

Features

- Effectively lower down T_j and R_{th} , high anti-EMI ability
- High speed switching with low capacitances
- High blocking voltage with low $R_{DS(on)}$
- Easy to drive and parallel
- RoHS compliant

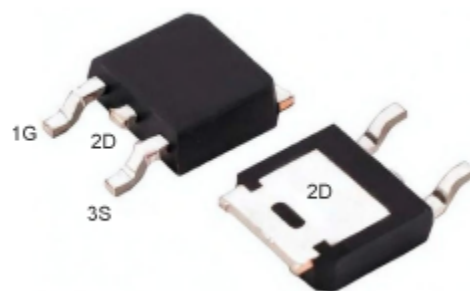
Benefits

- Increased power density
- Higher operating frequency
- Reduced heat sink requirements
- Higher efficiency
- EMI reduction

Applications

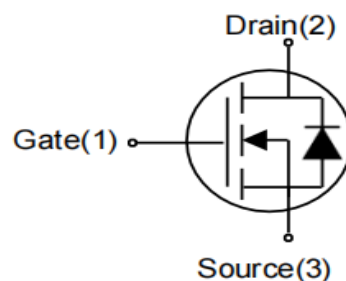
- Power factor correction modules
- Switch mode power supplies
- Power inverters
- High voltage converters

Parameter	Rating	Units
V_{DS}	800	V
$I_D @ 25^\circ C$	4	A
$R_{DS(on)}$	900	mΩ



TO-252 (DPAK) Package

Part Number	Package	Marking
GC3M090065E	TO-252 (DPAK)	GC3M090065



Maximum Ratings ($T_c=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Value	Unit	Note
V_{DSmax}	Drain-Source Voltage	$V_{GS} = 0V, I_D = 100\mu A$	800	V	
V_{GS}	Gate-Source voltage (transient)	$t_p \leq 500ns, \text{ duty cycle } \leq 1\%$	-8/+22	V	
V_{GSop}	Recommend Gate-Source Voltage	Static	-4/+18	V	
$V_{GSop,max}$	Maximum recommend Gate-Source Voltage		-5/+20	V	
EAS	Single pulse avalanche energy	$V_{DS}=800V, V_{DD}=50V, V_{GS}=15V, L=1mH, T_c=25^{\circ}\text{C}$	32	mJ	
I_D	Continuous Drain current ⁽¹⁾	$V_{GS} = 15V, T_c = 25^{\circ}\text{C}$	4	A	Fig. 14
		$V_{GS} = 15V, T_c = 100^{\circ}\text{C}$	3		
I_{DM}	Pulsed Drain Current ⁽²⁾	Pulse width t_p limited by T_{jmax}	30	A	Fig. 18
P_D	Power Dissipation	$T_c = 25^{\circ}\text{C}, T_j = 175^{\circ}\text{C}$	20	W	Fig. 16
T_j	Operating junction temperature		-55~175	$^{\circ}\text{C}$	
T_{stg}	Storage temperature		-55~175	$^{\circ}\text{C}$	

Thermal Characteristics

Symbol	Parameter	Value			Unit	Note
		Min.	Typ.	Max.		
$R_{th(jc)}$	Thermal resistance from Junction to Case		3.5		K/W	Fig. 15
$R_{th(ja)}$	Thermal resistance from Junction to Ambient		40		K/W	

Electrical Characteristics $T_j=25^{\circ}\text{C}$ unless otherwise specified

Static Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$V_{(BR)DSS}$	Drain-Source Breakdown voltage	$V_{GS} = 0V, I_D = 100\mu A$	800			V	
$V_{GS(th)}$	Gate Threshold voltage	$V_{GS} = V_{DS}, I_D = 10mA$		3.2		V	Fig. 9
		$V_{GS} = V_{DS}, I_D = 10mA, T_j=175^{\circ}\text{C}$		2.2			
I_{GSS}	Gate-Source Leakage current	$V_{GS} = 15V, V_{DS} = 0V$			250	nA	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = 800V, V_{GS} = 0V, T_j = 25^{\circ}\text{C}$		1	50	μA	
$R_{DS(on)}$	Drain-Source On-state Resistance	$V_{GS} = 15V, I_D = 0.5A$ $V_{GS} = 18V, I_D = 0.5$		900 700		m Ω	Fig. 3, 4, 5
		$V_{GS} = 15V, I_D = 0.5A, T_j = 175^{\circ}\text{C}$ $V_{GS} = 18V, I_D = 0.5A, T_j = 175^{\circ}\text{C}$		1000 800			
g_{fs}	Transconductance	$V_{DS} = 10V, I_D = 1A$		30		S	Fig. 6
		$V_{DS} = 10V, I_D = 1A, T_j = 175^{\circ}\text{C}$		28			

Gate Charge Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
Q_{GS}	Gate to Source Charge	$V_{GS} = -4/+18V$, $V_{DS} = 400V$, $I_D = 1A$, $T_j = 25^{\circ}C$		1		nC	Fig. 10
Q_{GD}	Gate to Drain Charge			4			
Q_G	Total Gate Charge			8			

