500mA, Micropower, VLDO Linear Regulator
UM177XX *QFN2020-6*

General Description

The UM177XX series are VLDO (very low dropout) linear regulators designed for low power portable applications. Typical output noise is only 75μV_{RMS} and maximum dropout is just 400mV at the load current of 500mA.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 500mA.
Other features include high output voltage accuracy, excellent transient response, under voltage lockout, stability with ultra low ESR ceramic capacitors as small as 1μF, reverse-battery, short-circuit and thermal overload protection and output current limiting.
The UM177XX series are available in a low profile QFN2020-6 package.

Applications

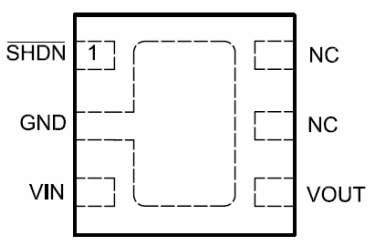
- Bluetooth/802.11 Cards
- PDAs and Notebook Computers
- Portable Instruments and Battery-Powered Systems
- Cellular Phones

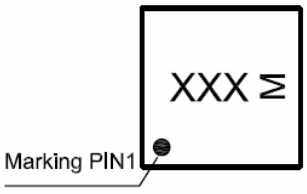
Features

- Very Low Dropout: 400mV(max) at 500mA
- Maximum Input Voltage: 6.0V
- Low Noise:75μV_{RMS} (10Hz to 100kHz)
- ±2.5%Voltage Accuracy at 500mA
- Fast Transient Response
- Under Voltage Lockout
- Fixed Output Voltage: 3.5V/3.3V/3.0V/2.8V/2.5V/1.8V/1.5V/1.3V/ 1.2V
- Output Current Limit
- Reverse-Battery Protection
- No Protection Diodes Needed
- Stable with 1μF Output Capacitor
- Short-Circuit and Thermal Overload Protection
- Low Profile QFN2020-6 Package

Pin Configurations

Top View





UM177XX
M: Month Code
QFN2020-6

Ordering Information

Part Number	Output Voltage	Packaging Type	Marking Code	Shipping Qty
UM17735	3.5V	QFN2020-6	AAZ	3000pcs/7Inch Tape & Reel
UM17733	3.3V		AAV	
UM17730	3.0V		AAR	
UM17728	2.8V		AAQ	
UM17725	2.5V		AAN	
UM17718	1.8V		AAK	
UM17715	1.5V		AAJ	
UM17713	1.3V		AAD	
UM17712	1.2V		AAC	

Pin Description

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

Absolute Maximum Ratings (Note 1)

Symbol	Parameter	Value	Unit
V_{IN}	Supply Voltage on IN Pin	-7.5 to +7.5	V
$V_{\overline{SHDN}}$	Voltage on $\overline{SHDN}$ Pin	-0.3 to +7.5	V
V_{OUT}	Voltage on OUT Pin	-0.3 to +7.5	V
	Output Short-Circuit Duration	Indefinite	
T_J	Operating Junction Temperature (Notes 2, 3)	-40 to +125	°C
T_{STG}	Storage Temperature Range	-65 to +150	°C
T_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 UM177XX is tested and specified under pulse load conditions such that $T_J \approx T_A$. The device is guaranteed to meet performance specifications from 0℃ to 70℃. Specifications over the – 40℃ to 125℃ 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℃ when overtemperature protection is active. Continuous operation above the specified maximum operating junction temperature may impair device reliability.

Electrical Characteristics

Over recommended operating free-air temperature range (unless otherwise noted)

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
V_{IN}	Input Voltage Range			V_{OUT}+ V_{DROP}		6.0	V
V_{UVLO}	Input Under Voltage Lockout*	V_{IN} falling		2.0		2.6	V
I_Q	Operating Quiescent Current	V_{IN}=5.0V,I_{OUT}=0mA			90		μA
		V_{IN}=5.0V,I_{OUT}=500mA			100		
$I_{\overline{SHDN}}$	Shutdown Leakage Current					1	μA
	ESD Rating	Human Body Mode		2			KV
I_{OUT}	Output Current			500			mA
	Output Voltage Accuracy	1mA≤I_{OUT}≤150mA, T_A=+25℃		-1		+1	%
		1mA≤I_{OUT}≤150mA, T_A=-40℃ to +85℃		-2		+2	
		1mA≤I_{OUT}≤500mA, T_A=-40℃ to +85℃		-2.5		+2.5	
ΔV_{DO}	Dropout Voltage	I_{OUT}=500mA			250	400	mV
I_{LIMT}	Output Current Limit	V_{IN}≥2.5V		700			mA
	Input Reverse Leakage Current (OUT to IN Leakage Current)	V_{IN}=4V, V_{OUT}=5.5V chip active			0.01	1.5	μA
t	Startup Time Response	R_L=68Ω, C_{OUT}=1μF			20		μs
V_{IL}	$\overline{SHDN}$ Input Low Voltage					0.3×V_{IN}	V
V_{IH}	$\overline{SHDN}$ Input High Voltage			0.7×V_{IN}			V
	$\overline{SHDN}$ Input Current	$\overline{SHDN}$=V_{IN} or GND		-1	0.1	+1	μA
T_{SHDN}	Thermal-Shutdown Temperature				160		℃
ΔT_{SHDN}	Thermal-Shutdown Hysteresis				20		℃
	Line Regulation	V_{OUT}+1V≤V_{IN}≤V_{OUT}+2V I_{OUT}=10mA			0.09		%/V
	Load Regulation	V_{IN}=V_{OUT}+1V 1mA≤I_{OUT}≤150mA			0.2		%
	Output Voltage Noise	10Hz to 100KHz C_{IN}=0.1μF, I_{OUT}=10mA			75		μV_{RMS}
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			

