



## P-Channel Enhancement Mode MOSFET

### GENERAL DESCRIPTION

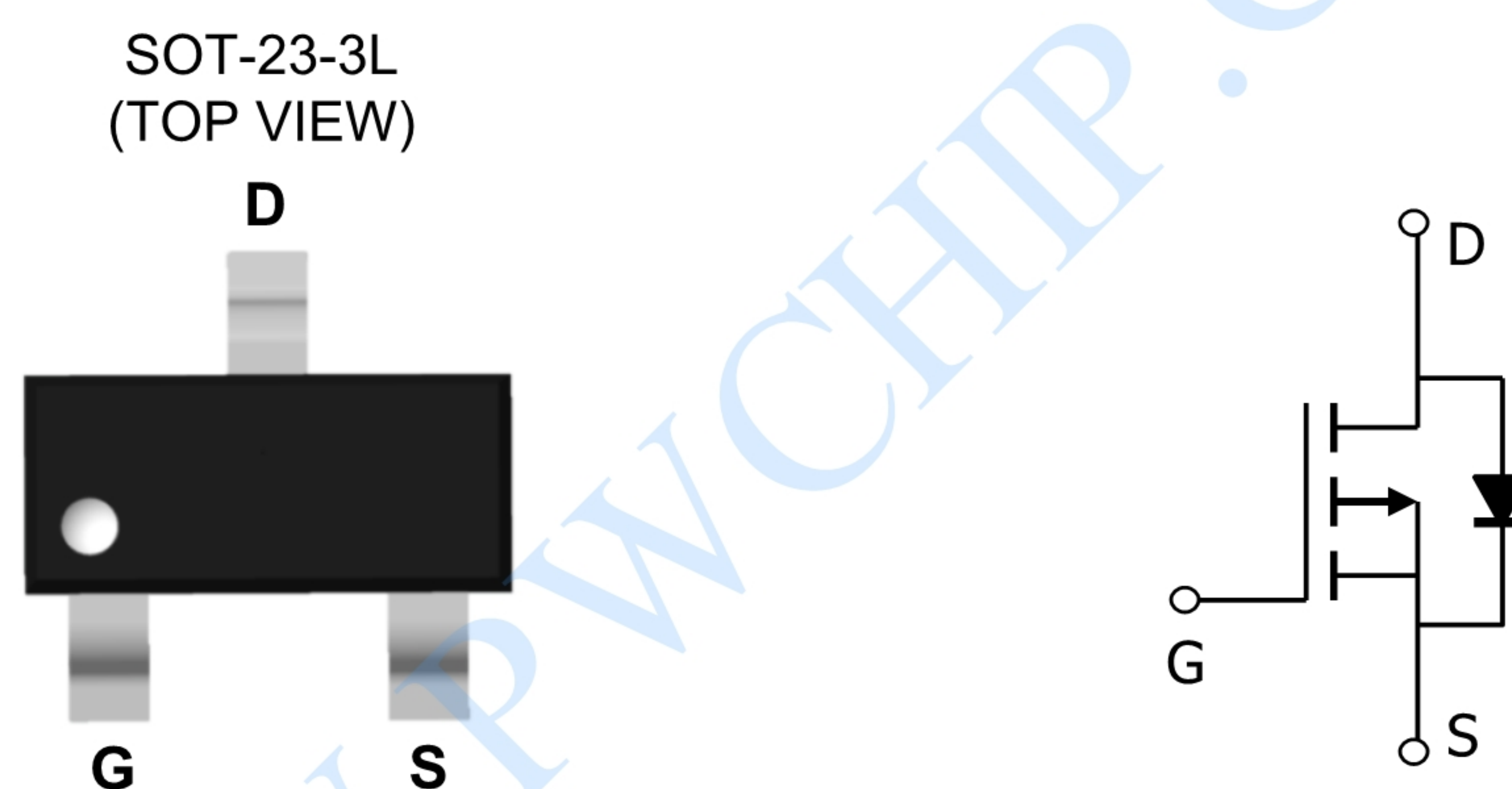
The PW2307 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application

### FEATURES

$V_{DS} = -20V$   $I_D = -7A$

$R_{DS(ON)} < 20m\Omega$  @  $V_{GS} = -4.5V$

Available in a 3-Pin SOT23-3 Package



### 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	$\pm 12$	V
$I_{D@T_A=25^\circ C}$	Continuous Drain Current, $V_{GS}$ @ -4.5V <sup>1</sup>	-7.1	A
$I_{D@T_A=70^\circ C}$	Continuous Drain Current, $V_{GS}$ @ -4.5V <sup>1</sup>	-4.8	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	-23.8	A
$P_{D@T_A=25^\circ C}$	Total Power Dissipation <sup>3</sup>	1	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 <sup>1</sup>	125	$^\circ C/W$
$R_{\theta JAC}$	Thermal Resistance Junction-Case <sup>1</sup> ( $t \leq 10s$ )	80	$^\circ C/W$





## ELECTRICAL CHARACTERISTICS

(TA = 25°C, unless otherwise noted.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BVDSS	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V , I <sub>D</sub> =-250uA	-20	-22	---	V
ΔBVDSS/ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25°C , I <sub>D</sub> =-1mA	---	-0.01	---	V/°C
RDS(ON)	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-4A	---	16	21	mΩ
		V <sub>GS</sub> =-2.5V , I <sub>D</sub> =-3A	---	20	28	
		V <sub>GS</sub> =-1.8V , I <sub>D</sub> =-1.5A		28	35	
VGS(th)	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-0.4	-0.7	-1.0	V
ΔVGS(th)	VGS(th) Temperature Coefficient		---	2.96	---	mV/°C
IDSS	Drain-Source Leakage Current	V <sub>DS</sub> =-16V , V <sub>GS</sub> =0V , T <sub>J</sub> =25°C	---	---	-1	uA
		V <sub>DS</sub> =-16V , V <sub>GS</sub> =0V , T <sub>J</sub> =55°C	---	---	-5	
IGSS	Gate-Source Leakage Current	V <sub>GS</sub> =±12V , V <sub>DS</sub> =0V	---	---	±100	nA
gfs	Forward Transconductance	V <sub>DS</sub> =-5V , I <sub>D</sub> =-4A	---	21	---	S
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-15V , V <sub>GS</sub> =-4.5V , I <sub>D</sub> =-4A	---	27.3	38.2	nC
Q <sub>gs</sub>	Gate-Source Charge		---	3.6	5.0	
Q <sub>gd</sub>	Gate-Drain Charge		---	6.5	9.1	
Td(on)	Turn-On Delay Time	V <sub>DD</sub> =-10V, V <sub>GS</sub> =-4.5V , R <sub>G</sub> =3.3Ω I <sub>D</sub> =-4A	---	9.2	18.4	ns
T <sub>r</sub>	Rise Time		---	59	106	
Td(off)	Turn-Off Delay Time		---	99	198	
T <sub>f</sub>	Fall Time		---	71	142	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V , V <sub>GS</sub> =0V , f=1MHz	---	2280	3192	pF
C <sub>oss</sub>	Output Capacitance		---	220	308	
Crss	Reverse Transfer Capacitance		---	187	262	
I <sub>S</sub>	Continuous Source Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V , Force Current	---	---	-4.7	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,4</sup>		---	---	-18.8	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V , I <sub>S</sub> =-1A , T <sub>J</sub> =25°C	---	---	-1	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-4A , di/dt=100A/μs , T <sub>J</sub> =25°C	---	52	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	28	---	nC

### Note :

- 1、 The data tested by surface mounted on a 1 inch<sup>2</sup> 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<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.



