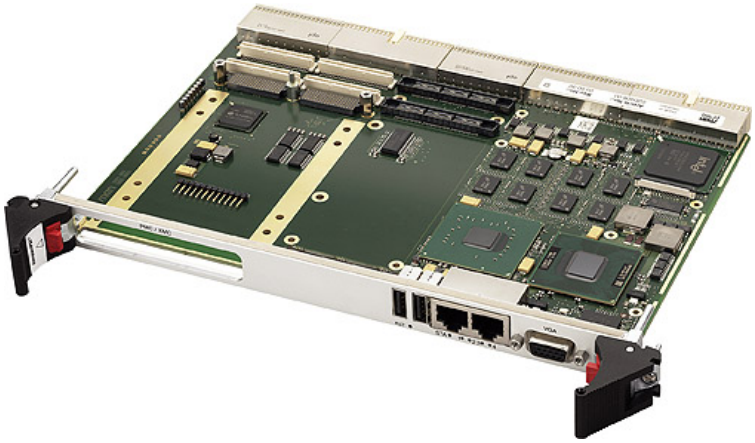
D9 – 6U CompactPCI® Intel® Core™ Duo / Core 2 Duo CPU Board

- **Intel® Core™ 2 Duo T7400 or L7400**
- **Core Duo T2500, U2500 or L2400**
- **PCI Express® five x1 links**
- **4 HP system master or stand-alone**
- **32-bit CompactPCI®**
- **PICMG 2.16 via mezzanine card**
- **Up to 4 GB DDR2 DRAM soldered**
- **2 SATA, 1 PATA interface**
- **Video via VGA and 2 SDVO, HD audio via mezzanine**
- **Up to 4 Gigabit Ethernet**
- **Up to 6 USB and 4 UARTs via mezzanine**
- **1 XMC or PMC, 1 mezzanine card slot**
- **Board controller**



The D9 6U single-board computer supports a variety of Intel® Core™ Duo and Core 2 Duo processors from the high-end 2.16 GHz T7400 to the low-voltage dual-core versions down to a selection of Celeron® M types. It is designed especially for embedded systems which require high computing and graphics performance and low power consumption.
The CPU card offers a 32-bit/33-MHz system slot CompactPCI® bus interface or can be used without a bus system.
A total of five PCI Express® lanes for high-speed communication (such as Gb Ethernet) are supported on the D9. 2 x1 PCIe® links are used for the two onboard Ethernet interfaces, another 2 x1 links support the XMC slot and 1 x1 link is available on a specific mezzanine card.
Further serial interfaces include two SATA ports for connection of an onboard hard disk (instead of the PMC or XMC) and a second one on the transition module at the rear. Alternatively, one of the two SATA ports is available via the mezzanine card. One PATA interface supports the onboard CompactFlash® slot.
A total of six USB 2.0 are supported at the front, on the rear I/O transition module and on board the mezzanine card. Four of the onboard USBs can be used to realize two UARTs on a mezzanine card and another two UARTs on the rear I/O transition module.

The standard I/O available at the front panel of the D9 includes VGA graphics, two Gigabit Ethernet and two USB 2.0 interfaces.
The D9 can be extended by different mezzanine cards. Additional functions include PICMG 2.16, digital video outputs for flat panel connection via DVI, different UARTs, USB 2.0 ports, SATA for hard disk or RAID connection and HD audio. The D9 is also prepared for rear I/O via the CT7 transition module with 2 USB 2.0, 2 UARTs, 2 Gigabit Ethernet, 1 SATA and 1 PIM module.
Supervision of the processor and board temperature as well as a watchdog for monitoring the operating system complete the functionality of the D9.
The D9 operates in Windows® and Linux environments and under RTOS systems that support multi-core architecture.
Equipped with Intel® components exclusively from the Intel® Embedded Line, the D9 has a guaranteed minimum standard availability of 5 years.
The D9 is suited for a wide range of industrial applications, e.g. monitoring, vision and control systems or test and measurement. The target markets include automation, multimedia, transportation, aerospace, shipbuilding, medical engineering and robotics.
The D9 is equipped with soldered DDR2 DRAM to guarantee optimum shock and vibration resistance. It comes with a tailored passive heat sink within 4 HP height. However, forced air cooling is always required inside the system. Its robust design makes the D9 especially suited for rugged environments with regard to extended operation temperature, shock and vibration according to applicable industry standards. It is also ready for coating for use in humid and dusty environments.

