

TS256MRMMC4

256MB MMCmobile

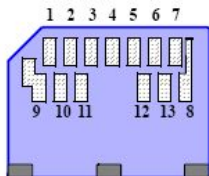
Description

TS256MRMMC4 is a 256MB MMCmobile memory card. It's a fastest, low-power, highly integration memory card. TS256MRMMC4 is designed to provide an inexpensive, mechanically robust storage medium in card form for multimedia consumer applications and mobile devices (handheld PCs, digital cameras, MP3 players, etc.) to store, copy, and move data at high-speed transfer rate.

Placement



Front



Back

Features

- Storage Capacity: 256MB
- Support Dual Operating Voltage: 2.7~3.6V/1.65~1.95V
- Support clock frequencies: 0~52MHz
- Support different Bus width: x1, x4, x8
- Operating Temperature: -25°C ~ 85°C
- Storage Temperature: -40°C ~ 85°C
- Data access mode: Byte mode
- Data Transfer Rate(Maximum):
Read:11MB/sec,Write:10MB/sec
- Fully compatible with MultiMediaCard system specification version 4.0 and backwards compatibility with previous specification
- Form Factor: 18mm x 24mm x 1.4mm
- Endurance: 1,000,000 Program/Erase cycles
- MTBF: 1,000,000 hours

Pin Definition

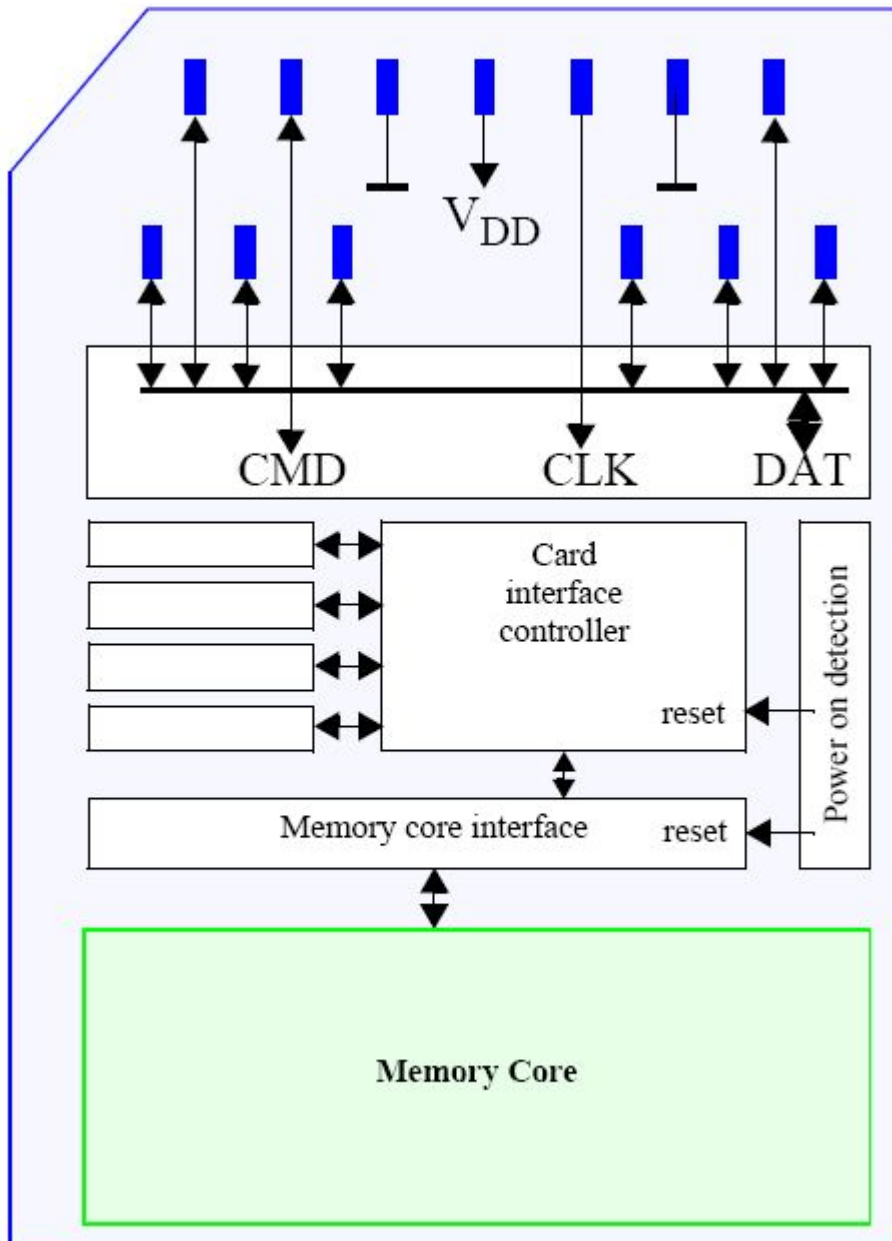
| Pin No. | MMC Mode | | | SPI Mode | | |
|---------|----------|-----------|------------------|----------|------|--------------|
| | Name | Type | Description | Name | Type | Description |
| 1 | DAT3 | I/O/PP | Data | CS | I | Chip select |
| 2 | CMD | I/O/PP/OD | Command/Response | DI | I/PP | Data in |
| 3 | VSS1 | S | Ground | VSS | S | Ground |
| 4 | VDD | S | Power supply | VDD | S | Power supply |
| 5 | CLK | I | Clock | SCLK | I | Clock |
| 6 | VSS2 | S | Ground | VSS2 | S | Ground |
| 7 | DAT0 | I/O/PP | Data | DO | O/PP | Data out |
| 8 | DAT1 | I/O/PP | Data | Not used | | |
| 9 | DAT2 | I/O/PP | Data | Not used | | |
| 10 | DAT4 | I/O/PP | Data | Not used | | |
| 11 | DAT5 | I/O/PP | Data | Not used | | |
| 12 | DAT6 | I/O/PP | Data | Not used | | |
| 13 | DAT7 | I/O/PP | Data | Not used | | |

