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.

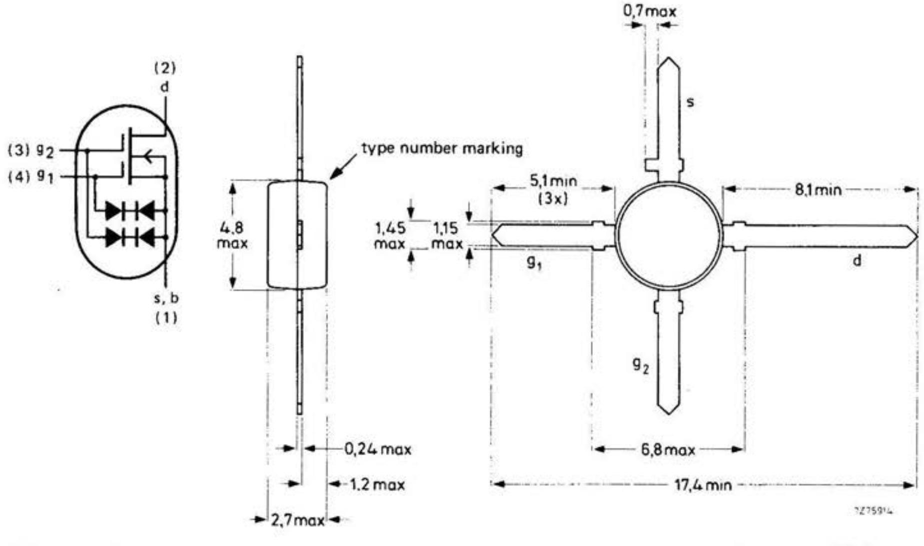
QUICK REFERENCE DATA

Drain-source voltage	V_{DS}	max.	20	V
Drain current	I_D	max.	20	mA
Total power dissipation up to T_{amb} = 75 °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
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 SOT-103.



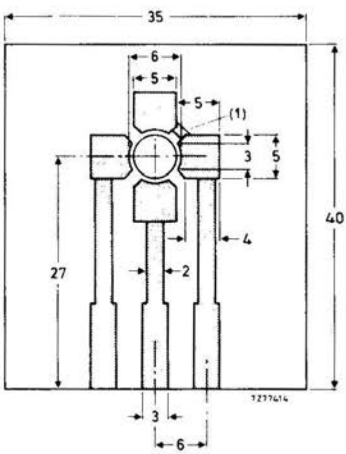
RATINGS

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	$\pm I_{G1\text{-}S}$	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	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_{amb} = 25 °C unless otherwise specified

Gate cut-off currents			
$\pm V_{G1-S}$ = 5 V; $V_{G2-S} = V_{DS}$ = 0	$\pm I_{G1-SS}$	<	50 nA
$\pm V_{G2-S}$ = 5 V; $V_{G1-S} = V_{DS}$ = 0	$\pm I_{G2-SS}$	<	50 nA
Gate-source breakdown voltages			
$\pm I_{G1-SS}$ = 10 mA; $V_{G2-S} = V_{DS}$ = 0	$\pm V_{(BR)G1-SS}$	>	6 V
$\pm I_{G2-SS}$ = 10 mA; $V_{G1-S} = V_{DS}$ = 0	$\pm V_{(BR)G2-SS}$	>	6 V
Drain current			
V_{DS} = 10 V; V_{G1-S} = 0; + V_{G2-S} = 4 V; T_j = 25 °C	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	$\|y_{fs}\|$	>	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	F	typ.	0,7 dB
		<	1,7 dB
Noise figure at f = 200 MHz; G_S = 2 mS	F	typ.	1,0 dB
		<	2,0 dB
Transducer gain at f = 100 MHz; G_S = 1 mS; G_L = 0,5 mS	G_{tr}	typ.	29 dB
Transducer gain at f = 200 MHz; G_S = 2 mS; G_L = 0,5 mS	G_{tr}	typ.	26 dB ←

