

SILICON N-CHANNEL DUAL GATE MOS-FET

Depletion type field-effect transistor in a plastic X-package with source and substrate interconnected, intended for v.h.f. applications, such as v.h.f. television tuners, f.m. tuners and professional communication equipment.

This MOS-FET tetrode is protected against excessive input voltage surges by integrated back-to-back diodes between gates and source.

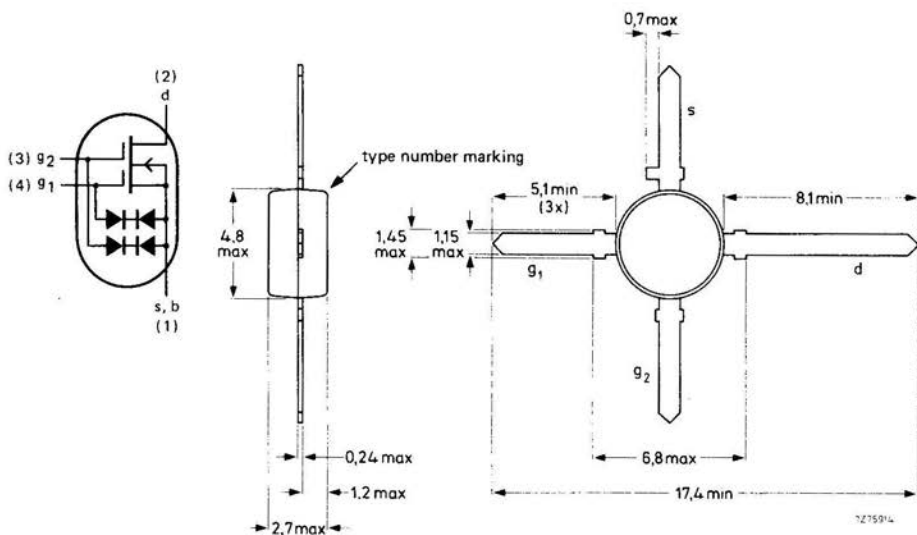
QUICK REFERENCE DATA

Drain-source voltage	V_{DS}	max.	20 V	
Drain current	I_D	max.	20 mA	
Total power dissipation up to $T_{amb} = 75\text{ }^\circ\text{C}$	P_{tot}	max.	225 mW	
Junction temperature	T_j	max.	150 $^\circ\text{C}$	
Transfer admittance at $f = 1\text{ kHz}$ $I_D = 10\text{ mA}$; $V_{DS} = 10\text{ V}$; $+V_{G2-S} = 4\text{ V}$	$ y_{fs} $	typ.	14 mS	←
Feedback capacitance at $f = 1\text{ MHz}$ $I_D = 10\text{ mA}$; $V_{DS} = 10\text{ V}$; $+V_{G2-S} = 4\text{ V}$	C_{rs}	typ.	20 fF	
Noise figure at optimum source admittance $I_D = 10\text{ mA}$; $V_{DS} = 10\text{ V}$; $+V_{G2-S} = 4\text{ V}$; $f = 200\text{ MHz}$	F	typ.	0,7 dB	

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-103.



RATINGS

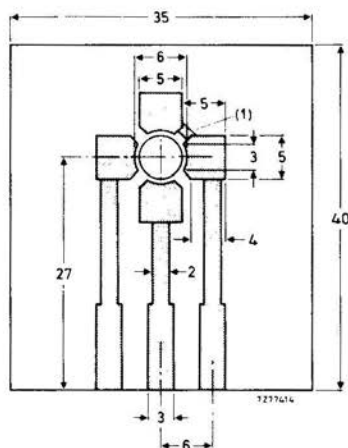
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Drain-source voltage	V_{DS}	max.	20 V
Drain current (d.c. or average)	I_D	max.	20 mA
Drain current (peak value)	I_{DM}	max.	30 mA
Gate 1 - source current	$\pm I_{G1-S}$	max.	10 mA
Gate 2 - source current	$\pm I_{G2-S}$	max.	10 mA
Total power dissipation up to $T_{amb} = 75\text{ }^\circ\text{C}$	P_{tot}	max.	225 mW
Storage temperature	T_{stg}	-65 to +150	$^\circ\text{C}$
Junction temperature	T_j	max.	150 $^\circ\text{C}$

THERMAL RESISTANCE

From junction to ambient in free air
mounted on the printed-circuit board (see Fig. 2)

$$R_{th\ j-a} = 335\text{ K/W}$$



Dimensions in mm

(1) Connection made by a strip or Cu wire.

