A3G90N1500MT4SX

1500V, 90A, 20mΩ, N-Channel, Silicon Carbide MOSFET

General Description

The AMG-MT4 series SiC MOSFET in TO-247-4S package ensures stable high-temperature operation for power-dense and energy-critical systems, enabling compact designs with reduced EMI.

Features

- 3rd Generation SiC MOSFET Technology
- High-Speed Switching with Low Capacitances
- High Blocking Voltage with Low $R_{DS(on)}$
- Optimized package with Separate Driver Source Pin
- Easy to Parallel and Simple to Drive
- RoHS Compliant, Halogen Free

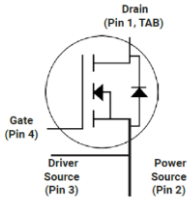
Application

- EV Charging
- High Voltage DC/DC Converters
- Switch Mode Power Supplies
- Power Factor Correction Modules

Product Summary

V_{DS}	1500V
I_D	90A





Ordering Information

Part Number	Marking	Package	Packaging
A3G90N1500MT4SX	A3G90N1500MT4S	TO-247-4S	Tube

Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	1500	V
I_D	Drain Current (continuous) at T_C=25°C	90	A
I_D	Drain Current (continuous) at T_C=100°C	61	A
I_{DM}	Drain Current (pulsed)	329	A
V_{GS}	Gate-Source Voltage	-10/+22	V
P_D	Power Dissipation T_C=25°C	350	W
P_D	Power Dissipation T_C=100°C	175	W
T_J, T_{stg}	Junction and Storage Temperature Range	-55 to +175	°C

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

Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-Source Breakdown Voltage	V_{GS}=0V	1500			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=1500V, V_{GS}=0V		1	50	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=-10/+22V, V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=16mA	2	3.3	4	V
$V_{GS(on)}$	Recommended Turn-on Voltage	Static		18		V
$V_{GS(off)}$	Recommended Turn-off Voltage			-5		V
$R_{DS(on)}$	Static Drain-Source On Resistance	V_{GS}=15V, I_D=60A, T_J=25°C		24	30	mΩ
		V_{GS}=18V, I_D=60A, T_J=25°C		20	25	mΩ
		V_{GS}=18V, I_D=60A, T_J=175°C		36.4		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=1200V f=100kHz, V_{AC}=30mV		4133		pF
C_{oss}	Output Capacitance			129		pF
C_{rss}	Reverse Transfer Capacitance			5.6		pF
E_{OSS}	C_{oss} Stored Energy			121		µJ
g_{fs}	Transconductance	V_{DS}=20V, I_D=40A		44		S
E_{ON}	Turn-On Energy (Body Diode)	V_{DS}=1000V V_{GS}=-5/+18V, I_D=60A $R_{G(ext)}$=2.5Ω, T_J=175°C		881		µJ
E_{OFF}	Turn-Off Energy (Body Diode)			49.5		µJ
Q_G	Total Gate Charge	V_{DS}=1000V V_{GS}=-5/+18V I_D=60A		103		nC
Q_{GS}	Gate-Source Charge			38		nC
Q_{GD}	Gate-Drain Charge			28		nC
R_G	Gate Resistance	f=1MHz, V_{AC}=30mV		1.8		Ω
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=1000V V_{GS}=-5/+18V, I_D=60A $R_{G(ext)}$=2.5Ω		35		ns
t_r	Rise Time			18		ns
$t_{d(off)}$	Turn-off Delay Time			46		ns
t_f	Fall Time			11		ns

Typical Performance-Reverse Diode (T_J=25°C unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}	Diode Forward Voltage	V_{GS}=-5V, I_F=30A, T_J=25°C		3.9		V
		V_{GS}=-5V, I_F=30A, T_J=175°C		3.4		V
I_S	Continuous Diode Forward Current	V_{GS}=-5V		87		A
t_{rr}	Reverse Recovery Time	V_{GS}=-5V, I_{SD}=60A V_R=1000V di/dt=2350A/µs, T_J=175°C		25		ns
Q_{rr}	Reverse Recovery Charge			450		nC
I_{rrm}	Peak Reverse Recovery Current			28		A

Thermal Characteristics

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	0.428	°C/W

The values are based on Junction-to-Case Thermal Impedance measured with the device mounted to a large heat sink, assuming a maximum junction temperature of $T_{J(max)}$=175°C.

