

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	$I_D@25^{\circ}C$
650V	95mΩ@18V	34A

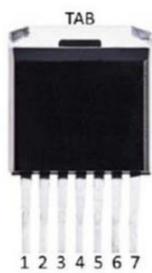
Feature

- 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

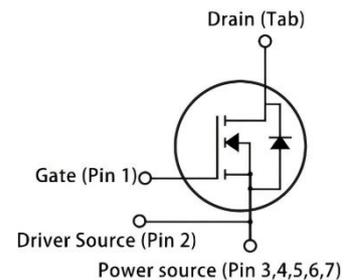


TO-263-7L

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_{GS}	$t_p \leq 500ns, \text{duty cycle} \leq 1\%$	-8/+20	V
Gate-Source Voltage	V_{GSOP}	Static	-4/+18	V
Continuous Drain Current	I_D	$V_{GS} = 18V$	34	A
	I_D	$V_{GS} = 18V, T_C = 100^{\circ}C$	24	A
Pulsed Drain Current	$I_{D,pulse}$	Pulse with t_p limited by T_{jmax}	54	A
Single Pulse Avalanche Energy	E_{AS}	$V_{DS} = 650V, V_{DD} = 50V, V_{GS} = 10V, L = 10mH$	451	mJ
Power Dissipation	P_D	$T_J = 175^{\circ}C$	163	W
Thermal Resistance (Typ)	$R_{\theta JC}$	Junction-to-Case	0.92	$^{\circ}C/W$
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 _{DS} = 0V, V _{GS} = 18V			250	nA	
Gate threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 4mA		3		V	
		V _{DS} = V _{GS} , I _D = 4mA, T _J = 175°C		2			
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 18V, I _D = 10A		95	125	mΩ	
		V _{GS} = 18V, I _D = 10A, T _J = 175°C		135			
Transconductance	g _{fs}	V _{GS} = 18V, I _D = 10A		7		S	
		V _{GS} = 18V, I _D = 10A, T _J = 175°C		6			
Dynamic characteristics							
Input Capacitance	C _{iss}	V _{DS} = 600V, V _{GS} = 0V V _{AC} = 25mV, f = 1MHz		803		pF	
Output Capacitance	C _{oss}			77			
Reverse Transfer Capacitance	C _{rss}			5			
Total Gate Charge	Q _g	V _{DS} = 400V, V _{GS} = -4V/18V I _D = 10A		34		nC	
Gate-Source Charge	Q _{gs}			7.8			
Gate-Drain Charge	Q _{gd}			9			
Internal Gate Resistance	R _{G(int)}	V _{AC} = 25mV, f = 1MHz		3.8		Ω	
Turn-on delay time	t _{d(on)}	V _{DS} = 400V, V _{GS} = -4V/+18V I _D = 10A, R _{G(ext)} = 5Ω, L = 294μH		6		nS	
Turn-on rise time	t _r			13			
Turn-off delay time	t _{d(off)}			15			
Turn-off fall time	t _f			9			
Turn-on Switching Energy	E _{on}				31		μJ
Turn-off Switching Energy	E _{off}				14		
Total switching energy	E _{tot}				45		
Source-Drain Diode characteristics							
Diode Forward Current	I _S	V _{GS} = -5V, T _C = 25°C		30		A	
Diode Forward voltage	V _{SD}	V _{GS} = -5V, I _{SD} = 5A		1.4	4	V	
		V _{GS} = -5V, I _{SD} = 5A, T _J = 175°C		1.9	4.5		
Reverse Recovery Time	T _{rr}	V _{GS} = -4V, I _{SD} = 10A, V _R = 400V dif/dt = 1000 A/μs		43		nS	
Reverse Recovery Charge	Q _{rr}			93		nC	
Peak Reverse Recovery Current	I _{rrm}			5		A	

