

THMR-IP3600 HP

High Performance i-line Positive Photo Resist

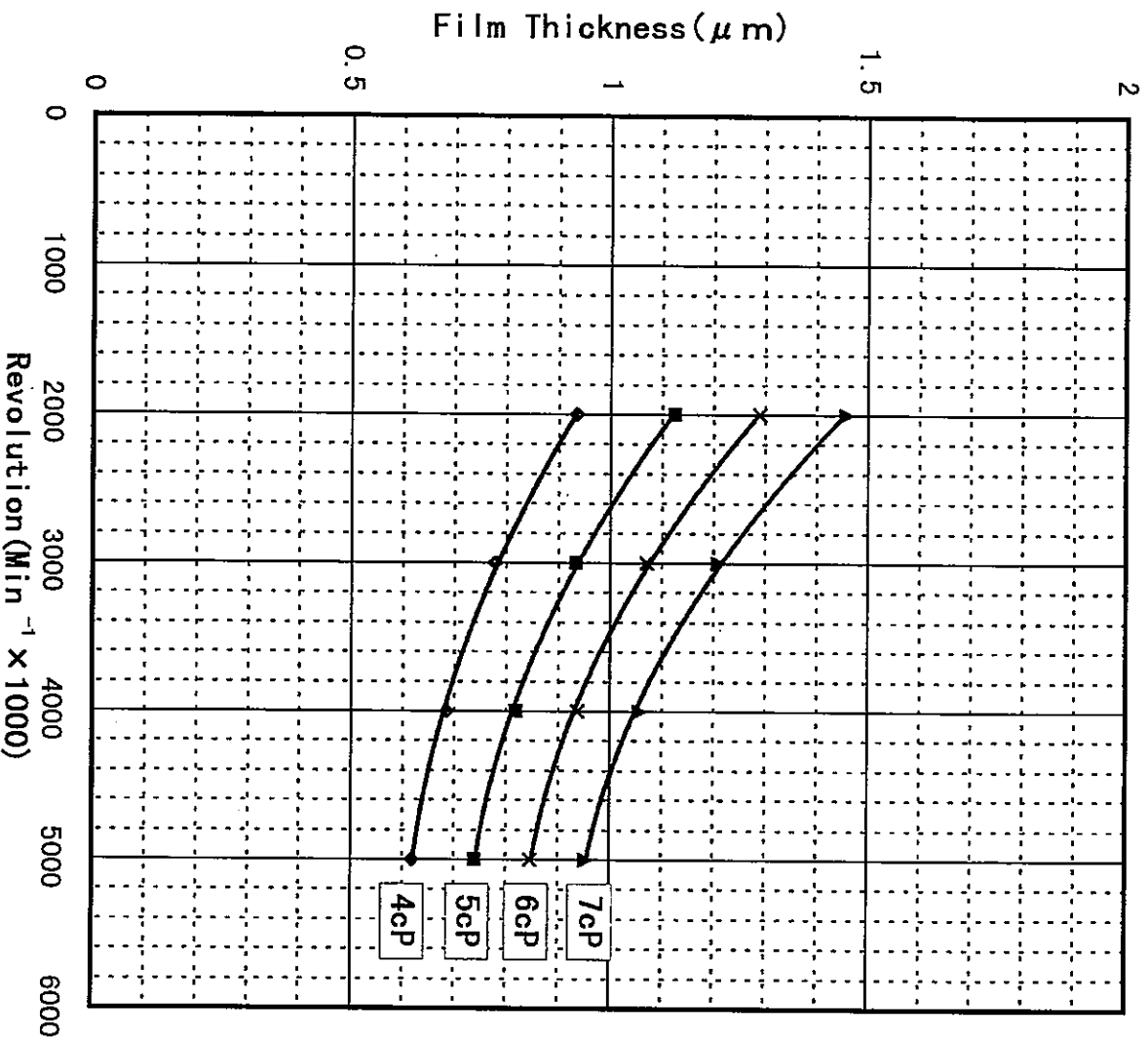
Evaluation Results

TOKYO OHKA KOGYO CO., LTD.

THMR-iP3600 (HP)
4cP, 5cP, 6cP, 7cP

Resist temperature 23°C
Spinner SK-W80A
Initial speed 800rpm X 3s
Working speed each X 30s
Prebake 90°C-90sec. (Proximity)
Measurement Nanospec

Nf:1.68



THMR-IP3600 HP

Eth 190ms
Eop 418ms

Substrate Si (HMDS treatment)
 Thickness 1.05 μm (Nf:1.68) Top of string
 Prebake 90°C-90sec (proxi)
 Exposure NSR-2005i10D (NA0.57 NA0.61D)
 Reticle TOK Part-6
 P.E.B. 110 °C-90sec (proxi)
 Development MMD-3 2.38% 60sec puddle (Si nozzle)

| | | | | |
|------|--------------------|--------------------|--------------------|--------------------|
| | 0.28 μm | 0.30 μm | 0.35 μm | 0.40 μm |
| -1.2 | | | | |
| -1.0 | | | | |
| -0.8 | | | | |
| -0.6 | | | | |
| -0.4 | | | | |
| -0.2 | | | | |
| 0.0 | | | | |
| +0.2 | | | | |
| +0.4 | | | | |
| +0.6 | | | | |
| +0.8 | | | | |
| +1.0 | | | | |
| +1.2 | | | | |

THMR—iP3500 HP

Eth 225ms
Eop 430ms

| | |
|-------------|--------------------------------------|
| Substrate | Si (RHDS treatment) |
| Thickness | 1.05 μ m (Nf:1.68) Top of swing |
| Prebake | 90°C-90sec (prox1) |
| Exposure | NSR-2005110D |
| Reticle | TOK Part-6 |
| P.E.B | 110 °C-90sec (prox1) |
| Development | NMD-3 2.38% 60sec puddle (Si nozzle) |

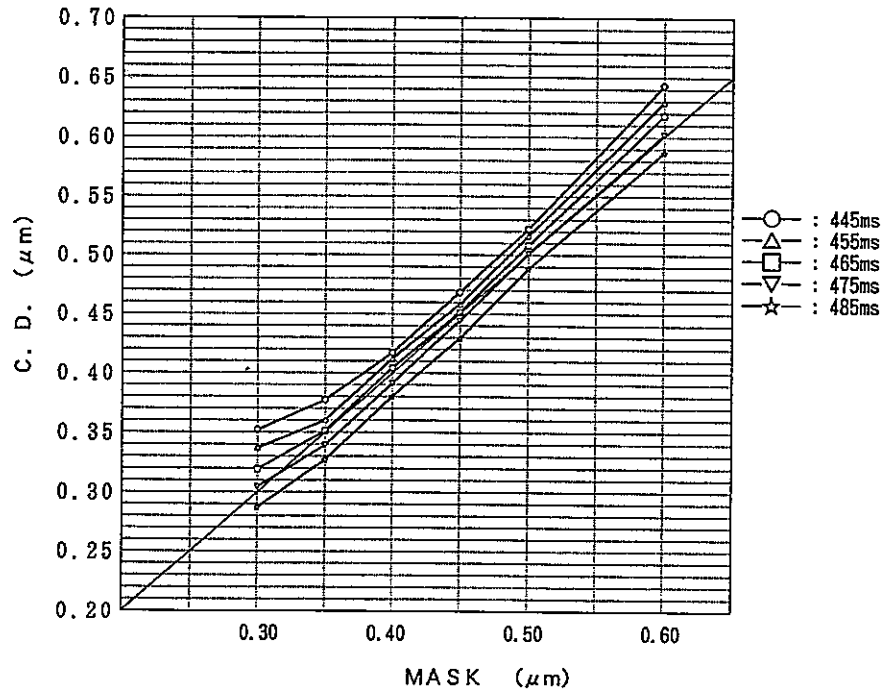
| | 0.28 μ m | 0.30 μ m | 0.35 μ m | 0.40 μ m |
|------|--------------|--------------|--------------|--------------|
| -1.2 | | | | |
| -1.0 | | | | |
| -0.8 | | | | |
| -0.6 | | | | |
| -0.4 | | | | |
| -0.2 | | | | |
| 0.0 | | | | |
| +0.2 | | | | |
| +0.4 | | | | |
| +0.6 | | | | |
| +0.8 | | | | |
| +1.0 | | | | |
| +1.2 | | | | |

MASK LINEARITY

THMR-IP3600 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90 °C-90sec. (Proximity)
 Resist Thickness : 1.05 μ m (Nf:1.68)
 Exposure : NSR-2005i10D
 (NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec
 Puddle. (SI Nozzle)
 Reticle : Nikon Reticle A

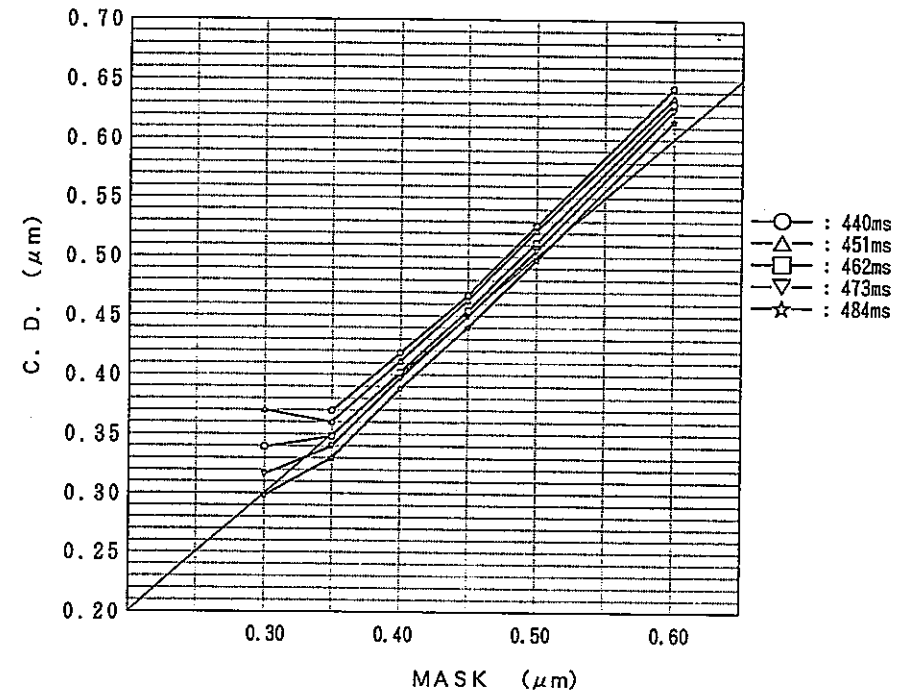


MASK LINEARITY

THMR-IP3500 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90 °C-90sec. (Proximity)
 Resist Thickness : 1.05 μ m (Nf:1.68)
 Exposure : NSR-2005i10D
 (NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec
 Puddle. (SI Nozzle)
 Reticle : Nikon Reticle A

