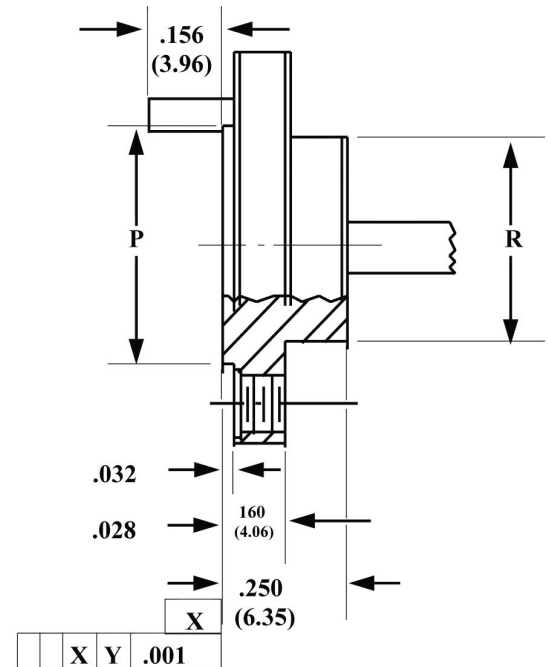
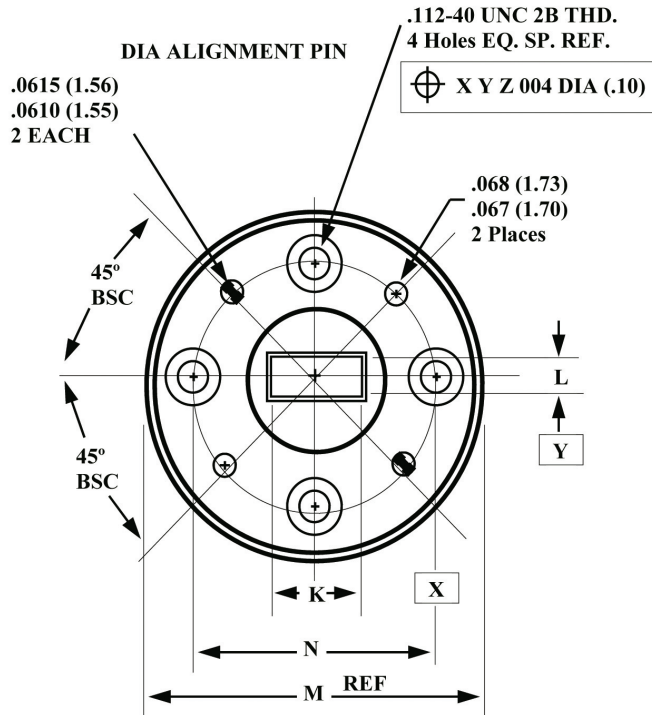


Rectangular Waveguides											
			Recommended Operating Range for TE ₁₀ Mode		Cut-off for TE ₁₀ Mode						
Mi-Wave Band	Waveguide Designator(s) (JAN & WR)	Waveguide Inner Dimensions in Inches	Frequency (GHz)	Wavelength (mm)	Frequency (GHz)	Wavelength (mm)	Theoretical Power CW Breakdown Lowest to Highest Frequency (KW)	Theoretical Attenuation Lowest to Highest Frequency (dB/ft)	Flange Type	Historic Designation	New MIL Part Number
KU	RG-91/U WR-62	0.622 x 0.311	12.4–18.0	24.2–16.6	9.486	31.60	400–600	.064–.030	Cover ¹ Choke	UG-419/U UG-541/U	M3922/53-4/005 M3922/59-2/001
K	RG-53/U WR-42	0.420 x 0.170	18.0–26.5	16.6–11.3	14.047	21.34	160–240	.17–.11	Cover ¹ Choke Cover	UG-595/U UG-596A/U UG-425/U	M3922/54-4/001 M3922/59-2/003 M3922/67-2/004
A	RG-96/U WR-28	0.280 x 0.140	26.5–40.0	11.3–7.5	21.081	14.22	95–145	0.22–0.15	Cover ¹ Choke Cover	UG-599/U UG-600/U UG-381/U	M3922/54-4/003 M3922/59-2/005 M3922/67-2/005
B	RG-97/U WR-22	0.224 X 0.112	33.0–50.0	9.1–6.0	26.342	11.38	62–90	0.31–0.21	Cover ¹ Cover Cover	UG-383/U 719 719T	M3922/67-2/006 N/A N/A
U	WR-19	0.188 x 0.094	40.0–60.0	7.5–5.0	31.357	9.56	47–64	0.39–0.27	Cover ¹² Cover Cover	UG-385/U-M 710 720T	M3922/67-2/007 N/A N/A
V	RG-98/U WR-15	0.148 x 0.074	50.0–75.0	6.0–4.0	39.863	7.52	29–42	0.78–0.53	Cover ¹	UG-385/U	M3922/67-2/008
E	RG-99/U WR-12	0.122 x 0.061	60.0–90.0	5.0–3.3	48.350	6.20	20–29	0.78–0.53	Cover ¹	UG-387/U	M3922/67-2/009
W	WR-10	0.100 x 0.050	75.0–110	4.0–2.7	59.010	5.08	14–20	1.02–0.71	Cover ¹²	UG-387/U-M	M3922/67-2/010
F	RG-138/U WR-8	0.080 x 0.040	90.0–140.0	3.3–2.1	73.764	4.06	8.5–13.5	1.52–0.98	Pin ¹ Cover ²	714 UG-387/U-M	M3922/74-001 N/A
D	RG-136/U WR-7	0.065 x 0.0325	110.0–170.0	2.7–1.8	90.786	3.30	5.8–9.0	2.12–1.35	Pin ¹ Cover ²	716 UG-387/U-M	M3922/74-002 N/A
G	RG-135/U WR-5	0.051 x 0.0255	140.0–220.0	2.1–1.4	115.71	2.59	3.7–6.1	3.05–1.93	Pin ¹ Cover ²	715 UG-387/U-M	M3922/74-003 N/A