S: Power Supply; I:Input; O:Output; PP:Push-Pull; OD:Open-Drain; NC:Not Connected

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MultiMediaCard Architecture



Temperature Characteristics

| Parameter | Min. | Max. | Unit |
|-----------------------|------|------|------|
| Operating temperature | -25 | 85 | °C |
| Storage temperature | -40 | 85 | °C |
| Junction temperature | | 95 | °C |

Electrical Characteristics

• Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|----------------------|-----------|-----------|------|
| Power Supply Voltage | V_{CC} | -0.6~+4.6 | V |
| Input Voltage | V_{IN} | -0.6~+4.6 | V |
| Input/Output Voltage | $V_{I/O}$ | -0.6~+4.6 | V |

• Recommended Operation Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|-----------|------|------|------|------|
| Power Supply Voltage (High Voltage Range) | V_{DDH} | 2.7 | 3.3 | 3.6 | V |
| Power Supply Voltage (Low Voltage Range) | V_{DDL} | 1.65 | 1.8 | 1.95 | V |

DC Characteristics

• High Voltage Power Supply

(Ta=-25°C to 85°C, V_{DDH}=2.7V to 3.6V)

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|--------------------------|-------------------|-------------------------|------|-------------------------|------|---|
| Output Low Voltage (OD) | V _{ODOL} | | | 0.3 | V | I _{OL} =2mA |
| Output High Voltage (PP) | V _{OH} | 0.75* V _{DDH} | | | V | I _{OH} =-100uA |
| Output Low Voltage (PP) | V _{OL} | | | 0.125* V _{DDH} | V | I _{OL} =100uA |
| Input High Voltage | V _{IH} | 0.625* V _{DDH} | | V _{DDH} +0.3 | V | |
| Input Low Voltage | V _{IL} | -0.3 | | 0.25* V _{DDH} | V | |
| Operating Current | I _{CC} | | | 20(TBD) | mA | I _{VCCF} =0mA |
| Stand-by Current | I _{SB} | | | 400(TBD) | uA | |
| Input Leakage Current | I _{LI} | | | -10/+10 | uA | V _{IN} =0 to V _{DDH} |
| Output Leakage Current | I _{LO} | | | -10/+10 | uA | V _{OUT} =0 to V _{DDH} |
| Pin Capacitance | C _P | | | 7 | pF | |
| Power Output Voltage | V _F | 1.50 | 1.8 | 1.95 | V | I _F <= 240mA |

• Low Voltage Power Supply

(Ta=-25°C to 85°C, V_{DDL}=1.65V to 1.95V)

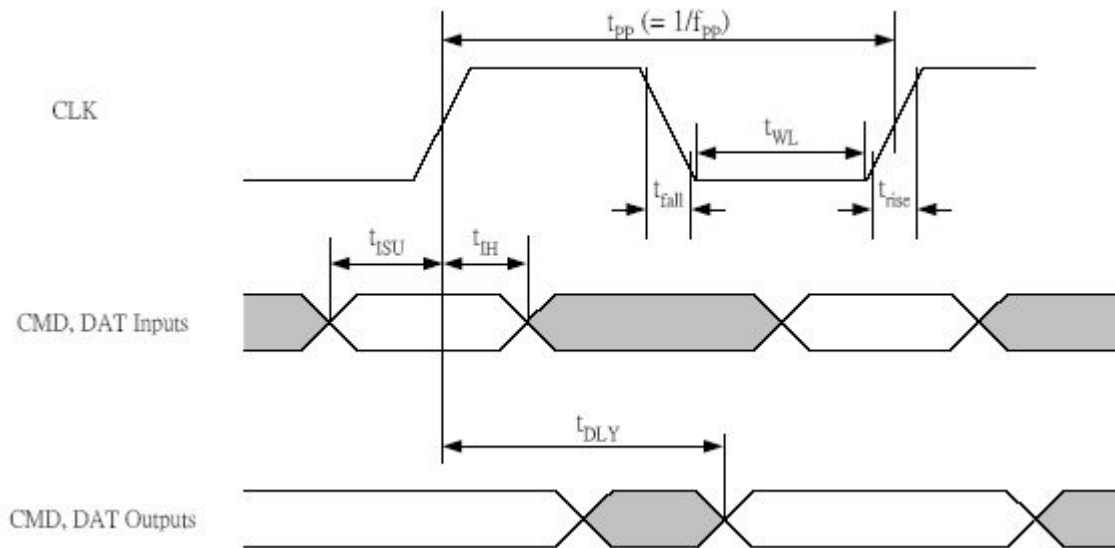
| Parameter | Symbol | Min. | Typ. | Max. | Unit | Condition |
|------------------------|-----------------|-----------------------|------|-----------------------|------|---|
| Output High Voltage | V _{OH} | V _{DDL} -0.2 | | | V | I _{OH} =-100uA |
| Output Low Voltage | V _{OL} | | | 0.2 | V | I _{OL} =100uA |
| Input High Voltage | V _{IH} | 0.7* V _{DDL} | | V _{DDL} +0.3 | V | |
| Input Low Voltage | V _{IL} | -0.3 | | 0.3* V _{DDL} | V | |
| Operating Current | I _{CC} | | | 20(TBD) | mA | I _{VCCF} =0mA |
| Stand-by Current | I _{SB} | | | 400(TBD) | uA | |
| Input Leakage Current | I _{LI} | | | -10/+10 | uA | V _{IN} =0 to V _{DDL} |
| Output Leakage Current | I _{LO} | | | -10/+10 | uA | V _{OUT} =0 to V _{DDL} |
| Pin Capacitance | C _P | | | 7 | pF | |

