



Pages 1 to 28

**INTEGRATED CIRCUITS, SILICON MONOLITHIC, CMOS
ANALOGUE MULTIPLEXER/DEMUTIPLEXER
(TRIPLE 2-CHANNEL)**

BASED ON TYPE 4053B

ESCC Detail Specification No. 9202/049

| | |
|---------|----------------|
| Issue 2 | September 2004 |
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| DCR No. | CHANGE DESCRIPTION |
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| 121, 90 | Specification up issued to incorporate editorial and technical changes per DCR. |

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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: 920204901

- Detail Specification Reference: 9202049
- Component Type Variant Number: 01 (as required)

1.4.2 Component Type Variants

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

| Variant Number | Based on Type | Case | Terminal Material and /or Finish | Weight max g |
|----------------|---------------|------|----------------------------------|--------------|
| 01 | 4053B | FP | G2 | 0.7 |
| 02 | 4053B | FP | G4 | 0.7 |
| 07 | 4053B | CCP | 2 | 0.6 |
| 08 | 4053B | DIP | G2 | 2.2 |
| 09 | 4053B | DIP | G4 | 2.2 |
| 10 | 4053B | SO | G2 | 0.7 |
| 11 | 4053B | SO | G4 | 0.7 |

The terminal material and/or finish shall be in accordance with the requirements of ESCC Basic Specification No. 23500.

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 18 | V | Note 1 |
| Supply Voltage Range | $V_{DD}-V_{EE}$ | -0.5 to 18 | V | Note 2 |
| Control Input Voltage | V_{IN} | -0.5 to $V_{DD} +0.5$ | V | Note 1 Power on |
| Channel Input/Output Voltage | V_{IN} | $V_{EE} -0.5$ to $V_{DD} +0.5$ | V | Note 1, 3 |
| Control Input Current | I_{IN} | ± 10 | mA | - |
| Device Power Dissipation (Continuous) | P_D | 200 | mW | - |
| Power Dissipation per Single Output | P_{DSO} | 100 | mW | - |
| Operating Temperature Range | T_{op} | -55 to +125 | $^{\circ}C$ | T_{amb} |
| Storage Temperature Range | T_{stg} | -65 to +150 | $^{\circ}C$ | - |
| Soldering Temperature For FP, DIP and SO For CCP | T_{sol} | +265 +245 | $^{\circ}C$ | Note 4 Note 5 |

NOTES:

1. Device is functional for $3V \leq V_{DD} \leq 15V$ with reference to V_{SS} .
2. Device is functional for $3V \leq V_{DD}-V_{EE} \leq 15V$.
3. To avoid draining V_{DD} supply current into the ON Channel when current flows from CH to COM the voltage drop across the ON Channel shall not exceed 0.4V.
4. Duration 10 seconds maximum at a distance of not less than 1.5mm from the device body and the same terminal shall not be resoldered until 3 minutes have elapsed.
5. Duration 5 seconds maximum and the same terminal shall not be resoldered until 3 minutes have elapsed.

1.6 **HANDLING PRECAUTIONS**

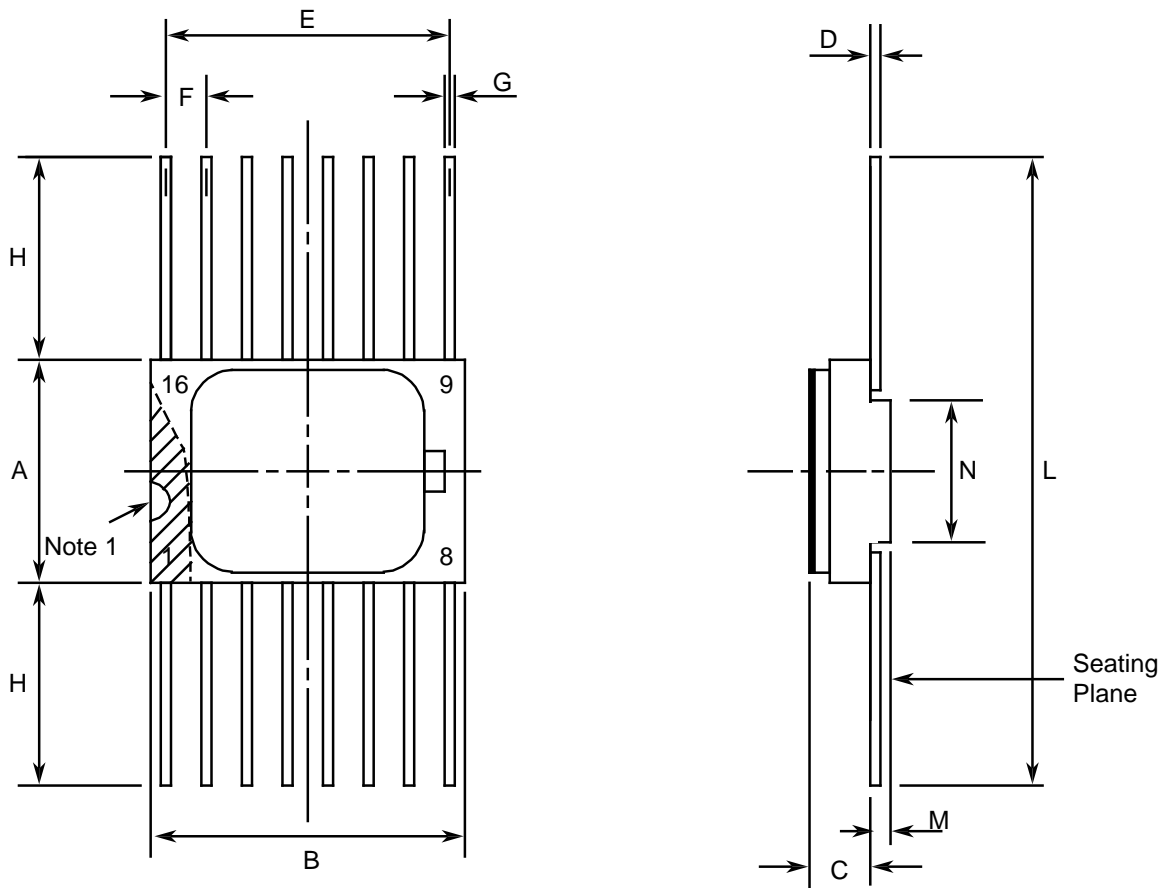
These devices are susceptible to damage by electrostatic discharge. Therefore, suitable precautions shall be employed for protection during all phases of manufacture, testing, packaging, shipment and any handling.

These components are categorised as Class 1 per ESCC Basic Specification No. 23800 with a minimum Critical Path Failure Voltage of 400 Volts.

1.7 **PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION**

Consolidated Notes are given following the case drawings and dimensions.

