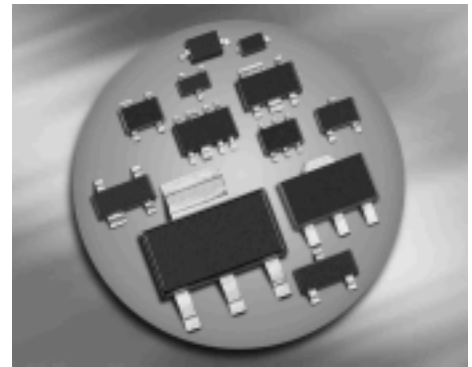


Silicon N-Channel MOSFET Tetrode

- 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
$T_S \leq 76^\circ\text{C}$, BF2040, BF2040R		200	
$T_S \leq 94^\circ\text{C}$, 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

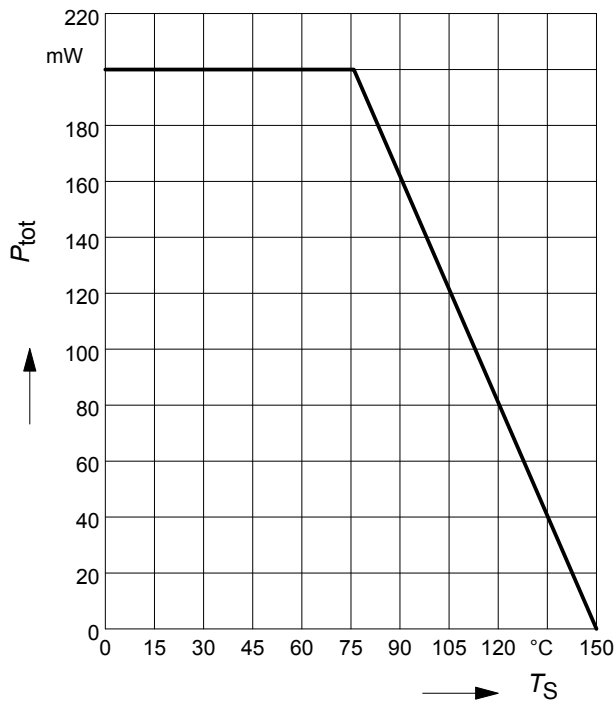
Parameter	Symbol	Values			Unit
		min.	typ.	max.	
DC Characteristics					
Drain-source breakdown voltage $I_D = 20\ \mu\text{A}$, $V_{G1S} = 0$, $V_{G2S} = 0$	$V_{(\text{BR})\text{DS}}$	10	-	-	V
Gate1-source breakdown voltage $+I_{G1S} = 10\ \text{mA}$, $V_{G2S} = 0$, $V_{\text{DS}} = 0$	$+V_{(\text{BR})\text{G1SS}}$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

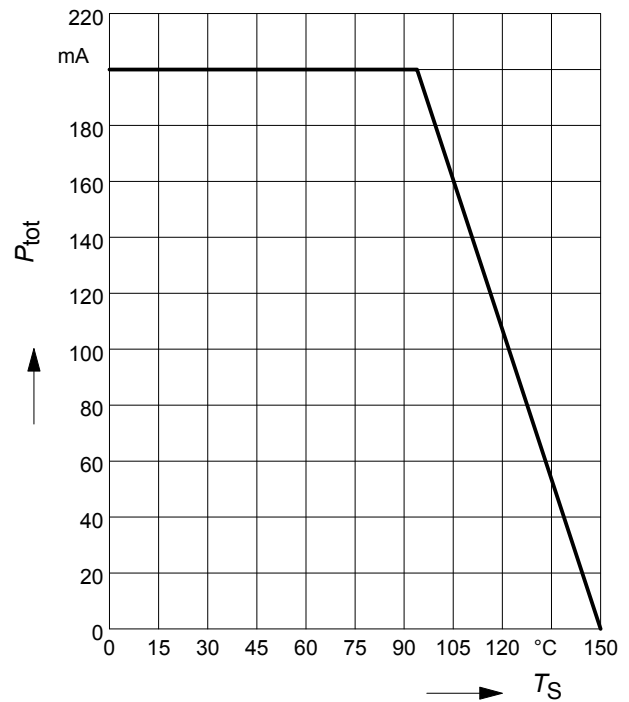
Total power dissipation $P_{\text{tot}} = f(T_S)$

