INTEGRATED CIRCUITS, SILICON MONOLITHIC,

BIPOLAR OCTAL BUFFER AND LINE DRIVER

WITH 3-STATE OUTPUTS,

BASED ON TYPE 54LS240

ESCC Detail Specification No. 9401/014

ISSUE 1

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Pages 1 to 30

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space components
coordination group

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		SCCG Chairman	ESA Director General or his Deputy
Issue 2	November 1993		
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DOCUMENTATION CHANGE NOTICE

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		This issue supersedes Issue 1 and incorporates all modifications defined in Revisions 'A', 'B', 'C', 'D' and 'E' to Issue 1 and the following DCR's:-		
		Cover page		None
		DCN		None
		Table 1(a)	: Lead Material and/or Finish amended for existing Variants	22881
			: Variant 02 added and existing figure reference amended	22920
			: Variants 11 and 12 added	22881
		Table 1(b)	: No. 2, in Remarks, Note No. amended to "1"	23573
			: No. 3, in Remarks, Note No. amended to "2"	23573
			: No. 6, existing temperature specified for DIL/FP and Note No. amended to "3"	23573
			, new temperature and Note reference added for CCP	23573
			: Note 1 renumbered as "2"	23573
			: Note 2 renumbered as "3" and text amended	23573
			: Note 3 renumbered as "1"	23573
			: New Note 4 added	23573
		Figure 2(a)	: New figure added	22920
		Figure 2(b)	: Drawing and Table amended	23592
		Figure 2(c)	: New figure added	22881
		Notes to Figures	: Title of the notes amended	22881
			: Existing Notes deleted, new Notes added	22881
			: Note 2, "Not applicable" deleted, new Note added	22920
		Figure 3(a)	: 2nd outline on 'chip carrier package' added	22881
			: Title of 1st outline added	22881/ 22920
			: '(Top View)' added to the 2 outlines	22881
		Figure 3(b)	: Note amended	23519
		Para. 4.2.2	: Deviation deleted, "None" added	21048
		Para. 4.2.4	: Deviation deleted, "None" added	22919
		Para. 4.2.5	: Deviation deleted, "None" added	22919
		Para. 4.3.2	: Paragraph rewritten	22920/ 23460
		Para. 4.4.2	: Paragraph rewritten	22881/ 22920
		Para. 4.5.2	: Paragraph rewritten	22881/ 22920
		Para. 4.5.3	: Paragraph standardised	23519
		Para. 4.6.3	: "...and functional test sequence..." deleted	23519
		Para. 4.7.1	: "T_{amb}" added before "... +22 ± 3°C"	23519
		Paras. 4.7.2 & 4.7.3	: In title and paragraph, "burn-in" amended to read "power burn-in"	23519
		Figure 4(j)	: In Note 1, t_p corrected to "0.5µs"	23573
		Para. 4.8	: Title amended	23519
'A'	Feb. '95	P1. Cover Page		None
		P2. DCN		None
		P14. Para. 4.3.2	: Maximum weights amended	221047

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TABLES

FIGURES

APPENDICES (Applicable to specific Manufacturers only)

1. GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for a silicon monolithic, low power bipolar Schottky Octal Buffer and Line Driver with 3-State Outputs, based on Type 54LS240. It shall be read in conjunction with ESA/SCC Generic Specification No. 9000, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS

Variants of the basic type integrated circuits specified herein, which are also covered by this specification, are given in Table 1(a).

1.3 MAXIMUM RATINGS

The maximum ratings, which shall not be exceeded at any time during use or storage, applicable to the integrated circuits specified herein, are as scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION (FIGURE 1)

Not applicable.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the integrated circuits specified herein are shown in Figure 2.

1.6 PIN ASSIGNMENT

As per Figure 3(a).

1.7 TRUTH TABLE

As per Figure 3(b).

1.8 CIRCUIT SCHEMATIC

As per Figure 3(c).

1.9 FUNCTIONAL DIAGRAM

As per Figure 3(d).

TABLE 1(a) - TYPE VARIANTS

VARIANT	CASE	FIGURE	LEAD MATERIAL AND/OR FINISH
02	FLAT	2(a)	G4
05	DIL	2(b)	D7
06	DIL	2(b)	G4
11	CCP	2(c)	7
12	CCP	2(c)	4

TABLE 1(b) - MAXIMUM RATINGS

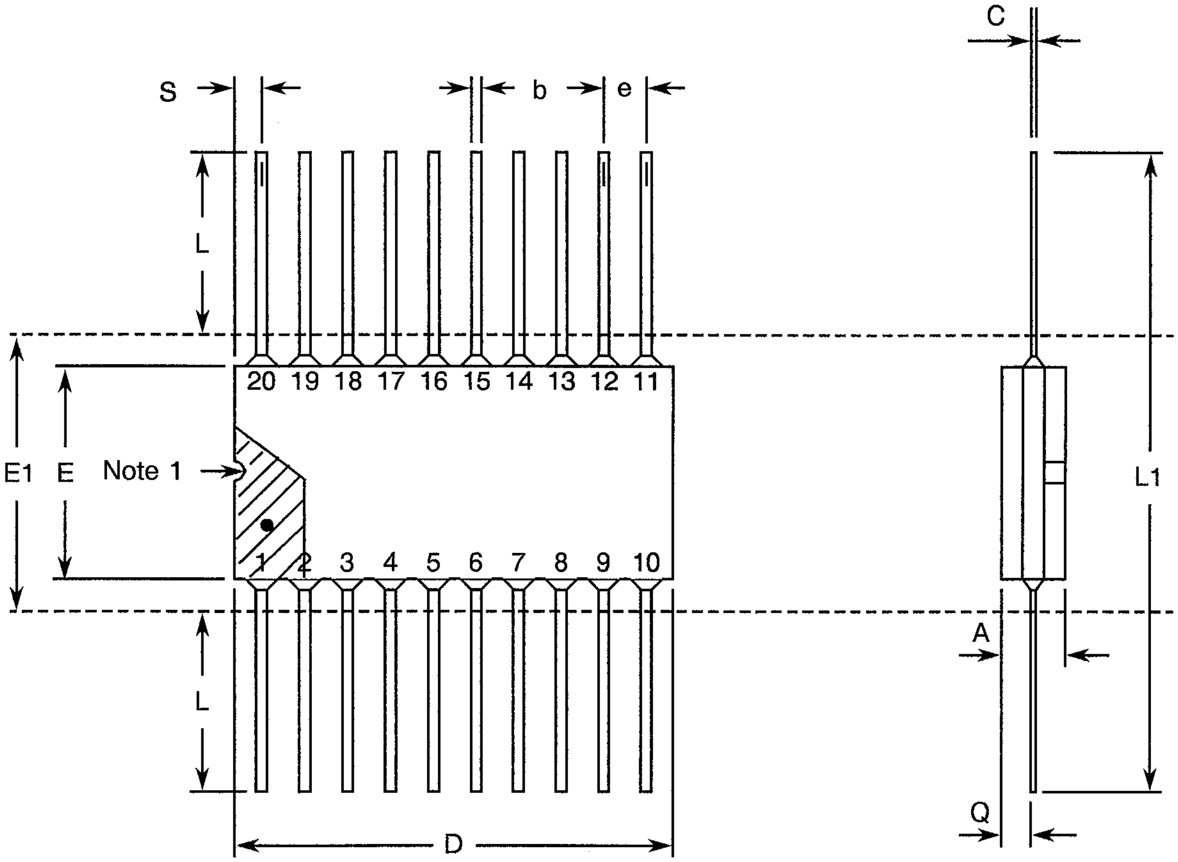
No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Supply Voltage	V_{CC}	−0.5 to 7.0	V	-
2	Input Voltage	V_{IN}	−0.5 to 7.0	V	Note 1
3	Device Dissipation	P_D	275	mWdc	Note 2
4	Operating Temperature Range	T_{op}	−55 to +125	°C	-
5	Storage Temperature Range	T_{stg}	−65 to +150	°C	-
6	Soldering Temperature For FP and DIP For CCP	T_{sol}	 +265 +245	°C	 Note 3 Note 4

