

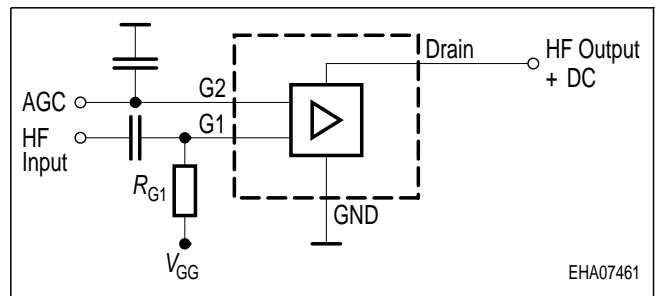
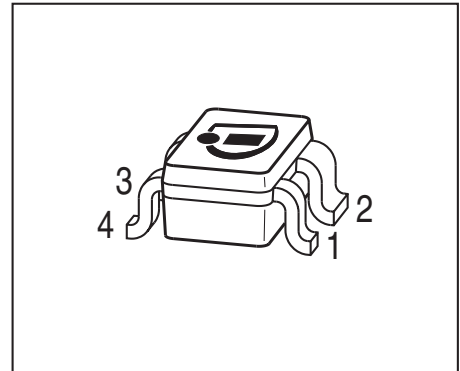


**THE DATASHEET OF  
BF5030W E6327**



**Silicon N-Channel MOSFET Tetrode**

- Designed for input stages of UHF- and VHF-tuners with AGC function
- Supporting 5 V operations and power saving 3 V operations
- Integrated ESD gate protection diodes
- Very low noise figure
- High gain, high forward transadmittance
- Very good cross modulation at gain reduction
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



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

Type	Package	Pin Configuration						Marking
BF5030	SOT143	1=S	2=D	3=G2	4=G1	-	-	KXs
BF5030R	SOT143R	1=D	2=S	3=G1	4=G2	-	-	KXs
BF5030W	SOT343	1=D	2=S	3=G1	4=G2	-	-	KXs

**Maximum Ratings**

Parameter	Symbol	Value	Unit
Drain-source voltage	$V_{DS}$	8	V
Continuous drain current	$I_D$	25	mA
Gate 1/ gate 2-source current	$I_{G1S}, I_{G2S}$	$\pm 1$	mA
Gate 1/ gate 2-source voltage	$V_{G1S}, V_{G2S}$	$\pm 6$	V
Total power dissipation	$P_{tot}$		mW
$T_S \leq 94\text{ °C}$ , BF5030W		200	
$T_S \leq 76\text{ °C}$ , BF5030, BF5030R		200	
Storage temperature	$T_{stg}$	-55 ... 150	°C
Channel temperature	$T_{ch}$	150	

**Thermal Resistance**

Parameter	Symbol	Value	Unit
Channel - soldering point <sup>1)</sup>	$R_{thchs}$		K/W
BF5030W		$\leq 280$	
BF5030, BF5030R		$\leq 370$	

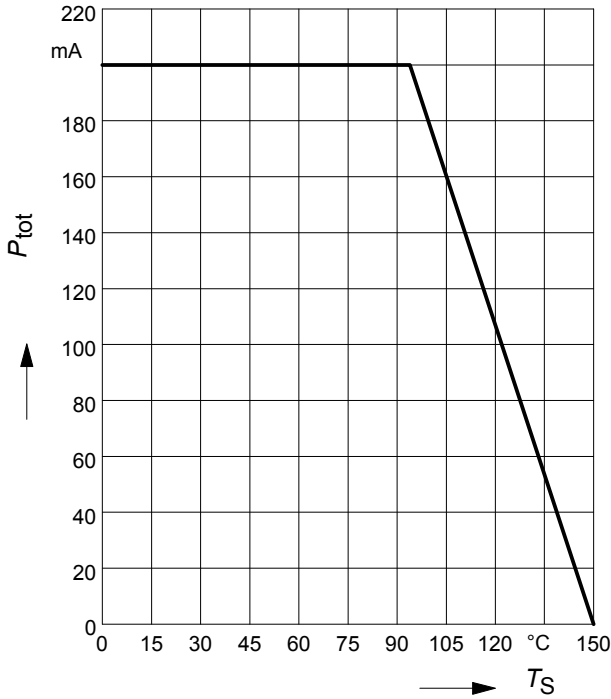
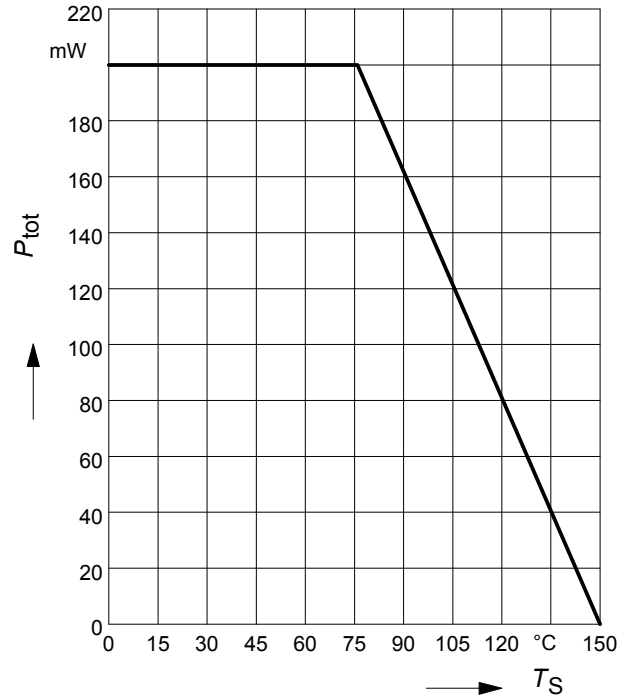
<sup>1)</sup>For calculation of  $R_{thJA}$  please refer to Application Note Thermal Resistance

