TC1054/TC1055/TC1186

50 mA, 100 mA and 150 mA CMOS LDOs with Shutdown and $\overline{\text{ERROR}}$ Output

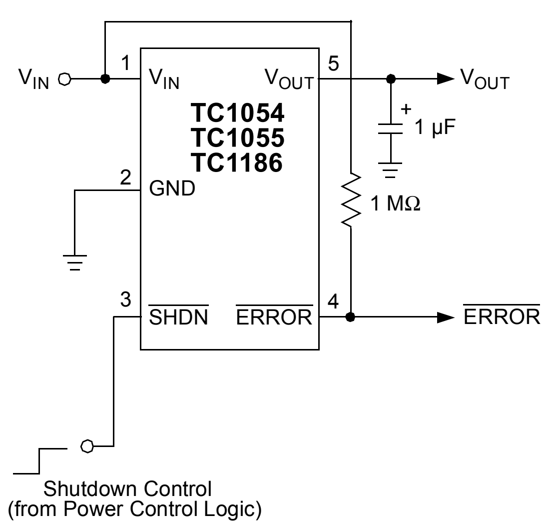
Features

- Low Ground Current for Longer Battery Life
- Low Dropout Voltage
- Choice of 50 mA (TC1054), 100 mA (TC1055) and 150 mA (TC1186) 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 Microcontroller Reset Generator
- Over-Current and Over-Temperature Protection
- 5-Pin SOT-23A Package
- Pin Compatible Upgrades for Bipolar Regulators

Applications

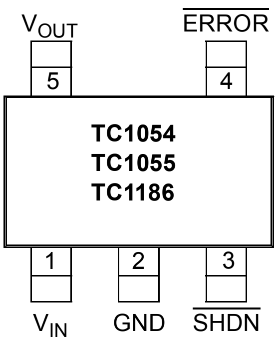
- Battery Operated Systems
- Portable Computers
- Medical Instruments
- Instrumentation
- Cellular/GSM/PHS Phones
- Linear Post-Regulators for SMPS
- Pagers

Typical Application



Package Type

5-Pin SOT-23A



NOTE: 5-Pin SOT-23A is equivalent to the EIAJ (SC-74A)

General Description

The TC1054, TC1055 and TC1186 are high accuracy (typically ±0.5%) CMOS upgrades for older (bipolar) low dropout regulators. Designed specifically for battery-operated systems, the devices' CMOS construction minimizes ground current, 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 low noise operation, low dropout voltage – typically 85 mV (TC1054), 180 mV (TC1055) and 270 mV (TC1186) 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), with both V_{OUT} and $\overline{\text{ERROR}}$ disabled when the shutdown input is low. The devices incorporate both over-temperature and over-current protection.

The TC1054, TC1055 and TC1186 are stable with an output capacitor of only 1 µF and have a maximum output current of 50 mA, 100 mA and 150 mA, respectively. For higher output current regulators, please refer to the TC1173 (I_{OUT} = 300 mA) data sheet (DS21632).

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 Junction Temperature Range ..-40°C < T_J < 125°C
Storage Temperature ....-65°C to +150°C

† 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.

DC CHARACTERISTICS

Electrical Specifications: Unless otherwise noted, $V_{IN} = V_{OUT}$ + 1V, I_L = 100 µA, 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.

Parameters	Sym	Min	Typ	Max	Units	Conditions
Input Operating Voltage	V_{IN}	**2.7**	—	**6.0**	V	**Note 8**
Maximum Output Current	I_{OUTMAX}	**50** **100** **150**	— — —	— — —	mA	TC1054 TC1055 TC1186
Output Voltage	V_{OUT}	**V_R – 2.5%**	V_R ±0.5%	**V_R + 2.5%**	V	**Note 1**
V_{OUT} Temperature Coefficient	TCV_{OUT}	— —	20 **40**	— —	ppm/°C	**Note 2**
Line Regulation	$\Delta V_{OUT}/\Delta V_{IN}$	—	0.05	**0.35**	%	(V_R + 1V) ≤ V_{IN} ≤ 6V
Load Regulation: TC1054; TC1055 TC1186	$\Delta V_{OUT}/V_{OUT}$	 — —	 0.5 0.5	 **2** **3**	 %	**(Note 3)** I_L = 0.1 mA to I_{OUTMAX} I_L = 0.1 mA to I_{OUTMAX}
Dropout Voltage: TC1055; TC1186 TC1186	V_{IN}-V_{OUT}	— — — — —	2 65 85 180 270	— — **120** **250** **400**	mV	I_L = 100 µA I_L = 20 mA I_L = 50 mA I_L = 100 mA I_L = 150 mA **(Note 4)**
Supply Current	I_{IN}	—	50	**80**	µA	$\overline{SHDN} = V_{IH}$, I_L = 0 µA **(Note 9)**
Shutdown Supply Current	I_{INSD}	—	0.05	0.5	µA	$\overline{SHDN}$ = 0V
Power Supply Rejection Ratio	PSRR	—	64	—	dB	f ≤ 1 kHz
Output Short Circuit Current	I_{OUTsc}	—	300	450	mA	V_{OUT} = 0V
Thermal Regulation	$\Delta V_{OUT}/\Delta P_D$	—	0.04	—	V/W	**Notes 5, 6**
Thermal Shutdown Die Temperature	T_{SD}	—	160	—	°C	
Thermal Shutdown Hysteresis	ΔT_{SD}	—	10	—	°C	

