



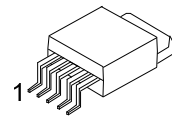
## UR15033

## LINEAR INTEGRATED CIRCUIT

### 2 CHANNEL LOW-DROPOUT VOLTAGE REGULATOR

#### ■ FEATURES

- \*Dual output: 5.0V/1A, 3.3V/1A.
- \*Output voltage precision of  $\pm 2\%$ .
- \*Output consists of PNP power transistor with low-dropout voltage.
- \*Built-in over current protection circuit (OCP).
- \*Built-in thermal shut down circuit (TSD).
- \*Ideal for hard disk drives applications.



TO-252-5

\*Pb-free plating product number: UR15033L

#### ■ ORDERING INFORMATION

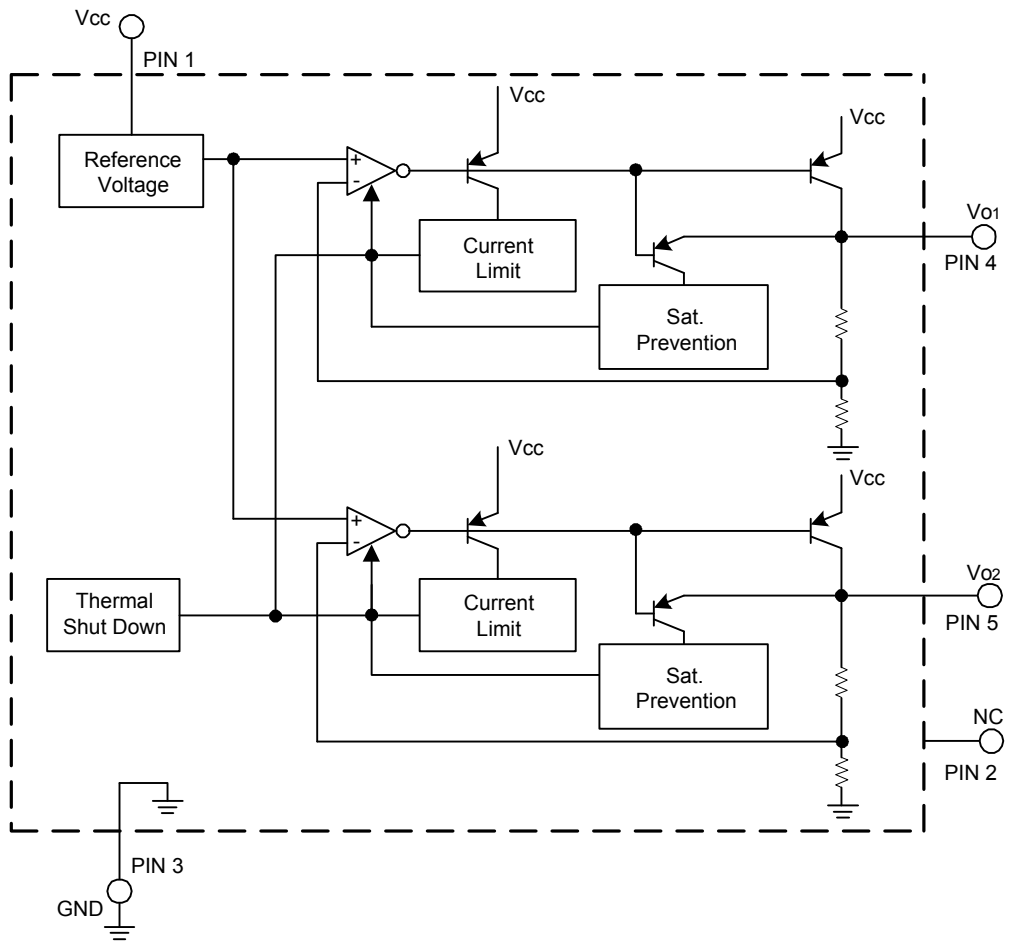
Ordering Number		Package	Packing
Normal	Lead Free Plating		
UR15033-TN5-R	UR15033L-TN5-R	TO-252-5	Tape Reel
UR15033-TN5-T	UR15033L-TN5-T	TO-252-5	Tube

<p>UR15033L-TN5-R</p>	<p>(1) Packing Type (2) Package Type (3) Lead Plating</p>	<p>(1) R: Tape Reel, T: Tube (2) TN5: TO-252-5 (3) L: Lead Free Plating, Blank: Pb/Sn</p>
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#### ■ PIN DESCRIPTIONS

PIN NO.	PIN NAME	PIN FUNCTION
1	V <sub>CC</sub>	Power Supply
2	N.C.	Not Internally Connected
3	GND	Ground
4	V <sub>O1</sub>	5.0V Output
5	V <sub>O2</sub>	3.3V Output

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ )

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_{CC}$	18	V
Power Dissipation	$P_D$	1	W
Junction Temperature	$T_J$	150	$^\circ\text{C}$
Operating Temperature	$T_{OPR}$	-40 ~ +85	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-55 ~ +150	$^\circ\text{C}$

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.

