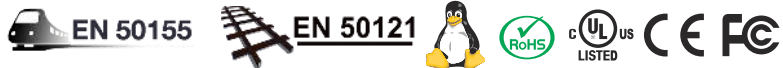# UC-8580 Series

Preliminary

Vehicle-to-ground computing platform with multiple WWAN ports

> **Complies with all EN 50155 mandatory test items***
> **Supports up to 3 WWAN connections and 2 SIM card slots per cellular module**
> **Supports 1 WLAN (IEEE 802.11b/g/n/ac) connection**
> **Single-panel I/O design for reduced installation space and easier maintenance**
> **Front-side access panel for easy maintenance**
> **Isolated 24 to 110 VDC power input with power-ignition function suitable for vehicle applications**
> **EN 50155 Tx (-40 to 70°C) operating temperature for harsh environments**
> **5-year warranty**

*This product is suitable for rolling stock railway applications, as defined by the EN 50155 standard. For a more detailed statement, click here: www.moxa.com/doc/specs/EN_50155_Compliance.pdf

EN 50155   EN 50121   RoHS   c UL us LISTED   CE   FC

: Overview

Moxa's UC-8580 is an innovative computing platform designed specifically for transportation applications.

The UC-8580 has four slots for installing wireless modules*. Three slots support 3G/LTE modules, and one slot supports a Wi-Fi module. Each 3G/LTE module has two SIM card slots, which can be used to enable redundant cellular network communications or geo-fencing SIM card selection by leveraging the built-in Wireless Manager, a Moxa software utility for cellular and Wi-Fi management.

The UC-8580 uses an open platform based on Debian 8 with Linux Kernel 4.1, allowing solution providers to manage software packages via Debian's APT (Advanced Packaging Tools), or develop software applications with Moxa's API Library and GNU C Library.
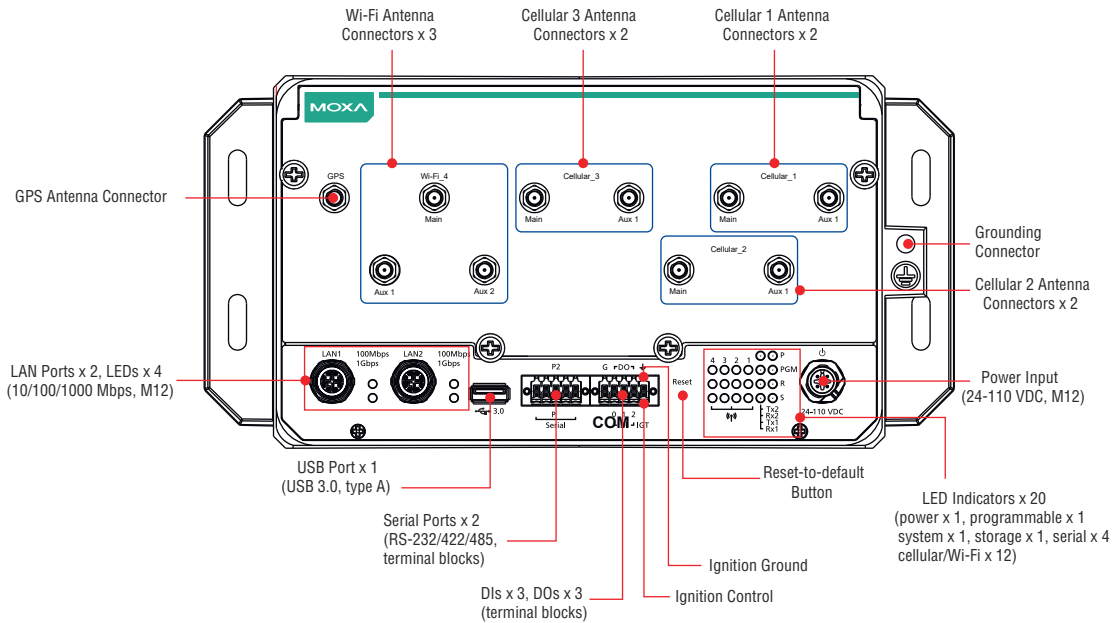
The UC-8580's single-sided I/O design is ideal for vehicle applications, which typically do not have a lot of room for installing communications devices. The UC-8580 also has an access panel on the front side, allowing users to install or change wireless modules, SIM cards, or mSATA cards without needing to remove the entire unit from the wall after being mounted.

