

General Description

The ILC514X is an innovative, multilevel voltage detector, designed to monitor the terminal voltage of a power source and provide up to four independent flags when the voltage levels drop below designated levels. The ILC514X is unique in its design because one device can now signal the user when a discharging battery goes below four (4) different threshold voltages and because it requires no external precision components to monitor these voltage levels. The open drain flags are asserted when the terminal voltage goes below their designated thresholds and are de-asserted 140ms after the thresholds are exceeded. Additionally, the ILC514X has a manual reset pin that allows the system to assert all flags for a minimum of 200ms.

Built using Impala's proprietary Analog CMOS process, the ILC514X is packaged in a spacesaving MSOP10 package. Quiescent current is below 10 μ A. The threshold values for the reset flags are factory set. Alternate values may be discussed with Impala Product Marketing. Threshold values are accurate to within $\pm 1\%$. The device is available in three output configurations: Open Drain $\overline{\text{RESET}}$, Push Pull $\overline{\text{RESET}}$ and Push Pull RESET.

Features

- Four levels of a single terminal voltage monitored
- No precision external components
- < 10 μ A Quiescent current
- Available in three output configurations
ILC5140 Open Drain $\overline{\text{RESET}}$
ILC5141 Push Pull $\overline{\text{RESET}}$
ILC5142 Push Pull RESET
- Threshold accuracies within $\pm 1\%$
- Small MSOP10 plastic package
- Factory preset threshold voltages
- Manual reset input pin
- Minimum 140ms delay on reset

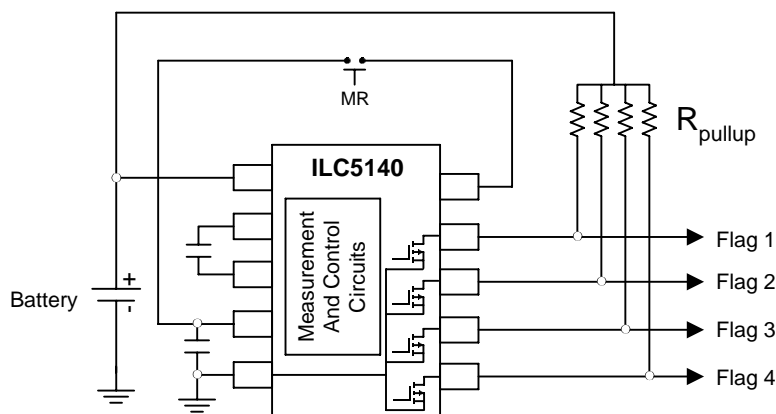
Applications

- Handheld PC's
- PDA's
- Notebook PC's
- Battery electronics
- Medical Instrumentation
- Personal Electronics
- Personal Communicators

Ordering Information* $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$

ILC514XCS	10-Pin MSOP
-----------	-------------

Typical Circuit



Pin-Package Configurations

To Be Assigned

Pin Number	Name	Pin Description and Function
TBD	V _{IN}	Voltage input from power source - battery or power supply
TBD	GND	IC Ground Pin
TBD	CP+	Charge Pump Capacitor +
TBD	CP-	Charge Pump Capacitor -
TBD	CPV _{SS}	Charge Pump V _{SS}
TBD	MR	Manual Reset Input (Connects to CPV _{SS} pin)
TBD	F1	Connection for output flags. Flags are asserted in order of decreasing voltage thresholds. F1 is asserted at a higher voltage than F2, F2 is asserted at a higher voltage than F3 and F3 is asserted at a higher voltage than F4. Output flags are: ILC5140 - Open Drain $\overline{\text{RESET}}$, ILC5141 - Push Pull $\overline{\text{RESET}}$, ILC5142 - Push Pull $\overline{\text{RESET}}$
TBD	F2	
TBD	F3	
TBD	F4	

Absolute Maximum Ratings (Note 1)

Parameter	Symbol	Ratings	Units
Supply Voltage (V+ to GND, or GND to OUT)	V_{CC}	+6	V
All Other Inputs	V_{IN}	+6	V
Output Current Per Flag	I_{OUT}	20	mA
Voltage on FLAG pin relative to GND	V_{Flg}	$V_{IN} + 0.3V$	V
Rate or Rise, V_{CC}		100	V/ μ s
Continuous Power Dissipation (T= +85°C)	P_D	470	mW
Operating Temperature Ranges	T_A	-40 to +85	°C
Maximum Junction Temperature	$T_{J(MAX)}$	170	°C
Storage Temperature Range	T_{stg}	-40 to +125	°C
Lead Temperature (soldering, 10sec)		300	°C
Package Thermal Resistance	θ_{JA}	TBD	°C/W

