

3300V Planar SiC MOSFET

Features

- Low reverse recovery
- Easy to parallel and simple to drive
- Low resistance with high blocking voltage
- Low capacitance with high-speed switching

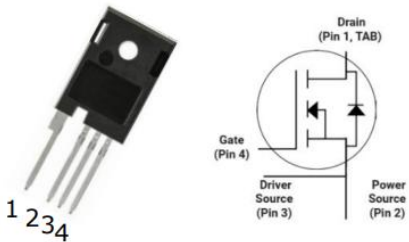
Benefits

- Higher system efficiency
- Reduced switching loss
- Increased power density
- High-reliability

Applications

- Switch Mode Power Supplies
- DC/DC Converters
- Battery Charges
- Motor Drivers
- Pulsed Power Applications

Para.	Value	Unit
V_{DS}	3300	V
$R_{DS(ON)}$	50	mΩ
$I_D(T_C=100^{\circ}C)$	41	A



TO-247-4L

Part Number	Marking	Package	Packaging Method
CI58N330SM4	CI58N330SM4	TO-247-4L	Tape & Reel

Maximum Ratings

Symbol	Parameter	Test Conditions	Value	Unit	Note
V_{DSmax}	Drain source voltage	$V_{GS}=0V, I_D=100\mu A$	3300	V	
V_{GSmax}	Gate source voltage	AC ($f>1Hz$)	-8/+22	V	
V_{GSop}	Gate source voltage	Recommended operational values	-4/+18	V	
I_D	Continuous drain current	$V_{GS}=18V, T_c=25^{\circ}C$	58	A	Fig 19.
		$V_{GS}=18V, T_c=100^{\circ}C$	41	A	
$I_{D (pulse)}$	Pulsed drain current	Pulse width t_p limited by T_{jmax}	230	A	Fig 20.
P_D	Power dissipation	$T_c=25^{\circ}C, T_j=175^{\circ}C$	500	W	Fig 18.
T_j	Operation junction		-55~+175	$^{\circ}C$	
T_{stg}	Storage temperature		-55~+175	$^{\circ}C$	

Thermal Characteristics

Para.	Symbol	Value			Unit
Thermal Resistance From Junction to Case	$R_{th (j-c)}$		0.3		$^{\circ}C/W$

Static Characteristics

Symbol	Parameter	Test Conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{DSS}	Drain-source breakdown voltage	$V_{GS}=0V, I_D=100\mu A$	3300	-	-	V	
$V_{GS(TH)}$	Gate threshold voltage	$V_{DS}=V_{GS}, I_D=10mA, T_j=25^{\circ}C$		3.2	4.0	V	Fig 9.
		$V_{DS}=V_{GS}, I_D=10mA, T_j=175^{\circ}C$		2.4			
$R_{DS(ON)}$	Drain-source On-resistance	$V_{GS}=18V, I_D=40A, T_j=25^{\circ}C$		50	60	$m\Omega$	Fig 3.
		$V_{GS}=18V, I_D=40A, T_j=175^{\circ}C$		146			
G_{fs}	Tranconductance	$V_{DS}=10V, I_D=40A, T_j=25^{\circ}C$		19.1		S	
		$V_{DS}=10V, I_D=40A, T_j=175^{\circ}C$		14.2		S	
I_{DSS}	Drain-source leakage current	$V_{GS}=0V, V_{DS}=3300V$	-	1	10	μA	
I_{GSS}	Gate-source leakage current	$V_{GS}=15V, V_{DS}=0V$	-	1	100	nA	

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Value	Unit	Note
C_{iss}	Input Capacitance	$V_{GS}=0V, V_{DS}=1000V,$ $f=100KHz, T_j=25^{\circ}C$	5031	pF	Fig 11.
C_{oss}	Output Capacitance		115		
C_{rss}	Reverse Transfer Capacitance		4.9		
E_{oss}	Output Capacitor Stored Energy		76	μJ	Fig 12.
Q_g	Total Gate Charge	$V_{GS}=-5/+20V, V_{DS}=1000V,$ $I_D=40A, T_j=25^{\circ}C$	212	nC	Fig 10.
Q_{gs}	Gate-Source Charge		73		
Q_{gd}	Gate-Drain Charge		58		
R_g	Gate Resistance	$V_{AC}=25mV, f=1MHz$	1.2	Ω	

Switching Characteristics

Symbol	Parameter	Test Conditions	Value	Unit	Note
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = -5V/20V$, $V_{DD} = 1700V$, $I_D = 50A$, $R_{g(ext)} = 3\Omega$, $L = 60\mu H$	37	ns	
t_r	Rise Time		27		
$t_{d(off)}$	Turn-Off Delay Time		51		
t_f	Fall Time		9.6		
Eon	Turn-on Switching Energy		737	uJ	
Eoff	Turn-off Switching Energy		288	uJ	

