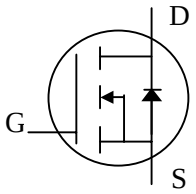
N-channel Enhancement-mode Power MOSFET

Simple Drive Requirement

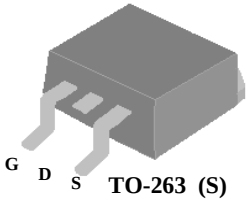
Supports 4.5V Logic-level Gate Drive

Low Gate Charge

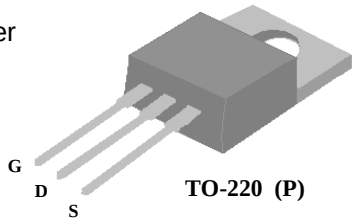
RoHS-compliant



BV_{DSS}	60V
$R_{DS(ON)}$	80mΩ
I_D	14A



TO-263 (S)



TO-220 (P)

Description

Advanced Power MOSFETs from APEC provide the designer with the best combination of fast switching, low on-resistance and cost-effectiveness.

The AP9973GS-3 is in the TO-263 package which is widely preferred for commercial and industrial surface mount applications such as medium-power DC/DC converters. The through-hole TO-220 version (AP9973GP-3) is available where a small PCB footprint is required.

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	60	V
V_{GS}	Gate-Source Voltage	±20	V
I_D at T_A=25°C	Continuous Drain Current[3]	14	A
I_D at T_A=100°C	Continuous Drain Current[3]	9	A
I_{DM}	Pulsed Drain Current[1]	40	A
P_D at T_A=25°C	Total Power Dissipation	27	W
	Linear Derating Factor	0.22	W/°C
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	°C

Thermal Data

Symbol	Parameter	Value	Unit
Rthj-c	Maximum Thermal Resistance, Junction-case	4.5	°C/W
Rthj-a	Maximum Thermal Resistance, Junction-ambient	62	°C/W

Ordering Information

AP9973GS-3TR **RoHS-compliant TO-263 shipped on tape and reel (800 pcs/reel)**

AP9973GP-3TB **RoHS-compliant TO-220 shipped in tubes**

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Electrical Specifications at T_j=25°C (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250uA	60	-	-	V
$\Delta BV_{DSS}/\Delta T_j$	Breakdown Voltage Temperature Coefficient	Reference to 25°C, I_D=1mA	-	0.05	-	V/°C
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}= 10V, I_D= 9A	-	-	80	mΩ
		V_{GS}= 4.5V, I_D= 6A	-	-	100	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250uA	1	-	3	V
g_{fs}	Forward Transconductance	V_{DS}=10V, I_D=9A	-	8.6	-	S
I_{DSS}	Drain-Source Leakage Current	V_{DS}=60V, V_{GS}=0V	-	-	10	uA
	Drain-Source Leakage Current (T_j=125°C)	V_{DS}=48V ,V_{GS}=0V	-	-	25	uA
I_{GSS}	Gate-Source Leakage	V_{GS}=±20V	-	-	±100	nA
Q_g	Total Gate Charge[2]	I_D= 9A	-	8	13	nC
Q_{gs}	Gate-Source Charge	V_{DS}=48V	-	3	-	nC
Q_{gd}	Gate-Drain ("Miller") Charge	V_{GS}=4.5V	-	4	-	nC
$t_{d(on)}$	Turn-on Delay Time[2]	V_{DS}=30V	-	7	-	ns
t_r	Rise Time	I_D= 9A	-	15	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=3.3Ω , V_{GS}= 10V	-	16	-	ns
t_f	Fall Time	R_D= 3.3Ω	-	3	-	ns
C_{iss}	Input Capacitance	V_{GS}=0V	-	720	1150	pF
C_{oss}	Output Capacitance	V_{DS}=25V	-	77	-	pF
C_{rss}	Reverse Transfer Capacitance	f=1.0MHz	-	45	-	pF

Source-Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
V_{SD}	Forward On Voltage[2]	I_S= 14A, V_{GS}=0V	-	-	1.2	V
t_{rr}	Reverse Recovery Time[2]	I_S= 9A, V_{GS}=0V	-	28	-	ns
Q_{rr}	Reverse Recovery Charge	dI/dt=100A/μs	-	27	-	nC

Notes:

1.Pulse width limited by maximum junction temperature.

