SHENZHEN TUOFENG SEMICONDUCTOR TECHNOLOGY CO.,LTD

N-CHANNEL ENHANCEMENT MODE POWER MOSFET

90N03L

Power-Transistor

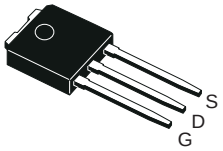
Product Summary

V_{DS}	30	V
$R_{DS(on),max}$	6.0	mΩ
I_D	90	A

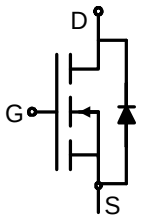
Features

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

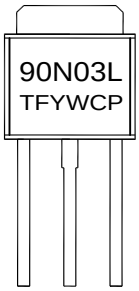
TO-251



Equivalent Circuit



MARKING



Y :year code W :week code

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

Parameter	Symbol	Conditions	Value	Unit
Continuous drain current[1)]	I_D	T_C=25 °C, V_{GS}=10 V	90	A
Pulsed drain current[2)]	$I_{D,pulse}$	T_C=25 °C	320	
Avalanche energy, single pulse	E_{AS}	I_D=80 A	240	mJ
Avalanche current, single pulse	I_{AS}	T_C=25 °C	80	A
Gate source voltage	V_{GS}	-	±20	V
Power dissipation	P_{tot}	T_C=25 °C	95	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}	-	-	-	1.1	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	30	-	-	V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250uA	1.0		1.5	
Zero gate voltage drain current	I_{DSS}	V_{DS}=24 V, V_{GS}=0 V, T_j=25 °C			50	nA
Gate-source leakage current	I_{GSS}	V_{GS}=±20V V_{DS}=0 V			± 100	nA
Drain-source on-state resistance	$R_{DS(on)}$	V_{GS}=4.5 V, I_D=20 A			10.0	mΩ
		V_{GS}=10 V, I_D=40 A			6.0	

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	-	7500	9750	pF
Output capacitance	C_{oss}		-	1900	2500	
Reverse transfer capacitance	C_{rss}		-	100	200	
Turn-on delay time	$t_{d(on)}$	V_{DD}=15 V, V_{GS}=10 V, I_D=80 A, R_G=3.5 Ω	-	14	-	ns
Rise time	t_r		-	9	-	
Turn-off delay time	$t_{d(off)}$		-	62	-	
Fall time	t_f		-	13	-	
Gate Charge Characteristics[2]						
Gate to source charge	Q_{gs}	V_{DD}=24 V, I_D=80 A, V_{GS}=0 to 10 V	-	22	30	nC
Gate to drain charge	Q_{gd}		-	14	28	
Gate charge total	Q_g		-	110	140	
Gate plateau voltage	$V_{plateau}$		-	3.1	-	V
Reverse Diode						
Diode continous forward current[2]	I_S	T_C=25 °C	-	-	90	
Diode pulse current[2]	$I_{S,pulse}$		-	-	360	
Diode forward voltage	V_{SD}	V_{GS}=0 V, I_F=80 A, T_j=25 °C	0.6	0.9	1.3	V
Reverse recovery time[2]	t_{rr}	V_R=15 V, I_F=I_S, di_F/dt=100 A/µs	-	120	-	ns
Reverse recovery charge[2]	Q_{rr}		-	100	-	nC

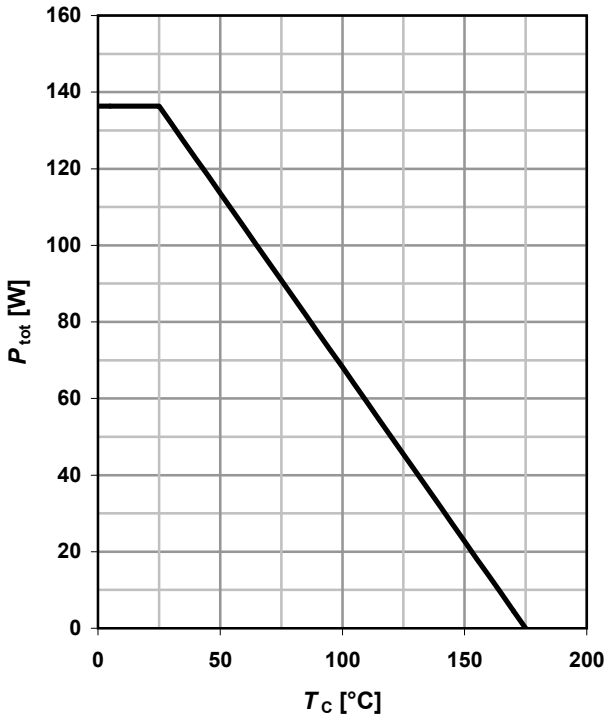
[1] Current is limited by bondwire; with an R_{thJC} = 1.1K/W the chip is able to carry 200A at 25°C. For detailed information see Application Note ANPS071E at *www.infineon.com/optimos*