The UC-8580 can be used as a communication-centric computing platform for the following applications:

- Vehicle-to-ground communication gateway
- TCMS T2G (train-to-ground) gateway
- Mobile condition monitoring unit
- Ethernet Consist Network T2G gateway
- Onboard wireless automated fare collection unit

*Wireless modules must be purchased separately. Please contact a Moxa sales representative for details.

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Appearance

Wi-Fi Antenna Connectors x 3

Cellular 3 Antenna Connectors x 2

Cellular 1 Antenna Connectors x 2

GPS Antenna Connector

Grounding Connector

Cellular 2 Antenna Connectors x 2

LAN Ports x 2, LEDs x 4 (10/100/1000 Mbps, M12)

Power Input (24-110 VDC, M12)

USB Port x 1 (USB 3.0, type A)

Reset-to-default Button

LED Indicators x 20 (power x 1, programmable x 1 system x 1, storage x 1, serial x 4 cellular/Wi-Fi x 12)

Serial Ports x 2 (RS-232/422/485, terminal blocks)

Ignition Ground

DIs x 3, DOs x 3 (terminal blocks)

Ignition Control

Hardware Specifications

Computer
CPU: ARMv7 Cortex-A7 dual-core 1 GHz processor
OS (pre-installed): Debian 8 (Linux Kernel v4.1)
USB: USB 2.0/3.0 hosts x 1 (Type A connector)
DRAM: 1 GB DDR3L SDRAM

Wireless-Enabled Mini-PCIe Slots
Number of Slots: 4
Slots 1 to 3: USB signal for cellular modules
Slot 4: PCIe signal for Wi-Fi module
SIM Card Slots: 2 SIM card slots per Mini-PCIe slot for celular modules
Note: Wireless modules must be purchased separately.

Storage
Main Storage: 4 GB eMMC for OS storage
Storage Expansion: mSATA slots x 1

Ethernet Interface
LAN: Auto-sensing 10/100/1000 Mbps Ethernet ports x 2 (M12 X-coded, 8-pin)
Magnetic Isolation Protection: 1.5 kV built in

GPS Module
Receiver Types:
• 72-channel u-blox M8 engine
• GPS L1C/A
• SBAS L1C/A
• QZSS L1C/A
• GLONASS L1OF
• BeiDou B1

Protocol	Types
NMEA 0183, version 4.0 (V2.3 or V4.1 configurable)	Input/output, ASCII
UBX	Input/output, binary, u-blox proprietary
RTCM	Input message, 1, 2, 3, 9

Time Pulse: 0.25 Hz to 10 MHz (configurable)
Velocity Accuracy: 0.05 m/s
Heading Accuracy: 0.3 degrees
Assisted GNSS (A-GNSS): Supports AssistNow Online and AssistNow Offline A-GNSS services, supports AssistNow Autonomous, and is OMA SUPL compliant
Operational Limits (assuming Airborne < 4 g platform):
• Dynamics: 4 g
• Altitude: 50,000 m
• Velocity: 500 m/s
Antenna Type: Passive/Active
Connector Type: SMA (F)

Serial Interface
Serial Standards: RS-232/422/485 software-selectable ports (5-pin terminal block connector) x 2
Console Port: RS-232 (TxD, RxD, GND), 4-pin pin-header output (115200, n, 8, 1)

Serial Communication Parameters
Data Bits: 5, 6, 7, 8
Stop Bits: 1, 1.5, 2
Parity: None, Even, Odd, Space, Mark
Flow Control: XON/XOFF, ADDC® (automatic data direction control) for RS-485
Baudrate: 115200 bps (max.)

