AC100VをDC220Vに変換する電子回路　A～Jの抵抗、K～Mのトランジスタ

電圧　$y=\dfrac{\left(a+\frac{b}{J}\right)\times(1.38\times100-1.33)+d\times(c+e)\times\frac{g}{f}-1.2}{1+d\times\frac{e}{f}+b\left(\frac{1}{J}+\frac{0.6}{100}+\frac{13.67}{J}\times\frac{0.6}{100}\right)+a\times13.67\times\frac{0.6}{100}}$

$$a=\frac{B}{A+B}$$

$$b=\frac{1}{L+M}\left(\frac{A\times B}{A+B}+C\right)+I$$

$$c=E+G\times0.5$$

$$d=\frac{A\times B}{A+B}\times K$$

$$e=F+G\times0.5$$

$$f=(c+e)\times(1+K)\times H+c\times e$$

$$g=H+0.6$$

$$\eta=\frac{\frac{1}{n}(S_m-V_m)}{V_e}$$

内側の直交表への水準割り当て

		制御因子 第2水準に対する比			制御因子		
因子	第2水準	第1水準	第2水準	第3水準	1	2	3
A	20,000	0.1	1	10	2,000	20,000	200,000
B	20,000	0.1	1	10	2,000	20,000	200,000
C	20,000	0.1	1	10	2,000	20,000	200,000
D	20,000	0.1	1	10	2,000	20,000	200,000
E	20,000	0.1	1	10	2,000	20,000	200,000
F	20,000	0.1	1	10	2,000	20,000	200,000
G	20,000	0.1	1	10	2,000	20,000	200,000
H	500	0.1	1	10	50	500	5,000
I	500	0.1	1	10	50	500	5,000
J	500	0.1	1	10	50	500	5,000
K	500	0.05	1	20	25	500	10,000
L	500	0.05	1	20	25	500	10,000
M	500	0.05	1	20	25	500	10,000

		誤差因子 内側水準に対する比			誤差因子		
	内側						
因子	1	第1水準	第2水準	第3水準	1	2	3
A	2,000	0.9	1	1.1	1,800	2,000	2,200
B	2,000	0.9	1	1.1	1,800	2,000	2,200
C	2,000	0.9	1	1.1	1,800	2,000	2,200
D	2,000	0.9	1	1.1	1,800	2,000	2,200
E	2,000	0.9	1	1.1	1,800	2,000	2,200
F	2,000	0.9	1	1.1	1,800	2,000	2,200
G	2,000	0.9	1	1.1	1,800	2,000	2,200
H	50	0.9	1	1.1	45	50	55
I	50	0.9	1	1.1	45	50	55
J	50	0.9	1	1.1	45	50	55
K	25	0.5	1	1.5	13	25	38
L	25	0.5	1	1.5	13	25	38
M	25	0.5	1	1.5	13	25	38

