

Intel Experience Day 2019

Kingston Technology

Best Solution for Servers and PC

*Redkorebrov Anton*  
*Technical Resource Group*



# Kingston Snapshot

- Founded in 1987
- Privately Held Company
- Financially Secure
- 3,000 Employees Worldwide
- Worldwide Manufacturing & Testing
- Focused Business:  
Memory Modules, Flash Products & Tech Solutions
- Delivering over 1M units per day
- Products distributed in 125 Countries and available in over 30,000 locations worldwide; widely accepted brand



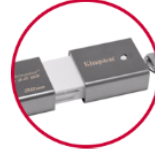
# Kingston Technology Corporation



**Kingston Technology**  
DRAM Solutions



**Kingston Digital**  
NAND Solutions



**HyperX**  
Gaming Solutions



**Kingston Solutions Inc.**  
Embedded Solutions



**Advanced Validation Labs**  
Testing Services



**Kingston Technology Services**  
OEM/ODM & EMS Logistics



# Worldwide Top 10 Third-Party DRAM Module Suppliers

## Global Revenue Ranking of DRAM Module Makers 2018

2018 Ranking	Company	Shipment Market Share	DRAM Revenue (Million USD)
1	Kingston Technology	72.17%	11,954
2	SMART Modular Technologies	5.07%	839
3	Ramaxel	4.68%	775
4	ADATA Technology	3.89%	644
5	tigo	2.08%	345
6	POWEV	2.05%	340
7	Transcend Information	1.04%	172
8	Apacer Technology	0.96%	159
9	Team Group	0.87%	144
10	Innodisk	0.67%	111
	Others	6.53%	1,082
	Total	100%	16,564

Note: Module Makers have diverse business operations. However, this ranking is based solely on their annual DRAM module revenues.

Source: TrendForce, Aug. 2019

For 16 years  
Kingston ranks

**#1**

# Current Global DRAM Supplier Base



DRAM suppliers that have been acquired or exited the memory business...

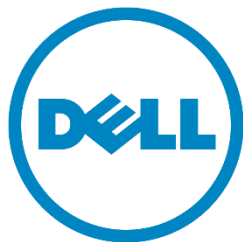


# Top 10 Global Purchasers of Semiconductor Chips

#8



\$7.843B  
Chip Purchases  
for 2018



HUAWEI

Hewlett Packard  
Enterprise



# Kingston's Global Manufacturing Centers

- 2019 worldwide SMT capacity: Over 19 million units per month
- 61 SMT manufacturing lines producing both DRAM, Flash, and SSD products
































SMT Lines	3	12	15	10	10	9	2
Allocation	Memory 3 Flash & SSD 0	Memory 6 Flash & SSD 6	Memory 10 Flash & SSD 5	Memory 5 Flash & SSD 5	Memory 5 Flash & SSD 5	Memory 0 Flash & SSD 9	Memory 0 Flash & SSD 2
Capacity	Memory 0.6M Flash 0M SSD 0M	Memory 1.2M Flash 0.7M SSD 0.8M	Memory 2.0M Flash 0M SSD 1.0M	Memory 1.4M Flash 3.5M SSD 0M	Memory 1.2M Flash 0M SSD 0.8M	Memory 0M Flash 3.5M SSD 1.2M	Memory 0M Flash 0.6M SSD 0M
Capacity Distribution	3%	15%	16%	26%	11%	25%	3%

4 Kingston Technology Manufacturing Facilities Worldwide  
Panram, OSE and CalComp are subcontractors to Kingston

# Strategic Alliances: Server Compatibility Check

Kingston works with many facets of technology to ensure server memory compatibility.

