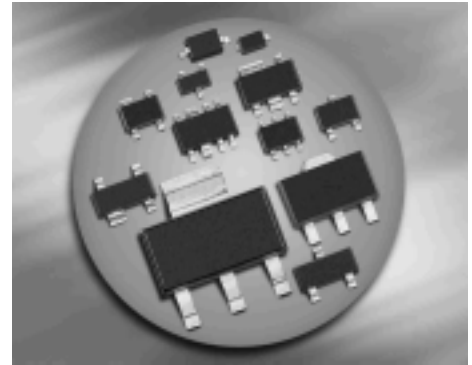


Silicon N-Channel MOSFET Tetrode

- For low noise , high gain controlled input stages up to 1GHz
- Operating voltage 5 V
- Pb-free (RoHS compliant) package
- Qualified according AEC Q101



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

Type	Package	Pin Configuration						Marking
BF2040	SOT143	1=S	2=D	3=G2	4=G1	-	-	NFs
BF2040R	SOT143R	1=D	2=S	3=G1	4=G2	-	-	NFs
BF2040W	SOT343	1=D	2=S	3=G1	4=G2	-	-	NFs

Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	8	V
Continuous drain current	I_D	40	mA
Gate 1/ gate 2-source current	$\pm I_{G1/2SM}$	10	
Gate 1 (external biasing)	$+V_{G1SE}$	7	V
Total power dissipation	P_{tot}		mW
$T_S \leq 76 \text{ }^\circ\text{C}$, BF2040, BF2040R		200	
$T_S \leq 94 \text{ }^\circ\text{C}$, BF2040W		200	
Storage temperature	T_{stg}	-55 ... 150	$^\circ\text{C}$
Channel temperature	T_{ch}	150	

Thermal Resistance

Parameter	Symbol	Value	Unit
Channel - soldering point ¹⁾	R_{thchs}		K/W
BF2040, BF2040R		≤ 370	
BF2040W		≤ 280	

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

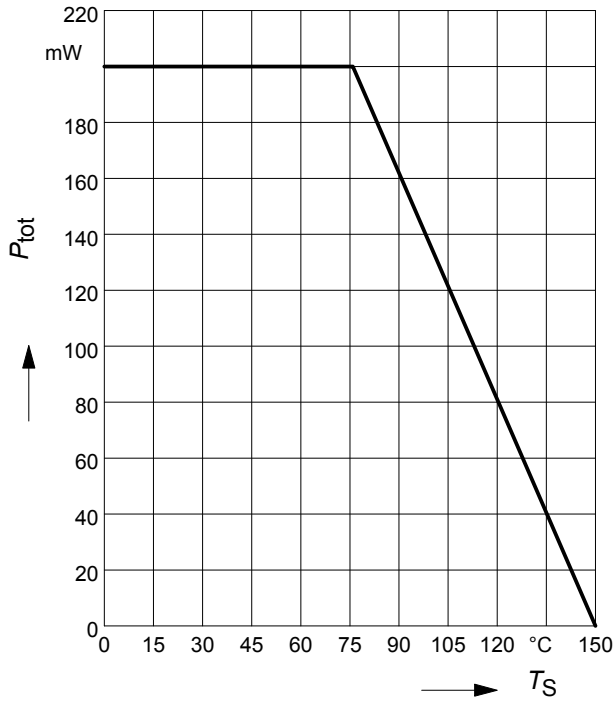
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain-source breakdown voltage $I_D = 20 \mu\text{A}$, $V_{G1S} = 0$, $V_{G2S} = 0$	$V_{(BR)DS}$	10	-	-	V
Gate1-source breakdown voltage $+I_{G1S} = 10 \text{ mA}$, $V_{G2S} = 0$, $V_{DS} = 0$	$+V_{(BR)G1SS}$	6	-	15	
Gate2-source breakdown voltage $+I_{G2S} = 10 \text{ mA}$, $V_{G1S} = 0$, $V_{DS} = 0$	$+V_{(BR)G2SS}$	6	-	15	
Gate1-source leakage current $V_{G1S} = 5 \text{ V}$, $V_{G2S} = 0$, $V_{DS} = 0$	$+I_{G1SS}$	-	-	50	nA
Gate2-source leakage current $V_{G2S} = 5 \text{ V}$, $V_{G1S} = 0$, $V_{DS} = 0$	$+I_{G2SS}$	-	-	50	
Drain current $V_{DS} = 5 \text{ V}$, $V_{G1S} = 0$, $V_{G2S} = 4 \text{ V}$	I_{DSS}	-	-	50	μA
Drain-source current $V_{DS} = 5 \text{ V}$, $V_{G2S} = 4 \text{ V}$, $R_{G1} = 100 \text{ k}\Omega$	I_{DSX}	-	15	-	mA
Gate1-source pinch-off voltage $V_{DS} = 5 \text{ V}$, $V_{G2S} = 4 \text{ V}$, $I_D = 20 \mu\text{A}$	$V_{G1S(p)}$	0.3	0.6	-	V
Gate2-source pinch-off voltage $V_{DS} = 5 \text{ V}$, $I_D = 20 \mu\text{A}$	$V_{G2S(p)}$	0.3	0.7	-	