DC Electrical Characteristics ILC514X

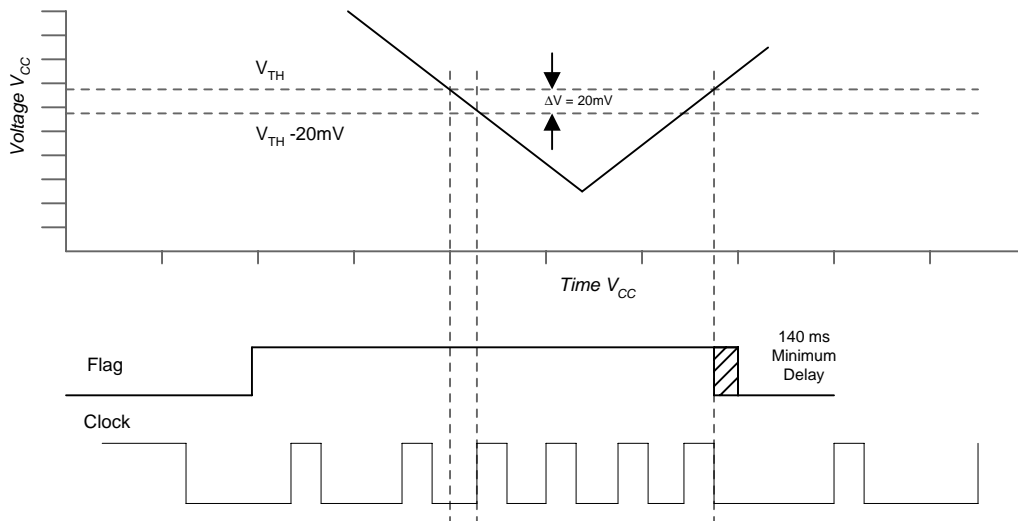
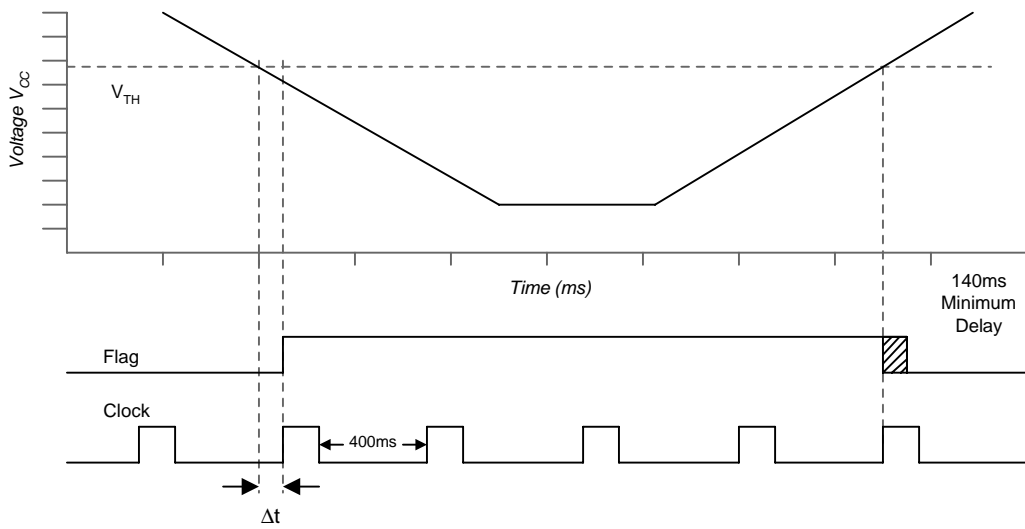
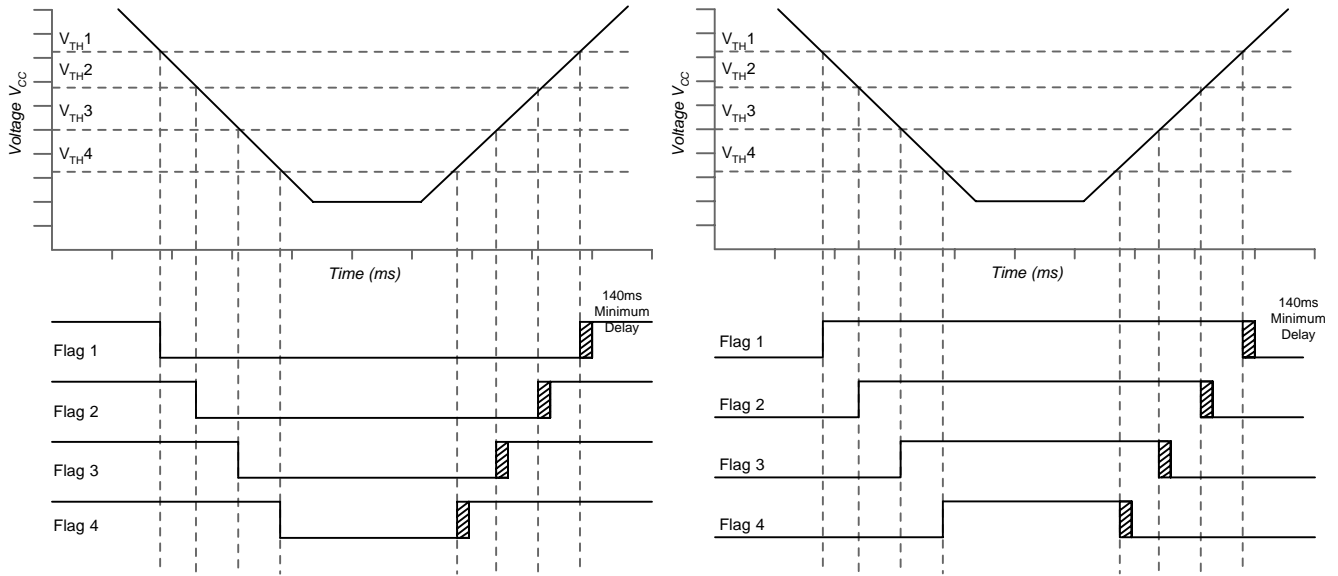
Unless otherwise specified, all limits are at $T_A = 25^\circ\text{C}$

