iCE40 Ultra™
Deliver Killer Features – Fast

More capable. Smaller footprint.

75% lower power than our previous family

5x more hardened IP than the competition
30% smaller package size than the competition
3x more LUT density than the competition

Unsurpassed integration of hardened IP in an incredibly small package size.

Reduced chip size and power consumption with integrated IR and RGB current sinks in one device.

The most capable, customizable device for performing common functions related to:

- IR remote
- Barcodes
- Touch
- User identification

Flexibility to differentiate.
Programmability speeds customization of killer functions like:

- User stimulated colors
- Breathing effects
- Pedometer
- You define it!

Upgrade. Innovate. Reduce Cost.

Integrated hard IP & programmable logic enable rapid customization

Three 24mA current sinks for RGB LED drivers

500mA constant current sink for IR / high bright LEDs

Instant on capability with integrated non-volatile memory

Small packages to reduce board area, complexity and cost

Production ready proven solutions for Smart Remote, Barcode, Breathing LED driver, etc.
# iCE40 Ultra™ FPGAs for Mobile Devices

Small, capable, efficient. World’s most integrated mobile FPGA.

Unsurpassed integration speeds customization, drives down cost
Accelerate innovation, create exciting new customer experiences and minimize BOMs. 4K LUTs and key IP for IR, barcode, touch, user ID, LEDs and pedometer.

Reduce power without compromising performance
Extend battery life in compact, high functionality mobile platforms. iCE40 Ultra consumes even lower power than previous devices.

Ultra small 2.08 mm x 2.08 mm x 0.45 mm WLCSP
Space constraints are no barrier to flexibility, innovation and customization with all of this functionality in the world’s smallest FPGAs.

<table>
<thead>
<tr>
<th>Features</th>
<th>iCE5LP1K</th>
<th>iCE5LP2K</th>
<th>iCE5LP4K</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density LUTs</td>
<td>1100</td>
<td>2048</td>
<td>3520</td>
</tr>
<tr>
<td>EBR RAM (Kbits)</td>
<td>64</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>PLL</td>
<td>1</td>
<td>1</td>
<td>1</td>
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<tr>
<td>NVCM</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DSP (16x16 Multipliers)</td>
<td>2</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Hard I²C, SPI</td>
<td>1,1</td>
<td>2,2</td>
<td>2,2</td>
</tr>
<tr>
<td>Oscillator (10KHz)</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Oscillator (48KHz)</td>
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<td>1</td>
<td>1</td>
</tr>
<tr>
<td>24mA RGB LED Sink</td>
<td>3</td>
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<tr>
<td>500mA IR LED Sink</td>
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<tr>
<td>PWM</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

0.35mm Pitch Packages
36-ball WLCSP (2.08 x 2.08 x 0.45 mm) | 26 | 26 | 26 |

0.40mm Pitch Packages
36-ball ucfBGA (2.5 x 2.5 x 0.80 mm) | 26 | 26 | 26 |

0.50mm Pitch Packages
48-ball QFN (7.0 x 7.0 x 0.90 mm) | 39 | 39 | 39 |

### Example Solutions

- **Infrared Remote Control:**
  [latticesemi.com/InfraredTxRx](latticesemi.com/InfraredTxRx)
- **Pedometer:**
  [latticesemi.com/Pedometer](latticesemi.com/Pedometer)
- **RGB LED Indicator:**
  [latticesemi.com/RGB](latticesemi.com/RGB)
- **Barcode Emulator:**
  [latticesemi.com/BarcodeEmulation](latticesemi.com/BarcodeEmulation)

### Need to know more?

- **Product Information:**
  [latticesemi.com/iCE40Ultra](latticesemi.com/iCE40Ultra)
- **Packaging Information:**
  [latticesemi.com/BGA](latticesemi.com/BGA)
- **Quality Information:**
  [latticesemi.com/QualityAndReliability](latticesemi.com/QualityAndReliability)