

Direct RDRAM Product Guide

Version 1.7
March 2006

Change History

Version 1.0 (Mar. '03)

First Copy

Version 1.1 (May '03)

Add 576Mb base RIMM® Module

Version 1.2 (July '03)

Add 128Mb F-die , Add 576Mb base 32bit RIMM Module

Version 1.3 (Oct '03)

Add 256Mb E-die , Add 576Mb base SO-RIMM™ & NexMod Module

Version 1.4 (Jan. '04)

Add 288Mb E-die , Add 288Mb E-die base Modules

Version 1.5 (May. '04)

Change the availability of 288Mb D-die/E-die base Modules, etc.

Version 1.6 (Sep. '05)

Add 128Mb H-die , Change the availability of 576Mb A-die & A-die base Modules

Version 1.7 (Mar. '06)

Delete 128Mb E-die, 256/288Mb D-die, 256Mb E-die, etc.

A. Direct RDRAM Component Product Guide

Density	Org.*1	Part Number	Speed*3	Power(V)	Refresh	Package Type*2	Availability
128Mb(F-die)	256Kx16*32s	K4R271669F-TC	S8	2.5±0.13V	16K/32ms	54ball WBGA	Now
576Mb(A-die)	1Mx18*32s	K4R761869A-FC	N1/T9/M8	2.5±0.13V	32K/32ms	92ball WBGA	EOL (Q2/'05)
		K4R761869A-GC					
		K4R761869A-HC					
256Mb(E-die)	512Kx16*32s	K4R571669E-GC	T9/M8/K8	2.5±0.13V	16K/32ms	84ball WBGA	Convert to 288Mb
288Mb(E-die)	512Kx18*32s	K4R881869E-GC	T9/M8/K8	2.5±0.13V	16K/32ms	92ball WBGA	Now
		K4R881869E-HC					
128Mb(H-die)	256Kx16*32s	K4R271669H-DC	S8	2.5±0.13V	16K/32ms	54ball FBGA	Q2/'06

*1 **Bank description**

- 32s :32 banks with a "spilt" architecture

*2 **Package Type**

Code	Description
F	WBGA
G	WBGA, Lead free
H	WBGA, Lead free for SO-RIMM™ module
T	54ball WBGA, Lead free
R	54ball WBGA
D	54ball FBGA, Lead free

*3 **Speed (Freq. & tRAC)**

Data frequency	Application	Code	Description (t _{CYCLE} , t _{RAC} , t _{RC})
1200Mbps	Long channel	N1	600MHz(1.667ns), -32, 32clks
1066Mbps	Long channel	T9	533MHz (1.875ns), -32P, 28clks
		N9	533MHz (1.875ns), -32, 28clks
		M9	533MHz (1.875ns), -35, 32clks
	Short channel	S9	533MHz (1.875ns), -35, 32clks
800Mbps	Long channel	M8	400MHz (2.5ns), -40, 28clks
		K8	400MHz (2.5ns), -45, 28clks
	Short channel	S8	400MHz (2.5ns), -45, 28clks

