

## Memory: SRAM and DRAM

---

### **SIMM30**

8/9-bit 30-pin Single Inline Memory Module.

If present, the parity (DP8) bit has separate data I/O and /CAS signals. At one time, SIMMs with soldered-on pins (called SIPs) were also available. Note: A11 is used as a battery connection in the DS2219 nonvolatile DRAM.

|        |            |
|--------|------------|
| 1 VCC  | 16 D4      |
| 2 /CAS | 17 A8      |
| 3 D0   | 18 A9      |
| 4 A0   | 19 A10     |
| 5 A1   | 20 D5      |
| 6 D1   | 21 /WR     |
| 7 A2   | 22 GND     |
| 8 A3   | 23 D6      |
| 9 GND  | 24 A11 BAT |
| 10 D2  | 25 D7      |
| 11 A4  | 26 Q8      |
| 12 A5  | 27 /RAS    |
| 13 D3  | 28 /CAS8   |
| 14 A6  | 29 DP8     |
| 15 A7  | 30 VCC     |

### **SIMM72**

32/36-bit 72-pin Single Inline Memory Module.

The DPn bits are the parity bits and aren't present on 32-bit SIMMs. 'Odd' size SIMMs (512k, 2M, etc) have two banks, with RAS0/2 addressing the primary, and RAS1/3 the secondary bank. RAS0/1 address the lower 18 bits (D0-17) and RAS2/3 the upper 18 bits (D18-35), while the CAS lines can be used as byte-select. The four PD bits are the presence and size-detect outputs.

|        |          |          |        |
|--------|----------|----------|--------|
| 1 GND  | 19 A10   | 37 DP17  | 55 D12 |
| 2 D0   | 20 D4    | 38 DP35  | 56 D30 |
| 3 D18  | 21 D22   | 39 GND   | 57 D13 |
| 4 D1   | 22 D5    | 40 /CAS0 | 58 D31 |
| 5 D19  | 23 D23   | 41 /CAS2 | 59 VCC |
| 6 D2   | 24 D6    | 42 /CAS3 | 60 D32 |
| 7 D20  | 25 D24   | 43 /CAS1 | 61 D14 |
| 8 D3   | 26 D7    | 44 /RAS0 | 62 D33 |
| 9 D21  | 27 D25   | 45 /RAS1 | 63 D15 |
| 10 VCC | 28 A7    | 46       | 64 D34 |
| 11     | 29       | 47 /WE   | 65 D16 |
| 12 A0  | 30 VCC   | 48       | 66     |
| 13 A1  | 31 A8    | 49 D9    | 67 PD1 |
| 14 A2  | 32 A9    | 50 D27   | 68 PD2 |
| 15 A3  | 33 /RAS3 | 51 D10   | 69 PD3 |
| 16 A4  | 34 /RAS2 | 52 D28   | 70 PD4 |
| 17 A5  | 35 DP26  | 53 D11   | 71     |
| 18 A6  | 36 DP8   | 54 D29   | 72 GND |

## DS1285, DS1287, DS1287A

Real-time clock with 50 bytes RAM.

DS1287(A) has built-in quartz crystal and lithium battery, and therefore the X1, X2 and VBAT pins are no-connect. On the (older) DS1287 the /RCLR pin is no-connect as well.

|               |    |        |            |
|---------------|----|--------|------------|
| +-----+-----+ |    |        |            |
| MOT           | 1  | +++    | 24   VCC   |
| X1            | 2  |        | 23   SQW   |
| X2            | 3  |        | 22         |
| AD0           | 4  |        | 21   /RCLR |
| AD1           | 5  |        | 20   VBAT  |
| AD2           | 6  | DS1285 | 19   /INT  |
| AD3           | 7  |        | 18   /RST  |
| AD4           | 8  |        | 17   DS    |
| AD5           | 9  |        | 16   GND   |
| AD6           | 10 |        | 15   R//W  |
| AD7           | 11 |        | 14   AS    |
| GND           | 12 |        | 13   /CE   |
| +-----+-----+ |    |        |            |

## 2114

1kx4 SRAM.

|               |   |      |          |
|---------------|---|------|----------|
| +-----+-----+ |   |      |          |
| A6            | 1 | +++  | 18   VCC |
| A5            | 2 |      | 17   A7  |
| A4            | 3 |      | 16   A8  |
| A3            | 4 |      | 15   A9  |
| A0            | 5 | 2114 | 14   D1  |
| A1            | 6 |      | 13   D2  |
| A2            | 7 |      | 12   D3  |
| /CE           | 8 |      | 11   D4  |
| GND           | 9 |      | 10   /WE |
| +-----+-----+ |   |      |          |

## 4116

16kx1 DRAM.

