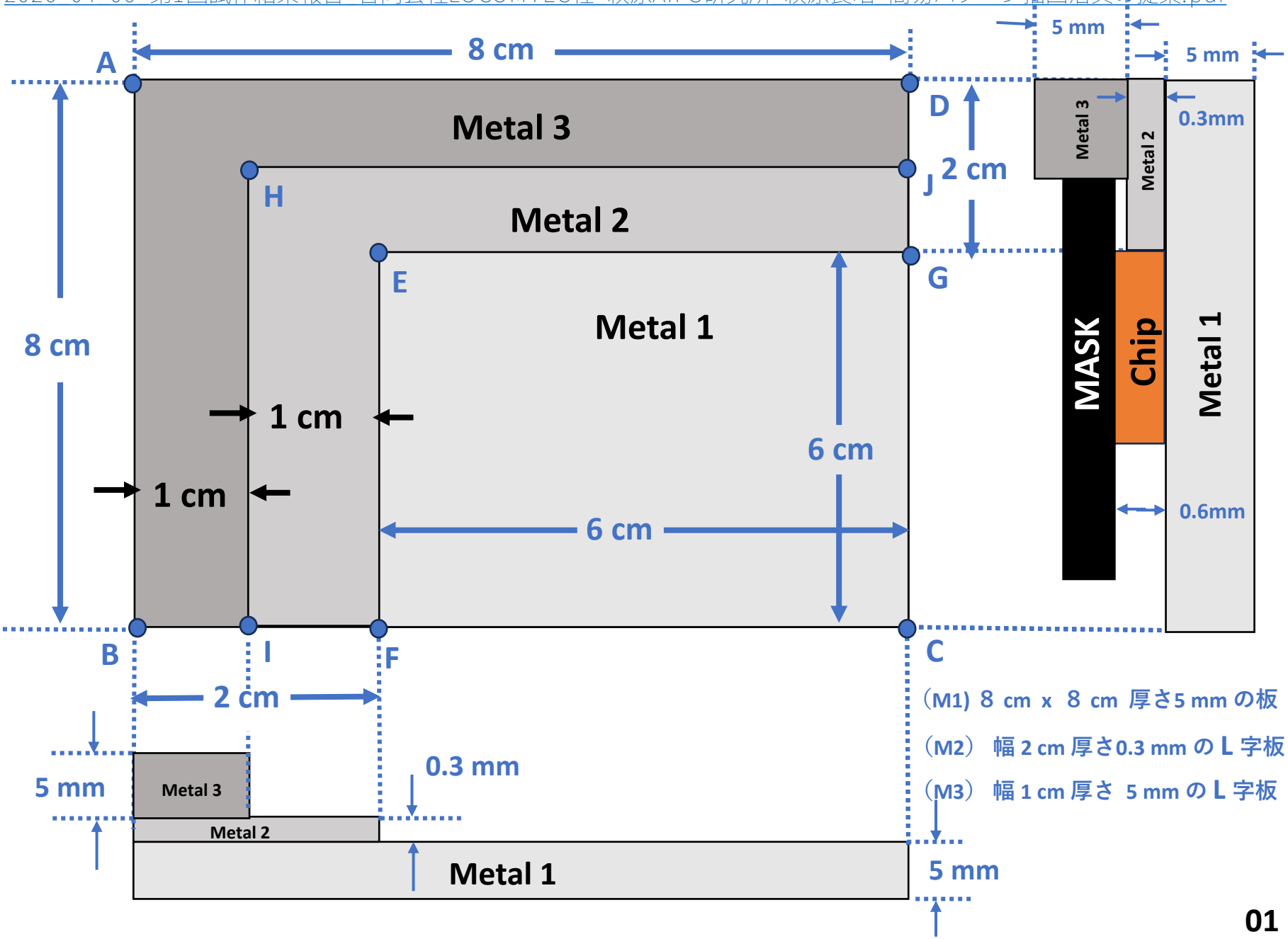
写真描画装置(Mask Aligner)が不要な パターン描画用の簡易治具

2026_04_06_第1回試作結果報告_合同会社LOCOMTEC社_萩原AIPS研究所_萩原良昭_簡易パターン描画治具の提案.pdf

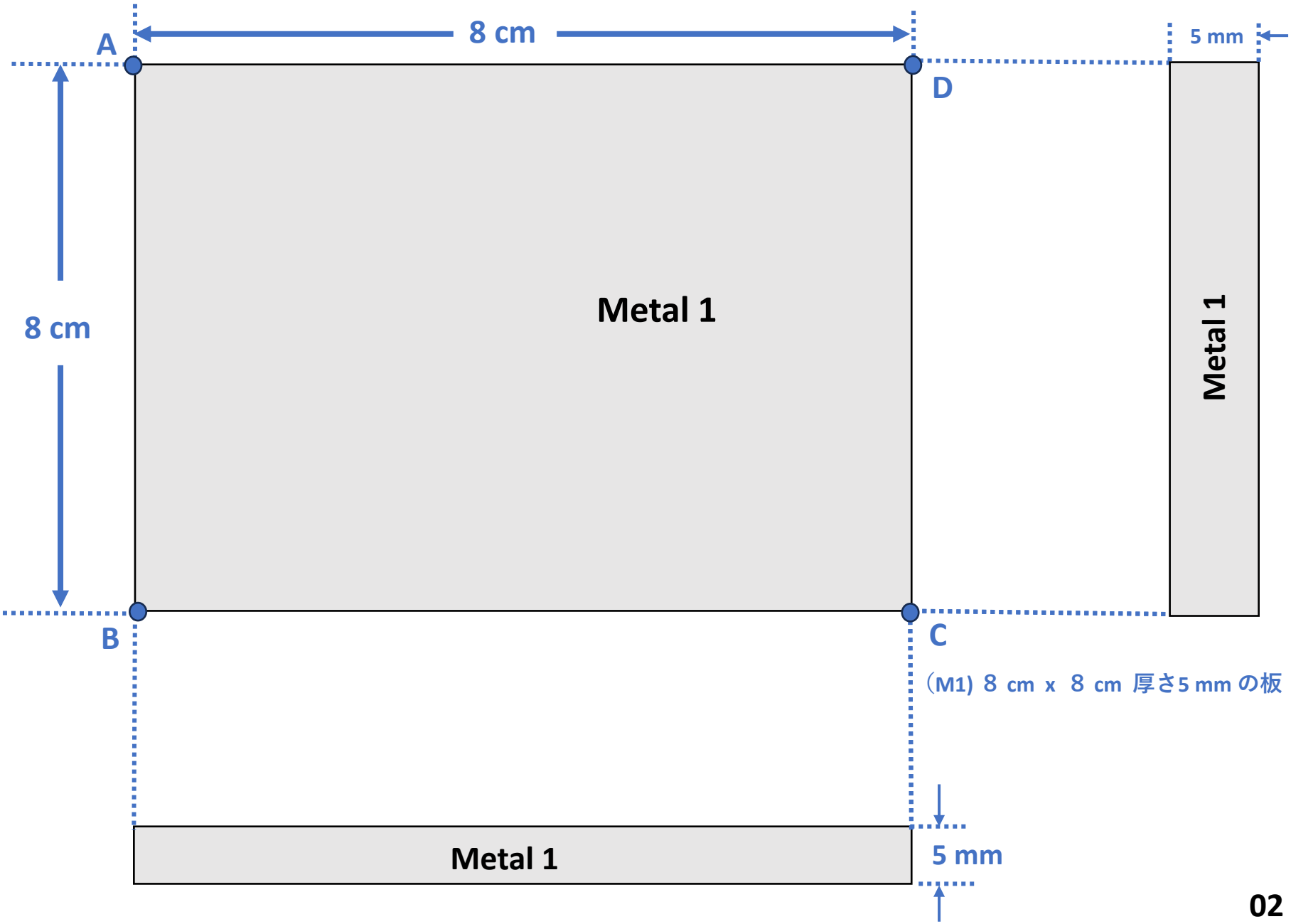


（M1) 8 cm x 8 cm 厚さ5 mm の板

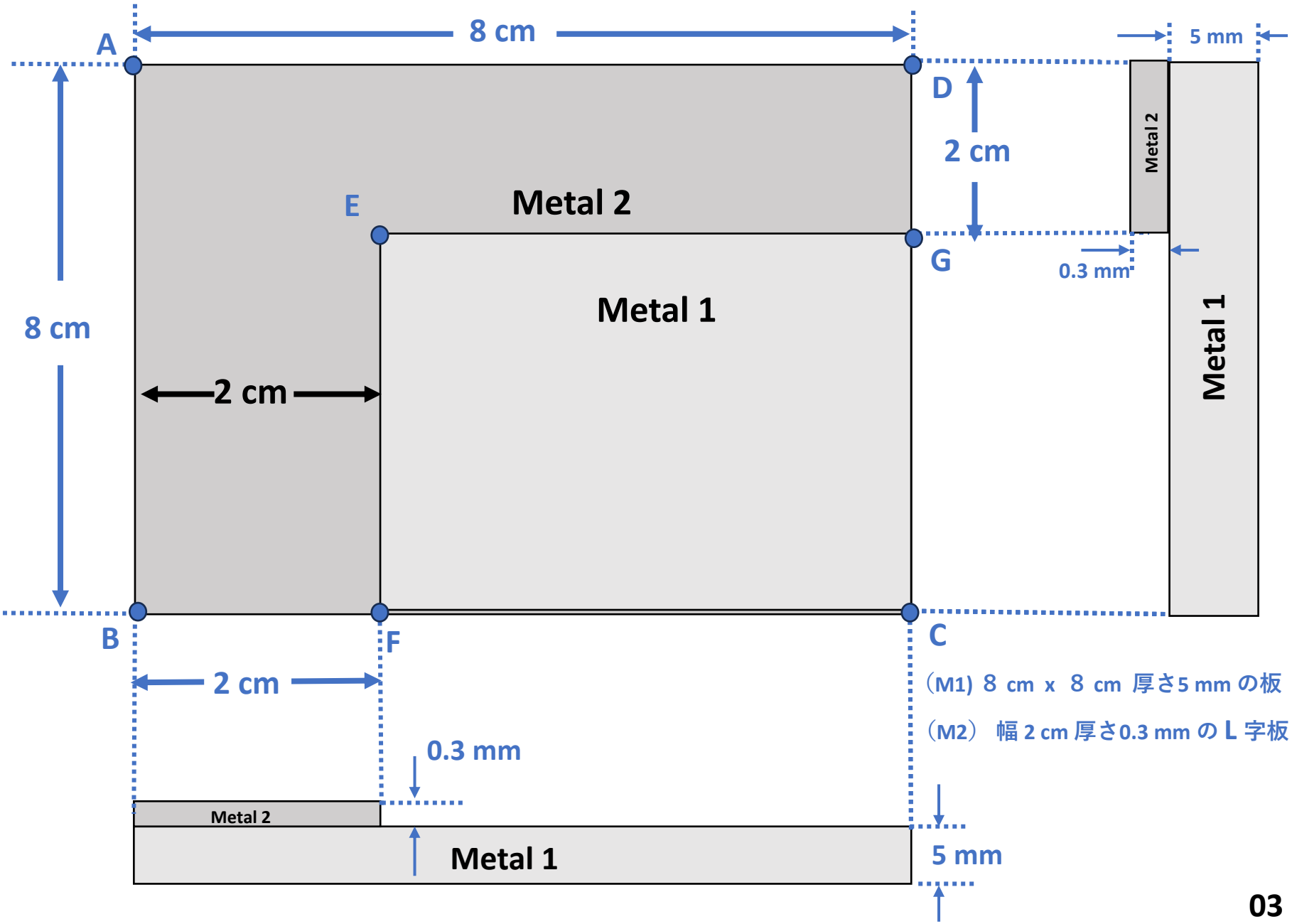
（M2） 幅 2 cm 厚さ0.3 mm の L 字板

（M3） 幅 1 cm 厚さ 5 mm の L 字板