NOTES

1. Input current limited to −18mA.
2. Must withstand added P_D due to short circuit conditions (i.e. I_{OS}) at one output for 5 seconds.
3. Duration 10 seconds maximum at a distance of not less than 1.5mm from the device body and the same lead shall not be resoldered until 3 minutes have elapsed.
4. Duration 5 seconds maximum and the same terminal shall not be resoldered until 3 minutes have elapsed.

FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(a) - FLAT PACKAGE

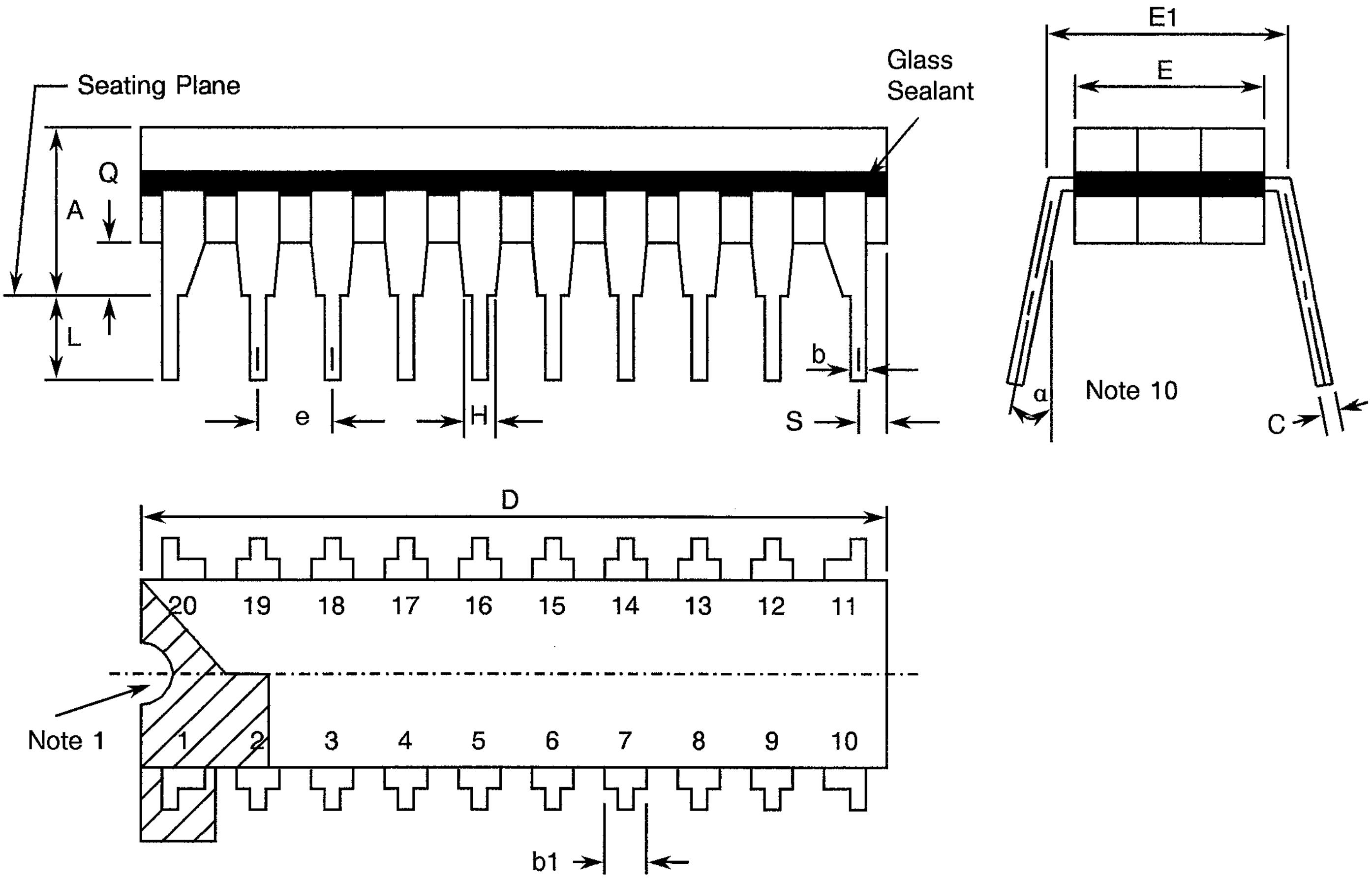


SYMBOL	MILLIMETRES		NOTES
	MIN	MAX	
A	1.14	2.34	
b	0.38	0.56	8
C	0.08	0.23	8
D	-	12.95	4
E	6.60	7.65	
E1	8.15	TYPICAL	4
e	1.27	TYPICAL	5, 9
L	6.35	9.40	8
L1	18.90	25.90	
Q	0.25	1.02	2
S	0.13	1.14	7

NOTES: See Page 10.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(b) - DUAL-IN-LINE PACKAGE

