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**BSC084P03NS3E G**

**OptiMOS™ P3 Power-Transistor**

**Features**

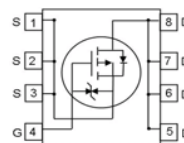
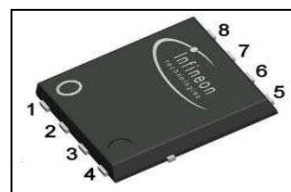
- single P-Channel in SuperSO8
- Qualified according JEDEC<sup>1)</sup> for target applications
- 150 °C operating temperature
- 100% Avalanche tested
- $V_{GS}=25\text{ V}$ , specially suited for notebook applications
- ESD protected
- Pb-free; RoHS compliant
- applications: battery management, load switching
- Halogen-free according to IEC61249-2-21



**Product Summary**

$V_{DS}$	-30	V
$R_{DS(on),max}$	8.4	mΩ
$I_D$	-78.6	A

PG-TDSON-8



Type	Package	Marking	Lead free	Halogen free	Packing
BSC084P03NS3E G	PG-TDSON-8	084P3NSE	Yes	Yes	non dry

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	$I_D$	$T_C=25\text{ °C}$	-78.6	A
		$T_C=70\text{ °C}$	-62.9	
		$T_A=25\text{ °C}$	-14.9	
Pulsed drain current	$I_{D,pulse}$	$T_C=25\text{ °C}^{2)}$	-200	
Avalanche energy, single pulse	$E_{AS}$	$I_D=-50\text{ A}, R_{GS}=25\text{ Ω}$	105	mJ
Gate source voltage	$V_{GS}$		±25	V
Power dissipation	$P_{tot}$	$T_C=25\text{ °C}$	69	W
		$T_A=25\text{ °C}^{1)}$	2.5	
Operating and storage temperature	$T_j, T_{stg}$		-55 ... 150	°C
ESD class		JESD22-A114 HBM	3 ( $\geq 4\text{ kV}$ )	
Soldering temperature			260	°C
IEC climatic category; DIN IEC 68-1			55/150/56	

<sup>1)</sup> J-STD20 and JESD22



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Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - case	$R_{thJC}$		-	-	1.8	K/W
Thermal resistance, junction - ambient	$R_{thJA}$	6 cm <sup>2</sup> cooling area <sup>2)</sup>	-	-	50	

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

**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=-250\mu\text{A}$	-30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-110\mu\text{A}$	-3.0	-2.5	-2.0	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=-30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^\circ\text{C}$	-	-	-1	$\mu\text{A}$
		$V_{DS}=-30\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ }^\circ\text{C}$	-	-	-100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=-25\text{ V}, V_{DS}=0\text{ V}$	-	-	-10	$\mu\text{A}$
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS}=-6\text{ V}, I_D=-30\text{ A}$	-	8.4	14.0	m $\Omega$
		$V_{GS}=-10\text{ V}, I_D=-50\text{ A}$	-	6.1	8.4	
Gate resistance	$R_G$		-	2.2	-	$\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=-50\text{ A}$	33	66	-	S

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



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Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

#### Dynamic characteristics

Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=-15\text{ V},$ $f=1\text{ MHz}$	-	3190	4240	pF
Output capacitance	$C_{oss}$		-	1520	2020	
Reverse transfer capacitance	$C_{rss}$		-	110	160	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=-15\text{ V}, V_{GS}=-$ $10\text{ V}, I_D=-50\text{ A},$ $R_G=6\ \Omega$	-	16.4	24.6	ns
Rise time	$t_r$		-	133.5	200.3	
Turn-off delay time	$t_{d(off)}$		-	33.3	50.0	
Fall time	$t_f$		-	8.1	12.2	

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

Gate to source charge	$Q_{gs}$	$V_{DD}=-24\text{ V}, I_D=-50\text{ A},$ $V_{GS}=0\text{ to }-10\text{ V}$	-	14.8	19.7	nC
Gate charge at threshold	$Q_{g(th)}$		-	5.0	6.7	
Gate to drain charge	$Q_{gd}$		-	7.2	10.8	
Switching charge	$Q_{sw}$		-	16.9	23.7	
Gate charge total	$Q_g$		-	43.4	57.7	
Gate plateau voltage	$V_{plateau}$		-	4.7	-	V
Output charge	$Q_{oss}$	$V_{DD}=-15\text{ V}, V_{GS}=0\text{ V}$	-	34.9	46.4	nC