Industry Leading OS, Software, Hardware	PC OEM's	Motherboard Manufacturers
        	           	       



# Intel and Kingston



DDR4 DRAM chip validation testing  
on new Advantest tester

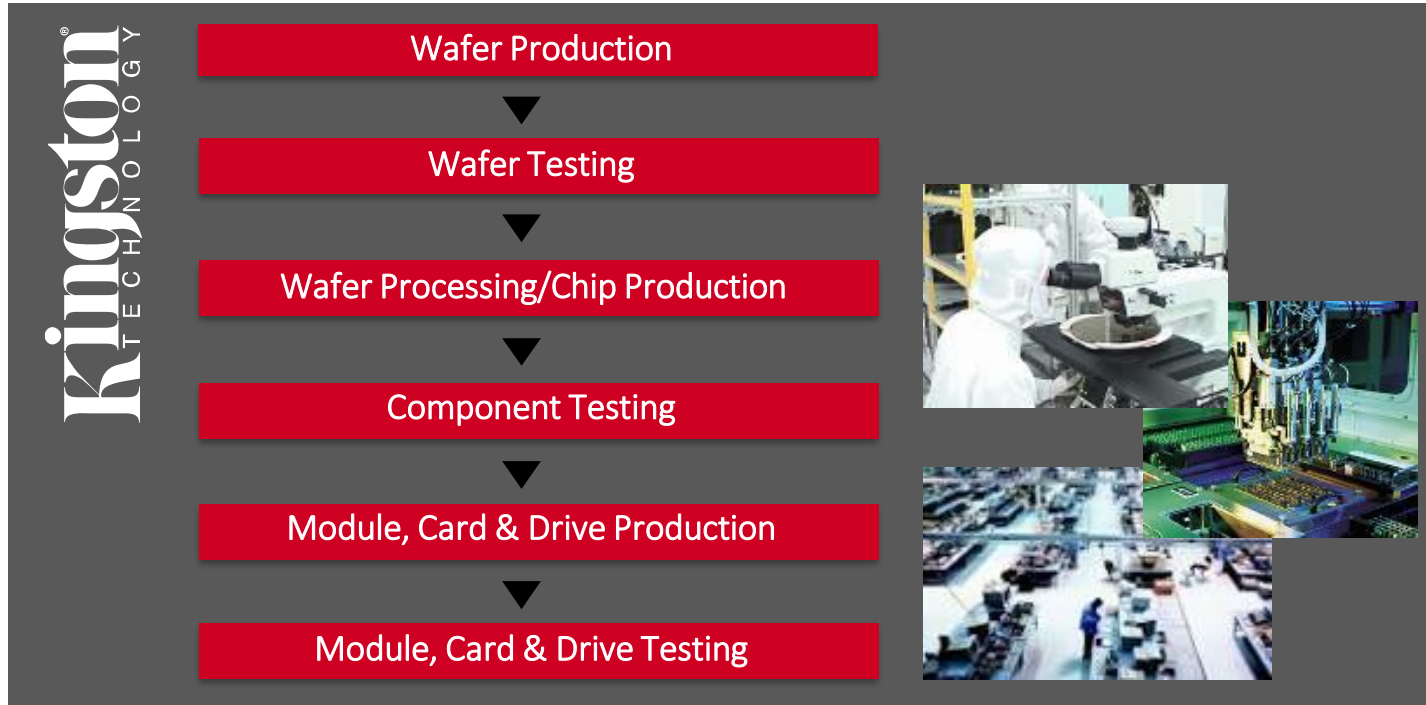


Checking early FB-DIMM prototype  
against specifications

Since 1998, Intel and Kingston have jointly developed memory technology validation testing processes for PC133, RDRAM, DDR, DDR2, FB-DIMM, DDR3, LRDIMM, and DDR4.

# Kingston Investments & Expertise

Kingston manages all six processes required to build modules, cards, and drives.

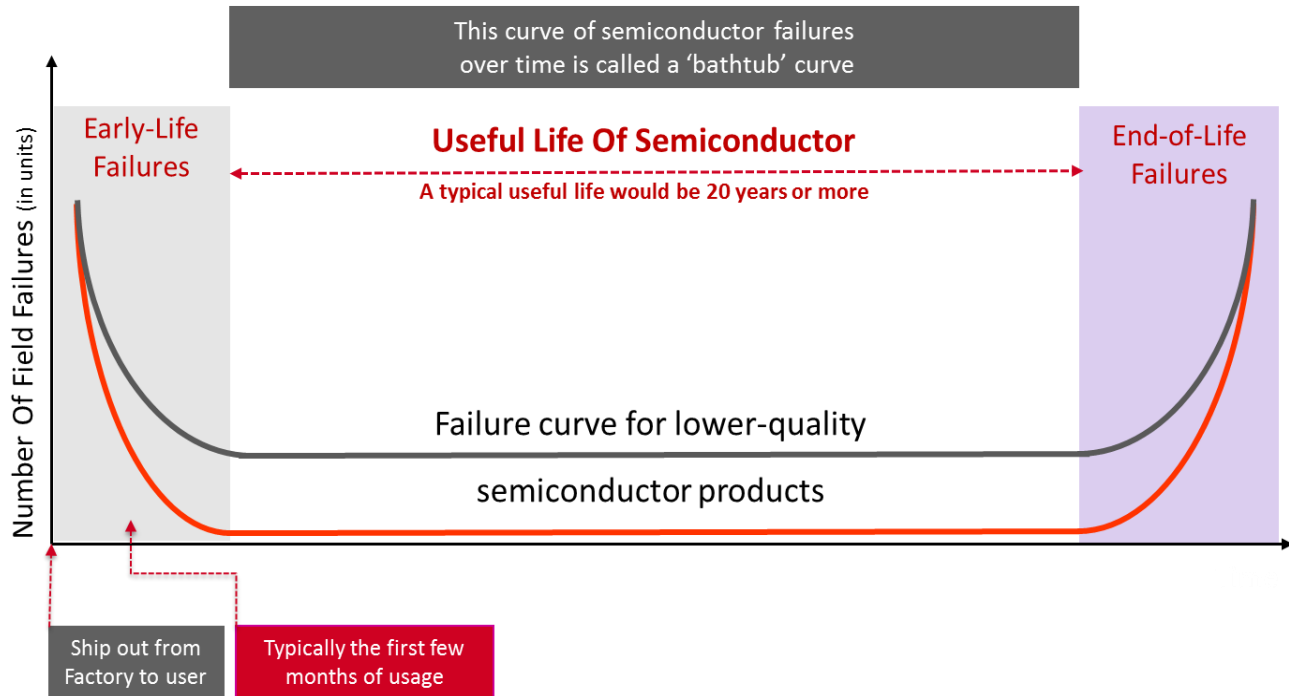


# The Challenges of Memory Testing and Semiconductor Reliability

Module Capacity	Number of Memory Cells
4GB	34+ Billion Cells
8GB	68+ Billion Cells
16GB	136+ Billion Cells
32GB	272+ Billion Cells
64GB	544+ Billion Cells

## Kingston Quality Standard

In production testing  
1 bad cell means defective  
and cannot leave factory



# Kingston Production Testing and Dynamic Server Burn-In

## 100% Testing

- No spot testing! Kingston memory is 100% tested prior to leaving our factories, as we have always done

## Dynamic Server Memory Burn-In

- Shrinking DRAM lithography increases sensitivity to temperature, forcing higher error rates and exposing weak memory cells
- Kingston's advanced burn-in process screens these by simulating 3 months of heavy server use at higher temperatures under full system environment and frequency stress

## Proprietary Production Testers

- Kingston's test engineers designed the first automated production testers in the memory industry
- New patented automated testers build upon our test engineering legacy to meet the more stringent demands of evolving memory technology

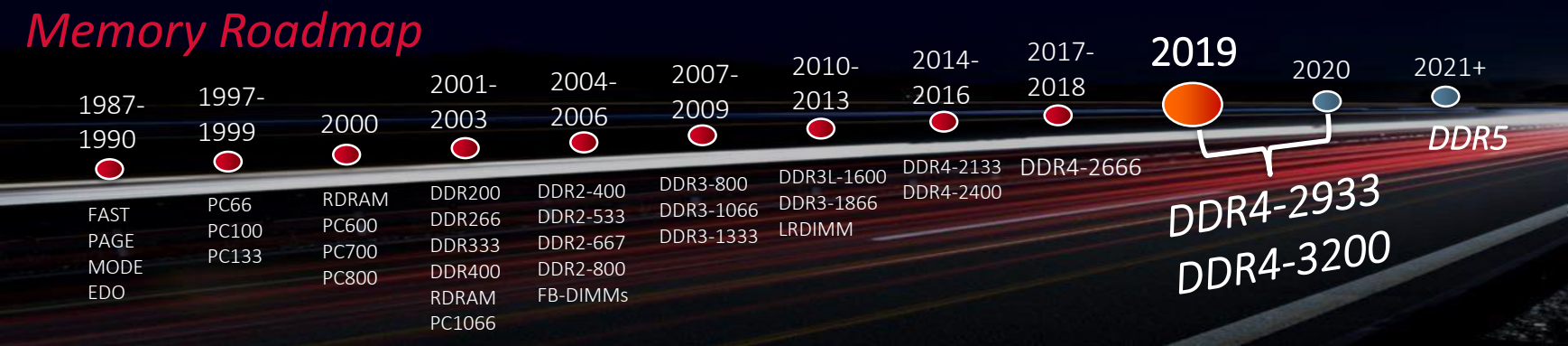
## 35 Quality Control Checkpoints

- Kingston uses AQL sampling methods to re-inspect and re-test every lot to ensure our quality standards are being met