写真描画装置(Mask Aligner)が不要な パターン描画用の簡易治具



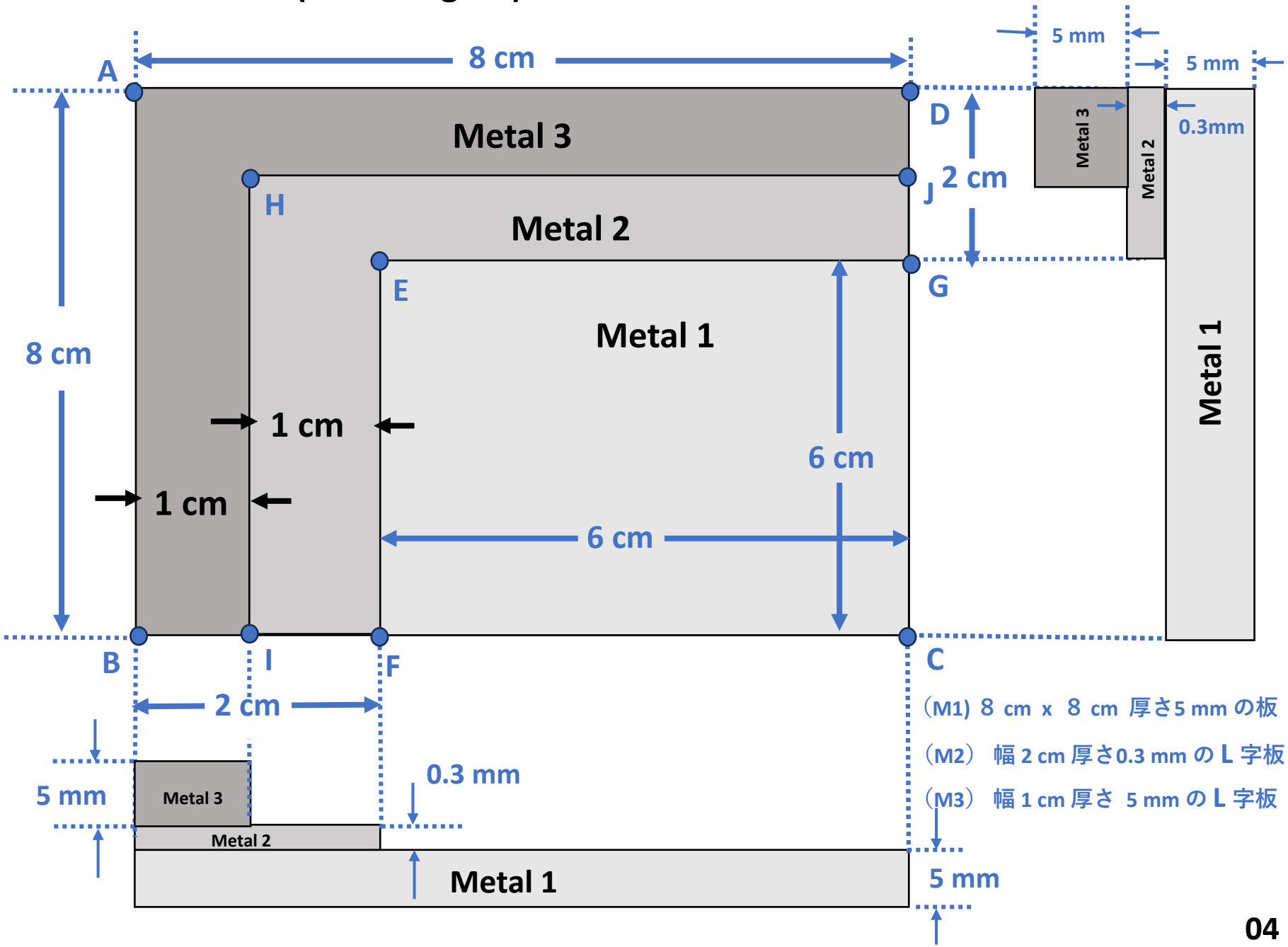
写真描画装置(Mask Aligner)が不要な パターン描画用の簡易治具



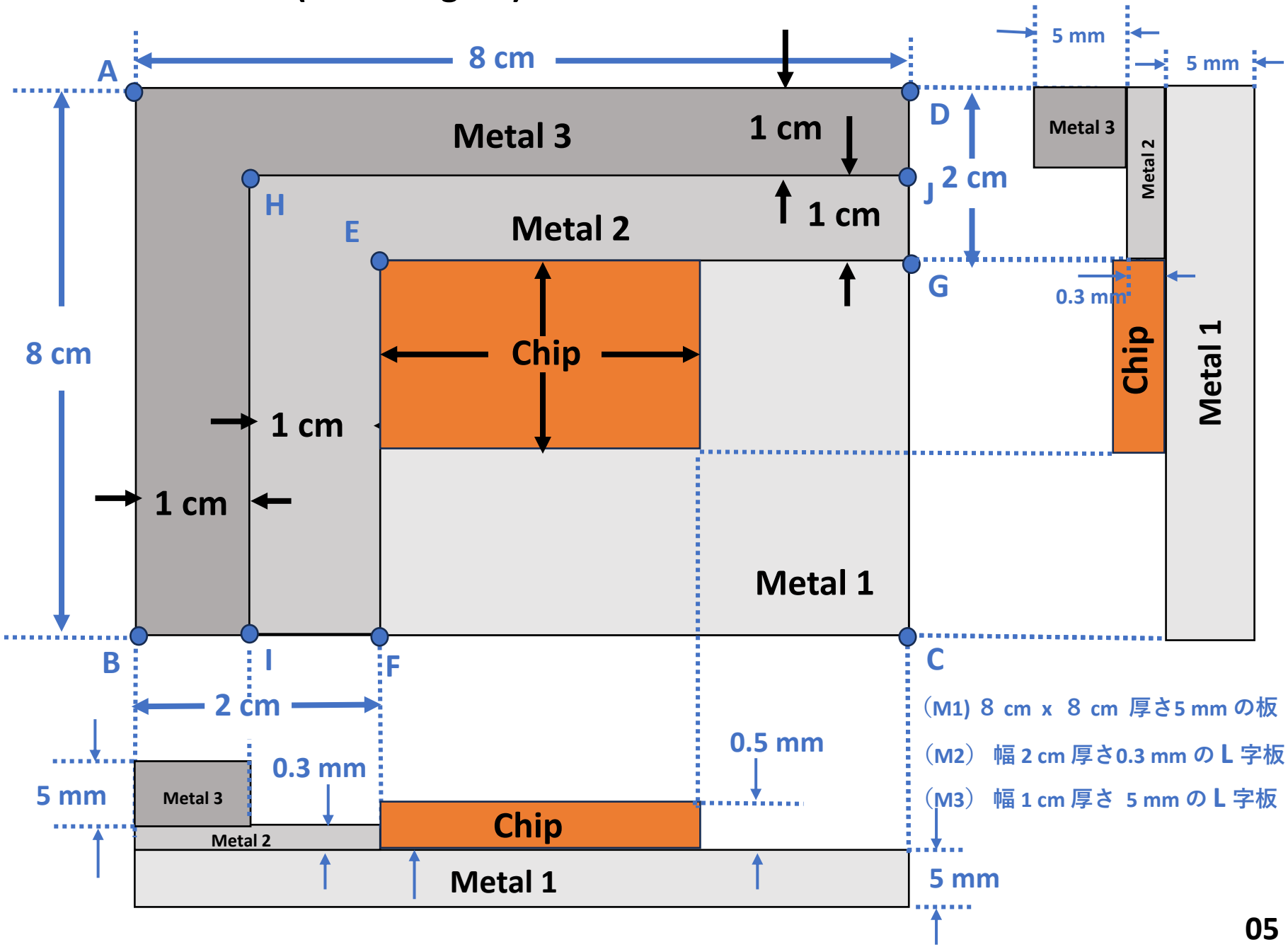
（M1) 8 cm x 8 cm 厚さ5 mm の板

（M2） 幅 2 cm 厚さ0.3 mm の L 字板

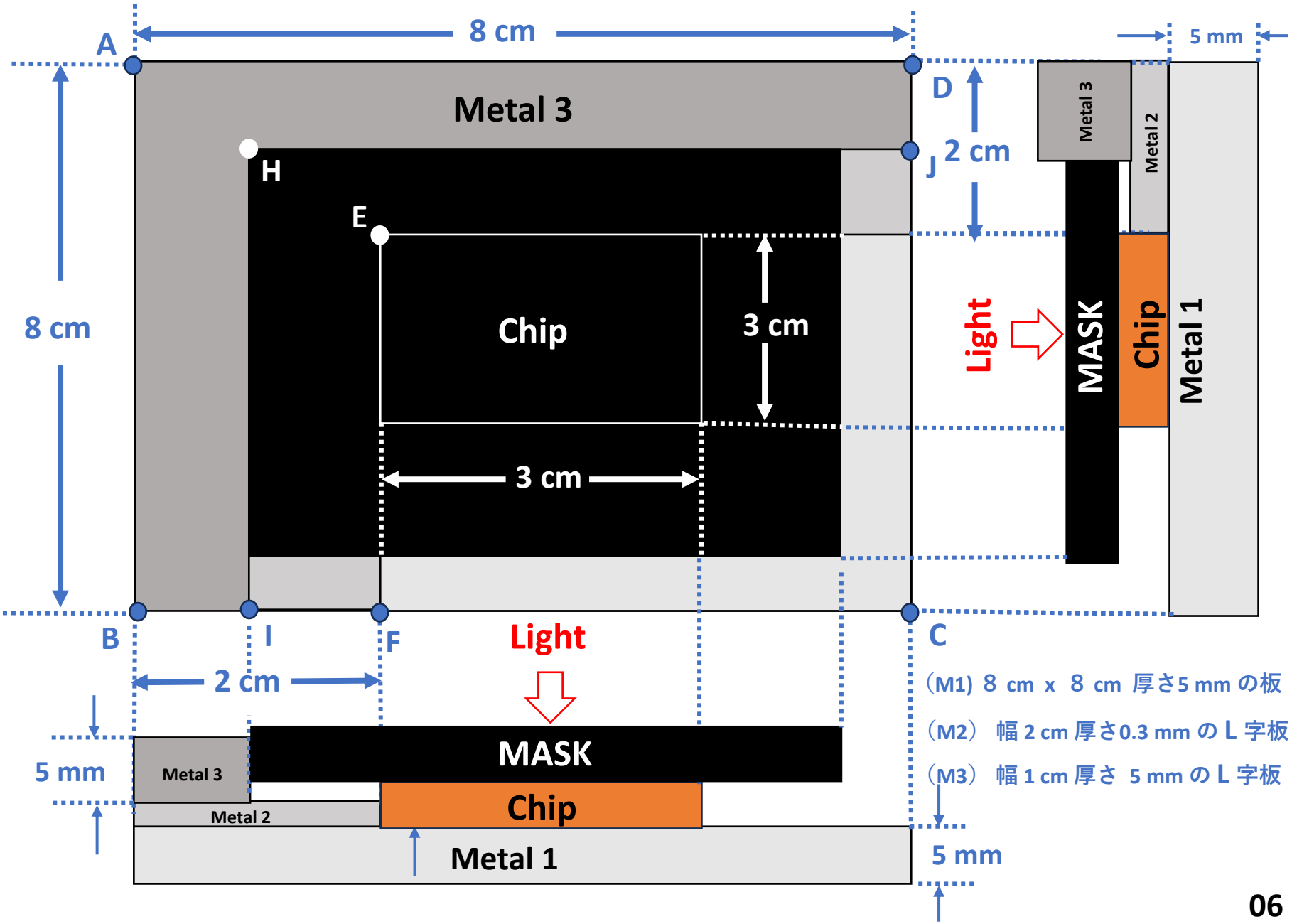
写真描画装置(Mask Aligner)が不要な パターン描画用の簡易治具



