

# 2SK170

## Low Noise Audio Amplifier Applications

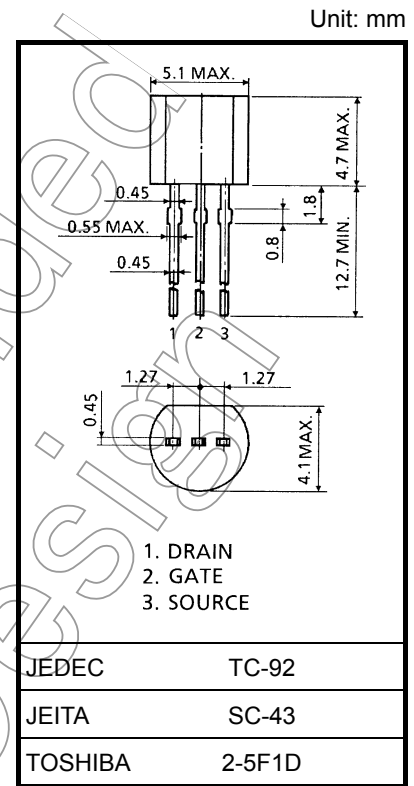
- Recommended for first stages of EQ and M.C. head amplifiers.
- High  $|Y_{fs}|$ :  $|Y_{fs}| = 22 \text{ mS (typ.)}$  ( $V_{DS} = 10 \text{ V}$ ,  $V_{GS} = 0$ ,  $I_{DSS} = 3 \text{ mA}$ )
- High breakdown voltage:  $V_{GDS} = -40 \text{ V}$
- Low noise:  $E_n = 0.95 \text{ nV/Hz}^{1/2}$  (typ.)  
( $V_{DS} = 10 \text{ V}$ ,  $I_D = 1 \text{ mA}$ ,  $f = 1 \text{ kHz}$ )
- High input impedance:  $I_{GSS} = -1 \text{ nA (max)}$  ( $V_{GS} = -30 \text{ V}$ )

## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Characteristics	Symbol	Rating	Unit
Gate-drain voltage	$V_{GDS}$	-40	V
Gate current	$I_G$	10	mA
Drain power dissipation	$P_D$	400	mW
Junction temperature	$T_j$	125	$^\circ\text{C}$
Storage temperature range	$T_{stg}$	-55~125	$^\circ\text{C}$

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/"Derating Concept and Methods") and individual reliability data (i.e. reliability test report and estimated failure rate, etc).



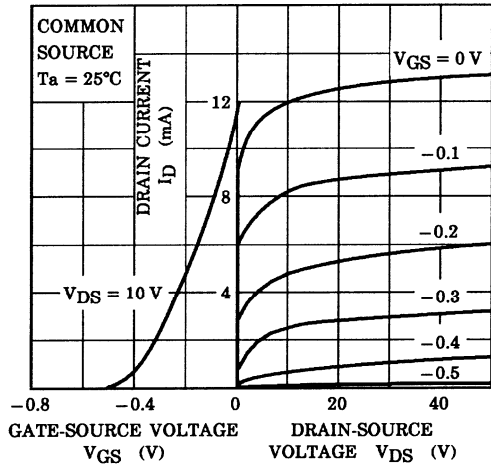
Weight: 0.21 g (typ.)

## Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

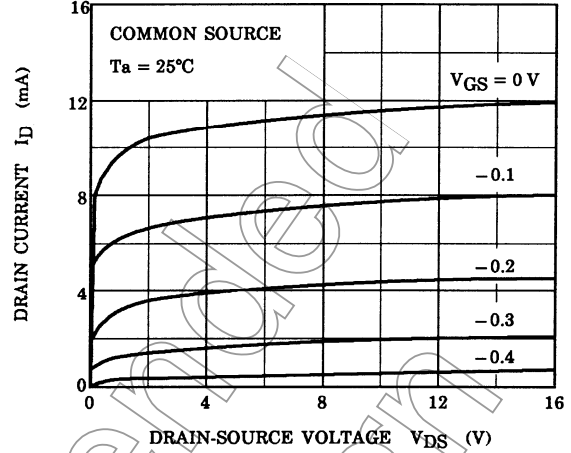
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate cut-off current	$I_{GSS}$	$V_{GS} = -30 \text{ V}$ , $V_{DS} = 0$	—	—	-1.0	nA
Gate-drain breakdown voltage	$V_{(BR)GDS}$	$V_{DS} = 0$ , $I_G = -100 \mu\text{A}$	-40	—	—	V
Drain current	$I_{DSS}$ (Note)	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$	2.6	—	20	mA
Gate-source cut-off voltage	$V_{GS(OFF)}$	$V_{DS} = 10 \text{ V}$ , $I_D = 0.1 \mu\text{A}$	-0.2	—	-1.5	V
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ , $f = 1 \text{ kHz}$	—	22	—	mS
Input capacitance	$C_{iss}$	$V_{DS} = 10 \text{ V}$ , $V_{GS} = 0$ , $f = 1 \text{ MHz}$	—	30	—	pF
Reverse transfer capacitance	$C_{rss}$	$V_{DG} = 10 \text{ V}$ , $I_D = 0$ , $f = 1 \text{ MHz}$	—	6	—	pF
Noise figure	NF (1)	$V_{DS} = 10 \text{ V}$ , $I_D = 1.0 \text{ mA}$ , $R_G = 1 \text{ k}\Omega$ , $f = 1 \text{ kHz}$	—	1.0	10	dB
	NF (2)	$V_{DS} = 10 \text{ V}$ , $I_D = 1.0 \text{ mA}$ , $R_G = 1 \text{ k}\Omega$ , $f = 1 \text{ kHz}$	—	0.5	2	

Note:  $I_{DSS}$  classification GR: 2.6~6.5 mA, BL: 6.0~12 mA, V: 10~20 mA

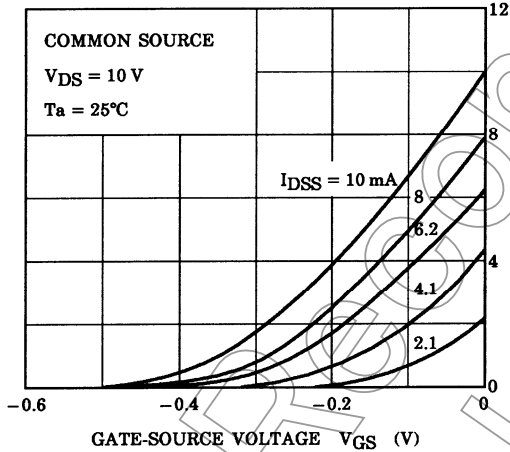
**STATIC CHARACTERISTICS**



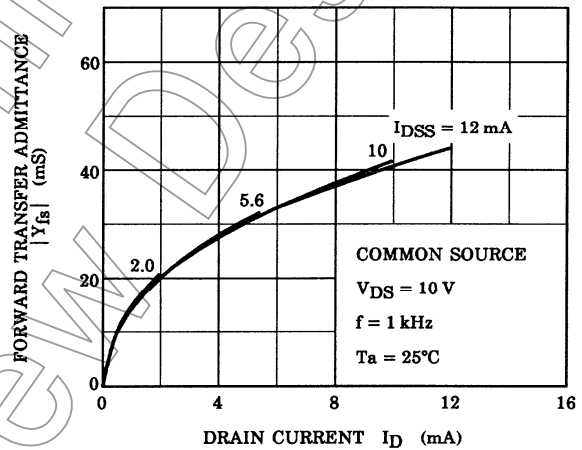
**$I_D - V_{DS}$  (LOW VOLTAGE REGION)**