## Typical Characteristics

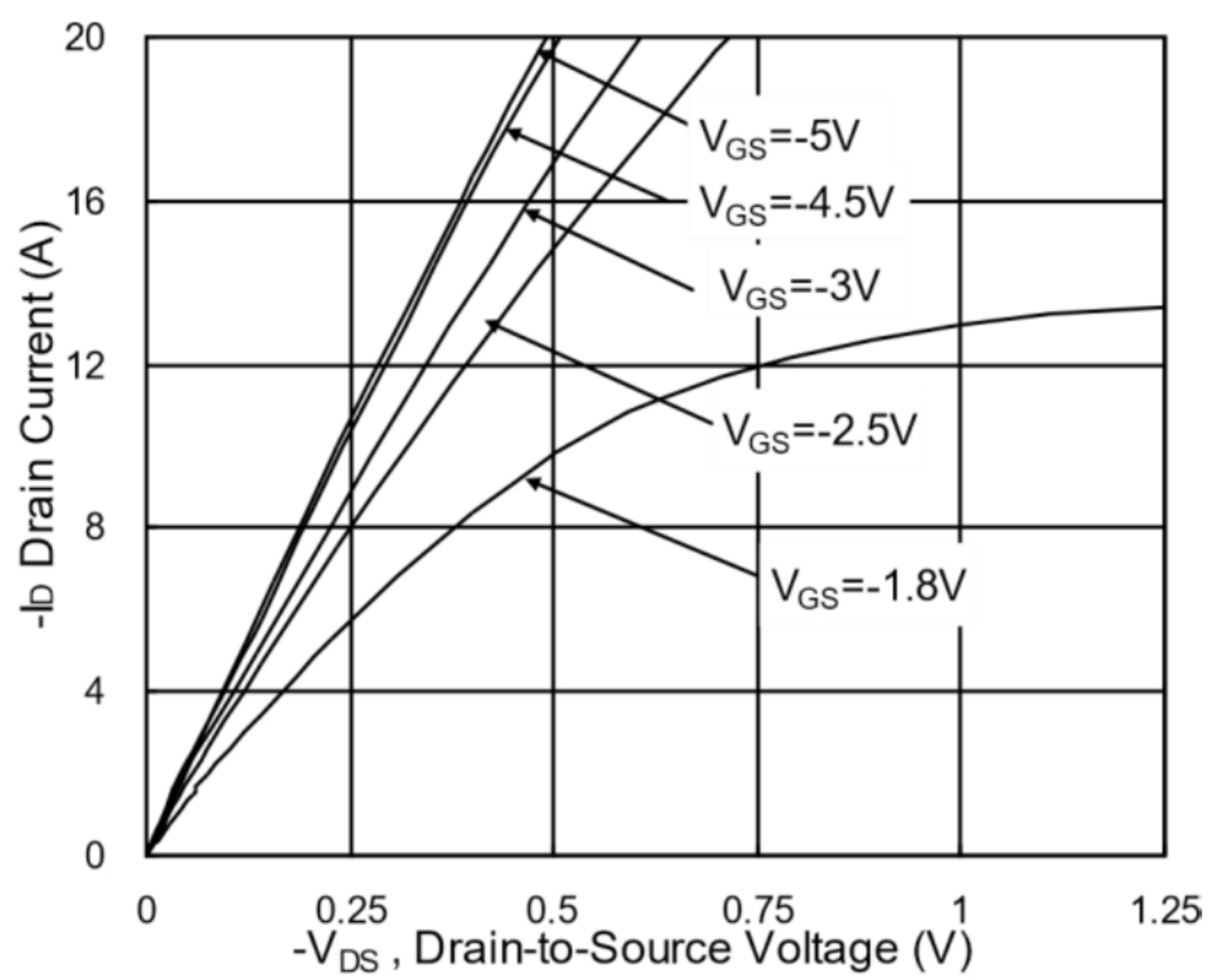


Fig.1 Typical Output Characteristics

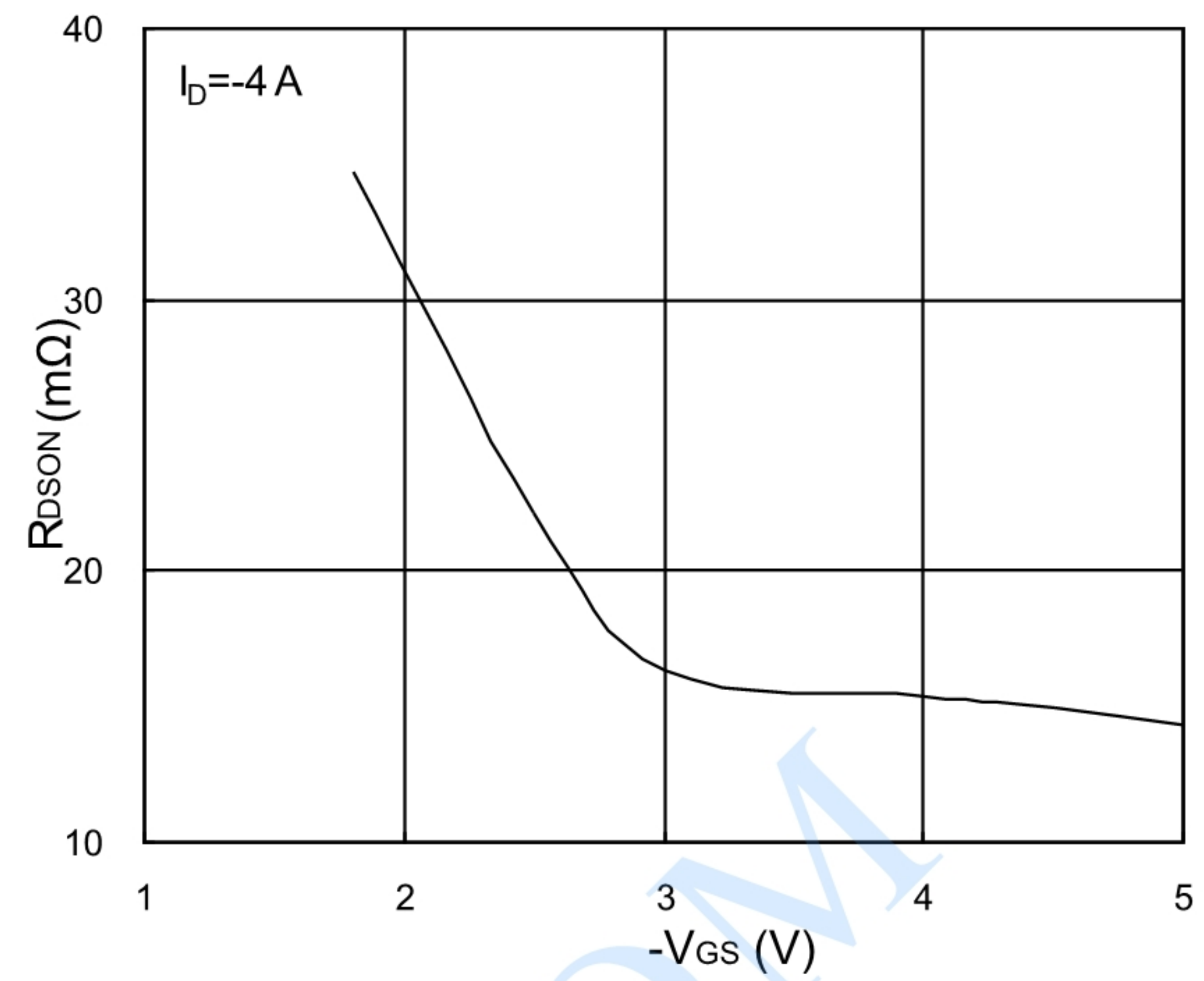


