# *Built**SAFE***™ MFCC-8558 SBC

### *NXP QorIQ™ T2080 Conduction-cooled Single Board Computer (SBC) XMC Module*

- **Designed for DAL-C (DO-178C/DO-254) certification**
- **NXP QorIQ™ T2080 processor**
- **Low-SWaP and power options with I/O avionics interfaces or high performance video graphics**
- **4x PCIe Gen2 interfaces on XMC (full mesh support)**
- **1x DAL-C Fast Ethernet interface on XMC**
- **Maintenance/mission mode with specific hardware logic**
- **Safety optimized board management controller**
- **Backward compatibility with MFCC-8557**
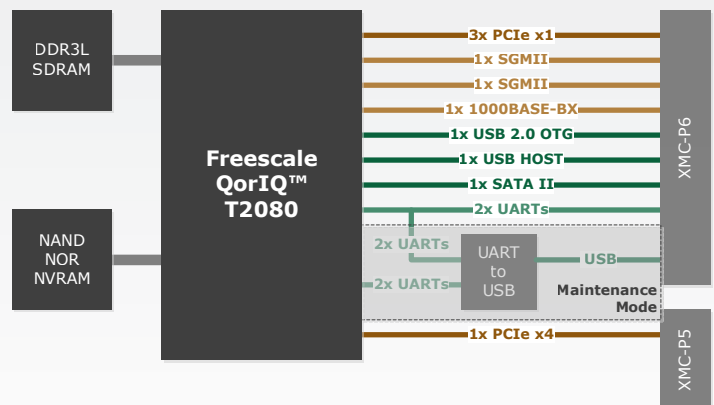
**HIGHEST DAL**
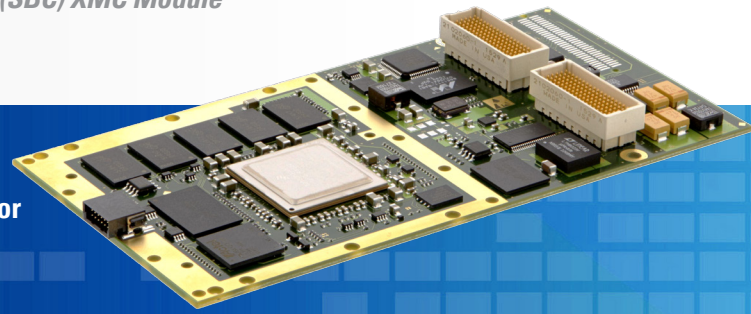
Mercury's BuiltSAFE™ products bring the highest level of flight-safety assurance to aerospace and defense applications. Our proven, reusable Design Assurance Level (DAL) certified artifacts for mission computing, avionics, networking and datalink comms processing save time and cost while decreasing risk.

Mercury's MFCC-8558 BuiltSAFE board is a DAL-C safety certifiable XMC 2.0 Single Board Computer (SBC) engineered for the most stringent aerospace and defense applications that may require certification to DO-178C/DO-254. The MFCC 8558 can be delivered with all documentation, certification evidence and supporting artifacts required to prove compliance for avionics certification.

Leveraging the MFCC-8558 ensures a smooth development process supported by Mercury's safety engineering team and their deep domain expertise. The MFCC-8558 BuiltSAFE SBC has been engineered with DAL safety certification in mind from the top down, systematically applying DO-178C/DO-254 best design practices.

The MFCC-8558 has a comprehensive set of Power-On, Continuous and Initiated Built-In-Tests and hardware components that physically disconnect maintenance interfaces during missions for built in reliability.



Block diagram:
- DDR3L SDRAM
- NAND NOR NVRAM
- Freescale QorIQ™ T2080
- 3x PCIe x1
- 1x SGMII
- 1x SGMII
- 1x 1000BASE-BX
- 1x USB 2.0 OTG
- 1x USB HOST
- 1x SATA II
- 2x UARTs
- 2x UARTs — UART to USB — USB
- 2x UARTs — Maintenance Mode
- 1x PCIe x4
- XMC-P6
- XMC-P5

## Pre-integration

The MFCC-8558 BuiltSAFE SBC is engineered for seamless integration with complementary building blocks with XMC 2.0 compatible mezzanine sites. Pre-integrated with BuiltSAFE 3U OpenVPX modules such as Mercury's VGP-2870 video and graphic processor card or AVIO-2353 avionics I/O card, the MFCC-8558 becomes a powerful DAL-C (DO-178C/DO-254) certifiable subsystem that is packaged in a single 3U OpenVPX slot. This approach is ideal for computation intensive video/graphics or I/O intense avionic applications.

*Mercury Systems is a leading commercial provider of secure sensor and mission processing subsystems. Optimized for customer and mission success, Mercury's solutions power a wide variety of critical defense and intelligence programs.*

ACQUIRE  DIGITIZE  PROCESS  STORAGE  EXPLOIT  DISSEMINATE

## BuiltSAFE for Avionics

Mercury's expertise and experience in safety certifiable solutions has been built on successful execution of dozens of programs over three decades. This domain knowledge is the foundation of our BuiltSAFE portfolio of open architecture modules, systems and software for avionics, communications, video servers, and mission computing.

