

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D@T_C=25^{\circ}C$
650V	56mΩ@18V	70A

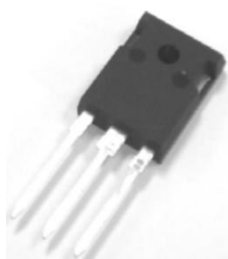
Feature

- 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

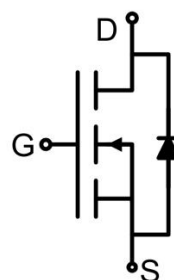


TO-247AB

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}	$V_{GS}=0V, I_D=100\mu A$	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	$V_{GS}=18V, T_C=25^{\circ}C$	70	A
		$V_{GS}=18V, T_C=100^{\circ}C$	49	
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax}	121	A
Power Dissipation	P_D	$T_J=175^{\circ}C$	214	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	0.7	$^{\circ}C/W$
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			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 =12mA		2.7		V
		V _{DS} =V _{GS} , I _D =12mA, T _J =175℃		1.9		
Drain-source on-resistance	R _{DS(on)}	V _{GS} =15V, I _D =20A		44		mΩ
		V _{GS} =18V, I _D =20A		36	56	
		V _{GS} =15V, I _D =20A, T _J =175℃		52		
		V _{GS} =18V, I _D =20A, T _J =175℃		47		
Transconductance	g _{fs}	V _{GS} =18V, I _D =20A		15		S
		V _{GS} =18V, I _D =20A, T _J =175℃		14		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =600V, V _{GS} =0V, f =1 MHz V _{AC} = 25mV		1525		pF
Output Capacitance	C _{oss}			115		
Reverse Transfer Capacitance	C _{rss}			3.3		
Internal Gate Resistance	R _{G(int)}	f=1 MHz, V _{AC} = 25mV		1.4		Ω
Total Gate Charge	Q _g	V _{DS} =400V, I _D =20A V _{GS} =-4/18V		80		nC
Gate-Source Charge	Q _{gs}			19		
Gate-Drain Charge	Q _{gd}			21		
Turn-on delay time	t _{d(on)}	V _{DD} =400V, V _{GS} =-4V/18V, I _D =20A, R _{G(ext)} =5Ω, L=200μH		3		nS
Turn-on rise time	t _r			22		
Turn-off delay time	t _{d(off)}			19		
Turn-off fall time	t _f			5		
Turn-on Switching Energy	E _{on}			108		μJ
Turn-off Switching Energy	E _{off}			22		
Total switching energy	E _{tot}			130		
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} =-4V, T _C =25℃		44		A
Diode Pulse Current	I _{S, pulse}	V _{GS} =-4V, pulse width t _p limited by T _{Jmax}		121		
Diode Forward voltage	V _{SD}	V _{GS} =-4V, I _{SD} =10A		4.0		V
		V _{GS} =-4V, I _{SD} =10A, T _J =175℃		3.5		
Reverse Recovery Time	t _{rr}	V _{GS} =-4V, I _{SD} =20A, V _R =400V dif/dt=2400 A/μs		18		nS
Reverse Recovery Charge	Q _{rr}			95		nC
Peak Reverse Recovery Current	I _{rrm}			10		A