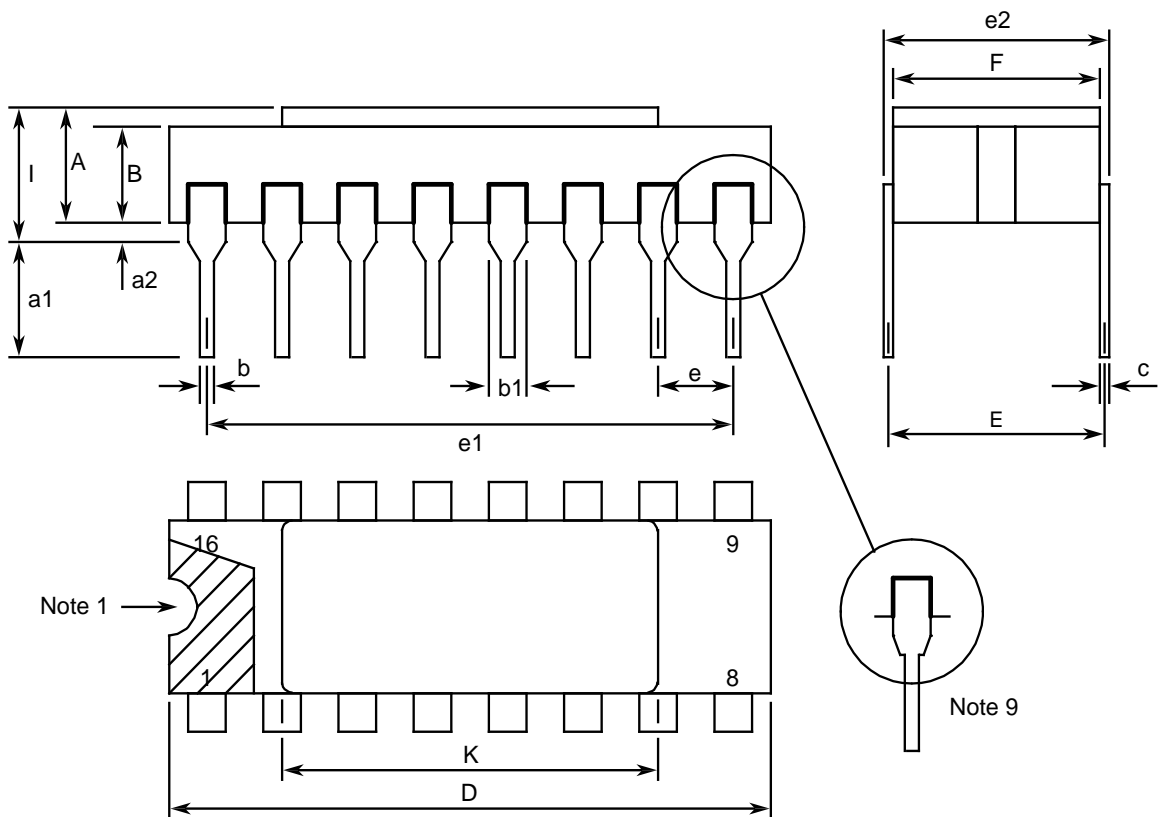
1.7.1 **Flat Package (FP) - 16 Pin**



| Symbols | Dimensions mm | | Notes |
|---------|---------------|-------|-------|
| | Min | Max | |
| A | 6.75 | 7.06 | |
| B | 9.76 | 10.14 | |
| C | 1.49 | 1.95 | |
| D | 0.1 | 0.15 | 5 |
| E | 8.76 | 9.01 | |
| F | 1.27 TYPICAL | | 3, 6 |
| G | 0.38 | 0.48 | 5 |
| H | 6 | - | 5 |
| L | 18.75 | 22 | |
| M | 0.33 | 0.43 | |

| Symbols | Dimensions mm | | Notes |
|---------|---------------|-----|-------|
| | Min | Max | |
| N | 4.32 TYPICAL | | |

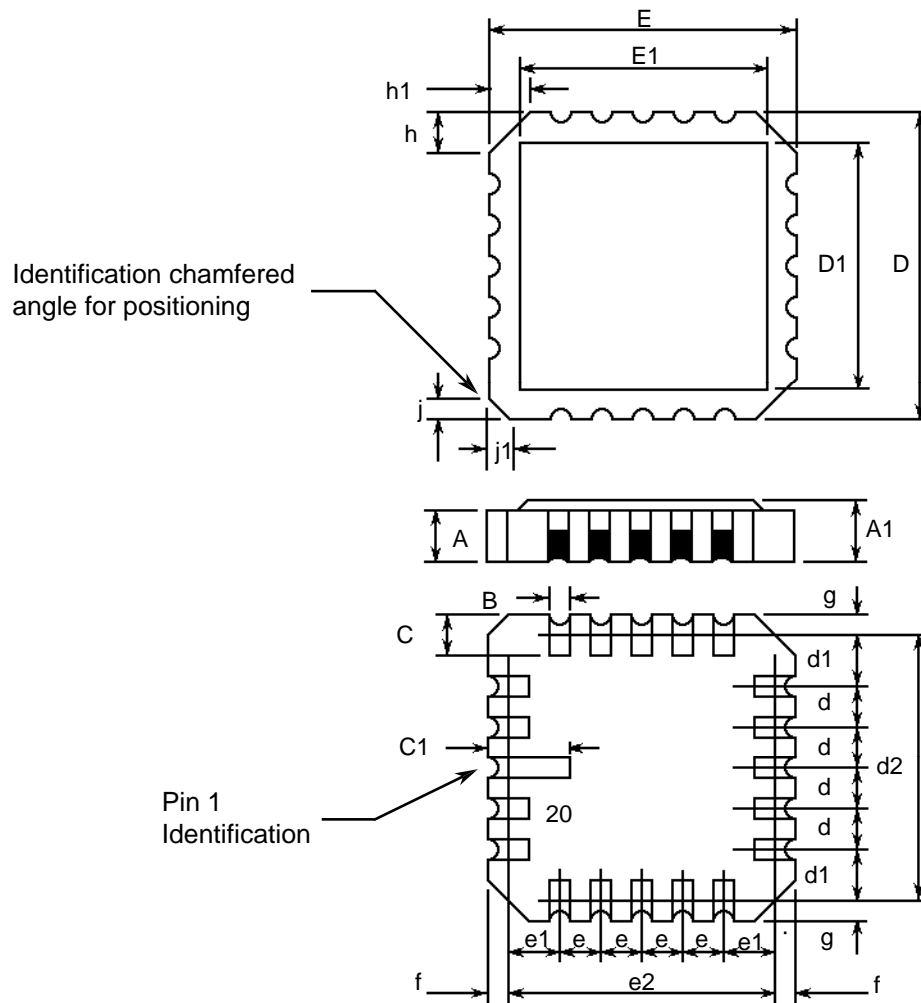
1.7.2 Dual-in-line Package (DIP) - 16 Pin



| Symbols | Dimensions mm | | Notes |
|---------|---------------|-------|-------|
| | Min | Max | |
| A | 2.1 | 2.71 | |
| a1 | 3 | 3.7 | |
| a2 | 0.63 | 1.14 | 2 |
| B | 1.82 | 2.39 | |
| b | 0.4 | 0.5 | 5 |
| b1 | 1.14 | 1.5 | 5 |
| c | 0.2 | 0.3 | 5 |
| D | 20.06 | 20.58 | |
| E | 7.36 | 7.87 | |

