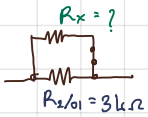
Voltage Selection (3.3V, 5V.)

$$V_{OUT} = V_{REF}\left(1 + \frac{R_2}{R_1}\right) \text{ where } V_{REF} = 1.23\ V$$

Given $R_1 = 1k\Omega$, $V_{O1} = 5V.$, $V_{O2} = 3.3\ V.$

$R_{2/O1} = R_1\left(\frac{V_{O1}}{V_{REF}} - 1\right) = 1k\left(\frac{5v}{1.23} - 1\right) \approx 3\ k\Omega$ → R_1

$R_{2/O2} = R_1\left(\frac{V_{O2}}{V_{REF}} - 1\right) = 1k\left(\frac{3.3}{1.23} - 1\right) \approx 1.6\ k\Omega\ (3.196\ V)$ / $1.8\ k\Omega\ (3.444\ V)$ } $1.7k$ @ $3.32V$



$R_{eq} = R_x // R_{2/O1} = 1.7k\Omega = (R_x^{-1} + 3k^{-1})^{-1}$

$R_x = 3.923\ k\Omega \rightarrow \approx 3.9k\Omega$? ($R_{eq} = 1.695\ k\Omega$) → $V_{O2} = 3.315V.$

$\approx 4k\Omega$? ($R_{eq} = 1.714k\Omega$)

$V_{O2} = 3.338\ V.$

$R_x = 4k\Omega$ (selected) → R_2

Inductor Design

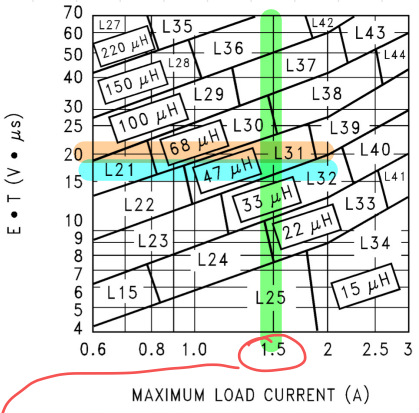


Figure 9-8. LM2596-ADJ

$V_{IN,max} = 12\ V.$ $V_{SAT} = 1.16V$, $V_D = 0.5V$

$$E^*T = (V_{IN} - V_{OUT} - V_{SAT})\left(\frac{V_{OUT} + V_D}{V_{IN} - V_{SAT} + V_D}\right)\left(\frac{1000}{150\ kHz}\right)$$

@ $V_o = 3.3V$

$$E_1^*T = (12 - 3.3 - 1.16)\left(\frac{3.3 + 0.5}{12 - 1.16 + 0.5}\right)\left(\frac{1000}{150k}\right)$$

$$E_1^*T = 18.883\ V^*\mu s$$

@ $V_o = 5V$

$$E_2^*T = (12 - 5 - 1.16)\left(\frac{3.3 + 0.5}{12 - 1.16 + 0.5}\right)\left(\frac{1000}{150k}\right)$$

$$E_2^*T = 16.844\ V^*\mu s$$

$I_{L(max)} = 1.5\ A$

Power Inductors 71

Coil Selection Guide

Inductance インダクタンス		DC Resistance 直流抵抗 (W) max. – typical						DC saturation allowable current 直流重畳許容電流 (A)				Temperature rise allowable current 温度上昇許容電流 (A)			
Code	(µH)	7210		7212M		7212N	7916N	7210	7212M	7212N	7916N	7210	7212M	7212N	7916N
3R9	3.9						0.007 0.005				24.0				8.9
4R7	4.7						0.008 0.006				21.5				8.7
5R6	5.6						0.009 0.007				19.7				8.4
6R8	6.8						0.010 0.007				17.5				7.7
8R2	8.2						0.011 0.008				16.5				7.4
100	10	0.039	0.031	0.030	0.023	0.028 0.021	0.012 0.009	7.00	5.00	8.80	14.6	2.50	3.30	3.40	7.2
120	12	0.043	0.037	0.032	0.025	0.032 0.024	0.013 0.010	5.50	4.60	7.70	13.2	2.40	3.10	3.20	6.8
150	15	0.046	0.043	0.036	0.028	0.039 0.028	0.015 0.011	5.30	4.00	6.80	11.7	2.30	3.00	3.00	6.3
180	18	0.048	0.048	0.038	0.029	0.043 0.031	0.016 0.012	4.90	3.80	6.40	11.0	2.20	2.90	2.90	5.9
220	22	0.056	0.052	0.042	0.032	0.048 0.035	0.018 0.014	4.20	3.40	5.80	9.3	2.00	2.70	2.70	5.7
270	27	0.067	0.058	0.048	0.037	0.056 0.041	0.021 0.016	4.00	3.10	5.00	8.5	1.80	2.60	2.50	5.6
330	33	0.082	0.067	0.057	0.044	0.062 0.046	0.027 0.021	3.60	2.70	4.60	7.6	1.75	2.40	2.40	4.8
390	39	0.091	0.072	0.063	0.048	0.067 0.050	0.030 0.023	3.40	2.50	4.30	6.9	1.65	2.30	2.30	4.6
470	47	0.13	0.096	0.072	0.055	0.076 0.056	0.036 0.025	3.00	2.20	3.90	6.5	1.50	2.10	2.20	4.3
560	56	0.14	0.106	0.078	0.060	0.084 0.062	0.041 0.028	2.80	2.10	3.50	5.8	1.40	2.00	2.10	4.2
680	68	0.19	0.142	0.092	0.071	0.094 0.069	0.045 0.032	2.50	1.90	3.10	5.4	1.20	1.90	2.00	4.0

※ $L \approx 47\mu H.$