

## Fuji power MOSFET Specification

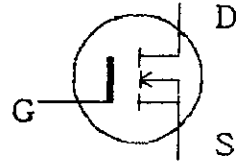
2SK1016

## 1. Scope

This specifies Fuji power MOSFET 2SK1016

## 2. Outline

- I) Construction N-channel enhancement mode power MOSFET  
 II) Application for switching  
 III) Outview TO-3P

3. Absolute maximum ratings at  $T_c=25^\circ\text{C}$  (unless otherwise specified)

| Description                             | Symbol             | Characteristics   | Unit             | Remarks                   |
|-----------------------------------------|--------------------|-------------------|------------------|---------------------------|
| Drain-source voltage                    | $V_{DS}$           | 500               | V                |                           |
| Drain-gate voltage                      | $V_{DGR}$          | 500               | V                | $R_{GS}=20\text{K}\Omega$ |
| Continuous Drain current                | $I_D$              | 15                | A                |                           |
| Pulsed drain current                    | $I_{Dpulse}$       | 40                | A                |                           |
| Gate-source voltage                     | $V_{GS}$           | $\pm 30$          | V                |                           |
| Maximum power dissipation               | $P_D$              | 125               | W                |                           |
| Operating and storage temperature range | $T_j$<br>$T_{stg}$ | 150<br>-55 ~ +150 | $^\circ\text{C}$ |                           |

4. Electrical characteristics at  $T_c=25^\circ\text{C}$  (unless otherwise specified)  
Static ratings

| Description                      | Symbol       | Conditions                                                           | Characteristics |      |      | Unit          |
|----------------------------------|--------------|----------------------------------------------------------------------|-----------------|------|------|---------------|
|                                  |              |                                                                      | Min.            | Typ. | Max. |               |
| Drain-source breakdown voltage   | $BV_{DSS}$   | $I_D=1\text{mA}$<br>$V_{GS}=0\text{V}$                               | 500             |      |      | V             |
| Gate threshold voltage           | $V_{GS(th)}$ | $I_D=1\text{mA}$<br>$V_{DS}=V_{GS}$                                  | 2.5             | 3.5  | 5.0  | V             |
| Zero gate voltage drain current  | $I_{DSS}$    | $V_{DS}=500\text{V}$<br>$V_{GS}=0\text{V}$<br>$T_j=25^\circ\text{C}$ |                 | 10   | 500  | $\mu\text{A}$ |
|                                  | $I_{DSS}$    | $T_j=125^\circ\text{C}$                                              |                 | 0.2  | 1.0  | mA            |
| Gate-source leakage current      | $I_{GSS}$    | $V_{GS}=\pm 30\text{V}$<br>$V_{DS}=0\text{V}$                        |                 | 10   | 100  | nA            |
| Drain-source on-state resistance | $R_{DS(on)}$ | $I_D=8\text{A}$<br>$V_{GS}=10\text{V}$                               |                 | 0.36 | 0.55 | $\Omega$      |

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|-----------|---------|-------------|-------------|-------------------------|----------|----------|-----|--|
| REVISIONS | DATE    | NAME        | APPROVED    | Fuji Electric Co., Ltd. | DWG. NO. | MT5F1306 | 1/5 |  |
|           | DRAWN   | Nov. 21 '89 | N. Fujisawa |                         |          |          |     |  |
|           | CHECKED | Nov. 21 '89 | S. Furukawa |                         |          |          |     |  |
|           |         |             |             |                         |          |          |     |  |

# Dynamic ratings

| Description                  | Symbol     | Conditions                                                              | Characteristics |      |      | Unit |
|------------------------------|------------|-------------------------------------------------------------------------|-----------------|------|------|------|
|                              |            |                                                                         | Min.            | Typ. | Max. |      |
| Forward transconductance     | $g_{fs}$   | $I_D = 8A$<br>$V_{DS} = 25V$                                            | 5.0             | 10.0 |      | S    |
| Input capacitance            | $C_{iss}$  | $V_{DS} = 25V$<br>$V_{GS} = 0V$<br>$f = 1MHz$                           |                 | 1800 | 2700 | pF   |
| Output capacitance           | $C_{oss}$  |                                                                         |                 | 270  | 410  | pF   |
| Reverse transfer capacitance | $C_{rss}$  |                                                                         |                 | 120  | 185  | pF   |
| Turn-on time                 | $t_d(ON)$  | $V_{CC} = 300V$<br>$V_{GS} = 10V$<br>$I_D = 15A$<br>$R_{GS} = 25\Omega$ |                 | 70   | 110  | ns   |
|                              | $t_r$      |                                                                         |                 | 100  | 150  | ns   |
| Turn-off time                | $t_d(OFF)$ |                                                                         |                 | 250  | 380  | ns   |
|                              | $t_f$      |                                                                         |                 | 80   | 120  | ns   |

## Reverse diode

| Description                      | Symbol    | Conditions                                                                       | Characteristics |      |      | Unit    |
|----------------------------------|-----------|----------------------------------------------------------------------------------|-----------------|------|------|---------|
|                                  |           |                                                                                  | Min.            | Typ. | Max. |         |
| Continuous reverse drain current | $I_{DR}$  |                                                                                  |                 |      | 15   | A       |
| Pulsed reverse deain current     | $I_{DRM}$ |                                                                                  |                 |      | 40   | A       |
| Diode forward on-voltage         | $V_{SD}$  | $I_F = 2 \times I_{DR}$<br>$V_{GS} = 0V, T_j = 25^\circ C$                       |                 | 1.1  | 1.65 | V       |
| Reverse recovery time            | $t_{rr}$  | $I_F = I_{DR}$<br>$V_{GS} = 0V$<br>$-dI_F/dt = 100A/\mu s$<br>$T_j = 25^\circ C$ |                 | 400  |      | ns      |
| Reverse recovery charge          | $Q_{rr}$  |                                                                                  |                 | 4    |      | $\mu C$ |

## 5. Thermal resistance

| Description        | Symbol       | Conditions | Characteristics |      |      | Unit         |
|--------------------|--------------|------------|-----------------|------|------|--------------|
|                    |              |            | Min.            | Typ. | Max. |              |
| Thermal resistance | $R_{th j-c}$ |            |                 |      | 1.0  | $^\circ C/W$ |
|                    | $R_{th j-a}$ |            |                 |      | 35.0 | $^\circ C/W$ |

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| DRAWN     |      |          |                         |          |           |     |
| CHECKED   |      |          |                         |          |           |     |
| REVISIONS |      |          |                         |          |           |     |

