

Switching Regulator IC Series

Resistor Value Table to set Output Voltage of Buck Converter IC

No.12027EBY03

In a typical Buck (step-down) switching regulator IC, the external resistors are set to obtain a desired output voltage. This Application Note offers reference table to easily set resistor values for output voltage with various internal reference voltages V_{REF} .

Configuration of a typical Buck Converter IC

The resistor value table described in this application note is suitable for buck switching regulator IC designed by basic configuration as shown in Figure1.

The error amplifier in the IC controls the output voltage V_O by detecting changes in the load and feedback that information to bias circuit of switching regulator. Output Voltage V_O is input to the inverse-side of error amplifier, after being divided by external feedback resistors R_1 and R_2 . Error amplifier compares voltage input and internal reference-voltage V_{REF} , and outputs the error signal to the next stage of the circuit. PWM converter drives the switching element of the output stage, responding to error signal, and the output-voltage shifts to prescribed voltage value. Depending on type of power supply circuit, several function blocks exists between the error amplifier output and the switching element of output stage.

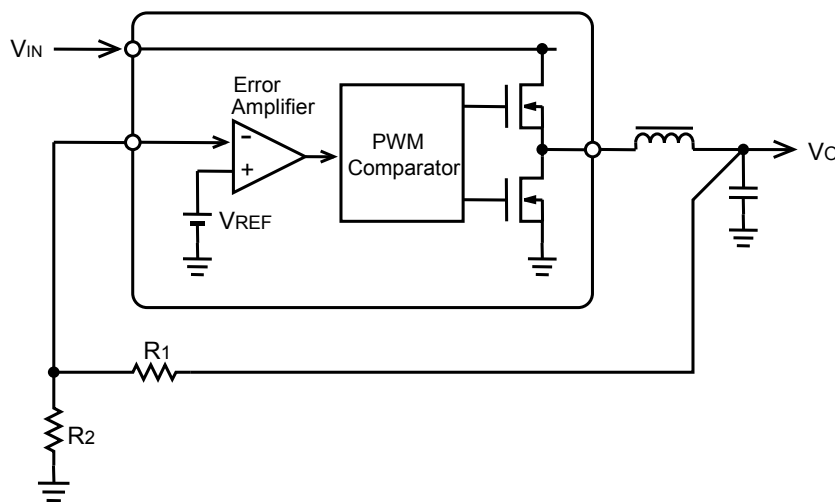


Figure 1. Configuration of typical Buck Converter circuit

Computation of Output Voltage V_O

Output voltage, V_O can be set by external resistors R_1 and R_2 as in Figure1. Output voltage V_O can be shown by following method.

$$V_O = \frac{R_1 + R_2}{R_2} \times V_{REF} \quad (V) \quad (1)$$

V_{REF} : Internal reference-voltage of IC (V)

Also, resistor ratio of R_1 and R_2 can be shown by following method.

$$\frac{R_1}{R_2} = \frac{V_O}{V_{REF}} - 1 \quad (2)$$

- Resistor value setting table when internal reference-voltage of IC, V_{REF} is 0.7V, 0.75V, 0.8V, 0.9V, and 1.0V are shown in the following pages:

