

# ILC7070

## SOT-23 CMOS LDO Regulator with Shutdown

### Features

- All-CMOS design in 5-lead SOT-23 package
- $\pm 2\%$  precision outputs
- Up to 150mA output current
- 120mV dropout at 100mA load
- Only 5 $\mu$ A quiescent current at full load
- 0.5 $\mu$ A quiescent current in shutdown
- Voltage options allow:
  - 50mA 5V Regulator
  - 50mA 5V to 3.3, 3.0, or 2.5V Converter
  - 150mA 3.3V or 3.0V to 2.5V Converter

### Description

150mA CMOS LDO regulator in a 5-lead SOT-23 package, featuring 120mV dropout at 100mA levels and nearly negligible dropout below 5mA.

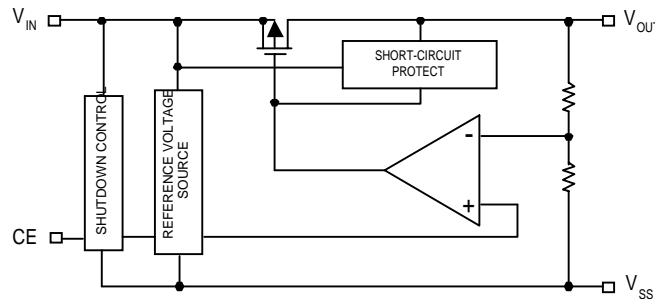
The part offers  $\pm 2\%$  precision as standard, yet draws only 5 $\mu$ A of current in operation and drops to 0.5 $\mu$ A in shutdown.

The outputs offer short-circuit protection, and the shutdown pin has an internal pull-down which will disable the output if the pin is left floating.

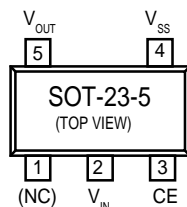
### Applications

- Battery-powered Equipment
- Reference voltage sources
- Portable Cameras and Video Recorders
- PDAs

### Block Diagram



## Pin Assignments



## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ )

Parameter	Symbol	Ratings	Units
Input Voltage	$V_{IN}$	12	V
CE Input Voltage	$V_{CE}$	$V_{SS} - 0.3 \sim V_{IN} + 0.3$	V
Output Current	$I_{OUT}$	500	mA
Output Voltage	$V_{OUT}$	$V_{SS} - 0.3 \sim V_{IN} + 0.3$	V
Continuous Total Power Dissipation	$P_{D(max)}$	150	mW
Operating Ambient Temperature	$T_{opr}$	-30~+80	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-40~+125	$^\circ\text{C}$

## Electrical Characteristics ILC7070HCM-50

$V_{OUT} = 5.0\text{V}$ ,  $T_A = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	$V_{OUT}$	$I_{OUT} = 40\text{mA}$ , $V_{IN} = 6.0\text{V}$	4.90	5.0	5.10	V
Maximum Output Current	$I_{OUTMAX}$	$V_{IN} = 6.0\text{V}$ , $V_{OUT} \geq 4.5\text{V}$	125			mA
Load Stability	$\Delta V_{OUT}$	$V_{IN} = 6.0\text{V}$ , $1\text{mA} \leq I_{OUT} \leq 100\text{mA}$			80	mV
Input/Output Voltage Differential	$V_{dif}$	$I_{OUT} = 100\text{mA}$ , $V_{OUT} = V_{SET} \times 0.98$		200	300	mV
Supply Current 1	$I_{SS1}$	$V_{IN} = V_{CE} = 6.0\text{V}$		6	12	$\mu\text{A}$
Supply Current 2	$I_{SS2}$	$V_{IN} = 6.0\text{V}$ , $V_{CE} = \text{open}$ (Note 5)		0.5	2.0	$\mu\text{A}$
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot \Delta V_{OUT}}$	$I_{OUT} = 40\text{mA}$ $6.0\text{V} \leq V_{IN} \leq 10\text{V}$			0.3	%/V
Input Voltage	$V_{IN}$				10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT} = 40\text{mA}$ $-30^\circ\text{C} \leq T_{opr} \leq 80^\circ\text{C}$		$\pm 100$		ppm/ $^\circ\text{C}$
CE Input Current	$I_{IH}$ $I_{IL}$	$V_{IN} = 6.0\text{V}$ , $V_{CE} = 2.5\text{V}$ $V_{IN} = 6.0\text{V}$ , $V_{CE} = 0\text{V}$		2	4 0.1	$\mu\text{A}$
CE ON Voltage	$CE_{(ON)}$	$V_{IN} = 6.0\text{V}$	2.5		$V_{IN}$	V
CE OFF Voltage	$Cl_{(OFF)}$	$V_{IN} = 6.0\text{V}$	0		0.7	V