B. Direct RDRAM Memory Module Product Guide

Density	Part Number	Feature	Base Component				Availability
			Base Component	*1Org.	Power		
16 bit RIMM Module (Non-ECC)							
128MB	MR16R1624EG0-CT9	SS, 1375mil 184pin	288Mb E-die	K4R881869E-GCT9 x 4pcs	512Kx16*32s	2.5±0.13V	Now
	MR16R1624EG0-CM8/CK8	SS, 1250mil 184pin		K4R881869E-GCM8/GCK8 x 4pcs			
256MB	MR16R1628EG0-CT9	SS, 1375mil 184pin	288Mb E-die	K4R881869E-GCT9 x 8pcs	512Kx16*32s	2.5±0.13V	Now
	MR16R1628EG0-CM8/CK8	SS, 1250mil 184pin		K4R881869E-GCM8/GCK8 x 8pcs			
512MB	MR16R162GEG0-CT9	DS, 1375mil 184pin	288Mb E-die	K4R881869E-GCT9 x 16pcs	512Kx16*32s	2.5±0.13V	Now
	MR16R162GEG0-CM8/CK8	DS, 1250mil 184pin		K4R881869E-GCM8/GCK8 x 16pcs			
16 bit RIMM Module (ECC)							
144MB	MR18R1624EG0-CT9	SS, 1375mil 184pin	288Mb E-die	K4R881869E-GCT9 x 4pcs	512Kx18*32s	2.5±0.13V	Now
	MR18R1624EG0-CM8/CK8	SS, 1250mil 184pin		K4R881869E-GCM8/GCK8 x 4pcs			
288MB	MR18R1628EG0-CT9	SS, 1375mil 184pin	288Mb E-die	K4R881869E-GCT9 x 8pcs	512Kx18*32s	2.5±0.13V	Now
	MR18R1628EG0-CM8/CK8	SS, 1250mil 184pin		K4R881869E-GCM8/GCK8 x 8pcs			
576MB	MR18R162GEG0-CT9	DS, 1375mil 184pin	288Mb E-die	K4R881869E-GCT9 x 16pcs	512Kx18*32s	2.5±0.13V	Now
	MR18R162GEG0-CM8/CK8	DS, 1250mil 184pin		K4R881869E-GCM8/GCK8 x 16pcs			
16 bit RIMM Module based on 576Mb A-die							
1152MB	MR18R326GAG0-CT9/CM8	DS, 1375mil 184pin	576Mb A-die	K4R761869A-GCT9/GCM8 x 16pcs	1Mx18*32s	2.5±0.13V	EOL (Q2/'05)
32 bit RIMM Module based on 576Mb A-die							
576MB	MD18R3268AG0-CN1/CT9/CM8	SS, 1375mil 232pin	576Mb A-die	K4R761869A-GCN1/GCT9/GCM8 x 8pcs	1Mx18*32s	2.5±0.13V	EOL (Q2/'04)
1152MB	MD18R326GAG0-CN1/CT9/CM8	DS, 1375mil 232pin	576Mb A-die	K4R761869A-GCN1/GCT9/GCM8 x 16pcs	1Mx18*32s	2.5±0.13V	
32 bit RIMM Module based on 256Mb E-die							
128MB	MD16R1624EG0-CN1/CT9/CM8	SS, 1375mil 232pin	256Mb E-die	K4R571669E-GCN1/GCT9/CGM8 x 4pcs	512Kx16*32s	2.5±0.13V	EOL (Q4/'05)
256MB	MD16R1628EG0-CN1/CT9/CM8	SS, 1375mil 232pin	256Mb E-die	K4R571669E-GCN1/GCT9/CGM8 x 8pcs	512Kx16*32s	2.5±0.13V	
512MB	MD16R162GEG0-CN1/CT9/CM8	DS, 1375mil 232pin	256Mb E-die	K4R571669E-GCN1/GCT9/CGM8 x 16pcs	512Kx16*32s	2.5±0.13V	
32d RIMM Module based on 288Mb E-die							
1152MB	MR18R162WEG0-CM8	DS, 2750mil ECC, 184pin	288Mb E-die	K4R881869E-GCM8 x 32pcs	512Kx18*32s	2.5±0.13V	EOL (Q4/'05)

