



### Features

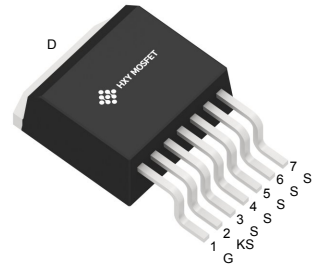
- Wide bandgap SiC MOSFET technology
- Low On-Resistance with High Blocking Voltage
- Low Capacitances with High-Speed switching
- Low reverse recovery(Qrr)
- Halogen free, RoHs compliant

### Benefits

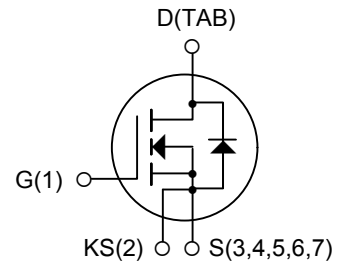
- Reduce switching losses
- Increased system Switching Frequency
- Increased power density
- Reduction of heat sink requirements

### Applications

- Switch mode power supplies
- Renewable energy
- On Board Charger
- High Voltage DC/DC Converters



TO-263-7L



Ordering Part Number	Package	Brand
IMBG65R030M1HXTMA1	TO-263-7L	HXY MOSFET

### Maximum Ratings (T<sub>c</sub> = 25 °C unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit	Note
V <sub>DSmax</sub>	Drain-Source Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 100μA	650	V	
V <sub>GSmax</sub>	Gate-Source voltage	AC (f > 1 Hz)	-10/+25	V	
V <sub>GSop</sub>	Recommend Gate-Source Voltage	Static	-4/+18	V	
I <sub>D</sub>	Continuous Drain current	V <sub>GS</sub> = 18V, T <sub>C</sub> = 25°C	73	A	Fig. 14
		V <sub>GS</sub> = 18V, T <sub>C</sub> = 100°C	52		
I <sub>D,pulse</sub>	Pulsed Drain Current	Pulse with t <sub>p</sub> limited by T <sub>jmax</sub>	146	A	
P <sub>D</sub>	Power Dissipation	T <sub>C</sub> = 25°C, T <sub>j</sub> = 175°C	181	W	Fig.16
T <sub>j</sub>	Operating junction temperature		-55~175	°C	
T <sub>stg</sub>	Storage temperature		-55~175	°C	



### Thermal Characteristics

Symbol	Parameter	Value			Unit	Note
		Min.	Typ.	Max.		
$R_{th(jc)}$	Thermal resistance from Junction to Case		0.83		K/W	Fig. 15
$R_{th(ja)}$	Thermal resistance from Junction to Ambient		40		K/W	

### Electrical Characteristics (T<sub>c</sub> = 25°C unless other wise specified)

#### Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown voltage	$V_{GS} = 0V, I_D = 100\mu A$	650			V	
$V_{GS(th)}$	Gate Threshold voltage	$V_{GS} = V_{DS}, I_D = 16mA$		3.0		V	Fig. 9
		$V_{GS} = V_{DS}, I_D = 16mA, T_j = 175^\circ C$		2.0			
$I_{GSS}$	Gate-Source Leakage current	$V_{GS} = 18V, V_{DS} = 0V$			250	nA	
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 650V, V_{GS} = 0V, T_j = 25^\circ C$		1	50	$\mu A$	
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS} = 18V, I_D = 40A$		26	38	m $\Omega$	Fig. 3, 4, 5
		$V_{GS} = 18V, I_D = 40A, T_j = 175^\circ C$		35			
$g_{fs}$	Transconductance	$V_{DS} = 18V, I_D = 40A$		27		S	Fig. 6
		$V_{DS} = 18V, I_D = 40A, T_j = 175^\circ C$		25			



### Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$Q_{GS}$	Gate to Source Charge	$V_{DS} = 400V$ $I_D = 40A$ $V_{GS} = -4V/18V$		29		nC	Fig. 10
$Q_{GD}$	Gate to Drain Charge			35			
$Q_G$	Total Gate Charge			74.5			

### AC Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$C_{iss}$	Input Capacitance	$V_{GS} = 0V, V_{DS} = 600V$ $f = 1\text{ MHz}$ $V_{AC} = 25mV$		2543		pF	Fig. 13
$C_{oss}$	Output Capacitance			173		pF	
$C_{rss}$	Reverse Transfer Capacitance			8		pF	
$R_{G(int)}$	Internal Gate Resistance	$f = 1\text{ MHz}, V_{AC} = 25mV$		1.2		$\Omega$	



