

## 300mA, Micropower, VLDO Linear Regulator

### UM175xx SOT23-5

#### General Description

The UM175xx series are VLDO (very low dropout) linear regulators designed for low power portable applications. Maximum dropout is just 90mV at the load current of 150mA. The internal P-channel MOSFET pass transistor requires no base current, allowing the device to draw only 100µA during normal operation at the maximum load current of 300mA.

Other features include high output voltage accuracy, excellent transient response, under voltage lockout, stability with ultralow ESR ceramic capacitors as small as 1µF, reverse-battery protection, short-circuit and thermal overload protection and output current limiting.

The UM175xx series are available in a low profile SOT23-5 package.

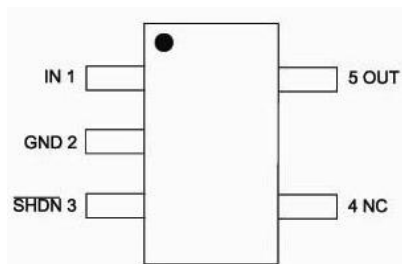
#### Applications

- Bluetooth/802.11 Cards
- PDAs and Notebook Computers
- Portable Instruments and Battery-Powered Systems
- Cellular Phones

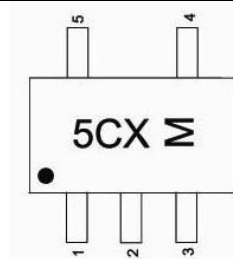
#### Features

- Very Low Dropout: 90mV(Max) at 150mA
- Maximum Input Voltage: 6.0V
- ±2% Voltage Accuracy at 150mA
- Fast Transient Response
- Under Voltage Lockout
- Fixed Output Voltage: 3.3V/2.8V
- Output Current Limit
- Reverse-Battery Protection
- No Protection Diodes Needed
- Stable with 1µF Output Capacitor
- Short-Circuit and Thermal Overload Protection
- Low Profile SOT23-5 Package

#### Pin Configurations



#### Top View



**M: Month Code**  
**UM175xx**  
**SOT23-5**

## Ordering Information

Part Number	Output Voltage	Packaging Type	Marking Code	Shipping Qty
UM17528	2.8V	SOT23-5	5CQ	3000pcs/7Inch Tape & Reel
UM17533	3.3V		5CU	

## Pin Description

Pin Number	Symbol	Function
1	IN	Power Supply
2	GND	Ground
3	$\overline{\text{SHDN}}$	Shutdown Input, Active Low
4	NC	Not Connected
5	OUT	Voltage Regulated Output

## Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Value	Unit
$V_{\text{IN}}$	Supply Voltage on IN Pin	-7.5 to +7.5	V
$V_{\overline{\text{SHDN}}}$	Voltage on $\overline{\text{SHDN}}$ Pin	-0.3 to +7.5	V
$V_{\text{OUT}}$	Voltage on OUT Pin	-0.3 to +7.5	V
	Output Short-Circuit Duration	Indefinite	
$T_{\text{J}}$	Operating Junction Temperature (Note 2, 3)	-40 to +125	°C
$T_{\text{STG}}$	Storage Temperature Range	-65 to +150	°C
$T_{\text{L}}$	Lead Temperature for Soldering 10 Seconds	+300	°C

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: The UM175xx is tested and specified under pulse load conditions such that  $T_{\text{J}} \approx T_{\text{A}}$ . The device is guaranteed to meet performance specifications from 0°C to 70°C. Specifications over the -40°C to 125°C operating junction temperature range are assured by design, characterization and correlation with statistical process controls.

Note 3: This IC includes overtemperature protection that is intended to protect the device during momentary overload conditions. Junction temperature will exceed 125°C when overtemperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

