







# Samsung Semiconductor, Inc.

Samsung continues to lead the industry with the broadest portfolio of memory products and technology. Its DRAM, flash, mobile, and graphics memory are found in computers – from ultra-mobile notebooks to powerful servers – and in a wide range of handheld devices such as smartphones and tablets. Samsung also delivers the industry's widest line of storage products from the consumer to the enterprise level. These include optical disk drives as well as flash storage, such as Solid State Drives, and a range of embedded and removable flash storage products.

Markets		DRAM	SSD	FLASH	ASIC	LOGIC	TFT/LCD	ODD
Mobile/Wireless		●	N/A	●	●	●	●	●
Notebook PCs/ Ultrabooks™		●	●	●	●	●	●	●
Desktop PCs/ Workstations		●	●	●	●	●	●	●
Servers		●	●	●	●	●	●	●
Networking/ Communications		●	●	●	●	●	N/A	●
Consumer Electronics		●	N/A	●	●	●	●	●

To access our online sales portal, visit: <https://smarttools.ssi.samsung.com>

[samsung.com/us/oem-solutions](https://samsung.com/us/oem-solutions)

SEMICONDUCTOR  
LARGEST  
INNOVATION  
DDR4  
CUTTING-EDGE  
FLASH  
ENTERPRISE  
DESIGN  
SSD  
DYNAMIC  
LOGIC INNOVATION  
MEMORY  
GREEN  
STORAGE  
ENTERPRISE  
POWER TOGGLE-MODE  
NAND



**DRAM**

Pages 4–12

[samsung.com/dram](http://samsung.com/dram)

- DDR4 SDRAM
- DDR3 SDRAM
- DDR2 SDRAM
- DDR SDRAM
- Mobile DRAM
- Graphics SDRAM
- DRAM Ordering Information

**FLASH - SSD**

Pages 13–17

[samsung.com/flash](http://samsung.com/flash)

- SLC Flash
- MLC Flash
- microSD Cards
- eMMC
- Solid State Drives (SSD)
- Flash Products Ordering Information
- Industrial Cards

**MULTI-CHIP PACKAGES**

Page 18–19

[samsung.com/mcp](http://samsung.com/mcp)

- eMMC + LPDDR2
- eMMC + LPDDR3
- eMMC + MDDR

**STORAGE**

Pages 20–21

[samsung.com/flash-ssd](http://samsung.com/flash-ssd)

- Solid State Drives

[samsungodd.com](http://samsungodd.com)

- Optical Disc Drives

**DISPLAYS**

Pages 22–24

[samsungdisplay.com](http://samsungdisplay.com)

- Exclusive Digital Information Display (E-DID)
- Performance Digital Information Display (P-DID)
- Basic Digital Information Display (B-DID)
- Tablets
- Ultrabooks™/PCs
- Monitors

**CONTACTS**

Pages 25–27

[samsung.com/us/oem-solutions](http://samsung.com/us/oem-solutions)

- Sales Representatives and Distributors
- To access our online sales portal, visit: <https://smarttools.ssi.samsung.com>

## DDR4 SDRAM REGISTERED MODULES

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
8GB	1.2V	1Gx 72	M393A1G40DB0-CPB	4Gb (1G x4) * 18	Lead Free & Halogen Free, Flip Chip	2133	1	3Q'13
16GB	1.2V	2Gx72	M393A2G40DB0-CPB	4Gb (1G x4) * 36	Lead Free & Halogen Free, Flip Chip	2133	2	3Q'13
Notes:	Register is not fixed yet	NA = DDR4-1866 (14-14-14)		QB = DDR4-2133(16-16-16)	PB = DDR4-2133(15-15-15)			

## DDR4 SDRAM LOAD REDUCED MODULES

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
32GB	1.2V	4Gx 72	M386A4GDM0-CPB	4Gb MDP (2Gx4) * 36	Lead Free & Halogen Free	2133	4	4Q'13
Notes:	Register is not fixed yet	NA = DDR4-1866 (14-14-14)		QB = DDR4-2133(16-16-16)	PB = DDR4-2133(15-15-15)			

## DDR3 SDRAM REGISTERED MODULES

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
1GB	1.5V	128Mx72	M393B2873GB0-C(F8/H9/K0/MA)(08/09)	1Gb (128M x8) * 9	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
2GB	1.5V	256Mx72	M393B5673GB0-C(F8/H9/K0/MA)(08/09)	1Gb (128M x8) * 18	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	2	Now
			M393B5670GB0-C(F8/H9/K0/MA)(08/09)	1Gb (256M x4) * 18	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
			M393B5773DH0-C(F8/H9/K0/MA)(08/09)	2Gb (256M x8) * 9	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
4GB	1.5V	512Mx72	M393B5170GB0-C(F8/H9/K0/MA)(08/09)	1Gb (256M x4) * 36	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	2	Now
			M393B5273DH0-C(F8/H9/K0/MA)(08/09)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M393B5270DH0-C(F8/H9/K0/MA)(08/09)	2Gb (512M x4) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
8GB	1.5V	1Gx72	M393B1K73DH0-C(F8/H9)(08/09)	2Gb (256M x8) * 36	Lead Free & Halogen Free	1066/1333	4	Now
			M393B1K70DH0-C(F8/H9/K0/MA)(08/09)	2Gb (512M x4) * 36	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M393B1K70QB0-C(K0/MA) (08/09)	2Gb (512M x4) * 36	Lead Free & Halogen Free	1600/1866	2	Q3'13
			M393B1G70BH0-C(F8/H9/K0/MA)(08/09)	4Gb (1G x4) * 18	Lead Free & Halogen Free	1066/1333	1	Now
			M393B1G70QH0-C(K0/MA) (08/09)	4Gb (1G x4) * 18	Lead Free & Halogen Free	1600/1866	1	Q3'13
			M393B1G73BH0-C(F8/H9/K0/MA)(08/09)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
16GB	1.5V	2Gx72	M393B2K70DM0-C(F8/H9)(08/09)	2Gb DDP (1G x4) * 36	Lead Free & Halogen Free	1066/1333	4	Now
			M393B2G70BH0-C(K0/MA)(08/09)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1600/1866	2	Now
			M393B2G70QB0-C(K0/MA)(08/09)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1600/1866	2	Now
			M393B2G70DB0-C(K0/MA)(02/03)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1600/1866	2	Now
32GB	1.5V	4Gx72	M393B4G70BM0-C(F8/H9)(08/09)	8Gb DDP (2G x4) * 36	Lead Free & Halogen Free	1066/1333	4	Now
2GB	1.35V	256Mx72	M393B5773DH0-Y(F8/H9/K0)(08/09)	2Gb (256M x4) * 9	Lead Free & Halogen Free	1066/1333/1600	1	Now
4GB	1.35V	512Mx72	M393B5173GB0-Y(F8/H9)(08/09)	1Gb (128M x8) * 36	Lead Free & Halogen Free, Flip Chip	1066/1333	4	Now
			M393B5170GB0-Y(F8/H9/K0)(08/09)	1Gb (256M x4) * 36	Lead Free & Halogen Free, Flip Chip	1066/1333/1600	2	Now
			M393B5273DH0-Y(F8/H9/K0)(08/09)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M393B5270DH0-Y(F8/H9/K0)(08/09)	2Gb (512M x4) * 18	Lead Free & Halogen Free	1066/1333/1600	1	Now
8GB	1.35V	1Gx72	M393B1G70BH0-Y(F8/H9/K0)(08/09)	4Gb (1G x4) * 18	Lead Free & Halogen Free	1066/1333/1600	1	Now
			M393B1K70QB0-Y(H9/K0) (08/09)	2Gb (512M x4) * 36	Lead Free & Halogen Free	1333/1600	2	Q3'13
			M393B1G70QH0-Y(H9/K0) (08/09)	4Gb (1G x4) * 18	Lead Free & Halogen Free	1333/1600	2	Now
			M393B1G73BH0-Y(F8/H9/K0)(08/09)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
16GB	1.35V	2Gx72	M393B2G70BH0-Y(F8/H9/K0)(08/09)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M393B2G70BH0-Y(H9/K0) (08/09)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1600/1866	2	Now
			M393B2G70QB0-Y(H9/K0) (08/09)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1600/1866	2	Now
			M393B2G70DB0-Y(H9/K0) (02/03)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1600/1866	2	Now
			M393B2G70QH0-Y(K0) (08/09)	4Gb (1G x4) * 36	Lead Free & Halogen Free	1600/1866*	2	Q3'13
			M393B2G73BH0-Y(F8/H9)(08/09)	4Gb (512M x8) * 36	Lead Free & Halogen Free	1066/1333	4	Now
			M393B2G73BH0-C(F8/H9)(08/09)	4Gb (512M x8) * 36	Lead Free & Halogen Free	1066/1333	4	Now
			M393B2K70DM0-Y(F8/H9)(08/09)	4Gb DDP (1G x4) * 36	Lead Free & Halogen Free	1066/1333	4	Now
32GB	1.35V	4Gx72	M393B4G70BM0-Y(F8/H9)(08/09)	8Gb DDP (2G x4) * 36	Lead Free & Halogen Free	1066/1333	4	Now
			M393B4G70DM0-YH9(02/03)	8Gb DDP (2G x4) * 36	Lead Free & Halogen Free	1333	4	Q3'13

Notes: 04 = IDT B0 register  
 05 = Inphi C0 register  
 08 = IDT A1  
 09 = Inphi UV GS02  
 F8 = DDR3-1066 (7-7-7)  
 H9 = DDR3-1333 (9-9-9)  
 K0 = DDR3-1600 (11-11-11)  
 MA = DDR3-1866 (13-13-13)

\* K0 (1600Mbps) available in ES only

## DDR3 SDRAM LOAD REDUCED REGISTERED MODULES

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
16GB	1.35V	2Gx72	M386B2K70DM0-YH90	4Gb DDP (1G x4) * 36	Lead Free & Halogen Free	1333	4	Now
32GB	1.35V/1.5V	4Gx72	M386B4G70BMO-YK0(3/4)/CMA(3/4)	8Gb DDP (2G x4) * 36	Lead Free & Halogen Free	1333/1600/1866	4	Now
			M386B4G70DM0-YK0(3/4)/CMA(3/4)	8Gb DDP (2G x4) * 36	Lead Free & Halogen Free	1600/1866	4	Q3'13
64GB	1.35V/1.5V	8Gx72	M386B8G70B00-YH94/CK04	4Gb QDP (4G x4) * 36	Lead Free & Halogen Free	1333/1600	8	Now
			M386B8G70DE0-YH9(4)/CK0(4)	16Gb QDP (4G x4) * 36	Lead Free & Halogen Free	1333/1600	8	Q3'13

