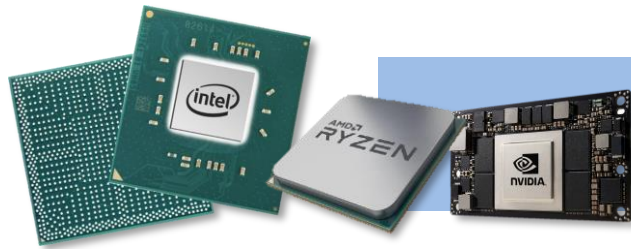
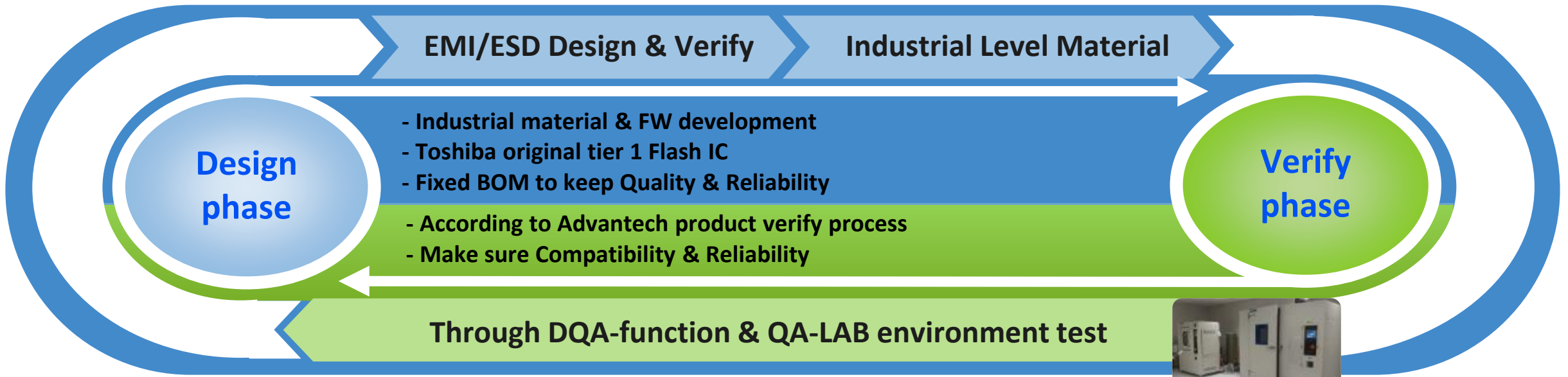


SQFlash Product Selection



Advantech design and quality control standard



with different generation chipset and platform
to ensure good compatibility.

100% Screening Test

- High temp. Burn-In test
- High-Low temp. cycling test

- Vibration test
- Industrial Quality Assurance



Quality, let the numbers speak!

SQFlash all	2018	2019	2020	2021	Summary
Total Shipping Q'ty	1,143,979	1,233,086	803,610	1,160,211	4,340,886
RMA Q'ty	1143	1297	1023	699	4,162
RMA rate (%)	0.10%	0.11%	0.13%	0.06%	0.10%
Defect Q'ty (NPF excluded)	609	842	593	385	2,429
Defect rate (%)	0.05%	0.07%	0.07%	0.03%	0.06%

- Defect rate gets lower over years
- Industry leading < 0.06% defect rate

All SATA Products	2018	2019	2020	2021	Summary
Total Shipping Q'ty	680,745	825,726	647,820	898,304	3,052,595
RMA Q'ty	951	1100	897	596	3,544
RMA rate (%)	0.14%	0.13%	0.14%	0.07%	0.12%
Defect Q'ty (NPF excluded)	549	763	541	345	2,198
Defect rate (NPF excluded)	0.08%	0.09%	0.08%	0.04%	0.07%

- <0.07% defect rate for SATA product

Mainstream Embedded Series	2018	2019	2020	2021	Summary
Total Shipping Q'ty	387,611	333,357	512,194	757,541	1,990,703
RMA Q'ty	555	647	617	453	2,272
RMA rate (%)	0.12%	0.19%	0.12%	0.06%	0.11%
Defect Q'ty (NPF excluded)	325	486	426	262	1,499
Defect rate (NPF excluded)	0.08%	0.15%	0.08%	0.03%	0.08%

- ✓ < 0.1% defect rate for mainstream embedded 600 series!

