



Not for new design, this product will be obsoleted soon

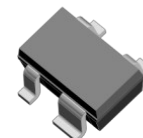
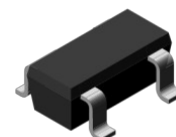
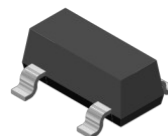
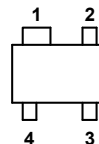
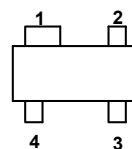
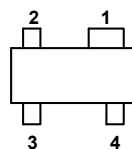
BF998/BF998R/BF998RW

Vishay Semiconductors

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

Features

- Integrated gate protection diodes^{SOT143}
- Low noise figure
- Low feedback capacitance
- High cross modulation performance
- Low input capacitances^{SOT143R}
- High AGC-range
- High gain
- Lead (Pb)-free component
- Component in accordance to RoHS 2002/95/EC and WEEE 2002/96/EC^{SOT343R}



Applications¹⁹²¹⁶

- Input and mixer stages in UHF tuners

Electrostatic sensitive device.



Observe precautions for handling.

Mechanical Data

Typ: BF998

Case: SOT143 Plastic case

Weight: approx. 8.0 mg

Marking: MO

Pinning:

1 = Source, 2 = Drain,

3 = Gate 2, 4 = Gate 1

Typ: BF998R

Case: SOT143R Plastic case

Weight: approx. 8.0 mg

Marking: MOR

Parts Table

Pinning:

1 = Source, 2 = Drain,

3 = Gate 2, 4 = Gate 1

Typ: BF998RW

Case: SOT343R Plastic case

Weight: approx. 6.0 mg

Marking: WMO

Pinning:

1 = Source, 2 = Drain,

3 = Gate 2, 4 = Gate 1

Part	Ordering code	Type Marking	Remarks
BF998	BF998A-GS08	MO	SOT143
BF998A	BF998A-GS08	MO	SOT143
BF998R	BF998RA-GS08	MOR	SOT143R
BF998RA	BF998RA-GS08	MOR	SOT143R

BF998RW	BF998RAW-GS08 or BF998RBW-GS08	WMO	SOT343R
BF998RAW	BF998RAW-GS08	WMO	SOT343R
BF998RBW	BF998RBW-GS08	WMO	SOT343R

Absolute Maximum Ratings

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Test condition	Symbol	Value	Unit
		V_{DS} 12	V	
		I_D 30	mA	
Gate 1/Gate 2 - source peak current		$\pm I_{G1/G2SM}$	10	mA
Gate 1/Gate 2 - source voltage	$\leq$	$\pm V_{G1S/G2S}$	7	V
		P_{tot}	200	mW
		T_{Ch} 150	$^{\circ}\text{C}$	
Storage temperature range		T_{stg}	-65 to +150	$^{\circ}\text{C}$

Thermal Characteristics

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) mm³ plated with 35 μm Cu

Electrical DC Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Test condition	Part	Symbol	Min.	Typ.	Max.	Unit
Drain - source breakdown voltage	$I_D = 10\text{ }\mu\text{A}$, $-V_{G1S} = -V_{G2S} = 4\text{ V}$		$V_{(BR)DS}$	12			V
Gate 1 - source breakdown voltage	$\pm I_{G1S} = 10\text{ mA}$, $V_{G2S} = V_{DS} = 0$		$\pm V_{(BR)G1SS}$	7		14	V
Gate 2 - source breakdown voltage	$\pm I_{G2S} = 10\text{ mA}$, $V_{G1S} = V_{DS} = 0$		$\pm V_{(BR)G2SS}$	7		14	V
Gate 1 - source leakage current	$\pm V_{G1S} = 5\text{ V}$, $V_{G2S} = V_{DS} = 0$		$\pm I_{G1SS}$			50	nA
Gate 2 - source leakage current	$\pm V_{G2S} = 5\text{ V}$, $V_{G1S} = V_{DS} = 0$		$\pm I_{G2SS}$			50	nA
Drain current	$V_{DS} = 8\text{ V}$, $V_{G1S} = 0$, $V_{G2S} = 4\text{ V}$	BF998/ BF998R/ BF998RW	I_{DSS}	4		18	mA

Parameter	Test condition	Symbol	Min.	Typ.	Max.	Unit
Forward transadmittance		$ y_{21s} $	21	24		mS
Gate 1 input capacitance		C_{issg1}		2.1	2.5	pF
Gate 2 input capacitance	$V_{G1S} = 0$, $V_{G2S} = 4\text{ V}$	C_{issg2}		1.1		pF
Feedback capacitance		C_{rss}		25		fF
Output capacitance		C_{oss}		1.05		pF