Note 1: V_R is the regulator output voltage setting. For example: V_R = 1.8V, 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 msec.

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

9: Apply for junction temperatures of -40C to +85C.

DC CHARACTERISTICS (CONTINUED)

Electrical Specifications: Unless otherwise noted, $V_{IN} = V_{OUT} + 1V$, $I_L = 100\ \mu A$, $C_L = 3.3\ \mu F$, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$.
Boldface type specifications apply for junction temperatures of -40°C to +125°C.

Parameters	Sym	Min	Typ	Max	Units	Conditions
Output Noise	eN	—	260	—	$nV/\sqrt{Hz}$	$I_L = I_{OUTMAX}$
$\overline{SHDN}$ Input						
$\overline{SHDN}$ Input High Threshold	V_{IH}	45	—	—	$\%V_{IN}$	V_{IN} = 2.5V to 6.5V
$\overline{SHDN}$ Input Low Threshold	V_{IL}	—	—	15	$\%V_{IN}$	V_{IN} = 2.5V to 6.5V
$\overline{ERROR}$ Output						
Minimum V_{IN} Operating Voltage	V_{INMIN}	1.0	—	—	V	
Output Logic Low Voltage	V_{OL}	—	—	400	mV	1 mA Flows to $\overline{ERROR}$
$\overline{ERROR}$ Threshold Voltage	V_{TH}	—	0.95 x V_R	—	V	See **Figure 4-2**
$\overline{ERROR}$ Positive Hysteresis	V_{HYS}	—	50	—	mV	**Note 7**

Note 1: V_R is the regulator output voltage setting. For example: V_R = 1.8V, 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 msec.

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: 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}.

9: Apply for junction temperatures of -40C to +85C.

2.0 TYPICAL PERFORMANCE 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 indicated, $V_{IN} = V_{OUT} + 1V$, $I_L = 100\ \mu A$, $C_L = 3.3\ \mu F$, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$.

