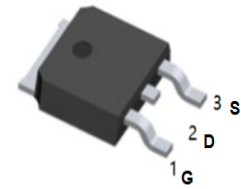
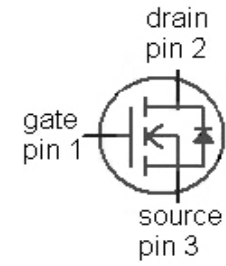


Features

- Fast switching MOSFET for SMPS
- Optimized technology for DC/DC converters
- N-channel, logic level
- Excellent gate charge x $R_{DS(on)}$ product (FOM)
- Very low on-resistance $R_{DS(on)}$
- Avalanche rated
- Pb-free plating



TO-252(DPAK) top view

Product Summary

V_{DS} (V) = 30V

I_D = 50A (V_{GS} = 10V)

$R_{DS(ON)}$ <6m Ω (V_{GS} = 10V)

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current	I_D	$V_{GS}=10\text{ V}, T_C=25^\circ\text{C}$	50	A
		$V_{GS}=10\text{ V}, T_C=100^\circ\text{C}$	50	
		$V_{GS}=4.5\text{ V}, T_C=25^\circ\text{C}$	50	
		$V_{GS}=4.5\text{ V}, T_C=100^\circ\text{C}$	43	
Pulsed drain current ²⁾	$I_{D,pulse}$	$T_C=25^\circ\text{C}$	350	
Avalanche current, single pulse ³⁾	I_{AS}	$T_C=25^\circ\text{C}$	50	
Avalanche energy, single pulse	E_{AS}	$I_D=20\text{ A}, R_{GS}=25\ \Omega$	60	mJ
Reverse diode dv/dt	dv/dt	$I_D=50\text{ A}, V_{DS}=24\text{ V}, di/dt=200\text{ A}/\mu\text{s}, T_{j,max}=175^\circ\text{C}$	6	kV/ μs
Gate source voltage	V_{GS}		± 20	V

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

Parameter	Symbol	Conditions		Value		Unit
			min.	typ.	max.	
Thermal resistance, junction - case	R_{thJC}		-	-	2.7	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint	-	-	75	
		6 cm ² cooling area ⁴⁾	-	-	50	
Power dissipation	P_{tot}	$T_C=25\text{ }^{\circ}\text{C}$	56			W
Operating and storage temperature	T_j, T_{stg}		-55 ... 175			$^{\circ}\text{C}$
IEC climatic category; DIN IEC 68-1			55/175/56			
Electrical characteristics, at $T_j=25\text{ }^{\circ}\text{C}$, unless otherwise specified						
Static characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{ V}, I_D=1\text{ mA}$	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\text{ }\mu\text{A}$	1	-	2.2	
Zero gate voltage drain current	I_{DSS}	$V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=25\text{ }^{\circ}\text{C}$	-	0.1	1	μA
		$V_{DS}=30\text{ V}, V_{GS}=0\text{ V}, T_j=125\text{ }^{\circ}\text{C}$	-	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 ⁵⁾	$R_{DS(on)}$	$V_{GS}=4.5\text{ V}, I_D=30\text{ A}$	-	7.2	9	m Ω
		$V_{GS}=10\text{ V}, I_D=30\text{ A}$	-	5	6	
Gate resistance	R_G		-	1.4	-	Ω
Transconductance	g_{fs}	$ V_{DS} >2 I_D R_{DS(on)max}, I_D=30\text{ A}$	34	67	-	S

²⁾ See figure 3 for more detailed information

³⁾ See figure 13 for more detailed information

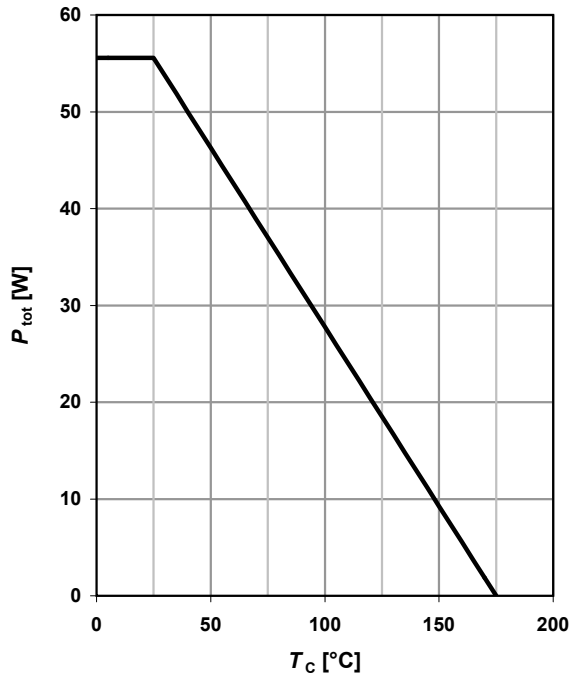
⁴⁾ Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air.