		BF998A/ BF998RA/ BF998RAW	I_{DSS}	4		10.5	mA
		BF998RBW	I_{DSS}	9.5		18	mA
Gate 1 - source cut-off voltage	$V_{DS} = 8\text{ V}, V_{G2S} = 4\text{ V}, I_D = 20\text{ }\mu\text{A}$		$-V_{G1S(OFF)}$		1.0	2.0	V
Gate 2 - source cut-off voltage	$V_{DS} = 8\text{ V}, V_{G1S} = 0, I_D = 20\text{ }\mu\text{A}$		$-V_{G2S(OFF)}$		0.6	1.0	V

Electrical AC Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

$V_{DS} = 8\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}, f = 1\text{ MHz}$

Parameter	Test condition	Symbol	Min.	Typ.	Max.	Unit
Power gain	$G_S = 2\text{ mS}, G_L = 0.5\text{ mS}, f = 200\text{ MHz}$	G_{ps}		28		dB
	$G_S = 3.3\text{ mS}, G_L = 1\text{ mS}, f = 800\text{ MHz}$	G_{ps}	16.5	20		dB
AGC range	$V_{G2S} = 4\text{ to }-2\text{ V}, f = 800\text{ MHz}$	ΔG_{ps}	40			dB
Noise figure	$G_S = 2\text{ mS}, G_L = 0.5\text{ mS}, f = 200\text{ MHz}$	F		1.0		dB
	$G_S = 3.3\text{ mS}, G_L = 1\text{ mS}, f = 800\text{ MHz}$	F		1.5		dB

Common Source S-Parameters

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

$V_{DS} = 8\text{ V}, V_{G2S} = 4\text{ V}, Z_0 = 50\text{ }\Omega$

ID/mA	f/MHz	S11		S21		S12		S22	
		LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG	LOG MAG	ANG
			deg		deg		deg		deg
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	134.7	- 48.51	67.7	- 0.29	- 9.7
	400	- 0.70	- 32.1	2.01	121.3	- 46.98	62.8	- 0.44	- 12.3
	500	- 1.03	- 39.2	1.45	108.4	- 46.40	57.8	- 0.59	- 15.1
	600	- 1.33	- 45.8	0.94	96.5	- 46.40	57.3	- 0.76	- 17.4
	700	- 1.62	- 52.3	0.43	85.0	- 47.02	58.9	- 0.91	- 19.7
	800	- 1.92	- 58.7	- 0.10	74.1	- 47.53	63.3	- 1.08	- 22.0
	900	- 2.21	- 64.7	- 0.59	63.6	- 47.81	73.1	- 1.26	- 24.3
	1000	- 2.49	- 70.7	- 1.12	53.1	- 48.52	83.5	- 1.45	- 26.2
	1100	- 2.80	- 76.6	- 1.52	43.7	- 48.53	102.1	- 1.57	- 28.4
	1200	- 3.07	- 82.5	- 1.93	33.6	- 46.95	120.4	- 1.75	- 30.5
	1300	- 3.31	- 88.6	- 2.35	24.1	- 44.44	131.7	- 1.92	- 32.7

