

DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR 3SK176A

RF AMP. AND MIXER FOR CATV TUNER N-CHANNEL Si DUAL GATE MOS FIELD-EFFECT TRANSISTOR 4 PINS MINI MOLD

FEATURES

- High Power Gain: $G_{PS} = 24 \text{ dB TYP. (} f = 470 \text{ MHz)}$
- Low Noise Figure: $NF = 2.0 \text{ dB TYP. (} f = 470 \text{ MHz)}$
 $NF = 1.0 \text{ dB TYP. (} f = 55 \text{ MHz)}$
- Automatically Mounting: Embossed Type Taping
- Suitable for use as RF amplifier and Mixer in CATV tuner.
- Small Package: 4 Pins Mini Mold

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

Drain to Source Voltage	V_{DSX}	18	V
Gate1 to Source Voltage	V_{G1S}	$\pm 8 (\pm 10)^*$	V
Gate2 to Source Voltage	V_{G2S}	$\pm 8 (\pm 10)^*$	V
Drain Current	I_D	25	mA
Total Power Dissipation	P_D	200	mW
Channel Temperature	T_{ch}	125	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +125	$^\circ\text{C}$

* $R_L \geq 10 \text{ k}\Omega$

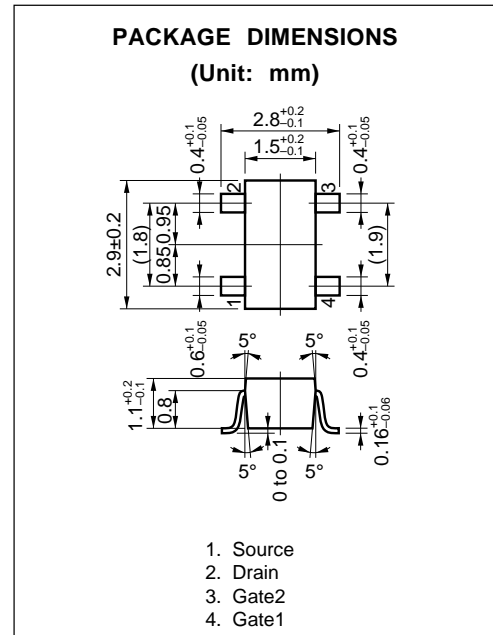
ELECTRICAL CHARACTERISTICS ($T_A = 25 \text{ }^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source Breakdown Voltage	BV_{DSX}	18			V	$V_{G1S} = V_{G2S} = -2 \text{ V, } I_D = 10 \text{ }\mu\text{A}$
Drain Current	I_{DSX}	1.0		10	mA	$V_{DS} = 5 \text{ V, } V_{G1S} = 0.75 \text{ V, } V_{G2S} = 4 \text{ V}$
Gate1 to Source Cutoff Voltage	$V_{G1S(off)}$	0		+1.0	V	$V_{DS} = 6 \text{ V, } V_{G2S} = 3 \text{ V, } I_D = 10 \text{ }\mu\text{A}$
Gate2 to Source Cutoff Voltage	$V_{G2S(off)}$	0		+1.0	V	$V_{DS} = 6 \text{ V, } V_{G1S} = 3 \text{ V, } I_D = 10 \text{ }\mu\text{A}$
Gate1 Reverse Current	I_{G1SS}			± 20	nA	$V_{DS} = 0, V_{G2S} = 0, V_{G1S} = \pm 10 \text{ V}$
Gate2 Reverse Current	I_{G2SS}			± 20	nA	$V_{DS} = 0, V_{G1S} = 0, V_{G2S} = \pm 10 \text{ V}$
Forward Transfer Admittance	$ y_{fs} $	22	25.5		mS	$V_{DS} = 5 \text{ V, } V_{G2S} = 4 \text{ V, } I_D = 10 \text{ mA}$ $f = 1 \text{ kHz}$
Input Capacitance	C_{iss}	2.2	2.7	3.2	pF	$V_{DS} = 6 \text{ V, } V_{G2S} = 3 \text{ V, } I_D = 10 \text{ mA}$ $f = 1 \text{ MHz}$
Output Capacitance	C_{oss}	1.3	1.6	1.9	pF	
Reverse Transfer Capacitance	C_{rss}		0.015	0.03	pF	
Power Gain	G_{PS}	21.0	24.0		dB	$V_{DS} = 6 \text{ V, } V_{G2S} = 3 \text{ V, } I_D = 10 \text{ mA}$
Noise Figure 1	NF1		2.0	3.5	dB	$f = 470 \text{ MHz}$
Noise Figure 2	NF2		1.0	2.5	dB	$V_{DS} = 6 \text{ V, } V_{G2S} = 3 \text{ V, } I_D = 10 \text{ mA}$ $f = 55 \text{ MHz}$

