



General Features

- $V_{DS} = -60V, I_D = -1.6A$
- $R_{DS(ON)} < 200m\Omega @ V_{GS} = -10V$
- $R_{DS(ON)} < 240m\Omega @ V_{GS} = -4.5V$

Application

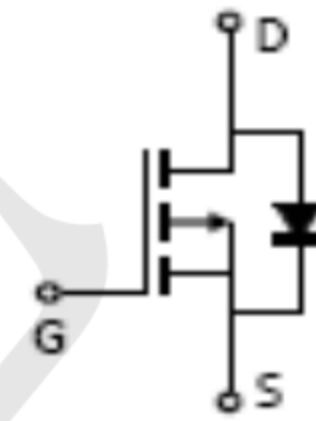
- Load/Power Switching
- Interfacing Switching
- Logic Level Shift

Package and Pin Configuration

SOT-23



Circuit diagram



Marking: N9HKT

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-1.6	A
Pulsed Drain Current ^(Note 1)	I_{DM}	-8	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	$R_{\theta JA}$	83.3	$^\circ C/W$
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Electrical Characteristics ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-60V, V_{GS}=0V$	-	-	-1	μA
Parameter						
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.4	-2.0	-2.6	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-1.5A$	-	150	200	m Ω
		$V_{GS}=-4.5V, I_D=-1.5A$	-	190	240	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-1.5A$	-	3	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=-30V, V_{GS}=0V,$ $F=1.0MHz$	-	444.2	-	PF
Output Capacitance	C_{oss}		-	19.6	-	PF
Reverse Transfer Capacitance	C_{rss}		-	17.9	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-30V, I_D=-1.5A,$ $V_{GS}=-10V, R_G=3\Omega$	-	40	-	nS
Turn-on Rise Time	t_r		-	35	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	$V_{DS}=-30, I_D=-1.5A,$ $V_{GS}=-10V$	-	11.3	-	nC
Gate-Source Charge	Q_{gs}		-	2.7	-	nC
Gate-Drain Charge	Q_{gd}		-	1.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=-1.5A$	-	-	-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-1.6	A
Reverse Recovery Time	t_{rr}	$T_J = 25^\circ\text{C}, I_F = -1.5A$	-	25	-	nS
Reverse Recovery Charge	Q_{rr}	$di/dt = -100A/\mu s$ (Note 3)	-	31	-	nC



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60V P-Channel Power MOSFET

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Typical Electrical and Thermal Characteristics (Curves)

