



Pages 1 to 27

**INTEGRATED CIRCUITS, SILICON MONOLITHIC, CMOS,
STATIC 16K X 9BIT, PARALLEL FIRST IN FIRST OUT
MEMORY WITH THREE STATE OUTPUTS**

BASED ON TYPE 67206H, 672061H

ESCC Detail Specification No. 9301/048

| | |
|---------|--------------|
| Issue 1 | October 2007 |
|---------|--------------|



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1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

1.2 APPLICABLE DOCUMENTS

The following documents form part of this specification and shall be read in conjunction with it:

- (a) ESCC Generic Specification No. 9000
- (b) MIL-STD-883, Test Methods and Procedures for Microelectronics

1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. 21300 shall apply.

1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 930104801P

- Detail Specification Reference: 9301048
- Component Type Variant Number: 01 (as required)
- Total Dose Radiation Level Letter: P (as required)

1.4.2 Component Type Variants

The component type variants applicable to this specification are as follows:

| Variant Number | Based on Type | Access Time (ns) | Case | Lead/ Terminal Material and Finish | Weight max g | Total Dose Radiation Level Letter |
|----------------|------------------------|------------------|---------|------------------------------------|--------------|-----------------------------------|
| 01 | 67206H-15 | 15 | MDIL28 | G2 | 3.5 | P [30kRAD(Si)] |
| 02 | 67206H-15 | 15 | MFP-F28 | G2 | 3 | P [30kRAD(Si)] |
| 03 | 67206H-30 | 30 | MDIL28 | G2 | 3.5 | P [30kRAD(Si)] |
| 04 | 67206H-30 | 30 | MFP-F28 | G2 | 3 | P [30kRAD(Si)] |
| 05 | 672061H-15 (Note 1) | 15 | MDIL28 | G2 | 3.5 | P [30kRAD(Si)] |
| 06 | 672061H-15 (Note 1) | 15 | MFP-F28 | G2 | 3 | P [30kRAD(Si)] |

| Variant Number | Based on Type | Access Time (ns) | Case | Lead/ Terminal Material and Finish | Weight max g | Total Dose Radiation Level Letter |
|----------------|---------------------|------------------|---------|------------------------------------|--------------|-----------------------------------|
| 07 | 672061H-30 (Note 1) | 30 | MDIL28 | G2 | 3.5 | P [30kRAD(Si)] |
| 08 | 672061H-30 (Note 1) | 30 | MFP-F28 | G2 | 3 | P [30kRAD(Si)] |

NOTES:

1. With Programmable Half-full Flag (PHF).
2. The lead/terminal material and finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.
3. The total dose radiation level letter shall be as defined in ESCC Basic Specification No. 22900. If an alternative radiation test level is specified in the Purchase Order the letter shall be changed accordingly.

1.5 **MAXIMUM RATINGS**

The maximum ratings shall not be exceeded at any time during use or storage. Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

| Characteristics | Symbols | Maximum Ratings | Units | Remarks |
|-------------------------------------|---------------|------------------------|-------|-------------------------|
| Supply Voltage | V_{DD} | -0.5 to 7 | V | Note 1 |
| Input Voltage Range | V_{IN} | -0.5 to $V_{DD} + 0.3$ | V | Notes 1, 2 |
| Output Voltage Range | V_{OUT} | -0.5 to $V_{DD} + 0.3$ | V | Notes 1, 2 |
| Output Current into Outputs | I_O | 50 | mA | Low condition Note 3 |
| Maximum Device Power Dissipation | P_D | 2 | W | |
| Operating Temperature | T_{op} | -55 to +125 | °C | T_{amb} |
| Storage Temperature | T_{stg} | -65 to +150 | °C | |
| Soldering Temperature | T_{sol} | + 265 | °C | Note 4 |
| Junction Temperature | T_j | +150 | °C | Note 5 |
| Thermal Resistance Junction to Case | $R_{th(j-c)}$ | 3 | °C/W | |

NOTES:

1. Device is functional for $4.5 \leq V_{DD} \leq 5.5V$ with reference to $V_{SS} = 0V$.
2. $V_{DD} + 0.3V$ shall not exceed 7V.
3. The maximum output current of any single output.
4. Duration 10 seconds maximum at a distance of not less than 1.6mm from the device body and the same terminal shall not be resoldered until 3 minutes have elapsed.
5. Maximum junction temperature may be increased to +175°C during Power Burn-in and Operating Life.

1.6 **HANDLING PRECAUTIONS**

These devices are susceptible to damage by electrostatic discharge. Therefore, suitable precautions shall be employed for protection during all phases of manufacture, testing, packaging, shipment and any

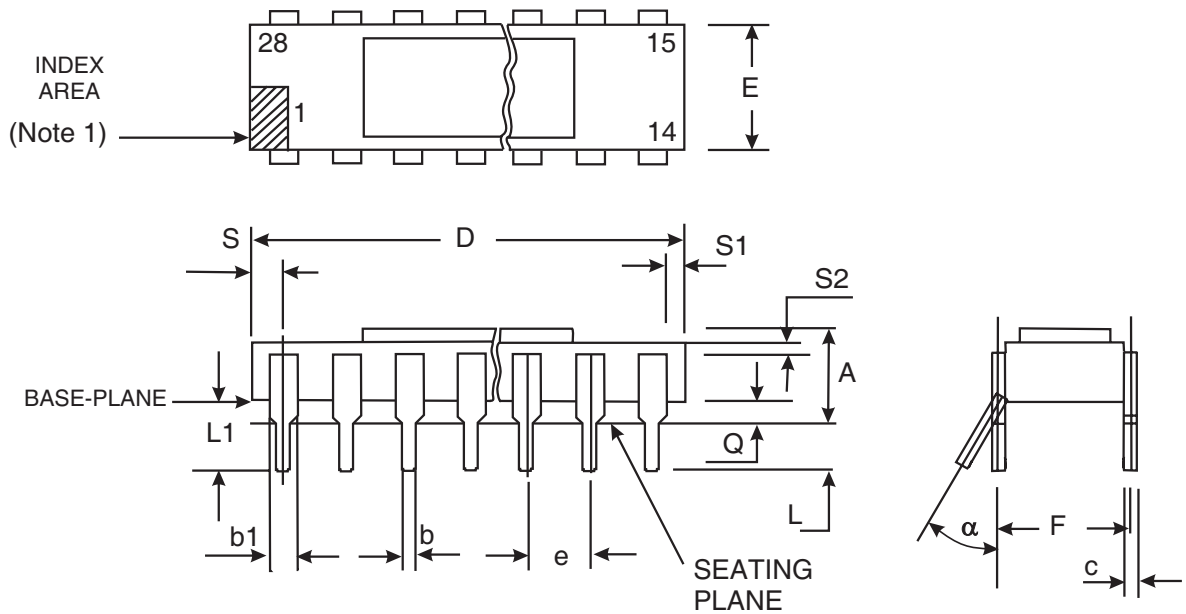
handling.

These components are categorised as Class 2 with a Minimum Critical Path Failure Voltage of 2000 Volts per Basic specification no. 23800.

1.7 **PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION**

Consolidated Notes are given following the case drawings and dimensions.

