UMW®

UMW HT75xx-2

250mA, 45V Low Voltage, Low Quiescent Current, Low Dropout Linear Regulator

1.Description

The UMW HT75xx-2 is a low-dropout linear voltage regulator using CMOS technology. It has a 45V voltage rating and offers several fixed output voltages ranging from 2.0V to 5.0V, capable of outputting 250mA of current. It features low quiescent power consumption, output short-circuit protection, and high-temperature output current reduction to prevent system failure. It is widely used to power various audio, video, and communications equipment.

2.Features

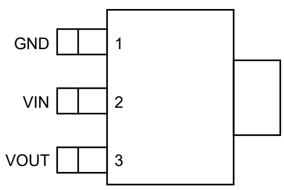
- Low power consumption, typical quiescent current 2.5μA
- Low Input-Output Voltage Difference
- Small Temperature Drift Coefficient
- 45V voltage rating
- Output Voltage Accuracy: ±1%
- Output Short-Circuit Protection
- When the Junction Temperature Exceeds
- 120°C, the Output Current Reduces

3.Applications

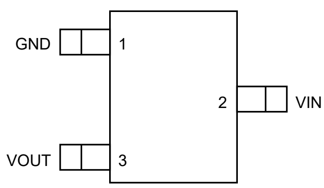
- Various Power Supply Equipment
- Communication Equipment
- Audio and Video Equipment

4.Pinning Information

Pin	Symbol	Description
1	GND	Ground
2	VIN	Input
3	VOUT	Output

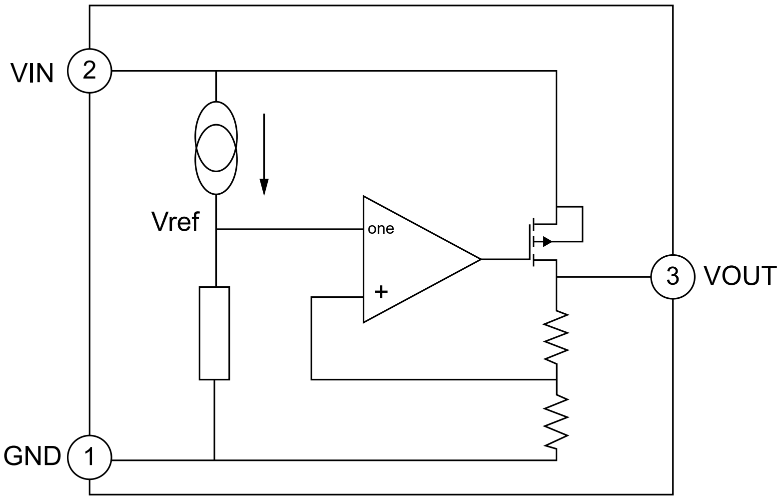


SOT-89



SOT-23

5.Circuit Block Diagram



6.Maximum Ratings (T_A=25°C unless otherwise specified)

Parameter	Symbol	Range	Unit
Maximum Voltage	V_{IN}	-0.3 ~ 48	V
Storage Temperature	T_{STG}	-50 ~ 125	°C
Operating Temperature	T_A	-40 ~ 125	°C
Junction temperature (1)	T_J	150	°C

Note: Application beyond the maximum rated value may cause permanent damage to the device.

(1) When the junction temperature reaches 150°C, the system can work, but the IC has over-temperature protection. When the junction temperature exceeds 120°C, the output current is reduced.

7.Thermal Information

Parameter	Symbol	Package Type	Value Range	Unit
Thermal Resistance	θ_{JA}	SOT-89	200	°C/W
		SOT-23	500	°C/W
Power Dissipation	P_D	SOT-89	500	mW
		SOT-23	200	mW

8.1 Electrical Parameters (Output Model HT7520-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	1.98	2	2.02	V
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+2V$		250		mA
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$, $1mA\leq I_{OUT}\leq 200mA$		10	72	mV
Low Dropout Voltage	V_{DIF}	$I_{OUT}=100mA$, $\Delta V_{OUT}=2\%$		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	$V_{OUT}+1V\leq V_{IN}\leq 45V$, $I_{OUT}=1mA$		0.01	0.2	%/V
Input Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	$V_{OUT}+2V$, $I_{OUT}=1mA$, $-40°C\leq T_A\leq 125°C$		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) The 45V input withstand voltage rating does not mean the circuit can operate normally with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply may exceed 45V, causing permanent damage to the chip.