Fig. 2 Single-sided 35 μm Cu-clad epoxy fibre-glass printed-circuit board, thickness 1,5 mm. Tracks are fully tin-lead plated. Board in horizontal position for R_{th} measurement.

STATIC CHARACTERISTICS

$T_{amb} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Gate cut-off currents

$$\pm V_{G1-S} = 5\text{ V}; V_{G2-S} = V_{DS} = 0$$

$$\pm V_{G2-S} = 5\text{ V}; V_{G1-S} = V_{DS} = 0$$

$$\pm I_{G1-SS} < 50\text{ nA}$$

$$\pm I_{G2-SS} < 50\text{ nA}$$

Gate-source breakdown voltages

$$\pm I_{G1-SS} = 10\text{ mA}; V_{G2-S} = V_{DS} = 0$$

$$\pm I_{G2-SS} = 10\text{ mA}; V_{G1-S} = V_{DS} = 0$$

$$\pm V_{(BR)G1-SS} > 6\text{ V}$$

$$\pm V_{(BR)G2-SS} > 6\text{ V}$$

Drain current

$$V_{DS} = 10\text{ V}; V_{G1-S} = 0; +V_{G2-S} = 4\text{ V}; T_j = 25\text{ }^{\circ}\text{C}$$

$$I_{DSS} \quad 4\text{ to }25\text{ mA}$$

Gate-source cut-off voltages

$$I_D = 20\text{ }\mu\text{A}; V_{DS} = 10\text{ V}; +V_{G2-S} = 4\text{ V}$$

$$I_D = 20\text{ }\mu\text{A}; V_{DS} = 10\text{ V}; V_{G1-S} = 0$$

$$-V_{(P)G1-S} < 2,5\text{ V}$$

$$-V_{(P)G2-S} < 2,5\text{ V}$$

DYNAMIC CHARACTERISTICS

Measuring conditions (common source): $I_D = 10\text{ mA}; V_{DS} = 10\text{ V}; +V_{G2-S} = 4\text{ V}; T_{amb} = 25\text{ }^{\circ}\text{C}$

Transfer admittance at $f = 1\text{ kHz}$

$$|Y_{fs}| \quad \begin{array}{l} > 10\text{ mS} \\ \text{typ. } 14\text{ mS} \end{array}$$

Input capacitance at gate 1; $f = 1\text{ MHz}$

$$C_{ig1-s} \quad \text{typ. } 2,1\text{ pF}$$

Input capacitance at gate 2; $f = 1\text{ MHz}$

$$C_{ig2-s} \quad \text{typ. } 1,0\text{ pF}$$

Feedback capacitance at $f = 1\text{ MHz}$

$$C_{rs} \quad \text{typ. } 20\text{ fF}$$

Output capacitance at $f = 1\text{ MHz}$

$$C_{os} \quad \text{typ. } 1,1\text{ pF}$$

Noise figure at $f = 100\text{ MHz}; G_S = 1\text{ mS}$

$$F \quad \begin{array}{l} \text{typ. } 0,7\text{ dB} \\ < 1,7\text{ dB} \end{array}$$

Noise figure at $f = 200\text{ MHz}; G_S = 2\text{ mS}$

$$F \quad \begin{array}{l} \text{typ. } 1,0\text{ dB} \\ < 2,0\text{ dB} \end{array}$$

