SILICON N-CHANNEL DUAL GATE MOS-FET

Depletion type field-effect transistor in a plastic X-package with source and substrate interconnected, intended for VHF applications, such as VHF television tuners, FM 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 °C	P_{tot}	max.	225	mW
Junction temperature	T_j	max.	150	°C
Transfer admittance at f = 1 kHz I_D = 10 mA; V_{DS} = 10 V; + V_{G2-S} = 4 V	$\|y_{fs}\|$	typ.	14	mS
Input capacitance at gate 1; f = 1 MHz I_D = 10 mA; V_{DS} = 10 V; + V_{G2-S} = 4 V	C_{ig1-s}	typ.	2.1	pF
Feedback capacitance at f = 1 MHz I_D = 10 mA; V_{DS} = 10 V; + V_{G2-S} = 4 V	C_{rs}	typ.	20	fF
Noise figure at optimum source admittance I_D = 10 mA; V_{DS} = 10 V; + V_{G2-S} = 4 V; f = 200 MHz	F	typ.	0.7	dB

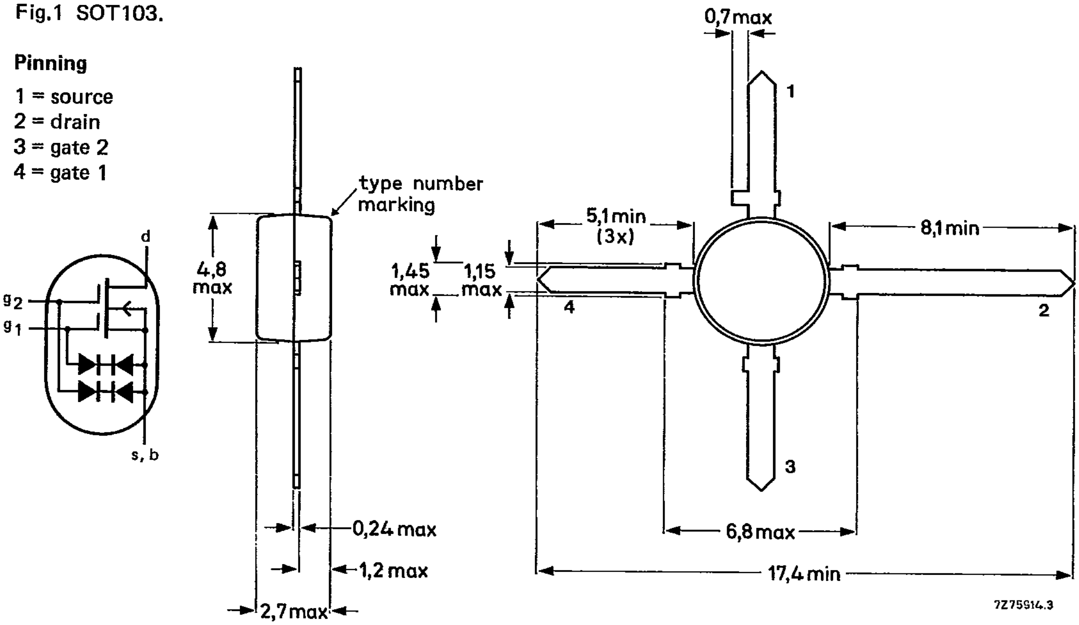
MECHANICAL DATA

Dimensions in mm

Fig.1 SOT103.

Pinning

1 = source
2 = drain
3 = gate 2
4 = gate 1



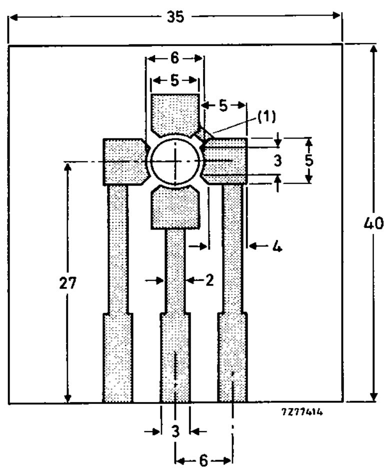
RATINGS

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

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

THERMAL RESISTANCE

From junction to ambient in free air mounted on the printed-circuit board (see Fig.2)	$R_{th\,j\text{-}a}$	=	335	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