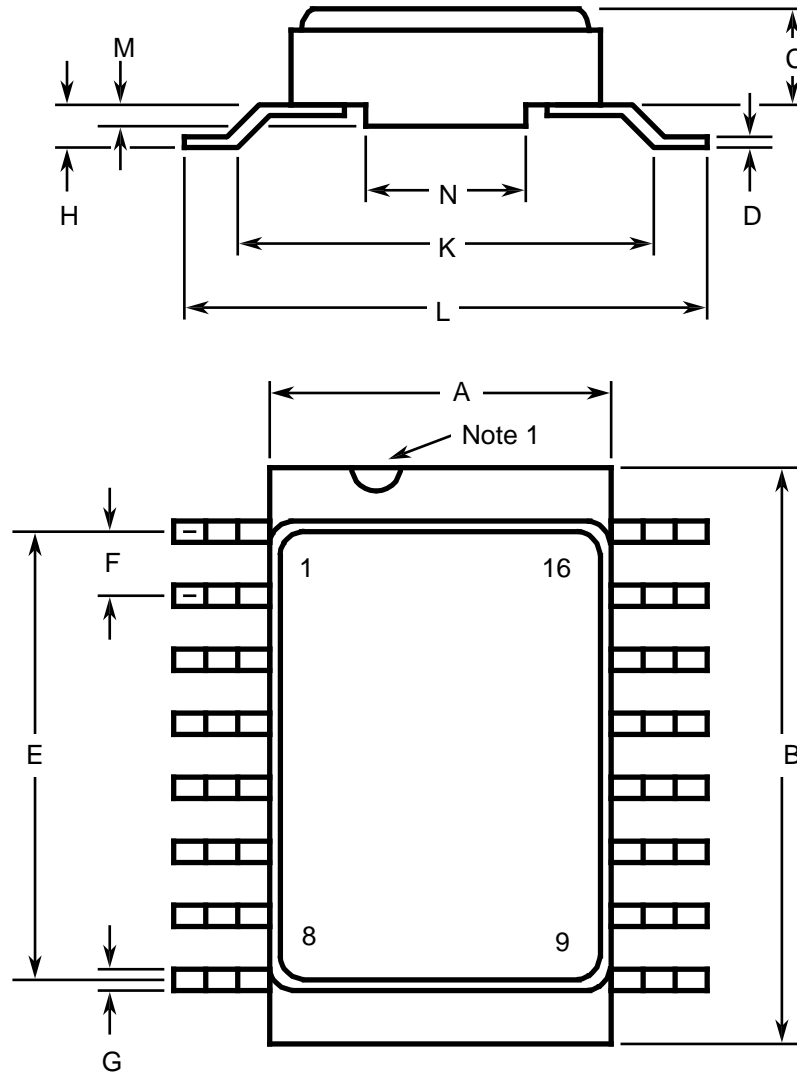
| Symbols | Dimensions mm | | Notes |
|---------|---------------|------|-------|
| | Min | Max | |
| e | 2.54 TYPICAL | | 4, 6 |
| e1 | 17.65 | 17.9 | |
| e2 | 7.62 | 8.12 | |
| F | 7.29 | 7.7 | |
| l | - | 3.83 | |
| K | 10.9 | 12.1 | |

1.7.3 Chip Carrier Package (CCP) - 20 Terminal



| Symbols | Dimensions mm | | Notes |
|---------|---------------|------|-------|
| | Min | Max | |
| A | 1.14 | 1.95 | |
| A1 | 1.63 | 2.36 | |
| B | 0.55 | 0.72 | 5 |
| C | 1.06 | 1.47 | 5 |
| C1 | 1.91 | 2.41 | |
| D | 8.67 | 9.09 | |
| D1 | 7.21 | 7.52 | |
| d, d1 | 1.27 TYPICAL | | 3, 6 |
| d2 | 7.62 TYPICAL | | |
| E | 8.67 | 9.09 | |
| E1 | 7.21 | 7.52 | |
| e, e1 | 1.27 TYPICAL | | 3, 6 |
| e2 | 7.62 TYPICAL | | |
| f, g | - | 0.76 | |
| h, h1 | 1.01 TYPICAL | | 8 |
| j, j1 | 0.51 TYPICAL | | 7 |

1.7.4 Small Outline Ceramic Package (SO) - 16 Pin



| Symbols | Dimensions mm | | Notes |
|---------|---------------|-------|-------|
| | Min | Max | |
| A | 6.75 | 7.06 | |
| B | 9.76 | 10.14 | |
| C | 1.49 | 1.95 | |
| D | 0.1 | 0.15 | 5 |
| E | 8.76 | 9.01 | |
| F | 1.27 TYPICAL | | 3, 6 |
| G | 0.38 | 0.48 | 5 |
| H | 0.6 | 0.9 | 5 |

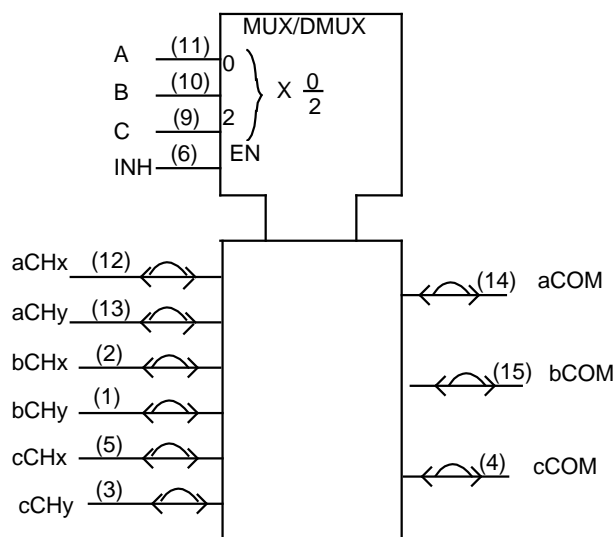
| Symbols | Dimensions mm | | Notes |
|---------|---------------|-------|-------|
| | Min | Max | |
| K | 9 TYPICAL | | |
| L | 10 | 10.65 | |
| M | 0.33 | 0.43 | |
| N | 4.31 TYPICAL | | |

1.7.5 Consolidated Notes

1. Index area; a notch or a dot shall be located adjacent to Pin 1 and shall be within the shaded area shown. For chip carrier packages, the index shall be as shown.
2. The dimension shall be measured from the seating plane to the base plane.
3. 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.
4. 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.
5. All terminals.
6. 14 spaces for flat, dual-in-line and small outline packages.
16 spaces for chip carrier packages.
7. Index corner only - 2 dimensions.
8. 3 non-index corners - 6 dimensions.
9. For all pins, either pin shape may be supplied.

