

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
1200V	20mΩ@15V	132A
	16mΩ@18V	
	15mΩ@20V	

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
- Motor Drives
- High Voltage DC/DC Converters

Package

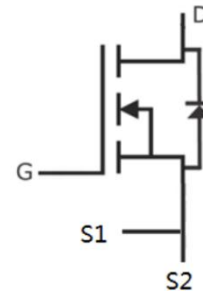


TO-247-4

Marking



Circuit diagram



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

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DS}	$V_{GS} = 0V, I_D = 100\mu A$	1200	V
Gate-Source Voltage	V_{GSmax}	AC ($f > 1 Hz$)	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Static	-4/+15 -4/+18	V
Continuous Drain Current	I_D	$V_{GS} = 15V, T_c=25^{\circ}C$	132	A
		$V_{GS} = 18V, T_c=25^{\circ}C$		
	I_D	$V_{GS} = 15V, T_c=100^{\circ}C$	84	A
		$V_{GS} = 18V, T_c=100^{\circ}C$		
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax} at 1 ms Pulse with t_p limited by T_{jmax} at 100 μs	297 708	A
Power Dissipation	P_D	$T_c=25^{\circ}C$	595	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	0.21	$^{\circ}C/W$
Junction Temperature	T_J		-55~ +150	$^{\circ}C$
Storage Temperature	T_{STG}		-55~ +150	$^{\circ}C$

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, T _j = 150°C		1	50	μA	
Gate-Source leakage current	I _{GSS}	V _{GS} = 15V, V _{DS} = 0V			250	nA	
		V _{GS} = 18V, V _{DS} = 0V			250		
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 23mA		2.9		V	
		V _{DS} = V _{GS} , I _D = 23mA, T _j = 150°C		2.0			
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 15V, I _D = 75A		20		mΩ	
		V _{GS} = 18V, I _D = 75A		16	24		
		V _{GS} = 20V, I _D = 75A		15			
		V _{GS} = 15V, I _D = 75A, T _j = 150°C		36			
		V _{GS} = 18V, I _D = 75A, T _j = 150°C		34			
		V _{GS} = 20V, I _D = 75A, T _j = 150°C		33			
Dynamic characteristics							
Input Capacitance	C _{iss}	V _{DS} = 1000V, V _{GS} = 0V, f = 100kHz V _{AC} = 25mV		5806		pF	
Output Capacitance	C _{oss}			216			
Reverse Transfer Capacitance	C _{rss}			14			
Total Gate Charge	Q _g	V _{DS} = 800V, I _D = 75A V _{GS} = -4/18V, V _{GS} = -4/15V		235		nC	
Gate-Source Charge	Q _{gs}			73.6			
Gate-Drain Charge	Q _{gd}			69.8			
Turn-on delay time	t _{d(on)}	V _{DS} = 800V, V _{GS} = -4V/18V, V _{GS} = -4/15V, I _D = 75A, R _{G(ext)} = 5Ω, L = 276μH		44.7		nS	
Turn-on rise time	t _r			15.9			
Turn-off delay time	t _{d(off)}			49.2			
Turn-off fall time	t _f			16.6			
Turn-On Energy	E _{on}				1133		μJ
Turn-Off Energy	E _{off}				585.6		
Total switching energy	E _{tot}				1718.6		
Source-Drain Diode characteristics							
Diode Forward Current	I _S		V _{GS} = -4V, T _C = 25°C		146		A
Diode Forward voltage	V _{SD}		V _{GS} = -4V, I _{SD} = 37.5A		3.9		V
		V _{GS} = -4V, I _{SD} = 37.5A, T _J = 150°C		3.3		V	
Reverse Recovery Time	t _{rr}	V _{GS} = -4V, I _{SD} = 75A, V _R = 800V di/dt = 3500 A/μs		50.3		nS	
Reverse Recovery Charge	Q _{rr}			855.2		nC	
Peak Reverse Recovery Current	I _{rrm}			29.8		A	

