N-channel silicon field-effect transistors

J308/309/310

FEATURES

- Low noise
- Interchangeability of drain and source connections
- High gain.

DESCRIPTION

Silicon symmetrical n-channel junction FETs in a TO-92 envelope. They are intended for use in the AM input stage in car radios and in UHF/VHF amplifiers, oscillators and mixers.

PIN CONFIGURATION

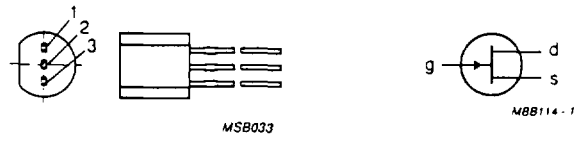


Fig.1 Simplified outline and symbol.

PINNING - TO-92

PIN	DESCRIPTION
1	gate
2	source
3	drain

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$\pm V_{DS}$	drain-source voltage		–	25	V
I_{DSS}	drain current	V_{DS} = 10 V; V_{GS} = 0			
	J308		12	60	mA
	J309		12	30	mA
	J310		24	60	mA
P_{tot}	total power dissipation	up to T_{amb} = 50 °C	–	400	mW
$-V_{GS(off)}$	gate-source cut-off voltage	V_{DS} = 10 V; I_D = 1 µA			
	J308		1	6.5	V
	J309		1	4	V
	J310		2	6.5	V
Y_{fs}	common-source transfer admittance	V_{DS} = 10 V; I_D = 10 mA	10	–	mS

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$\pm V_{DS}$	drain-source voltage		–	25	V
$-V_{GSO}$	gate-source voltage		–	25	V
$-V_{GDO}$	gate-drain voltage		–	25	V
I_G	forward gate current	DC value	–	50	mA
P_{tot}	total power dissipation	up to T_{amb} = 50 °C	–	400	mW
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}a}$	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 minimum 10 x 10 mm

STATIC CHARACTERISTICS

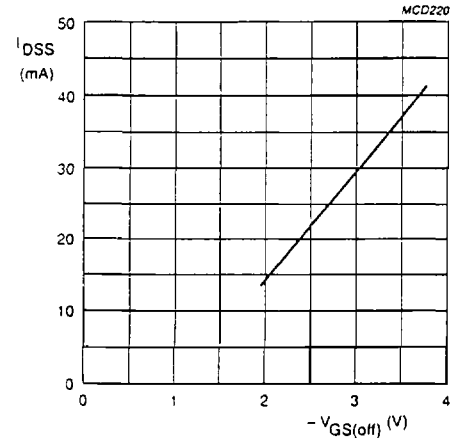
T_j = 25 °C.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$-V_{(BR)GSS}$	gate-source breakdown voltage	$-I_G$ = 1 μA V_{DS} = 0	25	–		V
I_{DSS}	drain current	V_{DS} = 10 V; V_{GS} = 0				
	J308		12	–	60	mA
	J309		12	–	30	mA
	J310		24	–	60	mA
$-I_{GSS}$	reverse gate leakage current	$-V_{GS}$ = 15 V; V_{DS} = 0	–	–	1	nA
V_{GSS}	gate-source forward voltage	V_{DS} = 0; I_G = 1 mA	–	–	1	V
$-V_{GS(off)}$	gate-source cut-off voltage	V_{DS} = 10 V; I_D = 1 μA				
	J308		1	–	6.5	V
	J309		1	–	4	V
	J310		2	–	6.5	V
$R_{DS(on)}$	drain-source on-resistance	V_{DS} = 100 mV; V_{GS} = 0	–	50	–	Ω
$\lvert Y_{fs}\rvert$	common-source transfer admittance	V_{DS} = 10 V; I_D = 10 mA	10	–	–	mS
$\lvert Y_{os}\rvert$	common-source output admittance	V_{DS} = 10 V; I_D = 10 mA	–	–	250	μS

DYNAMIC CHARACTERISTICS

T_j = 25 °C.

