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; + $V_{G2\text{-}S}$ = 4 V	$\lvert y_{fs} \rvert$	typ.	14 mS
Input capacitance at gate 1; f = 1 MHz I_D = 10 mA; V_{DS} = 10 V; + $V_{G2\text{-}S}$ = 4 V	$C_{ig1\text{-}s}$	typ.	2.1 pF
Feedback capacitance at f = 1 MHz I_D = 10 mA; V_{DS} = 10 V; + $V_{G2\text{-}S}$ = 4 V	C_{rs}	typ.	20 fF
Noise figure at optimum source admittance I_D = 10 mA; V_{DS} = 10 V; + $V_{G2\text{-}S}$ = 4 V; f = 200 MHz	F	typ.	0.7 dB

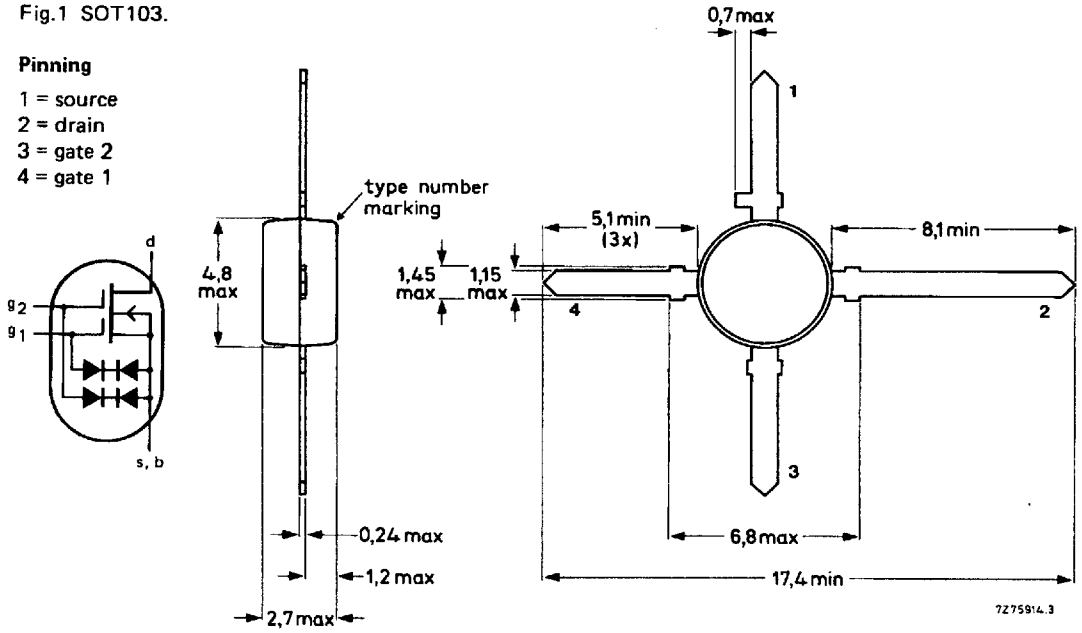
MECHANICAL DATA

Dimensions in mm

Fig.1 SOT103.

Pinning

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



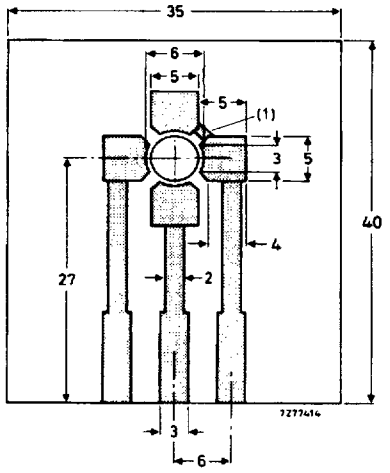
RATINGS

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	$\pm I_{G1-S}$	max.	10 mA
Gate 2 - source current	$\pm I_{G2-S}$	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)	$R_{th\ j-a}$	=	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 °C

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

DYNAMIC CHARACTERISTICS

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

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-s}	typ. 2.1	pF
Input capacitance at gate 2; f = 1 MHz	C_{ig2-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

