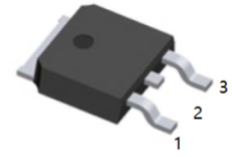


**Features**

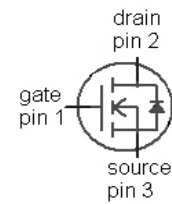
- Fast switching MOSFET for SMPS
- Optimized technology for DC/DC converters
- Excellent gate charge x R<sub>DS(on)</sub> product (FOM)
- Very low on-resistance R<sub>DS(on)</sub>
- Avalanche rated

**Product Summary**

- V<sub>DS</sub>=30 V
- R<sub>DS(on),max</sub>=13.5mΩ
- I<sub>D</sub> =30A



1.G 2.D 3.S  
TO-252(DPAK) top view



**Maximum ratings, at T<sub>J</sub>=25°C unless otherwise specified**

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I <sub>D</sub>	V <sub>GS</sub> =10 V, T <sub>C</sub> =25 °C	30	A
		V <sub>GS</sub> =10 V, T <sub>C</sub> =100 °C	26	
		V <sub>GS</sub> =4.5 V, T <sub>C</sub> =25 °C	30	
		V <sub>GS</sub> =4.5 V, T <sub>C</sub> =100 °C	21	
Pulsed drain current <sup>2)</sup>	I <sub>D,pulse</sub>	T <sub>C</sub> =25 °C	210	
Avalanche current single pulse <sup>3)</sup>	I <sub>AS</sub>	T <sub>C</sub> =25 °C	30	
Avalanche energy, single pulse	E <sub>AS</sub>	I <sub>D</sub> =10 A, R <sub>GS</sub> =25 Ω	20	mJ
Reverse diode dv/dt	dv/dt	I <sub>D</sub> =30 A, V <sub>DS</sub> =24 V, di/dt=200 A/μs, T <sub>j,max</sub> =175 °C	6	kV/μs
Gate source voltage	V <sub>GS</sub>		±20	V

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

**Maximum ratings, at  $T_J=25^\circ\text{C}$  unless otherwise specified**

Parameter	Symbol	Conditions	Value			Unit
Power dissipation	$P_{tot}$	$T_C=25^\circ\text{C}$	31			W
Operating and storage temperature	$T_j, T_{stg}$		-55-175			$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1			55/175/56			
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Thermal characteristics**

Thermal resistance, junction - case	$R_{thJC}$				4.9	K/W
SMD version, device on PCB	$R_{thJA}$	minimal footprint			75	
		6 cm <sup>2</sup> cooling area <sup>4)</sup>			50	

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

**Static characteristics**

Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	30			V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\ \mu\text{A}$	1.0	1.7	2.5	
Zero gate voltage drain current	$I_{DSS}$	$V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_J=25^\circ\text{C}$		0.1	1	$\mu\text{A}$
		$V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_J=125^\circ\text{C}$		10	100	
Gate-source leakage current	$I_{GSS}$	$V_{GS}=20\text{ V}, V_{DS}=0\text{ V}$		10	100	nA
Drain-source on-state resistance <sup>5)</sup>	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}, I_D=20\text{ A}$		16.4	20.5	$\text{m}\Omega$
		$V_{GS}=10\text{ V}, I_D=30\text{ A}$		11.3	13.5	
Gate resistance	$R_G$			1.2		$\Omega$
Transconductance	$g_{fs}$	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=30\text{ A}$	22	43		S

<sup>2)</sup> See figure 3 for more detailed information

<sup>3)</sup> See figure 13 for more detailed information

<sup>4)</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.

