ASZM025065P

N-Channel Silicon Carbide Power MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP.}$	I_D@25℃
650V	26mΩ@18V	105A

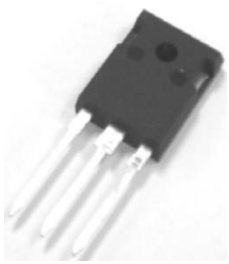
Feature

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

Application

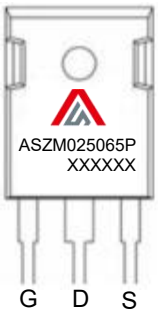
- Switch mode power supplies
- Renewable energy
- Motor drives
- High voltage DC/DC converters

Package

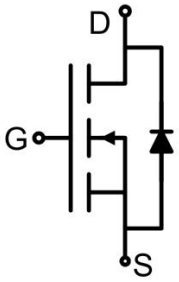


TO-247-3

Marking



Circuit diagram



Absolute maximum ratings (T_C=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Value	Unit
Drain-Source Voltage	V_{DSmax}	V_{GS} = 0V, I_D =100μA	650	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,T_C=25℃	105	A
	I_D	V_{GS} =18V,T_C=100℃	74	A
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	188 340	A
Power Dissipation	P_D	T_C=25℃	341	W
Thermal Resistance(Typ.)	$R_{\theta JC}$	Junction-to-Case	0.44	℃/W
Junction Temperature	T_J		-55 ~ +175	℃
Storage Temperature	T_{STG}		-55 ~ +175	℃

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,T_J=25℃		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 =16mA		3.0		V
		V_{DS} =V_{GS}, I_D =16mA ,T_J=175℃		2.0		
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =18V, I_D =40A		26	38	mΩ
		V_{GS} =20V, I_D =40A		23		
		V_{GS} =18V, I_D =40A,T_J=175℃		32		
		V_{GS} =20V, I_D =40A,T_J=175℃		30		
Transconductance	g_{fs}	V_{GS} =18V, I_D =40A		32		S
		V_{GS} =18V, I_D =40A,T_J=175℃		30		
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =600V,V_{GS} =0V,f =1MHz V_{AC}=25mV		3249		pF
Output Capacitance	C_{oss}			193		
Reverse Transfer Capacitance	C_{rss}			14		
Total Gate Charge	Q_g	V_{DS} =400V,V_{GS} =-4V/18V, I_D =40A		138		nC
Gate-Source Charge	Q_{gs}			68.7		
Gate-Drain Charge	Q_{gd}			24.2		
Internal Gate Resistance	$R_{G(int)}$	f =1MHz ,V_{AC}=25mV		0.9		Ω
Turn-on delay time	$t_{d(on)}$	V_{DS}=400V,V_{GS}=-4/+18V, I_D =40A,$R_{G(ext)}$=5Ω, L=293μH		2.1		nS
Turn-on rise time	t_r			25		
Turn-off delay time	$t_{d(off)}$			37		
Turn-off fall time	t_f			13		
Turn-On Energy	E_{on}			79		μJ
Turn-Off Energy	E_{off}			175		
Total switching energy	E_{tot}			254		
Source-Drain Diode characteristics						
Diode Forward Current	I_S	V_{GS} =-4V,T_C=25℃		74		A
Diode Forward voltage	V_{SD}	V_{GS} =-4V, I_{SD}=20A		3.9		V
		V_{GS} =-4V, I_{SD}=20A,T_J=175℃		3.5		
Diode Pulse Current	$I_{S,\ pulse}$	V_{GS} = -4V, pulse width t_p limited by T_{jmax}		188		A
Reverse Recovery Time	t_{rr}	V_{GS} =-4V,I_{SD}= 40A,V_R=400V dif/dt = 4610 A/μs		32		nS
Reverse Recovery Charge	Q_{rr}			881		nC
Peak Reverse Recovery Current	I_{rrm}			50		A