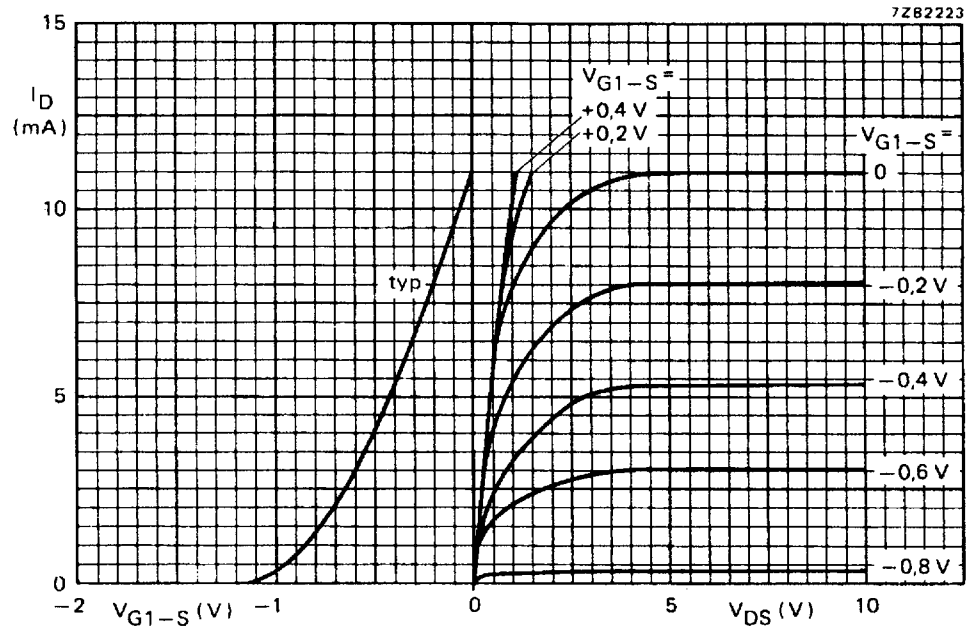


Fig. 3 **Left-hand graph:** V_{DS} = 10 V; V_{G2-S} = + 4 V; T_{amb} = 25 °C. **Right-hand graph:** V_{G2-S} = + 4 V; T_{amb} = 25 °C.

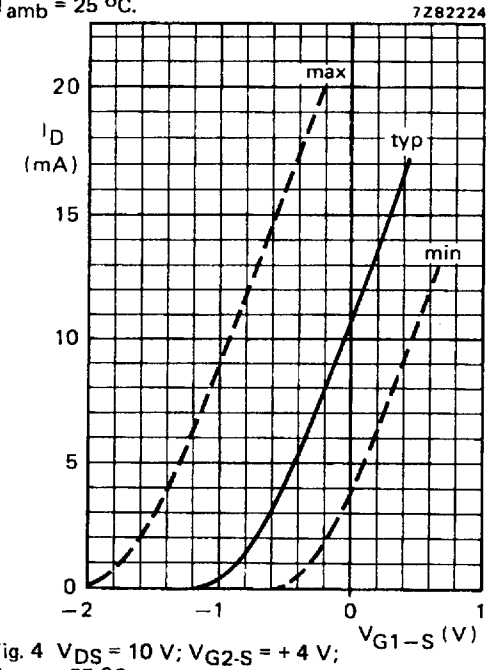


Fig. 4 V_{DS} = 10 V; V_{G2-S} = + 4 V; T_{amb} = 25 °C.

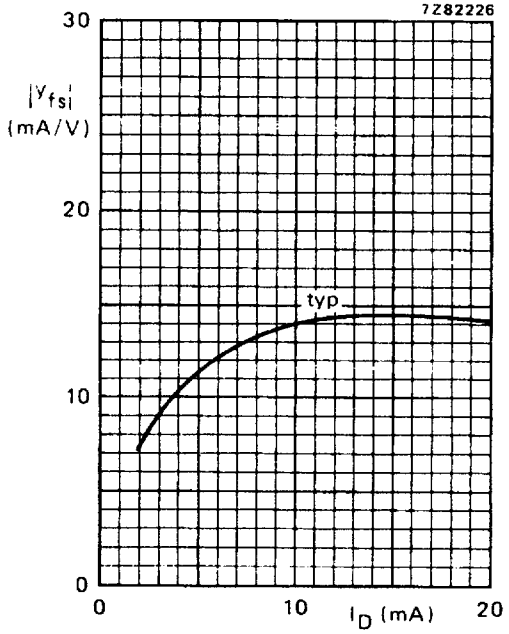


Fig. 5 V_{DS} = 10 V; V_{G2-S} = + 4 V; f = 1 kHz; T_{amb} = 25 °C.