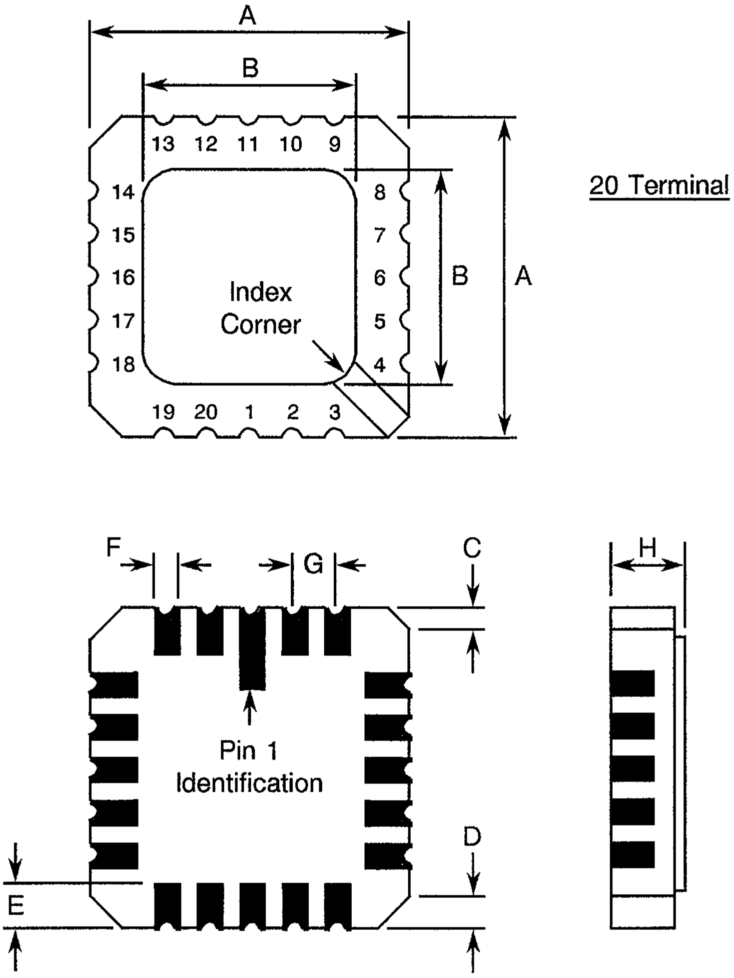


SYMBOL	MILLIMETRES		NOTES
	MIN	MAX	
A	-	5.08	
b	0.38	0.66	8
b1	-	1.78	8
C	0.20	0.44	8
D	23.62	24.76	4
E	6.22	7.62	4
E1	7.37	8.13	
e	2.54 TYPICAL		6, 9
F	1.27 TYPICAL		
H	0.76	-	
L	3.30	5.08	8
Q	0.51	-	3
S	0.38	1.27	7
α	0°	15°	10

NOTES: See Page 10.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(c) - SQUARE CHIP CARRIER PACKAGE (3 LAYER BASE)



SYMBOL	MILLIMETRES		NOTES
	MIN.	MAX.	
A	8.687	9.093	-
B	7.798	9.093	-
C	0.250	0.510	11
D	0.889	1.143	12
E	1.140	1.400	8
F	0.559	0.712	8
G	1.27 TYPICAL		5, 9
H	1.630	2.540	-

NOTES: See Page 10.

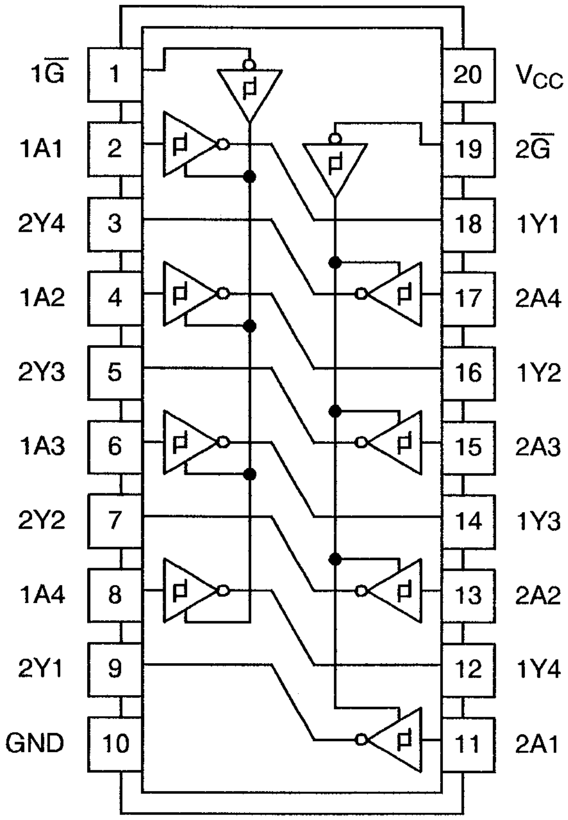
FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

NOTES TO FIGURES 2(a) TO 2(c)

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 in Figure 2(c).
2. Dimension Q shall be measured at the point of exit of the lead from the body.
3. Dimension Q shall be measured from the seating plane to the base plane.
4. This dimension allows for off-centre lids, meniscus and glass overrun.
5. The true position pin spacing is 1.27mm between centrelines. Each pin centreline shall be located within ±0.13mm of its true longitudinal position relative to Pins 1 and 20.
6. The true position pin spacing is 2.54mm between centrelines. Each pin centreline shall be located within ±0.25mm of its true longitudinal position relative to Pins 1 and 20.
7. Applies to all four corners.
8. All leads or terminals.
9. 18 spaces for flat and dual-in-line packages.
   16 spaces for chip carrier packages.
10. Lead centre when α is 0°.
11. Index corner only - 2 dimensions.
12. 3 non-index corners - 6 dimensions.

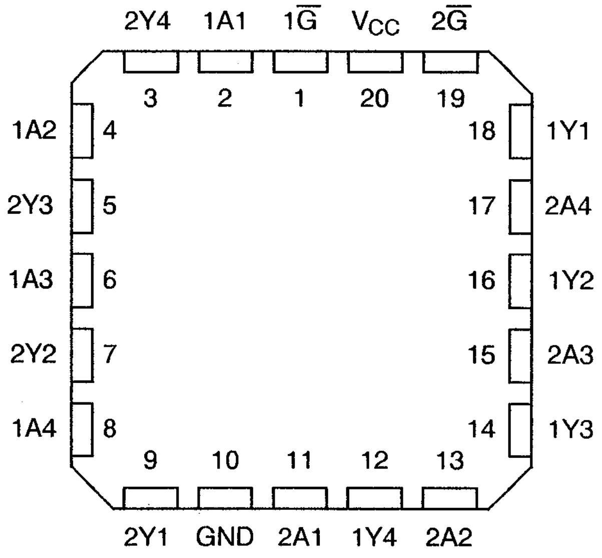
FIGURE 3(a) - PIN ASSIGNMENT

DUAL-IN-LINE AND FLAT PACKAGE



(TOP VIEW)

CHIP CARRIER PACKAGE



(TOP VIEW)

FIGURE 3(b) - TRUTH TABLE (EACH BUFFER)