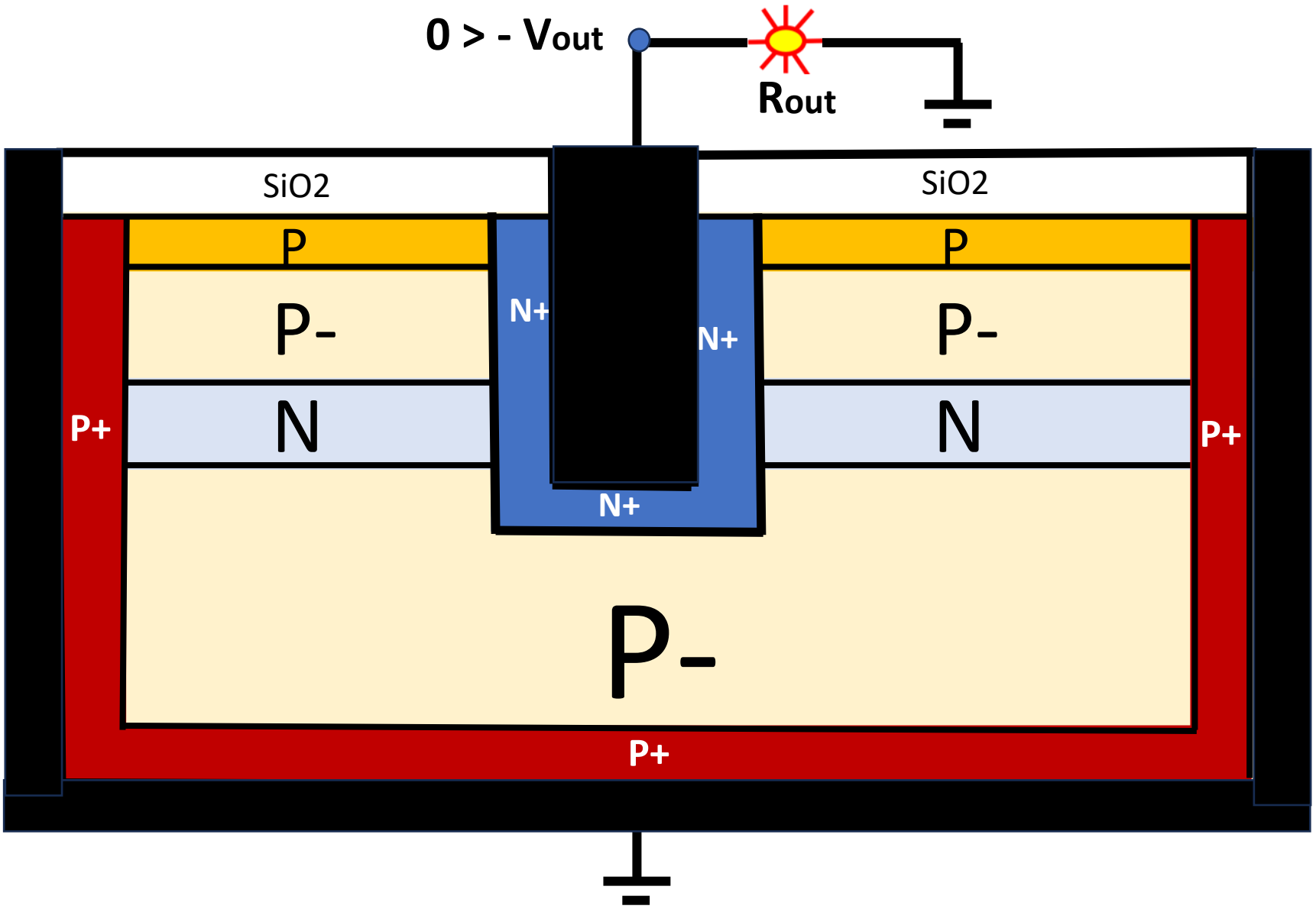
写真描画装置(Mask Aligner)が不要な パターン描画用の簡易治具



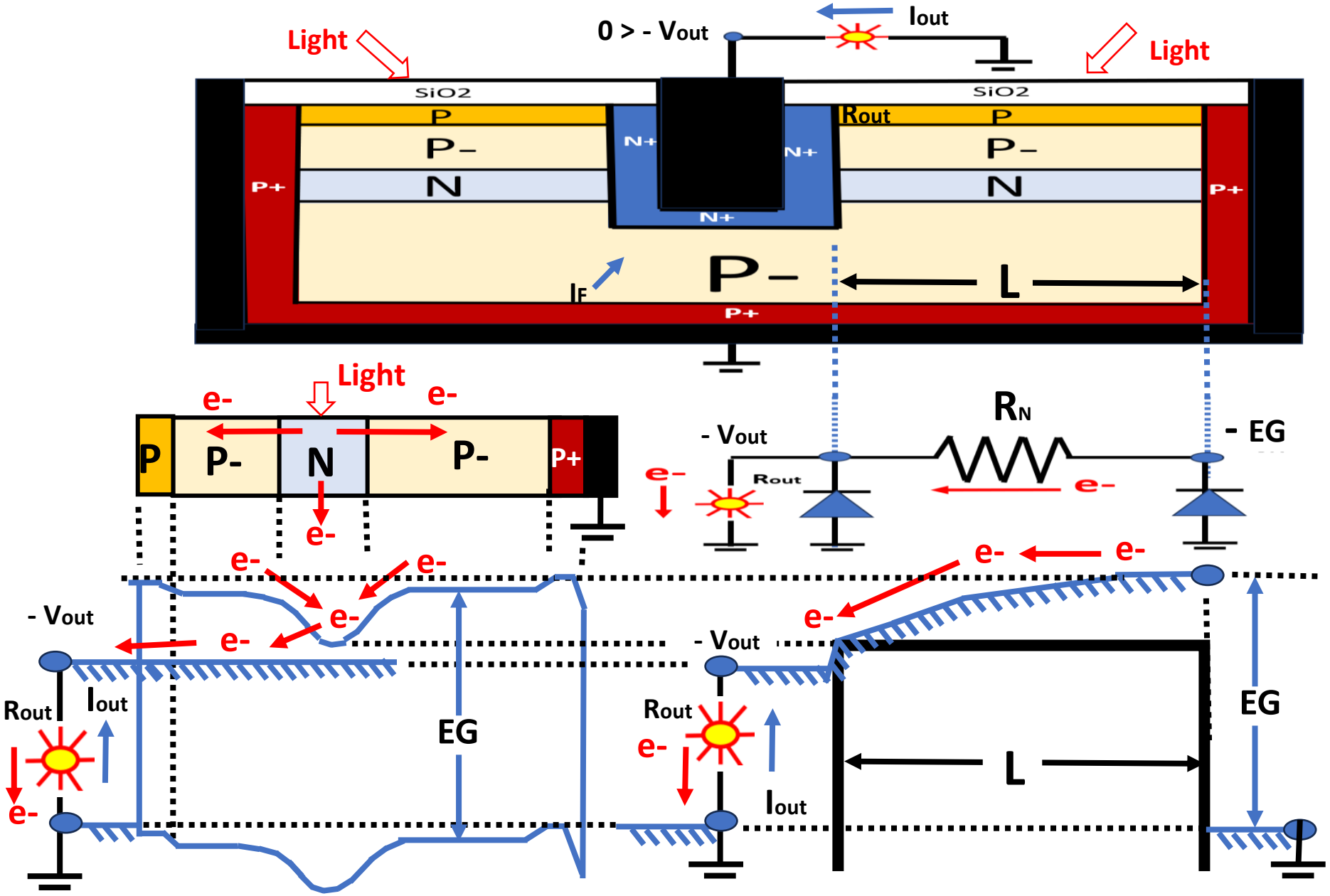
写真描画装置(Mask Aligner)が不要な パターン描画用の簡易治具



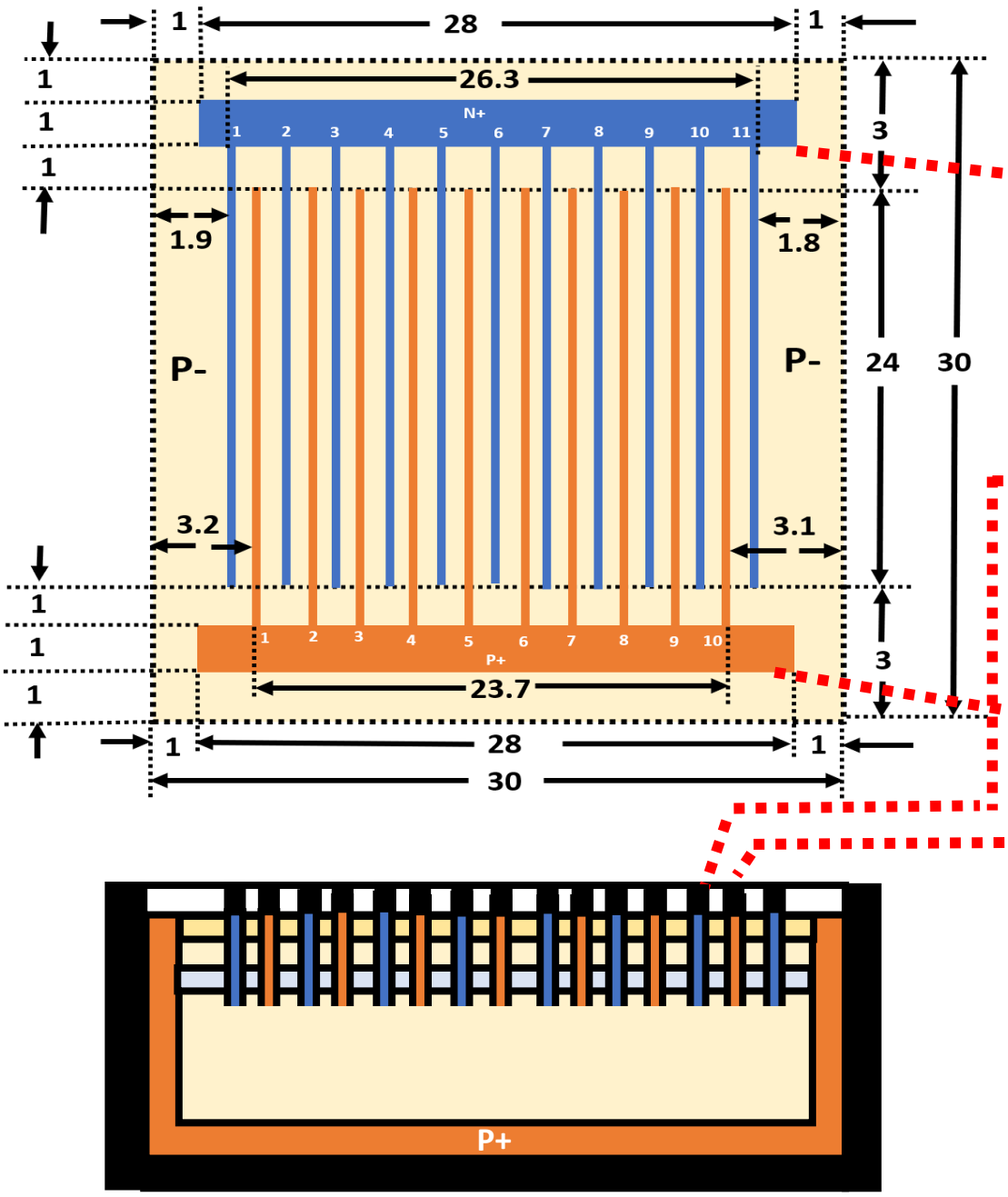
写真描画装置(Mask Aligner)が不要な低コスト新型太陽電池の製法工程



2026_03_30_LOCOMTECJ社萩原AIPS研究所萩原良昭.mp4

