

2.5X Linear Fan Driver for 12V DC Fan

Features

- VO Follows 2.5 Times of VSET
- 0.5V Dropout @ 0.5A
- Over Current and Over Temperature Protection
- Enable Pin
- 100 μ A Quiescent Current in Shutdown
- Power SOP-8 with power pad Package

Applications

- Notebook Computer Fan Driver
- Projector Cooling Fan
- Battery Powered Systems
- Motherboards
- Peripheral Cards

General Description

The G9941A is a high performance positive voltage regulator designed for use in applications requiring very low dropout voltage at up to 0.5 Amps. The G9941A VO output voltage follows the 2.5 times of VSET voltage until it reaches VIN voltage. The VSET voltage must be larger than 1V to guarantee VO 2.5 times of VSET. An enable pin further reduces power dissipation while shut down. The G9941A provides excellent regulation over variations in line, load and temperature.

The G9941A is available in the power SOP-8 with power pad package.

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G9941AF11U	G9941A	-40°C ~ +85°C	SOP-8 (FD)

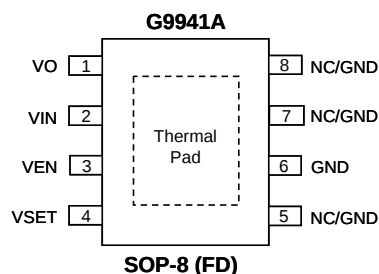
Note: F1:SOP (FD)

1: Bonding Code

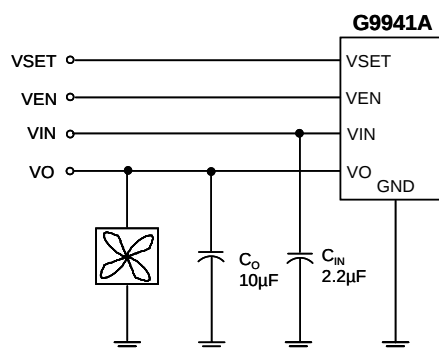
U: Tape & Reel

Green : Lead Free / Halogen Free

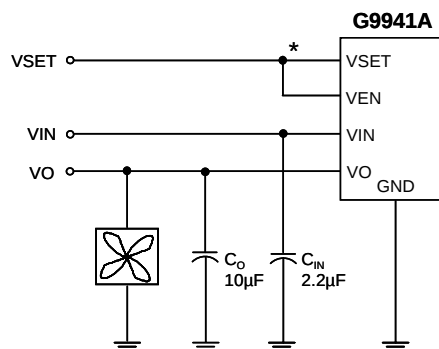
Pin Configuration



Typical Application Circuit



VO = 2.5X VSET



VO = 2.5X VSET

* : V_{SET} < 0.3V Disable; V_{SET} > 1V Enable

Absolute Maximum Ratings (Note 1)

Input Voltage17V
 V_{SET}, V_{EN} Voltage.....6V
 Power Dissipation Internally Limited (Note 2)
 Maximum Junction Temperature150°C
 Storage Temperature Range . . . -65°C ≤ T_J ≤ +150°C
 Reflow Temperature (soldering, 10sec).260°C
 Thermal Resistance Junction to Ambient, (θ_{JA}) (Note 3)

SOP-8 (FD) 110°C/W
 Thermal Resistance Junction to Case, (θ_{JC})
 SOP-8 (FD)12°C/W
 ESD Rating (Human Body Model)2kV
 Input Voltage8V ~15V
 Temperature Range-40°C ≤ T_A ≤ +85°C

Electrical Characteristics

V_{SET}=2V, V_{EN}=5V, V_{IN}=13V, I_O=0.5A, C_{IN}=2.2μF, C_{OUT}=10μF, T_A=T_J=25°C.

The device is not guaranteed to function outside its operating conditions. Parameters with MIN and/or MAX limits are 100% tested at +25°C, unless otherwise specified.