1.8 FUNCTIONAL DIAGRAM

Pin numbers relate to FP, DIP and SO packages only.



1.9 PIN ASSIGNMENT

| Pin | Function | | Pin | Function | |
|-----|---|---|-----|-----------------------------------|-----------------------------------|
| | FP, DIP and SO | CCP | | FP, DIP and SO | CCP |
| 1 | bCHy Input/Output (Channel) | bCHy Input/Output (Channel) | 11 | A Input (Select) | C Input (Select) |
| 2 | bCHx Input/Output (Channel) | bCHx Input/Output (Channel) | 12 | aCHx Input/Output (Channel) | B Input (Select) |
| 3 | cCHy Input/Output (Channel) | - | 13 | aCHy Input/Output (Channel) | - |
| 4 | cCOM Output/Input (Common) | cCHy Input/Output (Channel) | 14 | aCOM Output/Input (Common) | A Input (Select) |
| 5 | cCHx Input/Output (Channel) | cCOM Output/Input (Common) | 15 | bCOM Output/Input (Common) | aCHx Input/Output (Channel) |
| 6 | INH Input (Inhibit) | cCHx Input/Output (Channel) | 16 | V _{DD} | aCHy Input/Output (Channel) |
| 7 | V _{EE} (Analogue Negative Supply) | INH Input (Inhibit) | 17 | - | aCOM Output/Input (Common) |
| 8 | V _{SS} (Digital Negative Supply) | - | 18 | - | - |
| 9 | C Input (Select) | V _{EE} (Analogue Negative Supply) | 19 | - | bCOM Output/Input (Common) |
| 10 | B Input (Select) | V _{SS} (Digital Negative Supply) | 20 | - | V _{DD} |

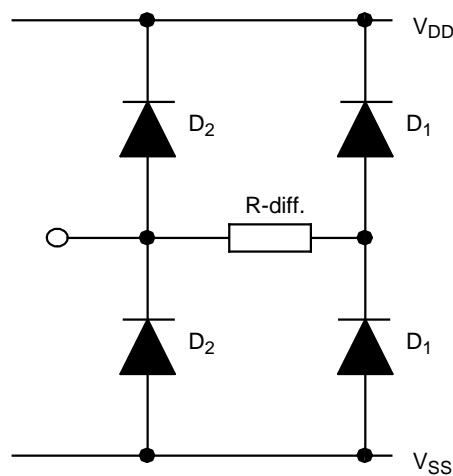
1.10 TRUTH TABLE

1. Logic Level Definitions: L = Low Level, H = High Level, X =Irrelevant.

| CONTROL INPUTS | | | | ON CHANNELS |
|----------------|--------|---|---|--|
| INH | SELECT | | | |
| | A | B | C | |
| L | L | L | L | aCHx to aCOM, aCOM to aCHx bCHx to bCOM, bCOM to bCHx cCHx to cCOM, cCOM to cCHx |

| CONTROL INPUTS | | | | ON CHANNELS |
|----------------|--------|---|---|--|
| INH | SELECT | | | |
| | A | B | C | |
| L | L | L | H | aCHx to aCOM, aCOM to aCHx bCHx to bCOM, bCOM to bCHx cCHy to cCOM, cCOM to cCHy |
| L | L | H | L | aCHx to aCOM, aCOM to aCHx bCHy to bCOM, bCOM to bCHy cCHx to cCOM, cCOM to cCHx |
| L | L | H | H | aCHx to aCOM, aCOM to aCHx bCHy to bCOM, bCOM to bCHy cCHy to cCOM, cCOM to cCHy |
| L | H | L | L | aCHy to aCOM, aCOM to aCHy bCHx to bCOM, bCOM to bCHx cCHx to cCOM, cCOM to cCHx |
| L | H | L | H | aCHy to aCOM, aCOM to aCHy bCHx to bCOM, bCOM to bCHx cCHy to cCOM, cCOM to cCHy |
| L | H | H | L | aCHy to aCOM, aCOM to aCHy bCHy to bCOM, bCOM to bCHy cCHx to cCOM, cCOM to cCHx |
| L | H | H | H | aCHy to aCOM, aCOM to aCHy bCHy to bCOM, bCOM to bCHy cCHy to cCOM, cCOM to cCHy |
| H | X | X | X | NONE (High Impedance) |

1.11 INPUT PROTECTION NETWORK
(CONTROL INPUTS)



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

None.

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. Consolidated Notes are given after the tables.