8.2 Electrical Parameters (Output Model HT7524-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	2.376	2.4	2.424	V
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+2V$		250		mA
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$, $1mA\leq I_{OUT}\leq 200mA$		10	72	mV
Low Dropout Voltage	V_{DIF}	$I_{OUT}=100mA$, $\Delta V_{OUT}=2\%$		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	$V_{OUT}+1V\leq V_{IN}\leq 45V$, $I_{OUT}=1mA$		0.01	0.2	%/V
Input Withstand Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	$V_{OUT}+2V$, $I_{OUT}=1mA$, $-40°C\leq T_A\leq 125°C$		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

8.3 Electrical Parameters (Output Model HT7528-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	2.772	2.8	2.828	V
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+2V$		250		mA
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$, $1mA\leq I_{OUT}\leq 200mA$		10	72	mV
Low Dropout Voltage	V_{DIF}	$I_{OUT}=100mA$, $\Delta V_{OUT}=2\%$		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	$V_{OUT}+1V\leq V_{IN}\leq 45V$, $I_{OUT}=1mA$		0.01	0.2	%/V
Input Withstand Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	$V_{OUT}+2V$, $I_{OUT}=1mA$, $-40°C\leq T_A\leq 125°C$		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

8.4 Electrical Parameters (Output Model HT7530-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	V_{IN}=V_{OUT}+2V, I_{OUT}=1mA	2.970	3	3.03	V
Output Current	I_{OUT}	V_{IN}=V_{OUT}+2V		250		mA
Load Regulation	ΔV_{OUT}	V_{IN}=V_{OUT}+2V, 1mA≤I_{OUT}≤200mA		10	72	mV
Low Dropout Voltage	V_{DIF}	I_{OUT}=100mA, ΔV_{OUT}=2%		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	V_{OUT}+1V≤V_{IN}≤45V, I_{OUT}=1mA		0.01	0.2	%/V
Input Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	V_{OUT}+2V, I_{OUT}=1mA, -40°C≤T_A≤125°C		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

8.5 Electrical Parameters (Output Model HT7533-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	V_{IN}=V_{OUT}+2V, I_{OUT}=1mA	3.267	3.3	3.333	V
Output Current	I_{OUT}	V_{IN}=V_{OUT}+2V		250		mA
Load Regulation	ΔV_{OUT}	V_{IN}=V_{OUT}+2V, 1mA≤I_{OUT}≤200mA		10	72	mV
Low Dropout Voltage	V_{DIF}	I_{OUT}=100mA, ΔV_{OUT}=2%		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	V_{OUT}+1V≤V_{IN}≤45V, I_{OUT}=1mA		0.01	0.2	%/V
Input Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	V_{OUT}+2V, I_{OUT}=1mA, -40°C≤T_A≤125°C		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

8.6 Electrical Parameters (Output Model HT7536-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	3.564	3.6	3.636	V
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+2V$		250		mA
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$, $1mA \le I_{OUT} \le 200mA$		10	72	mV
Low Dropout Voltage	V_{DIF}	$I_{OUT}=100mA$, $\Delta V_{OUT}=2\%$		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	$V_{OUT}+1V \le V_{IN} \le 45V$, $I_{OUT}=1mA$		0.01	0.2	%/V
Input Withstand Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	$V_{OUT}+2V$, $I_{OUT}=1mA$, $-40°C \le T_A \le 125°C$		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

8.7 Electrical Parameters (Output Model HT7540-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	3.96	4	4.04	V
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+2V$		250		mA
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$, $1mA \le I_{OUT} \le 200mA$		10	72	mV
Low Dropout Voltage	V_{DIF}	$I_{OUT}=100mA$, $\Delta V_{OUT}=2\%$		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	$V_{OUT}+1V \le V_{IN} \le 45V$, $I_{OUT}=1mA$		0.01	0.2	%/V
Input Withstand Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	$V_{OUT}+2V$, $I_{OUT}=1mA$, $-40°C \le T_A \le 125°C$		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

