

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
1200V	75m Ω @18V	34A
	68m Ω @20V	

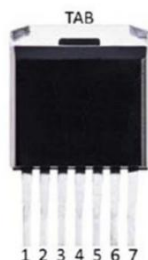
Feature

- 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

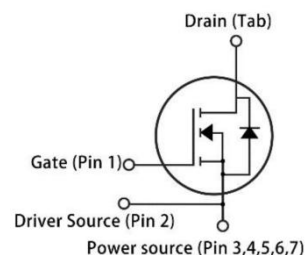


TO-263-7

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}	$V_{GS} = 0V, I_D = 100\mu A$	1200	V
Gate-Source Voltage	V_{GSmax}	AC ($f > 1\text{ Hz}$)	-10/+25	V
Gate-Source Voltage	V_{GSOP}	Static	-5/+20	V
Continuous Drain Current	I_D	$V_{GS}=20V, T_C=25^{\circ}C$	34	A
	I_D	$V_{GS}=20V, T_C=100^{\circ}C$	22	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax} at 1 ms	70	A
		Pulse with t_p limited by T_{jmax} at 100 μs	170	A
Power Dissipation	P_D	$T_C=25^{\circ}C$	242	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	0.62	$^{\circ}C/W$
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	1200			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =1200V,V _{GS} = 0V		1	50	μA
Gate-Source leakage current	I _{GSS}	V _{GS} =20V, V _{DS} = 0V			250	nA
Gate threshold voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =5mA		3.0		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		75	100	mΩ
		V _{GS} =20V, I _D =20A		68	98	
		V _{GS} =18V, I _D =20A,T _J =175°C		135		
		V _{GS} =20V, I _D =20A,T _J =175°C		130		
Transconductance	g _{fs}	V _{GS} =20V, I _D =20A		9		S
		V _{GS} =20V, I _D =20A,T _J = 175°C		7		
Dynamic characteristics						
Input Capacitance	C _{iss}	V _{DS} =1000V,V _{GS} =0V,f =1MHz V _{AC} =25mV		1374		pF
Output Capacitance	C _{oss}			63		
Reverse Transfer Capacitance	C _{rss}			3.5		
Total Gate Charge	Q _g	V _{DS} =800V,V _{GS} =-5V/20V, I _D =20A		44.8		nC
Gate-Source Charge	Q _{gs}			14		
Gate-Drain Charge	Q _{gd}			19		
Turn-on delay time	t _{d(on)}	V _{DS} =800V,V _{GS} =-4/+20V, I _D =20A,R _{G(ext)} =5Ω, L = 276μH		8.2		nS
Turn-on rise time	t _r			10.8		
Turn-off delay time	t _{d(off)}			16.7		
Turn-off fall time	t _f			10.5		
Turn-On Energy	E _{on}			154.9		μJ
Turn-Off Energy	E _{off}			84.5		
Total switching energy	E _{tot}			218		
Internal Gate Resistance	R _{G(int)}	f=1 MHz, V _{AC} = 25mV		2		Ω
Source-Drain Diode characteristics						
Diode Forward Current	I _S	V _{GS} =-4V,T _C =25°C		32		A
Diode Forward voltage	V _{SD}	V _{GS} =-4V, I _{SD} =10A		3.7		V
		V _{GS} =-4V, I _{SD} =10A,T _J =175°C		3.1		
Diode pulse Current	I _{S,pulse}	V _{GS} =-4V, pulse width t _p limited by T _{jmax}		70		A
Reverse Recovery Time	t _{rr}	V _{GS} =-4V,I _{SD} = 20A,V _R =800V dif/dt = 2800 A/μs		29.3		nS
Reverse Recovery Charge	Q _{rr}			156.5		nC
Peak Reverse Recovery Current	I _{rrm}			9.5		A

