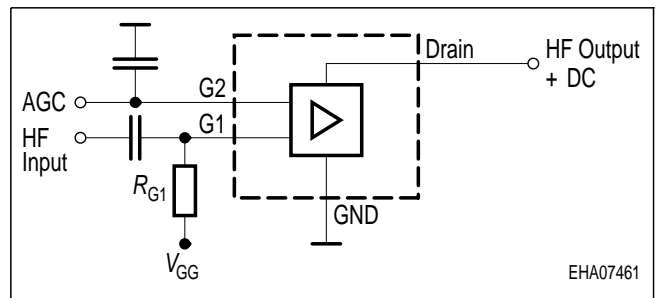
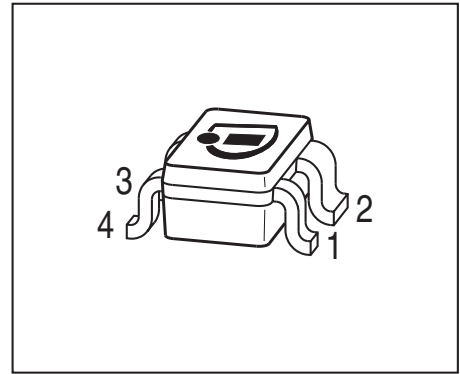


Silicon N-Channel MOSFET Tetrode

- 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}	± 1	mA
Gate 1/ gate 2-source voltage	V_{G1S}, V_{G2S}	± 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 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 $T_A = 25^\circ\text{C}$, unless otherwise specified

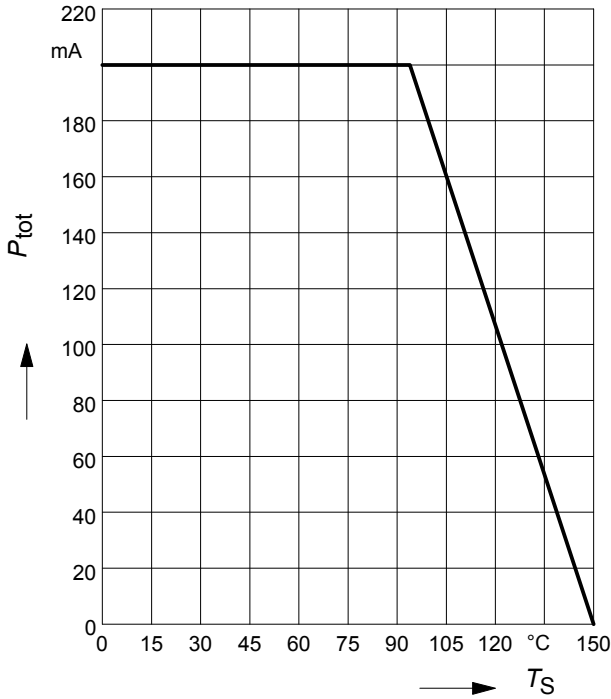
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain-source breakdown voltage $I_D = 20 \mu\text{A}$, $V_{G1S} = 0$, $V_{G2S} = 0$	$V_{(BR)DS}$	12	-	-	V
Gate1-source breakdown voltage $+I_{G1S} = 10 \text{ mA}$, $V_{G2S} = 0$, $V_{DS} = 0$	$+V_{(BR)G1SS}$	6	-	15	
Gate2-source 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	
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	-	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	-	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	-	

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 $V_{DS} = 3\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 3\text{ V}$ $V_{DS} = 5\text{ V}, I_D = 10\text{ mA}, V_{G2S} = 4\text{ V}$	g_{fs}	- -	41 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 2.8	- -	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 1.5	- -	
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 34 24 34	- - - -	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 0.9 1.3 0.9	- - - -	dB
Gain control range $V_{DS} = 3\text{ V}, V_{G2S} = 3\dots 0\text{ V}, f = 800\text{ MHz}$ $V_{DS} = 5\text{ V}, V_{G2S} = 4\dots 0\text{ V}, f = 800\text{ MHz}$	ΔG_p	45 45	50 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 - 96	94 92 98	- - -	dB

