■ General Description

The An3130 family is a 3A CMOS LDO linear regulators that features a low quiescent current (90µAtyp.) with ultra low: input voltage (to 1.4V), fixed output voltage (from 0.8V to 5.15V by step 50mV) or adjustable version, and dropout voltage (300mVtyp.), as well as over temperature protection, making them ideal for battery applications. The fixed output voltages are set at the factory (by mask option) and trimmed to ± 1.0 % accuracy.

These rugged devices have both Thermal Shutdown, and Current Fold-back to prevent device failure under the "Worst" of operating conditions.

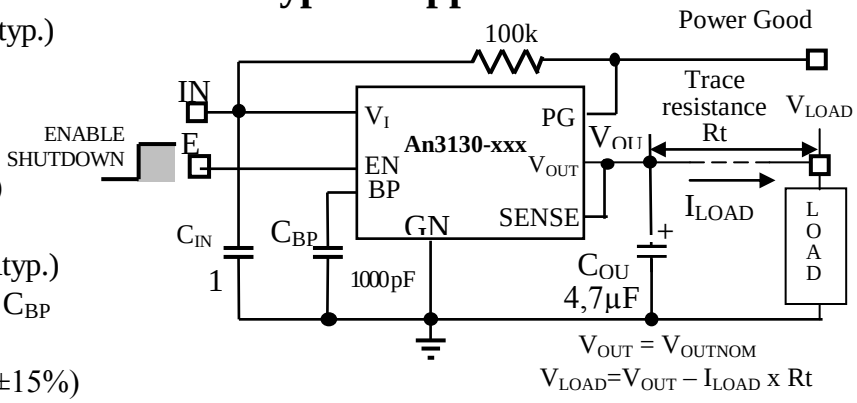
An additional feature is a "Power Good" detector with open drain output, which pulls low when the output is out of regulation ±10% or ±15% (mask option) at Under voltage or Over voltage conditions, occurred due to low input voltage, current or thermal limiting, or output is pulled up. Over Voltage detector (+10% or +15%) may be not involved (mask option). When the EN pin is pulled low a PG flag output may be invalid (by mask option) for reasons of saving power in shutdown mode.

The An3130 is stable with an output capacitance of 4.7µF or greater.

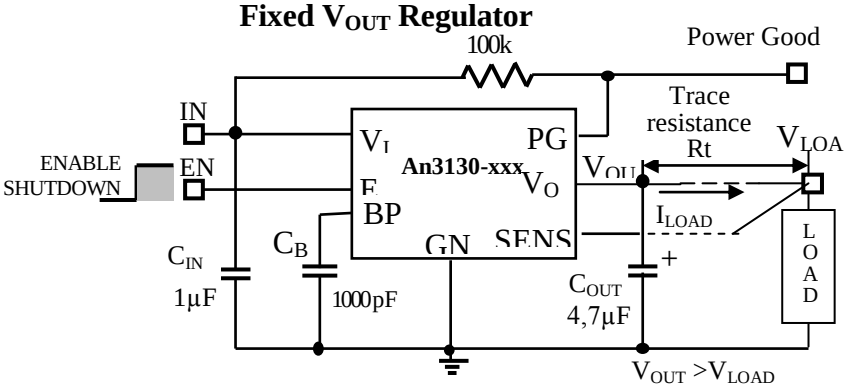
■ Features

- Ultra Low Dropout Voltage (300mVtyp.)
- Guaranteed 3A Output
- Accurate to within 1.0%
- 90µA Quiescent Current Typically
- Over-Temperature Shutdown(150°C)
- Current Limiting (4.5A)
- Short Circuit Current Fold-back (1Atyp.)
- Noise Reduction Bypass Capacitor C_{BP}
- Low Temperature Coefficient
- "Power Good" Detector (±10% or ±15%)

