N-Channel Dual Gate MOS-Fieldeffect Tetrode, Depletion Mode

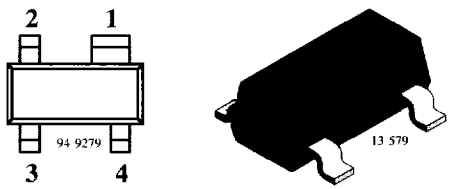
Electrostatic sensitive device.
Observe precautions for handling.

Applications

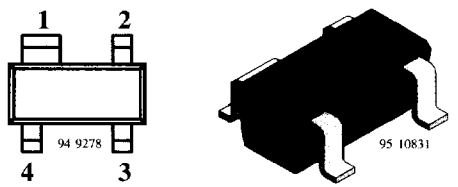
Input- and mixer stages in UHF- and VHF-tuner

Features

- Integrated gate protection diodes
- Low noise figure
- Low feedback capacitance
- High cross modulation performance
- Low input capacitance
- High AGC-range
- High gain
- Available with reverse pin configuration (BF 998 R) on request



BF998 Marking: MO
Plastic case (SOT 143)
1 = Source; 2 = Drain; 3 = Gate 2; 4 = Gate 1



BF998R Marking: MOR
Plastic case (SOT 143R)
1 = Source; 2 = Drain; 3 = Gate 2; 4 = Gate 1

Absolute Maximum Ratings

Parameters	Symbol	Value	Unit
Drain source voltage	V_{DS}	12	V
Drain current	I_D	30	mA
Gate 1/gate 2-source peak current	$\pm I_{G1/G2SM}$	10	mA
Gate 1/gate 2-source voltage	$\pm V_{G1S/G2S}$	7	V
Total power dissipation $T_{amb} \leq 60$ °C	P_{tot}	200	mW
Channel temperature	T_{Ch}	150	°C
Storage temperature range	T_{stg}	–65 ... +150	°C

Maximum Thermal Resistance

Parameters	Symbol	Value	Unit
Channel ambient on glass fibre printed board 25 x 20 x 1.5 mm^3 plated with 35 µm Cu	R_{thChA}	450	K/W

Electrical DC Characteristics

T_{amb} = 25 °C

Parameters / Test Conditions	Type	Symbol	Min	Typ	Max	Unit
Drain-source breakdown voltage I_D = 10 µA, $-V_{G1S} = -V_{G2S}$ = 4 V		$V_{(BR)DS}$	12			V
Gate 1-source breakdown voltage $\pm I_{G1S}$ = 10 mA, $V_{G2S} = V_{DS}$ = 0		$\pm V_{(BR)G1SS}$	8		14	V
Gate 2-source breakdown voltage $\pm I_{G2S}$ = 10 mA, $V_{G1S} = V_{DS}$ = 0		$\pm V_{(BR)G2SS}$	8		14	V
Gate 1-source leakage current $\pm V_{G1S}$ = 5 V, $V_{G2S} = V_{DS}$ = 0		$\pm I_{G1SS}$			50	nA
Gate 2-source leakage current $\pm V_{G2S}$ = 5 V, $V_{G1S} = V_{DS}$ = 0		$\pm I_{G2SS}$			50	nA
Drain current V_{DS} = 8 V, V_{G1S} = 0, V_{G2S} = 4 V	BF 998 / BF 998 R	I_{DSS}	4		18	mA
	BF 998 A / BF 998 RA	I_{DSS}	4		10.5	mA
	BF 998 B / BF 998 RB	I_{DSS}	9.5		18	mA
Gate 1-source cut-off voltage V_{DS} = 8 V, V_{G2S} = 4 V, I_D = 20 µA		$-V_{G1S(OFF)}$		1.0	2.0	V
Gate 2-source cut-off voltage V_{DS} = 8 V, V_{G1S} = 0, I_D = 20 µA		$-V_{G2S(OFF)}$		0.6	1.0	V

