UMW BSP170P

-60V P-Channel MOSFET

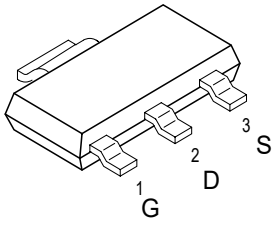
1.Features

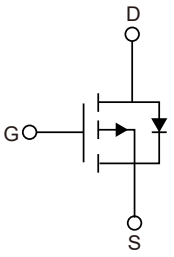
- $V_{DS(V)}$=-60V
- I_D=-1.9A
- $R_{DS(ON)}$ <150mΩ(V_{GS}=-10V)
- Enhancement mode
- Avalanche rated
- dv /dt rated
- Pb-free lead plating; RoHS compliant

2.Pinning information

Pin	Symbol	Description
1	G	GATE
2	D	DRAIN
3	S	SOURCE

SOT-223





3.Absolute Maximum Ratings T_J=25°C unless otherwise noted

Parameter	Symbol	Conditions	Value	Units
Continuous drain current	I_D	T_A=25°C	-1.9	A
		T_A=70°C	-1.5	A
Pulsed drain current	$I_{D,pulse}$	T_A=25°C	-7.6	A
Avalanche energy, single pulse	E_{AS}	I_D=1.9A, R_{GS}=25Ω	70	mJ
Avalanche energy, periodic limited byT_{jmax}	E_{AR}		0.18	mJ
Reverse diode dv /dt	dv/dt	I_D=1.9A, V_{DS}=48V, di/dt=-200A/μs, $T_{j,max}$=150°C	-6	kV/μs
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_A=25°C	1.8	W
Operating and storage temperature	T_J,T_{STG}		-55 to 150	°C
ESD class		JESD22-C101 (HBM)	1A (250V to 500V)	
Soldering temperature			260°C	
IEC climatic category; DIN IEC 68-1			55/150/56	

4.Thermal resistance rating

Parameter	Symbol	Conditions	min.	typ.	max.	Units
Thermal resistance,junction -soldering point	R_{thJS}				20	K/W
SMD version, device on PCB:	R_{thJA}	minimal footprint			110	K/W
		6 cm^2 cooling area [1)]			70	K/W

5.Specifications (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=-250μA	-60			V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-2.1	-3	-4	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-60V, V_{GS}=0V, T_J=25°C		-0.1	-1	μA
		V_{DS}=-60V, V_{GS}=0V, T_J=125°C		-10	-100	μA
Gate-source leakage current	I_{GSS}	V_{GS}=-20V, V_{DS}=0V		-10	-100	nA
Drain-source on-state resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-1.9A		100	150	mΩ
Transconductance	g_{FS}	$\|V_{DS}\|>2\|I_D\|R_{DS(ON)}$max, I_D=-1.9A	1.3	2.6		S
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-25V, f =1MHz		328	410	pF
Output Capacitanc	C_{oss}			105	135	pF
Reverse Transfer Capacitance	C_{rss}			38	48	pF
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=-30V, V_{GS}=-10V I_D=-1.9A, R_G=6Ω		14	21	ns
Rise Time	t_r			28	42	ns
Turn-Off DelayTime	$t_{D(off)}$			92	138	ns
Fall Time	t_f			60	90	ns
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=-48V, I_D=-1.9A V_{GS}=0 to -10V		-1.4	-1.9	nC
Gate to drain charge	Q_{gd}			-4.9	-7.4	nC
Gate charge total	Q_g			-10	-14	nC
Gate plateau voltage	$V_{plateau}$			-4.34		V

Reverse Diode						
Diode continuous forward current	I_S	T_A=25°C			-1.98	A
Diode pulse current	$I_{S,pulse}$				-7.6	A
Diode forward voltage	V_{SD}	V_{GS}=0 V, IF=-1.9A, T_J=25°C		-0.83	-1.1	V
Reverse recovery time	t_{rr}	V_R=30V, I_F=$\|I_S\|$,		36	54	ns
Reverse recovery charge	Q_{rr}	di_F/dt =100A/μs		41	62	nC