INPUTS		OUTPUT
$1\overline{G}$, $2\overline{G}$	A	Y
L	L	H
L	H	L
H	X	Z

NOTES

1. Logic Level Definitions: L = Low Level, H = High Level, Z = High Impedance, X = Don't Care.

FIGURE 3(c) - CIRCUIT SCHEMATIC

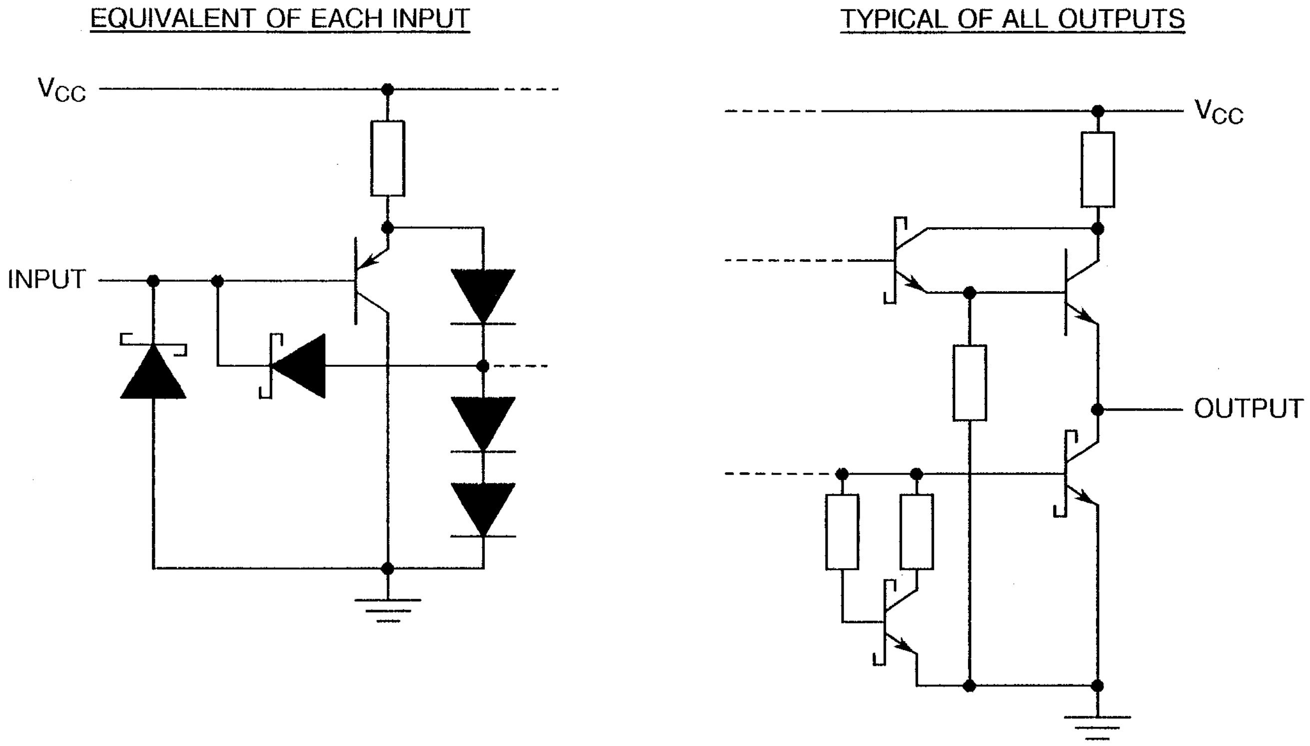
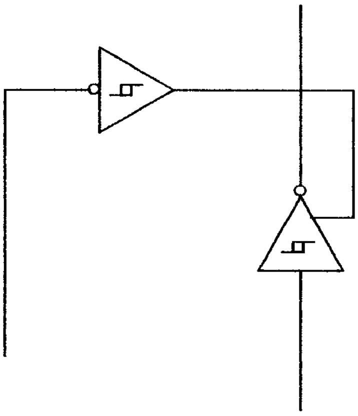


FIGURE 3(d) - FUNCTIONAL DIAGRAM



2. APPLICABLE DOCUMENTS

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

(a) ESA/SCC Generic Specification No. 9000 for Integrated Circuits.

(b) MIL-STD-883, Test Methods and Procedures for Micro-electronics.

3. TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESA/SCC Basic Specification No. 21300 shall apply. In addition, the following abbreviations are used:-

V_{IC} = Input Clamp Voltage.
I_{CC} = Supply Current.
V_{CC} = Supply Voltage.
I_{CCZ} = Supply Current, all outputs disabled.
I_{OZH} = Off-State Current, Outputs High.
I_{OZL} = Off-State Current, Outputs Low.
V_H = Hysteresis Voltage (V_{TP} - V_{TN}).
V_{TP} = V_{IN} for V_{OUT} to change when V_{IN} increases from 0V.
V_{TN} = V_{IN} for V_{OUT} to change when V_{IN} decreases from 5.0V.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the integrated circuits specified herein are stated in this specification and ESA/SCC Generic Specification No. 9000 for Integrated Circuits. Deviations from the Generic Specification applicable to this specification only, are listed in Para. 4.2.

Deviations from the applicable Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESA/SCC requirements and do not affect the components' reliability, are listed in the appendices attached to this specification.

4.2 DEVIATIONS FROM GENERIC SPECIFICATION

4.2.1 Deviations from Special In-process Controls

None.

4.2.2 Deviations from Final Production Tests (Chart II)

None.

4.2.3 Deviations from Burn-in Tests (Chart III)

(a) Para. 7.1.1(a), High Temperature Reverse Bias tests and subsequent electrical measurements related to this test shall be omitted.

(b) Para. 9.9.2, Electrical Measurements at High and Low Temperatures: Only a test result summary, based on go-no-go tests and presented in histogram form is required.

4.2.4 Deviations from Qualification Tests (Chart IV)

None.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

None.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check

The dimensions of the integrated circuits specified herein shall be checked. They shall conform to those shown in Figure 2.

4.3.2 Weight

The maximum weight of the integrated circuits specified herein shall be 0.9 grammes for the flat package, 3.2 grammes for the dual-in-line package and 0.6 grammes for the chip carrier package.

4.4 MATERIALS AND FINISHES

The materials and finishes shall be as specified herein. Where a definite material is not specified, a material which will enable the integrated circuits specified herein to meet the performance requirements of this specification shall be used. Acceptance or approval of any constituent material does not guarantee acceptance of the finished product.

4.4.1 Case

The case shall be hermetically sealed and have a metal body with hard glass seals or a ceramic body and the lids shall be welded, brazed, preform-soldered or glass frit-sealed.

4.4.2 Lead Material and Finish

For dual-in-line and flat packages, the material shall be either Type 'D' or Type 'G' with either Type '4' or Type '7' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500. For chip carrier packages, the finish shall be either Type '4' or Type '7' in accordance with the requirements of ESA/SCC Basic Specification No. 23500. (See Table 1(a) for Type Variants).

4.5 MARKING

4.5.1 General

The marking of all components delivered to this specification shall be in accordance with the requirements of ESA/SCC Basic Specification No. 21700. Each component shall be marked in respect of:-

(a) Lead Identification.

(b) The SCC Component Number.

(c) Traceability Information.

4.5.2 Lead Identification

For dual-in-line and flat packages, an index shall be located at the top of the package in the position defined in Note 1 to Figure 2 or, alternatively, a tab may be used to identify Pin No. 1. The pin numbering must be read with the index or tab on the left-hand side. For chip carrier packages, the index shall be as defined by Figure 2(c).

4.5.3 The SCC Component Number

Each component shall bear the SCC Component Number which shall be constituted and marked as follows:

940101402B

Detail Specification Number ── 9401014
Type Variant (see Table 1(a)) ── 02
Testing Level (B or C, as applicable) ── B

4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESA/SCC Basic Specification No. 21700.

4.6 ELECTRICAL MEASUREMENTS

4.6.1 Electrical Measurements at Room Temperature

The parameters to be measured in respect of electrical characteristics are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.6.2 Electrical Measurements at High and Low Temperatures

The parameters to be measured at high and low temperatures are scheduled in Table 3. The measurements shall be performed at $T_{amb} = +125$ and -55 °C respectively.

4.6.3 Circuits for Electrical Measurements

Circuits for use in performing the electrical measurements listed in Tables 2 and 3 of this specification are shown in Figure 4.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values

The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at $T_{amb} = +22 \pm 3$ °C. The parameter drift values (Δ) applicable to the parameters scheduled, shall not be exceeded. In addition to these drift value requirements, the appropriate limit value specified for a given parameter in Table 2 shall not be exceeded.

4.7.2 Conditions for Power Burn-in

The requirements for power burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 9000. The conditions for power burn-in shall be as specified in Table 5 of this specification.