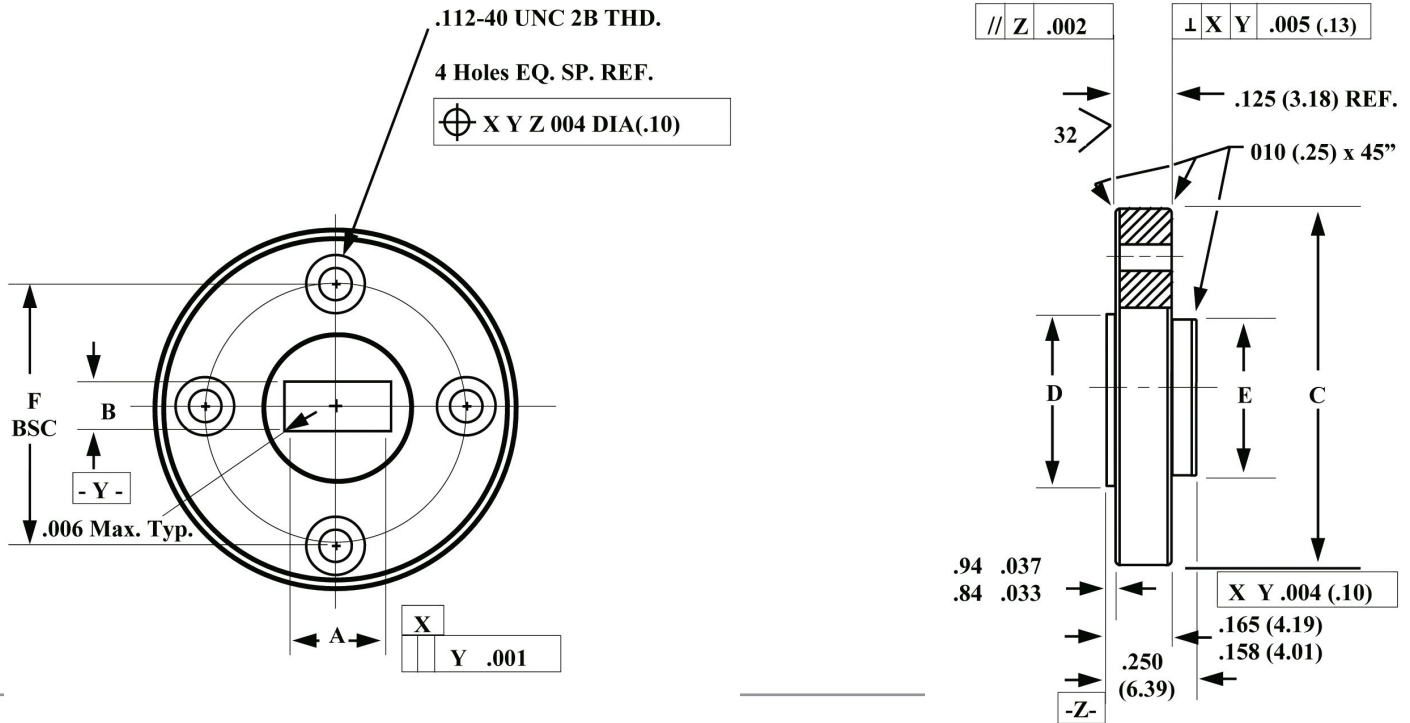
1. Standard flange unless otherwise specified.