SQFlash ER-1 & 930 Series

Edge Rugged and high Performance
PCIe Gen.4/ NVMe solution

- **Industrial thermal solution with wide temperature support**
Reduces thermal energy by 10%, support -40~85°C operation
- **Fully supports AES256 & TCG-OPAL schemes security function**
- **WISE-DeviceOn/ SQ Manager Compatibility, remote monitoring**



- **An excellent choice for higher accuracy in AI analytics and enterprise server application**
- **Triple-CPU and Dual processors**
Compliant with NVMe 1.4, 2x faster with Gen. 3.

PCIe Gen. 4 solution comparison

High Performance Data Acquisition

SQF 930

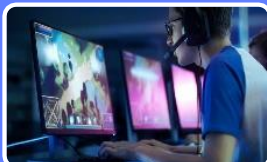
- PCIe/NVMe Gen.4 x4
- M.2 2280 M-Key
- Seq. Read 7,200 MB/s
- Seq. Write 6,500 MB/s
- DWPD 0.6
- BiCS5, 480GB to 3.8TB
- Power consumption 11 W
- 0~70°C/-40~85°C



Real-time Surveillance



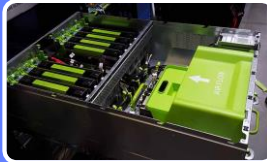
Gaming Consoles



AI Analytics Workloads



Cloud AI Server



Extra Endurance & Performance with Edge Server

SQF ER-1, Read-Intensive

- PCIe/NVMe Gen.4 x4
- M.2 2280 M-Key
- DWPD 1
- BiCS5, 400GB to 3.2TB
- 0~70°C/-40~85°C

SQF ER-1, Mixed-Use

- PCIe/NVMe Gen.4 x4
- U.2 SSD, SFF-8639
- DWPD 3
- B47R, 400GB to 6.4TB
- 0~70°C

Key Benefits

- More stable of Read/ Write operation, Random Read/ Write (IOPS) achieve **750,000**
- Excellent Durability & Endurance - Long term operation achieve on **DWPD 1, DWPD 3**
- Meet different applications on **0 ~ 70°C, -40 ~ 85°C**
- Higher **PWR** into low carbon supply chain (ESG market)



Industrial NVMe Solution – SQFlash 720-D/ 920-D Series

New BiCS5 based PCIe Gen.3 SSD

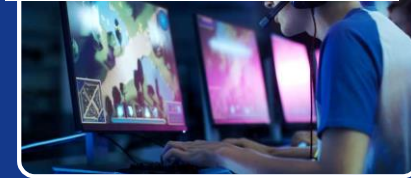
Real-time Surveillance



Machine Vision



Gaming Consoles



M.2 2230 (A+E Key)

SQF-C3A

- PCIe Gen.3 x2
- AES256, OPAL
- Upto 512GB
- 0~70C/-20~85C/-40~85C



M.2 2280 (B+M/M Key)

SQF-C8B

- PCIe Gen.3 x2/ x4
- AES256, OPAL
- Upto 2TB
- 0~70C/-20~85C/-40~85C



M.2 2280 (M Key)

SQF-CM8

- PCIe Gen.3 x4
- AES256, OPAL
- Upto 2TB
- 0~70C/-40~85C



M.2 2242 (M Key)

SQF-C4M

- PCIe Gen.3 x4
- AES256, OPAL
- Upto 1TB
- 0~70C/-20~85C/-40~85C



CF Express (B type)

SQF-CFX

- PCIe Gen.3 x2
- AES256, OPAL
- Upto 1TB
- 0~70C/-20~85C/-40~85C



U.2 (SFF-8639)

SQF-C25

- PCIe Gen.3 x4
- AES256, OPAL
- Upto 8TB
- 0~70C/-40~85C



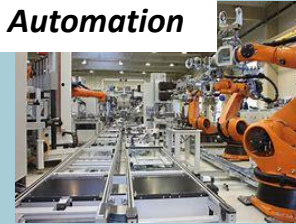
New SQFlash 650 SATA Low Power Series

New BiCS5 based SATA III SSD

Gaming



Automation



Medical



3-Year Longevity



TCG OPAL



High Endurance sTLC



Various Temp. Option

* M-temp. (-20~85°C)

