AC2M0040330K

Silicon Carbide Power MOSFET
N-Channel Enhancement Mode

Features

1) Low reverse recovery
2) Easy to parallel and simple to drive
3) Low on-resistance with high blocking voltage
4) Low capacitance with high-speed switching
5) 1000 h HTGB qualified at 175 °C (VGS = +22 V / -8 V)

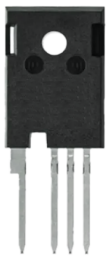
Parameter	Rating	Units
V_{DS}	**3300**	V
$I_{D\ @\ 25°C}$	**67**	A
$R_{DS(on)}$	**40**	mΩ

Benefits

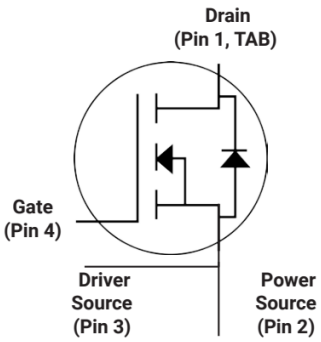
- Higher system efficiency
- Reduced switching loss
- Increased power density
- High-reliability

Applications

- Switch mode power supplies
- DC/DC converters
- Battery chargers
- Motor drivers
- Pulsed power applications



TO-247-4 Package



Part Number	Package	Marking
AC2M0040330K	TO-247-4	AC2M0040330

Maximum Ratings For MOSFET (TJ = 25°C unless otherwise specified)

Symbol	Parameter	Value	Unit	Test Conditions
V_{DSS}	Drain-Source Voltage	3300	V	VGS = 0V, ID = 100μA
V_{GS} max	Gate-Source Voltage	-8/+22	V	AC (f > 1Hz)
V_{GS} op	Gate-Source Voltage	-4/+18~20	V	Recommended operational values
I_D	Continuous Drain Current	67	A	VGS = 18V, TC = 25°C
		50	A	VGS = 18V, TC = 100°C
$I_{D(pulse)}$	Pulsed Drain Current	265	A	tp limited by Tjmax
P_D	Power Dissipation	560	W	TC = 25°C, TJ = 175°C
T_J	Operating Junction Temperature	-55 ~ +175	°C	
T_{STG}	Storage Temperature	-55 ~ +175	°C	

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Thermal Characteristics

Symbol	Parameter	Value	Unit	Test Conditions
$R_{th(j-c)}$	Thermal Resistance, Junction to Case	0.27	°C/W	

Static Characteristics (TJ = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{DSS}	Drain-Source Breakdown Voltage	3300	3900		V	VGS = 0V, ID = 100μA
$V_{GS(th)}$	Gate Threshold Voltage		3.2	4.0	V	VDS = VGS, ID = 10mA
			2.4		V	VDS = VGS, ID = 10mA, TJ = 175°C
$R_{DS(on)}$	Drain-Source On-Resistance		40	48	mΩ	VGS = 18V, ID = 45A
			80		mΩ	VGS = 18V, ID = 45A, TJ = 175°C
g_{fs}	Transconductance		21.5		S	VDS = 10V, ID = 45A
			16.0		S	VDS = 10V, ID = 45A, TJ = 175°C
I_{DSS}	Drain-Source Leakage Current		1	10	μA	VGS = 0V, VDS = 3300V
I_{GSS}	Gate-Source Leakage Current		1	100	nA	VGS = 15V, VDS = 0V

Dynamic Characteristics (TJ = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{iss}	Input Capacitance		5660		pF	VGS = 0V, VDS = 1000V, f = 100kHz
C_{oss}	Output Capacitance		131		pF	
C_{rss}	Reverse Transfer Capacitance		5.6		pF	
E_{oss}	Output Capacitor Stored Energy		86		μJ	
Q_g	Total Gate Charge		239		nC	VGS = -5/+20V, VDS = 1000V, ID = 45A
Q_{gs}	Gate-Source Charge		82		nC	
Q_{gd}	Gate-Drain Charge		65		nC	
$R_{G(int)}$	Gate Resistance		1.1		Ω	VAC = 25mV, f = 1MHz

Switching Characteristics (TJ = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(on)}$	Turn-On Delay Time		35		ns	VGS = -5V/+20V, VDD = 1700V, ID = 55A, RG(ext) = 3Ω, L = 60μH
t_r	Rise Time		26		ns	
$t_{d(off)}$	Turn-Off Delay Time		49		ns	
t_f	Fall Time		9.2		ns	
E_{on}	Turn-On Switching Energy		810		μJ	
E_{off}	Turn-Off Switching Energy		315		μJ	

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Reverse Diode Characteristics (TJ = 25°C unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage		3.9		V	VGS = -5V, ISD = 20A
			3.3		V	VGS = -5V, ISD = 20A, TJ = 175°C
I_S	Continuous Diode Forward Current			48	A	VGS = -5V
I_{SM}	Diode Pulse Current			335	A	VGS = -5V, tp limited by Tjmax
t_{rr}	Reverse Recovery Time		17.8		ns	VGS = -5V, ISD = 55A, VR = 3300V
Q_{rr}	Reverse Recovery Charge		320		nC	
I_{rrm}	Peak Reverse Recovery Current		31		A	