Notes: 0 = Inphi iMB GS02A  
3 = Inphi iMB GS02B  
4 = Montage C1

## DDR3 SDRAM VLP REGISTERED MODULES

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
1GB	1.5V	128Mx72	M392B2873GB0-C(F8/H9/K0/MA)(08/09)	1Gb (128M x8) * 9	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
2GB	1.5V	256Mx72	M392B5673GB0-C(F8/H9/K0/MA)(08/09)	1Gb (128M x8) * 18	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	2	Now
			M392B5670GB0-C(F8/H9/K0/MA)(08/09)	1Gb (256M x8) * 18	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
			M392B5773DH0-C(F8/H9/K0/MA)(08/09)	2Gb (256M x8) * 9	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
4GB	1.5V	512Mx72	M392B5273DH0-C(F8/H9/K0/MA)(08/09)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M392B5270DH0-C(F8/H9/K0/MA)(08/09)	2Gb (512M x4) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
8GB	1.5V	1Gx72	M392B1K73DM0-C(F8/H9)(08/09)	2Gb DDP (512M x8) * 18	Lead Free & Halogen Free	1066/1333	4	Now
			M392B1K70DM0-C(F8/H9/K0/MA)(08/09)	2Gb DDP (1G x4) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M392B1G73BH0-C(F8/H9/K0/MA)(08/09)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
			M392B1G73DB0-CMA (08/09)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1866	1	Q3'13
			M392B1G70BH0-C(F8/H9/K0/MA)(08/09)	4Gb (1G x4) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
16GB	1.5V	2Gx72	M392B2G70BMO-C(F8/H9/K0/MA)(08/09)	8Gb DDP (2G x4) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M392B2G70DM0-YK0/CMA (03/04)	8Gb DDP (2G x4) * 18	Lead Free & Halogen Free	1600/1866	2	Q3'13
			M392B2G73BMO-C(F8/H9)(08/09)	4Gb DDP (1G x8) * 18	Lead Free & Halogen Free	1066/1333	4	Now
2GB	1.35V	256Mx72	M392B5773DH0-Y(F8/H9/K0)(08/09)	2Gb (256M x8) * 9	Lead Free & Halogen Free	1066/1333/1600	1	Now
4GB	1.35V	512Mx72	M392B5273DH0-Y(F8/H9/K0)(08/09)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M392B5270DH0-Y(F8/H9/K0)(08/09)	2Gb (512M x4) * 18	Lead Free & Halogen Free	1066/1333/1600	1	Now
8GB	1.35V	1Gx72	M392B1K73DM0-Y(F8/H9)(08/09)	4Gb DDP (512M x8) * 18	Lead Free & Halogen Free	1066/1333	4	Now
			M392B1K70DM0-Y(F8/H9/K0)(08/09)	2Gb DDP (1G x4) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M392B1G73BH0-Y(F8/H9/K0)(08/09)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M392B1G73DB0-YK0/CMA (03/04)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1600/1866	2	Now
			M392B1G70BH0-Y(F8/H9/K0)(08/09)	4Gb (1G x4) * 18	Lead Free & Halogen Free	1066/1333/1600	1	Now
16GB	1.35V	2Gx72	M392B2G70BMO-Y(F8/H9/K0)(08/09)	8Gb DDP (2G x4) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M392B2G70DM0-YK0 (03/04)	8Gb DDP (1G x8) * 18	Lead Free & Halogen Free	1600	4	Now
32GB	1.35V	4Gx72	M392B4G70BE0-Y(F8/H9)(08)	4Gb QDP (4G x4) * 18	Lead Free & Halogen Free	1066/1333	4	Now

Notes: 04 = IDT B0 register  
05 = Inphi C0 register  
08 = IDT A1  
09 = Inphi UV GS02  
F8 = DDR3-1066 (7-7-7)  
H9 = DDR3-1333 (9-9-9)  
K0 = DDR3-1600 (11-11-11)  
MA = DDR3-1866 (13-13-13)

## DDR3 SDRAM UNBUFFERED MODULES

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
1GB	1.5V	128Mx64	M378B2873GB0-C(F8/H9/KO/MA)	1Gb (128M x8) * 8	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
2GB	1.5V	256Mx64	M378B5673GB0-C(F8/H9/KO/MA)	1Gb (128M x8) * 16	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	2	Now
			M378B5773DH0-C(F8/H9/KO/MA)	2Gb (256M x8) * 8	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
			M378B5773QB0-CK0/MA	2Gb (256M x8) * 8	Lead Free & Halogen Free	1600/1866	1	Q4'13
4GB	1.5V	512Mx64	M378B5273CH0-C(F8/H9)	2Gb (256M x8) * 16	Lead Free & Halogen Free	1066/1333	2	Now
			M378B5273DH0-C(F8/H9/KO/MA)	2Gb (256M x8) * 16	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M378B5173QH0-C(KO/MA)	4Gb (512M x8) * 8	Lead Free & Halogen Free	1600/1866	1	Q3'13
			M378B5173DB0-C(KO/MA)	4Gb (512M x8) * 8	Lead Free & Halogen Free	1600/1866	1	Now
8GB	1.5V	1024Mx64	M378B1G73BH0-C(F8/H9/KO/MA)	4Gb (512M x8) * 16	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M378B1G73QH0-C(KO/MA)	4Gb (512M x8) * 16	Lead Free & Halogen Free	1600/1866	2	Q3'13
			M378B1G73DB0-C(KO/MA)	4Gb (512M x8) * 16	Lead Free & Halogen Free	1600/1866	2	Now

## DDR3 SDRAM UNBUFFERED MODULES (with ECC)

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
1GB	1.5V	128Mx72	M391B2873GB0-C(F8/H9/KO/MA)	1Gb (128M x8) * 9	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
2GB	1.5V	256Mx72	M391B5673GB0-C(F8/H9/KO/MA)	1Gb (128M x8) * 18	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	2	Now
			M391B5773CH0-C(F8/H9)	2Gb (256M x8) * 9	Lead Free & Halogen Free	1066/1333	1	Now
			M391B5773DH0-C(F8/H9/KO/MA)	2Gb (256M x8) * 9	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
4GB	1.5V	512Mx72	M391B5273CH0-C(F8/H9)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333	2	Now
			M391B5273DH0-C(F8/H9/KO/MA)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
8GB	1.5V	1024Mx72	M391B1G73BH0-C(F8/H9/KO/MA)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M391B1G73QH0-C(MA)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1866	2	Q3'13
1GB	1.35V	128Mx72	M391B2873GB0-Y(F8/H9/KO)	1Gb (128M x8) * 9	Lead Free & Halogen Free, Flip Chip	1066/1333/1600	1	Now
2GB	1.35V	256Mx72	M391B5673GB0-Y(F8/H9/KO)	1Gb (128M x8) * 18	Lead Free & Halogen Free, Flip Chip	1066/1333/1600	2	Now
			M391B5773CH0-Y(F8/H9)	2Gb (256M x8) * 9	Lead Free & Halogen Free	1066/1333	1	Now
			M391B5773DH0-Y(F8/H9/KO)	2Gb (256M x8) * 9	Lead Free & Halogen Free	1066/1333/1600	1	Now
4GB	1.35V	512Mx72	M391B5273CH0-Y(F8/H9)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333	2	Now
			M391B5273DH0-Y(F8/H9/KO)	2Gb (256M x8) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M391B5173QH0-YKO	4Gb (512M x8) * 9	Lead Free & Halogen Free	1600	1	Q3'13
8GB	1.35V	1024Mx72	M391B1G73BH0-Y(F8/H9/KO)	4Gb (512M x8) * 18	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M391B1G73QH0-YKO	4Gb (512M x8) * 18	Lead Free & Halogen Free	1600	2	Q3'13

Notes: F8 = DDR3-1066 (7-7-7)      KO = DDR3-1600 (11-11-11)  
H9 = DDR3-1333 (9-9-9)      MA = DDR3-1866 (13-13-13)

## DDR3 SDRAM SODIMM MODULES

Density	Voltage	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Ranks	Production
1GB	1.5V	128Mx64	M471B2873GB0-C(F8/H9/K0/MA)	1Gb (128M x8) * 8	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
2GB	1.5V	256Mx64	M471B5673GB0-C(F8/H9/K0/MA)	1Gb (128M x8) * 16	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	2	Now
4GB	1.5V	512Mx64	M471B5773DH0-C(F8/H9/K0/MA)	2Gb (256M x8) * 8	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
			M471B5273DH0-C(F8/H9/K0/MA)	2Gb (256M x8) * 16	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
			M471B5173BH0-C(F8/H9/K0/MA)	4Gb (512M x8) * 8	Lead Free & Halogen Free	1066/1333/1600/1866	1	Now
8GB	1.5V	1024Mx64	M471B1G73BH0-C(F8/H9/K0/MA)	4Gb (512M x8) * 16	Lead Free & Halogen Free	1066/1333/1600/1866	2	Now
1GB	1.35V	128Mx64	M471B2873GB0-Y(F8/H9/K0)	1Gb (128M x8) * 8	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	1	Now
2GB	1.35V	256Mx64	M471B5673GB0-Y(F8/H9/K0)	1Gb (128M x8) * 16	Lead Free & Halogen Free, Flip Chip	1066/1333/1600	2	Now
			M471B5773DH0-Y(F8/H9/K0)	2Gb (256M x8) * 8	Lead Free & Halogen Free	1066/1333/1600	1	Now
			M471B5674QH0-YK0	4Gb (256M x16) * 4	Lead Free & Halogen Free	1600	1	Q4'13
4GB	1.35V	512Mx64	M471B5273DH0-Y(F8/H9/K0)	2Gb (256M x8) * 16	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M471B5173BH0-Y(F8/H9/K0)	4Gb (512M x8) * 8	Lead Free & Halogen Free	1066/1333/1600	1	Now
			M471B5173QH0-YK0	4Gb (512M x8) * 8	Lead Free & Halogen Free	1600	1	Q3'13
			M471B5173DB0-YK0	4Gb (512M x8) * 8	Lead Free & Halogen Free	1600	1	Q3'13
8GB	1.35V	1024Mx64	M471B1G73BH0-Y(F8/H9/K0)	4Gb (512M x8) * 16	Lead Free & Halogen Free	1066/1333/1600	2	Now
			M471B1G73QH0-YK0	4Gb (512M x8) * 16	Lead Free & Halogen Free	1600	2	Q3'13
			M471B1G73DB0-YK0	4Gb (512M x8) * 16	Lead Free & Halogen Free	1600	2	Q3'13

Notes: F8 = DDR3-1066 (7-7-7) K0 = DDR3-1600 (11-11-11)  
H9 = DDR3-1333 (9-9-9) MA = DDR3-1866 (13-13-13)

## DDR3 SDRAM ECC SODIMM MODULES

Density	Organization	Part Number	Composition	Compliance	Speed (Mbps)	Register	Rank	Production
2GB	1.35V	256Mx64	M474B5773DH0-YH9/K0	2Gb x8*9	Lead Free & Halogen Free	1333/1600	1	Now
4GB	1.35V	512Mx64	M474B5273DH0-YH9/K0	2Gb x8*18	Lead Free & Halogen Free	1333/1600	2	Now
			M474B5173BH0-YH9/K0	4Gb x8*9	Lead Free & Halogen Free	1333/1600	1	Now
8GB	1.35V	1024Mx64	M474B1G73BH0-YH9/K0	4Gb x8*18	Lead Free & Halogen Free	1333/1600	2	Now
			M474B1G73QH0-YK0	4Gb x8*18	Lead Free & Halogen Free	1600	2	Q3'13
			M474B1G73QH0-CMA	4Gb x8*18	Lead Free & Halogen Free	1866	2	Q3'13

Notes: E6 = PC2-5300 (DDR2-667 @ CL=5)  
F7 = PC2-6400 (DDR2-800 @ CL=6)  
E7 = PC2-6400 (DDR2-800 @ CL=5)

## DDR3 SDRAM COMPONENTS

Density	Voltage	Organization	Part Number	# Pins-Package	Compliance	Speed (Mbps)	Dimensions	Production
1Gb	1.5V	256M x4	K4B1G0446G-BC(F8/H9/K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	7.5x11mm	Now
		128M x8	K4B1G0846G-BC(F8/H9/K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866	7.5x11mm	Now
		128M x16	K4B1G1646G-BC(F8/H9/K0/MA/NB)	96 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1066/1333/1600/1866/2133	7.5x13.3mm	Now
2Gb	1.5V	512M x4	K4B2G0446C-HC(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B2G0446D-HC(F8/H9/K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600/1866	7.5x11mm	Now
			K4B2G0446Q-BC(K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1600/1866	7.5x11mm	Now
		256M x8	K4B2G0846C-HC(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B2G0846D-HC(F8/H9/K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600/1866	7.5x11mm	Now
			K4B2G0846Q-BC(K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1600/1866	7.5x11mm	Now
		128M x16	K4B2G1646C-HC(F8/H9/K0/MA)	96 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600/1866	7.5x13.3mm	Now
			K4B2G1646E-BC(F8/H9/K0/MA)	96 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600/1866	7.5x13.3mm	Now
			K4B2G1646Q-B(K0/MA/NB)	96 Ball -FBGA	Lead Free & Halogen Free	1600/1866/2133	7.5x13.3mm	Q3'13
4Gb	1.5V	1G x4	K4B4G0446B-HC(F8/H9/K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600/1866	10x11mm	Now
			K4B4G0446Q-HC(K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1600/1866	10x11mm	Now
		512M x8	K4B4G0846B-HC(F8/H9/K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600/1866	10x11mm	Now
			K4B4G0846D-HC(K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1600/1866	7.5x11mm	Now
			K4B4G0846Q-HC(K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1600/1866	10x11mm	Now
		256Mx16	K4B4G1646B-HC(F8/H9/K0/MA)	96 Ball -FBGA	Lead Free & Halogen Free	1333/1600/1866/2133	10x13.3mm	Now
			K4B4G1646D-BC(K0/MA)	96 Ball -FBGA	Lead Free & Halogen Free	1600/1866	7.5x13.3mm	Q3'13
1Gb	1.35V	256M x4	K4B1G0446F-HY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B1G0446G-BY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1066/1333/1600	7.5x11mm	Now
	1.35V	128M x8	K4B1G0846F-HY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B1G0846G-BY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1066/1333/1600	7.5x11mm	Now
2Gb	1.35V	512M x4	K4B2G0446C-HY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B2G0446D-HY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B2G0446Q-BY(K0)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1600	7.5x11mm	Now
		256M x8	K4B2G0846C-HY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B2G0846D-HY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	7.5x11mm	Now
			K4B2G0846Q-BY(K0)	78 Ball -FBGA	Lead Free & Halogen Free, Flip Chip	1600	7.5x11mm	Now
4Gb	1.35V	1G x4	K4B4G0446B-HY(F8/H9/K0)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600	10x11mm	Now
			K4B4G0446D-HY(K0)	78 Ball -FBGA	Lead Free & Halogen Free	1600	7.5x11mm	Now
			K4B4G0446Q-HY(K0)	78 Ball -FBGA	Lead Free & Halogen Free	1600	10x11mm	Now
		512M x8	K4B4G0846B-HY(F8/H9/K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1066/1333/1600/1866	10x11mm	Now
			K4B4G0846D-BC(K0/MA)	78 Ball -FBGA	Lead Free & Halogen Free	1600/1866	10x11mm	Q3'13
			K4B4G0846D-HY(K0)	78 Ball -FBGA	Lead Free & Halogen Free	1600	7.5x11mm	Now
		256Mx16	K4B4G0846Q-HY(K0)	78 Ball -FBGA	Lead Free & Halogen Free	1600	10x11mm	Now
			K4B4G1646B-HY(K0/MA)	96 Ball -FBGA	Lead Free & Halogen Free	1333/1600/1866/2133	10x13.3mm	Now
			K4B4G1646D-BY(K0/MA)	96 Ball -FBGA	Lead Free & Halogen Free	1600/1866	7.5x13.3mm	Q3'13

