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**BSO301SP H**

**OptiMOS® -P Power-Transistor**

**Features**

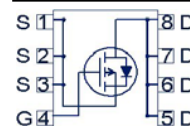
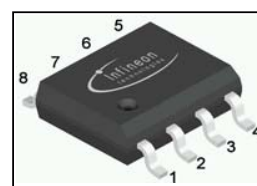
- P-Channel
- Enhancement mode
- Logic level
- 150°C operating temperature
- Avalanche rated
- Qualified according JEDEC for target applications
- Pb-free lead plating; RoHS compliant
- Halogen-free according to IEC61249-2-21



**Product Summary**

$V_{DS}$		-30	V
$R_{DS(on),max}$	$V_{GS}=10\text{ V}$	8.0	mΩ
	$V_{GS}=4.5\text{ V}$	12.0	A
$I_D$		-14.9	A

PG-DSO-8



Type	Package	Marking	Leadfree	Halogen free	packing
BSO301SP H	PG-DSO-8	301SP	Yes	Yes	dry

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

Parameter	Symbol	Conditions	Value		Unit
			≤10 secs	steady state	
Continuous drain current	$I_D$	$T_A=25\text{ °C}^{(1)}$	-14.9	-12.6	A
		$T_A=70\text{ °C}^{(1)}$	-11.9	-10	
Pulsed drain current	$I_{D,pulse}$	$T_A=25\text{ °C}^{(2)}$	-60		
Avalanche energy, single pulse	$E_{AS}$	$I_D=-14.9\text{ A}, R_{GS}=25\text{ Ω}$	248		mJ
Gate source voltage	$V_{GS}$		±20		V
Power dissipation	$P_{tot}$	$T_A=25\text{ °C}^{(1)}$	2.5	1.79	W
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 150		°C
ESD class		JESD22-A114 HBM	1C (1kV - 2kV)		
Soldering temperature			260		°C
IEC climatic category; DIN IEC 68-1			55/150/56		



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Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - soldering point	$R_{thJS}$		-	-	35	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	minimal footprint, $t_p \leq 10$ s	-	-	110	
		minimal footprint, steady state	-	-	150	
		6 cm <sup>2</sup> cooling area <sup>1)</sup> , $t_p \leq 10$ s	-	-	50	
		6 cm <sup>2</sup> cooling area <sup>1)</sup> , steady state	-	-	80	

**Electrical characteristics, at  $T_j=25$  °C, unless otherwise specified**

**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0$ V, $I_D=-250$ $\mu$ A	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ , $I_D=-250$ $\mu$ A	-1	-1.5	-2	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-30$ V, $V_{GS}=0$ V, $T_j=25$ °C	-	-0.1	-1	$\mu$ A
		$V_{DS}=-30$ V, $V_{GS}=0$ V, $T_j=125$ °C	-	-10	-100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=-20$ V, $V_{DS}=0$ V	-	-10	-100	nA
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-4.5$ V, $I_D=-12$ A	-	8.8	12	m $\Omega$
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-10$ V, $I_D=-14.9$ A	-	6.3	8.0	
Transconductance	$g_{fs}$	$ V_{DS}  > 2 I_D R_{DS(on)max}$ , $I_D=-14.9$ A	22	44	-	S

<sup>1)</sup> Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70  $\mu$ m thick) copper area for drain connection. PCB is vertical in still air.



**BSO301SP H**

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic characteristics**

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V},$ $V_{DS}=-25\text{ V}, f=1\text{ MHz}$	-	4430	5890	pF
Output capacitance	$C_{oss}$		-	1180	1570	
Reverse transfer capacitance	$C_{rss}$		-	970	1500	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15\text{ V},$ $V_{GS}=-10\text{ V},$ $I_D=-1\text{ A}, R_G=6\ \Omega$	-	15	23	ns
Rise time	$t_r$		-	22	33	
Turn-off delay time	$t_{d(off)}$		-	130	195	
Fall time	$t_f$		-	110	165	