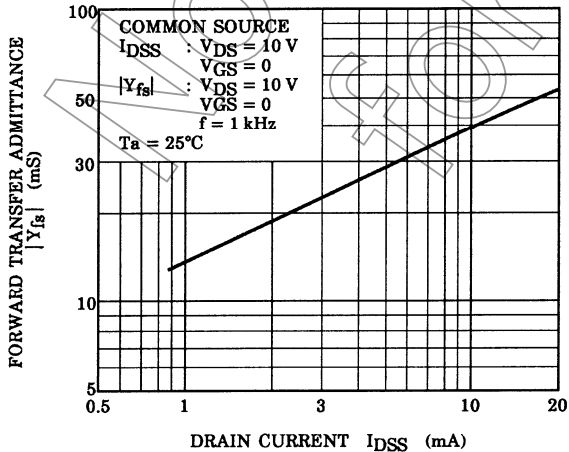
**$I_D - V_{GS}$**



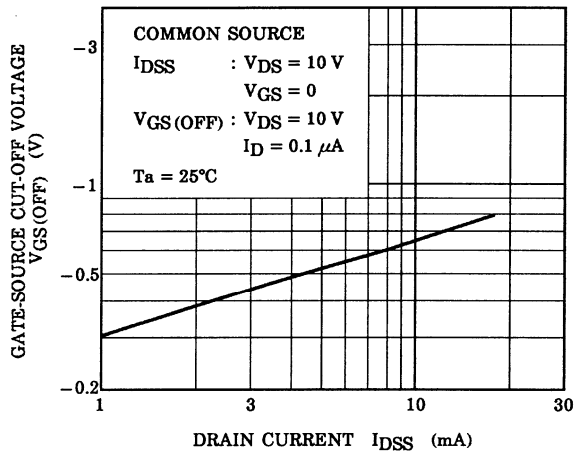
**$|Y_{fs}| - I_D$**

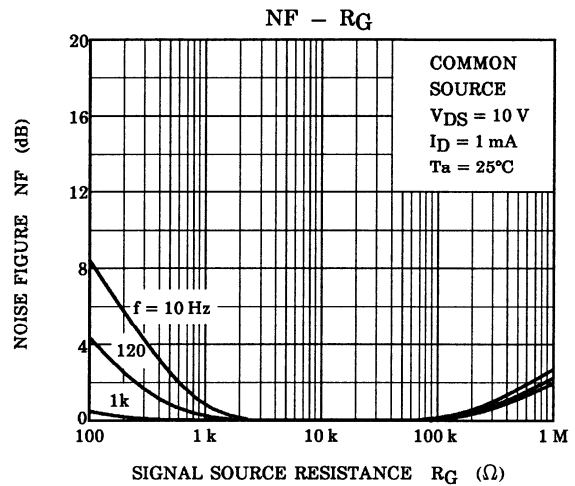
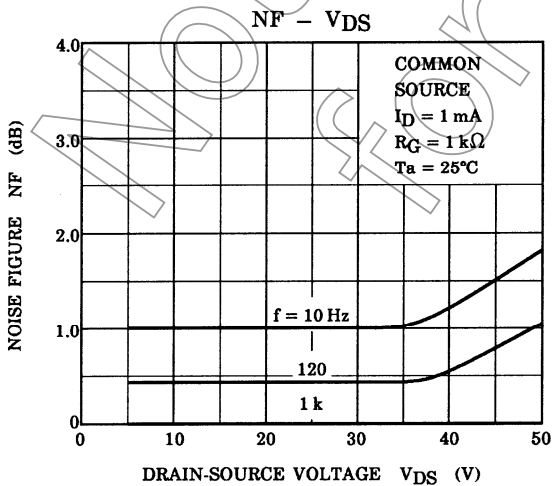
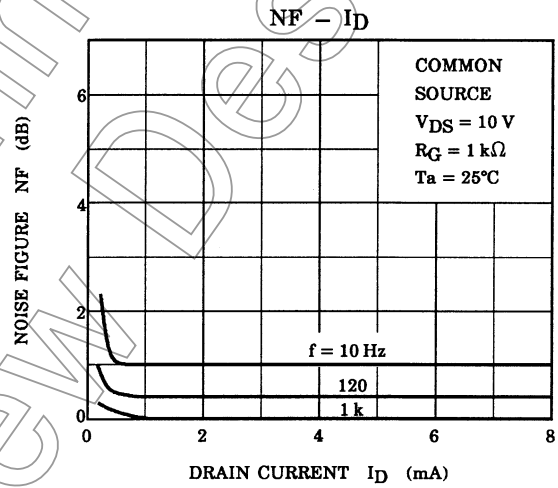
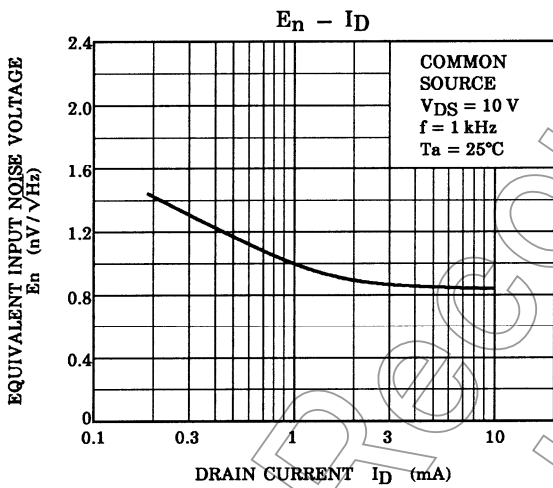
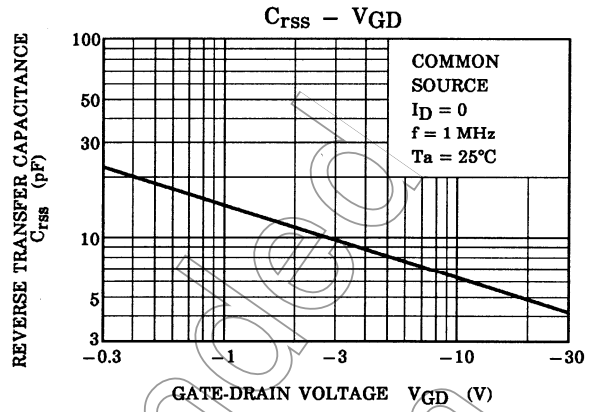
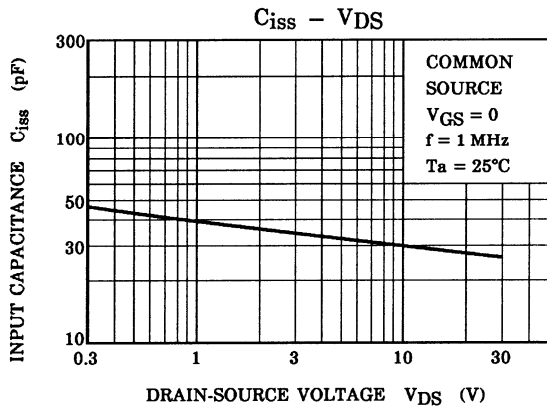


