SEMICONDUCTOR

SC290N75M

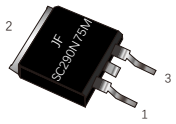
750V 13A N- Channel SIC Power MOSFET

Features

- High blocking voltage with low on-resistance
- High speed switching with low capacitance
- Wide Bandgap SiC MOSFET Technology
- Halogen free, RoHs compliant

Product Summary			
V_{DS}	$R_{DS(on)}$(mΩ)Typ	I_D(A)	Qg(Typ)
750V	290@ 18V 4.5A	13	11.2nc

TO-252
(DPAK)



Mechanical Data

- Case:TO-252 Package

Application

- Switch Mode Power Supplies
- High Voltage DC/DC Converters
- Battery Chargers
- Pulsed Power Applications
- Motor Drives

Pin Definition:

1. Gate
2. Drain
3. Source

Block Diagram

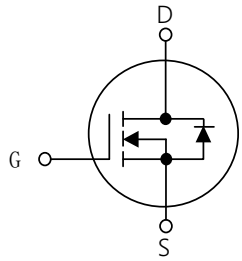


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	750	V
Gate-Source Voltage(Max)		$V_{GS(max)}$	-8/+22	V
Continuous Drain Current	T_C=25°C	I_D	13	A
	T_C=100°C		9	
Pulsed Drain Current (Note 1)		I_{DM}	26	A
Single Pulse Avalanche Energy(Note 2)		E_{AS}	72	mJ
Repetive Avalanche Energy(Note 2)		E_{AR}	52.5	mJ
Power Dissipation	T_C=25°C	P_D	57	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~+175	°C

Table 2.Thermal Characteristics

Parameter	Symbol	SC290N75M	Unit
Thermal resistance Junction to Case	$R_{\theta JC}$	2.63	°C/W

Table 3. Electrical Characteristics (T_J=25°C, unless otherwise specified)

Parameter		Symbol	Test Conditions	Min	Typ	Max	Unit
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS}=0V,I_D=500μA	750	-	-	V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=750V,V_{GS}=0V	-	-	10	μA
Gate- Source Leakage Current	Forward	I_{GSS}	V_{GS}=18V,V_{DS}=0V	-	-	250	nA
	Reverse		V_{GS}=-4V,V_{DS}=0V	-	-	-250	nA
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=10mA	2.0	-	3.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=15V,I_D= 4.5A,T_J=25°C	-	400	550	mΩ
			V_{GS}=18V,I_D=4.5A,T_J=25°C	-	290	378	
Gate Resisitance		R_G	f=1MHz	-	25	-	Ω
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS}=600V,V_{GS}=0V, f=1MHz	-	203	-	pF
Output Capacitance		C_{OSS}		-	25	-	pF
Reverse Transfer Capacitance		C_{RSS}		-	3.5	-	pF
Turn-On Delay Time		td(on)	V_{DS}=400V,I_D=4.5A V_{GS}=-4/10V,R_G=2.5Ω, T_J=25°C	-	3	-	ns
Turn-On Rise Time		t_R		-	8	-	ns
Turn-Off Delay Time		td(off)		-	6	-	ns
Turn-Off Fall Time		tf		-	11	-	ns
Total Gate Charge		Q_G	V_{DD}=400V,I_D=4.5A, V_{GS}=-4/15V	-	12	-	nC
Gate-Source Charge		Q_{GS}		-	2	-	nC
Gate-Drain Charge		Q_{GD}		-	5.2	-	nC
Drain-Source Diode Characteristics and Maximum Ratings(Note 3)							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V,I_S=4.5A	-	4.7	-	V
Continuous Diode Forward Current		I_S		-	20	-	A
Reverse Recovery Time		trr	V_R=400V,V_{GS}=0V I_{SD}=4.5A, di/dt=530A/us	-	12	-	ns
Recovered charge		Qrr		-	56	-	nC
Peak reverse recovery current		Irrm		-	5.2	-	A

Notes: 1 Repetitive Rating:Pulse width limited by maximum junction temperature
2 E_{AS}: L=1mH,V_{DD}=50V,Starting T_J=25℃,R_G=25Ω
3 Pulse Test: Pulse width ≤300μS,Duty cycle≤2%

