# Built**SAFE**™ MFCC-8557

*Freescale QorIQ™ P3041 Conduction-cooled Single Board Computer XMC Module*

- **Designed for DAL-C (DO-178C/DO-254) certification**
- **Freescale QorIQ™ P3041 processor**
- **Low-SWaP and power options with broad 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**
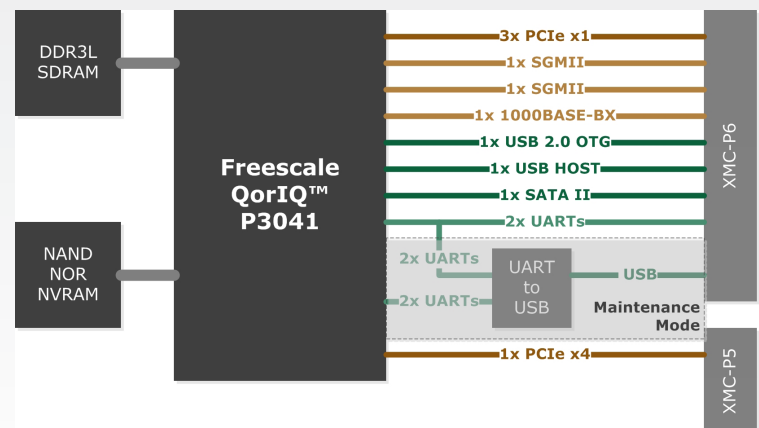- **Safety optimized board management controller**
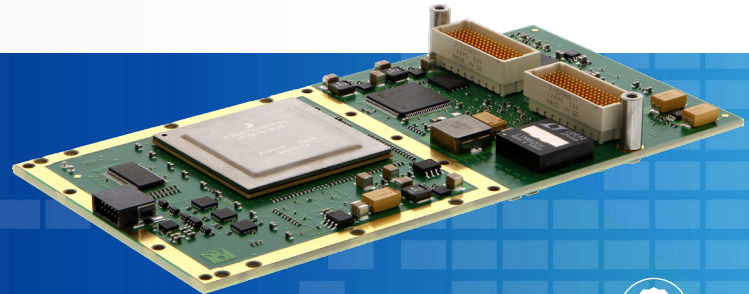
**HIGHEST DAL**

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 BuiltSAFE MFCC-8557 is a DAL C (other upon request) certifiable XMC 2.0 Single Board Computer (SBC) engineered for the most stringent aerospace and defense applications that require certification to DO-178C/DO-254. The MFCC-8557 can be delivered with all documentation, certification evidence and supporting artifacts required to prove compliance for avionics certification. Leveraging the MFCC-8557 ensures a smooth development process supported by Mercury's safety engineering team and their deep domain expertise. The BuiltSAFE MFCC-8557 has been engineered with DAL safety certification in mind from the top down, with DO-178C/DO-254 best design practices systematically applied throughout all phases of development.

The BuiltSAFE MFCC-8557 features 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.



DDR3L SDRAM

NAND NOR NVRAM

**Freescale QorIQ™ P3041**

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
2x UARTs
UART to USB
USB
**Maintenance Mode**

1x PCIe x4

XMC-P6

XMC-P5

## 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.

*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
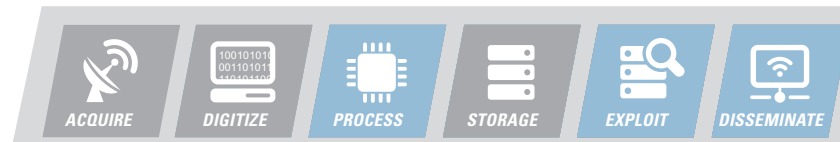
## Pre-integration

The MFCC-8557 is engineered for seamless integration feature complementary building blocks with XMC 2.0 compatible mezzanine sites. Pre-integrated with our BuiltSAFE VGP-2870 or AVIO-2353, the MFCC-8557 becomes a powerful DAL-C (DO-178C/DO-254) certifiable subsystem that is packaged in a single 3U OpenVPX™ slot. This approach is ideally suitable for computation intensive video/graphics or I/O intense avionic applications.

