

ILC7070

SOT-23 CMOS LDO Regulator with Shutdown



General 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 μ A of current in operation and drops to 0.5 μ 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.

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 μ A quiescent current at full load
- 0.5 μ 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

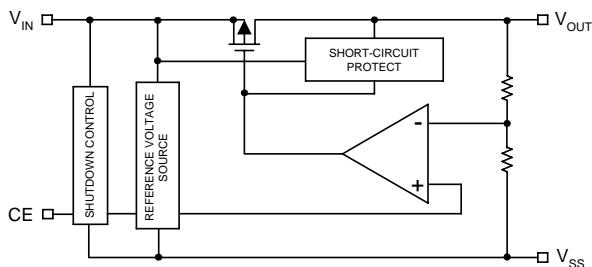
Applications

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

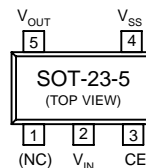
Ordering Information

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
ICL7070HCM-50	30mA 5V regulator, High-level true Chip Enable

Block Diagram



Pin-Package Configurations



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	$^\circ\text{C}$

Note: I_{OUT} must be less than $P_{d(max)} / (V_{IN} - V_{OUT})$

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	ΔV_{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	μA
Supply Current 2	I_{SS2}	$V_{IN} = 6.0\text{V}$, $V_{CE} = \text{open}$ (Note 5)		0.5	2.0	μA
Input Stability	$\frac{\Delta V_{OUT}}{\Delta V_{IN} \cdot V_{OUT}}$	$I_{OUT} = 40\text{mA}$ $6.0\text{V} \leq V_{IN} \leq 10.0\text{V}$			0.3	%/V
Input Voltage	V_{IN}				10	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT} = 40\text{mA}$ $-30^\circ\text{C} \leq T_{opr} \leq 80^\circ\text{C}$		± 100		ppm/ $^\circ\text{C}$
CE Input Current	I_{IH} I_{IL}	$V_{IN} = 6.0\text{V}$, $V_{CE} = 2.5\text{V}$ $V_{IN} = 6.0\text{V}$, $V_{CE} = 0$		2	4 0.1	μA
CE ON Voltage	$CE_{(ON)}$	$V_{IN} = 6.0\text{V}$	2.5		V_{IN}	V
CE OFF Voltage	$CI_{(OFF)}$	$V_{IN} = 6.0\text{V}$	0		0.7	V