Notes: F8 = DDR3-1066 (7-7-7) K0 = DDR3-1600 (11-11-11) NB = DDR3-2133 (14-14-14)  
H9 = DDR3-1333 (9-9-9) MA = DDR3-1866 (13-13-13)

## DDR2 SDRAM COMPONENTS

Density	Organization	Part Number	# Pins-Package	Dimensions	Package	Speed (Mbps)	Production
256Mb	16Mx16	K4T56163QN-HC(E6/F7/E7/F8)	84-FBGA	7.5x12.5mm	Lead free & Halogen free	667/800/1066	Now
512Mb	128M x4	K4T51043QJ-HC(E6/F7/E7)	60-FBGA	7.5x9.5mm	Lead free & Halogen free	667/800	Now
	64M x8	K4T51083QJ-HC(E6/F7/E7/F8)	60-FBGA	7.5x9.5mm	Lead free & Halogen free	667/800/1066	Now
	32M x16	K4T51163QJ-HC(E6/F7/E7/F8)	84-FBGA	7.5x12.5mm	Lead free & Halogen free	667/800/1066	Now
1Gb	256M x4	K4T1G044QF-BC(E6/F7/E7)	60-FBGA	7.5x9.5mm	Lead free & Halogen free	667/800	Now
	128M x8	K4T1G084QF-BC(E6/F7/E7/F8)	60-FBGA	7.5x9.5mm	Lead free & Halogen free	667/800/1066	Now
	64M x16	K4T1G164QF-BC(E6/F7/E7/F8)	84-FBGA	7.5x12.5mm	Lead free & Halogen free	667/800/1066	Now



## DDR SDRAM COMPONENTS

Density	Organization	Part Number	# Pins - Package	Speed (Mbps)
512Mb	128Mx4	K4H510438J-LCB3/B0	66-TSOP	266/333
		K4H510438J-BCCC/B3	60-FBGA	333/400
	64Mx8	K4H510838J-LCCC/B3	66-TSOP	333/400
		K4H510838J-BCCC/B3	60-FBGA	333/400
		K4H511638J-LCCC/B3	66-TSOP	333/400

Notes: B0 = DDR266 (133MHz @ CL=2.5) A2 = DDR266 (133MHz @ CL=2) B3 = DDR333 (166MHz @ CL=2.5) CC = DDR400 (200MHz @ CL=3)

## MOBILE DRAM COMPONENTS

Density	Type	Organization	Part Number	Package	Power	Production	
512Mb	MDDR	32Mx16	K4X51163PK-FGD8	60-FBGA, 200MHz	1.8V	Now	
		16Mx32	K4X51323PK-8GD8	90-FBGA, 200MHz	1.8V	Now	
		64Mx32	K4X2G323PD-8GD8	90-FBGA, 200MHz	1.8V	Now	
2Gb	MDDR	x32 (2CS, 2CKE)	K4X4G303PD-AGD8	168-FBGA, 12x12 PoP, DDP, 200MHz	1.8V	Now	
4Gb		LPDDR2	1CH x32	K4P2G324ED-AGC1	168-FBGA, 12x12 PoP, MONO, 800Mbps	1.8V/1.2V/1.2V	Now
2Gb			1CH x32	K4P4G324EQ-AGC2	168-FBGA, 12x12 PoP, MONO, 1066Mbps	1.8V/1.2V/1.2V	Now
4Gb	1CH x32		K4P4G324EQ-FGC2	134-FBGA, 11x11.5, MONO, 1066Mbps	1.8V/1.2V/1.2V	Now	
8Gb	LPDDR2	1CH x32	K4P8G304EQ-AGC2	168-FBGA, 12x12 PoP, DDP, 1066Mbps	1.8V/1.2V/1.2V	Now	
		1CH x32	K4P8G304EQ-PGC2	216-FBGA, 12x12 PoP, DDP, 1066Mbps	1.8V/1.2V/1.2V	Now	
		2CH x32	K3PE7E70QM-BGC2	216-FBGA, 12x12 PoP, DDP, 1066Mbps	1.8V/1.2V/1.2V	Now	
16Gb	LPDDR2	2CH x32	K3PE7E70QM-CGC2	220-FBGA, 14x14 PoP, DDP, 1066Mbps	1.8V/1.2V/1.2V	Now	
		2CH x32	K3PE0E00QM-BGC2	216-FBGA, 12x12 PoP, QDP, 1066Mbps	1.8V/1.2V/1.2V	Now	
		2CH x32	K3PE0E00QM-CGC2	220-FBGA, 14x14 PoP, QDP, 1066Mbps	1.8V/1.2V/1.2V	Now	
4Gb	LPDDR3	1CH x32	K4E4E324ED-EGCE	178-FBGA, 11x11.5, MONO, 1600Mbps	1.8V/1.2V/1.2V	CS	
		1CH x32	K4E8E304ED-EGCE	178-FBGA, 11x11.5, DDP, 1600Mbps	1.8V/1.2V/1.2V	CS	
		2CH x32	K3QF1F10DM-AGCE	253-FBGA, 11x11.5, DDP, 1600Mbps	1.8V/1.2V/1.2V	CS	
8Gb	LPDDR3	2CH x32	K3QF1F10DA-QGCE	216-FBGA, 15x15 PoP, DDP, 1600Mbps	1.8V/1.2V/1.2V	Now	
		1CH x32	K4E6E304ED-EGCE	178-FBGA, 11x11.5, QDP, 1600Mbps	1.8V/1.2V/1.2V	CS	
		2CH x32	K3QF2F20DM-AGCE	253-FBGA, 11x11.5, QDP, 1600Mbps	1.8V/1.2V/1.2V	CS	
16Gb	LPDDR3	2CH x32	K3QF2F20DM-FGCE	256-FBGA, 14x14 PoP, QDP, 1600Mbps	1.8V/1.2V/1.2V	CS	
		2CH x32	K3QF2F20DA-QGCE	216-FBGA, 15x15 PoP, QDP, 1600Mbps	1.8V/1.2V/1.2V	Now	

## GRAPHICS DRAM COMPONENTS

Type	Density	Organization	Part Number	Package	VDD/VDDQ	Speed Bin (MHz)	Production
GDDR5	4Gb	128Mx32	K4G41325FC-HC(04/03/28)	170-FCFBGA	1.5V/1.5V	5000/6000/7000	Now
			K4G41325FC-HC(04/03)	170-FCFBGA	1.35V/1.35V	4000/5000	Now
	2Gb	64Mx32	K4G20325FD-FC(04/03/28)	170-FBGA	1.5V/1.5V	5000/6000/7000	Now
			K4G20325FD-FC(04/03)	170-FBGA	1.35V/1.35V	4000/5000	Now
	1Gb	32Mx32	K4G10325FG-HC(03)	170-FCFBGA	1.6V/1.6V	6000	Now
			K4G10325FG-HC(05/04)	170-FCFBGA	1.5V/1.5V	4000/5000	Now
GDDR3	1Gb	32Mx32	K4J10324KG-HC(14/1A)	136-FBGA	1.8V/1.8V	1400/2000	Now
gDDR3	4Gb	256Mx16	K4W4G1646D-BC(12/11/1A)	96-FCFBGA	1.5V/1.5V	1600/1866/2133	Now
			K4W4G1646D-BC(1A)	96-FCFBGA	1.35V/1.35V	1866	
			K4W4G1646D-BY(12)	96-FCFBGA	1.35V/1.35V	1600	
			K4W4G1646B-HC(12/11/1A)	96-FBGA	1.5V/1.5V	1600/1866/2133	Now
	2Gb	128Mx16	K4W2G1646Q-BC(12/11/1A)	96-FCFBGA	1.5V/1.5V	1600/1866/2133	Now
			K4W2G1646Q-BC(1A)	96-FCFBGA	1.35V/1.35V	1866	
			K4W2G1646Q-BY(12)	96-FCFBGA	1.35V/1.35V	1600	
			K4W2G1646E-BC(15/12/11/1A)	96-FBGA	1.5V/1.5V	1333/1600/1866/2133	Now
			K4W1G1646G-BC(15/12/11/1A)	96-FBGA	1.5V/1.5V	1333/1600/1866/2133	Now

Notes: **Package**  
H: FBGA (Halogen Free & Lead Free) (DDR3)  
B: FCFBGA (Halogen Free & Lead Free) (DDR3)  
H: FCFBGA (Halogen Free & Lead Free) (GDDR5)  
F: FBGA (Halogen Free & Lead Free) (GDDR5)

**(1) Speeds (clock cycle - speed bin)**  
28: 0.28ns (7000Mbps) 1A: 1.0ns (2000Mbps GDDR3)  
03: 0.3ns (6000Mbps) 14: 1.4ns (1400Mbps GDDR3)  
04: 0.4ns (5000Mbps) 1A: 1.0ns (2133Mbps gDDR3)  
05: 0.5ns (4000Mbps) 11: 1.1ns (1866Mbps)  
12: 1.25ns (1600Mbps)

# COMPONENT DRAM ORDERING INFORMATION

	1	2	3	4	5	6	7	8	9	10	11
	<b>K</b>	<b>4</b>	<b>T</b>	<b>XX</b>	<b>XX</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>XX</b>
<b>SAMSUNG Memory</b>											<b>Speed</b>
<b>DRAM</b>											<b>Temp &amp; Power</b>
<b>DRAM Type</b>											<b>Package Type</b>
<b>Density</b>											<b>Generation</b>
<b>Bit Organization</b>											<b>Interface (VDD, VDDQ)</b>
											<b>Number of Internal Banks</b>

## 1. Memory (K)

## 2. DRAM: 4

## 3. DRAM Type

B: DDR3 SDRAM  
 D: GDDR SDRAM  
 G: GDDR5 SDRAM  
 H: DDR SDRAM  
 J: GDDR3 SDRAM  
 M: Mobile SDRAM  
 N: SDDR2 SDRAM  
 S: SDRAM  
 T: DDR SDRAM  
 U: GDDR4 SDRAM  
 V: Mobile DDR SDRAM Power Efficient Address  
 W: SDDR3 SDRAM  
 X: Mobile DDR SDRAM  
 Y: XDR DRAM  
 Z: Value Added DRAM