2. Modified (-M) means waveguide opening has been reduced appropriately. Screw and pin pattern are unchanged.

Finished Flange and Waveguide



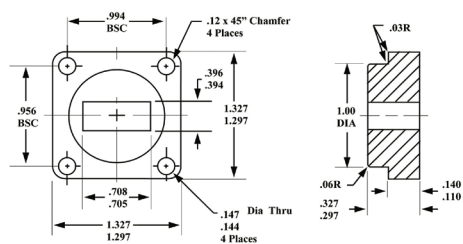
MIWV Band	Frequency Band (GHz)	MIL Part Number M3922/67	K ±.0015 (.04)	L ±.0015 (.04)	M ±.000/.002 (.05)	N BSC	P ±.005 (.13)	R ±.005 (.13)	EIA Waveguide Designation	MIWV Flange Designation	MIWV Flange Bank
K	18.0-26.5	-004	.4200 (10.67)	.1700 (4.32)	1.125 (28.58)	.9375 (23.81)	.625 (15.88)	.625 (15.88)	WR-42	UG-425/U	101957-10
A	26.5–40.0	-005	.2800 (7.11)	.1400 (3.56)	1.125 (28.58)	.9375 (23.81)	.500 (12.70)	.468 (11.89)	WR-28	UG-381/U	101957-1
B	33.0–50.0	-006	.2240 (5.69)	.1120 (2.84)	1.125 (28.58)	.9375 (23.81)	.500 (12.70)	.468 (11.89)	WR-22	UG-383/U	101957-2
U	40.0–60.0	-007	.1180 (4.78)	.0940 (2.39)	1.125 (28.58)	.9375 (23.81)	.500 (12.70)	.468 (11.89)	WR-19	UG-383/U-M	101957-3
V	50.0–75.0	-008	.1480 (3.76)	.0740 (1.88)	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	WR-15	UG-385/U	101957-4
E	60.0–90.0	-009	.1220 (3.10)	.0610 (1.55)	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	WR-12	UG-387/U	101957-5
W	75.0–110.0	-010	.1000 (2.54)	.0500 (1.27)	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	WR-10	UG-387/U-M	101957-6
F	90.0–140.0	N/A	.0800 (2.03)	.0400 (1.02)	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	WR-8	UG-387/U-M	101957-7
D	110.0–170.0	N/A	.0650 (1.65)	.0325 (.83)	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	WR-7	UG-387/U-M	101957-8
G	140.0–220.0	N/A	.0510 (1.30)	.0255 (.65)	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	WR-5	UG-387/U-M	101957-9



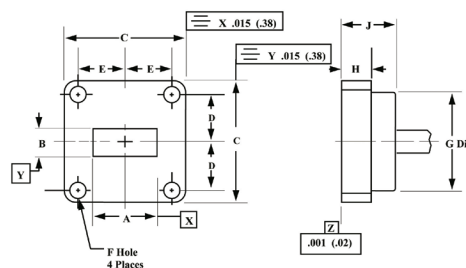
Note: Flange can be ordered with or without holes for pins

MIWV Band	Frequency Band (GHz)	MIL Part Number M3922/67	A $+.002/-0.000 (.05)$	B $+.002/-0.000 (.05)$	C $+.000/-0.002 (.05)$	D $\pm .005 (.13)$	E $\pm .005 (.13)$	F BSC	MIWV Flange Designation
K	180.0 260.5	-004	.502 (12.75)	.252 (6.40)	1.125 (28.58)	.625 (15.88)	.625 (15.88)	.312 (7.92)	UG-425/U
A	26.5 40.0	-005	.362 (9.19)	.222 (5.64)	1.125 (28.58)	.500 (12.70)	.468 (11.89)	.9375 (23.81)	UG-381/U
B	33.0 50.0	-006	.306 (7.77)	.194 (4.93)	1.125 (28.58)	.500 (12.70)	.468 (11.89)	.9375 (23.81)	UG-383/U
U	40.0 60.0	-007	.270 (6.86)	.167 (4.47)	1.125 (28.58)	.500 (12.70)	.468 (11.89)	56.25 (14.29)	UG-383/U-M
V	50.0 75.0	-008	.230 (5.84)	.156 (3.96)	.750 (19.05)	.375 (9.53)	.312 (7.92)	56.25 (14.29)	UG-385/U
E	60.0 90.0	-009	.204 (5.18)	.143 (3.63)	.750 (19.05)	.375 (9.53)	.312 (7.92)	56.25 (14.29)	UG-387/U
W	75.0 110.0	-010	.182 (4.62)	.132 3.35	.750 (19.05)	.375 (9.53)	.312 (7.92)	56.25 (14.29)	UG-387/U-M
F	90.0 140.0	N/A	.141 (3.58)	.101 (2.56)	.750 (19.05)	.375 (9.53)	.312 (7.92)	56.25 (14.29)	UG-387/U-M
D	110.0 170.0	N/A	.126 (3.20)	.094 (2.39)	.750 (19.05)	.375 (9.53)	.312 (7.92)	56.25 (14.29)	UG-387/U-M
G	140.0 220.0	N/A	.112 (2.84)	.089 (2.21)	.750 (19.05)	.375 (9.53)	.312 (7.92)	.9375 (23.81)	UG-387/U-M

UG-419/U (WR-62)



Cover Flanges — Finished Flange and Waveguide UG-419/U (WR-62)

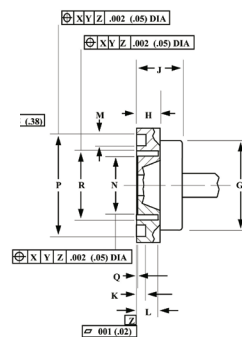
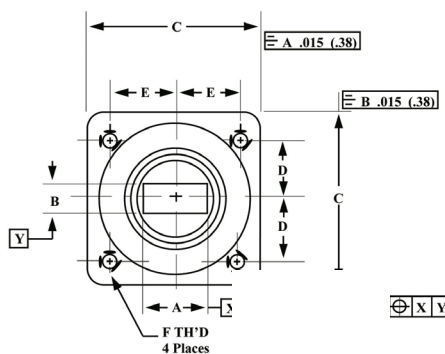