### Reverse Diode Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$V_{SD}$	Diode Forward Voltage	$V_{GS} = -4V, I_{SD} = 20A$		4.3		V	Fig. 7,8
		$V_{GS} = -4V, I_{SD} = 20A, T_j = 175^\circ C$		3.7			
$I_S$	Continuous Diode Forward Current	$V_{GS} = -4V, T_C = 25^\circ C$		42		A	
$I_{S, pulse}$	Diode pulse Current	$V_{GS} = -4V$ , pulse width $t_p$ limited by $T_{jmax}$		146		A	
$t_{rr}$	Reverse Recovery Time	$V_{GS} = -4V, I_{SD} = 40A, V_R = 400V$ $diff/dt = 3800A/us$		15		nS	
$Q_{rr}$	Reverse Recovery Charge			348		nC	
$I_{rm}$	Peak Reverse Recovery Current			25		A	

### Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note	
			Min.	Typ.	Max.			
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 400V, V_{GS} = -4/+18V$ $I_D = 40A, R_{G(ext)} = 5\Omega$ $L = 294\mu H$		2		nS	Fig.21	
$t_r$	Rise Time			18		nS		
$t_{d(off)}$	Turn-Off Delay Time			18		nS		
$t_f$	Fall Time			5		nS		
$E_{on}$	Turn-On Energy				58		$\mu J$	Fig.19
$E_{off}$	Turn-Off Energy				72		$\mu J$	
$E_{tot}$	Total switching energy				130		$\mu J$	



