

# Impala Linear Corporation

**ILC7011** Preliminary  
80mA SC70 Ultra Low Noise CMOS RF-LDO™ Regulator



## General Description

The ILC7011 is an 80mA, Ultra Low Noise, Low Dropout (LDO) linear regulator, designed and processed in Impala'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 100µA, 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 10µV<sub>RMS</sub> 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 1µF input capacitor. The enable pin can be tied to V<sub>IN</sub> 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. Please contact Impala for samples and application information.

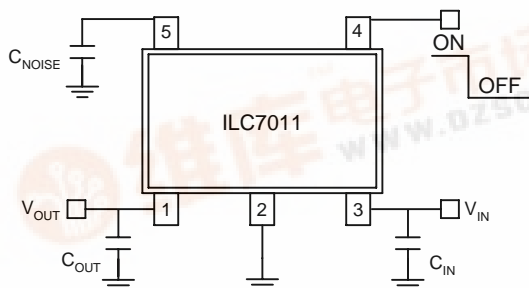
## Features

- 1% output voltage accuracy
- Only 10µV<sub>RMS</sub> noise from 300Hz to 100kHz
- Uses low ESR ceramic or Tantalum output capacitor to minimize noise and output ripple.
- Only 90µA 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 2.8V, 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

## Typical Circuit



| Ordering Information<br>(T <sub>A</sub> = 0°C to 70°C) |                                    |
|--|------------------------------------|
| ILC7011C5-XX   | 80mA, fixed voltage, SC-70 Package |

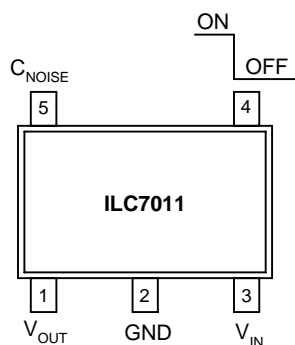
Note: Fixed voltage options are defined by 2-digit code as shown in the package markings information section of the data sheet



## Pin Description ILC7011 (fixed voltage version)

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

## Pin Package Configurations



| Parameter                     | Symbol              | Ratings                      | Units |
|-------------------------------|---------------------|------------------------------|-------|
| Input Voltage 7011            | V <sub>IN</sub>     | -0.3 to +9V                  | V     |
| ON/OFF Input Voltage          | V <sub>ON/OFF</sub> | -0.3 to V <sub>IN</sub>      | V     |
| Output Current                | I <sub>OUT</sub>    | Short Circuit Protected      | mA    |
| Output Voltage                | V <sub>OUT</sub>    | -0.3 to V <sub>IN</sub> +0.3 | V     |
| Package Power Dissipation     | P <sub>D</sub>      | TBD                          | mW    |
| Maximum Junction Temp. Range  | T <sub>J(MAX)</sub> | -40 to +125                  | °C    |
| Storage Temperature           | T <sub>STG</sub>    | -40 to +125                  | °C    |
| Operation Ambient Temperature | T <sub>STG</sub>    | -40 to +125                  | °C    |

## Electrical Characteristics ILC7011

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

| Parameter                         | Symbol   | Conditions   | Typ            | Units            |    |
|-----------------------------------|--|--|----------------|------------------|----|
| Input Voltage Range               | $V_{IN}$                                       |  | 2.5-8          | V                |    |
| Output Voltage Accuracy           |  |  | $\pm 1$        | %                |    |
| Line Regulation                   | $\Delta V_{OUT}/(V_{OUT} \cdot \Delta V_{IN})$ | $V_{OUT} (\text{NOM}) + 1\text{V} \leq 8\text{V}$  | 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             | $\mu\text{A}$    |    |
|                                   |  | $I_{OUT} = 10\text{mA}$  | 67             |                  |    |
|                                   |  | $I_{OUT} = 80\text{mA}$  | 90             |                  |    |
| Shutdown (OFF) Current            | $I_{ON/OFF}$                                   | $I_{ON/OFF} = 0\text{V}$   | 0.1            | $\mu\text{A}$    |    |
| ON/OFF Input Voltage              | $V_{ON/OFF}$                                   | High = Regulator On<br>Low = Regulator Off   | 1.5-2.0<br>0.6 | V                |    |
| ON/OFF Pin Input Current (Note 5) | $I_{IN \text{ ON/OFF}}$                        | $V_{ON/OFF} = 0.6\text{V}$ Regulator OFF<br>$V_{ON/OFF} = 2\text{V}$ Regulator ON  | 0.3<br>1       | $\mu\text{A}$    |    |
| Peak Output Current (Note 4)      | $I_{OUT (\text{peak})}$                        | $V_{OUT} \geq 0.95 V_{OUT (\text{NOM})}$ , $t_{pw} = 2\text{ms}$   | 100-120        | mA               |    |
| Output Noise Voltage              | $e_N$  | BW = 300Hz to 50kHz, $C_{IN} = 1\mu\text{F}$<br>$C_{NOISE} = 0.01\mu\text{F}$ , $C_{OUT} = 1.0\mu\text{F}$ , $I_{OUT} = 10\text{mA}$ | TBD            | $\mu\text{Vrms}$ |    |
| Ripple Rejection                  | $\Delta V_{OUT}/\Delta V_{IN}$                 | $C_{OUT} = 4.7\mu\text{F}$ Tantalum<br>$I_{OUT} = 80\text{mA}$   | Freq = 1kHz    | 70               | dB |
|                                   |  |  | Freq = 10kHz   | 50               |    |
|                                   |  |  | Freq = 1MHz    | 65               |    |
| Dynamic Line Regulation           | $\Delta V_{OUT (\text{line})}$                 | $V_{IN}: V_{OUT (\text{NOM})} + 1\text{V}$ to $V_{OUT (\text{NOM})} + 2\text{V}$ , $tr/tf = 2\mu\text{s}$ ; $I_{OUT} = 80\text{mA}$  | 14             | mV               |    |
| Dynamic Load Regulation           | $\Delta V_{OUT (\text{load})}$                 | $I_{OUT}: 1\text{mA}$ 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 $\Omega$       |    |

