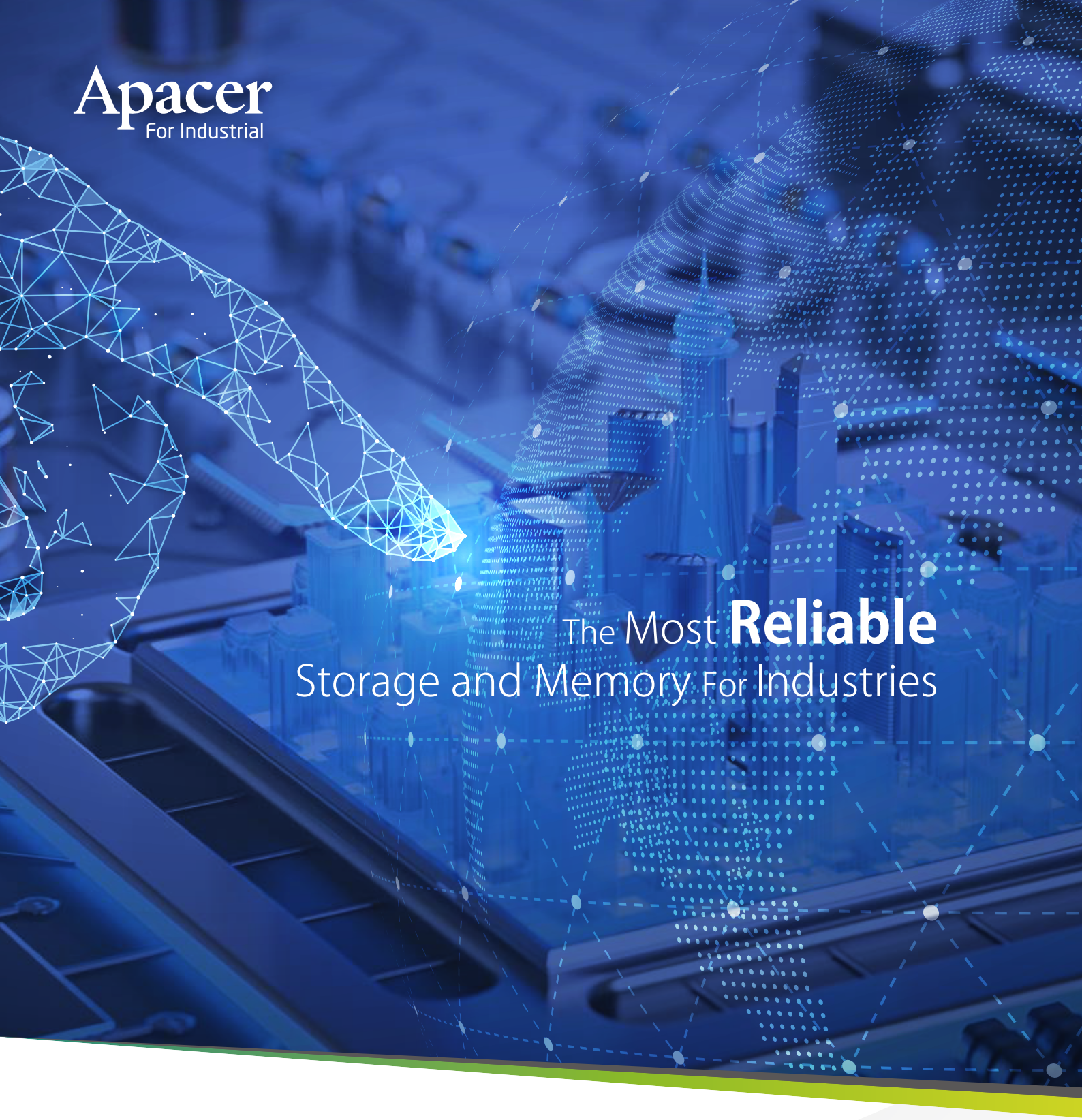
Apacer
For Industrial



The Most **Reliable**
Storage and Memory For Industries

IoT Solutions

industrial.apacer.com

Index

What Sets Apacer Apart?

Professional Technique

- Strong HW/FW engineering know-how
- Customized design with a variety of solutions
- State-of-the-art technology

Quality Assurance

- **100% reliable & compliant**
  - Wide temperature test
  - Thermal shock test
  - Strict ORT (Ongoing Reliability Test)
  - Power cycle test
  - Humidity test
  - Altitude test
  - Reliability test (Vibration/Shock)

Extensive Experience

- Tier 1 industrial SSD & memory supplier; delivered over 135 million units
- Comprehensive experience in product customization (across industries)

Reliable Service

- Fixed BOM solution
- Longevity of supply, EOL & LTB notice
- Manufacturing in Taiwan protects IP

Trustworthy Supplier

- A global-scale service and maintenance system
- Responsive local FAE technical support
- 24/7 flexible and quick delivery service
- Complete RMA system

