

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
1200V	165mΩ@18V	23A

Feature

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

Application

- Switch Mode Power Supplies
- Renewable Energy
- On Board Charger
- High Voltage DC/DC Converters

Package

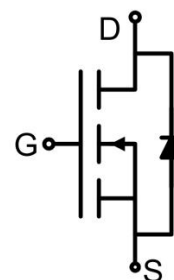


TO-247-3L

Marking



Circuit diagram



Absolute maximum ratings ($T_C=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	$V_{GS} = 0V, I_D = 100\mu A$	1200	V
Gate-Source Voltage	V_{GSmax}	AC ($f > 1$ Hz)	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Static	-4/+18	V
Continuous Drain Current	I_D	$V_{GS} = 18V$	23	A
	I_D	$V_{GS} = 18V, T_C = 100^{\circ}C$	16	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{Jmax}	33	A
Power Dissipation	P_D	$T_J = 175^{\circ}C$	132	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction to Case	1.14	$^{\circ}C/W$
Operating Junction Temperature	T_J		-55 ~ +175	$^{\circ}C$
Storage Temperature	T_{STG}		-55 ~ +175	$^{\circ}C$

Electrical characteristics (T_J=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit	
Static Characteristics							
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = 100μA	1200			V	
Zero gate voltage drain current	I _{DSS}	V _{DS} = 1200V, V _{GS} = 0V			50	μA	
Gate-Source leakage current	I _{GSS}	V _{DS} = 0V, V _{GS} = 18V			250	nA	
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 2.5mA		3		V	
		V _{DS} = V _{GS} , I _D = 2.5mA, T _J = 175°C		2			
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 18V, I _D = 10A		165	240	mΩ	
		V _{GS} = 20V, I _D = 10A		160			
		V _{GS} = 18V, I _D = 10A, T _J = 175°C		330			
		V _{GS} = 20V, I _D = 10A, T _J = 175°C		320			
Transconductance	g _{fs}	V _{GS} = 18V, I _D = 10A		9.7		S	
		V _{GS} = 18V, I _D = 10A, T _J = 175°C		6			
Dynamic characteristics							
Input Capacitance	C _{iss}	V _{DS} = 1000V, V _{GS} = 0V V _{AC} = 25mV, f = 1MHz		730		pF	
Output Capacitance	C _{oss}			24			
Reverse Transfer Capacitance	C _{rss}			1			
Total Gate Charge	Q _g	V _{DS} = 800V, V _{GS} = -4V/18V I _D = 10A		41		nC	
Gate-Source Charge	Q _{gs}			8.4			
Gate-Drain Charge	Q _{gd}			15			
Internal Gate Resistance	R _{G(int)}	V _{AC} = 25mV, f = 1MHz		3		Ω	
Turn-on delay time	t _{d(on)}	V _{DS} = 800V, V _{GS} = -4V/+18V I _D = 10A, R _{G(ext)} = 5Ω, L = 620μH		3		nS	
Turn-on rise time	t _r			13			
Turn-off delay time	t _{d(off)}			13			
Turn-off fall time	t _f			9			
Turn-on Switching Energy	E _{on}				84		μJ
Turn-off Switching Energy	E _{off}				31		
Total switching energy	E _{tot}				115		
Source-Drain Diode characteristics							
Diode Forward Current	I _S	V _{GS} = -4V, T _C = 25°C		27		A	
Diode Forward voltage	V _{SD}	V _{GS} = -4V, I _{SD} = 3A		3.6		V	
		V _{GS} = -4V, I _{SD} = 3A, T _J = 175°C		3.1			
Reverse Recovery Time	t _{rr}	V _{GS} = -4V, V _R = 800V, I _{SD} = 10A dif/dt = 1000A/μs		44		nS	
Reverse Recovery Charge	Q _{rr}			87		nC	
Peak Reverse Recovery Current	I _{rrm}			6		A	