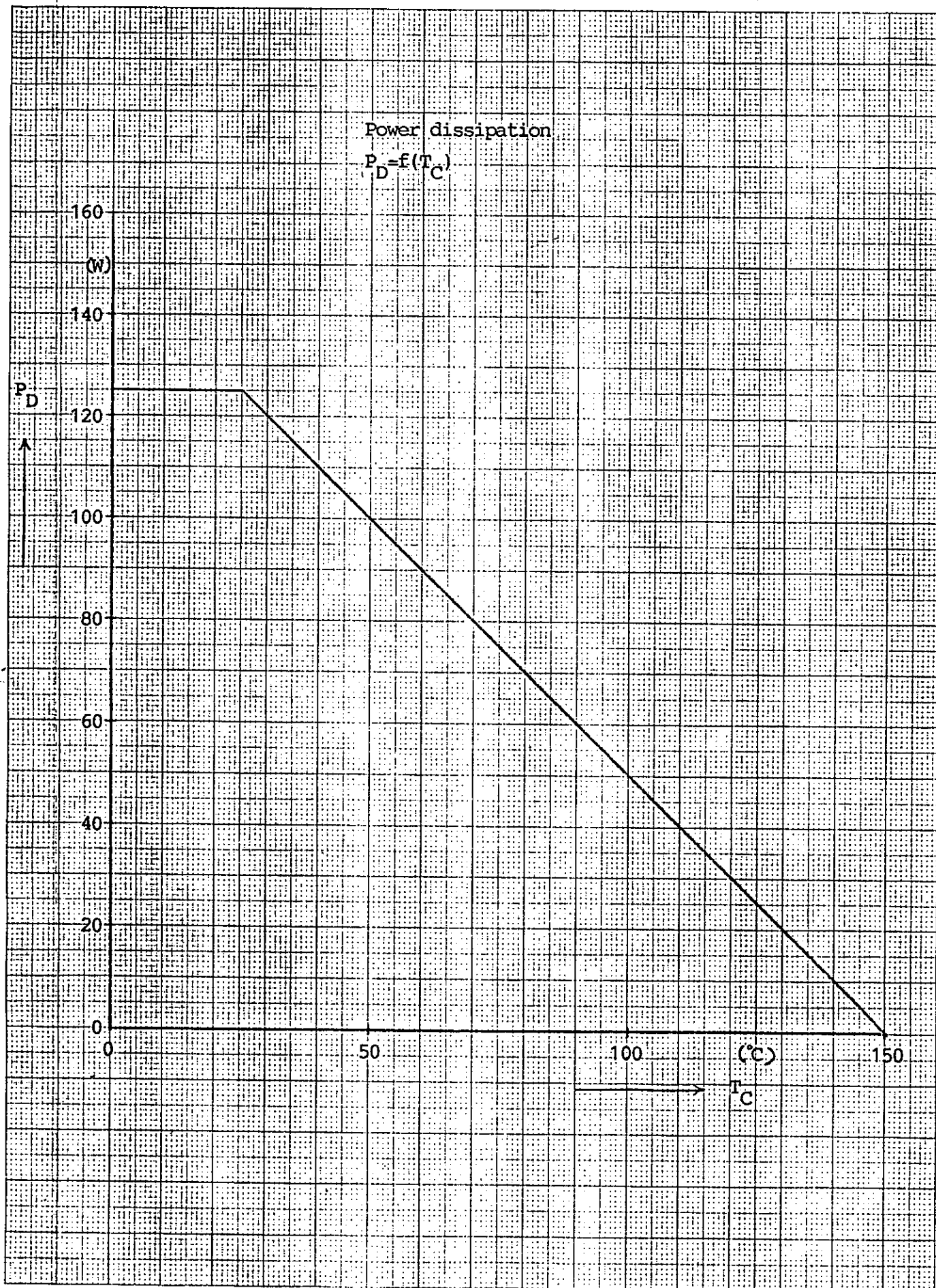
# 6. 御注意 (Attention)

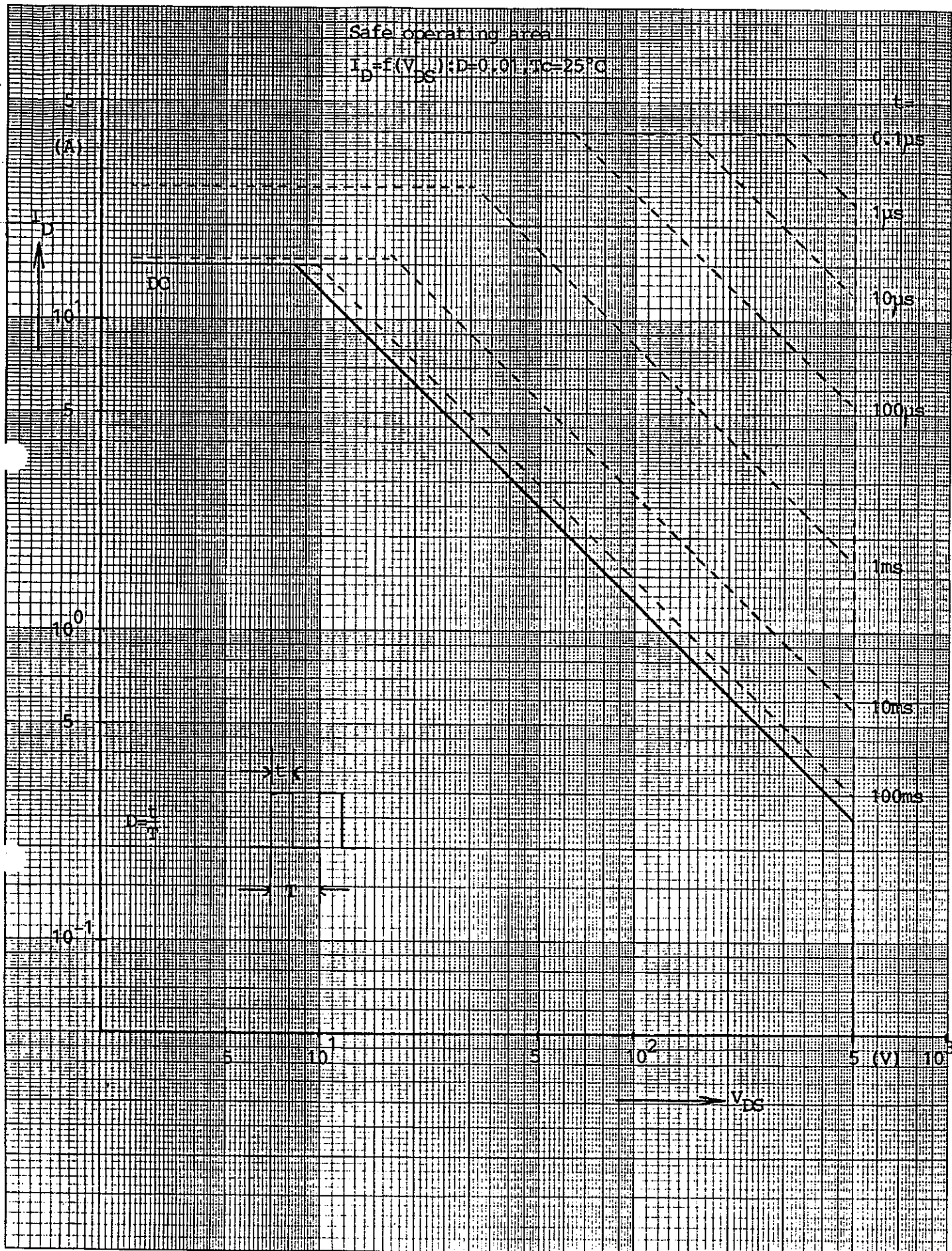
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|           | CHECKED | - - |  |  |          |                         |           |     |  |
|           |         |     |  |  |          |                         |           |     |  |

