

ASR90N650MD88PB

650V, 25A, 72mΩ, N-Channel, Silicon Carbide MOSFET

Product Data Sheet

ASTC-3T04-53A A/1



爱仕特科技
AST TECHNOLOGY

General Description

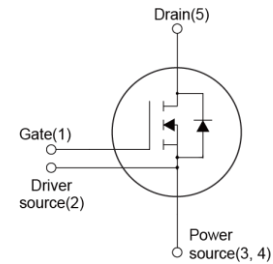
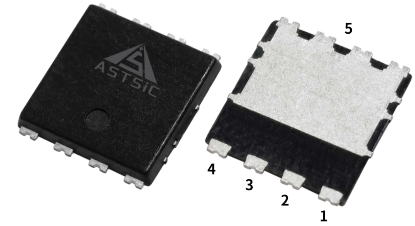
The AST-MD88 series SiC MOSFET in PDFN8*8 package ensures stable high-temperature operation for power-dense and energy-critical systems, enabling compact designs with reduced EMI.

Features

- 3rd Generation SiC MOSFET Technology
- Extremely Low Switching Loss
- High Blocking Voltage with Low $R_{DS(on)}$
- Excellent Stability and Uniformity
- Easy to Parallel and Simple to Drive
- RoHS Compliant, Halogen Free

Applications

- PC Power
- EV Charger
- LED Lighting
- Server Power
- Telecom Power
- Solar PV Inverters
- UPS



Ordering Informations

Order Number	ASR90N650MD88PB
Marking	ASR90N650MD88
Package Type	PDFN8*8
Packing Method	Reel

Key Parameters

Symbol	Parameter	Values			Unit	Test Conditions
Absolute maximum rating						
V _{DS}	Drain-Source Voltage	650			V	T _C =25°C
I _D	Drain Current (continuous)	25			A	T _C =25°C
P _D	Power Dissipation	102			W	T _C =25°C
T _J ; Max	Junction Temperature	175			°C	
Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics						
R _{DS(on)}	Static Drain-Source on Resistance	-	72	90	mΩ	V _{GS} =12V; I _D =15A; T _J =25°C
Dynamic characteristics						
Q _G	Total Gate Charge	-	75	-	nC	V _{DS} =400V; V _{GS} =-3V/12V; I _D =15A; T _J =25°C
Q _{GD}	Gate-Drain Charge	-	26	-		

Absolute Maximum Ratings (at $T_c=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter	Values	Unit
V_{DS}	Drain-Source Voltage	650	V
I_D	Drain Current (continuous; $T_c=25^\circ\text{C}$)	25	A
	Drain Current (continuous; $T_c=100^\circ\text{C}$)	18	
I_{DM}	Drain Current (pulsed)	100	A
V_{GS}	Gate-Source Voltage	-5/+15	V
P_D	Power Dissipation ($T_c=25^\circ\text{C}$)	102	W
T_J, T_{stg}	Junction and Storage Temperature Range	-55 to +175	$^\circ\text{C}$

MOSFET Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
Static characteristics (at T _J =25°C unless otherwise specified)						
BV _{DS}	Drain-Source Breakdown Voltage	650	-	-	V	I _D =250μA; V _{GS} =0V
I _{DSS}	Zero Gate Voltage Drain Current	-	5	100	μA	V _{DS} =650V; V _{GS} =0V
I _{GSS}	Gate-Body Leakage Current	-	10	250	nA	V _{DS} =0V; V _{GS} =-5 to 15V
V _{GS(th)}	Gate Threshold Voltage	1.2	1.8	2.5	V	V _{DS} = V _{GS} ; I _D =2mA
V _{GS(on)}	Recommended Turn-on Voltage	-	12	-	V	Static
V _{GS(off)}	Recommended Turn-off Voltage	-	-3	-		
R _{DS(on)}	Static Drain-Source on Resistance	-	72	90	mΩ	V _{GS} =12V; I _D =15A; T _J =25°C
		-	108	-		V _{GS} =12V; I _D =15A; T _J =175°C
Dynamic characteristics (at T _J =25°C unless otherwise specified)						
C _{iss}	Input Capacitance	-	1450	-	pF	V _{DS} =600V; f=1MHZ; V _{AC} =25mV
C _{oss}	Output Capacitance	-	110	-		
C _{rss}	Reverse Transfer Capacitance	-	4.6	-		
g _{fs}	Transconductance	-	7.5	-	S	V _{DS} =12V; I _D =10A
E _{oss}	Coss Stored Energy	-	18	-	μJ	V _{DS} =600V; f=1MHZ
E _{on}	Turn-on Energy (Body Diode)	-	72	-	μJ	V _{DS} =400V; V _{GS} =-3V/12V; I _D =15A; L=150μH; R _{G(ext)} =2.5Ω; T _J =175°C
E _{off}	Turn-off Energy (Body Diode)	-	8	-		
Q _G	Total Gate Charge	-	75	-	nC	V _{DS} =400V; V _{GS} =-3V/12V; I _D =15A
Q _{GS}	Gate-Source Charge	-	19	-		
Q _{GD}	Gate-Drain Charge	-	26	-		
R _{G(int)}	Internal Gate Resistance	-	5.5	-	Ω	f=1MHz; V _{AC} =25mV
t _{d(on)}	Turn-on Delay Time	-	20	-	ns	V _{DS} =400V; V _{GS} =-3V/12V; I _D =15A; L=150μH; R _{G(ext)} =2.5Ω
t _r	Rise Time	-	11	-		
t _{d(off)}	Turn-off Delay Time	-	18	-		
t _f	Fall Time	-	7	-		