AC Characteristics ($T_j=25^{\circ}C$ unless otherwise specified)

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
C_{iss}	Input Capacitance	$V_{GS} = 0V$, $V_{DS} = 400V$, $f = 100KHz$, $T_j = 25^{\circ}C$		165		pF	Fig. 13
C_{oss}	Output Capacitance			10		pF	
C_{rss}	Reverse Transfer Capacitance			2		pF	
$R_{G(int)}$	Internal Gate Resistance	$f = 1\text{ MHz}$, $V_{AC} = 25mV$		12		Ω	

Reverse Diode Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Diode Forward Voltage	$V_{GS} = -4\text{V}, I_{SD} = 1.25\text{A}$		4.3		V	Fig. 7,8
		$V_{GS} = -4\text{V}, I_{SD} = 1.25\text{A}, T_J = 175^{\circ}\text{C}$		3.8			
I_S	Continuous Diode Forward Current	$V_{GS} = -4\text{V}, T_C = 25^{\circ}\text{C}$		7.4		A	
$I_{S, pulse}$	Diode pulse Current	$V_{GS} = -4\text{V}$, pulse width t_p limited by T_{Jmax}		32		A	
t_{rr}	Reverse Recovery Time	$V_{GS} = -4\text{V}, I_{SD} = 2.5\text{A}, V_R = 400\text{V}$ $dif/dt = 1000\text{A/us}$		33		nS	
Q_{rr}	Reverse Recovery Charge			35		nC	
I_{rm}	Peak Reverse Recovery Current			1.9		A	

Switching Characteristics

Symbol	Parameter	Test conditions	Value			Unit	Note
			Min.	Typ.	Max.		
$t_{d(on)}$	Turn-On Delay Time	$V_{DS} = 400\text{V}, V_{GS} = -4/+15\text{V}$ $I_D = 2.5\text{A}, R_{G(ext)} = 20\Omega$ $L = 2.4\text{mH}$		1		nS	Fig.22
t_r	Rise Time			6		nS	
$t_{d(off)}$	Turn-Off Delay Time			4		nS	
t_f	Fall Time			12		nS	
E_{on}	Turn-On Energy			5		μJ	Fig.19
E_{off}	Turn-Off Energy			3		μJ	
E_{tot}	Total switching energy			8		μJ	

