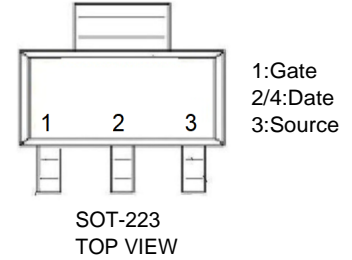


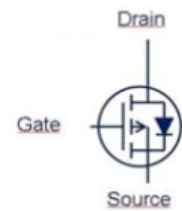
Features

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



Product Summary

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



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

Parameter	Symbol	Conditions	Value	Unit
			steady state	
Continuous drain current	I_D	$T_A=25\text{ }^\circ\text{C}$	-1.9	A
		$T_A=70\text{ }^\circ\text{C}$	-1.5	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ }^\circ\text{C}$	-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	$I_D=1.9\text{ A}$, $V_{DS}=48\text{ V}$, $di /dt = -200\text{ A}/\mu\text{s}$, $T_{j,max}=150\text{ }^\circ\text{C}$	-6	kV/ μs
Gate source voltage	V_{GS}		± 20	V
Power dissipation	P_{tot}	$T_A=25\text{ }^\circ\text{C}$	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 $T_j=25\text{ }^\circ\text{C}$, 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}	$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$		-0.1	-1	μA
		$V_{DS}=-60\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ }^\circ\text{C}$		-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

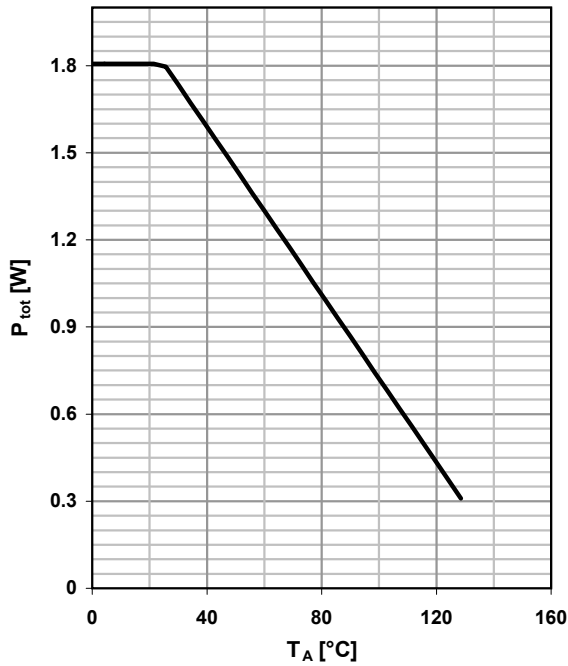
Gate to source charge	Q_{gs}	$V_{DD}=-48\text{ V}, I_D=-1.9\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$		-1.4	-1.9	nC
Gate to drain charge	Q_{gd}			-4.9	-7.4	
Gate charge total	Q_g			-10	-14	
Gate plateau voltage	$V_{plateau}$			-4.34	-	V