**Electrical Characteristics**

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{IN}$	Input Voltage Range		$V_{OUT+}$ $V_{DROP}$		6.0	V
$V_{UVLO1}$ (Note 1)	Input Under Voltage Lockout	$V_{IN}$ Falling	2.0		2.6	V
$V_{UVLO2}$ (Note 2)	Input Under Voltage Lockout	$V_{IN}$ Falling	2.1		2.3	V
$I_Q$	Operating Quiescent Current	$I_{OUT}=0mA$		90		$\mu A$
		$I_{OUT}=300mA$		100		
$I_{SHDN}$	Shutdown Leakage Current				1	$\mu A$
	ESD Rating	Human Body Mode	2			kV
$I_{OUT}$	Output Current		300			mA
	Output Voltage Accuracy	$1mA \leq I_{OUT} \leq 150mA$ , $T_A = +25^\circ C$	-1		+1	%
		$1mA \leq I_{OUT} \leq 150mA$ , $T_A = -40^\circ C$ to $+85^\circ C$	-2		+2	
		$1mA \leq I_{OUT} \leq 300mA$ , $T_A = -40^\circ C$ to $+85^\circ C$	-2.5		+2.5	
$\Delta V_{DO}$	Dropout Voltage	$I_{OUT}=150mA$			90	mV
$I_{LIMIT}$	Output Current Limit	$V_{IN} \geq 2.5V$	450			mA
t	Startup Time Response	$R_L=68\Omega$ , $C_{OUT}=1\mu F$		20		$\mu s$
$V_{IL}$	SHDN Input Low Voltage				$0.3 \times V_{IN}$	V
$V_{IH}$	SHDN Input High Voltage		$0.7 \times V_{IN}$			V
	SHDN Input Current	$\overline{SHDN}=V_{IN}$ or GND	-1	0.1	+1	$\mu A$
$T_{SHDN}$	Thermal-Shutdown Temperature			160		$^\circ C$
$\Delta T_{SHDN}$	Thermal-Shutdown Hysteresis			20		$^\circ C$
	Line Regulation	$V_{OUT+1V} \leq V_{IN} \leq V_{OUT+2V}$ $I_{OUT}=10mA$		0.09		%/V
	Load Regulation	$V_{IN}=V_{OUT+1V}$ $1mA \leq I_{OUT} \leq 150mA$		0.2		%
PSRR	Power Supply Ripple Rejection	$V_{IN}=V_{OUT+1V}$ $I_{OUT}=100mA$	f=100Hz	70		dB
			f=1kHz	65		
			f=10kHz	50		
			f=100kHz	40		

Note 1:  $V_{UVLO1}$  is measured for devices with  $V_{OUT} \geq 1.8V$ .

Note 2:  $V_{UVLO2}$  is measured for devices with  $V_{OUT} \leq 1.5V$ .

Note 3:  $\Delta V_{DO}$  just define for device with  $V_{OUT} \geq 2.5V$ .

## Pin Function

**IN (Pin 1):** Power for UM175xx and Load. Power is supplied to the devices through the IN pin. The IN pin should be locally bypassed to ground if the UM175xx series are more than a few inches away from another source of bulk capacitance. In general, the output impedance of a battery rises with frequency, so it is usually advisable to include an input bypass capacitor in battery-powered circuits. A capacitor in the range of 0.1 $\mu$ F to 1 $\mu$ F is usually sufficient. The UM175xx series are designed to withstand reverse voltages on the IN pin with respect to both ground and the output pin. In the case of a reversed input, which can happen if a battery is plugged in backwards, the UM175xx will act as if there is a large resistor in series with its input with only a small amount of current flow.

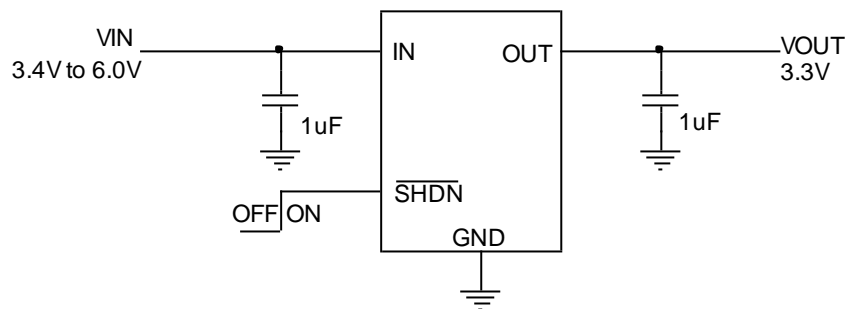
**GND (Pin 2):** Ground and Heat Sink. Solder to a ground plane or large pad to maximize heat dissipation.

**SHDN (Pin 3):** Shutdown, Active Low. This pin is used to put the UM175xx into shutdown. The SHDN pin cannot be left floating and must be tied to the input pin if not used.