#### Reverse Diode

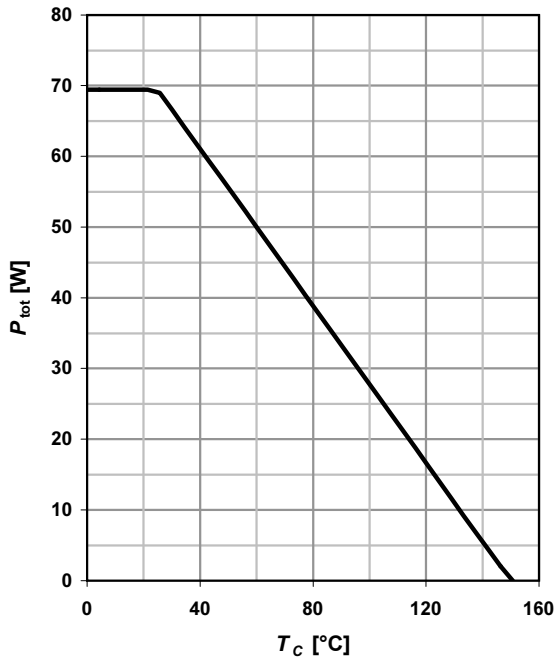
Diode continuous forward current	$I_S$	$T_C=25\text{ }^\circ\text{C}$	-	-	78	A
Diode pulse current	$I_{S,pulse}$		-	-	200	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=-50\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	-	-1.1	V
Reverse recovery time	$t_{rr}$	$V_R=15\text{ V}, I_F= I_S ,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	45.4	-	ns
Reverse recovery charge	$Q_{rr}$		-	49.7	-	nC



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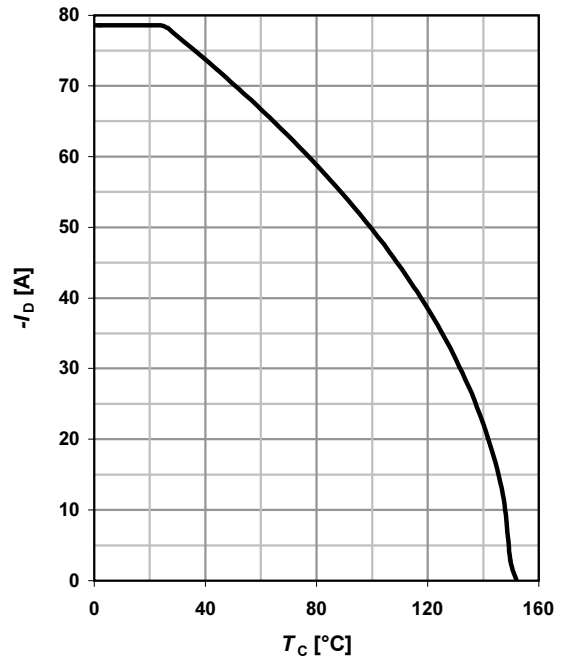
**1 Power dissipation**