Table1: Resistor Values (R1 and R2) when VREF=0.7V

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
0.7	-	0	-	0.7	0
0.75	0.071	13	180	0.7506	+0.074
	0.071	5.1	68+3.3	0.7501	+0.009
0.8	0.143	4.3	30	0.8003	+0.042
0.85	0.214	12	56	0.85	0
0.9	0.286	16	56	0.9	0
0.95	0.357	20	56	0.95	0
1	0.429	24	56	1.	0
1.05	0.5	15	30	1.05	0
1.1	0.571	39	68	1.1015	+0.134
	0.571	16	18+10	1.1	0
1.15	0.643	36	56	1.15	0
1.2	0.714	13	18	1.2056	+0.463
	0.714	12	10+6.8	1.2	0
1.25	0.786	12	15	1.26	+0.8
	0.786	22	18+10	1.25	0
1.3	0.857	11	13	1.2923	-0.592
	0.857	24	18+10	1.3	0
1.35	0.929	12	13	1.346	-0.285
	0.929	39	27+15	1.35	0
1.4	1.	22	22	1.4	0
1.45	1.071	16	15	1.447	-0.230
	1.071	12	10+1.2	1.45	0
1.5	1.143	15	13	1.5077	+0.513
	1.143	33+4.7	33	1.4997	-0.02
1.55	1.214	68	56	1.55	0
1.6	1.286	13	10	1.61	+0.625
	1.286	36	18+10	1.6	0
1.65	1.357	15	11	1.6545	+0.275
	1.357	68+1.2	51	1.6498	-0.012
1.7	1.429	13	9.1	1.7	0
1.75	1.5	15	10	1.75	0
1.8	1.571	47	30	1.7967	-0.185
	1.571	33+4.7	24	1.7996	-0.023
1.85	1.643	15	9.1	1.8538	+0.208
	1.643	82+10	56	1.85	0
1.9	1.714	62	36	1.9056	+0.292
	1.714	10+5.6	9.1	1.9	0
1.95	1.786	100	56	1.95	0
2	1.857	56	30	2.0067	+0.333
	1.857	47	22+3.3	2.0004	+0.02
2.05	1.929	33+5.6	20	2.051	+0.049
2.1	2.	20	10	2.1	0
2.2	2.143	12	5.6	2.2	0
2.3	2.286	62	27	2.3074	+0.322
	2.286	47+3.3	22	2.3005	+0.02
2.4	2.429	39	16	2.4063	+0.26
	2.429	68	18+10	2.4	0
2.5	2.571	100	39	2.4949	-0.205
	2.571	33+5.6	15	2.5013	+0.053
2.6	2.714	30	11	2.6091	+0.35
	2.714	22+2.7	9.1	2.6	0
2.65	2.786	10+5.6	5.6	2.65	0
2.7	2.857	16	5.6	2.7	0
2.75	2.929	82	18+10	2.75	0
2.8	3.	30	10	2.8	0
2.85	3.071	120	39	2.8538	+0.135
	3.071	15+2.2	5.6	2.85	0
2.9	3.143	160	51	2.8961	-0.135
	3.143	33+4.7	12	2.8992	-0.029
3	3.286	27	8.2	3.0049	+0.163
	3.286	47+5.6	16	3.0013	+0.042
3.1	3.429	82	24	3.0917	-0.269
	3.429	33+4.7	11	3.0991	-0.029
3.15	3.5	56	16	3.15	0
3.2	3.571	20	5.6	3.2	0
3.25	3.643	43	10+1.8	3.2508	+0.026
3.3	3.714	82	22	3.3091	+0.275
	3.714	68	15+3.3	3.3011	+0.033
3.4	3.857	150	39	3.3923	-0.226
	3.857	33+5.6	10	3.402	+0.059
3.5	4.	30	7.5	3.5	0
3.6	4.143	91	22	3.5955	-0.126
	4.143	33+4.7	9.1	3.6	0
3.7	4.286	39	9.1	3.7	0
3.8	4.429	120	27	3.8111	+0.292
	4.429	33+3.3	8.2	3.7988	-0.032
3.9	4.571	82	18	3.8889	-0.285
	4.571	47+3.3	11	3.9009	+0.023
4	4.714	47	10	3.99	-0.25
	4.714	68+2.7	15	3.9993	-0.017
4.1	4.857	33	6.8	4.0971	-0.072
4.2	5.	75	15	4.2	0
4.3	5.143	82	16	4.2875	-0.291
	5.143	22+6.8	5.6	4.3	0
4.4	5.286	36	6.8	4.4059	+0.134
	5.286	91	15+2.2	4.4035	+0.079
4.5	5.429	130	24	4.4917	-0.185
	5.429	33+3.9	6.8	4.4985	-0.033
4.6	5.571	100	18	4.5889	-0.242
	5.571	68	10+2.2	4.6016	+0.036
4.7	5.714	47	8.2	4.7122	+0.259
	5.714	22+10	5.6	4.7	0
4.8	5.857	30	5.1	4.8176	+0.368
	5.857	68+8.2	13	4.8031	+0.064
4.9	6.	120	20	4.9	0
5	6.143	56	9.1	5.0077	+0.154
	6.143	75	10+2.2	5.0033	+0.066
5.5	6.857	110	16	5.5125	+0.227
	6.857	150+1	22	5.5045	+0.083
6	7.571	47	6.2	6.0065	+0.108
	7.571	33+5.6	5.1	5.998	-0.033
7	9.	180	20	7.	0
7.7	10.	100	10	7.7	0
8	10.429	160	15	8.1667	+2.083
	10.429	120	10+1.5	8.0043	+0.054
9	11.857	130	11	8.9727	-0.303
	11.857	56+33	7.5	9.0067	+0.074
10	13.286	100	7.5	10.0333	+0.333
	13.286	100+33	10	10.01	+0.1
12	16.143	100	6.2	11.9903	-0.081
14.4	19.571	82+10	4.7	14.4021	+0.015
15	20.429	150	7.5	14.7	-2
	20.429	100+39	6.8	15.0088	+0.059
18	24.714	150	6.2	17.6355	-2.025
	24.714	150+3.3	6.2	18.0081	+0.045
20	27.571	130	4.7	20.0617	+0.309
	27.571	150+4.7	5.6	20.0375	+0.187
24	33.286	160	4.7	24.5298	+2.207
	33.286	150+6.8	4.7	24.0532	+0.222

