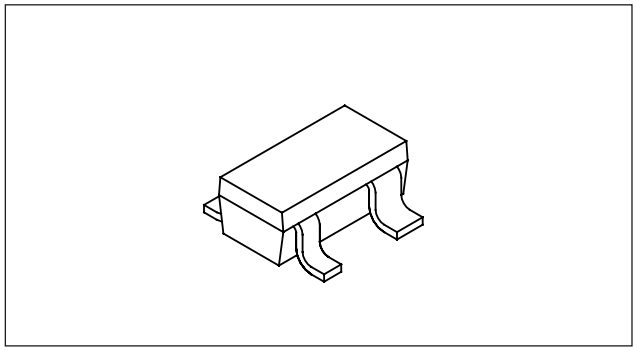
SONY

3SK165A

GaAs N-channel Dual Gate MES FET



Description

The 3SK165A is an N-channel dual gate GaAs MES FET for UHF band low-noise amplification. This FET is suitable for a wide range of applications including cellular, cordless phone.

Features

- Low voltage operation
- Low noise: NF = 1.2dB (typ.) at 800MHz
- High gain: Ga = 20dB (typ) at 800MHz
- High stability

Application

UHF band amplifier, mixer and oscillator

Structure

GaAs N-channel dual-gate metal semiconductor field-effect transistor

Absolute Maximum Ratings (Ta = 25°C)

• Drain to source voltage	V_{DSX}	8	V
• Gate 1 to source voltage	V_{G1S}	–6	V
• Gate 2 to source voltage	V_{G2S}	–6	V
• Drain current	I_D	80	mA
• Allowable power dissipation	P_D	150	mW
• Channel temperature	Tch	150	°C
• Storage temperature	Tstg	–55 to +150	°C

E96Y12-PS

Electrical Characteristics (Ta = 25°C)

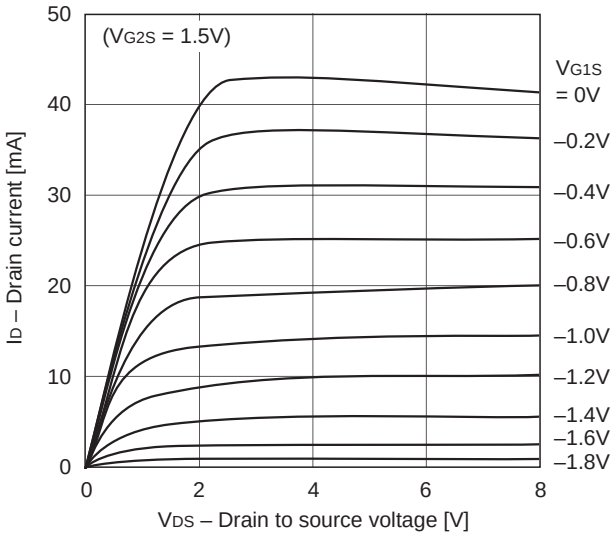
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Drain cut-off current	I_{DSX}	V_{DS} = 8V V_{G1S} = –4V V_{G2S} = 0V			100	µA
Gate 1 to source current	I_{G1SS}	V_{G1S} = –4V V_{G2S} = 0V V_{DS} = 0V			–20	µA
Gate 2 to source current	I_{G2SS}	V_{G2S} = –4V V_{G1S} = 0V V_{DS} = 0V			–20	µA
Drain saturation current	I_{DSS}	V_{DS} = 5V V_{G1S} = 0V V_{G2S} = 0V	20		55	mA
Gate 1 to source cut-off voltage	V_{G1S} (OFF)	V_{DS} = 5V I_D = 100µA V_{G2S} = 0V	–1		–4	V
Gate 2 to source cut-off voltage	V_{G2S} (OFF)	V_{DS} = 5V I_D = 100µA V_{G1S} = 0V	–1		–4	V
Forward transfer admittance	gm	V_{DS} = 5V I_D = 10mA V_{G2S} = 1.5V f = 1kHz	15	22		ms
Input capacitance	Ciss	V_{DS} = 5V I_D = 10mA V_{G2S} = 1.5V f = 1MHz		0.5	1.0	pF
Feedback capacitance	Crss			7.5	25	fF
Noise figure	NF	V_{DS} = 5V I_D = 10mA V_{G2S} = 1.5V f = 800MHz		1.2	2.5	dB
Associated gain	Ga		16	20		dB