$T_j = 25\ ^oC$

Gate cut-off currents			
$\pm V_{G1\text{-}S} = 5$ V; $V_{G2\text{-}S} = V_{DS} = 0$	$\pm I_{G1\text{-}SS}$	<	25 nA
$\pm V_{G2\text{-}S} = 5$ V; $V_{G1\text{-}S} = V_{DS} = 0$	$\pm I_{G2\text{-}SS}$	<	25 nA
Gate-source breakdown voltages			
$\pm I_{G1\text{-}SS} = 10$ mA; $V_{G2\text{-}S} = V_{DS} = 0$	$\pm V_{(BR)G1\text{-}SS}$		6 to 20 V
$\pm I_{G2\text{-}SS} = 10$ mA; $V_{G1\text{-}S} = V_{DS} = 0$	$\pm V_{(BR)G2\text{-}SS}$		6 to 20 V
Drain current			
$V_{DS} = 10$ V; $V_{G1\text{-}S} = 0$; $+V_{G2\text{-}S} = 4$ V	I_{DSS}		4 to 25 mA
Gate-source cut-off voltages			
$I_D = 20\ \mu A$; $V_{DS} = 10$ V; $+V_{G2\text{-}S} = 4$ V	$-V_{(P)G1\text{-}S}$	<	2.5 V
$I_D = 20\ \mu A$; $V_{DS} = 10$ V; $V_{G1\text{-}S} = 0$	$-V_{(P)G2\text{-}S}$	<	2.5 V

DYNAMIC CHARACTERISTICS

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

Transfer admittance at f = 1 kHz	$\lvert y_{fs} \rvert$	>	10 mS
		typ.	14 mS
Input capacitance at gate 1; f = 1 MHz	$C_{ig1\text{-}s}$	typ.	2.1 pF
Input capacitance at gate 2; f = 1 MHz	$C_{ig2\text{-}s}$	typ.	1.0 pF
Feedback capacitance at f = 1 MHz	C_{rs}	typ.	20 fF
Output capacitance at f = 1 MHz	C_{os}	typ.	1.1 pF
Noise figure at f = 100 MHz; $G_S = 1$ mS; $B_S = B_S$ opt	F	typ.	0.7 dB
		<	1.7 dB
Noise figure at f = 200 MHz; $G_S = 2$ mS; $B_S = B_S$ opt	F	typ.	1.0 dB
		<	2.0 dB
Transducer gain at f = 100 MHz; $G_S = 1$ mS; $B_S = B_S$ opt; $G_L = 0.5$ mS; $B_L = B_L$ opt	G_{tr}	typ.	29 dB
Transducer gain at f = 200 MHz; $G_S = 2$ mS; $B_S = B_S$ opt; $G_L = 0.5$ mS; $B_L = B_L$ opt	G_{tr}	typ.	26 dB