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

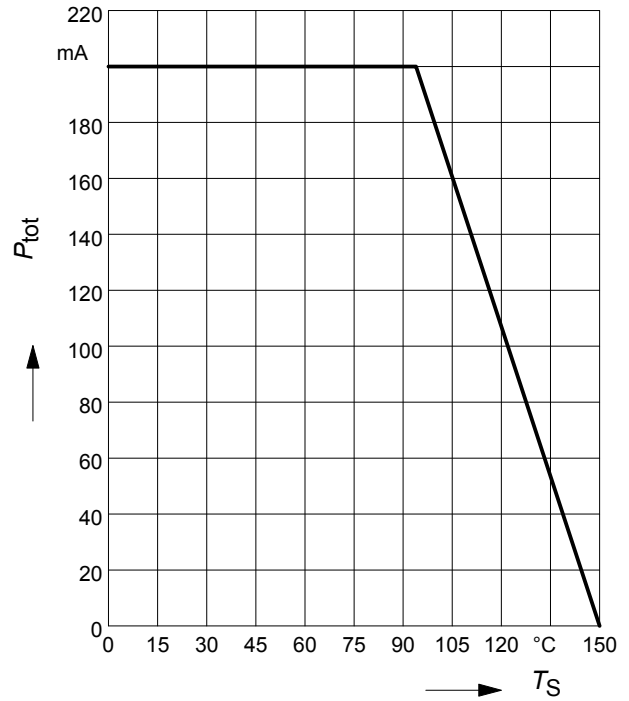
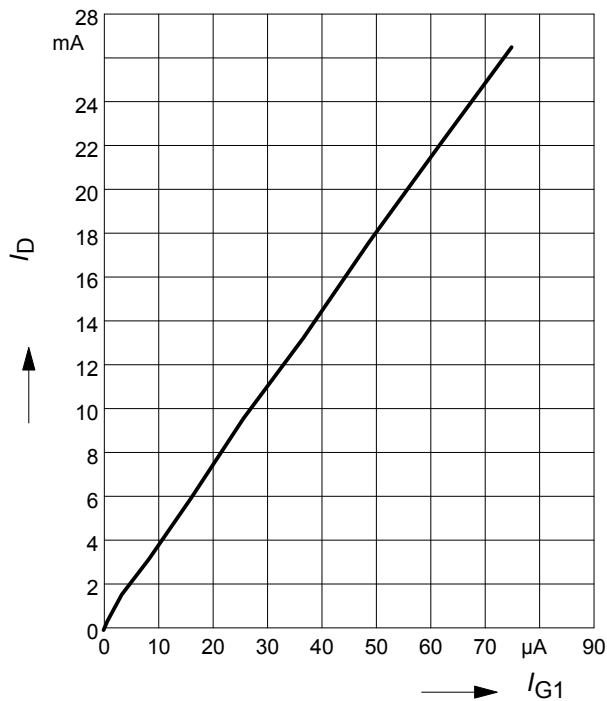
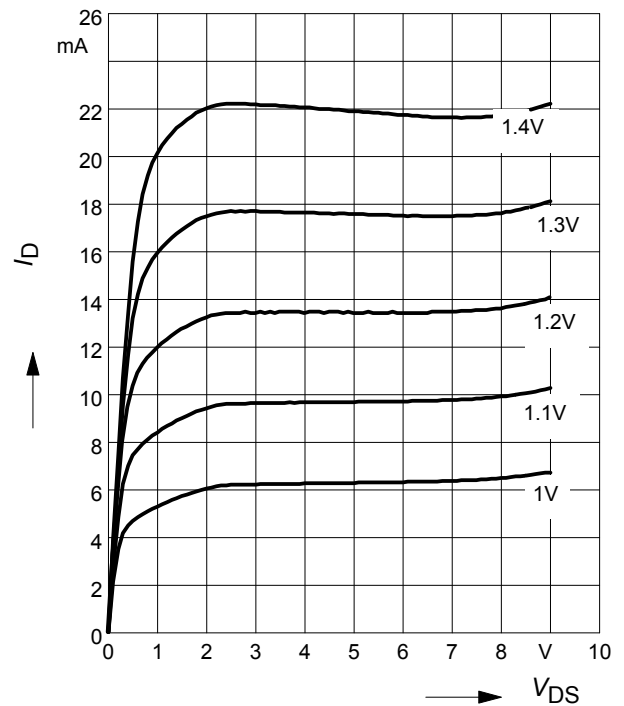
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
AC Characteristics - (verified by random sampling)					
Forward transconductance $V_{DS} = 5\text{ V}$, $I_D = 15\text{ mA}$, $V_{G2S} = 4\text{ V}$	g_{fs}	37	42	-	mS
Gate1 input capacitance $V_{DS} = 5\text{ V}$, $I_D = 15\text{ mA}$, $V_{G2S} = 4\text{ V}$, $f = 10\text{ MHz}$	C_{g1ss}	-	2.9	3.4	pF
Output capacitance $V_{DS} = 5\text{ V}$, $I_D = 15\text{ mA}$, $V_{G2S} = 4\text{ V}$, $f = 10\text{ MHz}$	C_{dss}	-	1.6	-	
Power gain $V_{DS} = 5\text{ V}$, $I_D = 15\text{ mA}$, $V_{G2S} = 4\text{ V}$, $f = 800\text{ MHz}$	G_p	20	23	-	dB
Noise figure $V_{DS} = 5\text{ V}$, $I_D = 15\text{ mA}$, $V_{G2S} = 4\text{ V}$, $f = 800\text{ MHz}$	F	-	1.6	2.2	dB
Gain control range $V_{DS} = 5\text{ V}$, $V_{G2S} = 4 \dots 0\text{ V}$, $f = 800\text{ GHz}$	ΔG_p	45	50	-	