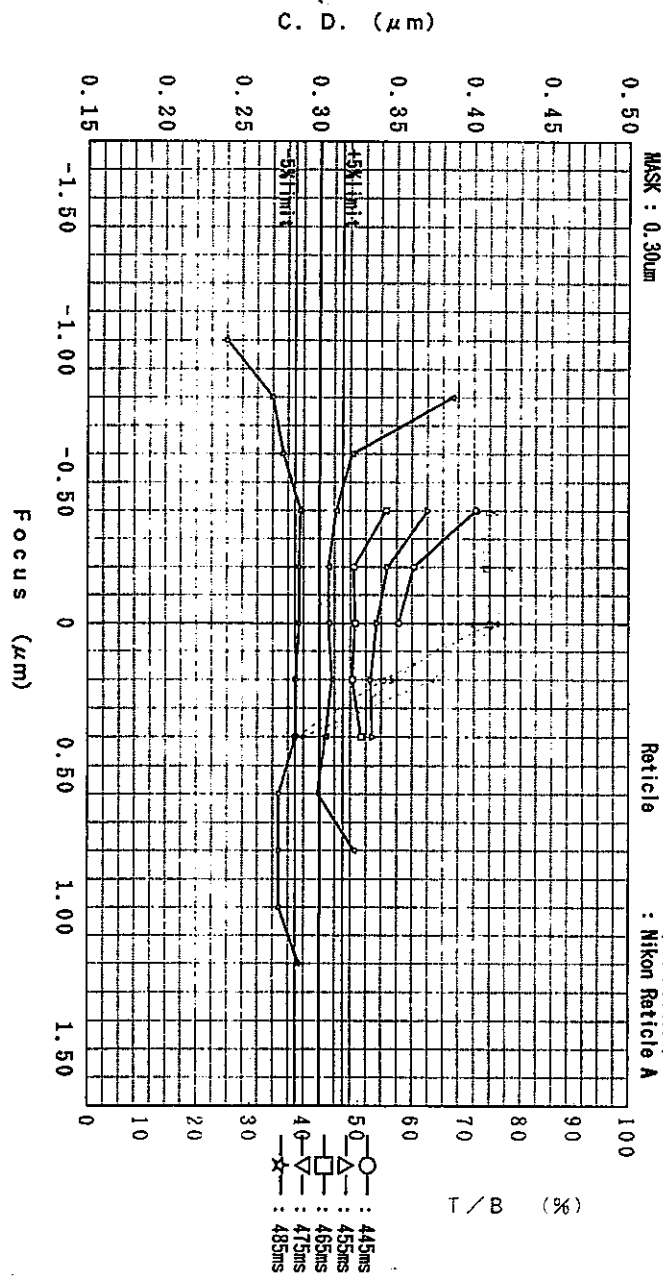


C.D. vs FOCUS

THMR-1P3600 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90°C-90sec. (Proximity)
 Resist Thickness : 1.05 μ m (Nf:1.68)
 Exposure : NSR-2005110D(NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : MMD-3 Z.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A

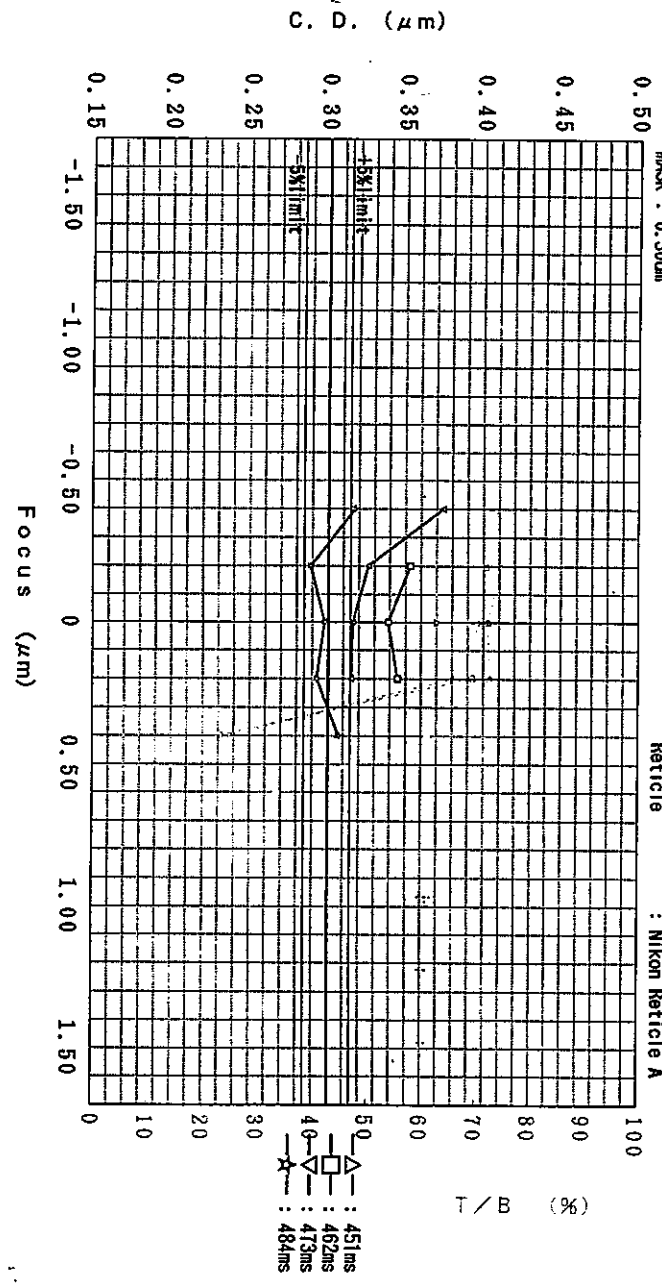


C.D. vs FOCUS

THMR-1P3500 HP

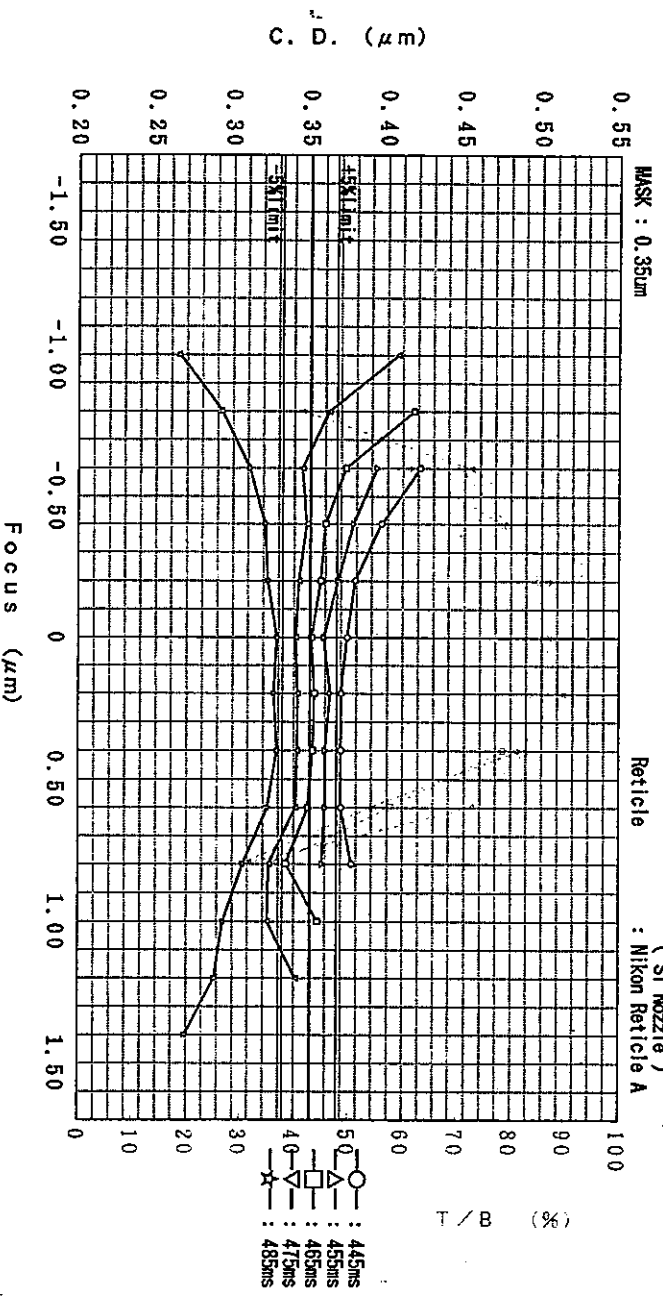
OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90°C-90sec. (Proximity)
 Resist Thickness : 1.05 μ m (Nf:1.68)
 Exposure : NSR-2005110D(NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : MMD-3 Z.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A



C/D vs Focus

THMR-IP3600 HP

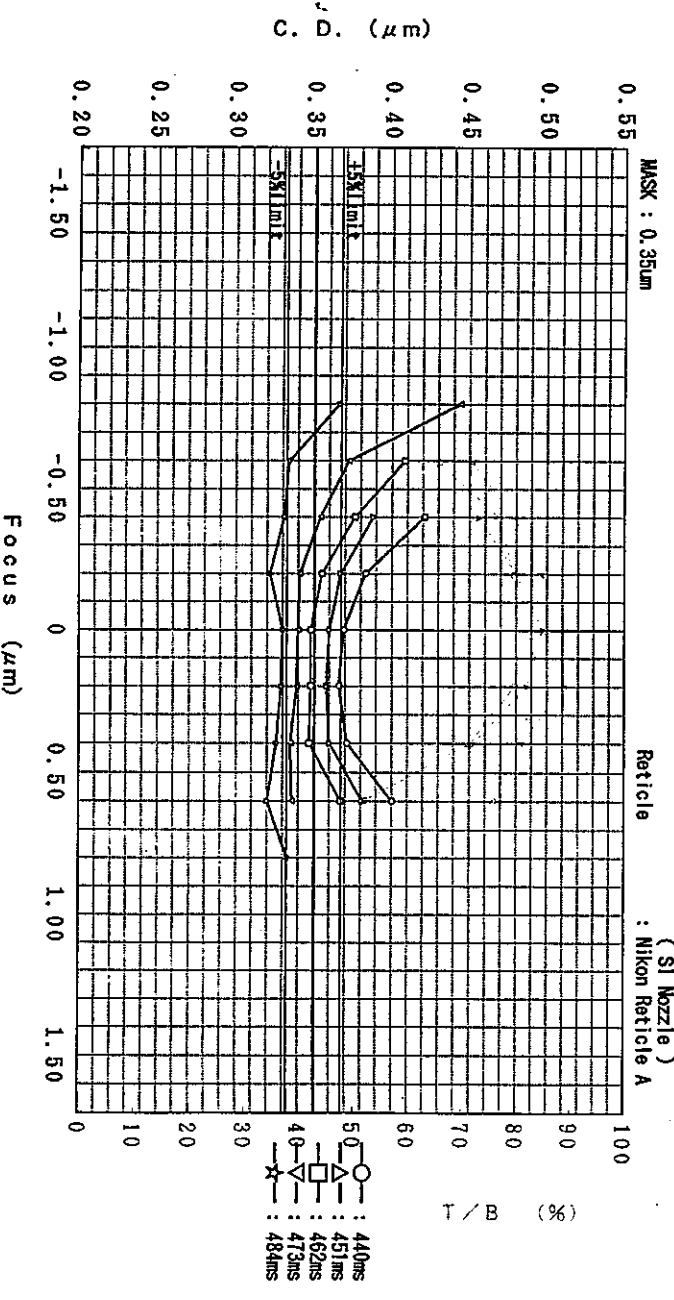


OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90°C-90sec (Proximity)
 Resist Thickness : 1.05μm (NF:1.68)
 Exposure : NSR-2005110D(NA:0.57 σ:0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : MMD-3 2.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A