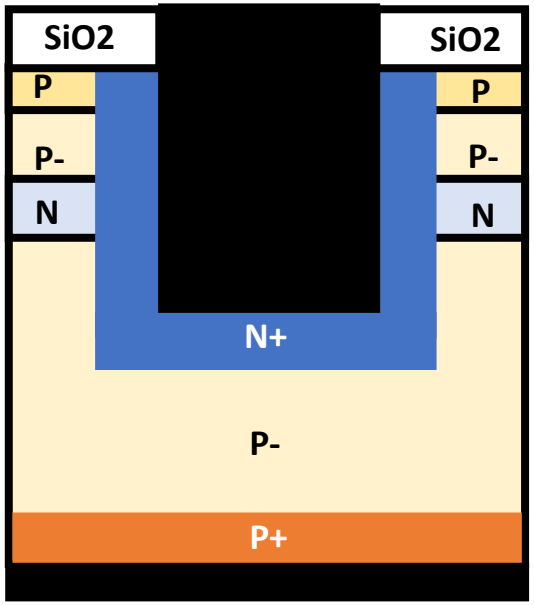


$$I_{SC} = I_{out} + I_F \; ; \; I_F = I_o \{ \exp(V_{out}/kT) - 1 \} \; ; \; (EG - V_{out}) = I_{out} \; R_N \; ;$$

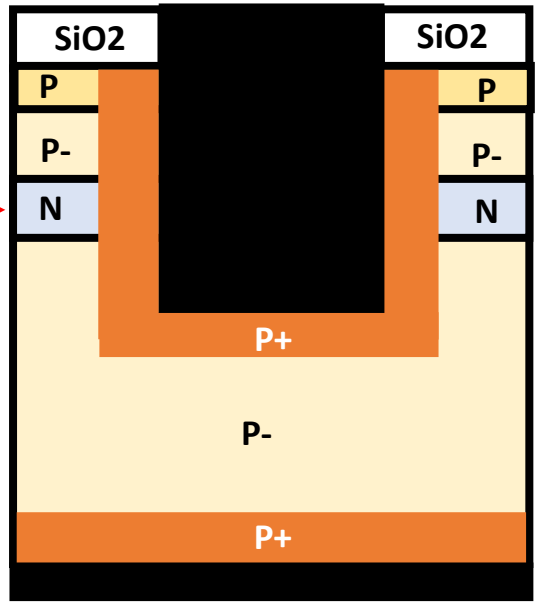

1
28
1
26.3
1
1
1
N+
1 2 3 4 5 6 7 8 9 10 11
3
1.9
1.8
P-
P-
24
30
3.2
3.1
1
1
1
1 2 3 4 5 6 7 8 9 10
P+
3
23.7
1
28
1
30