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
VIN					
Supply Voltage Range		8	---	15	V
Quiescent Current	V _{EN} = 5V	---	3	--	mA
	V _{EN} = 0V	---	100	--	μA
VO					
Output Voltage/V _{SET} voltage	V _{SET} = 2V	4.85	5	5.15	V/V
Line Regulation	V _{IN} = 9V to 14V	---	0.1	0.5	%
Load Regulation	V _{SET} = 3V 10mA ≤ I _O ≤ 0.5A	---	0.5	2	%
Output Resistance	I _O = 0.5A, V _{SET} = 4V	---	0.7	---	Ω
Short Circuit Current		---	0.2	---	A
VSET					
Minimum V _{SET} voltage		---	1	5.5	V
V _{SET} pin Current		---	100	---	nA
VEN					
V _{EN} Voltage High		1	---	---	V
V _{EN} Voltage Low		---	---	0.3	V
V _{EN} pin Bias Current	V _{EN} = 0V	---	3	---	μA
Over Temperature Protection					
Over Temperature		---	150	---	°C
Over Temperature Hysteresis		---	25	---	°C

Note 1: Absolute Maximum Ratings are limits beyond which damage to the device may occur. Operating Conditions are conditions under which the device functions but the specifications might not be guaranteed. For guaranteed specifications and test conditions see the Electrical Characteristics.

Note2: The maximum power dissipation is a function of the maximum junction temperature, T_{Jmax}; total thermal resistance, θ_{JA}, and ambient temperature T_A. The maximum allowable power dissipation at any ambient temperature is (T_{Jmax}-T_A) / θ_{JA}. If this dissipation is exceeded, the die temperature will rise above 150°C and IC will go into thermal shutdown.

Note3: The package is placed on a 2-layer PCB (1oz/1oz) with minimum footprint.

Definitions
Line Regulation

The change in output voltage for a change in input voltage. The measurement is made under conditions of low dissipation or by using pulse techniques such that average chip temperature is not significantly affected.

Load Regulation

The change in output voltage for a change in load current at constant chip temperature. The measurement is made under conditions of low dissipation or by

using pulse techniques such that average chip temperature is not significantly affected.

Maximum Power Dissipation

The maximum total device dissipation for which the regulator will operate within specifications.

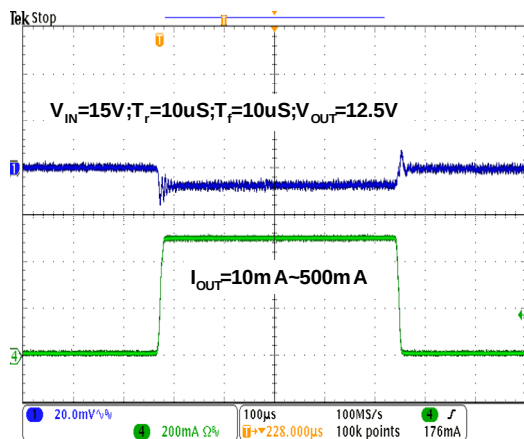
Quiescent Bias Current

Current which is used to operate the regulator chip and is not delivered to the load.

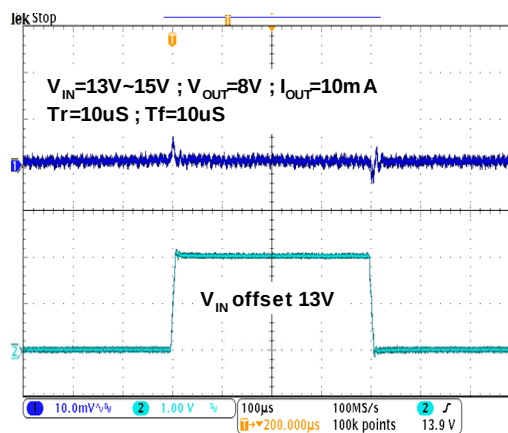
Typical Performance Characteristics

$V_{SET}=2V$, $V_{EN}=5V$, $V_{IN}=12V$, $I_O=0.5A$, $C_{IN}=2.2\mu F$, $C_{OUT}=10\mu F$, $T_A=T_J=25^\circ C$.