Typical Characteristics

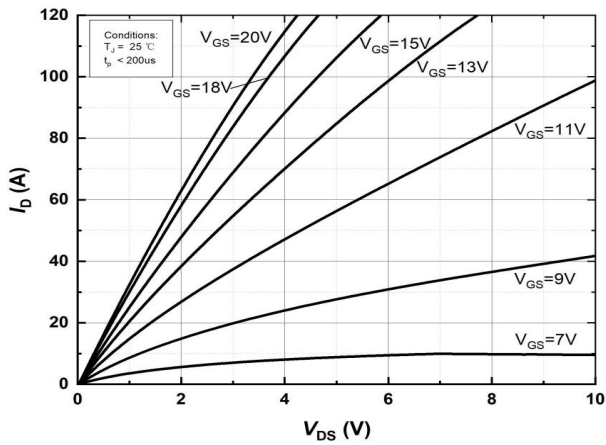


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

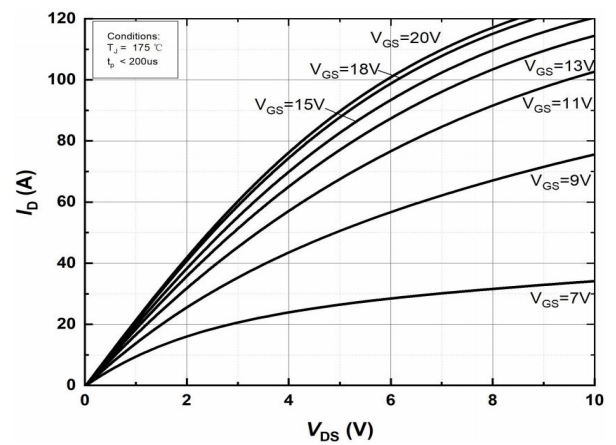


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

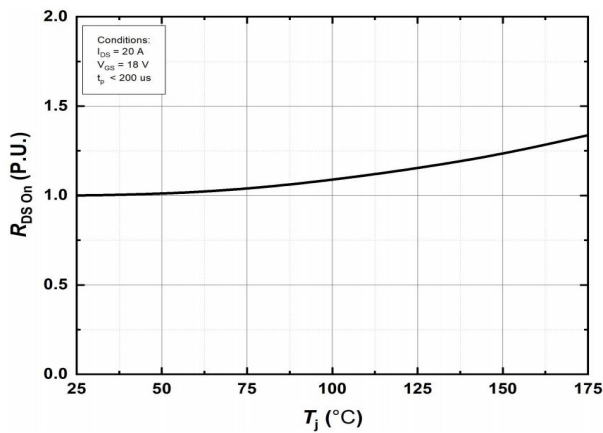


Figure 3. Normalized On-Resistance vs. Temperature

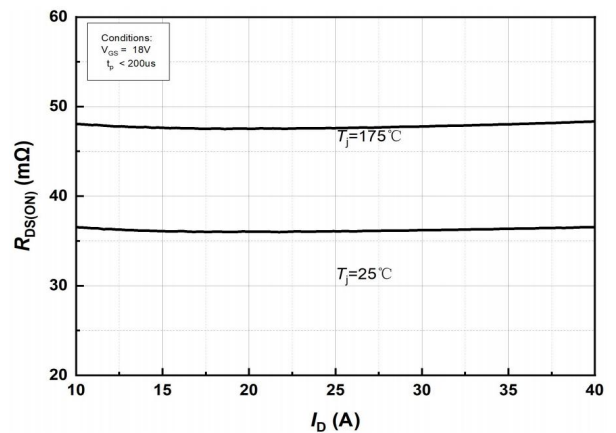


Figure 4. On-Resistance vs. Drain current for Various Temperature

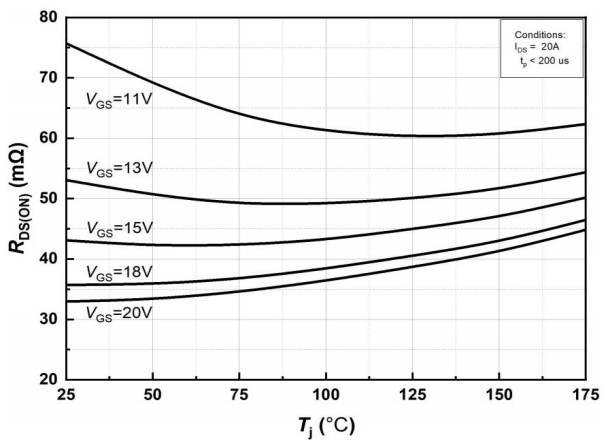


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