IoT Applications

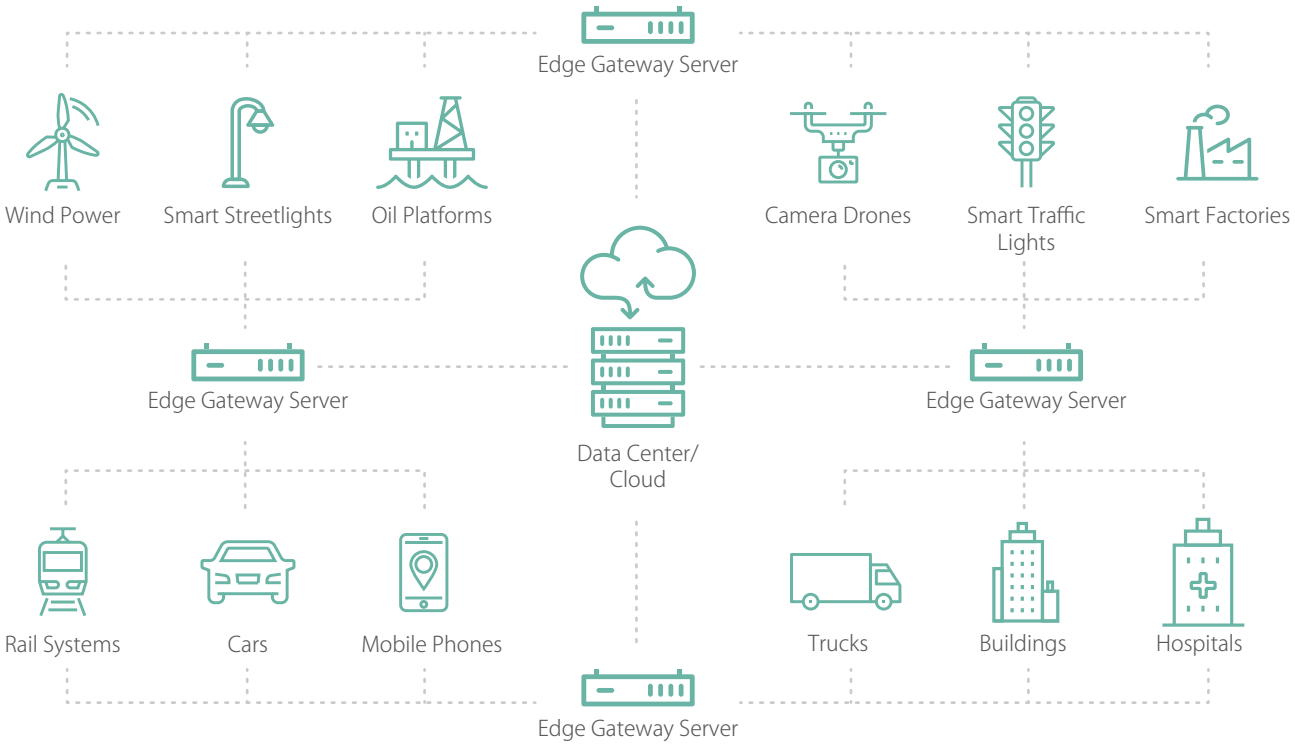
Introduction

The age of the Internet of Things isn't approaching – it's already here. The IoT industry is already seeing innovative developments such as Industrial Internet of Things (IIoT) and Artificial Intelligence of Things (AIoT). As IoT pivots from centralized cloud storage to an edge computing architecture, Apacer remains a crucial supplier of storage devices for IIoT and AIoT applications.

AIoT is less a new industry than it is the combination of pre-existing industries. Data has taken center place as the most important asset, highlighting the importance of memory and storage devices. Beyond storing data, companies will need to rethink how they integrate and analyze data to get the best return on their investment in IoT, while maximizing the benefits of smart storage. Both challenges and business opportunities present themselves. Apacer is here to help you overcome the challenges and take advantage of the opportunities.

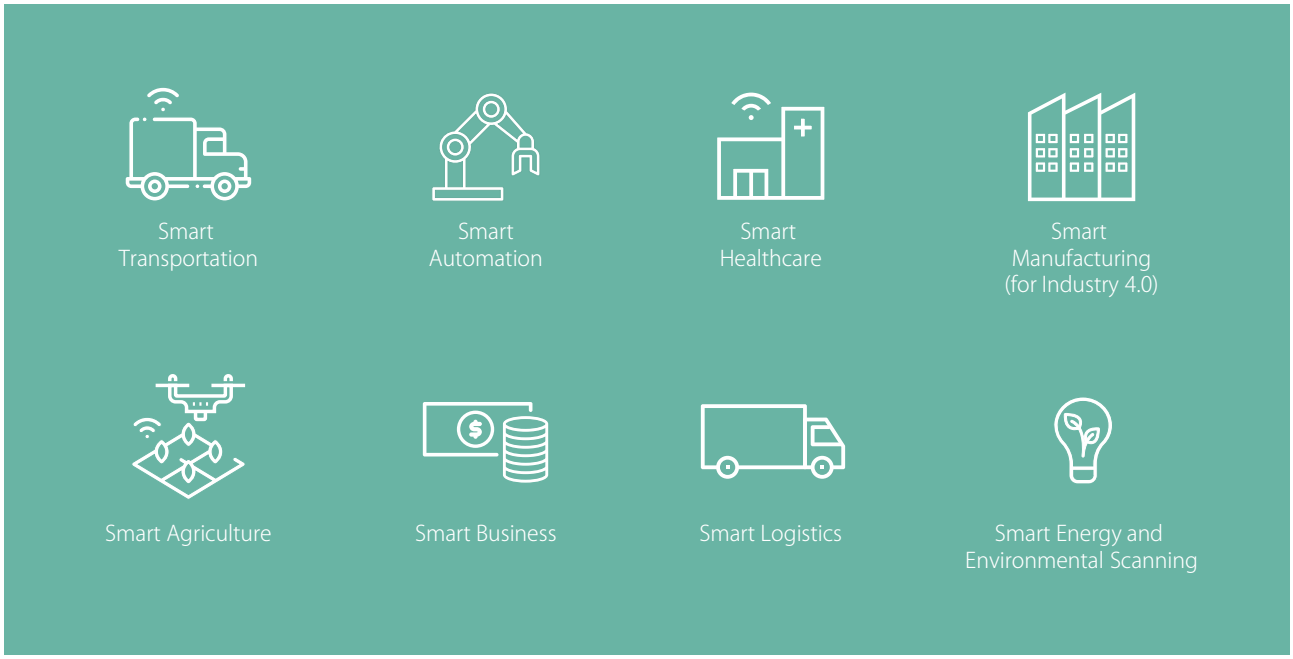
Overview

According to the latest research report by the market research firm MarketsandMarkets, the global Industrial Internet of Things (IIoT) market reached about US$64 billion in 2018. It is expected to grow to US$91.4 billion in 2023. Certainly there are a lot of opportunities for manufacturers to creatively take control of their own share of this growing industry.