**NC (Pin 4):** Not Connected.

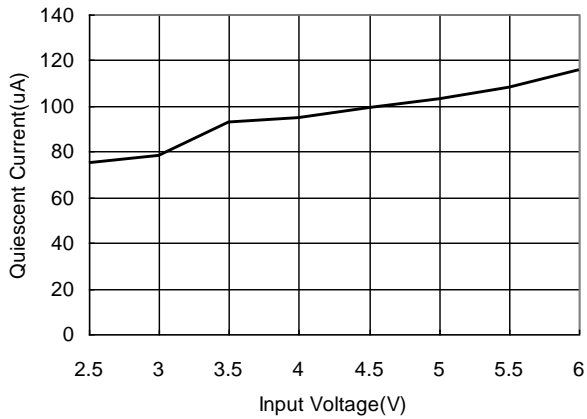
**OUT (Pin 5):** Voltage Regulated Output. The OUT pin supplies power to the load. A minimum output capacitor of 1 $\mu$ F is required to ensure stability. Larger output capacitors may be required for applications with large transient loads to limit peak voltage transients. See the Applications Information section for more information on output capacitance.

## Typical Application Circuit

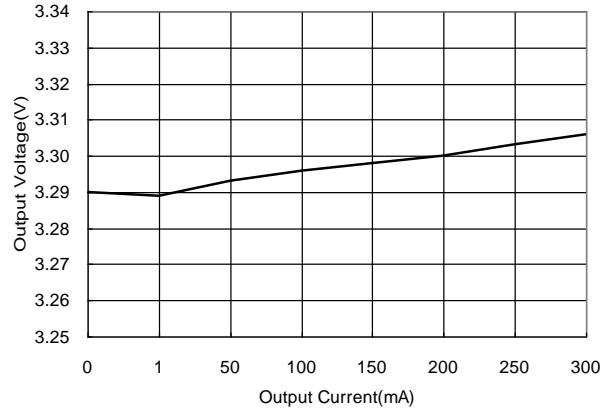


## Typical Performance Characteristics

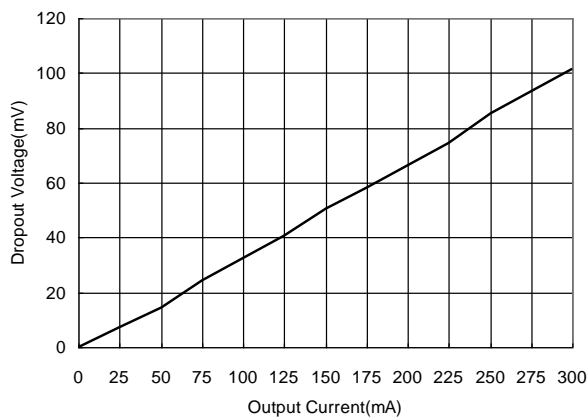
