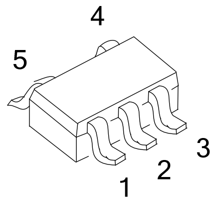
UTC **UNISONIC TECHNOLOGIES CO., LTD**

600mA LOW DROPOUT LINEAR REGULATOR



SOT-25

■ DESCRIPTION

The UTC **LR1148** belonged to low-noise, low-dropout, linear regulators operate from 2.3V to 6V input and are guaranteed to deliver 600mA. Wide range of preset output voltage options are available. Built-in low on-resistance transistor provides low dropout voltage and large output current. The UTC **LR1148** is designed and optimized for battery-powered systems to work with low noise.

The UTC **LR1148** consumes less than 0.01μA in shutdown mode. Other features include ultra low dropout voltage, current limiting protection, thermal shutdown protection and high ripple rejection ratio.

■ FEATURES

* 600mA Guaranteed Output Current
* 0.01μA Shutdown Current
* Ultra Low Dropout Voltage
* Low Temperature Coefficient
* Current Limiting Protection
* Thermal Shutdown Protection
* Excellent Line/Load Transient

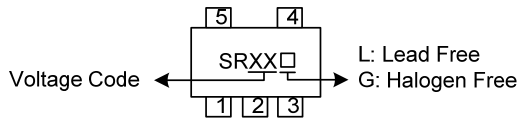
■ ORDERING INFORMATION

Ordering Number		Package	Pin Assignment					Packing
Lead Free	Halogen Free		1	2	3	4	5	
LR1148L-xx-AF5-R	LR1148G-xx-AF5-R	SOT-25	I	G	S	A	O	Tape Reel

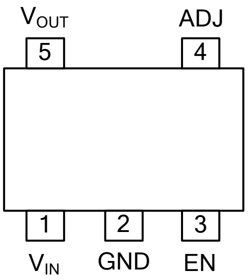
Note: Pin Assignment: I:V_{IN} G:GND S:EN A: ADJ O:V_{OUT}

LR1148G-xx-AF5-R	
(1)Packing Type	(1) R: Tape Reel
(2)Package Type	(2) AF5: SOT-25
(3)Output Voltage Code	(3) xx: refer to Marking Information
(4)Green Package	(4) G: Halogen Free and Lead Free, L: Lead Free