### Typical Performance

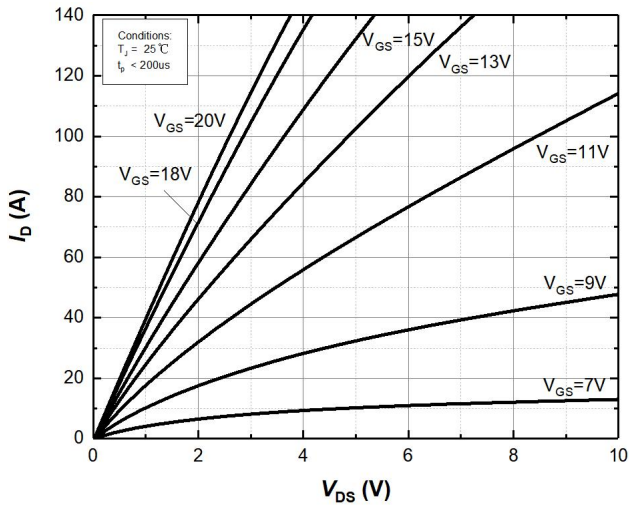


Figure 1. Output characteristics at  $T_j=25^\circ\text{C}$

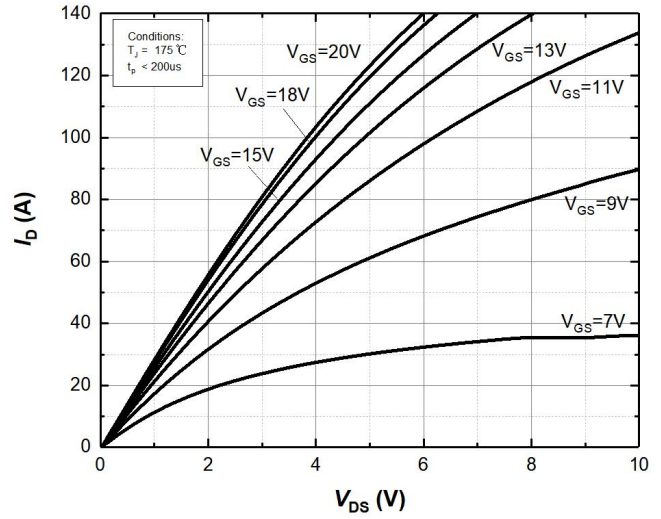


Figure 2. Output characteristics at  $T_j=175^\circ\text{C}$

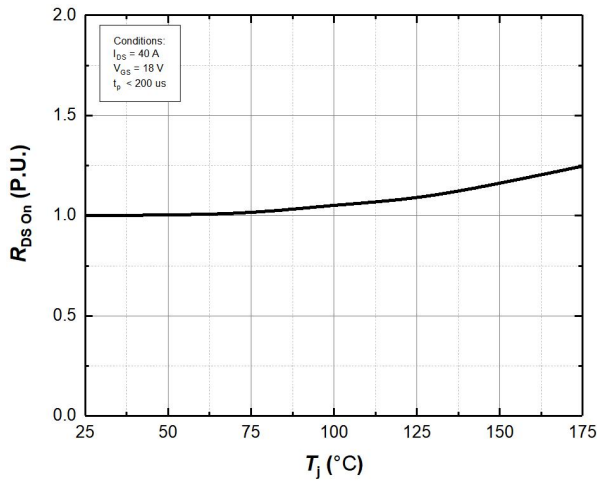


Figure 3. Normalized On-Resistance vs. Temperature

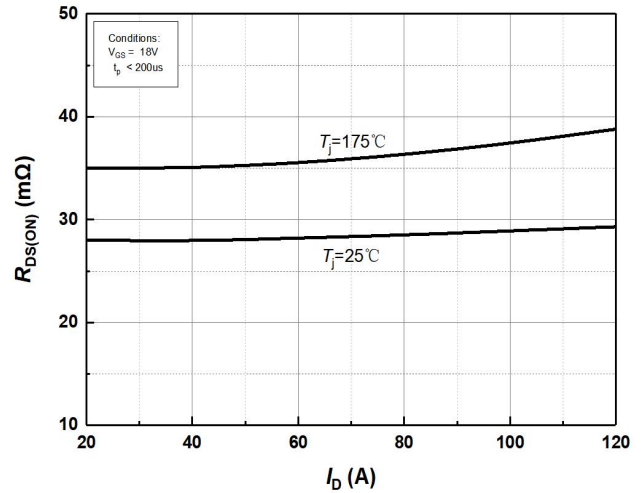