Typical Characteristics

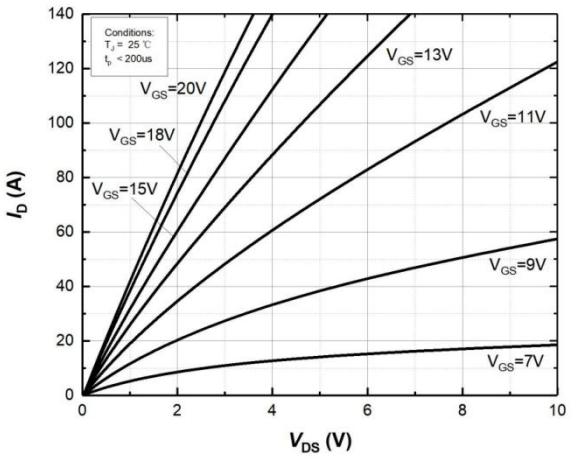


Figure 1. Output characteristics at Tj=25°C

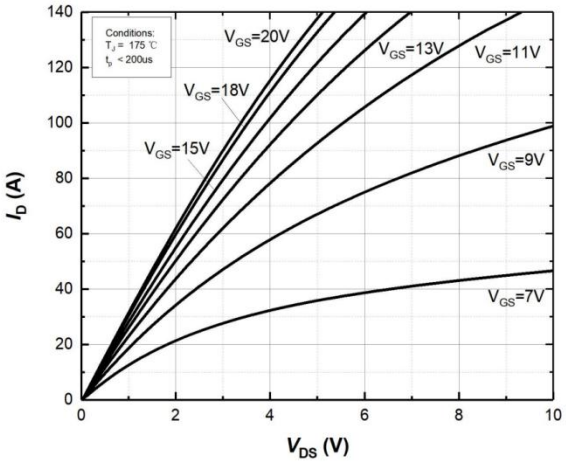


Figure 2. Output characteristics at Tj=175°C

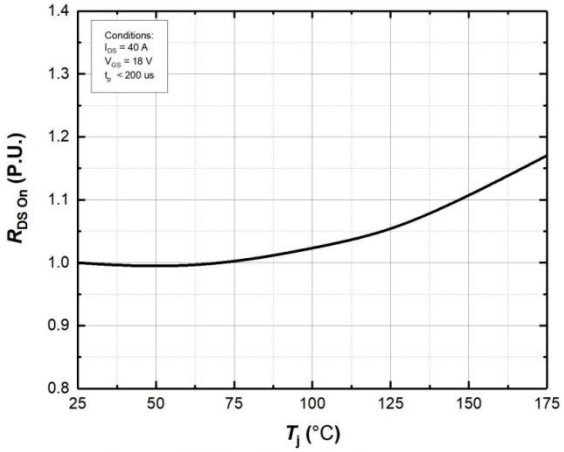


Figure 3. Normalized On-Resistance vs. Temperature

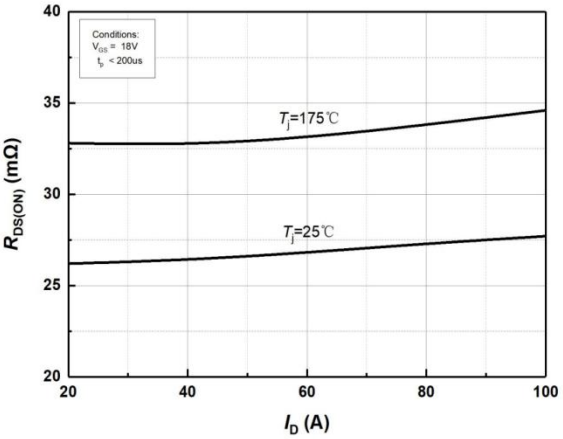


Figure 4. On-Resistance vs. Drain current for Various Temperature

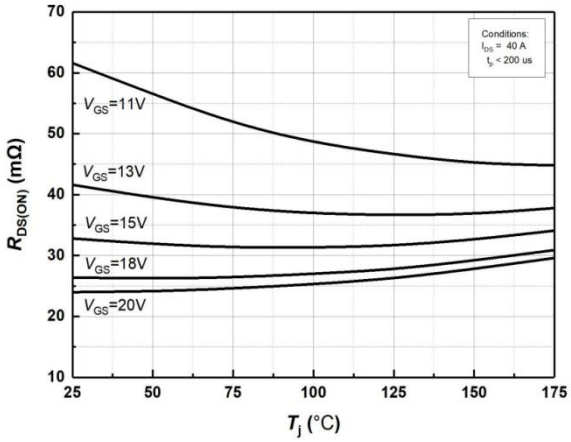


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

