TC1072/TC1073

50mA and 100mA CMOS LDOs with Shutdown, $\overline{\text{ERROR}}$ Output and V_{REF} Bypass

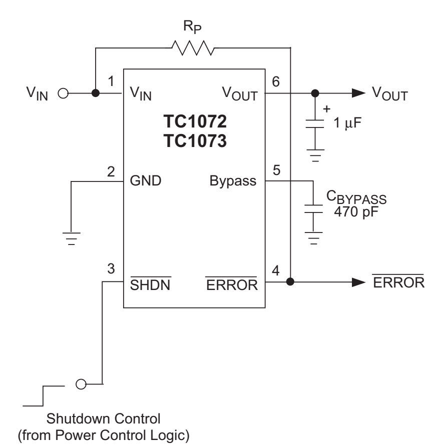
Features:

- 50 µA Ground Current for Longer Battery Life
- Very Low Dropout Voltage
- Choice of 50 mA (TC1072) and 100 mA (TC1073) Output
- High Output Voltage Accuracy
- Standard or Custom Output Voltages
- Power-Saving Shutdown Mode
- $\overline{\text{ERROR}}$ Output Can Be Used as a Low Battery Detector or Processor Reset Generator
- Bypass Input for Ultra Quiet Operation
- Overcurrent and Overtemperature Protection
- Space-Saving 6-Pin SOT-23 Package
- Pin Compatible Upgrades for Bipolar Regulators
- Standard Output Voltage Options:
  - 1.8V, 2.5V, 2.6V, 2.7V, 2.8V, 2.85V, 3.0V, 3.3V, 3.6V, 4.0V, 5.0V
- Other output voltages are available. Please contact Microchip Technology Inc. for details.

Applications:

- Battery Operated Systems
- Portable Computers
- Medical Instruments
- Instrumentation
- Cellular/GSM/PHS Phones
- Linear Post-Regulators for SMPS
- Pagers

Typical Application Circuit



General Description

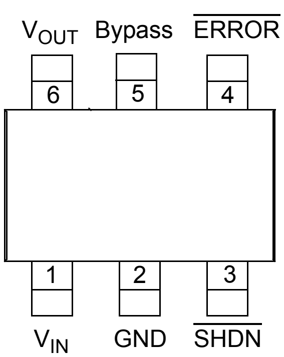
The TC1072 and TC1073 are high accuracy (typically ±0.5%) CMOS upgrades for older (bipolar) low dropout regulators. Designed specifically for battery-operated systems, the devices' CMOS construction eliminates wasted ground current, significantly extending battery life. Total supply current is typically 50 µA at full load (20 to 60 times lower than in bipolar regulators).

The devices' key features include ultra low noise operation (plus optional Bypass input); very low dropout voltage (typically 85 mV, TC1072 and 180 mV, TC1073 at full load) and fast response to step changes in load. An error output ($\overline{\text{ERROR}}$) is asserted when the devices are out-of-regulation (due to a low input voltage or excessive output current). $\overline{\text{ERROR}}$ can be used as a low battery warning or as a processor $\overline{\text{RESET}}$ signal (with the addition of an external RC network). Supply current is reduced to 0.5 µA (max) and both V_{OUT} and $\overline{\text{ERROR}}$ are disabled when the shutdown input is low. The devices incorporate both overtemperature and overcurrent protection.

The TC1072 and TC1073 are stable with an output capacitor of only 1 µF and have a maximum output current of 50 mA, and 100 mA, respectively. For higher output current versions, please see the TC1185, TC1186, TC1187 (I_{OUT} = 150 mA) and TC1107, TC1108 and TC1173 (I_{OUT} = 300 mA) data sheets.

Package Type

6-Pin SOT-23



1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Input Voltage 6.5V
Output Voltage........................... (-0.3V) to (V_{IN} + 0.3V)
Power Dissipation................Internally Limited **(Note 6)**
Maximum Voltage on Any Pin ....V_{IN} +0.3V to -0.3V
Operating Temperature Range...... -40°C < T_J < 125°C
Storage Temperature..........................-65°C to +150°C

† **Note:** Stresses above those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions above those indicated in the operation sections of the specifications is not implied. Exposure to Absolute Maximum Rating conditions for extended periods may affect device reliability.

TC1072/TC1073 ELECTRICAL SPECIFICATIONS

Electrical Characteristics: Unless otherwise noted, $V_{IN} = V_{OUT}$ + 1V, I_L = 0.1 mA, C_L = 3.3 µF, $\overline{SHDN} > V_{IH}$, T_A = +25°C. **Boldface** type specifications apply for junction temperatures of -40°C to +125°C.

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
V_{IN}	Input Operating Voltage	**2.7**	—	**6.0**	V	**Note 9**
I_{OUTMAX}	Maximum Output Current	**50** **100**	— —	— —	mA mA	TC1072 TC1073
V_{OUT}	Output Voltage	**V_R – 2.5%**	V_R ±0.5%	**V_R + 2.5%**	V	**Note 1**
TCV_{OUT}	V_{OUT} Temperature Coefficient	— —	20 **40**	— —	ppm/°C	**Note 2**
$\Delta V_{OUT}/\Delta V_{IN}$	Line Regulation	—	0.05	**0.35**	%	$(V_R + 1V) \le V_{IN} \le 6V$
$\Delta V_{OUT}/V_{OUT}$	Load Regulation	—	0.5	**2.0**	%	I_L = 0.1 mA to I_{OUTMAX} **(Note 3)**
V_{IN}-V_{OUT}	Dropout Voltage	— — — —	2 65 85 180	— — **120** **250**	mV	I_L = 0.1 mA I_L = 20 mA I_L = 50 mA I_L = 100 mA **(Note 4)**, TC1073
I_{IN}	Supply Current	—	50	**80**	µA	$\overline{SHDN} = V_{IH}$, I_L = 0 **(Note 8)**
I_{INSD}	Shutdown Supply Current	—	0.05	0.5	µA	$\overline{SHDN}$ = 0V
PSRR	Power Supply Rejection Ratio	—	64	—	dB	$F_{RE} \le$ 1 kHz
I_{OUTSC}	Output Short Circuit Current	—	300	450	mA	V_{OUT} = 0V
$\Delta V_{OUT}/\Delta P_D$	Thermal Regulation	—	0.04	—	V/W	**Notes 5, 6**
T_{SD}	Thermal Shutdown Die Temperature	—	160	—	°C	
ΔT_{SD}	Thermal Shutdown Hysteresis	—	10	—	°C	
eN	Output Noise	—	260	—	nV/√Hz	$I_L = I_{OUTMAX}$ 470 pF from Bypass to GND

Note 1: V_R is the regulator output voltage setting. For example: V_R = 2.5V, 2.7V, 2.85V, 3.0V, 3.3V, 3.6V, 4.0V, 5.0V.