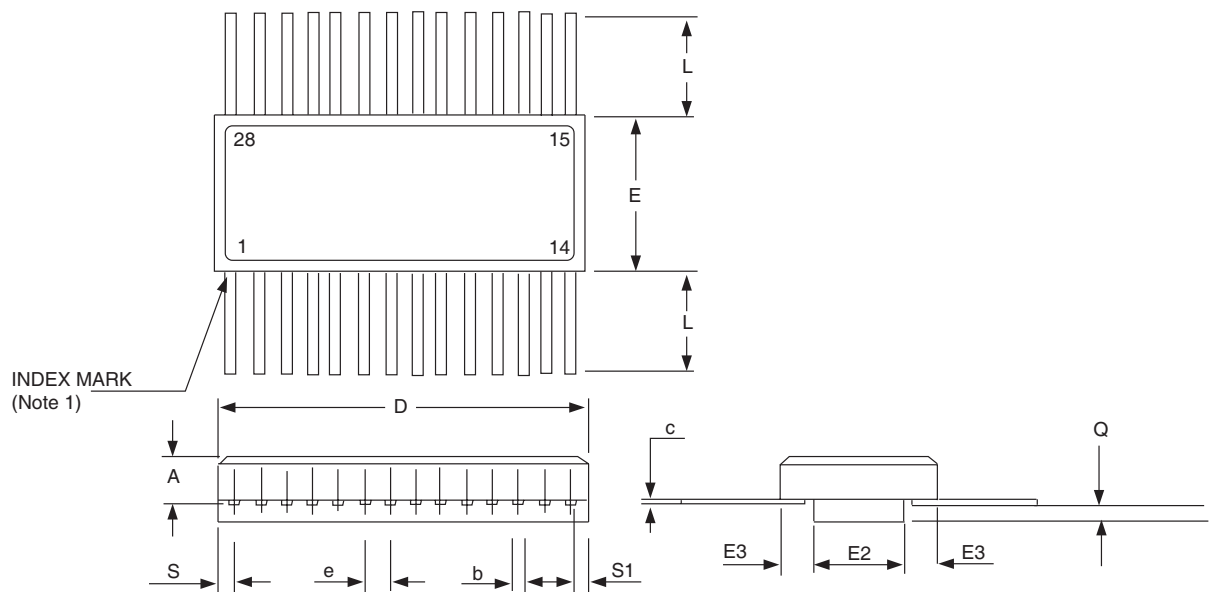
1.7.1 **Multilayer Ceramic Dual-in-line Package (MDIL28) - 28 Pin**



| Symbols | Dimensions mm | | Notes |
|---------|---------------|-------|-------|
| | Min | Max | |
| A | 3.3 | 5.84 | 5 |
| b | 0.36 | 0.58 | 2 |
| b1 | 0.96 | 1.65 | 2 |
| c | 0.2 | 0.38 | 2 |
| D | - | 37.72 | |
| E | 6.1 | 7.87 | |
| F | 7.37 | 8.13 | 6 |
| e | 2.54 BSC | | 2, 3 |
| L | 2.92 | 5.08 | 2, 5 |
| L1 | 3.3 | - | 2 |
| Q | 0.38 | 2.54 | 5 |
| S | - | 2.54 | 8 |
| S1 | 0.13 | - | 8 |

| Symbols | Dimensions mm | | Notes |
|----------|---------------|-----|-------|
| | Min | Max | |
| S2 | 0.13 | - | 2 |
| α | 0° | 15° | 2 |

1.7.2 Flat Leaded Multilayer Flat Package (MFP-F28) - 28 Lead

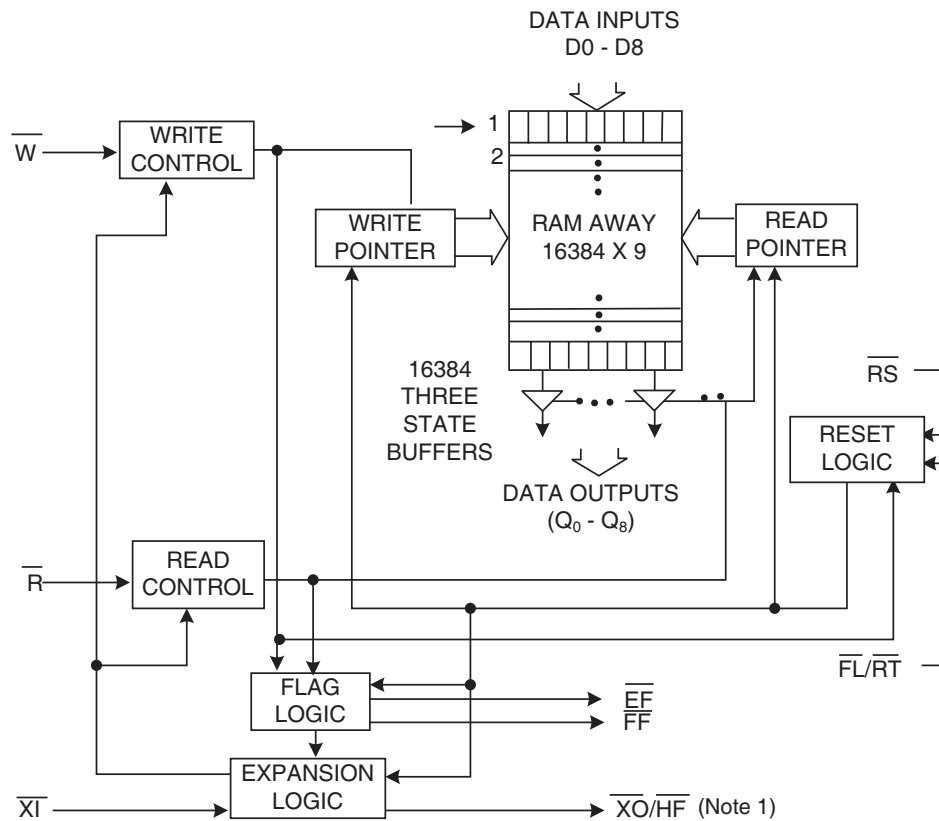


| Symbols | Dimensions mm | | Notes |
|---------|---------------|-------|-------|
| | Min | Max | |
| A | 2.29 | 3.3 | |
| b | 0.38 | 0.48 | 2 |
| c | 0.08 | 0.15 | 2 |
| D | - | 18.8 | 7 |
| E | 9.65 | 10.67 | 7 |
| E2 | 4.57 | - | |
| E3 | 0.76 | - | |
| e | 1.27 BSC | | 2, 4 |
| L | 6.35 | 9.4 | 2 |
| Q | 0.66 | - | 2, 9 |
| S | - | 1.3 | 8 |
| S1 | 0 | - | 8 |

1.7.3 Notes to Physical Dimensions and Terminal Identification

1. Index mark: a notch or terminal 1 identification mark for MFP-F28 package shall be located adjacent to terminal 1 and for MDIL28 package shall be in the shaded area.
2. All terminals.
3. 26 places. The true position pin spacing is 2.54mm between centrelines. Each pin centreline shall be located within $\pm 0.25\text{mm}$ of its true longitudinal position relative to Pin 1 and the highest pin number.
4. 26 places. The true position pin spacing is 1.27mm between centrelines. Each pin centreline shall be located within $\pm 0.13\text{mm}$ of its true longitudinal position relative to Pin 1 and the highest pin number.
5. Dimensions are measured with the package seated in a seating plane gauge.
6. Dimensions are measured with the leads constrained to be perpendicular to the base plane.
7. This dimension allows for package edge anomalies caused by material protrusions, such as rough ceramic, misaligned ceramic layers and lids, meniscus, and glass overrun.
The corner shape (square, notch, radius etc.) may vary at the manufacturer's option from that shown on the drawing.
8. Two places.
9. Dimension shall be measured at the point of exit of the lead from the body.