Electrical AC Characteristics

V_{DS} = 8 V, I_D = 10 mA, V_{G2S} = 4 V, f = 1 MHz, T_{amb} = 25 °C

Parameters / Test Conditions	Symbol	Min	Typ	Max	Unit
Forward transadmittance	$\lvert y_{21s} \rvert$	21	24		mS
Gate 1 input capacitance	C_{issg1}		2.1	2.5	pF
Gate 2 input capacitance V_{G1S} = 0, V_{G2S} = 4 V	C_{issg2}		1.1		pF
Feedback capacitance	C_{rss}		25		fF
Output capacitance	C_{oss}		1.05		pF
Power gain g_S = 2 mS, g_L = 0.5 mS, f = 200 MHz g_S = 3.3 mS, g_L = 1 mS, f = 800 MHz	 G_{ps} G_{ps}	 16.5	 28 20	 	 dB dB
AGC range V_{G2S} = 4 V to −2 V, f = 800 MHz	ΔG_{ps}	40			dB
Noise figure g_S = 2 mS, g_L = 0.5 mS, f = 200 MHz g_S = 3.3 mS, g_L = 1 mS, f = 800 MHz	 F F	 	 1.0 1.5	 	 dB dB

Common Source S-Parameters
V_{G2S} = 4 V, Z_0 = 50 Ω

V_{DS}/V	I_D/mA	f/MHz	S_{11}		S_{21}		S_{12}		S_{22}	
			LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG
			dB	deg	dB	deg	dB	deg	dB	deg
8	5	100	–0.03	–7.2	5.71	168.8	–55.94	83.6	–0.08	–3.6
		200	–0.15	–14.1	5.51	157.3	–50.26	76.8	–0.13	–7.0
		300	–0.34	–20.9	5.20	145.9	–47.29	70.6	–0.21	–10.4
		400	–0.57	–27.4	4.84	135.5	–45.68	65.5	–0.28	–13.5
		500	–0.83	–33.6	4.39	125.3	–44.98	60.1	–0.37	–16.7
		600	–1.10	–39.3	3.98	116.0	–44.62	58.6	–0.47	–19.5
		700	–1.35	–45.0	3.57	107.2	–45.51	56.2	–0.55	–22.5
		800	–1.62	–50.1	3.16	98.9	–45.88	58.4	–0.65	–25.1
		900	–1.84	–55.6	2.80	90.6	–46.46	64.0	–0.72	–28.2
		1000	–2.09	–60.6	2.43	83.0	–47.88	70.0	–0.77	–30.9
		1100	–2.33	–65.4	2.11	75.3	–49.66	89.8	–0.82	–33.7
		1200	–2.52	–70.2	1.79	67.5	–49.70	116.0	–0.89	–36.7
		1300	–2.72	–74.9	1.52	60.4	–47.29	145.4	–0.89	–39.6
	10	100	–0.04	–7.6	7.92	168.9	–55.74	83.2	–0.10	–3.6
		200	–0.15	–14.8	7.72	157.6	–49.95	76.8	–0.16	–7.1
		300	–0.38	–21.9	7.42	146.7	–47.09	70.5	–0.24	–10.5
		400	–0.62	–28.6	7.02	136.4	–45.38	65.4	–0.33	–13.8
		500	–0.91	–35.0	6.60	126.5	–44.69	60.1	–0.43	–17.1
		600	–1.19	–41.0	6.15	117.4	–44.43	58.8	–0.53	–19.8
		700	–1.45	–46.6	5.73	108.9	–45.21	57.0	–0.61	–22.6
		800	–1.74	–52.0	5.32	100.8	–45.48	59.5	–0.72	–25.4
		900	–2.01	–57.5	4.95	92.8	–46.06	65.2	–0.79	–28.4
		1000	–2.27	–62.5	4.58	85.4	–47.18	71.5	–0.85	–31.1
		1100	–2.52	–67.2	4.23	78.1	–48.75	89.0	–0.90	–33.8
		1200	–2.73	–72.0	3.92	70.6	–48.80	111.9	–0.96	–36.9
		1300	–2.94	–76.6	3.62	63.9	–46.98	139.8	–0.97	–39.7
	15	100	–0.04	–7.6	8.75	169.1	–55.44	83.4	–0.13	–3.7
		200	–0.16	–14.9	8.54	157.8	–49.75	76.8	–0.19	–7.2
		300	–0.39	–22.1	8.24	147.0	–46.89	70.5	–0.28	–10.6
		400	–0.64	–28.9	7.83	136.7	–45.18	65.5	–0.35	–13.9
		500	–0.93	–35.3	7.40	126.8	–44.49	60.3	–0.46	–17.2
		600	–1.22	–41.5	6.94	117.9	–44.23	59.4	–0.57	–20.0
		700	–1.50	–47.1	6.52	109.3	–44.91	57.6	–0.66	–22.8
		800	–1.80	–52.6	6.12	101.5	–45.08	60.2	–0.76	–25.7
		900	–2.06	–58.0	5.73	93.6	–45.56	65.8	–0.84	–28.6
		1000	–2.32	–62.9	5.35	86.4	–46.48	71.4	–0.90	–31.3
		1100	–2.59	–67.7	5.00	79.0	–47.85	87.0	–0.95	–34.0
		1200	–2.78	–72.4	4.68	71.7	–48.20	107.0	–1.00	–36.9
		1300	–3.00	–77.0	4.38	65.2	–46.78	133.8	–1.01	–39.9

