

# RADIO FREQUENCY (RF) ALTERNATING CURRENT (AC) FREE SPACE 'ELECTRICAL' WAVELENGTH (l) IN METERS PER SECOND (MPS) & ATMOSPHERIC 'PHYSICAL' WAVELENGTH (l) IN FEET PER SECOND (FPS)

WAVELENGTH (l)	FREE SPACE 'ELECTRICAL' WAVELENGTH (l) IN METERS PER SECOND (MPS)	ATMOSPHERIC 'PHYSICAL' WAVELENGTH (l) MINUS 'K' FACTOR = 95% OF FREE SPACE WAVELENGTH (l) IN METERS PER SECOND (MPS)	ATMOSPHERIC "PHYSICAL" WAVELENGTH (l) MINUS 'K' FACTOR <u>ROUNDED OFF</u> IN METERS PER SECOND (MPS)	FREE SPACE 'ELECTRICAL' WAVELENGTH (l) IN FEET PER SECOND (FPS)	ATMOSPHERIC 'PHYSICAL' WAVELENGTH (l) MINUS 'K' FACTOR = 95% OF FREE SPACE WAVELENGTH (l) IN FEET PER SECOND (FPS)	ATMOSPHERIC 'PHYSICAL' WAVELENGTH (l) MINUS 'K' FACTOR <u>ROUNDED OFF</u> IN FEET PER SECOND (FPS)
<b>1 l</b>	300,000,000	285,000,000	<b>285 MPS</b>	984,251,969	935,039,370	<b>935 FPS</b>
<b>3/4 l</b>	225,000,000	213,750,000	<b>214 MPS</b>	738,188,976	701,279,528	<b>701 FPS</b>
<b>5/8 l</b>	187,500,000	178,125,000	<b>178 MPS</b>	615,157,480	584,399,606	<b>584 FPS</b>
<b>1/2 l</b>	150,000,000	142,500,000	<b>143 MPS</b>	492,125,984	467,519,685	<b>468 FPS</b>
<b>1/4 l</b>	75,000,000	71,250,000	<b>71 MPS</b>	246,062,992	233,759,843	<b>234 FPS</b>

**(HORIZONTAL CONFIGURATION) 1/2 λ MONO BAND HERTZ ("DIPOLE") CENTER FED [MBHCF] AND MULTIPLE MONO BAND HERTZ ("DIPOLE") CENTER FED PARALLEL CONNECTED [MMBHCFC] USING # 12 AWG THHN INSULATED WIRE.**

PHYSICAL WAVELENGTH DIMENSIONS BASED ON CENTER FREQUENCY (fc) OF THE AMATEUR RADIO BAND AS RESONANT FREQUENCY

FREQUENCY SPECTRUM	U.S. AMATEUR RADIO SERVICE BAND	U.S. AMATEUR RADIO SERVICE BAND - AUTHORIZED RADIO FREQUENCIES	BAND CENTER FREQUENCY (fc) IN MEGAHERTZ (MHz) USED FOR RESONANT FREQUENCY	1/2 λ TOTAL LENGTH OF "HORIZONTAL" CONFIGURATION (180 DEGREE) LENGTH IN FEET $L(\text{ft}) = 468 / f_c(\text{MHz})$	1/4 λ EACH LEG OF "HORIZONTAL" CONFIGURATION (180 DEGREE) LENGTH IN FEET $L(\text{ft}) = 234 / f_c(\text{MHz})$
<b>MF</b>	160 Meters	1.800 - 2.000 MHz	1.900 MHz	246.32 Feet	123.16 Feet
<b>HF</b>	80 Meters	3.500 - 3.600 MHz	3.550 MHz	131.83 Feet	65.92 Feet
	75 Meters	3.600 - 4.000 MHz	3.800 MHz	123.16 Feet	61.58 Feet
	60 Meters	5.3305 - 5.4035 MHz	5.367 MHz	87.20 Feet	43.60 Feet
	40 Meters	7.000 - 7.300 MHz	7.150 MHz	65.45 Feet	32.73 Feet
	30 Meters	10.100 - 10.150 MHz	10.125 MHz	46.22 Feet	23.11 Feet
	20 Meters	14.000 - 14.350 MHz	14.175 MHz	33.02 Feet	16.51 Feet
	17 Meters	18.068 - 18.168 MHz	18.118 MHz	25.83 Feet	12.92 Feet
	15 Meters	21.000 - 21.450 MHz	21.225 MHz	22.05 Feet	11.02 Feet
	12 Meters	24.890 - 24.990 MHz	24.940 MHz	18.77 Feet	9.38 Feet
10 Meters	28.000 - 29.700 MHz	28.850 MHz	16.22 Feet	8.11 Feet	

