

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
2200V	80mΩ@18V	48A

Feature

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

Application

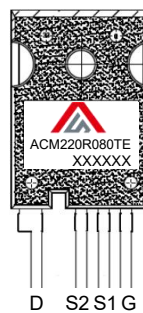
- Switch mode power supplies
- Renewable Energy
- UPS
- High voltage DC/DC Converters

Package

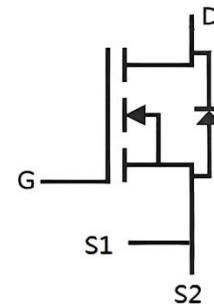


TO-247-4L

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}	$V_{GS}=0V, I_D=100\mu A$	2200	V
Gate-Source Voltage	V_{GSmax}	AC ($f > 1\text{ Hz}$)	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Static	-4/+18	V
Continuous Drain Current	I_D	$V_{GS}=18V$	48	A
	I_D	$V_{GS}=18V, T_c=100^{\circ}C$	34	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax}	77	A
Power Dissipation	P_D	$T_J=175^{\circ}C$	341	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction to Case	0.44	$^{\circ}C/W$
Thermal Resistance (Typ)	$R_{\theta JA}$	Junction to Ambient	40	$^{\circ}C/W$
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	650			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =2200V, 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 =5mA		3.2		V
		V _{DS} =V _{GS} , I _D =5mA, T _J =175°C		2.3		
Drain-source on-resistance	R _{DS(on)}	V _{GS} =18V, I _D =20A		80		mΩ
		V _{GS} =18V, I _D =20A, T _J =175°C		160		
Transconductance	g _{fs}	V _{GS} =18V, I _D =20A		9		S
		V _{GS} =18V, I _D =20A, T _J =175°C		8		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =1000V, V _{GS} =0V V _{AC} =25mV, f =100kHz		2369		pF
Output Capacitance	C _{oss}			76		
Reverse Transfer Capacitance	C _{rss}			6.7		
Total Gate Charge	Q _g	V _{DS} =1200V, V _{GS} =-4V/18V I _D =20A		81		nC
Gate-Source Charge	Q _{gs}			24		
Gate-Drain Charge	Q _{gd}			35.5		
Internal Gate Resistance	R _{G(int)}	V _{AC} =25mV, f =1MHz		1.3		Ω
Turn-on delay time	t _{d(on)}	V _{DS} =1000V, V _{GS} =-4/+18V I _D =20A, R _{G(ext)} =5Ω, L =294μH		5		nS
Turn-on rise time	t _r			14		
Turn-off delay time	t _{d(off)}			23		
Turn-off fall time	t _f			10		
Turn-On Energy	E _{on}			232		μJ
Turn-Off Energy	E _{off}			83		
Total switching energy	E _{tot}			315		
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} =-4V, T _C =25°C		65		A
Diode Forward voltage	V _{SD}	V _{GS} =-4V, I _{SD} =10A		3.8		V
		V _{GS} =-4V, I _{SD} =10A, T _J =175°C		3.3		V
Reverse Recovery Time	T _{rr}	V _{GS} =-4V, V _R =1000V, I _{SD} =20A dif/dt =1200 A/μs		67		nS
Reverse Recovery Charge	Q _{rr}			242		nC
Peak Reverse Recovery Current	I _{rrm}			9		A

