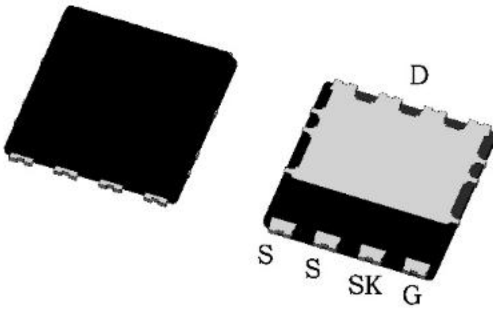
1200V N-Channel MOSFET

Description

Silicon Carbide (SiC) MOSFET use a completely new technology that provide superior switching performance and higher reliability compared to Silicon. In addition, the low ON resistance and compact chip size ensure low capacitance and gate charge. Consequently, system benefits include highest efficiency, faster operating frequency, increased power density, reduced EMI, and reduced system size.

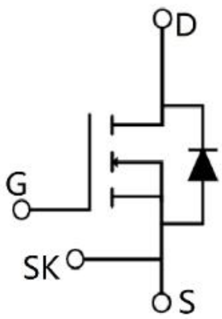


Features

- Extremely low switching loss
- High Blocking Voltage with Low RDS(on)
- Excellent stability and uniformity
- Easy to parallel and simple to drive
- ROHS Compliant, Halogen free

Application

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



G: Gate
D:Drain
SK: Driver Source
S: Power Source

Ordering Information

Part Number	Marking	Package	Packaging
ASR80N1200MD88	ASR80N1200MD88	PDFN8*8	Reel

Absolute Maximum Ratings(Tc=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage	1200	V
I_D	Drain Current(continuous)at Tc=25℃	30	A
I_D	Drain Current(continuous)at Tc=100℃	23	A
I_{DM}	Drain Current (pulsed)	80	A
V_{GS}	Gate-Source Voltage	-10/+22	V
P_D	Power Dissipation T_C = 25°C	101	W
T_J, Tstg	Junction and Storage Temperature Range	-55 to +175	℃

Electrical Characteristics(T_J = 25℃ unless otherwise specified)

Typical Performance-Static

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
BV_{DS}	Drain-source Breakdown Voltage	I_D=250uA,V_{GS}=0V	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} =1200V, V_{GS} =0V, T_J=25°C			100	uA
I_{GSS}	Gate-body Leakage Current	V_{DS} =0V ; V_{GS} =-10 to 20V			250	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_D=5mA	2	3	4	V
V_{GSon}	Recommended turn-on Voltage	Static		18		V
V_{GSoff}	Recommended turn-off Voltage			-5		V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS}=18V, I_D=20A		80	112	mΩ
		V_{GS}=18V, I_D=20A T_J=175℃		144		mΩ

Typical Performance-Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input Capacitance	V_{DS}=1000V,f=1MHz, V_{AC}=25mV		1455		pF
C_{oss}	Output Capacitance			78		pF
C_{rss}	Reverse Transfer Capacitance			3.5		pF
g_{fs}	Transconductance	V_{DS}=20V , I_D=20A		2.8		S
E_{OSS}	C_{OSS} Stored Energy	V_{DS}=1000V,f=1MHz		35.7		μJ
E_{ON}	Turn-On Energy（Body Diode）	V_{DS}=800V,V_{GS}=-5/20V，I_D=20A，L=150uH T_J=175℃		492		μJ
E_{OFF}	Turn-Off Energy（Body Diode）			120		μJ
Q_g	Total Gate Charge	V_{DS}=800V, V_{GS}=-5V/20V, I_D = 15 A		72		nC
Q_{gs}	Gate-source Charge			21		nC
Q_{gd}	Gate-Drain Charge			22		nC
$R_{G(int)}$	Internal Gate Resistance	f=1MHz,V_{AC}=25mV		5.6		Ω
$t_{d(on)}$	Turn-on Delay Time	V_{DS}=800V,V_{GS}=-5V/20V, I_D =20A, L=150μH Rext=2.5Ω		40		ns
t_r	Rise Time			14		ns
$t_{d(off)}$	Turn-off Delay Time			34		ns
t_f	Fall Time			10		ns