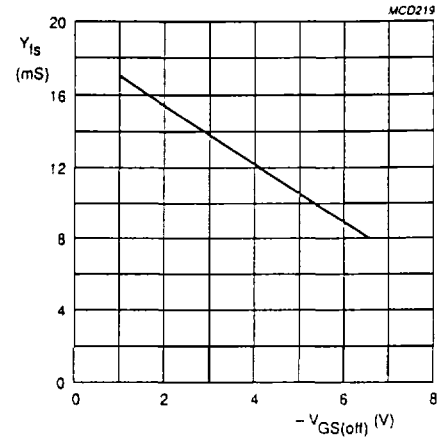
SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
C_{is}	input capacitance	V_{DS} = 10 V; $-V_{GS}$ = 10 V; f = 1 MHz	3	5	pF
		V_{DS} = 10 V; $-V_{GS}$ = 0; T_{amb} = 25 °C	6	–	pF
C_{rs}	feedback capacitance	V_{DS} = 0; $-V_{GS}$ = 10 V; f = 1 MHz	1.3	2.5	pF
g_{is}	common-source input conductance	V_{DS} = 10 V; I_D = 10 mA; f = 100 MHz	200	–	µS
		V_{DS} = 10 V; I_D = 10 mA; f = 450 MHz	3	–	mS
g_{fs}	common-source transfer conductance	V_{DS} = 10 V; I_D = 10 mA; f = 100 MHz	13	–	mS
		V_{DS} = 10 V; I_D = 10 mA; f = 450 MHz	12	–	mS
$-g_{rs}$	common-source feedback conductance	V_{DS} = 10 V; I_D = 10 mA; f = 100 MHz	30	–	µS
		V_{DS} = 10 V; I_D = 10 mA; f = 450 MHz	450	–	µS
g_{os}	common-source output conductance	V_{DS} = 10 V; I_D = 10 mA; f = 100 MHz	150	–	µS
		V_{DS} = 10 V; I_D = 10 mA; f = 450 MHz	400	–	µS
$\bar{e}_n$	equivalent input noise voltage	V_{DS} = 10 V; I_D = 10 mA; f = 100 Hz	6	–	$\frac{nV}{\sqrt{Hz}}$



J308, 309 & 310.

V_{DS} = 10 V; T_j = 25 °C.

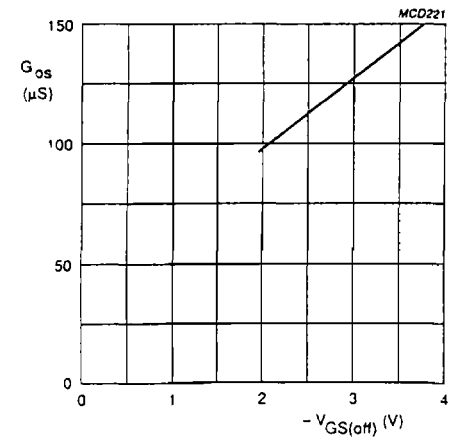
Fig.2 Drain current as a function of gate-source cut-off voltage.



J308, 309 & 310.

V_{DS} = 10 V; I_D = 10 mA; T_j = 25 °C.

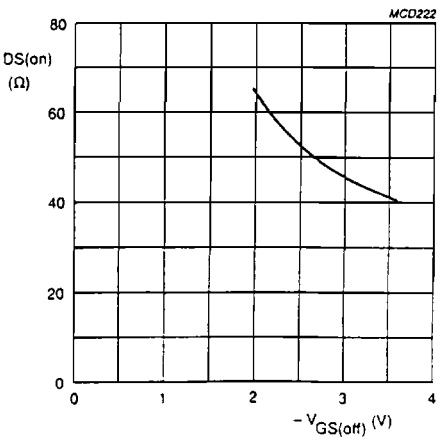
Fig.3 Common-source transfer admittance as a function of gate-source cut-off voltage.



J308, 309 & 310.

V_{DS} = 10 V; I_D = 10 mA; T_j = 25 °C.

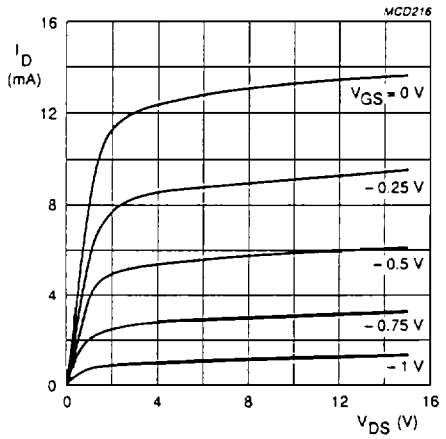
Fig.4 Common-source output conductance as a function of gate-source cut-off voltage.



J308, 309 & 310.

V_{DS} = 0.1 V; V_{GS} = 0; T_j = 25 °C.

