STL12N65M5

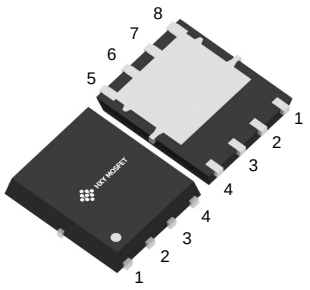
SiC Power MOSFET N-Channel Enhancement Mode

Features

- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant

Benefits

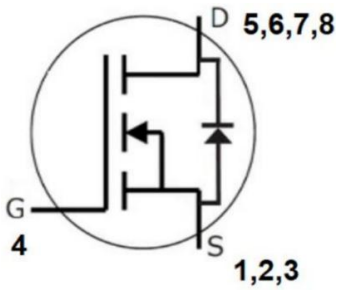
- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink reguirements



DFN5X6-8L

Applications

- Switch mode power supplies
- Renewable energy
- On Board Charger
- High Voltage DC/DC Converters



Ordering Part Number	Package	Brand
STL12N65M5	DFN5X6-8L	HXY MOSFET

Maximum Ratings (T_C = 25 ˚C unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit	Note
V_{DSmax}	Drain-Source Voltage	V_{GS} = 0V, I_D = 100μA	650	V	
V_{GS}	Gate-Source voltage (transient)	$t_p \leqslant$500ns, duty cycle ⩽1%	-8/+20	V	
V_{GSop}	Recommend Gate-Source Voltage	Static	-4/+18	V	
EAS	Single pulse avalanche energy	V_{DS}=650V, V_{DD}=50V, V_{GS}=10V, L=10mH, T_C=25°C	68	mJ	
I_D	Continuous Drain current	V_{GS} = 18V, T_C = 25°C	9	A	Fig. 14
		V_{GS} = 18V, T_C = 100°C	5		
$I_{D,pulse}$	Pulsed Drain Current	Pulse with t_p limited by T_{jmax}	15	A	
P_D	Power Dissipation	T_C = 25°C, Tj = 175°C	43.4	W	Fig. 16
T_j	Operating junction temperature		-55~175	°C	
T_{stg}	Storage temperature		-55~175	°C	

Thermal Characteristics

Symbol	Parameter	Value			Unit	Note
		Min.	Typ.	Max.		
$R_{th(jc)}$	Thermal resistance from Junction to Case		3.46		K/W	Fig. 15
$R_{th(ja)}$	Thermal resistance from Junction to Ambient		40		K/W	

Electrical Characteristics (T_C = 25°C unless other wise specified)

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown voltage	V_{GS} = 0V, I_D = 100μA	650			V	
$V_{GS(th)}$	Gate Threshold voltage	V_{GS} = V_{DS}, I_D =1mA		2.8		V	Fig. 9
		V_{GS} = V_{DS}, I_D =1mA, T_j=175°C		2.0			
I_{GSS}	Gate-Source Leakage current	V_{GS} = 18V, V_{DS} = 0V			250	nA	
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =650V, V_{GS} = 0V, T_j = 25°C		1	50	μA	
$R_{DS(on)}$	Drain-Source On-state Resistance	V_{GS} = 15V, I_D =3A V_{GS} = 18V, I_D =3A		530 410	690	mΩ	Fig. 3, 4 , 5
		V_{GS} = 15V, I_D =3A, T_j = 175°C V_{GS} = 18V, I_D =3A, T_j = 175°C		550 500			
g_{fs}	Transconductance	V_{DS} = 18V, I_D =3A		2.4		S	Fig. 6
		V_{DS} = 18V, I_D =3A, T_j = 175°C		1.9			

Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
Q_{GS}	Gate to Source Charge	V_{DS} = 400V I_D =3A V_{GS} = -4V/18V		2.4		nC	Fig. 10
Q_{GD}	Gate to Drain Charge			4.0			
Q_G	Total Gate Charge			9.7			

AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
C_{iss}	Input Capacitance	V_{GS} = 0V, V_{DS} = 600V f =1 MHz V_{AC} = 25mV		147		pF	Fig. 13
C_{oss}	Output Capacitance			19		pF	
C_{rss}	Reverse Transfer Capacitance			2.5		pF	
$R_{G(int)}$	Internal Gate Resistance	f=1 MHz, V_{AC} = 25mV		5		Ω	