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{FSD}	Forward Voltage	V_{GS}=0V,I_F=10A,T_J=25°C		3.9	6	V
		V_{GS}=0V,I_F=10A,T_J=175°C		3.5	6	V
Is	Continuous Diode Forward Current	V_{GS}=0V，T_C=25°C		27		A
t_{rr}	Reverse Recovery Time	V_{GS}=-5 V, I_F=20A, V_R=800 V, *di*/*dt*=900 A/μs，T_J=175°C		36		nS
Q_{rr}	Reverse Recovery Charge			297		nC
I_{rrm}	Peak Reverse Recovery Current			12.5		A

Thermal Characteristics

Symbol	Parameter	Value.	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.48	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	°C/W

The values are based on the junction-to case thermal impedance which is measured with the device mounted to a large heat sink assuming maximum junction temperature of Tj(max)=175℃

Electrical Characteristics

Fig1. Output characteristics (T_J = 25 °C)

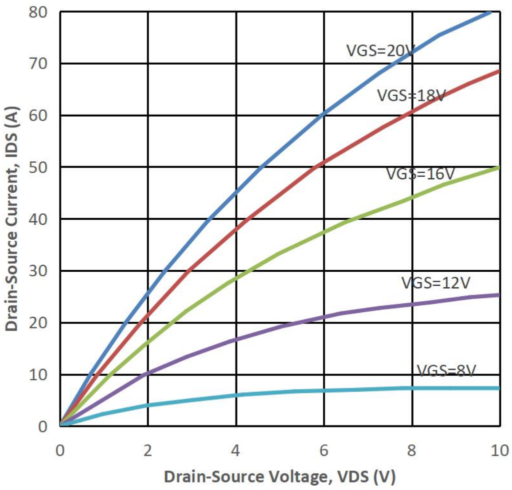


Fig2. Output characteristics (T_J = 175 °C)

