

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

Quantum™ SA.45s CSAC

Chip Scale Atomic Clock



Quantum™

Microsemi invented portable atomic timekeeping with QUANTUM™, the world's first family of miniature and chip scale atomic clocks.

Choose QUANTUM™ class for best-in-class stability, size, weight, and power consumption.

With an extremely low power consumption of <120 mW and a volume of <17 cc, the Microsemi SA.45s Chip Scale Atomic Clock (CSAC) brings the accuracy and stability of an atomic clock to portable applications for the first time.

The SA.45s provides 10 MHz and 1 PPS outputs at standard CMOS levels, with short-term stability (Allan Deviation) of 3.0×10^{-10} @ TAU = 1 sec, typical long-term aging of $<9 \times 10^{-10}$/month, and maximum frequency change of $\pm 5 \times 10^{-10}$ over an operating temperature range of –10 °C to 70 °C.

The SA.45s CSAC accepts a 1 PPS input that may be used to synchronize the unit's 1 PPS output to an external reference clock with ±100 ns accuracy. It also use the 1 PPS input to discipline its phase and frequency to within 1 ns and 1.0×10^{-12}, respectively.

A standard CMOS-level RS-232 serial interface is built in to the SA.45s. This is used to control and calibrate the unit and also to provide a comprehensive set of status monitors. The interface is also used to set and read the CSAC's internal time-of-dayclock.

Features

- Power consumption <120 mW
- Less than 17 cc volume, 1.6" x 1.39" x 0.45"
- 10 MHz CMOS-compatible output
- 1 PPS output and 1 PPS input for synchronization
- RS-232 interface for monitoring and control
- Short term stability (Allan Deviation) of 3.0×10^{-10} @ TAU = 1 sec

Applications*

- GPS receivers
- Backpack radios
- Anti-IED jamming systems
- Autonomous sensor networks
- Unmanned vehicles
- Underwater sensor systems
- Stability for various other communication and transmission applications

*The Chip Scale Atomic Clock is not tested, qualified, and rated for space applications

Quantum™ SA.45s CSAC

Chip Scale Atomic Clock

Options to Meet a Wider Range of Applications

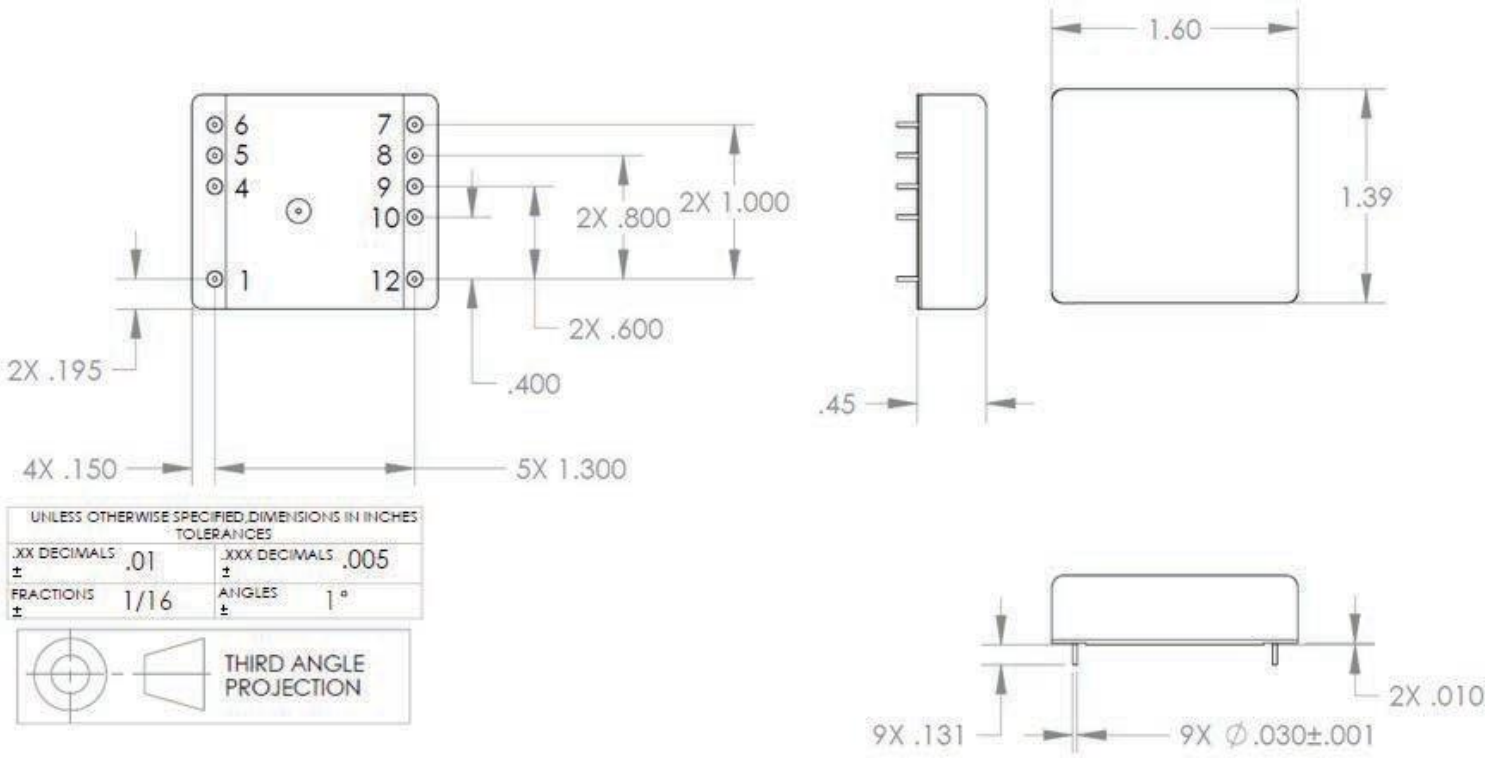
Following are the different SA.45s CSAC options with their output frequencies.