Transducer gain at $f = 100\text{ MHz}; G_S = 1\text{ mS}; G_L = 0,5\text{ mS}$

$$G_{tr} \quad \text{typ. } 29\text{ dB}$$

Transducer gain at $f = 200\text{ MHz}; G_S = 2\text{ mS}; G_L = 0,5\text{ mS}$

$$G_{tr} \quad \text{typ. } 26\text{ dB}$$

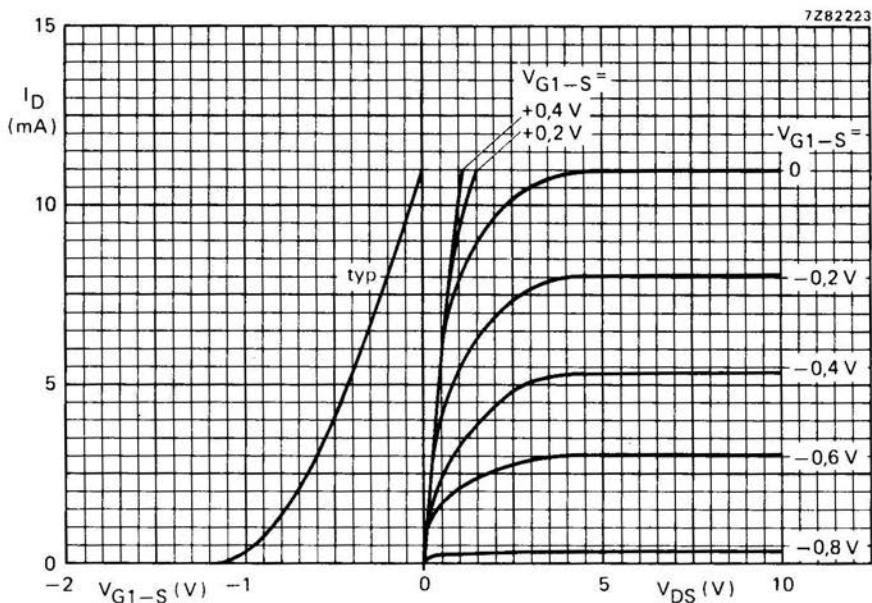


Fig. 3 Left-hand graph: $V_{DS} = 10 \text{ V}$; $V_{G2-S} = +4 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$. Right-hand graph: $V_{G2-S} = +4 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.

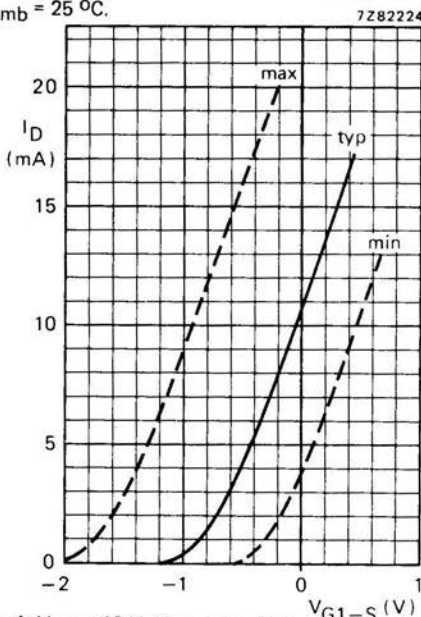


Fig. 4 $V_{DS} = 10 \text{ V}$; $V_{G2-S} = +4 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.

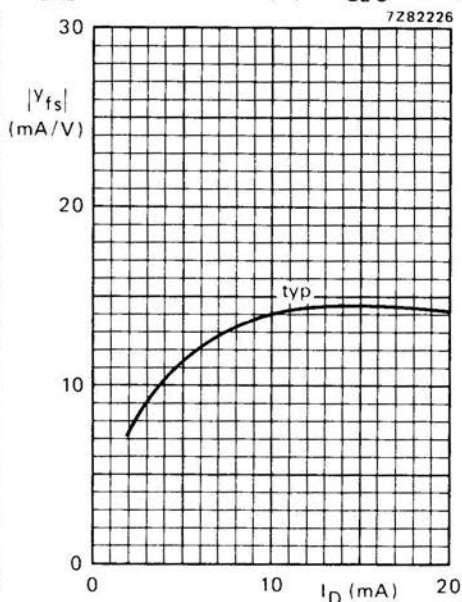


Fig. 5 $V_{DS} = 10 \text{ V}$; $V_{G2-S} = +4 \text{ V}$; $f = 1 \text{ kHz}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.

