Cheat Sheet for EE464

Performance Parameters

$$TruePowerFactor = \frac{P}{S} = DPF\frac{I_{1,RMS}}{I_{RMS}}$$

$$THD = \sqrt{(\frac{I_{rms}}{I_{1rms}})^2 - 1}$$

Symmetry	*Condition Required*	a_h and b_h
Even	$f(-t) = f(t)$	$b_h = 0 \quad a_h = \frac{2}{\pi}\int_0^{\pi} f(t)\cos(h\omega t)\, d(\omega t)$
Odd	$f(-t) = -f(t)$	$a_h = 0 \quad b_h = \frac{2}{\pi}\int_0^{\pi} f(t)\sin(h\omega t)\, d(\omega t)$
Half-wave	$f(t) = -f(t + \frac{1}{2}T)$	$a_h = b_h = 0$ for even h $a_h = \frac{2}{\pi}\int_0^{\pi} f(t)\cos(h\omega t)\, d(\omega t)$ for odd h $b_h = \frac{2}{\pi}\int_0^{\pi} f(t)\sin(h\omega t)\, d(\omega t)$ for odd h

Figure 1: Fourier Transform Table

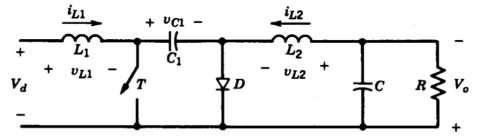

Figure 2: Cuk converter

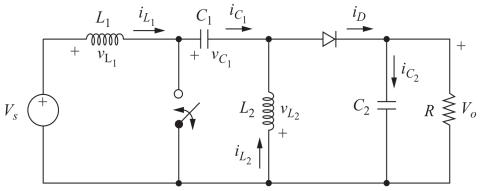

Figure 3: Sepic converter

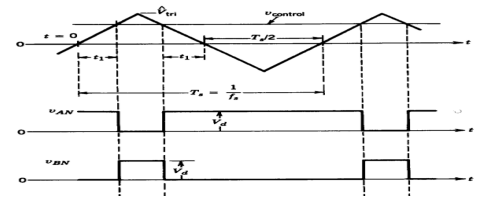

Figure 4: Bipolar Switching

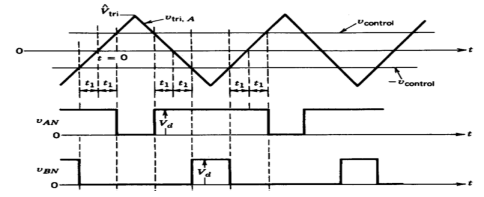

Figure 5: Unipolar switching

Fourier Coefficients

Table 8-1 Generalized Harmonics of v_{Ao} for a Large m_f.

h \ m_a	0.2	0.4	0.6	0.8	1.0
1 Fundamental	0.2	0.4	0.6	0.8	1.0
m_f	1.242	1.15	1.006	0.818	0.601
$m_f \pm 2$	0.016	0.061	0.131	0.220	0.318
$m_f \pm 4$					0.018
$2m_f \pm 1$	0.190	0.326	0.370	0.314	0.181
$2m_f \pm 3$		0.024	0.071	0.139	0.212
$2m_f \pm 5$				0.013	0.033
$3m_f$	0.335	0.123	0.083	0.171	0.113
$3m_f \pm 2$	0.044	0.139	0.203	0.176	0.062
$3m_f \pm 4$		0.012	0.047	0.104	0.157
$3m_f \pm 6$				0.016	0.044
$4m_f \pm 1$	0.163	0.157	0.008	0.105	0.068
$4m_f \pm 3$	0.012	0.070	0.132	0.115	0.009
$4m_f \pm 5$			0.034	0.084	0.119
$4m_f \pm 7$				0.017	0.050

Note: $(\hat{V}_{Ao})_h/\frac{1}{2}V_d$ [= $(\hat{V}_{AN})_h/\frac{1}{2}V_d$] is tabulated as a function of m_a.

Figure 6: Harmonics

Table 8-5 Normalized Fourier Coefficients V_n/V_{dc} for Unipolar PWM in Fig. 8-18

	m_a=1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1
n=1	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10
$n=2m_f\pm1$	0.18	0.25	0.31	0.35	0.37	0.36	0.33	0.27	0.19	0.10
$n=2m_f\pm3$	0.21	0.18	0.14	0.10	0.07	0.04	0.02	0.01	0.00	0.00

Figure 7: Unipolar Harmonics

Table 8-3 Normalized Fourier Coefficients V_n/V_{dc} for Bipolar PWM

	m_a=1	0.9	0.8	0.7	0.6	0.5	0.4	0.3	0.2	0.1
n=1	1.00	0.90	0.80	0.70	0.60	0.50	0.40	0.30	0.20	0.10
$n=m_f$	0.60	0.71	0.82	0.92	1.01	1.08	1.15	1.20	1.24	1.27
$n=mf\pm2$	0.32	0.27	0.22	0.17	0.13	0.09	0.06	0.03	0.02	0.00

Figure 8: Bipolar Harmonics