## 4. Density

10: 1G, 8K/32ms  
 16: 16M, 4K/64ms  
 26: 128M, 4K/32ms  
 28: 128M, 4K/64ms  
 32: 32M, 2K/32ms  
 50: 512M, 32K/16ms  
 51: 512M, 8K/64ms  
 52: 512M, 8K/32ms  
 54: 256M, 16K/16ms  
 55: 256M, 4K/32ms  
 56: 256M, 8K/64ms  
 62: 64M, 2K/16ms  
 64: 64M, 4K/64ms  
 68: 768M, 8K/64ms  
 1G: 1G, 8K/64ms  
 2G: 2G, 8K/64ms  
 4G: 4G, 8K/64ms

## 5. Bit Organization

02: x2  
 04: x4  
 06: x4 Stack (Flexframe)  
 07: x8 Stack (Flexframe)

08: x8  
 15: x16 (2CS)  
 16: x16  
 26: x4 Stack (JEDEC Standard)  
 27: x8 Stack (JEDEC Standard)  
 30: x32 (2CS, 2CKE)  
 31: x32 (2CS)  
 32: x32

## 6. # of Internal Banks

2: 2 Banks  
 3: 4 Banks  
 4: 8 Banks  
 5: 16 Banks

## 7. Interface ( VDD, VDDQ)

2: LVTTTL, 3.3V, 3.3V  
 4: LVTTTL, 2.5V, 2.5V  
 5: SSTL-2 1.8V, 1.8V  
 6: SSTL-15 1.5V, 1.5V  
 8: SSTL-2, 2.5V, 2.5V  
 A: SSTL, 2.5V, 1.8V  
 F: POD-15 (1.5V, 1.5V)  
 H: SSTL\_2 DLL, 3.3V, 2.5V  
 M: LVTTTL, 1.8V, 1.5V  
 N: LVTTTL, 1.5V, 1.5V  
 P: LVTTTL, 1.8V, 1.8V  
 Q: SSTL-2 1.8V, 1.8V  
 R: SSTL-2, 2.8V, 2.8V  
 U: DRSL, 1.8V, 1.2V

## 8. Generation

A: 2nd Generation  
 B: 3rd Generation  
 C: 4th Generation  
 D: 5th Generation  
 E: 6th Generation  
 F: 7th Generation  
 G: 8th Generation  
 H: 9th Generation  
 I: 10th Generation  
 J: 11th Generation  
 K: 12th Generation  
 M: 1st Generation  
 N: 14th Generation  
 Q: 17th Generation

## 9. Package Type

### DDR2 DRAM

L: TSOP II (Lead-free & Halogen-free)  
 H: FBGA (Lead-free & Halogen-free)  
 F: FBGA for 64Mb DDR (Lead-free & Halogen-free)  
 6: sTSOP II (Lead-free & Halogen-free)  
 T: TSOP II  
 N: sTSOP II  
 G: FBGA  
 U: TSOP II (Lead-free)  
 V: sTSOP II (Lead-free)  
 Z: FBGA (Lead-free)

### DDR2 SDRAM

Z: FBGA (Lead-free)  
 J: FBGA DDP (Lead-free)  
 Q: FBGA QDP (Lead-free)  
 H: FBGA (Lead-free & Halogen-free)  
 M: FBGA DDP (Lead-free & Halogen-free)  
 E: FBGA QDP (Lead-free & Halogen-free)  
 T: FBGA DSP (Lead-free & Halogen-free, Thin)

### DDR3 SDRAM

Z: FBGA (Lead-free)  
 H: FBGA (Halogen-free & Lead-free)

### Graphics Memory

Q: TQFP  
 U: TQFP (Lead Free)  
 G: 84/144 FBGA  
 V: 144 FBGA (Lead Free)  
 Z: 84 FBGA (Lead Free)  
 T: TSOP  
 L: TSOP (Lead Free)  
 A: 136 FBGA  
 B: 136 FBGA (Lead Free)  
 H: FBGA (Hologen Free & Lead Free)  
 E: 100 FBGA (Hologen Free & Lead Free)

### SDRAM

L TSOP II (Lead-free & Halogen-free)  
 N: STSOP II  
 T: TSOP II  
 U: TSOP II (Lead-free)  
 V: sTSOP II (Lead-free)

## COMPONENT DRAM ORDERING INFORMATION

	1	2	3	4	5	6	7	8	9	10	11
	K	4	T	XX	XX	X	X	X	X	X	XX
SAMSUNG Memory											Speed
DRAM											Temp & Power
DRAM Type											Package Type
Density											Generation
Bit Organization											Interface (VDD, VDDQ)
											Number of Internal Banks

### XDR DRAM

J: BOC(LF) P: BOC

### Mobile DRAM

#### Leaded/Lead Free

G/A: 52balls FBGA Mono

R/B: 54balls FBGA Mono

X/Z: 54balls BOC Mono

J/V: 60(72)balls FBGA Mono 0.5pitch

L /F: 60balls FBGA Mono 0.8pitch

S/D: 90balls FBGA

#### Monolithic (11mm x 13mm)

F/H: Smaller 90balls FBGA Mono

Y/P: 54balls CSP DDP

M/E: 90balls FBGA DDP

### DDR2 SDRAM

CC: DDR2-400 (200MHz @ CL=3, tRCD=3, tRP=3)

D5: DDR2-533 (266MHz @ CL=4, tRCD=4, tRP=4)

E6: DDR2-667 (333MHz @ CL=5, tRCD=5, tRP=5)

F7: DDR2-800 (400MHz @ CL=6, tRCD=6, tRP=6)

E7: DDR2-800 (400MHz @ CL=5, tRCD=5, tRP=5)

### DDR3 SDRAM

F7: DDR3-800 (400MHz @ CL=6, tRCD=6, tRP=6)

F8: DDR3-1066 (533MHz @ CL=7, tRCD=7, tRP=7)

G8: DDR3-1066 (533MHz @ CL=8, tRCD=8, tRP=8)

H9: DDR3-1333 (667MHz @ CL=9, tRCD=9, tRP=9)

K0: DDR3-1600 (800MHz @ CL=11, tRCD=11, tRP=11)

MA: DDR3-1866 (933MHz @ CL=13, tRCD=13, tRP=13)

NB: DDR3-2133 (1067MHz @ CL=14, tRCD=14, tRP=14)

### Graphics Memory

18: 1.8ns (550MHz)

04: 0.4ns (2500MHz)

20: 2.0ns (500MHz)

05: 0.5ns (2000MHz)

22: 2.2ns (450MHz)

5C: 0.56ns (1800MHz)

25: 2.5ns (400MHz)

06: 0.62ns (1600MHz)

2C: 2.66ns (375MHz)

6A: 0.66ns (1500MHz)

2A: 2.86ns (350MHz)

07: 0.71ns (1400MHz)

33: 3.3ns (300MHz)

7A: 0.77ns (1300MHz)

36: 3.6ns (275MHz)

08: 0.8ns (1200MHz)

40: 4.0ns (250MHz)

09: 0.9ns (1100MHz)

45: 4.5ns (222MHz)

1 : 1.0ns (1000MHz)

50/5A: 5.0ns (200MHz)

1 : 1.1ns (900MHz)

55: 5.5ns (183MHz)

12: 1.25ns (800MHz)

60: 6.0ns (166MHz)

14: 1.4ns (700MHz)

16: 1.6ns (600MHz)

### SDRAM (Default CL=3)

50: 5.0ns (200MHz CL=3)

60: 6.0ns (166MHz CL=3)

67: 6.7ns

75: 7.5ns PC133 (133MHz CL=3)

### XDR DRAM

A2: 2.4Gbps, 36ns, 16Cycles

B3: 3.2Gbps, 35ns, 20Cycles

C3: 3.2Gbps, 35ns, 24Cycles

C4: 4.0Gbps, 28ns, 24Cycles

DS: Daisychain Sample

### Mobile-SDRAM

60: 166MHz, CL 3

75: 133MHz, CL 3

80: 125MHz, CL 3

1H: 105MHz, CL 2

1L: 105MHz, CL 3

15: 66MHz, CL 2 & 3

### Mobile-DDR

C3: 133MHz, CL 3

C2: 100MHz, CL 3

C0: 66MHz, CL 3

Note: All Lead-free and Halogen-free products are in compliance with RoHS

## 10. Temp & Power - COMMON (Temp, Power)

C: Commercial, Normal (0°C – 95°C) & Normal Power

C: (Mobile Only) Commercial (-25 ~ 70°C), Normal Power

J: Commercial, Medium

L: Commercial, Low (0°C – 95°C) & Low Power

L: (Mobile Only) Commercial, Low, i-TCSR

F: Commercial, Low, i-TCSR & PASR & DS

E: Extended (-25~85°C), Normal

N: Extended, Low, i-TCSR

G: Extended, Low, i-TCSR & PASR & DS

I: Industrial, Normal (-40°C – 85°C) & Normal Power

P: Industrial, Low (-40°C – 85°C) & Low Power

H: Industrial, Low, i-TCSR & PASR & DS

## 11. Speed (Wafer/Chip Biz/BGD: 00)

### DDR SDRAM

CC: DDR400 (200MHz @ CL=3, tRCD=3, tRP=3)

B3: DDR333 (166MHz @ CL=2.5, tRCD=3, tRP=3) \*1

A2: DDR266 (133MHz @ CL=2, tRCD=3, tRP=3)

B0: DDR266 (133MHz @ CL=2.5, tRCD=3, tRP=3)

Note 1: "B3" has compatibility with "A2" and "B0"

## MODULE DRAM ORDERING INFORMATION

	1	2	3	4	5	6	7	8	9	10	11	12	13
	M	X	XX	T	XX	X	X	X	X	X	X	XX	X
SAMSUNG Memory													AMB Vendor
DIMM													Speed
Data bits													Temp & Power
DRAM Component Type													PCB Revision
Depth													Package
Number of Banks													Generation
Bit Organization													

### 1. Memory Module: M

#### 2. DIMM Type

- 3: DIMM
- 4: SODIMM

#### 3. Data bits

- 12: x72 184pin Low Profile Registered DIMM
- 63: x63 PC100/PC133 μSODIMM with SPD for 144pin
- 64: x64 PC100/PC133 SODIMM with SPD for 144pin (Intel/JEDEC)
- 66: x64 Unbuffered DIMM with SPD for 144pin/168pin (Intel/JEDEC)
- 68: x64 184pin Unbuffered DIMM
- 70: x64 200pin Unbuffered SODIMM
- 71: x64 204pin Unbuffered SODIMM
- 74: x72/ECC Unbuffered DIMM with SPD for 168pin (Intel/JEDEC)
- 77: x72/ECC PLL + Register DIMM with SPD for 168pin (Intel PC100)
- 78: x64 240pin Unbuffered DIMM
- 81: x72 184pin ECC unbuffered DIMM
- 83: x72 184pin Registered DIMM
- 90: x72/ECC PLL + Register DIMM
- 91: x72 240pin ECC unbuffered DIMM
- 92: x72 240pin VLP Registered DIMM
- 93: x72 240pin Registered DIMM
- 95: x72 240pin Fully Buffered DIMM with SPD for 168pin (JEDEC PC133)

#### 4. DRAM Component Type

- B: DDR3 SDRAM (1.5V VDD)
- L: DDR SDRAM (2.5V VDD)
- S: SDRAM
- T: DDR2 SDRAM (1.8V VDD)

### 5. Depth

- 09: 8M (for 128Mb/512Mb)
- 17: 16M (for 128Mb/512Mb)
- 16: 16M
- 28: 128M
- 29: 128M (for 128Mb/512Mb)
- 32: 32M
- 33: 32M (for 128Mb/512Mb)
- 51: 512M
- 52: 512M (for 512Mb/2Gb)
- 56: 256M
- 57: 256M (for 512Mb/2Gb)
- 59: 256M (for 128Mb/512Mb)
- 64: 64M
- 65: 64M (for 128Mb/512Mb)
- 1G: 1G
- 1K: 1G (for 2Gb)

### 6. # of Banks in Comp. & Interface

- 1: 4K/64mxRef., 4Banks & SSTL-2
- 2 : 8K/64ms Ref., 4Banks & SSTL-2
- 2: 4K/64ms Ref., 4Banks & LVTTL (SDR Only)
- 5: 8K/64ms Ref., 4Banks & LVTTL (SDR Only)
- 5: 4Banks & SSTL-1.8V
- 6: 8Banks & SSTL-1.8V

### 7. Bit Organization

- 0: x 4
- 3: x 8
- 4: x16
- 6: x 4 Stack (JEDEC Standard)
- 7: x 8 Stack (JEDEC Standard)
- 8: x 4 Stack
- 9: x 8 Stack

### 8. Generation

- A: 2nd Gen.
- B: 3rd Gen.
- C: 4th Gen.
- D: 5th Gen.
- E: 6th Gen.
- F: 7th Gen.
- G: 8th Gen.
- M: 1st Gen.
- Q: 17th Gen.

