

300mA ULTRA LOW DROPOUT POSITIVE ADJUSTABLE AND FIXED REGULATORS

FEATURES

- SOT-23 Package
- Stable with 2.2μF Ceramic Capacitor
- 1% Voltage Reference Accuracy
- Only 270mV Dropout at 300mA and 170mV Dropout at 150mA
- 5μA Quiescent Current in Shutdown
- Current Limit and Thermal Shutdown
- Logic Input Enable Pin

APPLICATIONS

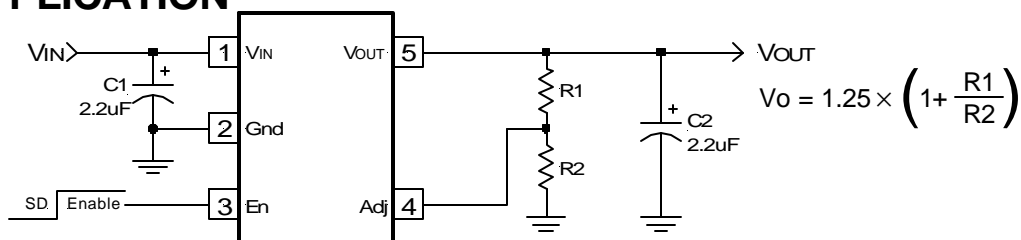
- Laptop, Notebook & Palmtop computers
- Battery Powered Equipments
- PCMCIA Vcc & Vpp Regulator
- Consumer Electronics
- High Efficiency Linear Power Supplies

DESCRIPTION

The IRU1205 device is an efficient linear voltage regulator with better than 1% initial voltage accuracy, very low dropout voltage and very low ground current designed especially for hand held, battery powered applications. Other features of the device are: TTL compatible enable/shutdown control input, current limiting and thermal shutdown.

The IRU1205 is available in fixed and adjustable output voltage versions in a small SOT-23 5-Pin package.

TYPICAL APPLICATION



$$V_o = 1.25 \times \left(1 + \frac{R_1}{R_2} \right)$$

Figure 1 - Typical application of the IRU1205 adjustable voltage regulator.

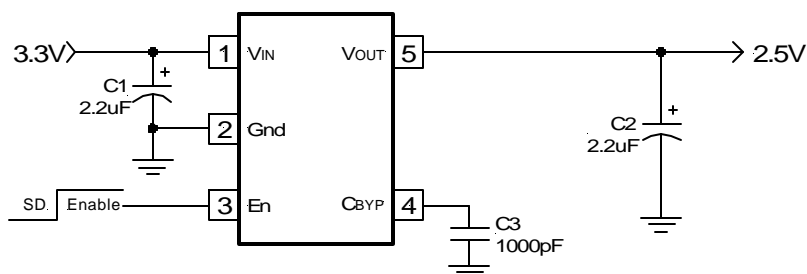


Figure 2 - Typical application of the IRU1205-25 fixed voltage regulator.

PACKAGE ORDER INFORMATION

| T _J (°C) | 5-PIN SOT-23 (L5) | SOT-23 MARKING | OUTPUT VOLTAGE |
|---------------------|----------------------|-------------------|-------------------|
| 0 To 125 | IRU1205CL | AT00 | Adj |
| 0 To 125 | IRU1205-18CL | AT18 | 1.8V |
| 0 To 125 | IRU1205-25CL | AT25 | 2.5V |
| 0 To 125 | IRU1205-28CL | AT28 | 2.8V |
| 0 To 125 | IRU1205-30CL | AT30 | 3.0V |
| 0 To 125 | IRU1205-33CL | AT33 | 3.3V |
| 0 To 125 | IRU1205-36CL | AT36 | 3.6V |

ABSOLUTE MAXIMUM RATINGS

| | |
|--------------------------------------|----------------|
| Input Voltage (V_{IN}) | 10V |
| Enable Input Voltage | 10V |
| Storage Temperature Range | -65°C To 150°C |
| Operating Junction Temperature Range | 0°C To 150°C |

