

FEATURES

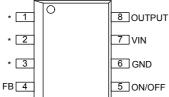
- 3.3V, 5V, 12V, and adjustable output versions
- Adjustable version output voltage range, 1.2V to 37V ±4% max over line and load conditions
- Available in 8-pin surface mount and DIP-8 package
- Guaranteed 0.5A output current
- Input voltage range up to 40V
- Requires only 4 external components
- 150 kHz fixed frequency internal oscillator
- TTL Shutdown capability
- Low power standby mode, I_Q typically 85 μA
- High Efficiency
- Uses readily available standard inductors
- Thermal shutdown and current limit protection

Typical Application

- Simple high-efficiency step-down (buck) regulator
- Efficient pre-regulator for linear regulators
- On-card switching regulators
- Positive to Negative convertor

PIN ASSIGNMENT

(Top View)



GENERAL DESCRIPTION

The FSP3127 series of regulators are monolithic integrated circuits that provide all the active functions for a step-down (buck) switching regulator, capable of driving a 0.5A load with excellent line and load regulation. These devices are available in fixed output voltages of 3.3V, 5V, 12V, and an adjustable output version, and are packaged in a 8-lead DIP and a 8-lead surface mount package.

FSP3127

Requiring a minimum number of external components, these regulators are simple to use and feature internal frequency compensation, a fixed-frequency oscillator, and improved line and load regulation specifications.

The FSP3127 series operates at a switching frequency of 150 kHz thus allowing smaller sized filter components than what would be needed with lower frequency switching regulators. Because of its high efficiency, the copper traces on the printed circuit board are normally the only heat sinking needed.

A standard series of inductors (both through hole and surface mount types) are available from several different manufacturers optimized for use with the FSP3127 series. This feature greatly simplifies the design of switch-mode power supplies.

Other features include a guaranteed $\pm 4\%$ tolerance on output voltage under all conditions of input voltage and output load conditions, and $\pm 15\%$ on the oscillator frequency. External shutdown is included, featuring typically 85 µA stand-by current. Self protection features include a two stage frequency reducing current limit for the output switch and an over temperature shutdown for complete protection under fault conditions.

*: Pin 1,2,3 No internal connection, but should be soldered to PC board for best heat transit

ABSOLUTE MAXIMUM RATINGS(NOTE1)

Parar	neter	Value	Unit
Maximum Su	ipply Voltage	45	V
ON/OFF Pin	Input Voltage	-0.3 to 25	V
Feedback I	Pin Voltage	– 0.3 to 25	V
Output Voltage to G	round(Steady State)	-1	V
Power Di	ssipation	Internally limited	
Maximum Junct	on Temperature	+150	٥C
ESD Suscept	ibility(Note 2)	2000	V
Storage Te	mperature	-65 to 150	°C
Lead Temperature (SOP8L)	Vapor Phase (60 sec.)	215	°C
	Infrared (15 sec.)	220	
Lead Temperature (PDIP	8L) (Soldering, 10 sec)	260	С°С

Note 1: Absolute Maximum Ratings indicate limits beyond which damage to the device may occur. Operating Ratings indicate conditions for which the device is intended to be functional, but do not guarantee specific performance limits. For guaranteed specifications and test conditions, see the Electrical Characteristics. Note 2: The human body model is a 100 pF capacitor discharged through a 1.5k resistor into each pin.



FSP3127

OPERATING CONDITIONS

Parameter	Symbol	Test Conditions	Min.	Тур.	Max.	Unit
Input Voltage	V _{IN}		4.5		40	V
Junction Temperature	ΤJ		-40		+125	°C

