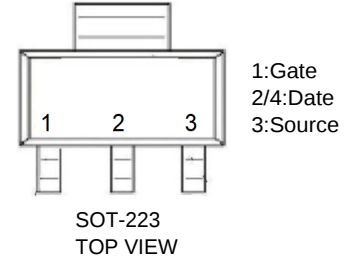


Features

- Enhancement mode
- Avalanche rated
- dv /dt rated
- Pb-free lead plating; RoHS compliant



Product Summary

- V_{DS} (V) = -60V
- I_D = -1.9A (V_{GS} = -10V)
- $R_{DS(ON)}$ < 300m Ω (V_{GS} = -10V)



Maximum ratings, at $T_j=25^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	I_D	$T_A=25^\circ\text{C}$	-1.9	A
		$T_A=70^\circ\text{C}$	-1.5	
		$T_A=25^\circ\text{C}$	-7.6	
Pulsed drain current	$I_{D,pulse}$	$T_A=25^\circ\text{C}$	-7.6	
Avalanche energy, single pulse	E_{AS}	$I_D=1.9\text{ A}$, $R_{GS}=25\ \Omega$	70	mJ
Avalanche energy, periodic limited by T_{jmax}	E_{AR}		0.18	
Reverse diode dv /dt	dv /dt	$I_D=1.9\text{ A}$, $V_{DS}=48\text{ V}$, $di/dt=-200\text{ A}/\mu\text{s}$, $T_{j,max}=150^\circ\text{C}$	-6	kV/ μs
Gate source voltage	V_{GS}		± 20	V
Power dissipation	P_{tot}	$T_A=25^\circ\text{C}$	1.8	W
Operating and storage temperature	T_j , T_{stg}		-55 ... 150	
$^\circ\text{C}$			1A (250V to 500V)	
ESD class		JESD22-C101 (HBM)	260 $^\circ\text{C}$	
Soldering temperature			55/150/56	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Thermal characteristics

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	

Electrical characteristics, at $T_j=25\text{ °C}$, unless otherwise specified

Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\text{ }\mu\text{A}$	-60			V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\text{ }\mu\text{A}$	-1.1	-2	-3	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$		-0.1	-1	μA
		$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}$		-10	-100	
Gate-source leakage current	I_{GSS}	$V_{GS}=-20\text{ V}, V_{DS}=0\text{ V}$		-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-10\text{ V}, I_D=-1.9\text{ A}$		239	300	m Ω
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-1.9\text{ A}$	1.3	2.6		S

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics

Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=-25\text{ V},$ $f=1\text{ MHz}$		328	410	pF
Output capacitance	C_{oss}			105	135	
Reverse transfer capacitance	C_{rss}			38	48	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-30\text{ V}, V_{GS}=-10\text{ V}, I_D=-1.9\text{ A},$ $R_G=6\ \Omega$		14	21	ns
Rise time	t_r			28	42	
Turn-off delay time	$t_{d(off)}$			92	138	
Fall time	t_f			60	90	

Gate Charge Characteristics

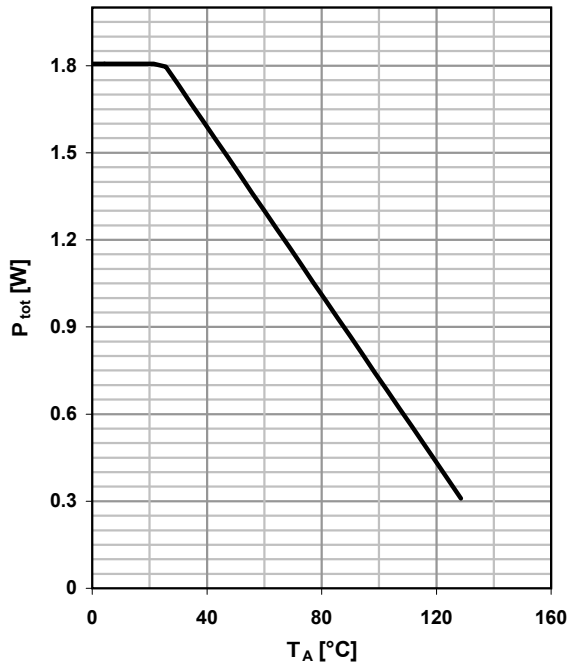
Gate to source charge	Q_{gs}	$V_{DD}=-48\text{ V}, I_D=-1.9\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$		-1.4	-1.9	nC
Gate to drain charge	Q_{gd}			-4.9	-7.4	
Gate charge total	Q_g			-10	-14	
Gate plateau voltage	$V_{plateau}$			-4.34	-	V

