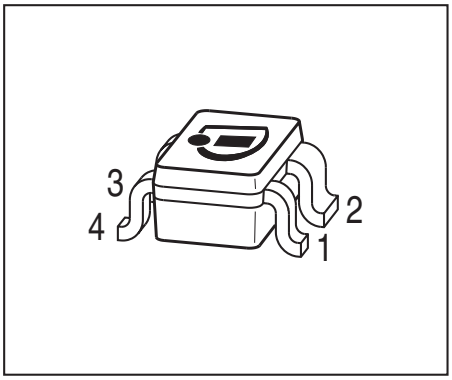
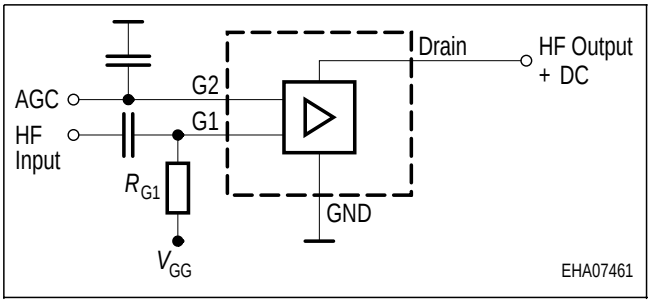
Silicon N-Channel MOSFET Tetrode



- Low noise gain controlled input stages of UHF- and VHF - tuners with 3 V up to 5 V supply voltage
- Integrated gate protection diodes
- Excellent noise figure
- High gain, high forward transadmittance
- Improved 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
BF5020	SOT143	1 = S	2 = D	3 = G2	4 = G1	-	-	KYs
BF5020R	SOT143R	1 = D	2 = S	3 = G1	4 = G2	-	-	KYs
BF5020W	SOT343	1 = D	2 = S	3 = G1	4 = G2	-	-	KYs

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}	± 10	mA
Gate 1/ gate 2-source voltage	V_{G1S}, V_{G2S}	± 6	V
Total power dissipation	P_{tot}		mW
$T_S \leq 76$ °C, BF5020, BF5020R		200	
$T_S \leq 94$ °C, BF5020W		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
BF5020, BF5020R		≤ 370	
BF5020W		≤ 280	

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 V_{DS} = 5 V, V_{G1S} = 0 , V_{G2S} = 4 V	I_{DSS}	-	-	100	
Drain-source current V_{DS} = 5 V, V_{G2S} = 4 V, R_{G1} = 120 kΩ	I_{DSX}	-	14	-	mA
Gate1-source pinch-off voltage V_{DS} = 5 V, V_{G2S} = 4 V, I_D = 20 µA	$V_{G1S(p)}$	-	0.7	-	V
Gate2-source pinch-off voltage V_{DS} = 5 V, I_D = 20 µA, V_{G1S} = 2 V	$V_{G2S(p)}$	-	0.7	-	

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

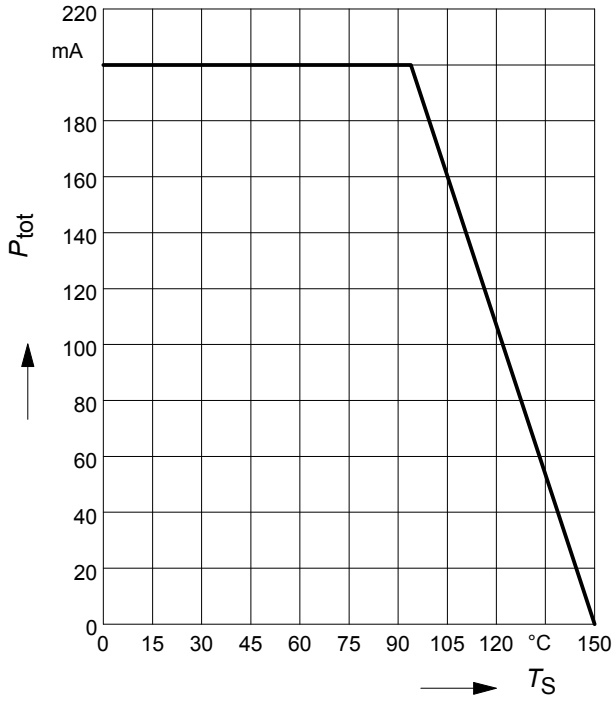
Electrical Characteristics at T_A = 25°C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics - (verified by random sampling)					
Forward transconductance V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V	g_{fs}	-	34	-	mS
Gate1 input capacitance V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V	C_{g1ss}	-	2.4	-	pF
Output capacitance V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V	C_{dss}	-	1	-	
Power gain V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 800 MHz V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 45 MHz	G_p	 - -	 26 32	 - -	dB
Noise figure V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 800 MHz V_{DS} = 5 V, I_D = 10 mA, V_{G2S} = 4 V, f = 45 MHz	F	 - -	 1.2 0.8	 - -	dB
Gain control range V_{DS} = 5 V, V_{G2S} = 4...0 V	ΔG_p	-	45	-	
Cross-modulation[1], V_{DS} = 5 V, R_{G1} = 120 kΩ AGC = 0 AGC = 10 dB AGC = 40 dB	X_{mod}	 - - -	 98 96 106	 - - -	dBµV

