OptiMOS® - T Power-Transistor

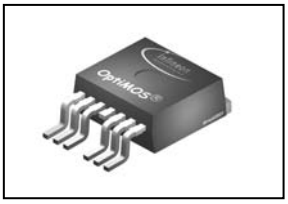
Features

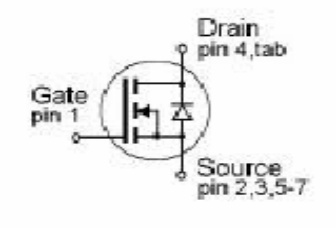
- N-channel - Enhancement mode
- Automotive AEC Q101 qualified
- MSL1 up to 260°C peak reflow
- 175°C operating temperature
- Green package (lead free)
- Ultra low Rds(on)
- 100% Avalanche tested

Product Summary

V_{DS}	40	V
$R_{DS(on),max}$	2.9	mΩ
I_D	160	A

PG-TO263-7-3





Type	Package	Ordering Code	Marking
IPB160N04S2-03	PG-TO263-7-3	SP0002-18151	P2N0403

Maximum ratings, at T_j=25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	T_C=25 °C	160	A
		T_C=100 °C[2)]	160	
Pulsed drain current[2)]	$I_{D,pulse}$	T_C=25 °C	640	
Avalanche energy, single pulse	E_{AS}	I_D=80A	810	mJ
Gate source voltage	V_{GS}		±20	V
Power dissipation	P_{tot}	T_C=25 °C	300	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 characteristics[2]						
Thermal resistance, junction - case	R_{thJC}		-	-	0.5	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint	-	-	62	
		6 cm^2 cooling area[3]	-	-	40	
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=1 mA	40	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250 µA	2.1	3.0	4	
Zero gate voltage drain current	I_{DSS}	V_{DS}=40 V, V_{GS}=0 V, T_j=25 °C	-	0.1	1	µA
		V_{DS}=40 V, V_{GS}=0 V, T_j=125 °C[2]	-	10	100	
Gate-source leakage current	I_{GSS}	V_{GS}=20 V, V_{DS}=0 V	-	1	100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=10 V, I_D=60 A, SMD version	-	2.4	2.9	mΩ

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic characteristics[2]						
Input capacitance	C_{iss}	V_{GS}=0 V, V_{DS}=25 V, f=1 MHz	-	5300	-	pF
Output capacitance	C_{oss}		-	2150	-	
Reverse transfer capacitance	C_{rss}		-	580	-	
Turn-on delay time	$t_{d(on)}$	V_{DD}=20 V, V_{GS}=10 V, I_D=160 A, R_G=2.2 Ω	-	27	-	ns
Rise time	t_r		-	45	-	
Turn-off delay time	$t_{d(off)}$		-	52	-	
Fall time	t_f		-	32	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=32 V, I_D=160 A, V_{GS}=0 to 10 V	-	27	30	nC
Gate to drain charge	Q_{gd}		-	46	75	
Gate charge total	Q_g		-	123	170	
Gate plateau voltage	$V_{plateau}$		-	5.2	-	V
Reverse Diode						
Diode continuous forward current	I_S	T_C=25 °C	-	-	160	A
Diode pulse current	$I_{S,pulse}$		-	-	640	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=80 A, T_j=25 °C	-	0.84	1.3	V