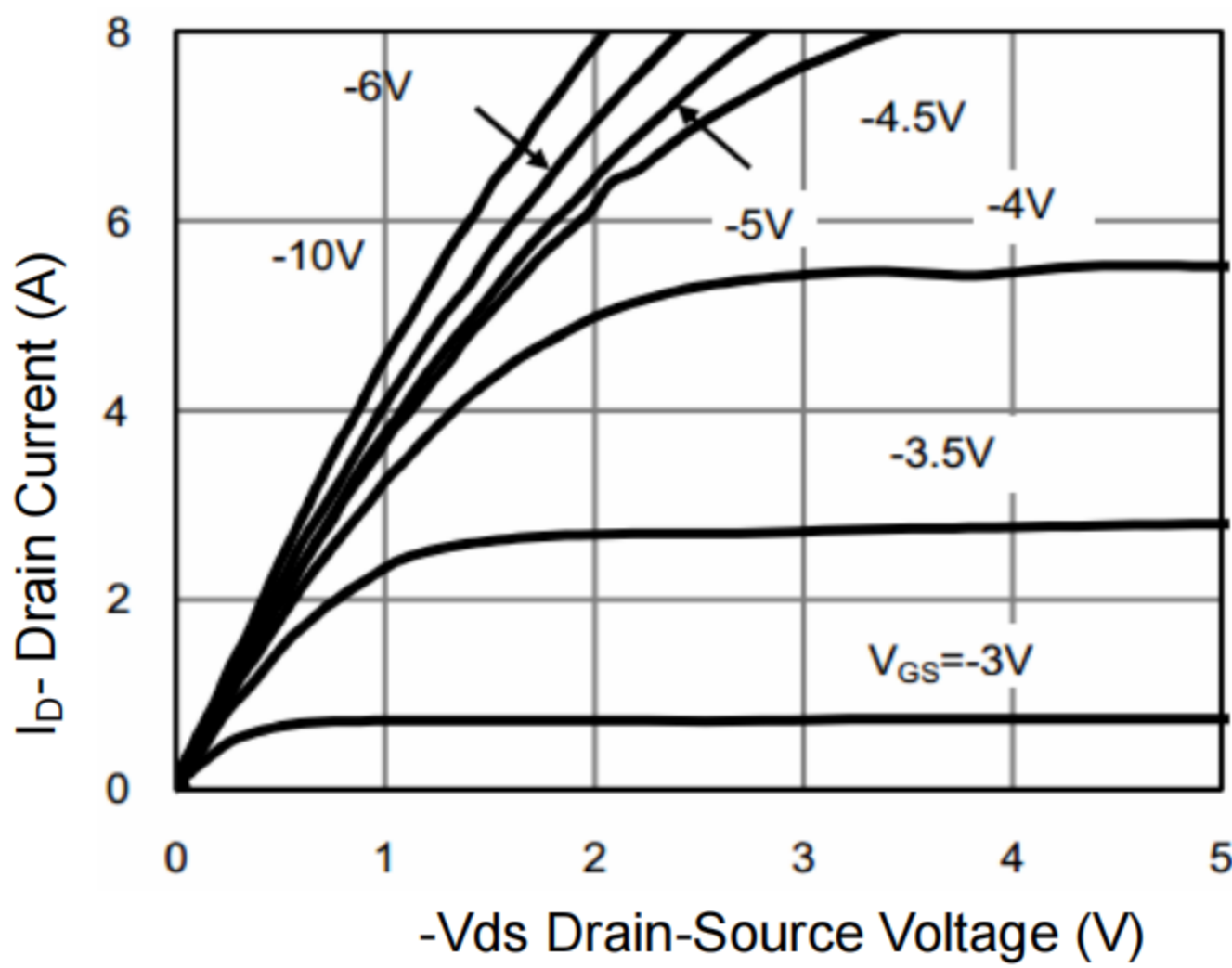


Figure 1 Output Characteristics

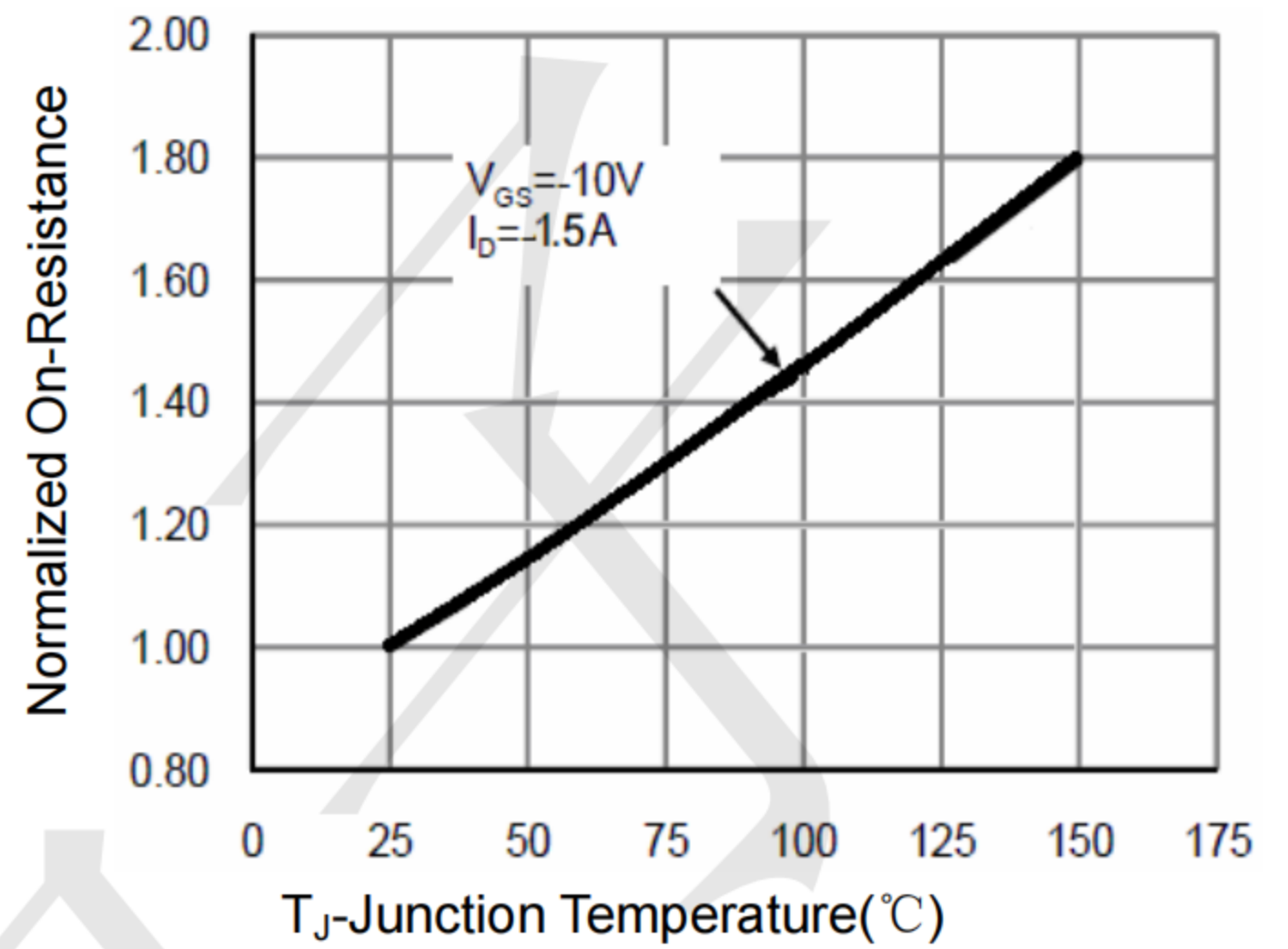


Figure 4 Rdson-Junction Temperature