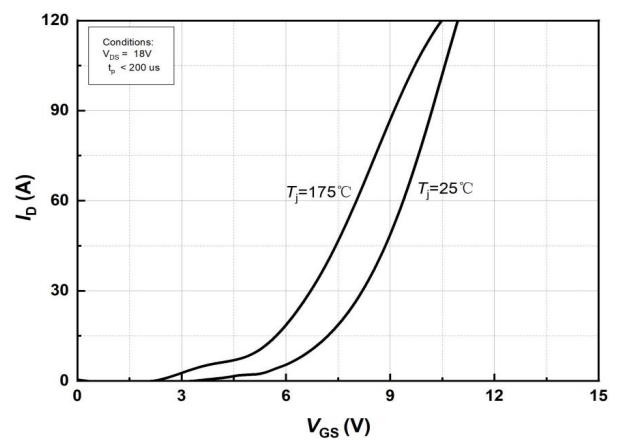


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

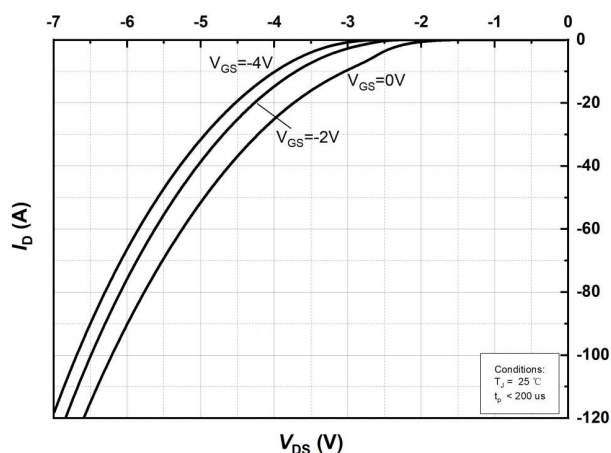


Figure 7. Body Diode Characteristics at $T_j=25^{\circ}\text{C}$

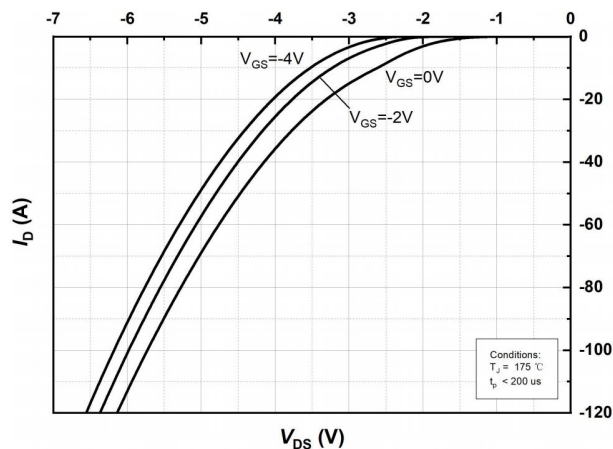


Figure 8. Body Diode Characteristics at $T_j=175^{\circ}\text{C}$

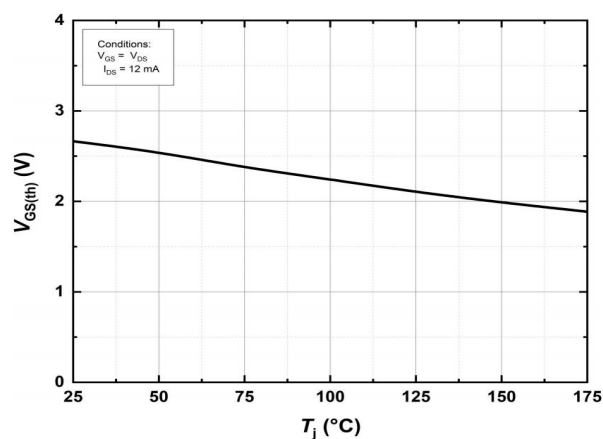


Figure 9. Threshold Voltage vs. Temperature

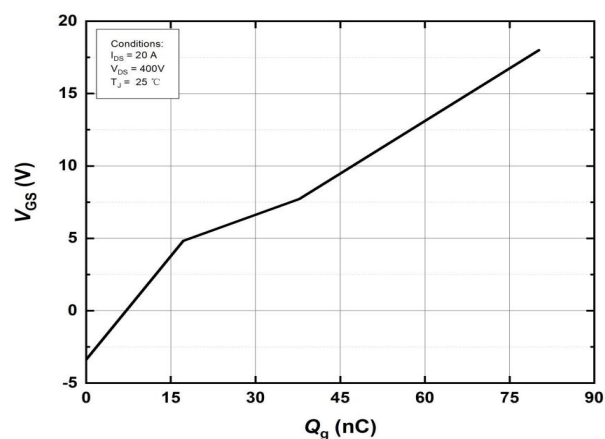


Figure 10 Gate Charge Characteristics

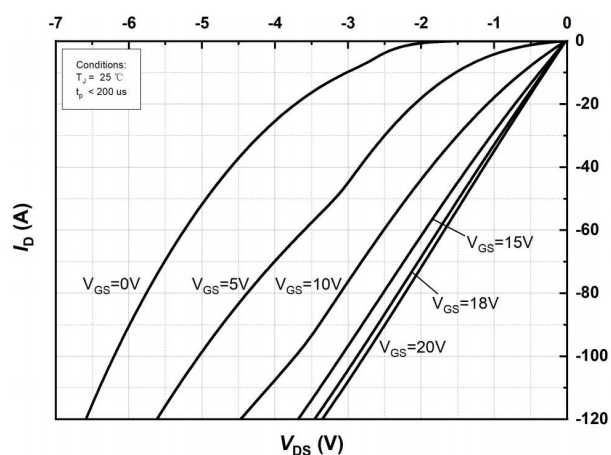