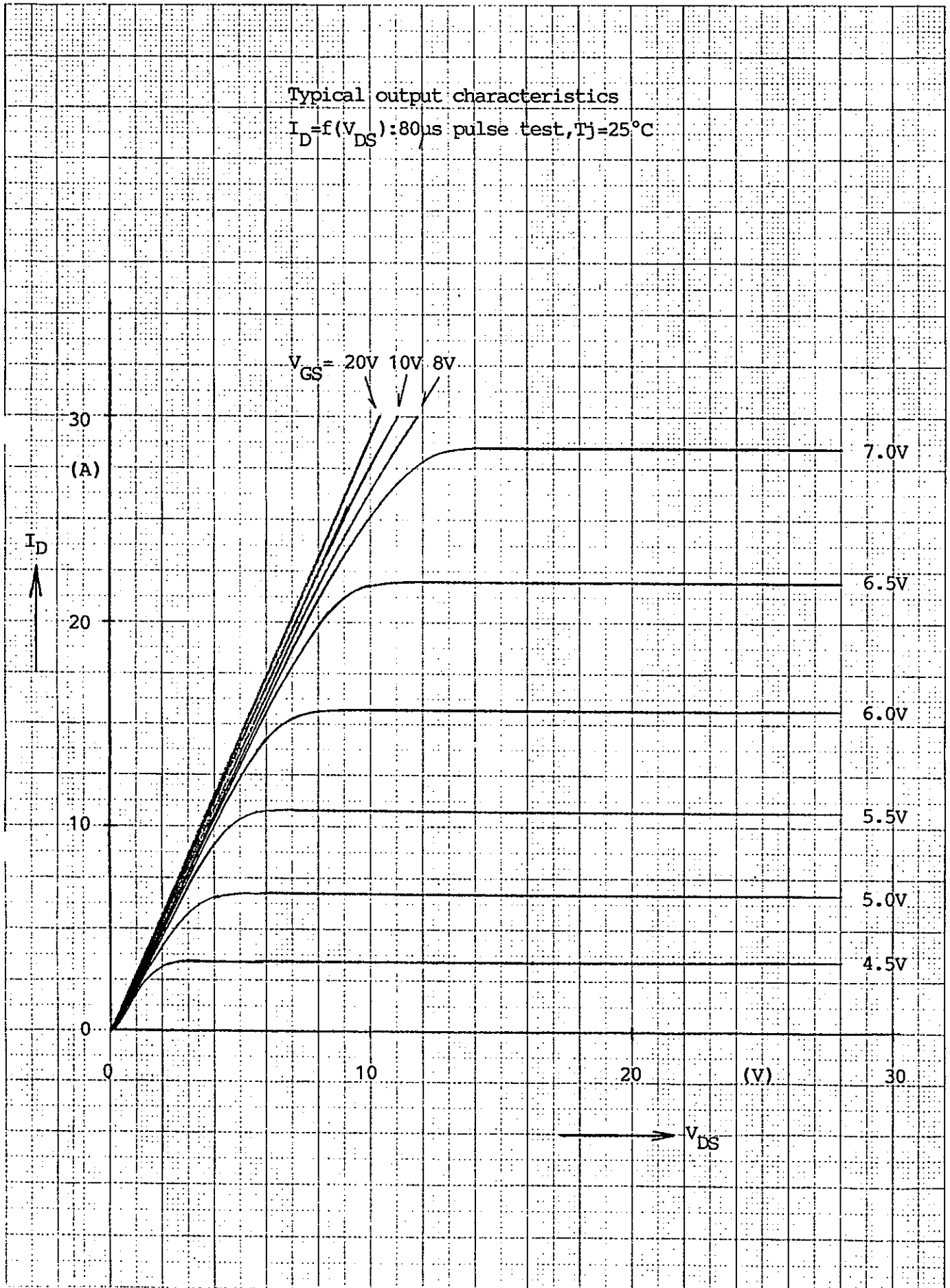




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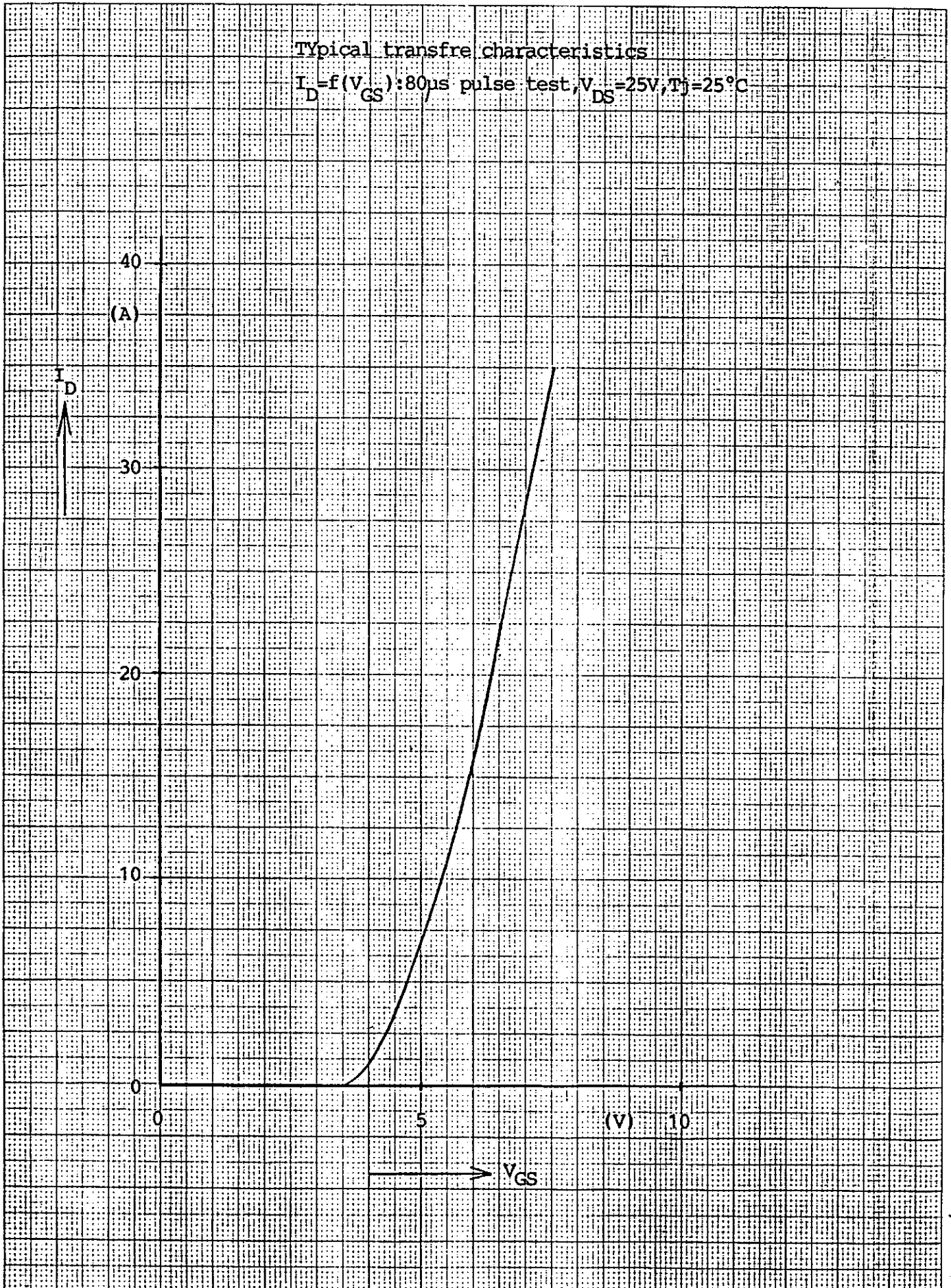
Typical output characteristics