MIWV Band	Frequency Band (GHz)	MIL Part Number M3922/53	A	B	C .015 (.38)	D BSC	E BSC	F ±.003 (.08)	G ±.015 (.38)	H ±.015 (.38)	J ±.015 (.38)	MIWV Flange Bank
Ku	12.4 18.0	-4/005	.622 ± .002 (15.8) (.05)	.311 ± .002 (7.9) (.05)	1.312 33.32	4.78 (12.14)	.497 (12.62)	.144 (3.66)	1.000 (25.40)	.125 (3.18)	.313 (7.95)	UG-419/U

Appendix G

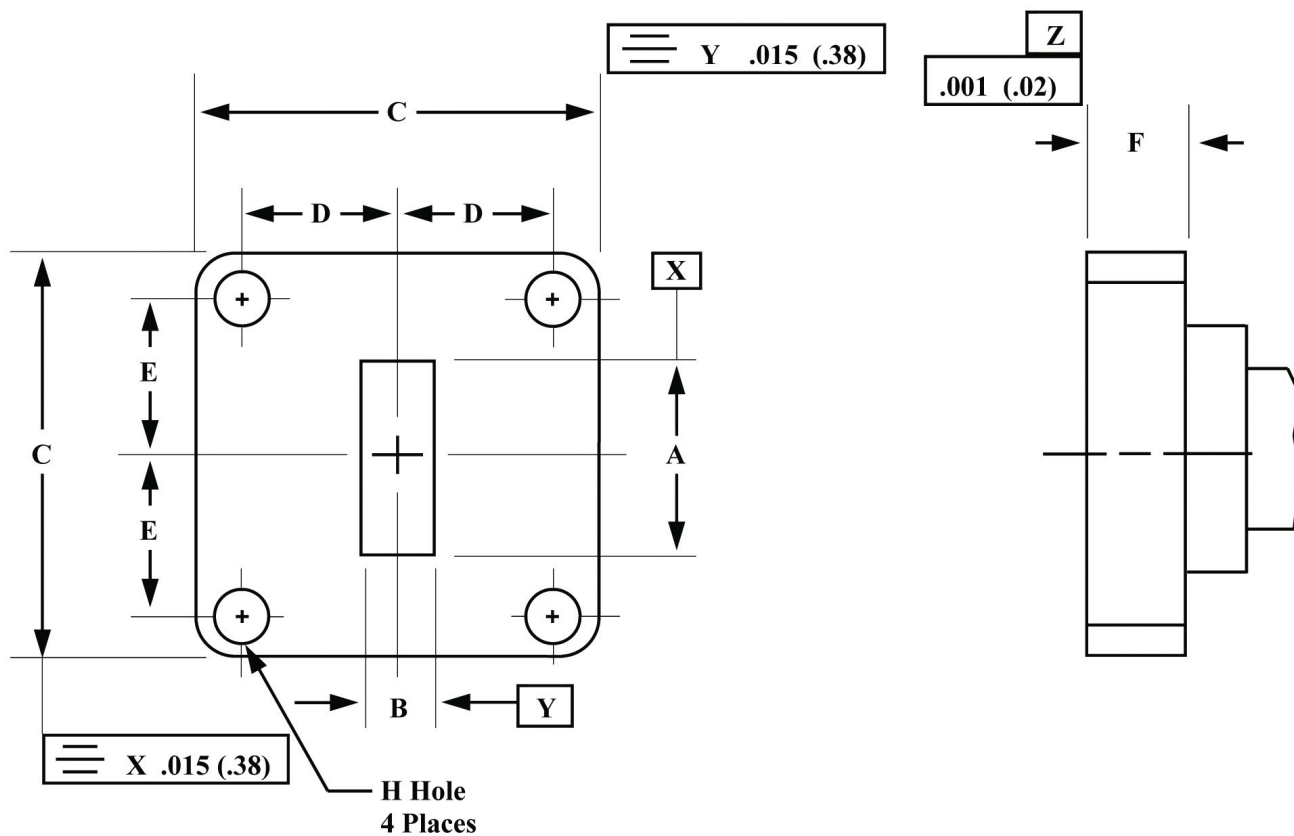
Choke Flanges

Finished Flange and Waveguide



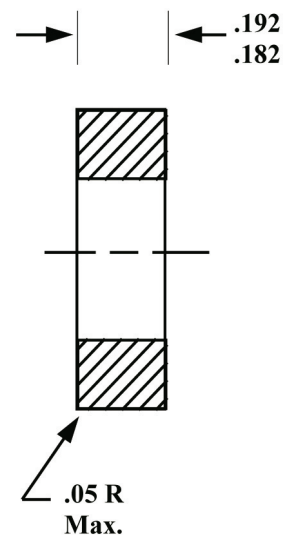
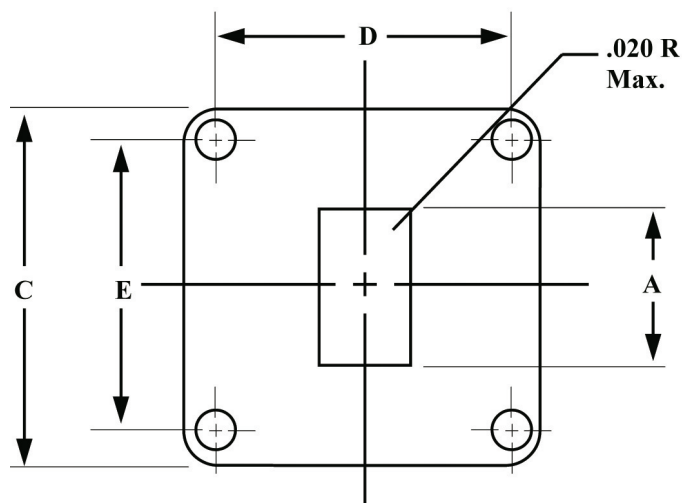
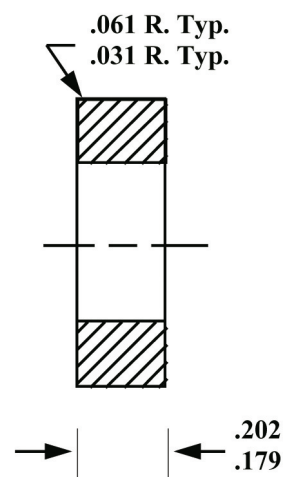
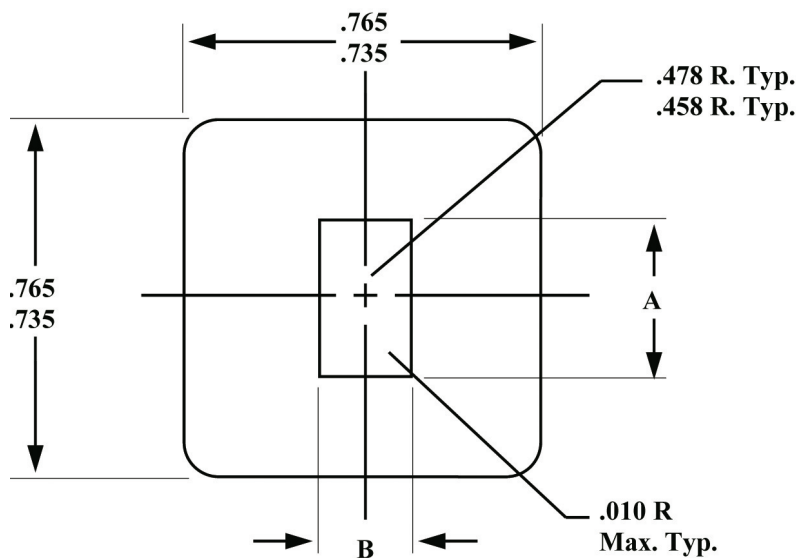
MIWV Band	Frequency Band (GHz)	MIL Part Number M3922/59	MIWV FLG. ESIG.	A	B	C .015 (.38)	D BSC	E BSC	F	G ±.015 (.38)	H ±.015 (.38)	J ±.015 (.38)	K ±.002 (.05)	L ±.002 (.05)	M ±.002 (.05)	N ±.002 (.05)	P ±.002 (.05)	Q ±.001 (.03)	R ±.002 (.05)