4.7.3 Electrical Circuits for Power Burn-in

Circuits for use in performing the power burn-in tests are shown in Figure 5 of this specification.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - D.C. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
1	Functional Test	-	-	3(b)	Verify Truth Table with Load. Note 1	-	-	-
2 to 11	Input Current High Level 1	I_{IH1}	3010	4(a)	$V_{CC}=5.5V$, $V_{IN}=2.7V$ (Pins 1-2-4-6-8-11-13-15-17-19)	-	20	µA
12 to 21	Input Current High Level 2 (Max. Input Voltage)	I_{IH2}	3010	4(a)	$V_{CC}=5.5V$, $V_{IN}=7.0V$ (Pins 1-2-4-6-8-11-13-15-17-19)	-	100	µA
22 to 31	Input Clamp Voltage	V_{IC}	3008	4(b)	$V_{CC}=4.5V$, $I_{IN}=-18mA$ Note 2 (Pins 1-2-4-6-8-11-13-15-17-19)	-	-1.5	V
32 to 41	Input Current Low Level	I_{IL}	3009	4(c)	$V_{CC}=5.5V$, $V_{IN}=0.4V$ (Pins 1-2-4-6-8-11-13-15-17-19)	-	-200	µA
42 to 49	Output Voltage Low Level	V_{OL}	3007	4(d)	$V_{CC}=4.5V$, $V_{IL}=0.7V$ $V_{IH}=2.0V$, $I_{OL}=12mA$ (Pins 3-5-7-9-12-14-16-18)	-	0.4	V
50 to 57	Output Voltage High Level 1	V_{OH1}	3006	4(e)	$V_{CC}=4.5V$, $V_{IL}=0.5V$ $V_{IH}=2.0V$, $I_{OH}=-3.0mA$ (Pins 3-5-7-9-12-14-16-18)	2.4	-	V
58 to 65	Output Voltage High Level 2	V_{OH2}	3006	4(e)	$V_{CC}=4.5V$, $V_{IL}=0.7V$ $V_{IH}=2.0V$, $I_{OH}=-12mA$ (Pins 3-5-7-9-12-14-16-18)	2.0	-	V
66 to 73	Off-State Output Current Low Level Applied	I_{OZL}	3006	4(h)	$V_{CC}=5.5V$, $V_{OUT}=0.4V$ $V_{IL}=0.7V$, $V_{IH}=2.0V$ (Pins 3-5-7-9-12-14-16-18)	-	-20	µA
74 to 81	Off-State Output Current High Level Applied	I_{OZH}	3006	4(h)	$V_{CC}=5.5V$, $V_{OUT}=2.7V$ $V_{IL}=0.7V$, $V_{IH}=2.0V$ (Pins 3-5-7-9-12-14-16-18)	-	20	µA
82 to 89	Short Circuit Output Current	I_{OS}	3011	4(f)	$V_{CC}=5.5V$ Note 3 (Pins 3-5-7-9-12-14-16-18)	-40	-225	mA

NOTES: See Page 18.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - D.C. PARAMETERS (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
90	Supply Current Outputs High	I_{CCH}	3005	4(g)	$V_{CC} = 5.5V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pin 20)	-	27	mA
91	Supply Current Outputs Low	I_{CCL}	3005	4(g)	$V_{CC} = 5.5V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pin 20)	-	44	mA
92	Supply Current Outputs Disabled	I_{CCZ}	3005	4(g)	$V_{CC} = 5.5V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pin 20)	-	50	mA
93 to 102	Input Hysteresis Voltage	V_H	-	4(i)	$V_{CC} = 4.5V$ Note 5 (Pins 1-2-4-6-8-11-13-15-17-19)	0.2	-	V

NOTES: See Page 18.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - A.C. PARAMETERS

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
103 to 110	Propagation Delay, Low to High Level	t_{PLH}	3003	4(j)	$V_{CC} = 5.0V$ $R_L = 667\Omega \pm 5\%$ $C_L = 45pF \pm 5\%$ Note 4 Pins 2 to 18 11 to 9 4 to 16 13 to 7 6 to 14 15 to 5 8 to 12 17 to 3	-	14	ns
111 to 118	Propagation Delay, High to Low Level	t_{PHL}				-	18	
119 to 126	Output Enable Time to Low Level	t_{PZL}	3003	4(j)	$V_{CC} = 5.0V$ $R_L = 667\Omega \pm 5\%$ $C_L = 45pF \pm 5\%$ Pins 1 to 18 19 to 9 1 to 16 19 to 7 1 to 14 19 to 5 1 to 12 19 to 3	-	30	ns
127 to 134	Output Enable Time to High Level	t_{PZH}				-	23	
135 to 142	Output Disable Time from Low Level	t_{PLZ}	3003	4(j)	$V_{CC} = 5.0V$ $R_L = 667\Omega \pm 5\%$ $C_L = 5.0pF \pm 5\%$ Pins 1 to 18 19 to 9 1 to 16 19 to 7 1 to 14 19 to 5 1 to 12 19 to 3	-	20	ns
143 to 150	Output Disable Time from High Level	t_{PHZ}				-	25	

NOTES

1. Go-no-go test with $V_{IL} = 0.3V$; $V_{IH} = 3.0V$; trip point 1.5V.
2. All inputs and outputs not under test shall be open.
3. No more than one output should be shorted at a time, and only for 1 second maximum.
4. Propagation delay measurements shall be performed as a go-no-go test on a 100% basis. Read-and-record measurements shall be performed on an LTPD7 sample basis following the Chart III Burn-in Test.
5. Measurement performed during Qualification and Maintenance of Qualification only.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125(+0−5) °C AND −55(+5−0) °C

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
1	Functional Test	-	-	3(b)	Verify Truth Table with Load. Note 1	-	-	-
2 to 11	Input Current High Level 1	I_{IH1}	3010	4(a)	$V_{CC} = 5.5V$, $V_{IN} = 2.7V$ (Pins 1-2-4-6-8-11-13-15-17-19)	-	20	µA
12 to 21	Input Current High Level 2 (Max. Input Voltage)	I_{IH2}	3010	4(a)	$V_{CC} = 5.5V$, $V_{IN} = 7.0V$ (Pins 1-2-4-6-8-11-13-15-17-19)	-	100	µA
22 to 31	Input Clamp Voltage	V_{IC}	3008	4(b)	$V_{CC} = 4.5V$, $I_{IN} = -18mA$ Note 2 (Pins 1-2-4-6-8-11-13-15-17-19)	-	−1.5	V
32 to 41	Input Current Low Level	I_{IL}	3009	4(c)	$V_{CC} = 5.5V$, $V_{IN} = 0.4V$ (Pins 1-2-4-6-8-11-13-15-17-19)	-	−200	µA
42 to 49	Output Voltage Low Level	V_{OL}	3007	4(d)	$V_{CC} = 4.5V$, $V_{IL} = 0.7V$ $V_{IH} = 2.0V$, $I_{OL} = 12mA$ (Pins 3-5-7-9-12-14-16-18)	-	0.4	V
50 to 57	Output Voltage High Level 1	V_{OH1}	3006	4(e)	$V_{CC} = 4.5V$, $V_{IL} = 0.5V$ $V_{IH} = 2.0V$, $I_{OH} = -3.0mA$ (Pins 3-5-7-9-12-14-16-18)	2.4	-	V
58 to 65	Output Voltage High Level 2	V_{OH2}	3006	4(e)	$V_{CC} = 4.5V$, $V_{IL} = 0.7V$ $V_{IH} = 2.0V$, $I_{OH} = -12mA$ (Pins 3-5-7-9-12-14-16-18)	2.0	-	V
66 to 73	Off-State Output Current Low Level Applied	I_{OZL}	3006	4(h)	$V_{CC} = 5.5V$, $V_{OUT} = 0.4V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pins 3-5-7-9-12-14-16-18)	-	−20	µA
74 to 81	Off-State Output Current High Level Applied	I_{OZH}	3006	4(h)	$V_{CC} = 5.5V$, $V_{OUT} = 2.7V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pins 3-5-7-9-12-14-16-18)	-	20	µA
82 to 89	Short Circuit Output Current	I_{OS}	3011	4(f)	$V_{CC} = 5.5V$ Note 3 (Pins 3-5-7-9-12-14-16-18)	−40	−225	mA

NOTES: See Page 18.