Figure 4. On-Resistance vs. Drain current for Various Temperature

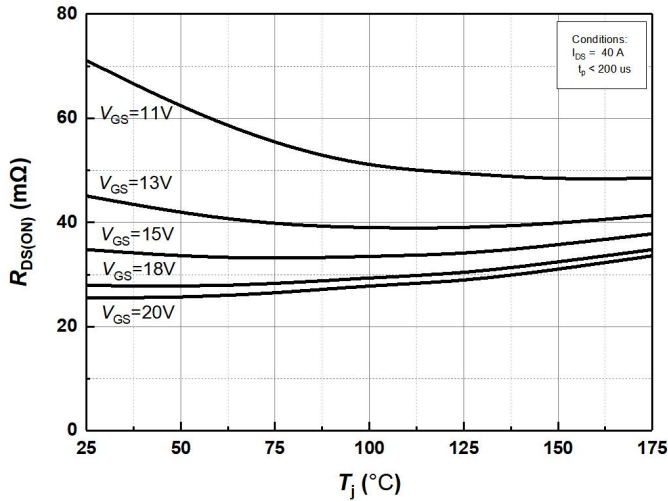


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

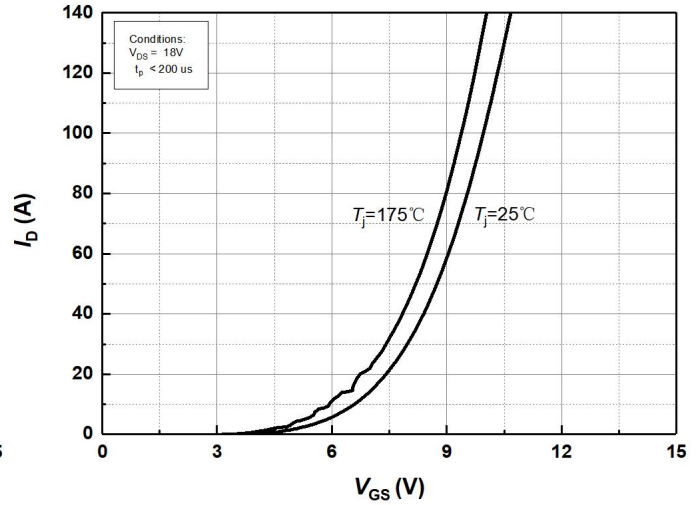


Figure 6. Transfer Characteristics for Various Junction Temperatures

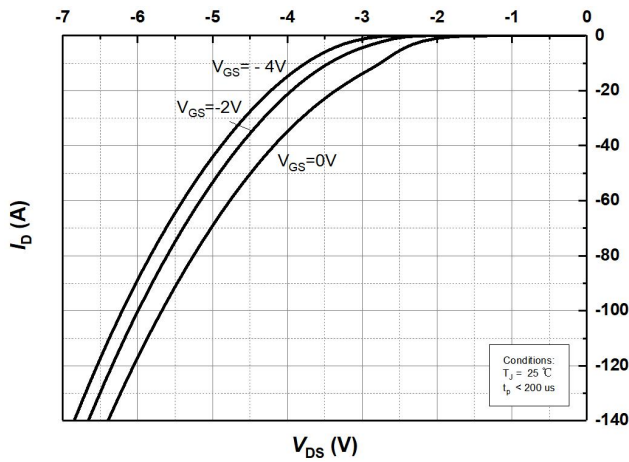


Figure 7. Body Diode Characteristics at Tj=25°C