BF2040, BFD2040R



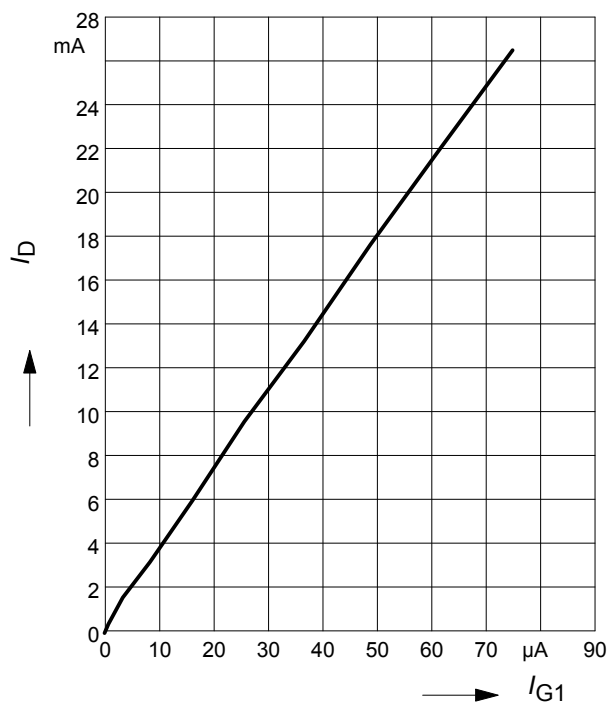
Total power dissipation $P_{\text{tot}} = f(T_S)$