Typical Characteristics Diagrams

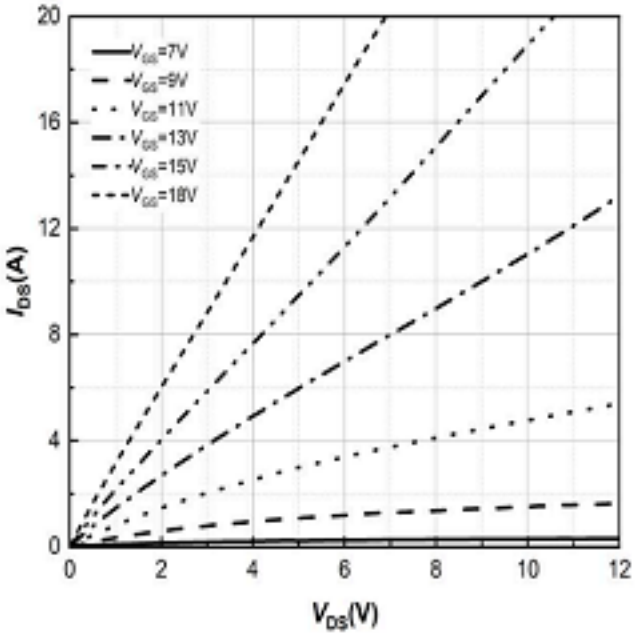


Figure 1. **Output Characteristics**
T_j=-40°C

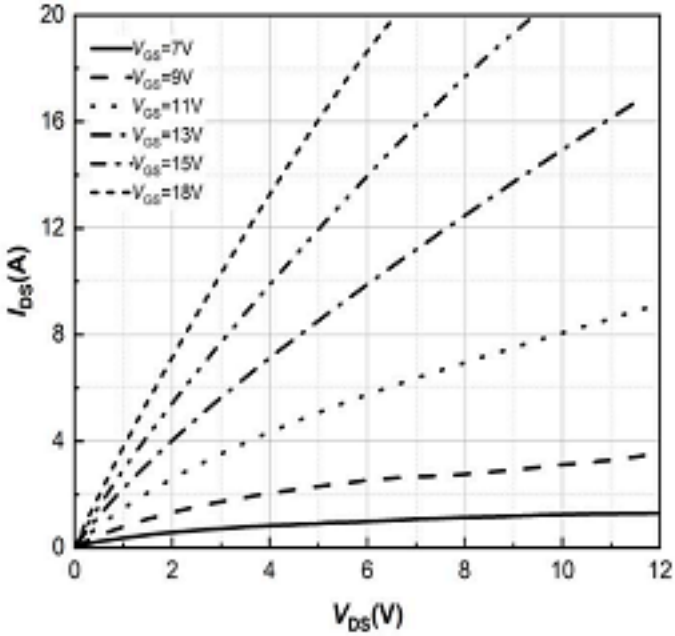


Figure 2. **Output Characteristics**
T_j=25°C

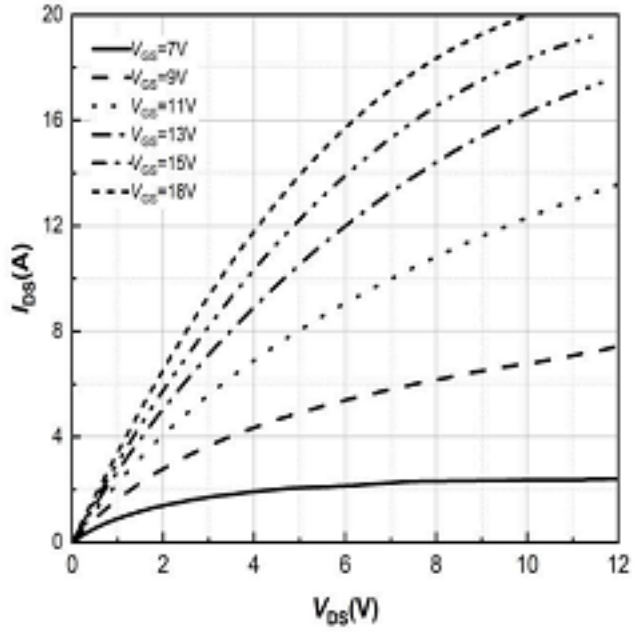


Figure 3. **Output Characteristics**
T_j=175°C

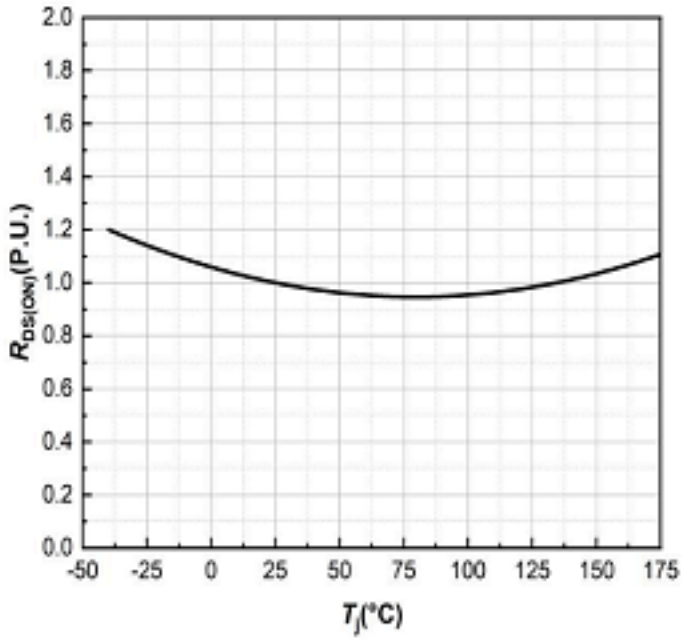


Figure 4. **Normalized On-Resistance vs. Temperature**