- Setting range of resistor values may be restricted by the type of IC being used. Please refer to the datasheet of each IC.

Table2: Resistor Values (R1 and R2) when VREF=0.75V

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
0.75	-	0	-	0.75	0
0.8	0.0666...	2	30	0.8	0
0.85	0.1333...	6.8	51	0.85	0
0.9	0.2	3	15	0.9	0
0.95	0.2666...	20	75	0.95	0
1	0.3333...	13	39	1.	0
1.05	0.4	12	30	1.05	0
1.1	0.4666...	5.6	12	1.1	0
1.15	0.5333...	16	30	1.15	0
1.2	0.6	12	20	1.2	0
1.25	0.6666...	10	15	1.25	0
1.3	0.7333...	11	15	1.3	0
1.35	0.8	12	15	1.35	0
1.4	0.8666...	13	15	1.4	0
1.45	0.9333...	15	16	1.4531	+0.216
	0.9333...	10+1.2	12	1.45	0
1.5	1	10	10	1.5	0
1.55	1.0666...	16	15	1.55	0
1.6	1.1333...	18	16	1.5938	-0.391
	1.1333...	33+1	30	1.6	0
1.65	1.2	12	10	1.65	0
1.7	1.2666...	15	12	1.6875	-0.735
	1.2666...	33+1.2	27	1.7	0
1.75	1.3333...	16	12	1.75	0
1.8	1.4	18	13	1.7885	-0.641
	1.4	10+6.8	12	1.8	0
1.85	1.4666...	22	15	1.85	0
1.9	1.5333...	20	13	1.9038	+0.202
	1.5333...	22+1	15	1.9	0
1.95	1.6	16	10	1.95	0
2	1.6666...	20	12	2.	0
2.05	1.7333...	13	7.5	2.05	0
2.1	1.8	18	10	2.1	0
2.2	1.9333...	12	6.2	2.2016	+0.073
	1.9333...	15+8.2	12	2.2	0
2.3	2.0666...	62	30	2.3	0
2.4	2.2	22	10	2.4	0
2.5	2.3333...	56	24	2.5	0
2.6	2.4666...	27	11	2.5909	-0.35
	2.4666...	22+15	15	2.6	0
2.65	2.5333...	33	13	2.6538	+0.145
	2.5333...	18+1	7.5	2.65	0
2.7	2.6	39	15	2.7	0
2.75	2.6666...	20	7.5	2.75	0
2.8	2.7333...	82	30	2.8	0
2.85	2.8	56	20	2.85	0
2.9	2.8666...	43	15	2.9	0
3	3	36	12	3.	0
3.1	3.1333...	47	15	3.1	0
3.15	3.2	24	7.5	3.15	0
3.2	3.2666...	36	11	3.2045	+0.142
	3.2666...	39+10	15	3.2	0

