TOSHIBA FIELD EFFECT TRANSISTOR SILICON MONOLITHIC P CHANNEL JUNCTION TYPE

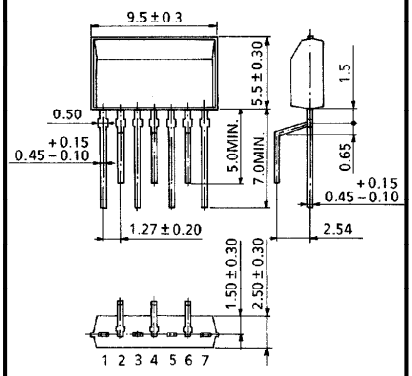
2SJ109

LOW NOISE AUDIO AMPLIFIER APPLICATIONS

DIFFERENTIAL AMPLIFIER APPLICATIONS

- 1 Chip Dual Type
- High $|Y_{fs}|$: $|Y_{fs}| = 22$mS (Typ.) ($V_{DS} = -10$V, $V_{GS} = 0$, f = 1kHz, $I_{DSS} = -3$mA)
- Good Pair Characteristics : $|V_{GS1} - V_{GS2}| = 20$mV (Max.) ($V_{DS} = -10$V, $I_D = -1$mA)
- Very Low Noise : NF = 0.5dB (Typ.) ($V_{DS} = -10$V, $I_D = -1$mA, $R_G = 1$kΩ, f = 1kHz)
- Very High Input Impedance : $I_{GSS} = 1.0$nA (Max.) ($V_{GS} = 30$V, $V_{DS} = 0$)
- Complementary to 2SK389

Unit in mm



1. DRAIN 1
2. GATE 1
3. SOURCE 1
4. SUBSTRATE (Use the substrate lead with open)
5. SOURCE 2
6. GATE 2
7. DRAIN 2

JEDEC	—
EIAJ	—
TOSHIBA	2-10M1A

Weight : 0.37g (Typ.)

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Gate-Drain Voltage	V_{GDS}	30	V
Gate Current	I_G	−10	mA
Drain Power Dissipation	P_D	200	mW
Junction Temperature	T_j	125	°C
Storage Temperature Range	T_{stg}	−55~125	°C

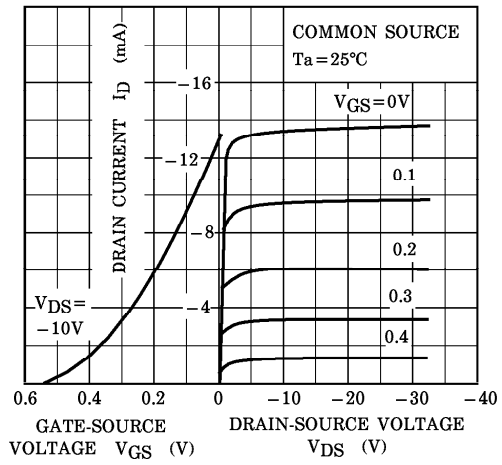
961001EAA2

ELECTRICAL CHARACTERISTICS (Ta = 25°C)