⁵⁾ Measured from drain tab to source pin

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Input capacitance	C_{iss}	$V_{GS}=0\text{ V}, V_{DS}=15\text{ V},$ $f=1\text{ MHz}$	-	1700	2300	pF
Output capacitance	C_{oss}		-	640	850	
Reverse transfer capacitance	C_{rss}		-	35	52	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=15\text{ V}, V_{GS}=10\text{ V},$ $I_D=30\text{ A}, R_G=1.6\text{ }\Omega$	-	5	-	ns
Rise time	t_r		-	3	-	
Turn-off delay time	$t_{d(off)}$		-	20	-	
Fall time	t_f		-	3	-	
Gate charge at threshold						
Gate to source charge	Q_{gs}	$V_{DD}=15\text{ V}, I_D=30\text{ A},$ $V_{GS}=0\text{ to }4.5\text{ V}$	-	5.6	-	nC
	$Q_{g(th)}$		-	2.8	-	
Gate to drain charge Gate Charge Characteristics ⁶⁾	Q_{gd}		-	2.5	-	
Switching charge	Q_{sw}		-	5.3	-	
Gate charge total	Q_g		-	10.8	14.4	
Gate plateau voltage	$V_{plateau}$		-	3.2	-	V
Gate charge total	Q_g	$V_{DD}=15\text{ V}, I_D=30\text{ A},$ $V_{GS}=0\text{ to }10\text{ V}$	-	22	30	nC
Gate charge total, sync. FET	$Q_{g(sync)}$	$V_{DS}=0.1\text{ V},$ $V_{GS}=0\text{ to }4.5\text{ V}$	-	9.4	-	
Output charge	Q_{oss}	$V_{DD}=15\text{ V}, V_{GS}=0\text{ V}$	-	17	-	
Reverse Diode						
Diode continuous forward current	I_S	$T_C=25\text{ }^{\circ}\text{C}$	-	-	50	A
Diode pulse current	$I_{S,pulse}$		-	-	350	
Diode forward voltage	V_{SD}	$V_{GS}=0\text{ V}, I_F=30\text{ A},$ $T_J=25\text{ }^{\circ}\text{C}$	-	0.88	1.1	V
Reverse recovery charge	Q_{rr}	$V_R=15\text{ V}, I_F=I_S,$ $di_F/dt=400\text{ A}/\mu\text{s}$	-	-	10	nC

