

Datasheet

# FS1084

5.0A Adjustable & Fixed Voltage LDO Linear Regulator

FORTUNE,  
Properties  
For Reference Only

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**1. General Description**

The FS1084 is a series of low dropout three-terminal regulators with a dropout of 1.5V at 1Aoutput current.

The FS1084 series provides current limiting and thermal shutdown. Its circuit includes a trimmed band gap reference to assure output voltage accuracy to be within 2% for 1.8V, 3.3V and adjustable versions. Current limit is trimmed to ensure specified output current and controlled short-circuit current. On-chip thermal shutdown provides protection against any combination of overload and ambient temperature that would create excessive junction temperature.

The FS1084 has an adjustable version that can provide the output voltage from 1.25V to 12V with only two external resistors.

The FS1084 series is available in the industry standard TO263-3L power package.

**2. Features**

- Input voltage up to 18V.
- 1.5V maximum dropout at full load current
- Fast transient response.
- Output current limiting
- Built-in thermal shutdown
- Good noise rejection
- 3-Terminal Adjustable or Fixed 1.8V, 3.3V
- TO263-3L: "Green" Molding Compound(no Br, Sb)
- Lead Free Finish/RoHS compliant(Note 1)

**3. Applications**

- Input voltage:4.4V to 1.8V
- PC Motherboard
- LCD Monitor
- Graphic Card
- DVD-video player
- NIC/Switch
- Telecom Equipment
- ADSL Modem
- Printer and other Peripheral Equipment

**4. Ordering Information**

FS1084-xx x x

Package Pin Out  
 K : SOT-263-3L 1.GND 2.OUT  
 3.IN

Note : For the adjustable voltage types, the GND pin is replaced with the ADJ pin

Package Type

G : G stands for Green-Package

Output Voltage

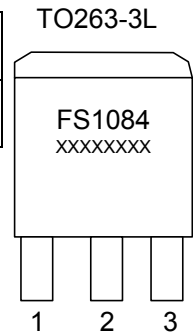
18 : 1.8V 33 : 3.3V

VR : Adjustable Output

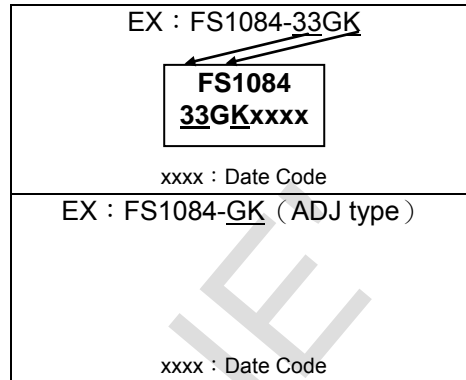
Note: The output voltages other than the preset values are available by order only.