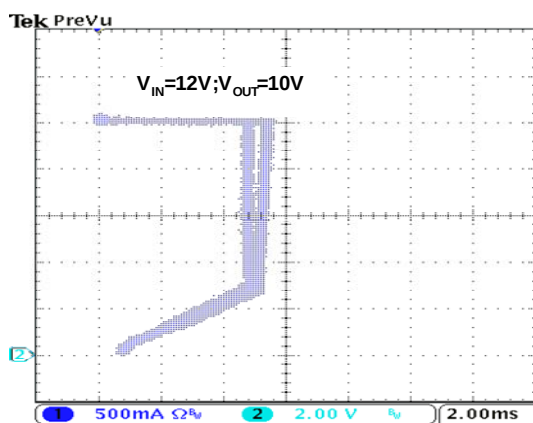
Load Transient



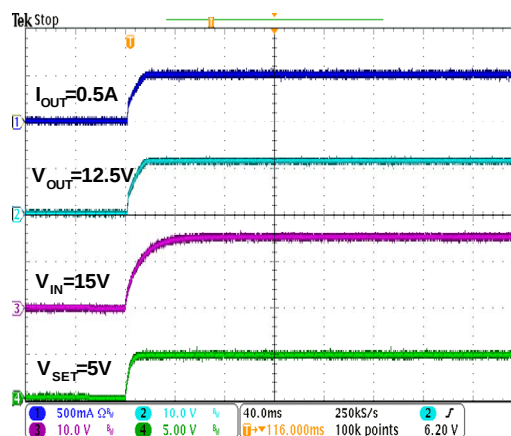
Line Transient



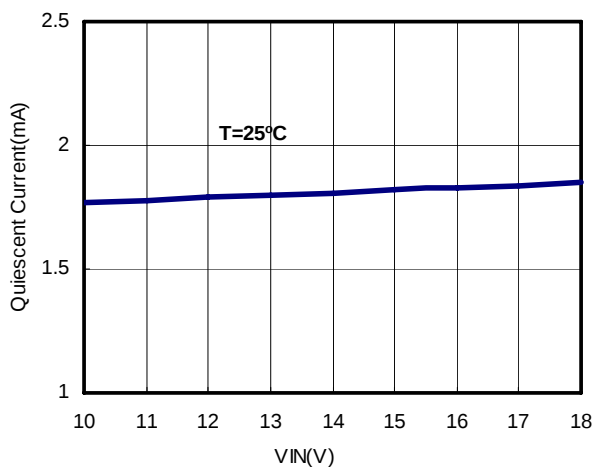
Overcurrent Protection Characteristics



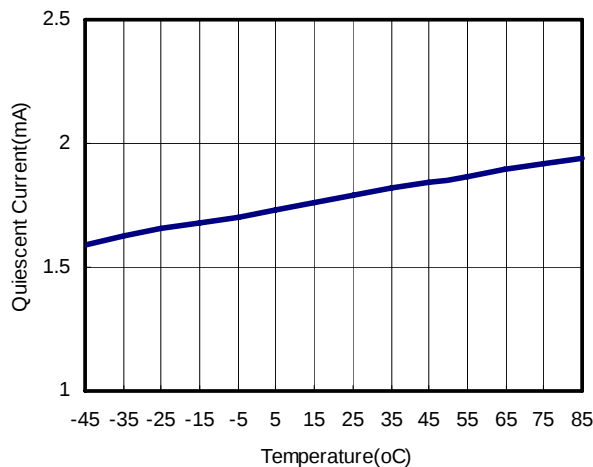
Start Up



Quiescent Current vs. V_{IN}

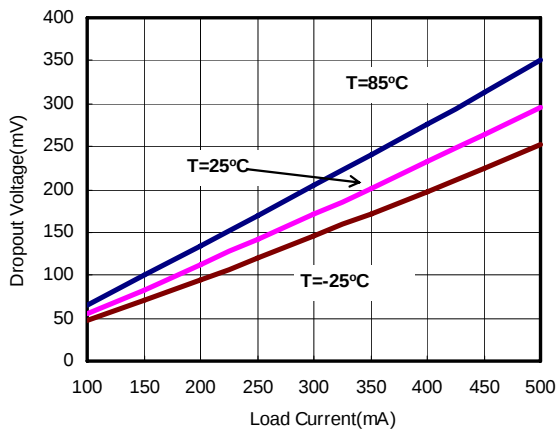


Quiescent Current vs. Temperature

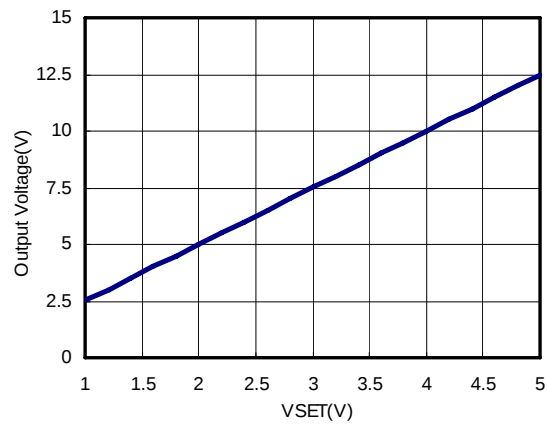