■ Typical Application



Fixed V_{OUT} Regulator



Improving Remote Load Regulator

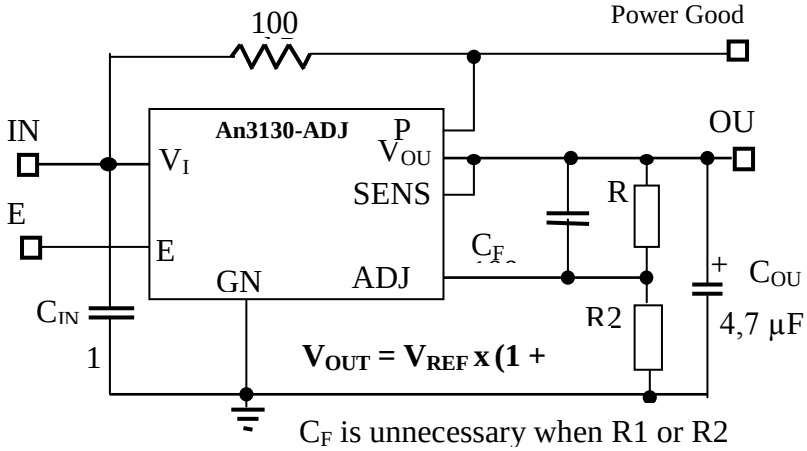
■ Applications

- DSP, FPGA and Microprocessor Power Supply
- 1.2V Core Voltage for DSPs
- SATA Power Supply
- LCD TV/ Monitors
- Portable Electronics
- Wireless Devices
- Communication Device
- Post Regulator for SMPS

■ Ordering Information

An3130 - xxx

V_{OUT}	xxx
$V_{OUT(min)}$ = 0.80 V	080
V_{OUT} = 0.85 V : : (by step 0.05 V) V_{OUT} = 5.100 V	085 : 510
$V_{OUT(max)}$ = 5.15 V	515
$V_{OUT}=V_{REF}$ * (1+R1/R2)	ADJ



Adjustable Regulator (ADJ-version)

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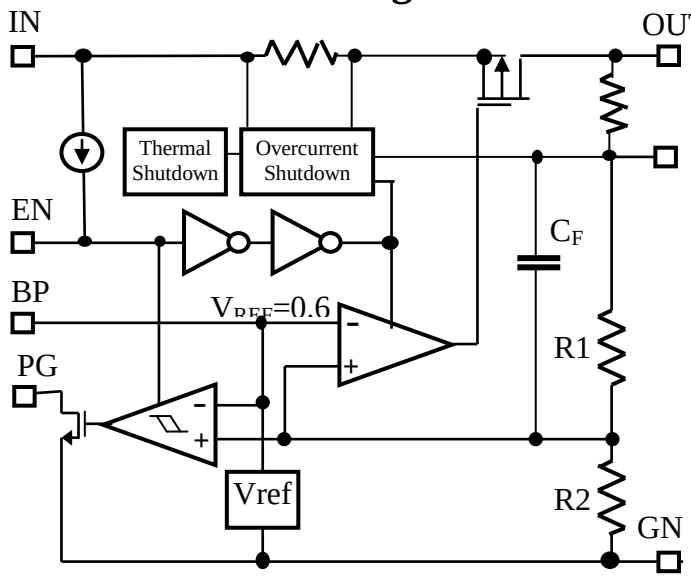
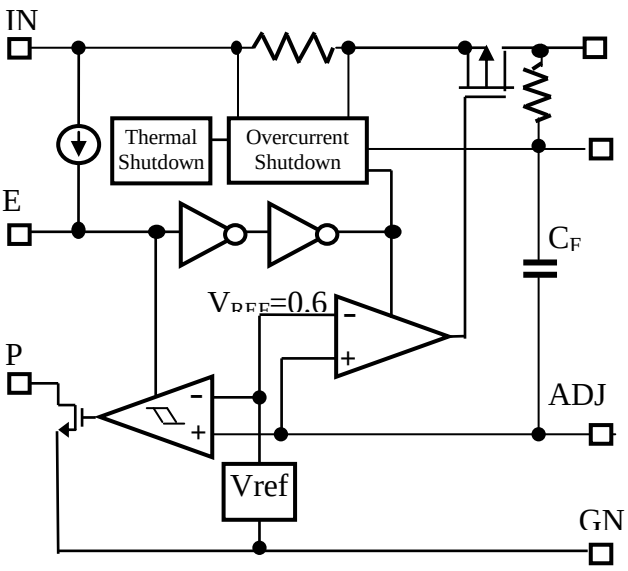
Rev 0.0 September 2012

■ Functional Block Diagram



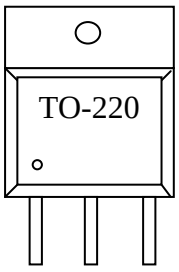
Fixed Voltage Regulator (FIX - version)