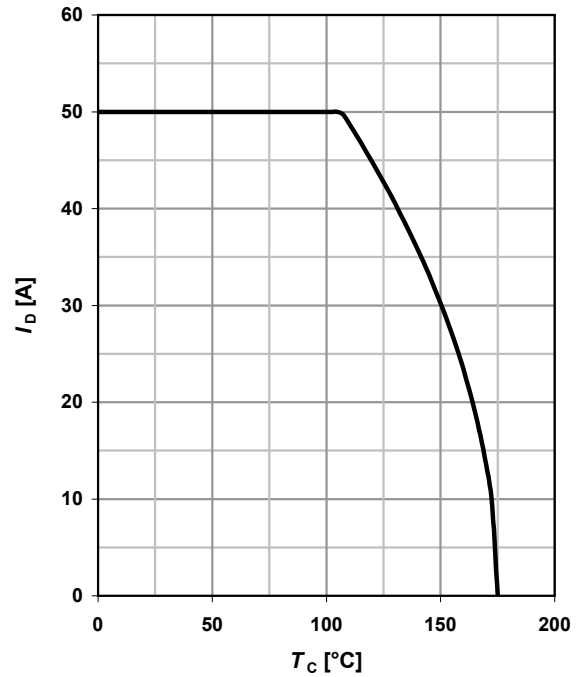
1 Power dissipation

$$P_{\text{tot}} = f(T_C)$$



2 Drain current

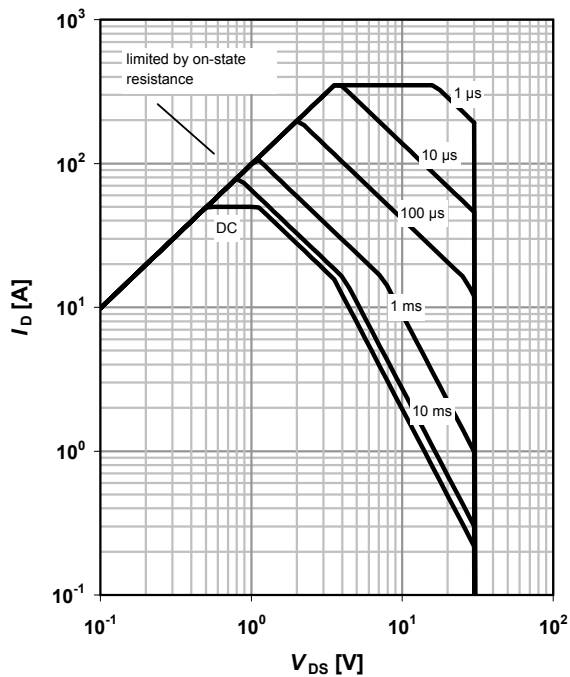
$$I_D = f(T_C); V_{GS} \geq 10 \text{ V}$$



