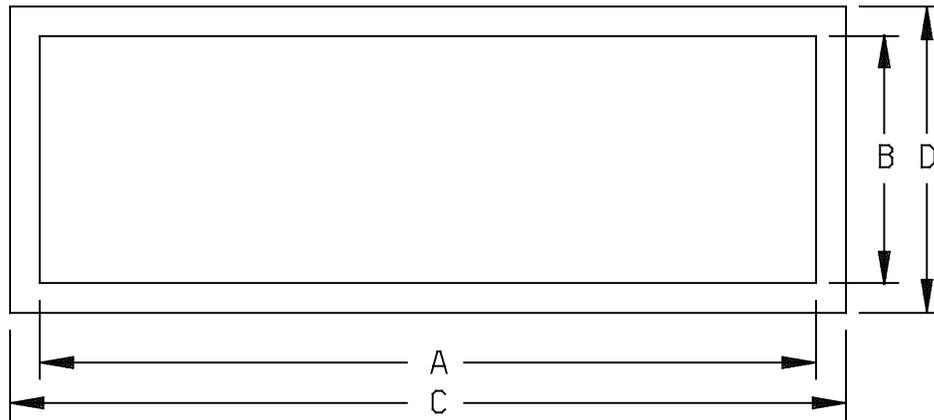


FIGURE 1. Waveguide, Rigid, Rectangular (Millimeter Wavelength).

REQUIREMENTS:

Design, construction, and physical dimensions: See figure 1 and table I.

Material: See table I and table IV.

Part number: See table I.

NOTES:

1. Engineering information: See table II.
2. Supersession data and cross index: See table III.
3. Typical resistivity and conductivity of materials: See table IV.
4. There shall be no "dog ears" from fabrication.

TABLE I. Dash numbers and dimensions.

Part <u>1</u> / number M85/3-	Dimensions (inches) <u>2</u> /										(see Table IV) ASTM type material
	EIA WR - ##	Inside			Outside			Wall Thickness (nominal)	(max.) Outer corner radius	(max.) Inner corner radius	
		Width (A)	Height (B)	Toler- ance	Width (C)	Height (D)	Toler- ance				
006-XXX 007-XXX 008-XXX 009-XXX	28	.2800 (7.11)	.1400 (3.56)	± .0015 (.04)	.360 (9.14)	.220 (5.59)	± .002 (.05)	.040 (1.02)	.012 (.30)	.008 (.20)	Coin silver Copper (OFHC) <u>3</u> / Bronze (90/10) 6061
010-XXX 011-XXX 012-XXX 013-XXX	22	.2240 (5.69)	.1120 (2.84)	± .0010 (.03)	.304 (7.72)	.192 (4.88)	± .002 (.05)	.040 (1.02)	.010 (.25)	.007 (.18)	Coin silver Copper (OFHC) Bronze (90/10) 6061
014-XXX 015-XXX 016-XXX	19	.1880 (4.78)	.0940 (2.39)	± .0010 (.03)	.268 (6.81)	.174 (4.42)	± .002 (.05)	.040 (1.02)	.009 (.23)	.006 (.15)	Coin silver Copper (OFHC) Bronze (90/10)
017-XXX 018-XXX	15	.1480 (3.76)	.0740 (1.88)	± .0010 (.03)	.228 (5.79)	.154 (3.91)	± .002 (.05)	.040 (1.02)	.008 (.20)	.004 (.11)	Coin silver Copper (OFHC)
020-XXX 021-XXX	12	.1220 (3.10)	.0610 (1.55)	± .0010 (.03)	.202 (5.13)	.141 (3.58)	± .002 (.05)	.040 (1.02)	.007 (.18)	.004 (.11)	Coin silver Copper (OFHC)
023-XXX 024-XXX	10	.1000 (2.54)	.0500 (1.27)	± .0010 (.03)	.180 (4.57)	.130 (3.30)	± .002 (.05)	.040 (1.02)	.007 (.18)	.003 (.08)	Coin silver Copper (OFHC)
026-XXX 027-XXX	08	.0800 (2.03)	.0400 (1.02)	± .0005 (.01)	.1600 (4.06)	.1200 (3.09)	± .0015 (.04)	.040 (1.02)	.006 (.15)	.002 (.05)	Coin silver Copper (OFHC)
029-XXX 030-XXX	06	.0650 (1.65)	.0325 (.83)	± .0005 (.01)	.1450 (3.68)	.1125 (2.86)	± .0015 (.04)	.040 (1.02)	.005 (.13)	.002 (.05)	Coin silver Copper (OFHC)
032-XXX 033-XXX	05	.0510 (1.30)	.0255 (.65)	± .0005 (.01)	.1310 (3.33)	.1055 (2.68)	± .0015 (.04)	.040 (1.02)	.005 (.13)	.002 (.05)	Coin silver Copper (OFHC)
035-XXX 036-XXX	04	.0430 (1.09)	.0215 (.55)	± .0005 (.01)	.1230 (3.12)	.1015 (2.58)	± .0015 (.04)	.040 (1.02)	.004 (.11)	.001 (.03)	Coin silver Copper (OFHC)
038-XXX 039-XXX	03	.0340 (.86)	.0170 (.43)	± .0005 (.01)	.1140 (2.90)	.0970 (2.46)	± .0015 (.04)	.040 (1.02)	.004 (.11)	.001 (.03)	Coin silver Copper (OFHC)

1/ The complete part number shall be the number shown and a three-digit number indicating length in inches (for example, M85/3-006-096). Part numbers M85/3-001 through -005, 019, 022, 025, 028, 031, 034, 037, 040 through 055 have been deleted. Material type was changed for part numbers 008, 012, 016 because previous listed composition was never made.

