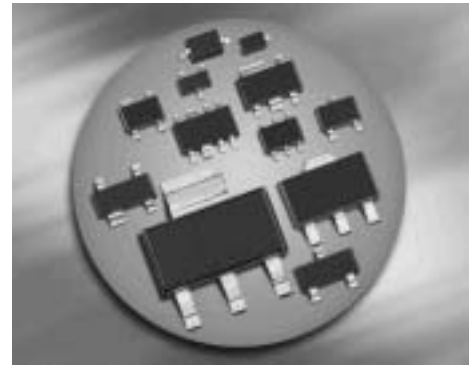


**Silicon N\_Channel MOSFET Tetrode**

- Short-channel transistor with high S / C quality factor
- For low-noise, gain-controlled input stage up to 1 GHz
- Pb-free (RoHS compliant) package<sup>1)</sup>
- Qualified according AEC Q101



**ESD (Electrostatic discharge) sensitive device, observe handling precaution!**

Type	Package	Pin Configuration						Marking
BF998	SOT143	1=S	2=D	3=G2	4=G1	-	-	MOs
BF998R	SOT143R	1=D	2=S	3=G1	4=G2	-	-	MRs

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	12	V
Continuous drain current	$I_D$	30	mA
Gate 1/ gate 2-source current	$\pm I_{G1/2SM}$	10	
Total power dissipation $T_S \leq 76 \text{ }^\circ\text{C}$ , BF998, BF998R	$P_{tot}$	200	
Storage temperature	$T_{stg}$	-55 ... 150	$^\circ\text{C}$
Channel temperature	$T_{ch}$	150	

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Channel - soldering point <sup>2)</sup> , BF998, BF998R	$R_{thchs}$	$\leq 370$	K/W

