

### General Description

The ILC705/ILC706/ILC707/ILC708 are low cost microprocessor supervisory circuits that monitor power supplies in microprocessor based systems. Circuit functions include a watchdog timer, microprocessor reset, power failure warning and a debounced manual reset input.

The ILC705 and ILC706 offer a watchdog timer function while the ILC707 and ILC708 have an active high reset output in addition to the active low reset output.

Supply voltage monitor levels of 4.65V and 4.4V are available. The ILC705/ILC707 have a nominal reset threshold level of 4.65V while the ILC706 and ILC708 have a 4.4V nominal reset threshold level. When the supply voltage drops below the respective reset threshold level, RESET is asserted.

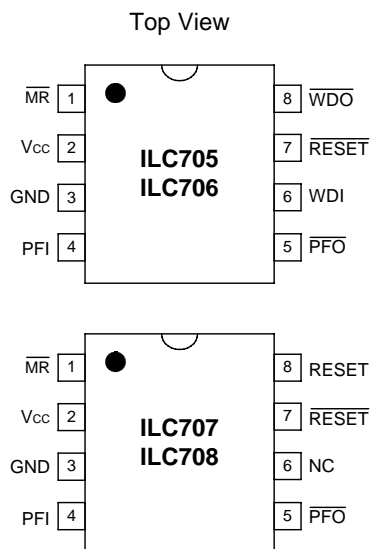
### Features

- ◆ 4.4V or 4.65V Precision Voltage Monitor
- ◆ 200ms Reset Pulse Width
- ◆ Debounced TTL/CMOS Compatible Manual Reset Input
- ◆ Watchdog Timer with 1.6 sec Timeout (ILC705/ILC706)
- ◆ Voltage Monitor for Early Power Fail Warning or Low Battery Detect
- ◆ 8-Pin SOIC or DIP Package

### Applications

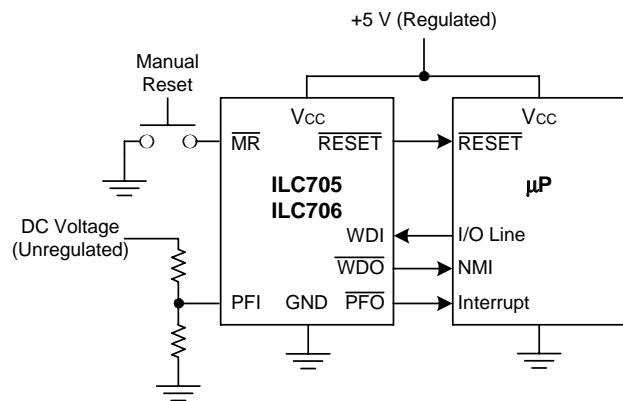
- ◆ Computers
- ◆ Controllers
- ◆ Critical Microprocessor Power Monitoring
- ◆ Intelligent Instruments
- ◆ Portable Equipment
- ◆ Controllers

### Pin Package Configuration



N Package - 8 Lead Plastic DIP Package  
M Package - 8 Lead Plastic SOIC Package

### Typical Circuit



### Ordering Information

Part	Package	Temp. Range
ILC70_N	8-Lead PDIP	-40°C to +85°C
ILC70_M	8-Lead SOIC	-40°C to +85°C

### Absolute Maximum Ratings

Parameter	Symbol	Ratings	Units
Terminal Voltage	$V_{CC}$	-0.3 to 6.0	V
	All other inputs	-0.3 to ( $V_{CC} + 0.3$ )	V
Input Current	$V_{CC}$ , GND	25	mA
Output Current	All outputs	20	mA
Operating Temperature Range	$T_A$	-40 to +85	°C
Storage Temperature Range		-65 to +150	°C
Lead Temperature (Soldering, 10 sec.)		300	°C
Power Dissipation	PDIP	475	mW
	SOIC	400	mW

Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent device failure. Functionality at or above these limits is not implied. Exposure to absolute maximum ratings for extended periods may affect device reliability. Operating ranges define those limits between which the functionality of the device is guaranteed.

