

N-Channel Enhancement Mode MOSFET

GENERAL DESCRIPTION

The PW2308 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

FEATURES

$V_{DS} = 60V$, $I_D = 5A$

$R_{DS(ON)} < 38m\Omega$ @ $V_{GS} = 10V$

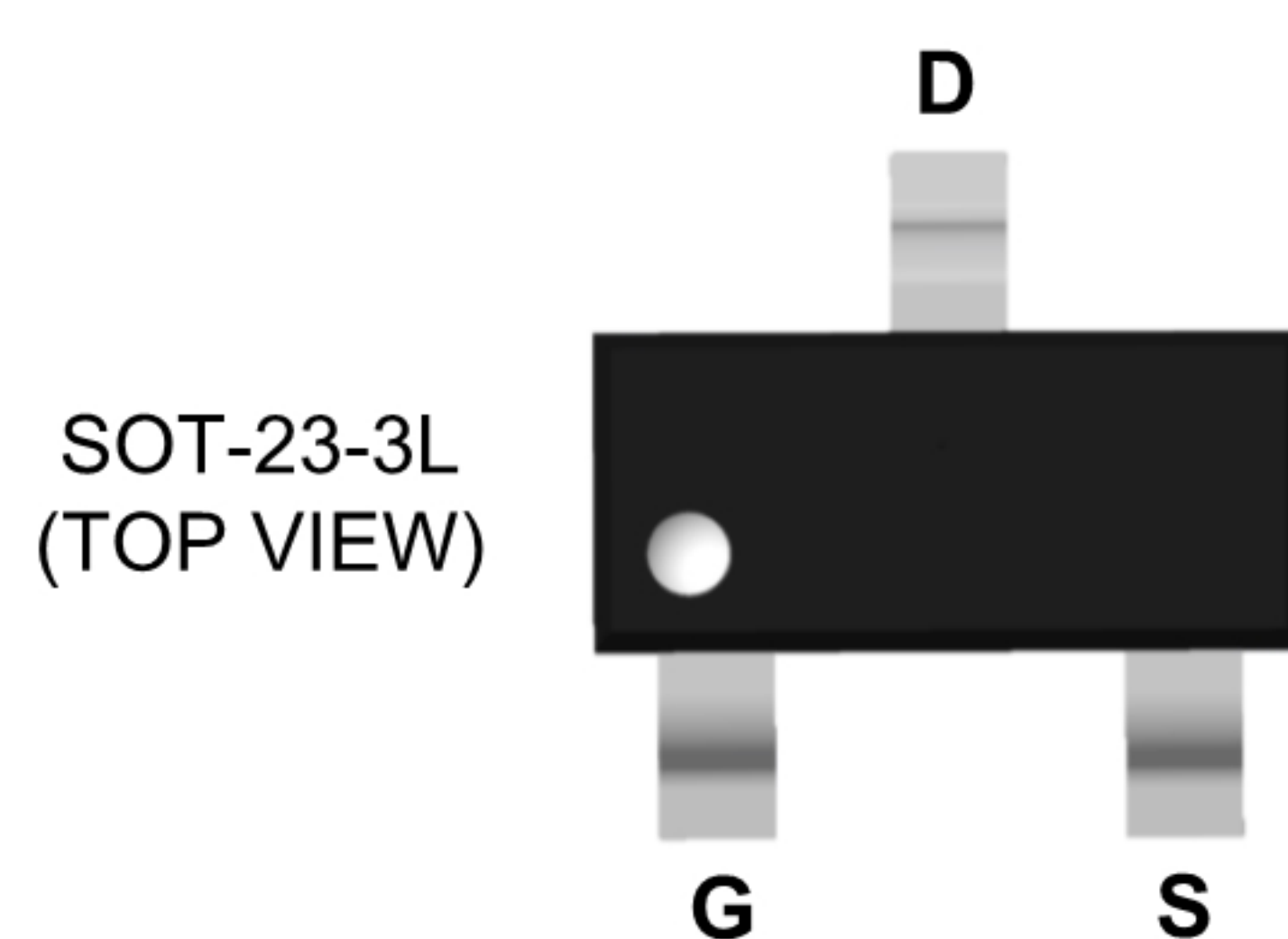
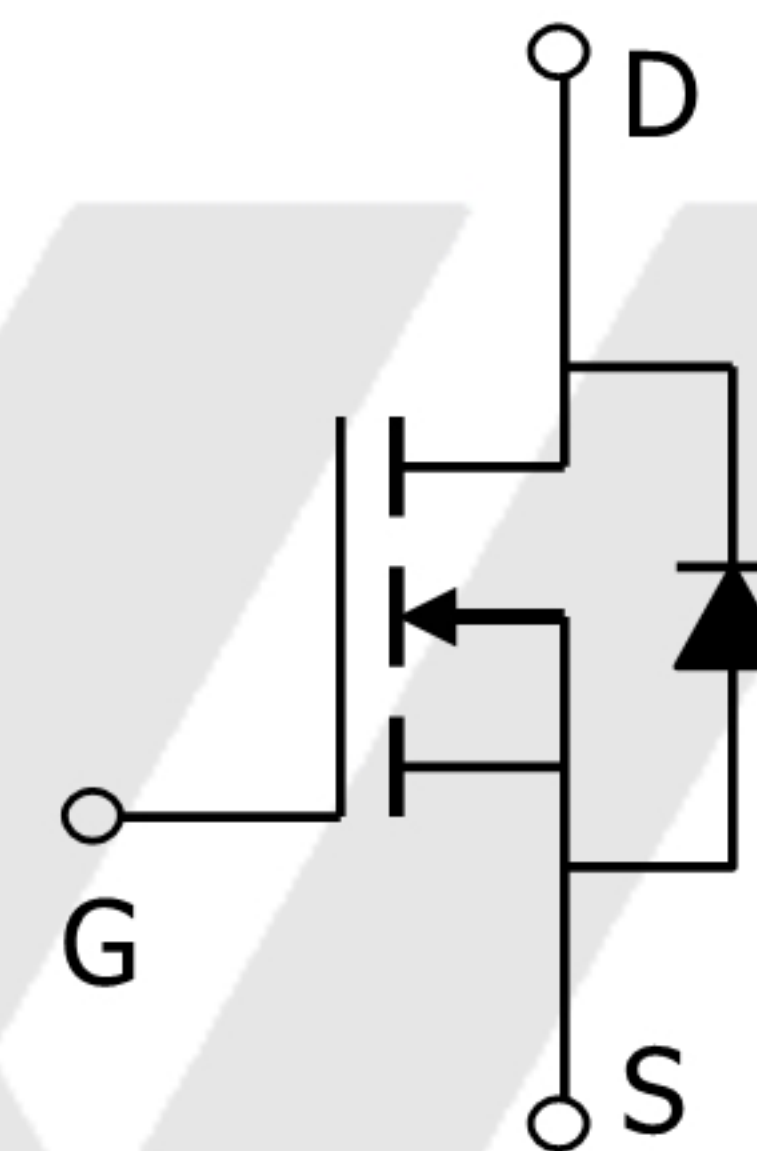
Available in a 3-Pin SOT23-3 Package