**5. Pin Configurations**

Part No.	Pin 1	Pin 2	Pin 3
FS1084-xxGK	GND/ADJ	OUT (TAP)	IN



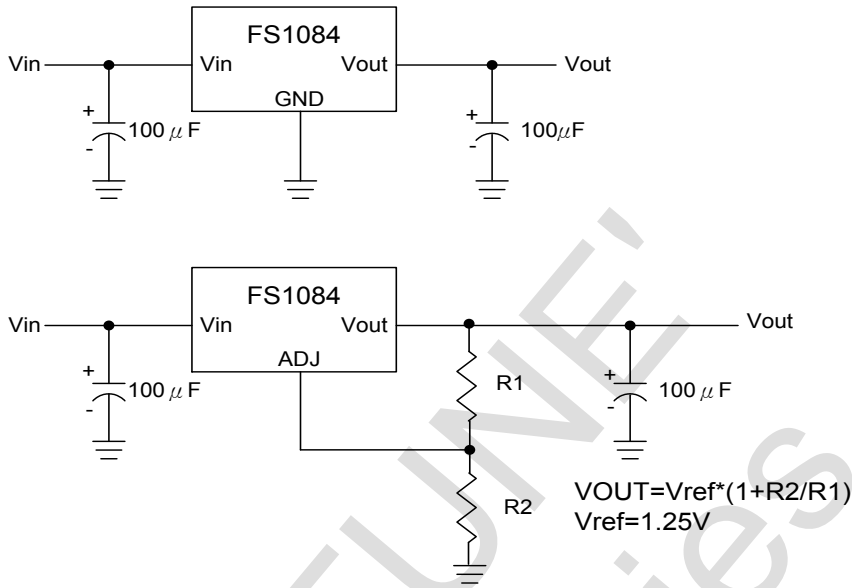
6. Package Marking Information



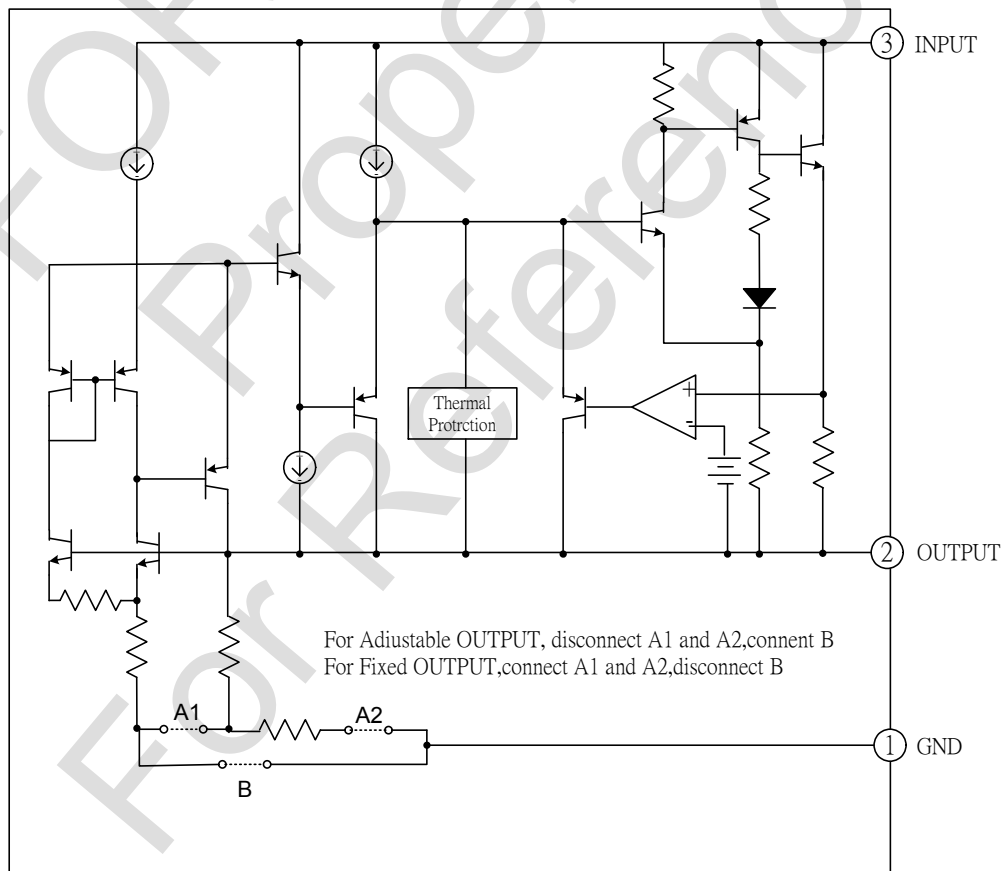
7. Pin Description

Part NO.	Symbol	Description
FS1084-xxGJ	GND/ADJ	Ground pin or adjust terminal pin.
	IN	Regulator input pin.
	OUT	Regulator output pin.