BF2040W



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

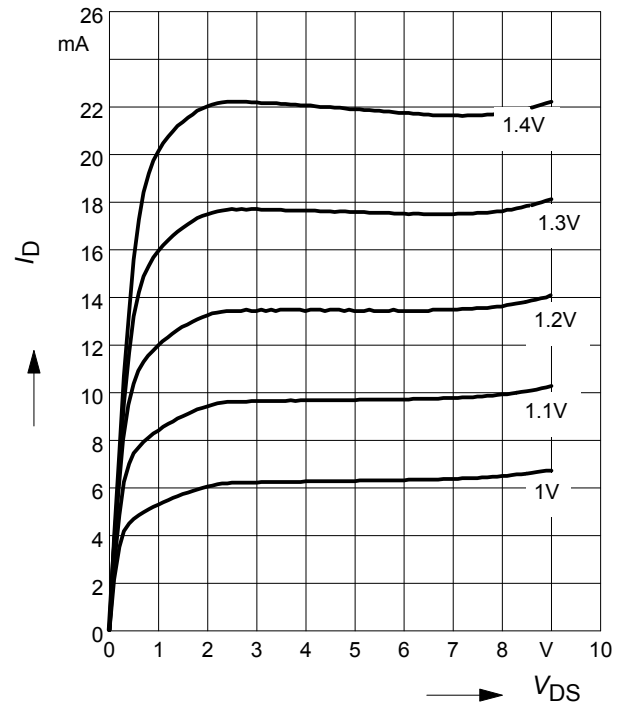
$V_{G2S} = 4V$



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

$V_{G2S} = 4V$

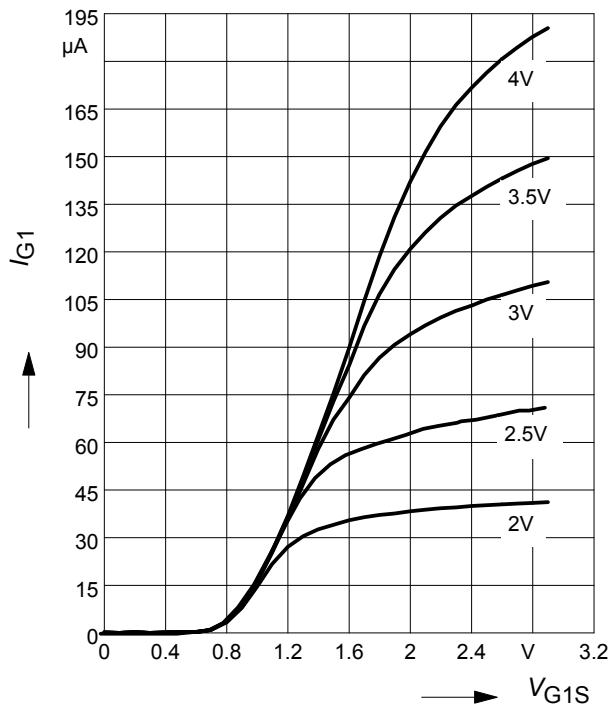
$V_{G1S} = \text{Parameter}$



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

$V_{DS} = 5V$

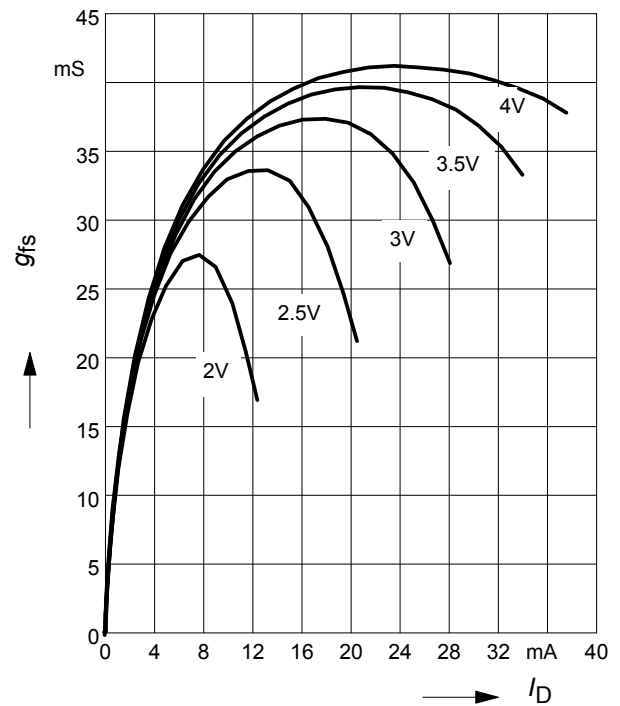
$V_{G2S} = \text{Parameter}$



Gate 1 forward transconductance

$g_{fs} = f(I_D)$

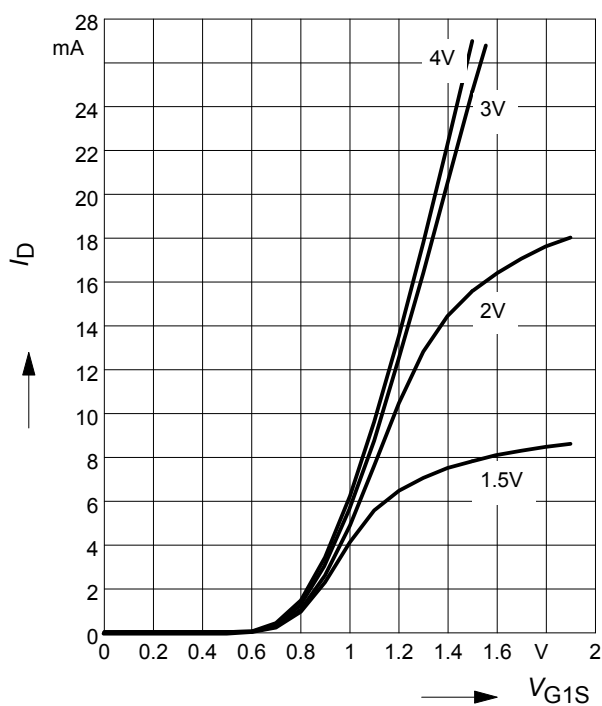
$V_{DS} = 5V, V_{G2S} = \text{Parameter}$



