GENERAL DESCRIPTION

The An8810 family of linear regulators feature low quiescent current (45µA typ.) with low dropout voltage (600mV typ.), making them ideal for battery applications.

Output voltages are set at the factory (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.

In applications requiring a low noise, regulated supply, place a 1000pF capacitor between Bypass and Ground.

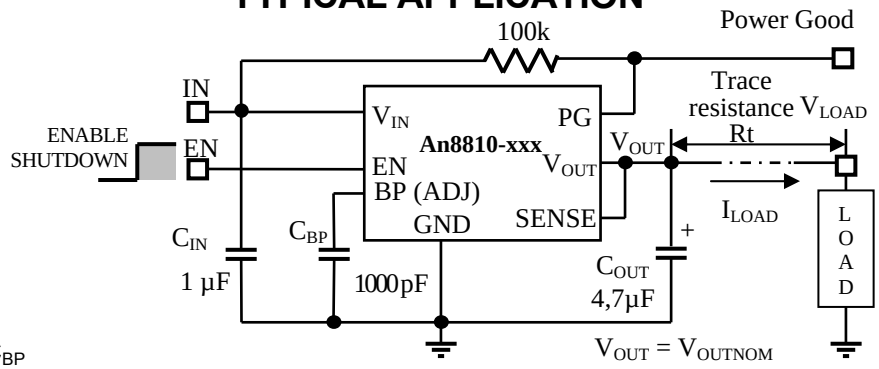
An additional feature is a "Power Good" detector, which pulls low when the output is out of regulation (Under voltage or Over voltage conditions can occur due to low input voltage, current or thermal limiting, or output is pulled up). In purposes of false alarm elimination (at Remote Load) over voltage detector must be not used (mask option).

The An8810 is stable with an output capacitance of 4.7µF or greater.

FEATURES

- Low Dropout Voltage
- Guaranteed 1A Output
- Accurate to within 1.0%
- 45µA Quiescent Current Typically
- Over-Temperature Shutdown
- Current Limiting
- Short Circuit Current Fold-back
- Noise Reduction Bypass Capacitor C_{BP}
- Low Temperature Coefficient

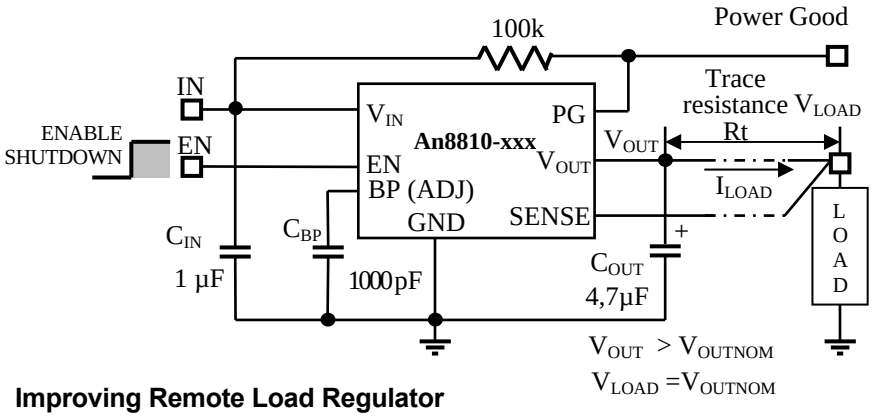
TYPICAL APPLICATION



Fixed V_{OUT} 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



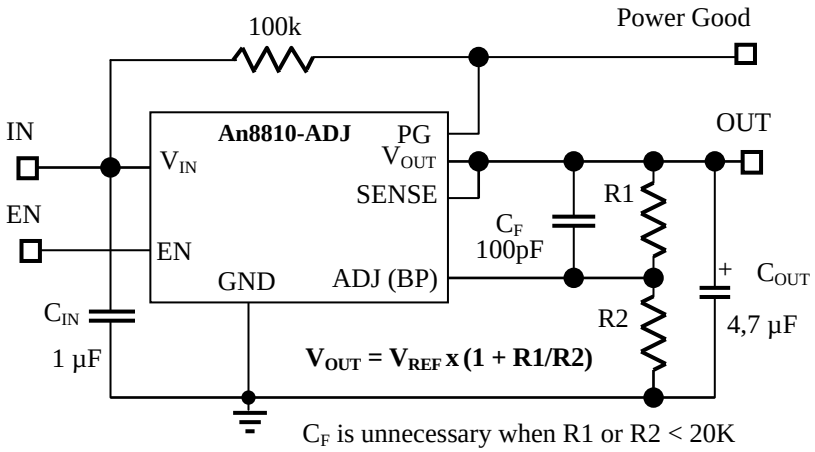
Improving Remote Load Regulator

(PG must be invalid under Over voltage condition, mask option)