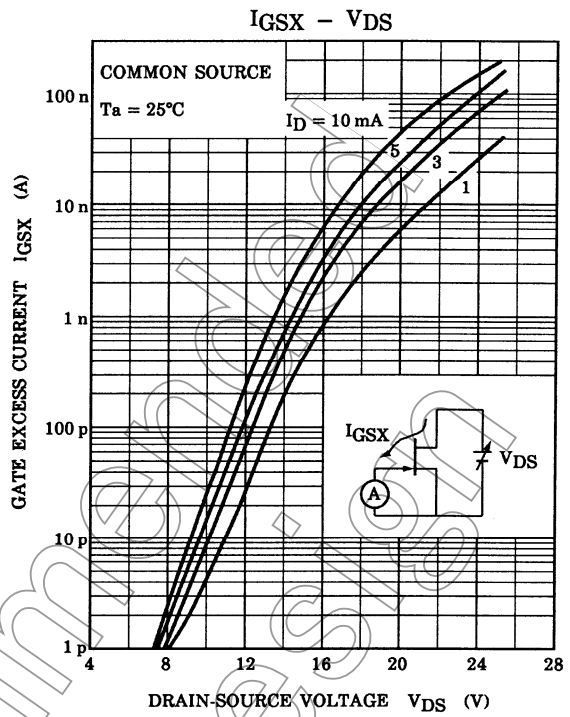
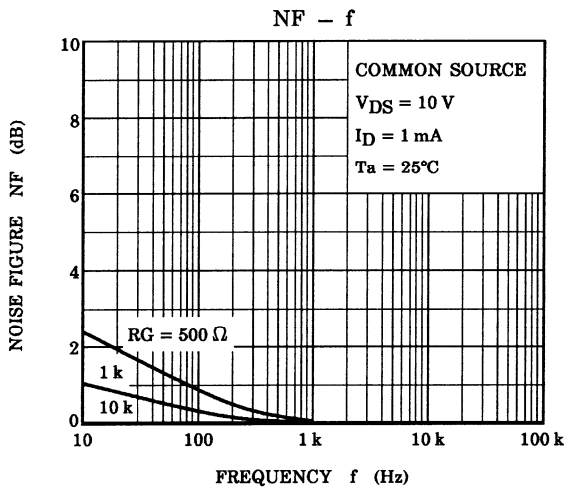
**$|Y_{fs}| - I_{DSS}$**



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







Not Recommended for New Design

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