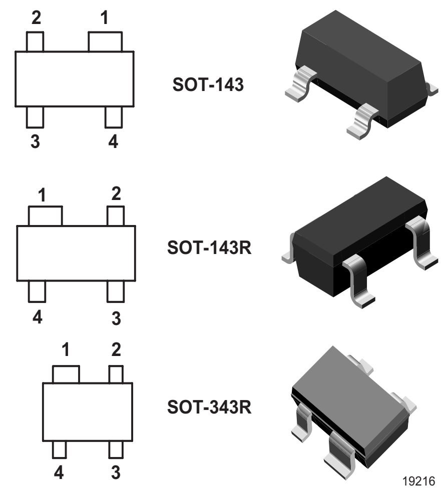
MOSMIC® for TV-Tuner Prestage with 5 V Supply Voltage

Comments

MOSMIC - **MOS M**onolithic **I**ntegrated **C**ircuit

Features

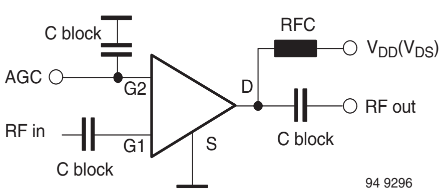
- Integrated gate protection diodes
- Low noise figure
- High gain
- Biasing network on chip
- Improved cross modulation at gain reduction
- High AGC-range
- SMD package
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC



Electrostatic sensitive device.
Observe precautions for handling.

Applications

Low noise gain controlled input stages in UHF-and VHF- tuner with 5 V supply voltage.



Mechanical Data

Typ: S594T
Case: SOT-143 Plastic case
Weight: approx. 8.0 mg
Pinning: 1 = Source, 2 = Drain,
3 = Gate 2, 4 = Gate 1
Typ: S594TR
Case: SOT-143R Plastic case
Weight: approx. 8.0 mg
Pinning: 1 = Source, 2 = Drain,
3 = Gate 2, 4 = Gate 1
Typ: S594TRW
Case: SOT-343R Plastic case
Weight: approx. 6.0 mg
Pinning: 1 = Source, 2 = Drain,
3 = Gate 2, 4 = Gate 1

Parts Table

Part	Marking	Package
S594T	594	SOT-143
S594TR	94R	SOT-143R
S594TRW	W94	SOT-343R

Absolute Maximum Ratings

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Value	Unit
Drain - source voltage		V_{DS}	8	V
Drain current		I_D	20	mA
Gate 1/Gate 2 - source peak current		$\pm I_{G1/G2SM}$	10	mA
Gate 1/Gate 2 - source voltage		$\pm V_{G1/G2SM}$	6	V
Total power dissipation	$T_{amb} \leq 60$ °C	P_{tot}	160	mW
Channel temperature		T_{Ch}	150	°C
Storage temperature range		T_{stg}	- 55 to + 150	°C

Maximum Thermal Resistance

Parameter	Test condition	Symbol	Value	Unit
Channel ambient	1)	R_{thChA}	450	K/W

1) on glass fibre printed board (25 x 20 x 1.5) mm^3 plated with 35 µm Cu

Electrical DC Characteristics

T_{amb} = 25 °C, unless otherwise specified

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Gate 1 - source breakdown voltage	$\pm I_{G1S}$ = 10 mA, $V_{G2S} = V_{DS} = 0$	$\pm V_{(BR)G1SS}$	7		10	V
Gate 2 - source breakdown voltage	$\pm I_{G2S}$ = 10 mA, $V_{G1S} = V_{DS} = 0$	$\pm V_{(BR)G2SS}$	7		10	V
Gate 1 - source leakage current	+ V_{G1S} = 5 V, $V_{G2S} = V_{DS} = 0$	+ I_{G1SS}			50	µA
	- V_{G1S} = 5 V, $V_{G2S} = V_{DS} = 0$	- I_{G1SS}			100	µA
Gate 2 - source leakage current	$\pm V_{G2S}$ = 5 V, $V_{G1S} = V_{DS} = 0$	$\pm I_{G2SS}$			20	nA
Drain current	V_{DS} = 5 V, V_{G1S} = 0, V_{G2S} = 4 V	I_{DSS}	50		500	µA
Self-biased operating current	V_{DS} = 5 V, V_{G1S} = nc, V_{G2S} = 4 V	I_{DSP}	7	10	14	mA
Gate 2 - source cut-off voltage	V_{DS} = 5 V, V_{G1S} = nc, I_D = 20 µA	$V_{G2S(OFF)}$		1.0		V

Caution for Gate 1 switch-off mode:

No external DC-voltage on Gate 1 in active mode!

