



**SAMSUNG**



**Samsung Semiconductor, Inc.**  
Product Selection Guide

**Memory and Storage**  
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### DDR3 SDRAM UNBUFFERED MODULES

Density	Org	Speed (Mbps)	Part Number	Rank	Composition	Package
512MB	64Mx64	800/1066/1333	M378B6474CZ0-C(F7/F8/H9)	1	1Gb(64M x16) * 4	RoHS
1GB	128Mx64	800/1066/1333	M378B2873CZ0-C(F7/F8/H9)	1	1Gb(128M x8) * 8	RoHS
2GB	256Mx64	800/1066/1333	M378B5673CZ0-C(F7/F8/H9)	2	1Gb(128M x8) * 16	RoHS

NOTES: E7=DDR3-800 (5-5-5) F8 = DDR3-1066 (7-7-7) G9=DDR3-1333 (8-8-8) Voltage: 1.5V

### DDR3 SDRAM COMPONENTS

Density	Org	Speed (Mbps)	Part Number	Package	Package Dimension
1Gb	256M x4	800/1066/1333	K4B1G0446C-ZC(F7/F8/H9)	94ball FBGA	11x18mm
1Gb	128M x8	800/1066/1333	K4B1G0846C-ZC(F7/F8/H9)	94ball FBGA	11x18mm
1Gb	64M x16	800/1066/1333	K4B1G1646C-ZC(F7/F8/H9)	112ball FBGA	11x18mm

NOTES: E7=DDR3-800 (6-6-6) F8 = DDR3-1066 (7-7-7) G9=DDR3-1333 (9-9-9) Voltage: 1.5V

### DDR2 SDRAM REGISTERED MODULES

Density	Org	Speed (Mbps)	Part Number	Parity			Package
				Register	Rank	Composition	
512MB	64Mx72	400/533/667	M393T6553EZ4-C(CC/D5/E6)	Y	1	(64M x8)*9	Lead-free
1GB	128Mx72	400/533	M393T2950EZ3-C(CC/D5)	N	1	(128M x4)*18	Lead-free
1GB	128Mx72	400/533	M393T2953EZ3-C(CC/D5)	N	2	(64M x8)*18	Lead-free
1GB	128Mx72	400/533/667	M393T2950EZ4-C(CC/D5/E6)	Y	1	(128M x4)*18	Lead-free
1GB	128Mx72	400/533/667	M393T2953EZ4-C(CC/D5/E6)	Y	2	(64M x8)*18	Lead-free
2GB	256Mx72	400/533	M393T5750EZ3-C(CC/D5)	N	2	(128M x4)*36	Lead-free
2GB	256Mx72	400/533	M393T5660CZ3-C(CC/D5)	N	1	(256M x4)*18	Lead-free
2GB	256Mx72	400/533	M393T5663CZ3-C(CC/D5)	N	2	(128M x8)*18	Lead-free
2GB	256Mx72	400/533/667	M393T5750EZ3-C(CC/D5/E6)	Y	2	(128M x4)*36	Lead-free
2GB	256Mx72	400/533/667	M393T5660CZA-C(CC/D5/E6)	Y	1	(256M x4)*18	Lead-free
2GB	256Mx72	533/667	M393T5663CZA-C(D5/E6)	Y	2	(128M x8)*18	Lead-free
4GB	512Mx72	400/533	M393T5160CZ0-C(CC/D5)	N	2	st. (512M x4)*18	Lead-free
4GB	512Mx72	400/533/667	M393T5160CZA-C(CC/D5/E6)	Y	2	st. (512M x4)*18	Lead-free

NOTES: CC=PC2-3200 (DDR2-400 @ CL=3) D5=PC2-4200 (DDR2-533 @ CL=4) E6=PC2-5300 (DDR2-667 @ CL=5) Voltage:1.8V Module Height=1.2"

### DDR2 SDRAM FULLY BUFFERED MODULES

Density	Org	Speed (Mbps)	Part Number	Rank	Composition	Package
512MB	64Mx72	533	M395T6553EZ4-CD5(50/60/20)	1	(64M x8)*9	Lead-free
512MB	64Mx72	667	M395T6553EZ4-CE6(50/60/20)	1	(64M x8)*9	Lead-free
1GB	128Mx72	533	M395T2953EZ4-CD5(50/60/20)	2	(64M x8)*18	Lead-free
1GB	128Mx72	667	M395T2953EZ4-CE6(50/60/20)	2		Lead-free
2GB	256Mx72	533	M395T5750EZ4-CD5(50/60/20)	2		Lead-free
2GB	256Mx72	667	M395T5750EZ4-CE6(50/60/20)	2	(128M x4)*36	Lead-free
4GB	512Mx72	533	M395T5160CZ4-CD5(50/60/20)	2	st. (512M x4)*18	Lead-free
4GB	512Mx72	533	M395T5160CZ4-CE6(50/60/20)	2	st. (512M x4)*18	Lead-free

NOTES: 50=Intel AMB 60: IDT AMB Voltage for AMB:1.5V Voltage for DRAM:1.8V Module Height=1.2" 20: NEC AMB

### DDR2 DRAM SODIMM MODULES

Density	Org	Speed (Mbps)	Part Number	Rank	Composition	Package
512MB	64Mx64	533/667	M470T6554EZ3-C(D5/E6)	2	(32M x16)*8	Lead-free
1GB	128Mx64	533/667	M470T2953EZ3-C(D5/E6)	2	(64M x8)*16	Lead-free
1GB	128Mx64	533/667	M470T2864DZ3-C(D5/E6)	2	(64M x16)*8	Lead-free
2GB	256Mx64	533/667	M470T5663CZ3-C(D5/E6)	2	st.(256M x8)*8	Lead-free

NOTES: CC=PC2-3200 (DDR2-400 @ CL=3) D5 =PC2-4200 (DDR2-533 @ CL=4) E6=PC2-5300 (DDR2-667 @ CL=5) Voltage: 1.8V Module Height=1.2"

## DDR2 SDRAM UNBUFFERED MODULES

Density	Org	Speed (Mbps)	Part Number	Rank	Composition	Package
512MB	64Mx64	533/667/800	M378T6553EZ3-C(D5/E6/E7/F7)	1	(64M x8)*8	Lead-free
1GB	128Mx64	533/667/800	M378T2953EZ3-C(D5/E6/E7/F7)	2	(64M x8)*16	Lead-free
1GB	128MX72	533/667/800	M378T2863DZ3-C(D5/E6/E7/F7)	1	(128MX8)*9	Lead-free
2GB	256Mx64	533/667	M378T5663DZ3-C(D5/E6)	2	(128M x8)*16	Lead-free

NOTES: CC=PC2-3200 (DDR2-400 @ CL=3) D5 = PC2-4200 (DDR2-533 @ CL=4) E6=PC2-5300 (DDR2-667 @ CL=5) E7=PC2-6400 (DDR2-800 @ CL=5) Voltage: 1.8V  
Module Height =1.2" F7=PC2-6400

## DDR2 SDRAM COMPONENTS

Density	Org	Speed (Mbps)	Part Number	Package	Dimension
512Mb	128M x4	400/533/667	K4T51043QE-ZC(CC/D5/E6)	60ball FBGA	10x11mm
512Mb	64M x8	400/533/667/800	K4T51083QE-ZC(CC/D5/E6/E7)	60ball FBGA	10x11mm
512Mb	32M x16	400/533/667	K4T51163QE-ZC(CC/D5/E6)	84ball FBGA	11x13mm
1Gb	256M x4	533/667	K4T1G044QC-ZC(D5/E6)	68ball FBGA	11x18mm
1Gb	128M x8	533/667	K4T1G084QD-ZC(D5/E6)	68ball FBGA	11x18mm
1Gb	128M x8	533/667	K4T1G084QD-ZC(D5/E6)	68ball FBGA	11x18mm
1Gb	64M x16	533/667	K4T1G164QD-ZC(D5/E6)	84ball FBGA	11x18mm

NOTES: CC=DDR2-400 (3-3-3) D5 = DDR2-533 (4-4-4) E6=DDR2-667 (5-5-5) E7=DDR2-800 (5-5-5) Voltage: 1.8V

## DDR SDRAM 1U DIMM MODULES: REGISTERED

Density	Org	Speed (Mbps)	Composition	Part Number	Package	# Banks	Notes
512MB	64Mx72	333/400	(64Mx8)*9	M312L6523DZ3 - CB3/CCC	FBGA	1	Pb-free
1GB	128Mx72	333/400	(128Mx4)*18	M312L2920DZ3 -CB3/CCC	FBGA	1	Pb-free
2GB	256Mx72	333/400	(128Mx4)*36	M312L5720DZ3-CB3/CCC	FBGA	2	Pb-free

NOTES: B0 = DDR266 (133MHz @ CL=2.5) A2 = DDR266 (133MHz @ Cl=2) B3 = DDR333 (166MHz @ CL=2.5) CC = DDR400 (200MHz @ CL=3)  
Type: 184-pin

## DDR DRAM SODIMM MODULES

Density	Org	Speed (Mbps)	Composition	Part Number	Notes
512MB	64Mx64	333	(32M x 16)*4	M470L6524DU0-CB300	Pb-free
1GB	128MX64	333	(64M x 8)*16	M470L2923BN0 - C(L)B3	
1GB	128MX64	333	(64M x 8)*16	M470L2923DV0-CB300	Pb-free

NOTES: B0 = DDR266 (133MHz @ CL=2.5) A2 = DDR266 (133MHz @ Cl=2) B3 = DDR333 (166MHz @ CL=2.5) CC = DDR400 (200MHz @ CL=3)  
Type: 200-pin, Double Sided Height(in): 1.25

## DDR SDRAM DIMM MODULES: UNBUFFERED

Density	Org	Speed (Mbps)	Composition	Part Number	Notes
512MB	64MX64	333/400	(64M x8) *8	M368L6523DUS-CB3/CCC	Pb-free
512MB	64Mx72	333/400	(64M x 8)*9	M381L6523DUM-CB3/CCC	Pb-free
1GB	128Mx64	333/400	(64M x 8)*16	M368L2923DUN-CB3/CCC	Pb-free
1GB	128Mx72	333/400	(64M x 8)*18	M381L2923DUM-CB3/CCC	Pb-free

NOTES: B0 = DDR266 (133MHz @ CL=2.5) A2 = DDR266 (133MHz @ Cl=2) B3 = DDR333 (166MHz @ CL=2.5) CC = DDR400 (200MHz @ CL=3)  
Type: 184-pin Package: TSOP components Voltage: 2.5V

## DDR SDRAM COMPONENTS

Density	Org	Speed (Mbps)	Part Number	Package	Notes
256M	64Mx4	266	K4H560438H-UC(L)B0	66 pin TSOP	Pb-free
256M	64Mx4	333/400	K4H560438H-ZC(L)CC/B3	60 ball FBGA	Pb-free
256M	32Mx8	333/400	K4H560838H-UC(L)B3/CCC	66 pin TSOP	Pb-free
256M	32Mx8	333/400	K4H560838H-ZC(L)B3/CCC	60 ball FBGA	Pb-free
256M	16Mx16	333/400	K4H561638H-UC(L)B3/CCC	66 pin TSOP	Pb-free
256M	16Mx16	333/400	K4H561638H-ZC(L)B3/CCC	60 ball FBGA	Pb-free
512M	128Mx4	333/400	K4H510438D-ZC(L)B3/CCC	60 ball FBGA	Pb-free
512M	128Mx4	333/400	K4H510438D-ZC(L)B3/CCC	60 ball FBGA	Pb-free
512M	64Mx8	333/400	K4H510838D-UC(L)B3/CCC	66 pin TSOP	Pb-free
512M	64Mx8	333/400	K4H510838D-ZC(L)B3/CCC	60 ball FBGA	Pb-free
512M	64Mx8	333/400	K4H510838D-UC(L)B3/CCC	66 pin TSOP	Pb-free
512M	32Mx16	333/400	K4H511638D-UC(L)B3/CCC	66 pin TSOP	Pb-free
512M	32Mx16	333/400	K4H511638D-ZC(L)B3/CCC	60 ball FBGA	Pb-free
512M	32Mx16	333/400	K4H511638D-UC(L)B3/CCC	66 pin TSOP	Pb-free

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

1U SDRAM DIMM MODULES, PC133 / PC100 COMPLIANT: REGISTERED  
LOW-PROFILE DIMMs (1.2-INCH HEIGHT)

Density	Org	Speed	Composition	Part Number	# Banks		
					Module	Refresh	Remarks
128MB**	16Mx72	PC133	(16x8)*9	M390S1723TU - C7A00	1	4K	
256MB	32Mx72	PC133	(32Mx8)*9	M390S3253HUU - C7A00	1	8K	
512MB	64Mx72	PC133	(64Mx4)*18	M390S6450HUU - C7A00	2	8K	stacked
1GB	128Mx72	PC133	(St.128Mx4)*18	M390S2858ETU - C7A00	2	8K	
1GB	128Mx72	PC133	(128Mx4)*18	M390S2950DUU - C7A00	2	8K	
2GB	256Mx72	PC133	(St.128Mx4)*18	M390S5658DUU - C7A00	2	8K	

NOTES: St. = Stacked components      Type: 168 pin, Double sided      Package: TSOP Components      Voltage: 3.3V      stacked, avail Q204

## SDRAM SODIMM MODULES

Density	Org	Speed	Composition	Part Number	Height (in)	# Banks	
						Module	Module
128MB	16Mx64	PC133	(8Mx16)*8	M464S1724ITS-L7A00	1.15	1	
256MB	32Mx64	PC133	(16Mx16)*8	M464S3254HUS-L7A00	1.25	1	
256MB	32Mx64	PC133	(32Mx16)*4	M464S3354DUS-C(L)7A	1.25	1	
512MB	64Mx64	PC133	(32Mx16)*8	M464S6554DUS-C(L)7A	1.18	1	
512MB	64Mx64	PC133	(64Mx8)*16	M464S6453HVO-C75/L7500	1.25	2	

NOTES: DS = Double-Sided      L = Commercial Temp., Low Power      Interface: SSTL-2      # Banks: 4      Latency: CL6      Refresh: 8K/32ms