C/D vs Focus

THMR-IP3500 HP



OPERATING CONDITIONS

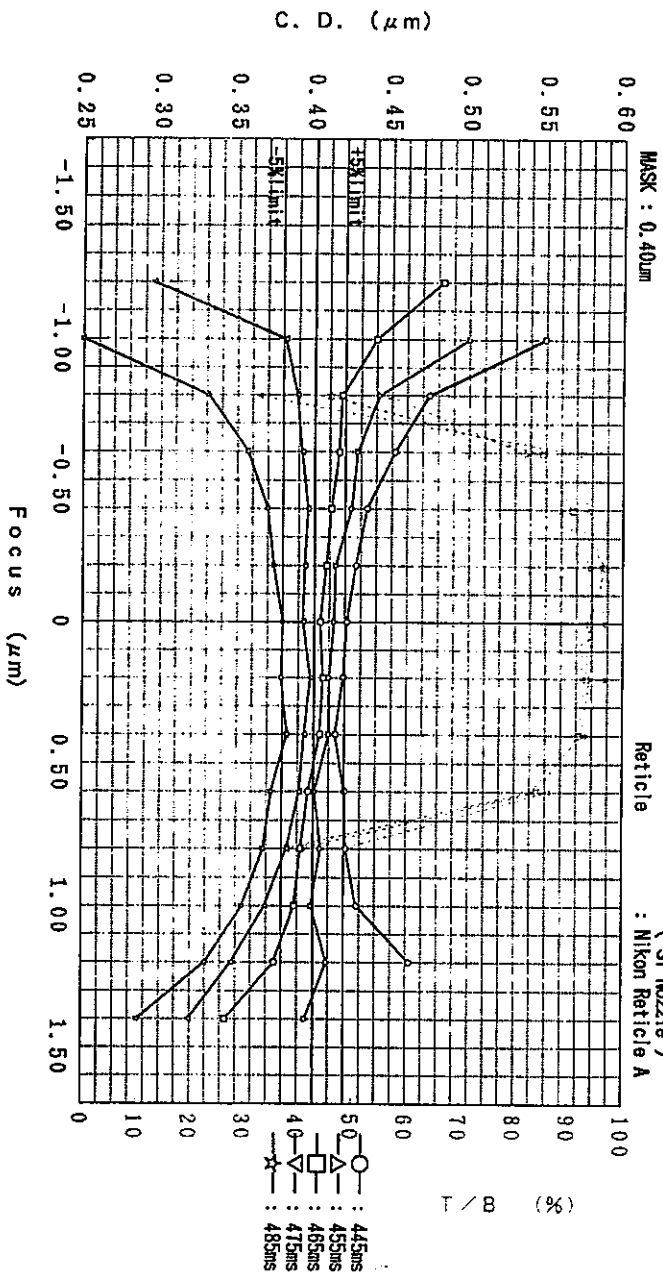
Substrate : Si (HMDS Treatment)
 Prebake : 90°C-90sec. (Proximity)
 Resist Thickness : 1.05μm (NF:1.68)
 Exposure : NSR-2005110D(NA:0.57 σ:0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : MMD-3 2.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A

C.D. vs FOCUS

THMR-1 P 3 6 0 0 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90 °C-90sec (Proximity)
 Resist Thickness : 1.05 μ m (N:1.68)
 Exposure : NSR-2005110D (NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A

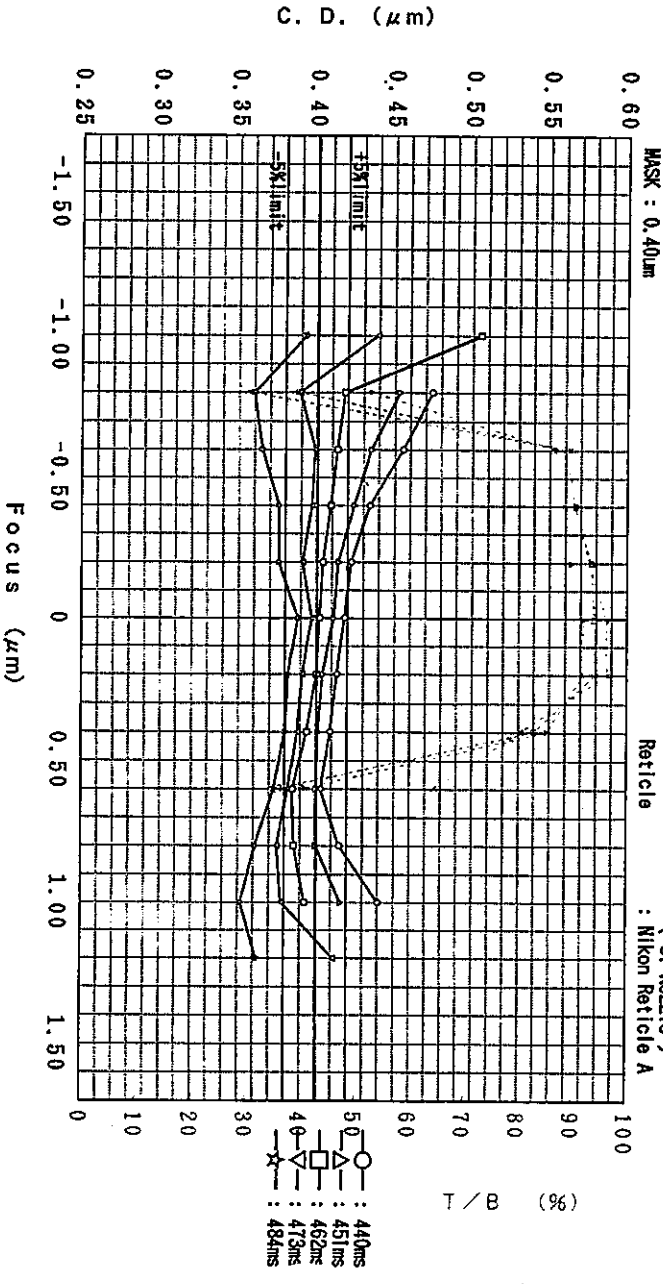


C.D. vs FOCUS

THMR-1 P 3 5 0 0 HP

OPERATING CONDITIONS

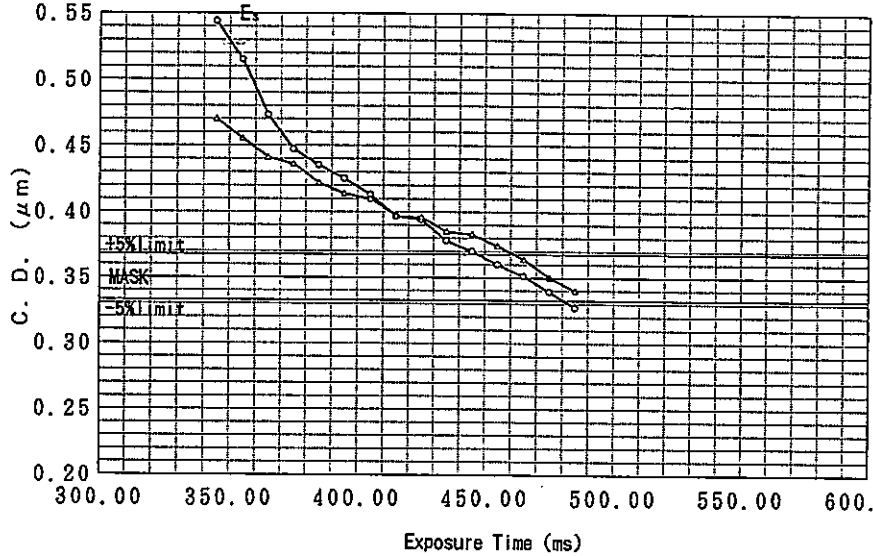
Substrate : Si (HMDS Treatment)
 Prebake : 90 °C-90sec (Proximity)
 Resist Thickness : 1.05 μ m (N:1.68)
 Exposure : NSR-2005110D (NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A



EXPOSURE TIME vs C. D.

THMR-IP3600 HP

L/S ○—
ISO △—
MASK : 0.35um



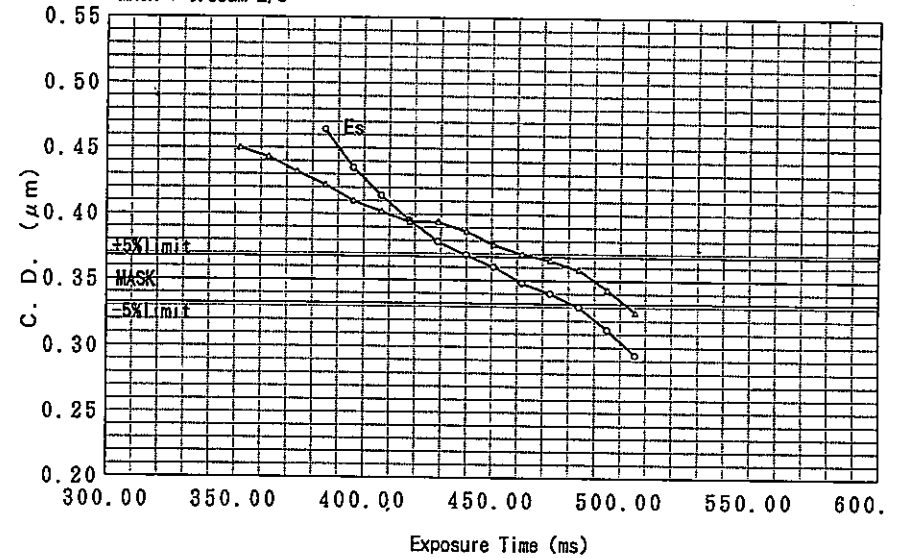
OPERATING CONDITIONS

Substrate : Si (HMSD Treatment)
Prebake : 90 °C-90sec. (Proximity)
Resist Thickness : 1.05um (Nf:1.68)
Exposure : NSR-2005i10D
(NA:0.57 σ:0.61)
P.E.B. : 110°C-90sec. (Proximity)
Development : NMD-3 2.38% 23°C 60sec
Puddle. (Si Nozzle)
Reticle : Nikon Reticle A

EXPOSURE TIME vs C. D.