<sup>1)</sup>Pb-containing package may be available upon special request

<sup>2)</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

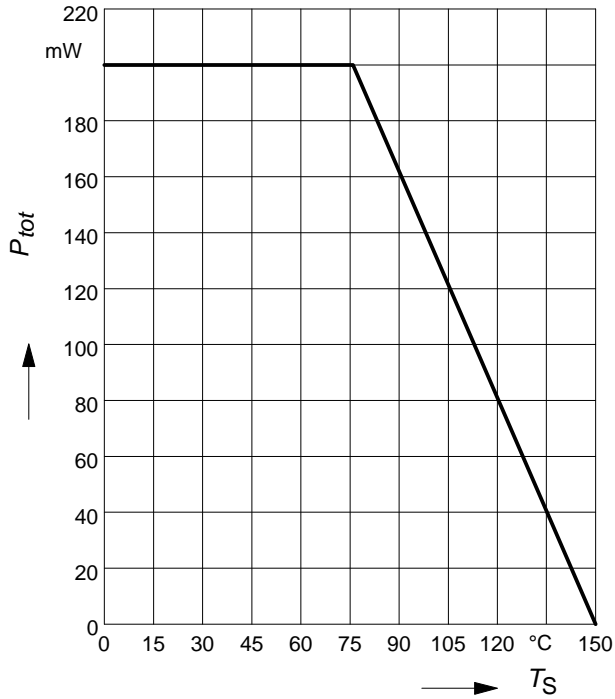
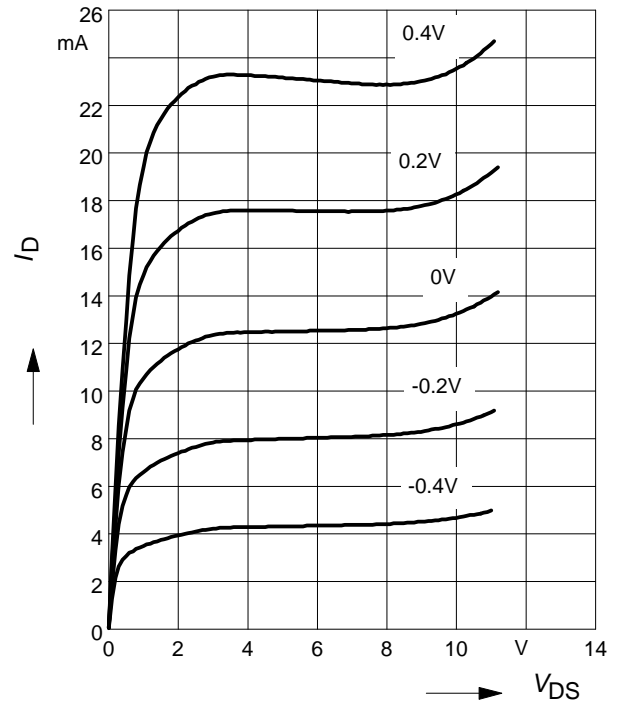
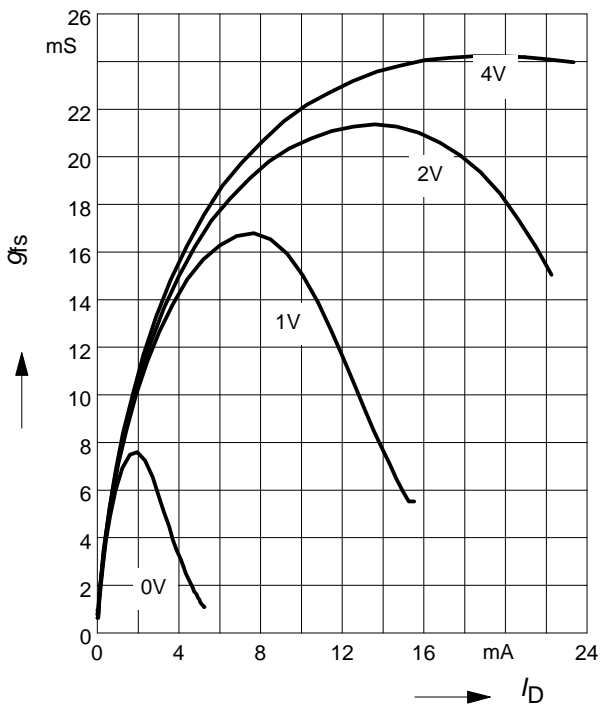
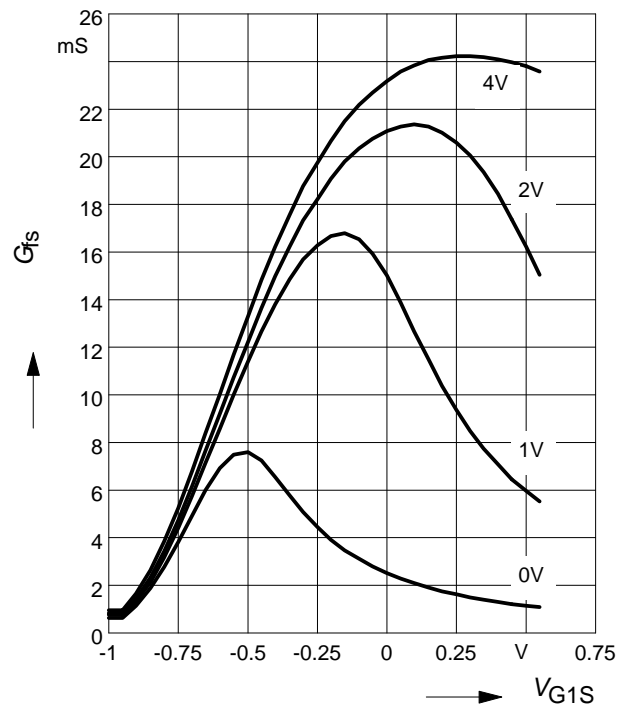
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>DC Characteristics</b>					
Drain-source breakdown voltage $I_D = 10 \mu\text{A}$ , $V_{G1S} = -4 \text{ V}$ , $V_{G2S} = -4 \text{ V}$	$V_{(BR)DS}$	12	-	-	V
Gate 1 source breakdown voltage $\pm I_{G2S} = 10 \text{ mA}$ , $V_{G2S} = V_{DS} = 0$	$\pm V_{(BR)G1SS}$	8	-	12	
Gate2 source breakdown voltage $\pm I_{G2S} = 10 \text{ mA}$ , $V_{G2S} = V_{DS} = 0$	$\pm V_{(BR)G2SS}$	8	-	12	
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 $\pm V_{G2S} = 5 \text{ V}$ , $V_{G2S} = V_{DS} = 0$	$\pm I_{G2SS}$	-	-	50	nA
Drain current $V_{DS} = 8 \text{ V}$ , $V_{G1S} = 0$ , $V_{G2S} = 4 \text{ V}$	$I_{DSS}$	5	9	15	mA
Gate 1 source pinch-off voltage $V_{DS} = 8 \text{ V}$ , $V_{G2S} = 4 \text{ V}$ , $I_D = 20 \mu\text{A}$	$-V_{G1S(p)}$	-	0.8	2.5	V
Gate 2 source pinch-off voltage $V_{DS} = 8 \text{ V}$ , $V_{G1S} = 0$ , $I_D = 20 \mu\text{A}$	$-V_{G2S(p)}$	-	0.8	2	