Typical Characteristics

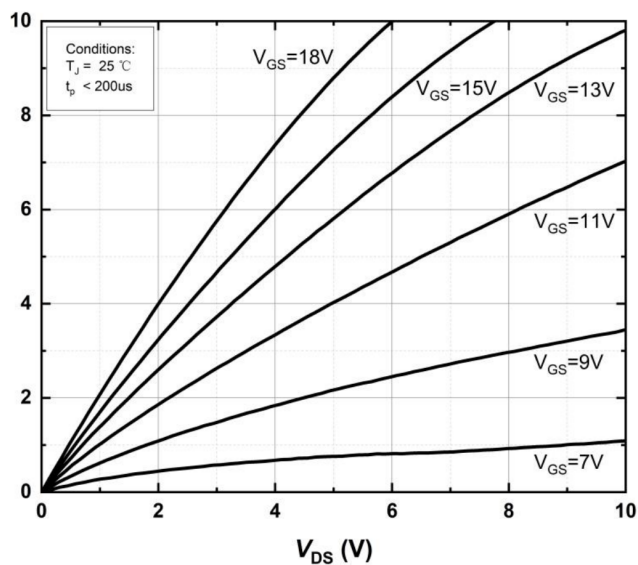


Figure 1. Output characteristics at $T_j = 25^\circ\text{C}$

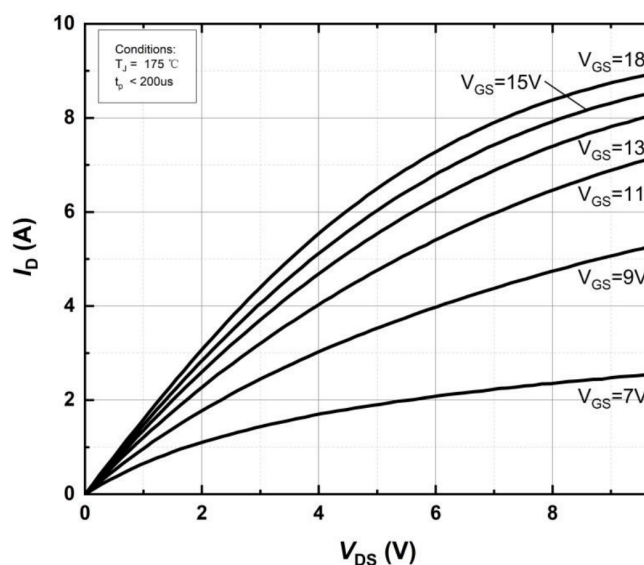


Figure 2. Output characteristics at $T_j = 175^\circ\text{C}$

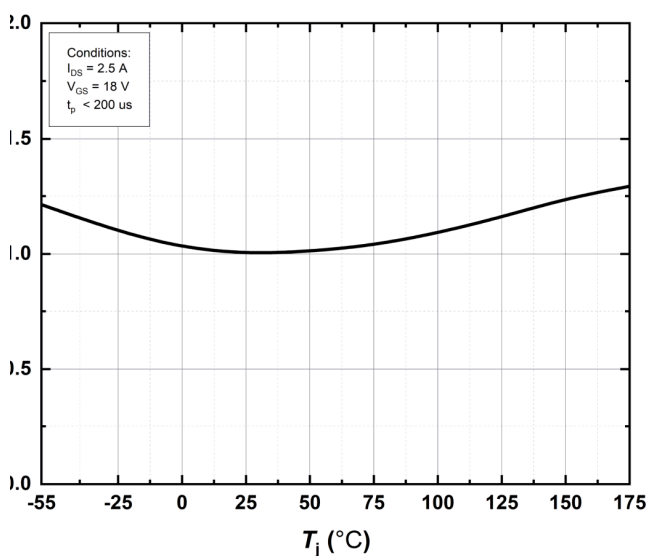


Figure 3. Normalized On-Resistance vs. Temperature

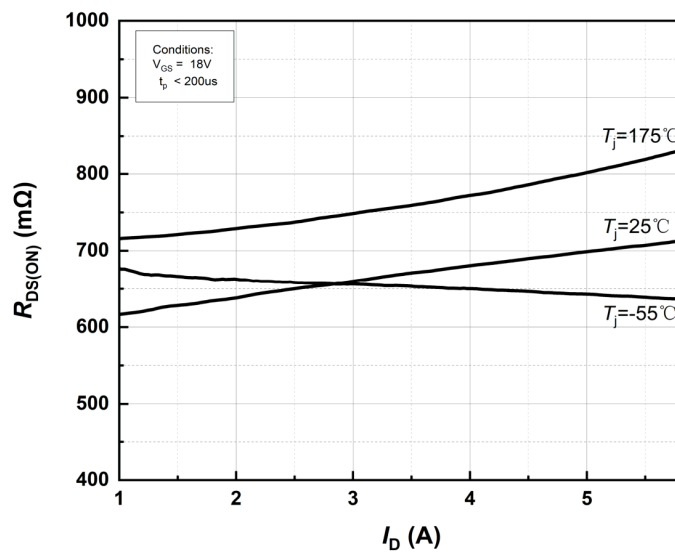


Figure 4. On-Resistance vs. Drain current for Various Temperature