Typical Characteristics

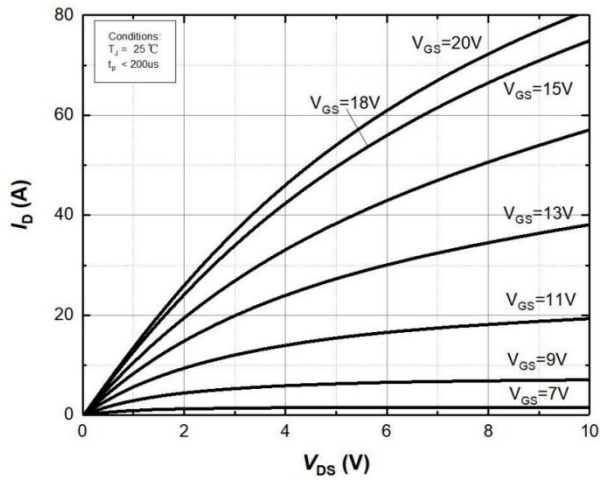


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

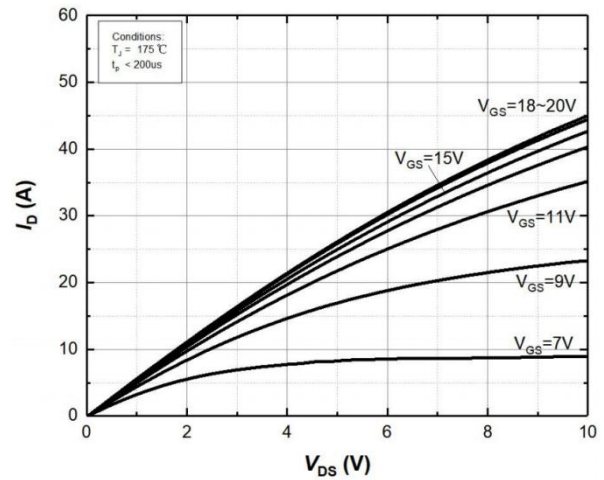


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

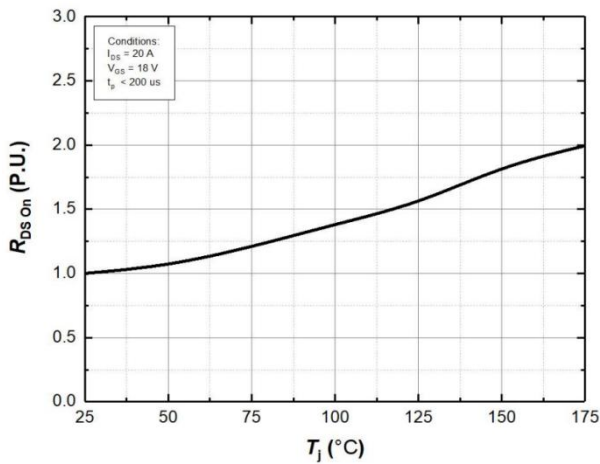


Figure 3. Normalized On-Resistance vs. Temperature

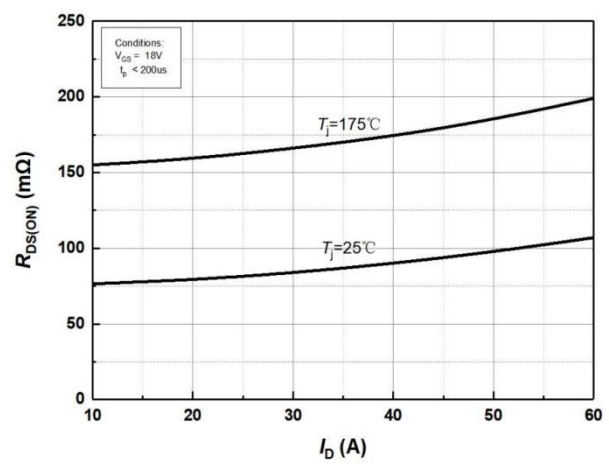