Switch-off at Gate 1 with V_{G1S} < 0.7 V is feasible.

Using open collector switching transistor (inside of PLL), insert 10 kΩ collector resistor.

Electrical AC Characteristics

T_{amb} = 25 °C, unless otherwise specified

V_{DS} = 5 V, V_{G2S} = 4 V, $I_D = I_{DSP}$, f = 1 MHz

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
Forward transadmittance		$\lvert y_{21s} \rvert$	20	24	28	mS
Gate 1 input capacitance		C_{issg1}		2.1	2.5	pF
Feedback capacitance		C_{rss}		20		fF
Output capacitance		C_{oss}		0.9		pF
Power gain	G_S = 2 mS, G_L = 0.5 mS, f = 200 MHz	G_{ps}		26		dB
	G_S = 3,3 mS, G_L = 1 mS, f = 800 MHz	G_{ps}	16.5	20		dB

Parameter	Test condition	Symbol	Min	Typ.	Max	Unit
AGC range	V_{DS} = 5 V, V_{G2S} = 1 to 4 V, f = 800 MHz	ΔG_{ps}	40			dB
Noise figure	G_S = 2 mS, G_L = 0.5 mS, f = 200 MHz	F		1		dB
	G_S = 3.3 mS, G_L = 1 mS, f = 800 MHz	F		1.3		dB

Common Emitter S-Parameters

f/MHz	S11		S21		S12		S22	
	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG
		deg		deg		deg		deg
50	-0.02	-4.1	7.63	174.7	-63.74	88.0	-0.07	-1.8
100	-0.04	-7.9	7.56	169.0	-57.38	85.8	-0.09	-3.4
150	-0.11	-11.6	7.47	162.5	-53.95	82.9	-0.12	-5.3
200	-0.19	-15.5	7.36	156.7	-51.68	80.5	-0.15	-6.9
250	-0.30	-19.6	7.20	150.3	-50.05	78.0	-0.17	-8.8
300	-0.39	-22.9	7.06	145.2	-48.69	76.6	-0.22	-10.4
350	-0.54	-26.6	6.84	139.3	-47.82	74.8	-0.27	-11.8
400	-0.67	-30.0	6.67	133.9	-47.15	73.6	-0.29	-13.6
450	-0.82	-33.3	6.44	128.7	-46.66	72.8	-0.37	-15.1
500	-0.98	-36.7	6.26	123.5	-46.39	72.1	-0.44	-16.8
550	-1.14	-39.8	6.07	118.7	-46.33	72.0	-0.48	-18.3
600	-1.30	-43.2	5.81	113.4	-46.34	74.4	-0.55	-19.8
650	-1.44	-46.1	5.62	109.3	-46.14	76.3	-0.61	-21.1
700	-1.58	-49.2	5.43	104.4	-46.17	78.6	-0.66	-22.5
750	-1.74	-52.0	5.22	100.0	-46.48	81.7	-0.72	-24.2
800	-1.91	-54.9	5.01	95.5	-46.65	87.0	-0.78	-25.5
850	-2.02	-58.0	4.86	91.2	-46.62	93.4	-0.82	-27.0
900	-2.16	-61.0	4.68	86.8	-46.43	102.1	-0.86	-28.7
950	-2.28	-63.8	4.53	82.6	-45.77	110.0	-0.93	-30.0
1000	-2.43	-66.6	4.29	78.4	-45.10	114.9	-1.01	-31.4
1050	-2.57	-69.4	4.12	73.8	-44.59	119.4	-1.12	-32.7
1100	-2.74	-72.4	3.93	69.9	-44.05	126.3	-1.18	-34.2
1150	-2.81	-75.3	3.85	65.7	-43.14	132.1	-1.20	-35.8
1200	-2.93	-78.0	3.74	62.0	-42.24	138.1	-1.23	-37.3
1250	-3.06	-80.8	3.63	57.8	-41.21	143.1	-1.27	-38.7
1300	-3.16	-83.8	3.47	53.4	-40.03	146.5	-1.39	-40.1

