

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from Europe, America and south Asia, supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of "Quality Parts, Customers Priority, Honest Operation, and Considerate Service", our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip, ALPS, ROHM, Xilinx, Pulse, ON, Everlight and Freescale. Main products comprise IC, Modules, Potentiometer, IC Socket, Relay, Connector. Our parts cover such applications as commercial, industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



## Contact us

Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

Email & Skype: [info@chipsmall.com](mailto:info@chipsmall.com) Web: [www.chipsmall.com](http://www.chipsmall.com)

Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



Is Now Part of



**ON Semiconductor®**

To learn more about ON Semiconductor, please visit our website at  
[www.onsemi.com](http://www.onsemi.com)

---

ON Semiconductor and the ON Semiconductor logo are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.



# SG6520A

## PC Power Supply Supervisors

### Features

- Two 12V Sense Input Pins: VS12 and VS12B
- Over-Voltage Protection (OVP) for 3.3V, 5V, and Two 12V
- Over-Current Protection (OCP) for 3.3V, 5V, and Two 12V
- Under-Voltage Protection (UVP) for 3.3V, 5V, and Two 12V
- Open-Drain Output for PGO and FPO Pins
- 300ms Power-Good Delay
- 2.8ms PSON Control to FPO Turn-off Delay
- 48ms PSON Control Delay
- No Lock-up During the Fast AC Power On/Off
- Wide Supply Voltage Range: 4V to 15V
- Over-Temperature Protection (OTP)

### Applications

- Switch-Mode Power Supplies with Active PFC
- Servo System Power Supplies
- PC-ATX Power Supplies

### Description

The SG6520A is designed to provide the supply voltage, current supervisor, remote on/off (PSON), power good (PGO) indicator, and fault protection (FPO) functions for switching power systems.

For supervisory functions, it provides the over-voltage protection (OVP) for 3.3V, 5V, and two 12V; over-current protection (OCP) for 3.3V, 5V, and two 12V; under-voltage protection (UVP) for 3.3V, 5V, and two 12V. When 3.3V, 5V, or 12V voltage decreases to 2.3V, 3.5V, and 9V, respectively, the under-voltage protection function is enabled. FPO is set HIGH to turn off the PWM controller IC. The voltage difference across the external current shunt is used for OCP functions. An external resistor can be used to adjust protection threshold. An additional protection input pin provides the flexibility for designing protection circuits.

The power supply is turned on after a 48ms delay when PSON signal is set from HIGH to LOW. To turn off the power supply, the PSON signal is set from LOW to HIGH with a delay of 48ms. The PGI circuitry provides a power-down warning signal for PGO. When PGI input is lower than the internal 1.25V reference voltage, the PGO signal is pulled LOW.

