

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
650V	105m Ω @18V	32A
	94m Ω @20V	

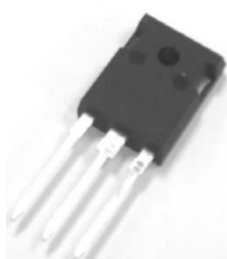
Feature

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

Application

- Switch Mode Power Supplies
- Renewable energy
- Motor drives
- High Voltage DC/DC Converters

Package

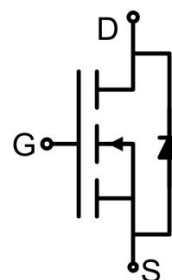


TO-247-3

Marking



Circuit diagram



Absolute maximum ratings (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	$V_{GS}=0V, I_D = 100\mu A$	650	V
Gate-Source Voltage	V_{GSmax}	AC (f > 1Hz)	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Static	-4/+18	V
Continuous Drain Current	I_D	$V_{GS}=18V, T_C=25^{\circ}C$	32	A
	I_D	$V_{GS}=18V, T_C=100^{\circ}C$	23	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse width t_p limited by T_{jmax} at 1ms	50	A
		Pulse width t_p limited by T_{jmax} at 100 μs	94	A
Power Dissipation	P_D	$T_C=25^{\circ}C$	142	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	1.06	$^{\circ}C/W$
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	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =650V,V _{GS} = 0V		1	50	μA
Gate-Source leakage current	I _{GSS}	V _{GS} =18V, V _{DS} = 0V			250	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =5mA		2.7		V
		V _{DS} =V _{GS} , I _D =5mA ,T _J =175℃		1.8		
Drain-source on-resistance	R _{DS(on)}	V _{GS} =18V, I _D =10A		105	150	mΩ
		V _{GS} =20V, I _D =10A		94		
		V _{GS} =18V, I _D =10A,T _J =175℃		140		
		V _{GS} =20V, I _D =10A,T _J =175℃		130		
Transconductance	g _{fs}	V _{GS} =18V, I _D =10A		13		S
		V _{GS} =18V, I _D =10A,T _J =175℃		9		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =600V,V _{GS} =0V,f =1MHz V _{AC} =25mV		767		pF
Output Capacitance	C _{oss}			55		
Reverse Transfer Capacitance	C _{rss}			7		
Total Gate Charge	Q _g	V _{DS} =400V,V _{GS} =-4V/18V, I _D =10A		35.8		nC
Gate-Source Charge	Q _{gs}			8.3		
Gate-Drain Charge	Q _{gd}			12.1		
Turn-on delay time	t _{d(on)}	V _{DS} =400V,V _{GS} =-4V/+18V, I _D =12A,R _{G(ie} xt)=2.4Ω,L=293μH		2.6		nS
Turn-on rise time	t _r			10		
Turn-off delay time	t _{d(off)}			11		
Turn-off fall time	t _f			5		
Turn-on Switching Energy	E _{on}			16		μJ
Turn-off Switching Energy	E _{off}			12		
Total switching energy	E _{tot}			28		
Internal Gate Resistance	R _{G(int)}	f =1MHz,V _{AC} =25mV		2.8		Ω
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} =-5V,T _C =25℃		28		A
Diode Forward voltage	V _{SD}	V _{GS} =-5V, I _{SD} =7.5A		4.0		V
		V _{GS} =-5V, I _{SD} =7.5A,T _J =175℃		3.5		
Diode pulse Current	I _{S,pulse}	V _{GS} =-5V, pulse width t _p limited by T _{jmax}		50		A
Reverse Recovery Time	t _{rr}	V _{GS} =-5V,I _{SD} =12A,V _R =400V dif/dt=1050A/μs		14.2		nS
Reverse Recovery Charge	Q _{rr}			63		nC
Peak Reverse Recovery Current	I _{rrm}			6		A