内側の直交表

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	1
3	3	3	3	3	3	3	3	3	3	3	3	3	1
4	1	1	1	1	2	2	2	2	3	3	3	3	1
5	2	2	2	2	3	3	3	3	1	1	1	1	1
6	3	3	3	3	1	1	1	1	2	2	2	2	1
7	1	1	2	3	1	2	3	3	1	2	2	3	1
8	2	2	3	1	2	3	1	1	2	3	3	1	1
9	3	3	1	2	3	1	2	2	3	1	1	2	1
10	1	1	3	2	1	3	2	3	2	1	3	2	1
11	2	2	1	3	2	1	3	1	3	2	1	3	1
12	3	3	2	1	3	2	1	2	1	3	2	1	1
13	1	2	3	1	3	2	1	3	3	2	1	2	2
14	2	3	1	2	1	3	2	1	1	3	2	3	2
15	3	1	2	3	2	1	3	2	2	1	3	1	2
16	1	2	3	2	1	1	3	2	3	3	2	1	2
17	2	3	1	3	2	2	1	3	1	1	3	2	2
18	3	1	2	1	3	3	2	1	2	2	1	3	2
19	1	2	1	3	3	3	1	2	2	1	2	3	2
20	2	3	2	1	1	1	2	3	3	2	3	1	2
21	3	1	3	2	2	2	3	1	1	3	1	2	2
22	1	2	2	3	3	1	2	1	1	3	3	2	2
23	2	3	3	1	1	2	3	2	2	1	1	3	2
24	3	1	1	2	2	3	1	3	3	2	2	1	2
25	1	3	2	1	2	3	3	1	3	1	2	2	3
26	2	1	3	2	3	1	1	2	1	2	3	3	3
27	3	2	1	3	1	2	2	3	2	3	1	1	3
28	1	3	2	2	2	1	1	3	2	3	1	3	3
29	2	1	3	3	3	2	2	1	3	1	2	1	3
30	3	2	1	1	1	3	3	2	1	2	3	2	3
31	1	3	3	3	2	3	2	2	1	2	1	1	3
32	2	1	1	1	3	1	3	3	2	3	2	2	3
33	3	2	2	2	1	2	1	1	3	1	3	3	3
34	1	3	1	2	3	2	3	1	2	2	3	1	3
35	2	1	2	3	1	3	1	2	3	3	1	2	3
36	3	2	3	1	2	1	2	3	1	1	2	3	3

内側の直交表

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	1
3	3	3	3	3	3	3	3	3	3	3	3	3	1
4	1	1	1	1	2	2	2	2	3	3	3	3	1
5	2	2	2	2	3	3	3	3	1	1	1	1	1
6	3	3	3	3	1	1	1	1	2	2	2	2	1
7	1	1	2	3	1	2	3	3	1	2	2	3	1
8	2	2	3	1	2	3	1	1	2	3	3	1	1
9	3	3	1	2	3	1	2	2	3	1	1	2	1
10	1	1	3	2	1	3	2	3	2	1	3	2	1
11	2	2	1	3	2	1	3	1	3	2	1	3	1
12	3	3	2	1	3	2	1	2	1	3	2	1	1
13	1	2	3	1	3	2	1	3	3	2	1	2	2
14	2	3	1	2	1	3	2	1	1	3	2	3	2
15	3	1	2	3	2	1	3	2	2	1	3	1	2
16	1	2	3	2	1	1	3	2	3	3	2	1	2
17	2	3	1	3	2	2	1	3	1	1	3	2	2
18	3	1	2	1	3	3	2	1	2	2	1	3	2
19	1	2	1	3	3	3	1	2	2	1	2	3	2
20	2	3	2	1	1	1	2	3	3	2	3	1	2
21	3	1	3	2	2	2	3	1	1	3	1	2	2
22	1	2	2	3	3	1	2	1	1	3	3	2	2
23	2	3	3	1	1	2	3	2	2	1	1	3	2
24	3	1	1	2	2	3	1	3	3	2	2	1	2
25	1	3	2	1	2	3	3	1	3	1	2	2	3
26	2	1	3	2	3	1	1	2	1	2	3	3	3
27	3	2	1	3	1	2	2	3	2	3	1	1	3
28	1	3	2	2	2	1	1	3	2	3	1	3	3
29	2	1	3	3	3	2	2	1	3	1	2	1	3
30	3	2	1	1	1	3	3	2	1	2	3	2	3
31	1	3	3	3	2	3	2	2	1	2	1	1	3
32	2	1	1	1	3	1	3	3	2	3	2	2	3
33	3	2	2	2	1	2	1	1	3	1	3	3	3
34	1	3	1	2	3	2	3	1	2	2	3	1	3
35	2	1	2	3	1	3	1	2	3	3	1	2	3
36	3	2	3	1	2	1	2	3	1	1	2	3	3