## SDRAM DIMM MODULES, PC133 COMPLIANT: UNBUFFERED

Density	Org	Speed (Mbps)	Composition	Part Number	# Banks	
					Module	Module
128MB	16Mx72	PC133	128M: (16Mx8)*9	M374S1723KUS-C7A00	1	
256MB	32Mx64	PC133	256M: (16Mx8)*16	M366S3323KUS - C7A00	2	
256MB	32Mx72	PC133	256M: (16Mx8)*18	M374S3323KUS-C7A00	2	
256MB	32Mx64	PC133	256M: (32Mx8)*8	M366S3253HUS-C7A00	1	
256MB	32Mx64	PC133	256M: (32Mx8)*8	M366S3253HUS-C7A00	1	
512MB	64Mx64	PC133	256M: (32Mx8)*16	M366S6453HUS-C7A00	2	
1GB	128Mx64	PC133	512M: (64Mx8)*16	M366S2953DUS-C7A00	2	

NOTES: Type: 168 pin      Package: TSOP components      Voltage: 3.3V

SDRAM COMPONENTS

Density	Org	Speed (Mbps)	Part Number	Refresh	Pkg TSOP	Remarks
64Mb**	8Mx8	133	K4S640832K-UC(75)000	4K	54	
64Mb**	4Mx16	133/143/166	K4S641632K-UC(L)(75/60)000	4K	54	
128Mb**	16Mx8	133	K4S280832I-UC(L)(75)000	4K	54	
128Mb**	8Mx16	133/166	K4S281632I-UC(L)(75/60)000	4K	54	
256Mb	64Mx4	133	K4S560432H-UC(L)(75)000	8K	54	
256Mb	32Mx8	133	K4S560832H-UC(L)(75)000	8K	54	
256Mb	16Mx16	133/166	K4S561632H-UC(L)(75/60)000	8K	54	
512Mb	128Mx4	133	K4S510632D-UC(L)(75)000	8K	54	stacked
512Mb	64Mx8	133	K4S510732D-UC(L)(75)000	8K	54	stacked
512Mb	128Mx4	133	K4S510432D-UC(L)(75)000	8K	54	
512Mb	64Mx8	133	K4S510832D-UC(L)(75)000	8K	54	
512Mb	32Mx16	133	K4S511632D-UC(L)(75)000	8K	54	

NOTES:

1 L = Commercial Temp., Low Power  
2 # Banks: 4

3 Package: TC = TSOP; UC = Lead Free  
4 Voltage: 3.3V

5 Speed: PC133 (133MHz CL=3/PC100 CL2)  
6 For Ind. Temp., check with SSI Marketing

MOBILE SDRAM COMPONENTS

Density	Org	Part Number	Refresh	Power	# Pins TSOP/BGA
64Mb	4Mx16	K4M641633K-(1)(2)(3)(4)	4K	3.0V	FBGA-54balls
64Mb	4Mx16	K4M64163LK-(1)(2)(3)(4)	4K	2.5V	FBGA-54balls
64Mb	4Mx16	K4M64163PK-(1)(2)(3)(4)	4K	1.8V	FBGA-54balls
128Mb	8Mx16	K4M281633H-(1)(2)(3)(4)	4K	3.0V	FBGA-54balls
128Mb	8Mx16	K4M28163LH-(1)(2)(3)(4)	4K	2.5V	FBGA-54balls
128Mb	8Mx16	K4M28163PH-(1)(2)(3)(4)	4K	1.8V	FBGA-54balls
128Mb	4Mx32	K4M283233H-(1)(2)(3)(4)	4K	3.0V	FBGA-90balls
128Mb	4Mx32	K4M28323LH-(1)(2)(3)(4)	4K	2.5V	FBGA-90balls
128Mb	4Mx32	K4M28323PH-(1)(2)(3)(4)	4K	1.8V	FBGA-90balls
256Mb	16Mx16	K4M561633G-(1)(2)(3)(4)	8K	3.0V	FBGA-54balls
256Mb	16Mx16	K4M56163LG-(1)(2)(3)(4)	8K	2.5V	FBGA-54balls
256Mb	16Mx16	K4M56163PG-(1)(2)(3)(4)	8K	1.8V	FBGA-54balls
256Mb	16Mx16	K4X56163PG-(1)(2)(3)(4)	8K	1.8V	FBGA-60balls
256Mb	8Mx32	K4M563233G-(1)(2)(3)(4)	8K	3.0V	FBGA-90balls
256Mb	8Mx32	K4M56323LG-(1)(2)(3)(4)	8K	2.5V	FBGA-90balls
256Mb	8Mx32	K4M56323PG-(1)(2)(3)(4)	8K	1.8V	FBGA-90balls
256Mb	8Mx32	K4X56323PG-(1)(2)(3)(4)	8K	1.8V	FBGA-90balls
512Mb	32Mx16	K4M511633E-(1)(2)(3)(4)	8K	3.0V	FBGA-54balls
512Mb	32Mx16	K4M51163LE-(1)(2)(3)(4)	8K	2.5V	FBGA-54balls
512Mb	32Mx16	K4M51163PE-(1)(2)(3)(4)	8K	1.8V	FBGA-54balls
512Mb	32Mx16	K4X51163PE-(1)(2)(3)(4)	8K	1.8V	FBGA-60balls
512Mb	16Mx32	K4M513233E-(1)(2)(3)(4)	8K	3.0V	FBGA-90balls
512Mb	16Mx32	K4M51323LE-(1)(2)(3)(4)	8K	2.5V	FBGA-90balls
512Mb	16Mx32	K4M51323PE-(1)(2)(3)(4)	8K	1.8V	FBGA-54balls
512Mb	16Mx32	K4X51323PE-(1)(2)(3)(4)	8K	1.8V	FBGA-54balls

NOTES:

(1) Package: 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  
(2) Temp & Power:  
C: Commercial (-25 ~ 70°C), Normal

L: 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 (-40-85°C), Normal

P: Industrial, Low  
H: Industrial, Low, i-TCSR & PASR & DS PASR & TCSR  
(3)-(4) Speed:  
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

## RIMM™ MODULES

Density	Org	Speed (Mbps)	# of Devices	Part Number	Component
128MB ECC	x18	800/1066Mbps	4	MR18R1624EG0-CM8/T9	288Mb
256MB ECC	x18	800/1066Mbps	8	MR18R1628EG0-CM8/T9	288Mb
512MB ECC	x18	800/1066Mbps	16	MR18R162GEG0-CM8/T9	288Mb
128MB NON-ECC	x16	800/1066Mbps	4	MR16R1624EG0-CM8/T9	256Mb
256MB NON-ECC	x16	800/1066Mbps	8	MR16R1628EG0-CM8/T9	256Mb

## RDRAM COMPONENTS

Density	Org	Speed (Mbps)	Part Number	Refresh	Package
288Mb	x18	800/1066	K4R881869E-GCM8/T9	16K/32ms	92ball FBGA
128Mb *	x16	800/1066	K4R271669F-SCK8/S8	16K/32ms	54ball FBGA

NOTES: Voltage: 2.5 v

## GRAPHICS MEMORY SELECTION GUIDE

Type	Density	Org	Part Number	Package	VDD/VDDQ	Speed	Bin (MHz)				
GDDR4	512Mb	16Mx32	K4U52324Q		136 FBGA*	1.8/1.8V	1100/1200/1400				
						1.95/1.95V	CS				
GDDR3	512Mb	16Mx32	K4J52324Q		136 FBGA*	1.8/1.8V	700/800				
						1.9/1.9V	900/1000/1200				
						1.8/1.8V	700/800/				
	256Mb	8Mx32	K4J55323Q		136 FBGA	1.9/1.9V	900/1000				
GDDR2	512Mb	32Mx16	K4N51163Q		84 FBGA	1.8/1.8V	350/400				
						1.9/1.9V	450/500				
	256Mb	16Mx16	K4N56163Q	84	FBGA	1.8/1.8V	350/400/450/500				
GDDR1	256Mb	16Mx16	K4D551638		66 TSOPII	2.5/2.5V	200/250				
						128Mb	4Mx32	K4D263238	144 FBGA	2.5/2.5V	200/250
						8Mx16		K4D261638	66 TSOPII	2.5/2.5V	200/250

NOTES: \*lead free only \* clock cycle time \*\* all products are 4 banks

Part No. Suffix	07	08	09	1A	11	12	14	16	20	22	25	2A	33	40	50
Description	0.71ns	0.83ns	0.90ns	1ns	1.11ns	1.25ns	1.429ns	1.667ns	2.0 ns	2.2 ns	2.5 ns	2.86 NS	3.3 ns	4.0 ns	5.0 ns
	(1400MHz)	(1200MHz)	(1100MHz)	(1000MHz)	(900MHz)	(800MHz)	(700MHz)	(600MHz)	(500MHz)	(450MHz)	(400MHz)	(350MHz)	(300MHz)	(250MHz)	(200MHz)

Product chart for fusion memory solution, OneDRAM, is on page 23.

DRAM ORDERING INFORMATION

K	4	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	

1. Memory (K)

66: 64M, 8K/64ms

S: SSTL-2, 2.2V, 1.8V

2. DRAM:4

68: 768M, 8K/64ms

U: DRSL, 1.8V, 1.2V

72: 72M, 8K/32ms

Y: SSTL(LP), 2.5V, 2.5V

3. Small Classification

A: Advanced Dram Technology

B: DDR3 SDRAM

D: DDR SGRAM

E: EDO

F: FP

H: DDR SDRAM

J: GDDR3 SDRAM

K: Mobile SDRAM PEA

L: Mobile L2RAM

M: Mobile SDRAM

N: DDR SGRAM II

R: Direct RDRAM

S: SDRAM

T: DDR SDRAM IIF

U: GDDR4 SDRAM

V: Mobile DDR SDRAM PEA

X: Mobile DDR SDRAM

Y: XDR DRAM

Z: Value Added DRAM

°∞ PEA: Power Efficient Address

76: 576M, 32K/32ms

80: 8M, 2K/32ms

88: 288M, 16K/32ms

89: 288M, 8K/32ms

1G: 1G, 8K/64ms

2G: 2G, 8K/64ms

4G: 4G, 8K/64ms

2A: 128M, 4K/64ms with TCSR

5A: 256M, 8K/64ms with TCSR

6A: 64M, 4K/64ms with TCSR

6-7. Organization

01: x1      02: x2      03: x2  
(Including x1)

04: x4      05: x4 (2CS)

06: x4 Stack (Flexframe)

07: x8 Stack (Flexframe)

08: x8      09: x9      15: x16 (2CS)

16: x16      17: x16 (Including x8/ x4)

18: x18      30: x32 (2CS, 2CKE)

31: x32 (2CS)    32: x32 36: x36

A8: x8 Stack (70-mono)

8. Bank

1: 1Bank      2: 2Bank      3: 4Bank

4: 8Bank      5: 16Bank      6: 32Bank

9. Interface,VDD,VDDQ

0: NONE, NONE, NONE

1: TTL, 5.0V, 5.0V

2: LVTTTL, 3.3V, 3.3V

3: LVTTTL, 3.0V, 3.0V

4: LVTTTL, 2.5V, 2.5V

5: SSTL(LP), 1.8V, 1.8V

6: SSTL, 1.5V, 1.5V

7: SSTL-2, 3.3V, 2.5V

8: SSTL-2, 2.5V, 2.5V

9: RSL, 2.5V, 2.5V

A: SSTL, 2.5V, 1.8V

H: SSTL-2 DLL, 3.3V, 2.5V

J: LVTTTL, 3.0V, 1.8V

L: LVTTTL, 2.5V, 1.8V

M: LVTTTL, 1.8V, 1.5V

N: LVTTTL, 1.5V, 1.5V

P: LVTTTL, 1.8V, 1.8V

Q: SSTL, 1.8V, 1.8V

R: SSTL-2, 2.8V, 2.8V

10. Generation

M: 1st 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

Y: Partial DRAM(2nd)

Z: Partial DRAM (for RAMOSTAK Product)

11. "----"

12. Package

- Advanced DRAM Technology

G: WBGA

L: TSOP2-400F(LF)

T: TSOP2 Z: BOC(LF)

- DDR SDRAM

J: TSOP2-400(LF, DDP)

T: TSOP2-400

K: TSOP2-400(DDP)

U: TSOP2-400(LF)

G: BOC, WBGA

Z: BOC(LF)

P: BOC(DDP)

Q: ISM

N: STSOP2

V: STSOP2(LF)

S: POP(DDP)

X: POP(LF, DDP)

- DDR SDRAM II

G: BOC

Z: BOC(LF)

S: BOC(Smaller)

Y: BOC(Smaller, LF)

R: WLP

- DDR3 SDRAM

G: BOC

Z: BOC(LF)

- DDR SGRAM

E: FBGA(LF, DDP)

G : FBGA

J: FBGA(DDP)

V: FBGA(LF)

P: FBGA(LLDDP)

M: FBGA(1DQS)

N: FBGA(1DQS,LF)

H: BOC

L: TSOP2-400(LF)

T: TSOP2-400

Q: TQFP

U: TQFP(LF)