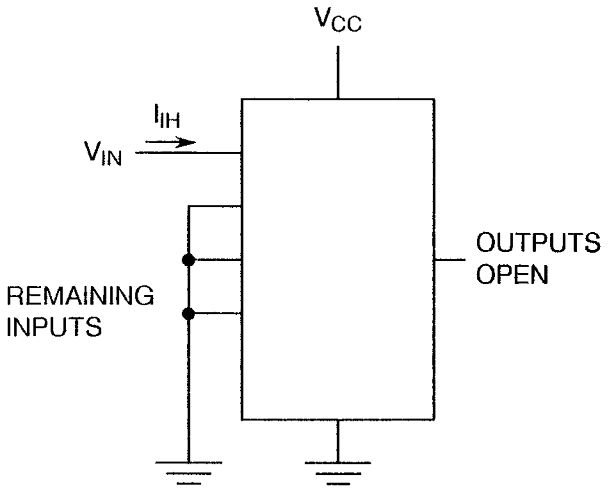
TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125(+0−5) °C AND −55(+5−0) °C (CONT'D)

No.	CHARACTERISTICS	SYMBOL	TEST METHOD MIL-STD 883	TEST FIG.	TEST CONDITIONS (PINS UNDER TEST)	LIMITS		UNIT
						MIN	MAX	
90	Supply Current Outputs High	I_{CCH}	3005	4(g)	$V_{CC} = 5.5V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pin 20)	-	27	mA
91	Supply Current Outputs Low	I_{CCL}	3005	4(g)	$V_{CC} = 5.5V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pin 20)	-	44	mA
92	Supply Current Outputs Disabled	I_{CCZ}	3005	4(g)	$V_{CC} = 5.5V$ $V_{IL} = 0.7V$, $V_{IH} = 2.0V$ (Pin 20)	-	50	mA
93 to 102	Input Hysteresis Voltage	V_H	-	4(i)	$V_{CC} = 4.5V$ Note 5 (Pins 1-2-4-6-8-11-13-15-17-19)	0.2	-	V