IoT Applications

Industries



Challenges and Requirements

Data integrity is crucial

In order to facilitate constant improvement in the field of IoT, data must be gathered and analyzed to identify and correct any issues that arise. Apacer uses the latest in redundant protection technology to ensure that data integrity is as high as possible.

Encryption protects against intrusion

Smart devices in an IoT system need to be able to communicate with each other while still remaining protected from unwanted intrusions by hackers. Apacer offers SSDs with AES 256-bit encryption to ensure that even if the hardware is stolen or lost, hackers are prevented from accessing the data.

Strong enough to survive

IoT devices need to function smoothly even in challenging real-world conditions. Apacer's storage solutions can be protected by a variety of advanced technologies to make them more resilient to shocks and vibration. Employing underfill technology makes our products that much tougher.

Featured Technologies for IoT Applications

No matter where an IoT device is incorporated into a system, it needs to gather and store data for later analysis. Both the quantity and quality of data that is being gathered are constantly growing. Manufacturers are looking for robust embedded solutions for data storage.

Apacer's Industrial SSD team has more than 20 years of experience in the embedded storage hard drive industry. We focus on designing and manufacturing solutions designed to deliver high performance, high reliability and top quality in the IoT industry to provide complete solutions and help our customers build reliable, flexible and low-cost systems.

Extreme Environments

- Wide Temperature
- Thermal Throttling
- Anti-sulfuration
- Underfill
- Conformal Coating
- Nano Coating

Data Security

- TCG Opal 2.0
- AES Encryption
- CoreEraser
- Write Protect

Data Integrity

- Page Mapping
- DataRAID™
- End-to-end Data Protection
- CorePower

Value-added Application

Double-barreled Solution

- CoreAnalyzer2
- SSDWidget 2.0

Extreme Environments

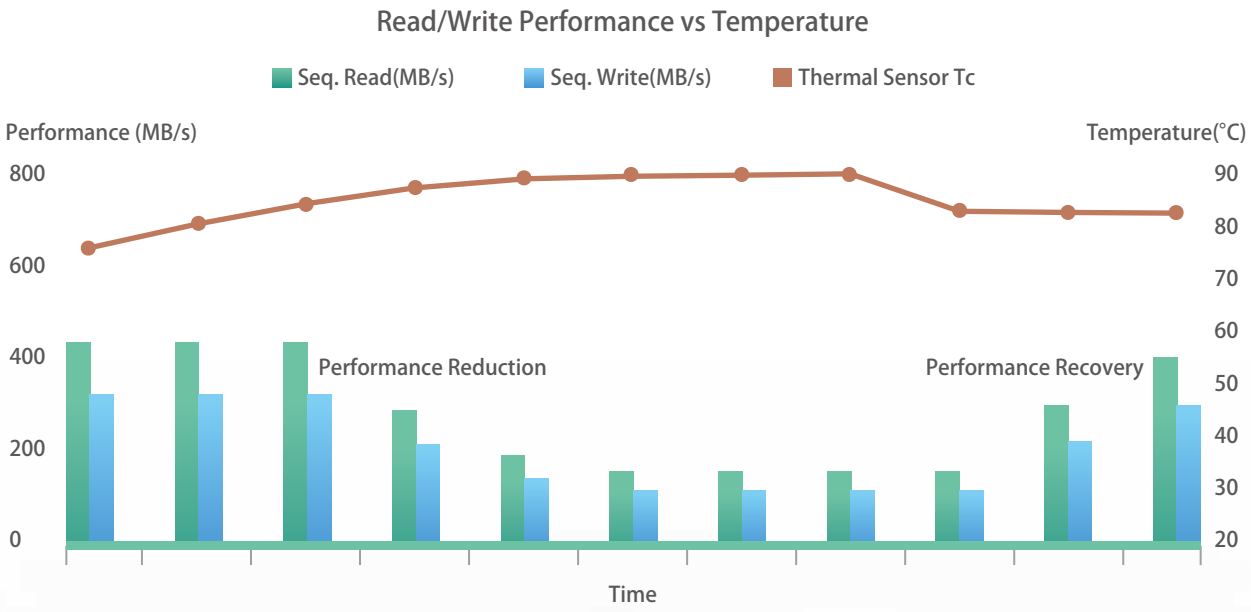
IoT devices need to be tough enough to operate smoothly even in a challenging environment. They are threatened by vibration, shock and wide temperature swings. Apacer offers a variety of technologies which can greatly reduce the wear and tear on storage, meaning devices with Apacer memory will have longer operating lives.

Wide Temperature

Apacer Industrial SSDs can operate at temperatures as low as -40°C and as high as 85°C, giving them greater flexibility than most.

Thermal Throttling

Thermal throttling ensures that a device's temperature stays within temperature limits through the use of drive throttling, i.e. reducing the speed of the drive when the device's temperature reaches the threshold. This prevents overheating, guarantees data reliability, and prolongs the product's lifespan.



Anti-sulfuration

Anti-sulfuration memory modules are mainly used in equipment exposed in highly contaminated environment.

