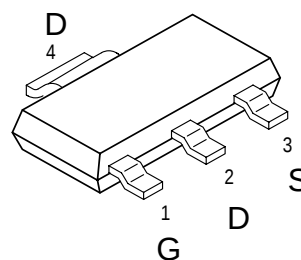


Description

- P-Channel
- Enhancement mode
- Avalanche rated
- Logic Level
- dv/dt rated
- Pb-free lead plating; RoHS compliant



Features

$V_{DS} (V) = -60V$
 $I_D = -1.17A (V_{GS} = -10V)$
 $R_{DS(ON)} < 60m\Omega (V_{GS} = -10V)$
 $R_{DS(ON)} < 95m\Omega (V_{GS} = -4.5V)$

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

Parameter	Symbol	Value	Unit
Continuous drain current	I_D	-1.17	A
$T_A = 25\text{ }^\circ\text{C}$		-0.94	
$T_A = 70\text{ }^\circ\text{C}$			
Pulsed drain current	$I_{D\text{ puls}}$	-4.68	mJ
$T_A = 25\text{ }^\circ\text{C}$			
Avalanche energy, single pulse	E_{AS}	24	
$I_D = -1.17\text{ A}$, $V_{DD} = -25\text{ V}$, $R_{GS} = 25\text{ }\Omega$			
Avalanche energy, periodic limited by T_{jmax}	E_{AR}	0.18	kJ
Reverse diode dv/dt	dv/dt	6	
$I_S = -1.17\text{ A}$, $V_{DS} = -48\text{ V}$, $di/dt = 200\text{ A}/\mu\text{s}$, $T_{jmax} = 150\text{ }^\circ\text{C}$			
Gate source voltage	V_{GS}	± 20	V
Power dissipation	P_{tot}	1.8	W
$T_A = 25\text{ }^\circ\text{C}$			
Operating and storage temperature	T_j, T_{stg}	-55...+150	$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1		55/150/56	
ESD Class; JESD22-A114-HBM		Class 0	

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - soldering point (Pin 4)	R _{thJS}			25	K/W
SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾	R _{thJA}			115 70	K/W

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain- source breakdown voltage $V_{GS} = 0\text{ V}$, $I_D = -250\text{ }\mu\text{A}$	$V_{(BR)DSS}$	-60			V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = -160\text{ }\mu\text{A}$	$V_{GS(th)}$	-1	-1.5	-2	
Zero gate voltage drain current $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 25\text{ }^{\circ}\text{C}$ $V_{DS} = -60\text{ V}$, $V_{GS} = 0\text{ V}$, $T_j = 125\text{ }^{\circ}\text{C}$	I_{DSS}		-0.1 -10	-1 -100	μA
Gate-source leakage current $V_{GS} = -20\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}		-10	-100	nA
Drain-Source on-state resistance $V_{GS} = -4.5\text{ V}$, $I_D = -0.89\text{ A}$	$R_{DS(on)}$			60	$\text{m}\Omega$
Drain-Source on-state resistance $V_{GS} = -10\text{ V}$, $I_D = -1.17\text{ A}$	$R_{DS(on)}$			95	$\text{m}\Omega$

Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 μm thick) copper area for drain connection.

PCB is vertical without blown air.

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

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Transconductance $V_{DS} \leq 2 \cdot I_D \cdot R_{DS(on)max}$, $I_D = -0.89$ A	g_{fs}	0.7	1.4		S
Input capacitance $V_{GS} = 0$ V, $V_{DS} = -25$ V, $f = 1$ MHz	C_{iss}		130	160	pF
Output capacitance $V_{GS} = 0$ V, $V_{DS} = -25$ V, $f = 1$ MHz	C_{oss}		40	50	
Reverse transfer capacitance $V_{GS} = 0$ V, $V_{DS} = -25$ V, $f = 1$ MHz	C_{rss}		17	21	
Turn-on delay time $V_{DD} = -30$ V, $V_{GS} = -4.5$ V, $I_D = -0.89$ A, $R_G = 18\Omega$	$t_{d(on)}$		24	36	ns
Rise time $V_{DD} = -30$ V, $V_{GS} = -4.5$ V, $I_D = -0.89$ A, $R_G = 18\Omega$	t_r		9	14	
Turn-off delay time $V_{DD} = -30$ V, $V_{GS} = -4.5$ V, $I_D = -0.89$ A, $R_G = 18\Omega$	$t_{d(off)}$		32	48	
Fall time $V_{DD} = -30$ V, $V_{GS} = -4.5$ V, $I_D = -0.89$ A, $R_G = 18\Omega$	t_f		19	28	

