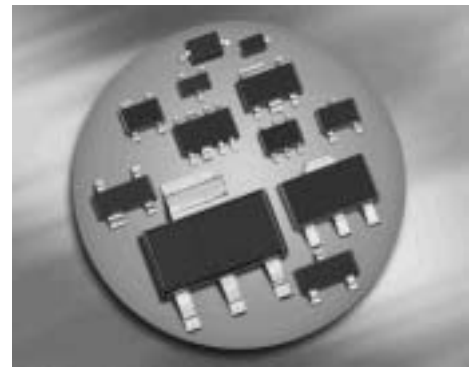


Silicon N_Channel MOSFET Tetrode

- Short-channel transistor with high S / C quality factor
- For low-noise, gain-controlled input stage up to 1 GHz
- Pb-free (RoHS compliant) package¹⁾
- 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 $T_S \leq 76^\circ\text{C}$, 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 ²⁾ , BF998, BF998R	R_{thchs}	≤ 370	K/W

¹⁾Pb-containing package may be available upon special request

²⁾For calculation of R_{thJA} please refer to Application Note Thermal Resistance

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

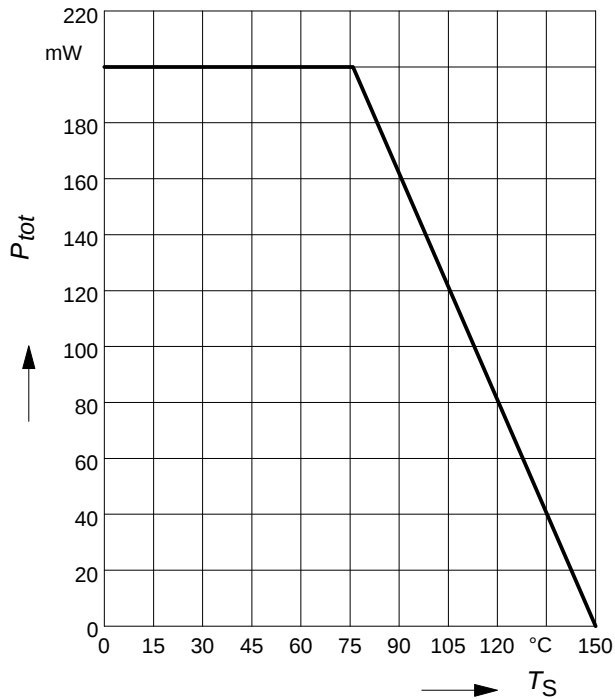
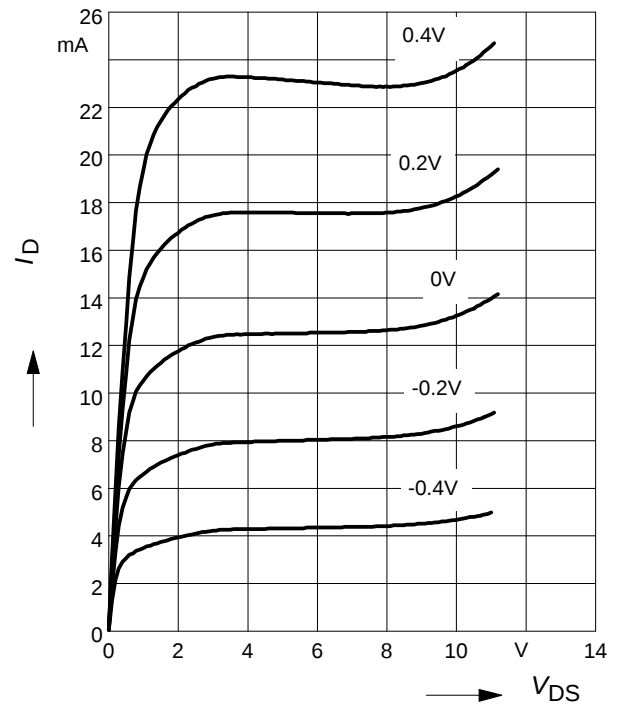
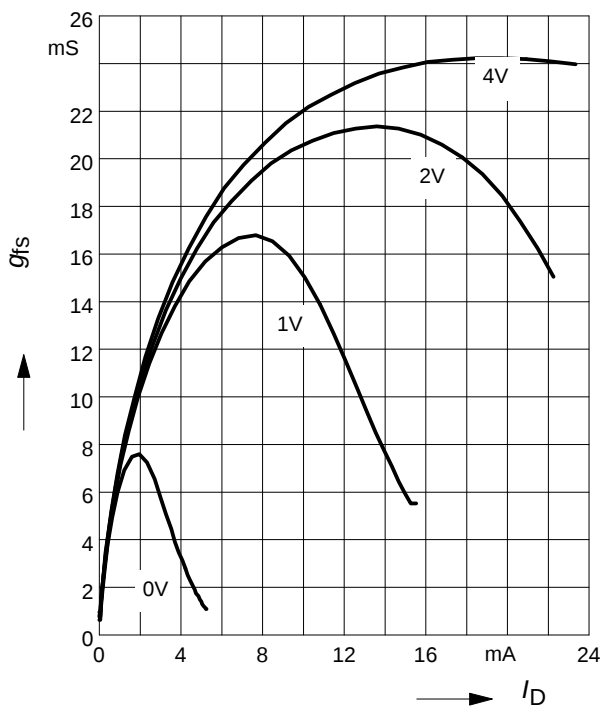
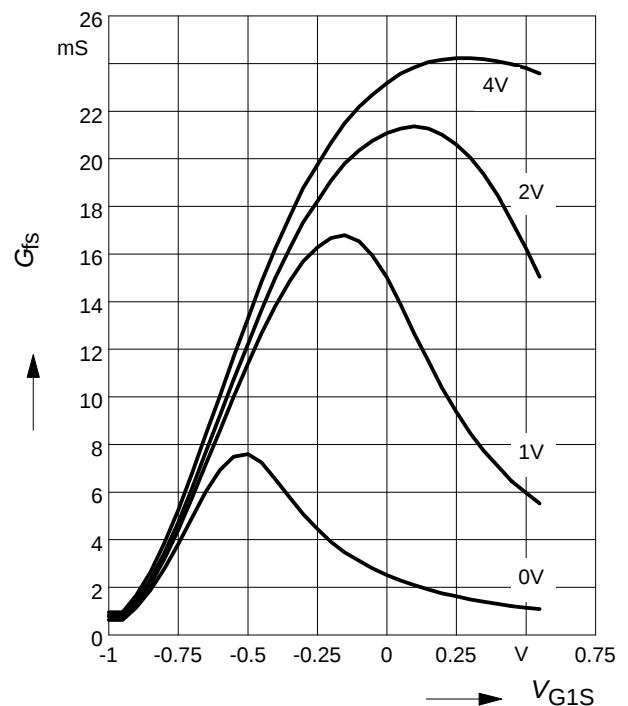
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain-source breakdown voltage $I_D = 10\ \mu\text{A}$, $V_{G1S} = -4\ \text{V}$, $V_{G2S} = -4\ \text{V}$	$V_{(\text{BR})\text{DS}}$	12	-	-	V
Gate 1 source breakdown voltage $\pm I_{G2S} = 10\ \text{mA}$, $V_{G2S} = V_{\text{DS}}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