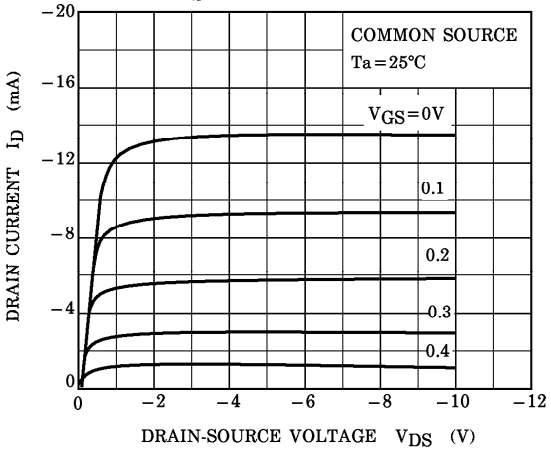
CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Cut-off Current	I_{GSS}	$V_{GS}=30V$, $V_{DS}=0$	—	—	1.0	nA
Gate-Drain Breakdown Voltage	$V_{(BR)GDS}$	$V_{DS}=0$, $I_G=100\mu A$	30	—	—	V
Drain Current	I_{DSS} *	$V_{DS}=-10V$, $V_{GS}=0$	−2.6	—	−20	mA
Gate-Source Cut-off Voltage	$V_{GS(OFF)}$	$V_{DS}=-10V$, $I_D=-0.1\mu A$	0.2	—	2.0	V
Forward Transfer Admittance	$\|Y_{fs}\|$	$V_{DS}=-10V$, $V_{GS}=0$, $f=1kHz$, $I_{DSS}=-3mA$	8	22	—	mS
Drain Current Ratio	I_{DSS} (small) / I_{DSS} (large)	$V_{DS}=-10V$, $V_{GS}=0$	0.9	—	—	—
Forward Transfer Admittance Ratio	$\|Y_{fs}\|$ (small) / $\|Y_{fs}\|$ (large)	$V_{DS}=-10V$, $V_{GS}=0$, $f=1kHz$	0.9	—	—	—
Differential Gate-Source Voltage	$\|V_{GS1}-V_{GS2}\|$	$V_{DS}=-10V$, $I_D=-1mA$	—	—	20	mV
Input Capacitance	C_{iss}	$V_{DS}=-10V$, $V_{GS}=0$, $f=1MHz$	—	95	—	pF
Reverse Transfer Capacitance	C_{rss}	$V_{GD}=10V$, $I_D=0$, $f=1MHz$	—	25	—	pF
Noise Figure	NF (1)	$V_{DS}=-10V$, $I_D=-1mA$, $R_G=1k\Omega$, $f=10Hz$	—	1.5	11	dB
	NF (2)	$V_{DS}=-10V$, $I_D=-1mA$, $R_G=1k\Omega$, $f=1kHz$	—	0.5	2	

* I_{DSS} Classification : GR = −2.6 ~ −6.5mA, BL = −6 ~ −12mA, V = −10 ~ −20mA

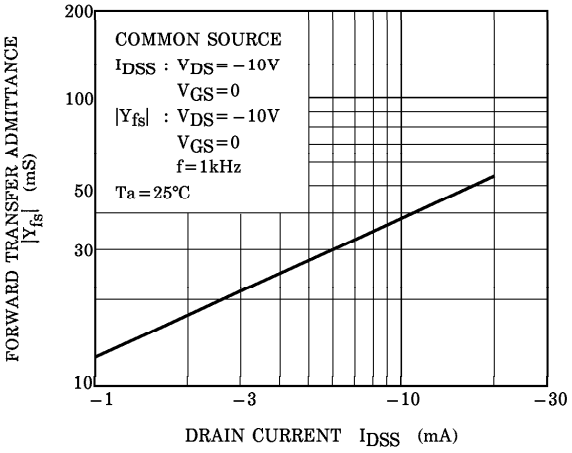
STATIC CHARACTERISTICS



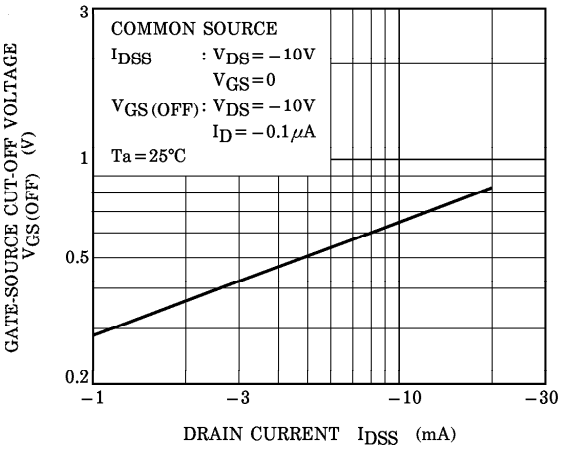
I_D – V_{DS} (LOW VOLTAGE REGION)