*Only UM17735/UM17733/UM17730/UM17728/UM17725 has this function.

Typical Characteristics (shown for 3.3 V output option)
(CIN=1.0uF, COUT = 1.0 uF, TA = 25℃ unless otherwise specified.)

Figure1. Output Voltage Vs. Input Voltage

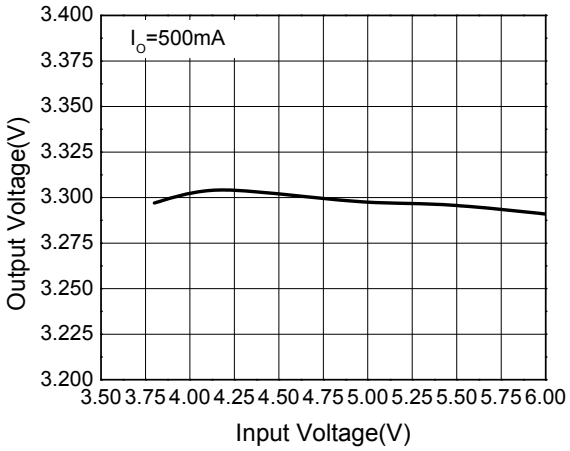


Figure2. Dropout Voltage Vs. Output Current

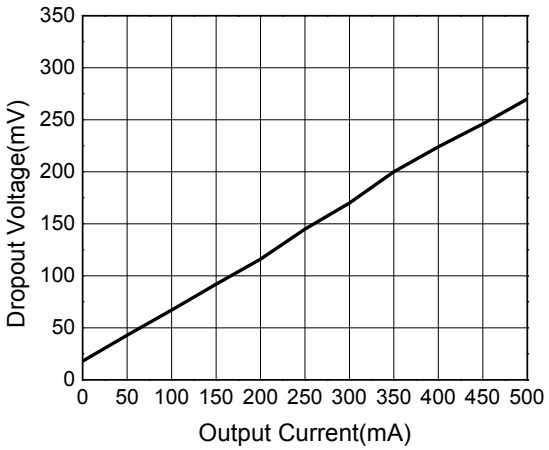


Figure3. Output Voltage Vs. Temperature

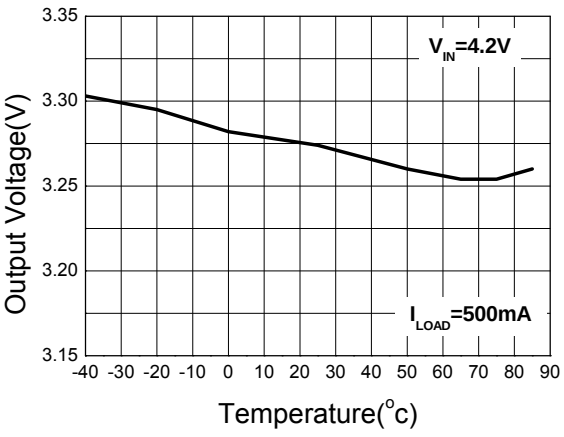
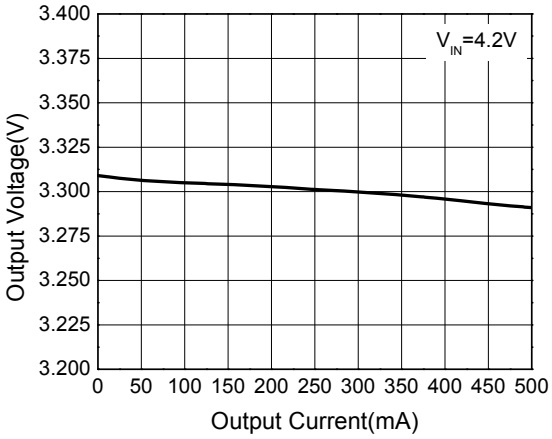