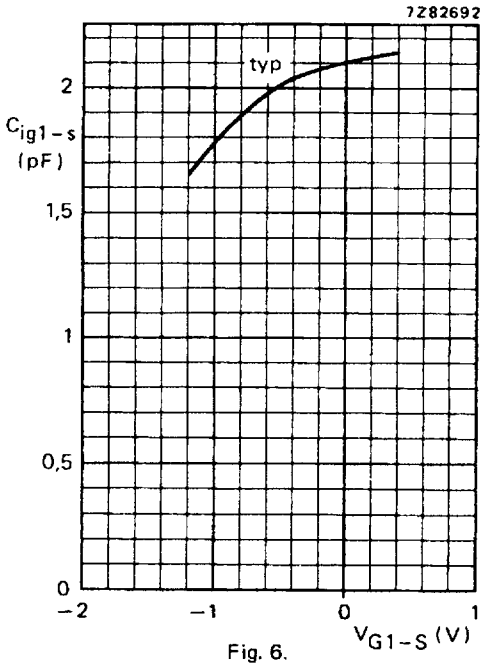


Fig. 6.

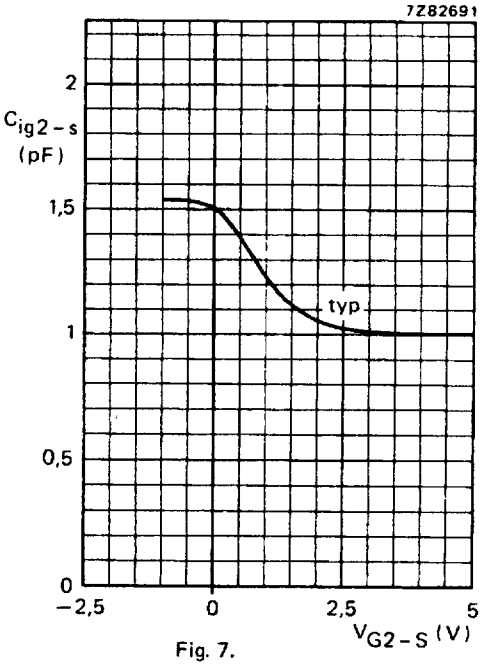


Fig. 7.

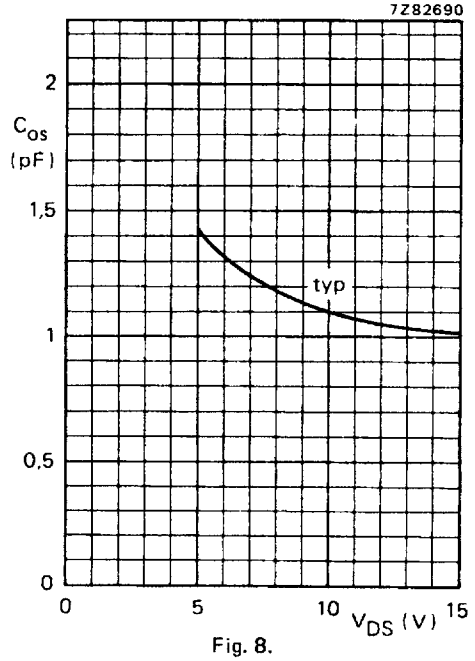


Fig. 8.

Measuring conditions:

Fig. 6 V_{DS} = 10 V; V_{G2-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 V; I_D = 10 mA; V_{G2-S} = + 4 V; T_{amb} = 25 °C.

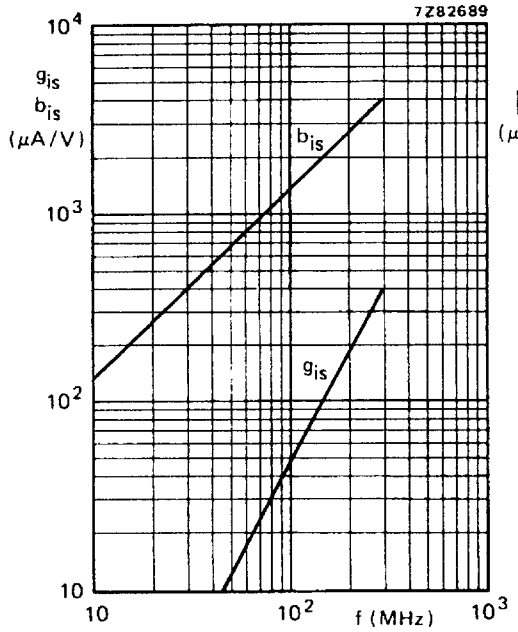


Fig. 9.

