



# Healthcare Application

## Embedded Solutions

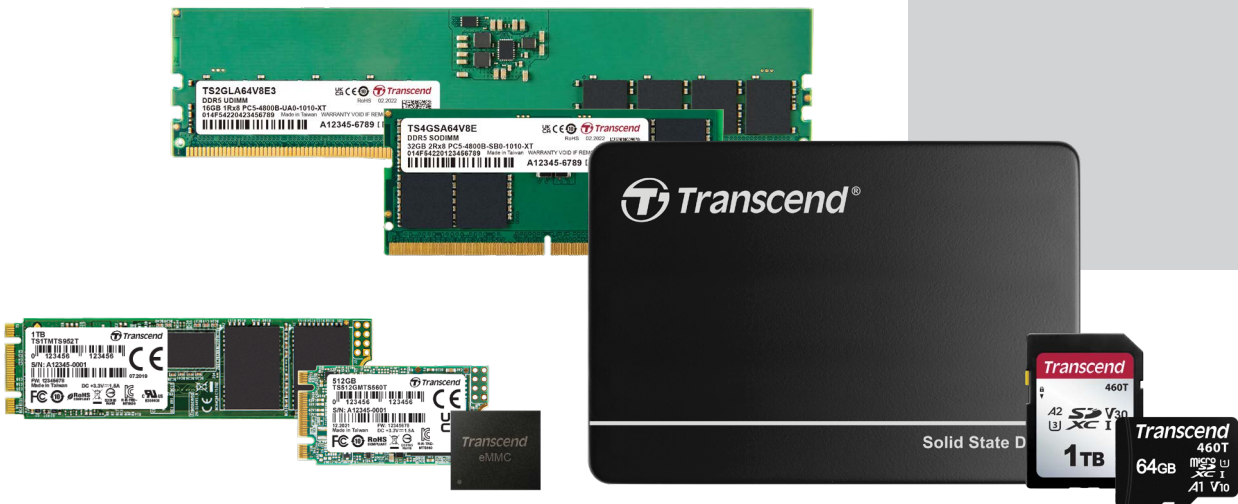


Quality, stability, reliability.

Comprehensive storage solutions for the medical industry.

# Introduction

As developed countries enter aging societies, innovative technology is crucial to improve medical resources and achieve remote treatment. Transcend has long been building medical-grade storage solutions that tackle the challenges in healthcare applications. With a stable product supply, comprehensive product management, and real-time technical support, Transcend maintains a sustainable vision for medical and healthcare institutions.



# Applications

**MRI machines**

**Ultrasound systems**

**da Vinci surgical systems**

**Mechanical ventilators**

**Smart medical carts**

**Vital signs monitors**

**Medical all-in-one PCs**

**Medical tablets**

**Nursing stations**





# Transcend Embedded Storage Solutions

- High quality
- Utmost stability
- Absolute reliability



# Challenges and Transcend Solutions

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## Challenge/ **Heavy workloads**

### Solution / **High storage quality and great performance**

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Medical professionals are well trained to conduct careful diagnosis and deliver quality patient care in healthcare settings. A wide range of medical-grade devices are employed to monitor and translate patients' physical conditions for further medical treatment. High performance interconnect solutions are crucial to ensure accurate and stable operations at these medical facilities. Patient monitoring systems require memory solutions that feature high speed data transfers and top-tier performance that conform to non-negotiable requirements for stability and reliability in critical care institutions. Transcend provides a complete product line of storage solutions for healthcare applications. We offer memory modules ranging from DDR1 to DDR5, NAND flash from MLC to 3D TLC and corresponding products for all solid state drive interfaces. These memory solutions are required to endure the capability of handling video feeds of up to 4K resolutions and to process user operation of connected equipment effortlessly in healthcare applications.