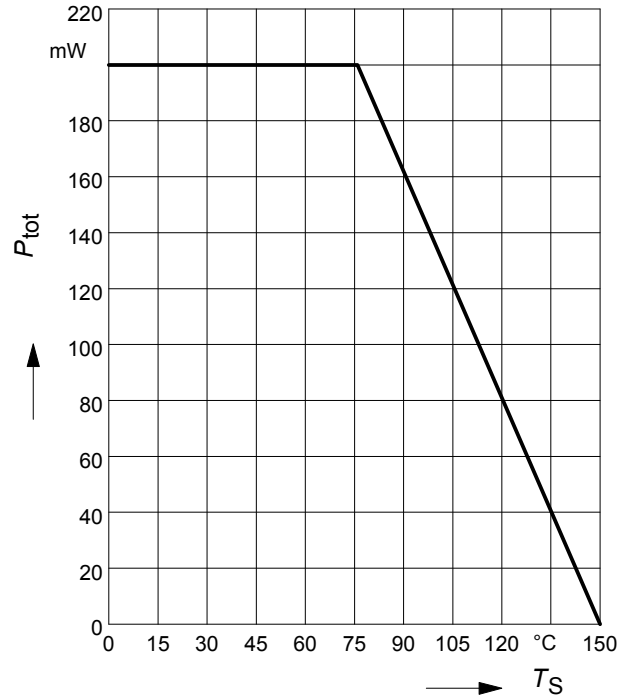
Total power dissipation $P_{tot} = f(T_S)$

BF5030W



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

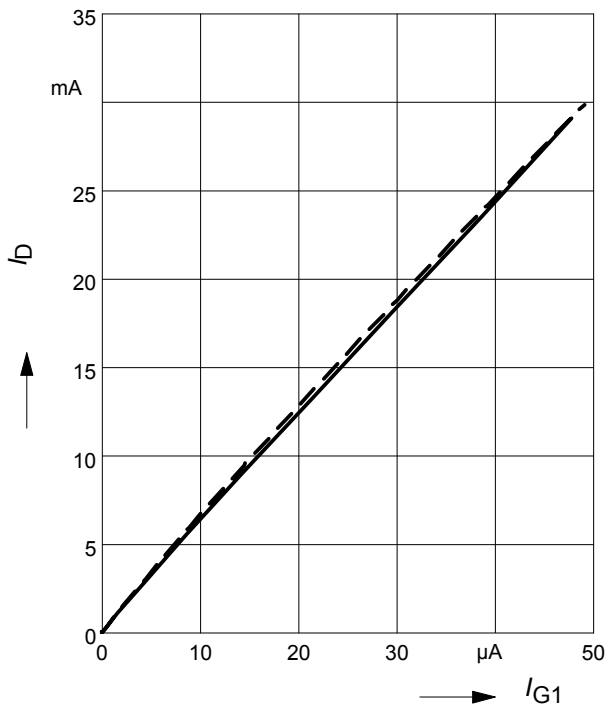
BF5030, BF5030R



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

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

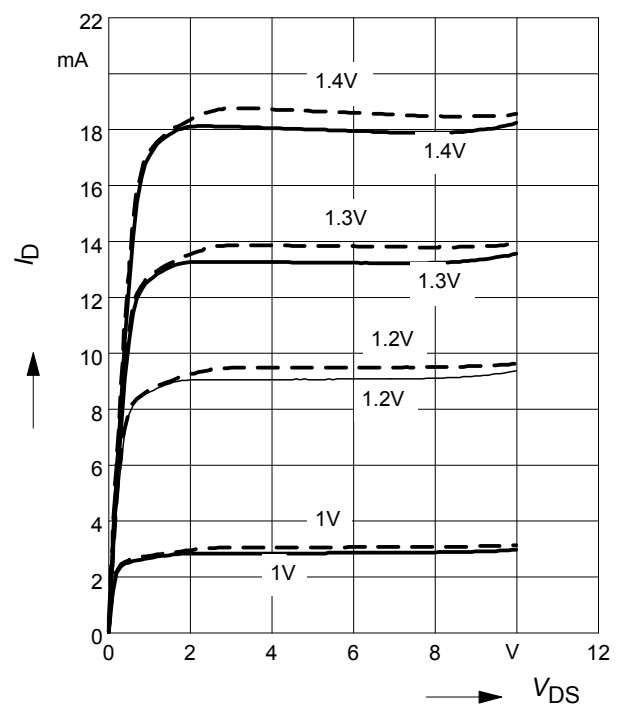
... $V_{DS} = 5\text{ V}$, $V_{G2S} = 4\text{ V}$