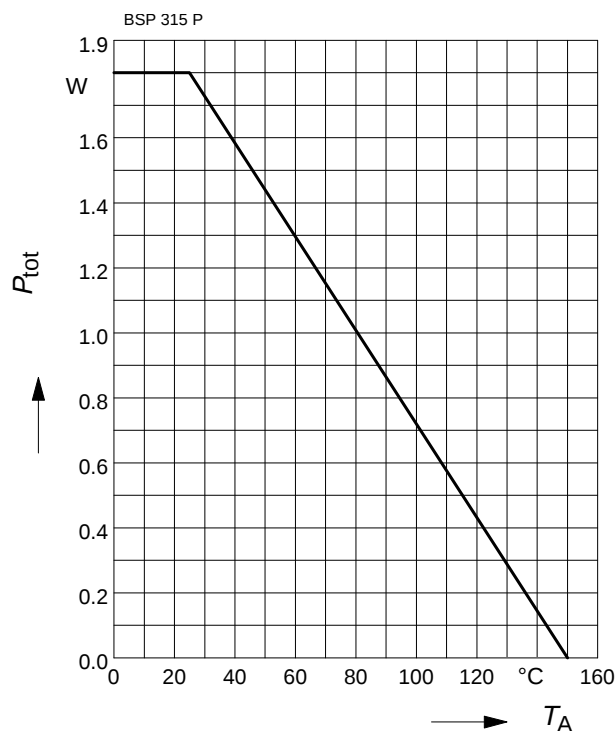
Electrical Characteristics, at $T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Dynamic Characteristics					
Gate to source charge $V_{DD} = -48\text{ V}$, $I_D = -1.17\text{ A}$	Q_{gs}		0.7	1.1	nC
Gate to drain charge $V_{DD} = -48\text{ V}$, $I_D = -1.17\text{ A}$	Q_{gd}		1.8	2.6	
Gate charge total $V_{DD} = -48\text{ V}$, $I_D = -1.17\text{ A}$, $V_{GS} = 0\text{ to }-10\text{ V}$	Q_g		5.2	7.8	
Gate plateau voltage $V_{DD} = -48\text{ V}$, $I_D = -1.17\text{ A}$	$V_{(plateau)}$		-3.14		V

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Reverse Diode					
Inverse diode continuous forward current $T_A = 25\text{ }^{\circ}\text{C}$	I_S			-1.17	A
Inverse diode direct current,pulsed $T_A = 25\text{ }^{\circ}\text{C}$	I_{SM}			-4.68	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$, $I_F = -1.17\text{ A}$	V_{SD}		-0.97	-1.3	V
Reverse recovery time $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	t_{rr}		30.5	46	ns
Reverse recovery charge $V_R = -30\text{ V}$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}		36	54	μC