Fig.2 On-Resistance vs. Gate-Source

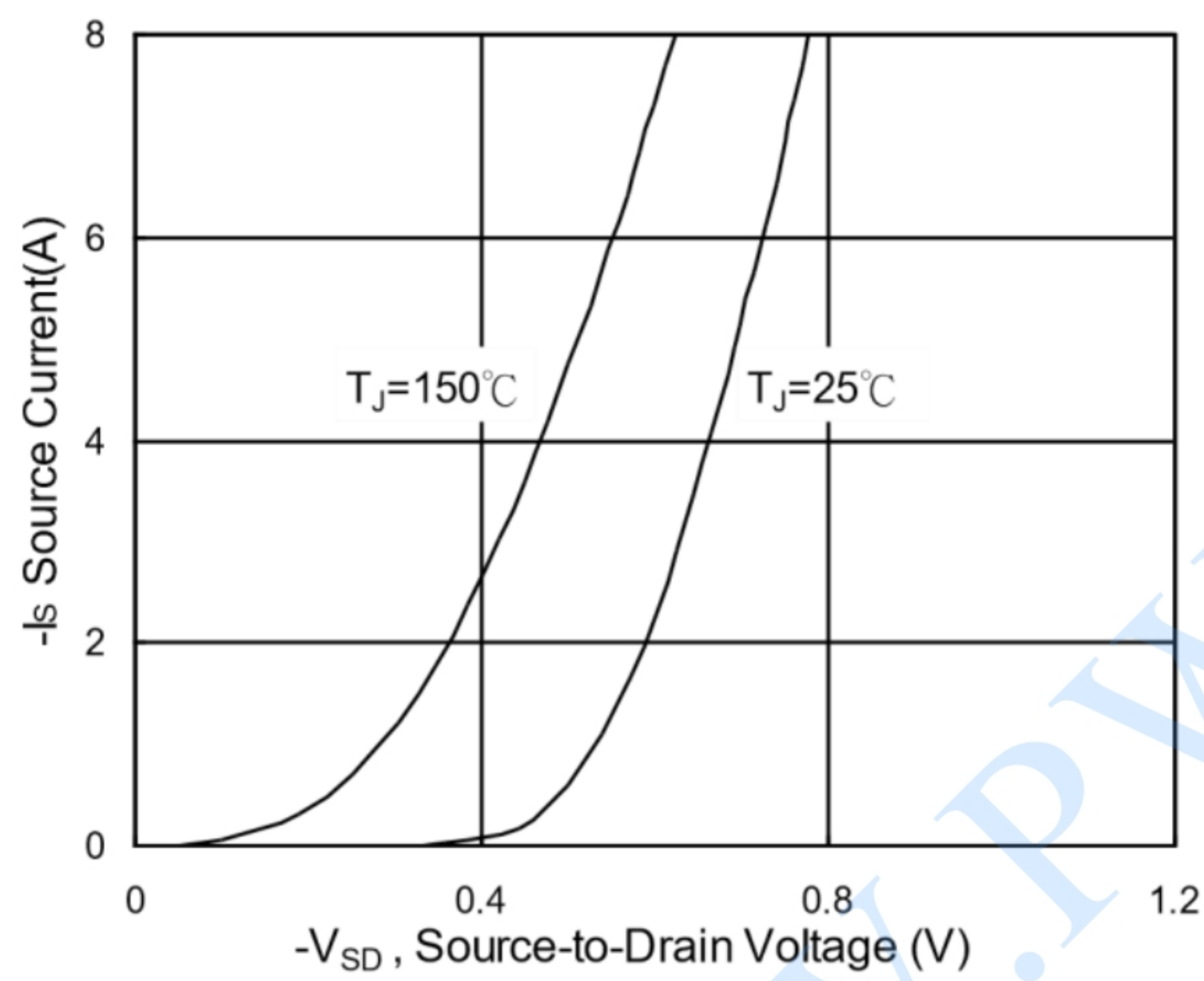


Fig.3 Forward Characteristics Of Reverse

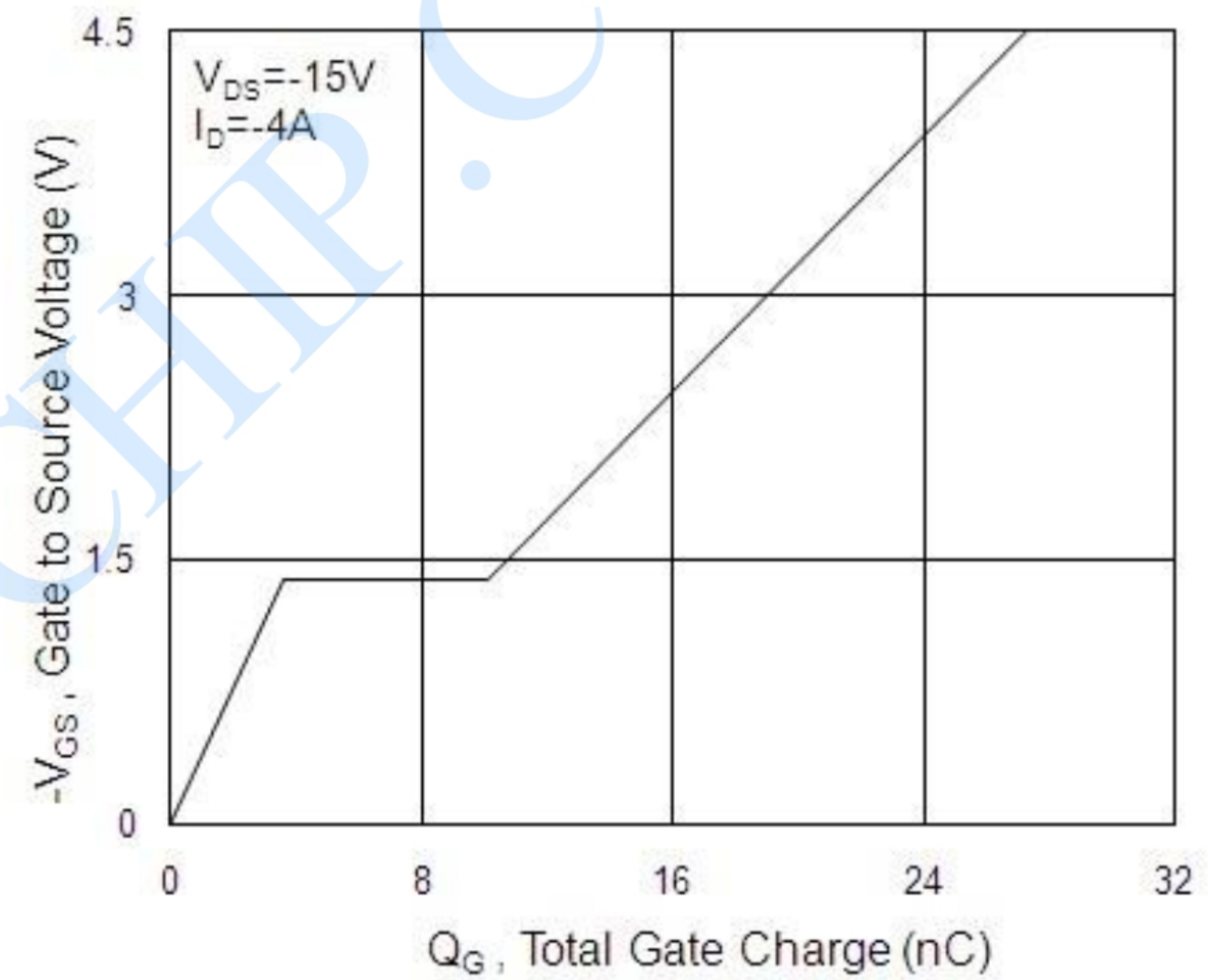


Fig.4 Gate-Charge Characteristics

