Features/Benefits

- ICS91730 is a Spread Spectrum Clock targeted for Mobile PC and LCD panel applications that generates an EMI-optimized clock signal (EMI peak reduction of 7-14 dB on 3rd-19th harmonics) through use of Spread Spectrum techniques.
- ICS91730 focuses on the lower input frequency range of 14.318 to 80.00 MHz with a spread modulation of 20kHz to 40kHz.

Specifications

- Supply Voltages: VDD = 3.3V ±0.3V
- Frequency range: 14.318 MHz ≤Fin ≥ 80 MHz
- Cyc to Cyc jitter: <150ps
- Output duty cycle 45-55%
- 0°C to +85°C operation
- 8-pin SOIC
- Reference input

Pin Configuration

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLKN</td>
<td>Input</td>
</tr>
<tr>
<td>VDD</td>
<td>Power supply</td>
</tr>
<tr>
<td>GND</td>
<td>Ground</td>
</tr>
<tr>
<td>SCLK</td>
<td>Input</td>
</tr>
<tr>
<td>SDATA</td>
<td>Input</td>
</tr>
<tr>
<td>PD#</td>
<td>Input</td>
</tr>
<tr>
<td>CLKOUT</td>
<td>Output</td>
</tr>
<tr>
<td>REF_OUT/FS_IN1</td>
<td>Output</td>
</tr>
</tbody>
</table>

8 Pin SOIC
* Internal Pull-Up Resistor

Functionality

<table>
<thead>
<tr>
<th>Fsin_1</th>
<th>MHz</th>
<th>Spread % default</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>14.318 MHz in --&gt; 27MHz out</td>
<td>-0.8 down spread</td>
</tr>
<tr>
<td>1</td>
<td>27.00MHz in --&gt; 27.00MHz out</td>
<td>-1.25 down spread</td>
</tr>
</tbody>
</table>

Block Diagram
## Pin Descriptions

<table>
<thead>
<tr>
<th>PIN #</th>
<th>PIN NAME</th>
<th>PIN TYPE</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CLKN</td>
<td>PWR</td>
<td>Input for reference clock.</td>
</tr>
<tr>
<td>2</td>
<td>VDD</td>
<td>IN</td>
<td>Power supply, nominal 3.3V</td>
</tr>
<tr>
<td>3</td>
<td>GND</td>
<td>OUT</td>
<td>Ground pin.</td>
</tr>
<tr>
<td>4</td>
<td>CLKOUT</td>
<td>I/O</td>
<td>Un-modulated 3.3V reference clock output.</td>
</tr>
<tr>
<td>5</td>
<td>REF_OUT/FS_IN1*</td>
<td>I/O</td>
<td>Frequency select latch input. Refer to the functionality table.</td>
</tr>
<tr>
<td>6</td>
<td>SDATA</td>
<td>PWR</td>
<td>Data pin for SMBus circuitry, 5V tolerant.</td>
</tr>
<tr>
<td>7</td>
<td>SCLK</td>
<td>PWR</td>
<td>Clock pin of SMBus circuitry, 5V tolerant.</td>
</tr>
<tr>
<td>8</td>
<td>PD#*</td>
<td>PWR</td>
<td>Asynchronous active low input pin, with 120Kohm internal pull-up resistor, used to power down the device. The internal clocks are disabled and the VCO and the crystal are stopped.</td>
</tr>
</tbody>
</table>

* Internal Pull-Up Resistor  ** Internal Pull-Down Resistor
Table 1: Frequency Configuration (see I2C Byte0)

<table>
<thead>
<tr>
<th>FS4</th>
<th>FS3</th>
<th>FS2</th>
<th>FS1</th>
<th>FS0</th>
<th>Sprd Type</th>
<th>Sprd %</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>DOWN</td>
<td>0.60</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPREAD (-)</td>
<td>0.80</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>CENTER</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPD (+/-)</td>
<td>1.25</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>1</td>
<td>DOWN</td>
<td>1.50</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>SPREAD (-)</td>
<td>2.00</td>
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<tr>
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<td>1</td>
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<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPD (+/-)</td>
<td>1.00</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>DOWN</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPREAD (-)</td>
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<tr>
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<td>0</td>
<td>CENTER</td>
<td>-0.80</td>
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<td>SPD (+/-)</td>
<td>+/-0.3</td>
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<td>0</td>
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<td>1.50</td>
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<td>SPREAD (-)</td>
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<td>2.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPD (+/-)</td>
<td>2.50</td>
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<tr>
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<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>DOWN</td>
<td>3.00</td>
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<td>0.40</td>
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<td>SPD (+/-)</td>
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</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>CENTER</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SPD (+/-)</td>
<td>1.00</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
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<td>0.50</td>
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<td></td>
<td></td>
<td></td>
<td>SPD (+/-)</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Above is the hard coded 5 bit (32 entry) ROM table.

