SEMICONDUCTOR

SC290N75F

750V 10A N- Channel SIC Power MOSFET

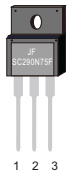
Features

- 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	10	12nc

ITO-220

SC290N75F



Mechanical Data

- Case:ITO-220 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

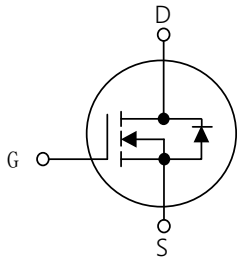


Table1 Absolute Maximum Ratings (T_C=25°C, unless otherwise specified)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	750	V
Gate-Source Voltage(Max)		$V_{GS(max)}$	-8/+22	V
Recommend Gate-Source Voltage		V_{GSop}	0/+15	V
Continuous Drain Current	T_C=25°C	I_D	10 ※	A
	T_C=100°C		7 ※	
Pulsed Drain Current (Note 1)		I_{DM}	20	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	40	W
Operating Junction and Storage Temperature		T_J/T_{STG}	-55 ~+175	°C

※limited by maximum junction temperature

Table 2.Thermal Characteristics

Parameter	Symbol	SC290N75F	Unit
Thermal resistance Junction to Case	$R_{\theta JC}$	3.76	°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=250μA	750	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=750V,V_{GS}=0V,T_C=25°C	-	-	1	μA
		V_{DS}=750V,V_{GS}=0V,T_C=125°C	-	-	10	
Gate- Source Leakage Current	I_{GSS}	V_{GS}=18V,V_{DS}=0V	-	-	250	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{DS}=V_{GS},I_D=250μA	2.0	-	4.0	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}=-4/18V,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}=-4/18V	-	12	-	nC
Gate-Source Charge	Q_{GS}		-	3.0	-	nC
Gate-Drain Charge	Q_{GD}		-	4.8	-	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		-	10	-	A
Reverse Recovery Time	trr	V_R=400V,V_{GS}=0V I_{SD}=4.5A, di/dt=100A/us	-	6	-	ns
Recovered charge	Qrr		-	16	-	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