### 9. Package

- E: FBGA QDP (Lead-free & Halogen-free)
- G: FBGA
- H: FBGA (Lead-free & Halogen-free)
- J: FBGA DDP (Lead-free)
- M: FBGA DDP (Lead-free & Halogen-free)
- N: sTSOP
- Q: FBGA QDP (Lead-free)
- T: TSOP II (400mil)
- U: TSOP II (Lead-Free)
- V: sTSOP II (Lead-Free)
- Z: FBGA (Lead-free)

### 10. PCB Revision

- 0: Mother PCB
- 1: 1st Rev
- 2: 2nd Rev.
- 3: 3rd Rev.
- 4: 4th Rev.
- A: Parity DIMM
- S: Reduced PCB
- U: Low Profile DIMM

### 11. Temp & Power

- C: Commercial Temp. (0°C ~ 95°C) & Normal Power
- L: Commercial Temp. (0°C ~ 95°C) & Low Power

### 12. Speed

- CC: (200MHz @ CL=3, tRCD=3, tRP=3)
- D5: (266MHz @ CL=4, tRCD=4, tRP=4)
- E6: (333MHz @ CL=5, tRCD=5, tRP=5)
- F7: (400MHz @ CL=6, tRCD=6, tRP=6)
- E7: (400MHz @ CL=5, tRCD=5, tRP=5)
- F8: (533MHz @ CL=7, tRCD=7, tRP=7)
- G8: (533MHz @ CL=8, tRCD=8, tRP=8)
- H9: (667MHz @ CL=9, tRCD=9, tRP=9)
- K0: (800MHz @ CL=10, tRCD=10, tRP=10)
- 7A: (133MHz CL=3/PC100 CL2)

### 13. AMB Vendor for FBDIMM

- 0, 5: Intel
- 1, 6, 8: IDT
- 9: Montage

Note: All Lead-free and Halogen-free products are in compliance with RoHS

## SLC FLASH

Density	Technology	Part Number	Package Type	Org.	Vol(V)	Status
16Gb QDP	21nm SDR	K9WAG08U1E-SCB0*	TSOP1-LF/HF	x8	3.3	Sampling now
		K9WAG08U1E-SIB0*	TSOP1-LF/HF, i-temp	x8	3.3	Sampling now
8Gb DDP	21nm SDR	K9K8G08U0E-SCB0*	TSOP1-LF/HF	x8	3.3	Sampling now
		K9K8G08U0E-SIB0*	TSOP1-LF/HF, i-temp	x8	3.3	Sampling now
4Gb	21nm SDR	K9F4G08U0E-SCB0*	TSOP1 LF/HF	x8	3.3	Sampling now
		K9F4G08U0E-SIB0*	TSOP1 LF/HF, i-temp	x8	3.3	Sampling now
1Gb	21nm SDR	K9F1G08U0E-SCB0*	TSOP1-LF/HF	x8	3.3	CS Sept'13
		K9F1G08U0E-SIB0*	TSOP1-LF/HF, i-temp	x8	3.3	CS Sept'13
		K9F1G08U0E-BCB0*	FBGA-LF/HF	x8	3.3	CS Sept'13
		K9F1G08U0E-BIB0*	FBGA-LF/HF, i-temp	x8	3.3	CS Sept'13
16Gb QDP	42nm SDR	K9WAG08U1D-SCB0*	TSOP1	x8	3.3	<b>42nm SLC EOL Notice:</b> Last-time buy: Dec 2013 Last-time ship: Mar 2014
		K9WAG08U1D-SIB0*	TSOP1	x8	3.3	
8Gb DDP	42nm SDR	K9K8G08U0D-SCB0*	TSOP-LF/HF	x8	3.3	
		K9K8G08U0D-SIB0*	TSOP-LF/HF, i-temp	x8	3.3	
4Gb	42nm SDR	K9F4G08U0D-SCB0*	TSOP1 HF & LF	x8	3.3	
		K9F4G08U0D-SIB0*	TSOP1 HF & LF, i-temp	x8	3.3	
2Gb	42nm SDR	K9F2G08U0C-SCB0*	TSOP-LF/HF	x8	3.3	
		K9F2G08U0C-SIB0*	TSOP-LF/HF, i-temp	x8	3.3	
1Gb	42nm SDR	K9F1G08U0D-SCB0*	TSOP-LF/HF	x8	3.3	
		K9F1G08U0D-SIB0*	TSOP-LF/HF, i-temp	x8	3.3	

Please contact your local Samsung sales representative for latest product offerings.

Note: All parts are lead free

## MLC FLASH

Type	Density	Technology	Part Number	Package Type	Org.	Vol(V)	Status
2bit	512Gb ODP	21nm DDR	K9PHGY8S5A-HCK0000	132BGA	x8	3.3/1.8	<b>21nm 2bit MLC EOL Notice:</b> Last-time buy: Nov 2013 Last-time ship: Feb 2014
	256Gb QDP	21nm DDR	K9HFGY8S5A-HCK0000	132BGA	x8	3.3/1.8	
	128Gb DDP	21nm DDR	K9LDGY8S1A-HCK0000	132BGA	x8	3.3/1.8	
	64Gb mono	21nm DDR	K9GCGY8S0A-HCK0000	132BGA	x8	3.3/1.8	
	32Gb mono	21nm SDR	K9GBG08U0B-SCB0000	48TSOP	x8	3.3	
		21nm DDR	K9GBGY8U0B-HCK0000	132BGA	x8	3.3/1.8	
3bit	256Gb QDP	21nm DDR	K9CFGD8U1A-SCB0000	48TSOP	x8	3.3	<b>21nm 3bit MLC EOL Notice:</b> Last-time buy: Nov 2013 Last-time ship: Feb 2014
	128Gb DDP	21nm DDR	K9BDGD8U0A-SCB0000	48TSOP	x8	3.3	
	64Gb mono	21nm DDR	K9ACGD8U0A-SCB0000	48TSOP	x8	3.3	
	32Gb mono	21nm DDR	K9ABGD8U0C-SCB0000	48TSOP	x8	3.3	

Please contact your local Samsung sales representative for latest product offerings.

Note: All parts are lead-free & halogen-free

## INDUSTRIAL CARDS

Density	Part Number	Sequential Reads	Sequential Writes
8GB	MMCAF08G3ACA-QMWCV	24 MB/s	16MB/s
16GB	MMCAF16GWACA-QMWCV	24 MB/s	21MB/s

Please contact your local Samsung sales representative for part numbers and latest product offerings.

## microSD FLASH CARDS

Application	Density	Part Number	Class	Ultra High Speed (UHS)
uSD Cards	2GB	MMAURO2G3ACA-QNJ00	CL4	
	4GB	MMBTR04G3CCA-QNJ00	CL4	UHS 104
	8GB	MMCTR08G3ACH-QNJ00	CL4	UHS 104
	16GB	MMCTR16GUACJ-SAC00	CL10	UHS 104
	32GB	MMCTR32GUACJ-SAC00	CL10	UHS 104
	64GB	MMCTR64GUACJ-SAC00	CL10	UHS 104

Please contact your local Samsung sales representative for part numbers and latest product offerings.

## microSD Card Key Features

- Durable and high-performance data storage for your secure digital (SD)-enabled handset and tablet designs
- Fastest performing, sturdiest and most dependable memory cards on the market today
- 10nm-class leading-edge NAND chips, advanced controller designs and state-of-the-art firmware
- 4GB ~ 64GB capacities, UHS-104, Class 6/10

### A variety of storage capacities to fit all usage needs

Usage	4GB	8GB	16GB	32GB	64GB
<b>Photo*</b>	750 photos	1,500 photos	3,000 photos	6,000 photos	12,000 photos
<b>Video**</b>	30 mins	60 mins	120 mins	240 mins	480 mins
<b>Music***</b>	940 songs	1,880 songs	3,760 songs	7,520 songs	15,040 songs

\*\*Photo: 20 Megapixels (5472x2448) \*\*Video: H264@1080p \*\*\*Music: 3.5 minute MP3 song

## High Capacities

With Samsung's full lineup of microSD cards, you can capture more photos and videos, and download more media files and apps to your mobile device without worrying about speed or capacity.



## Extreme Performance

All of Samsung's microSD cards feature the highest quality NAND and are available with UHS-I support, offering Samsung's fastest speeds at up to 80MB/s Read and 20MB/s Write—ideal for use in high-end smart phones and tablet PCs.



## MAINSTREAM eMMC

Density	Flash	MMC*	Class	Part Number	Seq R/W Perf (MB/s)	Random R/W IOPS	Package Size (mm)	C/S
4GB	32Gb*1	5.0	200	KLM4G1YEMD-C031	100/6	2500/200	11.5x13x0.8	Oct
8GB	64Gb*1	5.0	200	KLM8G1WEMB-B031	100/6	2500/200	11.5x13x0.8	Sep
16GB	64Gb*2	5.0	700	KLMAG2WEMB-B031	170/11	4000/500	11.5x13x0.8	Oct
32GB	64Gb*4	5.0	1500	KLMAG4WEMB-B031	200/50	4000/1500	11.5x13x1.0	Sep
64GB	64Gb*8	5.0	1500	KLMCG8WEMB-B031	200/50	4000/1500	11.5x13x1.0	Oct

\*MMC5.0 is backwards compatible with 4.5 & 4.41

## eMMC-PRO (HIGH PERFORMANCE)

Density	Flash	MMC*	Class	Part Number	Seq R/W Perf (MB/s)	Random R/W IOPS	Package Size (mm)	C/S
4GB	32Gb*1	5.0	700	KLM4G1FEAC-B031	150/10	4000/700	11x10x0.8	Now
8GB	64Gb*1	5.0	700	KLMAG2GEAC-B031	180/20	4000/700	11.5x13x1.0	Now
16GB	64Gb*2	5.0	2000	KLMAG2GEAC-B031	240/40	6000/2500	11.5x13x1.0	Now
32GB	64Gb*4	5.0	2000	KLMAG4GEAC-B031	240/60	6000/2500	11.5x13x1.0	Now
64GB	64Gb*8	5.0	2000	KLMCG8GEAC-B031	240/60	6000/2500	11.5x13x1.2	Now
128GB	64Gb*16	4.5	2000	KLMDGAGEAC-B001	150/50	4000/2000	11.5x13x1.4	Now

\*MMC5.0 is backwards compatible with 4.5 & 4.41

## eMMC Key Features

- Industry's fastest eMMC
- Fully-managed NAND
- Low active & standby power
- High density in small form factor (11.5x13mm pkg)
- 4GB to 128GB capacities
- JEDEC standard MMC 4.51/5.0
- Leading edge 10nm-class NAND Flash
- Advanced controller & firmware design

### Performance Specs

32GB, 64GB	eMMC 4.5	eMMC 5.0
Interface Speed	200MB/s	400MB/s
Random R/W	3500/2000 IOPS	7000/2500 IOPS
Sequential R/W	150/50 MB/s	250/60 MB/s

\* Device performance condition: x8 Bus, Cache-On mode, without host overhead.

### Applications

eMMC is the ideal flash solution for tablets and smartphones, as well as applications from eReaders, HD cameras and smart TVs to PNDs, multi-media players and gaming devices.

