1A ULTRA LOW DROPOUT POSITIVE ADJUSTABLE & FIXED REGULATOR

PRELIMINARY DATASHEET

FEATURES

- **Low Droput Voltage (500mV at 1A)**
- **1% Voltage Reference Accuracy**
- **Low Ground Current**
- **10uA Quiescent Current in Shutdown (US1207,1208)**
- **Fast Transient Response**
- **Current Limit and Thermal Shutdown**
- **Error Flag Signal for Output out of Regulation (US1207,1209)**
- **Pin Compatible with MIC39100/101/102 series**

APPLICATIONS

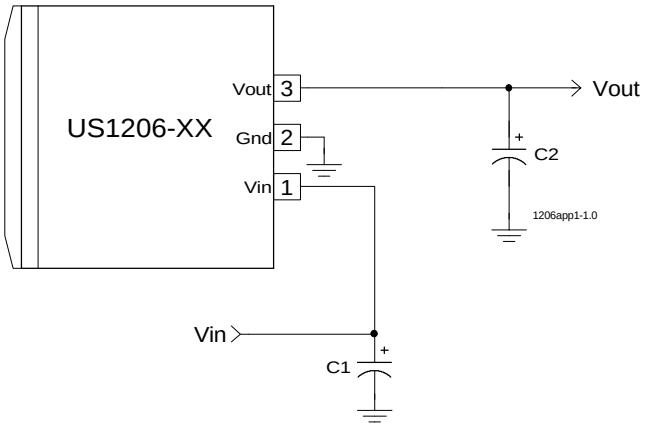
- 2.5V Supply from 3.3V Input for the new generation of Logic ICs
- Computer Mother Board, Add on Cards
- High Efficiency Post Regulator in SMPS

DESCRIPTION

The US1206 family of devices are ultra low dropout 1A regulators using PNP transistor as the pass element. These products are ideal when a single input supply is available only and the dropout voltage is less than 1V, exceeding the minimum dropout characteristics of NPN/PNP hybrid regulators. One common application of these regulators are where input is 3.3V and a 2.5V output is needed.

Besides the low dropout of less than 0.5V, other features of the family of the parts are; micropower shutdown capability and output UVLO detection where Flag pin is switched low when output is below 5% of its nominal point. The US1206-XX in SOT223 is pin compatible with MIC39100-XX, US1207 and 1209 in SO8 power package are compatible with MIC39101 and 39102 respectively.

TYPICAL APPLICATION



PACKAGE ORDER INFORMATION

Tj (°C)	3 LEAD TO252	5 LEAD TO263	8 PIN PLASTIC SOIC Power	Voltage	Pin Functions
0 TO 125	US1206-18CD	US1206-18CY	US1206-18CM	1.8V	Vin, Vout, GND
0 TO 125	US1206-25CD	US1206-25CY	US1206-25CM	2.5V	Vin, Vout, GND
0 TO 125	US1206-33CD	US1206-33CY	US1206-33CM	3.3V	Vin, Vout, GND
0 TO 125	NA	US1207-18CM	US1207CS	1.8V	Vin, Vout, GND, Enable, Flag
0 TO 125	NA	US1207-25CM	US1207CS	2.5V	Vin, Vout, GND, Enable, Flag
0 TO 125	NA	US1207-33CM	US1207CS	3.3V	Vin, Vout, GND, Enable, Flag
0 TO 125	NA	US1208CM	US1208CS	Adj	Vin, Vout, GND, Flag, Adj
0 TO 125	NA	US1209CM	US1209CS	Adj	Vin, Vout, GND, Adj, Enable

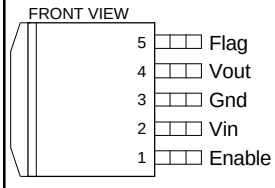
ABSOLUTE MAXIMUM RATINGS

Input Voltage (Vin) 12V
Enable Input Voltage 12V
Storage Temperature Range ..... -65°C TO 150°C
Operating Junction Temperature Range ..... 0°C TO 135°C