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	

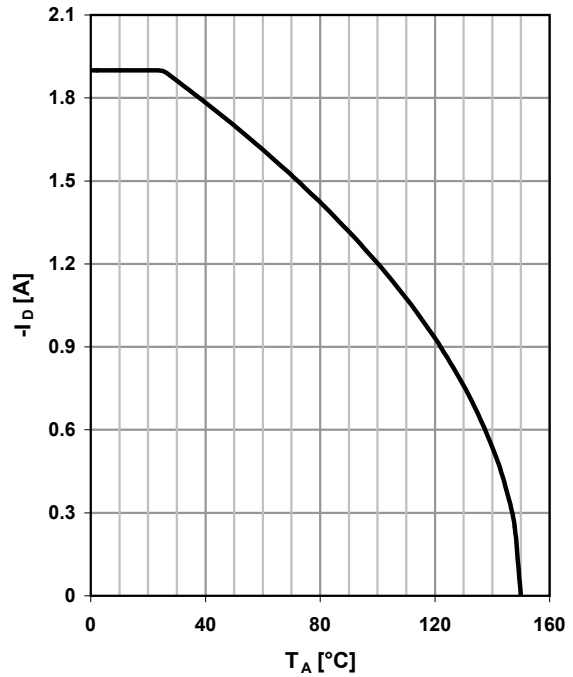
1 Power dissipation

$P_{tot} = f(T_A)$



2 Drain current

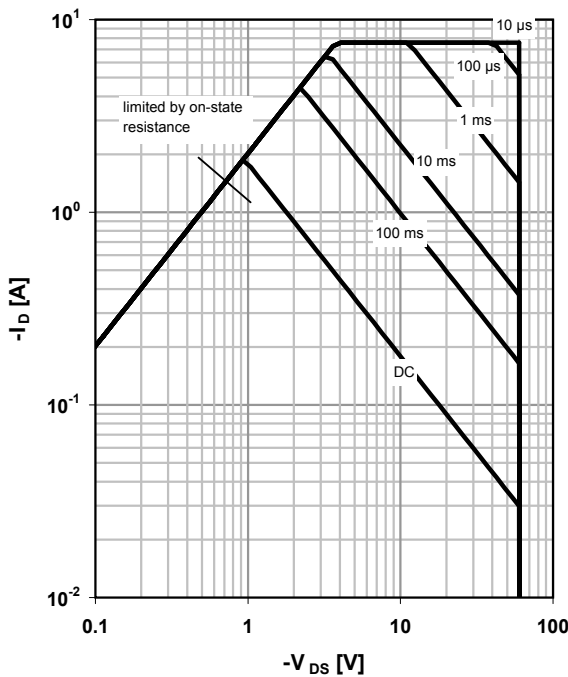
$I_D = f(T_A); |V_{GS}| \geq 10\text{ V}$



3 Safe operating area

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

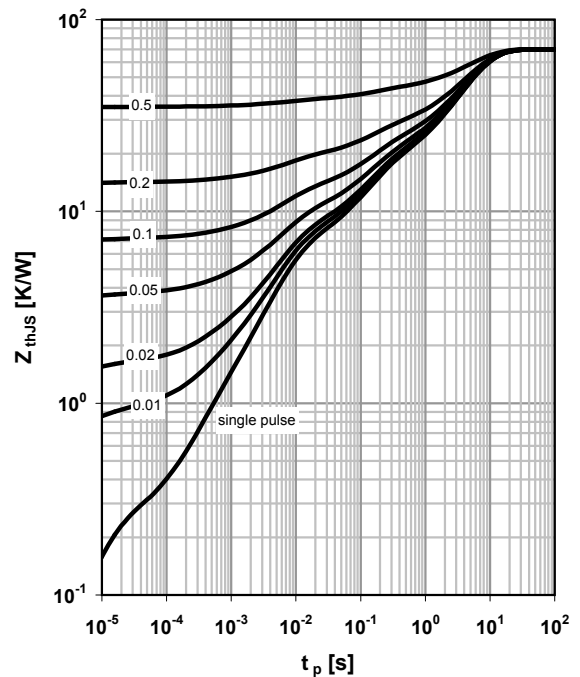
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJA} = f(t_p)$