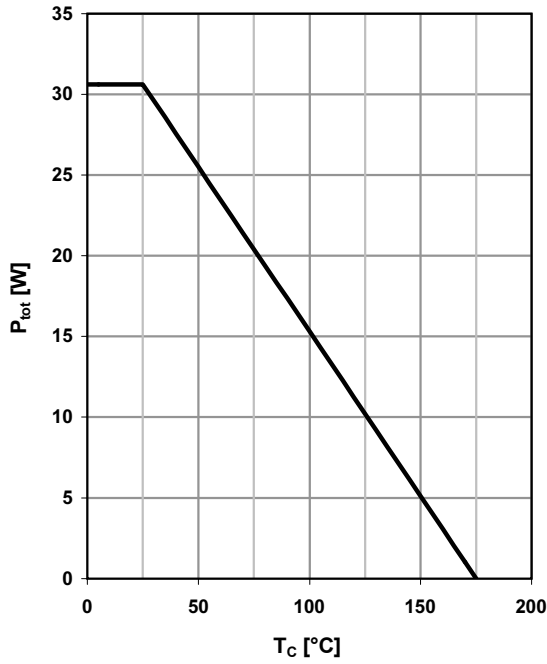
<sup>5)</sup> Measured from drain tab to source pin

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
<b>Dynamic characteristics</b>						
Input capacitance	$C_{iss}$	$V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$		770	1000	pF
Output capacitance	$C_{oss}$			350	470	
Reverse transfer capacitance	$C_{rss}$			16		
Turn-on delay time	$t_{d(on)}$	$V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$ $I_D=30\text{ A}, R_G=1.6\ \Omega$		3.0		ns
Rise time	$t_r$			3.0		
Turn-off delay time	$t_{d(off)}$			12		
Fall time	$t_f$			2.2		
<b>Gate Charge Characteristics<sup>6)</sup></b>						
Gate to source charge	$Q_{gs}$	$V_{DD}=15\text{ V}, I_D=30\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$		2.7		nC
Gate charge at threshold	$Q_{g(th)}$			1.2		
Gate to drain charge	$Q_{gd}$			1.2		
Switching charge	$Q_{sw}$			2.6		
Gate charge total	$Q_g$			4.8	6.4	
Gate plateau voltage	$V_{plateau}$			3.5		
Gate charge total	$Q_g$	$V_{DD}=15\text{ V}, I_D=30\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$		10		nC
Gate charge total, sync. FET	$Q_{g(sync)}$	$V_{DS}=0.1\text{ V},$ $V_{GS}=0\text{ to }4.5\text{ V}$		4.2	5.5	
Output charge	$Q_{oss}$	$V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$		9		
<b>Reverse Diode</b>						
Diode continuous forward current	$I_S$	$T_C=25\text{ }^\circ\text{C}$			25	A
Diode pulse current	$I_{S,pulse}$				210	
Diode forward voltage	$V_{SD}$	$V_{GS}=0\text{ V}, I_F=30\text{ A},$ $T_J=25\text{ }^\circ\text{C}$		0.98	1.2	V
Reverse recovery charge	$Q_{rr}$	$V_R=15\text{ V}, I_F=I_S,$ $d_F I dt=400\text{ A}\mu\text{s}$			10	nC