PACKAGE INFORMATION

| 5-PIN SOT-23 (L5) | 5-PIN SOT-23 (L5) |
|--|---|
| <p>Adjustable $\theta_{JA}=256^{\circ}\text{C}/\text{W}$</p> | <p>Fixed $\theta_{JA}=256^{\circ}\text{C}/\text{W}$</p> |

ELECTRICAL SPECIFICATIONS

Unless otherwise specified, these specifications apply over $C_N=C_O=22\mu\text{F}$, $I_O=100\mu\text{A}$, $V_{IN(MIN)}=2.5\text{V}$ (Adjustable devices) $V_{IN}=V_O + 1\text{V}$ (for fixed voltage devices), $V_{OUT}=V_{FB}$ (for adjustable version only), $C_{BYP}=470\text{pF}$ (for AT18, AT25, AT28, AT30, AT33 and AT36), $V_{ENB}=2\text{V}$ and $T_A=25^{\circ}\text{C}$. Typical values refer to $T_A=25^{\circ}\text{C}$. Low duty cycle pulse testing is used which keeps junction and case temperatures equal to the ambient temperature.

| PARAMETER | SYM | TEST CONDITION | MIN | TYP | MAX | UNITS |
|---|-------------------|---|----------|--|--|---------------|
| Reference Voltage (See Table 1 for typical values) | V_O | (Note 4) | -1 -2 | | 1 2 | % |
| Line Regulation | ΔV_I | $V_O + 1\text{V} < V_{IN} < 10\text{V}$ | | 0.005 | | %/V |
| Load Regulation (Note 1) | ΔV_L | $1\text{mA} < I_O < 100\text{mA}$ $100\text{mA} < I_O < 300\text{mA}$ | | 0.8 0.1 | | % |
| Dropout Voltage (Note 2) | $\Delta V_{I(O)}$ | $I_O=100\mu\text{A}$ $I_O=100\mu\text{A}$ (Note 4) $I_O=50\text{mA}$ $I_O=50\text{mA}$ (Note 4) $I_O=150\text{mA}$ $I_O=150\text{mA}$ (Note 4) $I_O=300\text{mA}$ $I_O=300\text{mA}$ (Note 4) | | 10 13 85 100 170 204 270 324 | 50 70 110 140 220 260 350 400 | mV |
| Ground Current (Note 3) | I_Q | $V_{EN}=2\text{V}$, $I_O=100\mu\text{A}$ $I_O=100\mu\text{A}$ (Note 4) $I_O=50\text{mA}$ $I_O=50\text{mA}$ (Note 4) $I_O=150\text{mA}$ $I_O=150\text{mA}$ (Note 4) $I_O=300\text{mA}$ $I_O=300\text{mA}$ (Note 4) | | 120 240 420 540 2200 2900 7200 9300 | 160 600 2900 9500 | μA |
| Ground Current-SD Activated | $I_{Q(SD)}$ | $V_{EN}=0\text{V}$ to 0.8V or Open | | 5 | | μA |
| Current Limit | I_{CL} | $V_O=0\text{V}$ | 320 | 420 | | mA |
| Thermal Regulation | ΔV_P | $V_{IN}=10\text{V}$, $I_O=150\text{mA}$, 10ms Pulse | | 0.05 | | %/W |
| Adjust Pin Current | I_{ADJ} | $V_{IN}=2.5\text{V}$, $V_O=V_{ADJ}$ | | 0.1 | | μA |
| Enable Pin Input LO Voltage | $V_{EN(L)}$ | Regulator OFF | | | 0.8 | V |
| Enable Pin Input HI Voltage | $V_{EN(H)}$ | Regulator ON | 2 | | | V |
| Enable Pin Input LO Current | | $V_{EN(L)}=0\text{V}$ to 0.8V | | 0.01 | | μA |
| Enable Pin Input HI Current | | $V_{EN(H)}=2\text{V}$ to V_{IN} | | 20 | | μA |

