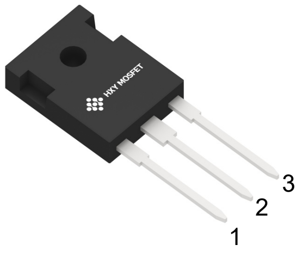
Features

- 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



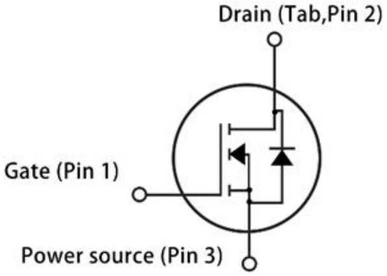
TO-247

Benefits

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

Applications

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



Ordering Part Number	Package	Brand
NTHL082N65S3HF	TO-247	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 $\leqslant$1%	-8/+20	V	
V_{GSop}	Recommend Gate-Source Voltage	Static	-4/+18	V	
I_D	Continuous Drain current	V_{GS} = 18V, T_C = 25°C	36	A	Fig. 14
		V_{GS} = 18V, T_C = 100°C	25		
$I_{D,pulse}$	Pulsed Drain Current	Pulse with t_p limited by T_{jmax}	57	A	
P_D	Power Dissipation	T_C = 25°C, Tj = 175°C	127	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		1.18		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 =5mA		2.3		V	Fig. 9
		V_{GS} = $V_{DS,}$ I_D =5mA, T_j=175°C		1.6			
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 =15A V_{GS} = 18V, I_D =15A		90 75	105	mΩ	Fig. 3, 4 , 5
		V_{GS} = 15V, I_D =15A, T_j = 175°C V_{GS} = 18V, I_D =15A, T_j = 175°C		112 105			
g_{fs}	Transconductance	V_{DS} = 15V, I_D =15A		10		S	Fig. 6
		V_{DS} = 15V, I_D =15A, T_j = 175°C		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 = 15A V_{GS} = -4V/18V		11.3		nC	Fig. 10
Q_{GD}	Gate to Drain Charge			10.4			
Q_G	Total Gate Charge			32			

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		721		pF	Fig. 13
C_{oss}	Output Capacitance			60		pF	
C_{rss}	Reverse Transfer Capacitance			4.9		pF	
$R_{G(int)}$	Internal Gate Resistance	f=1 MHz, V_{AC} = 25mV		3.8		Ω	

Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	V_{GS} = -4V, I_{SD} = 7.5 A		4.4		V	Fig. 7,8
		V_{GS} = -4V, I_{SD} = 7.5 A, T_j = 175°C		3.8			
I_S	Continuous Diode Forward Current	V_{GS} = -4V, T_C = 25°C		26		A	
$I_{S,\ pulse}$	Diode pulse Current	V_{GS} = -4V, pulse width t_p limited by T_{jmax}		57		A	
t_{rr}	Reverse Recovery Time	V_{GS} = -4V, I_{SD} = 15 A, V_R = 400V dif/dt = 1000A/us		17		nS	
Q_{rr}	Reverse Recovery Charge			64		nC	
I_{rrm}	Peak Reverse Recovery Current			4.9		A	

Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$t_{d(on)}$	Turn-On Delay Time	V_{DS} = 400V, V_{GS} = -4/+18V I_D= 15 A, $R_{G(iext)}$ = 5Ω L = 200μH		2		nS	Fig.21
t_r	Rise Time			14		nS	
$t_{d(off)}$	Turn-Off Delay Time			11		nS	
t_f	Fall Time			3.5		nS	
E_{on}	Turn-On Energy			44		μJ	Fig.19
E_{off}	Turn-Off Energy			16		μJ	
E_{tot}	Total switching energy			60		μJ	