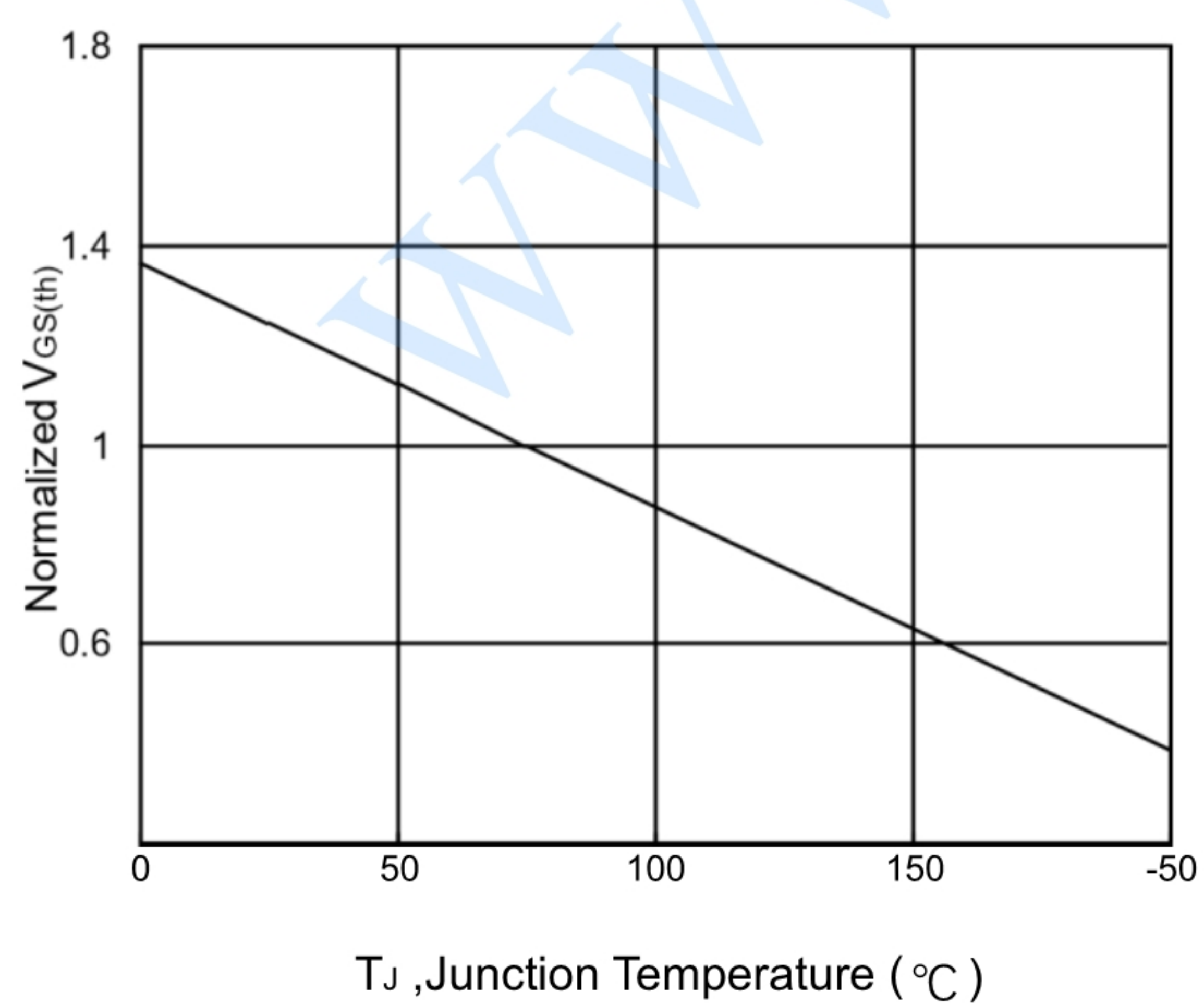


Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$

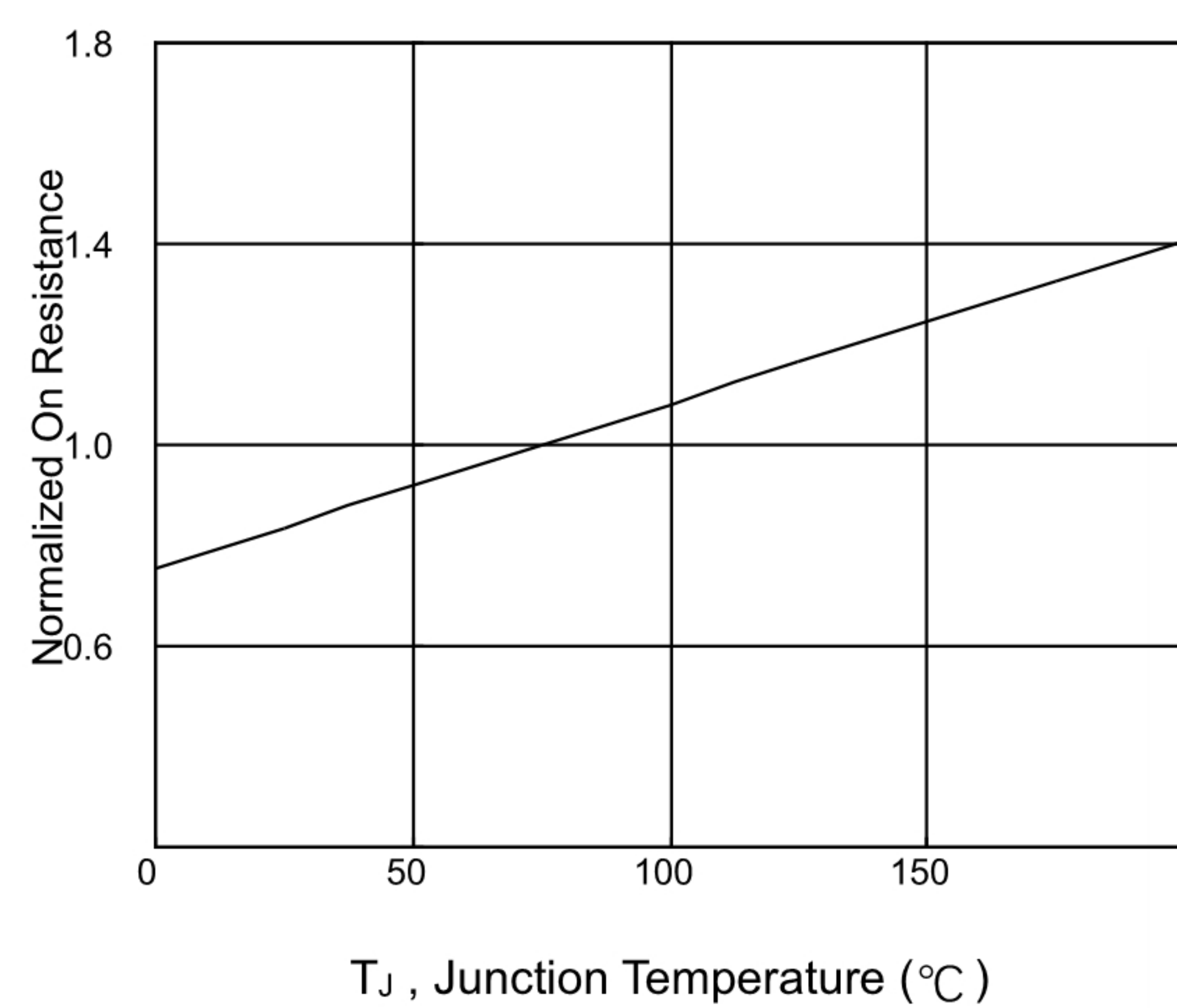


Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$



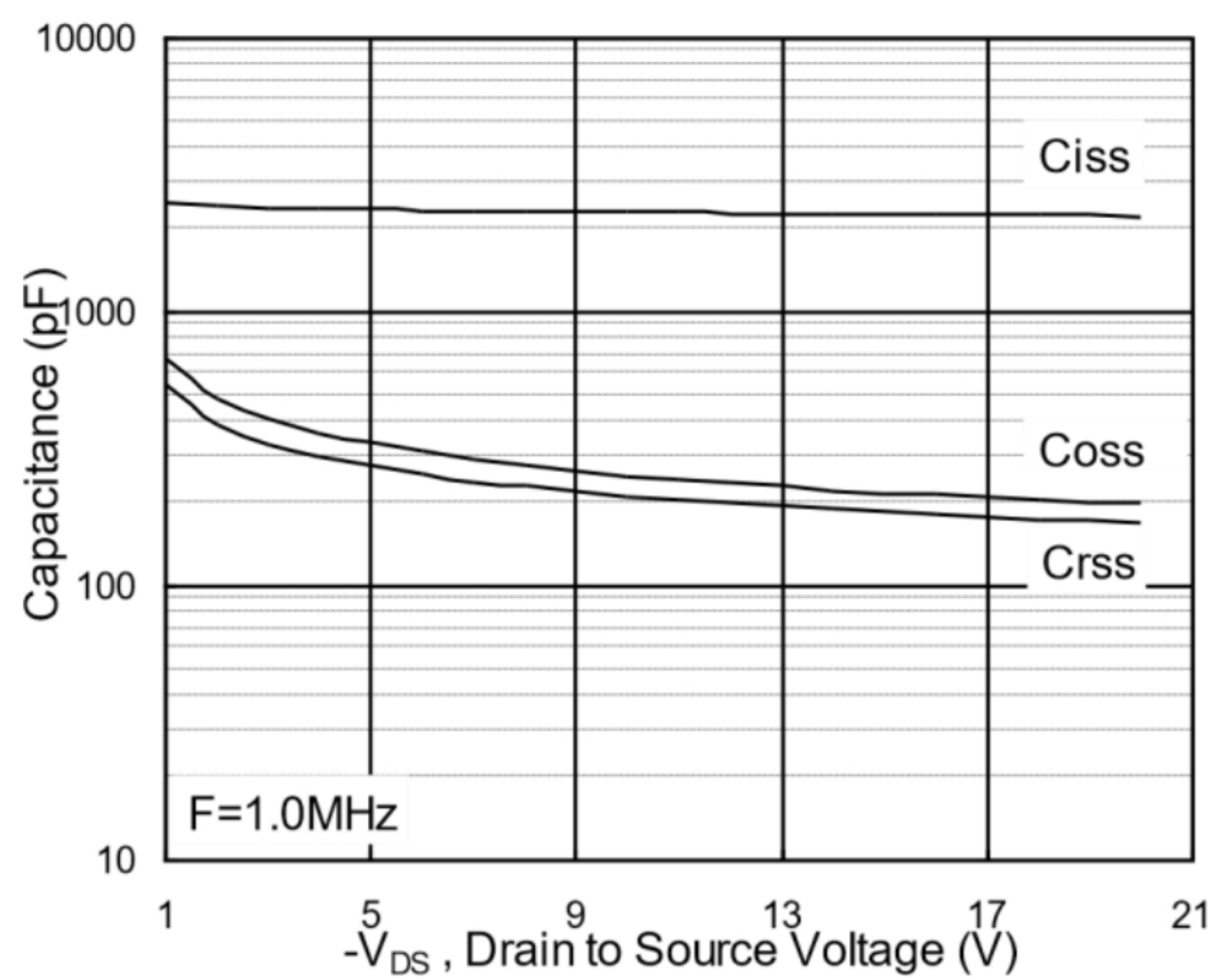


Fig.7 Capacitance

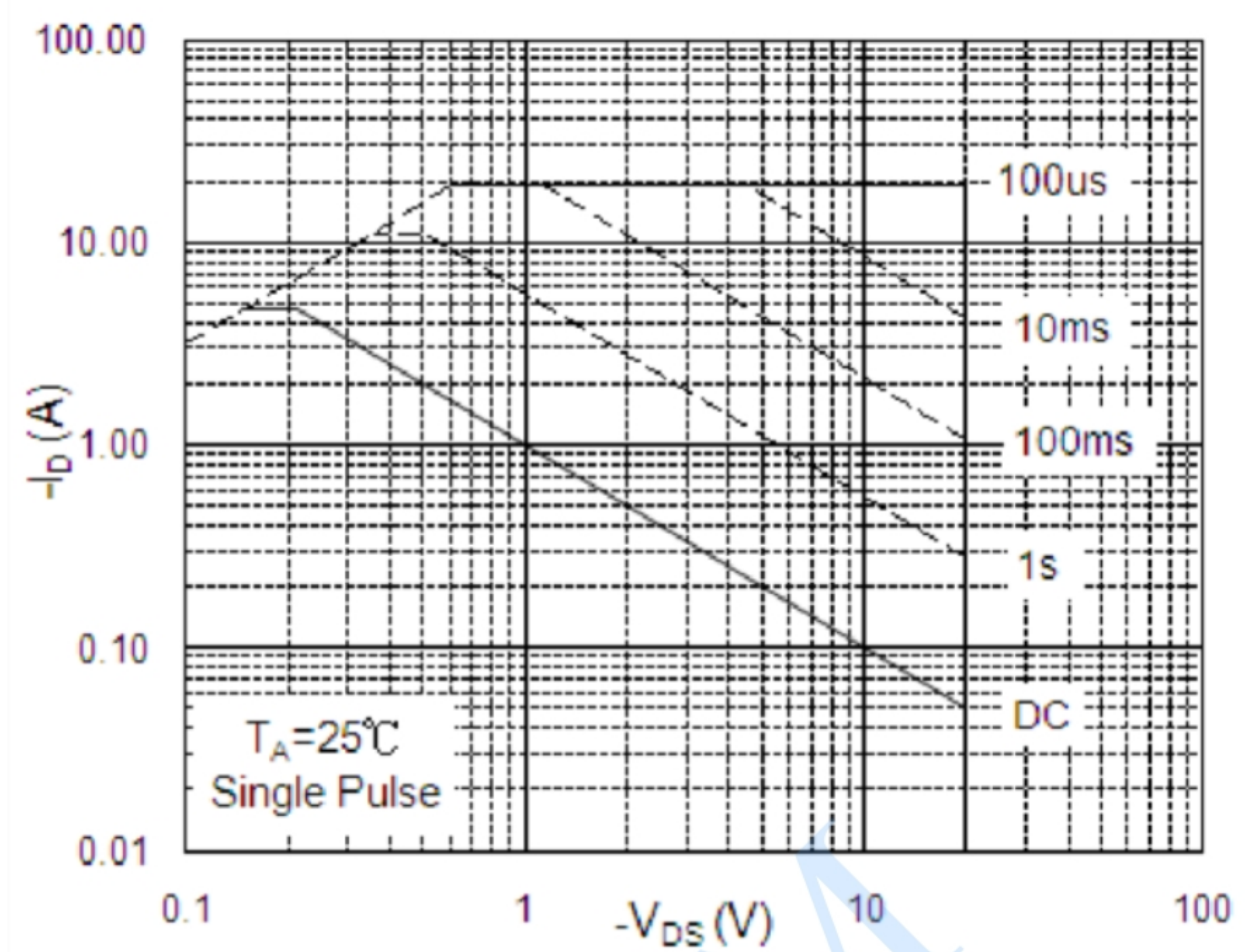


Fig.8 Safe Operating Area