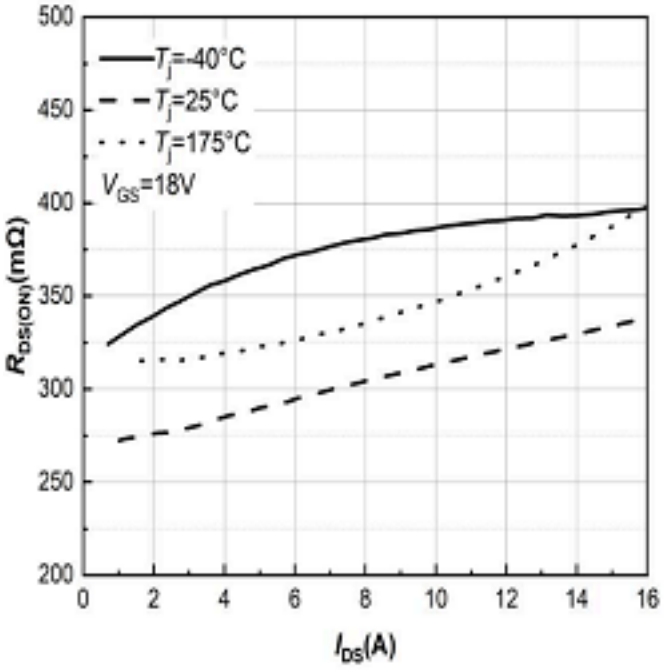


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

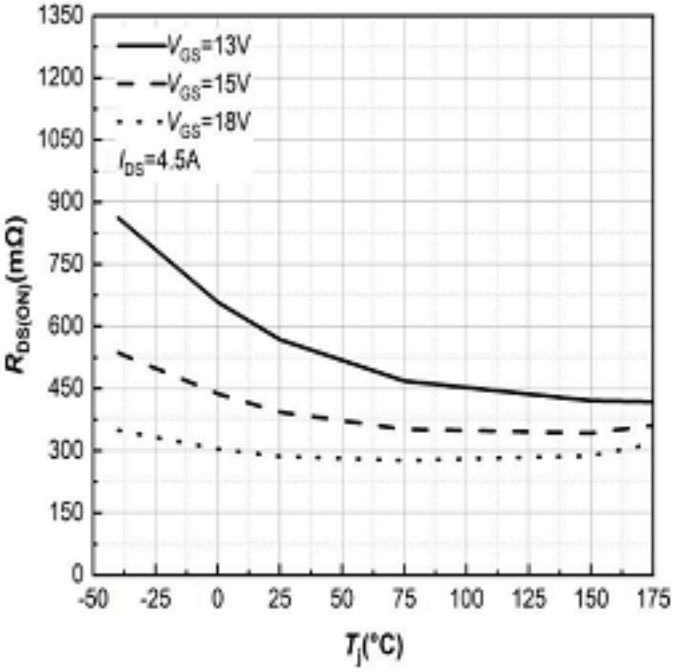


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

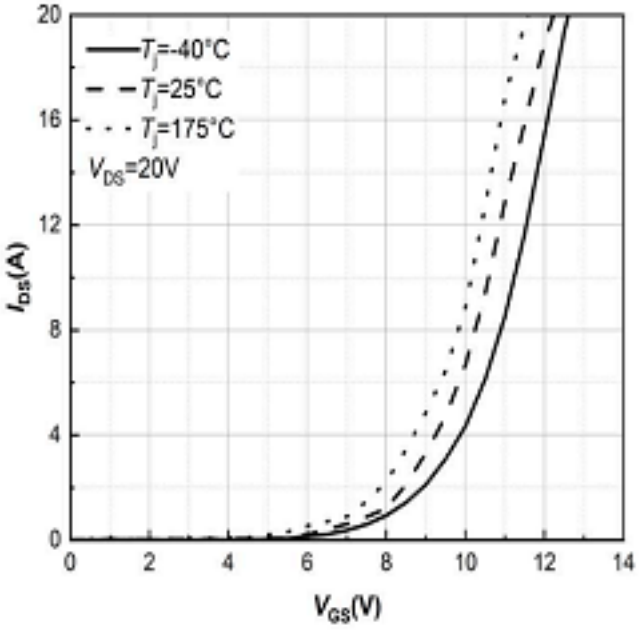


Figure 7. **Transfer Characteristic for Various Junction Temperatures**

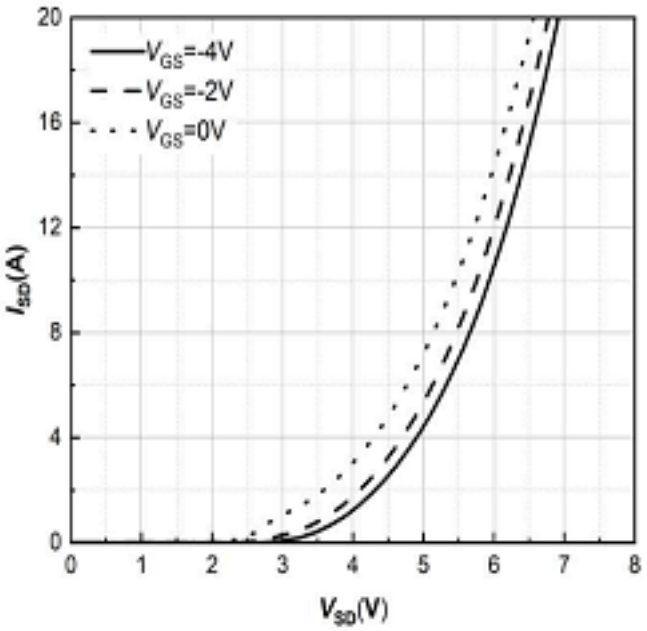


Figure 8. **Body Diode Characteristic T_j=-40°C**