**(INVERTED - 'V' CONFIGURATION) 1/2 λ MONO BAND HERTZ ("DIPOLE") CENTER FED [MBHCF] AND MULTIPLE MONO BAND HERTZ ("DIPOLE") CENTER FED PARALLEL CONNECTED [MMBHCFC] USING # 12 AWG THHN INSULATED WIRE.**

PHYSICAL WAVELENGTH DIMENSIONS BASED ON CENTER FREQUENCY (fc) OF THE AMATEUR RADIO BAND AS RESONANT FREQUENCY

FREQUENCY SPECTRUM	U.S. AMATEUR RADIO SERVICE BAND	U.S. AMATEUR RADIO SERVICE BAND - AUTHORIZED RADIO FREQUENCIES	BAND CENTER FREQUENCY (fc) IN MEGAHERTZ (MHz) USED FOR RESONANT FREQUENCY	1/2 λ TOTAL LENGTH OF "INVERTED - V" CONFIGURATION (120 DEGREE) LENGTH IN FEET L(ft) = 485 / fc(MHz)	1/4 λ EACH LEG OF AN "INVERTED - V" CONFIGURATION (120 DEGREE) LENGTH IN FEET L(ft) = 242.5 / fc(MHz)
MF	160 Meters	1.800 - 2.000 MHz	1.900 MHz	255.26 Feet	127.63 Feet
HF	80 Meters	3.500 - 3.600 MHz	3.550 MHz	136.62 Feet	68.31 Feet
	75 Meters	3.600 - 4.000 MHz	3.800 MHz	127.63 Feet	63.82 Feet
	60 Meters	5.3305 - 5.4035 MHz	5.367 MHz	90.37 Feet	45.18 Feet
	40 Meters	7.000 - 7.300 MHz	7.150 MHz	67.83 Feet	33.92 Feet
	30 Meters	10.100 - 10.150 MHz	10.125 MHz	47.90 Feet	23.95 Feet
	20 Meters	14.000 - 14.350 MHz	14.175 MHz	34.22 Feet	17.11 Feet
	17 Meters	18.068 - 18.168 MHz	18.118 MHz	26.77 Feet	13.38 Feet
	15 Meters	21.000 - 21.450 MHz	21.225 MHz	22.85 Feet	11.43 Feet
	12 Meters	24.890 - 24.990 MHz	24.940 MHz	19.45 Feet	9.72 Feet
	10 Meters	28.000 - 29.700 MHz	28.850 MHz	16.81 Feet	8.41 Feet

**(INVERTED - 'V' CONFIGURATION) 1/2 λ MONO BAND HERTZ ("DIPOLE") CENTER FED [MBHCF] AND MULTIPLE MONO BAND HERTZ ("DIPOLE") CENTER FED PARALLEL CONNECTED [MMBHCFPC] USING # 12 AWG THHN INSULATED WIRE.**  
 PHYSICAL WAVELENGTH DIMENSIONS BASED ON CENTER FREQUENCY (fc) OF THE AMATEUR RADIO BAND AS RESONANT FREQUENCY

FREQUENCY SPECTRUM	U.S. AMATEUR RADIO SERVICE BAND	U.S. AMATEUR RADIO SERVICE BAND - AUTHORIZED RADIO FREQUENCIES	BAND CENTER FREQUENCY (fc) IN MEGAHERTZ (MHz) USED FOR RESONANT FREQUENCY	1/2 λ TOTAL LENGTH OF "INVERTED - V" CONFIGURATION (90 DEGREE) LENGTH IN FEET $L(ft) = 463.3 / fc(MHz)$	1/4 λ EACH LEG OF AN "INVERTED - V" CONFIGURATION (90 DEGREE) LENGTH IN FEET $L(ft) = 231.65 / fc(MHz)$
MF	160 Meters	1.800 - 2.000 MHz	1.900 MHz	243.84 Feet	121.92 Feet
HF	80 Meters	3.500 - 3.600 MHz	3.550 MHz	130.51 Feet	65.25 Feet
	75 Meters	3.600 - 4.000 MHz	3.800 MHz	121.92 Feet	60.96 Feet
	60 Meters	5.3305 - 5.4035 MHz	5.367 MHz	86.32 Feet	43.16 Feet
	40 Meters	7.000 - 7.300 MHz	7.150 MHz	64.80 Feet	32.40 Feet
	30 Meters	10.100 - 10.150 MHz	10.125 MHz	45.76 Feet	22.88 Feet
	20 Meters	14.000 - 14.350 MHz	14.175 MHz	32.68 Feet	16.34 Feet
	17 Meters	18.068 - 18.168 MHz	18.118 MHz	25.57 Feet	12.79 Feet
	15 Meters	21.000 - 21.450 MHz	21.225 MHz	21.83 Feet	10.91 Feet
	12 Meters	24.890 - 24.990 MHz	24.940 MHz	18.58 Feet	9.29 Feet
	10 Meters	28.000 - 29.700 MHz	28.850 MHz	16.06 Feet	8.03 Feet