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## Challenge/ **Errors in data storage**

### Solution / **Utmost reliability and stability**

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In healthcare settings, medical equipment are vital components of all healthcare facilities as they are utilized for patient diagnosis and treatment. Mistakes are unacceptable and non-negotiable as medical care involves life-threatening conditions. Thus, unwavering stability and reliability are prerequisites for solutions supporting all point-of-care devices employed by hospitals and medical institutions. Transcend's industrial memory and storage solutions offer many approaches to the highest level of data reliability and device stability. They are equipped with an error-correcting mechanism that helps eliminate medical errors and streamline the overall workflow of medical regulations, thus increasing data reliability. Transcend also provides storage solutions of utmost stability, which is demanded for life-critical work in operating rooms, as interference of any kind are non-tolerable. On top of that, Transcend has forged long-term alliances with world leading suppliers as well as established long-term partnerships with NAND vendors. With all the memory solutions completely manufactured in Taiwan, Transcend's industrial products are fully tested and guaranteed with the utmost reliability and stability.

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Challenge/ **Consistent product delivery over an extended period of time**

Solution / **Prolonged introduction period and complete PLM**

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Product lifecycle management (aka PLM) is the process of managing the complete life cycle of a product from its design, manufacture and validation. Product longevity is of utmost importance in many embedded industries and especially in the healthcare settings where life and death matters are involved. Transcend provides complete product details and verification at the initial stage of product introduction. During the middle stage of the process, switching PCN's allows system manufacturers to stay up-to-date with firmware and hardware; and finally streamline the transition to component-alternatives when product eventually reaches its end-of-life (EOL) phase. Transcend developed its own in-house system and provides worldwide access to real-time information, including product availability, component pricing, sales data and logistics. With consistent and stable product delivery and life-long product support, the firm is able to overcome the challenges of a long introduction period and unstable product supplies. Transcend is fully committed to product longevity support and continues to provide full management for the life cycle of all its embedded products.

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Challenge/ **Health data leakage and distortion**

Solution / **AES Encryption + TCG Opal**

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Patients' medical records are highly confidential and their handling should have the maximum security. For medical applications that handle sensitive data, Transcend offers hardware-based AES encryption on several SSD models in the 2.5", M.2, and mSATA form factors. As a symmetric block cipher that can encrypt and decrypt data, the Advanced Encryption Standards (AES) specifies a FIPS-approved cryptographic algorithm distinctively employed to protect electronic data. Industrial products equipped with AES encryption ensure that data is encrypted before being stored on NAND; these products are also compliant with TCG Opal 2.0 Specifications, offering superior data protection. Devices which conform to TCG Opal specifications can be operated without passing through the host and device managers may assign permissions to different users for each logical block address range. Given the need to keep patients' health records confidential, data security is an uncompromising prerequisite for medical equipment employed in point-of-care services. The absence of such may discourage healthcare providers from implementing authentication measures, leaving them vulnerable to unauthorized access and data losses.



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Challenge/ **24/7 operation causes high power consumption**

Solution / **DEVSLP (Device Sleep)**

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Medical computing carts, medical tablets, and medical panel PCs are widely employed in healthcare settings to provide patients' with advanced point-of-care services as well as to reduce potential medication errors that could cause life-threatening risks. Thus, storage solutions supporting these vital healthcare devices must not only retain unyielding stability but also sustain unwavering reliability to enhance patient satisfaction. Medical devices are mainly powered by batteries and thus product durability and power saving mechanisms in the equipment is extremely important. The ability to enter an ultra-low power state is therefore crucial for battery-powered devices. DevSlp (DevSleep) function is a feature in SATA SSDs which allows them to enter and remain in a low power "Device Sleep" mode when the DEVSLP signal is de-asserted. One or two orders of magnitude provide less power than the traditional idle (about 5 mW) which is consumed under the sleep mode. Transcend's DEVSLP solutions are attractive options for healthcare industries to enjoy the highest level of product performance, stability and durability.

