

ILC7011

80mA SC70 Ultra Low Noise CMOS RF-LDO™ Regulator

Features

- 1% output voltage accuracy
- Only $10\mu\text{V}_{\text{RMS}}$ noise from 300Hz to 100kHz
- Uses low ESR ceramic or Tantalum output capacitor to minimize noise and output ripple.
- Only $90\mu\text{A}$ ground current at 80mA load
- Ripple rejection up to 70dB at 1kHz, 60dB at 1MHz
- Excellent line and load transient response
- Guaranteed to 80mA output current
- Industry standard five lead SC70 packages
- Fixed 2.5V, 2.6V, 2.8V, 2.9V, 3.0V, 3.3V, 3.6V, 4.7V, 5.0V, output voltage options
- Metal mask option available for custom voltages between 2.5V and 8V

Applications

- Cellular phones
- Wireless communicators
- PDAs / palmtops / organizers
- Battery powered portable electronics

Description

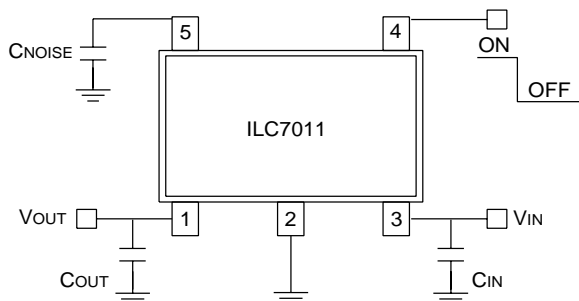
The ILC7011 is an 80mA, Ultra Low Noise, Low Dropout (LDO) linear regulator, designed and processed in Fairchild Semiconductor's proprietary CMOS process technology. This process combines the best CMOS features of low quiescent current, small size and low dropout voltage with the best bipolar features of high ripple rejection, ultra low noise and power handling capability. The ILC7011 offers a quiescent current of less than $100\mu\text{A}$, a logic level enable (regulator on/off) pin, a footprint that is half the size of the industry standard SOT-23 and a low dropout voltage of 50mV at 10mA. With better than 70dB (1kHz) of ripple rejection, ultra low noise of $10\mu\text{V}_{\text{RMS}}$ and 1% output voltage accuracy, the ILC7011 sets a new standard in linear regulators for communications and personal electronics applications.

The ILC7011 is designed to operate with small, low cost, ceramic capacitors and is stable over a wide range of ESR values. In addition to the output capacitor, the ILC7011 requires only a $1\mu\text{F}$ input capacitor. The enable pin can be tied to V_{IN} for easy device layout. The ILC7011 is available in a number of fixed output voltages ranging from 2.5V to 8V. An adjacent version will be available shortly.

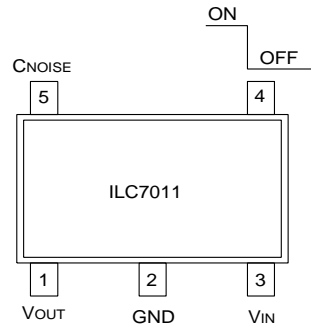
The ILC7011 is ideally suited for use in small size cordless and cellular handsets as well as many other low battery powered electronic devices.

Preliminary Information

Typical Applications



Pin Assignments



Pin Definitions

Pin Number	Pin Name	Pin Function Description
4	ON/OFF	By applying less than 0.4V to this pin the device will be turned off
5	C _{NOISE}	Noise Bypass Capacitor
2	GND	Ground Pin. Local ground for C _{OUT}
1	V _{OUT}	Output Voltage. Connect C _{OUT} between this pin and the GND (pin 2)
3	V _{IN}	Connect Directly to Supply

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Ratings	Units
Input Voltage	V _{IN}	-0.3 to +6V	V
ON/OFF Input Voltage	V _{ON/OFF}	-0.3 to V _{IN}	V
Output Current	I _{OUT}	Short Circuit Protected	-
Output Voltage	V _{OUT}	-0.3 to V _{IN} +0.3	V
Package Power Dissipation	P _D	TBD	mW
Maximum Junction Temp. Range	T _{J(MAX)}	-40 to +125	°C
Storage Temperature	T _{STG}	-40 to +125	°C

*An input voltage up to 9V is allowed if V_{OUT} > 3V

Recommended Operating Conditions

Parameter	Conditions	Min.	Typ.	Max.	Units
Supply Voltage, V _{IN}	V _{IN} to GND	2.5		6	V
Ambient Operating Temperature		-40		+85	°C