THMR-IP3500 HP

L/S ○—
ISO △—
MASK : 0.35um L/S



OPERATING CONDITIONS

Substrate : Si (HMSD Treatment)
Prebake : 90 °C-90sec. (Proximity)
Resist Thickness : 1.05um (Nf:1.68)
Exposure : NSR-2005i10D
(NA:0.57 σ:0.61)
P.E.B. : 110°C-90sec. (Proximity)
Development : NMD-3 2.38% 23°C 60sec
Puddle. (Si Nozzle)
Reticle : Nikon Reticle A

EXPOSURE LATITUDE 0.35umL/S

| Exposure time (ms) | | | | Exposure latitude | | |
|------------------------------|------------------------------|-----------------------------|------------------------------|-------------------|-----------------|---|
| E _s (Separate) | E ₁ (+5%limit) | E _{op} (Target) | E ₂ (-5%limit) | Under | ±5% | ΔCD (±5%)um/10ms |
| | | | | $E_{op}-E_s$ | $E_2 - E_1$ | $\frac{\Delta CD (\pm 5\%) \times 10}{E_2 - E_1}$ |
| | | | | E _{op} | E _{op} | E ₂ - E ₁ |
| 345 | 446 | 466 | 482 | 26.0 | 7.7 | 0.010 |

EXPOSURE LATITUDE 0.35umL/S

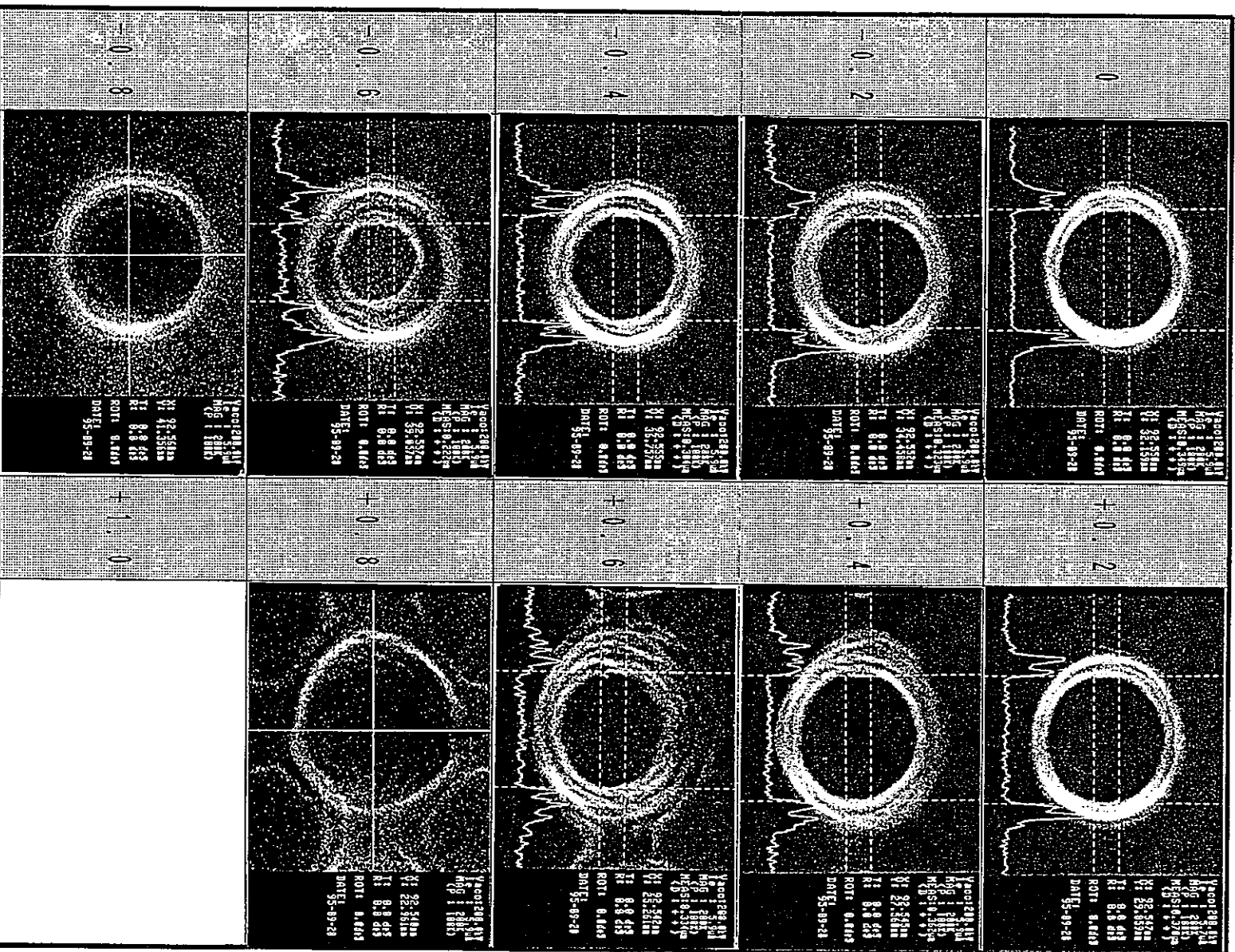
| Exposure time (ms) | | | | Exposure latitude | | |
|------------------------------|------------------------------|-----------------------------|------------------------------|-------------------|-----------------|---|
| E _s (Separate) | E ₁ (+5%limit) | E _{op} (Target) | E ₂ (-5%limit) | Under | ±5% | ΔCD (±5%)um/10ms |
| | | | | $E_{op}-E_s$ | $E_2 - E_1$ | $\frac{\Delta CD (\pm 5\%) \times 10}{E_2 - E_1}$ |
| | | | | E _{op} | E _{op} | E ₂ - E ₁ |
| 385 | 441 | 460 | 482 | 16.3 | 8.9 | 0.009 |

THMR-IP3500 HP

Eop:1218ms

0.35 μ mC/H Defocus

Substrate : Si (HMDS Treatment)
 Prebake : 90°C - 90sec. (Proximity)
 Resist Thickness : 1.05 μ m (Mf:1.68)
 Exposure : MSR-2005i10D(NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C-60sec. Si Puddle.
 Rinse : D.I. Water
 Reticle : Nikon Test Reticle A

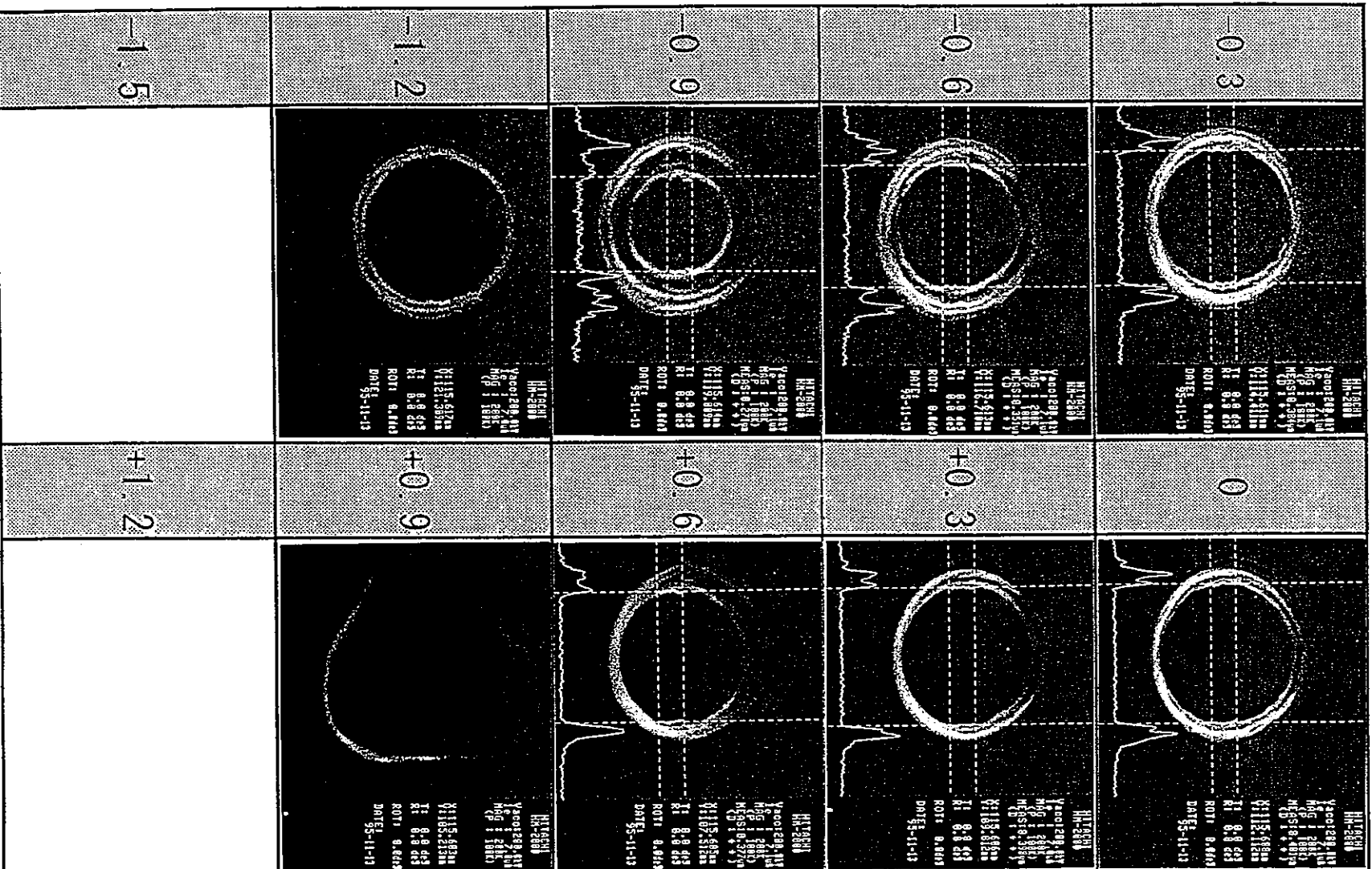


0.4μmC/H

THMR-IP3600 HP

Eth: 190ms EOP: 893ms

Substrate SI (HMDS treatment)
Thickness 1.05μm (NF:1.68) Top of swinge
Prebake 90°C-90sec (proxi)
Exposure NSIR-2005110D (NA:0.57 σ:0.60)
Reticle NIKON TEST A
P.E.B. 110°C-90sec (proxi)
Development MMD-3 2.38% 60sec puddle (SI nozzle)