## Electrical Characteristics ILC7070HCM-25

$V_{OUT} = 2.5V$ ,  $T_A = 25^\circ C$

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Output Voltage	$V_{OUT}$	$I_{OUT} = 40mA$ , $V_{IN} = 3.5V$	2.450	2.5	2.55	V
Maximum Output Current	$I_{OUTMAX}$	$V_{IN} = 3.5V$ , $V_{OUT} \geq 2.25V$	125			mA
Load Stability	$\Delta V_{OUT}$	$V_{IN} = 3.5V$ , $1mA \leq I_{OUT} \leq 60mA$		45	90	mV
Input/Output Voltage Differential	$V_{dif}$	$I_{OUT} = 60mA$ , $V_{OUT} = V_{SET} \times 0.98$		180	360	mV
Supply Current 1	$I_{SS1}$	$V_{IN} = V_{CE} = 3.5V$		5	10	$\mu A$
Supply Current 2	$I_{SS2}$	$V_{IN} = 3.5V$ , $V_{CE} = \text{open}$ (Note 5)		0.5	2.0	$\mu A$
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT} = 40mA$ $3.5V \leq V_{IN} \leq 10V$		0.2	0.3	%/V
Input Voltage	$V_{IN}$				10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT} = 40mA$ $-30^\circ C \leq T_{opr} \leq 80^\circ C$		$\pm 100$		ppm/ $^\circ C$
CE Input Current	$I_{IH}$ $I_{IL}$	$V_{IN} = 3.5V$ , $V_{CE} = 3.5V$ $V_{IN} = 3.5V$ , $V_{CE} = 0V$		2	4 0.1	$\mu A$
CE ON Voltage	$CE_{(ON)}$	$V_{IN} = 3.5V$	2.5		$V_{IN}$	V
CE OFF Voltage	$Cl_{(OFF)}$	$V_{IN} = 3.5V$	0		0.7	V

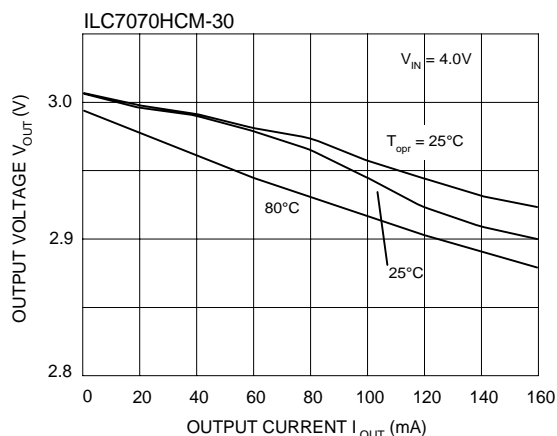
### Notes:

- $V_{OUT}$  means the output voltage when " $V_{OUT} + 1.0V$ " is provided at the  $V_{IN}$  pin while maintaining a certain  $I_{OUT}$  value.
- $V_{IN1}$  is defined as the input value that is gradually decreased until the output value reaches  $V_{OUT} \times 98\%$ .
- $V_{dif}$  is defined as " $V_{IN1} - V_{OUT}$ ".
- $I_{OUT}$ : this is limited by continuous total power dissipation in the package.
- When  $V_{CE}$  is LOW or OPEN, the output is disabled.