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Challenge/ **Special requirements for different medical applications**

Solution / **Customized service and technical support**

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Healthcare applications bear innumerable challenges, mostly under extreme life threatening conditions, and depend on the perfect solutions to satisfy its stringent requirements. Thus, Transcend thrives to design and manufacture embedded solutions that are capable to stand the tests of time and exhaustion. Product durability and stability can be achieved by Transcend's tailor-made storage solutions, including DRAM modules and SSD solutions that can be customized based on the special needs of the customer. Transcend's R&D team has years of experience with mass production of motherboards as well as being up on the latest R&D techniques. Also, the exacting C System of R&D management delineates rules for the stringent assessment of new products, circuit design, software design, sorting, sample inspections, and product tests. From product development to the mass production stage, products are put to rigorous reliability, compatibility, thermal stress, intense read/write cycles, and dynamic burn-in quality tests. Transcend responds quickly to customers' needs and provide them with the latest information, facilitating seamless internal coordination and external communication.

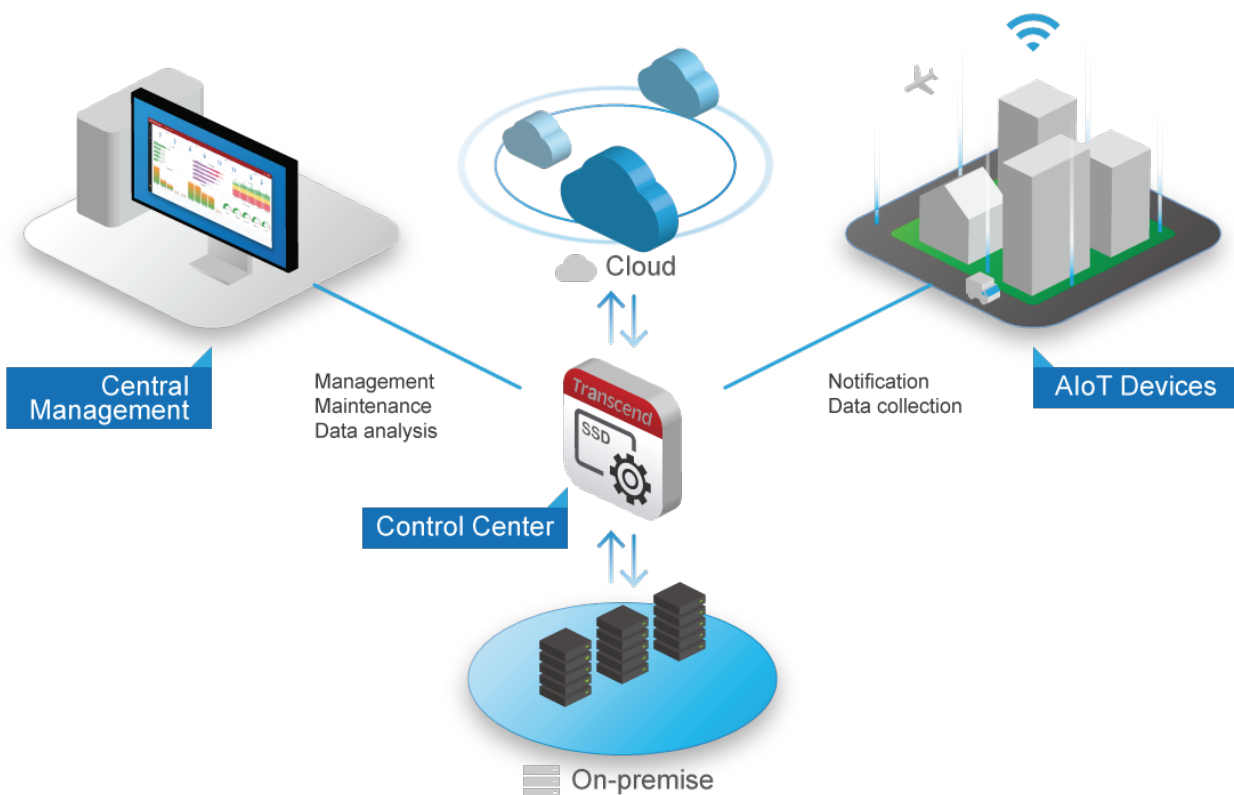
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## Challenge/ **Strenuous management of multiple devices**