* I-temp. (-40~85°C)

SQFlash 650 Series

Y2025

SQF-S25 2.5" Up to 2TB

SQF-S8B M.2 2280 Up to 2TB

SQF-SMS mSATA Up to 2TB

SQF-S4B M.2 2242 Up to 1TB

SQF-S10 CFast Up to 512GB

SQF-SLM Half Slim Up to 1TB

SQF-SHM Half-Size mSATA Up to 1TB

SQFlash 840/840L High Performance SATA Series

New BiCS5 based SATA III SSD

SME Storage



Surveillance



Medical



3-Year Longevity



TCG OPAL Compliant



Enterprise 840L Series
High Endurance 840 sTLC Series



True Wide Temp -40~85°C

SQFlash 840 Series

Y2025

SQF-S25 2.5" Up to 8TB
sTLC Up to 2TB

SQF-SM8 M.2 2280 Up to 2TB

SQF-SMS mSATA Up to 2TB

SQFlash 840L Series (5Y DWPD ≥ 1)

Y2025

SQF-S25 2.5" Up to 8TB

Power Loss Protection – SQFlash 840V SATA Series

New BiCS5 based SATA III SSD

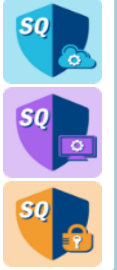
Military



Energy



In-Vehicle



3-Year Longevity



TCG OPAL Compliant



Power Loss Protection & Super Cap



True Wide Temp -40~85°C

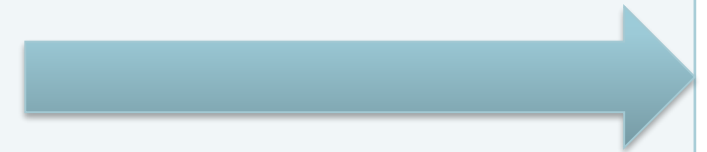
SQFlash 840V Series

To Y2025

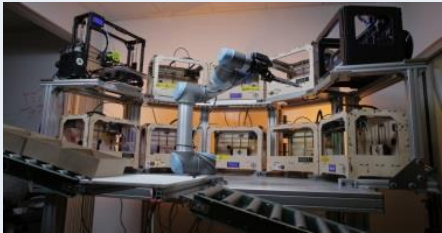
SQF-S25

2.5"

Up to 8TB



Comparison of NAND Flash for Traditional Industrial Application

		SLC	Ultra MLC	MLC	3D TLC (BiCS 5)
NAND Program Time		200 ~ 300 μ s	300 ~ 600 μ s	600 ~ 900 μ s	900 ~ 1350 μ s
Program / Erase Cycle		100,000+	30,000+	3,000+	3,000+ (w/ LDPC)
Op. Temp.	Commercial	0~70°C (T _A)	0~70°C (T _A)	0~70°C (T _A)	0~70°C (T _A)
	Industrial	-40~85°C (T _A)	-40~85°C (T _A)	-40~85°C (T _A)	-40~85°C (T _A)
Advantages		Best Performance Robust and Longevity	High Endurance Excellent Performance	Stable Performance Wide-temp. Range	Acceptable Performance Cost-effective
Application		Write-Intensive and Long Life Service  Automation Machine	Write-Intensive  Surveillance / Ticket Machine	Severe Environment  Fan-less / Embedded System	Read-Intensive  POS Machine / Kiosk