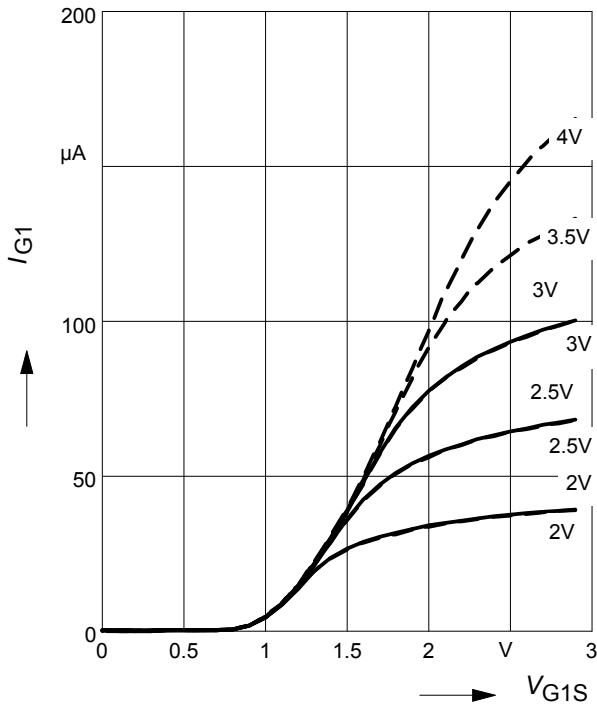
Output characteristics $I_D = f(V_{DS})$

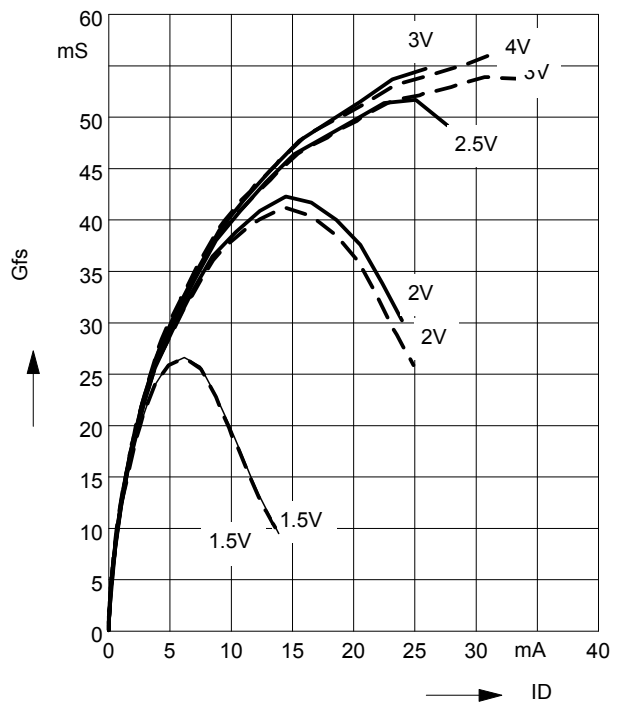
$V_{G1S} = \text{Parameter}$

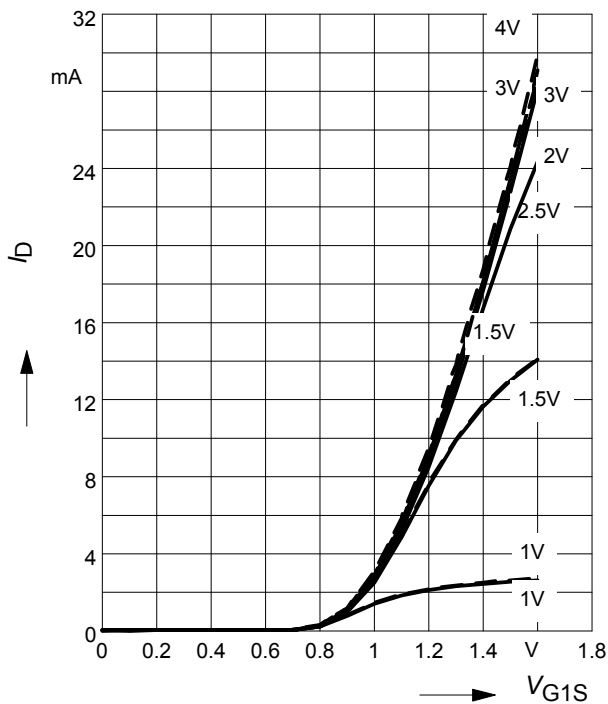
— $V_{DS} = 3\text{ V}$, ... $V_{DS} = 5\text{ V}$