1.8 FUNCTIONAL DIAGRAM



NOTES:

1. For Variants 05 to 08 the terminal symbol is $\overline{XO/PHF}$.

1.9 PIN ASSIGNMENT

| Pin | Function | Pin | Function |
|-----|--------------------------------------|-----|---|
| 1 | \overline{W} Input (Write Enable) | 15 | \overline{R} Input (Read Enable) |
| 2 | D8 Input (Data) | 16 | Q4 Output |
| 3 | D3 Input (Data) | 17 | Q5 Output |
| 4 | D2 Input (Data) | 18 | Q6 Output |
| 5 | D1 Input (Data) | 19 | Q7 Output |
| 6 | D0 Input (Data) | 20 | $\overline{XO}/\overline{HF}$ Output (Expansion Out/Half-full Flag) Note 1 |
| 7 | \overline{XI} Input (Expansion In) | 21 | \overline{EF} Output (Empty Flag) |
| 8 | \overline{FF} Output (Full Flag) | 22 | \overline{RS} Input (Reset) |
| 9 | Q0 Output | 23 | $\overline{FL}/\overline{RT}$ Input (First Load/Retransmit) |
| 10 | Q1 Output | 24 | D7 Input (Data) |
| 11 | Q2 Output | 25 | D6 Input (Data) |
| 12 | Q3 Output | 26 | D5 Input (Data) |
| 13 | Q8 Output | 27 | D4 Input (Data) |
| 14 | V_{SS} | 28 | V_{DD} |

NOTES:

- For Variants 05 to 08 the function shall be $\overline{XO}/\overline{PHF}$ Output (Expansion Out/Programmable Half-full Flag).

1.10 TRUTH TABLES AND TIMING DIAGRAMS

- The Logic Level Definitions: L = Low Level, H = High Level, X = Irrelevant.
- For Variants 05 to 08 the output symbol \overline{HF} shall be \overline{PHF} .
- Pointer will increment if flag is high.
- \overline{XI} is connected to \overline{XO} of previous device.

Reset and Retransmit Truth Table

Single Device Configuration/Width Expansion Mode

| Mode | Inputs | | | Internal Status | | Outputs Note 2 | | |
|------------|-----------------|-----------------|-----------------|--------------------|--------------------|-------------------|-----------------|-----------------|
| | \overline{RS} | \overline{RT} | \overline{XI} | Read Pointer | Write Pointer | \overline{EF} | \overline{FF} | \overline{HF} |
| Reset | L | X | L | Location Zero | Location Zero | L | H | H |
| Retransmit | H | L | L | Location Zero | Unchanged | X | X | X |
| Read/Write | H | H | L | Increment (Note 3) | Increment (Note 3) | X | X | X |

Reset and First Load Truth Table

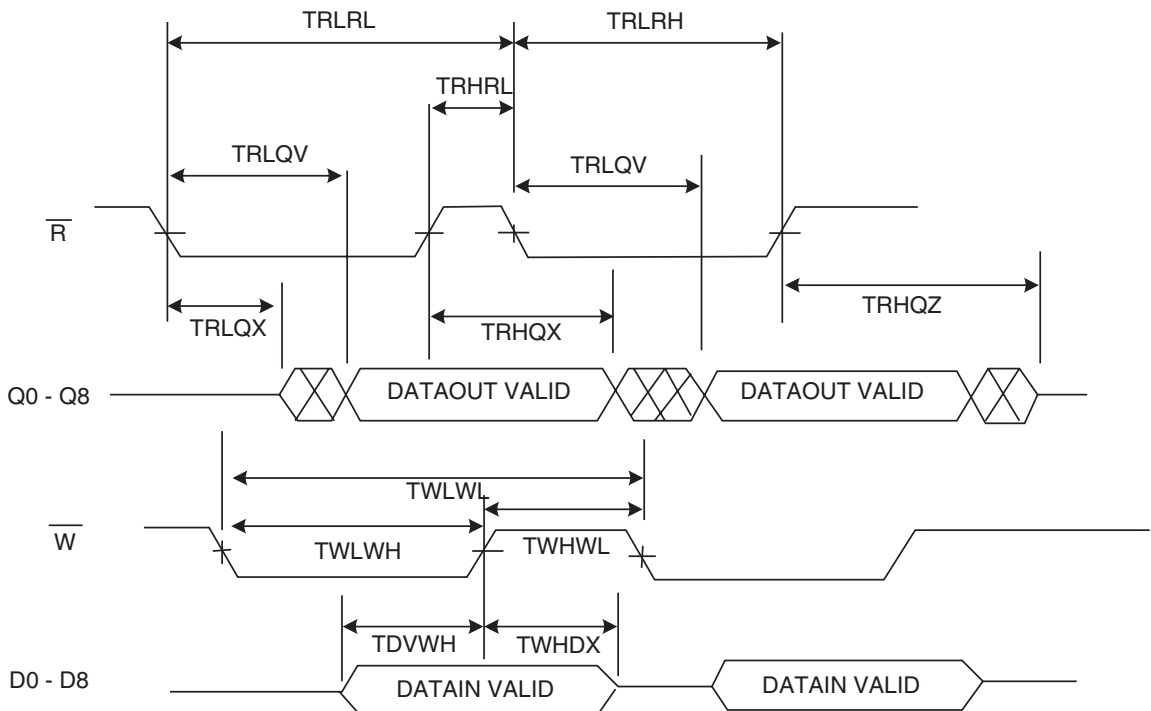
Depth Expansion/Compound Expansion Mode

| Mode | Inputs | | | Internal Status | | Outputs | |
|-------------------------|-----------------|-----------------|-----------------|-----------------|---------------|-----------------|-----------------|
| | \overline{RS} | \overline{FL} | \overline{XI} | Read Pointer | Write Pointer | \overline{EF} | \overline{FF} |
| Reset First Device | L | L | Note 4 | Location Zero | Location Zero | L | H |
| Reset All other Devices | L | H | Note 4 | Location Zero | Location Zero | L | H |
| Read/Write | H | X | Note 4 | X | X | X | X |

