



**THE DATASHEET OF
IPG20N06S2L65ATMA1**



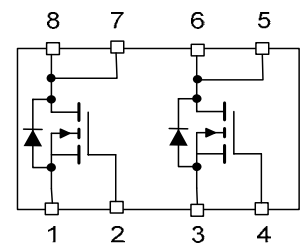
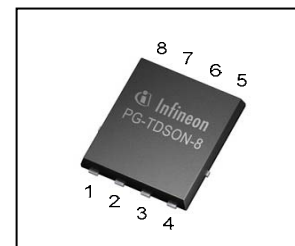
OptiMOS® Power-Transistor

Features

- Dual N-channel Logic Level - Enhancement mode
- AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green Product (RoHS compliant)
- 100% Avalanche tested

Product Summary

V_{DS}	55	V
$R_{DS(on),max}^{3)}$	65	mΩ
I_D	20	A

PG-TDSON-8-4


Type	Package	Marking
IPG20N06S2L-65	PG-TDSON-8-4	2N06L65

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current one channel active ¹⁾	I_D	$T_C=25\text{ °C}$, $V_{GS}=10\text{ V}$	20	A
		$T_C=100\text{ °C}$, $V_{GS}=10\text{ V}$	14	
Pulsed drain current ¹⁾ one channel active	$I_{D,pulse}$	-	80	
Avalanche energy, single pulse ^{1,3)}	E_{AS}	$I_D=10\text{ A}$	40	mJ
Avalanche current, single pulse ³⁾	I_{AS}	-	15	A
Gate source voltage	V_{GS}	-	±20	V
Power dissipation one channel active	P_{tot}	$T_C=25\text{ °C}$	43	W
Operating and storage temperature	T_j, T_{stg}	-	-55 ... +175	°C
IEC climatic category; DIN IEC 68-1	-	-	55/175/56	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Thermal characteristics¹⁾						
Thermal resistance, junction - case	R_{thJC}	-	-	-	3.5	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint	-	100	-	
		6 cm ² cooling area ²⁾	-	60	-	

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

Static characteristics

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	55	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=14\text{ }\mu\text{A}$	1.2	1.6	2.0	
Zero gate voltage drain current ³⁾	I_{DSS}	$V_{DS}=55\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ °C}$	-	0.01	1	μA
		$V_{DS}=55\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ °C}^{2)}$	-	1	100	
Gate-source leakage current ³⁾	I_{GSS}	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$	-	1	100	nA
Drain-source on-state resistance ³⁾	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}, I_D=7.5\text{ A}$	-	67	79	m Ω
		$V_{GS}=10\text{ V}, I_D=15\text{ A}$	-	53	65	

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

Dynamic characteristics¹⁾

Input capacitance ³⁾	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=25\text{ V},$ $f=1\text{ MHz}$	-	315	410	pF
Output capacitance ³⁾	C_{oss}		-	90	120	
Reverse transfer capacitance ³⁾	C_{rss}		-	35	50	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=27.5\text{ V},$ $V_{GS}=10\text{ V}, I_D=20\text{ A},$ $R_G=11\ \Omega$	-	2	-	ns
Rise time	t_r		-	3	-	
Turn-off delay time	$t_{d(off)}$		-	10	-	
Fall time	t_f		-	7	-	

Gate Charge Characteristics^{1, 3)}

Gate to source charge	Q_{gs}	$V_{DD}=44\text{ V}, I_D=20\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	1.2	1.6	nC
Gate to drain charge	Q_{gd}		-	3.5	5.3	
Gate charge total	Q_g		-	9.4	12	
Gate plateau voltage	$V_{plateau}$		-	3.9	-	V

Reverse Diode

Diode continuous forward current ¹⁾ one channel active	I_S	$T_C=25\text{ }^\circ\text{C}$	-	-	20	A
Diode pulse current ¹⁾ one channel active	$I_{S,pulse}$		-	-	80	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=15\text{ A},$ $T_j=25\text{ }^\circ\text{C}$	-	1.0	1.3	V
Reverse recovery time ¹⁾	t_{rr}	$V_R=27.5\text{ V}, I_F=I_S,$ $di_F/dt=100\text{ A}/\mu\text{s}$	-	30	-	ns
Reverse recovery charge ^{1, 3)}	Q_{rr}		-	28	-	nC