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 $V_{IL}=0V, V_{IH}=3V$ $V_{DD}=3V, V_{SS}=V_{EE}=0V$ Note 2 | - | - | - |
| Functional Test 2 | - | 3014 | Verify Truth Table $V_{IL}=0V, V_{IH}=15V$ $V_{DD}=15V,$ $V_{SS}=V_{EE}=0V$ Note 2 | - | - | - |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|--|------------|----------------------------|---|--------|------|----------|
| | | | | Min | Max | |
| Quiescent Current | I_{DD} | 3005 | $V_{IL}=0V, V_{IH}=15V$ $V_{DD}=15V,$ $V_{SS}=V_{EE}= 0V$ Note 3 | - | 1 | μA |
| Low Level Input Current, Control Inputs | I_{IL} | 3009 | V_{IN} (Under Test)=0V $V_{DD}=15V,$ $V_{SS}=V_{EE}=0V$ | - | -50 | nA |
| High Level Input Current, Control Inputs | I_{IH} | 3010 | V_{IN} (Under Test)=15V $V_{DD}=15V,$ $V_{SS}=V_{EE}= 0V$ | - | 50 | nA |
| Channel OFF Leakage Current 1, Any Channel CH | I_{OFF1} | - | Channel Under Test V_{IN} (CH)=15V V_{IN} (COM)=0V All other Channels Open $V_{DD}=15V,$ $V_{SS}=V_{EE}= 0V$ | - | -100 | nA |
| Channel OFF Leakage Current 2, Any Channel CH | I_{OFF2} | - | Channel Under Test V_{IN} (CH)=0V V_{IN} (COM)=15V All other Channels Open $V_{DD}=15V,$ $V_{SS}=V_{EE}= 0V$ | - | 100 | nA |
| Channel OFF Leakage Current 3, All Channels Tested Together | I_{OFF3} | - | V_{IN} (CH)=0V V_{IN} (COM)=15V $V_{DD}=15V,$ $V_{SS}=V_{EE}= 0V$ | - | 100 | nA |
| Channel OFF Leakage Current 4, All Channels Tested Together | I_{OFF4} | - | V_{IN} (CH)=15V V_{IN} (COM)=0V $V_{DD}=15V,$ $V_{SS}=V_{EE}= 0V$ | - | -100 | nA |
| Channel ON Resistance 1 | R_{ON1} | - | $V_{IL}=0V, V_{IH}=5V$ $R_L=10k\Omega$ $V_{DD}=5V, V_{SS}=V_{EE}= 0V$ Note 4 | - | 1050 | Ω |
| Channel ON Resistance 2 | R_{ON2} | - | $V_{IL}=0V, V_{IH}=15V$ $R_L=10k\Omega$ $V_{DD}=15V,$ $V_{SS}=V_{EE}= 0V$ Note 4 | - | 280 | Ω |
| Low Level Input Voltage 1 (Noise Immunity) (Functional Test) | V_{IL1} | - | Verify Truth Table $V_{DD}=5V, V_{SS}=V_{EE}=0V$ Note 5 | - | 1.5 | V |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|--|-----------|----------------------------|--|--------|-----|-------|
| | | | | Min | Max | |
| Low Level Input Voltage 2 (Noise Immunity) (Functional Test) | V_{IL2} | - | Verify Truth Table $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ Note 5 | - | 4 | V |
| High Level Input Voltage 1 (Noise Immunity) (Functional Test) | V_{IH1} | - | Verify Truth Table $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 5 | 3.5 | - | V |
| High Level Input Voltage 2 (Noise Immunity) (Functional Test) | V_{IH2} | - | Verify Truth Table $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ Note 5 | 11 | - | V |
| Threshold Voltage N-Channel | V_{THN} | - | INH Input and V_{EE} at Ground All Other Inputs: $V_{IN}=5V$ $V_{DD}=5V$, $I_{SS}=-10\mu A$ | -0.7 | -3 | V |
| Threshold Voltage P-Channel | V_{THP} | - | INH Input at Ground All Other Inputs: $V_{IN}=-5V$ $V_{SS}=V_{EE}=-5V$, $I_{DD}=3.5\mu A$ | 0.7 | 3 | V |
| Input Clamp Voltage 1, to V_{SS} , Control Inputs | V_{IC1} | - | I_{IN} (Under Test)=- $-100\mu A$ $V_{DD}=\text{Open}$, $V_{SS}=0V$ All Other Pins Open | - | -2 | V |
| Input Clamp Voltage 2, to V_{DD} , Control Inputs | V_{IC2} | - | V_{IN} (Under Test)=6V $R=30k\Omega$, $V_{SS}=\text{Open}$ All Other Pins Open Note 6 | 3 | - | V |
| Input Capacitance, Control Inputs | C_{IN} | 3012 | V_{IN} (Not Under Test)=0V $V_{DD}=V_{SS}=V_{EE}=0V$ $f = 100 \text{ kHz to } 1 \text{ MHz}$ Note 7 | - | 7.5 | pF |
| Channel Capacitance, CH | C_{CH} | 3012 | V_{IN} (Not Under Test)=0V $V_{DD}=V_{SS}=V_{EE}=0V$ $f = 100 \text{ kHz to } 1 \text{ MHz}$ Note 7 | - | 7.5 | pF |
| Channel Capacitance, COM | C_{COM} | 3012 | V_{IN} (Not Under Test)=0V $V_{DD}=V_{SS}=V_{EE}=0V$ $f = 100 \text{ kHz to } 1 \text{ MHz}$ Note 7 | - | 15 | pF |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|---|------------|-------------------------|---|--------|-----|-------|
| | | | | Min | Max | |
| Propagation Delay Low to High, bCOM to bCHy | t_{PLH} | 3003 | $V_{IN}(COM)=$ Pulse Generator V_{IN} (Remaining Inputs)=Truth Table $V_{IL}=0V$, $V_{IH}=5V$, $R_L=200k\Omega$ $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 8 | - | 40 | ns |
| Propagation Delay High to Low, bCOM to bCHy | t_{PHL} | 3003 | $V_{IN}(COM)=$ Pulse Generator V_{IN} (Remaining Inputs)=Truth Table $V_{IL}=0V$, $V_{IH}=5V$, $R_L=200k\Omega$ $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 8 | - | 40 | ns |
| Output Enable Time High Impedance to High Output 1, A to aCOM | t_{PZH1} | 3003 | $V_{IN}(A)=$ Pulse Generator V_{IN} (Remaining Inputs)=Truth Table $V_{IL}=0V$, $V_{IH}=5V$, $V_{IN}(CH)=5V$ and Open $R_L=10k\Omega$ $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 8 | - | 670 | ns |
| Output Disable Time High Output to High Impedance 1, A to aCOM | t_{PHZ1} | 3003 | $V_{IN}(A)=$ Pulse Generator V_{IN} (Remaining Inputs)=Truth Table $V_{IL}=0V$, $V_{IH}=5V$, $V_{IN}(CH)=5V$ and Open $R_L=300\Omega$ $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 8 | - | 670 | ns |
| Output Enable Time High Impedance to High Output 2, INH to aCOM | t_{PZH2} | 3003 | $V_{IN}(INH)=$ Pulse Generator V_{IN} (Remaining Inputs)=Truth Table $V_{IL}=0V$, $V_{IH}=5V$, $V_{IN}(CH)=5V$, $R_L=10k\Omega$ $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 8 | - | 400 | ns |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|--|------------|----------------------------|---|--------|-----|-------|
| | | | | Min | Max | |
| Output Disable Time High Output to High Impedance 2, INH to aCOM | t_{PHZ2} | 3003 | $V_{IN}(INH)=$ Pulse Generator V_{IN} (Remaining Inputs)=Truth Table $V_{IL}=0V$, $V_{IH}=5V$, $V_{IN}(CH)=5V$, $R_L=300\Omega$ $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 8 | - | 400 | ns |

2.3.2 High and Low Temperatures Electrical Measurements

The measurements shall be performed at $T_{amb}=+125 (+0 -5) ^\circ C$ and $T_{amb}=- 55(+5-0)^\circ C$.