8. Typical Application Circuit



9. Functional Block Diagrams



**10. Absolute Maximum Ratings**

Symbol	Parameter	Rating	Unit
V <sub>IN</sub>	Input Voltage	-0.3~20	V
T <sub>MJ</sub>	Maximum Junction Temperature	150	°C
T <sub>ST</sub>	Storage Temperature	-65~150	°C

**11. Recommended Operating Conditions**

Symbol	Parameter	Rating	Unit
V <sub>IN</sub>	Input Voltage	18	V
T <sub>J</sub>	Operating Junction Temperature Range	-20~120	°C

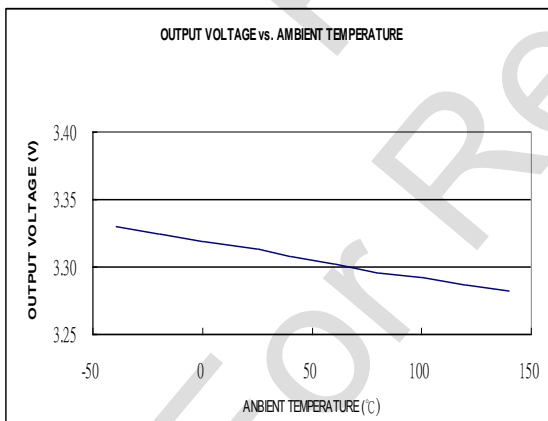
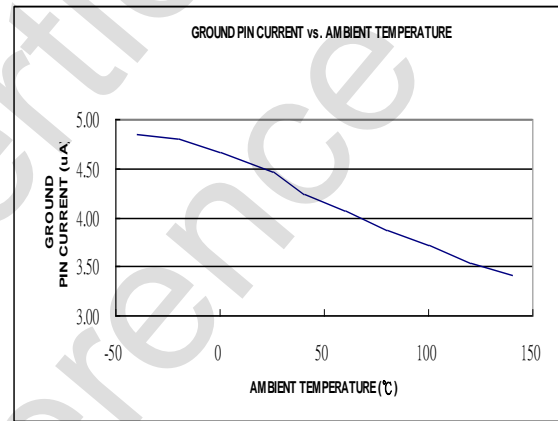
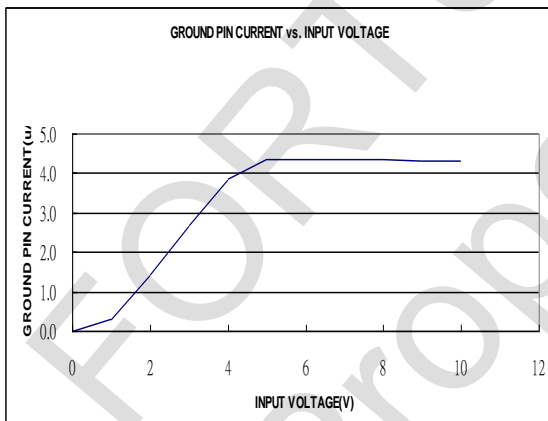
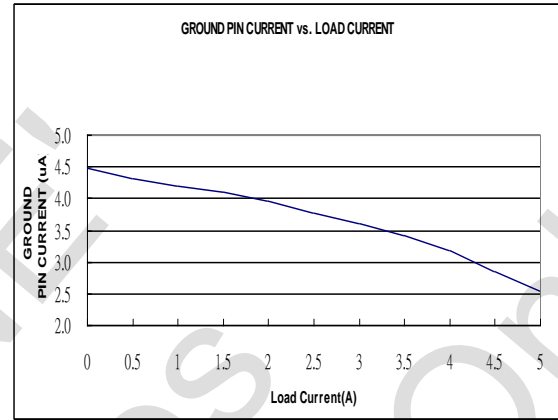
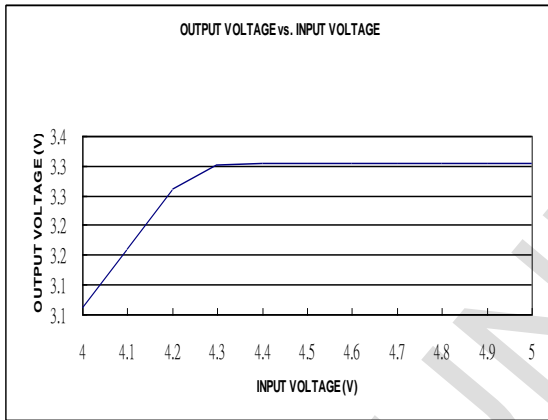
**12. Electrical Characteristics**