AC Characteristics

• High Speed Card Interface Timing

($T_a = -25^{\circ}\text{C}$ to 85°C , $V_{DDH} = 2.7\text{V}$ to 3.6V)

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|---------------------------------------|------------|------|------|------|------------------------|
| Clock Frequency (Data Transfer Mode) | f_{pp} | 26 | 52 | MHz | |
| Clock Frequency (Identification Mode) | f_{OD} | 0 | 400 | KHz | |
| Clock Low Time | t_{WL} | 6.5 | | ns | |
| Clock Rise Time | t_{TLH} | | 3 | ns | |
| Clock Fall Time | t_{THL} | | 3 | ns | |
| Input Set-up Time | t_{ISU} | 3 | | ns | |
| Input Hold Time | t_{IH} | 3 | | ns | |
| Output Delay Time | t_{DLY} | 5 | 14 | ns | $C_L \leq 30\text{pF}$ |
| Signal Rise Time | t_{rise} | | 3 | ns | $C_L \leq 30\text{pF}$ |
| Signal Fall Time | t_{fall} | | 3 | ns | $C_L \leq 30\text{pF}$ |



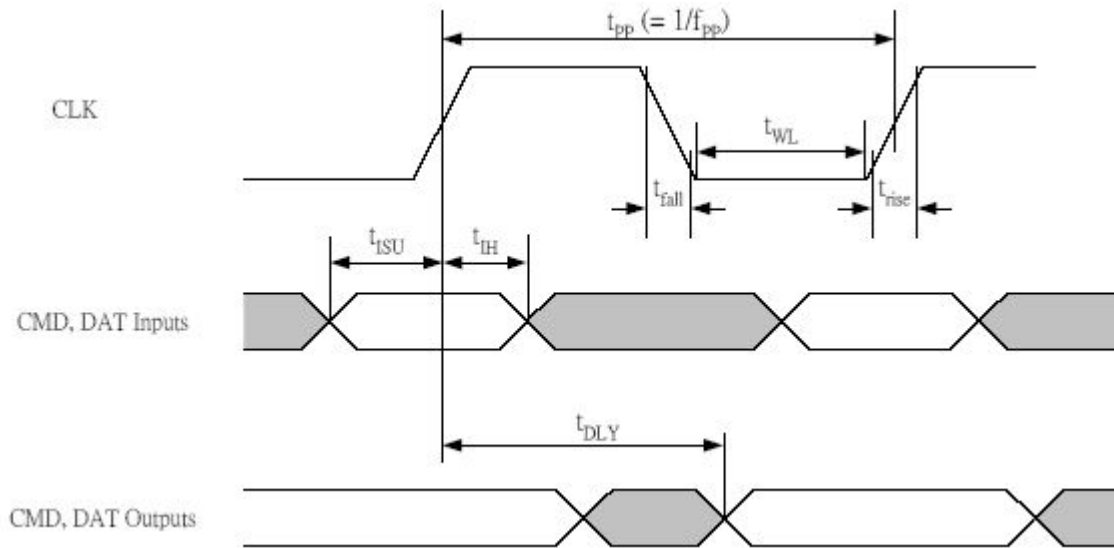
• Backwards Compatible Card Interface Timing