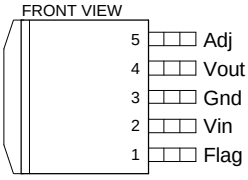
PACKAGE INFORMATION

5 PIN PLASTIC TO263 (M) or 5 PIN POWER FLEX (P)

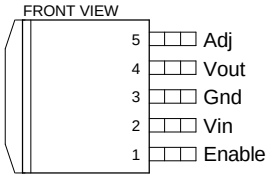
US1207



US1208



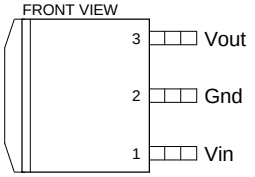
US1209



θ_{JA}=35°C/W for 0.5" square pad

3 PIN PLASTIC TO263 (M)

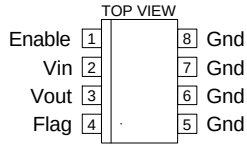
US1206-XX



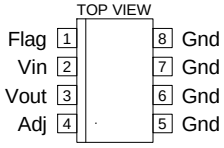
θ_{JA}=35°C/W for 0.5" square pad

8 PIN PLASTIC POWER SOIC (S)

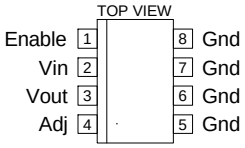
US1207



US1208



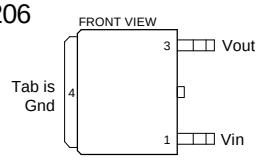
US1209



θ_{JA}=55°C/W for 1" Sq pad

3 PIN PLASTIC TO252 (D)

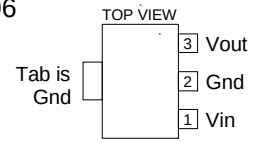
US1206



θ_{JA}=70°C/W for 0.5" Sq pad

3 PIN PLASTIC SOT223 (Y)

US1206



θ_{JA}=90°C/W for 0.4" Sq pad

ELECTRICAL SPECIFICATIONS

Unless otherwise specified ,these specifications apply over ,Cin=Cout=10uF,Vin=Vo+1V, Vout=Vfb (for adjustable version only), and Ta=25 °C. Typical values refer to Ta=25 °C.Low duty cycle pulse testing are used which keeps junction and case temperatures equal to the ambient temperature.

PARAMETER	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS
Reference Voltage	Vo	Io=10mA	-1		1	%
See Table 1 for typical values		(Note 4)	-2		2	
Line Regulation	dVi	Vo+1V<Vin<12		0.06		%/V
Load Regulation (note 1)	dVL	10mA<Io<1A			0.7	%
		1mA<Io<150mA			0.5	%
Output voltage Temp Coef.	dVoT			20	100	ppm/°C
Dropout Voltage (note 2)	dVio	Io=100mA (Note 4)		100	200	mV
		Io=500mA (Note 4)		300	400	mV
		Io=1000mA (Note 4)		500	650	mV
Ground Current (Note 3)	Iq	Vin=Vo +1				
		Io=100mA (Note 4)			3	mA
		Io=500mA (Note 4)			15	mA
		Io=1000mA (Note 4)			50	mA
Current Limit	Icl	Vo=0V	1.1			A
Minimum Input Voltage	Vinmin			2.1	2.3	V
US1208,1209						
Adjust Pin Current	Iadj	Vin=2.5V,Vo=Vadj (Note 4)			0.1	uA
Minimum Load Current	Iomin				1	mA

US1207,1208	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS
Ground Current-S.D Activated	Iqsd	Enable=0V		0.01	1	uA
Enable pin input LO voltage	Venl	Regulator OFF (Note 4)			0.8	V
Enable pin input HI voltage	Venh	Regulator ON (Note 4)	2			V
Enable pin input LO current		Venl=0V to 0.8V (Note 4)		0.1	2	uA
Enable pin input HI current		Venh=2V to Vin (Note 4)		100	600	uA
US1207,1209						
Flag Output Threshold Voltage	Vthfg			3.8		%Vo
Flag Output Hysterises Voltage	Vhys	Output Ramping Up		0.8		%Vo
Flag Output Saturation Voltage	Vfsat	Io=5mA		400		mV
		Io=500uA		230		mV

Note 1 : Low duty cycle pulse testing with Kelvin connections are required in order to maintain accurate data.
Note 2 : Drop-out voltage is defined as the minimum differential voltage between Vin and Vout required to maintain regulation at Vout. It is measured when the output voltage drops 1% below its nominal value.
Note 3 : Ground current is the the regulator quiescent current plus the pass transistor current. The total current from the supply is the sum of the load current plus the ground pin current.
Note 4 : The specification applies for the junction temperature of 0 to +125°C.