Figure 11. 3rd Quadrant Characteristic at $T_i=25^{\circ}\text{C}$

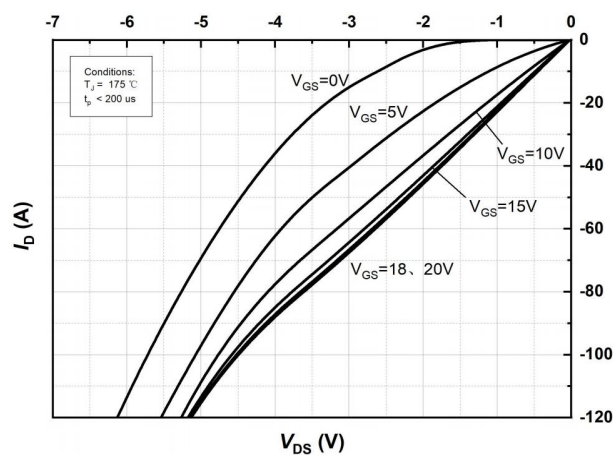


Figure 12. 3rd Quadrant Characteristic at $T_j=175^{\circ}\text{C}$

Typical Characteristics

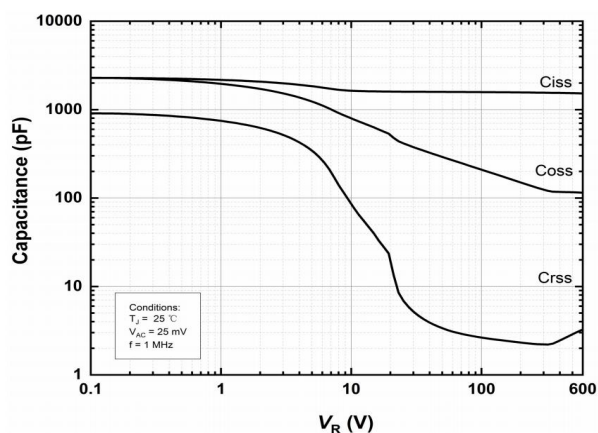


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

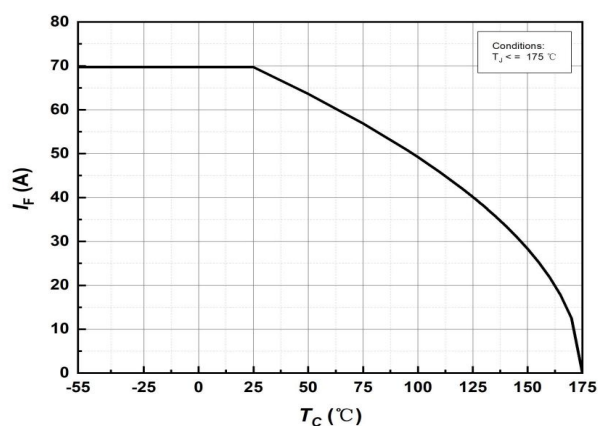


Figure 14. Continuous Drain Current Derating vs Case Temperature

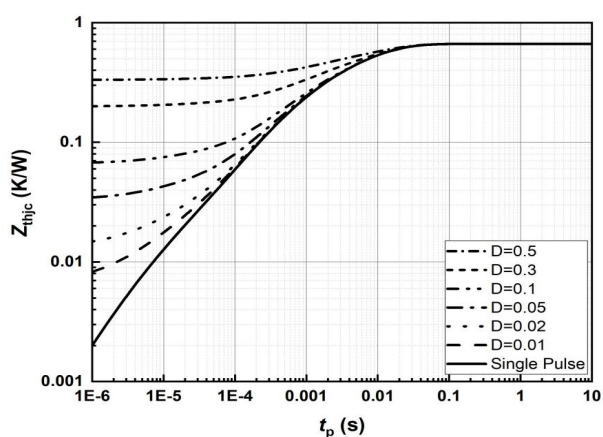


Figure 15. Transient Thermal Impedance (Junction – Case)