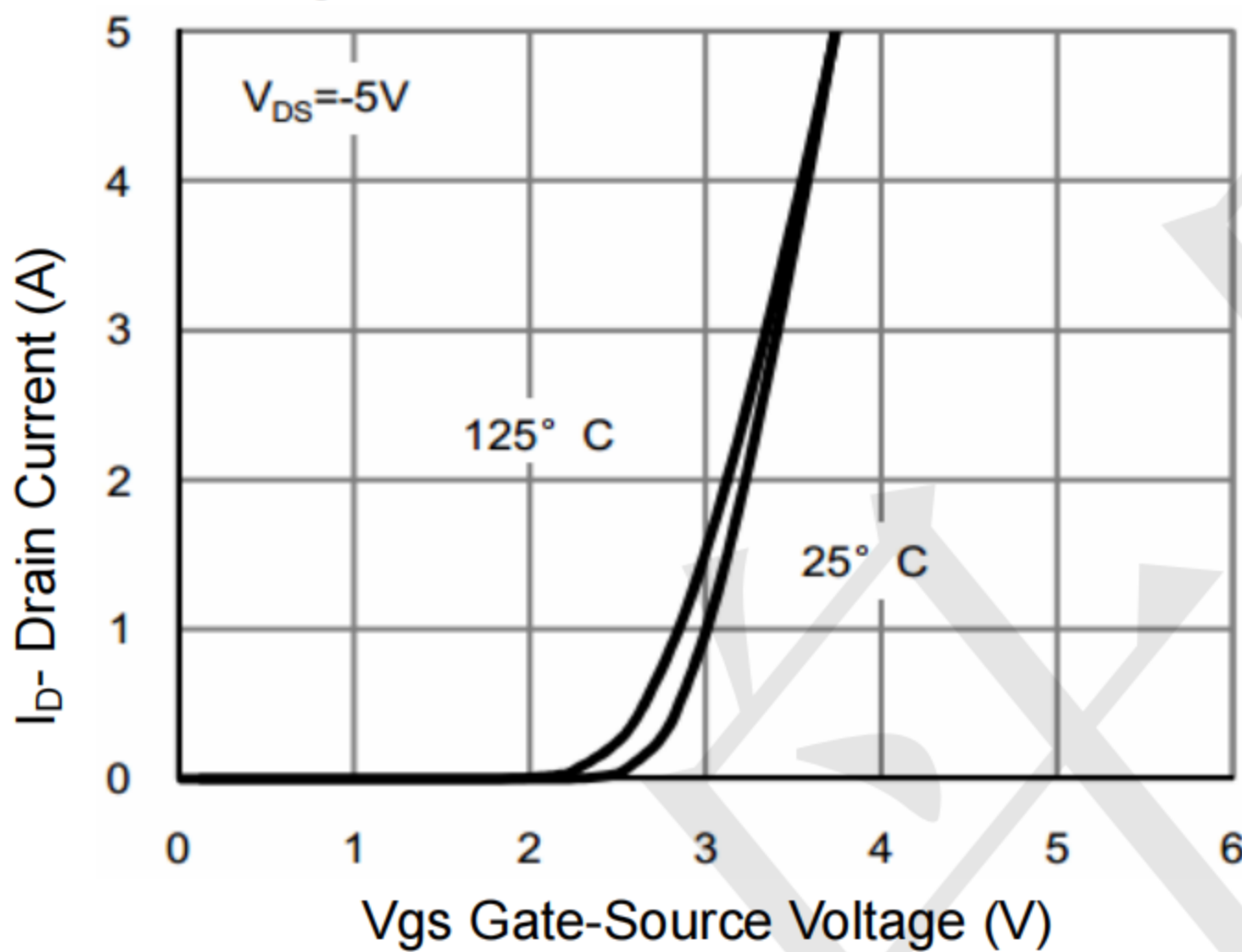


Figure 2 Transfer Characteristics

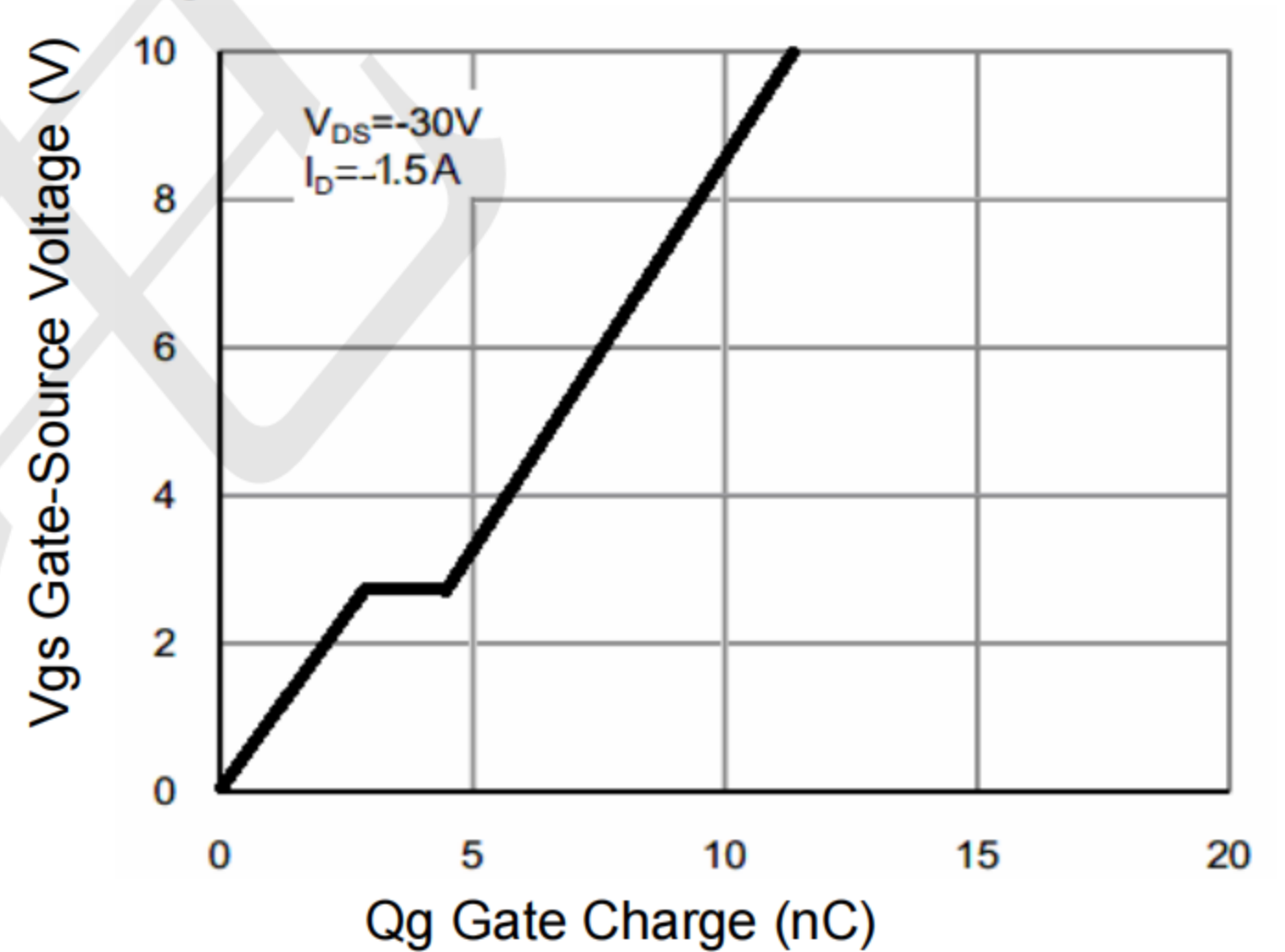