Reverse Diode

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

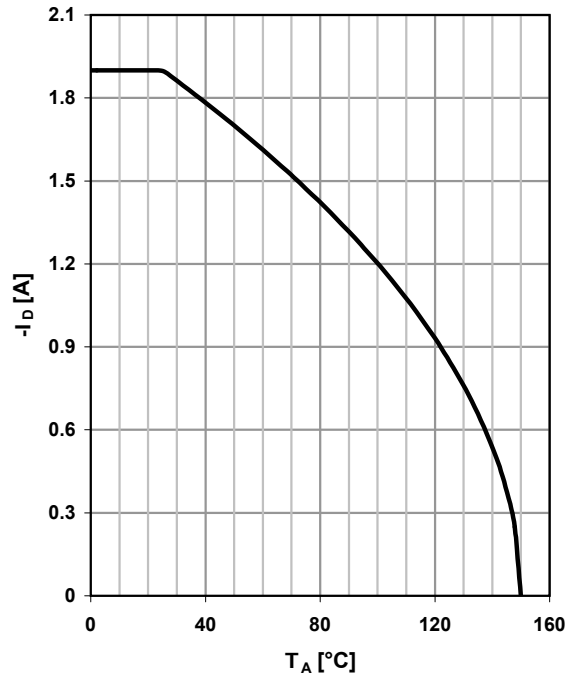
1 Power dissipation

$$P_{\text{tot}} = f(T_A)$$



2 Drain current

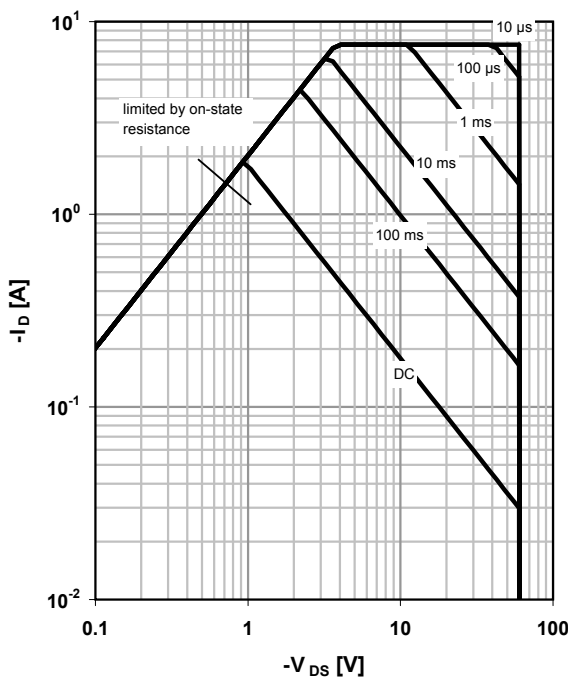
$$I_D = f(T_A); |V_{GS}| \geq 10 \text{ V}$$