Requires -5, +5 and +12V.

|               |   |      |           |
|---------------|---|------|-----------|
| +-----+-----+ |   |      |           |
| VEE           | 1 | +++  | 16   GND  |
| D             | 2 |      | 15   /CAS |
| /WE           | 3 |      | 14   Q    |
| /RAS          | 4 | 4116 | 13   A6   |
| A0            | 5 |      | 12   A3   |
| A2            | 6 |      | 11   A4   |
| A1            | 7 |      | 10   A5   |
| VDD           | 8 |      | 9   VCC   |
| +-----+-----+ |   |      |           |

## 4164

### 64kx1 DRAM.

|      |   |               |           |
|------|---|---------------|-----------|
|      |   | +---+---+---+ |           |
|      | 1 | +---+         | 16   GND  |
| D    | 2 |               | 15   /CAS |
| /WE  | 3 |               | 14   Q    |
| /RAS | 4 | 4164          | 13   A6   |
| A0   | 5 |               | 12   A3   |
| A2   | 6 |               | 11   A4   |
| A1   | 7 |               | 10   A5   |
| VCC  | 8 |               | 9   A7    |
|      |   | +-----+       |           |

## 4464

### 64kx4 DRAM.

|      |   |               |           |
|------|---|---------------|-----------|
|      |   | +---+---+---+ |           |
| /OE  | 1 | +---+         | 18   GND  |
| D0   | 2 |               | 17   D3   |
| D1   | 3 |               | 16   /CAS |
| /WE  | 4 |               | 15   D2   |
| /RAS | 5 | 4464          | 14   A0   |
| A6   | 6 |               | 13   A1   |
| A5   | 7 |               | 12   A2   |
| A4   | 8 |               | 11   A3   |
| VCC  | 9 |               | 10   A7   |
|      |   | +-----+       |           |

## 4580

### 4x4-bit 3-state synchronous triple-port register file.

|      |    |               |           |
|------|----|---------------|-----------|
|      |    | +---+---+---+ |           |
| 1Q3  | 1  | +---+         | 24   VCC  |
| 1Q2  | 2  |               | 23   1Q1  |
| 1RD  | 3  |               | 22   1Q0  |
| 2Q0  | 4  |               | 21   2RD  |
| 2Q1  | 5  |               | 20   D0   |
| 2Q2  | 6  |               | 19   D1   |
| 2Q3  | 7  | 40108         | 18   D2   |
| WA0  | 8  |               | 17   D3   |
| WA1  | 9  |               | 16   WCLK |
| 2RA1 | 10 |               | 15   WR   |
| 2RA0 | 11 |               | 14   1RA1 |
| GND  | 12 |               | 13   1RA0 |
|      |    | +-----+       |           |

## 5516

### 2Kx8 SRAM.

|               |    |      |    |     |
|---------------|----|------|----|-----|
| +-----+-----+ |    |      |    |     |
| A7            | 1  | +++  | 24 | VCC |
| A6            | 2  |      | 23 | A8  |
| A5            | 3  |      | 22 | A9  |
| A4            | 4  |      | 21 | /WE |
| A3            | 5  |      | 20 | /OE |
| A2            | 6  |      | 19 | A10 |
| A1            | 7  | 5516 | 18 | /CE |
| A0            | 8  |      | 17 | D7  |
| D0            | 9  |      | 16 | D6  |
| D1            | 10 |      | 15 | D5  |
| D2            | 11 |      | 14 | D4  |
| GND           | 12 |      | 13 | D3  |
| +-----+-----+ |    |      |    |     |