Reverse Diode Characteristics

Symbol	Parameter	Test Conditions	Value			Unit	Note
			Min.	Typ.	Max.		
V_{SD}	Drain-source breakdown voltage	$V_{GS} = -5V$, $I_{SD} = 20A$, $T_j = 25^\circ C$		3.9	-	V	
		$V_{GS} = -5V$, $I_{SD} = 20A$, $T_j = 175^\circ C$		3.3			
I_S	Continuous Diode Forward Current	$V_{GS} = -5V$		43		A	
$I_{S(pulse)}$	Diode Pulse Current	$V_{GS} = -5V$		300		A	
T_{rr}	Drain-source On-resistance	$V_{GS} = -5V$, $I_{SD} = 50A$, $V_R = 3300V$		17.8		ns	
Q_{rr}	Drain-source leakage current		-	290		nC	
I_{rrm}	Gate-source leakage current		-	28		A	

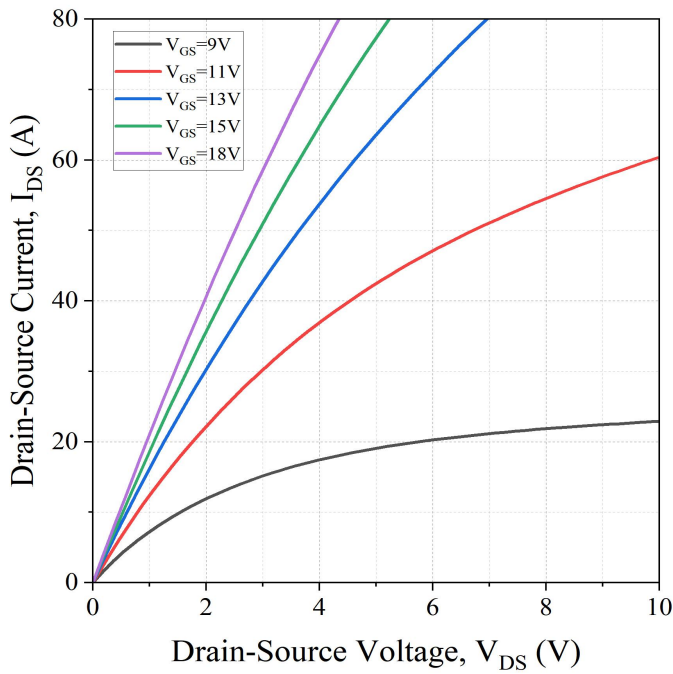
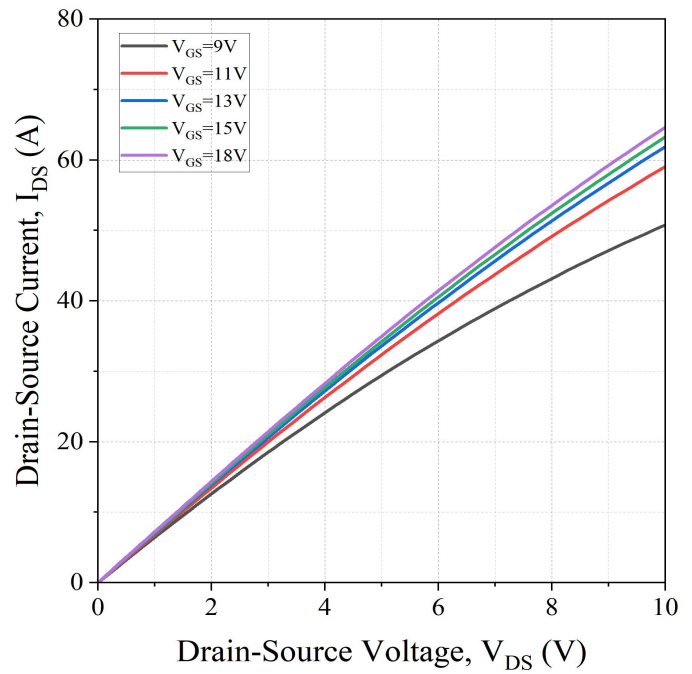
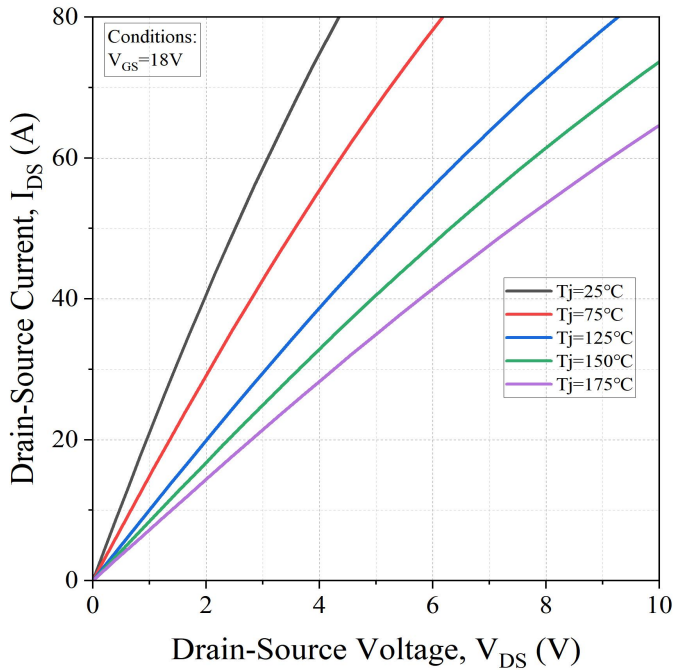