Typical Characteristics

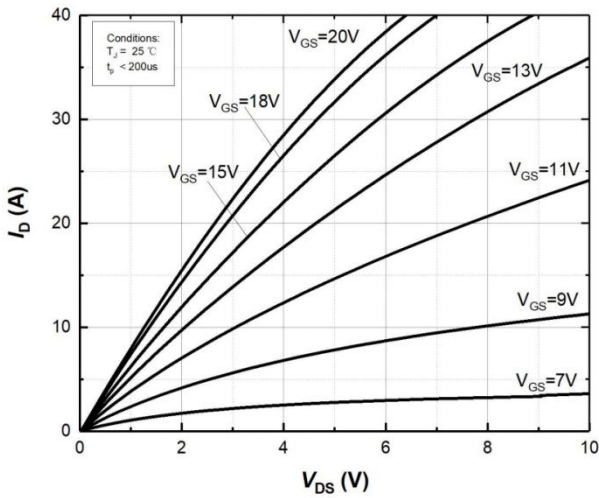


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

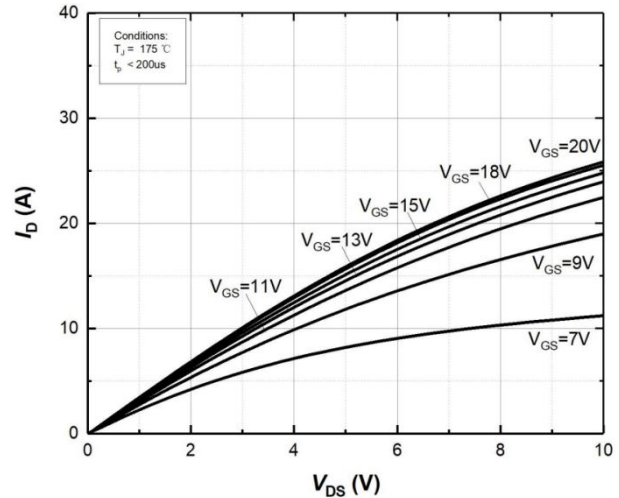


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

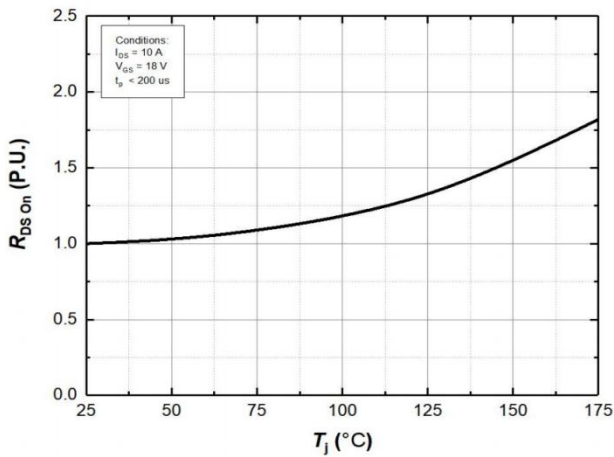


Figure 3. Normalized On-Resistance vs. Temperature

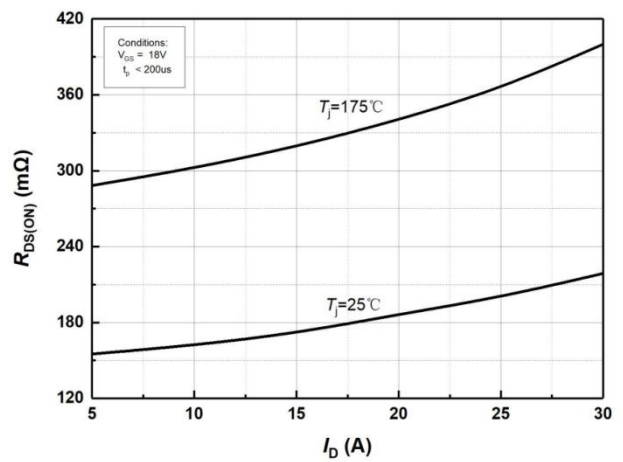