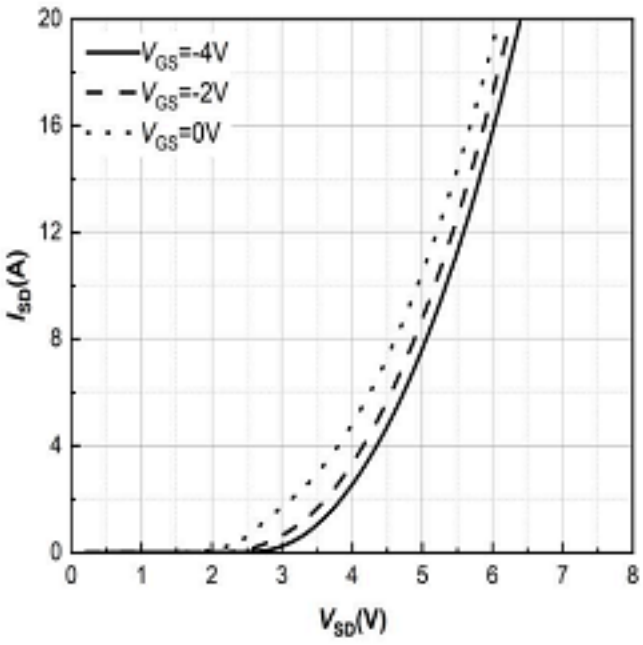


Figure 9. **Body Diode Characteristic T_j=25°C**

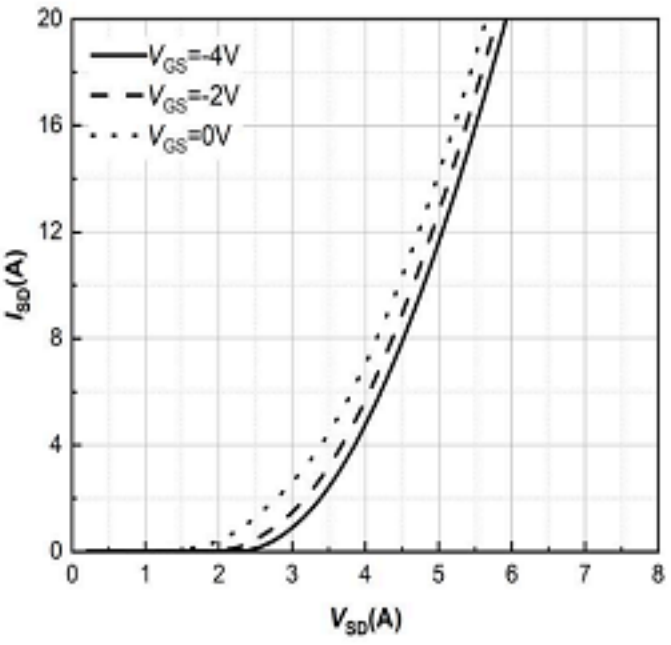


Figure 10. **Body Diode Characteristic T_j=175°C**

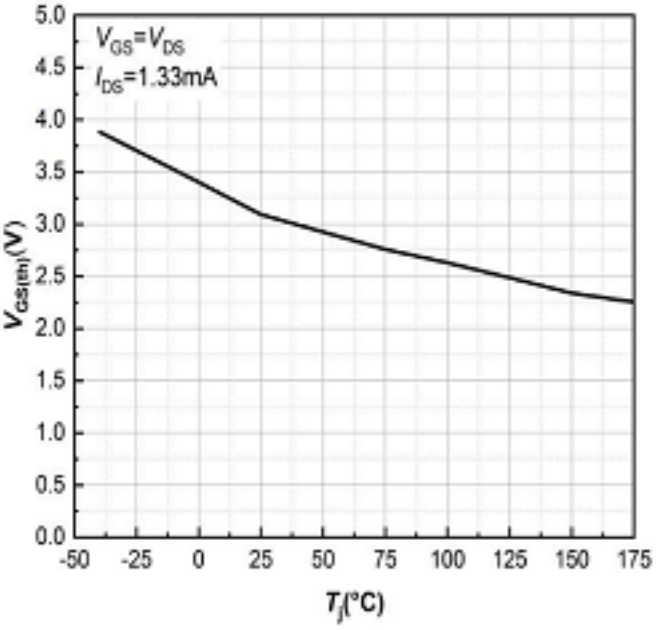


Figure 11. **Threshold Voltage vs. Temperature**

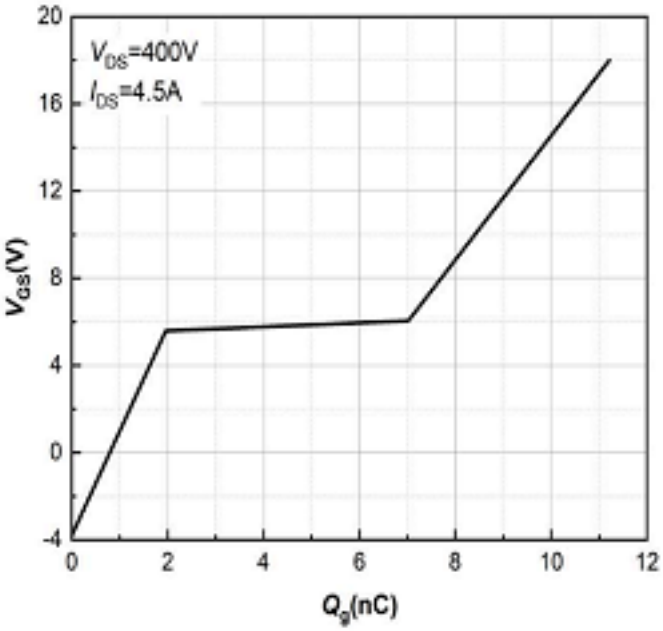


Figure 12. **Gate Charge Characteristics**

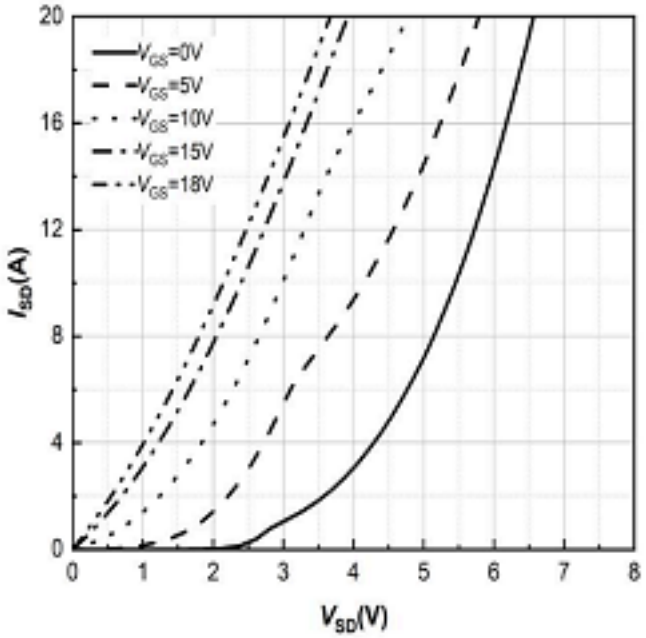