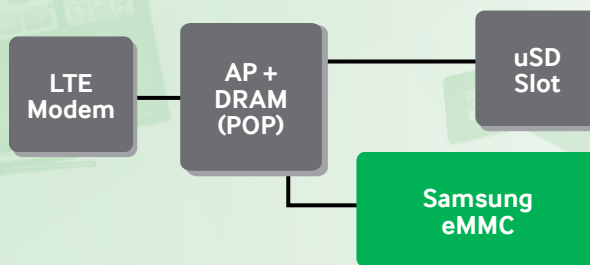
## Industry-Leading Smartphone and Tablet Design

### Specifications

- Density: 4GB to 128GB
- Class: 200/700/1500/2000\*
- Flash: 32Gb/64Gb
- Package Type: FBGA
- Package Size: 11x10mm, 11.5x13mm
- eMMC: 4.5/5.0

\* Class = Random Write IOPS

### Simple Block Diagram



## SOLID STATE DRIVES (SSD)

Drive Type	Drive Name	Interface	Form Factor	Connector	Component	Power-loss Protection	Density	Part Number	Status	
Client PC/ Embedded	PM841	SATA III - 6Gb/s	mSATA MO-300	Mini PCI-E	3-bit MLC	No	128GB	MZMTD128HAFV-00000	EOL	
							256GB	MZMTD256HAGM-00000	EOL	
							512GB	MZMTD512HAGL-00000	EOL	
	SM841	SATA III - 6Gb/s	mSATA MO-300	Mini PCI-E	2-bit MLC	No	128GB	MZMPD128HAFV-00000	EOL	
							256GB	MZMPD256HAGM-00000	EOL	
							512GB	MZMPD512HAGL-00000	EOL	
	XP941	PCIe - SATAe	M.2 (22x80mm)	M.2	2-bit MLC	No	128GB	MZHPU128HCGM-00000	MP	
							256GB	MZHPU256HCGL-00000	MP	
							512GB	MZHPU512HCGL-00000	MP	
Data Center	PM843	SATA III - 6Gb/s	2.5" 7mmT	SF-8223	3-bit MLC	No	120GB	MZ7TD120HAFV-000DA	EOL	
							240GB	MZ7TD240HAFV-000DA	EOL	
							480GB	MZ7TD480HAGM-000DA	EOL	
	SM843	SATA III - 6Gb/s	2.5" 7mmT	SF-8223	2-bit MLC	No	120GB	MZ7PD120HAFV-000DA	EOL	
							240GB	MZ7PD240HAFV-000DA	EOL	
							480GB	MZ7PD480HAGM-000DA	EOL	
	SM843T	SATA III - 6Gb/s	2.5" 7mmT	SF-8223	2-bit MLC	Yes	120GB	MZ7WD120HCFV-00003	MP Q4	
							240GB	MZ7WD240HCFV-00003	MP Q4	
							480GB	MZ7WD480HCGM-00003	MP Q4	
							960GB	MZ7WD960HCGP-00003	MP Q4	
	Storage Enclosure	SM1625	SAS Gen 2.0 - 6Gb/s	2.5" 15mmT	SFF-8482	2-bit E-MLC	Yes	100GB	MZ6ER100HAFV-00003	EOL
								200GB	MZ6ER200HAGM-00003	EOL
400GB								MZ6ER400HAGL-00003	EOL	
800GB								MZ6ER800HAGL-00003	EOL	



# FLASH PRODUCTS ORDERING INFORMATION

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	K	9	X	X	X	X	X	X	X	X	-	X	X	X	X
SAMSUNG Memory															Pre-Program Version
NAND Flash															Customer Bad Block
Small Classification															Temp
Density															Package
Density															---
Organization															Generation
Organization															Mode
Vcc															

## 1. Memory (K)

## 2. NAND Flash : 9

## 3. Small Classification

(SLC : Single Level Cell, MLC : Multi Level Cell)

- 7 : SLC eMMC
- 8 : MLC eMMC
- F : SLC Normal
- G : MLC Normal
- H : MLC QDP
- K : SLC DDP
- L : MLC DDP
- M : MLC DSP
- N : SLC DSP
- P : MLC 8 Die Stack
- Q : SLC 8 Die Stack
- S : SLC Single SM
- T : SLC SINGLE (S/B)
- U : 2 Stack MSP
- W : SLC 4 Die Stack

## 4~5. Density

- 12 : 512M
- 56 : 256M
- 1G : 1G
- 2G : 2G
- 4G : 4G
- 8G : 8G
- AG : 16G
- BG : 32G
- CG : 64G
- DG : 128G
- EG : 256G
- LG : 24G
- NG : 96G
- ZG : 48G
- 00 : NONE

## 6~7. Organization

- 00 : NONE
- 08 : x8
- 16 : x16

## 8. Vcc

- A : 1.65V~3.6V
- C : 5.0V (4.5V~5.5V)
- E : 2.3V~3.6V
- Q : 1.8V (1.7V~1.95V)
- U : 2.7V~3.6V
- W : 2.7V~5.5V, 3.0V~5.5V
- B : 2.7V (2.5V~2.9V)
- D : 2.65V (2.4V~2.9V)
- R : 1.8V (1.65V~1.95V)
- T : 2.4V~3.0V
- V : 3.3V (3.0V~3.6V)
- 0 : NONE

## 9. Mode

- 0 : Normal
- 1 : Dual nCE & Dual R/nB
- 3 : Tri/CE & Tri R/B
- 4 : Quad nCE & Single R/nB
- 5 : Quad nCE & Quad R/nB
- 9 : 1st block OTP
- A : Mask Option 1
- L : Low grade

## 10. Generation

- M : 1st Generation
- A : 2nd Generation
- B : 3rd Generation
- C : 4th Generation
- D : 5th Generation

## 11. ----

## 12. Package

- A : COB
- B : FBGA (Halogen-Free, Lead-Free)
- C : CHIP BIZ D : 63-TBGA
- F : WSOP (Lead-Free) G : FBGA
- H : TBGA (Lead-Free)
- I : ULGA (Lead-Free) (12\*17)
- J : FBGA (Lead-Free)
- L : ULGA (Lead-Free) (14\*18)
- M : TLGA N : TLGA2
- P : TSOP1 (Lead-Free)
- Q : TSOP2 (Lead-Free)
- S : TSOP1 (Halogen-Free, Lead-Free)
- T : TSOP2 U : COB (MMC)
- V : WSOP W : Wafer
- Y : TSOP1 Z : WELP (Lead-Free)

## 13. Temp

- C : Commercial I : Industrial
- 0 : NONE (Containing Wafer, CHIP, BIZ, Exception handling code)

## 14. Customer Bad Block

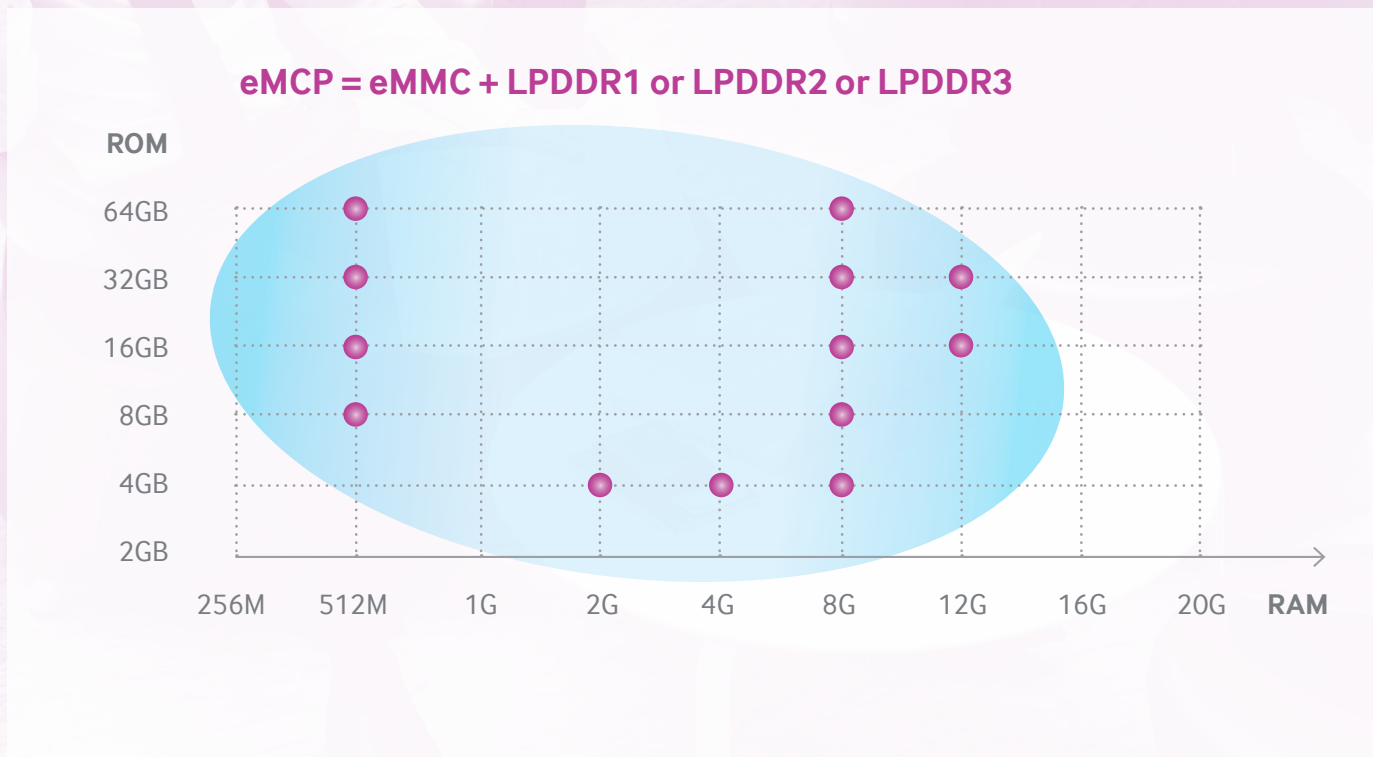
- B : Include Bad Block
- D : Daisychain Sample
- L : 1~5 Bad Block
- N : ini. 0 blk, add. 10 blk
- S : All Good Block
- 0 : NONE (Containing Wafer, CHIP, BIZ, Exception handling code)

## 15. Pre-Program Version

- 0 : None
- Serial (1~9, A~Z)

Samsung has a vast portfolio of eMCP products for a variety of devices, such as mobile phones and tablets. The following illustration shows Samsung's lineup of eMCP memory solutions, which can be deployed in almost any application.

→ Samsung eMCP product suite with different densities and types of Mobile DRAM and eMMC



## eMCP: eMMC + LPDDR3

Memory	eMMC Density	DRAM Density/Organization	Voltage (eMMC-DRAM)	Package
eMMC & MDRAM	4GB	4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	221FBGA 11.5x13mm
	8GB	4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	221FBGA 11.5x13mm
	16GB	4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	221FBGA 11.5x13mm

## eMCP: eMMC + LPDDR2

Memory	eMMC Density	DRAM Density/Organization	Voltage (eMMC-DRAM)	Package
eMMC & MDRAM	4GB	2Gb (x32)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
		4Gb (x32)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
		4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
	8GB	4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
	16GB	4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
		4Gb*4 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
	32GB	4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
		4Gb*4 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm
	64GB	4Gb*2 (x32, 1ch, 2CS)	3.3V/1.8V - 1.8V/1.2V	162FBGA 11.5x13mm

## eMCP: eMMC + MDDR

Memory	eMMC Density	DRAM Density/Organization	Voltage (eMMC-DRAM)	Package
eMMC & MDRAM	4GB	2Gb*2 (x32, 2CS/CKE)	3.3V/1.8V - 1.8V	153FBGA 11.5x13mm
		2Gb*4 (x32, 2CS/CKE)	3.3V/1.8V - 1.8V	153FBGA 11.5x13mm
	8GB	512Mb (x16)	3.3V/1.8V - 1.8V	153FBGA 11.5x13mm
		2Gb*4 (x32, 2CS/CKE)	3.3V/1.8V - 1.8V	153FBGA 11.5x13mm
	16GB	512Mb (x16)	3.3V/1.8V - 1.8V	153FBGA 11.5x13mm
	32GB	512Mb (x16)	3.3V/1.8V - 1.8V	153FBGA 11.5x13mm
	64GB	512Mb (x16)	3.3V/1.8V - 1.8V	153FBGA 11.5x13mm

## SAMSUNG SOLID STATE DRIVES

### STANDARD DATA CENTER SERIES

Read-Intensive Environments

### PRO DATA CENTER SERIES

High-Read and Write Environments

### DELUXE ENTERPRISE SERIES

High-Write Environments

	Samsung PM843	Samsung SM843T	Samsung SM1625
<b>Form Factor</b>	2.5 inches	2.5 inches	2.5 inches
<b>Capacity (GB)</b>	120/240/480	120/240/480/960 GB	100/200/400/800
<b>Host Interface</b>	Serial ATA 3 (6 Gb/s)	Serial ATA 3 (6 Gb/s)	SAS (6 Gb/s)
<b>MTBF</b>	1.5 Million Hours	2,000,000 hours	2,000,000 hours
<b>Uncorrectable Bit Error Rate (UBER)</b>	1x10 <sup>16</sup>	1x10 <sup>17</sup>	1x10 <sup>17</sup>
<b>Power Consumption (Active)</b>	4.2W	3.4W	9W
<b>Power Consumption (Idle)</b>	300 mW	300 mW	4W
<b>Random Read</b>	Up to 60,000 IOPS	Up to 98,000 IOPS	Up to 100,000 IOPS
<b>Random Write</b>	Up to 2,500 IOPS	Up to 15,000 IOPS (28% O/P: up to 35,000 IOPS)	Up to 23,000 IOPS
<b>Random Terabytes Written (TBW)</b>	Up to 320 TBW	Up to 3,860 TBW Up to 2 WPD	Up to 10,200 TBW Up to 10 WPD*
<b>Sequential Read</b>	Up to 520 MB/s	Up to 500 MB/s	Up to 900 MB/s
<b>Sequential Writes</b>	Up to 330 MB/s	Up to 370 MB/s	Up to 500 MB/s
<b>Sequential Terabytes Written (TBW)</b>	Up to 1,280 TBW	Up to 20,000 TBW Up to 11 WPD	Up to 26,500 TBW Up to 18 WPD*
<b>Physical Dimensions</b>	100 x 70 x 7mm	100 x 70 x 7mm	100 x 70 x 15mm
<b>Weight</b>	60g	56g	169g

\*WPD = Drive Writes Per Day for 5 Years

→ Which SSD is right for you?