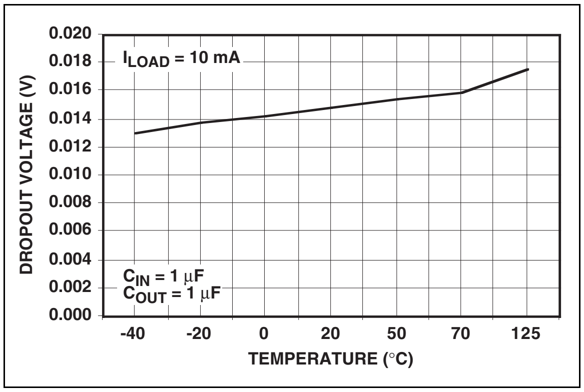


FIGURE 2-1: *Dropout Voltage vs. Temperature (I_{LOAD} = 10 mA).*

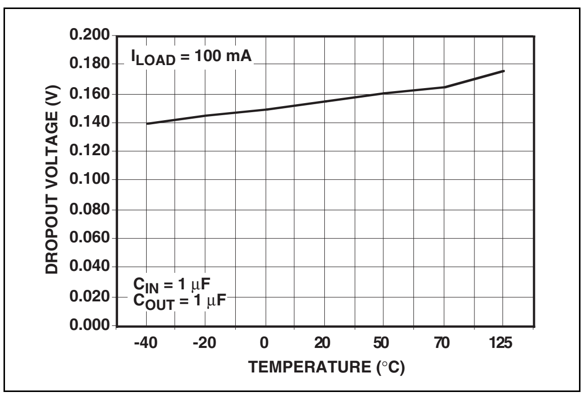


FIGURE 2-2: *Dropout Voltage vs. Temperature (I_{LOAD} = 100 mA).*

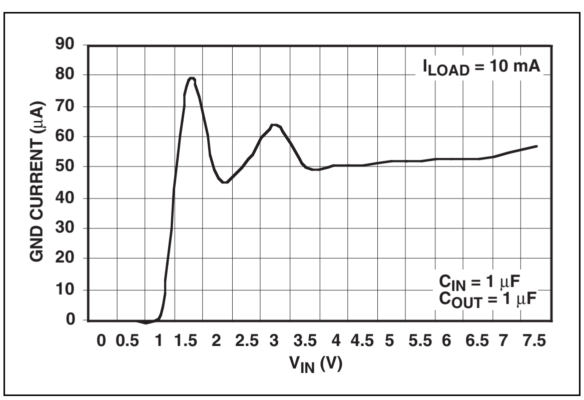


FIGURE 2-3: *Ground Current vs. V_{IN} (I_{LOAD} = 10 mA).*

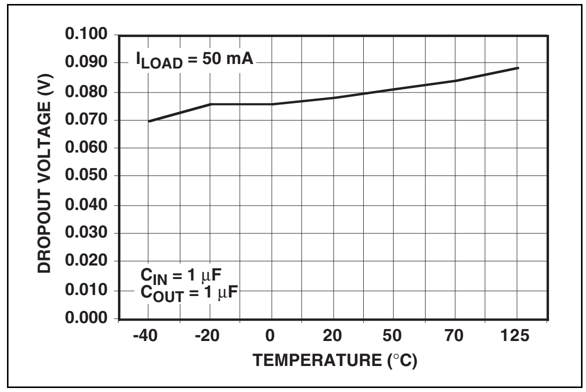


FIGURE 2-4: *Dropout Voltage vs. Temperature (I_{LOAD} = 50 mA).*

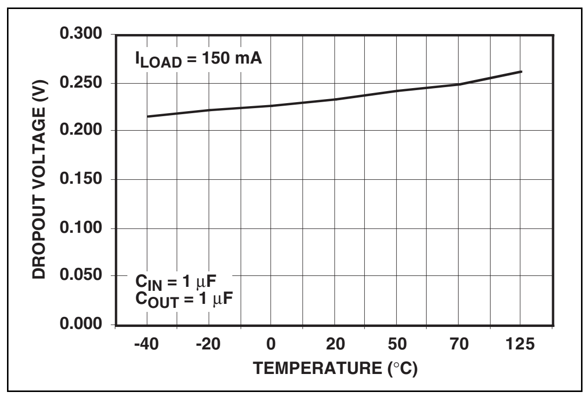


FIGURE 2-5: *Dropout Voltage vs. Temperature (I_{LOAD} = 150 mA).*

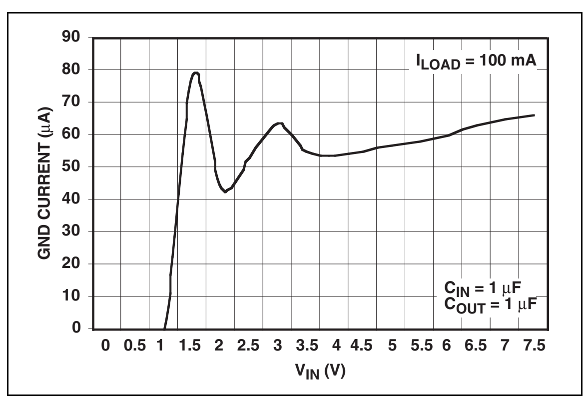


FIGURE 2-6: *Ground Current vs. V_{IN} (I_{LOAD} = 100 mA).*

Note: Unless otherwise indicated, $V_{IN} = V_{OUT} + 1V$, $I_L = 100\ \mu A$, $C_L = 3.3\ \mu F$, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$.