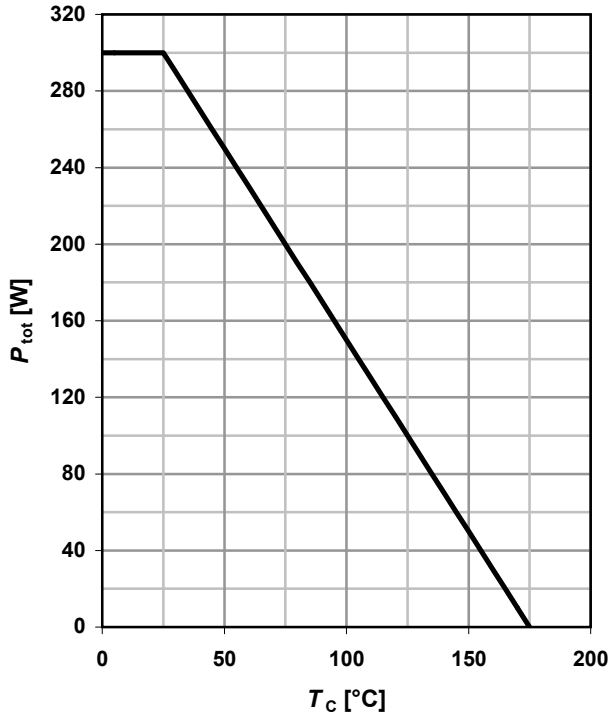
[1] Current is limited by bondwire; with an R_{thJC} = 0.5K/W the chip is able to carry 235A at 25°C. For detailed information see Application Note ANPS071E at *www.infineon.com/optimos*

[2] Defined by design. Not subject to production test.