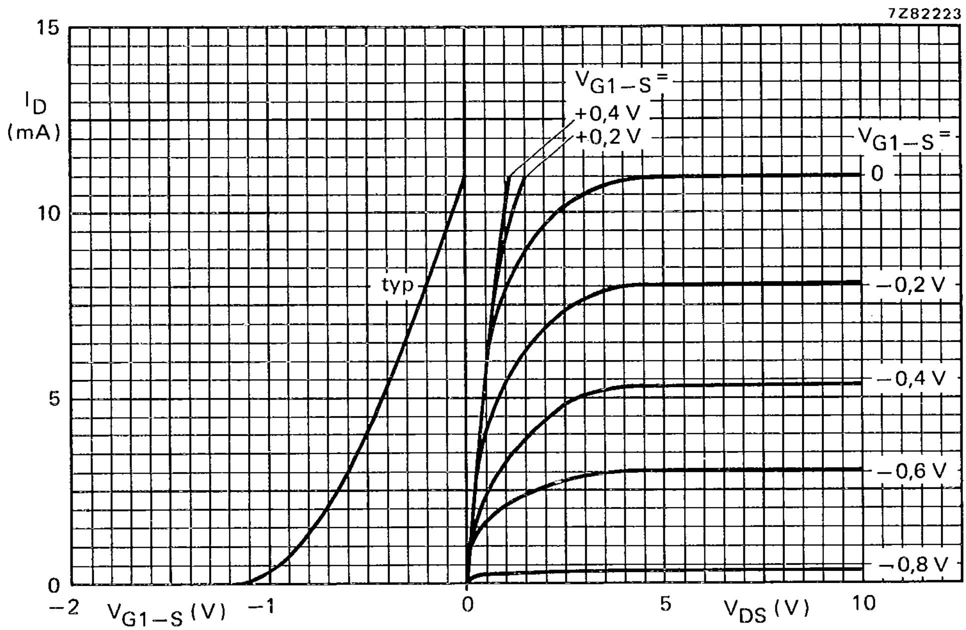


Fig. 3 **Left-hand graph:** V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; T_{amb} = 25 °C. **Right-hand graph:** $V_{G2\text{-}S}$ = + 4 V; T_{amb} = 25 °C.

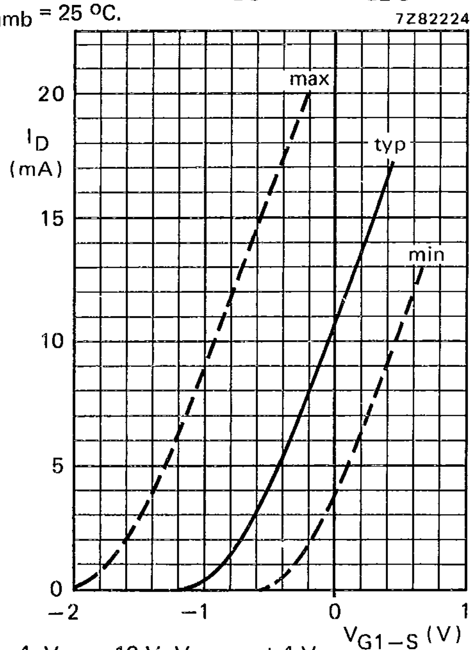


Fig. 4 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; T_{amb} = 25 °C.

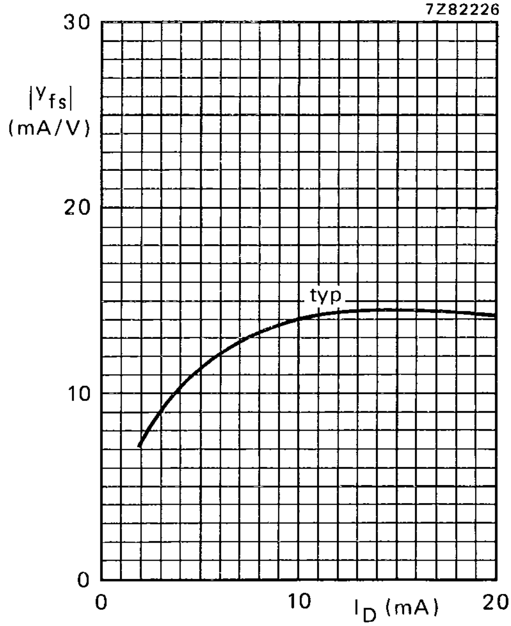


Fig. 5 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; f = 1 kHz; T_{amb} = 25 °C.

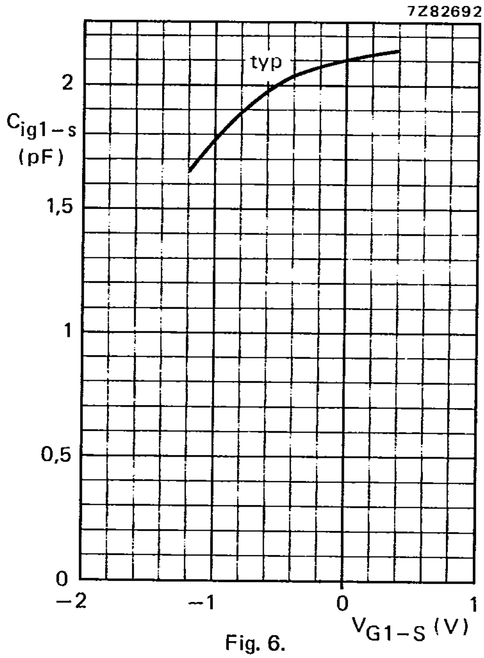


Fig. 6.