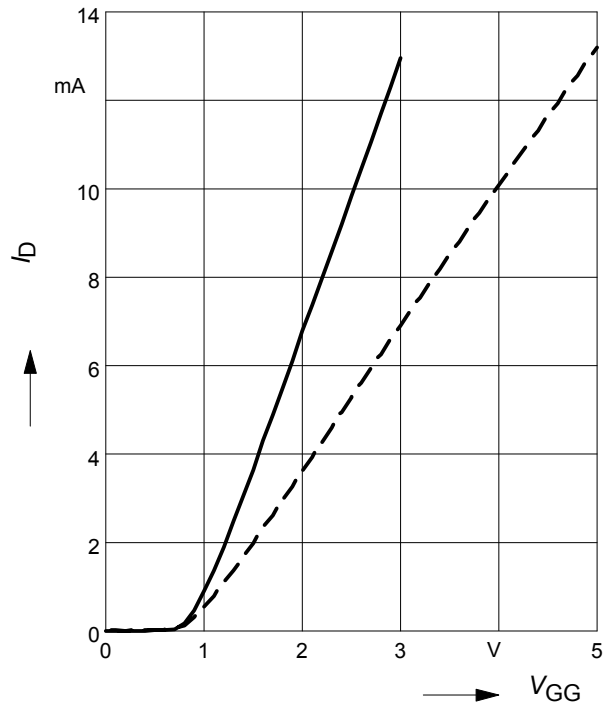
Gate 1 current $I_{G1} = f(V_{G1S})$
 $V_{G2S} = \text{Parameter}$

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

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 $I_D = f(V_{GG})$

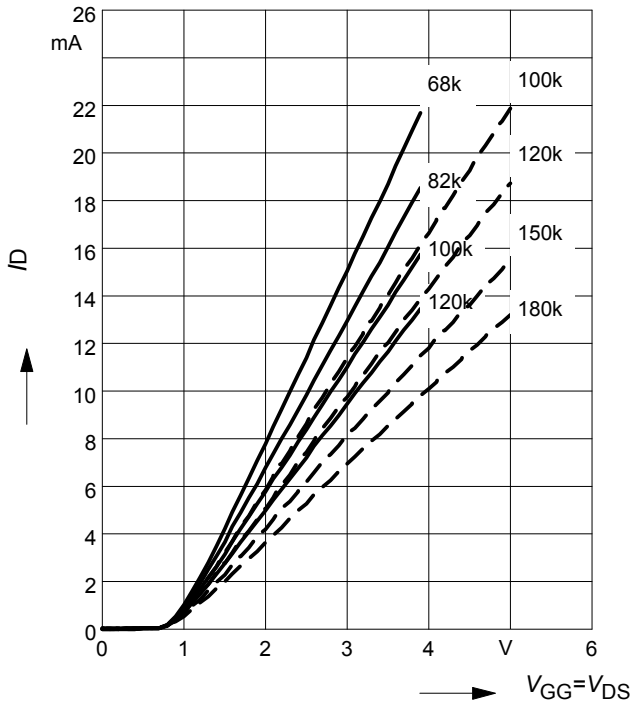
 — $V_{DS} = 3\text{ V}, V_{G2S} = 3\text{ V}, R_{G1} = 82\text{ k}\Omega$

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


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

R_{G1} = Parameter in k Ω

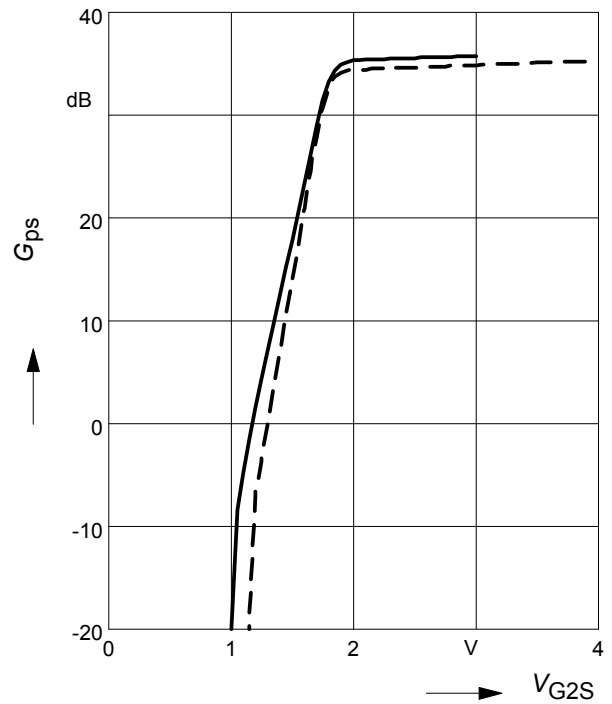
— $V_{DS} = 3\text{ V}$, ... $V_{DS} = 5\text{ V}$