## 5564

### 8Kx8 SRAM.

|               |    |      |    |      |
|---------------|----|------|----|------|
| +-----+-----+ |    |      |    |      |
|               | 1  | +++  | 28 | VCC  |
| A12           | 2  |      | 27 | /WE  |
| A7            | 3  |      | 26 | CE2  |
| A6            | 4  |      | 25 | A8   |
| A5            | 5  |      | 24 | A9   |
| A4            | 6  |      | 23 | A11  |
| A3            | 7  | 5564 | 22 | /OE  |
| A2            | 8  |      | 21 | A10  |
| A1            | 9  |      | 20 | /CE1 |
| A0            | 10 |      | 19 | D7   |
| D0            | 11 |      | 18 | D6   |
| D1            | 12 |      | 17 | D5   |
| D2            | 13 |      | 16 | D4   |
| GND           | 14 |      | 15 | D3   |
| +-----+-----+ |    |      |    |      |

## 6116

### 2Kx8 SRAM.

|               |    |      |    |     |
|---------------|----|------|----|-----|
| +-----+-----+ |    |      |    |     |
| A7            | 1  | +++  | 24 | VCC |
| A6            | 2  |      | 23 | A8  |
| A5            | 3  |      | 22 | A9  |
| A4            | 4  |      | 21 | /WE |
| A3            | 5  |      | 20 | /OE |
| A2            | 6  |      | 19 | A10 |
| A1            | 7  | 5516 | 18 | /CE |
| A0            | 8  |      | 17 | D7  |
| D0            | 9  |      | 16 | D6  |
| D1            | 10 |      | 15 | D5  |
| D2            | 11 |      | 14 | D4  |
| GND           | 12 |      | 13 | D3  |
| +-----+-----+ |    |      |    |     |

## 6264

### 8kx8 SRAM.

|     |      |    |    |      |
|-----|------|----|----|------|
|     |      | 1  | 28 | VCC  |
| A12 |      | 2  | 27 | /WE  |
| A7  |      | 3  | 26 | CE2  |
| A6  |      | 4  | 25 | A8   |
| A5  |      | 5  | 24 | A9   |
| A4  |      | 6  | 23 | A11  |
| A3  | 5564 | 7  | 22 | /OE  |
| A2  |      | 8  | 21 | A10  |
| A1  |      | 9  | 20 | /CE1 |
| A0  |      | 10 | 19 | D7   |
| D0  |      | 11 | 18 | D6   |
| D1  |      | 12 | 17 | D5   |
| D2  |      | 13 | 16 | D4   |
| GND |      | 14 | 15 | D3   |

## 6818

### Real-time clock with 50 bytes RAM.

|     |        |    |    |       |
|-----|--------|----|----|-------|
|     |        | 1  | 24 | VCC   |
| X1  |        | 2  | 23 | SQW   |
| X2  |        | 3  | 22 |       |
| AD0 |        | 4  | 21 | /RCLR |
| AD1 |        | 5  | 20 | VBAT  |
| AD2 | 146818 | 6  | 19 | /INT  |
| AD3 |        | 7  | 18 | /RST  |
| AD4 |        | 8  | 17 | DS    |
| AD5 |        | 9  | 16 | GND   |
| AD6 |        | 10 | 15 | R//W  |
| AD7 |        | 11 | 14 | AS    |
| GND |        | 12 | 13 | /CE   |

## 40108

### 4x4-bit 3-state synchronous triple-port register file.

|      |       |    |    |      |
|------|-------|----|----|------|
|      |       | 1  | 24 | VCC  |
| 1Q3  |       | 2  | 23 | 1Q1  |
| 1Q2  |       | 3  | 22 | 1Q0  |
| 1RD  |       | 4  | 21 | 2RD  |
| 2Q0  |       | 5  | 20 | D0   |
| 2Q1  |       | 6  | 19 | D1   |
| 2Q2  |       | 7  | 18 | D2   |
| 2Q3  | 40108 | 8  | 17 | D3   |
| WA0  |       | 9  | 16 | WCLK |
| 2RA1 |       | 10 | 15 | WR   |
| 2RA0 |       | 11 | 14 | 1RA1 |
| GND  |       | 12 | 13 | 1RA0 |

## 40208

4x4-bit 3-state synchronous triple-port register file.