Adjustable Voltage Regulator (ADJ - version)

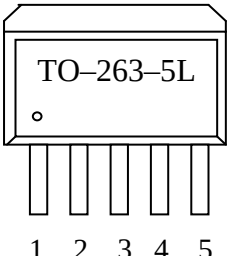
■ Package Pin Configuration Examples

Top View



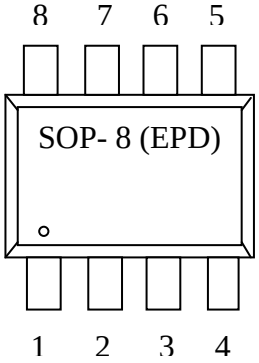
Pin Number	Name	Function
1	V_{IN}	Supply Voltage Input
2	GND	Ground (Heat sink)
3	V_{OUT}	Voltage Output

Top View



Pin Number	Name	Function
1	V_{IN}	Supply Voltage Input
2	EN	Enable Input
3	GND	Ground (Heat sink)
4	PG / SENSE	Power Good Output / Sense Input
5	V_{OUT}	Voltage Output

Top View



Pin Number	Name	Function
1	GND / BP (ADJ)	Ground / V_{REF} Output (Adjustment Feedback Input)
2	V_{IN}	Supply Voltage Input
3	EN	Enable Input
4	GND	Ground
5	PG	Power Good Output
6	SENSE	Remote Feedback Sense Input
7	V_{OUT}	Voltage Output
8	GND / BP (ADJ)	Ground / V_{REF} Output (Adjustment Feedback Input)

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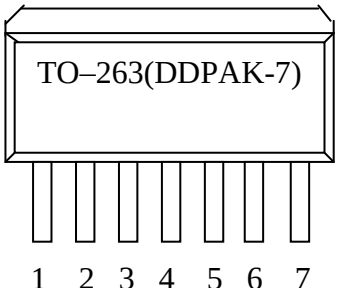
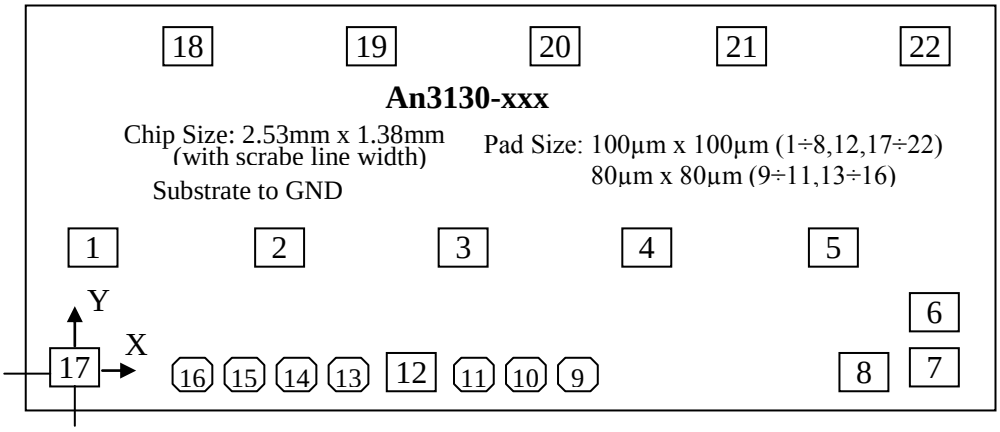
Top View



Pin Number	Name	Function
1	BP (ADJ)	V_{REF} Output (Adjustment Feedback Input)
2	V_{IN}	Supply Voltage Input
3	EN	Enable Input
4	GND	Ground (Heat sink)
5	PG	Power Good Output
6	SENSE	Remote Feedback Sense Input
7	V_{OUT}	Voltage Output

Pin Number	Name	Function
1	V_{IN}	Supply Voltage Input
2	EN	Enable Input
3	PG	Power Good Output
4	GND	Ground (Heat sink)
5	SENSE	Remote Feedback Sense Input
6	V_{OUT}	Voltage Output
7	BP (ADJ)	V_{REF} Output (Adjustment Feedback Input)