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
3.25	3.3333...	100	30	3.25	0
3.3	3.4	51	15	3.3	0
3.4	3.5333...	24	6.8	3.3971	-0.087
	3.5333...	47	12+1.3	3.4004	+0.011
3.5	3.6666...	110	30	3.5	0
3.6	3.8	91	24	3.5938	-0.174
	3.8	47+10	15	3.6	0
3.7	3.9333...	22	5.6	3.6964	-0.097
	3.9333...	47+12	15	3.7	0
3.8	4.0666...	110	27	3.8056	+0.146
	4.0666...	47+1.8	12	3.8	0
3.9	4.2	75	18	3.875	-0.641
	4.2	27+15	10	3.9	0
4	4.3333...	130	30	4.	0
4.1	4.4666...	120	27	4.0833	-0.407
	4.4666...	15+10	5.6	4.0982	-0.044
4.2	4.6	110	24	4.1875	-0.298
	4.6	47+8.2	12	4.2	0
4.3	4.7333...	43	9.1	4.294	-0.141
	4.7333...	56+15	15	4.3	0
4.4	4.8666...	33	6.8	4.3897	-0.234
	4.8666...	56	10+1.5	4.4022	+0.049
4.5	5	75	15	4.5	0
4.6	5.1333...	82	16	4.5938	-0.136
	5.1333...	100+2.7	20	4.6013	+0.027
4.7	5.2666...	43	8.2	4.6829	-0.363
	5.2666...	33+15	9.1	4.706	+0.129
4.8	5.4	130	24	4.8125	+0.26
	5.4	39+15	10	4.8	0
4.9	5.5333...	100	18	4.9167	+0.34
	5.5333...	68+15	15	4.9	0
5	5.6666...	68	12	5.	0
5.5	6.3333...	43	6.8	5.4926	-0.134
	6.3333...	68+27	15	5.5	0
6	7	91	13	6.	0
7	8.3333...	100	12	7.	0
7.7	9.2666...	120	13	7.6731	-0.35
	9.2666...	68+1.5	7.5	7.7	0
8	9.6666...	100	10	8.25	+3.125
	9.6666...	33+27	6.2	8.0081	+0.1
9	11	110	10	9.	0
10	12.3333...	160	13	9.9808	-0.192
	12.3333...	100+1.2	8.2	10.0061	+0.061
12	15	150	10	12.	0
14.4	18.2	150	8.2	14.4695	+0.483
	18.2	68+56	6.8	14.4265	+0.184
15	19	130	6.8	15.0882	+0.588
	19	82+15	5.1	15.0147	+0.098
18	23	130	5.6	18.1607	+0.893
	23	100+8.2	4.7	18.016	+0.089
20	25.6666...	110	4.3	19.936	-0.32
24	31	160	5.1	24.2794	+1.164
	31	150+8.2	5.1	24.0147	+0.061

- Setting range of resistor values may be restricted by the type of IC being used. Please refer to the datasheet of each IC.