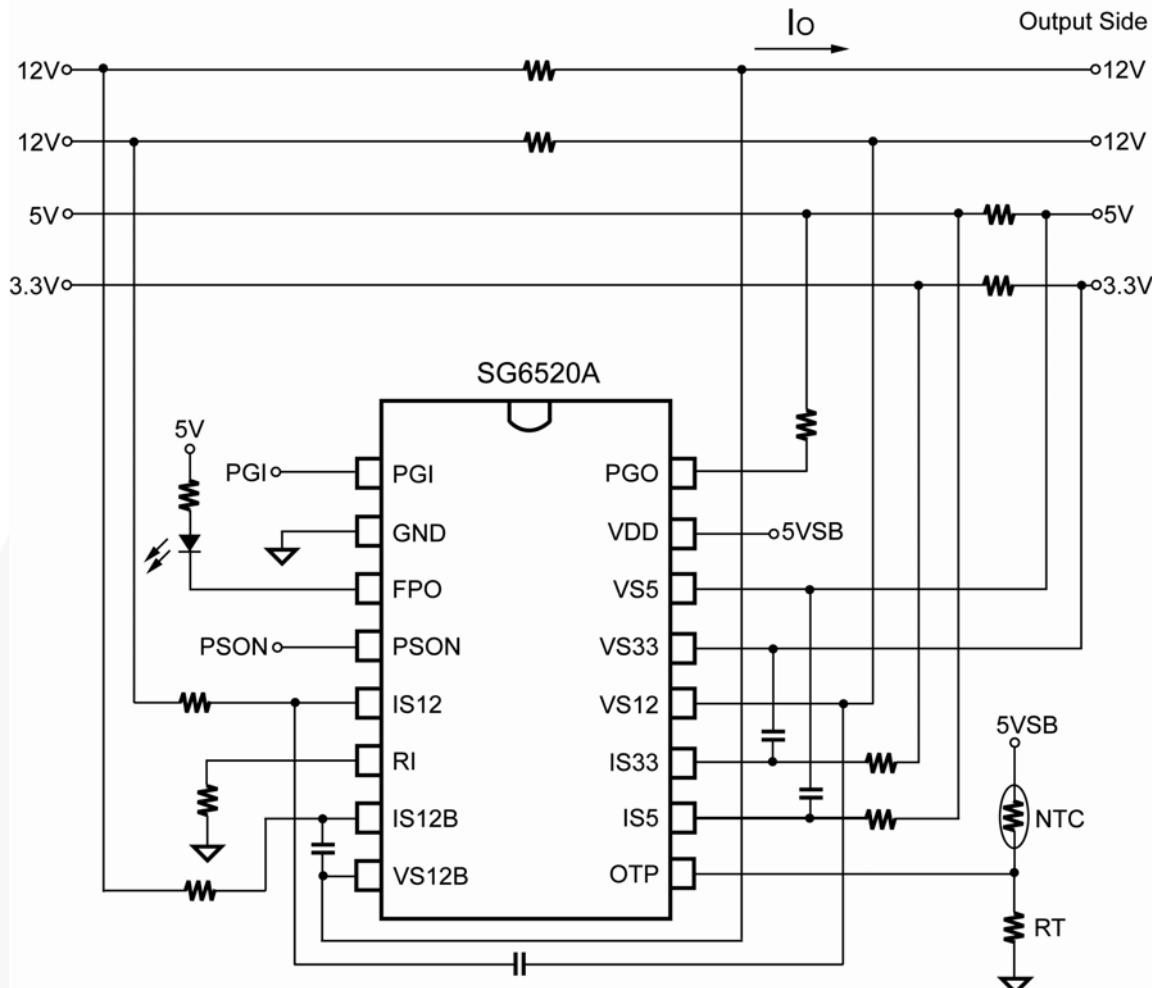
### Ordering Information

Part Number	Operating Temperature Range	Eco Status	Package	Packing Method
SG6520ADY	-40°C to +85°C	Green	16-pin Dual In-Line Package (DIP)	Tube



For Fairchild's definition of "green" Eco Status, please visit: [http://www.fairchildsemi.com/company/green/rohs\\_green.html](http://www.fairchildsemi.com/company/green/rohs_green.html).

Application Diagram



## Block Diagram

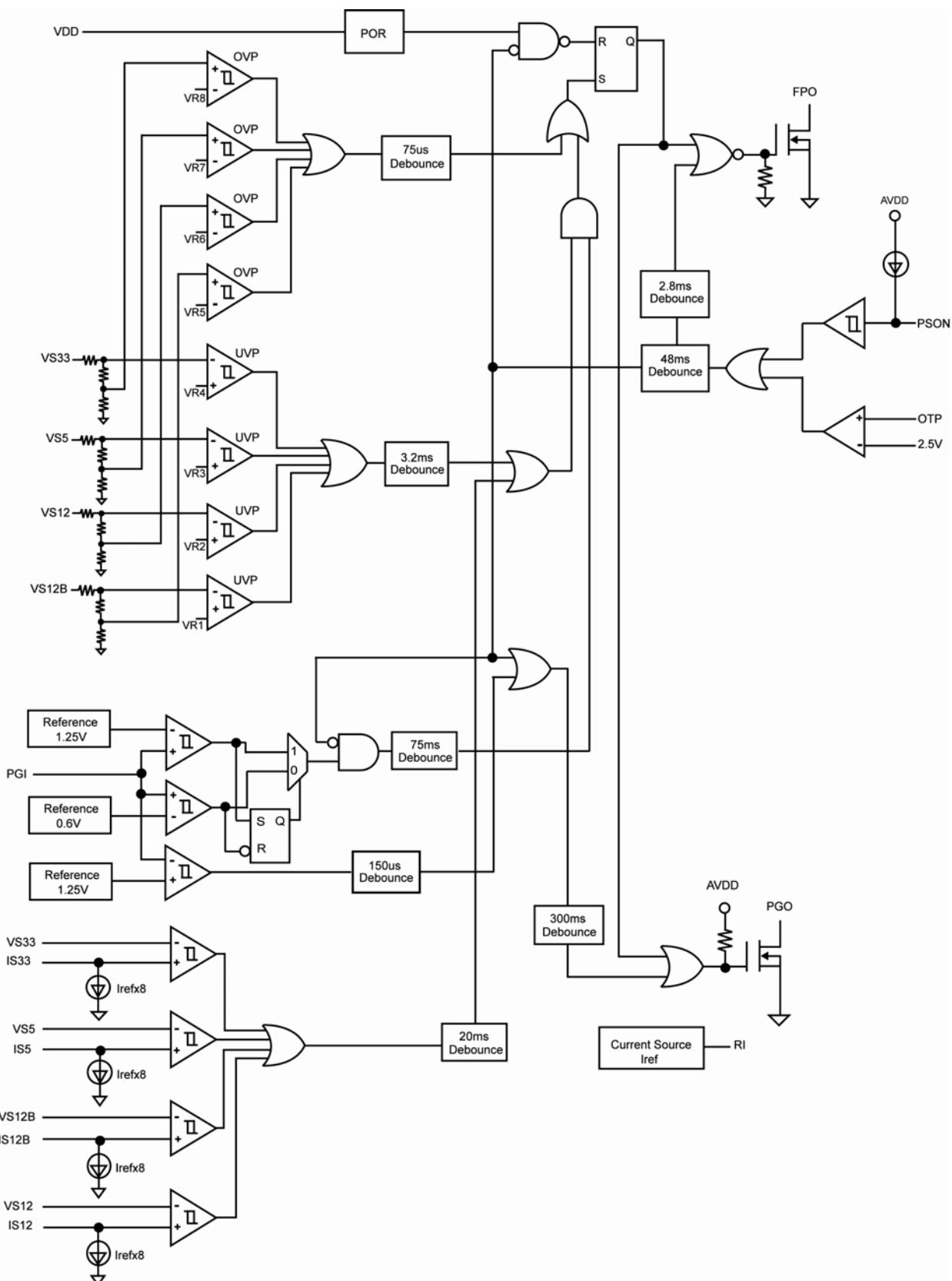
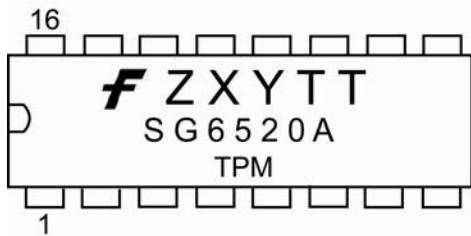