Typical Characteristics

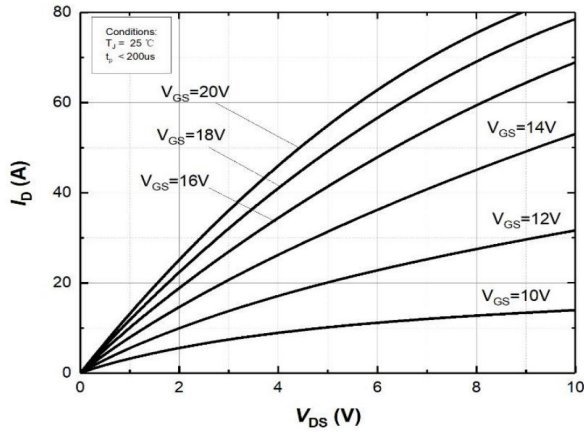


Figure 1. Output characteristics at $T_j=25^{\circ}\text{C}$

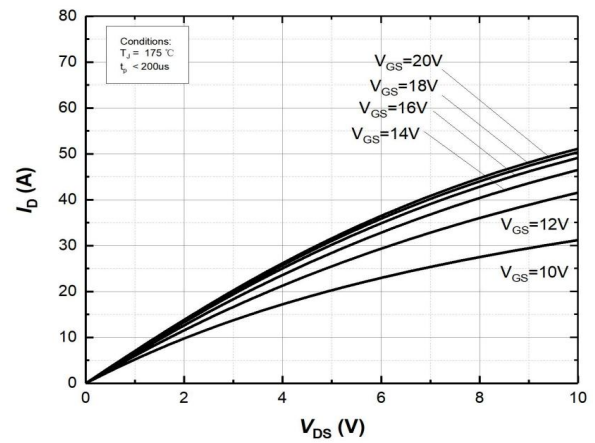


Figure 2. Output characteristics at $T_j=175^{\circ}\text{C}$

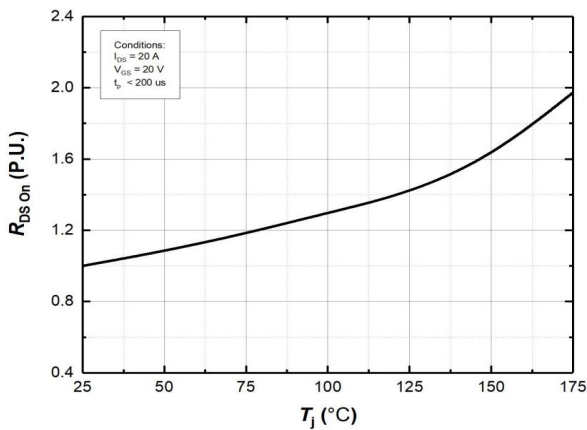


Figure 3. Normalized On-Resistance vs. Temperature

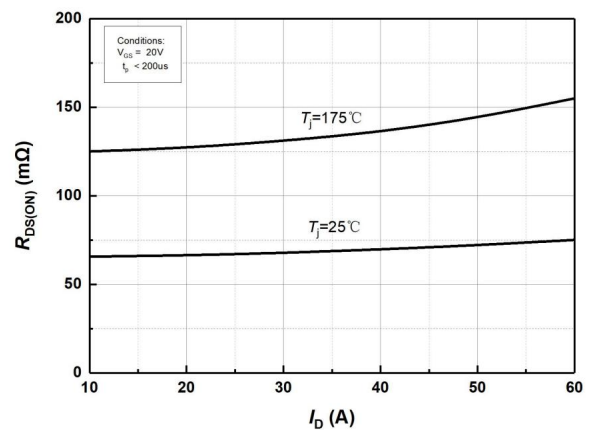


Figure 4. On-Resistance vs. Drain current for Various Temperature

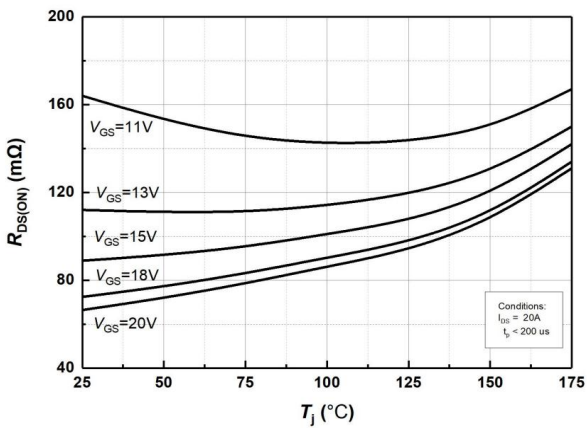