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



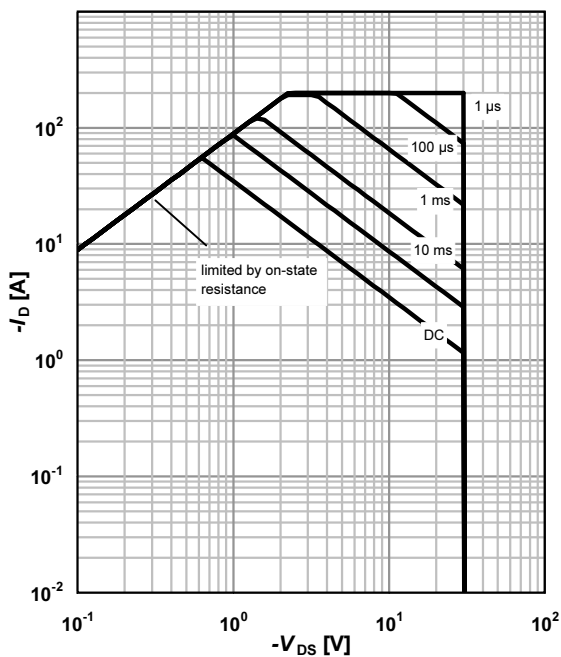
**2 Drain current**

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



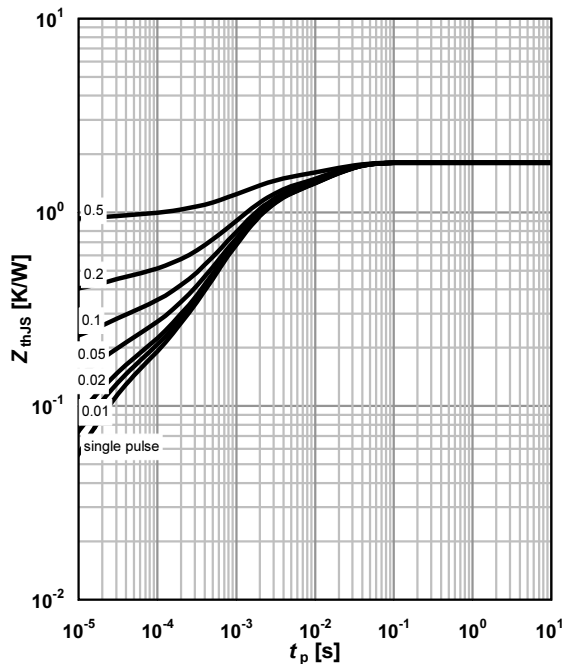
**3 Safe operating area**

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



**4 Max. transient thermal impedance**

$Z_{thJS}=f(t_p)$   
 parameter:  $D=t_p/T$



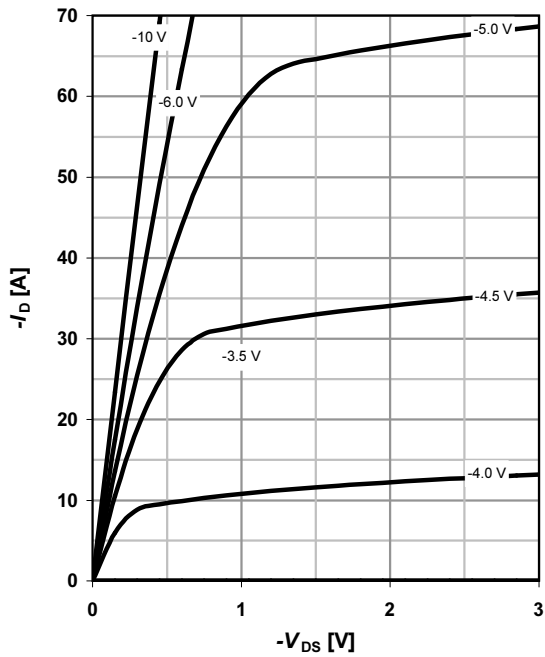


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**5 Typ. output characteristics**