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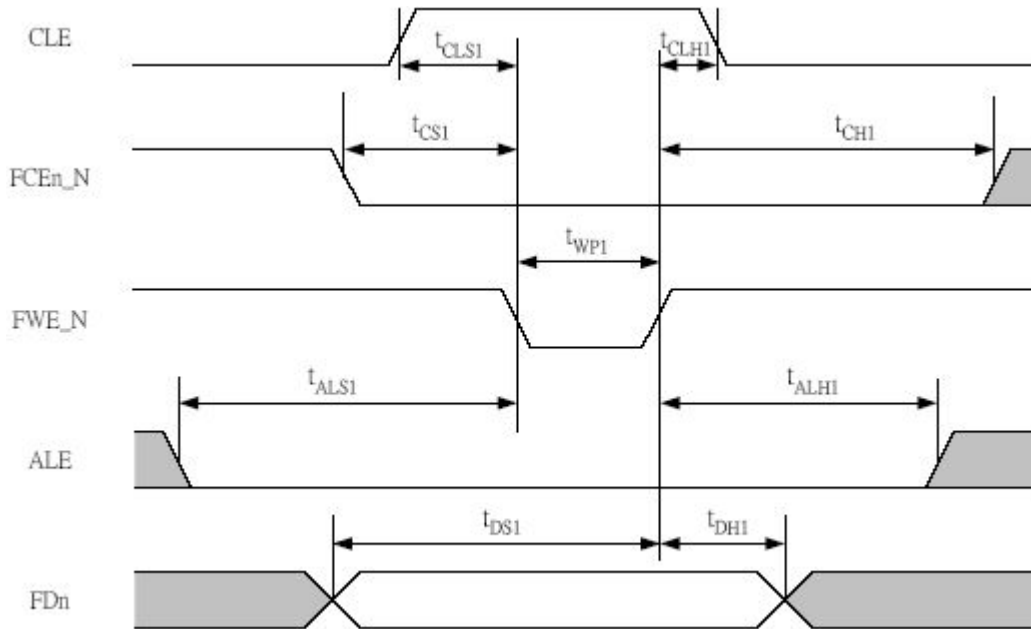
($T_a = -25^{\circ}\text{C}$ to 85°C , $V_{DDH} = 2.7\text{V}$ to 3.6V)

| Parameter | Symbol | Min. | Max. | Unit | Notes |
|---------------------------------------|-----------|------|------|------|------------------------|
| Clock Frequency (Data Transfer Mode) | f_{pp} | 0 | 20 | MHz | |
| Clock Frequency (Identification Mode) | f_{OD} | 0 | 400 | KHz | |
| Clock Low Time | t_{WL} | 10 | | ns | |
| Clock Rise Time | t_{TLH} | | 10 | ns | |
| Clock Fall Time | t_{THL} | | 10 | ns | |
| Input Set-up Time | t_{ISU} | 3 | | ns | |
| Input Hold Time | t_{IH} | 3 | | ns | |
| Output Delay Time | t_{DLY} | 9.7 | 35 | ns | $C_L \leq 30\text{pF}$ |