Figure 4. On-Resistance vs. Drain current for Various Temperature

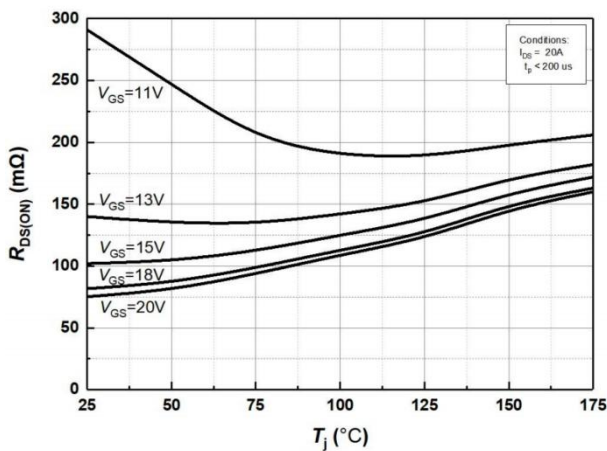


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

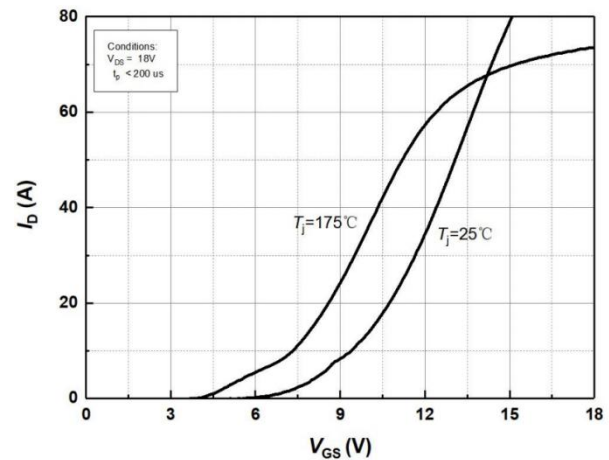


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

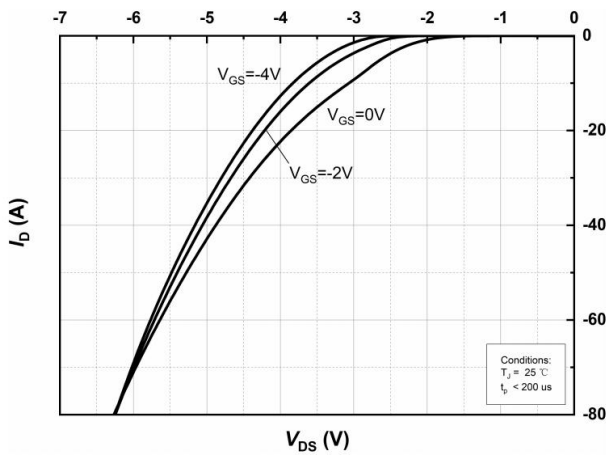


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}\text{C}$

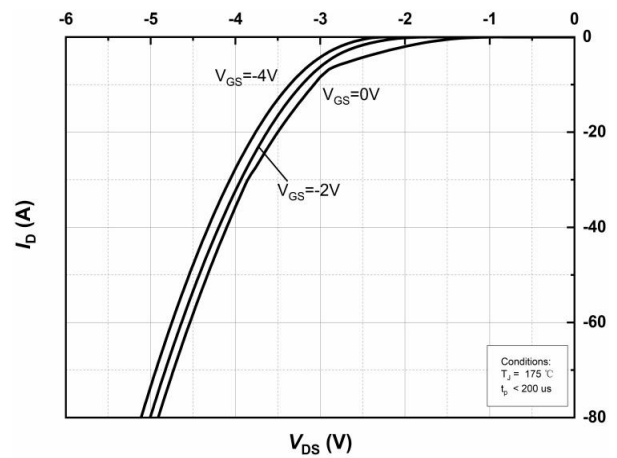