## Technical Specifications

### Compliance

XMC 2.0 (VITA-61), XMC PCIe (VITA 42.3)
Certifiable up to DAL-C (DO-178C/DO-254) – Higher upon request
Certifiable board support package: VxWorks®653 (partitioned)

### Power Consumption

| minimum | typical | maximum |
|---------|---------|---------|
| - | 15W | 20W |

### Processor

NXP QorIQ T2080 four dual threaded e6500 cores
AltiVec unit

### Memory

4 GB DDR3L at 14.4 GB/s peak with ECC protection
4 GB Flash EPROM (NAND)
512MB Flash EPROM (NOR)
256 KB FRAM NVRAM

### Links/Connections

3x PCIe Gen2 x1 on XMC-P6
1x PCIe Gen2 x4 on XMC-P5
1x SGMII on XMC-P6 (DAL-C) [1]
2x UARTs on XMC-P6 [2]
Maintenance or DAL-E only interfaces (disabled when on mission)

|   |   |
|---|---|
| 1x 1000BASE-BX interface on XMC-P6 | 1x USB 2.0 HOST on XMC-P6 |
| 1x SGMII interface on XMC-P6 | 4x UARTs over USB on XMC-P6 (2) |
| 1x USB 2.0 OTG on XMC-P6 | 1x SATA 2.0 on XMC-P6 |

[1] DAL-C certifiable in Fast Ethernet mode

[2] Mutually exclusive

### Ruggedization Levels

☐ A1 : 0°C to 55°C
☐ C4 : -40°C to 85°C

### Safety Optimized Board Management Controller

Voltage monitoring
Temperature monitoring (thermal sensors on critical positions)
Elapsed time and real-time counter
Watchdog (short and long period)
Error reporting
Reset management
Certifiable board support package
Initialization sequence
Built-In Tests

### Environmental Specifications

| Condition | Limits, standards | Comments |
|-----------|-------------------|----------|
| Non-operating temperature | -55°C to 105°C [C4] | |
| Humidity | 95% | |
| Altitude | -1,500 to 60,000 feet | May require conformal coating |
| Fungus resistance | No nutrient materials | |
| Workmanship | IPC-A-160 class 3 | |
| Soldering | IPC J-STD-001 class 3 | |
| PCB Manufacturing | IPC-A-600 class 3 | |
| Conformal coating | IPC-CC-830 | Optional |
| Materials | REACH compliant | ROHS variants as an option |
| Flammability | UL 94 Class V-0 | |
| Quality | EN 9100:2008 | |

## Product Ordering

**MFCC-8558**      NXP QorIQ T2080 processor XMC

### Software

☐ VxWorks653 board support package     ☐ Linux board support package

### Safety Artifacts

☐ DO-178C certification kit*     ☐ DO-254 certification kit*

*Please consult factory

Note: If the MFCC-8558 is to be used on a VME/CPCI carrier, please contact factory

| Level | Description | Cooling Type | Operating Temperature | Vibration (1 hour per axis) | Operating Shocks |
|-------|-------------|--------------|-----------------------|------------------------------|------------------|
| A1 | Commercial AC | Forced air* | 0°C to 55°C [AC1] | 5-100 Hz: increase at 3 dB/octave, 100-1000 Hz: 0.04 $g^2$/Hz, 1000-2000Hz: decrease at 6 dB/octave [V2] | 20g, 11ms saw-tooth, three axes [OS1] |
| C4 | Extended range CC | Conduction | -40°C to 85°C [CC4] | 5-100 Hz: increase at 3 dB/octave, 100-1000 Hz: 0.1 $g^2$/Hz, 1000-2000Hz: decrease at 6 dB/octave | 40g, 11ms saw-tooth, three axes |

* The required air-flow is defined separately for each product

## Related Hardware Products

| | |
|---|---|
| AVIO-2353 | 3U OpenVPX avionics I/O board |
| VGP-2870 | 3U OpenVPX video I/O and graphic processor |
| CB3P-6357A0 | 3U OpenVPX carrier board for MFCC-8557/8 |
| RTM-8557A0 | Rear Transition Module for CB3P-6357A0 + MFCC-8557/8 integration |
| ACS-6076 | Forced air-cooled 4-slot payload, 3U OpenVPX sealed conduction-cooled enclosure (0.8", 0.85", 1" pitch, 250 Watts) with MIL connectors |
| ROCK-2 | 3U OpenVPX, low-SWaP, rugged, modular, pre-qualified subsystems |

## Less space for more functions

### Mission Computer featuring stacked XMCs for low-SWaP
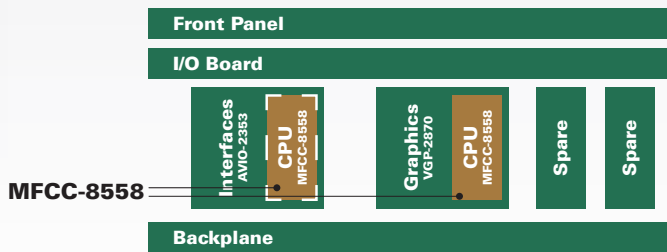
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