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics (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 20	- -	dB
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 1.8	- -	dB
Gain control range $V_{DS} = 8\text{ V}$, $V_{G2S} = 4 \dots -2\text{ V}$, $f = 800\text{ MHz}$	ΔG_p	40	50	-	

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

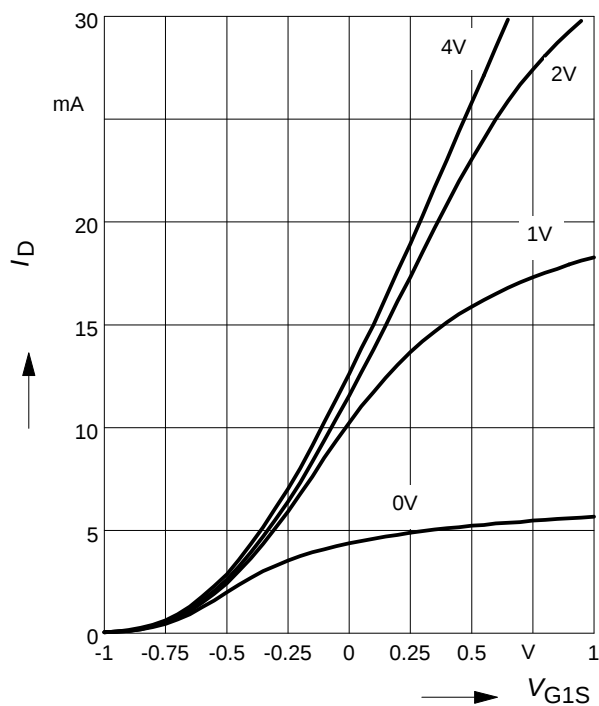
BF998, BF998R


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

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

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


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