### Solution / **Smart management & remote monitoring**

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Highly sophisticated medical devices are employed in hospitals to monitor patient's vital signs in real time. It is very important for such devices to be equipped with effective monitoring functions to keep track of patients' physiological data and device readings. Transcend offers smart monitoring services with its exclusive Control Center, a SaaS (Software as a Service) solution built for storage devices, to provide real-time notifications and timely status updates for critical care equipment. Control Center allows users to manage devices within a local network. This decreases the possibility of latency issues, and alleviates network loads, providing agility and mobility to users. Also, with remote upgrades and monitoring, users can remotely check on devices' health status, monitor device life, temperature and unexpected power outages. Thus, when anomalies are detected, remote system maintenance can be carried out in real time. Data analysis in the Control Center are displayed in graphic form and are presented on a dashboard layout to offer a user-friendly interface and ensure easy management for healthcare professionals to apply.







da Vinci surgical systems



Vital signs monitors



Medical tablets



MRI machines

# SSD Solutions

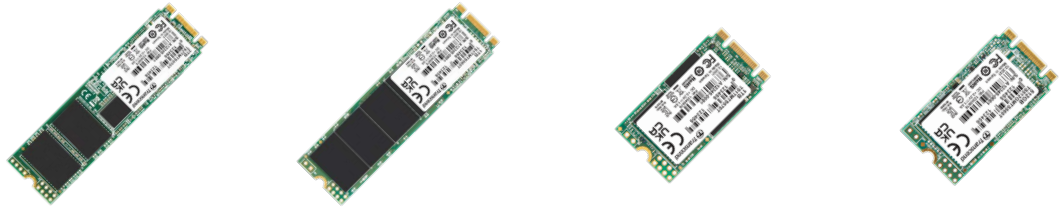


<b>Model</b>	MTE710T & MTE710T-I	MTE670T
<b>Form Factor</b>	M.2	
<b>M.2 Type</b>	2280-D2-M (Double-sided)	2280-S2-M (Single-sided)
<b>Bus Interface</b>	NVMe PCIe Gen4 x4	NVMe PCIe Gen3 x4
<b>Capacity</b>	256GB~2TB	128GB~1TB
<b>DRAM Cache</b>	Supported	-
<b>Flash Type</b>	112-layer 3D NAND flash	
<b>Sequential R/W*</b>	3,800/3,200 MB/s	2,100/1,600 MB/s
<b>P/E Cycle</b>	3K	
<b>DWPD*</b>	1.55 (3 yrs)	0.88 (3 yrs)
<b>Operating Temperature</b>	Extended Temp. -20°C (-4°F)~75°C (167°F) Wide Temp. -40°C (-40°F) ~ 85°C (185°F)	Extended Temp. -20°C (-4°F) ~ 75°C (167°F)
<b>Operating Voltage</b>	3.3V±5%	
<b>Corner Bond</b>	Supported	
<b>Thermal Throttling</b>	Supported	
<b>Warranty</b>	Three-year Limited Warranty	

\* Value varies by capacity, user hardware, system configuration, and calculation method.



# SSD Solutions



Model	MTS970T	MTS960T	MTS570T	MTS560T
Form Factor	M.2			
M.2 Type	2280-D2-B-M (Double-sided)	2280-S2-B-M (Single-sided)	2242-D2-B-M (Double-sided)	2242-S2-B-M (Single-sided)
Bus Interface	SATA III 6Gb/s			
Capacity	128GB~2TB		128GB~1TB	
DRAM Cache	Supported	-	Supported	-
Flash Type	112-layer 3D NAND flash			
Sequential R/W*	560/520 MB/s	560/500 MB/s	560/520 MB/s	560/500 MB/s
P/E Cycle	3K			
DWPD*	2.16 (3yrs)	1.95 (3yrs)	2.16 (3yrs)	1.95 (3yrs)
Operating Temperature	Extended Temp. -20°C (-4°F) ~ 75°C (167°F)			
Operating Voltage	3.3V±5%			
Corner Bond	Supported			
Thermal Throttling	Supported			
Warranty	Three-year Limited Warranty			

\* Value varies by capacity, user hardware, system configuration, and calculation method.