6.1Typical characteristic

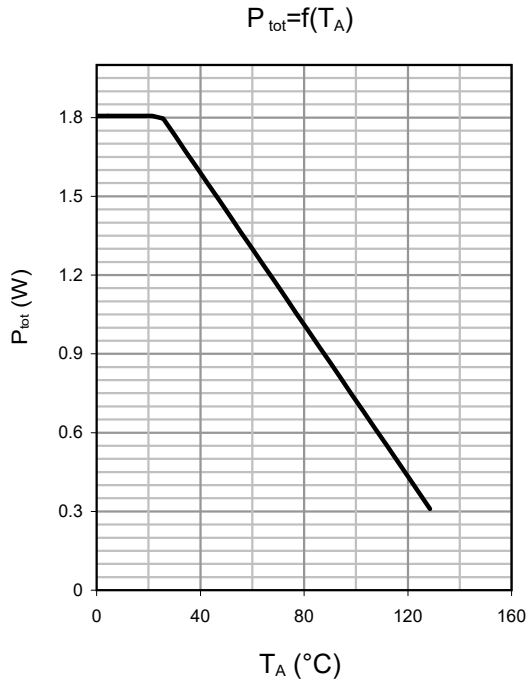


Figure 1: Power dissipation

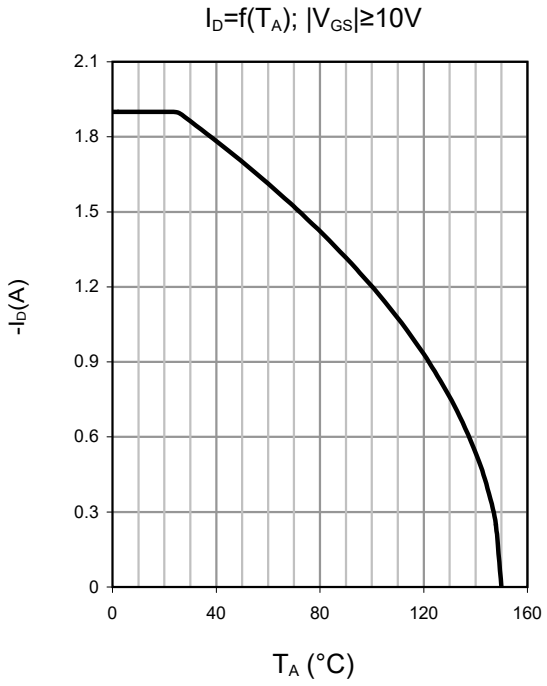


Figure 2: Drain current

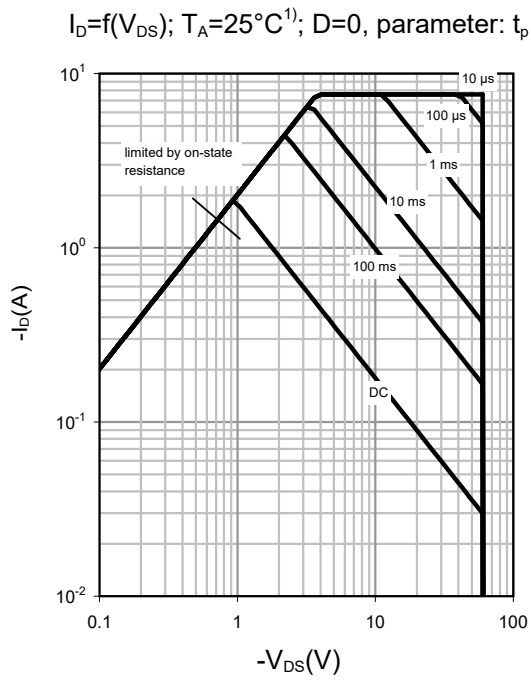


Figure 3: Safe Operating Area

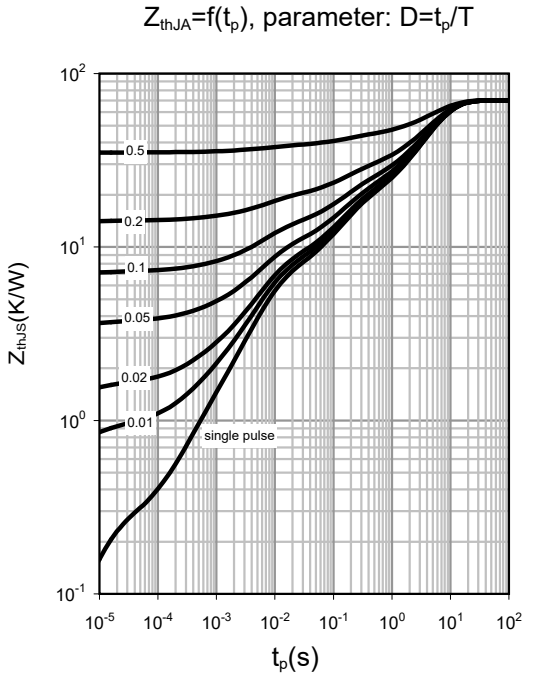


Figure 4:Max. Transient Thermal Impedance

6.2Typical characteristic

$I_D=f(V_{DS})$; $T_J=25°C$, parameter: V_{GS}