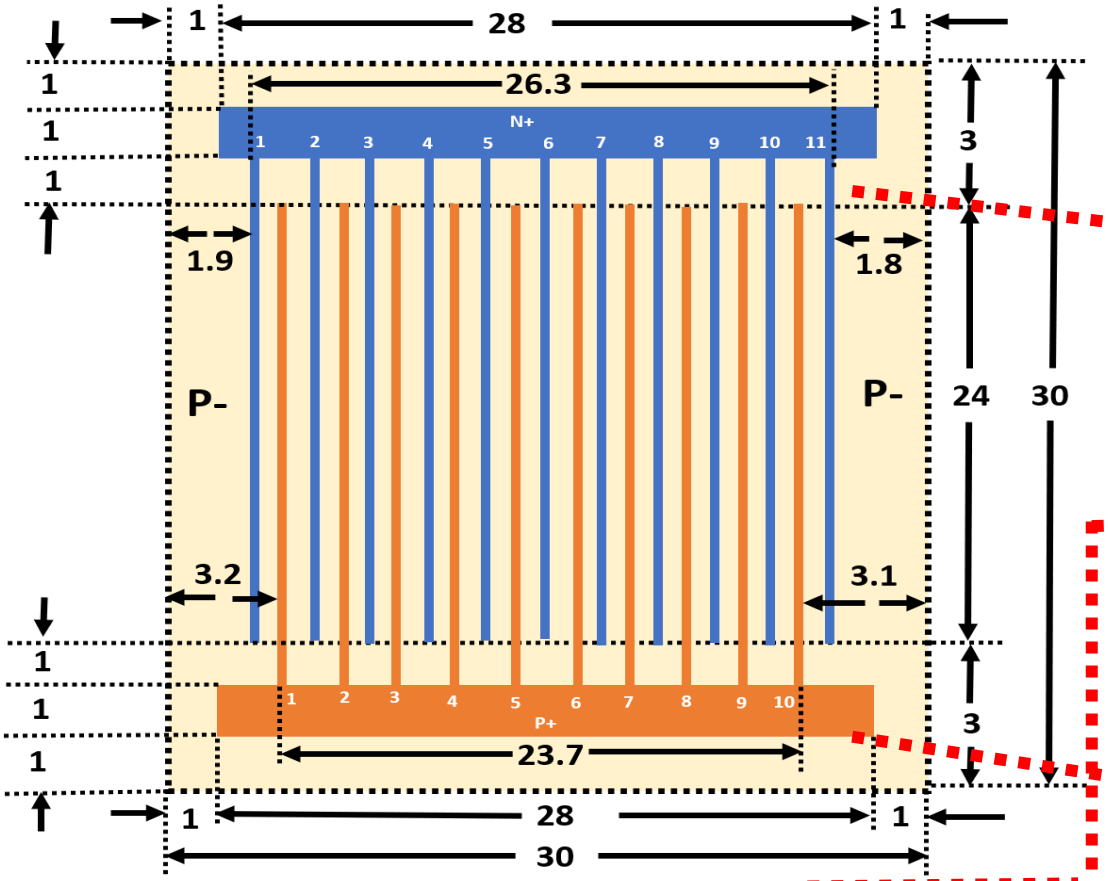
P+

N+ MASK

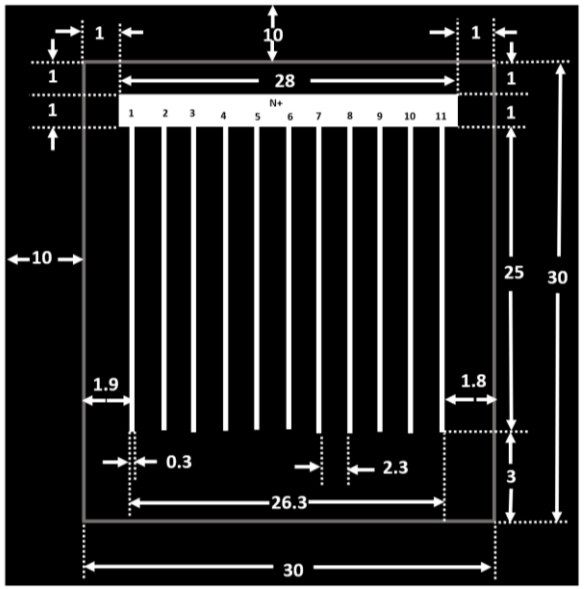

SiO2
SiO2
P
P
P-
P-
N
N
N+
P-
P+

P+ MASK

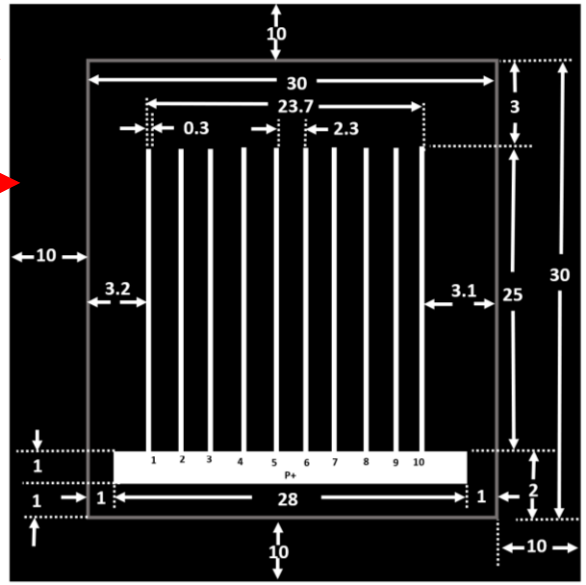

SiO2
SiO2
P
P
P-
P-
N
N
P+
P-
P+

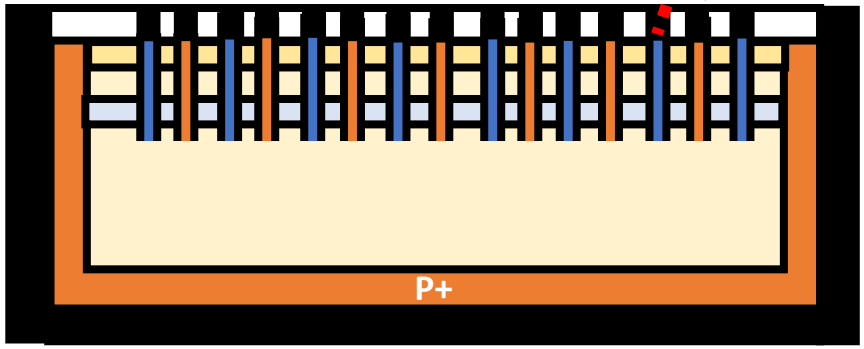

1
28
1
26.3
N+
1 2 3 4 5 6 7 8 9 10 11
1
1
1
3
1.9
1.8
P-
P-
24
30
3.2
3.1
1
1
1
1 2 3 4 5 6 7 8 9 10
P+
3
23.7
1
28
1
30

