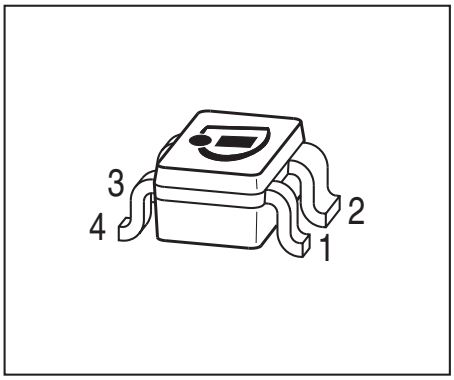
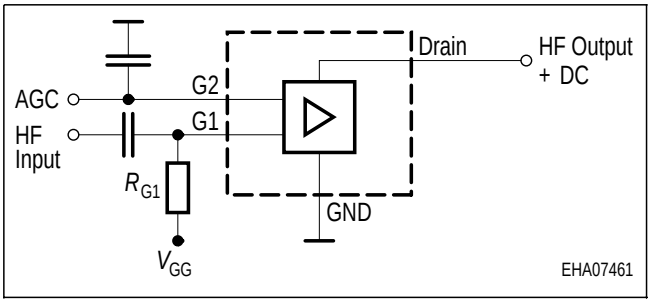
Silicon N-Channel MOSFET Tetrode



- 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

AEC Qualified RoHS



ESD (**E**lectro**s**tatic **d**ischarge) 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}	± 1	mA
Gate 1/ gate 2-source voltage	V_{G1S}, V_{G2S}	± 6	V
Total power dissipation	P_{tot}		mW
$T_S \leq 94$ °C, BF5030W		200	
$T_S \leq 76$ °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[1)]	R_{thchs}		K/W
BF5030W		≤ 280	
BF5030, BF5030R		≤ 370	

[1]For calculation of R_{thJA} please refer to Application Note Thermal Resistance

Electrical Characteristics at T_A = 25°C, unless otherwise specified

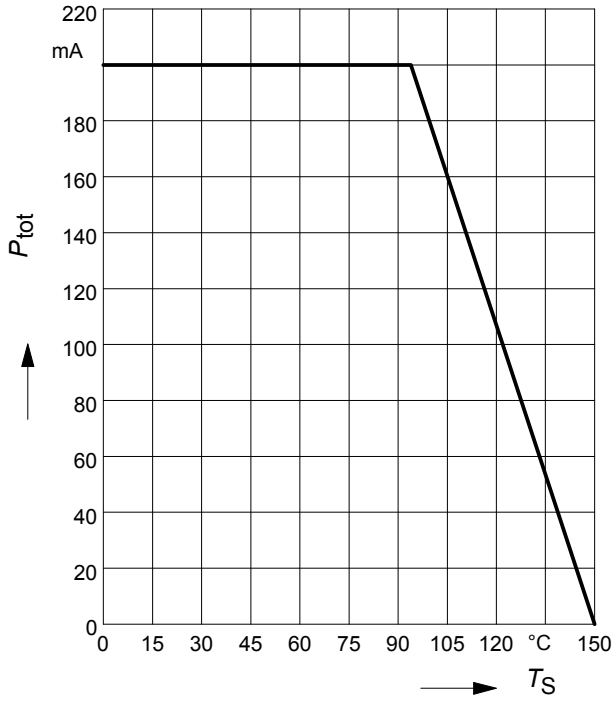
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain-source breakdown voltage I_D = 20 µA, V_{G1S} = 0 , V_{G2S} = 0	$V_{(BR)DS}$	12	-	-	V
Gate1-source breakdown voltage +I_{G1S} = 10 mA, V_{G2S} = 0 , V_{DS} = 0	+$V_{(BR)G1SS}$	6	-	15	
Gate2-source breakdown voltage +I_{G2S}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