Kingston holds **29** patents related to memory testing

# Memory Roadmap



Technology	Data Rate	Module Classification	Peak Bandwidth
DDR3 (1.5V) DDR3L (1.35V)	800	DDR3-800/PC3-6400	6400 MB/s or 6.4 GB/s
	1066	DDR3-1066/PC3-8500, DDR3L-1066/PC3L-8500	8500 MB/s or 8.5 GB/s
	1333	DDR3-1333/PC3-10600, DDR3L-1333/PC3L-10600	10600 MB/s or 10.6 GB/s
	1600	DDR3-1600/PC3-12800, DDR3L-1600/PC3L-12800	12800 MB/s or 12.8 GB/s
	1866	DDR3-1866/PC3-14900	14900 MB/s or 14.9 GB/s
DDR4 (1.2V)	2133	DDR4-2133 / PC4-2133	17000 MB/s or 17 GB/s
	2400	DDR4-2400 / PC4-2400	19200 MB/s or 19.2 GB/s
	2666	DDR4-2666 / PC4-2666	21300 MB/s or 21.3 GB/s
	2933	DDR4-2933 / PC4-2933	23400 MB/s or 23.4 GB/s
	3200	DDR4-3200 / PC4-3200	25600 MB/s or 25.6 GB/s

# Kingston's Memory Business Lines

## Industry Standard

- Order by JEDEC specification
- Ideal for system builders or datacenters
- **Server Premier** server product line
- **ValueRAM** client product line



## System Specific

- Guaranteed compatibility
- Ideal for users who want to upgrade name-brand systems



## OEM Services

- Customized, turn-key solutions
- Supply chain management
- Contract manufacturing



## Gaming / Overclocking

- Enthusiast gaming market
- Intel XMP, Plug N Play
- *HyperX* brand





Kingston Technology

Server Memory



# System Specific Memory – *Server*

## Guaranteed Compatible

- Testing conducted in the system in which the memory will be installed

## Importance of Branded Memory

- Different chips provide varying performance levels
- Chip Compatibility can vary
- Possible constraints in module height or width
- Presence Detect Configuration





# System Specific Memory – *Server SKU*

<b>Adaptec</b>	<b>Cell Computing</b>	<b>CompUSA</b>	<b>IronKey</b>	<b>3Com</b>	<b>Acer</b>	<b>Acros</b>	<b>Agfa</b>	<b>ATI Technologies</b>	<b>ALR</b>	<b>Amstrad</b>	<b>AT&amp;T/NCR</b>
<b>ADA</b>	<b>CEL</b>	<b>CPC</b>	<b>IK</b>	<b>K3C</b>	<b>KAC</b>	<b>KAC</b>	<b>KAG</b>	<b>KAI</b>	<b>KAL</b>	<b>KAM</b>	<b>KAT</b>
<b>Axil Computer</b>	<b>Nortel/Bay Netwrk</b>	<b>NCD</b>	<b>Creative</b>	<b>CMD Technology</b>	<b>Canon</b>	<b>Cisco</b>	<b>Circuit City</b>	<b>Data General</b>	<b>Diamond</b>	<b>Dataproducts</b>	<b>KDS Computers</b>
<b>KAX</b>	<b>KBN</b>	<b>KCD</b>	<b>KCL</b>	<b>KCM</b>	<b>KCN</b>	<b>KCS</b>	<b>KCY</b>	<b>KDG</b>	<b>KDM</b>	<b>KDP</b>	<b>KDS</b>
<b>Epson</b>	<b>Everex</b>	<b>Fujitsu</b>	<b>Intergraph</b>	<b>Gateway</b>	<b>Hitachi</b>	<b>Micron</b>	<b>Mitsubishi</b>	<b>Motorola</b>	<b>MIPS</b>	<b>Matrox</b>	<b>Nilox</b>
<b>KEP</b>	<b>KEV</b>	<b>KFJ</b>	<b>KGR</b>	<b>KGW</b>	<b>KHI</b>	<b>KMC</b>	<b>KMI</b>	<b>KMO</b>	<b>KMP</b>	<b>KMX</b>	<b>KNI</b>
<b>NeXT</b>	<b>Olympus</b>	<b>Packard Bell</b>	<b>Tadpole</b>	<b>Psion</b>	<b>RCA</b>	<b>Ricoh</b>	<b>Solbourne</b>	<b>ViewSonic</b>	<b>Siemens Nixdorf</b>	<b>SGI</b>	<b>Samsung</b>
<b>KNX</b>	<b>KOL</b>	<b>KPB</b>	<b>KPO</b>	<b>KPS</b>	<b>KRC</b>	<b>KRI</b>	<b>KSB</b>	<b>KSC</b>	<b>KSE</b>	<b>KSG</b>	<b>KSM</b>
<b>Sharp</b>	<b>AST</b>	<b>Sony</b>	<b>Apple</b>	<b>Brother</b>	<b>Compaq (see HP)</b>	<b>Dell</b>	<b>Tatung</b>	<b>HP/Compaq</b>	<b>Texas Instruments</b>	<b>Tektronix</b>	<b>Lenovo</b>
<b>KSP</b>	<b>KST</b>	<b>KSY</b>	<b>KTA</b>	<b>KTB</b>	<b>KTC</b>	<b>KTD</b>	<b>KTG</b>	<b>KTH</b>	<b>KTI</b>	<b>KTK</b>	<b>KTL</b>
<b>IBM</b>	<b>Lexmark</b>	<b>NEC</b>	<b>Okidata</b>	<b>Panasonic</b>	<b>QMS (see Konica)</b>	<b>Radius</b>	<b>Sun/Oracle</b>	<b>Toshiba</b>	<b>Digital</b>	<b>Zenith</b>	<b>Tandy</b>
<b>KTM</b>	<b>KTM</b>	<b>KTN</b>	<b>KTO</b>	<b>KTP</b>	<b>KTQ</b>	<b>KTR</b>	<b>KTS</b>	<b>KTT</b>	<b>KTV</b>	<b>KTZ</b>	<b>KVT</b>
<b>WinBook</b>	<b>Xerox</b>	<b>Kyocera</b>	<b>MiTAC</b>	<b>SoftLayer</b>	<b>SOTEC</b>	<b>Via</b>	<b>VK Mobile</b>				
<b>KWB</b>	<b>KXR</b>	<b>KYO</b>	<b>MTC</b>	<b>SL</b>	<b>SOT</b>	<b>VIA</b>	<b>VKM</b>				