Electrical Characteristics

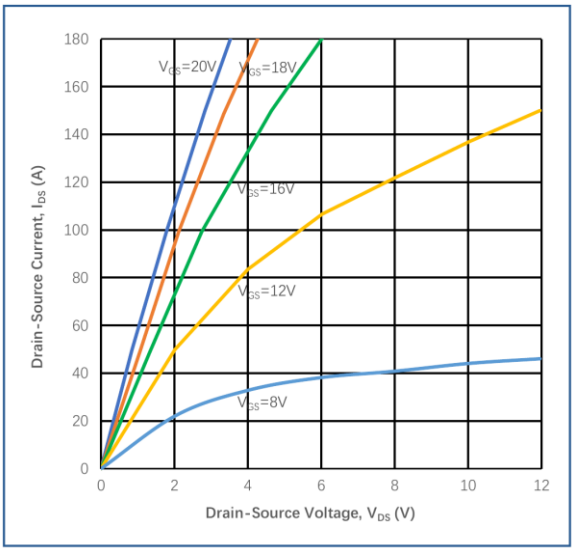


Figure 1
Output Characteristics (T_J=25°C)

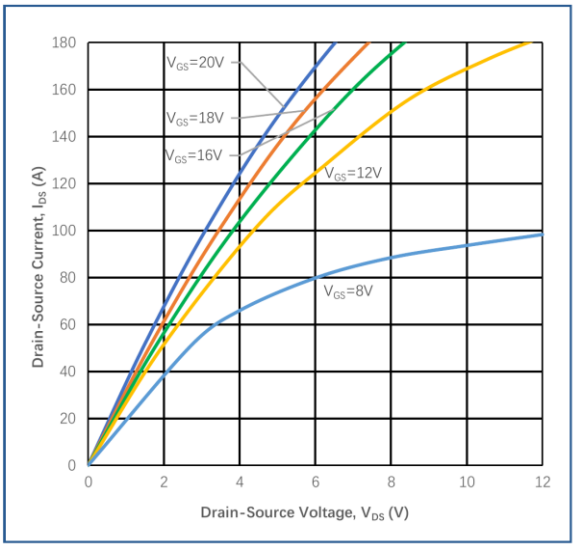


Figure 2
Output Characteristics (T_J=175°C)