Typical Performance

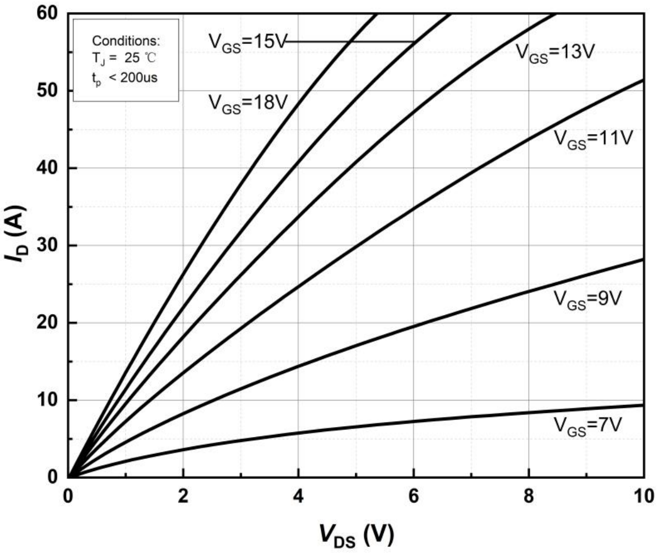


Figure 1. Output characteristics at Tj=25°C

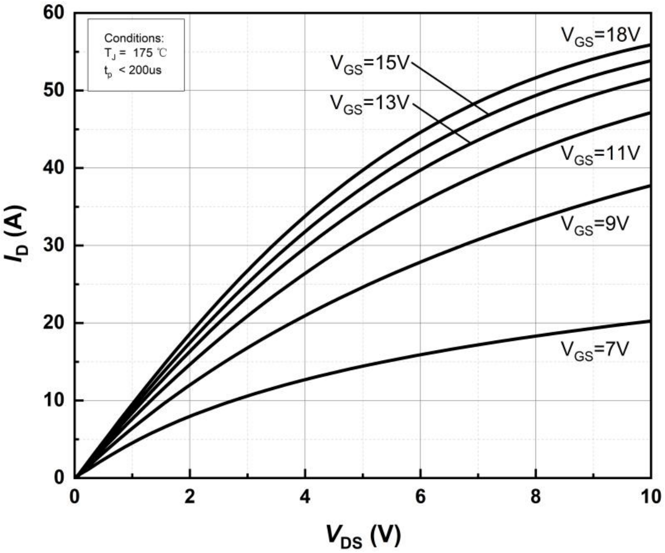


Figure 2. Output characteristics at Tj=175°C

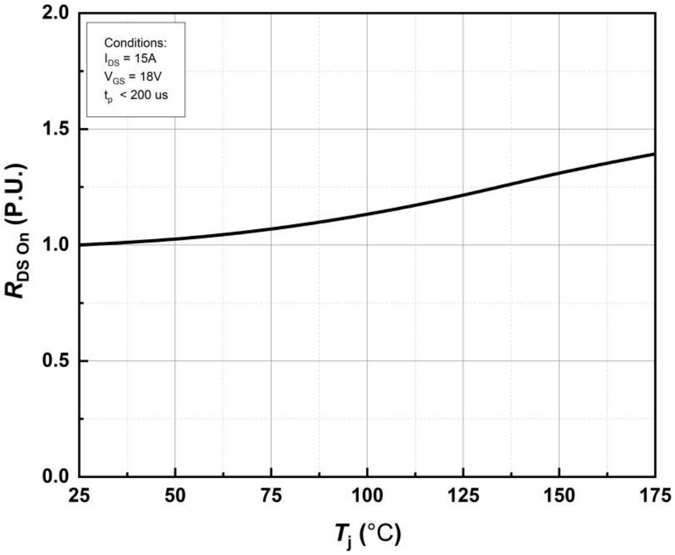


Figure 3. Normalized On-Resistance vs. Temperature