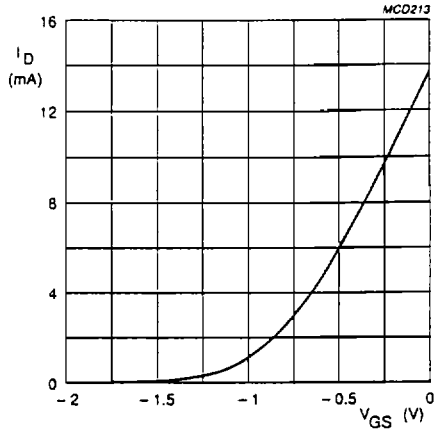
Fig.5 Drain-source on resistance as a function of gate-source cut-off voltage.



J308.

T_j = 25 °C.

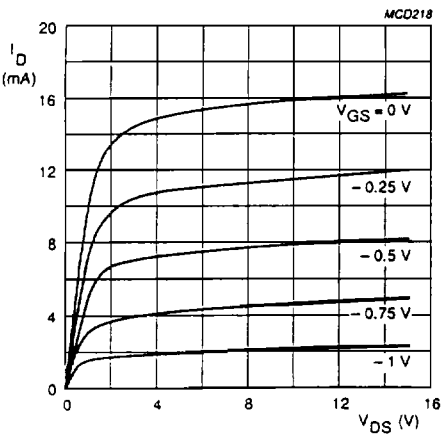
Fig.6 Output characteristics, typical values.



J308.

V_{DS} = 10 V; T_j = 25 °C.

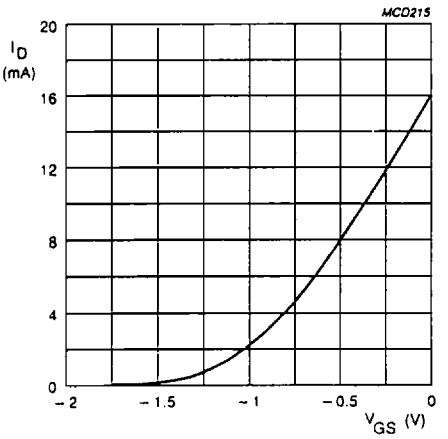
Fig.7 Input characteristics, typical values.



J309.

T_j = 25 °C.

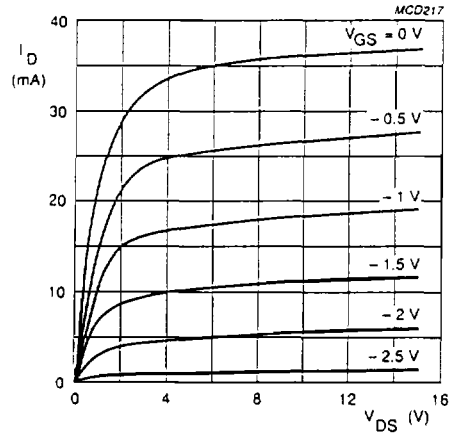
Fig.8 Output characteristics, typical values.



J309.

V_{DS} = 10 V; T_j = 25 °C.

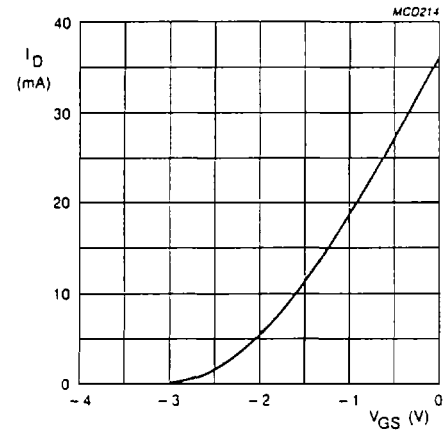
Fig.9 Input characteristics, typical values.



J310.

T_j = 25 °C.

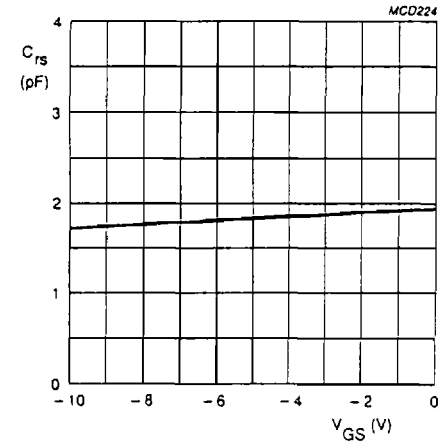
Fig.10 Output characteristics, typical values.