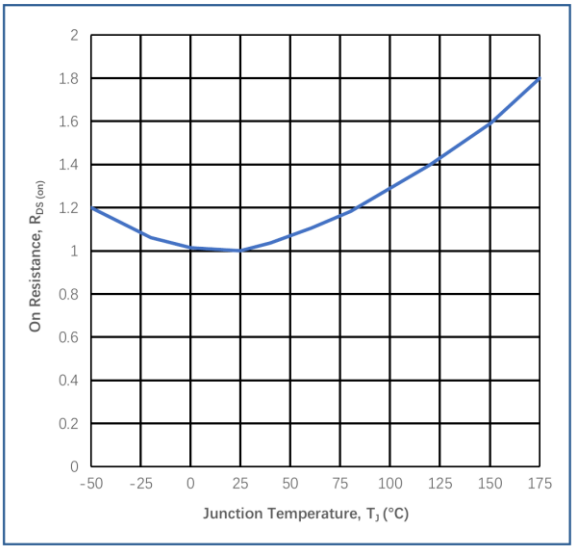


Figure 3
Normalized On-Resistance vs. Temperature

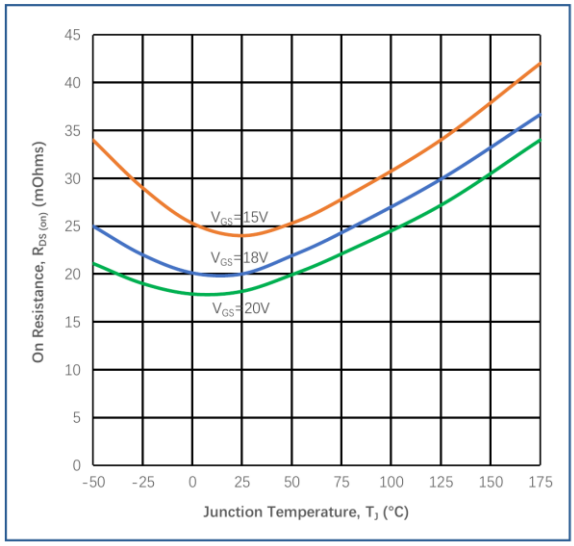


Figure 4
On-Resistance vs. Temperature

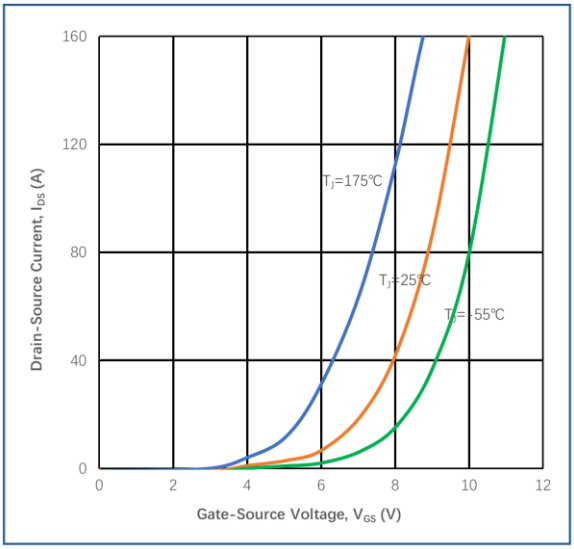


Figure 5
Transfer Characteristic

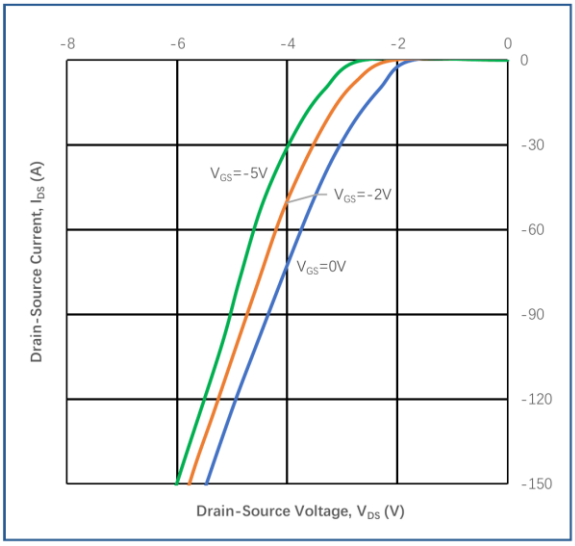


Figure 6
Body Diode Characteristic at 25°C

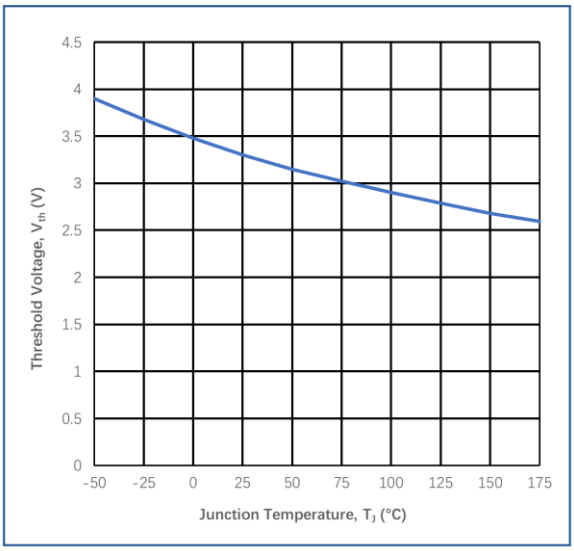


Figure 7
Threshold Voltage vs. Temperature