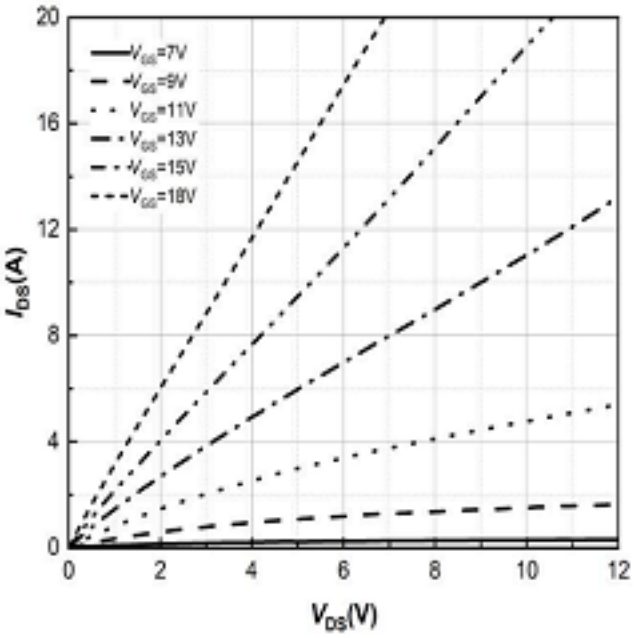


Figure 1. **Output Characteristics T_j=-40°C**

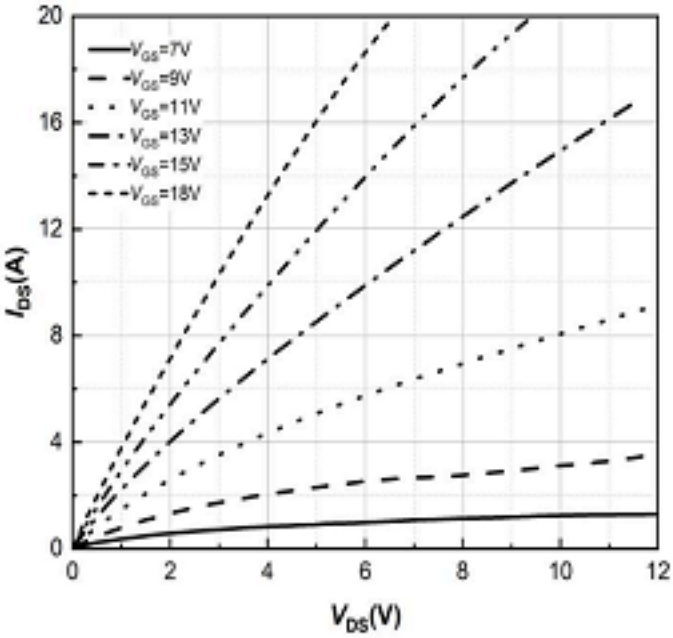


Figure 2. **Output Characteristics T_j=25°C**

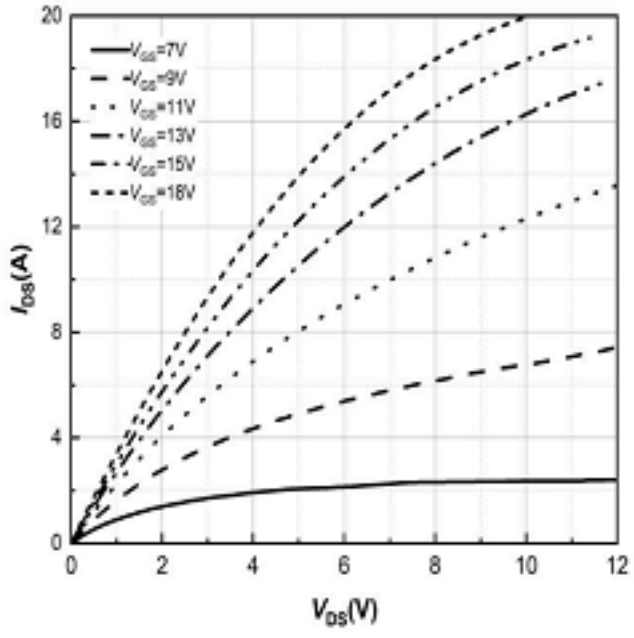


Figure 3. **Output Characteristics T_j=175°C**

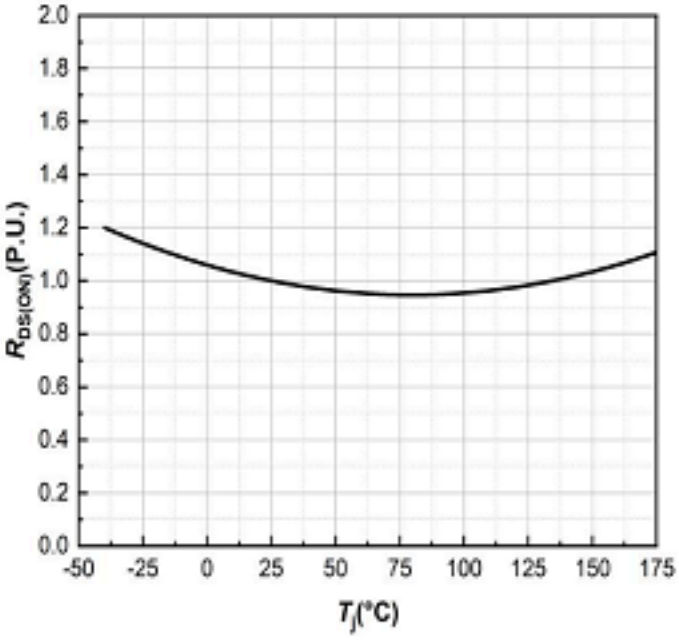


Figure 4. **Normalized On-Resistance vs. Temperature**

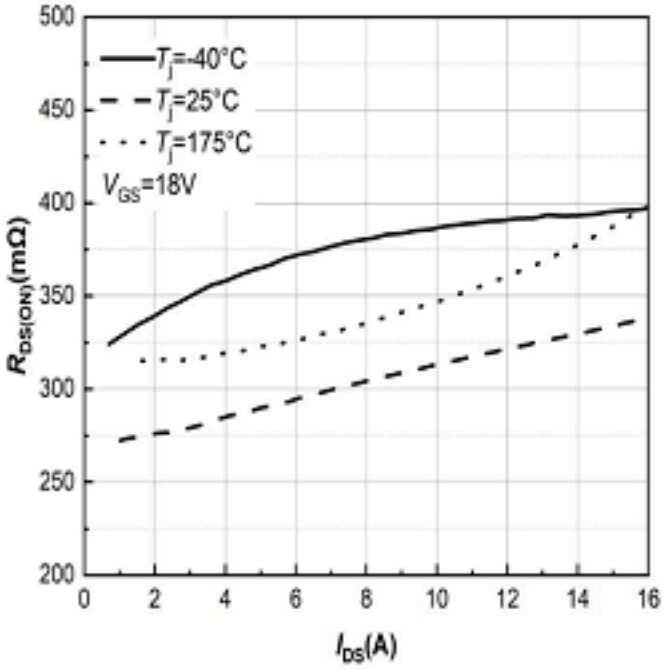


Figure 5. **On-Resistance vs. Drain Current For Various Temperatures**