Typical Characteristics

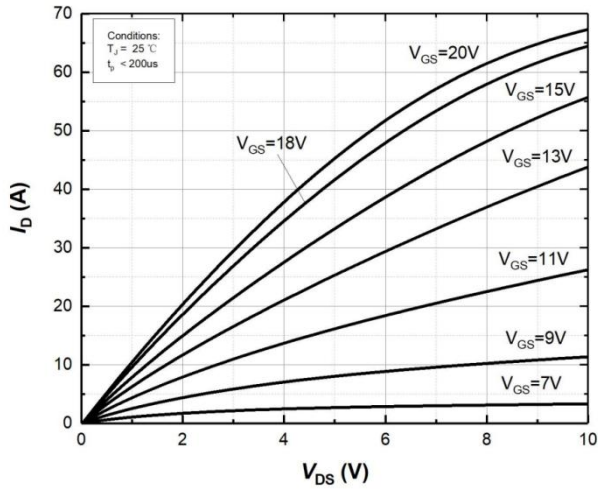


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

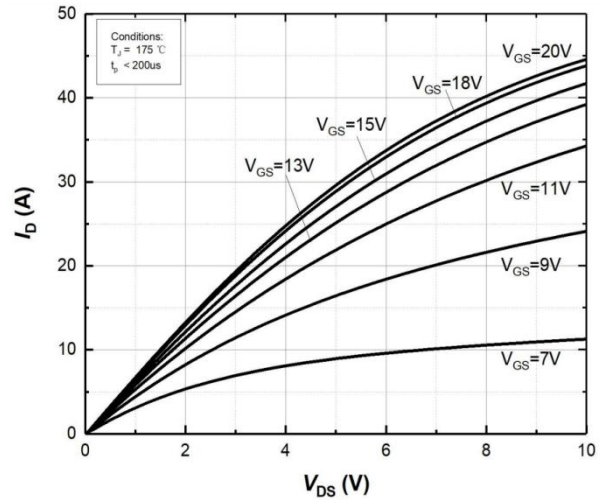


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

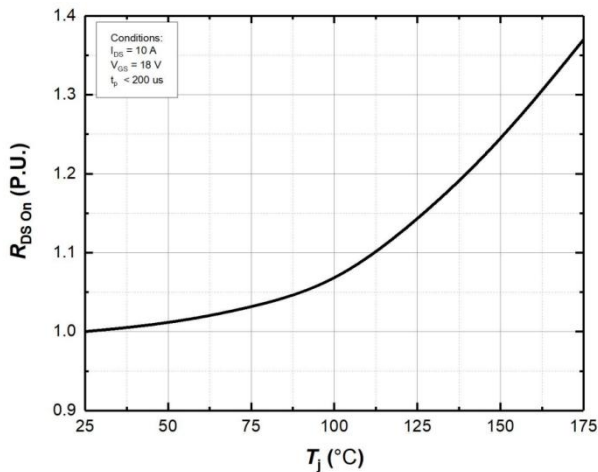


Figure 3. Normalized On-Resistance vs. Temperature

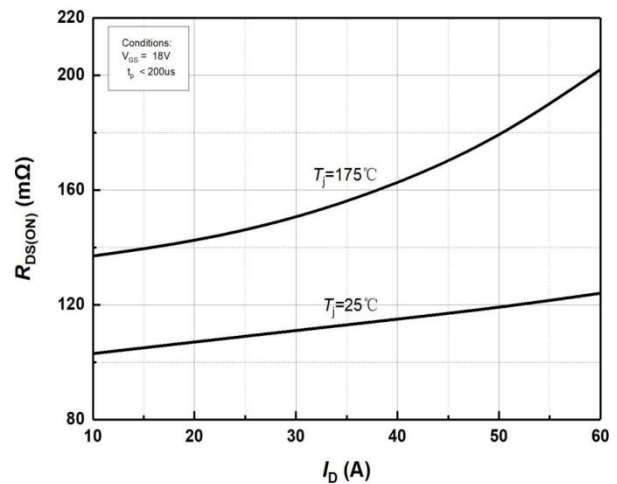