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

$V_{DS} = 5V$

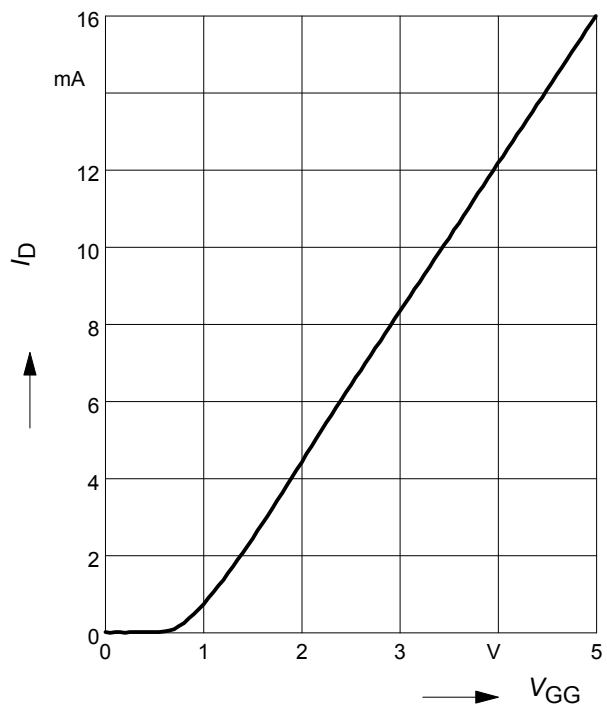
$V_{G2S} = \text{Parameter}$



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

$V_{DS} = 5V, V_{G2S} = 4V, R_{G1} = 80k\Omega$

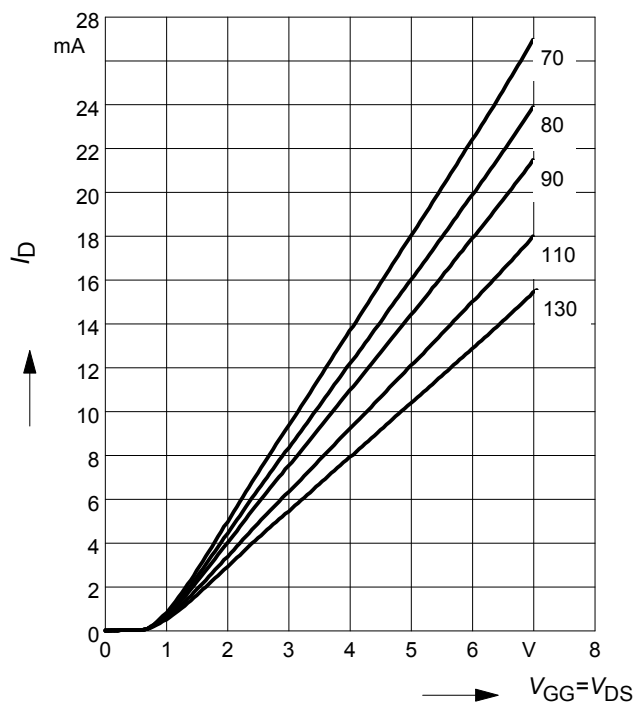
(connected to V_{GG} , $V_{GG} = \text{gate1 supply voltage}$)