2/ Metric equivalents (to the nearest .01 mm) are given for general information only. Millimeters are in parentheses.

3/ Copper (OFHC) is oxygen-free high conductivity copper shall conform to ASTM-B187/B187M for bar and ASTM-B152/B152M for plate.

TABLE II. Performance characteristics.

Part number M85/3-	frequency range TE <sub>10</sub> mode (GHz)	Cutoff for TE <sub>10</sub> mode (GHz)	Theoretical attenuation (lowest to highest frequency) (dB/100 ft) <sup>1/</sup>	Theoretical peak power rating (lowest to highest frequency) (kilowatts) <sup>2/</sup>	Theoretical CW power rating (lowest to highest frequency) (watts) <sup>3/</sup>
006-XXX 007-XXX 008-XXX 009-XXX	26.50 - 40.00	21.10	24.55 - 16.80 23.02 - 15.77 --- 34.46 - 23.59	96.0 - 146	103.1 - 150.1 109.7 - 160.1 --- 73.27 - 107.0
010-XXX 011-XXX 012-XXX 013-XXX	33.00 - 50.00	26.350	34.57 - 23.50 32.44 - 22.05 --- 48.53 - 32.99	64.4 - 97.0	64.73 - 95.30 68.89 - 101.4 --- 46.05 - 67.74
014-XXX 015-XXX 016-XXX	40.00 - 60.00	31.41	42.39 - 30.46 39.81 - 28.60 ---	48 - 70	48.30 - 67.21 51.32 - 71.43 ---
017-XXX 018-XXX	50.00 - 75.00	39.90	64.23 - 43.89 60.25 - 41.17	30 - 40	28.46 - 41.44 30.27 - 44.30
020-XXX 021-XXX	60.00 - 90.00	48.40	87.79 - 58.86 82.37 - 55.22	20 - 30	19.15 - 28.56 20.37 - 30.38
023-XXX 024-XXX	75.00 - 110.00	59.06	112.5 - 79.26 105.6 - 74.37	14 - 20	13.82 - 19.63 14.73 - 20.86
026-XXX 027-XXX	90.00 - 140.00	73.84	171.4 - 110.0 160.9 - 103.3	8.8 - 13	8.618 - 13.43 9.161 - 14.27
029-XXX 030-XXX	110.00 - 170.00	90.845	238.1 - 150.9 223.5 - 141.7	5.9 - 9.3	5.662 - 8.934 6.019 - 9.494
032-XXX 033-XXX	140.00 - 220.00	115.750	343.6 - 216.0 322.7 - 202.8	3.7 - 6.1	3.674 - 5.844 3.904 - 6.211
035-XXX 036-XXX	170.00 - 260.00	137.52	428.2 - 283.2 402.0 - 265.9	2.8 - 4.5	2.832 - 4.282 3.010 - 4.551
038-XXX 039-XXX	220.00 - 325.00	173.28	570.9 - 388.0 536.0 - 364.4	1.9 - 2.6	2.021 - 2.973 2.148 - 3.159

<sup>1/</sup> At 20°C waveguide temperature.

<sup>2/</sup> These values were determined by calculating the non-pressurized air dielectric breakdown strength produced by considering the E field within the waveguide. This determination was based on the peak value of a continuous wave (CW) signal. For further information see M. Gilden and L. Gould, "Handbook on High Power Capabilities of Waveguide Systems," June 1963, Navy Contract Nobsr-85190, Index No. SR0080302, ST 9604.

<sup>3/</sup> These values were determined by calculation of the rate of heat loss to the ambient, considering a non-pressurized air dielectric waveguide in air using no artificial heat sink. A maximum waveguide temperature of 71°C, 1:1 VSWR, and an ambient temperature of 30°C were assumed. For additional information see H.E. King, "Rectangular Waveguide Theoretical CW Average Power Rating," IRE Transactions PGMTT-9, pp 349-357, July 1961.

TABLE III. Supersession data and cross index.

Part number M85/3-	Superseded part number M85/1-	Cross index		
		AN type	NATO type	EIA type
006-XXX	114-XXX	RG-96/U	NWG-6A22	WR28S
008-XXX	117-XXX	RG-271/U	---	---
010-XXX	118-XXX	RG-97/U	NWG-6A23	WR22S
012-XXX	121-XXX	RG-272/U	---	---
016-XXX	124-XXX	RG-358/U	---	---
017-XXX	125-XXX	RG-98/U	NWG-6A25	WR15S
020-XXX	129-XXX	RG-99/U	NWG-6A26	WR12S

TABLE IV. Materials.

Material	Resistivity @ 20°C (max) (microhm-cm)	Conductivity (percent) <u>1/</u>	Specification Reference <u>2/</u>
Aluminum alloy 6061	4.00	40 to 45	ASTM-B308/B308M
Copper: OF	1.77	101	ASTM-B249/B249M
DLP	1.793	up to 100	ASTM-B75
Bronze (90 Cu/10 Zn)	3.9	44	ASTM-B249/B249M
Silver, coin	2.03	85	ASTM-B617

1/ 172.41 / resistivity = % IACS (International Annealed Copper Standard).

2/ Copies are available through ASTM International, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, U.S. 19428-2959 or <http://www.astm.org/>.

Referenced documents. In addition to MIL-DTL-85, this specification sheet references the following documents:

ASTM-B75  
 ASTM-B249/B249M  
 ASTM-B308/B308M  
 ASTM-B187/B187M  
 ASTM-B152/B152M  
 ASTM-B617

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