Electrical Characteristics at T_A = 25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics - (verified by random sampling)					
Forward transconductance	g_{fs}				mS
V_{DS} = 3 V, I_D = 10 mA, V_{G2S} = 3 V		-	41	-	
V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V		-	41	-	
Gate1 input capacitance	C_{g1ss}				pF
V_{DS} = 3 V, I_D = 10 mA, V_{G2S} = 3 V		-	2.7	-	
V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V		-	2.8	-	
Output capacitance	C_{dss}				
V_{DS} = 3 V, I_D = 10 mA, V_{G2S} = 3 V		-	1.6	-	
V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V		-	1.5	-	
Power gain	G_p				dB
V_{DS} = 3 V, I_D = 10 mA, V_{G2S} = 3 V, f = 800 MHz		-	24	-	
V_{DS} = 3 V, I_D = 10 mA, V_{G2S} = 3 V, f = 45 MHz		-	34	-	
V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 800 MHz		-	24	-	
V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 45 MHz		-	34	-	
Noise figure	F				dB
V_{DS} = 3 V, I_D = 10 mA, V_{G2S} = 3 V, f = 800 MHz		-	1.3	-	
V_{DS} = 3 V, I_D = 10 mA, V_{G2S} = 3 V, f = 45 MHz		-	0.9	-	
V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 800 MHz		-	1.3	-	
V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 45 MHz		-	0.9	-	
Gain control range	ΔG_p				
V_{DS} = 3 V, V_{G2S} = 3...0 V , f = 800 MHz		45	50	-	
V_{DS} = 5 V, V_{G2S} = 4...0 V , f = 800 MHz		45	50	-	
Cross-modulation k=1%, f_w=50MHz, f_{unw}=60MHz	X_{mod}				dB
AGC = 0		90	94	-	
AGC = 10 dB		-	92	-	
AGC = 40 dB		96	98	-	

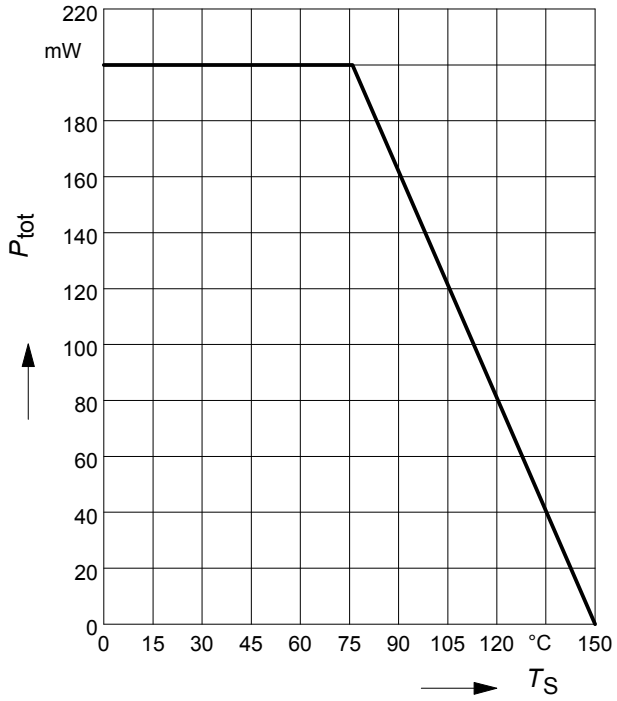
Total power dissipation $P_{tot} = f(T_S)$

