

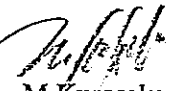
Technical Data of Ceramic Resonator

Type CSA4.19MG  
CST4.19MGW

Applied to  $\mu$ PD780032A

**TOYAMA MURATA MANUFACTURING CO., LTD.**

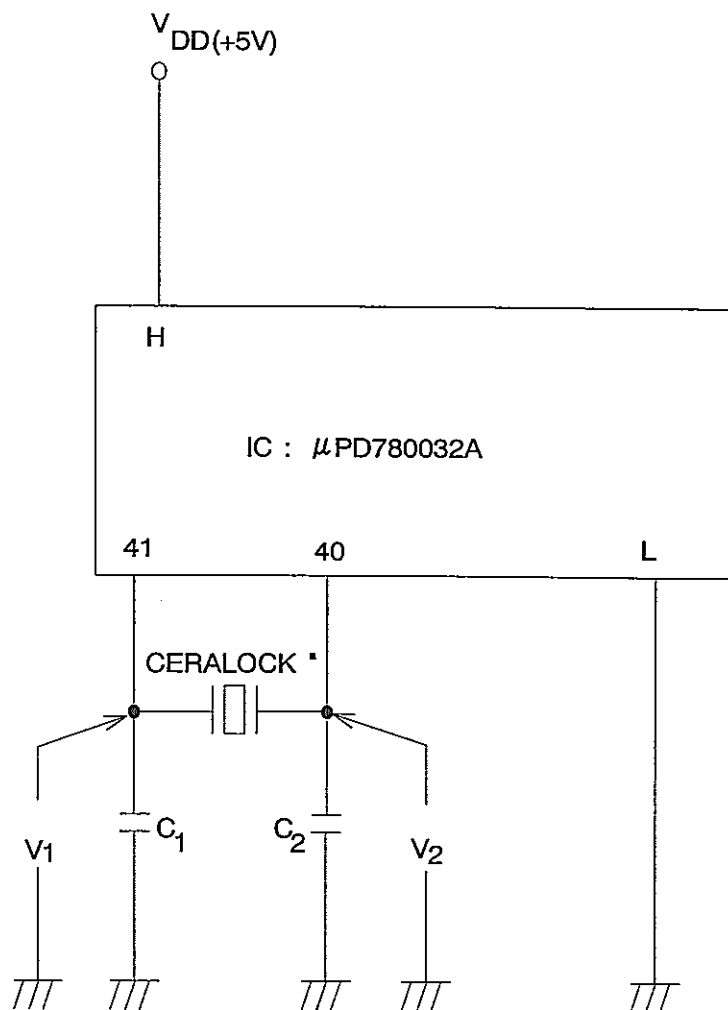
Product Engineering Service Section I  
Engineering Service Department  
Piezoelectric Components Group

| Approved by                                                                                      | Checked by                                                                                        | Checked by                                                                                        | Issued by                                                                                       | Issued Date  | TCD No.     |
|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|--------------|-------------|
| <br>S.Iwasaki | <br>K.Kuramoto | <br>M.Kurosaka | <br>Y.Ishiho | Jan 28, 1999 | TCD-99-6A20 |

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## Test Circuit



H:10,24,35,36,38

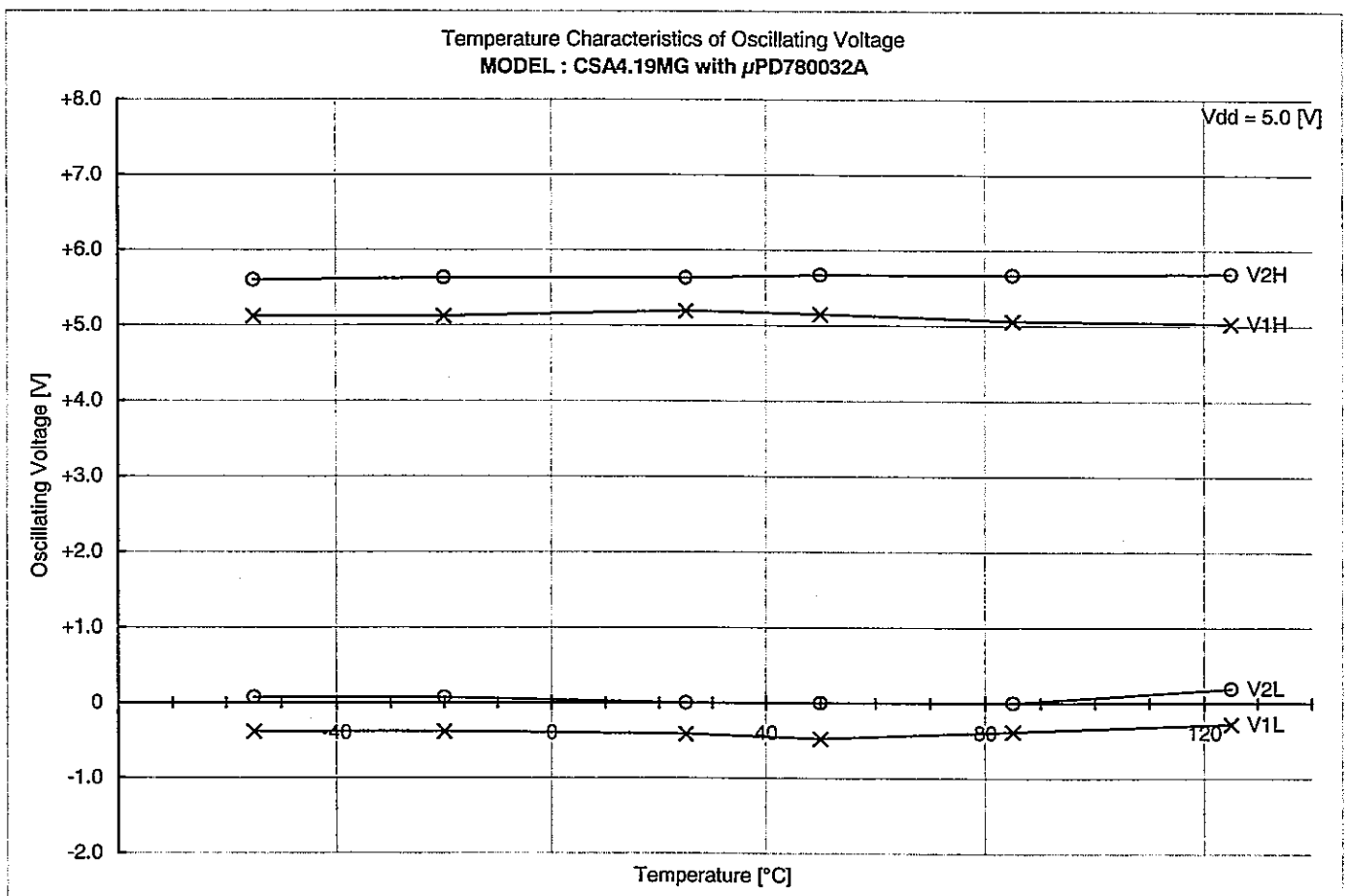
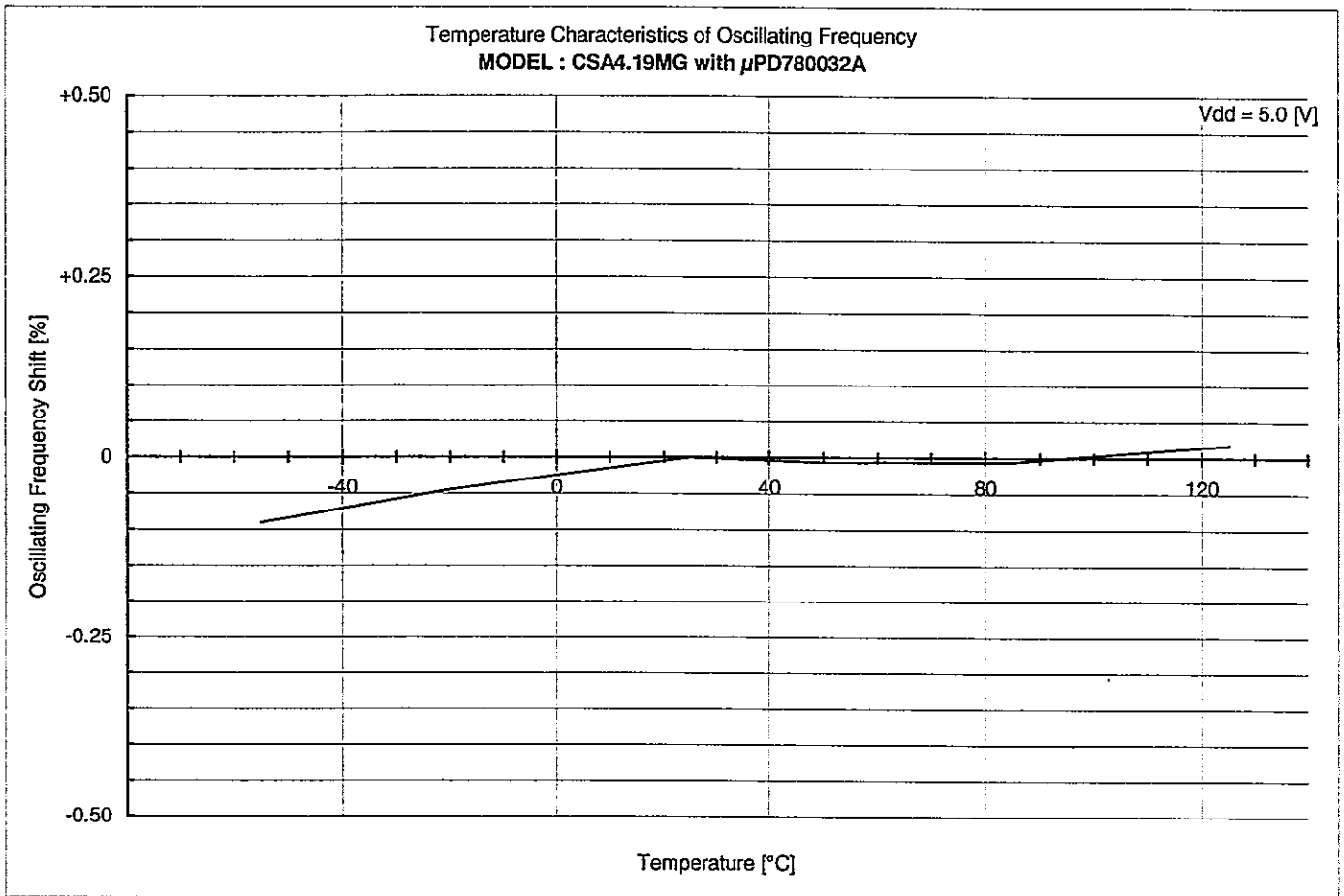
L:9,25 ~34,39,42