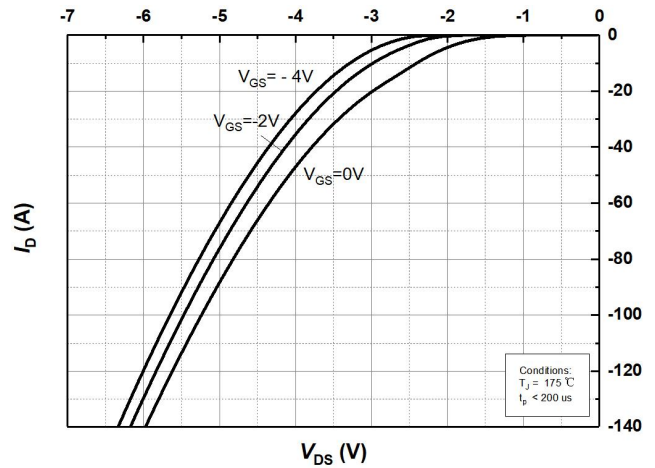


Figure 8. Body Diode Characteristics at Tj=175°C

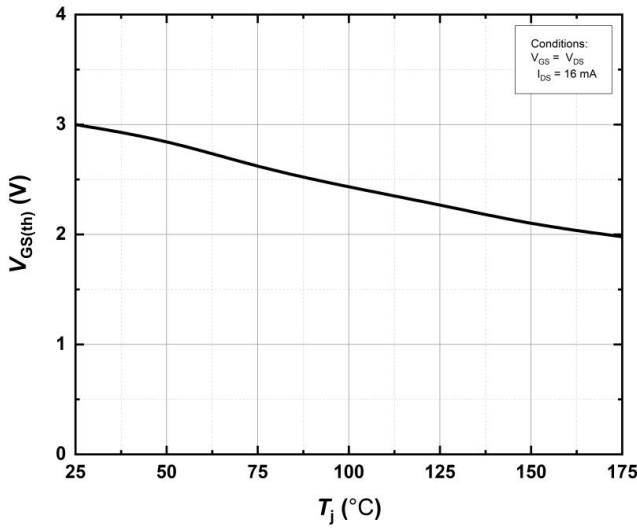


Figure 9. Threshold Voltage vs. Temperature

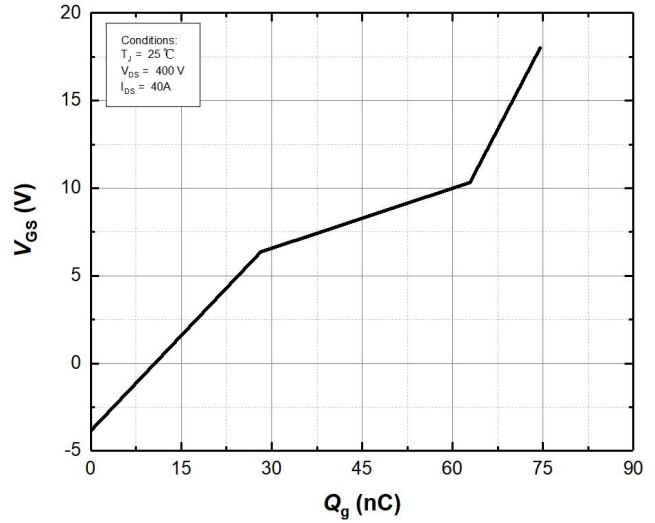


Figure 10 Gate Charge Characteristics

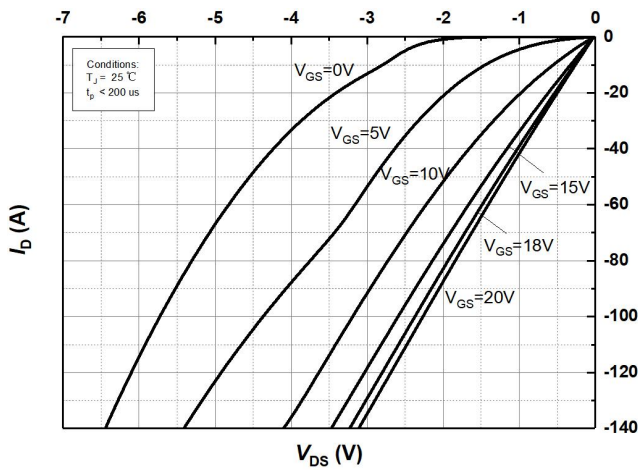


Figure 11. 3rd Quadrant Characteristic at T<sub>j</sub>=25°C

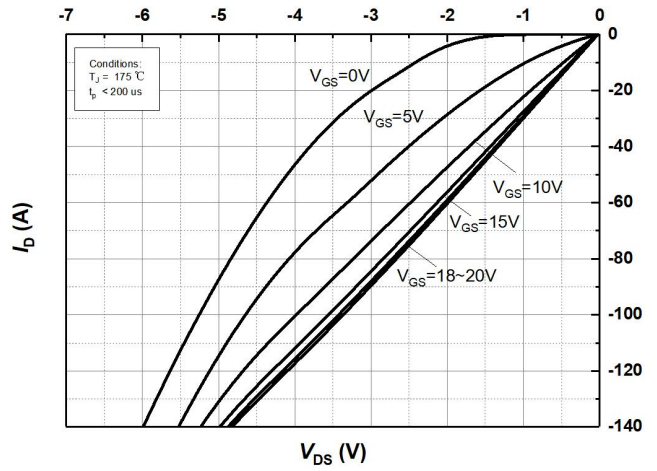


