

# GS5115

## 150KHz, 3.5A/40V Step-Down Converter

### Product Description

GS5115 consists of step-down switching regulator with PWM control. These devices include a reference voltage source, oscillation circuit, error amplifier, internal PMOS and etc. GS5115 provides low-ripple power, high efficiency, and excellent transient characteristics. The PWM control circuit is able to vary the duty ratio linearly from 0 up to 100%. This converter also contains an error amplifier circuit as well as a soft-start circuit that prevents overshoot at startup. An enable function, an over current protect function and a short circuit protect function are built inside, and when OCP or SCP happens, the operation frequency will be reduced from 150KHz to 30KHz. Also, an internal compensation block is built in to minimum external component count. With the addition of an internal P-channel Power MOS, a coil, capacitors, and a diode connected externally, these ICs can function as step-down switching regulators. They serve as ideal power supply units for portable devices when coupled with the SOP-8P mini-package, providing such outstanding features as low current consumption. Since this converter can accommodate an input voltage up to 40V, it is also suitable for the operation via an AC adapter.

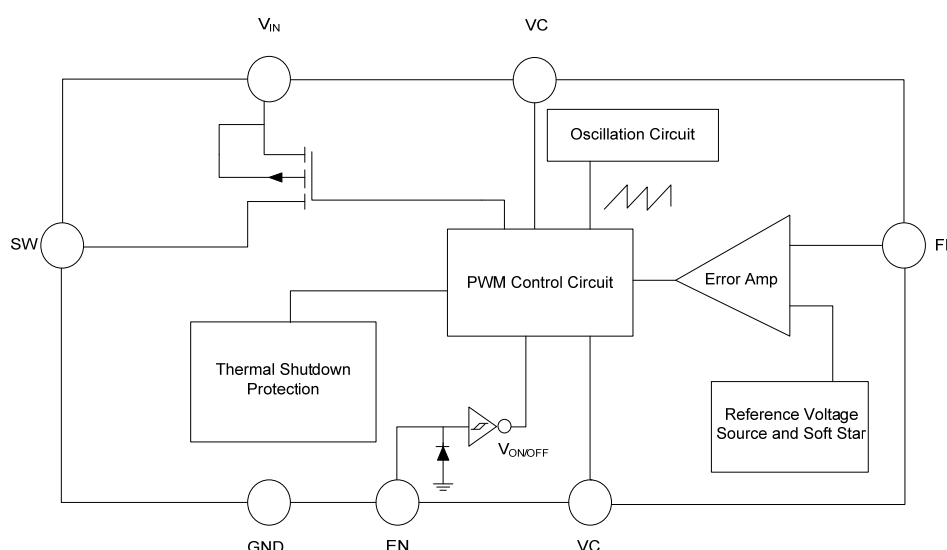
### Features

- Input voltage: 4.2V to 40V
- Output voltage: 0.8V to  $V_{IN}$
- Duty ratio: 0% to 100% PWM control
- Oscillation frequency: 150KHz typ
- Soft-start, Current limit, Enable function
- Thermal Shutdown function
- Built-in internal P-channel MOS
- SOP-8P Package

### Applications

- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-Video Player
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment
- Microprocessor core supply
- Networking power supply

