Glenrothes, Scotland

Established in 1960, Raytheon’s facility in Glenrothes was the first semiconductor fabrication plant in Scotland’s ‘Silicon Glen’. Today, at our 19,000-square-metre facility, we continue to manufacture semiconductors in both Silicon and in ground-breaking Silicon Carbide materials.

Raytheon’s design expertise now extends into CMOS on Silicon Carbide enabling high temperature ASIC’s to be fabricated for harsh environment applications in oil & gas, aviation, automotive and many other extreme environments, where high integrity devices are required.

Raytheon operates a Silicon Carbide foundry, offering a lower cost alternative for the development and production of Silicon Carbide devices. Our experience in Silicon Carbide processing enables accelerated product developments, faster times and more efficient route to market, as well as sustainable production capacity.

We work closely with customers to define and capture their requirements. Our global capability and experience allow us to offer both U.S. technology transfer and ITAR-free products, to provide outstanding solutions. We combine the excellence of Raytheon technology with world-class manufacturing, to deliver exceptional performance.

Silicon Carbide Semiconductor Solutions
Today’s Technology…. Today

For further information contact
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www.raytheon.com/semiconductors
Registered in England Number 406809

Customer Success Is Our Mission

is a registered trademark of Raytheon Company.
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For more than 50 years, Raytheon UK has been a technology and engineering hub of excellence, designing and manufacturing silicon based mixed signal and non-volatile memory Application Specific Integrated Circuits (ASICs). This has been achieved on a range of CMOS processes, to suit the specific needs of our customers. We have a recognised heritage, with a successful history of solutions, across some of the world’s harshest operating conditions. Device application areas include signal conditioning and sensor interfaces in domains such as fire detection, oil and gas and transportation, the latter covering both automotive electronics (TS16949) and rail. Raytheon UK’s in-house design and manufacturing resources are complemented by our test, assembly and qualification capabilities.

**Silicon Carbide Fabrication Facility**

Building on our significant experience in the design, development and fabrication of Silicon devices, Raytheon has invested in its capability to be the only open global fabrication facility available for both product development and volume production of Silicon Carbide (SiC) power devices.

SiC has some unique processing requirements, over and above Silicon, which necessitate significant facility investments and a steep learning curve in processing. However, with Raytheon’s established facilities and material processing expertise, we eliminate capital intensive production start-up costs, thus enabling an efficient, cost-effective and reduced time to market for your power devices.

Unique to our success is our device manufacturing and engineering expertise, combined with our complete in-house, end-to-end fabrication capability. This makes Raytheon a ideal supply chain partner, able to exploit economies of scale and further benefits throughout the product life-cycle.

Raytheon’s superior processing capability provides a cost-effective route to product development and volume manufacturing.

**High Temperature Silicon Carbide**

Raytheon’s Silicon Carbide Fabrication Facility began development work on wide bandgap substrates in 2004. Over the past 10 years, our processing expertise and capability has gained enormous strength and we now partner with leading customers and research academia in this environment.

Raytheon is developing an advanced Silicon Carbide manufacturing technology, known as HiTSiC (High Temperature SiC), to produce SiC MOSFET and IGBT integrated circuits capable of operating above 250 degrees Celsius. This breakthrough process integrates both MOCVD and IVASS SiC transistors on the same substrate, and has been specifically designed for extreme environment sensors, instrumentation circuits and drivers used in aerospace, oil and gas, automotive and other harsh environment electronics applications, where Silicon fails to function.

Key to our success is the unique leverage we have of our HiTSiC technology from our own on-site UK fabrication facility. This means we control and scale the core building blocks of our road map, offering bespoke roadmap to optimised power delivery and thermal management at a modular level. This is where we distinguish ourselves, in delivering high current, high power density and high temperature operation. HiTSiC technology is a ‘game changer’ for energy, sustainability and green-related applications.

**IN HOUSE CAPABILITIES**

<table>
<thead>
<tr>
<th>Photolithography</th>
<th>Oxidation and Diffusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Ultraviolet steppers and ArF lasers</td>
<td>• Range of oxidation processes to 1200 degrees Celsius in N2O</td>
</tr>
<tr>
<td>Wide range of resistors</td>
<td>• Solid source Phosphorus deposition</td>
</tr>
<tr>
<td>Plasma processes</td>
<td>• Spray process pre-furnace dears</td>
</tr>
<tr>
<td>Phosphosilicate polyamide</td>
<td>• Rapid Thermal Anneal</td>
</tr>
<tr>
<td>Plasma Etch for all film types</td>
<td>• High temp implant anneal to 1800 degrees Celsius</td>
</tr>
<tr>
<td>For oxide, nitride, Silicon, Silicon carbide and metals</td>
<td></td>
</tr>
<tr>
<td>LPCVD and PECVD</td>
<td>LCVD</td>
</tr>
<tr>
<td>• Range of deposited oxides, undoped, PSG, PECVD</td>
<td>• Back-end</td>
</tr>
<tr>
<td>Ion Implant</td>
<td>• Wafer prober, wafer saw</td>
</tr>
<tr>
<td>Material Analysis</td>
<td>• Wafer taping with hot chuck facility</td>
</tr>
<tr>
<td>High temperature silicon carbide</td>
<td>• High voltage testing to 2kV and 5A</td>
</tr>
<tr>
<td>Silicon Carbide Fabrication Facility</td>
<td>HiTSiC project has taken a step change in SiC device capability.</td>
</tr>
</tbody>
</table>

**APPROACH:**
- Process development, co-development and testing
- Prototyping
- Full qualification
- Use of medium volume production
- ‘A’ marking
- In-house design support capability

**CERTIFICATIONS:**
- BS EN ISO 9001:2008
- MIL-STD 883
- ISO 14001
- ISO 13485
- 9050
- ISO 13485
- MIL-STD 883
- ISO 13485
- 9001
- ISO 13485
- MIL-STD 883
- ISO 13485

**Raytheon’s Silicon Carbide Fabrication Facility**

Raytheon’s Silicon Carbide Fabrication Facility is to be a ‘game changer’ for energy, sustainability and green-related applications.
Raytheon’s superior processing capability provides a cost-effective route to product development and volume manufacturing.
Glenrothes, Scotland

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