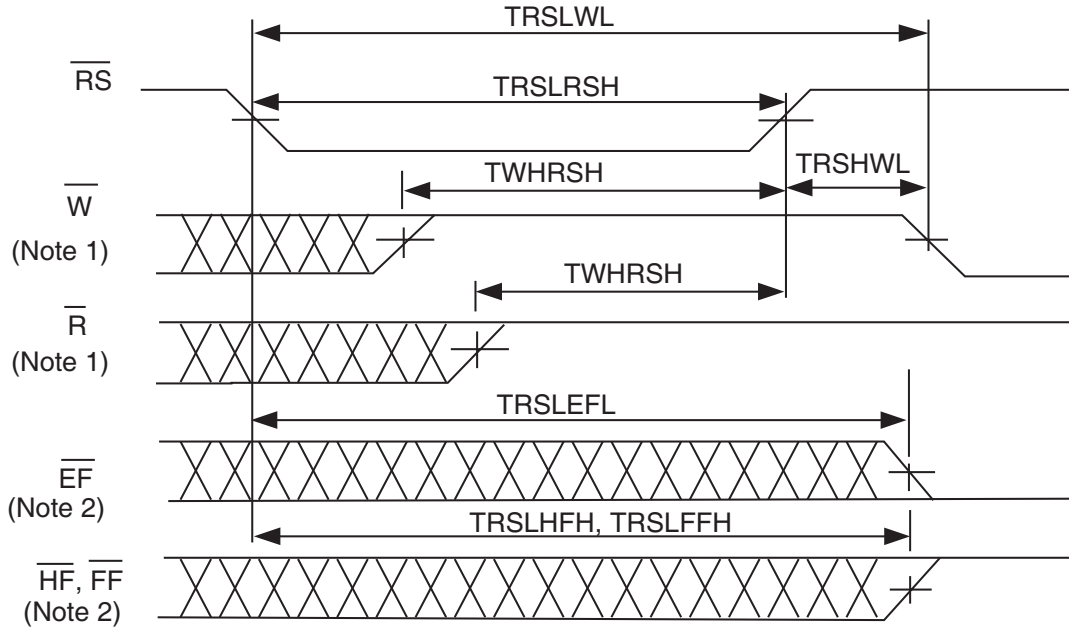
Programmable Half-full Flag Offset (Variants 05 to 08)

| INPUTS | | | | | | | | | Offset |
|--------|----|----|----|----|----|----|----|----|------------------------------------|
| D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 | |
| L | L | L | L | L | L | L | L | L | 0 |
| L | L | L | L | L | L | L | L | H | 32 |
| L | L | L | L | L | L | L | H | L | 64 |
| ... | | | | | | | | | |
| H | L | L | L | L | L | L | L | L | 8192 (half-full) Default offset |
| ... | | | | | | | | | |
| H | H | H | H | H | H | H | H | L | 16384-64 |
| H | H | H | H | H | H | H | H | H | 16384-32 |

Asynchronous Write and Read Operation

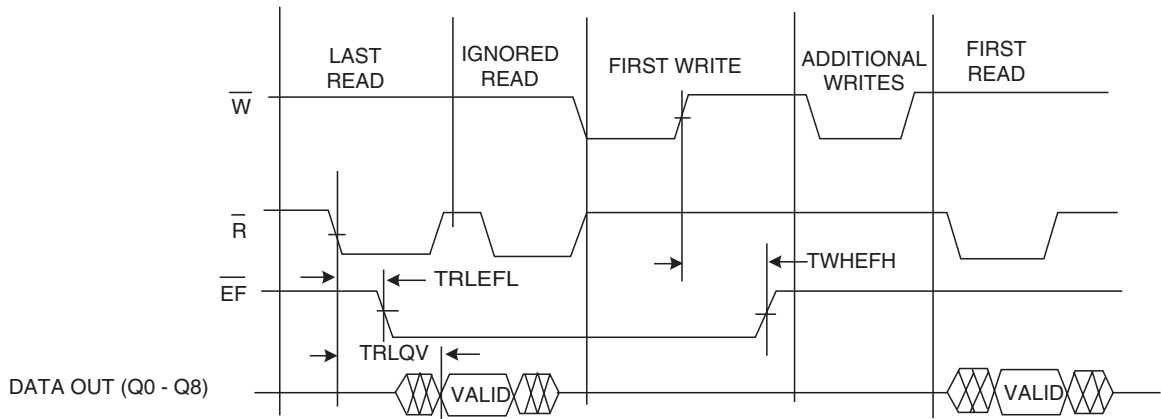


Reset Timing

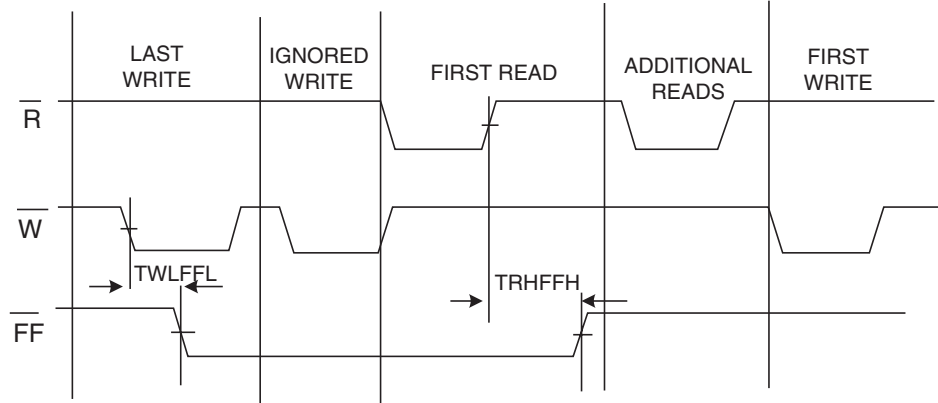


NOTES:

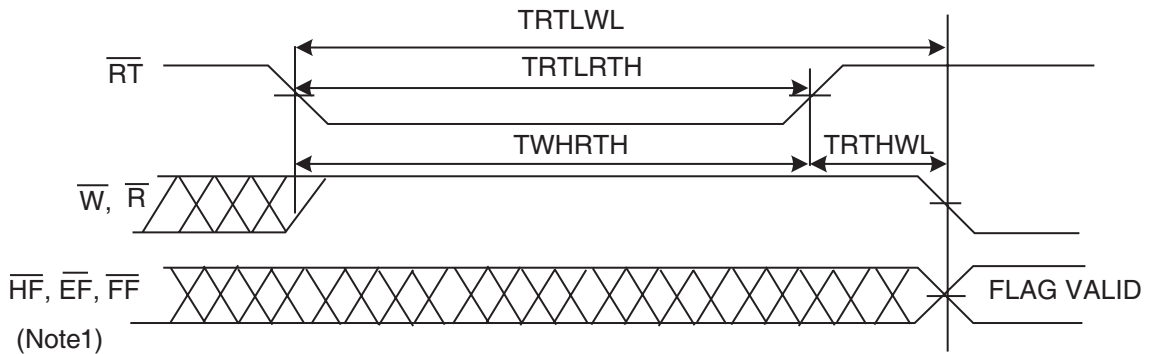
- \overline{W} and $\overline{R} = V_{IH}$ around the rising edge of \overline{RS} .
- \overline{EF} , \overline{HF} and \overline{FF} may change status during RESET, but flags will be valid at $TRSLWL$.
Empty Flag from Last Read to First Write



Full Flag from Last Write to First Read



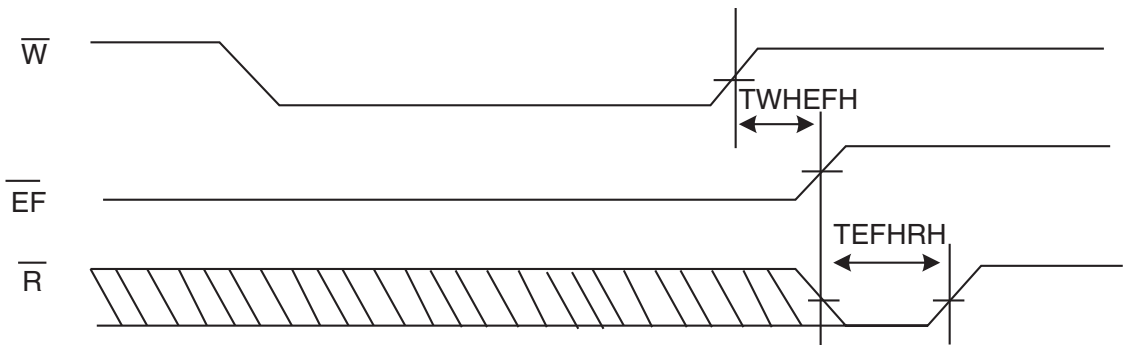
Retransmit (Note 1)