8.8 Electrical Parameters (Output Model HT7544-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	4.356	4.4	4.444	V
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+2V$		250		mA
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$, $1mA\leq I_{OUT}\leq 200mA$		10	72	mV
Low Dropout Voltage	V_{DIF}	$I_{OUT}=100mA$, $\Delta V_{OUT}=2\%$		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	$V_{OUT}+1V\leq V_{IN}\leq 45V$, $I_{OUT}=1mA$		0.01	0.2	%/V
Input Withstand Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	$V_{OUT}+2V$, $I_{OUT}=1mA$, $-40°C\leq T_A\leq 125°C$		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

8.9 Electrical Parameters (Output Model HT7550-2)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$V_{IN}=V_{OUT}+2V$, $I_{OUT}=1mA$	4.95	5	5.05	V
Output Current	I_{OUT}	$V_{IN}=V_{OUT}+2V$		250		mA
Load Regulation	ΔV_{OUT}	$V_{IN}=V_{OUT}+2V$, $1mA\leq I_{OUT}\leq 200mA$		10	72	mV
Low Dropout Voltage	V_{DIF}	$I_{OUT}=100mA$, $\Delta V_{OUT}=2\%$		550		mV
Quiescent Current	I_{SS}	No Load		2.5	3.4	μA
Line Regulation	$\Delta V_{OUT}/(\Delta V_{OUT}*V_{IN})$	$V_{OUT}+1V\leq V_{IN}\leq 45V$, $I_{OUT}=1mA$		0.01	0.2	%/V
Input Withstand Voltage					45	V
Temperature Coefficient	$\Delta V_{OUT}/\Delta T_A*V_{OUT}$	$V_{OUT}+2V$, $I_{OUT}=1mA$, $-40°C\leq T_A\leq 125°C$		60		ppm/°C

(1) When V_{IN} = V + 2.0V, under fixed load conditions, the output voltage drops by 2%. The difference between the input and output voltages is the low-voltage differential, VDIF.

(2) A 45V input withstand voltage does not guarantee normal operation with a 45V power supply. When powering the device on or off, the voltage pulses generated on the 45V power supply could exceed 45V, causing permanent damage to the chip.