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|--|----------|----------------------------|--|--------|-------------|---------|
| | | | | Min | Max | |
| Functional Test 1 | - | 3014 | Verify Truth Table $V_{IL}=0V$, $V_{IH}=3V$ $V_{DD}=3V$, $V_{SS}=V_{EE}=0V$ Note 2 | - | - | - |
| Functional Test 2 | - | 3014 | Verify Truth Table $V_{IL}=0V$, $V_{IH}=15V$ $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ Note 2 | - | - | - |
| Quiescent Current | I_{DD} | 3005 | $V_{IL}=0V$, $V_{IH}=15V$ $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ Note 3 $T_{amb}=+125^\circ C$ $T_{amb}=- 55^\circ C$ | - | 30 1 | μA |
| Low Level Input Current, Control Inputs | I_{IL} | 3009 | V_{IN} (Under Test)= $0V$ $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ $T_{amb}=+125^\circ C$ $T_{amb}=- 55^\circ C$ | - | -100 -50 | nA |
| High Level Input Current, Control Inputs | I_{IH} | 3010 | V_{IN} (Under Test)= $15V$ $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ $T_{amb}=+125^\circ C$ $T_{amb}=- 55^\circ C$ | - | 100 50 | nA |

| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|--|------------|-------------------------|--|--------|-------------|----------|
| | | | | Min | Max | |
| Channel OFF Leakage Current 1, Any Channel CH | I_{OFF1} | - | Channel Under Test $V_{IN}(CH)=15V$ $V_{IN}(COM)=0V$ All other Channels Open $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | - - | -1 -0.1 | μA |
| Channel OFF Leakage Current 2, Any Channel CH | I_{OFF2} | - | Channel Under Test $V_{IN}(CH)=0V$ $V_{IN}(COM)=15V$ All other Channels Open $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | - - | 1 0.1 | μA |
| Channel OFF Leakage Current 3, All Channels Tested Together | I_{OFF3} | - | $V_{IN}(CH)=0V$ $V_{IN}(COM)=15V$ $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | - - | 1 0.1 | μA |
| Channel OFF Leakage Current 4, All Channel Tested Together | I_{OFF4} | - | $V_{IN}(CH)=15V$ $V_{IN}(COM)=0V$ $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | - - | -1 -0.1 | μA |
| Channel ON Resistance 1 | R_{ON1} | - | $V_{IL}=0V, V_{IH}=5V$ $R_L=10k\Omega$ $V_{DD}=5V, V_{SS}=V_{EE}=0V$ Note 4 $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | - - | 1200 880 | Ω |
| Channel ON Resistance 2 | R_{ON2} | - | $V_{IL}=0V, V_{IH}=15V$ $R_L=10k\Omega$ $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ Note 4 $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | - - | 400 220 | Ω |
| Low Level Input Voltage 1 (Noise Immunity) (Functional Test) | V_{IL1} | - | Verify Truth Table $V_{DD}=5V, V_{SS}=V_{EE}=0V$ Note 5 | - | 1.5 | V |

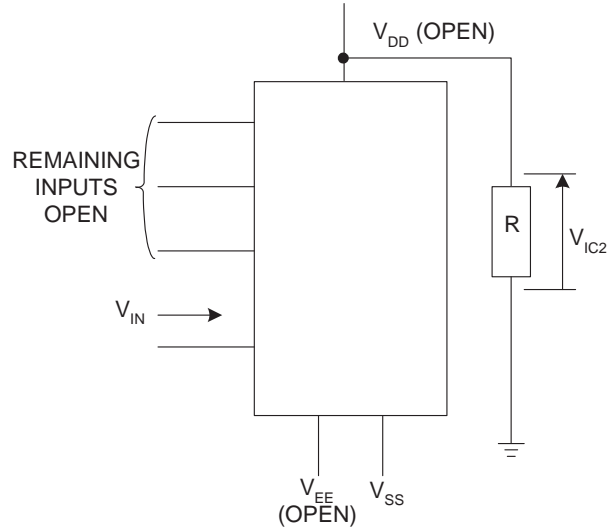
| Characteristics | Symbols | MIL-STD-883 Test Method | Test Conditions Note 1 | Limits | | Units |
|---|-----------|-------------------------|--|--------------|--------------|-------|
| | | | | Min | Max | |
| Low Level Input Voltage 2 (Noise Immunity) (Functional Test) | V_{IL2} | - | Verify Truth Table $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ Note 5 | - | 4 | V |
| High Level Input Voltage 1 (Noise Immunity) (Functional Test) | V_{IH1} | - | Verify Truth Table $V_{DD}=5V$, $V_{SS}=V_{EE}=0V$ Note 5 | 3.5 | - | V |
| High Level Input Voltage 2 (Noise Immunity) (Functional Test) | V_{IH2} | - | Verify Truth Table $V_{DD}=15V$, $V_{SS}=V_{EE}=0V$ Note 5 | 11 | - | V |
| Threshold Voltage N-Channel | V_{THN} | - | INH Input and V_{EE} at Ground All Other Inputs: $V_{IN}=5V$ $V_{DD}=5V$, $I_{SS}=-10\mu A$ $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | -0.3 -0.7 | -3.5 -3.5 | V |
| Threshold Voltage P-Channel | V_{THP} | - | INH Input at Ground All Other Inputs: $V_{IN}=-5V$ $V_{SS}=V_{EE}=-5V$, $I_{DD}=3.5\mu A$ $T_{amb}=+125^{\circ}C$ $T_{amb}=-55^{\circ}C$ | 0.3 0.7 | 3.5 3.5 | V |

2.3.3 Notes to Electrical Measurement Tables

- Unless otherwise specified all inputs and channels shall be tested for each characteristic, inputs not under test shall be $V_{IN} = V_{SS}$ or V_{DD} and channels not under test shall be open.
- Functional tests shall be performed to verify Truth Table. The Maximum time to output comparator strobe = 300 μ s.
- Quiescent Current shall be tested using the following input conditions:
 - Inputs INH = A = B = C = V_{IL} ; All CH and COM inputs = V_{IH}
 - Inputs A = B = C = V_{IH} ; Input INH = All CH and COM inputs = V_{IL}
 - Inputs A = B = C = V_{IL} ; Input INH = All CH and COM inputs = V_{IH}
- Channel ON Resistance shall be tested for each channel in both directions using the following input conditions:
 - INH = V_{IL}
 - A, B, C = V_{IL} or V_{IH} per Truth Table to select channel under test.
 - I_{IN} (CH or COM) = 100 μ A.
 - R_{ON1} shall be tested with V_{IN} (CH or COM)= 1.5V, 1.9V, 2.3V, 2.7V, 3.3V, 3.7V, 4.1V.
 R_{ON2} shall be tested with V_{IN} (CH or COM)= 1.5V, 1.9V, 2.3V, 2.7V, 13.3V, 13.7V, 14.1V, 14.5V.
 Channel ON Resistance shall be recorded for Channel cy (cCHy to cCOM, cCOM to cCHy) at each specified V_{IN} . Other channels may be tested go-no-go.
- Performed as a functional test to verify for all OFF channels $I_{OFF}<2\mu A$ with V_{IN} (CH)= V_{DD} through

1kΩ, COM output load resistance $R_L=1k\Omega$.