ORDERING INFORMATION

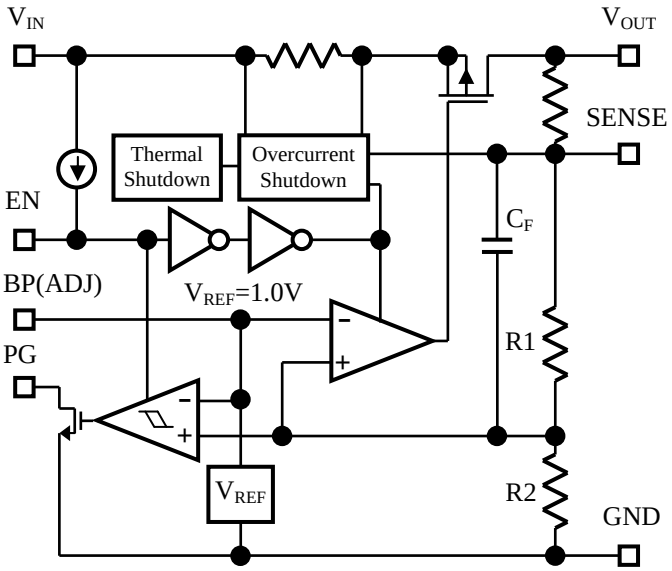
An8810 - xxx

V_{OUT}	xxx
$V_{OUT(min)}$ = 1.10 V	110
V_{OUT} = 1.15 V : : (by step 0.05 V) V_{OUT} = 5.20 V	115 : 520
$V_{OUT(max)}$ = 5.25 V	515
$V_{OUT}=V_{REF}$ x (1+R1/R2)	ADJ

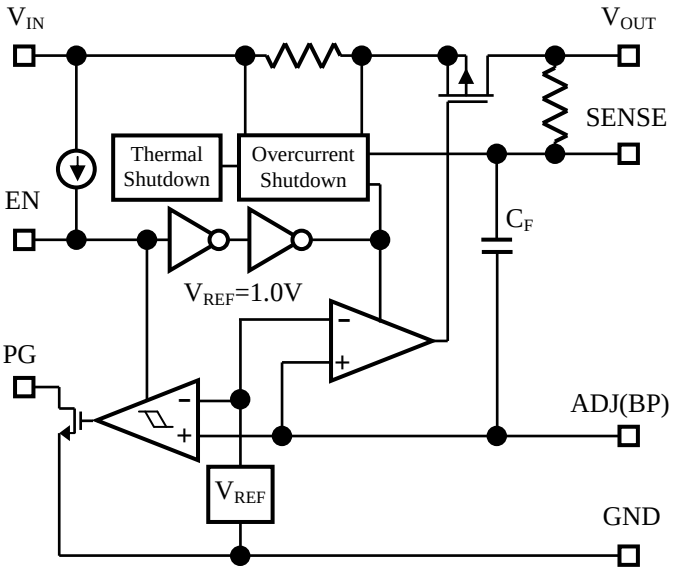


Adjustable Regulator (ADJ-version)

FUNCTIONAL BLOCK DIAGRAM



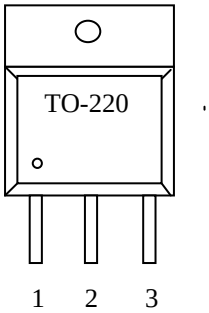
Fixed Voltage Regulator (FIX - version)



Adjustable Voltage Regulator (ADJ - version)

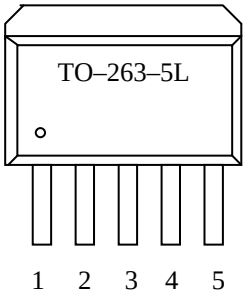
PACKAGE PIN CONFIGURATION EXAMPLES

Top View



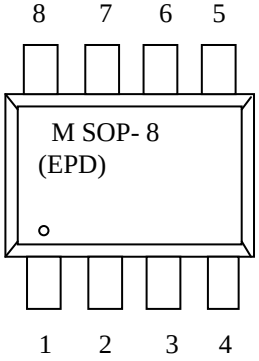
Pin Number	Name	Function
1	V_{IN}	Supply Voltage Input
2	GND	Ground (Heat sink)
3	V_{OUT}	Voltage Output

Top View



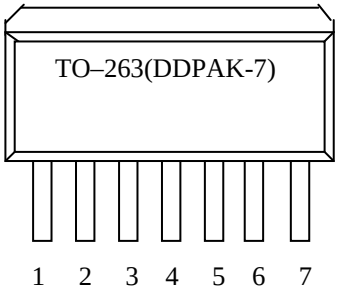
Pin Number	Name	Function
1	V_{IN}	Supply Voltage Input
2	EN	Enable Input
3	GND	Ground (Heat sink)
4	PG / SENSE	Power Good Output / Sense Input
5	V_{OUT}	Voltage Output