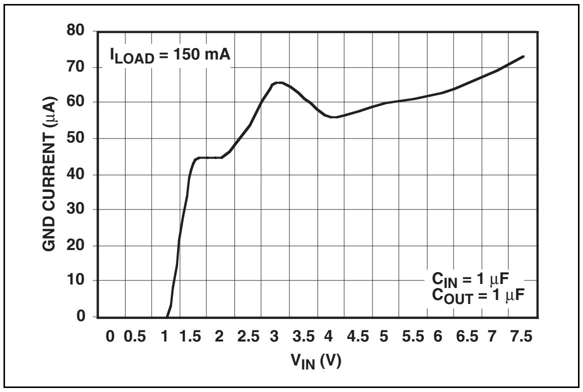


FIGURE 2-7: *Ground Current vs. V_{IN} (I_{LOAD} = 150 mA).*

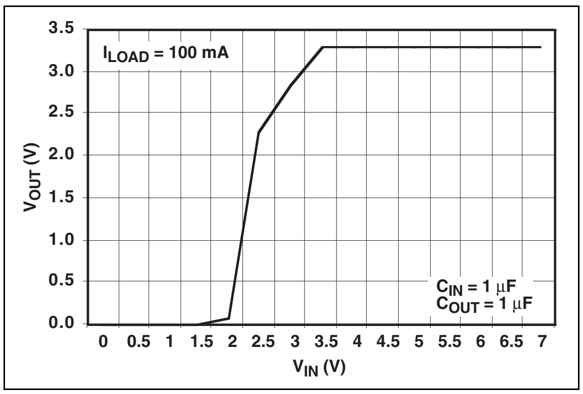


FIGURE 2-8: *V_{OUT} vs. V_{IN} (I_{LOAD} = 100 mA).*

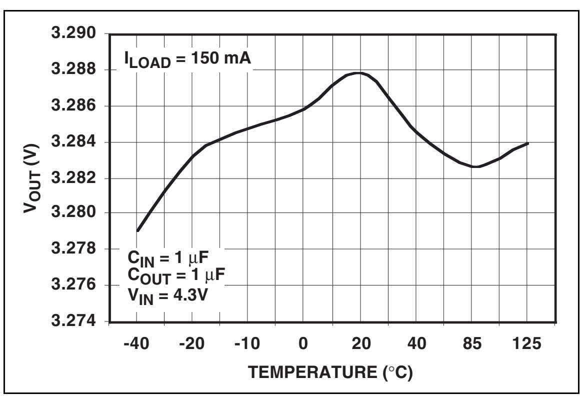


FIGURE 2-9: *V_{OUT} vs. V_{IN} (I_{LOAD} = 150 mA).*

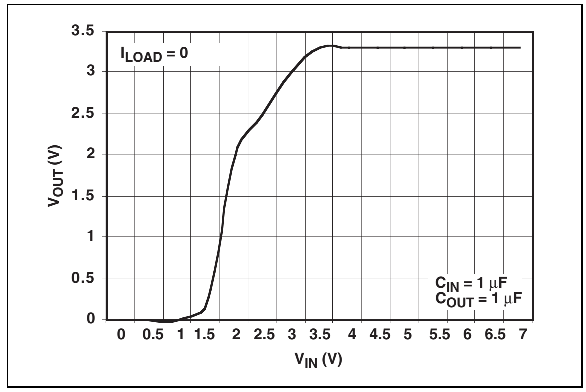


FIGURE 2-10: *V_{OUT} vs. V_{IN} (I_{LOAD} = 0 mA).*

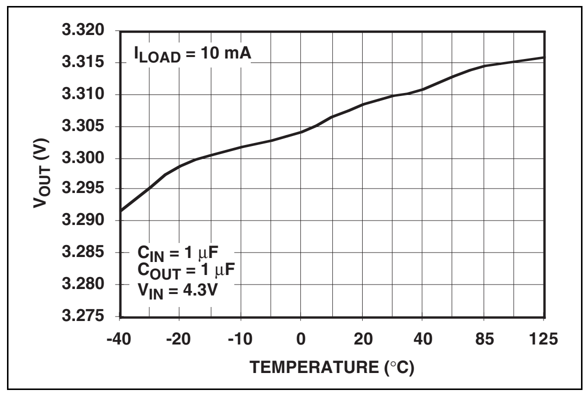


FIGURE 2-11: *Output Voltage (3.3V) vs. Temperature (I_{LOAD} = 10 mA).*

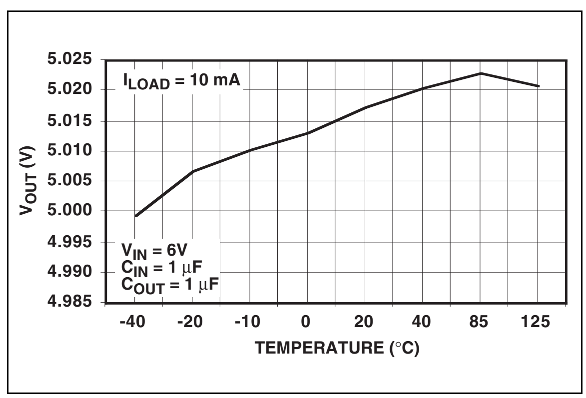


FIGURE 2-12: *Output Voltage (5V) vs. Temperature (I_{LOAD} = 10 mA).*

Note: Unless otherwise indicated, $V_{IN} = V_{OUT} + 1V$, $I_L = 100\ \mu A$, $C_L = 3.3\ \mu F$, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$.