3 Safe operating area

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

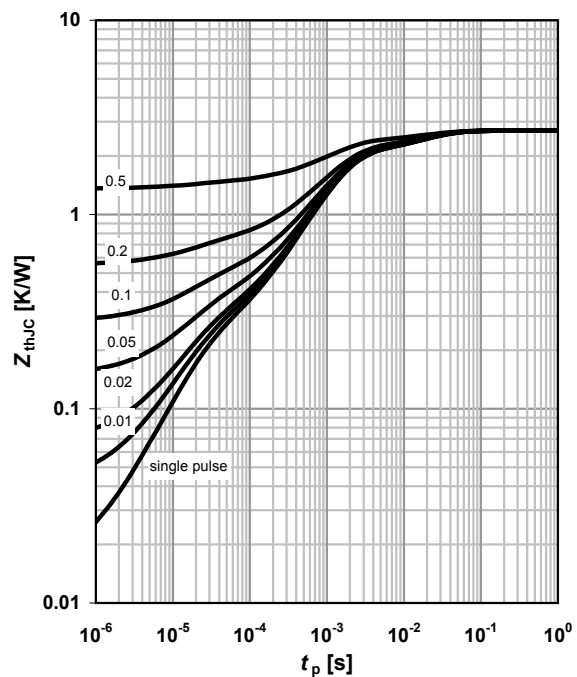
parameter: t_p



4 Max. transient thermal impedance

$$Z_{\text{thJC}} = f(t_p)$$

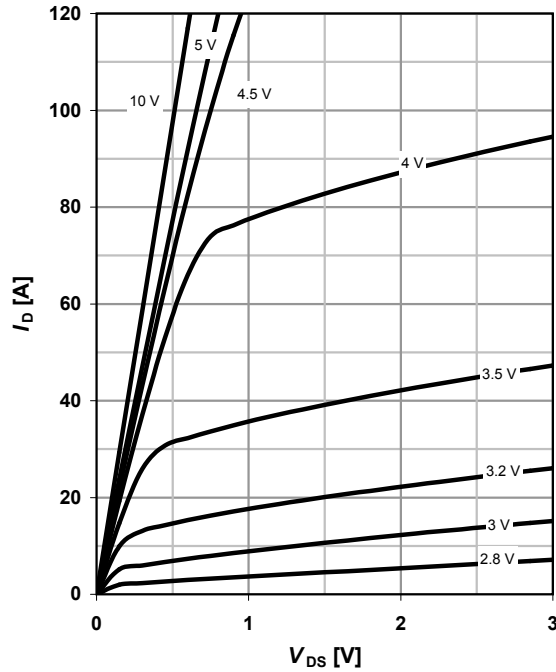
parameter: $D = t_p / T$



5 Typ. output characteristics

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

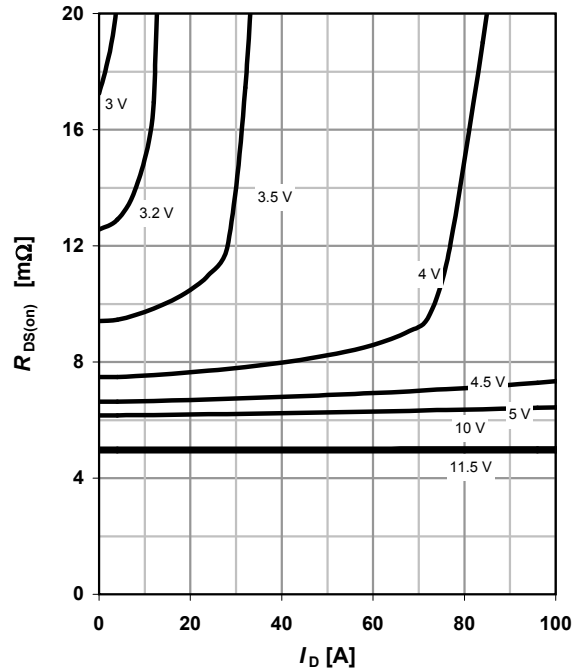
parameter: V_{GS}



6 Typ. drain-source on resistance

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

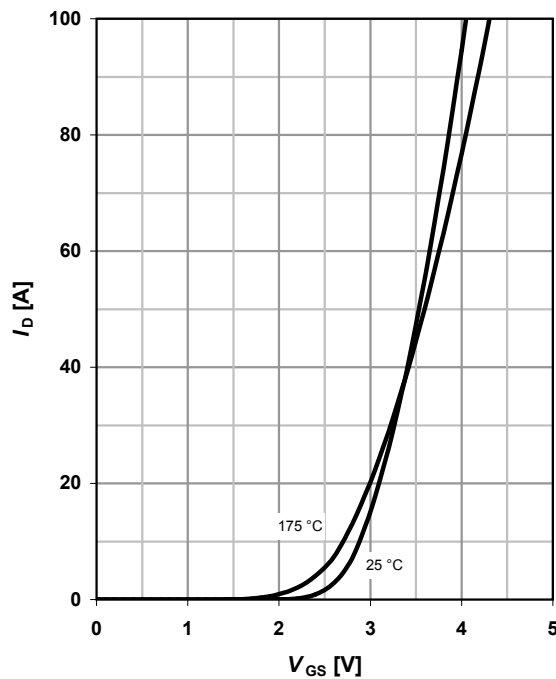
parameter: V_{GS}



7 Typ. transfer characteristics

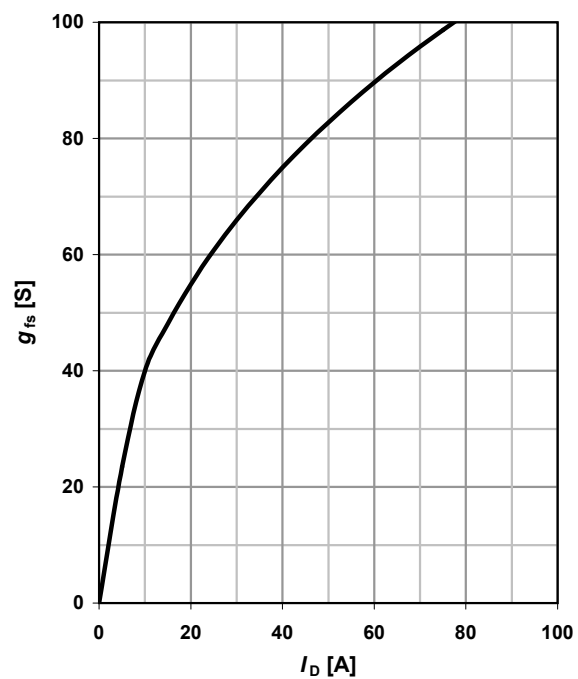
$$I_D = f(V_{GS}); |V_{DS}| > 2|I_D|R_{DS(on)max}$$