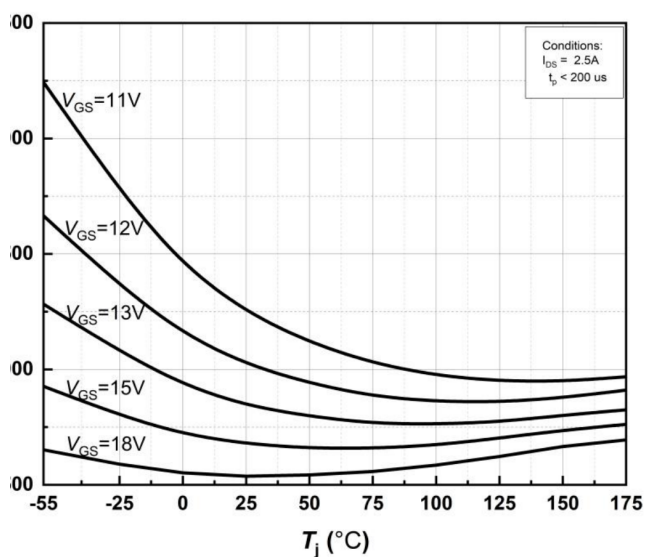


Figure 5. On-Resistance vs. Temperature for Various Gate Voltage

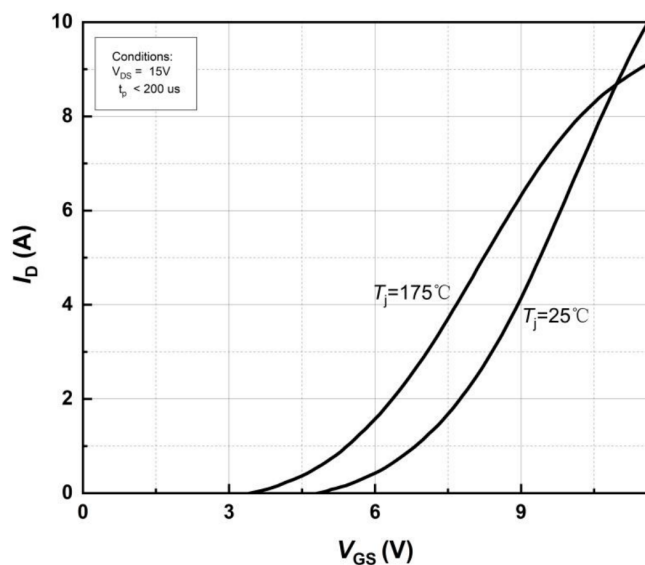


Figure 6. Transfer Characteristics for Various Junction Temperatures

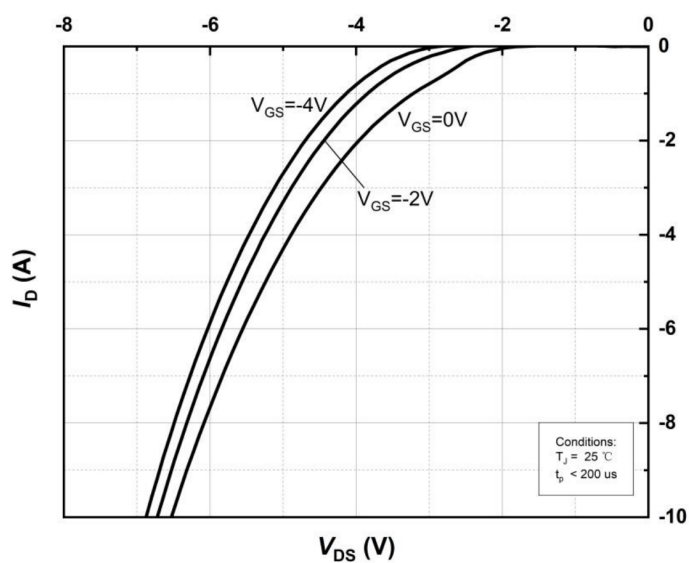


Figure 7. Body Diode Characteristics at T_J=25°C

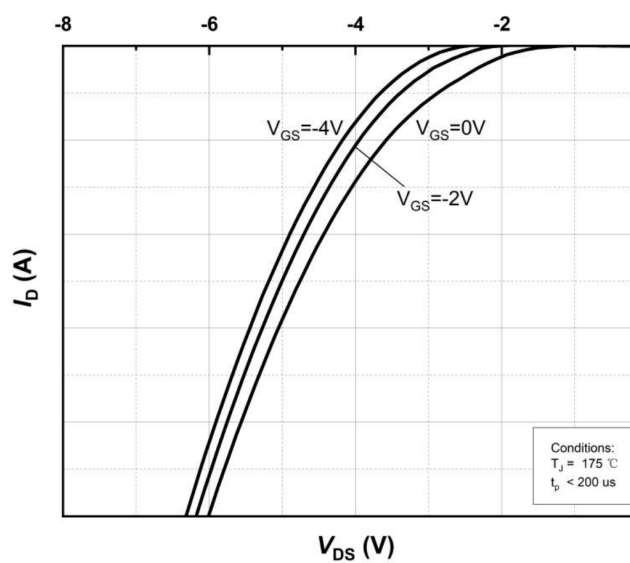


Figure 8. Body Diode Characteristics at T_J=175°C

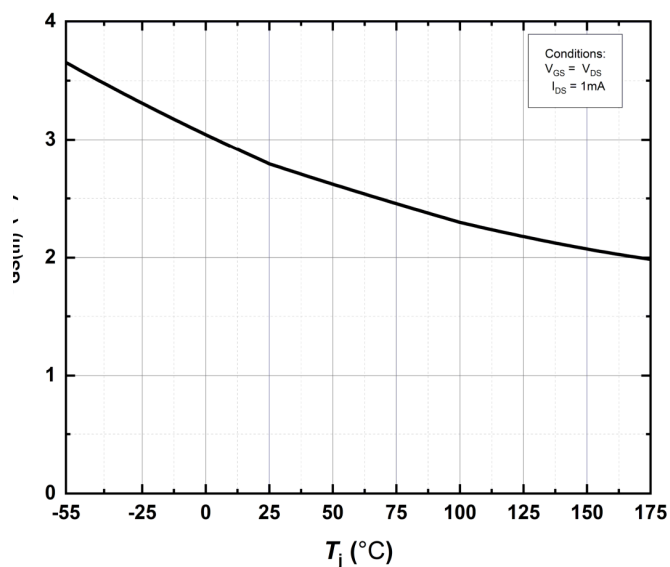