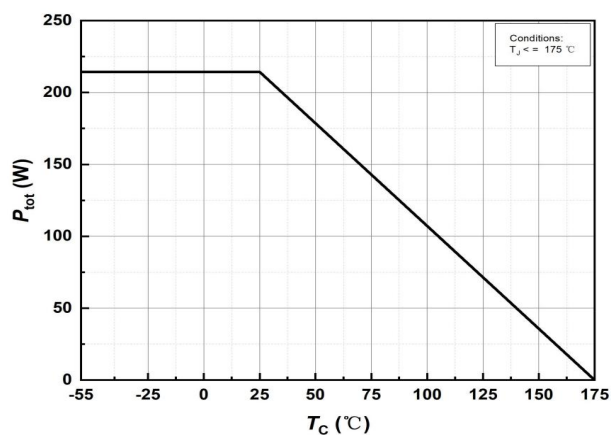


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

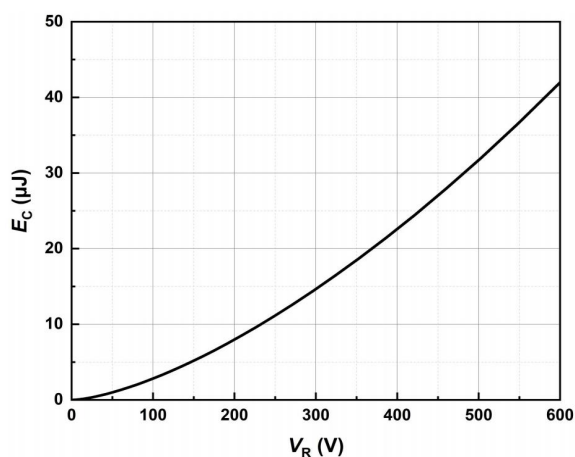


Figure 17. Output Capacitor Stored Energy

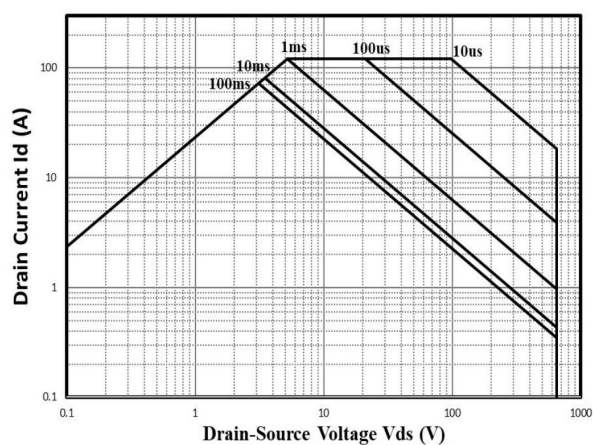


Figure 18. Safe Operating Area

Typical Characteristics

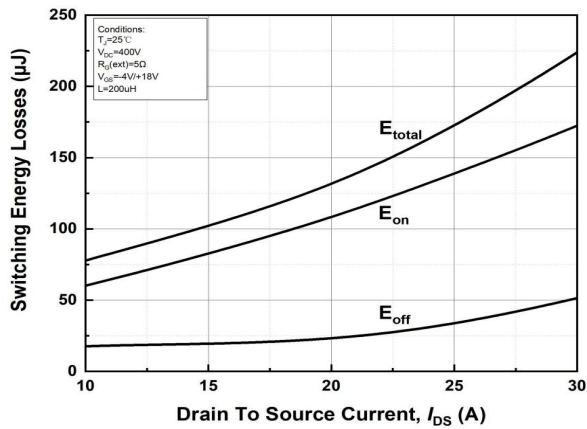


Figure 19. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 400\text{V}$)