Typical Characteristics

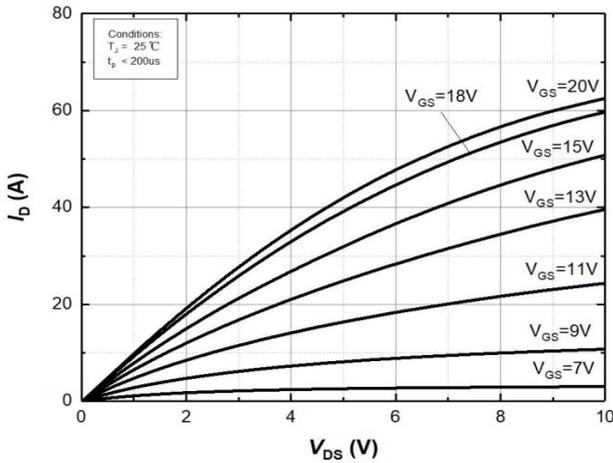


Figure 1. Output characteristics at $T_j=25^\circ\text{C}$

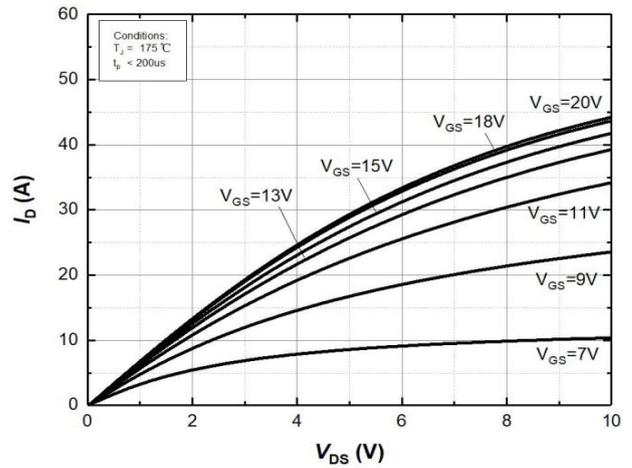


Figure 2. Output characteristics at $T_j=175^\circ\text{C}$

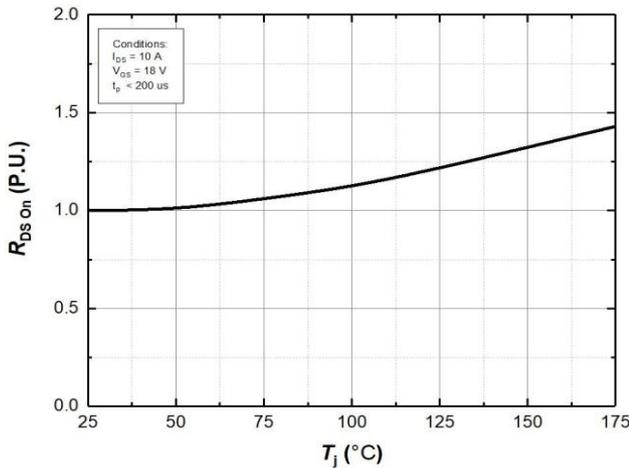


Figure 3. Normalized On-Resistance vs. Temperature

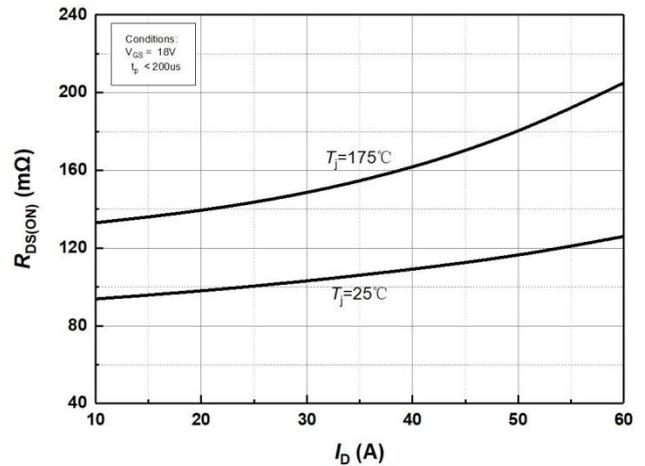