Typical Performance Characteristics (continued)

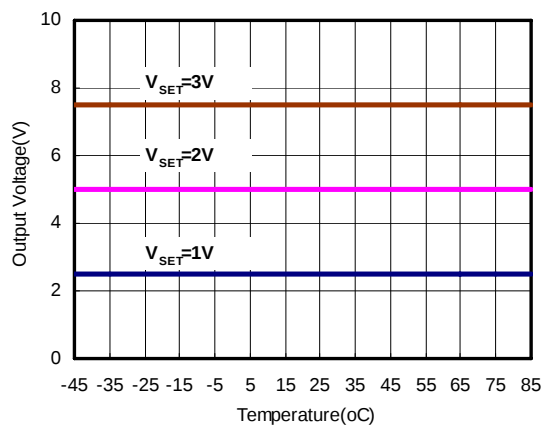
Dropout Voltage vs. Load Current



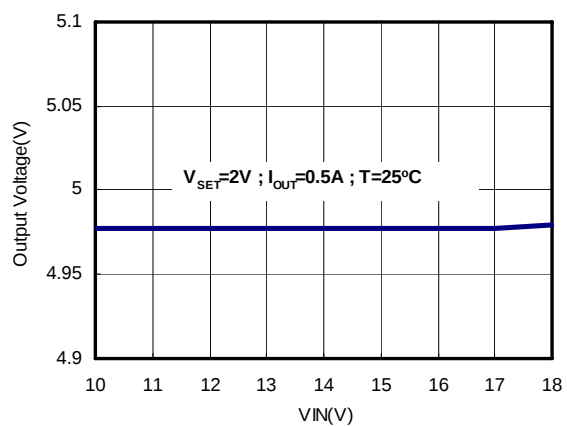
Output Voltage vs. V_{SET}



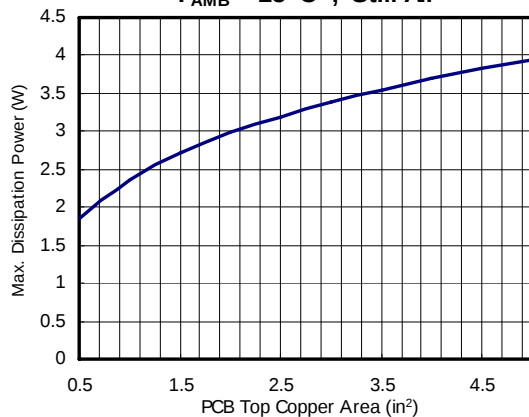
Output Voltage vs. Temperature



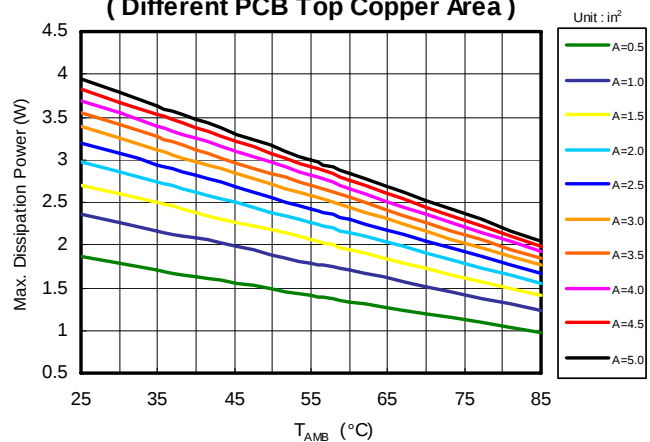
Output Voltage vs. V_{IN}



SOP-8 (FD) Max. Power Dissipation vs. PCB Top Copper Area
 $T_{AMB} = 25^{\circ}\text{C}$; Still Air