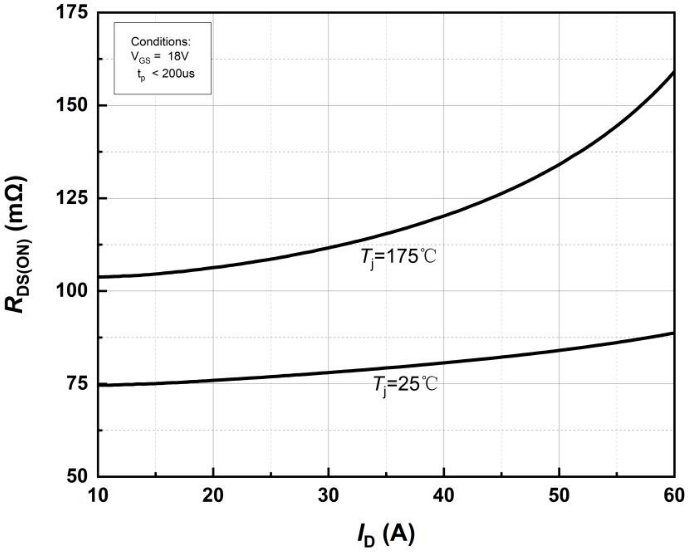


Figure 4. On-Resistance vs. Drain current for Various Temperature

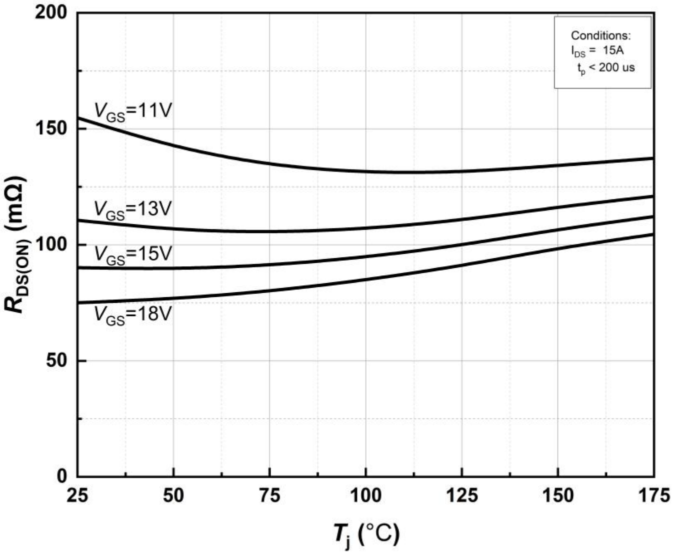


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

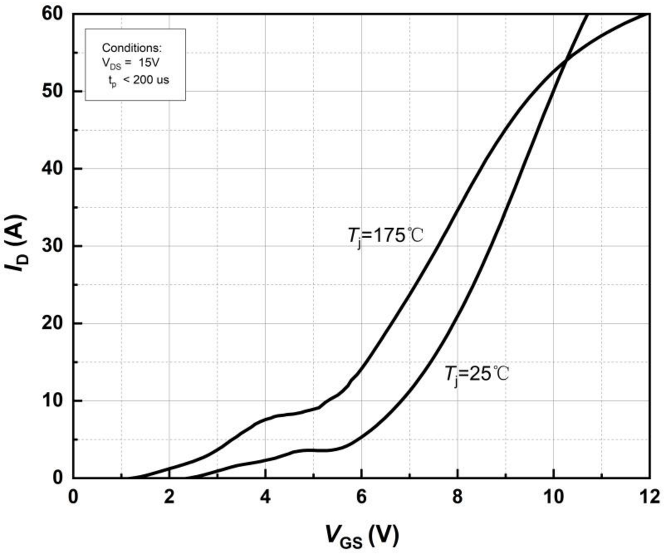


Figure 6. Transfer Characteristics for Various Junction Temperatures