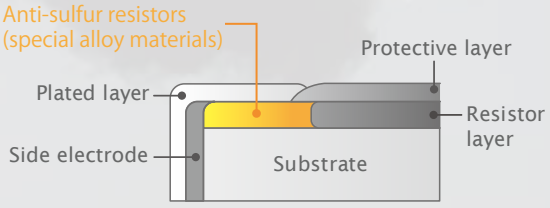
- World's first anti-sulfuration memory modules
- Solves corrosion problems effectively and increases overall system lifespan
- Ensures product reliability and durability
- Widely recognized and awarded patents in many countries

Widely recognized and awarded patents

	Date	No.
China	2019/3/1	201610348460.2
USA	2017/4/11	US9,622,337
Taiwan	2017/9/11	I598878

Apacer's anti-sulfuration technology

Resistor construction

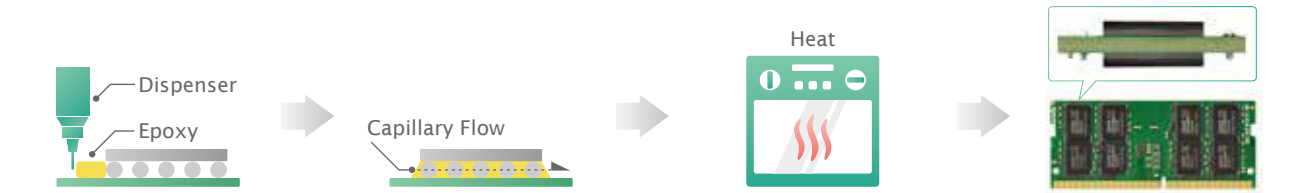


Apacer has been awarded patents for its anti-sulfuration memory, which prevents sulfur corrosion problems.

Underfill

Apacer provides underfill technology to increase product reliability and resistance to various thermal and mechanical shocks.

- Strengthens the solder joints between solder balls and printed circuit board
- Increases the product's resistance against shock and vibration
- Reduces thermal stress damage
- Complies with MIL-STD-810G shock and vibration requirements
- Increases product reliability and lifespan



a.Underfill Dispensing | b.Dispense Completed | c.Underfill Cure | d.Finished Product

Conformal Coating

Enhances reliability of products by applying coatings on the surface of printed circuit boards. The protective film can safeguard devices from dust ingression and liquid immersion.

- Uses automated spraying to maintain precise coating thickness
- Enhances product reliability
- Prolongs SSD and DRAM modules lifespan

IP57

Nano Coating

The IP57 waterproof and dustproof Nano Coating (parylene conformal coating) solution is especially ideal for SSD modules as it provides invulnerable protection for the components on the devices.

	Conformal Coating	Nano Coating
Protection	Dust, moisture, fungus, corrosion	Dust, moisture, fungus, corrosion IP57
Product	Module type w/o housing	Module type w/o housing
Cost	$	$$$
Additional LT	14 Working-days	14 Working-days

Data Security

Nowadays, almost everything can be connected to the Internet, and all connected devices will have security issues. If a network is invaded by a hacker, personal or company information can be put at risk. Apacer has prioritized data security with these conditions in mind.

TCG Opal 2.0

Advanced encryption mechanism for data security

Apacer has stepped in with TCG Opal-compliant SSDs as the demand for more invincible data security solutions gives self-encrypting drives (SEDs) a strong foothold in the industrial SSD market.

- AES 256-bit encryption
- 100 % hardware encryption
- Fast data encryption
- Pre-boot authentication
- LBA range assignment

Hardware-based AES Encryption

AES 256-bit encryption is an extremely high encryption standard. To brute-force it would take literally millions of years, so it has been adopted by many governments and defense contractors over recent years.

CoreEraser

The CoreEraser comes in three types of block sanitizations and can be implemented through software command or hardware architecture.

- **Quick Erase:**
  Eliminates FAT (File Allocation Table) and the MBR (Master Boot Record) in LBA.
- **Full Erase:**
  Erases all contents of MBR and FAT as well as user and free blocks.
- **Mil Erase:**
  Sanitizes the MBR and FAT as well as user and free blocks by erasing the blocks, overwriting with random data, then verifying. Mil Erase supports a variety of a variety of standards:

- NSA 9-12
- DoD 5220.22-M
- NSA Manual 130-2
- USA-AF AFSSI 5020
- USA-Army 380-19
- USA Navy NAVSO P-5239-26
- NISPOMSUP Chap 8, Sect. 8-501
- IREC (IRIG) 106

Write Protect

Write Protect can prevent drives from unauthorized data write via a hardware switch/pin or vendor software command.

a. Pin Header

b. Pin Configuration

• SATA 22pin Connector

LED Indication Pin P11
Security Function Pin P4
Power Segment Pin P1
Single Segment Pin S1

c. Slide Switch

Data Integrity

With the architectural framework for the Internet of Things (IoT) rapidly maturing, industrial automation, medical care, and in-vehicle devices have become the focus of future developments in the industrial control market. The application of random access data is also gradually increasing. Different read/write rates to the drive usage will affect SSD's lifespan. Therefore, critical SSD technology must evolve to solve system application problems to effectively improve SSD performance and lifetime.

Page Mapping

Page mapping is an advanced flash management technology which distributes the data into flash pages to allow the data to be evenly written. This way, random access speed will be increased. Also, it reduces the block erasing frequency.

DataRAID™

The Apacer DataRAID™ algorithm applies an additional level of protection and error-checking. Using this algorithm, a certain amount of space is given over to aggregating and resaving the existing parity data used for error checking. So, in the event that data becomes corrupted, the parity data can be compared to the existing uncorrupted data and the content of the corrupted data can be rebuilt.

End-to-end Data Protection

Apacer's End-to-End Data Protection is a feature implemented in Apacer SSD products that extends error control to cover the entire path from the host computer to the drive and back, and ensure data integrity at multiple points in the path through error-checking techniques including CRC, ECC and DataRAID™ to enable reliable data transfer.

CorePower

Apacer's hardware-based technology is designed to prevent data loss and ensure the stability of data transmission during a power outage by implementing backup power supply that allows sufficient time to move all cached data to NAND flash.

CorePower Circuit

Detect

Backup Power

- SSD will stop receiving host commands
- Detect IC will inform controller to move all the cached data into NAND
- Capacitors start working - backup power supply

Value-added Application

Double-barreled Solution

Apacer's Double-barreled Solution extends SSD lifespans, and is comprised of CoreAnalyzer2 and SSDWidget 2.0. CoreAnalyzer2 helps determine which SSD and firmware are most suitable for a customer's application, and SSDWidget 2.0 allows for customers to remotely monitor SSD status in real-time on smartphones or other connected devices, via their private server.