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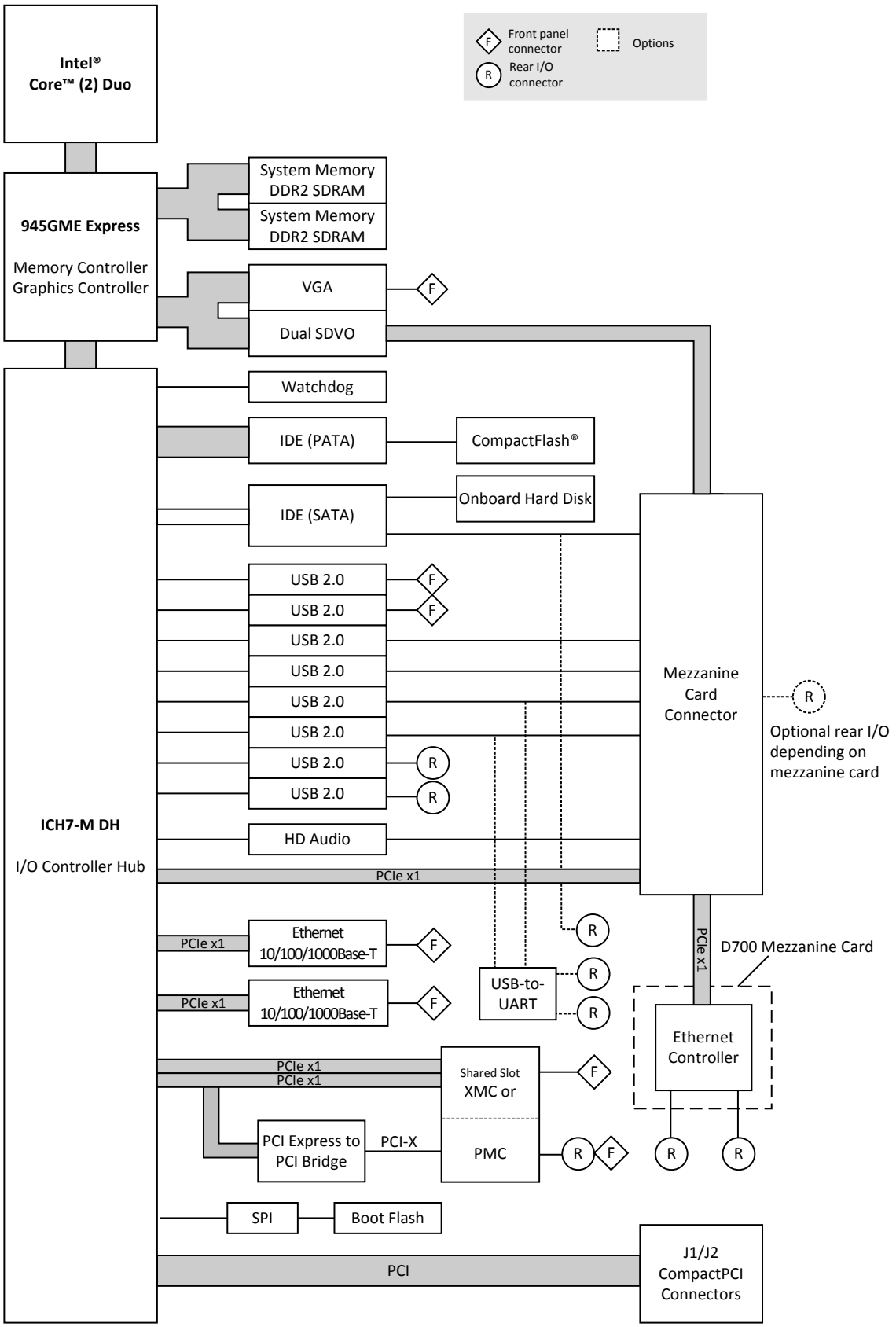
Diagram


Front panel connector
Rear I/O connector
Options
Intel®
Core™ (2) Duo
945GME Express
Memory Controller
Graphics Controller
System Memory
DDR2 SDRAM
System Memory
DDR2 SDRAM
VGA
Dual SDVO
Watchdog
IDE (PATA)
CompactFlash®
IDE (SATA)
Onboard Hard Disk
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
USB 2.0
ICH7-M DH
I/O Controller Hub
HD Audio
PCIe x1
Mezzanine
Card
Connector
Optional rear I/O
depending on
mezzanine card
PCIe x1
Ethernet
10/100/1000Base-T
PCIe x1
Ethernet
10/100/1000Base-T
USB-to-
UART
PCIe x1
PCIe x1
Shared Slot
XMC or
PMC
PCI Express to
PCI Bridge
PCI-X
D700 Mezzanine Card
Ethernet
Controller
SPI
Boot Flash
PCI
J1/J2
CompactPCI
Connectors