[1]Input level for k = 1%; f_w = 50 MHz, f_{unw} = 60 MHz

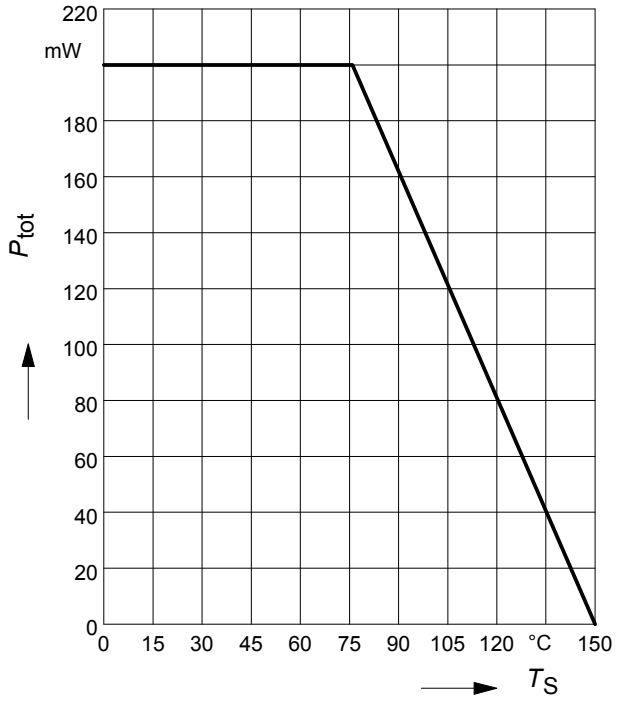
Total power dissipation $P_{tot} = f(T_S)$