3 Safe operating area

$$I_D = f(V_{DS}); T_A = 25^\circ\text{C}^{(1)}; D = 0$$

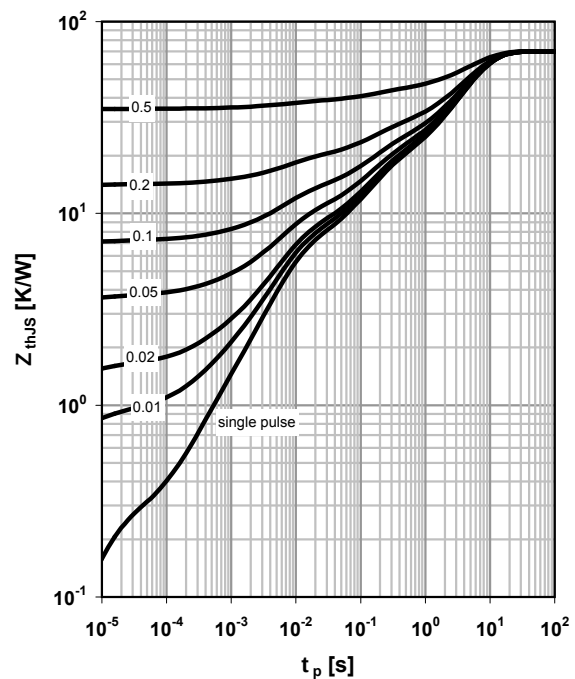
parameter: t_p



4 Max. transient thermal impedance

$$Z_{\text{thJA}} = f(t_p)$$

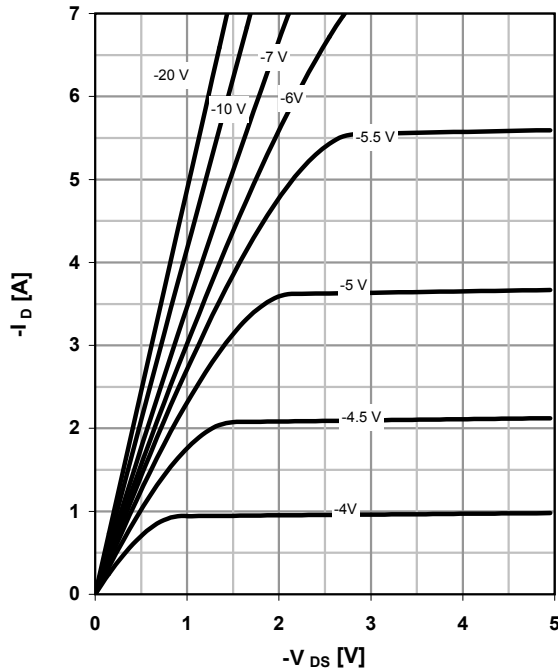
parameter: $D = t_p/T$



5 Typ. output characteristics

$$I_D = f(V_{DS}); T_j = 25^\circ\text{C}$$