2: $TC\ V_{OUT} = \dfrac{(V_{OUTMAX} - V_{OUTMIN}) \times 10^6}{V_{OUT} \times \Delta T}$

3: Regulation is measured at a constant junction temperature using low duty cycle pulse testing. Load regulation is tested over a load range from 0.1 mA to the maximum specified output current. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

4: Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value.

5: Thermal Regulation is defined as the change in output voltage at a time T after a change in power dissipation is applied, excluding load or line regulation effects. Specifications are for a current pulse equal to I_{LMAX} at V_{IN} = 6V for T = 10 ms.

6: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction-to-air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation causes the device to initiate thermal shutdown. Please see **Section 5.0 "Thermal Considerations"** for more details.

7: Hysteresis voltage is referenced by V_R.

8: Apply for Junction Temperatures of -40°C to +85°C.

9: The minimum V_{IN} has to justify the conditions = $V_{IN} \ge V_R + V_{DROPOUT}$ and $V_{IN} \ge$ 2.7V for I_L = 0.1 mA to I_{OUTMAX}.

TC1072/TC1073 ELECTRICAL SPECIFICATIONS (CONTINUED)

Electrical Characteristics: Unless otherwise noted, $V_{IN} = V_{OUT} + 1V$, $I_L = 0.1$ mA, $C_L = 3.3$ µF, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$.
Boldface type specifications apply for junction temperatures of -40°C to +125°C.

Symbol	Parameter	Min	Typ	Max	Units	Test Conditions
$\overline{SHDN}$ Input						
V_{IH}	$\overline{SHDN}$ Input High Threshold	45	—	—	$\%V_{IN}$	V_{IN} = 2.5V to 6.5V
V_{IL}	$\overline{SHDN}$ Input Low Threshold	—	—	15	$\%V_{IN}$	V_{IN} = 2.5V to 6.5V
$\overline{ERROR}$ Open Drain Output						
V_{INMIN}	Minimum V_{IN} Operating Voltage	1.0	—	—	V	
V_{OL}	Output Logic Low Voltage	—	—	400	mV	1 mA Flows to $\overline{ERROR}$
V_{TH}	$\overline{ERROR}$ Threshold Voltage	—	0.95 x V_R	—	V	See Figure 4-2
V_{HYS}	$\overline{ERROR}$ Positive Hysteresis	—	50	—	mV	**Note 7**
t_{DELAY}	V_{OUT} to $\overline{ERROR}$ Delay	—	2.5	—	ms	Vout falling from V_R to V_R-10%

Note 1: V_R is the regulator output voltage setting. For example: V_R = 2.5V, 2.7V, 2.85V, 3.0V, 3.3V, 3.6V, 4.0V, 5.0V.

2: $TC\ V_{OUT} = \frac{(V_{OUTMAX} - V_{OUTMIN}) \times 10^6}{V_{OUT} \times \Delta T}$

3: Regulation is measured at a constant junction temperature using low duty cycle pulse testing. Load regulation is tested over a load range from 0.1 mA to the maximum specified output current. Changes in output voltage due to heating effects are covered by the thermal regulation specification.

4: Dropout voltage is defined as the input to output differential at which the output voltage drops 2% below its nominal value.

5: Thermal Regulation is defined as the change in output voltage at a time T after a change in power dissipation is applied, excluding load or line regulation effects. Specifications are for a current pulse equal to I_{LMAX} at V_{IN} = 6V for T = 10 ms.

6: The maximum allowable power dissipation is a function of ambient temperature, the maximum allowable junction temperature and the thermal resistance from junction-to-air (i.e., T_A, T_J, θ_{JA}). Exceeding the maximum allowable power dissipation causes the device to initiate thermal shutdown. Please see **Section 5.0 "Thermal Considerations"** for more details.

7: Hysteresis voltage is referenced by V_R.

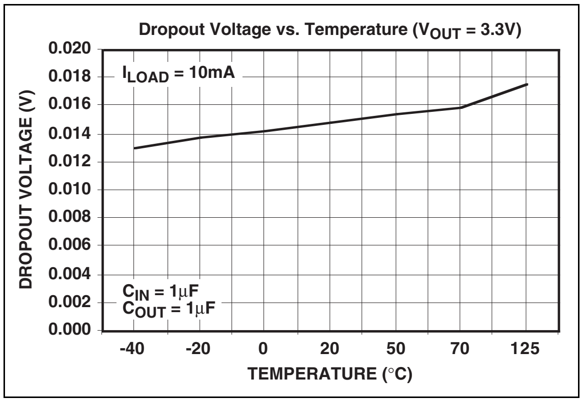
8: Apply for Junction Temperatures of -40°C to +85°C.

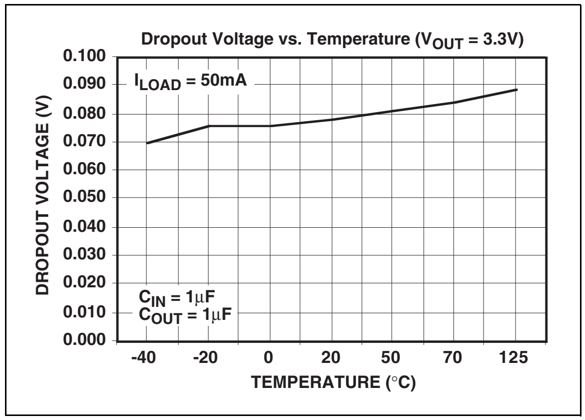
9: The minimum V_{IN} has to justify the conditions = $V_{IN} \geq V_R + V_{DROPOUT}$ and $V_{IN} \geq 2.7V$ for I_L = 0.1 mA to I_{OUTMAX}.

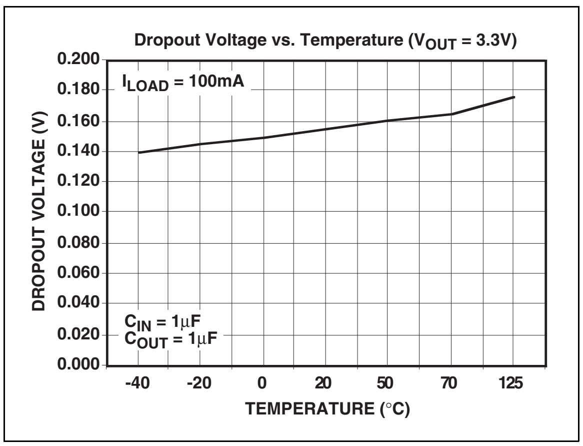
2.0 TYPICAL CHARACTERISTICS CURVES

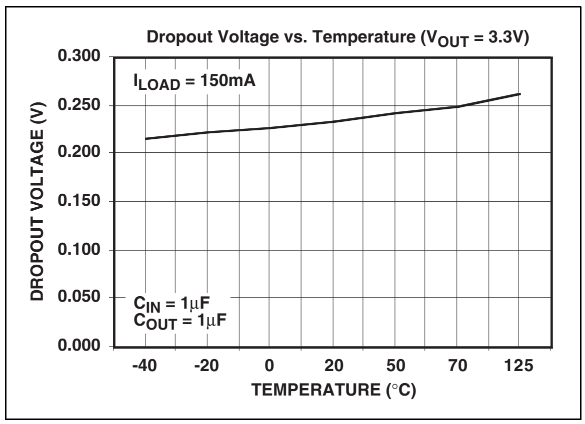
Note: The graphs and tables provided following this note are a statistical summary based on a limited number of samples and are provided for informational purposes only. The performance characteristics listed herein are not tested or guaranteed. In some graphs or tables, the data presented may be outside the specified operating range (e.g., outside specified power supply range) and therefore outside the warranted range.