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	V_{GS} =-4V, I_{SD} =1.5A		4.4		V	Fig. 7,8
		V_{GS} =-4V, I_{SD} =1.5A, T_j = 175°C		3.9			
I_S	Continuous Diode Forward Current	V_{GS} =-4V , T_C = 25°C		7		A	
$I_{S,\ pulse}$	Diode pulse Current	V_{GS} =-4V,pulse width t_p limited by T_{jmax}		15		A	

Typical Performance

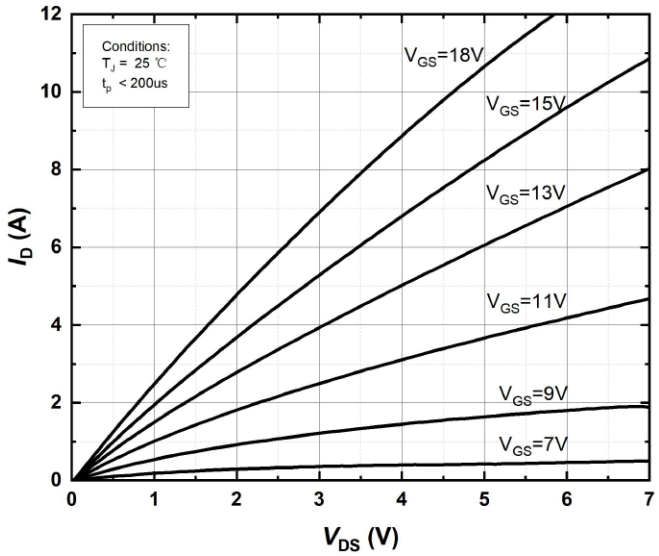


Figure 1. Output characteristics at Tj=25°C

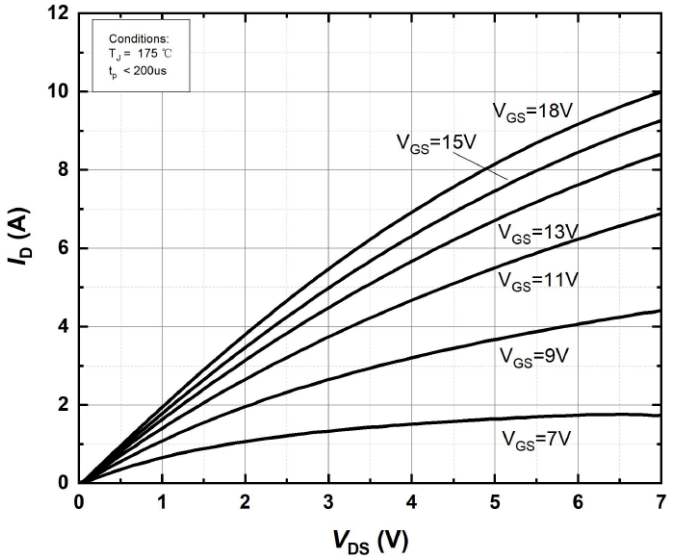


