1A VERY LOW DROPOUT POSITIVE ADJUSTABLE & FIXED REGULATOR

FEATURES

- Low Dropout Voltage (500mV at 1A)
- 1% Voltage Reference Accuracy
- Low Ground Current
- 10uA Quiescent Current in Shutdown (IRU1207, 1208)
- Fast Transient Response
- Current Limit and Thermal Shutdown
- Error Flag Signal for Output out of Regulation (IRU1207, 1208)
- 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

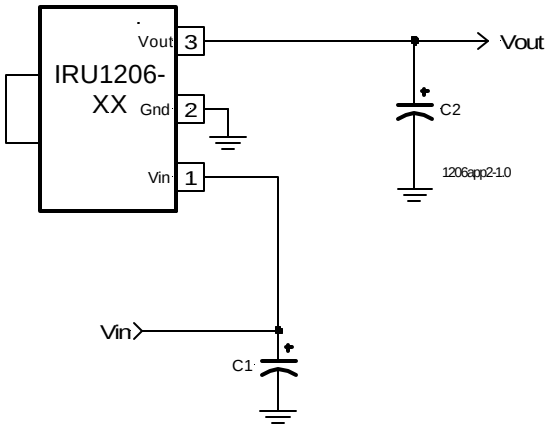
DESCRIPTION

The IRU1206 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 is 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 IRU1206-XX in SOT-223 is pin compatible with MIC39100-XX, IRU1207 and IRU1209 in SO-8 power package are compatible with MIC39101 and 39102 respectively.

TYPICAL APPLICATION



PACKAGE ORDER INFORMATION

Tj (°C)	3-LEAD D-PAK	3-LEAD SOT-223	8-PIN PLASTIC SOIC Power	Voltage	Pin Functions
0 TO 125	IRU1206-18CD	IRU1206-18CY	NA	1.8V	Vin, Vout, GND
0 TO 125	IRU1206-25CD	IRU1206-25CY	NA	2.5V	Vin, Vout, GND
0 TO 125	IRU1206-33CD	IRU1206-33CY	NA	3.3V	Vin, Vout, GND
0 TO 125	NA	NA	IRU1207-18CS	1.8V	Vin, Vout, GND, Enable, Flag
0 TO 125	NA	NA	IRU1207-25CS	2.5V	Vin, Vout, GND, Enable, Flag
0 TO 125	NA	NA	IRU1207-33CS	3.3V	Vin, Vout, GND, Enable, Flag
0 TO 125	NA	NA	IRU1208CS	Adj	Vin, Vout, GND, Flag, Adj
0 TO 125	NA	NA	IRU1209CS	Adj	Vin, Vout, GND, Adj, Enable

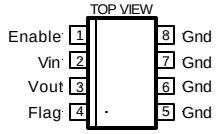
ABSOLUTE MAXIMUM RATINGS

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

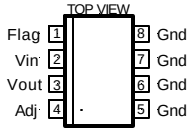
PACKAGE INFORMATION

8-PIN PLASTIC POWER SOIC (S)

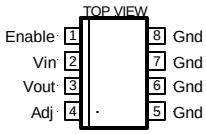
IRU1207



IRU1208



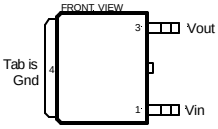
IRU1209



θ_{JA}=55°C/W for 1" Sq pad

3-PIN PLASTIC TO-252 (D)

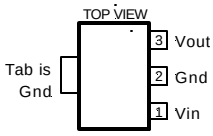
IRU1206



θ_{JA}=70°C/W for 0.5" Sq pad

3-PIN PLASTIC SOT-223 (Y)