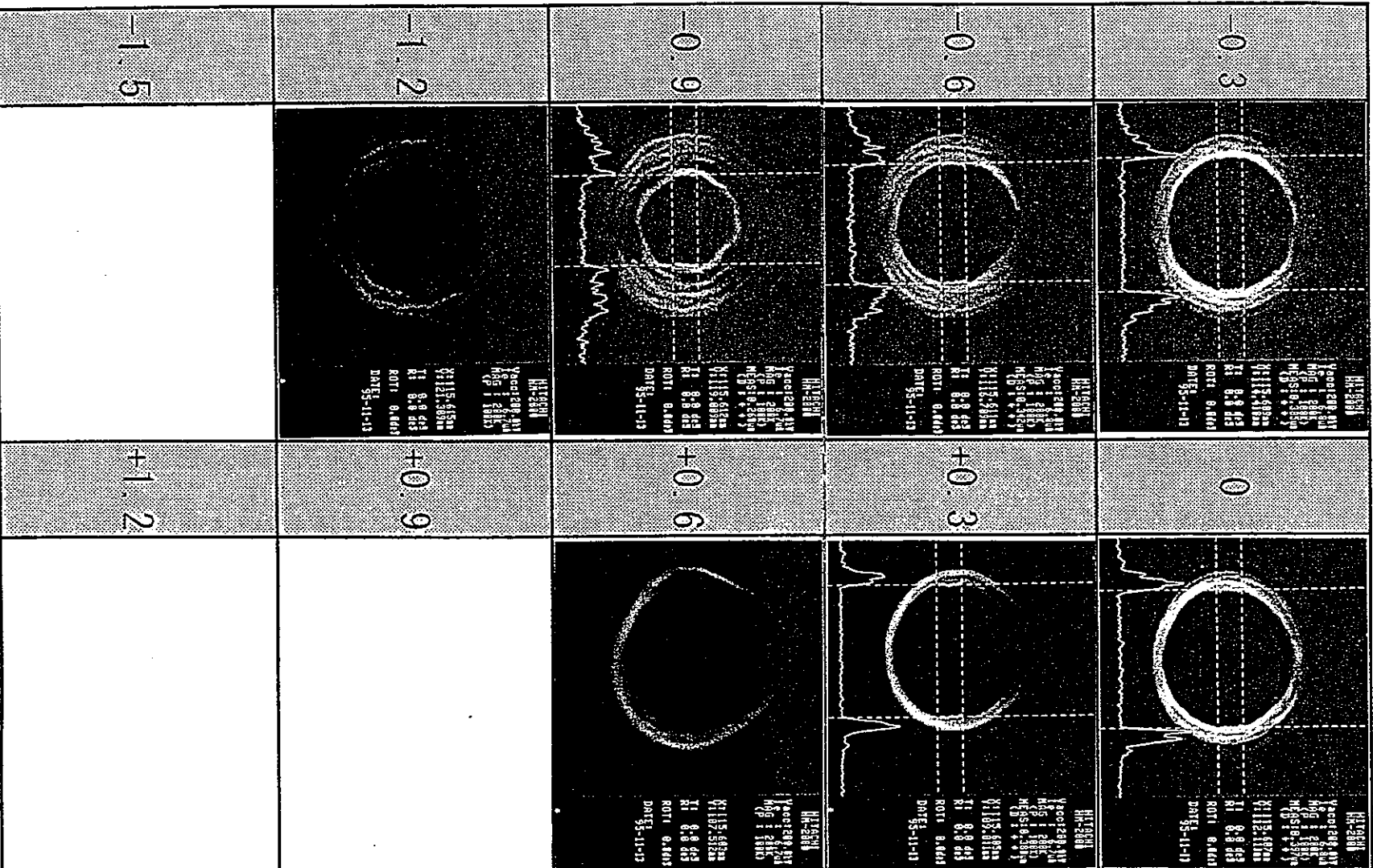


0.4 $\mu\text{mC/H}$

THMR-IP3500 HP

Eth:220ms Eop:902ms

Substrate Si (HMDS treatment)
Thickness 1.05 μm (Nf:l. 68) Top of swing
Prebake 90°C-90sec (proxi)
Exposure NSR-2005110D (NA:0.57 σ :0.60)
Reticle NIKON TEST A
P.E.B. 110 °C-90sec (proxi)
Development NMO-3 2.38% 60sec puddle (Si nozzle)

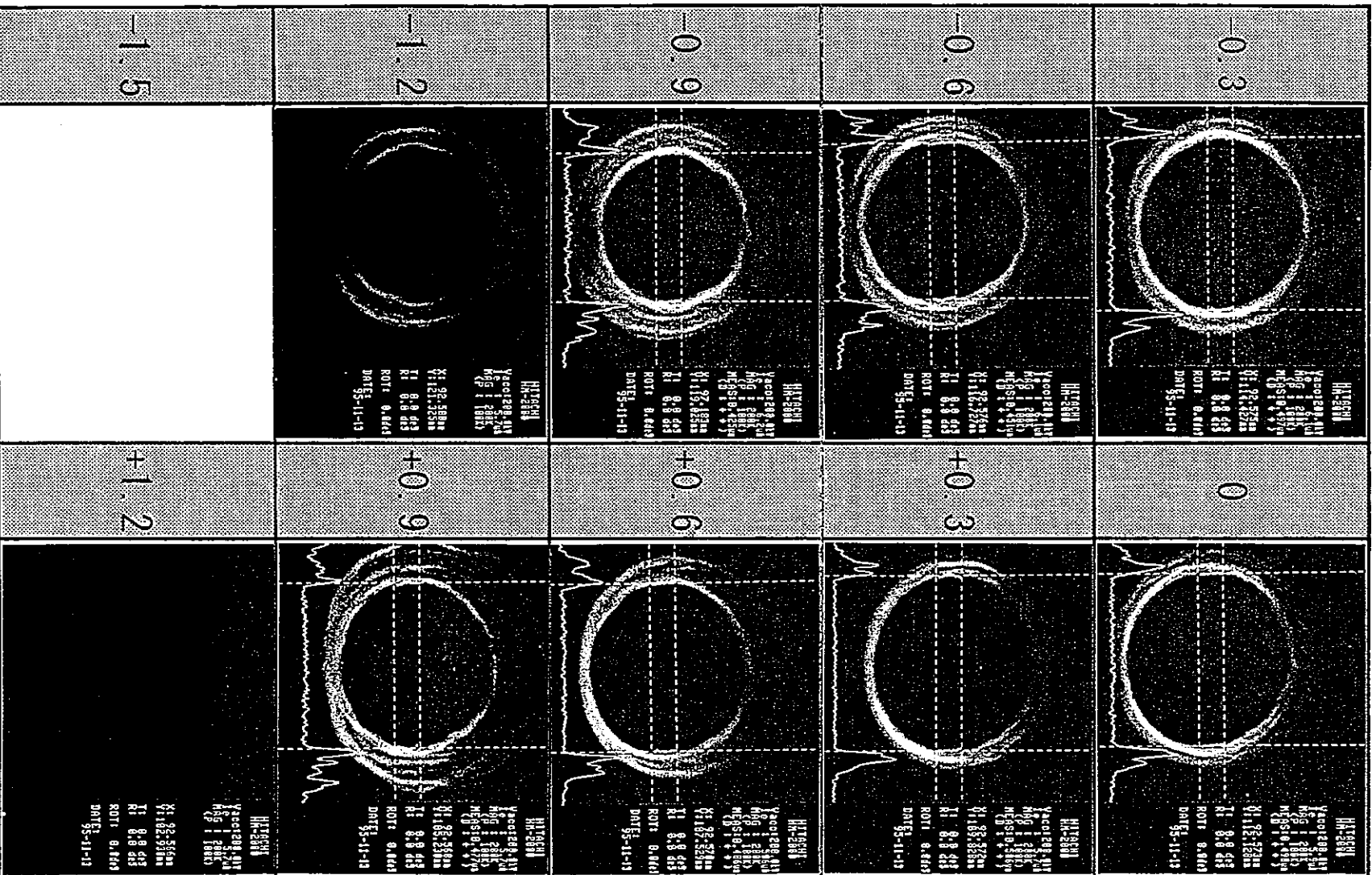


0.5 μ mC/H

THMR-IP3600 HP

Eth:190ms Eop:703ms

Substrate Si (HMDS treatment)
Thickness 1.05 μ m (NF:1.68)^{Top of swing}
Prebake 90°C-90sec (proxi)
Exposure NSR-2005110D(N.A.:0.57 σ :0.60)
Reticle NIKON TEST A
P.E.B. 110°C-90sec (proxi)
Development NMD-3 2.38% 60sec puddle (SI nozzle)