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

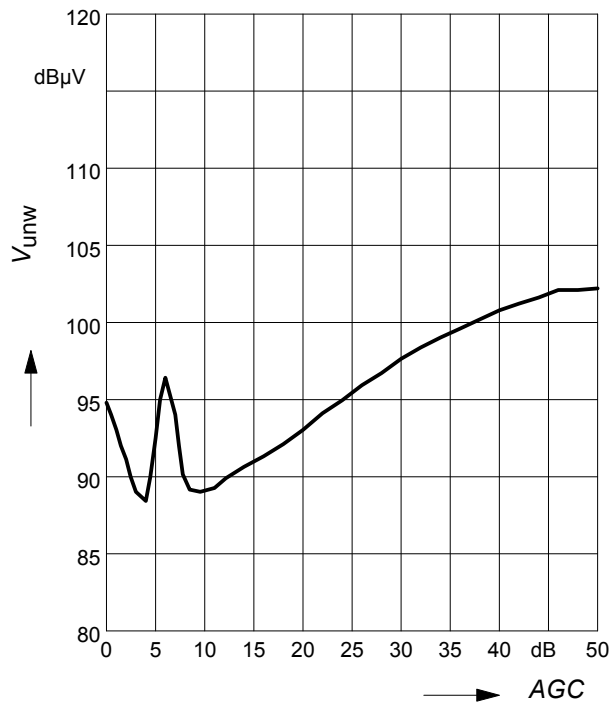
$V_{G2S} = 4V$

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

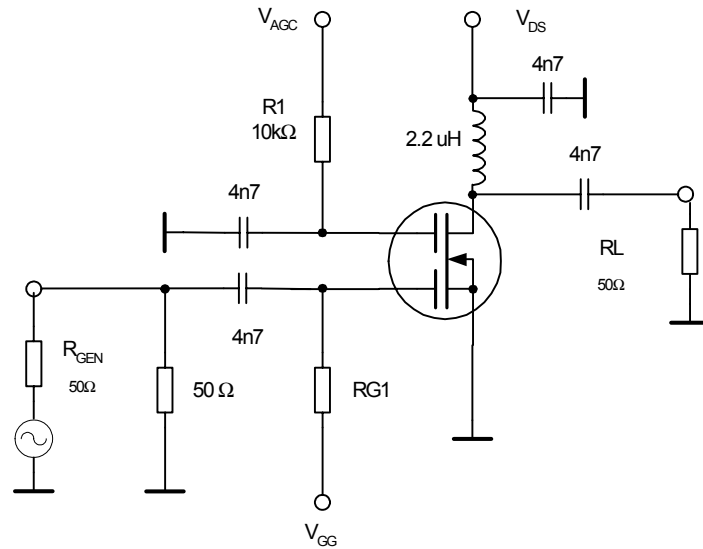


Crossmodulation $V_{unw} = (AGC)$

$V_{DS} = 5 V$

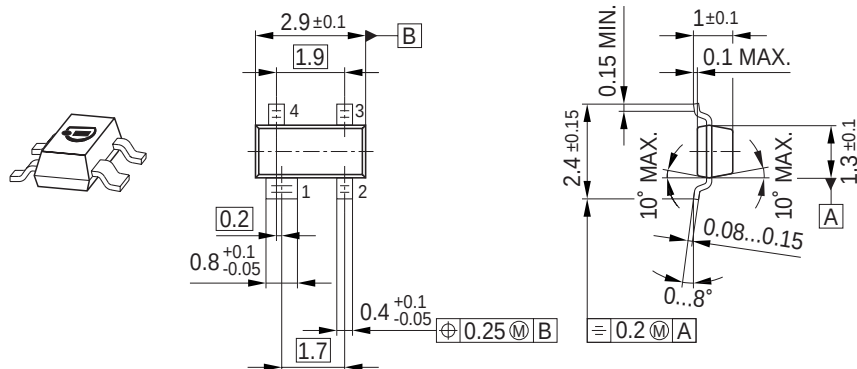


Cossmodulation test circuit

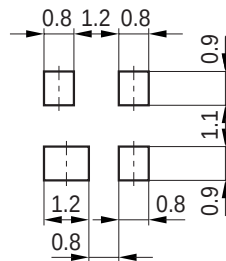


Semibiased

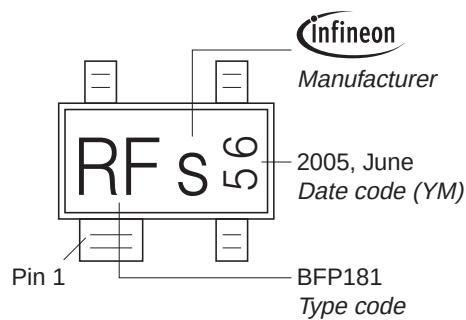
Package Outline



Foot Print

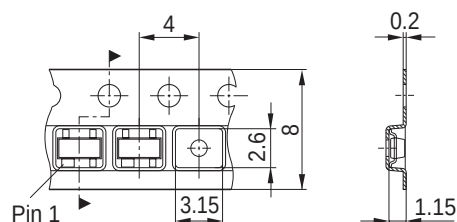


Marking Layout (Example)