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

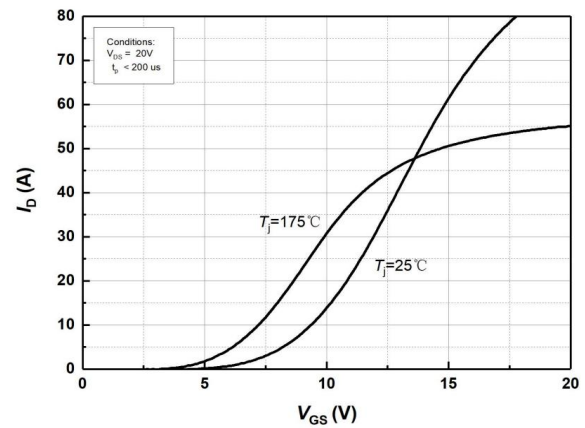


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

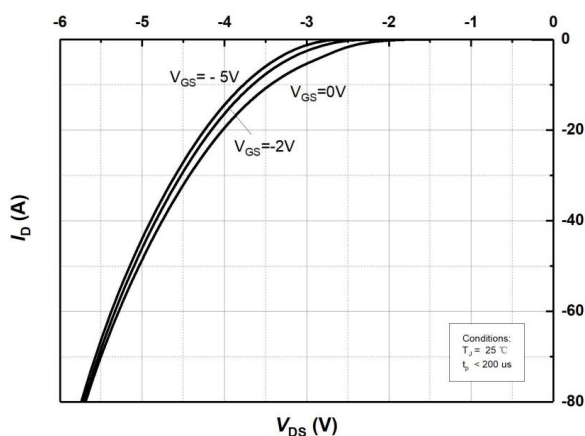


Figure 7. Body Diode Characteristics at Tj=25°C

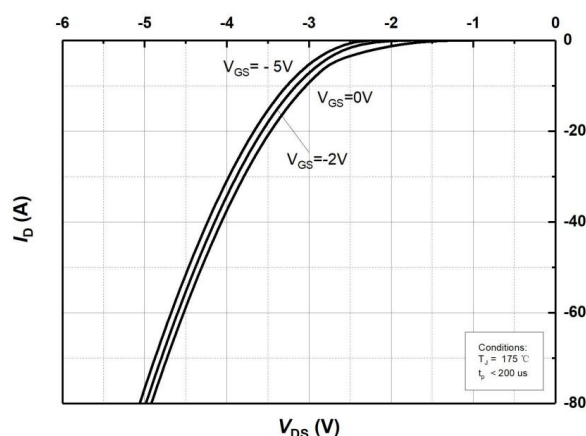


Figure 8. Body Diode Characteristics at Tj=175°C

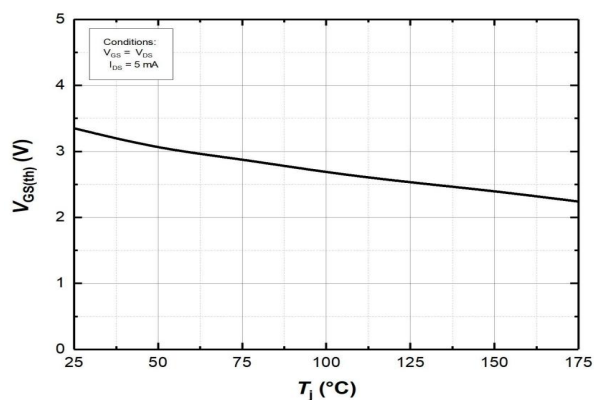


Figure 9. Threshold Voltage vs. Temperature

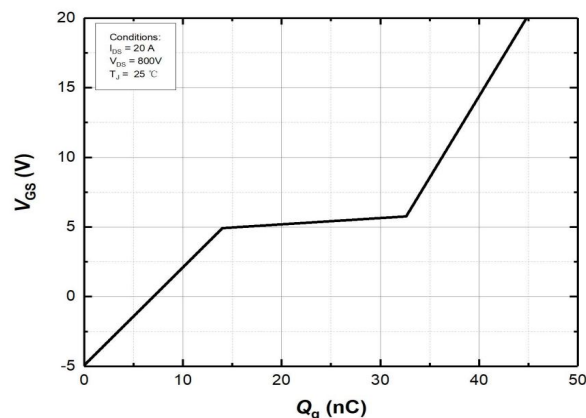


Figure 10 Gate Charge Characteristics

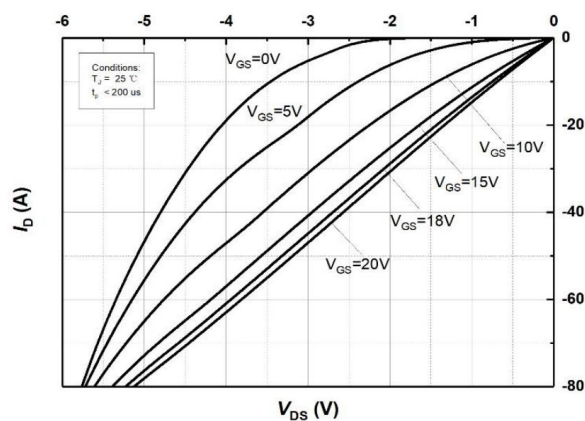