Figure 9. Threshold Voltage vs. Temperature

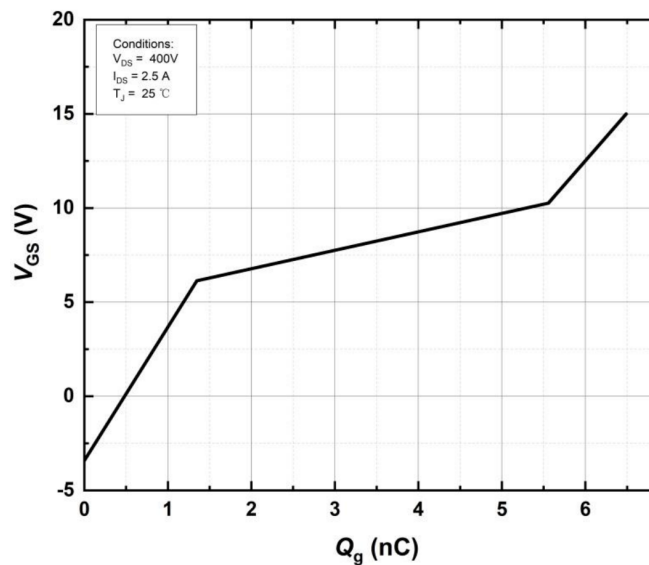


Figure 10 Gate Charge Characteristics

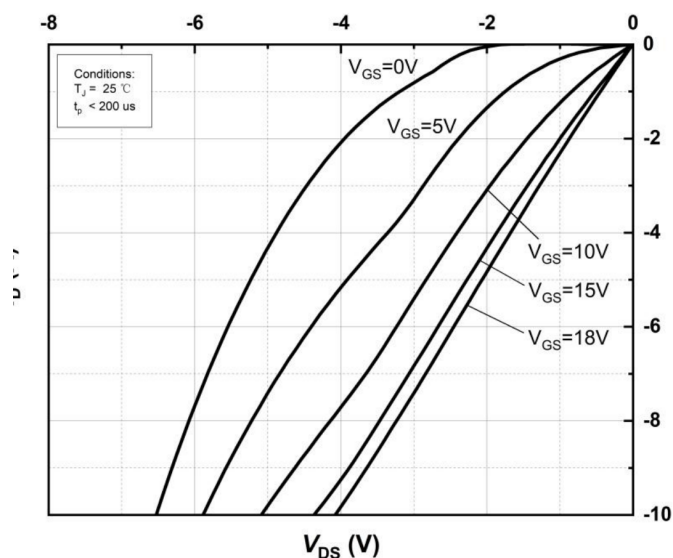


Figure 11. 3rd Quadrant Characteristic at Tj=25°C

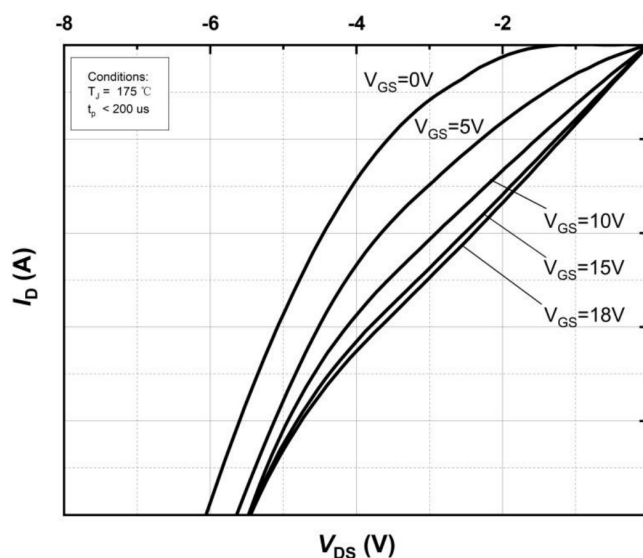


Figure 12. 3rd Quadrant Characteristic at Tj=175°C

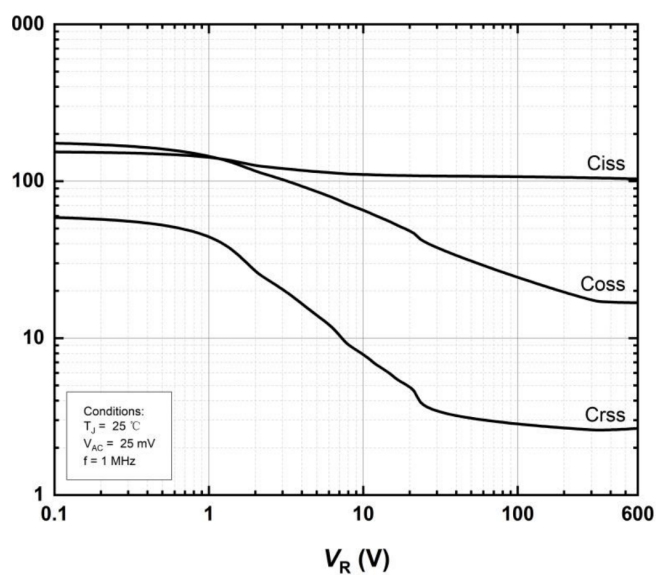


Figure 13. Capacitances vs. Drain-Source Voltage (0 – 600V)