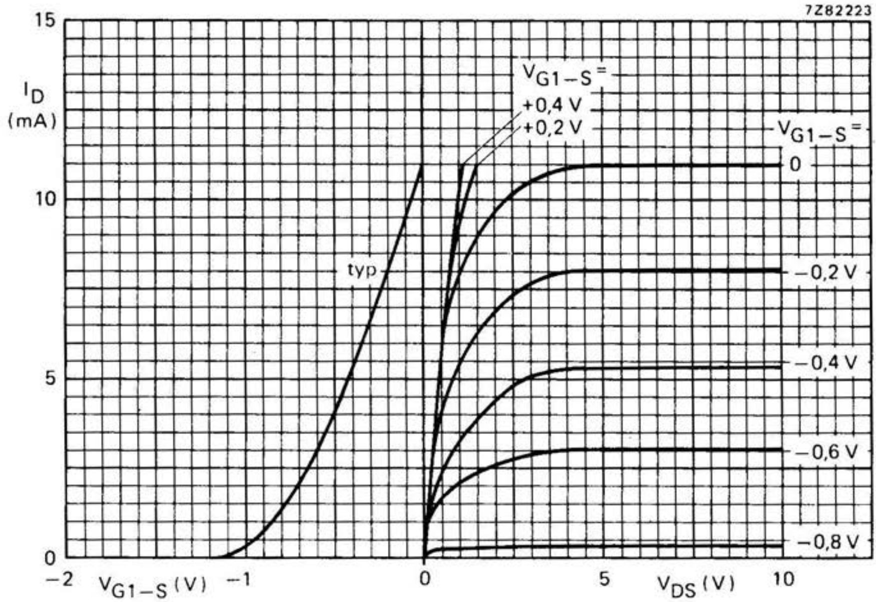


Fig. 3 **Left-hand graph:** V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; T_{amb} = 25 °C. **Right-hand graph:** $V_{G2\text{-}S}$ = + 4 V; T_{amb} = 25 °C.

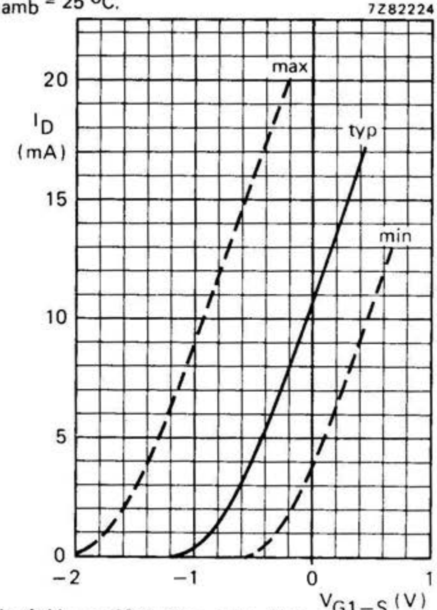


Fig. 4 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; T_{amb} = 25 °C.

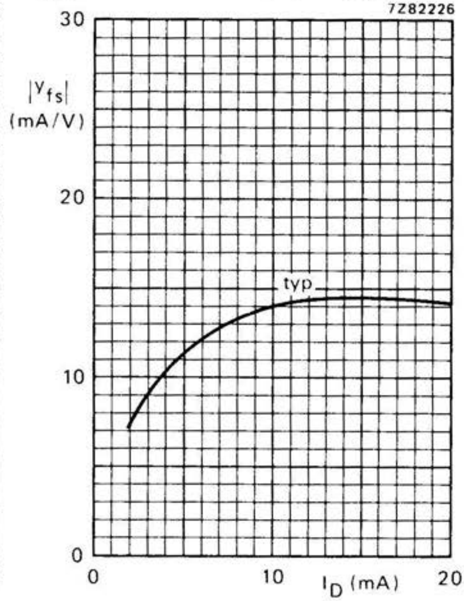


Fig. 5 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; f = 1 kHz; T_{amb} = 25 °C.