### Quiescent Current vs. Input Voltage



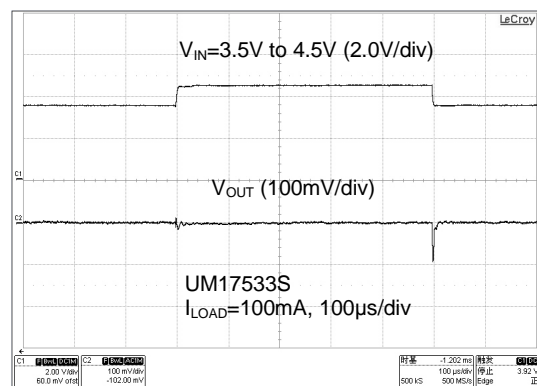
### Output Voltage vs. Output Current



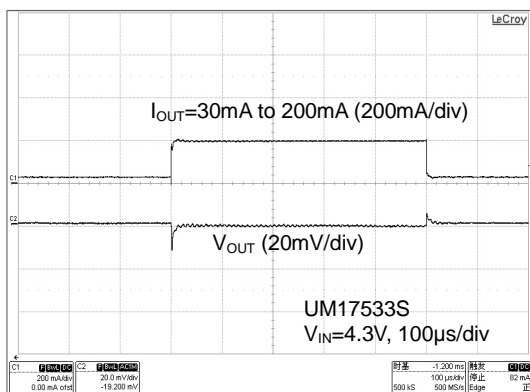
### Dropout Voltage vs. Output Current



### Line Transient Response



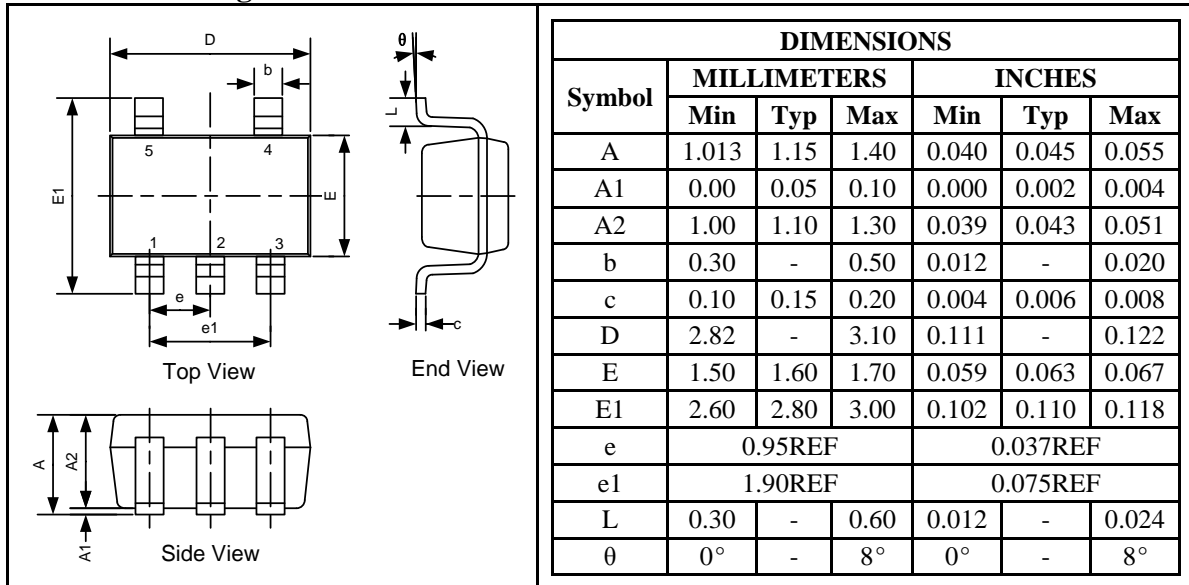
### Load Transient Response



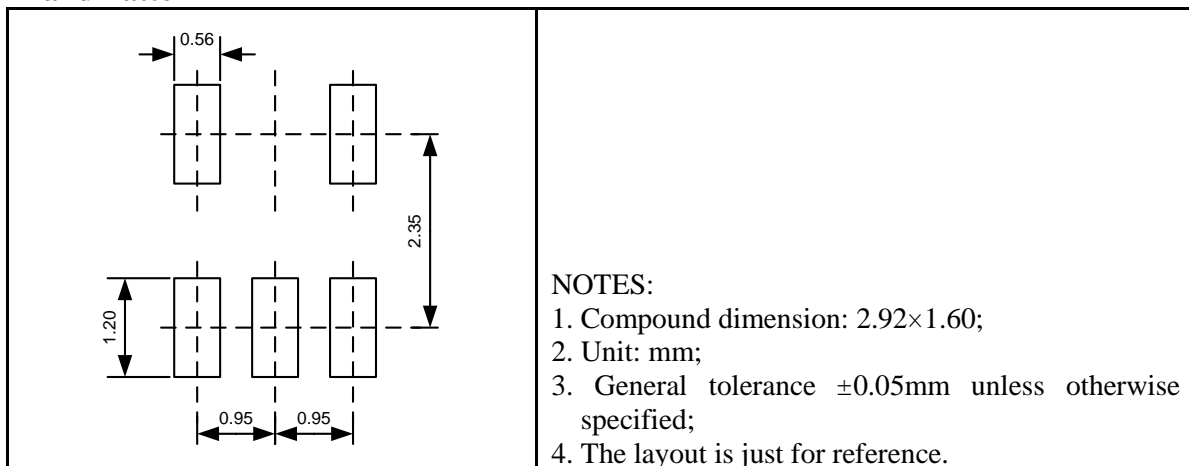
## Package Information

### UM175xx: SOT23-5

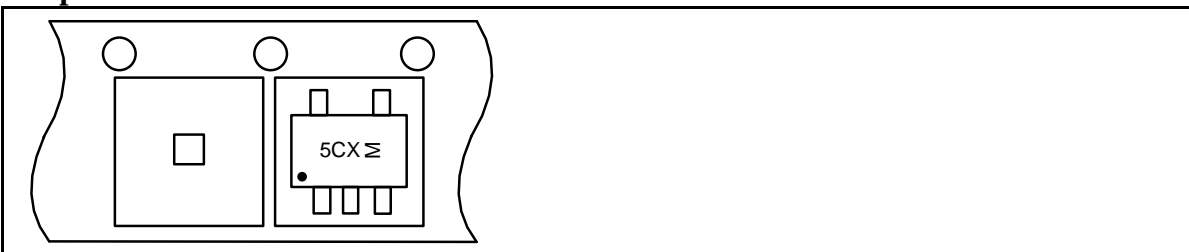
#### Outline Drawing



#### Land Pattern



#### Tape and Reel Orientation



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