Pin DescRIPTIONS

PIN SYMBOL	PIN DESCRIPTION
Adj US1208,1209	A resistor divider from this pin to the Vout pin and ground sets the output voltage.
Flag US1208	An open collector output that switches low when the output voltage drops about 4% below its expected regulated voltage.
Vout All devices	The output of the regulator .A minimum of 2.2uF capacitor must be connected from this pin to ground.
GND All devices	Ground pin. This pin must be connected to the lowest potential in the system & all other pins must be at higher potential with respect to this pin.
Enable US1207,1209	Enable pin. A low signal or left open on this pin shuts down the output.This pin must be tied HI or to Vin for normal operation.
Vin All devices	The input pin of the regulator. Typically a large storage capacitor is connected from this pin to ground to insure that the input voltage does not sag below the minimumdrop out voltage during the load transient response. This pin must always be 0.6V higher than Vout in order for thedevice to regulate properly.

Part Number	Output Voltage
US1206-18	1.8V
US1206-25	2.5V
US1206-33	3.3V
US1207-18	1.8V
US1207-25	2.5V
US1207-33	3.3V
US1208	1.24V
US1209	1.24V

Table 1- Output voltage v.s. part number

APPLICATION INFORMATION

Stability

The US120X series of regulators require the use of an output capacitor as part of the frequency compensation in order to make the regulator stable. A minimum of 2.2uF capacitance and the ESR in the range of 0.5 to 2 ohm insures the stability of the system.

TYPICAL APPLICATION

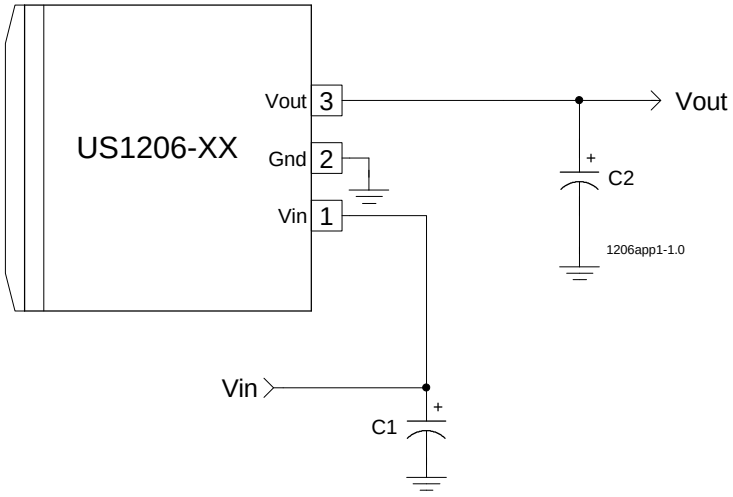


Figure 1- Typical application of US1206

Ref Desig	Description	Qty	Part #	Manuf
C1	Capacitor	1	10uF, Tantalum	AVX
C2	Capacitor	1	10uF, Tantalum	AVX

TYPICAL APPLICATION

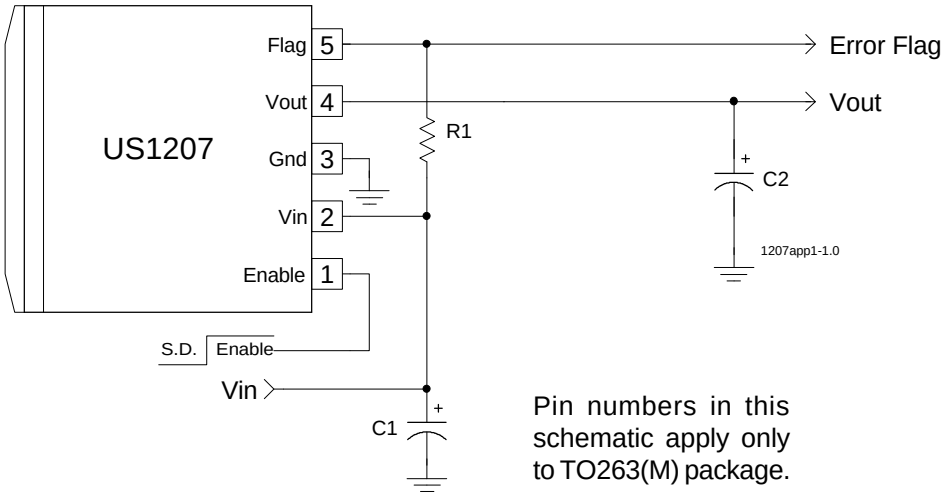


Figure 1- Typical application of US1207

Ref Desig	Description	Qty	Part #	Manuf
C1	Capacitor	1	10uF, Tantalum	AVX
C2	Capacitor	1	10uF, Tantalum	AVX
R1	Resistor	1	10kΩ , 5%	Panasonic