4-5. Density, Refresh

111: 1G, 64K/16ms

15: 16M, 1K/16ms

16: 16M, 2K/32ms

17: 16M, 4K/64ms

26: 128M, 4K/32ms

27: 128M, 16K/32ms

28: 128M, 4K/64ms

32: 32M, 2K/32ms

40: 4M, 512/8ms

41: 4M, 1K/16ms

44: 144M, 16K/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

57: 256M, 16K/32ms

58: 256M, 8K/32ms

62: 64M, 2K/16ms

64: 64M, 4K/64ms

DRAM ORDERING INFORMATION

K	4	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
<b>- DDR SGRAM II</b>																	
G: FBGA, BOC			Z: BOC (LF)														
<b>- GDDR3 SDRAM</b>																	
A: 136-FBGA, BOC			B: 136-FBGA, BOC(LF)														
G: FBGA, BOC			V: FBGA, BOC(LF)														
<b>- Direct RDRAM</b>																	
F: WBGA			G: WBGA(LF)3														
H: WBGA(LF, B/ L 320)			J: MWBGA(LF)														
M: μBGA® packages <sup>1)</sup> (M) <sup>2)</sup>																	
N: μBGA® packages																	
P: MWBGA			R: 54-WBGA														
S: 54-μBGA® packages			T: 54-WBGA(LF)														
<b>- EDO</b>																	
B: SOJ-300			J: SOJ-400														
N: STSOP2																	
T: TSOP2-400			U: TSOP2-400(LF)														
F: TSOP2-300			H: TSOP2-300(LF)														
<b>- FP</b>																	
B: SOJ-300			J: SOJ-400														
F: TSOP2-300			H: TSOP2-300(LF)														
N: STSOP2																	
T: TSOP2-400			U: TSOP2-400(LF)														
<b>- Mobile SDRAM</b>																	
1: MCP			6: MCP(LF)														
2: 90-FBGA(DDP)			3: 90-FBGA(DDP,LF)														
4: 96-FBGA			5: 96-FBGA(LF)														
R: 54-CSP			B: 54-CSP(LF)														
J: WBGA			V: WBGA(LF)														
M: FBGA(MCP)			E: FBGA(LF, MCP)														
F: Smaller 90 FBGA																	
H: Smaller 90 FBGA(LF)																	
Y: 54-CSP(DDP)			P: 54-CSP(LF, DDP)														
T: TSOP2-400			Q: ISM														
S: 90-FBGA			D: 90-FBGA(LF)														
<b>Mobile SDRAM PEA</b>																	
F: Smaller 90-FBGA																	
H: Smaller 90-FBGA(LF)																	
S: 90-FBGA			D: 90-FBGA(LF)														
<b>Mobile DDR SDRAM</b>																	
1: MCP																	
4: 96-FBGA																	
7: 90-FBGA																	
F: WBGA(LF, 0.8MM)																	
L: WBGA(0.8MM)																	
V: WBGA(LF)																	
S: POP																	
<b>Mobile DDR SDRAM PEA</b>																	
6: POP MONO(LF)																	
8: 90-FBGA(LF)																	
L: 60-FBGA																	
S: POP(DDP)																	
<b>XDR DRAM</b>																	
J: BOC(LF)																	
<b>SDRAM</b>																	
1: MCP																	
3: 90-FBGA(DDP, LF)																	
5: 96-FBGA(LF)																	
G: CSP(except 54 Pin)																	
B: 54-CSP(LF)																	
E: 90-FBGA (LF, MCP)																	
M: 90-FBGA(MCP)																	
H: Smaller 90FBGA(LF)																	
N: STSOP2																	
T: TSOP2-400																	
Y: 54-CSP(DDP)																	
X: BOC																	
<b>DRAM COMMON</b>																	
C: CHIP BIZ																	
(M): Mirror (LF): Lead Free																	
W: WAFER																	
<b>13. Temp, Power</b>																	
<b>- COMMON (Temp, Power)</b>																	
O: NONE, NONE																	
A: Automotive, Normal																	
C: Commercial, Normal																	
J: Commercial, Medium																	
L: Commercial, Low																	
F: Commercial, Low, PASR & TCSR																	
B: Commercial, Super Low																	
R: Commercial, Super Low, PASR & TCSR																	
K: Commercial, Reduced																	
E: Extended, Normal																	
N: Extended, Low																	
G: Extended, Low, PASR & TCSR																	
U: Extended, Super Low																	
S: Extended, Super Low, PASR & TCSR																	
X: Extra Extend, Normal																	
I: Industrial, Normal																	
P: Industrial, Low																	
H: Industrial, Low, PASR & TCSR																	
D: Industrial, Super Low																	
T: Industrial, Super Low, PASR & TCSR																	
<b>- WAFER,CHIP BIZ Level Classification</b>																	
O: NONE, NONE																	
1: DC test only																	
2: DC test, WBI																	
3: DC, several AC test, WBI																	
<b>14-15. Speed (Wafer/Chip Biz/BGD: 00)</b>																	
<b>- DDR SDRAM</b>																	
A0: 10ns@CL2 A1: 8ns																	
A2: 7.5ns@CL2																	
AA :7.5ns@CL2,TRCD2,TRP2																	
B0: 7.5ns@CL2.5			B3: 6ns@CL2.5														
B4: 5ns@CL2.5			C3: 6ns@CL3														
C4: 5ns@CL3			C5: 3.75ns@CL3														
CA: 5.5ns@CL3																	
CC: 5ns@CL3,TRCD3,TRP3			CD: 4ns@CL3														
CE: 5ns@CL3, TRCD3, TRPS3(2.5V)																	
D4: 5ns@CL4			DS: Daisychain														
M0: 10ns@CL1.5																	
<Only DDR SDRAM TPB code>																	
S0: SH BIN(TPB) V0: SH 2/ 2/ 2 BIN																	
W0: SH 3/ 3/ 3 BIN X0: Uniq. BIN																	
Y0: SH 3/ 4/ 4 BIN																	
<b>- DDR SDRAM II</b>																	
C4: 5ns@CL3			C5: 3.75ns@CL3														
CC: 5ns@CL3,TRCD3,TRP3																	
CF: 3.75ns@CL3(1.9V)																	
D4: 5ns@CL4			D5: 3.75ns@CL4														
D6: 3.0ns@CL4			D7: 2.5ns@CL4														
DH: 3ns@CL4(1.9V)																	
DS: Daisychain Sample			E4: 5ns@CL5														
E5: 3.75ns@CL5			E6: 3.0ns@CL5														
E7: 2.5ns@CL5			F6: 3.0ns@CL6														
F7: 2.5ns@CL6																	
<b>- DDR3 SDRAM</b>																	
E7: 2.5ns@CL5			F6: 3.0ns@CL6														
F7: 2.5ns@CL6																	

DRAM ORDERING INFORMATION

K	4	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	
<b>- EDO &amp; FP (tRAC)</b>																		
40: 40ns			45: 45ns															
50: 50ns			60: 60ns															
<b>- Direct RDRAM (tCC, tRAC)</b>																		
C6: 300MHz, 53.3ns w/ consumer PKG																		
C8: 400MHz, 45ns w/ consumer PKG																		
C9: 533MHz, 32ns w/ consumer PKG																		
G6: 300MHz(3.3ns), 53.3ns																		
K7: 356MHz(2.8ns), 45ns																		
K8: 400MHz(2.5ns), 45ns																		
M8: 400MHz(2.5ns), 40ns																		
M9: 533MHz(1.9ns), 35ns																		
N1: 600MHz(1.667ns), 32ns																		
N9: 533MHz(1.9ns), 32ns																		
P3: 667Mhz(1.5ns), 31ns																		
R6: 800Mhz(1.25ns), 27ns																		
S8: 400MHz, 45ns SC																		
S9: 533MHz(1.9ns), 35ns SC																		
T9: 533MHz(1.9ns), 32ns, tDAC 3																		
DS: Daisychain Sample																		
*SC (Short channel)																		
<b>- Mobile SDRAM</b>																		
15: 15ns@CL2			1H: 10ns@CL2															
1L: 10ns@CL3			75: 7.5ns@CL3															
80: 8ns@CL3																		
90: 9.0ns@CL3(12ns@CL2)																		
95: 9.5ns@CL3(12ns@CL2)																		
DP: Daisychain (PCB)																		
DS: Daisychain Sample																		
DY: Daisychain (Sanyo PCB)																		
<b>- Mobile SDRAM PEA</b>																		
1L: 10ns@CL3			60: 6ns@CL3															
75: 7.5ns@CL3																		
90: 9.0ns@CL3(12ns@CL2)																		
<b>- Mobile DDR SDRAM</b>																		
C0: 15ns@CL3			C2: 10ns@CL3															
C3: 7.5ns@CL3			C6: 6ns@CL3															
CA: 9ns@CL3																		
DP: Daisychain (PCB)																		
DS: Daisychain																		
DY: Daisychain (Sanyo PCB)																		
<b>- Mobile DDR SDRAM PEA</b>																		
C3: 7.5ns@CL3			C6: 6ns@CL3															
CA: 9ns@CL3																		
L0: 100Mhz, CL3									L1: 133Mhz, CL3									
L2: 166Mhz, CL4																		
<b>- SDRAM (tCC: Default CL3)</b>																		
10: 10ns, PC66									12: 12ns									
15: 15ns																		
1H: 10ns@CL2, PC100									1L: 10ns, PC100									
33: 3.3ns									40: 4ns									
45: 4.5ns									50: 5ns									
55: 5.5ns									56: 5.6ns									
60: 6ns									67: 6.7ns									
70: 7ns									74: 7.4ns									
75: 7.5ns, PC133																		
7B: 7.5ns PC133, CL3, TRCD2, TRP2																		
7C: 7.5ns PC133, CL2, TRCD2, TRP2																		
80: 8ns									90: 9ns									
96: 9.6ns																		
DP: Daisychain (PCB)									DS: Daisychain									
DY: Daisychain (Sanyo PCB)																		
< Only SDRAM TPB Code >																		
S0: 7.0ns BIN									T0: 5.5ns BIN									
U0: 6.0ns BIN									V0: 7.5ns BIN									
W0: 8.0ns BIN									G0: 5.6ns BIN									
<b>- DDR SGRAM (tCC: Default CL3)</b>																		
20: 2.0ns									21: 2.1ns(475MHz)									
22: 2.2ns(450MHz)									25: 2.5ns									
30: 3ns									33: 3.3ns									
35: 3.5ns									36: 3.6ns									
3N 3.32ns(301MHz)									40: 4ns									
45: 4.5ns									50: 5ns									
55: 5.5ns									60: 6ns									
70: 7ns									2A: 2.86ns(350MHz)									
2B: 2.94ns(340MHz)									2C: 2.66ns(375MHz)									
5A: 5ns@CL3(TRCD3, TRP3)																		
< Only SDRAM TPB Code >																		
S0: 4.0ns BIN																		
<b>- DDR SGRAM II</b>																		
12: 1.25ns									14: 1.429ns									
15: 1.5ns (667MHz)									16: 1.667ns									
18: 1.818ns									1K: 1.996ns									
2A: 2.86ns(350MHz)									20: 2ns									
22: 2.2ns									25: 2.5ns									
30: 3.0ns									33: 3.3ns									
37: 3.75ns																		
<b>- GDDR3 SDRAM</b>																		
11: 1.1ns									12: 1.25ns									
14: 1.429ns									15: 1.5ns(667MHz)									
16: 1.667ns									18: 1.818ns									
20: 2.0ns									22: 2.2ns									
25: 2.5ns									30: 3.0ns									
33: 3.3ns									36: 3.6ns									
40: 4.0ns									1A: 1.0ns									
2A: 2.86ns																		
<b>- GDDR4 SDRAM</b>																		
15: 1.5ns(667MHz)																		
<b>XDR DRAM</b>																		
A2: 2.4Gbps, 36ns, 16Cycles																		
A3: 3.2Gbps, 27ns, 16Cycles																		
B3: 3.2Gbps, 35ns, 20Cycles																		
B4: 4.0Gbps, 28ns, 20Cycles																		
C3: 3.2Gbps, 35ns, 24Cycles																		
C4: 4.0Gbps, 28ns, 24Cycles																		
DS: Daisychain Sample																		
DRAM COMMON																		
00: NONE																		
<b>16. Packing Type (16 digit)</b>																		
Common to all products, except of Mask ROM																		
Divided into TAPE & REEL(In Mask ROM, divided into																		
TRAY, AMMO Packing Separately)																		
<b>Type</b>			<b>Packing Type</b>			<b>New Marking</b>												
<b>Component</b>			TAPE & REEL			T												
			Other (Tray, Tube, Jar)			0 (Number)												
			Stack			S												
<b>Component</b>			TRAY			Y												
<b>(Mask ROM)</b>			AMMO PACKING			A												
<b>Module</b>			MODULE TAPE & REEL			P												
			MODULE Other Packing			M												
<b>NOTES:</b>																		
1) µBGA® packages are registered trademarks of Tessera.																		
2) (M): Mirror																		
3) (LF): Lead Free																		

## NAND FLASH DISCRETE COMPONENTS

Density	Part Number	Organization	Voltage(V)	Package	Comments
<b>SLC NAND</b>					
256Mb	K9F5608x0D-PCB	x8	1.8V; 3.3V	TSOP48	
256Mb	K9F5608x0D-JIB	x8	1.8V; 3.3V	BGA63	
512Mb	K9F1208x0C-PCB	x8	1.8V; 3.3V	TSOP48	
512Mb	K9F1208x0C-JIB	x8	1.8V; 3.3V	BGA63	
1Gb	K9F1G08U0B-PCB	x8	3.3V	TSOP48	
1Gb	K9F1G08R0B-JIB	x8	1.8V	BGA63	
2Gb	K9F2G08U0A-PCB	x8	3.3V	TSOP48	
2Gb	K9F2G08R0A-JIB	x8	1.8V	BGA63	
4Gb	K9F4G08U0A-PCB	x8	3.3V	TSOP48	
8Gb	K9K8G08U0A-PCB	x8	3.3V	TSOP48	DDP
16Gb	K9WAG08U1A-PCB	x8	3.3V	TSOP48	ODP
32Gb	K9NBG08U5A-PCB	x8	3.3V	TSOP48	DSP
<b>MLC NAND</b>					
8Gb	K9G8G08U0M-PCB	x8	3.3V	TSOP48	mono; moving to A-die
16Gb	K9LAG08U0M-PCB	x8	3.3V	TSOP48	DDP
32Gb	K9HBG08U1M-PCB	x8	3.3V	TSOP48	ODP
64Gb	K9MCG08U5M-PCB	x8	3.3V	TSOP48	DSP

Product charts for flash fusion memory products – OneNAND, moviNAND and Flex-OneNAND – are located on page 23.