Figure 5 Gate Charge

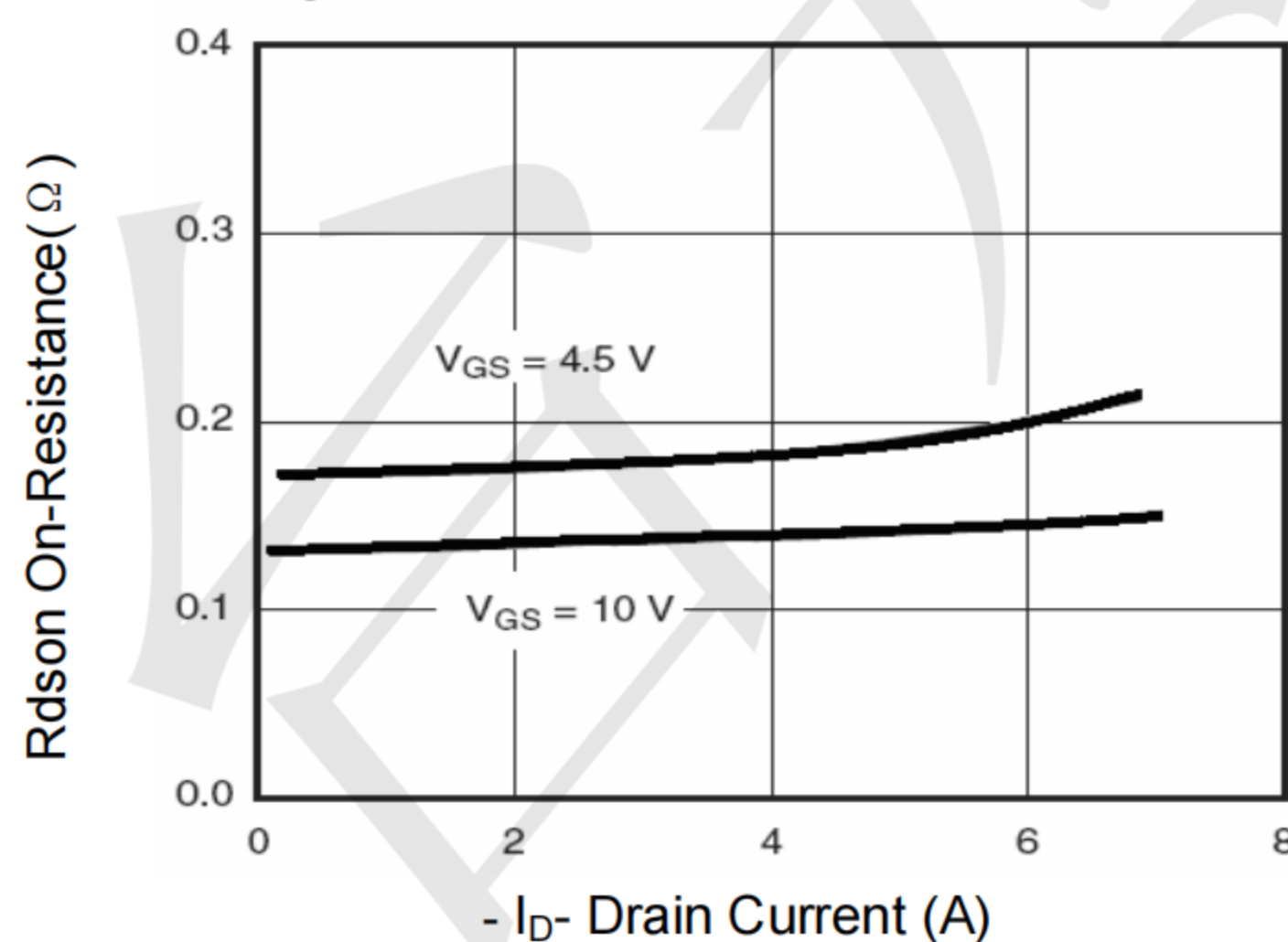


Figure 3 Rdson- Drain Current

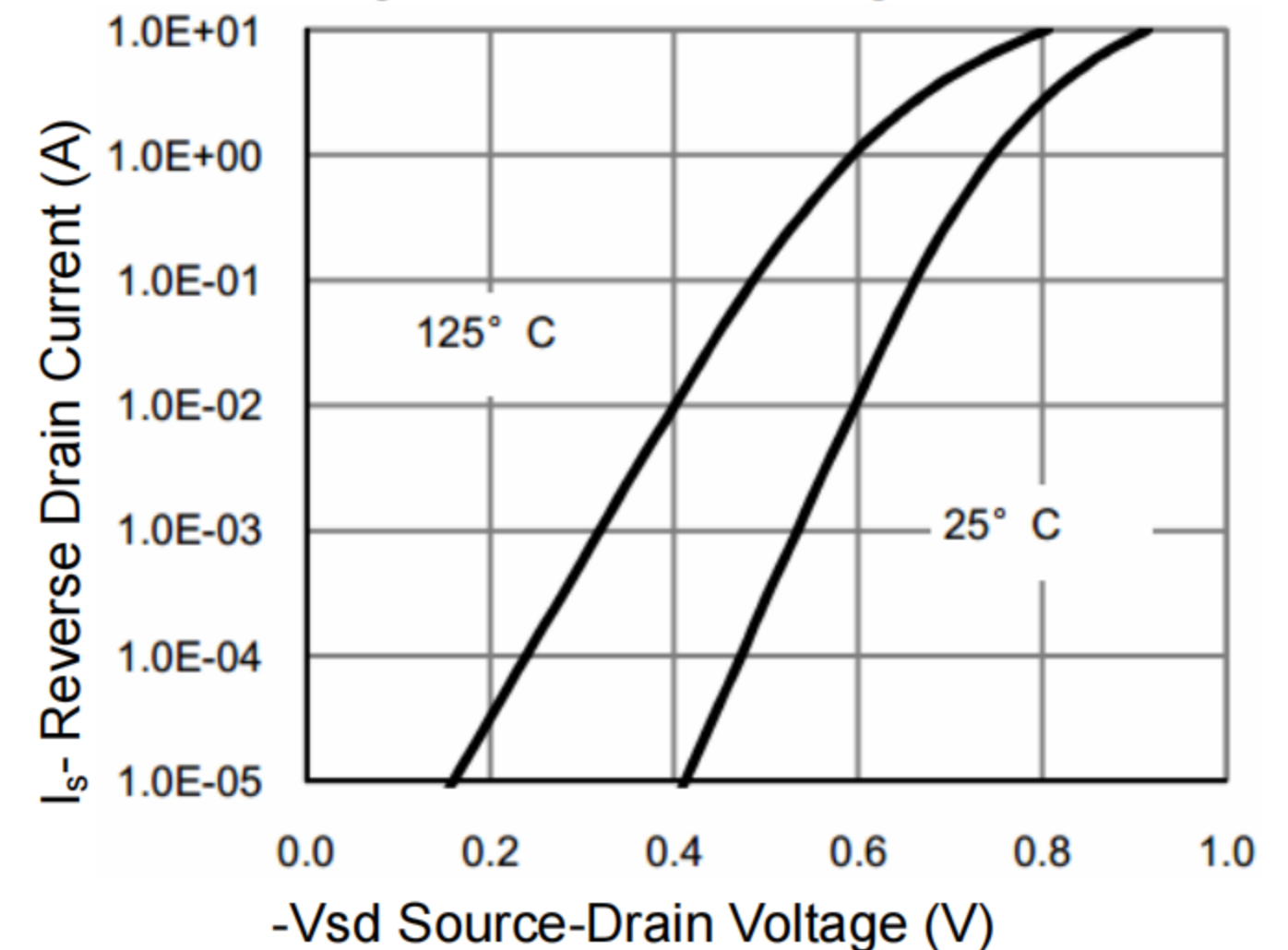