Body Diode Characteristics (at $T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
V_{SD}	Diode Forward Voltage	-	4.5	6	V	$V_{GS}=0\text{V}; I_F=5\text{A}; T_J=25^{\circ}\text{C}$
		-	4.2	6		$V_{GS}=0\text{V}; I_F=5\text{A}; T_J=175^{\circ}\text{C}$
I_S	Continuous Diode Forward Current	-	20	-	A	$V_{GS}=0\text{V}; T_C=25^{\circ}\text{C}$
t_{rr}	Reverse Recovery Time	-	12	-	nS	$V_{GS}=-3\text{V}; I_F=15\text{A}; V_R=400\text{V};$ $di/dt=2400\text{A}/\mu\text{s}; T_J=175^{\circ}\text{C}$
Q_{rr}	Reverse Recovery Charge	-	80	-	nC	
I_{rrm}	Peak Reverse Recovery Current	-	10	-	A	

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.46	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^{\circ}\text{C}/\text{W}$

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 $T_{J(max)}=175^{\circ}\text{C}$.

Typical Performance

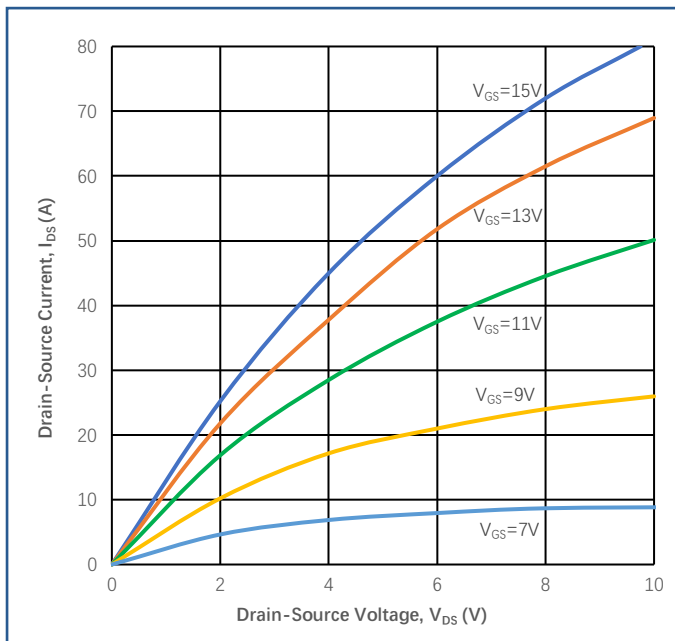


Figure 1
Output Characteristics ($T_J = 25^\circ\text{C}$)

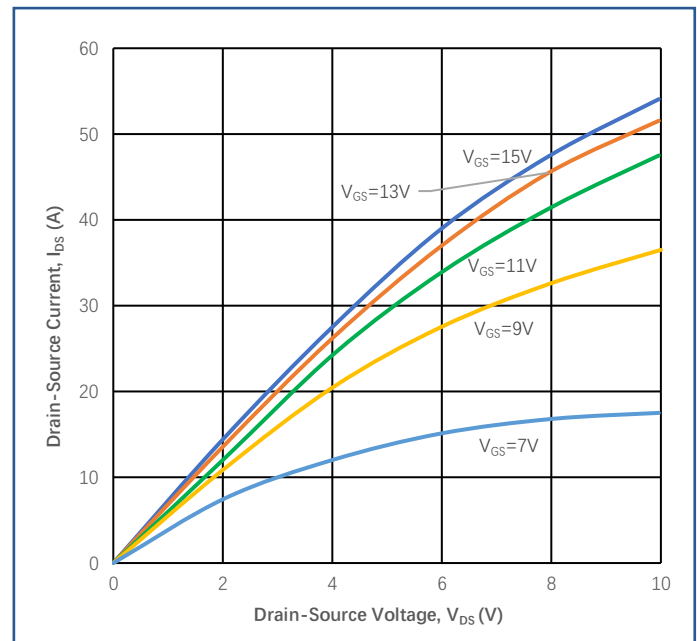


Figure 2
Output Characteristics ($T_J = 175^\circ\text{C}$)