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

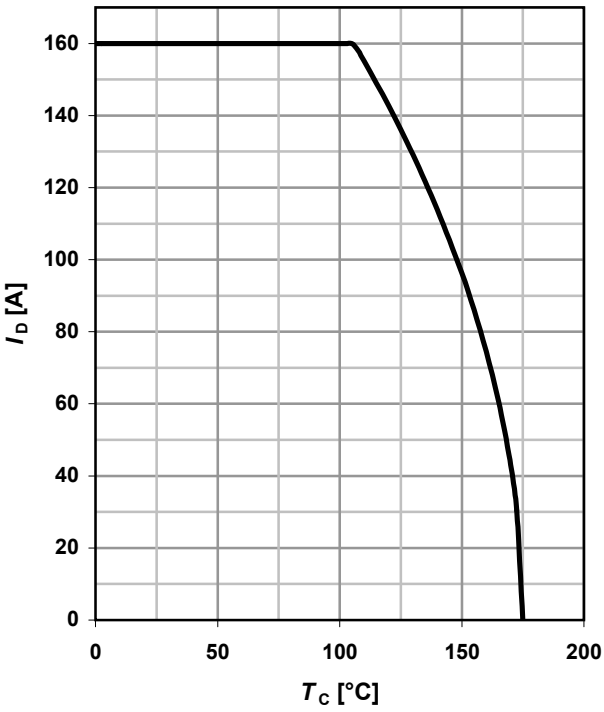
1 Power dissipation

$P_{tot}=f(T_C)$



2 Drain current

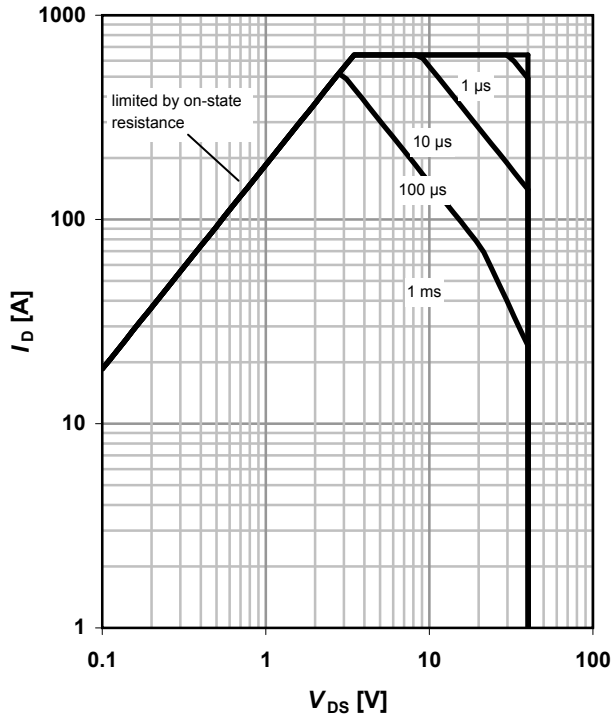
$I_D=f(T_C)$; $V_{GS}\geq 10$ V



3 Safe operating area

$I_D=f(V_{DS})$; $T_C=25$ °C; $D=0$

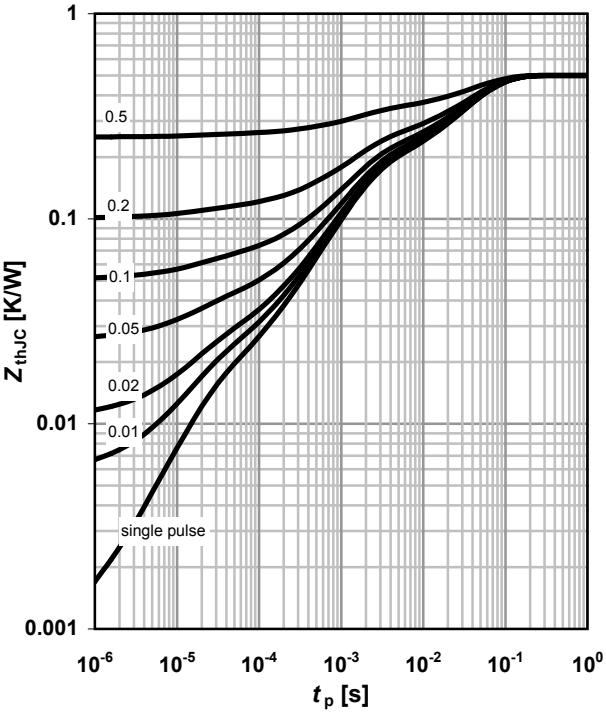
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC}=f(t_p)$