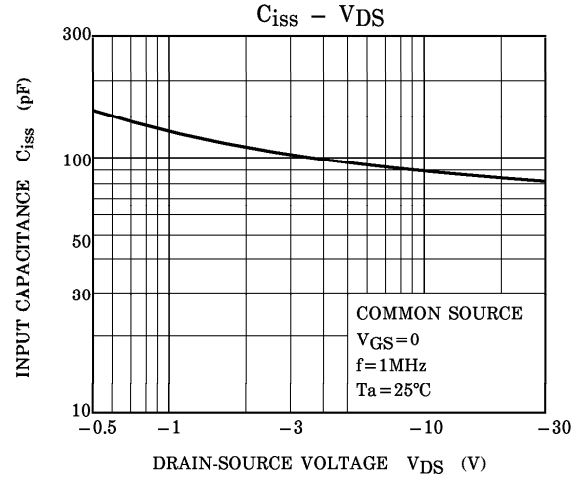
$|Y_{fs}|$ – I_{DSS}



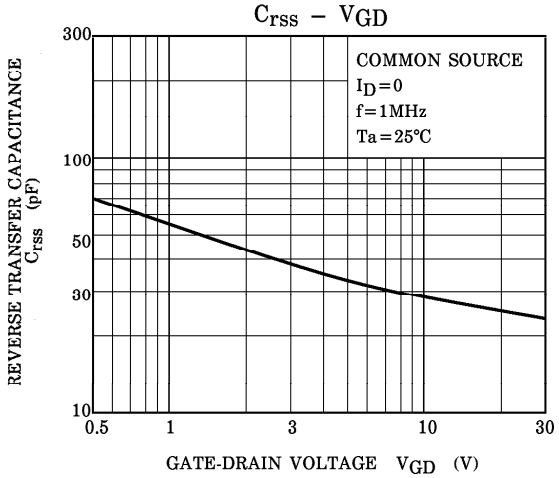
$V_{GS\,(OFF)}$ – I_{DSS}



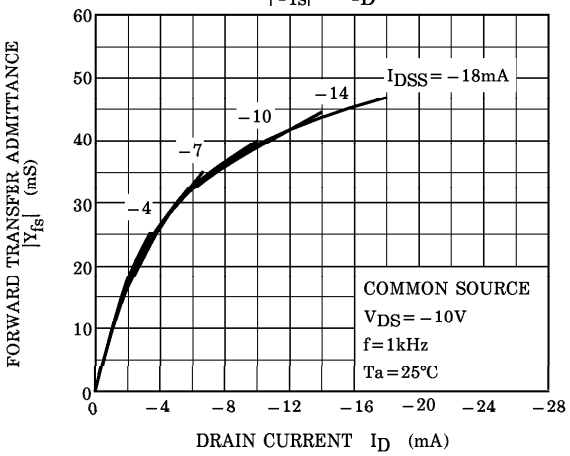
C_{iss} – V_{DS}



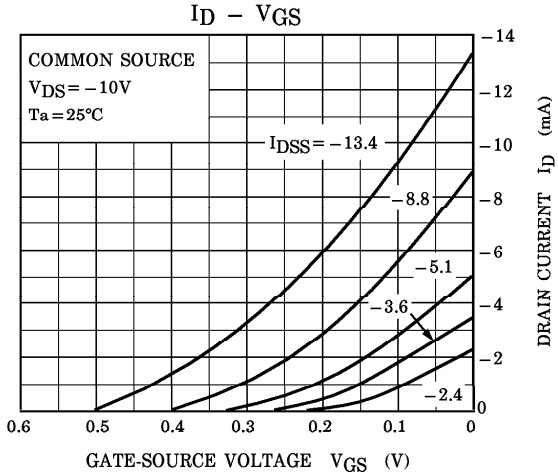
C_{rss} – V_{GD}



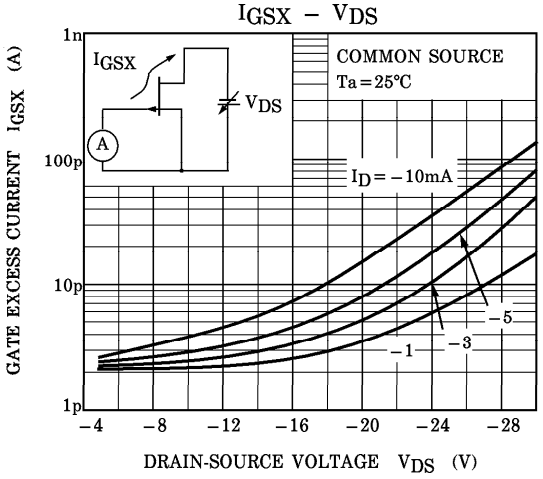
$|Y_{fs}|$ – I_D



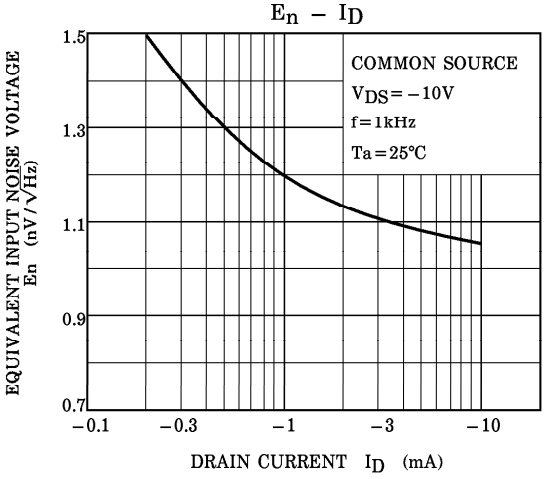
I_D – V_{GS}



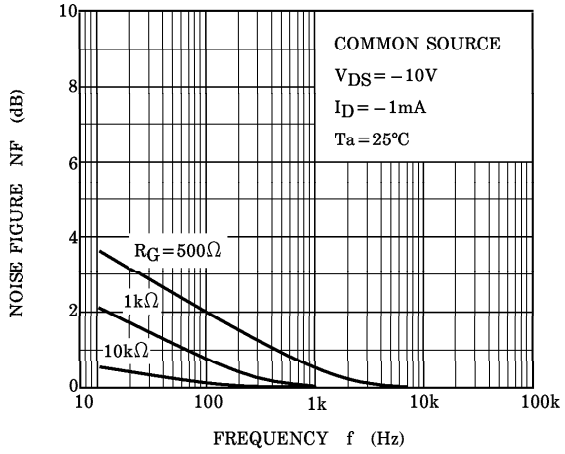
I_{GSX} – V_{DS}