Ku	12.4 18.0	-2/001	UG541	.622±.002 (15.8)(.05)	.311±.002 (7.9)(.05)	1.312 (33.32)	.478 (12.14)	.497 (12.62)	.138-32 UNC-2B	1.000 (25.40)	.188 (4.78)	.375 (9.53)	.113 (2.87)	.190 (4.83)	1.58 (4.01)	.710 (18.03)	1.208 (30.68)	.0075 (.19)	.828 (21.03)
K	18.0 26.5	-2/003	UG596	.420±.002 (10.67)(.05)	.170±.002 (4.32)(.05)	.875 (22.23)	.335 (8.51)	.320 (8.13)	.112-40 UNC-2B	.625 (15.88)	.156 (3.96)	.285 (7.24)	0.42 (1.07)	.129 (3.28)	0.87 (2.21)	.472 (11.99)	.761 (19.33)	.005 (.13)	.536 (13.61)
A	26.5 40.0	-2/005	UG600	.280±.0014 (7.11)(.04)	.140±.0014 (3.56)(.04)	.750 (19.05)	.265 (6.73)	.250 (6.35)	.112-40 UNC-2B	.500 (12.70)	.109 (2.77)	.210 (5.33)	.050 (1.27)	.086 (2.18)	.096 (2.44)	.321 (8.15)	.596 (15.14)	.003 (.08)	.372 (9.45)