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

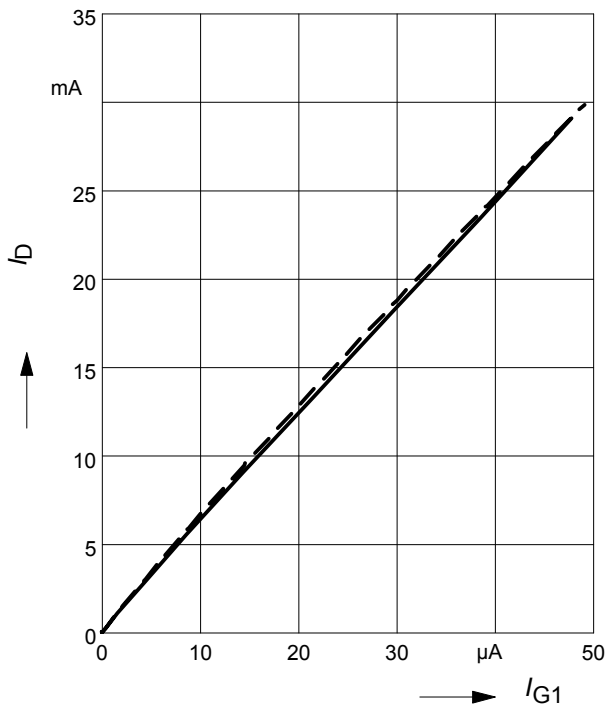
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>DC Characteristics</b>					
Drain-source breakdown voltage $I_D = 20 \mu\text{A}$ , $V_{G1S} = 0$ , $V_{G2S} = 0$	$V_{(BR)DS}$	12	-	-	V
Gate1-source breakdown voltage $+I_{G1S} = 10 \text{ mA}$ , $V_{G2S} = 0$ , $V_{DS} = 0$	$+V_{(BR)G1SS}$	6	-	15	
Gate2-source breakdown voltage $+I_{G2S} = 10 \text{ mA}$ , $V_{G1S} = 0$ , $V_{DS} = 0$	$+V_{(BR)G2SS}$	6	-	15	
Gate1-source leakage current $V_{G1S} = 6 \text{ V}$ , $V_{G2S} = 0$ , $V_{DS} = 0$	$+I_{G1SS}$	-	-	50	nA
Gate2-source leakage current $V_{G2S} = 6 \text{ V}$ , $V_{G1S} = 0$ , $V_{DS} = 0$	$+I_{G2SS}$	-	-	50	
Drain current $V_{DS} = 3 \text{ V}$ , $V_{G1S} = 0$ , $V_{G2S} = 3 \text{ V}$ $V_{DS} = 5 \text{ V}$ , $V_{G1S} = 0$ , $V_{G2S} = 4 \text{ V}$	$I_{DSS}$	-	-	100 100	
Drain-source current $V_{DS} = 3 \text{ V}$ , $V_{G2S} = 3 \text{ V}$ , $R_{G1} = 82 \text{ k}\Omega$ $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 4 \text{ V}$ , $R_{G1} = 180 \text{ k}\Omega$	$I_{DSX}$	-	13 13	-	mA
Gate1-source pinch-off voltage $V_{DS} = 3 \text{ V}$ , $V_{G2S} = 3 \text{ V}$ , $I_D = 20 \mu\text{A}$ $V_{DS} = 5 \text{ V}$ , $V_{G2S} = 4 \text{ V}$ , $I_D = 20 \mu\text{A}$	$V_{G1S(p)}$	-	0.7 0.7	-	V
Gate2-source pinch-off voltage $V_{DS} = 3 \text{ V}$ , $V_{G1S} = 3 \text{ V}$ , $I_D = 20 \mu\text{A}$ $V_{DS} = 5 \text{ V}$ , $V_{G1S} = 4 \text{ V}$ , $I_D = 20 \mu\text{A}$	$V_{G2S(p)}$	-	0.7 0.7	-	