Figure 4. On-Resistance vs. Drain current for Various Temperature

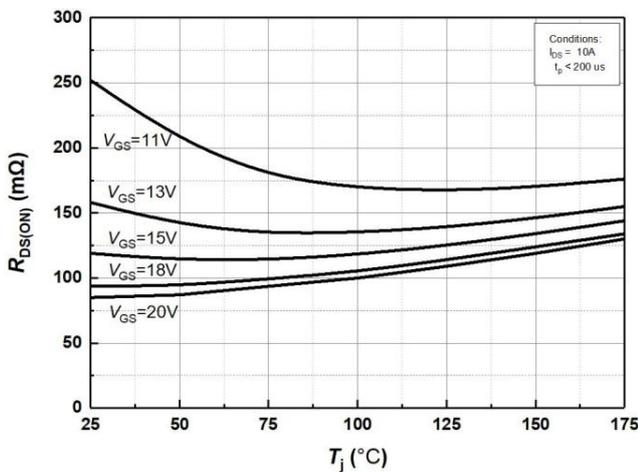


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

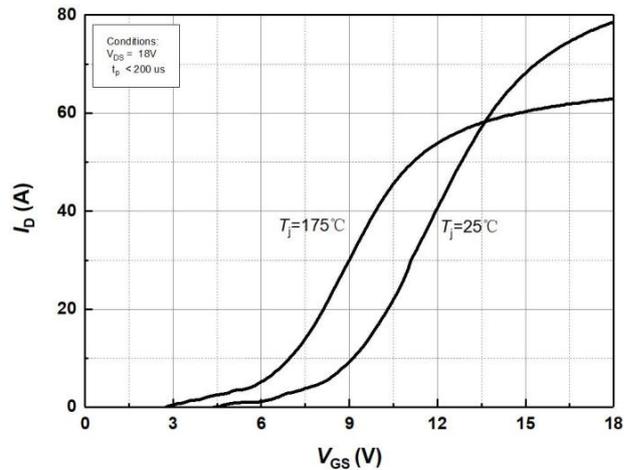


Figure 6. Transfer Characteristics for Various Junction Temperatures

Typical Characteristics

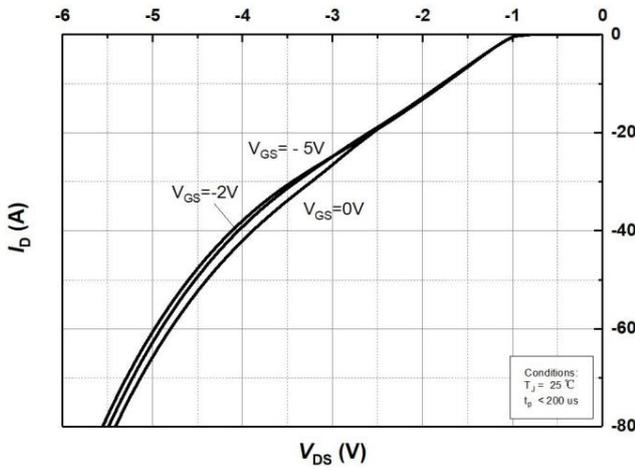


Figure 7. Body Diode Characteristics at Tj=25°C