Table3: Resistor Values (R1 and R2) when VREF=0.8V

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
0.8	-	0	-	0.8	0
0.85	0.063	7.5	120	0.85	0
0.9	0.125	3	24	0.9	0
0.95	0.188	30	160	0.95	0
1	0.25	7.5	30	1.	0
1.05	0.313	7.5	24	1.05	0
1.1	0.375	7.5	20	1.1	0
1.15	0.438	33	75	1.152	+0.174
	0.438	10+1.8	27	1.1496	-0.032
1.2	0.5	12	24	1.2	0
1.25	0.563	6.2	11	1.2509	+0.073
1.3	0.625	7.5	12	1.3	0
1.35	0.688	11	16	1.35	0
1.4	0.75	12	16	1.4	0
1.45	0.813	13	16	1.45	0
1.5	0.875	13	15	1.4933	-0.444
	0.875	39+10	56	1.5	0
1.55	0.938	15	16	1.55	0
1.6	1.	22	22	1.6	0
1.65	1.063	16	15	1.6533	+0.202
	1.063	51	33+15	1.65	0
1.7	1.125	18	16	1.7	0
1.75	1.188	51	43	1.7489	-0.066
1.8	1.25	15	12	1.8	0
1.85	1.313	100	68+8.2	1.8499	-0.007
1.9	1.375	22	16	1.9	0
1.95	1.438	56	39	1.9487	-0.066
	1.438	22+1	16	1.95	0
2	1.5	27	18	2.	0
2.05	1.563	15+10	16	2.05	0
2.1	1.625	39	24	2.1	0
2.2	1.75	68	39	2.1949	-0.233
	1.75	18+10	16	2.2	0
2.3	1.875	30	16	2.3	0
2.4	2.	24	12	2.4	0
2.5	2.125	51	24	2.5	0
2.6	2.25	27	12	2.6	0
2.65	2.313	22+15	16	2.65	0
2.7	2.375	43	18	2.7111	+0.412
	2.375	47+10	24	2.7	0
2.75	2.438	39	16	2.75	0
2.8	2.5	30	12	2.8	0
2.85	2.563	82	32	2.85	0
2.9	2.625	47	18	2.8889	-0.383
	2.625	27+15	16	2.9	0
3	2.75	33	12	3.	0
3.1	2.875	43	15	3.0933	-0.215
	2.875	33+1.5	12	3.1	0
3.15	2.938	47	16	3.15	0
3.2	3.	30	10	3.2	0
3.25	3.063	39+10	16	3.25	0
3.3	3.125	75	24	3.3	0
3.4	3.25	39	12	3.4	0
3.5	3.375	91	27	3.4963	-0.106
	3.375	39+15	16	3.5	0
3.6	3.5	56	16	3.6	0
3.7	3.625	33	9.1	3.7011	+0.03
	3.625	100+1.5	18+10	3.7	0
3.8	3.75	75	20	3.8	0
3.9	3.875	62	16	3.9	0
4	4.	120	30	4.	0
4.1	4.125	62	15	4.1067	+0.163
	4.125	33+33	16	4.1	0
4.2	4.25	51	12	4.2	0
4.3	4.375	36	8.2	4.3122	+0.284
	4.375	39+10	10+1.2	4.3	0
4.4	4.5	68	15	4.4267	+0.606
	4.5	39+15	12	4.4	0
4.5	4.625	51	11	4.5091	+0.202
	4.625	47+27	16	4.5	0
4.6	4.75	39	8.2	4.6049	+0.106
	4.75	47+10	12	4.6	0
4.7	4.875	160	33	4.6788	-0.451
	4.875	68+10	16	4.7	0
4.8	5.	75	15	4.8	0
4.9	5.125	82	16	4.9	0
5	5.25	43	8.2	4.9951	-0.098
	5.25	150+39	36	5.	0
5.5	5.875	130	22	5.5273	+0.496
	5.875	47+47	16	5.5	0
6	6.5	130	20	6.	0
7	7.75	100	13	6.9538	-0.659
	7.75	68+56	16	7.	0
7.7	8.625	22+22	5.1	7.702	+0.025
8	9.	180	20	8.	0
9	10.25	100	10	8.8	-2.222
	10.25	160	10+5.6	9.0051	+0.057
10	11.5	150	13	10.0308	+0.308
	11.5	68+47	10	10.	0
12	14.	180	13	11.8769	-1.026
	14.	120+20	10	12.	0
14.4	17.	150+4.7	9.1	14.4	0
15	17.75	110	6.2	14.9935	-0.043
18	21.5	110	5.1	18.0549	+0.305
	21.5	68+33	4.7	17.9915	-0.047
20	24.	180	7.5	20.	0
24	29.	180	6.2	24.0258	+0.108

- Setting range of resistor values may be restricted by the type of IC being used. Please refer to the datasheet of each IC.