Application

Battery protection

Load switch

Automotive lighting



Absolute Maximum Ratings (TA=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current, $V_{GS} @ 10V$ (NOTE1)	$I_{D@TA=25^{\circ}C}$	5.8	A
	$I_{D@TA=70^{\circ}C}$	3.5	
Pulsed Drain Current (NOTE2)	I_{DM}	18	A
Single Pulse Avalanche Energy (NOTE3)	EAS	22	mJ
Avalanche Current	I_{AS}	21	A
Total Power Dissipation (NOTE4)	$P_D @ TA=25^{\circ}C$	1.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^{\circ}C$
Thermal Resistance Junction-Ambient (NOTE1)	$R_{\theta JA}$	85	$^{\circ}C/W$
Thermal Resistance Junction-Case (NOTE1)	$R_{\theta JC}$	25	$^{\circ}C/W$

Note 1、 The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

Note 2、 The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

Note 3、 The EAS data shows Max. rating . The test condition is $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=21A$

Note 4、 The power dissipation is limited by 150 $^{\circ}C$ junction temperature

ELECTRICAL CHARACTERISTICS

(TA = 25°C, unless otherwise noted.)

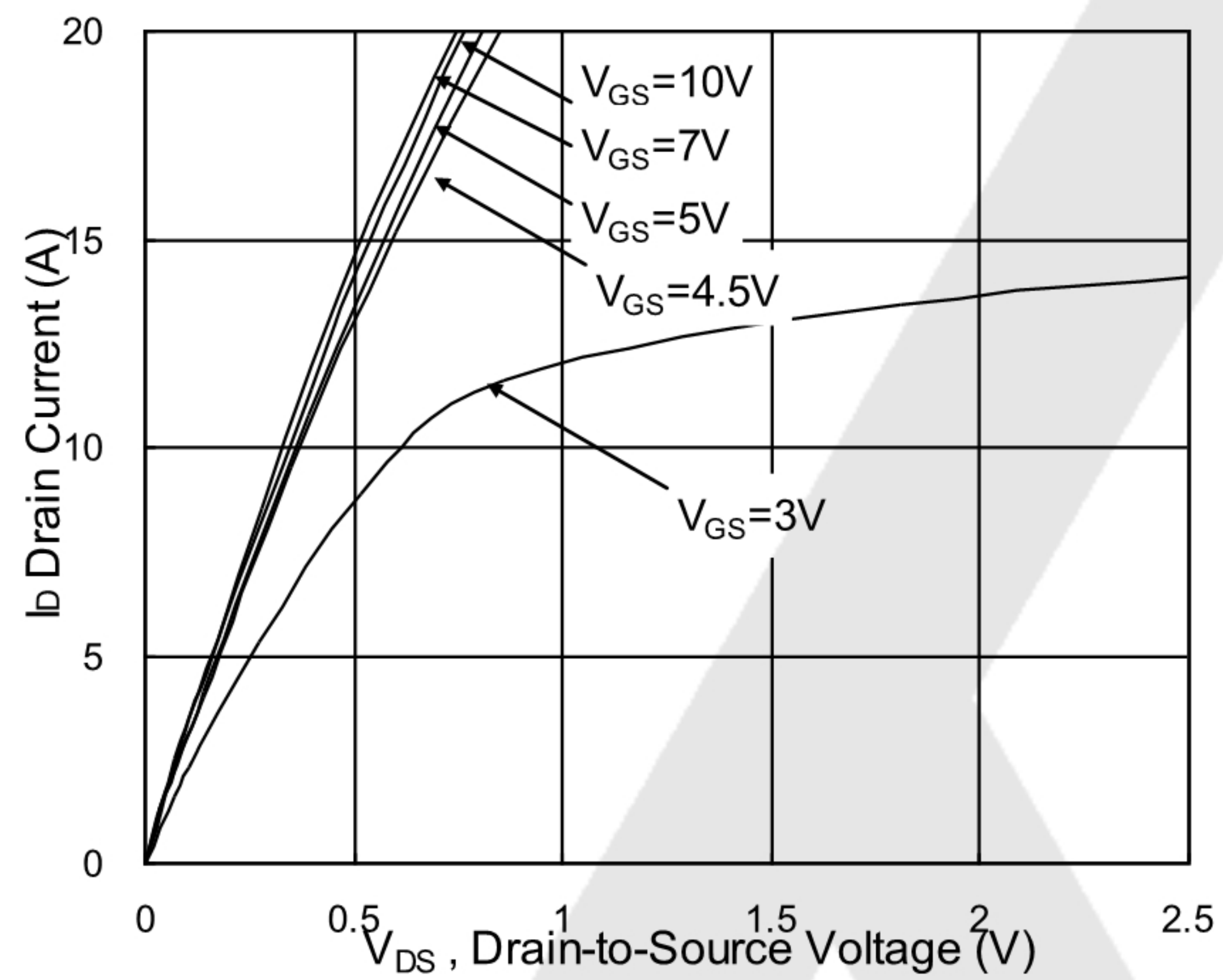
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V , I _D =-250uA	60			V
$\Delta BV_{DSS}/\Delta T_J$	BV _{DSS} Temperature Coefficient	Reference to 25°C , I _D =-1mA		0.044		V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance (NOTE2)	V _{GS} =10V , I _D =1.5A		28	38	mΩ
		V _{GS} =4.5V , I _D =2A		35	50	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	1.0	1.76	2.5	V
$\Delta V_{GS(th)}$	V _{GS(th)} Temperature Coefficient			-4.08		mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =48V , V _{GS} =0V , T _J =25°C			1	uA
		V _{DS} =48V , V _{GS} =0V , T _J =55°C			5	uA
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V , V _{DS} =0V			±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V , I _D =4A		28.3		S
R _g	Gate Resistance	V _{DS} =0V , V _{GS} =0V , f=1MHz		2.5		Ω
Q _g	Total Gate Charge (10V)	V _{DS} =48V , V _{GS} = 10V , I _D =4A		19		nC
Q _{gs}	Gate-Source Charge			2.6		nC
Q _{gd}	Gate-Drain Charge			4.1		nC
T _{d(on)}	Turn-On Delay Time	V _{DS} =30V , V _{GS} = 10V , R _G =3.3Ω, I _D = 4A		3		ns
T _r	Rise Time			34		ns
T _{d(off)}	Turn-Off Delay Time			23		ns
T _f	Fall Time			6		ns
C _{iss}	Input Capacitance	V _{DS} =15V , V _{GS} =0V , f=1MHz		1027		pF
C _{oss}	Output Capacitance			65		pF
C _{rss}	Reverse Transfer Capacitance			46		pF
I _S	Continuous Source Current(NOTE1, 3)	V _G =V _D =0V , Force Current			4.5	A
I _{SM}	Pulsed Source Current(NOTE2, 3)				18	A
V _{SD}	Diode Forward Voltage (NOTE2)	V _{GS} =0V , I _S =1A , T _J =25°C			1.2	V
t _{rr}	Reverse Recovery Time	I _F =4A , dI/dt=100A/μs , T _J =25°C		12.1		nS
Q _{rr}	Reverse Recovery Charge			6.7		nC