Figure 6 Source- Drain Diode Forward



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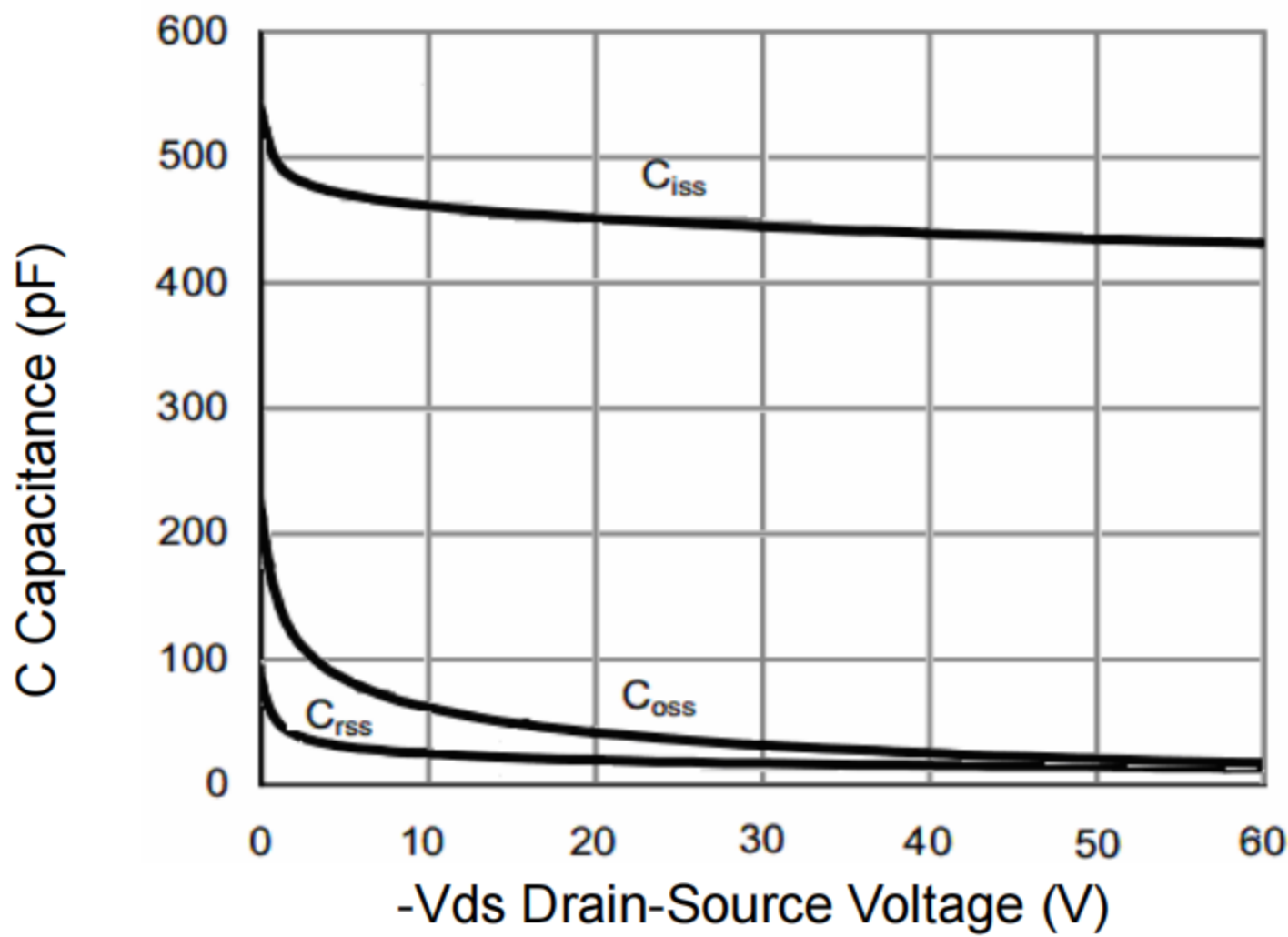