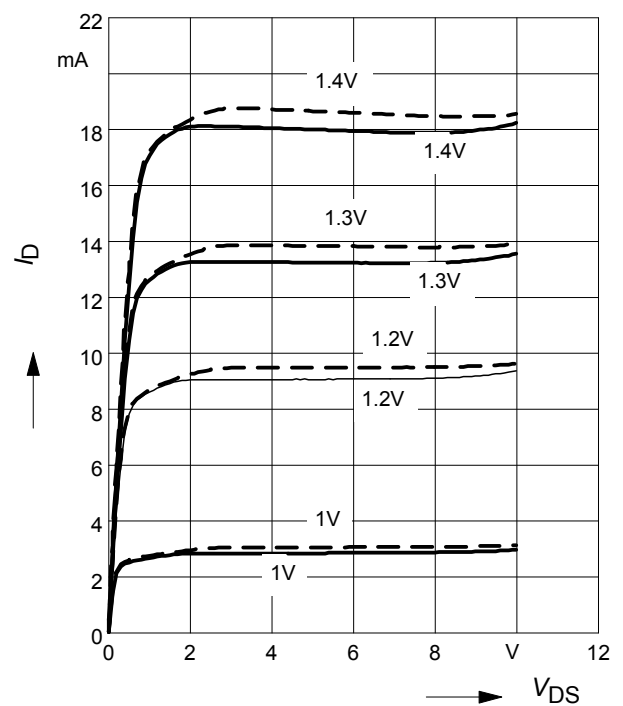
**Electrical Characteristics at  $T_A = 25^\circ\text{C}$ , unless otherwise specified**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
<b>AC Characteristics - (verified by random sampling)</b>					
Forward transconductance $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}$	$g_{fs}$	-	41	-	mS
Gate1 input capacitance $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}$	$C_{g1ss}$	-	2.7	-	pF
Output capacitance $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}$	$C_{dss}$	-	1.6	-	
Power gain $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}, f = 800\text{ MHz}$ $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}, f = 45\text{ MHz}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}, f = 800\text{ MHz}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}, f = 45\text{ MHz}$	$G_p$	-	24	-	dB
Noise figure $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}, f = 800\text{ MHz}$ $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}, f = 45\text{ MHz}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}, f = 800\text{ MHz}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}, f = 45\text{ MHz}$	$F$	-	1.3	-	dB
Gain control range $V_{DS} = 3\text{ V}, V_{G2S} = 3\dots 0\text{ V}, f = 800\text{ MHz}$ $V_{DS} = 5\text{ V}, V_{G2S} = 4\dots 0\text{ V}, f = 800\text{ MHz}$	$\Delta G_p$	45	50	-	
Cross-modulation $k=1\%$ , $f_w=50\text{MHz}$ , $f_{unw}=60\text{MHz}$ AGC = 0 AGC = 10 dB AGC = 40 dB	$X_{mod}$	90	94	-	dB

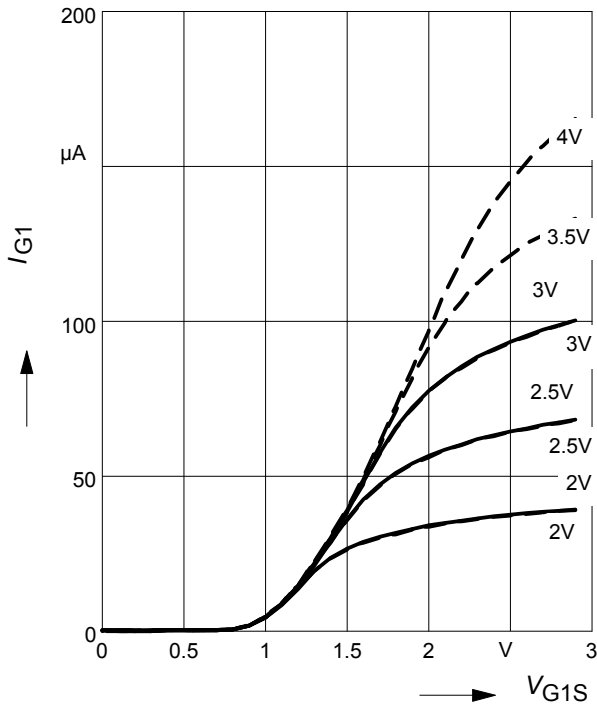
**Total power dissipation  $P_{tot} = f(T_S)$** 
**BF5030W**

**Total power dissipation  $P_{tot} = f(T_S)$** 
**BF5030, BF5030R**

**Drain current  $I_D = f(I_{G1})$** 

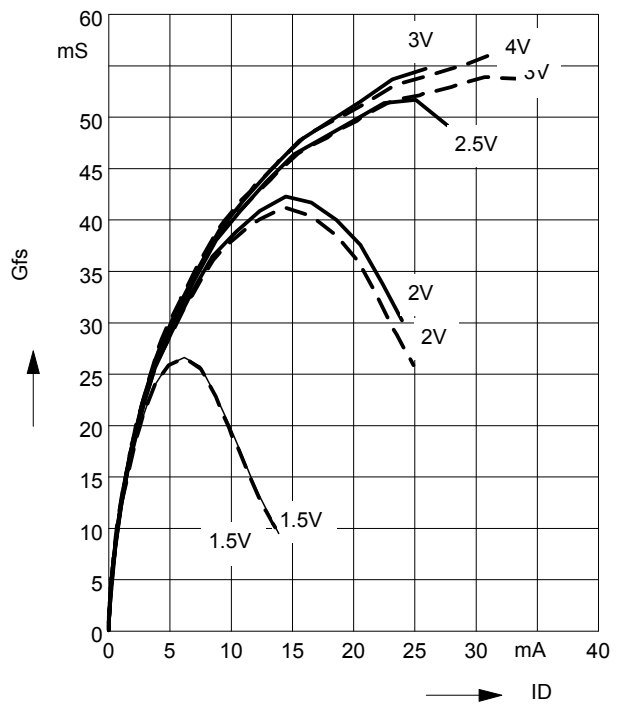
 —  $V_{DS} = 3\text{ V}$ ,  $V_{G2S} = 3\text{ V}$ 