$I_D = f(V_{DS})$ : 80 $\mu$ s pulse test,  $T_j = 25^\circ\text{C}$



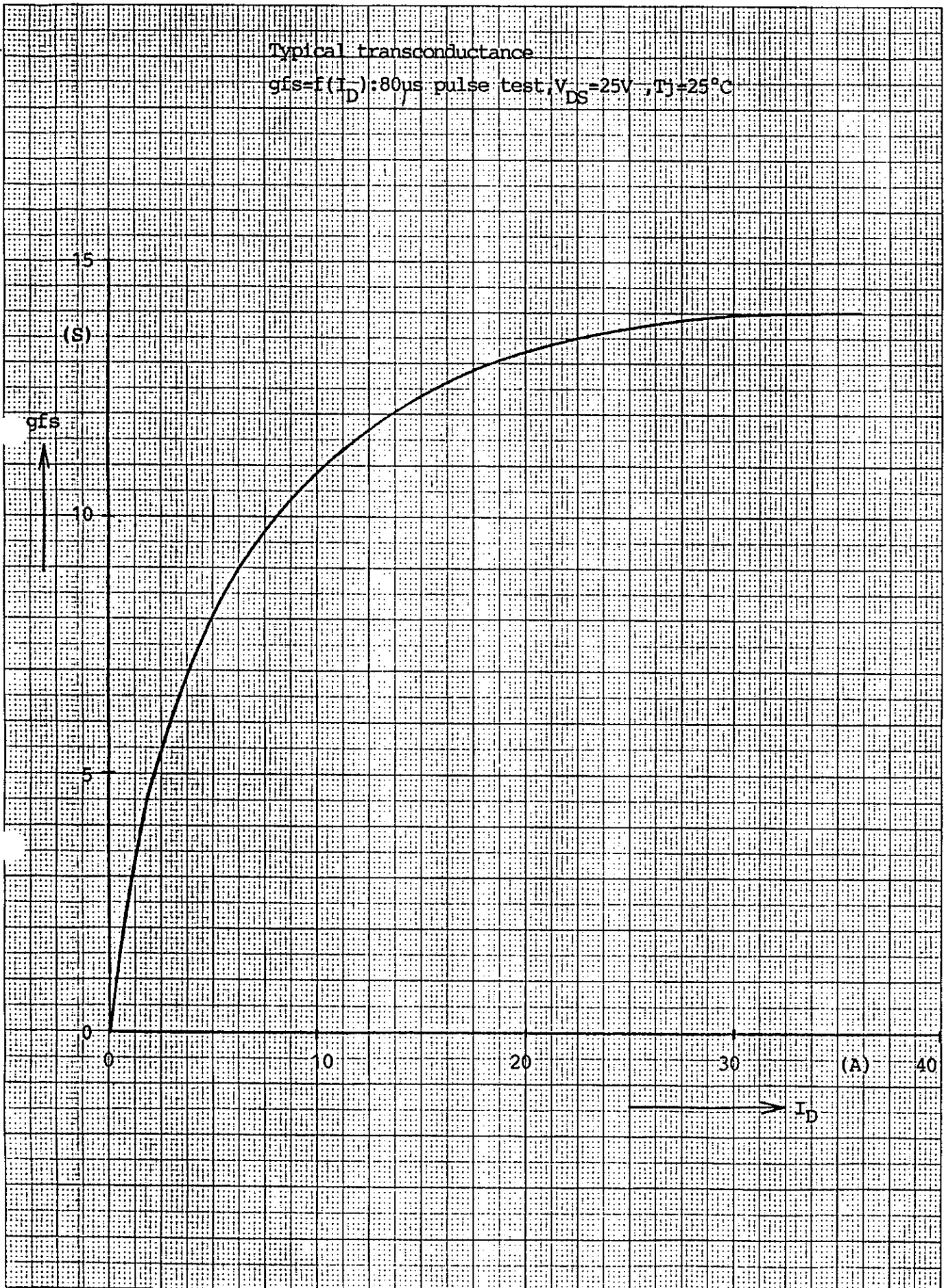
Typical transfre characteristics

$I_D = f(V_{GS})$ : 80 $\mu$ s pulse test,  $V_{DS} = 25V$ ,  $T_j = 25^\circ C$



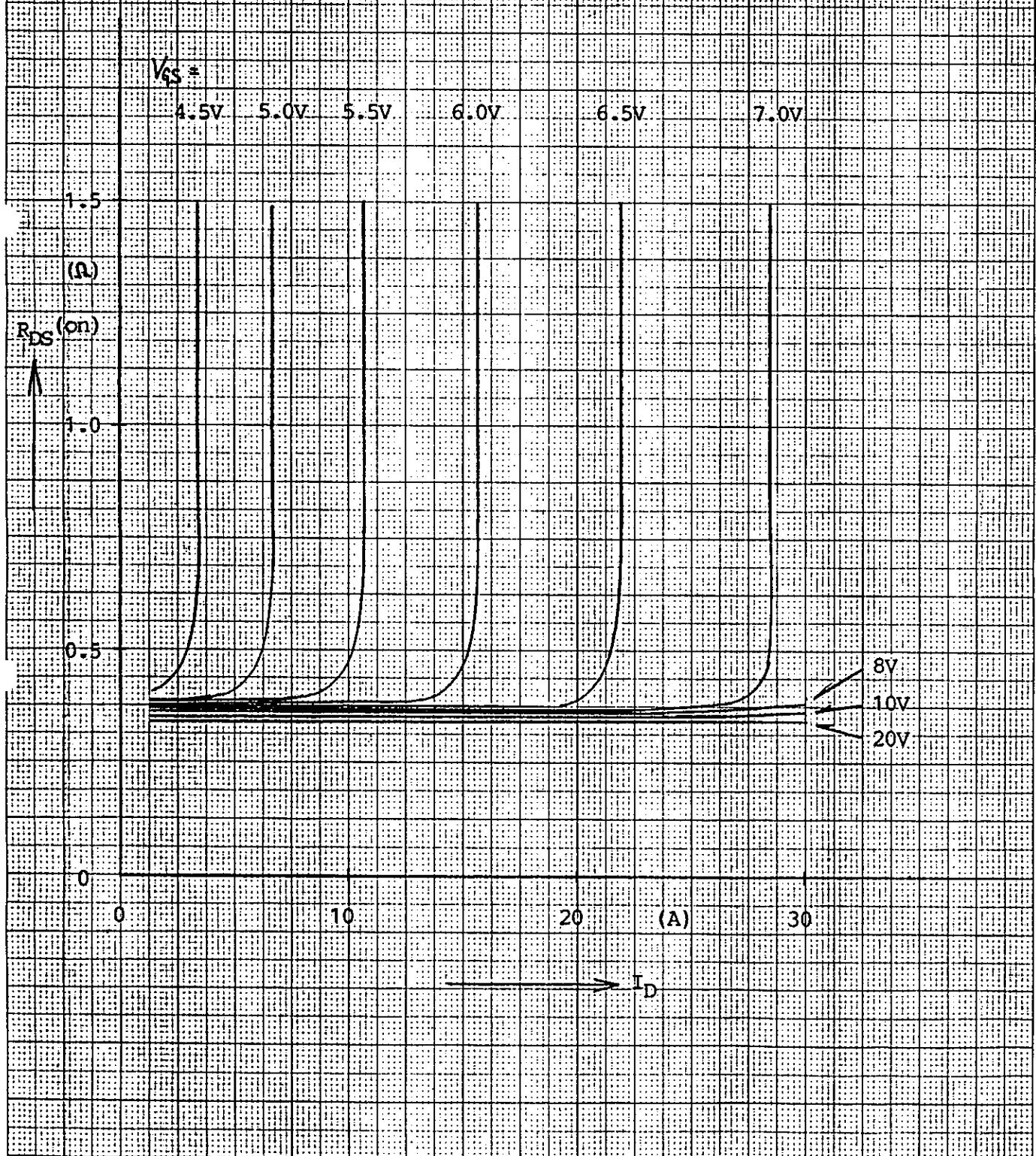