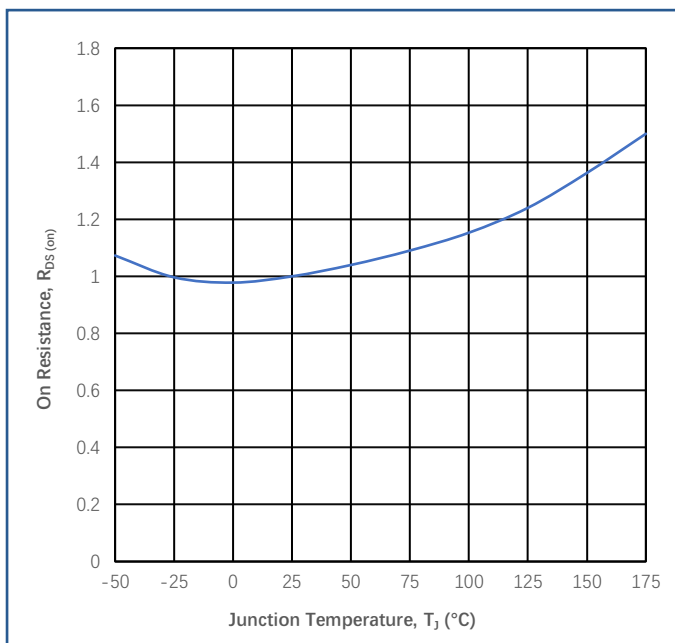


Figure 3
Normalized On-Resistance vs. Temperature

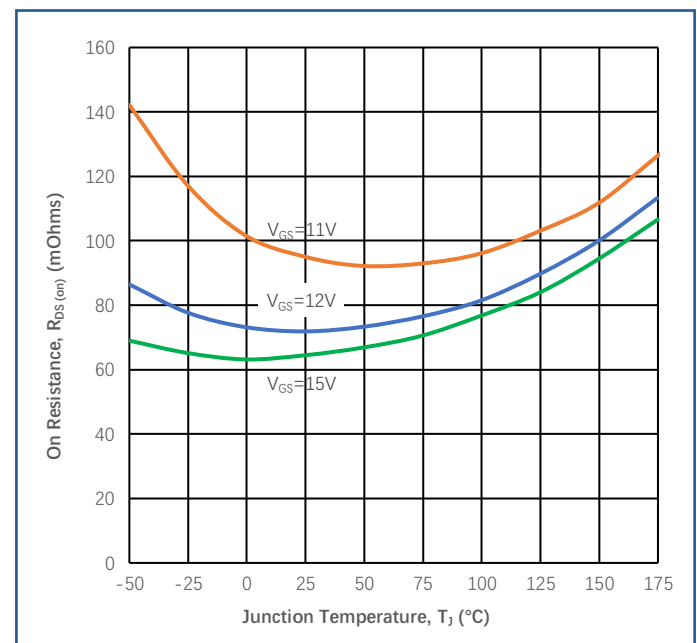


Figure 4
On-Resistance vs. Temperature

Typical Performance

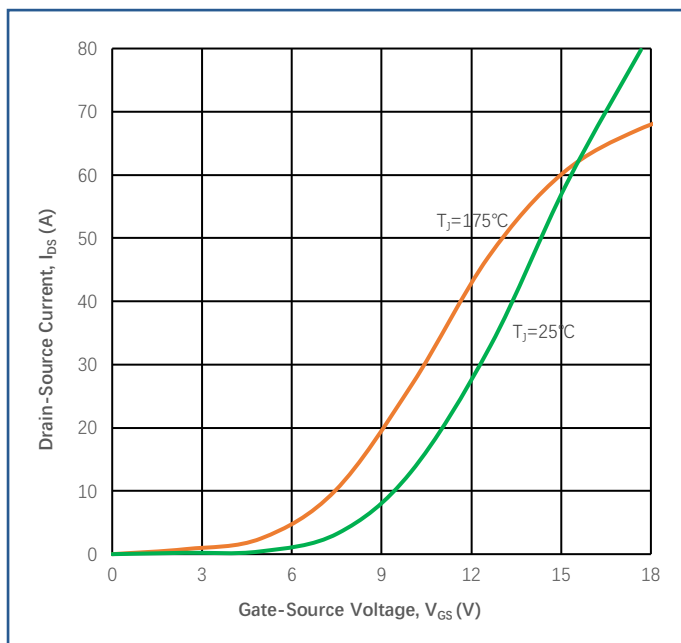


Figure 5
Transfer Characteristic

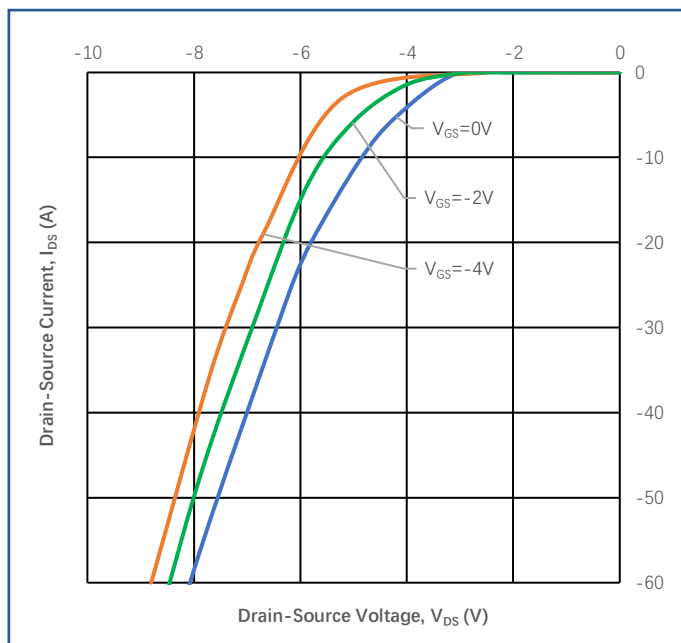


Figure 6
Body Diode Characteristic at 25°C

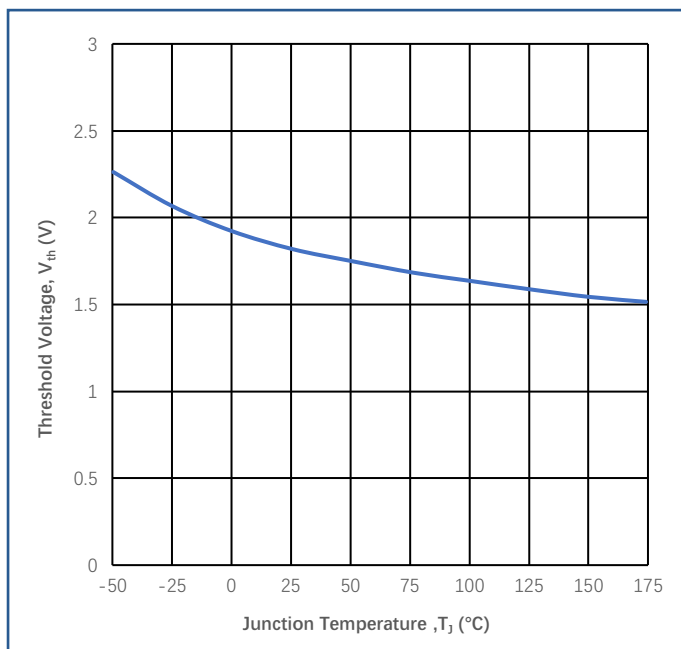


Figure 7
Threshold Voltage vs. Temperature

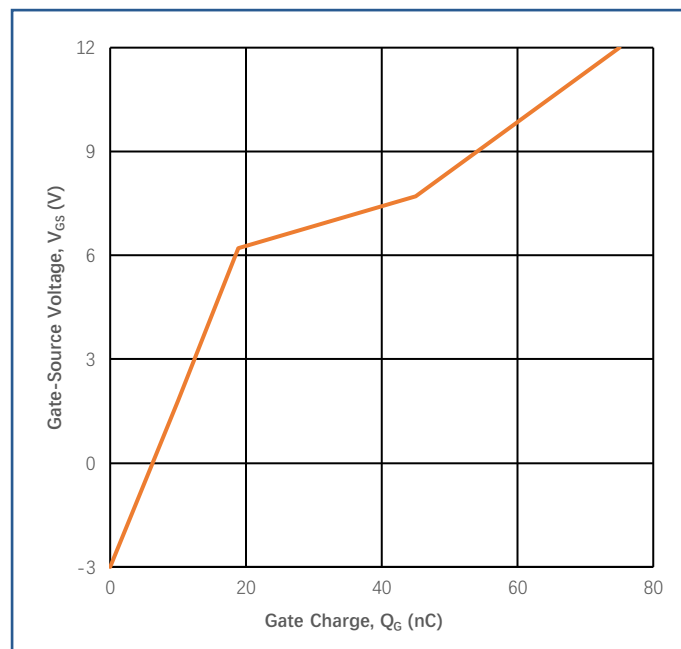