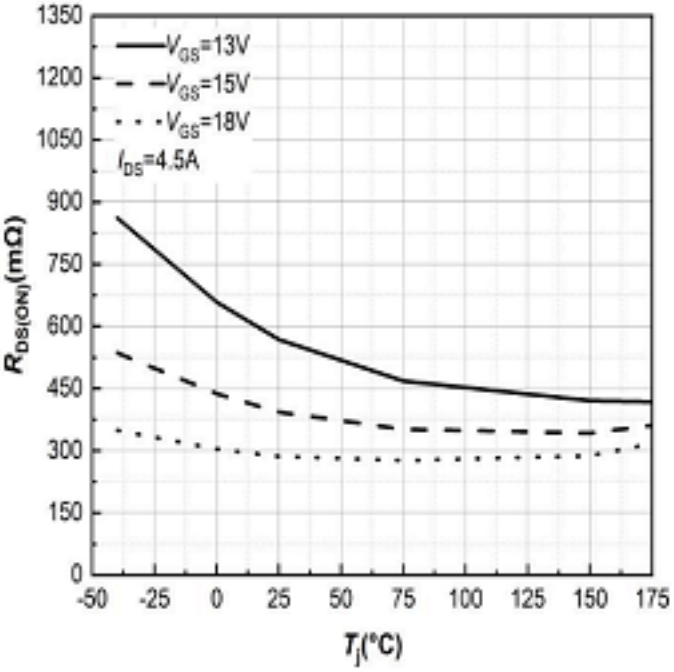


Figure 6. **On-Resistance vs. Temperature For Various Gate Voltage**

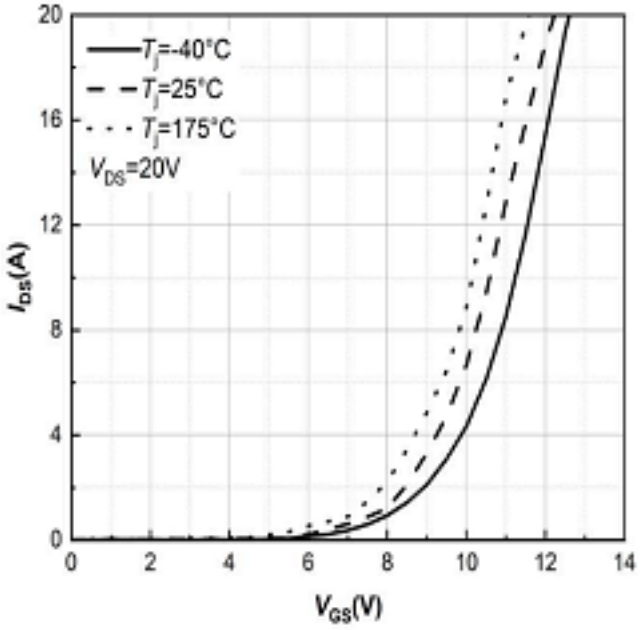


Figure 7. **Transfer Characteristic for Various Junction Temperatures**

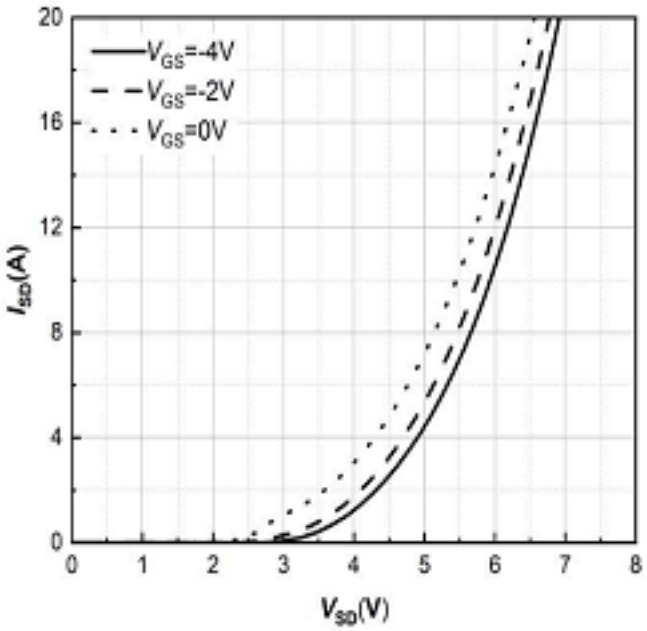


Figure 8. **Body Diode Characteristic T_j=-40°C**

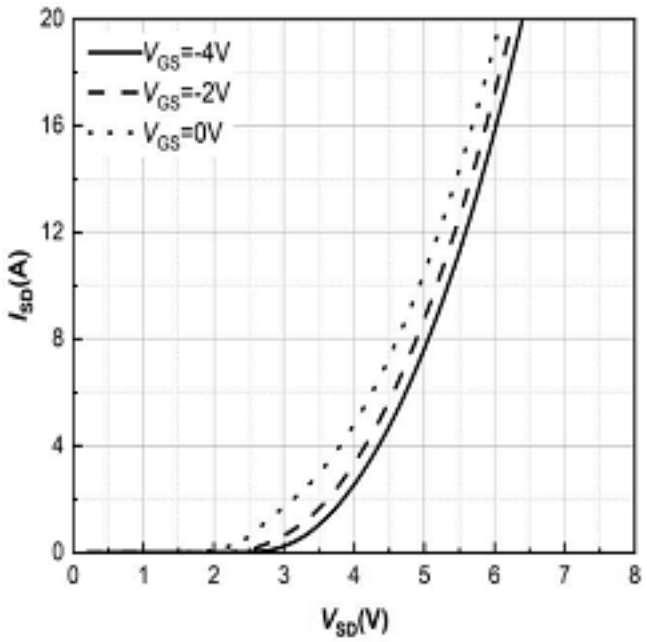


Figure 9. **Body Diode Characteristic T_j=25°C**