Figure 4. On-Resistance vs. Drain current for Various Temperature

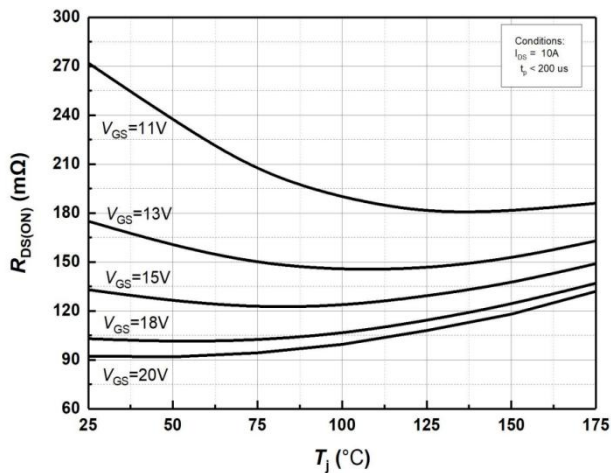


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

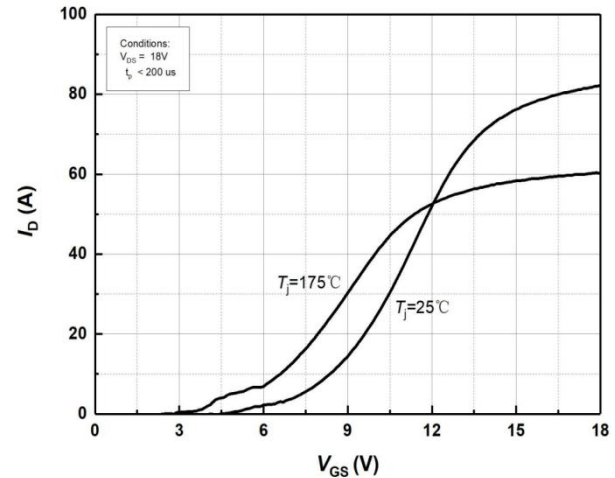


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

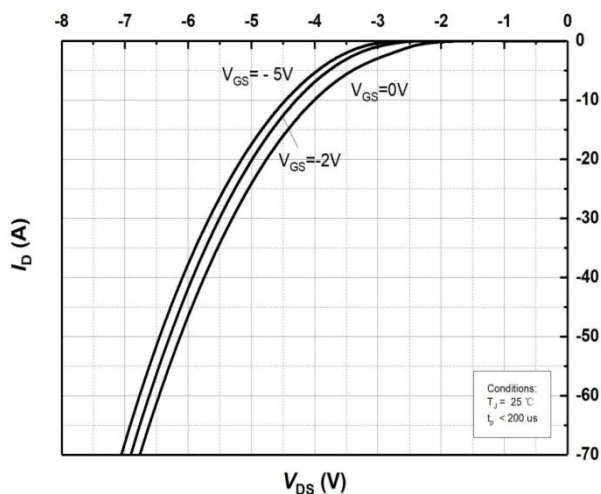


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}\text{C}$

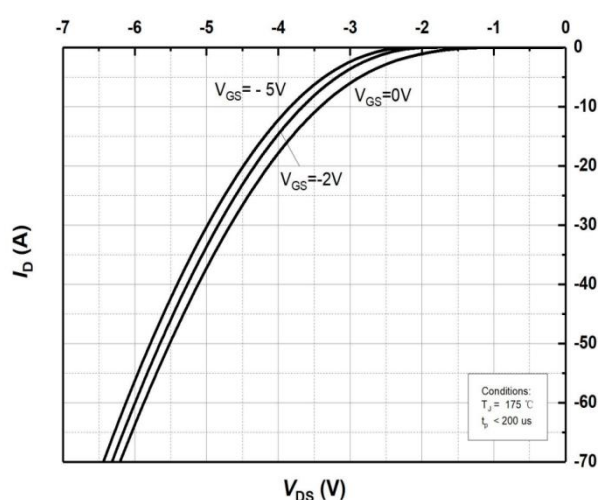