BF5020W

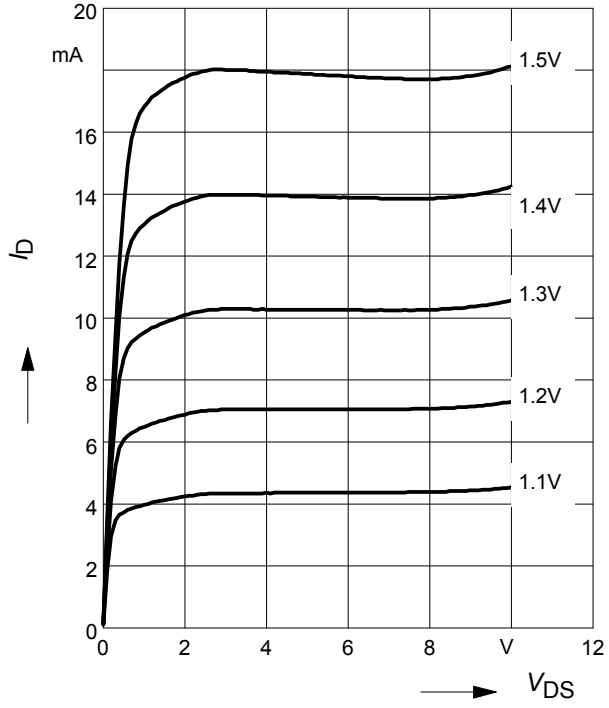


Total power dissipation $P_{tot} = f(T_S)$

BF5020, BF5020R



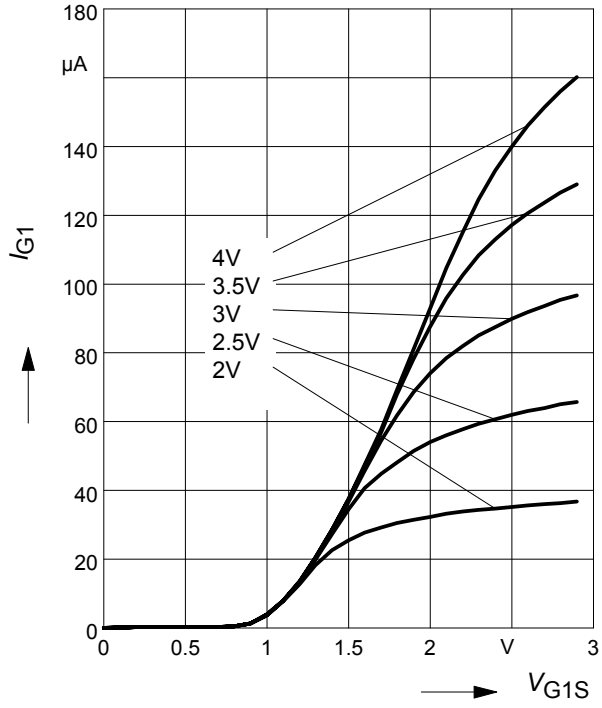
Output characteristics $I_D = f(V_{DS})$