Note 1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

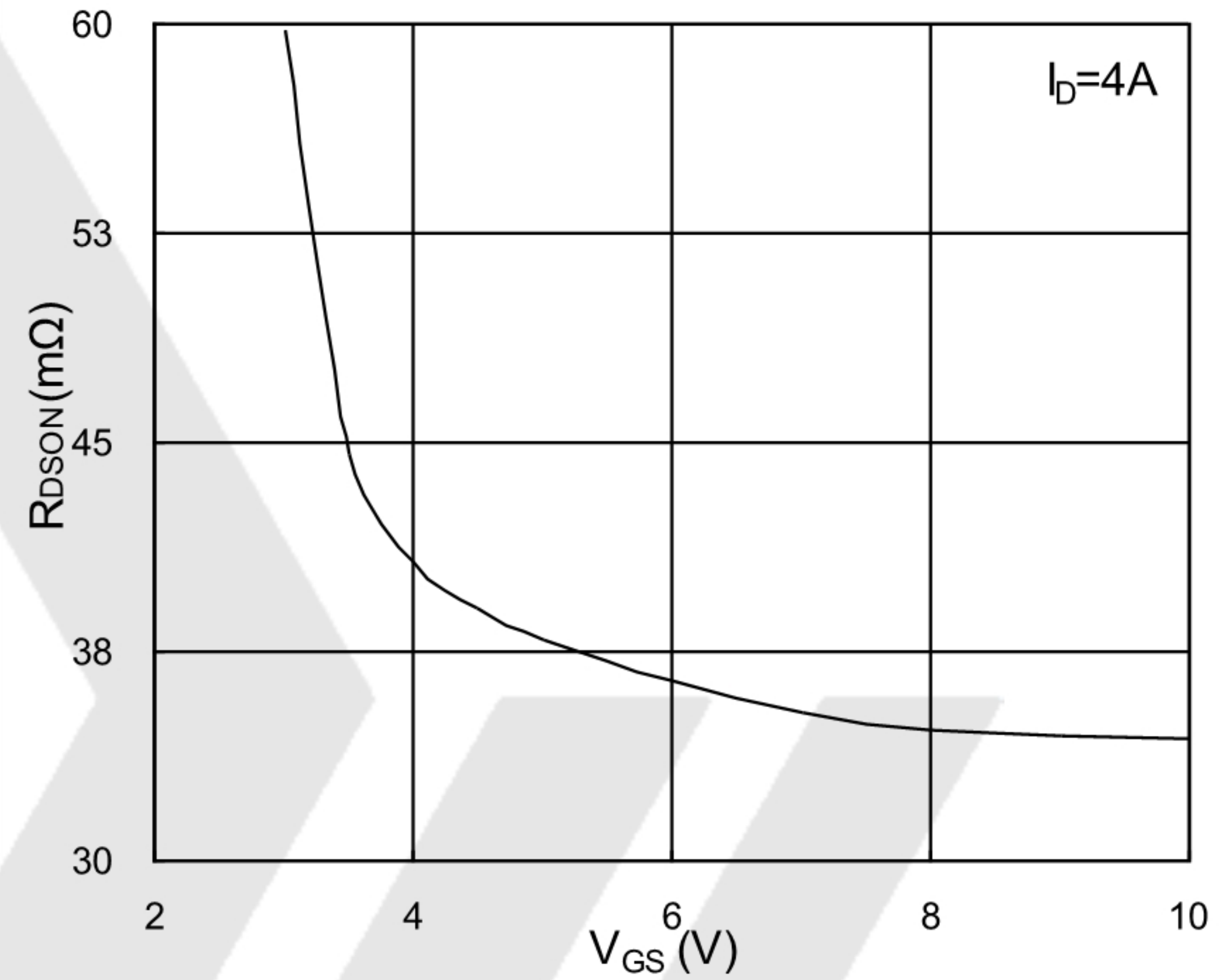
Note 2. The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%