**Electrical Characteristics** at  $T_A = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics</b> (verified by random sampling)					
Forward transconductance $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$	$g_{fs}$	20	24	-	-
Gate1 input capacitance $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 10\text{ MHz}$	$C_{g1ss}$	-	2.1	2.5	pF
Gate 2 input capacitance $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 10\text{ MHz}$	$C_{g2ss}$	-	1.2	-	pF
Feedback capacitance $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 10\text{ MHz}$	$C_{dg1}$	-	25	-	fF
Output capacitance $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 10\text{ MHz}$	$C_{dss}$	-	1.1	-	pF
Power gain $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 45\text{ MHz}$ $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 800\text{ MHz}$	$G_p$	-	28	-	dB
		-	20	-	
Noise figure $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 45\text{ MHz}$ $V_{DS} = 8\text{ V}$ , $I_D = 10\text{ mA}$ , $V_{G2S} = 4\text{ V}$ , $f = 800\text{ MHz}$	$F$	-	2.8	-	dB
		-	1.8	-	
Gain control range $V_{DS} = 8\text{ V}$ , $V_{G2S} = 4 \dots -2\text{ V}$ , $f = 800\text{ MHz}$	$\Delta G_p$	40	50	-	

**Total power dissipation  $P_{tot} = f(T_S)$** 

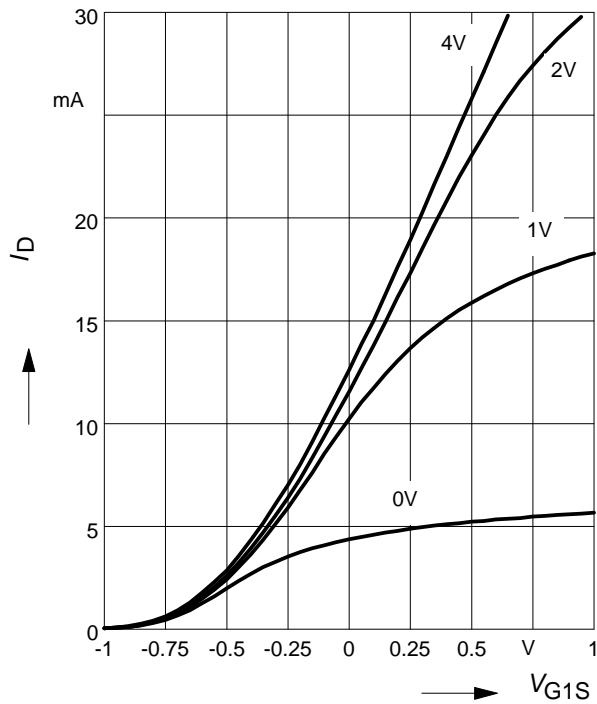
BF998, BF998R


**Output characteristics  $I_D = f(V_{DS})$** 
 $V_{G2S} = 4\text{ V}$ 
 $V_{G1S} = \text{Parameter}$ 

**Gate 1 forward transconductance**
 $g_{fs} = f(I_D)$ 