Figure 2. Function Block Diagram

## Marking Information



**F** – Fairchild logo  
**Z** – Plant code  
**X** – 1 digit year code  
**Y** – 1 digit week code  
**TT** – 2 digits die run code  
**T** – Package type (D:DIP)  
**P** – Z:Pb free, Y:Green package  
**M** – Manufacture flow code

Figure 3. Top Mark

## Pin Configuration

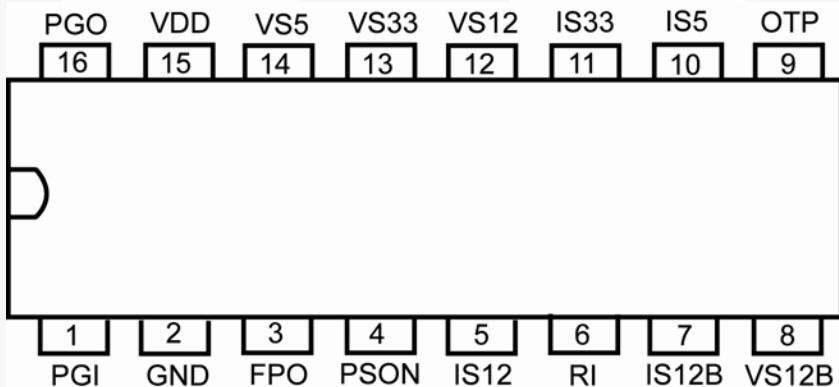


Figure 4. Pin Configuration (Top View)

## Pin Definitions

Pin #	Name	Description
1	PGI	<b>Power good input.</b> For ATX SMPS, it detects AC line voltage through the main transformer.
2	GND	<b>Ground.</b>
3	FPO	<b>Fault protection output.</b> Output signal to control the primary PWM IC through an opto-coupler. When FPO is low, the PWM IC is enabled.
4	PSON	<b>Remote on/off logic input from CPU or main board.</b> The power supply is turned on/off after a 48ms delay.
5	IS12	<b>12V over-current protection sense input.</b> For typical applications, this pin is connected to the positive end of a current shunt through one resistor. When the voltage on IS12 is higher than that of VS12 by 5mV, OCP is enabled.
6	RI	<b>Reference setting.</b> One external resistor RI connected between the RI and GND pins determines a reference current, $I_{REF} = 1.25/R_I$ , for OCP programming.
7	IS12B	<b>12V over-current protection sense input.</b> For typical application, this pin is connected to the positive end of a current shunt through one resistor. When the voltage on IS12 is higher than that of VS12 by 5mV, OCP is enabled.
8	VS12B	<b>Second 12V over/under-voltage control sense input.</b>
9	OTP	<b>Over-temperature protection.</b>
10	IS5	<b>5V over-current protection sense input.</b>
11	IS33	<b>3.3V over-current protection sense input.</b>
12	VS12	<b>12V over/under-voltage control sense input.</b>
13	VS33	<b>3.3V over/under-voltage control sense input.</b>
14	VS5	5V over/under-voltage control sense input.
15	VDD	<b>Supply voltage:</b> 4.2V ~ 15V. For ATX SMPS, it is connected to 5V-standby and 12V through diodes, respectively.
16	PGO	<b>Power-good logic output,</b> 0 or 1 (open-drain). Power good=1 means that the power supply is good for operation. The power good delay is 300ms.

## Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter		Min.	Max.	Unit
$V_{DD}$	DC Supply Voltage <sup>(1, 2)</sup>			16	V
$V_{IN}$	Input Voltage	PSON, PGI, VS5, IS5, VS33, IS33, OTP	-0.3	7.0	V
		VS12, VS12B, IS12, IS12B	-0.3	15.0	V
$V_{OUT}$	FPO, PGO		-0.3	7.0	V
$T_J$	Operating Junction Temperature		-40	+125	°C
$T_{STG}$	Storage Temperature Range		-55	+150	°C
$T_L$	Lead Temperature (Soldering)			+260	°C
ESD	Electrostatic Discharge Capability, Human Body Model, JESD22-A114			3.0	kV
	Electrostatic Discharge Capability, Machine Model, JESD22-A115			200	V

### Notes:

1. All voltage values, except differential voltage, are given with respect to GND pin.
2. Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device.

## Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Typ.	Max.	Unit
$T_A$	Operating Ambient Temperature	-40		+85	°C

## Electrical Characteristics

$V_{DD} = 5V$ ,  $T_A = 25^\circ C$ , unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
<b><math>V_{DD}</math> Section</b>						
$V_{DD}$	DC Supply Voltage		4.2		15.0	V
$I_{DD1}$	Supply Current	$PSON = LOW$		1.7	2.6	mA
$I_{DD2}$	Supply Current	$PSON = HIGH$		1.0	1.5	mA
$t_R$	Supply Voltage Rising Time		1			ms
$V_{ST}$	$V_{DD}$ Start Threshold Voltage				4.2	V
<b>Over-Voltage (OVP) and Over-Current (OCP) Protections</b>						
$V_{OVP}$	Over-Voltage Protection	VS33	3.830	3.965	4.100	V
		VS5	5.80	6.15	6.50	
		VS12, VS12B	13.70	14.05	14.40	
$I_{REF}$	Ratio of Current-Sense Sink Current to Current-Sense Setting Pin (RI) Source Current	$R_I = 18.5k\Omega \sim 75k\Omega$ (temperature = $-40^\circ C \sim +80^\circ C$ )	7.80	8.05	8.30	
$V_{OFFSET}$	OCP Comparator Input Offset Voltage		-3		3	mV
$I_{LKG-FPO}$	Leakage Current (FPO)	FPO = 5V			5	$\mu A$
$V_{OL-FPO}$	Low-Level Output Voltage (FPO)	$I_{SINK} 20mA$			0.4	V
$t_{OVP}$	OVP Delay Time		33	75	110	$\mu s$
$t_{OCP}$	OCP Delay Time		12.5	20.0	27.5	ms
$V_{RI}$	RI Pin Voltage		0.98•Typ.	1.25	1.01•Typ.	V
$I_{RI}$	Output Current RI		12.5		62.5	$\mu A$
$t_{ST-OCP}$	Start-up OCP / UVP Protection Time	0.6V < PGI < 1.25V; FPO = Low	49	75	114	ms
<b>Under-Voltage Protection and PGI, PGO</b>						
$V_{PGI\_1}$	Input Threshold Voltage	PGI 1	0.98•Typ.	1.25	1.02•Typ.	V
$V_{PGI\_2}$	Input Threshold Voltage	PGI 2	0.96•Typ.	0.60	1.03•Typ.	V
$V_{UVP}$	Under-Voltage Protection	VS33	2.65	2.80	2.95	V
		VS5	3.7	4.1	4.5	
		VS12, VS12B	9.2	10.0	10.8	
$t_{OND}$	Under-Voltage Turn-on Delay	PGI>0.6V	49	75	114	ms
$t_{UVP}$	UVP Delay	PGI>1.25V	2.4	3.2	4.0	ms
$I_{LKG-PGO}$	Leakage Current (PGO)	PGO = 5V			5	$\mu A$
$V_{OL-PGO}$	Low-Level Output Voltage (PGO)	$V_{DD} = 12V$ ; $I_{SINK}$ 10mA			0.4	V
$t_{PG}$	Timing PG Delay		200	300	450	ms
$t_{ND1}$	Noise Deglitch Time		90	150	210	$\mu s$
<b>PSON Control</b>						
$I_{PSON}$	Input Pull-up Current	PSON = 0V		120		$\mu A$
$V_{IH}$	High-Level Input Voltage		2			V
$V_{IL}$	Low-Level Input Voltage				0.8	V
$t_{PSON}$	Timing PSON to On/Off	PSON LOW to FPO LOW	34	48	67	ms
		PSON HIGH to PGO LOW	34	48	67	
$t_{PSOFF}$	Timing PGO LOW to FPO HIGH		1.6	2.8	4.5	ms
<b>Over-Temperature Section</b>						
$V_{TH}$	Over-Temperature Threshold		2.4	2.5	2.6	V
$V_{HYST}$	Hysteresis		0.18		0.23	V