Figure 7 Capacitance vs Vds

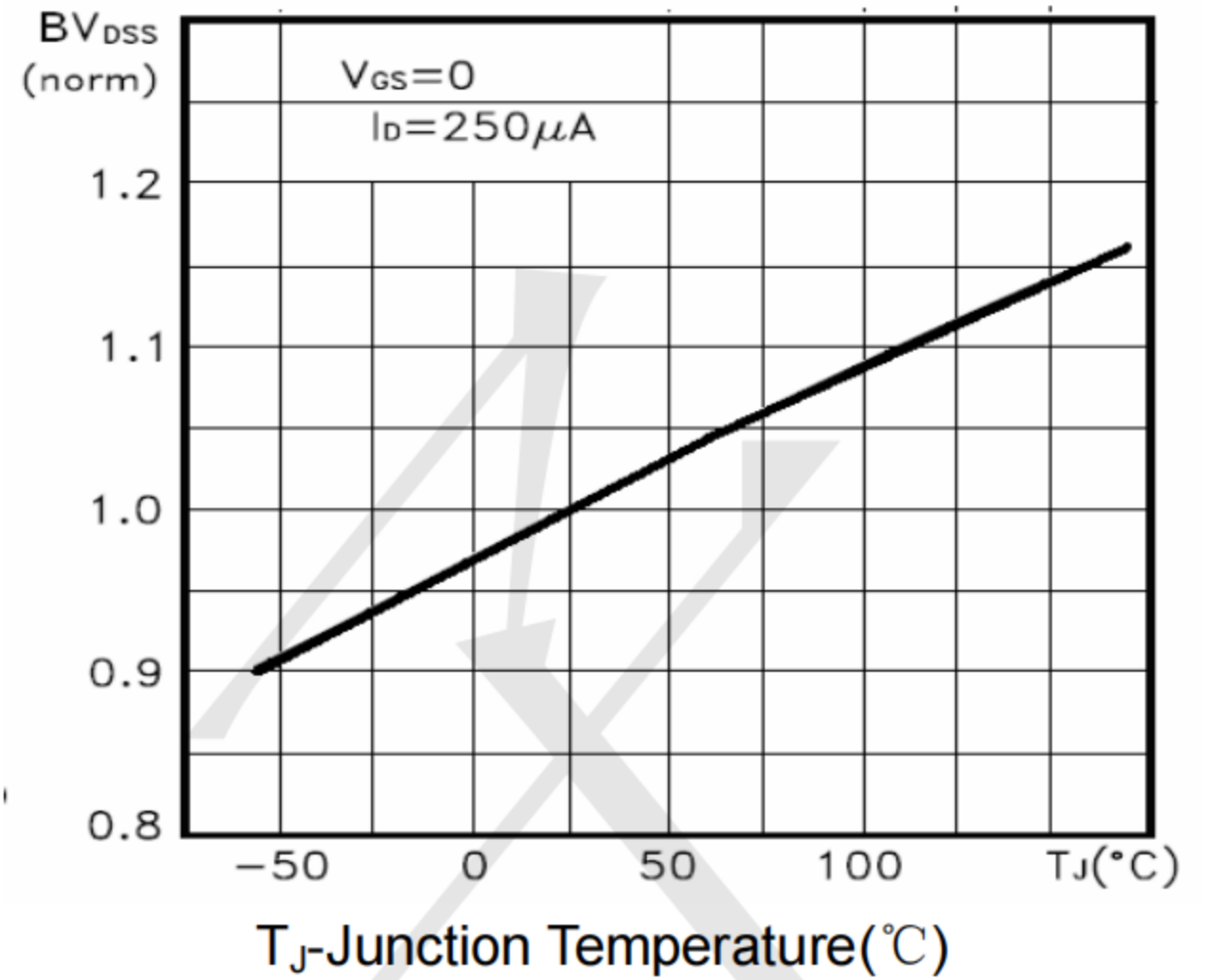


Figure 9 BV_{DSS} vs Junction Temperature

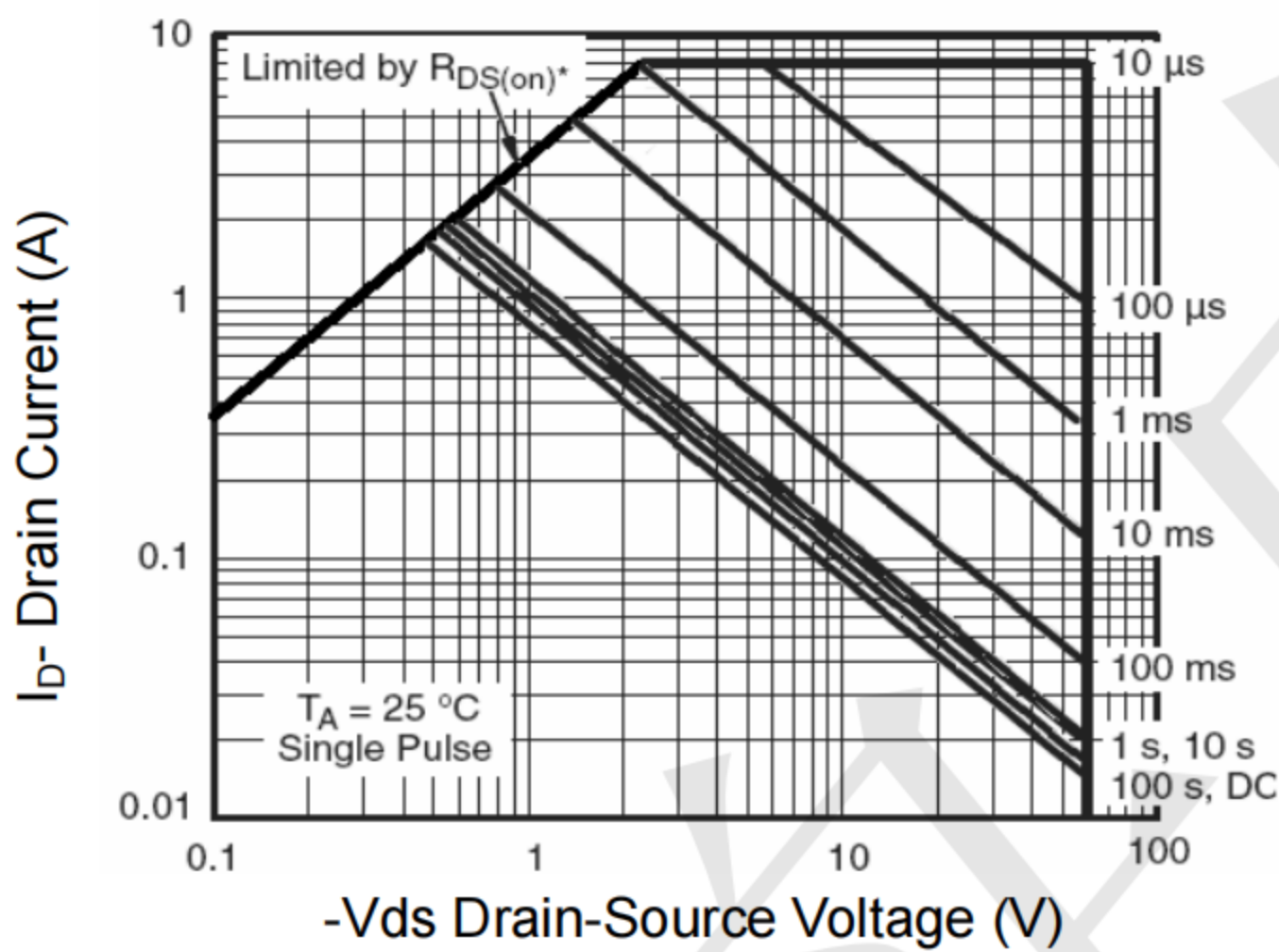


Figure 8 Safe Operation Area

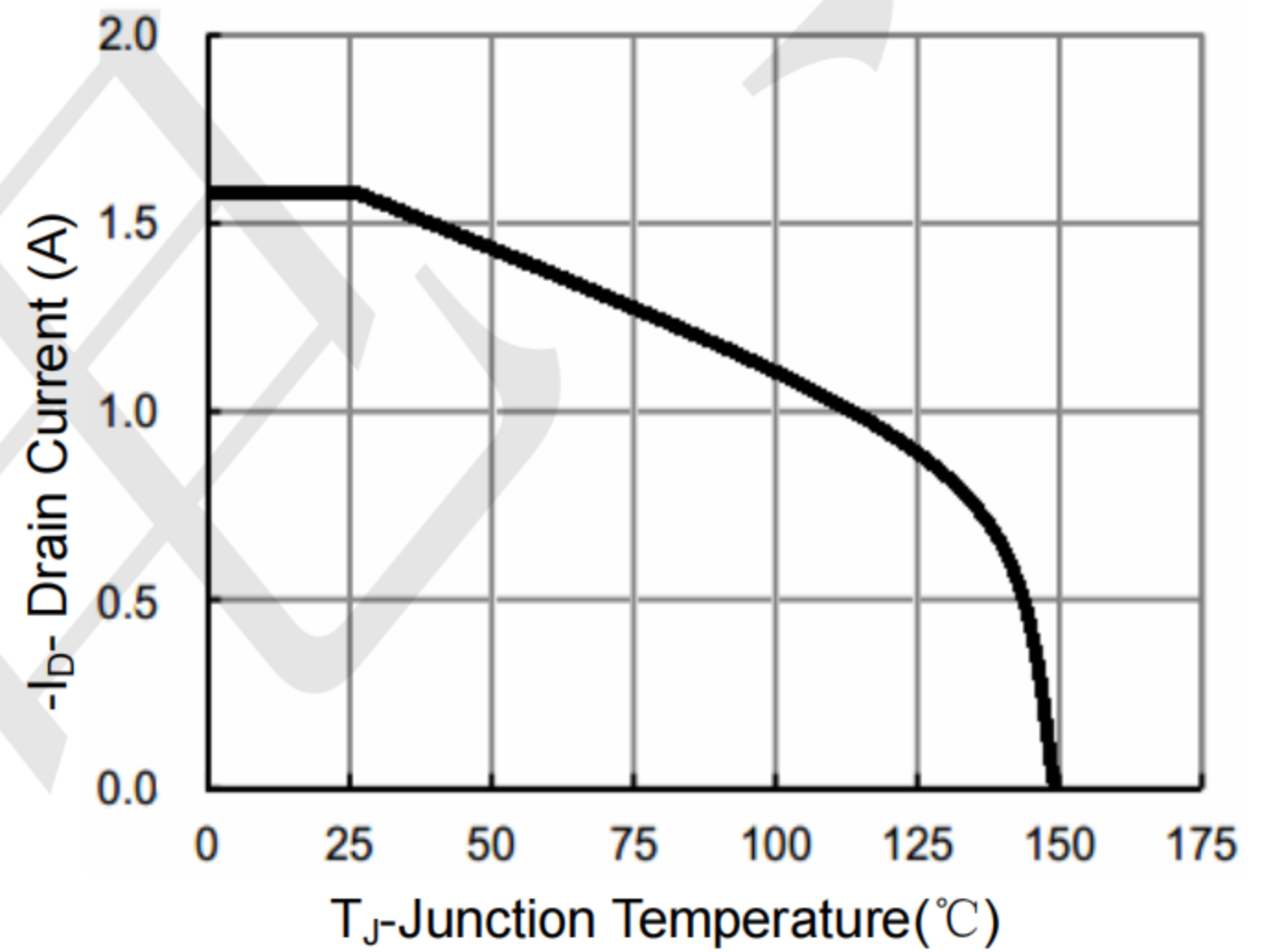