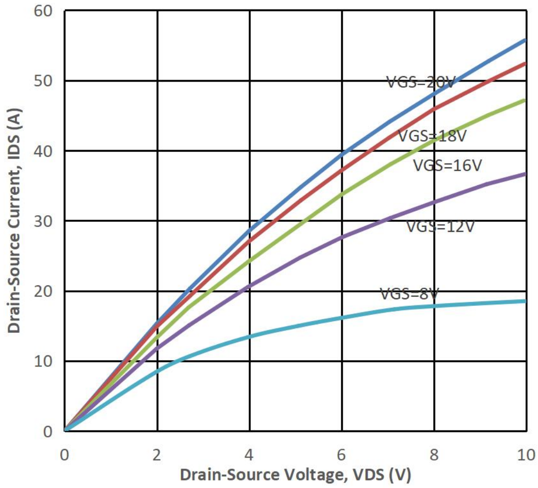


Fig3.Normalized On-Resistance vs. Temperature

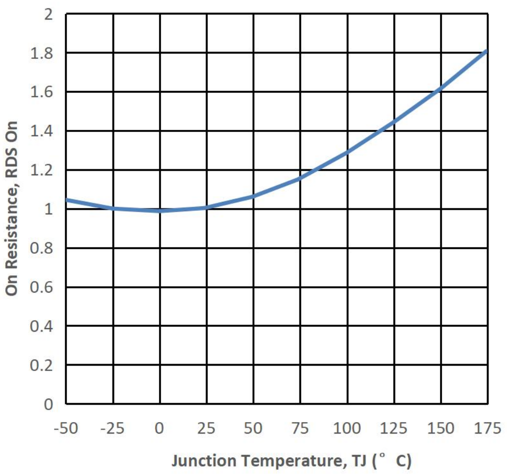


Fig4. On-Resistance vs.Temperature

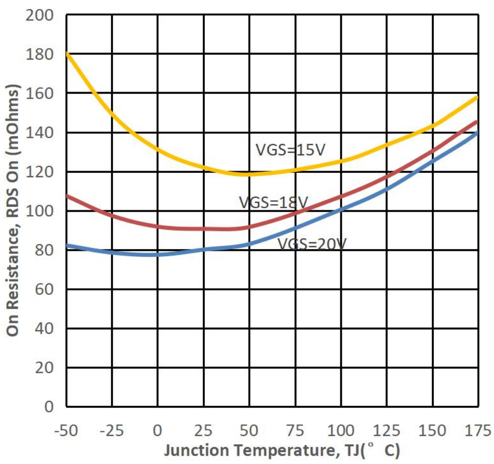


Fig5.Transfer Characteristic

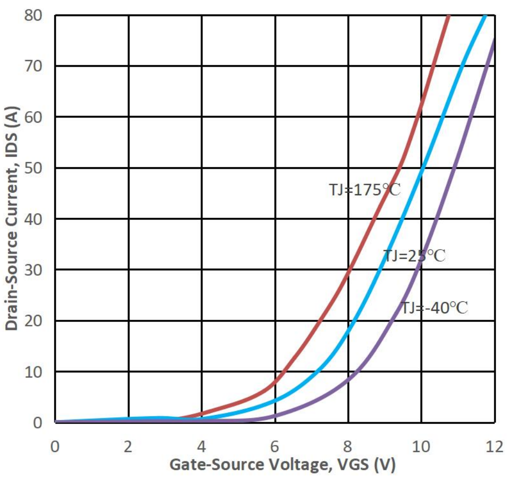


Fig6. Body Diode Characteristic at 25 °C

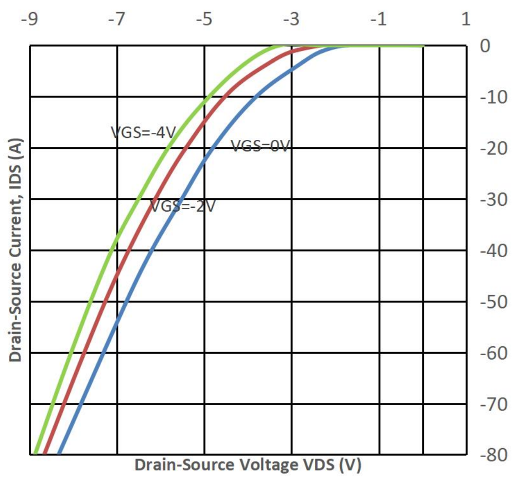