Serial Signals
RS-232: TxD, RxD, RTS, CTS, GND
RS-422: TxD+, TxD-, RxD+, RxD-, GND
RS-485-4w: TxD+, TxD-, RxD+, RxD-, GND
RS-485-2w: Data+, Data-, GND

Digital Input/Output
Digital Inputs: 3 (terminal block)
Digital Input Default Value: High
Input Voltage: 0 to 30 VDC at 25 Hz
Digital Input Levels for Dry Contacts:
Logic level 0: Close to GND
Logic level 1: Open

Digital Input Levels for Wet Contacts:
Logic level 0: +3 V max.
Logic level 1: +10 V to +30 V (COM to DI)
Digital Outputs: 3 (terminal block)
DO Default Value: High-Z
DO IO Type: Open drain
Output Current: Max. 200 mA per channel
On-State Voltage: 24 VDC nominal, open collector to 30 VDC
Isolation: 3 KV optical isolation
Connector: 10-pin terminal blocks with CAGE CLAMP® connection (4 inputs, COM, GND, 4 outputs)

LEDs
System: Power x 1, System Ready x 1
LAN: 100/1000M x 4
Serial: Tx x 2, Rx x 2
Programmable: Diagnostics x 1
Wireless Signal Strength: Cellular/Wi-Fi x 12

Buttons
Reset to Default: Resets the device to factory default values

Physical Characteristics
Housing: Al 5052 + ADC 12
Weight: 2.2 kg (4.86 lb)
Dimensions:
• 220 x 134 x 88 mm (8.66 x 5.28 x 3.46 in) without wallmount ears
• 270 x 134 x 88 mm (10.63 x 5.28 x 3.46 in) with wallmount ears
Mounting: Wall

Environmental Limits
Operating Temperature:
• UC-8580-LX: EN 50155 Class T1, -25 to 55°C (-13 to 131°F)
• UC-8580-T-LX/UC-8580-T-CT-LX (with LTE module): EN 50155 Class Tx, -40 to 70°C (-40 to 158°F)
Storage Temperature: -40 to 85°C (-40 to 185°F)
Ambient Relative Humidity: 5 to 95% (non-condensing)
Anti-Vibration: 7.9 m/s2 @ EN 50155 random wave, 5-150 Hz, 5 hrs per axis
Anti-Shock: 50 m/s2 @ EN 50155 , half sine wave, 30 ms
Conformal Coating: EN 50155 Tx

Power Requirements
Input Voltage: 24 to 110 VDC
(EN 50155 nominal input voltages: 24/48/72/96/110 V)
Input Current: 1.66 A @ 24 VDC; 0.36 A @ 110 VDC
Power Consumption: Less than 40 W
(with external loading on USB port and Mini-PCIe module)
Power-to-Chassis Isolation: 1400 VDC
(EN 50155 power interuption class S2)
Connector: M12 4-pin A-coded (2-pin M12, V+, V-)

Standards and Certifications
Safety: UL 60950-1, CSA C22.2 No. 60950-1-03, EN 60950-1
EMC: EN 55032 Class A, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, FCC Part 15 Subpart B Class A
Green Product: RoHS, CRoHS, WEEE
Rail Traffic: EN 50155, EN 50121-4, EN 45545, NFPA 130

Reliability
Alert Tools: Built-in buzzer and RTC (real-time clock)
Automatic Reboot Trigger: Built-in WDT (watchdog timer)

Warranty
Warranty Period: 5 years
Details: See www.moxa.com/warranty
Note: The Hardware Specifications apply to the embedded computer unit itself, but not to accessories. In particular, the wide temperature specification does not apply to accessories such as the power adapter and cables.