 $V_{DS} = 5\text{ V}, V_{G2S} = \text{Parameter}$ 

**Gate 1 forward transconductance**
 $g_{fs1} = f(V_{G1S})$ 


**Drain current  $I_D = f(V_{G1S})$**

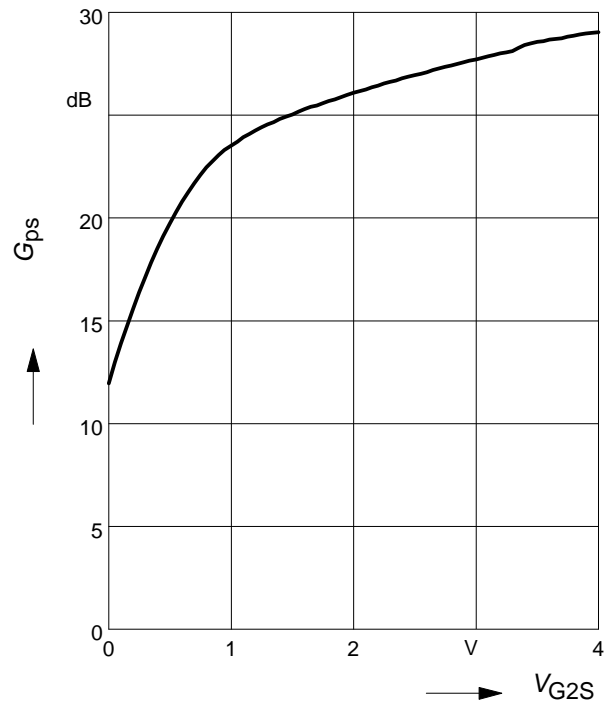
$V_{DS} = 5V$

$V_{G2S} = \text{Parameter}$



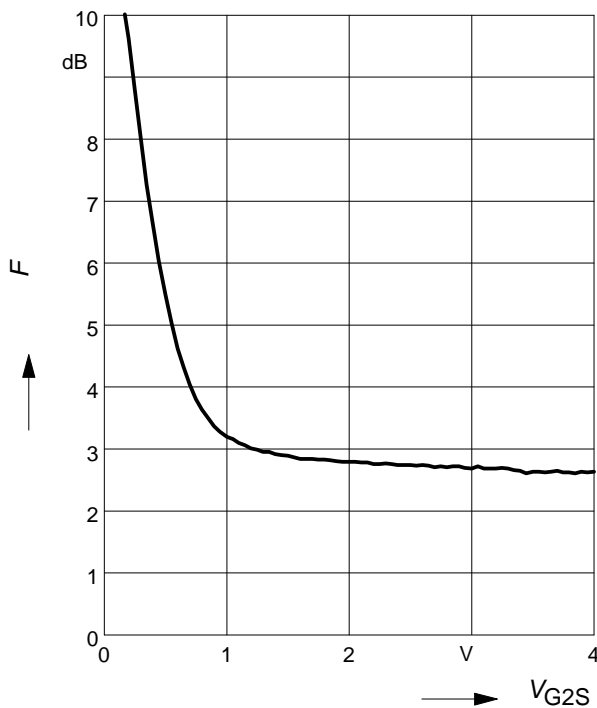
**Power gain  $G_{ps} = f(V_{G2S})$**

$f = 45 \text{ MHz}$



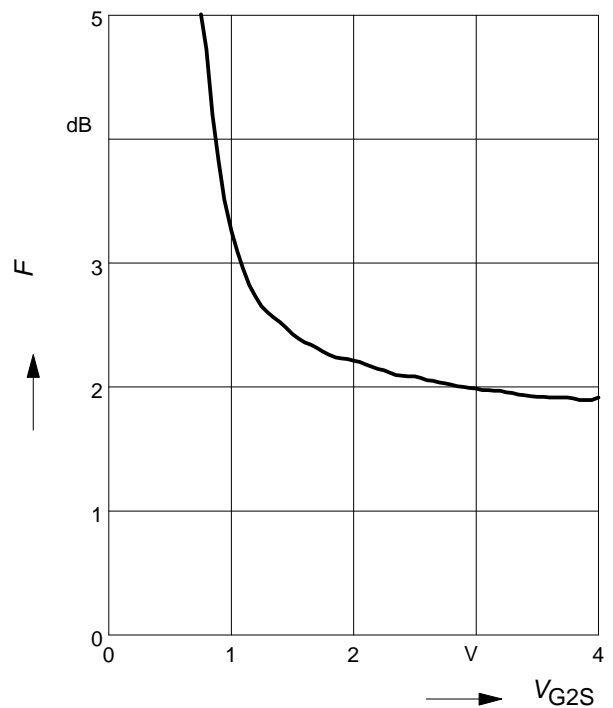
**Noise figure  $F = f(V_{G2S})$**

$f = 45 \text{ MHz}$



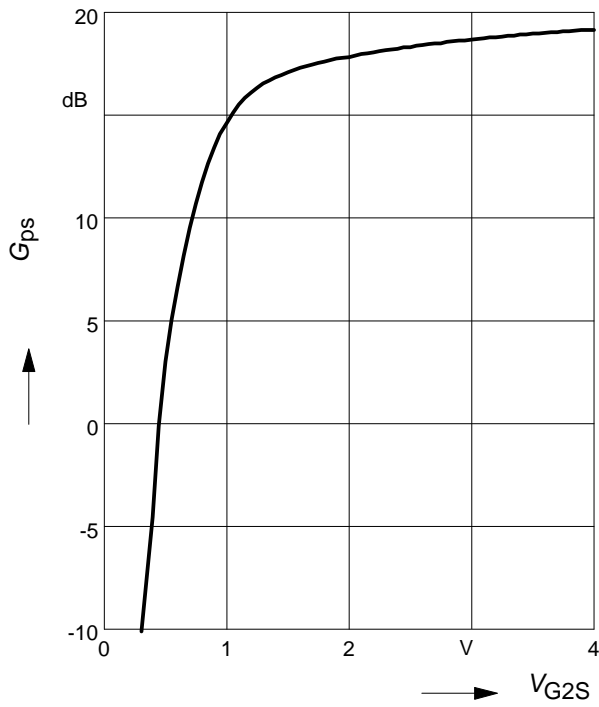
**Noise figure  $F = f(V_{G2S})$**

$f = 800 \text{ MHz}$

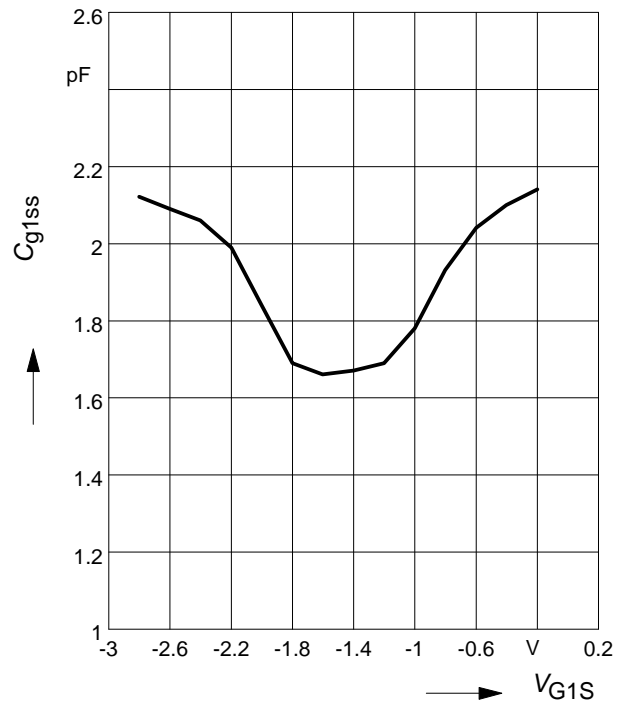


**Power gain  $G_{ps} = f(V_{G2S})$**

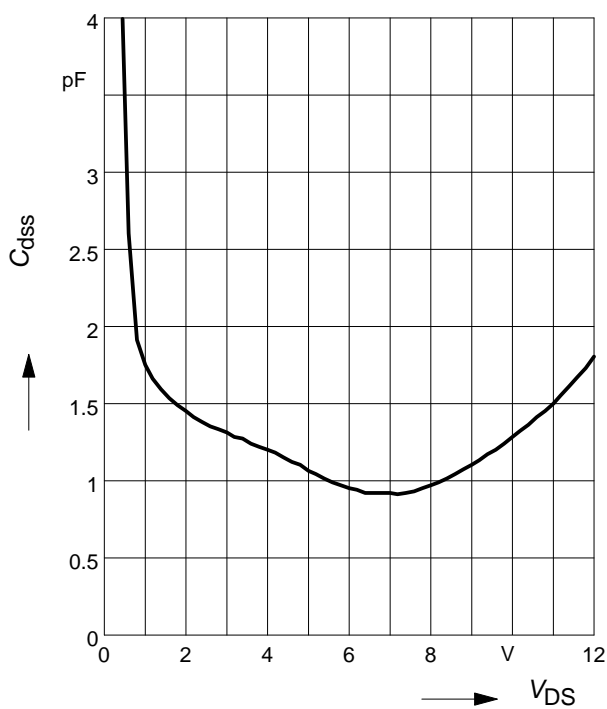
$f = 800$  MHz



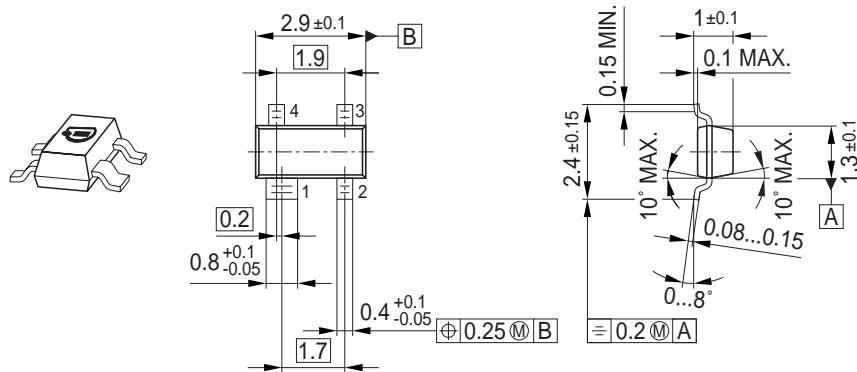
