BC50M – Box PC for In-Vehicle Applications

- **AMD Embedded G-Series APU**
- **2 DisplayPorts, up to 2560x1600 each**
- **2 Gigabit Ethernet, 1 USB 2.0**
- **WLAN, GSM (2G), UMTS (3G), LTE (4G), GPS or GLONASS via 2 PCI Express® Mini Card slots**
- **2 Slots for IBIS, GPS, RS232, RS485, RS422**
- **24 VDC and 36 VDC nom. (10 to 50.4 V) class S2 power supply, incl. ignition**
- **-40 to +85°C operating temperature**
- **Fanless and maintenance-free design**
- **Compliant to EN 50155 (railways)**
- **Prepared for E1 (automotive)**

The BC50M (formerly called BC1) is a maintenance-free box computer that has been designed for independent use or as display computer electronics for use in vehicles, e.g. in trains, commercial vehicles, mobile machines or airplanes.

It is powered by an AMD Embedded G-Series APU (Accelerated Processing Unit), the T48N, running at 1.4 GHz. The G-Series combines low-power CPUs and advanced GPUs, in this case an AMD Radeon™ HD 6310, into a single embedded device. The use of the Embedded G-Series makes for high scalability in CPU (single/dual core) and graphics performance (various Radeon™ GPUs or none at all).

The BC50M is equipped with 2 GB of DDR3 SDRAM and offers SD card and mSATA slots. A SATA hard-disk/ solid-state drive can be installed within the housing as an option. The system is designed for fanless operation at temperatures from -40 to +70°C (+85°C for up to 10 minutes), its special aluminum housing with cooling fins serves as a heat sink for the internal electronics and in this way provides conduction cooling.

The BC50M supports up to two DisplayPort® interfaces with a maximum resolution of 2560x1600 each. The DisplayPort® interfaces and all other I/O are available at the unit's front panel on standard connectors like USB, 9-pin D-Sub (HD audio and optional serial I/O), 8-pin M12 (Gigabit Ethernet) and DisplayPort®. On the inside, the system offers two PCI Express® Mini card slots with two SIM card slots. By default, one is used for each of the two PCI Express® Mini cards, but the first PCI Express® Mini card can also switch between the two SIM cards as an option. The necessary antenna connectors can be made available at the front panel.

The BC50M comes with an integrated 30W wide-range DC/DC converter and is compliant with EN 50155 (nominal input voltages 24 and 36 V) and prepared for E1 certification (nominal input voltages 12 and 24 V). The power can be switched on and off using an ignition signal on the power connector, and a shutdown-delay time after switching off the power can be adjusted by software.

The combination of the various CPU/GPU options with the available selection of external interfaces (realized via separate graphics and I/O interface boards within the system) makes for an extremely flexible system design that can quickly be tailored to a vast number of applications.

Diagram

Technical Data

CPU	■ AMD Embedded G-Series T48N □ Dual-Core □ 1.4 GHz processor core frequency □ Accelerated Processing Unit (APU), also includes GPU (see Graphics)
Controller Hub	■ AMD A55E
Memory	■ 64 KB L1 and 512 KB L2 cache ■ 2 GB DDR3 SDRAM system memory □ Soldered □ 1066 MT/s
Mass Storage	■ One SD card slot □ Via USB ■ One mSATA slot □ Transfer rate up to 3 Gbit/s ■ Serial ATA (SATA) □ One port for hard-disk/solid-state drive mounted within the unit's housing □ SATA Revision 3.x support □ Transfer rates up to 600 MB/s (6 Gbit/s)
Graphics	■ AMD Radeon™ HD 6310 □ Dual independent display support □ Dual DisplayPort® □ Maximum resolution: 2560x1600 □ Embedded in T48N APU ■ 3D Graphics Acceleration □ Full DirectX® 11 support, including full speed 32-bit floating point per component operations □ Shader Model 5 □ OpenCL™ 1.1 support □ OpenGL® 4.0 support ■ Motion Video Acceleration □ Dedicated hardware (UVD 3) for H.264, VC-1 and MPEG2 decoding □ HD HQV and SD HQV support: noise removal, detail enhancement, color enhancement, cadence detection, sharpness, and advanced de-interlacing □ Super up-conversion for SD to HD resolutions
Front I/O	■ 2 DisplayPort® 1.1a interfaces □ AUX channels and hot plug detection ■ 1 HD audio □ HD audio codec □ Audio stereo in □ Audio stereo out □ SPDIF out □ All available via 9-pin D-Sub connector ■ 2 Gigabit Ethernet □ Via M12 connectors ■ 1 USB 2.0 □ Via Series A connector ■ 2 SA-Adapter™ slots for serial I/O □ 1 UART or IBIS, GPS, SGPIO □ 1 UART or CAN bus ■ 8 status LEDs □ 4 for Ethernet link and activity status □ 2 for general board status □ 2 user LEDs