Figure 12. 3rd Quadrant Characteristic at T<sub>j</sub>=175°C

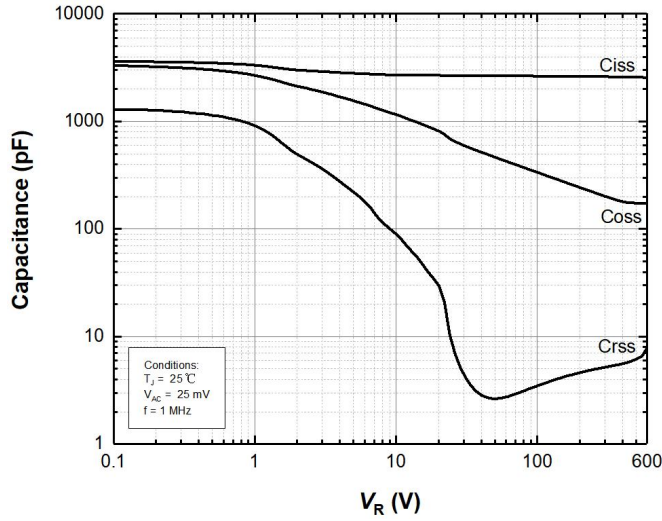


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

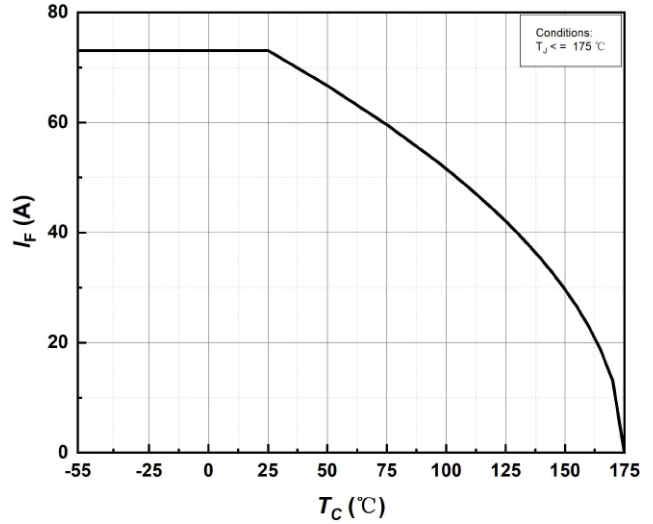


Figure 14. Continuous Drain Current Derating vs Case Temperature

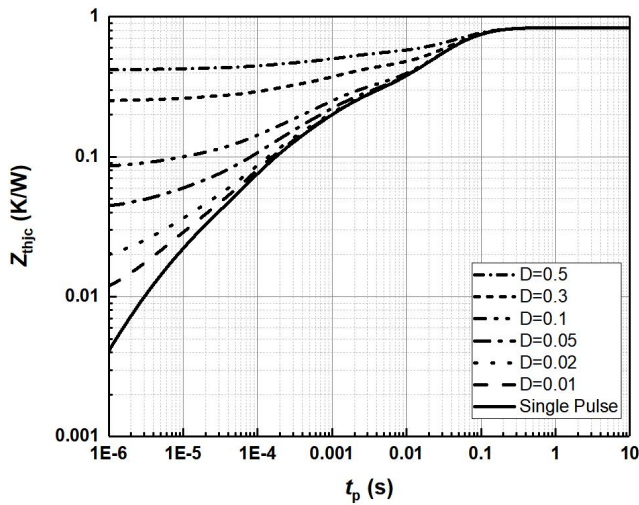


Figure 15. Transient Thermal Impedance (Junction – Case)