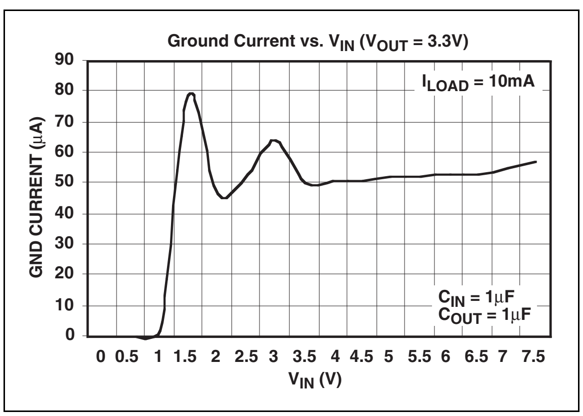
Note: Unless otherwise specified, all parts are measured at temperature = +25°C.

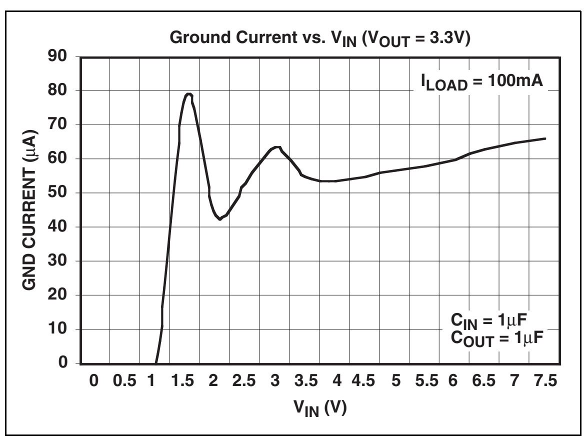




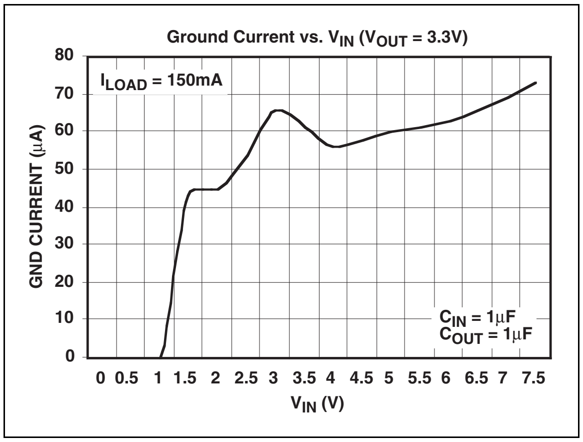


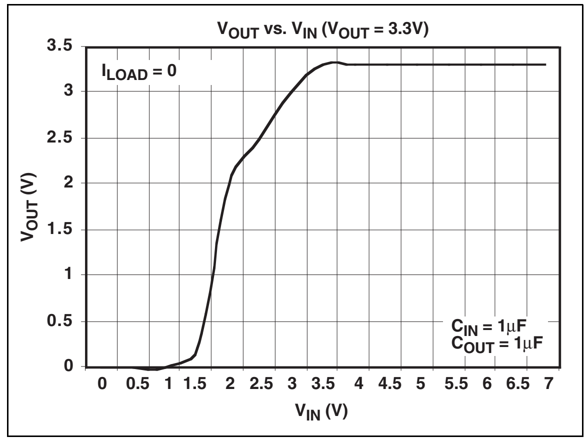


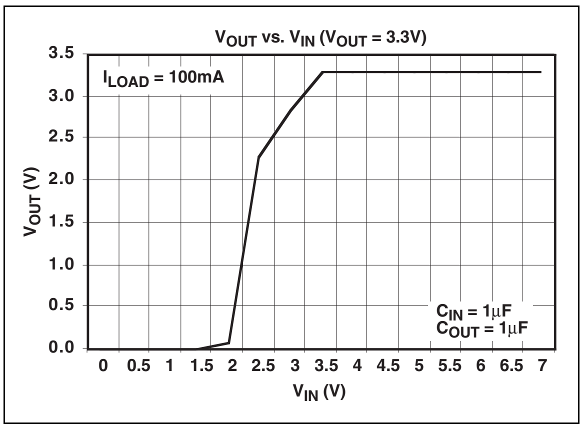


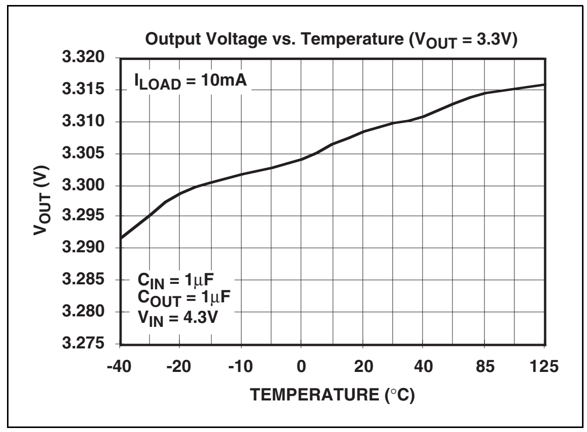


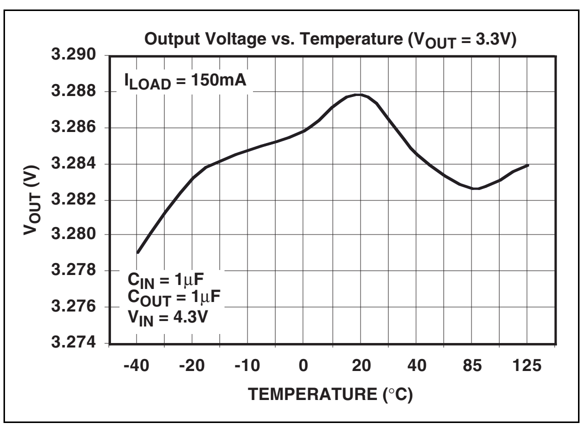
Note: Unless otherwise specified, all parts are measured at temperature = +25°C.