FS3:0 are ONLY accessible through I2C software programming bits (byte0 bits5:7). FS4 can also be decoded from FS_IN1 latched input hardware pins.

FS_IN1 → FS4. Upon power-up the default is to use hardware selection of FS_IN1 latched value.

FS3 = 0, FS2 = 0, FS1 = 0, FS0 = 1 upon power-up (refer to the functionality table on page 1).

To access non-default spread entries in the ROM, byte0 programming should be used. In order to change the power up default of FS_IN1 = 1 (-1.25% down spread) to any other spread % entry, first change byte0bit 0 to software selection by switching this bit to a ‘1’ and then program the desired percentage by changing byte0 bits 7:3.
General SMBus Serial Interface Information

How to Write
• Controller (host) sends a start bit
• Controller (host) sends the write address
• IDT clock will acknowledge
• Controller (host) sends the beginning byte location = N
• IDT clock will acknowledge
• Controller (host) sends the byte count = X
• IDT clock will acknowledge
• Controller (host) starts sending Byte N through Byte N+X-1
• IDT clock will acknowledge each byte one at a time
• Controller (host) sends a Stop bit

How to Read
• Controller (host) will send a start bit
• Controller (host) sends the write address
• IDT clock will acknowledge
• Controller (host) sends the beginning byte location = N
• IDT clock will acknowledge
• Controller (host) will send a separate start bit
• Controller (host) sends the read address
• IDT clock will acknowledge
• IDT clock will send the data byte count = X
• IDT clock sends Byte N+X-1
• IDT clock sends Byte 0 through Byte X (if X(H) was written to Byte 8)
• Controller (host) will need to acknowledge each byte
• Controller (host) will send a not acknowledge bit
• Controller (host) will send a stop bit

Index Block Write Operation

<table>
<thead>
<tr>
<th>Controller (Host)</th>
<th>IDT (Slave/Receiver)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T starT bit</td>
<td></td>
</tr>
<tr>
<td>Slave Address</td>
<td>ACK</td>
</tr>
<tr>
<td>WR Write</td>
<td>ACK</td>
</tr>
<tr>
<td>Beginning Byte = N</td>
<td>ACK</td>
</tr>
<tr>
<td>Data Byte Count = X</td>
<td>ACK</td>
</tr>
<tr>
<td>Beginning Byte N</td>
<td>ACK</td>
</tr>
<tr>
<td>O</td>
<td>ACK</td>
</tr>
<tr>
<td>O</td>
<td>ACK</td>
</tr>
<tr>
<td>O</td>
<td>ACK</td>
</tr>
<tr>
<td>Byte N + X - 1</td>
<td>ACK</td>
</tr>
<tr>
<td>P stop bit</td>
<td></td>
</tr>
</tbody>
</table>

Index Block Read Operation

<table>
<thead>
<tr>
<th>Controller (Host)</th>
<th>IDT (Slave/Receiver)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T starT bit</td>
<td></td>
</tr>
<tr>
<td>Slave Address</td>
<td>ACK</td>
</tr>
<tr>
<td>WR Write</td>
<td>ACK</td>
</tr>
<tr>
<td>Beginning Byte = N</td>
<td>ACK</td>
</tr>
<tr>
<td>RT Repeat starT</td>
<td>ACK</td>
</tr>
<tr>
<td>Slave Address</td>
<td>ACK</td>
</tr>
<tr>
<td>RD Read</td>
<td>ACK</td>
</tr>
<tr>
<td>Data Byte Count = X</td>
<td>ACK</td>
</tr>
<tr>
<td>Beginning Byte N</td>
<td>ACK</td>
</tr>
<tr>
<td>X Byte</td>
<td></td>
</tr>
<tr>
<td>N Not acknowledge</td>
<td></td>
</tr>
<tr>
<td>P stop bit</td>
<td></td>
</tr>
</tbody>
</table>