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}\text{C}$

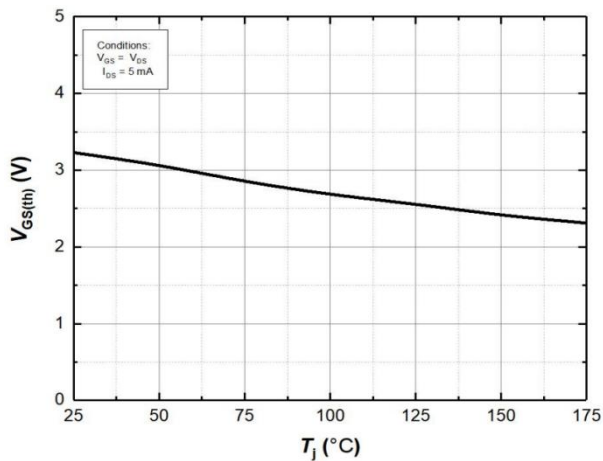


Figure 9. Threshold Voltage vs. Temperature

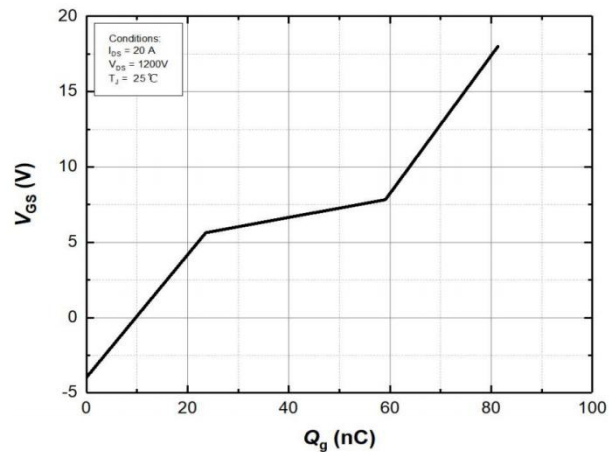


Figure 10 Gate Charge Characteristics

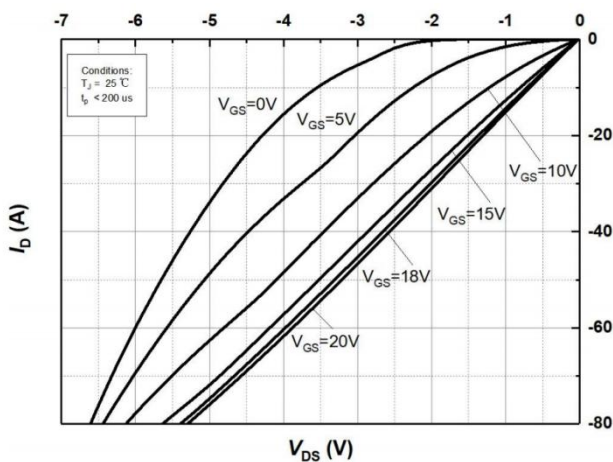


Figure 11. 3rd Quadrant Characteristic at $T_j=25^{\circ}\text{C}$

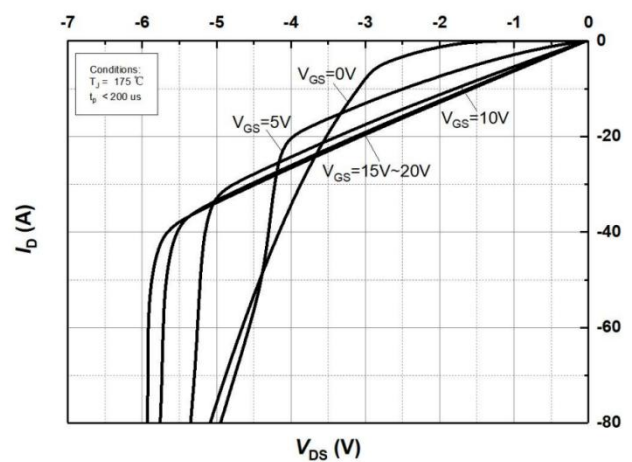