BF5030W



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

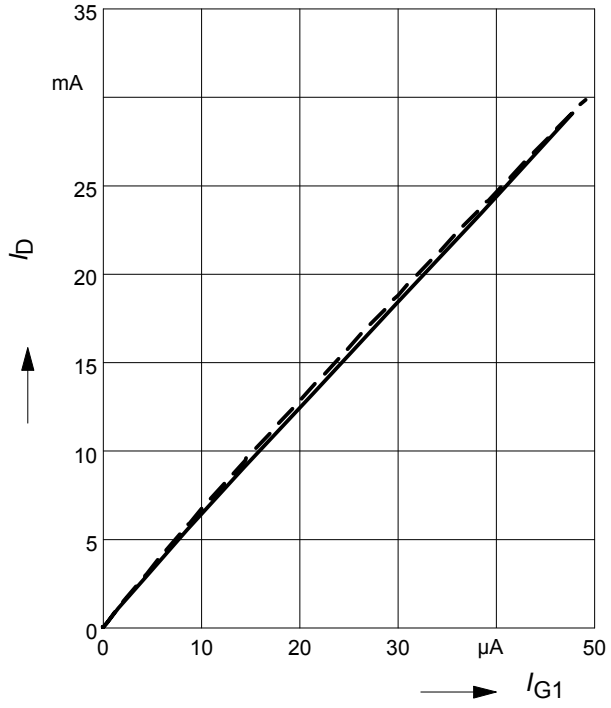
BF5030, BF5030R



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

— V_{DS} = 3 V, V_{G2S} = 3 V

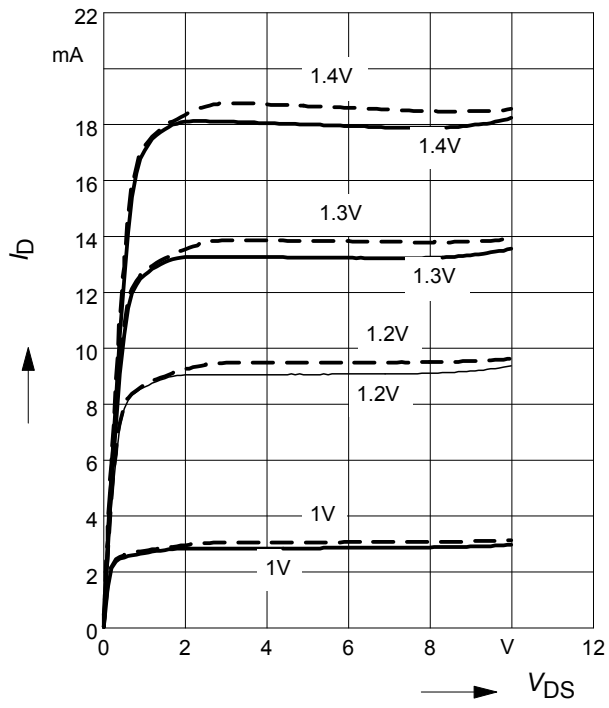
… V_{DS} = 5 V, V_{G2S} = 4 V



Output characteristics $I_D = f(V_{DS})$

V_{G1S} = Parameter

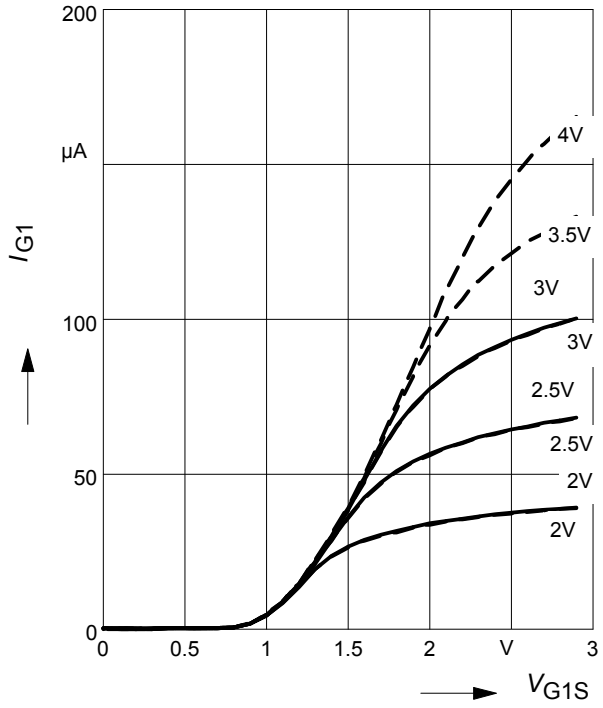
— V_{DS} = 3 V, … V_{DS} = 5 V



Gate 1 current $I_{G1} = f(V_{G1S})$