Fig 1. Output Characteristics at $T_j = 25^\circ\text{C}$

Fig 2. Output Characteristics at $T_j = 175^\circ\text{C}$


Fig 3. Output Characteristics vs. Temperature

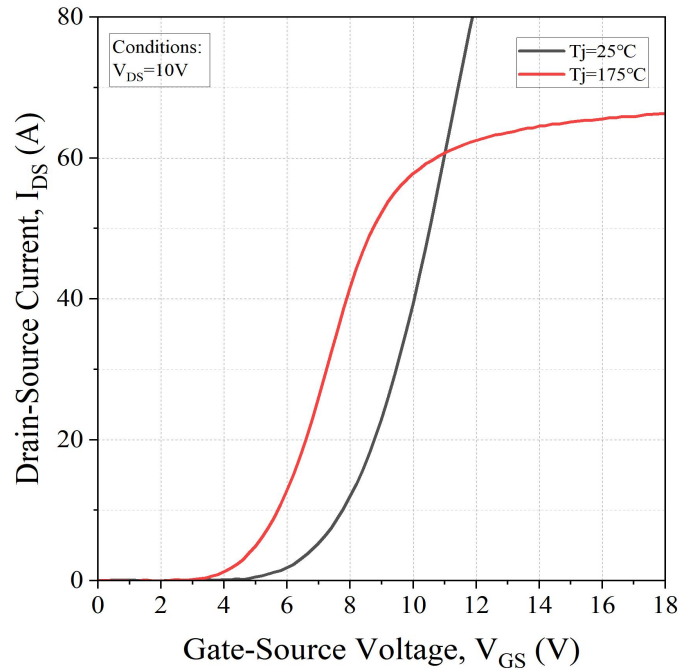


Fig 4. Transfer Characteristics vs. Temperature