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Typical Characteristics

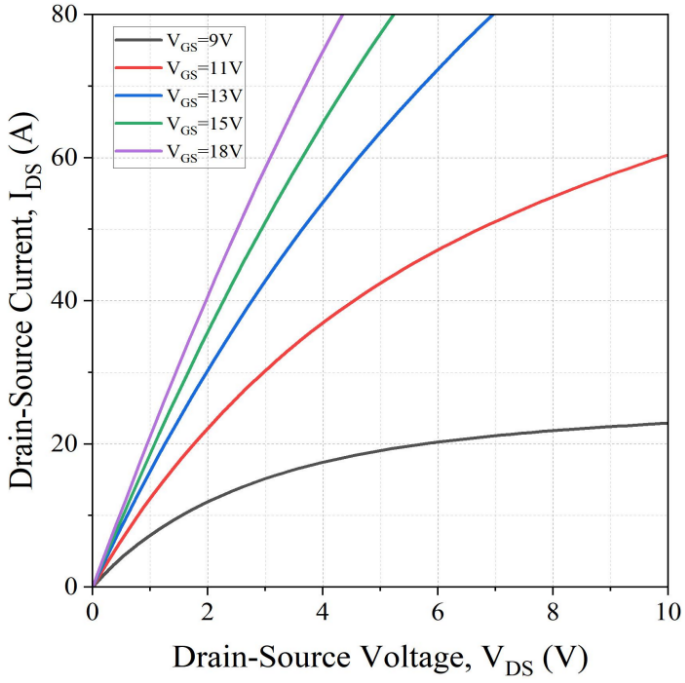


Fig 1. Output Characteristics at Tj= 25°C

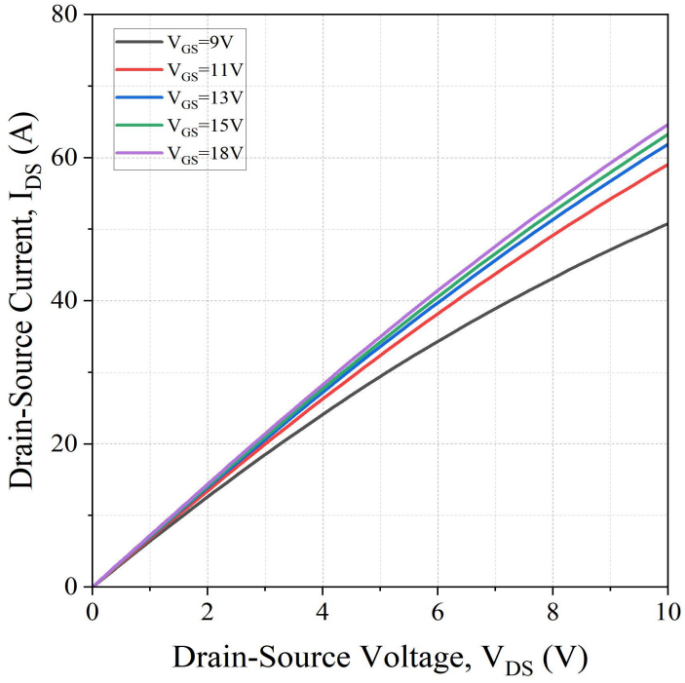


Fig 2. Output Characteristics at Tj= 175°C