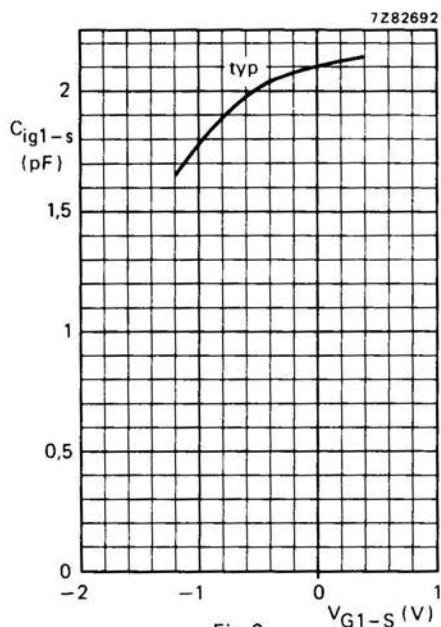


Fig. 6.

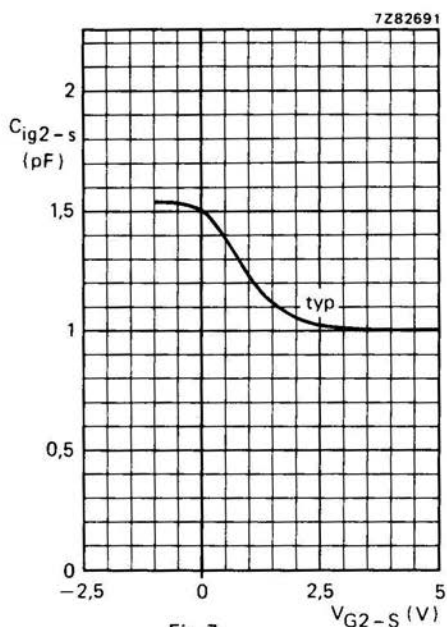


Fig. 7.

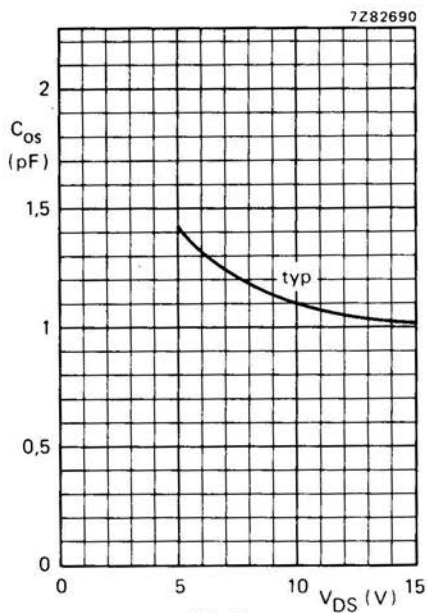


Fig. 8.

Measuring conditions:

Fig. 6 $V_{DS} = 10$ V; $V_{G2-S} = +4$ V; $f = 1$ MHz;
 $T_{amb} = 25$ °C.

Fig. 7 $V_{DS} = 10$ V; $V_{G1-S} = 0$; $f = 1$ MHz;
 $T_{amb} = 25$ °C.

Fig. 8 $V_{G2-S} = +4$ V; $I_D = 10$ mA; $f = 1$ MHz;
 $T_{amb} = 25$ °C.

Measuring conditions for Figs 9 to 12: $V_{DS} = 10 \text{ V}$; $I_D = 10 \text{ mA}$; $V_{G2-S} = +4 \text{ V}$; $T_{amb} = 25 \text{ }^\circ\text{C}$.

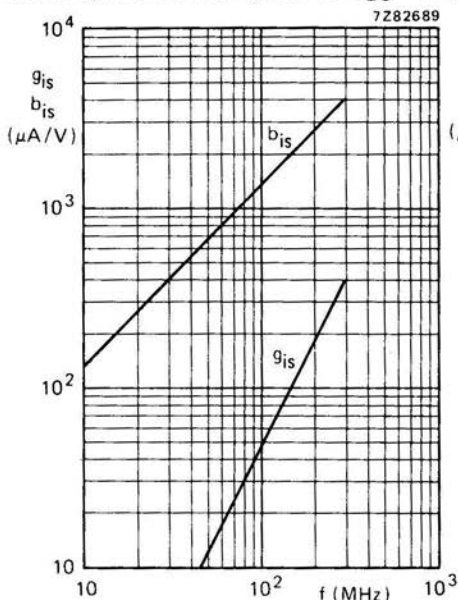


Fig. 9.