10	100	- 0.05	- 9.0	5.19	165.3	- 56.24	81.9	- 0.11	- 3.5
	200	- 0.16	- 18.7	5.58	151.8	- 49.97	75.0	- 0.21	- 7.2
	300	- 0.48	- 26.0	4.45	136.3	- 47.91	67.2	- 0.33	- 9.8
	400	- 0.76	- 33.7	3.95	123.3	- 46.48	61.8	- 0.47	- 12.6
	500	- 1.11	- 41.2	3.40	110.9	- 45.91	56.3	- 0.65	- 15.3
	600	- 1.43	- 48.3	2.88	99.5	- 45.91	55.8	- 0.81	- 17.8
	700	- 1.75	- 55.1	2.39	88.7	- 46.53	56.7	- 0.96	- 20.0
	800	- 2.07	- 61.6	1.88	78.1	- 47.13	60.7	- 1.12	- 22.4
	900	- 2.40	- 67.9	1.39	67.9	- 47.41	69.9	- 1.32	- 24.6
	1000	- 2.70	- 74.2	0.90	57.9	- 48.21	80.0	- 1.49	- 26.6
	1100	- 3.03	- 80.2	0.50	48.7	- 48.43	98.9	- 1.61	- 28.8
	1200	- 3.32	- 86.4	0.13	38.9	- 47.04	118.2	- 1.79	- 31.0
	1300	- 3.59	- 92.3	- 0.28	29.6	- 44.54	130.5	- 1.96	- 33.3
15	100	- 0.05	- 9.4	6.07	165.4	- 55.74	81.4	- 0.15	- 3.6
	200	- 0.17	- 19.4	6.44	152.0	- 49.47	74.6	- 0.24	- 7.3
	300	- 0.50	- 27.1	5.31	136.7	- 47.41	66.4	- 0.36	- 10.0
	400	- 0.81	- 35.0	4.80	123.8	- 45.98	60.8	- 0.52	- 12.9
	500	- 1.18	- 42.9	4.23	111.5	- 45.41	55.1	- 0.68	- 15.7
	600	- 1.52	- 50.3	3.72	100.3	- 45.41	54.4	- 0.84	- 18.0
	700	- 1.86	- 57.2	3.22	89.6	- 46.13	54.9	- 1.02	- 20.4
	800	- 2.20	- 63.9	2.72	79.4	- 46.63	58.5	- 1.16	- 22.7
	900	- 2.53	- 70.4	2.24	69.2	- 47.00	67.3	- 1.35	- 25.0
	1000	- 2.86	- 76.8	1.74	59.4	- 47.91	76.7	- 1.53	- 27.1
	1100	- 3.21	- 82.9	1.34	50.2	- 48.33	95.2	- 1.66	- 29.4
	1200	- 3.50	- 89.0	0.95	40.8	- 47.04	115.3	- 1.84	- 31.6
	1300	- 3.80	- 95.1	0.56	31.5	- 44.53	128.7	- 2.00	- 33.9

Typical Characteristics

$T_{amb} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified



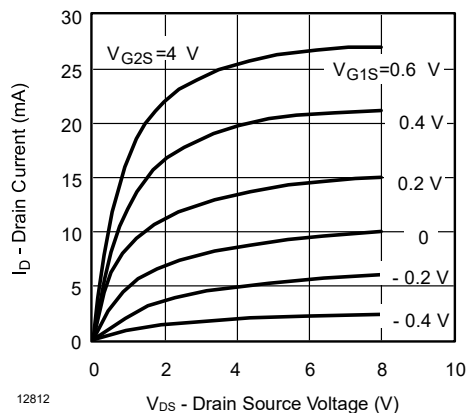
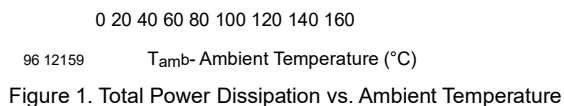


Figure 2. Drain Current vs. Drain Source Voltage

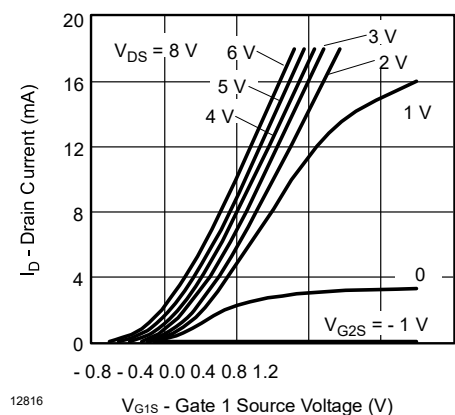


Figure 3. Drain Current vs. Gate 1 Source Voltage

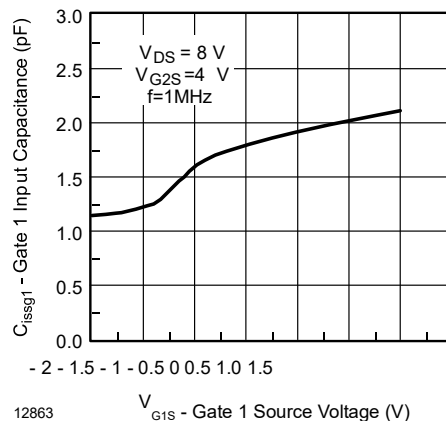
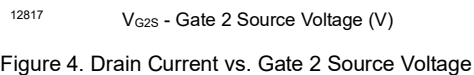
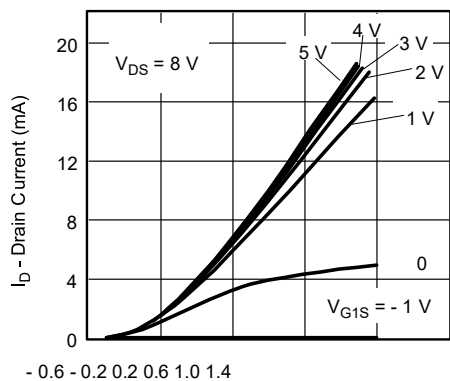