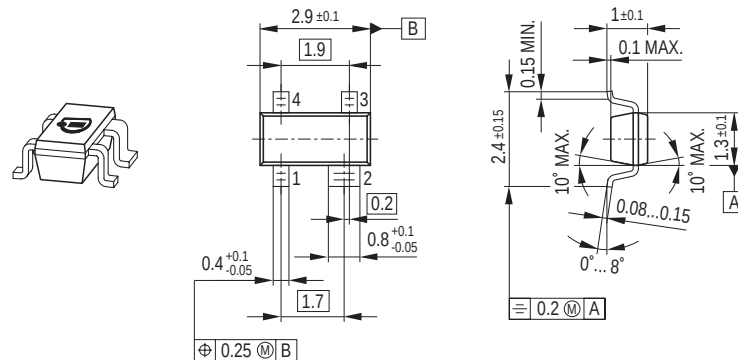


Standard Packing

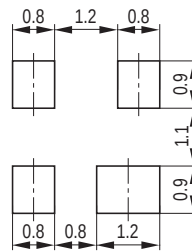
Reel ø180 mm = 3.000 Pieces/Reel
 Reel ø330 mm = 10.000 Pieces/Reel



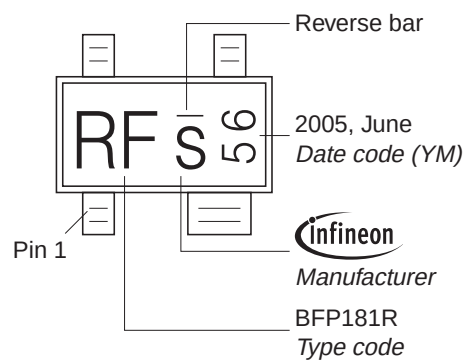
Package Outline



Foot Print

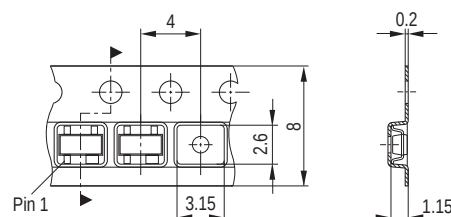


Marking Layout (Example)

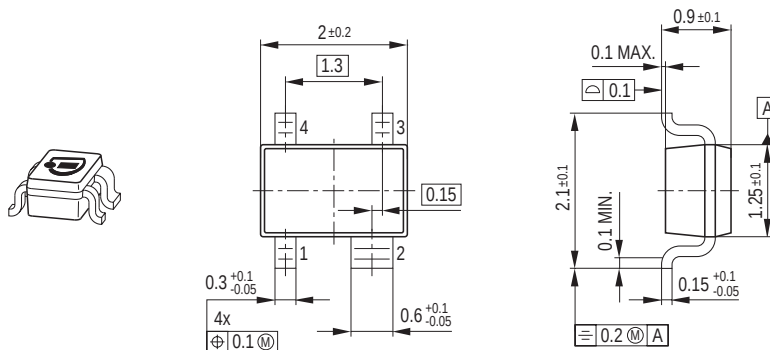


Standard Packing

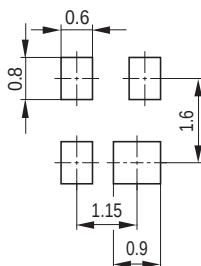
Reel ø180 mm = 3.000 Pieces/Reel
Reel ø330 mm = 10.000 Pieces/Reel



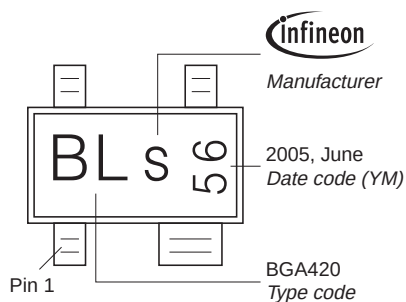
Package Outline



Foot Print

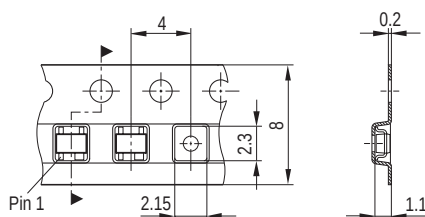


Marking Layout (Example)



Standard Packing

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



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