Figure 2. Output characteristics at Tj=175°C

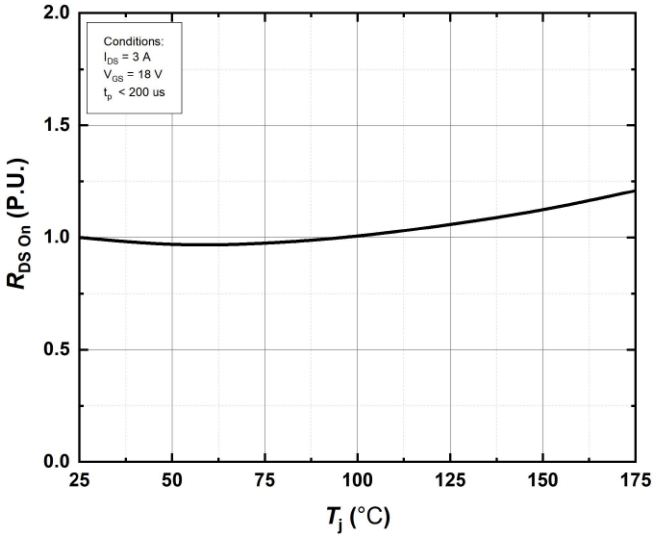


Figure 3. Normalized On-Resistance vs. Temperature

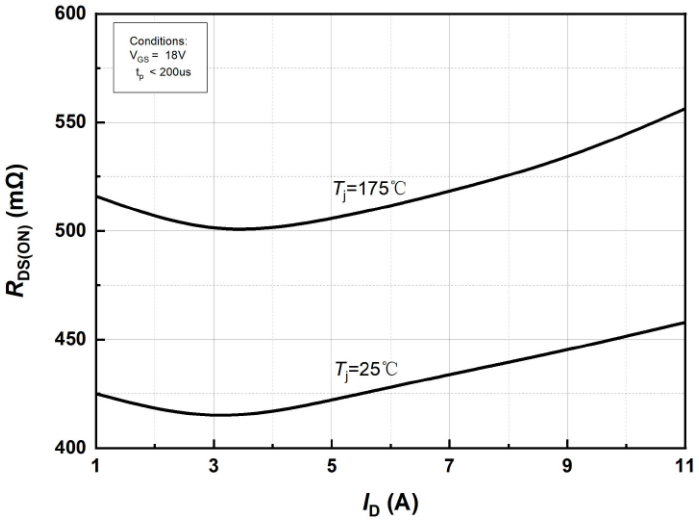


Figure 4. On-Resistance vs. Drain current for Various Temperature

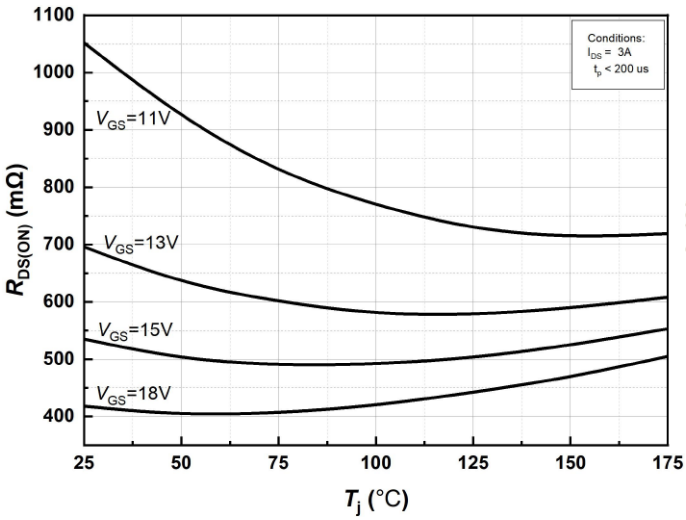


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

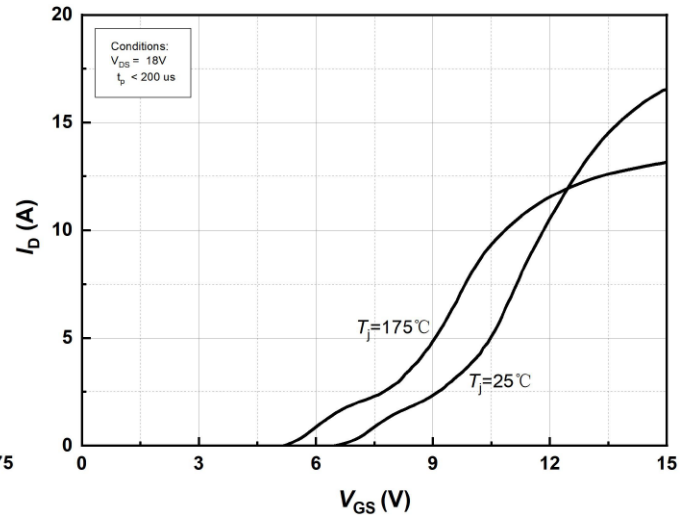


Figure 6. Transfer Characteristics for Various Junction Temperatures