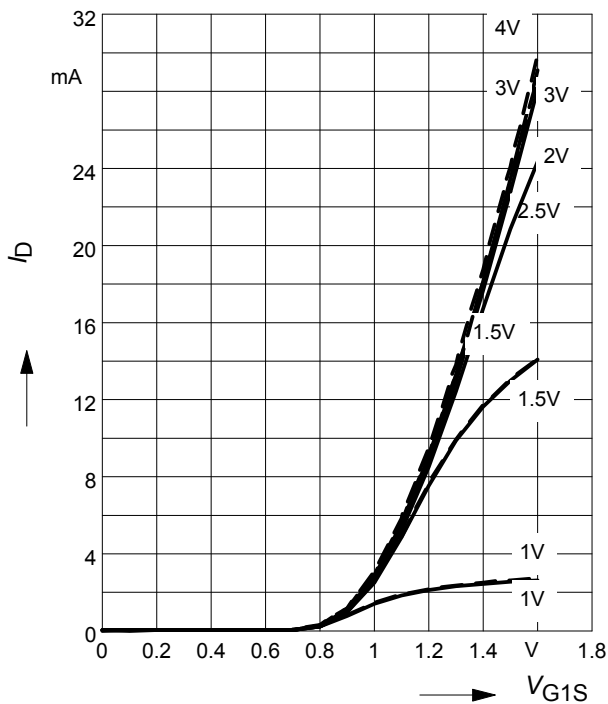
 ...  $V_{DS} = 5\text{ V}$ ,  $V_{G2S} = 4\text{ V}$ 

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

 —  $V_{DS} = 3\text{ V}$ , ...  $V_{DS} = 5\text{ V}$ 


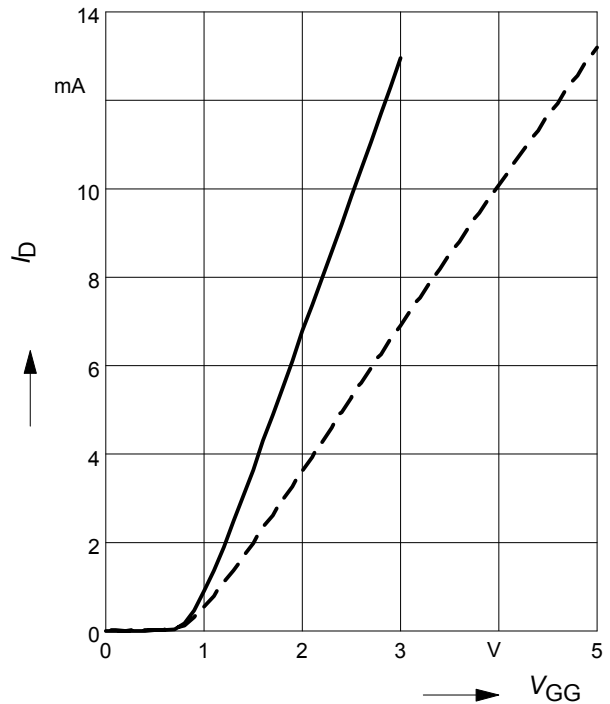
**Gate 1 current  $I_{G1} = f(V_{G1S})$** 
 $V_{G2S} = \text{Parameter}$ 

 —  $V_{DS} = 3\text{ V}, \dots V_{DS} = 5\text{ V}$ 

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

 —  $V_{DS} = 3\text{ V}, \dots V_{DS} = 5\text{ V}$ 

**Drain current  $I_D = f(V_{G1S})$** 
 $V_{G2S} = \text{Parameter}$ 

 —  $V_{DS} = 3\text{ V}, \dots V_{DS} = 5\text{ V}$ 

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

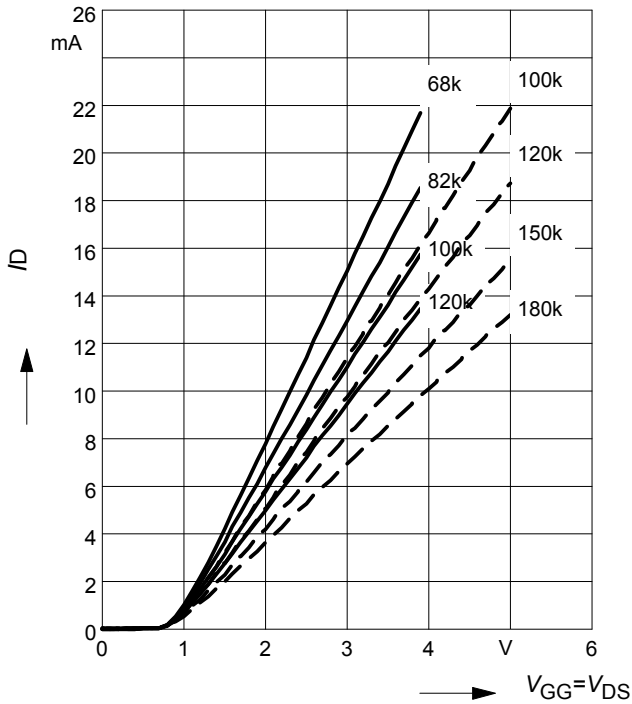
 —  $V_{DS} = 3\text{ V}, V_{G2S} = 3\text{ V}, R_{G1} = 82\text{ k}\Omega$ 