		誤差因子			誤差因子		
	内側	内側水準に対する比					
因子	1	第1水準	第2水準	第3水準	1	2	3
A	2,000	0.9	1	1.1	1,800	2,000	2,200
B	2,000	0.9	1	1.1	1,800	2,000	2,200
C	2,000	0.9	1	1.1	1,800	2,000	2,200
D	2,000	0.9	1	1.1	1,800	2,000	2,200
E	2,000	0.9	1	1.1	1,800	2,000	2,200
F	2,000	0.9	1	1.1	1,800	2,000	2,200
G	2,000	0.9	1	1.1	1,800	2,000	2,200
H	50	0.9	1	1.1	45	50	55
I	50	0.9	1	1.1	45	50	55
J	50	0.9	1	1.1	45	50	55
K	25	0.5	1	1.5	13	25	38
L	25	0.5	1	1.5	13	25	38
M	25	0.5	1	1.5	13	25	38

割付

外側の直交表

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2	2	2	2	1
3	3	3	3	3	3	3	3	3	3	3	3	3	1
4	1	1	1	1	2	2	2	2	3	3	3	3	1
5	2	2	2	2	3	3	3	3	1	1	1	1	1
6	3	3	3	3	1	1	1	1	2	2	2	2	1
7	1	1	2	3	1	2	3	3	1	2	2	3	1
8	2	2	3	1	2	3	1	1	2	3	3	1	1
9	3	3	1	2	3	1	2	2	3	1	1	2	1
10	1	1	3	2	1	3	2	3	2	1	3	2	1
11	2	2	1	3	2	1	3	1	3	2	1	3	1
12	3	3	2	1	3	2	1	2	1	3	2	1	1
13	1	2	3	1	3	2	1	3	3	2	1	2	2
14	2	3	1	2	1	3	2	1	1	3	2	3	2
15	3	1	2	3	2	1	3	2	2	1	3	1	2
16	1	2	3	2	1	1	3	2	3	3	2	1	2
17	2	3	1	3	2	2	1	3	1	1	3	2	2
18	3	1	2	1	3	3	2	1	2	2	1	3	2
19	1	2	1	3	3	3	1	2	2	1	2	3	2
20	2	3	2	1	1	1	2	3	3	2	3	1	2
21	3	1	3	2	2	2	3	1	1	3	1	2	2
22	1	2	2	3	3	1	2	1	1	3	3	2	2
23	2	3	3	1	1	2	3	2	2	1	1	3	2
24	3	1	1	2	2	3	1	3	3	2	2	1	2
25	1	3	2	1	2	3	3	1	3	1	2	2	3
26	2	1	3	2	3	1	1	2	1	2	3	3	3
27	3	2	1	3	1	2	2	3	2	3	1	1	3
28	1	3	2	2	2	1	1	3	2	3	1	3	3
29	2	1	3	3	3	2	2	1	3	1	2	1	3
30	3	2	1	1	1	3	3	2	1	2	3	2	3
31	1	3	3	3	2	3	2	2	1	2	1	1	3
32	2	1	1	1	3	1	3	3	2	3	2	2	3
33	3	2	2	2	1	2	1	1	3	1	3	3	3
34	1	3	1	2	3	2	3	1	2	2	3	1	3
35	2	1	2	3	1	3	1	2	3	3	1	2	3
36	3	2	3	1	2	1	2	3	1	1	2	3	3