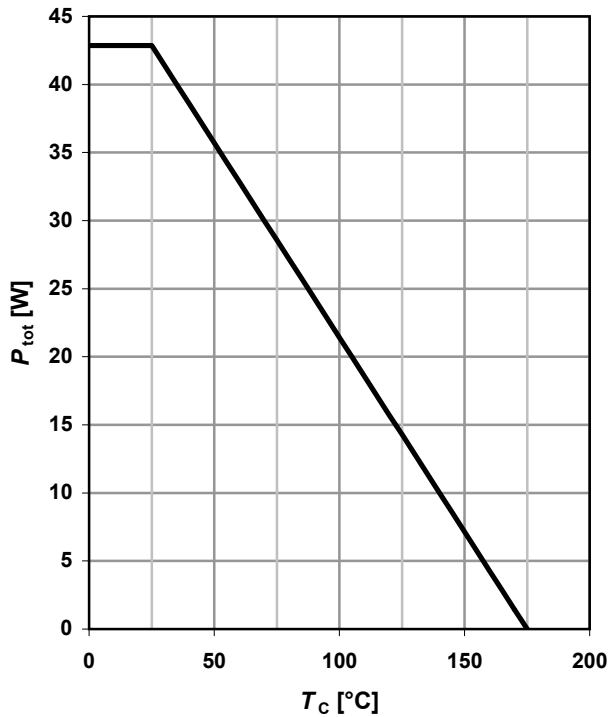
¹⁾ Specified by design. Not subject to production test.

²⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air.