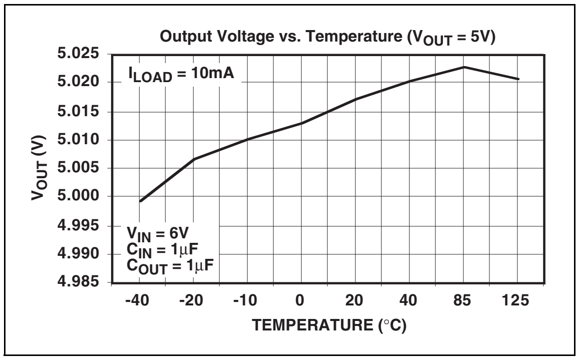


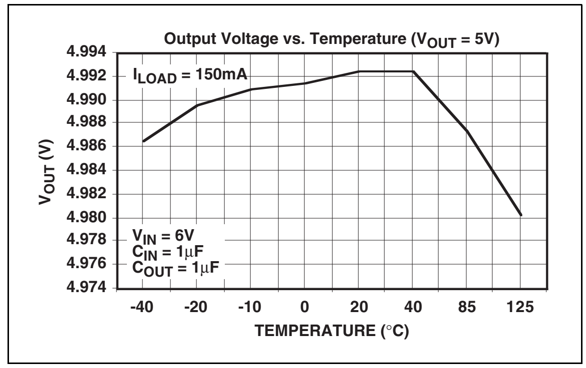


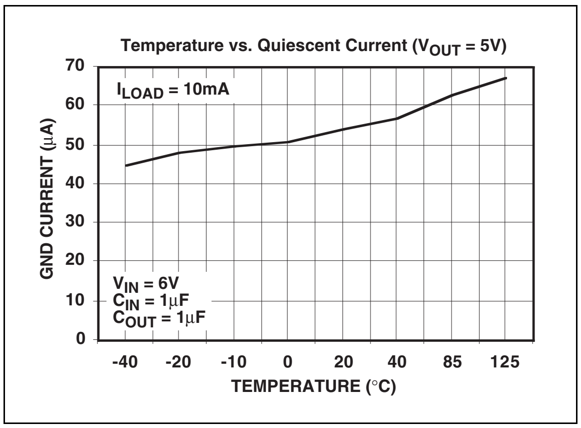


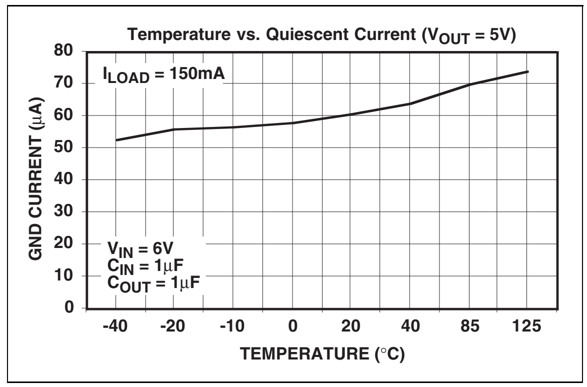


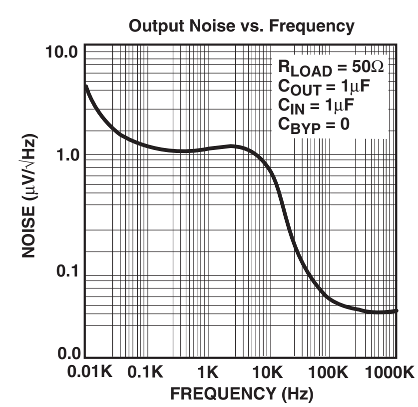
Note: Unless otherwise specified, all parts are measured at temperature = +25°C.

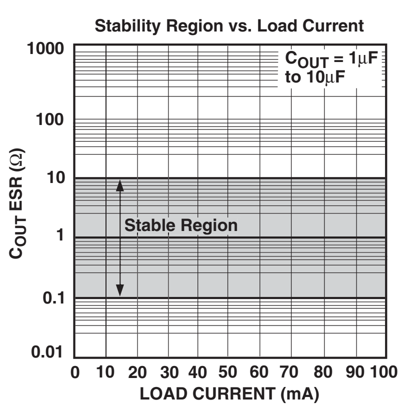


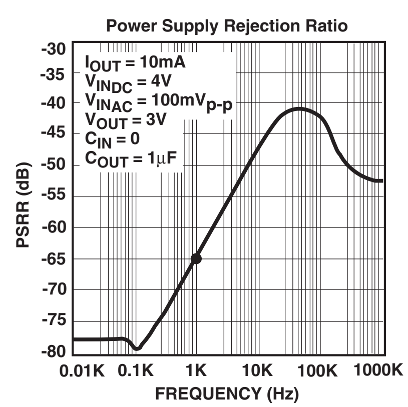








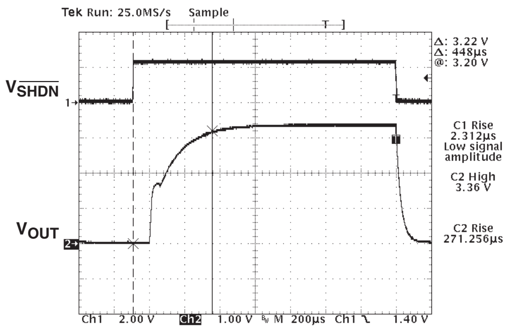




Note: Unless otherwise specified, all parts are measured at temperature = +25°C.

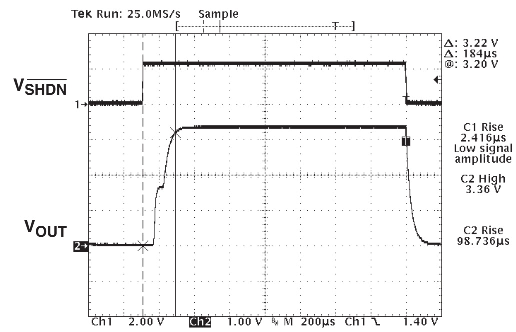
Measure Rise Time of 3.3V LDO with Bypass Capacitor

Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 470pF, I_{LOAD} = 100mA
V_{IN} = 4.3V, Temp = 25°C, Rise Time = 448µS



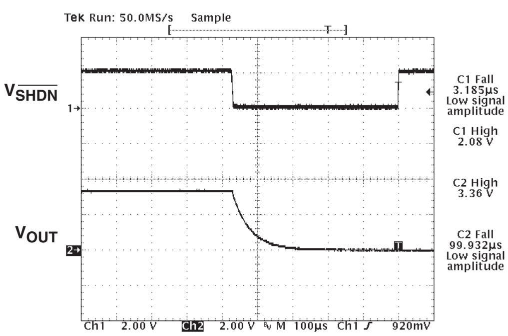
Measure Rise Time of 3.3V LDO without Bypass Capacitor

Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 0pF, I_{LOAD} = 100mA
V_{IN} = 4.3V, Temp = 25°C, Rise Time = 184µS