<sup>6)</sup> See figure 16 for gate charge parameter definition

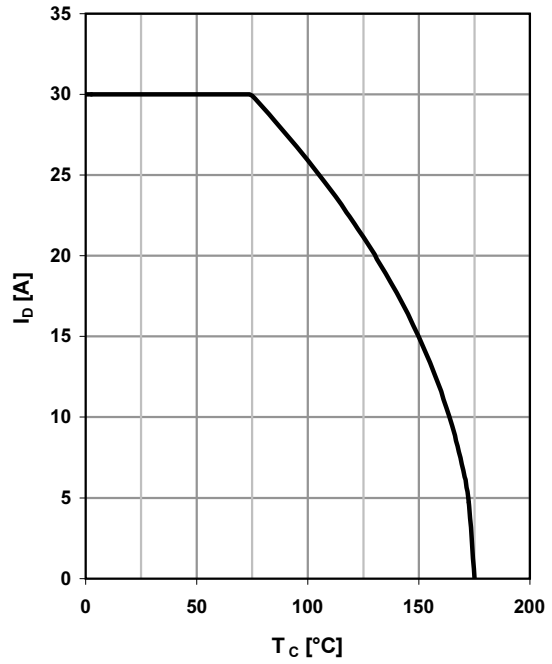
**1 Power dissipation**

$P_{tot}=f(T_c)$



**2 Drain current**

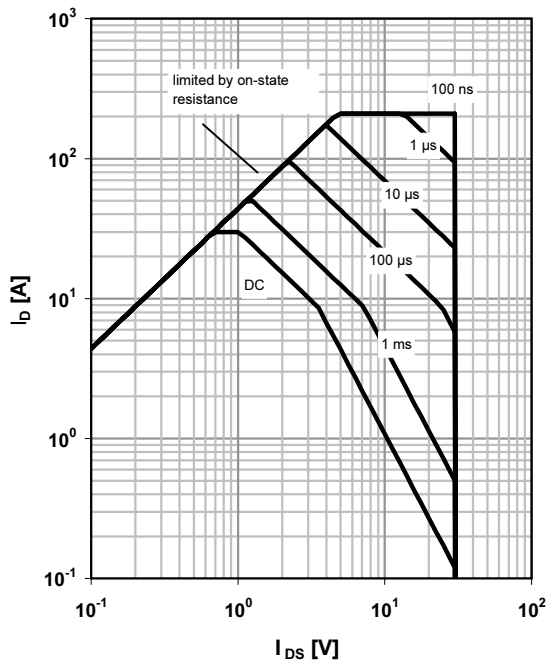
$I_D=f(T_c); V_{GS} \geq 10V$



**3 Safe operating area**

$I_D=f(V_{DS}); T_c=25^\circ C; D=0$

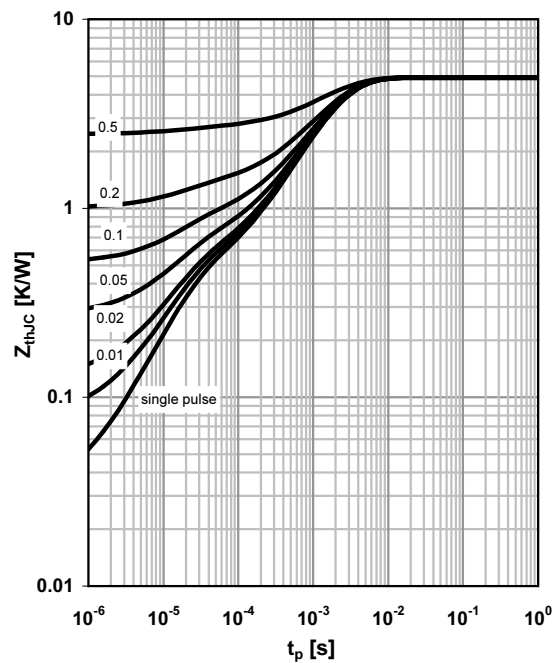
parameter:  $t_p$



**4 Max. transient thermal impedance**

$Z_{thJC}=f(t_p)$

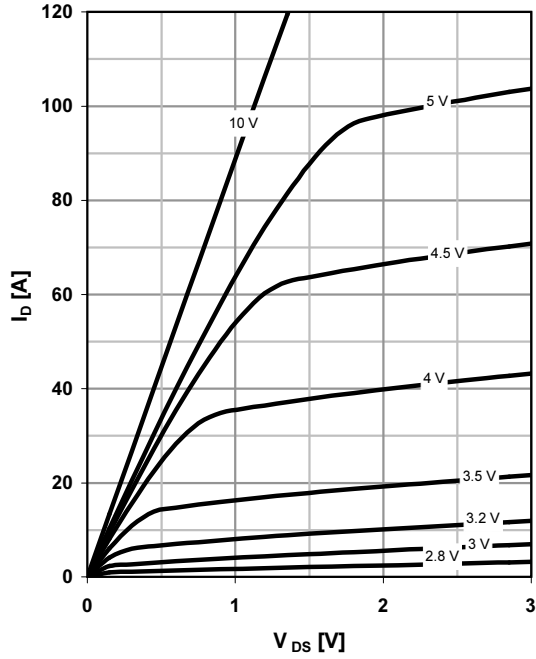