Table4: Resistor Values (R1 and R2) when VREF=0.9V

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
0.9	-	0	-	0.9	0
0.95	0.0555...	10	180	0.95	0
1	0.1111...	6.2	56	0.9996	-0.036
1.05	0.1666...	2	12	1.05	0
1.1	0.2222...	15	68	1.0985	-0.134
	0.2222...	10	33+12	1.1	0
1.15	0.2777...	10	36	1.15	0
1.2	0.3333...	10	30	1.2	0
1.25	0.3888...	6.2	16	1.2488	-0.1
1.3	0.4444...	12	27	1.3	0
1.35	0.5	12	24	1.35	0
1.4	0.5555...	15	27	1.4	0
1.45	0.6111...	11	18	1.45	0
1.5	0.6666...	18	27	1.5	0
1.55	0.7222...	13	18	1.55	0
1.6	0.7777...	10	13	1.5923	-0.481
	0.7777...	16	15+5.6	1.599	-0.061
1.65	0.8333...	10	12	1.65	0
1.7	0.8888...	16	18	1.7	0
1.75	0.9444...	15	16	1.7438	-0.357
	0.9444...	33+1	36	1.75	0
1.8	1	22	22	1.8	0
1.85	1.0555...	15+8.2	22	1.8491	-0.049
1.9	1.1111...	20	18	1.9	0
1.95	1.1666...	18+10	24	1.95	0
2	1.2222...	22	18	2.	0
2.05	1.2777...	22+1	18	2.05	0
2.1	1.3333...	24	18	2.1	0
2.2	1.4444...	39	27	2.2	0
2.3	1.5555...	56	36	2.3	0
2.4	1.6666...	20	12	2.4	0
2.5	1.7777...	39	22	2.4955	-0.182
	1.7777...	22+10	18	2.5	0
2.6	1.8888...	51	27	2.6	0
2.65	1.9444...	56	22+6.8	2.65	0
2.7	2	30	15	2.7	0
2.75	2.0555...	22+15	18	2.75	0
2.8	2.1111...	91	43	2.8047	+0.166
	2.1111...	47+10	27	2.8	0
2.85	2.1666...	39	18	2.85	0
2.9	2.2222...	33	15	2.88	-0.69
	2.2222...	47+33	36	2.9	0
3	2.3333...	56	24	3.	0
3.1	2.4444...	39	16	3.0938	+0.202
	2.4444...	22+22	18	3.1	0
3.15	2.5	30	12	3.15	0

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
3.2	2.5555...	110	43	3.2023	+0.073
3.25	2.6111...	47	18	3.25	0
3.3	2.6666...	20	7.5	3.3	0
3.4	2.7777...	75	27	3.4	0
3.5	2.8888...	18	6.2	3.5129	+0.369
	2.8888...	68+10	27	3.5	0
3.6	3	36	12	3.6	0
3.7	3.1111...	56	18	3.7	0
3.8	3.2222...	20	6.2	3.8032	+0.085
3.9	3.333...	100	30	3.9	0
4	3.4444...	62	18	4.	0
4.1	3.5555...	22	6.2	4.0935	-0.157
	3.5555...	160	33+12	4.1	0
4.2	3.666...	110	30	4.2	0
4.3	3.7777...	68	18	4.3	0
4.4	3.8888...	39	10	4.41	+0.227
	3.8888...	15+6.8	5.6	4.4036	+0.081
4.5	4	30	7.5	4.5	0
4.6	4.1111...	23	5.6	4.5964	-0.078
4.7	4.2222...	68	16	4.725	+0.532
	4.2222...	62	10+4.7	4.6959	-0.087
4.8	4.3333...	130	30	4.8	0
4.9	4.4444...	120	27	4.9	0
5	4.5555...	82	18	5.	0
5.5	5.1111...	51	10	5.49	-0.182
	5.1111...	68	10+3.3	5.5015	+0.027
6	5.6666...	68	12	6.	0
7	6.7777...	68	10	7.02	+0.286
	6.7777...	27+15	6.2	6.9968	-0.046
7.7	7.5555...	68+68	18	7.7	0
8	7.8888...	120	15	8.1	+1.25
	7.8888...	120+22	18	8.	0
9	9	180	20	9.	0
10	10.1111...	100	90	9.9	-1
	10.1111...	100+82	18	10.	0
12	12.3333...	160	13	11.9769	-0.192
	12.3333...	100+1.2	8.2	12.0073	+0.061
14.4	15	180	12	14.4	0
15	15.6666...	130	8.2	15.1683	+1.122
	15.6666...	150+6.8	10	15.012	+0.08
18	6.8	180+10	130	18.1059	+0.588
	19	180+10	10	18.	0
20	21.2222...	160	7.5	20.1	+0.5
	21.2222...	100+8.2	5.1	19.9941	-0.029
24	25.6666...	160	6.2	24.1258	+0.524
	25.6666...	160	6.2+0.033	24.0028	+0.012