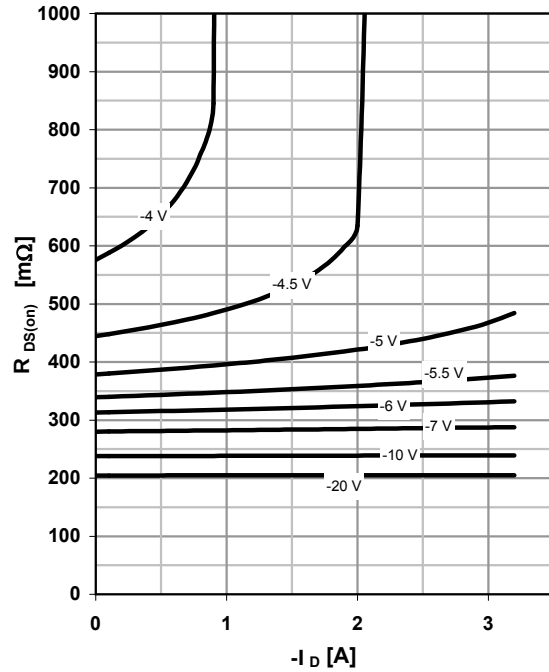
parameter: V_{GS}



6 Typ. drain-source on resistance

$$R_{DS(on)} = f(I_D); T_j = 25^\circ\text{C}$$

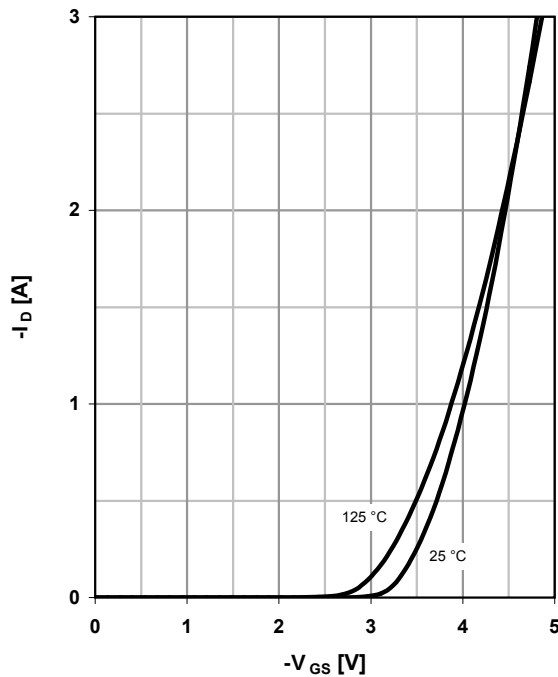
parameter: V_{GS}



7 Typ. transfer characteristics

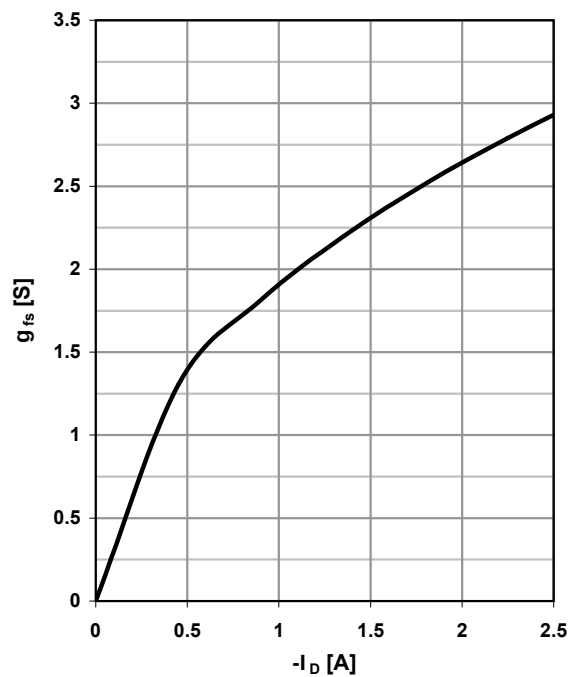
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$$