³⁾ Per channel

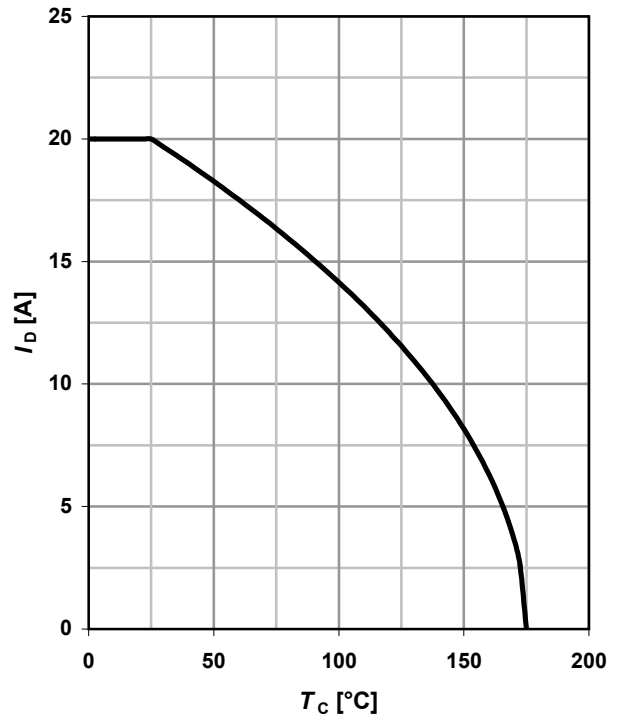
1 Power dissipation

$P_{tot} = f(T_C); V_{GS} \geq 6\text{ V};$ one channel active



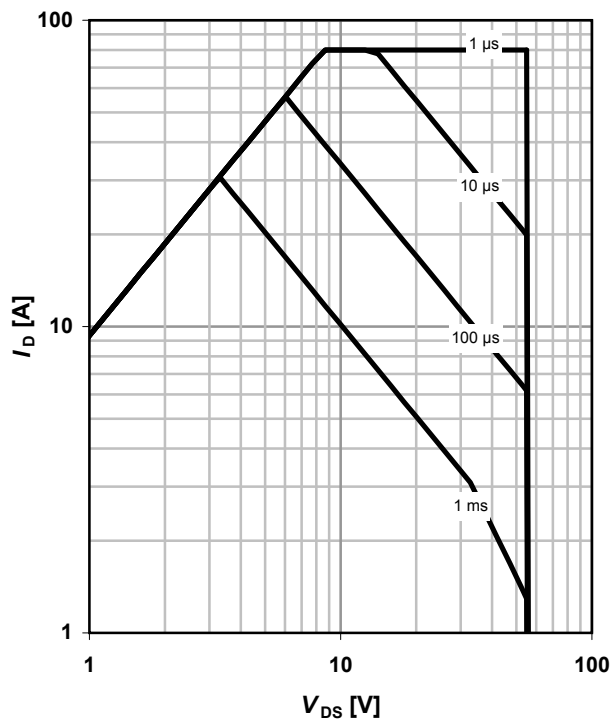
2 Drain current

$I_D = f(T_C); V_{GS} \geq 6\text{ V};$ one channel active



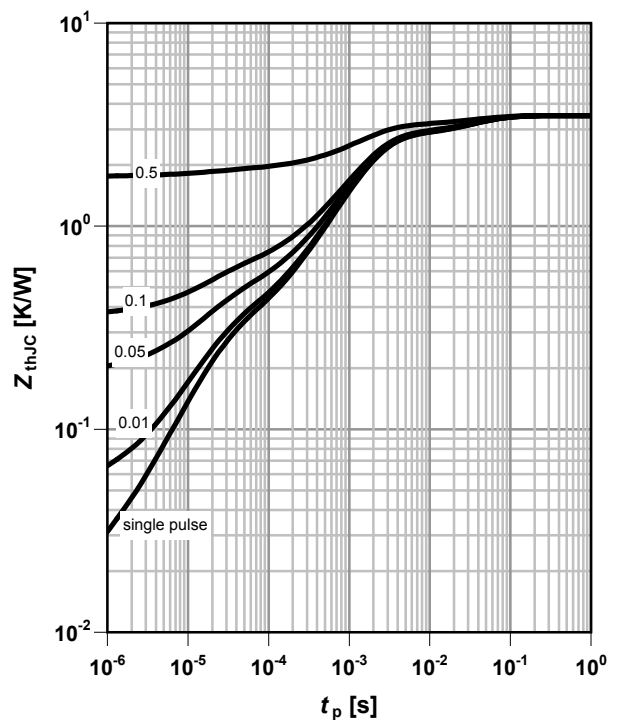
3 Safe operating area

$I_D = f(V_{DS}); T_C = 25^\circ\text{C}; D = 0;$ one channel active
parameter: t_p



4 Max. transient thermal impedance

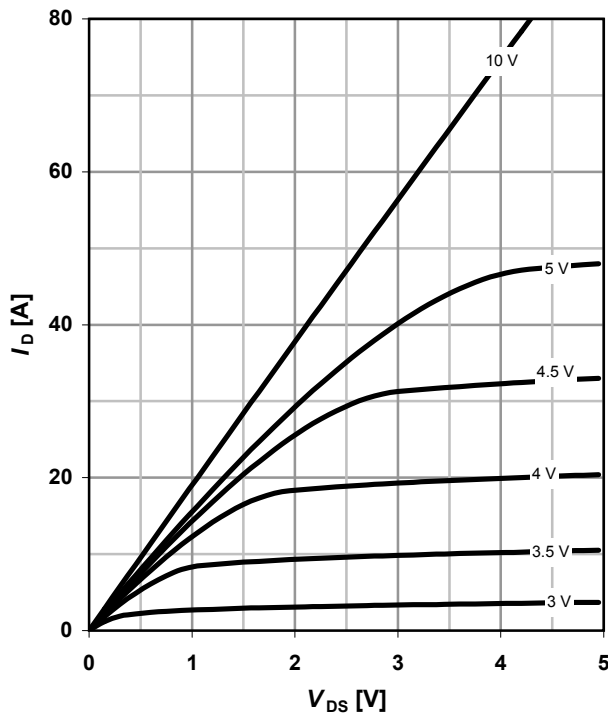
$Z_{thJC} = f(t_p)$
parameter: $D = t_p/T$