Figure 4. On-Resistance vs. Drain current for Various Temperature

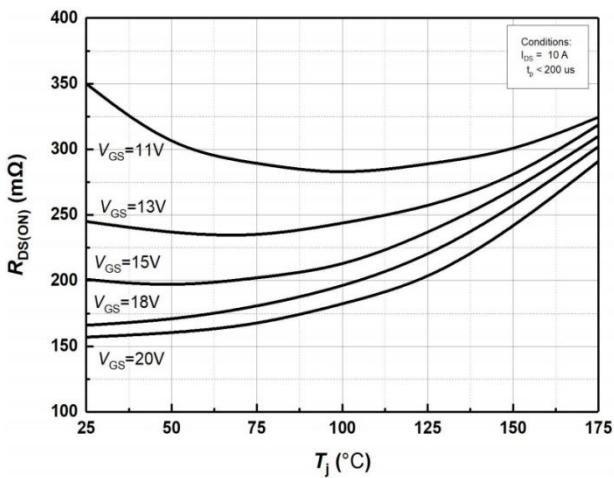


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

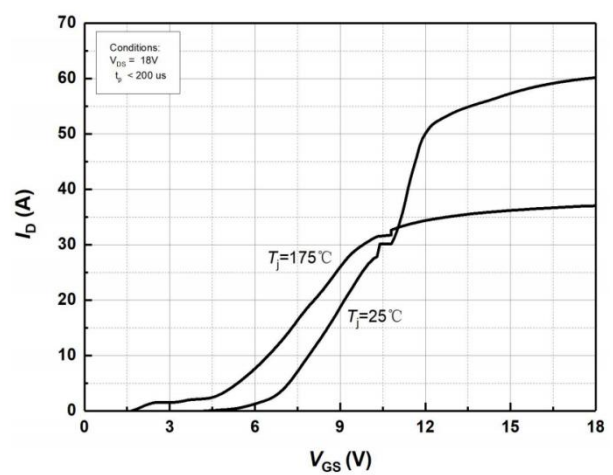


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

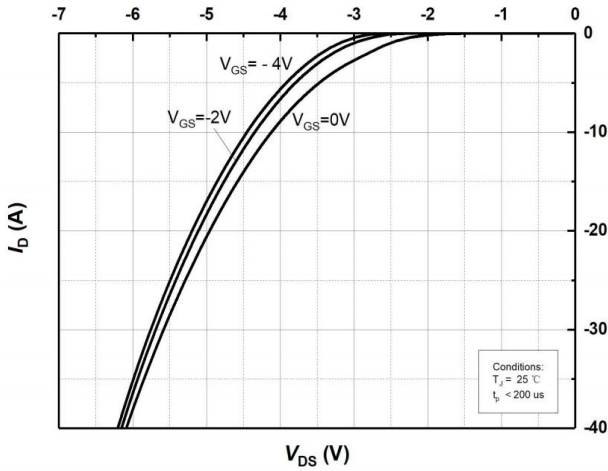


Figure 7. Body Diode Characteristics at $T_j=25^\circ\text{C}$

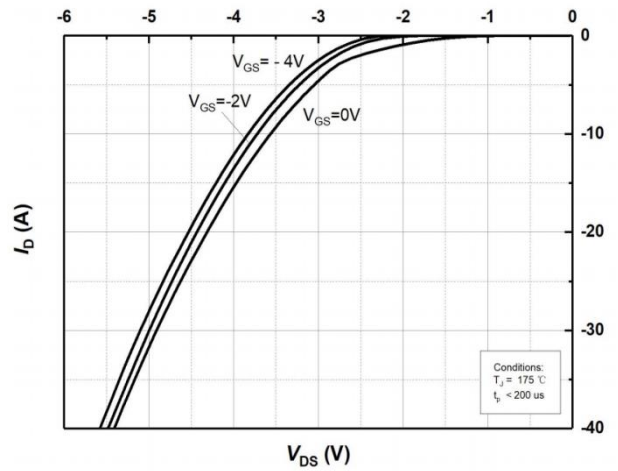