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

V_{DS} = 5V

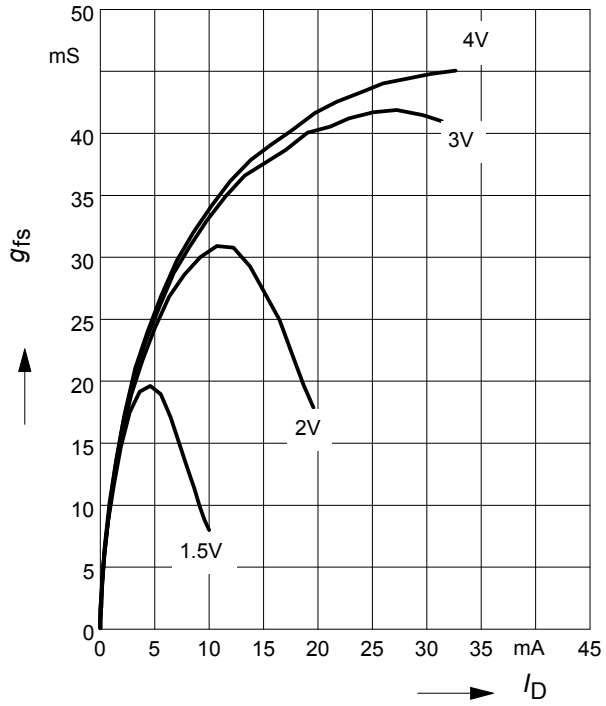
V_{G2S} = Parameter



Gate 1 forward transconductance

$g_{fs} = f(I_D)$

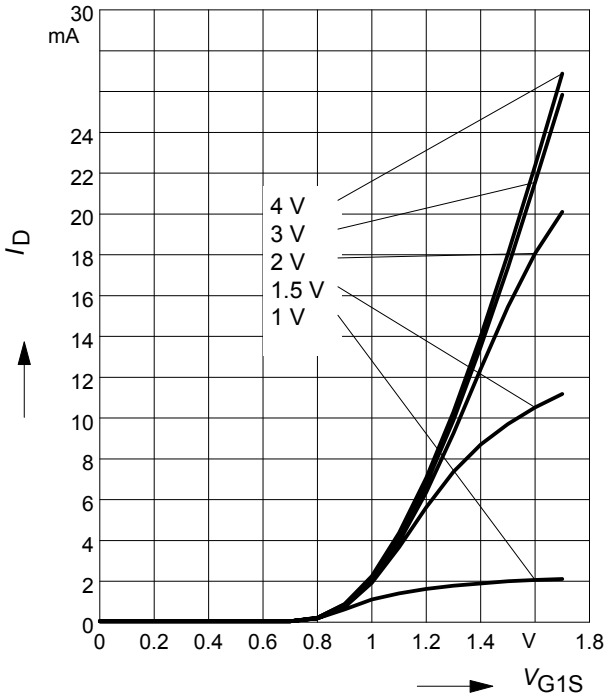
V_{DS} = 5V, V_{G2S} = Parameter



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

V_{DS} = 5V

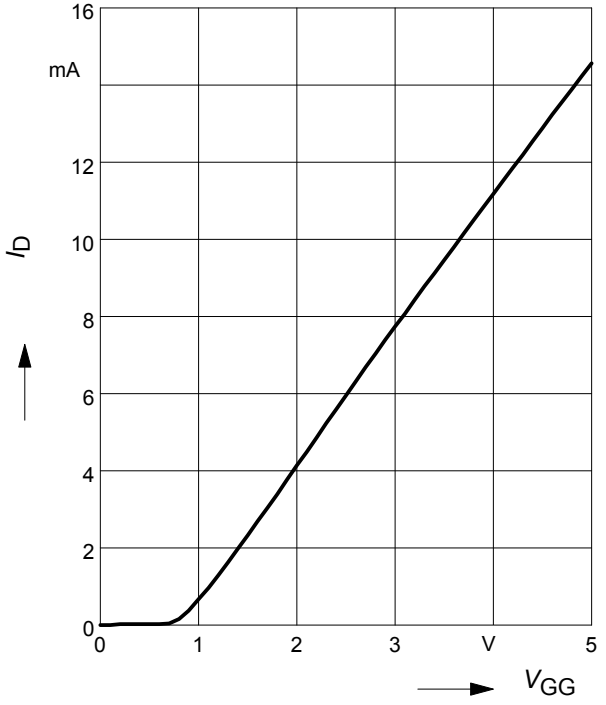
V_{G2S} = Parameter



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

V_{DS} = 5V, V_{G2S} = 4V, R_{G1} = 120 kΩ

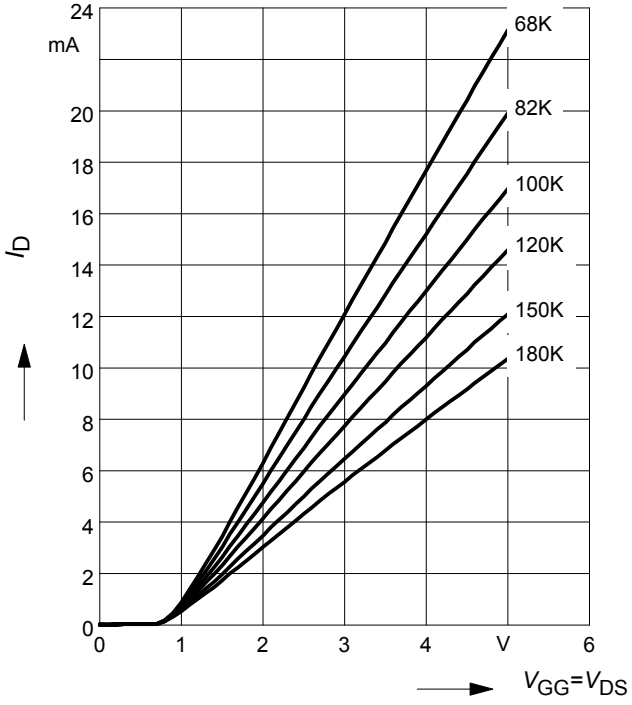
(connected to V_{GG}, V_{GG}=gate1 supply voltage)