Typical Characteristics

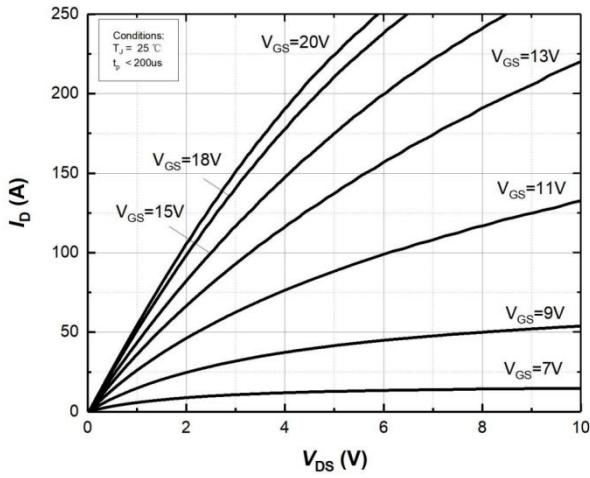


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

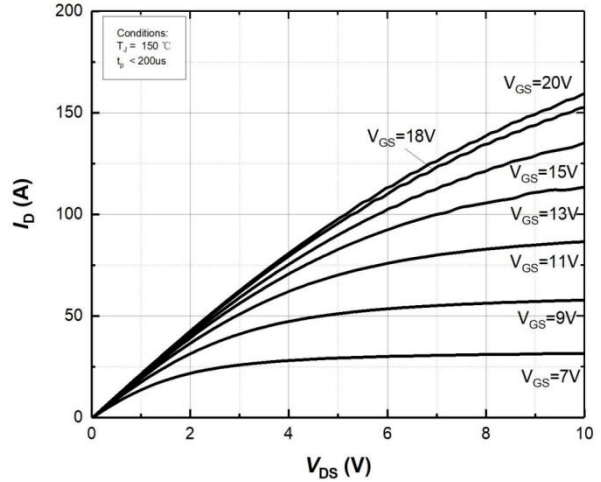


Figure 2. Output characteristics at $T_j=150^\circ\text{C}$

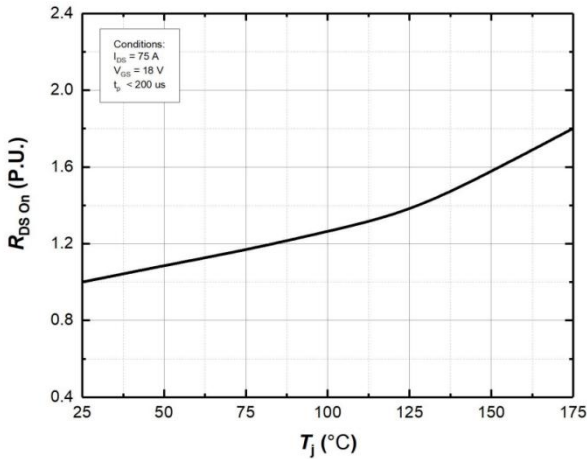


Figure 3. Normalized On-Resistance vs. Temperature

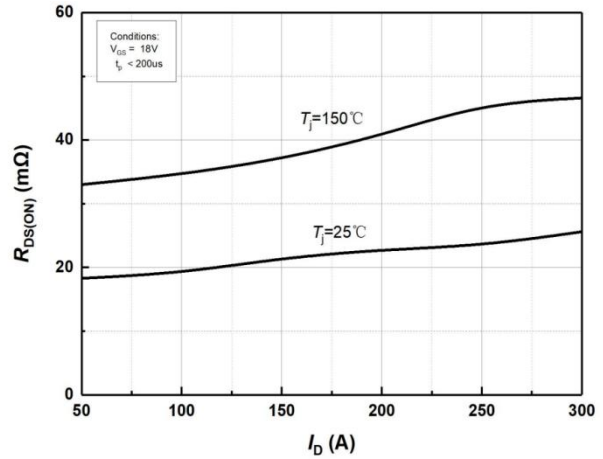