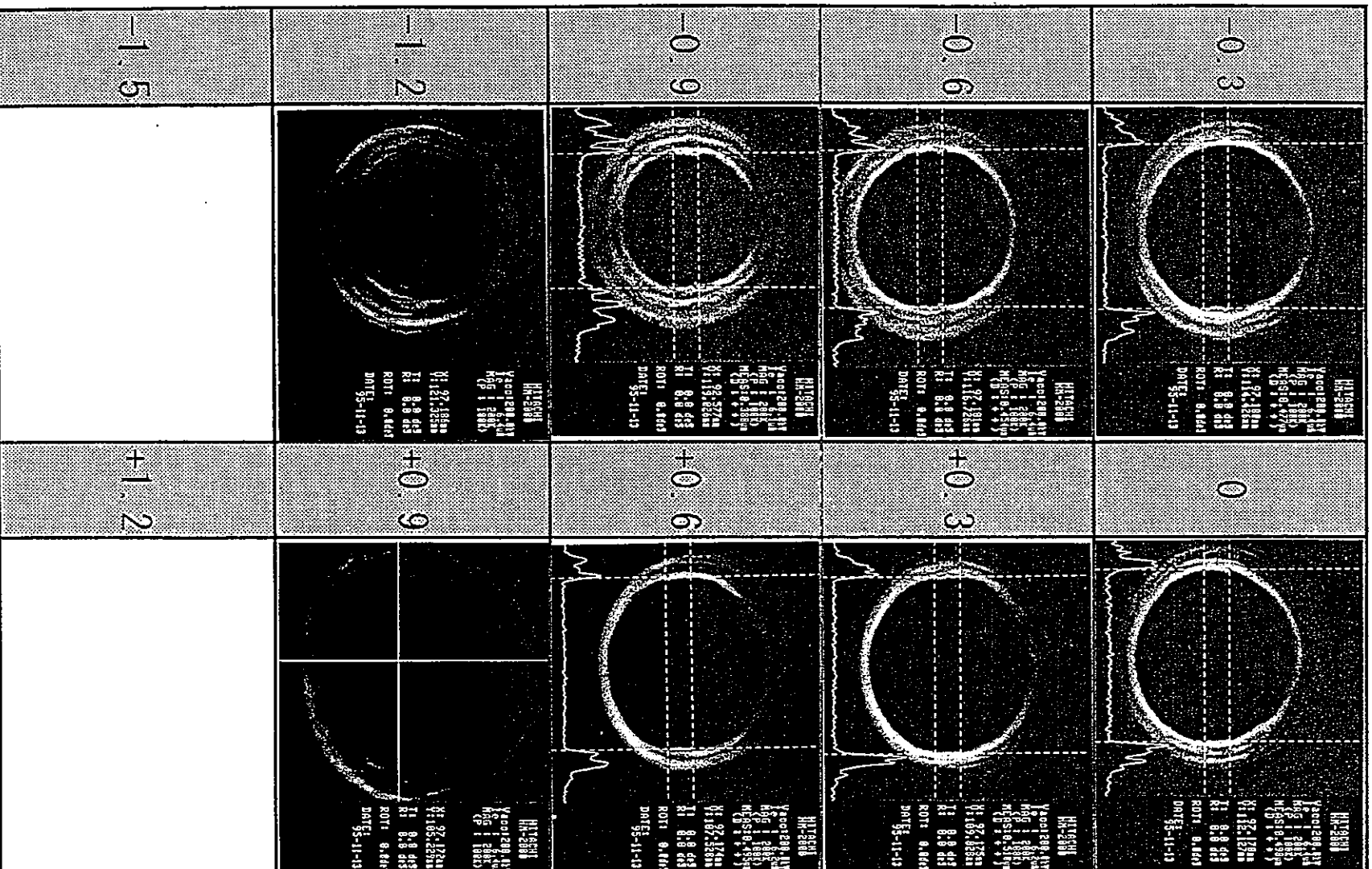


0.5 μ mC/H

THMR-IP3500 HP

Eth: 220ms Eop: 748ms

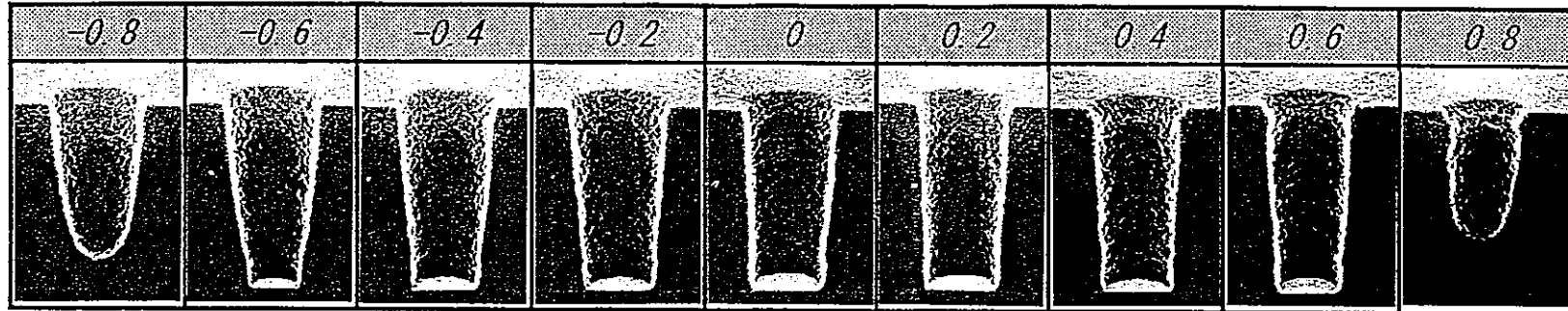
Substrate Si (HMDS treatment)
Thickness 1.05 μ m(Nf:1.68)Top of swing
Prebake 90°C-90sec (proxi)
Exposure NSR-2005110D(NA:0.57 σ :0.60)
Reticle NIKON TEST A
P.E.B. 110 °C-90sec (proxi)
Development NMD-3 2.38% 60sec puddle (SI nozzle)



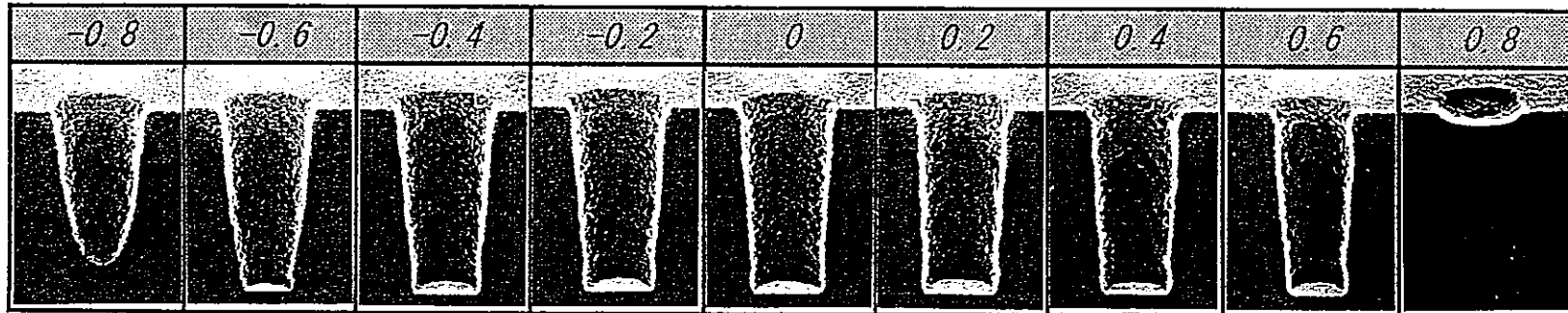
Substrate Si (HMDS treatment)
 Thickness 1.05 μm (Nf:1.68) Top of swing
 Prebake 90°C-90sec (proxi)
 Exposure NSR-2005i10D (NA:0.57) (NA:0.61)
 Reticle TOK Part-6
 P.E.B. 110 °C-90sec (proxi)
 Development NMD-3 2.38% 60sec puddle (SI nozzle)

0.35 μm C/H

THMR-iP3600 HP Eop:1083ms



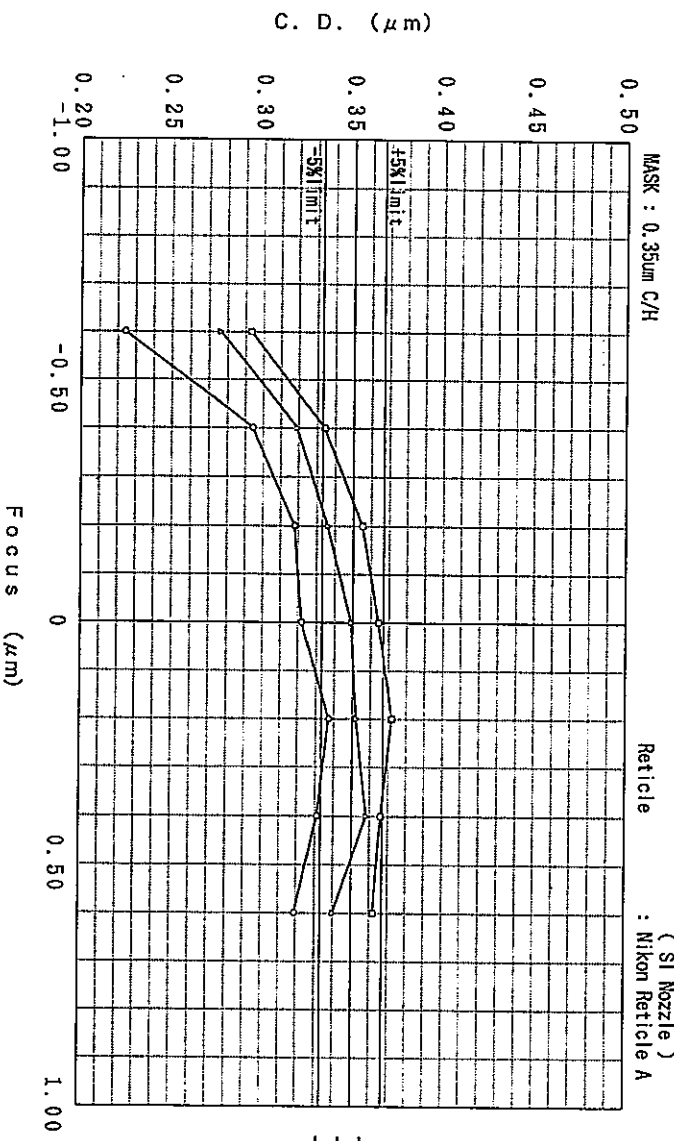
THMR-iP3500 HP Eop:1104ms



C/H C.D. vs FOCUS

THMR-1 P 3 6 0 0 HP

OPERATING CONDITIONS
 Substrate : Si (HMDS Treatment)
 Prebake : 90°C-90sec. (Proximity)
 Resist Thickness : 1.05µm (NF:1.68)
 Exposure : NSR-2005:10D(NA:0.57 σ:0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A

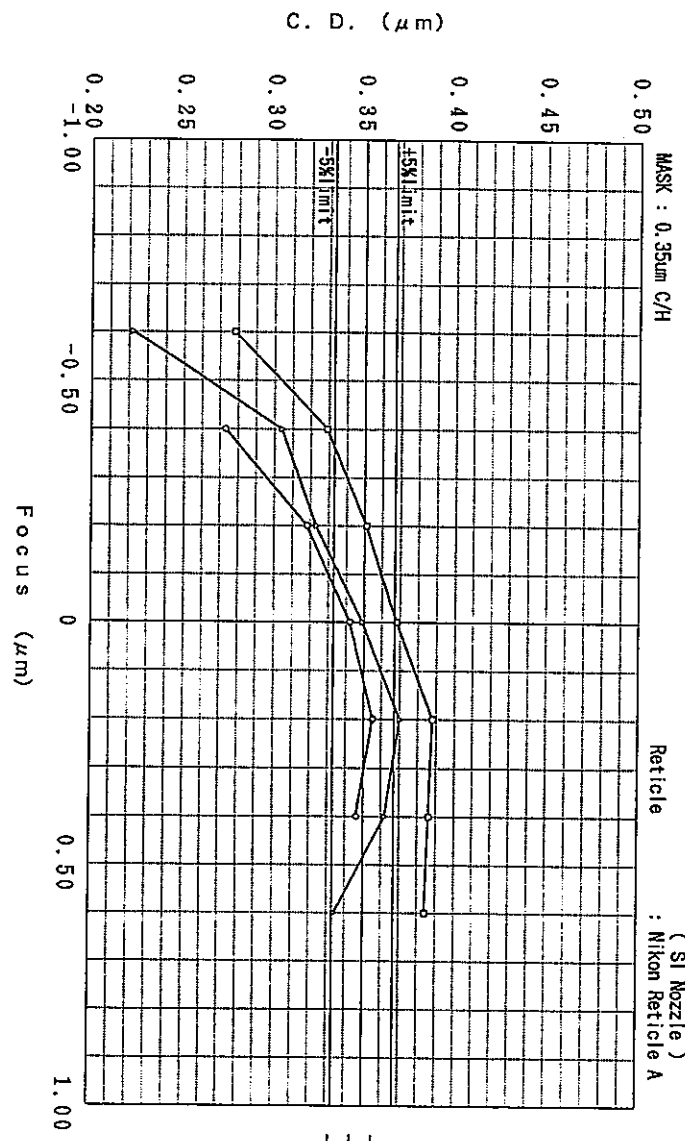


○ :1147ms
 △ :1184ms
 □ :1221ms

C/H C.D. vs FOCUS

THMR-1 P 3 5 0 0 HP

OPERATING CONDITIONS
 Substrate : Si (HMDS Treatment)
 Prebake : 90°C-90sec. (Proximity)
 Resist Thickness : 1.05µm (NF:1.68)
 Exposure : NSR-2005:10D(NA:0.57 σ:0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec. Puddle.
 (SI Nozzle)
 Reticle : Nikon Reticle A