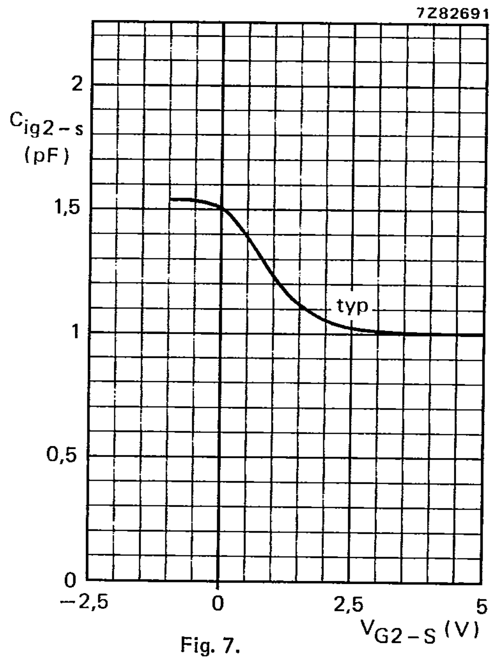


Fig. 7.

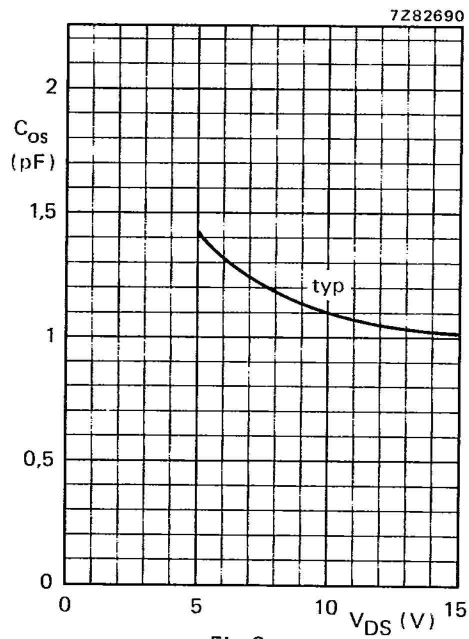


Fig. 8.

Measuring conditions:

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

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

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

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

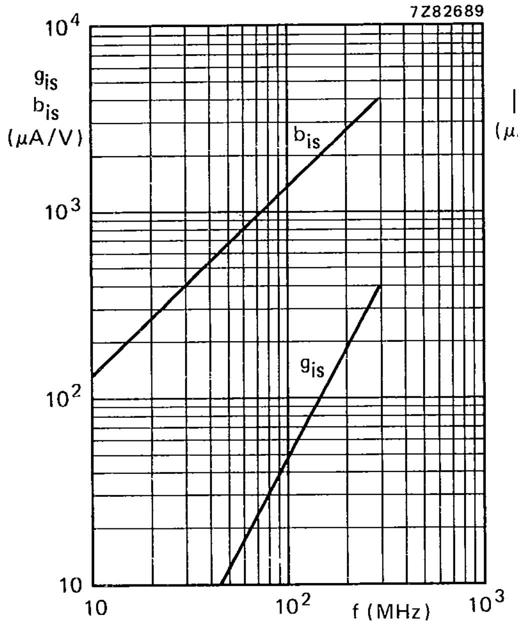


Fig. 9.

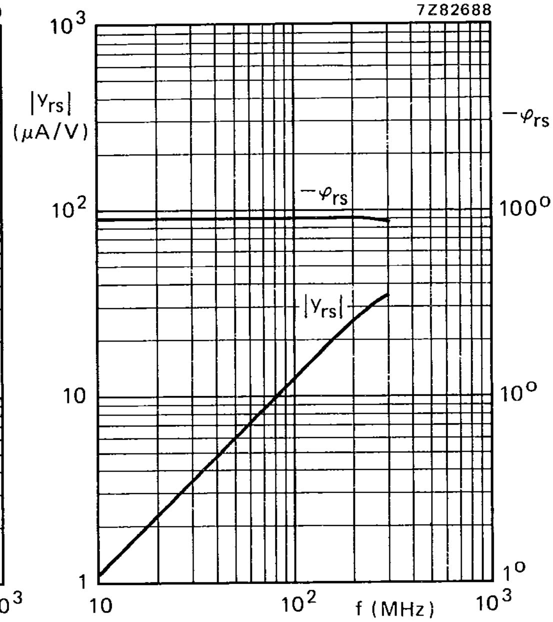


Fig. 10.