Figure 12. 3rd Quadrant Characteristic at $T_j=175^{\circ}\text{C}$

Typical Characteristics

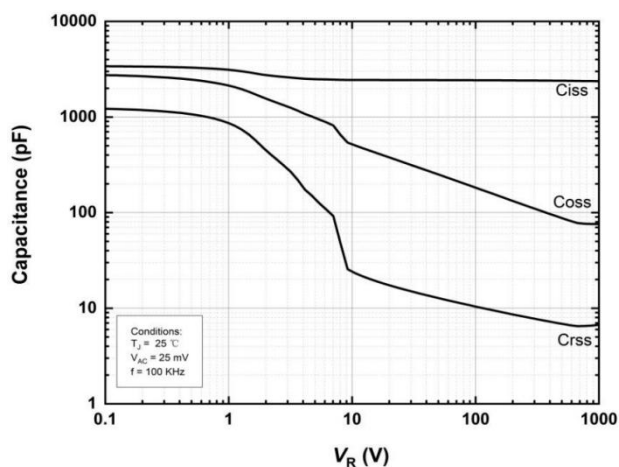


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

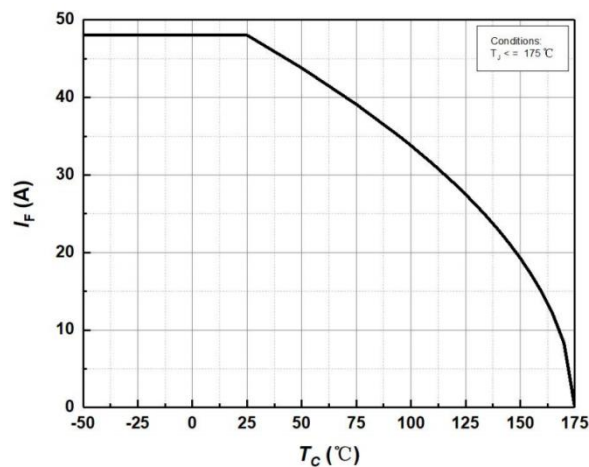


Figure 14. Continuous Drain Current Derating vs Case Temperature

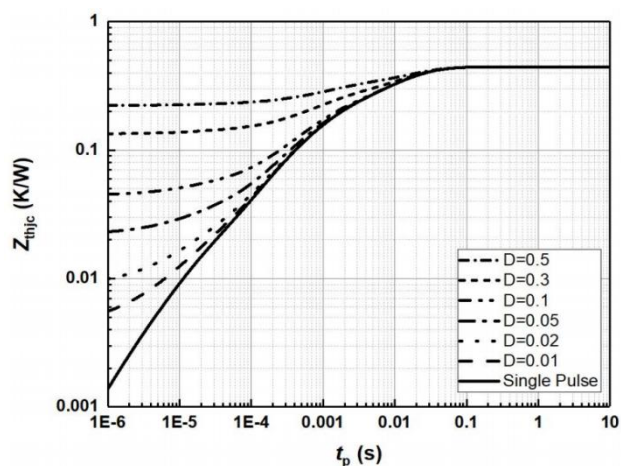


Figure 15. Transient Thermal Impedance (Junction – Case)