**NAND FLASH ORDERING INFORMATION**

K	9	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

**1. Memory (K)**

**2. NAND Flash: 9**

**3. Small Classification (SLC: Single Level Cell, MLC: Multi Level Cell, SM: SmartMedia, S/B: Small Block)**

- A: SLC + Muxed I/F Chip
- B: Muxed I/F Chip
- S: SLC Single SM
- D: SLC Dual SM
- Q: 4CHIP SM
- T: SLC SINGLE (S/B)
- E: SLC DUAL (S/B)
- R: SLC 4DIE STACK (S/B)
- F: SLC Normal
- G: MLC Normal
- K: SLC 2-Die Stack
- W: SLC 4-Die Stack
- J: Non-Muxed OneNAND
- U: 2 STACK MSP
- V: 4 STACK MSP

**4-5. Density**

- 12: 512M      16: 16M
- 28: 128M     32: 32M
- 40: 4M        56: 256M
- 64: 64M      80: 8M
- 1G: 1G        2G: 2G
- 4G: 4G        8G: 8G
- 00: NONE

**6-7. Organization**

- 00: NONE      08: x8
- 16: x16

**8. Vcc**

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

**9. Mode**

- O: Normal
- 1: Dual nCE & Dual Rn/B
- 4: Quad nCE & Single RnB
- A: Mask Option 1

**10. Generation**

- M: 1st Generation
- A: 2nd Generation
- B: 3rd Generation
- C: 4th Generation
- D: 5th Generation
- Y: Partial NAND(2nd)
- Z: Partial NAND(1st)
- M: 1st Generation
- A: 2nd Generation
- B: 3rd Generation
- C: 4th Generation
- D: 5th Generation
- Y: Partial NAND(2nd)
- Z: Partial NAND(1st)

**11. "--"**

**12. Package**

- A: COB                      B: TBGA
- C: CHIP BIZ                D: 63-TBGA
- E: TSOP1(LF,1217)        F: WSOP1(LF)
- G: FBGA                    H: TBGA(LF)
- J: FBGA(LF)                K: TSOP1(1217)
- L: LGA                      M: tLGA
- P: TSOP1(LF)              Q: TSOP2(LF)
- R: TSOP2-R                S: SMARTMEDIA
- T: TSOP2                    V: WSOP
- W: WAFER                  Y: TSOP1

**13. Temp**

- C: Commercial      I: Industrial
- O: NONE

**14. Bad Block**

- B: Include Bad Block
- D: Daisychain Sample
- L: 1~5 Bad Block
- N: Ini. All Good, Add. 10 Blocks
- S: All Good Block
- O: NONE

**15. NAND-Reserved**

- O: Reserved

**16. Packing Type (16 digit)**

Common to all products, except of Mask ROM  
Divided into TAPE & REEL(In Mask ROM, divided into TRAY, AMMO Packing Separately)

Type	Packing Type	New Marking
<b>Component</b>	TAPE & REEL	T
	Other (Tray, Tube, Jar)	O (Number)
	Stack	S
<b>Component</b>	TRAY	Y
<b>(Mask ROM)</b>	AMMO PACKING	A
<b>Module</b>	MODULE TAPE & REEL	P
	MODULE Other Packing	M

## UtRAM (High Density & Low Power)

Density	Part Number	Organization	Vcc (V)	Speed (ns)	Operating	Operating	Standby	Package	Production
					Temp	Current (mA)	Current (uA)		Status
32Mbit	K1S321611C	2Mx16	3	70	I	35	100	48-FBGA	Mass Production
	K1S32161CD	2Mx16	3	70	I	35	100	48-FBGA	Mass Production
	K1S32161BCD	2Mx16	1.8	70	I	35	100	48-FBGA	Mass Production
	K1S32161CD	2Mx16	3	70	E	35	100	48-TBGA	Mass Production

## HIGH-SPEED (4Mbit) ASYNCHRONOUS FAST SRAM

Density	Part Number	Organization	Vcc (V)	Speed (ns)	Operating	Operating	Standby	Package	Production
					Temp	Current (mA)	Current (uA)		Status
4Mbit	K6R4016C1D	256Kx16	5	10	I	65, 55	20, 5	44SOJ, 44TSOP2, 48TBGA	Mass Production
	K6R4016V1D	256Kx16	3.3	10	I	80, 65	20, 5(1.2)	44SOJ, 44TSOP2, 48TBGA	Mass Production
	K6R4008C1D	512Kx8	5	10	I	65, 55	20, 5	36 SOJ, 44 TSOP2	Mass Production
	K6R4008V1D	512Kx8	3.3	10	I	80, 65	20, 5	36 SOJ, 44 TSOP2	Mass Production

NOTE: Ordering Information: [http://www.samsung.com/Products/Semiconductor/Support/Label\\_CodeInfo/Async\\_SRAM.pdf](http://www.samsung.com/Products/Semiconductor/Support/Label_CodeInfo/Async_SRAM.pdf)

ASYNCHRONOUS SRAM ORDERING INFORMATION

K	6	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	

1. Memory (K)

2. Async SRAM: 6

3. Small Classification

- E: Corner Vcc/Vss + Fast SRAM
- F: fCMOS Cell + LPSRAM
- H: High Speed(LPSRAM)
- X: High Voltage(LPSRAM)
- J: BICMOS
- L: Poly Load Cell + LPSRAM
- R: Center Vcc/Vss + Fast SRAM
- T: TFT Cell + LPSRAM

4~5. Density

06: 64K	08: 256K	09: 512K
10: 1M	16: 16M	20: 2M
30: 3M	32: 32M	40: 4M
60: 6M	64: 64M	80: 8M

6~7. Organization

01: x1	04: x4	08: x8
16: x16	18: x18	24: x24
32: x32		

8. Vcc

5: 1.5V		C: 5.0V
Q: VDD 3.0V/VDDQ 1.8V		
R: 1.65V~2.2V		
S: 2.5V	T: 2.7V~3.6V	U: 3.0V
V: 3.3V	W: 2.2V~3.3V	

9. Mode

- 1: CS Low Active
- 2: CS1, CS2 - Dual Chip Select Signal
- 3: Single Chip Select with /LB,/UB(tOE)
- 4: Single Chip Select with /LB,/UB(tCS)
- 5: Dual Chip Select with /LB,/UB(tOE)
- 6: Dual Chip Select with /LB,/UB(tCS)
- 7: I/Os Control with /BYTE
- 8: CDMA Function
- 9: Multiplexed Address
- A: Mirror Chip Option

10. Generation

- M: 1st Generation
- A: 2nd Generation
- C: 4th Generation
- E: 6th Generation
- G: 8th Generation
- B: 3rd Generation
- D: 5th Generation
- F: 7th Generation
- H: 9th Generation

11. "-----"

12. Package

- A: TBGA(LF)
- C: CHIP BIZ
- E: TBGA
- G: SOP
- J: SOJ
- L: TSOP1-0813.4F(LF)
- P: TSOP1-0820F(LF)
- Q: TSOP2-400R(LF)
- T: TSOP
- W: WAFER
- B: SOP(LF)
- D: DIP
- F: FBGA
- H: BGA
- K: SOJ(LF)
- R: TSOP-R
- U: TSOP2-400(LF)
- Z: UBGA

\* Exception

- 1MFSRAM B-ver

- 32-SOJ-300 > S
- 28-SOJ-300 > S
- 512K/1M/2M/4M LPSRAM

- 32-TSOP1-0813.4F > Y
- 32-TSOP1-0813.4 > Y
- 32-TSOP1-0813.4R > N

- 4M LPSRAM

- 32-TSOP2-400F > V
- 32-TSOP2-400R > M

13. 1st Chip Speed

- COMMON (Temp,Power)

- A: Automotive,Normal
- B: Commercial,Low Low
- C: Commercial,Normal
- D: Extended,Low Low
- E: Extended,Normal
- F: Industrial,Low Low
- I: Industrial,Normal
- L: Commercial,Low
- M: Military,Normal
- N: Extended,Low
- P: Industrial,Low
- Q: Automotive,Low
- R: Industrial,Super Low
- T: Extended,Super Low
- U: Commercial,Ultra Super Low
- O: NONE,NONE

- WAFER, CHIP BIZ Level Division

- O: NONE,NONE
- 1: Hot DC sort
- 2: Hot DC,selected AC sort
- 3: Cold/Hot DC,selected AC sort

14~15. Speed (tAA)

- fCMOS Cell + LPSRAM & Poly Load Cell + LPSRAM & TFT Cell + LPSRAM
- 10: 100ns
- 12: 120ns
- 15: 150ns
- 25: 25ns(only fCMOS Cell)
- 30: 300ns
- 35: 35ns(except Poly Load Cell)
- 45: 45ns(except fCMOS Cell)
- 55: 55ns
- 60: 60ns(only fCMOS Cell)
- 70: 70ns
- 85: 85ns
- 90: 90ns(only fCMOS Cell)
- DS: Daisychain Sample
- High Speed (LPSRAM)
- 20: 20ns
- 25: 25ns
- High Voltage (LPSRAM)
- 55: 55ns
- 70: 70ns
- 85: 85ns
- Corner Vcc/Vss + Fast SRAM
- 10: 10ns
- 12: 12ns
- 13: 13ns
- 15: 15ns
- 17: 17ns
- 20: 20ns
- 25: 25ns
- 30: 30ns
- 35: 35ns
- 45: 45ns
- BICMOS & Center Vcc/Vss + Fast SRAM
- 06: 6ns
- 08: 8ns
- 09: 9ns
- 10: 10ns
- 12: 12ns
- 13: 13ns
- 15: 15ns
- 17: 17ns
- 20: 20ns
- 25: 25ns
- 30: 30ns(only Center Vcc/Vss + Fast SRAM)
- 35: 35ns(only Center Vcc/Vss + Fast SRAM)
- 7A: 7.2ns(only BICMOS)
- 8A: 8.6ns(only BICMOS)
- DS: Daisychain Sample
- Async SRAM COMMON
- 00: NONE
- (Containing Wafer, CHIP BIZ, Exception code)

16. Packing Type (16 digit)

- Common to all products, except of Mask ROM
- Divided into TAPE & REEL(In Mask ROM, divided into TRAY, AMMO Packing Separately)

Type	Packing Type	New Marking
Component	TAPE & REEL	T
	Other (Tray, Tube, Jar)	O (Number)
	Stack	S
Component	TRAY	Y
(Mask ROM)	AMMO PACKING	A
Module	MODULE TAPE & REEL	P
	MODULE Other Packing	M

## SPB &amp; FT (36Mbit) SRAM

Part		Operating		Access Time	Speed	I/O			
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status	Comments
K7A323630C	1Mx36	SPB	3.3, 2.5	3.1	200	3.3, 2.5	100TQFP Pb-free		2E1D
K7A321830C	2Mx18	SPB	3.3, 2.5	3.1	200	3.3, 2.5	100TQFP Pb-free		2E1D
K7B323635C	1Mx36	SB	3.3, 2.5	7.5	118	3.3, 2.5	100TQFP Pb-free		Ind Temp only
K7B321835C	2Mx18	SB	3.3, 2.5	7.5	118	3.3, 2.5	100TQFP Pb-free		Ind Temp only

NOTES: 2E1D = 2-cycle Enable and 1-cycle Disable  
200MHz could cover 167MHz, 133MHz speed option

## SPB &amp; FT (18Mbit) SRAM

Part		Operating		Access Time	Speed	I/O			
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status	Comments
K7A163630B	512Kx36	SPB	3.3, 2.5	2.6, 3.5	250, 167	3.3, 2.5	100TQFP Pb-free		2E1D
K7A163631B	512Kx36	SPB	3.3, 2.5	3.1	200	3.3, 2.5	100TQFP Pb-free		2E2D
K7A161830B	1Mx18	SPB	3.3, 2.5	2.6, 3.5	250, 167	3.3, 2.5	100TQFP Pb-free		2E1D
K7A161831B	1Mx18	SPB	3.3, 2.5	3.1	200	3.3, 2.5	100TQFP Pb-free		2E2D
K7B163635B	512Kx36	SB	3.3, 2.5	7.5	117	3.3, 2.5	100TQFP Pb-free		-
K7B161835B	1Mx18	SB	3.3, 2.5	7.5	117	3.3, 2.5	100TQFP Pb-free		-

NOTES: 2E1D = 2-cycle Enable and 1-cycle Disable    2E2D = 2-cycle Enable and 2-cycle Disable  
250MHz could cover 200MHz speed option / 167MHz could cover 133MHz speed option

## SPB &amp; FT (8Mbit) SRAM

Part		Operating		Access Time	Speed	I/O			
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status	Comments
K7A803600B	256x36	SPB	3.3	3.5	167	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7A803609B	256x36	SPB	3.3	2.6	250	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7A801800B	512x18	SPB	3.3	3.5	167	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7A801809B	512x18	SPB	3.3	2.6	250	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7B803625B	256x36	SB	3.3	6.5	133	3.3, 2.5	100TQFP (LF only)	Not for new designs	-
K7B801825B	512x18	SB	3.3	6.5	133	3.3, 2.5	100TQFP (LF only)	Not for new designs	-

NOTES: 2E1D = 2-cycle Enable and 1-cycle Disable    Recommended speed options for SPB are 250MHz and 167MHz  
2E2D = 2-cycle Enable and 2-cycle Disable    Recommended access speed option for SB is 6.5ns

## SPB &amp; FT (4Mbit) SRAM

Part		Operating		Access Time	Speed	I/O			
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status	Comments
K7A403600B	128Kx36	SPB	3.3	3.5	167	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7A401800B	256Kx18	SPB	3.3	3.5	167	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7A403609B	128Kx36	SPB	3.3	2.4	250	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7A401809B	256Kx18	SPB	3.3	2.4	250	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7A403200B	128Kx32	SPB	3.3	3.5	167	3.3, 2.5	100TQFP (LF only)	Not for new designs	2E1D
K7B403625B	128Kx36	SB	3.3	6.5	133	3.3, 2.5	100TQFP (LF only)	Not for new designs	
K7B401825B	256Kx18	SB	3.3	6.5	133	3.3, 2.5	100TQFP (LF only)	Not for new designs	

NOTES: 2E1D = 2-cycle Enable and 1-cycle Disable    Recommended speed options for SPB are 250MHz and 167MHz  
2E2D = 2-cycle Enable and 2-cycle Disable    Recommended access speed option for SB is 6.5ns

## NtRAM™ (72Mbit) SRAM

Part		Operating		Access Time	Speed	I/O			
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status	Comments
K7N643645M	2Mx36	SPB	2.5	2.6, 3.5	250, 167	2.5	100TQFP, 165FBGA		
K7N641845M	4Mx18	SPB	2.5	2.6, 3.5	250, 167	2.5	100TQFP, 165FBGA		

NOTES: 250MHz could cover 200MHz speed option / 167MHz could cover 133MHz speed option    All packages are Pb-free

**NtRAM™ (36Mbit) SRAM**

Part	Organization	Operating Mode	Vdd (V)	Access Time tCD(ns)	Speed tCYC (MHz)	I/O Voltage (V)	Package	Status
K7N323635C	1Mx36	SPB	3.3, 2.5	2.6, 3.5	250, 167	3.3, 2.5	100TQFP, 165FBGA	
K7N321835C	2Mx18	SPB	3.3, 2.5	2.6, 3.5	250, 167	3.3, 2.5	100TQFP, 165FBGA	
K7M323631C	1Mx36	FT	3.3, 2.5	7.5	118	3.3, 2.5	100TQFP	
K7M321831C	2Mx18	FT	3.3, 2.5	7.5	118	3.3, 2.5	100TQFP	