Figure 10 I_D Current De-rating

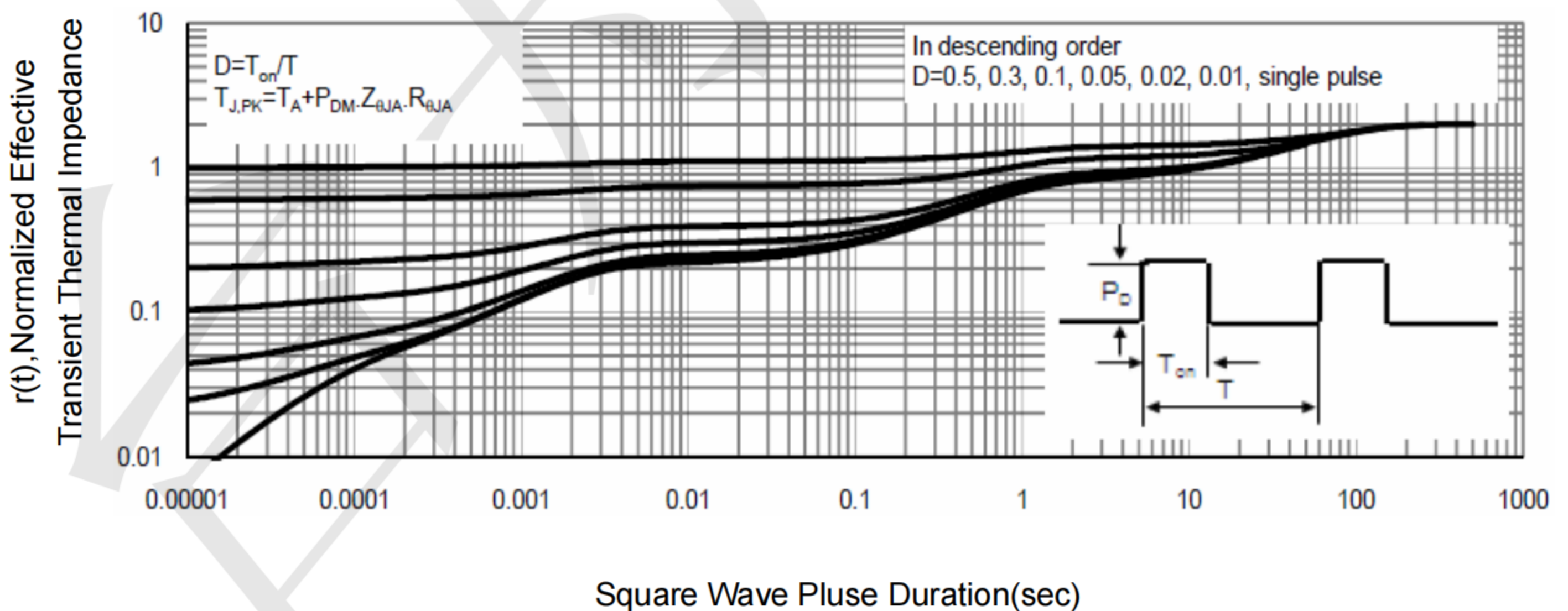
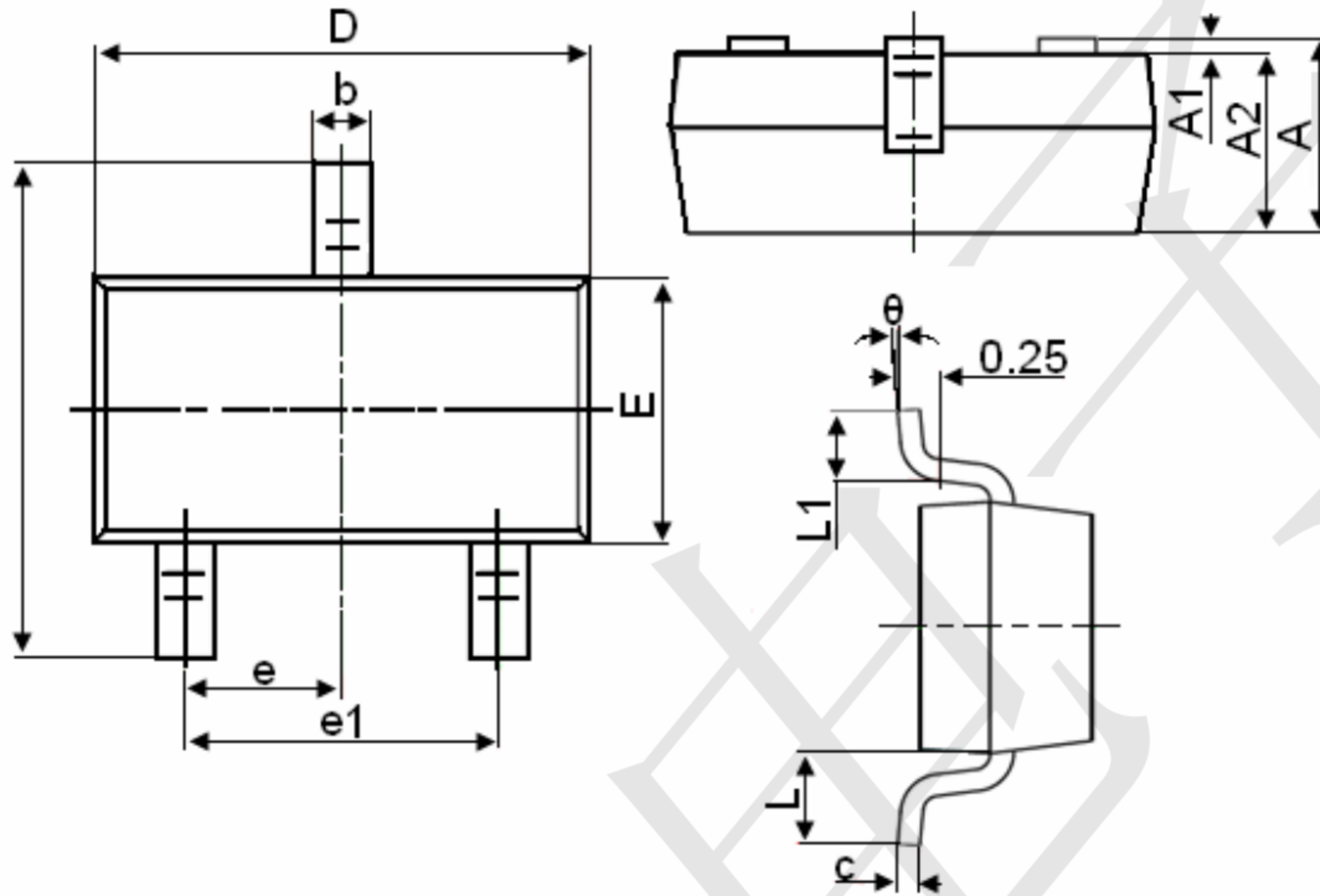


Figure 11 Normalized Maximum Transient Thermal Impedance



SOT-23 Package Information



Symbol	Dimensions in Millimeters	
	MIN.	MAX.
A	0.900	1.150
A1	0.000	0.100
A2	0.900	1.050
b	0.300	0.500
c	0.080	0.150
D	2.800	3.000
E	1.200	1.400
E1	2.250	2.550
e	0.950TYP	
e1	1.800	2.000
L	0.550REF	
L1	0.300	0.500
θ	0°	8°