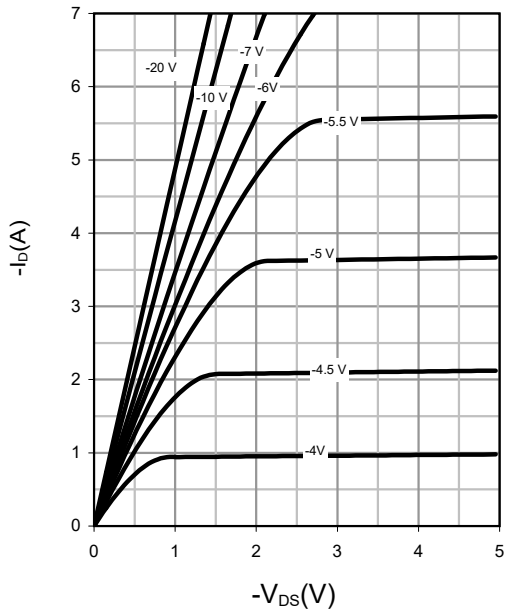


Figure 5: Output Characteristics

$R_{DS(ON)}=f(I_D)$; $T_J=25°C$, parameter: V_{GS}

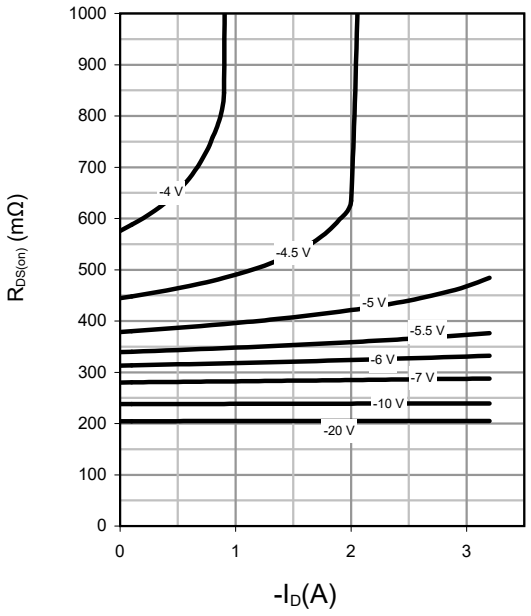


Figure 6: Drain-source On Resistance

$I_D=f(V_{GS})$; $|V_{DS}|>2|I_D|R_{DS(ON)max}$, parameter: T_J

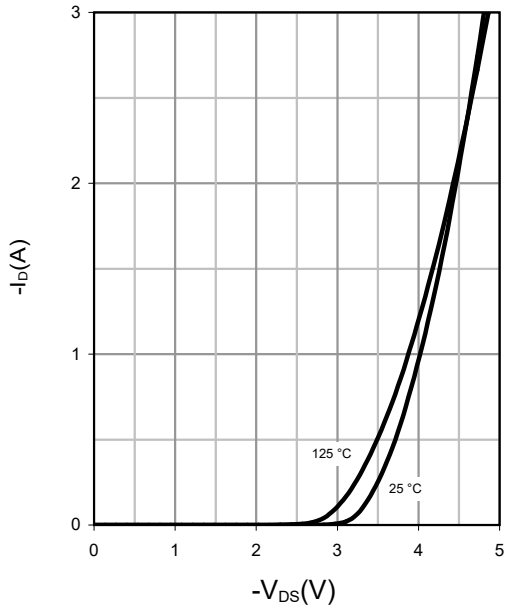


Figure 7: Transfer Characteristics

$g_{fs}=f(I_D)$; $T_J=25°C$

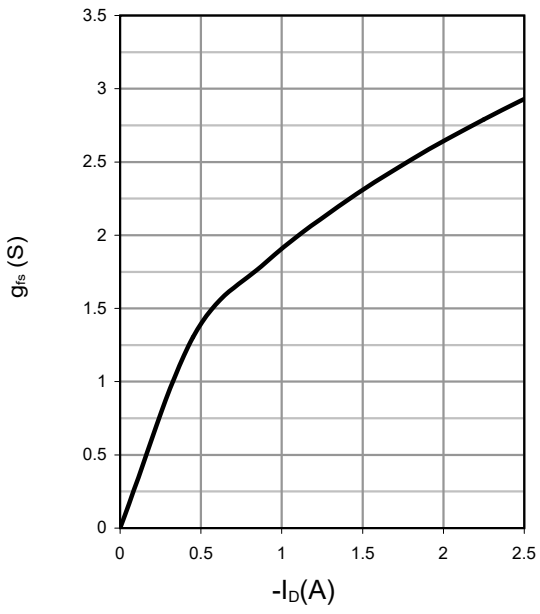