NOTES: Recommended speed options for SPB are 250MHz and 167MHz  
250MHz could cover 200MHz speed option / 167MHz could cover 133MHz speed option

Recommended access speed option for SB is 7.5ns

**NtRAM™ (18Mbit) SRAM**

Part	Organization	Operating Mode	Vdd (V)	Access Time tCD(ns)	Speed tCYC (MHz)	I/O Voltage (V)	Package	Status
K7N161831B	1Mx18	SPB	3.3, 2.5	2.6, 3.5	250, 167	3.3, 2.5	"100TQFP, 165FBGA"	
K7N163631B	512Kx36	SPB	3.3, 2.5	2.6, 3.5	250, 167	3.3, 2.5	"100TQFP, 165FBGA"	
K7M161835B	1Mx18	FT(SB)	3.3	6.5	133	3.3, 2.5	100TQFP	
K7M163635B	512Kx36	FT(SB)	3.3	6.5	133	3.3, 2.5	100TQFP	

NOTES: 250MHz could cover 200MHz speed option / 167MHz could cover 133MHz speed option / 6.5ns could cover 7.5ns speed option  
All packages are Pb-free

**NtRAM (8Mbit) SRAM**

Part	Organization	Operating Mode	Vdd (V)	Access Time tCD(ns)	Speed tCYC (MHz)	I/O Voltage (V)	Package	Status
K7N803601B	256Kx36	SPB	3.3	3.5	167	3.3,2.5	100TQFP	Not for new designs
K7N801801B	512Kx18	SPB	3.3	3.5	167	3.3,2.5	100TQFP	Not for new designs
K7N803609B	256Kx36	SPB	3.3	2.6	250	3.3,2.5	100TQFP	Not for new designs
K7N801809B	512Kx18	SPB	3.3	2.6	250	3.3,2.5	100TQFP	Not for new designs
K7N803645B	256Kx36	SPB	2.5	3.5	167	2.5	100TQFP	Not for new designs
K7N801845B	512Kx18	SPB	2.5	3.5	167	2.5	100TQFP	Not for new designs
K7N803649B	256Kx36	SPB	2.5	2.6	250	2.5	100TQFP	Not for new designs
K7N801849B	512Kx18	SPB	2.5	2.6	250	2.5	100TQFP	Not for new designs
K7M801825B	512Kx18	FT	3.3	6.5	133	3.3, 2.5	100TQFP	Not for new designs
K7M803625B	256Kx36	FT	3.3	6.5	133	3.3, 2.5	100TQFP	Not for new designs

NOTE: All packages are Pb-free

**NtRAM (4Mbit) SRAM**

Part	Organization	Operating Mode	Vdd (V)	Access Time tCD(ns)	Speed tCYC (MHz)	I/O Voltage (V)	Package	Status
K7N403609B	128Kx36	SPB	3.3	3.0	200	3.3,2.5	100TQFP	Not for new designs
K7N401809B	256Kx18	SPB	3.3	3.0	200	3.3,2.5	100TQFP	Not for new designs

NOTE: All packages are Pb-free

**LATE-WRITE R-R (32Mbit) SRAM**

Part	Organization	Operating Mode	Vdd (V)	Access Time tCD(ns)	Speed tCYC (MHz)	I/O Voltage (V)	Package	Status
K7P321874C	2Mx18	SP	1.8 / 2.5V	1.6, 2.0	300,250	1.5 (Max 1.8)	119BGA	C/S
K7P323674C	1Mx36	SP	1.8 / 2.5V	1.6, 2.0	300,250	1.5 (Max 1.8)	119BGA	C/S

## LATE-WRITE R-R (16Mbit) SRAM

Part		Operating		Access Time	Speed	I/O		
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status
K7P161874C	1Mx18	SP	2.5	2	250	1.5 (Max 1.9)	119BGA	C/S
K7P163674C	512Kx36	SP	2.5	1.6	300	1.5 (Max.1.9)	119BGA	C/S

## LATE-WRITE R-R (8Mbit) SRAM

Part		Operating		Access Time	Speed	I/O		
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status
K7P801811B	512Kx18	SP	3.3	1.6	300	1.5 (Max.2.0)	119BGA	Not for new designs
K7P803611B	256Kx36	SP	3.3	1.6	300	1.5 (Max.2.0)	119BGA	Not for new designs
K7P801866B	512Kx18	SP	2.5	2.0	250	1.5 (Max.2.0)	119BGA	Not for new designs
K7P803666B	256Kx36	SP	2.5	2.0	250	1.5 (Max.2.0)	119BGA	Not for new designs

## LATE-WRITE R-R &amp; R-L (4Mbit) SRAM

Part		Operating		Access Time	Speed	I/O		
Number	Organization	Mode	Vdd (V)	tCD(ns)	tCYC (MHz)	Voltage (V)	Package	Status
K7P401822B	256Kx18	SP	3.3	2.5,2.7,3.0	250,200,167	2.5/3.3	119BGA	Not for new designs
K7P401823B	256Kx18	SP	3.3	6.5	167	2.5/3.3	119BGA	Not for new designs
K7P403622B	128Kx36	SP	3.3	2.5,2.7,3.0	250,200,167	2.5/3.3	119BGA	Not for new designs

## DDR (8Mbit) SRAM

Part		Operating		Access Time	Cycle Time	I/O		
Number	Organization	Vdd (V)	tCD (ns)	(MHz)	Voltage (V)	Package	Status	
K7D803671B	256Kx36	2.5	1.7/1.9/2.1	333, 330, 250	1.5(Max 2.0)	153BGA	Not for new designs	
K7D801871B	512Kx18	2.5	1.7/1.9/2.1	333, 330, 250	1.5(Max 2.0)	153BGA	Not for new designs	

## DDR (16Mbit) SRAM

Part		Operating		Access Time	Cycle Time	I/O		
Number	Organization	Vdd (V)	tCD (ns)	(MHz)	Voltage (V)	Package	Status	
K7D161874B	1Mx18	1.8~2.5	2.3	330, 300	1.5~1.9	153BGA		
K7D163674B	512Kx36	1.8~2.5	2.3	330, 300	1.5~1.9	153BGA		

## DDR (32Mbit) SRAM

Part		Operating		Access Time	Cycle Time	I/O		
Number	Organization	Vdd (V)	tCD (ns)	(MHz)	Voltage (V)	Package	Status	
K7D321874A	2Mx18	1.8~2.5	2.0	400, 375, 333	1.5~1.8	153BGA	EOL in June'07	
K7D323674A	1Mx36	1.8~2.5	2.0	400, 375, 333	1.5~1.8	153BGA	EOL in June'07	
K7D321874C	2Mx18	1.8~2.5	2.0	400, 375, 333	1.5~1.8	153BGA		
K7D323674C	1Mx36	1.8~2.5	2.0	400, 375, 333	1.5~1.8	153BGA		

## DDR II CIO/SIO (18Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Package	Status	Comments
K7I161882B	1Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-2B
K7I161884B	1Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-4B
K7J161882B	1Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		SIO-2B
K7J163682B	512Kx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		SIO-2B
K7I163682B	512Kx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-2B
K7I163684B	512Kx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-4B

NOTES: 2B = Burst of 2

4B = Burst of 4

SIO = Separate I/O

CIO = Common I/O

## DDR II CIO/SIO (36Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Production Package	Status	Comments
K7I321882C	2Mx18	1.8	0.45	333,300,250	1.5,1.8	165FBGA		CIO-2B
K7I321884C	2Mx18	1.8	0.45	333,300,250	1.5,1.8	165FBGA		CIO-4B
K7J321882C	2Mx18	1.8	0.45	333,300,250	1.5,1.8	165FBGA		SIO-2B
K7I323682C	1Mx36	1.8	0.45	333,300,250	1.5,1.8	165FBGA		CIO-2B
K7I323684C	1Mx36	1.8	0.45	333,300,250	1.5,1.8	165FBGA		CIO-4B
K7J323682C	1Mx36	1.8	0.45	333,300,250	1.5,1.8	165FBGA		SIO-2B

NOTES: 2B = Burst of 2

4B = Burst of 4

SIO = Separate I/O

CIO = Common I/O

C-die will support high-speed bins only 330, 300, 250MHz, which can cover slow-speed bins (200MHz, 167MHz) using stable DLL circuit.

## DDR II CIO/SIO (72Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Package	Status	Comments
K7I641882M	4Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-2B
K7I641884M	4Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-4B
K7J641882M	4Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		SIO-2B
K7I643682M	2Mx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-2B
K7I643684M	2Mx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		CIO-4B
K7J643682M	2Mx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		SIO-2B

NOTES: 2B = Burst of 2

4B = Burst of 4

SIO = Separate I/O

CIO = Common I/O

## DDR II + CIO (18Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Package	Status	Comments
K7K1618T2C	1Mx18	1.8	0.45	450, 400, 333	1.5	165FBGA		DDRII + CIO-2B
K7K1636T2C	512Kx36	1.8	0.45	450, 400, 333	1.5	165FBGA		DDRII + CIO-2B

NOTE: Offer 2-clock latency now; we can also support 2.5-clock latency with 500MHz speed based on demand.

## DDR II + CIO (36Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Production Package	Status	Comments
K7K3218T2C	2Mx18	1.8	0.45	450, 400, 333	1.5	165FBGA		DDRII + CIO-2B
K7K3236T2C	1Mx36	1.8	0.45	450, 400, 333	1.5	165FBGA		DDRII + CIO-2B

NOTE: Offer 2-clock latency now; we can also support 2.5-clock latency with 450MHz speed based on demand.

## QDR I, II (18Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Package	Status	Comments
K7R160982B	2Mx9	1.8	0.45,0.45,0.50	250,200,167	1.5,1.8	165FBGA		QDR II - 2B
K7R161882B	1Mx18	1.8	0.45,0.45,0.50	250,200,167	1.5,1.8	165FBGA		QDR II - 2B
K7R161884B	1Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		QDR II - 4B
K7Q161862B	1Mx18	1.8v / 2.5v	2.5	167	1.5,1.8	165FBGA		QDR I - 2B
K7Q161864B	1Mx18	1.8v / 2.5v	2.5	167	1.5,1.8	165FBGA		QDR I - 4B
K7R163682B	512Kx36	1.8	0.45,0.45,0.50	250,200,167	1.5,1.8	165FBGA		QDR II - 2B
K7R163684B	512Kx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		QDR II - 4B
K7Q163662B	512Kx36	1.8v / 2.5v	2.5	167	1.5,1.8	165FBGA		QDR I - 2B
K7Q163664B	512Kx36	1.8v / 2.5v	2.5	167	1.5,1.8	165FBGA		QDR I - 4B

NOTES: 2B = Burst of 2

4B = Burst of 4

## QDR II (36Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Package	Status	Comments
K7R320982C	4Mx9	1.8	0.45	300, 250, 200	1.5,1.8	165FBGA		QDR II-2B
K7R321882C	2Mx18	1.8	0.45	300, 250, 200	1.5,1.8	165FBGA		QDR II-2B
K7R321884C	2Mx18	1.8	0.45	333, 300, 250	1.5,1.8	165FBGA		QDR II-4B
K7R323682C	1Mx36	1.8	0.45	300, 250, 200	1.5,1.8	165FBGA		QDR II-2B
K7R323684C	1Mx36	1.8	0.45	333, 300, 250	1.5,1.8	165FBGA		QDR II-4B

NOTES: 2B = Burst of 2

4B = Burst of 4

C-die will support high-speed bins only 300, 250, 200MHz, which can cover slow-speed bin (167MHz) using stable DLL circuit.

## QDR II (72Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Package	Status	Comments
K7R640982M	8Mx9	1.8	0.45,0.45,0.50	250,200,167	1.5,1.8	165FBGA		QDR II-2B
K7R641882M	4Mx18	1.8	0.45,0.45,0.50	250,200,167	1.5,1.8	165FBGA		QDR II-2B
K7R641884M	4Mx18	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		QDR II-4B
K7R643682M	2Mx36	1.8	0.45,0.45,0.50	250,200,167	1.5,1.8	165FBGA		QDR II-2B
K7R643684M	2Mx36	1.8	0.45,0.45,0.45,0.50	300,250,200,167	1.5,1.8	165FBGA		QDR II-4B

NOTES: 2B = Burst of 2

4B = Burst of 4

The recommended speed bins are 250MHz, 200MHz for 2B part, 300MHz, 250MHz for 4B part.

## QDR II+ (18Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Package	Status	Comments
K7S1618T4C	1Mx18	1.8	0.45	450, 400, 333	1.5	165FBGA		QDR II + 4B
K7S1636T4C	512Kx36	1.8	0.45	450, 400, 333	1.5	165FBGA		QDR II + 4B

NOTE: Offer 2-clock latency now; we can also support 2.5-clock latency with 450MHz speed based on demand.

## QDR II+ (36Mbit) SRAM

Part Number	Organization	Vdd (V)	Access Time tCD (ns)	Cycle Time (MHz)	I/O Voltage (V)	Production Package	Status	Comments
K7S3218T4C	1Mx36	1.8	0.45	450, 400, 333	1.5	165FBGA		QDR II + 4B
K7S3236T4C	2Mx18	1.8	0.45	450, 400, 333	1.5	165FBGA		QDR II + 4B

NOTE: Offer 2-clock latency now; we can also support 2.5-clock latency with 450MHz speed based on demand.