Figure 8. Body Diode Characteristics at $T_j=175^\circ\text{C}$

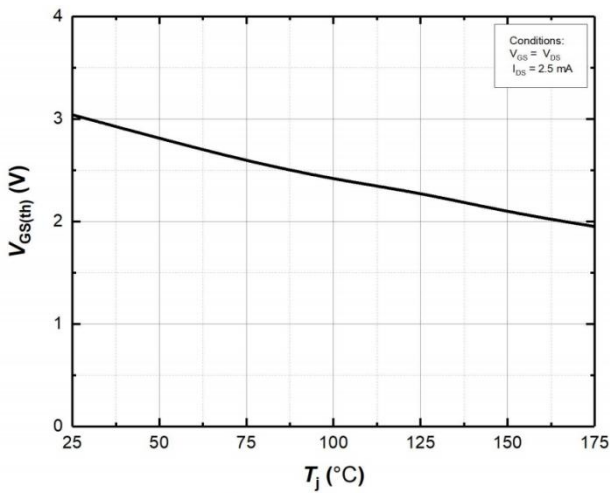


Figure 9. Threshold Voltage vs. Temperature

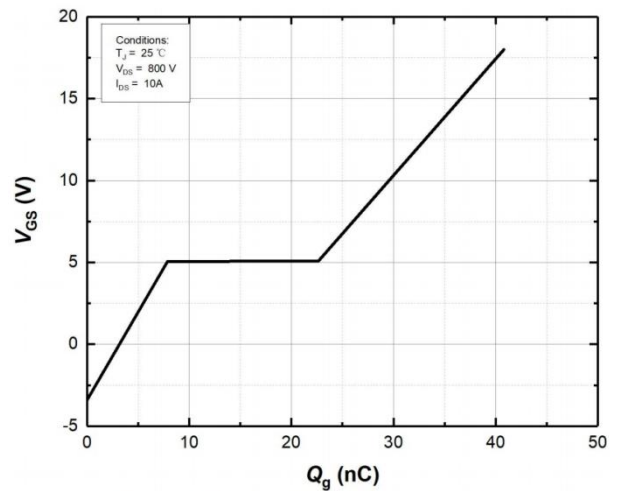


Figure 10 Gate Charge Characteristics

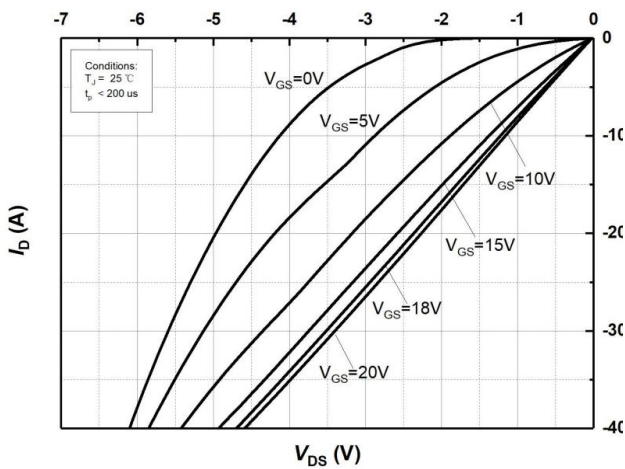


Figure 11. 3rd Quadrant Characteristic at $T_j=25^\circ\text{C}$

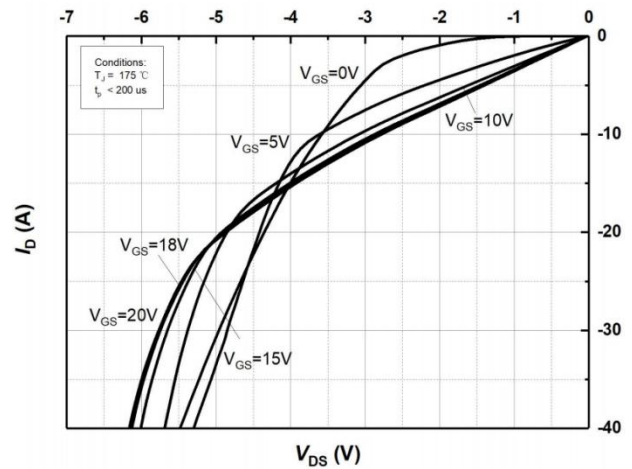