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}\text{C}$

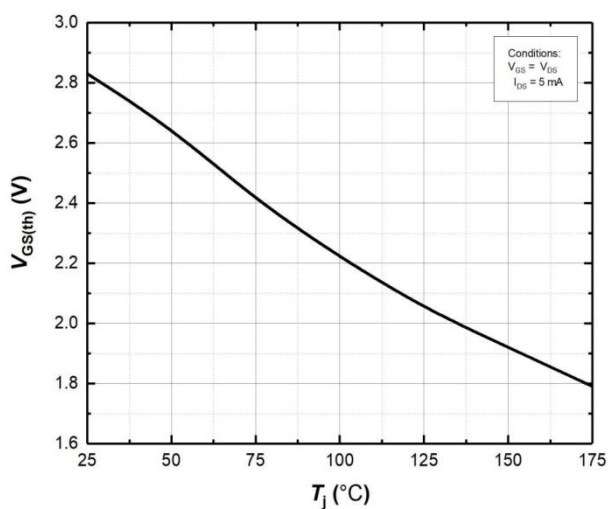


Figure 9. Threshold Voltage vs. Temperature

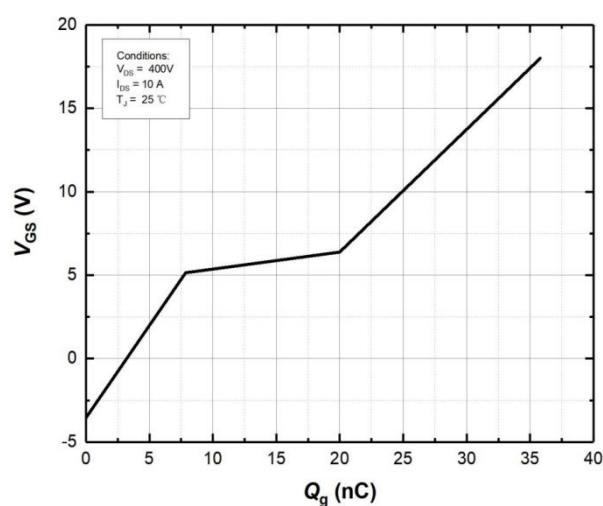


Figure 10. Gate Charge Characteristics

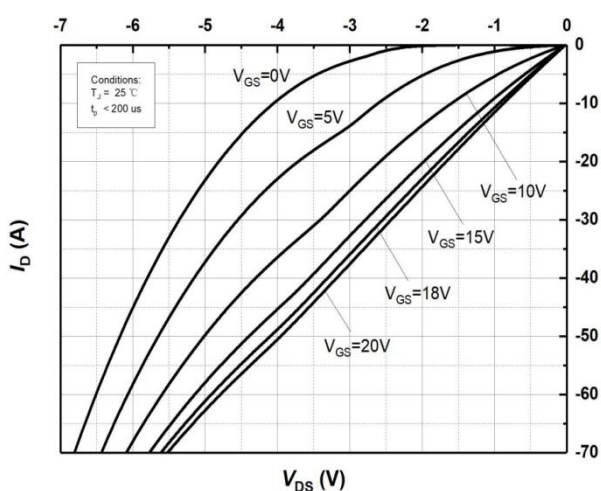


Figure 11. 3rd Quadrant Characteristic at $T_j=25^{\circ}\text{C}$

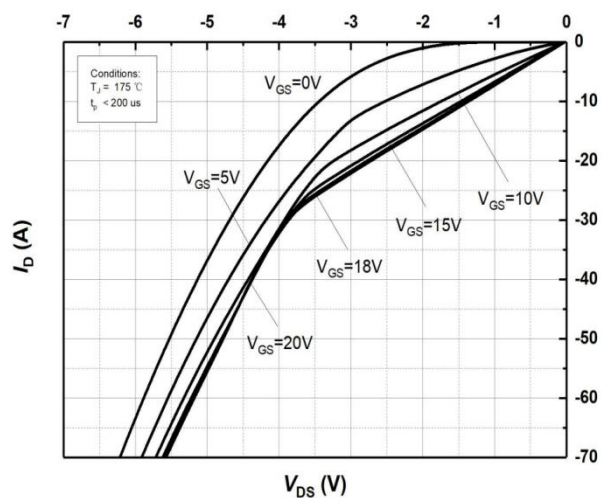