SYNCHRONOUS SRAM ORDERING INFORMATION

K	7	X	X	X	X	X	X	X	X	-	X	X	X	X	X	X	X	X
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	

1. Memory (K)

2. Sync SRAM: 7

3. Small Classification

- A: Sync Pipelined Burst
- B: Sync Burst
- C: Custom Product
- D: Double Data Rate
- I: Double Data Rate II, Common I/O
- J: Double Data Rate, Separate I/O
- K: Double Data II+, Common I/O
- L: Late Select
- M: Sync Burst + NtRAM
- N: Sync Pipelined Burst + NtRAM
- P: Sync Pipe
- Q: Quad Data Rate I
- R: Quad Data Rate II
- S: Quad Data Rate II+

4~5. Density

- 10: 1M
- 20: 2M
- 40: 4M
- 64: 72M
- 80: 8M
- 16: 18M
- 32: 36M
- 44: 144M

6~7. Organization

- 08: x8
- 18: x18
- 36: x36
- 72: x72
- 09: x9
- 32: x32
- 44: x144

8~9. Vcc, Interface, Mode

- 00: 3.3V, LVTTL, 2E1D WIDE
- 01: 3.3V, LVTTL, 2E2D WIDE
- 08: 3.3V, LVTTL, 2E2D Hi SPEED
- 09: 3.3V, LVTTL, Hi SPEED
- 11: 3.3V, HSTL, R-R
- 12: 3.3V, HSTL, R-L
- 14: 3.3V, HSTL, R-R Fixed ZQ
- 22: 3.3V, LVTTL, R-R
- 23: 3.3V, LVTTL, R-L
- 25: 3.3V, LVTTL, SB-FT WIDE
- 30: 1.8/2.5/3.3V, LVTTL, 2E1D
- 31: 1.8/2.5/3.3V, LVTTL, 2E2D
- 35: 1.8/2.5/3.3V, LVTTL, SB-FT
- 44: 2.5V, LVTTL, 2E1D
- 45: 2.5V, LVTTL, 2E2D
- 49: 2.5V, LVTTL, Hi SPEED
- 52: 2.5V, 1.5/1.8V, HSTL, Burst2
- 54: 2.5V, 1.5/1.8V, HSTL, Burst4

- 62: 2.5V/1.8V, HSTL, Burst2
- 64: 2.5V/1.8V, HSTL, Burst4
- 66: 2.5V, HSTL, R-R
- 70: 2.5V, HSTL, 4-1-1-1
- 71: 2.5V, HSTL, 3-1-1-1
- 73: 1.5V, 1.8V, HSTL, All
- 74: 1.8V, 2.5V, HSTL, All
- 80: 1.8V, LVCMOS, 2E1D
- 82: 1.8V, HSTL, Burst2
- 84: 1.8V, HSTL, Burst4
- 85: 1.8V, LVCMOS, 2E2D, Hi SPEED
- 88: 1.8V, HSTL, R-R
- 91: 1.5V, HSTL, All
- 95: 1.0V, HSTL, All
- T2: 1.8V, 2Clock Latency, Burst2
- T4: 1.8V, 2Clock Latency, Burst4
- U2: 1.8V, 2.5Clock Latency, Burst2
- U4: 1.8V, 2.5Clock Latency, Burst4

10. Generation

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

11. "--"

12. Package

- H: BGA, FCBGA, PBGA
- G: BGA, FCBGA, FBGA (LF)
- F: FBGA
- E: FBGA (LF)
- Q: (L)QPF
- P: (L)QFP(LF)
- C: CHIP BIZ
- W: WAFER

13. Temp, Power

- COMMON (Temp, Power)
- 0: NONE, NONE (Containing of Error handling code)
- A: Automotive, Normal
- B: Commercial, Low Low
- C: Commercial, Normal
- E: Extended, Normal
- I: Industrial, Normal
- WAFER, CHIP BIZ Level Division
- 0: NONE, NONE
- 1: Hot DC sort
- 2: Hot DC, selected AC sort

14~15. Speed

- Sync Burst, Sync Burst + NtRAM & < Mode is R-L > (Clock Accesss Time)
- 10: 10ns (Sync Burst, Sync Burst + NtRAM)
- 38: 3.8ns
- 43: 4.3ns
- 48: 4.8ns
- 50: 5ns (Only Sync Pipe)
- 55: 5.5ns
- 60: 6ns
- 65: 6.5ns
- 67: 6.7ns
- 70: 7ns
- 75: 7.5ns
- 80: 8ns
- 85: 8.5ns
- 90: 9ns

- Other Small Classification (Clock Cycle Time)

- 10: 100MHz
- 11: 117MHz
- 13: 133MHz
- 14: 138MHz
- 15: 150MHz
- 16: 166MHz
- 17: 175MHz
- 18: 183MHz
- 19: 143MHz
- 20: 200MHz
- 21: 200MHz(2.0ns)
- 22: 225MHz
- 25: 250MHz
- 26: 250MHz(1.75ns)
- 27: 275MHz
- 30: 300MHz
- 33: 333MHz
- 35: 350MHz
- 36: 366MHz(t-CYCLE)
- 37: 375MHz
- 40: 400MHz(t-CYCLE)
- 42: 425MHz
- 45: 450MHz
- 50: 500MHz(except Sync Pipe)
- 6A: 600MHz
- 6F: 650MHz(Only CSRAM)
- 7F: 750MHz

16. Packing Type (16 digit)

- Common to all products, except of Mask ROM
- Divided into TAPE & REEL (In Mask ROM, divided into TRAY, AMMO Packing Separately)

Type	Packing Type	New Marking
Component	TAPE & REEL	T
	Other (Tray, Tube, Jar)	0 (Number)
	Stack	S
Component	TRAY	Y
(Mask ROM)	AMMO PACKING	A
Module	MODULE TAPE & REEL	P
	MODULE Other Packing	M

## MCP: NAND/DRAM

DENSITY		Memory Combination	VCC (V)		ORGANIZATION		Part No.	PACKAGE INFORMATION	
FLASH	DRAM		FLASH	DRAM	FLASH	DRAM		Size	Type
256Mb	256Mb	ND256256	1.8V	1.8V	x8	x16	K5D5657ACC-D090000	10.5x13x1.4	107FBGA
256Mb	512Mb	ND256512	3.0V	2.5V	x8	x32	K5D5613HCA-D075000	10.5x13x1.2	137FBGA
256Mb	1Gb	NDD256512512	3.0V	2.5V	x8	x16	KAL005005M-DGY0000	10.5x13x1.4	137FBGA
512Mb	256Mb	ND512256	1.8V	1.8V	x8	x16	K5D1257ACC-D090000	10.5x13x1.2	107FBGA
			2.7V	1.8V	x8	x16	K5D12571CM-D090000	10.5x13x1.4	107FBGA
			1.8V	1.8V	x8	x16	K5E1257ACM-D075000	10.5x13x1.2	107FBGA
			2.65V	1.8V	x8	x32	K5D1258DCA-A090000	10.5x13x1.2	137FBGA
512Mb	512Mb	ND512512	1.8V	1.8V	x8	x16	K5D12121CM-D090000	10.5x13x1.4	107FBGA
			1.8V	1.8V	x8	x32	K5D12131CM-D090000	10.5x13x1.4	137FBGA
			1.8V	1.8V	x8	x32	K5D1213ACE-D090000	10.5x13x1.2	137FBGA
1Gb	256Mb	ND1G256	1.8V(L)	1.8V	x8	x16	K5D1G572CM-D075000	10.5x13x1.2	107FBGA
			1.8V(L)	1.8V	x8	x32	K5E1G58ACM-D060000	10.5x13x1.2	107FBGA
1Gb	512Mb	ND1G512	1.8V(L)	1.8V	x8	x16	K5D1G12ACD-D075000	10.5x13x1.4	107FBGA
			1.8V(L)	1.8V	x8	x32	TBD	10.5x13x1.2	137FBGA
			1.8V(L)	1.8V(D)	x8	x32	K5E1G131CA-D075000	10.5x13x1.4	137FBGA
1Gb	1Gb	NDD1G512512	1.8V(L)	1.8V(D)	x8	x32	KAL00X001M-AJYY000	11.5x13x1.4	137FBGA
			1.8V(L)	1.8V	x8	x16	KAL00X00VM-DJYY000	10.5x13x1.4	137FBGA
2Gb	512Mb	NND1G1G512	1.8V(L)	1.8V	x8	x32(D)	KAG001002A-DJJY000	11.5x13x1.4	137FBGA
			1.8V(L)	2.65V	x8	x16	KAG006003B-DJJ5000	10.5x13x1.4	137FBGA
		ND2G512	1.8V	1.8V	x8	x16	K5E2G12ACM-D075000	12.0x14x1.4	107FBGA
2Gb	1Gb	NDD2G512512	1.8V	1.8V	x8	x32	KAL009001M-D1YY000	12x14x1.4	137FBGA
		ND2G1G	1.8V	1.8V	x8	x32	K5E2G1GACM-D060000	12x14x1.2	137FBGA

- NOTES:
1. N = NAND, D = DRAM memory combination indicates the type, density, and number of die stacks in the MCP. (Ex. NDD256256256 = 256Mb NAND + 256Mb DRAM + 256Mb DRAM).
  2. When ordering Tape and Reel, please indicate by the letter "T" on the 3rd to last field in the part number. (Ex. K5D5629ACC-D090T00)
  3. (D) Denotes DDR SDRAM packaged in MCP
  4. (L) Denotes Large Block NAND packaged in MCP

## MCP: NOR/SRAM AND NOR/UtRAM

DENSITY		Memory Combination	VCC (V)				ORGANIZATION			PACKAGE INFORMATION	
FLASH	SRAM		FLASH	SRAM	FLASH	SRAM	BOOT	NOR OPR.	Part No.	Size	Type
32Mb	8Mb	RC3208	1.8V	1.8V	x16	x16	TOP	Sync. Mux, Ut2	K5N3208ATM-SF66000	8x9.2x1.2	56FBGA
	16Mb	RU3216	3.0V	3.0V	x16	x16	TOP/BOM	Async. No Page	TBD	8x11x1.2	69FBGA
64Mb	32Mb	RU6432	3.0V	3.0V	x16	x16	TOP	Async. No Page	K5J6332CTM-D770000	8x11.6x1.4	69FBGA
			1.8V	1.8V	x16	x16	TOP	Async. DeMux	K5L6532ATM-D870000	8x12x1.2	115FBGA
128Mb	32Mb	RU12832	3.0V	3.0V	x16	x16	TOP/BOT	Async. Page Mode	K5L2931CAA-D770000	8x11.6x1.2	64FBGA
			1.8V	1.8V	x16	x16	TOP	Sync Mux	K5L2931CAM-D770000	8.0x9.2x1.2	56FBGA
128Mb	64Mb	RU12864	3.0V	3.0V	x16	x16	TOP/BOT	Async Page Mode	K5L2963CAM-D770000	8x11.6x1.2	64FBGA
		RC12864	1.8V	1.8V	x16	x16	BOT	Sync Mux	K5N2866ABM-DF66000	8x9.2x1.2	56FBGA
256Mb	64Mb	RU25664	3.0V	3.0V	x16	x16	TOP/BOT	Async Page Mode	K5L5563CAM-D770000	8x11.6x1.2	84FBGA
		RC25664	1.8V	1.8V	x16	x16	TOP	Sync Mux, Ut2	K5N5666ATM-SS66000	8x9.2x1.2	56FBGA
256Mb	128Mb	RU256128	2.7V	2.7V	x16	x16	TOP/BOT	Async Page Mode	K5L5527CAM-D770000	8x11.6x1.2	84FBGA
			1.8V	1.8V	x16	x16	TOP	Sync DeMux	K5L5628ATA-DF66000	8x11.6x1.3	84FBGA

- NOTES:
1. R= NOR, S= SRAM, U= UTRAM Memory combination indicates the type, density, and number of die stacks in the MCP. (Ex. RRU646432 = 64Mb NOR + 64Mb NOR + 32Mb UTRAM).
  2. When ordering Tape and Reel, please indicate by the letter "T" on the 3rd to last field in the part number. (Ex. K5A3240CTM-F755T00)
  3. All NOR Flash have demuxed Add/Data lines unless otherwise indicated in NOR OPR column.
  4. All packages are pin compatible to Spansion's MCP pin out.

**MCP: OneNAND/DRAM**

DENSITY		Memory Combination	VCC (V)		ORGANIZATION		Part No.	PACKAGE INFORMATION	
FLASH	DRAM		FLASH	DRAM	FLASH	DRAM		Size	Type
256Mb	256Mb	OD256256	3.3V	3.3V	x16	x32	K5R5658VCM-DR75000	8x13x1.4	188FBGA
			3.3V	1.8V	x16	x32			
512Mb	512Mb	OD512512	1.8V	1.8V	x16	x32	K5R1213ACB-DK75000	11.5x13x1.4	202FBGA
1Gb	512Mb	OD1G512	1.8V	1.8V	x16	x16(D)	K5W1G12ACD-DK75000	11.5x13x1.4	167FBGA
2Gb	512Mb	OD2G512	1.8V	1.8V	x16	x16	K5R2G12ACM-DK90000	11.5x13x1.4	202FBGA

- NOTES: 1. O= OneNAND, D= DRAM Memory combination indicates the type, density, and number of die stacks in the MCP. (Ex. OD1G512 = 1Gb OneNAND + 512Mb SDRAM).  
 2. When ordering Tape and Reel, please indicate by the letter "T" on the 3rd to last field in the part number. (Ex. K5R5658VCM-DR75T00)  
 3. (D) Denotes DDR SDRAM packaged in MCP.  
 4. All OneNAND Flash have demuxed Add/Data lines.