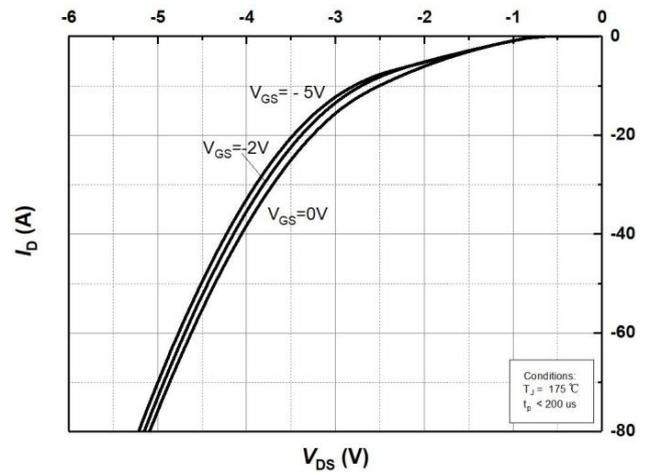


Figure 8. Body Diode Characteristics at Tj=175°C

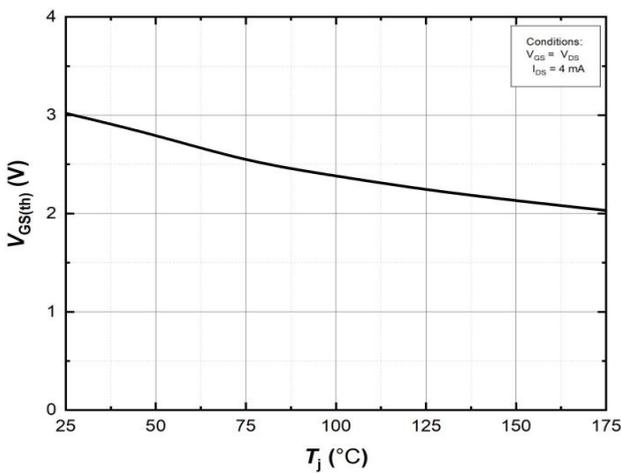


Figure 9. Threshold Voltage vs. Temperature

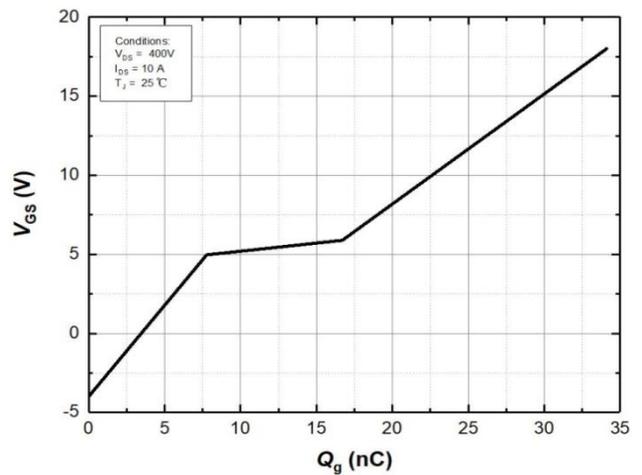


Figure 10 Gate Charge Characteristics

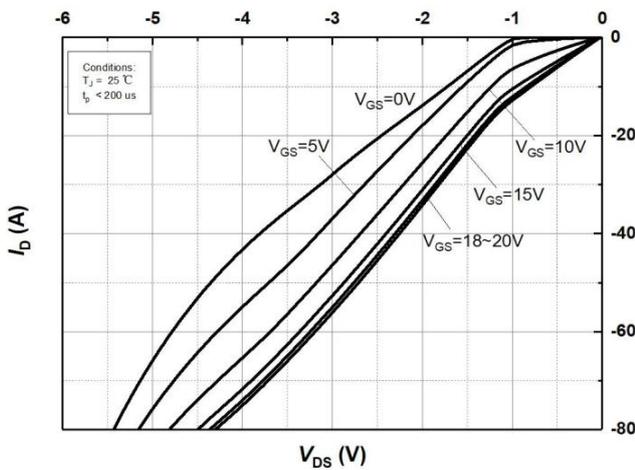


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

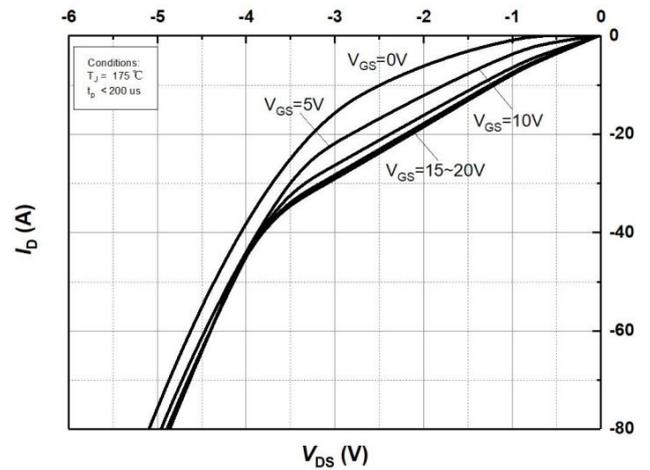