Note 1: Low duty cycle pulse testing with Kelvin connections is 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 # | PIN SYMBOL | PIN DESCRIPTION |
|-------|---------------------------|---|
| 1 | V_{IN} | 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 higher than V_{OUT} by at least the amount of the dropout voltage and some margin in order for the device to regulate properly. |
| 2 | Gnd | 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. |
| 3 | En | 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. |
| 4 | Adj (Adjustable Only) | A resistor divider from this pin to the V_{OUT} pin and ground sets the output voltage. To minimize the error due to the error amplifier, select the values of the resistor dividers to be less than 10KΩ. |
| 4 | C_{BYP} (Fixed Only) | A 470 to 1000pF bypass capacitor connected to this pin reduces the output noise. |
| 5 | V_{OUT} | The output of the regulator. A minimum of 2.2μF with max ESR of 1Ω capacitor must be connected from this pin to ground to insure stability. |

| 5-PIN SOT-23 | Output Voltage |
|-----------------|-------------------|
| IRU1205 | 1.25V |
| IRU1205-18 | 1.8V |
| IRU1205-25 | 2.5V |
| IRU1205-28 | 2.8V |
| IRU1205-30 | 3.0V |
| IRU1205-33 | 3.3V |
| IRU1205-36 | 3.6V |

Table 1- Nominal output voltage vs. part number.

The output voltage of the adjustable device can be set using:

$$V_o = 1.25 \times \left(1 + \frac{R_1}{R_2} \right)$$

Where:

R1 = Resistor connected from output to the Adj pin

R2 = Resistor connected from Adj pin to Gnd

BLOCK DIAGRAM

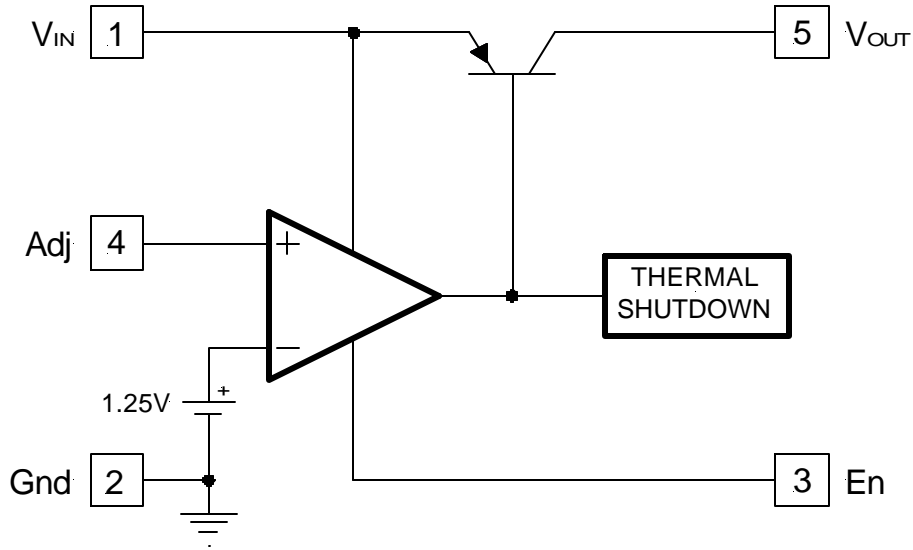


Figure 3 - IRU1205 Adjustable output block diagram.