 ...  $V_{DS} = 5\text{ V}, V_{G2S} = 4\text{ V}, R_{G1} = 180\text{ k}\Omega$ 


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

$R_{G1}$  = Parameter in k $\Omega$

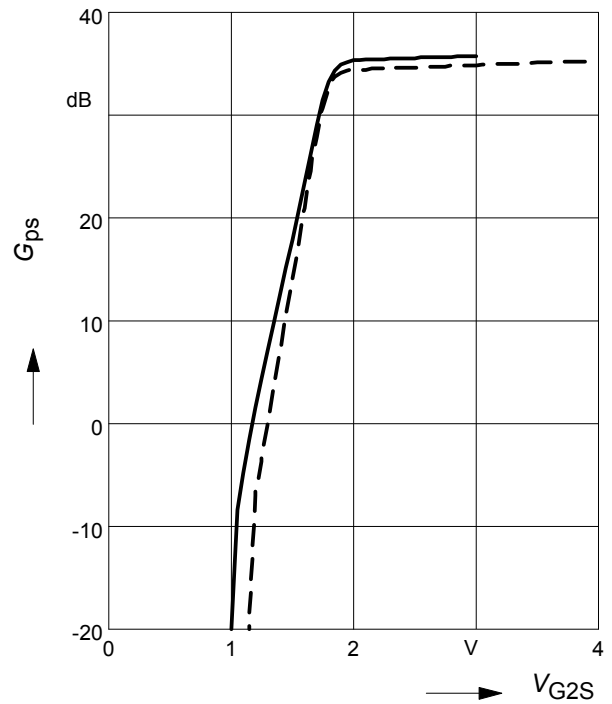
—  $V_{DS} = 3\text{ V}$ , ...  $V_{DS} = 5\text{ V}$



**Power gain  $G_{ps} = f(V_{G2S})$ ,  $f = 45\text{ MHz}$**

—  $V_{DS} = 3\text{ V}$ ,  $V_{G2S} = 3\text{ V}$ ,  $R_{g1} = 82\text{ k}\Omega$

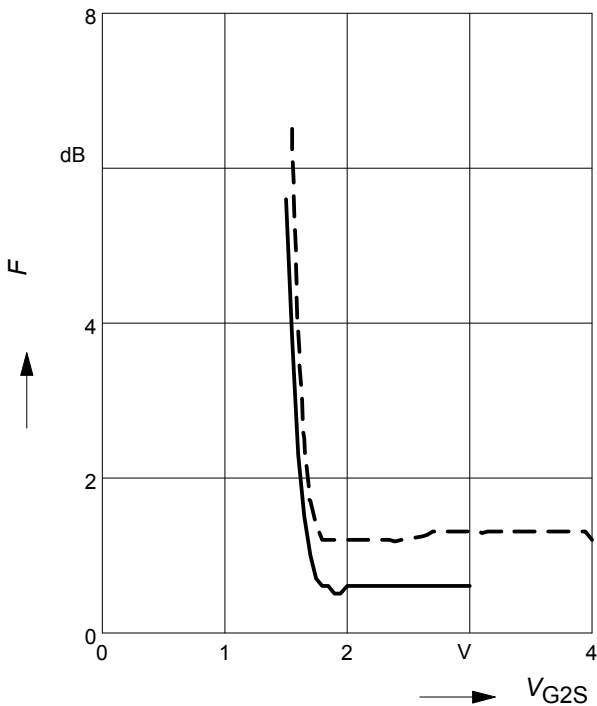
...  $V_{DS} = 5\text{ V}$ ,  $V_{G2S} = 4\text{ V}$ ,  $R_{g1} = 180\text{ k}\Omega$



**Noise figure  $F = f(V_{G2S})$ ,  $f = 45\text{ MHz}$**

—  $V_{DS} = 3\text{ V}$ ,  $V_{G2S} = 3\text{ V}$ ,  $R_{g1} = 82\text{ k}\Omega$