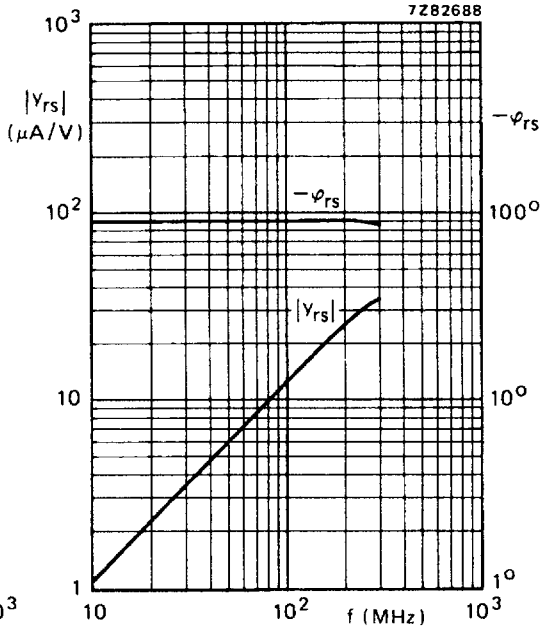


Fig. 10.

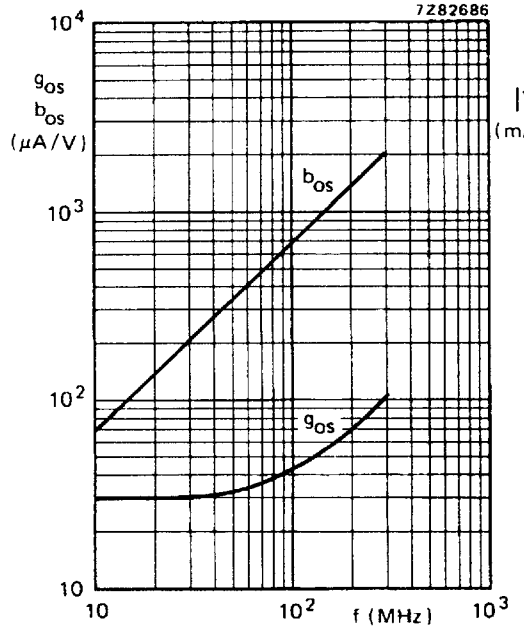


Fig. 11.

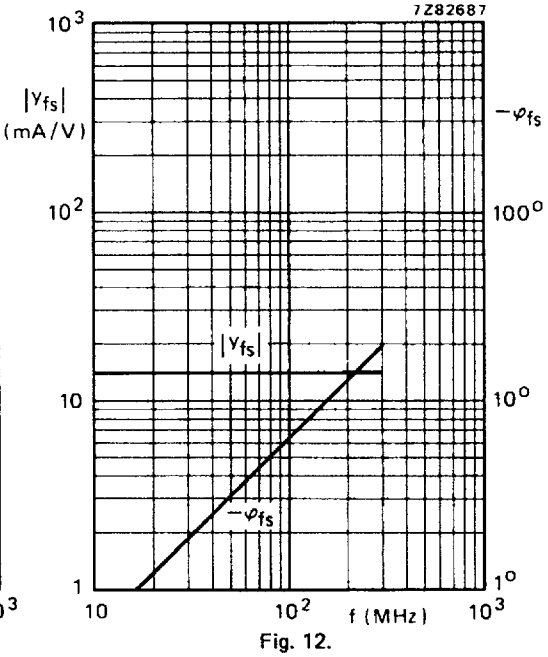


Fig. 12.

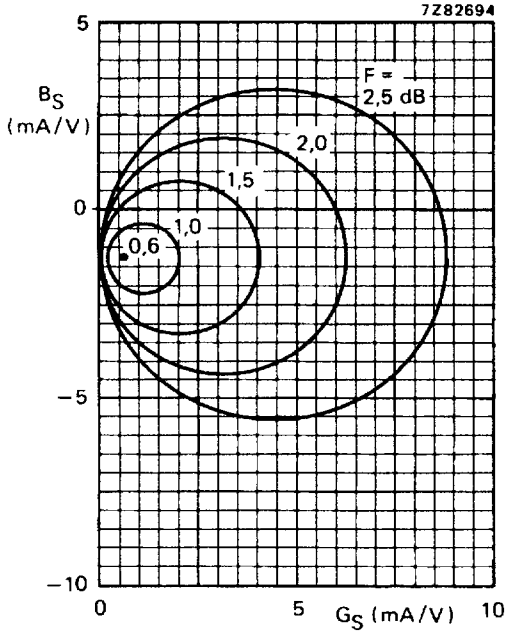


Fig. 13 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; I_D = 10 mA; f = 100 MHz; T_{amb} = 25 °C; circles of typical constant noise figures.