Figure 5. Gate 1 Input Capacitance vs. Gate 1 Source Voltage

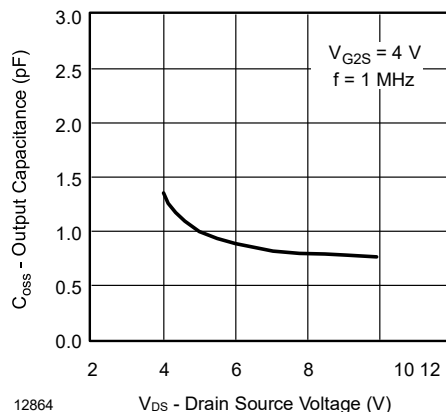


Figure 6. Output Capacitance vs. Drain Source Voltage

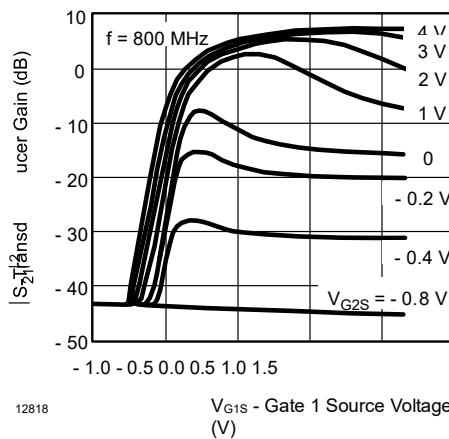
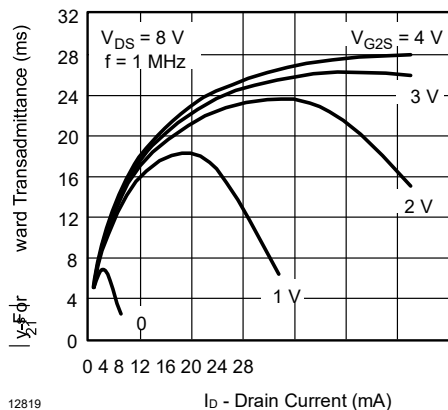
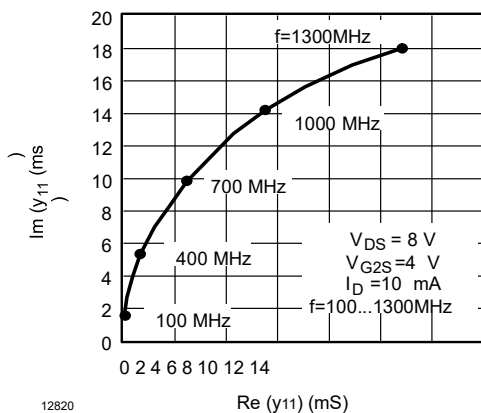


