

P-Channel Enhancement Mode MOSFET

GENERAL DESCRIPTION

The PW2305 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

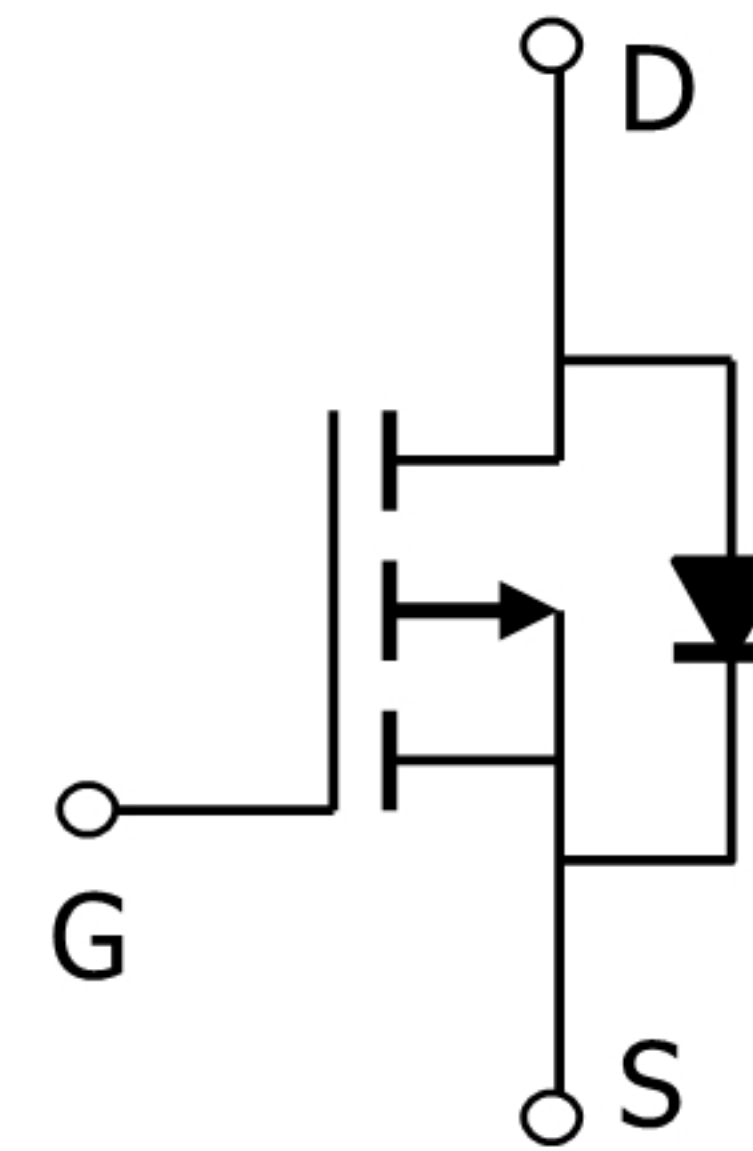
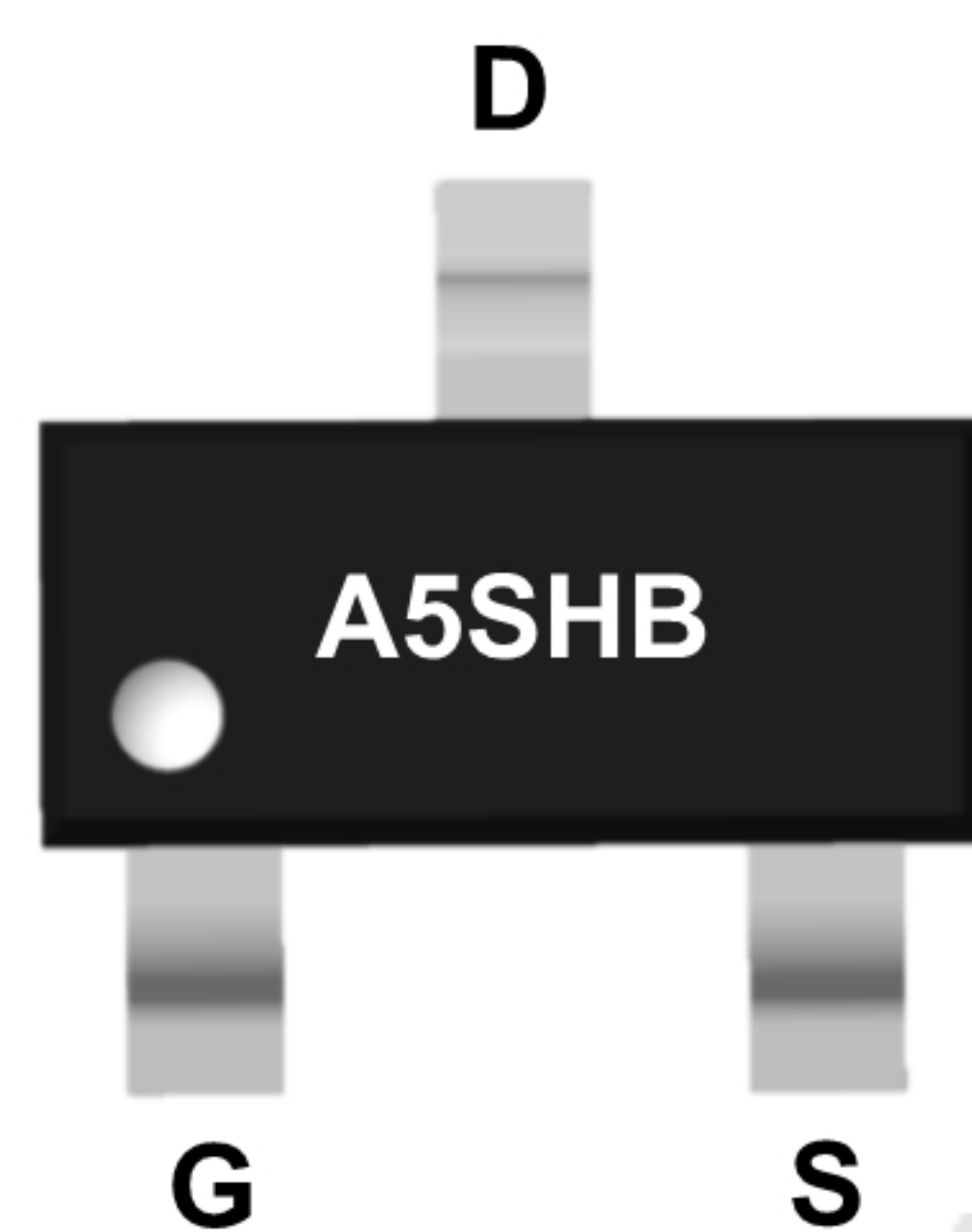
$V_{DS} = -20V$ $I_D = -4.9A$

$R_{DS(ON)} < 38m\Omega$ @ $V_{GS} = -4.5V$

Available in a 3-Pin SOT23-3 Package



SOT-23-3L
(TOP VIEW)



Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	-20	V
V_{GS}	Gate-Source Voltage	± 12	V
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-4.9	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ -4.5V^1$	-3.9	A
I_{DM}	Pulsed Drain Current ²	-14	A
$P_D @ T_A = 25^\circ C$	Total Power Dissipation ³	1.31	W
$P_D @ T_A = 70^\circ C$	Total Power Dissipation ³	0.84	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ C$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	120	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹ ($t \leq 10s$)	95	$^\circ C/W$

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	-20	---	---	V
△BV _{DSS} △T _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.014	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-4.5V, I _D =-4.9A	---	32	38	mΩ
		V _{GS} =-2.5V, I _D =-3.4A	---	45	55	
		V _{GS} =-1.8V, I _D =-2A	---	65	85	
V _{GS(th)}	Gate Threshold Voltage		-0.4	---	-1.0	V
△V _{GS(th)}	V _{GS(th)} Temperature Coefficient	V _{GS} =V _{DS} , I _D =-250uA	---	3.95	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-16V, V _{GS} =0V, T _J =25°C	---	---	-1	uA
		V _{DS} =-16V, V _{GS} =0V, T _J =55°C	---	---	-5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±12V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =-5V, I _D =-3A	---	12.8	---	S
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-15V, V _{GS} =-4.5V, I _D =-3A	---	10.2	14.3	nC
Q _{gs}	Gate-Source Charge		---	1.89	2.6	
Q _{gd}	Gate-Drain Charge		---	3.1	4.3	
T _{d(on)}	Turn-On Delay Time	V _{DD} =-10V, V _{GS} =-4.5V, R _G =3.3Ω, I _D =-3A	---	5.6	11.2	ns
T _r	Rise Time		---	40.8	73	
T _{d(off)}	Turn-Off Delay Time		---	33.6	67	
T _f	Fall Time		---	18	36	
C _{iss}	Input Capacitance	V _{DS} =-15V, V _{GS} =0V, f=1MHz	---	857	1200	pF
C _{oss}	Output Capacitance		---	114	160	
C _{rss}	Reverse Transfer Capacitance		---	108	151	
I _S	Continuous Source Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	-4.9	A
I _{SM}	Pulsed Source Current ^{2,4}		---	---	-14	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1	V
t _{rr}	Reverse Recovery Time	I _F =-3A, di/dt=100A/μs, T _J =25°C	---	21.8	---	nS
Q _{rr}	Reverse Recovery Charge		---	6.9	---	nC

Note :

- 1、 The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2、 The data tested by pulsed , pulse width ≤ 300us , duty cycle ≤ 2%
- 3、 The power dissipation is limited by 150°C junction temperature
- 4、 The data is theoretically the same as I_D and I_{DM}, in real applications , should be limited by total power dissipation.