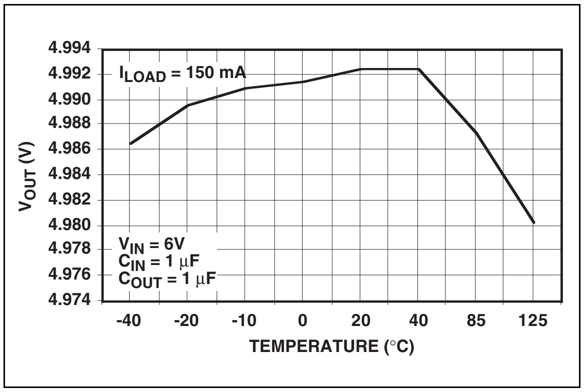


FIGURE 2-13: *Output Voltage (5V) vs. Temperature (I_{LOAD} = 10 mA).*

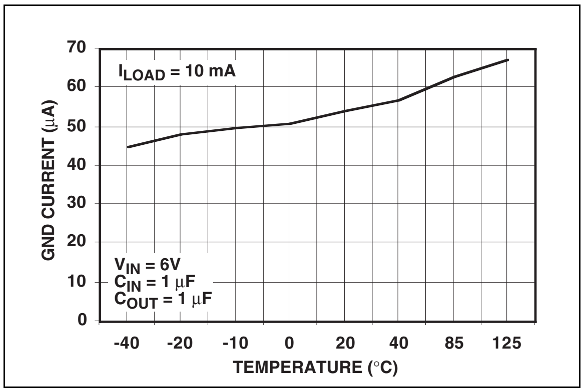


FIGURE 2-14: *GND Current vs. Temperature (I_{LOAD} = 10 mA).*

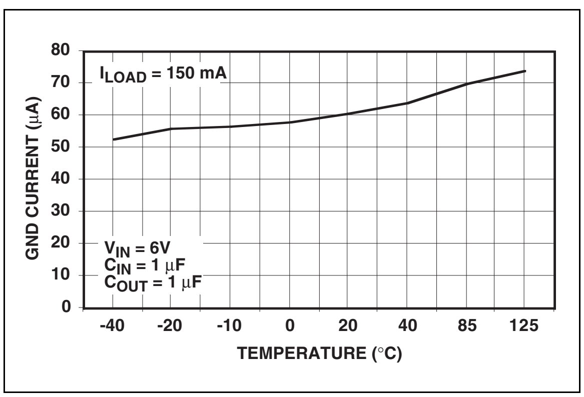


FIGURE 2-15: *GND Current vs. Temperature (I_{LOAD} = 150 mA).*

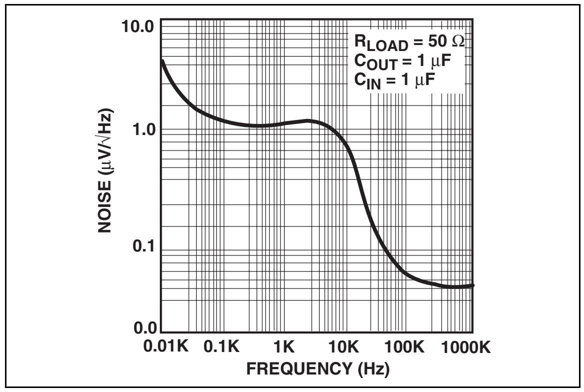


FIGURE 2-16: *Output Noise vs. Frequency.*

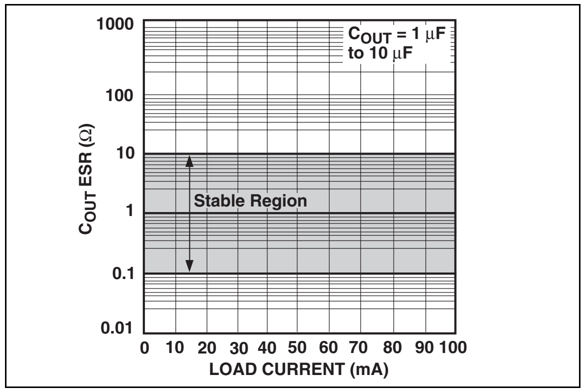
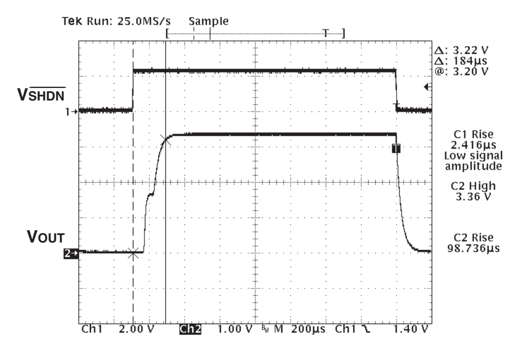