* I_{DSS} classification

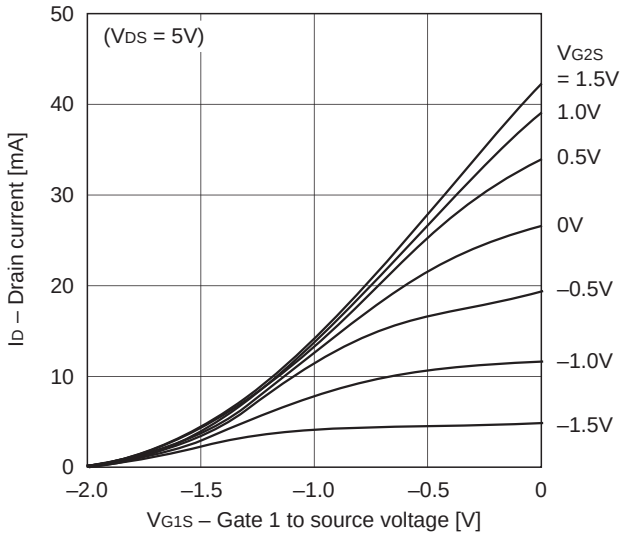
Product name classification	I_{DSS} RANK
3SK165A-0	20 to 55mA
3SK165A-1	20 to 35mA

Typical Characteristics (Ta = 25°C)