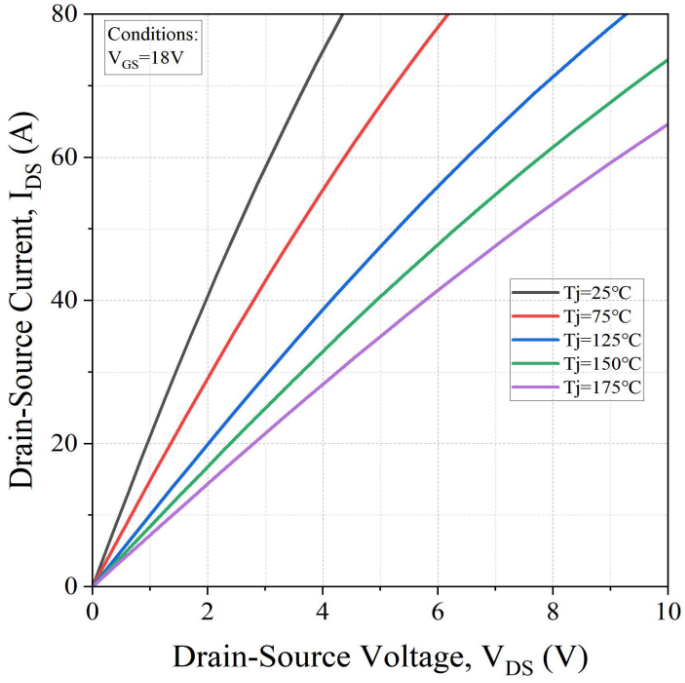


Fig 3. Output Characteristics vs. Temperature

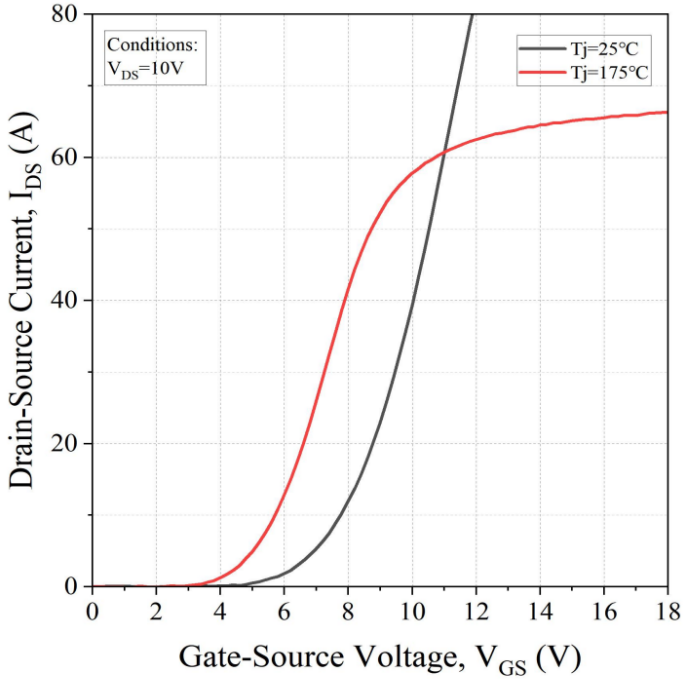


Fig 4. Transfer Characteristics vs. Temperature

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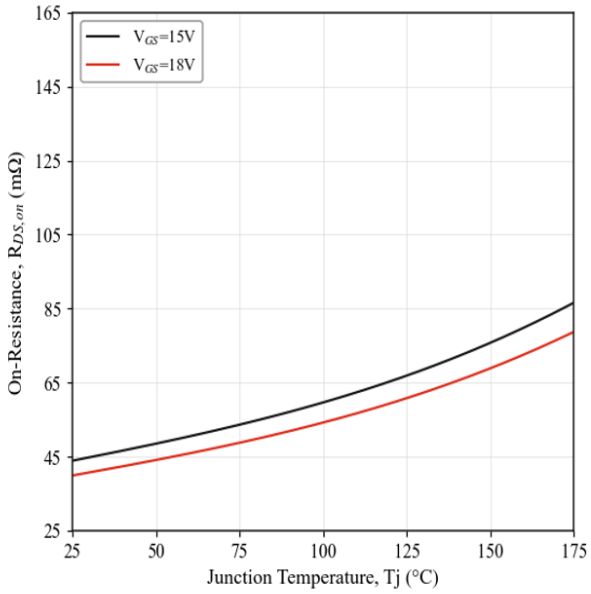