Figure 7. Transducer Gain vs. Gate 1 Source Voltage



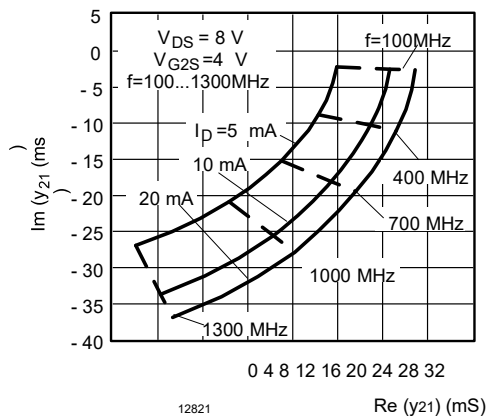
12819

Figure 8. Forward Transadmittance vs. Drain Current



12820

Figure 9. Short Circuit Input Admittance



12821

Figure 10. Short Circuit Forward Transfer Admittance

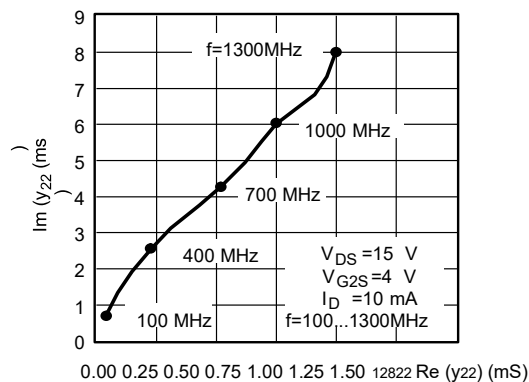
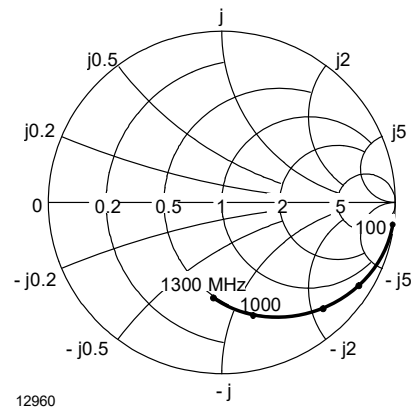


Figure 11. Short Circuit Output Admittance

$V_{DS} = 8\text{ V}$, $I_D = 10\text{ mA}$, $V_{G2S} = 4\text{ V}$, $Z_0 = 50\text{ }\Omega$
S11



12960

Figure 12. Input Reflection Coefficient

S12

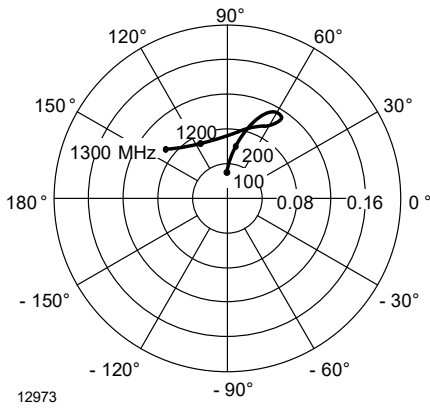


Figure 13. Reverse Transmission Coefficient

Figure 14. Forward Transmission Coefficient

S22

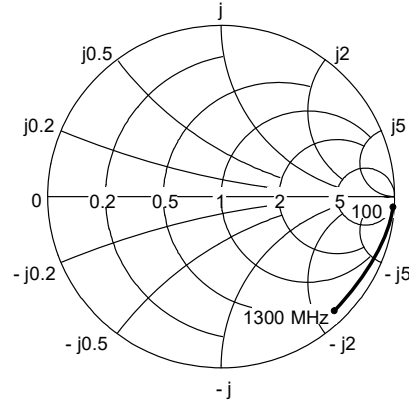
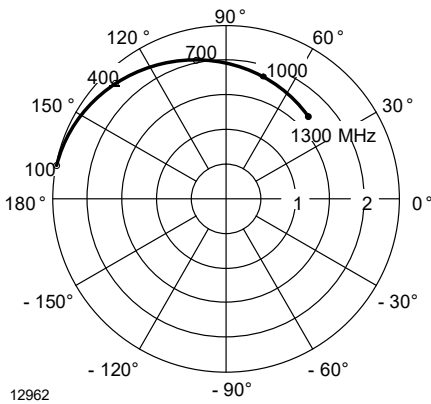


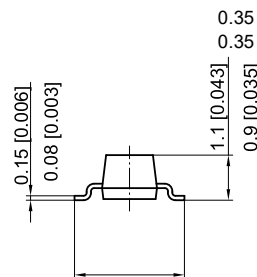
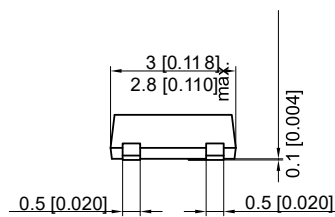
Figure 15. Output Reflection Coefficient