Typical transconductance

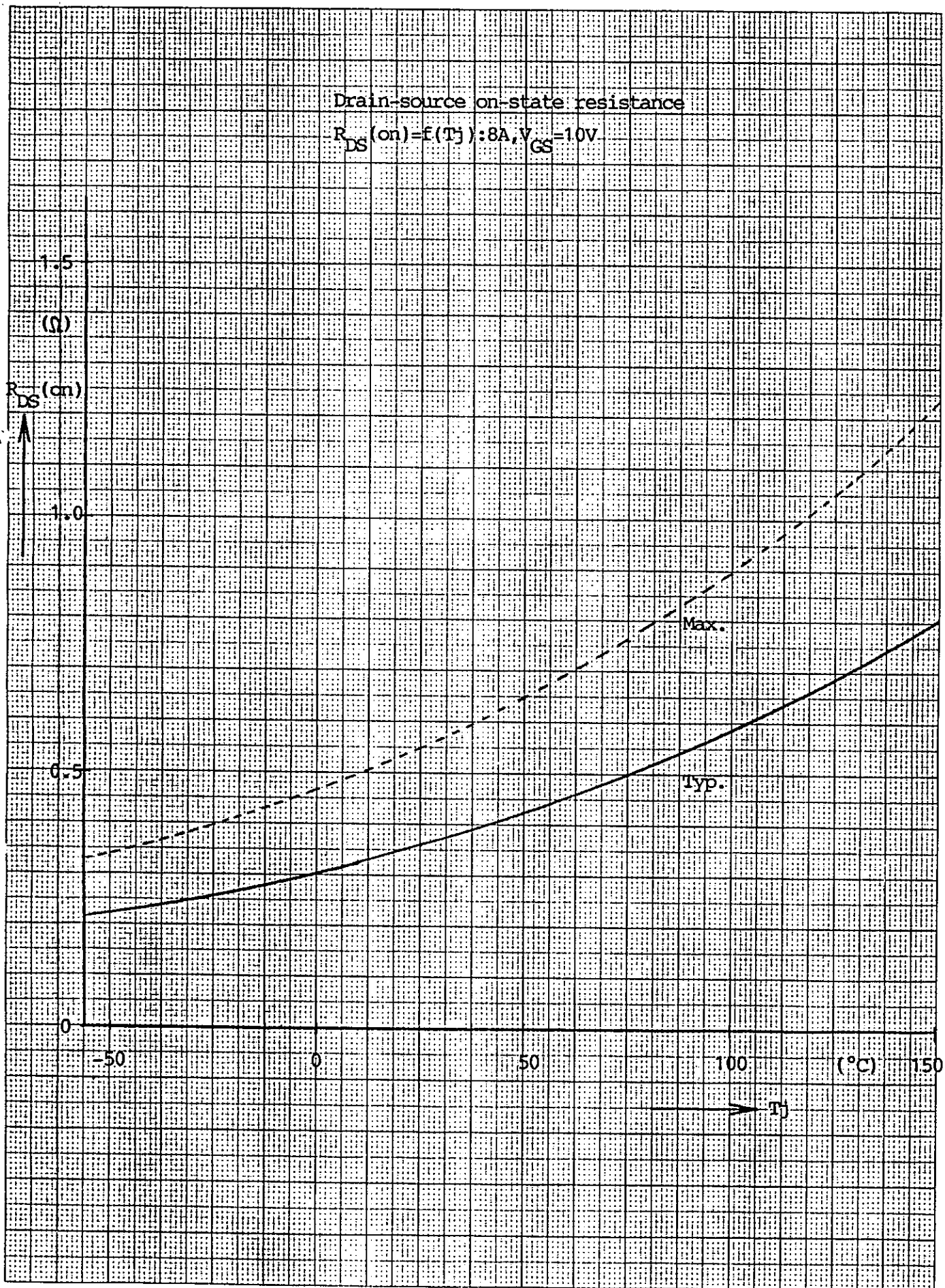
$g_{fs} = f(I_D)$ : 80 $\mu$ s pulse test,  $V_{DS} = 25V$ ,  $T_J = 25^\circ C$



Typical drain-source on-state resistance

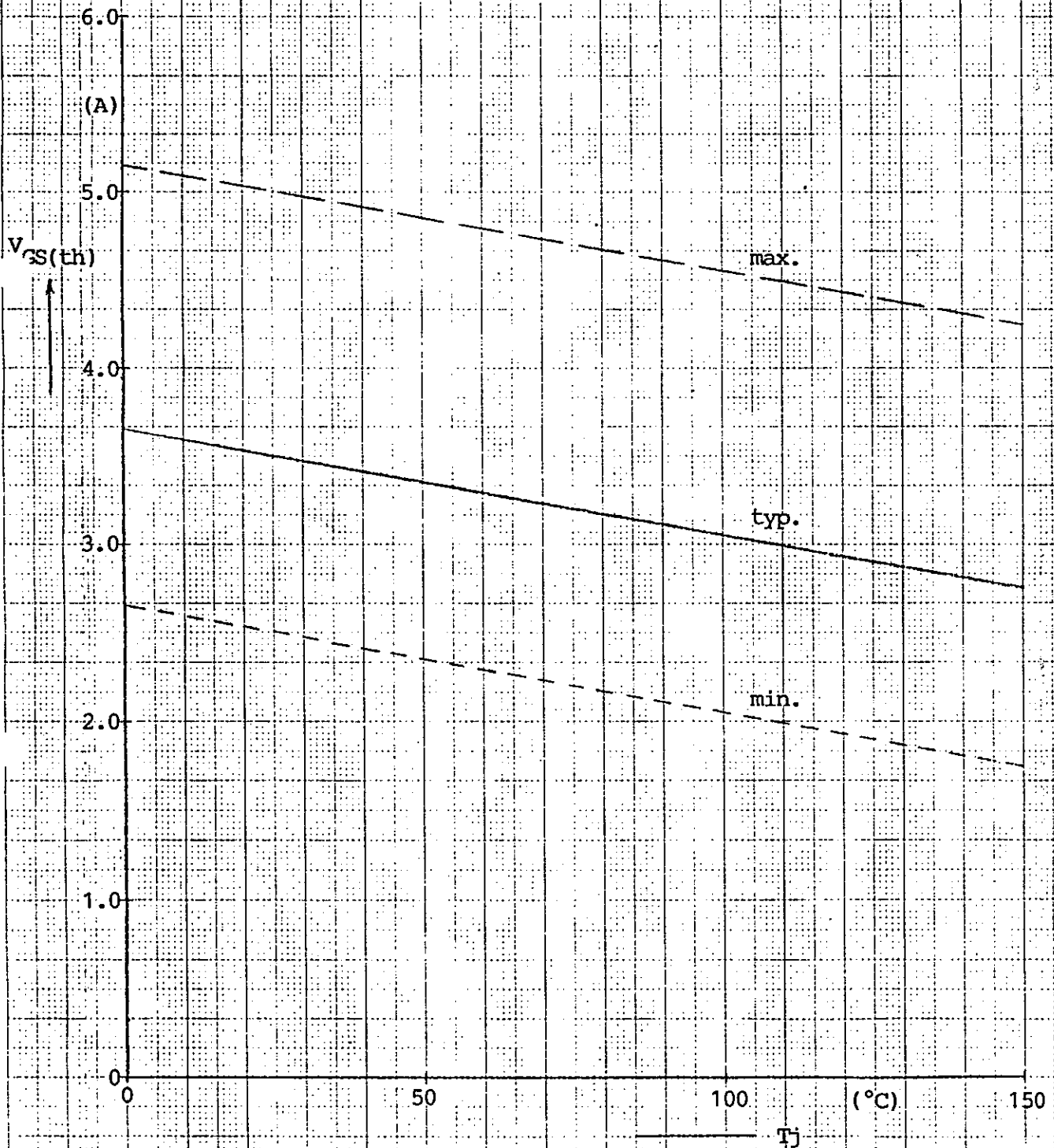
$$R_{DS(on)} = f(I_D, V_{GS}, T_j = 25^\circ\text{C})$$