Fig 5. On-Resistance vs. Temperature

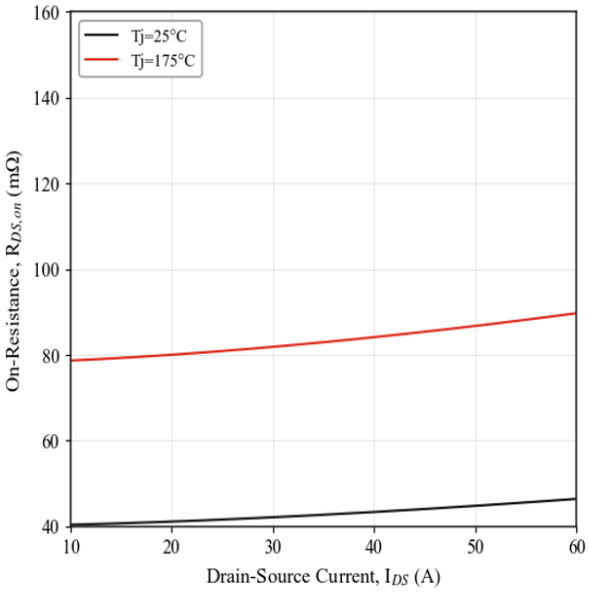


Fig 6. On-Resistance vs. Drain current

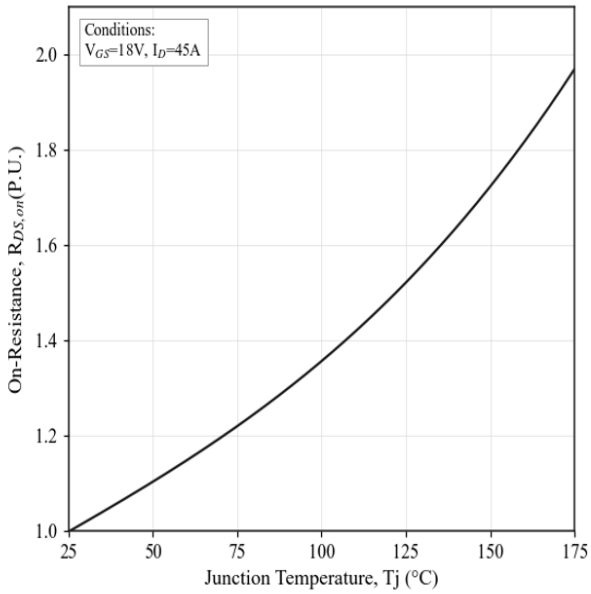


Fig 7. Normalized On-Resistance vs. Temperature

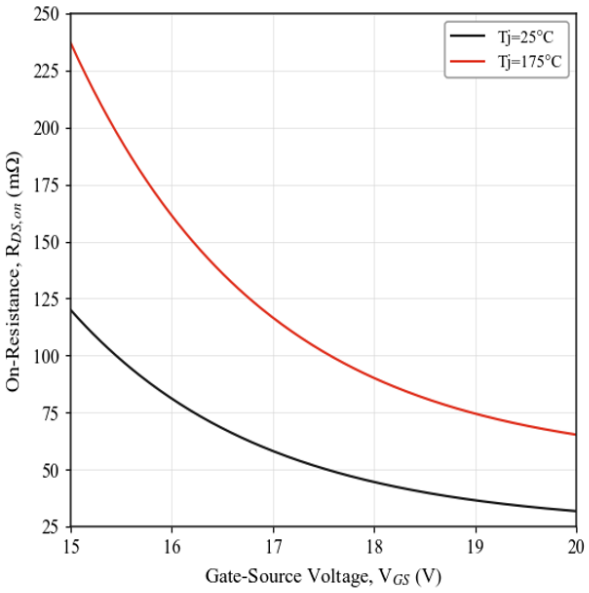


Fig 8. On-Resistance vs. Gate Voltage

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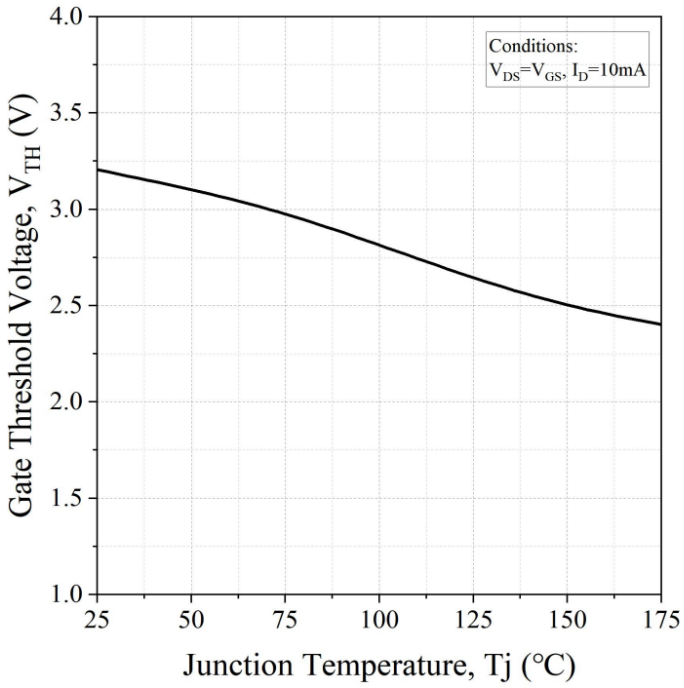