Read Address | Write Address
-------------|----------------|
D5(H)         | D4(H)
### Byte 0

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Name</th>
<th>Control Function</th>
<th>Type</th>
<th>Bit Control</th>
<th>PWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit 7</td>
<td>FS0</td>
<td>Spread/FS0</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 6</td>
<td>FS1</td>
<td>Spread/FS1</td>
<td>RW</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bit 5</td>
<td>FS2</td>
<td>Spread/FS2</td>
<td>RW</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bit 4</td>
<td>FS3</td>
<td>Spread/FS3</td>
<td>RW</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bit 3</td>
<td>FS4</td>
<td>FS4</td>
<td>RW</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Bit 2</td>
<td>PD# Tri_Safe</td>
<td>PD# Tri_Safe</td>
<td>RW</td>
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<td>0</td>
</tr>
<tr>
<td>Bit 1</td>
<td>Spread Enable</td>
<td>Spread Enable</td>
<td>RW</td>
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<td>0</td>
</tr>
<tr>
<td>Bit 0</td>
<td>HW/SW Control</td>
<td>Spread Spectrum Control</td>
<td>RW</td>
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<td>0</td>
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</tbody>
</table>

- Spread Percentage: See Table 1
- These are I2C bits only

### Byte 1

<table>
<thead>
<tr>
<th>Pin #</th>
<th>Name</th>
<th>Control Function</th>
<th>Type</th>
<th>Bit Control</th>
<th>PWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit 7</td>
<td>REF_OUT</td>
<td>REF_OUT_Enable</td>
<td>RW</td>
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<td>1</td>
</tr>
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<td>Bit 6</td>
<td>REF_OUT</td>
<td>Slew Rate REF-OUT</td>
<td>RW</td>
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<td>1</td>
</tr>
<tr>
<td>Bit 5</td>
<td>FS-IN_1</td>
<td>FS-IN_1 Readback</td>
<td>R</td>
<td>-</td>
<td>X</td>
</tr>
<tr>
<td>Bit 4</td>
<td>(Reserved)</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>Bit 3</td>
<td>CLK_OUT</td>
<td>Slew Rate CLK-OUT</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 2</td>
<td>CLK_OUT</td>
<td>CLK_OUT_Enable</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 1</td>
<td>(Reserved)</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bit 0</td>
<td>(Reserved)</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
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### Byte 2

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<th>Bit Control</th>
<th>PWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit 7</td>
<td>x</td>
<td>(Reserved)</td>
<td>RW</td>
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<td>1</td>
</tr>
<tr>
<td>Bit 6</td>
<td>x</td>
<td>(Reserved)</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 5</td>
<td>x</td>
<td>(Reserved)</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 4</td>
<td>x</td>
<td>(Reserved)</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 3</td>
<td>x</td>
<td>(Reserved)</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 2</td>
<td>x</td>
<td>(Reserved)</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 1</td>
<td>x</td>
<td>(Reserved)</td>
<td>RW</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 0</td>
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<td>(Reserved)</td>
<td>RW</td>
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### Byte 3