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

Typical Characteristics

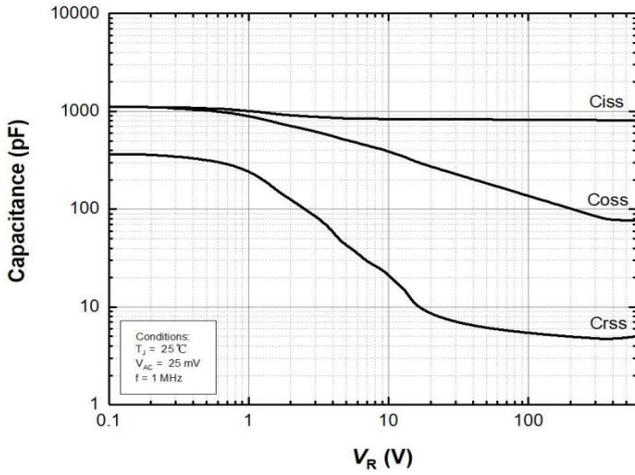


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

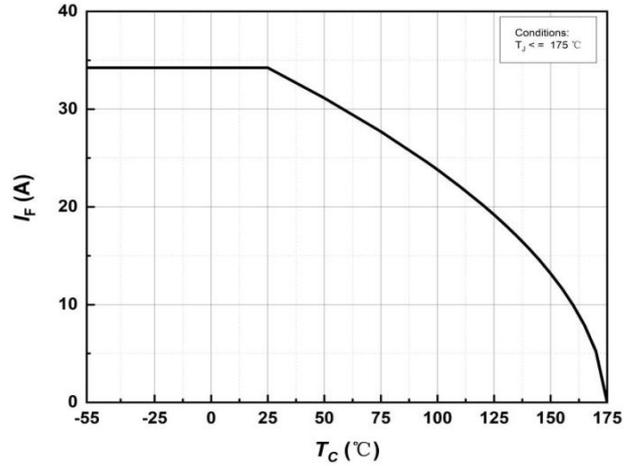


Figure 14. Continuous Drain Current Derating vs Case Temperature

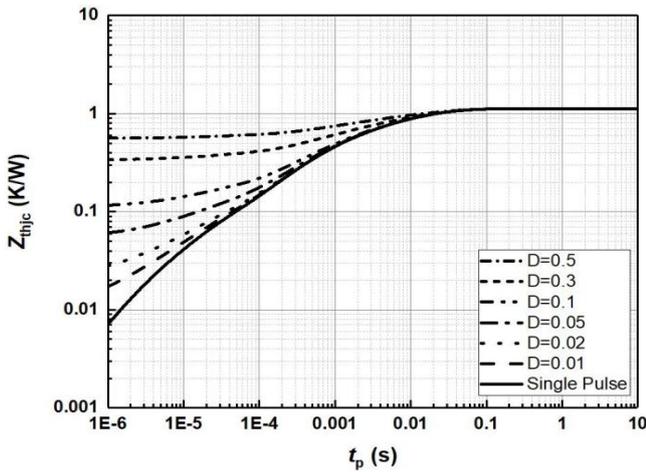


Figure 15. Transient Thermal Impedance (Junction – Case)