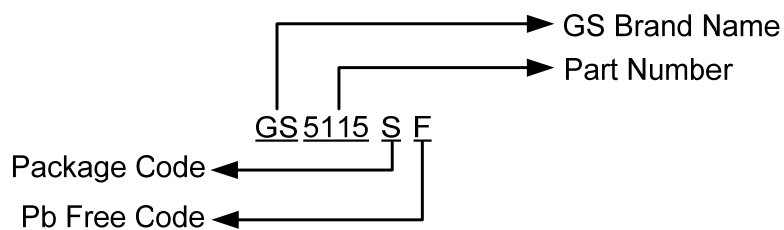
### Block Diagram



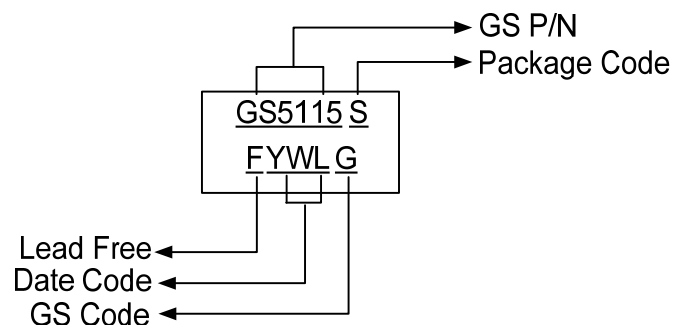
## Pin Assignments

GS5115SF (SOP-8)		
Pin	Name	Description
1	FB	Feedback pin.
2	EN	Enable / Disable pin H: Normal operation mode.(Step-down operation) L: Shutdown mode.(All circuits deactivated)
3	VC	Add an external capacitor to $V_{IN}$ . It's voltage is set to $V_{IN} - 7V$
4	$V_{IN}$	IC power supply pin
5 · 6	SW	Switch Pin. Connect external inductor/diode here. Minimize trace area at this pin to reduce EMI
7 · 8	GND	GND Pin

## Ordering Information



## Marking Information



## Absolute Maximum Rating

( $T_A=25^\circ\text{C}$ , unless otherwise noted)

The following ratings designate persistent limits beyond which damage to the device may occur.

Symbol	Parameter	Rating	Units
$V_{IN}$	$V_{IN}$ Pin Voltage	GND - 0.3 to GND + 40	V
$V_{FB}$	Feedback Pin Voltage	GND - 0.3 to $V_{IN}$	V
$V_{EN}$	EN Pin Voltage	GND - 0.3 to $V_{IN} + 0.3$	V
$V_{SW}$	Switch Pin Voltage	$V_{IN} - 0.3$ to $V_{IN} + 0.3$	V
VC	Clamp Voltage	$V_{IN} - 20$ to $V_{IN} + 0.3$	V
PD	Power Dissipation	Internally Limited	mW
$T_{OPR}$	Operating Temperature Range	-20 to +125	$^\circ\text{C}$

### Caution:

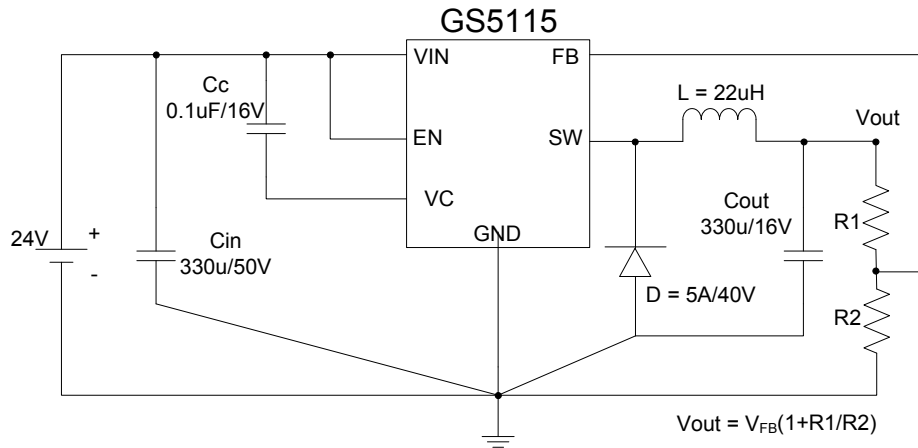
The absolute maximum ratings are rated values exceeding which the product could suffer physical damage. These values must therefore not be exceeded under any conditions.