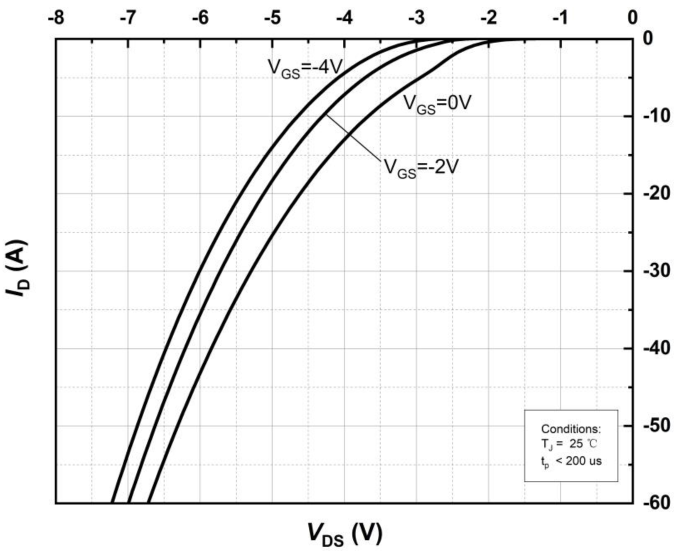


Figure 7. Body Diode Characteristics at Tj=25°C

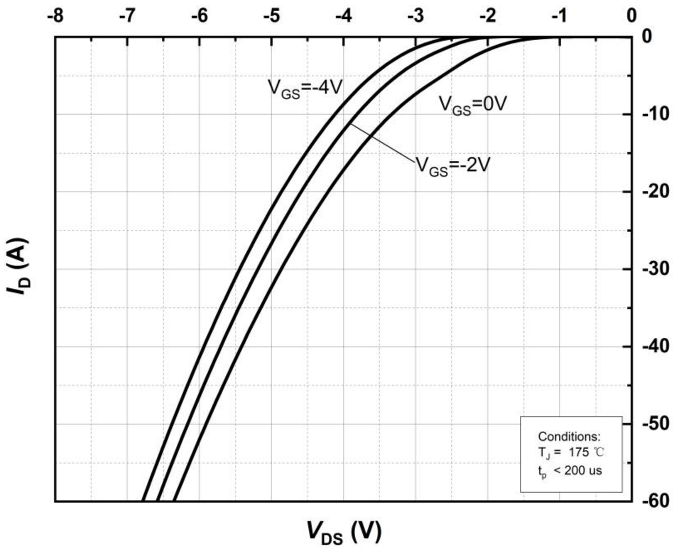


Figure 8. Body Diode Characteristics at Tj=175°C

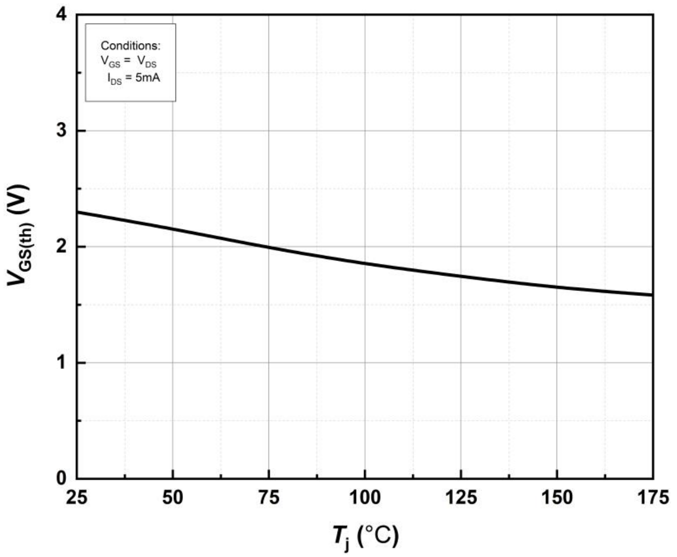


Figure 9. Threshold Voltage vs. Temperature