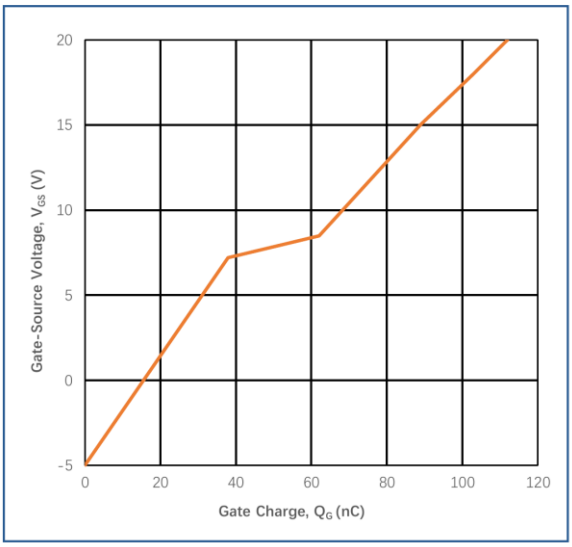


Figure 8
Gate Charge Characteristics

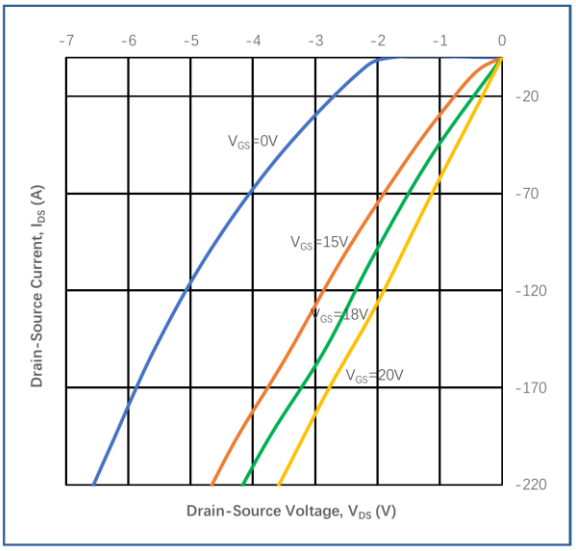


Figure 9
3rd Quadrant Characteristic at 25°C

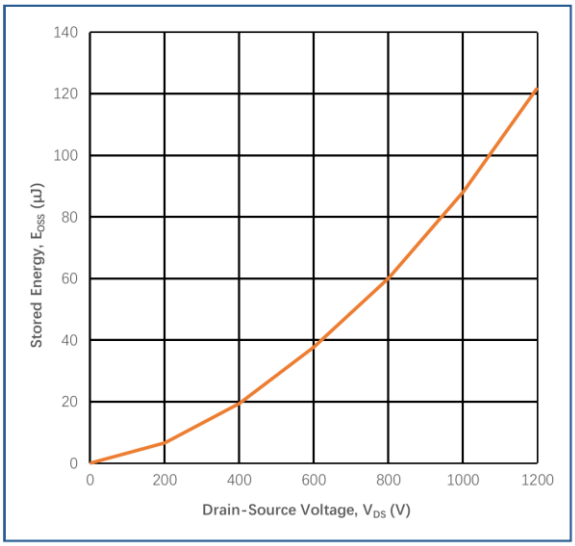


Figure 10
Output Capacitor Stored Energy

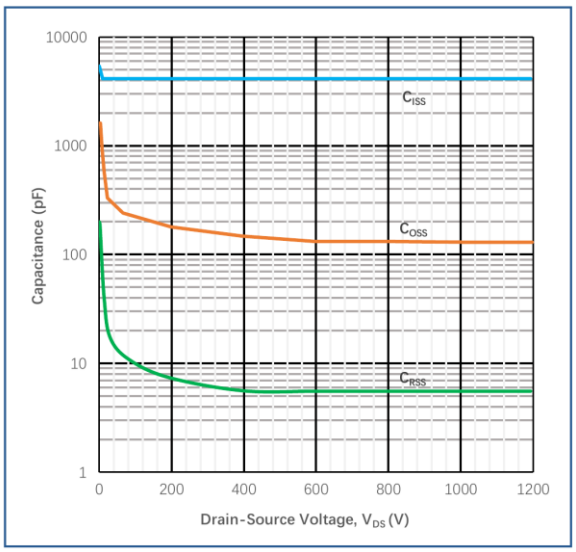


Figure 11
Capacitances vs. Drain-Source

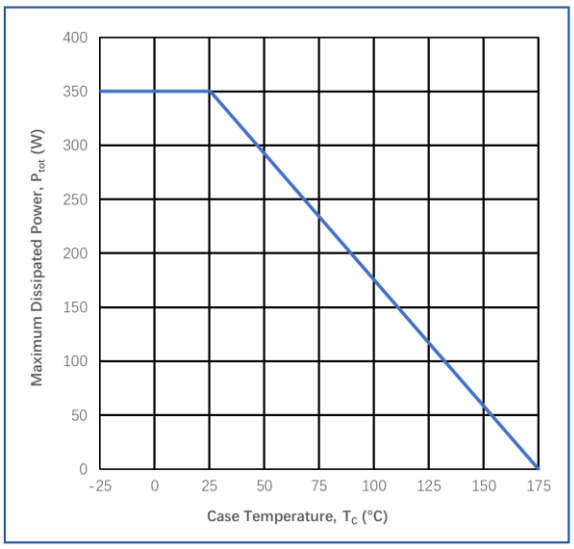


Figure 12
Max Power Dissipation Derating vs T_C

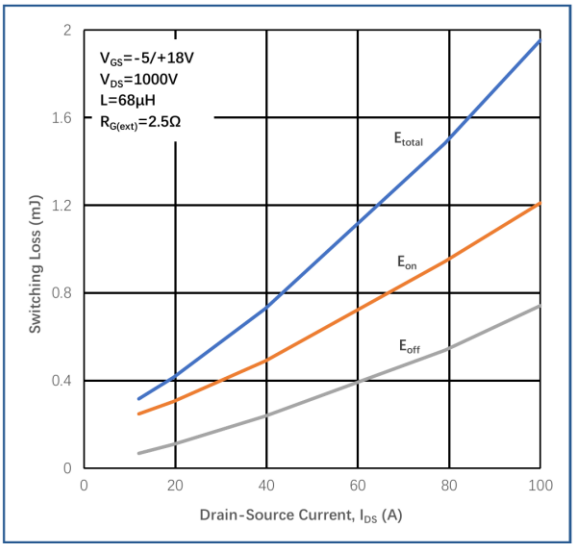