内側直交表No.1に関する外側直交表の割り付けと計算結果

	No1													
	A	B	C	D	E	F	G	H	I	J	K	L	M	y
1	1,800	1,800	1,800	1,800	1,800	1,800	1,800	45	45	45	13	13	13	89.591
2	2,000	2,000	2,000	2,000	2,000	2,000	2,000	50	50	50	25	25	13	95.326
3	2,200	2,200	2,200	2,200	2,200	2,200	2,200	55	55	55	38	38	13	102.372
4	1,800	1,800	1,800	1,800	2,000	2,000	2,000	50	55	55	38	38	13	95.210
5	2,000	2,000	2,000	2,000	2,200	2,200	2,200	55	45	45	13	13	13	98.994
6	2,200	2,200	2,200	2,200	1,800	1,800	1,800	45	50	50	25	25	13	89.373
7	1,800	1,800	2,000	2,200	1,800	2,000	2,200	55	45	50	25	38	13	98.706
8	2,000	2,000	2,200	1,800	2,000	2,200	1,800	45	50	55	38	13	13	87.206
9	2,200	2,200	1,800	2,000	2,200	1,800	2,000	50	55	45	13	25	13	98.326
10	1,800	1,800	2,200	2,000	1,800	2,200	2,000	55	50	45	38	25	13	98.234
11	2,000	2,000	1,800	2,200	2,000	1,800	2,200	45	55	50	13	38	13	90.160
12	2,200	2,200	2,000	1,800	2,200	2,000	1,800	50	45	55	25	13	13	97.313
13	1,800	2,000	2,200	1,800	2,200	2,000	1,800	55	55	50	13	25	25	100.566
14	2,000	2,200	1,800	2,000	1,800	2,200	2,000	45	45	55	25	38	25	84.854
15	2,200	1,800	2,000	2,200	2,000	1,800	2,200	50	50	45	38	13	25	97.910
16	1,800	2,000	2,200	2,000	1,800	1,800	2,200	50	55	55	25	13	25	95.188
17	2,000	2,200	1,800	2,200	2,000	2,000	1,800	55	45	45	38	25	25	103.655
18	2,200	1,800	2,000	1,800	2,200	2,200	2,000	45	50	50	13	38	25	86.877
19	1,800	2,000	1,800	2,200	2,200	2,200	1,800	50	50	45	25	38	25	96.042
20	2,000	2,200	2,000	1,800	1,800	1,800	2,000	55	55	50	38	13	25	103.167
21	2,200	1,800	2,200	2,000	2,000	2,000	2,200	45	45	55	13	25	25	85.985
22	1,800	2,000	2,000	2,200	2,200	1,800	2,000	45	45	55	38	25	25	93.373
23	2,000	2,200	2,200	1,800	1,800	2,000	2,200	50	50	45	13	38	25	93.303
24	2,200	1,800	1,800	2,000	2,000	2,200	1,800	55	55	50	25	13	25	98.312
25	1,800	2,200	2,000	1,800	2,000	2,200	2,200	45	55	45	25	25	38	88.930
26	2,000	1,800	2,200	2,000	2,200	1,800	1,800	50	45	50	38	38	38	100.125
27	2,200	2,000	1,800	2,200	1,800	2,000	2,000	55	50	55	13	13	38	96.144
28	1,800	2,200	2,000	2,000	2,000	1,800	1,800	55	50	55	13	38	38	101.520
29	2,000	1,800	2,200	2,200	2,200	2,000	2,000	45	55	45	25	13	38	91.192
30	2,200	2,000	1,800	1,800	1,800	2,200	2,200	50	45	50	38	25	38	91.515
31	1,800	2,200	2,200	2,200	2,000	2,200	2,000	50	45	50	13	13	38	92.940
32	2,000	1,800	1,800	1,800	2,200	1,800	2,200	55	50	55	25	25	38	104.179
33	2,200	2,000	2,000	2,000	1,800	2,000	1,800	45	55	45	38	38	38	87.490
34	1,800	2,200	1,800	2,000	2,200	2,000	2,200	45	50	50	38	13	38	92.005
35	2,000	1,800	2,000	2,200	1,800	2,200	1,800	50	55	55	13	25	38	88.938
36	2,200	2,000	2,200	1,800	2,000	1,800	2,000	55	45	45	25	38	38	104.110