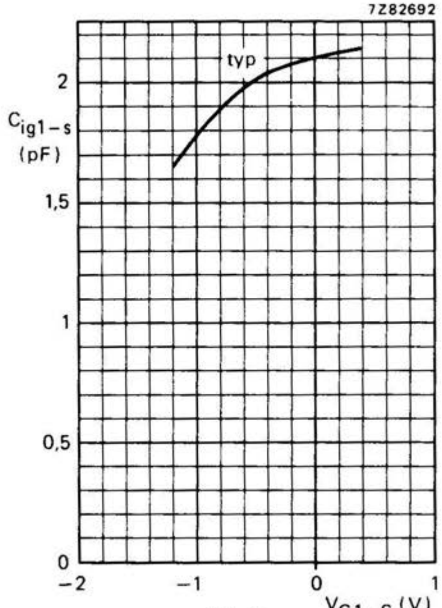


Fig. 6.

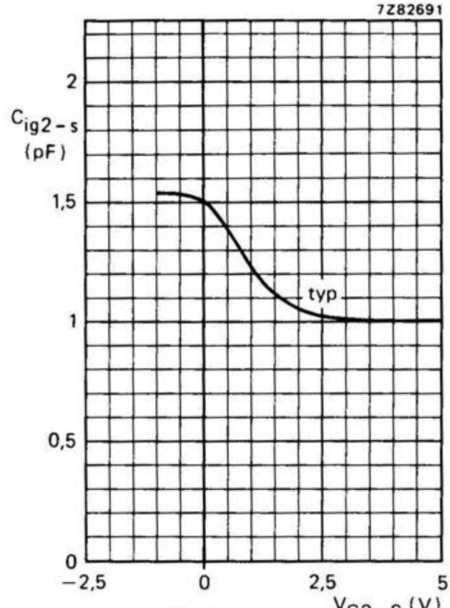


Fig. 7.

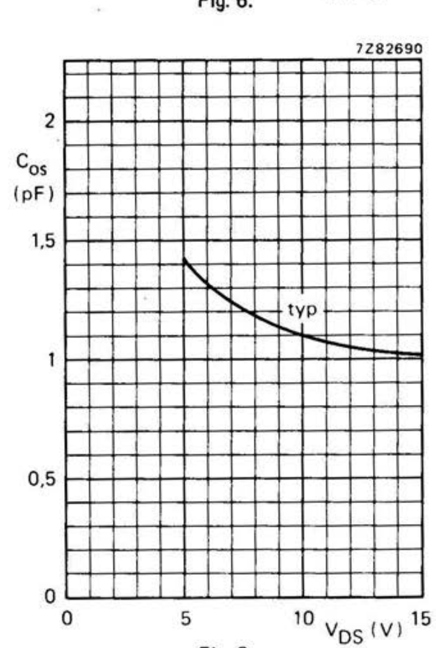


Fig. 8.

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.

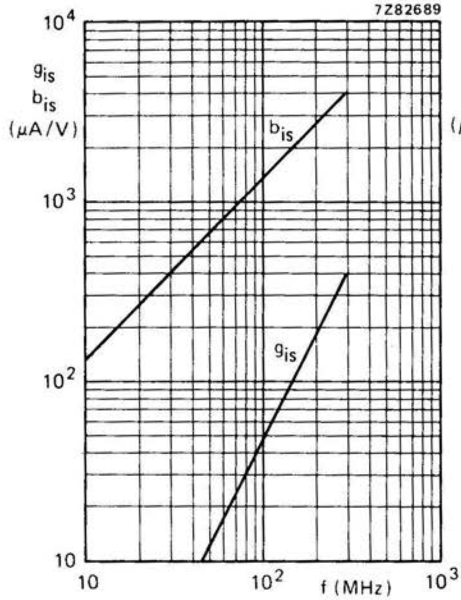


Fig. 9.