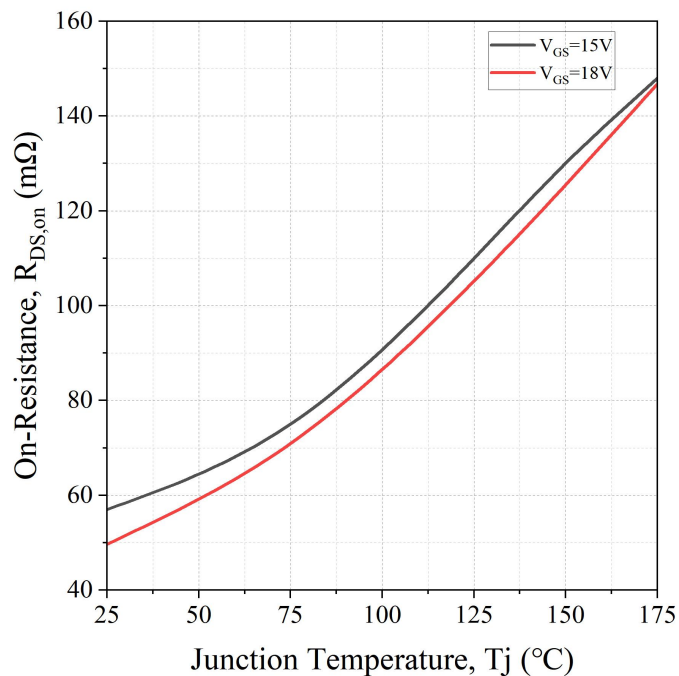


Fig 5. On-Resistance vs. Temperature

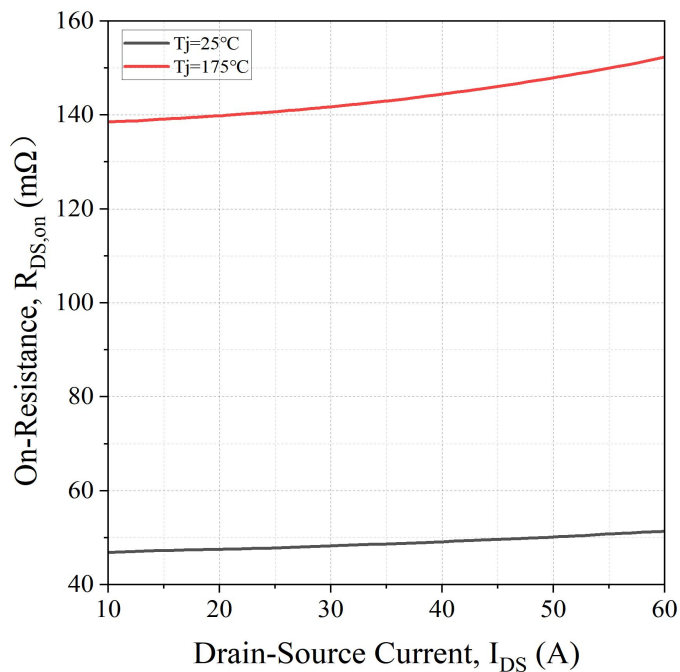


Fig 6. On-Resistance vs. Drain current

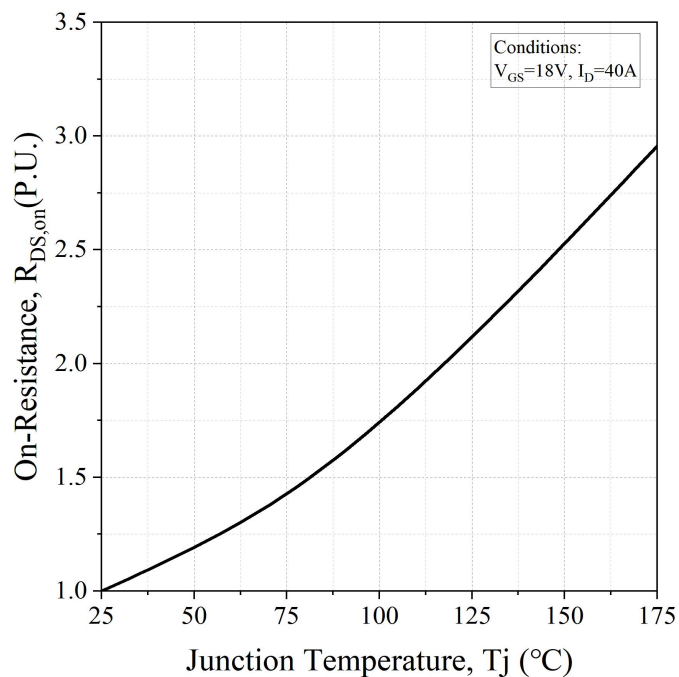


Fig 7. Normalized On-Resistance vs. Temperature