Step 1

CoreAnalyzer2 – Know your application

Choose the most suitable F/W for SSD

Step 2

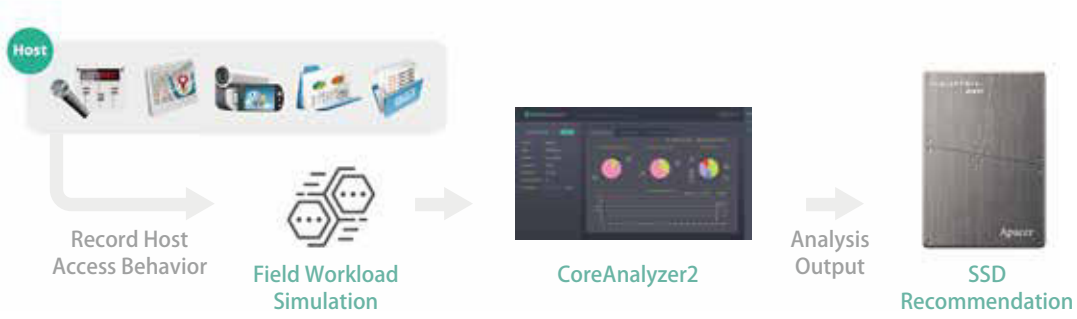
SSDWidget 2.0 – Monitor your SSD Status

Anticipate and mitigate SSD failures remotely

Longer-lasting SSDs

CoreAnalyzer2

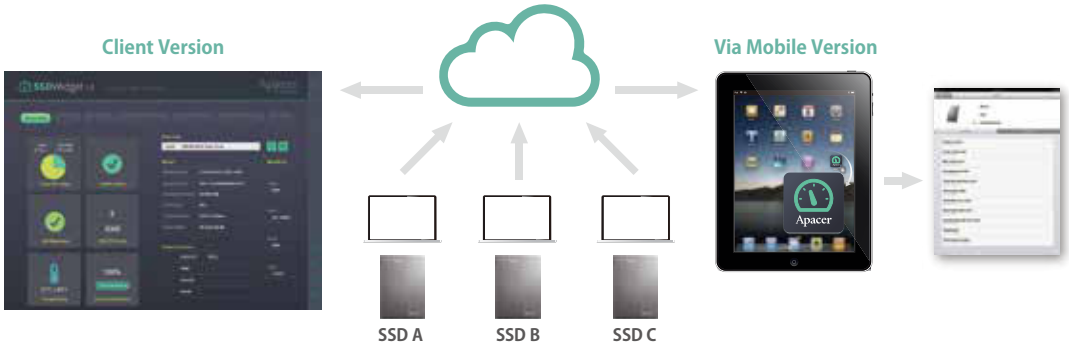
CoreAnalyzer is an exclusive, analytic data-behavior technology integrated with Apacer's SSD products. By collecting and analyzing data from a customer's host system, it can help customers analyze their usage behavior so they can choose the best-suited SSD for their application.



SSDWidget 2.0

Intelligent and comprehensive monitoring and maintaining software

This program features advanced monitoring that allows users to get more detailed read and write records for further use-behavior analysis. The SSD self-test and performance optimization are also included.



Success Story - They Chose Apacer

Challenges

- Logistical challenges in terms of physical access
- Expensive manpower costs
- Sulfurous environment

Solutions

- SM210-M280
- SM230-25

Value-added technologies

- **Hardware:**
  Anti-sulfuration modules
- **Software:**
  SSDWidget 2.0
  CoreAnalyzer2
- **Firmware:**
  Firmware customization

The Customer and the Application: Offshore Oil Drilling

Our customer maintains and operates an offshore oil drilling platform located near Ireland. Due to the nature of offshore oil drilling, there were many challenges they faced in terms of day-to-day operations.

Challenges

An offshore oil drilling platform can be a dangerous place to live and work. Even a small malfunction could lead to a fire, an explosion or even extensive pollution. So the failure of a crucial component is something that must be prevented at all costs. And since power is supplied to the platform via an underwater cable, voltage can be unstable at times.

In addition to this, many oil workers live on the mainland and travel to an offshore rig by boat, so there are logistical challenges especially when the weather is poor. The dangerous nature of oil drilling means that salaries are often extremely high, and since the industry is unionized, overtime or weekend pay structures can be extremely costly to management.

What's more, certain parts of an offshore drilling platform have environments that are high in sulfur, which can corrode certain electronic components at alarming rates.

Solutions and Technologies

Our customer asked us if we could provide a SSD solution that was protected against sulfuration. After careful consideration, we recommended certain products which incorporate patented technologies that resist sulfuration. Unlike some of our competitor's modules where the silver components are simply covered with sulfur-resistant materials, our modules actually include special alloys in place of silver that sulfur cannot damage.

And to help the customer deal with the logistical challenges of reaching the oil rig to perform regular maintenance, we suggested that they take full advantage of our SSDWidget2.0 software. They set up a private server where all their Apacer SSDs could regularly upload their current status, then installed apps on their engineers' phones and computers so that their engineers could monitor the health of the SSDs remotely. By using this software to anticipate the end of an SSD's operational lifetime, the engineers could replace older modules before they failed. This meant both greater data integrity and less overtime due to unscheduled maintenance trips from the mainland to the oil rig.

Results and Benefits

The client reported that in the first year of using Apacer's SSDs, they logged significantly less overall SSD failures due to sulfuration. They also noticed a considerable reduction in overtime and manpower costs thanks to the remote SSD monitoring provided by SSDWidget2.0. Currently, we are in the process of collaborating with them on a custom order for even more resilient SSDs for use in future oil-drilling projects.