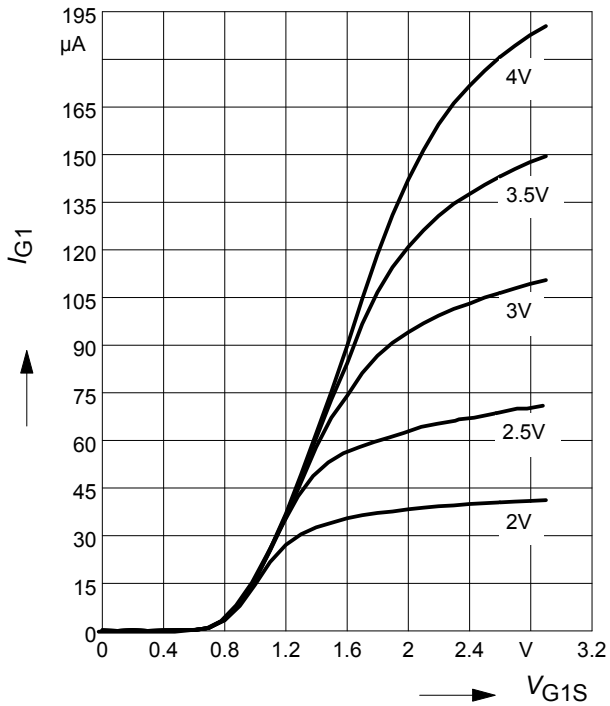
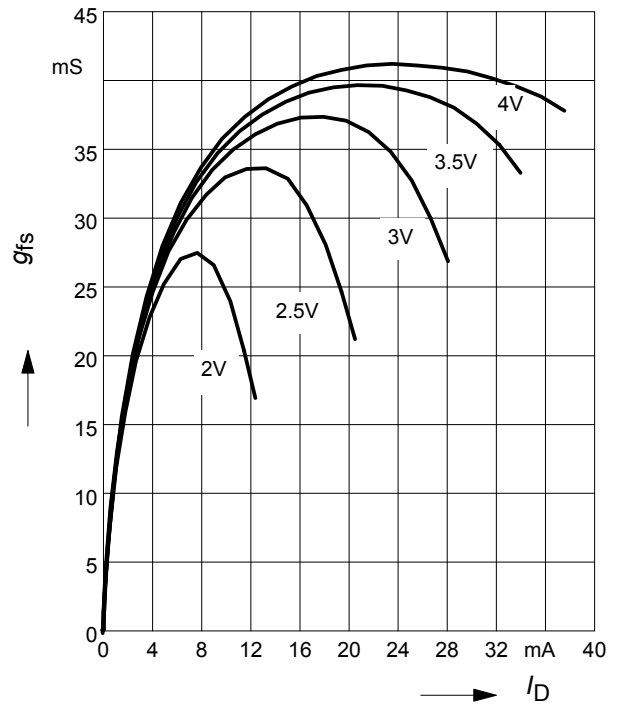
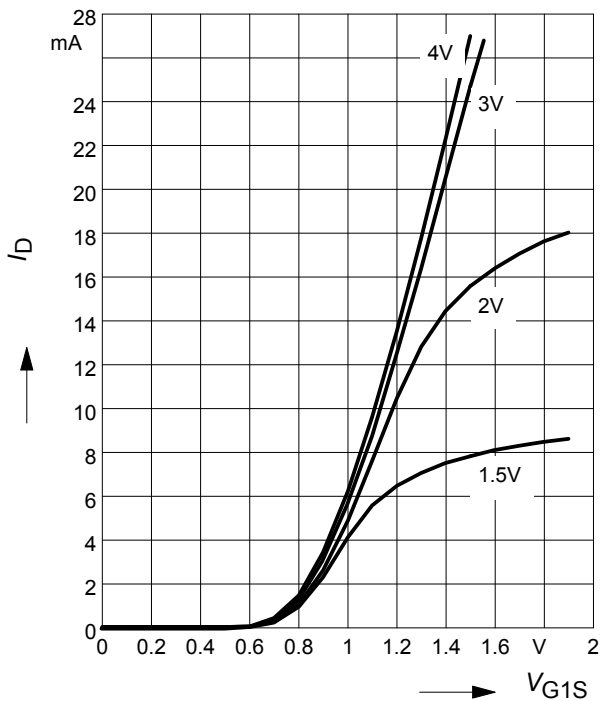
Total power dissipation $P_{tot} = f(T_S)$

