

N-channel field-effect transistors

J210; J211; J212

FEATURES

- High speed switching
- Interchangeability of drain and source connections
- High impedance.

APPLICATIONS

- Analog switches
- Choppers, multiplexers and commutators
- Audio amplifiers.

DESCRIPTION

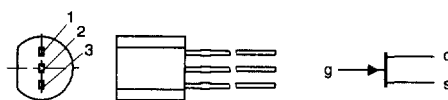
N-channel symmetrical junction field-effect transistor in a TO-92 (SOT54) package.

CAUTION

This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B.

PINNING - TO-92 (SOT54)

PIN	SYMBOL	DESCRIPTION
1	g	gate
2	s	source
3	d	drain



MAM197

Marking codes:

J210: J210.
J211: J211.
J212: J212.

Fig.1 Simplified outline and symbol.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	±25	V
V_{GSoff}	gate-source cut-off voltage	$I_D = 1 \text{ nA}; V_{DS} = 15 \text{ V}$			
	J210		–1	–3	V
	J211		–2.5	–4.5	V
	J212		–4	–6	V
I_{DSS}	drain current	$V_{GS} = 0; V_{DS} = 15 \text{ V}$			
	J210		2	15	mA
	J211		7	20	mA
	J212		15	40	mA
P_{tot}	total power dissipation	$T_{amb} \leq 50 \text{ °C}$	–	400	mW
$ y_{fs} $	common-source transfer admittance	$V_{GS} = 0; V_{DS} = 15 \text{ V}$			
	J210		4	12	mS
	J211		6	12	mS
	J212		7	12	mS

N-channel field-effect transistors

J210; J211; J212

LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DS}	drain-source voltage		–	± 25	V
V_{GSO}	gate-source voltage	open drain	–	–25	V
V_{DGO}	drain-gate voltage	open source	–	–25	V
I_G	forward gate current (DC)		–	10	mA
P_{tot}	total power dissipation	$T_{amb} \leq 50\text{ }^{\circ}\text{C}$; note 1; see Fig.13	–	400	mW
T_{stg}	storage temperature		–65	150	$^{\circ}\text{C}$
T_j	operating junction temperature		–	150	$^{\circ}\text{C}$

Note

1. Device mounted on a printed-circuit board, maximum lead length 4 mm; mounting pad for the drain lead 10 mm².

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient; note 1	250	K/W

Note

1. Device mounted on a printed-circuit board, maximum lead length 4 mm; mounting pad for the drain lead 10 mm².

N-channel field-effect transistors

J210; J211; J212

STATIC CHARACTERISTICS

 $T_j = 25\text{ }^{\circ}\text{C}$.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)GSS}$	gate-source breakdown voltage	$I_G = -1\text{ }\mu\text{A}$; $V_{DS} = 0$	–	–25	V
V_{GSoff}	gate-source cut-off voltage	$I_D = 1\text{ nA}$; $V_{DS} = 15\text{ V}$			
	J210		–1	–3	V
	J211		–2.5	–4.5	V
	J212		–4	–6	V
V_{GSS}	gate-source forward voltage	$I_G = 0$; $V_{DS} = 0$	–	1	V
I_{DSS}	drain current	$V_{GS} = 0$; $V_{DS} = 15\text{ V}$			
	J10		2	15	mA
	J11		7	20	mA
	J12		15	40	mA
I_{GSS}	reverse gate leakage current	$V_{GS} = -15\text{ V}$; $V_{DS} = 0$	–	–100	pA
$ y_{fs} $	common-source transfer admittance	$V_{GS} = 0$; $V_{DS} = 15\text{ V}$			
	J210		4	12	mS
	J211		6	12	mS
	J212		7	12	mS
$ y_{os} $	common source output admittance	$V_{GS} = 0$; $V_{DS} = 15\text{ V}$			
	J210		–	150	μS
	J211		–	200	μS
	J212		–	200	μS