## Functional Description

The SG6520A provides over-current protection for the 3.3V, 5V, and two 12V rails. Whenever an OCP condition occurs at any of the voltage rails, PGO is LOW and FPO is open. The internal OCP comparators have a very small offset voltage ( $\pm 3\text{mV}$ ). The sink currents of IS33, IS5, and IS12 are eight times the current at the RI pin. The current at the RI pin is  $V_{RI}/R_i$ .

Here is an example demonstrating how to set the over current protection. If  $I_1 \times R_1 > I_{RI} \times R_2$ , OCP is active. If  $R_1=5\text{m}\Omega$ ,  $R_2=30\text{K}\Omega$ , and the OCP active level is 35A, the  $R_2$  resistor is:

$$R_2 = \frac{I_1 \times R_1}{I_{RI} \times 8} = 525\Omega \quad (1)$$

where C is bypass noise; suggested value is between  $1\mu\text{F} \sim 2.2\mu\text{F}$ .

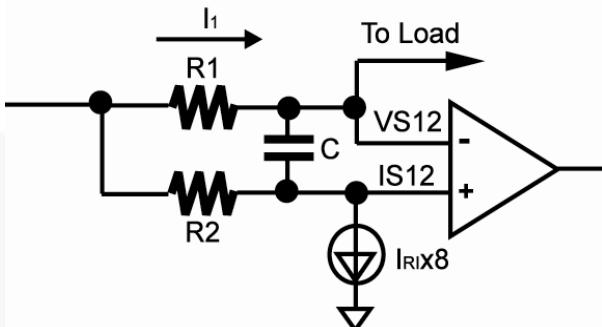


Figure 5. OCP Set Up

## Timing Chart

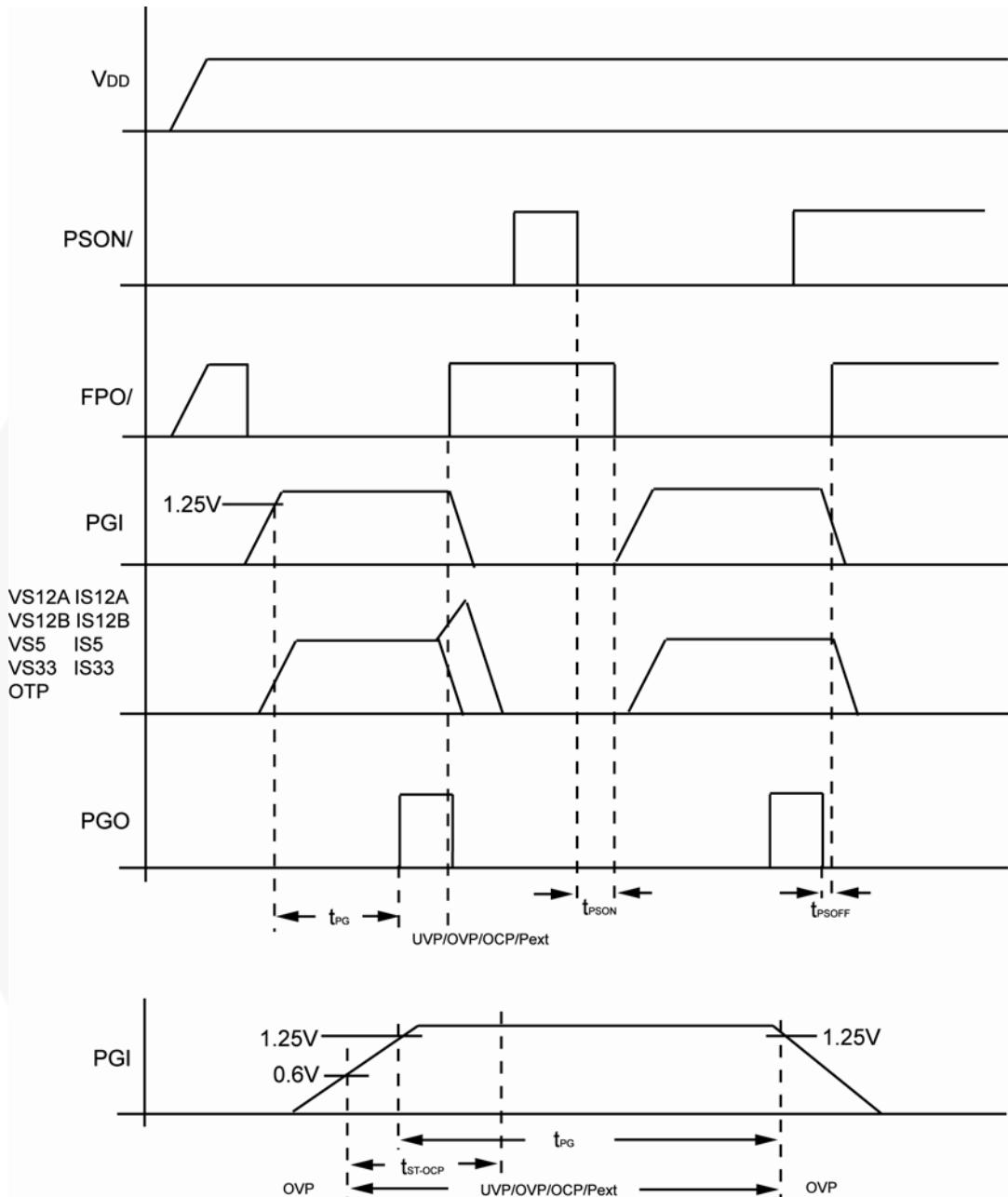
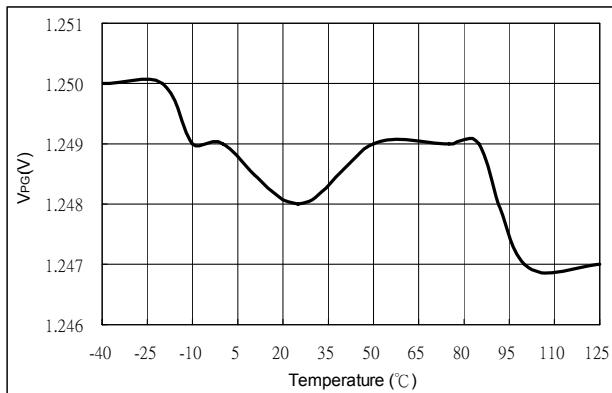
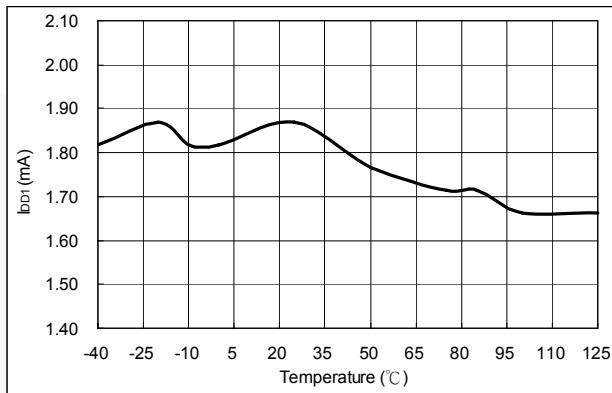
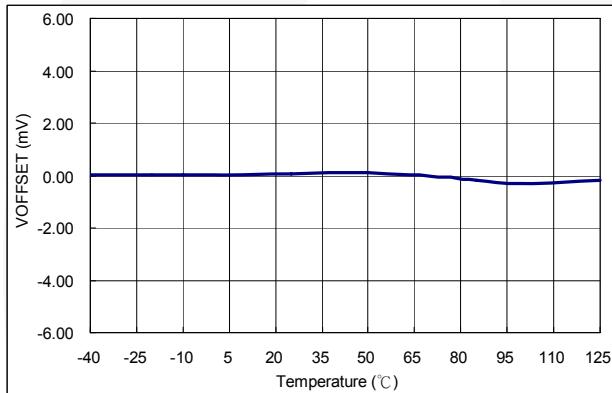
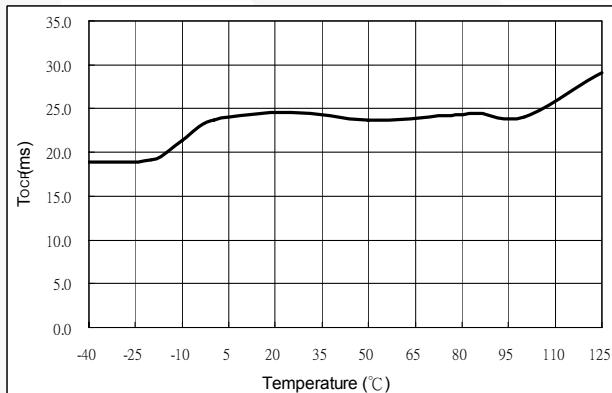
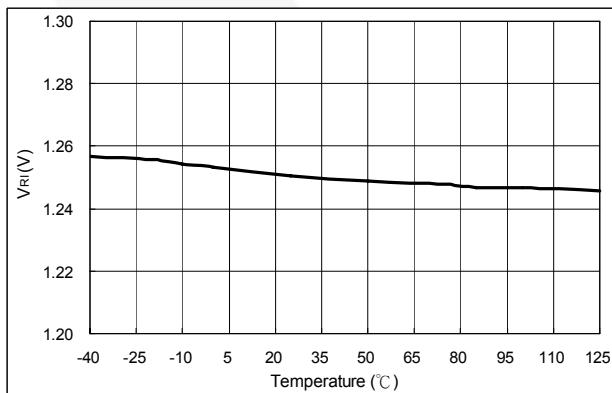
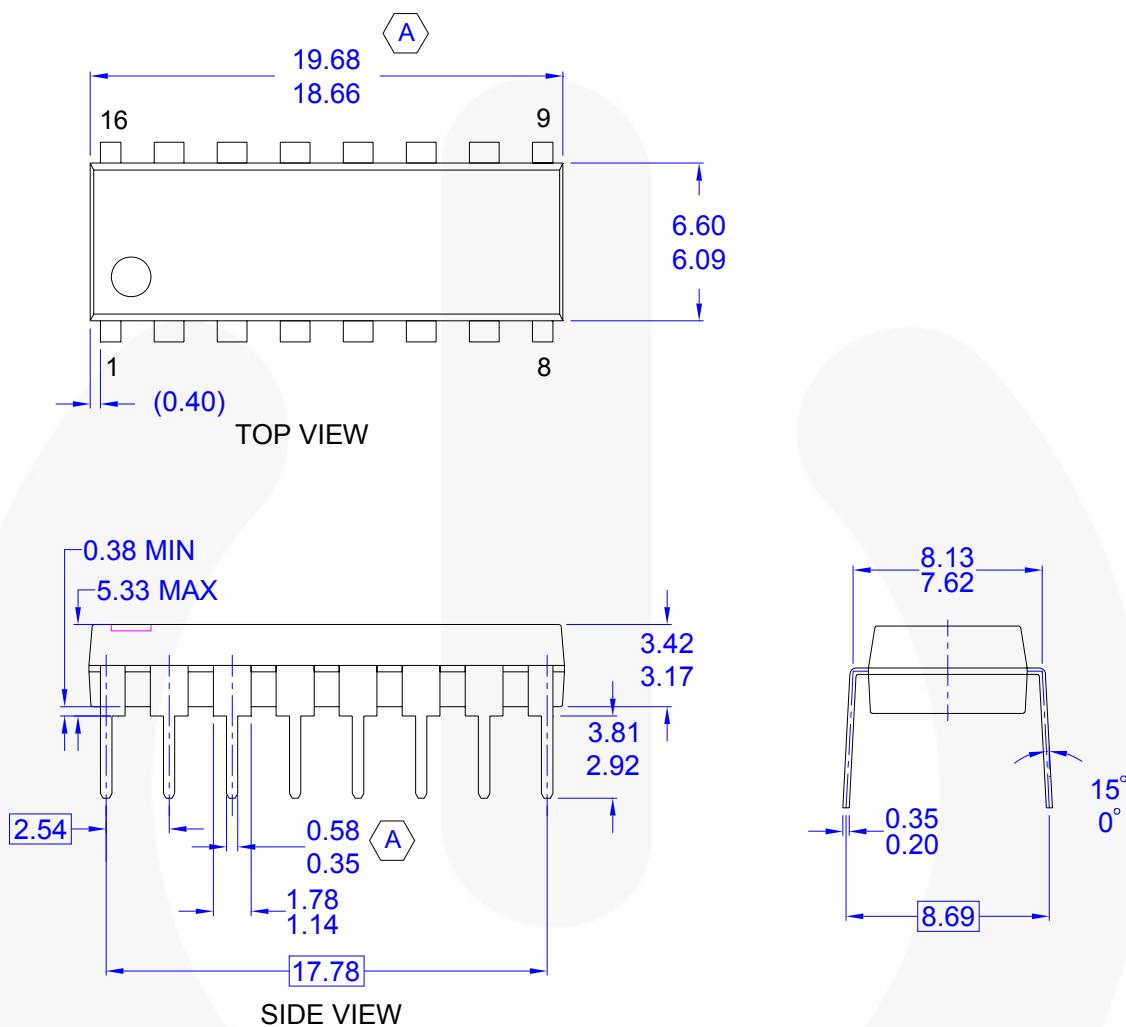