Top View



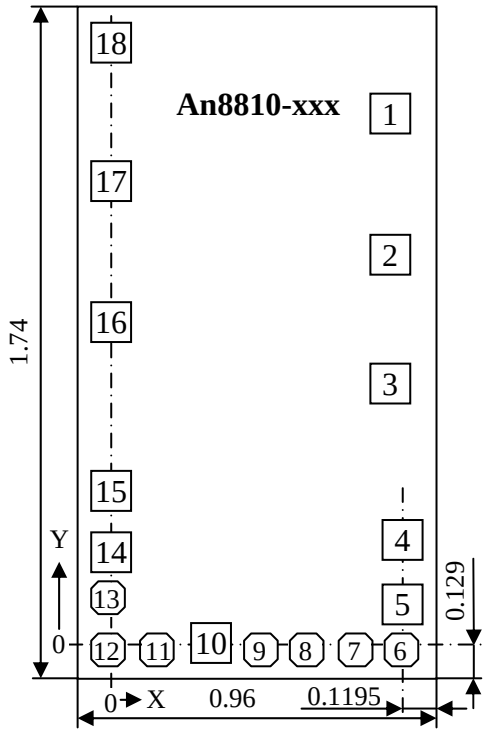
Pin Number	Name	Function
1	EN	Enable Input
2	V_{IN}	Supply Voltage Input
3	PG/BP(ADJ)	Power Good Output/ V_{REF} Output (Adjustment Feedback Input)
4	V_{OUT}	Voltage Output
5	GND	Ground
6	GND	Ground
7	GND	Ground
8	GND	Ground

Top View



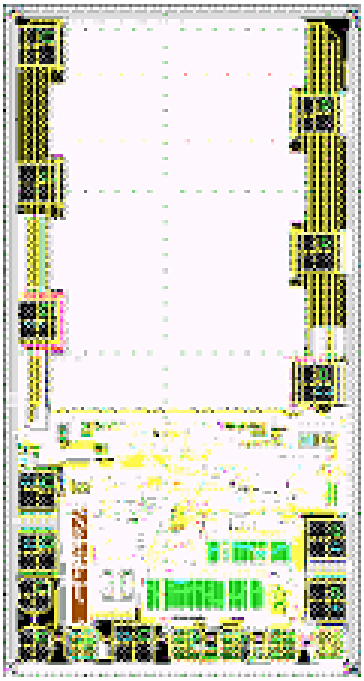
Pin Number	Name	Function
1	EN	Enable Input
2	PG	Power Good Output
3	V_{IN}	Supply Voltage Input
4	GND	Ground (Heat sink)
5	V_{OUT}	Voltage Output
6	V_{OUT}	Voltage Output
7	SENSE/BP(ADJ)	Remote Feedback Sense Input/V_{REF} Output (Adjustment Feedback Input)

CHIP PAD POSITION



1. Chip size: X=0.88 mm, Y=1.66 mm (without scribe line width).
2. Scribe line width: X=80 µm, Y=80 µm
3. Pad size: 100µm x 100µm (1÷5, 10, 14÷18)
   80µm x 80µm (6÷9, 11÷13)
4. Substrate to GND.
5. Wafer thickness: 675 µm

PHOTO



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	689	1311.5	11	F4	V_{OUT} Trim Input	112.5	-5.0
2			689	970	12	F5	V_{OUT} Trim Input	-7.5	-5.0
3			689	645.5	13	F6	V_{OUT} Trim Input	-7.5	121.5
4	PG	Open-drain “Power Good” Output	721	259	14	BP	Voltage Reference Output, V_{REF} (FIX- output version only)	0	226.5
5	EN	Enable Input	721	105					
6	F3	Voltage Reference Trim Input	729	-5.0		ADJ	Adjustment Feedback Input (ADJ-output version only)		
7	F2	Voltage Reference Trim Input	609	-5.0					
8	F1	Voltage Reference Trim Input	489	-5.0	15	SENSE	Remote Feedback Sense Input	0	380.5
9	F0	Voltage Reference Trim Input	369	-5.0	16	V_{OUT}	Voltage Output	0	799
10	GND	Ground Input	241	0	17			0	1140.5
					18			0	1482

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Maximum	Unit
Input Supply Voltage	V_{IN}	-0.3 to 8.0	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	°C
Storage Temperature Range	T_{ST}	-65 to +150	°C
Lead Temperature (soldering, 10 seconds)	T_{LEAD}	+300	°C
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}	2.5 to 7.0	V
Enable Input Voltage	V_{EN}	-0.3 to V_{IN} + 0.3	V
Maximum Output Current (DC)	I_{OUT}	1000	mA
Ambient Temperature Range	T_A	-40 to +85	°C
Operating Junction Temperature Range	T_{OJ}	-40 to +125	°C