Technical Data

CPU	■ Up to Intel® Core™ 2 Duo T7400 □ Dual-core 64-bit processor □ Up to 2.16GHz processor core frequency □ Up to 667MHz front-side bus frequency ■ Chipset □ Northbridge: Intel® 945GME Express □ Southbridge: Intel® ICH7-M DH
Memory	■ 4MB L2 cache integrated in Core 2 Duo ■ Up to 4GB SDRAM system memory □ Soldered □ DDR2 □ 667MHz memory bus frequency □ Dual-channel, 2x64 bits ■ 8Mbits boot Flash ■ Serial EEPROM 2kbits for factory settings ■ CompactFlash® card interface □ Via onboard IDE □ Type I □ True IDE □ DMA support
Mass Storage	■ Parallel IDE (PATA) □ One IDE port for local CompactFlash® ■ Serial ATA (SATA) □ One channel for onboard hard disk □ One channel via mezzanine card connector or rear I/O connector □ Transfer rates up to 150MB/s □ RAID level 0/1 support
Graphics	■ Integrated in 945GME Express chipset □ 200/250MHz 256-bit graphics core ■ VGA connector at front panel ■ Two SDVO ports available via mezzanine-card connector □ One additional DVI connector at front panel optional via mezzanine card
I/O	■ USB □ Two USB 2.0 ports via Series A connectors at front panel □ Four USB 2.0 ports via mezzanine-card connector (if a transition module is used two of these are converted to UARTs) □ Two USB 2.0 ports via rear I/O (if these are used only two USB are available on the mezzanine card connector) □ UHCI implementation □ Data rates up to 480Mbit/s ■ Ethernet □ Two 10/100/1000Base-T Ethernet channels at front panel □ RJ45 connectors at front panel □ Ethernet controllers are connected by two x1 PCIe® links □ Onboard LEDs to signal activity status and connection speed □ Two 10/100/1000Base-T Ethernet channels via mezzanine card on backplane (PICMG 2.16 or on transition module) □ Via one x1 PCIe® link and without LEDs ■ High Definition (HD) audio □ Accessible via mezzanine-card connector
Front Connections	■ VGA ■ Two USB 2.0 (Series A) ■ Two Ethernet (RJ45)

Technical Data

Rear I/O	■ USB 2.0, two ports ■ UART □ Two ports instead of two USB on mezzanine card connector ■ PMC rear I/O ■ Ethernet 1000Base-T via mezzanine card, two ports (only with D700)
Mezzanine Slot	■ One slot usable for PMC or XMC ■ XMC slot □ Compliant with XMC standard VITA 42.3-200x □ Two x1 PCI Express® links ■ PMC slot □ Compliant with PMC standard IEEE 1386.1 □ PCI / PCI-X 32/64 bit, 33/66/133MHz, 3.3V V(I/O) □ One x1 PCI Express® link via PCI Express® to PCI bridge □ PMC I/O module (PIM) support via J14
Miscellaneous	■ Board controller ■ Real-time clock, buffered by a GoldCap or alternatively a battery ■ Watchdog timer ■ Temperature measurement ■ One user LED ■ Reset button
PCI Express®	■ Two x1 links to connect local 1000Base-T Ethernet controllers ■ One x1 link for extension through mezzanine-card connector ■ Two x1 links to connect XMC (or one x1 link for connection of PMC via PCI Express® to PCI bridge) ■ Data rate up to 250MB/s in each direction (2.5 Gbit/s per lane)
CompactPCI® Bus	■ Compliance with CompactPCI® Core Specification PICMG 2.0 R3.0 ■ System slot ■ 32-bit/33-MHz CompactPCI® bus ■ V(I/O): +3.3V (+5V tolerant) ■ Compliance with CompactPCI® Packet Switching Backplane PICMG 2.16 R1.0
Busless Operation	■ Backplane connectors used only for power supply
Electrical Specifications	■ Supply voltage/power consumption: □ +5V (-3%/+5%), approx. 8.9A (9.8A with 5V only supply) □ +3.3V (-3%/+5%), approx. 1.25A □ +12V (-10%/+10%), approx. 10mA (without PMC or XMC module) □ If the board is supplied with 5V only (typically without a bus connection), the 3.3V are generated on the board and fed to the backplane (3A max.)
Mechanical Specifications	■ Dimensions: conforming to CompactPCI® specification for 6U boards ■ Front panel: 4HP with ejector ■ Weight: □ Without XMC/PMC and mezzanine board: 400g □ With XMC/PMC and mezzanine board: 530g