# LENGTH CONVERSIONS

CONVERSION: DECIMAL FEET TO INCHES										
	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
<b>0.00</b>	0	1/8	1/4	3/8	1/2	5/8	3/4	13/16	15/16	1 1/16
<b>0.10</b>	1 13/16	1 5/16	1 7/16	1 9/16	1 11/16	1 13/16	1 15/16	2 1/16	2 3/16	2 1/4
<b>0.20</b>	2 3/8	2 1/2	2 5/8	2 3/4	2 7/8	3	3 1/8	3 1/4	3 3/8	3 1/2
<b>0.30</b>	3 5/8	3 3/4	3 13/16	3 15/16	4 1/16	4 3/16	4 5/16	4 7/16	4 9/16	4 11/16
<b>0.40</b>	4 13/16	4 15/16	5 1/16	5 3/16	5 1/4	5 3/8	5 1/2	5 5/8	5 3/4	5 7/8
<b>0.50</b>	6	6 1/8	6 1/4	6 3/8	6 1/2	6 5/8	6 3/4	6 13/16	6 15/16	7 1/16
<b>0.60</b>	7 2/8	7 5/16	7 7/16	7 9/16	7 11/16	7 13/16	7 15/16	8 1/16	8 3/16	8 1/4
<b>0.70</b>	8 3/8	8 1/2	8 5/8	8 3/4	8 7/8	9	9 1/8	9 1/4	9 3/8	9 1/2
<b>0.80</b>	9 5/8	9 3/4	9 13/16	9 15/16	10 1/16	10 3/16	10 5/16	10 7/16	10 9/16	10 11/16
<b>0.90</b>	10 13/16	10 15/16	11 1/16	11 3/16	11 1/4	11 3/8	11 1/2	11 5/8	11 3/4	11 7/8
<b>EXAMPLE: 11.63 FEET CONVERTED IS "0.60" ROW + "0.03" COLUMN = 11 FEET 7 9/16 INCHES</b>										
CONVERSION: INCHES AND FRACTIONS TO DEIMAL FEET										
	0	1/8	1/4	3/8	1/2	5/8	3/4	7/8		
<b>0</b>	0.000	0.010	0.021	0.031	0.042	0.052	0.063	0.073		
<b>1</b>	0.083	0.094	0.104	0.115	0.125	0.135	0.146	0.156		
<b>2</b>	0.167	0.177	0.188	0.198	0.208	0.219	0.229	0.240		
<b>3</b>	0.250	0.260	0.271	0.281	0.292	0.302	0.313	0.323		
<b>4</b>	0.333	0.344	0.354	0.365	0.375	0.385	0.396	0.406		
<b>5</b>	0.417	0.427	0.438	0.448	0.458	0.469	0.479	0.490		
<b>6</b>	0.500	0.510	0.521	0.531	0.542	0.552	0.563	0.573		
<b>7</b>	0.583	0.594	0.604	0.615	0.625	0.635	0.646	0.656		
<b>8</b>	0.667	0.677	0.688	0.698	0.708	0.719	0.729	0.740		
<b>9</b>	0.750	0.760	0.771	0.781	0.792	0.802	0.813	0.823		
<b>10</b>	0.833	0.844	0.854	0.865	0.875	0.885	0.896	0.906		
<b>11</b>	0.917	0.927	0.938	0.948	0.958	0.969	0.979	0.990		
<b>EXAMPLE: 19 FEET 7 3/4 INCHES CONVERTED IS "7" ROW + "3/4" COLUMN = 19.65 FEET</b>										
Metric and SAE Equivalents										
millimeters = inches (") x 25.4										
inches (") = millimeters / 25.4										
miles = kilometers / 1.609										
kilometers = miles x 1.609										
miles = feet (') x 0.3048										
feet (') = miles / 0.3048										
GAIN REFERENCE										
Hertz (Dipole) = 0.0 dBd										
Hertz (Dipole) = 2.14 dBi										