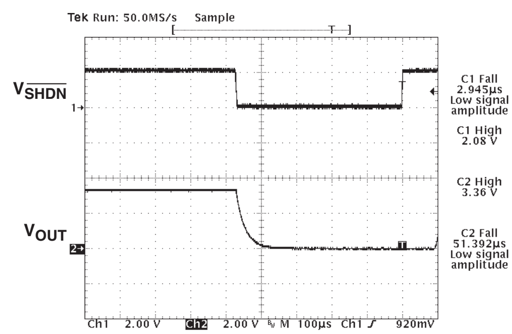
Measure Fall Time of 3.3V LDO with Bypass Capacitor

Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 470pF, I_{LOAD} = 50mA
V_{IN} = 4.3V, Temp = 25°C, Fall Time = 100µS



Measure Fall Time of 3.3V LDO without Bypass Capacitor

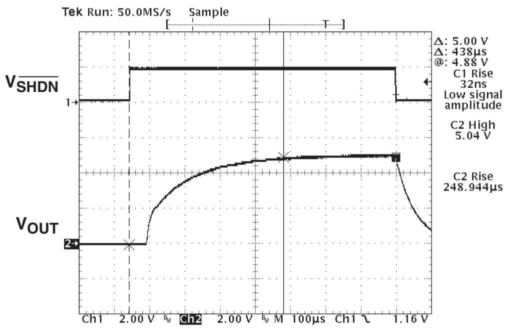
Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 0pF, I_{LOAD} = 100mA
V_{IN} = 4.3V, Temp = 25°C, Fall Time = 52µS



Note: Unless otherwise specified, all parts are measured at temperature = +25°C.

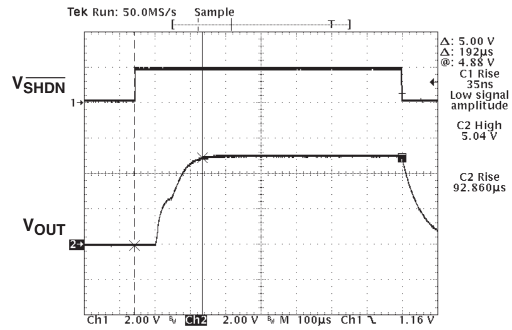
Measure Rise Time of 5.0V LDO with Bypass Capacitor

Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 470pF, I_{LOAD} = 100mA
V_{IN} = 6V, Temp = 25°C, Rise Time = 390µS



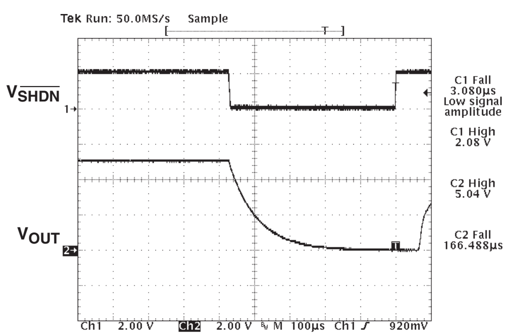
Measure Rise Time of 5.0V LDO without Bypass Capacitor

Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 0pF, I_{LOAD} = 100mA
V_{IN} = 6V, Temp = 25°C, Rise Time = 192µS



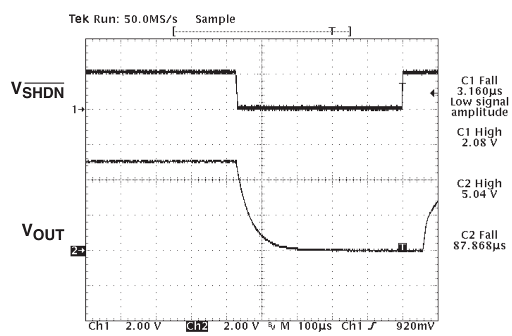
Measure Fall Time of 5.0V LDO with Bypass Capacitor

Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 470pF, I_{LOAD} = 50mA
V_{IN} = 6V, Temp = 25°C, Fall Time = 167µS



Measure Fall Time of 5.0V LDO without Bypass Capacitor

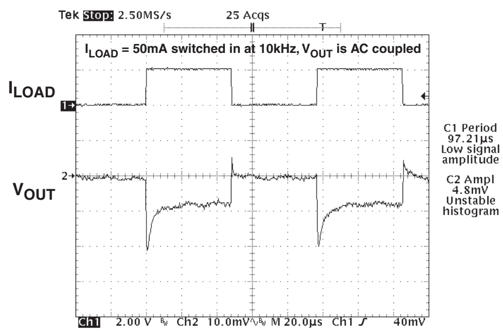
Conditions: C_{IN} = 1µF, C_{OUT} = 1µF, C_{BYP} = 0pF, I_{LOAD} = 100mA
V_{IN} = 6V, Temp = 25°C, Fall Time = 88µS



Note: Unless otherwise specified, all parts are measured at temperature = +25°C.

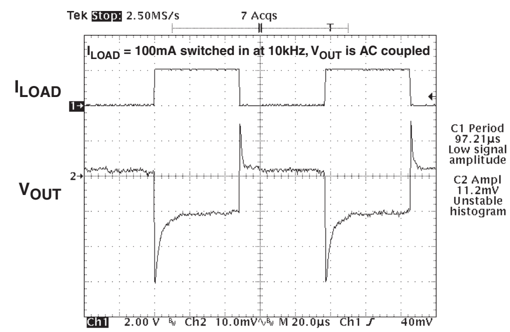
Load Regulation of 3.3V LDO

Conditions: C_{IN} = 1µF, C_{OUT} = 2.2µF, C_{BYP} = 470pF, V_{IN} = V_{OUT} + 0.25V, Temp = 25°C



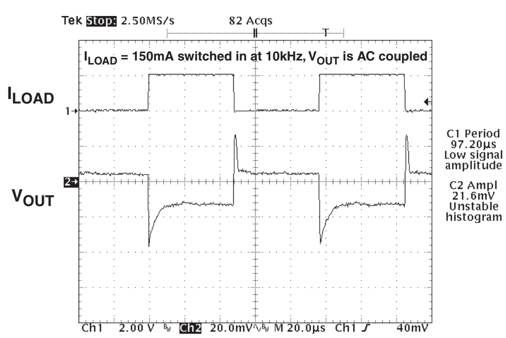
Load Regulation of 3.3V LDO

Conditions: C_{IN} = 1µF, C_{OUT} = 2.2µF, C_{BYP} = 470pF, V_{IN} = V_{OUT} + 0.25V, Temp = 25°C



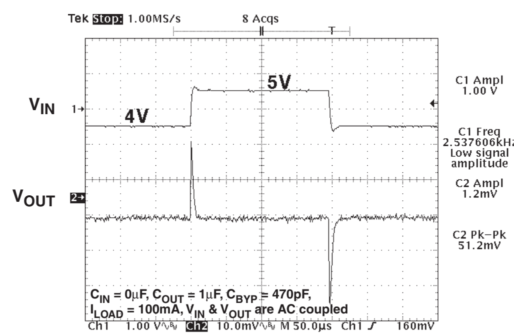
Load Regulation of 3.3V LDO

Conditions: C_{IN} = 1µF, C_{OUT} = 2.2µF, C_{BYP} = 470pF, V_{IN} = V_{OUT} + 0.25V, Temp = 25°C



Line Regulation of 3.3V LDO

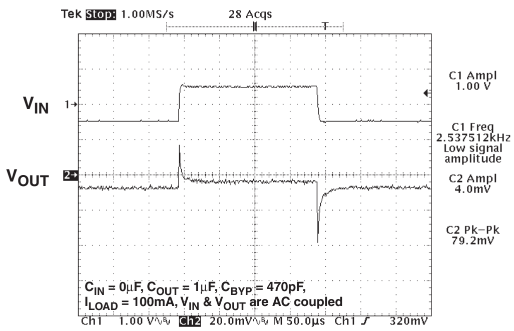
Conditions: V_{IN} = 4V, + 1V Squarewave @ 2.5kHz



Note: Unless otherwise specified, all parts are measured at temperature = +25°C.