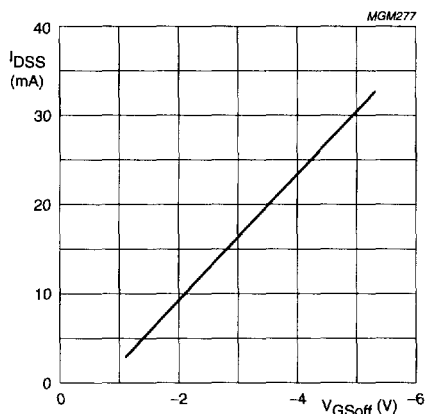
DYNAMIC CHARACTERISTICS

 $T_{amb} = 25\text{ }^{\circ}\text{C}$.

SYMBOL	PARAMETER	CONDITIONS	TYP.	UNIT
C_{is}	input capacitance	$V_{DS} = 15\text{ V}$; $V_{GS} = -10\text{ V}$; $f = 1\text{ MHz}$	2	pF
		$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 1\text{ MHz}$	4	pF
C_{os}	output capacitance	$V_{DS} = 15\text{ V}$; $V_{GS} = -10\text{ V}$; $f = 1\text{ MHz}$	0.8	pF
		$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 1\text{ MHz}$	2	pF
C_{rs}	feedback capacitance	$V_{DS} = 15\text{ V}$; $V_{GS} = -10\text{ V}$; $f = 1\text{ MHz}$	0.8	pF
		$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 1\text{ MHz}$	0.9	pF
g_{is}	common source input conductance	$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 100\text{ MHz}$	70	μS
		$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 450\text{ MHz}$	1.1	mS
g_{fs}	common source transfer conductance	$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 100\text{ MHz}$	7.5	mS
		$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 450\text{ MHz}$	7.5	mS
g_{rs}	common source feedback conductance	$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 100\text{ MHz}$	–8	μS
		$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 450\text{ MHz}$	–90	μS
g_{os}	common source output conductance	$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 100\text{ MHz}$	95	μS
		$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 450\text{ MHz}$	200	μS
V_n	equivalent input noise voltage	$V_{DS} = 15\text{ V}$; $V_{GS} = 0$; $f = 1\text{ kHz}$	5	$\text{nV}/\sqrt{\text{Hz}}$

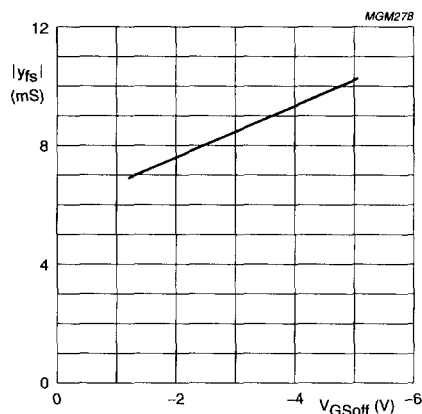
N-channel field-effect transistors

J210; J211; J212



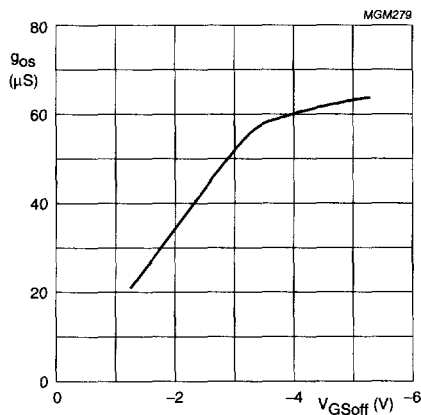
$V_{DS} = 15$ V; $T_j = 25$ °C.

Fig.2 Drain current as a function of gate-source cut-off voltage; typical values.