Figure 13
Switching Energy vs. Drain Current

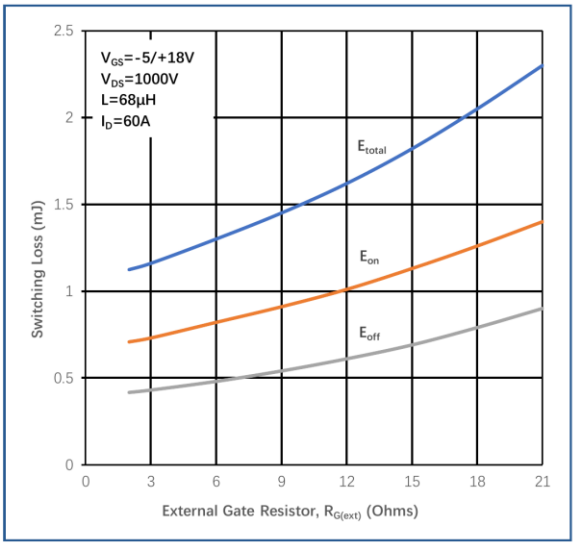


Figure 14
Switching Energy vs. $R_{G(ext)}$

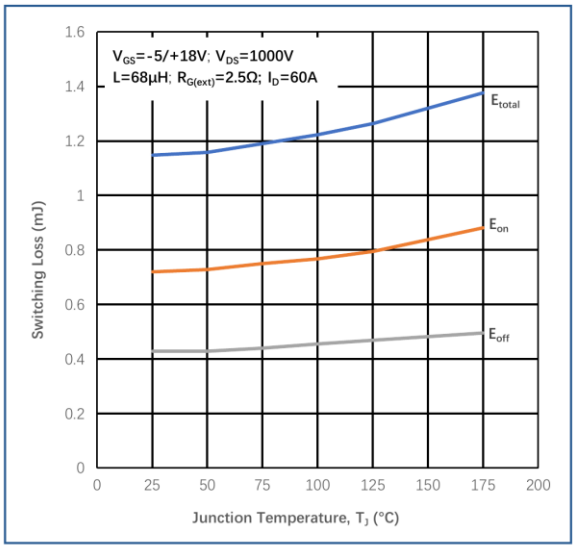


Figure 15
Switching Energy vs. Temperature

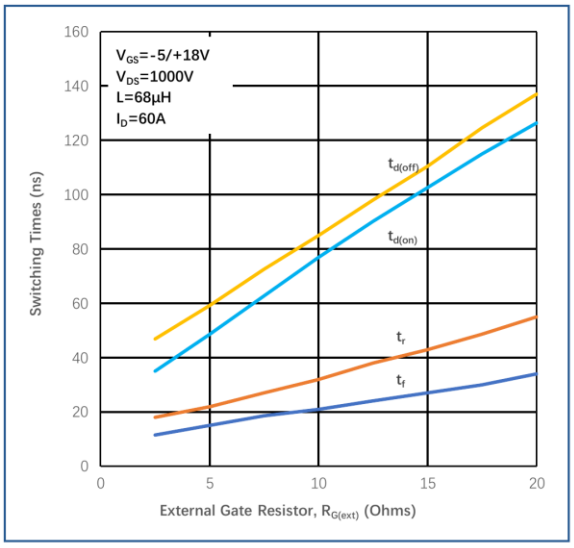


Figure 16
Switching Times vs. $R_{G(ext)}$

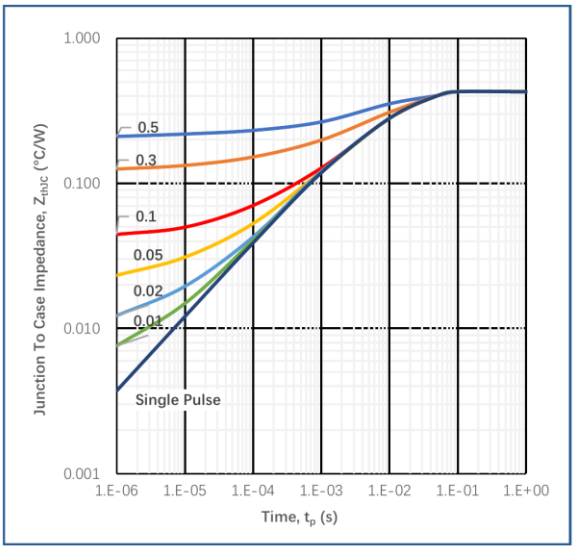


Figure 17
Transient Thermal Impedance

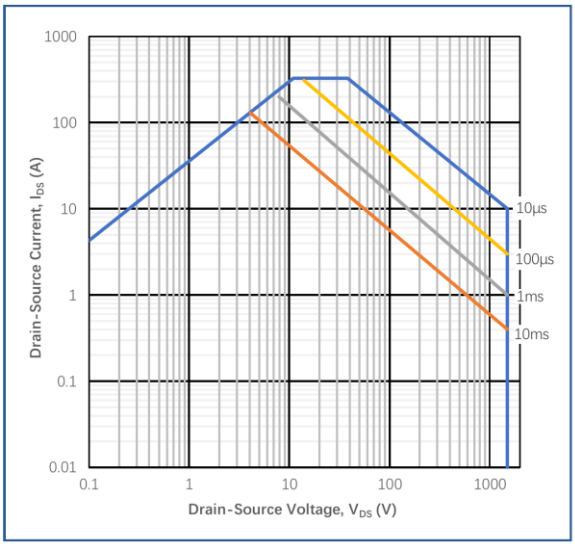