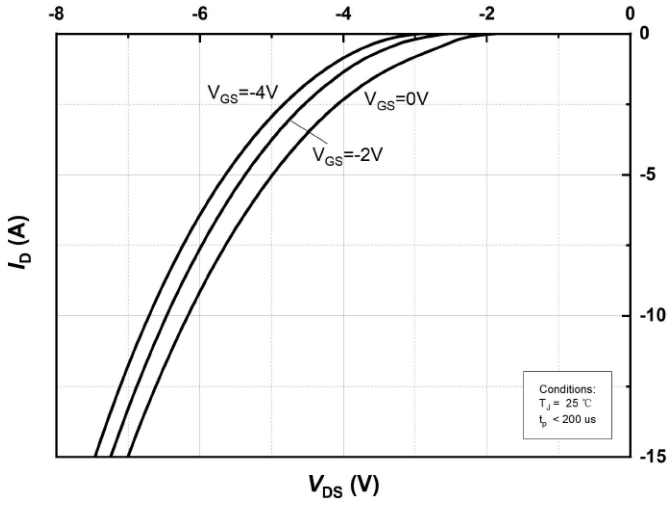


Figure 7. Body Diode Characteristics at Tj=25°C

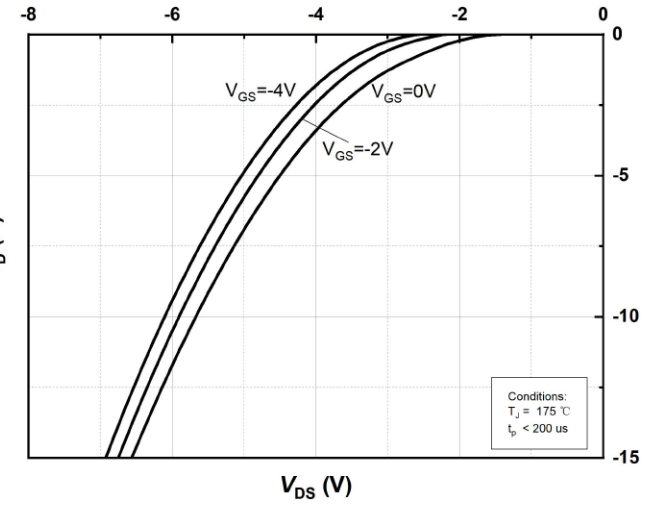


Figure 8. Body Diode Characteristics at Tj=175°C

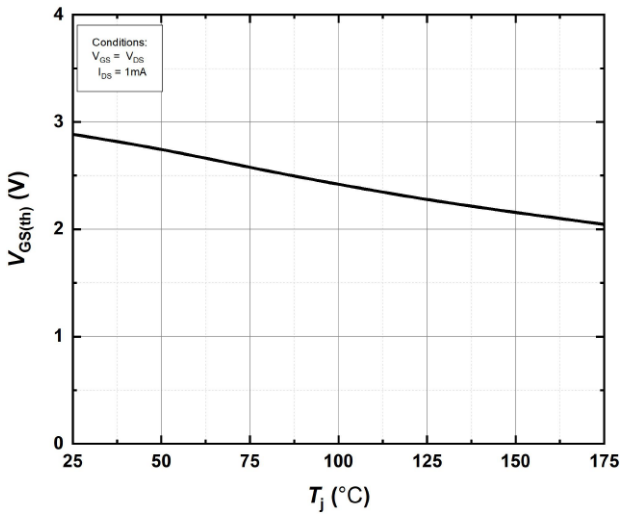


Figure 9. Threshold Voltage vs. Temperature

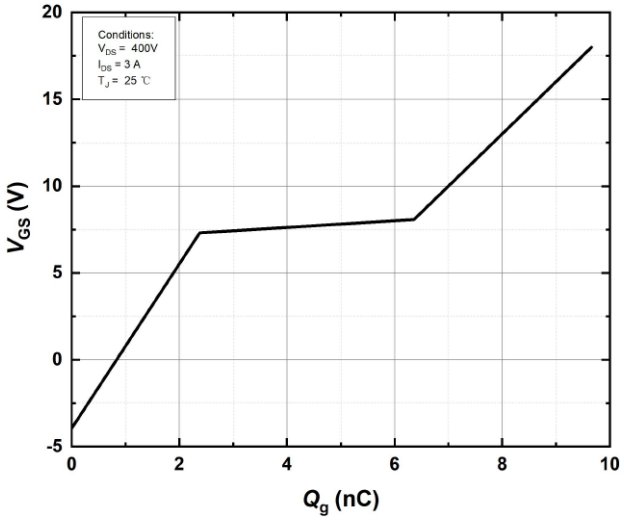


Figure 10 Gate Charge Characteristics

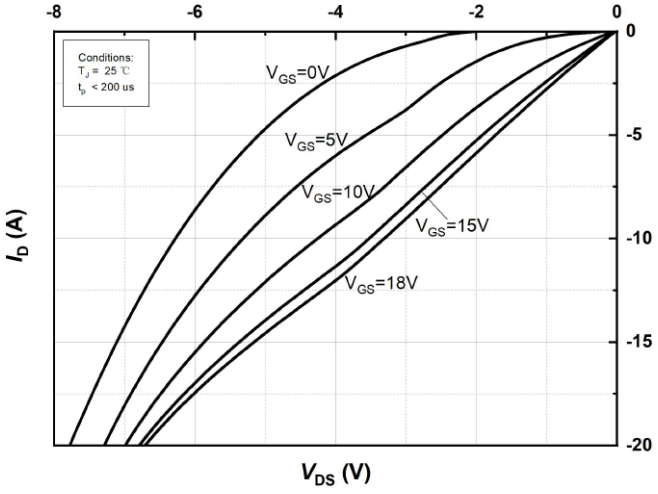