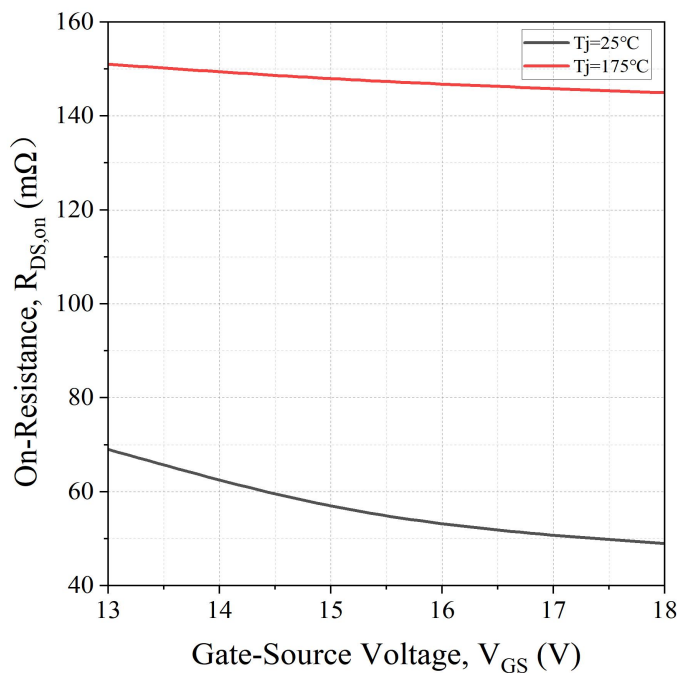


Fig 8. On-Resistance vs. Gate Voltage

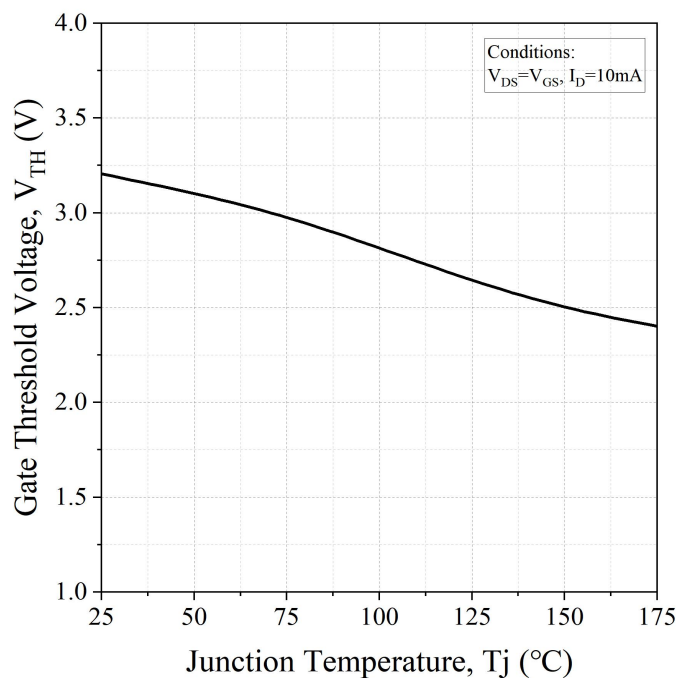


Fig 9. Threshold Voltage vs. Temperature

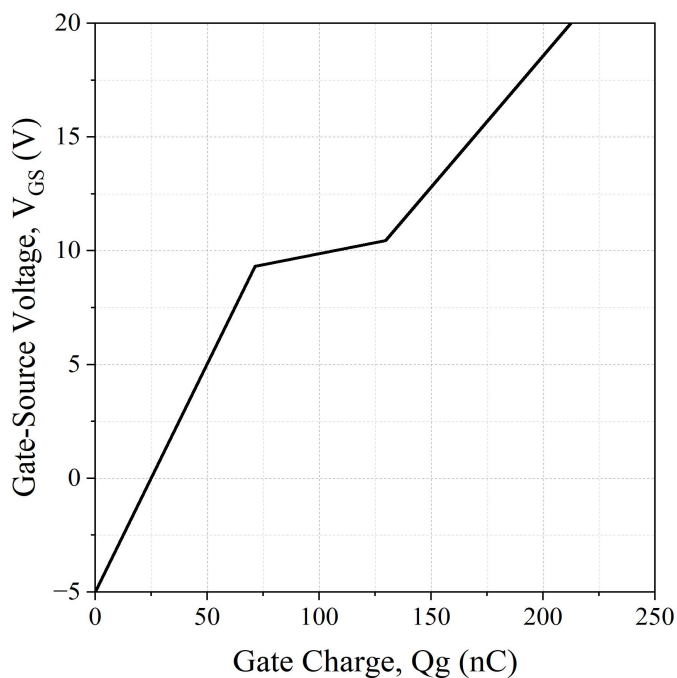


Fig 10. Gate Charge Characteristics

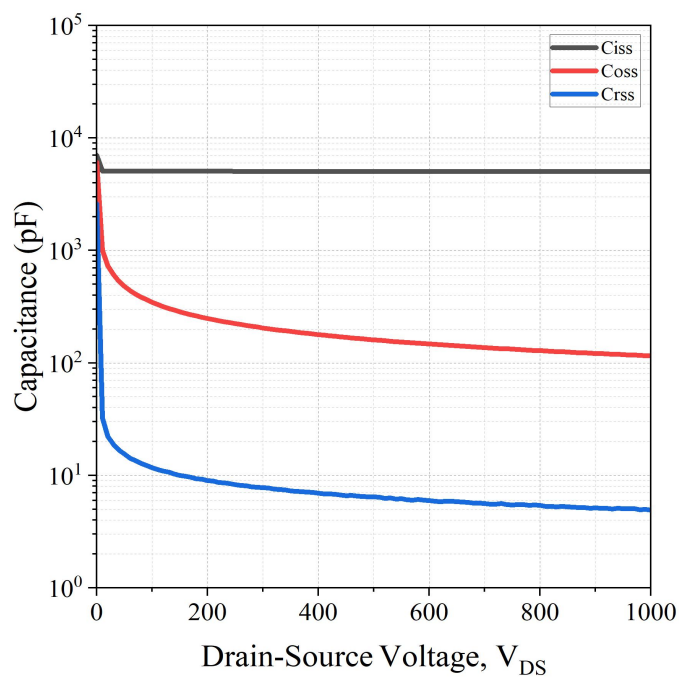