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	°C / W
		TO - 220	7	
		MSOP - 8	90	
Thermal Resistor (Junction to Ambient)	θ_{JA}	TO - 263	60	
		TO - 220	50	
		MSOP - 8	124	
Internal Power Dissipation	P_D	TO - 263	2800	mW
		TO - 220	3000	
		MSOP - 8	810	

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

■ ELECTRICAL SPECIFICATIONS

$V_{IN} = V_{OUTNOM} + 1.0V$, $T_A = 25^{O}C$, $C_{IN} = 1\mu F$, $C_{OUT} = 4.7\mu F$, unless otherwise noted.

Parameter	Symbol	Test Condition		Min.	Typ.	Max.	Units
Input Supply Voltage	V_{IN}			**Note 1**	-	7.0	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} = 1A, $V_{OUT} = V_{OUTNOM}$ - 2%	1.5V ≤ V_{OUTNOM} < 2.0V	-	1000	-	mV
			2.0V ≤ V_{OUTNOM} < 2.8V	-	800	-	
			2.8V ≤ V_{OUTNOM}	**-**	600	**-**	
Line Regulation (ΔV_{OUT} / ΔV_{IN})	REG_{LINE}	I_{OUT} = 1mA, $V_{IN} = V_{OUTNOM}$ +1V to V_{OUTNOM} + 2V	V_{OUTNOM} < 2.0V	-0.15	-	0.15	%
			4.0V>V_{OUTNOM} ≥2.0V	-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 1000mA		-1	0.2	1	%
Current Parameters							
Output Current	I_{OUT}	V_{OUT} ≥ 1.1V		1000	-	**Note 4**	mA
Current Limit	I_{LIM}	V_{OUT} ≥ 1.1V		1000	1500	-	mA
Short Circuit Current	I_{SC}	$V_{IN} = V_{OUTNOM}$ + 1.0V, V_{OUT} < 0.5V		-	500	-	mA
Quiescent Current	I_Q	I_{OUT} = 0mA		-	45	70	µA
Ground Pin Current	I_{GND}	I_{OUT} = 1mA to 1000mA		-	45	70	µA
Reference Voltage							
ADJ Reference Voltage	V_{REF}	Adjustable version only		0.996	1.000	1.004	V
Enable Input							
EN Input Threshold	V_{EH}	V_{IN} = 2.5V to 7.0V, Output = High		1.6	-	-	V
	V_{EL}	V_{IN} = 2.5V to 7.0V,Output = Low		-	-	0.4	V
EN Input Current	I_{EH}	$V_{EN} = V_{IN}$, V_{IN} = 2.5 V to 7.0V		-	-	0.1	µA
EN Input Current	I_{EL}	V_{EN} = 0V, V_{IN} = 2.5V to 7.0V		-	-	0.5	µA
Shutdown Supply Current	I_{SD}	V_{IN} = 5V, V_{OUT} = 0V, V_{EN} < V_{EL}		-	-	2	µA
"Power Good" Flag Comparator							
Output Under Voltage	V_{UV}			-	-	90	% V_{OUTNOM}
Output Over Voltage	V_{OV}			110	-	-	
PG Leakage Current	I_{PGLEAK}	V_{PG} = 7.0V		-	-	1	µA
PG Voltage Rating	V_{PG}	V_{OUT} in regulation		-	-	7.0	V
PG Voltage Low	V_{OL}	I_{SINK} = 500µA		-	-	0.4	V
Over Temperature Protection							
Over Temperature Shutdown	OTS			-	150	-	°C
Over Temperature Hysteresis	OTH			-	40	-	°C
V_{OUT} Temperature Coefficient	TC	**Note 5**		-	30	-	ppm/°C
AC Parameters							
Power Supply Rejection	PSRR	I_{OUT} = 100mA, C_{OUT} = 4.7µF, C_{BP}=0.01µF	f = 1 kHz	**-**	75	**-**	dB
			f = 10 kHz	**-**	55	**-**	
			f = 100 kHz	**-**	30	**-**	
Output Voltage Noise	eN	f = 10Hz to 100kHz, I_{OUT} = 10mA	C_{OUT} = 4.7 µF	-	30	-	µV(rms)

Note

1. $V_{INMIN} = V_{OUTNOM} + V_{DROPOUT} \geq 2.5$ 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 1.5V, dropout voltage is the input to output voltage differential with minimum input voltage being 2.5V.
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. TC is defined as the worst case voltage change divided by the total temperature range.