NEC
ELECTRON DEVICE

N-CHANNEL JUNCTION FIELD-EFFECT TRANSISTOR

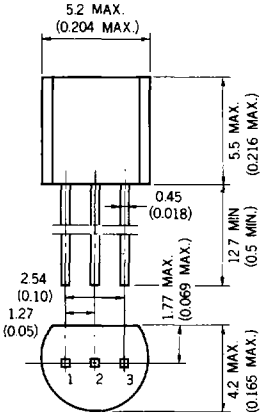
2SK163

DESCRIPTION The 2SK163 is designed for use in the first stage for AF Low Noise amplifier.

FEATURES

- Low Equivalent Noise Voltage.
  $e_n = 1.3\ nV/\sqrt{Hz}$ TYP. ($V_{DS} = 10$ V, $I_D = 1.0$ mA, f = 1.0 kHz)
- High Voltage and High $|Y_{fs}|$
  $V_{DSX} > 50$ V ($V_{GS} = -2.0$ V)
  $|Y_{fs}| > 7.0$ mS ($V_{DS} = 10$ V, $I_D = 1.0$ mA, f = 1.0 kHz)

PACKAGE DIMENSIONS
in millimeters (inches)



1. DRAIN
2. GATE
3. SOURCE

EIAJ : SC-43
JEDEC : TO-92
IEC : PA33

ABSOLUTE MAXIMUM RATINGS

Maximum Temperatures

Storage Temperature . . . . . −55 to +125 °C

Junction Temperature . . . . . +125 °C Maximum

Maximum Power Dissipation (Ta = 25 °C)

Total Power Dissipation . . . . . 400 mW

Maximum Voltages and Currents (Ta = 25 °C)

V_{GDO}	Gate to Drain Voltage	−50	V
V_{GSO}	Gate to Source Voltage	−50	V
V_{DSX}*	Drain to Source Voltage	50	V
I_D	Drain Current	30	mA
I_G	Gate Current	10	mA

* $V_{GS} = -2.0$ V

ELECTRICAL CHARACTERISTICS (Ta = 25 °C)

SYMBOL	CHARACTERISTIC	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
I_{DSS}	Drain Current	1.0	8.0	18	mA	$V_{DS} = 10$ V, $V_{GS} = 0$
e_n	Equivalent Noise Voltage		1.3		$nV/\sqrt{Hz}$	$V_{DS} = 10$ V, $I_D = 1.0$ mA, f = 1.0 kHz
$\|Y_{fs}\|_1$	Forward Transfer Admittance	7.0	9.0		mS	$V_{DS} = 10$ V, $I_D = 1.0$ mA, f = 1.0 kHz
$\|Y_{fs}\|_2$	Forward Transfer Admittance	7.0			mS	$V_{DS} = 10$ V, $V_{GS} = 0$, f = 1.0 kHz
NV	Noise Voltage			20	mV	See test circuit
C_{iss}	Input Capacitance		15		pF	$V_{DS} = 10$ V, $I_D = 1.0$ mA, f = 1.0 MHz
C_{rss}	Feedback Capacitance		6.0		pF	$V_{DS} = 10$ V, $I_D = 1.0$ mA, f = 1.0 MHz
I_{GSS}	Gate Cutoff Current			−1.0	nA	$V_{GS} = -20$ V, $V_{DS} = 0$
$V_{GS(off)}$	Gate to Source Cutoff Voltage	−0.2		−1.2	V	$V_{DS} = 10$ V, $I_D = 10\ \mu A$

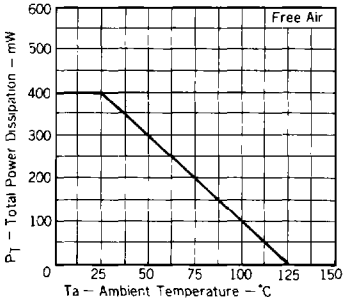
Classification of I_{DSS}

Rank	K	L	M	N
I_{DSS}(mA)	1.0 − 6.0	5.0 − 10	9.0 − 14	13 − 18

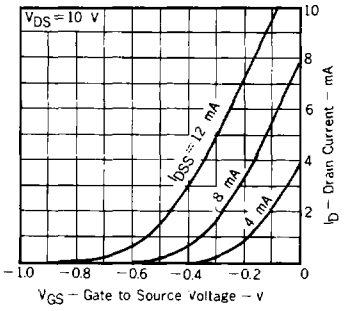
I_{DSS} Test Conditions: $V_{DS} = 10$ V, $V_{GS} = 0$

TYPICAL CHARACTERISTICS (Ta = 25 °C)

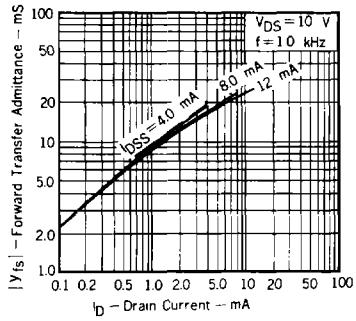
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



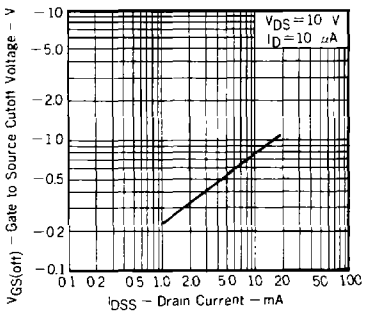
DRAIN CURRENT vs. GATE TO SOURCE VOLTAGE



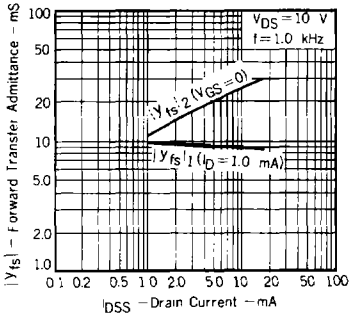
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



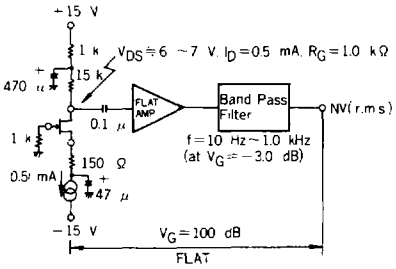
GATE TO SOURCE CUTOFF VOLTAGE vs. DRAIN CURRENT (CORRELATIVITY)



FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT (CORRELATIVITY)



NOISE VOLTAGE TEST CIRCUIT



4