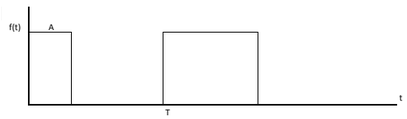


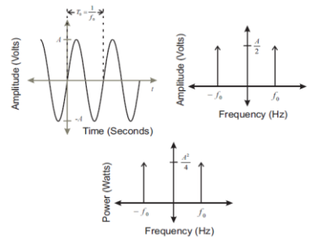
This time waveform can be written as a Fourier Series because it is periodic with period T and amplitude A.

$$f(t) = \frac{A}{4} + \sum_{n=1}^{\infty} \frac{A}{n\pi} \{\sin(n\pi/2)*\cos(2\pi fnt)+(1-\cos(n\pi/2)*\sin(2\pi fnt)\}$$

Using Eulers Formula :

$$\sin(2\pi fnt) = \frac{e^{j2\pi fnt} - e^{-j2\pi fnt}}{2}$$

$$A*\sin(2\pi fnt) = \frac{A\{e^{j2\pi fnt} - e^{-j2\pi fnt}\}}{2}$$



$$P = \frac{1}{T}\int_0^T x(t)^2\,dt = \frac{1}{T}\int_0^T \{A\sin(2\pi fnt)\}^2\,dt$$

$$= \frac{A^2}{T}\int_0^T \{\sin(2\pi fnt)\}^2\,dt$$

$$\int_0^T \{\sin(at)\}^2\,dt = (t/2) - (\sin(2at)/4a)$$

$$\frac{A^2}{T}\int_0^T \{\sin(2\pi fnt)\}^2\,dt = \frac{A^2}{T}\{(t/2) - (\sin(4\pi fnt)/8\pi fn)\}$$

t = T ; f = 1/T

$$= \frac{A^2}{T}\{(T/2) - (T\sin(4\pi fnT)/8\pi n)\}$$

$$= \frac{A^2}{T}\{(T/2) - (T\sin(4\pi n)/8\pi n)\}$$

for n is odd
sin (4πn) = 0

$$= \frac{A^2}{T}\{(T/2)\}$$

$$= A^2/2$$

To provide a nomalised response the Fourier coefficient for f(1) = 1 i.e. multiply by π/2*A

25% DUTY CYCLE

AMPLITUDE A = 1				HARMONIC	PEAK VOLTAGE 1 line spectra	AVERAGE POWER (WATTS) 1 line spectra	dB_M 1 line spectra	PEAK VOLTAGE 2 line spectra	AVERAGE POWER (WATTS) 2 line spectra	dB_W 2 line spectra	dB_M 2 line spectra	DIFF dB_M		**NORMALISATION**	dBm
f(t) = A/4				n = 0	0.25	0.0625	17.95880017	0.25	0.0625	-12.0412	17.9588	0		0.39	21.881198
f(t) = A/4	"+"	√2*A/n*π	cos (2πft - π/4)	n = 1	0.450158	0.101321184	20.05700255	0.225079	0.050660592	-12.9533	17.0467	3.0103	2.00E-03	0.71	26.9897
												i.e. multiply by 2			
f(t) = A/4	"+"	2*A/n*π	sin (4πft)	n= 2	0.31831	0.050660592	17.04670259	0.159155	0.025330296		14.0364				
												i.e. multiply by 0.5			
f(t) = A/4	"+"	√2*A/3*π	cos (6πft - 3π/4)	n = 3	0.150053	0.011257909	10.51457745	0.075026	0.005628955		7.504277			1/3	0.24	17.447275
				n= 4											
f(t) = A/4	"+"	√2*A/5*π	cos (10πft - π/4)	n = 5	0.090032	0.004052847	6.077602459	0.045016	0.002026424		3.067303			1/5	0.14	13.0103
		2*A/n*π	sin (12πft)	n= 6	0.106103	0.005628955	7.504277495	0.053052	0.002814477		4.493978				
f(t) = A/2	"+"	√2*A/7π	cos (14πft - 3π/4)	n = 7	0.064308	0.002067779	3.155041746	0.032154	0.00103389		0.144742			1/7	0.10	10.087739
f(t) =		0		n= 8	0	0	0	0	0	0	0				
f(t) = A/2	"+"	√2*A/9*π	cos (18πft - π/4)	n = 9	0.050018	0.001250879	0.972152357	0.025009	0.000625439		-2.03815			1/9	0.08	7.9048499
		2*A/n*π	sin (20πft)	n= 10	0.063662	0.002026424	3.067302503	0.031831	0.001013212		0.057003				
f(t) = A/2	"+"	√2*A/n*π	cos (22πft - 3π/4)	n = 11	0.040923	0.000837365	-0.770851157	0.020462	0.000418683		-3.78115			1/11	0.06	6.1618463
				n= 12	0	0	0	0	0	0	0				
f(t) = A/2	"+"	√2*A/n*π	cos (26πft - π/4)	n = 13	0.034628	0.000599534	-2.2218645	0.017314	0.000299767		-5.23216			1/13	0.05	4.710833
										-12.9533	53.25774				

0.242203
CORRECT !!!!

0.152351734
CORRECT !!!!

This is the power in watts only upto n=13 if we let n = ∞ the total power = 0.5 W.

-8.171525995 dB_W

$$P = \frac{1}{T}\int_0^T x(t)^2\,dt \qquad P = \frac{1}{T}\int_{0.5}^{1} (1)^2\,dt = 0.5\ W$$

	dB_M 1 line spectra
0.000000	17.958800
2000	20.05700255
	#REF!
6000	10.51457745
	0
10000	6.077602459
	0
14000	3.155041746
	0
18000	0.972152357
	7.504277495
20000	-0.770851157
	0
24000	-2.2218645

	dB_M 2 line spectra
0	17.9588
1	17.0467
2	0.0000
3	7.5043
4	0.0000
5	3.0673
6	0.0000
7	0.1447
8	0.0000
9	-2.0381
10	0.0000
11	-3.7812
12	0.0000
13	-5.2322

0	23.97940009
2000	23.0673025
6000	13.52487741
10000	9.087902416
14000	6.165341702
18000	3.982452314
20000	2.2394488
24000	0.788435457

	23.9794
	20.057
	10.51458
	6.077602
	3.155042
	0.972152
	-0.77085
	-2.22186