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<th>Type</th>
<th>Bit Control</th>
<th>PWD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bit 7</td>
<td>X</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bit 6</td>
<td>X</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bit 5</td>
<td>X</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bit 4</td>
<td>X</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bit 3</td>
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<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
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</tr>
<tr>
<td>Bit 2</td>
<td>X</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bit 1</td>
<td>X</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Bit 0</td>
<td>X</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>1</td>
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<td>Affected Pin</td>
<td>Type</td>
<td>Bit Control</td>
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<td>-------------</td>
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</tr>
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<td>Name</td>
<td>Control Function</td>
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<td>1</td>
<td></td>
</tr>
<tr>
<td>Bit 7</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 6</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 5</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 4</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 3</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>RW</td>
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<td>-</td>
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<tr>
<td>Bit 2</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>RW</td>
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<td>-</td>
</tr>
<tr>
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<td>(Reserved)</td>
<td>RW</td>
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<td>-</td>
</tr>
<tr>
<td>Bit 0</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>RW</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Byte 5</th>
<th>Affected Pin</th>
<th>Type</th>
<th>Bit Control</th>
<th>PWD</th>
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<tbody>
<tr>
<td>Pin #</td>
<td>Name</td>
<td>Control Function</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 7</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 6</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 5</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 4</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 3</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 2</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 1</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bit 0</td>
<td>X (Reserved)</td>
<td>(Reserved)</td>
<td>-</td>
<td>-</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Byte 6</th>
<th>Affected Pin</th>
<th>Type</th>
<th>Bit Control</th>
<th>PWD</th>
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<tbody>
<tr>
<td>Pin #</td>
<td>Name</td>
<td>Control Function</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Bit 7</td>
<td>X Revision ID Bit 3</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>Bit 6</td>
<td>X Revision ID Bit 2</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>Bit 5</td>
<td>X Revision ID Bit 1</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>Bit 4</td>
<td>X Revision ID Bit 0</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>Bit 3</td>
<td>X Vendor ID Bit 3</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>Bit 2</td>
<td>X Vendor ID Bit 2</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>Bit 1</td>
<td>X Vendor ID Bit 1</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
<tr>
<td>Bit 0</td>
<td>X Vendor ID Bit 0</td>
<td>(Reserved)</td>
<td>R</td>
<td>-</td>
</tr>
</tbody>
</table>
Absolute Maximum Ratings

Stresses above the ratings listed below can cause permanent damage to the ICS91730. These ratings, which are standard values for IDT commercially rated parts, are stress ratings only. Functional operation of the device at these or any other conditions above those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods can affect product reliability. Electrical parameters are guaranteed only over the recommended operating temperature range.

Supply Voltage ......................... 3.7 V
Voltage on any pin with respect to GND ... -0.5 to +3.7 V
Storage Temperature .................... -55°C to +125°C
Power Dissipation ...................... 0.5 W

Electrical Characteristics—Input/Supply/Common Output Parameters

\[ T_A = 0 - 85°C; \text{Supply Voltage } V_{DD} = 3.3 \text{ V } +/-5\% \]

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input High Voltage</td>
<td>V_{IH}</td>
<td>2</td>
<td>V_{DD} + 0.3 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Low Voltage</td>
<td>V_{IL}</td>
<td>V_{SS} - 0.3</td>
<td>0.8 V</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input High Current</td>
<td>I_{IH}</td>
<td>V_{IN} = V_{DD}</td>
<td>-5 mA</td>
<td>5 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Low Current</td>
<td>I_{IL1}</td>
<td>V_{IN} = 0 V; Inputs with no pull-up resistors</td>
<td>-5 mA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powerdown Current</td>
<td>I_{DD3.3PD}</td>
<td>fin = 14.318MHz(^2)</td>
<td>27 mA</td>
<td>41 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>fin = 66.67MHz(^2)</td>
<td>32 mA</td>
<td>50 mA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Frequency Pin Inductance</td>
<td>F_i</td>
<td>V_{DD} = 3.3 V</td>
<td>14.318 MHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Capacitance(^1)</td>
<td>C_{IN}</td>
<td>Logic Inputs</td>
<td>5 pF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C_{OUT}</td>
<td>Output pin capacitance</td>
<td>6 pF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C_{INX}</td>
<td>X1 &amp; X2 pins</td>
<td>27 pF</td>
<td>36 pF</td>
<td>45 pF</td>
<td></td>
</tr>
<tr>
<td>Transition time(^1)</td>
<td>T_{trans}</td>
<td>To 1st crossing of target frequency</td>
<td>3 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Settling time(^1)</td>
<td>T_s</td>
<td>From 1st crossing to 1% target frequency</td>
<td>3 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clk Stabilization(^1)</td>
<td>T_{STAB}</td>
<td>From V_{DD} = 3.3 V to 1% target frequency</td>
<td>3 ms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Delay</td>
<td>t_{pZH},t_{pZL}</td>
<td>Output enable delay (all outputs)</td>
<td>1 ns</td>
<td>10 ns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^1\)Guaranteed by design, not 100% tested in production.