Electrical Characteristics ILC7070HCM-25

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

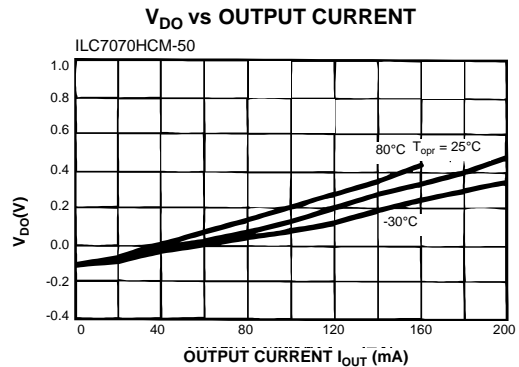
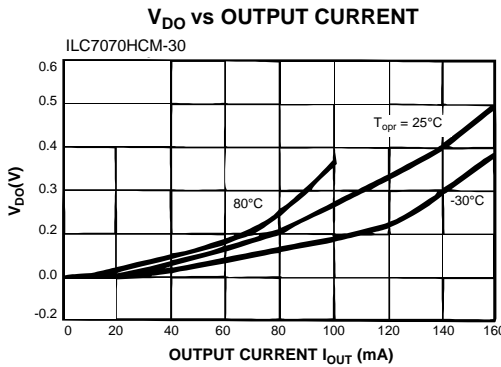
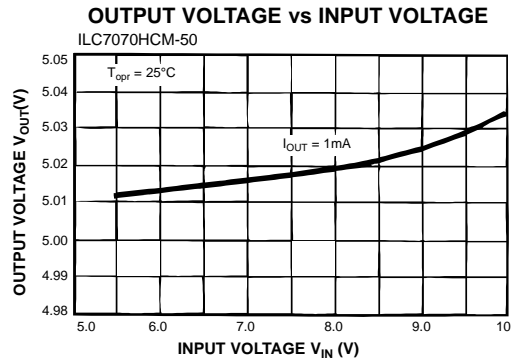
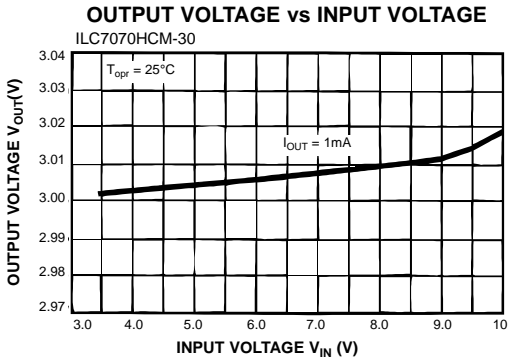
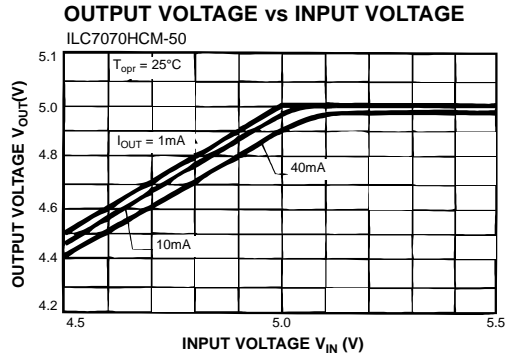
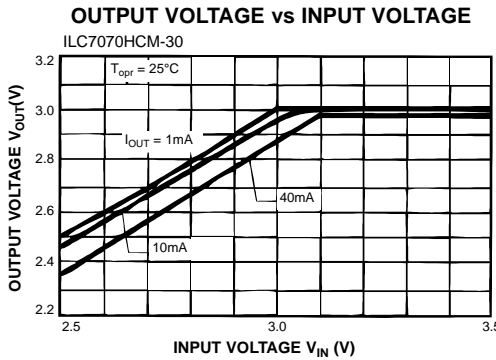
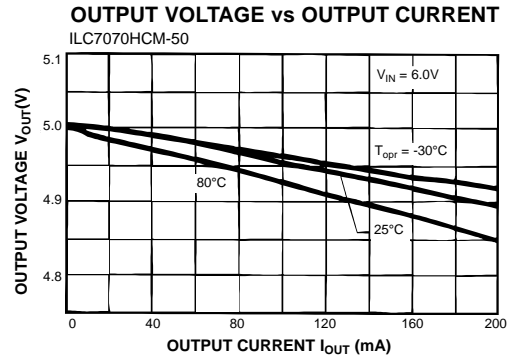
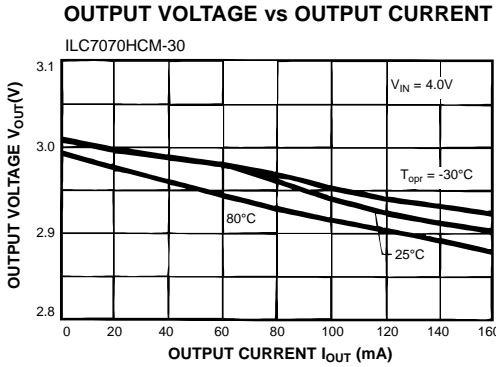
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Voltage	V_{OUT}	$I_{OUT} = 40mA$, $V_{IN} = 3.5V$	2.450	2.5	2.55	V
Maximum Output Current	I_{OUTmax}	$V_{IN} = 3.5V$, $V_{OUT} \geq 2.25V$	125			mA
Load Stability	ΔV_{OUT}	$V_{IN} = 3.5V$, $1mA \leq I_{OUT} \leq 60mA$		45	90	mV
Input/Output Voltage Differential	V_{dif}	$I_{OUT} = 60mA$, $V_{OUT} = V_{SET} \times .98$		180	360	mV
Supply Current 1	I_{SS1}	$V_{IN} = V_{CE} = 3.5V$		5	10	μA
Supply Current 2	I_{SS2}	$V_{IN} = 3.5V$, $V_{CE} = \text{open}$ (Note 5)		0.5	2	μA
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}				10.0	V
Output Voltage Temperature Characteristics	$\frac{\Delta V_{OUT}}{\Delta T_{opr} \cdot V_{OUT}}$	$I_{OUT} = 40mA$ $-30^\circ C \leq T_{opr} \leq 80^\circ C$		± 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	μA
CE ON Voltage	$CE_{(ON)}$	$V_{IN} = 3.5V$	2.5		V_{IN}	V
CE OFF Voltage	$CE_{(OFF)}$	$V_{IN} = 3.5V$	0		0.7	V

Note:

