To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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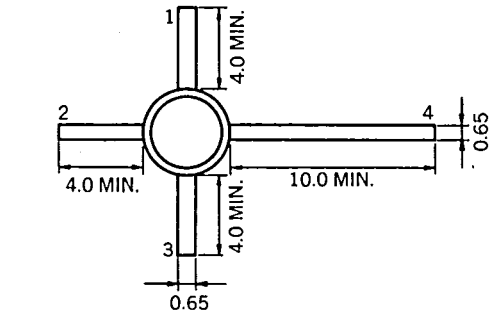
RENESAS

MES FIELD EFFECT TRANSISTOR

3SK174

RF AMP. FOR UHF TV TUNER
N-CHANNEL GaAs DUAL-GATE MES FIELD-EFFECT TRANSISTOR
4PIN DISK MOLD

PACKAGE DIMENSIONS
in millimeters



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

FEATURES

- Suitable for use as RF amplifier in UHF TV tuner.
- Low C_{rss} : 0.02 pF TYP.
- High G_{PS} : 20 dB TYP.
- Low NF : 1.1 dB TYP.

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Drain to Source Voltage	V_{DSX}	13	V
Gate1 to Source Voltage	V_{G1S}	−4.5	V
Gate2 to Source Voltage	V_{G2S}	−4.5	V
Drain Current	I_D	40	mA
Total Power Dissipation	P_T	200	mW
Channel Temperature	T_{ch}	125	°C
Storage Temperature	T_{stg}	−55 to +125	°C

ELECTRICAL CHARACTERISTICS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITIONS
Drain to Source Breakdown Voltage	BV_{DSX}	13			V	V_{G1S} = −4 V, V_{G2S} = 0, I_D = 10 μA
Drain Current	I_{DSS}	5	20	40	mA	V_{DS} = 5 V, V_{G2S} = 0, V_{G1S} = 0
Gate1 to Source Cutoff Voltage	$V_{G1S(off)}$			−3.5	V	V_{DS} = 5 V, V_{G2S} = 0, I_D = 100 μA
Gate2 to Source Cutoff Voltage	$V_{G2S(off)}$			−3.5	V	V_{DS} = 5 V, V_{G1S} = 0, I_D = 100 μA
Gate1 Reverse Current	I_{G1SS}			10	μA	V_{DS} = 0, V_{G1S} = −4 V, V_{G2S} = 0
Gate2 Reverse Current	I_{G2SS}			10	μA	V_{DS} = 0, V_{G2S} = −4 V, V_{G1S} = 0
Forward Transfer Admittance	$\lvert y_{fs} \rvert$	18	25	35	mS	V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 1.0 kHz
Input Capacitance	C_{iss}	0.5	1.0	1.5	pF	V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 1 MHz
Reverse Transfer Capacitance	C_{rss}		0.02	0.03	pF	
Power Gain	G_{PS}	16.0	20.0		dB	V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA, f = 900 MHz
Noise Figure	NF		1.1	2.5	dB	

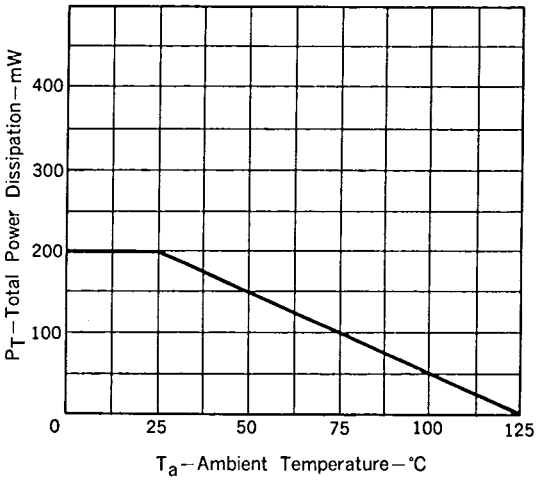
I_{DSS} Classification

Unit: mA

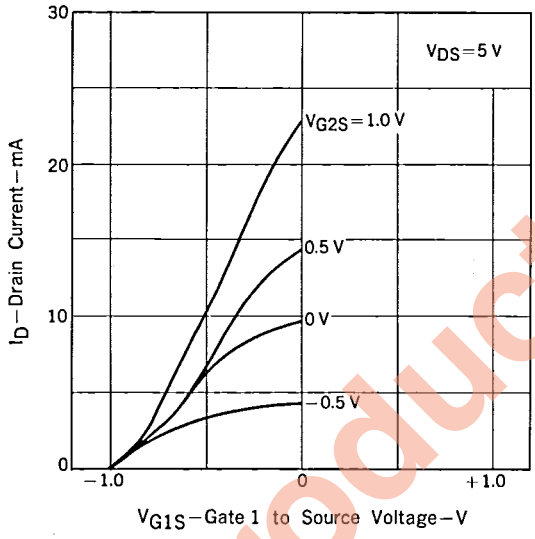
Marking	N	M	L	K
I_{DSS}	5 to 15	10 to 25	20 to 35	30 to 40