9.Typical Characterisitics

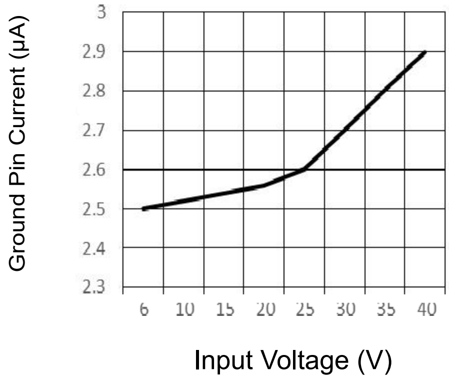


Figure 1: Ground Pin Current vs Input Voltage

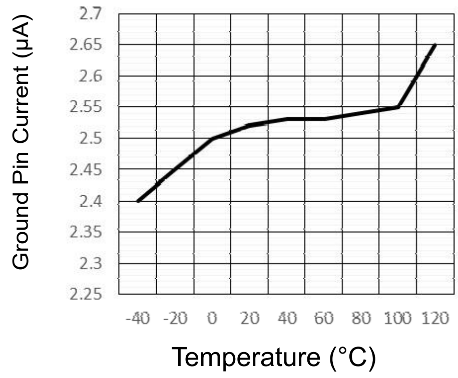


Figure 2: Ground Pin Cuient vs Temperanre

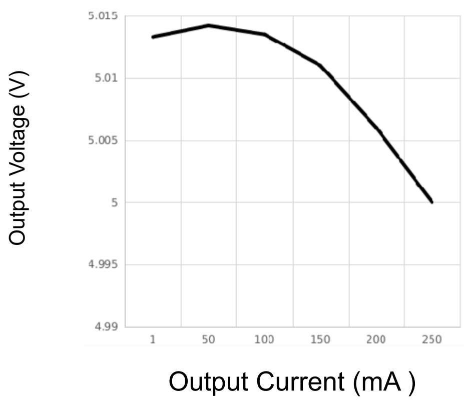


Figure 3: Output Voltage vs Output Current

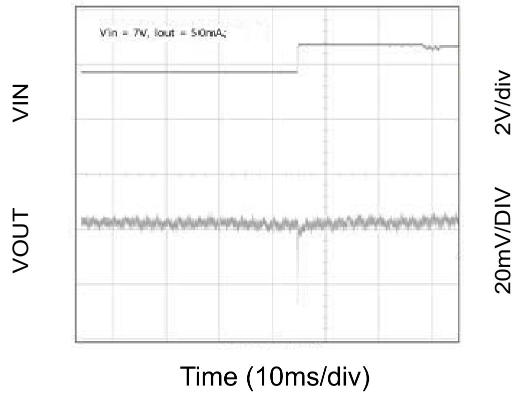


Figure 4: Line-transient Response

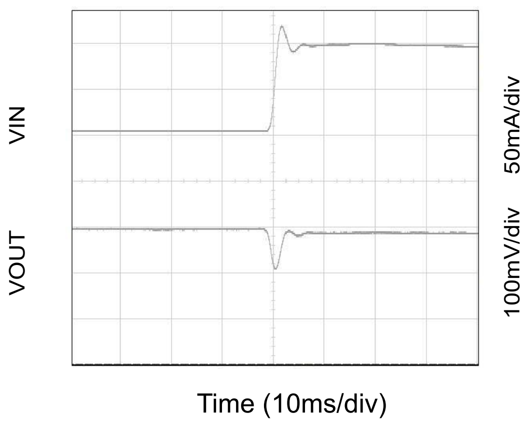


Figure 5: Load transient Response

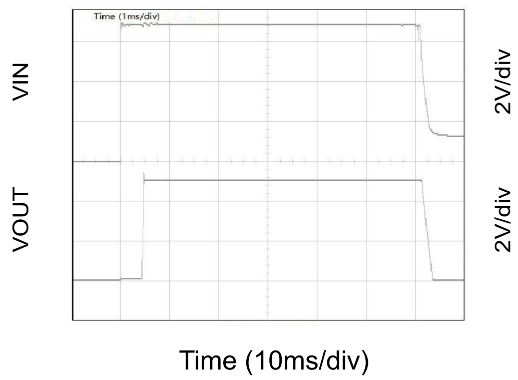
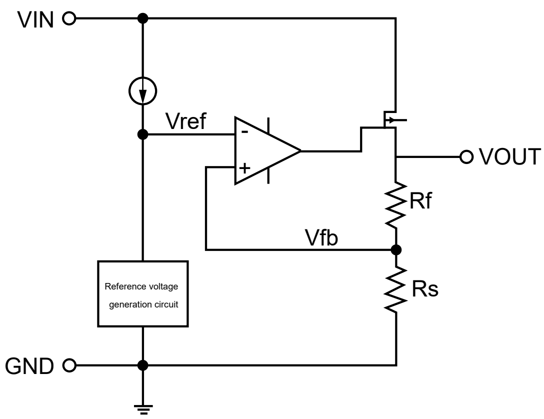


Figure 6: Power Up/Down Output Waveform

10.Application Description

The error amplifier compares the input voltage Vfb with the reference voltage Vref via the voltage divider formed by feedback resistors Rs and Rf. This error amplifier provides the necessary gate voltage to the output transistor, keeping the output voltage constant regardless of changes in input voltage or temperature.



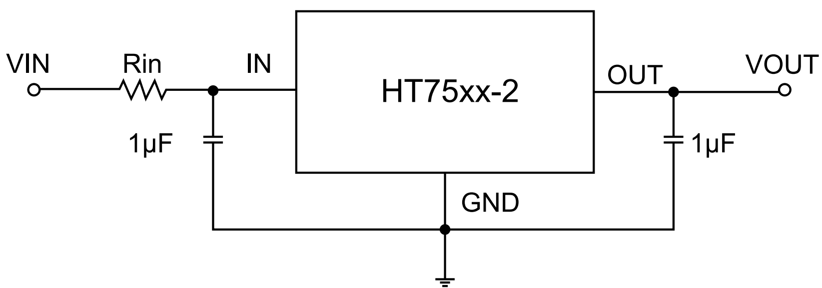
1.When applying, try to connect the capacitor close to the VIN and VOUT pins.

2. The circuit uses a phase compensation circuit and the ESR of the output capacitor for compensation. Therefore, a capacitor larger than 1μF must be connected to the output ground. Tantalum capacitors are recommended.