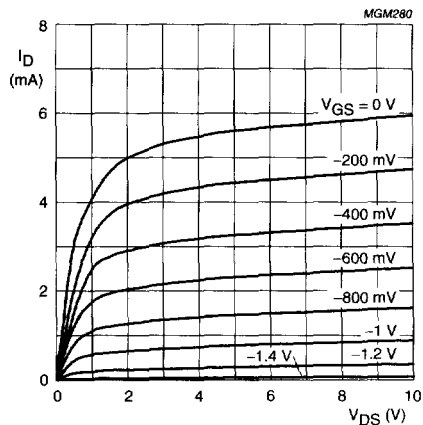
$V_{DS} = 15$ V; $T_j = 25$ °C.

Fig.3 Common-source transfer admittance as a function of gate-source cut-off voltage; typical values.



$V_{DS} = 15$ V; $T_{amb} = 25$ °C.

Fig.4 Common-source output conductance as a function of gate-source cut-off voltage; typical values.



J210.

$T_j = 25$ °C.

Fig.5 Output characteristics; typical values.

N-channel field-effect transistors

J210; J211; J212

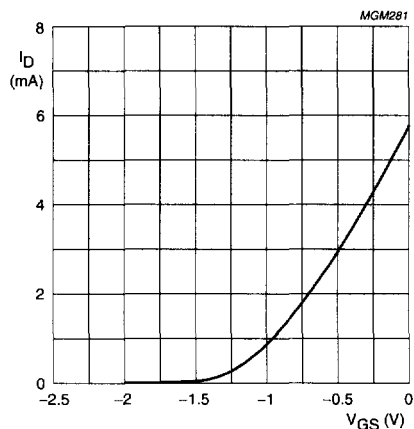
**J210.** $V_{DS} = 10$ V; $T_J = 25$ °C.

Fig.6 Input characteristics; typical values.

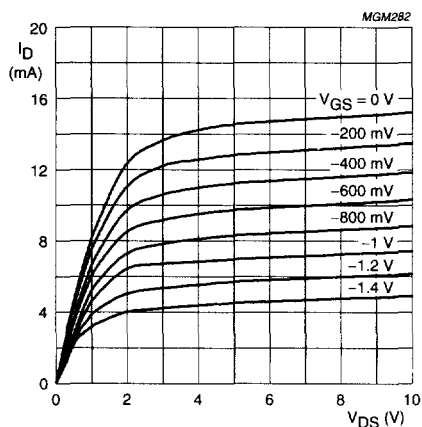
**J211.** $T_J = 25$ °C.

Fig.7 Output characteristics; typical values.

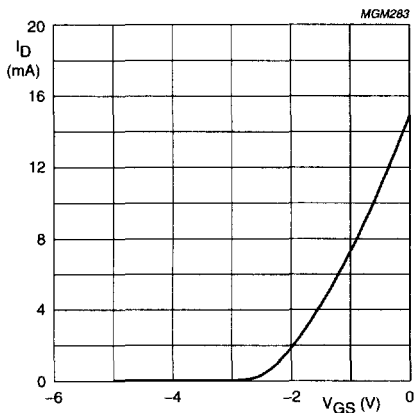
**J211.** $V_{DS} = 10$ V; $T_J = 25$ °C.

Fig.8 Input characteristics; typical values.

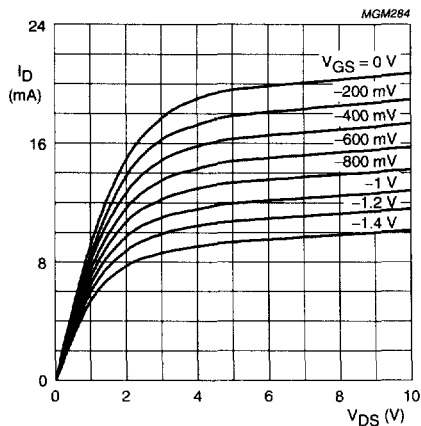
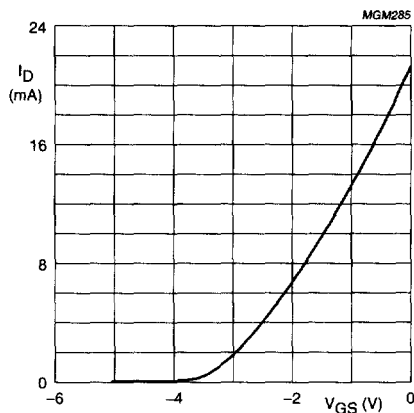
**J212.** $T_J = 25$ °C.