2.Pulse test - pulse width ≤ 300μs , duty cycle≤ 2%

THIS PRODUCT IS SENSITIVE TO ELECTROSTATIC DISCHARGE, PLEASE HANDLE WITH CAUTION.

USE OF THIS PRODUCT AS A CRITICAL COMPONENT IN LIFE SUPPORT OR OTHER SIMILAR SYSTEMS IS NOT AUTHORIZED.

APEC DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS.

APEC RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION OR DESIGN.

Typical Electrical Characteristics

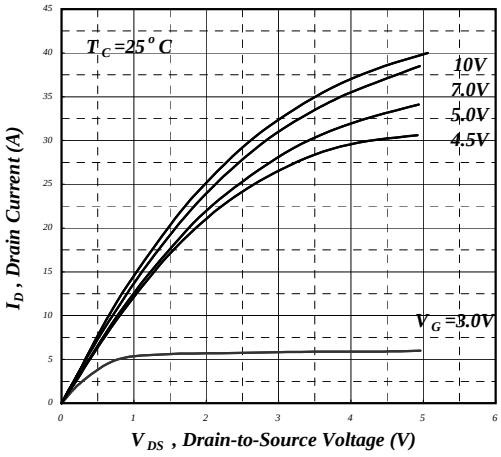

Fig 1. Typical Output Characteristics

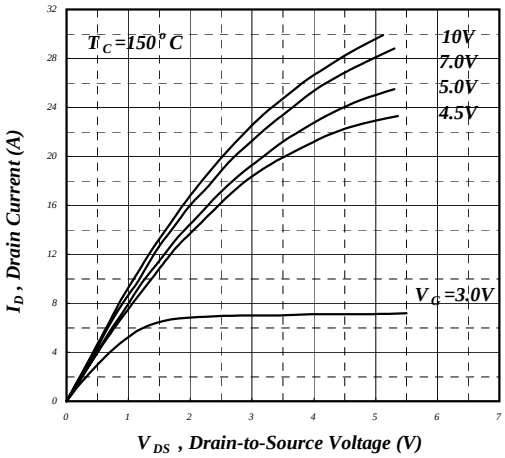