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

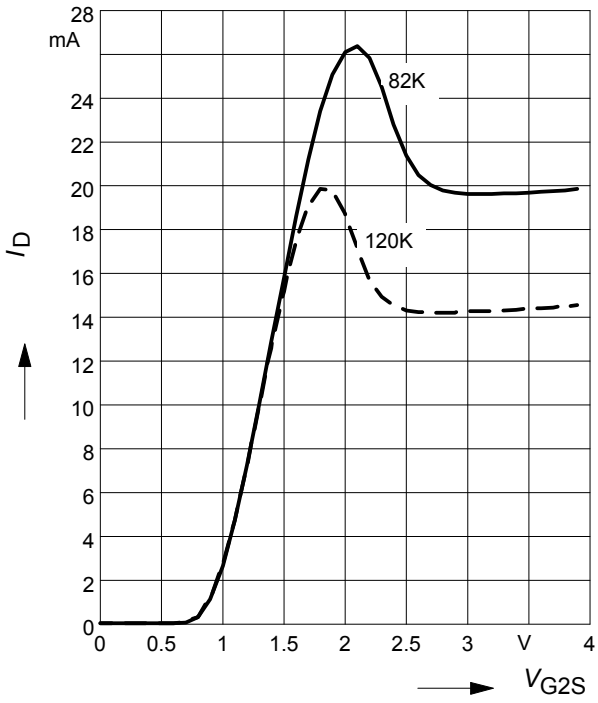
V_{G2S} = 4V

R_{G1} = Parameter in kΩ



Drain current $I_D = f(V_{G2S})$

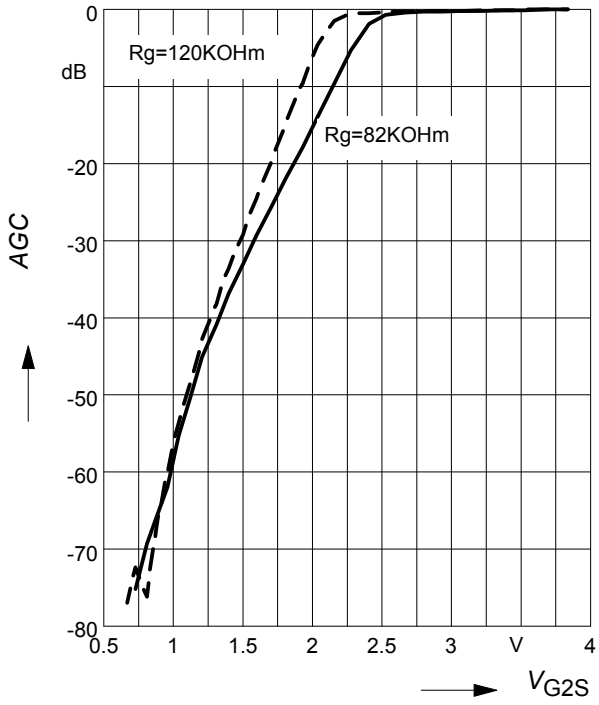
V_{DS} = 5 V, R_{G1} = Parameter in kΩ



AGC characteristic $AGC = f(V_{G2S})$

f = 50 MHz

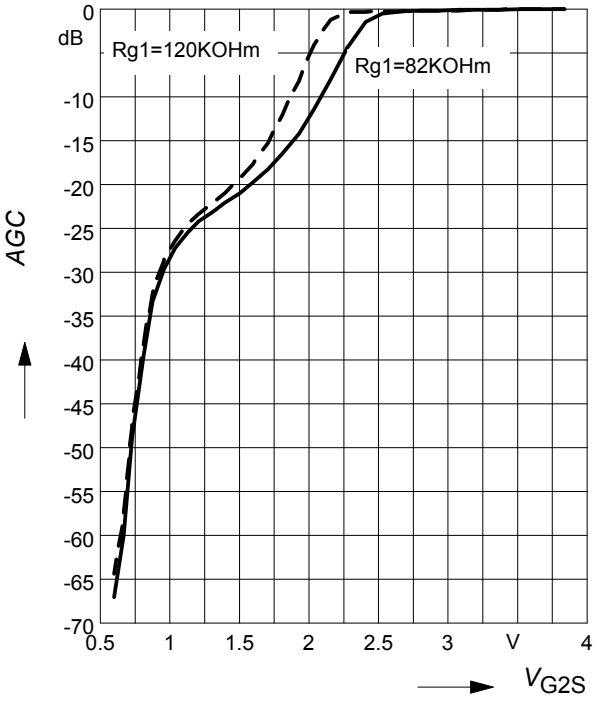
measured in test circuit, see page 7



AGC characteristic $AGC = f(V_{G2S})$

f = 800 MHz

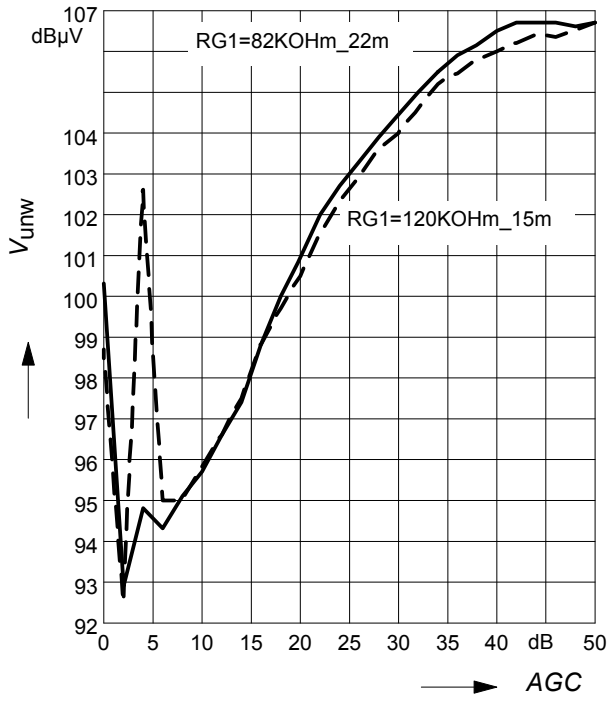