ELECTRICAL CHARACTERISTICS

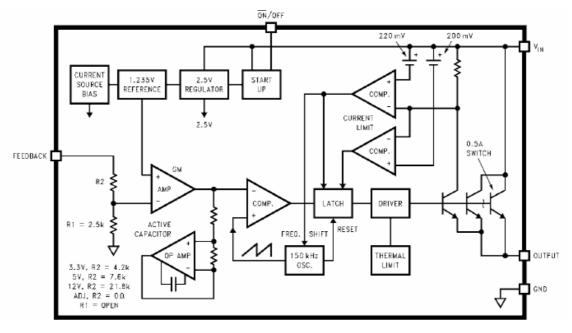
Para	meter	Symbol	Те	st Conditions	Min.	Тур.	Max.	Unit
Feedback Bias Current		I _{FB}	V _{FB} = 1.3V			10	50	nA
		'FB	(Adjustable version Only)			10	100	10.0
Oscillator Frequency		F _{osc}	No Outside Circuit ,		127	150	173	kHz
	· ·			0V force drive on	110		173	
	uit Oscillator	F _{CSP}		rrent Limit Occur and ~ 0.5 V T = 25°C	10	30	50	kHz
rieq	uency		VFB	< 0.5V, T _A =25°C			1.1	
Saturatio	on Voltage	V_{SAT}		I _{OUT} = 0.5A,		0.9	1.1 1.2	V
Maximum Di	uty Cycle(On)	DC	V _{ED} =	0V force drive on		100	1.2	
	uty Cycle(Off)			12V force drive off		0		%
				Peak Current	0.65	•	1.3	
Curre	nt Limit	I _{CL}	No Outside Circuit ,			0.8		
				0V force drive on	0.58		1.4	А
Output=0	Output			Outside Circuit,		2	50	μA
•	Leakage	IL _	V _{FB} =	12V force drive off				-
Output=1	Current			$V_{\rm IN} = 40V$		2	15	mA
Quiescer	nt Current	Ι _Q	V _{FB} =	12V force drive off		5	10	mA
Standby Quie	escent Current	I _{STBY}	ON/OFF Pin=5V,V _{IN} = 40V			85	200	μA
							250	
ON/OFF Pin Logic Input		V _{IL}	Low (Regulator ON)			1.3	0.6	V
Threshold Voltage		V _{IH}	High (Regulator OFF)		2.0		_	
	Input Current	١L	I _L V _{LOGIC} =0.5V(ON)			0.02	5	
ON/OFF Pin Logic Input Current		I _H	V _{LOGIC} =2.5V(OFF)			5	15	μA
Cui	irent		SOP8L	Junction to Ambient		150		
Thermal F	Resistance	$^{ extsf{ heta}}$ JA	PDIP8L	Junction to Ambient		95		°C/W
			4.5V ≤V _{IN} ≤40V		1.193	30	1.267	<u> </u>
Output		V _{FB}	$4.3V \le V_{IN} \le 40V$ $0.1A \le I_{LOAD} \le 0.5A$ V_{OUT} Programmed for 3V			1.23		V
Feedback	FSP3127-ADJ				1.18	-	1.28	
Efficiency		n	V -		80			%
Enciency		η	V_{IN} =12V, I_{LOAD} = 0.5A		00			70
Output			4.5V ≤V _{IN} ≤40V 0.1A ≤I _{LOAD} ≤0.5A		3.168	3.3	3.432	V
Feedback					3.135	5.5	3.465	v
Efficiency	1010121-0.00	η	V _{IN} =12V, I _{LOAD} = 0.5A		80			%
Output			7V ≤V _{IN} ≤40V 0.2=1A ≤I _{LOAD} ≤2=0.5A		4.8		5.2	V
Feedback	FSP3127-5.0V	V_{FB}			4.75 5	5.25	v	
Efficiency	1	η	$V_{IN} = 12V, I_{LOAD} = 2 = 0.5A$		82			%
		· ·					44.4	V
Output Foodback			15V ≤V _{IN} ≤40V 0.1A ≤I _{LOAD} ≤0.5A		11.52	12	11.4	
reeuback	Feedback FSP3127-12V		U. I	A SILOAD SU.JA	12.48		12.6	
Efficiency]	η	V _{IN} =12V, I _{LOAD} = 0.5A		88			%

Specifications with **boldface** are for full operating temperature range, the other type are for T_J=25°C



FSP3127

■ FUNCTIONAL BLOCK DIAGRAM



FUNCTIONAL DESCROPTION

Pin Functions

V_{IN}

This is the positive input supply for the IC switching regulator. A suitable input bypass capacitor must be present at this pin to minimize voltage transients and to supply the switching currents needed by the regulator.