Options	Output Frequency
001	10 MHz
003	16.384 MHz
004	10.24 MHz
006	5 MHz

For other output frequencies please contact Microsemi for details.

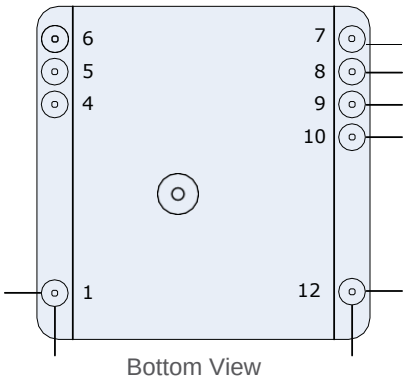
The Chip Scale Atomic Clock is not tested, qualified, and rated for space applications.

Mechanical Interface



Pin Description

Pin Number	I.D.
1	Tune
2	N/A
3	N/A
4	BITE
5	Tx
6	Rx
7	Vcc
8	GND
9	1 PPS IN
10	1 PPS OUT
11	N/A
12	10 MHz OUT



Bottom View

Quantum™ SA.45s CSAC Option 001

Part number 090-02984-001

Specification

All specifications at 25 °C, V_{cc} = 3.3 VDC unless otherwise specified.

Electrical Specification

RF Output

- Frequency: 10 MHz
- Format: CMOS
- Amplitude: 0 V to V_{cc}
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Output

- Rise/fall time (10%-90%) at load capacitance 10 pF: <10 ns
- Pulse width: 100 µs
- Level: 0 V to V_{cc}
- Logic High (V_{oH}) min: 2.80 V
- Logic Low (V_{oL}) max: 0.30 V
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Input

- Format: Rising edge
- Low level: <0.5 V
- High level: 2.5 V to V_{cc}
- Input impedance: 1 MΩ
- Quantity: 1

Serial Communications

- Protocol: RS232
- Format: CMOS 0 V to V_{cc}
- Tx/Rx impedance: 1 MΩ
- Baud rate: 57600

Built-in Test Equipment (BITE) output

- Format: CMOS 0 V to V_{cc}
- Load impedance: 1 MΩ
- Logic: 0 = Normal operation, 1 = Alarm