[2] Specified 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.

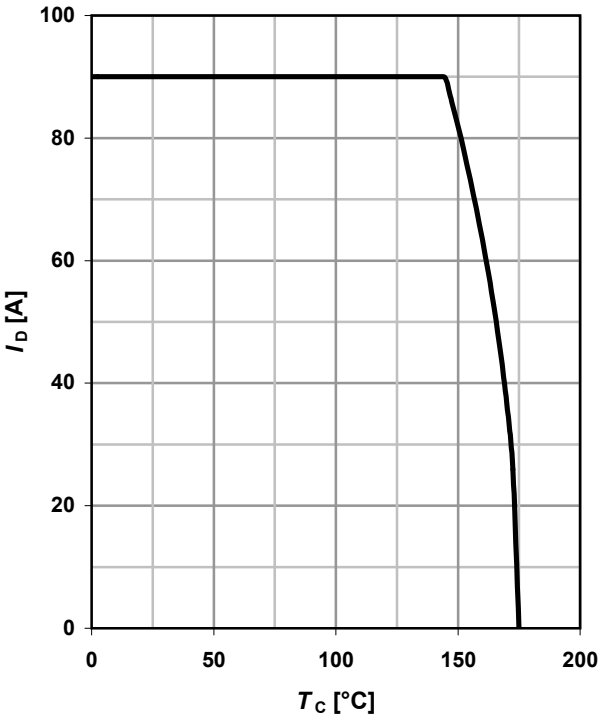
1 Power dissipation

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



2 Drain current

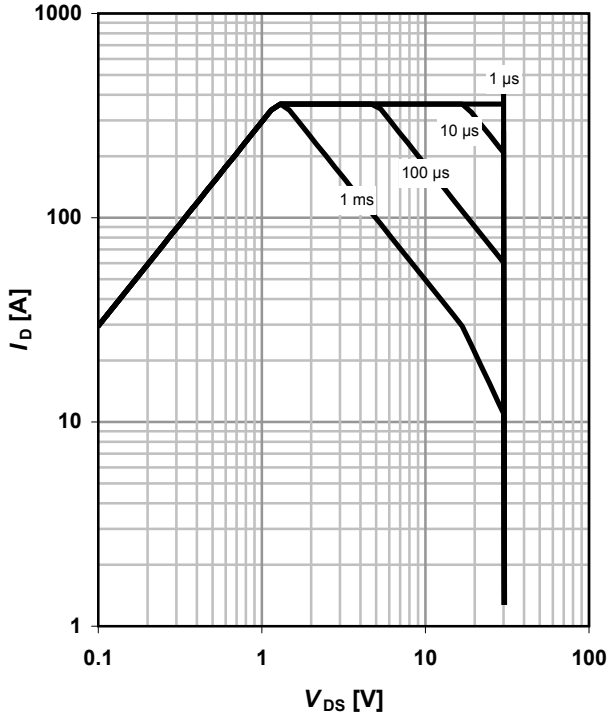
$I_D = f(T_C)$; $V_{GS} \geq 6$ V



3 Safe operating area

$I_D = f(V_{DS})$; $T_C = 25$ °C; $D = 0$