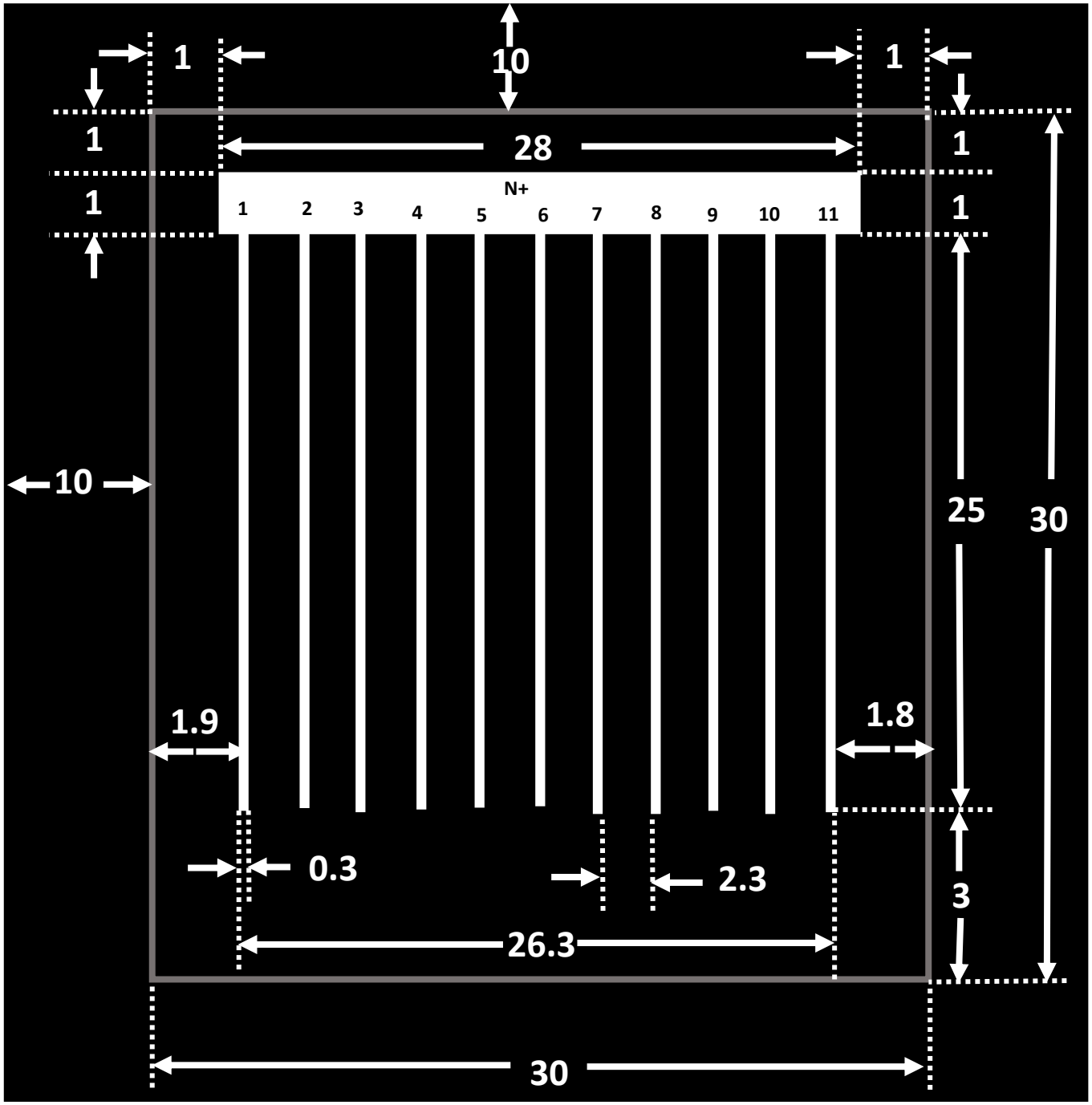
N+ MASK


1
10
1
28
1
1
1
N+
1 2 3 4 5 6 7 8 9 10 11
1
10
25
30
1.9
1.8
0.3
2.3
3
26.3
30

P+ MASK

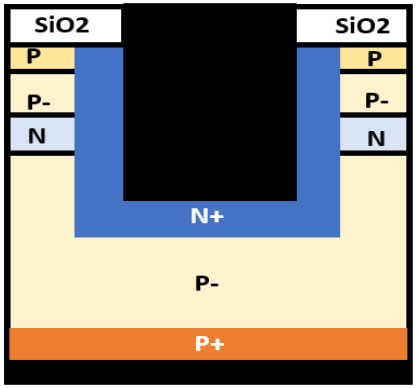

10
30
23.7
0.3
2.3
3
10
3.2
3.1
25
30
1
1 2 3 4 5 6 7 8 9 10
P+
1
1
28
1
2
10
10

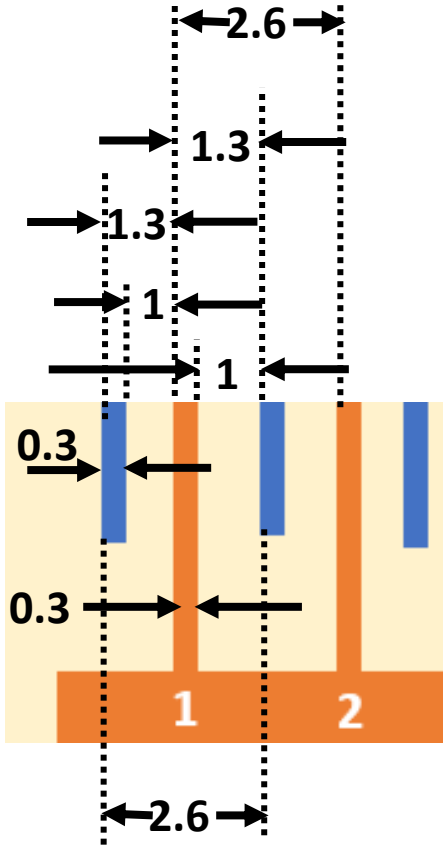

P+

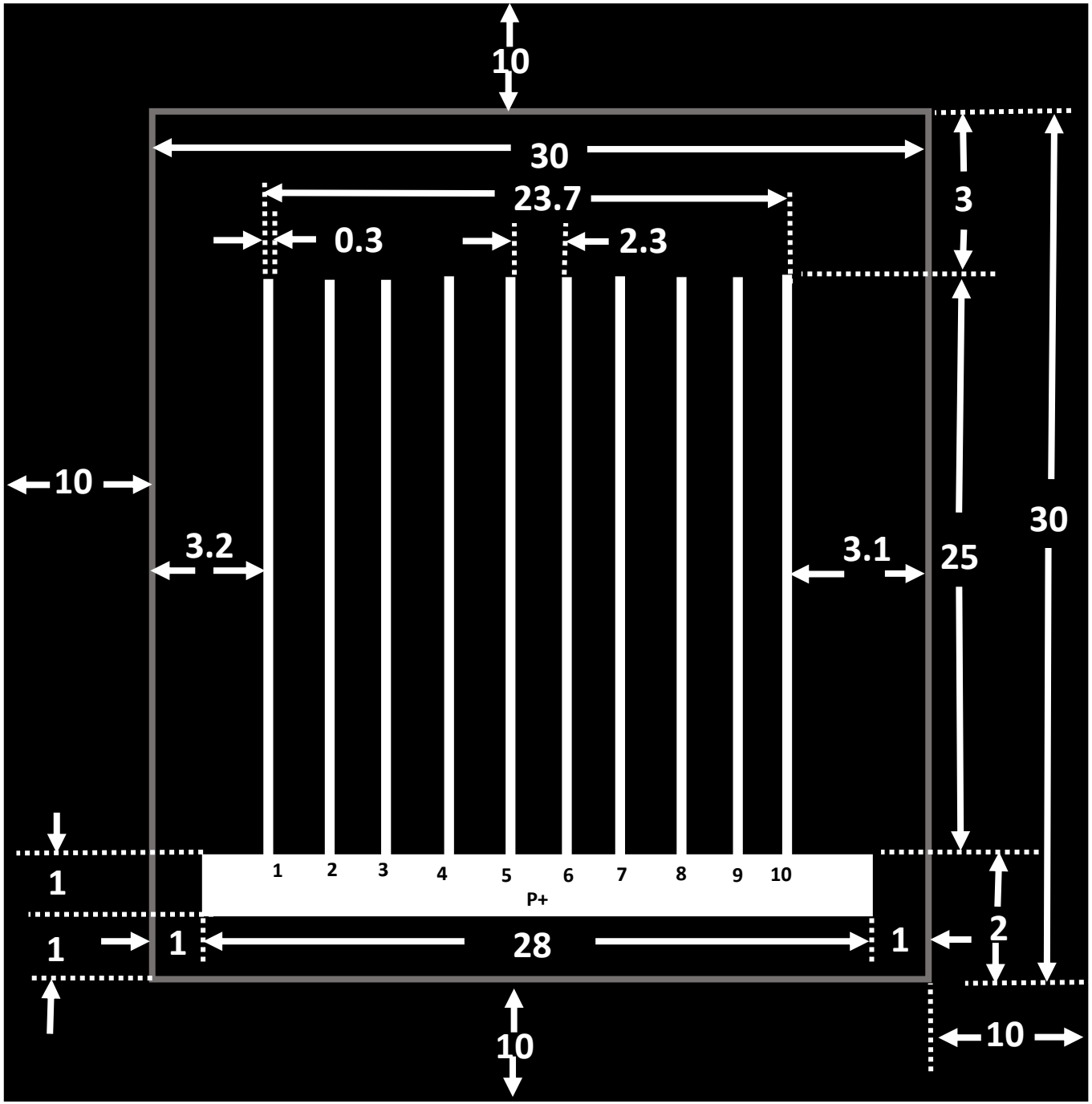


Mask Metal Plate 01

N+ MASK

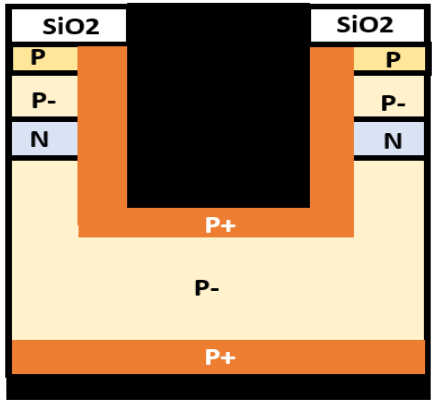


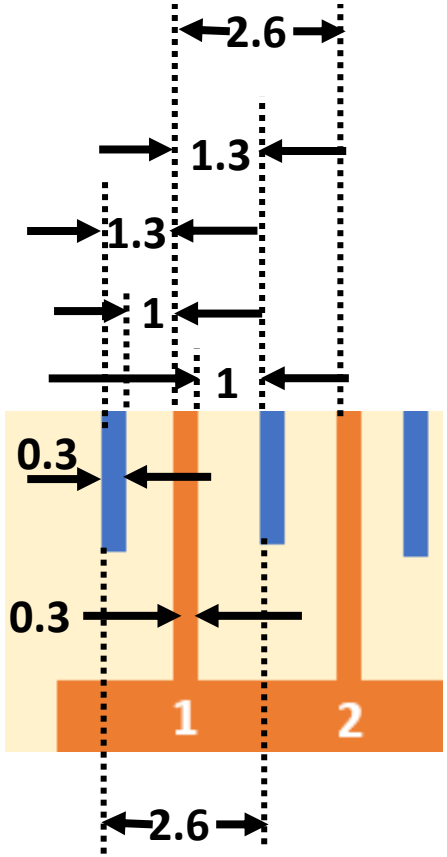




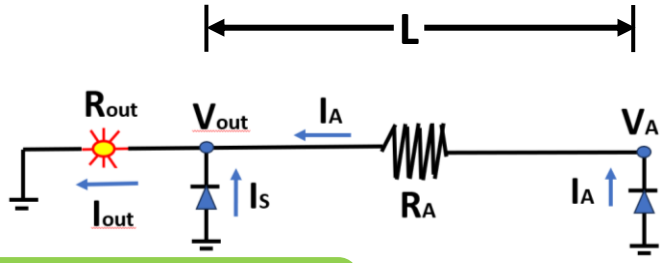
Mask Metal Plate 02

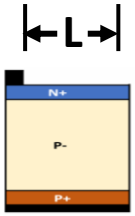
P+ MASK

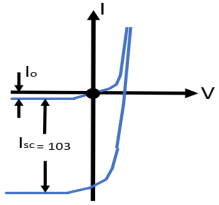


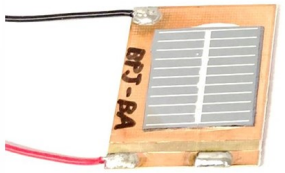


(1)







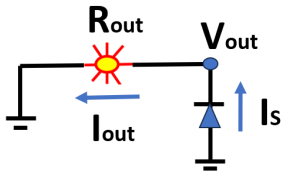


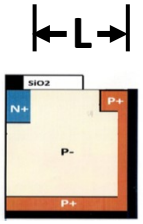
微細MASK使用

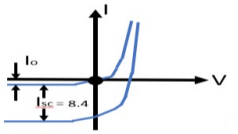
I_{SC1} = 103mA

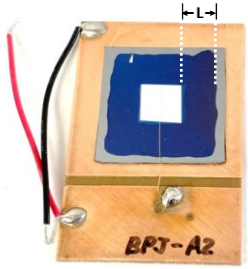
L = 1 mm ;

(2)