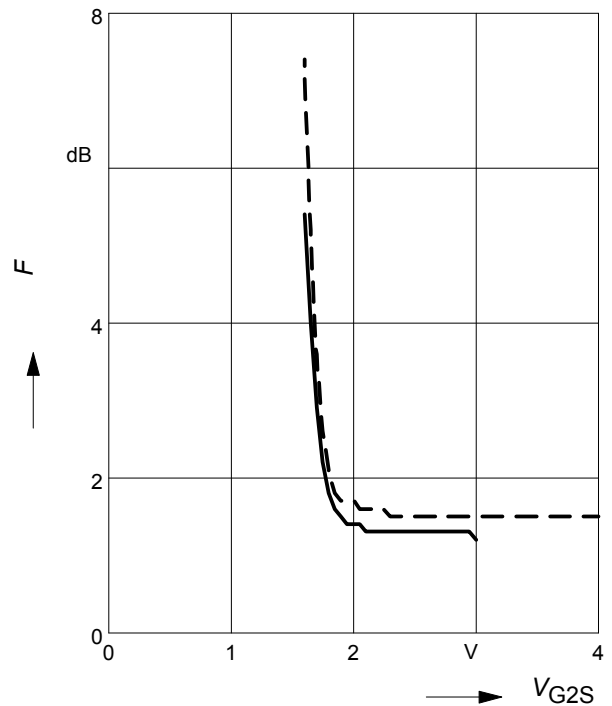
...  $V_{DS} = 5\text{ V}$ ,  $V_{G2S} = 4\text{ V}$ ,  $R_{g1} = 180\text{ k}\Omega$



**Noise figure  $F = f(V_{G2S})$ ,  $f = 800\text{ MHz}$**

—  $V_{DS} = 3\text{ V}$ ,  $V_{G2S} = 3\text{ V}$ ,  $R_{g1} = 82\text{ k}\Omega$

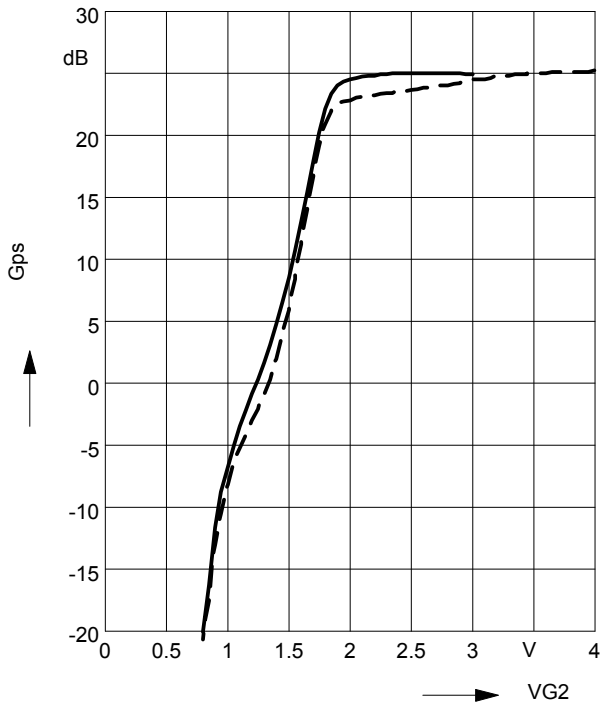
...  $V_{DS} = 5\text{ V}$ ,  $V_{G2S} = 4\text{ V}$ ,  $R_{g1} = 180\text{ k}\Omega$



**Power gain  $G_{ps} = f(V_{G2S})$ ,  $f = 800$  MHz**

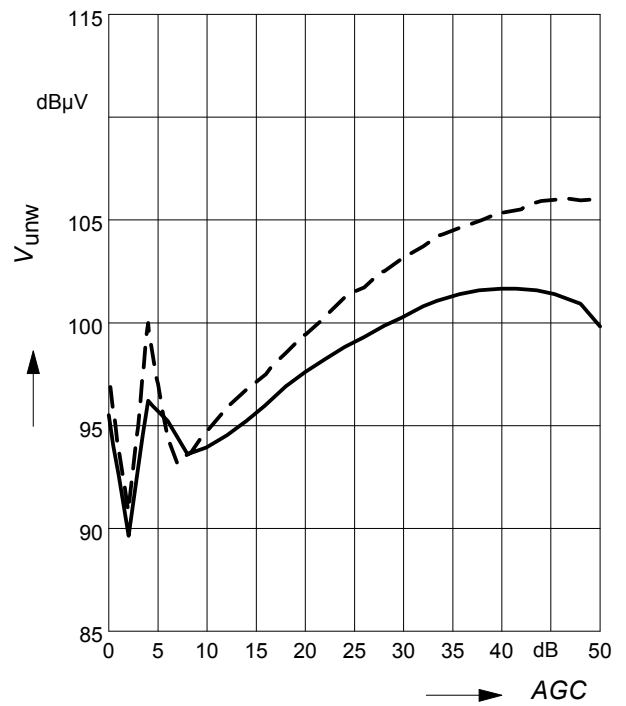
—  $V_{DS} = 3$  V,  $V_{G2S} = 3$  V,  $R_{g1} = 82$  k $\Omega$