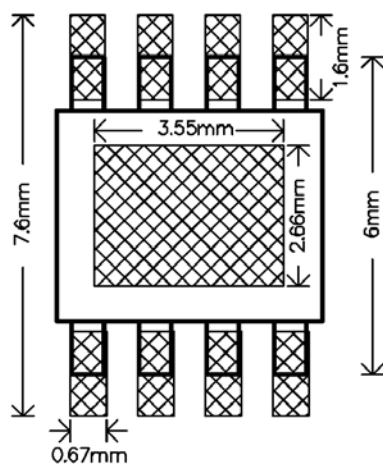


SOP-8 (FD) Max. Power Dissipation vs. T_{AMB} (still air)
(Different PCB Top Copper Area)



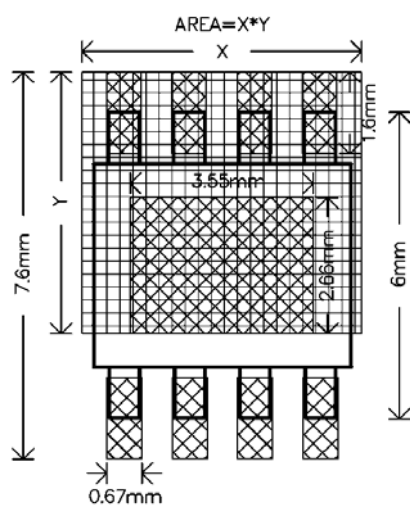
Minimum Footprint PCB Layout Section

SOP-8 (FD)



Recommended Ground Layout for Power Dissipation

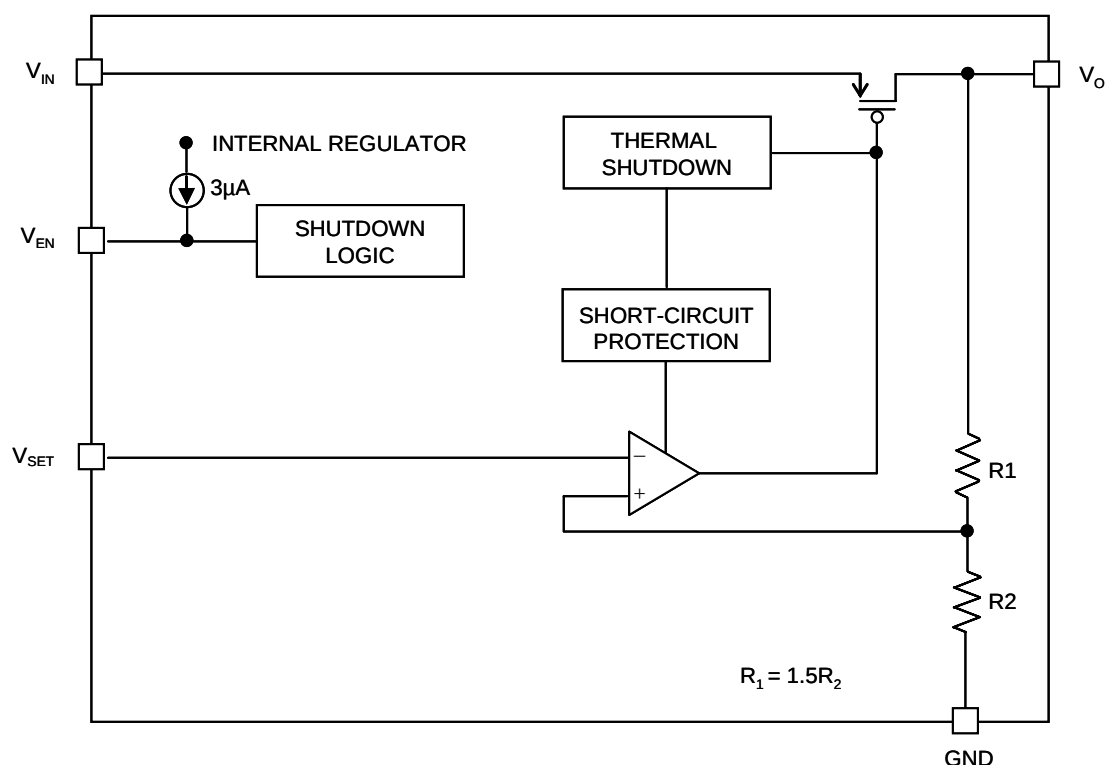
SOP-8 (FD)