Finished Flange and Waveguide



MIWV Band	Frequency Band (GHz)	MIL Part Number M3922/54-4	A $\pm .0015$ (.04)	B $\pm .0015$ (.04)	C	D BSC	E BSC	F	H	MIWV Flange
K	18.0 26.5	-001	.4200 (10.67)	.1700 (4.32)	.875 $\pm$.015 (22.22)(.38)	.335 (8.51)	.320 (8.13)	.156 $\pm$.015 (3.96)(.38)	.116 $\pm$.002 (2.95)(.05)	UG-595/U
A	26.5 40.0	-003	.2800 (7.11)	.1400 (3.56)	.750 $\pm$.005 (19.05)(1.3)	.265 (6.75)	.250 (6.35)	.109 $\pm$.005 (2.77)(.38)	.116 $\pm$.002 (2.95)(.05)	UG-599/U
B	33.0 50.0	N/A	.2240 (5.69)	.1120 (2.84)	.750 $\pm$.005 (19.05)(1.3)	.265 (6.75)	.250 (6.35)	.156 $\pm$.005 (3.96)(.38)	.116 $\pm$.002 (2.95)(.05)	719 (UG-599/UM)
B	33.0 50.0	N/A	.2240 (5.69)	.1120 (2.84)	.750 $\pm$.005 (19.05)(1.3)	.265 (6.75)	.250 (6.35)	.156 $\pm$.005 (3.96)(.38)	.112-40 UNC-2B	719T
U	40.0 60.0	N/A	.1880 (4.78)	.0940 (2.39)	.750 $\pm$.005 (19.05)(1.3)	.265 (6.75)	.250 (6.35)	.187 $\pm$.005 (4.75)(.38)	.116 $\pm$.002 (2.95)(.05)	720 (UG-599/UM)
U	40.0 60.0	N/A	.1880 (4.78)	.0940 (2.39)	.750 $\pm$.005 (19.05)(1.3)	.265 (6.75)	.250 (6.35)	.187 $\pm$.005 (4.75)(.38)	.112-40 UNC-2B	720T

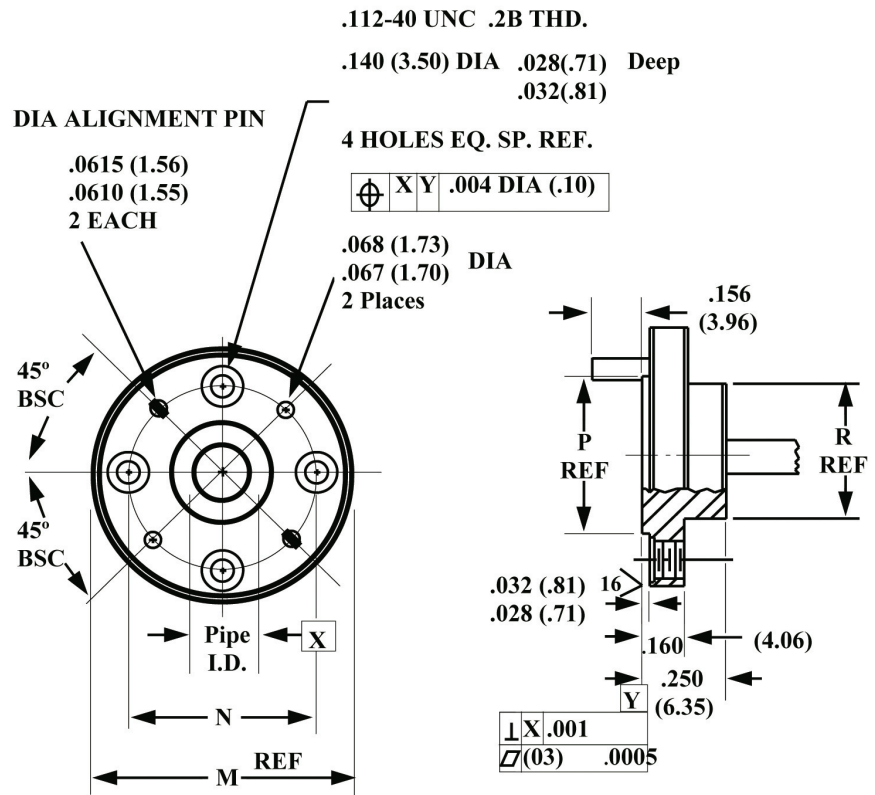
Flange Blank



MIWV Flange Designation	A	B	C	D BSC	E BSC
UG 599A	.364 .362	.224 .222	.755 .745	.530	.500
UG 595K	.505 .503	.255 .253	.890 .860	.670	.640

MIWV Part Number	A +.002-.000	B +.002-.000
719B	.306	.194
720U	.270	.176

Band	Pipe ID	Frequency Band
Ku-1	.660	12.4–14.6
Ku-2	.550	14.6–17.5
K-1	.470	17.5–20.5
K-2	.396	20.5–24.5
K-3	.328	24.5–26.5
A-0	.328	26–28.5
A-1	.281	28.5–33
A-2	.250	33–38.5
A-3	.219	38.5–43
B-0	.250	33–38.5
B1	.219	38.5–43
B-2	.188	43–50
U-0	.219	38.5–43
U-1	.188	43–50
U-2	.165	50–58
V-0	.165	50–58
V-1	.141	58–68
V-2	.125	68–77
E-0	.141	58–68
E-1	.125	68–77
E-2	.110	77–87
E-3	.094	87–100
W-0	.110	77–87
W-1	.094	87–100
W-2	.082	100–112
F-0	.094	87–100
F-1	.082	100–112
F-2	.075	112–125
F-3	.067	125–140
D-0	.082	100–112
D-1	.075	112–125
D-2	.067	125–140
D-3	.059	140–160
G-0	.067	125–140
G-1	.059	140–220