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

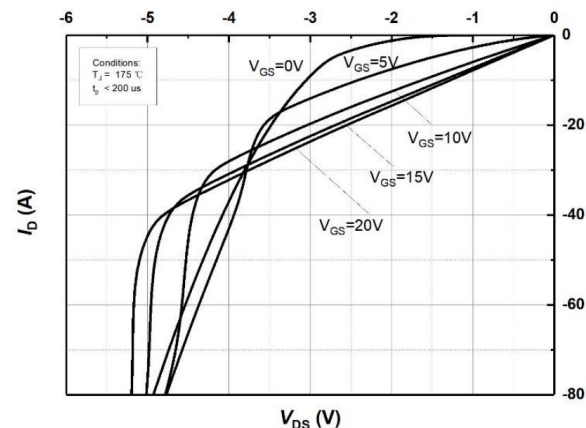


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

Typical Characteristics

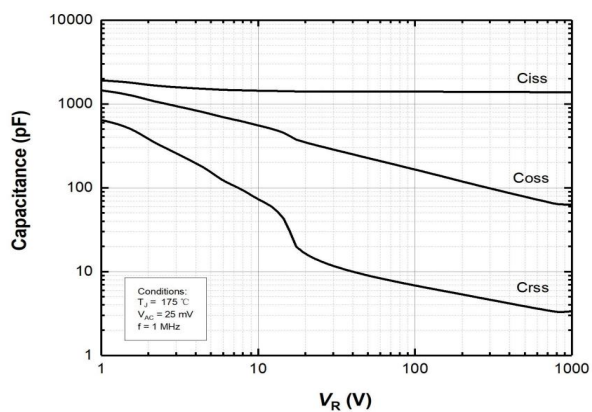


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 1000V)

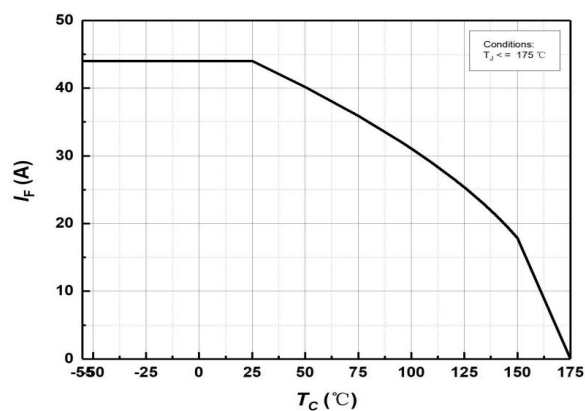


Figure 14. Continuous Drain Current Derating vs Case Temperature

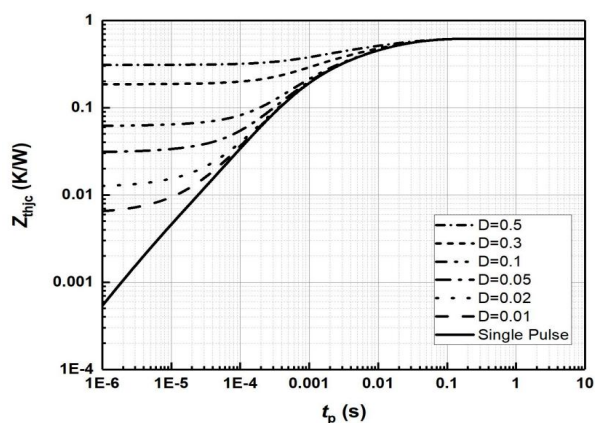


Figure 15. Transient Thermal Impedance (Junction – Case)