## Recommendable Value

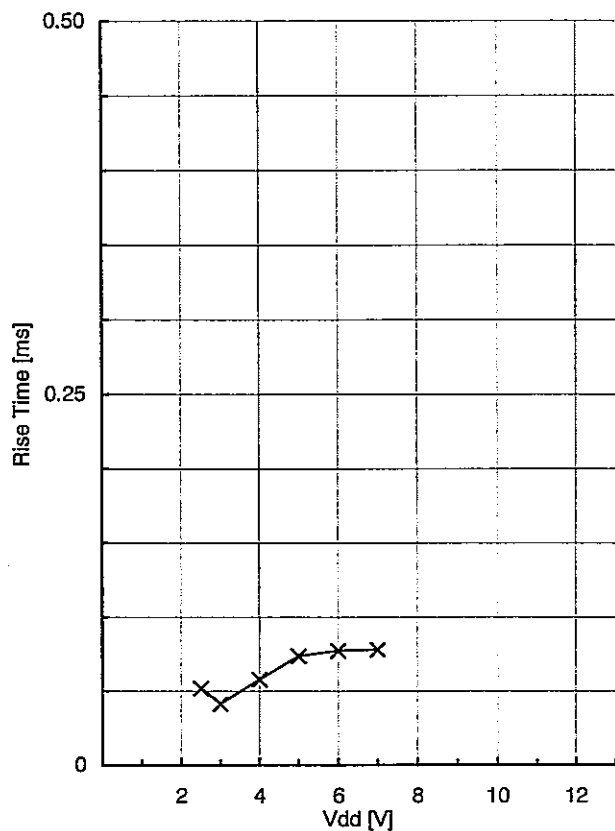
CERALOCK® : CSA4.19MG

$C_1 = 30 \text{ [pF]}$

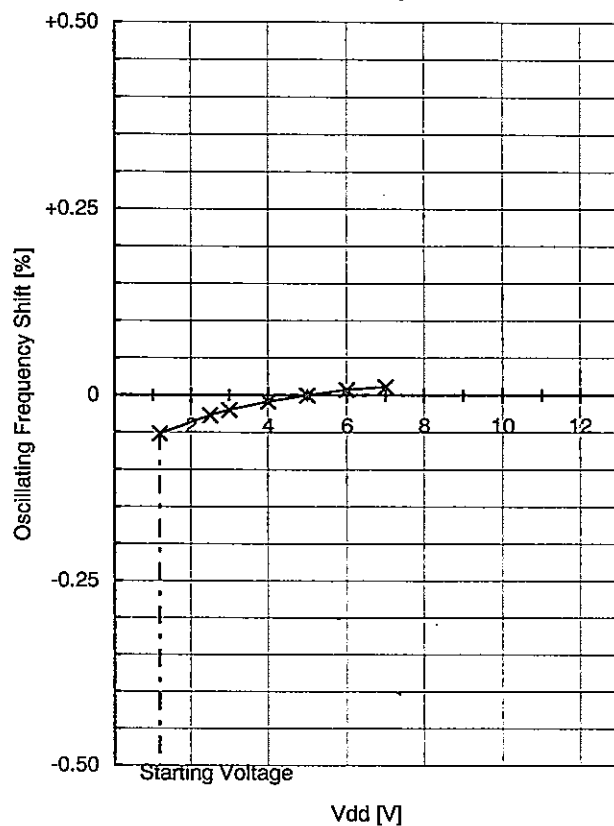
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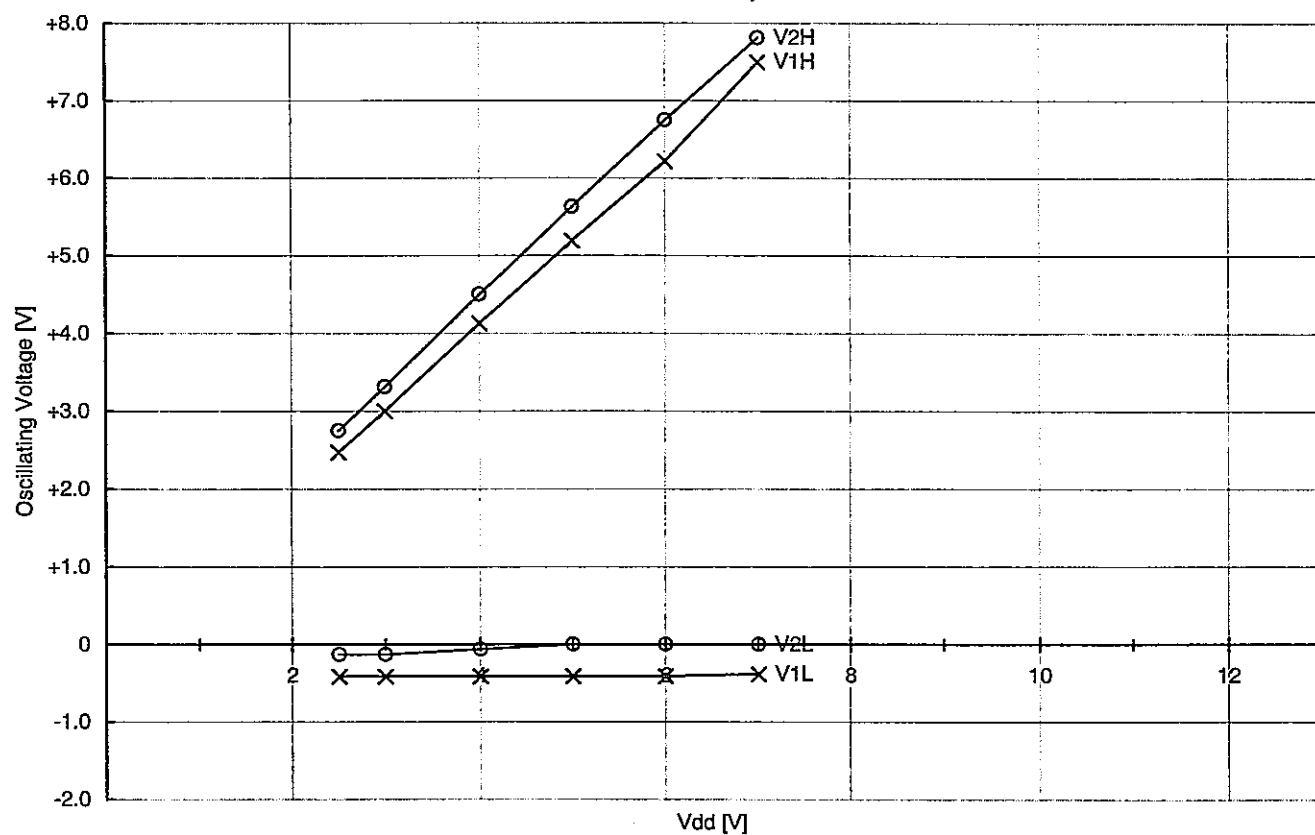
Rise Time vs Vdd Characteristics  
MODEL : CSA4.19MG with  $\mu$ PD780032A