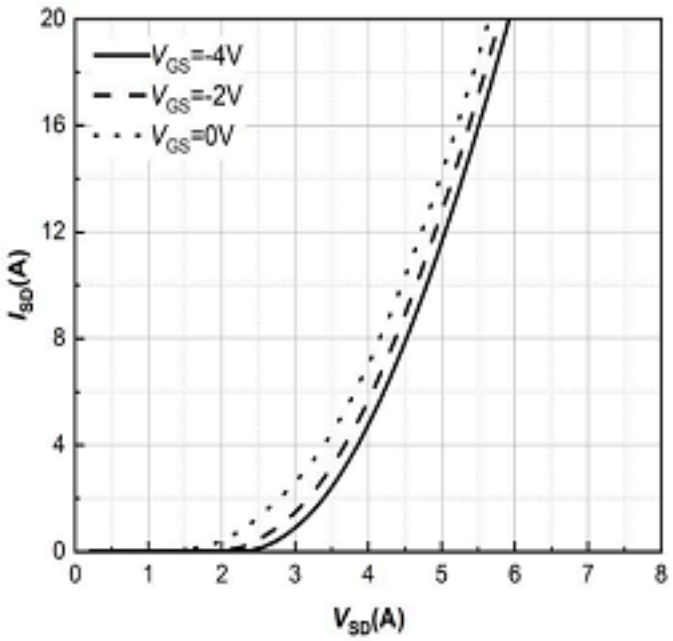


Figure 10. **Body Diode Characteristic T_j=175°C**

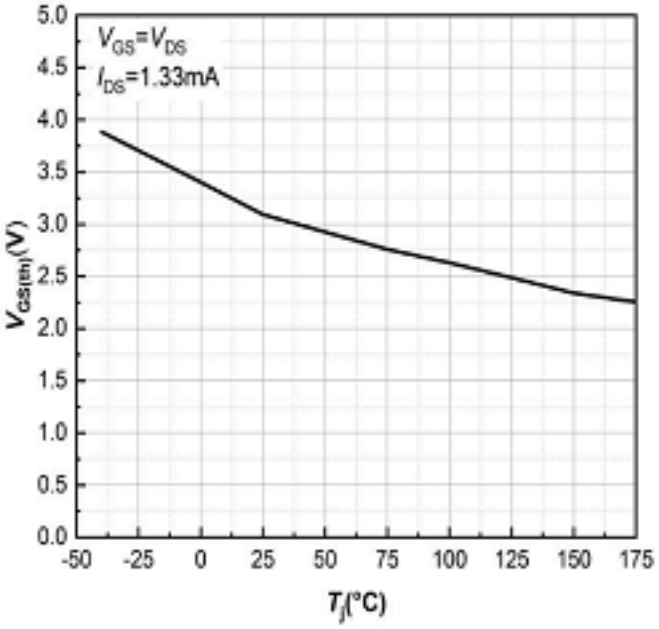


Figure 11. **Threshold Voltage vs. Temperature**

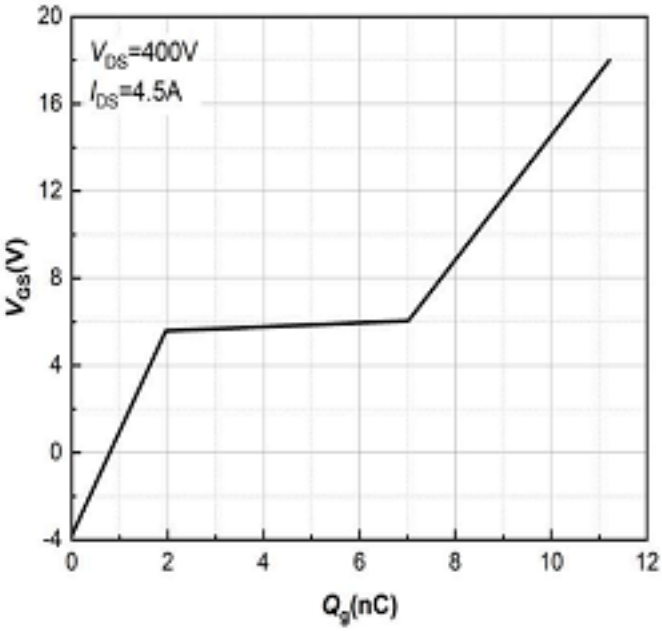


Figure 12. **Gate Charge Characteristics**

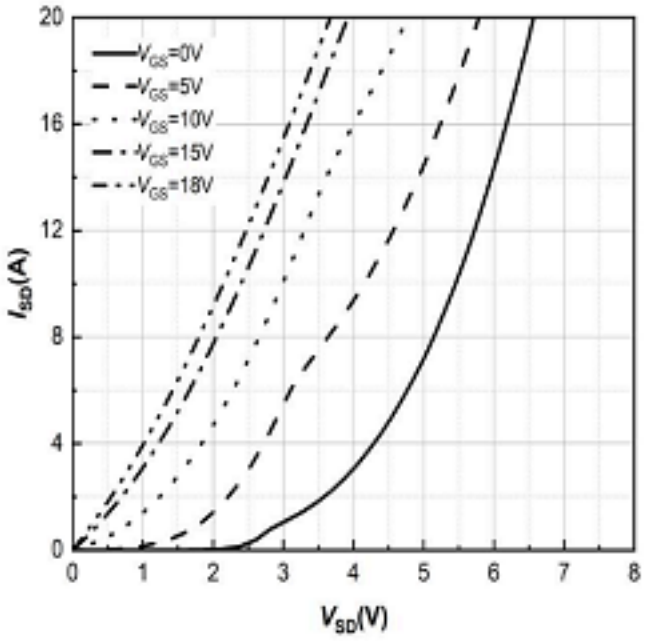


Figure 13. **3rd Quadrant Characteristic T_j=-40°C**

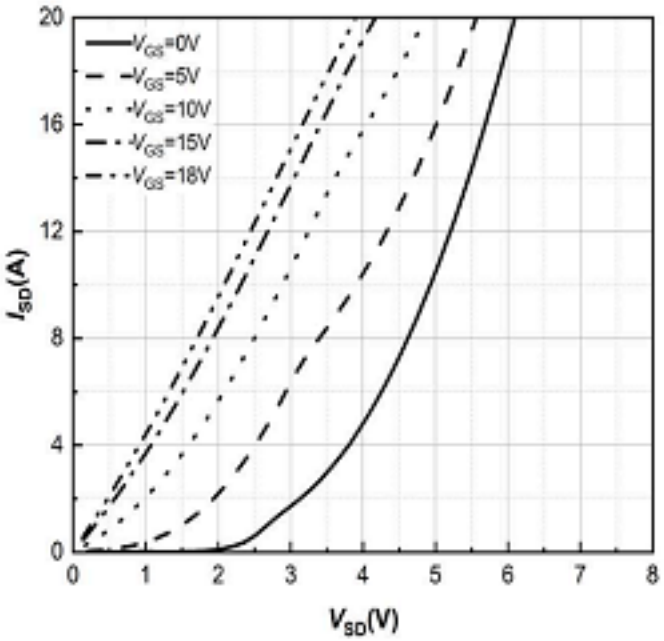


Figure 14. **3rd Quadrant Characteristic T_j=25°C**