NOTES: See Page 18.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

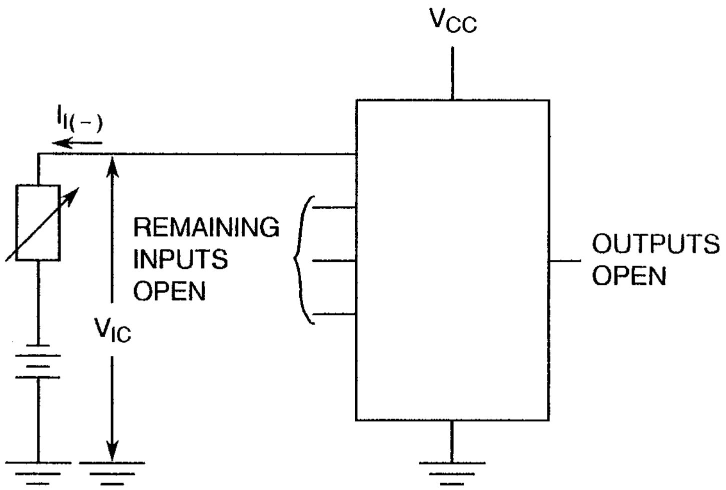
FIGURE 4(a) - HIGH LEVEL INPUT CURRENT



NOTES

1. Each input to be tested separately.

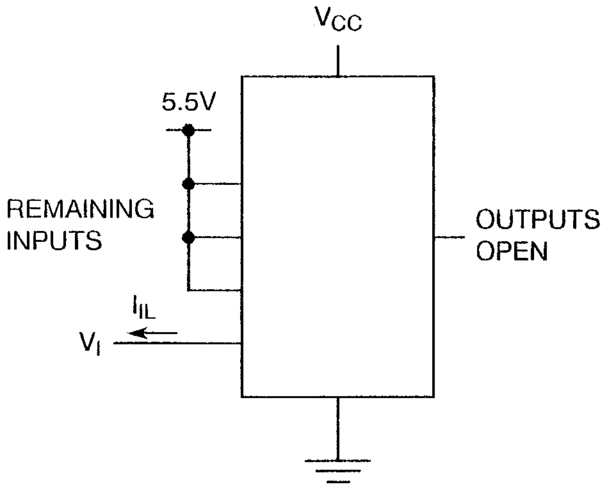
FIGURE 4(b) - INPUT CLAMP VOLTAGE



NOTES

1. Each input to be tested separately.

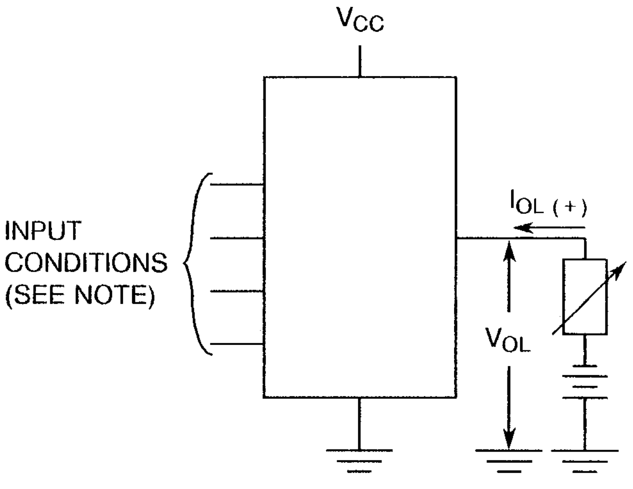
FIGURE 4(c) - LOW LEVEL INPUT CURRENT



NOTES

1. Each input to be tested separately.

FIGURE 4(d) - LOW LEVEL OUTPUT VOLTAGE



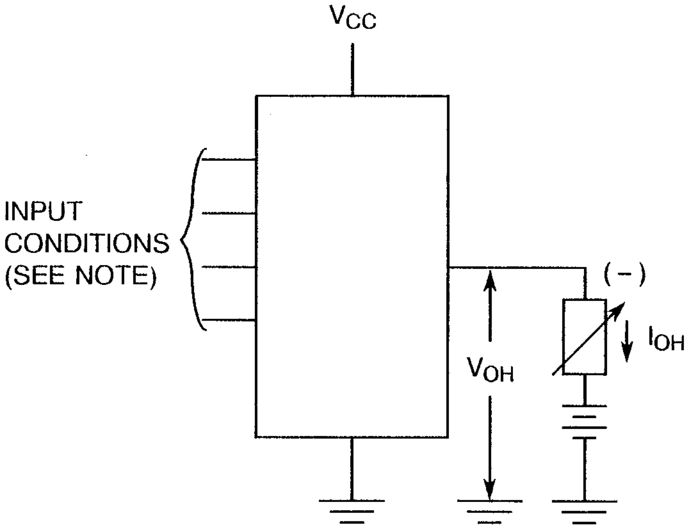
NOTES

1. Inputs $1\overline{G}$, $2\overline{G}$ at V_{IL}.

   Inputs A at V_{IH}.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

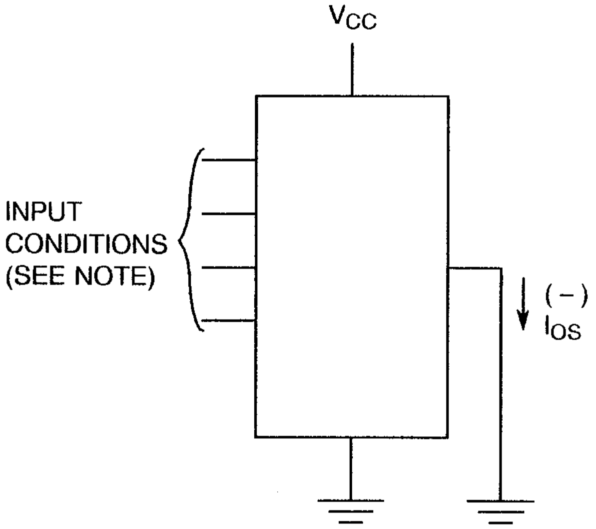
FIGURE 4(e) - HIGH LEVEL OUTPUT VOLTAGE



NOTES

1. All inputs at V_{IL}.

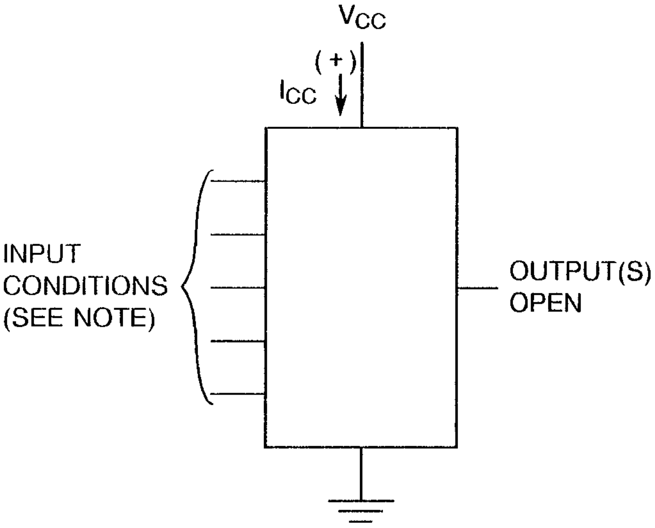
FIGURE 4(f) - SHORT CIRCUIT OUTPUT CURRENT



NOTES

1. All inputs at V_{IL}.

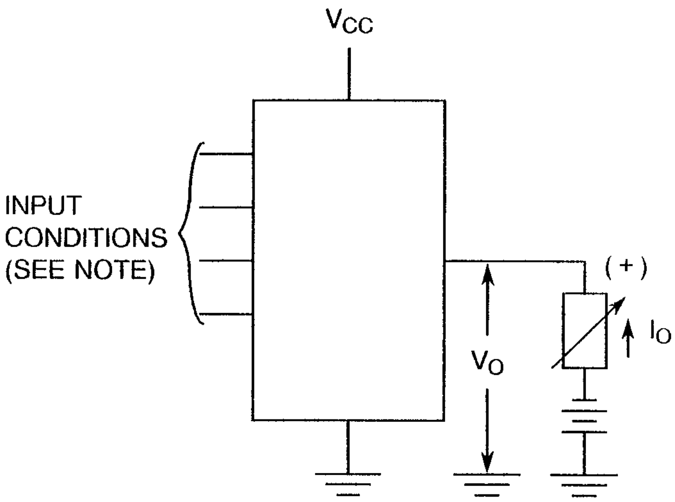
FIGURE 4(g) - SUPPLY CURRENT



NOTES

1. See Figure 3(b) for Low, High or Off-State Output.

FIGURE 4(h) - OFF-STATE OUTPUT CURRENT

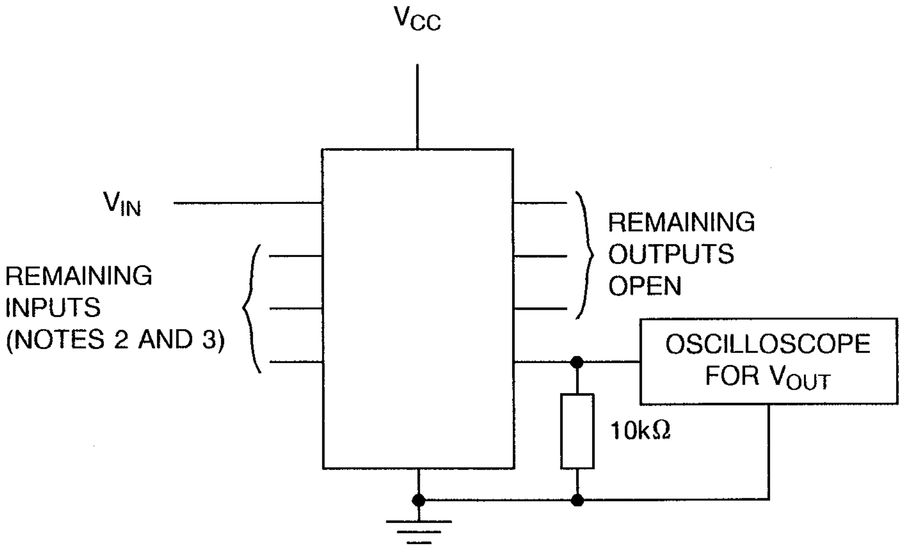


NOTES

1. See Figure 3(b) for Off-State Output.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(i) - INPUT HYSTERESIS VOLTAGE