Figure 12. 3rd Quadrant Characteristic at $T_j=175^{\circ}\text{C}$

Typical Characteristics

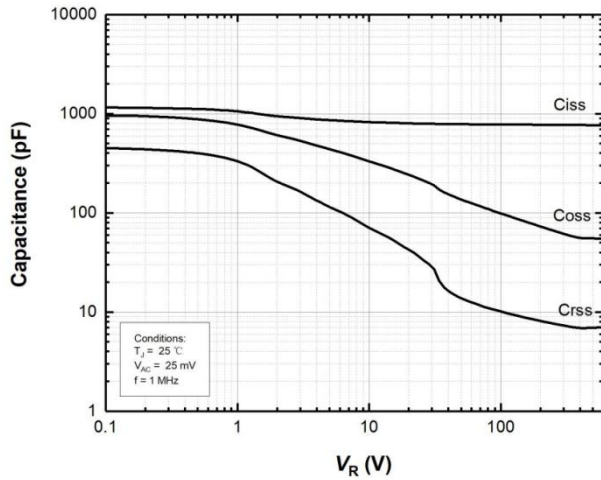


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

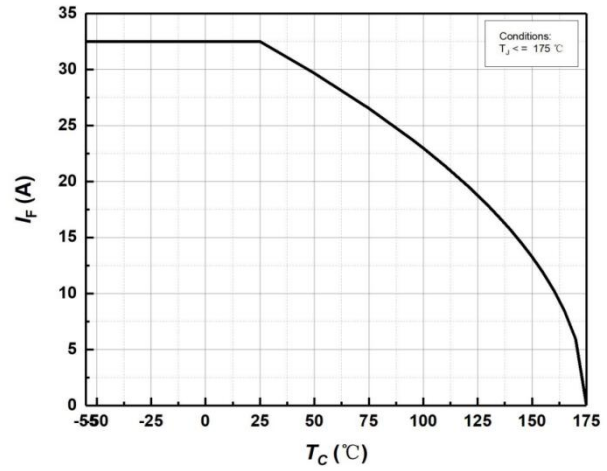


Figure 14. Continuous Drain Current Derating vs Case Temperature

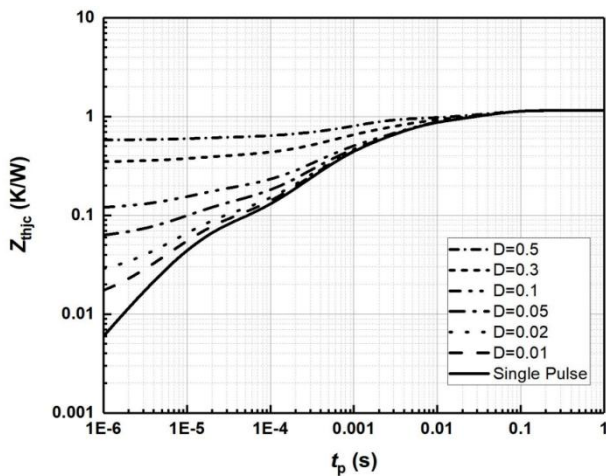


Figure 15. Transient Thermal Impedance (Junction – Case)