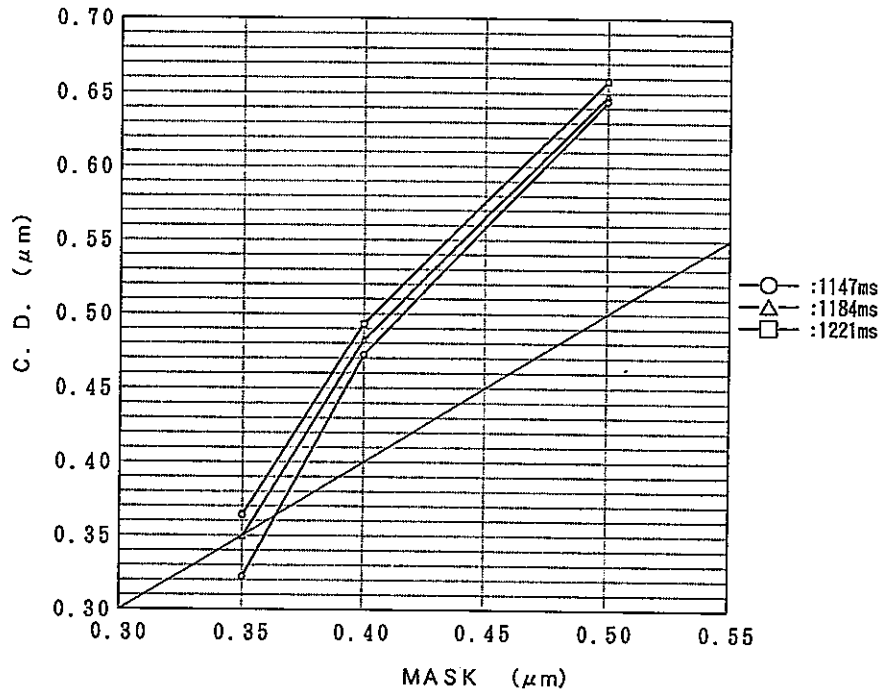
○ :1176ms
 △ :1218ms
 □ :1260ms

C/H MASK LINEARITY

THMR-iP3600 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90 °C-90sec. (Proximity)
 Resist Thickness : 1.05um (Nf:1.68)
 Exposure : NSR-2005i10D
 (NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec
 Puddle. (SI Nozzle)
 Reticle : Nikon Reticle A

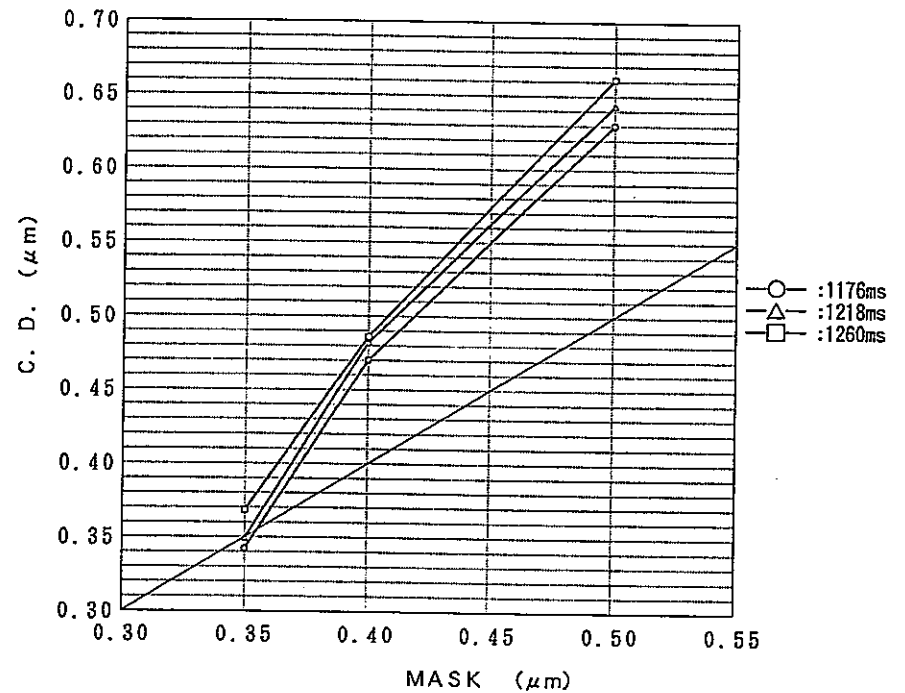


C/H MASK LINEARITY

THMR-iP3500 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90 °C-90sec. (Proximity)
 Resist Thickness : 1.05um (Nf:1.68)
 Exposure : NSR-2005i10D
 (NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : NMD-3 2.38% 23°C 60sec
 Puddle. (SI Nozzle)
 Reticle : Nikon Reticle A

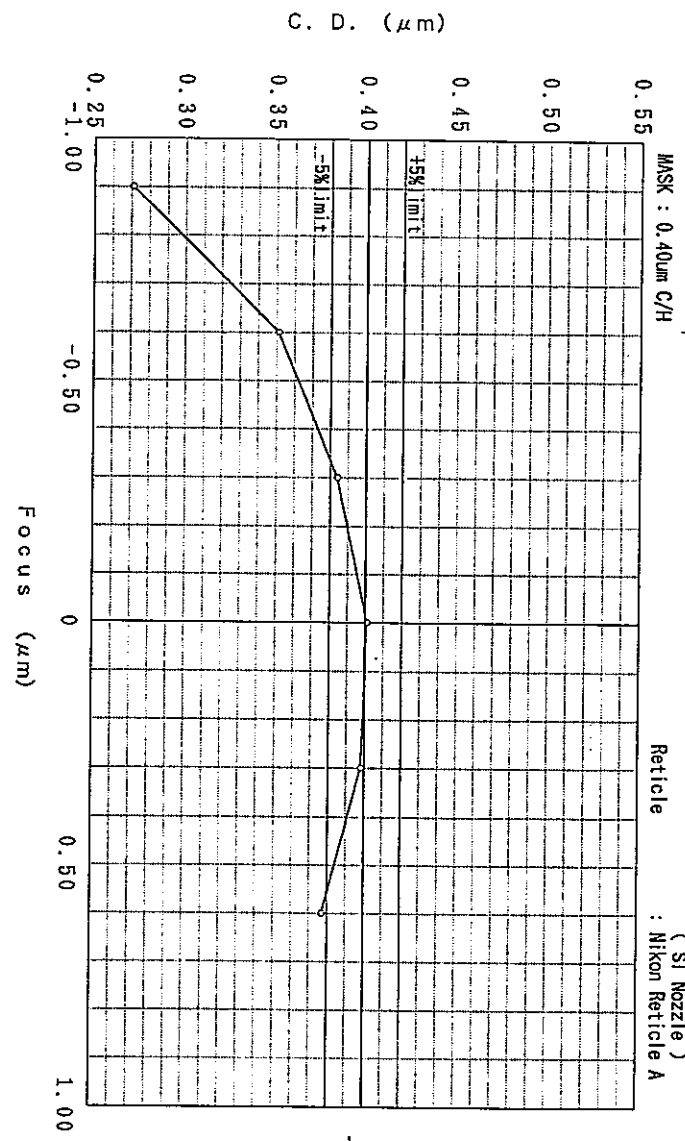


C/H C.D. vs FOCUS

THMR-i P 3 6 0 0 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90 °C- 90sec. (Proximity)
 Resist Thickness : 1.05um (Nr:1.68)
 Exposure : NSR-2005110D(NA:0.57 σ :0.60)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : MMD-3 2.38% 23°C 60sec. Puddle.
 (Si Nozzle)
 Reticle : Nikon Reticle A



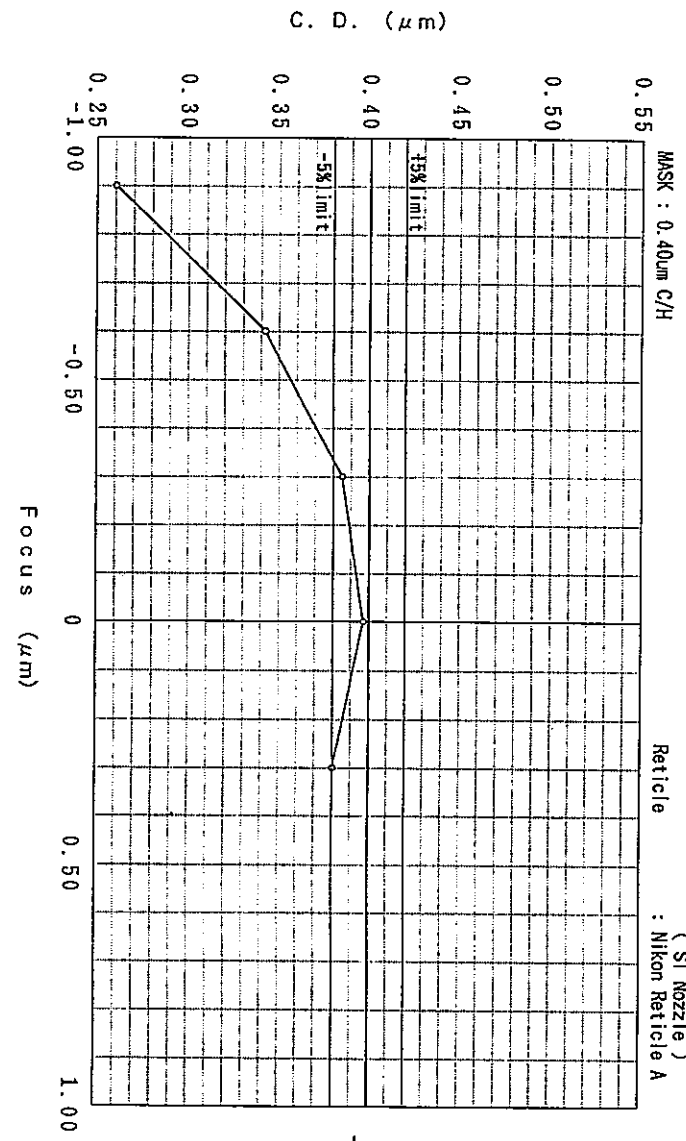
—○— : 893ms

C/H C.D. vs FOCUS

THMR-i P 3 5 0 0 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
 Prebake : 90 °C- 90sec. (Proximity)
 Resist Thickness : 1.05um (Nr:1.68)
 Exposure : NSR-2005110D(NA:0.57 σ :0.61)
 P.E.B. : 110°C-90sec. (Proximity)
 Development : MMD-3 2.38% 23°C 60sec. Puddle.
 (Si Nozzle)
 Reticle : Nikon Reticle A