### Electrical Characteristics

$V_{CC} = 4.75\text{ V to }5.5\text{ V}$  for ILC705/ILC707,  $V_{CC} = 4.5\text{ V to }5.5\text{ V}$  for ILC706/ILC708,  $T_A =$  Operating Temperature Range, unless otherwise noted.

Parameter	Conditions	Min	Typ	Max	Units
Operating Voltage Range, $V_{CC}$	ILC70__	1.4		5.5	V
Supply Current, $I_{CC}$	ILC70__			60	$\mu\text{A}$
Reset Voltage Threshold	ILC705, ILC707	4.5	4.65	4.75	V
	ILC706, ILC708	4.25	4.4	4.5	
Reset Threshold Hysteresis			40		mV
Reset Pulse Width, $t_{RS}$		140	200	280	ms
RESET Output Voltage	$I_{SOURCE} = 800\ \mu\text{A}$ $I_{SINK} = 3.2\ \text{mA}$ $I_{SINK} = 50\ \mu\text{A}, V_{CC} = 1.4\text{V}$	$V_{CC} - 1.5\text{V}$		0.4 0.3	V
RESET Output Voltage	$I_{SOURCE} = 800\ \mu\text{A}$ $I_{SINK} = 1.2\ \text{mA}$	$V_{CC} - 1.5\text{V}$		0.4	V
Watchdog Timeout Period, $t_{WD}$		1.0	1.6	2.25	sec
WDI Minimum Input Pulse, $t_{WP}$	$V_{IL} = 0.4\text{V}, V_{IH} = 80\% \text{ of } V_{CC}$	50			ns
WDI Threshold Voltage	$V_{IH}, V_{CC} = 5\text{V}$ $V_{IL}, V_{CC} = 5\text{V}$	3.5		0.8	V
WDI Input Current	WDI = 0V WDI = $V_{CC}$	-150	-50 50	150	$\mu\text{A}$
WDO Output Voltage	$I_{SOURCE} = 800\ \mu\text{A}$ $I_{SINK} = 1.2\ \text{mA}$	$V_{CC} - 1.5\text{V}$		0.4	V
$\overline{\text{MR}}$ Pull-Up Current	$\overline{\text{MR}} = 0\text{V}$	100	250	600	$\mu\text{A}$
$\overline{\text{MR}}$ Pulse Width, $t_{MR}$		150			ns
MR Input Threshold	$V_{IL}$ $V_{IH}$	2.0		0.8	V
$\overline{\text{MR}}$ to Reset Output Delay, $t_{MD}$				250	ns
PFI Input Threshold	$V_{CC} = 5\text{V}$	1.2	1.25	1.3	V
PFI Input Current		-25	0.01	25	nA
$\overline{\text{PFO}}$ Output Voltage	$I_{SINK} = 3.2\ \text{mA}$ $V_{CC} = 5\text{V}, I_{SOURCE} = 800\ \mu\text{A}$	$V_{CC} - 1.5\text{V}$		0.4	V