5 Typ. output characteristics³⁾

$I_D = f(V_{DS}); T_j = 25\text{ °C}$

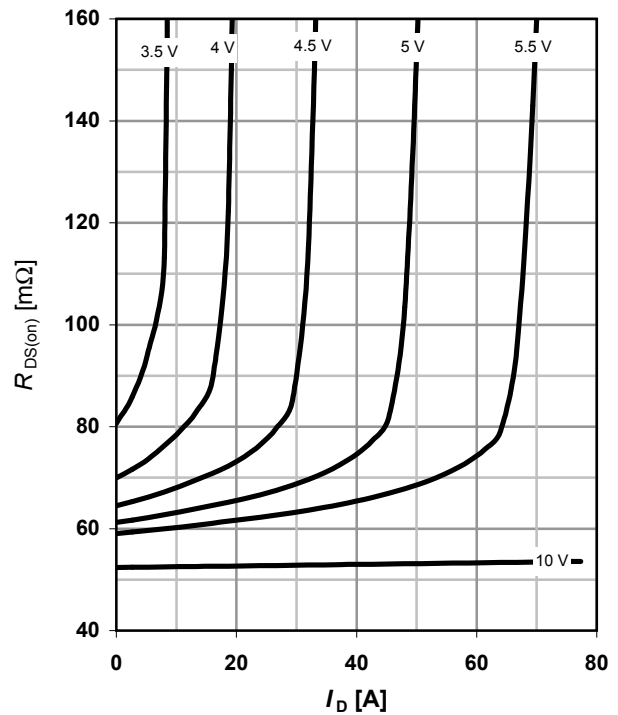
parameter: V_{GS}



6 Typ. drain-source on-state resistance³⁾

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

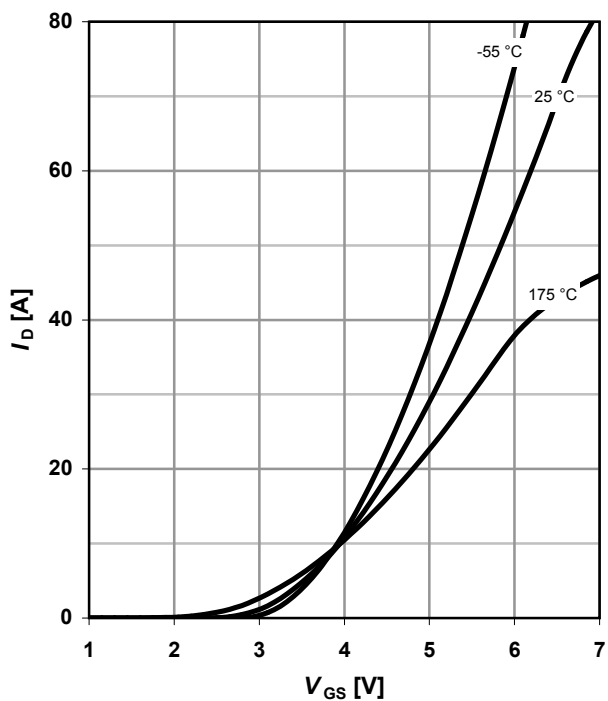
parameter: V_{GS}



7 Typ. transfer characteristics³⁾

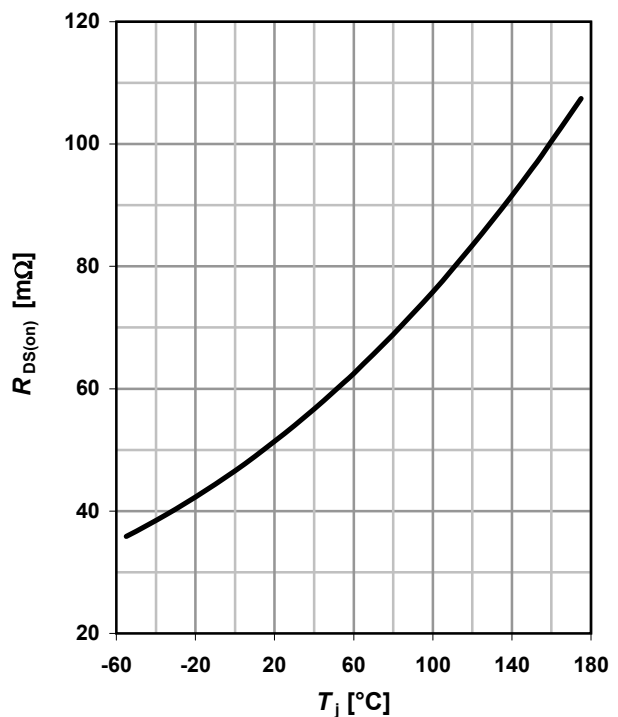
$I_D = f(V_{GS}); V_{DS} = 6V$