Technical Data

Environmental Specifications	■ Temperature range (operation): □ 0..+45°C □ 0..+60°C (version with Celeron® M processor) □ Airflow: min. 15m³/h (1.5m/s) ■ Temperature range (storage): -40..+85°C ■ Relative humidity (operation): max. 95% non-condensing ■ Relative humidity (storage): max. 95% non-condensing ■ Altitude: -300m to + 3,000m ■ Shock: 15g/11ms (EN 60068-2-27) ■ Bump: 10g/16ms (EN 60068-2-29) ■ Vibration (sinusoidal): 1g/ 10..150Hz (EN 60068-2-6) ■ Conformal coating on request
MTBF	■ 182,199h @ 40°C according to IEC/TR 62380 (RDF2000)
Safety	■ PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers
EMC	■ Tested according to EN 55022 Class A (radio disturbance), EN 61000-4-2 (ESD), EN 61000-4-4 (burst) and EN 61000-4-5 (surge)
BIOS	■ Award BIOS
Software Support	■ Windows® ■ Linux ■ VxWorks® (on request) ■ QNX® (on request) ■ Intel® Virtualization Technology, allows a platform to run multiple operating systems and applications in independent partitions; one computer system can function as multiple "virtual" systems ■ For more information on supported operating system versions and drivers see Downloads.

Configuration & Options

Standard Configurations

Article No.	CPU Type	System RAM	XMC/PMC	Operation Temp.
02D009-00	T7400	2 GB DDR2	1 slot	0..+45°C

Options

CPU	■ Core 2 Duo T7400, 2.16GHz ■ Core 2 Duo L7400, 1.5GHz LV ■ Core Duo T2500, 2GHz ■ Core Duo L2400, 1.66GHz LV ■ Core Duo U2500, 1.2GHz ULV ■ Celeron® M 423, 1.06 GHz
Memory	■ System RAM □ 256 MB, 512 MB, 1 GB, 2 GB or 4 GB ■ CompactFlash® □ 0 MB up to maximum available
Graphics	■ One DVI-D connector at front via mezzanine card
I/O	■ Ethernet □ 9-pin D-Sub connector with one or two 10/100Base-T ports instead of two RJ45 connectors □ Active Management Technology for remote service
I/O with mezzanine card	■ One RS232 UART interface via RJ45
Rear I/O	■ One SATA channel (instead of the mezzanine card channel) ■ Two COM via USB-to-UART bridges (instead of two USB on the mezzanine card connector) ■ Two SDVO ports via mezzanine card ■ Four USB ports via mezzanine card ■ Two Ethernet via mezzanine card (PICMG 2.16 or on transition module) ■ HD Audio via mezzanine card ■ One x1 PCIe® link via mezzanine card ■ Battery on CT7 transition module
Cooling Concept	■ Also available with conduction cooling in MEN CCA frame

Please note that some of these options may only be available for large volumes. Please ask our sales staff for more information.