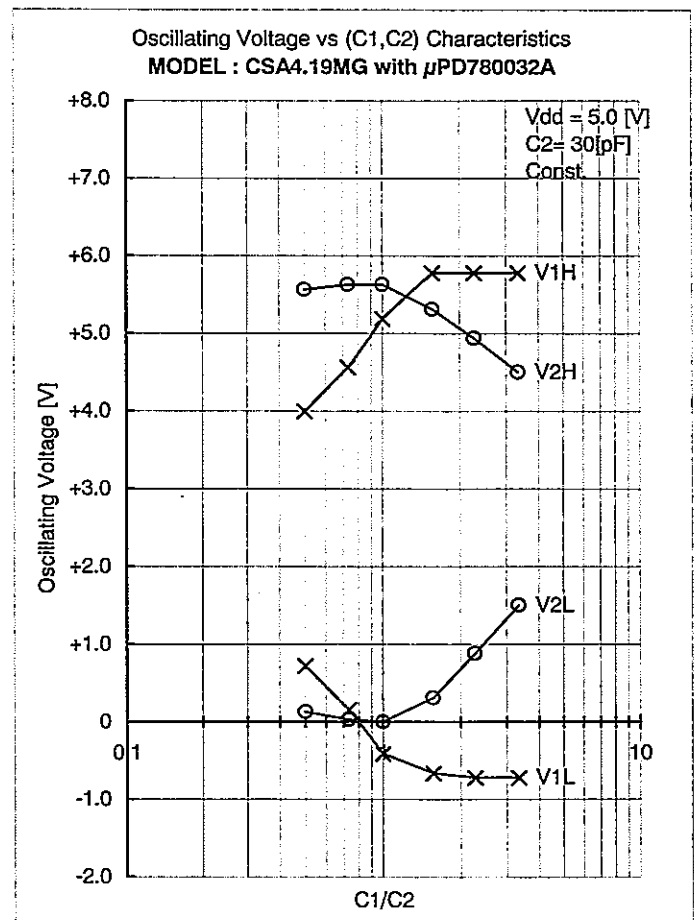
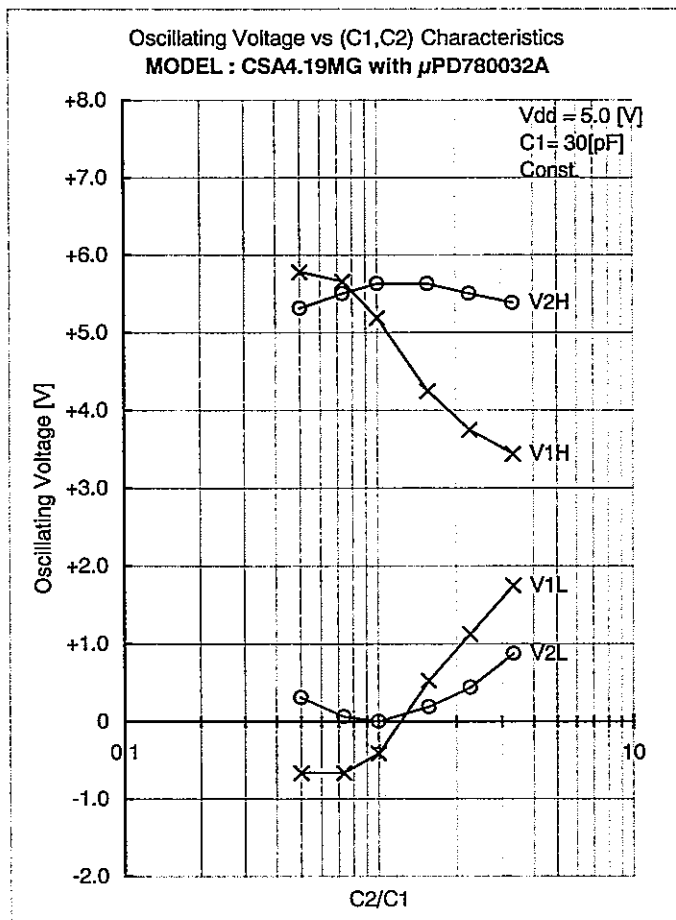
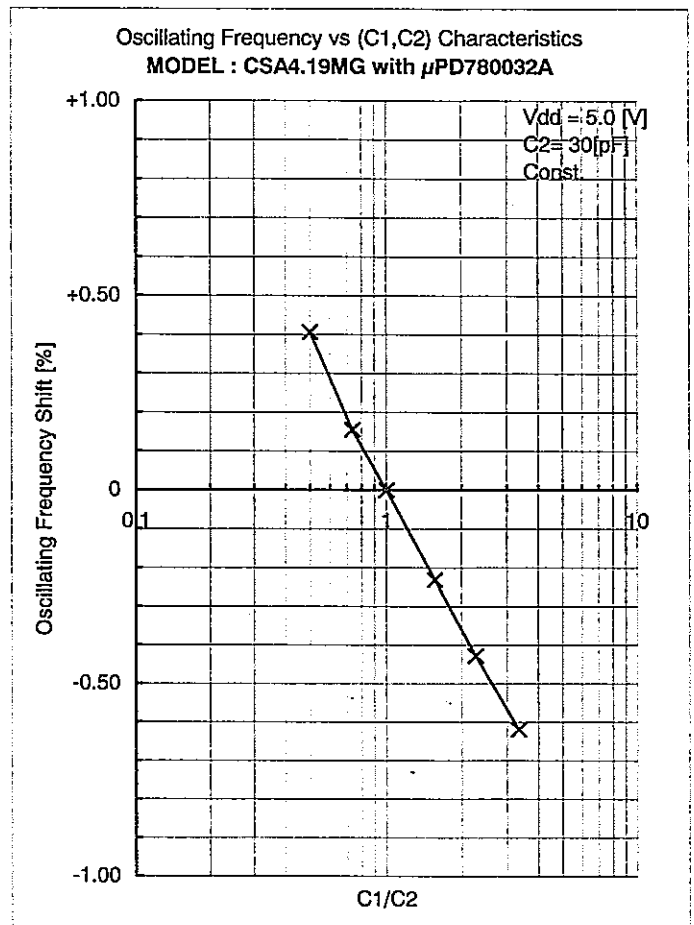
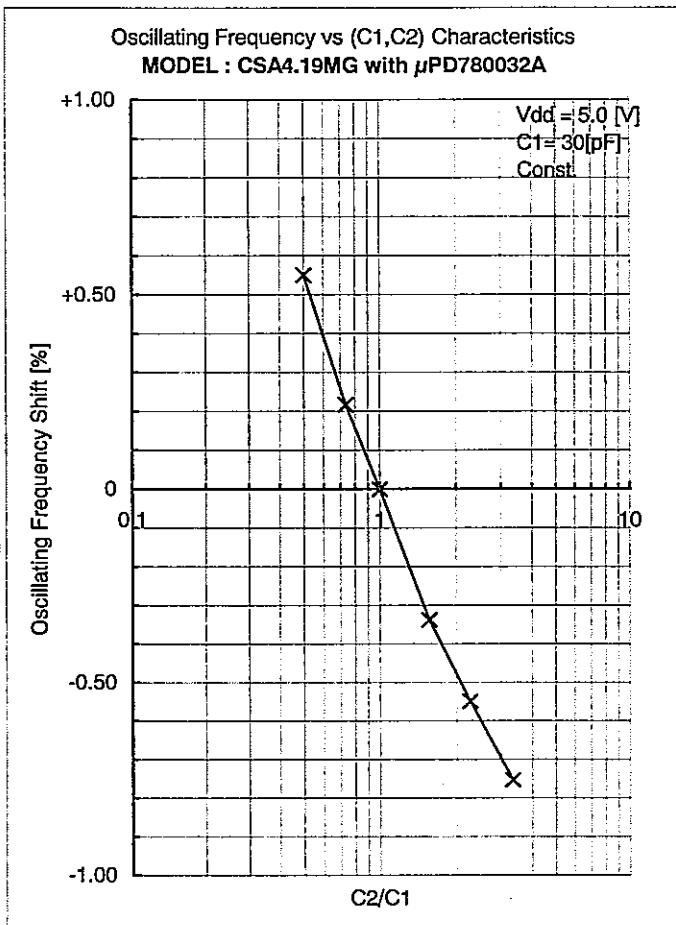


Oscillating Frequency vs Vdd Characteristics  
MODEL : CSA4.19MG with  $\mu$ PD780032A

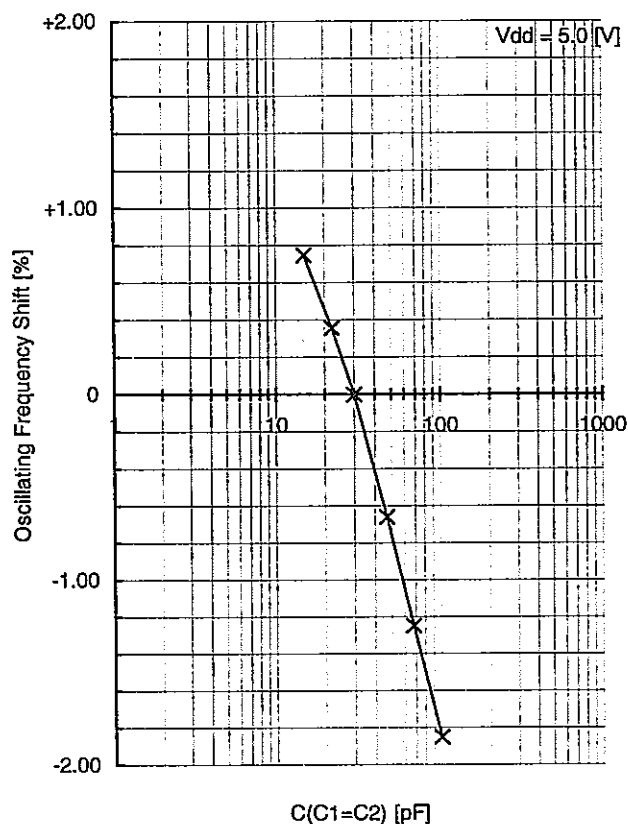


Oscillating Voltage vs Vdd Characteristics  
MODEL : CSA4.19MG with  $\mu$ PD780032A