Fig 2. Typical Output Characteristics

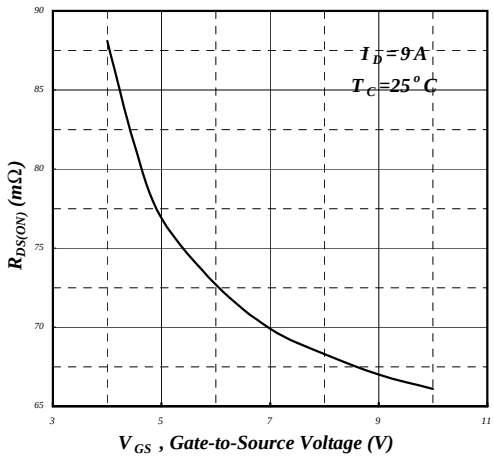

Fig 3. On-Resistance vs. Gate Voltage

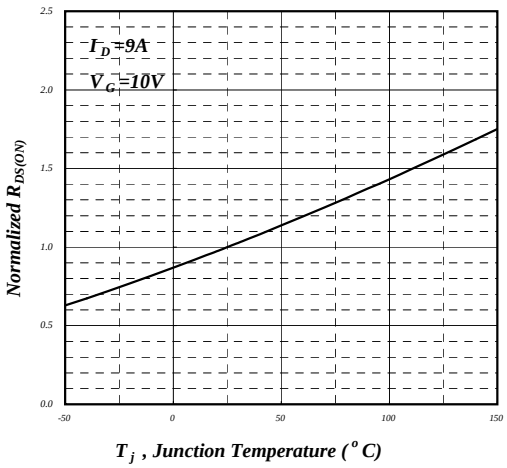

Fig 4. Normalized On-Resistance vs. Junction Temperature

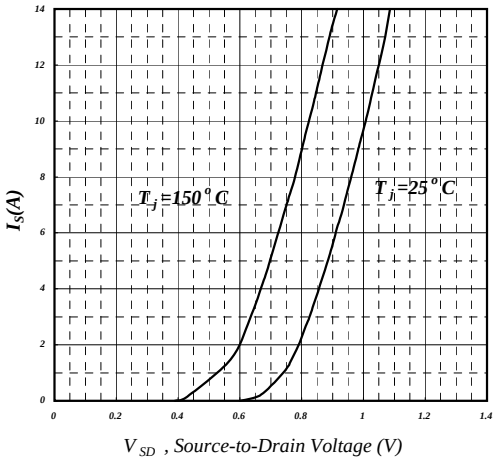

Fig 5. Forward Characteristic of Reverse Diode

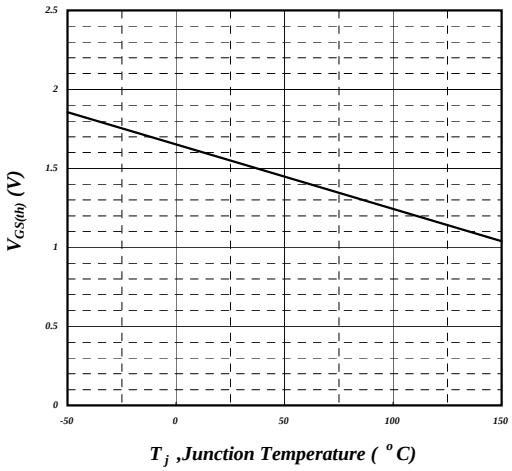

Fig 6. Gate Threshold Voltage vs. Junction Temperature

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Typical Electrical Characteristics (cont.)