parameter: T_j



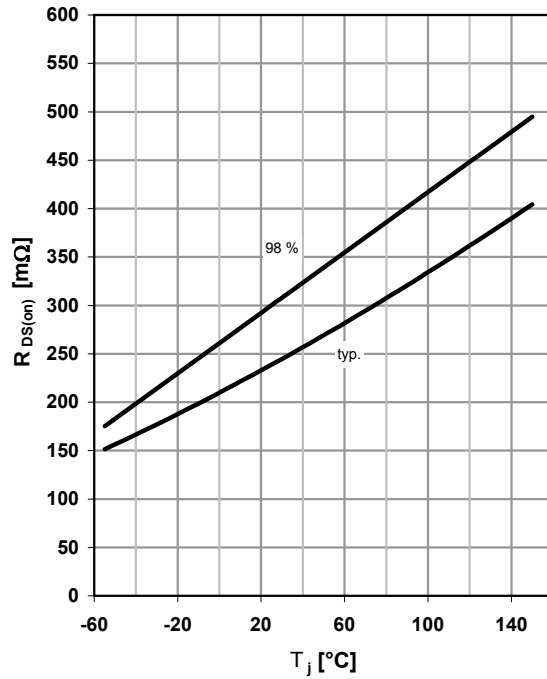
8 Typ. forward transconductance

$$g_{fs} = f(I_D); T_j = 25^\circ\text{C}$$



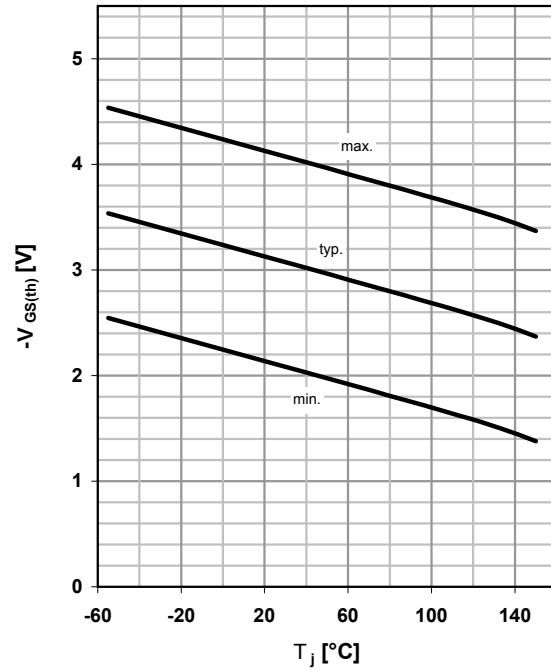
9 Drain-source on-state resistance

$$R_{DS(on)} = f(T_j); I_D = -1.9 \text{ A}; V_{GS} = -10 \text{ V}$$



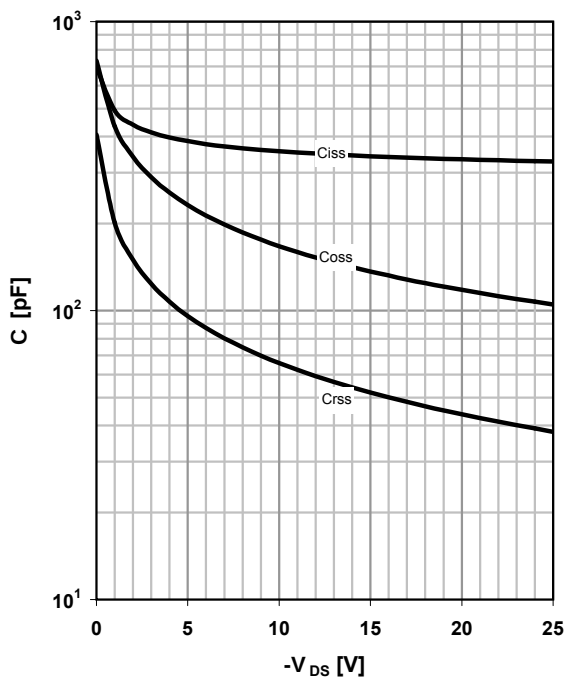
10 Typ. gate threshold voltage

$$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}; I_D = -250 \mu\text{A}$$



11 Typ. capacitances

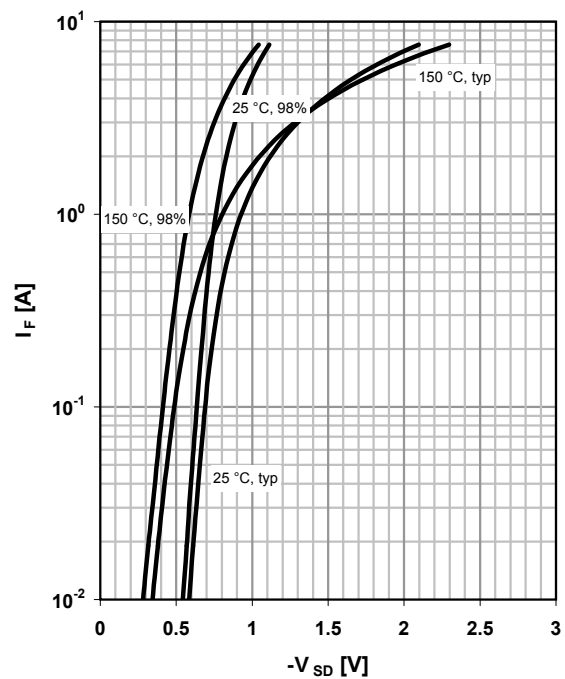
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Forward characteristics of reverse diode