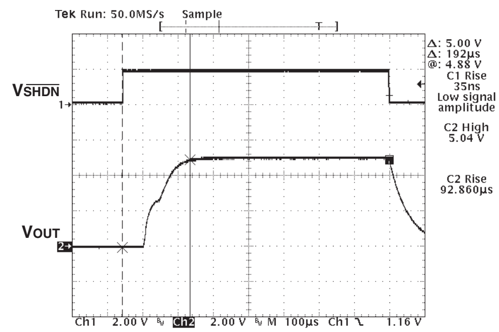
FIGURE 2-17: *Stability Region vs. Load Current.*



Conditions: C_{IN} = 1 µF, C_{OUT} = 1 µF, I_{LOAD} = 100 mA, V_{IN} = 4.3V, Temp = +25°C, Fall Time = 184 µs

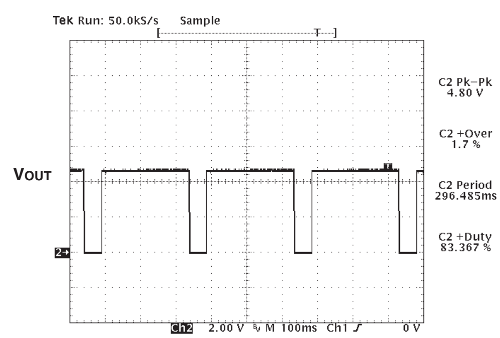
FIGURE 2-18: *Measure Rise Time of 3.3V LDO.*

Note: Unless otherwise indicated, $V_{IN} = V_{OUT} + 1V$, $I_L = 100\ \mu A$, $C_L = 3.3\ \mu F$, $\overline{SHDN} > V_{IH}$, $T_A = +25°C$.



Conditions: $C_{IN} = 1\ \mu F$, $C_{OUT} = 1\ \mu F$, $I_{LOAD} = 100\ mA$, $V_{IN} = 6V$, Temp = +25°C, Fall Time = 192 µs

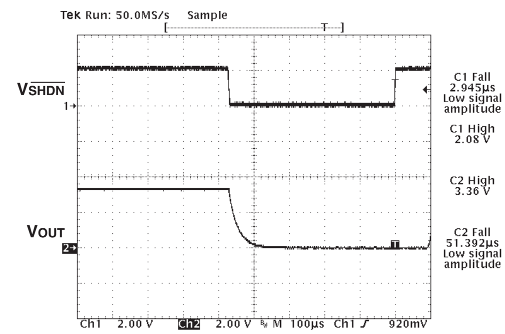
FIGURE 2-19: *Measure Rise Time of 5.0V LDO.*



Conditions: $V_{IN} = 6V$, $C_{IN} = 0\ \mu F$, $C_{OUT} = 1\ \mu F$

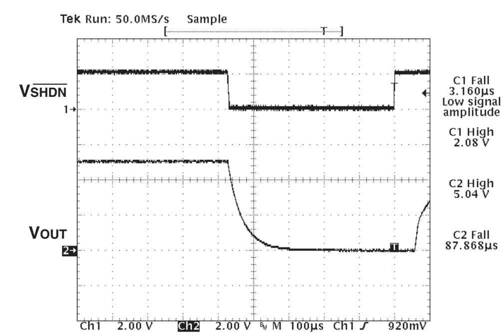
I_{LOAD} was increased until temperature of die reached about 160°C, at which time integrated thermal protection circuitry shuts the regulator off when die temperature exceeds approximately 160°C. The regulator remains off until die temperature drops to approximately 150°C.

FIGURE 2-20: *Thermal Shutdown Response of 5.0V LDO.*



Conditions: $C_{IN} = 1\ \mu F$, $C_{OUT} = 1\ \mu F$, $I_{LOAD} = 100\ mA$, $V_{IN} = 4.3V$, Temp = +25°C, Fall Time = 52 µs

FIGURE 2-21: *Measure Fall Time of 3.3V LDO.*



Conditions: $C_{IN} = 1\ \mu F$, $C_{OUT} = 1\ \mu F$, $I_{LOAD} = 100\ mA$, $V_{IN} = 6V$, Temp = +25°C, Fall Time = 88 µs

FIGURE 2-22: *Measure Fall Time of 5.0V LDO.*

3.0 PIN DESCRIPTIONS

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

TABLE 3-1: PIN FUNCTION TABLE

Pin No.	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	V_{OUT}	Regulated voltage output

3.1 Unregulated Supply Input (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 Terminal (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 (max).