I_{DSX} Classification

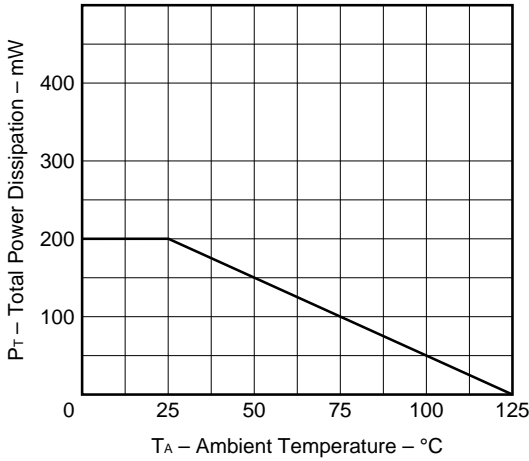
Class	U87/UHG*	U88/UHH*
Marking	U87	U88
I_{DSX} (mA)	1.0 to 6.0	4.0 to 10.0

* Old Specification/New Specification

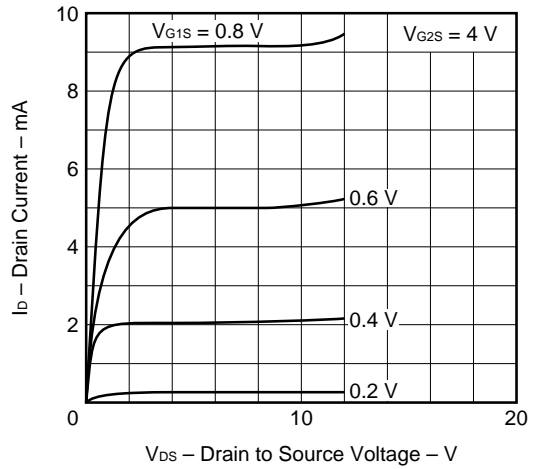


TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$)

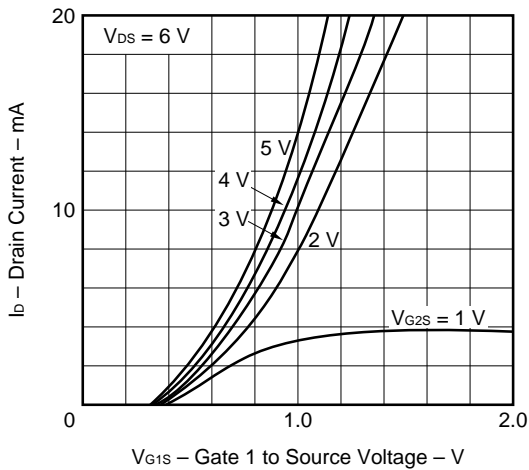
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



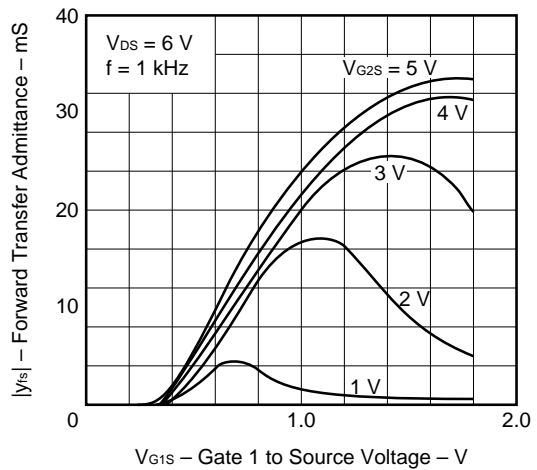
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