# SSD Solutions



Model	SSD470K	SSD460K
Form Factor	2.5"	
Bus Interface	SATA III 6Gb/s	
Capacity	128GB~4TB	128GB~2TB
DRAM Cache	Supported	-
Flash Type	112-layer 3D NAND flash	
Sequential R/W*	560/520 MB/s	560/500 MB/s
P/E Cycle	3K	
DWPD*	2.16 (3yrs)	1.95 (3 yrs)
Operating Temperature	Extended Temp. -20°C (-4°F) ~ 75°C (167°F)	
Operating Voltage	5V±5%	
Corner Bond	-	
Thermal Throttling	Supported	
Warranty	Three-year Limited Warranty	

\* Value varies by capacity, user hardware, system configuration, and calculation method.

# SSD Solutions



Model	HSD470T	MSA470T
Form Factor	Half-Slim (MO-297)	mSATA (MO-300A)
Bus Interface	SATA III 6Gb/s	
Capacity	256GB~1TB	
DRAM Cache	Supported	
Flash Type	112-layer 3D NAND flash	
Sequential R/W*	560/520 MB/s	
P/E Cycle	3K	
DWPD*	1.35 (3 yrs)	
Operating Temperature	Extended Temp. -20°C (-4°F) ~ 75°C (167°F)	
Operating Voltage	5V±5%	3.3V±5%
Corner Bond	Supported	
Thermal Throttling	Supported	
Warranty	Three-year Limited Warranty	

\* Value varies by capacity, user hardware, system configuration, and calculation method.

# DRAM Modules



## DDR5 Unbuffered Long-DIMM

PN	Capacity	Data Rate	Component Composition
TS4GLA64V8E	32GB	4800	(2Gx8)x16
TS2GLA64V8E	16GB	4800	(2Gx8)x8
TS1GLA64V8G	8GB	4800	(1Gx16)x4

## DDR5 Unbuffered SO-DIMM

PN	Capacity	Data Rate	Component Composition
TS4GSA64V8E	32GB	4800	(2Gx8)x16
TS2GSA64V8E	16GB	4800	(2Gx8)x8
TS1GSA64V8G	8GB	4800	(1Gx16)x4

## DDR5 ECC Long-DIMM

PN	Capacity	Data Rate	Component Composition
TS4GLA72V8E	32GB	4800	(2Gx8)x20
TS2GLA72V8E	16GB	4800	(2Gx8)x10

## DDR5 ECC SO-DIMM

PN	Capacity	Data Rate	Component Composition
TS4GSA72V8E	32GB	4800	(2Gx8)x20
TS2GSA72V8E	16GB	4800	(2Gx8)x10

## DDR5 Registered Long-DIMM

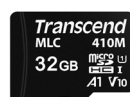
PN	Capacity	Data Rate	Component Composition
TS4GAR80V8E	32GB	4800	(2Gx8)x20
TS2GAR80V8E	16GB	4800	(2Gx8)x10



# SD and microSD Cards



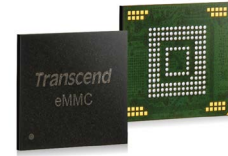
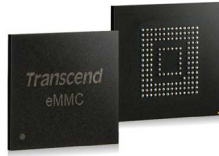
<b>Model</b>	SDXC460T	SD/SDHC410M	SD/SDHC220I
<b>Capacity</b>	64GB~1TB	2GB~32GB	128MB~4GB
<b>Flash Type</b>	112-layer 3D NAND flash	MLC NAND flash	MLC NAND flash (SLC mode)
<b>Sequential R/W*</b>	100/85 MB/s	95/30 MB/s	22/20 MB/s
<b>P/E Cycle</b>	3K		30K
<b>Operating Temperature</b>	Standard Temp. -25°C (-13°F) ~ 85°C (185°F)		Wide Temp. -40°C (-40°F) ~ 85°C (185°F)
<b>Operating Voltage</b>	2.7V ~ 3.6V		
<b>S.M.A.R.T.</b>	Supported	-	Supported
<b>Warranty</b>	Three-year Limited Warranty		