Fig 9. Threshold Voltage vs. Temperature

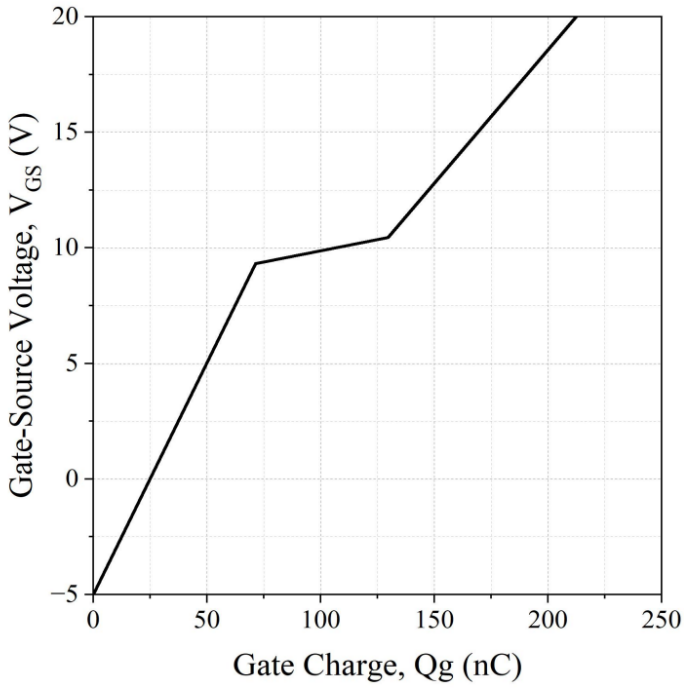


Fig 10. Gate Charge Characteristics

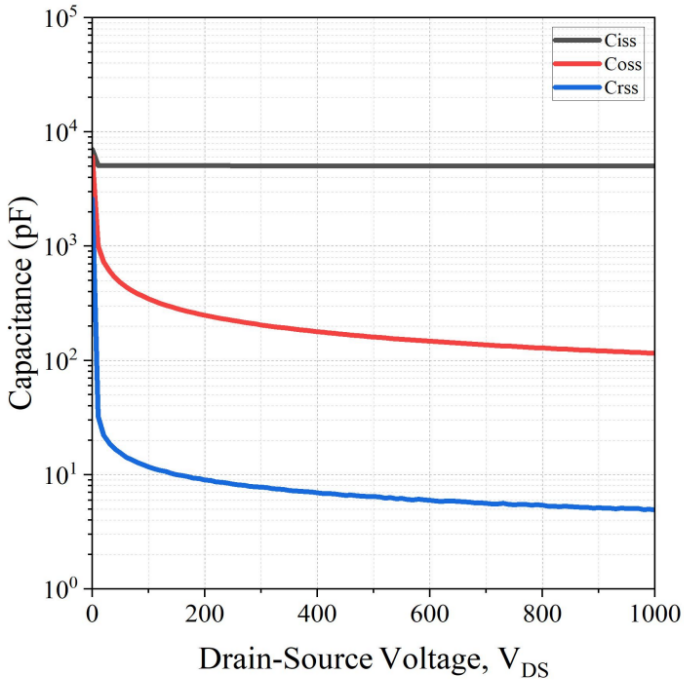


Fig 11. Capacitances vs. Drain-Source

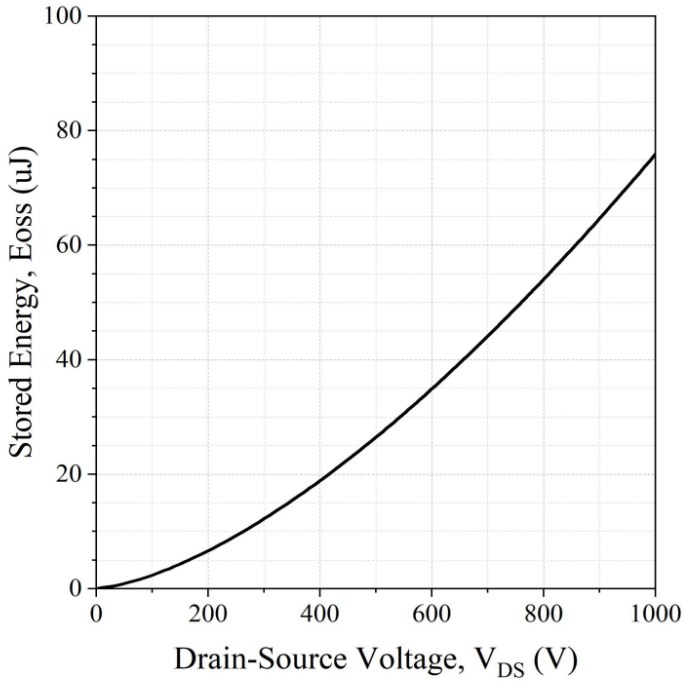


Fig 12. Output Capacitor Stored Energy

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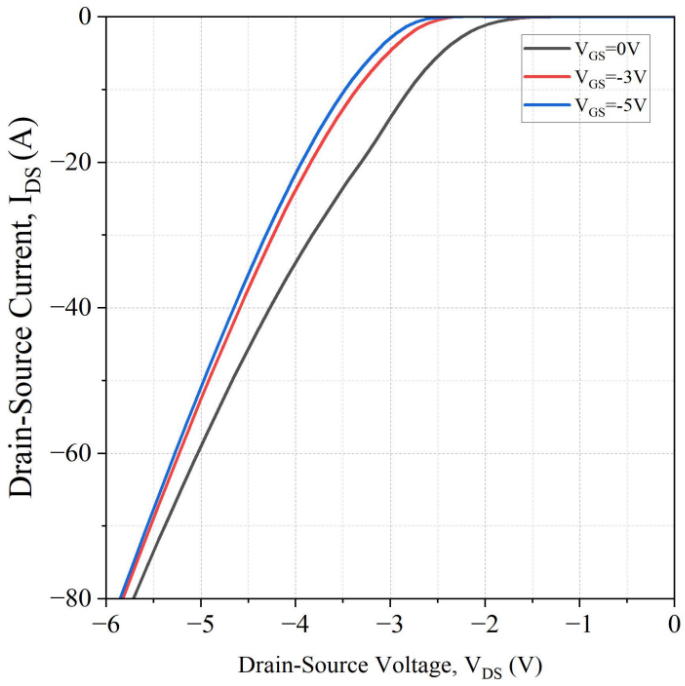