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

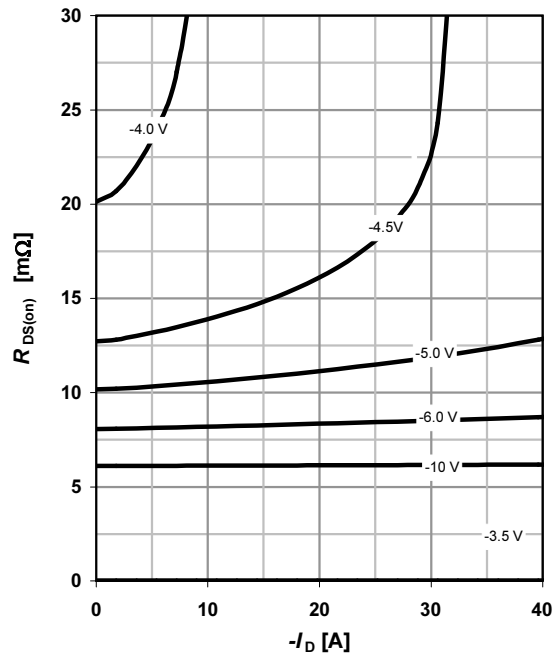
parameter:  $V_{GS}$



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

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

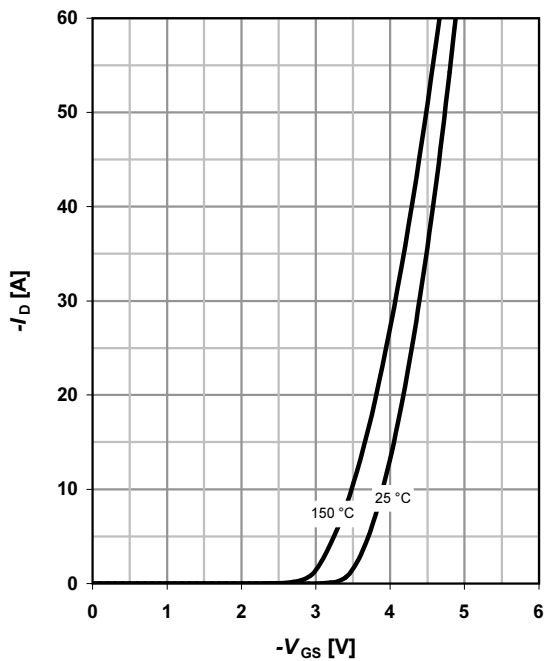
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

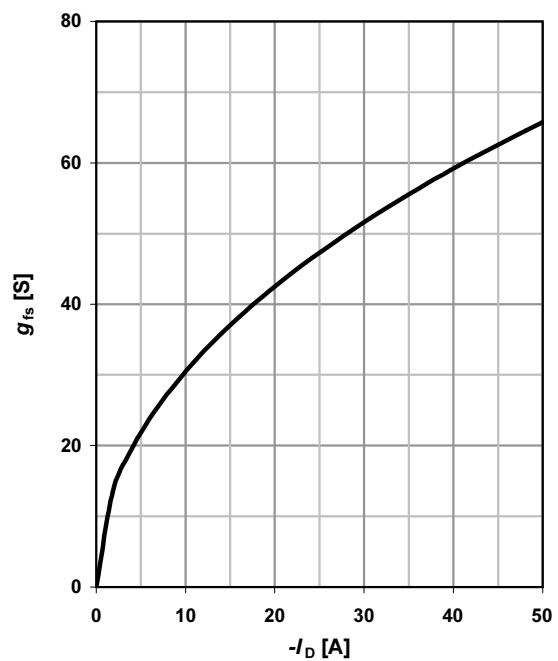
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