Figure 8
Gate Charge Characteristics

Typical Performance

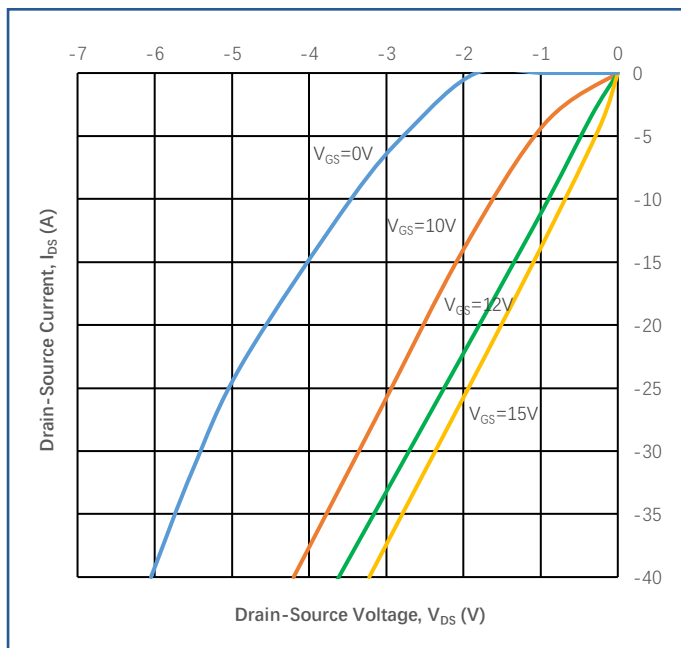


Figure 9

3rd Quadrant Characteristic at 25°C

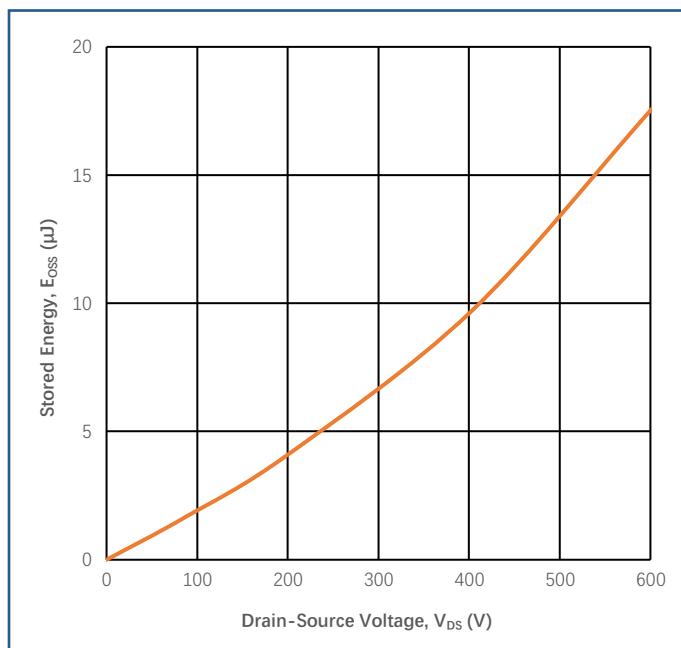


Figure 10

Output Capacitor Stored Energy

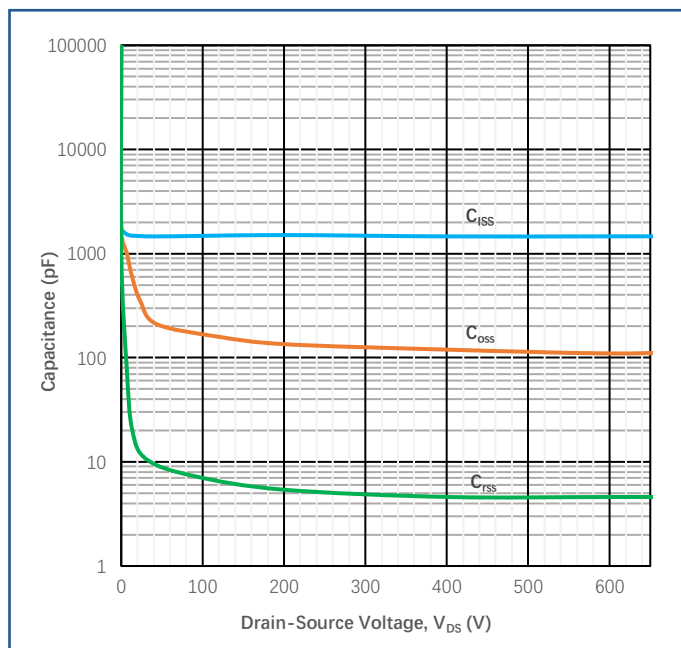


Figure 11

Capacitances vs. Drain-Source

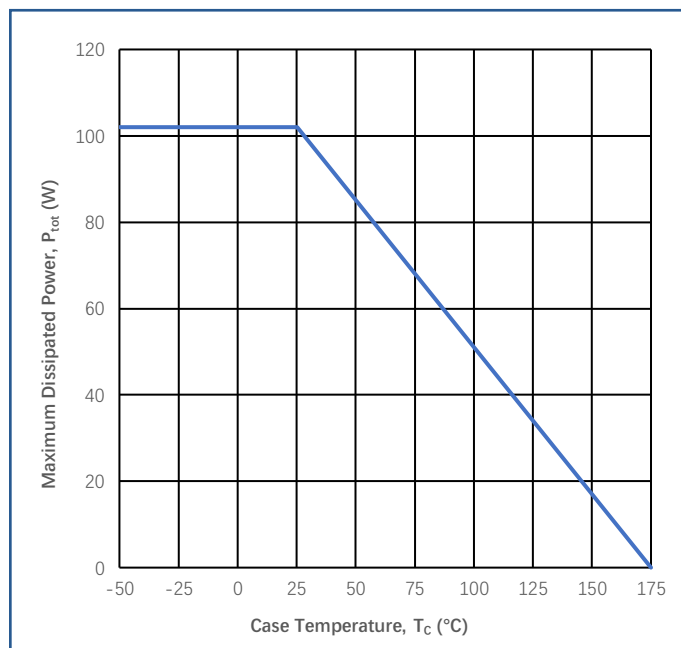


Figure 12

Max Power Dissipation Derating vs T_C

Typical Performance

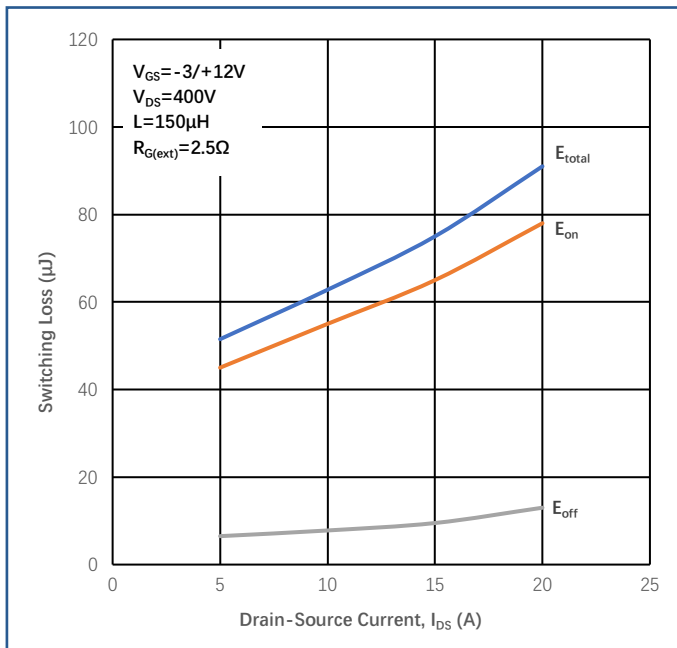


Figure 13