Note 3. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

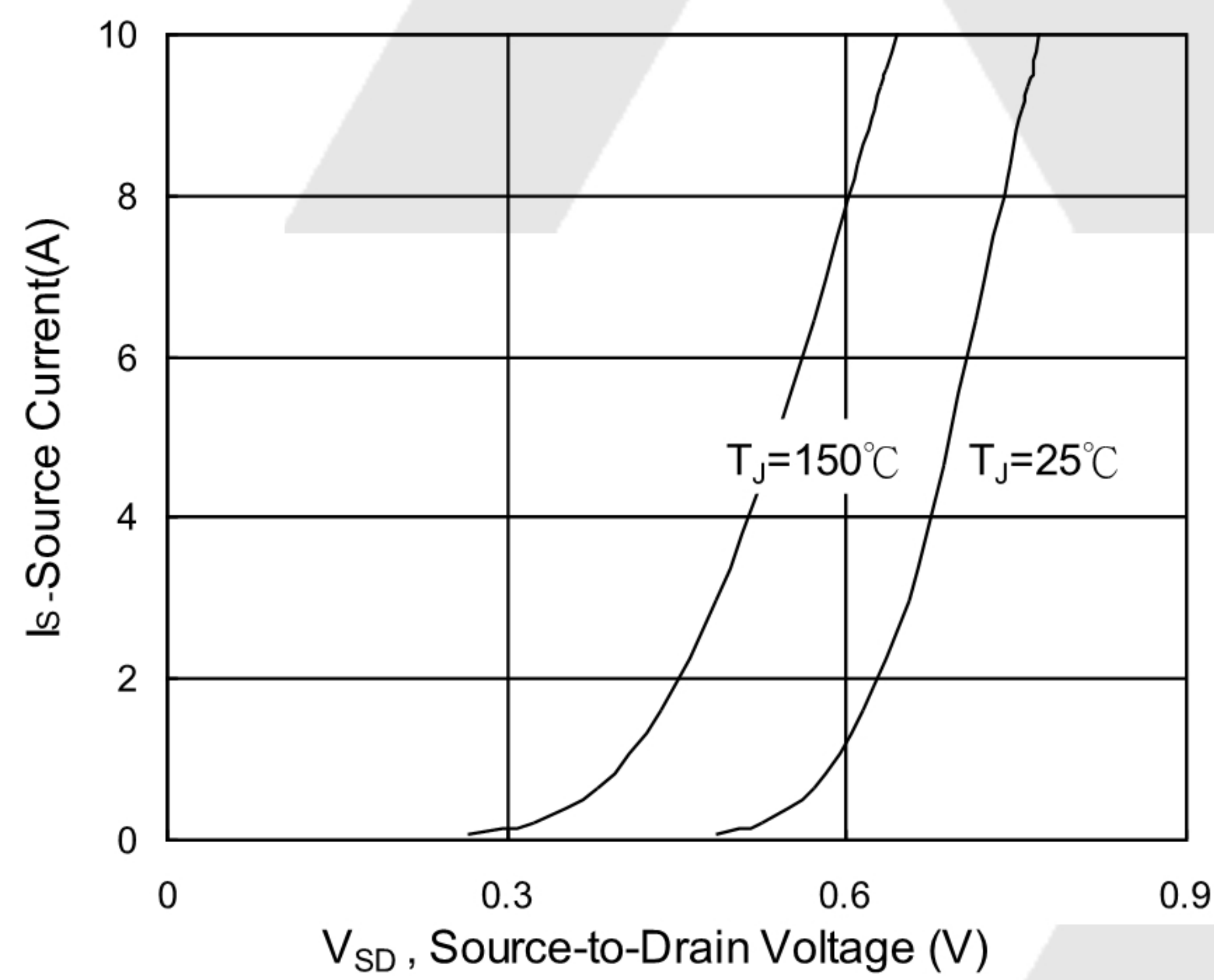
Thermal Characteristics



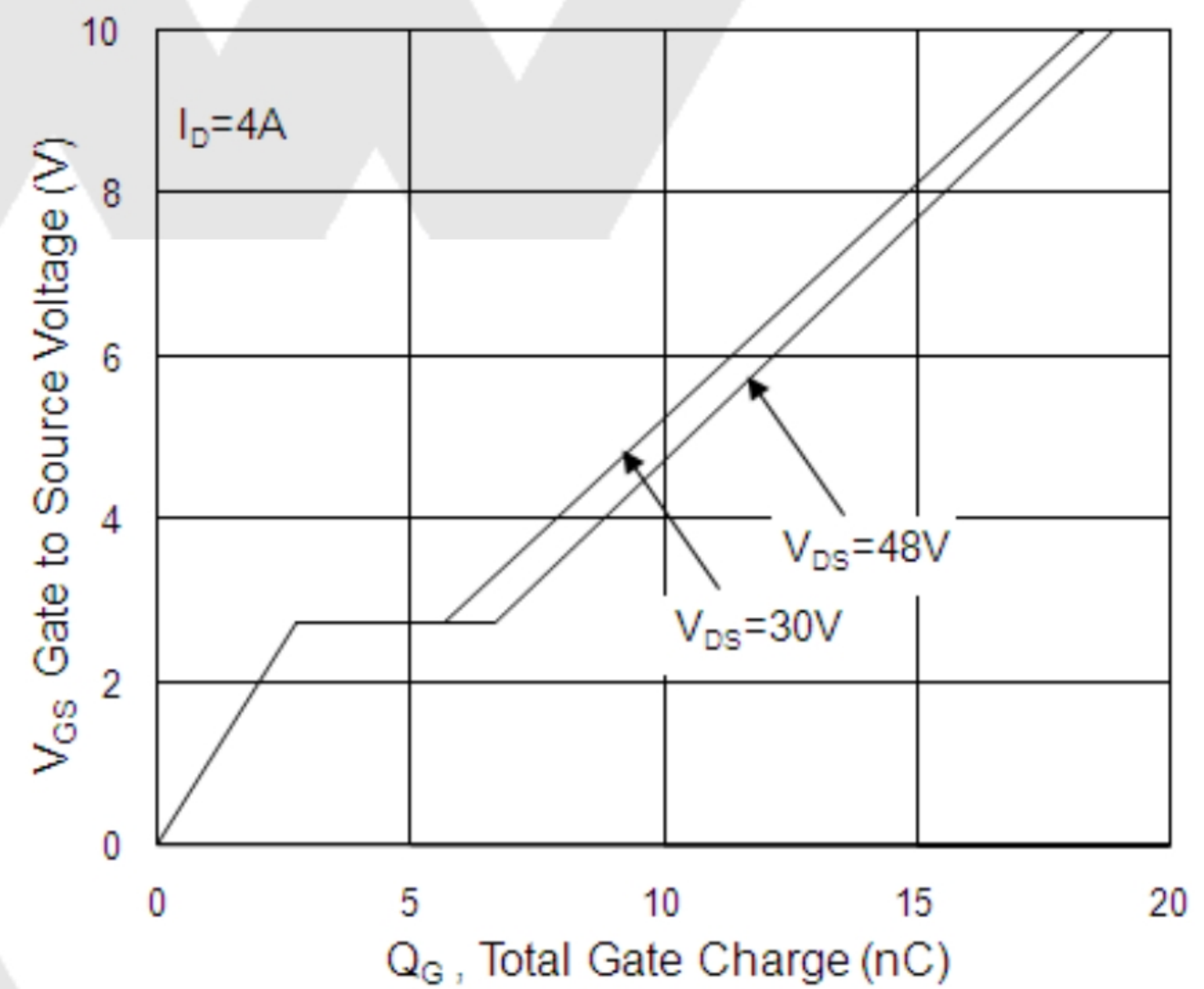
Typical Output Characteristics



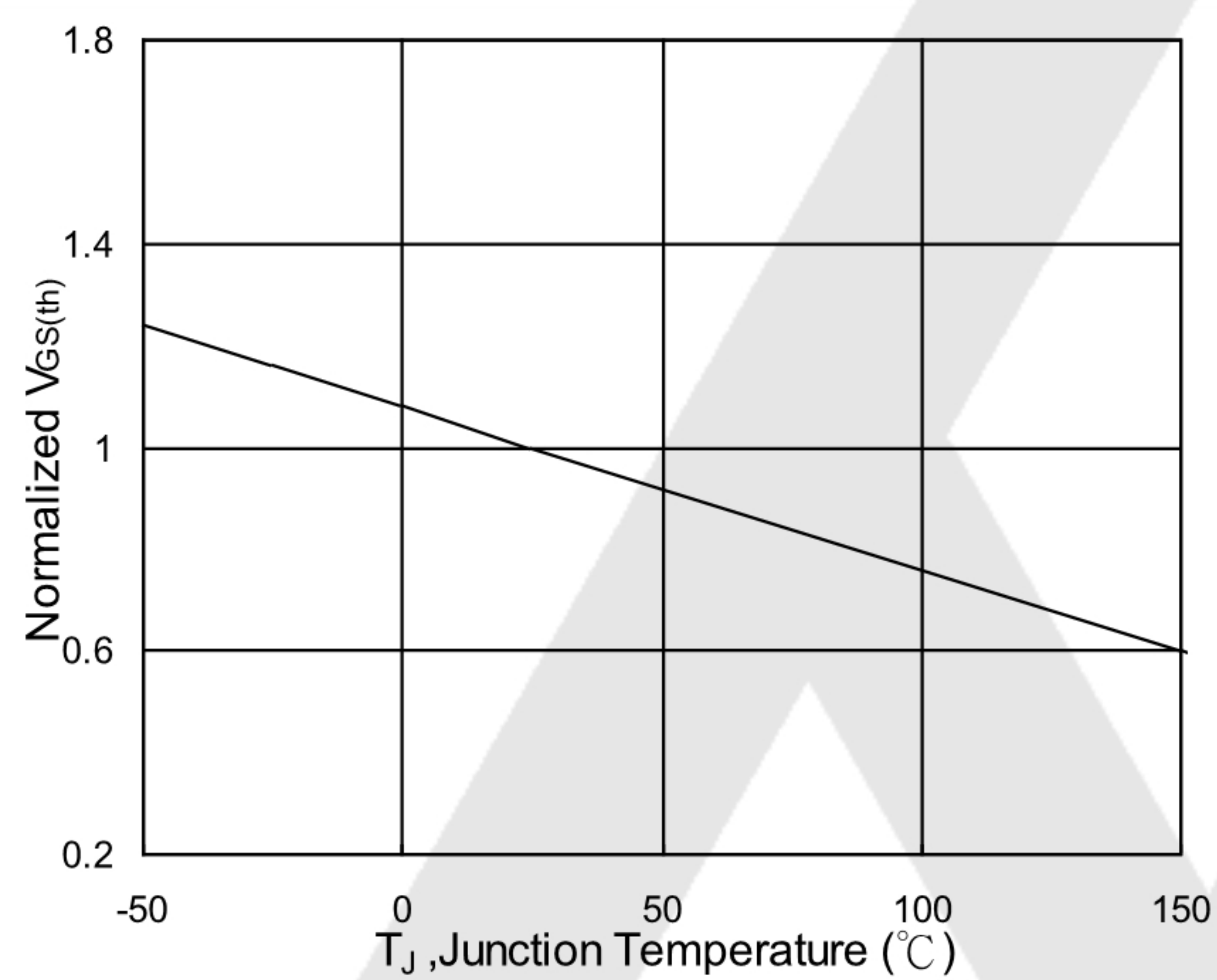