(C<sub>IN</sub>=100μF, C<sub>OUT</sub>=100μF, T<sub>A</sub>=25°C, unless otherwise noted.)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V <sub>ref</sub>	Reference Voltage	FS1084-Adj	I <sub>o</sub> =10mA, 1.5V ≤ V <sub>IN</sub> ≤ 8V	1.225	1.250	1.275	V
V <sub>OUT</sub>	Output Voltage	FS1084-1.8V	I <sub>o</sub> =10mA, 3.3V ≤ V <sub>IN</sub> ≤ 10V	1.764	1.8	1.836	V
		FS1084-3.3V	I <sub>o</sub> =10mA, 4.8V ≤ V <sub>IN</sub> ≤ 10V	3.235	3.3	3.365	V
I <sub>LIMIT</sub>	Current Limit	FS1084-XXX	V <sub>IN</sub> -V <sub>OUT</sub> =3V	5.1			A
I <sub>Q</sub>	Ground Pin Current	FS1084-XXX	V <sub>IN</sub> =V <sub>OUT</sub> +1.25V		5	10	mA
I <sub>ADJ</sub>	ADJ Pin Current	FS1084-Adj	I <sub>o</sub> =10mA~5A, 1.5V=V <sub>IN</sub> -V <sub>OUT</sub> =10V		60	120	μA
V <sub>DROP</sub>	Dropout Voltage	FS1084-XXX	I <sub>OUT</sub> =5A, ΔV <sub>OUT</sub> =1%V <sub>OUT</sub>		1.3	1.5	V
ΔV <sub>LINE</sub>	Line Regulation	FS1084-XXX	I <sub>OUT</sub> =10mA, 1.5V ≤ V <sub>IN</sub> -V <sub>OUT</sub> ≤ 7V		0.2	0.5	%
ΔV <sub>LOAD</sub>	Load Regulation	FS1084-1.8V	V <sub>IN</sub> =3.3V, 10mA < I <sub>o</sub> < 5A		15	18	mV
		FS1084-3.3V	V <sub>IN</sub> =5V, 10mA < I <sub>o</sub> < 5A		26	33	mV
e <sub>N</sub>	Output Noise	FS1084-XXX	F=10Hz to 10KHz,		0.003		%
PSRR	Ripple Rejection	FS1084-XXX	F=120Hz, C <sub>OUT</sub> =25μF Tantalum, V <sub>IN</sub> -V <sub>OUT</sub> =3V		60		dB
TSD	Thermal Shutdown Temperature	FS1084-XXX			150		°C
THYS	Thermal Shutdown Hysteresis	FS1084-XXX			25		°C
θ <sub>JA</sub>	Thermal Resistance ( No heat-sink, No air flow)	FS1084-XXX	TO263-3L		45		°C/W

### 13. Typical Operating Characteristics

(C<sub>IN</sub>=10μF, C<sub>OUT</sub>=10μF, T<sub>A</sub>=+25°C, unless otherwise noted.)



## 14. Application Description

The FS1117 keeps a constant 1.25V between the output pin and the adjust pin. By placing a resistor R1 across these two pins a constant current flows through R1, assign to the  $I_{adj}$  current and into the R2 resistor producing a voltage equal to the  $(1.25/R1)*R2+I_{adj}*R2$  which will be added to the 1.25V to set the output voltage. This is summarized in the above equation. Since the minimum load current requirement of the FS1117 is 10mA, R1 is typically selected to be 121Ω resistor so that it automatically satisfies the minimum current requirement. Notice that since  $I_{adj}$  is typically in the range and should only be considered when a very precise output voltage setting is required. For example, in a typical 3.3V application where  $R1=121\Omega$  and  $R2=220\Omega$  the error due to  $I_{adj}$  is only 0.3% of the nominal set point.