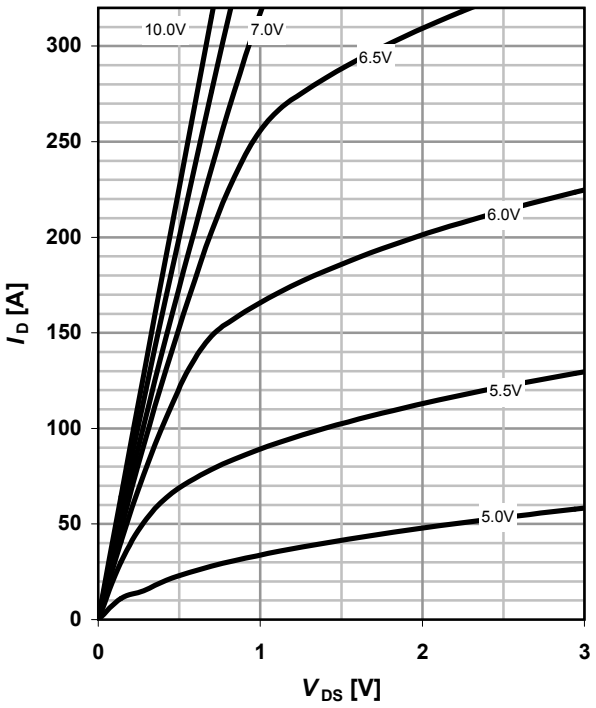
parameter: $D=t_p/T$



5 Typ. output characteristics

I_D=f(V_{DS}); T_j=25 °C

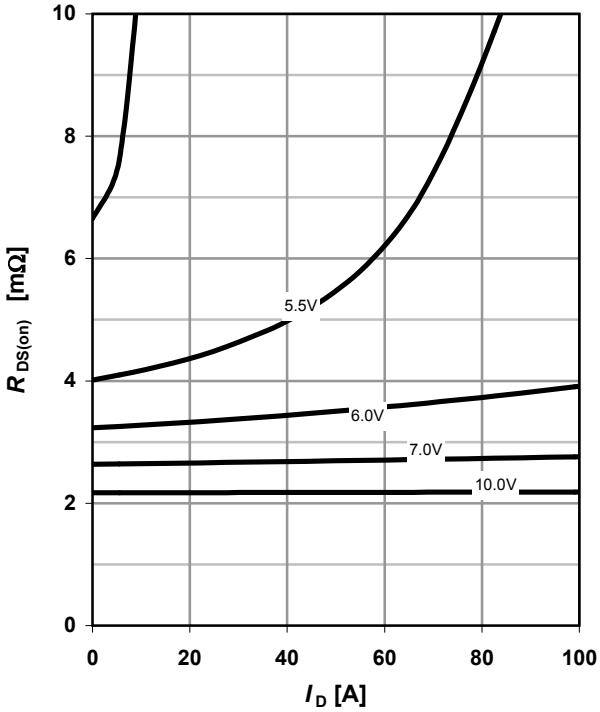
parameter: V_{GS}



6 Typ. drain-source on resistance

$R_{DS(on)}$=f(I_D); T_j=25 °C

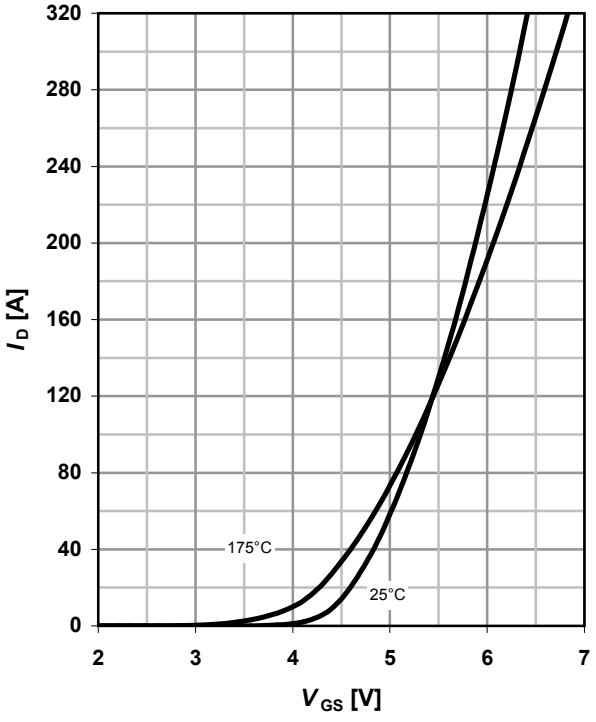
parameter: V_{GS}



7 Typ. transfer characteristics

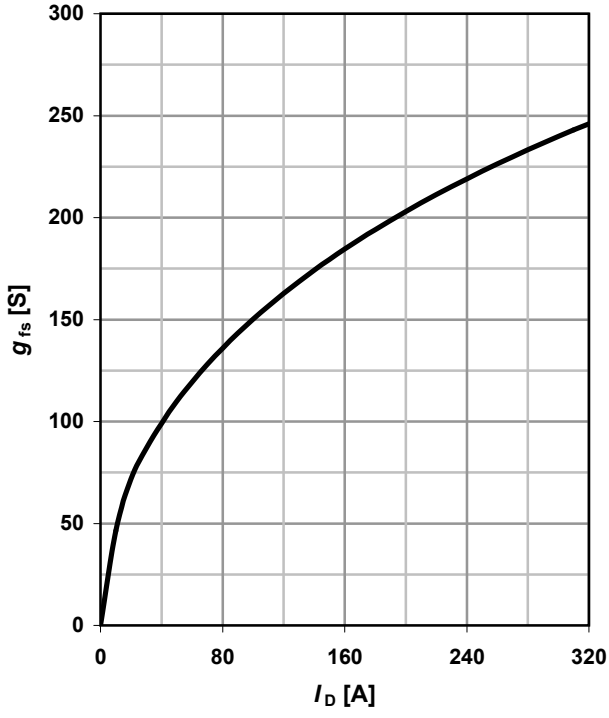
I_D=f(V_{GS}); $|V_{DS}|>2|I_D|R_{DS(on)max}$