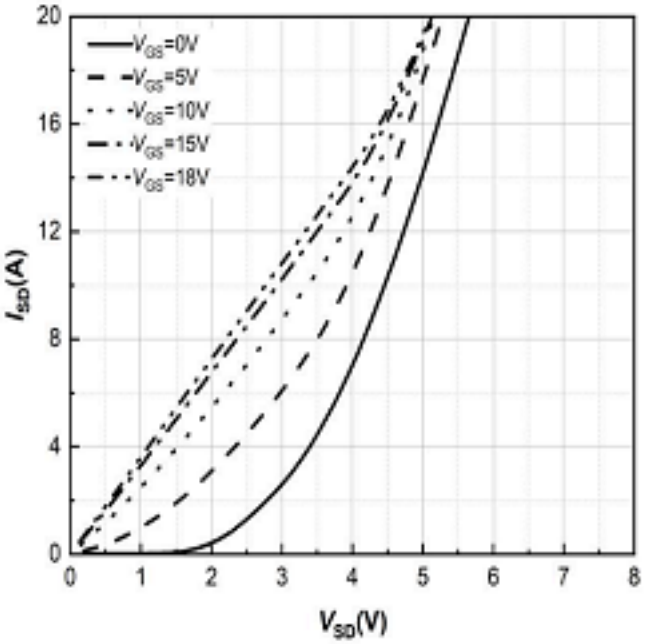


Figure 15. **3rd Quadrant Characteristic T_j=175°C**

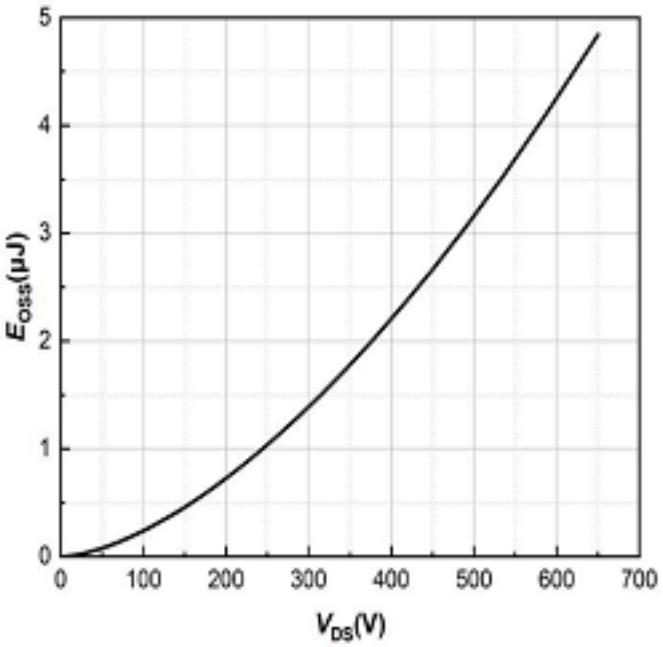


Figure 16. **Output Capacitor Stored Energy**

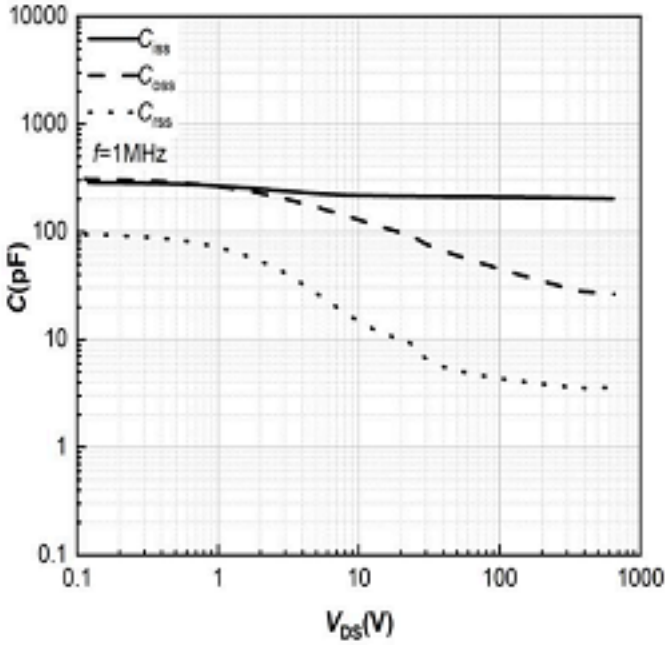


Figure 17. **Capacitances vs. Drain-Source**

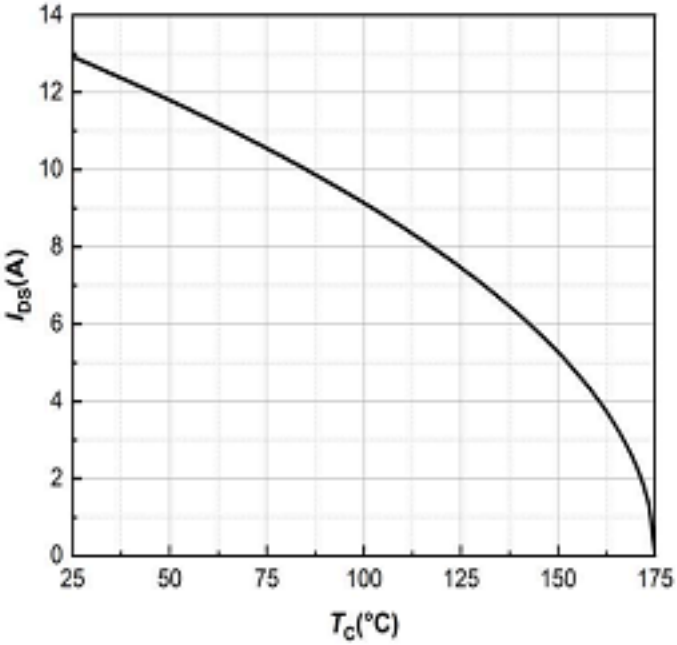


Figure 18. **Continuous Drain Current Derating vs. Case Temperature**

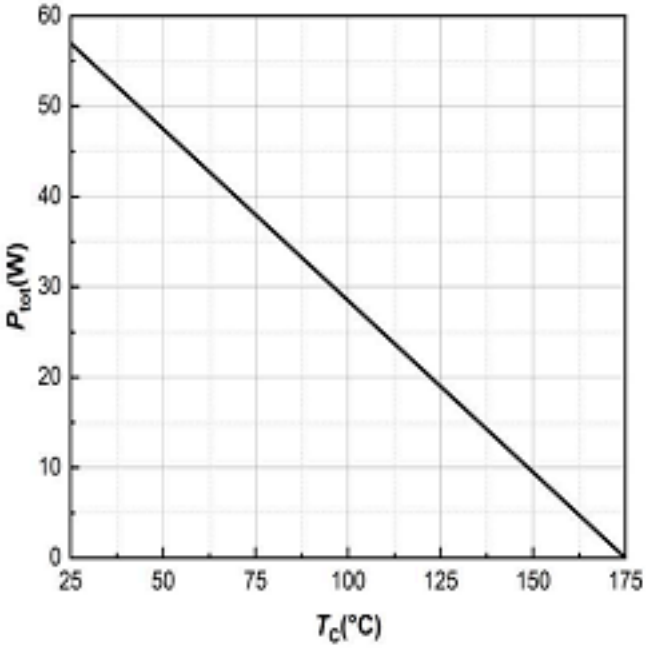


Figure 19. **Maximum Power Dissipation Derating vs. Case Temperature**