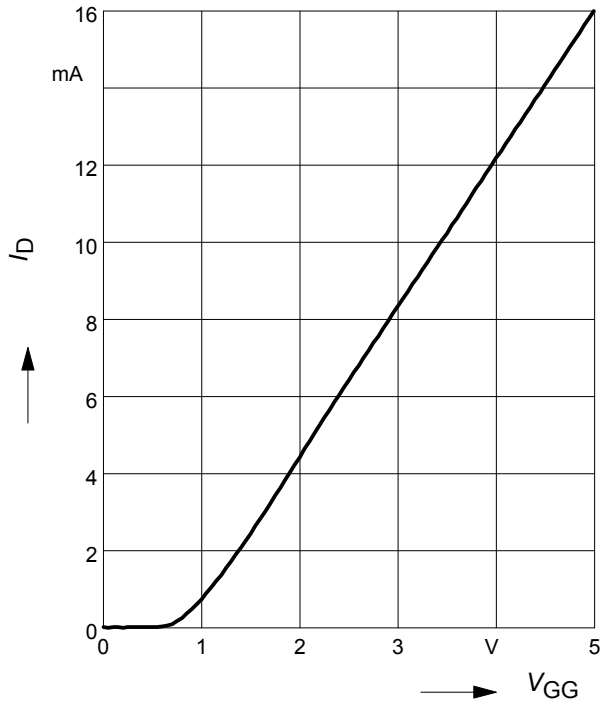
BF2040, BFD2040R


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

BF2040W


Drain current $I_D = f(I_{G1})$
 $V_{G2S} = 4V$

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


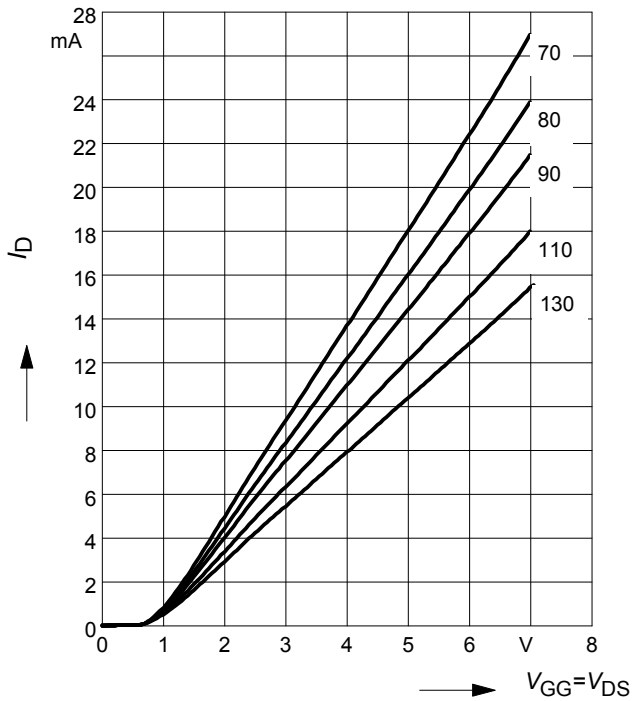
Gate 1 current $I_{G1} = f(V_{G1S})$
 $V_{DS} = 5V$
 $V_{G2S} = \text{Parameter}$