V_{G2S} = Parameter

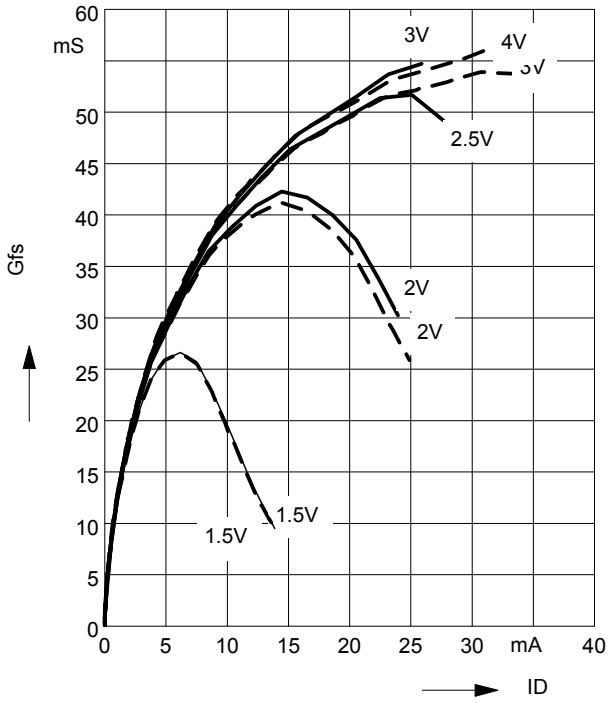
— V_{DS} = 3 V, … V_{DS} = 5 V



Gate 1 forward transconductance

$g_{fs} = f(I_D), V_{G2S}$ = Parameter

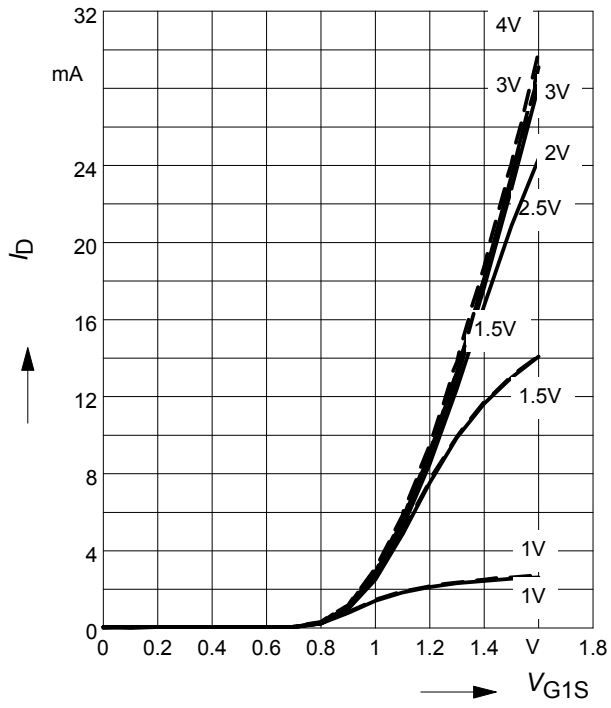
— V_{DS} = 3 V, … V_{DS} = 5 V



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

V_{G2S} = Parameter

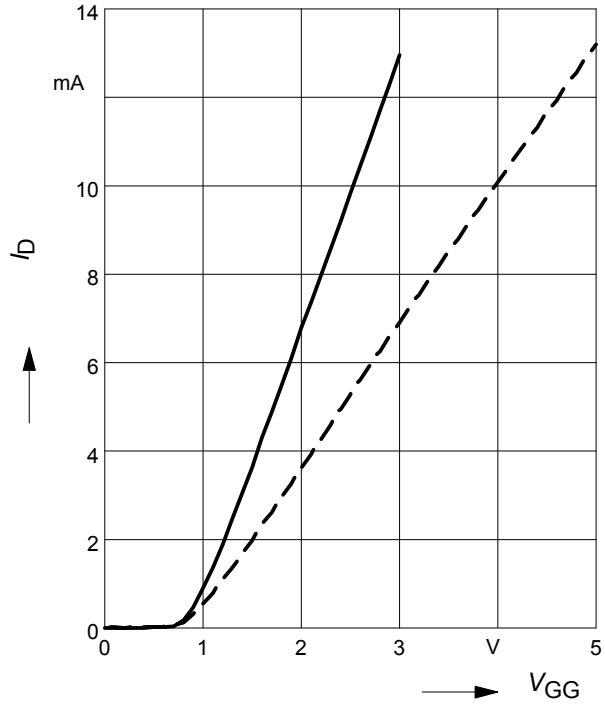
— V_{DS} = 3 V, … V_{DS} = 5 V



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