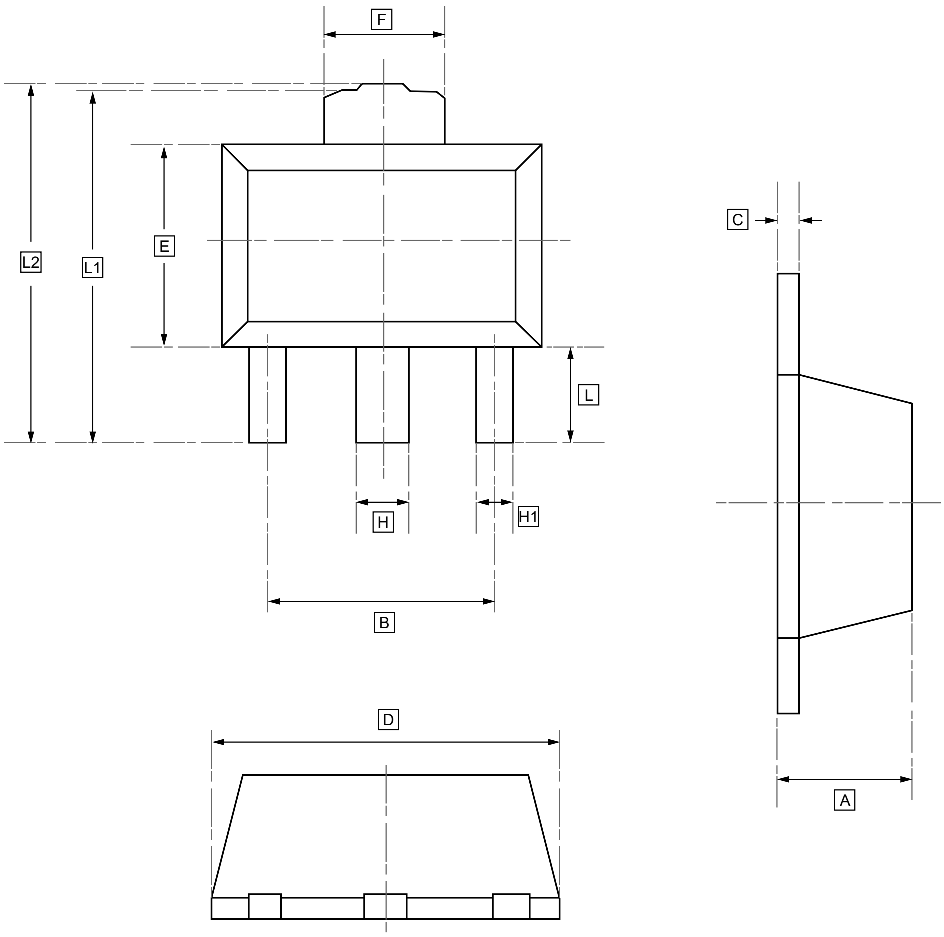
3. Pay attention to the usage conditions of input and output voltage and load current, and avoid the internal power consumption of the IC exceeding the maximum power consumption allowed by the package.

4. Placing a resistor of appropriate value in series with the linear regulator's VIN pin can help the linear regulator dissipate some of the energy during surges. The resistor should be small. The specific value depends on the circuit application. Generally, a value of 20Ω or less is recommended.