...  $V_{DS} = 5$  V,  $V_{G2S} = 4$  V,  $R_{g1} = 180$  k $\Omega$

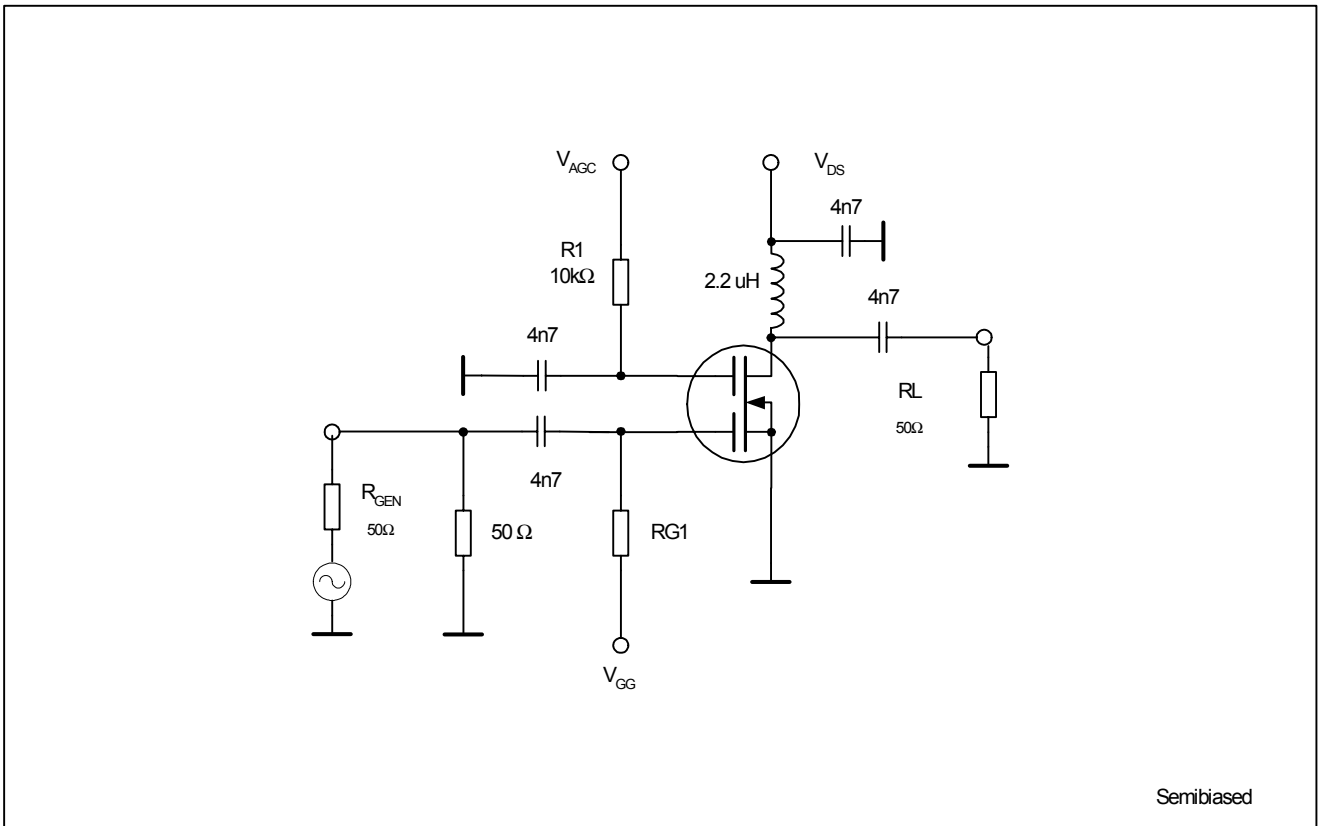

**Crossmodulation  $V_{unw} = (AGC)$** 

—  $V_{DS} = 3$  V,  $V_{G2S} = 3$  V,  $R_{g1} = 82$  k $\Omega$

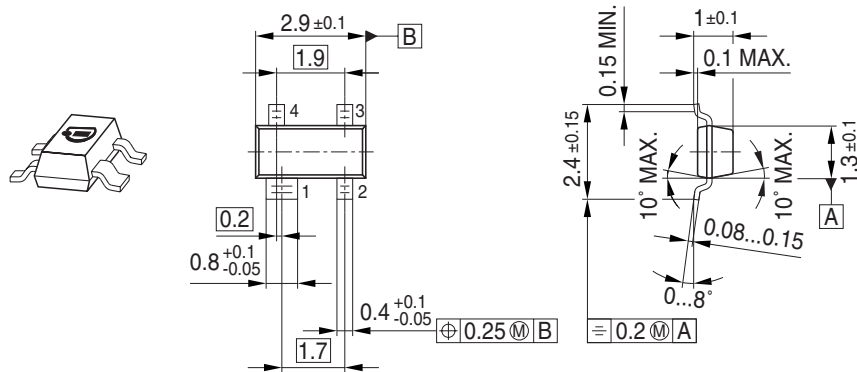
...  $V_{DS} = 5$  V,  $V_{G2S} = 4$  V,  $R_{g1} = 180$  k $\Omega$