Find Your SQFlash BiCS5 3D TLC Solutions

PCIe / NVMe

SQF ER-1 Series

SQF-C8M ER-1

SQF-CU2 ER-1



Ruggedized

- High Durable & Endurance
- Ultimate Speed
- High Power Efficiency

SQF 930 Series

SQF-C8M 930



SQF 720 Series

SQF-C3A 720

SQF-C8B 720

SQF-C4M 720

SQF-CFX 720

SQF-C8M 720



Embedded

SQF 920 Series

SQF-C25 920

SQF-CM8 920

SQF-CM8 920F



Performance

Find Your SQFlash BiCS5 3D TLC Solutions

SATA



Embedded

SQF 650 Series

SQF-S25 650

SQF-SMS 650

SQF-S10 650

SQF-SHM 650

SQF-S8B 650

SQF-S4B 650

SQF-SLM 650

Card / Onboard Storage



SD Card / Micro SD Card / USB

SQF-ISD

SQF-MSD

SQF-UPD



Performance

SQF 840 Series

SQF-S25 840

SQF-S25 840F

SQF-S25 840L

SQF-S25 840V

SQF-SM8 840

SQF-SM8 840F

SQF-SMS 840

BGA SSD / eMMC

SQF-SUS 640 (SATA BGA SSD)

SQF-CUS 730 (PCIe Gen4 BGA SSD)

SQF-MMC (100 ball eMMC)

SQF-MM5 (153 ball eMMC)

Find Your SQFlash 3D sTLC Solutions

up to **50k** P/E cycles



SATA



SQF 650 Series

SQF-S25 650

SQF-SHM 650

SQF-SMS 650

SQF-S8B 650

SQF-S10 650

SQF-S4B 650

PCIe / NVMe



SQF 720 Series

SQF-C3A 720

SQF-C8B 720

SQF-C4M 720

SQF-CFX 720

SQF-C8M 720



SQF 840 Series

SQF-S25 840



SQF 920 Series

SQF-C25 920



Naming Rule – SQFlash

Model Name:

SQFlash

SQF-XXXXXX-XXXX-XXX

Flash type:

S → SLC
M → MLC
U → UltraMLC
T → 2D TLC
V → 3D TLC

Z → 3D sTLC (1-bit)
W → 3D TLC (2-bit)

E → 3D eTLC

Channel type:

(After S11, E8: Flash IC Q'ty)

1 → Single Channel
2 → Dual Channel
4 → Quad Channel
5 → 5 Channel
8 → 8 Channel
9 → 9 Channel
A → 10 Channel
F → 16 Channel

Flash Source:

- → Kioxia
A → Intel
B → Sandisk
C → Micron
D → Hynix
E → YMTC JGS
F → WD
H → Samsung

Capacity:

256M~8T

Others support:

- → Normal (BiCS3, B16)
A → w/ OPAL (E8 only)
R → Retail package
C, D, E → New Flash gen. After (BiCS4, B27) of 3D TLC

Form Factor:

P10 → CF
P25 → 2.5" PATA SSD
PDM → PATA DOM
ISD → Industrial SD
MSD → MicroSD
UPD → USB PenDrive
UDM → USB DOM
C25 → 2.5" PCIe/U.2 (SFF-8639)
C3A → M.2 2230 (AE Key)
C4M → M.2 2242 (M Key)
C8M → M.2 2280 (M Key)
C8B → M.2 2280 (BM Key)
CBM → M.2 22110 (M Key)
CMS → Full-size MiniPCIe
CFX → CFexpress

SMS → mSATA

SHM → Half-size mSATA

SDM → SATA DOM

SLM → Half Slim

S4B → M.2 2242 (BM Key)

S6B → M.2 2260 (BM Key)

S8B → M.2 2280 (BM Key)

SUS → uSATA SSD

MMC → eMMC, 100B

MM5 → eMMC, 153B

Temperature:

C → Commercial Temp (0~70°C)

E → Extended (or Auto Grade3) Temp (-40~85°C)

If Form Factor is 'MMC' or 'MM5', please follow as below

I → Industrial Temp (-40~85°C)

E → Auto Grade3 Temp (-40~85°C)

A → Auto Grade2 Temp (-40~105°C)

Controller type:

P8 → PS3016-P8

P9 → PS3016-P9

S8 → PS3108-S8

S9 → PS3109-S9

SA → PS3110-S10

SB → PS3111-S11

SC → PS3112-S12

M5 → PS8225

21 → PS8210

D1 → PS8131

E7 → PS5007-E7

E8 → PS5008-E8/E8T

EC → PS5012-E12

ED → PS5013-E13T

EI → PS5018-E18

Example: SQF-S25S4-32G-S9C

Note. After E13, S17 (since 2021/1/1) project, the definition of M.2 form factor will be changed.

Co-Creating the Future of the IoT World