For more information, email: [SSD@ssi.samsung.com](mailto:SSD@ssi.samsung.com)

## SOLID STATE DRIVES (SSD)

Drive Type	Drive Name	Interface	Form Factor	Connector	Component	Power-loss Protection	Density	Part Number	Status
Client PC/ Embedded	PM841	SATA III - 6Gb/s	mSATA MO-300	Mini PCI-E	3-bit MLC	No	128GB	MZMTD128HAFV-00000	EOL
							256GB	MZMTD256HAGM-00000	EOL
							512GB	MZMTD512HAGL-00000	EOL
	SM841	SATA III - 6Gb/s	mSATA MO-300	Mini PCI-E	2-bit MLC	No	128GB	MZMPD128HAFV-00000	EOL
							256GB	MZMPD256HAGM-00000	EOL
							512GB	MZMPD512HAGL-00000	EOL
	XP941	PCIe - SATAe	M.2 (22x80mm)	M.2	2-bit MLC	No	128GB	MZHPU128HCGM-00000	MP
							256GB	MZHPU256HCGL-00000	MP
							512GB	MZHPU512HCGL-00000	MP
Data Center	PM843	SATA III - 6Gb/s	2.5" 7mmT	SF-8223	3-bit MLC	No	120GB	MZ7TD120HAFV-000DA	EOL
							240GB	MZ7TD240HAFV-000DA	EOL
							480GB	MZ7TD480HAGM-000DA	EOL
	SM843	SATA III - 6Gb/s	2.5" 7mmT	SF-8223	2-bit MLC	No	120GB	MZ7PD120HAFV-000DA	EOL
							240GB	MZ7PD240HAFV-000DA	EOL
							480GB	MZ7PD480HAGM-000DA	EOL
	SM843T	SATA III - 6Gb/s	2.5" 7mmT	SF-8223	2-bit MLC	Yes	120GB	MZ7WD120HCFV-00003	MP Q4
							240GB	MZ7WD240HCFV-00003	MP Q4
							480GB	MZ7WD480HCGM-00003	MP Q4
960GB							MZ7WD960HCGP-00003	MP Q4	
Storage Enclosure	SM1625	SAS Gen 2.0 - 6Gb/s	2.5" 15mmT	SFF-8482	2-bit E-MLC	Yes	100GB	MZ6ER100HAFV-00003	EOL
							200GB	MZ6ER200HAGM-00003	EOL
							400GB	MZ6ER400HAGL-00003	EOL
							800GB	MZ6ER800HAGL-00003	EOL

## BLU-RAY SLIM

Interface	Speed	Type	Loading	Lightscribe	Model
SATA	BD Writer 6X	Slim	Tray	X	SN-506BB

## BLU-RAY WRITER SLIM EXTERNAL

Interface	Speed	Type	Loading	Lightscribe	Model
USB 2.0	BD Writer 6X	Slim	Tray	X	SE-506BB

## DVD-W H/H

Interface	Speed	Type	Loading	Lightscribe	Model
SATA	DVD Write 24X	H/H	Tray	X	SH-224DB

## DVD-W SLIM

Interface	Speed	Type	Loading	Lightscribe	Model
SATA	DVD Write 8X	Slim	Tray	X	SN-208DB

## DVD-W SLIM EXTERNAL

Interface	Speed	Type	Loading	Lightscribe	Model
USB 2.0	DVD Write 8X	Ultra Slim	Tray	X	SE-218CB
		Slim	Tray	X	SE-208DB

## DID Product Classification

<b>E-DID: Exclusive DID</b>	<b>SUPER NARROW BEZEL</b> » Video Wall	<b>OUTDOOR: HIGH LUMINANCE</b> » Up to 1500 nits	
<b>P-DID: Performance DID</b>	<b>NARROW</b> » Narrow » Black Bezel	<b>WALL-MOUNTED</b> » Thin/Light » (Edge LED)	<b>LARGE FORMAT DISPLAY</b> » 70"/82"
<b>B-DID: Basic DID</b>	<b>LANDSCAPE/PORTRAIT CONVERTIBLE</b>	<b>ANIT-GLARE/ ANTI-REFLECTIVE</b>	

### Why DID Instead of TV?

	Commercial (DID)	Consumer (TV)
<b>WARRANTY</b>	18 months to 2 years	90 days to 1 year
<b>RELIABILITY</b>	Public environments 20 hours + daily duty cycle Variety of temperatures & location	Designed for in-home use in controlled environment 6-8 hours + daily duty cycle In-home living room
<b>PICTURE QUALITY</b>	Designed to resist image retention LCD backlight covers a wider color spectrum necessary for PC source integration giving better picture quality AGAR coating for public viewing	120Hz /240Hz for full-motion video Designed for TV signals
<b>LOCATION</b>	Can be oriented in either portrait or landscape mode	Can only be oriented in landscape mode

## Product Segmentation

**HEAVY USE**

↑

**E-DID: Exclusive**  
Includes all features of P-DID *plus*:  
» Specialty: SNB, High Brightness  
» Robust Design

**P-DID: Performance**  
Includes all features of B-DID *plus*:  
» Narrow & Black Bezel  
» Typ. Brightness: 700 (cd/m<sup>2</sup>)

**B-DID: Basic**  
» Landscape/Portrait  
» High Reliability  
» Pol. (Haze 44%)  
» Long Lifetime: More than 2 Years

↓

**LIGHT USE**

<b>Professional</b>	<b>Outdoor Events</b>	<b>Billboard</b>	
<ul style="list-style-type: none"> <li>Control Room</li> <li>Simulation</li> </ul>	<ul style="list-style-type: none"> <li>Scoreboard</li> <li>Sports Broadcasting</li> </ul>	<ul style="list-style-type: none"> <li>Billboard</li> </ul>	
<b>Entertainment</b>	<b>Transportation</b>	<b>Communication</b>	<b>Rental</b>
<ul style="list-style-type: none"> <li>Casino</li> <li>Theatre</li> <li>Poster</li> <li>Menu</li> </ul>	<ul style="list-style-type: none"> <li>Airport</li> <li>Train/Bus Station</li> </ul>	<ul style="list-style-type: none"> <li>Conference Room</li> </ul>	<ul style="list-style-type: none"> <li>Rental</li> <li>Staging</li> </ul>
<b>Commercial</b>	<b>Education</b>		
<ul style="list-style-type: none"> <li>Kiosk</li> <li>Mart Board</li> </ul>	<ul style="list-style-type: none"> <li>e-Board</li> </ul>		

### Product Segmentation

TYPE	ABBR	WARRANTY	BEZEL	SUGGESTED RUN TIME	BRIGHTNESS	USAGE	APPLICATIONS	PRICING
E-DID	Exclusive	2 years	Narrow and Super Narrow	20 hours +	450 to 1500 nits	Heavy	Outdoor, Video Walls	High-value commercial range
P-DID	Performance	2 years	Narrow	20 hours +	600/700 nits	Medium	Semi-Outdoor	Mid-price range
B-DID	Basic	18 months	Normal	12 hours	450 nits	Light	Indoor, e-Board	High-value commercial range

## SAMSUNG DIGITAL INFORMATION DISPLAY (DID) PANEL LINEUP

Type	Current Model	Size	Model resolution	Bezel	Backlight	Brightness (typical)	Contrast Ratio	Response Time	Frequency	MP*	Comment	High TNI 85°C
E-DID	LT1216XM01	21.6"	960x960	Super narrow	D-LED	450 nits	4,000:1	8ms	60Hz	Now	Square panel	85°C
	LT1460HN03	46"	FHD	Narrow + Black	CCFL	1500 nits	3,000:1	8ms	60Hz	Ltd Avail.	High Bright, Hi Temp LC, 1/4λ Pol.	85°C
	LT1460HN01	46"	FHD	Super narrow	D-LED	700 nits	3,000:1	8ms	60Hz	Now	5.9mm Active to Active, LED	85°C
	LT1460HN07	46"	FHD	Super narrow	D-LED	450 nits	3,000:1	8ms	60Hz	Ltd Avail.	5.9mm Active to Active, LED	85°C
	LT1460HN09	46"	FHD	Super narrow	D-LED	500 nits	3,000:1	8ms	60Hz	New 10/13	5.9mm Active to Active, LED	85°C
	LT1460AA05	46"	HD	Super narrow	CCFL	450 nits	4,000:1	8ms	60Hz	EOL	7.3mm Active to Active	85°C
	LT1460AN01	46"	HD	Super narrow	CCFL	450 nits	4,000:1	8ms	60Hz	NEW	7.3mm Active to Active, TiCu	85°C
	LT1460HN10	16"	FHD	Narrow	D-LED	2,500 nits	3,000:1	8Ms	60Hz	New 11/13	High Bright, Hi Temp LC, 1/4λ Pol.	110°C
	LT1550HN01	55"	FHD	Super narrow	D-LED	700 nits	3,000:1	8ms	60Hz	Now	5.9mm Active to Active, LED	85°C
	LT1550HN05	55"	FHD	Super narrow	D-LED	450 nits	3,000:1	8ms	60Hz	Ltd Avail.	5.9mm Active to Active, LED	85°C
LT1550HN08	55"	FHD	Super narrow	D-LED	500 nits	3,000:1	8ms	60Hz	New 10/13	5.7mm Active to Active, LED	85°C	
P-DID	LT1400HA08	40"	FHD	Narrow + Black	CCFL	700 nits	3,000:1	8ms	60Hz	Ltd Avail.		85°C
	LT1400HA10	40"	FHD	Narrow	E-LED	700 nits	3,000:1	8ms	60Hz	Now	LED	85°C
	LT1460HN05	46"	FHD	Narrow + Black	CCFL	700 nits	3,500:1	8ms	60Hz	Ltd Avail.		85°C
	LT1460HN08	46"	FHD	Narrow	E-LED	700 nits	4,000:1	8ms	60Hz	Now	LED	85°C
	LT1550HN03	55"	FHD	Narrow	CCFL	700 nits	4,000:1	8ms	60Hz	Ltd Avail.		85°C
	LT1550HN06	55"	FHD	Narrow	E-LED	700 nits	4,000:1	8ms	60Hz	Now		85°C
	LT1550HN07	55"	FHD	Narrow	E-LED	450 nits	4,000:1	8ms	60Hz	New 7/13		85°C
	LT1700HD01	70"	FHD	Normal	CCFL	600 nits	2,000:1	8ms	60Hz	EOL		
LT1820HT-L01	82"	FHD	Normal	CCFL	600 nits	2,000:1	8ms	60Hz	EOL			
B-DID	LT1460HN04-N	46"	FHD	Normal	CCFL	450 nits	3,000:1	8ms	60Hz	EOL		85°C
	LT1550HN02	55"	FHD	Normal	CCFL	450 nits	3,500:1	8ms	60Hz	Now		85°C
	LT1700HA02	70"	FHD	Normal	E-LED	400 nits	4,000:1	8ms	60Hz	Now	E-Board; Landscape mode only	85°C
	LT1820HD03	82"	FHD	Normal	CCFL	450 nits	2,000:1	8ms	60Hz	EOL	E-Board; Landscape mode only	
	LT1820HA01	82"	FHD	Normal	E-LED	450 nits	3,000:1	8ms	60Hz	New 8/13	E-Board; Landscape mode only	85°C
Transparent	LT1460AP01	46"	HD	Narrow	Transparent/No BLU		4,500:1	8ms	60Hz	Now		
	LT1220MT02	46"	WSXGA+	Narrow	Transparent/No BLU		5,000:1	5ms	60Hz	EOL	LVDS Input	