parameter:  $D=t_p/T$



**5 Typ. output characteristics**

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

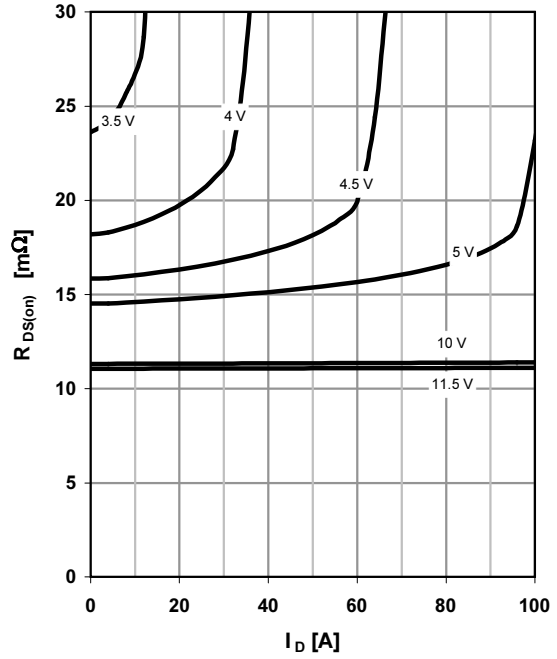
parameter:  $V_{GS}$



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

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

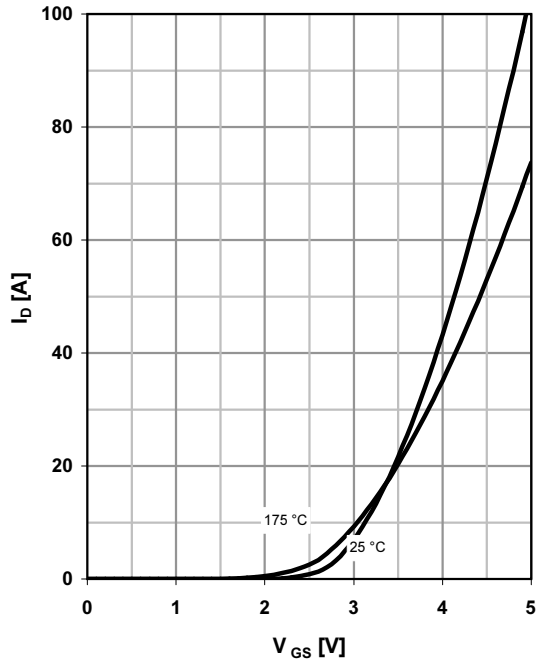
parameter:  $V_{GS}$



**7 Typ. transfer characteristics**

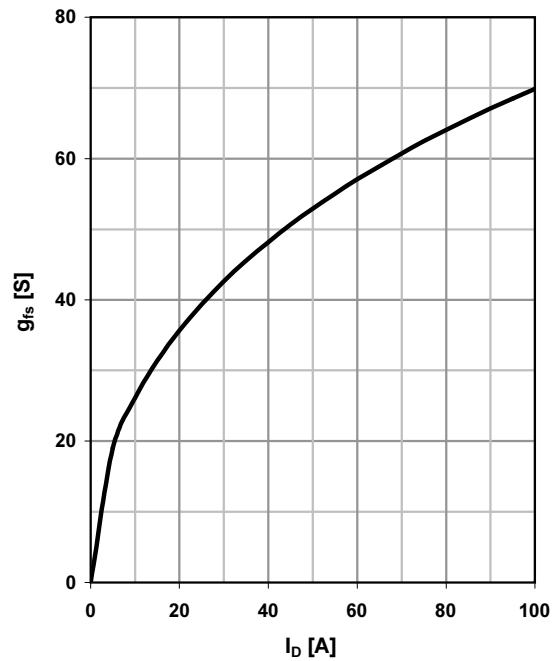
$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$