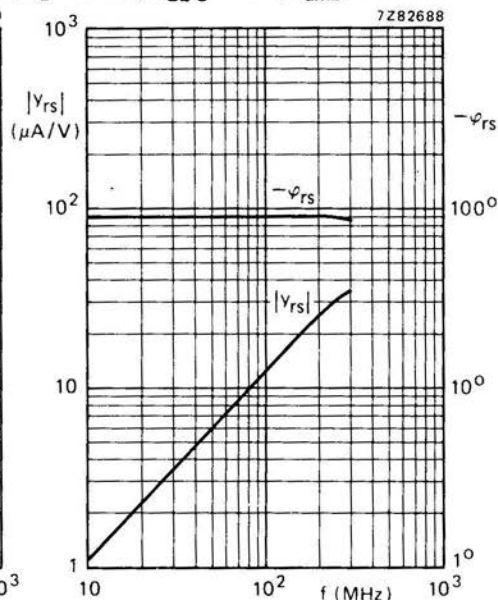


Fig. 10.

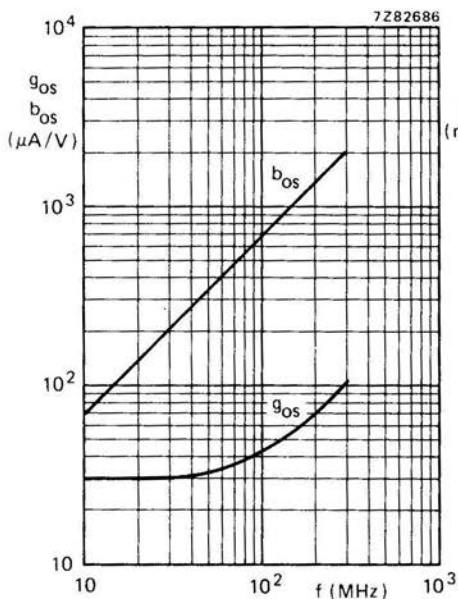


Fig. 11.

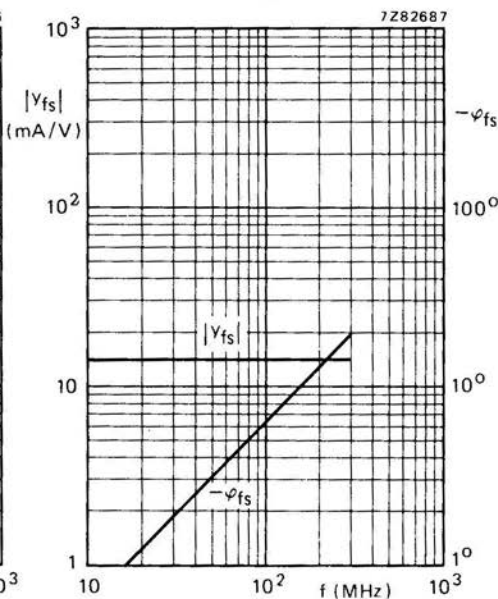


Fig. 12.

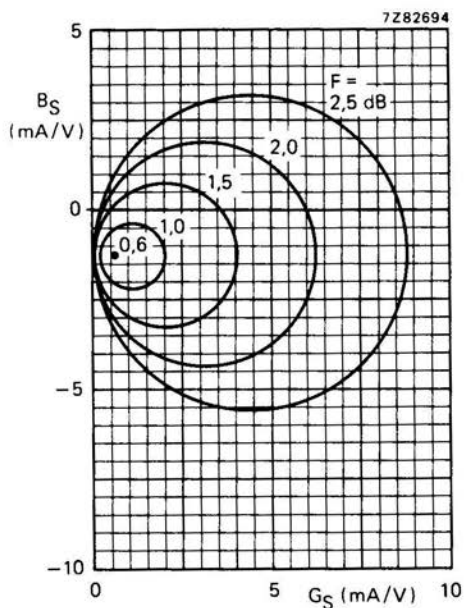


Fig. 13 $V_{DS} = 10$ V; $V_{G2-S} = +4$ V; $I_D = 10$ mA;
 $f = 100$ MHz; $T_{amb} = 25$ °C; circles of typical
 constant noise figures.