TYPICAL CHARACTERISTICS (T_a = 25 °C)

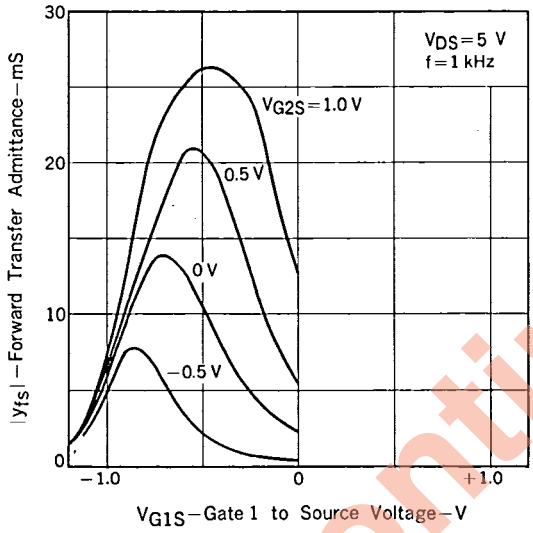
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



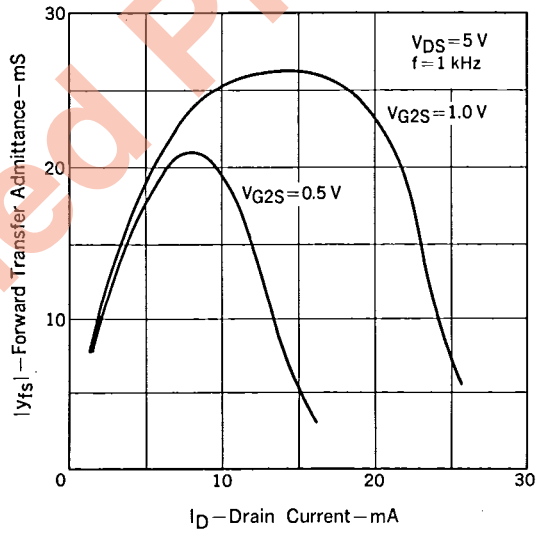
DRAIN CURRENT vs. GATE1 TO SOURCE VOLTAGE



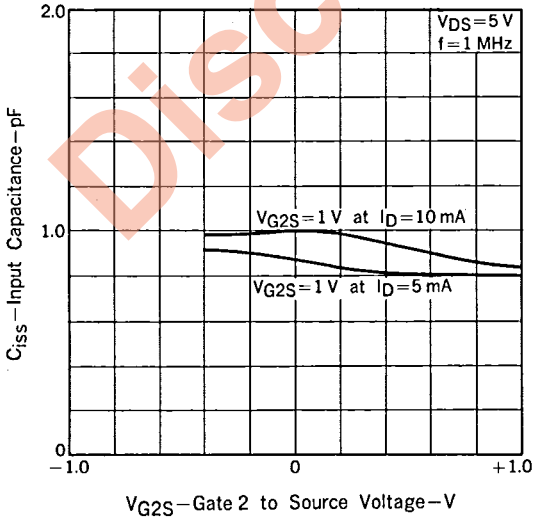
FORWARD TRANSFER ADMITTANCE vs. GATE1 TO SOURCE VOLTAGE



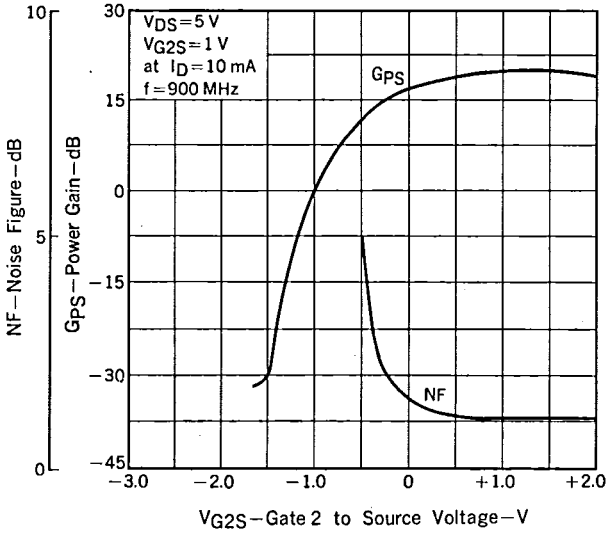
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