Typical Characteristics

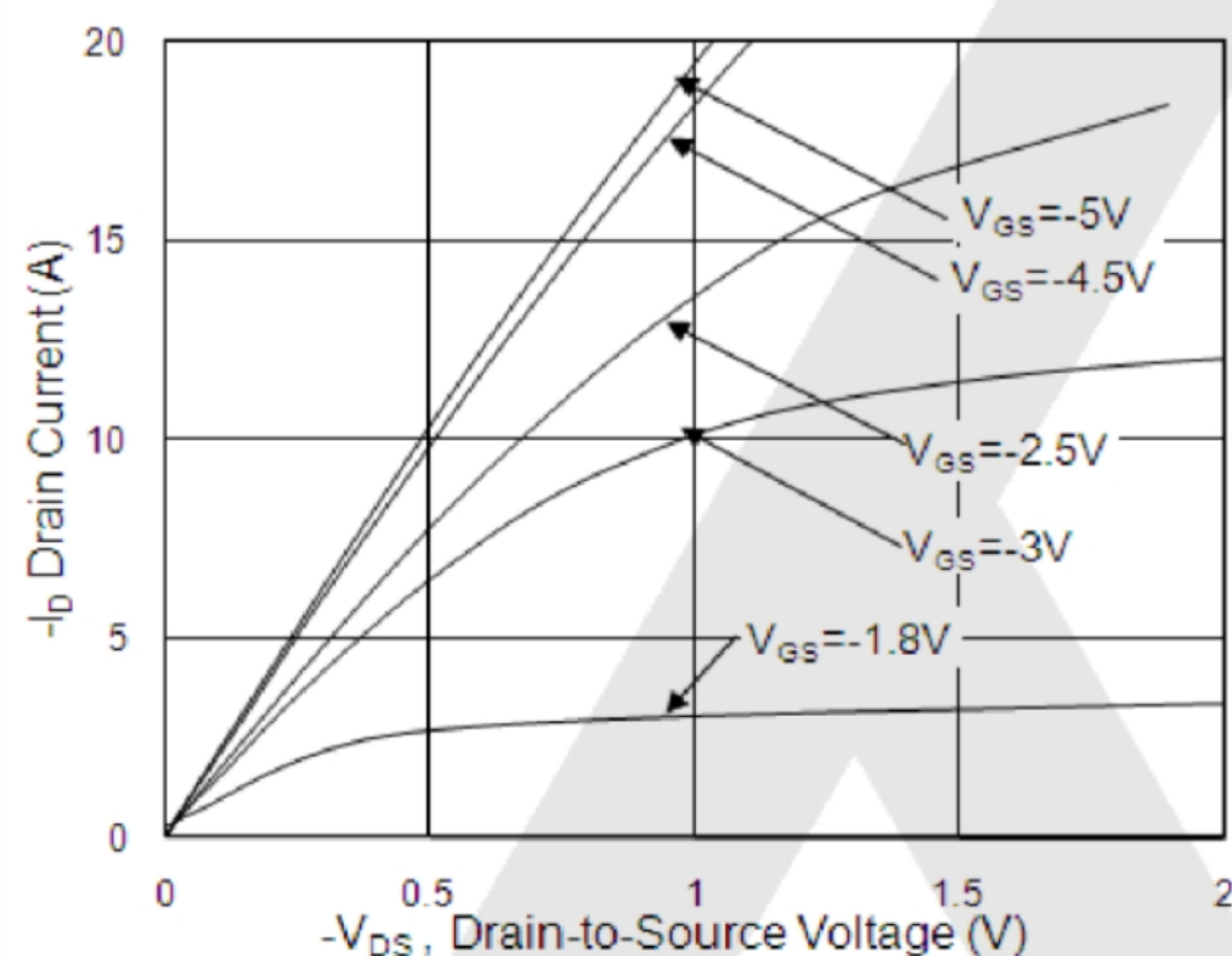


Fig.1 Typical Output Characteristics

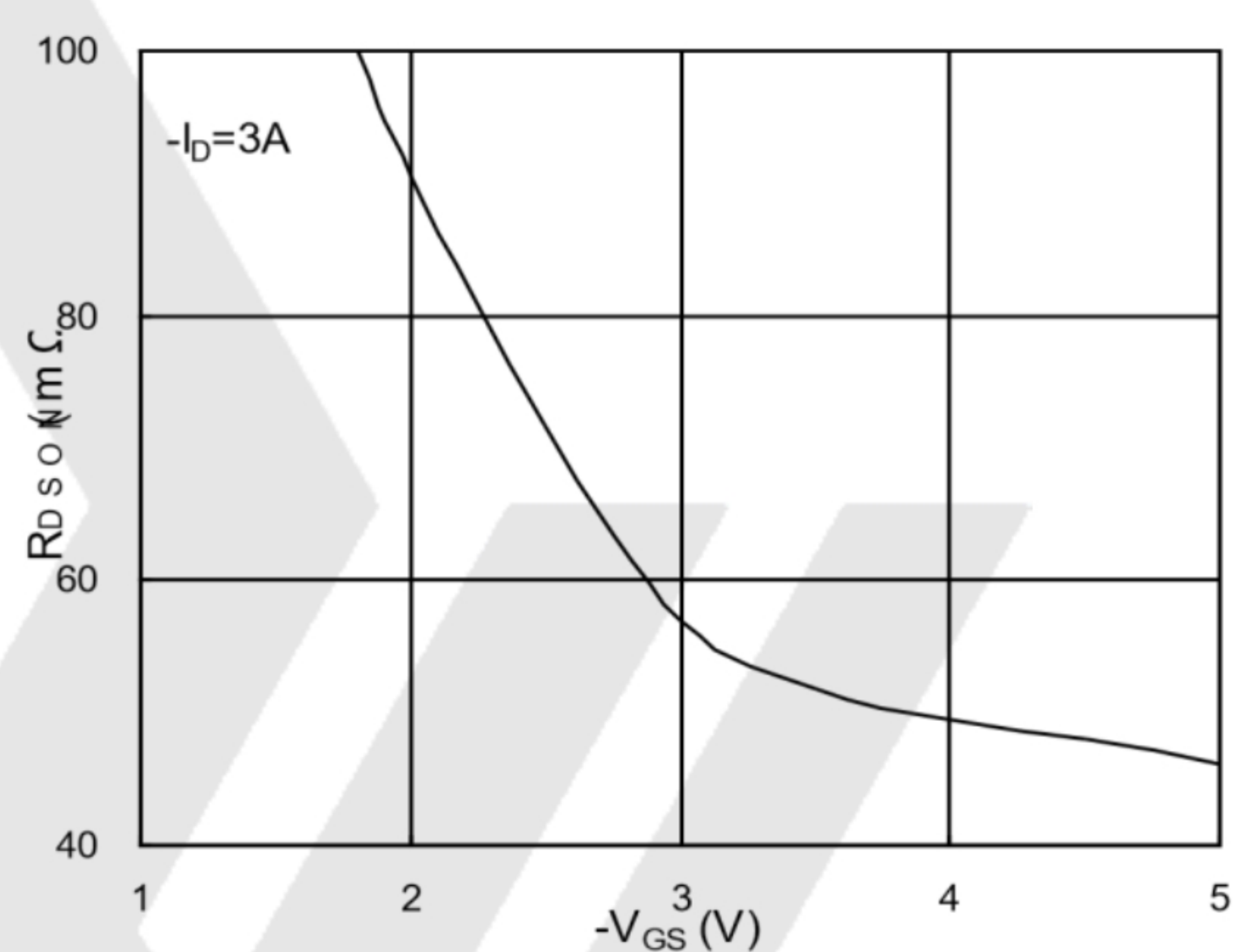


Fig.2 On-Resistance vs. G-S Voltage

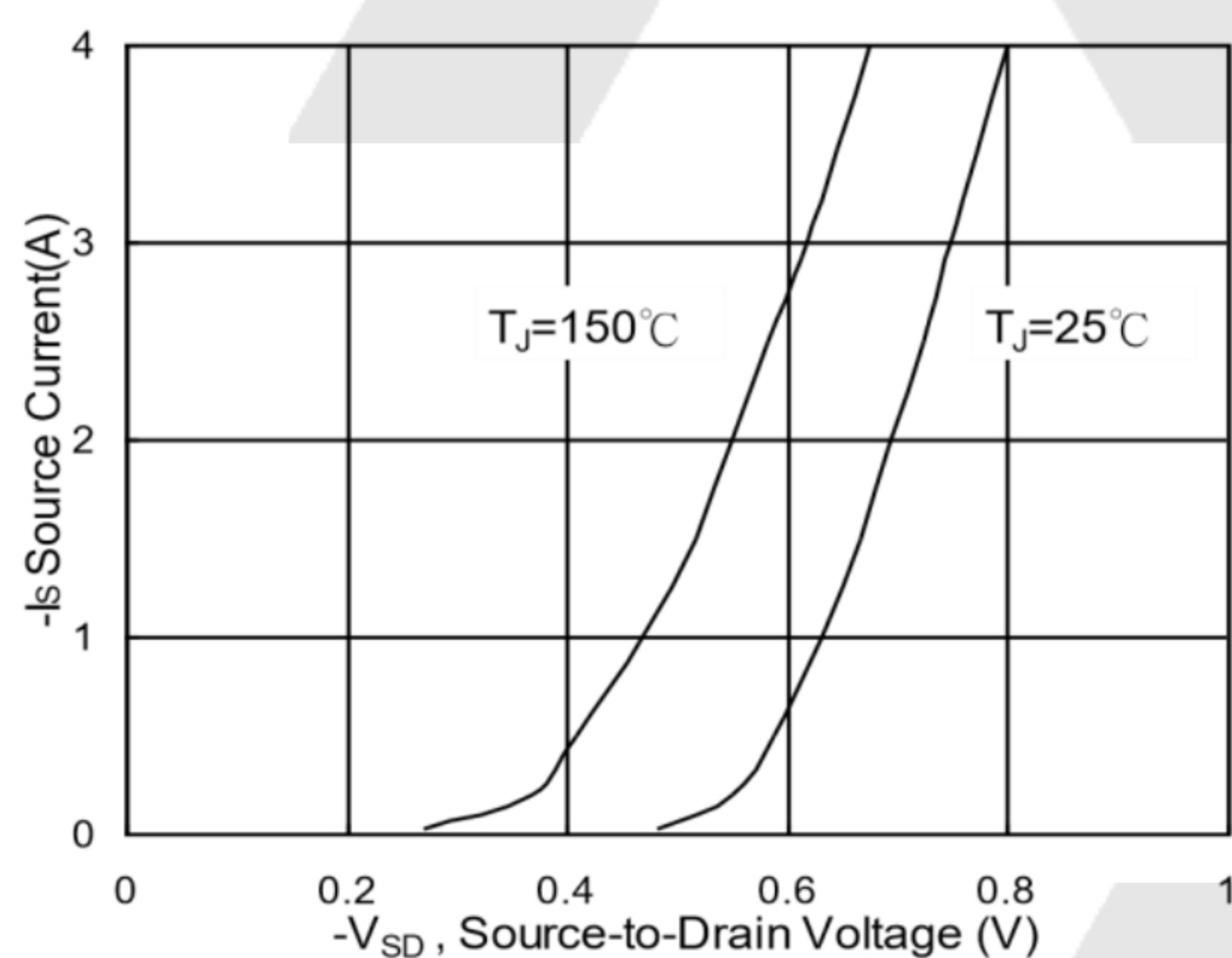