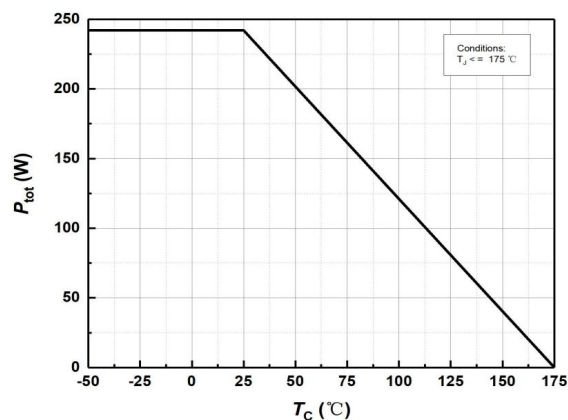


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

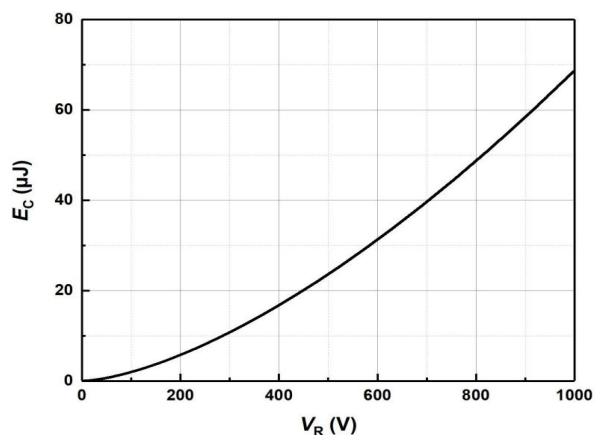


Figure 17. Output Capacitor Stored Energy

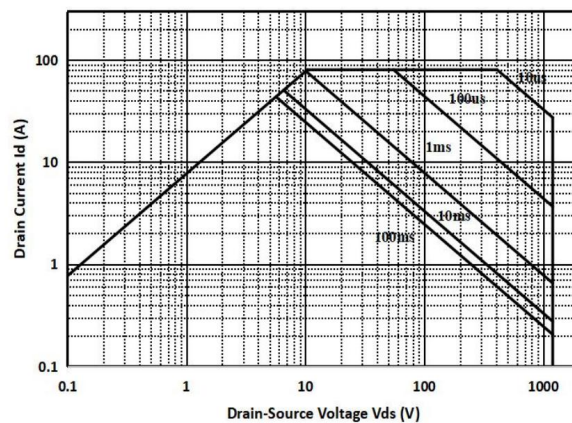


Figure 18. Safe Operating Area

Typical Characteristics

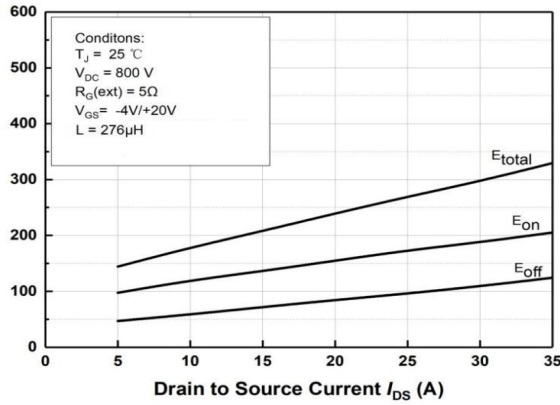


Figure 19. Clamped Inductive Switching Energy vs. Drain Current($V_{DD} = 800\text{V}$)

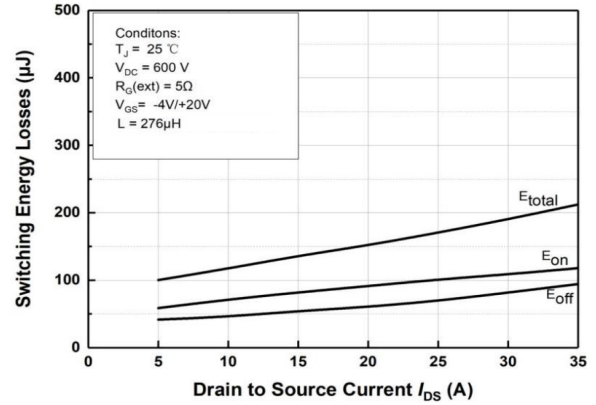


Figure 20. Clamped Inductive Switching Energy vs. Drain Current($V_{DD} = 600\text{V}$)