parameter: T_j



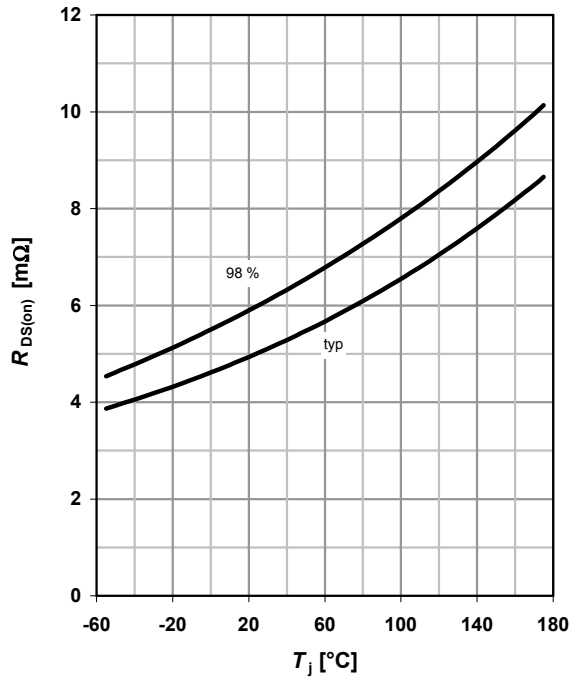
8 Typ. forward transconductance

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



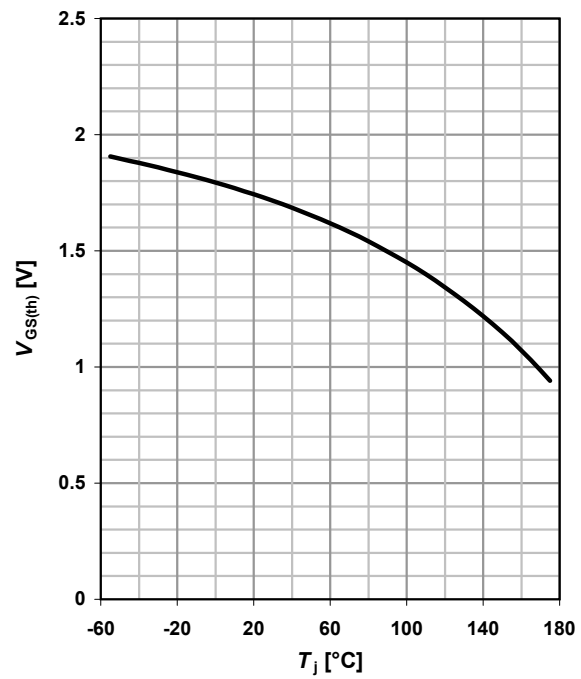
9 Drain-source on-state resistance

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



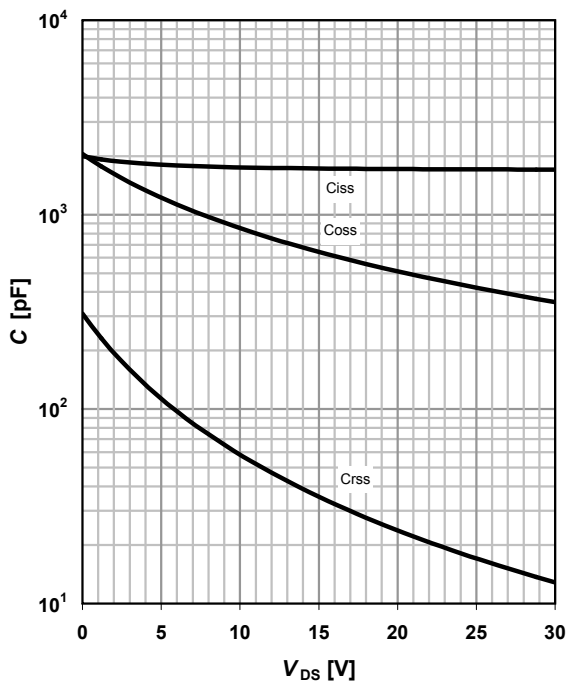
10 Typ. gate threshold voltage

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



11 Typ. capacitances

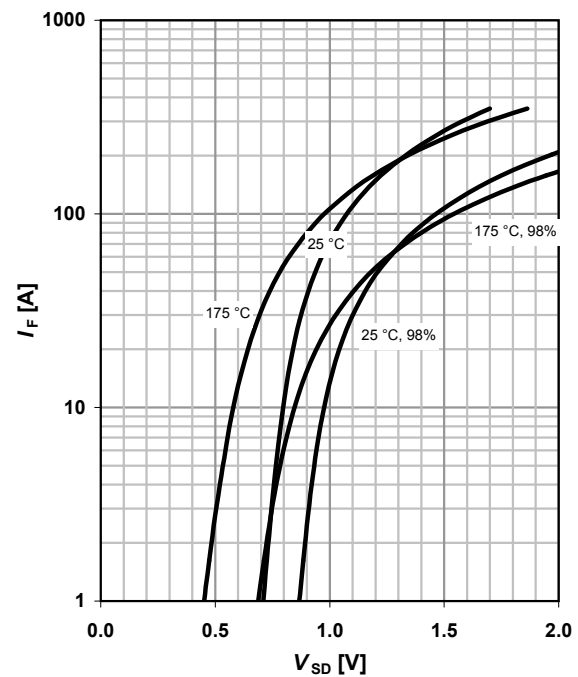
$$C = f(V_{DS}); V_{GS} = 0 \text{ V}; f = 1 \text{ MHz}$$