parameter: T_j



8 Typ. drain-source on-state resistance³⁾

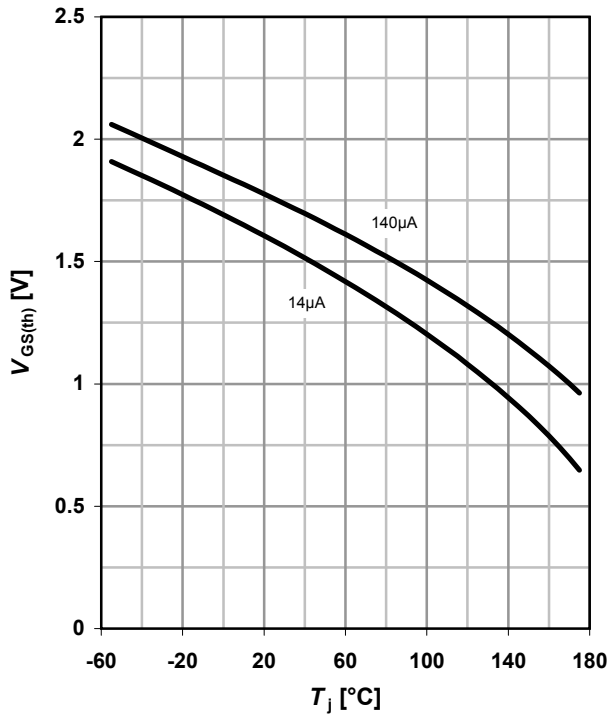
$R_{DS(on)} = f(T_j); I_D = 15\text{ A}; V_{GS} = 10\text{ V}$



9 Typ. gate threshold voltage

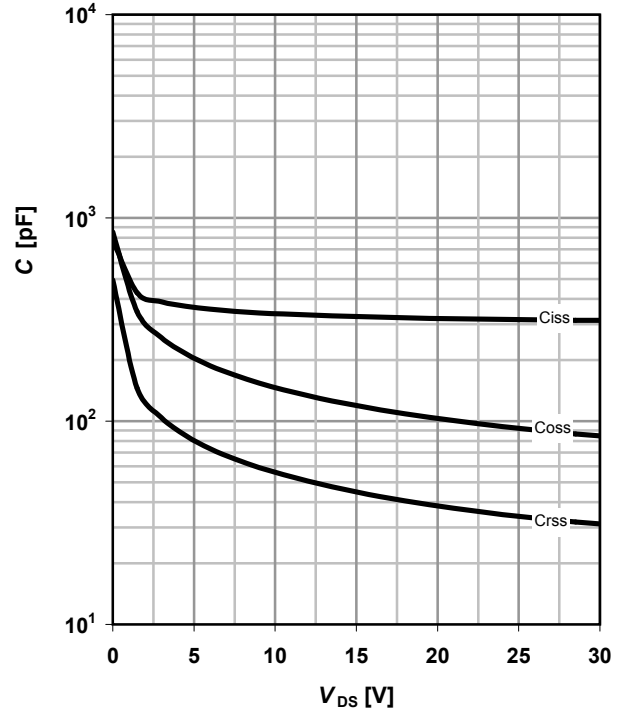
$V_{GS(th)} = f(T_j); V_{GS} = V_{DS}$

parameter: I_D



10 Typ. Capacitances³⁾

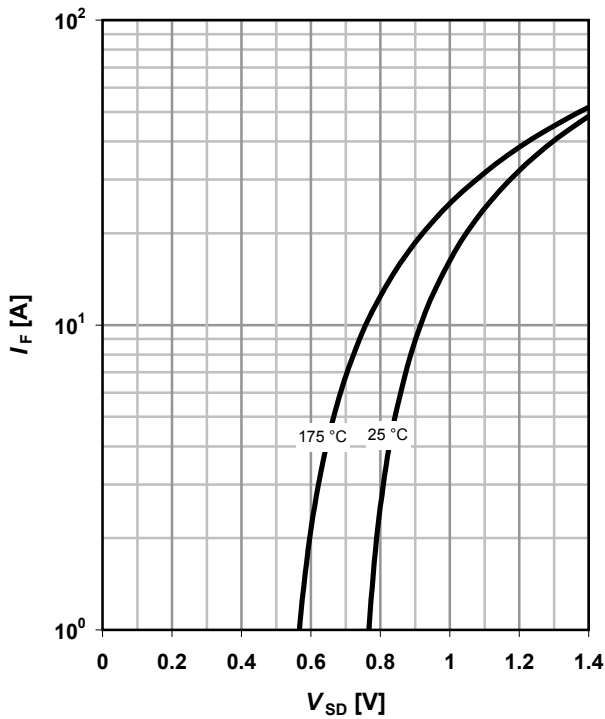
$C = f(V_{DS}); V_{GS} = 0 V; f = 1 MHz$