Fig.3 Forward Characteristics of Reverse

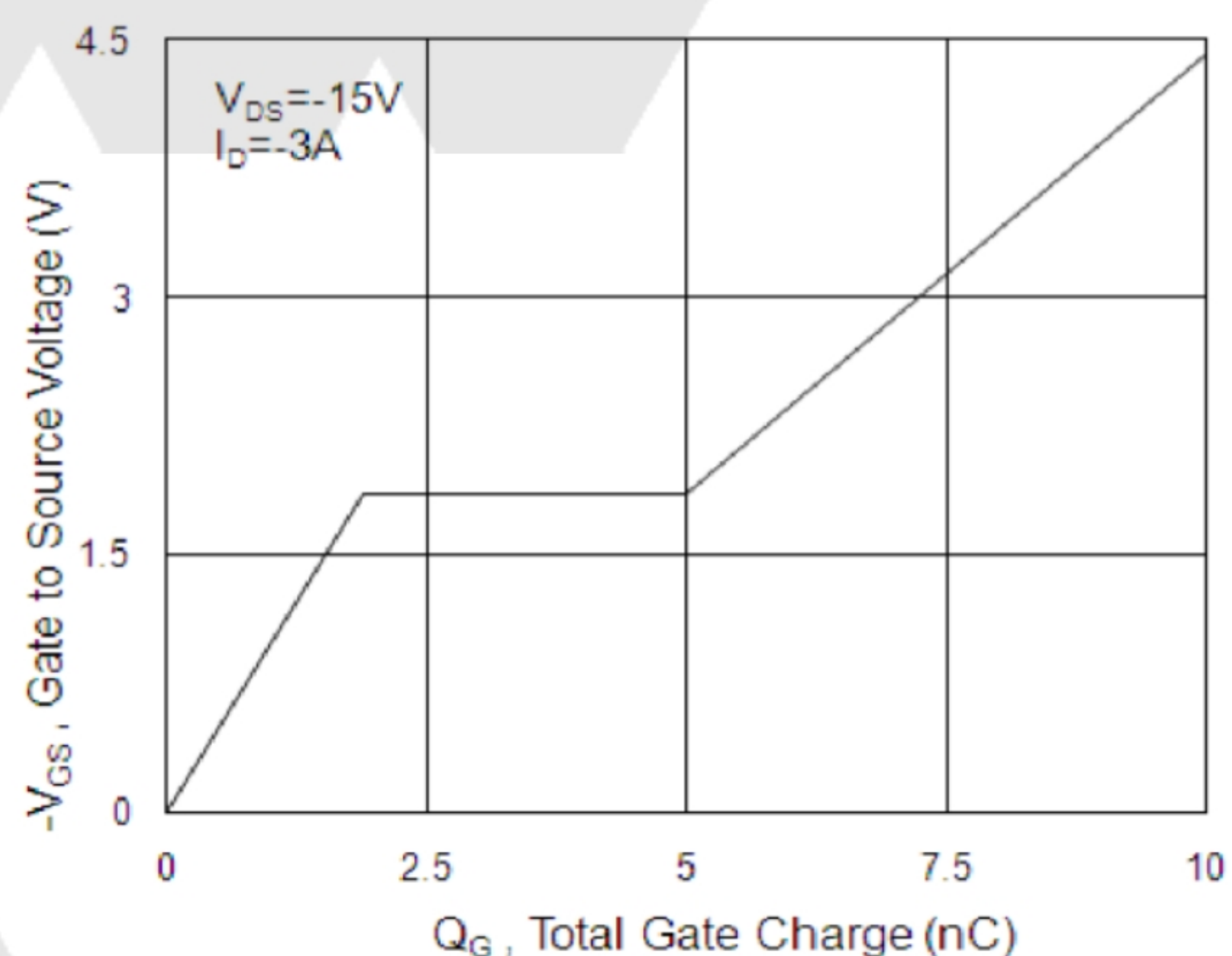


Fig.4 Gate-charge Characteristics

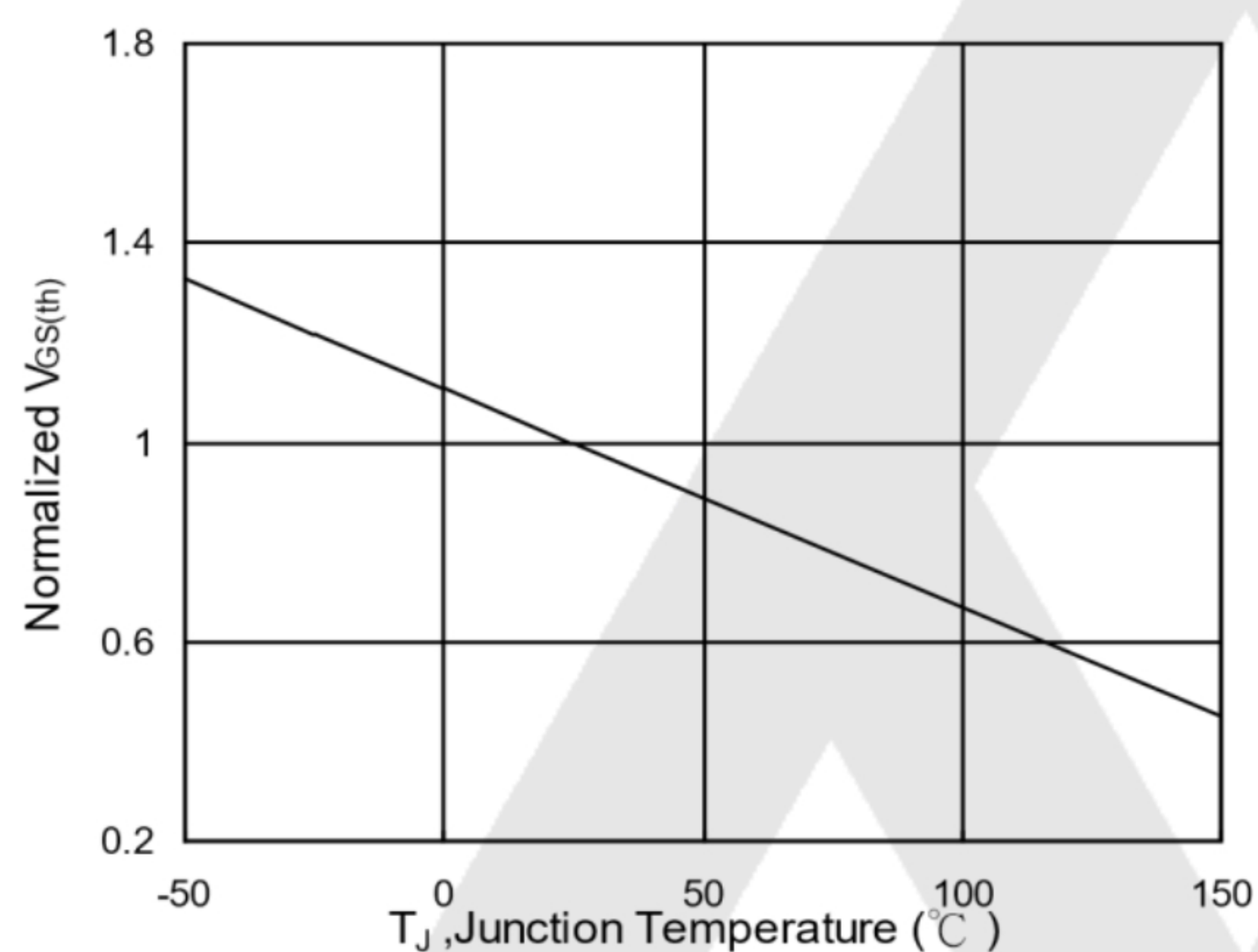


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