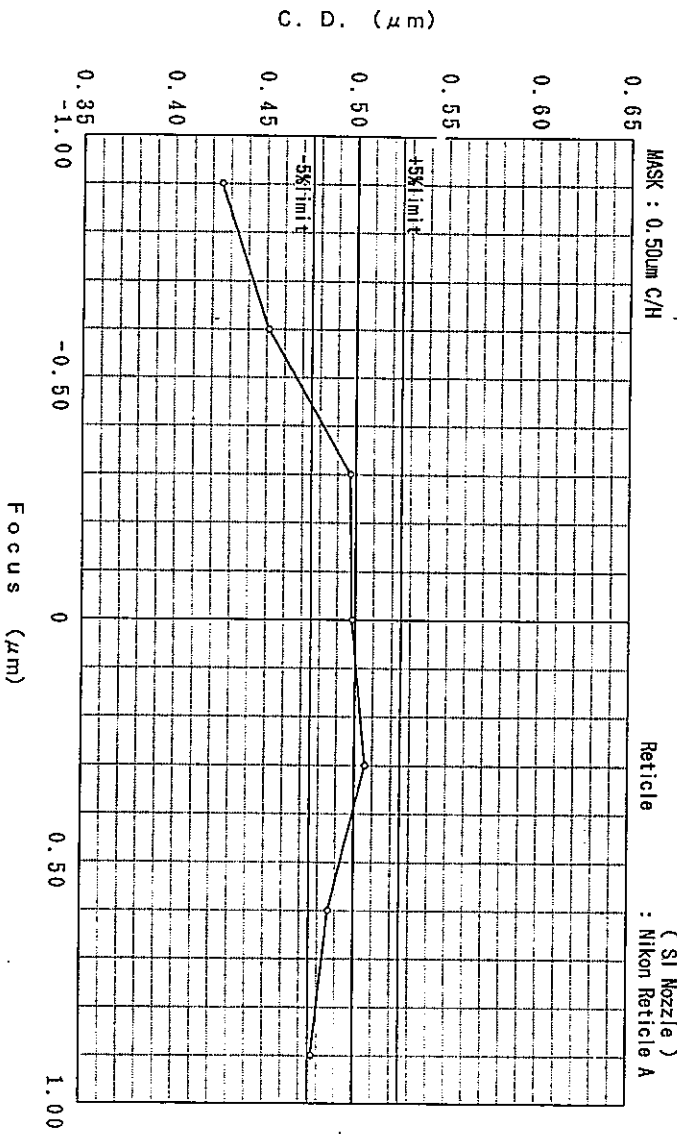
—○— : 902ms

C/H C.D. vs FOCUS

THMR-IP3600 HP

OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
Prebake : 90°C-90sec. (Proximity)
Resist Thickness : 1.05um (NF:1.68)
Exposure : NSR-2005110D (NA:0.57 σ :0.60)
P.E.B. : 110°C-90sec. (Proximity)
Development : MMD-3 2.38% 23°C 60sec. Puddle.
(SI Nozzle)
Reticle : Nikon Reticle A



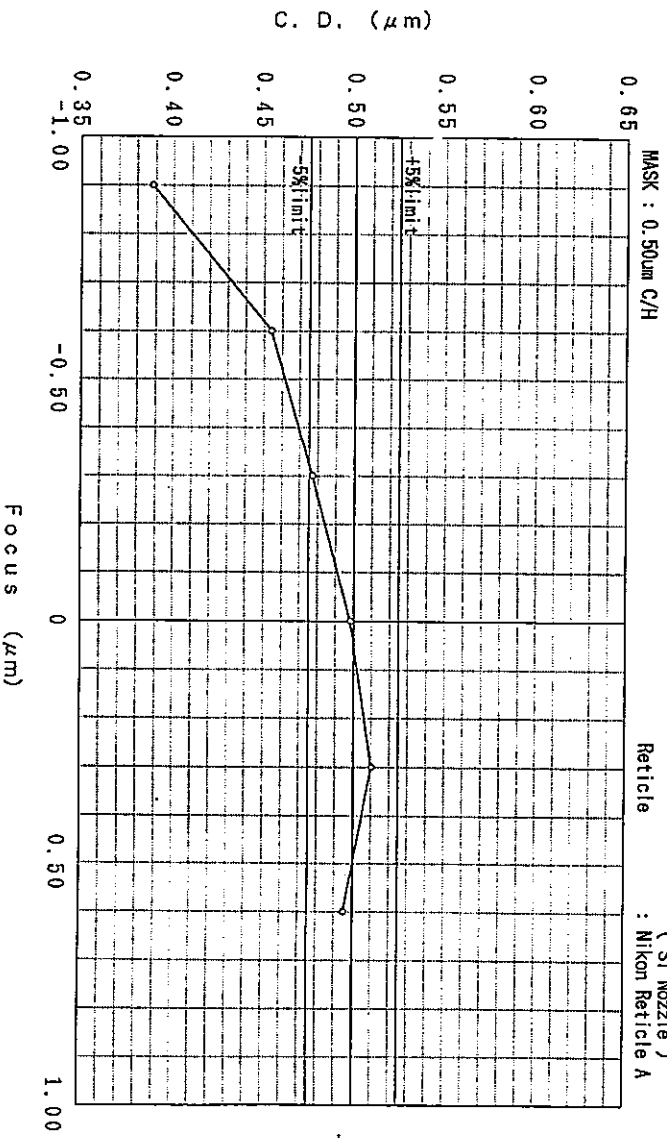
○ : 703ms

C/H C.D. vs FOCUS

THMR-IP3500 HP

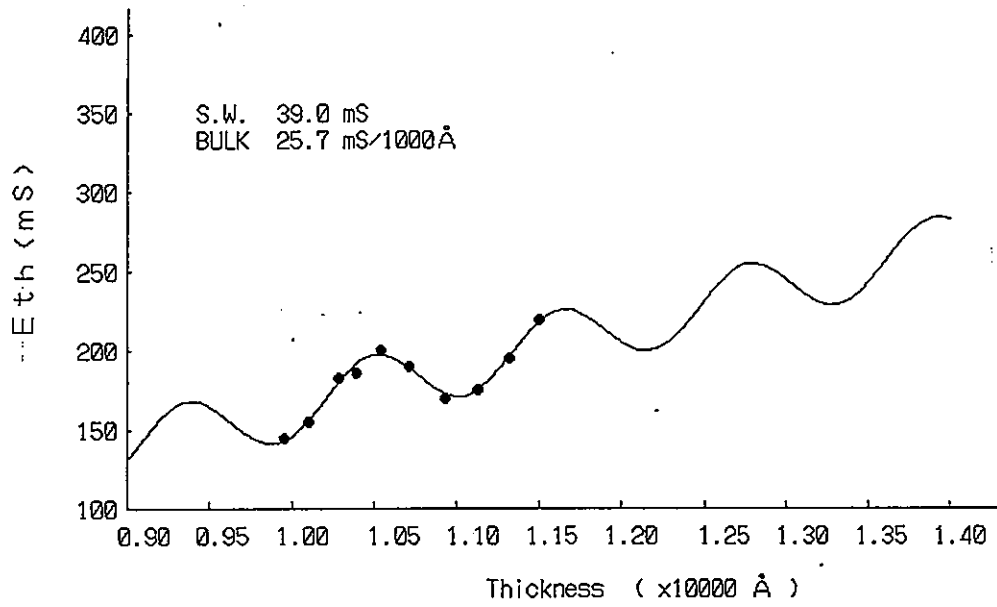
OPERATING CONDITIONS

Substrate : Si (HMDS Treatment)
Prebake : 90°C-90sec. (Proximity)
Resist Thickness : 1.05um (NF:1.68)
Exposure : NSR-2005110D (NA:0.57 σ :0.61)
P.E.B. : 110°C-90sec. (Proximity)
Development : MMD-3 2.38% 23°C 60sec. Puddle.
(SI Nozzle)
Reticle : Nikon Reticle A

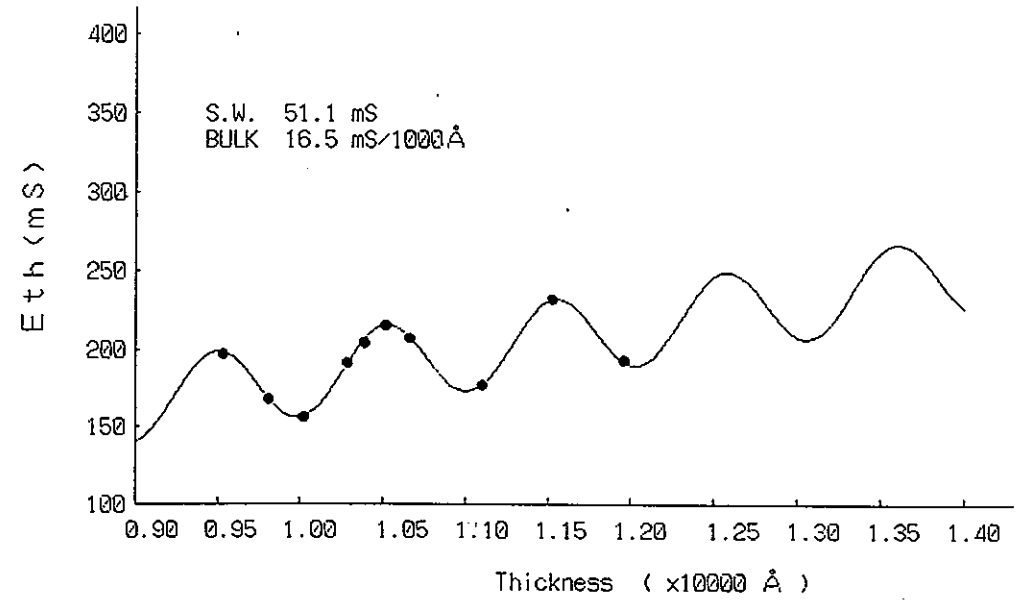


○ : 748ms

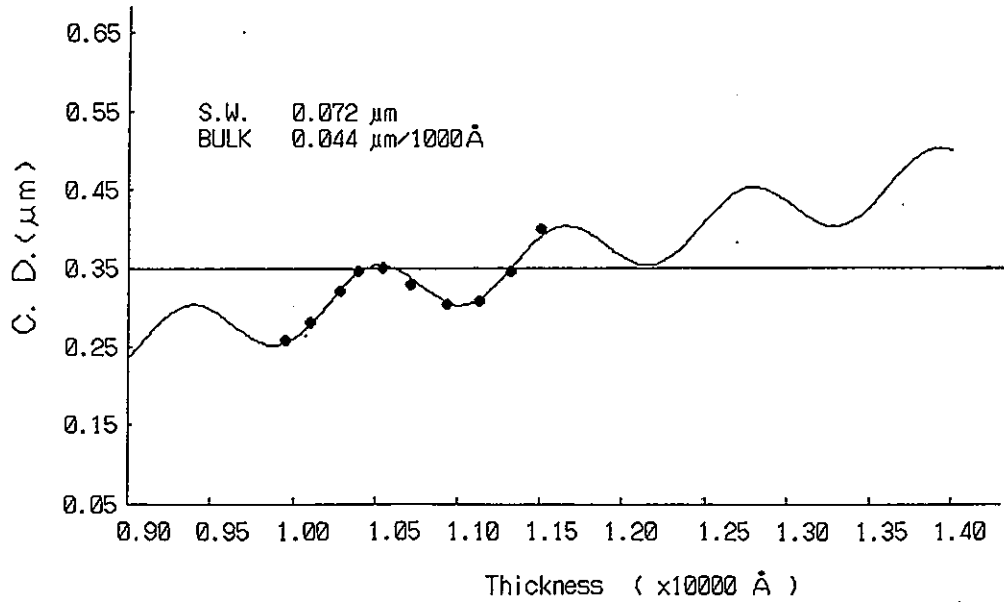
THMR-iP3600 HP Eth



THMR-iP3500 HP Eth



THMR-iP3600 HP 0.35μm



THMR-iP3500 HP 0.35μm