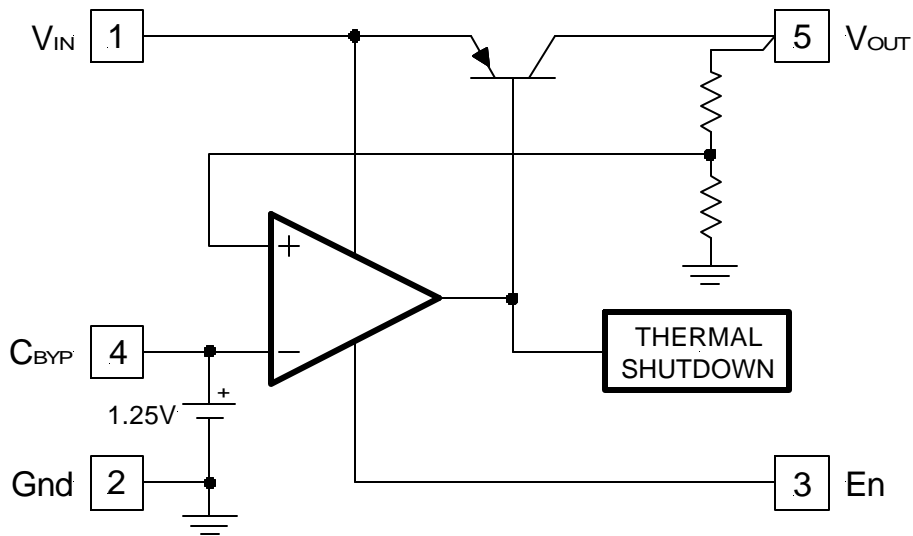
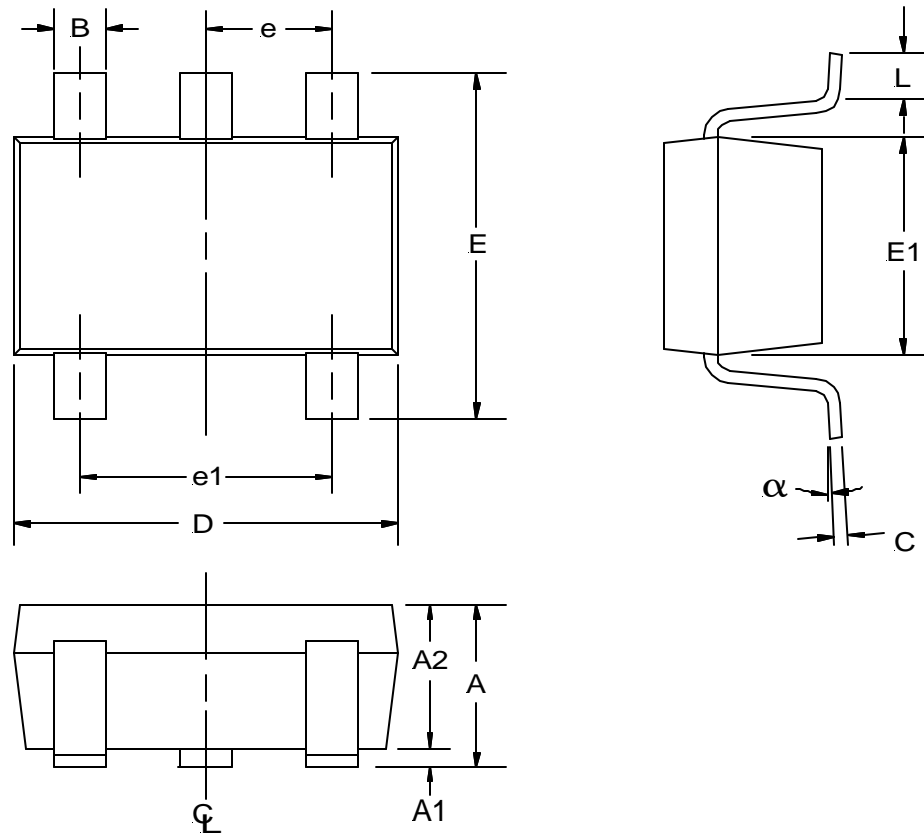


Figure 4 - IRU1205-18, IRU1205-25, IRU1205-28, IRU1205-30, IRU1205-33 and IRU1205-36 Fixed output block diagram.

**(L5) SOT-23 Package
 5-Pin**



| SYMBOL | MIN | MAX |
|--------|----------|------|
| A | 0.90 | 1.45 |
| A1 | 0.00 | 0.15 |
| A2 | 0.90 | 1.30 |
| B | 0.25 | 0.50 |
| C | 0.09 | 0.20 |
| D | 2.80 | 3.00 |
| E | 2.60 | 3.00 |
| E1 | 1.50 | 1.75 |
| e | 0.95 REF | |
| e1 | 1.90 REF | |
| L | 0.35 | 0.55 |
| α | 0° | 10° |

NOTE: ALL MEASUREMENTS
 ARE IN MILLIMETERS.

PACKAGE SHIPMENT METHOD

| PKG DESIG | PACKAGE DESCRIPTION | PIN COUNT | PARTS PER TUBE | PARTS PER REEL | T & R Orientation |
|--------------|------------------------|--------------|-------------------|-------------------|----------------------|
| L5 | SOT-23 | 5 | --- | 3000 | Fig A |