|               |    |       |           |
|---------------|----|-------|-----------|
| +-----+-----+ |    |       |           |
| 1Q3           | 1  | +---+ | 24   VCC  |
| 1Q2           | 2  |       | 23   1Q1  |
| 1RD           | 3  |       | 22   1Q0  |
| 2Q0           | 4  |       | 21   2RD  |
| 2Q1           | 5  |       | 20   D0   |
| 2Q2           | 6  |       | 19   D1   |
| 2Q3           | 7  | 40108 | 18   D2   |
| WA0           | 8  |       | 17   D3   |
| WA1           | 9  |       | 16   WCLK |
| 2RA1          | 10 |       | 15   WR   |
| 2RA0          | 11 |       | 14   1RA1 |
| GND           | 12 |       | 13   1RA0 |
| +-----+-----+ |    |       |           |

## 41256, 41257

256kx1 DRAM.

|               |   |       |           |
|---------------|---|-------|-----------|
| +-----+-----+ |   |       |           |
| A8            | 1 | +---+ | 16   GND  |
| D             | 2 |       | 15   /CAS |
| /WE           | 3 |       | 14   Q    |
| /RAS          | 4 | 41256 | 13   A6   |
| A0            | 5 | 41257 | 12   A3   |
| A2            | 6 |       | 11   A4   |
| A1            | 7 |       | 10   A5   |
| VCC           | 8 |       | 9   A7    |
| +-----+-----+ |   |       |           |

## 44256, 44258

256kx4 DRAM.

|               |    |       |           |
|---------------|----|-------|-----------|
| +-----+-----+ |    |       |           |
| D0            | 1  | +---+ | 20   GND  |
| D1            | 2  |       | 19   D3   |
| /WE           | 3  |       | 18   D2   |
| /RAS          | 4  |       | 17   /CAS |
|               | 5  | 44256 | 16   /OE  |
| A0            | 6  | 44258 | 15   A8   |
| A1            | 7  |       | 14   A7   |
| A2            | 8  |       | 13   A6   |
| A3            | 9  |       | 12   A5   |
| VCC           | 10 |       | 11   A4   |
| +-----+-----+ |    |       |           |

## 55256

### 32kx8 SRAM.

|               |    |       |          |
|---------------|----|-------|----------|
| +-----+-----+ |    |       |          |
| A14           | 1  | +--+  | 28   VCC |
| A12           | 2  |       | 27   /WE |
| A7            | 3  |       | 26   A13 |
| A6            | 4  |       | 25   A8  |
| A5            | 5  |       | 24   A9  |
| A4            | 6  |       | 23   A11 |
| A3            | 7  | 55256 | 22   /OE |
| A2            | 8  |       | 21   A10 |
| A1            | 9  |       | 20   /CE |
| A0            | 10 |       | 19   D7  |
| D0            | 11 |       | 18   D6  |
| D1            | 12 |       | 17   D5  |
| D2            | 13 |       | 16   D4  |
| GND           | 14 |       | 15   D3  |
| +-----+-----+ |    |       |          |

## 146818

### Real-time clock with 50 bytes RAM.

|               |    |        |            |
|---------------|----|--------|------------|
| +-----+-----+ |    |        |            |
|               | 1  | +--+   | 24   VCC   |
| X1            | 2  |        | 23   SQW   |
| X2            | 3  |        | 22         |
| AD0           | 4  |        | 21   /RCLR |
| AD1           | 5  |        | 20   VBAT  |
| AD2           | 6  | 146818 | 19   /INT  |
| AD3           | 7  |        | 18   /RST  |
| AD4           | 8  |        | 17   DS    |
| AD5           | 9  |        | 16   GND   |
| AD6           | 10 |        | 15   R//W  |
| AD7           | 11 |        | 14   AS    |
| GND           | 12 |        | 13   /CE   |
| +-----+-----+ |    |        |            |

## 421000, 421001, 421002, 441000

### 1Mx1 DRAM.

|               |   |      |           |
|---------------|---|------|-----------|
| +-----+-----+ |   |      |           |
| D             | 1 | +--+ | 18   GND  |
| /WE           | 2 |      | 17   Q    |
| /RAS          | 3 |      | 16   /CAS |
|               | 4 |      | 15   A9   |
| A0            | 5 | 42   | 14   A8   |
| A1            | 6 | 100x | 13   A7   |
| A2            | 7 |      | 12   A6   |
| A3            | 8 |      | 11   A5   |
| VCC           | 9 |      | 10   A4   |
| +-----+-----+ |   |      |           |