Figure 12. 3rd Quadrant Characteristic at $T_j=175^\circ\text{C}$

Typical Characteristics

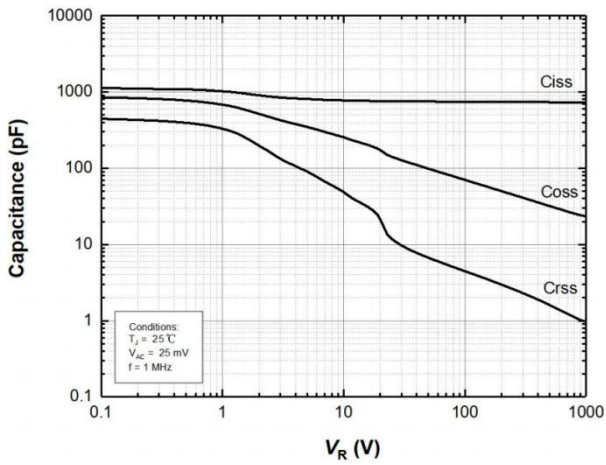


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

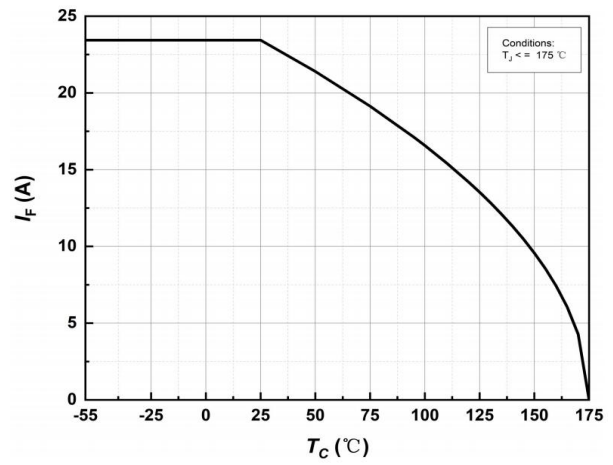


Figure 14. Continuous Drain Current Derating vs Case Temperature

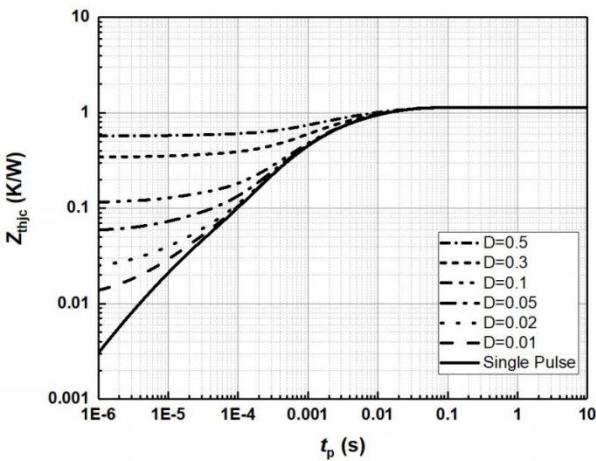


Figure 15. Transient Thermal Impedance (Junction – Case)