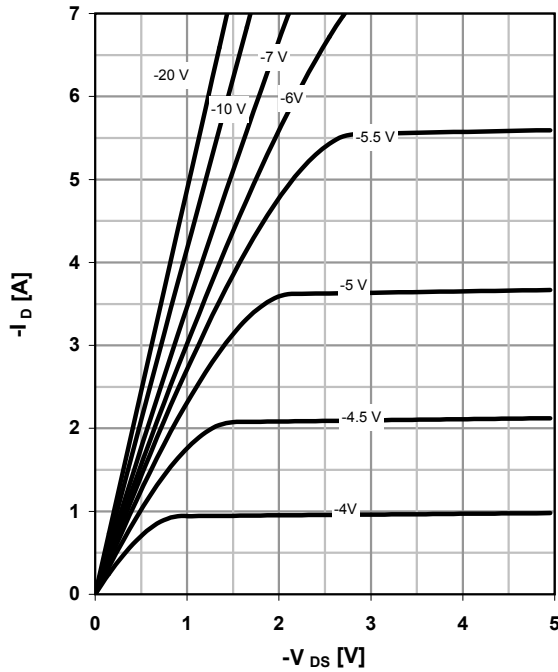
parameter: $D = t_p/T$



5 Typ. output characteristics

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

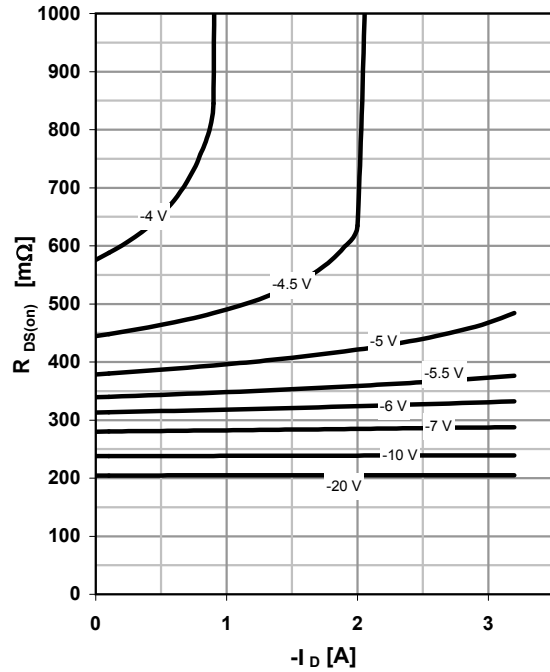
parameter: V_{GS}



6 Typ. drain-source on resistance

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

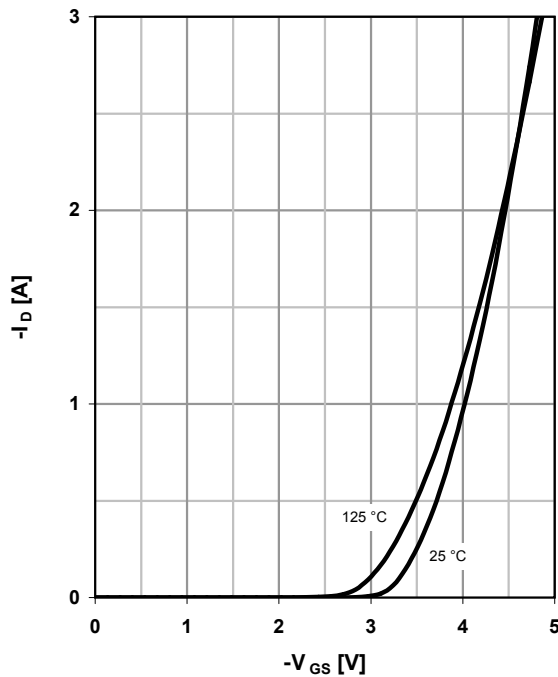
parameter: V_{GS}



7 Typ. transfer characteristics

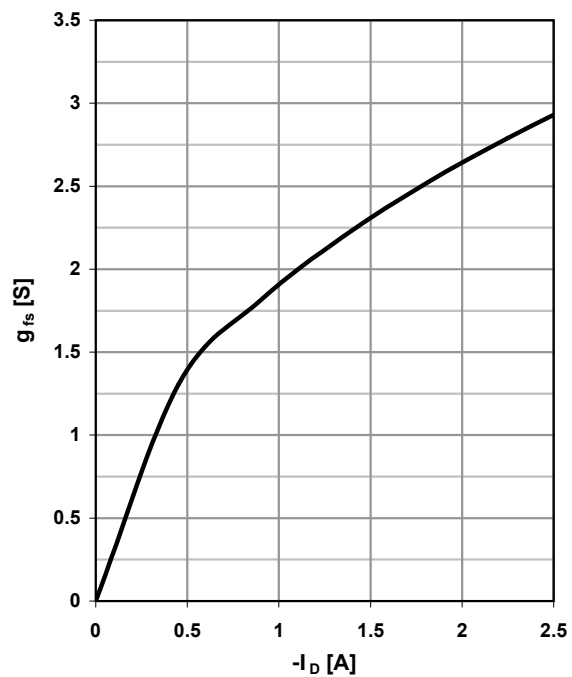
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter: T_j