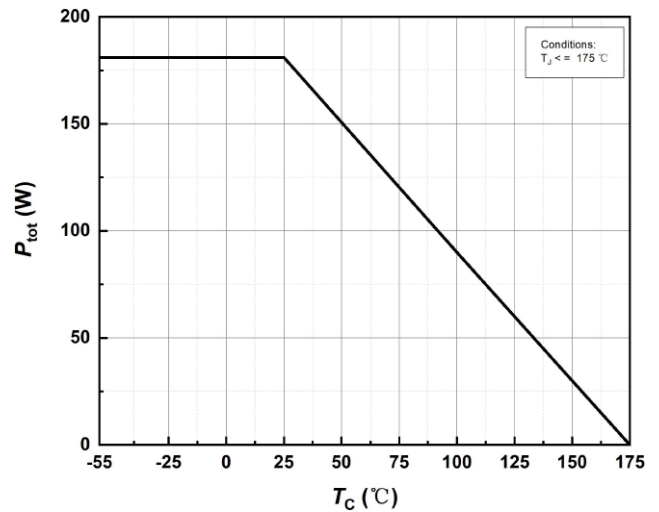


Figure 16. Maximum Power Dissipation Derating vs. Case Temperature

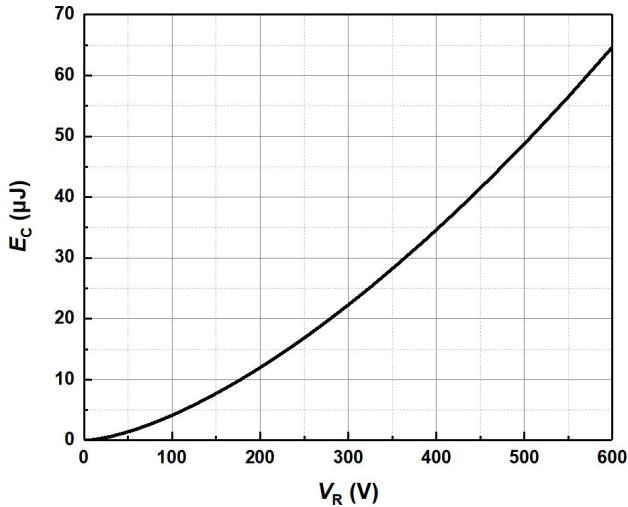


Figure 17. Output Capacitor Stored Energy

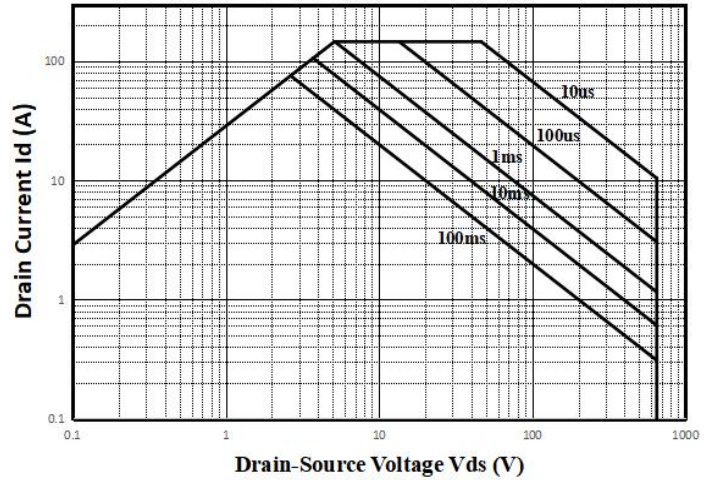


Figure 18. Safe Operating Area

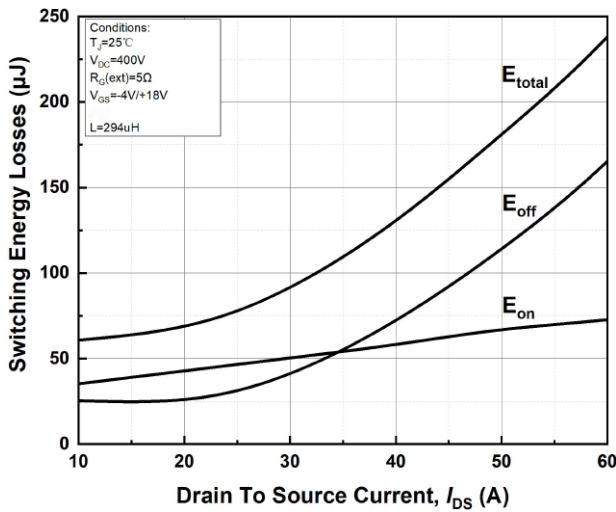


Figure 19. Clamped Inductive Switching Energy vs. Drain Current( $V_{DD} = 400V$ )