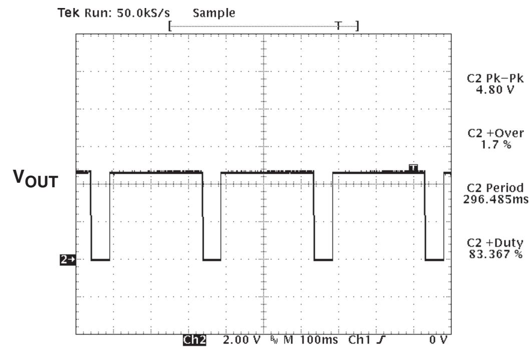
Line Regulation of 5.0V LDO

Conditions: V_{IN} = 6V, + 1V Squarewave @ 2.5kHz



Thermal Shutdown Response of 5.0V LDO

Conditions: V_{IN} = 6V, C_{IN} = 0µF, C_{OUT} = 1µF



I_{LOAD} was increased until temperature of die reached about 160°C, at which time integrated thermal protection circuitry shuts the regulator off when die temperature exceeds approximately 160°C. The regulator remains off until die temperature drops to approximately 150°C.

3.0 PIN DESCRIPTIONS

The descriptions of the pins are listed in Table 3-1.

TABLE 3-1: PIN FUNCTION TABLE

Pin No. (6-Pin SOT-23)	Symbol	Description
1	V_{IN}	Unregulated supply input.
2	GND	Ground terminal.
3	$\overline{SHDN}$	Shutdown control input.
4	$\overline{ERROR}$	Out-of-Regulation Flag. (Open drain output).
5	Bypass	Reference bypass input.
6	V_{OUT}	Regulated voltage output.

3.1 Input Voltage Supply (V_{IN})

Connect unregulated input supply to the V_{IN} pin. If there is a large distance between the input supply and the LDO regulator, some input capacitance is necessary for proper operation. A 1 µF capacitor connected from V_{IN} to ground is recommended for most applications.

3.2 Ground (GND)

Connect the unregulated input supply ground return to GND. Also connect the negative side of the 1 µF typical input decoupling capacitor close to GND and the negative side of the output capacitor C_{OUT} to GND.

3.3 Shutdown Control Input ($\overline{SHDN}$)

The regulator is fully enabled when a logic-high is applied to $\overline{SHDN}$. The regulator enters shutdown when a logic-low is applied to $\overline{SHDN}$. During shutdown, output voltage falls to zero, $\overline{ERROR}$ is open-circuited and supply current is reduced to 0.5 µA (maximum).

3.4 Out-Of-Regulation Flag ($\overline{ERROR}$)

$\overline{ERROR}$ goes low when V_{OUT} is out-of-tolerance by approximately – 5%.

3.5 Reference Bypass Input (Bypass)

Connecting a 470 pF to this input further reduces output noise.

3.6 Regulated Voltage Output (V_{OUT})

Connect the output load to V_{OUT} of the LDO. Also connect the positive side of the LDO output capacitor as close as possible to the V_{OUT} pin.

4.0 DETAILED DESCRIPTION

The TC1072 and TC1073 are precision fixed output voltage regulators. (If an adjustable version is desired, please see the TC1070/TC1071/TC1187 data sheet.) Unlike bipolar regulators, the TC1072 and TC1073's supply current does not increase with load current. In addition, V_{OUT} remains stable and within regulation over the entire 0 mA to I_{OUTMAX} load current range, (an important consideration in RTC and CMOS RAM battery back-up applications).

Figure 4-1 shows a typical application circuit. The regulator is enabled any time the shutdown input ($\overline{SHDN}$) is at or above V_{IH}, and shutdown (disabled) when $\overline{SHDN}$ is at or below V_{IL}. $\overline{SHDN}$ may be controlled by a CMOS logic gate, or I/O port of a microcontroller. If the $\overline{SHDN}$ input is not required, it should be connected directly to the input supply. While in shutdown, supply current decreases to 0.05 µA (typical), V_{OUT} falls to zero volts, and $\overline{ERROR}$ is open-circuited.

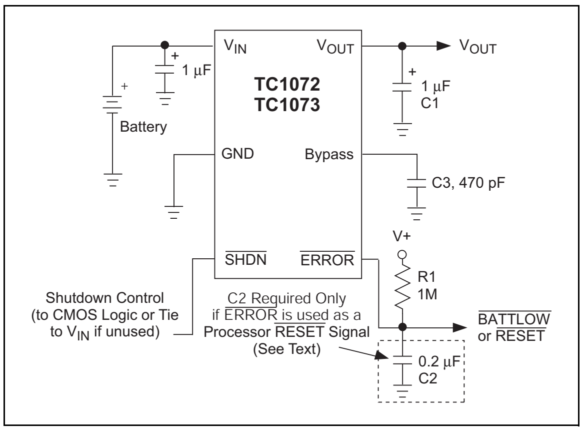


FIGURE 4-1: *Typical Application Circuit.*

4.1 $\overline{\text{ERROR}}$ Open-Drain Output

$\overline{ERROR}$ is driven low whenever V_{OUT} falls out of regulation by more than –5% (typical). This condition may be caused by low input voltage, output current limiting, or thermal limiting. The $\overline{ERROR}$ output voltage value (e.g. $\overline{ERROR}$ = V_{OL} at 4.75V (typical) for a 5.0V regulator and 2.85V (typical) for a 3.0V regulator). $\overline{ERROR}$ output operation is shown in Figure 4-2.

Note that $\overline{ERROR}$ is active tDELAY (typically, 2.5 µs) after V_{OUT} falls to V_{TH}, and inactive when V_{OUT} rises above V_{TH} by V_{HYS}.

As shown in Figure 4-1, $\overline{ERROR}$ can be used as a battery low flag, or as a processor $\overline{RESET}$ signal (with the addition of timing capacitor C_2). R_1 x C_2 should be chosen to maintain $\overline{ERROR}$ below V_{IH} of the processor $\overline{RESET}$ input for at least 200 ms to allow time for the system to stabilize. Pull-up resistor R_1 can be tied to V_{OUT}, V_{IN} or any other voltage less than (V_{IN} + 0.3V).