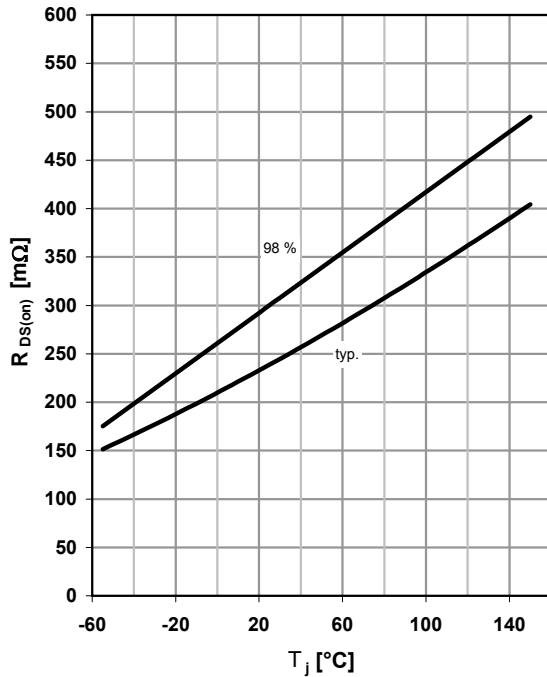
8 Typ. forward transconductance

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



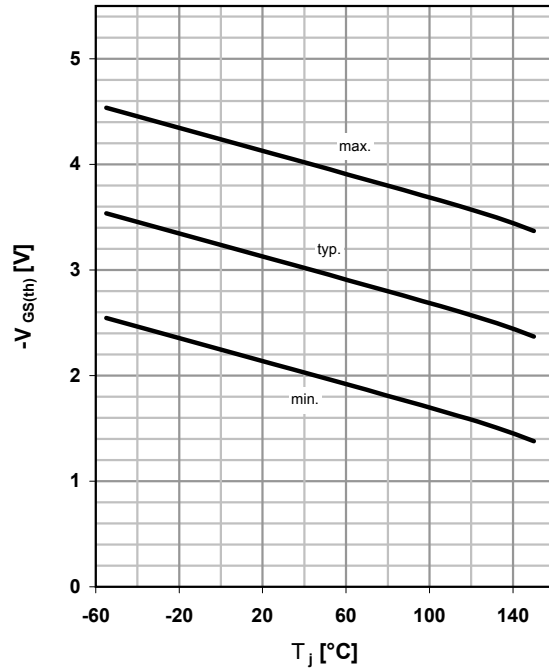
9 Drain-source on-state resistance

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



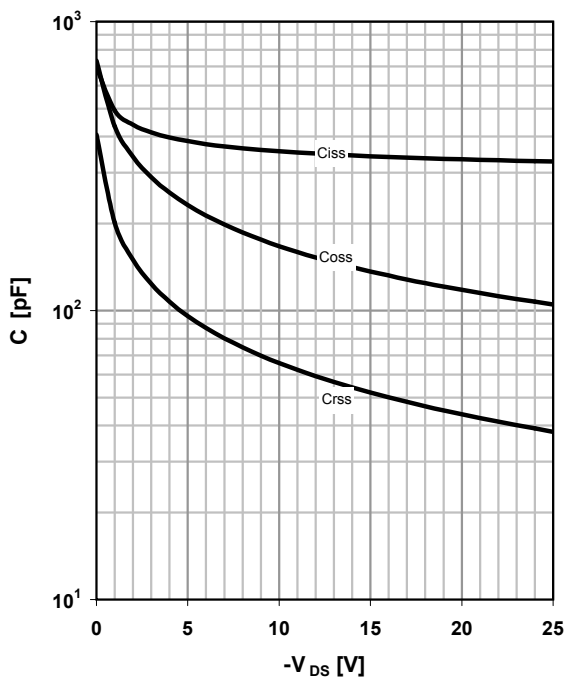
10 Typ. gate threshold voltage

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



11 Typ. capacitances

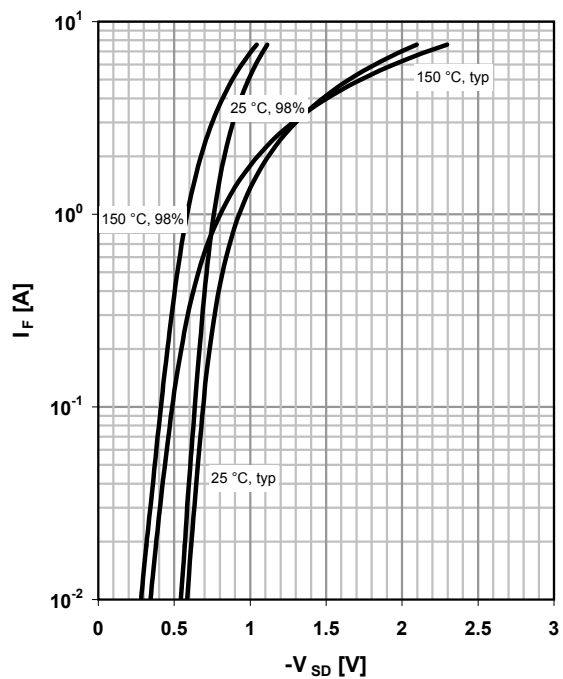
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