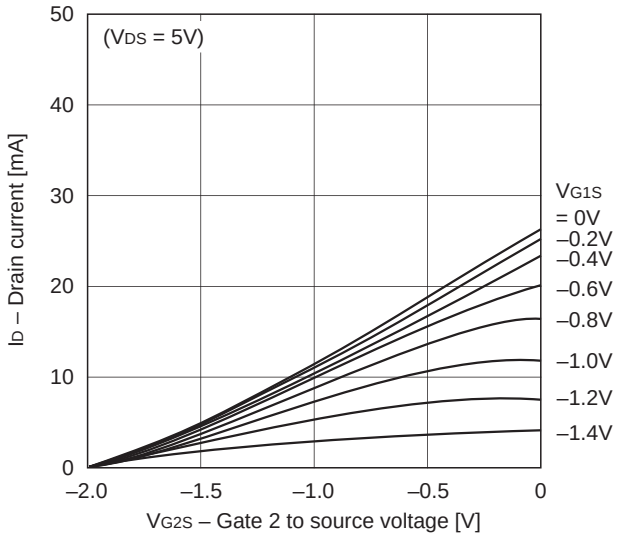
I_D vs. V_{DS}



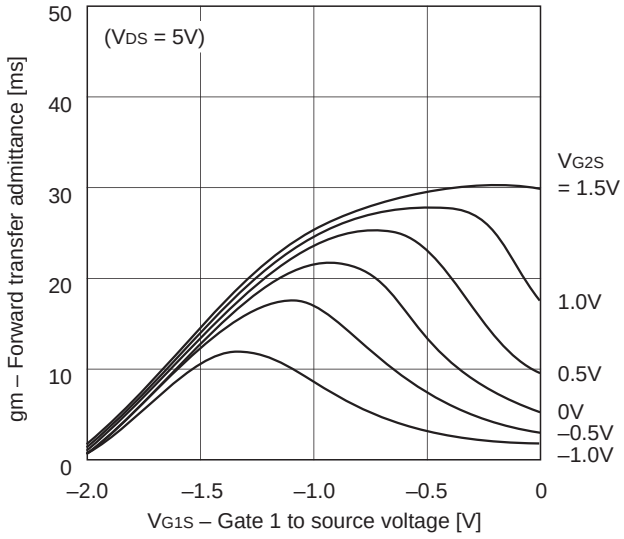
I_D vs. V_{G1S}



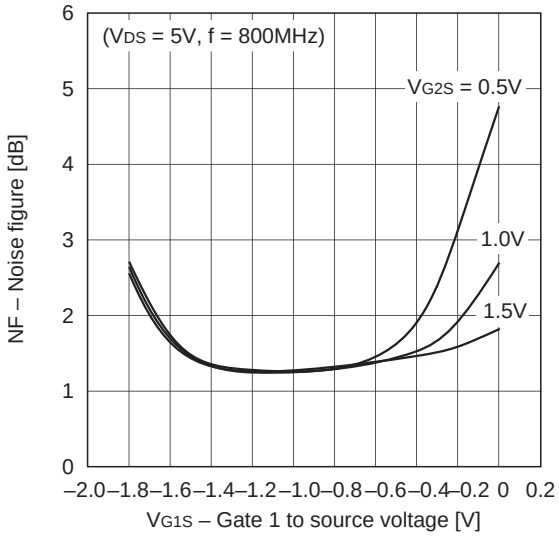
I_D vs. V_{G2S}



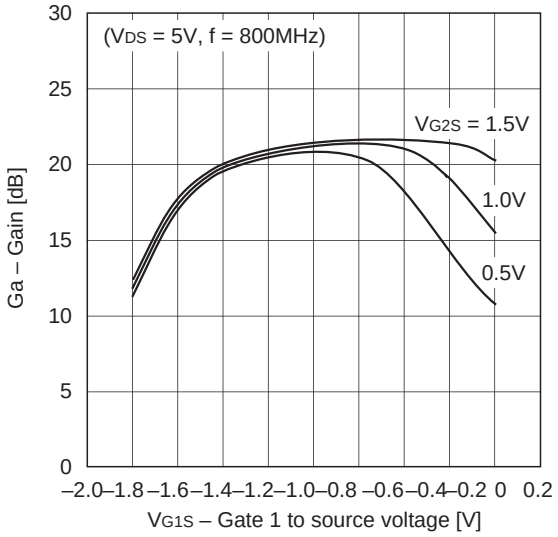
gm vs. V_{G1S}



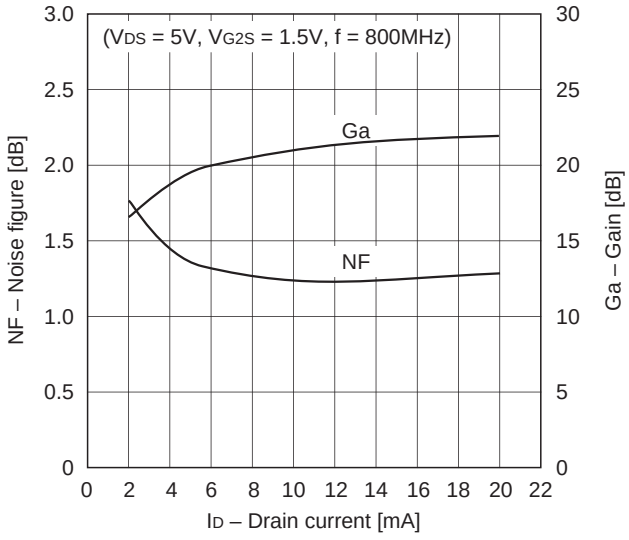
NF vs. V_{G1S}



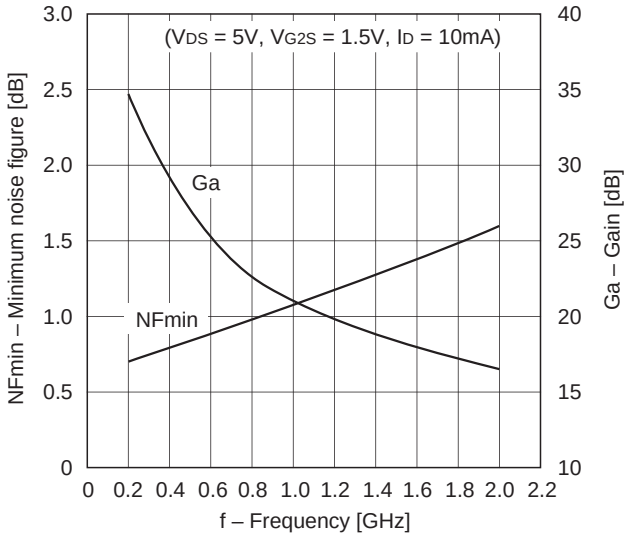
Ga vs. V_{G1S}



NF, Ga vs. I_D



NF, Ga vs. f



S-parameter vs. Frequency Characteristics (V_{DS} = 5V, V_{G2S} = 1.5V, I_D = 10mA) (Z_0 = 50Ω)