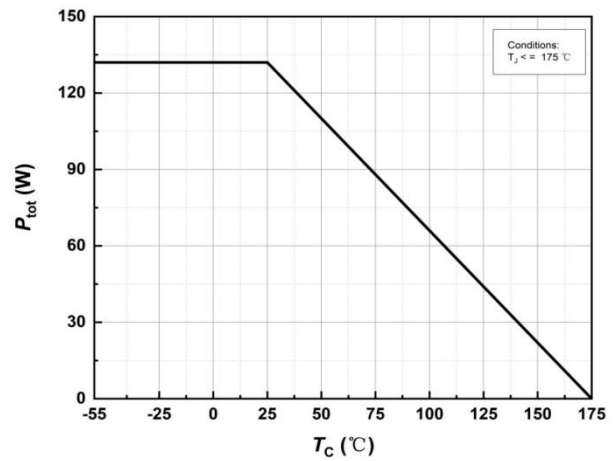


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

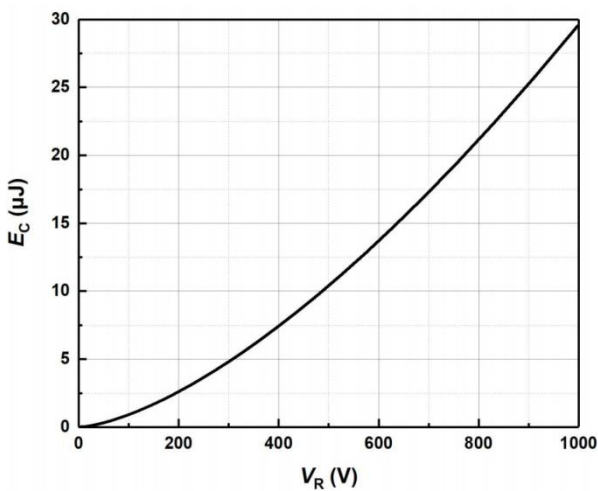


Figure 17. Output Capacitor Stored Energy

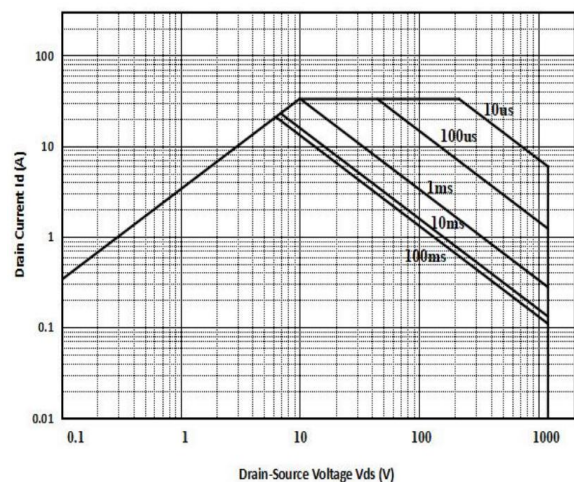


Figure 18. Safe Operating Area

Typical Characteristics

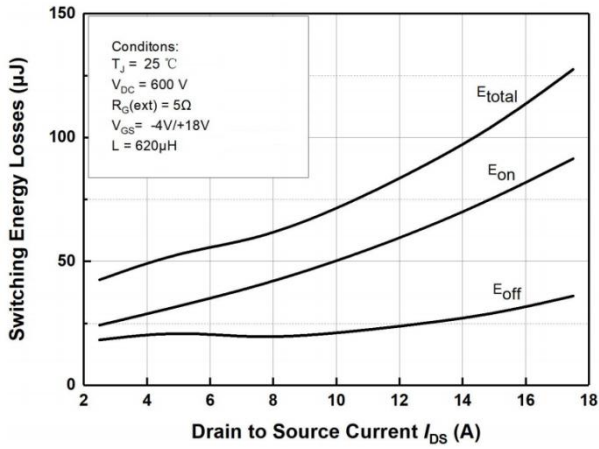


Figure 19. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 600V$)

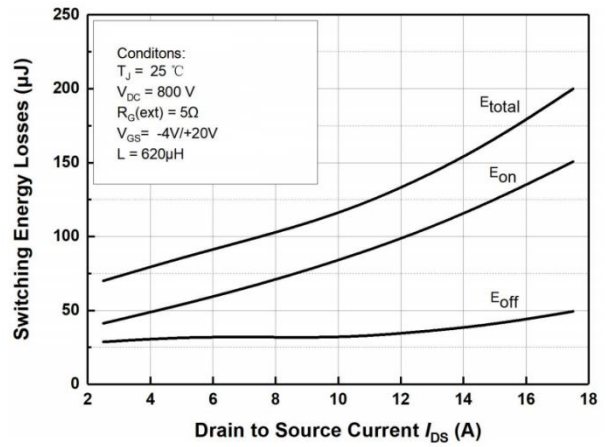


Figure 20. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 800V$)