S21

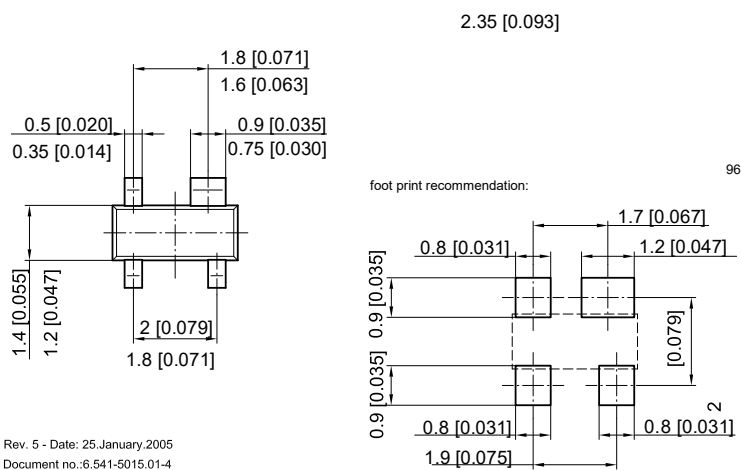


Package Dimensions in millimeters (inches): SOT143

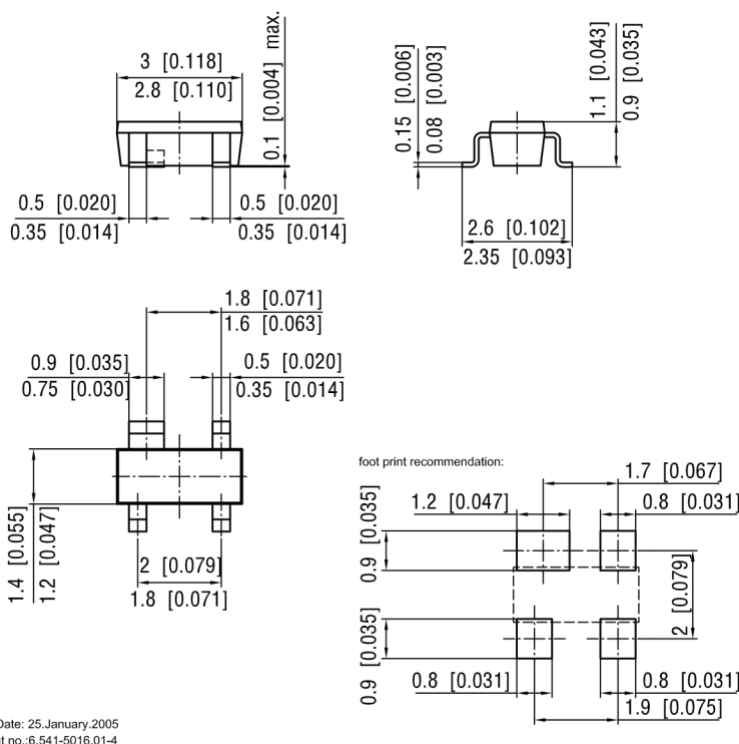
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2.6 [0.102]



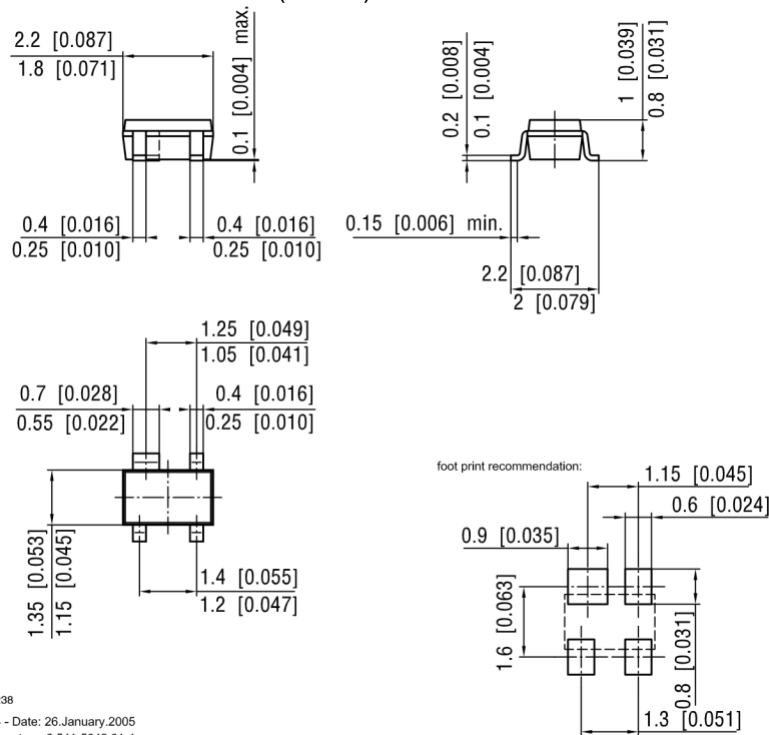
12240





Package Dimensions in millimeters (inches): **SOT143R**

Package Dimensions in millimeters (inches): **SOT343R**



96 12238
Rev. 4 - Date: 26 January 2005
Document no.: 6.541-5042.01-4



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.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use Vishay Semiconductors products for any unintended or unauthorized application, the buyer shall indemnify Vishay Semiconductors against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

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



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BF998/BF998R/BF998RW

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