**Gate 1 input capacitance  $C_{g1ss} = f(V_{G1S})$**



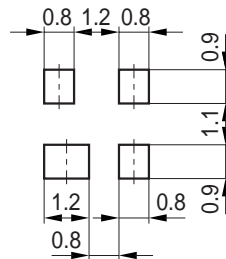
**Output capacitance  $C_{dss} = f(V_{DS})$**



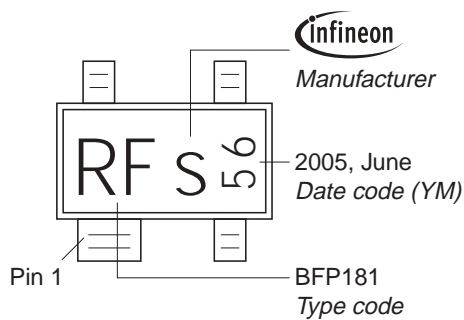
Package Outline



Foot Print

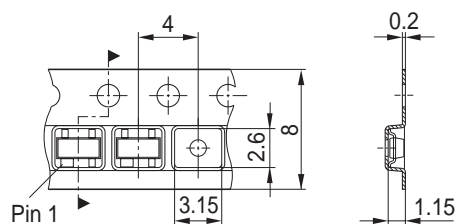


Marking Layout (Example)

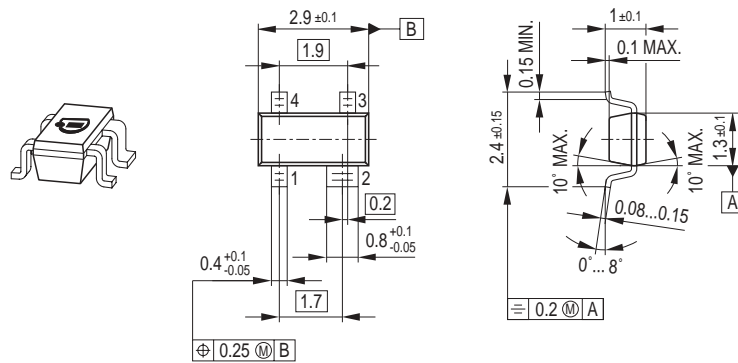


Standard Packing

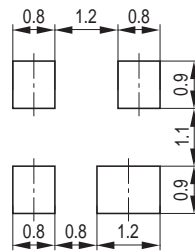
Reel ø180 mm = 3.000 Pieces/Reel  
 Reel ø330 mm = 10.000 Pieces/Reel



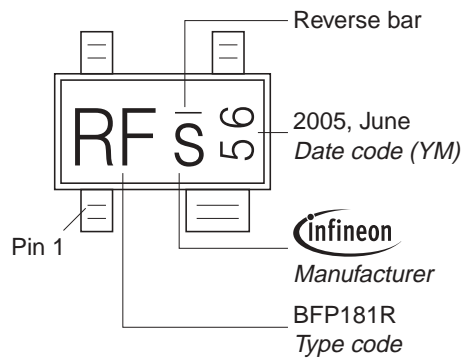
Package Outline



Foot Print

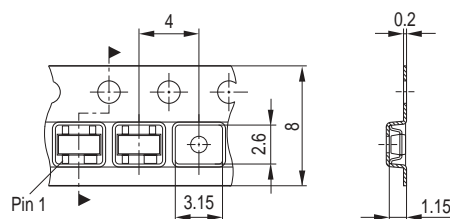


Marking Layout (Example)



Standard Packing

Reel  $\varnothing$ 180 mm = 3.000 Pieces/Reel  
 Reel  $\varnothing$ 330 mm = 10.000 Pieces/Reel





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