6. Input Clamp Voltage 2 to V_{DD} , V_{IC2} , shall be tested on each input as follows:-

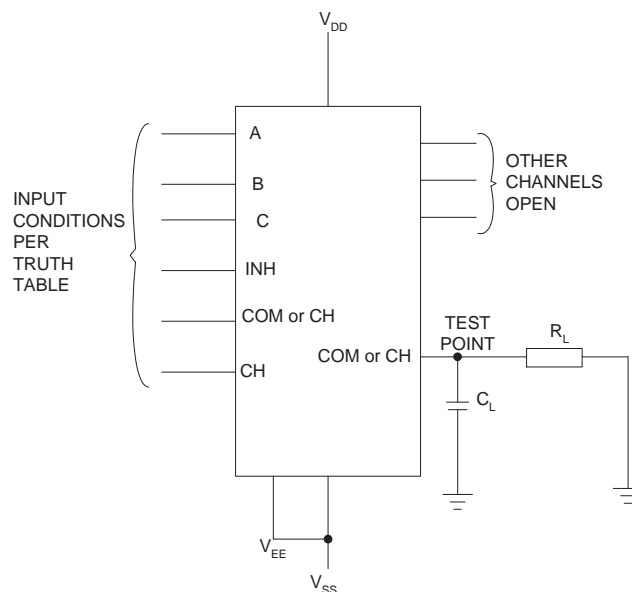


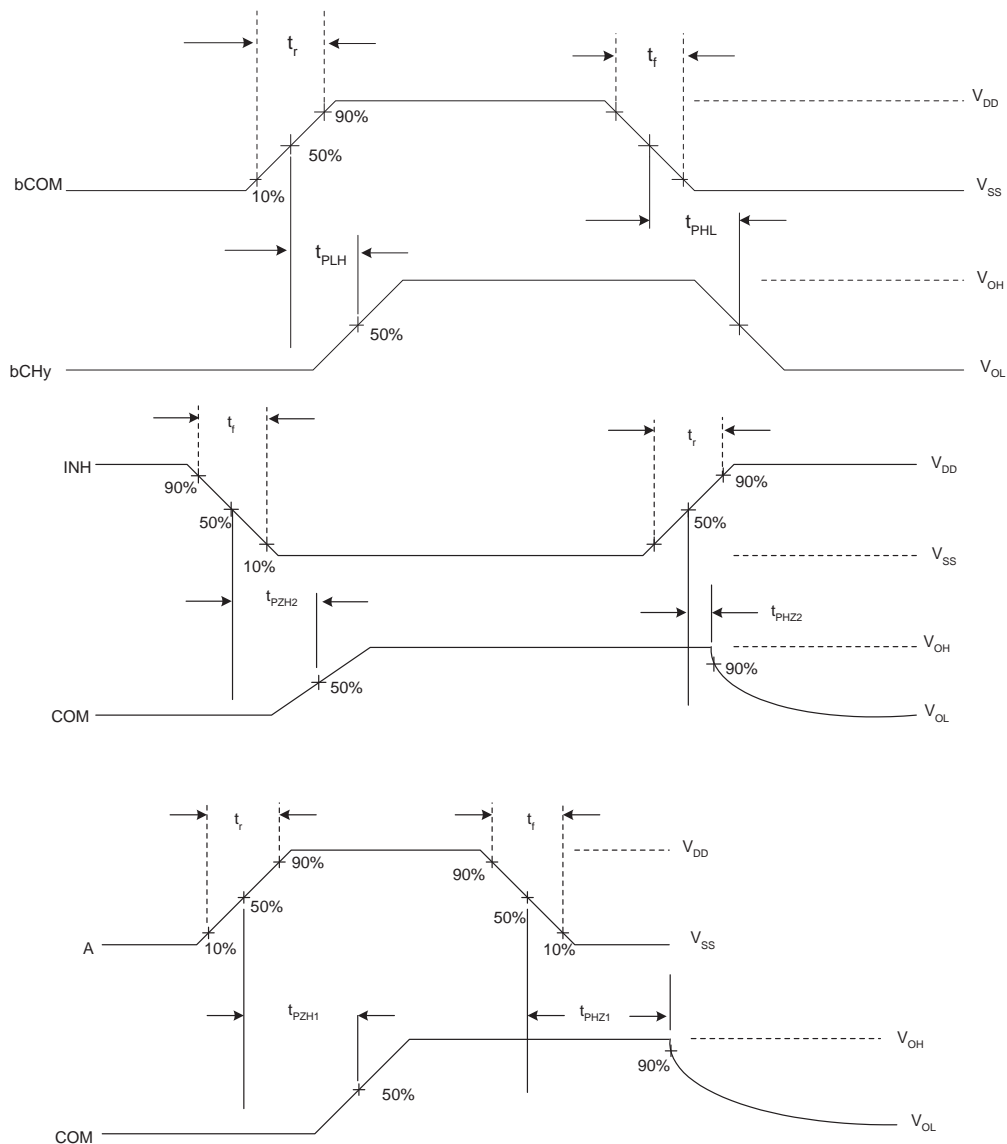
7. Guaranteed but not tested.
8. Read and record measurements shall be performed on a sample of 32 components with 0 failures permitted.

The pulse generator shall have the following characteristics:

$V_{GEN} = 0$ to V_{DD} ; $f = 500kHz$; t_r and $t_f \leq 15$ ns (10% to 90%); duty cycle = 50%. Output load capacitance $C_L = 50pF \pm 5\%$ including scope probe, wiring and stray capacitance without component in the test fixture. Channel bias resistance $R_L =$ as specified.

Propagation delay times shall be measured as follows:





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 | Symbols | Limits | | | Units |
|--|-----------|-------------------------|----------|------|----------|
| | | Drift Value Δ | Absolute | | |
| | | | Min | Max | |
| Quiescent Current | I_{DD} | ± 0.15 | - | 1 | μA |
| Channel ON Resistance 1, cCHy to cCOM, cCOM to cCHy Note 2 | R_{ON1} | ± 50 | - | 1050 | Ω |
| Channel ON Resistance 2, cCHy to cCOM, cCOM to cCHy Note 2 | R_{ON2} | ± 15 | - | 280 | Ω |
| Threshold Voltage N-Channel | V_{THN} | ± 0.3 | -0.7 | -3 | V |
| Threshold Voltage P-Channel | V_{THP} | ± 0.3 | 0.7 | 3 | V |

NOTES:

1. Unless otherwise specified all inputs and outputs shall be tested for each characteristic.
2. Channel ON Resistance shall be tested at each input voltage level specified in Room Temperature Electrical Measurements in both directions for cCHy to cCOM only.