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

Drain current $I_D = f(V_{G1S})$
 $V_{DS} = 5V$
 $V_{G2S} = \text{Parameter}$

Drain current $I_D = f(V_{GG})$
 $V_{DS} = 5V, V_{G2S} = 4V, R_{G1} = 80k\Omega$

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


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

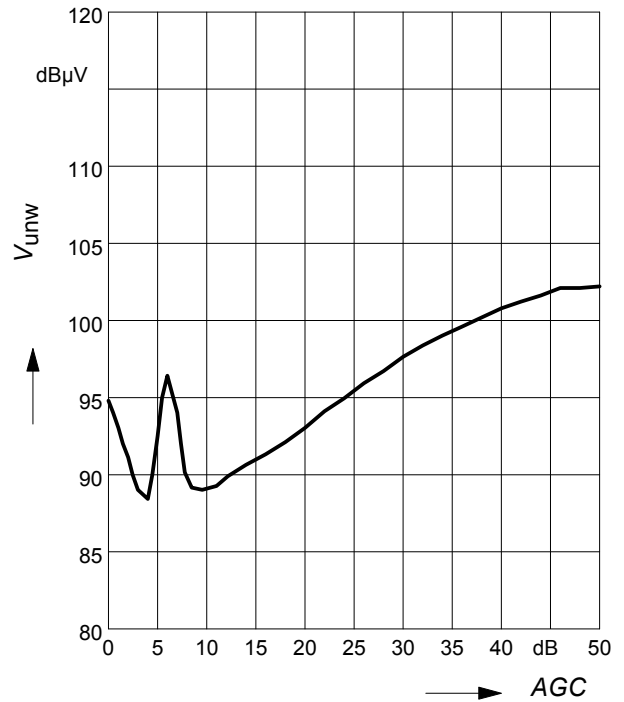
$V_{G2S} = 4V$