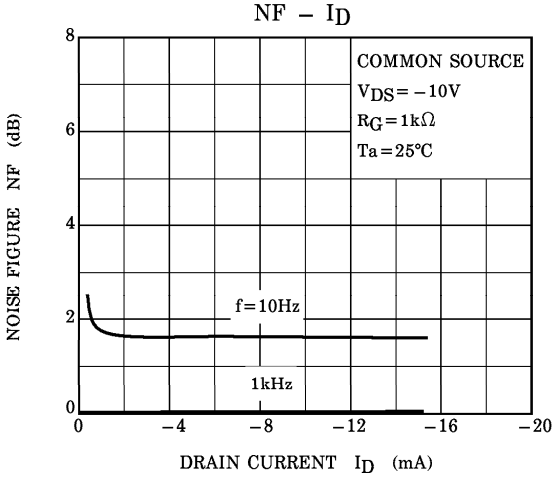
E_n – I_D

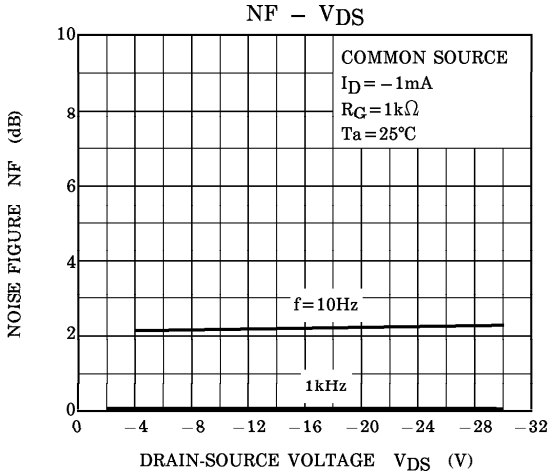


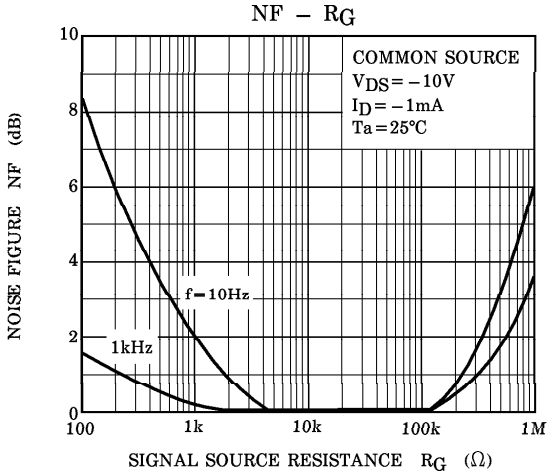
NF – f



NF – I_D




NF – VDS
COMMON SOURCE
ID = −1mA
RG = 1kΩ
Ta = 25°C
f = 10Hz
1kHz
NOISE FIGURE NF (dB)
DRAIN-SOURCE VOLTAGE VDS (V)
0
2
4
6
8
10
0
−4
−8
−12
−16
−20
−24
−28
−32


NF – RG
COMMON SOURCE
VDS = −10V
ID = −1mA
Ta = 25°C
f = 10Hz
1kHz
NOISE FIGURE NF (dB)
SIGNAL SOURCE RESISTANCE RG (Ω)
0
2
4
6
8
10
100
1k
10k
100k
1M