<b>Model</b>	microSDXC460T	microSD/SDHC410M	microSDHC/SDXC230I
<b>Capacity</b>	64GB~512GB	2GB~32GB	2GB~64GB
<b>Flash Type</b>	112-layer 3D NAND flash	MLC NAND flash	3D NAND flash (SLC mode)
<b>Sequential R/W*</b>	100/80 MB/s	95/50 MB/s	100/70 MB/s
<b>P/E Cycle</b>	3K		50K/100K
<b>Operating Temperature</b>	Standard Temp. -25°C (-13°F) ~ 85°C (185°F)		Wide Temp. -40°C (-40°F) ~ 85°C (185°F)
<b>Operating Voltage</b>	2.7V ~ 3.6V		
<b>S.M.A.R.T.</b>	Supported	-	Supported
<b>Warranty</b>	Three-year Limited Warranty		

\* Value varies by capacity, user hardware, system configuration, and calculation method.

# eMMC and Flash Solutions



<b>Model</b>	EMC410T	EMC310M
<b>Form Factor</b>	e.MMC5.1 (BGA-153)	
<b>Bus Width Supported</b>	x1, x4, x8	
<b>Bus Speed Mode</b>	HS400	
<b>Capacity</b>	32 GB	8GB / 16GB
<b>Flash Type</b>	96-layer 3D NAND flash	MLC NAND flash
<b>Sequential R/W*</b>	290/155 MB/s	280/100 MB/s
<b>P/E Cycle</b>	3K	
<b>Operating Temperature</b>	Standard Temp. -25°C (-13°F) ~ 85°C (185°F)	
<b>Warranty</b>	Three-year Limited Warranty	



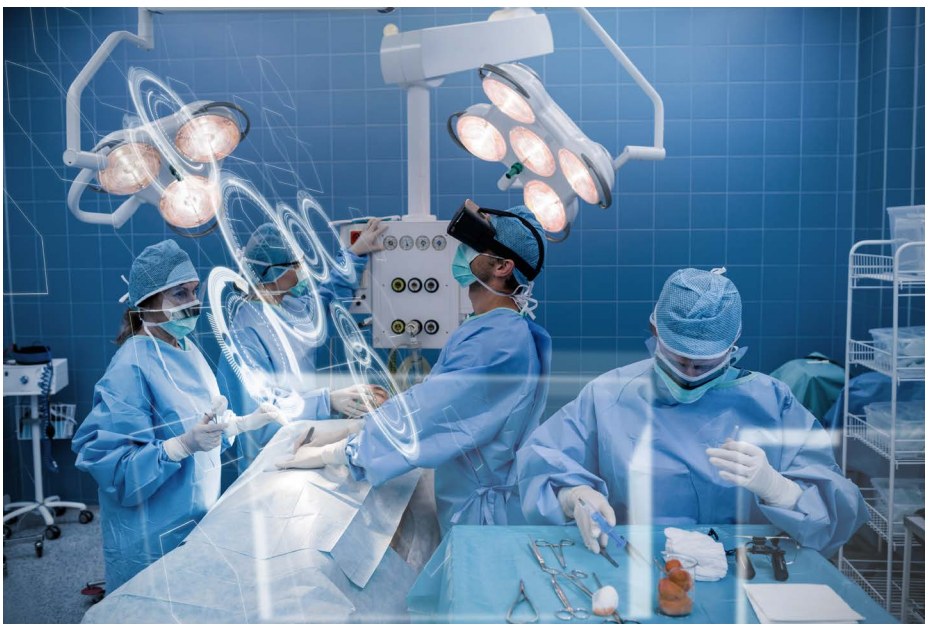
<b>Model</b>	JF280T	JF270M
<b>USB Type</b>	USB Type-A	
<b>Connection Interface</b>	USB 3.1 Gen 1	
<b>Capacity</b>	16GB~128GB	8GB~32GB
<b>Flash Type</b>	3D NAND flash	MLC NAND flash
<b>Sequential R/W*</b>	140/40 MB/s	160/40 MB/s
<b>P/E Cycle</b>	3K	
<b>Operating Temperature</b>	Standard Temp. 0°C (32°F) ~ 70°C (158°F)	
<b>Warranty</b>	Three-year Limited Warranty	

\* Value varies by capacity, user hardware, system configuration, and calculation method.