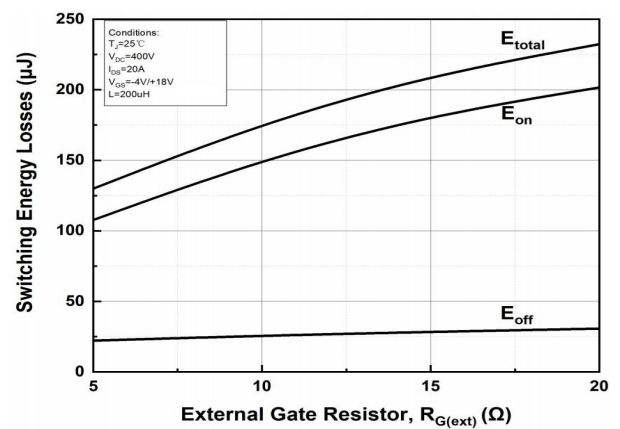


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

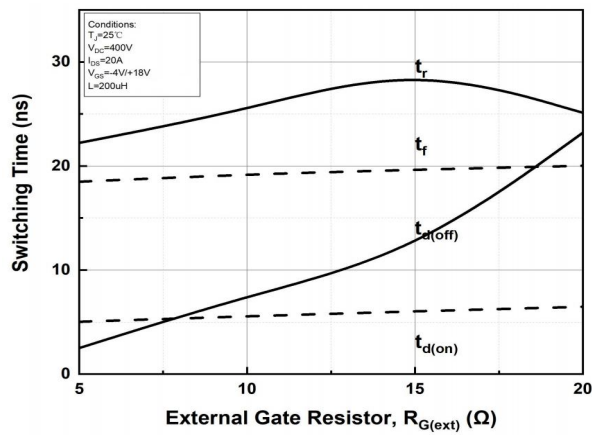
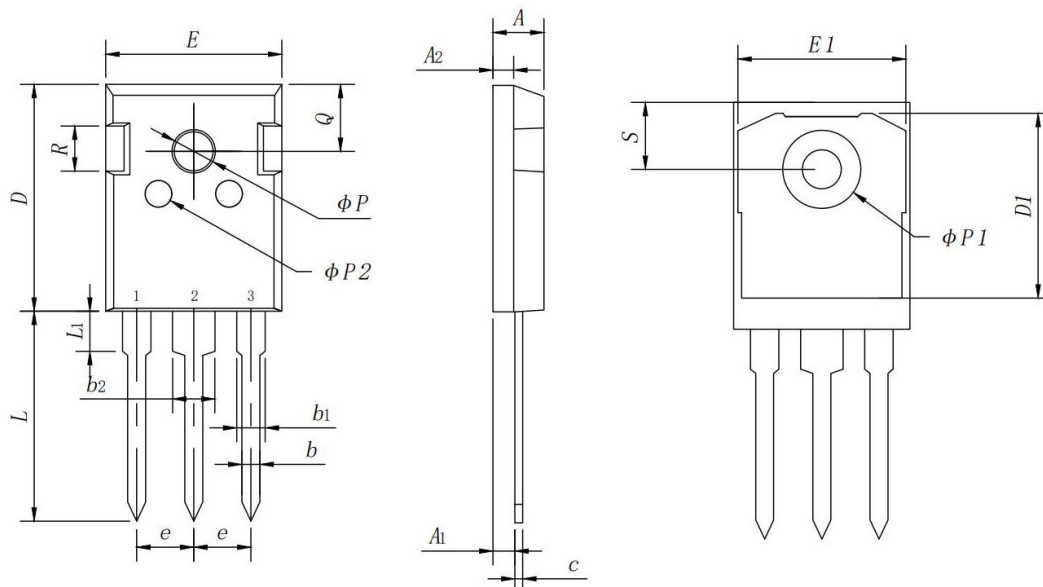


Figure 21. Switching Times vs. $R_{G(ext)}$

TO-247AB Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.700	5.300	0.185	0.209
A1	2.240	2.580	0.088	0.102
A2	1.800	2.200	0.071	0.087
b	1.000	1.400	0.039	0.055
b1	1.600	2.600	0.063	0.102
b2	2.600	3.600	0.102	0.142
c	0.400	0.800	0.016	0.031
D	20.000	22.000	0.787	0.866
D1	15.240	17.240	0.600	0.679
E	15.500	16.010	0.610	0.630
E1	13.770	14.270	0.542	0.562
e	5.200	5.720	0.205	0.225
L	19.700	20.200	0.776	0.795
L1	3.850	4.450	0.152	0.175
ϕP	3.550	3.650	0.140	0.144
ϕp1	7.140	7.240	0.281	0.285
ϕp1	2.350	2.450	0.093	0.096
Q	5.890	6.400	0.232	0.252
R	4.300	4.900	0.169	0.193
S	6.040	6.300	0.238	0.248