Density	Part Number	Feature	Base Component				Availability
			Base Component	Org.*1	Power		
SO-RIMM Module based on 576Mb A-die							
432MB	MS18R3266AH*2-CT9/CM8*3	DS, 1230mil ECC, 160pin	576Mb A-die	K4R761869A-HCT9/HCM8 x 6pcs	1Mx18*32s	2.5±0.13V	EOL (Q2/'05)
SO-RIMM Module based on 288Mb E-die							
72MB	MS18R1622EH0-CT9/CM8/CK8	SS, 1230mil ECC, 160pin	288Mb E-die	K4R881869E-HCT9/HCM8/HCK8 x 2pcs	512Kx18*32s	2.5±0.13V	Now
144MB	MS18R1624EH0-CT9/CM8/CK8	SS, 1230mil ECC, 160pin	288Mb E-die	K4R881869E-HCT9/HCM8/HCK8 x 4pcs	512Kx18*32s	2.5±0.13V	Now
288MB	MS18R1628EH0-CT9/CM8/CK8	DS, 1230mil ECC, 160pin	288Mb E-die	K4R881869E-HCT9/HCM8/HCK8 x 8pcs	512Kx18*32s	2.5±0.13V	Now
NexMod Module based on 576Mb A-die							
576MB	MN18R3268AF0-CN1/CT9/CM8	BGA Connector ECC, 200pin	576Mb A-die	K4R761869A-GCT9/GCM8 x 8pcs	1Mx18*32s	2.5±0.13V	EOL (Q2/'05)
NexMod Module based on 288Mb E-die							
144MB	MN18R1624EF0-CN1/CT9/CM8	BGA Connector ECC, 200pin	288Mb E-die	K4R881869E-GCT9/GCM8 x 4pcs	512Kx18*32s	2.5±0.13V	Now
	MP18R1624EF0-CN1/CT9/CM8	PGA Connector ECC, 200pin	288Mb E-die	K4R881869E-GCT9/GCM8 x 4pcs	512Kx18*32s	2.5±0.13V	Now
288MB	MN18R1628EF0-CN1/CT9/CM8	BGA Connector ECC, 200pin	288Mb E-die	K4R881869E-GCT9/GCM8 x 8pcs	512Kx18*32s	2.5±0.13V	Now
	MP18R1628EF0-CN1/CT9/CM8	PGA Connector ECC, 200pin	288Mb E-die	K4R881869E-GCT9/GCM8 x 8pcs	512Kx18*32s	2.5±0.13V	Now

***1 Bank description**

- 32s :32 banks with a "spilt" architecture

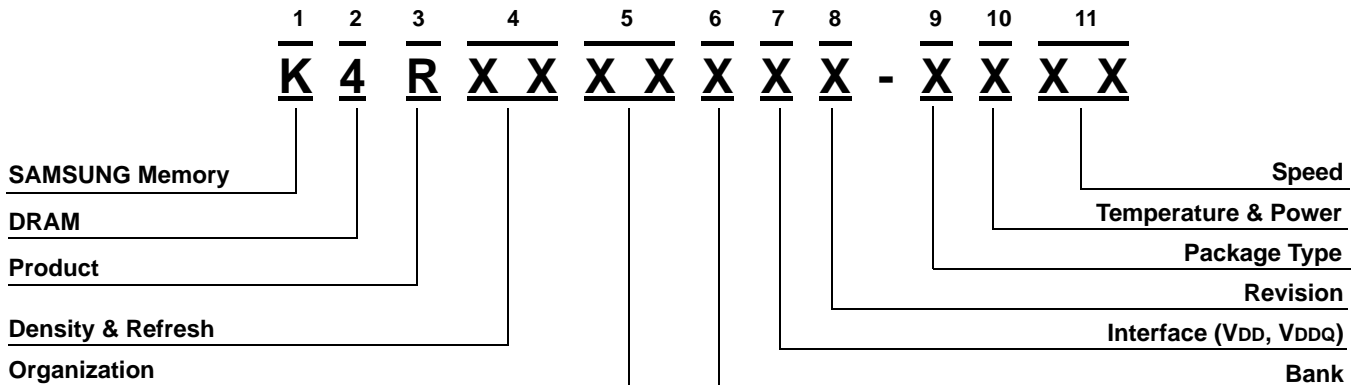
***2 Package Type**

Code	Description
F	WBGA
G	WBGA, Lead free
H	WBGA, Lead free for SO-RIMM™ module
T	54ball WBGA, Lead free
R	54ball WBGA
D	54ball FBGA, Lead free