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

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

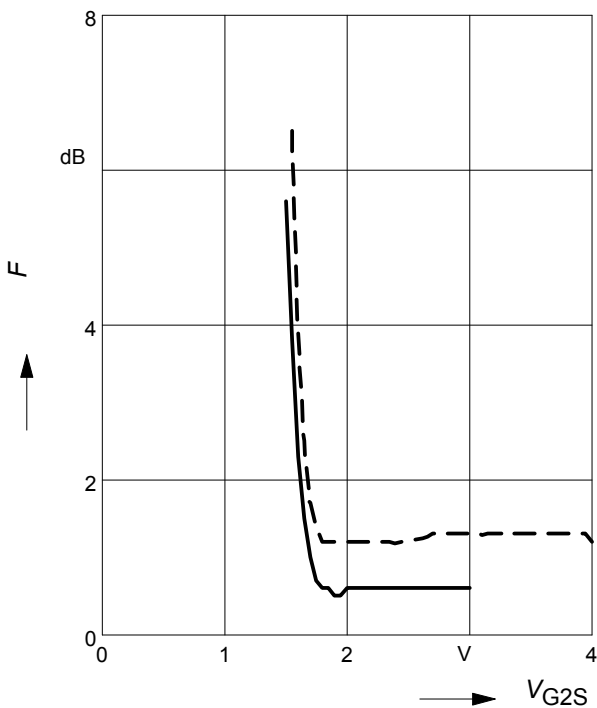
... $V_{DS} = 5\text{ V}$, $V_{G2S} = 4\text{ V}$, $R_{G1} = 180\text{ k}\Omega$



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

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

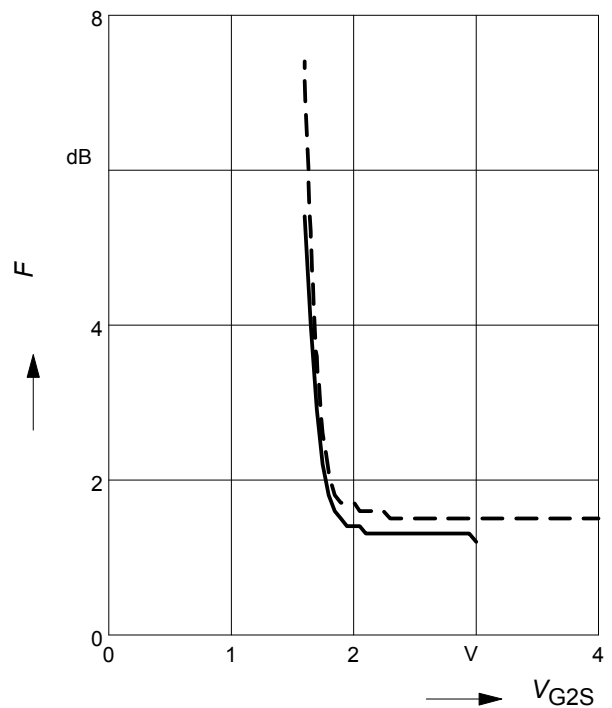
... $V_{DS} = 5\text{ V}$, $V_{G2S} = 4\text{ V}$, $R_{G1} = 180\text{ k}\Omega$