Fig7.Threshold Voltage vs. Temperature

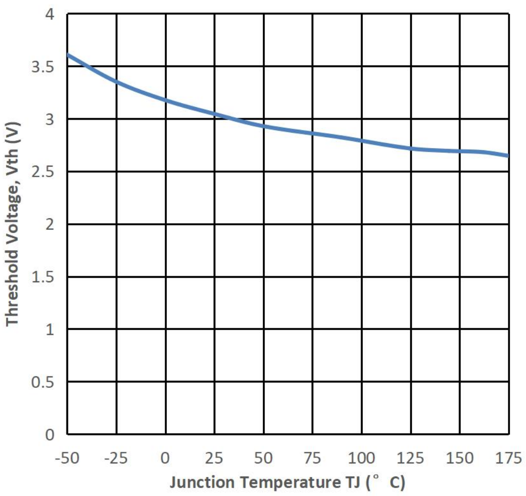


Fig8. Gate Charge Characteristics

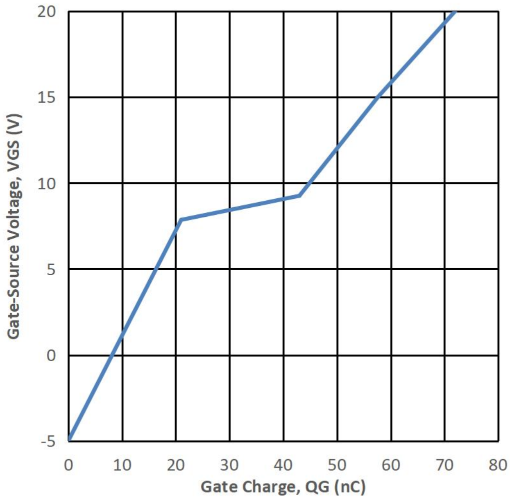


Fig9. 3rd Quadrant Characteristic at 25 °C

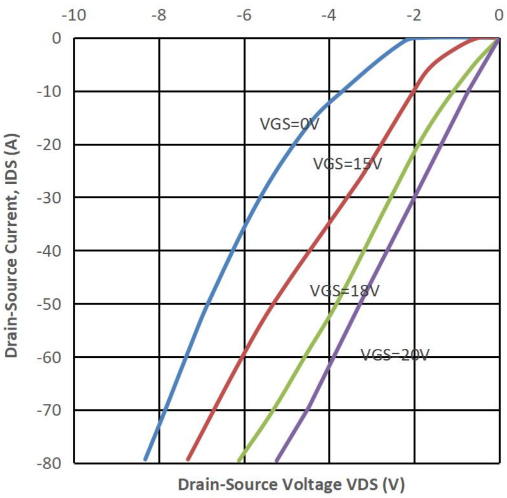


Fig10. Output Capacitor Stored Energy

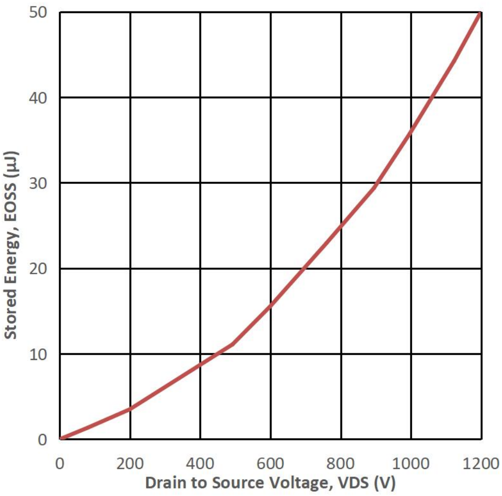


Fig11. Capacitances vs. Drain-Source

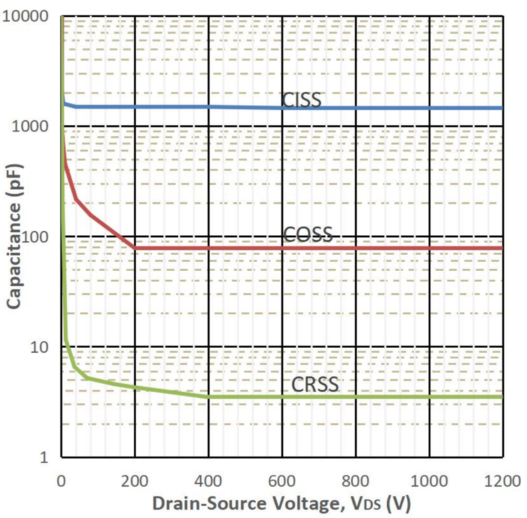