## Electrical Characteristics

( $T_A = 25^\circ\text{C}$ ,  $V_{IN} = 24\text{V}$ , unless otherwise specified.)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
$V_{IN}$	Input Voltage	-	4.2	-	40	V
VEN_H	EN Pin Input Voltage	Evaluate oscillation at SW pin	2.0			
VEN_L		Evaluate oscillation stop at SW pin			0.8	V
$V_{FB}$	Feedback Voltage	$I_{OUT} = 0.1\text{A}$	0.803	0.82	0.836	V
$I_{FB}$	Feedback Bias Current	$I_{OUT} = 0.1\text{A}$	-	0.1	0.5	$\mu\text{A}$
ICL	Current Limit	-	3.5	5	6	A
$I_{GND}$	Quiescent Current (switch off)	$EN \geq V_{EN\_H}, V_{FB} = 1\text{V}$		1	2	mA
IGND_OFF	Current Consumption During Power Off	$EN \leq V_{EN\_L}$		1	10	$\mu\text{A}$
VC	Voltage Clamp	No load	$V_{IN}-6$	$V_{IN}-7$	$V_{IN}-8$	V
$F_{OSC}$	Oscillation Frequency		120	150	180	
$F_{OSC1}$	Frequency of Current Limit or Short Circuit Protect	Measure Waveform at SW pin	20	30	40	KHz
$\Delta V_{OUT}/V_{OUT}$	Line Regulation	$V_{IN}=12\text{V}\sim 40\text{V}, I_{OUT}=0.2\text{A}$		1	2	%
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	$I_{OUT}=0.1$ to 2A		0.2	0.5	%
$R_{DS(ON)}$	Internal MOSFET $R_{DS(ON)}$	$V_{FB}=0\text{V}, I_{OUT}=2\text{A}$		80	100	m $\Omega$
$\eta$	Efficiency	$V_{IN}=24\text{V}, V_{OUT} = 5\text{V}, I_{OUT}=3.5\text{A}$		87		%

## Typical Applications

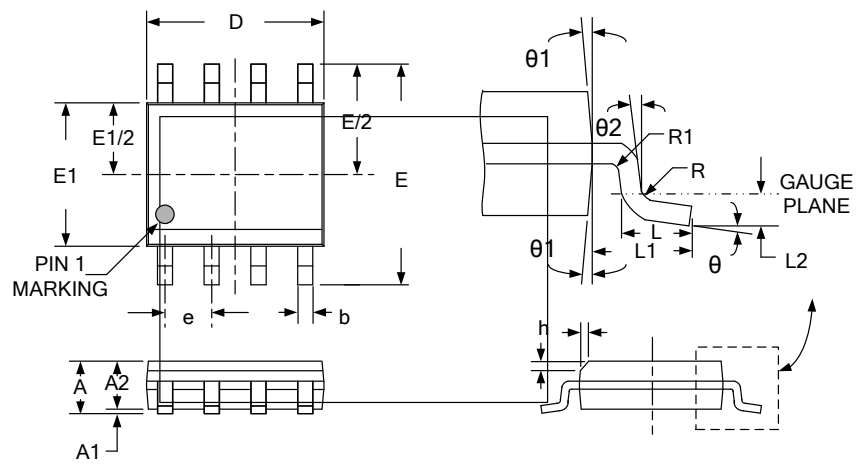


## Function Description

### PWM Control

The GS5115 consists of DC/DC converters that employ a pulse-width modulation (PWM) system. In converters of the GS5115, the pulse width varies in a range from 0 to 100%, according to the load current. The ripple voltage produced by the switching can easily be removed through a filter because the switching frequency remains constant. Therefore, these converters provide a low-ripple power over broad ranges of input voltage and load current.

## SOP-8 PLASTIC PACKAGE







Dimensions				
SYMBOL	Millimeters		Inches	
	MIN	MAX	MIN	MAX
<b>A</b>	1.35	1.75	.053	.069
<b>A1</b>	0.10	0.25	.004	.010
<b>A2</b>	1.25	1.65	.049	.065
<b>b</b>	0.31	0.51	.012	.020
<b>c</b>	0.17	0.25	.007	.010
<b>D</b>	4.90 (TYP)		.193 (TYP)	
<b>E</b>	6.00 (TYP)		.236 (TYP)	
<b>E1</b>	3.90 (TYP)		.154 (TYP)	
<b>e</b>	1.27 (TYP)		.050 (TYP)	
<b>L</b>	0.40	1.27	.016	.050
<b>L1</b>	1.04 (TYP)		.041 (TYP)	
<b>L2</b>	0.25 (TYP)		.010 (TYP)	
<b>R</b>	0.07	-	.003	-
<b>R1</b>	0.07	-	.003	-
<b>h</b>	0.25	0.50	.010	.020
<b><math>\theta</math></b>	0°	8°	0°	8°
<b><math>\theta1</math></b>	5°	15°	5°	15°
<b><math>\theta2</math></b>	0°	-	0°	-




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