parameter:  $T_j$



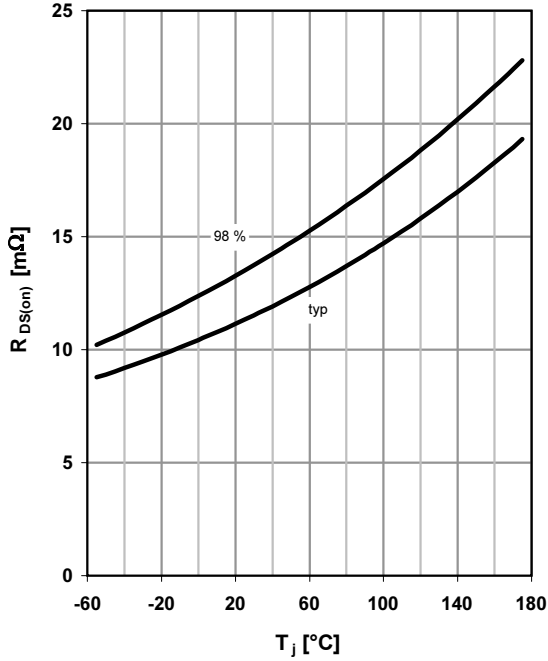
**8 Typ. forward transconductance**

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



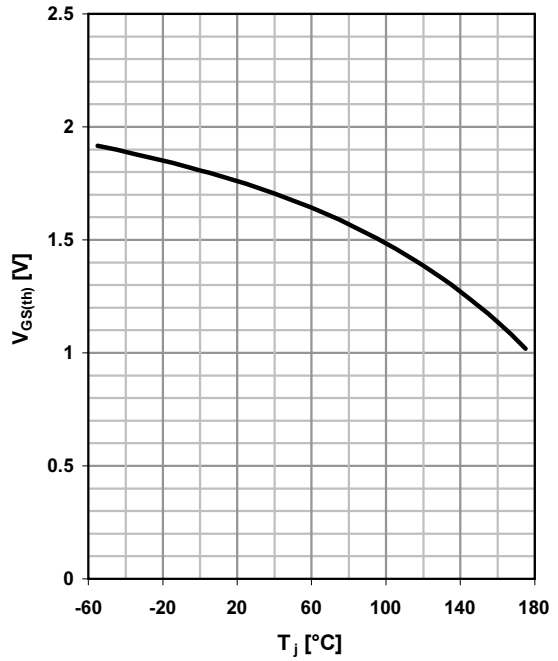
**9 Drain-source on-state resistance**

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



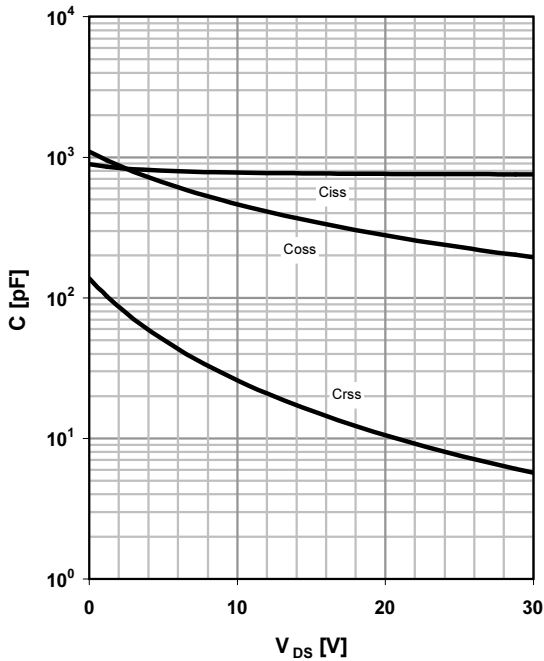
**10 Typ. gate threshold voltage R**

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



**11 Typ. capacitances**

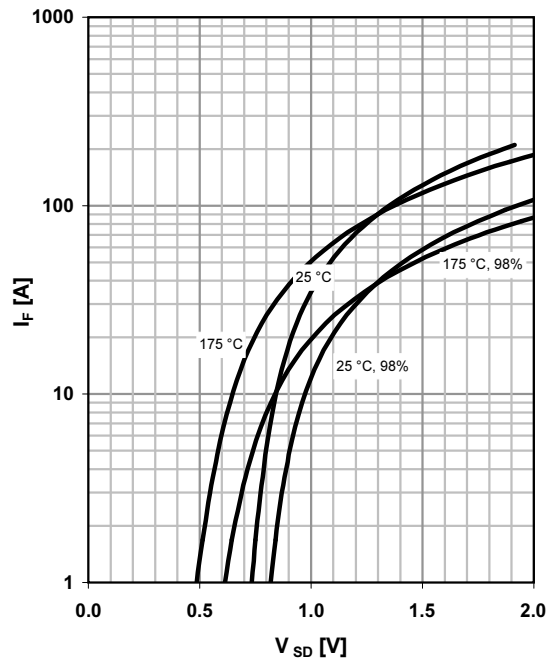
$C = f(V_{DS})$ ;  $V_{GS} = 0\text{ V}$ ;  $f = 1\text{ MHz}$