IRU1206



θ_{JA}=90°C/W for 0.4" Sq pad

ELECTRICAL SPECIFICATIONS

Unless otherwise specified, these specifications apply over, C_{in}=C_{out}=10µF, V_{in}=Vo+1V, V_{out}=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
Initial Voltage Accuracy	Vo	Io=10mA, Ta=25°C	-1		1	%
See Table 1 for nominal values		(Note 4)	-1.3		1.3	
Line Regulation	dVi	Vo+1V<Vin<12		0.5	1	%
Load Regulation (note 1)	dVL	10mA<Io<1A		0.5	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=5% below regulation point	1.1	1.4		A
Minimum Input Voltage	Vinmin			2.1	2.3	V
IRU1208, 1209						
Adjust Pin Current	Iadj	Vin=2.5V,Vo=Vadj (Note 4)			0.1	µA
Minimum Load Current	Iomin		1			mA

IRU1207, 1209	SYM	TEST CONDITION	MIN	TYP	MAX	UNITS
Ground Current-S.D Activated	Iqsd	Enable=0V		0.01	1	µA
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	µA
Enable pin input HI current		Venh=2V to Vin (Note 4)		100	600	µA
IRU1207, 1208						
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=500µA		230		m

Note 1: Low duty cycle pulse testing with Kelvin connections are required in order to maintain accurate data.
Note 2: Dropout voltage is defined as the minimum differential voltage between V_{in} and V_{out} required to maintain regulation at V_{out}. It is measured when the output voltage drops 1% below its nominal value.
Note 3: Ground current is 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 IRU1208, 1209	A resistor divider from this pin to the V_{out} pin and ground sets the output voltage.
Flag IRU1208	An open collector output that switches low when the output voltage drops about 4% below its expected regulated voltage.
V_{out} All devices	The output of the regulator. A minimum of 2.2µF 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 and all other pins must be at higher potential with respect to this pin.
Enable IRU1207, 1209	Enable pin. A low signal or left open on this pin shuts down the output. This pin must be tied HI or to V_{in} for normal operation.
V_{in} 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 minimum drop out voltage during the load transient response. This pin must always be 0.6V higher than V_{out} in order for the device to regulate properly.

APPLICATION INFORMATION

Stability

The IRU120X 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 2.2µF capacitance and the ESR in the range of 0.5 to 2 ohm insures the stability of the system.

Table 1 - Output voltage vs. part number

Part Number	Output Voltage
IRU1206-18	1.8V
IRU1206-25	2.5V
IRU1206-33	3.3V
IRU1207-18	1.8V
IRU1207-25	2.5V
IRU1207-33	3.3V
IRU1208	1.24V
IRU1209	1.24V