**MCP: NOR/DRAM**

DENSITY		Memory Combination	VCC (V)				ORGANIZATION			PACKAGE INFORMATION	
FLASH	SRAM		FLASH	SRAM	FLASH	DRAM	BOOT	NOR OPR.	Part No.	Size	Type
64Mb	256Mb	RD64256	3.0V	1.8V	x16	x32	TOP	Async. No Page	K5H6358LTM-D7750CD	10x11x0.8	145FBGA
64Mb	512Mb	RD64512	3.0V	1.8V	x16	x32(D)	TOP	Async. No Page	K5Y6313LTM-D790000	10.5x12x1.4	151FBGA
512Mb	256Mb	RRD512256	1.8V	1.8V	x16	x16(D)	TOP	Sync MLC	KAS35000AM-S44Y000	11x10x1.3	133FBGA
512Mb	512Mb	RRD256256512	1.8V	1.8V	x16	x16	T+B	Sync	KAS280003M-DUU5000	11.5x13x1.4	167FBGA

- NOTES: 1. R= NOR, D= DRAM Memory combination indicates the type, density, and number of die stacks in the MCP. (Ex. RDD32128128 = 32Mb NOR + 128Mb DRAM + 128Mb DRAM).  
 2. When ordering Tape and Reel, please indicate by the letter "T" on the 3rd to last field in the part number. (Ex. K5H6358ETA-D775T00)  
 3. All NOR Flash have demuxed Add/Data lines

**MCP: MOST COMMONLY USED MCP CONFIGURATIONS**

Memory	NAND Density	DRAM Density/Organization	Voltage (NAND-DRAM)	Package
<b>NAND &amp; DRAM</b>	256Mb	128Mb (x16)	1.8V - 1.8V	107FBGA
	256Mb	256Mb (x16)	2.65V - 1.8/1.8V	107FBGA
	256Mb	512Mb (x32)	3V - 3/2.5V	137FBGA
	512Mb	256Mb (x16/x32)	2.65/1.8V - 1.8V	107FBGA/137FBGA
	512Mb	512Mb (x16/x32)	2.65/1.8V - 1.8V	107FBGA/137FBGA
	1Gb	256Mb (x16)	2.65V - 1.8V	107FBGA
	1Gb	512Mb (x16/x32)	3.0/2.65/1.8V - 3.0/2.65/1.8V	137/107FBGA
	2Gb	512Mb (x16/x32)	3.0/2.65/1.8V - 3.0/2.65/1.8V	137/107FBGA
	2Gb	1Gb (x32)	2.65/1.8V - 1.8V	137FBGA
<b>NOR &amp; UTRAM</b>	64Mb	32Mb	3.0V - 3.0V	69FBGA
	128Mb	32Mb	3.0/1.8V - 3.0/1.8V	56FBGA/64FBGA
	128Mb	64Mb	3.0/1.8V - 3.0/1.8V	64FBGA
	256Mb	64Mb	3.0V - 3.0V	84FBGA
	256Mb	128Mb	3.0V - 3.0V	84FBGA
<b>OneNAND &amp; DRAM</b>	256Mb	256Mb (x32)	3.3V - 3.3/1.8V	188FBGA/167FBGA
	512Mb	512Mb (x16/x32)	1.8V-1.8V	167FBGA/202FBGA
	1Gb	512Mb (x16/x32)	1.8V-1.8V	167FBGA/202FBGA
	1Gb	1Gb (x16/x32)	1.8V-1.8V	202FBGA

- NOTES: This list represents the most commonly used MCPs; more options are available.  
 All NAND organization is x8; all NOR and UTRAM organization is x16 each.

## FLASH: OneNAND

OneNAND is a monolithic IC that combines a NAND flash array with a NOR flash interface plus an SRAM buffer. It's ideal for high-performance, high-density applications.

Density	Org	Speed (MHz)	Voltage(V)	Part Number	Package	Temperature	Comments
256Mb	X16	54Mhz	3.3	KFG5616U1A-PIB5000	48TSOP (12x20)	Industrial	
256Mb	X16	54Mhz	1.8	KFG5616Q1A-DEB5000	67 FBGA	Extended	
256Mb	X16	66MHz	1.8	KFG5616Q1A-DEB6000	67 FBGA	Extended	
256Mb	X16	54MHz	3.3	KFG5616U1A-DIB5000	FBGA (7x9)	Industrial	
256Mb	X16	66MHz	3.3	KFG5616U1A-DIB6000	FBGA (7x9)	Industrial	
512Mb	X16	54MHz	1.8	KFG1216Q2B-DEB5000	63 FBGA	Extended	
512Mb	X16	66MHz	1.8	KFG1216Q2B-DEB6000	63 FBGA	Extended	
512Mb	X16	54MHz	3.3	KFG1216U2B-DIB5000	FBGA (9.5x12)	Industrial	
512Mb	X16	66MHz	3.3	KFG1216U2B-DIB6000	FBGA (9.5x12)	Industrial	
1Gb	X16	83Mhz	1.8	KFG1G16Q2B-DEB8000	63 FBGA(10x13)	Extended	
2Gb	X16	83Mhz	1.8	KFG2G16Q2M-DEB8000	63 FBGA (11x13)	Extended	
4Gb	X16	83Mhz	1.8	KFH4G16Q2M-DEB8000	63 FBGA (10x13)	Extended	

NOTE: All parts are lead free

For ordering information, refer to page 11.

## FLASH: moviNAND

Combining high-density MLC NAND flash with an MMC controller in a single chip that has an MMC interface, moviNAND delivers dense, cost-effective storage for embedded applications.

Density	Org	Speed (MHz)	Voltage(V)	Part Number	Package	Package Size	Comments
512MB	x8	52MHz	1.8/3.3	KMAIN0000A-S998000	153FBGA	11.5x13x1.3t	
1GB	x8	52MHz	1.8/3.3	KMAFN0000M-S998000	169FBGA	12.0x18x1.2t	
2GB	x8	52MHz	1.8/3.3	KMBDN0000M-S998000	169FBGA	12.0x18x1.2t	
2GB	x8	52MHz	1.8/3.3	KMBDE0000A-S998000	153FBGA	11.5x13x1.3t	
2GB	x8	52MHz	1.8/3.3	KMAKE0000M-B998000	169FBGA	12.0x18x1.2t	
4GB	x8	52MHz	1.8/3.3	KMCEN0000M-S998000	169FBGA	12.0x18x1.2t	
4GB	x8	52MHz	1.8/3.3	KMCEE0000A-S998000	153FBGA	11.5x13x1.3t	
4GB	x8	52MHz	1.8/3.3	KMBLE0000M-B998000	169FBGA	12.0x18x1.2t	
8GB	x8	52MHz	1.8/3.3	KMCME0000M-B998000	169FBGA	12.0x18x1.3t	

NOTE: All parts are lead free.

For ordering information, refer to page 11.

## FLASH: FLEX-OneNAND

A monolithic IC with a NAND flash array using a NOR flash interface, Flex-OneNAND enables partitioning into SLC and MLC areas so the chip can be configured for storage or high-speed access.

Density	Org	Speed (MHz)	Voltage(V)	Part Number	Package	Comments
4Gb	x16				DDP	ES
8Gb	x16				DDP	ES
16Gb	x16				ODP	ES

NOTE: All parts are lead free

## DRAM: OneDRAM

OneDRAM is a dual-port, low power DRAM with an SRAM buffer interface and is optimal for high-performance, high-density mobile applications.

Density	Org	Speed (MHz)	Voltage(V)	Part Number	Package	Comments
512Mb	X16	133MHz				Coming Second Half 2007

NOTE: All parts are lead free

## 3.5" HARD DISK DRIVES

Family	Capacity (GB)	RPM	Interface	Buffer	Model
T1665	500	7200	SATA-2	8	HD500LJ
	500	7200	SATA-2	16	HD501LJ
	320	7200	SATA-2	8	HD320KJ
	320	7200	SATA-2	16	HD321KJ
T1335	400	7200	SATA-2	8	HD400LI
	400	7200	SATA-2	16	HD401LI
	300	7200	SATA-2	8	HD300LI
T133	400	7200	PATA	8	HD400LD
	300	7200	PATA	8	HD300LD
S166S	160	7200	SATA-2	8	HD161HJ
	120	7200	SATA-2	8	HD120HJ
	80	7200	SATA-2	2	HD081GJ
	80	7200	SATA-2	8	HD082GJ
	40	7200	SATA-2	2	HD041GJ
	40	7200	SATA-2	8	HD042GJ
P120S	250	7200	SATA-2	8	SP2504C
	250	7200	SATA-2	8	SP2004C
P120	250	7200	PATA	8	SP2514N
	200	7200	PATA	8	SP2014N
P80SD	160	7200	SATA-2	8	HD160JJ
	120	7200	SATA-2	8	HD120JJ
	80	7200	SATA-2	8	HD080HJ
P80SD	160	7200	PATA	2	SP1644N
	160	7200	PATA	8	SP1654N
	120	7200	PATA	2	SP1243N
	120	7200	PATA	8	SP1253N
	80	7200	PATA	2	SP0842N

## 2.5" HARD DISK DRIVES

Family	Capacity (GB)	RPM	Interface	Buffer	Model
M5S	250	5400	SATA	8	HM250JI
	160	5400	SATA	8	HM160HI
	120	5400	SATA	8	HM121HI
	80	5400	SATA	8	HM080GI
	60	5400	SATA	8	HM061GI
M80S	160	5400	SATA	8	HM160JI
	120	5400	SATA	8	HM120II
	80	5400	SATA	8	HM080HI
M80	160	5400	PATA	8	HM160JC
	120	5400	PATA	8	HM120IC
	80	5400	PATA	8	HM080HC
M60S	120	5400	SATA	8	HM120JI
	100	5400	SATA	8	HM100JI
	60	5400	SATA	8	HM060HI
M60	120	5400	PATA	8	HM120JC
	100	5400	PATA	8	HM100JC
	60	5400	PATA	8	HM060HC
M40S	40	5400	SATA	8	HM040HI
M40S	40	5400	PATA	8	MP0402H

**1.8" HARD DISK DRIVES**

Family	Capacity (GB)	RPM	Interface	Buffer	Model
N1 (3600rpm)	60	3600	PATA	2	HS061HA
	60	3600	CEATA	2	HS061HP
	40	3600	PATA	2	HS041HA
	40	3600	CEATA	2	HS041HP
	30	3600	PATA	2	HS031GA
	30	3600	CEATA	2	HS031GP
	20	3600	PATA	2	HS021GA
	20	3600	CEATA	2	HS021GP
N1 (4200rpm)	60	4200	PATA	2	HS060HB
	60	4200	CEATA	2	HS060HQ
	40	4200	PATA	2	HS040HB
	40	4200	CEATA	2	HS040HQ
	30	4200	PATA	2	HS030GB
	30	4200	CEATA	2	HS030GQ
	20	4200	PATA	2	HS020GB
	20	4200	CEATA	2	HS020GQ

## 2.5" HYBRID HARD DRIVES

Family	Capacity (GB)	RPM	Interface	Buffer	Model
MH80S	160	5400	SATA	8	HM16HJI
	120	5400	SATA	8	HM12HII
	80	5400	SATA	8	HM08HHI

## NAND-FLASH BASED SSD

Capacity	Form Factor	Idle Power	Part Number	Noise	Interface
4GB	2.5"	0.1W	MC4GE04G5APP-0XA	0dB	ATA5
8GB	2.5"	0.1W	MC8DE08G5APP-0XA	0dB	ATA5
16GB	2.5"	0.1W	MC8DE16G5APP-0XA	0dB	ATA5
32GB	2.5"	0.1W	MCAQE32G5APP-0XA	0dB	ATA5
4GB	1.8"	0.1W	MC4GE04G8APR-0X	0dB	ATA5
8GB	1.8"	0.1W	MC8DE08G8APR-0XA	0dB	ATA5
16GB	1.8"	0.1W	MCAQE16G8APR-0XA	0dB	ATA5
32GB	1.8"	0.1W	MCBOE32G8APR-0XA	0dB	ATA5
64GB	1.8"	0.1W		0dB	ATA5
8GB	Slim Card Module	0.1W		0dB	ATA5
16GB	Slim Card Module	0.1W		0dB	ATA5
32GB	Slim Card Module	0.1W		0dB	ATA5

## EXTERNAL DVD DRIVES

	External DVD Writer SE-S184M					Slot-in Slim External DVD Writer SE-T084L				
Drive Type	External					External, Slot-in, Slim				
Dimensions (WxHxD)	163x50x232mm					143x19x157mm				
Interface	USB 2.0					USB 2.0				
Buffer Memory	2MB					2MB				
Disc Capacity (Max)	Up to 4.7GB Single Layer / 8.5GB Double Layer					Up to 4.7GB Single Layer / 8.5GB Double Layer				
Seek Time (Ave)	DVD-ROM: 130ms CD-ROM: 110ms					DVD-ROM: 130ms CD-ROM: 130ms				
Data Transfer Rate (Max)	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>
	DVD+R	24.3	18x	16.2	12x	DVD+R	10.8	8x	10.8	8x
	DVD+R DL	10.8	8x	10.8	8x	DVD+R DL	8.1	6x	10.8	8x
	DVD+RW	10.8	8x	10.8	8x	DVD+RW	10.8	8x	10.8	8x
	DVD-R	24.3	18x	16.2	12x	DVD-R	10.8	8x	10.8	8x
	DVD-R DL	10.8	8x	10.8	8x	DVD-R DL	5.4	4x	10.8	8x
	DVD-RAM	21.6	12x	21.6	12x	DVD-RAM	6.75	5x	6.75	5x
	DVD-RW	8.1	6x	10.8	8x	DVD-RW	8.1	6x	10.8	8x
	DVD-ROM	-	-	21.6	16x	DVD-ROM	-	-	10.8	8x
	CD-ROM	-	-	7.2	48x	CD-ROM	-	-	3.6	24x
	CD-R	7.2	48x	6.0	40x	CD-R	3.6	24x	3.6	24x
	CD-RW	7.2	32x	6.0	40x	CD-RW	3.6	24x	3.6	24x
Burst Transfer Rate (Max)	PIO Mode		16.6MB/s							
	Ultra DMA Mode 2		33.3MB/s							
LightScribe V1.2	<20min Draft					<20min Draft				
Full Labling Time	<28min Normal					<28min Normal				
	<36min Best					<36min Best				
Supported Disks	DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text LightScribe DVD±R / LightScribe CD-R					DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text LightScribe DVD±R / LightScribe CD-R				
Other	RoHS Compliant Vertical Mounting Supported					Both 12cm and 8cm standard round discs supported Operates on either AC Adaptor or USB Power Manual Disc Ejection in case of power loss				