### Stability

The FS1117 requires the use of an output capacitor as part of the frequency compensation in order to make the regulator stable. For most applications a minimum of 100μF aluminum electrolytic capacitor insures both stability and good transient response.

### Thermal Design

The FS1117 incorporates an internal thermal shutdown that protects the device when the junction temperature exceeds the maximum allowable junction temperature. Although this device can operate with junction temperatures in the range of 150°C, it is recommended that the selected heat sink be chosen such that during maximum continuous load operation the junction temperature is kept below the temperature.

$$P_d = V_{OUT} \times I_{OUT}$$

$$T_J = T_A + P_d \times \theta_{JA} < 150^\circ\text{C}$$

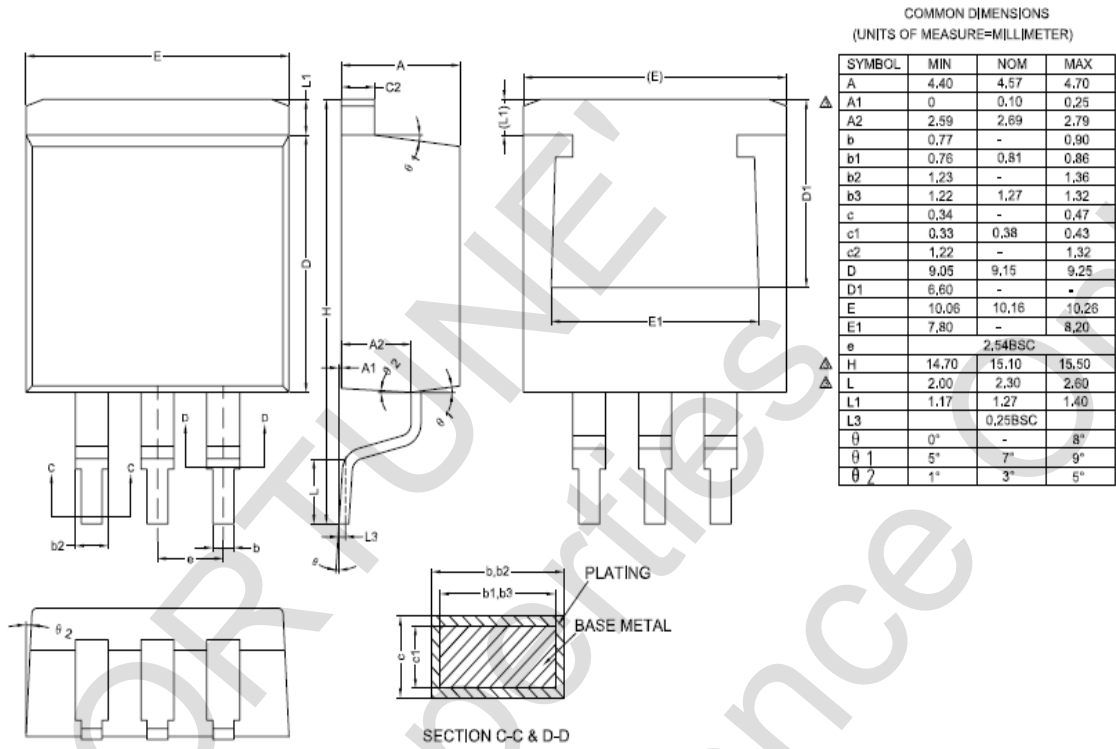
### Layout Consideration

The output capacitors must be located as close to the VOUT terminal of the device as possible. It is recommended to use a section of a layer of the PC board as a plane to connect the VOUT pin to the output capacitors that may result due to excessive trace inductance.



15. Package Outline

TO263-3L



16. Revision History

Version	Date	Page	Description
1.0	2010/3/12	All	New release