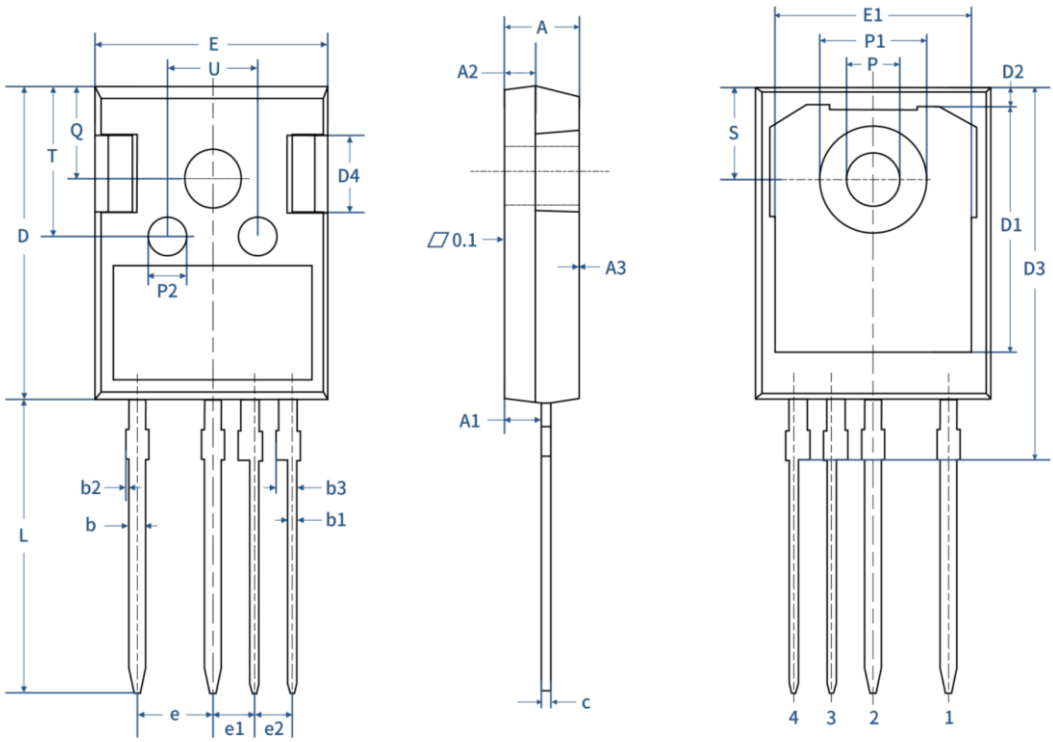


Figure 18
Safe Operating Area

Package Drawing: TO-247-4S



Dimensions (Unit: mm)

Symbol	Millimeters		Symbol	Millimeters	
	Min.	Max.		Min.	Max.
A	4.9	5.1	**E**	15.7	15.9
A1	2.31	2.51	**E1**	13.1	13.5
A2	1.9	2.1	**e**	5.08	
A3	0.05	0.25	**e1**	2.79	
b	1.1	1.3	**e2**	2.54	
b1	0.65	0.79	**L**	19.8	20.1
b2	-	0.2	**P**	3.5	3.7
b3	1.34	1.44	**P1**	7	7.4
c	0.58	0.66	**P2**	2.4	2.6
D	20.9	21.1	**Q**	5.6	6
D1	16.25	16.85	**S**	6.15	-
D2	1.05	1.35	**T**	9.8	10.2
D3	24.97	25.27	**U**	6	6.4
D4	4.9	5.1			

Pin Assignment

Pin	Symbol	Description
1, Tab	D	Drain
2	S	Power Source
3	S	Driver Source
4	G	Gate

Note:

1. All metal surfaces are Sn plated (matte), except area of cut.
2. Burr or mold flash size (0.5 mm) is not included in the dimensions.

Revision version	Description	Date
1	Initial	10.2026

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