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

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

3.5 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 TC1054, TC1055 and TC1186 are precision fixed output voltage regulators (If an adjustable version is desired, please see the TC1070/TC1071/TC1187 data sheet (DS21353)). Unlike bipolar regulators, the TC1054, TC1055 and TC1186 supply current does not increase with load current.

Figure 4-1 shows a typical application circuit, where 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.

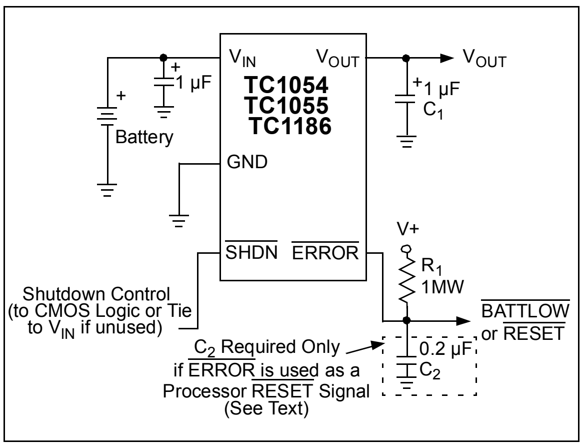


FIGURE 4-1: *Typical Application Circuit.*

4.1 $\overline{ERROR}$ 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 $\overline{ERROR}$ threshold is 5% below rated V_{OUT}, regardless of the programmed output voltage value (e.g. $\overline{ERROR}$ = V_{OL} at 4.75V (typ.) for a 5.0V regulator and 2.85V (typ.) for a 3.0V regulator). $\overline{ERROR}$ output operation is shown in Figure 4-2.

Note that $\overline{ERROR}$ is active when 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 either 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 msec 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).

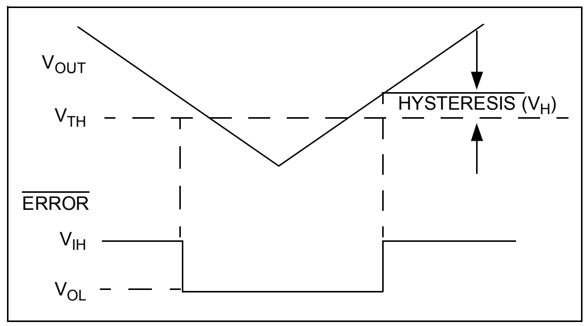


FIGURE 4-2: *$\overline{Error}$ Output Operation.*

4.2 Output Capacitor

A 1 µF (min) 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, with 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.

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 voltage, 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 5-Pin SOT-23A 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:

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

Maximum allowable power dissipation:

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

In this example, the TC1054 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.

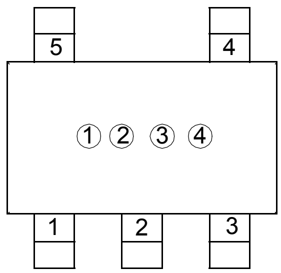
5.3 Layout Considerations

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

5-Pin SOT-23A



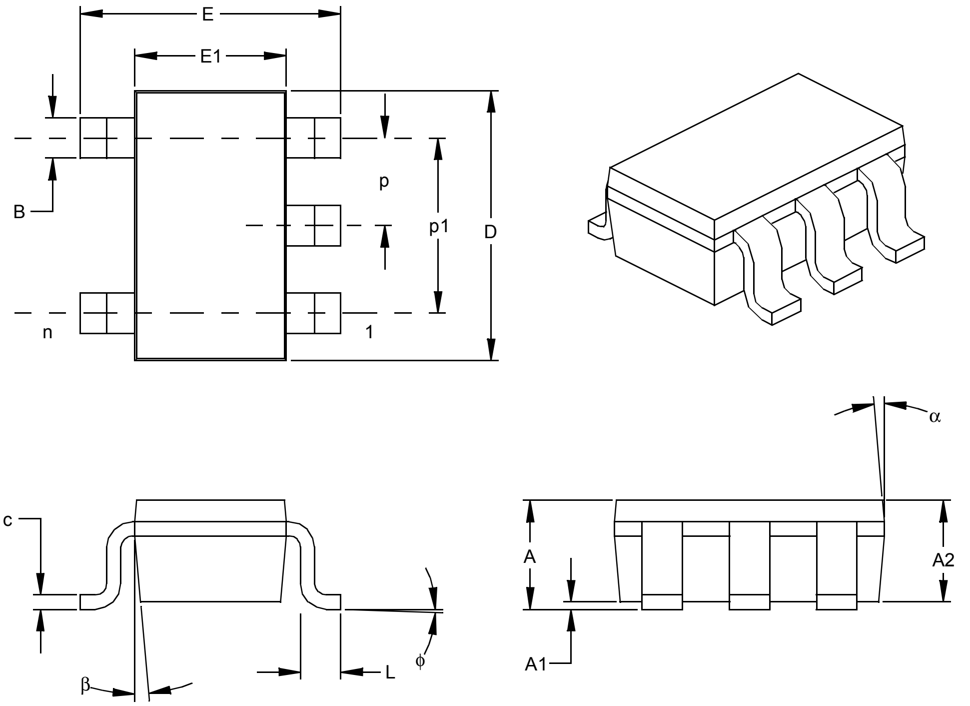
①&② represents part number code + temperature range and voltage