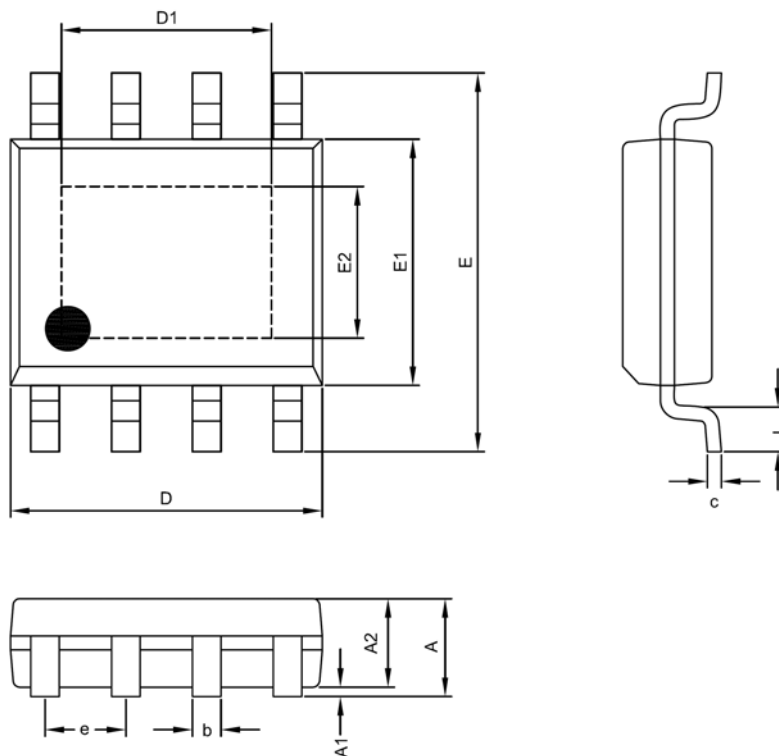
Pin Description

PIN	NAME	FUNCTION
1	VO	The pin is the power output of the device. Its voltage is 2.5 times of VSET.
2	VIN	Input voltage.
3	VEN	Enable Input. Pulling this pin below 0.3V turns the regulator off, reducing the quiescent current to a fraction of its operating value. Internal weakly pull-high is implemented. If let this pin open, it is still activated.
4	VSET	This pin sets the output voltage. Its voltage must be larger than 1V to guarantee VO 2.5 times of VSET.
6	GND	Reference ground. Use all four pins on the SO-8 device for heatsinking.
5,7,8	NC/GND	This pin is no internal connection and should connect to the Ground for power dissipation.
Thermal Pad		Recommend connecting the Thermal Pad to the GND for excellent power dissipation.

Block Diagram



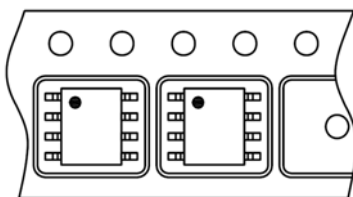
Package Information



SOP- 8 (FD) Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.60	0.053	0.061	0.063
A1	0.00	---	0.10	0.000	---	0.004
A2	1.15	1.35	1.50	0.045	0.053	0.059
D	4.80	4.90	5.00	0.189	0.192	0.197
D1	2.29	---	3.71	0.090	---	0.146
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.153	0.157
E2	2.29	---	2.64	0.090	---	0.104
c	0.19	0.23	0.27	0.007	0.009	0.011
b	0.33	0.43	0.53	0.013	0.017	0.021
e	1.27 BSC			0.050 BSC		
L	0.40	0.70	1.00	0.016	0.028	0.039

Taping Specification



Feed Direction

PACKAGE	Q'TY/REEL
SOP-8 (FD)	2,500 ea

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