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

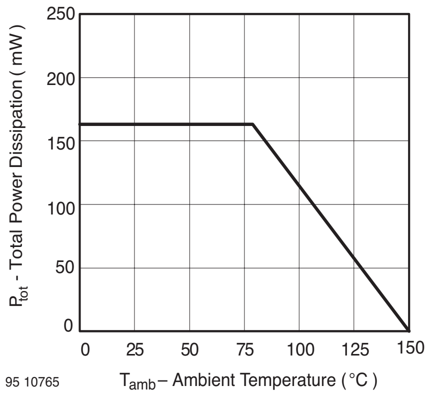


Figure 1. Total Power Dissipation vs. Ambient Temperature

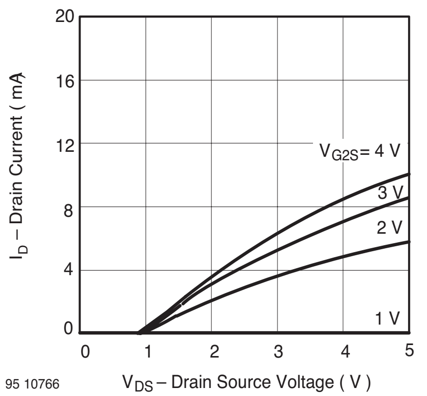


Figure 2. Drain Current vs. Drain Source Voltage

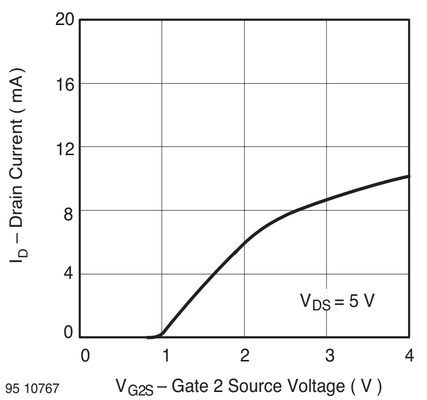


Figure 3. Drain Current vs. Gate 2 Source Voltage

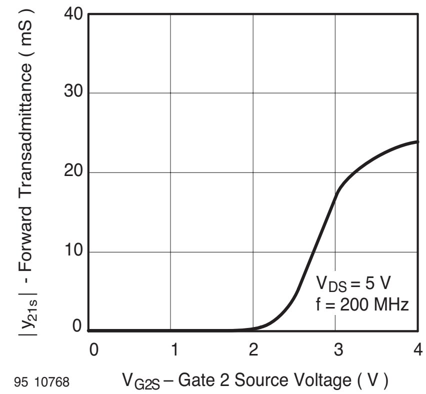


Figure 4. Forward Transadmittance vs. Gate 2 Source Voltage

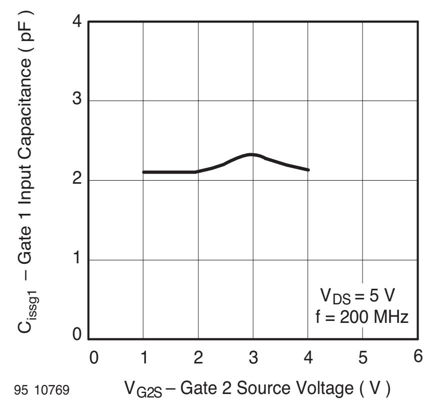


Figure 5. Gate 1 Input Capacitance vs. Gate 2 Source Voltage

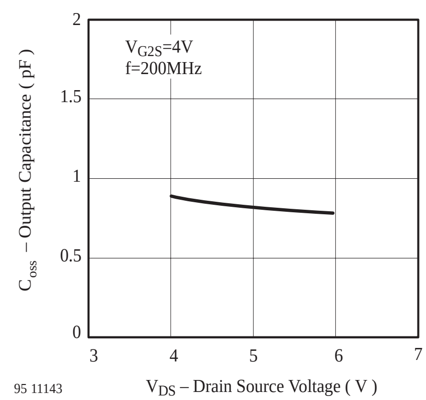


Figure 6. Output Capacitance vs. Drain Source Voltage

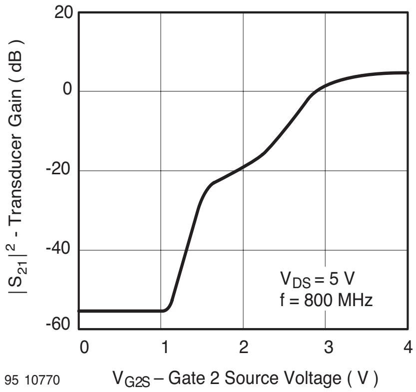