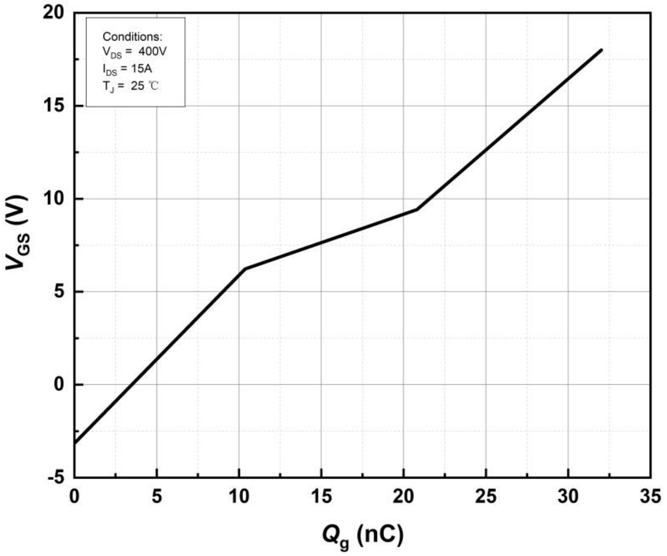


Figure 10 Gate Charge Characteristics

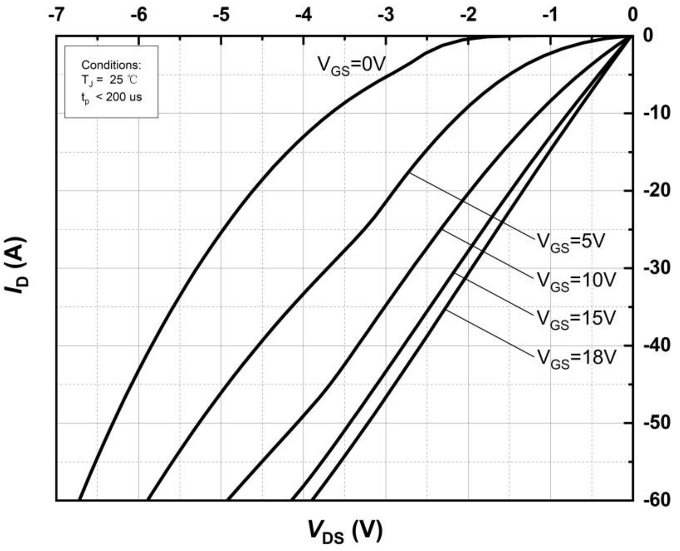


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

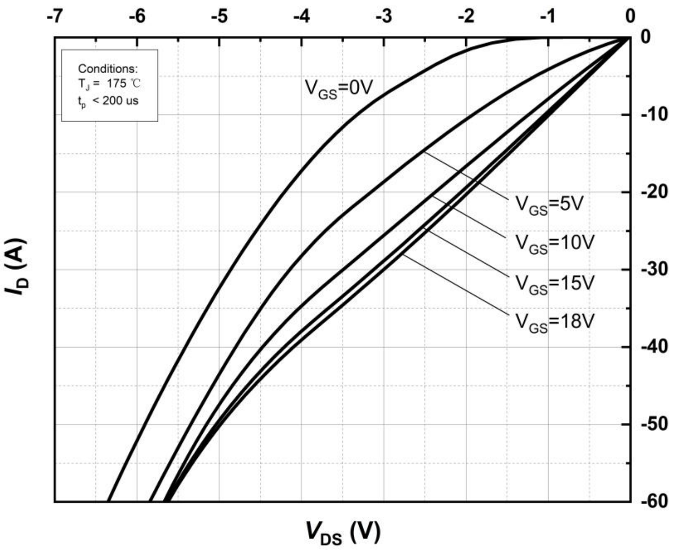


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