measured in test circuit, see page 7



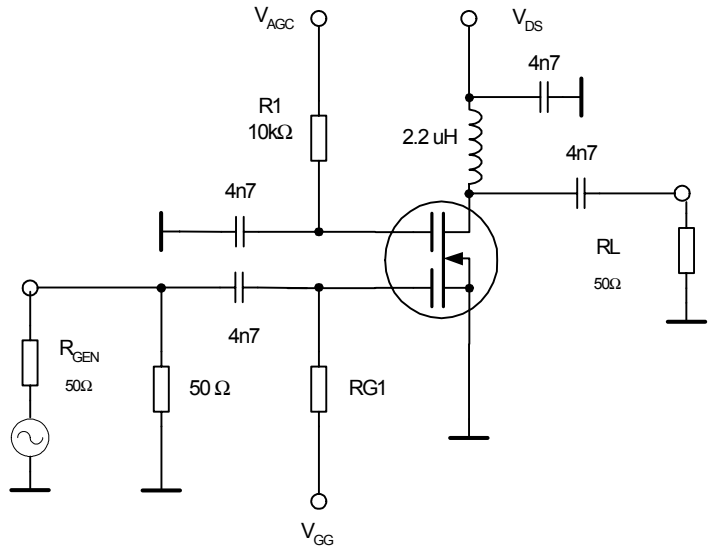
Crossmodulation V_{unw} = (AGC)

V_{DS} = 5 V

measured in test circuit, see page 7

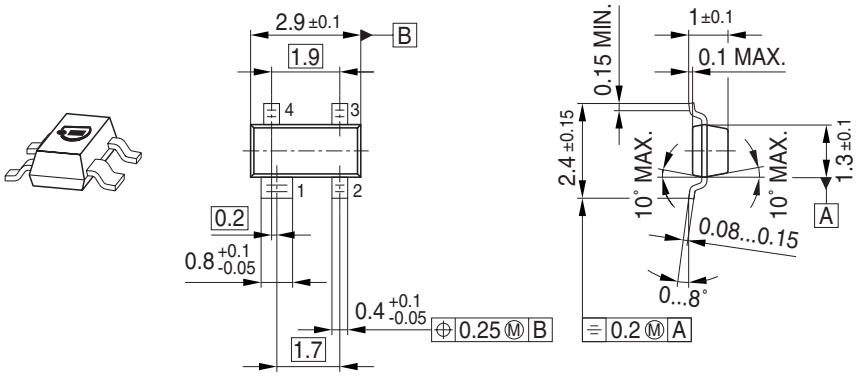


Test circuit for Crossmodulation / AGC

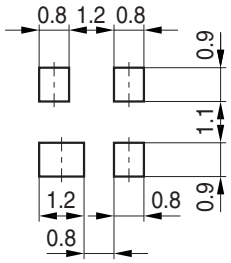


Semibiased

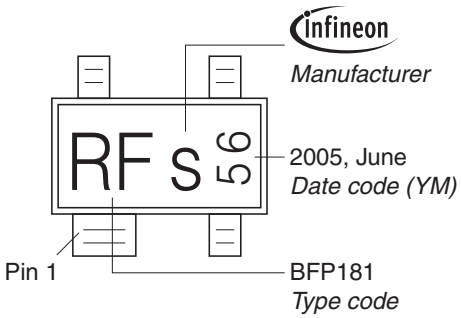
Package Outline



Foot Print

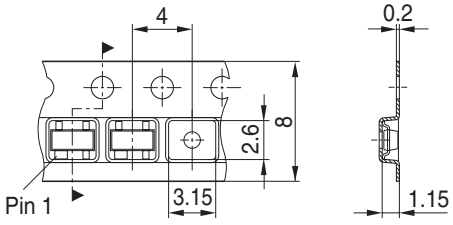


Marking Layout (Example)