— V_{DS} = 3 V, V_{G2S} = 3 V, R_{g1} = 82 kΩ

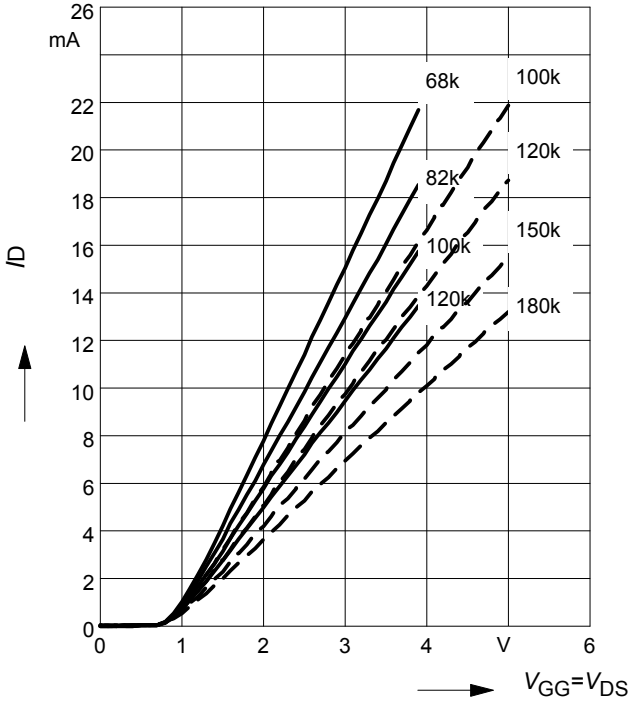
… V_{DS} = 5 V, V_{G2S} = 4 V, R_{g1} = 180 kΩ



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

R_{G1} = Parameter in kΩ

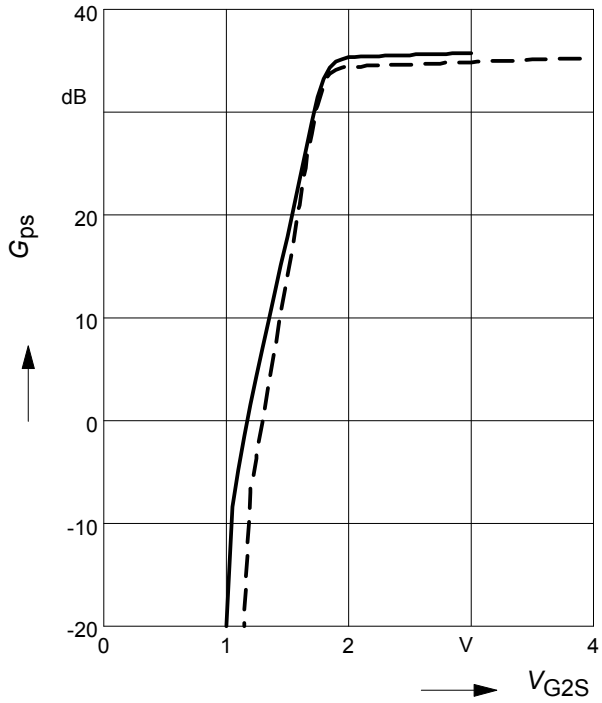
— V_{DS} = 3 V, … V_{DS} = 5 V



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

— V_{DS} = 3 V, V_{G2S} = 3 V, R_{g1} = 82 kΩ

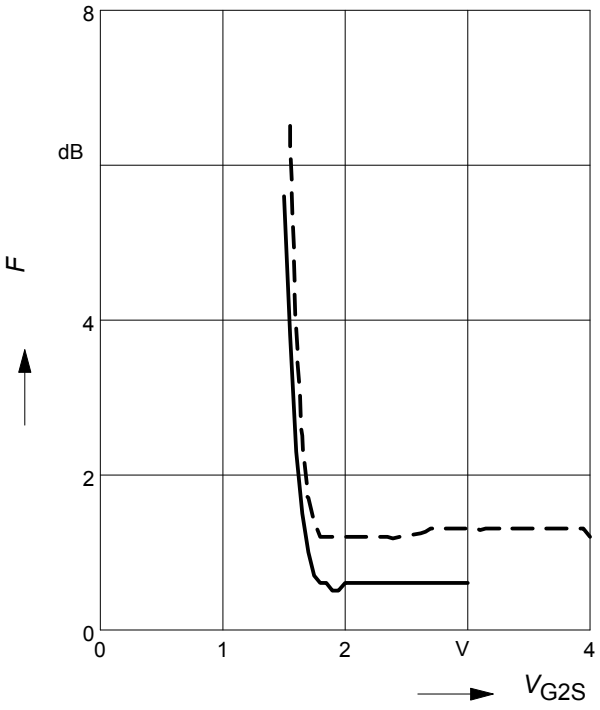
… V_{DS} = 5 V, V_{G2S} = 4 V, R_{g1} = 180 kΩ