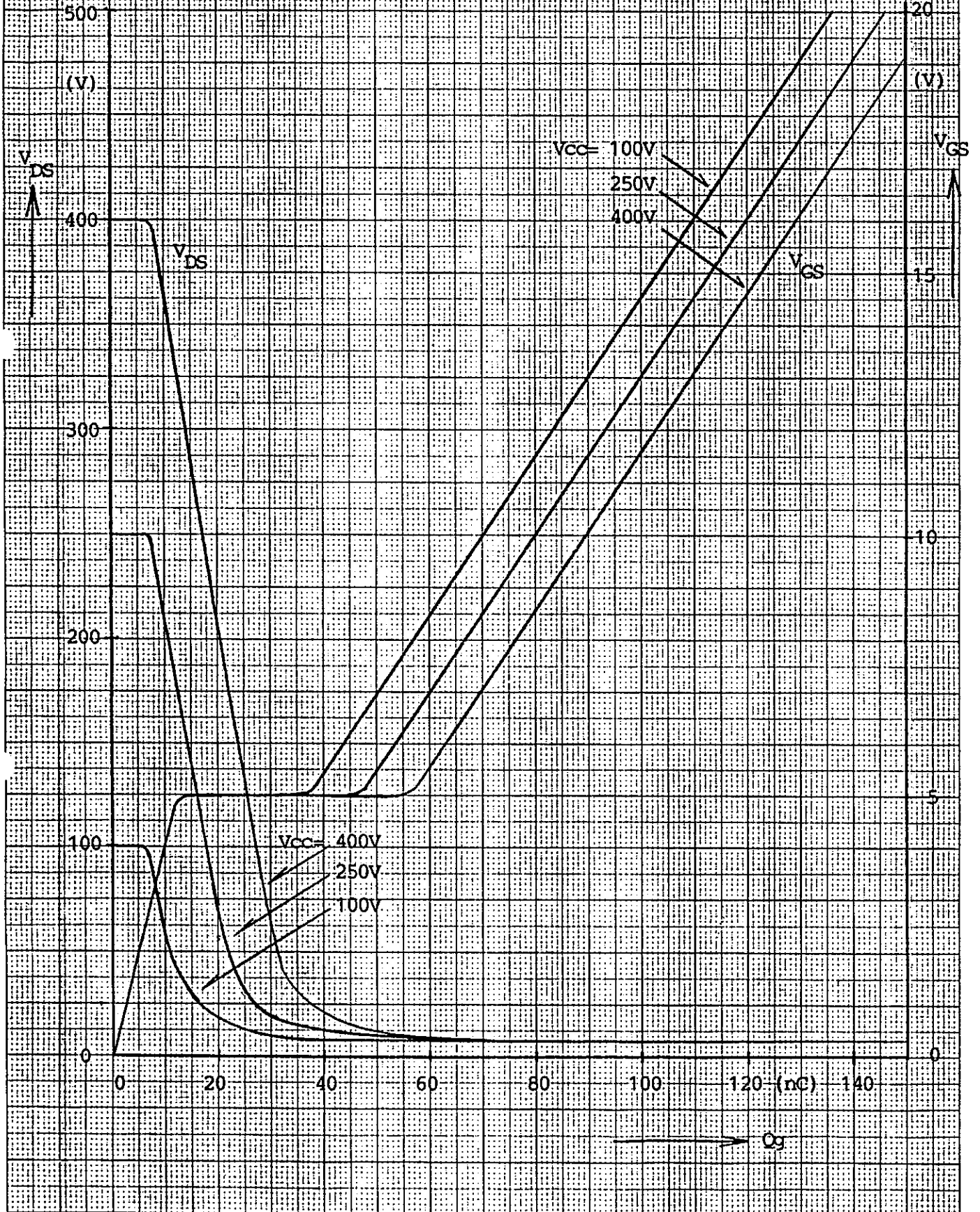
Gate threshold voltage

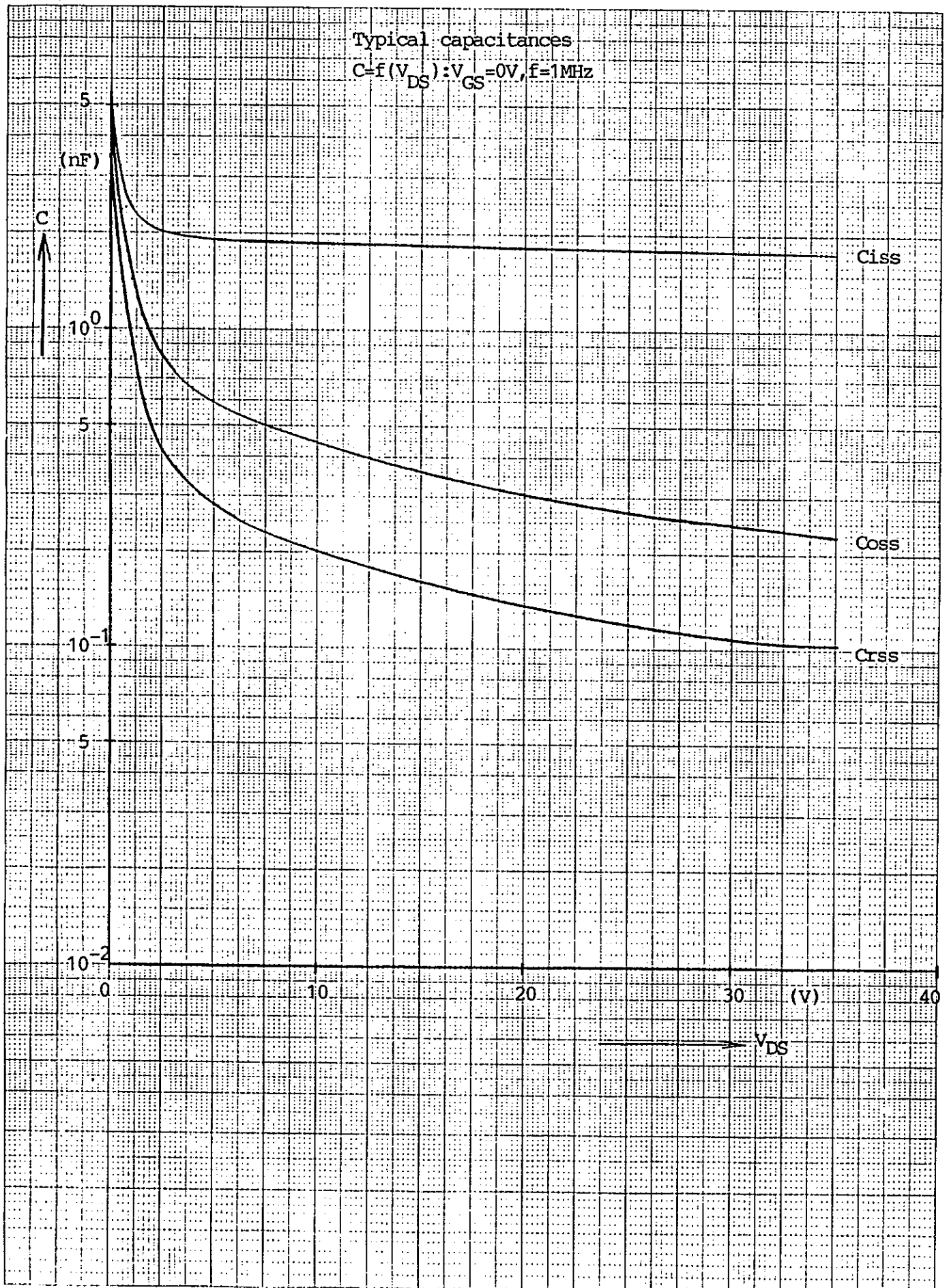
$$V_{GS(th)} = f(T_j): I_D = 1\text{mA}, V_{DS} = V_{GS}$$