J310.

V_{DS} = 10 V; T_j = 25 °C.

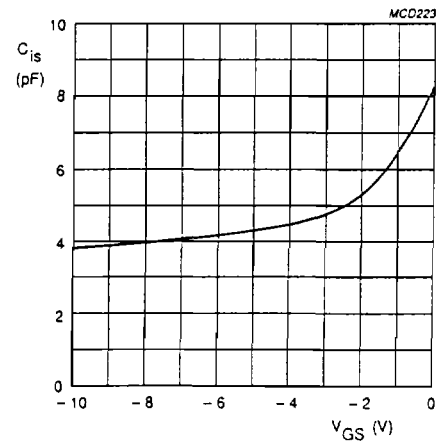
Fig.11 Input characteristics, typical values.



J308, 309 & 310.

V_{DS} = 10 V; T_j = 25 °C.

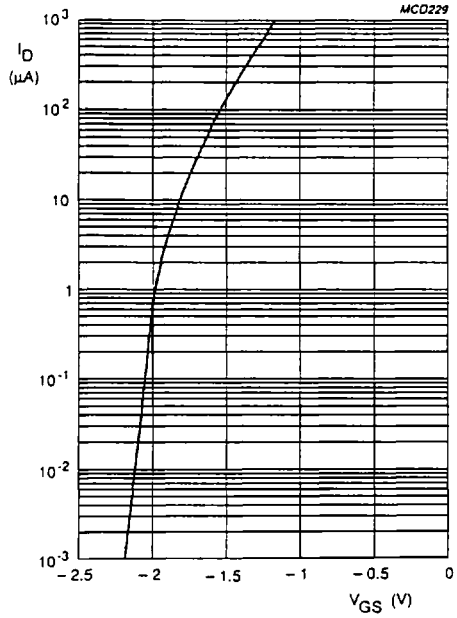
Fig.12 Feedback capacitance, typical values.



J308, 309 & 310.

V_{DS} = 10 V; T_j = 25 °C.

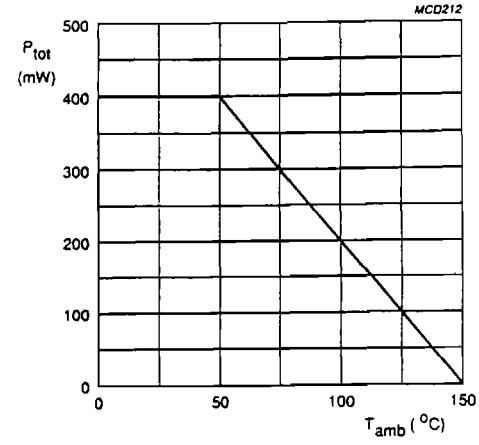
Fig.13 Input capacitance, typical values.



J308, 309 & 310.

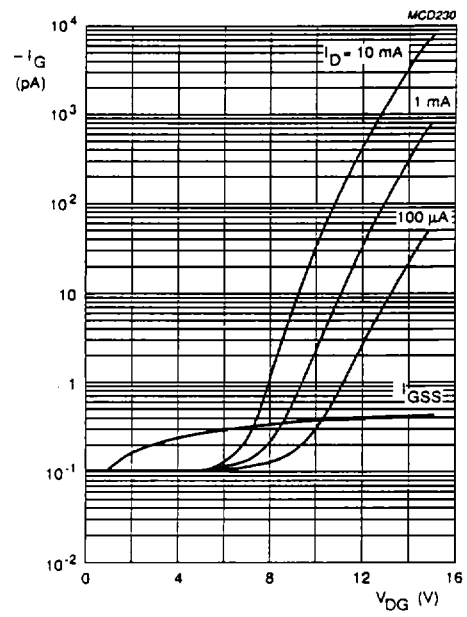
V_{DS} = 10 V; T_j = 25 °C.

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



J308, 309 & 310.