Figure 4. On-Resistance vs. Drain current for Various Temperature

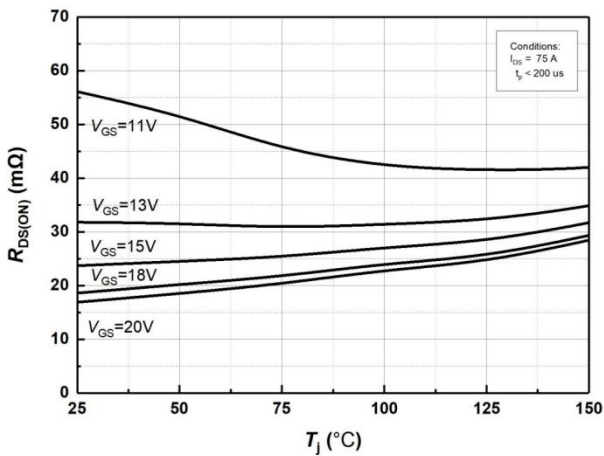


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

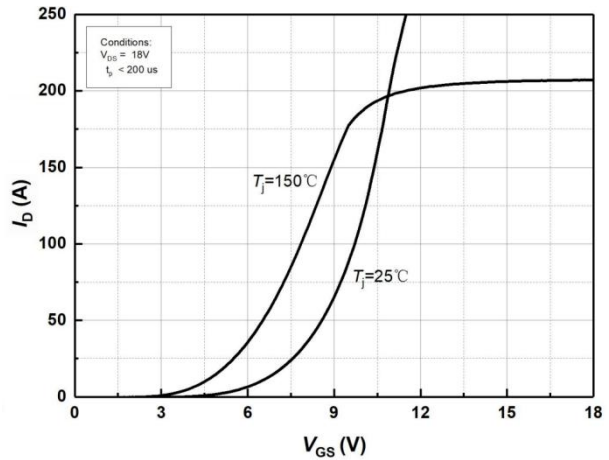


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

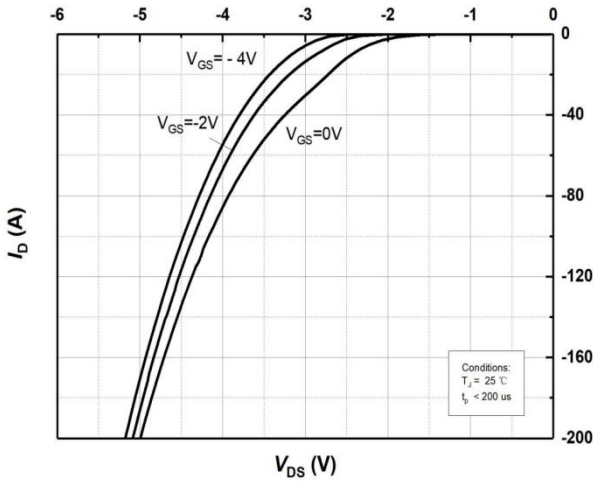


Figure 7. Body Diode Characteristics at Tj=25°C

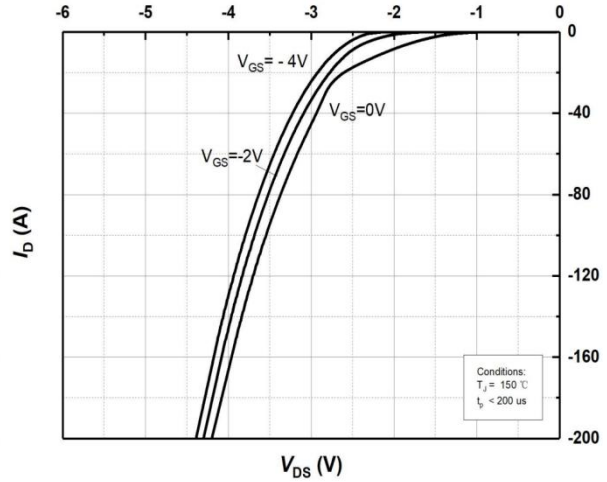