\(^2\)Operating current depends on both the input and output frequencies. The values shown represent the upper and lower extremes. The higher the input/output frequency, the higher the current draw. The relationship is linear.
### Electrical Characteristics—CLKOUT

**T<sub>A</sub> = 0 - 85°C; V<sub>DD</sub> = 3.3V +/-5%; C<sub>L</sub> = 15 pF (unless otherwise specified)**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output High Voltage</td>
<td>V&lt;sub&gt;OH&lt;/sub&gt;</td>
<td>I&lt;sub&gt;OH&lt;/sub&gt; = -1 mA</td>
<td>2.4</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Output Low Voltage</td>
<td>V&lt;sub&gt;OL&lt;/sub&gt;</td>
<td>I&lt;sub&gt;OL&lt;/sub&gt; = 1 mA</td>
<td>0.4</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Rise Time</td>
<td>t&lt;sub&gt;r&lt;/sub&gt;, V&lt;sub&gt;OL&lt;/sub&gt; = 0.41V, V&lt;sub&gt;OH&lt;/sub&gt; = 0.86V</td>
<td>0.5</td>
<td>0.6</td>
<td>1</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Fall Time</td>
<td>t&lt;sub&gt;f&lt;/sub&gt;, V&lt;sub&gt;OH&lt;/sub&gt; = 0.86V, V&lt;sub&gt;OL&lt;/sub&gt; = 0.41V</td>
<td>0.5</td>
<td>0.6</td>
<td>1</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>d&lt;sub&gt;1&lt;/sub&gt;</td>
<td>measurement from differential waveform - 0.35V to +0.35V</td>
<td>45</td>
<td>50</td>
<td>55</td>
<td>%</td>
</tr>
<tr>
<td>Jitter, Cycle to cycle</td>
<td>t&lt;sub&gt;jyc-cyc&lt;/sub&gt;</td>
<td>V&lt;sub&gt;T&lt;/sub&gt; = 50%</td>
<td>50</td>
<td>150</td>
<td></td>
<td>ps</td>
</tr>
</tbody>
</table>

*Guaranteed by design, not 100% tested in production.

### Electrical Characteristics—REF

**T<sub>A</sub> = 0 - 85°C; V<sub>DD</sub> = 3.3V +/-5%; C<sub>L</sub> = 15 pF (unless otherwise specified)**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SYMBOL</th>
<th>CONDITIONS</th>
<th>MIN</th>
<th>TYP</th>
<th>MAX</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Frequency</td>
<td>F&lt;sub&gt;O1&lt;/sub&gt;</td>
<td></td>
<td>14.318</td>
<td></td>
<td></td>
<td>MHz</td>
</tr>
<tr>
<td>Output Impedance</td>
<td>R&lt;sub&gt;DSP&lt;sup&gt;1&lt;/sup&gt;&lt;/sub&gt;</td>
<td>V&lt;sub&gt;O&lt;/sub&gt; = V&lt;sub&gt;DD&lt;/sub&gt;*0.5</td>
<td>20</td>
<td>48</td>
<td>60</td>
<td>Ω</td>
</tr>
<tr>
<td>Output High Voltage</td>
<td>V&lt;sub&gt;OH&lt;/sub&gt;</td>
<td>I&lt;sub&gt;OH&lt;/sub&gt; = -1 mA</td>
<td>2.4</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Output Low Voltage</td>
<td>V&lt;sub&gt;OL&lt;/sub&gt;</td>
<td>I&lt;sub&gt;OL&lt;/sub&gt; = 1 mA</td>
<td>0.4</td>
<td></td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Output High Current</td>
<td>I&lt;sub&gt;OH&lt;/sub&gt;</td>
<td>V&lt;sub&gt;OL@MIN&lt;/sub&gt; = 1.0 V, V&lt;sub&gt;OH@MAX&lt;/sub&gt; = 3.135 V</td>
<td>-29</td>
<td>-23</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Output Low Current</td>
<td>I&lt;sub&gt;OL&lt;/sub&gt;</td>
<td>V&lt;sub&gt;OL@MIN&lt;/sub&gt; = 1.95 V, V&lt;sub&gt;OL@MAX&lt;/sub&gt; = 0.4 V</td>
<td>29</td>
<td>27</td>
<td></td>
<td>mA</td>
</tr>
<tr>
<td>Rise Time</td>
<td>t&lt;sub&gt;r&lt;/sub&gt;, V&lt;sub&gt;OL&lt;/sub&gt; = 0.4 V, V&lt;sub&gt;OH&lt;/sub&gt; = 2.4 V</td>
<td>1</td>
<td>1.2</td>
<td>2</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Fall Time</td>
<td>t&lt;sub&gt;f&lt;/sub&gt;, V&lt;sub&gt;OH&lt;/sub&gt; = 2.4 V, V&lt;sub&gt;OL&lt;/sub&gt; = 0.4 V</td>
<td>1</td>
<td>1.2</td>
<td>2</td>
<td>ns</td>
<td></td>
</tr>
<tr>
<td>Duty Cycle</td>
<td>d&lt;sub&gt;1&lt;/sub&gt;</td>
<td>V&lt;sub&gt;T&lt;/sub&gt; = 1.5 V</td>
<td>45</td>
<td>51</td>
<td>55</td>
<td>%</td>
</tr>
<tr>
<td>Jitter, Cycle to cycle</td>
<td>t&lt;sub&gt;jyc-cyc&lt;/sub&gt;</td>
<td>V&lt;sub&gt;T&lt;/sub&gt; = 1.5 V</td>
<td>105</td>
<td>300</td>
<td></td>
<td>ps</td>
</tr>
</tbody>
</table>