Figure 13. **3rd Quadrant Characteristic T_j=-40°C**

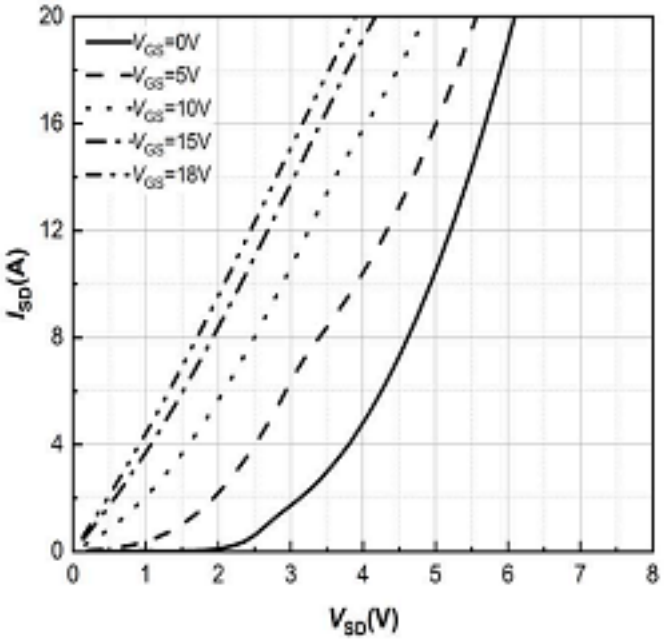


Figure 14. **3rd Quadrant Characteristic T_j=25°C**

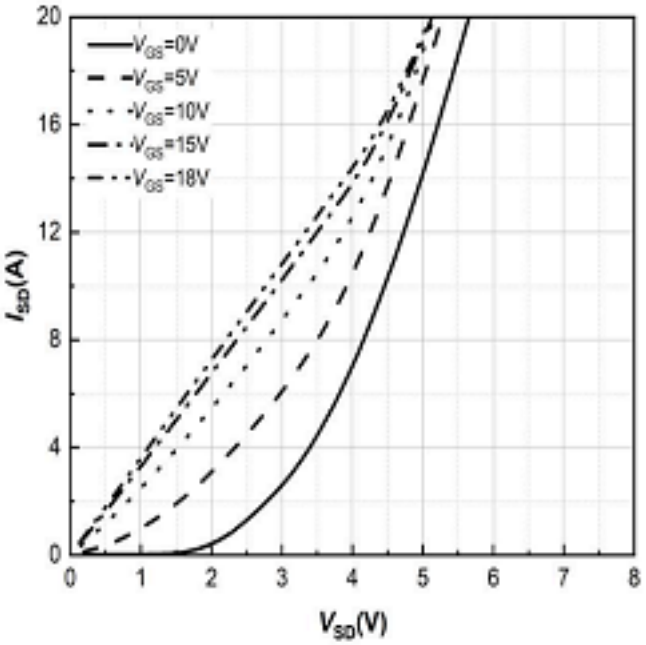


Figure 15. **3rd Quadrant Characteristic T_j=175°C**

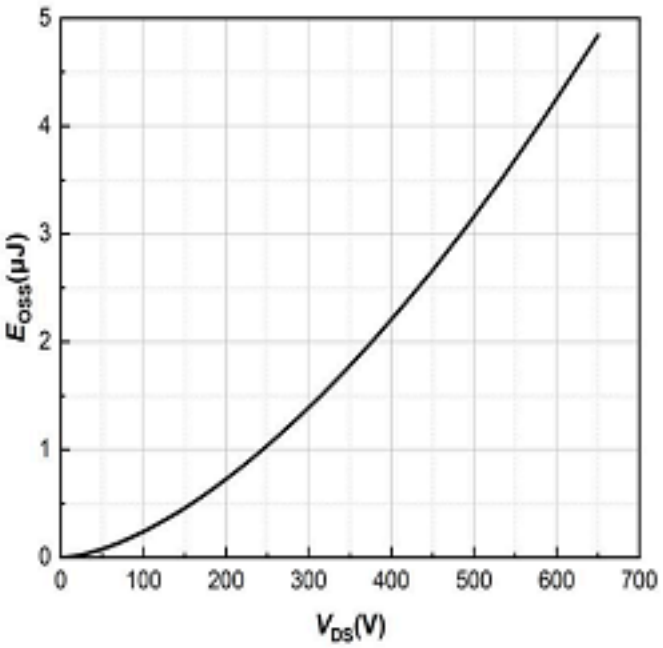


Figure 16. **Output Capacitor Stored Energy**

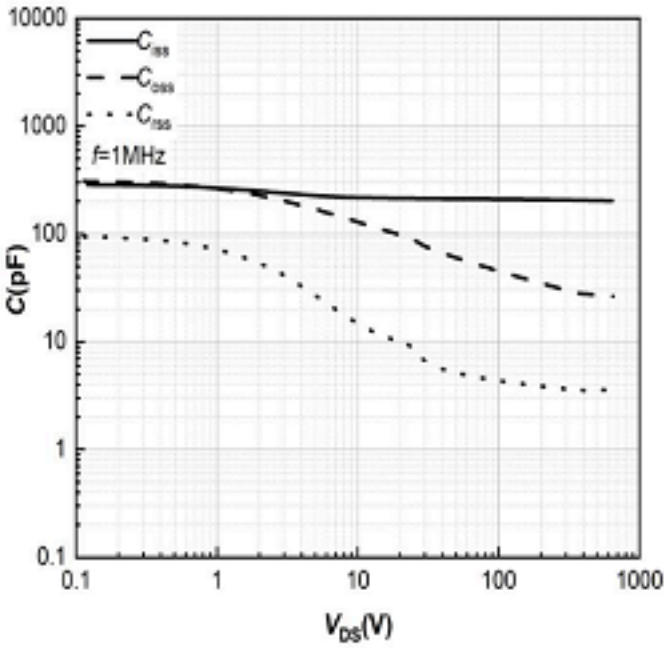


Figure 17. **Capacitances vs. Drain-Source**