Fig 13. Body Diode Characteristics at Tj= 25°C

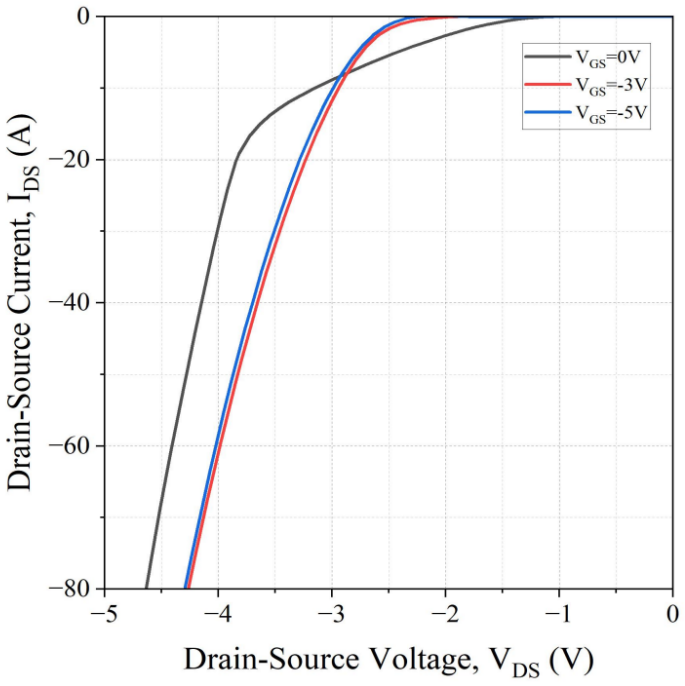


Fig 14. Body Diode Characteristics at Tj= 175°C

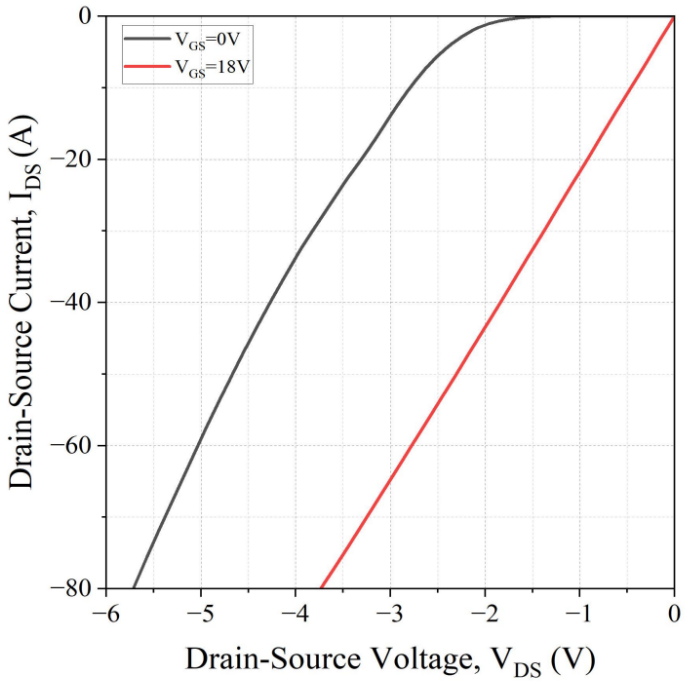


Fig 15. 3rd Quadrant Characteristic at Tj= 25°C

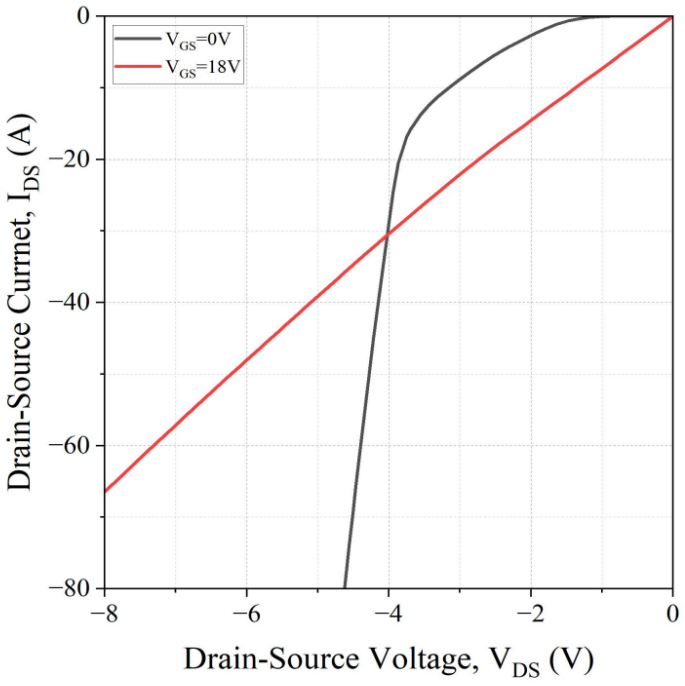


Fig 16. 3rd Quadrant Characteristic at Tj= 175°C

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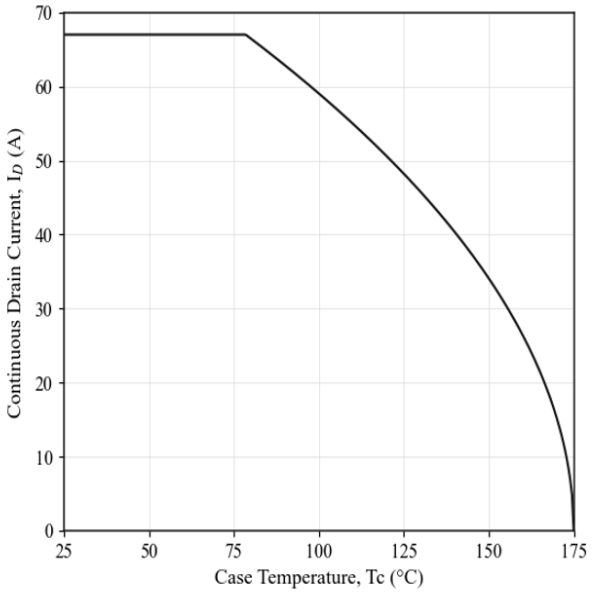