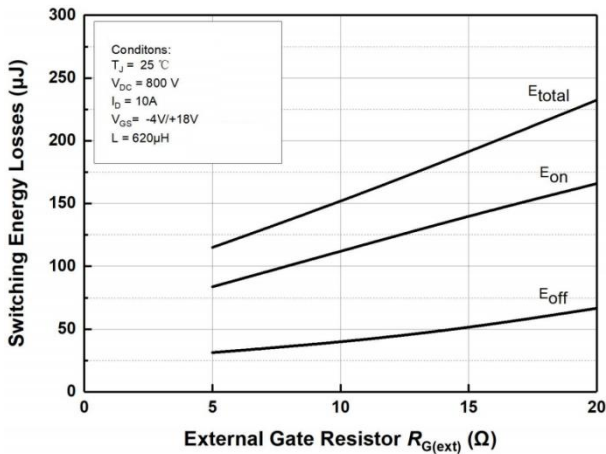


Figure 21. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

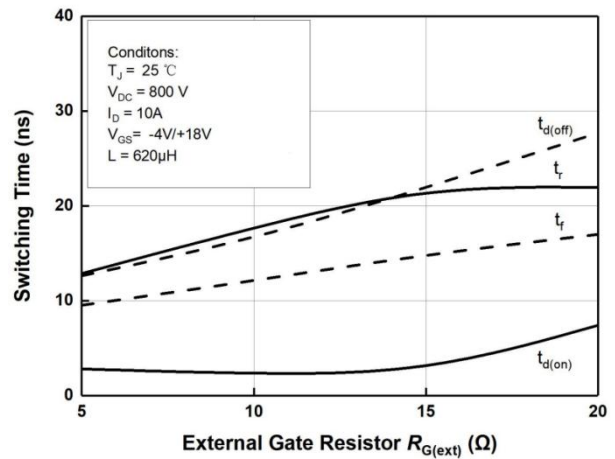
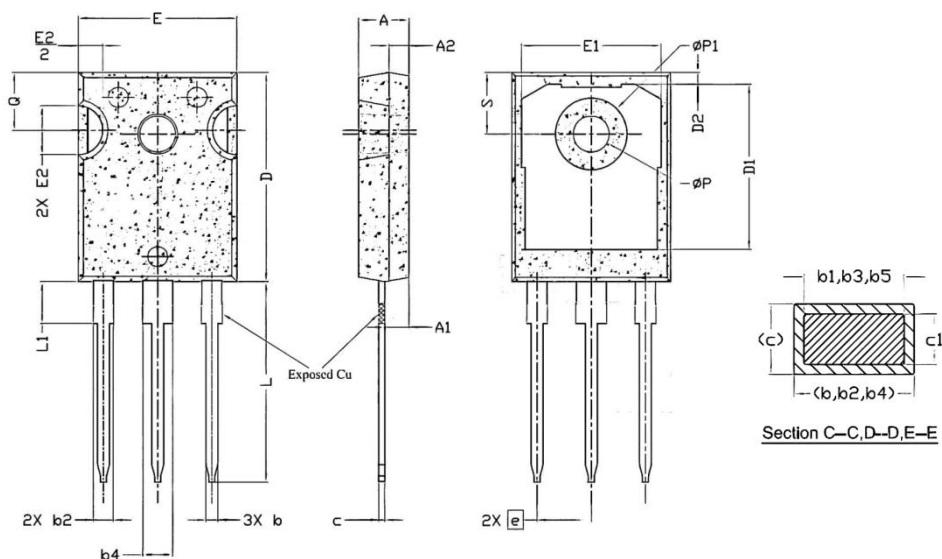


Figure 22. Switching Times vs. $R_{G(ext)}$

TO-247-3L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.830	5.210	0.190	0.205
A1	2.290	2.550	0.090	0.100
A2	1.500	2.490	0.059	0.098
b	1.120	1.330	0.044	0.052
b1	1.120	1.280	0.044	0.050
b2	1.910	2.390	0.075	0.094
b3	1.910	2.340	0.075	0.092
b4	2.870	3.220	0.113	0.127
b5	2.870	3.180	0.113	0.125
c	0.550	0.690	0.022	0.027
c1	0.550	0.650	0.022	0.026
D	20.800	21.100	0.819	0.831
D1	16.250	17.650	0.640	0.695
D2	0.510	1.350	0.020	0.053
E	15.750	16.130	0.620	0.635
E1	13.460	14.160	0.530	0.557
E2	4.320	5.490	0.170	0.216
e	5.440 BSC		0.214 BSC	
L	19.810	20.320	0.780	0.800
L1	4.100	4.400	0.161	0.173
ΦP	3.560	3.650	0.140	0.144
ΦP1	7.19 REF.		0.283 REF.	
Q	5.390	6.200	0.212	0.244
S	6.040	6.300	0.238	0.248