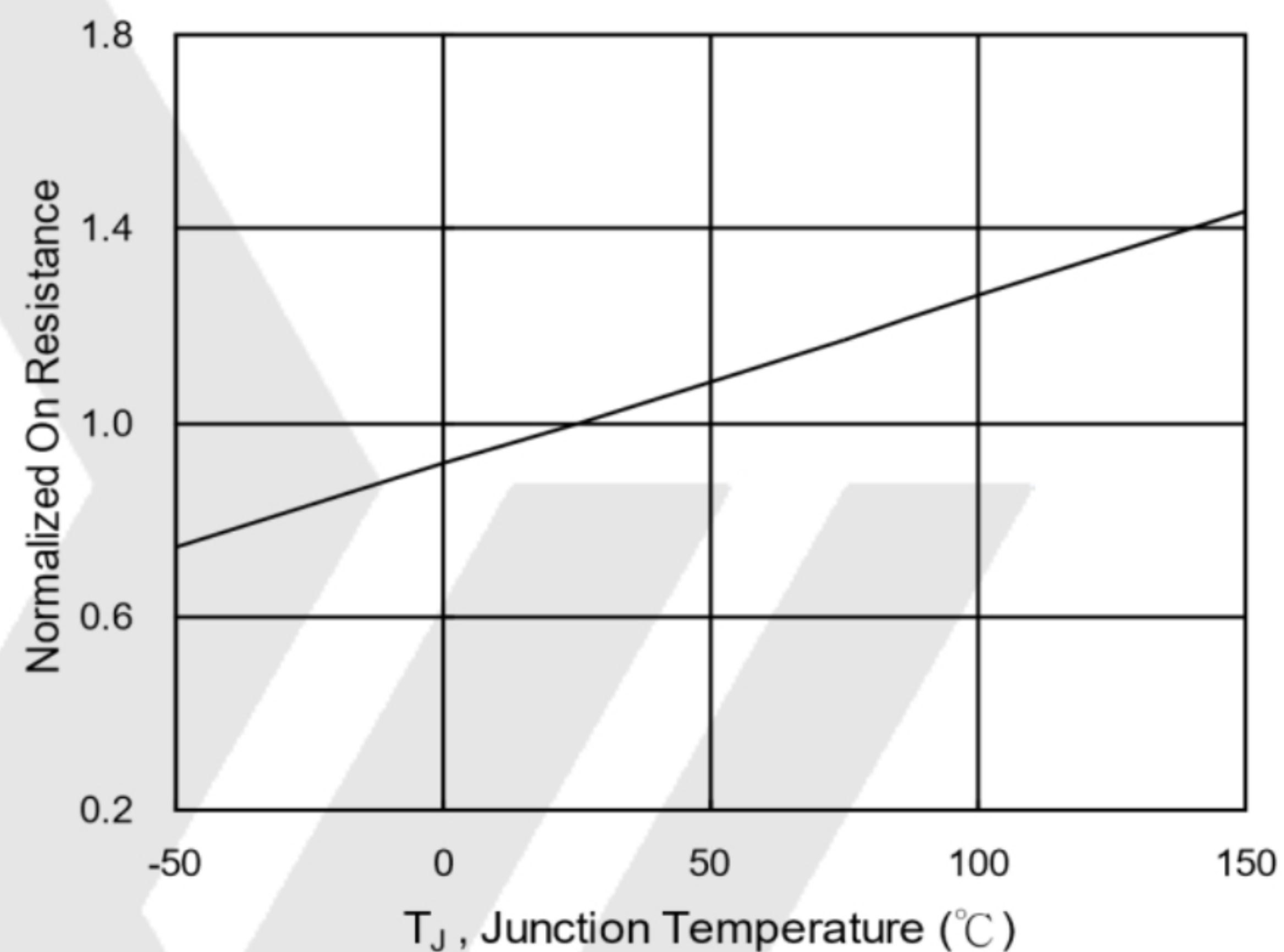


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

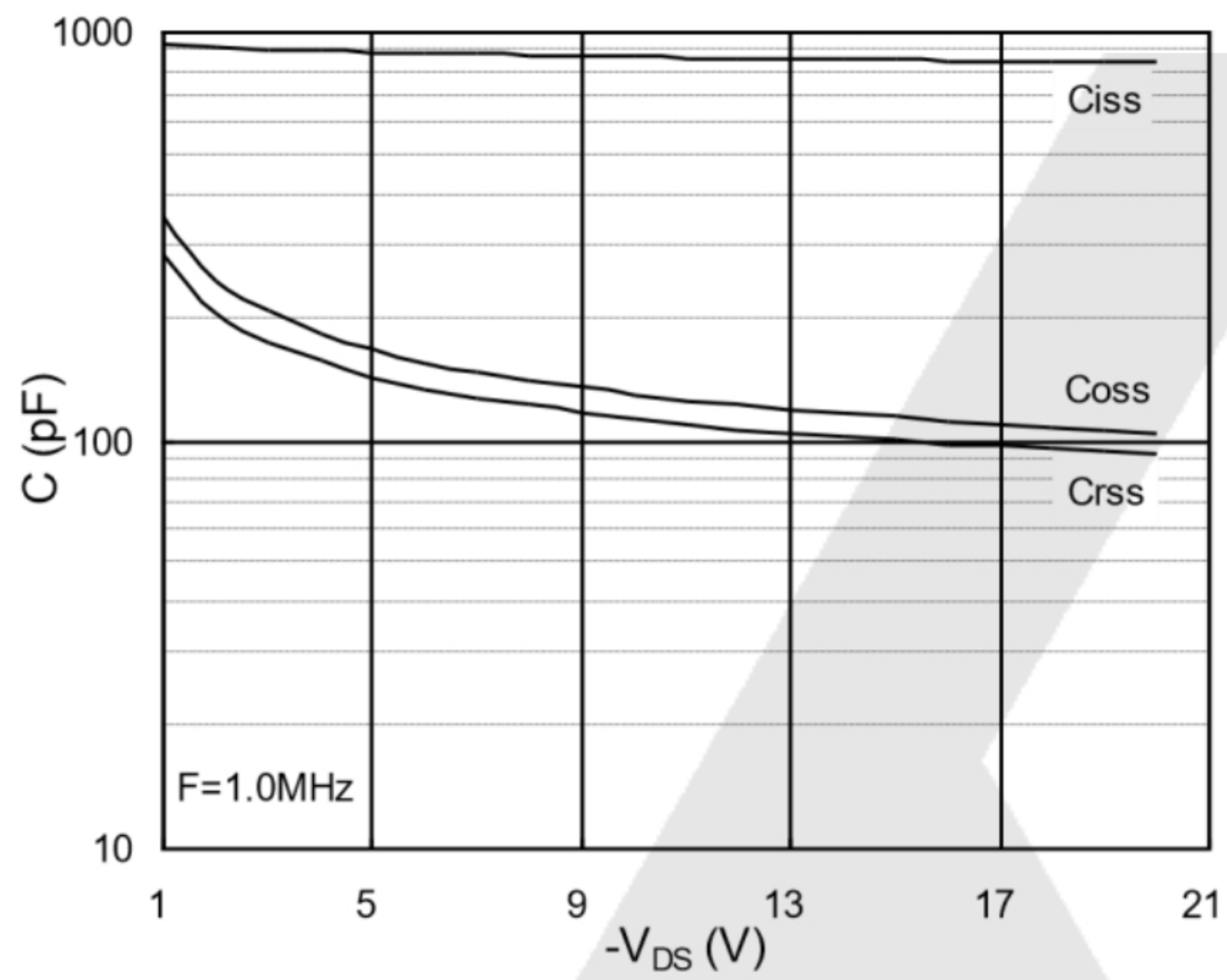


Fig.7 Capacitance

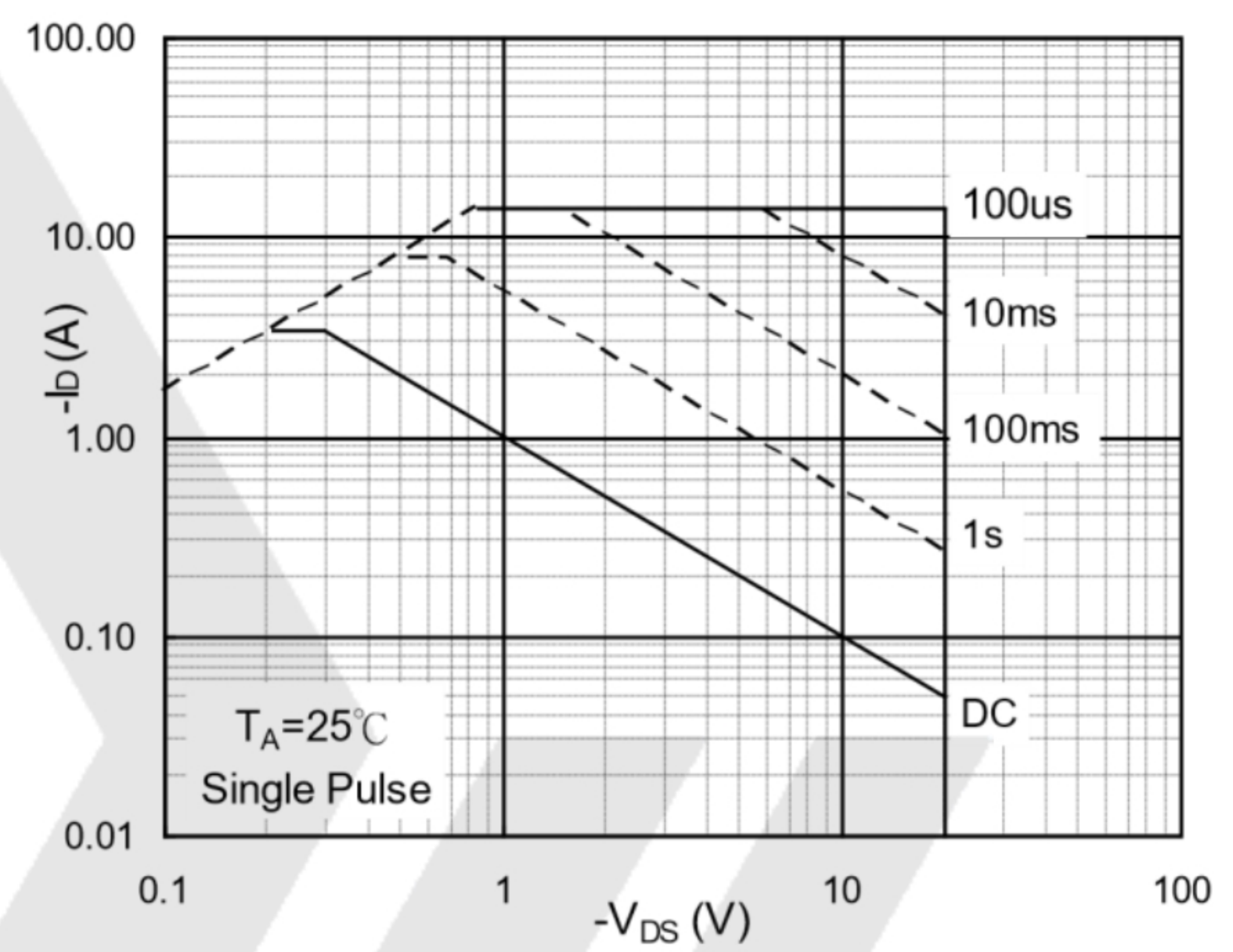