12 Forward characteristics of reverse diode

$I_F = f(V_{SD})$

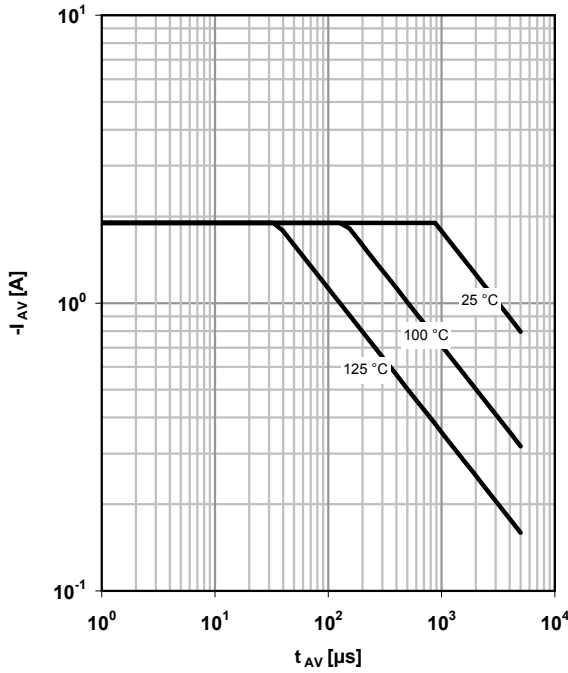
parameter: T_j



13 Avalanche characteristics

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

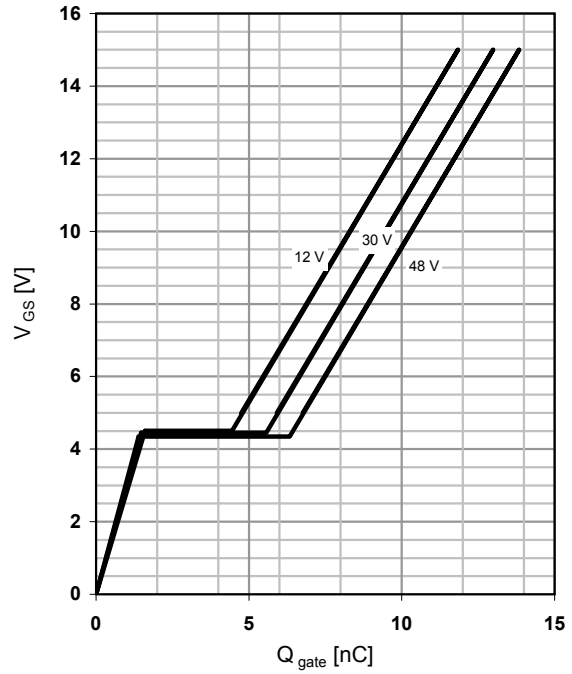
parameter: $T_{j(start)}$



14 Typ. gate charge

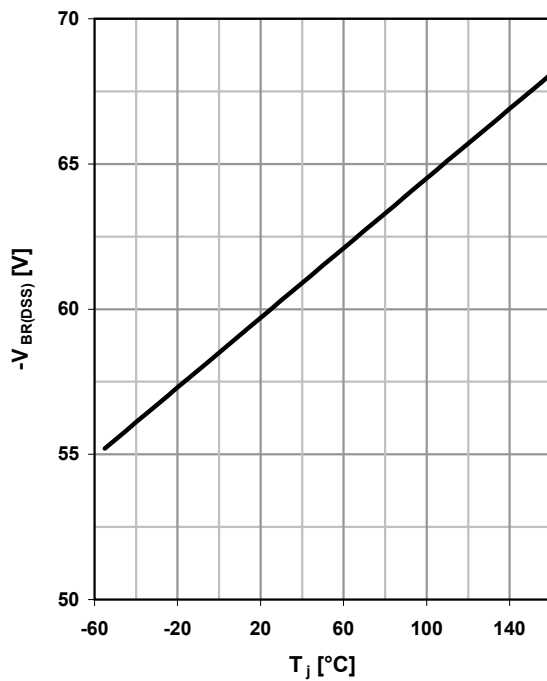
$V_{GS}=f(Q_{gate}); I_D=-1.9\ A\ pulsed$

