Going beyond the call of duty for military and aerospace applications

Altera Enhanced COTS PLD Initiative

The Altera commitment

At Altera, we're committed to serving the military and aerospace industry for the long term, anticipating your challenges and advancing innovation to deliver next-generation technology to you on time and through time. Altera will ensure you meet your commitments, reduce risk, and provide high reliability.

The Altera® Enhanced COTS PLD Initiative spearheads development of COTS programmable logic device (PLD) solutions, including FPGAs, CPLDs, and ASICs, to overcome extraordinary military and aerospace challenges beyond baseline DoD requirements and competitive offerings. As a result, you get enhanced feature sets for military and aerospace applications plus the same functionality, density, performance, and low power consumption of our industry-leading commercial solutions—at no additional cost. Our commercial solutions reduce your risk of obsolescence over custom solutions. At Altera, we're committed to serving the military and aerospace industry, anticipating your challenges and advancing innovation to deliver next-generation technology to you on time and through time.

Altera enhanced COTS features

Anti-tampering design security—Volatile and non-volatile embedded encryption key assures that your designs will be protected in the field. Stratix® III and IV FPGAs offer a 256-bit Advanced Encryption Standard (AES) algorithm (FIPS-197 compliant) and both volatile and non-volatile key storage, which can be used to encrypt military intellectual property (IP) programmed into the FPGA. MAX® II CPLDs and HardCopy® series ASICs are non-volatile, inherently providing design security because they do not require external configuration memory.

Extended life cycle—Altera keeps devices in production to support longer product life cycles, reducing your obsolescence risk. JEDEC standard compliance includes JESD48 for sufficient notification of obsolescence: 12-month notification with an additional 6 months for delivery. Automated alerts for product change notifications (PCNs), product discontinuation notices (PDNs), and other documents are available by registering at **www.altera.com/literature/updates**.

Military temperature support—We've expanded industrial-grade temperature range devices to include military-grade temperature support (-55°C to 125°C) for select Stratix, Stratix II, and HardCopy II devices. This is done without the typical cost premiums, limited device offerings, and poor end-of-life (EOL) protection associated with competitive military-grade products. Altera will continue to introduce product families that meet military-grade temperature requirements.

Quality and reliability levels for rugged environments—Altera devices stand up to shock and vibration, high temperature operation life (HTOL), highly accelerated stress tests (HASTs), and more. Our silicon and packaging are designed concurrently to ensure reliable compatibility. Extensive package options meet various needs, including tolerance to humidity, shock, and vibration. Flip-chip packaging is reliable even after the PCB cleaning process and conformal coating. Additionally, Altera has been certified to STACK International's Level I and Level II requirements for over 10 years. Altera has a closed-loop quality and reliability system that conforms to the requirements of ISO 9001-Rev2000, MIL-I-45208, and JEDEC standards.

Bare die support—We provide support for raw-die procurement for military applications that require multi-chip module (MCM) integration, resulting in size, weight, and power (SWaP) savings, and partner with White Electronic Designs Corporation for on-shore packaging needs such as small form factor and ceramic packaging, MCMs, extended temperature products, and more.

Lead packaging—To meet the extreme reliability requirements for military and aerospace applications, we continue to offer lead packages for most devices in addition to RoHS-compliant offerings. We're committed to maintaining lead packaging options on current and future products.

Reliable supply chain—We strategically partner with suppliers to ensure customer satisfaction. From wafer fabrication, packaging, and test through sales and distribution, Altera stands on its reputation for a robust and reliable supply chain.

AQEC compliance—Altera is part of the Aerospace Qualified Electronics Components (AQEC) working group and was the first semiconductor manufacturer to be certified; our Stratix and Cyclone® series FPGAs are GEIA-STD-0002-01 certified.

DO-254 compliance—Our Nios® II soft processor is DO-254 compliant for airborne electronic hardware to ensure FAA airworthiness. Documentation and certification support for other IP is available through our network of IP suppliers.

ITAR compliance—International Traffic in Arms Regulations (ITAR) compliance for export and manufacturing includes the license agreement for HardCopy II ASICs manufactured at established overseas plants to control sensitive technical data. This secure design and manufacturing flow ensures customer and design application anonymity.