TYPICAL APPLICATION

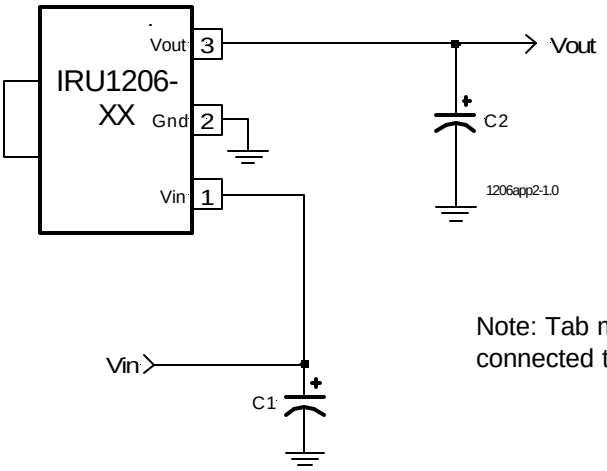


Figure 1- Typical application of IRU1206

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

TYPICAL APPLICATION

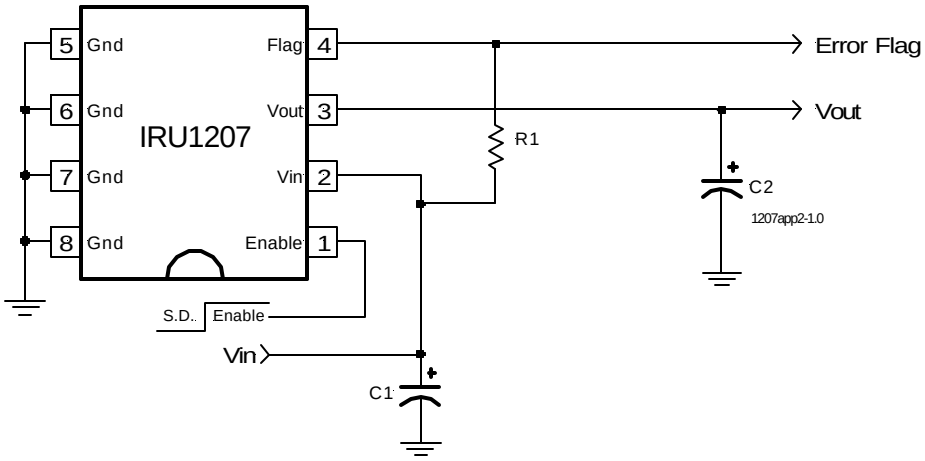


Figure 1- Typical application of IRU1207

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

TYPICAL APPLICATION

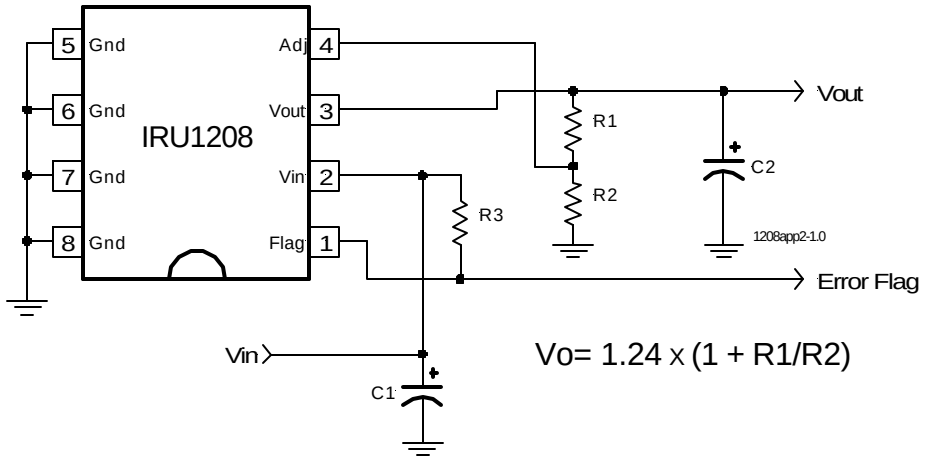


Figure 2- Typical application of IRU1208 in 3.3V to 2.5V regulator

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

TYPICAL APPLICATION

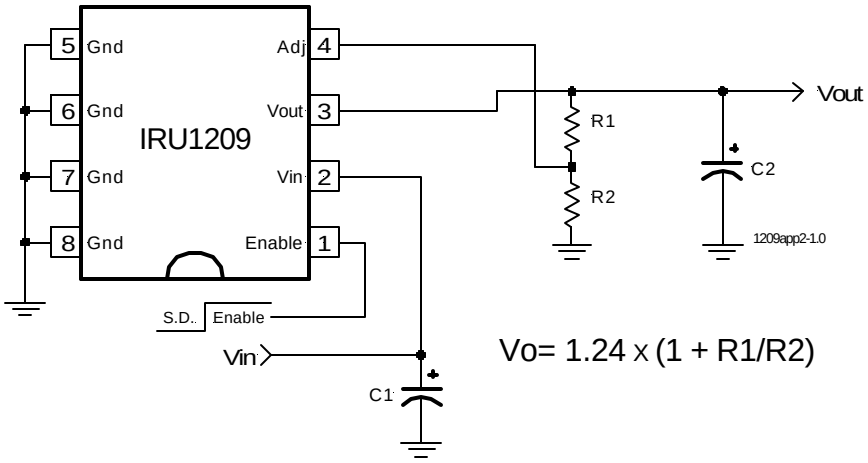


Figure 2- Typical application of IRU1209 in 3.3V to 2.5V regulator

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