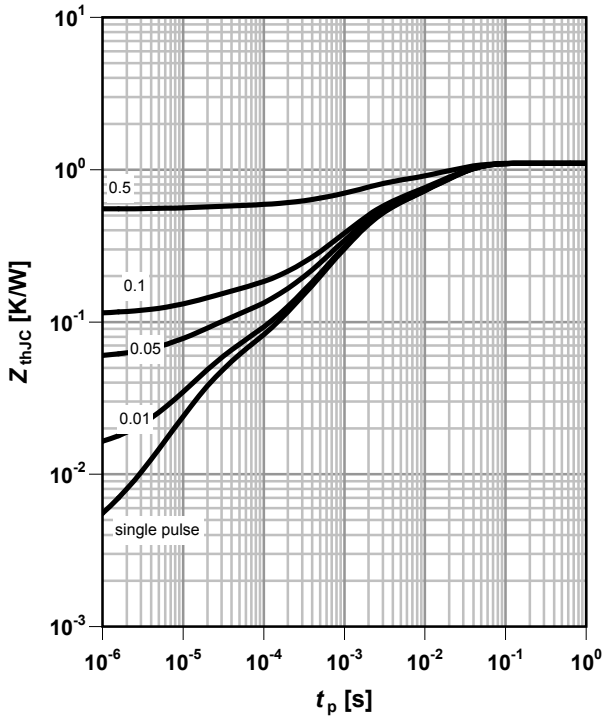
parameter: t_p



4 Max. transient thermal impedance

$Z_{thJC} = f(t_p)$

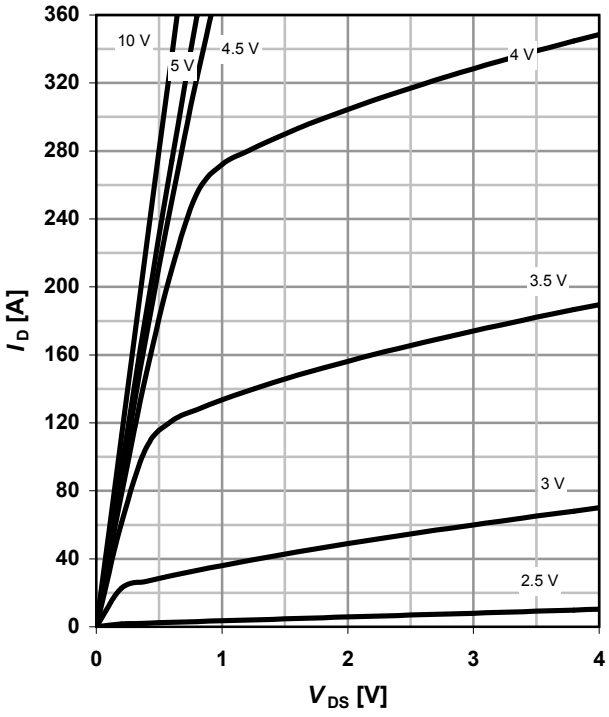
parameter: $D = t_p/T$



5 Typ. output characteristics

$I_D = f(V_{DS})$; $T_j = 25$ °C

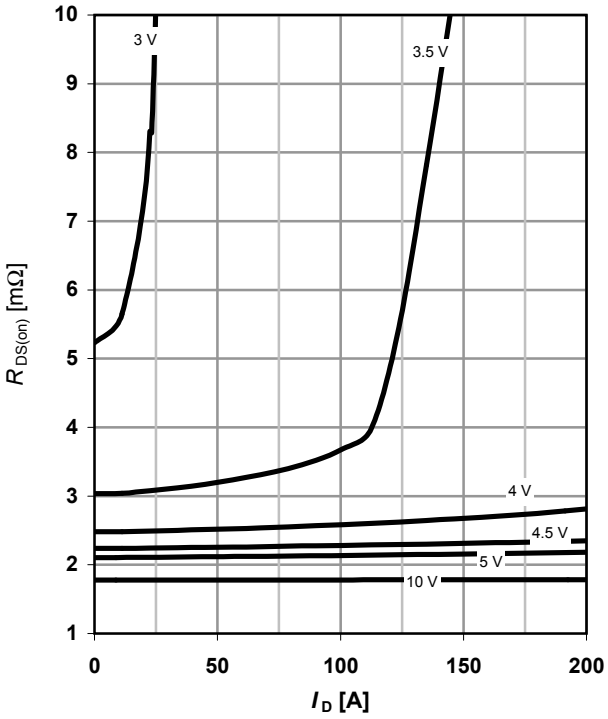
parameter: V_{GS}



6 Typ. drain-source on-state resistance