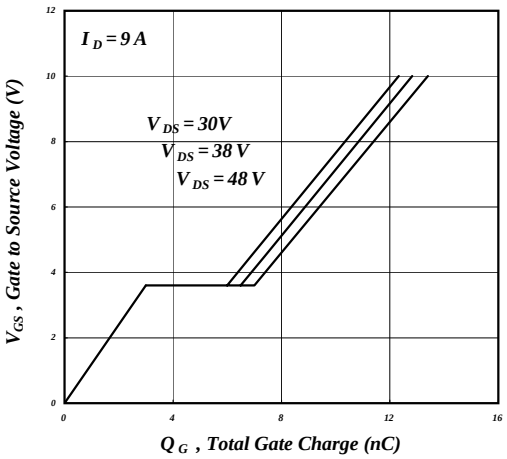

Fig 7. Gate Charge Characteristics

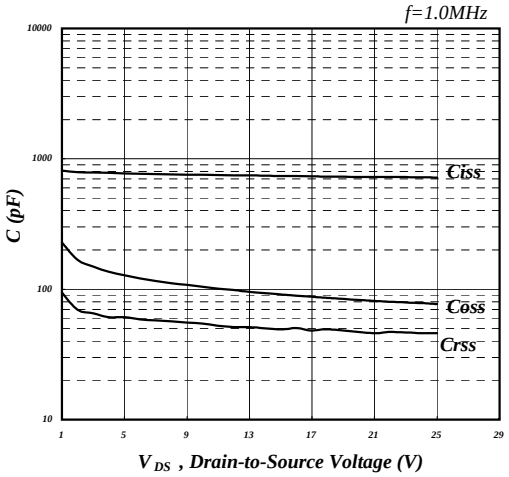

Fig 8. Typical Capacitance Characteristics

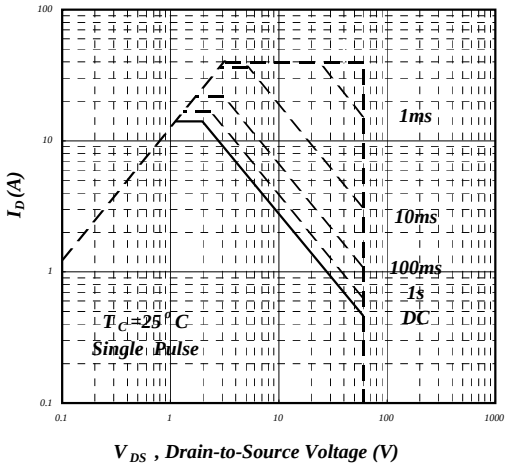

Fig 9. Maximum Safe Operating Area

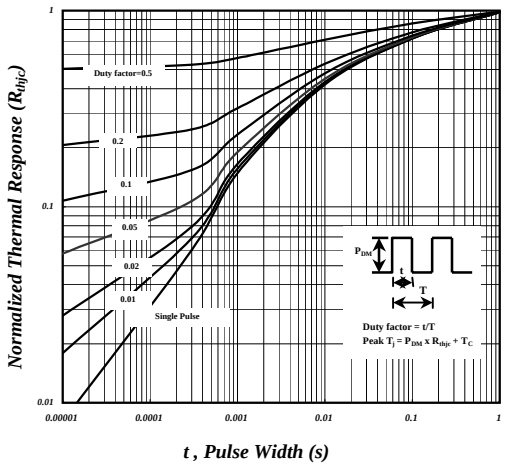

Fig 10. Effective Transient Thermal Impedance

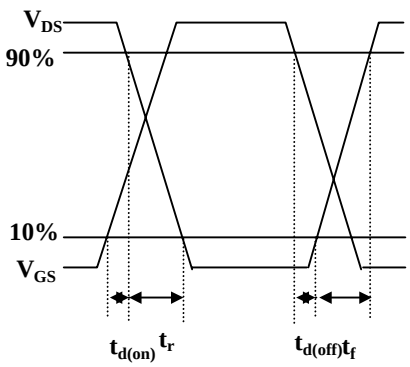

Fig 11. Switching Time Waveforms

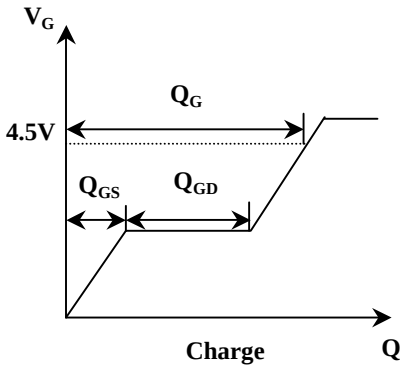

Fig 12. Gate Charge Waveform