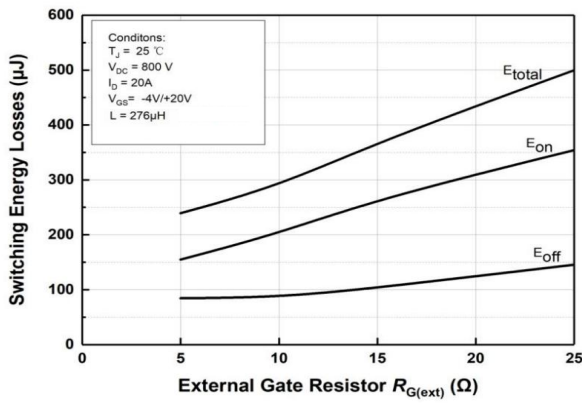


Figure 21. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

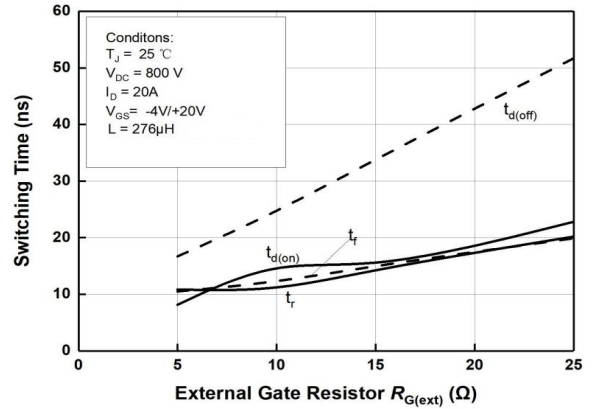
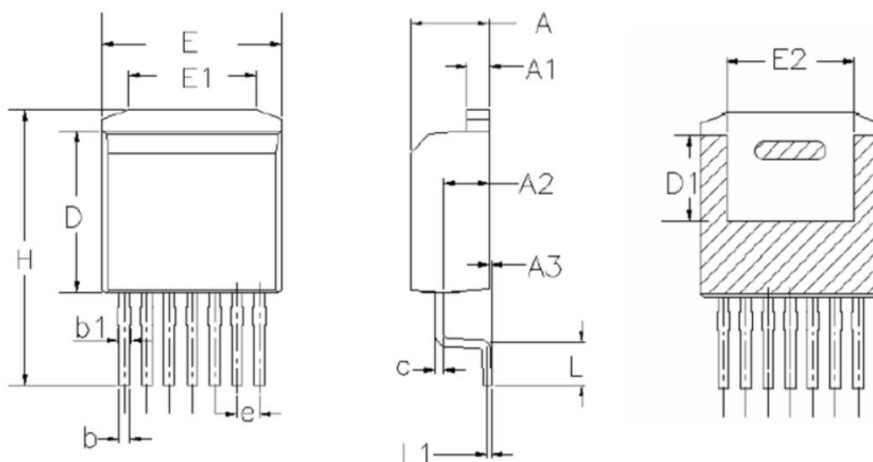


Figure 22. Switching Times vs. $R_{G(ext)}$

TO-263-7 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.600	0.169	0.181
A1	1.200	1.400	0.047	0.055
A2	2.400	2.700	0.094	0.106
A3	0.000	0.250	0.000	0.010
b	0.500	0.700	0.020	0.028
b1	0.600	0.900	0.024	0.035
c	0.400	0.600	0.016	0.024
D	8.880	9.280	0.350	0.365
D1	4.650	6.650	0.183	0.262
e	1.270 BSC		0.050 BSC	
E	10.080	10.280	0.397	0.405
E1	6.500	8.300	0.256	0.327
E2	6.820	7.97	0.269	0.314
H	14.800	16.000	0.583	0.630
L	1.900	2.750	0.075	0.108