Fig12. Max Power Dissipation Derating Vs Tc

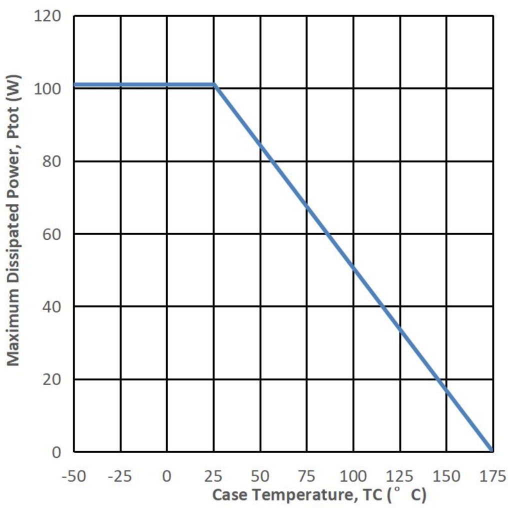


Fig13. Switching Energy vs. Drain Current

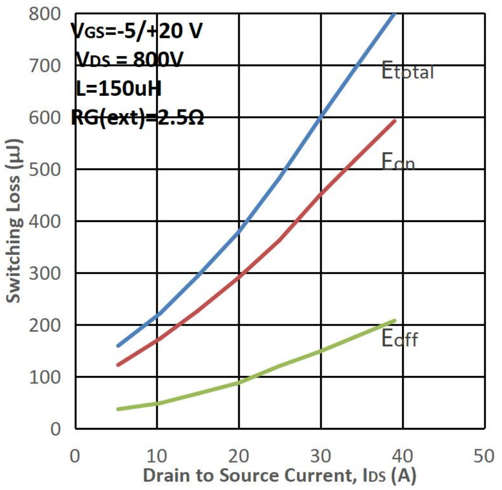


Fig14. Switching Energy vs. RG(ext）

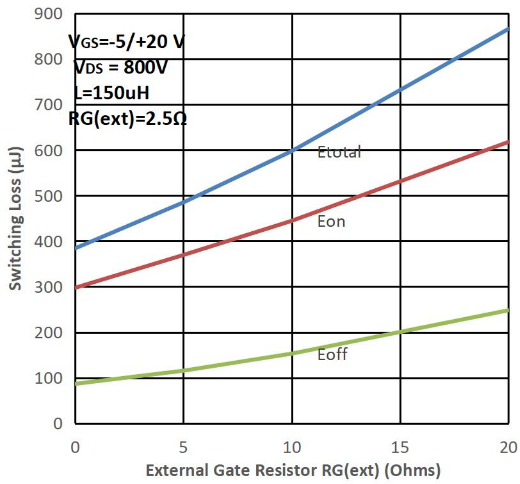


Fig15. Switching Energy vs. Temperature

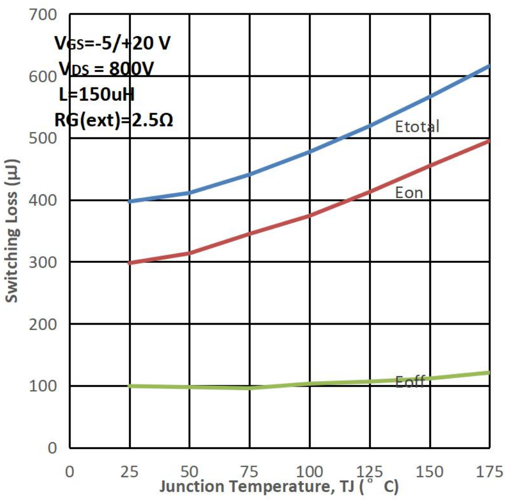


Fig16. Switching Times vs. RG(ext)