*Guaranteed by design, not 100% tested in production.*
Package Outline and Package Dimensions (8-pin SOIC, 150 Mil. Body)

Package dimensions are kept current with JEDEC Publication No. 95

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Min</th>
<th>Max</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
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<td>A</td>
<td>1.35</td>
<td>1.75</td>
<td>.0532</td>
<td>.0688</td>
</tr>
<tr>
<td>A1</td>
<td>0.10</td>
<td>0.25</td>
<td>.0040</td>
<td>.0098</td>
</tr>
<tr>
<td>B</td>
<td>0.33</td>
<td>0.51</td>
<td>.013</td>
<td>.020</td>
</tr>
<tr>
<td>C</td>
<td>0.19</td>
<td>0.25</td>
<td>.0075</td>
<td>.0098</td>
</tr>
<tr>
<td>D</td>
<td>4.80</td>
<td>5.00</td>
<td>.1890</td>
<td>.1968</td>
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<td>E</td>
<td>3.80</td>
<td>4.00</td>
<td>.1497</td>
<td>.1574</td>
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<tr>
<td>e</td>
<td>1.27</td>
<td>BASIC</td>
<td>.050</td>
<td>BASIC</td>
</tr>
<tr>
<td>H</td>
<td>5.80</td>
<td>6.20</td>
<td>.2284</td>
<td>.2440</td>
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<tr>
<td>h</td>
<td>0.25</td>
<td>0.50</td>
<td>.010</td>
<td>.020</td>
</tr>
<tr>
<td>L</td>
<td>0.40</td>
<td>1.27</td>
<td>.016</td>
<td>.050</td>
</tr>
<tr>
<td>α</td>
<td>0°</td>
<td>8°</td>
<td>0°</td>
<td>8°</td>
</tr>
</tbody>
</table>

"LF" suffix to the part number are the Pb-Free configuration and are RoHS compliant.

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# Revision History

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Issue Date</th>
<th>Who</th>
<th>Description</th>
<th>Page #</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>06/25/04</td>
<td></td>
<td>Add Lead Free package description to Ordering Information</td>
<td>10</td>
</tr>
<tr>
<td>C</td>
<td>06/29/04</td>
<td></td>
<td>Add Revision History table to datasheet.</td>
<td>11</td>
</tr>
<tr>
<td>D</td>
<td>05/23/05</td>
<td></td>
<td>1. Revise ABS max ratings.</td>
<td>8-10</td>
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<tr>
<td></td>
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<td>2. Updated REF Electrical Characteristics table.</td>
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<td></td>
<td></td>
<td></td>
<td>3. Updated LF ordering information from &quot;lead free&quot; to &quot;RoHS compliant&quot;</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>06/04/08</td>
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<td>Updated MLF ordering info</td>
<td>9</td>
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<tr>
<td>F</td>
<td>06/16/11</td>
<td>RDW</td>
<td>1. Added operating current specs that were inadvertently omitted</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Updated ordering info to latest format</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>3. Changed CL from &quot;10-20 pF&quot; to 15 pF</td>
<td>1, 7-9</td>
</tr>
</tbody>
</table>
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