

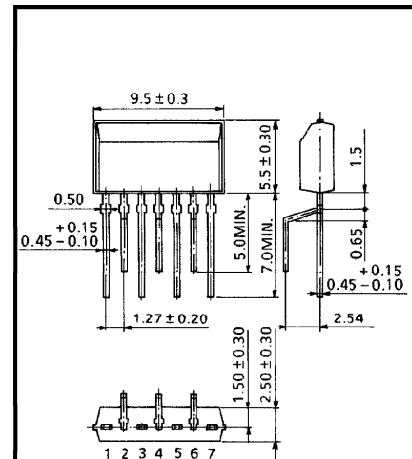
TOSHIBA DUAL FIELD EFFECT TRANSISTOR SILICON MONOLITHIC N CHANNEL JUNCTION TYPE

# 2SK389

LOW NOISE AUDIO AND DIFFERENTIAL AMPLIFIER APPLICATIONS.

Unit in mm

- 1 Chip Dual Type.
- Recommended for First Differential Stages of DC Amplifiers.
- Very High  $|Y_{fs}|$  :  $|Y_{fs}|=20\text{mS}$  (Typ.)  
( $V_{DS}=10\text{V}$ ,  $V_{GS}=0$ ,  $f=1\text{kHz}$ ,  $I_{DSS}=3\text{mA}$ )
- Good Pair Characteristics
- High Breakdown Voltage :  $V_{GDS}=-50\text{V}$  (Min.)
- Very Low Noise :  $NF=0.5\text{dB}$  (Typ.)  
( $V_{DS}=10\text{V}$ ,  $I_D=1\text{mA}$ ,  $R_G=1\text{k}\Omega$ ,  $f=1\text{kHz}$ )
- High Input Impedance :  $I_{GSS}=-1.0\text{nA}$  (Max.) ( $V_{GS}=-30\text{V}$ )
- Complementary to 2SJ109



1. DRAIN 1
2. GATE 1
3. SOURCE 1
4. SUBSTRATE (Note 2)
5. SOURCE 2
6. GATE 2
7. DRAIN 2

JEDEC	—
EIAJ	—
TOSHIBA	2-10M1A

Weight : 0.37g (Typ.)

MAXIMUM RATINGS ( $T_a = 25^\circ\text{C}$ )

CHARACTERISTIC	SYMBOL	RATING	UNIT
Gate-Drain Voltage	$V_{GDS}$	-50	V
Gate Current	$I_G$	10	mA
Drain Power Dissipation	$P_D$	200	mW
Junction Temperature	$T_j$	125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-55~125	$^\circ\text{C}$

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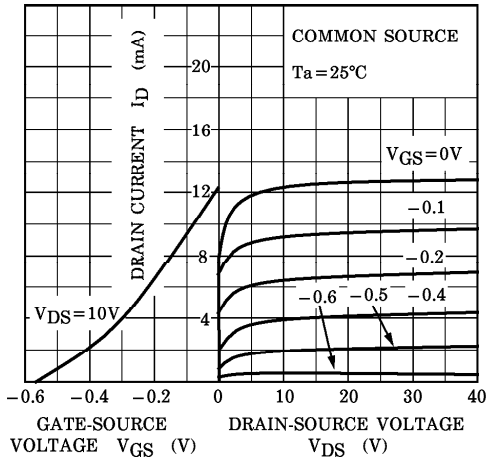
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Gate Cut-off Current	I <sub>GSS</sub>	V <sub>GS</sub> = -30V, V <sub>DS</sub> = 0	—	—	-1.0	nA
Gate-Drain Breakdown Voltage	V (BR) GDS	V <sub>DS</sub> = 0, I <sub>G</sub> = -100μA	-50	—	—	V
Drain Current	I <sub>DSS</sub> (Note 1)	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0	2.6	—	20	mA
Drain Current Ratio	I <sub>DSS</sub> / I <sub>DSS</sub> (small) (large)	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0	0.9	—	—	—
Gate-Source Cut-off Voltage	V <sub>GS</sub> (OFF)	V <sub>DS</sub> = 10V, I <sub>D</sub> = 0.1μA	-0.15	—	-2.0	V
Forward Transfer Admittance	Y <sub>fs</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0 f = 1kHz, I <sub>DSS</sub> = 3mA	8	20	—	mS
Forward Transfer Admittance Ratio	Y <sub>fs</sub>   /  Y <sub>fs</sub>   (small) (large)	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0, f = 1kHz	0.9	—	—	—
Differential Gate-Source Voltage	V <sub>GS1</sub> - V <sub>GS2</sub>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 1mA	—	—	20	mV
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0, f = 1MHz	—	25	—	pF
Reverse Transfer Capacitance	C <sub>rss</sub>	V <sub>GD</sub> = -10V, I <sub>D</sub> = 0, f = 1MHz	—	5.5	—	pF
Noise Figure	NF (1)	V <sub>DS</sub> = 10V, R <sub>G</sub> = 1kΩ I <sub>D</sub> = 1mA, f = 10Hz	—	1.5	10	dB
	NF (2)	V <sub>DS</sub> = 10V, R <sub>G</sub> = 1kΩ I <sub>D</sub> = 1mA, f = 1kHz	—	0.5	2	dB