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

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

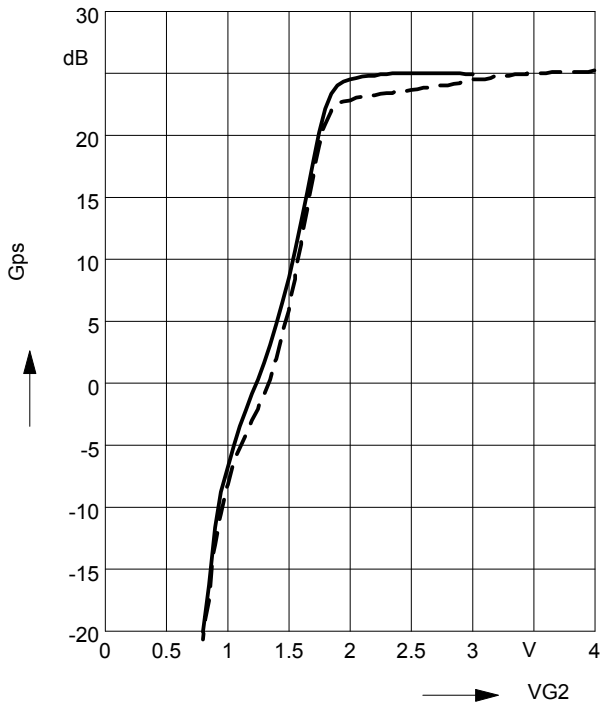
... $V_{DS} = 5\text{ V}$, $V_{G2S} = 4\text{ V}$, $R_{G1} = 180\text{ k}\Omega$



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

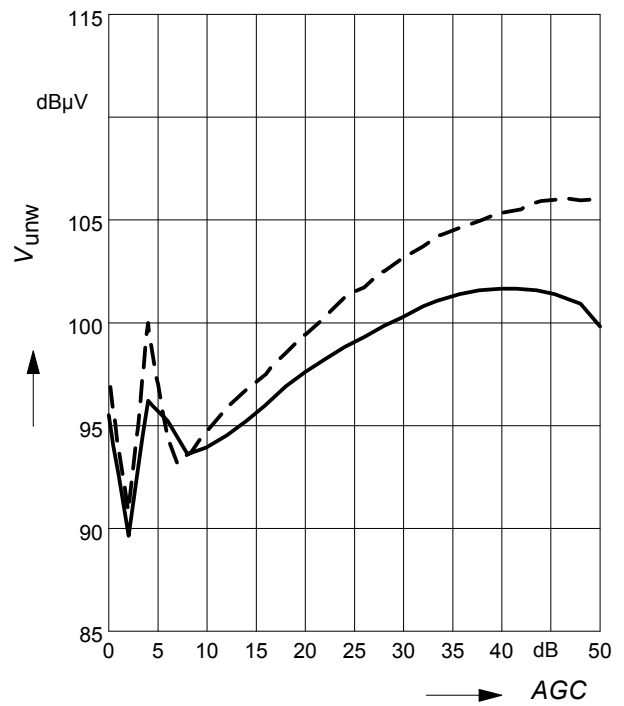
— $V_{DS} = 3$ V, $V_{G2S} = 3$ V, $R_{g1} = 82$ k Ω