11.Application Circuit



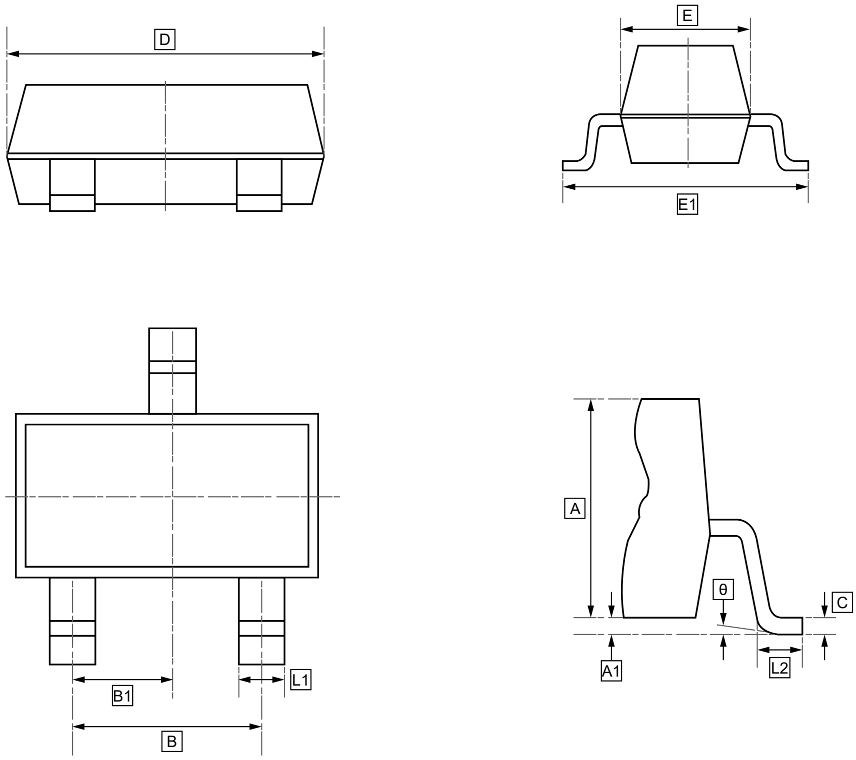
12.1 SOT-89 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	B	C	D	E	F	H	H1	L	L1	L2
Min	1.450	2.950	0.330	4.450	2.450	1.650	0.450	0.370	0.900	4.100	4.100
Max	1.550	3.050	0.430	4.550	2.550	1.750	0.580	0.480	1.000	4.300	4.350

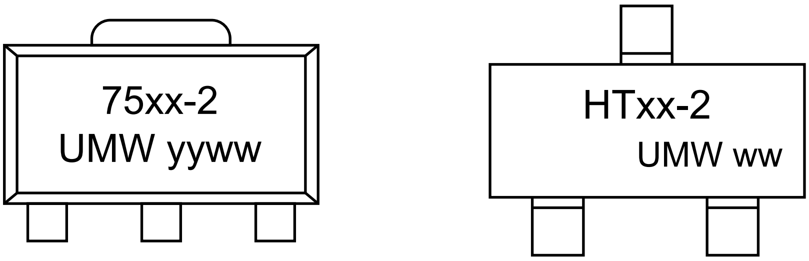
12.2 SOT-23 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	L1	L2	C	D	E	E1	B	B1	θ
Min	0.900	0.020	0.300	0.300	0.100	2.800	1.200	2.300	1.800	0.950 TYP	0°
Max	1.100	0.100	0.500	0.500	0.120	3.000	1.400	2.500	2.000		8°

13.Ordering Information



yy: Year Code
ww: Week Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW HT7520-2	7520-2	SOT-89	1000	Tape and reel
UMW HT7524-2	7524-2	SOT-89	1000	Tape and reel
UMW HT7528-2	7528-2	SOT-89	1000	Tape and reel
UMW HT7530-2	7530-2	SOT-89	1000	Tape and reel
UMW HT7533-2	7533-2	SOT-89	1000	Tape and reel
UMW HT7536-2	7536-2	SOT-89	1000	Tape and reel
UMW HT7540-2	7540-2	SOT-89	1000	Tape and reel
UMW HT7544-2	7544-2	SOT-89	1000	Tape and reel
UMW HT7550-2	7550-2	SOT-89	1000	Tape and reel
UMW HT7520S-2	HT20-2	SOT-23	3000	Tape and reel
UMW HT7524S-2	HT24-2	SOT-23	3000	Tape and reel
UMW HT7528S-2	HT28-2	SOT-23	3000	Tape and reel
UMW HT7530S-2	HT30-2	SOT-23	3000	Tape and reel
UMW HT7533S-2	HT33-2	SOT-23	3000	Tape and reel
UMW HT7536S-2	HT36-2	SOT-23	3000	Tape and reel
UMW HT7540S-2	HT40-2	SOT-23	3000	Tape and reel
UMW HT7544S-2	HT44-2	SOT-23	3000	Tape and reel
UMW HT7550S-2	HT50-2	SOT-23	3000	Tape and reel

14.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.