$$I_F = f(V_{SD})$$

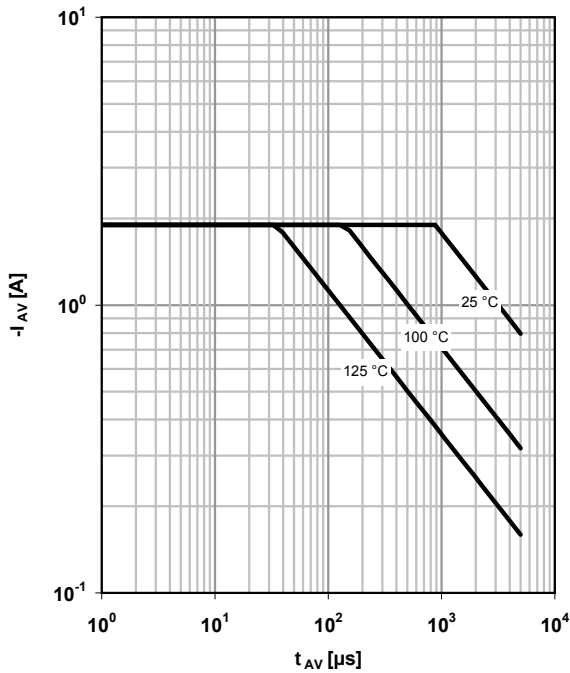
parameter: T_j



13 Avalanche characteristics

$$I_{AS}=f(t_{AV}); R_{GS}=25\ \Omega$$

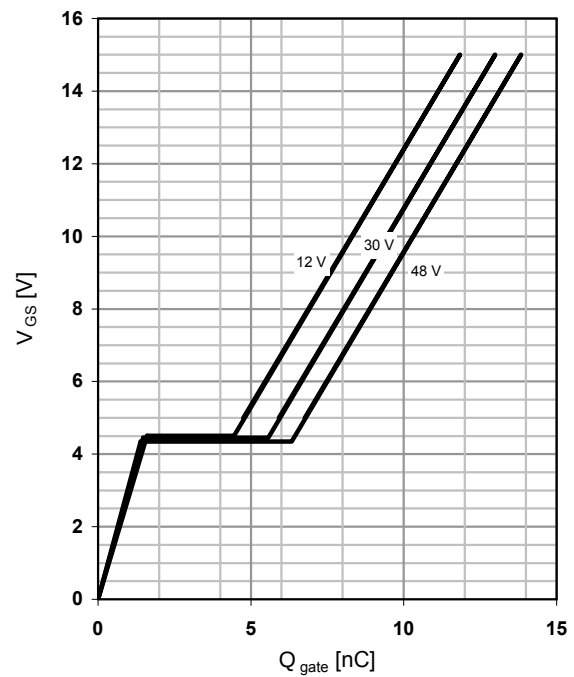
parameter: $T_{j(\text{start})}$



14 Typ. gate charge

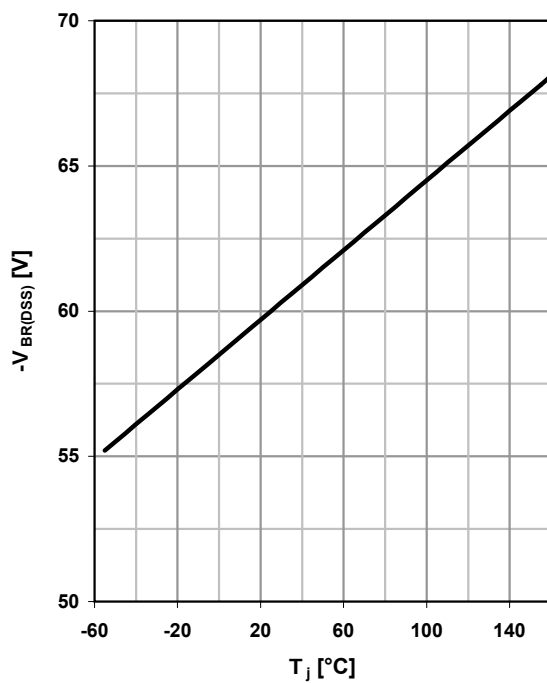
$$V_{GS}=f(Q_{\text{gate}}); I_D=-1.9\ \text{A pulsed}$$

parameter: V_{DD}



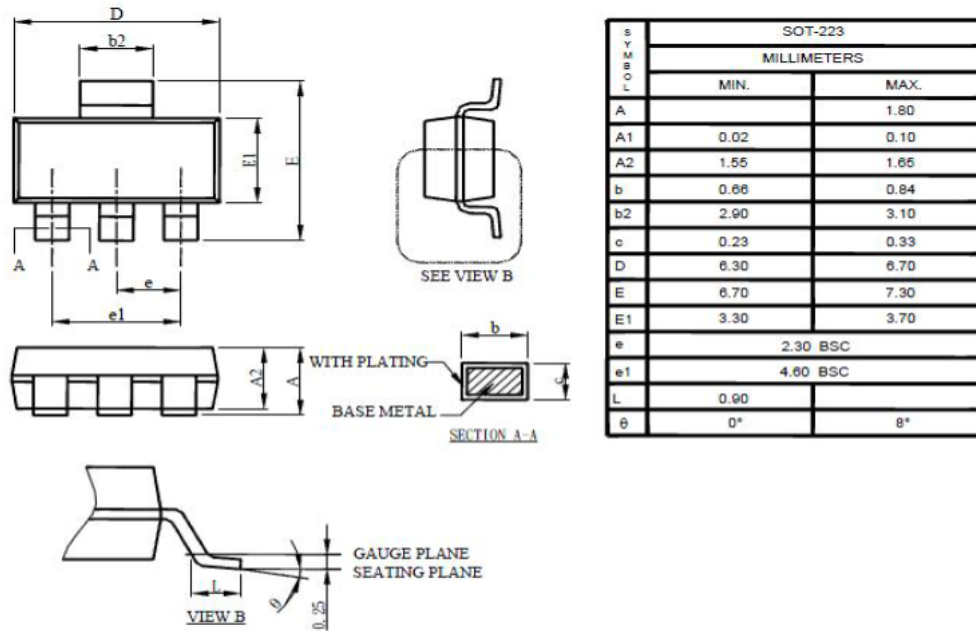
15 Drain-source breakdown voltage

$$V_{BR(DSS)}=f(T_j); I_D=-250\ \mu\text{A}$$

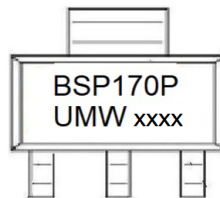


Package Outline

SOT-223:



Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW BSP170	SOT-223	2500	Tape and reel