**Gate Charge Characteristics<sup>3)</sup>**

Gate to source charge	$Q_{gs}$	$V_{DD}=-24\text{ V},$ $I_D=-14.9\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	-11	-15	nC
Gate charge at threshold	$Q_{g(th)}$		-	-7.1	-9.5	
Gate to drain charge	$Q_{gd}$		-	-35		
Switching charge	$Q_{sw}$		-	-40	-59	
Gate charge total	$Q_g$		-	-102	-136	
Gate plateau voltage	$V_{plateau}$		-	-2.5	-	V
Output charge	$Q_{oss}$	$V_{DD}=-15\text{ V}, V_{GS}=0\text{ V}$	-	-36	-48	

**Reverse Diode**

Diode continuous forward current	$I_S$	$T_A=25\text{ }^\circ\text{C}$	-	-	-2.1	A
Diode pulse current	$I_{S,pulse}$		-	-	-60	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=-14.9\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-0.82	-1.2	V
Reverse recovery time	$t_{rr}$	$V_R=15\text{ V}, I_F=-14.9\text{ A},$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	32	40	ns
Reverse recovery charge	$Q_{rr}$		-	-20	-25	

<sup>2)</sup> See figure 3

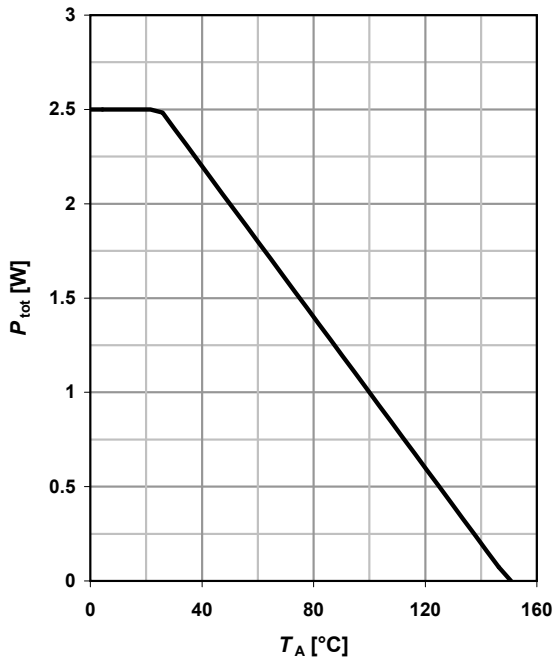
<sup>3)</sup> See figure 16 for gate charge parameter definition



**BSO301SP H**

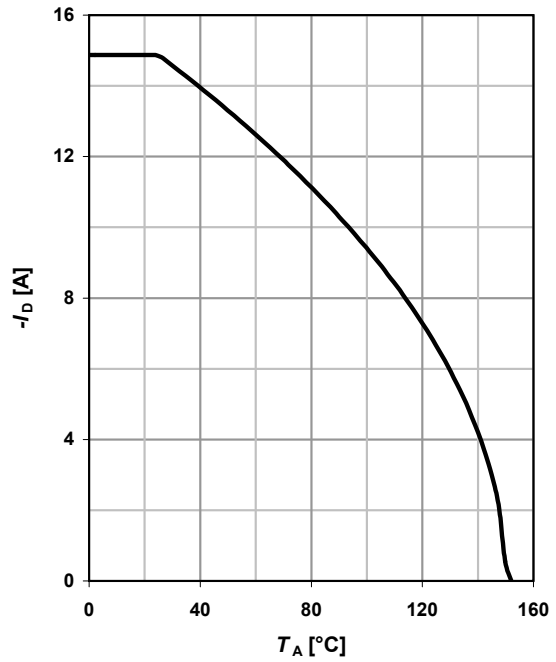
**1 Power dissipation**

$P_{tot}=f(T_A); t_p \leq 10 \text{ s}$



**2 Drain current**

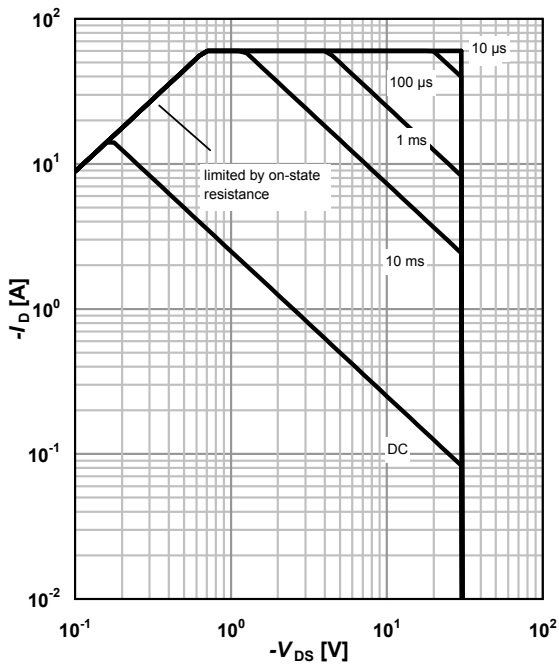
$I_D=f(T_A); |V_{GS}| \geq 10 \text{ V}; t_p \leq 10 \text{ s}$