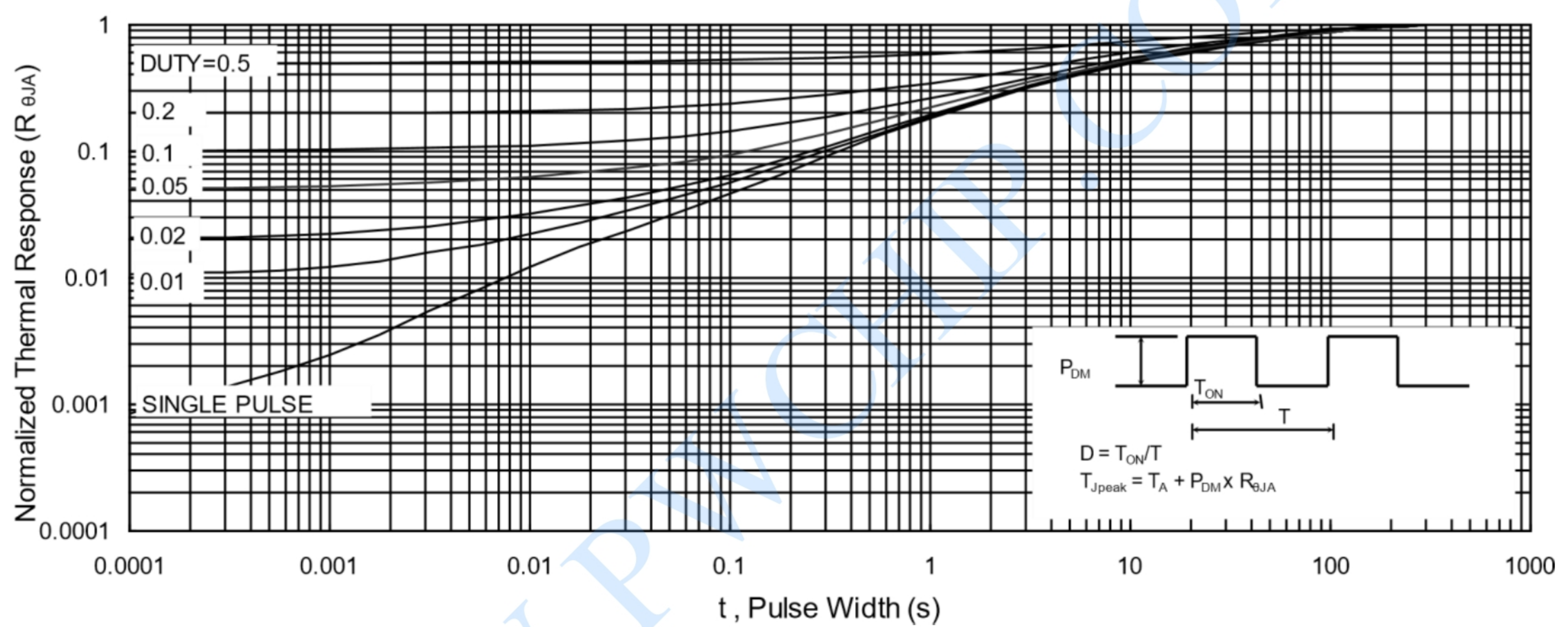


Fig.9 Normalized Maximum Transient Thermal Impedance

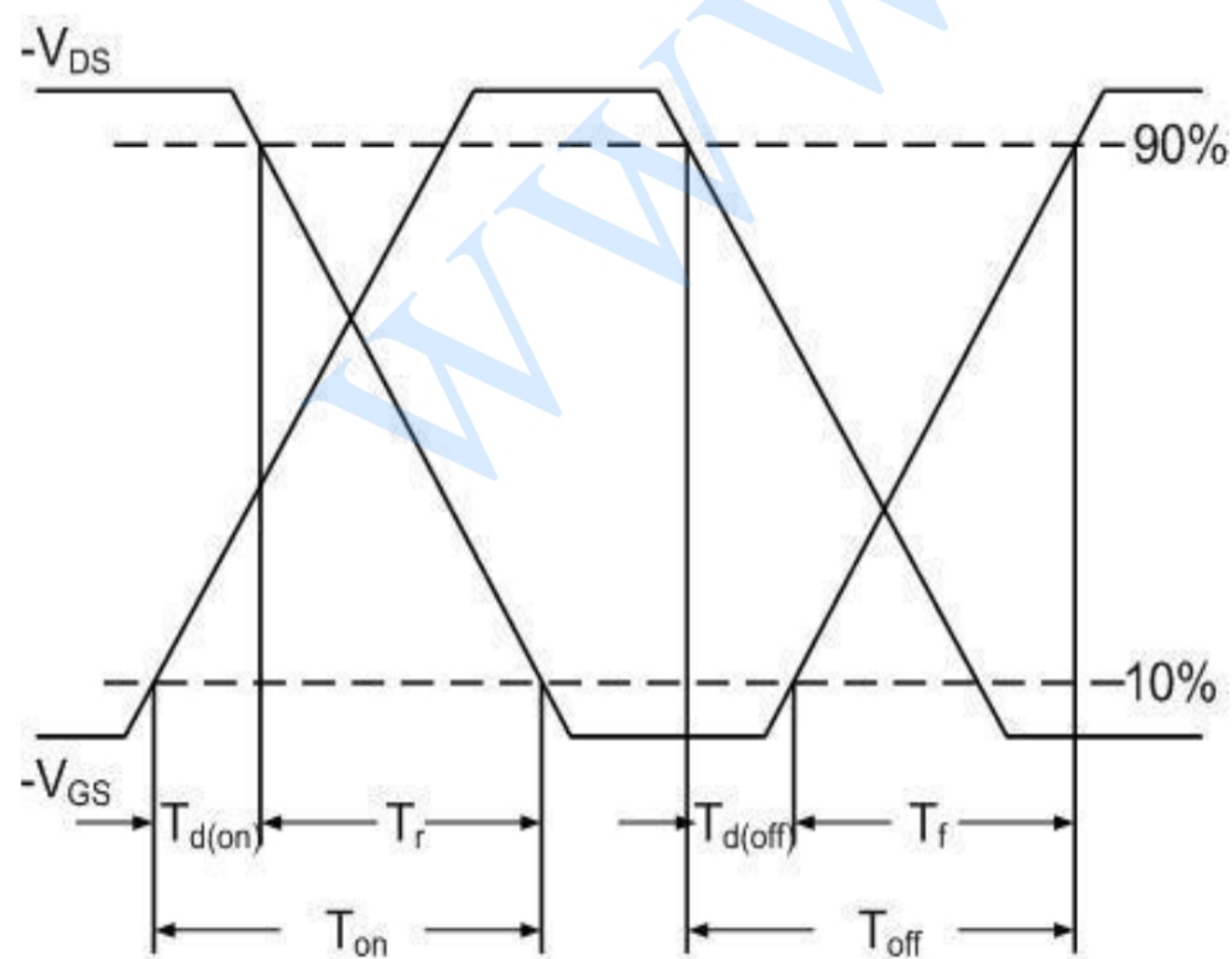


Fig.10 Switching Time Waveform