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

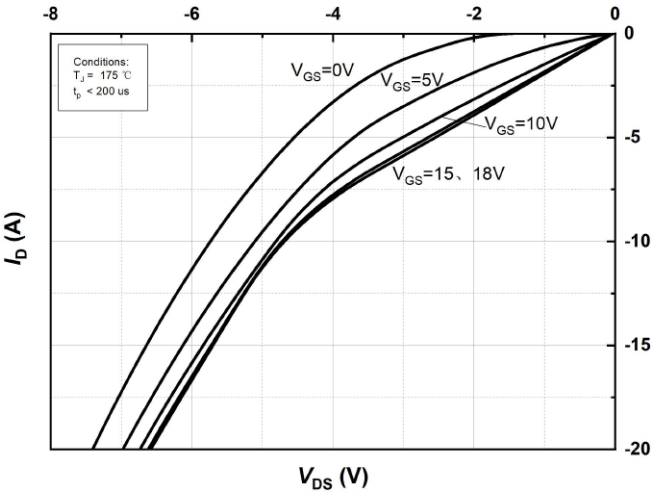


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

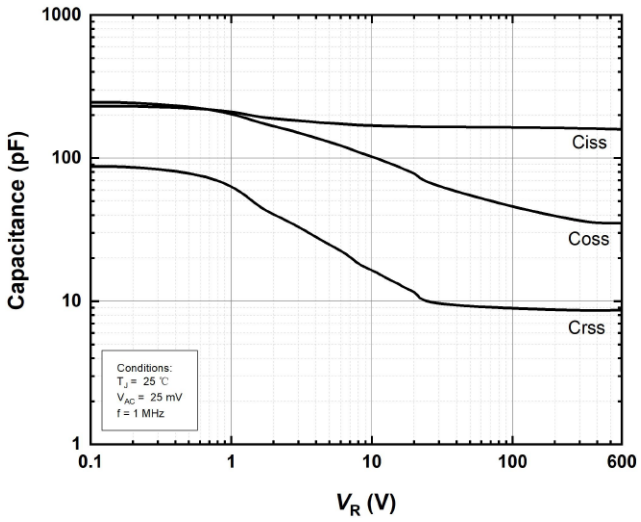


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

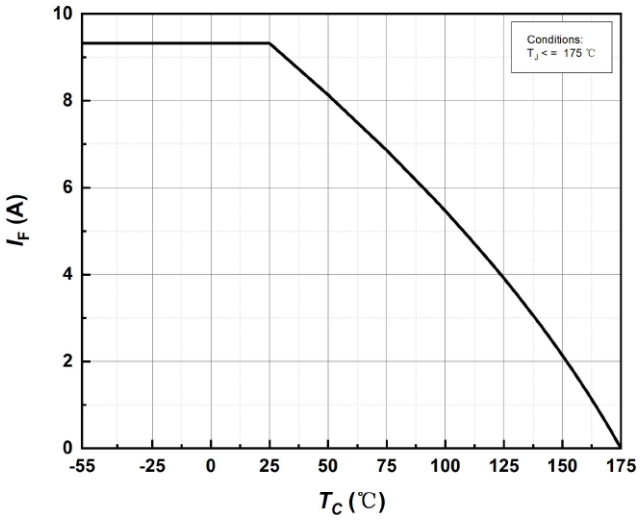


Figure 14. Continuous Drain Current Derating vs Case Temperature

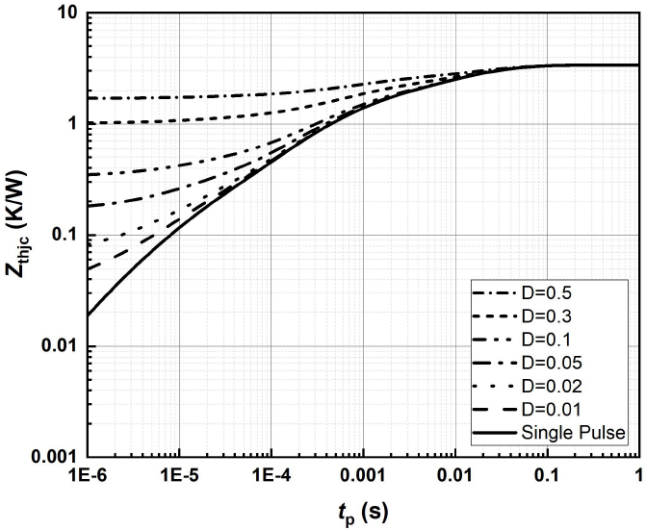


Figure 15.Transient Thermal Impedance (Junction – Case)