$R_{DS(on)} = f(I_D)$; $T_j = 25$ °C

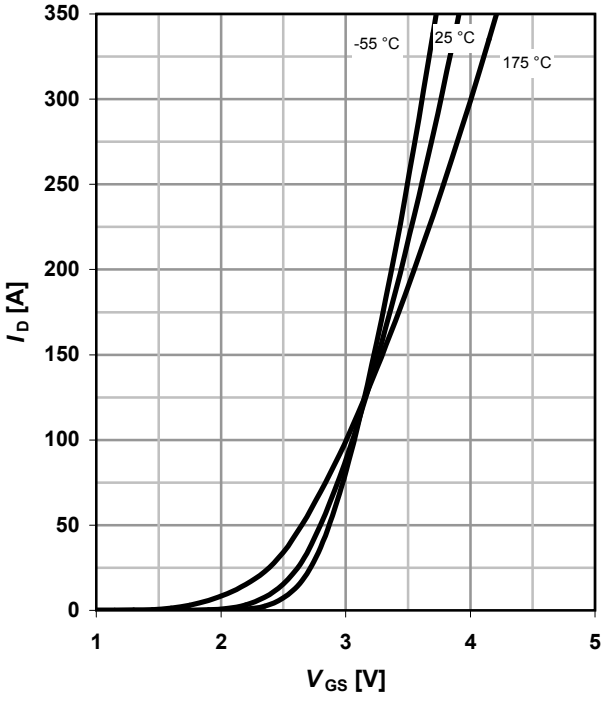
parameter: V_{GS}



7 Typ. transfer characteristics

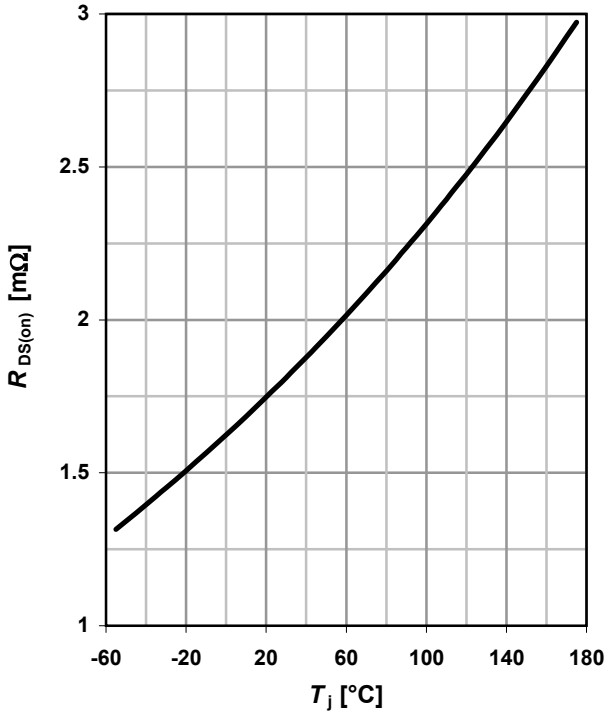
$I_D = f(V_{GS})$; $V_{DS} = 6$V

parameter: T_j



8 Typ. drain-source on-state resistance

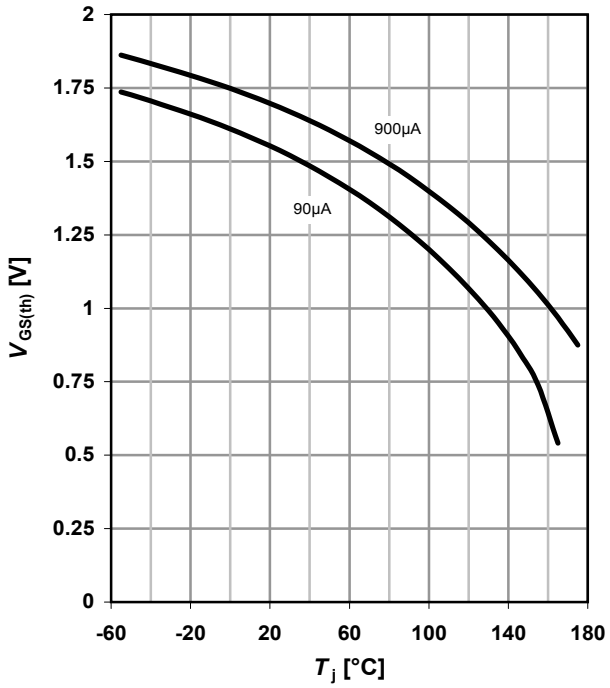
$R_{DS(on)} = f(T_j)$; $I_D = 80$ A; $V_{GS} = 10$ V