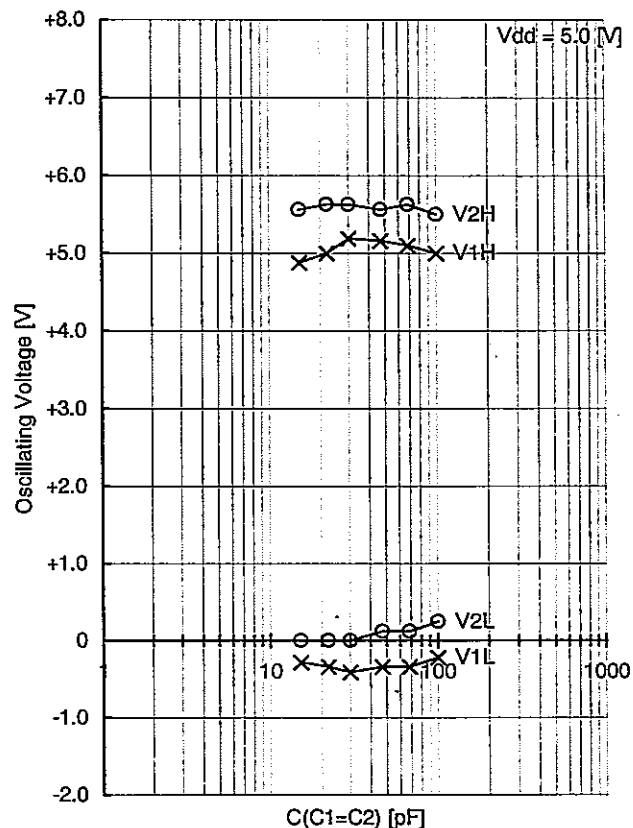




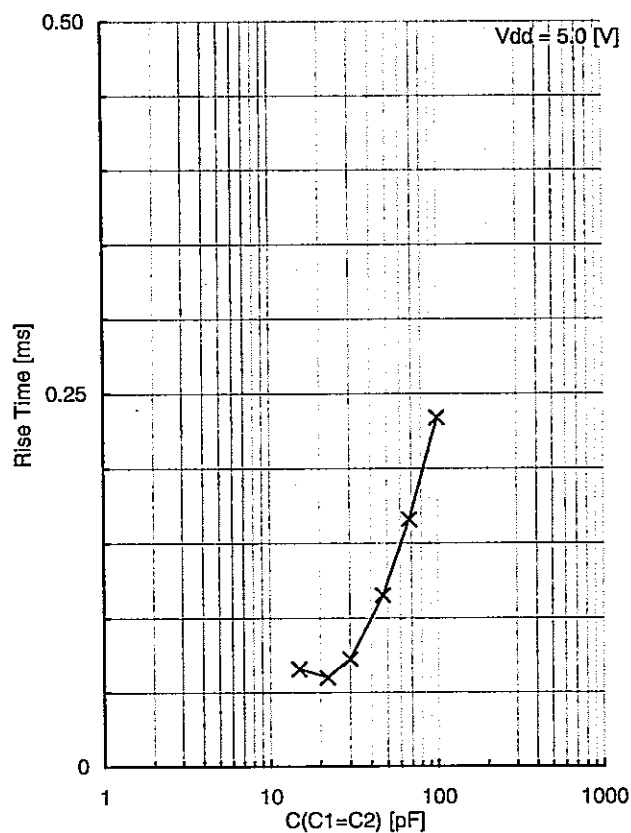
Oscillating Frequency vs C(C1=C2) Characteristics  
MODEL : CSA4.19MG with  $\mu$ PD780032A



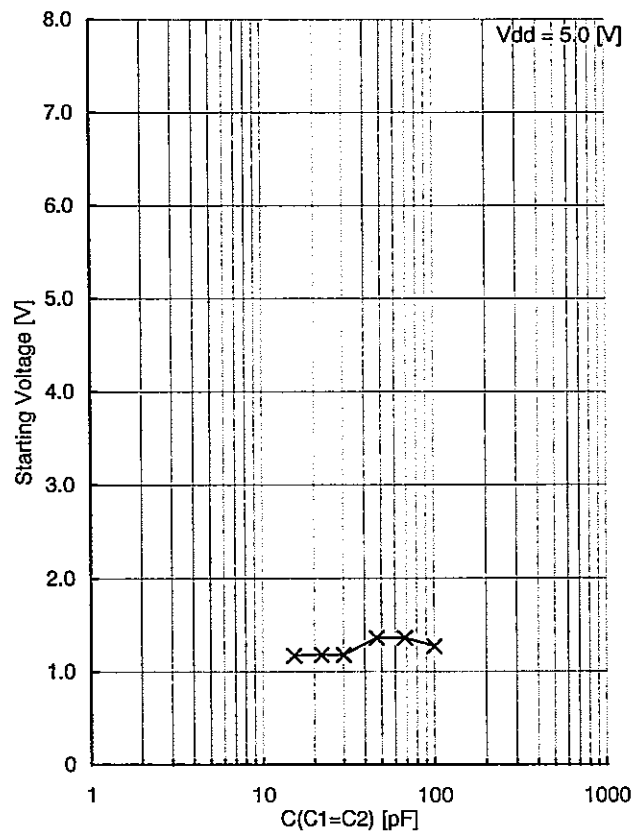
Oscillating Voltage vs C(C1=C2) Characteristics  
MODEL : CSA4.19MG with  $\mu$ PD780032A



Rise Time vs C(C1=C2) Characteristics  
MODEL : CSA4.19MG with  $\mu$ PD780032A



Starting Voltage vs C(C1=C2) Characteristics  
MODEL : CSA4.19MG with  $\mu$ PD780032A



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**Comparison Table**

| IC : No | V1H [V] | V1L [V] | V1p-p [V] | V2H [V] | V2L [V] | V2p-p [V] | Fosc [kHz] | Trise [ms] | Vstart [V] |
|---------|---------|---------|-----------|---------|---------|-----------|------------|------------|------------|
| W03     | 5.19    | -0.41   | 5.60      | 5.63    | -0.06   | 5.69      | 4216.265   | 0.064      | 1.29       |
| W05     | 5.19    | -0.34   | 5.53      | 5.63    | 0.00    | 5.63      | 4216.365   | 0.080      | 1.08       |
| W07     | 5.19    | -0.41   | 5.60      | 5.63    | -0.13   | 5.76      | 4216.319   | 0.067      | 1.29       |
| W09     | 5.22    | -0.34   | 5.56      | 5.63    | 0.00    | 5.63      | 4216.371   | 0.085      | 1.15       |
| W15     | 5.19    | -0.41   | 5.60      | 5.63    | 0.00    | 5.63      | 4216.365   | 0.073      | 1.19       |

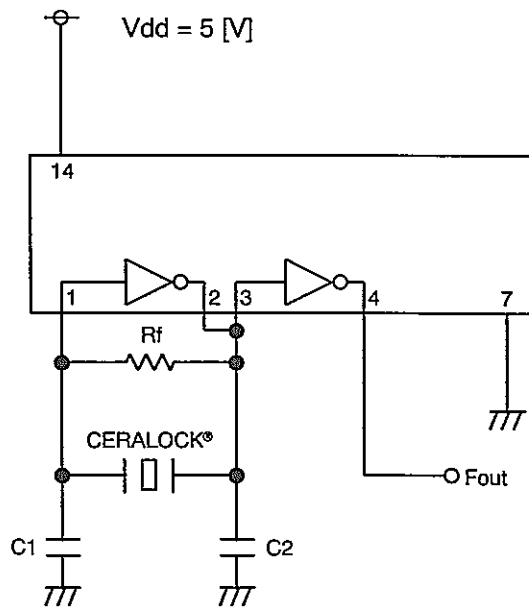
Ref.

Performance described page 2 to 5 were measured with IC No. 107

### Frequency Correlation Data

| Sample No. | $\mu$ PD780032A<br>Fosc [kHz] | CD4069UBE<br>Fosc [kHz] | Shift [%] |
|------------|-------------------------------|-------------------------|-----------|
| 1          | 4216.332                      | 4200.790                | 0.3700    |
| 2          | 4200.494                      | 4185.329                | 0.3624    |
| 3          | 4202.359                      | 4186.862                | 0.3701    |
| 4          | 4204.464                      | 4188.815                | 0.3736    |
| 5          | 4203.591                      | 4188.158                | 0.3685    |
| $\bar{X}$  | 4205.448                      | 4189.991                | 0.3689    |