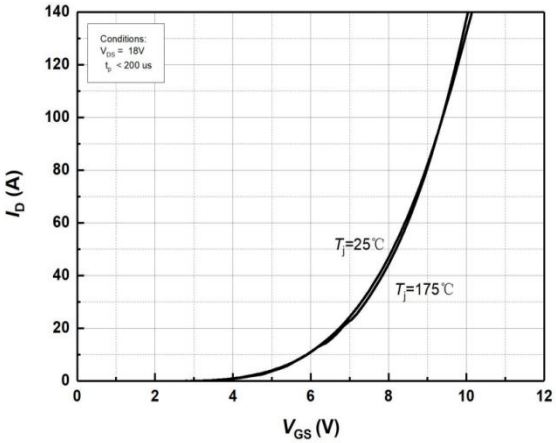


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

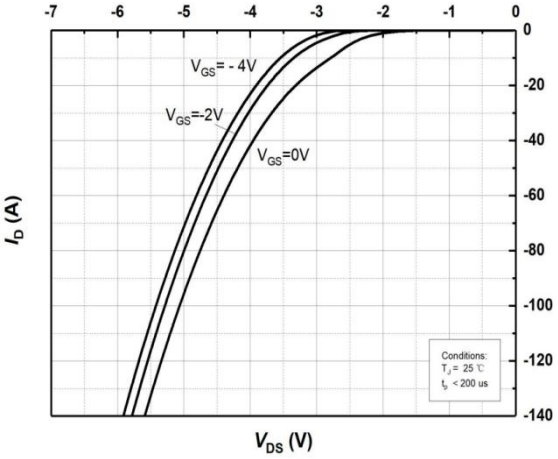


Figure 7. Body Diode Characteristics at Tj=25°C

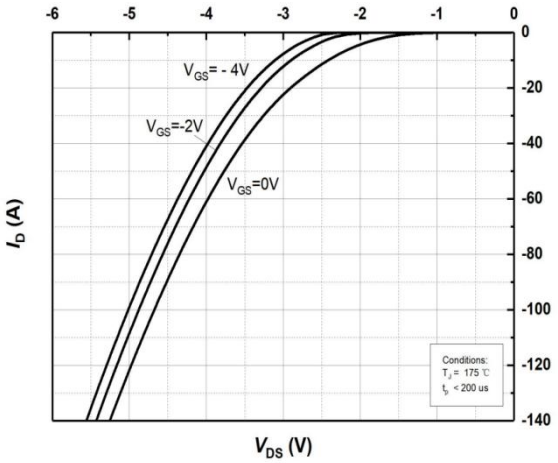


Figure 8. Body Diode Characteristics at Tj=175°C

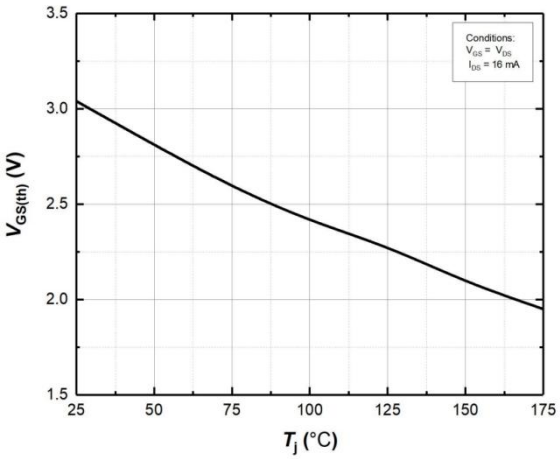


Figure 9. Threshold Voltage vs. Temperature

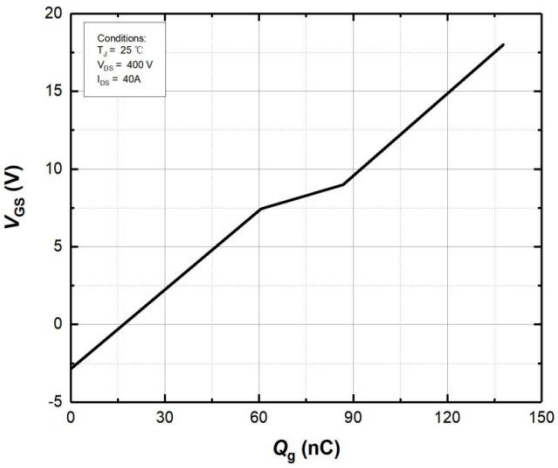


Figure 10 Gate Charge Characteristics

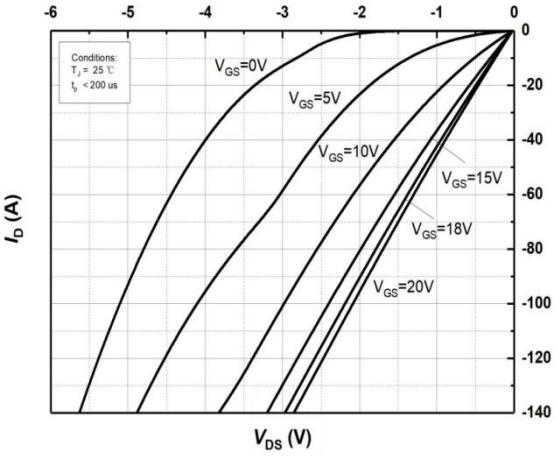