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

— V_{DS} = 3 V, V_{G2S} = 3 V, R_{g1} = 82 kΩ

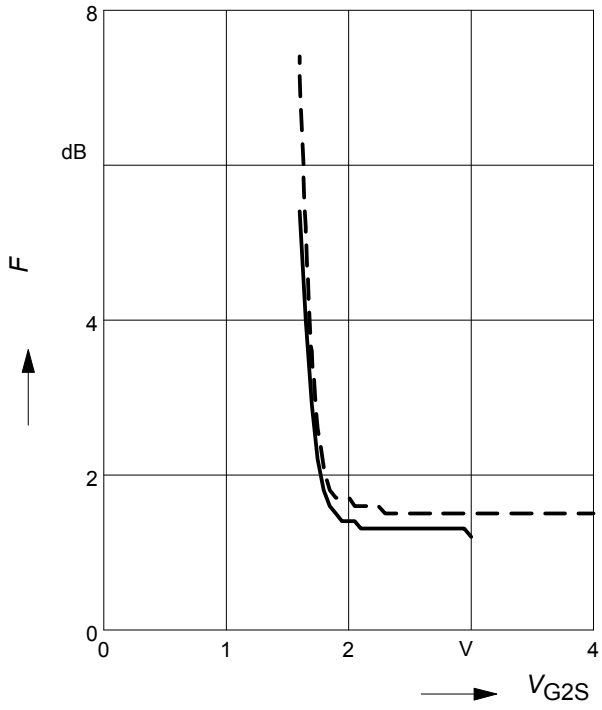
… V_{DS} = 5 V, V_{G2S} = 4 V, R_{g1} = 180 kΩ



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

— V_{DS} = 3 V, V_{G2S} = 3 V, R_{g1} = 82 kΩ

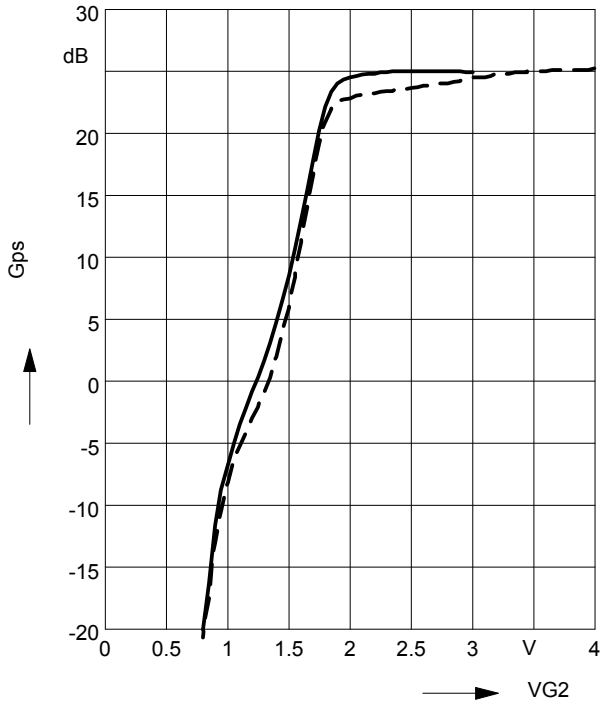
… V_{DS} = 5 V, V_{G2S} = 4 V, R_{g1} = 180 kΩ