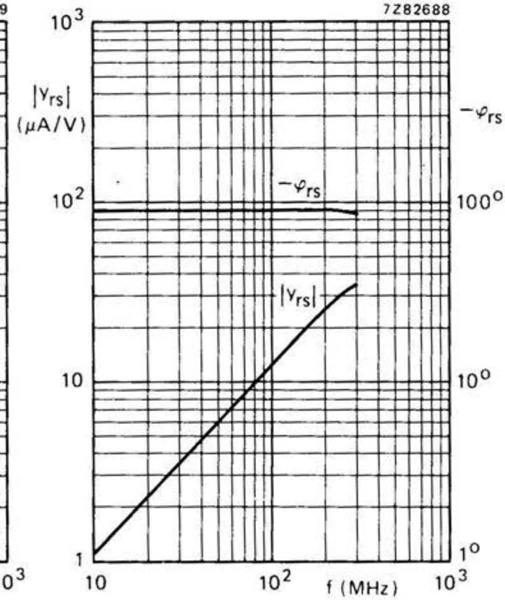


Fig. 10.

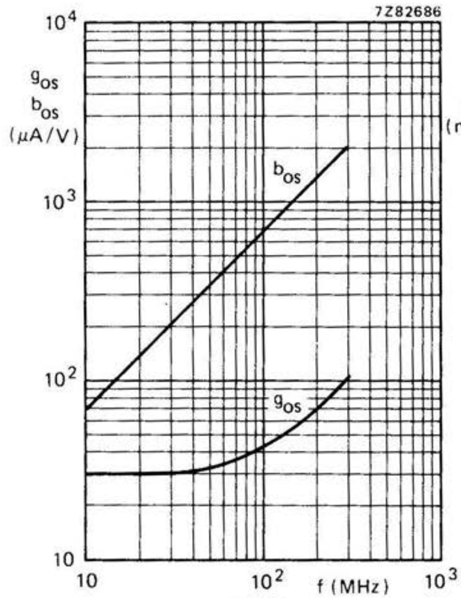


Fig. 11.

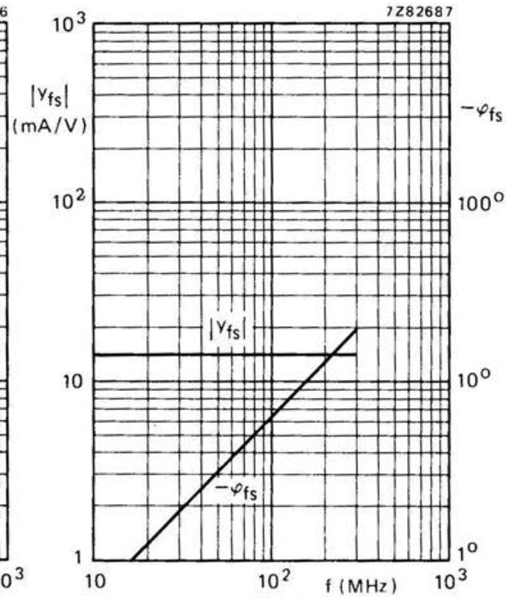


Fig. 12.

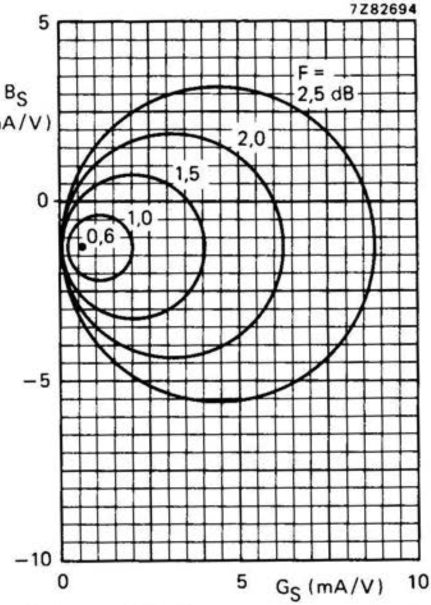


Fig. 13 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; I_D = 10 mA; f = 100 MHz; T_{amb} = 25 °C; circles of typical constant noise figures.