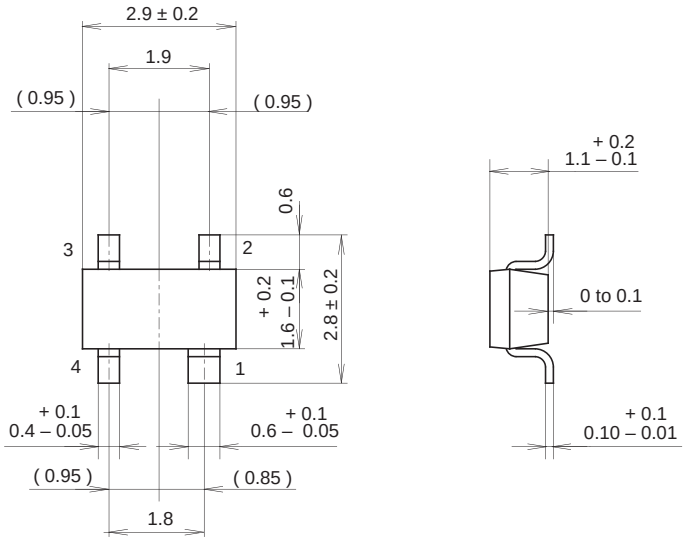
f (MHz)	S11		S21		S12		S22	
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100	0.999	–1.8	2.110	176.7	0.001	73.3	0.970	–0.7
200	0.998	–3.7	2.105	173.0	0.002	91.6	0.968	–1.6
300	0.991	–5.7	2.097	169.7	0.004	80.5	0.965	–2.4
400	0.984	–7.8	2.094	166.4	0.004	85.0	0.963	–3.2
500	0.980	–10.0	2.083	162.7	0.005	84.9	0.961	–4.2
600	0.970	–12.2	2.070	159.5	0.006	84.7	0.958	–4.9
700	0.964	–14.1	2.058	156.1	0.007	83.2	0.958	–5.8
800	0.956	–16.1	2.048	152.8	0.007	82.5	0.958	–6.7
900	0.949	–17.9	2.039	149.4	0.008	82.0	0.958	–7.3
1000	0.938	–19.7	2.021	146.0	0.008	78.1	0.958	–8.3
1100	0.927	–21.3	2.008	142.8	0.009	84.4	0.954	–9.0
1200	0.911	–22.8	1.990	139.6	0.010	76.7	0.953	–9.6
1300	0.898	–24.4	1.973	136.3	0.011	77.8	0.950	–10.5
1400	0.882	–25.8	1.954	133.3	0.011	80.9	0.949	–11.2
1500	0.868	–27.4	1.941	130.0	0.011	80.0	0.947	–12.1
1600	0.856	–29.0	1.928	126.8	0.011	80.5	0.947	–12.9
1700	0.838	–30.2	1.901	123.7	0.012	74.3	0.946	–13.9
1800	0.824	–31.5	1.888	120.6	0.012	79.2	0.945	–14.5
1900	0.809	–32.9	1.865	117.3	0.013	80.6	0.942	–15.3
2000	0.792	–34.1	1.846	114.1	0.013	79.5	0.941	–15.9

Noise Figure Characteristics (V_{DS} = 5V, V_{G2S} = 1.5V, I_D = 10mA)

f (MHz)	NFmin (dB)	Gamma Optimum		Rn (Ω)
		ANG	MAG	
200	0.72	0.97	4.4	63.7
300	0.75	0.95	6.4	63.0
400	0.81	0.93	8.2	62.2
500	0.84	0.91	9.9	61.5
600	0.90	0.88	11.4	60.7
700	0.94	0.86	12.8	59.9
800	0.98	0.84	14.2	59.1
900	1.02	0.83	15.5	58.4
1000	1.07	0.81	16.7	57.6
1100	1.13	0.80	17.9	56.8
1200	1.17	0.79	19.1	56.0
1300	1.22	0.78	20.3	55.2
1400	1.26	0.78	21.5	54.3
1500	1.31	0.77	22.8	53.5
1600	1.38	0.77	24.2	52.7
1700	1.42	0.77	25.6	51.9
1800	1.48	0.76	27.1	51.0
1900	1.52	0.76	28.8	50.2
2000	1.57	0.75	30.6	49.3

Package Outline Unit: mm

M-254



1. Source
2. Gate1
3. Gate2
4. Drain

SONY CODE	M-254
EIAJ CODE	————
JEDEC CODE	————

PACKAGE MASS	0.01g