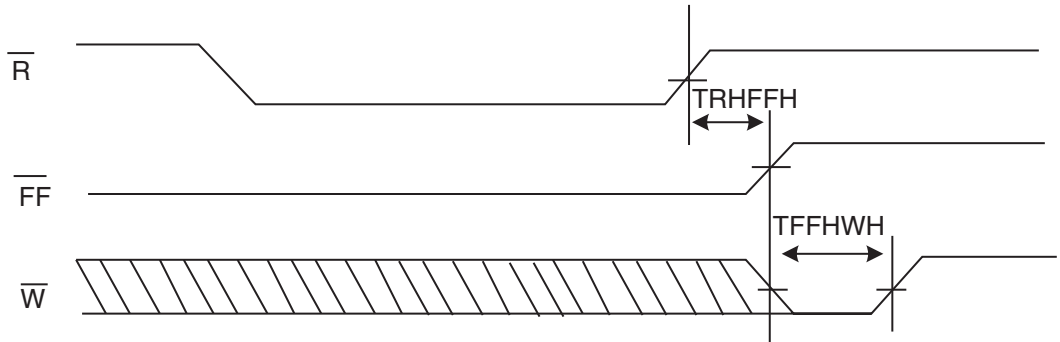
NOTES:

1. \overline{EF} , \overline{FF} and \overline{HF} may change status during Retransmit, but flags will be valid at TRTLWL. (\overline{HF} shall be PHF for Variants 05 to 08).

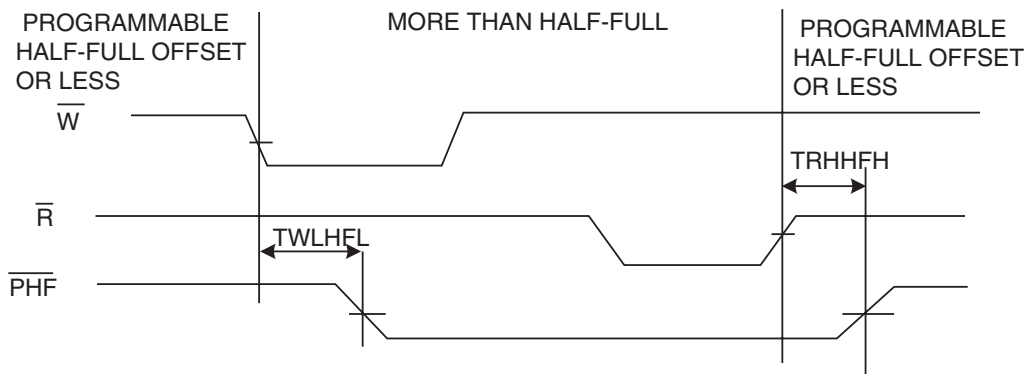
Empty Flag Timing



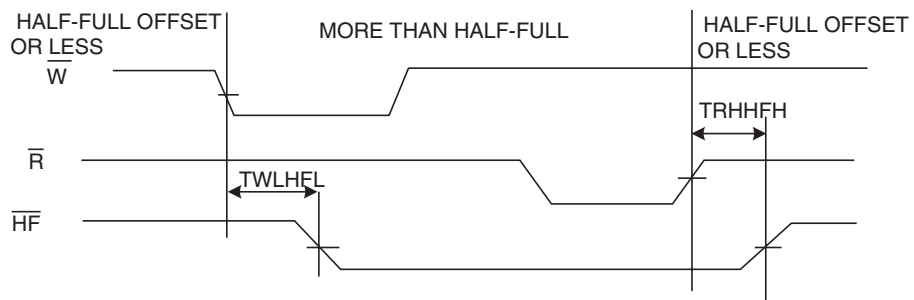
Full Flag Timing



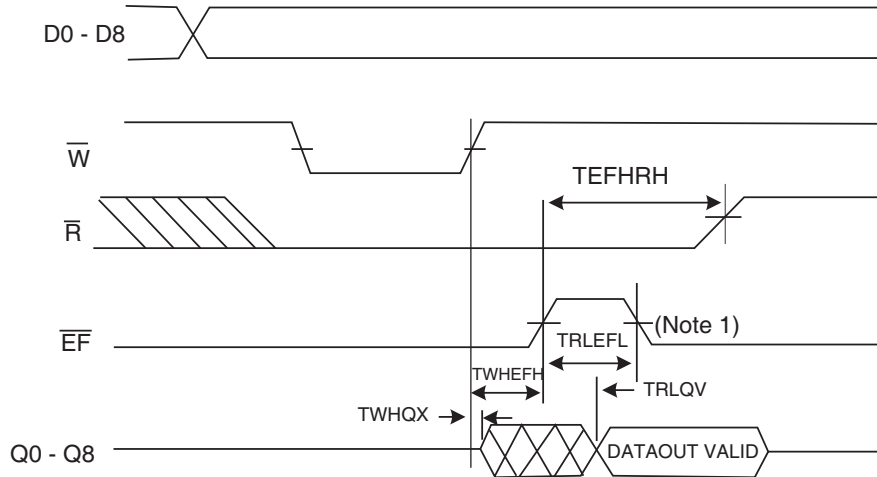
Programmable Half-full Flag Timing (Variants 05 to 08)



Half-Full Flag Timing (Variants 01 to 04)



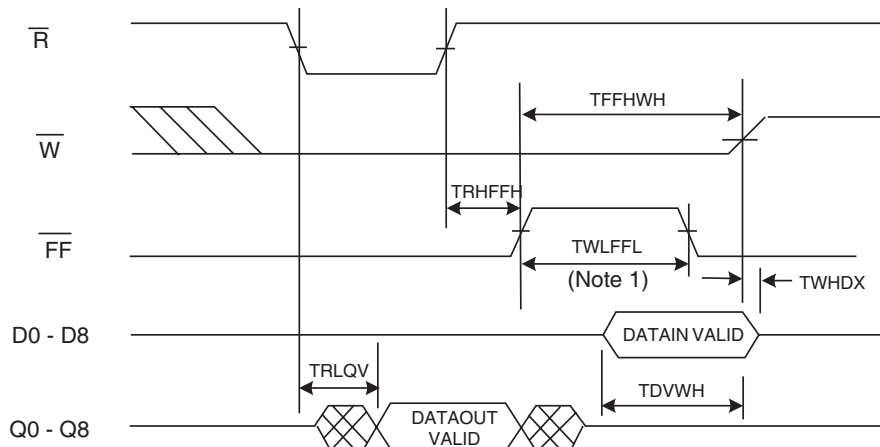
Read Data Flow - Through Mode



NOTES:

1. For FIFO empty condition only, a read cannot begin until completion of a write. Therefore the TRLEFL reference is the rising edge of \overline{EF} .