SEU detection and mitigation—The industry's first automatic cyclical redundancy check (CRC) device for the configuration of RAM in an FPGA continually and automatically checks for changes in configuration that might occur from a single event upset (SEU) event. For critical flight systems, HardCopy technology offers very high levels of immunity to soft errors.

The right applications

With Altera, you can meet military requirements, and design for higher levels of functionality and speed in these applications and more.

The right product mix

- MAX II CPLDs—Lowest-cost, lowest-power CPLDs
- Cyclone series FPGAs—Lowest-power FPGAs for power-sensitive, high-volume applications
- Arria® GX FPGAs—Low-cost, transceiver-based, and protocol-optimized FPGAs
- Stratix IV high-performance and transceiver-based FPGAs—Unmatched core performance, memory capacity, and time-to-market advantages
- HardCopy ASICs with transceivers—adding design options to military programs with sensitivities to power, and flight-critical certifications
- Quartus® II software—#1 in performance and productivity
- Nios II embedded processor—Build an exact-fit processor system in minutes
- Intellectual property—Off-the-shelf IP cores for video and image processing, digital down/up conversion, forward error correction (FEC), and more
- Additional documentation, including the *Designing with Confidence for Military SDR Production Applications* white paper and additional information on the Altera SWaP advantage, designing for radar processing, and anti-tamper solutions, as well as development kits, references designs, and much more

Military and aerospace applications

Application	Devices	Top-level design requirements
Radar	• Arria GX protocol-optimized, low-cost transceiver-based FPGAs • Stratix IV high-performance and transceiver-based FPGAs • HardCopy IV GX ASICs	• Digital signal processing (DSP) • Floating point functionality • High density • High-speed transceivers[1] • Programmable Power Technology for power/performance management[2]
Wireless software defined radio (SDR)	• Cyclone III low-power FPGAs	• Abundant memory and DSP resources for waveform processing • Low power • Reprogrammability
	• Stratix series high-performance FPGAs • HardCopy series ASICs	• DSP (expanded capabilities) • AES encryption • High performance • Memory • Reprogrammability • Waveform processing
Inline network	• Stratix series high-performance FPGAs • HardCopy series ASICs	• Industrial-grade or military-grade temperature[3] • Low cost/low power • SEU detection and mitigation • AES encryption

Application	Devices	Top-level design requirements
Missiles and unmanned aerial vehicles	• MAX II low-power CPLDs • Cyclone series low-power FPGAs • Stratix series high-performance and transceiver-based FPGAs	• Up to military-grade temperature[3] • I/O performance • Low cost • Low power • Small form factor • SEU detection and mitigation
Avionics and flight displays	• MAX II low-cost CPLDs	• Instant on • Low cost • SEU detection and mitigation
	• Cyclone series low-power FPGAs	• Low power • SEU detection and mitigation
	• Stratix series high-performance FPGAs • HardCopy series ASICs	• Abundant memory and DSP resources for video and image processing • SEU detection and mitigation
Electronic warfare	• Arria GX protocol-optimized, low-cost transceiver-based FPGAs • Stratix IV GX high-performance, transceiver-based FPGAs • HardCopy IV GX ASICs	• DSP • High performance • Military-grade temperature[3] • High-speed transceivers[1]
	• Cyclone series low-power FPGAs	• Low power • Small form factor

[1] Transceivers available in Stratix series FPGAs and Arria GX FPGAs.
[2] Stratix III FPGAs.
[3] Military temperature support for select Stratix series and HardCopy series devices.

The right answer

Altera sets the custom logic industry standard for reliability and for meeting commitments to lower your risk and increase your productivity in military and aerospace applications. Get started on your next design today by contacting an Altera sales representative or visiting **www.altera.com/military**.

Altera Corporation
101 Innovation Drive
San Jose, CA 95134
USA
www.altera.com

Altera European Headquarters
Holmers Farm Way
High Wycombe
Buckinghamshire
HP12 4XF
United Kingdom
Telephone: (44) 1494 602000

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