## TABLETS

Size	PN	Mode	Resolution	H(RGB)	V	Aspect Ratio	PPI	Brightness (nits)	MP
7"	LTN070AL01	PLS	WXGA	1280	800	16:10	216	400	EOL
	LTL070NL01	PLS	WSVGA	1024	600	16:09	170	400	Now
8.0" Open Cell	LTL080AL01	PLS	WXGA	1280	800	16:09	189	N/A	Now
10.1"	LTL101AL06	PLS	WXGA	1280	800	16:10	149	400	Now
	LTL101DL03	PLS	WQXGA	2560	1600	16:10	300	370	Now

## MONITORS

Size	PN	Mode	Resolution	H(RGB)	V	Aspect Ratio	PPI	Brightness (nits)	MP
23"	LTM230HT10	TN	FHD	1920	1080	16:09	96	300	Ltd Avail.
	LTM230HT11	TN	FHD	1920	1080	16:09	96	300	New
	LTM230HL01	PLS	FHD	1920	1080	16:09	96	300	Now
27"	LTM270HT03	TN	FHD	1920	1080	16:09	82	300	Now
	LTM270DL02	PLS	QHD	2560	1440	16:09	109	300	Now
	LTM270HL02	PLS	FHD	1920	1080	16:09	82	350	Now



# Contacts

Feel free to contact your local distributor or sales representative with any Samsung sales inquiries.

## Representatives

NAME	PRODUCTS	ADDRESS	MAIN PHONE	FAX
<b>Adelsa</b>	Memory SLSI LCD	Hacienda Corralejo #80 Bosque de Echegaray Naucalpan, Mexico 53310	52-555-560-5002	
		Guadalajara office		
		Monterrey office		
		Cd. Juarez office		
<b>ATMI Sales</b> <a href="http://www.atmisales.com">www.atmisales.com</a>	Memory SLSI	<b>OREGON</b> 4900 S.W. Griffith Drive Suite 253 Beaverton, OR 97005	1-800-898-2446 503-643-8307	503-643-4364 503-643-4364
		<b>WASHINGTON</b> 8581 154th Ave. NE Redmond WA 98052	425-869-7636	425-869-9841
<b>Bear VAI Technology</b> <a href="http://www.bearvai.com">www.bearvai.com</a>	Memory SLSI LCD	<b>MAIN OFFICE - BRECKSVILLE, OHIO</b> 6910 Treeline Drive Unit H Brecksville, OH 44141	440-526-1991	440-526-5426
		<b>MAIN OFFICE - INDIANA</b> 11451 Overlook Drive Fishers, IN 46037	440-832-7637	317-845-8650
		<b>SOUTHERN OHIO OFFICES</b> 2676 Longwood Dr. Beavercreek, Ohio 45431	440-526-1991	440-526-5426
		3130 Brookview Dr. Galena, Ohio 43021	440-526-1991	440-526-5426
		<b>PITTSBURGH OFFICE</b> 1975 Menold Dr. Allison Park, PA 15101	440-526-1991	412-364-8776
		<b>INDIANA/KENTUCKY OFFICES</b> 11451 Overlook Drive Fishers, IN 46038	440-526-1991	317-845-8650
		<b>MICHIGAN OFFICES</b> 5506 Alpine Ridge Stevensville, MI 49127	440-526-1991	440-526-5426
		17426 Willow Ridge Northville, MI 48168		
		1844 Clover Ridge Drive Howell, MI 48843		
		600 Broadway Ave NW #617 Grand Rapids, MI 49504		
3120 Edgewood Park Dr. Commerce Twp, MI 48382				
<b>Core Sales, Inc</b> <a href="http://www.coresales.com">www.coresales.com</a>	Memory SLSI LCD	901 Warrenville Road Suite 211 Lisle, IL 60532	847-843-8888	

## Representatives

NAME	PRODUCTS	ADDRESS	MAIN PHONE	FAX
<b>Crestone Technology Group</b> <a href="http://www.crestonegroup.com">www.crestonegroup.com</a>	Memory SLSI LCD	<b>COLORADO</b> 7108 S. Alton Way Building L Centennial, CO 80112	303-280-7202	720-482-2220
		<b>UTAH*</b> <i>*all employees are home office based</i> 841 E. Rosefield Lane Draper, UT 84020		
		1578 West Trailside Road Farmington, UT 84025		
<b>CUSTOMER 1st</b> <a href="http://www.customer1st.com">www.customer1st.com</a>	Memory SLSI LCD	<b>MINNESOTA</b> 2950 Metro Drive, Suite 101 Bloomington, MN 55425	952 851 7909	952 851 7907
		<b>KANSAS</b> 2111 E. Crossroad Lane, Suite 202 Olathe, KS 66062		
		<b>IOWA</b> 342 Eastland Drive SE Cedar Rapids, IA 52403		
<b>Digit Tech Sales, Inc.</b> <a href="http://www.digit-tech.com">www.digit-tech.com</a>	Memory SLSI LCD	P.O. BOX 1945 14 Calle Carro Ste 1 San German PR 00683-4089	787-892-4260	787-892-3366
		Rua Dr. Renato Paes de Barros, 750-Cj.52 Itaim Bibi Sao Paulo, SP, Brazil	5511-3165-2218	5511-3165-2216
		Manaus, Brazil		
		Miami, FL	787-892-4260	787-892-3366
<b>INTELaTECH</b> <a href="http://www.intelatech.com">www.intelatech.com</a>	Memory SLSI	<b>ONTARIO-CANADA</b> 5225 Orbitor Drive, Suite 2 Mississauga, ONT L4W 4Y8	905-629-0082	905-624-6909 905-629-1795 905-629-8910
		21 Concourse Gate, Suite 12 Ottawa, ONT K2E 7S4	905-629-0082	613-221-9160
		<b>ALBERTA-CANADA</b> 14939 Mt. McKenzie Drive SE Calgary, Alberta T2Z 2M6	905-629-0082	403-686-6926
		<b>QUEBEC-CANADA</b> 620 St. Jean Boulevard, Suite 202 Pointe Claire, Quebec H9R 3K2	905-629-0082	905-629-0082
		<b>BRITISH COLUMBIA-CANADA</b> 5811 Cooney Road Suit 305, South Tower Vancouver, BC V5X 3M1	905-629-0082	905-629-1795
<b>I-Squared Incorporated</b> <a href="http://www.isquared.com">www.isquared.com</a>	Memory SLSI LCD	2635 N. 1st Street, Suite 128 San Jose, CA 95134	408-988-3400	408-988-2079
		1250 B Street Petaluma, CA 94952		
<b>Neptune Electronics (necco)</b> <a href="http://www.neccoelect.com">www.neccoelect.com</a>	Memory SLSI LCD	11 Oval Drive, Suite 169 Islandia, NY 11749	631-234-2525	631-234-2707
<b>New Elpis, Inc.</b> <a href="http://www.newelpis.com">www.newelpis.com</a>	LCD	2550 Matheson Boulevard E. Unit 129 Mississauga, ONT Canada L4W 4Z1	905-275-3516	905-275-4109
<b>New Tech Solutions</b> <a href="http://www.ntsca.com">www.ntsca.com</a>	Memory SLSI LCD	26 Ray Avenue Burlington, MA 01803	781-229-8888	781-229-1614

## Representatives

NAME	PRODUCTS	ADDRESS	MAIN PHONE	FAX
<b>Rep One Associates, Inc.</b> <a href="http://www.repone.com">www.repone.com</a>	Memory SLSI LCD	<b>ALABAMA</b> 303 Williams Avenue, Suite 1011 Huntsville, AL 35801	256-539-7371	256-533-4509
		<b>GEORGIA</b> 3000 Langford Road, Building 300 Norcross, GA 30071	770-209-9242 678-591-6753	770-209-9245
		<b>NORTH CAROLINA</b> 5540 Centerview Drive, Suite 200 Raleigh, NC 27606	704-846-5744	919-424-3866
		10800 Sikes Place, Suite 300 Charlotte, NC 28277	704-846-5744	704-846-5925
		<b>FLORIDA</b> 128 Ledbury Drive Longwood, FL 32779		
<b>West Associates</b> <a href="http://www.westassociates.com">www.westassociates.com</a>	Memory SLSI LCD	<b>AUSTIN / SAN ANTONIO</b> 4100 Duval Road Building 1, Ste 102 Austin, TX 78759	512-343-1199	512-343-1922
		<b>DALLAS / OKLAHOMA / ARKANSAS</b> 2745 Dallas Parkway, Suite 460 Plano, TX 75093	972-680-2800	972-699-0330
		<b>HOUSTON / VALLEY / LOUISIANA</b> 1117 Cheshire Lane Houston, TX 77018	512-343-1199	512-343-1922
<b>Tech Coast</b> <a href="http://tc-sales.com">http://tc-sales.com</a>	Memory System Logic LCD	23121 Verdugo Drive, Suite 101 Laguna Hills, CA 92653	949-305-6869	Email: sales@tc-sales.com

## Distributors

NAME	ADDRESS	MAIN PHONE	FAX	OTHER
<b>Edge Electronics, Inc.</b> <a href="http://www.edgeelectronics.com">www.edgeelectronics.com</a>	Headquarters 75 Orville Drive, Unit 2 Bohemia, NY 11716	800-647-EDGE (3343)	631-471-3405	Email: edge@edgeelectronics.com
<b>Avnet, Inc.</b> <a href="http://www.avnet.com">www.avnet.com</a>	Headquarters 2211 South 47th Street Phoenix, AZ 85034	800-409-1483		For sales inquiries: 800-332-8638 <a href="http://www.avnetexpress.com">www.avnetexpress.com</a>
<b>WPG Americas Inc.</b> <a href="http://www.wpgamericas.com">www.wpgamericas.com</a>	Corporate Office 5285 Hellyer Avenue, Suite 150 San Jose, CA 95138	408-392-8100 888-WPG-8881	408-436-9551	For sales inquiries: inquiry@wpgamericas.com
<b>Arrow Electronics, Inc.</b> <a href="http://www.arrow.com">www.arrow.com</a>	Corporate Headquarters 7459 S. Lima Street Englewood, CO 80112-5816	303-824-4000		For sales inquiries: <a href="http://www.arrow.com">www.arrow.com</a> onlinesales@arrow.com 800-833-3557

To access our online sales portal, visit: <https://smarttools.ssi.samsung.com>

→ For all product information please visit: [samsung.com/us/oem-solutions](http://samsung.com/us/oem-solutions)



## MEMORY

DRAM  
Flash  
SRAM  
MCPs



## STORAGE

Solid State Drives  
Optical Disc Drives



## DISPLAYS

Monitors  
Smartphones  
Tablets  
TVs

**SAMSUNG**

Samsung Semiconductor, Inc.  
601 McCarthy Boulevard  
Milpitas, CA 95035

[samsung.com/us/oem-solutions](http://samsung.com/us/oem-solutions)

**Disclaimer:** The information in this publication has been carefully checked and is believed to be accurate at the time of publication. Samsung assumes no responsibility, however, for possible errors or omissions, or for any consequences resulting from the use of the information contained herein. Samsung reserves the right to make changes in its products or product specifications with the intent to improve function or design at any time and without notice and is not required to update this documentation to reflect such changes. This publication does not convey to a purchaser of semiconductor devices described herein any license under the patent rights of Samsung or others. Samsung makes no warranty, representation, or guarantee regarding the suitability of its products for any particular purpose, nor does Samsung assume any liability arising out of the application or use of any product or circuit and specifically disclaims any and all liability, including without limitation any consequential or incidental damages.

**Copyright 2013.** Samsung and Samsung Semiconductor, Inc. are registered trademarks of Samsung Electronics, Co., Ltd. Ultrabooks is a trademark of Intel Corporation. All other names and brands may be claimed as the property of others. The appearance of all products, dates, figures, diagrams and tables are subject to change at any time, without notice.