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

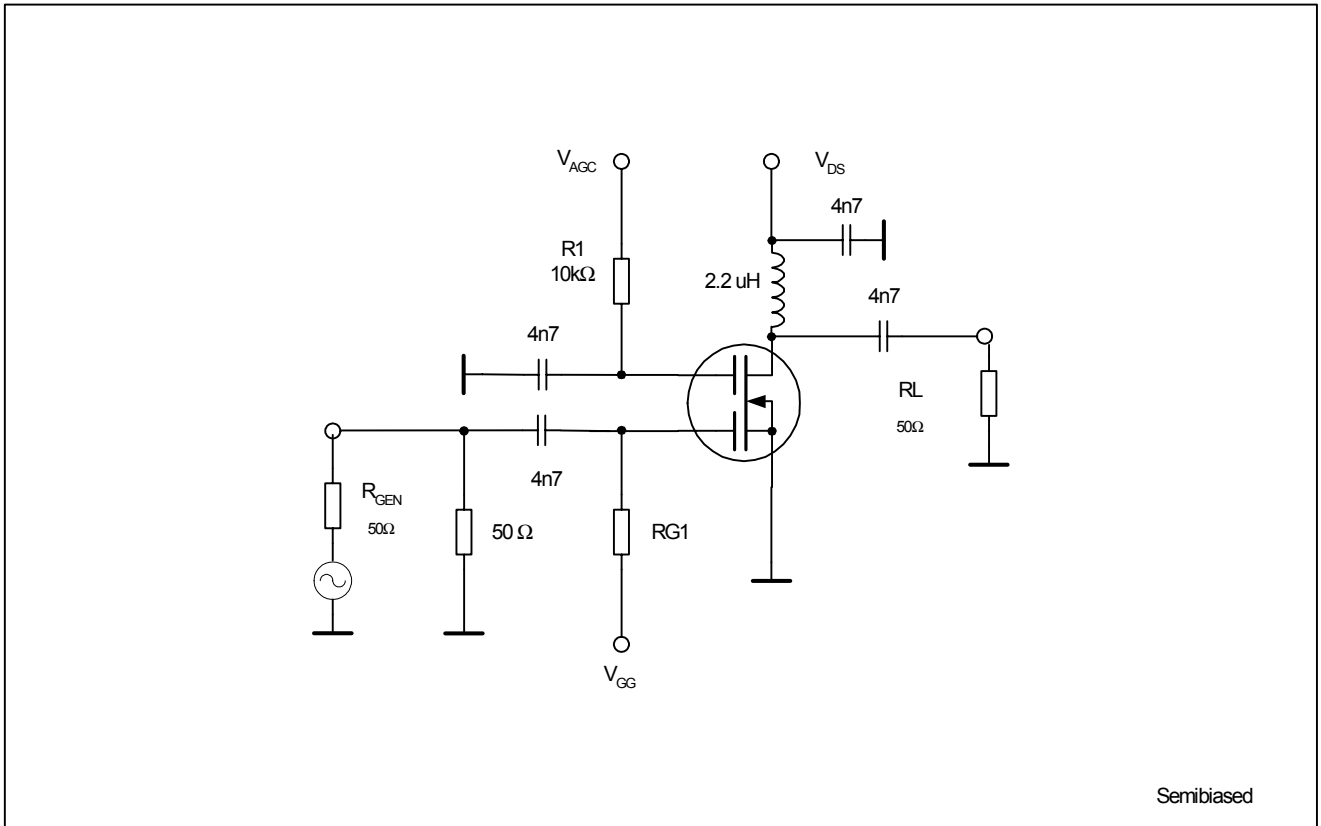


Crossmodulation $V_{unw} = (AGC)$

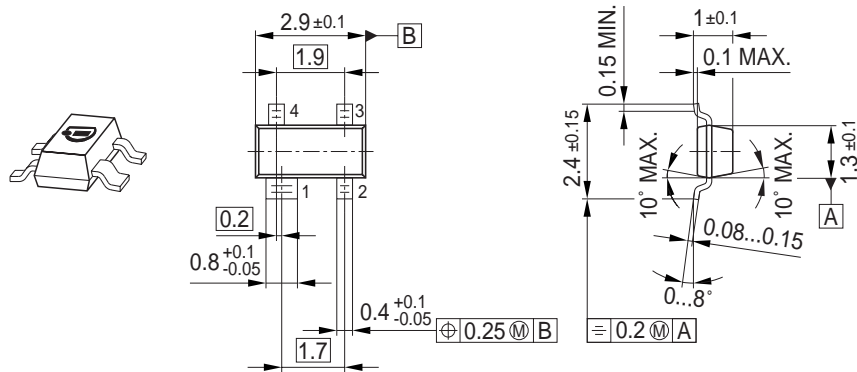
$V_{DS} = 5 V$



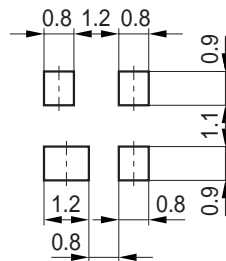
Cossmodulation test circuit



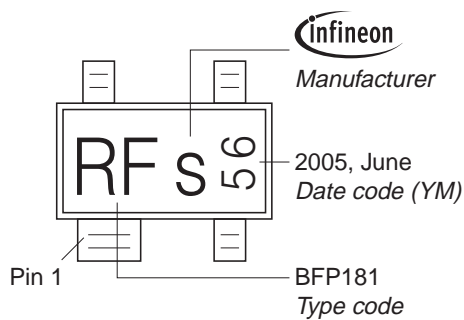
Package Outline



Foot Print

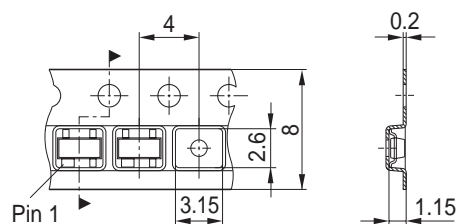


Marking Layout (Example)