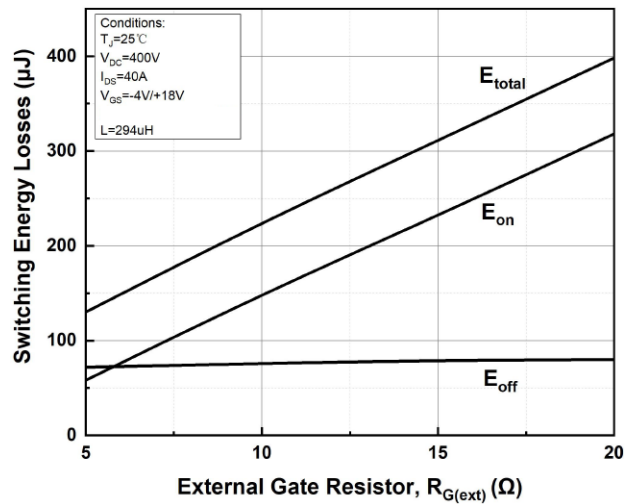


Figure 20. Clamped Inductive Switching Energy vs.  $R_{G(ext)}$

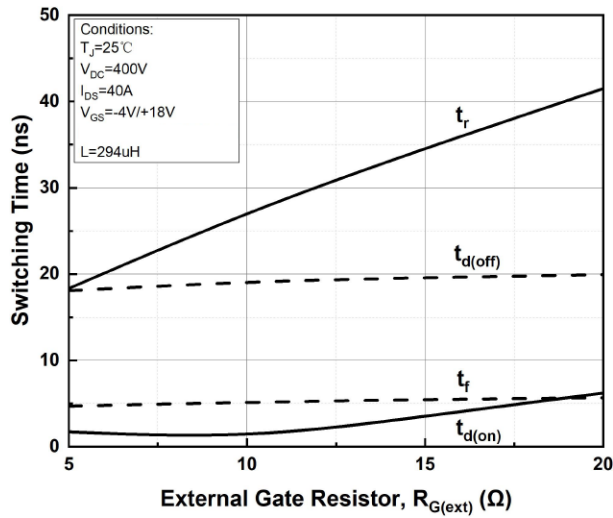
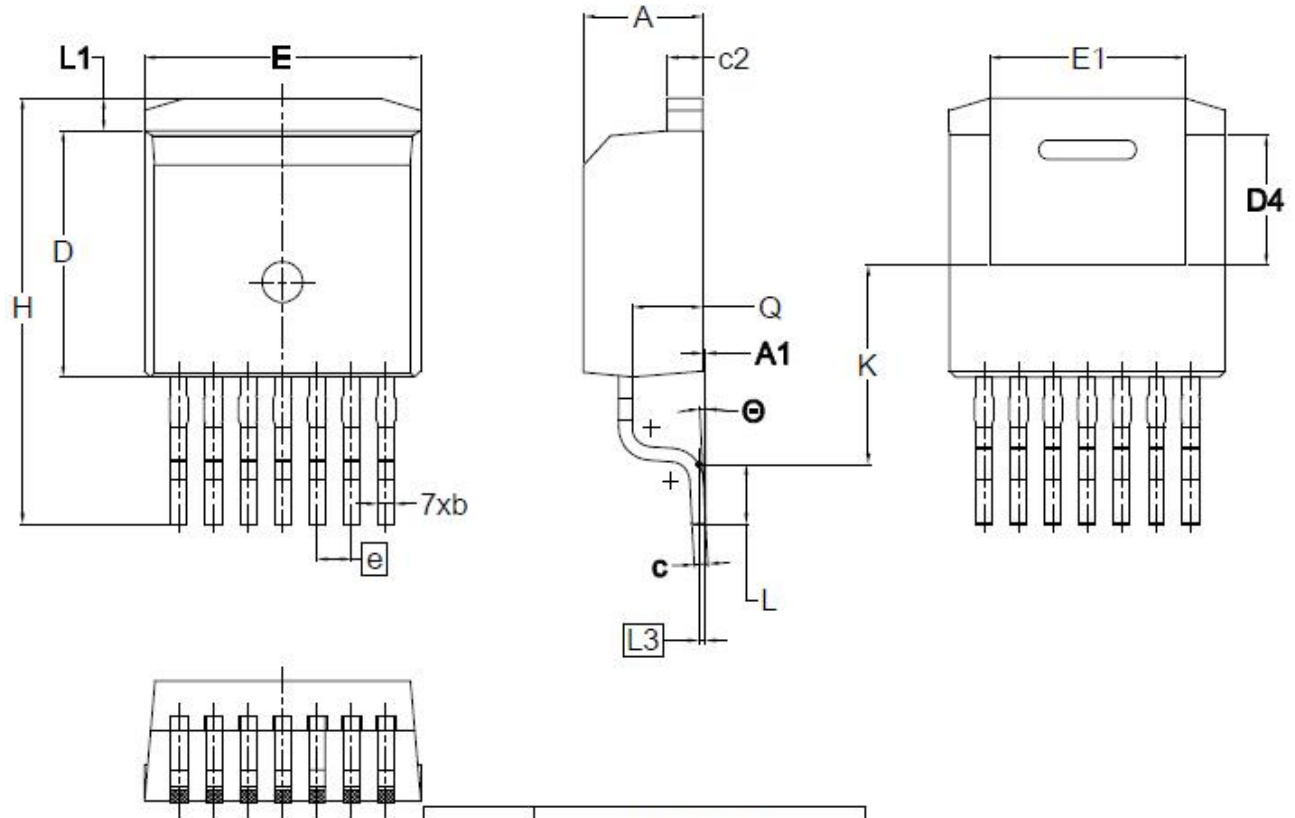


Figure 21. Switching Times vs.  $R_{G(\text{ext})}$



## Package Dimensions

Package TO-263-7L



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	4.30	4.40	4.50
A1	0.00	0.10	0.25
b	0.50	0.60	0.70
c	0.45	0.50	0.60
c2	1.20	1.30	1.40
D	8.93	9.08	9.23
D4	4.65	4.80	4.95
E	10.08	10.18	10.28
E1	6.82	7.22	7.62
e	1.27 BSC		
H	15.00	15.70	16.00
K	7.30		
L	1.90	2.20	2.50
L1	1.00	1.20	1.40
L3	0.25 BSC		
Q	2.45	2.60	2.75
Θ	0°	3°	7°



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