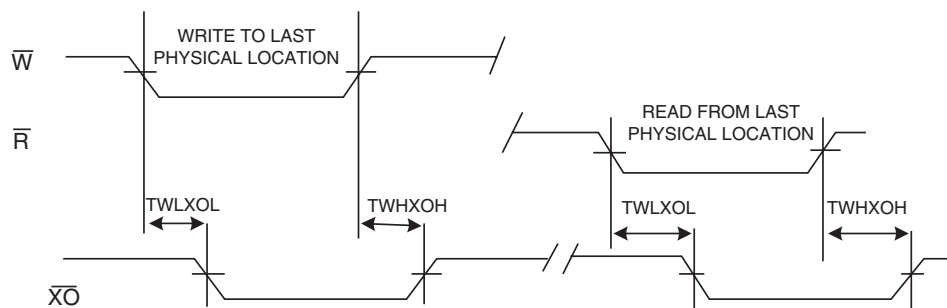
Write Data Flow - Through Mode



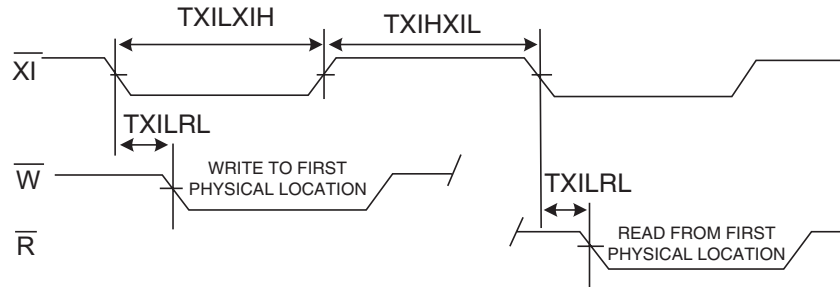
NOTES:

1. For FIFO empty condition only, a write cannot begin until completion of a read. Therefore the TWLFFL reference is the rising edge of \overline{FF} .

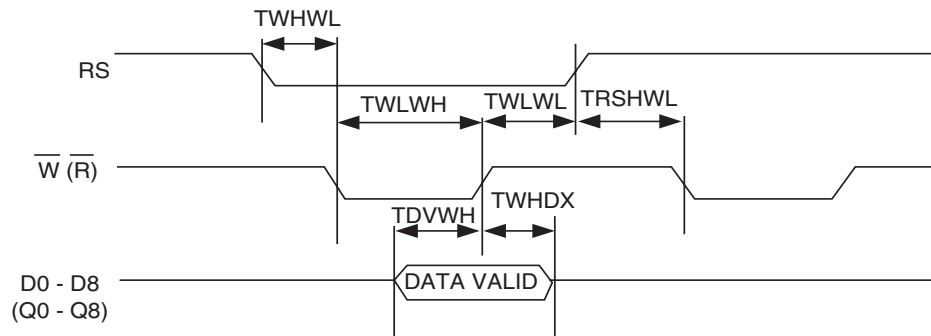
Expansion Out



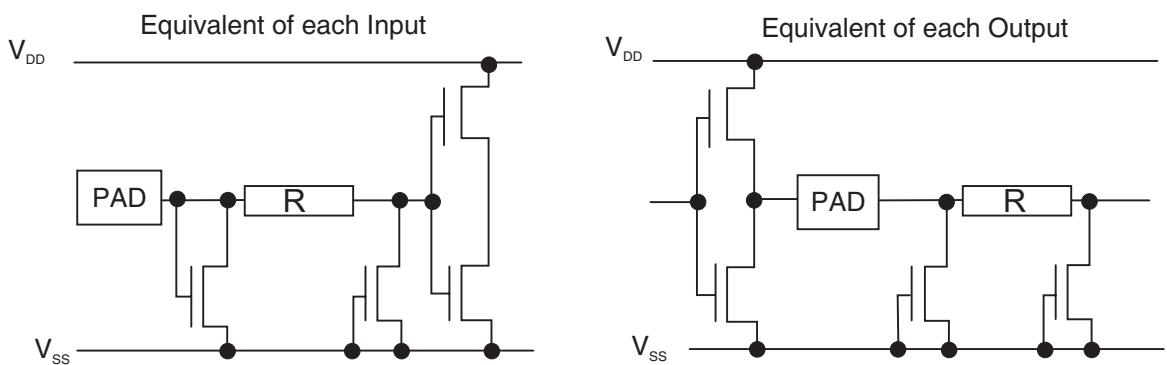
Expansion In



Reset (Write (Read) to Programmable Half-full Flag Register) Variants 05 to 08 only



1.11 PROTECTION NETWORKS



2. REQUIREMENTS

2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

2.1.1 Deviations from the Generic Specification

2.1.1.1 *Deviations from Screening Tests - Chart F3*

(a) High Temperature Reverse Bias Burn-in shall not be performed.

2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. 21700 and as follows.

The information to be marked on the component shall be:

- (a) Terminal identification.
- (b) The ESCC qualified components symbol (for ESCC qualified components only).
- (c) The ESCC Component Number.
- (d) Traceability information.

2.3 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

Electrical measurements shall be performed at room, high and low temperatures.

2.3.1 Room Temperature Electrical Measurements

The measurements shall be performed at $T_{amb}=+22 \pm 3^{\circ}C$.