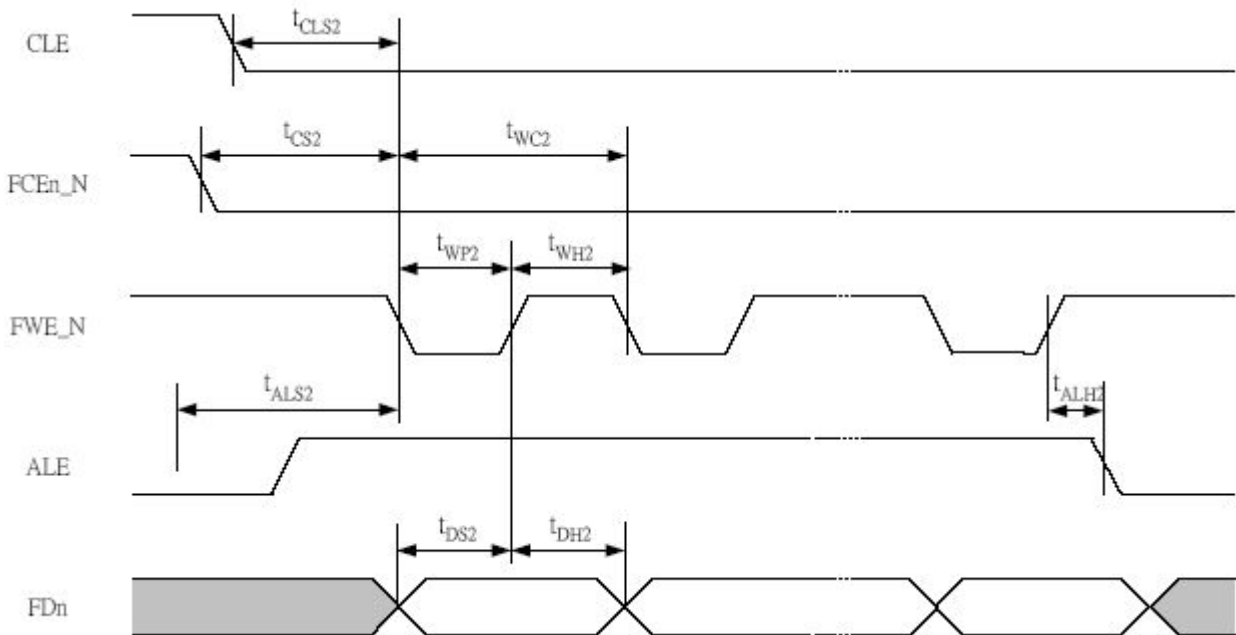
• Command Latch Cycle

| Parameter | Symbol | Min. | Unit | Notes |
|-----------------|------------|------|------|------------------------|
| CLE Setup Time | t_{CLS1} | 30 | ns | $C_L \leq 80\text{pF}$ |
| CLE Hold Time | t_{CLH1} | 15 | ns | $C_L \leq 80\text{pF}$ |
| CE Setup Time | t_{CS1} | 40 | ns | $C_L \leq 80\text{pF}$ |
| CE Hold Time | t_{CH1} | 90 | ns | $C_L \leq 80\text{pF}$ |
| ALE Setup Time | t_{ALS1} | 90 | ns | $C_L \leq 80\text{pF}$ |
| ALE Hold Time | t_{ALH1} | 75 | ns | $C_L \leq 80\text{pF}$ |
| WE Pulse Width | t_{WP1} | 45 | ns | $C_L \leq 80\text{pF}$ |
| Data Setup Time | t_{DS1} | 90 | ns | $C_L \leq 80\text{pF}$ |
| Data Hold Time | t_{DH1} | 30 | ns | $C_L \leq 80\text{pF}$ |