**3 Safe operating area**

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

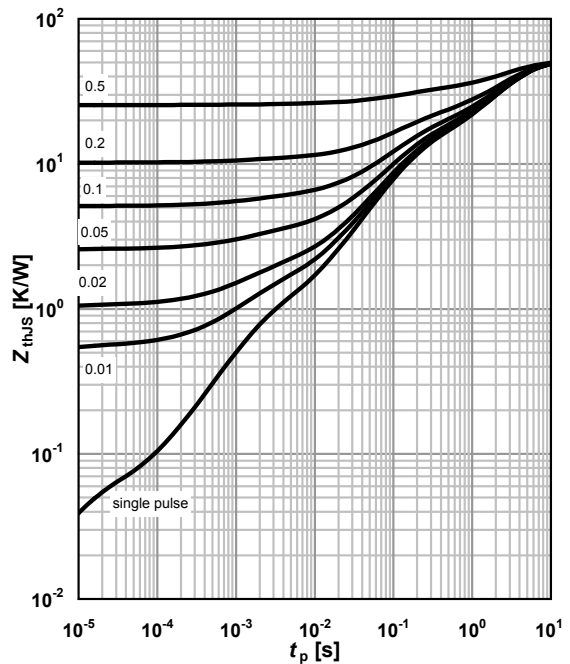
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJS}=f(t_p)$

parameter:  $D=t_p/T$



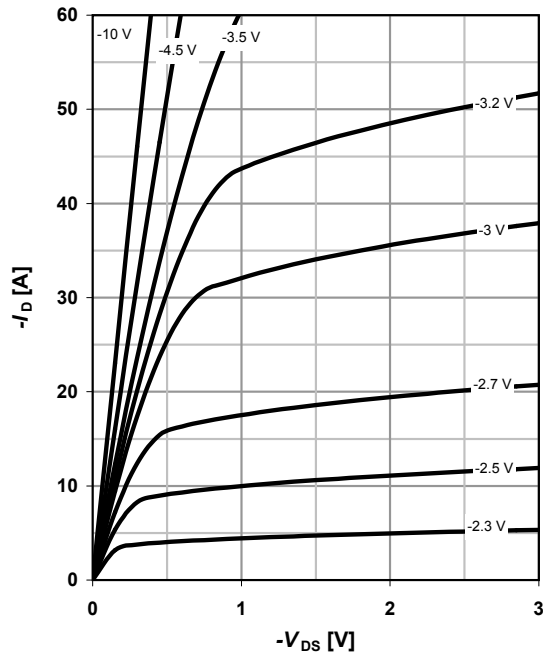


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**5 Typ. output characteristics**