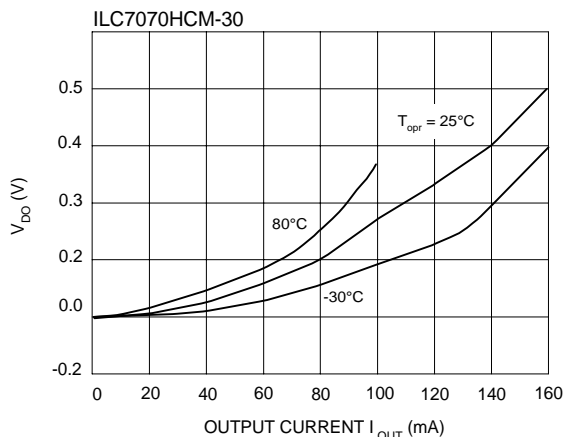
**Note:** CE pin is a CMOS input. Because of this, when the input voltage reaches  $V_{IN}/2$ , a rush current will start to flow.

# Typical Performance Characteristics General conditions for all curves

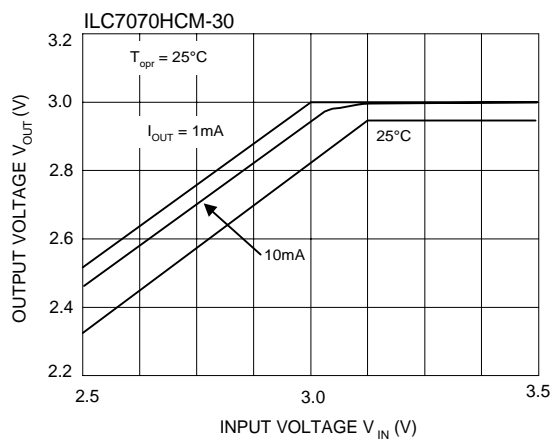
**Output Voltage vs Output Current**



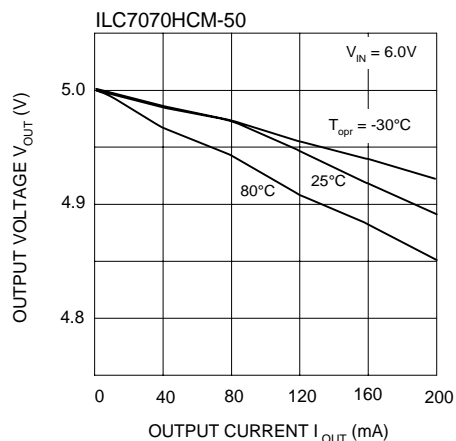
**$V_{DO}$  vs Output Current**



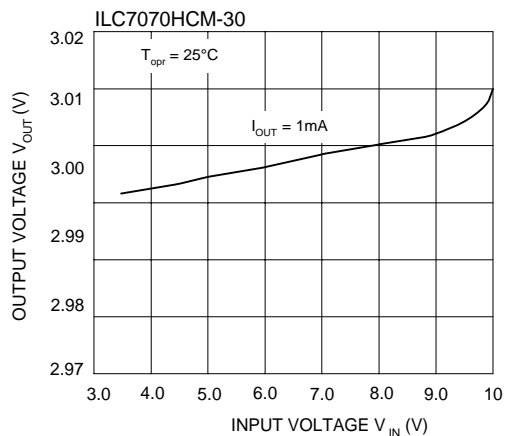
**Output Voltage vs Input Voltage**



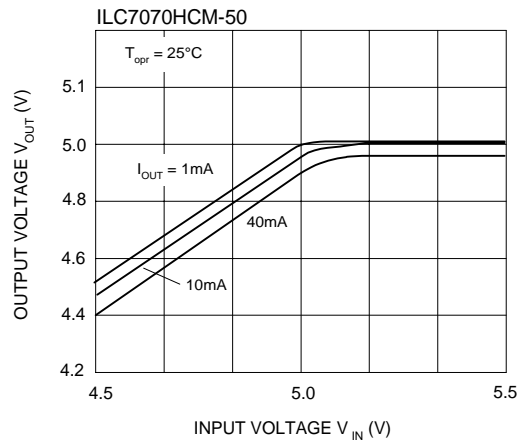