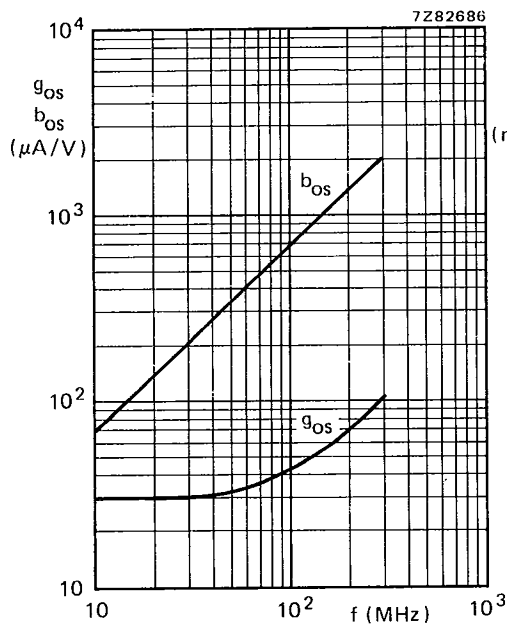


Fig. 11.

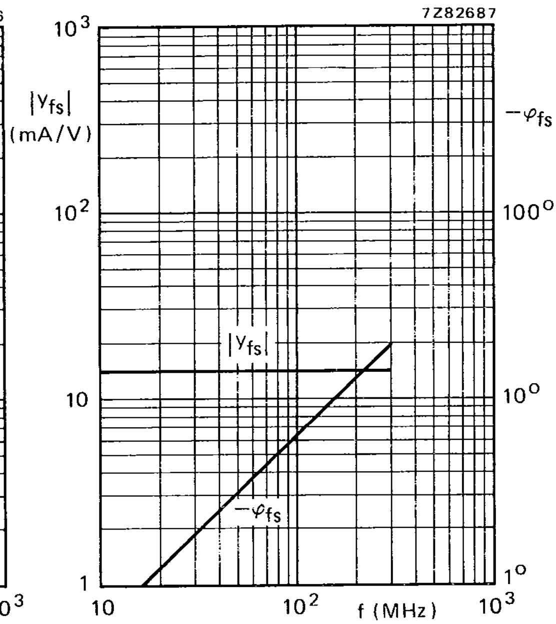


Fig. 12.

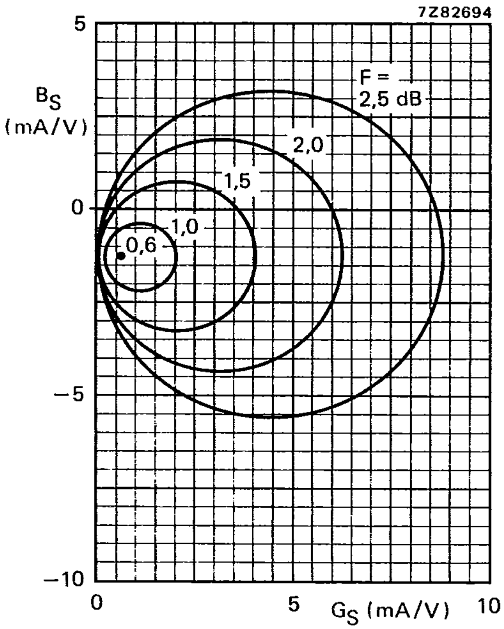


Fig. 13 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; I_D = 10 mA; f = 100 MHz; T_{amb} = 25 °C; circles of typical constant noise figures.