Fig 17. Current De-rating

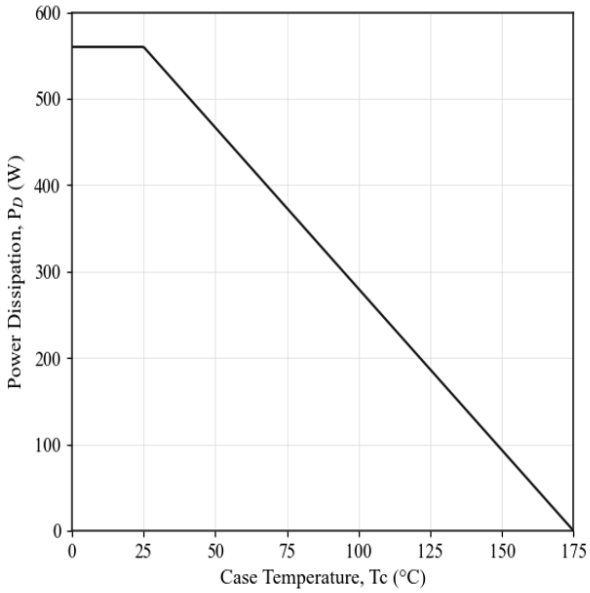


Fig 18. Power Dissipation De-rating

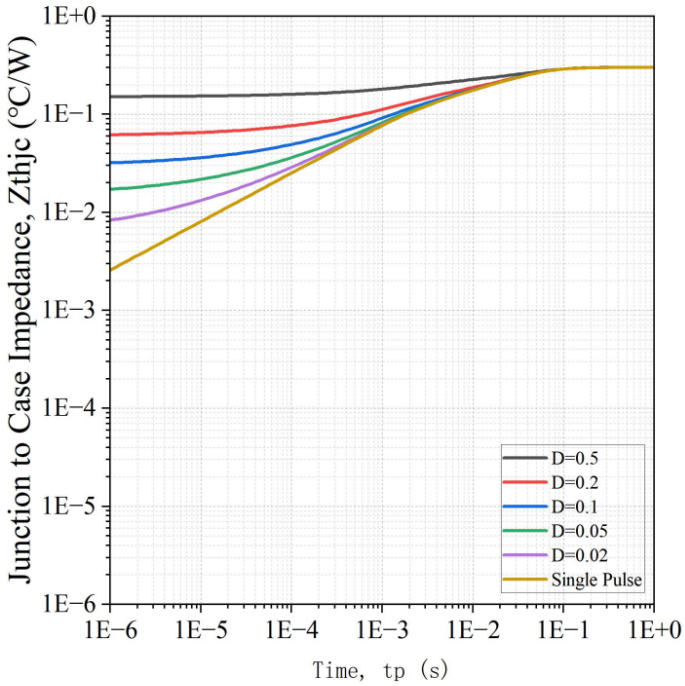


Fig 19. Transient Thermal Impedance

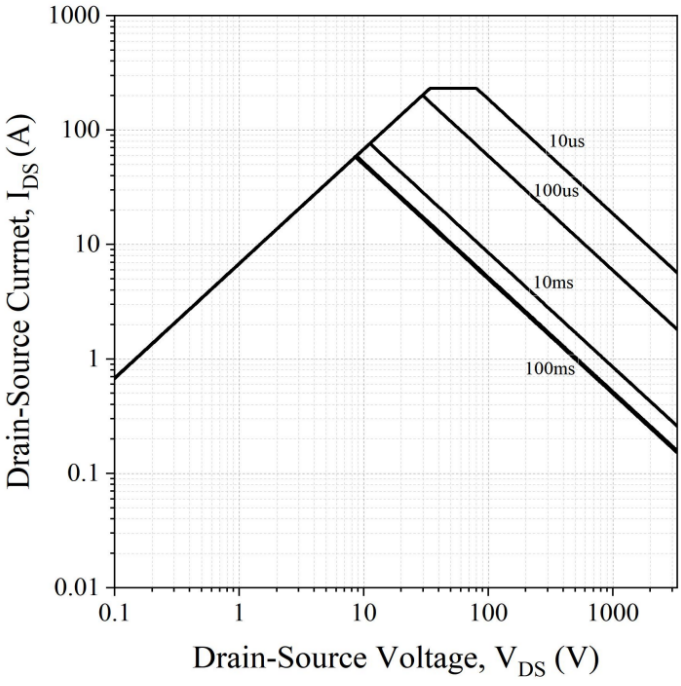
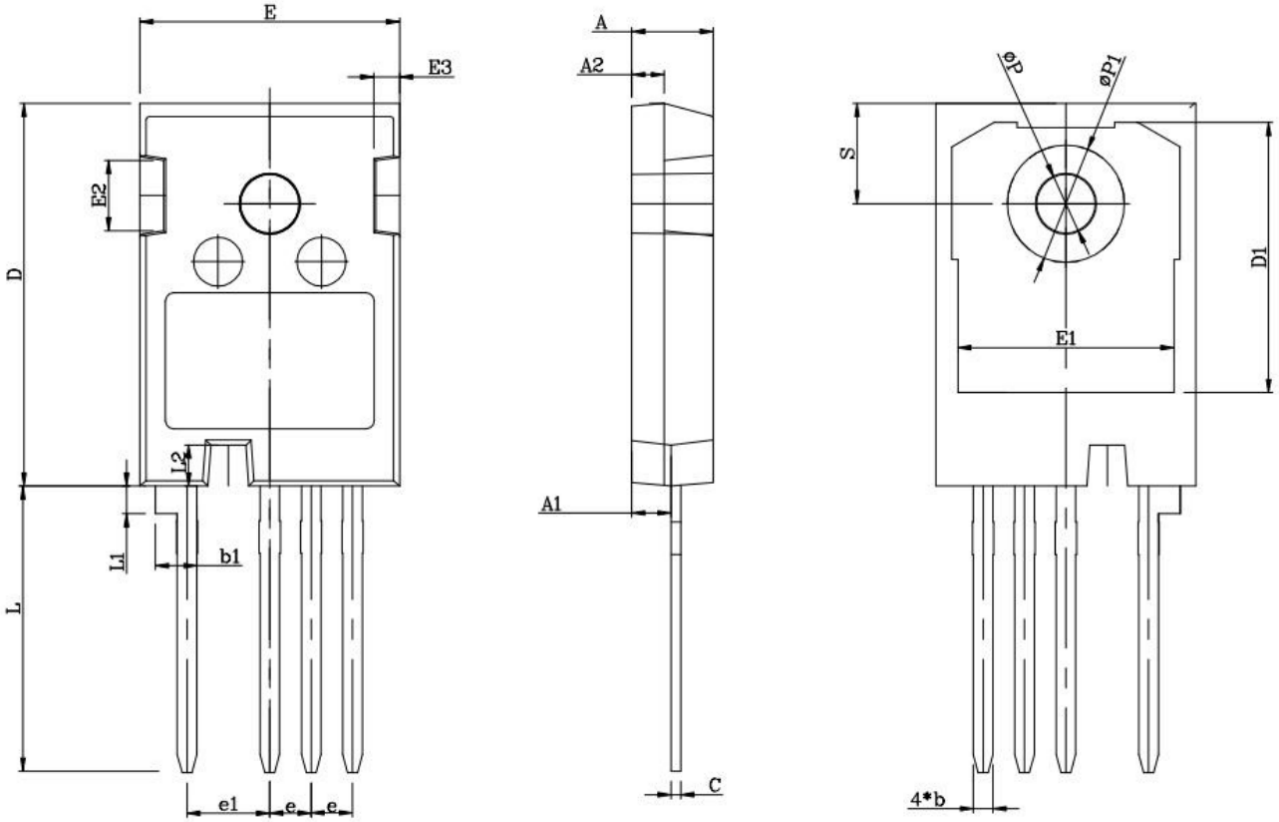


Fig 20. Safe Operating Area

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Package Dimensions: TO-247-4



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		

Appendix: Reliability Qualification (Report No. R202509225605-01)

Gate bias reliability qualification by GRGTEST (Report No. R202509225605-01, issued 19.Dec. 2025), 22 pcs per test leg, TA = 175 °C, 1000 h. All samples passed.

Test item	Test condition	Duration	Sample size	Result
HTPGB (High Temperature Positive Gate Bias)	TA = 175 °C, VGS = +22 V	1000 h	22 pcs	Pass
HTNGB (High Temperature Negative Gate Bias)	TA = 175 °C, VGS = -8 V	1000 h	22 pcs	Pass

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Reliability Parameter Drift (lot averages, 0 h → 1000 h)

Parameter	Test condition	Unit	HTPGB 0 h	HTPGB 1000 h	HTNGB 0 h	HTNGB 1000 h