Typical Characteristics (T_j = 25°C unless otherwise specified)

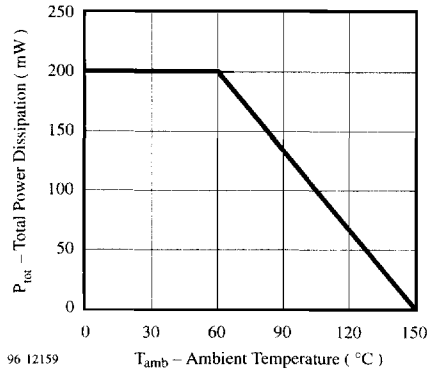


Figure 1. Total Power Dissipation vs. Ambient Temperature

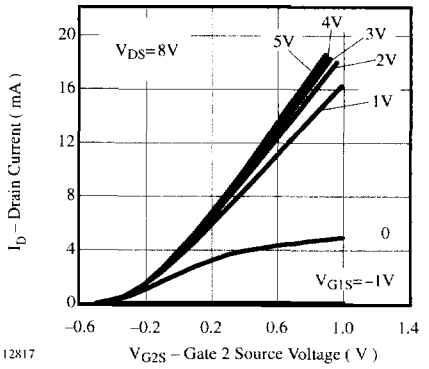


Figure 4. Drain Current vs. Gate 2 Source Voltage

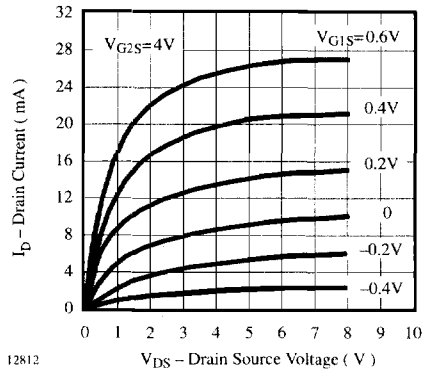


Figure 2. Drain Current vs. Drain Source Voltage

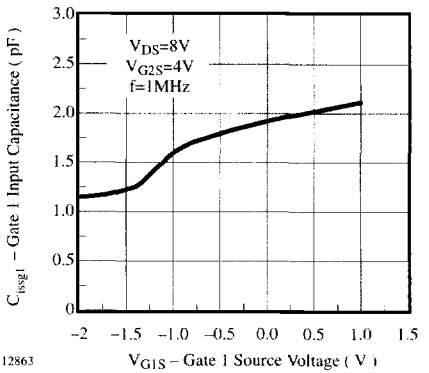


Figure 5. Gate 1 Input Capacitance vs. Gate 1 Source Voltage

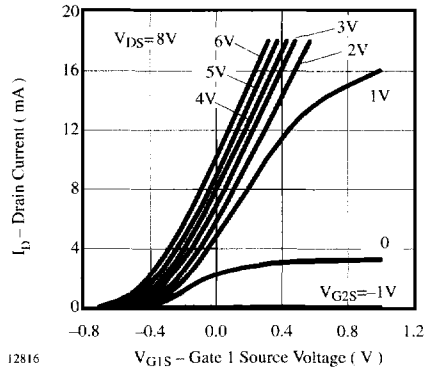


Figure 3. Drain Current vs. Gate 1 Source Voltage