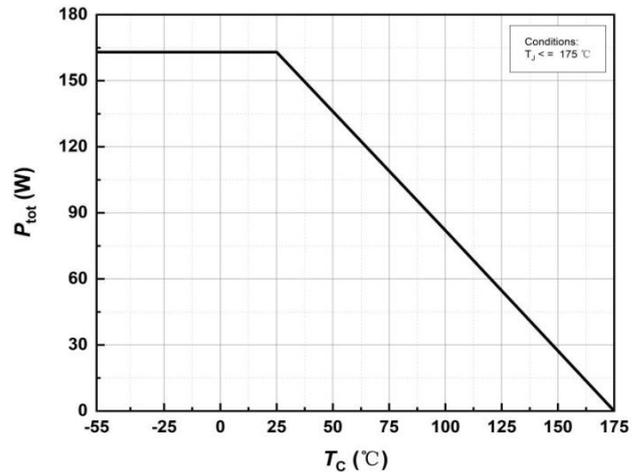


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

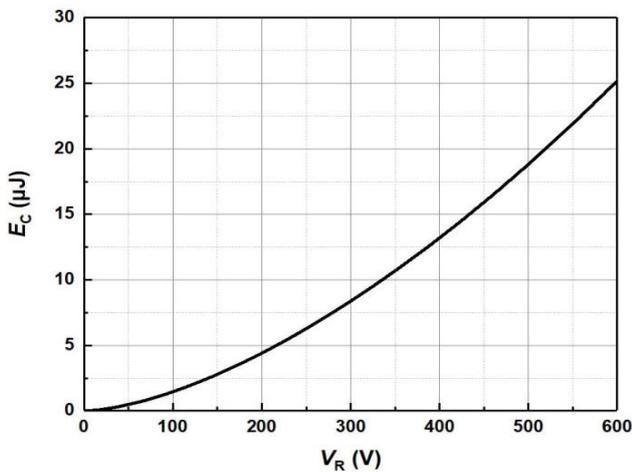


Figure 17. Output Capacitor Stored Energy

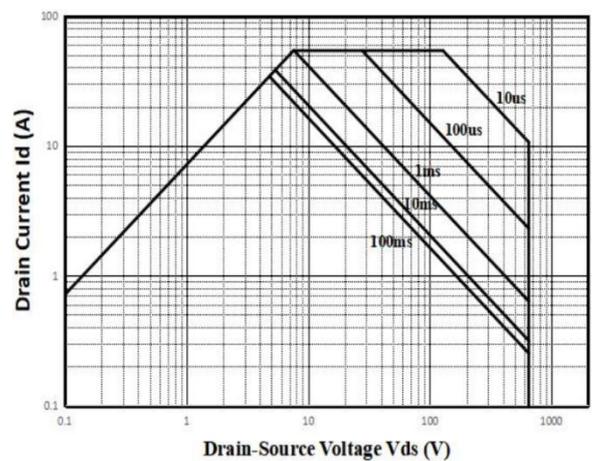


Figure 18. Safe Operating Area

Typical Characteristics

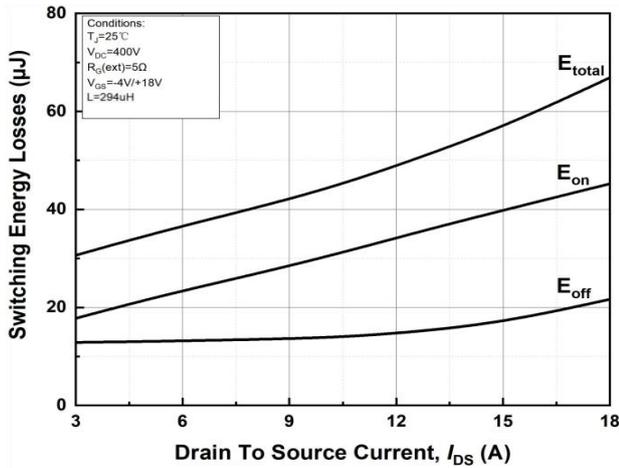


Figure 19. Clamped Inductive Switching Energy vs. Drain Current ($V_{DD} = 400V$)