9 Typ. gate threshold voltage

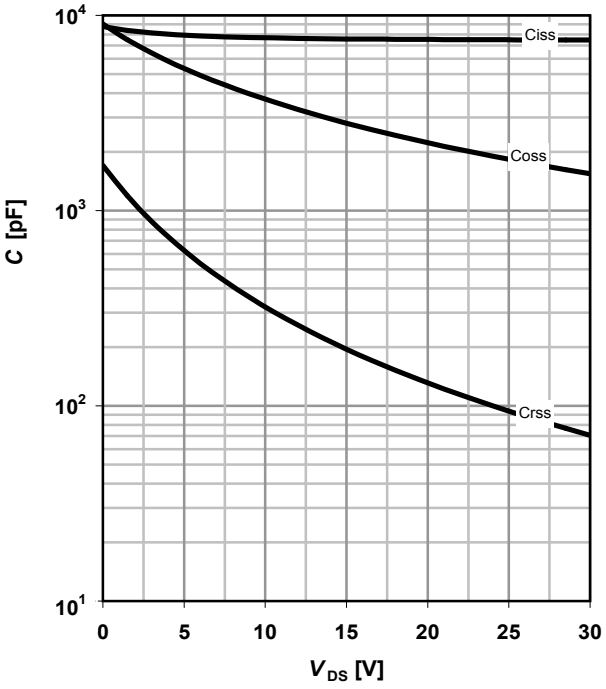
$V_{GS(th)} = f(T_j)$; $V_{GS} = V_{DS}$

parameter: I_D



10 Typ. capacitances

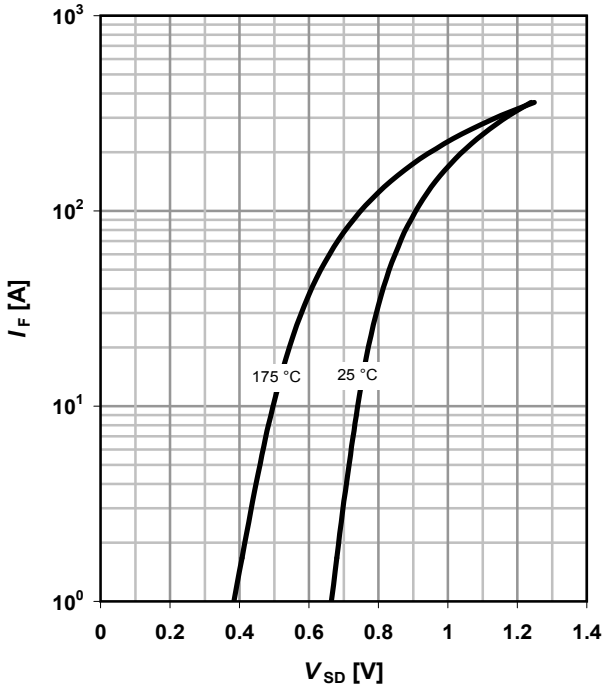
$C = f(V_{DS})$; $V_{GS} = 0$ V; $f = 1$ MHz



11 Typical forward diode characteristicis

IF = f(V_{SD})