Software Specifications

Linux
OS: Debian 8
Web Server (Apache): Allows you to create and manage web sites; supports PHP and XML
Terminal Server (SSH): SSH allows remote logins to a secure encrypted console from any connected network
Kernel: GNU/Linux 4.1
System Shell: dash, bash
Text Editor: vim, nano
File System: Ext2, Ext3, Ext4
Internet Protocol Suite: TCP, UDP, IPv4, IPv6, SNMPv2, ICMP, ARP, HTTP, CHAP, PAP, DHCP, NTP, NFS, SSH, PPP, SFTP, RSYNC, SSL
Programming Language Support: PHP, Perl, Python
Internet Security: OpenVPN, iptables
Cryptographic Hardware Accelerators: AES, SHA, OpenSSL
Self Diagnosis: Check the status of system and hardware components via software
Linux Board Support Packages (BSP): GCC C/C++ cross development tool chain: Bootloader/Kernel/filesystem
Cellular Networking:
• WVDIAL: Point-to-Point Protocol dialer that dials a modem and starts pppd service to connect to the Internet
• QMI (Qualcomm MSM Interface): Glib-based library for talking to WWAN modems and devices that speak the Qualcomm MSM Interface (QMI) protocol

Watchdog: Features a hardware function to trigger system reset in a user-specified time interval (Linux standard provided)
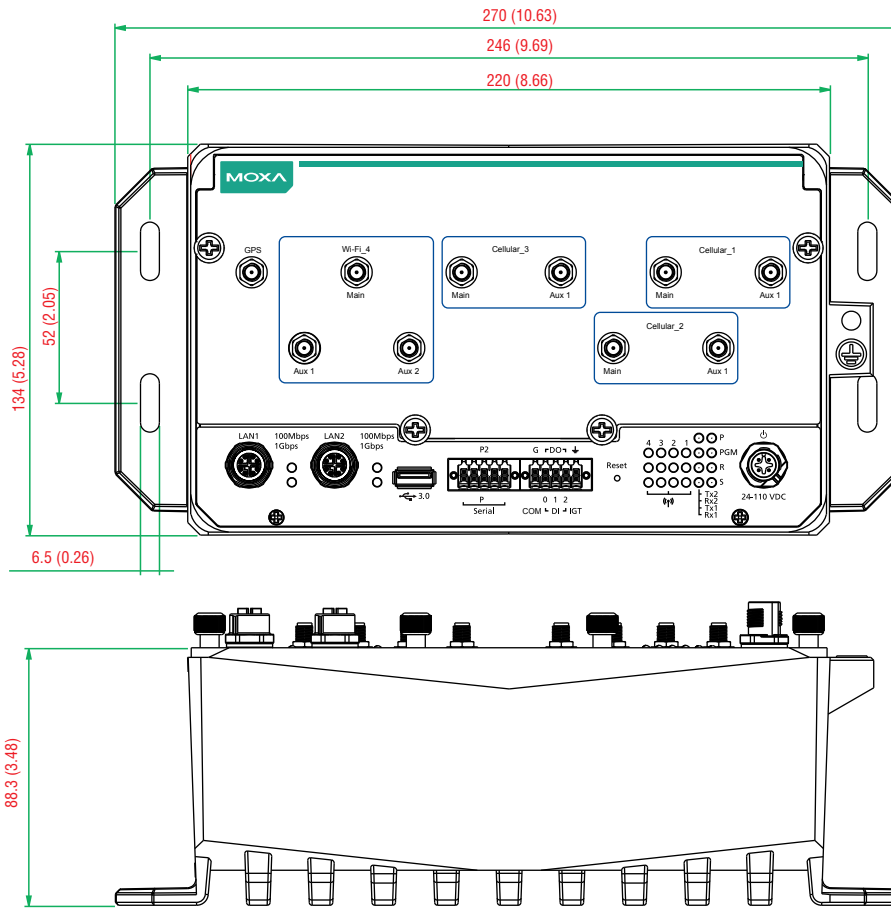**Application Development Software:**
• Moxa API Library (Watchdog timer, Moxa serial I/O control, Moxa DI/DO API)
• GNU C/C++ cross-compiler
• GNU C library
• GDB source-level debugging server
Software Protection: Encryption tool for user executable files (based on patented Moxa technology)
Wireless Communication Management Tool: SW utility and SDK for the management of wireless interfaces; supports the management of dual-SIM-on-single-modem