Fig.9 Output characteristics; typical values.

N-channel field-effect transistors

J210; J211; J212



J212.

 $V_{DS} = 10$ V; $T_J = 25$ °C.

Fig.10 Input characteristics; typical values.

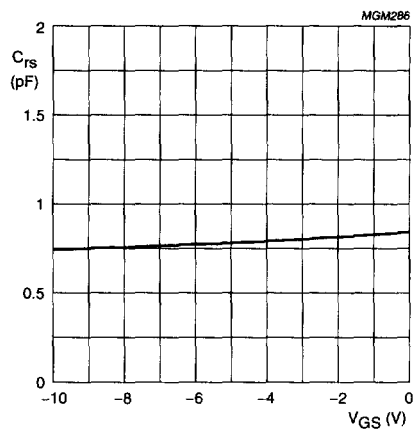
 $V_{DS} = 15$ V; $f = 1$ MHz; $T_{amb} = 25$ °C.

Fig.11 Feedback capacitance as a function of gate-source voltage; typical values.

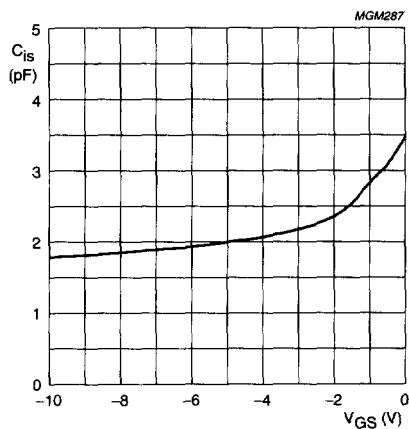
 $V_{DS} = 15$ V; $f = 1$ MHz; $T_{amb} = 25$ °C.

Fig.12 Input capacitance as a function of gate-source voltage; typical values.

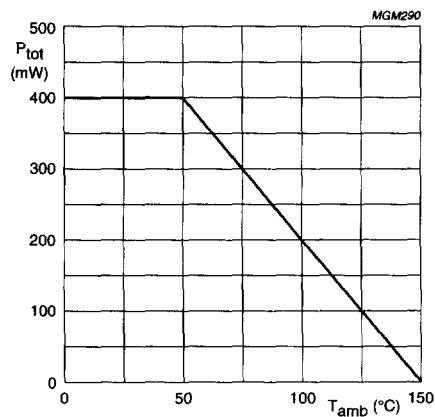
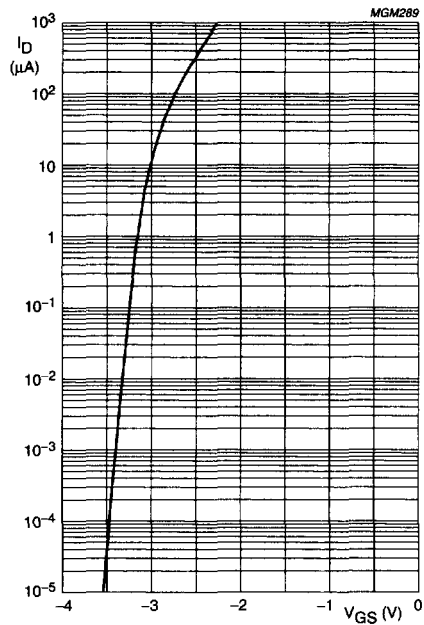


Fig.13 Power derating curve.