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

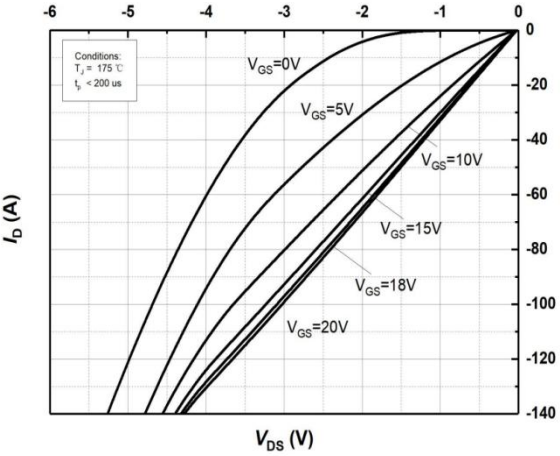


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

Typical Characteristics

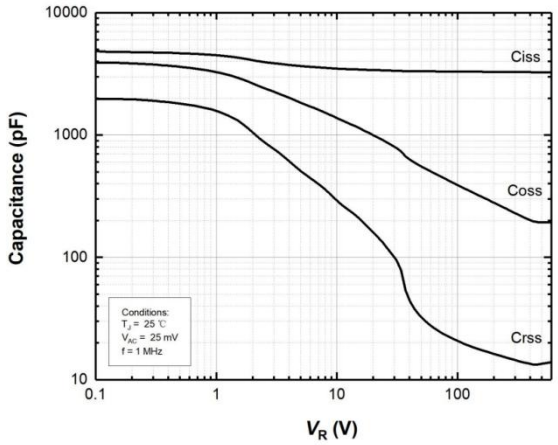


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

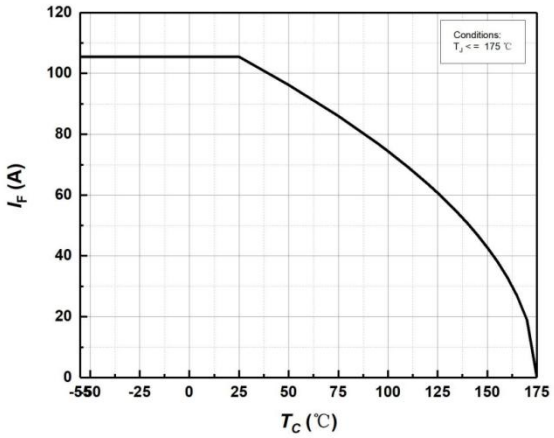


Figure 14. Continuous Drain Current Derating vs Case Temperature

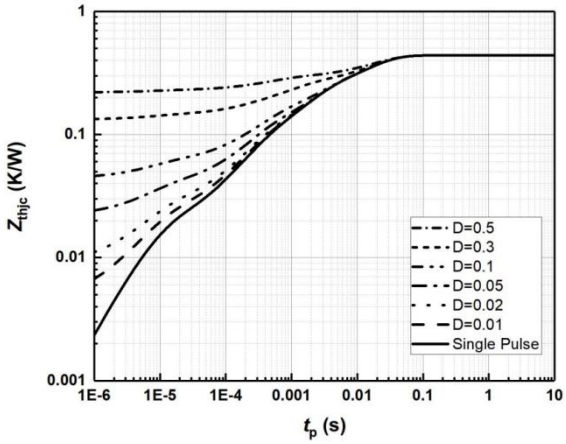


Figure 15.Transient Thermal Impedance (Junction – Case)