**12 Forward characteristics of reverse diode**

$I_F = f(V_{SD})$

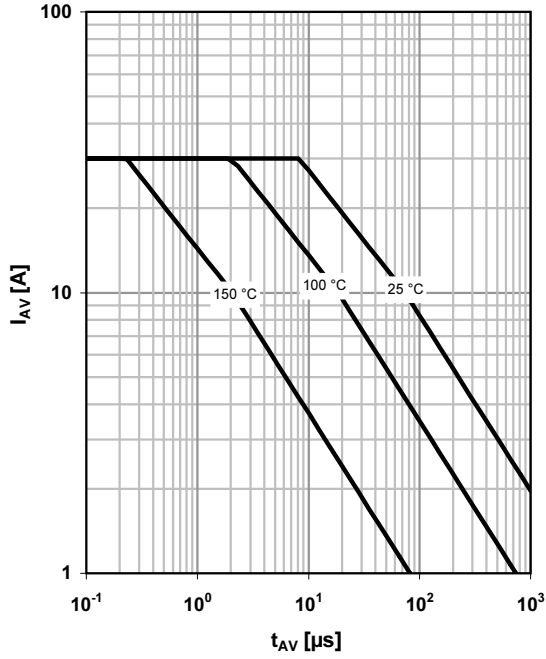
parameter:  $T_j$



**13 Avalanche characteristics**

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

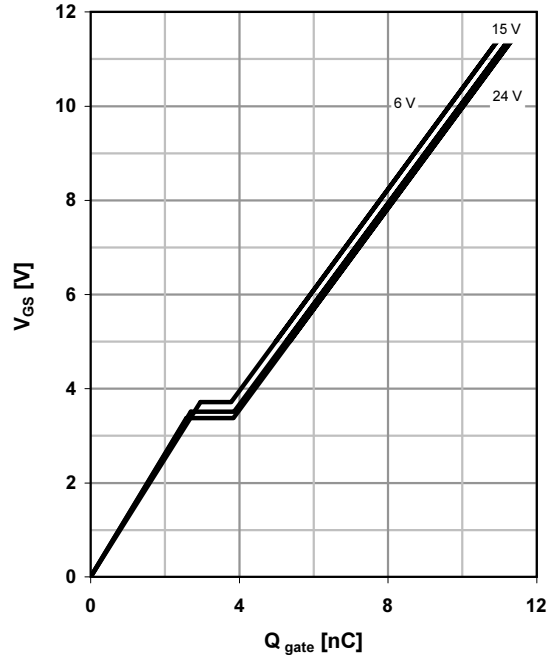
parameter:  $T_{j(start)}$



**14 Typ. gate charge**

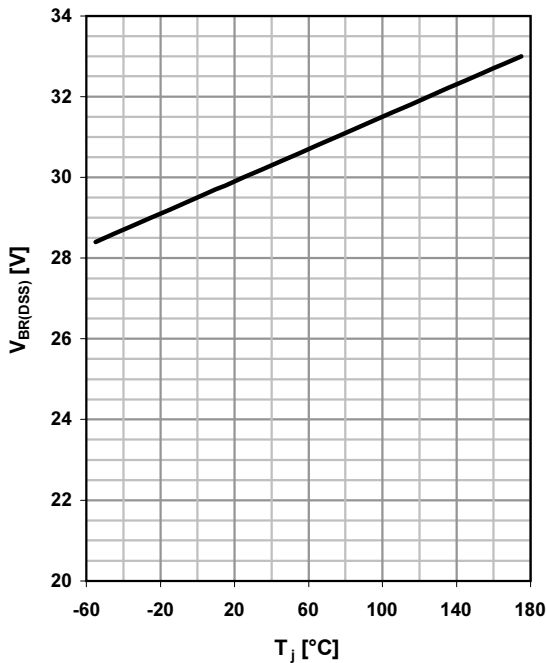