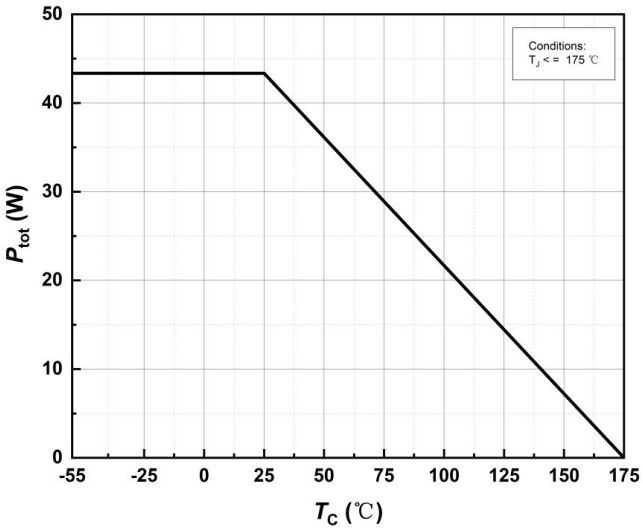


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

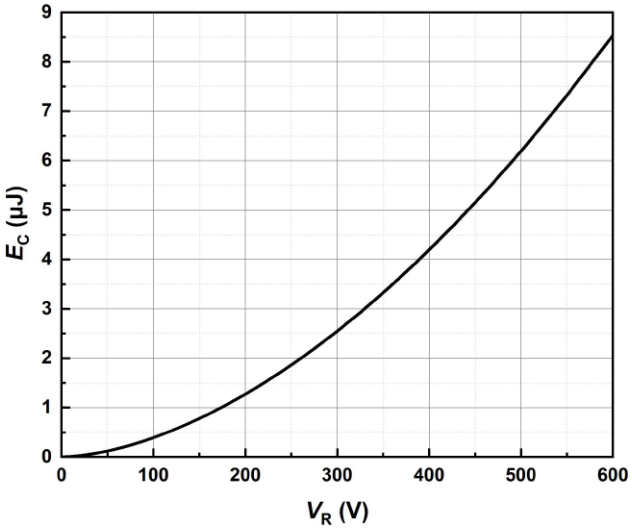


Figure 17. Output Capacitor Stored Energy

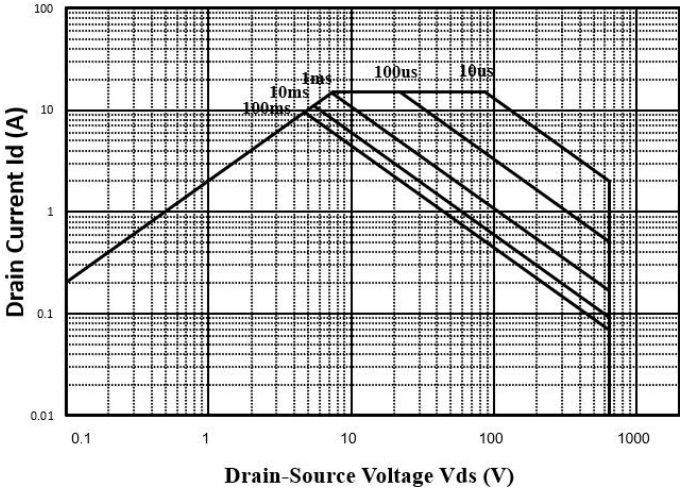
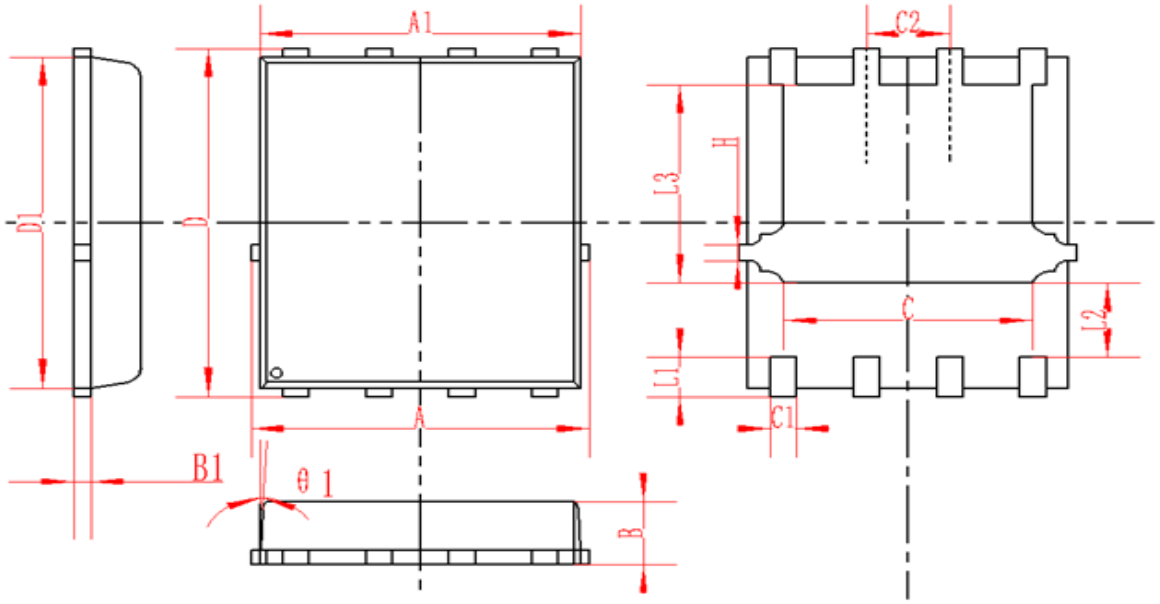


Figure 18. Safe Operating Area

Package Dimensions

Package DFN5X6-8L



SYMBOL	MM			INCH		
	MIN	NOM	MAX	MIN	NOM	MAX
A	4.95	5	5.05	0.195	0.197	0.199
A1	4.82	4.9	4.98	0.190	0.193	0.196
D	5.98	6	6.02	0.235	0.236	0.237
D1	5.67	5.75	5.83	0.223	0.226	0.230
B	0.9	0.95	1	0.035	0.037	0.039
B1	0.254REF			0.010REF		
C	3.95	4	4.05	0.156	0.157	0.159
C1	0.35	0.4	0.45	0.014	0.016	0.018
C2	1.27TYP			0.5TYP		
θ1	8°	10°	12°	8°	10°	12°
L1	0.63	0.64	0.65	0.025	0.025	0.026
L2	1.2	1.3	1.4	0.047	0.051	0.055
L3	3.415	3.42	3.425	0.134	0.135	0.135
H	0.24	0.25	0.26	0.009	0.010	0.010

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