### muRata Standard Circuit

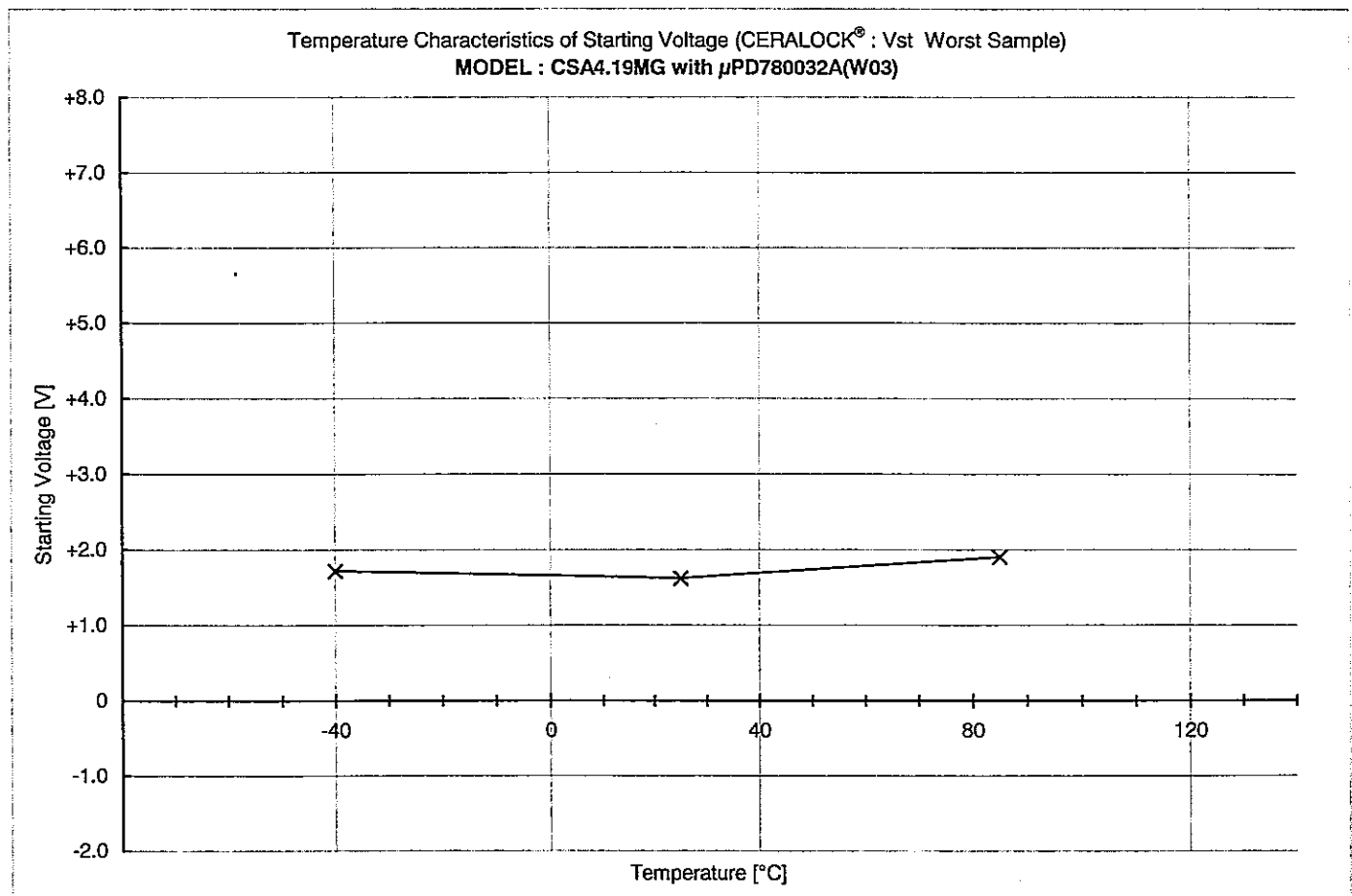
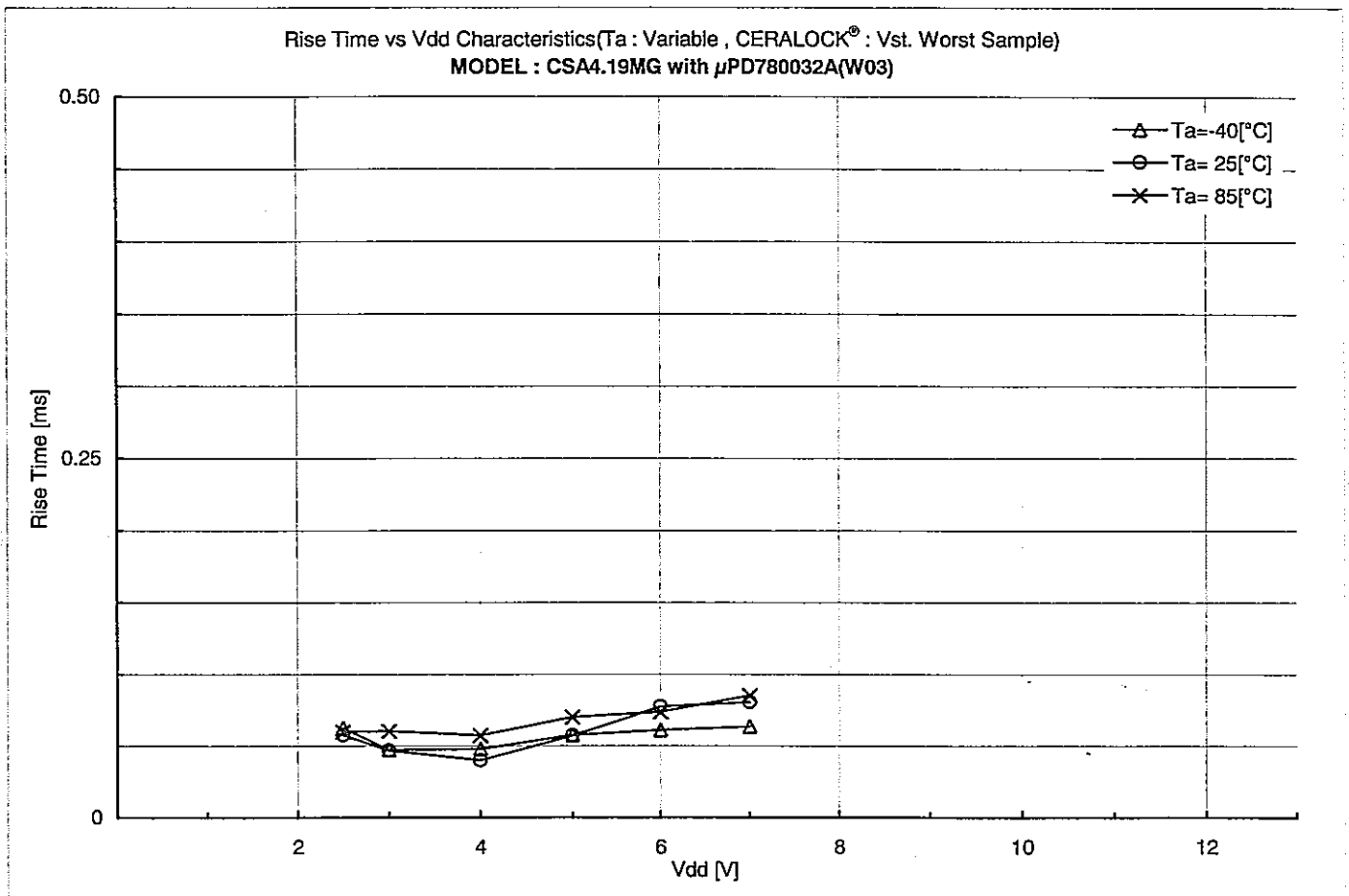