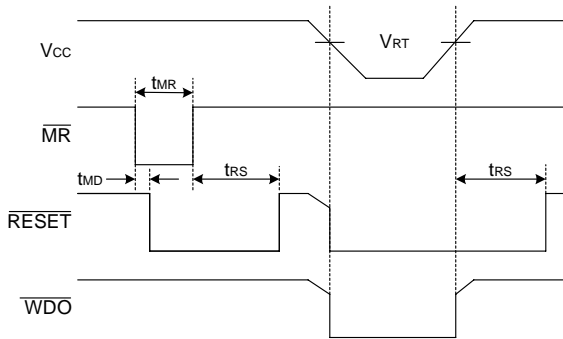
## Pin Functions

Pin Name	Pin Number		Description
	ILC705 ILC706	ILC707 ILC708	
$\overline{\text{MR}}$	1	1	Manual reset input. $\overline{\text{MR}}$ forces $\overline{\text{RESET}}$ to assert when pulled below 0.8V. An internal pull-up current of 250 mA on this input forces it high when left floating. This input can also be driven from TTL or CMOS logic.
$\text{V}_{\text{CC}}$	2	2	Power supply input, 5V.
$\text{GND}$	3	3	Ground pin, 0 V reference.
$\text{PFI}$	4	4	Power fail input. Internally connected to the power fail comparator, which is referenced to 1.25V. The power fail output ( $\overline{\text{PFO}}$ ) remains high if PFI is above 1.25V. PFI should be connected to GND or $\text{V}_{\text{OUT}}$ if the power fail comparator is not used.
$\overline{\text{PFO}}$	5	5	Power fail output. The power fail comparator is independent of all other functions on this device.
$\text{WDI}$	6	N/A	Watchdog input. The WDI input monitors microprocessor activity, an internal watchdog timer resets itself with each transition on the watchdog input. If the WDI pin is held high or low for longer than the watchdog timeout period, $\overline{\text{WDO}}$ is forced to active low. The watchdog function can be disabled by floating the WDI pin.
$\text{N/C}$	N/A	6	No Connect.
$\overline{\text{RESET}}$	7	7	$\overline{\text{RESET}}$ output. $\overline{\text{RESET}}$ is asserted if either $\text{V}_{\text{CC}}$ goes below the reset threshold or by a low signal on the manual reset input ( $\overline{\text{MR}}$ ). $\overline{\text{RESET}}$ remains asserted for one reset timeout period (200ms) after $\text{V}_{\text{CC}}$ exceeds the reset threshold or after the manual reset pin transitions from low to high. The watchdog timer will not assert $\overline{\text{RESET}}$ unless $\overline{\text{WDO}}$ is connected to $\overline{\text{MR}}$ .
$\overline{\text{WDO}}$	8	N/A	Watchdog timer output. The watchdog timer resets itself with each transition on the watchdog input. If the WDI pin is held high or low for longer than the watchdog timeout period, $\overline{\text{WDO}}$ is forced low. $\overline{\text{WDO}}$ will also be forced low if $\text{V}_{\text{CC}}$ is below the reset threshold and will remain low until $\text{V}_{\text{CC}}$ returns to a valid level.
$\text{RESET}$	N/A	8	$\text{RESET}$ output. $\text{RESET}$ is the compliment of $\overline{\text{RESET}}$ and is asserted if either $\text{V}_{\text{CC}}$ goes below the reset threshold or by a low signal on the manual reset input ( $\overline{\text{MR}}$ ). $\text{RESET}$ is suitable for microprocessors systems that use an active high reset.

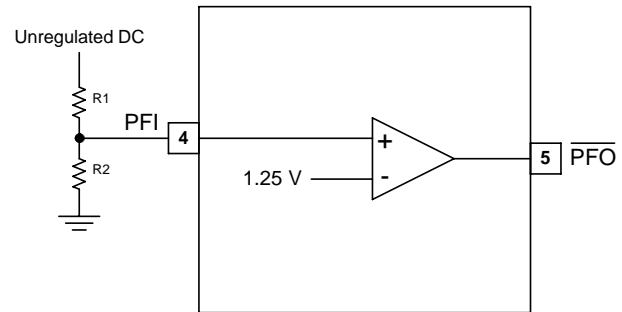
**Circuit Description**

**Microprocessor Reset**

The **RESET** pin is asserted whenever  $V_{CC}$  falls below the reset threshold voltage or when  $\overline{MR}$  goes low. The reset pin remains asserted for a period of 200ms after  $V_{CC}$  has risen above the reset threshold voltage and  $MR$  goes high. The reset function ensures the microprocessor is properly reset and powers up into a known condition after a power failure. **RESET** will remain valid with  $V_{CC}$  as low as 1.4V



fail comparator (PFI) can be chosen so as to trip the power fail comparator a few milliseconds before  $V_{CC}$  falls below the maximum reset threshold voltage. The output of the power fail comparator (PFO) can be used to interrupt the microprocessor when used in this mode and execute shut-down procedures prior to power loss



**Alternate Reference Guide**

**Watchdog Timer**

The microprocessor can be monitored by connecting the WDI pin (watchdog input) to a bus line or I/O line. If a transition does not occur on the WDI pin within the watchdog timeout period, then **WDO** will go low. A minimum pulse of 50ns or any transition low-to-high or high-to-low on the WDI pin will reset the watchdog timer. The output of the watchdog timer (**WDO**) will remain high if WDI sees a valid transition within the watchdog timeout period or if WDI is left floating. If  $V_{CC}$  falls below the reset threshold voltage then **WDO** goes low immediately regardless of WDI. If WDI is left floating, then **WDO** can be used as a low line indicator.