Technical Data

2 PCI Express® Mini Card slots	■ For functions such as □ Mobile service standards: GSM (2G), UMTS (3G), LTE (4G) and derivates □ Wireless communication: WLAN / WiFi IEEE 802.11 and derivates □ Positioning: GPS, GLONASS, GALILEO ■ 2 SIM card slots ■ PCI Express® and USB interface
Real-Time Clock	■ Buffered by Gold Cap for up to 12 h
Electrical Specifications	■ Isolation voltage 1,500 VDC □ Ethernet port 1, Ethernet port 2, power input, system ground (USB, Display Port, Audio...) ■ Supply voltage: □ 24 VDC and 36 VDC (10 to 50.4 V input voltage range) □ EN 50155 power interruption class S2 ■ Power consumption: up to 30 W
Mechanical Specifications	■ Dimensions: approx. 250 mm x 220 mm x 44.1 mm ■ Weight: 1.8 kg ■ Front protected according to IP20
Environmental Specifications	■ Temperature range (operation): □ Depends on system configuration (CPU, PCIeMiniCards, Ethernet, USB, ...) □ Maximum: +70°C (+85°C for 10 minutes) according to EN50155 Tx □ Minimum: -40°C (all processors) □ Conditions: typical power dissipation: 14.4 W (with 18W CPU T48N) with Windows®® 7 operating system and 1 Gb Ethernet connection □ Fanless operation ■ Temperature range (storage): -40..+85°C ■ Relative humidity (operation): max. 95% non-condensing ■ Relative humidity (storage): max. 95% non-condensing ■ Altitude: -300 m to +3,000 m ■ Shock: 50 m/s², 30 ms ■ Vibration (function): 1 m/s², 5 Hz - 150 Hz ■ Vibration (lifetime): 7.9 m/s², 5 Hz - 150 Hz ■ Conformal coating of internal components on request
MTBF	■ 262,804 h @ 40°C according to IEC/TR 62380 (RDF 2000)
Safety	■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers
EMC	■ Conforming to EN 55022 (radio disturbance), IEC 61000-4-2 (ESD) and IEC 61000-4-4 (burst) ■ Prepared for certification according to E1 requirements of the German Federal Motor Transport Authority
BIOS	■ InsydeH2O™ UEFI Framework
Software Support	■ Windows® 7 ■ Windows® Embedded Standard 7 ■ Windows® XP Embedded ■ Linux ■ For more information on supported operating system versions and drivers see Downloads.

Configuration & Options

Standard Configurations

Article No.	APU	Graphics	Memory	Input Voltage	HD Audio	Antenna Connectors	SATA HDD/ SSD
09BC50M00	AMD T48N, 1.4 GHz Dual Core (18W)	AMD Radeon HD 6310	2 GB DDR3-1066, 64 KB L1 cache, 512 KB L2 cache	24 VDC nom.	Yes	No	No