Figure 8: Forward Transconductance

6.3Typical characteristic

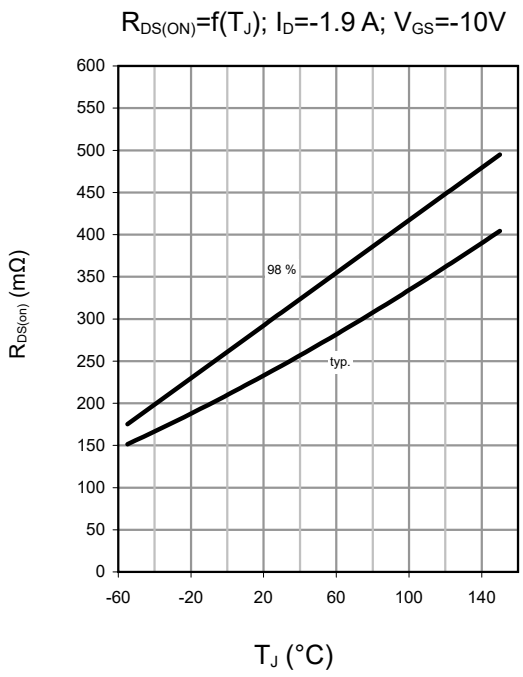


Figure 9: Drain-source On-state Resistance

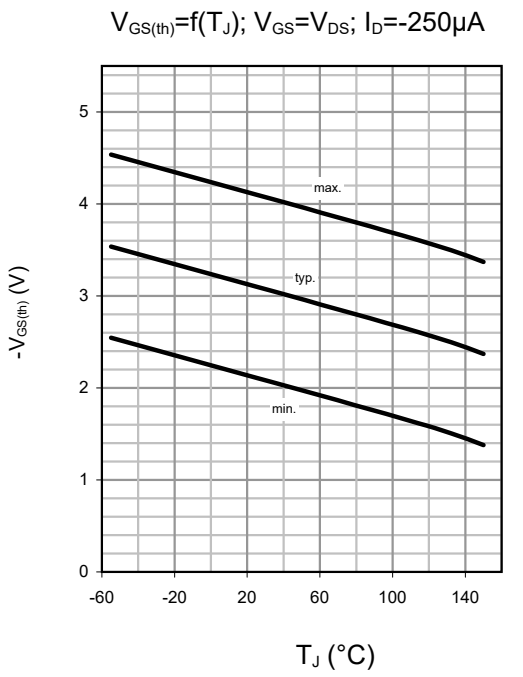


Figure 10: Gate Threshold Voltage

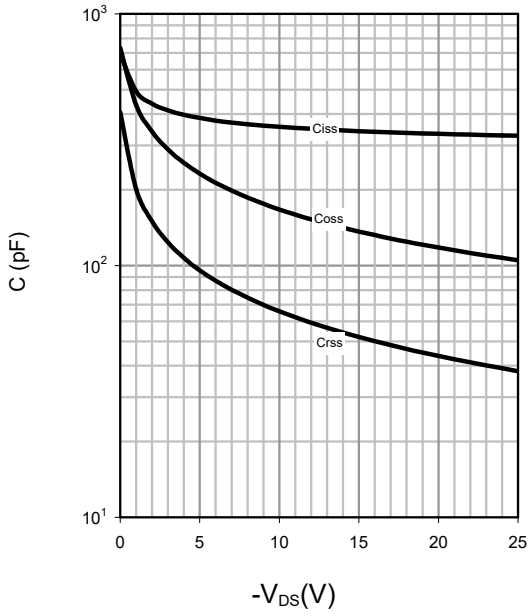


Figure 11: Capacitances

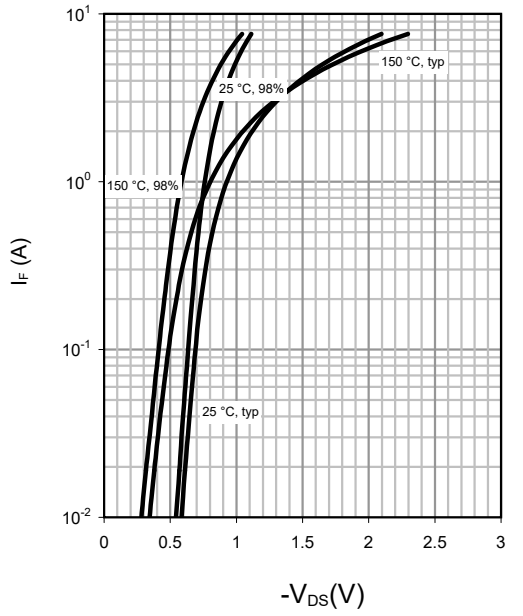


Figure 12: Forward Characteristics Of Reverse Diode

6.4Typical characteristic