**8 Typ. forward transconductance**

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

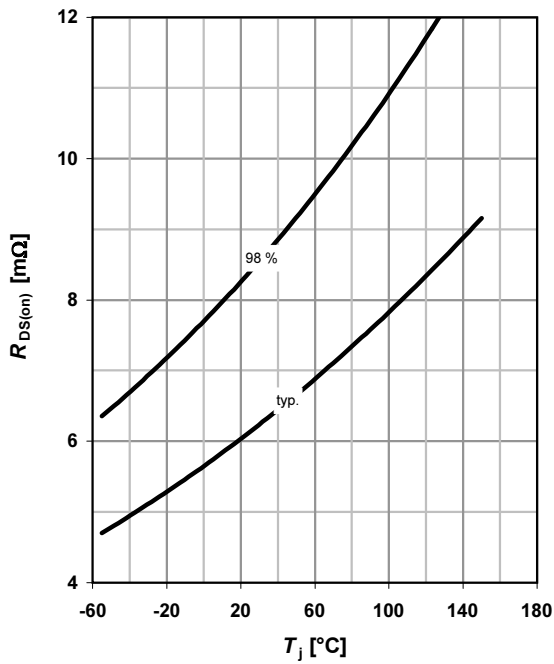




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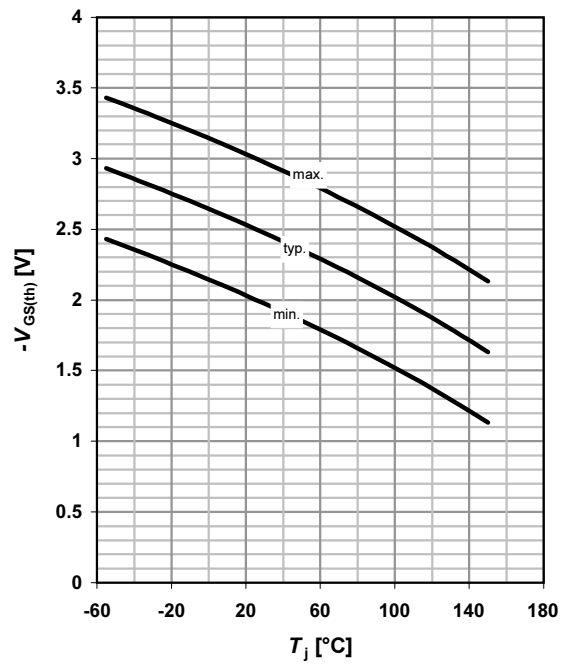
**9 Drain-source on-state resistance**

$R_{DS(on)} = f(T_j); I_D = -30 \text{ A}; V_{GS} = -10 \text{ V}$



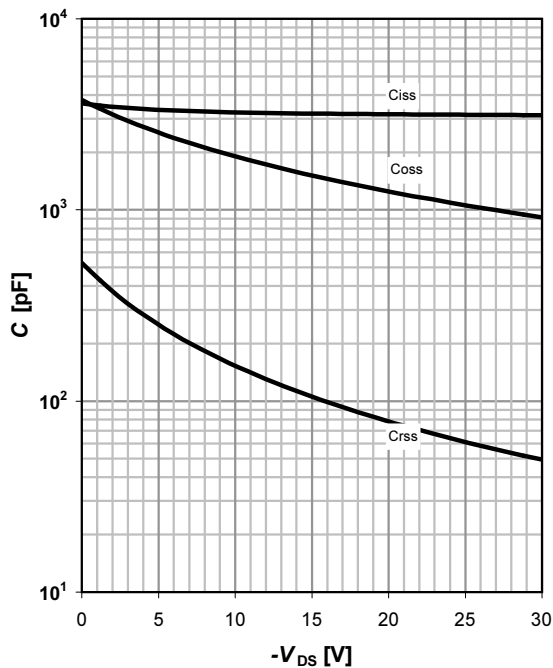
**10 Typ. gate threshold voltage**

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



**11 Typ. capacitances**

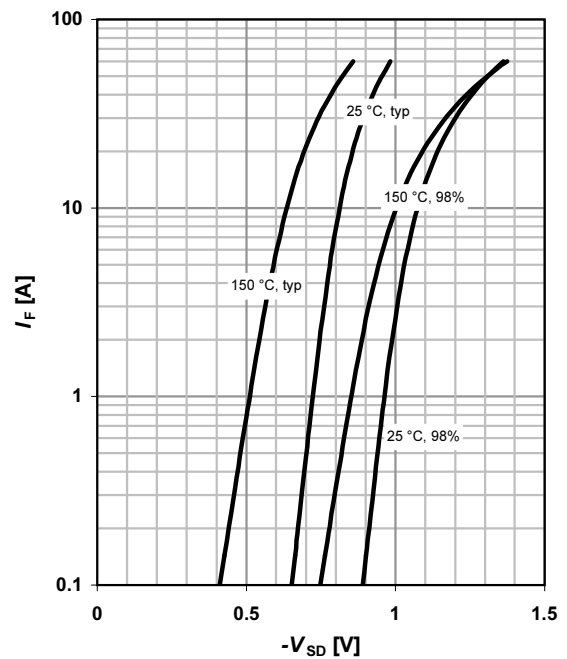
$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