Power Dissipation

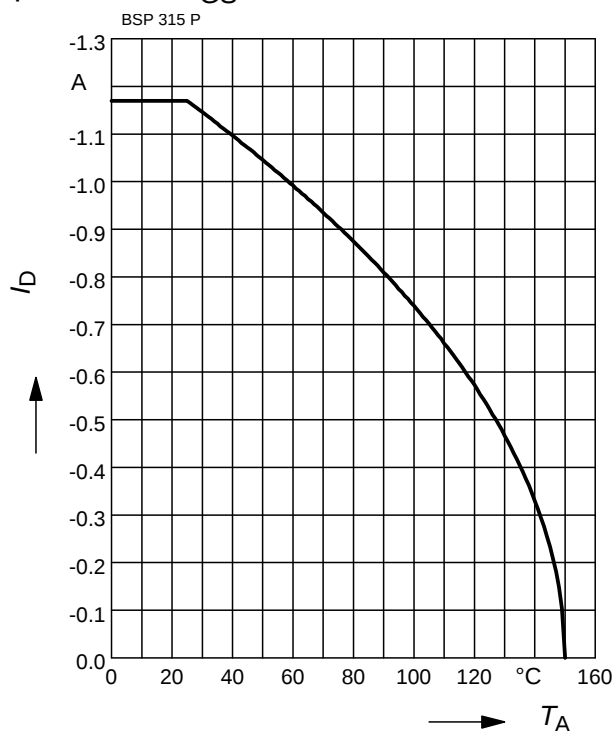
$$P_{\text{tot}} = f(T_A)$$



Drain current

$$I_D = f(T_A)$$

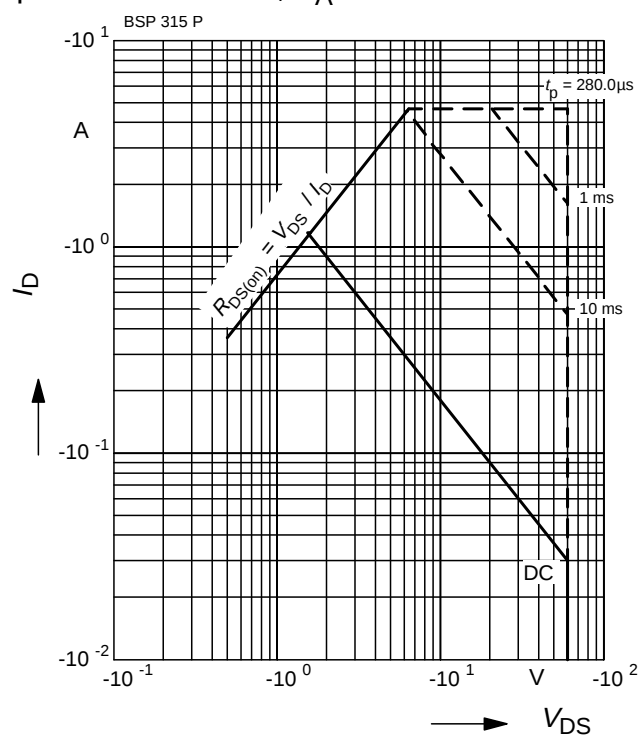
parameter : $V_{GS} \geq -10V$



Safe operating area

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

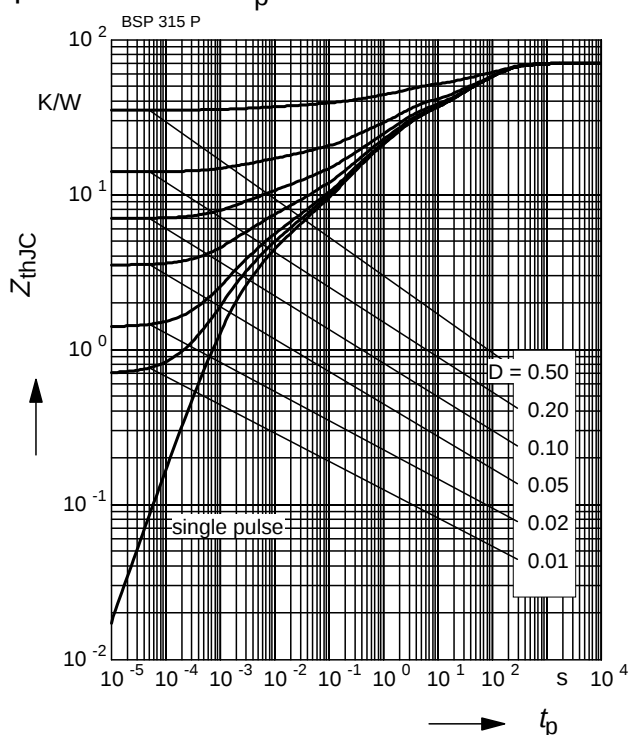
parameter : $D = 0$, $T_A = 25^\circ\text{C}$