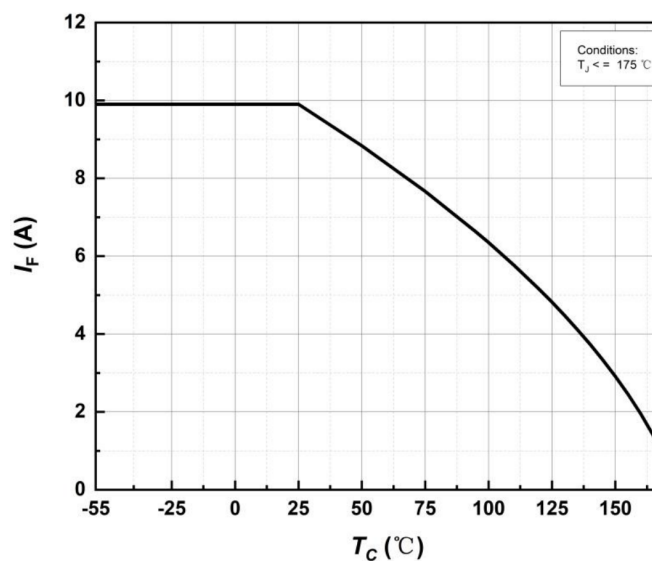


Figure 14. Continuous Drain Current Derating vs Case Temperature

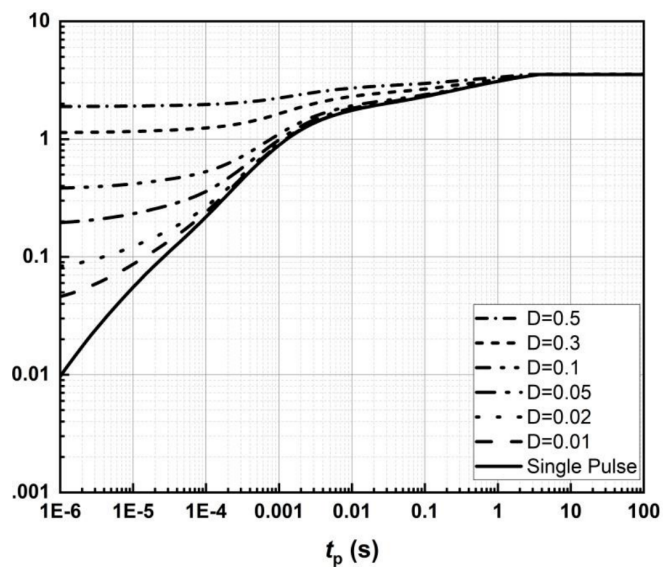


Figure 15. Transient Thermal Impedance (Junction – Case)