Additional Support

Longevity

Fixed BOM solution,
EOL & LTB notice

Strong customization capabilities

Strong HW/FW
engineering know-how

Service

Real-time and responsive
after-sales service

Apacer's Strengths

Industrial solutions for
IoT applications

Value-Added Application

Double-barreled Solution

- CoreAnalyzer2
- SSDWidget 2.0

Longevity

- Fixed BOM support
- Unique S/N for RMA tracking

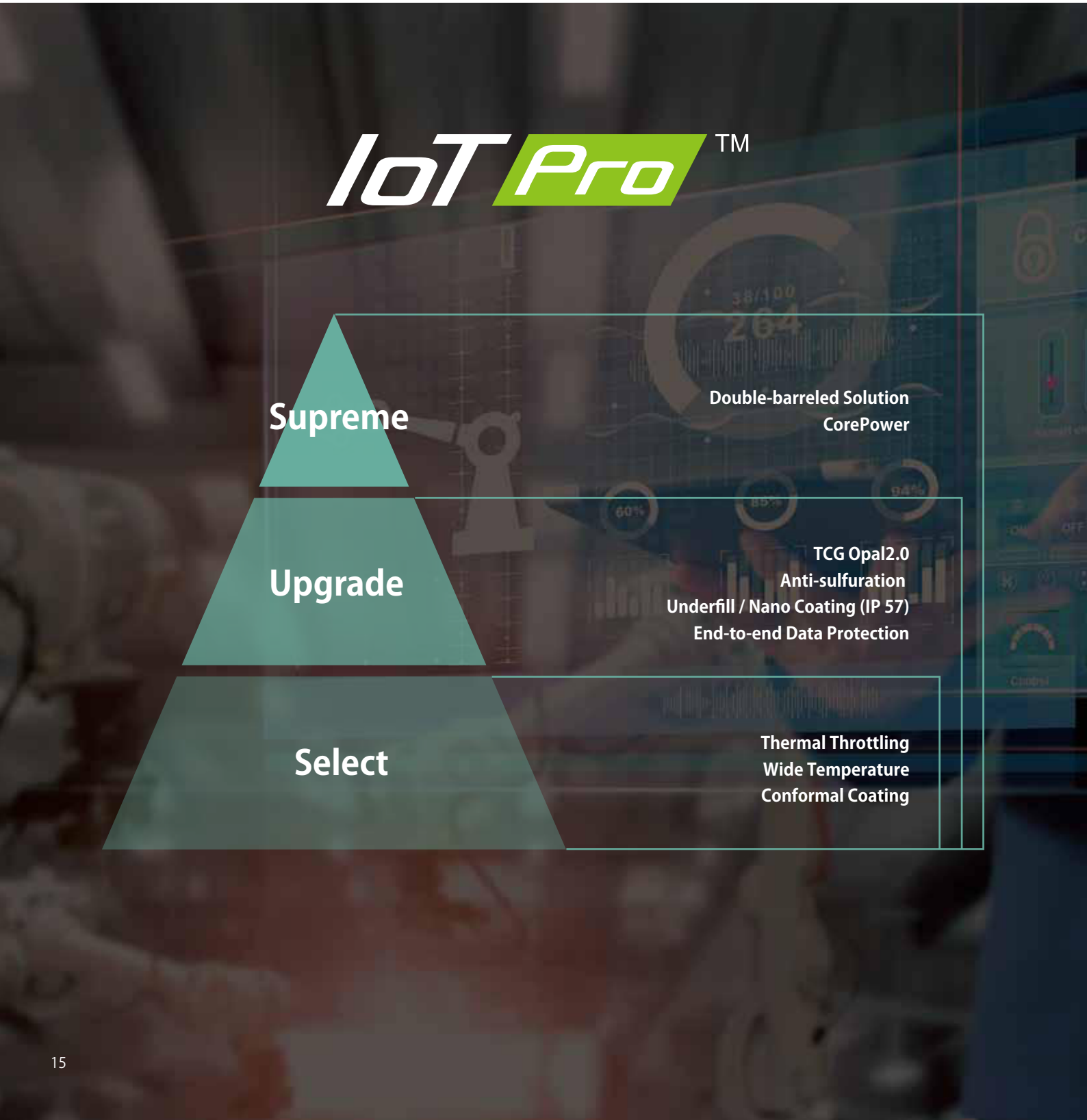
Strong R&D and customization capabilities

Apacer's Premium Package: IoTPro™

A Tailor-made Technology Set for IoT Applications

Apacer has developed a tailor-made technology set, IoTPro™, to meet the multi-faceted requirements of IoT applications and help customers find the right solutions, further simplifying the process of implementation.

IoTPro™ is classified into three levels based on customers' requirements and Apacer's strong industry background.



2.5" SATA SSD





Model	SV250-25	SU210-25	SM230-25	SS21P-25	SS210-25
Interface	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.1 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)
NAND Flash Type	3D TLC	MLC	MLC	SLC	SLC
Connector	(7+15) pin male	(7+15) pin male	(7+15) pin male	(7+15) pin male	(7+15) pin male
Capacity	30GB~480GB	16GB~256GB	With AES 256 support: 32GB~1TB With TCG Opal 2.0 support: 32GB~512GB	32GB~240GB	8GB~240GB
External DRAM	No	Yes	No	Yes	Yes
EST. Seq R/W Performance (MB/sec)	560/520	545/450	530/520	555/435	510/470
Standard Operating Temperature (°C)	0 ~ + 70	0 ~ + 70	0 ~ + 70	0 ~ + 70	0 ~ + 70
Wide Temperature (°C)	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85
Storage Temperature (°C)	-40 ~ + 100	-40 ~ + 100	-40 ~ + 100	-40 ~ + 100	-40 ~ + 100
ECC Engine	Low-Density Parity-Check (LDPC) Code	Built-in 40-bit per 1K bytes BCH ECC	Built-in 40-bit per 1K bytes BCH ECC	Built-in 40-bit per 1K bytes BCH ECC	Built-in 40-bit per 1K bytes BCH ECC
IOPS (4K Random Write)	76K	80K	65K	76K	79K
Thermal Sensor	Yes	Yes	Yes	Yes	Yes
Shock	Operating:50G/11ms,(compliant with MIL-STD-202G) Non-operating: 1500G/0.5ms,(compliant with MIL-STD-883K)				
Vibration	Operation: 7.69 Grms, 20~2000 Hz/random (compliant with MIL-STD-810G) Non-operation: 4.02 Grms, 15 ~ 2000 Hz/sine (compliant with MIL-STD-810G)				
Dimension (mm)	7mm: 100.00 x 69.85 x 6.90 9.5mm: 100.00 x 69.85 x 9.3	7mm: 100.00 x 69.85 x 6.90 9.5mm: 100.00 x 69.85 x 9.3	7mm: 100.00 x 69.85 x 6.90	9.5mm: 100.00 x 69.85 x 9.3	7mm: 100.00 x 69.85x 6.90 9.5mm: 100.00 x 69.85 x 9.3
MTBF (hours)	>2,000,000	>1,000,000	>1,200,000	>2,000,000	>2,000,000