11 Typical forward diode characteristics³⁾

$I_F = f(V_{SD})$

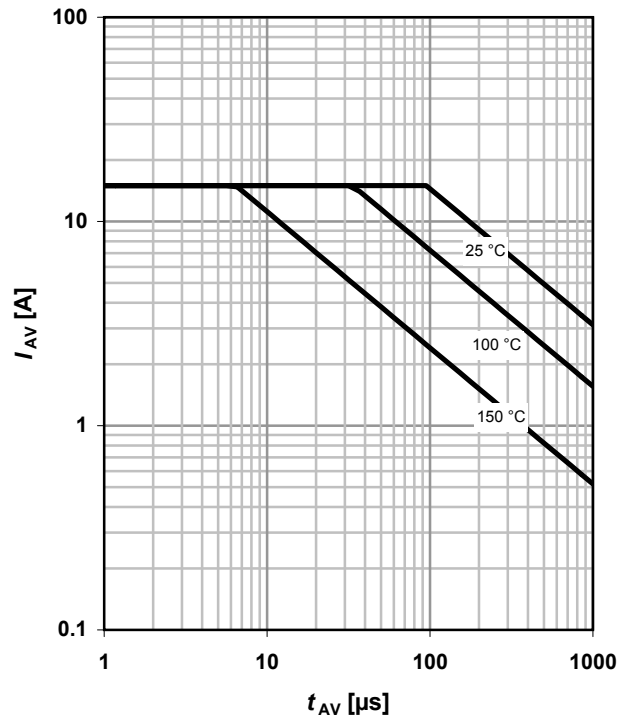
parameter: T_j



12 Avalanche characteristics³⁾

$I_{AS} = f(t_{AV})$

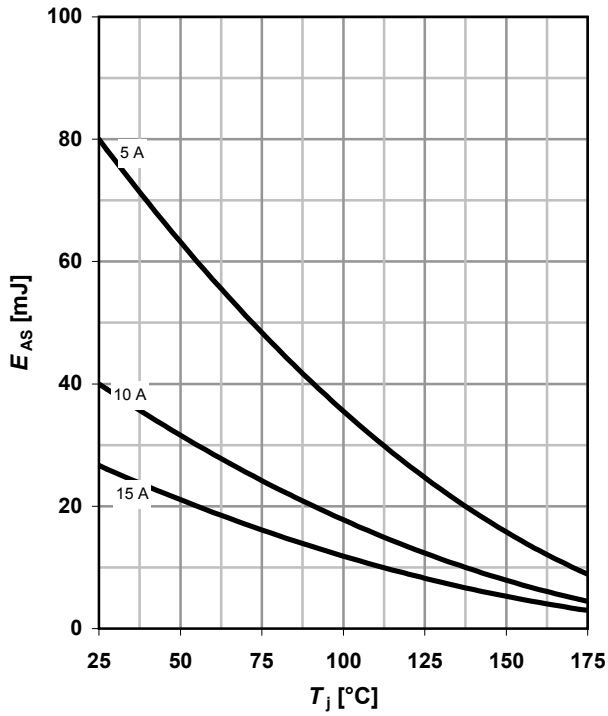
parameter: $T_{j(start)}$



13 Avalanche energy³⁾

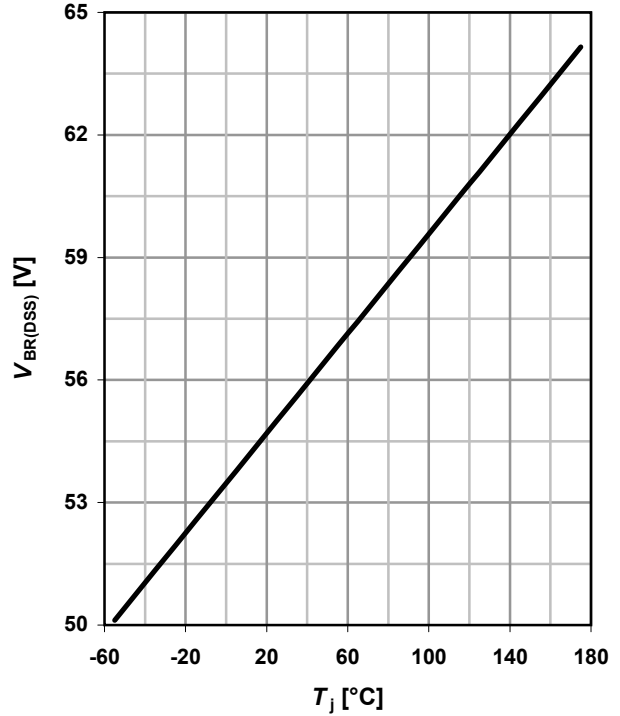
$E_{AS} = f(T_j)$

parameter: I_D



14 Drain-source breakdown voltage

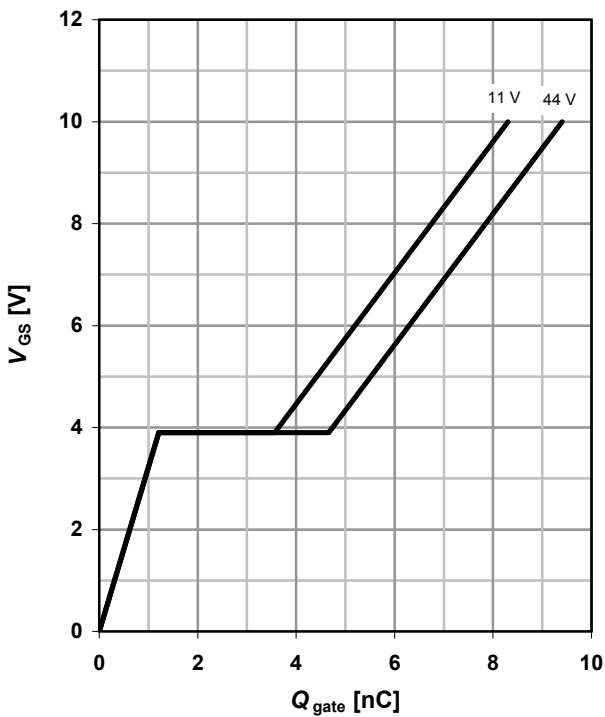