**Output Voltage vs Output Current**



**Output Voltage vs Input Voltage**

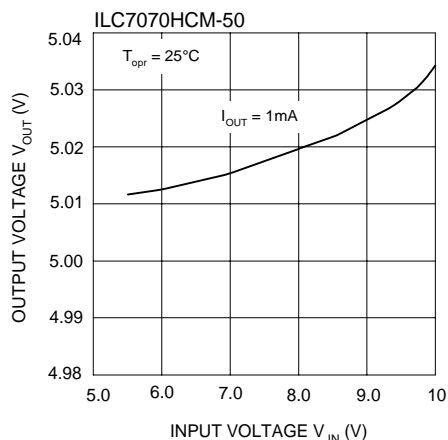


**Output Voltage vs Input Voltage**

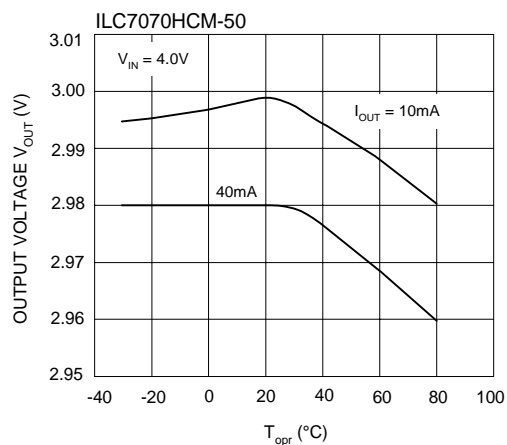


# Typical Performance Characteristics General conditions for all curves

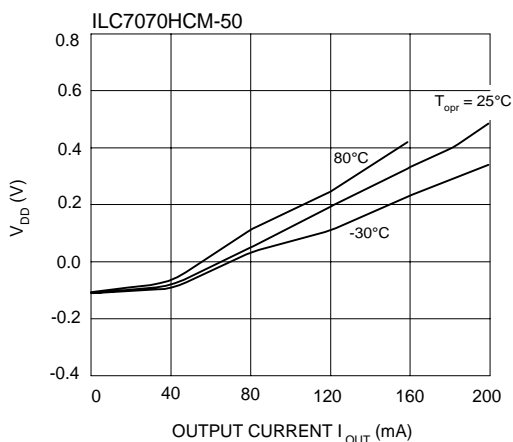
**Output Voltage vs Input Voltage**



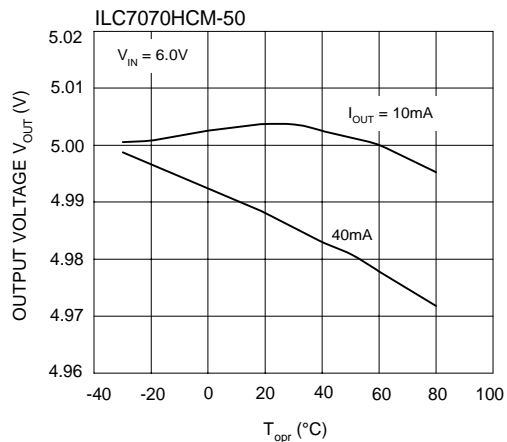
**Output Voltage vs Temperature**



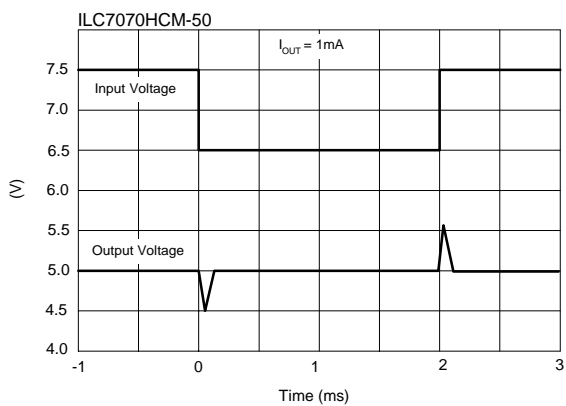
**$V_{DD}$  vs Output Current**



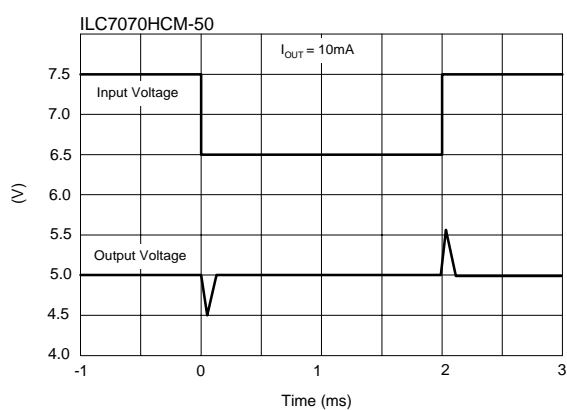