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|---------------------------------|----------|-------------------------|---|--------|------|---------|
| | | | | Min | Max | |
| Functional Test 1 | - | 3014 | Verify Truth Table Note 2 | - | - | - |
| Functional Test 2 | - | 3014 | Verify Truth Table Note 2 | - | - | - |
| Functional Test 3 | - | 3014 | Verify Truth Table Note 2 | - | - | - |
| Input Clamp Voltage to V_{SS} | V_{IC} | 3008 | $I_{IN}(\text{Under Test})=-200\mu A$, $V_{IN}(\text{Remaining Inputs})=0V$ $V_{DD}=V_{SS}=0V$ | -0.1 | -1.9 | V |
| Low Level Input Current | I_{IL} | 3009 | $V_{IN}(\text{Under Test})=0V$ $V_{IN}(\text{Remaining Inputs})=5.5V$ $V_{DD}=V_{SS}=0V$ | - | -1 | μA |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|--|------------|-------------------------|--|--------|------------|---------|
| | | | | Min | Max | |
| High Level Input Current | I_{IH} | 3010 | $V_{IN}(\text{Under Test})=5.5V$ $V_{IN}(\text{Remaining Inputs})=0V$ $V_{DD}=5.5V, V_{SS}=0V$ | - | 1 | μA |
| Output Leakage Current Third State, Low Level Applied | I_{OZL} | 3020 | $V_{IN}(\bar{R})=2.2V$ $V_{OUT}=0V$ $V_{DD}=5.5V, V_{SS}=0V$ | - | -1 | μA |
| Output Leakage Current Third State, High Level Applied | I_{OZH} | 3021 | $V_{IN}(\bar{R})=2.2V$ $V_{OUT}=5.5V$ $V_{DD}=5.5V, V_{SS}=0V$ | - | 1 | μA |
| Low Level Output Voltage | V_{OL} | 3007 | $V_{IL}=0.8V, V_{IH}=2.2V$ $I_{OL}=8mA$ $V_{DD}=4.5V, V_{SS}=0V$ Note 3 | - | 400 | mV |
| High Level Output Voltage | V_{OH} | 3006 | $V_{IL}=0.8V, V_{IH}=2.2V$ $I_{OH}=-2mA$ $V_{DD}=4.5V, V_{SS}=0V$ Note 3 | 2.4 | - | V |
| Stand-by Supply Current | I_{DDSB} | 3005 | $V_{IN}(\bar{XI})=0V$ $V_{IN}(\bar{R}, \bar{W}, \bar{RS}, \bar{FL}/\bar{RT})=2.2V$ All Outputs Open $V_{DD}=5.5V, V_{SS}=0V$ | - | 5 | mA |
| Power Down Supply Current | I_{DDPD} | 3005 | $V_{IN}(\bar{XI})=0V$ $V_{IN}(\text{Remaining Inputs})=5.5V$ All Outputs Open $V_{DD}=5.5V, V_{SS}=0V$ | - | 400 | μA |
| Dynamic Operating Current | I_{DDOP} | 3005 | $V_{IL}=0V, V_{IH}=3V$ Write/Read cycle: $f_{read}=f_{write}=25MHz$ (Variants 03, 04, 07, 08) and = 40MHz (Variants 01, 02, 05, 06) $f_{read}=100MHz$ All Outputs Open $V_{DD}=5.5V, V_{SS}=0V$ Variants 01, 02, 05, 06 Variants 03, 04, 07, 08 | - | 120 110 | mA |
| Input Capacitance | C_{IN} | 3012 | $V_{IN}(\text{Not Under Test})=0V$ $f=1MHz$ $V_{DD}=V_{SS}=0V$ Note 4 | - | 10 | pF |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|---|---------------------|----------------------------|---|----------|----------|-------|
| | | | | Min | Max | |
| Output Capacitance | C _{OUT} | 3012 | V _{IN} (Not Under Test)=0V f=1MHz V _{DD} =V _{SS} =0V Note 4 | - | 10 | pF |
| Read Pulse Low to Data Bus, Low Impedance | t _{RLQX} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 4 | 0 | - | ns |
| Write Pulse High to Data Bus, Low Impedance | t _{WHQX} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 4 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 5 3 | - - | ns |
| Read Pulse High to Data Bus, High Impedance | t _{RHQZ} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 4 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 20 15 | ns |
| Retransmit Set-up Time | t _{WHRTH} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 4 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Reset to Empty Flag Low | t _{RSLEFL} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 4 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 25 | ns |
| Read/Write High to Expansion Out High | t _{WHXOH} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 4 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 15 | ns |
| Read Cycle Time | t _{RLRL} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 5 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 40 25 | - - | ns |
| Access Time | t _{RLQV} | 3003 | V _{DD} =4.5V & 5.5V V _{SS} =0V Note 5 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 15 | ns |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|---------------------------------|-------------|----------------------------|---|----------|----------|-------|
| | | | | Min | Max | |
| Data Set-up Time | t_{DVWH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 5 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 18 9 | - - | ns |
| Data Hold Time | t_{WHDX} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 5 | 0 | - | ns |
| Read Low to Empty Flag Low | t_{RLEFL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 5 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 25 | ns |
| Write High to Empty Flag High | t_{WHEFH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 5 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 15 | ns |
| Read High to Full Flag High | t_{RHFFH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 5 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 25 | ns |
| Write Low to Full Flag Low | t_{WLFFL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 5 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 20 | ns |
| Write Low to Half-full Flag Low | t_{WLHFL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 5 | - | 30 | ns |
| Read Recovery Time | t_{RHRL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | 10 | - | ns |
| Read Pulse Width | t_{RLRH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Data Valid from Read Pulse High | t_{RHQX} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | 5 | - | ns |
| Write Cycle Time | t_{WLWL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 40 25 | - - | ns |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|------------------------------|---------------|----------------------------|---|----------|----------|-------|
| | | | | Min | Max | |
| Write Pulse Width | t_{WLWH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Write Recovery Time | t_{WHWL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | 10 | - | ns |
| Reset Cycle | t_{RSLWL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 40 25 | - - | ns |
| Reset Pulse Width | t_{RSLRSH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Reset Set-up Time | t_{WHRSH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 20 | - - | ns |
| Reset Recovery Time | t_{RSHWL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | 10 | - | ns |
| Retransmit Cycle Time | t_{RTLWL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 40 25 | - - | ns |
| Retransmit Pulse Width | $t_{RTL RTH}$ | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Retransmit Recovery Time | t_{RTHWL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | 10 | - | ns |
| Reset to Half-full Flag High | t_{RSLHFH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 25 | ns |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|--|--------------|----------------------------|---|----------|----------|-------|
| | | | | Min | Max | |
| Reset to Full Flag High | t_{RSLFFH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 25 | ns |
| Read Pulse Width after Empty Flag High | t_{EFHRH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Read High to Half-full Flag High | t_{RHHFH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | - | 30 | ns |
| Write Pulse Width after Full Flag High | t_{FFHWH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Read/Write Low to Expansion Out Low | t_{WLXOL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | - - | 30 15 | ns |
| Expansion In Pulse Width | t_{XILXIH} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 Variants 03, 04, 07, 08 Variants 01, 02, 05, 06 | 30 15 | - - | ns |
| Expansion In Recovery Time | t_{XIHXL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | 10 | - | ns |
| Expansion In Set-up Time | t_{XILRL} | 3003 | $V_{DD}=4.5V$ & $5.5V$ $V_{SS}=0V$ Note 6 | 10 | - | ns |

NOTES:

1. Unless otherwise specified all inputs and outputs shall be tested for each characteristic, inputs not under test shall be $V_{IN} = V_{SS}$ or V_{DD} and outputs not under test shall be open.

2. Functional go-no-go test with the following sequences:

FUNCTIONAL TEST 1

| Pattern | Timing (ns) Note (a) | V _{DD} (V) | V _{SS} (V) | V _{IL} (V) | V _{IH} (V) | I _{OL} (mA) | I _{OH} (mA) | V _{out comp} (V) Note (b) |
|-----------|-------------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|---------------------------------------|
| WRT-RD000 | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| WRT-RD1FF | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| MARCH-000 | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| MARCH-155 | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| MARCH-1FF | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| FIFO-000 | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| FIFO-155 | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| FIFO-1FF | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| ADDRESS | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| CKBD-000 | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| CKBD-1FF | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| FLAGS | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| Xi | 175 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |

FUNCTIONAL TEST 2

| Pattern | Timing (ns) Note (a) | V _{DD} (V) | V _{SS} (V) | V _{IL} (mV) | V _{IH} (V) | I _{OL} (mA) | I _{OH} (mA) | V _{out comp} (V) Note (b) |
|---------------|-------------------------|---------------------|---------------------|----------------------|---------------------|----------------------|----------------------|---------------------------------------|
| WRITE/READ000 | 175 | 4.5 | 0 | 800 | 4.5 | 8 | -2 | 1.5 |
| WRITE/READ000 | 175 | 5.5 | 0 | 0 | 2.2 | 8 | -2 | 1.5 |
| FLAGS | 175 | 4.5 | 0 | 800 | 4.5 | 8 | -2 | 1.5 |
| FLAGS | 175 | 5.5 | 0 | 0 | 2.2 | 8 | -2 | 1.5 |
| Xi | 175 | 4.5 | 0 | 800 | 4.5 | 8 | -2 | 1.5 |
| Xi | 175 | 5.5 | 0 | 0 | 2.2 | 8 | -2 | 1.5 |