# Case Study

## Intro

Smart medical carts (aka workstations on wheels) serve as a staple in the healthcare industry, contributing to a significant transformation and advancement in telemedicine applications. Such medical all-in-one PCs provide health professionals with the ability to offer bedside patient charting, accurately distribute medication based on patient records, and review doctors' orders. They also allow hospital staff to transport computers between patients and health institutions with no downtime.





## Potential Challenges and Recommended Solutions

### Shock and Vibration

- Medical equipment is placed under potential risks of shock and vibrations during transportation within operating rooms and between hospitals / medical institutions.
- Corner Bond / SiP (System in a Package)



### Data Security

- Given the need to keep patients' medical records confidential, data security is an uncompromising prerequisite for medical devices employed within point-of-care services.

### Complete PLM

- Validation process of medical devices in healthcare settings usually requires a period of 1~2 years. And thus, a long introduction period and complete Product Lifecycle Management (PLM) mechanism is well demanded to ensure product longevity.
- Applications: Da Vinci robotic arms, medical tablets

# About Us

Transcend is a globally recognized leader in the manufacture of industrial storage solutions. Established in Taiwan in 1988, Transcend has gained over 30 years of experience in storage manufacture. With its mature production process and persistence to high quality, Transcend offers a full line of standard and proprietary internal SSDs (PCIe M.2/SATA III 2.5", M.2, mSATA, and half-slim type), different generations of DRAM memory modules, SD/microSD cards, e.MMC memory, and flash solutions. Transcend products are widely used in various industries, from transportation, healthcare, to 5G communication, AIoT and embedded applications.

We solve clients' obstacles by tapping advanced technology and offering customized services exclusively for each client. As a customer-oriented company, Transcend responds quickly to the market's changing needs. Transcend does not merely provide durable industrial-grade storage devices, but serves as a trusted partner in the long run. For more information, please visit [www.transcend-info.com](http://www.transcend-info.com)



# Our Strengths

## Storage Solutions with Best Quality

- Branded chips to ensure high quality
- In-house software for efficient management
- Technology integration for innovative products

## Reliable Supply

- Strategic alliance with top-tier suppliers



## R&D Expertise

- More than 140 patents
- 100+ R&D talents
- National Invention & Creation Award



## Global Operation & Worldwide Support

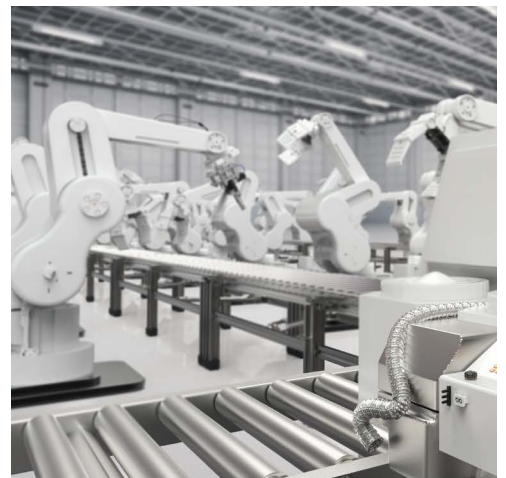
- In-time professional technical support
- 12 branch offices worldwide
- Localized sales and FAE support

## Management of Product Life Cycle

- Fixed BOM
- In-house ERP system
- Roadmap & failure analysis report

## Facilities & Production Process

- Automatic production
- Enhanced reliability tests
- Rigorous quality control: IQC, IPQC, FQC, OQC







# Your trusted partner to high quality

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special requests you might have.

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