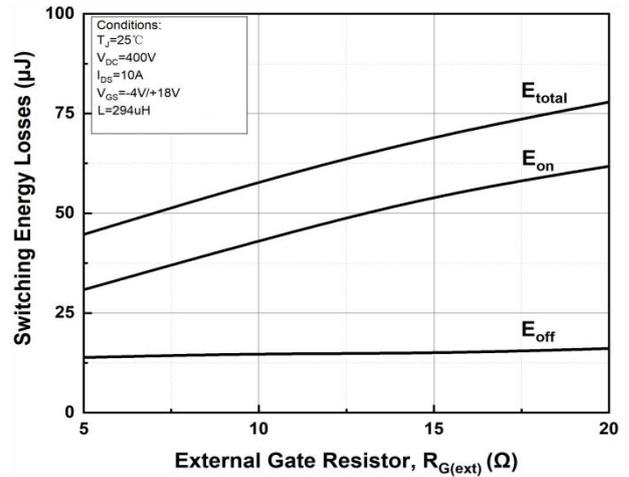


Figure 20. Clamped Inductive Switching Energy vs. $R_{G(ext)}$

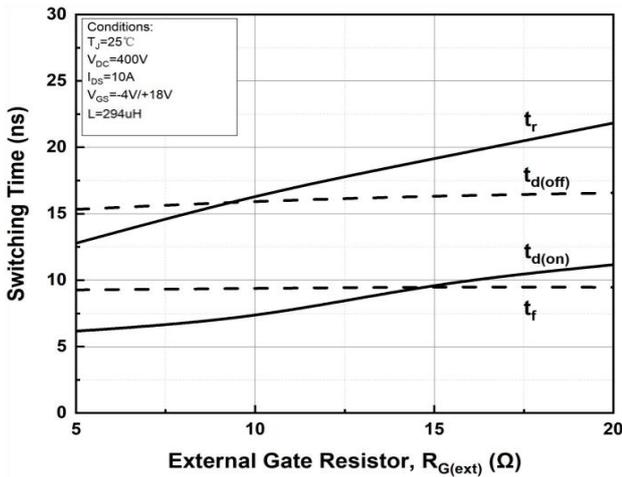
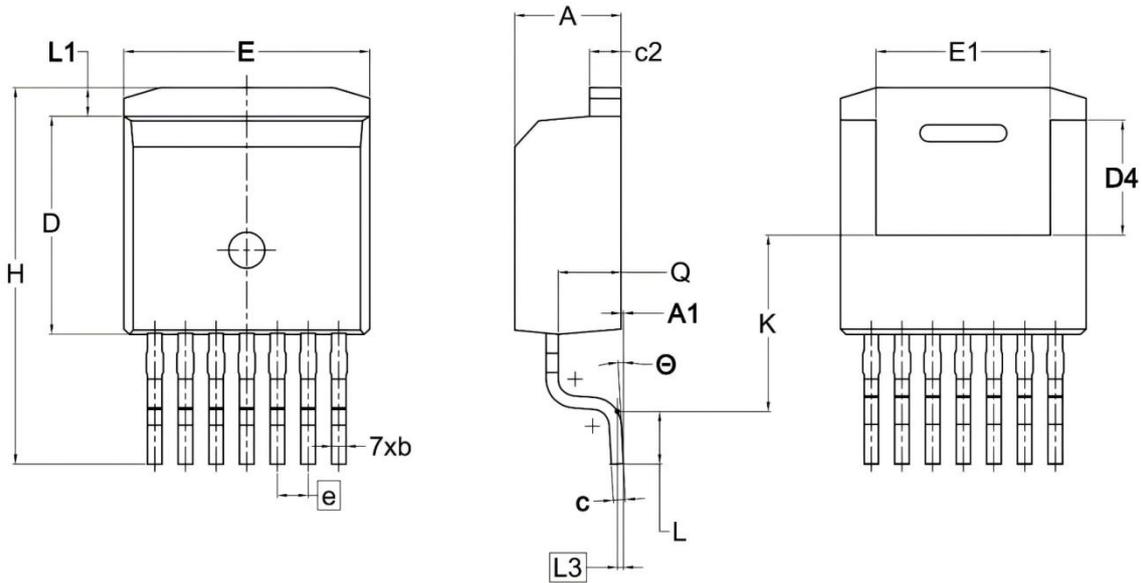


Figure 21. Switching Times vs. $R_{G(ext)}$

TO-263-7L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.500	0.169	0.177
A1	0.000	0.250	0.000	0.010
b	0.500	0.700	0.020	0.028
c	0.450	0.600	0.018	0.024
c2	1.200	1.400	0.047	0.055
D	8.930	9.230	0.352	0.363
D4	4.650	4.950	0.183	0.195
E	10.080	10.280	0.397	0.405
E1	6.820	7.620	0.269	0.300
e	1.270 BSC.		0.050 BSC.	
H	15.000	16.000	0.591	0.630
K	7.300 BSC.		0.287 BSC.	
L	1.900	2.500	0.075	0.098
L1	1.000	1.400	0.039	0.055
L3	0.250 BSC.		0.010 BSC.	
Q	2.450	2.750	0.096	0.108
θ	0°	7°	0°	7°