- Setting range of resistor values may be restricted by the type of IC being used. Please refer to the datasheet of each IC.

Table5: Resistor Values (R1 and R2) when VREF=1.0V

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
1	-	0	-	1.	0
1.05	0.05	0.75	15	1.05	0
1.1	0.1	2	20	1.1	0
1.15	0.15	15	100	1.15	0
1.2	0.2	3	15	1.2	0
1.25	0.25	7.5	30	1.25	0
1.3	0.3	30	100	1.3	0
	0.3	7.5	15+10	1.3	0
1.35	0.35	5.6	16	1.35	0
1.4	0.4	12	30	1.4	0
1.45	0.45	6.8	15	1.4533	+0.230
	0.45	15+1.2	36	1.45	0
1.5	0.5	10	20	1.5	0
1.55	0.55	11	20	1.55	0
1.6	0.6	12	20	1.6	0
1.65	0.65	13	20	1.65	0
1.7	0.7	9.1	13	1.7	0
1.75	0.75	12	16	1.75	0
1.8	0.8	12	15	1.8	0
1.85	0.85	11	13	1.8462	-0.208
	0.85	51	33+27	1.85	0
1.9	0.9	18	20	1.9	0
1.95	0.95	15	16	1.9375	-0.641
	0.95	33+1.2	36	1.95	0
2	1	22	22	2.	0
2.05	1.05	16	15	2.0667	+0.813
	1.05	10+6.8	16	2.05	0
2.1	1.1	22	20	2.1	0
2.2	1.2	24	20	2.2	0
2.3	1.3	39	30	2.3	0
2.4	1.4	18	13	2.3846	-0.641
	1.4	27+15	30	2.4	0
2.5	1.5	33	22	2.5	0
2.6	1.6	24	15	2.6	0
2.65	1.65	33	20	2.65	0
2.7	1.7	51	30	2.7	0
2.75	1.75	18+10	16	2.75	0
2.8	1.8	27	15	2.8	0
2.85	1.85	24	13	2.8462	-0.135
	1.85	37	20	2.85	0
2.9	1.9	82	43	2.907	+0.241
	1.9	18+1	10	2.9	0
3	2	36	18	3.	0