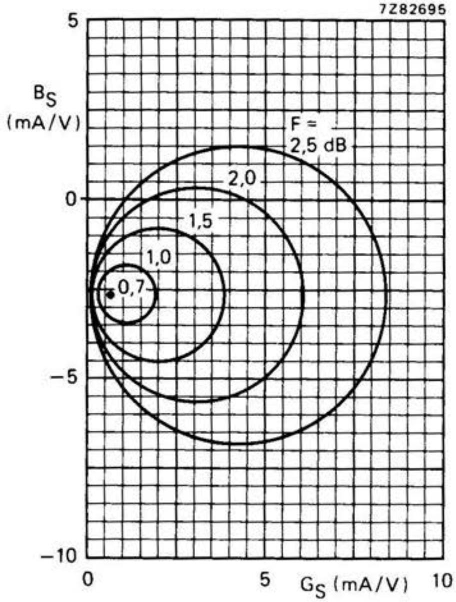


Fig. 14 V_{DS} = 10 V; $V_{G2\text{-}S}$ = + 4 V; I_D = 10 mA; f = 200 MHz; T_{amb} = 25 °C; circles of typical constant noise figures.

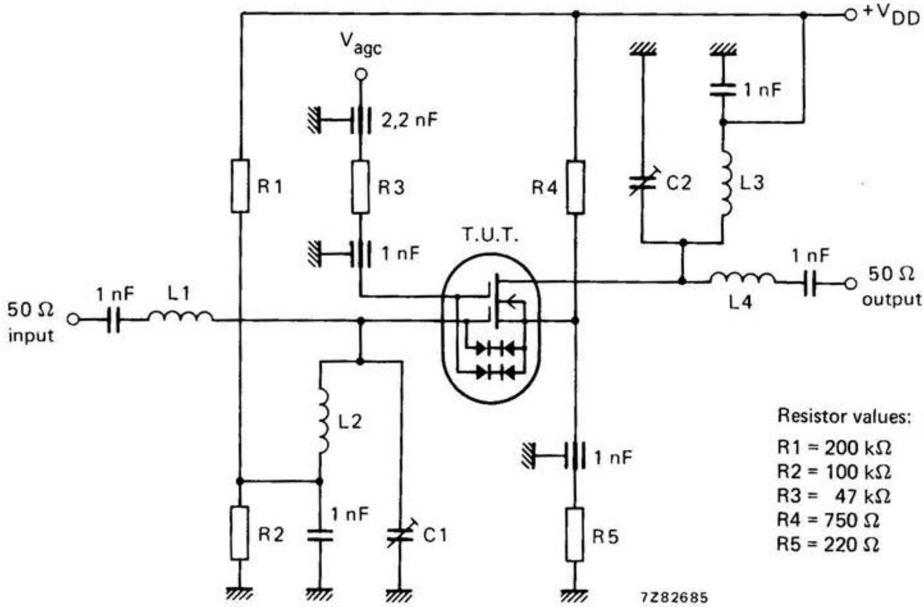


Fig. 15 Automatic gain control test circuit at f = 200 MHz (see also Fig. 16).
V_{DD} = 16 V; G_S = 2 mA/V; G_L = 0,5 mA/V.

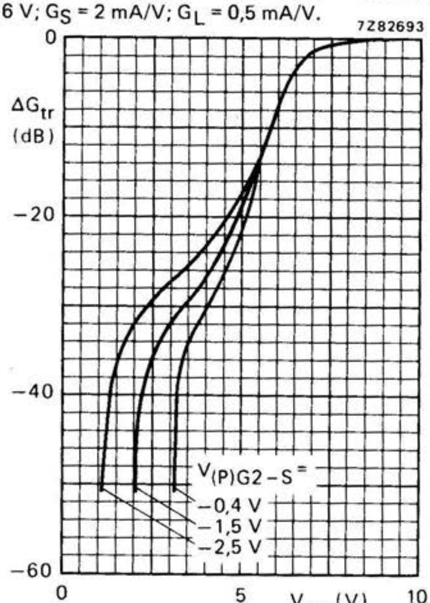


Fig. 16 V_{DD} = 16 V; f = 200 MHz; T_{amb} = 25 °C; typical values; see also Fig. 15.