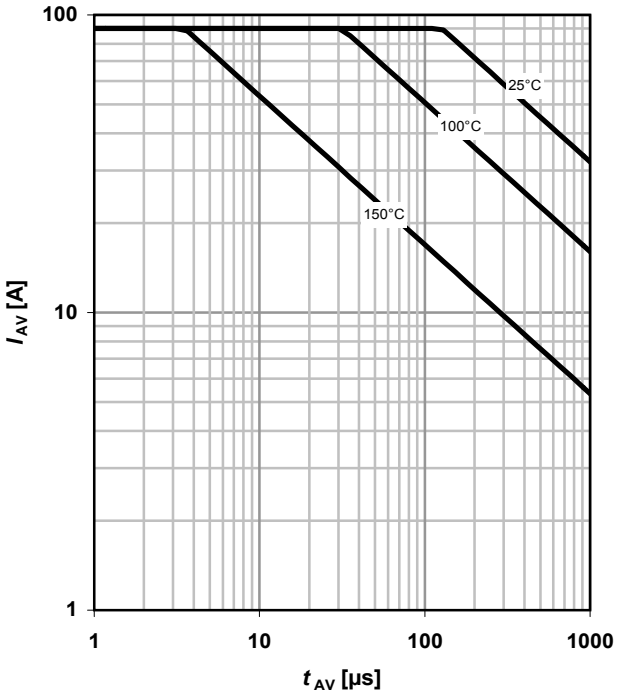
parameter: T_j



12 Typ. avalanche characteristics

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

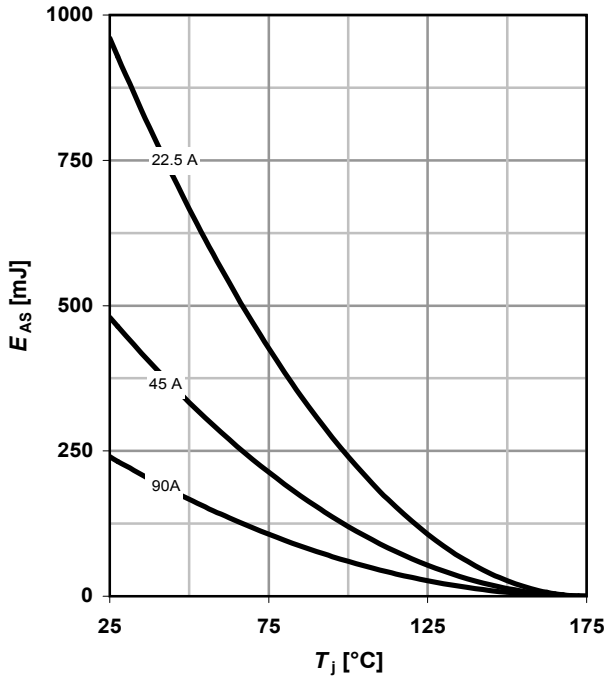
parameter: $T_{j(start)}$



13 Typical avalanche energy

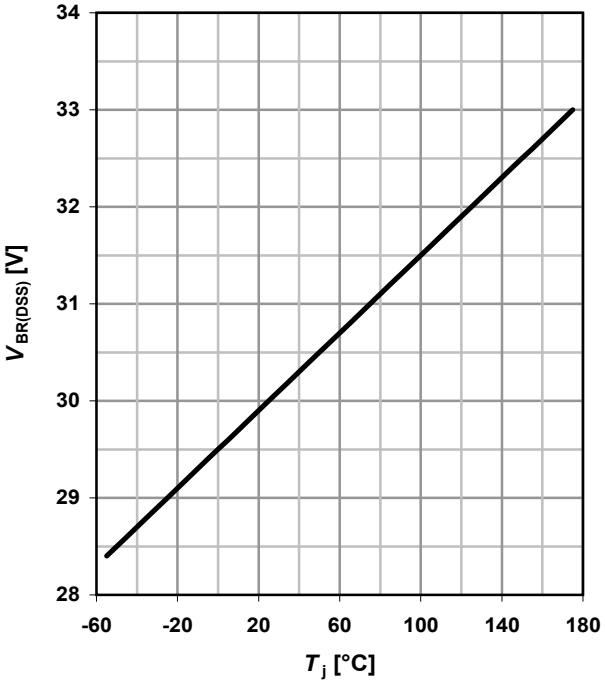
$E_{AS} = f(T_j)$

parameter: I_D



14 Typ. drain-source breakdown voltage

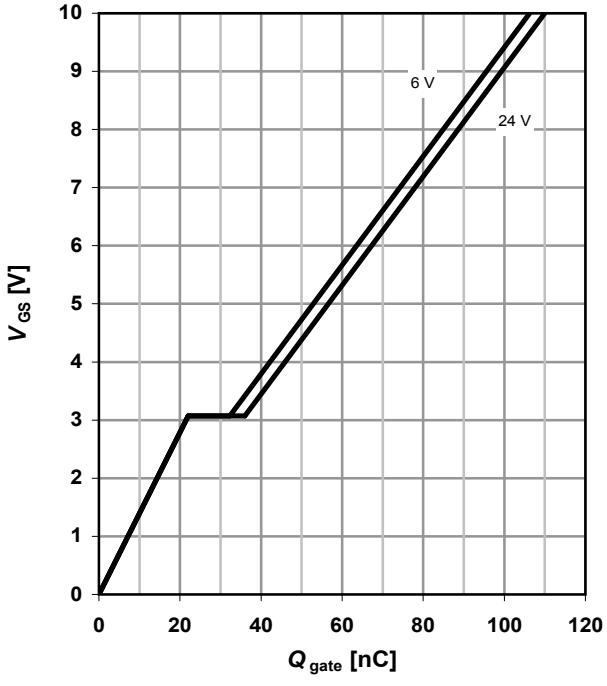
$V_{BR(DSS)} = f(T_j)$; $I_D = 1$ mA



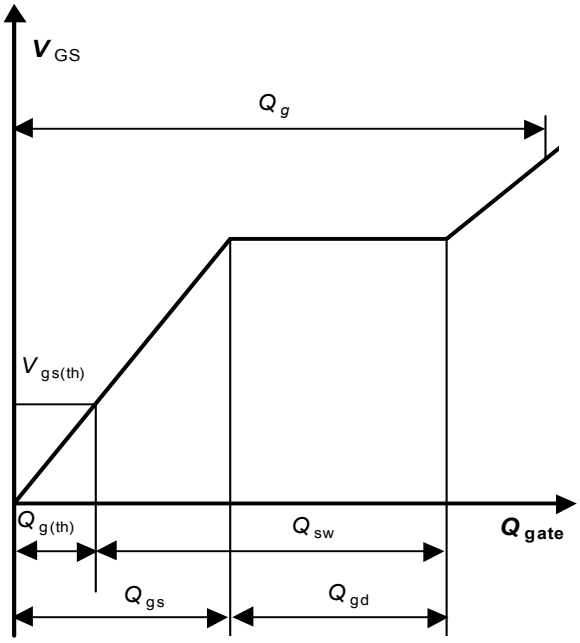
15 Typ. gate charge

$V_{GS} = f(Q_{gate})$; $I_D = 90$ A pulsed

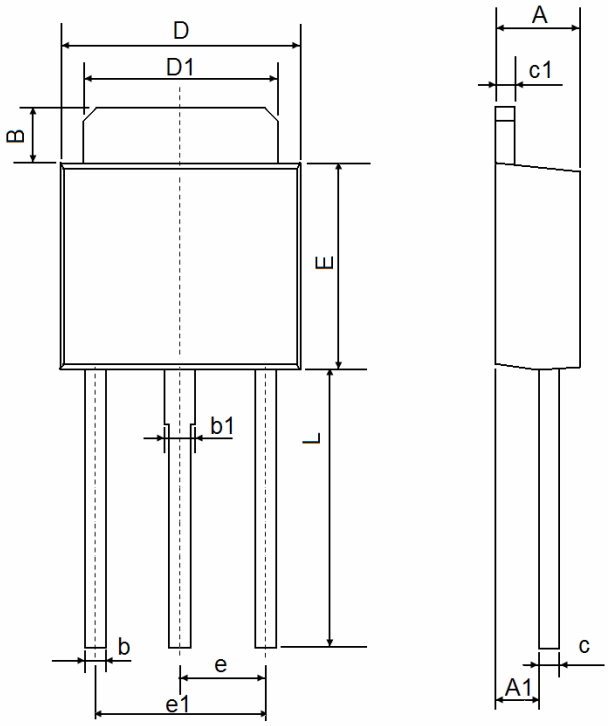
parameter: V_{DD}



16 Gate charge waveforms



TO-251 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	1.050	1.350	0.042	0.054
B	0.700	1.000	0.028	0.040
b	0.500	0.700	0.020	0.028
b1	0.700	0.900	0.028	0.035
c	0.430	0.580	0.017	0.023
c1	0.430	0.580	0.017	0.023
D	6.350	6.650	0.250	0.262
D1	5.200	5.400	0.205	0.213
E	5.400	6.000	0.213	0.237
e	2.300 TYP.		0.091 TYP.	
e1	4.500	4.700	0.177	0.185
L	4.900	9.400	0.194	0.372

Notes

1. All dimensions are in millimeters.
2. Tolerance ±0.10mm (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exac

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