Ground

Circuit ground.

Output

Internal switch. The voltage at this pin switches between ($V_{IN} - V_{SAT}$) and approximately +0.5V, with a duty cycle of V_{OUT}/V_{IN} . To minimize coupling to sensitive circuitry, the PC board copper area connected to this pin should be kept to a minimum.

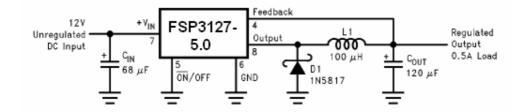
Feedback

Senses the regulated output voltage to complete the feedback loop.

ON/OFF

Allows the switching regulator circuit to be shut down using logic level signals thus dropping the total input supply current to approximately 80 mA. Pulling this pin below a threshold voltage of approximately 1.3V turns the regulator on, and pulling this pin above 1.3V (up to a maximum of 25V) shuts the regulator down. If this shutdown feature is not needed, the ON/OFF pin can be wired to the ground pin or it can be left open, in either case the regulator will be in the ON condition.

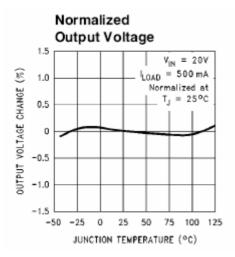
■ TYPICAL APPLICATION CIRCUIT

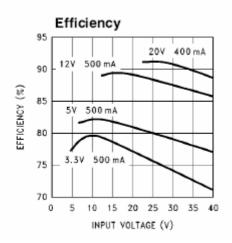


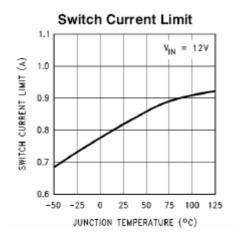


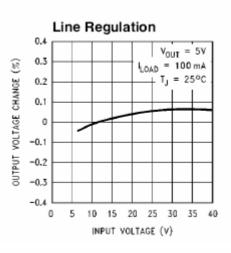
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TYPICAL CHARACTERISTICS

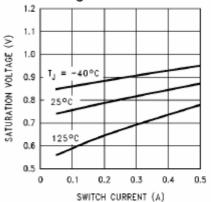


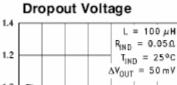


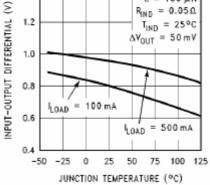




Switch Saturation Voltage



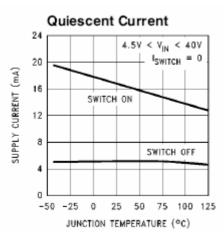




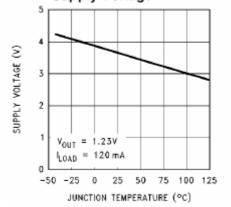


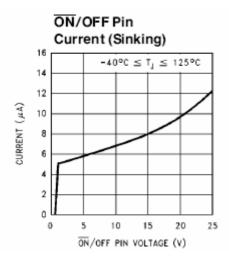
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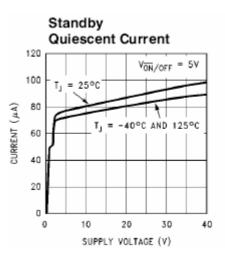
TYPICAL CHARACTERISTICS (CONTINUED)



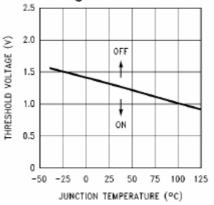
Minimum Operating Supply Voltage

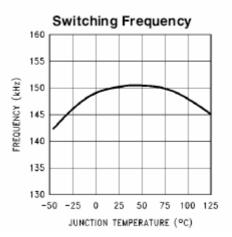








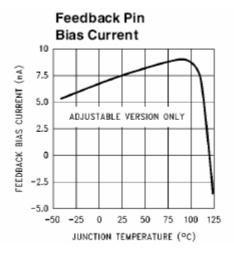






■ TYPICAL CHARACTERISTICS (CONTINUED)