■ RECOMMENDED OPERATING RATINGS ( $T_A=25^\circ\text{C}$ )

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Input Voltage	$V_{CC}$	4.0		16.0	V
5.0V Output Current	$I_{O1}$			1	A
3.3V Output Current	$I_{O2}$			1	A

■ ELECTRICAL CHARACTERISTICS

(refer to the test circuit,  $T_A=25^\circ\text{C}$ ,  $V_{CC}=6\text{V}$  unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Bias Current	$I_B$	$I_{O1}=0\text{mA}$ , $I_{O2}=0\text{mA}$		0.8	1.5	mA
<b>5.0V Output</b>						
Output Voltage 1	$V_{O1}$	$I_{O1}=500\text{mA}$	4.9	5.0	5.1	V
Dropout Voltage 1	$\Delta V_{D1}$	$I_{O1}=500\text{mA}$		0.25	0.5	V
Peak Output Current 1	$I_{O1}$		1.0	1.7		A
Ripple Rejection 1	R.R.1	$f=120\text{Hz}$ , $e_{in}=1\text{Vrms}$ , $I_{O1}=200\text{mA}$	50	58		dB
Line Regulation 1	$\Delta V_{LINE1}$	$V_{CC}=6\text{V} \sim 16\text{V}$ , $I_{O1}=500\text{mA}$		5	30	mV
Load Regulation 1	$\Delta V_{LOAD1}$	$I_{O1}=0\text{mA} \sim 1\text{A}$		30	75	mV
Temperature Coefficient of Output Voltage 1 (Note 1)	$T_{CV01}$	$I_{O1}=5\text{mA}$ , $T_J=0 \sim 125^\circ\text{C}$		$\pm 0.01$		$\%/^\circ\text{C}$
Short circuit Output Current 1	$I_{OS1}$	$V_{CC}=16\text{V}$		270		mA
<b>3.3V Output</b>						
Output Voltage 2	$V_{O2}$	$I_{O2}=500\text{mA}$	3.234	3.30	3.366	V
Peak Output Current 2	$I_{O2}$		1.0	1.7		A
Ripple Rejection 2	R.R.2	$f=120\text{Hz}$ , $e_{in}=1\text{Vrms}$ , $I_{O2}=200\text{mA}$	50	58		dB
Line Regulation 2	$\Delta V_{LINE2}$	$V_{CC}=6\text{V} \sim 16\text{V}$ , $I_{O2}=500\text{mA}$		5	30	mV
Load Regulation 2	$\Delta V_{LOAD2}$	$I_{O2}=0\text{mA} \sim 1\text{A}$		30	75	mV
Temperature Coefficient of Output Voltage 2 (Note 1)	$T_{CV02}$	$I_{O2}=5\text{mA}$ , $T_J=0 \sim 125^\circ\text{C}$		$\pm 0.01$		$\%/^\circ\text{C}$
Short circuit Output Current 2	$I_{OS2}$	$V_{CC}=16\text{V}$		270		mA

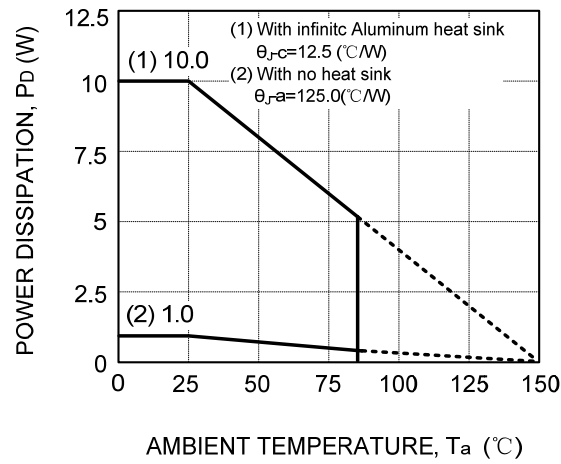
Note: 1. Design Guarantee. (Outgoing inspection is not done on all products.)

2. This product is not designed for protection against radioactive rays.

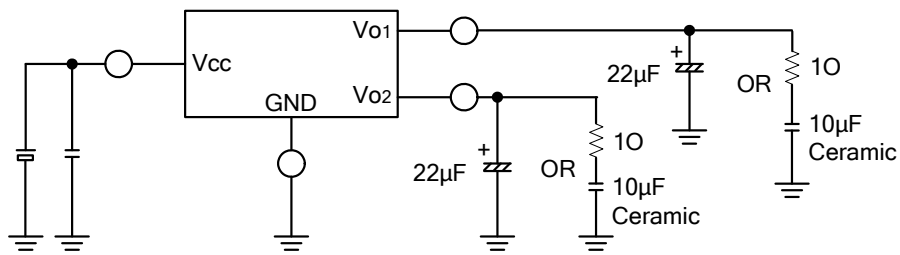
3. All characteristic are measured with a capacity across the input (0.33 $\mu\text{F}$ ) and the output (22 $\mu\text{F}$ ).

Measurement is done at  $T_A \doteq T_J$ , and variations in the parameter of all measurement (except for Temperature Coefficient of Output Voltage) caused by temperature change are not considered.