Fig 11. Capacitances vs. Drain-Source

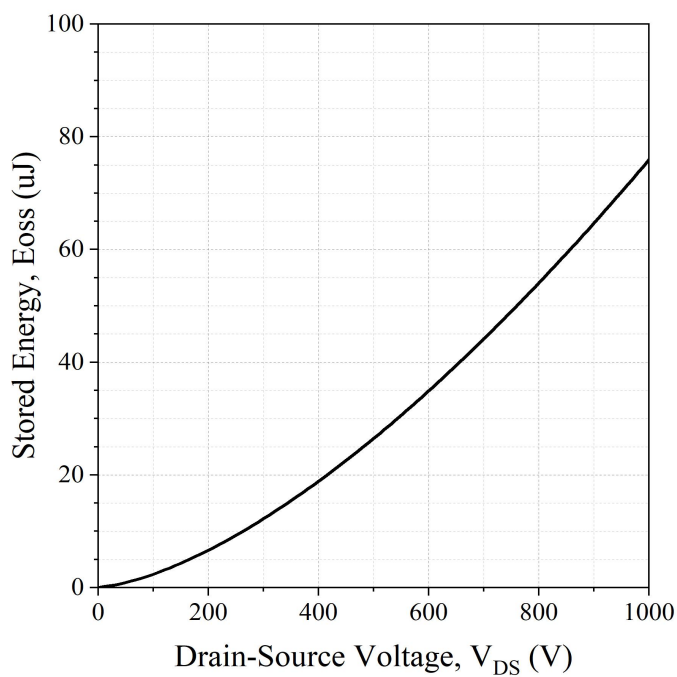
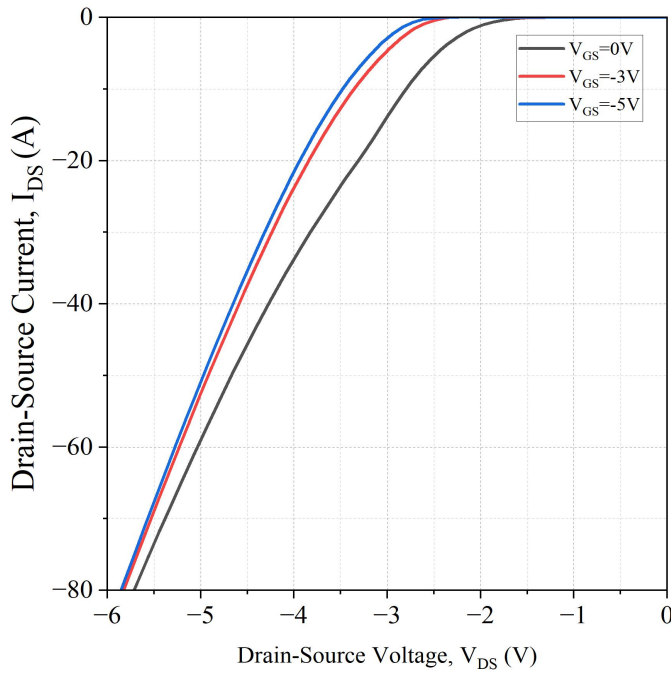
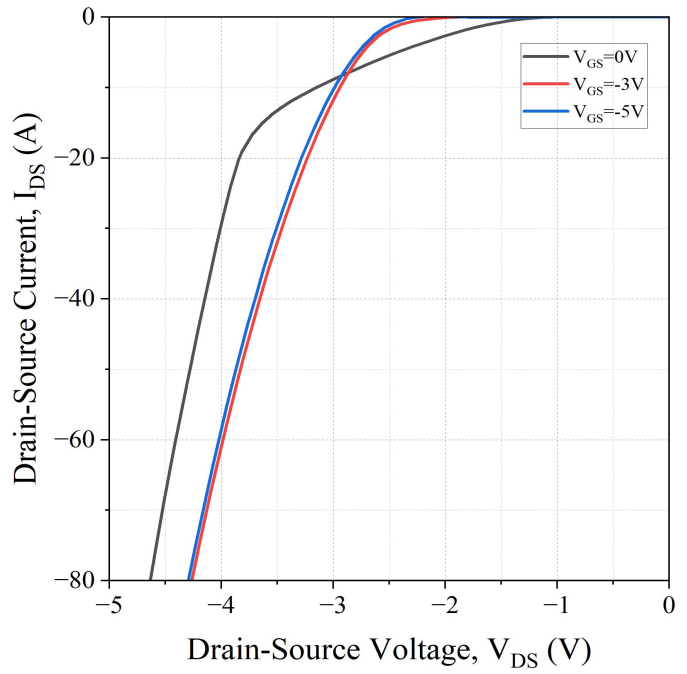
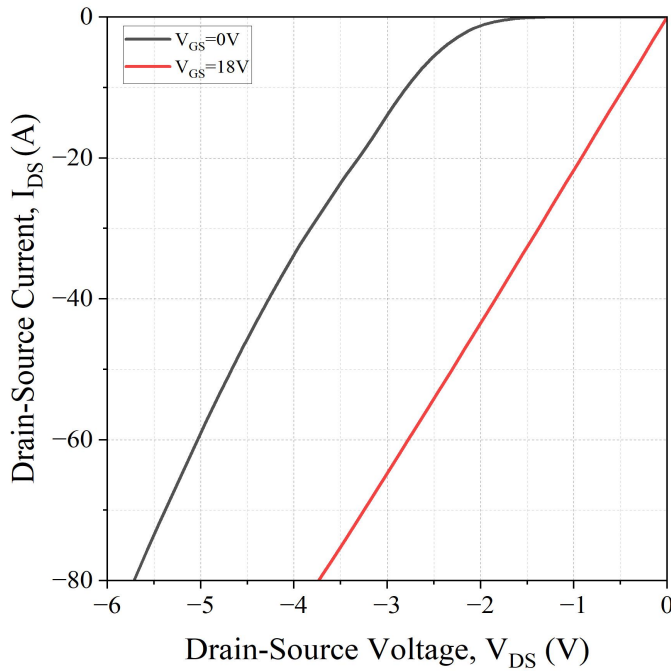
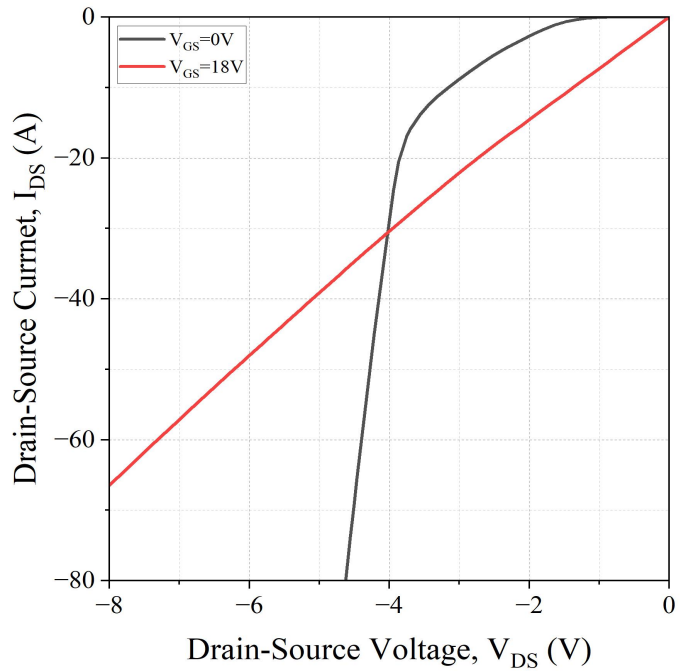