$V_{GS}=f(Q_{gate}); I_D=30 \text{ A pulsed}$

parameter:  $V_{DD}$

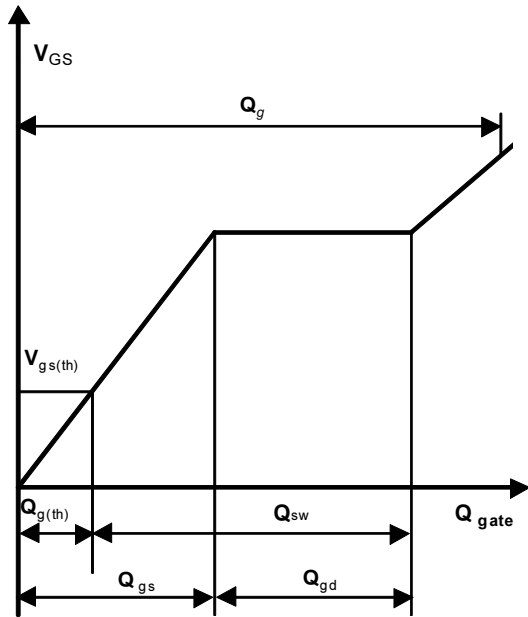


**15 Drain-source breakdown voltage**

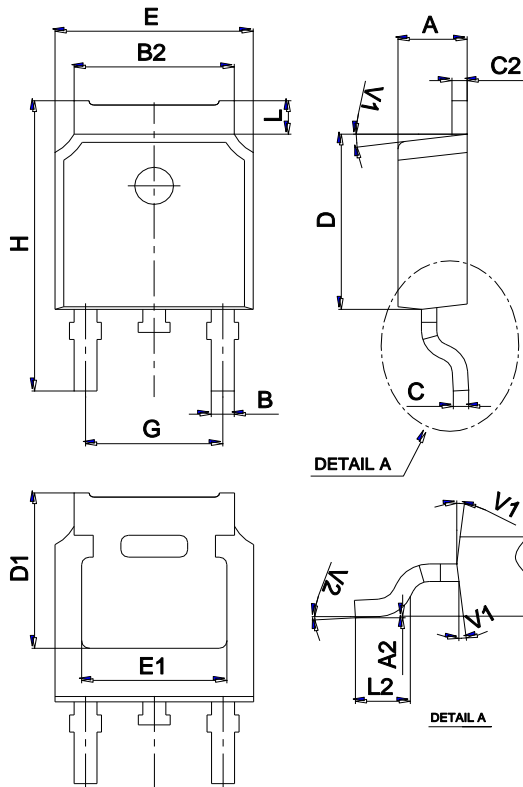
$V_{BR(DSS)}=f(T_j); I_D=1 \text{ mA}$



**16 Gate charge waveforms**

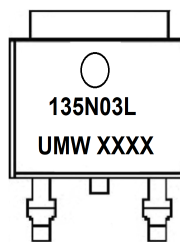


Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IPD135N03LG	TO-252	2500	Tape and reel