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

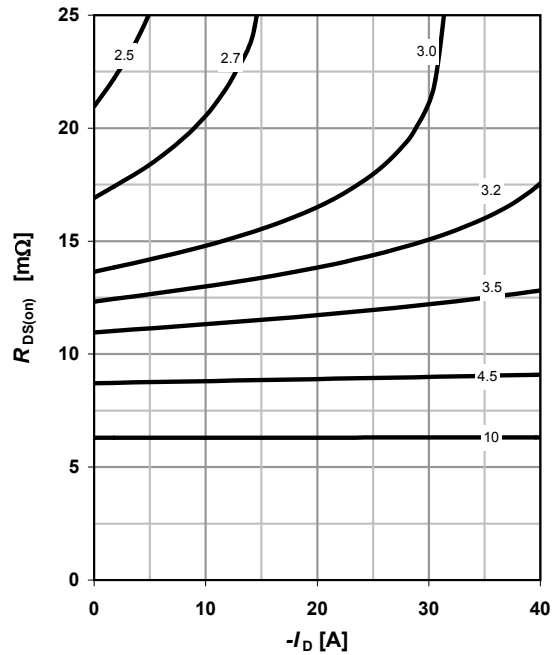
parameter:  $V_{GS}$



**6 Typ. drain-source on resistance**

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

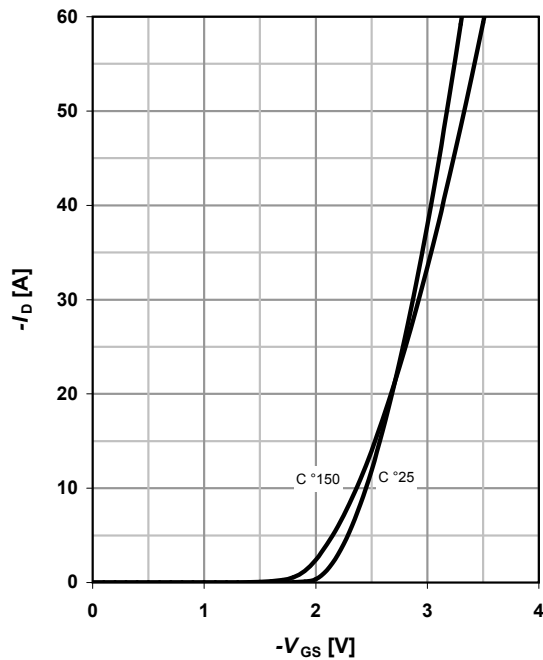
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

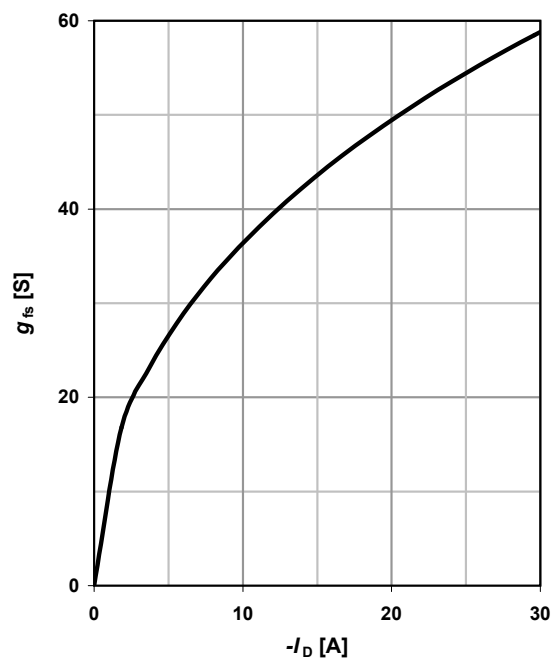
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