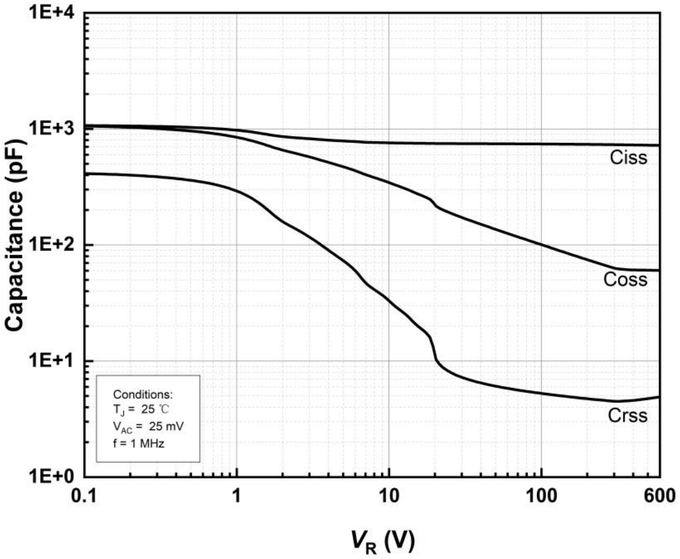


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

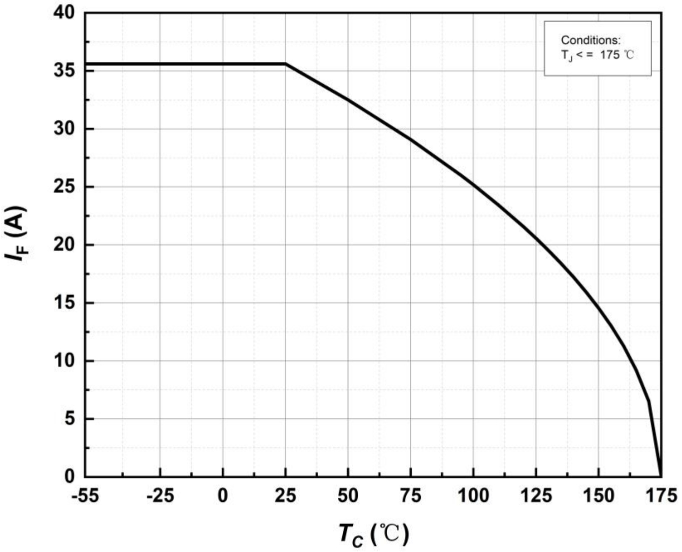


Figure 14. Continuous Drain Current Derating vs Case Temperature

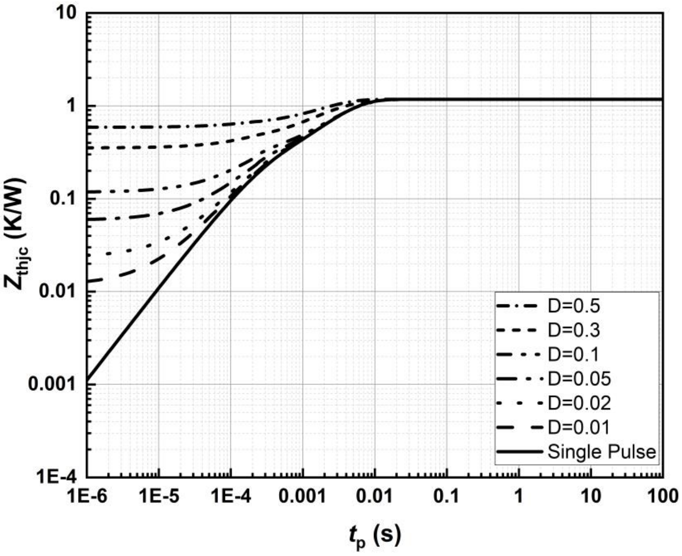


Figure 15.Transient Thermal Impedance (Junction – Case)