parameter: T_j



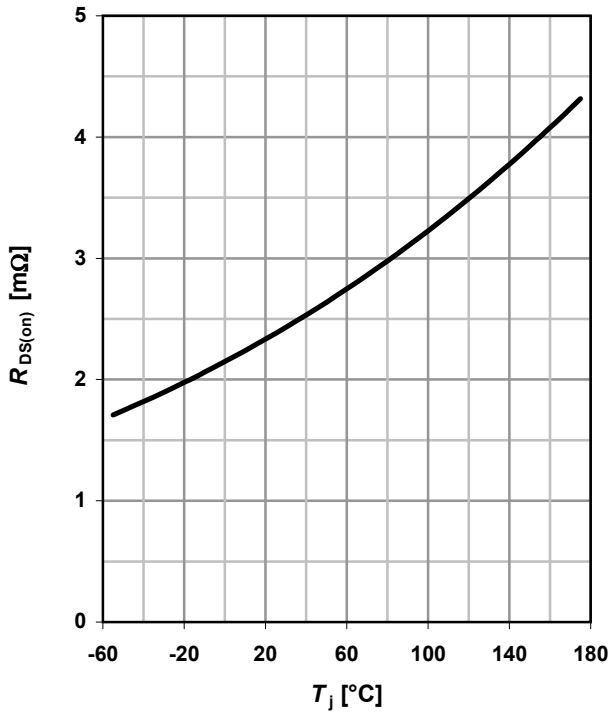
8 Typ. forward transconductance

g_{fs}=f(I_D); T_j=25 °C



9 Drain-source on-state resistance

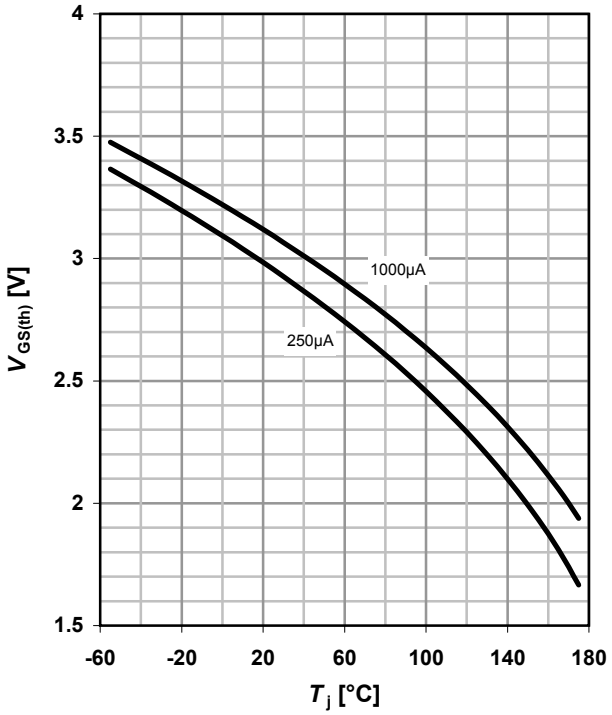
$R_{DS(on)}$=f(T_j); I_D=80 A; V_{GS}=10 V