On-Resistance v.s Gate-Source



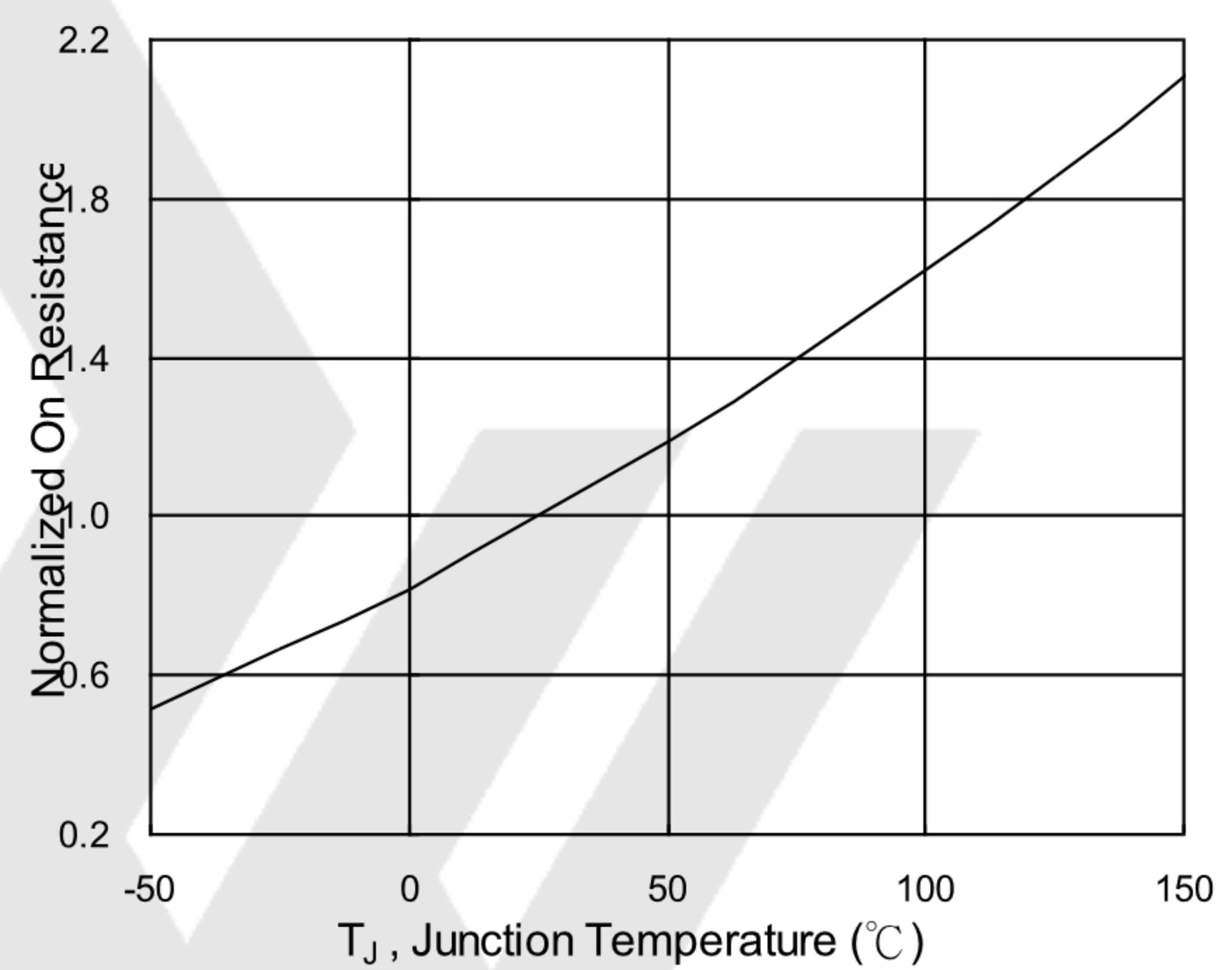
Forward Characteristics Of Reverse



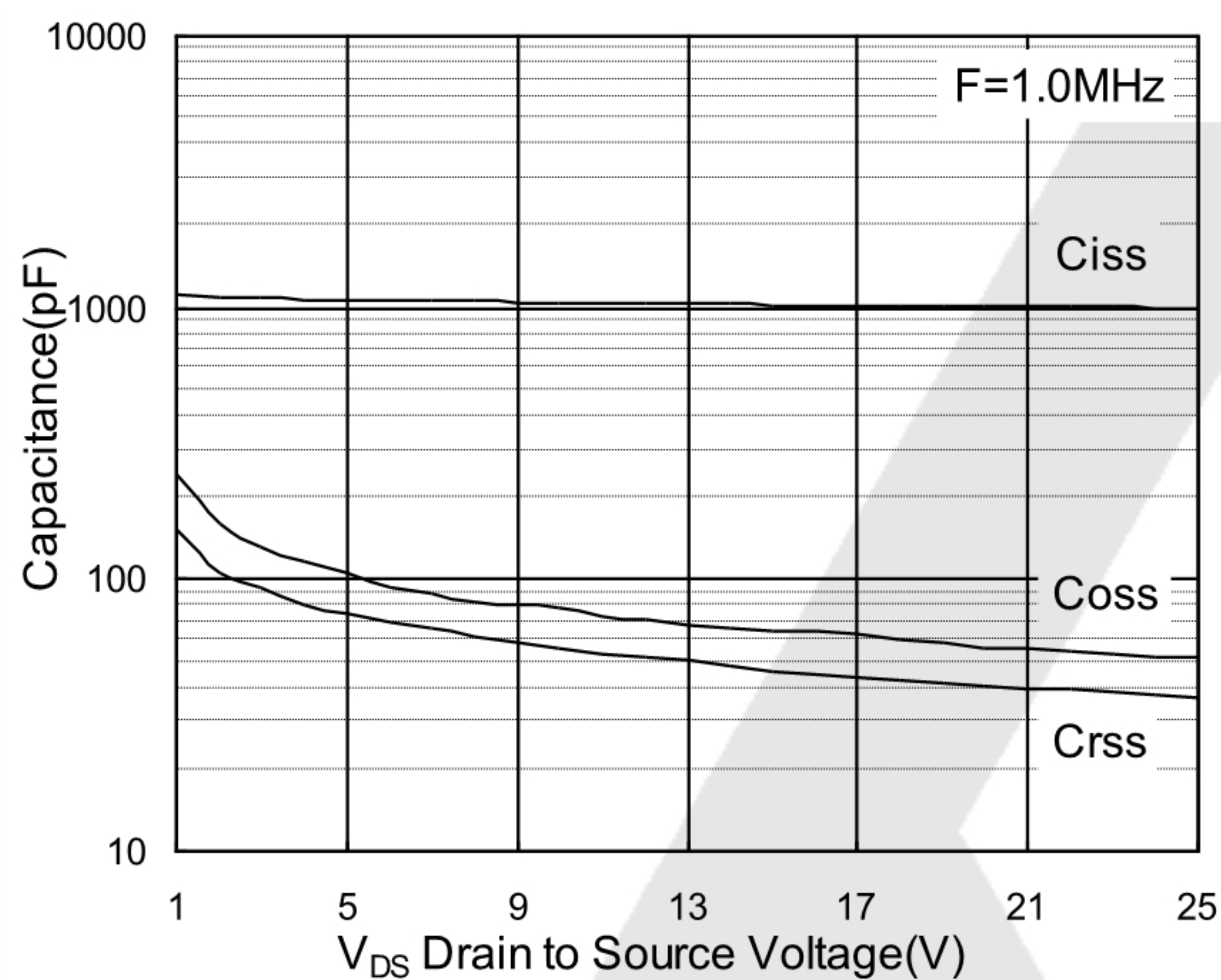
Gate-Charge Characteristics



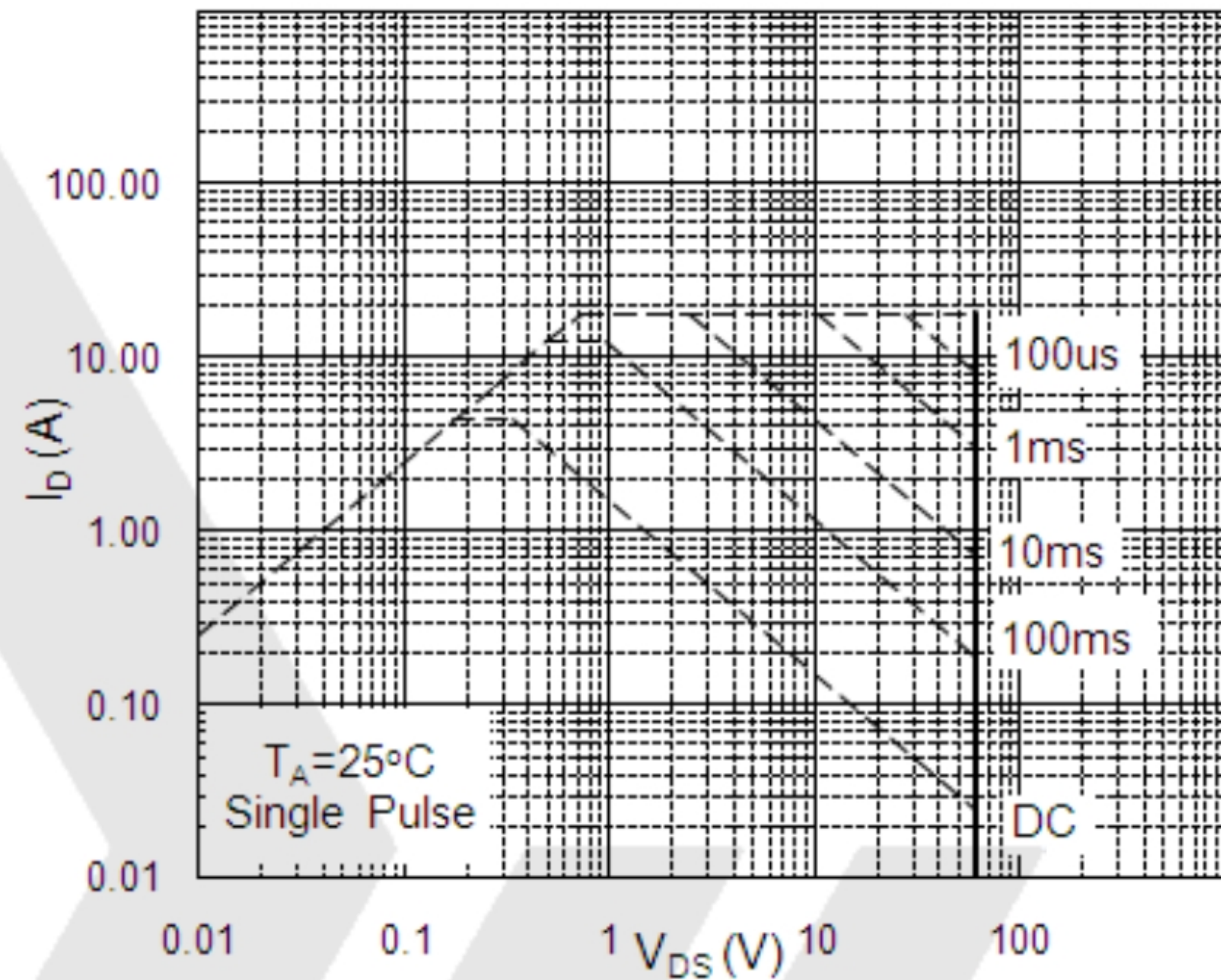