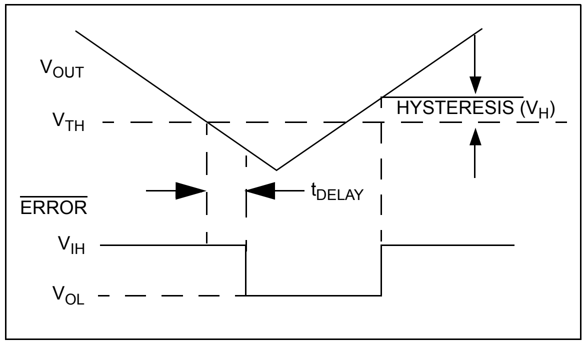


FIGURE 4-2: *$\overline{\text{Error}}$ Output Operation.*

4.2 Output Capacitor

A 1 µF (minimum) capacitor from V_{OUT} to ground is recommended. The output capacitor should have an effective series resistance greater than 0.1Ω and less than 5.0Ω, and a resonant frequency above 1 MHz. A 1 µF capacitor should be connected from V_{IN} to GND if there is more than 10 inches of wire between the regulator and the AC filter capacitor, or if a battery is used as the power source. Aluminum electrolytic or tantalum capacitor types can be used. (Since many aluminum electrolytic capacitors freeze at approximately -30°C, solid tantalums are recommended for applications operating below -25°C.) When operating from sources other than batteries, supply-noise rejection and transient response can be improved by increasing the value of the input and output capacitors and employing passive filtering techniques.

4.3 Bypass Input

A 470 pF capacitor connected from the Bypass input to ground reduces noise present on the internal reference, which in turn significantly reduces output noise. If output noise is not a concern, this input may be left unconnected. Larger capacitor values may be used, but results in a longer time period to rated output voltage when power is initially applied.

5.0 THERMAL CONSIDERATIONS

5.1 Thermal Shutdown

Integrated thermal protection circuitry shuts the regulator off when die temperature exceeds 160°C. The regulator remains off until the die temperature drops to approximately 150°C.

5.2 Power Dissipation

The amount of power the regulator dissipates is primarily a function of input and output voltage, and output current. The following equation is used to calculate worst-case *actual* power dissipation:

EQUATION 5-1:

$$P_D \approx (V_{INMAX} - V_{OUTMIN}) I_{LOADMAX}$$

Where:

P_D = Worst-case actual power dissipation
V_{INMAX} = Maximum voltage on V_{IN}
V_{OUTMIN} = Minimum regulator output voltage
$I_{LOADMAX}$ = Maximum output (load) current

The maximum *allowable* power dissipation (Equation 5-2) is a function of the maximum ambient temperature (T_{AMAX}), the maximum allowable die temperature (T_{JMAX}) and the thermal resistance from junction-to-air (θ_{JA}). The 6-Pin SOT-23 package has a θ_{JA} of approximately 220°C/Watt.

EQUATION 5-2:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$

where all terms are previously defined.

Equation 5-1 can be used in conjunction with Equation 5-2 to ensure regulator thermal operation is within limits. For example:

Given:

V_{INMAX} = 3.0V ±5%
V_{OUTMIN} = 2.7V – 2.5%
$I_{LOADMAX}$ = 40 mA
T_{JMAX} = 125°C
T_{AMAX} = 55°C

Find: 1. Actual power dissipation
2. Maximum allowable dissipation

Actual power dissipation:

$$P_D \approx (V_{INMAX} - V_{OUTMIN}) I_{LOADMAX}$$
$$= [(3.0 \times 1.05) - (2.7 \times 0.975)] \times 40 \times 10^{-3}$$
$$= 20.7\ mW$$

Maximum allowable power dissipation:

$$P_{DMAX} = \frac{(T_{JMAX} - T_{AMAX})}{\theta_{JA}}$$
$$= \frac{(125 - 55)}{220}$$
$$= 318\ mW$$

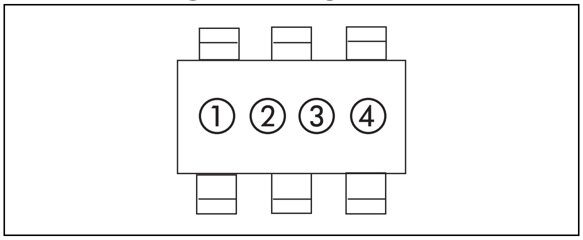
In this example, the TC1072 dissipates a maximum of 20.7 mW; below the allowable limit of 318 mW. In a similar manner, Equation 5-1 and Equation 5-2 can be used to calculate maximum current and/or input voltage limits.

5.3 Layout Considerations

The primary path of heat conduction out of the package is via the package leads. Therefore, layouts having a ground plane, wide traces at the pads, and wide power supply bus lines combine to lower θ_{JA} and therefore increase the maximum allowable power dissipation limit.

6.0 PACKAGING INFORMATION

6.1 Package Marking Information



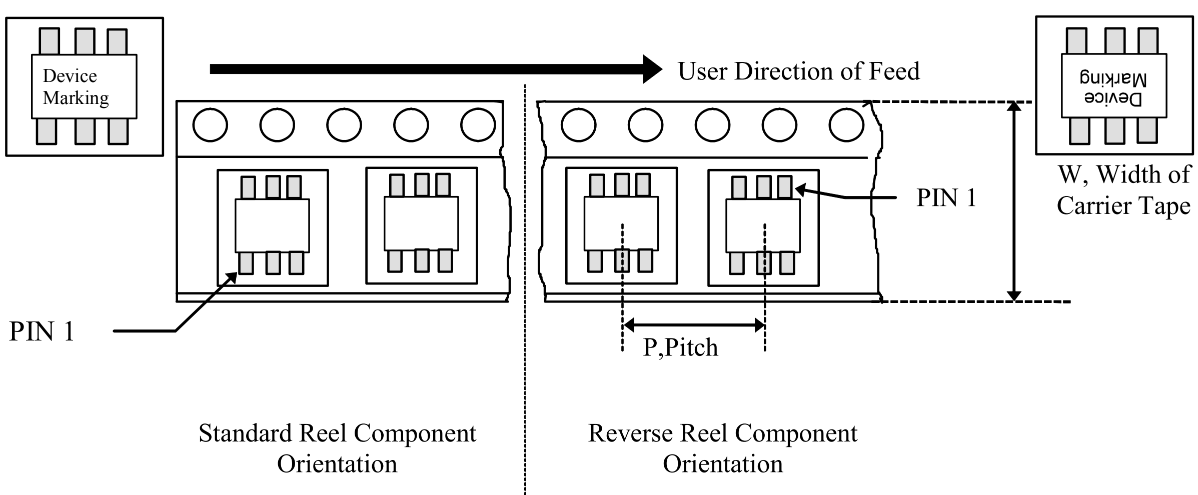
① & ② = part number code + threshold voltage (two-digit code)