**8 Typ. forward transconductance**

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

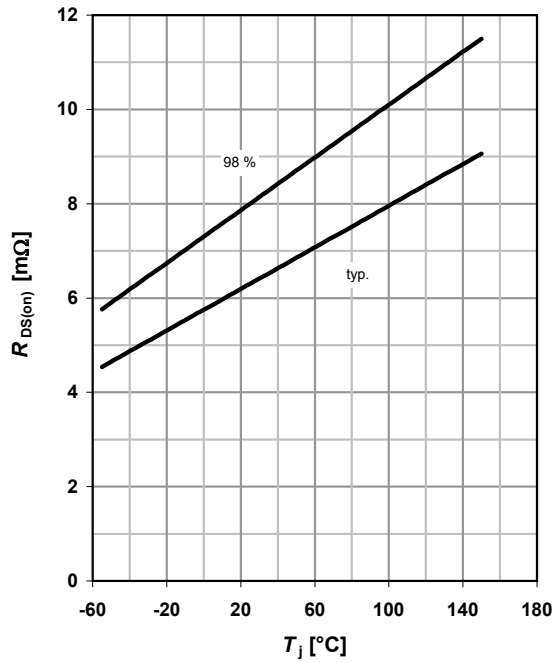




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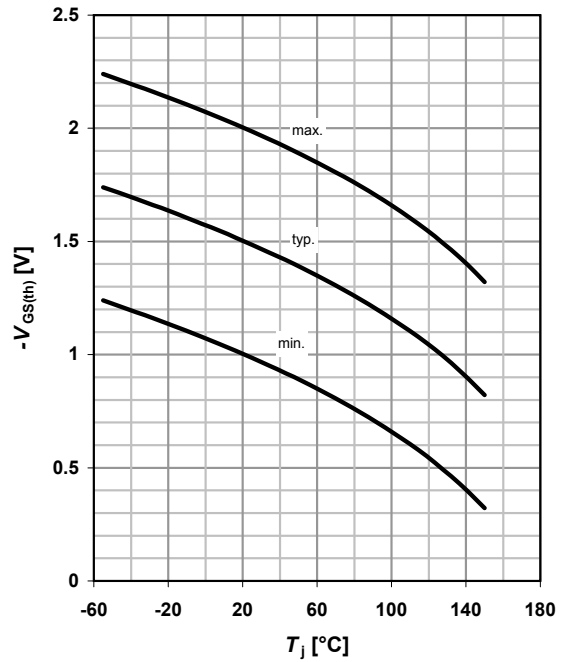
**9 Drain-source on-state resistance**

$R_{DS(on)} = f(T_j); I_D = -14.9 \text{ A}; V_{GS} = -10 \text{ V}$



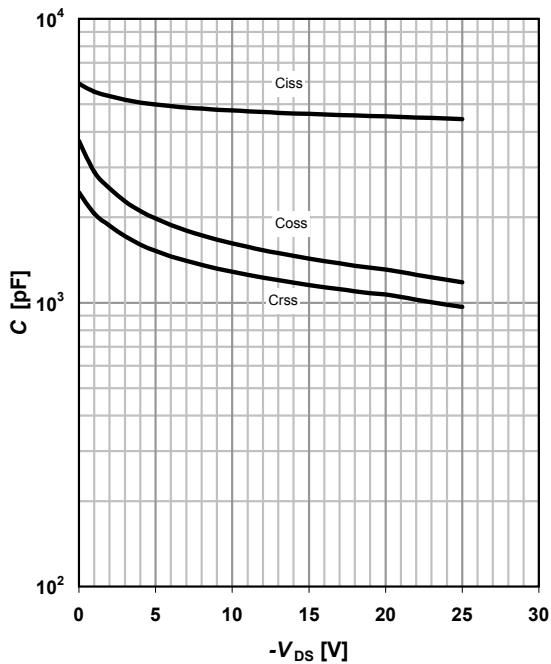
**10 Typ. gate threshold voltage**

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



**11 Typ. capacitances**

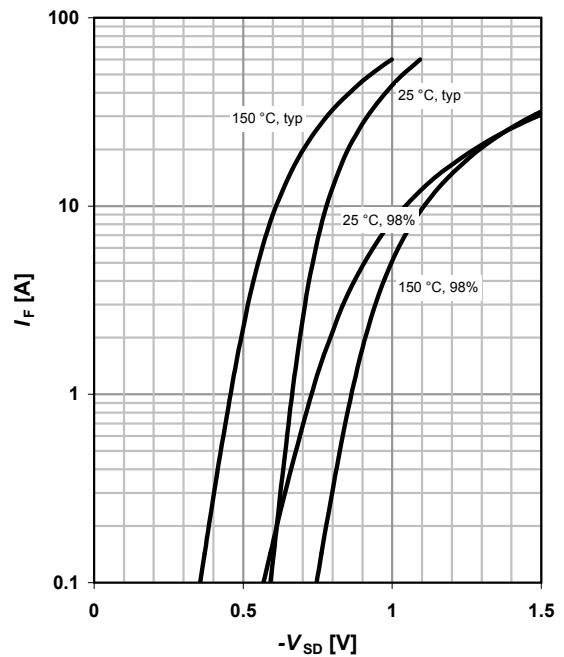
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