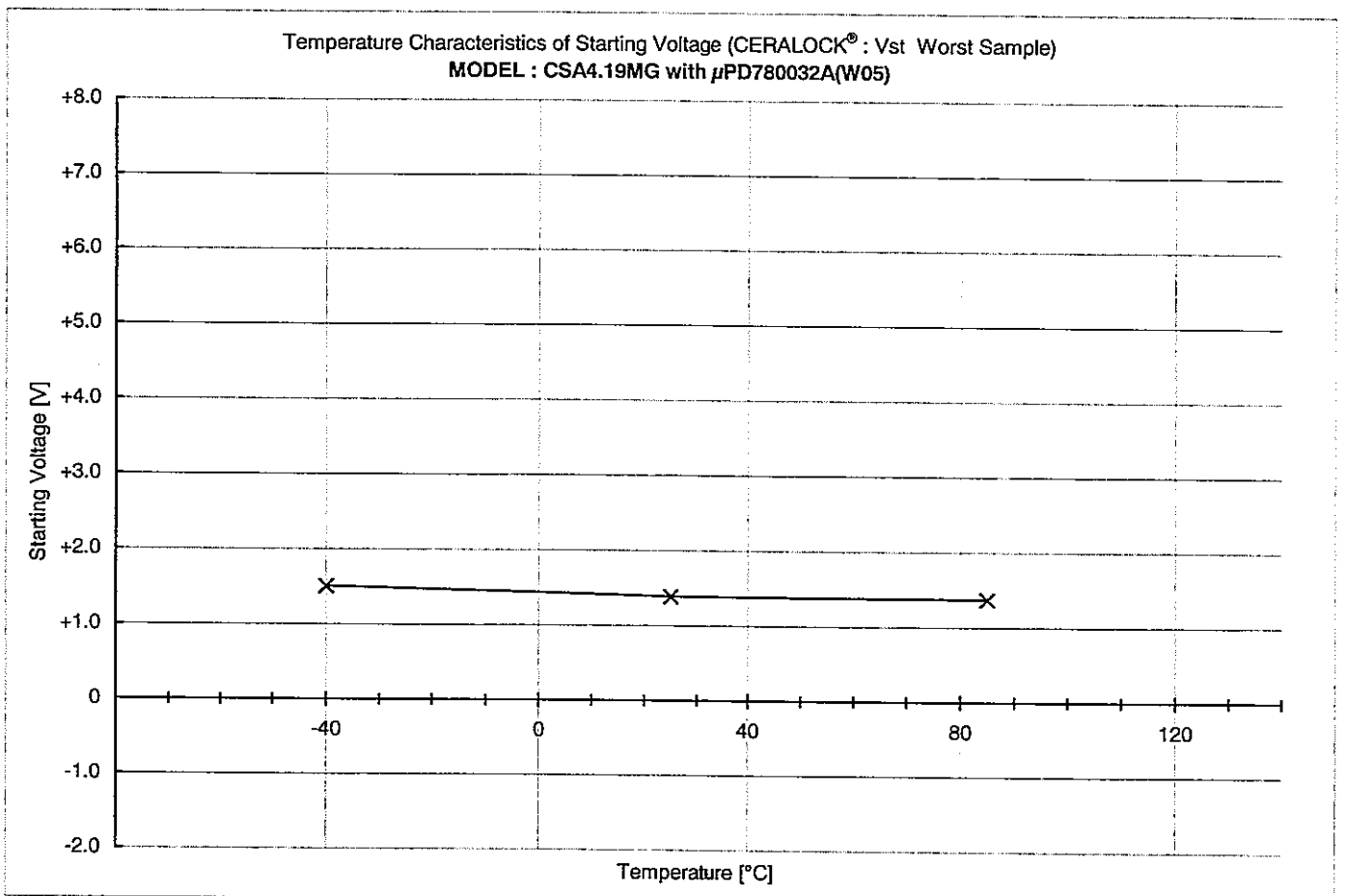
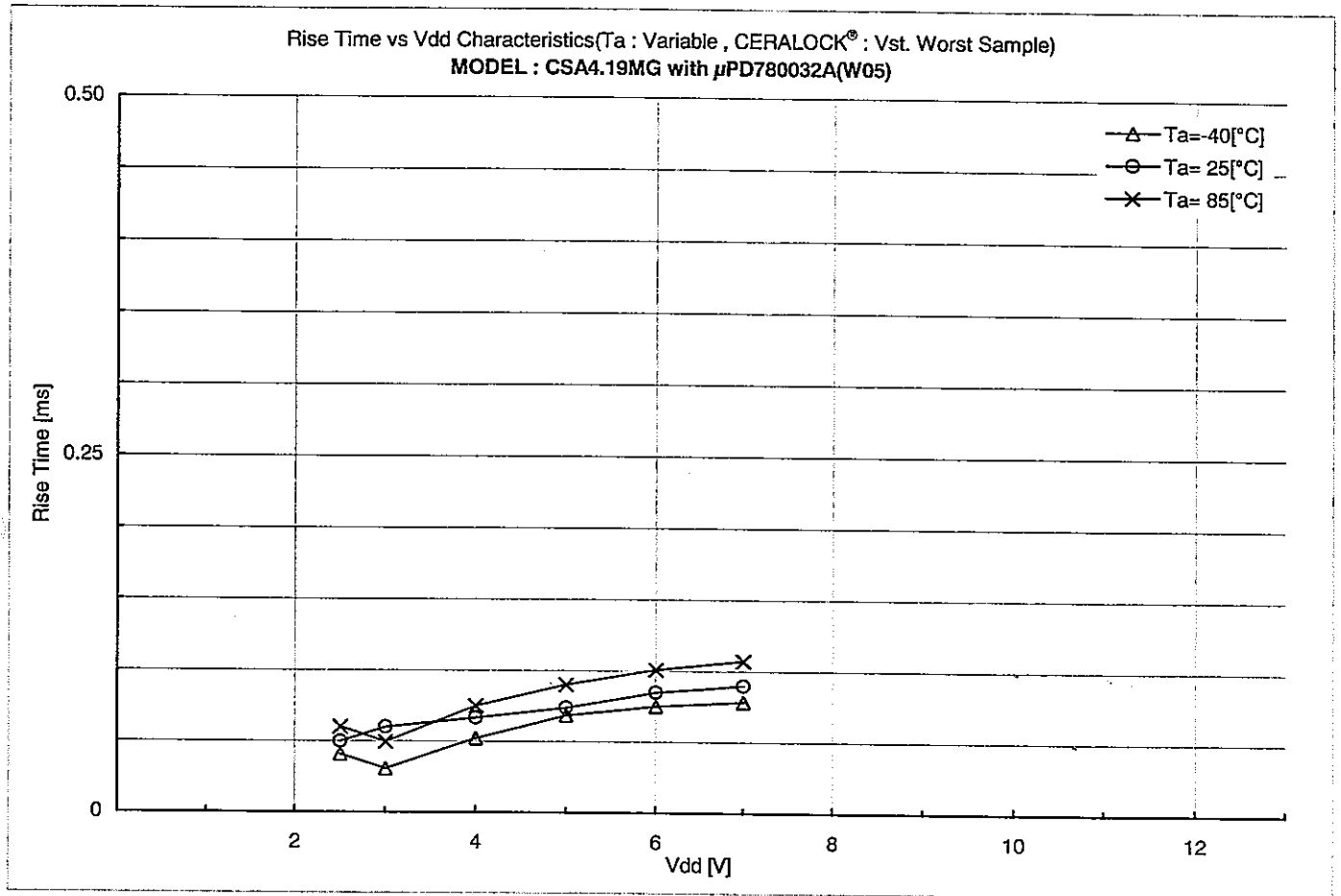
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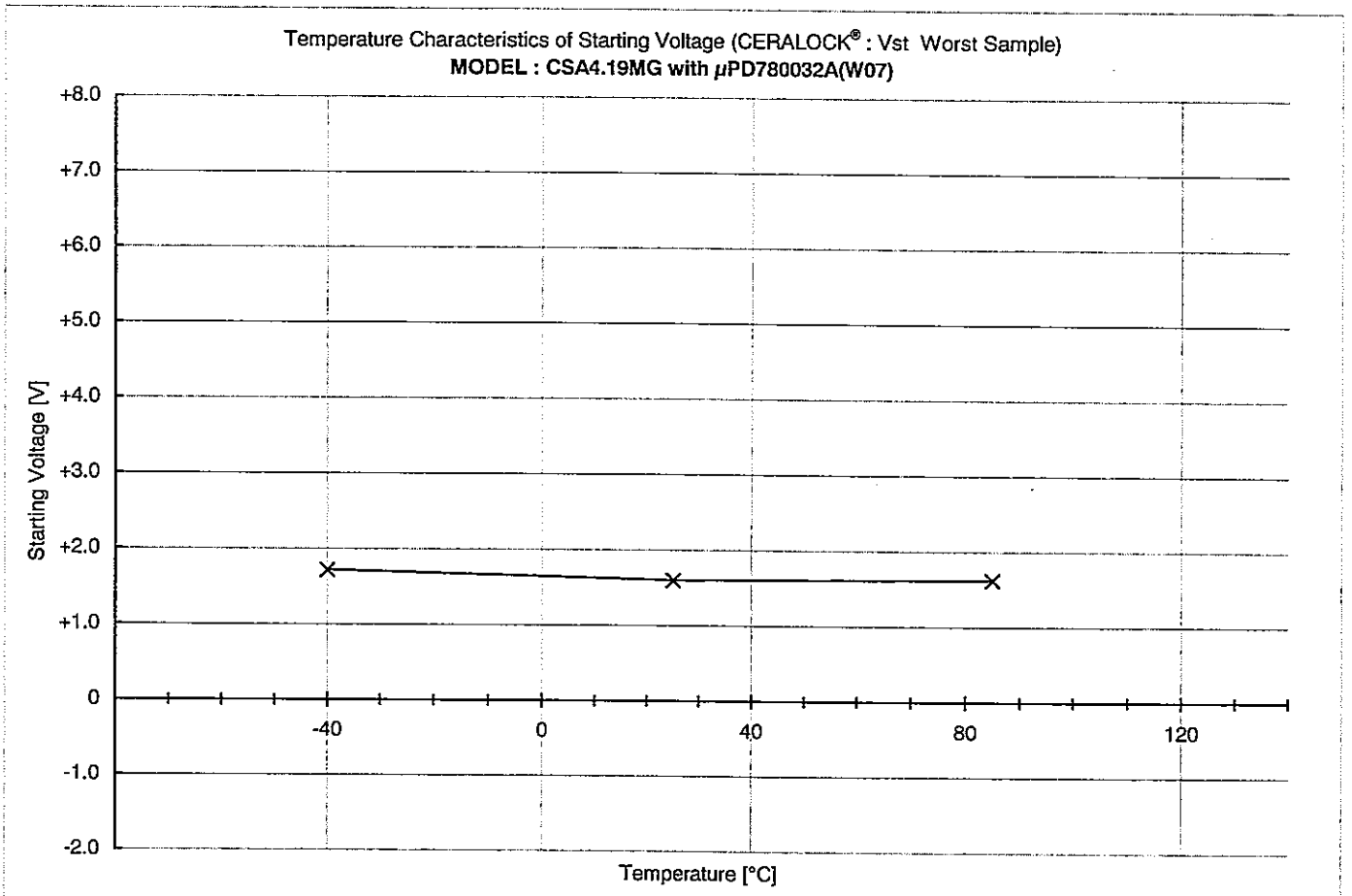
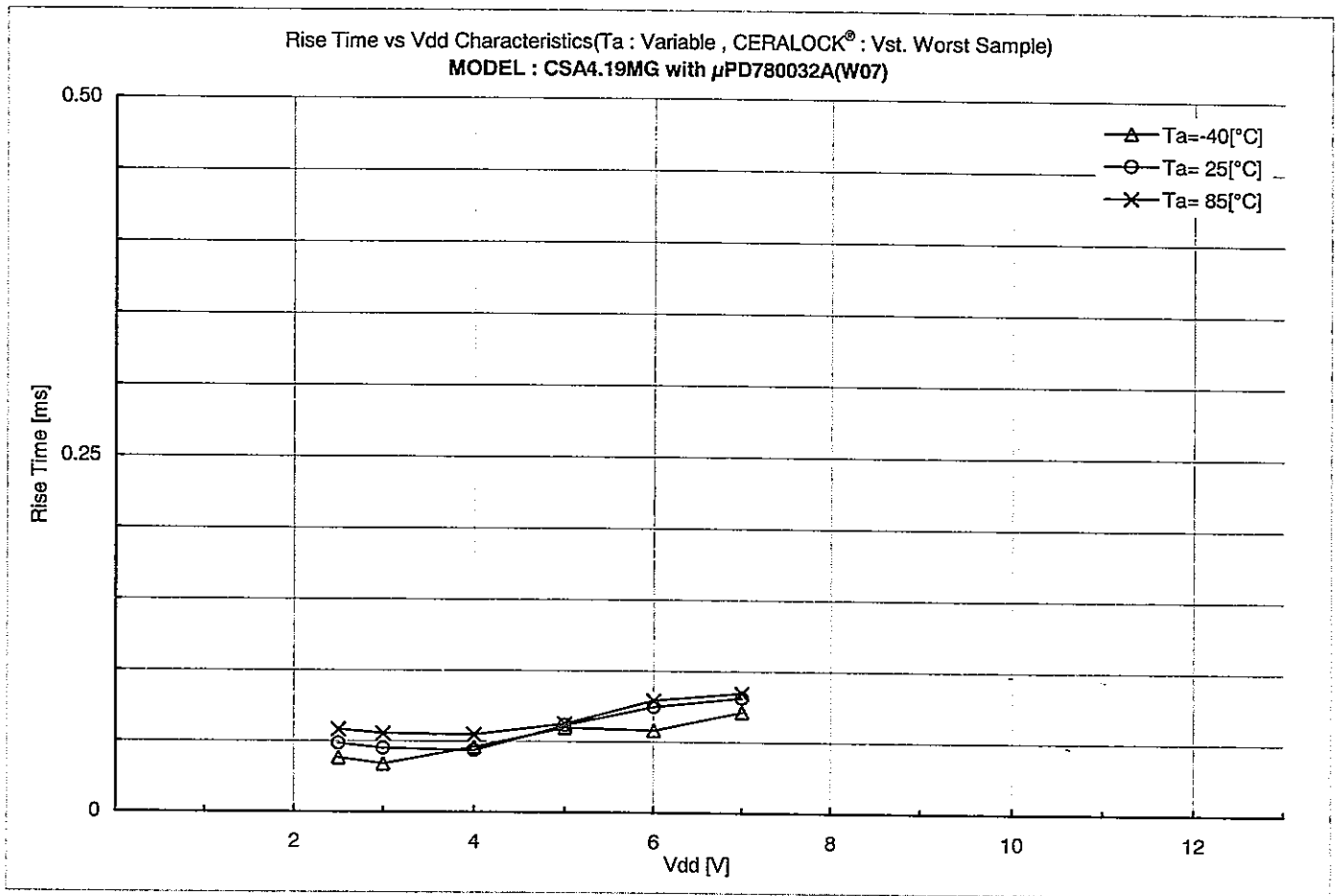
C1 = 30 [pF]