■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-25	AD: ADJ	

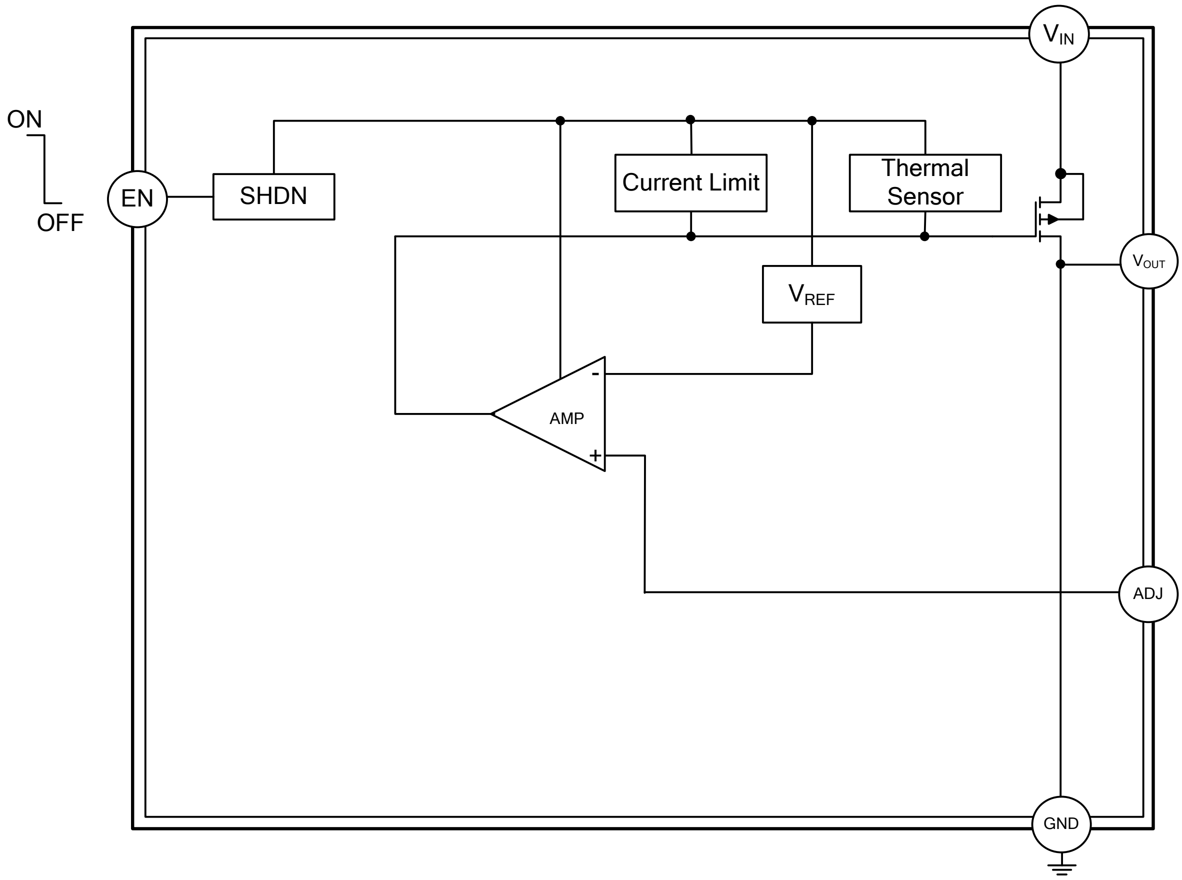
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NAME	DESCRIPTION
V_{IN}	Power Input Voltage. Supply voltage can range from 2.3V to 6V. Bypass with a 1μF capacitor to GND.
GND	Ground
EN	Active-Low Shutdown Input. A logic low at EN reduces supply current to 0.01μA. Connect EN to V_{IN} for normal operation.
V_{OUT}	Output Voltage
ADJ	Voltage-adjust Input. Connect an external resistive voltage-divider from V_{OUT} to ADJ to set the output voltage between 0.8V and 5V.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (T_A=25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{IN}	6.5	V
Power Dissipation	P_D	360	mW
Junction Temperature	T_J	+125	°C
Ambient Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	260	°C/W
Junction to Case	θ_{JC}	81	°C/W

■ ELECTRICAL CHARACTERISTICS

(C_{IN} = 1μF, C_{OUT} =1μF, T_A= 25°C, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS		MIN	TYP	MAX	UNIT
Input Voltage(Note 2)	V_{IN}			2.3		6	V
Output Voltage Accuracy (Preset Mode)	V_{OUT}	T_A=25°C , I_{OUT}= 1mA ~0.6A		-2		2	%
		T_A=0~85°C, I_{OUT}= 1mA~0.6A		-3		3	%
Maximum Output Current	I_{OUT}				600		mA
Short-Circuit Current Limit	I_{LIMIT}	V_{OUT}=0V			1		A
Ground Pin Current	I_{GND}	I_{OUT} = 0mA			70		μA
		I_{OUT}= 1mA to 600mA			80		μA
Dropout Voltage (Note3)	V_D	I_{OUT}=600mA	$V_{OUT(NOM)} \le 1.8V$		500	1200	mV
			$1.8V < V_{OUT(NOM)}$		200	450	
Line Regulation (Note4)	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \times V_{OUT}}$	$V_{IN}=V_{OUT}+V_D$~6V			0.08	0.55	%/V
Load Regulation(Note4,5)	ΔV_{OUT}	$V_{IN}=V_{OUT}+V_D$, I_{OUT}=10mA~600mA			0.25	1.0	%
Output Voltage Noise	eN	f=10Hz to100kHz, C_{BP}=0.1nF			24		μV_{RMS}
Shutdown Supply Current	I_{OFF}	EN=GND			0.01	5	μA
Shutdown Threshold	V_{IH}			2			V
	V_{IL}					0.4	V
Thermal Shutdown Temperature	T_{SHDN}				170		°C
Thermal Shutdown Hysteresis	DT_{SHDN}				20		°C
ADJ Voltage	V_{REF}	Measured on ADJ, I_{OUT} =10mA		0.774	0.8	0.826	V
Adjustable Output Voltage				0.8		5	V