Figure 8. Body Diode Characteristics at Tj=150°C

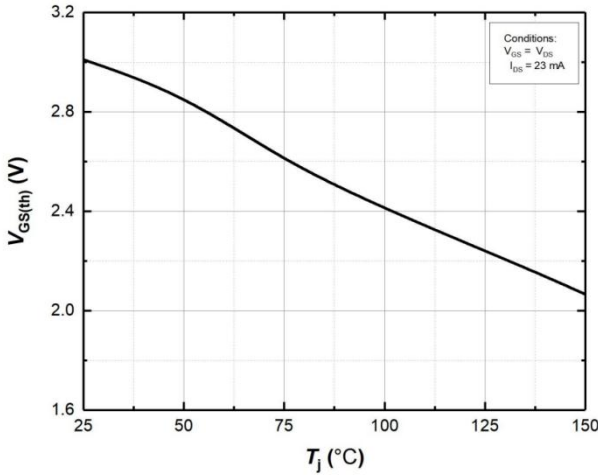


Figure 9. Threshold Voltage vs. Temperature

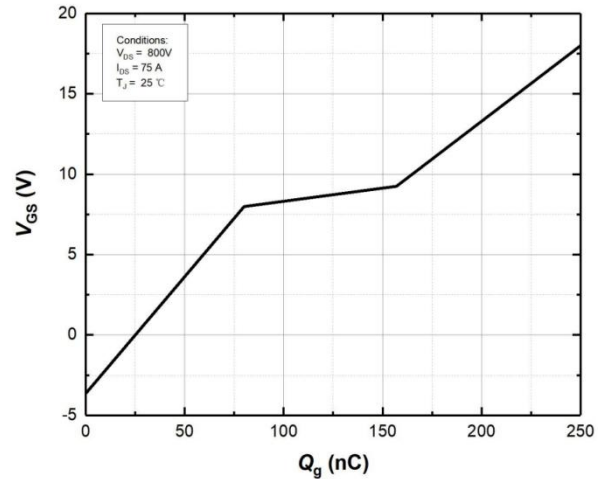


Figure 10. Gate Charge Characteristics

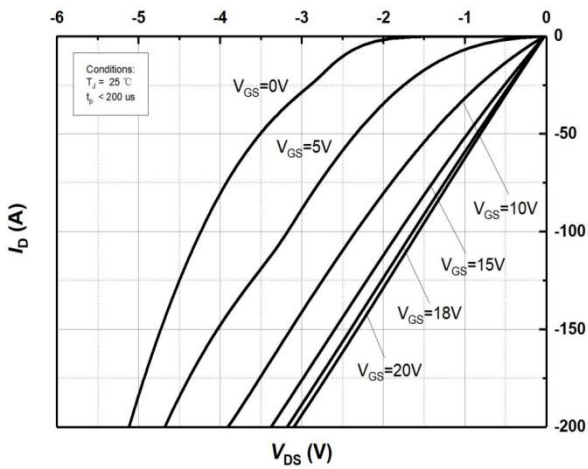


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

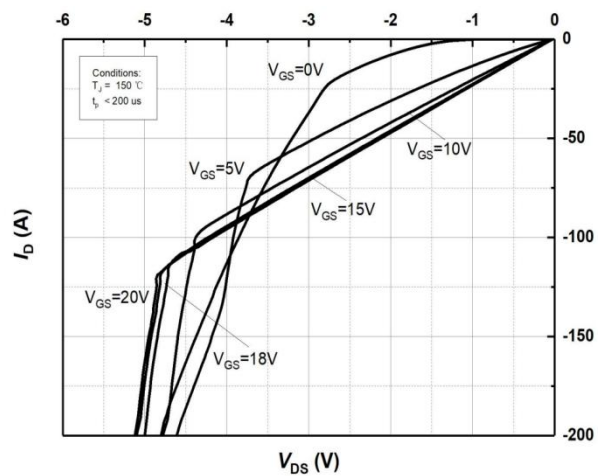