(V)	TC1072 Code	TC1073 Code
1.8	EY	FY
2.5	E1	F1
2.6	ET	FT
2.7	E2	F2
2.8	EZ	FZ
2.85	E8	F8
3.0	E3	F3
3.3	E4	F4
3.6	E9	F9
4.0	E0	F0
5.0	E6	F6

③ represents year and quarter code

④ represents production lot ID code

6.2 Taping Form

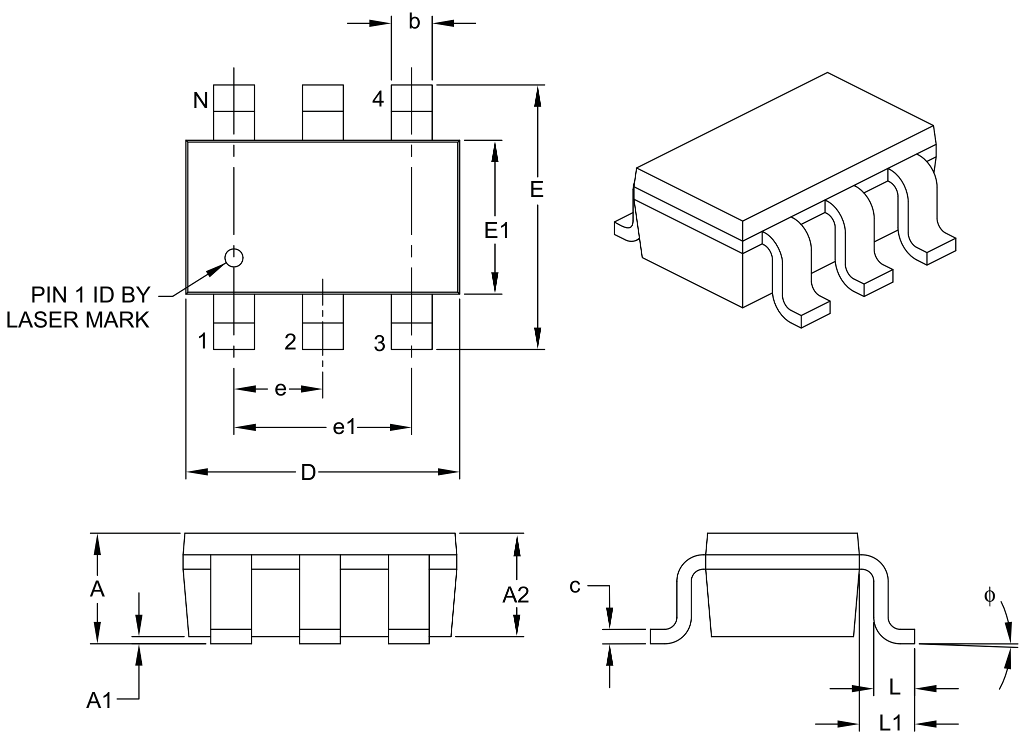


Carrier Tape, Number of Components per Reel and Reel Size

Package	Carrier Width (W)	Pitch (P)	Part Per Full Reel	Reel Size
6-Pin SOT-23	8 mm	4 mm	3000	7 in

6-Lead Plastic Small Outline Transistor (CH) [SOT-23]

Note:	For the most current package drawings, please see the Microchip Packaging Specification located at http://www.microchip.com/packaging



Units		MILLIMETERS		
Dimension Limits		MIN	NOM	MAX
Number of Pins	N	6		
Pitch	e	0.95 BSC		
Outside Lead Pitch	e1	1.90 BSC		
Overall Height	A	0.90	–	1.45
Molded Package Thickness	A2	0.89	–	1.30
Standoff	A1	0.00	–	0.15
Overall Width	E	2.20	–	3.20
Molded Package Width	E1	1.30	–	1.80
Overall Length	D	2.70	–	3.10
Foot Length	L	0.10	–	0.60
Footprint	L1	0.35	–	0.80
Foot Angle	ϕ	0°	–	30°
Lead Thickness	c	0.08	–	0.26
Lead Width	b	0.20	–	0.51

Notes:

1. Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed 0.127 mm per side.
2. Dimensioning and tolerancing per ASME Y14.5M.

BSC: Basic Dimension. Theoretically exact value shown without tolerances.

Microchip Technology Drawing C04-028B

NOTES:

APPENDIX A: REVISION HISTORY

Revision D (February 2007)

- **Page 1**: Ground current changed to 50 µA.
- Package type changed from SOT-23A to SOT-23.
- Added voltage options.
- T_{DELAY} added to Table 1-1.
- **Section 3.0 "Pin Descriptions"**: Added pin descriptions.
- **Section 4.1 "ERROR Open-Drain Output"**: Defined t_{DELAY}.
- Changed Figure 4-2.
- Updated Packaging Information.

Revision C (January 2006)

- Undocumented changes.

Revision B (May 2002)

- Undocumented changes.

Revision A (March 2002)

- Original Release of this Document.

NOTES:

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

PART NO.	—	X.X	X	XXXXX
Device		Threshold Voltage	Temperature Range	Package

Device	TC1072:	CMOS LDO with Shutdown, $\overline{ERROR}$ Output & V_{REF} Bypass
	TC1073:	CMOS LDO with Shutdown, $\overline{ERROR}$ Output & V_{REF} Bypass
Threshold voltage (typical)	1.8 =	1.8V
	2.5 =	2.5V
	2.6 =	2.6V
	2.7 =	2.7V
	2.8 =	2.8V
	2.85 =	2.85V
	3.0 =	3.0V
	3.3 =	3.3V
	3.6 =	3.6V
	4.0 =	4.0V
	5.0 =	5.0V
Temperature Range	V	= -40° C to +125° C
Package	CH713 =	Plastic small outline transistor (CH) SOT-23, 6 lead, (tape and reel).

Examples:

a) TC1072-1.8VCH713: 1.8V
b) TC1072-2.5VCH713 2.5V
c) TC1072-2.6VCH713 2.6V
d) TC1072-2.7VCH713 2.7V
e) TC1072-2.8VCH713 2.8V
f) TC1072-2.85VCH713 2.85V
g) TC1072-3.0VCH713 3.0V
h) TC1072-3.3VCH713 3.3V
i) TC1072-3.6VCH713 3.6V
j) TC1072-4.0VCH713 4.0V
k) TC1072-5.0VCH713 5.0V

a) TC1073-1.8VCH713: 1.8V
b) TC1073-2.5VCH713 2.5V
c) TC1073-2.6VCH713 2.6V
d) TC1073-2.7VCH713 2.7V
e) TC1073-2.8VCH713 2.8V
f) TC1073-2.85VCH713 2.85V
g) TC1073-3.0VCH713 3.0V
h) TC1073-3.3VCH713 3.3V
i) TC1073-3.6VCH713 3.6V
j) TC1073-4.0VCH713 4.0V
k) TC1073-5.0VCH713 5.0V

NOTES:

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