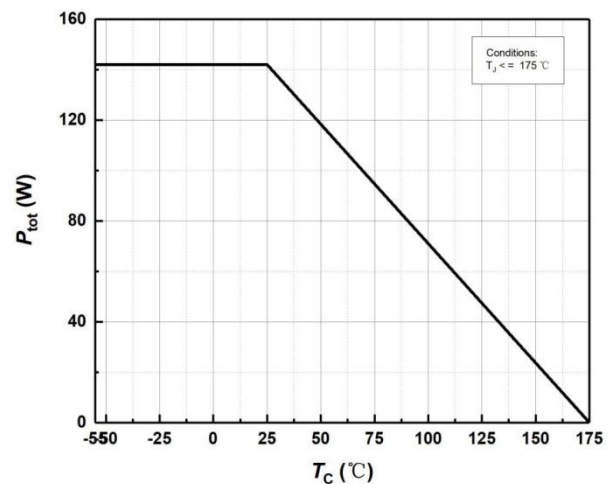


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

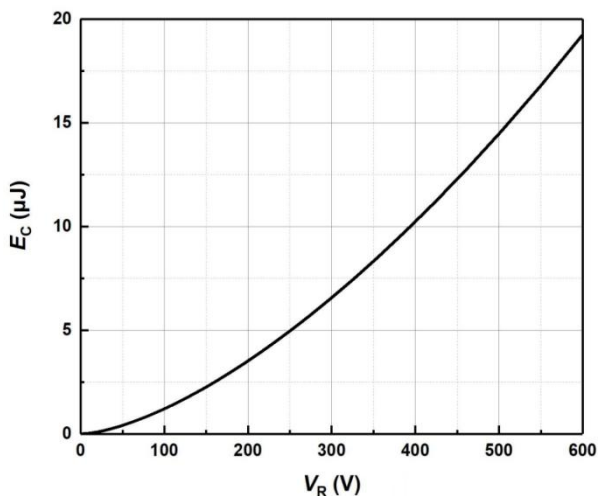


Figure 17. Output Capacitor Stored Energy

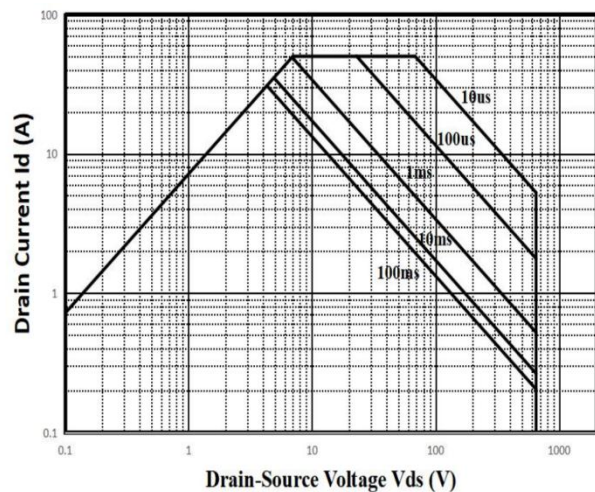


Figure 18. Safe Operating Area

Typical Characteristics

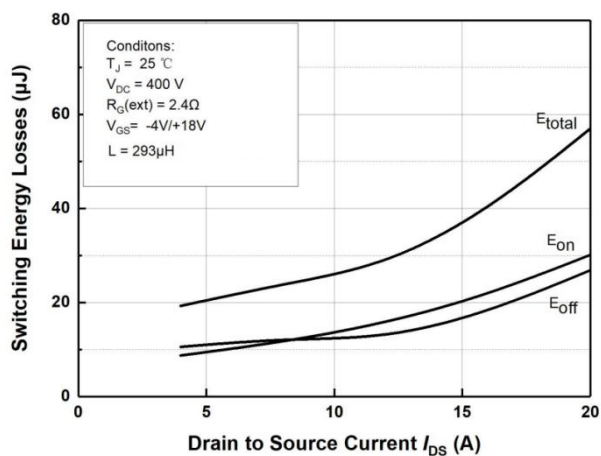


Figure 19. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 600\text{V}$)