parameter: V_{DD}



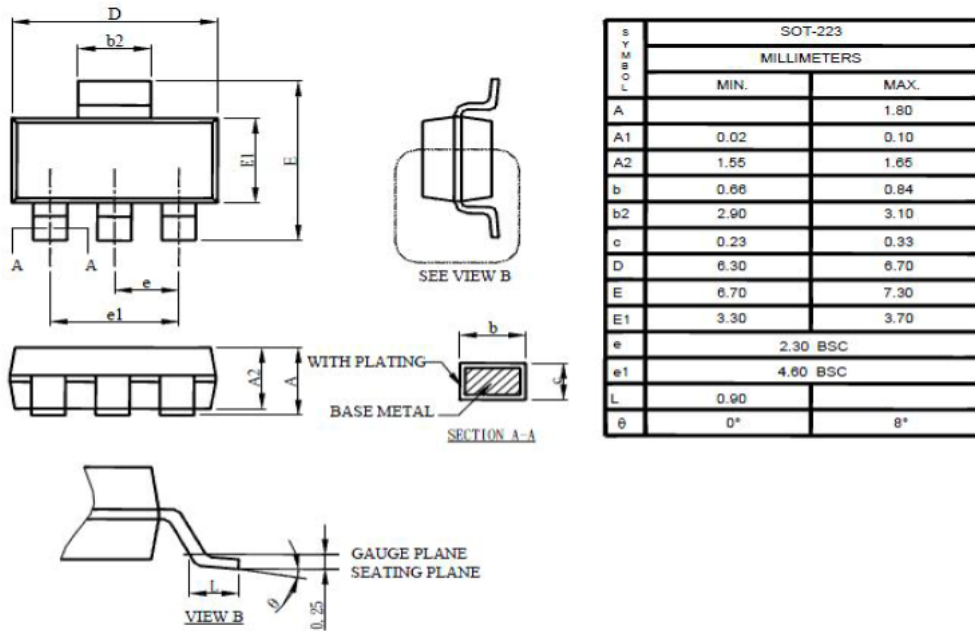
15 Drain-source breakdown voltage

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

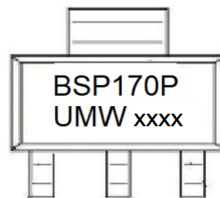


Package Outline

SOT-223:



Marking



Ordering information

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

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