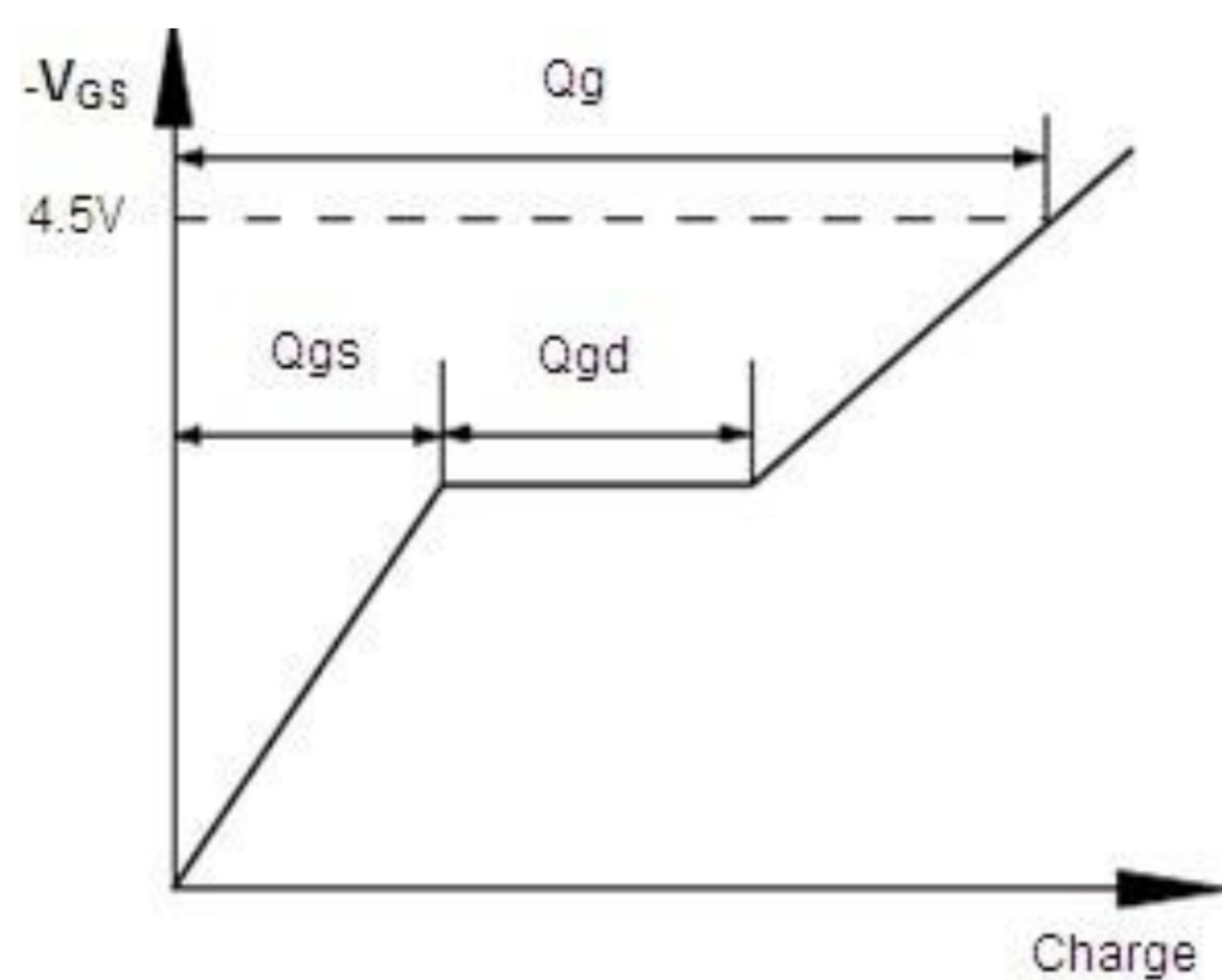
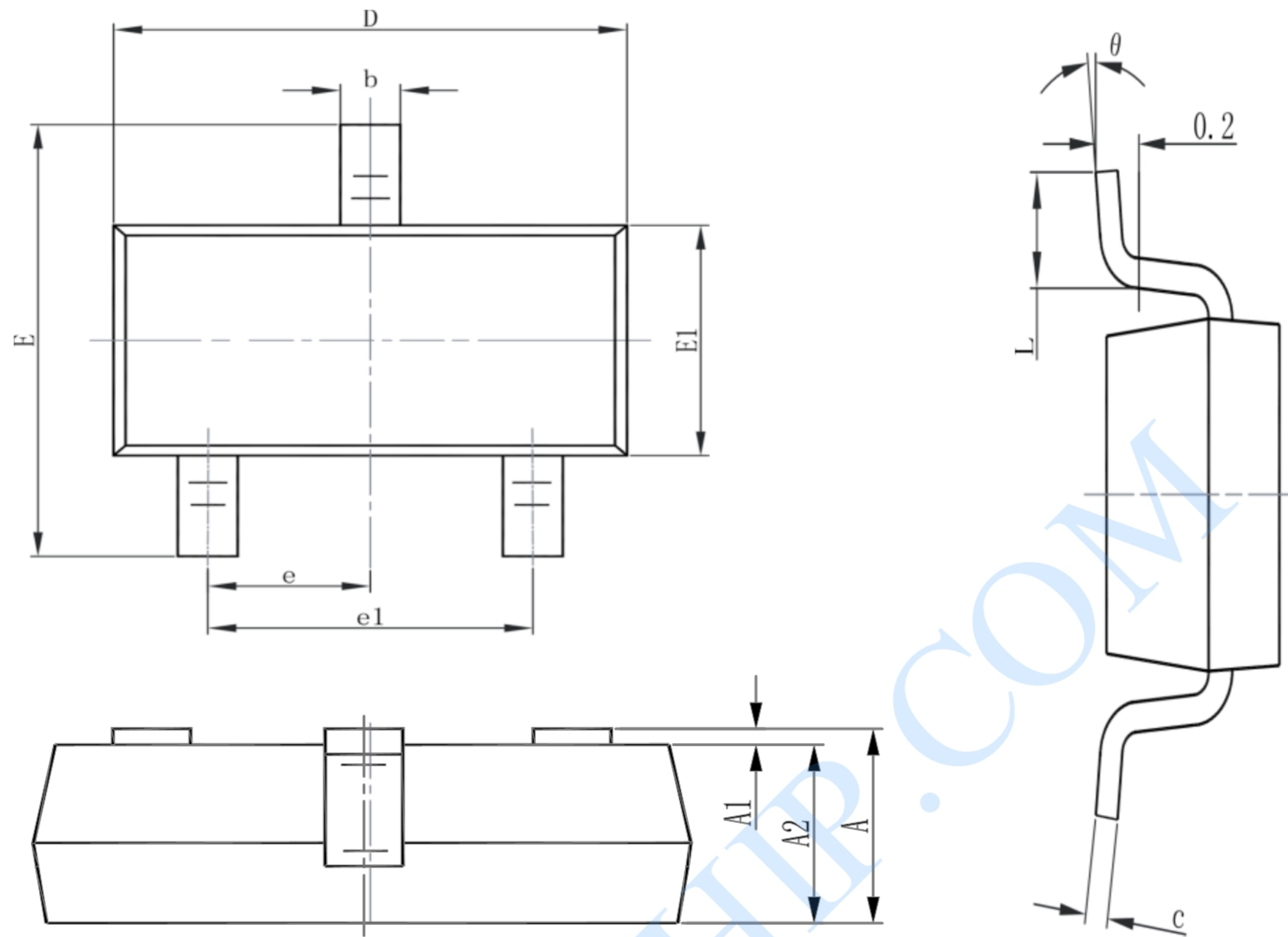


Fig.11 Gate Charge Waveform





## PACKAGE DESCRIPTION



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	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
$\theta$	0°	8°	0°	8°





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