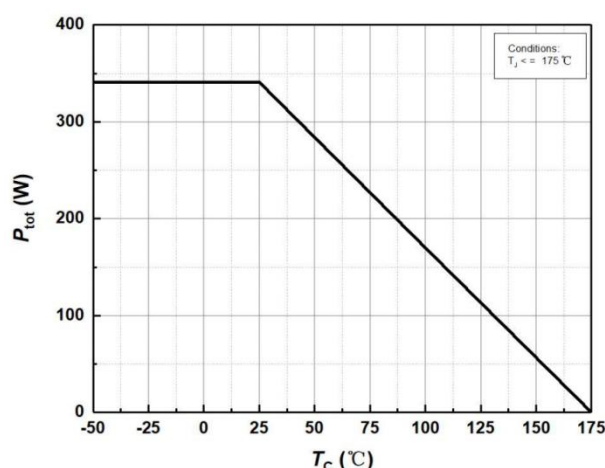


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

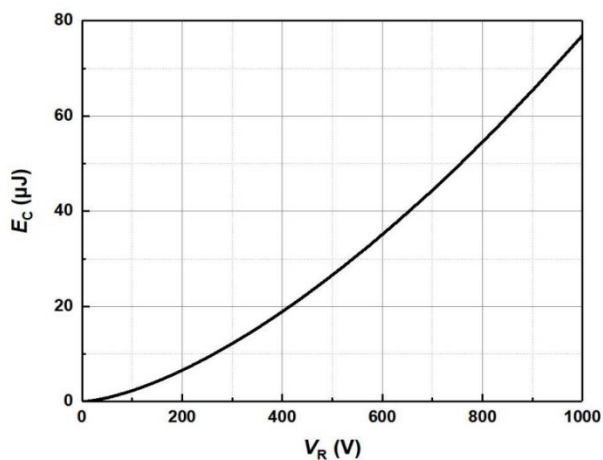


Figure 17. Output Capacitor Stored Energy

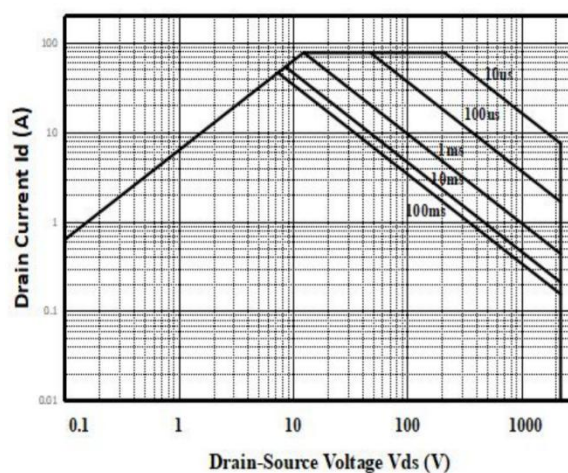


Figure 18. Safe Operating Area

Typical Characteristics

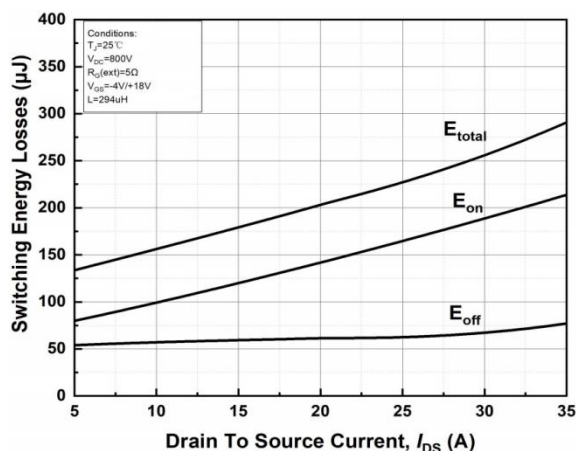


Figure 19. Clamped Inductive Switching Energy vs. Drain Current ($V_{DS} = 800\text{V}$)

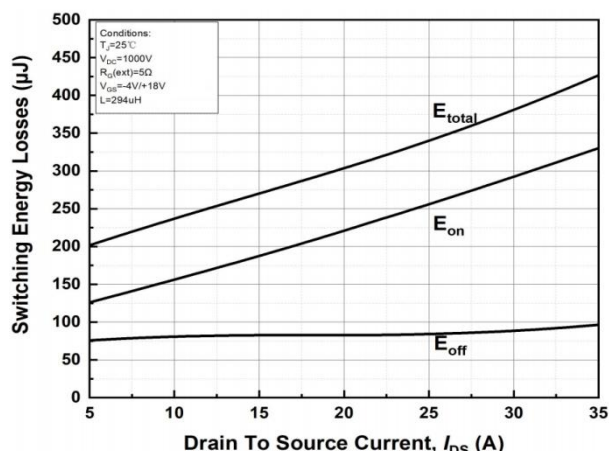


Figure 20. Clamped Inductive Switching Energy vs. Drain Current ($V_{DS} = 1000\text{V}$)