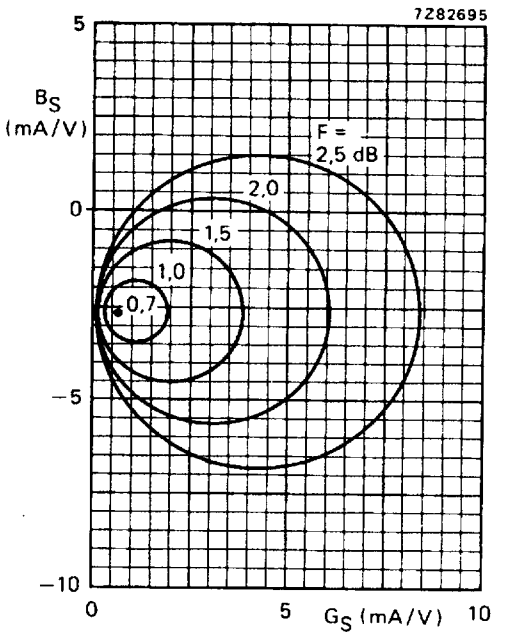


Fig. 14 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; I_D = 10 mA; f = 200 MHz; T_{amb} = 25 °C; circles of typical constant noise figures.

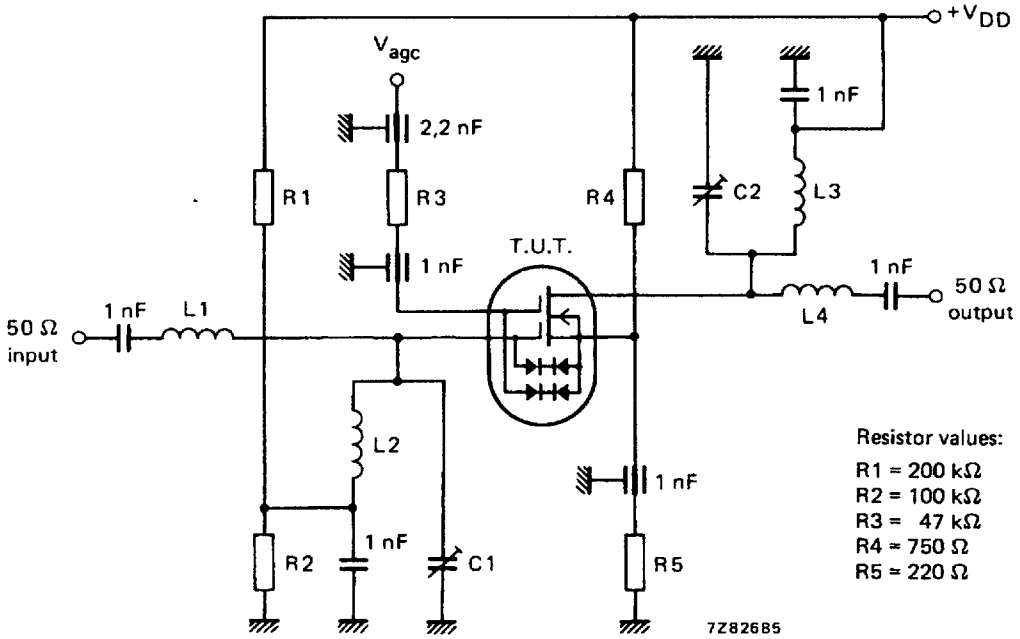


Fig. 15 Automatic gain control test circuit at f = 200 MHz (see also Fig. 16).
V_{DD} = 16 V; G_S = 2 mA/V; G_L = 0,5 mA/V.

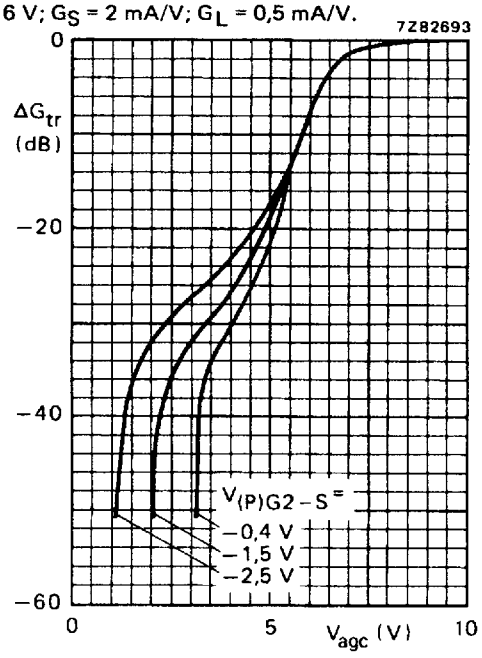


Fig. 16 V_{DD} = 16 V; f = 200 MHz;
T_{amb} = 25 °C; typical values;
see also Fig. 15.