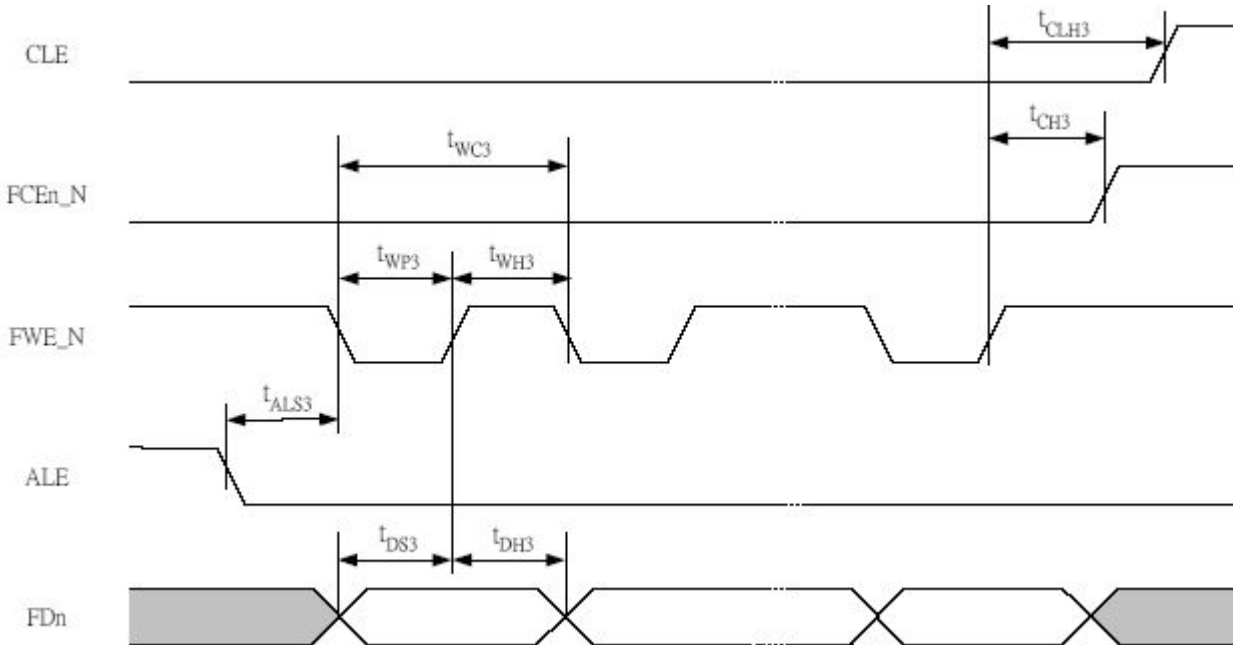
• Address Latch Cycle

| Parameter | Symbol | Min. | Unit | Remark |
|-------------------|------------|------|------|------------------------|
| CLE Setup Time | t_{CLS2} | 90 | ns | $C_L \leq 80\text{pF}$ |
| CE Setup Time | t_{CS2} | 195 | ns | $C_L \leq 80\text{pF}$ |
| ALE Setup Time | t_{ALS2} | 30 | ns | $C_L \leq 80\text{pF}$ |
| ALE Hold Time | t_{ALH2} | 15 | ns | $C_L \leq 80\text{pF}$ |
| Write Cycle Time | t_{WC2} | 150 | ns | $C_L \leq 80\text{pF}$ |
| WE Pulse Width | t_{WP2} | 45 | ns | $C_L \leq 80\text{pF}$ |
| WE High Hold Time | t_{WH2} | 105 | ns | $C_L \leq 80\text{pF}$ |
| Data Setup Time | t_{DS2} | 90 | ns | $C_L \leq 80\text{pF}$ |
| Data Hold Time | t_{DH2} | 30 | ns | $C_L \leq 80\text{pF}$ |



