

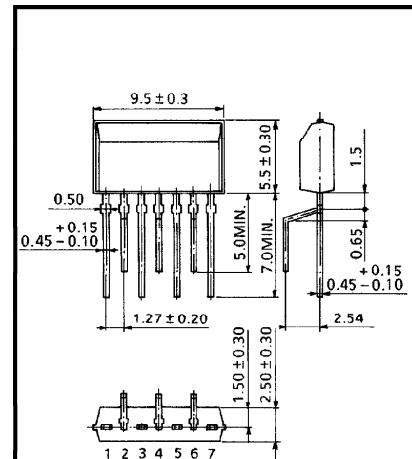
TOSHIBA DUAL FIELD EFFECT TRANSISTOR SILICON MONOLITHIC N CHANNEL JUNCTION TYPE

# 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	$^\circ\text{C}$

961001EAA2

● TOSHIBA is continually working to improve the quality and the reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to observe standards of safety, and to avoid situations in which a malfunction or failure of a TOSHIBA product could cause loss of human life, bodily injury or damage to property. In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent products specifications. Also, please keep in mind the precautions and conditions set forth in the TOSHIBA Semiconductor Reliability Handbook.

● The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA CORPORATION for any infringements of intellectual property or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any intellectual property or other rights of TOSHIBA CORPORATION or others.

● The information contained herein is subject to change without notice.

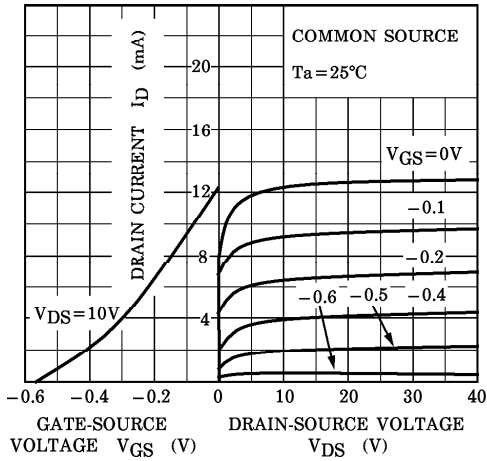
## ELECTRICAL CHARACTERISTICS (Ta = 25°C)

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	$V_{(BR)GDS}$	$V_{DS} = 0, I_G = -100\mu A$	-50	—	—	V
Drain Current	$I_{DSS}$ (Note 1)	$V_{DS} = 10V, V_{GS} = 0$	2.6	—	20	mA
Drain Current Ratio	$I_{DSS}/I_{DSS}$ (small) (large)	$V_{DS} = 10V, V_{GS} = 0$	0.9	—	—	—
Gate-Source Cut-off Voltage	$V_{GS(OFF)}$	$V_{DS} = 10V, I_D = 0.1\mu A$	-0.15	—	-2.0	V
Forward Transfer Admittance	$ Y_{fs} $	$V_{DS} = 10V, V_{GS} = 0$ $f = 1kHz, I_{DSS} = 3mA$	8	20	—	mS
Forward Transfer Admittance Ratio	$ Y_{fs} / Y_{fs} $ (small) (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	$C_{iss}$	$V_{DS} = 10V, V_{GS} = 0,$ $f = 1MHz$	—	25	—	pF
Reverse Transfer Capacitance	$C_{rss}$	$V_{GD} = -10V, I_D = 0,$ $f = 1MHz$	—	5.5	—	pF
Noise Figure	NF (1)	$V_{DS} = 10V, R_G = 1k\Omega$ $I_D = 1mA, f = 10Hz$	—	1.5	10	dB
	NF (2)	$V_{DS} = 10V, R_G = 1k\Omega$ $I_D = 1mA, f = 1kHz$	—	0.5	2	dB

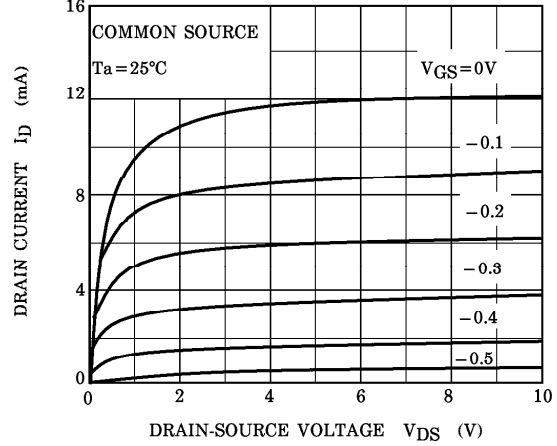
Note 1 :  $I_{DSS}$  Classification GR: 2.6~6.5mA, BL: 6~12mA, V: 10~20mA

Note 2 : Use the substrate lead with open.

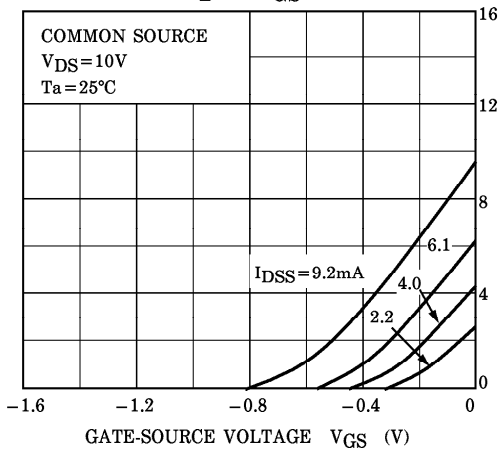
STATIC CHARACTERISTICS



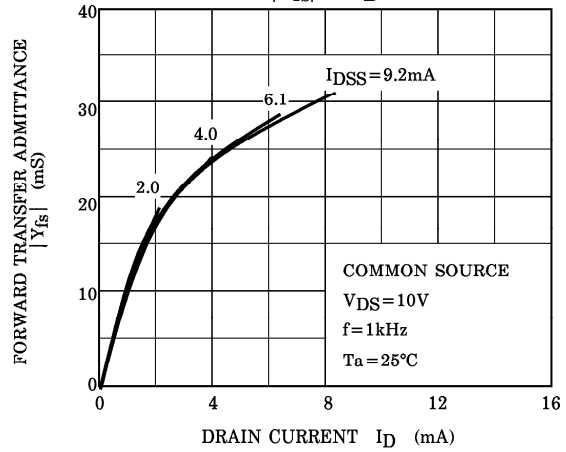
$I_D - V_{DS}$  (LOW VOLTAGE REGION)



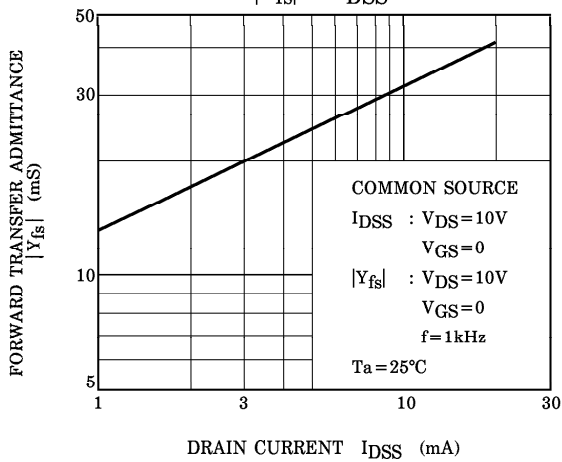
$I_D - V_{GS}$



$|Y_{fs}| - I_D$



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



VGS(OFF) - IDSS