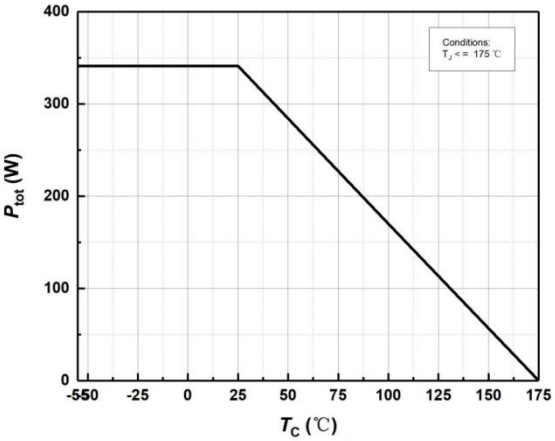


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

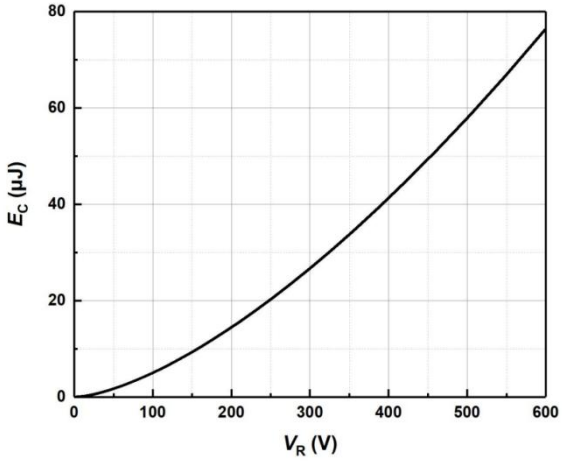


Figure 17. Output Capacitor Stored Energy

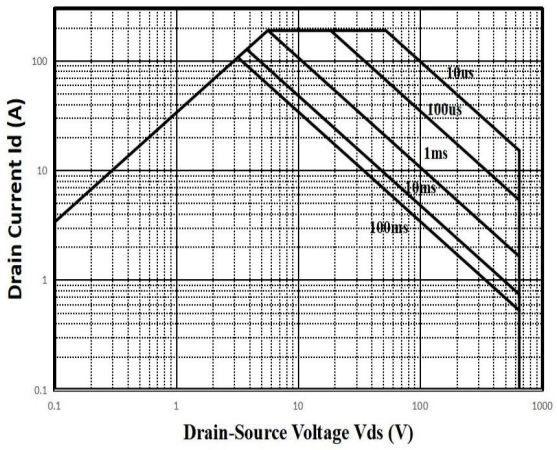


Figure 18. Safe Operating Area

Typical Characteristics

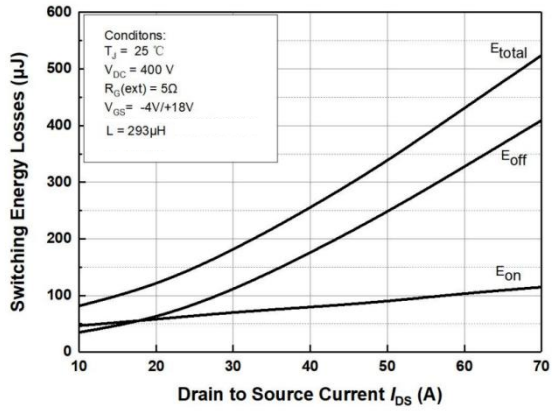