MIWV Band	M +.000/.002 (.05)	N BSC	P +.005 (.13)	R +.005 (.13)	MIWV Flange Designation	MIWV Flange Blank
Ku	1.44 (36.68)	1.250 (28.6)	.967 (24.6)	.967 (24.6)	731	108872
K	1.125 (28.58)	.9375 (23.8)	.625 (15.88)	.625 (15.88)	UG-425/U	107729-7
A	1.125 (28.58)	.9375 (23.8)	.500 (12.70)	.468 (11.89)	UG-381/U	107729-1
B	1.125 (28.58)	.9375 (23.8)	.500 (12.70)	.468 (11.89)	UG-383/U	107729-2
U	1.125 (28.58)	.9375 (23.8)	.500 (12.70)	.468 (11.89)	UG-385/U-M	107729-3
V	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	UG-385/U	107729-4
E	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	UG-387/U-M	107729-5
W	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	UG-387/U-M	107729-6
F	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	UG-387/U-M	107729-8
D	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	UG-387/U-M	107729-9
G	.750 (19.05)	.5625 (14.29)	.375 (9.53)	.312 (7.92)	UG-387/U-M	107729-10

Where frequency has two pipe sizes take smaller pipe, except for 100 GHz and higher, then take larger pipe.

Appendix K

The Effect of VSWR on Transmittal Power

VSWR	Return Loss (dB)	VSWR (dB)	Volt REFL COEFF	XMSN Loss (dB)	Power XMIT (%)	Power REFL (%)
1.006	50.00	0.05	0.00	.0000	100.	0.00
1.01	46.06	0.09	0.00	.0001	100.	0.00
1.011	45.00	0.10	0.01	.0001	100.	0.00
1.02	40.09	0.17	0.01	.0004	99.99	0.01
1.020	40.00	0.17	0.01	.0004	99.99	0.01
1.03	36.61	0.26	0.01	.0009	99.98	0.02
1.036	35.00	0.31	0.02	.0014	99.97	0.03
1.04	34.15	0.34	0.02	.0017	99.96	0.04
1.045	33.15	0.38	0.02	.0021	99.95	0.05
1.05	32.26	0.42	0.02	.0026	99.94	0.06
1.06	30.71	0.51	0.03	.0037	99.92	0.08
1.065	30.00	0.55	0.03	.0043	99.90	0.10
1.07	29.42	0.59	0.03	.0050	99.89	0.11
1.08	28.30	0.67	0.04	.0064	99.85	0.15
1.09	27.32	0.75	0.04	.0081	99.81	0.19
1.10	26.44	0.83	0.05	.0099	99.77	0.23
1.11	25.66	0.91	0.05	.0118	99.73	0.27
1.119	25.00	0.98	0.06	.0138	99.68	0.32
1.12	24.94	0.98	0.06	.0139	99.68	0.32
1.13	24.29	1.06	0.06	.0162	99.63	0.37
1.135	24.00	1.10	0.06	.0173	99.60	0.40
1.14	23.69	1.14	0.07	.0186	99.57	0.43
1.15	23.13	1.21	0.07	.0212	99.51	0.49
1.152	23.00	1.23	0.07	.0212	99.50	0.50
1.16	22.61	1.29	0.07	.0239	99.45	0.55
1.17	22.12	1.36	0.08	.0267	99.39	0.61
1.173	22.00	1.38	0.08	.0275	99.37	0.63
1.18	21.66	1.44	0.08	.0297	99.32	0.68
1.19	21.23	1.51	0.09	.0328	99.25	0.75
1.196	21.00	1.55	0.09	.0346	99.21	0.79
1.20	20.83	1.58	0.09	.0360	99.17	0.83
1.21	20.44	1.66	0.10	.0394	99.10	0.90
1.22	21.08	1.73	0.10	.0429	99.02	0.98
1.222	20.00	1.74	0.10	.0436	99.00	1.00
1.23	19.73	1.80	0.10	.0464	98.94	1.06
1.24	19.40	1.87	0.11	.0501	98.85	1.15
1.25	19.08	1.94	0.11	.0540	98.77	1.23
1.253	19.00	1.96	0.11	.0550	98.74	1.26
1.26	18.78	2.01	0.12	.0579	98.68	1.32
1.27	18.49	2.08	0.12	.0619	98.59	1.41
1.28	18.22	2.14	0.12	.0660	98.49	1.51
1.288	18.00	2.20	0.13	.0694	98.42	1.58
1.29	17.95	2.21	0.13	.0702	98.40	1.60
1.30	17.89	2.28	0.13	.0745	98.30	1.70