parameter:  $T_j$



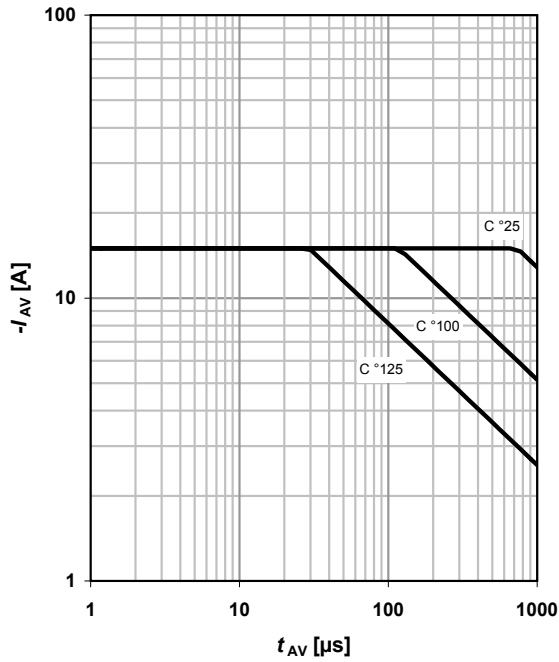


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**13 Avalanche characteristics**

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

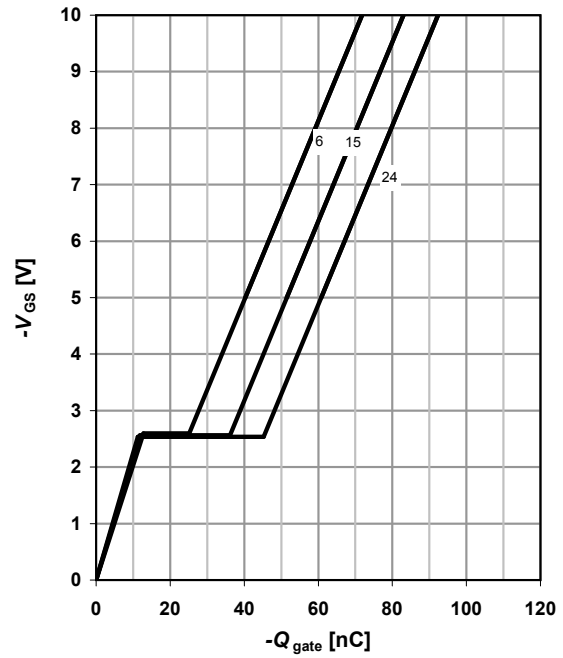
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

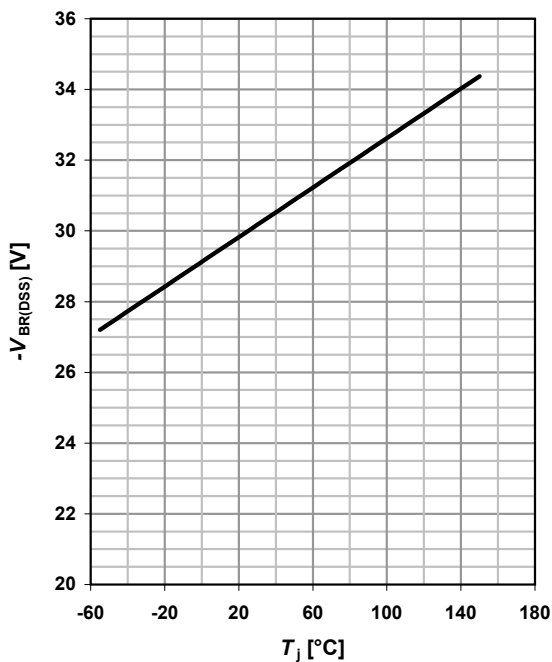
$V_{GS}=f(Q_{gate}); I_D=-14.9 \text{ A pulsed}$