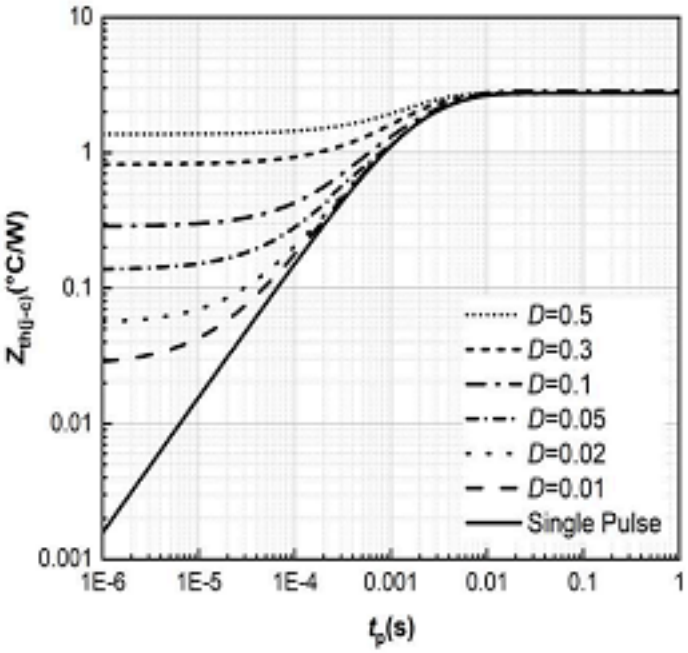


Figure 20. **Transient Thermal Impedance**

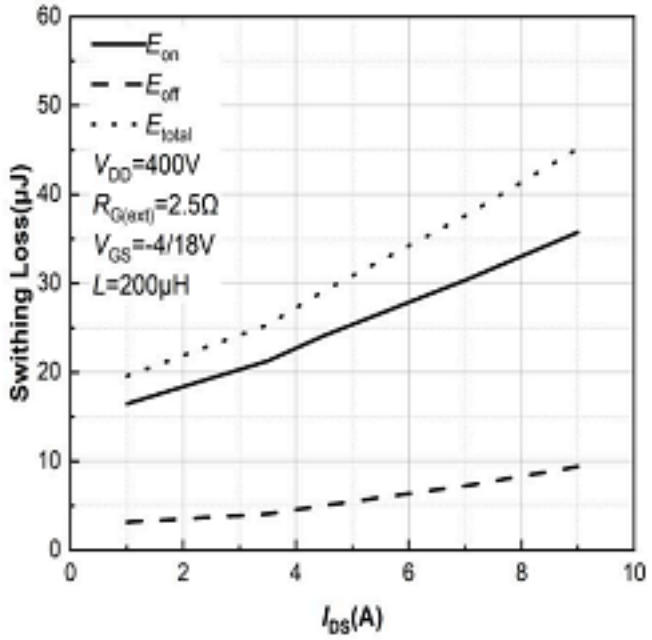


Figure 21. **Clamped Inductive Switching Energy vs. Drain Current T_j=25°C**

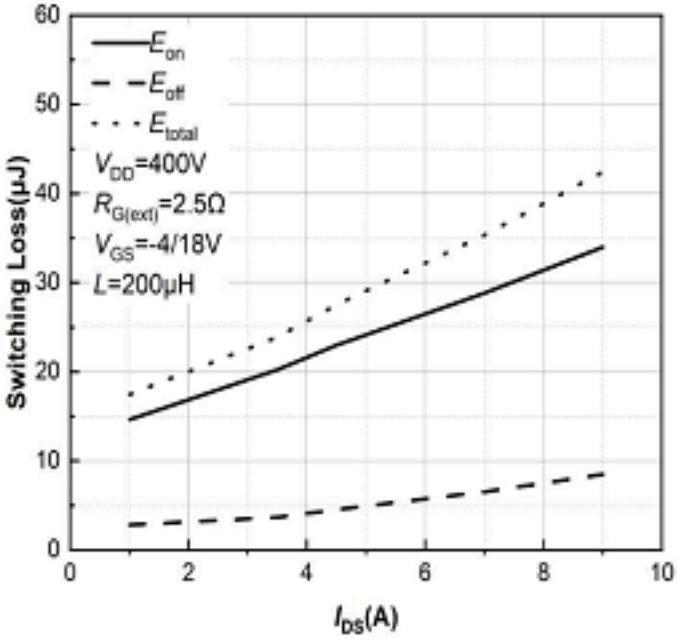


Figure 22. **Clamped Inductive Switching Energy vs. Drain Current T_j=175°C**

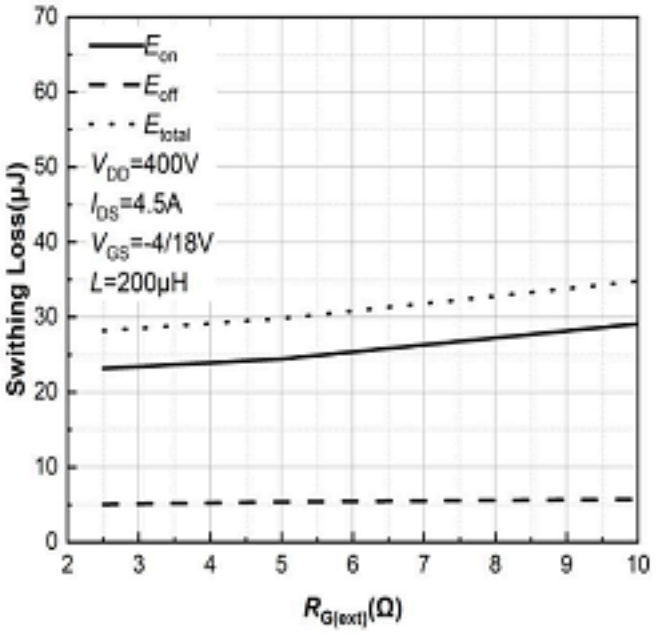


Figure 23. **Clamped Inductive Switching Energy vs. $R_{G(ext)}$ T_j=25°C**