Normalized $V_{GS(th)}$ v.s T_J



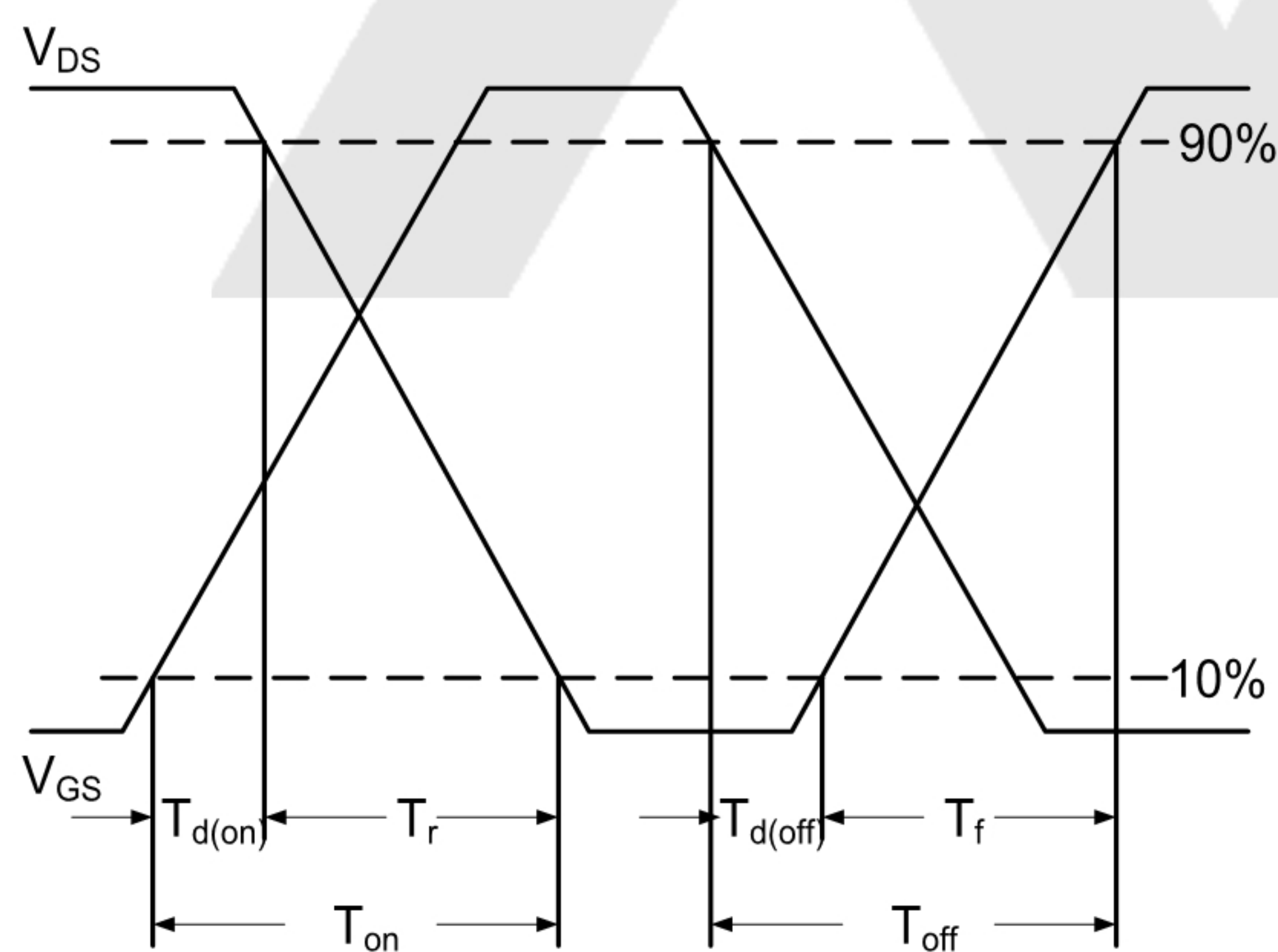
Normalized $R_{DS(on)}$ v.s T_J



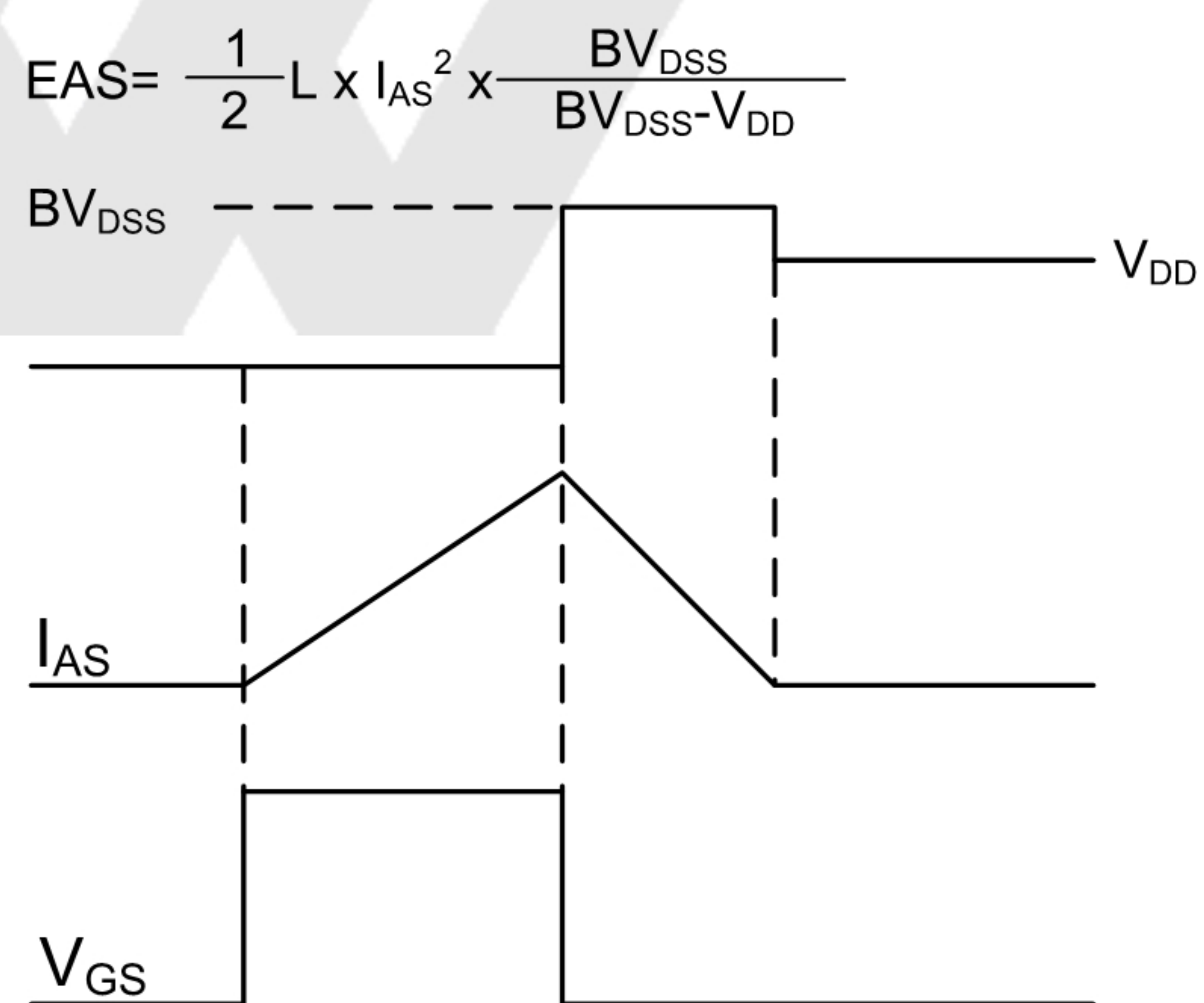
Capacitance



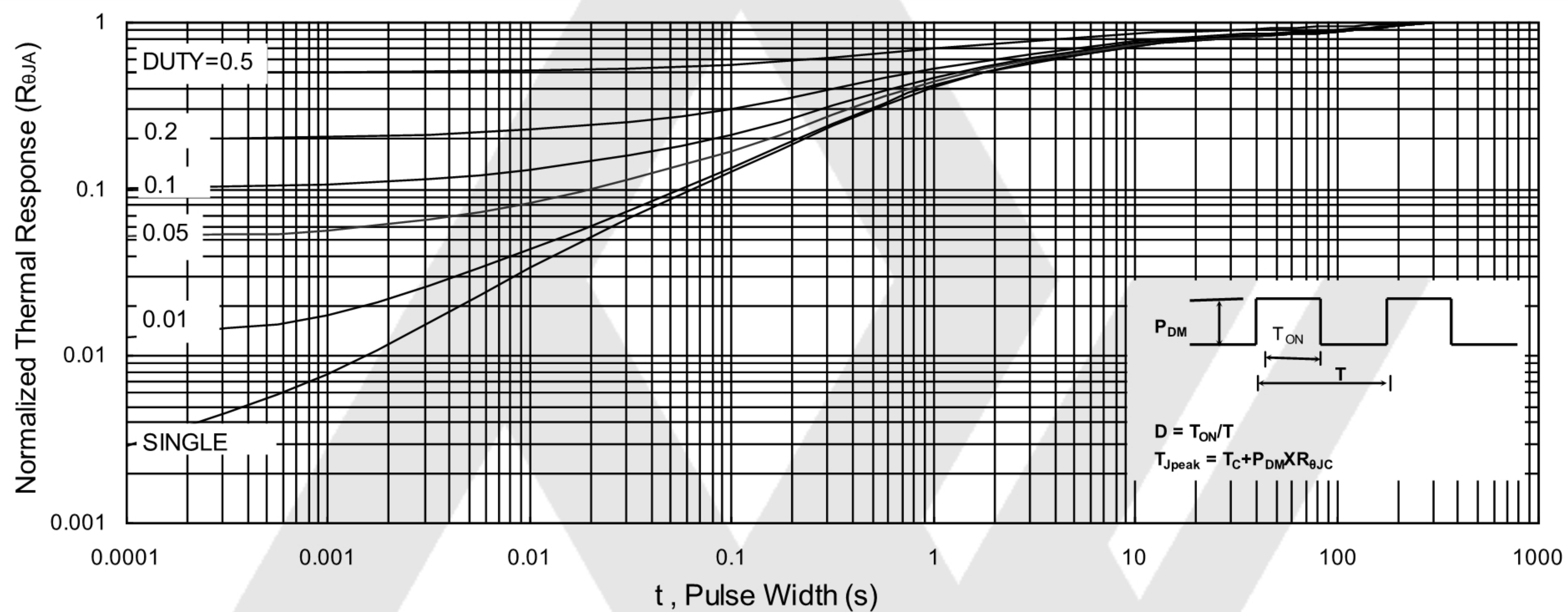