Ordering Information

Standard D9 Models	**02D009-00**	Intel® Core™ 2 Duo T7400, 2.16 GHz, 2 GB DDR2 DRAM, 0..+45°C
Related Hardware	**02D700-00**	1 DVI, 1 COM, PICMG 2.16 (2 Gb Ethernet) for D9 and compatible cPCI and VME SBCs, 0..+55°C
	08CT07-00	CompactPCI® rear I/O transition module 6U/80mm, 2 Gb Ethernet, 2 USB 2.0, 2 COMs, 1 PIM slot, 1 CompactFlash® slot, connecting to D9, 0..+60°C
Memory	**0751-0042**	CompactFlash® card, 4 GB, Type I, fixed bit set, -40..+85°C
	0751-0053	CompactFlash® card, 2 GB, Type I, fixed bit set, -40..+85°C
	0751-0055	CompactFlash® card, 8 GB, Type I, fixed bit set, -40..+85°C
	0751-0058	CompactFlash® card, 16 GB, Type I, fixed bit set, -40..+85°C
Systems & Card Cages	MEN delivers turn-key systems completely installed (hardware, operating system, accessories), wired and tested. Different rack sizes, power supplies and backplanes on request. For details please contact your local sales representative.	
	0701-0030	CompactPCI® 19" 3U/84HP rack-mount enclosure for 6U cards (horizontal), 6-slot backplane, system slot left (bottom), 250W ATX wide-range PSU, 2 fans, prepared for rear I/O
Miscellaneous Accessories	**05P000-01**	25 mounting screw sets to fix PMC/XMC modules on carrier boards
Software: Linux	This product is designed to work under Linux. See below for potentially available separate software packages from MEN. This product is designed to work under ELinOS Embedded Linux by Sysgo. For more information and product support please contact www.sysgo.com.	
	13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, D9, D601, A19 and A20
	13Y002-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board monitoring
	13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, G20, D9, D601, F600 and F601, A19, A20, F217 and SC24
	13Y007-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board controller
Software: Windows®	This product is designed to work under Windows®. See below for potentially available separate software packages from MEN.	
	13F014-77	Windows® Installset (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 (Includes all free drivers developed by MEN for the supported hardware.)
	13T001-70	Windows® network driver (Intel®) for F14, F15, F17, F18, D9, D6, D7, D601, A19, A20 and P601, P602
	13T003-70	Windows® chipset driver (Intel®) for F14, F15, F17, F18, F18E, F19P, F21P, G20, XM2, D9, D6, D7, D601, A19 and A20
	13T005-70	Windows® USB2UART driver (FTDI) for F14, F15, F17, F18, F19P, F21P, D9, A19, A20, XM2 and XM50 / XM51 / F50P / F50C hosts
	13T006-70	Windows® HD Audio driver (Realtek) for F14, F15, F17, F18, F19P, F21P, D9 and A19
	13T007-70	Windows® chipset graphics driver (Intel®) for F15, F17, D9, A19 and A20

Ordering Information

Software: VxWorks®	This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	10F015-60	VxWorks® BSP (MEN) for F15, F17 and D9
	13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, D9, D601, A19 and A20
	13Y002-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board monitoring
	13Y003-60	VxWorks® driver (MEN) for USB-to-UART bridges on F600, F601, F602, F603, F604 and F606
	13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, G20, D9, D601, F600 and F601, A19, A20, F217 and SC24
	13Y007-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board controller
Software: QNX®	This product is designed to work under QNX®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	10F014-40	QNX® 6.3.0 installation support files (QNX® and MEN) for F14, F15, F17, F18, F19P, XM1, XM2 and MM1
	13Y001-06	MDIS5™ low-level driver sources (MEN) for LM63 on SMBus for F14, F15, F17, F18, F19P, D9, D601, A19 and A20
	13Y002-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board monitoring
	13Y004-06	MDIS5™ low-level driver sources (MEN) for generic SMBus driver for F14, F15, F17, F18, F19P, F21P, G20, D9, D601, F600 and F601, A19, A20, F217 and SC24
	13Y007-06	MDIS5™ low-level driver sources (MEN) for F14, F15, F17, F18, D9, D601, A19 and A20 board controller
Software: Firmware/BIOS	This product includes a specially adapted BIOS.	
	14F015-00	System BIOS for F15, F17 and D9
Software: Miscellaneous	Intel® software development products such as analyzers, compilers, threading tools etc. can be downloaded under www.intel.com/cd/software/products/asmo-na/eng/index.htm. IA-32 Intel® Architecture Software Developer's Manuals are available under www.intel.com/products/processor/manuals/index.htm.	

For operating systems not mentioned here contact MEN sales.

Documentation	Compare Chart 6U CompactPCI® cards » Download	
	20APPN004	Application Note: How to make a USB stick bootable
	20D009-ER	D9 Errata
	20D009-00	D9 User Manual

Contact Information

Germany

MEN Mikro Elektronik GmbH
Neuwieder Straße 3-7
90411 Nuremberg
Phone +49-911-99 33 5-0
Fax +49-911-99 33 5-901

info@men.de
www.men.de

France

MEN Mikro Elektronik SA
18, rue René Cassin
ZA de la Châtelaine
74240 Gaillard
Phone +33 (0) 450-955-312
Fax +33 (0) 450-955-211

info@men-france.fr
www.men-france.fr

USA

MEN Micro, Inc.
24 North Main Street
Ambler, PA 19002
Phone (215) 542-9575
Fax (215) 542-9577

sales@menmicro.com
www.menmicro.com