Transient thermal impedance

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

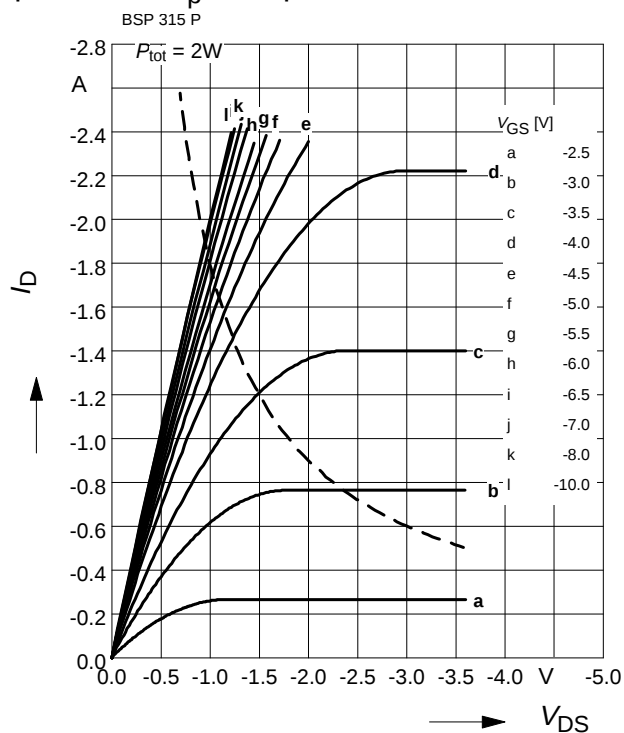
parameter : $D = t_p / T$



Typ. output characteristics

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

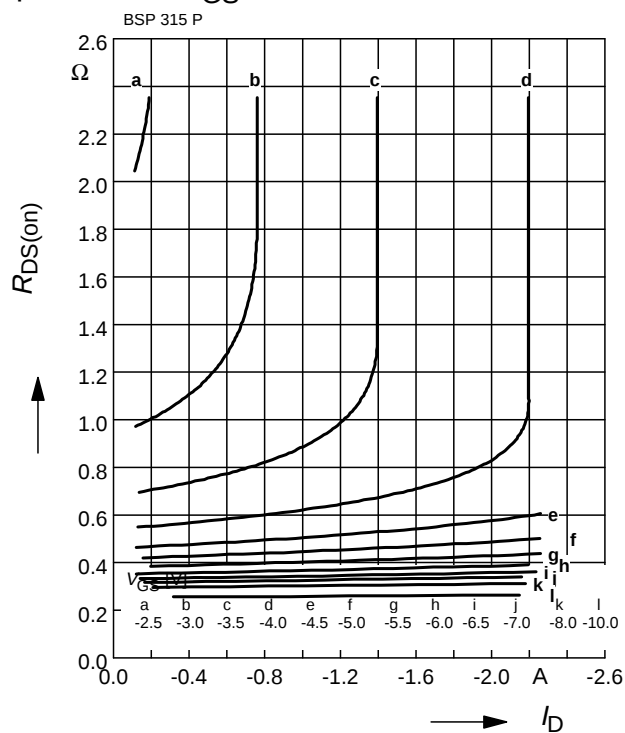
parameter: $t_p = 80 \mu s$



Typ. drain-source-on-resistance