Figure 7. Transducer Gain vs. Gate 2 Source Voltage

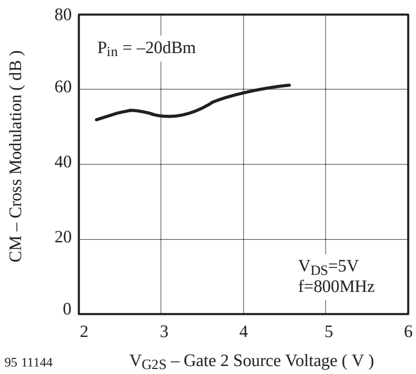


Figure 8. Cross Modulation vs. Gate 2 Source Voltage

V_{DS} = 10 V, I_D = 10 mA, Z_0 = 50 Ω

S_{11}

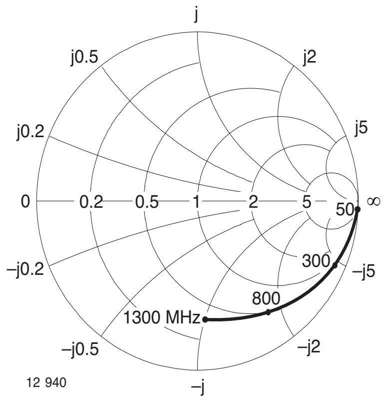


Figure 9. Input Reflection Coefficient

S_{12}

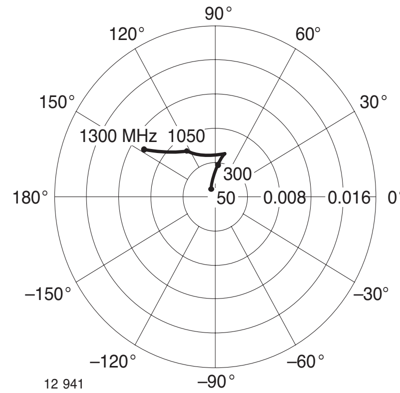


Figure 11. Reverse Transmission Coefficient

S_{21}

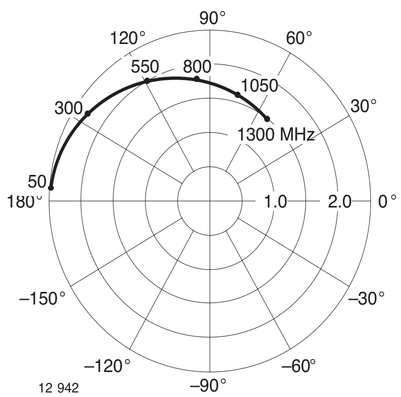


Figure 10. Forward Transmission Coefficient

S_{22}

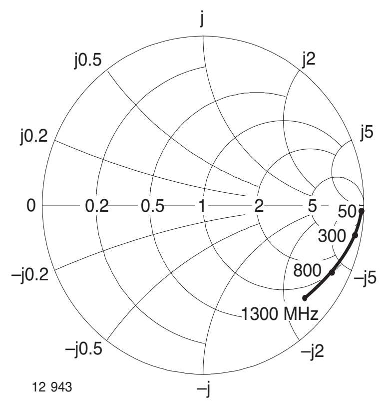
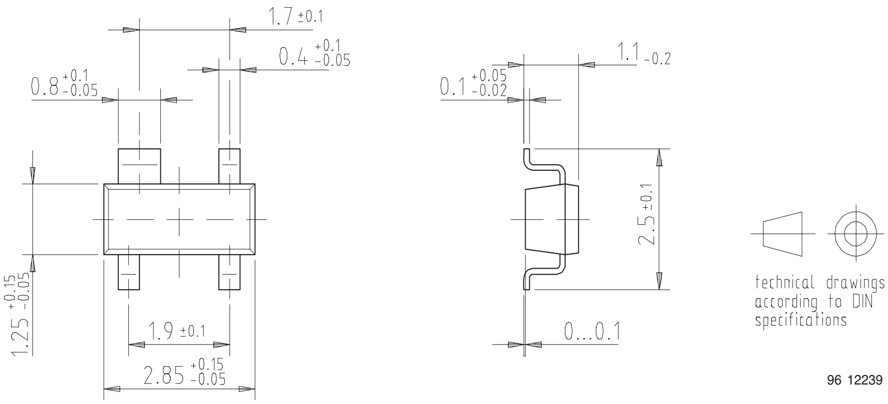
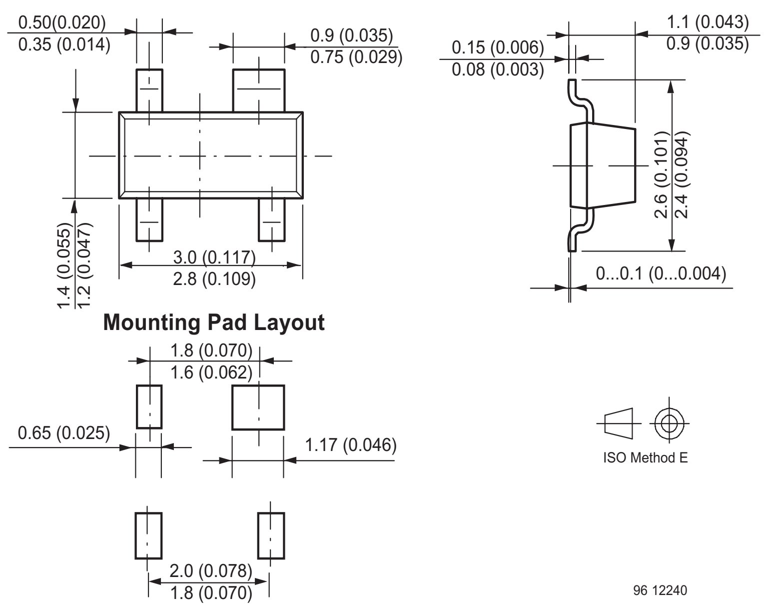


Figure 12. Output Reflection Coefficient

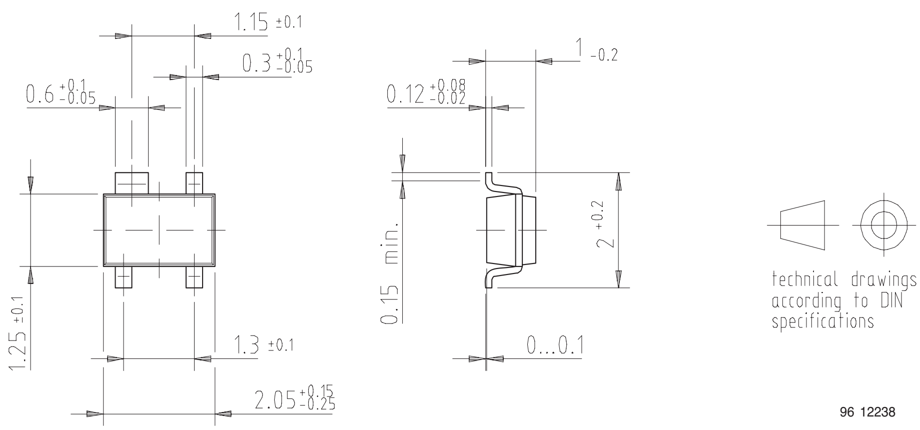
Package Dimensions in mm



Package Dimensions in mm



Package Dimensions in mm



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Ozone Depleting Substances Policy Statement

It is the policy of Vishay Semiconductor GmbH to

1. Meet all present and future national and international statutory requirements.
2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

Vishay Semiconductor GmbH has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively
2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

Vishay Semiconductor GmbH can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

Vishay Semiconductor GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany

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