Figure 12. 3rd Quadrant Characteristic at Tj=150°C

Typical Characteristics

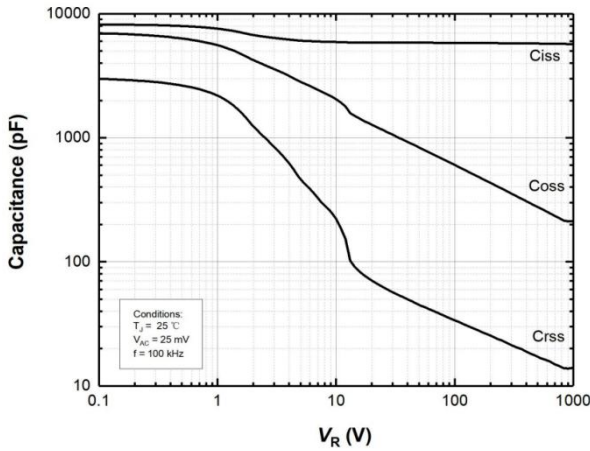


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

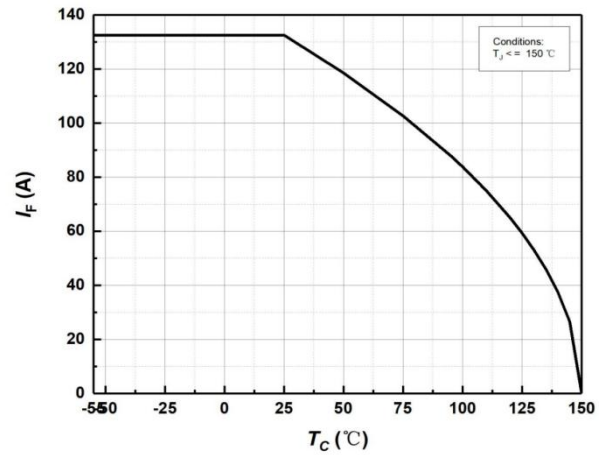


Figure 14. Continuous Drain Current Derating vs Case Temperature

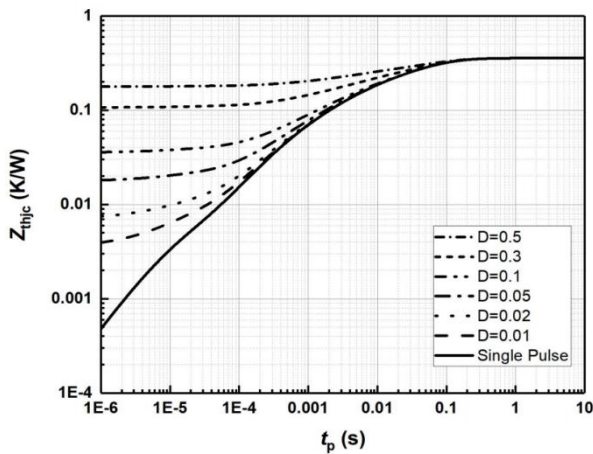


Figure 15. Transient Thermal Impedance (Junction – Case)