## Technical Specifications

### Compliance

XMC (VITA-42) XMC 2.0 (VITA-61), XMC PCIe (VITA 42.3)
Certifiable up to DAL-C (DO-178C/DO-254)
Certifiable board support package: VxWorks®653 (partitioned)

### Power Consumption

| minimum | typical | maximum | units |
|---------|---------|---------|-------|
| - | 12 | 18 | Watts |

### Processor

Freescale QorIQ P3041 @ 1.5 GHz

### Memory

2/4 GB DDR3L @ 10.6 GB/s peak with ECC protection
2 GB Flash EPROM (NAND)
256 MB Flash EPROM (NOR) for mission
256 MB Flash EPROM (NOR) for maintenance
256 KB FRAM NVRAM
32 MB EEPROM SPI

### Links/Connections

3x PCIe Gen2 x1 on XMC-P6
1x PCIe Gen2 x4 on XMC-P5
1x SGMII interface on XMC-P6 [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 SGMII interface on XMC-P6
  1x USB 2.0 OTG on XMC-P6
  1x USB 2.0 HOST on XMC-P6
  4x UARTs over USB on XMC-P6 [2]
  1x SATA 2.0 on XMC-P6

(1) DAL-C certifiable in Fast Ethernet mode

(2) Mutually exclusive

### Safety Optimized Board Management

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

## Product Ordering

**MFCC-8557**          Freescale QorIQ P3041 processor XMC

**Memory**

☐ 2 GB              ☐ 4 GB

**Connector**

☐ XMC (VITA-42)     ☐ XMC 2.0 (VITA-61)

**Environmental**

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

**Software**

☐ Green Hills INTEGRITY-178 tuMP      ☐ Linux [3]
☐ WindRiver VxWorks® 6.x and 653 3.x  ☐ SYSGO PikeOS
☐ DDC-I Deos

(3) Contact factory for more information

**Safety Artifacts**

☐ DO-178C certification kit (consult factory for more information)
☐ DO-254 certification kit (consult factory for more information)

Note: If the MFCC-8557 is used on a VME/CPCI carrier, please contact factory

## Related Hardware Products

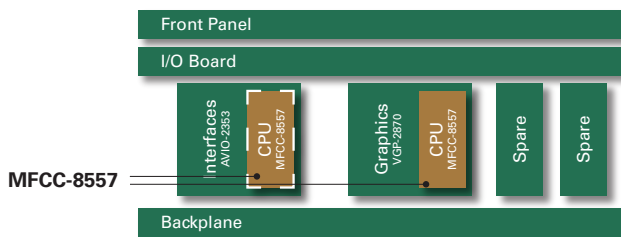| | |
|---|---|
| AVIO-2353 | 3U OpenVPX™ avionic I/O board |
| VGP-2870 | 3U OpenVPX video I/O and graphic processor |
| ROCK-2 | 3U OpenVPX, low-SWaP, rugged, modular, pre-qualified subsystems |
| CB3P-6357 | 3U OpenVPX carrier board for MFCC-8557/8 |
| RTM-8557A0 | Rear Transition Module for pre-integration CB3P-6357A0 + MFCC-8557/8 |

## Ruggedization Levels

| Level | Description | Cooling Type | Operating Temperature | Vibration (1 hour per axis) | Operating Shocks |
|-------|-------------|--------------|----------------------|----------------------------|-----------------|
| C4 | Extended range CC | Conduction | -40°C to 85°C [CC4] | 5-100 Hz: increase at 3 dB/octave, 100-1000 Hz: 0.1 g²/Hz, 1000-2000Hz: decrease at 6 dB/octave | 40g, 11ms saw-tooth, three axes |

## 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-610 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 | |

## Less space for more functions

**Mission computer featuring stacked XMCs for low-SWaP**

MFCC-8557

Front Panel
I/O Board
Interfaces AVIO-2253
CPU MFCC-8557
Graphics VGP-2870
CPU MFCC-8557
Spare
Spare
Backplane

3238.02E-0919-ds-MFCC-8557

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