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

— V_{DS} = 3 V, V_{G2S} = 3 V, R_{g1} = 82 kΩ

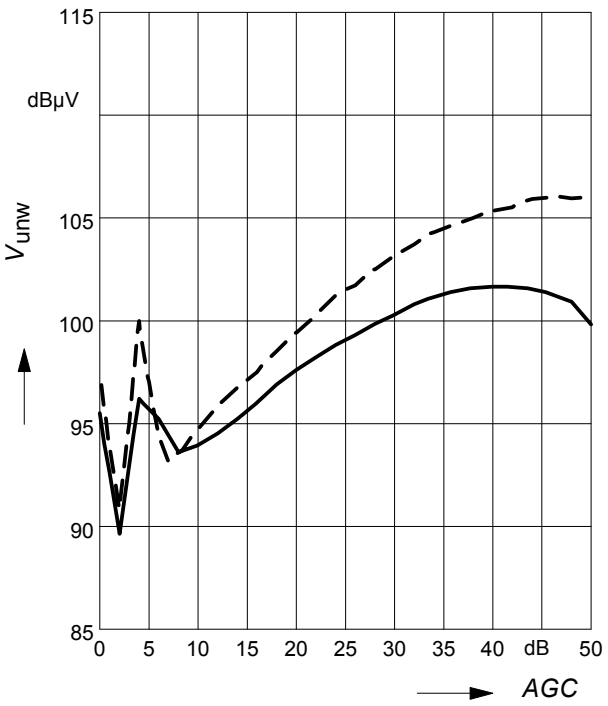
… V_{DS} = 5 V, V_{G2S} = 4 V, R_{g1} = 180 kΩ



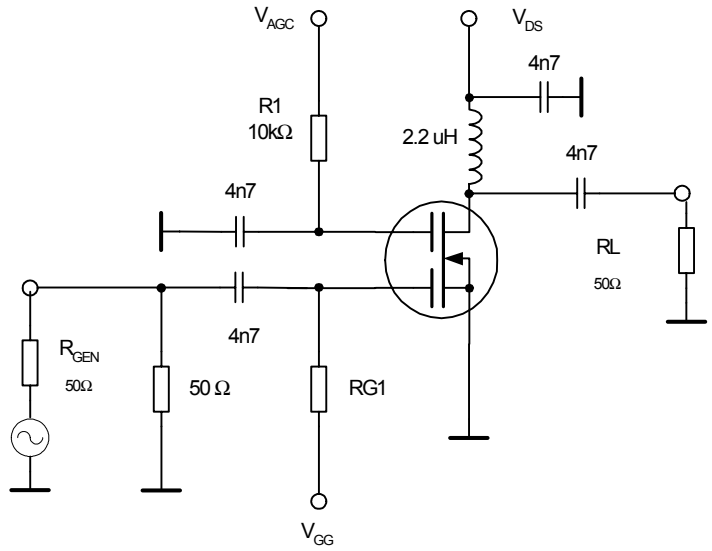
Crossmodulation V_{unw} = (*AGC*)

— V_{DS} = 3 V, V_{G2S} = 3 V, R_{g1} = 82 kΩ

… V_{DS} = 5 V, V_{G2S} = 4 V, R_{g1} = 180 kΩ

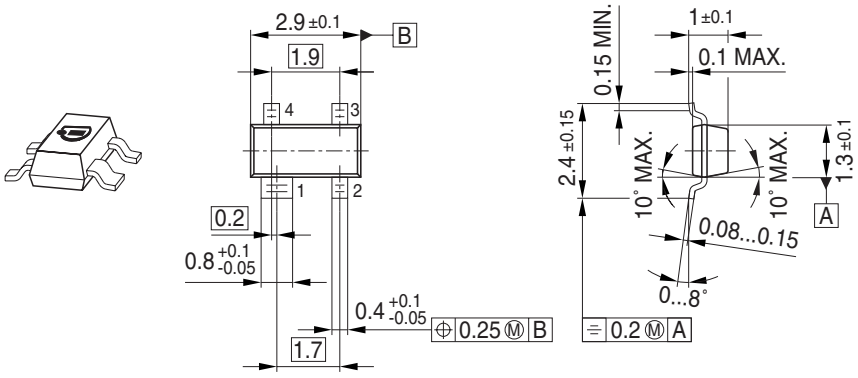


Crossmodulation test circuit

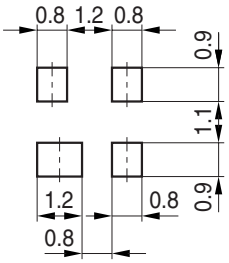


Semibiased

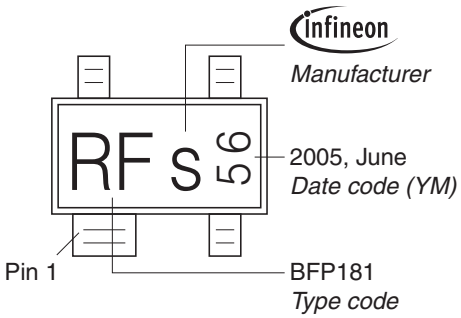
Package Outline



Foot Print

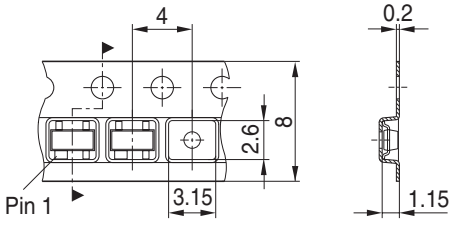


Marking Layout (Example)