Power Input

- Operating: <120 mW
- Warmup: <140 mW
- Input voltage (V_{cc}): 3.3 ± 0.1 VDC

Physical Specifications

- Size: 1.6” x 1.39” x 0.45”
- Weight: <35 g
- MTBF: >100,000 hours

Environmental Specification

Operating

- Operating temperature: –10 °C to 70 °C
- Maximum frequency change over operating temp range (max. rate of change 0.5 °C/minute): $\pm 5 \times 10^{-10}$
- Frequency change over allowable input voltage range: $\pm 4 \times 10^{-10}$
- Magnetic sensitivity (≤2.0 Gauss): $\pm 9 \times 10^{-11}$/Gauss
- Radiated emissions: Compliant to FCC part 15, Class B, when mounted properly onto host PCB.
- Vibration: Maintains lock under MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms
- Humidity: 0 to 95% RH per MIL-STD-810, Method 507.4.

Storage and Transport (non-operating)

- Temperature: –55 °C to 85 °C
- Shock (1 ms half-sine): 1000 g
- Vibration: MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms

Performance Parameters

Stability (Allan Deviation) ADEV

- TAU = 1 sec: 3.0×10^{-10}
- TAU = 10 sec: 1.0×10^{-10}
- TAU = 100 sec: 3.0×10^{-11}
- TAU = 1000 sec: 1.0×10^{-11}

RF Output Phase Noise (SSB)

- 1 Hz: <–50 dBc/Hz
- 10 Hz: <–70 dBc/Hz
- 100 Hz: <–113 dBc/Hz
- 1000 Hz: <–128 dBc/Hz
- 10000 Hz: <–135 dBc/Hz
- 100,000 Hz: <–140 dBc/Hz

Frequency Accuracy

- Maximum offset at shipment: $\pm 5 \times 10^{-11}$
- Maximum retrace (48 hrs off): $\pm 5 \times 10^{-10}$
- Aging, monthly*: $<9 \times 10^{-10}$ typical**
- Aging, yearly*: $<1 \times 10^{-8}$ typical**
- 1 PPS Sync.: ±100 ns

(*After 30 days of continuous operation)

Digital Tuning

- Range: $\pm 1 \times 10^{-6}$
- Resolution: 1×10^{-12}

Analog Tuning

- Range: $\pm 2.2 \times 10^{-8}$
- Resolution: 1×10^{-11}
- Input: 0-2.5 V into 100 kΩ

Warm-up Time

<180 s

Solder

Hand solder using 63/37 Tin/Lead Solder with maximum soldering tip of 329 °C (625 °F)

** All CSAC units are tested for aging specs as per the datasheet and meet the specs at the time of shipment. However, continuous operation of CSAC over extended period of time may yield unpredictable aging performance, resulting in failure to meet the aging specs and may not be suitable for certain applications.

Quantum™ SA.45s CSAC Option 003

Part number 090-02984-003

Specification

All specifications at 25 °C, V_{cc} = 3.3 VDC unless otherwise specified.

Electrical Specification

RF Output

- Frequency: 16.384 MHz
- Format: CMOS
- Amplitude: 0 V to V_{cc}
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Output

- Rise/fall time (10%-90%) at load capacitance 10 pF: <10 ns
- Pulse width: 97.656 µs
- Level: 0 V to V_{cc}
- Logic High (V_{OH}) min: 2.80 V
- Logic Low (V_{OL}) max: 0.30 V
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Input

- Format: Rising edge
- Low level: <0.5 V
- High level: 2.5 V to V_{cc}
- Input impedance: 1 MΩ
- Quantity: 1

Serial Communications

- Protocol: RS-232
- Format: CMOS 0 V to V_{cc}
- Tx/Rx impedance: 1 MΩ
- Baud rate: 57600

Built-in Test Equipment (BITE) output

- Format: CMOS 0 V to V_{cc}
- Load impedance: 1 MΩ
- Logic: 0 = Normal operation, 1 = Alarm