M.2 2280 & M.2 2242

Model	SV240-M280	SV250-M280	SM21P-M280	SM230-M280	SV250-M242	SM230-M242
Interface	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)
NAND Flash Type	3D TLC	3D TLC	MLC	MLC	3D TLC	MLC
Connector	M.2 B & M key	M.2 B & M key	M.2 B & M key	M.2 B & M key	M.2 B & M key	M.2 B & M key
Capacity	120GB~960GB	30GB ~ 960GB	32GB ~ 512GB	With AES 256 support: 32GB~1TB With TCG Opal 2.0 support: 32GB~512GB	30GB~480GB	8GB~256GB
External DRAM	No	No	Yes	No	No	No
EST. Seq R/W Performance (MB/sec)	560/515	560/525	545/155	560/510	560/520	555/470
Standard Operating Temperature (°C)	0 ~ + 70	0 ~ + 70	0 ~ + 70	0 ~ + 70	0 ~ + 70	0 ~ + 70
Wide Temperature (°C)	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85
Storage Temperature (°C)	-40 ~ + 100	-40 ~ + 100	-40 ~ + 100	-40 ~ + 100	-40 ~ + 100	-40 ~ + 100
ECC Engine	Low-Density Parity-Check (LDPC) Code	Low-Density Parity-Check (LDPC) Code	Built-in up to 72-bit per 1K bytes BCH ECC	Built-in up to 72-bit per 1K bytes BCH ECC	Low-Density Parity-Check (LDPC) Code	Built-in up to 72-bit per 1K bytes BCH ECC
IOPS (4K Random Write)	85K	87K	22K	63K	75K	41K
Thermal Sensor	Yes	Yes	No	Yes	Yes	Yes
Shock	Operating:50G/11ms,(compliant with MIL-STD-202G) Non-operating: 1500G/0.5ms,(compliant with MIL-STD-883K)					
Vibration	Operating: 7.69 GRMS, 20~2000Hz/random,(compliant with MIL-STD-810G) Non-operating: 4.02Grms,, 15~2000Hz/sine, (compliant with MIL-STD-810G)					
Dimension (mm)	80.00 x 22.00 x 3.58	Single side (30-60GB): 80.00 x 22.00 x 3.88 Single side (120-480GB): 80.00 x 22.00 x 2.38 Double side(960GB): 80.00 x 22.00 x 3.88	Single side: 80.00 x 22.00 x 2.23 Double side: 80.00 x 22.00 x 3.58	Single side: 80.00 x 22.00 x 2.23 Double side: 80.00 x 22.00 x 3.58	42 x 22 x 3.6	42.00 x22.00 x 3.80
MTBF (hours)	>1,000,000	>1,000,000	>1,000,000	>1,000,000	>2,000,000	>1,000,00

mSATA MO-300/ Industrial SD/ Industrial microSD/ uSSD







Model	SM230-300	SM23P-300	SM210-300	SS210-300	CV110-SD	CV110-MSD	SV170- μ SSD
Interface	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SATA 3.0 (6Gb/s)	SD3.0	SD3.0	SATA 3.0 (6Gb/s)
Connector	52 pin male	52 pin male	52 pin male	52 pin male	9-pin	8-pin	BGA 156 Ball
NAND Flash Type	MLC	MLC	MLC	SLC	3D TLC	3D TLC	3D TLC
Capacity	32GB~512GB	8GB~512GB	8GB~512GB	2GB~128GB	32GB~256GB	32GB~256GB	30GB~120GB
External DRAM	No	No	Yes	Yes	No	No	No
EST. Seq R/W Performance (MB/sec)	560/510	560/500	545/490	525/445	90/34	90/34	560/460
Standard Operating Temperature (°C)	0 ~ + 70	0 ~ + 70	0 ~ + 70	0 ~ + 70	-25 ~ + 85	-25 ~ + 85	0 ~ + 70
Wide Temperature (°C)	-40 ~ + 85	-40~ + 85	-40~ + 85	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85	-40 ~ + 85
Storage Temperature (°C)	-40 ~ + 100	-40~ + 100	-40~ + 100	-40 ~ + 100	-40 ~ + 85	-40 ~ + 85	-40 ~ + 100
ECC Engine	Built-in 40-bit per 1K bytes BCH ECC	Built-in 40-bit per 1K bytes BCH ECC	Built-in 40-bit per 1K bytes BCH ECC	Built-in 40-bit per 1K bytes BCH ECC	Built-in advanced ECC algorithm	Built-in advanced ECC algorithm	Low-Density Parity-Check (LDPC) Code
IOPS (4K Random Write)	58K	59K	78K	76K	42K	42K	79K
Thermal Sensor	Yes	Yes	Yes	Yes	No	No	No
Shock	Operating:50G/11ms,(compliant with MIL-STD-202G) Non-operating: 1500G/0.5ms,(compliant with MIL-STD-883K)						
Vibration	Operation: 7.69 Grms, 20~2000 Hz/random (compliant with MIL-STD-810G) Non-operation: 4.02 Grms, 15 ~ 2000 Hz/sine (compliant with MIL-STD-810G)						
Dimension (mm)	50.80 x 29.85 x 3.8	50.8 x 29.85 x 4.85	50.80 x 29.85 x 3.8	50.8 x 29.85 x 3.8	32 x 24 x 2.1	15 x 11 x 1	16 x 20 x 1.4
MTBF (hours)	>1,000,000	>1,000,000	>1,000,000	>2,000,000	>3,000,000	>3,000,000	>1,000,000