VSWR	Return Loss (dB)	VSWR (dB)	Volt REFL COEFF	XMSN Loss (dB)	Power XMIT (%)	Power REFL (%)
1.31	17.45	2.35	0.13	0.08	98.20	1.80
1.32	17.21	2.41	0.14	0.08	98.10	1.90
1.329	17.00	2.47	0.14	0.09	98.00	2.00
1.33	16.98	2.48	0.14	0.09	97.99	2.01
1.34	16.75	2.54	0.15	0.09	97.89	2.11
1.35	18.54	2.61	0.15	0.10	97.78	2.22
1.36	16.33	2.61	0.15	0.10	97.67	2.33
1.37	16.13	2.73	0.16	0.11	97.56	2.44
1.377	16.00	2.78	0.16	0.11	97.49	2.51
1.38	15.94	2.80	0.16	0.11	97.45	2.55
1.39	15.75	2.86	0.16	0.11	97.49	2.51
1.40	15.56	2.92	0.17	0.12	97.22	2.78
1.41	15.38	2.98	0.17	0.13	97.11	2.89
1.42	15.21	3.05	0.17	0.13	96.99	3.01
1.43	15.04	3.11	0.18	0.14	96.87	3.13
1.433	15.00	3.12	0.18	0.14	96.84	3.16
1.44	14.88	3.17	0.18	0.14	96.75	3.25
1.45	14.72	3.23	0.18	0.15	96.63	3.37
1.46	14.56	3.29	0.19	0.15	96.50	3.50
1.464	14.50	3.31	0.19	0.16	96.45	3.55
1.47	14.41	3.35	0.19	0.16	96.38	3.62
1.48	14.26	3.41	0.19	0.17	96.25	3.75
1.49	14.12	3.46	0.20	0.17	96.13	3.87
1.499	14.00	3.51	0.20	0.18	96.02	3.98
1.50	13.96	3.52	0.20	0.18	96.00	4.00
1.536	13.50	3.73	0.21	0.20	95.53	4.47
1.55	13.32	3.81	0.22	0.21	95.35	4.65
1.577	13.00	3.96	0.22	0.22	94.99	5.01
1.60	12.74	4.08	0.23	0.24	94.67	5.33
1.622	12.50	4.20	0.24	0.25	94.38	5.62
1.65	12.21	4.35	0.25	0.27	93.98	6.02
1.671	12.00	4.46	0.25	0.28	93.69	6.31
1.70	11.73	4.61	0.26	0.30	93.28	6.72
1.725	11.50	4.74	0.27	0.32	92.92	7.08
1.75	11.29	4.86	0.27	0.34	92.56	7.44
1.785	11.00	5.03	0.28	0.36	92.06	7.94
1.80	10.88	5.11	0.29	0.37	91.84	8.16
1.851	10.50	5.35	0.30	0.41	91.09	8.16
1.90	10.16	5.58	0.31	0.44	90.37	9.63
1.925	10.00	5.69	0.32	0.46	90.00	10.00
2.00	9.54	6.02	0.33	0.51	88.89	11.11
2.50	7.36	7.96	0.43	0.88	81.63	18.37
3.00	6.02	9.54	0.50	1.25	75.00	25.00
3.50	5.11	10.88	0.56	1.60	69.14	30.86

TE ₀₁ Specifications					
Circular Waveguide			MIL-W-23068 Circular Waveguide		
I.D. O.D (inches)	Frequency (GHz)		I.D. O.D (inches)	Frequency (GHz)	Type.
1.500 X 1.750	11.6–16.0		1.500 X 1.700	11.6–16.0	WRC530D14
1.265 x 1.375	13.2–18.9		1.281 X 1.441	13.6–18.7	WRC621D14
1.106 x 1.250	15.9–21.9		1.094 X 1.224	15.9–21.9	WRC727D14
0.951 X 1.125	18.6–25.6		0.938 X 1.068	18.6–25.6	WRC849D14
0.686 X 0.750	25.3–34.9		0.797 X 0.897	21.9–30.1	WRC997D14
0.688 X 0.888	25.3–34.9		0.688 X 0.788	25.3–34.9	WRC116C14
0.634 X 0.750	27.3–38.8		0.594 X 0.674	29.3–40.4	WRC134C14
0.545 X 0.625	32.4–44.0		—	—	N/A
0.495 X 0.625	34.8–48.0		0.500 X 0.580	34.8–48.0	WRC159C14
—	—		0.438 X 0.518	39.8–54.8	WRC182C14
0.370 X 0.500	46.4–63.9		0.375 X 0.435	46.4–63.9	WRC212C14
0.353 X 0.438	50.0–68.0		0.328 X 0.388	53.1–73.1	WRC243C14
0.291 X 0.375	62.0–84.0		0.281 X 0.341	61.9–85.0	WRC283C14
0.249 X 0.313	69.7–95.9		0.250 X 0.290	69.7–95.9	WRC318C14
0.201 X 0.290	86.0–115.0		0.219 X 0.259	79.6–110.0	WRC364C14
0.186 X 0.250	93.0–128.0		0.188 X 0.228	92.9–128.0	WRC424C14
—	—		0.172 X 0.212	101.0–139.0	WRC463C14
—	—		0.141 X 0.181	124.0–171.0	WRC566C14