***3 Speed (Freq. & tRAC)**

Data frequency	Application	Code	Description (t _{CYCLE} · t _{RAC} · t _{RC})
1200Mbps	Long channel	N1	600MHz(1.667ns), -32, 32clks
1066Mbps	Long channel	T9	533MHz (1.875ns), -32P, 28clks
		N9	533MHz (1.875ns), -32, 28clks
		M9	533MHz (1.875ns), -35, 32clks
800Mbps	Short channel	S9	533MHz (1.875ns), -35, 32clks
	Long channel	M8	400MHz (2.5ns), -40, 28clks
		K8	400MHz (2.5ns), -45, 28clks
	Short channel	S8	400MHz (2.5ns), -45, 28clks

C. Direct RDRAM Component Ordering Information



1. SAMSUNG Memory : K

2. DRAM : 4

3. Product

R : RDRAM®

4. Density & Refresh

- 27 : 128M, 16K/32ms(1.95us)
- 44 : 144M, 16K/32ms(1.95us)
- 57 : 256M, 16K/32ms(1.95us)
- 88 : 288M, 16K/32ms(1.95us)
- 52 : 512M, 32K/32ms(0.98us)
- 76 : 576M, 32K/32ms(0.98us)

5. Organization

- 16 : x16
- 18 : x18

6. Bank

- 6 : 32 Banks

7. Interface (VDD, VDDQ)

- 9 : RSL (2.5V)

8. Revision

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

9. Package Type

- M : * uBGA package for Mirrored Package
- N : * uBGA package for Normal Package
- S : * uBGA package for Consumer Package
- F : WBGA
- G : WBGA lead free
- H : WBGA lead free for SO-RIMM Module
- T : Consumer WBGA(54ball) & Lead free
- R : Consumer WBGA(54ball)
- D : Consumer FBGA(54ball) & Lead free

10. Temperature & Power

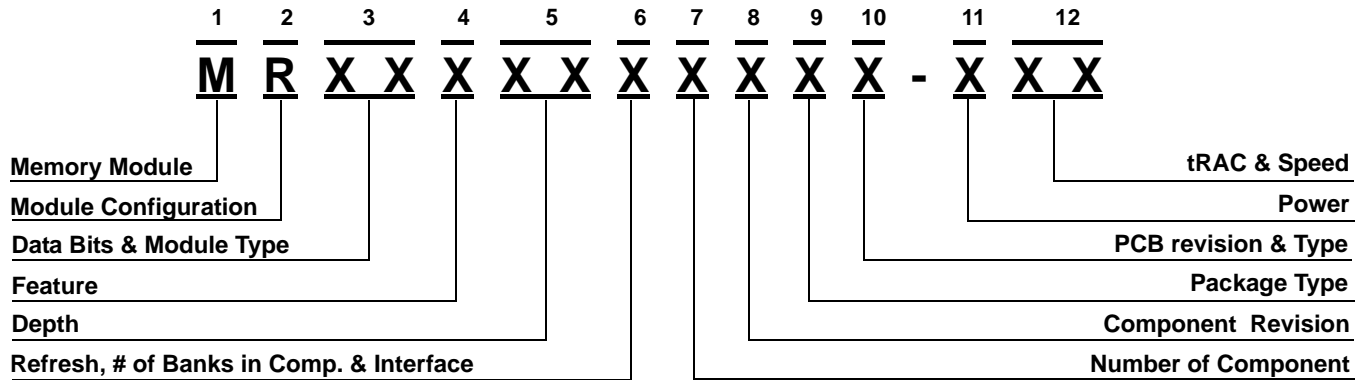
- C : Commercial, Normal
- L : Commercial, Low
- I : Industrial, Normal