Fig.8 Safe Operating Area

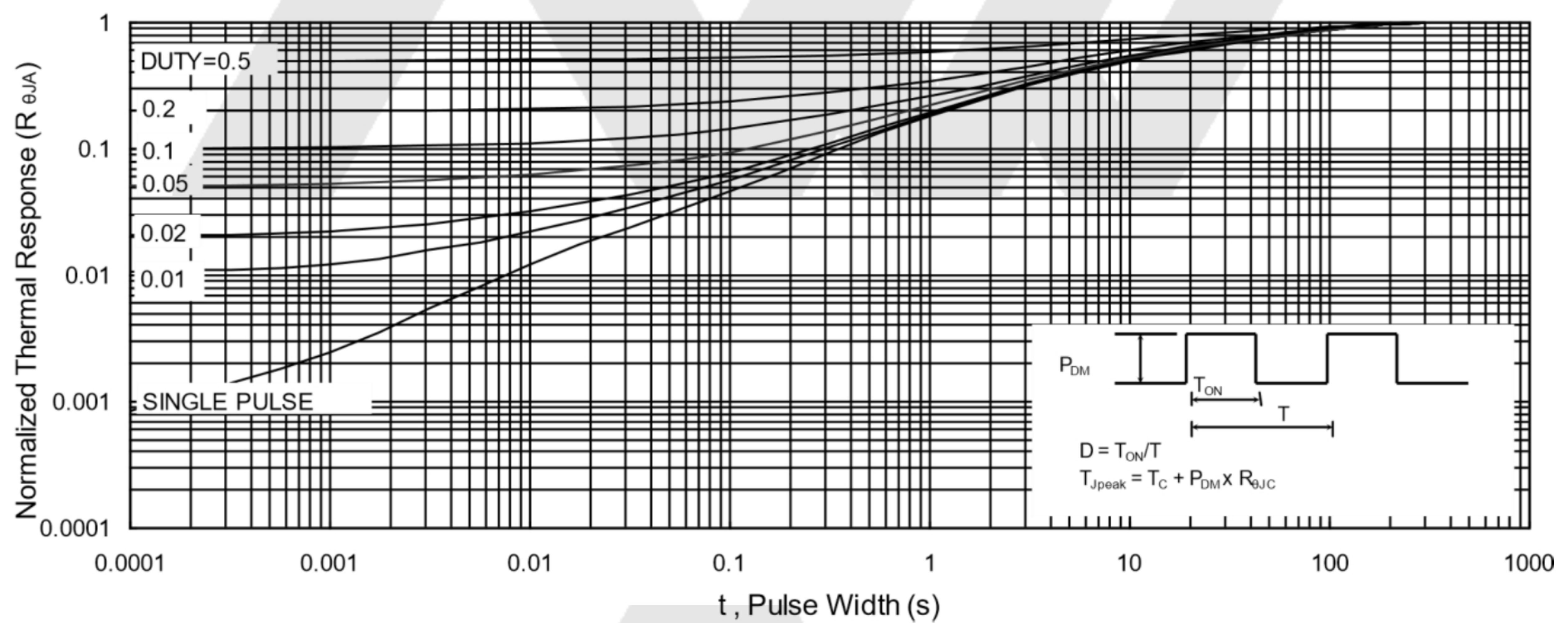


Fig.9 Normalized Maximum Transient Thermal Impedance

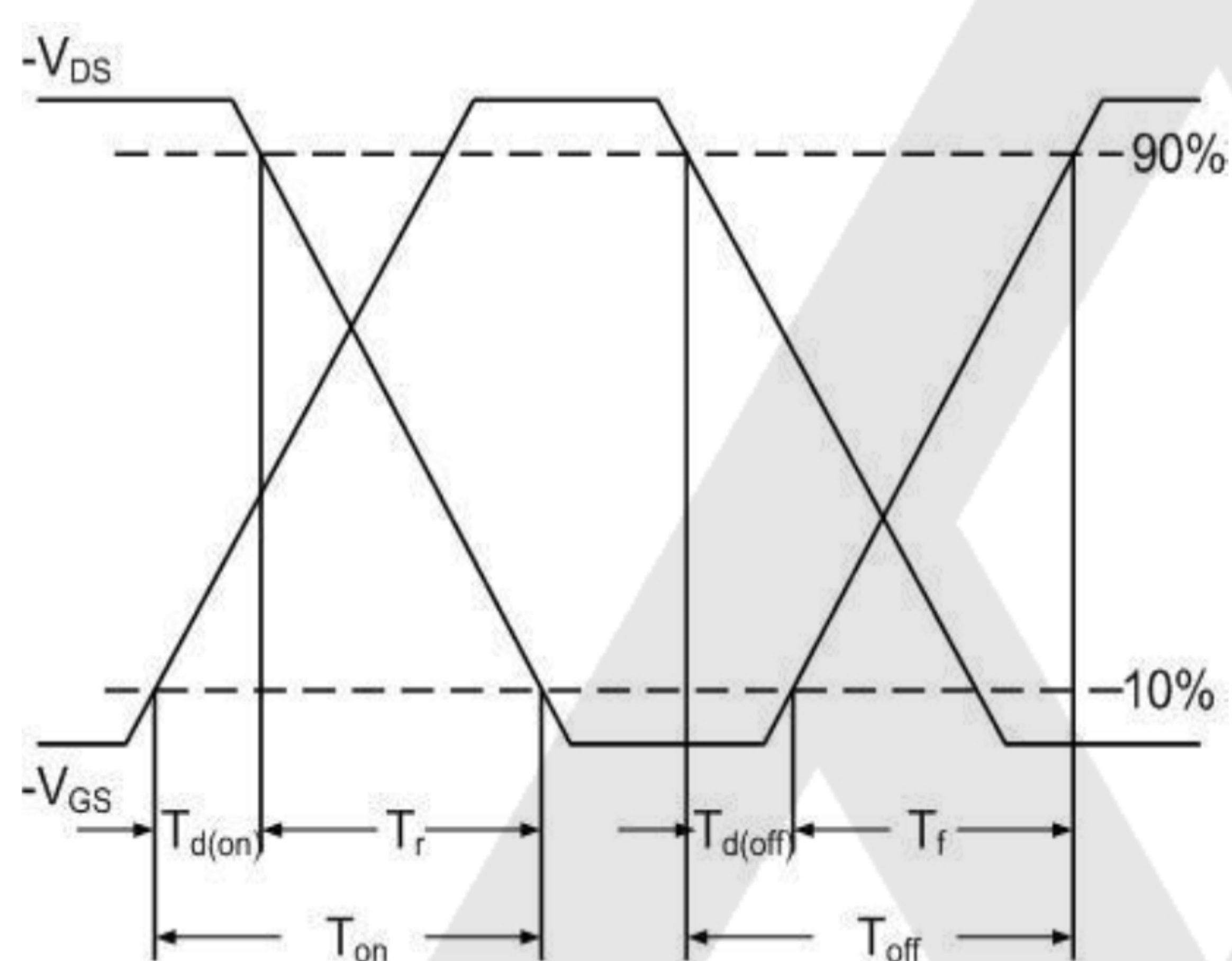


Fig.10 Switching Time Waveform