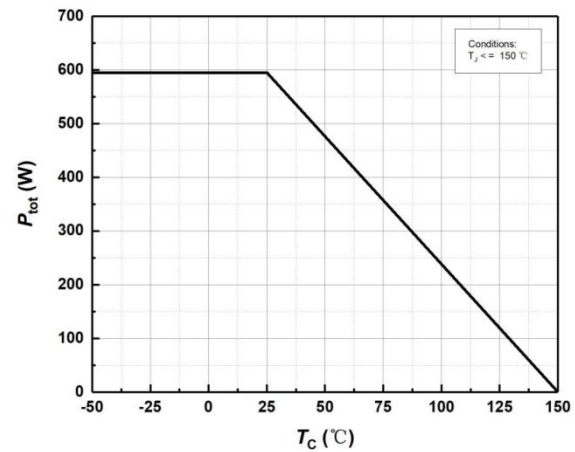


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

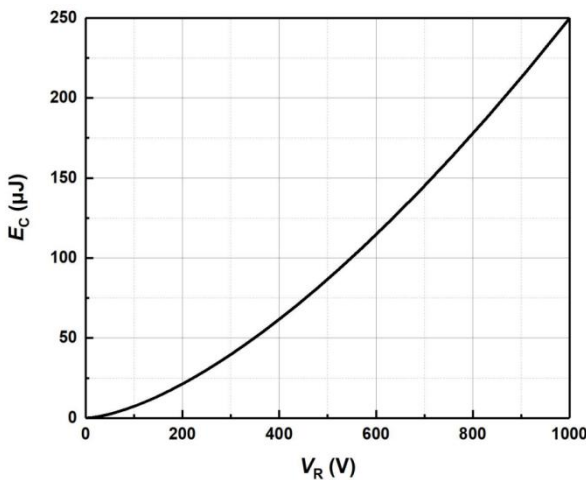


Figure 17. Output Capacitor Stored Energy

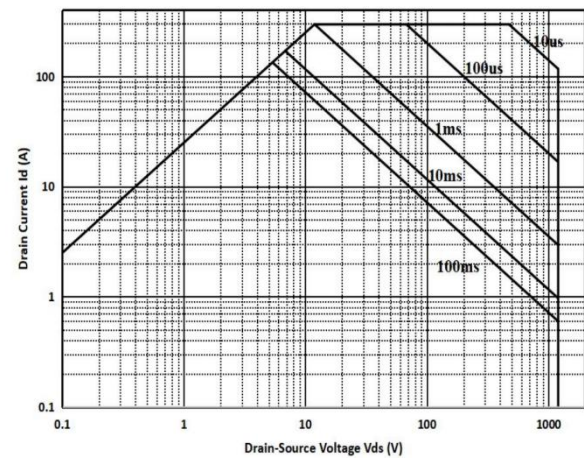


Figure 18. Safe Operating Area

Typical Characteristics

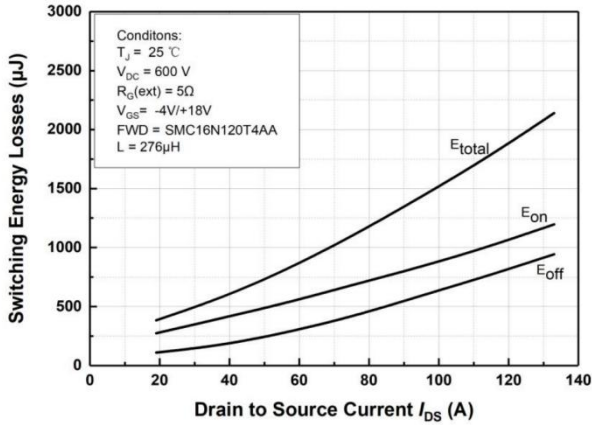


Figure 19. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 600V$)

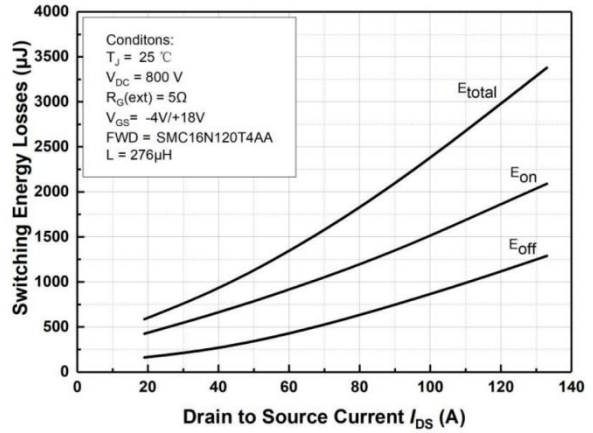


Figure 20. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 800V$)