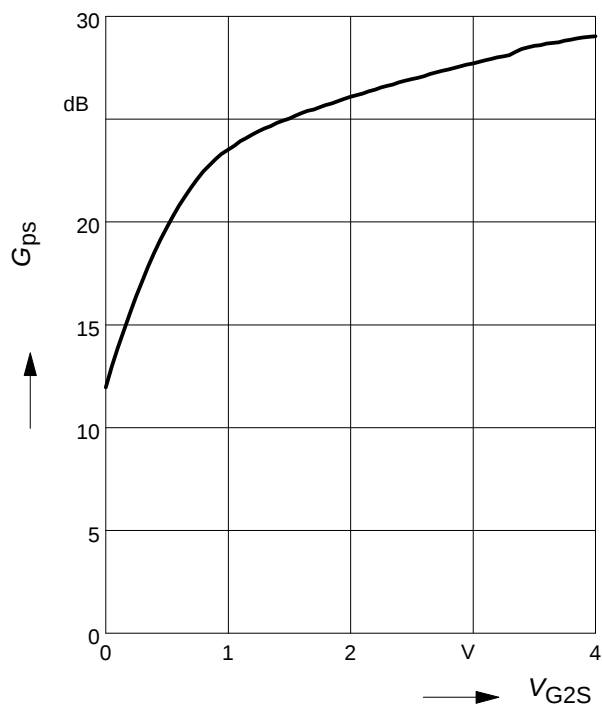
$V_{DS} = 5V$

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



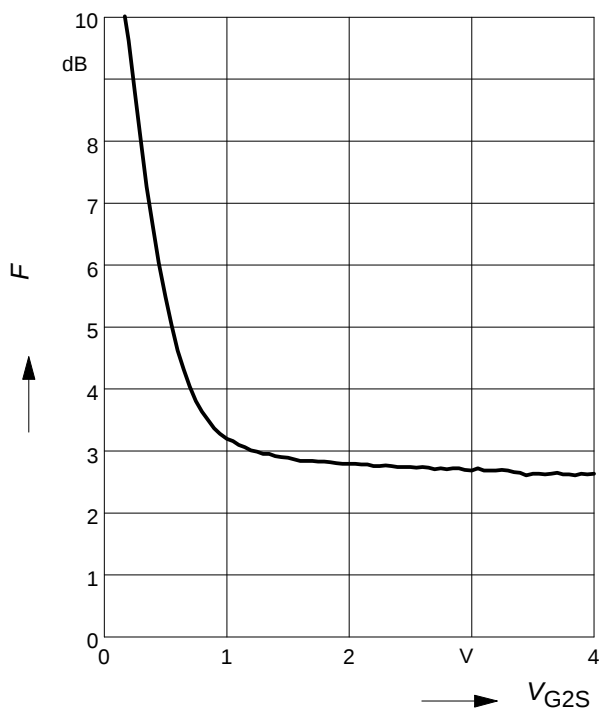
Power gain $G_{ps} = f(V_{G2S})$

$f = 45 \text{ MHz}$



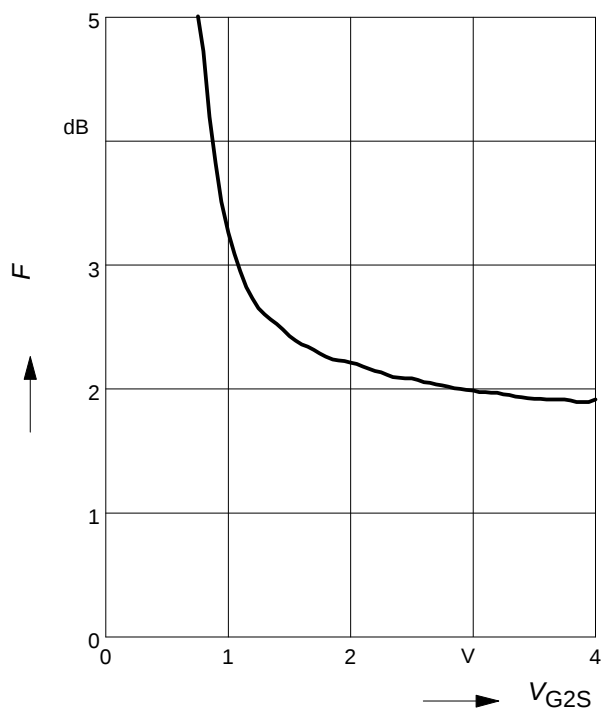
Noise figure $F = f(V_{G2S})$

$f = 45 \text{ MHz}$



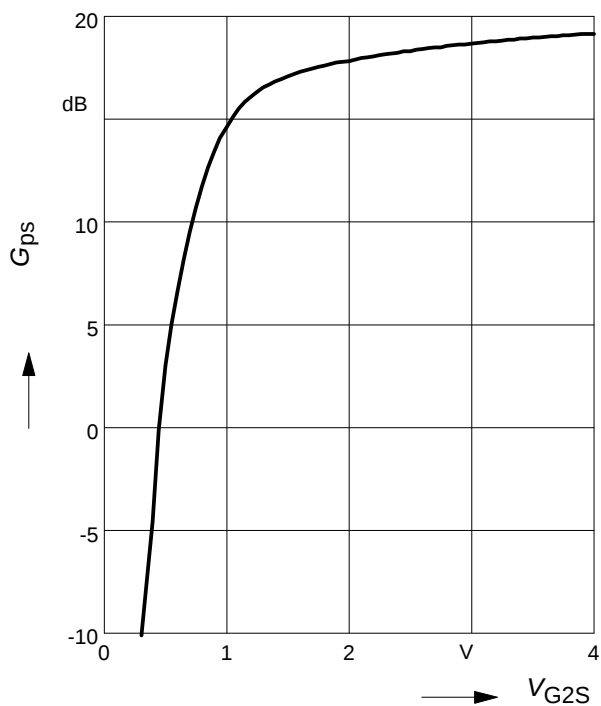
Noise figure $F = f(V_{G2S})$

$f = 800 \text{ MHz}$

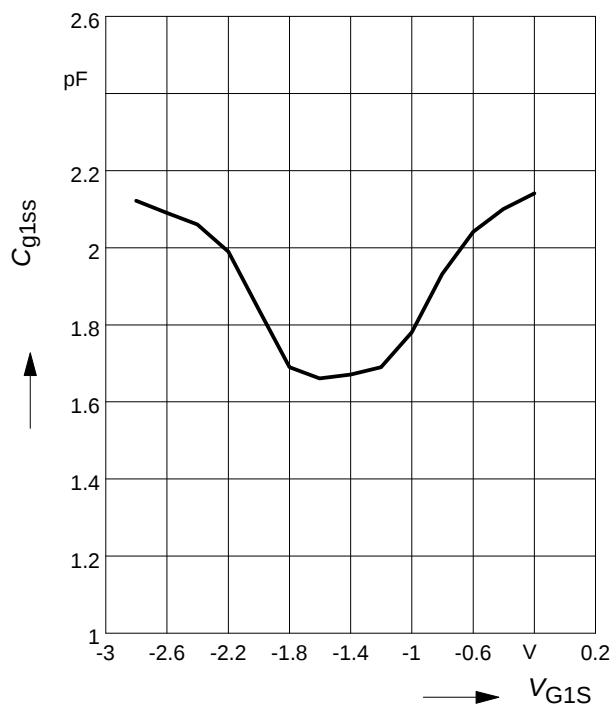


Power gain $G_{ps} = f(V_{G2S})$

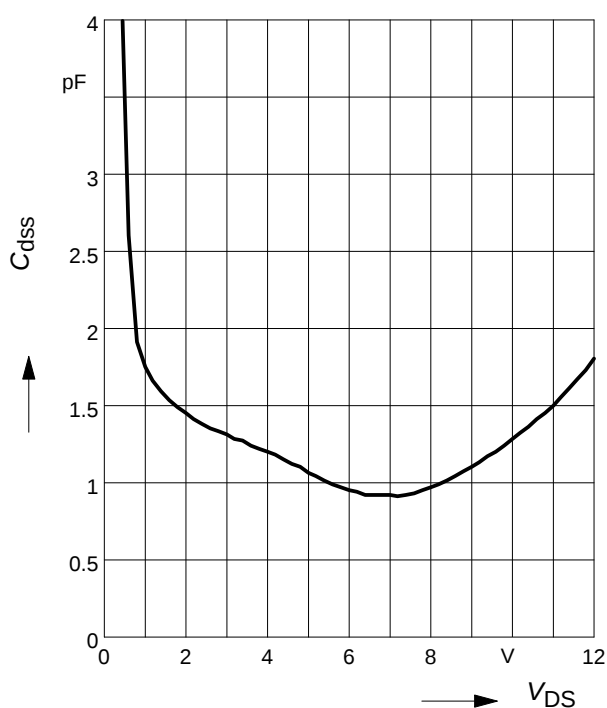
$f = 800 \text{ MHz}$



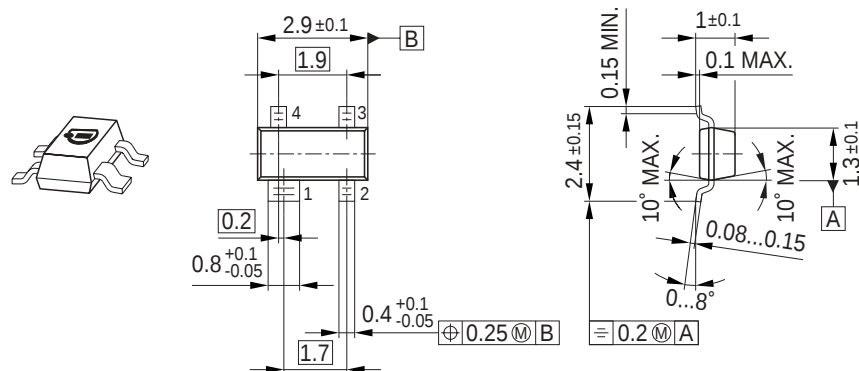
Gate 1 input capacitance $C_{g1ss} = f(V_{G1S})$



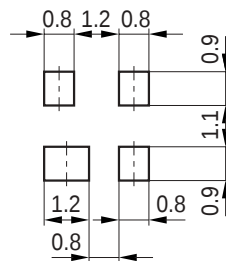