10 Typ. gate threshold voltage

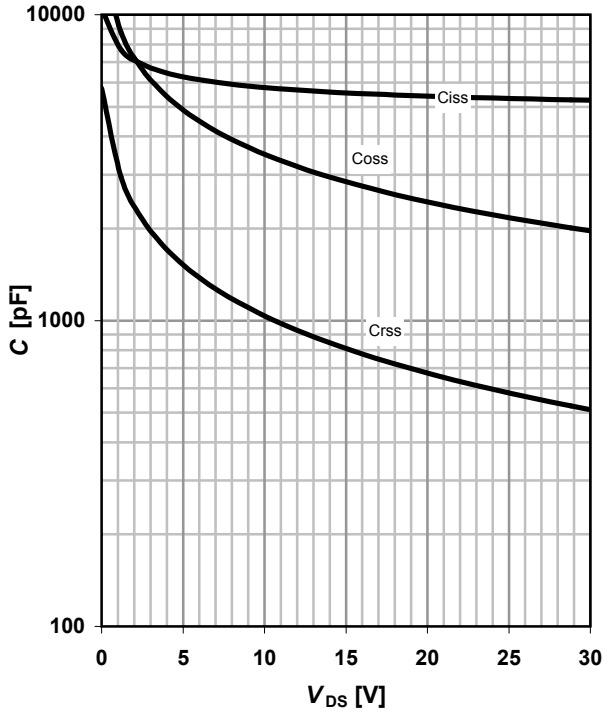
$V_{GS(th)}$=f(T_j); V_{GS}=V_{DS}

parameter: I_D



11 Typ. capacitances

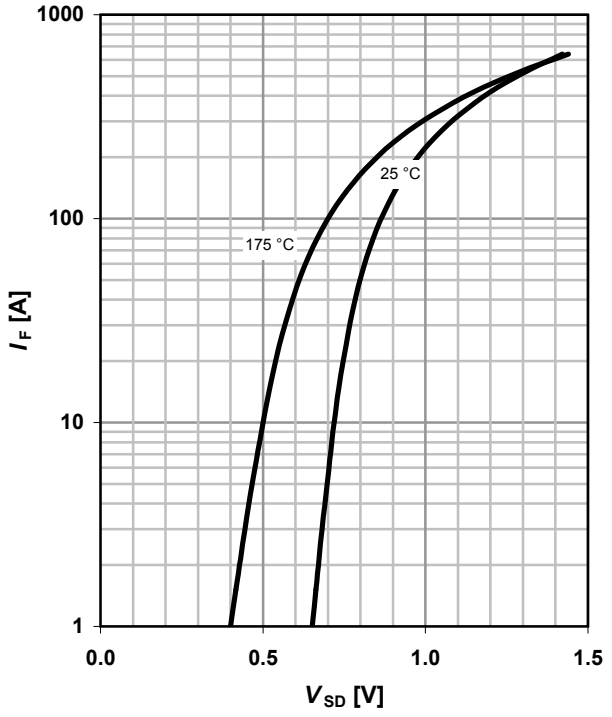
C=f(V_{DS}); V_{GS}=0 V; f=1 MHz



12 Typ. Forward characteristics of reverse diode

I_F=f(V_{SD})

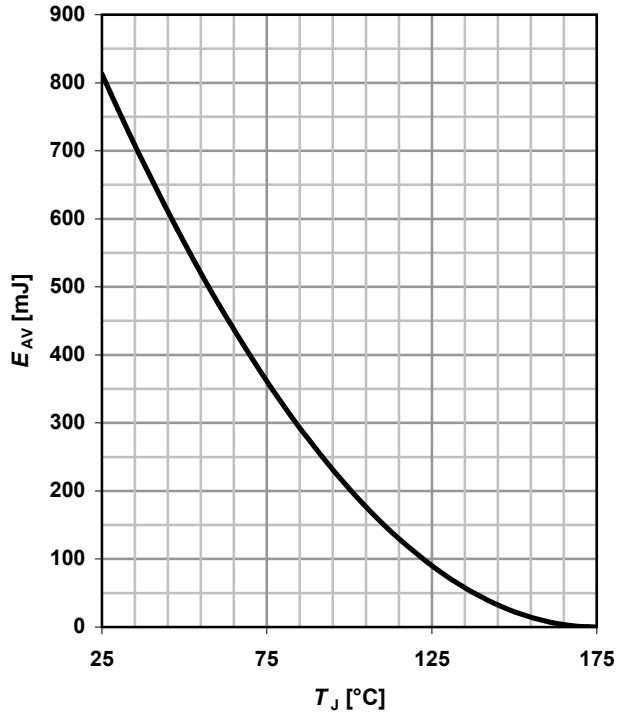
parameter: T_j



13 Typ. avalanche energy

E_{AS}=f(T_J)