Switching Energy vs. Drain Current

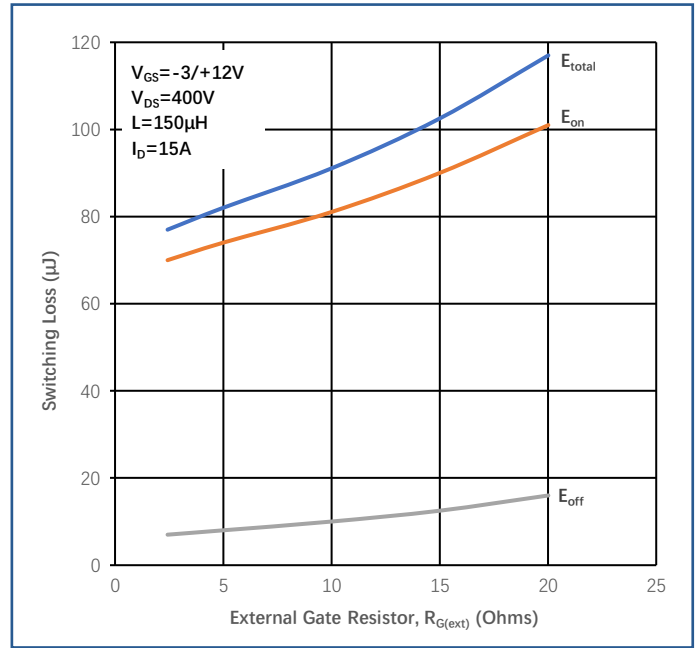


Figure 14

Switching Energy vs. $R_{G(\text{ext})}$

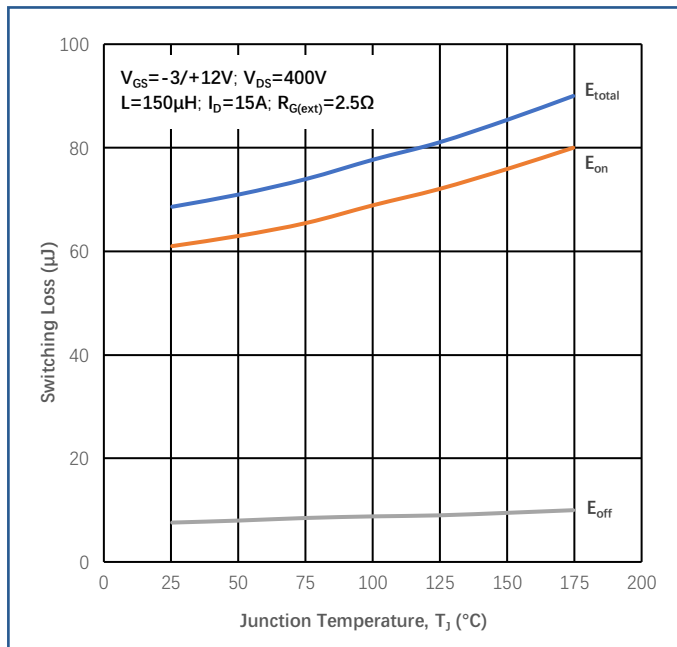


Figure 15

Switching Energy vs. Temperature

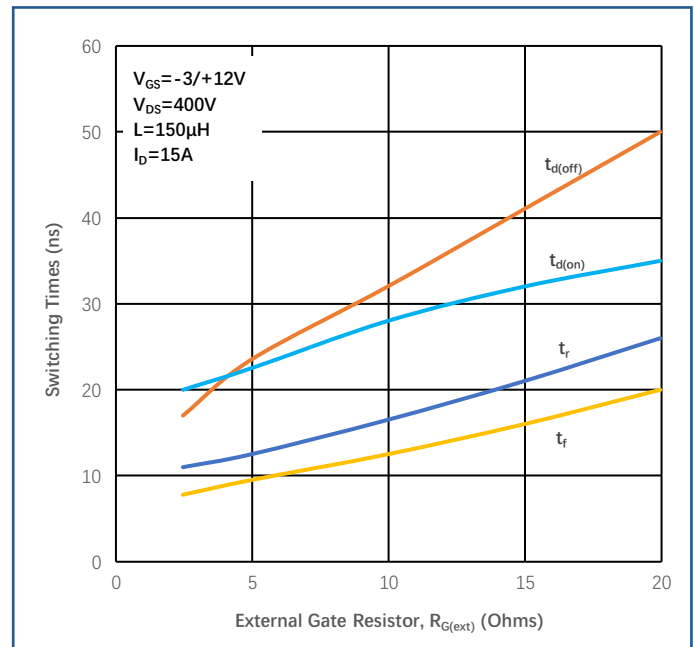


Figure 16

Switching Times vs. $R_{G(\text{ext})}$

Typical Performance

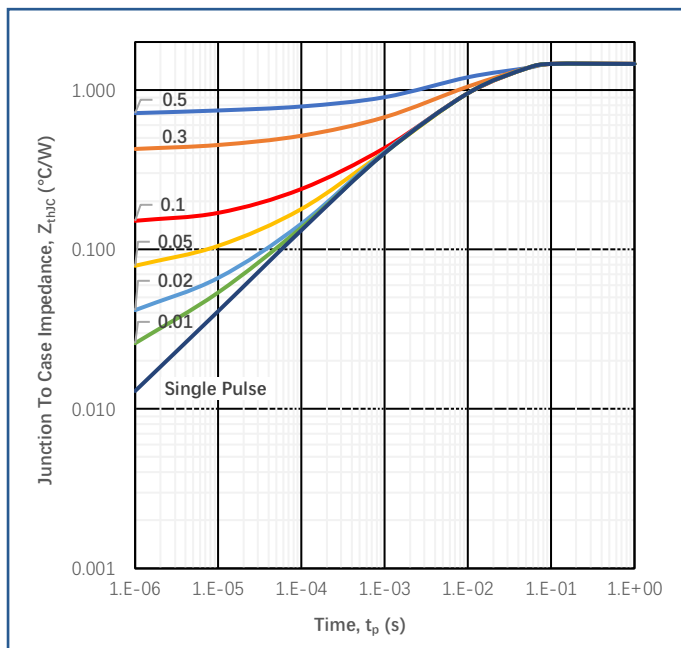


Figure 17
Transient Thermal Impedance

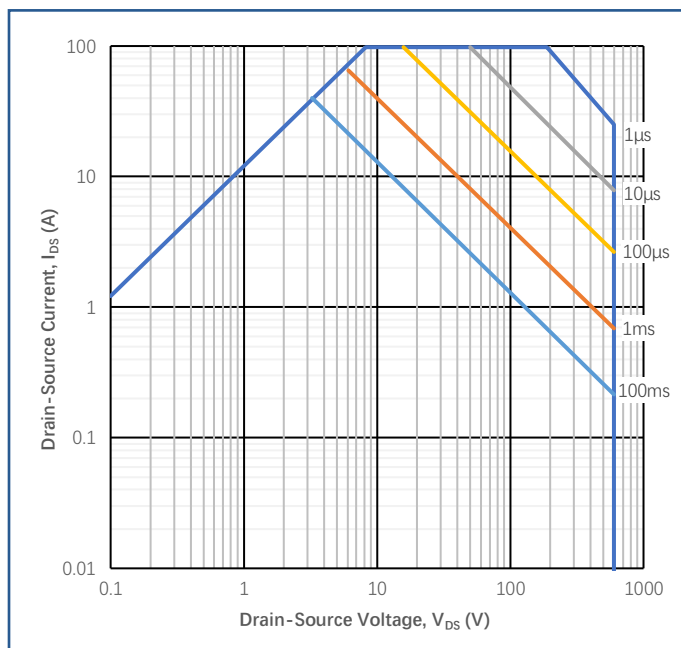
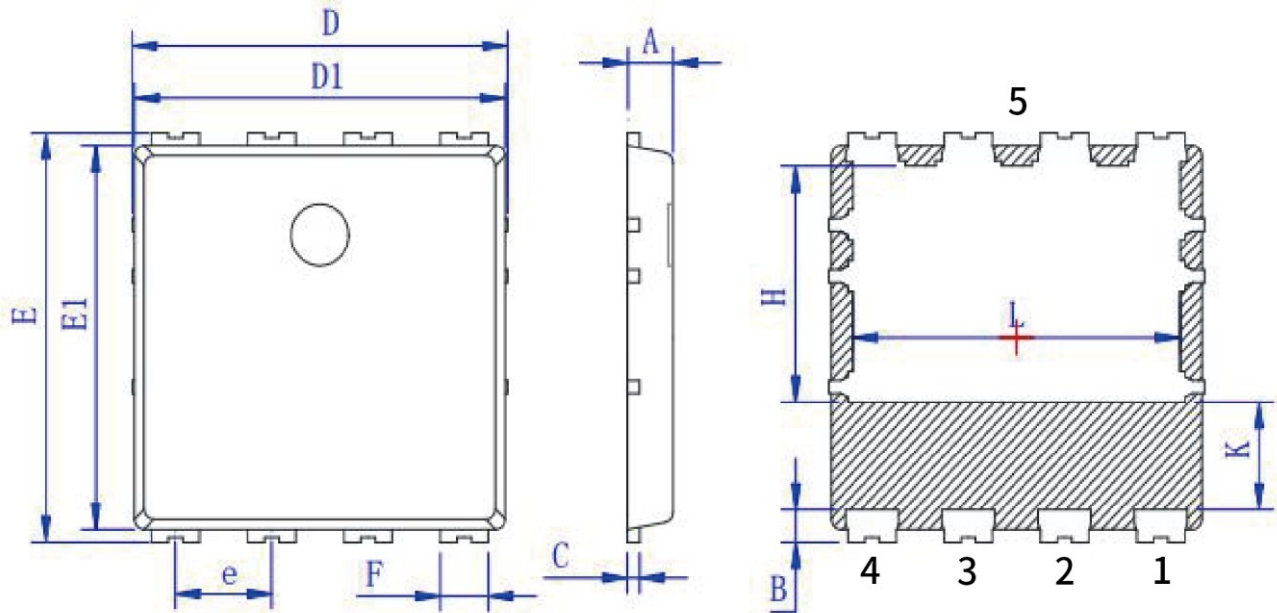


Figure 18
Safe Operating Area

Package Dimensions (mm)

Package Type: PDFN8*8



Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.90	0.95	1.00
B	0.50	0.60	0.70
C	0.254 Typ.		
D	7.70	7.80	7.90
D1	7.60	7.70	7.80
E	7.90	8.00	8.10
E1	7.40	7.50	7.60
e	2.0 Typ.		
F	1.0 Typ.		
H	4.40	4.60	4.70
L	6.60	6.80	6.90
K	2.00	-	-

Pin	Symbol	Description
1	G	Gate
2	S	Driver Source
3-4	S	Power Source
5	D	Drain

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.

Notes & Disclaimer

This document and the information contained herein are subject to change without notice. Any such change shall be evidenced by the publication of an updated version of this document by AST Technology. No communication from any employee or agent of AST Technology or any third party shall effect an amendment or modification of this document.

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, AST Technology hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

Any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of AST Technology in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

Except as otherwise explicitly approved by AST Technology in a written document signed by authorized representatives, the products of AST Technology may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

Contact Info

Tel: +86 755-89300160

Web: <http://www.astsic.com/>

Add: No.1 Rongtian Rd., Pingshan, Shenzhen, China

@2026 Shenzhen AST Technology Company. All Rights Reserved.