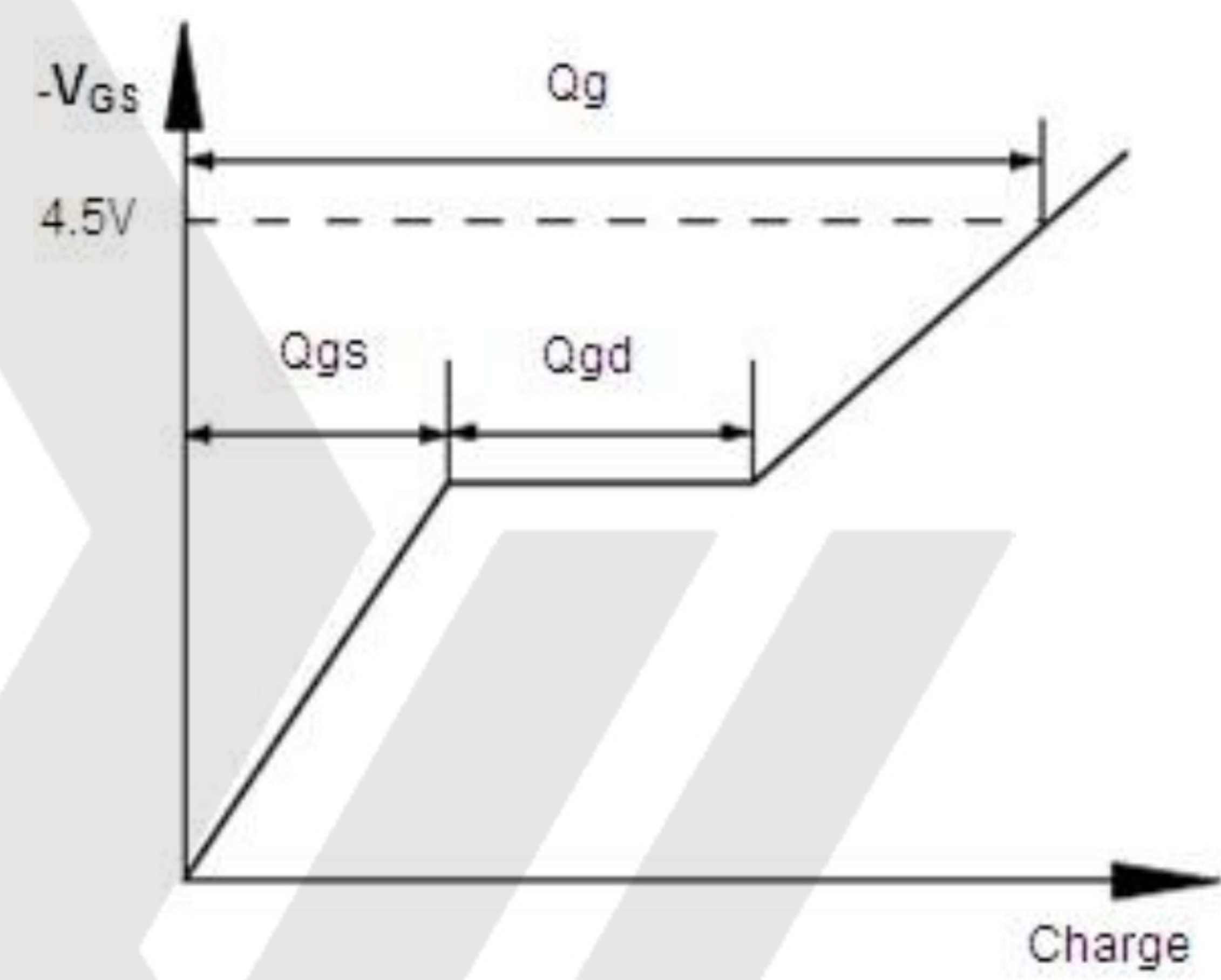
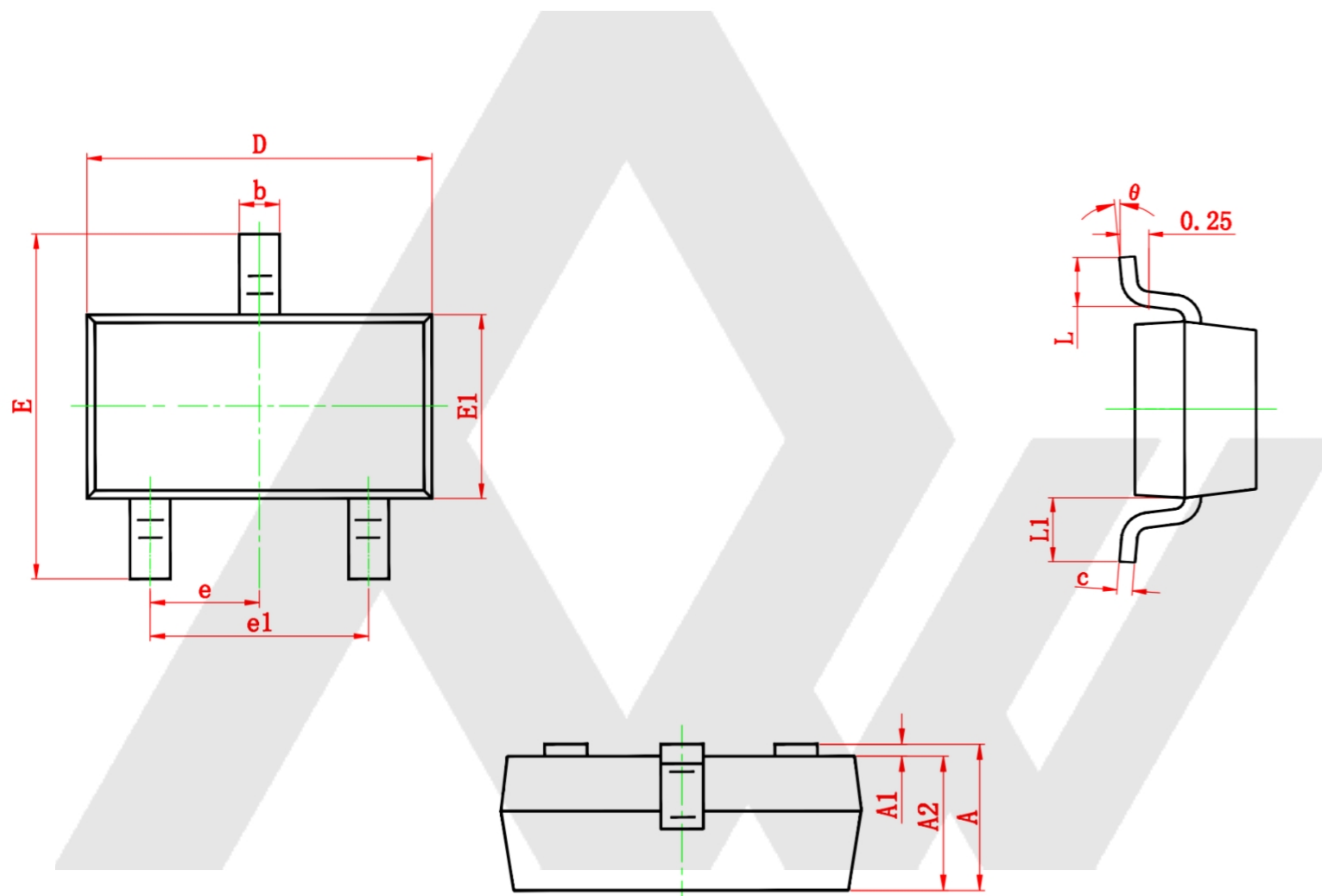


Fig.11 Gate Charge Waveform

PACKAGE DESCRIPTION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	2.250	2.550	0.089	0.100
E1	1.200	1.400	0.047	0.055
e	0.950 TYP.		0.037 TYP.	
e1	1.800	2.000	0.071	0.079
L	0.300	0.500	0.012	0.020
L1	0.550 REF.		0.022 REF.	
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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