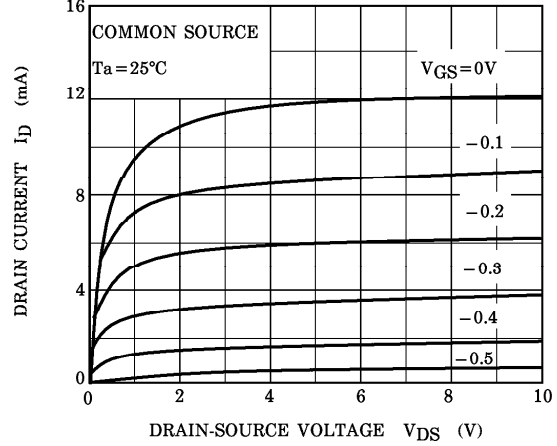
Note 1 : I<sub>DSS</sub> Classification GR: 2.6~6.5mA, BL: 6~12mA, V: 10~20mA

Note 2 : Use the substrate lead with open.

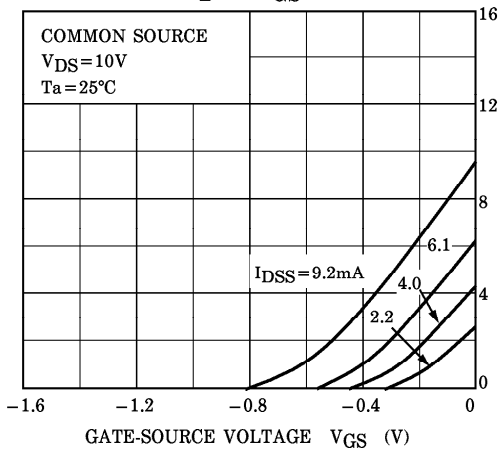
STATIC CHARACTERISTICS



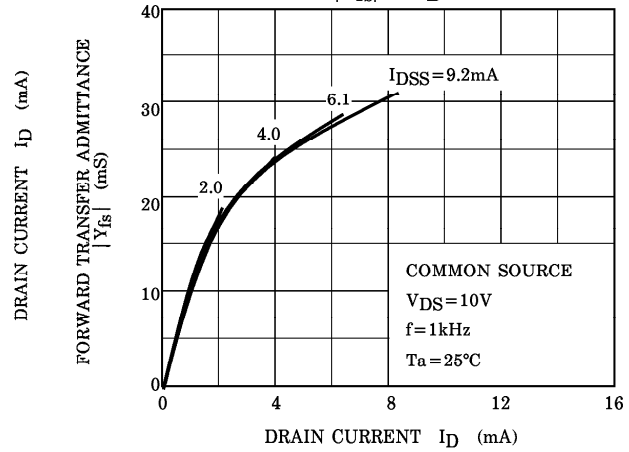
$I_D - V_{DS}$  (LOW VOLTAGE REGION)



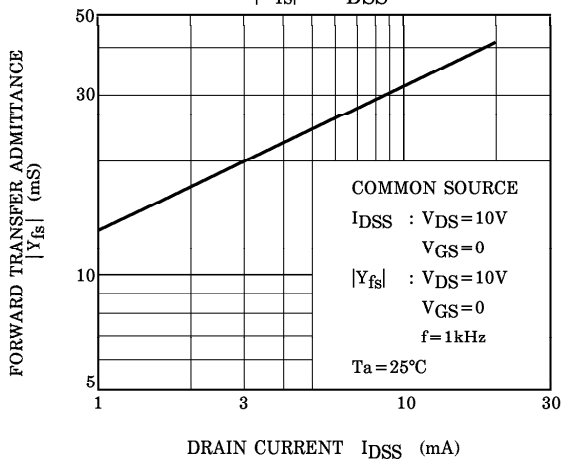
$I_D - V_{GS}$



$|Y_{fs}| - I_D$



$|Y_{fs}| - I_{DSS}$



$V_{GS(OFF)} - I_{DSS}$