Options

APU	■ AMD T56N, 1.65 GHz Dual Core, 18W, AMD Radeon™ HD 6320 ■ AMD T56E, 1.65 GHz Dual Core, 18W, AMD Radeon™ HD 6250 ■ AMD T48N, 1.4 GHz Dual Core, 18W, AMD Radeon™ HD 6310 ■ AMD T48E, 1.4 GHz Dual Core, 18W, AMD Radeon™ HD 6250 ■ AMD T40N, 1.0 GHz Dual Core, 9W, AMD Radeon™ HD 6290 ■ AMD T40E, 1.0 GHz Dual Core, 6.4W, AMD Radeon™ HD 6250 ■ AMD T52R, 1.5 GHz Single Core, 18W, AMD Radeon™ HD 6310 ■ AMD T44R, 1.2 GHz Single Core, 9W, AMD Radeon™ HD 6250 ■ AMD T40R, 1.0 GHz Single Core, 5.5W, AMD Radeon™ HD 6250 ■ AMD T16R, 615 MHz Single Core, 4.5W, AMD Radeon™ HD 6250 ■ AMD T48L, 1.4 GHz Dual Core, 18W ■ AMD T30L, 1.4 GHz Single Core, 18W ■ AMD T24L, 1000 MHz Single Core, 5W
Memory	■ Up to 4 GB DDR3 SDRAM system memory ■ SATA hard-disk/solid state drive (mounted within housing)
Graphics	■ Maximum resolution depending on GPU □ 2560x1600 (all DisplayPort® interfaces) with Radeon™ HD 6310 and 6320 □ 1920x1200 (all DisplayPort® interfaces) with Radeon™ HD 6250 and 6290
I/O	■ Antenna connectors □ For functions like Wi-Fi, WIMAX, GSM/GPRS, UMTS, LTE in combination with PCI Express® Mini Card(s) □ Reverse SMA connector ■ Two SA-Adapter™ slots for RS232, RS422/485, IBIS, binary I/O or CAN bus
Miscellaneous	■ Real-time clock □ 72 h buffer time ■ 3-axis accelerometer and 3-axis magnetometer
Electrical Specifications	■ Input voltages of 48V, 72V and 110V can be implemented on request
Mechanical Specifications	■ Sides protected according to IP40
Environmental Specifications	■ Temperature range (operation): □ -40°C to 85°C (screened) with wider housing with additional cooling fins

As the product concept is very flexible, there are many other configuration possibilities. Please contact our sales team if you do not find your required function in the options. Please note that some of these options may only be available for large volumes.

Ordering Information

Standard BC50M Models	**09BC50M00**	Box computer with dual graphics connection, 24 VDC PSU, AMD T48N, 1.4 GHz, 2 GB RAM, SD card slot, mSATA slot, 2x DisplayPort®, 2x Gb Ethernet, 1x USB, 2x SA-Adapter™ slot (UARTs, fieldbuses), 2x PCI Express® Mini card slot, 2x SIM card slot, -40..+70(+85)°C screened, IP40, EN 50155, prepared for E1
Related Hardware	**08AE63-00**	DisplayPort® to LVDS converter, temperature sensor, ambient light, touch input, key control, input voltage 12V..24V, -40°..+85°C screened
	15PX01-00	GLONASS & GPS PCI Express® MiniCard (full size), 3-axis Gyro sensor, -40..+85°C with qualified components
Memory	**0751-0047**	SD card, 4GB, -40..+85°C
	0751-0051	SSD mSATA, 8 GB, -40..+85°C
	0754-0007	SSD SATA 256 GB, 2.5" MLC, 0..+70°C
SA-Adapters™	You can find a more detailed overview of possible carrier board/SA-Adapter™ combinations along with software support in our option matrix (PDF).	
	08SA01-06	RS232, not optically isolated, -40..+85°C screened
	08SA02-07	RS422/485, full duplex, optically isolated, -40..+85°C screened
	08SA03-01	1 RS232, optically isolated, -40..+85°C screened
	08SA08-01	CAN ISO high-speed, optically isolated, -40..+85°C screened
	08SA15-00	8 digital I/O channels, -40..+85°C with qualified components, no RoHS
	08SA22-00	IBIS master SA-Adapter™, -40..+85°C screened
	08SA22-01	IBIS slave SA-Adapter™, -40..+85°C screened
Miscellaneous Accessories	**05BC00-00**	Starter Kit for BoxPC: 1x AC/DC power supply, 1x DisplayPort® to DVI adapter (active), 2x M12 to RJ45 Gbit Ethernet cable, 4x HF cable with U.FL plug to RP-SMA plug
	05BC01-00	19" insertion frame for Box PCs including 2 heat sinks More info
	0780-0005	DisplayPort® to DVI-D adapter, 20 cm
	0780-0006	Active DisplayPort® (DP) to single link DVI-D adapter, 20cm, max. resolution 1920x1200, AMD / ATI Eyefinity technology
	0781-0002	HF antenna cable with U.FL connector to RP-SMA connector, 200 mm
	0799-0003	UMTS PCIe® Mini Card GTM661W, half-size card with adapter for full-size slot, -10° C..+55°C operating temperature, -40°C..+85°C storage temperature Note: when using wireless modules the R&TTE Guide of the EU has to be observed. See the R&TTE website For the module's driver see Option's website
	0799-0004	WLAN PCIe® MiniCard 6205, 802.11n 2x2 MIMO, 2.4 GHz and 5 GHz, half-size card with adapter for full-size slot, operating temperature 0°C..+80°C, storage temperature -40°..+85°C Note: when using wireless modules the R&TTE Guide of the EU has to be observed. See the R&TTE website For the module's driver see Intel®'s website
	15PX01-00	GLONASS & GPS PCI Express® MiniCard (full size), 3-axis Gyro sensor, -40..+85°C with qualified components