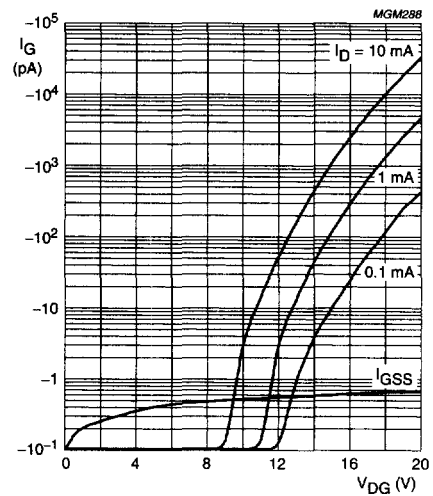
N-channel field-effect transistors

J210; J211; J212



$V_{DS} = 15 \text{ V}$; $T_i = 25^\circ\text{C}$.

Fig.14 Drain current as a function of gate-source voltage; typical values.

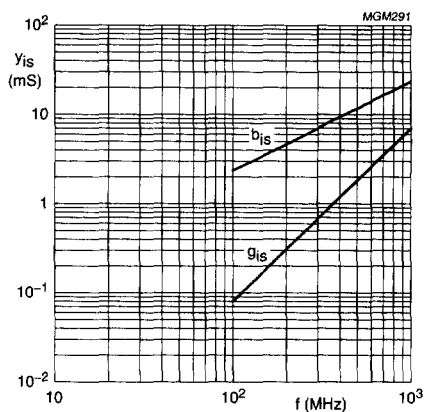


$T_i = 25^\circ\text{C}$.

Fig.15 Gate current as a function of drain-gate voltage; typical values.

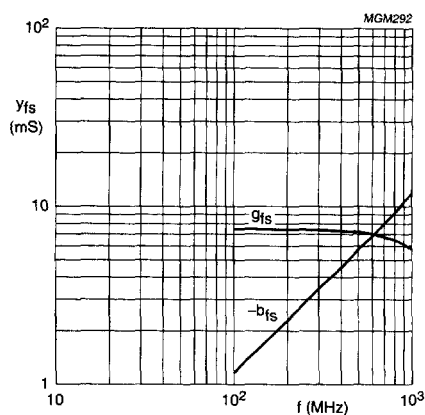
N-channel field-effect transistors

J210; J211; J212



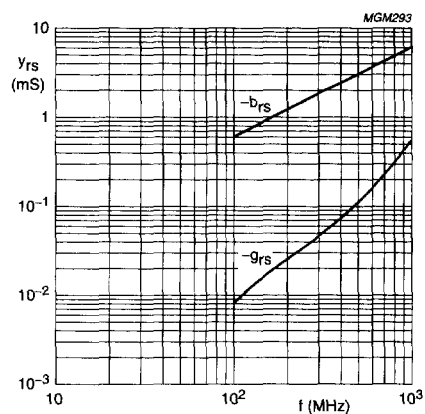
$V_{DS} = 15$ V; $V_{GS} = 0$; $T_{amb} = 25$ °C.

Fig.16 Common source input admittance as a function of frequency; typical values.



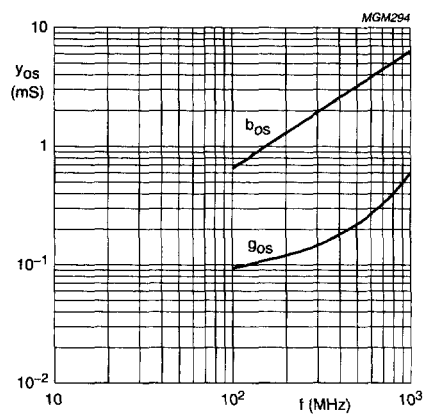
$V_{DS} = 15$ V; $V_{GS} = 0$; $T_{amb} = 25$ °C.

Fig.17 Common source transfer admittance as a function of frequency; typical values.



$V_{DS} = 15$ V; $V_{GS} = 0$; $T_{amb} = 25$ °C.

Fig.18 Common source reverse admittance as a function of frequency; typical values.



$V_{DS} = 15$ V; $V_{GS} = 0$; $T_{amb} = 25$ °C.

Fig.19 Common source output admittance as a function of frequency; typical values.