**Output Voltage vs Temperature**



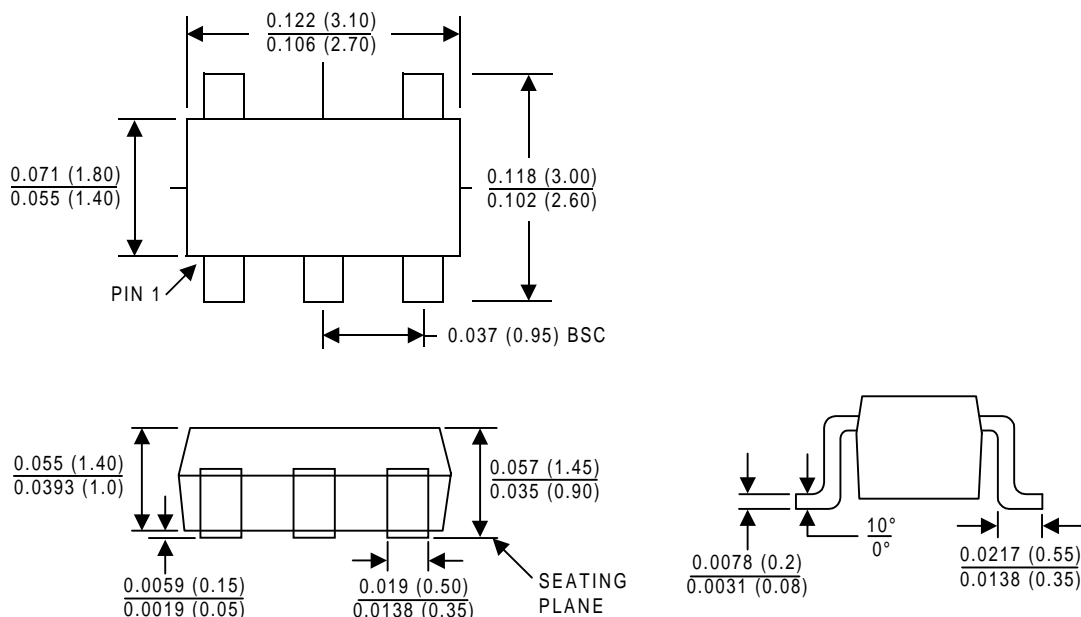
**Line Transient Response**



**Line Transient Response**



## Package Dimensions



## Ordering Information

Product Number	Package
ILC7070HCM-25	50mA 5V to 2.5V regulator, or 150mA 3.x to 2.5V regulator, High-level true Chip Enable
ILC7070HCM-30	50mA 5V to 3.0V regulator, High-level true Chip Enable
ILC7070HCM-33	50mA 5V to 3.3V regulator, High-level true Chip Enable
ILC7070HCM-50	30mA 5V regulator, High-level true Chip Enable

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