INTERNAL DVD DRIVES

	Internal DVD-ROM Drives								Internal DVD Writer				
	SH-D163A/B				SH-D162C				SH-S182D/M/F				
Drive Type	Internal				Internal				Internal				
Dimensions (WxHxD)	148.2x42x170mm				148.2x42x184mm				148.2x42x170mm				
Interface	S-ATA				EIDE / ATAPI				EIDE / ATAPI				
Buffer Memory	198KB				256KB				2MB				
Disc Capacity (Max)	CD-RW Type 80 700MB / CD-R Type 90 800MB				Up to 4.7GB Single Layer / 8.5GB Double Layer				Up to 4.7GB Single Layer / 8.5GB Double Layer				
Seek Time (Ave)	DVD: 150ms CD: 130ms				DVD: 150ms CD: 130ms				DVD-ROM: 130ms CD-ROM: 110ms				
Data Transfer Rate (Max)	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>MB/sWrite</b>	<b>MB/s</b>	<b>Read</b>	<b>Read</b>
	DVD	Read	21.6	48x	DVD	Read	21.6	48x	DVD+R	24.3	18x	16.2	12x
	CD	Read	7.2	16x	CD	Read	7.2	16x	DVD+R DL	10.8	8x	10.8	8x
									DVD+R DL (SH-S128F)	10.8	10x	10.8	8x
									DVD+RW	10.8	8x	10.8	8x
									DVD-R	24.3	18x	16.2	12x
									DVD-R DL	10.8	8x	10.8	8x
									DVD-RAM	16.2	12x	16.2	12x
									DVD-RW	8.1	6x	10.8	8x
									DVD-ROM	-	-	21.6	16x
								CD-ROM	-	-	7.2	48x	
								CD-R	7.2	48x	6.0	40x	
								CD-RW	4.8	32x	6.0	40x	
Burst Transfer Rate (Max)	S-ATA		1.5Gb/s		PIO Mode 4		16.6MB/s		PIO Mode 4		16.6MB/s		
	DMA Mode 2		16.6MB/s		Ultra DMA Mode 2		33.3MB/s		Ultra DMA Mode 2		33.3MB/s		
LightScribe V1.2 Full Labling Time	<20min Draft (SH-S128M only)				<28min Normal (SH-S128M only)				<36min Best (SH-S128M only)				
Supported Disks	DVD+R / DVD+RW / DVD-RAM				DVD+R / DVD+RW / DVD-RAM				DVD+R / DVD+R DL / DVD+RW / DVD-RAM				
	DVD-R / DVD-RW / DVD-Video / DVD-ROM				DVD-R / DVD-RW / DVD-Video / DVD-ROM				DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM				
	CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA				CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA				CD-R / CD-RW / CD-ROM / CD-ROM/XA				
	Video-CD / Photo CD / CD-I / CD-Extra / CD-Text				Video-CD / Photo CD / CD-I / CD-Extra / CD-Text				CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text LightScribe DVD±R / LightScribe CD-R (SH-S128M only)				
Other	RoHS Compliant				RoHS Compliant				RoHS Compliant				
	Horizontal or Vertical Drive Mounting Supported				Horizontal or Vertical Drive Mounting Supported				Buffer Under Run Free				
	Motorized Tray				Motorized Tray								
	MPEG II Card and Soft MPEG Compatible				MPEG II Card and Soft MPEG Compatible								

INTERNAL DVD DRIVES

	20x DVD Writer					Internal S-ATA DVD Writer					20x S-ATA DVD Writer				
	SH-S202G					SH-S183A/L					SH-S203B				
Drive Type	Internal					Internal					Internal				
Dimensions (WxHxD)	148.2x42x170mm					148.2x42x170mm					148.2x42x170mm				
Interface	EIDE / ATAPI					S-ATA					S-ATA				
Buffer Memory	2MB					2MB					2MB				
Disc Capacity (Max)	Up to 4.7GB Single Layer / 8.5GB Double Layer					Up to 4.7GB Single Layer / 8.5GB Double Layer					Up to 4.7GB Single Layer / 8.5GB Double Layer				
Seek Time (Ave)	DVD-ROM: 130ms CD-ROM: 110ms					DVD-ROM: 130ms CD-ROM: 110ms					DVD-ROM: 130ms CD-ROM: 110ms				
Data Transfer Rate (Max)	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>
	DVD+R	27.0	20x	21.6	16x	DVD+R	24.3	18x	16.2	12x	DVD+R	27.0	20x	21.6	16x
	DVD+R DL	16.2	12x	16.2	12x	DVD+R DL	10.8	8x	10.8	8x	DVD+R DL	21.6	16x	16.2	12x
	DVD+RW	10.8	8x	16.2	12x	DVD+RW	10.8	8x	10.8	8x	DVD+RW	10.8	8x	16.2	12x
	DVD-R	27.0	20x	21.6	16x	DVD-R	24.3	18x	16.2	12x	DVD-R	27.0	20x	21.6	16x
	DVD-R DL	16.2	12x	16.2	12x	DVD-R DL	10.8	8x	10.8	8x	DVD-R DL	16.2	12x	16.2	12x
	DVD-RAM	16.2	12x	16.2	12x	DVD-RAM	16.2	12x	21.6	12x	DVD-RAM	16.2	12x	16.2	12x
	DVD-RW	8.1	6x	16.2	12x	DVD-RW	8.1	6x	10.8	8x	DVD-RW	8.1	6x	16.2	12x
	DVD-ROM	-	-	21.6	12x	DVD-ROM	-	-	21.6	16x	DVD-ROM	-	-	21.6	16x
	CD-ROM	-	-	7.2	48x	CD-ROM	-	-	7.2	48x	CD-ROM	-	-	7.2	48x
	CD-R	7.2	48x	6.0	40x	CD-R	7.2	48x	6.0	40x	CD-R	7.2	48x	6.0	40x
	CD-RW	4.8	32x	6.0	40x	CD-RW	4.8	32x	6.0	40x	CD-RW	4.8	32x	6.0	40x
	Burst Transfer Rate (Max)	PIO Mode		16.6MB/s			S-ATA		1.5Gb/s			S-ATA		1.5Gb/s	
Ultra DMA Mode 2		33.3MB/s													
LightScribe V1.2 Full Labling Time						<20min Draft (SH-S183L only) <28min Normal (SH-S183L only) <36min Best (SH-S183L only)									
Supported Disks	DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text					DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text LightScribe DVD±R / LightScribe CD-R (SH-S183L only)					DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text				
Other	RoHS Compliant Buffer Under Run Free					RoHS Compliant Buffer Under Run Free Motorized Tray Supports Mt. Rainier					RoHS Compliant Buffer Under Run Free				

INTERNAL DVD DRIVES

	Slim DVD Writers														
	SN-T082A/L					SN-S082M					SN-S082D				
Drive Type	Internal					Internal					Internal				
Dimensions (WxHxD)	128x12.7x129mm					128x12.7x129mm					128x12.7x129mm				
Interface	EIDE / ATAPI					EIDE / ATAPI					EIDE / ATAPI				
Buffer Memory	2MB					2MB					2MB				
Disc Capacity (Max)	Up to 4.7GB Single Layer / 8.5GB Double Layer					Up to 4.7GB Single Layer / 8.5GB Double Layer					Up to 4.7GB Single Layer / 8.5GB Double Layer				
Seek Time (Ave)	DVD-ROM: 110ms CD-ROM: 110ms					DVD-ROM: 110ms CD-ROM: 110ms					DVD-ROM: 110ms CD-ROM: 110ms				
Data Transfer Rate (Max)	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>MB/s</b>	<b>Write</b>	<b>MB/s</b>	<b>Read</b>
	DVD+R	10.8	8x	10.8	8x	DVD+R	10.8	8x	10.8	8x	DVD+R	10.8	8x	10.8	8x
	DVD+R DL	8.1	6x	10.8	8x	DVD+R DL	8.1	6x	10.8	8x	DVD+R DL	8.1	6x	10.8	8x
	DVD+RW	10.8	8x	10.8	8x	DVD+RW	10.8	8x	10.8	8x	DVD+RW	10.8	8x	10.8	8x
	DVD-R	10.8	8x	10.8	8x	DVD-R	10.8	8x	10.8	8x	DVD-R	10.8	8x	10.8	8x
	DVD-R DL	5.4	4x	10.8	8x	DVD-R DL	5.4	4x	10.8	8x	DVD-R DL	5.4	4x	10.8	8x
	DVD-RAM	6.75	5x	6.75	5x	DVD-RAM	6.75	5x	6.75	5x	DVD-RAM	6.75	5x	6.75	5x
	DVD-RW	8.1	6x	10.8	8x	DVD-RW	8.1	6x	10.8	8x	DVD-RW	8.1	6x	10.8	8x
	DVD-ROM	-	-	10.8	8x	DVD-ROM	-	-	10.8	8x	DVD-ROM	-	-	10.8	8x
	CD-ROM	-	-	3.6	24x	CD-ROM	-	-	3.6	24x	CD-ROM	-	-	3.6	24x
	CD-R	3.6	24x	3.6	24x	CD-R	3.6	24x	3.6	24x	CD-R	3.6	24x	3.6	24x
	CD-RW	3.6	24x	3.6	24x	CD-RW	3.6	24x	3.6	24x	CD-RW	3.6	24x	3.6	24x
Burst Transfer Rate (Max)											PIO Mode 4 16.6MB/s DMA Mode 2 16.6MB/s Ultra DMA Mode 2 33.3MB/s				
LightScribe V1.2 Full Labling Time	<20min Draft (SN-T082L only) <28min Normal (SN-T082L only) <36min Best (SN-T082L only)					<20min Draft <28min Normal <36min Best									
Supported Disks	DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text LightScribe DVD±R / LightScribe CD-R (SM-T082L only)					DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text LightScribe DVD±R / LightScribe CD-R					DVD+R / DVD+R DL / DVD+RW / DVD-RAM DVD-R / DVD-R DL / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I (FMV) / CD-Extra / CD-Text				
Other	Slot-In Type Loader Supports disc burning from USB BUS Power Both 12cm and 8cm round discs supported Manual Disc Ejection in case of power loss					RoHS Compliant Buffer Under Run Free Drawer Type Tray					RoHS Compliant Buffer Under Run Free Drawer Type Tray				

## INTERNAL COMBO DRIVES

	Internal Combo Slim Drive				Internal Combo Drives							
	SN-M242D				SH-M523A/B				SH-M522C			
Drive Type	Internal				Internal				Internal			
Dimensions (WxHxD)	128x12.7x129mm				148.2x42x170mm				148.2x42x184mm			
Interface	EIDE / ATAPI				S-ATA				EIDE / ATAPI			
Buffer Memory	2MB				2MB				2MB			
Disc Capacity (Max)	CD-RW Type 80 700MB / CD-R Type 90 800MB				CD-RW Type 80 700MB / CD-R Type 90 800MB				Up to 4.7GB Single Layer / 8.5GB Double Layer			
Seek Time (Ave)	DVD: 120ms CD: 130ms				DVD: 150ms CD: 130ms				DVD: 150ms CD: 130ms			
Data Transfer Rate (Max)	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>
	CD	Record	3.6	24x	CD	Record	7.8	52x	CD	Record	7.8	52x
	CD	Rewrite	3.6	24x	CD	Rewrite	4.8	32x	CD	Rewrite	4.8	32x
	CD	Read	3.6	24x	CD	Read	7.8	52x	CD	Read	7.8	52x
	DVD	Read	10.8	8x	DVD	Read	21.6	16x	DVD	Read	21.6	16x
Burst Transfer Rate (Max)	PIO Mode 4		16.6MB/s		S-ATA		1.5Gb/s		PIO Mode 4		16.6MB/s	
	DMA Mode 2		16.6MB/s						DMA Mode 2		16.6MB/s	
	Ultra DMA Mode 2		33.3MB/s						Ultra DMA Mode 2		33.3MB/s	
Supported Disks	DVD+R / DVD+RW / DVD-RAM DVD-R / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I / CD-Extra / CD-Text				DVD+R / DVD+RW / DVD-RAM DVD-R / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I / CD-Extra / CD-Text				DVD+R / DVD+RW / DVD-RAM DVD-R / DVD-RW / DVD-Video / DVD-ROM CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA CD-Audio / Video-CD / Photo CD CD-I / CD-Extra / CD-Text			
Other	RoHS Compliant Horizontal or Vertical Drive Mounting Supported Drawer Type Tray Buffer Under Run Free				RoHS Compliant Horizontal or Vertical Drive Mounting Supported Motorized Tray Buffer Under Run Free Supports Mt. Rainier				RoHS Compliant Horizontal or Vertical Drive Mounting Supported Motorized Tray Buffer Under Run Free Supports Mt. Rainier			

INTERNAL CD DRIVES

	Internal CD-ROM Drives								CD-ROM Slim Drive			
	SH-C523A				SH-C522C				SN-C242C			
Drive Type	Internal				Internal				Internal			
Dimensions (WxHxD)	148.2x42x184mm				148.2x42x184mm				128x12.7x129mm			
Interface	S-ATA				EIDE / ATAPI				EIDE / ATAPI			
Buffer Memory	96KB				96KB				96KB			
Disc Capacity (Max)	CD-RW Type 80 700MB / CD-R Type 90 800MB				Up to 4.7GB Single Layer / 8.5GB Double Layer				CD-RW Type 80 700MB / CD-R Type 90 800MB			
Seek Time (Ave)	CD: 90ms				CD: 90ms				CD: 130ms			
Data Transfer Rate (Max)	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>
	CD	Read	7.8	52x	CD	Read	7.8	52x	CD	Read	3.6	24x
Burst Transfer Rate (Max)	S-ATA 1.5Gb/s				PIO Mode 4 16.6MB/s DMA Mode 2 16.6MB/s				PIO Mode 4 16.6MB/s DMA Mode 2 16.6MB/s Ultra DMS Mode 2 33.3MB/s			
Supported Disks	CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA Video-CD / Photo CD / CD-I / CD-Extra / CD-Text				CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA Video-CD / Photo CD / CD-I / CD-Extra / CD-Text				DVD+R / DVD+RW / DVD-RAM / DCD-R DVD-ROM / DVD-Video / Video-CD / Photo CD CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA CD-I / CD-Extra / CD-Text / CD-I / CD-Extra / CD-Text			
Other	RoHS Compliant Horizontal or Vertical Drive Mounting Supported Motorized Tray				RoHS Compliant Horizontal or Vertical Drive Mounting Supported Motorized Tray Optional Ultra DMA Burst Transfer				RoHS Compliant Horizontal or Vertical Drive Mounting Supported Drawer Type Tray 80mm and 120mm CD Disc Diameter			

INTERNAL CD DRIVES

	Internal CD-RW Drive			
	SH-R522C			
Drive Type	Internal			
Dimensions (WxHxD)	148.2x42x184mm			
Interface	EIDE / ATAPI			
Buffer Memory	2MB			
Disc Capacity (Max)	CD-RW Type 80 700MB / CD-R Type 90 800MB			
Seek Time (Ave)	CD: 100ms			
Data Transfer Rate (Max)	<b>Media Type</b>	<b>Activity</b>	<b>MB/s</b>	<b>Read</b>
	CD	Record	7.8	52x
	CD	Rewrite	4.8	32x
	CD	Read	7.8	52x
Burst Transfer Rate	PIO Mode 4 16.6MB/s DMA Mode 2 16.6MB/s Ultra DMA Mode 2 33.3MB/s			
Supported Disks	CD-R / CD-RW / CD-DA / CD-ROM / CD-ROM/XA Video-CD / Photo CD / CD-I / CD-Extra / CD-Text			
Other	RoHS Compliant Horizontal or Vertical Drive Mounting Supported Motorized Tray Buffer Under Run Free Supports Mt. Rainier			

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