$$R_{DS(on)} = f(I_D)$$

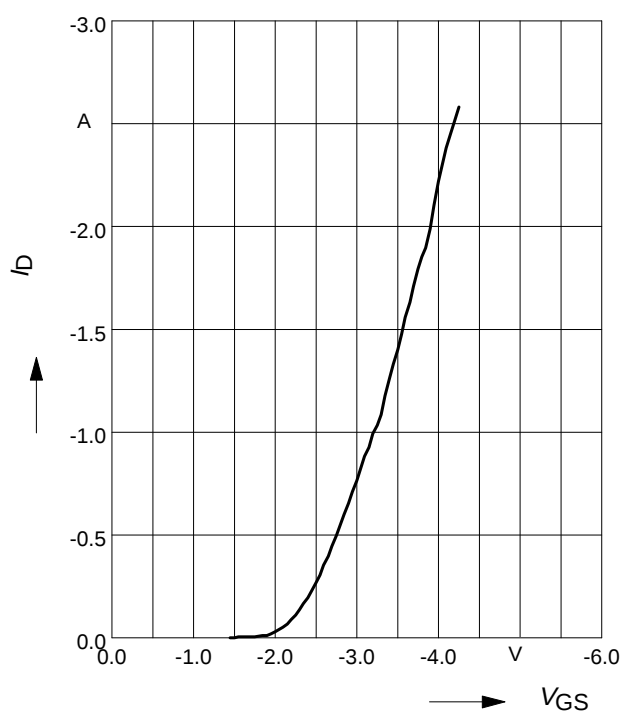
parameter: V_{GS}



Typ. transfer characteristics $I_D = f(V_{GS})$

$$V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$$

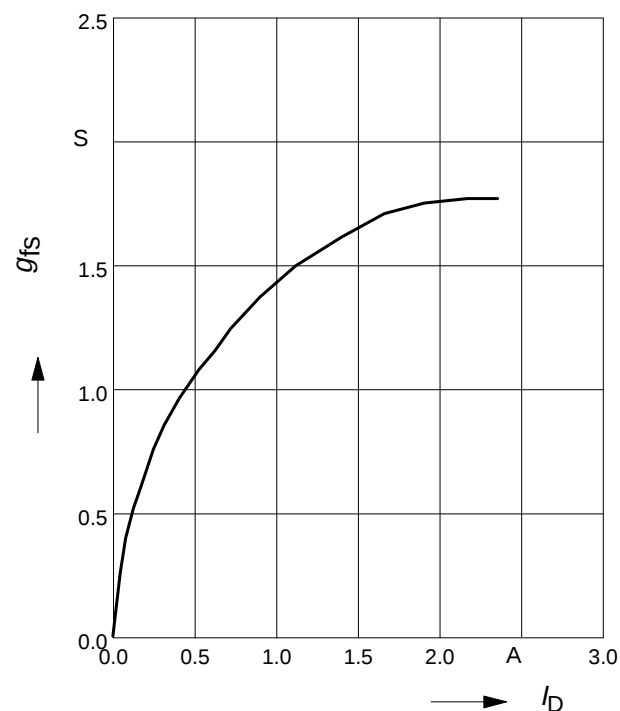
parameter: $t_p = 80 \mu s$



Typ. forward transconductance

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