11. Speed (t_{CYCLE}, t_{RAC}, t_{RC})

- DS : for Daisy chain Sample
- N1 : 600MHz (1.667 ns), - 32, 32clks, for Long channel
- T9 : 533MHz (1.875 ns), - 32P, 28clks, for Long channel
- N9 : 533MHz (1.875 ns), - 32, 28clks, for Long channel
- M9 : 533MHz (1.875 ns), - 35, 32clks, for Long channel
- S9 : 533MHz (1.875 ns), - 35, 32clks, for Short channel
- M8 : 400MHz (2.5 ns), - 40, 28clks, for Long channel
- K8 : 400MHz (2.5 ns), - 45, 28clks, for Long channel
- S8 : 400MHz (2.5 ns), - 45, 28clks, for Short channel
- K7 : 356MHz (2.81 ns), - 45, 28clks, for Long channel
- G6 : 300MHz (3.33 ns), - 53.3, 28clks, for Long channel
- S6 : 300MHz (3.33 ns), - 53.3, 28clks, for Short channel

* uBGA and micro BGA are registered trademarks of Tessera, Inc.

D. Direct RDRAM Memory Module Ordering Information



1. Memory Module : M

2. Module Configuration

- R : 16bit RIMM Module
- S : SO-RIMM Module
- D : 32bit RIMM Module
- N : NexMod Module (BGA type connector)
- P : NexMod Module (PGA type connector)

3. Data Bits & Module Type

- 16 : X16 Non-ECC
- 18 : X18 ECC

4. Feature

- C : for Continuity Module
- R : Direct RAMBUS™ DRAM

5. Depth

- NT: for Continuity Module
- 04 : 4M
- 08 : 8M
- 16 : 16M
- 32 : 32M

6. Refresh, # of Banks in Comp.& Interface(VDD, VDDQ)

- Y : for Continuity Module
- 2 : 16K/32ms Ref. Dependent 2* 16 Banks & RSL(2.5V,2.5V)
- 6 : 32K/32ms Ref. Dependent 2* 16 Banks & RSL(2.5V,2.5V)

7. Number of Component

- M : for Continuity Module
- 2 : 2ea
- 4 : 4ea
- 6 : 6ea
- 8 : 8ea
- C : 12ea
- G : 16ea
- W : 32ea

8. Component Revision

- U : for Continuity Module
- M : 1st Generation
- A : 2nd Generation
- B : 3rd Generation
- C : 4th Generation
- D : 5th Generation
- E : 6th Generation
- F : 7th Generation
- H : 9th Generation

9. Package Type

- L :for Continuity Module
- M :* uBGA® package for Mirrored Package
- N :* uBGA® package for Normal Package
- S :* uBGA® package for Consumer Package
- F : WBGA
- G : WBGA lead free
- H : WBGA lead free for SO-RIMM Module
- T : Consumer WBGA(54ball) & Lead free
- R : Consumer WBGA(54ball)
- D : Consumer FBGA(54ball) & Lead free

10. PCB Revision & Type

- 0 : Mother Ver.
- 1 : 1st Rev.
- 2 : 2nd Rev.
- 3 : 3rd Rev.

11. Power

- 0 : for Continuity Module
- C: Normal Power Self refresh

12. tRAC(Row Access Time) & Speed

- 00 : for Continuity Module
- N1 : -32 & 1200Mbps (600MHz)
- T9 : -32P & 1066Mbps (533MHz)
- N9 : -32 & 1066Mbps (533MHz)
- M9 : -35 & 1066Mbps (533MHz)
- M8 : -40 & 800Mbps (400MHz)
- K8 : -45 & 800Mbps (400MHz)
- K7 : -45 & 711Mbps (356MHz)
- G6 : -53.3 & 600Mbps (300MHz)

* uBGA and micro BGA are registered trademarks of Tessera, Inc.