Wide Temp. ECC SODIMM

Model	DDR4 Wide Temp. ECC SODIMM	DDR3 Wide Temp. ECC SODIMM
Module Type	Wide Temperature ECC SODIMM	Wide Temperature ECC SODIMM
Memory Technology	DDR4	DDR3
Frequency	2133/2400/2666	1066/1333/1600
Density	4G/8G/16G	2G/4G/8G
Voltage	1.2v	1.5v/1.35v
Pin Count	260-Pin	204-Pin
Width	72-Bit	72-Bit
PCB Height	1.18"	1.18"
Operation Temperature	TC=-40℃ to 85℃	TC=-40℃ to 85℃
Value-Added	Wide Temperature, Thermal Sensor, 30µ Gold Finger, Underfill, Conformal Coating	Wide Temperature, Thermal Sensor, 30µ Gold Finger, Underfill, Conformal Coating

Wide Temp. SODIMM

Model	DDR4 Wide Temp. SODIMM	DDR3 Wide Temp. SODIMM	DDR2 Wide Temp. SODIMM	DDR Wide Temp. SODIMM
Module Type	Wide Temperature SODIMM	Wide Temperature SODIMM	Wide Temperature SODIMM	Wide Temperature SODIMM
Memory Technology	DDR4	DDR3	DDR2	DDR
Frequency	2133/2400/2666	1066/1333/1600	533/667/800	266/333/400
Density	4G/8G/16G	1G/2G/4G/8G	512M/1G/2G	512M/1G
Voltage	1.2v	1.5v/1.35v	1.8v	2.5v/2.6v
Pin Count	260-Pin	204-Pin	200-Pin	200-Pin
Width	64-Bit	64-Bit	64-Bit	64-Bit
PCB Height	1.18"	1.18"	1.18"	1.25"
Operation Temperature	TC=-40℃ to 85℃	TC=-40℃ to 85℃	TC=-40℃ to 85℃	TA=-40℃ to 85℃
Value-Added	Wide Temperature, 30µ Gold Finger, Underfill, Conformal Coating	Wide Temperature, 30µ Gold Finger, Underfill, Conformal Coating	Wide Temperature, 30µ Gold Finger, Underfill, Conformal Coating	Wide Temperature, 30µ Gold Finger, Underfill, Conformal Coating

VLP ECC UDIMM


Model	DDR4 VLP ECC UDIMM	DDR3 VLP ECC UDIMM
Module Type	VLP ECC UDIMM	VLP ECC UDIMM
Memory Technology	DDR4	DDR3
Frequency	2133/2400/2666	1066/1333/1600
Density	4G/8G/16G	1G/2G/4G/8G
Voltage	1.2v	1.5v/1.35v
Pin Count	288-Pin	240-Pin
Width	72-Bit	72-Bit
PCB Height	0.738"	0.738"
Operation Temperature	TC=-0℃ to 85℃	TC=-0℃ to 85℃
Value-Added		

VLP ECC SODIMM

Model	DDR4 VLP ECC SODIMM
Module Type	VLP ECC SODIMM
Memory Technology	DDR4
Frequency	2133/2400/2666
Density	4G/8G
Voltage	1.2v
Pin Count	260-Pin
Width	72-Bit
PCB Height	0.7"
Operation Temperature	TC=-0℃ to 85℃
Value-Added	

Anti-Sulfuration SODIMM

Model	DDR4 Anti-Sulfuration SODIMM	DDR3 Anti-Sulfuration SODIMM
Module Type	Anti-Sulfuration SODIMM	Anti-Sulfuration SODIMM
Memory Technology	DDR4	DDR3
Frequency	2133/2400/2666	1066/1333/1600
Density	4G/8G/16G	1G/2G/4G/8G
Voltage	1.2v	1.35v/1.5v
Pin Count	260-Pin	204-Pin
Width	64-Bit	64-Bit
PCB Height	1.18"	1.18"
Operation Temperature	TC=0℃ to 85℃ / -40℃ to 85℃	TC=0℃ to 85℃ / -40℃ to 85℃
Value-Added		

About Apacer

Apacer is a global leader in digital storage solutions devoted to innovative storage technology and services. After 20 years in the industry, we remain dedicated to our belief in "persistence in doing the right things." Our core values, as always, continue to revolve around reliability and innovation.

The company focuses on embedded applications for a variety of vertical markets, including military, medical, gaming, and industrial, and has become an integration expert in digital storage, innovative applications, and value-added services. Apacer is known for its advanced technologies and product quality and was ranked by Gartner as the top industrial SSD supplier for five consecutive years, from 2012 to 2016. In addition, Apacer is committed to making a positive impact on societal issues and has joined the **Responsible Business Alliance (RBA)**, which is formerly known as Electronic Industry Citizenship Coalition (EICC), a coalition promoting **corporate social responsibility (CSR)** within the global electronics supply chain. We believe that the success of a corporation is marked not by profit but by how we benefit others, whether by caring for the environment or making contributions to society.

Compliance and Associations

ISO 9001:2015 ISO 14001:2015 OHSAS 18001:2015 IECQ CQ80000