12 Forward characteristics of reverse diode

$$I_F = f(V_{SD})$$

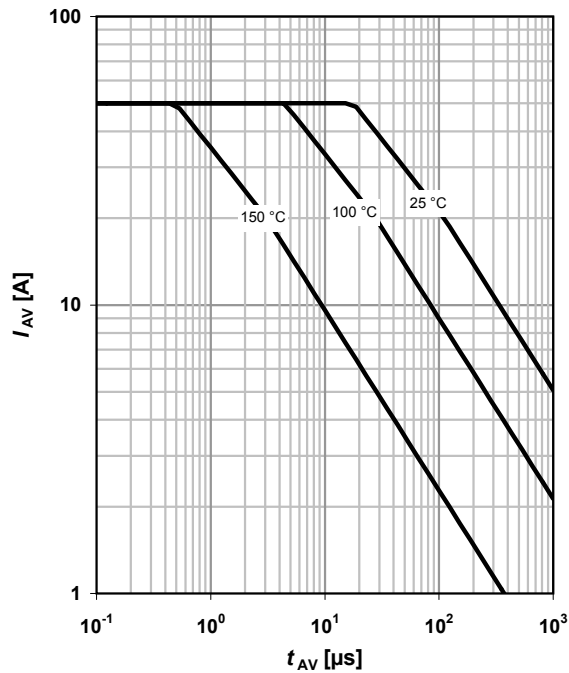
parameter: T_j



13 Avalanche characteristics

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

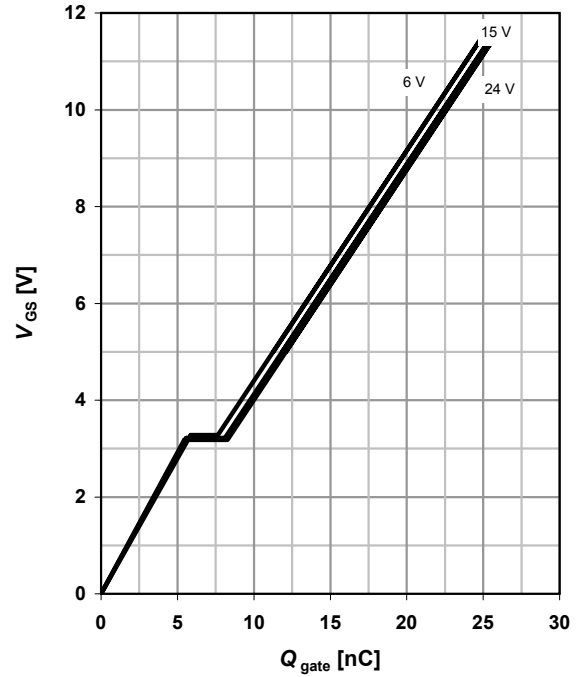
parameter: $T_{j(\text{start})}$



14 Typ. gate charge

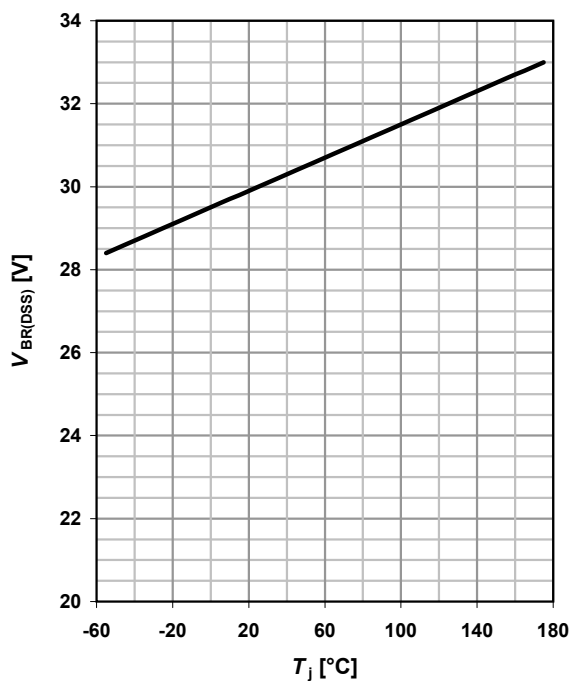
$$V_{GS}=f(Q_{\text{gate}}); I_D=30\ \text{A pulsed}$$

parameter: V_{DD}