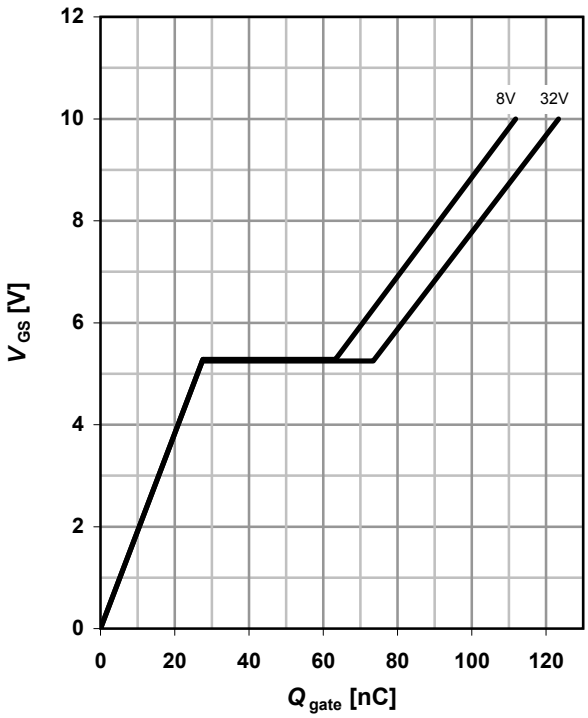
parameter: I_D=80A, V_{DD}=25V



14 Typ. gate charge

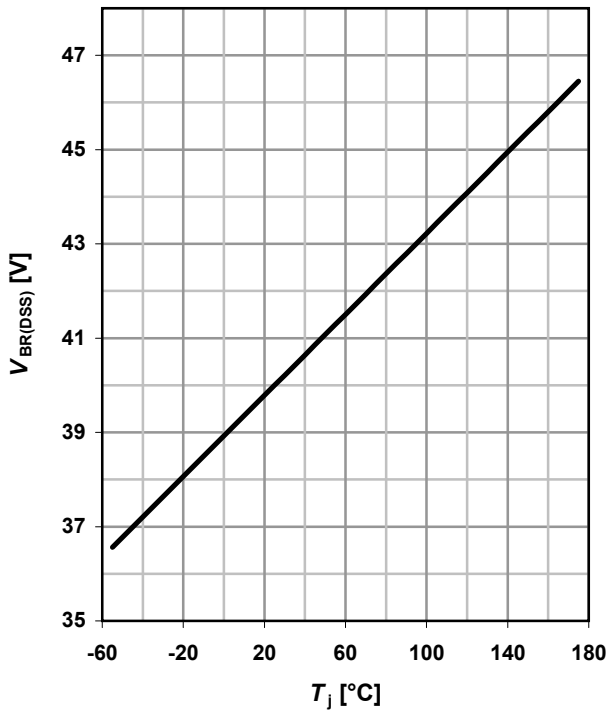
V_{GS}=f(Q_{gate}); I_D=160A pulsed

parameter: V_{DD}

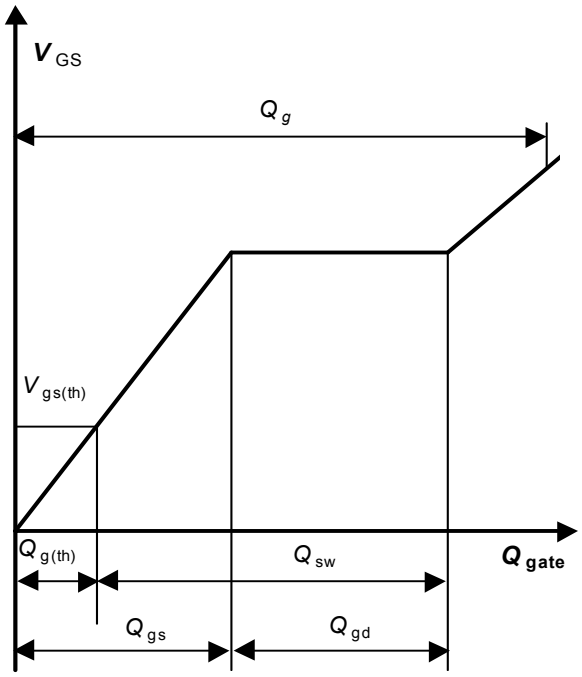


15 Drain-source breakdown voltage

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



16 Gate charge waveforms



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