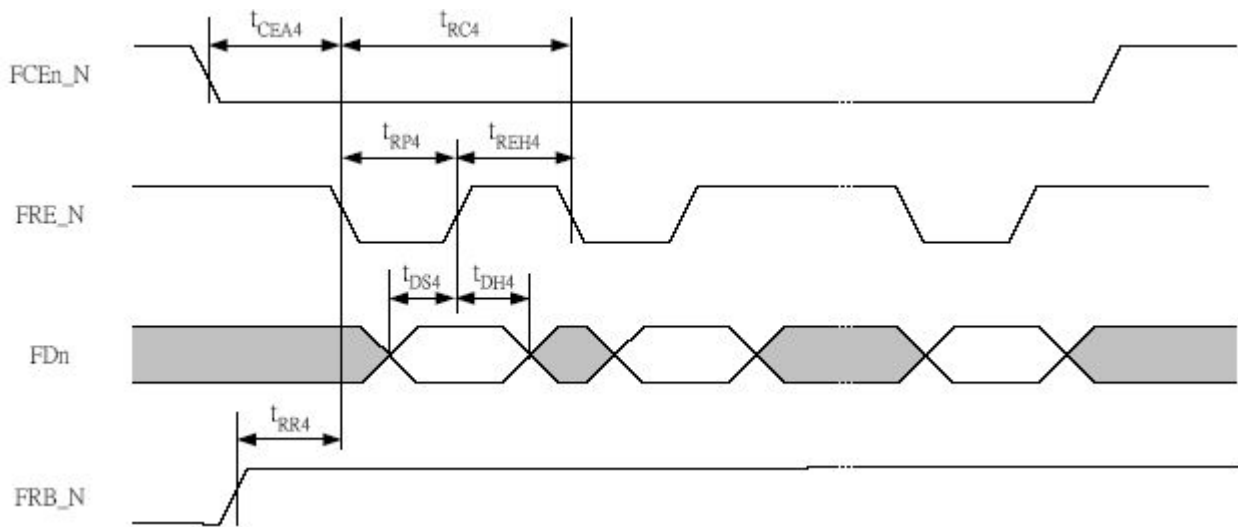
• Input Data Latch Cycle

| Parameter | Symbol | Min. | Unit | Remark |
|-------------------|------------|------|------|------------------------|
| CLE Hold Time | t_{CLH3} | 285 | ns | $C_L \leq 80\text{pF}$ |
| CE Hold Time | t_{CH3} | 195 | ns | $C_L \leq 80\text{pF}$ |
| ALE Setup Time | t_{ALS3} | 90 | ns | $C_L \leq 80\text{pF}$ |
| Write Cycle Time | t_{WC3} | 60 | ns | $C_L \leq 80\text{pF}$ |
| WE Pulse Width | t_{WP3} | 45 | ns | $C_L \leq 80\text{pF}$ |
| WE High Hold Time | t_{WH3} | 15 | ns | $C_L \leq 80\text{pF}$ |
| Data Setup Time | t_{DS3} | 30 | ns | $C_L \leq 80\text{pF}$ |
| Data Hold Time | t_{DH3} | 30 | ns | $C_L \leq 80\text{pF}$ |



• Serial Access Cycle after Read

| Parameter | Symbol | Min. | Unit | Remark |
|-------------------|------------|--------|------|------------------------|
| CE Access Time | t_{CEA4} | 285 | ns | $C_L \leq 80\text{pF}$ |
| Read Cycle Time | t_{RC4} | 60 | ns | $C_L \leq 80\text{pF}$ |
| RE Pulse Width | t_{RP4} | 45 | ns | $C_L \leq 80\text{pF}$ |
| RE High Hold Time | t_{REH4} | 15 | ns | $C_L \leq 80\text{pF}$ |
| Data Setup Time | t_{DS4} | 5(TBD) | ns | $C_L \leq 80\text{pF}$ |
| Data Hold Time | t_{DH4} | 5(TBD) | ns | $C_L \leq 80\text{pF}$ |
| Ready to RE Low | t_{RR4} | 285 | ns | $C_L \leq 80\text{pF}$ |



Reliability and Durability

| | |
|-------------------------------------|---|
| Temperature | Operation: -25°C / 85°C Storage: -40°C (168h) / 85°C (500h) Junction temperature: max. 95°C |
| Moisture and corrosion | Operation: 25°C / 95% rel. humidity Stress: 40°C / 93% rel. hum./500h Salt Water Spray: 3% NaCl/35C; 24h acc. MIL STD Method 1009 |
| ESD protection | Contact Pads: +/-4kV, Human body model according to ANSI EOS/ESD-S5.1-1998 Non Contact Pads area: +/-8kV(coupling plane discharge) +/-15kV(air discharge) Human body model according to IEC61000-4-2 |
| Durability | 10.000 mating cycles; test procedure: t.b.d. |
| Bending | t.b.d. |
| Torque | t.b.d. |
| Drop test | 1.5m free fall |
| UV light exposure | UV: 200nm, 15Ws/cm ² according to ISO 7816-1 |
| Visual inspection Shape and form | No warp page; no mold skin; complete form; no cavities surface smoothness sigma -0.1 mm/cm ² within contour; no cracks; no pollution (fat, oil dust, etc.) |

Above technical information is based on MMC4.0 standard specification and tested to be reliable. However, Transcend makes no warranty, either expressed or implied, as to its accuracy and assumes no liability in connection with the use of this product. Transcend reserves the right to make changes in specifications at any time without prior notice.