Power Input

- Operating: <120 mW
- Warmup: <140 mW
- Input Voltage (V_{cc}): 3.3 ± 0.1 VDC

Physical Specifications

- Size: 1.6” x 1.39” x 0.45”
- Weight: <35 g
- MTBF: >100,000 hours

Environmental Specification

Operating

- Operating temperature: –10 °C to 70 °C
- Maximum frequency change over operating temp range (max. rate of change 0.5 °C/minute): $\pm 5 \times 10^{-10}$
- Frequency change over allowable input voltage range: $\pm 4 \times 10^{-10}$
- Magnetic sensitivity (≤2.0 Gauss): $\pm 9 \times 10^{-11}$/Gauss
- Radiated emissions: Compliant to FCC part 15, Class B, when mounted properly onto host PCB.
- Vibration: Maintains lock under MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms
- Humidity: 0 to 95% RH per MIL-STD-810, Method 507.4.

Storage and Transport (non-operating)

- Temperature: –55 °C to 85 °C
- Shock (1 ms half-sine): 1000 g
- Vibration: MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms

Performance Parameters

Stability (Allan Deviation) ADEV

- TAU = 1 sec: 3.0×10^{-10}
- TAU = 10 sec: 1.0×10^{-10}
- TAU = 100 sec: 3.0×10^{-11}
- TAU = 1000 sec: 1.0×10^{-11}

RF Output Phase Noise (SSB)

- 1 Hz: <–46 dBc/Hz
- 10 Hz: <–66 dBc/Hz
- 100 Hz: <–110 dBc/Hz
- 1000 Hz: <–128 dBc/Hz
- 10000 Hz: <–135 dBc/Hz
- 100,000 Hz: <–140 dBc/Hz

Frequency Accuracy

- Maximum offset at shipment: $\pm 5 \times 10^{-11}$
- Maximum retrace (48 hrs off): $\pm 5 \times 10^{-10}$
- Aging, monthly*: $<9 \times 10^{-10}$ typical**
- Aging, yearly*: $<1 \times 10^{-8}$ typical**
- 1 PPS Sync.: ±100 ns

(*After 30 days of continuous operation)

Digital Tuning

- Range: $\pm 1 \times 10^{-6}$
- Resolution: 1×10^{-12}

Analog Tuning

- Range: $\pm 2.2 \times 10^{-8}$
- Resolution: 1×10^{-11}
- Input: 0-2.5 V into 100 kΩ

Warm-up Time

<180 s

Solder

Hand solder using 63/37 Tin/Lead Solder with maximum soldering tip of 329 °C (625 °F)

** All CSAC units are tested for aging specs as per the datasheet and meet the specs at the time of shipment. However, continuous operation of CSAC over extended period of time may yield unpredictable aging performance, resulting in failure to meet the aging specs and may not be suitable for certain applications.

Quantum™ SA.45s CSAC Option 004

Part number 090-02984-004

Specification

All specifications at 25 °C, V_{cc} = 3.3 VDC unless otherwise specified.

Electrical Specification

RF Output

- Frequency: 10.24 MHz
- Format: CMOS
- Amplitude: 0 V to V_{cc}
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Output

- Rise/fall time (10%-90%) at load capacitance 10 pF: <10 ns
- Pulse width: 100 µs
- Level: 0 V to V_{cc}
- Logic High (V_{OH}) min: 2.80 V
- Logic Low (V_{OL}) max: 0.30 V
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Input

- Format: Rising edge
- Low level: <0.5 V
- High level: 2.5 V to V_{cc}
- Input impedance: 1 MΩ
- Quantity: 1

Serial Communications

- Protocol: RS-232
- Format: CMOS 0 V to Vcc
- Tx/Rx impedance: 1 MΩ
- Baud rate: 57600

Built-in Test Equipment (BITE) output

- Format: CMOS 0 V to V_{cc}
- Load impedance: 1 MΩ
- Logic: 0 = Normal operation; 1 = Alarm