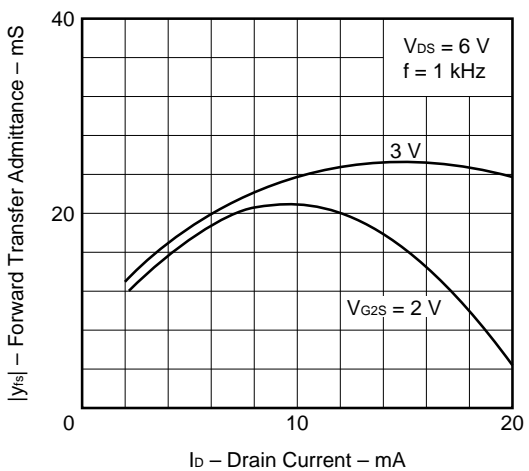
DRAIN CURRENT vs. GATE1 TO SOURCE VOLTAGE



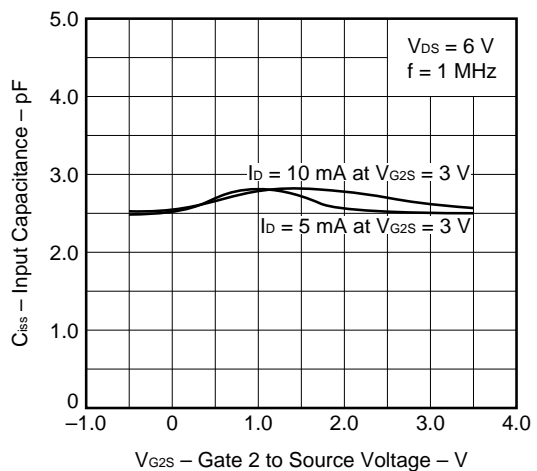
FORWARD TRANSFER ADMITTANCE vs. GATE1 TO SOURCE VOLTAGE



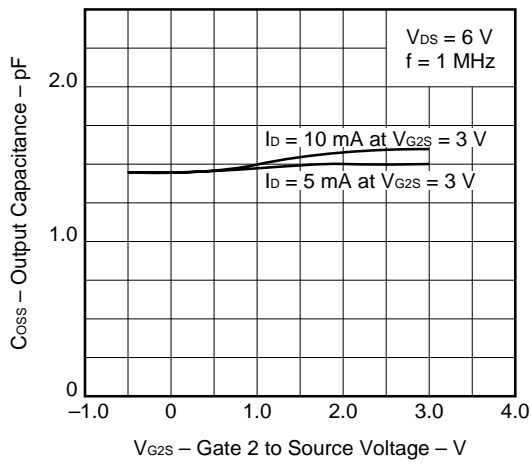
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



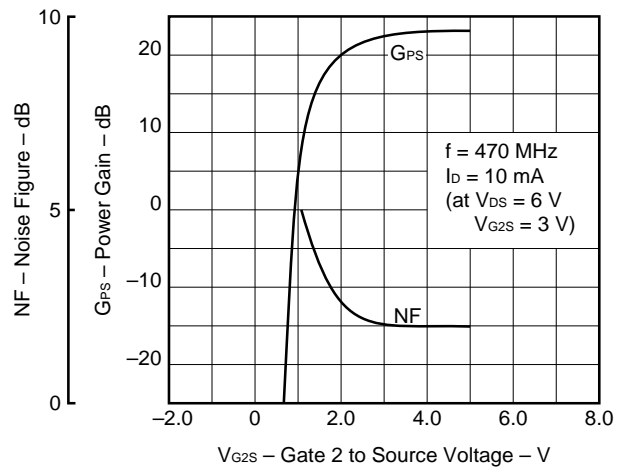
INPUT CAPACITANCE vs. GATE2 TO SOURCE VOLTAGE