Dimensions

Unit: mm (inch)

Ordering Information

Available Models	Operating Temperature	Conformal Coating
UC-8580-LX	-25 to 55°C (-13 to 131°F)	–
UC-8580-T-LX	-40 to 70°C (-40 to 158°F)	–
UC-8580-T-CT-LX	-40 to 70°C (-40 to 158°F)	✓

Package Checklist

- UC-8580 Series computer
- CBL-4PINDB9F-100: 4-pin pin header to DB9 female console port cable, 100 cm
- Quick installation guide (printed)
- Warranty card

⋮ Optional Accessories (can be purchased separately)

Type	Model Name	Description
Power		
Cable	CBL-M12(FF5P)/Open-150 IP67	Phoenix Contact 4-pin female A-coded M12-Open power cable, 1.5 meters, IP67-rated
Cable	CBL-M12(FF5P)/Open-300 IP67	Phoenix Contact 4-pin female A-coded M12-Open power cable, 3 meters, IP67-rated
Connector	M12A-4PFF-IP67	Phoenix Contact 4-pin female A-coded connector
Connector	M12A-4PMM-IP67	Phoenix Contact 4-pin male A-coded connector
Adapter	PWR-24270-DT-S1	Power adapter, input voltage 90 to 264 VAC, output voltage 24 VAC with a 2.7 A DC load
Power Cord	PWC-C7US-2B-183	Power cord with 2-pin connector, USA plug
Power Cord	PWC-C7EU-2B-183	Power cord with 2-pin connector, Euro plug
Power Cord	PWC-C7UK-2B-183	Power cord with 2-pin connector, British plug
Power Cord	PWC-C7AU-2B-183	Power cord with 2-pin connector, Australia plug
Power Cord	PWC-C7CN-2B-183	Power cord with 2-pin connector, China plug
Console Cable	CBL-F9DPF1x4-BK-100	Console cable with 4-pin connector
Ethernet		
Cable & Connector	CBL-M12XMM8PRJ45-BK-100-IP67	Phoenix Contact 8-pin male X-coded M12-to-RJ45 Cat.5e UTP gigabit Ethernet cable, 1 meter, IP67-rated
Cable & Connector	CBL-M12XMM8PRJ45-BK-200-IP67	Phoenix Contact 8-pin male X-coded M12-to-RJ45 Cat.5e UTP gigabit Ethernet cable, 2 meters, IP67-rated
Connector	M12X-8PMM-IP65	Phoenix Contact 8-pin male X-coded connector

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: Optional Accessories (can be purchased separately)

Type	Model Name	Description
LTE		
Mini-PCIe Card	UC-8580-4GCat3-US	LTE Cat. 3 module for North America, 2 SMA connectors with cable, 2 screws
Mini-PCIe Card	UC-8580-4GCat3-EU	LTE Cat. 3 module for Europe, 2 SMA connectors with cable, 2 screws
Mini-PCIe Card	UC-8580-4GCat3-CN	LTE Cat. 3 module for China, 2 SMA connectors with cable, 2 screws
External Antenna	ANT-LTEUS-ASM-01	LTE-US external antenna with SMA connector
External Antenna	ANT-LTE-ASM-02	LTE-EU external antenna with SMA connector
Wi-Fi		
Mini-PCIe Card	UC-8580-WLAN33-AC	3x3 802.11ac/a/b/g/n module, 3 SMA connectors with cable
External Antenna	ANT-WDB-ARM-02	Wi-Fi external antenna with SMA connector
GPS		
External Antenna	ANT-GPS-OSM-05-3M BK	26 dBi, 1,572 MHz, L1 band SMA antenna