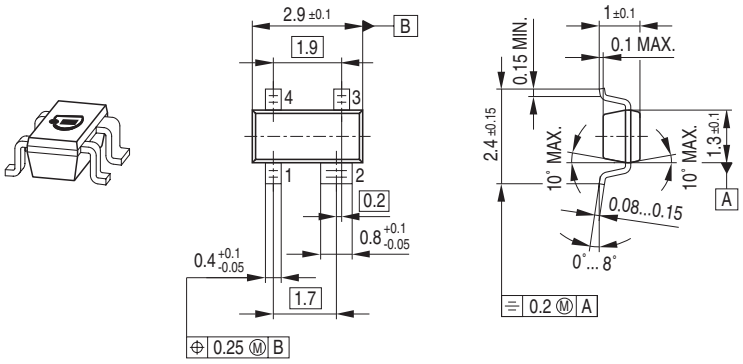


Standard Packing

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



Package Outline



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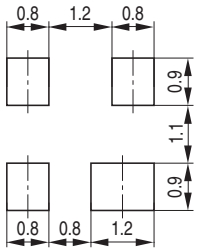

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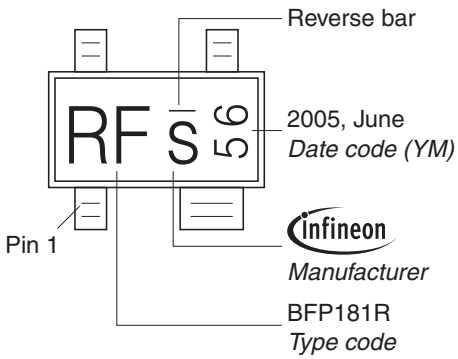

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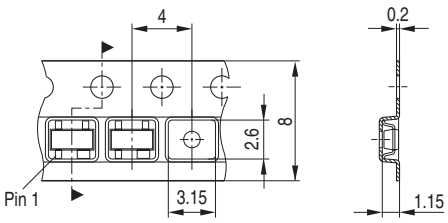
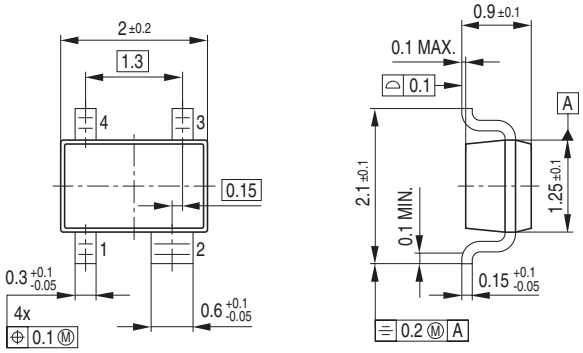


Package Outline



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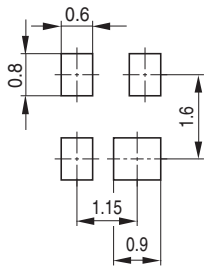
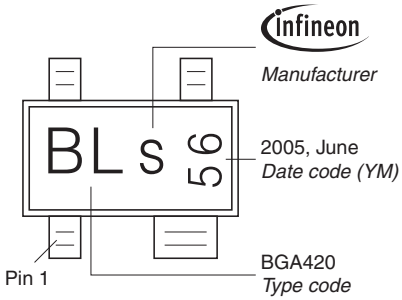


Marking Layout (Example)



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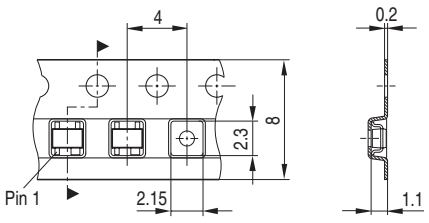

Edition 2006-02-01
Published by
Infineon Technologies AG
81726 München, Germany

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