## 424100 (DIP)

### 4Mx1 DRAM.

|      |    |               |    |      |
|------|----|---------------|----|------|
|      |    | +---+---+---+ |    |      |
| D    | 1  | +---+         | 20 | GND  |
| /WE  | 2  |               | 19 | Q    |
| /RAS | 3  |               | 18 | /CAS |
|      | 4  |               | 17 |      |
| A10  | 5  | 424           | 16 | A9   |
| A0   | 6  | 100           | 15 | A8   |
| A1   | 7  |               | 14 | A7   |
| A2   | 8  |               | 13 | A6   |
| A3   | 9  |               | 12 | A5   |
| VCC  | 10 |               | 11 | A4   |
|      |    | +-----+       |    |      |

## 424100 (SO)

### 4Mx1 DRAM.

|      |    |               |    |      |
|------|----|---------------|----|------|
|      |    | +---+---+---+ |    |      |
| D    | 1  | +---+         | 26 | GND  |
| /WE  | 2  |               | 25 | Q    |
| /RAS | 3  |               | 24 | /CAS |
|      | 4  |               | 23 |      |
| A10  | 5  |               | 22 | A9   |
|      |    |               |    |      |
|      |    | 424100        |    |      |
|      |    |               |    |      |
| A0   | 9  |               | 18 | A8   |
| A1   | 10 |               | 17 | A7   |
| A2   | 11 |               | 16 | A6   |
| A3   | 12 |               | 15 | A5   |
| VCC  | 13 |               | 14 | A4   |
|      |    | +-----+       |    |      |

## 424400 (SO)

### 1Mx4 DRAM.

|      |    |               |    |      |
|------|----|---------------|----|------|
|      |    | +---+---+---+ |    |      |
| D0   | 1  | +---+         | 26 | GND  |
| D1   | 2  |               | 25 | D3   |
| /WE  | 3  |               | 24 | D2   |
| /RAS | 4  |               | 23 | /CAS |
| A9   | 5  |               | 22 | /OE  |
|      |    |               |    |      |
|      |    | 424400        |    |      |
|      |    |               |    |      |
| A0   | 9  |               | 18 | A8   |
| A1   | 10 |               | 17 | A7   |
| A2   | 11 |               | 16 | A6   |
| A3   | 12 |               | 15 | A5   |
| VCC  | 13 |               | 14 | A4   |
|      |    | +-----+       |    |      |

## 424400 (DIP)

### 1Mx4 DRAM.

|               |    |      |          |
|---------------|----|------|----------|
| +-----+-----+ |    |      |          |
| D0            | 1  | +--+ | 20  GND  |
| D1            | 2  |      | 19  D3   |
| /WE           | 3  |      | 18  D2   |
| /RAS          | 4  |      | 17  /CAS |
| A9            | 5  | 424  | 16  /OE  |
| A0            | 6  | 400  | 15  A8   |
| A1            | 7  |      | 14  A7   |
| A2            | 8  |      | 13  A6   |
| A3            | 9  |      | 12  A5   |
| VCC           | 10 |      | 11  A4   |
| +-----+-----+ |    |      |          |

## 551000

### 128kx8 SRAM.

|               |    |        |         |
|---------------|----|--------|---------|
| +-----+-----+ |    |        |         |
|               | 1  | +--+   | 32  VCC |
| A16           | 2  |        | 31  A15 |
| A14           | 3  |        | 30  CE2 |
| A12           | 4  |        | 29  /WE |
| A7            | 5  |        | 28  A13 |
| A6            | 6  |        | 27  A8  |
| A5            | 7  |        | 26  A9  |
| A4            | 8  | 551000 | 25  A11 |
| A3            | 9  |        | 24  /OE |
| A2            | 10 |        | 23  A10 |
| A1            | 11 |        | 22  /CE |
| A0            | 12 |        | 21  D7  |
| D0            | 13 |        | 20  D6  |
| D1            | 14 |        | 19  D5  |
| D2            | 15 |        | 18  D4  |
| GND           | 16 |        | 17  D3  |
| +-----+-----+ |    |        |         |

---