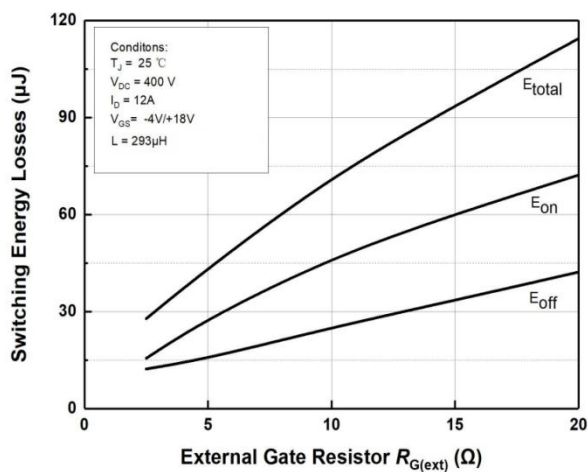


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

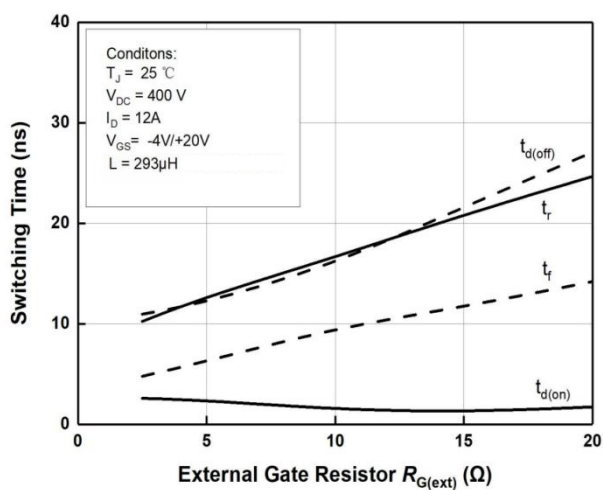
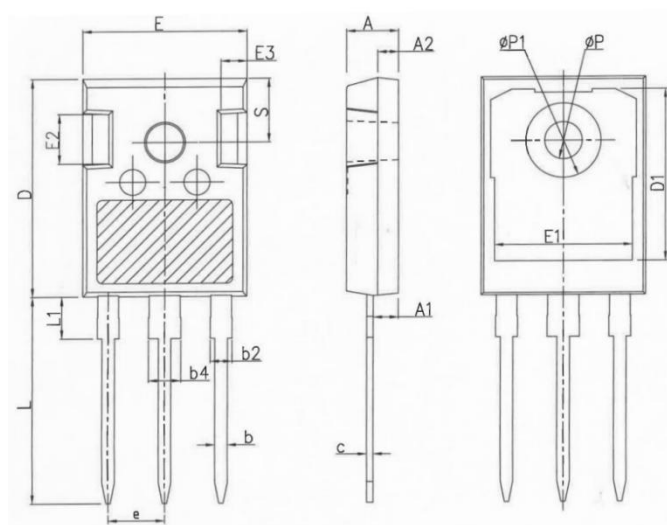


Figure 21. Switching Times vs. $R_{G(ext)}$

TO-247-3 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.200	0.189	0.205
A1	2.210	2.590	0.087	0.102
A2	1.850	2.150	0.073	0.085
b	1.110	1.360	0.044	0.054
b2	1.910	2.210	0.075	0.087
b4	2.910	3.210	0.115	0.126
c	0.510	0.750	0.020	0.030
D	20.700	21.300	0.815	0.839
D1	16.250	16.850	0.640	0.663
E	15.500	16.100	0.610	0.634
E1	13.000	13.600	0.512	0.535
E2	4.800	5.200	0.189	0.205
E3	2.300	2.700	0.091	0.106
e	5.440 BSC		0.214 BSC	
L	19.620	20.220	0.772	0.796
L1	-	4.300	-	0.169
φP	3.400	3.800	0.134	0.150
φP1	-	7.300	-	0.287
S	6.150 BSC		0.242 BSC	