(V)	TC1054 Code	TC1055 Code	TC1186 Code
1.8	CY	DY	PY
2.5	C1	D1	P1
2.7	C2	D2	P2
2.8	CZ	DZ	PZ
2.85	C8	D8	P8
3.0	C3	D3	P3
3.3	C4	D4	P5
3.6	C9	D9	P9
4.0	C0	D0	P0
5.0	C6	D6	P7

③ represents year and quarter code

④ represents lot ID number

5-Lead Plastic Small Outline Transistor (OT) (SOT23)



Units		INCHES*			MILLIMETERS		
Dimension Limits		MIN	NOM	MAX	MIN	NOM	MAX
Number of Pins	n		5			5	
Pitch	p		.038			0.95	
Outside lead pitch (basic)	p1		.075			1.90	
Overall Height	A	.035	.046	.057	0.90	1.18	1.45
Molded Package Thickness	A2	.035	.043	.051	0.90	1.10	1.30
Standoff §	A1	.000	.003	.006	0.00	0.08	0.15
Overall Width	E	.102	.110	.118	2.60	2.80	3.00
Molded Package Width	E1	.059	.064	.069	1.50	1.63	1.75
Overall Length	D	.110	.116	.122	2.80	2.95	3.10
Foot Length	L	.014	.018	.022	0.35	0.45	0.55
Foot Angle	ϕ	0	5	10	0	5	10
Lead Thickness	c	.004	.006	.008	0.09	0.15	0.20
Lead Width	B	.014	.017	.020	0.35	0.43	0.50
Mold Draft Angle Top	α	0	5	10	0	5	10
Mold Draft Angle Bottom	β	0	5	10	0	5	10

* Controlling Parameter
§ Significant Characteristic

Notes:
Dimensions D and E1 do not include mold flash or protrusions. Mold flash or protrusions shall not exceed .010” (0.254mm) per side.
JEDEC Equivalent: MO-178
Drawing No. C04-091

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	/XX
Device	Temperature Range	Package

Device:	TC1054:	50 mA LDO with Shutdown & /Error output
	TC1055:	100 mA LDO with Shutdown & /Error output
	TC1186:	150 mA LDO with Shutdown & /Error output
Temperature Range:	V =	-40°C to +125°C
Package:	CT713 =	5L SOT-23A, Tape and Reel

Examples:

a) TC1054-1.8VCT713: 50 mA LDO, 1.8V
b) TC1054-2.8VCT713: 50 mA LDO, 2.8V
c) TC1054-3.3VCT713: 50 mA LDO, 3.3V
d) TC1054-5.0VCT713: 50 mA LDO, 5.0V

a) TC1055-2.5VCT713: 100 mA LDO, 2.5V
b) TC1055-2.85VCT713: 100 mA LDO, 2.85V
c) TC1055-3.6VCT713: 100 mA LDO, 3.6V
d) TC1055-5.0VCT713: 100 mA LDO, 5.0V

a) TC1186-2.7VCT713: 150 mA LDO, 2.7V
b) TC1186-2.85VCT713: 150 mA LDO, 2.85V
c) TC1186-4.0VCT713: 150 mA LDO, 4.0V
d) TC1186-5.0VCT713: 150 mA LDO, 5.0V

Sales and Support

Data Sheets
Products supported by a preliminary Data Sheet may have an errata sheet describing minor operational differences and recommended workarounds. To determine if an errata sheet exists for a particular device, please contact one of the following:

1. Your local Microchip sales office
2. The Microchip Corporate Literature Center U.S. FAX: (480) 792-7277
3. The Microchip Worldwide Site (www.microchip.com)

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