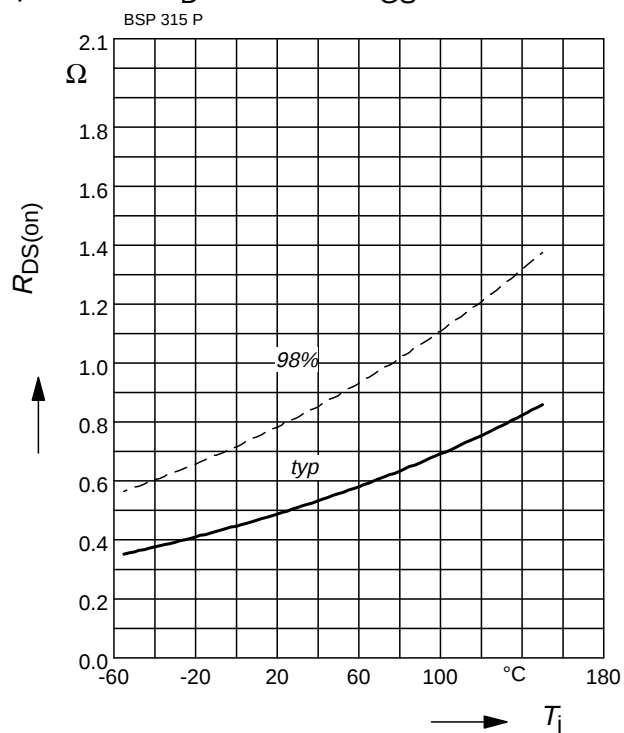
parameter: g_{fs}



Drain-source on-resistance

$$R_{DS(on)} = f(T_j)$$

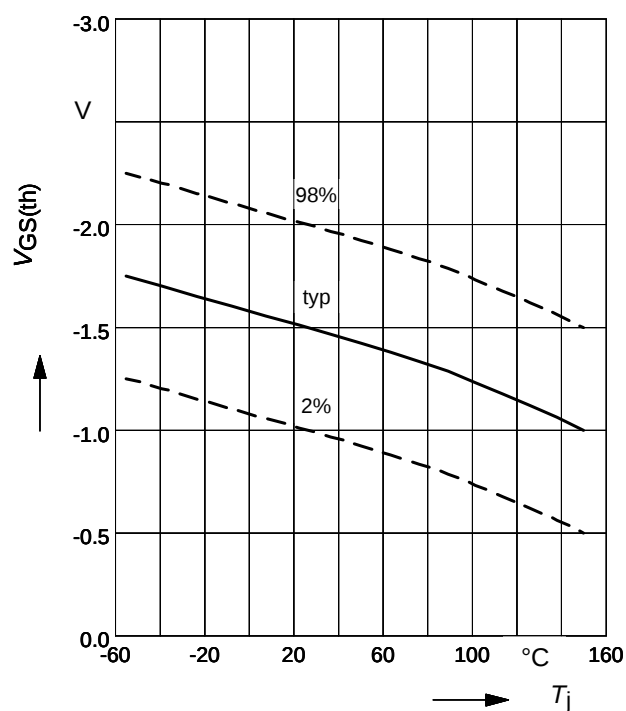
parameter: $I_D = -1.17$ A, $V_{GS} = -10$ V



Gate threshold voltage

$$V_{GS(th)} = f(T_j)$$

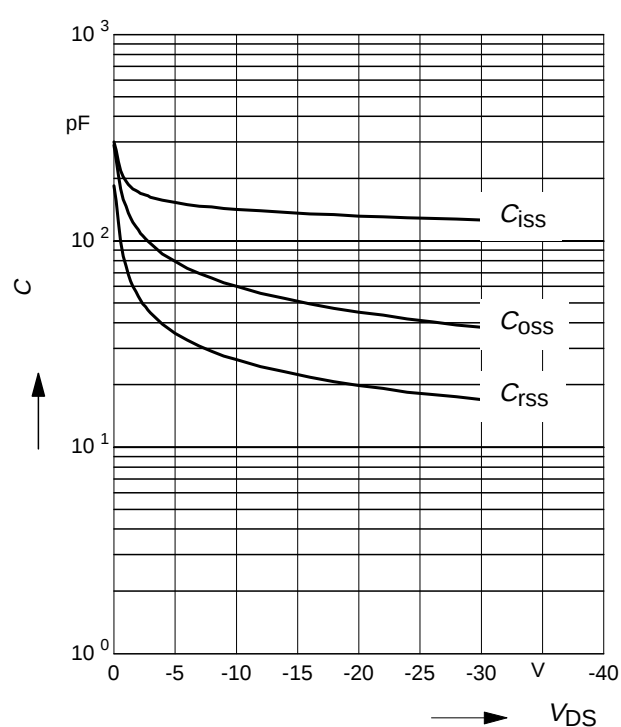
parameter: $V_{GS} = V_{DS}$, $I_D = -160$ μ A