Fig 12. Output Capacitor Stored Energy


Fig 13. Body Diode Characteristics at $T_j = 25^\circ\text{C}$

Fig 14. Body Diode Characteristics at $T_j = 175^\circ\text{C}$

Fig 15. 3rd Quadrant Characteristic at $T_j = 25^\circ\text{C}$

Fig 16. 3rd Quadrant Characteristic at $T_j = 175^\circ\text{C}$

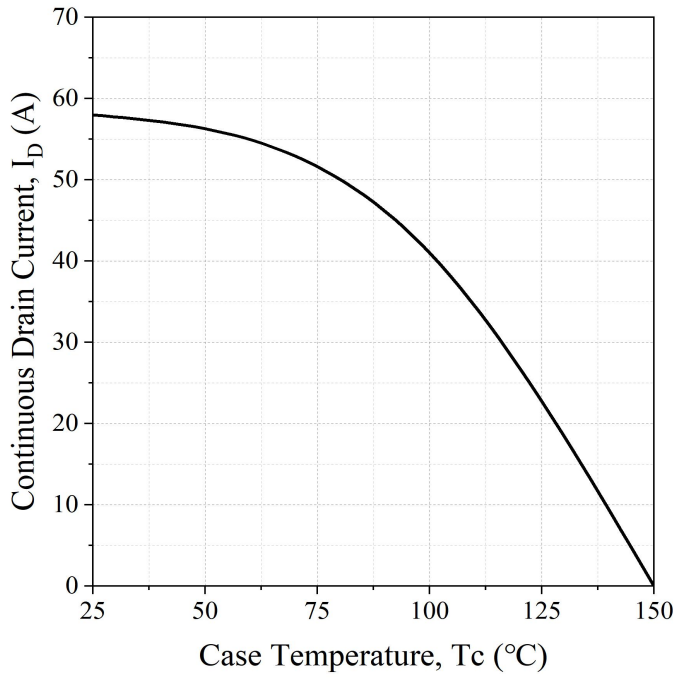


Fig 17. Current De-rating

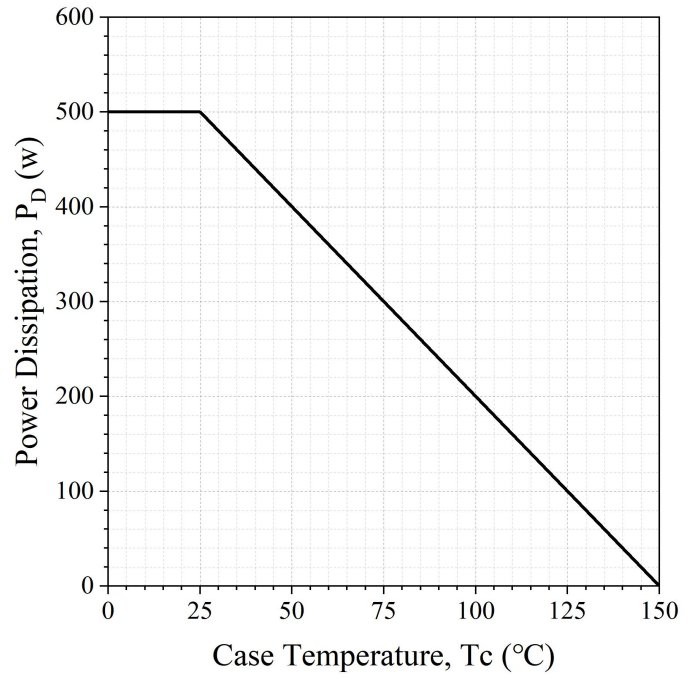


Fig 18. Power Dissipation De-rating

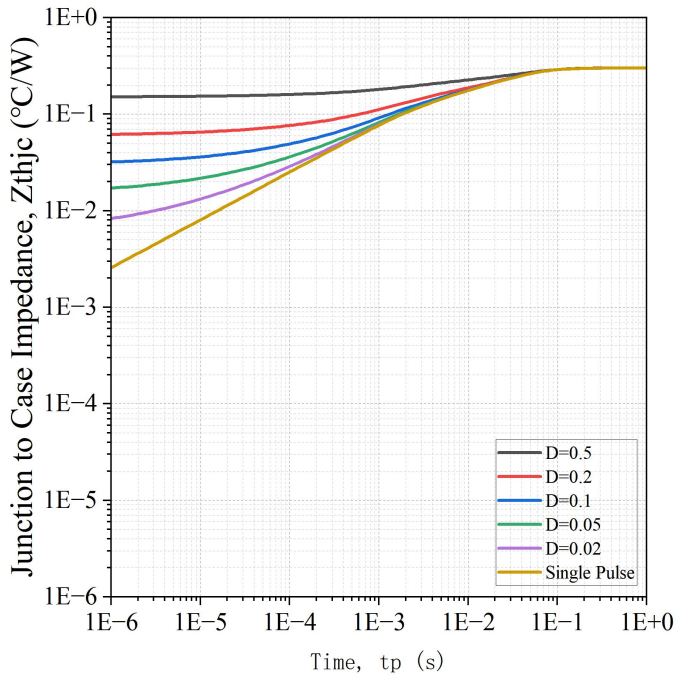


Fig 19. Transient Thermal Impedance