Boldface limits apply over the operating temperature range.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Operating Supply Voltage (RESET in correct state)	V_{CC}	$T_A = 0^\circ\text{C}$ to $+85^\circ\text{C}$	1.8		5.5	V
		$T_A = -40^\circ\text{C}$ to $+105^\circ\text{C}$	2.0		5.5	V
Reset Threshold Voltage			$V_{TH}-1\%$	V_{TH}	$V_{TH}-1\%$	V
Supply Current	I_{CC}	$V_{CC} < 3.6V$		10	30	μ A
MR Input Voltage		$V_{CC} < 3.6V$		$-V_{CC}$		V
Output Sink Current				3.2		mA
Output Voltage Low, RESET	V_{OL}					V
Output Voltage High, RESET	V_{OH}		$0.8V_{CC}$	30-50	0.4	V
Reset Threshold Tempco						ppm/°C

AC Electrical Characteristics ILC514X

Parameter	Symbol	Conditions	Min	Typ	Max	Units
MR Minimum Pulse Width				20		μ s
V_{CC} Detect to Flag Enable				20		μ s
V_{CC} Detect to Flag Enable			120	240		ms



Detailed Description

The ILC514X is designed to monitor the terminal voltage of a power source such as a battery and to assert a flag depending on the internally set threshold voltages. Up to four flags can be used to warn of declining stages of a battery's life. The flags are arranged in order of decreasing threshold values; therefore Flag 1 is asserted at V_{TH1} , Flag 2 is asserted at a voltage V_{TH2} which is lower than V_{TH1} and so on. The ILC514C is ideally suited for systems such as PDA's, notebooks and personal electronics where multiple warning and resets are desirable. An example of such a requirement is in a PDA, where Flag 1 is asserted at $V_{TH1} = 2.9V$ "LOW BATTERY WARNING" flag; Flag 2 is asserted at $V_{TH2} = 2.7V$ "DISABLE CMOS WRITE"; Flag 3 is asserted at $V_{TH3} = 2.5V$ "DISABLE IrDA PORT" and Flag 4 is asserted at $V_{TH4} = 2.3V$ "DISABLE SYSTEM EXCEPT CHARGING."