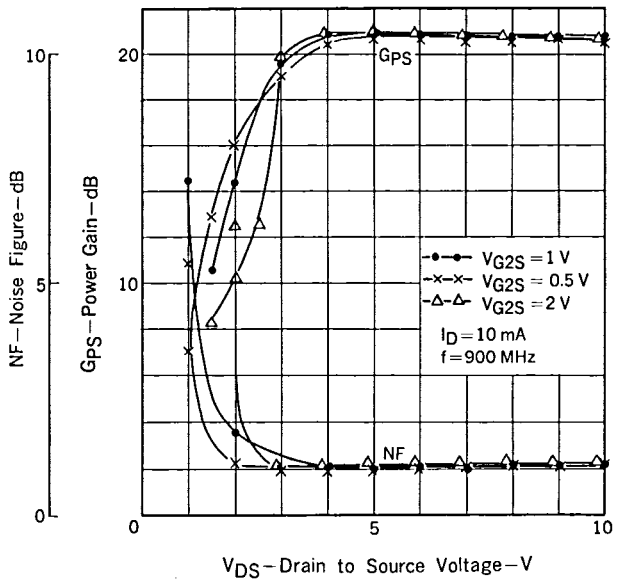
INPUT CAPACITANCE vs. GATE2 TO SOURCE VOLTAGE



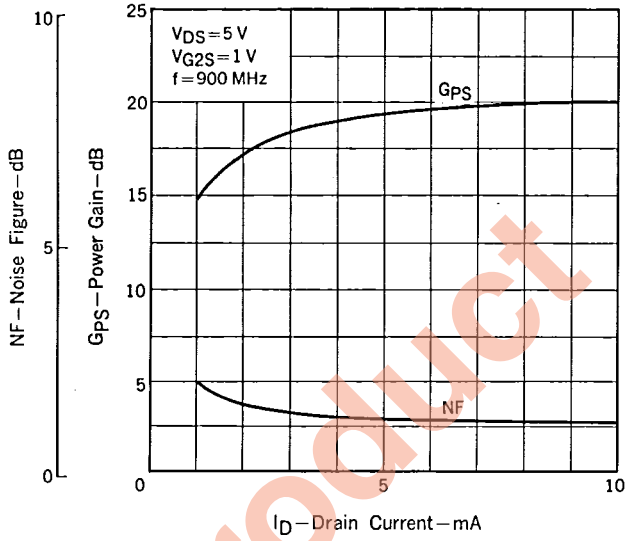
POWER GAIN AND NOISE FIGURE vs. GATE2 TO SOURCE VOLTAGE



POWER GAIN AND NOISE FIGURE vs.
DRAIN TO SOURCE VOLTAGE



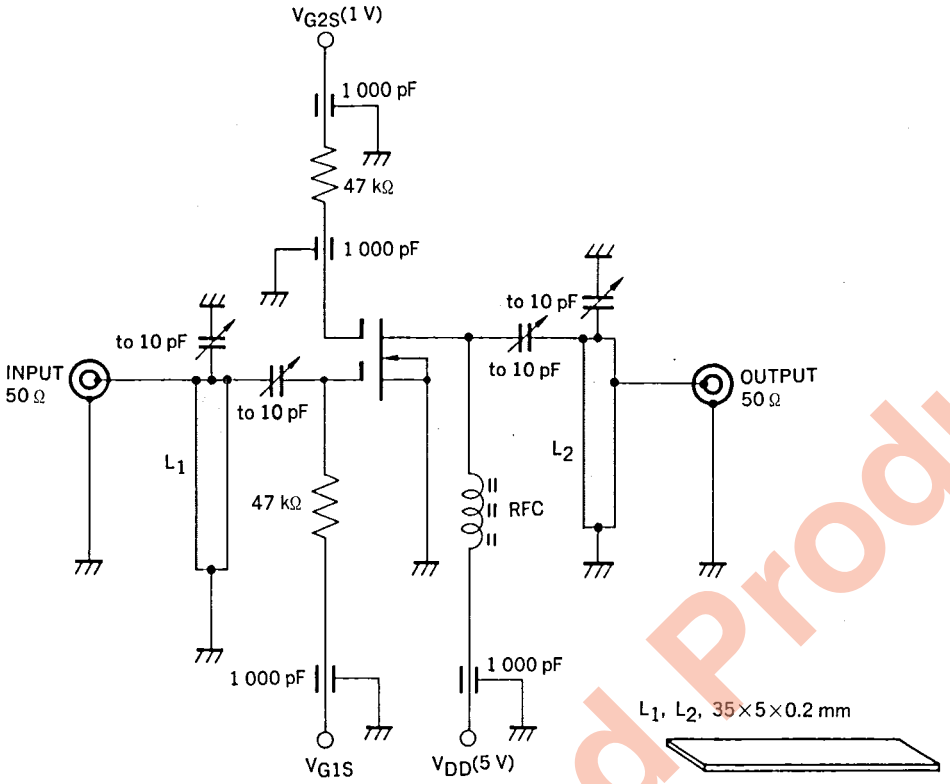
POWER GAIN AND NOISE FIGURE vs.
DRAIN CURRENT