■ Chip Pad Position



■ Chip Pad Description & Pad Location

№ Pad	Name	Function	X (µm)	Y (µm)	№ Pad	Name	Function	X (µm)	Y (µm)
1	V_{IN}	Supply Voltage Input	46	380	12	GND	Ground Input	825,5	- 10
2			502	380	13	F0	Voltage Reference Trim Input	668.5	- 20
3			958	380	14	F1	Voltage Reference Trim Input	541,5	- 20
4			1414	380	15	F2	Voltage Reference Trim Input	414.5	- 20
5			1870	380	16	F3	Voltage Reference Trim Input	287,5	- 20
6	SENSE	Remote Feedback Sense Input	2119	172	17	BP	Voltage Reference Output, V_{REF} (FIX- output version only)	0	0
						ADJ	Adjustment Feedback Input (ADJ-output version only)		
7	PG	Open-drain "Power Good" Output	2119	- 3	18	V_{OUT}	Regulator Voltage Output	274	1014
8	EN	Enable Input	1944	- 10	19			730	1014
9	F6	V_{OUT} Trim Input	1236,5	- 20	20			1186	1014
10	F5	V_{OUT} Trim Input	1109,5	- 20	21			1642	1014
11	F4	V_{OUT} Trim Input	982,5	- 20	22			2098	1014

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■ Absolute Maximum Ratings

Parameter	Symbol	Maximum	Unit
Input Supply Voltage	V_{IN}	-0.3 to 6.0	V
Enable Input Voltage	V_{EN}	-0.3 to V_{IN} + 0.3	V
Maximum Voltage for PG Pin	V_{PG}	V_{IN} + 0.3	V
Maximum Voltage for Sense Pin	V_{SENSE}	V_{OUT} + 0.3	V
Output Current	I_{OUT}	P_D / (V_{IN} - V_{OUT})	mA
Maximum Junction Temperature	T_J	+150	^oC
Storage Temperature Range	T_{ST}	-65 to +150	^oC
Lead Temperature (soldering, 10 seconds)	T_{LEAD}	+300	^oC
ESD Rating		2	kV

Caution: Stress above the listed absolute maximum rating may cause permanent damage to the device. All voltages are with respect to ground.

■ Recommended Operating Conditions

Parameter	Symbol	Maximum	Unit
Supply Voltage Range	V_{IN}	1.4 to 5.5	V
Enable Input Voltage	V_{EN}	-0.3 to V_{IN} + 0.3	V
Maximum Output Current (DC)	I_{OUT}	3000	mA
Ambient Temperature Range	T_A	-40 to +85	^oC
Operating Junction Temperature Range	T_{OJ}	-40 to +125	^oC

Caution: The device is not guaranteed to function outside its operating rating.

■ Thermal Information

Parameter	Symbol	Package	Maximum	Unit
Thermal Resistor (Junction to Case)	θ_{JC}	TO - 263	7	^oC / W
		TO - 220	7	
		SOP - 8	90	
Thermal Resistor (Junction to Ambient)	θ_{JA}	TO - 263	60	
		TO - 220	50	
		SOP - 8	11	
Internal Power Dissipation	P_D	TO - 263	2800	mW
		TO - 220	3000	

Caution: The maximum allowable power dissipation at any T_A (ambient temperature) is $P_{D(MAX)}$ = ($T_{J(MAX)}$ - T_A) / θ_{JA}. Exceeding the maximum power dissipation will result in excessive die temperature, and the regulator will go into thermal shutdown.

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■ Electrical Specifications

$V_{IN} = V_{OUTNOM} + 0.5V$, $T_A = 25^OC$, $C_{IN} = 1\mu F$, $C_{0UT} = 4.7\mu F$, unless otherwise noted.