Figure 19. Clamped Inductive Switching Energy vs. Drain Current(V_{DD} = 400V)

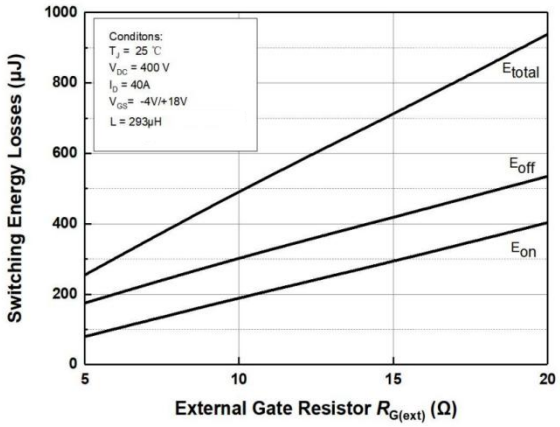


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

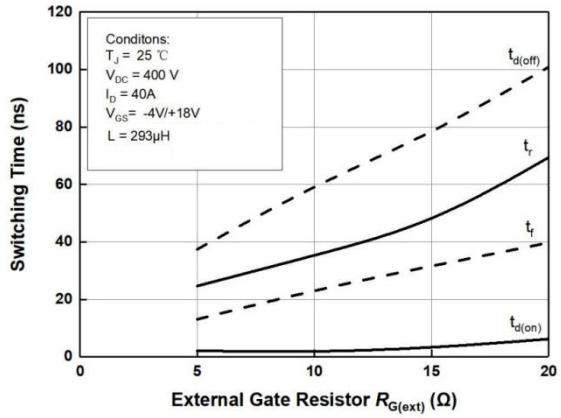
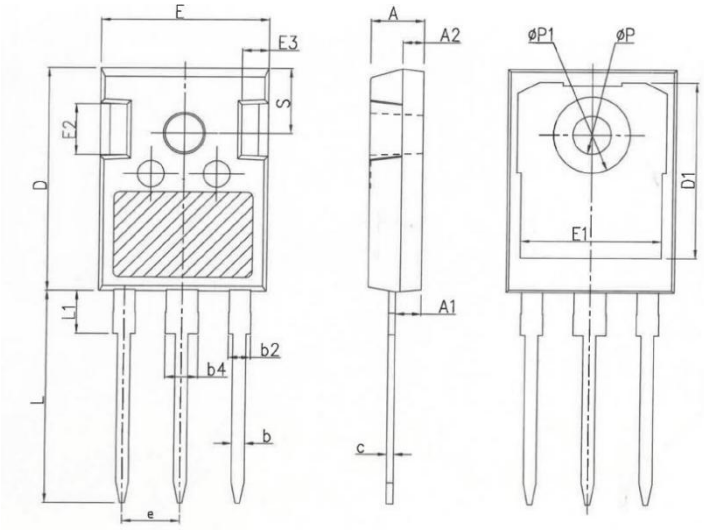


Figure 21. Switching Times vs. $R_{G(ext)}$

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	