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 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 where specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

| Characteristics | Symbols | Limits | | | Units |
|--|------------|-------------------------|----------|------|----------|
| | | Drift Value Δ | Absolute | | |
| | | | Min | Max | |
| Functional Test 1 | - | - | - | - | - |
| Quiescent Current | I_{DD} | ± 0.15 | - | 1 | μA |
| Low Level Input Current, Control Inputs | I_{IL} | - | - | -50 | nA |
| High Level Input Current, Control Inputs | I_{IH} | - | - | 50 | nA |
| Channel OFF Leakage Current 1, Any Channel CH | I_{OFF1} | - | - | -100 | nA |
| Channel OFF Leakage Current 3, All Channels Tested Together | I_{OFF3} | - | - | 100 | nA |
| Channel ON Resistance 1 | R_{ON1} | ± 50 | - | 1050 | Ω |
| Channel ON Resistance 2 | R_{ON2} | ± 15 | - | 280 | Ω |
| Low Level Input Voltage 1, (Noise Immunity) (Functional Test) | V_{IL1} | - | - | 1.5 | V |
| High Level Input Voltage 1, (Noise Immunity) (Functional Test) | V_{IH1} | - | 3.5 | - | V |
| Threshold Voltage N-Channel | V_{THN} | ± 0.3 | -0.7 | -3 | V |
| Threshold Voltage P-Channel | V_{THP} | ± 0.3 | 0.7 | 3 | V |

NOTES:

1. Unless otherwise specified all inputs and outputs shall be tested for each characteristic.
2. The drift values (Δ) are applicable to the Operating Life test only.

2.6 HIGH TEMPERATURE REVERSE BIAS BURN-IN CONDITIONS

2.6.1 N-Channel HTRB

| Characteristics | Symbols | Test Conditions | Units |
|----------------------------------|-----------|-----------------|-------|
| Ambient Temperature | T_{amb} | +125 (+0 -5) | °C |
| Output COM (all channels) | V_{OUT} | V_{SS} | V |
| Inputs CH (all channels) | V_{IN} | V_{DD} | V |
| Inputs INH, A, B, C | V_{IN} | V_{DD} | V |
| Positive Supply Voltage | V_{DD} | 15 (+0 -0.5) | V |
| Digital Negative Supply Voltage | V_{SS} | 0 | V |
| Analogue Negative Supply Voltage | V_{EE} | 0 | V |
| Duration | t | 72 | Hours |

NOTES:

1. Input Protection Resistor = Output Load = 2kΩ min to 47kΩ max.

2.6.2 P-Channel HTRB

| Characteristics | Symbols | Test Conditions | Units |
|----------------------------------|-----------|-----------------|-------|
| Ambient Temperature | T_{amb} | +125 (+0 -5) | °C |
| Output COM (all channels) | V_{OUT} | V_{SS} | V |
| Inputs CH (all channels) | V_{IN} | V_{SS} | V |
| Inputs INH, A, B, C | V_{IN} | V_{SS} | V |
| Positive Supply Voltage | V_{DD} | 15 (+0 -0.5) | V |
| Digital Negative Supply Voltage | V_{SS} | 0 | V |
| Analogue Negative Supply Voltage | V_{EE} | 0 | V |
| Duration | t | 72 | Hours |

NOTES:

1. Input Protection Resistor = Output Load = 2kΩ min to 47kΩ max.

2.7 POWER BURN-IN CONDITIONS

| Characteristics | Symbols | Test Conditions | Units |
|----------------------------------|--|---|-------|
| Ambient Temperature | T_{amb} | +125 (+0 -5) | °C |
| Output COM (all channels) | V_{OUT} | V_{SS} | V |
| Inputs CH (all channels) | V_{IN} | V_{DD} | V |
| Input A | V_{IN} | V_{GEN1} | V |
| Input B | V_{IN} | V_{GEN2} | V |
| Input C | V_{IN} | V_{GEN3} | V |
| Input INH | V_{IN} | V_{GEN4} | V |
| Pulse Voltage | V_{GEN} | 0V to V_{DD} | V |
| Pulse Frequency Square Wave | f_{GEN1} f_{GEN2} f_{GEN3} f_{GEN4} | 500k 250k 125k 62.5k 50% Duty Cycle | Hz |
| Positive Supply Voltage | V_{DD} | 15 (+0 -0.5) | V |
| Digital Negative Supply Voltage | V_{SS} | 0 | V |
| Analogue Negative Supply Voltage | V_{EE} | 0 | V |

NOTES:

1. Input Protection Resistor = Output Load = 2kΩ min to 47kΩ max.

2.8 OPERATING LIFE CONDITIONS

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

APPENDIX 'A'

AGREED DEVIATIONS FOR STMICROELECTRONICS (F)

| ITEMS AFFECTED | DESCRIPTION OF DEVIATIONS |
|--|---|
| <p>Deviations from Screening Tests - Chart F3</p> | <p>External Visual Inspection: The criteria applicable to chip outs are those described in MIL-STD-883, Test Method 2009, Paras 3.3.6(b) and 3.3.7(a).</p> <p>High Temperature Reverse Bias Burn-in: The temperature limits of MIL-STD-883, Para. 4.5.8(c) may be used.</p> <p>Power Burn-in test is performed using STMicroelectronics Specification Ref: 0019255.</p> |
| <p>Deviations from Qualification and Periodic Tests - Chart F4</p> | <p>External Visual Inspection: The criteria applicable to chip outs are those described in MIL-STD-883, Test Method 2009, Paras 3.3.6(b) and 3.3.7(a).</p> <p>Operating Life: The temperature limits of MIL-STD-883, Para. 4.5.8(c) may be used.</p> |
| <p>Deviations from High and Low Temperatures Electrical Measurements</p> | <p>High and Low Temperatures Electrical Measurements may be considered guaranteed but not tested if successful pilot lot testing has been performed on the wafer lot which includes High and Low Temperatures Electrical Measurements per the Detail Specification.</p> <p>A summary of the pilot lot testing shall be provided if required by the Purchase Order.</p> |
| <p>Deviations from Room Temperature Electrical Measurements</p> | <p>All AC characteristics (Capacitance and Timings) may be considered guaranteed but not tested if successful pilot lot testing has been performed on the wafer lot which includes AC characteristic measurements per the Detail Specification.</p> <p>A summary of the pilot lot testing shall be provided if required by the Purchase Order.</p> |