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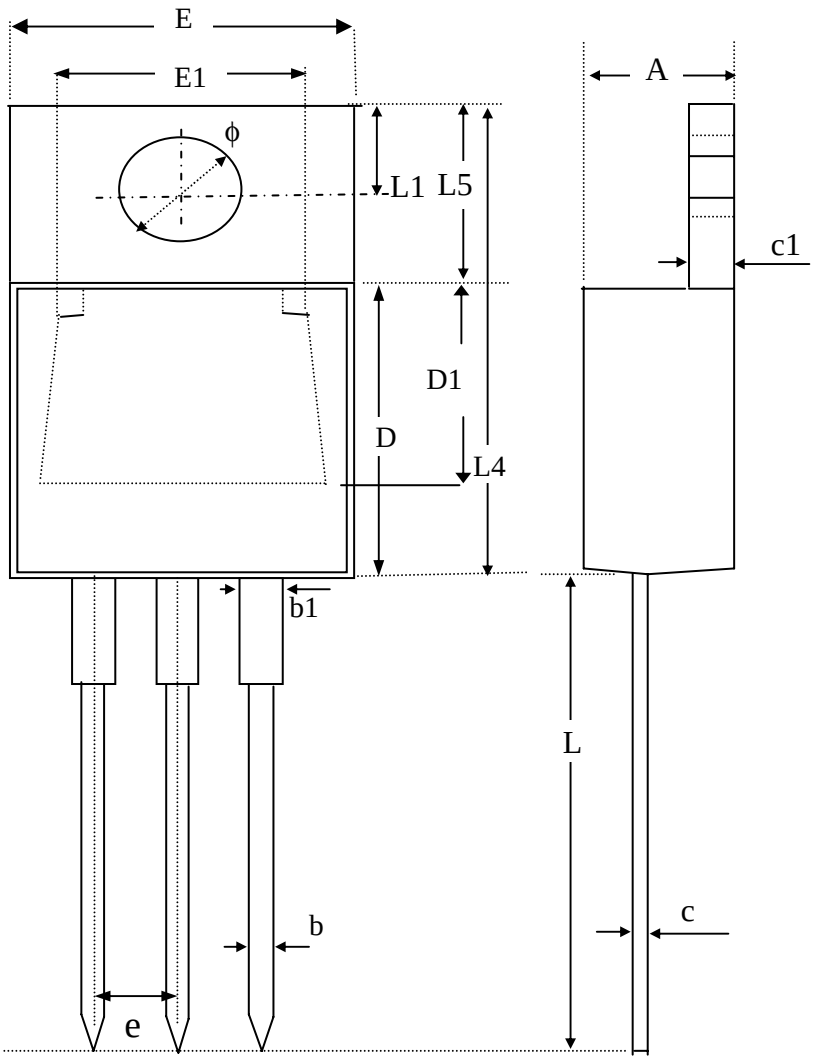
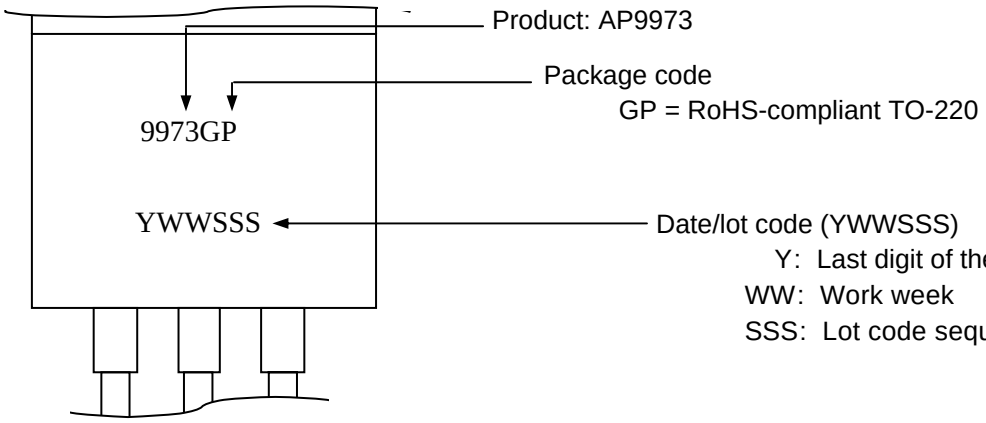
Package Dimensions: TO-220



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.40	4.60	4.80
b	0.76	0.88	1.00
D	8.60	8.80	9.00
c	0.36	0.43	0.50
E	9.80	10.10	10.40
L4	14.70	15.00	15.30
L5	6.20	6.40	6.60
D1	5.10 REF.		
c1	1.25	1.35	1.45
b1	1.17	1.32	1.47
L	13.25	13.75	14.25
e	2.54 REF.		
L1	2.60	2.75	2.89
ϕ	3.71	3.84	3.96
E1	7.4 REF.		