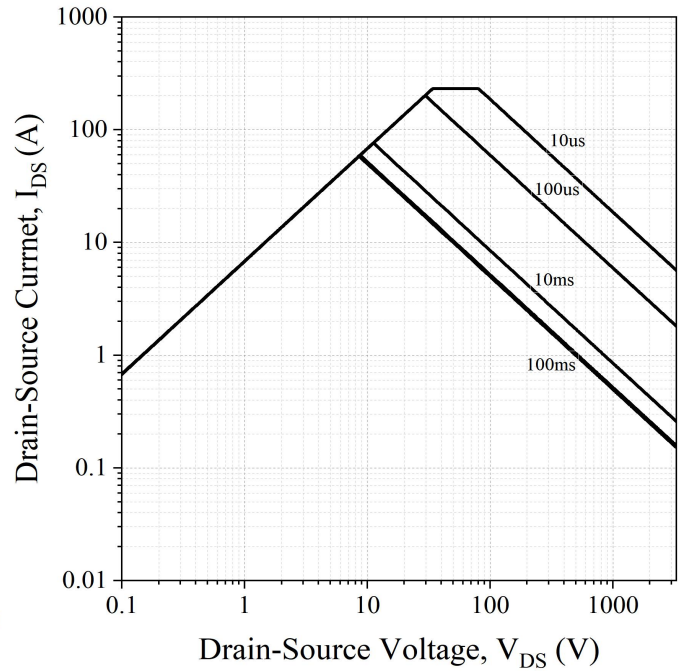
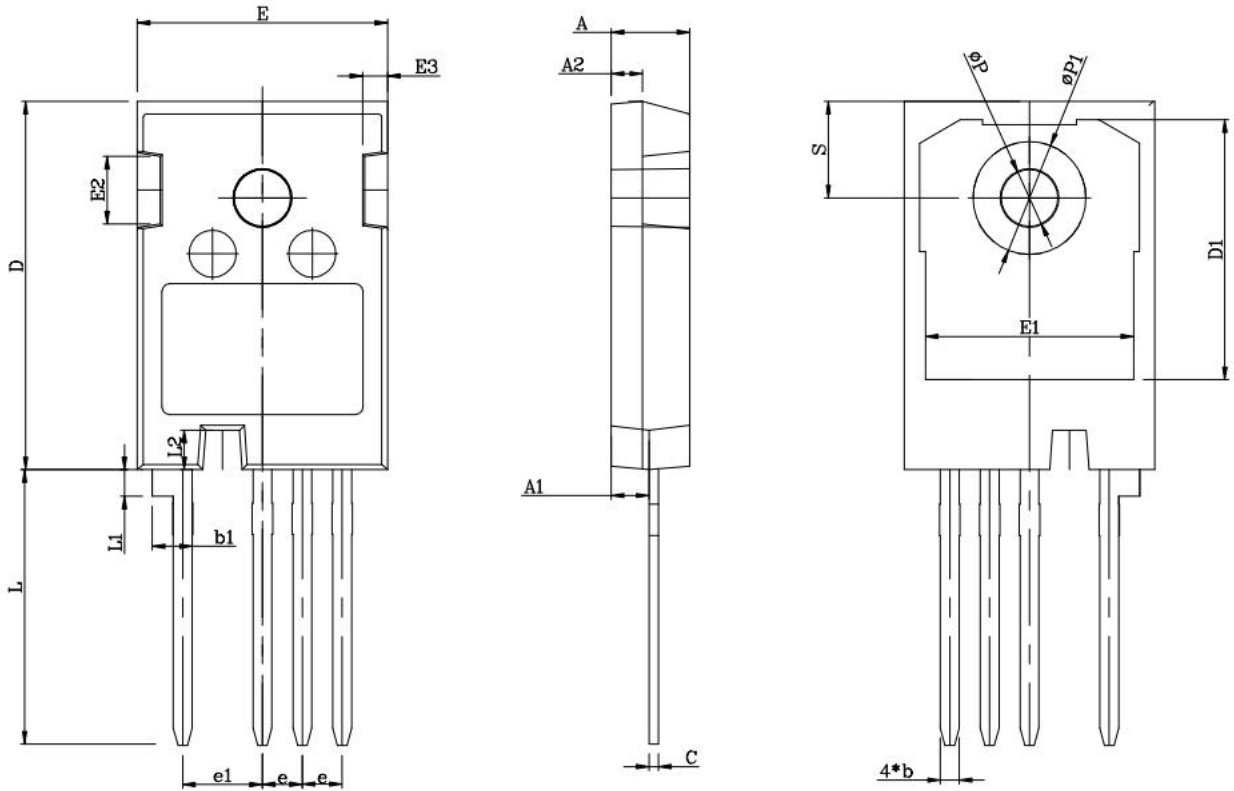


Fig 20. Safe Operating Area

Package Dimensions



SYMBOL	mm			SYMBOL	mm		
	Min	Nom	Max		Min	Nom	Max
A	4.80	5.00	5.20	E2	4.00	4.30	4.60
A1	2.23	2.41	2.59	E3	1.15	1.45	1.75
A2	1.85	2.00	2.15	e	2.54BSC		
b	1.11	1.21	1.36	e1	5.08BSC		
b1	2.35	2.55	2.75	L	17.31	17.47	17.82
c	0.51	0.61	0.75	L1	1.50	1.70	1.90
D	23.30	23.45	23.60	L2	2.35	2.5	2.65
D1	16.25	16.55	16.85	ØP	3.51	3.60	3.65
E	15.75	15.94	16.10	ØP1	7.08	7.19	7.30
E1	13.00	13.26	13.43	S	6.15BSC		