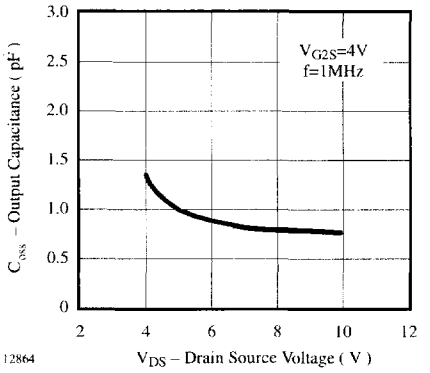


Figure 6. Output Capacitance vs. Drain Source Voltage

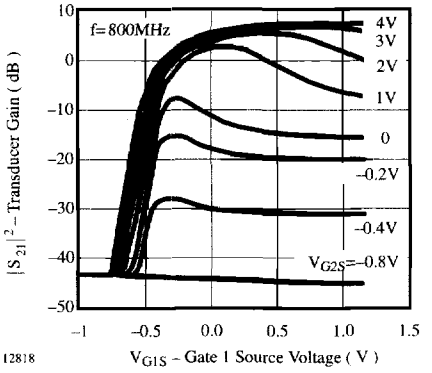


Figure 7. Transducer Gain vs. Gate 1 Source Voltage

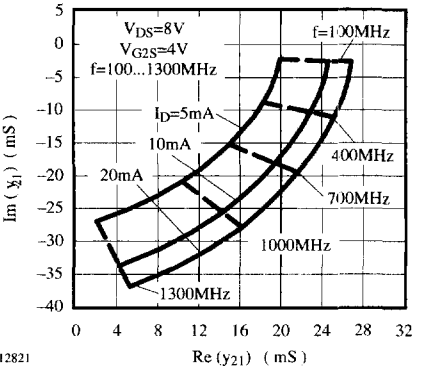


Figure 10. Short Circuit Forward Transfer Admittance

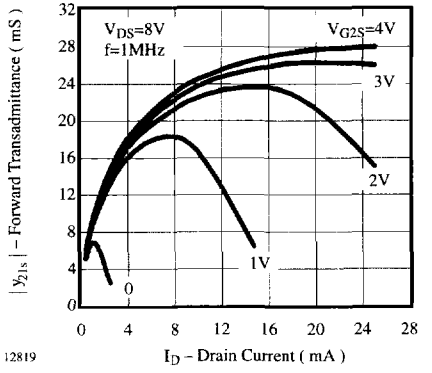


Figure 8. Forward Transadmittance vs. Drain Current

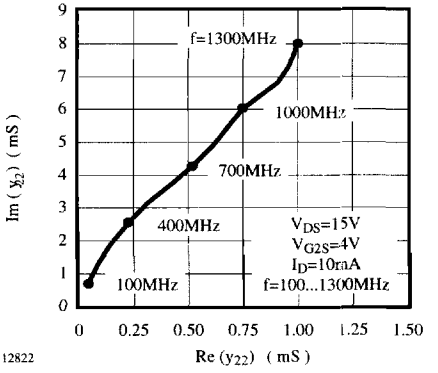


Figure 11. Short Circuit Output Admittance

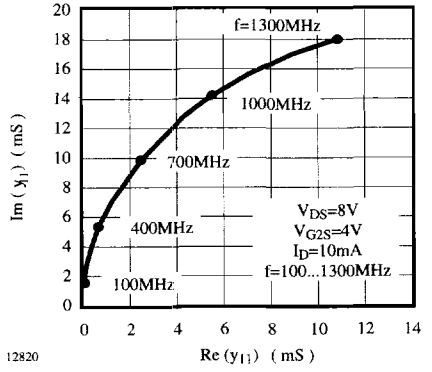


Figure 9. Short Circuit Input Admittance