parameter:  $T_j$



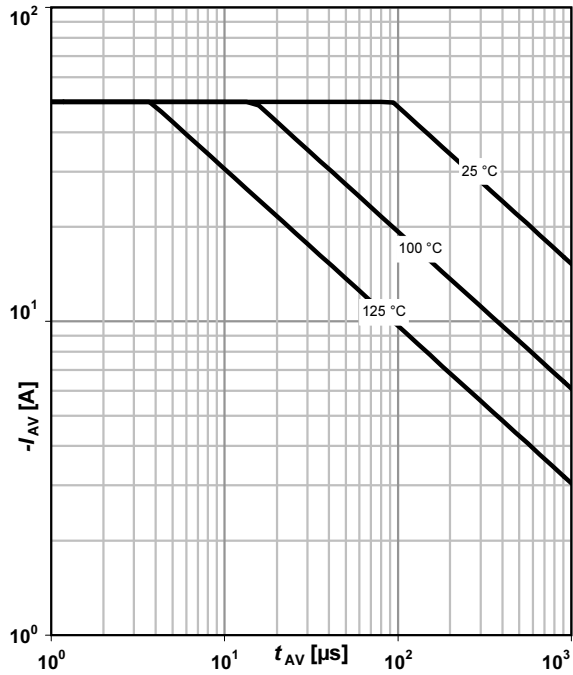


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**13 Avalanche characteristics**

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

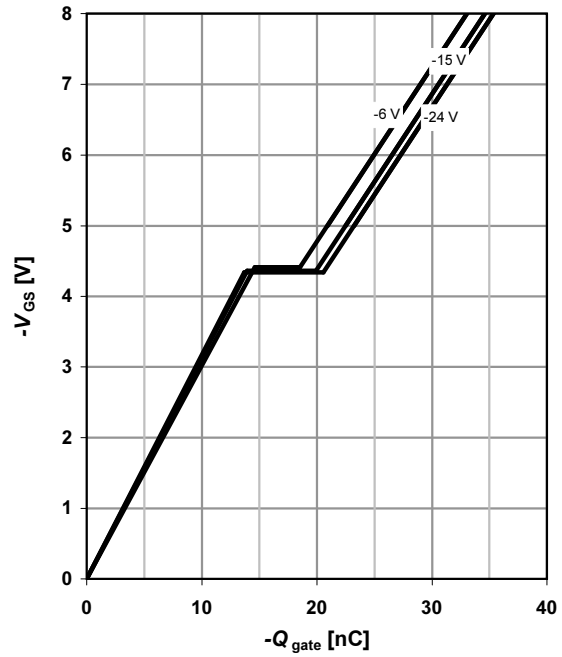
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

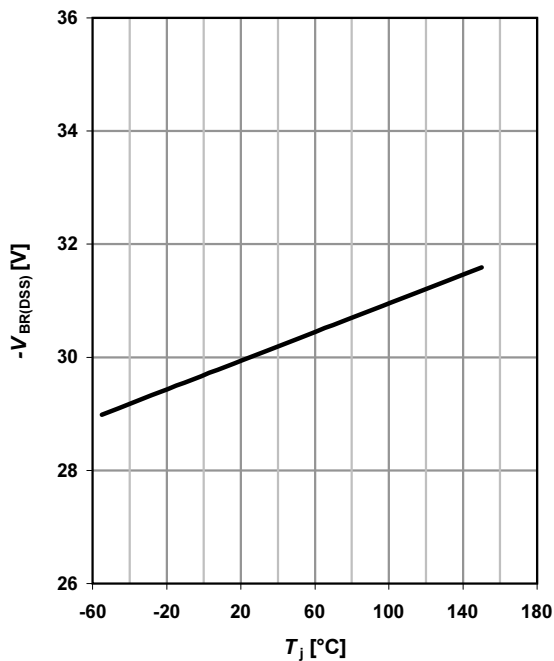
$V_{GS}=f(Q_{gate}); I_D=-50 \text{ A pulsed}$