Power Input

- Operating: <120 mW
- Warmup: <140 mW
- Input Voltage (V_{cc}): 3.3 ± 0.1 VDC

Physical Specifications

- Size: 1.6” x 1.39” x 0.45”
- Weight: <35 g
- MTBF: >100,000 hours

Environmental Specification

Operating

- Operating temperature: –10 °C to 70 °C
- Maximum frequency change over operating temp range (max. rate of change 0.5 °C/minute): $\pm 5 \times 10^{-10}$
- Frequency change over allowable input voltage range: $\pm 4 \times 10^{-10}$
- Magnetic sensitivity (≤2.0 Gauss): $\pm 9 \times 10^{-11}$/Gauss
- Radiated emissions: Compliant to FCC part 15, Class B, when mounted properly onto host PCB.
- Vibration: Maintains lock under MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms
- Humidity: 0 to 95% RH per MIL-STD-810, Method 507.4.

Storage and Transport (non-operating)

- Temperature: –55 °C to 85 °C
- Shock (1 ms half-sine): 1000 g
- Vibration: MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms

Performance Parameters

Stability (Allan Deviation) ADEV

- TAU = 1 sec: 3.0×10^{-10}
- TAU = 10 sec: 1.0×10^{-10}
- TAU = 100 sec: 3.0×10^{-11}
- TAU = 1000 sec: 1.0×10^{-11}

RF Output Phase Noise (SSB)

- 1 Hz: <–50 dBc/Hz
- 10 Hz: <–70 dBc/Hz
- 100 Hz: <–113 dBc/Hz
- 1000 Hz: <–128 dBc/Hz
- 10000 Hz: <–135 dBc/Hz
- 100,000 Hz: <–140 dBc/Hz

Frequency Accuracy

- Maximum offset at shipment: $\pm 5 \times 10^{-11}$
- Maximum retrace (48 hrs off): $\pm 5 \times 10^{-10}$
- Aging, monthly*: $<9 \times 10^{-10}$ typical**
- Aging, yearly*: $<1 \times 10^{-8}$ typical**
- 1 PPS Sync.: ±100 ns

(*After 30 days of continuous operation)

Digital Tuning

- Range: $\pm 1 \times 10^{-6}$
- Resolution: 1×10^{-12}

Analog Tuning

- Range: $\pm 2.2 \times 10^{-8}$
- Resolution: 1×10^{-11}
- Input: 0-2.5 V into 100 kΩ

Warm-up Time

<180 s

Solder

Hand solder using 63/37 Tin/Lead Solder with maximum soldering tip of 329 °C (625 °F)

** All CSAC units are tested for aging specs as per the datasheet and meet the specs at the time of shipment. However, continuous operation of CSAC over extended period of time may yield unpredictable aging performance, resulting in failure to meet the aging specs and may not be suitable for certain applications.

Quantum™ SA.45s CSAC Option 006

Part number 090-02984-006

Specification

All specifications at 25 °C, V_{cc} = 3.3 VDC unless otherwise specified.

Electrical Specification

RF Output

- Frequency: 5 MHz
- Format: CMOS
- Amplitude: 0 V to V_{cc}
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Output

- Rise/fall time (10%-90%) at load capacitance 10 pF: <10 ns
- Pulse width: 100 µs
- Level: 0 V to V_{cc}
- Logic High (V_{OH}) min: 2.80 V
- Logic Low (V_{OL}) max: 0.30 V
- Load impedance: 1 MΩ
- Quantity: 1

1 PPS Input

- Format: Rising edge
- Low level: <0.5 V
- High level: 2.5 V to V_{cc}
- Input impedance: 1 MΩ
- Quantity: 1

Serial Communications

- Protocol: RS-232
- Format: CMOS 0 V to V_{cc}
- Tx/Rx impedance: 1 MΩ
- Baud rate: 57600

Built-in Test Equipment (BITE) output

- Format: CMOS 0 V to V_{cc}
- Load impedance: 1 MΩ
- Logic: 0 = Normal operation
1 = Alarm

Power Input

- Operating: <120 mW
- Warmup: <140 mW
- Input Voltage (V_{cc}): 3.3 ± 0.1 VDC

Physical Specifications

- Size: 1.6” x 1.39” x 0.45”
- Weight: <35 g
- MTBF: >100,000 hours

Environmental

Specification Operating

- Operating temperature: –10 °C to 70 °C

Maximum frequency change over operating temp range

(max. rate of change 0.5 °C/minute): ±5x10^{-10}

- Frequency change over allowable input voltage range: ±4x10^{-10}
- Magnetic sensitivity (≤2.0 Gauss): ±9x10^{-11}/Gauss
- Radiated emissions: Compliant to FCC part 15, Class B, when mounted properly onto host PCB.
- Vibration: Maintains lock under MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms
- Humidity: 0 to 95% RH per MIL-STD-810, Method 507.4.