Ordering Information

Software: Linux

This product is designed to work under Linux. See below for potentially available separate software packages from MEN.

13SC24-90	Linux I2C controller driver (MEN) for SC24, AE51, BC50M, BC50I and BL50W
13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, F22P, G20, G22, D9, D601, F600 and F601, A19, A20, F217, SC24, BC50M, BC50I and BL50W
13Z010-06	MDIS4™/2004 / MDIS5™ low-level driver sources (MEN) for 16Z076_QSPI
13Z015-06	MDIS5™ low-level driver sources (MEN) for 16Z029_CAN (MSCAN/Layer2)
13Z016-06	MDIS5™ driver (MEN) for 16Z029_CAN (CANopen master)
13Z017-06	MDIS5™ low-level driver sources (MEN) for 16Z034_GPIO, 16Z037_GPIO and 16Z127_GPIO

Software: Windows®

This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.

10F014-78	Windows® XP Embedded BSP (MEN) for F11S, F14, F15, F17, F18, F19P, F21P, G20, XM1, XM1L, XM2, MM1, MM2, SC21, SC24, DC1, DC2, RC1, BC50I, BC50M and BL50W
10Y000-78	Windows® Embedded Standard 7 BSP for F11S, F19P, F21P, F22P, G20, G22, XM1L, XM2, MM1, MM2, SC21, SC24, SC27, BC50M, BC50I, BL50W, BL50S, F206, F210, F215, F216, G215, P506, P507 and P511
13SC24-77	Windows® Installset (MEN) for SC24, BC50M, BC50I and BL50W (Includes all free drivers developed by MEN for the supported hardware.)
13T010-70	Windows® 32-bit network driver (Intel®) for XM1, XM1L, XM2, MM2, F11S, F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, G211, G211F, SC24, BC50I, BC50M and BL50W
13T020-70	Windows® 64-bit network driver (Intel®) for F18, F18E, F19P, F21P, F22P, G20, G22, GM1, GM2, G211, G211F, XM2, SC24, BC50I, BC50M and BL50W
13T025-70	Windows® XP GPU and chipset driver (AMD) for BC50M, BC50I, BL50W and SC24
13T026-70	Windows® Vista™ / Windows® 7 GPU and chipset driver (AMD) for BC50M, BC50I, BL50W, SC24 and G214
13Z010-70	MDIS5™ Windows® driver (MEN) for 16Z076_QSPI devices
13Z015-70	MDIS4™/2004 / MDIS5™ Windows® driver (MEN) for 16Z029_CAN (MSCAN/Layer2)
13Z016-70	MDIS5™ Windows® driver (MEN) for 16Z029_CAN (CANopen master)
13Z017-70	MDIS4™/2004 / MDIS5™ Windows® driver (MEN) for 16Z034_GPIO devices

For operating systems not mentioned here contact MEN sales.

Documentation

Compare Chart Standard and Custom Box PCs » Download

20BC50MER	BC50M Errata
20BC50M00	BC50M User Manual
21APPN015	Application Note: Using Real-Time Operating Systems on MEN CPUs with InsydeH2O™ UEFI BIOS

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