**Manual Reset**

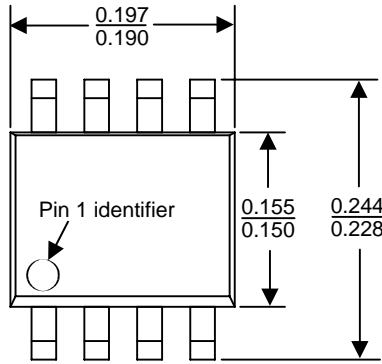
The manual-reset input ( $\overline{MR}$ ) allows reset to be triggered by a pushbutton switch which is debounced by the 140ms minimum reset pulse width.  $\overline{MR}$  can be driven by external TTL/CMOS compatible logic. By connecting **WDO** to  $\overline{MR}$  a watchdog timeout will generate a reset pulse in the ILC705/ILC706.

**Power Fail Warning**

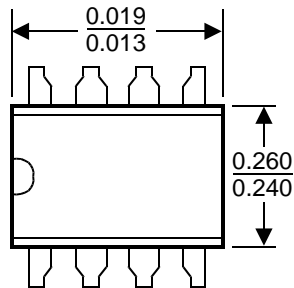
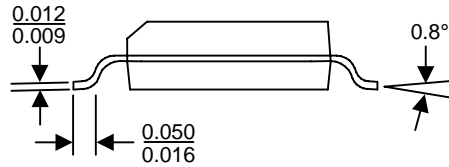
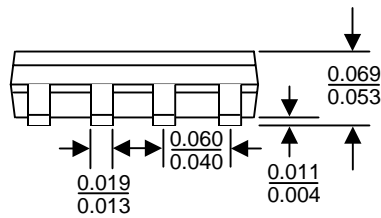
An additional comparator which is independent of other functions on the ILC705/706/707/708 is provided for early warning of power failure. An external voltage divider can be used to compare unregulated DC to an internal 1.25V reference. The voltage divider ratio on the input of the power

Industry P/N	ILC Direct Replacement
MAX705CPA	ILC705N
MAX705CSA	ILC705M
MAX705EPA	ILC705N
MAX705ESA	ILC705M
ADM705AN	ILC705N
DS1705	ILC705
MAX706CPA	ILC706N
MAX706CSA	ILC706M
MAX706EPA	ILC706N
MAX706C/D	ILC706D
ADM706AN	ILC706N
DS1706	ILC706
MAX707CPA	ILC707N
MAX707CSA	ILC707M
MAX707EPA	ILC707N
MAX707ESA	ILC707M
MAX707C/D	ILC707D
ADM707AN	ILC707N
DS1707	ILC707
MAX708CPA	ILC708N
MAX708CSA	ILC708M
MAX708EPA	ILC708N
MAX708ESA	ILC708M
MAX708C/D	ILC708D
ADM708AN	ILC708N
DS1708	ILC708

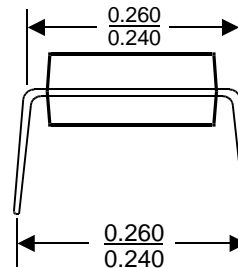
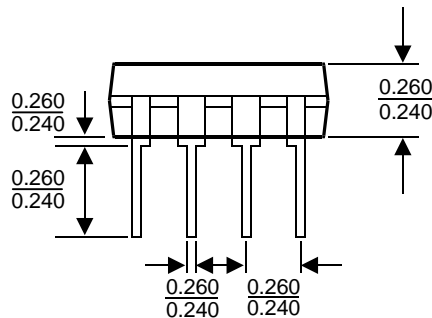
Packaging Information



M Package, 8-Pin Small Outline



N Package, 8-Pin Plastic Dual In-line



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