# Typical gate charge characteristics

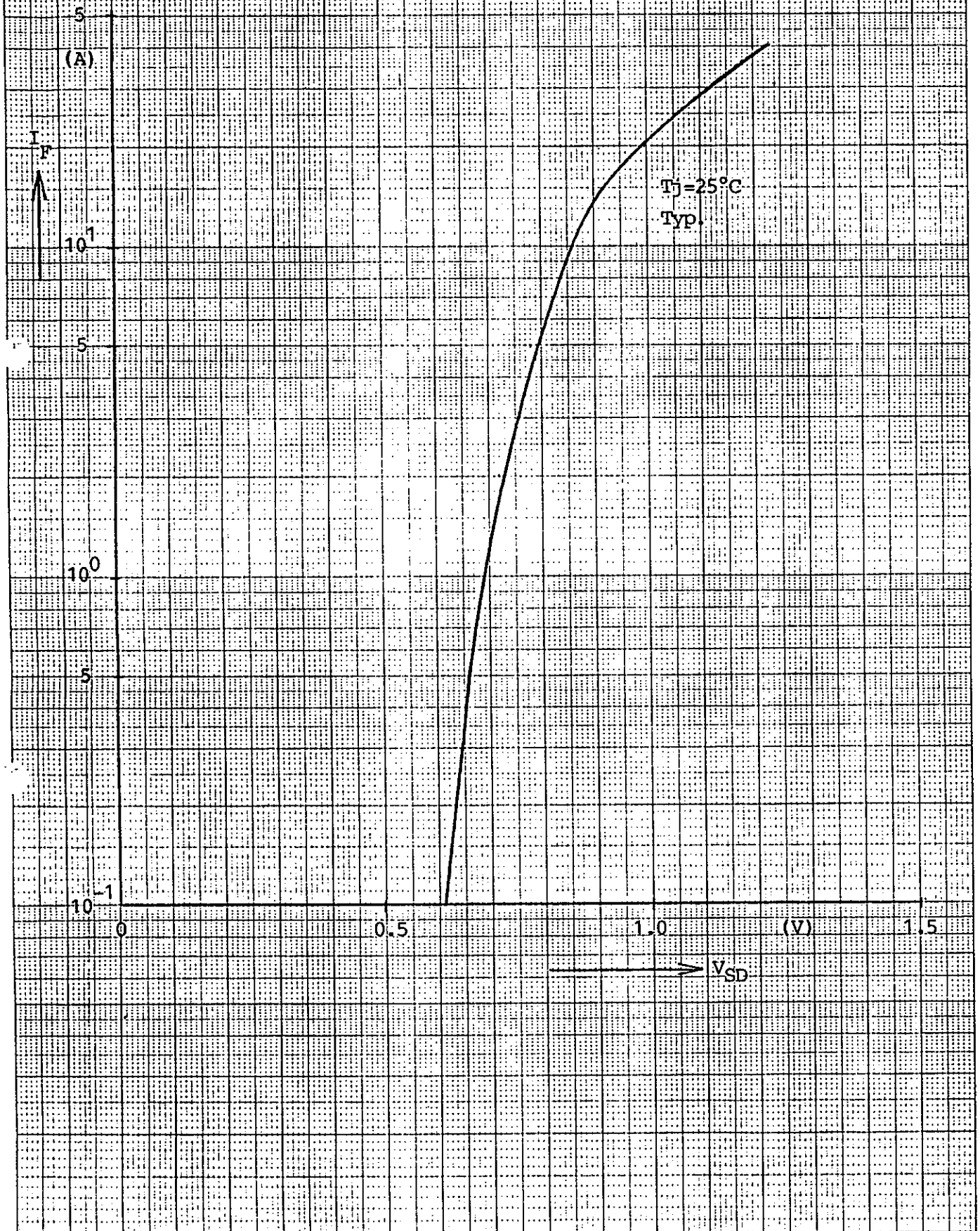
$$V_{GS} = f(Q_g); I_D = 15A$$



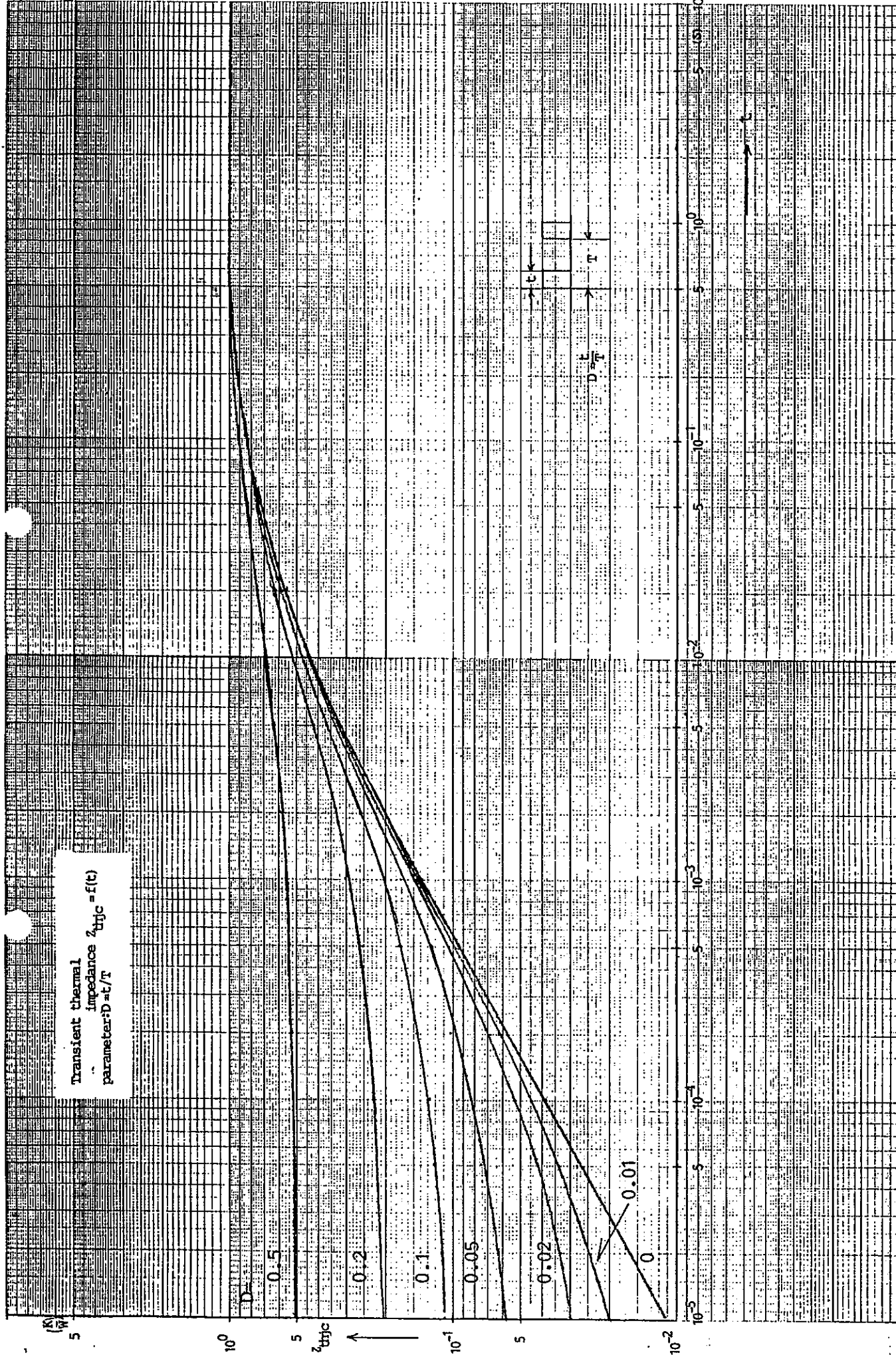


Forward characteristic of reverse diode

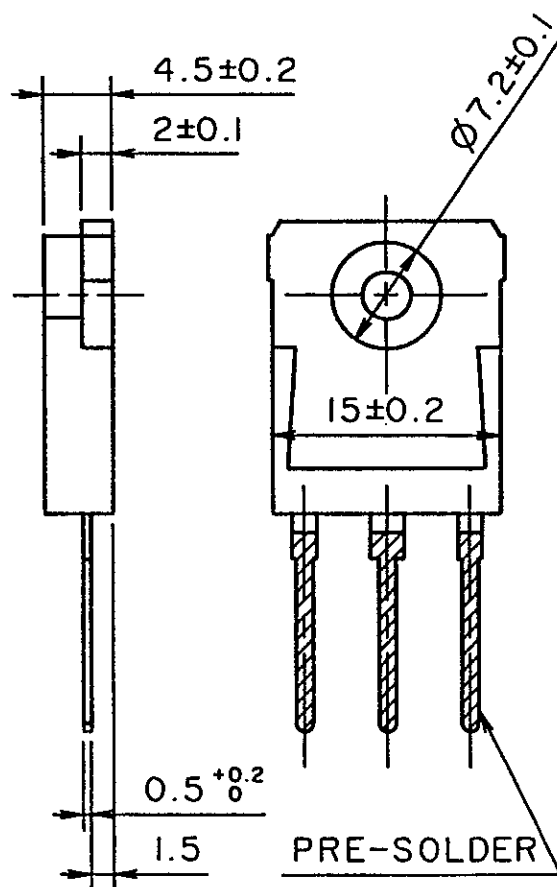
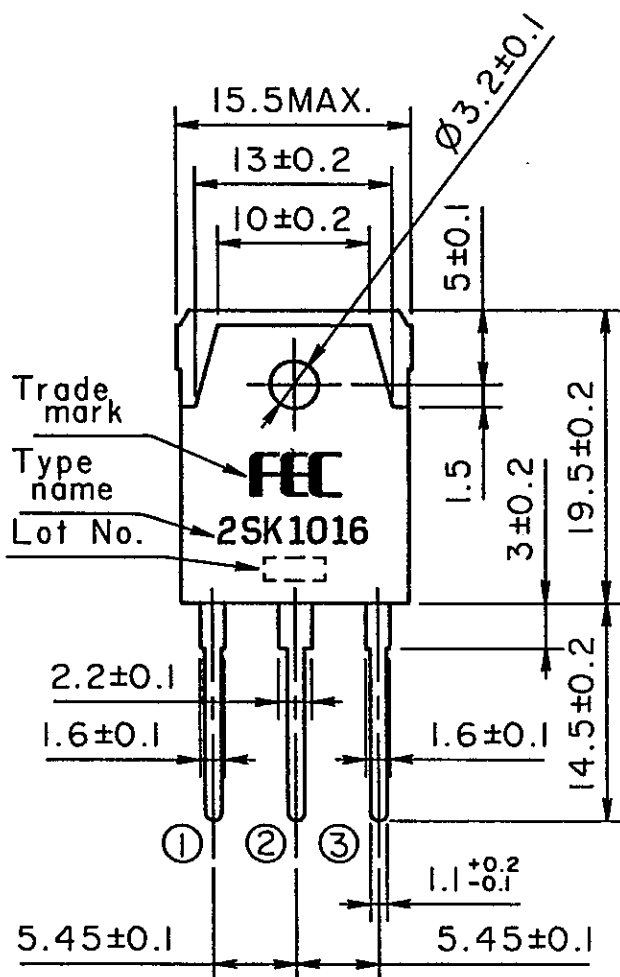
$I_F = f(V_{SD})$ : 80 $\mu$ s pulse test



Transient thermal  
impedance  $z_{thjc} = f(t)$   
parameter:  $D = t/T$



TYPE : 2SK1016



DIMENSIONS ARE IN MILLIMETERS.

## CONNECTION

- ① GATE
- ② DRAIN
- ③ SOURCE

JEDEC : TO-228AA

EIAJ : SC-65

MS.T03P.2SKI016

|         |            |             |           |
|---------|------------|-------------|-----------|
|         | DATE       | NAME        | APPROVED  |
| DRAWN   | '89 -11-24 | H. TAKEDA   | M. Miyagi |
| CHECKED | '89 -11-24 | A. MARUYAMA |           |

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