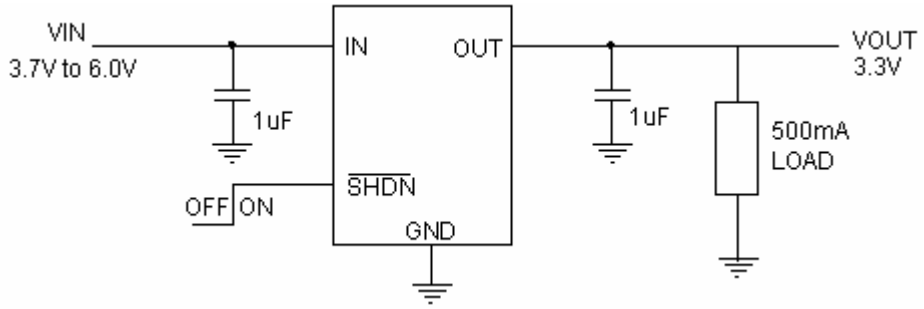
Figure4. Output Voltage Vs. Output Current



Pin Function

$\overline{SHDN}$ **(Pin 1):** Shutdown, Active Low. This pin is used to put the UM177XX into shutdown. The $\overline{SHDN}$ pin cannot be left floating and must be tied to the input pin if not used.
GND (Pin 2): Ground and Heat Sink. Solder to a ground plane or large pad to maximize heat dissipation.
VIN (Pin 3): Power for UM177XX and Load. Power is supplied to the devices through the IN pin. The IN pin should be locally bypassed to ground if the UM177XX 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 0.1μF to 1μF is usually sufficient. The UM177XX 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 UM177XX will act as if there is a large resistor in series with its input with only a small amount of current flow.
VOUT (Pin 4): Voltage Regulated Output. The OUT pin supplies power to the load. A minimum output capacitor of 1μF 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.
NC (Pin 5，6): Not Connected.

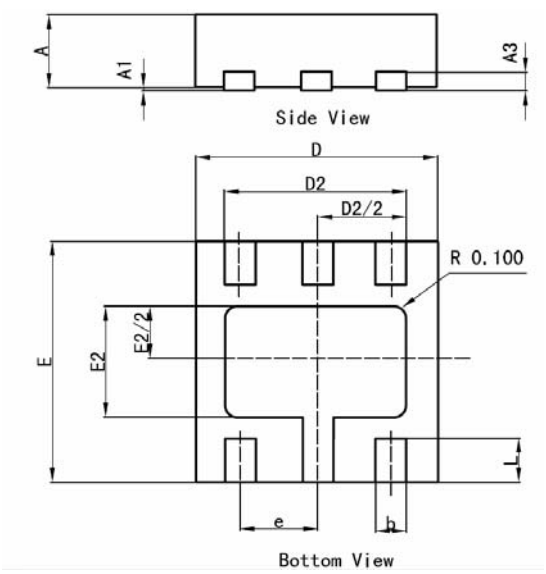
Typical Application Circuit



Package Information

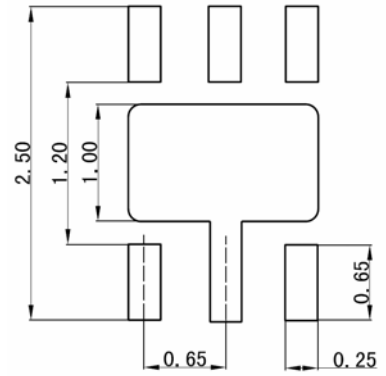
UM177XX: QFN2020-6

Outline Drawing



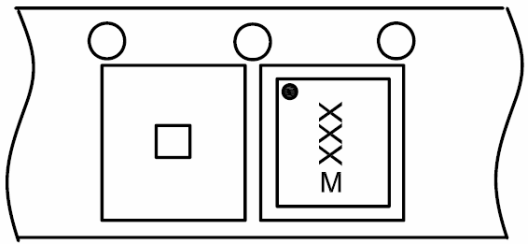
DIMENSIONS			
Symbol	MILLIMETERS		
	Min	Typ	Max
A	0.57	0.60	0.63
A1	0	0.03	0.05
A3		0.15TYP	
b	0.20	0.25	0.30
D	1.95	2.00	2.075
E	1.95	2.00	2.075
D2	1.45	1.55	1.65
E2	0.76	0.86	0.96
e		0.65TYP	
L	0.30	0.35	0.40

Land Pattern



NOTES:
1. Compound dimension: 2.0×2.0；
2. Unit: mm;
3. General tolerance ±0.05mm unless otherwise specified;
4. The layout is just for reference.

Tape and Reel Orientation



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