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information: TO-220



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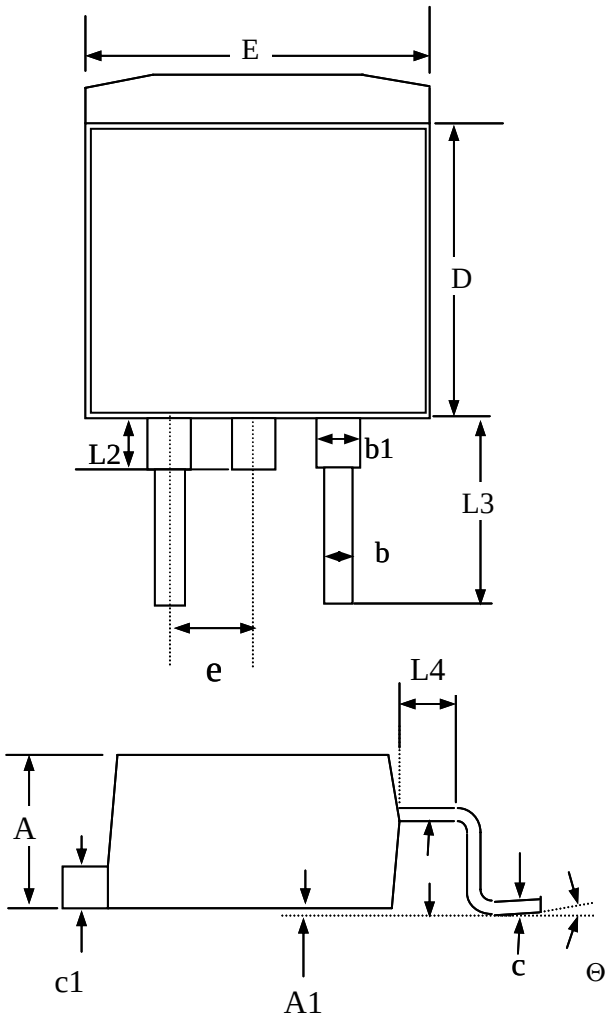
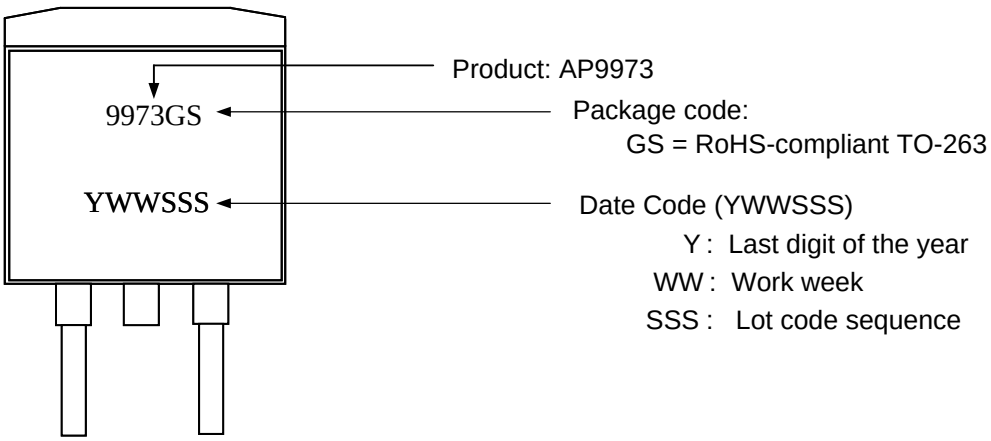
Package Dimensions: TO-263



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	4.25	4.75	5.20
A1	0.00	0.15	0.30
A2	2.20	2.45	2.70
b	0.70	0.90	1.10
b1	1.07	1.27	1.47
c	0.30	0.45	0.60
c1	1.15	1.30	1.45
D	8.30	8.90	9.40
E	9.70	10.10	10.50
e	2.04	2.54	3.04
L2	-----	1.50	-----
L3	4.50	4.90	5.30
L4	-----	1.50	----

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information: TO-263



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