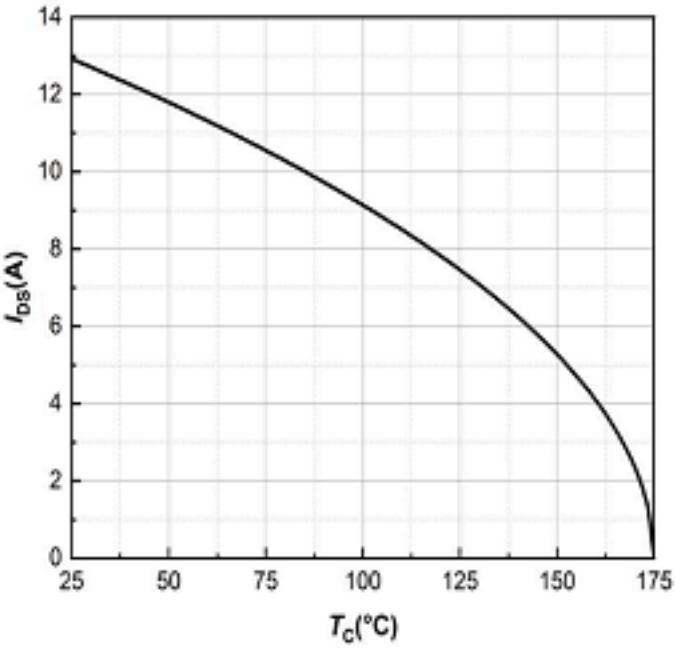


Figure 18. **Continuous Drain Current Derating vs. Case Temperature**

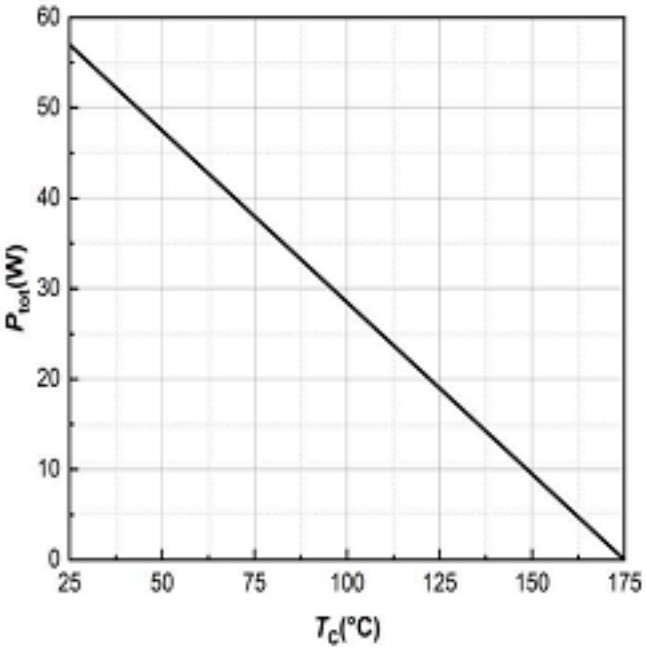


Figure 19. **Maximum Power Dissipation Derating vs. Case Temperature**

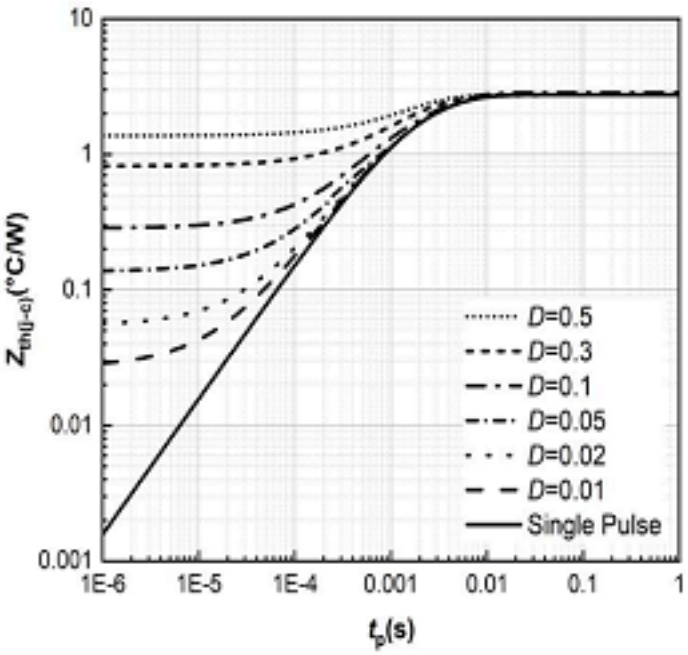


Figure 20. **Transient Thermal Impedance**

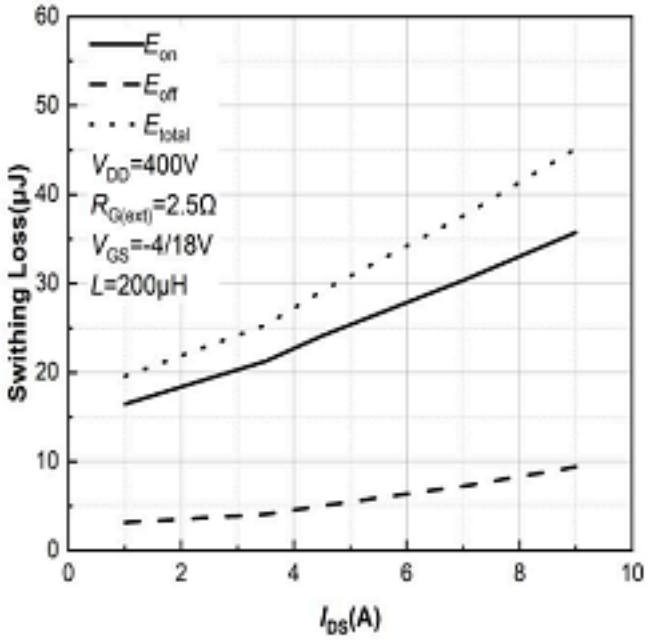


Figure 21. **Clamped Inductive Switching Energy vs. Drain Current T_j=25°C**