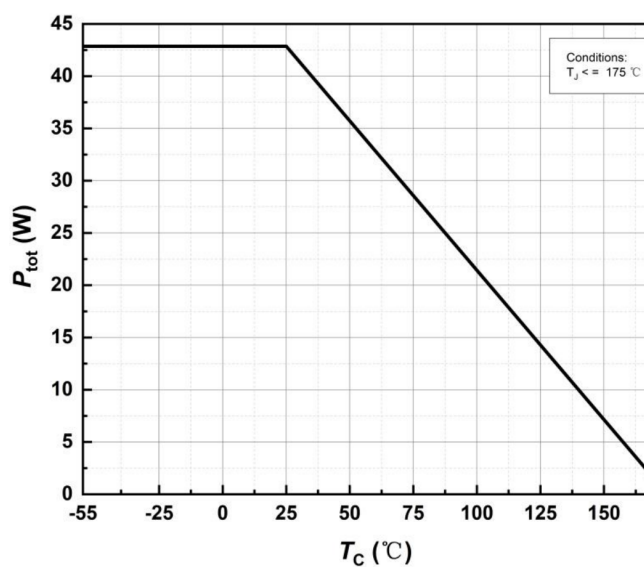


Figure 16. Maximum Power Dissipation Derating vs Case Temperature

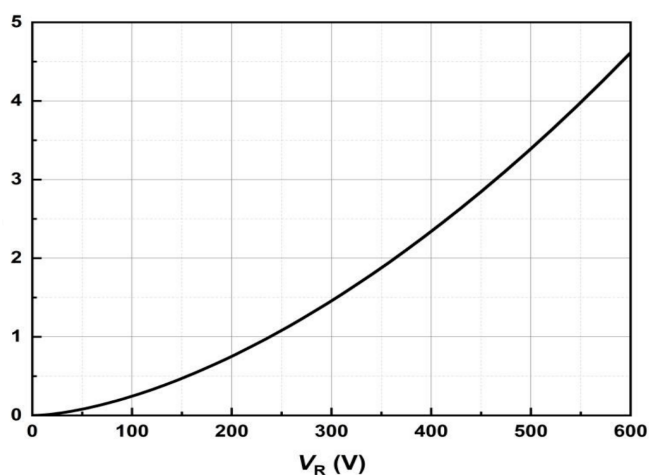


Figure 17. Output Capacitor Stored Energy

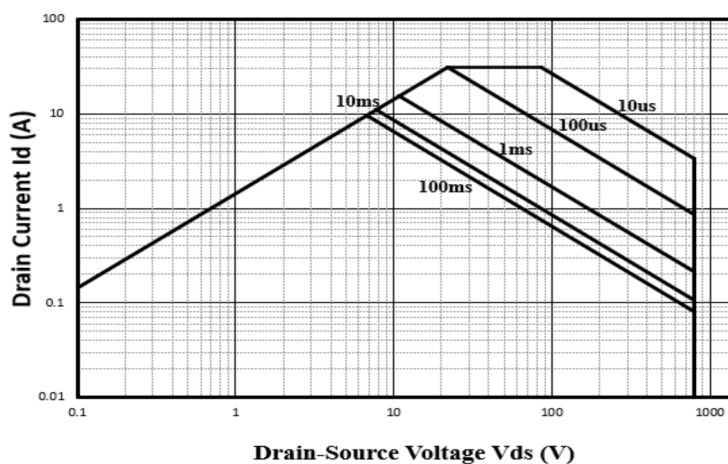


Figure 18. Safe Operating Area

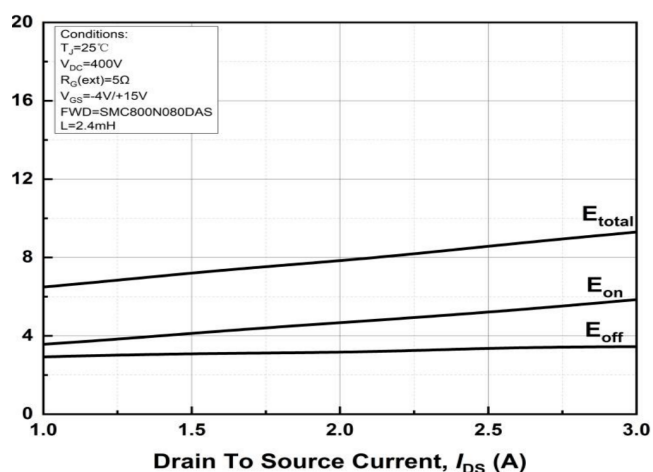


Figure 19. Clamped Inductive Switching Energy vs. Drain Current($V_{DD} = 400V$)

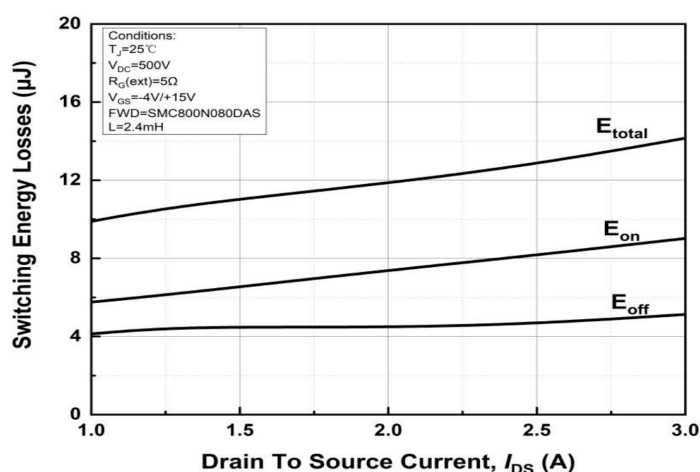


Figure 20. Clamped Inductive Switching Energy vs. Drain Current($V_{DD} = 500V$)