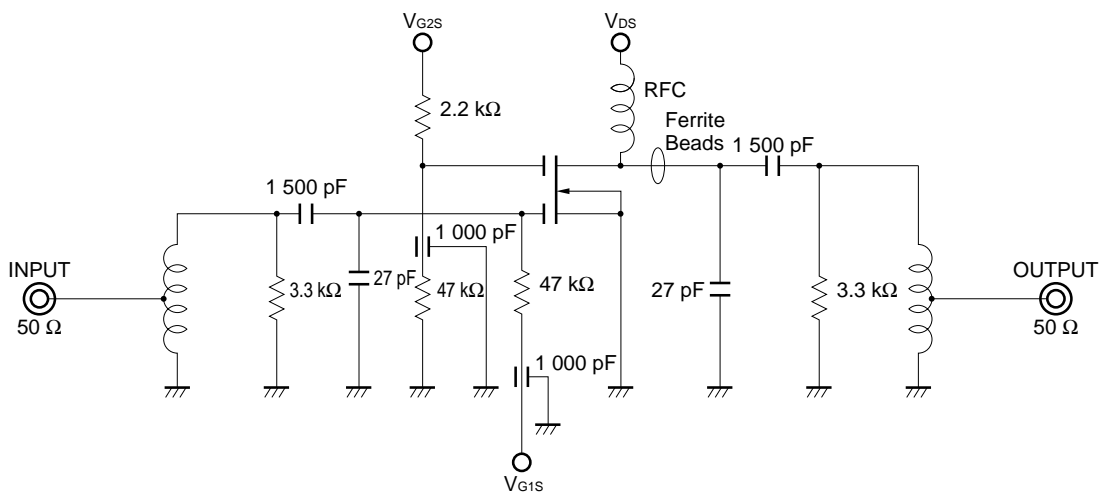
OUTPUT CAPACITANCE vs. GATE2 TO SOURCE VOLTAGE



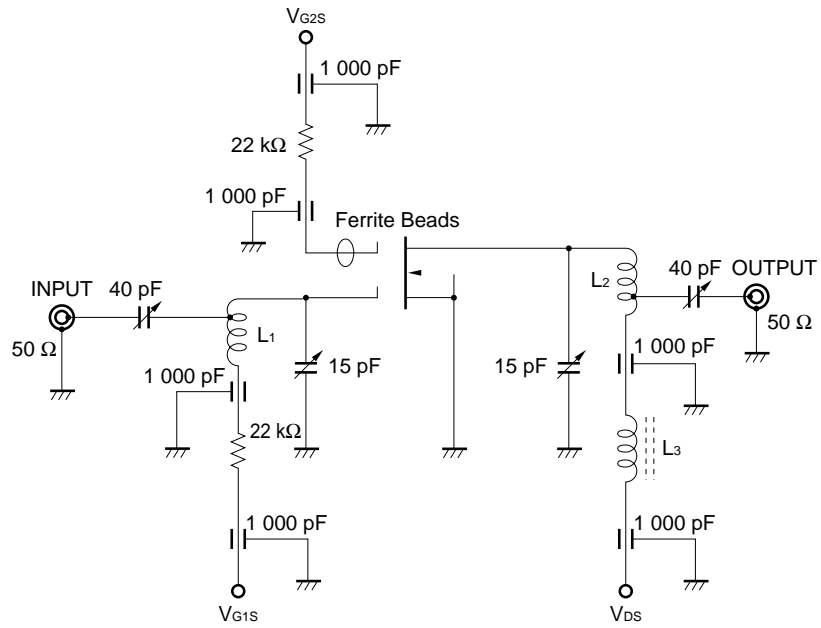
POWER GAIN AND NOISE FIGURE vs. GATE2 TO SOURCE VOLTAGE



NF TEST CIRCUIT AT $f = 55 \text{ MHz}$



GPS AND NF TEST CIRCUIT AT $f = 470 \text{ MHz}$



- L1: $\phi 1.2 \text{ mm U.E.W } \phi 5 \text{ mm 1T}$
- L2: $\phi 1.2 \text{ mm U.E.W } \phi 5 \text{ mm 1T}$
- L3: REC 2.2 μH

[MEMO]

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