BVDSS	ID = 100 µA	V	3815.8	3814.6	3843.8	3842.2
$V_{GS(th)}$	ID = 10 mA	V	3.211	3.294	3.207	3.162
$R_{DS(on)}$	ID = 40 A, VGS = 18 V	mΩ	44.97	45.15	45.02	44.96
I_{DSS}	VDS = 3300 V	µA	0.235	0.169	0.247	0.166
I_{GSS}	VGS = +22 V	nA	1.246	1.156	1.241	1.142
VFSD	ISD = 20 A, VGS = -4 V	V	3.362	3.376	3.364	3.359

Appendix: Wafer CP Test Data (Lot H60005_01)

Wafer probe (CP) results of 830 good dies, Lot H60005_01, tested 22.Aug. 2025 (CP yield 99.4 %). Values are die-level measurements before packaging.

Parameter	Test condition	Unit	Min.	Mean	Max.
Breakdown Voltage BVR	ID = 10 µA	V	3558	3796	3845
	ID = 100 µA	V	3702	3894	3922
	ID = 1 mA	V	3748	3909	3935
Leakage Current IR	VDS = 2640 V	µA	0.38	0.56	5.18
	VDS = 2970 V	µA	0.73	1.07	2.91
	VDS = 3300 V	µA	1.52	2.21	5.45
Body Diode Forward Voltage VF	IF = 1 mA	V	0.746	0.748	0.752
	IF = 6 A	V	1.401	1.420	1.435
	IF = 8 A	V	1.545	1.571	1.588
	IF = 10 A	V	1.687	1.721	1.738

Revision History

Revision	Date of Release	Description of Changes
V1.0	2025.10.15	Initial APSEMI release

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