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

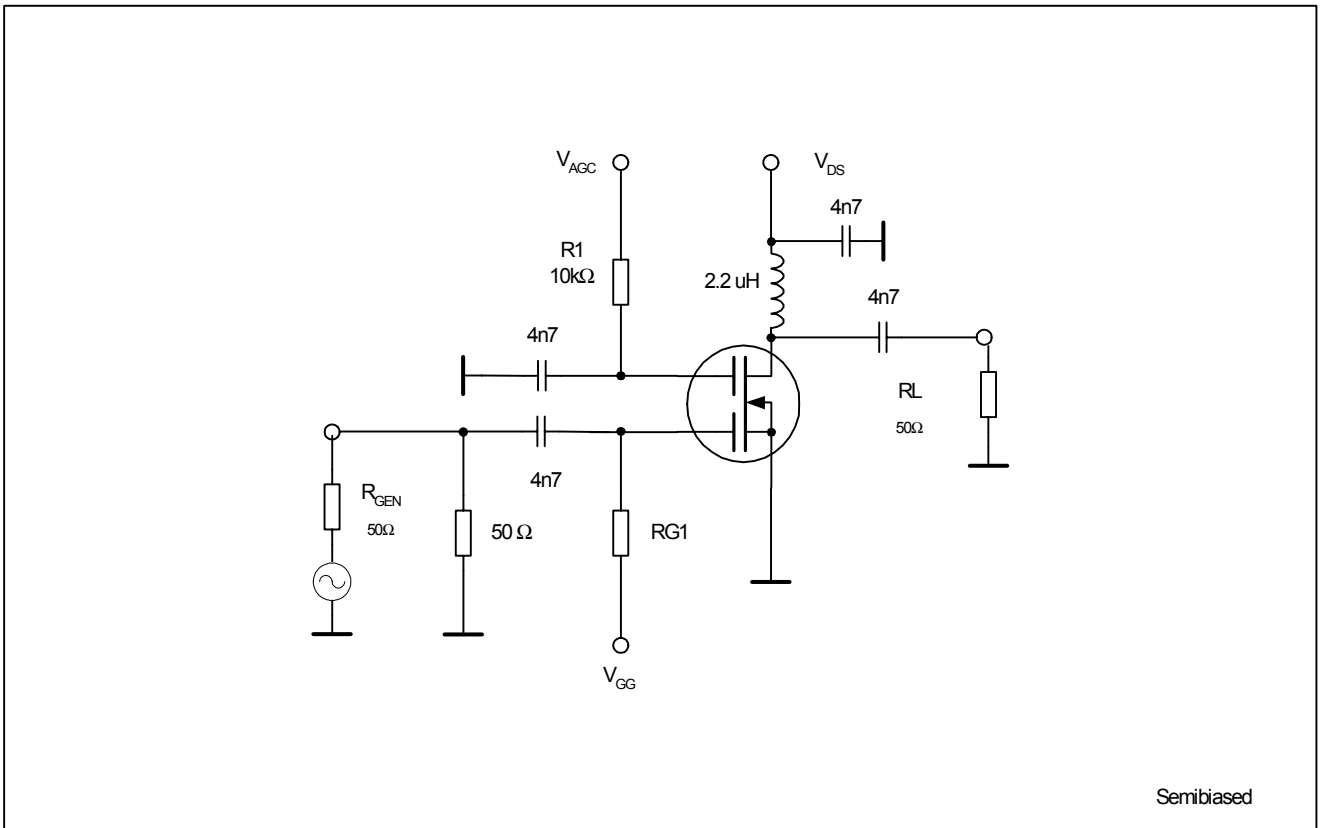

Crossmodulation $V_{unw} = (AGC)$

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

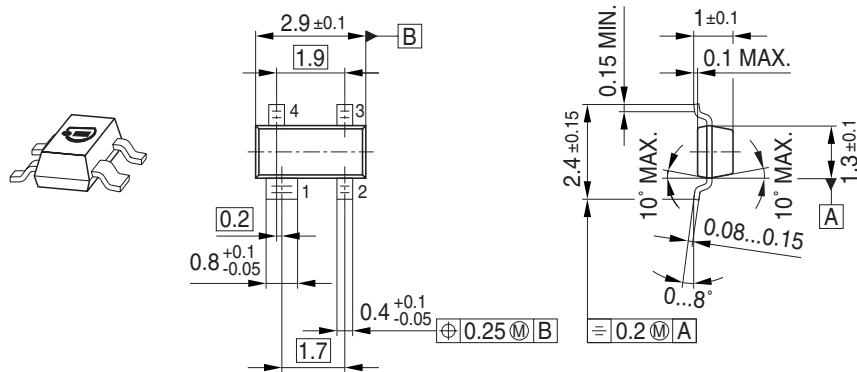
... $V_{DS} = 5$ V, $V_{G2S} = 4$ V, $R_{g1} = 180$ k Ω



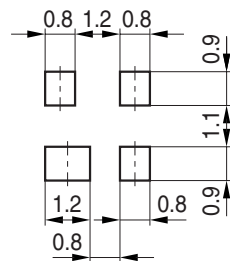
Crossmodulation test circuit



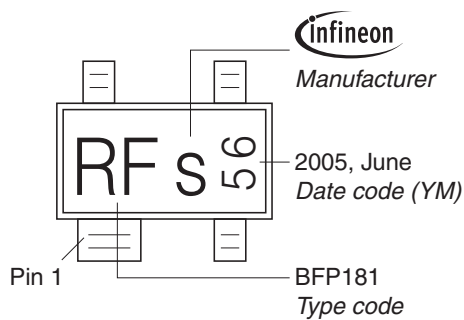
Package Outline



Foot Print

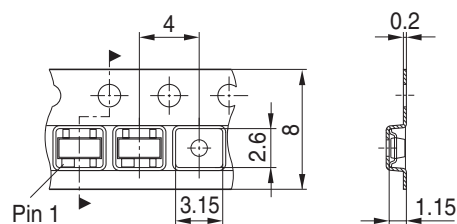


Marking Layout (Example)