Figure 6. Timing Diagram

## Typical Performance Characteristics

Figure 7.  $V_{PGI}$  vs.  $T_A$ Figure 8.  $I_{DD1}$  vs.  $T_A$ Figure 9.  $V_{OFFSET}$  vs.  $T_A$ Figure 10.  $T_{OCP}$  vs.  $T_A$ Figure 11.  $V_{RI}$  vs.  $T_A$

## Physical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO

JEDEC MS-001 VARIATION BB

B) ALL DIMENSIONS ARE IN MILLIMETERS.

C) DIMENSIONS ARE EXCLUSIVE OF BURRS,  
MOLD FLASH, AND TIE BAR PROTRUSIONS

D) CONFORMS TO ASME Y14.5M-1994

E) DRAWING FILE NAME: N16EREV1

Figure 12. 16-pin, Dual In-Line Package (DIP)

Package drawings are provided as a service to customers considering Fairchild components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a Fairchild Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of Fairchild's worldwide terms and conditions, specifically the warranty therein, which covers Fairchild products.

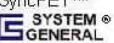
Always visit Fairchild Semiconductor's online packaging area for the most recent package drawings:  
<http://www.fairchildsemi.com/packaging/>



## TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

Build it Now™  
 CorePLUS™  
 CorePOWER™  
 CROSSVOLT™  
 CTL™  
 Current Transfer Logic™  
 EcoSPARK®  
 EfficientMax™  
 EZSWITCH™ \*  
  
  
 Fairchild®  
 Fairchild Semiconductor®  
 FACT Quiet Series™  
 FACT®  
 FAST®  
 FastvCore™  
 FlashWriter®  
 FPS™  
 FPFST™  
 FRFET®  
 Global Power Resource™  
 Green FPS™  
 Green FPS™ e-Series™  
 GTOT™  
 IntelliMAX™  
 ISOPLANAR™  
 MegaBuck™  
 MICROCOUPLER™  
 MicroFET™  
 MicroPak™  
 MillerDrive™  
 MotionMax™  
 Motion-SPM™  
 OPTOLOGIC®  
 OPTOPLANAR®  
 PDP J-PM™  
 Power-SPM™

PowerTrench®  
 Programmable Active Dropout™  
 QFET®  
 QST™  
 Quiet Series™  
 RapidConfigure™  
  
 Saving our world, 1mW/W/kW at a time™  
 SmartMax™  
 SMART START™  
 SPM®  
 STEALTH™  
 SuperFET™  
 SuperSOT™-3  
 SuperSOT™-6  
 SuperSOT™-8  
 SupreMOS™  
 SyncFET™  


The Power Franchise®  
  
 TinyBoost™  
 TinyBuck™  
 TinyLogic®  
 TINYOPTO™  
 TinyPower™  
 TinyPWM™  
 TinyWire™  
 µSerDes™  
  
 UHC®  
 Ultra FRFET™  
 UniFET™  
 VCXTM  
 VisualMax™

\* EZSWITCH™ and FlashWriter® are trademarks of System General Corporation, used under license by Fairchild Semiconductor.

## DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD 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. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

## LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

## ANTI-COUNTERFEITING POLICY

Fairchild Semiconductor Corporation's Anti-Counterfeiting Policy. Fairchild's Anti-Counterfeiting Policy is also stated on our external website, [www.fairchildsemi.com](http://www.fairchildsemi.com), under Sales Support.

Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

## PRODUCT STATUS DEFINITIONS

### Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I36

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC dba ON Semiconductor or its subsidiaries in the United States and/or other countries. ON Semiconductor owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of ON Semiconductor's product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). ON Semiconductor reserves the right to make changes without further notice to any products herein. ON Semiconductor makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does ON Semiconductor assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using ON Semiconductor products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by ON Semiconductor. "Typical" parameters which may be provided in ON Semiconductor data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. ON Semiconductor does not convey any license under its patent rights nor the rights of others. ON Semiconductor products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use ON Semiconductor products for any such unintended or unauthorized application, Buyer shall indemnify and hold ON Semiconductor and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that ON Semiconductor was negligent regarding the design or manufacture of the part. ON Semiconductor is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## PUBLICATION ORDERING INFORMATION

### LITERATURE FULFILLMENT:

Literature Distribution Center for ON Semiconductor  
19521 E. 32nd Pkwy, Aurora, Colorado 80011 USA  
**Phone:** 303-675-2175 or 800-344-3860 Toll Free USA/Canada  
**Fax:** 303-675-2176 or 800-344-3867 Toll Free USA/Canada  
**Email:** [orderlit@onsemi.com](mailto:orderlit@onsemi.com)

**N. American Technical Support:** 800-282-9855 Toll Free  
USA/Canada

**Europe, Middle East and Africa Technical Support:**  
Phone: 421 33 790 2910  
**Japan Customer Focus Center**  
Phone: 81-3-5817-1050

**ON Semiconductor Website:** [www.onsemi.com](http://www.onsemi.com)

**Order Literature:** <http://www.onsemi.com/orderlit>

For additional information, please contact your local  
Sales Representative