$V_{BR(DSS)} = f(T_j); I_D = 1 \text{ mA}$



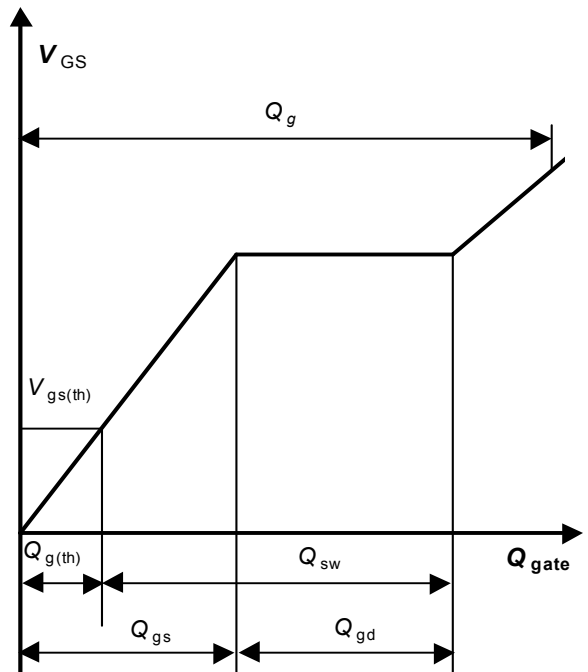
15 Typ. gate charge³⁾

$V_{GS} = f(Q_{gate}); I_D = 20 \text{ A pulsed}$

parameter: V_{DD}



16 Gate charge waveforms



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Revision History

Version	Date	Changes
Revision 1.0	07.09.2009	Final Data Sheet

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