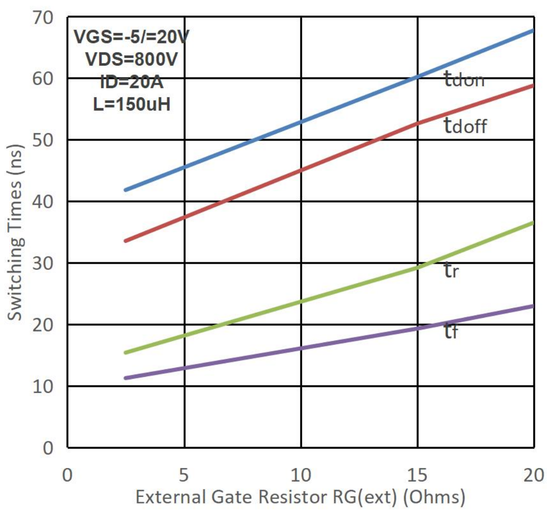


Fig17.Transient Thermal Impedance

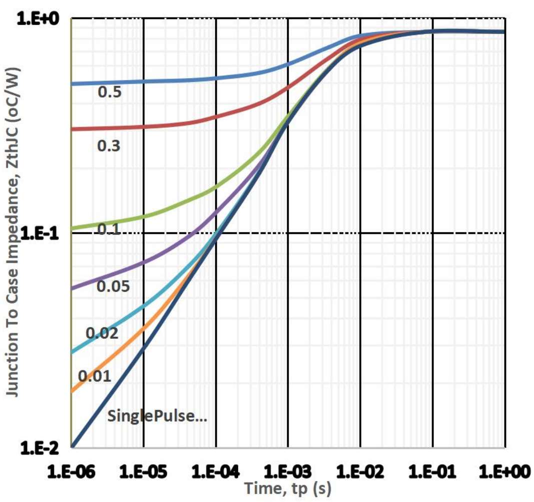
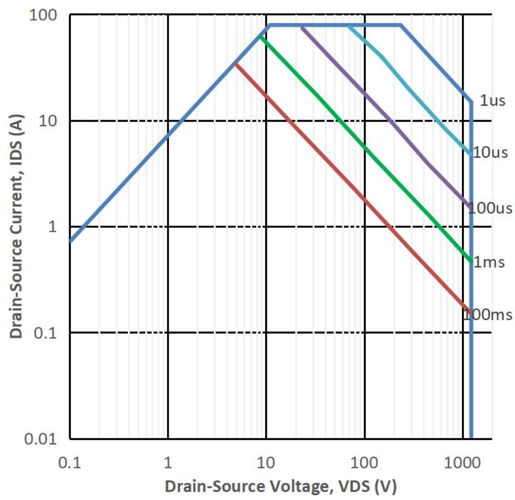
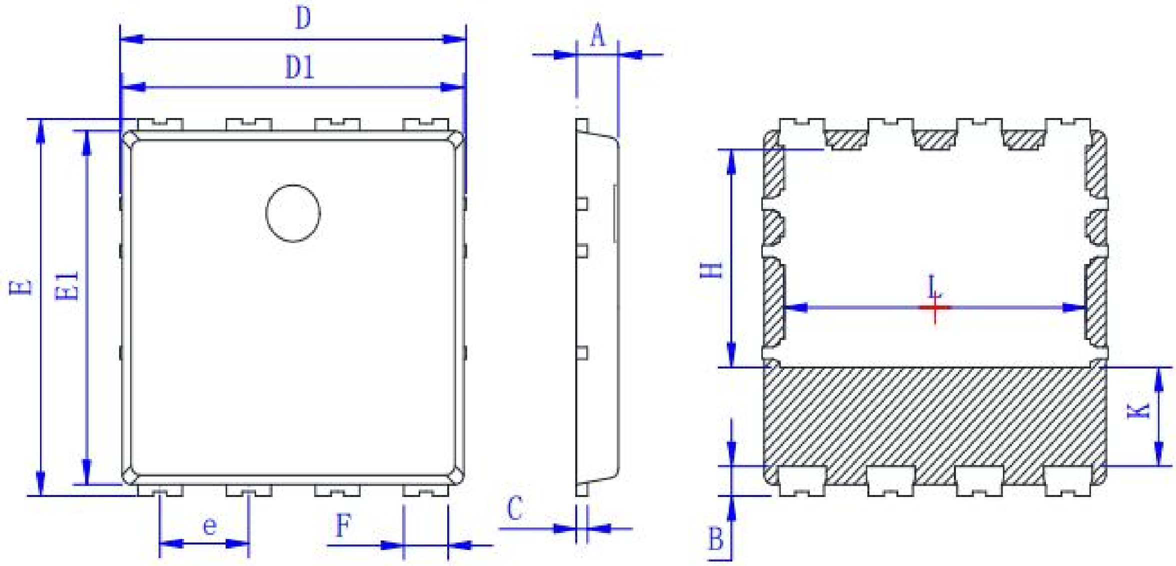


Fig18. Safe Operating Area



Package Drawing:



Dimensions (UNIT: mm)

Symbol	Min	Typ	Max
A	0.90	0.95	1.00
B	0.50	0.60	0.70
C	0.254TYP		
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		

Notes:

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Contact Info:

- Tel: +86 755-89300160
- Web: www.astsic.com
- Add: No.1 Rongtian Rd., Kendzi Street, Pingshan District, Shenzhen, China

Offical Account:

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