# SERVER PREMIER

**Server Premier** is our fully controlled server memory solution for data centers. Ideal for system builders and OEMs alike.

- DDR4 2400, 2666, 2933, 3200
- Fully BOM controlled (locked DRAM, Register, PCB)
- Load Reduced DIMMs, Registered DIMMs, ECC Unbuffered DIMMs / SODIMMs
- PCNs with 90 Day Notice
- 6Q roadmap visibility
- Platform validated and ODM qualified



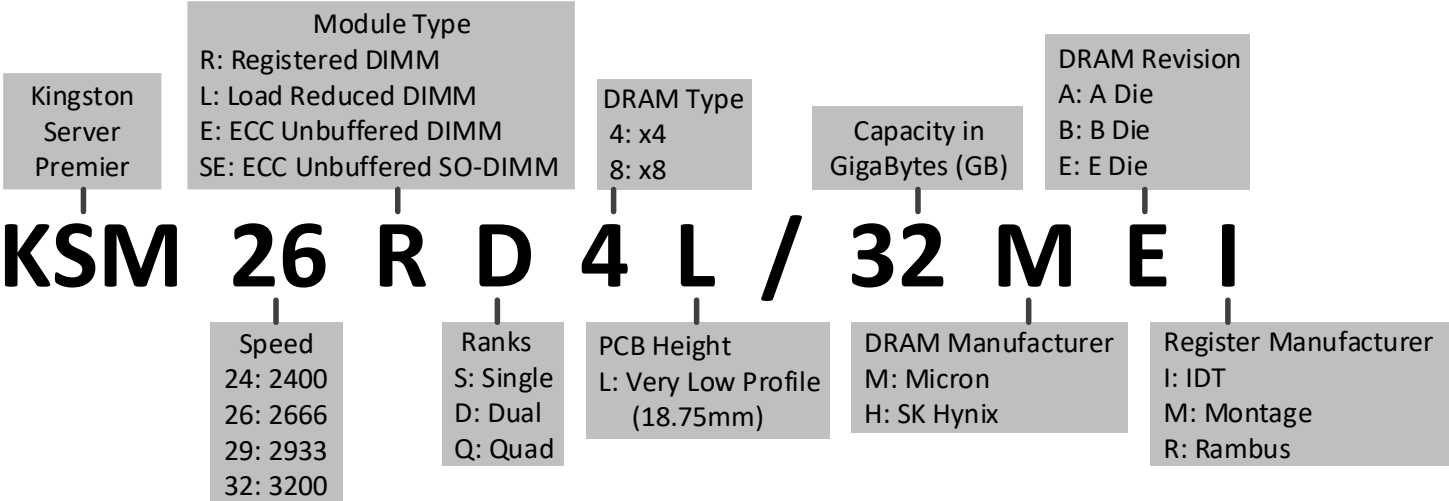
Quanta Computer



# Server Premier Memory Decoder

Kingston industry standard memory is built to the specifications outlined by J.E.D.E.C., the Joint Electron Device Engineering Council, on which Kingston holds a seat. Intel, AMD, and other computing chipset architects adhere to these standards for industry agreement and cross-platform compatibility. J.E.D.E.C. provides the specifications for Pin Count, Form Factor, Speed, Power, and Memory Technology Types.

## SERVER PREMIER



# Qualification Programs

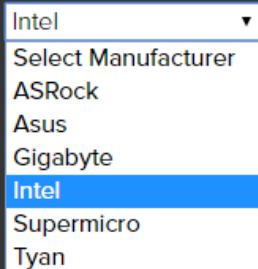


In addition to the strategic partnerships Kingston has with ODMs for submitting memory for qualification, we also work with independent memory test lab AVL for specific platform, motherboard, or system qualification. Test certificates are available on our website.

<http://www.kingston.com/us/memory/server>

## Manufacturer Qualification

Kingston works with leading server motherboard manufacturers to qualify its server memory on their platforms. Kingston also works with Advanced Validation Labs (AVL) to provide compatibility certification on a select list of Intel and SuperMicro server boards.



### Intel Certified

Part Number	Description	Intel Boards Supported	Test Report 2	Test Report 1
KSM26LQ4/64HAM	64GB DDR4-2666 Load Reduced DIMM CL19 4Rx4 1.2V Hynix A Die Montage (Server Premier)	S2600WF (Wolf Pass)		<a href="#">Download</a>
		S2600BP (Buchanan Pass)		<a href="#">Download</a>
		S2600ST (Sawtooth Pass)		<a href="#">Download</a>
KSM26LQ4/64HAI	64GB DDR4-2666 Load Reduced DIMM CL19 4Rx4 1.2V Hynix A Die IDT (Server Premier)	S2600WF (Wolf Pass)		<a href="#">Download</a>
		S2600BP (Buchanan Pass)		<a href="#">Download</a>
		S2600ST (Sawtooth Pass)		<a href="#">Download</a>

# 6Q Server Memory Overview by Memory Type



			2019		2020			
			Q3	Q4	Q1	Q2	Q3	Q4
3200	LRDIMM	128GB			Pending supplier support			
		64GB			Pending supplier support			
	RDIMM	64GB			Pending supplier support			
		8GB / 16GB / 32GB			Pending supplier support			
	ECC UDIMM/SODIMM	8GB / 16GB / 32GB			Pending platform support			
2933	LRDIMM	128GB			Pending supplier support			
		64GB			Pending supplier support			
	RDIMM	64GB			Pending supplier support			
		8GB / 16GB / 32GB			Pending supplier support			
	ECC UDIMM/SODIMM	32GB			Pending platform support			
		8GB / 16GB			Pending platform support			
2666	LRDIMM	128GB			Pending supplier support			
		64GB			Pending supplier support			
	RDIMM	64GB			Pending supplier support			
		8GB / 16GB / 32GB			Pending supplier support			
	ECC UDIMM/SODIMM	32GB			Pending platform support			
		8GB / 16GB			Pending platform support			
2400	RDIMM	8GB / 16GB / 32GB			Pending supplier support			
	ECC UDIMM/SODIMM	8GB / 16GB			Pending platform support			

# DRAM Chip Types Used in Servers

x4

1 2 3 4

Multiple Bit

Error Detection  
and Correction

10101111 00101110

10101111 00101110

x4 is used on  
Registered DIMMs  
LRDIMMs



x8

1 2 3 4 5 6 7 8

Single Bit

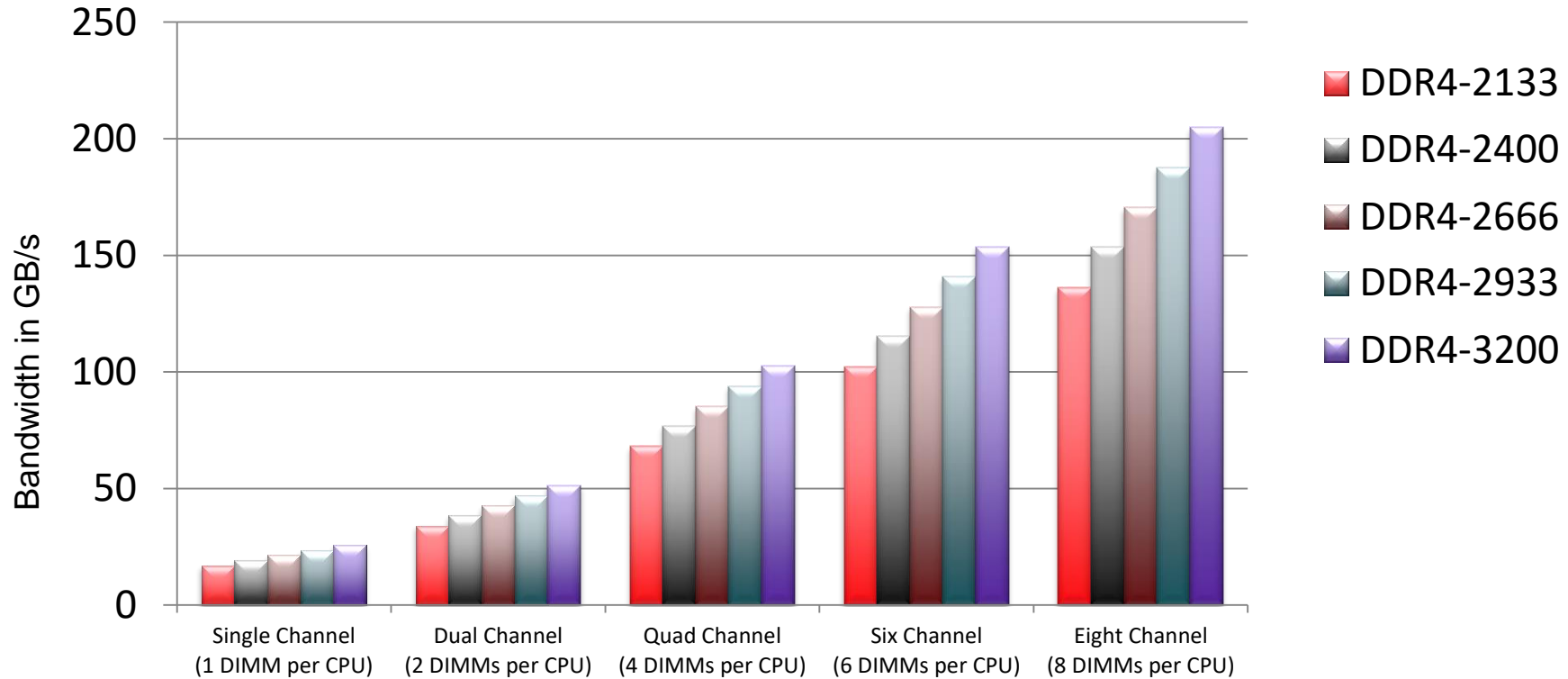
Error Detection  
and Correction

10101111 00101110

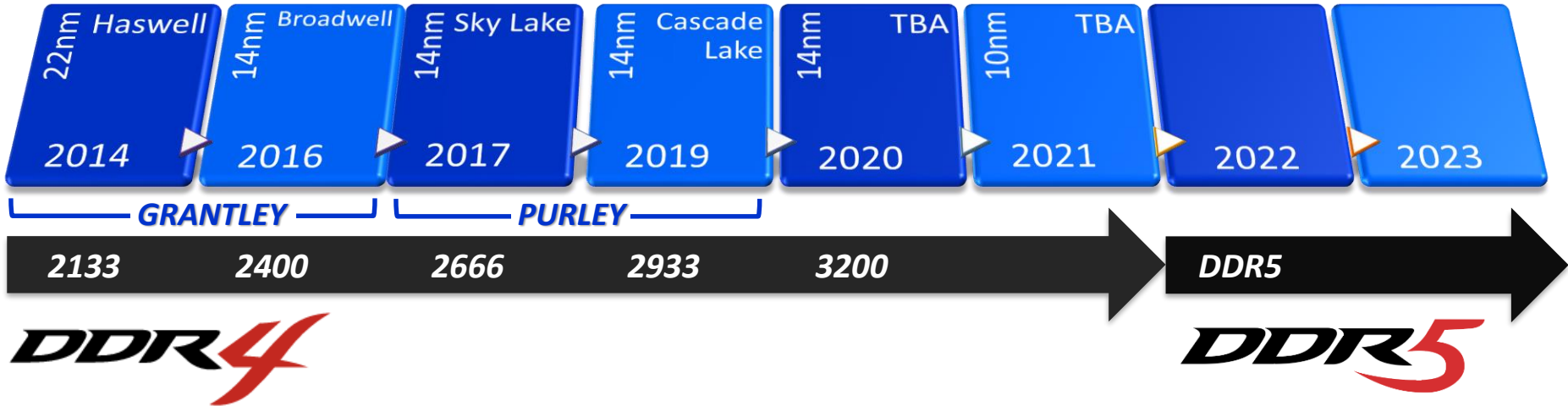
10101111 00101110

x8 is used on  
Registered DIMMs  
ECC Unbuffered DIMMs / SODIMMs  
Unbuffered DIMMs / SODIMMs

# DDR4 Server Memory Bandwidth



# Intel Microarchitecture Roadmap

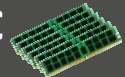
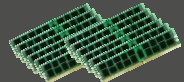




# Next Generation Intel® Xeon® SP (Codename Cascade Lake)

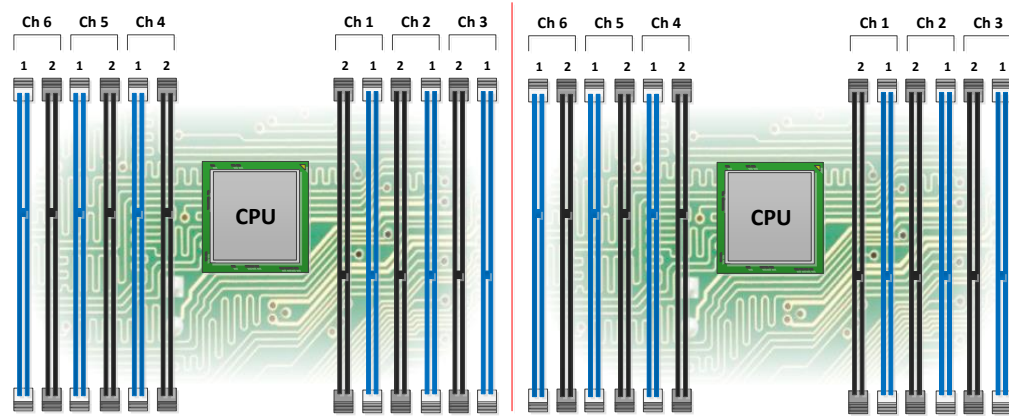


(6 Channel, 12 sockets per CPU, 2 DPC)

Module Type (No Mixing in a Server)	1 DIMMs per Channel <b>1 DPC</b> 	2 DIMMs per Channel <b>2 DPC</b> 
Registered DIMM (RDIMM, 3DS)	<b>2933</b>	<b>2666</b>
Load Reduced DIMM (LRDIMM, 3DS)		

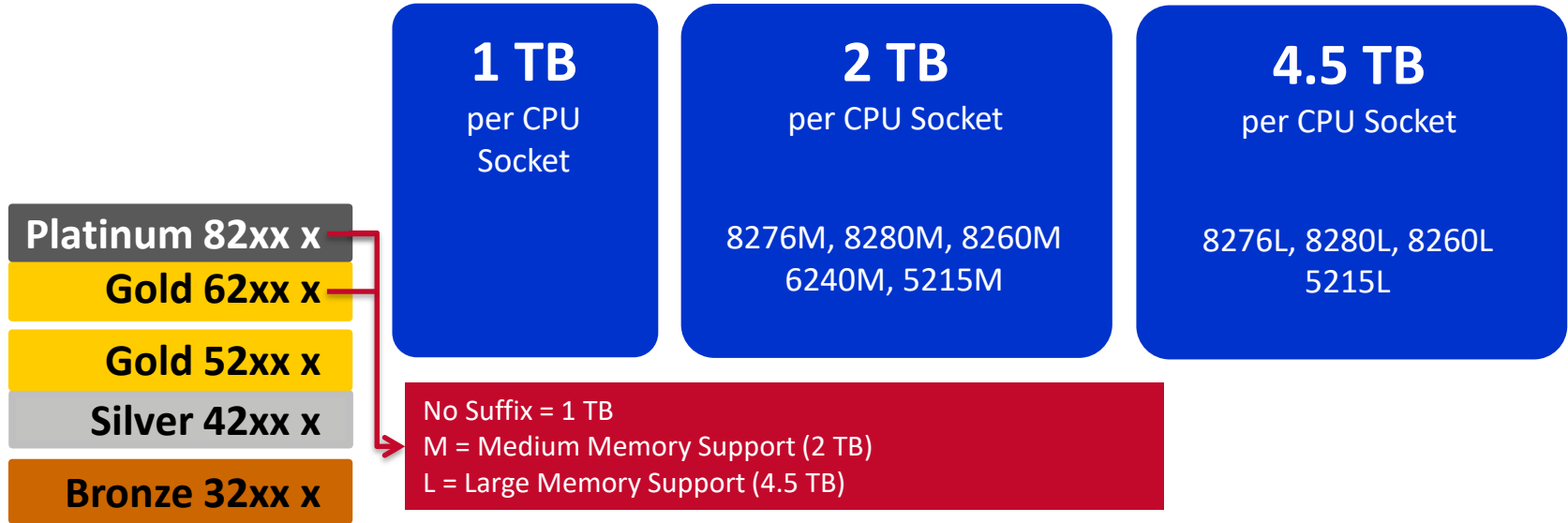
## New Intel Xeon SP Processors

Platinum 82xx	<b>2933</b>
Gold 62xx	
Gold 52xx	<b>2666</b>
Silver 42xx	
Bronze 32xx	<b>2400</b>



# Next Generation Intel® Xeon® SP (Codename Cascade Lake)

## Base vs Large Memory Options





Kingston Technology

Client Memory



# System Specific Memory

## Guaranteed Compatible (*Kingston “KCP” Product Line*)

- Testing conducted on the system in which the memory will be installed
- 100% factory tested
- Lifetime warranty

## Importance of Branded Memory

- Different chips provide varying performance levels
- Chip Compatibility can vary on name brand systems
- Possible constraints in module height or width

*acer*



**DELL™**



*lenovo*

# Industry Standard Memory – *ValueRAM*

## *JEDEC Standard (Kingston ValueRAM “KVR” Product Line)*

### **Built to Industry Standard Specifications**

- DDR3, DDR3L, and DDR4 standard speeds, voltages, and PCB designs
- 100% factory testing
- Lifetime warranty