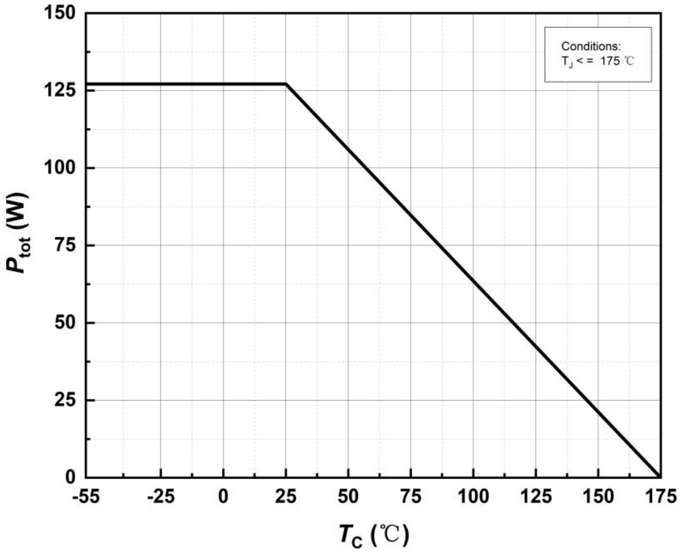


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

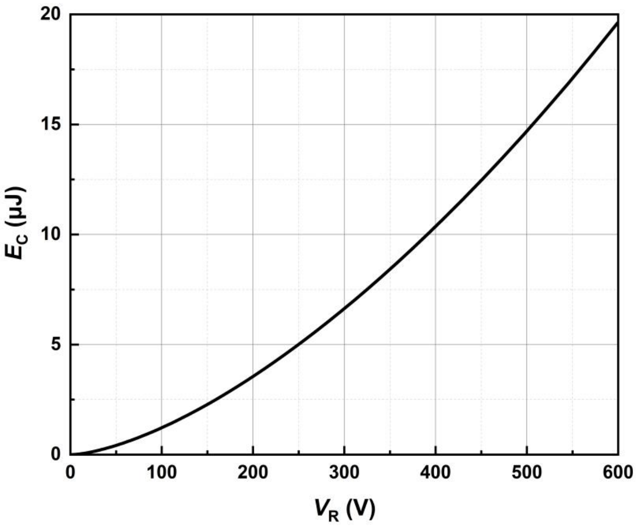


Figure 17. Output Capacitor Stored Energy

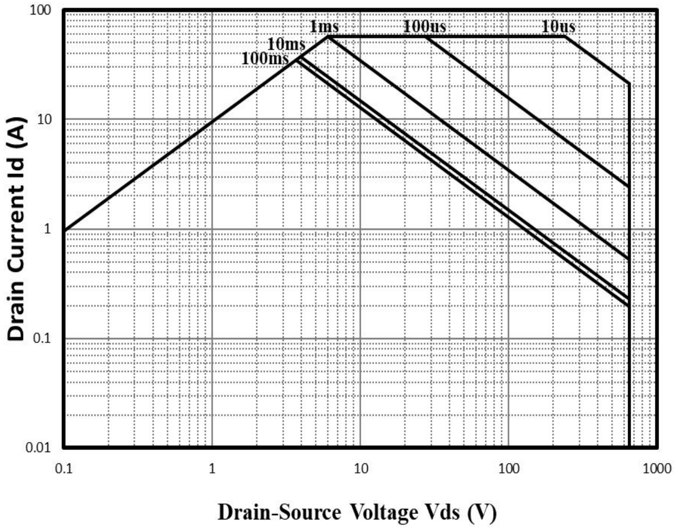


Figure 18. Safe Operating Area

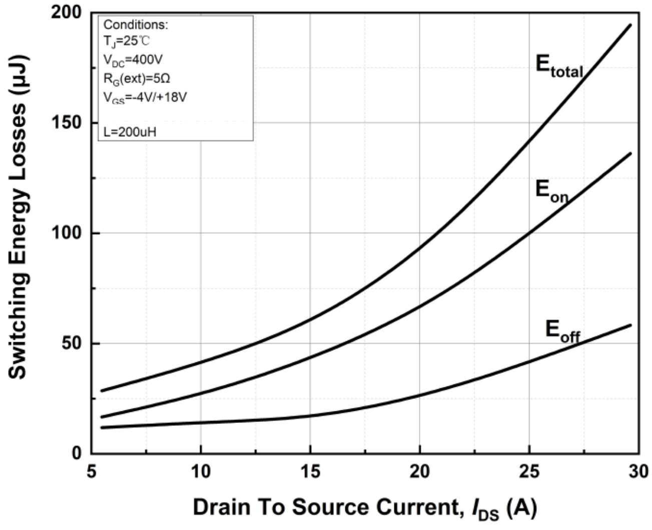


Figure 19. Clamped Inductive Switching Energy vs. Drain Current(V_{DD} = 400V)