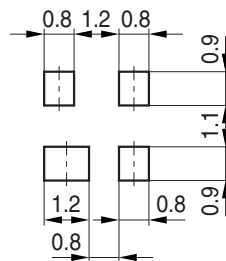
Crossmodulation test circuit



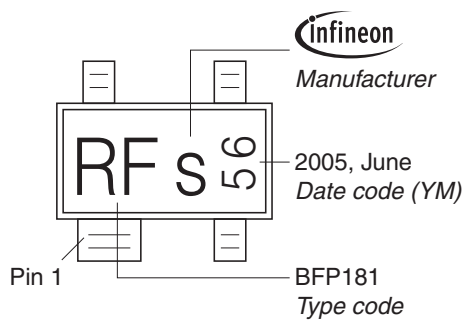
Package Outline



Foot Print

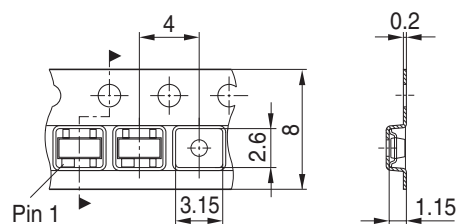


Marking Layout (Example)

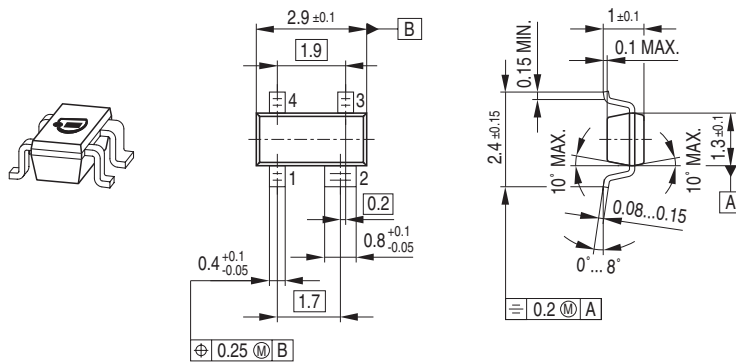


Standard Packing

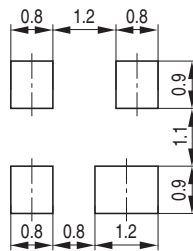
Reel  $\phi 180$  mm = 3.000 Pieces/Reel  
 Reel  $\phi 330$  mm = 10.000 Pieces/Reel



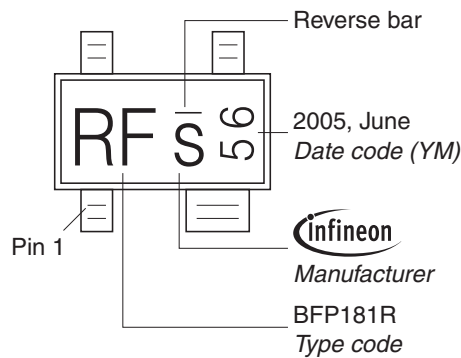
Package Outline



Foot Print

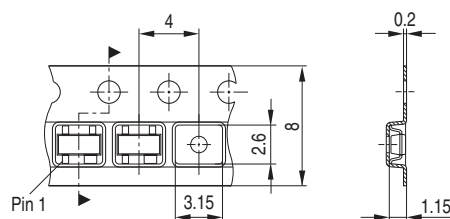


Marking Layout (Example)

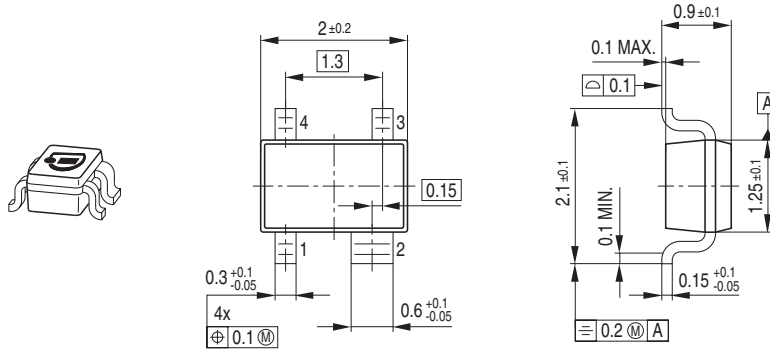


Standard Packing

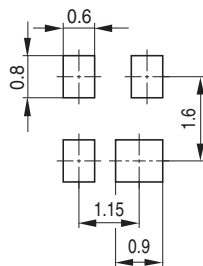
Reel  $\varnothing$ 180 mm = 3.000 Pieces/Reel  
 Reel  $\varnothing$ 330 mm = 10.000 Pieces/Reel



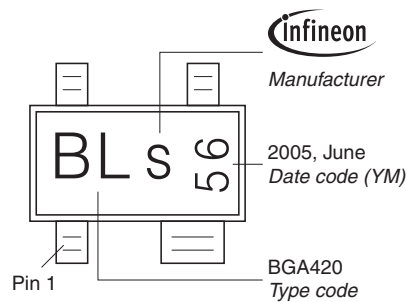
Package Outline



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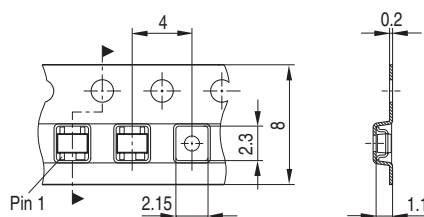


Marking Layout (Example)



Standard Packing

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



Edition 2006-02-01  
Published by  
Infineon Technologies AG  
81726 München, Germany  
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