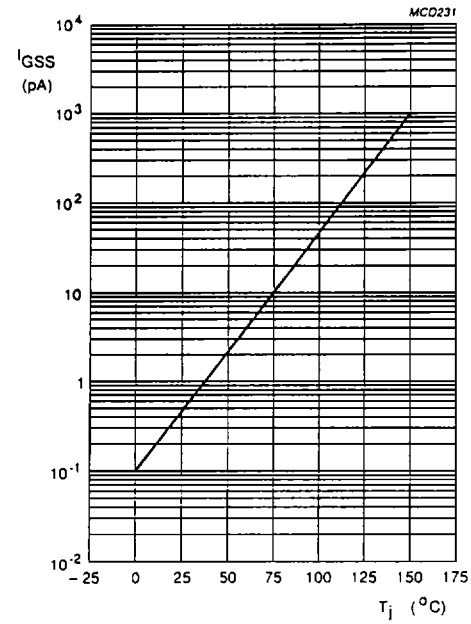
Fig.15 Power derating curve.



J308, 309 & 310.

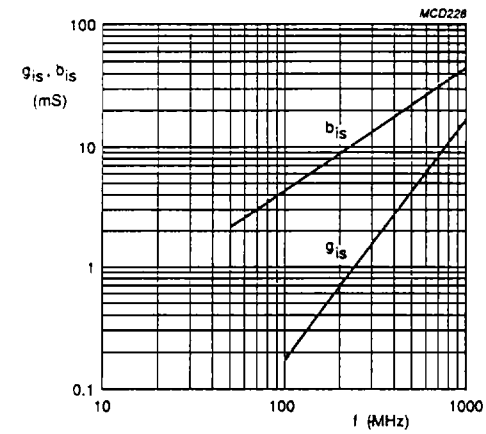
T_j = 25 °C.

Fig.16 Gate current as a function of drain-gate voltage, typical values.



J308, 309 & 310.

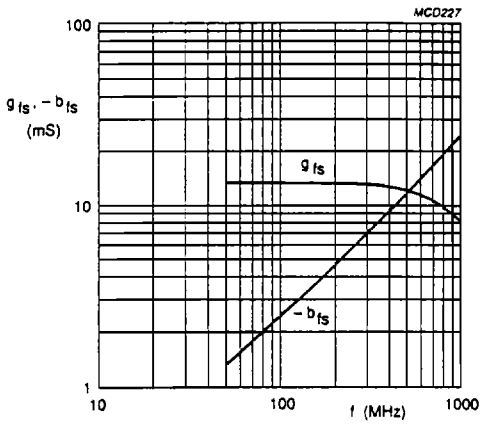
Fig.17 Gate current as a function of junction temperature, typical values.



J308, 309 & 310.

V_{DS} = 10 V; I_D = 10 mA; T_{amb} = 25 °C.

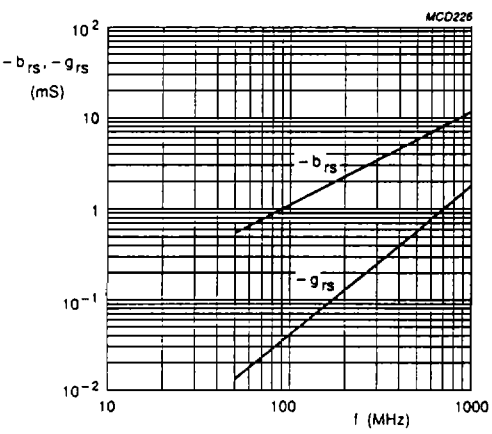
Fig.18 Input admittance, typical values.



J308, 309 & 310.

V_{DS} = 10 V; I_D = 10 mA; T_{amb} = 25 °C.

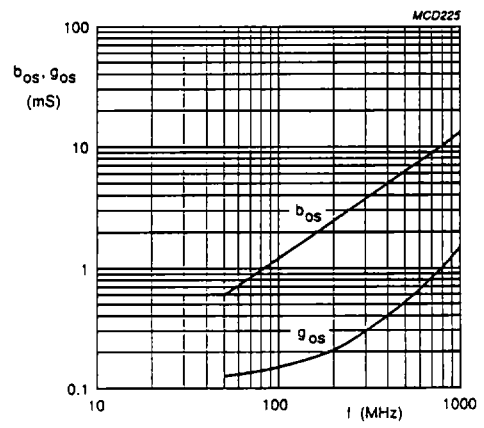
Fig.19 Forward admittance, typical values.



J308, 309 & 310.

V_{DS} = 10 V; I_D = 10 mA; T_{amb} = 25 °C.

Fig.20 Reverse admittance, typical values.



J308, 309 & 310.

V_{DS} = 10 V; I_D = 10 mA; T_{amb} = 25 °C.

Fig.21 Output admittance, typical values.