Storage and Transport (non-operating)

- Temperature: –55 °C to 85 °C
- Shock (1 ms half-sine): 1000 g
- Vibration: MIL-STD-810, Method 514.5, Procedure 1, 7.7 grms

Performance Parameters

Stability (Allan Deviation) ADEV

- TAU = 1 sec: 3.0x10^{-10}
- TAU = 10 sec: 1.0x10^{-10}
- TAU = 100 sec: 3.0x10^{-11}
- TAU = 1000 sec: 1.0x10^{-11}

RF Output Phase Noise (SSB)

- 1 Hz: <–53 dBc/Hz
- 10 Hz: <–73 dBc/Hz
- 100 Hz: <–116 dBc/Hz
- 1000 Hz: <–131 dBc/Hz
- 10000 Hz: <–138 dBc/Hz
- 100,000 Hz: <–140 dBc/Hz

Frequency Accuracy

- Maximum offset at shipment: ±5x10^{-11}
- Maximum retrace (48 hrs off): ±5x10^{-10}
- Aging, monthly*: <9x10^{-10} typical**
- Aging, yearly*: <1x10^{-8} typical**
- 1 PPS Sync.: ±100 ns

(*After 30 days of continuous operation)

Digital Tuning

- Range: ±1x10^{-6}
- Resolution: 1x10^{-12}

Analog Tuning

- Range: ±2.2x10^{-8}
- Resolution: 1x10^{-11}
- Input: 0-2.5 V into 100 kΩ

Warm-up Time

<180 s

Solder

Hand solder using 63/37 Tin/Lead Solder with maximum soldering tip of 329 °C (625 °F)

** All CSAC units are tested for aging specs as per the datasheet and meet the specs at the time of shipment. However, continuous operation of CSAC over extended period of time may yield unpredictable aging performance, resulting in failure to meet the aging specs and may not be suitable for certain applications.

Quantum™ SA.45s CSAC Option 006 cont.

Part number 090-02984-006

Microsemi
Power Matters.

Microsemi Corporate Headquarters
One Enterprise, Aliso Viejo, CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Fax: +1 (949) 215-4996
Email: sales.support@microsemi.com
www.microsemi.com

©2016–2017 Microsemi Corporation. All rights reserved. Microsemi and the Microsemi logo are registered trademarks of Microsemi Corporation. All other trademarks and service marks are the property of their respective owners.

Microsemi Corporation (Nasdaq: MSCC) offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions, security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

Microsemi makes no warranty, representation, or guarantee regarding the information contained herein or the suitability of its products and services for any particular purpose, nor does Microsemi assume any liability whatsoever arising out of the application or use of any product or circuit. The products sold hereunder and any other products sold by Microsemi have been subject to limited testing and should not be used in conjunction with mission-critical equipment or applications. Any performance specifications are believed to be reliable but are not verified, and Buyer must conduct and complete all performance and other testing of the products, alone and together with, or installed in, any end-products. Buyer shall not rely on any data and performance specifications or parameters provided by Microsemi. It is the Buyer's responsibility to independently determine suitability of any products and to test and verify the same. The information provided by Microsemi hereunder is provided "as is, where is" and with all faults, and the entire risk associated with such information is entirely with the Buyer. Microsemi does not grant, explicitly or implicitly, to any party any patent rights, licenses, or any other IP rights, whether with regard to such information itself or anything described by such information. Information provided in this document is proprietary to Microsemi, and Microsemi reserves the right to make any changes to the information in this document or to any products and services at any time without notice.

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP