High Density Stacked Nand Flash for SSDs

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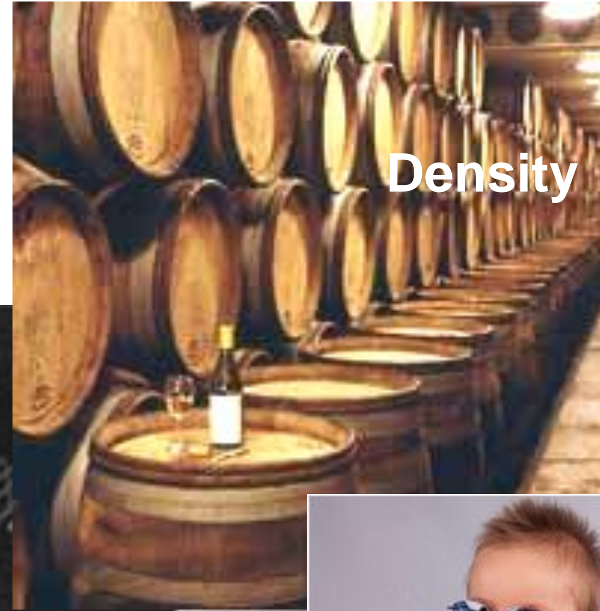
3D Plus USA

Why Stacking ?

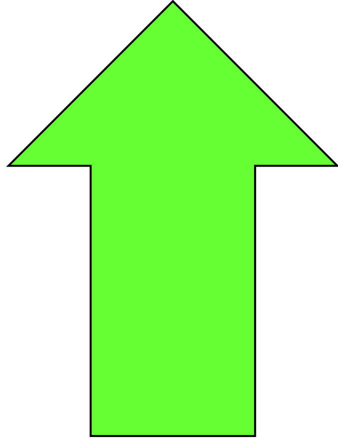


Why Stacking ?

We stack because **WE WANT MORE**

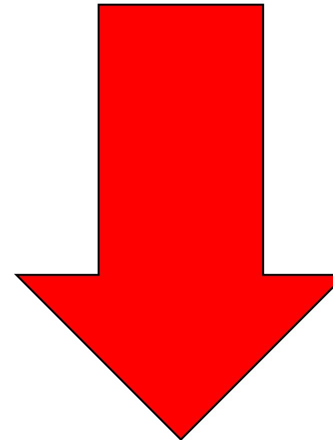
WITH LESS !!!!

Our quest is :



PERFORMANCE

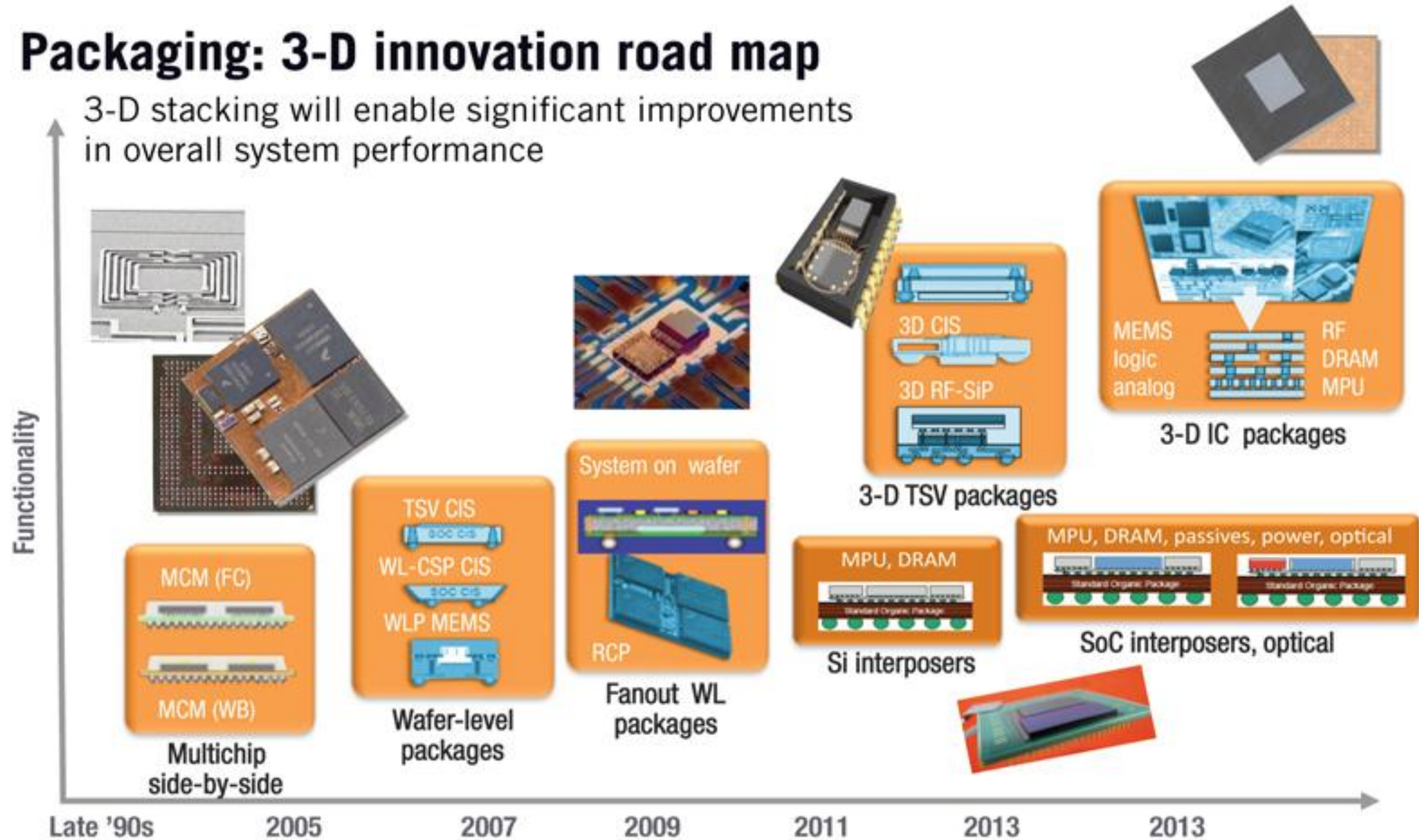
(speed, reliability, density, power consumption…)



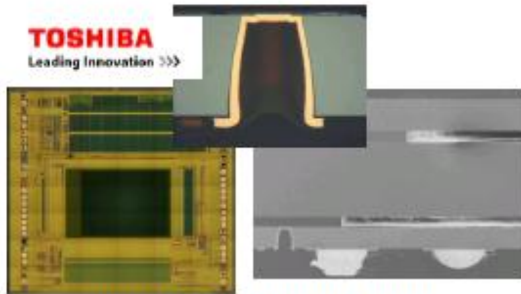
SIZE

COST

Many Technologies…



Many Applications…

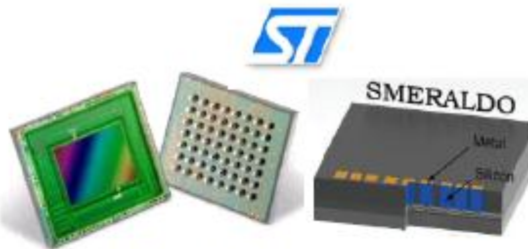


Toshiba CMOS image sensor

Discera's MEMS oscillator

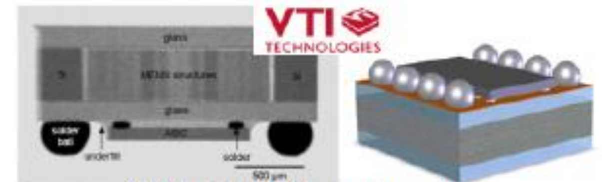
Avago's FBAR filters & Power amplifiers devices

Omnivision CMOS image sensor

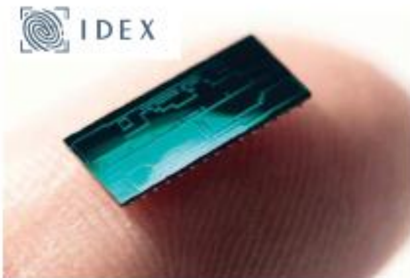


STMicro's CMOS imager sensors & MEMS inertial components

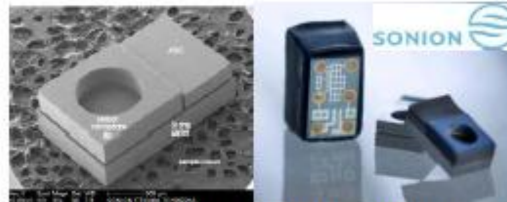
SiTime's MEMS oscillator



VTI 3-axis MEMS accelerometer



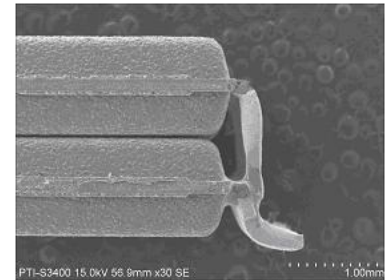
IDEX's fingerprint sensor



Sonion MEMS Silicon-microphone

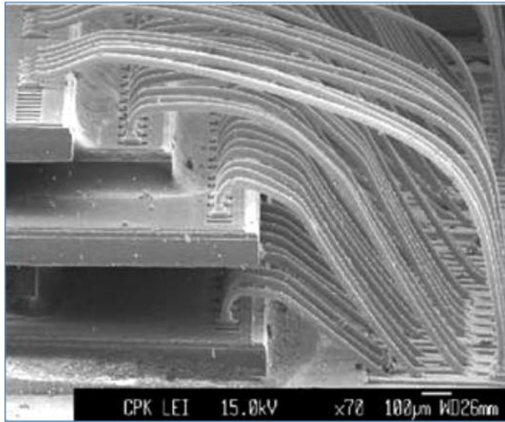
VisEra's HB-LED silicon Module

Back to the future

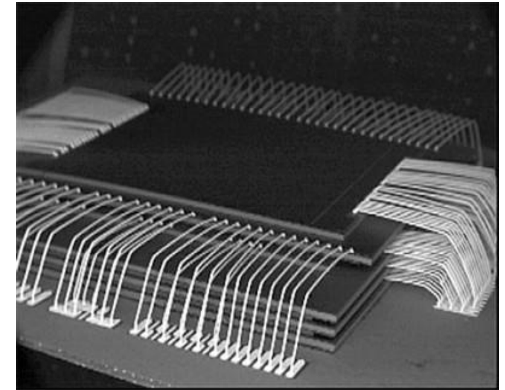


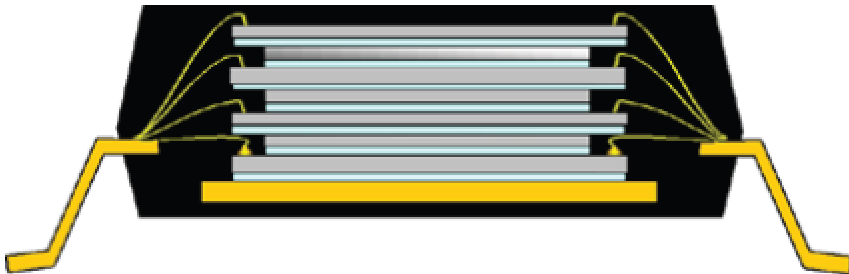
Cheap
Simple
Reliable
Not so small
Only compatible with Tssops

But we want more !



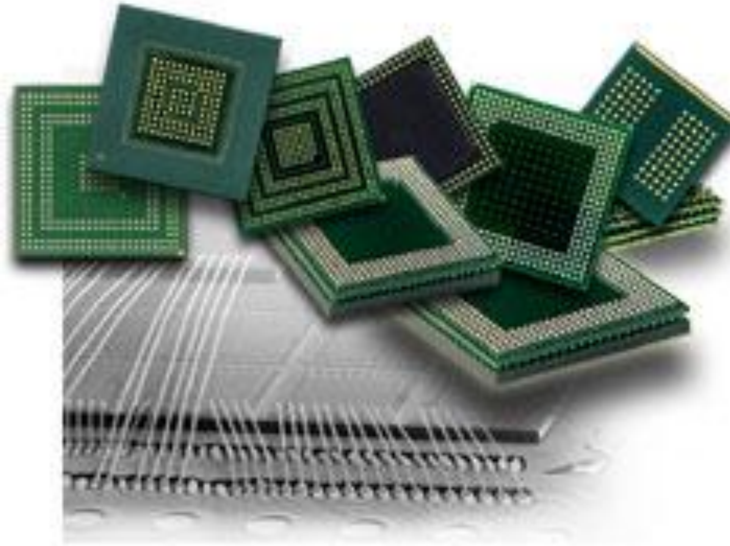
Why not stacking dice ?

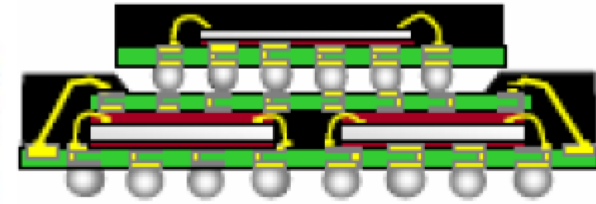


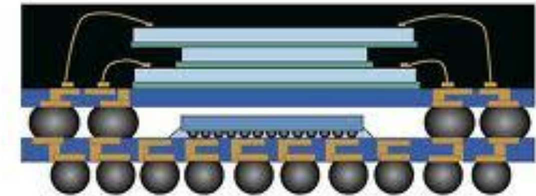


Very good solution. But limited (Yield, number of interconnections…)

We always want more !

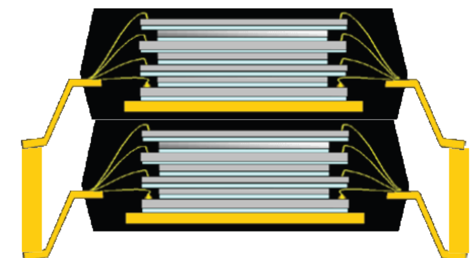






PiP PoP

Why not stacking packages ?



Higher density but Bigger !

Flash Memory SUMMIT

Enough ?

It’s too slow !

It’s too expensive !

It’s too big !

Power consumption is too high!

Flash Memory SUMMIT

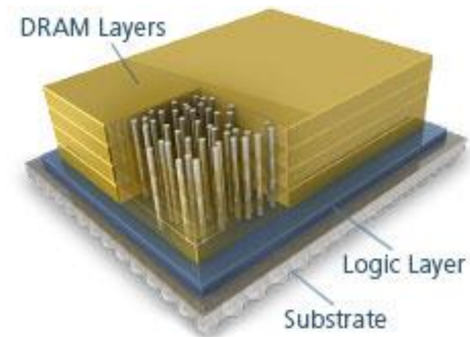
What is the status now ?

Wafer-Scale-Packaging Platforms

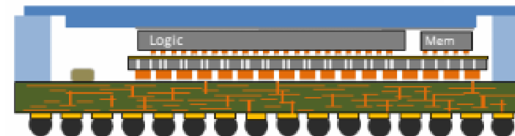
Wafer-Level Interface / Encapsulation
- LED & Sensors WLOptics
- 3D WLP For MEMS & sensors (also called 3D SIP sometimes)

Wafer-Level Electrical Redistribution
- WL CSP 'Fan-in'
- FOWLP 'Fan-Out'

Flip-chip & Wafer-Level Stacking / Integration
- Embedded IC in PCB / laminate
- 3D IC & TSV
- Glass / Silicon 2.5D interposers
- Flip-chip wafer bumping on BGA



Reducing size, increasing performance

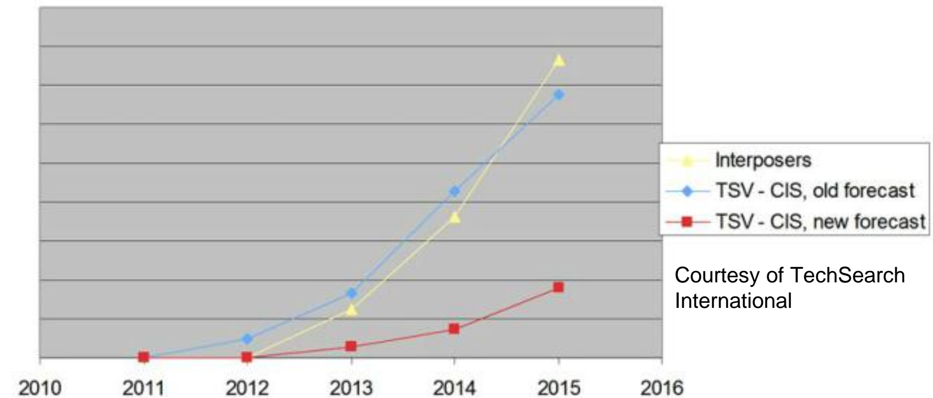


Flash Memory SUMMIT

Many players

And ... Many issues :

- Roadmaps keep shifting out.



Courtesy of TechSearch International

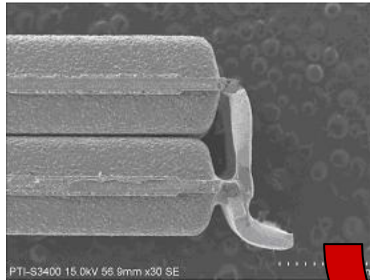
- Availability of simulation tools
- Thermal issues
- Yield ? Most of all the debonding step (remove carrier after thinning)
- Bump pitch, warpage (interposers)
- Test (KGD?)
- Roles between TSV and interposer assembly unclear.

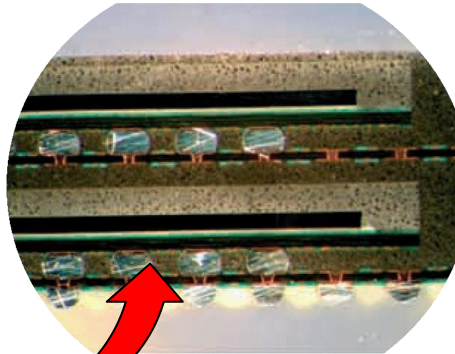
- But very promising technology and tremendous variety of applications for memories depending on **cost trade-off** and **reliability data**.

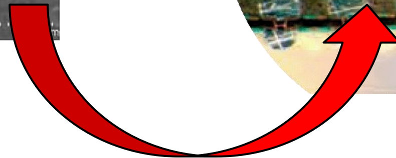
Any alternatives ?

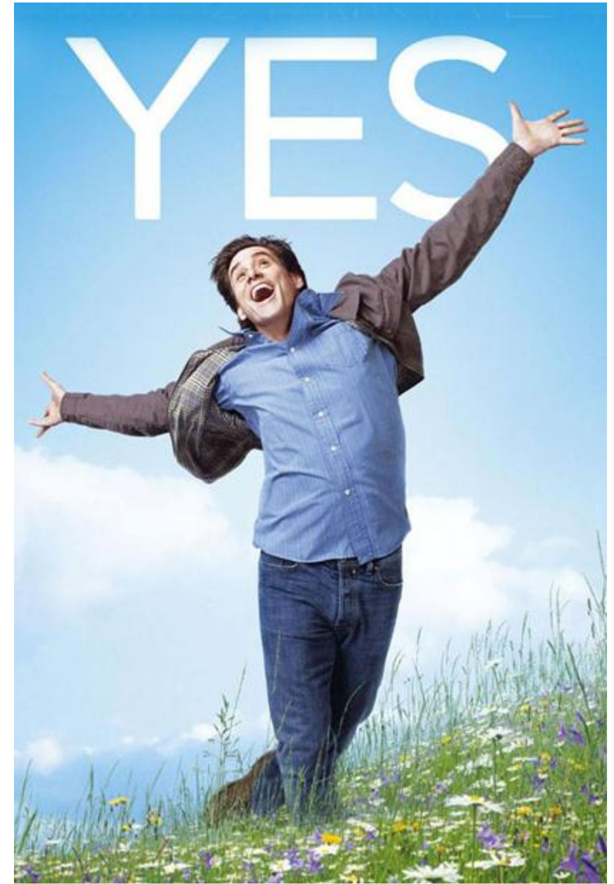
We have solutions :

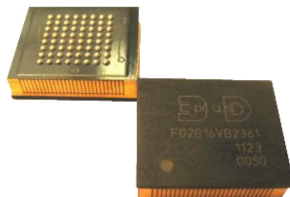
- **Stacking standard BGAs** :

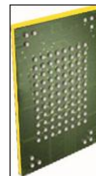


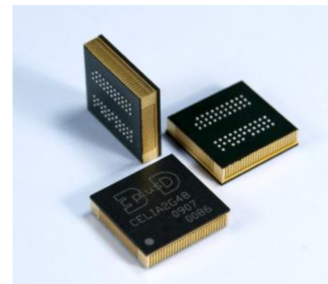


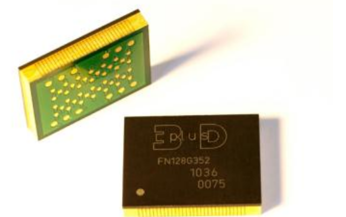






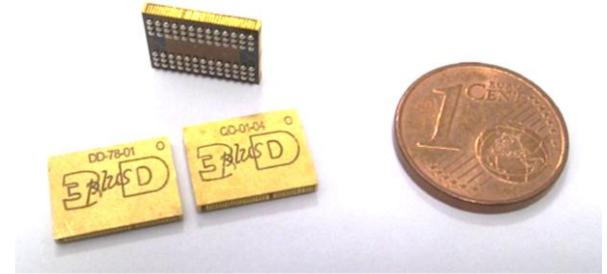




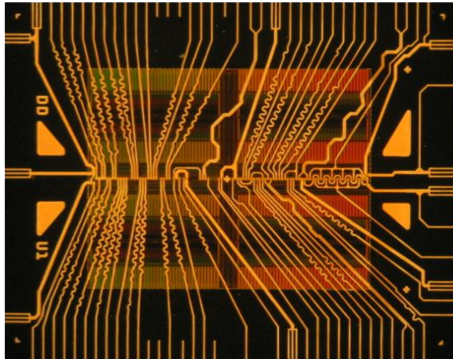


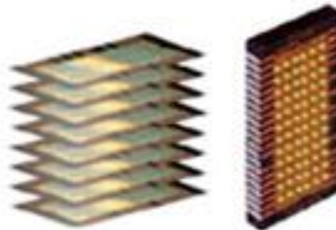
Any alternatives ?

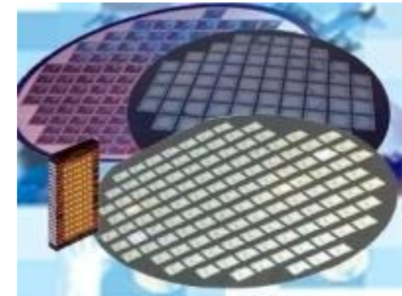
We have solutions :



- **Dice interconnection without TSV** :







A wide range of Nand Flash Products :

NAND FLASH ASYNCHRONOUS

Part Number	Density	Configuration	Bits/Cell	Voltage (V)	Package	Pitch (mm)	Temperature	RoHS	SCD#
3DFN64G08VB1388	64Gb	8Gx8	SLC	3.3	LGA 52	1.0	C, I, M	Yes or 5/6	3DFP-388
3DFN128G08VL1459	128Gb	16Gx8	SLC	3.3	LGA 52	1.0	C, I, M	Yes or 5/6	3DFP-459
3DFN128G08VL1441	128Gb	16Gx8	MLC	3.3	LGA 52	1.0	C, I	Yes or 5/6	3DFP-441
3DFN256G08VL1460	256Gb	32Gx8	SLC	3.3	LGA 52	1.0	C, I, M	Yes or 5/6	3DFP-460
3DFN256G08VL1461	256Gb	32Gx8	MLC	3.3	LGA 52	1.0	C, I	Yes or 5/6	3DFP-461
3DFN512G08VL2462	512Gb	2x(32Gx8)	SLC	3.3	LGA 52	1.0	C, I, M	Yes or 5/6	3DFP-462
3DFN512G08VL1463	512Gb	64Gx8	MLC	3.3	LGA 52	1.0	C, I	Yes or 5/6	3DFP-463
3DFN1T08VL2442	1Tb	2x(64Gx8)	MLC	3.3	LGA 52	1.0	C, I	Yes or 5/6	3DFP-442

NAND FLASH SYNCHRONOUS

Part Number	Density	Configuration	Speed (MT/s)	Bits/Cell	Voltage (V)	Package	Pitch (mm)	Temperature	RoHS	SCD#
3DFN64G08VB1450	64Gb	8Gx8	166-200	SLC	3.3	BGA 100	1.0	C, I, M	Yes or 5/6	3DFP-450
3DFN64G08VB1454	64Gb	8Gx8	166	MLC	3.3	BGA 100	1.0	C, I	Yes or 5/6	3DFP-454
3DFN128G08VB1451	128Gb	16Gx8	166-200	SLC	3.3	BGA 100	1.0	C, I, M	Yes or 5/6	3DFP-451
3DFN128G08VB1455	128Gb	16Gx8	166	MLC	3.3	BGA 100	1.0	C, I	Yes or 5/6	3DFP-455
3DFN128G08VB1601	128Gb	16Gx8	200-333	MLC	3.3	BGA 152	1.0	C, I	Yes or 5/6	3DFP-601
3DFN256G08VB1452	256Gb	32Gx8	166-200	SLC	3.3	BGA 100	1.0	C, I, M	Yes or 5/6	3DFP-452
3DFN256G08VB1456	256Gb	32Gx8	166	MLC	3.3	BGA 100	1.0	C, I	Yes or 5/6	3DFP-456
3DFN256G08VB1602	256Gb	32Gx8	200-333	MLC	3.3	BGA 152	1.0	C, I	Yes or 5/6	3DFP-602
3DFN512G08VB2453	512Gb	2x(32Gx8)	166-200	SLC	3.3	BGA 100	1.0	C, I, M	Yes or 5/6	3DFP-453
3DFN512G08VB1457	512Gb	64Gx8	166-200	MLC	3.3	BGA 100	1.0	C, I	Yes or 5/6	3DFP-457
3DFN512G08VB1603	512Gb	64Gx8	200-333	MLC	3.3	BGA 152	1.0	C, I	Yes or 5/6	3DFP-603
3DFN1T08VB2458	1Tb	2x(64Gx8)	166-200	MLC	3.3	BGA 100	1.0	C, I	Yes or 5/6	3DFP-458

Find out more at :

www.3d-plus.com

« Innovating for More Electronics in Less Space »