RESET AND RESET

The ILC514X has three output configurations: Open Drain (ILC5140) RESET, Push Pull (ILC5141) RESET and Push Pull (ILC5142) RESET

Voltage Thresholds

The ILC5140 series will be offered in a variety of voltage thresholds corresponding to industry standard requirements. In addition, customer defined voltage thresholds are available on a special ordering basis. Please consult Impala marketing for conditions surrounding custom thresholds.

Threshold Detect to Flag Enable

The ILC5140 samples the input voltage once every 400 ms. This sampling rate was chosen to conserve battery life and at the same time keep a reasonable vigil on the terminal voltage level. Once the threshold has been passed, the flag enable function reacts within 30 μ s.

In addition to the 400ms sampling, a sample and hold circuit compares the input voltage to the most recent sample and if there is a DV greater than 20mV the input sampling is turned on continuously until either a flag is asserted or the threshold is regained. If, during the continuous sampling a threshold is crossed, the flag is enabled. This method inherently prevents accidental tripping of the flag during minor input voltage level glitches.

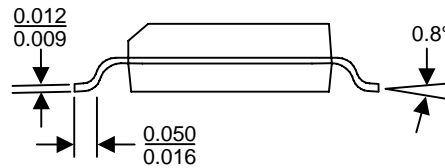
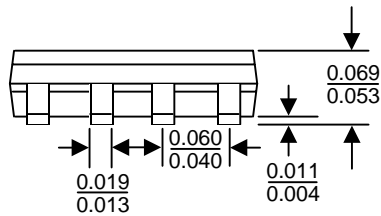
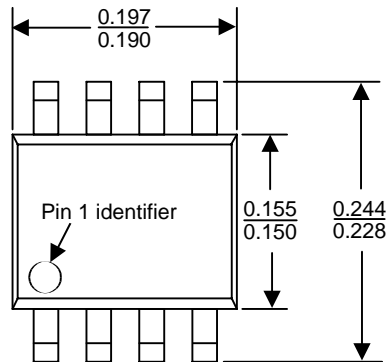
Once the threshold is crossed on an increasing voltage level, the flag is disabled 140ms after such a threshold is detected. This is a minimum time since an additional 400ms may be added if the threshold is not detected at the beginning of a regular sampling.

Voltage Thresholds for the Flags

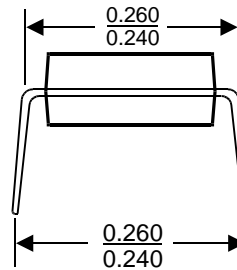
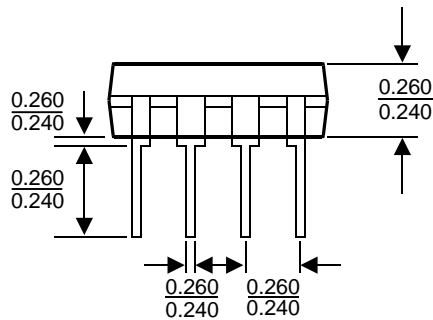
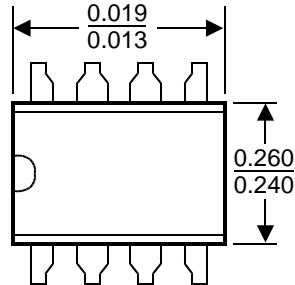
The flags are labelled Flag 1, Flag 2, Flag 3, Flag 4. Voltage thresholds are arranged in order of decreasing voltage levels, therefore Flag 1 will have a higher threshold than Flag 2 and so on.

Packaging Information

M Package, 8-Pin Small-Outline



N Package, 8-Pin Plastic Dual In-Line



Devices sold by Impala Linear Corporation are covered by the warranty and patent indemnification provisions appearing in its Terms of Sale only. Impala Linear Corporation makes no warranty, express, statutory, implied, or by description regarding the information set forth herein or regarding the freedom of the described devices from patent infringement. Impala Linear Corporation makes no warranty of merchantability or fitness for any purpose. Impala Linear Corporation reserves the right to discontinue production and change specifications and prices at any time and without notice.

This product is intended for use in normal commercial applications. Applications requiring an extended temperature range, unusual environmental requirements, or high reliability applications, such as military and aerospace, are specifically not recommended without additional processing by Impala Linear Corporation.

Impala Linear Corporation assumes no responsibility for the use of any circuitry other than circuitry embodied in an Impala Linear Corporation product. No other circuits, patents, licenses are implied.

Life Support Policy

Impala Linear Corporation's products are not authorized for use as critical components in life support devices or systems.

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.