Chip Size 3 cm x 3 cm

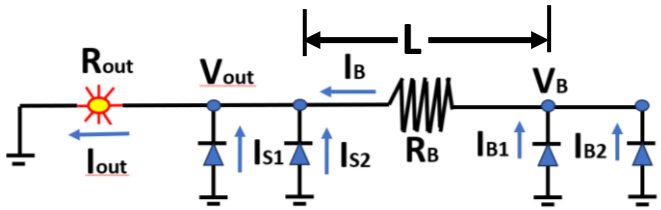
手描き

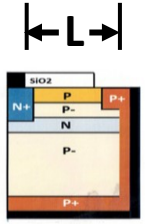
I_{SC2} = 8.4mA

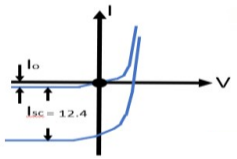
L = 10 mm ;

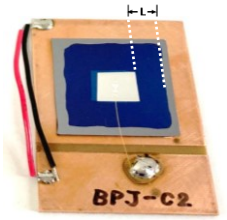
I_{SC3} / I_{SC2} = 1.48

(3)









Chip Size 3 cm x 3 cm

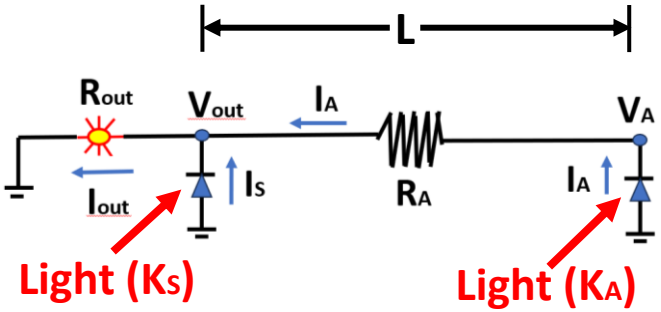
手描き

I_{SC3} = 12.4mA

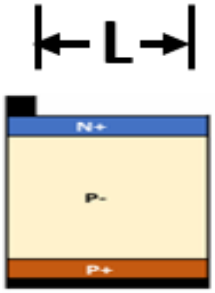
L = 10 mm :

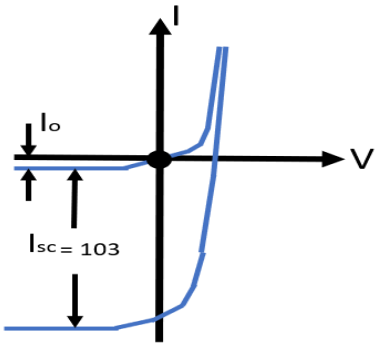
	I_0 [A]	n	Rs [Ω]	Rp [Ω]	V_{OC} [V]	I_{SC} [mA]	η [%]	S [cm^2]
(1) Single				160	0.60	103	8.0	4.3
(2) Single B	2.4×10^{-10}	1.04	2.00	14.4M	0.46	8.4	0.29	9
(3) Double			2.37	15.2k	0.46	12.4	0.32	9

(1)

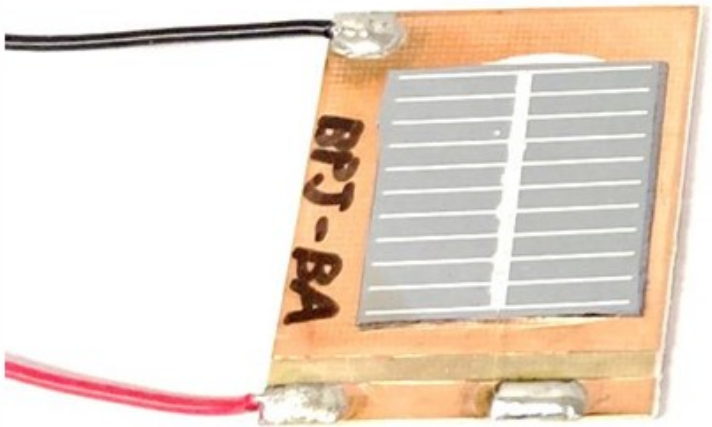


$I_{SC1} = I_S + I_A = 103$ mA



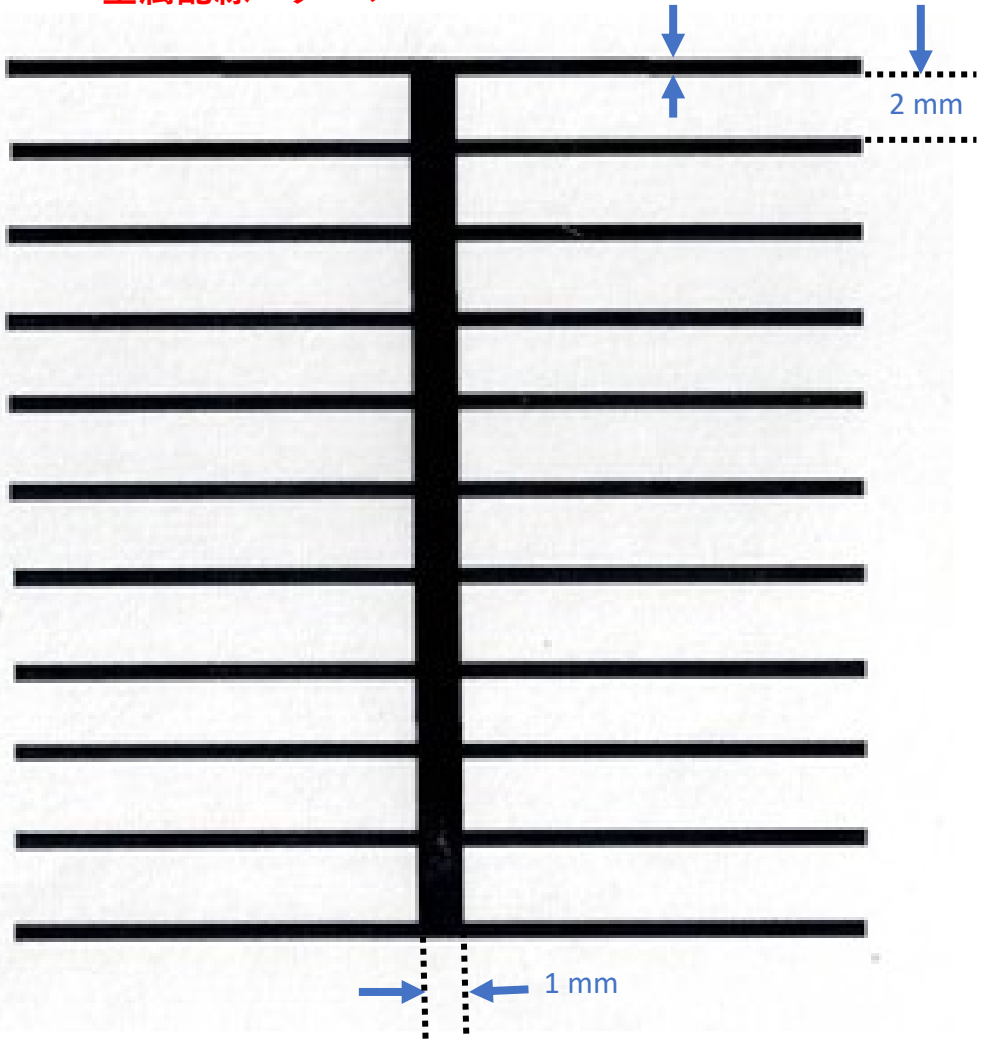


L = 1 mm ;

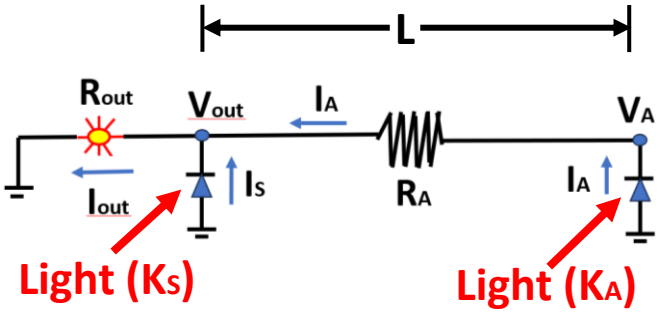


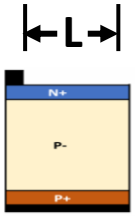
微細MASK使用

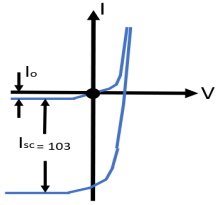
金属配線パターン

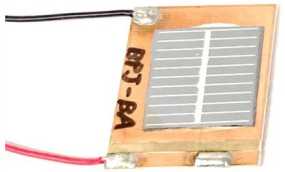


(1)









微細MASK使用

L = 1 mm ;

$I_{SC1} = I_S + I_A = 103$ mA

(1.1) $I_{out} = I_S + I_A$;

(1.2) $I_S = (A_S)(J_S) = (A_S)(K_S)\{ \exp(- V_{out}/kT) - 1 \}$;

(1.3) $I_A = (A_A)(J_A) = (A_A)(K_A)\{ \exp(- V_A /kT) - 1 \}$;

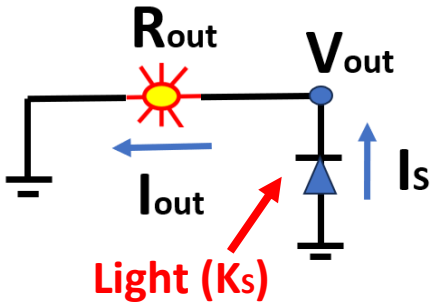
(1.4) $(V_{out} - V_A) = (I_A)(R_A)$;

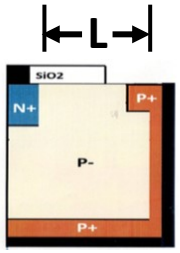
(1.5) $A_A >> A_S$;