**Note 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.

**Note 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.

**Note 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.

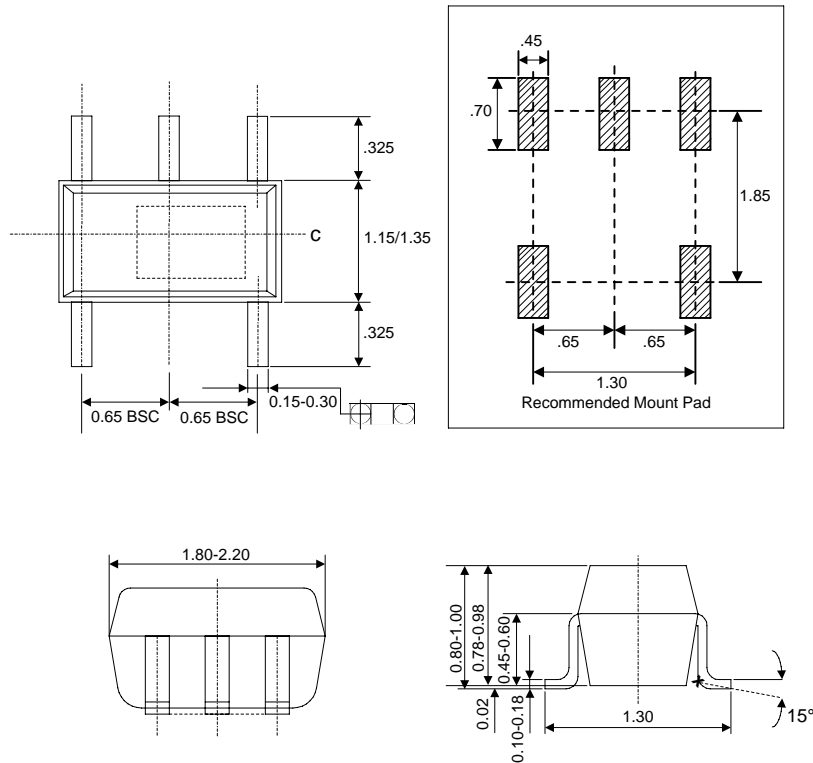
**Note 4:** Guaranteed by design

**Note 5:** The device's shutdown pin includes a 2M $\Omega$  internal pull down resistor connected to ground.

**SC-70 Package Markings**  
**ILC7011C5-xx**

| Output Voltage (V) | Grade | Order Information | Supplied As:              |
|--------------------|-------|-------------------|---------------------------|
| 2.8                | A     | ILC7011C5-28      | 3K Units on Tape and Reel |
| 3.0                | A     | ILC7011C5-30      | 3K Units on Tape and Reel |
| 3.3                | A     | ILC7011C5-33      | 3K Units on Tape and Reel |
| 3.6                | A     | ILC7011C5-36      | 3K Units on Tape and Reel |
| 4.7                | A     | ILC7011C5-47      | 3K Units on Tape and Reel |
| 5.0                | A     | ILC7011C5-50      | 3K Units on Tape and Reel |

\*NOTE: First two characters identify the product and the last two characters identify the datecode



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