Note: 1. Specifications are production tested at T_A=25°C. Pecifications over the -40°C to 85°C operating temperature range are assured by design, characterization and correlation with Statistical Quality Controls(SQC).

2. The minimum operating value for V_{IN} is equal to either [$V_{OUT(NOM)}+V_D$] or 2.3V,whichever is greater
3. Dropout voltage is defined as the voltage from the input to output when output is 2% below the nominal value.
4. Output voltage line regulation is defined as the change in output voltage from the nominal value resulting from a change in the input line voltage. Output voltage load regulation is defined as the change in output voltage from the nominal value as the load current increases from no load to full load.
5. Regulation is measured at constant junction temperature by using a 20ms current pulse. Devices are tested for load regulation in the load range from 10mA to 600mA.

■ APPLICATION INFORMATIONS

The **LR1148** is a high performance linear regulator that Provides low-Dropout voltage and low quiescent current. The device is available in an adjustable output voltages from 0.8~5.0V,and the device can supply loads up to 600mA.

SHUTDOWN

By connecting EN pin to Ground, the **LR1148** can be shut down to reduce the supply current. At this mode, the output voltage is equal to 0V

CURRENT LIMIT

The **LR1148** includes a current limiter, which monitors and controls the maximum output current .If the output is overload or shorter to ground, this can protect the device from being damaged.

THERMAL PROTECTION

The **LR1148** includes a thermal-limiting circuit, which is designed to protect the device against overload condition. When the junction temperature exceeds T_J=170°C, the thermal-limiting circuit turns off the pass transistor and let IC to cool. For continuous load condition, maximum rating of junction temperature must not be exceeded.

INPUT-OUTPUT CAPACITORS

Linear regulators require input and output capacitors to maintain stability. Input capacitor at 1uF with a 1uF ceramic output capacitor is recommended. When choosing the input and output ceramic capacitors, X5R and X7R types are recommended because they retain their capacitance over wider ranges of voltage and temperature than other types.

SETTING THE OUTPUT VOLTAGE

The external resistor divider R1 and R2 is used to set the output voltage, V_{OUT} can be calculated as:

$$V_{OUT}=0.8\times(1+R1/R2)$$

The resistive divider should sit as close to ADJ Pin as possible.

POWER DISSIPATION

The maximum power dissipation of **LR1148** depends on the thermal resistance of its case and circuit board, the temperature difference between the die junction and ambient air, and the rate of airflow. The rate of temperature rise is greatly affected by the mounting pad configuration on the PCB, the board material and the ambient temperature. When the IC mounting with good thermal conductivity is used, the junction emperature will be low even when large power dissipation applies.

The power dissipation across the device is:

$$P=I_{OUT}(V_{IN}-V_{OUT})\ ;$$

The Maximun power dissipation is:

$$P_{MAX}=(T_{JMAX}-T_A)/(R\times\theta_{JA})$$

Where T_{JMAX} is the maximum allowable junction temperature, and Ta is the ambient temperature suitable in application. As a general rule, the lower temperature is, the better reliability of the device is. So the PCB mounting pad should provide maximum thermal conductivity to maintain low device temperature.

■ TYPICAL APPLICATION CIRCUIT