parameter:  $V_{DD}$

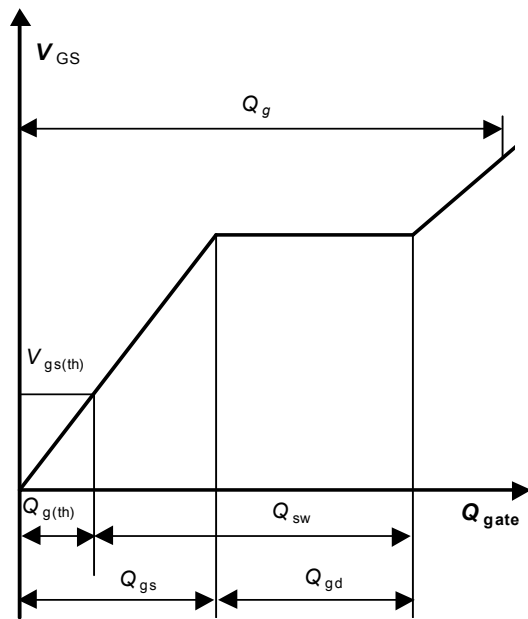


**15 Drain-source breakdown voltage**

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



**16 Gate charge waveforms**



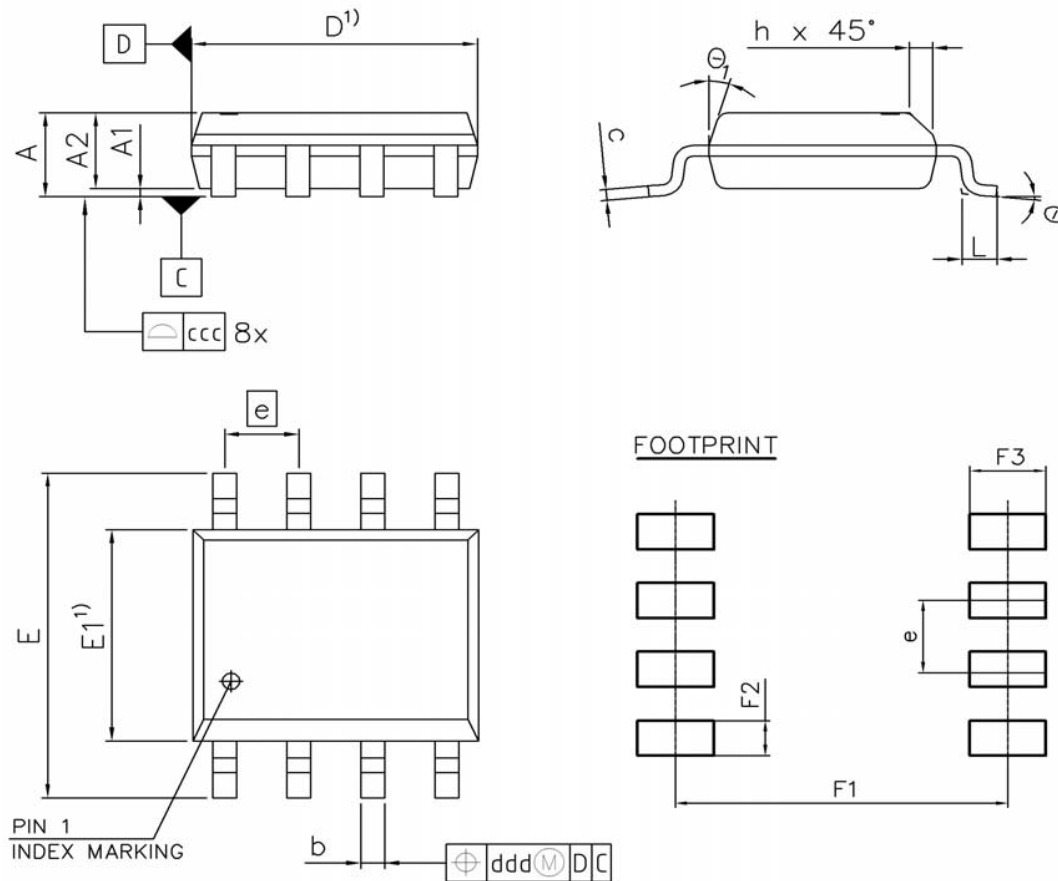




**BSO301SP H**

**Package Outline**

**P-DSO-8: Outline**



1) DOES NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	-	1.75	-	0.069
A1	0.10	-	0.004	-
A2	1.25	1.65	0.049	0.065
b	0.35	0.51	0.014	0.020
c	0.17	0.25	0.007	0.010
D	4.80	5.00	0.189	0.197
E	5.80	6.20	0.228	0.244
E1	3.80	4.00	0.150	0.157
e	1.27		0.050	
N	8		8	
L	0.39	0.89	0.015	0.035
h	0.23	0.50	0.009	0.020
Θ	0°	8°	0°	8°
Θ <sub>1</sub>	-	19°	-	19°
ccc	0.10		0.004	
ddd	0.25		0.010	
F1	5.59	5.79	0.220	0.228
F2	0.55	0.75	0.022	0.030
F3	1.21	1.41	0.048	0.056

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0 1.0 2mm

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