FUNCTIONAL TEST 3

| Pattern | Timing (ns) Note (a) | | V _{DD} (V) | V _{SS} (V) | V _{IL} (V) | V _{IH} (V) | I _{OL} (mA) | I _{OH} (mA) | V _{out comp} (V) Note (b) |
|-----------|-------------------------|-------------------------|---------------------|---------------------|---------------------|---------------------|----------------------|----------------------|---------------------------------------|
| | Variants 01, 02, 05, 06 | Variants 03, 04, 07, 08 | | | | | | | |
| MARCH-000 | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| MARCH-155 | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| MARCH-1FF | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| FIFO-000 | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |

| Pattern | Timing (ns) Note (a) | | V _{DD} (V) | V _{SS} (V) | V _{IL} (V) | V _{IH} (V) | I _{OL} (mA) | I _{OH} (mA) | V _{out comp} (V) Note (b) |
|----------|-------------------------------|-------------------------------|------------------------|------------------------|------------------------|------------------------|-------------------------|-------------------------|--|
| | Variants 01, 02, 05, 06 | Variants 03, 04, 07, 08 | | | | | | | |
| FIFO-155 | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| FIFO-1FF | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| FLAGS | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |
| Xi | 25 | 40 | 4.5 & 5.5 | 0 | 0 | 3 | 8 | -2 | 1.5 |

(a) $t_r = t_f \leq 5\text{ns}$

(b) Output Load = 1 TTL gate equivalent + $C_L < 100\text{pF}$

3. Measurements shall be performed using MARCH-000 and MARCH-1FF test patterns.
4. Guaranteed but not tested. Characterised at initial design and after major process changes.
5. Measurements shall be performed during Functional Test 3 using the following test patterns:

For t_{RLRL} and t_{RLQV} MARCH-000

For t_{DVWH} and t_{WHDX} FIFO-1FF

For t_{RLEFL} , t_{WHEFH} ,
 t_{RHFFH} , t_{WLFFL} and
 t_{WLHFL} FLAGS

6. Measurements shall be performed, on a go-no-go basis, during Functional Test 3.

2.3.2 High and Low Temperatures Electrical Measurements

The measurements shall be performed at $T_{amb}=+125(+0-5)^{\circ}\text{C}$ and $T_{amb}=-55(+5-0)^{\circ}\text{C}$. The characteristics, test methods, conditions and limits shall be the same as specified for Room Temperature Electrical Measurements.

2.4 PARAMETER DRIFT VALUES

Unless otherwise specified, the measurements shall be performed at $T_{amb}=+22 \pm 3^{\circ}\text{C}$.

The test methods and test conditions shall be as per the corresponding test defined in Room Temperature Electrical Measurements.

The drift values (Δ) shall not be exceeded for each characteristic specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

| Characteristics Note 1 | Symbols | Limits | | | Units |
|---|------------|----------------------------|----------|-----|---------|
| | | Drift Value Δ | Absolute | | |
| | | | Min | Max | |
| Low Level Input Current | I_{IL} | ± 0.1 | - | -1 | μA |
| High Level Input Current | I_{IH} | ± 0.1 | - | 1 | μA |
| Output Leakage Current, Third State, Low Level Applied | I_{OZL} | ± 0.1 | - | -1 | μA |
| Output Leakage Current, Third State, High Level Applied | I_{OZH} | ± 0.1 | - | 1 | μA |
| Low Level Output Voltage | V_{OL} | ± 100 | - | 400 | mV |
| High Level Output Voltage | V_{OH} | ± 0.1 | 2.4 | - | V |
| Stand-by Supply Current | I_{DDSB} | ± 0.5 | - | 5 | mA |
| Power Down Supply Current | I_{DDPD} | ± 40 | - | 400 | μA |

NOTES:

1. Unless otherwise specified all inputs and outputs shall be tested for each characteristic.

2.5 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}C$.

The test methods, test conditions and limits shall be as specified for Room Temperature Electrical Measurements.

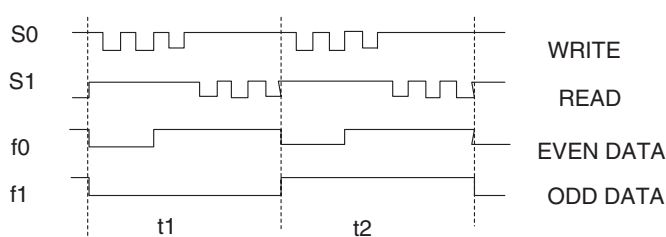
2.6 POWER BURN-IN CONDITIONS

| Characteristics | Symbols | Test Conditions | Units |
|--|-----------|----------------------|-------------|
| Ambient Temperature | T_{amb} | +125 (+0 -5) | $^{\circ}C$ |
| Outputs \overline{FF} , Qn, $\overline{XO}/\overline{HF}$ (\overline{PHF}) | V_{OUT} | V_{SS} | V |
| Inputs \overline{RS} , $\overline{FL}/\overline{RT}$ | V_{IN} | V_{DD} | V |
| Inputs \overline{XI} , \overline{EF} | V_{IN} | V_{SS} | V |
| Input \overline{W} | V_{IN} | S0 Note 1 | V |
| Input \overline{R} | V_{IN} | S1 Note 1 | V |
| Inputs D0, D2, D4, D6, D8 | V_{IN} | V_{GEN0} Note 1 | V |
| Inputs D1, D3, D5, D7 | V_{IN} | V_{GEN1} Note 1 | V |
| Pulse Voltage | V_{GEN} | 0V to V_{DD} | V |

| Characteristics | Symbols | Test Conditions | Units |
|-----------------------------|--------------------------|---|-------|
| Pulse Frequency Square Wave | f_{GEN0} f_{GEN1} | 275k \pm 20% 137.5k \pm 20% 50 \pm 15% Duty Cycle Note 1 | Hz |
| Positive Supply Voltage | V_{DD} | 5(+0.5 -0) | V |
| Negative Supply Voltage | V_{SS} | 0 | V |

NOTES:

1. Input waveforms to indicate required timing and phase relationships:



$t1 = t2 = 3.6 \mu s$

2. Input Protection Resistor = Output Load = 1k Ω .

2.7 OPERATING LIFE CONDITIONS

The conditions shall be as specified for Power Burn-in.

2.8 TOTAL DOSE RADIATION TESTING

2.8.1 Bias Conditions and Total Dose Level for Total Dose Radiation Testing

Continuous bias shall be applied during radiation testing as specified below. The total dose level applied shall be as specified in the component type variant information herein or in the Purchase Order.

| Characteristics | Symbols | Test Conditions | Units |
|---|-----------|-----------------|-------------|
| Ambient Temperature | T_{amb} | + 22 \pm 3 | $^{\circ}C$ |
| Outputs Q_n , \overline{FF} , $\overline{XO/HF}$ (PHF), \overline{EF} | V_{OUT} | Open | V |
| Inputs D_n , \overline{W} , \overline{XI} , $\overline{FL/RT}$, \overline{R} | V_{IN} | V_{DD} | V |
| Input \overline{RS} | V_{IN} | V_{SS} | V |
| Positive Supply Voltage | V_{DD} | 5 \pm 0.1 | V |
| Negative Supply Voltage | V_{SS} | 0 | V |

NOTES:

1. Input Protection Resistor = 1k Ω .

2.8.2 Electrical Measurements for Total Dose Radiation Testing

Prior to, during and on completion of radiation testing the devices shall successfully meet Room Temperature Electrical Measurements specified herein.

Unless otherwise specified the measurements shall be performed at $T_{amb} = +22 \pm 3^{\circ}C$.



The characteristics, test methods, conditions and limits shall be the same as specified for Room Temperature Electrical Measurements.