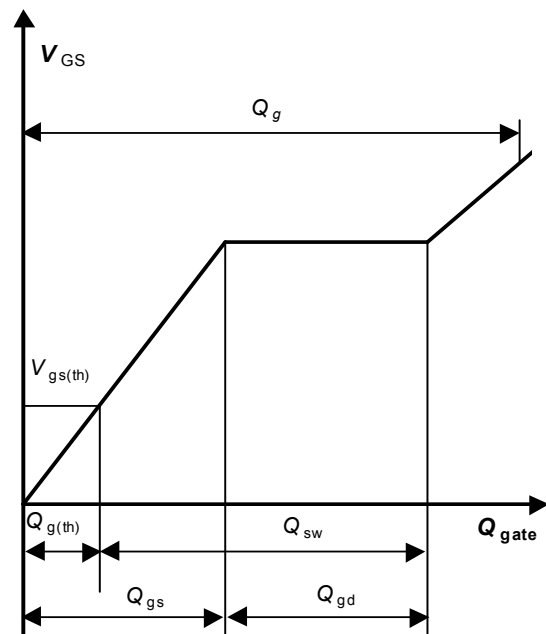


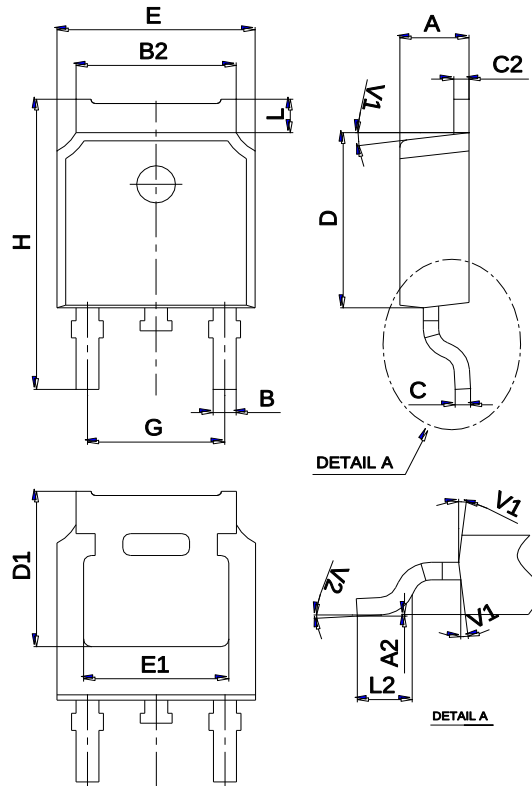
15 Drain-source breakdown voltage

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



16 Gate charge waveforms



Package Mechanical Data TO-252
30V N-Channel MOSFET


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°

Ordering information

Order code	Package	Baseqty	Delivery mode
UMW IPD060N03LG	TO-252	2500	Tape and reel