Output capacitance $C_{dss} = f(V_{DS})$



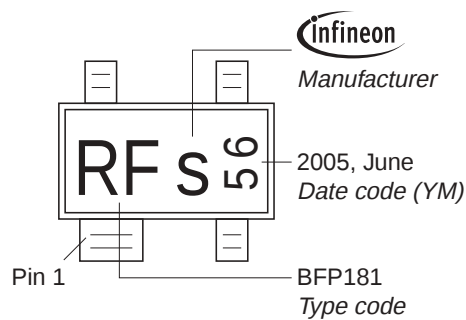
Package Outline



Foot Print

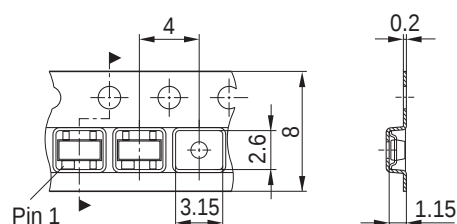


Marking Layout (Example)

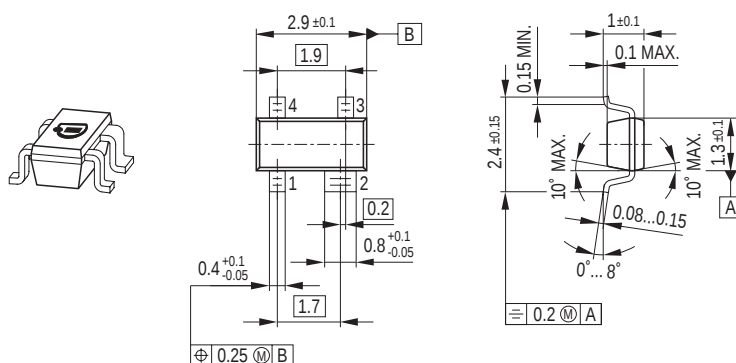


Standard Packing

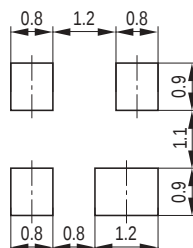
Reel ø180 mm = 3.000 Pieces/Reel
 Reel ø330 mm = 10.000 Pieces/Reel



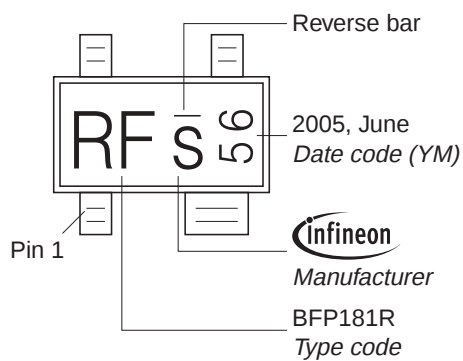
Package Outline



Foot Print

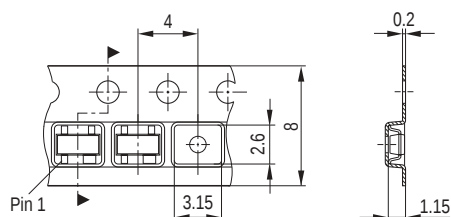


Marking Layout (Example)



Standard Packing

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



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