$$S_m = \frac{(\sum y_i)^2}{n}$$

$$S_T = \sum y_i{}^2$$

$$S_e = S_T - S_m$$

$$V_e = \frac{S_e}{f_e}$$

Source	f	S	V
m	1	324734.6	324734.6
e	35	1,112.2	31.77651
T	36	325,846.8	

SN比 $\eta = \frac{\frac{1}{n}(S_m - V_e)}{V_e}$=24.53

感度 $S = \frac{1}{n}(S_m - V_e)$=39.55

内側の直交表

外側の直交表

NO.1

NO.2

NO.36

SN比 η =24.53

感度S =39.55

SN比 η =23.18

感度S = 56.35

SN比 η =22.66

感度S = 74.49

	A	B	C	D	E	F	G	H	I	J	K	L	M	η	S
1	1	1	1	1	1	1	1	1	1	1	1	1	1	24.53	39.55
2	2	2	2	2	2	2	2	2	2	2	2	2	1	23.18	56.35
3	3	3	3	3	3	3	3	3	3	3	3	3	1	22.01	67.49
4	1	1	1	1	2	2	2	2	3	3	3	3	1	21.54	31.21
5	2	2	2	2	3	3	3	3	1	1	1	1	1	10.18	60.12
6	3	3	3	3	1	1	1	1	2	2	2	2	1	20.88	40.08
7	1	1	2	3	1	2	3	3	1	2	2	3	1	24.93	56.58
8	2	2	3	1	2	3	1	1	2	3	3	1	1	21.87	34.68
9	3	3	1	2	3	1	2	2	3	1	1	2	1	14.06	52.74
10	1	1	3	2	1	3	2	3	2	1	3	2	1	28.17	44.03
11	2	2	1	3	2	1	3	1	3	2	1	3	1	23.94	31.57
12	3	3	2	1	3	2	1	2	1	3	2	1	1	17.47	73.08
13	1	2	3	1	3	2	1	3	3	2	1	2	2	22.62	37.04
14	2	3	1	2	1	3	2	1	1	3	2	3	2	21.79	34.60
15	3	1	2	3	2	1	3	2	2	1	3	1	2	24.86	46.01
16	1	2	3	2	1	1	3	2	3	3	2	1	2	18.38	34.20
17	2	3	1	3	2	2	1	3	1	1	3	2	2	23.25	72.66
18	3	1	2	1	3	3	2	1	2	2	1	3	2	22.94	29.61
19	1	2	1	3	3	3	1	2	2	1	2	3	2	22.78	44.58
20	2	3	2	1	1	1	2	3	3	2	3	1	2	20.03	53.08
21	3	1	3	2	2	2	3	1	1	3	1	2	2	9.67	27.56
22	1	2	2	3	3	1	2	1	1	3	3	2	2	21.95	55.25
23	2	3	3	1	1	2	3	2	2	1	1	3	2	14.19	48.13
24	3	1	1	2	2	3	1	3	3	2	2	1	2	23.35	37.97
25	1	3	2	1	2	3	3	1	3	1	2	2	3	34.50	39.82
26	2	1	3	2	3	1	1	2	1	2	3	3	3	22.41	61.96
27	3	2	1	3	1	2	2	3	2	3	1	1	3	22.03	67.98
28	1	3	2	2	2	1	1	3	2	3	1	3	3	19.92	53.48
29	2	1	3	3	3	2	2	1	3	1	2	1	3	34.51	40.25
30	3	2	1	1	1	3	3	2	1	2	3	2	3	21.84	56.09
31	1	3	3	3	2	3	2	2	1	2	1	1	3	16.90	49.26
32	2	1	1	1	3	1	3	3	2	3	2	2	3	20.21	52.52
33	3	2	2	2	1	2	1	1	3	1	3	3	3	24.29	36.93
34	1	3	1	2	3	2	3	1	2	2	3	1	3	22.87	42.46
35	2	1	2	3	1	3	1	2	3	3	1	2	3	17.48	32.86
36	3	2	3	1	2	1	2	3	1	1	2	3	3	22.66	74.49