(1.6) $R_A << R_{out} = (V_{out}) / (I_{out})$;

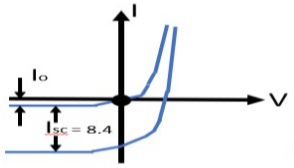
	I_0 [A]	n	Rs [Ω]	Rp [Ω]	V_{OC} [V]	I_{SC} [mA]	η [%]	S [cm^2]
(1) Single				160	0.60	103	8.0	4.3
(2) Single B	2.4×10^{-10}	1.04	2.00	14.4M	0.46	8.4	0.29	9
(3) Double			2.37	15.2k	0.46	12.4	0.32	9

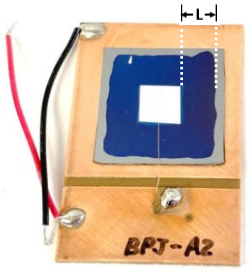
(2)





L = 10 mm ;





Chip Size 3 cm x 3 cm

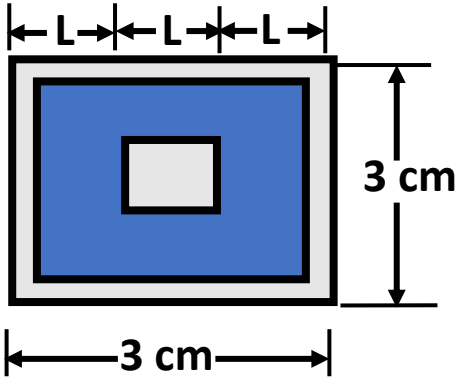
手描き

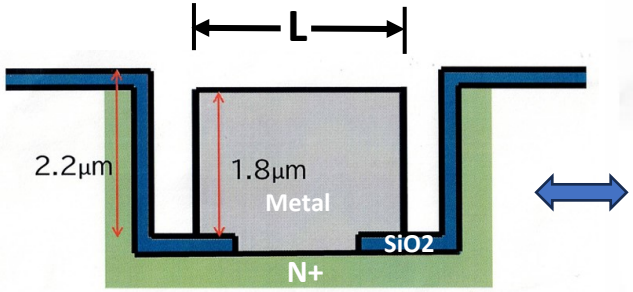
$I_{SC2} = 8.4\text{mA}$

(2.1) $I_S = (A_S)\,(J_S) = (A_S)(K_S)\{\exp(-V_{out}/kT) - 1\}$;

Chip (2) and Chip (3)；

L = 1 cm ;

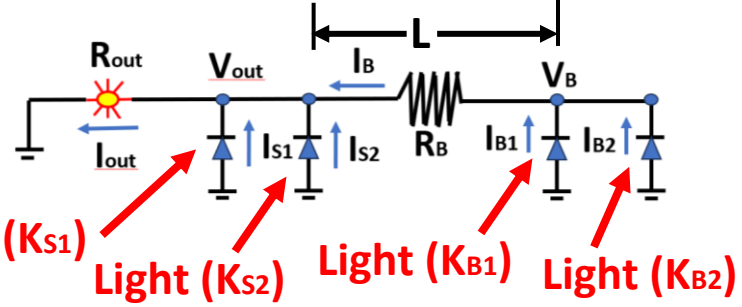


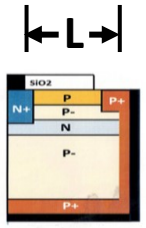


KOH Silicon Etching

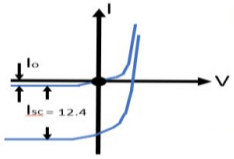
	I_0 [A]	n	Rs [Ω]	Rp [Ω]	V_{OC} [V]	I_{SC} [mA]	η [%]	S [cm^2]
(1) Single				160	0.60	103	8.0	4.3
(2) Single B	2.4×10^{-10}	1.04	2.00	14.4M	0.46	8.4	0.29	9
(3) Double			2.37	15.2k	0.46	12.4	0.32	9

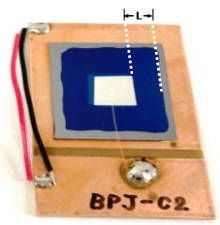
(3)





L = 10 mm :





Chip Size 3 cm x 3 cm

手描き

$$I_{SC3} = I_{S1} + I_{S2} = 12.4 \text{ mA}$$

(3.1) $I_{out} = I_{S1} + I_{S2} + I_B$; $I_B = I_{B1} + I_{B2}$; $K_B = K_{B1} + K_{B2}$;

(3.2) $I_{S1} = (A_S)\,(J_{S1}) = (A_S)\,(K_{S1})\{\exp(-V_{out}/kT) - 1\}$;

(3.3) $I_{S2} = (A_S)\,(J_{S2}) = (A_S)\,(K_{S2})\{\exp(-V_{out}/kT) - 1\}$;

(3.4) $I_B = (A_B)\,(J_B) = (A_B)\,(K_B)\{\exp(-V_B/kT) - 1\}$;

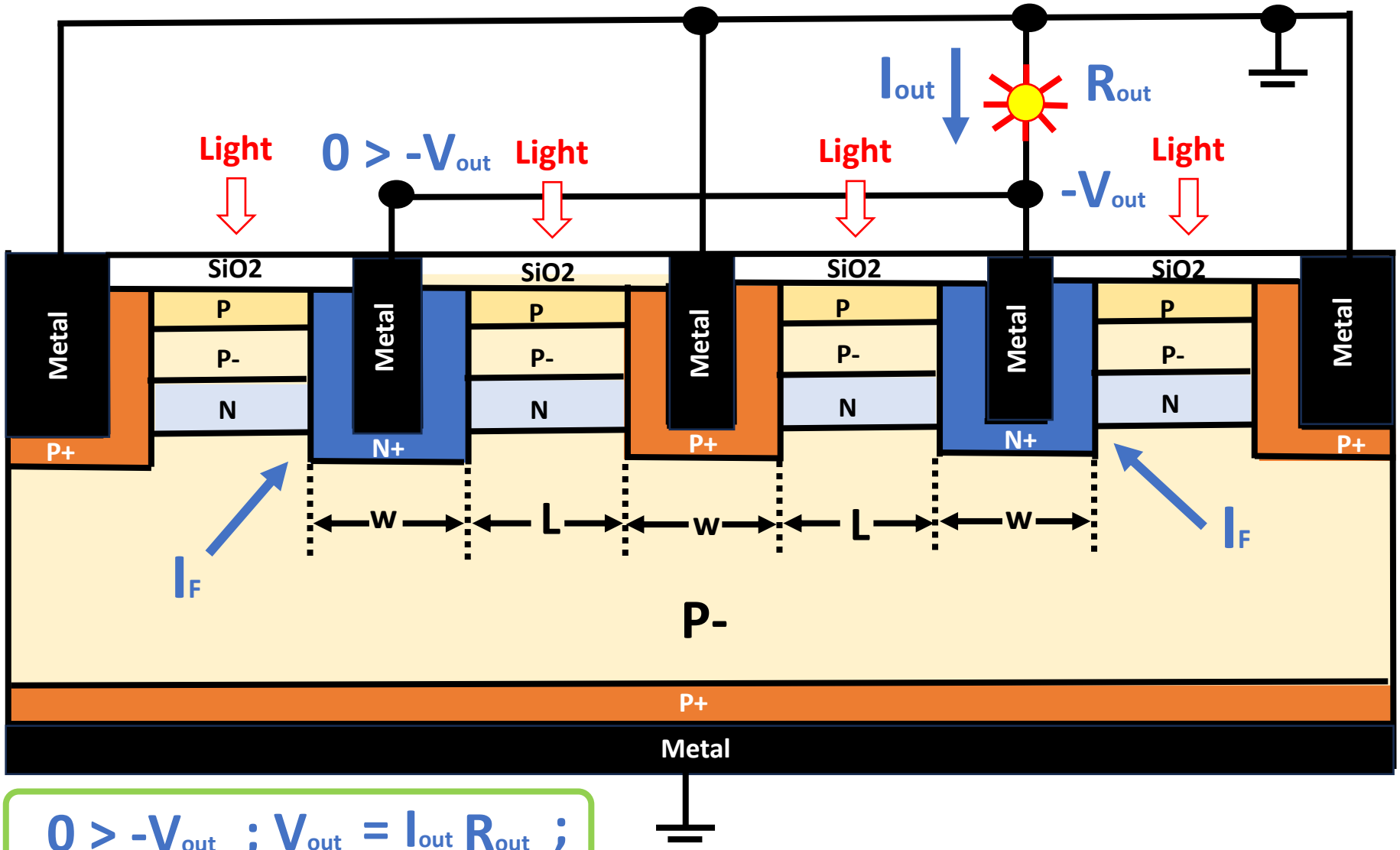
(3.5) $(V_{out} - V_B) = (I_B)\,(R_B)$;

(3.6) $A_B >> A_S$;

(3.7) $R_B >> R_{out} = (V_{out}) / (I_{out}) \rightarrow I_B << (I_{S1} + I_{S2})$;

$$I_{SC3} / I_{SC2} = 1.48$$

	I_0 [A]	n	Rs [Ω]	Rp [Ω]	V_{OC} [V]	I_{SC} [mA]	η [%]	S [cm^2]
(1) Single				160	0.60	103	8.0	4.3
(2) Single B	2.4×10^{-10}	1.04	2.00	14.4M	0.46	8.4	0.29	9
(3) Double			2.37	15.2k	0.46	12.4	0.32	9



$0 > -V_{out}$; $V_{out} = I_{out} R_{out}$;

$I_{SC} = I_{out} + I_F$; $I_F = I_o \{ \exp(V_{out}/kT) - 1 \}$; $(EG - V_{out}) = I_{out} R_N$;