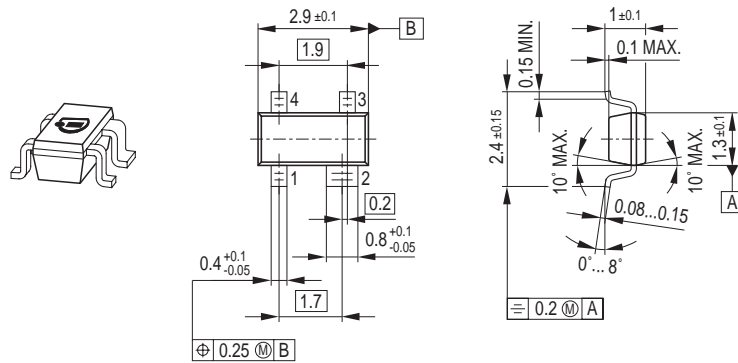


Standard Packing

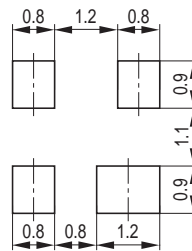
Reel $\varnothing 180 \text{ mm}$ = 3.000 Pieces/Reel
 Reel $\varnothing 330 \text{ mm}$ = 10.000 Pieces/Reel



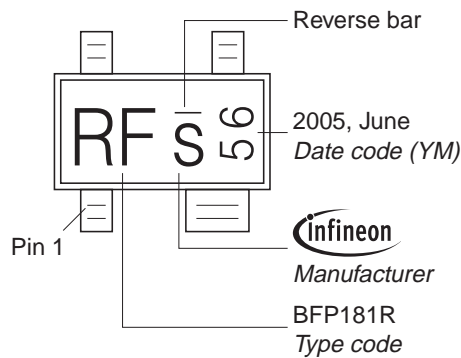
Package Outline



Foot Print

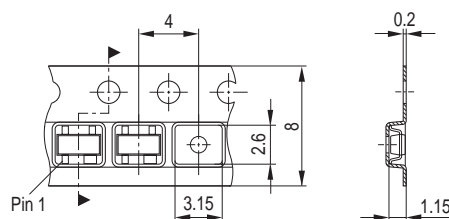


Marking Layout (Example)

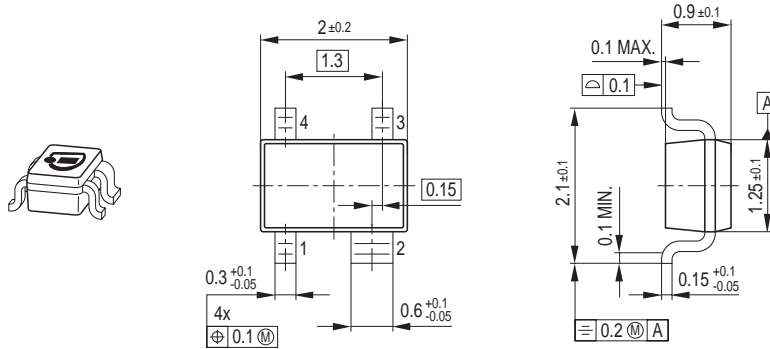


Standard Packing

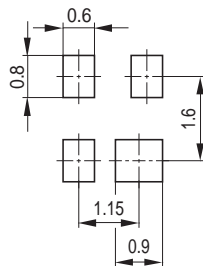
Reel \varnothing 180 mm = 3.000 Pieces/Reel
 Reel \varnothing 330 mm = 10.000 Pieces/Reel



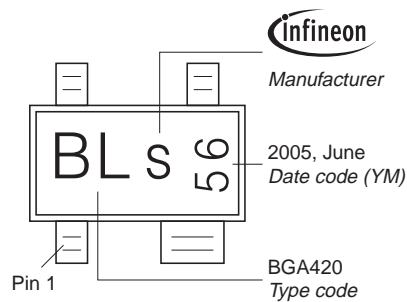
Package Outline



Foot Print

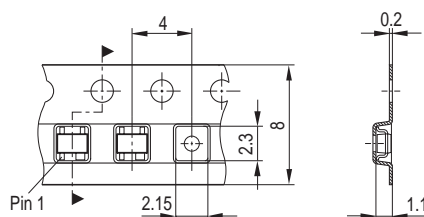


Marking Layout (Example)



Standard Packing

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



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