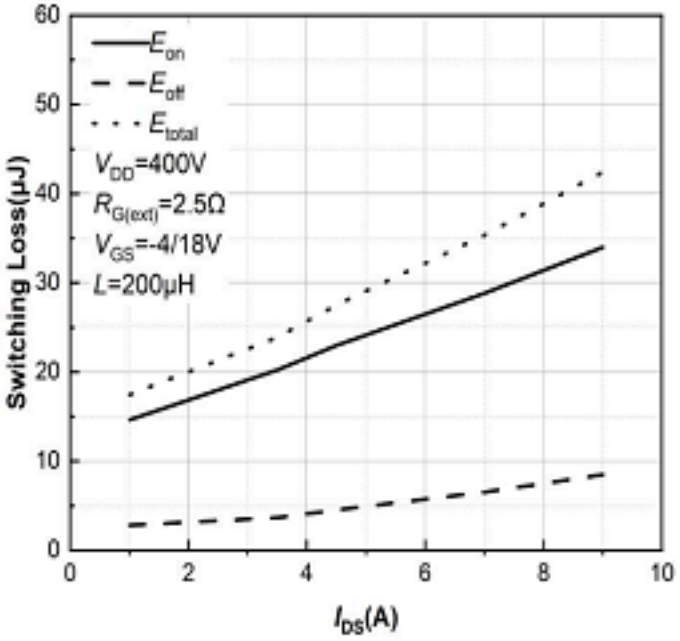


Figure 22. **Clamped Inductive Switching Energy vs. Drain Current T_j=175°C**

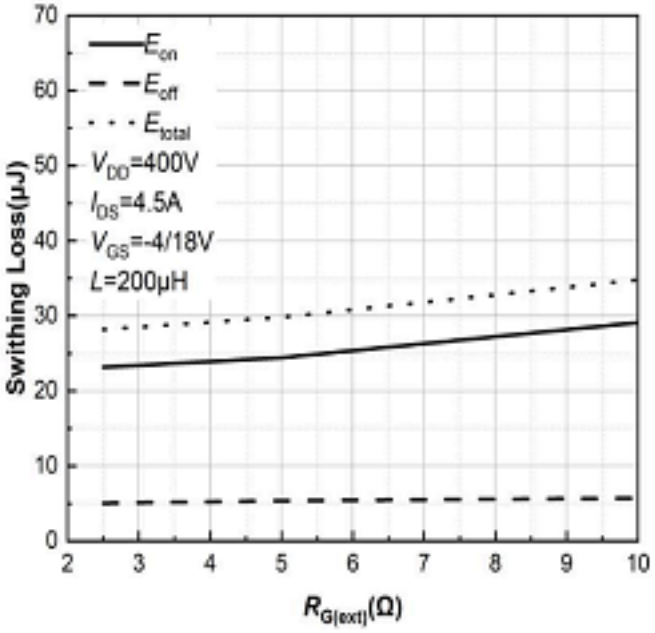


Figure 23. **Clamped Inductive Switching Energy vs. $R_{G(ext)}$ T_j=25°C**

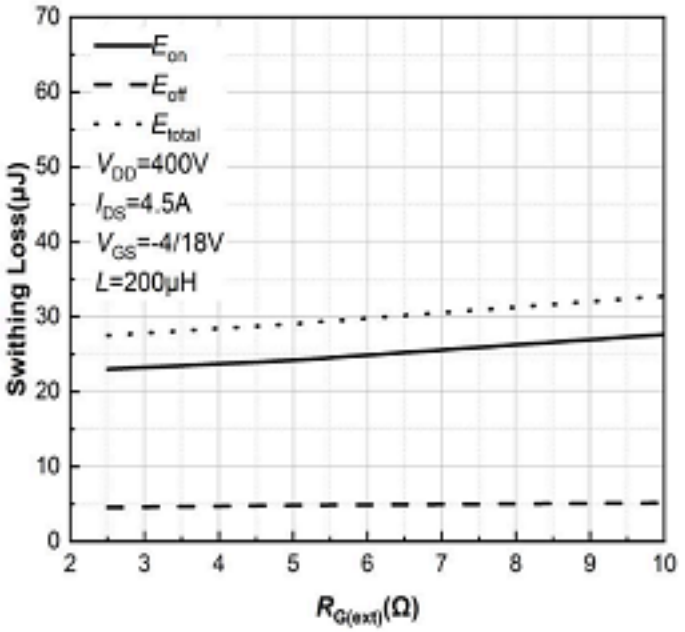


Figure 24. **Clamped Inductive Switching Energy vs. $R_{G(ext)}$ T_j=175°C**

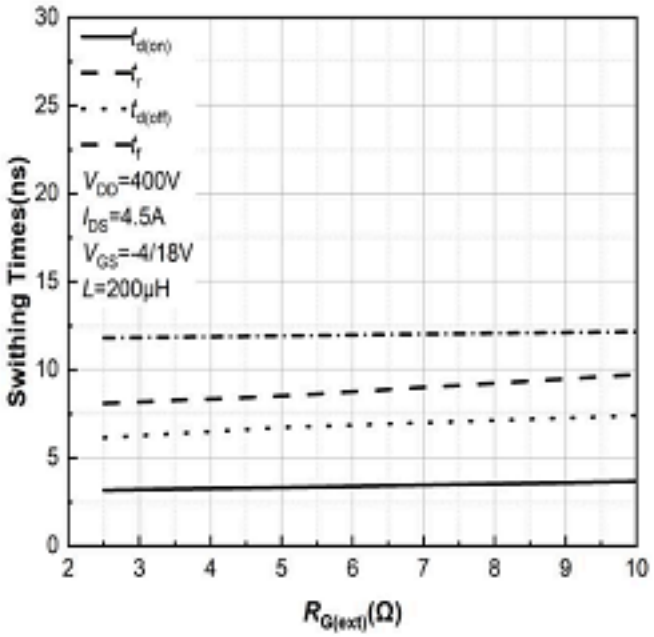