Safe Operating Area



Switching time waveform



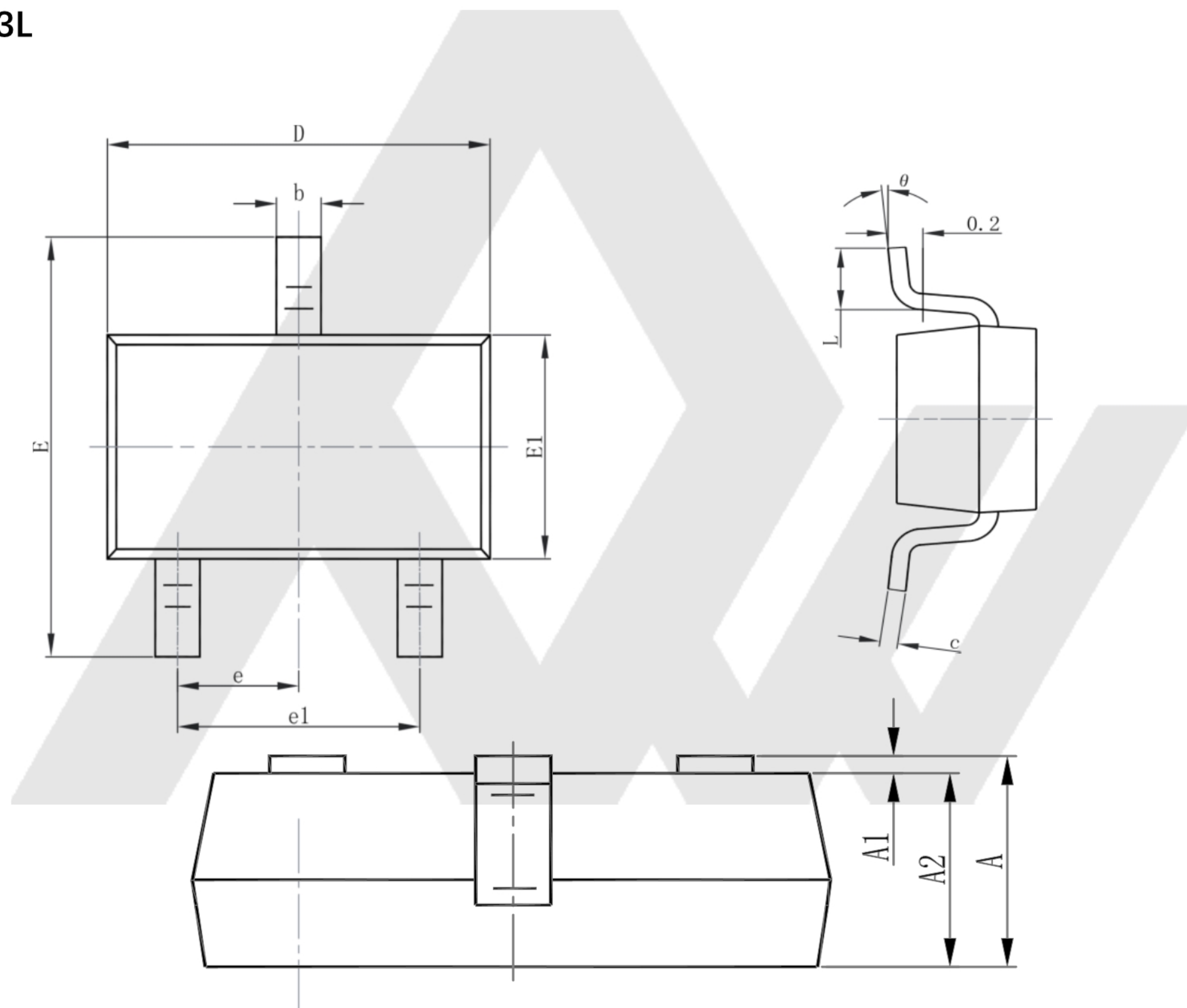
Unclamped Inductive Switching Waveform



Normalized Maximum Transient Thermal Impedance

PACKAGE DESCRIPTION

SOT23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

Notes

1. All dimensions are in millimeters.
2. Tolerance $\pm 0.10\text{mm}$ (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 exact.

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