Electrical Characteristics ILC7011

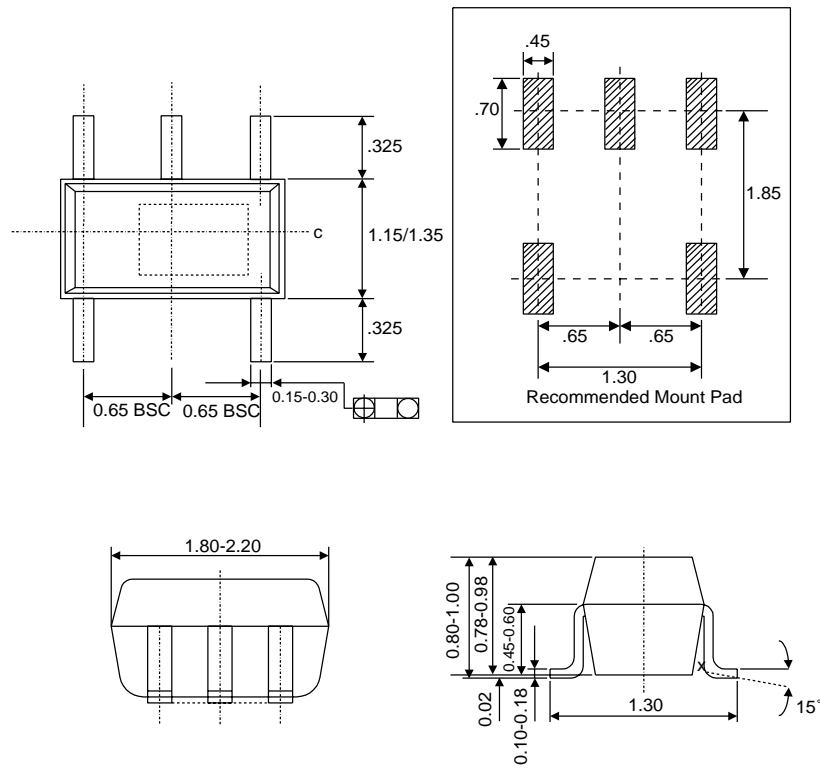
Unless otherwise specified all limits are at $T_A = 25^\circ\text{C}$, $V_{IN} = V_{OUT(NOM)} + 1\text{V}$, $I_{OUT} = 1\text{mA}$, $C_{OUT} = 1\mu\text{F}$, $V_{ON/OFF} = 2\text{V}$.

Parameter	Symbol	Conditions		Typ.	Units
Output Voltage Accuracy				± 1	%
Line Regulation	$\frac{\Delta V_{OUT}}{(V_{OUT} \cdot \Delta V_{IN})}$	$V_{OUT(NOM)} + 1\text{V} \leq 6\text{V}$		0.007	%/V
Dropout Voltage (Note 3)	$V_{IN} - V_{OUT}$	$I_{OUT} = 10\mu\text{A}$		0.1	mV
		$I_{OUT} = 10\text{mA}$		50	
		$I_{OUT} = 20\text{mA}$		70	
		$I_{OUT} = 80\text{mA}$		235	
Ground Pin Current	I_{GND}	$I_{OUT} = 0\text{mA}$		66	μA
		$I_{OUT} = 10\text{mA}$		67	
		$I_{OUT} = 80\text{mA}$		90	
Shutdown (OFF) Current	$I_{ON/OFF}$	$I_{ON/OFF} = 0\text{V}$		0.1	μA
ON/OFF Input Voltage	$V_{ON/OFF}$	High = Regulator On Low = Regulator Off		1.5-2.0 0.6	V
ON/OFF Pin Input Current (Note 5)	$I_{IN ON/OFF}$	$V_{ON/OFF} = 0.6\text{V}$ Regulator OFF $V_{ON/OFF} = 2\text{V}$ Regulator ON		0.3 1	μA
Peak Output Current (Note 4)	$I_{OUT(peak)}$	$V_{OUT} \geq 0.95V_{OUT(NOM)}$, $tpw = 2\text{ms}$		100-120	mA
Output Noise Voltage	e_N	$BW = 300\text{Hz to } 50\text{kHz}$, $C_{IN} = 1\mu\text{F}$ $C_{NOISE} = 0.01\mu\text{F}$, $C_{OUT} = 1.0\mu\text{F}$, $I_{OUT} = 10\text{mA}$		TBD	μV_{RMS}
Ripple Rejection	$\frac{\Delta V_{OUT}}{\Delta V_{IN}}$	$C_{OUT} = 4.7\mu\text{F}$ Tantalum $I_{OUT} = 80\text{mA}$	Freq=1kHz	70	dB
			Freq=10kHz	50	
			Freq=1MHz	65	
Dynamic Line Regulation	$\Delta V_{OUT(line)}$	$V_{IN}: V_{OUT(NOM)} + 1\text{V to } V_{OUT(NOM)} + 2\text{V}$, $tr/tf = 2\mu\text{s}$; $I_{OUT} = 80\text{mA}$		14	mV
Dynamic Load Regulation	$\Delta V_{OUT(load)}$	$I_{OUT}: 1\text{mA to } 80\text{mA}$; $tr < 5\mu\text{s}$		40	mV
Short Circuit Current	I_{SC}	$V_{OUT} = 0\text{V}$		200	mA
Resistance Shutdown Discharge				1.5	k Ω

Notes:

- 1: Absolute maximum ratings indicate limits which when exceeded may result in damage to the component. Electrical specifications do not apply when operating the device outside of its rated operating conditions.
- 2: Specified Min/Max limits are production tested or guaranteed through correlation based on statistical control methods. Measurements are taken at constant junction temperature as close to ambient as possible using low duty pulse testing.
- 3: Dropout voltage is defined as the input to output differential voltage at which the output voltage drops 2% below the nominal value measured with a 1V differential.
- 4: Guaranteed by design
- 5: The device's shutdown pin includes a 2M Ω internal pull down resistor connected to ground.

Preliminary Information



Ordering Information

ILC7011AIM525X	80mA, 2.5V, SC-70 Package
ILC7011AIM526X	80mA, 2.6V, SC-70 Package
ILC7011AIM527X	80mA, 2.7V, SC-70 Package
ILC7011AIM5285X	80mA, 2.85V, SC-70 Package
ILC7011AIM528X	80mA, 2.8V, SC-70 Package
ILC7011AIM529X	80mA, 2.9V, SC-70 Package
ILC7011AIM530X	80mA, 3.0V, SC-70 Package
ILC7011AIM531X	80mA, 3.1V, SC-70 Package
ILC7011AIM532X	80mA, 3.2V, SC-70 Package
ILC7011AIM533X	80mA, 3.3V, SC-70 Package

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