$I_{AS}=f(t_{AV})$; $R_{GS}=25\Omega$, parameter: $T_{j(start)}$

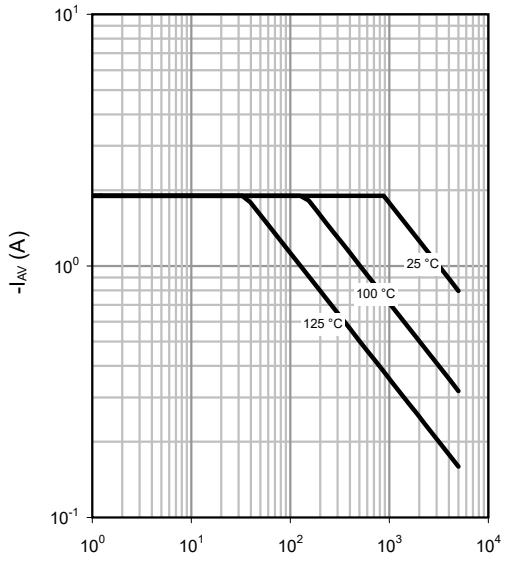


Figure 13: Avalanche Characteristics

$V_{GS}=f(Q_{gate})$; I_D=-1.9A pulsed, parameter: V_{DD}

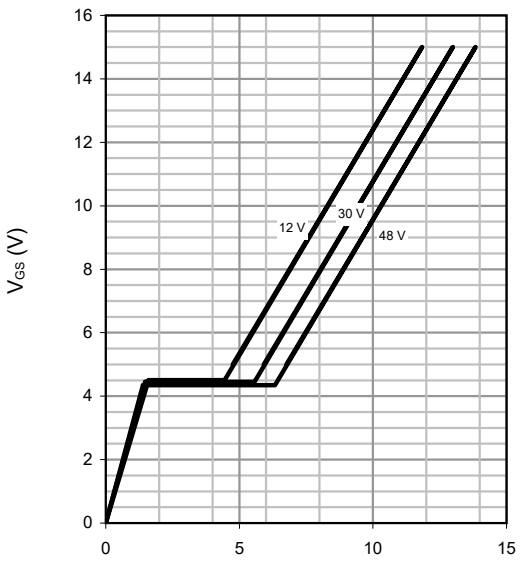


Figure 14: Gate Charge

$V_{BR(DSS)}=f(T_J)$; I_D=-250µA

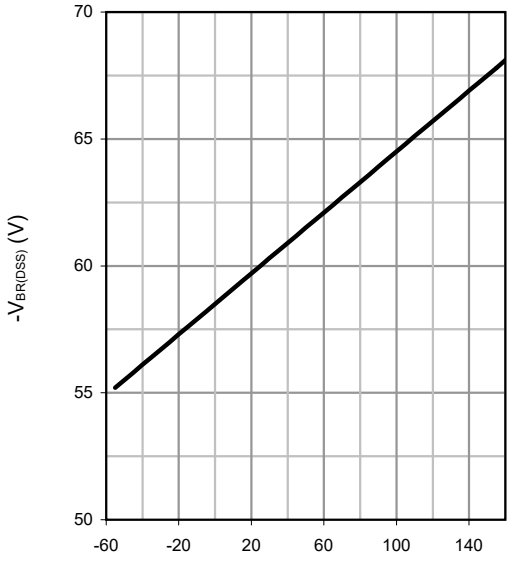
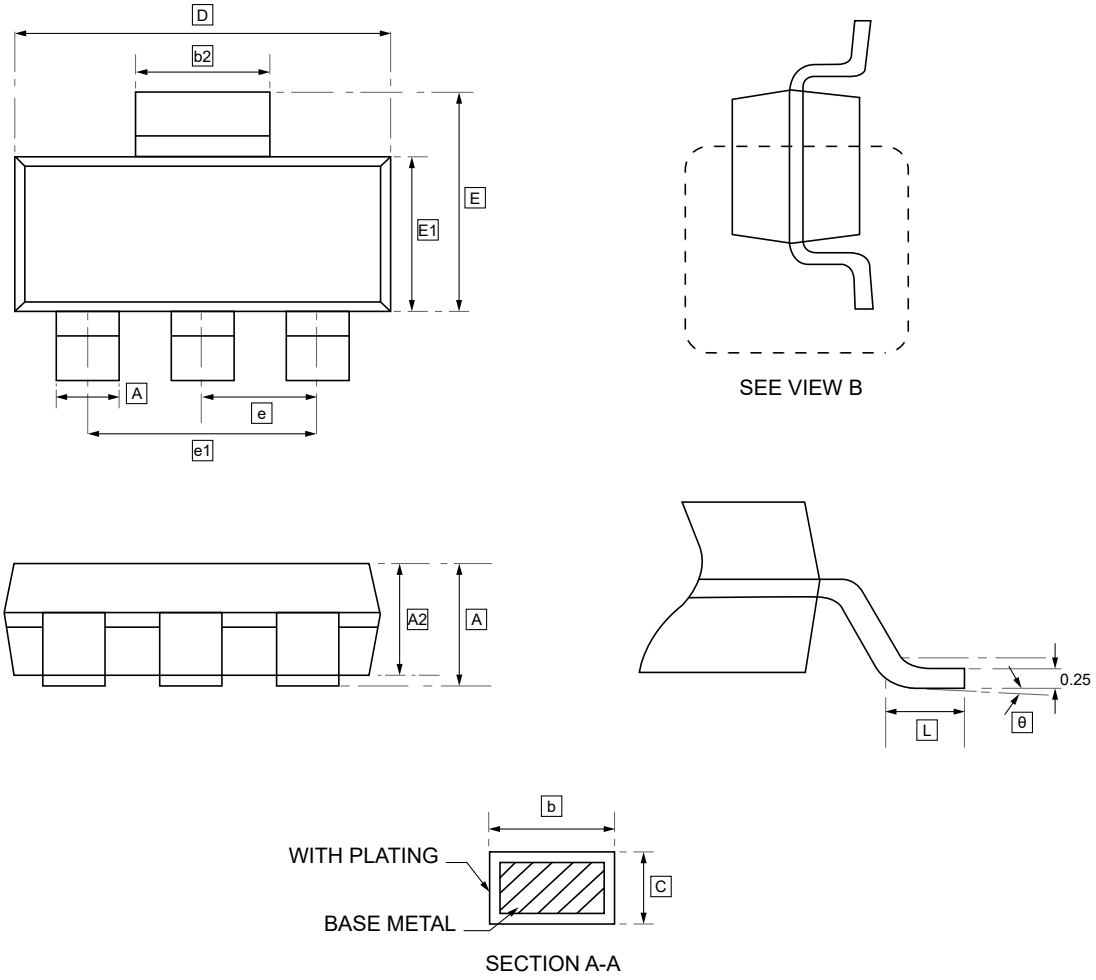


Figure 15: Drain-source Breakdown Voltage

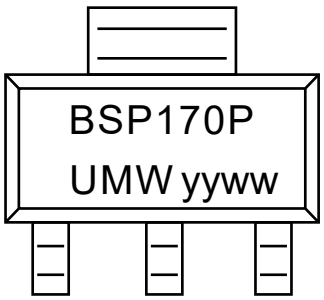
7.SOT-223 Package Outlie Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	b2	c	D	E	E1	e	e1	L	θ
Min		0.02	1.55	0.66	2.90	0.23	6.30	6.70	3.30	2.30	4.60	0.90	0°
Max	1.80	0.10	1.65	0.84	3.10	0.33	6.70	7.30	3.70	BSC	BSC		8°

8.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW BSP170P	SOT-223	2500	Tape and reel

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