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Units
Input Supply Voltage	V_{IN}			**Note 1**	-	5.5	V
Output Voltage Accuracy	V_{OUT}	I_{OUT} = 1mA.Variation from specified V_{OUT}		-1.0	-	+1.0	%
Dropout Voltage, **Note 2** (V_{IN} - V_{OUT})	$V_{DROPOUT}$	I_{OUT} = 3A V_{OUT} =V_{OUTNOM} - 2%	0.8V≤V_{OUTNOM}<0.9V	-	600	-	mV
			0.9V≤V_{OUTNOM}<1.0V	-	500	-	
			1.0V≤V_{OUTNOM}<1.2V	-	400	-	
			1.2V≤V_{OUTNOM}<2.5V	-	350	-	
			2.5V≤V_{OUTNOM}	-	300	-	
Line Regulation (ΔV_{OUT} / ΔV_{IN})	REG_{LINE}	I_{OUT} = 1mA V_{IN}= V_{OUTNOM} +0.5V to V_{OUTNOM} + 1.5V	V_{OUTNOM} < 2.0V	-0.15	-	0.15	%
			2.0V≤V_{OUTNOM}<4.0V	-0.1	0.02	0.1	%
			4.0V ≤ V_{OUT}	-0.4	-	0.4	%
Load Regulation, **Note 3** (ΔV_{OUT} / ΔI_{OUT})	REG_{LOAD}	I_{OUT} = 1mA to 3000mA		-1	0.2	1	%
Current Parameters							
Output Current	I_{OUT}	V_{OUT} ≥ 0.8V		3000	-	**Note 4**	mA
Current Limit	I_{LIM}	V_{OUT} ≥ 0.8V		3000	4500	-	mA
Short Circuit Current	I_{SC}	V_{IN} = V_{OUTNOM} + 0.5V, V_{OUT} < 0.4V		-	1000	-	mA
Quiescent Current	I_Q	I_{OUT} = 0mA		-	90	150	µA
Ground Pin Current	I_{GND}	I_{OUT} = 1mA to 3000mA		-	90	150	µA
Reference Voltage							
ADJ Reference Voltage	V_{REF}	Adjustable version only		595	600	605	mV
Enable Input							
EN Input Threshold	V_{EH}	V_{IN} = 1.4V to 5.5V, Output = High		**Note 5**	-	-	V
	V_{EL}	V_{IN} = 1.4V to 5.5V,Output = Low		-	-	0.4	V
EN Input Current	I_{EH}	V_{EN} = V_{IN}, V_{IN} = 1.4 V to 5.5V		-	-	0.1	µA
EN Input Current	I_{EL}	V_{EN} = 0V, V_{IN} = 1.4V to 5.5V		-	-	1.0	µA
Shutdown Supply Current	I_{SD}	V_{IN} = 5V, V_{OUT} = 0V, V_{EN} < V_{EL}		-	-	10	µA
"Power Good" Flag Comparator							
Output Under Voltage	V_{UV}			-	-	90(85)	% V_{OUTNOM}
Output Over Voltage	V_{OV}			110 (115)	-	-	
PG Leakage Current	I_{PGLEAK}	V_{PG} = 5.5V		-	-	1	µA
PG Voltage Rating	V_{PG}	V_{OUT} in regulation		-	-	5.5	V
PG Voltage Low	V_{OL}	I_{SINK} = 500µA		-	-	0.4	V
Over Temperature Protection							
Over Temperature Shutdown	OTS			-	150	-	^oC
Over Temperature Hysteresis	OTH			-	50	-	^oC
V_{OUT} Temperature Coefficient	TC	**Note 6**		-	30	-	ppm/^oC
AC Parameters							
Power Supply Rejection	PSRR	I_{OUT} = 100mA C_{OUT} = 4.7µF	f = 100 Hz	-	55	-	dB
			f = 1 kHz	-	55	-	
			f = 10 kHz	-	35	-	
Output Voltage Noise	eN	f = 10Hz to 100kHz I_{OUT} = 10mA	C_{OUT} = 4.7 µF	-	40	-	µV(rms)

Note1: $V_{INMIN} = V_{OUTNOM} + V_{DROPOUT} \geq 1.4$ V

2: Dropout voltage is defined as the input to output voltage differential at which the output voltage drops 2% below its nominal value measured at 1.0V differential. For V_{OUT} below 1.4V, dropout voltage is the input to output voltage differential with minimum input voltage being 1.4V.

3: Load Regulation is measured at constant junction temperature using low duty cycle pulse testing. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

4: Output current is limited by P_D, maximum $I_{OUT} = P_D / (V_{INMAX} - V_{OUT})$.

5: V_{EHMIN} = 1.6V for $V_{IN} \geq 1.6V$; $V_{EHMIN} = V_{IN}$ for $V_{IN} < 1.6V$.

6: TC is defined as the worst case voltage change divided by the total temperature range.

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