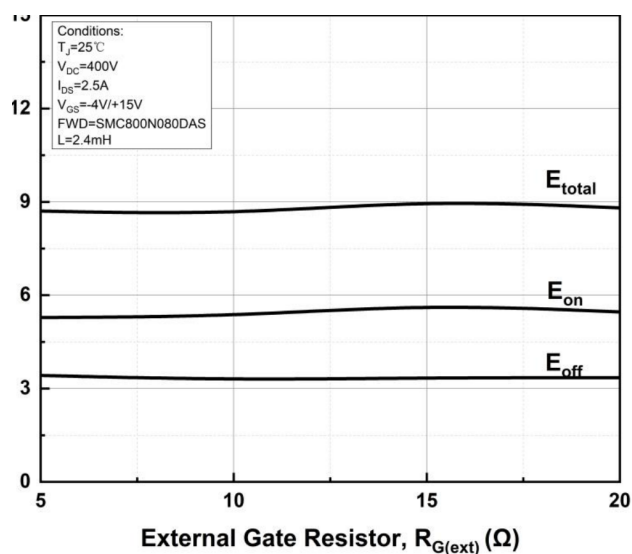


Figure 21. Clamped Inductive Switching Energy vs. $R_{G(\text{ext})}$

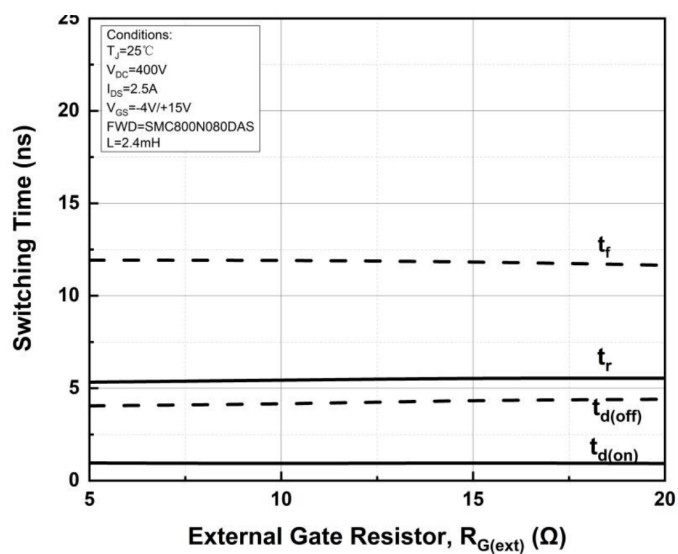
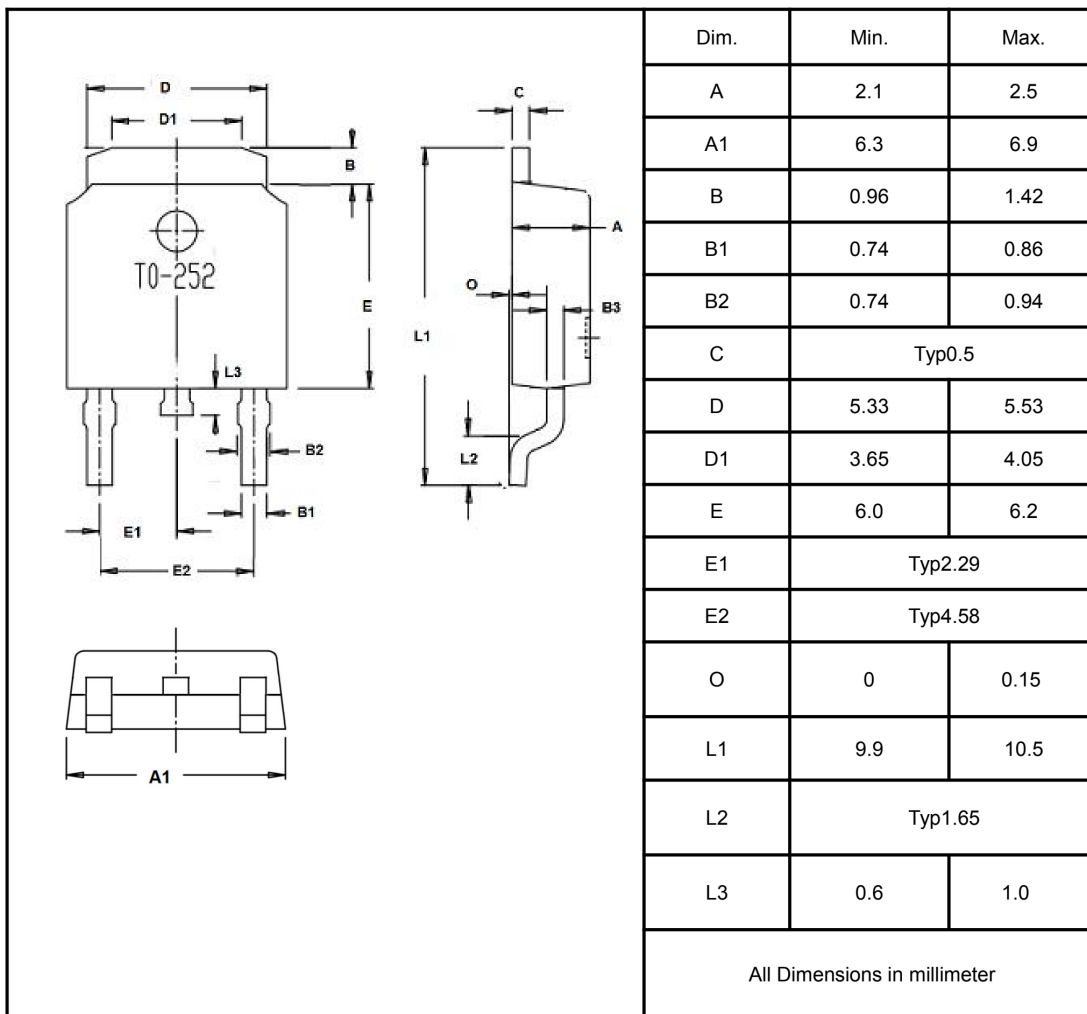


Figure 22. Switching Times vs. $R_{G(\text{ext})}$

Package Outline Dimension: TO-252 (DPAK)



Revision History

Revision	Date of Release	Description of Changes
Rev 0.3	2026-01-17	Updatethedatasheet.