Typ. capacitances

$$C = f(V_{DS})$$

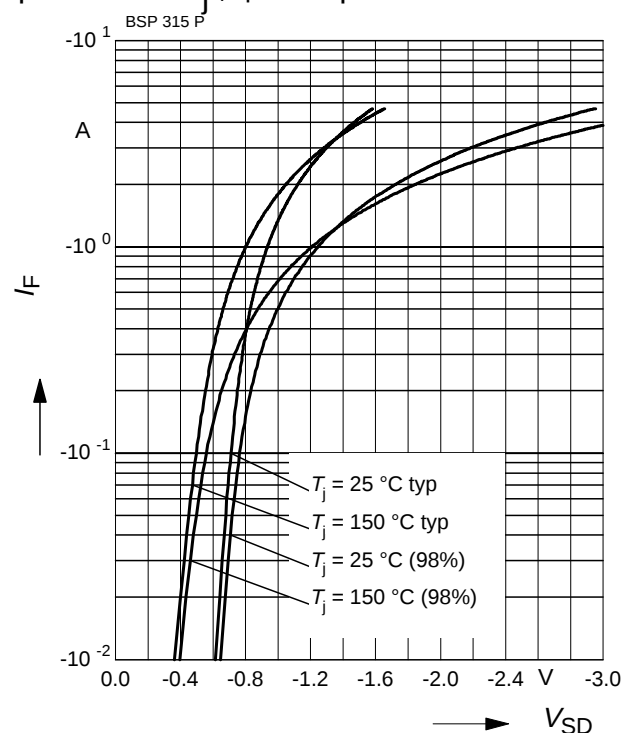
Parameter: $V_{GS} = 0$ V, $f = 1$ MHz



Forward characteristics of reverse diode

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

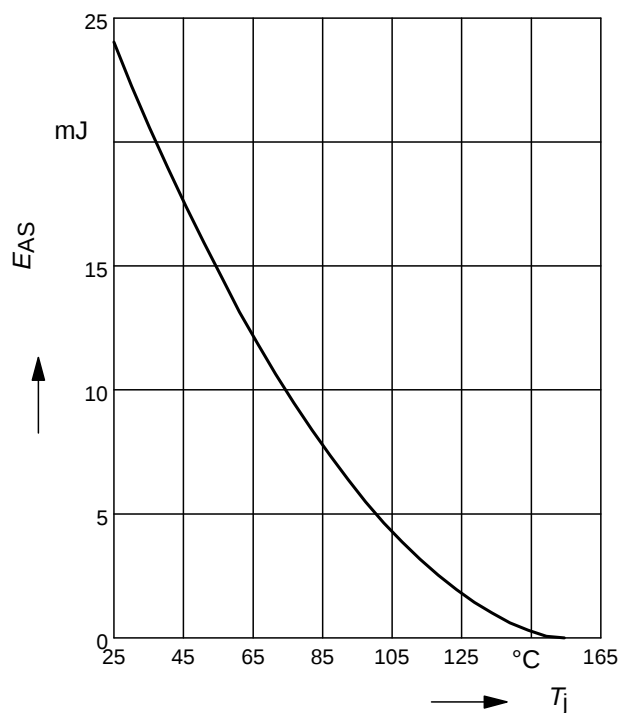
parameter: T_j , $t_p = 80$ μ s



Avalanche Energy $E_{AS} = f(T_j)$

parameter: $I_D = -1.17\text{ A}$, $V_{DD} = -25\text{ V}$

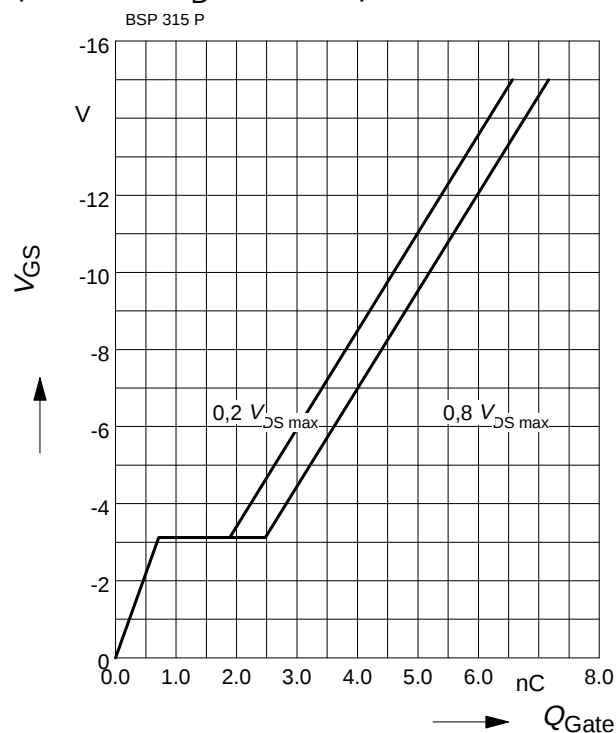
$R_{GS} = 25\ \Omega$



Typ. gate charge

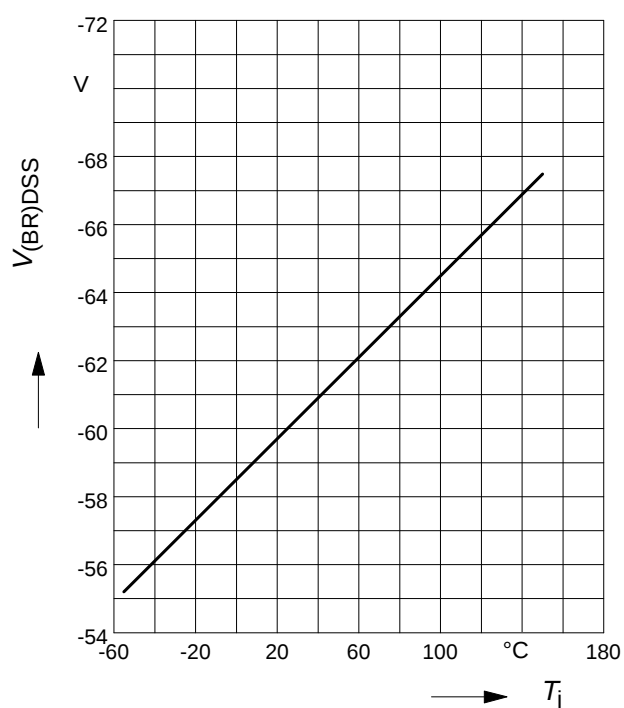
$V_{GS} = f(Q_{Gate})$

parameter: $I_D = -1.17\text{ A}$ pulsed

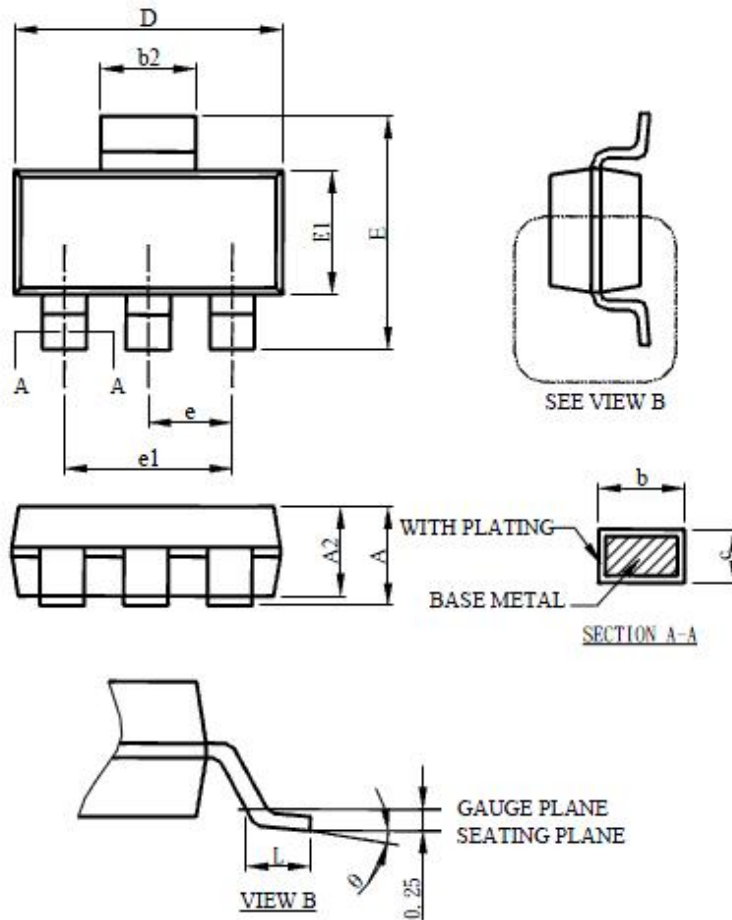


Drain-source breakdown voltage

$V_{(BR)DSS} = f(T_j)$



Package Mechanical Data SOT-223

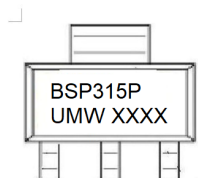


SYMBOL	SOT-223	
	MILLIMETERS	
	MIN.	MAX.
A		1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.68	0.84
b2	2.90	3.10
c	0.23	0.33
D	6.30	6.70
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	
θ	0°	8°

Note:

1. Refer to JEDEC TO-261AA.
2. Dimension D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs, and interlead flash, but including any mismatch between the top and bottom of the plastic body.
3. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW BSP315P	SOT-223	2500	Tape and reel