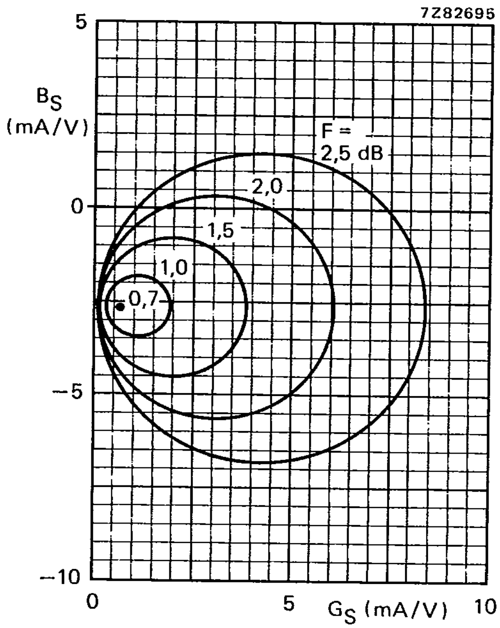
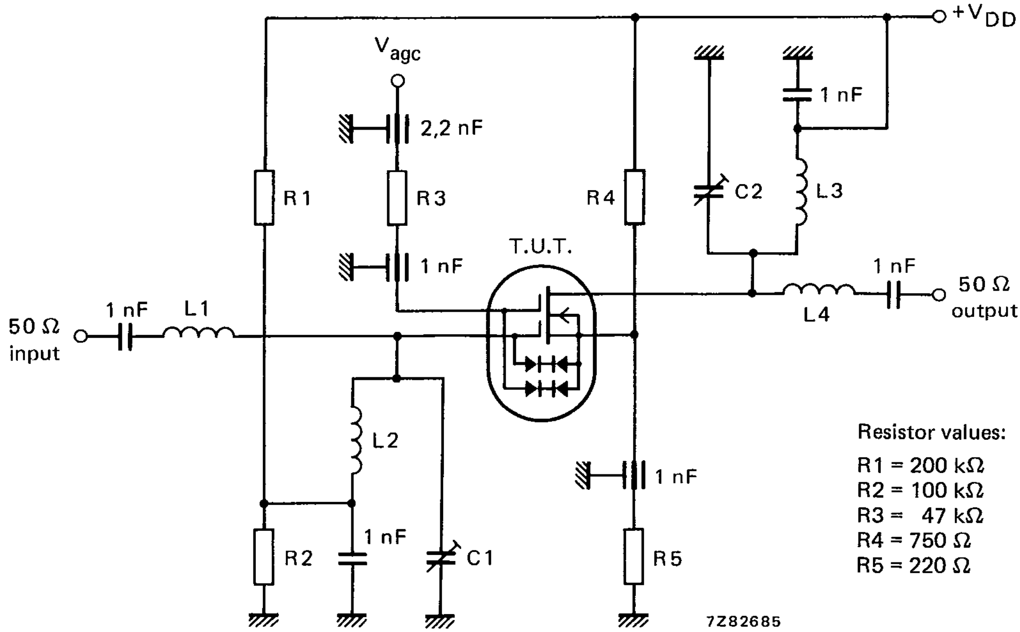


Fig. 14 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; I_D = 10 mA; f = 200 MHz; T_{amb} = 25 °C; circles of typical constant noise figures.



Resistor values:

R1 = 200 kΩ
R2 = 100 kΩ
R3 = 47 kΩ
R4 = 750 Ω
R5 = 220 Ω

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.

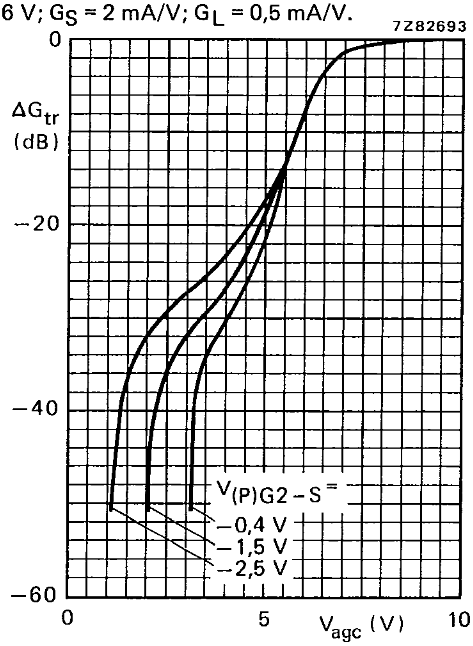


Fig. 16 V_{DD} = 16 V; f = 200 MHz; T_{amb} = 25 °C; typical values; see also Fig. 15.