	A	B	C	D	E	F	G	H	I	J	K	L	M	η	S
1	1	1	1	1	1	1	1	1	1	1	1	1	1	24.53	39.55
2	2	2	2	2	2	2	2	2	2	2	2	2	1	23.18	56.35
3	3	3	3	3	3	3	3	3	3	3	3	3	1	22.01	67.49
4	1	1	1	1	2	2	2	2	3	3	3	3	1	21.54	31.21
5	2	2	2	2	3	3	3	3	1	1	1	1	1	10.18	60.12
6	3	3	3	3	1	1	1	1	2	2	2	2	1	20.88	40.08
7	1	1	2	3	1	2	3	3	1	2	2	3	1	24.93	56.58
8	2	2	3	1	2	3	1	1	2	3	3	1	1	21.87	34.68
9	3	3	1	2	3	1	2	2	3	1	1	2	1	14.06	52.74
10	1	1	3	2	1	3	2	3	2	1	3	2	1	28.17	44.03
11	2	2	1	3	2	1	3	1	3	2	1	3	1	23.94	31.57
12	3	3	2	1	3	2	1	2	1	3	2	1	1	17.47	73.08
13	1	2	3	1	3	2	1	3	3	2	1	2	2	22.62	37.04
14	2	3	1	2	1	3	2	1	1	3	2	3	2	21.79	34.60
15	3	1	2	3	2	1	3	2	2	1	3	1	2	24.86	46.01
16	1	2	3	2	1	1	3	2	3	3	2	1	2	18.38	34.20
17	2	3	1	3	2	2	1	3	1	1	3	2	2	23.25	72.66
18	3	1	2	1	3	3	2	1	2	2	1	3	2	22.94	29.61
19	1	2	1	3	3	3	1	2	2	1	2	3	2	22.78	44.58
20	2	3	2	1	1	1	2	3	3	2	3	1	2	20.03	53.08
21	3	1	3	2	2	2	3	1	1	3	1	2	2	9.67	27.56
22	1	2	2	3	3	1	2	1	1	3	3	2	2	21.95	55.25
23	2	3	3	1	1	2	3	2	2	1	1	3	2	14.19	48.13
24	3	1	1	2	2	3	1	3	3	2	2	1	2	23.35	37.97
25	1	3	2	1	2	3	3	1	3	1	2	2	3	34.50	39.82
26	2	1	3	2	3	1	1	2	1	2	3	3	3	22.41	61.96
27	3	2	1	3	1	2	2	3	2	3	1	1	3	22.03	67.98
28	1	3	2	2	2	1	1	3	2	3	1	3	3	19.92	53.48
29	2	1	3	3	3	2	2	1	3	1	2	1	3	34.51	40.25
30	3	2	1	1	1	3	3	2	1	2	3	2	3	21.84	56.09
31	1	3	3	3	2	3	2	2	1	2	1	1	3	16.90	49.26
32	2	1	1	1	3	1	3	3	2	3	2	2	3	20.21	52.52
33	3	2	2	2	1	2	1	1	3	1	3	3	3	24.29	36.93
34	1	3	1	2	3	2	3	1	2	2	3	1	3	22.87	42.46
35	2	1	2	3	1	3	1	2	3	3	1	2	3	17.48	32.86
36	3	2	3	1	2	1	2	3	1	1	2	3	3	22.66	74.49

η

因子	1	2	3	平均値
A	23.26	21.09	20.50	21.62
B	22.88	21.31	20.66	21.62
C	21.85	21.81	21.19	21.62
D	22.03	19.86	22.96	21.62
E	21.54	22.14	21.17	21.62
F	21.15	21.71	21.98	21.62
G	21.74	22.48	20.63	21.62
H	23.64	19.59	21.61	21.62
I	19.80	21.99	23.06	21.62
J	23.17	22.16	19.53	21.62
K	18.20	23.72	22.93	21.62
L	21.41	21.49	21.95	21.62
M	21.06	20.48	23.30	21.62
			全体平均	21.62

S

因子	1	2	3	平均値
A	43.96	48.23	50.84	47.67
B	41.68	49.11	52.24	47.67
C	47.00	49.43	46.60	47.67
D	47.44	45.20	50.38	47.67
E	45.34	46.25	51.43	47.67
F	49.58	49.19	44.26	47.67
G	47.07	49.07	46.88	47.67
H	37.70	48.87	56.45	47.67
I	55.10	46.66	41.26	47.67
J	49.94	46.00	47.08	47.67
K	44.16	48.71	50.15	47.67
L	48.22	47.25	47.55	47.67
M	48.96	43.39	50.67	47.67
			全体平均	47.67