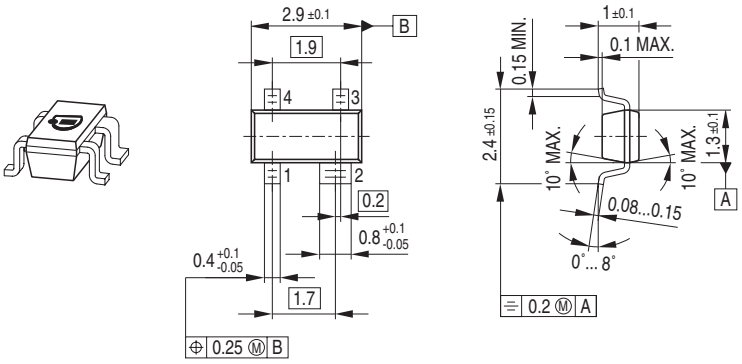


Standard Packing

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



Package Outline



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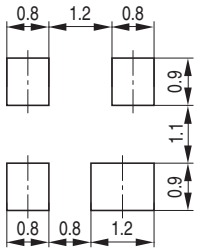

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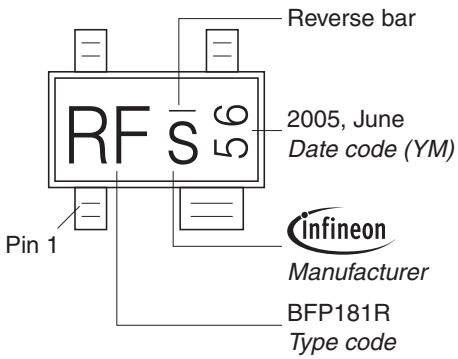

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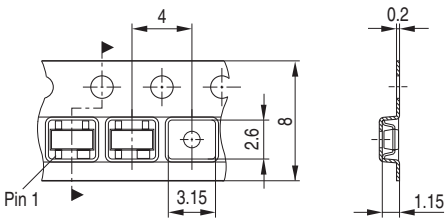

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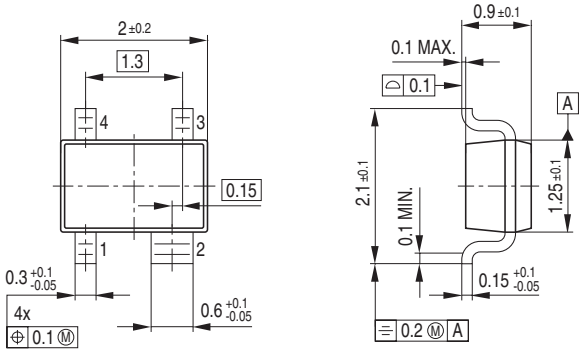

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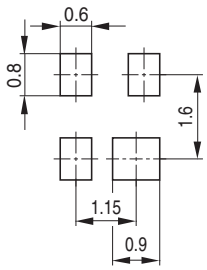

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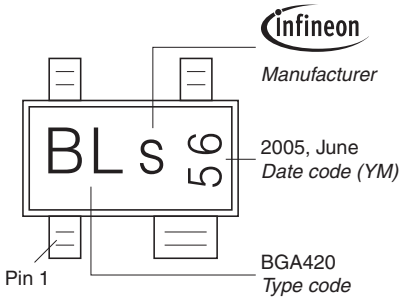

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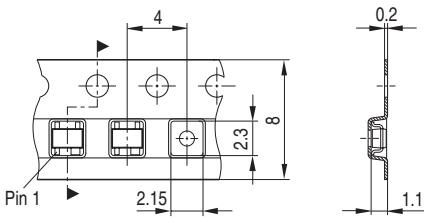

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