V_{DS} = 8 V; I_D = 10 mA;V_{G2S} = 4 V; Z_0 = 50 Ω

S_{11}

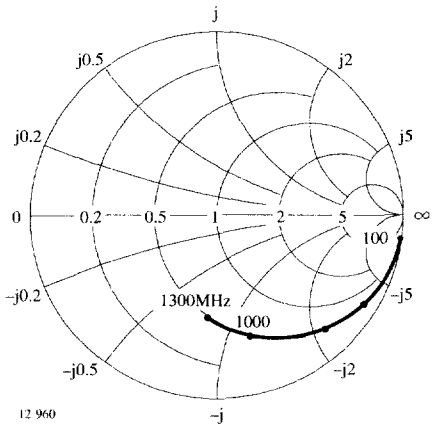


Figure 12. Input reflection coefficient

S_{12}

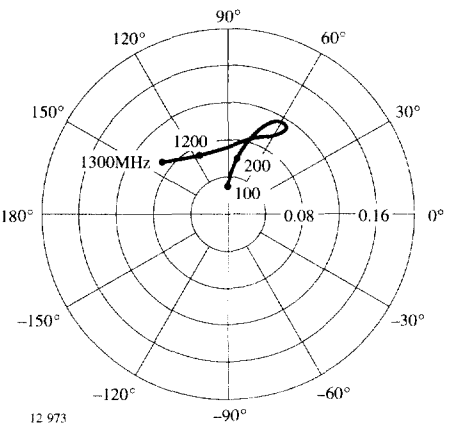


Figure 14. Reverse transmission coefficient

S_{21}

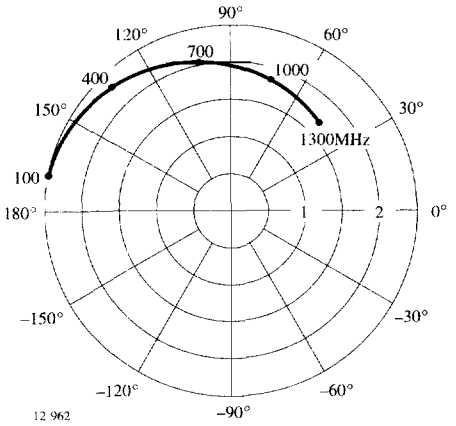


Figure 13. Forward transmission coefficient

S_{22}

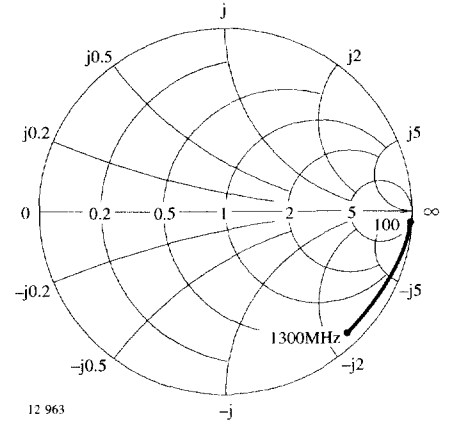
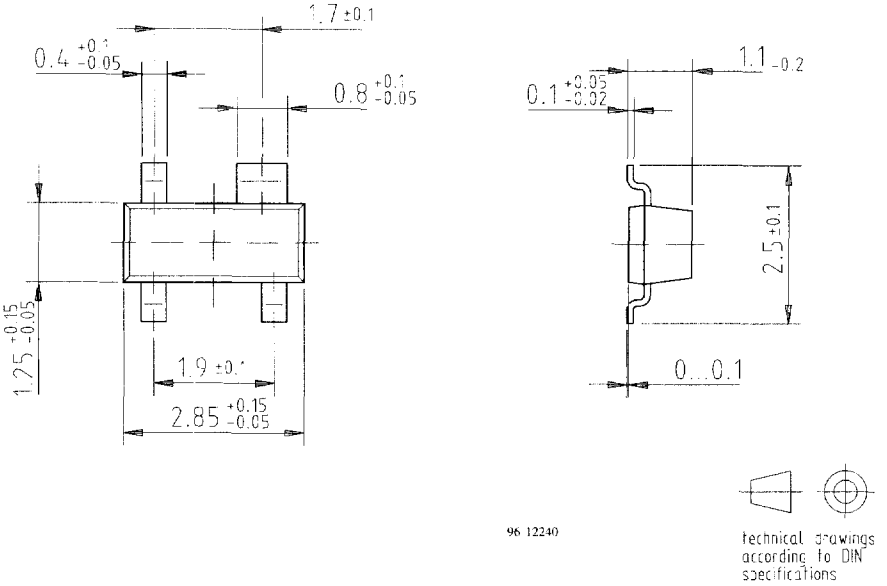


Figure 15. Output reflection coefficient

Dimensions of BF998 in mm



Dimensions of BF998R in mm