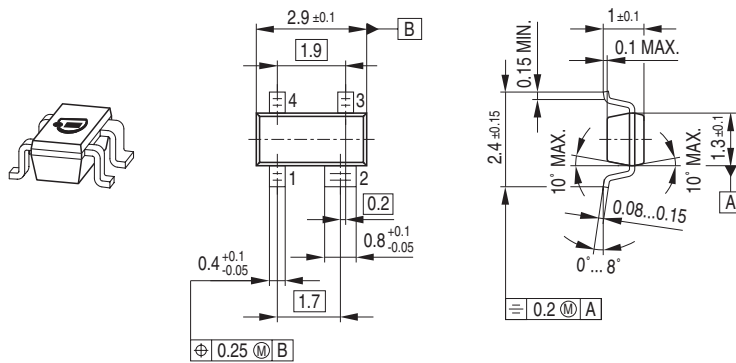


Standard Packing

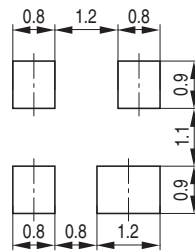
Reel $\varnothing 180 \text{ mm} = 3.000 \text{ Pieces/Reel}$
 Reel $\varnothing 330 \text{ mm} = 10.000 \text{ Pieces/Reel}$



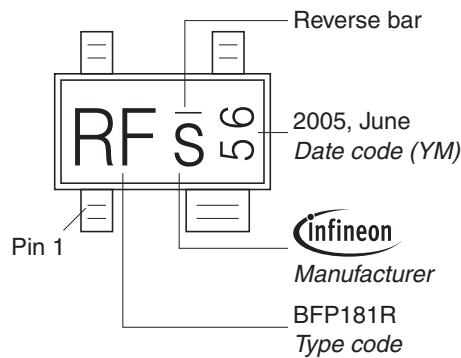
Package Outline



Foot Print

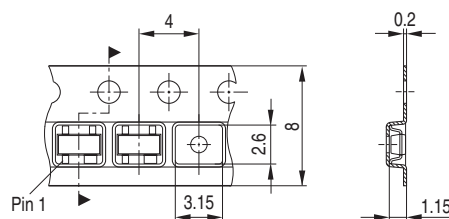


Marking Layout (Example)

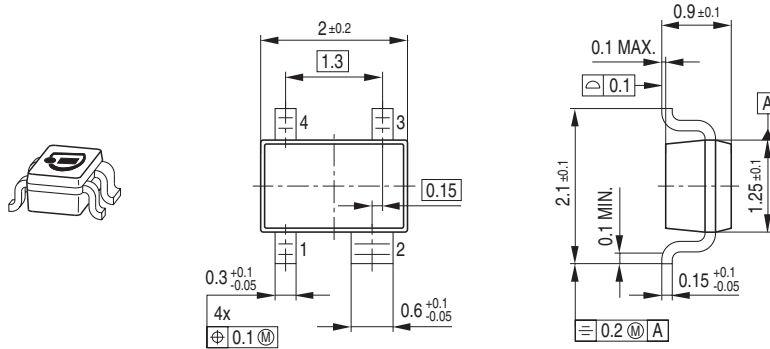


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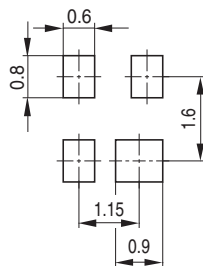
Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel



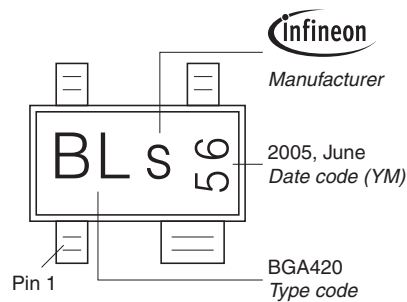
Package Outline



Foot Print

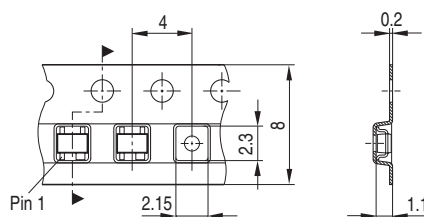


Marking Layout (Example)



Standard Packing

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



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