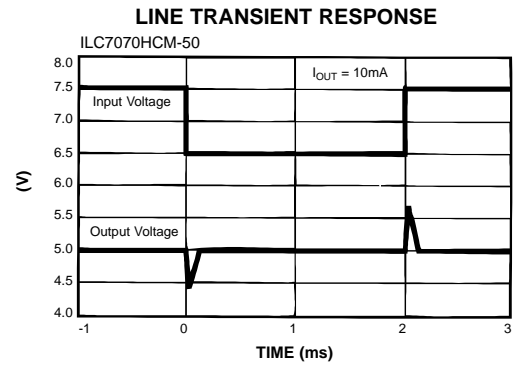
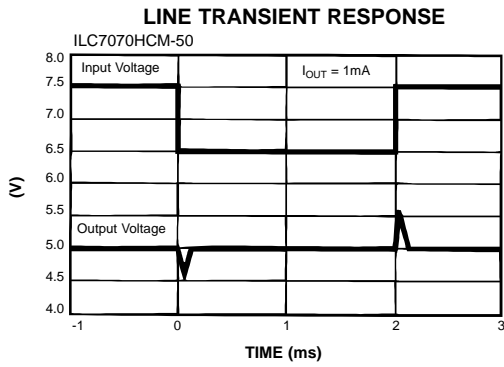
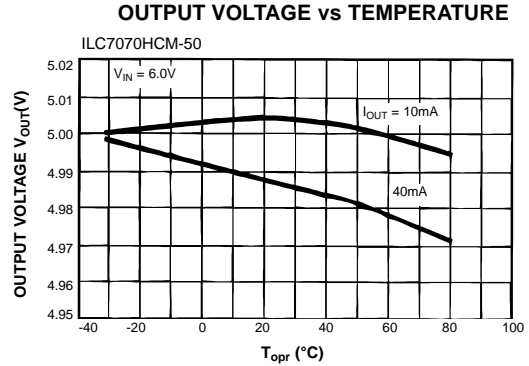
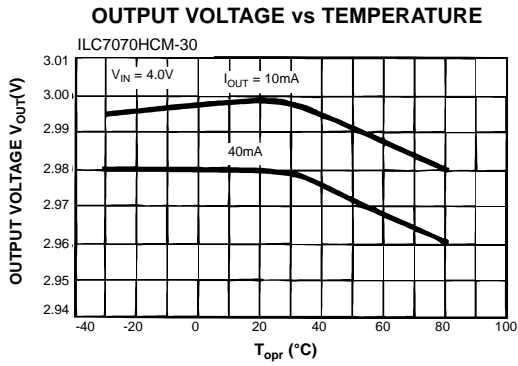
- V_{OUT} means the output voltage when " $V_{OUT} + 1.0V$ " is provided at the V_{IN} pin while maintaining a certain I_{OUT} value.
- V_{IN1} is defined as the input value that is gradually decreased until the output value reaches $V_{OUT} \times 98\%$.
- V_{dif} is defined as " $V_{IN1} - V_{OUT}$."
- 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.

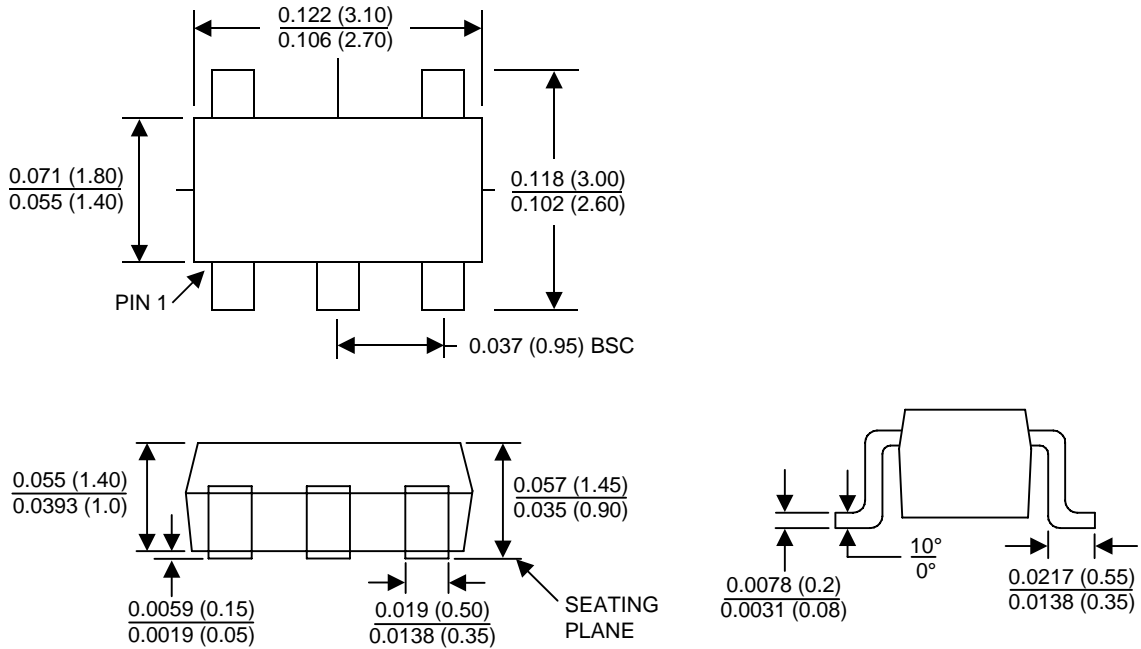
Typical Performance Characteristics *General conditions for all curves*



Electrical Characteristics *General conditions for all curves*



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