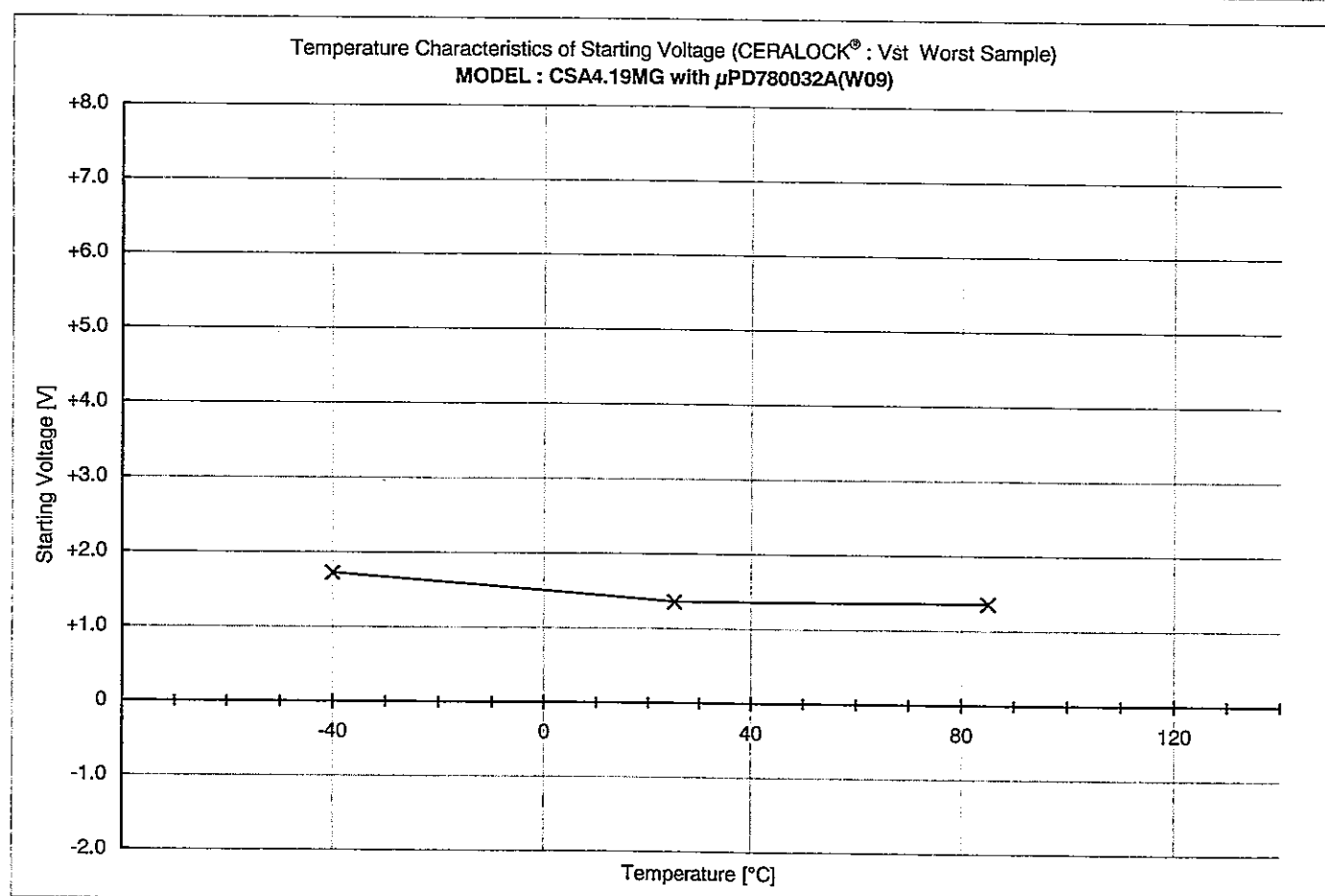
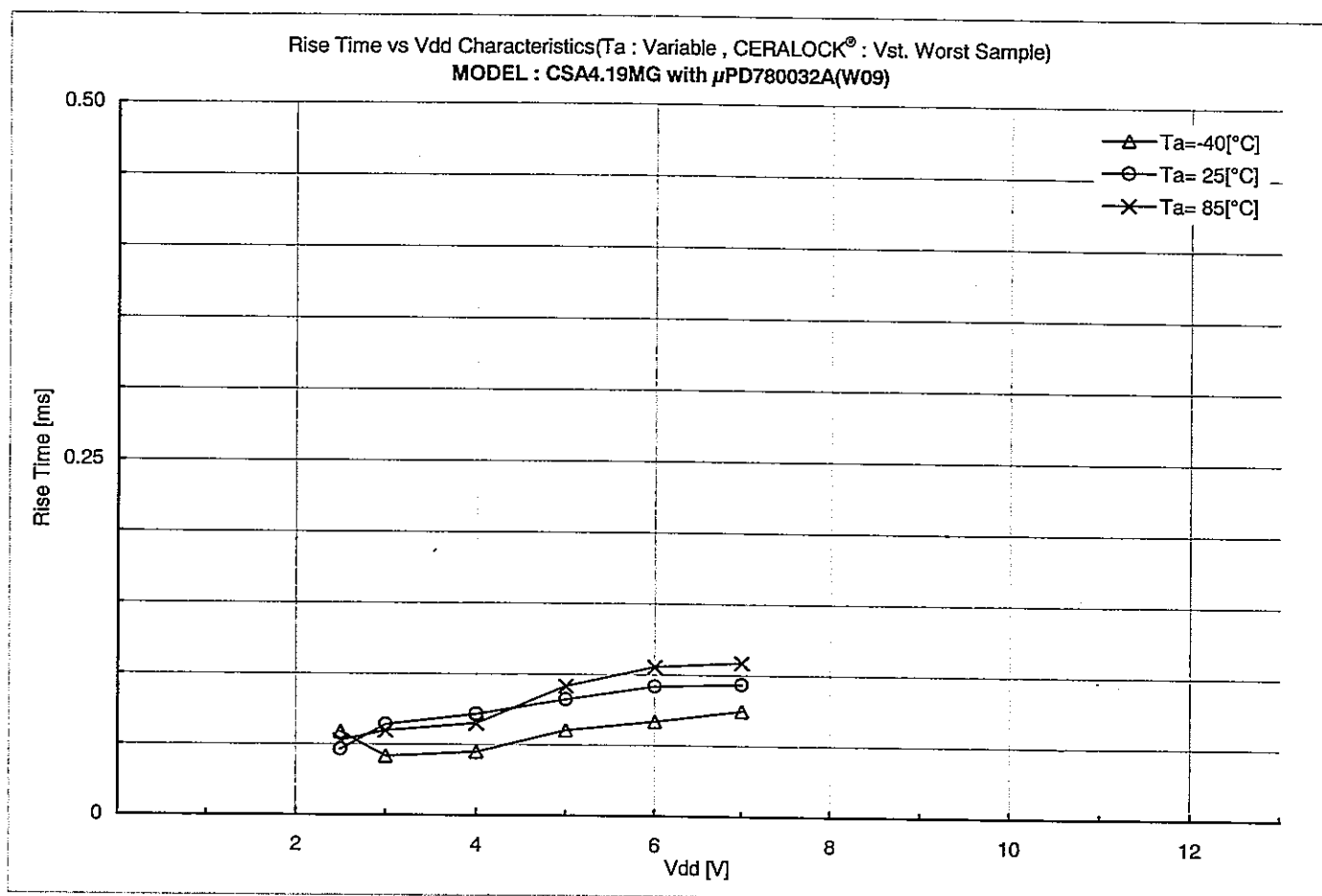
C2 = 30 [pF]