parameter:  $V_{DD}$

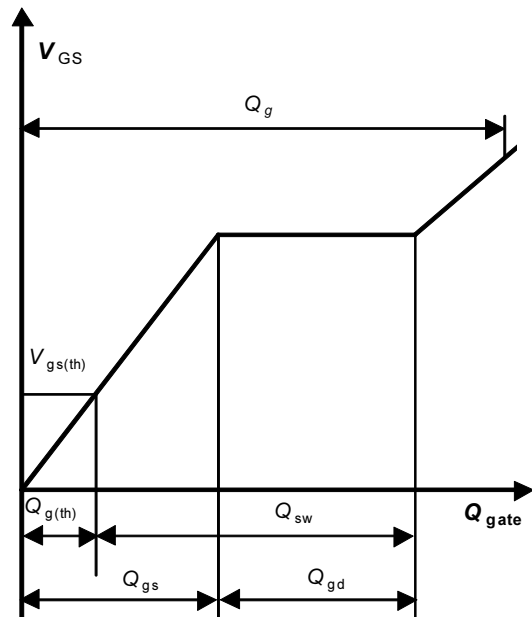


**15 Drain-source breakdown voltage**

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



**16 Gate charge waveforms**



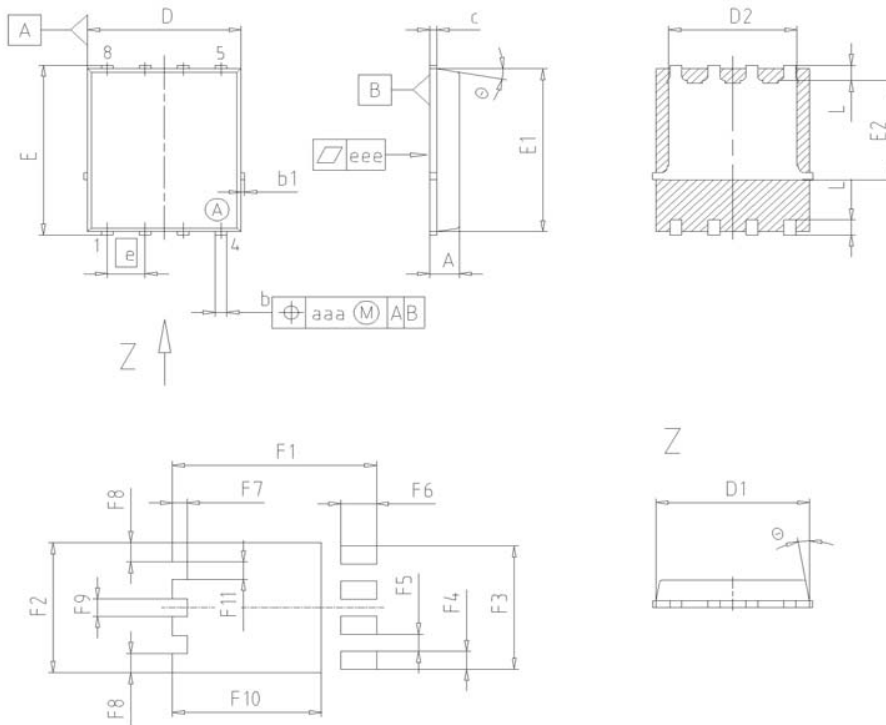




**BSC084P03NS3E G**

**Package Outline**

**PG-TDSON-8**



DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.34	0.54	0.013	0.021
b1	0.02	0.22	0.001	0.008
c	0.15	0.35	0.006	0.014
D=D1	4.95	5.35	0.195	0.211
D2	4.20	4.40	0.165	0.173
E	5.95	6.35	0.234	0.250
E1	5.70	6.10	0.224	0.240
E2	3.40	3.80	0.134	0.150
e	1.27		0.050	
N	8		8	
L	0.45	0.65	0.018	0.026
□	8.5°	11.5°	8.5°	11.5°
aaa	0.25		0.010	
eee	0.05		0.002	
F1	6.75	6.95	0.266	0.274
F2	4.60	4.80	0.181	0.189
F3	4.36	4.56	0.172	0.180
F4	0.55	0.75	0.022	0.030
F5	0.52	0.72	0.020	0.028
F6	1.10	1.30	0.043	0.051
F7	0.40	0.60	0.016	0.024
F8	0.60	0.80	0.024	0.031
F9	0.53	0.73	0.021	0.029
F10	4.90	5.10	0.193	0.201
F11	0.53	0.73	0.021	0.029

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