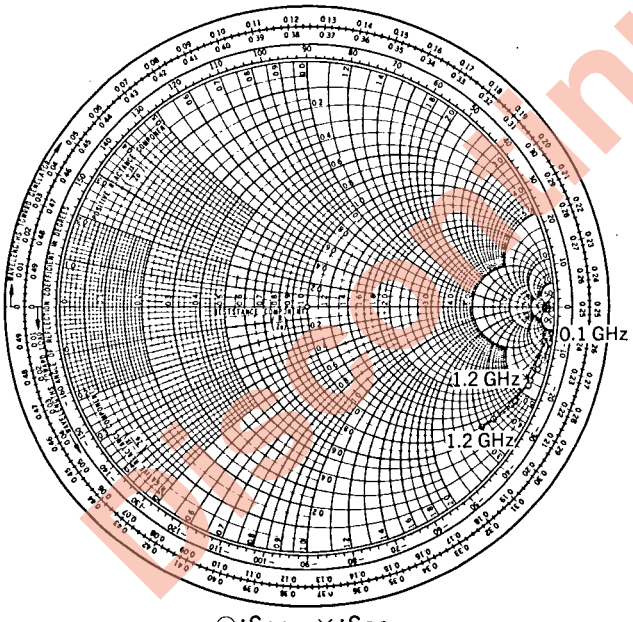
S-PARAMETER (V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA)

FREQUENCY	S11		S21		S12		S22	
MHz	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG
100.0000	0.993	–2.7	2.100	176.9	0.008	146.6	0.973	–1.5
200.0000	1.003	–6.2	2.140	169.8	0.009	55.7	0.976	–3.6
300.0000	0.994	–8.9	2.090	163.4	0.004	–12.9	0.981	–3.6
400.0000	0.982	–12.8	2.070	158.2	0.004	97.4	0.970	–6.0
500.0000	0.974	–14.7	2.115	156.8	0.010	82.9	0.975	–5.5
600.0000	0.946	–18.9	2.115	147.6	0.007	108.2	0.959	–9.2
700.0000	0.955	–19.6	2.068	143.8	0.005	102.4	0.980	–7.9
800.0000	0.931	–24.5	2.083	137.9	0.006	73.3	0.954	–11.4
900.0000	0.925	–25.5	2.161	136.2	0.007	80.2	0.980	–11.4
1000.0000	0.877	–30.4	2.122	125.5	0.001	138.9	0.950	–14.8
1100.0000	0.904	–30.6	2.154	122.8	0.003	111.5	0.975	–13.8
1200.0000	0.852	–35.3	2.186	115.9	0.002	129.9	0.945	–18.0

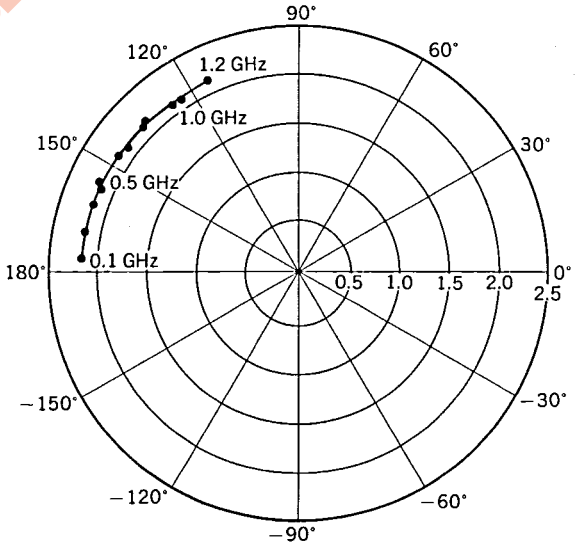
900 MHz G_{PS} AND NF TEST CIRCUIT



V_{DS} = 5 V, V_{G2S} = 1 V, I_D = 10 mA



○:S_{11} ×:S_{22}



S_{21}