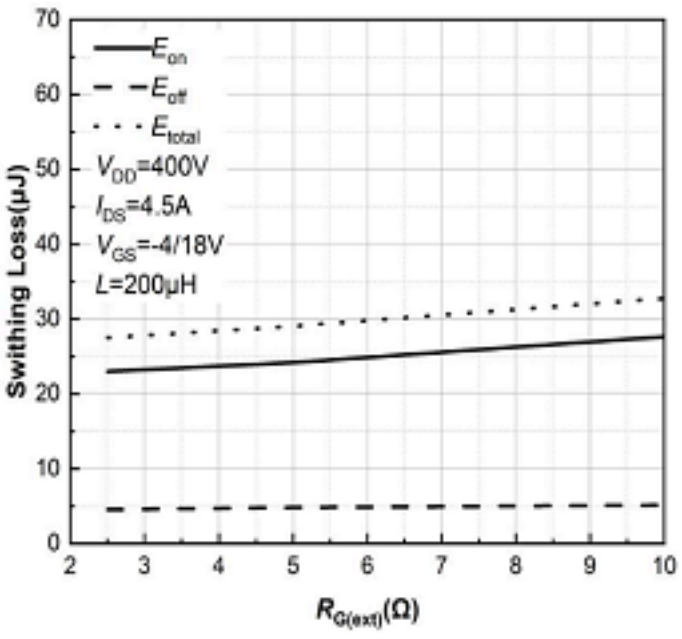


Figure 24. **Clamped Inductive Switching Energy vs. $R_{G(ext)}$ T_j=175°C**

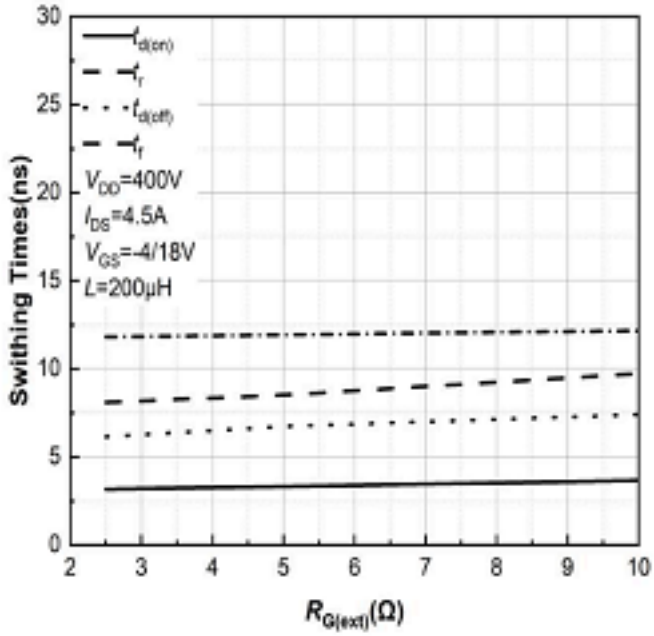


Figure 25. **Switching Times vs. $R_{G(ext)}$ T_j=25°C**

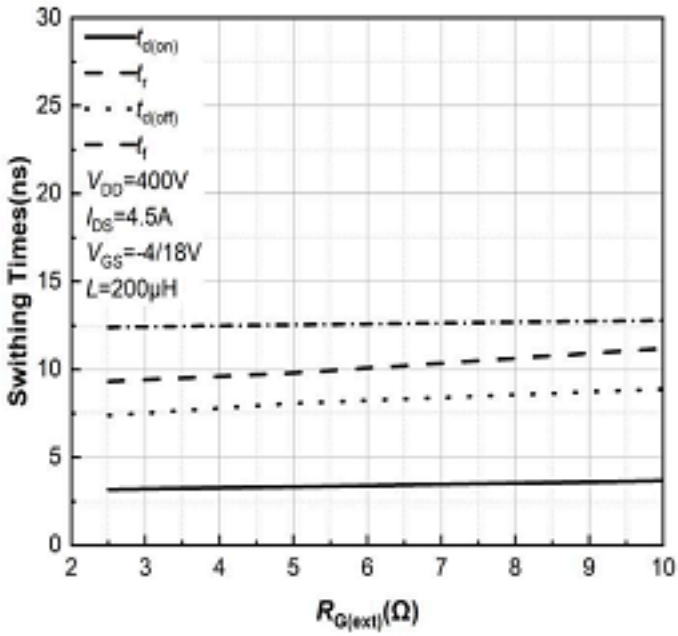


Figure 26. **Switching Times vs. $R_{G(ext)}$ T_j=175°C**

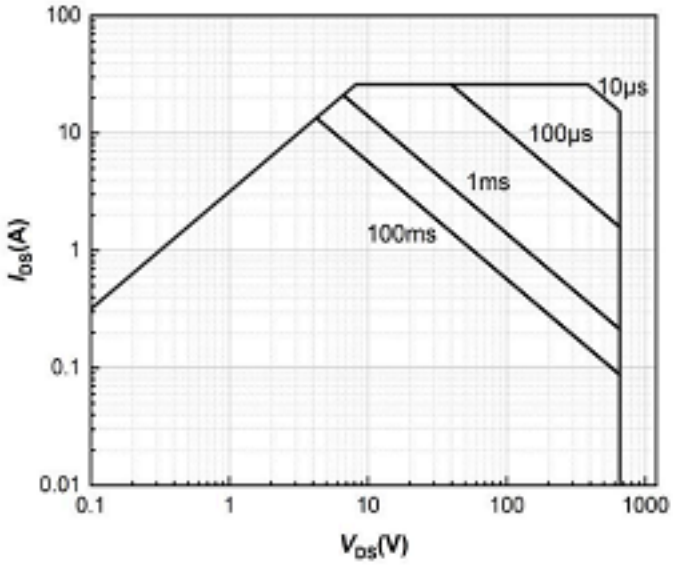
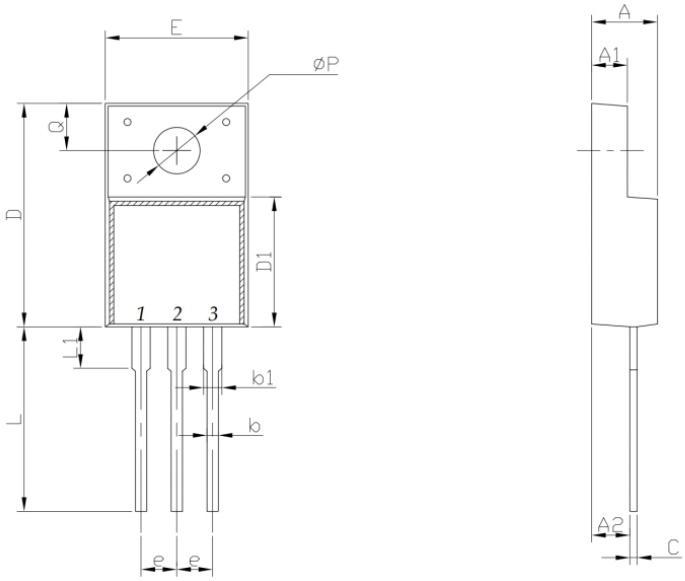


Figure 27. **Safe Operating Area**

Dimensions

ITO-220package



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	4.24	4.9	0.167	0.193
A1	2.3	2.92	0.091	0.115
A2	2.61	2.81	0.103	0.111
b	0.3	1	0.012	0.039
b1	0.9	1.55	0.035	0.061
C	0.3	0.7	0.012	0.028
D	14.5	16.36	0.571	0.644
D1	8.8	9.41	0.346	0.370
E	9.5	10.5	0.374	0.413
e	2.3	2.75	0.091	0.108
L	12.6	14	0.496	0.551
L1	2.45	4.3	0.096	0.169
P	2.9	3.8	0.114	0.150
Q	2.5	3.55	0.098	0.140

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