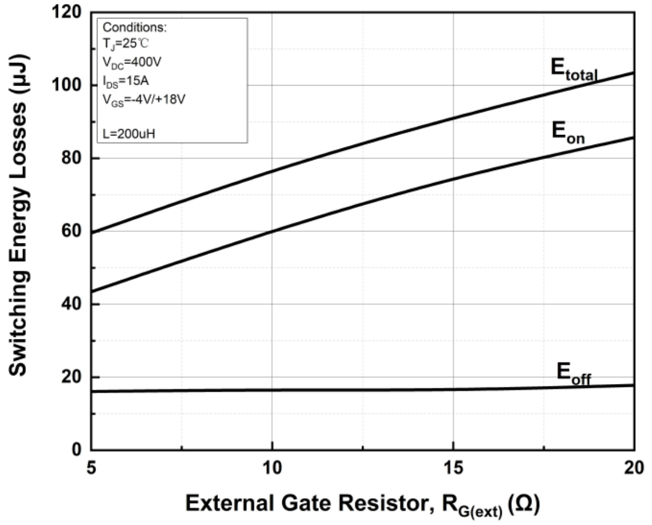


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

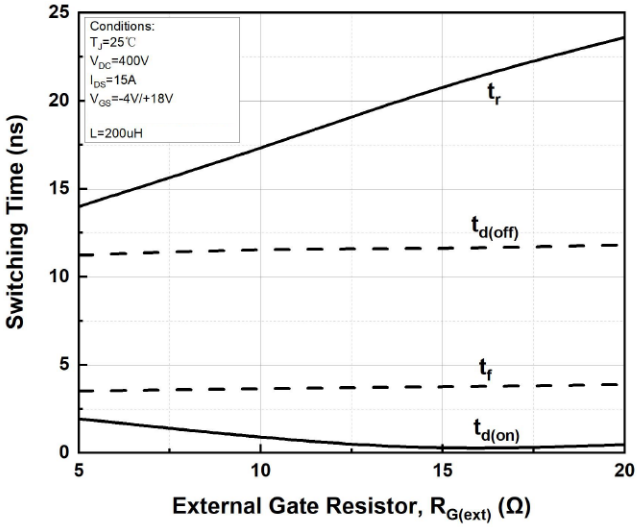
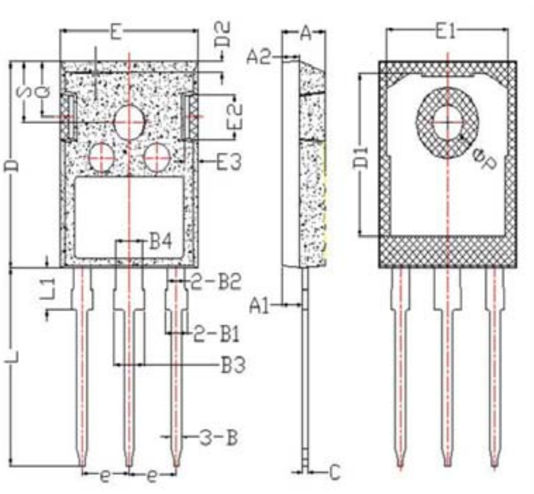


Figure 21. Switching Times vs. $R_{G(ext)}$

Package Dimensions

Package TO-247



Items	Values(mm)	
	MIN	MAX
A	4.6	5.2
A1	2.2	2.6
B	0.9	1.4
B1	1.75	2.35
B2	1.75	2.15
B3	2.8	3.35
B4	2.8	3.15
C	0.5	0.7
D	20.6	21.3
D1	16	18
E	15.5	16.1
E1	13	14.7
E2	3.8	5.3
E3	0.8	2.6
e	5.2	5.2
L	19	20.5
L1	3.9	4.6
Φp	3.3	3.7
Q	5.2	6
S	5.8	6.6

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