Vo (V)	R1/R2	R1 (kΩ)	R2 (kΩ)	Vo' (V)	Error (%)
3.1	2.1	82	39	3.1026	+0.083
	2.1	27+15	20	3.1	0
3.15	2.15	43	20	3.15	0
3.2	2.2	22	10	3.2	0
3.25	2.25	27	12	3.25	0
3.3	2.3	62	27	3.2963	-0.112
	2.3	22+1	10	3.3	0
3.4	2.4	24	10	3.4	0
3.5	2.5	30	12	3.5	0
3.6	2.6	39	15	3.6	0
3.7	2.7	27	10	3.7	0
3.8	2.8	56	20	3.8	0
3.9	2.9	18	6.2	3.9032	+0.083
	2.9	33+1.8	12	3.9	0
4	3	36	12	4.	0
4.1	3.1	62	20	4.1	0
4.2	3.2	24	7.5	4.2	0
4.3	3.3	33	10	4.3	0
4.4	3.4	51	15	4.4	0
4.5	3.5	56	16	4.5	0
4.6	3.6	36	10	4.6	0
4.7	3.7	100	27	4.7037	+0.079
	3.7	22+15	10	4.7	0
4.8	3.8	91	24	4.7917	-0.174
	3.8	47+10	15	4.8	0
4.9	3.9	39	10	4.9	0
5	4	120	30	5.	0
5.5	4.5	68	15	5.5333	+0.606
	4.5	68+22	20	5.5	0
6	5	75	15	6.	0
7	6	120	20	7.	0
7.7	6.7	39+22	9.1	7.7033	+0.043
8	7	91	13	8.	0
9	8	120	15	9.	0
10	9	180	20	10.	0
12	11	110	10	12.	0
14.4	13.4	100+22	9.1	14.4066	+0.046
15	14	180	13	14.8462	-1.026
	14	100+68	12	15.	0
18	17	130	7.5	18.3333	+1.852
	17	150+4.7	9.1	18.	0
20	19	130	6.8	20.1176	+0.588
	19	180+10	10	20.	0
24	23	150+39	8.2	24.0488	+0.203

- Setting range of resistor values may be restricted by the type of IC being used. Please refer to the datasheet of each IC.

About Resistance Values

The values of the feedback-resistance can be divided mainly into 2 kinds, with the type of IC used.

Firstly, the type of IC designed for high-current output and non-power saving function, use the resistance of 'tens of K-ohms'. And if the resistance used is more than 'hundreds of K-ohms', then IC operation might become unstable due to rise in impedance of the feedback-circuit and the malfunction due to noise may occur. Moreover, if the resistance of 'several K-ohms' or less is used, then the reactive-current of the feedback circuit increases and thereby the efficiency is deteriorated.

On the other hand, for the type of IC designed for the power-saving function, it is designed to use resistance of 'hundreds of K-ohms'. The purpose of this is to decrease reactive-current that pass to the feedback-resistance, and hence improve the efficiency. This type of IC is designed for stable operation with feedback-resistance of 'hundreds of K-ohms'.

As mentioned above, it is recommended to select a value not greatly different from the resistance value mentioned in datasheet of the IC used.

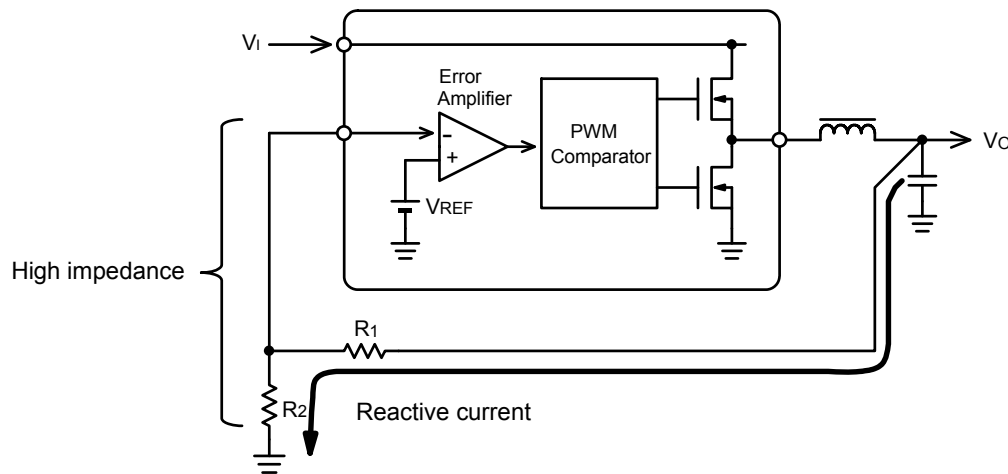


Figure 2. Consideration for feedback resistor

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