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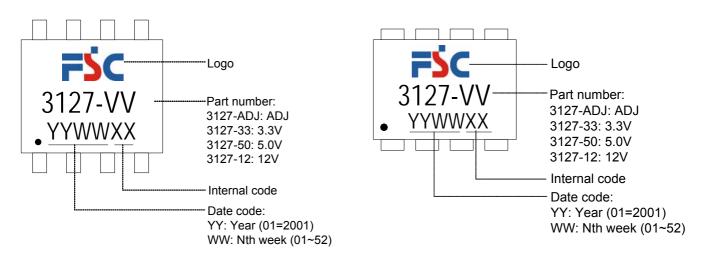
ORDER INFORMATION

	FSP3127XXX	X T	
Package: S: SOP8L N: PDIP8L	Output Voltage: Blank: ADJ 33: 3.3V 50: 5.0V 12: 12V	Packing: Blank: Tube or Bulk A: Tape & Reel	Temperature Grade: E: -40~125℃

MARKING INFORMATION

(1) SOP8L

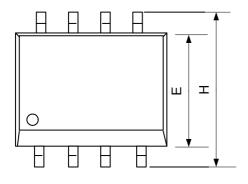
(2) PDIP8L

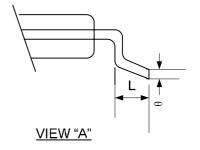




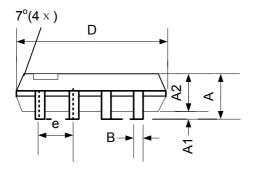
■ PACKAGE INFORMATION

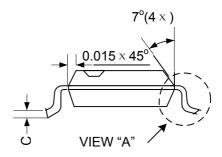
(1) SOP8L





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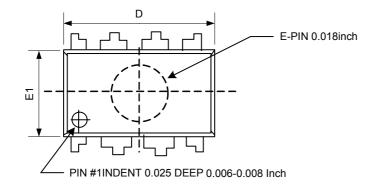


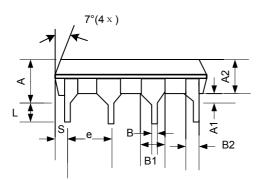


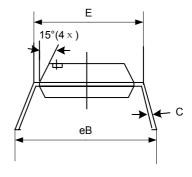
Symbol N	Dimensions In Millimeters			Dimensions In Inches			
	Min.	Nom.	Max.	Min.	Nom.	Max.	
А	1.35	1.60	1.75	0.053	0.063	0.069	
A1	0.10		0.25	0004		0.010	
A2	1.35	1.45	1.55	0.053	0.057	0.061	
В	0.33	0.41	0.51	0.013	0.016	0.020	
С	0.19	0.20	0.25	0.0075	0.008	0.010	
D	4.80	4.90	5.00	0.192	0.196	0.200	
E	3.80	3.90	4.00	0.148	0.154	0.160	
е		1.27TYP.			0.050TYP.		
Н	5.80	5.99	6.30	0.228	0.236	0.248	
L	0.38	0.71	1.27	0.015	0.028	0.050	
θ	0°		8°	0°		8°	



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Sympol	Dimensions In Millimeters			Dimensions In Inches		
Symbol	Min.	Nom.	Max.	Min.	Nom.	Max.
А			5.33			0.210
A1	0.38			0.015		
A2	3.1	3.30	3.5	0.122	0.130	0.138
В	0.36	0.46	0.56	0.014	0.018	0.022
B1	1.4	1.52	1.65	0.055	0.060	0.065
B2	0.81	0.99	1.14	0.032	0.039	0.045
С	0.20	0.25	0.36	0.008	0.010	0.014
D	9.02	9.27	9.53	0.335	0.365	0.375
E	7.62	7.94	8.26	0.300	0.313	0.325
E1	6.15	6.35	6.55	0.242	0.250	0.258
е		2.54			0.100	
Ĺ	2.92	3.3	3.81	0.115	0.130	0.150
eB	8.38	8.89	9.40	0.330	0.350	0.370
S	0.71	0.84	0.97	0.028	0.033	0.038