TYPICAL APPLICATION

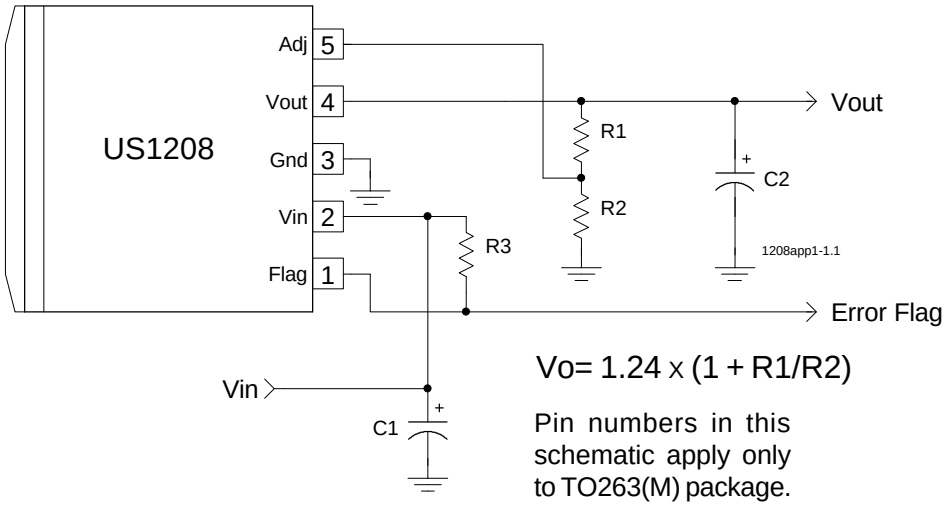


Figure 2- Typical application of US1208 in 3.3V to 2.5V regulator

Ref Desig	Description	Qty	Part #	Manuf
C1	Capacitor	1	10uF, Tantalum	AVX
C2	Capacitor	1	10uF, Tantalum	AVX
R1	Resistor	1	127Ω , 1%	
R2	Resistor	1	124Ω , 1%	

TYPICAL APPLICATION

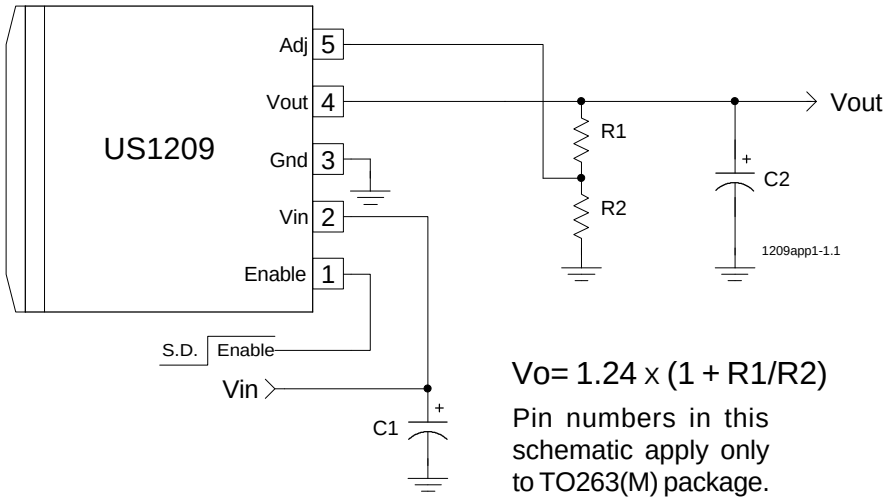


Figure 2- Typical application of US1209 in 3.3V to 2.5V regulator

Ref Desig	Description	Qty	Part #	Manuf
C1	Capacitor	1	10uF, Tantalum	AVX
C2	Capacitor	1	10uF, Tantalum	AVX
R1	Resistor	1	127Ω , 1%	
R2	Resistor	1	124Ω , 1%	
R3	Resistor	1	10kΩ , 5%	