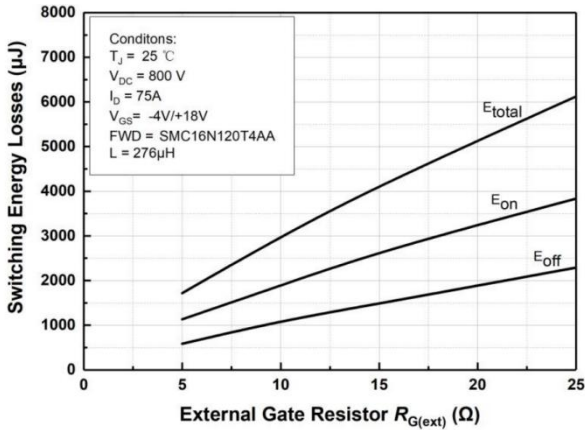


Figure 21. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

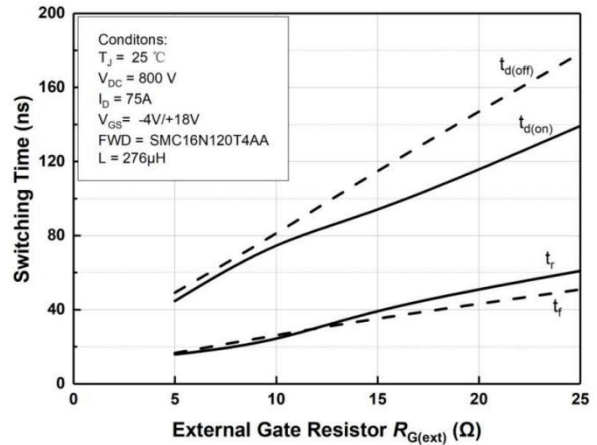
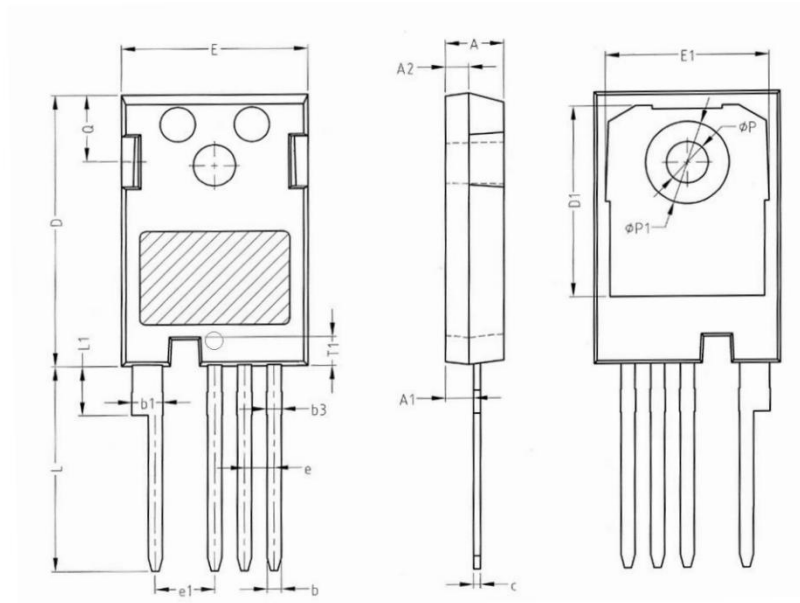


Figure 22. Switching Times vs. $R_{G(ext)}$

TO-247-4 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.210	0.189	0.205
A1	2.210	2.610	0.087	0.103
A2	1.800	2.200	0.071	0.087
b	1.060	1.360	0.042	0.054
b1	2.330	2.940	0.092	0.116
b3	1.070	1.600	0.042	0.063
c	0.510	0.750	0.020	0.030
D	23.300	23.600	0.917	0.929
D1	16.250	17.650	0.640	0.695
E	15.740	16.140	0.620	0.635
E1	13.100	14.320	0.516	0.564
T1	2.350	2.650	0.093	0.104
e	2.540 BSC		0.100 BSC	
e1	5.080 BSC		0.200 BSC	
Q	5.490	6.090	0.216	0.240
L	17.270	17.870	0.680	0.704
L1	3.970	4.390	0.156	0.173
φP	3.400	3.800	0.134	0.150
φP1	7.190 REF		0.283 REF	