Figure 25. **Switching Times vs. $R_{G(ext)}$ T_j=25°C**

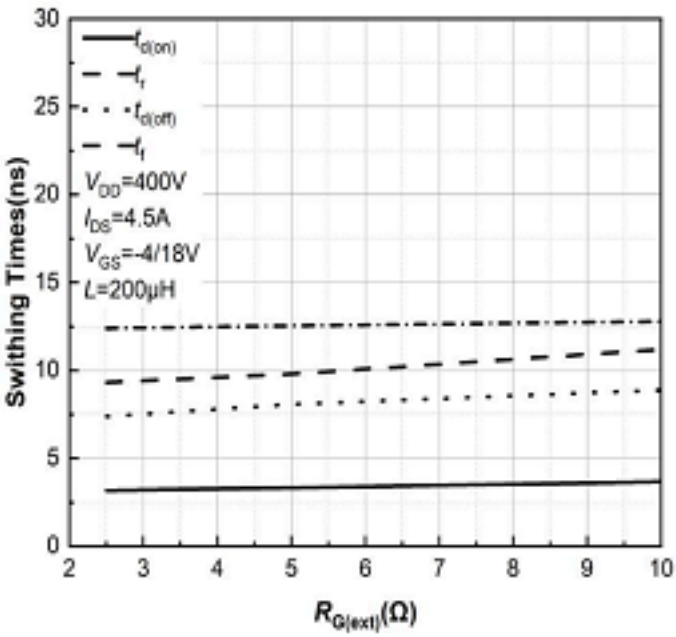


Figure 26. **Switching Times vs. $R_{G(ext)}$ T_j=175°C**

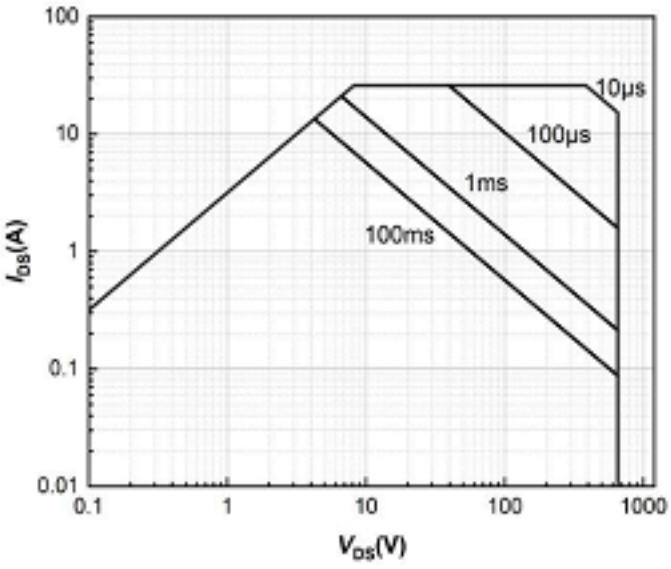
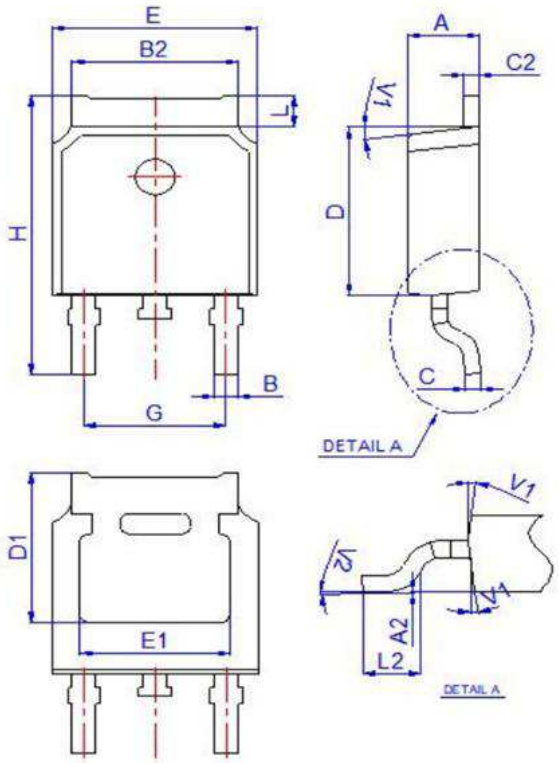


Figure 27. **Safe Operating Area**

Dimensions

TO-252 package



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

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