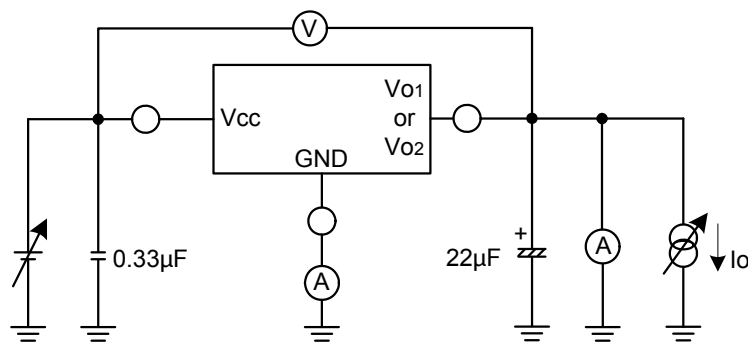
## ■ POWER DISSIPATION



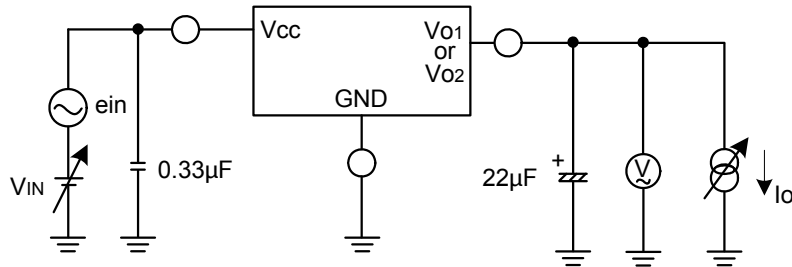
## ■ STANDARD APPLICATION CIRCUIT



## ■ TEST CIRCUIT FOR EACH CONDITION



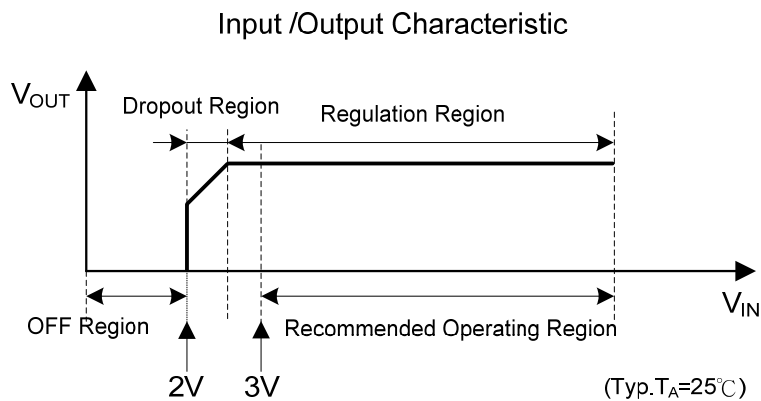
■ TEST CIRCUIT FOR RIPPLE REJECTION RATIO



■ APPLICATION INFORMATION

**Operation Supply Voltage Range**

The circuit functionality is guaranteed within operation of ambient temperature range, as long as it is within operation supply voltage range. The standard electrical characteristic values are guaranteed at the test circuit voltage of  $V_{cc}=6V$ . The cannot be guaranteed at other voltages in the operating range of  $4.0V \sim 16.0V$ , however, the variation will be small.



For proper regulation, this device must be operated in the Recommended Operating Region shown above.

**Power Dissipation**

Refer to the thermal duration characteristics shown in Fig.3. Also, be sure to use this IC within a power dissipation range allowing enough margins.

**Output and Bypass Capacitor**

To prevent oscillations, place the output capacitor between the output pin and GND for both channel. There is a possibility for oscillation if capacitor's value changes due to temperature, voltage, etc. More than  $22\mu F$  electrolytic capacitor is recommended. If an extremely large value of (over  $1000\mu F$ ) is used, it may cause oscillations at low frequency. In case of using ceramic capacitor (it is recommended more than  $10\mu F$ ) connect with  $1\Omega$  resistance serially as ESR. For the bypass capacitor, a  $0.33\mu F$  capacitor placed as close to  $V_{cc}$  pin and GND pin as possible is recommended.

**Over- current Protection Circuit**

The over-current protection circuits are built in at the outputs. They protect the IC from being damaged when the load is short-circuited or subjected to an over current condition. This protection circuits perform holdback current limiting.

### Thermal Protection Circuit

A thermal shut down circuit (T.S.D.) is built into the IC to prevent damage due to overheating, Therefore, all the outputs are turned off when the T.S.D. circuit is activated and are turned on when the temperature recedes to the specified level. However, the T.S.D. circuit is only for extreme conditions and the regulator circuit should still be designed for the IC not to exceed  $T_{J(max)}=150^{\circ}\text{C}$ .

### Grounding

It is recommended that every capacitor (bypass and output capacitors) is grounded to PIN3 using single-point connections.

### Electromagnetic Fields

The IC is susceptible to strong electromagnetic fields and may cause malfunction. Therefore, caution should be used when placing it on the PCB.

### Protection Diodes

It is recommended that protection diodes be used when the output is connected to an inductive load.

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