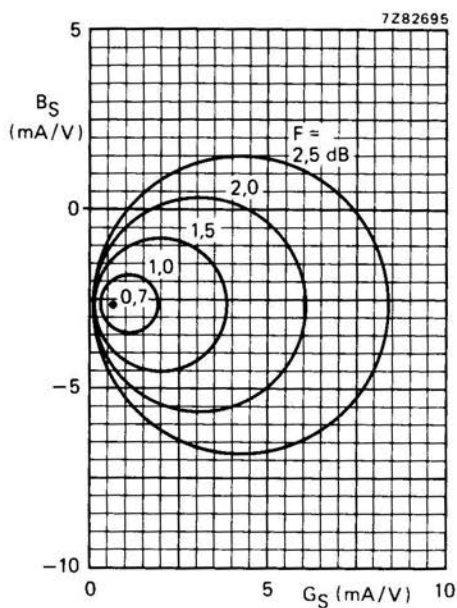


Fig. 14 $V_{DS} = 10$ V; $V_{G2-S} = +4$ V; $I_D = 10$ mA;
 $f = 200$ MHz; $T_{amb} = 25$ °C; circles of typical
 constant noise figures.

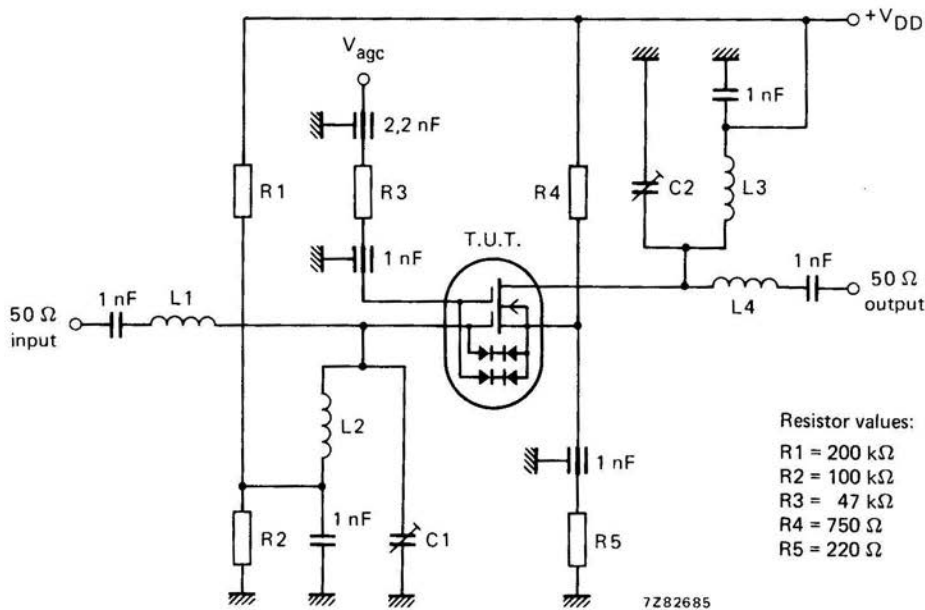


Fig. 15 Automatic gain control test circuit at $f = 200$ MHz (see also Fig. 16).
 $V_{DD} = 16$ V; $G_S = 2$ mA/V; $G_L = 0,5$ mA/V.

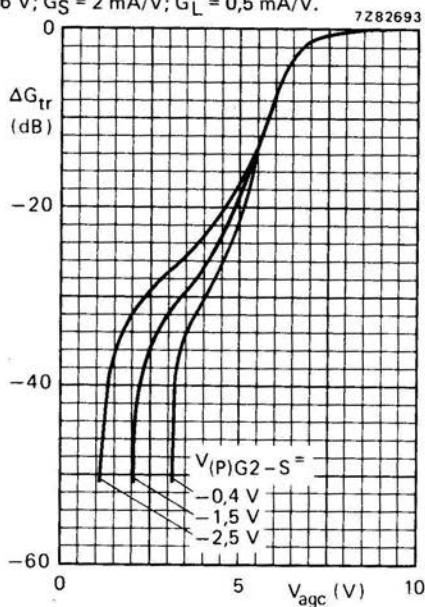


Fig. 16 $V_{DD} = 16$ V; $f = 200$ MHz;
 $T_{amb} = 25$ $^{\circ}$ C; typical values;
 see also Fig. 15.