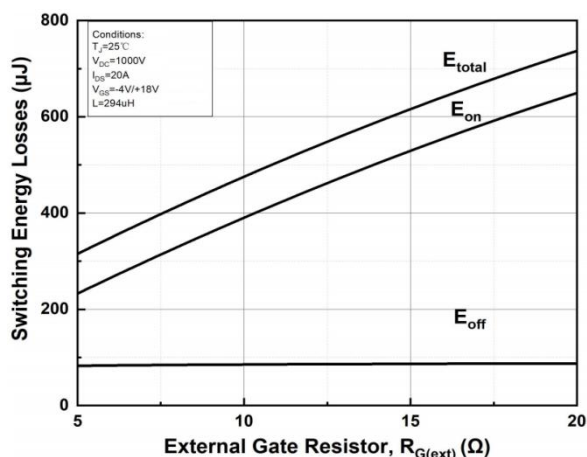


Figure 21. Clamped Inductive Switching Energy vs. $R_{G(\text{ext})}$

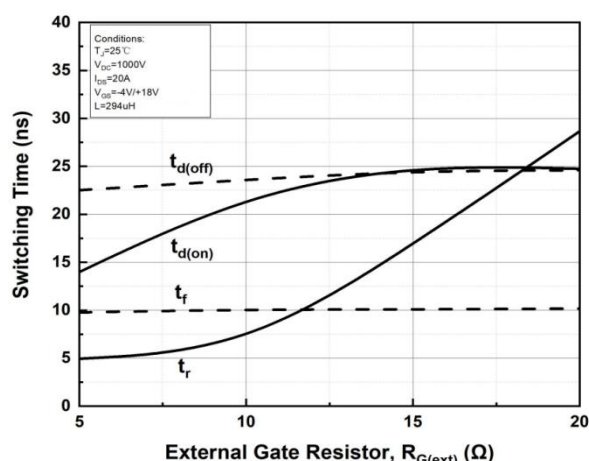
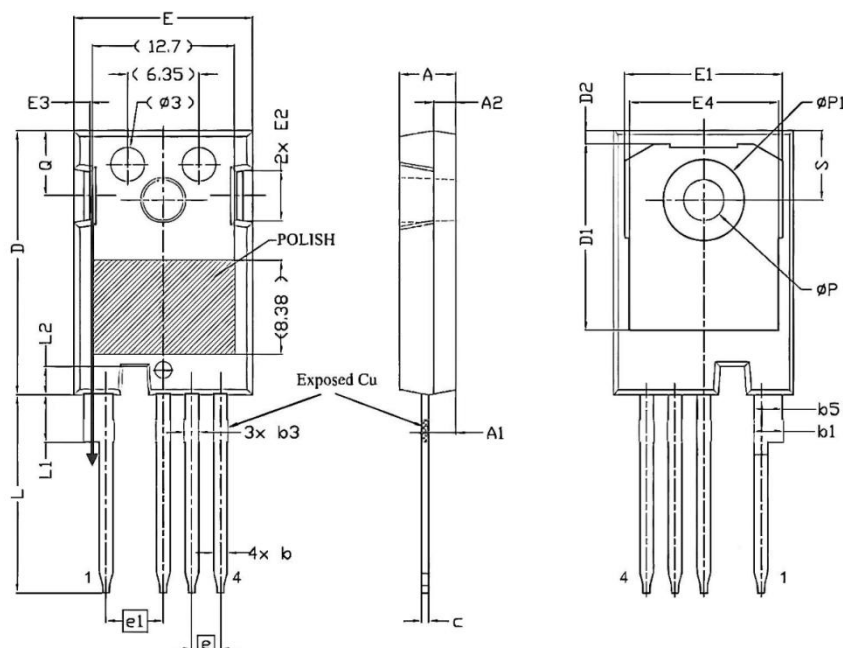


Figure 22. Switching Times vs. $R_{G(\text{ext})}$

TO-247-4L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.800	5.210	0.189	0.205
A1	2.290	2.540	0.090	0.100
A2	1.910	2.160	0.075	0.085
b	1.070	1.330	0.042	0.052
b1	2.390	2.940	0.094	0.116
b3	1.070	1.600	0.042	0.063
b5	2.390	2.690	0.094	0.106
c	0.550	0.680	0.022	0.027
D	23.30	23.600	0.917	0.929
D1	16.250	17.650	0.640	0.695
D2	0.950	1.250	0.037	0.049
E	15.750	16.130	0.620	0.635
E1	13.100	14.150	0.516	0.557
E2	3.680	5.100	0.145	0.201
E3	1.000	1.900	0.039	0.075
E4	12.380	13.430	0.487	0.529
e	2.540 BSC		0.100 BSC	
e1	5.080 BSC		0.200 BSC	
L	17.310	17.820	0.681	0.702
L1	3.970	4.370	0.156	0.172
L2	2.350	2.650	0.093	0.104
ΦP	3.510	3.650	0.138	0.144
ΦP1	7.190 REF		0.283 REF	
Q	5.490	6.000	0.216	0.236
S	6.040	6.300	0.238	0.248