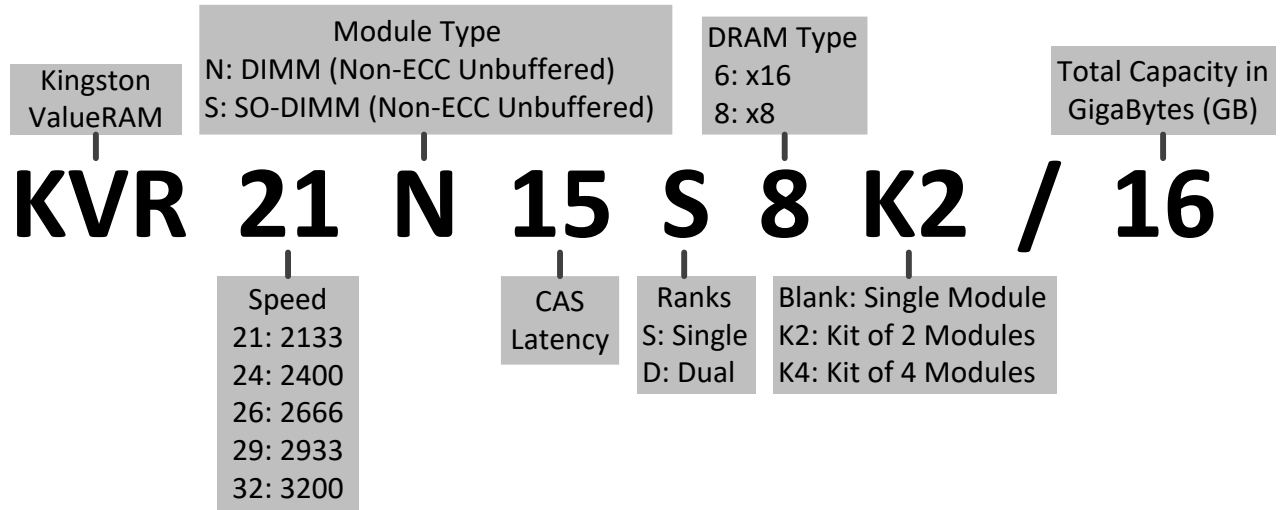
### **Guaranteed Compatible**

- Platform validated on Intel and AMD systems
- Featured on motherboard vendor qualified memory lists



# Industry Standard Memory Decoder

**Kingston** industry standard memory is built to the specifications outlined by J.E.D.E.C., the **Joint Electron Device Engineering Council**, on which Kingston holds a seat. Intel, AMD, and other computing chipset architects adhere to these standards for industry agreement and cross-platform compatibility. J.E.D.E.C. provides the specifications for Pin Count, Form Factor, Speed, Power, and Memory Technology Types.



# 6Q DDR4 Client Memory Roadmap



2019		2020			
Q3	Q4	Q1	Q2	Q3	Q4



# 6Q DDR4 Client Memory Roadmap



		2019		2020			
		Q3	Q4	Q1	Q2	Q3	Q4
SODIMM	3200	32GB SODIMM 2R (2Gx8)					
		16GB SODIMM 2R (1Gx8)					
		8GB SODIMM 1R (1Gx8)					
		4GB SODIMM 1R (512Mx16)					
SODIMM	2933	32GB SODIMM 2R (2Gx8)					
		16GB SODIMM 2R (1Gx8)					
		8GB SODIMM 1R (1Gx8)					
		4GB SODIMM 1R (512Mx16)					
SODIMM	2666	32GB SODIMM 2R (2Gx8)					
		16GB SODIMM 2R (1Gx8)					
		8GB SODIMM 1R (1Gx8)					
		4GB SODIMM 1R (512Mx16)					
SODIMM	2400	16GB UDIMM 2R (1Gx8)					
		8GB UDIMM 1R (1Gx8)					
		4GB UDIMM 1R (512Mx16)					

→ Pending 2933 specific platform support, likely 1H 2020. 3200 is backwards compatible.



# 6Q DDR3 Client Memory Roadmap



		2019		2020			
		Q3	Q4	Q1	Q2	Q3	Q4
UDIMM	1600	8GB UDIMM 2R (512Mx8) 1.35V / 1.5V					
		4GB UDIMM 1R (512Mx8) 1.35V / 1.5V					
		2GB UDIMM 1R (256Mx16) 1.5V					
	1333	8GB UDIMM 2R (512Mx8) 1.35V / 1.5V					
		4GB UDIMM 1R (512Mx8) 1.35V / 1.5V					
		2GB UDIMM 1R (256Mx16) 1.5V					
SODIMM	1600	8GB SODIMM 2R (512Mx8) 1.35V / 1.5V					
		4GB SODIMM 1R (512Mx8) 1.35V / 1.5V					
		2GB SODIMM 1R (256Mx16) 1.35V / 1.5V					
	1333	8GB SODIMM 2R (512Mx8) 1.35V / 1.5V					
		4GB SODIMM 1R (512Mx8) 1.35V / 1.5V					
		2GB SODIMM 1R (256Mx16) 1.35V / 1.5V					

# Overclocking Memory – *HyperX*

## Overclock

Memory tuned beyond JEDEC specifications using voltage, speed, and latency to achieve higher performance.

### *PnP (Plug N Play) + XMP – FURY, Impact*

- Automatic overclock from factory preset values that use standard JEDEC voltage (1.2V), but at lower latency at 2400 and 2666
- XMP profile at 3000, 3200, and 3466 with more aggressive timings at 1.35V
- Ideal for name-brand systems that don't allow memory specs to be adjusted, or XMP profiles to be enabled (Apple, HP, Dell, Lenovo, Acer, etc)

### *Intel XMP (Extreme Memory Profiles) – Predator*

- Engineer tuned overclock profiles programmed onto the module that can be enabled using BIOS or software
- Higher voltages, speeds, and lower latencies than PnP
- JEDEC default specs from factory with two profiles available, one extreme, one slightly less extreme
- XMP Ready and XMP Certified
  - “Ready” if it features the preset profiles
  - “Certified” if it has been submitted and verified by Intel, then posted to their website

# Overclocking Memory – *HyperX*

**NEW!**

- Available in 2400/2666/3000/3200/3466MHz with Plug N Play functionality @ 2400/2666MHz\*
- Optimized for both AMD and Intel's latest chipsets
- Patent pending HyperX Infrared Sync technology
  - Patent issued in Taiwan
- 8GB and 16GB single modules, Dual and Quad Channel kits up to 64GB
- Factory preset RGB wave lighting effect
- Lighting customizable with HyperX NGENUITY and motherboard\*\* RGB control software



# 2019 HyperX DRAM Family Line Up



<b>Speed</b>	<b><u>FURY DDR3</u></b>		<b><u>Impact DDR3</u></b>	<b><u>FURY DDR4</u></b>	<b><u>FURY DDR4 RGB</u></b>	<b><u>Predator DDR4</u></b>	<b><u>Predator DDR4 RGB</u></b>	<b><u>Impact DDR4</u></b>
4600MHz						CL19		
4266MHz						CL19		
4000MHz						CL19	CL19	
3600MHz						CL17	CL17	
3466MHz				CL16	CL16			
3333MHz						CL16		
3200MHz				CL16	CL16	CL16	CL16	CL20
3000MHz				CL15	CL15	CL15	CL15	
2933MHz							CL15	CL17
2666MHz				CL16	CL16	CL13		CL15
2400MHz				CL15	CL15	CL12		CL14
2133MHz			CL11					
1866MHz	CL10	CL11	CL11					
1600MHz	CL10	CL10	CL9					
1333MHz	CL9							
<b>Features</b>	<b><u>FURY DDR3</u></b>		<b><u>Impact DDR3</u></b>	<b><u>FURY DDR4</u></b>	<b><u>FURY DDR4 RGB</u></b>	<b><u>Predator DDR4</u></b>	<b><u>Predator DDR4 RGB</u></b>	<b><u>Impact DDR4</u></b>
XMP	No	No	No	Yes	Yes	Yes	Yes	Yes
PnP	Yes	Yes	Yes	Yes	Yes	No	No	Yes
CAS Latencies	CL9 - CL10	CL10 - CL11	CL9 - CL11	CL15 - CL16	CL15 - CL16	CL12 - CL19	CL15 - CL19	CL14 - CL20
Voltages	1.5V	1.35V	1.35V or 1.5V	1.2V - 1.35V	1.2V - 1.35V	1.35V	1.35V	1.2V
Module Capacities	4GB - 8GB	4GB - 8GB	4GB - 8GB	4GB - 16GB	8GB - 16GB	4GB - 16GB	8GB - 16GB	4GB - 16GB
Kit Capacities	8GB - 16GB	8GB - 16GB	8GB - 16GB	8GB - 64GB	16GB - 64GB	8GB - 128GB	16GB - 64GB	8GB - 64GB
Single Modules	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dual Channel Kits	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quad Channel Kits	No	No	No	Yes	Yes	Yes	Yes	Yes
PCB Color	Black	Black	Black	Black	Black	Black	Black	Black
Heat Spreader Colors	Red,Black, Blue,White	Black	Black	Black	Black	Black	Black	Black
Height	32.8mm	32.8mm	30mm	34.1mm	41.24mm	42.2mm	42.2mm	30mm

# Intel Client Platforms

DDR4-2933 UDIMM	Cascade Lake-X X299X	DDR4-2666 UDIMM	Coffee Lake-S 300 Series	Skylake-X X299	DDR4-2666 SODIMM	Coffee Lake-H 300 Series
KVR29N21D8/32	X	KVR26N19D8/32	X *	NOT SUPPORTED	KVR26S19D8/32	X *
KVR29N21D8/16	X	KVR26N19D8/16	X	X	KVR26S19D8/16	X
KVR29N21S8/8	X	KVR26N19S8/8	X	X	KVR26S19S8/8	X
KVR26N19S6/4	NOT SUPPORTED	KVR26N19S6/4	X	NOT SUPPORTED	KVR26S19S6/4	X

DDR4-2400 UDIMM	Kaby Lake-S 200 Series	DDR4-2400 SODIMM	Kaby Lake-H 200 Series
KVR24N17D8/16	X	KVR24S17D8/16	X
KVR24N17S8/8	X	KVR24S17S8/8	X
KVR24N17S6/4	X	KVR24S17S6/4	X

\* Requires BIOS Update to support 16Gb DRAM

# 2018 DRAM Opportunities with Intel Desktop Systems



**X**  
Processors

**X299X**  
**X299**

- Cascade Lake-X (10<sup>th</sup> Gen)  
• Quad Channel (8 sockets)
- Skylake-X (8<sup>th</sup> Gen Core)  
• Quad Channel (8 sockets)

**2933**

**2666**

**DDR4**



KVR29N21S8/8  
KVR29N21D8/16  
KVR29N21D8/32

KVR26N19S8/8  
KVR26N19D8/16  
KVR26N19D8/32  
KCP426NS8/8  
KCP426ND8/16  
KCP426ND8/32

KVR26N19S8/8  
KVR26N19D8/16  
KVR26N19D8/32  
KCP426NS8/8  
KCP426ND8/16  
KCP426ND8/32

FURY 3000 – 3466 K2 / K4  
Predator 2933 – 4000 K2 / K4

FURY 2666 – 3466 K2  
Predator 2666 – 4000 K2

FURY 2666 – 3466 K2  
Predator 2666 – 4000 K2

**S**  
Processors

**300 Series**

- Coffee Lake-S (8<sup>th</sup> / 9<sup>th</sup> Gen)  
• Dual Channel (4 sockets)

**2666**


**N**  
Processors

**SOC**

- Apollo Lake (System on Chip)
- Gemini Lake (System on Chip)

**DDR3L**  
**LPDDR3**  
**DDR4**  
**LPDDR4**

*Platform Specific*  
Discrete DRAM  
SODIMM  
UDIMM



## Solid State Drives (SSDs) for Laptops, Desktop PCs, and Servers

Add speed to an old desktop PC or laptop by upgrading from a hard disk drive (HDD) to a Kingston SSD. Kingston's fast and reliable SATA and NVMe SSDs are also a great choice for new PC builds, servers, and system builders.

<https://www.kingston.com/us/ssd>