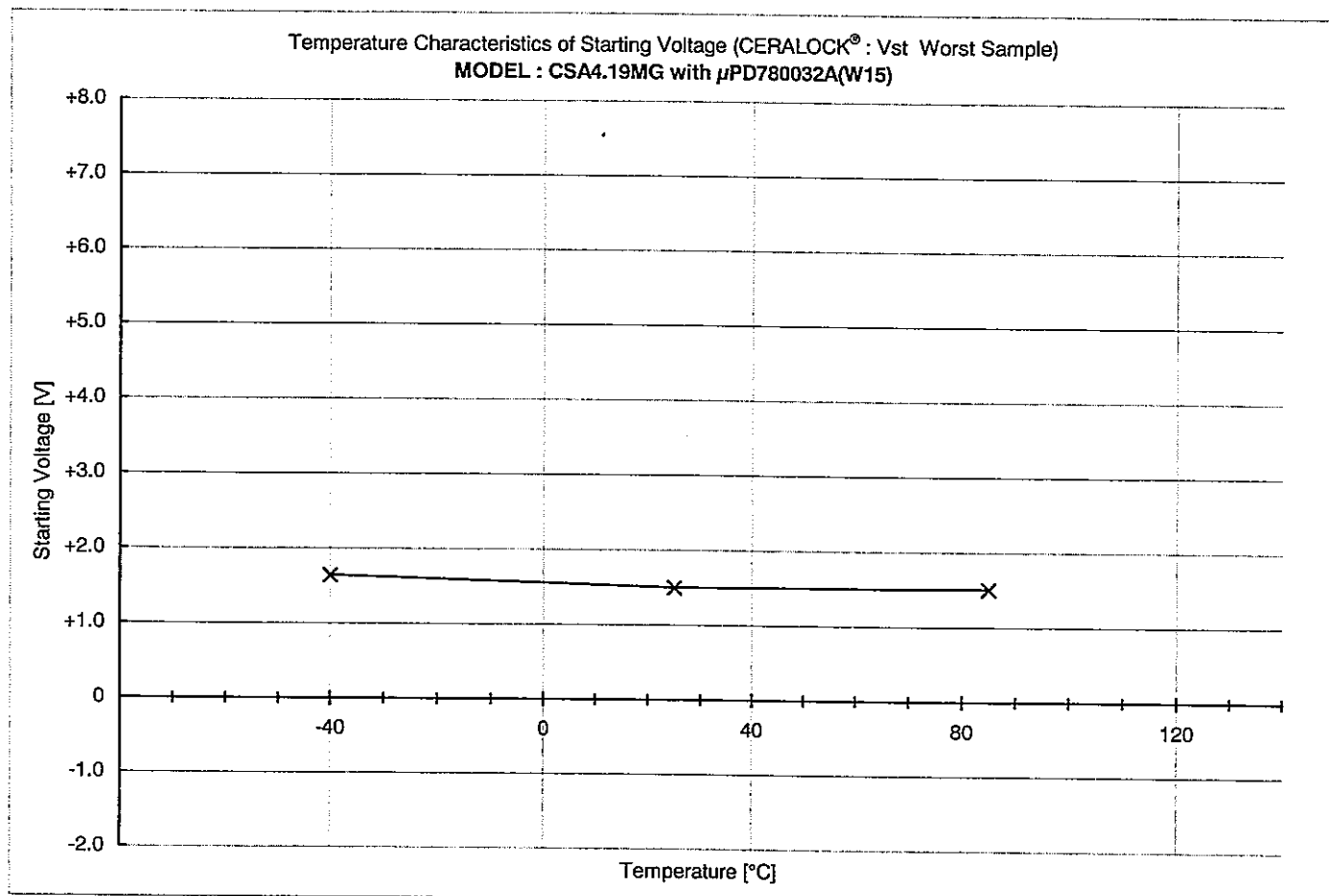
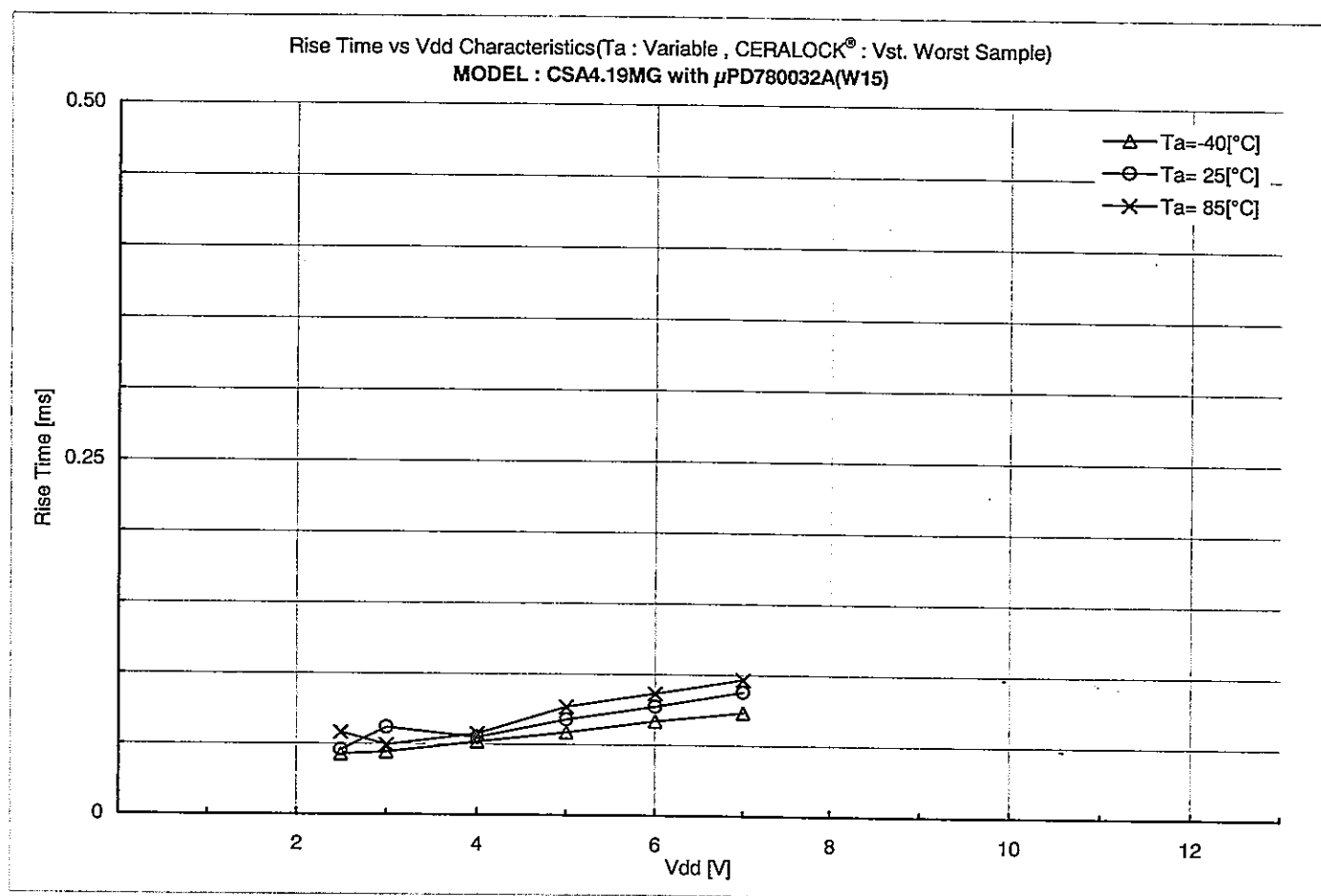
$R_f$  = 1 [Mohm]











Rs vs Vdd Characteristics  
MODEL : CSA4.19MG with uPD780032A