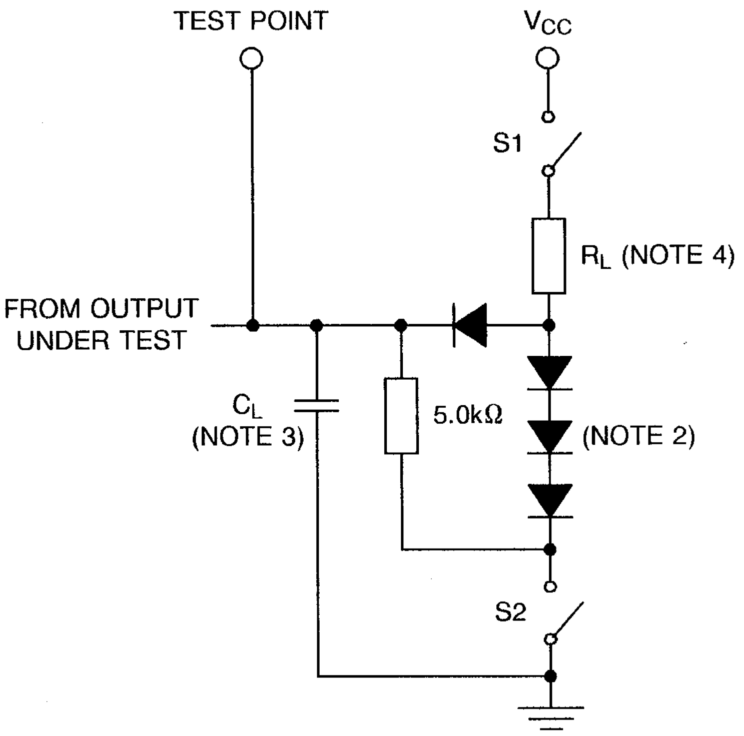
NOTES

1. V_H shall be derived as follows:-
   (i) Slowly increase input voltage (V_{IN}) from 0V until the output condition (V_{OUT}) changes. Record the value of V_{IN} at which the change occurs and call it V_{TP}.
   (ii) Slowly decrease input voltage (V_{IN}) from 5.0V until the output condition changes. Record the value of V_{IN} at which the change occurs and call it V_{TN}.
   (iii) $V_H = V_{TP} - V_{TN}$.
2. Measurement of 'A' inputs shall be performed with $\overline{G} = 0.7V$. Inputs not under test shall be open.
3. For measurement of $\overline{G}$ inputs, an appropriate output shall be monitored and the input conditions for that output shall be such that the object is high when enabled.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(j) - DYNAMIC TEST AND SWITCHING WAVEFORMS

LOAD CIRCUIT FOR 3-STATE OUTPUTS



VOLTAGE WAVEFORMS - PROPAGATION DELAY TIME

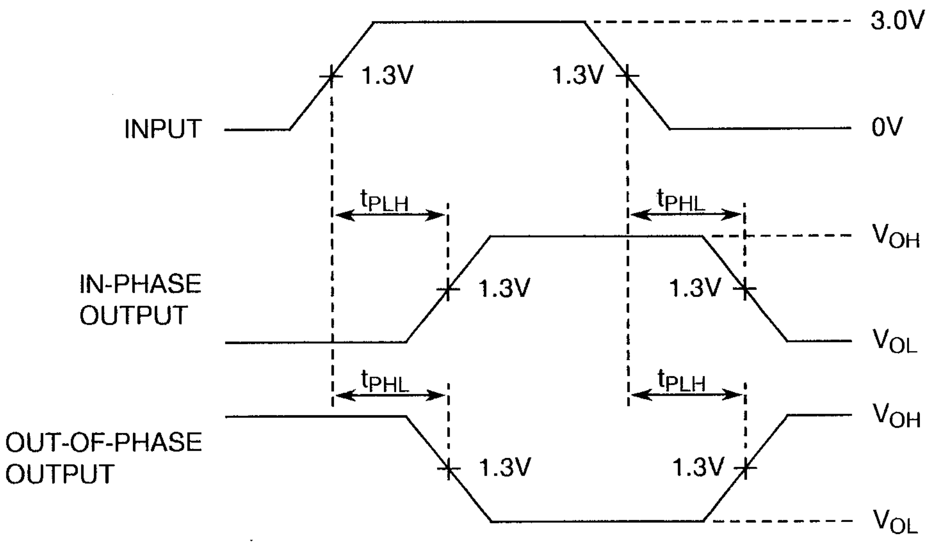
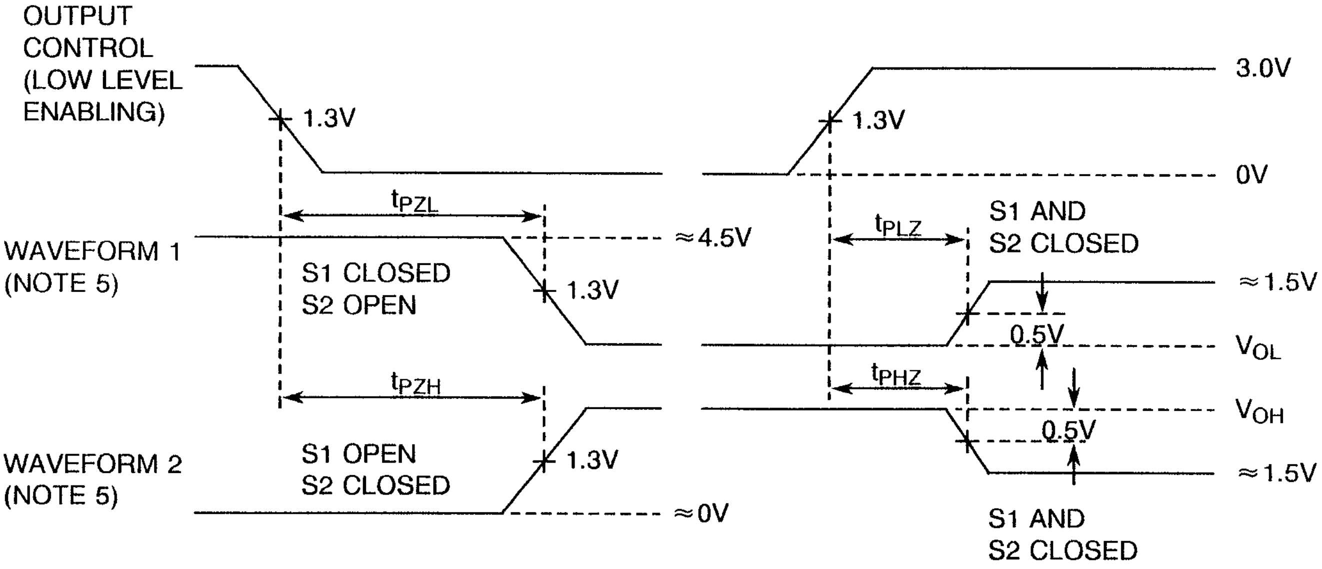


FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(j) - DYNAMIC TEST AND SWITCHING WAVEFORMS (CONTINUED)

VOLTAGE WAVEFORMS - ENABLE AND DISABLE TIMES



NOTES

1. All inputs are supplied by generators having the following characteristics: $t_r < 15ns$, $t_p = 0.5\mu s$, PRR < 1.0MHz, $Z_{OUT} = 50\Omega$.
2. All diodes are 1N916 or 1N3064.
3. $C_L = 45pF$ or 5.0pF ± 5% (see Table 2) including scope probe, wiring and stray capacitance without package in test fixture.
4. $R_L = 667\Omega \pm 5\%$.
5. Waveform 1 is for an output with internal conditions such that the output is low except when disabled by the output control.

   Waveform 2 is for an output with internal conditions such that the output is high except when disabled by the output control.
6. When measuring propagation delay time of 3-State Outputs, S1 and S2 are closed.

TABLE 4 - PARAMETER DRIFT VALUES

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS (Δ)	UNIT
2 to 11	Input Current High Level 1	I_{IH1}	As per Table 2	As per Table 2	±20 or (1) ±0.5	% μA
32 to 41	Input Current Low Level	I_{IL}	As per Table 2	As per Table 2	±18	μA
42 to 49	Output Voltage Low Level	V_{OL}	As per Table 2	As per Table 2	±60	mV
50 to 57	Output Voltage High Level 1	V_{OH1}	As per Table 2	As per Table 2	±240	mV

NOTES

1. Whichever is greater, referred to the initial value.

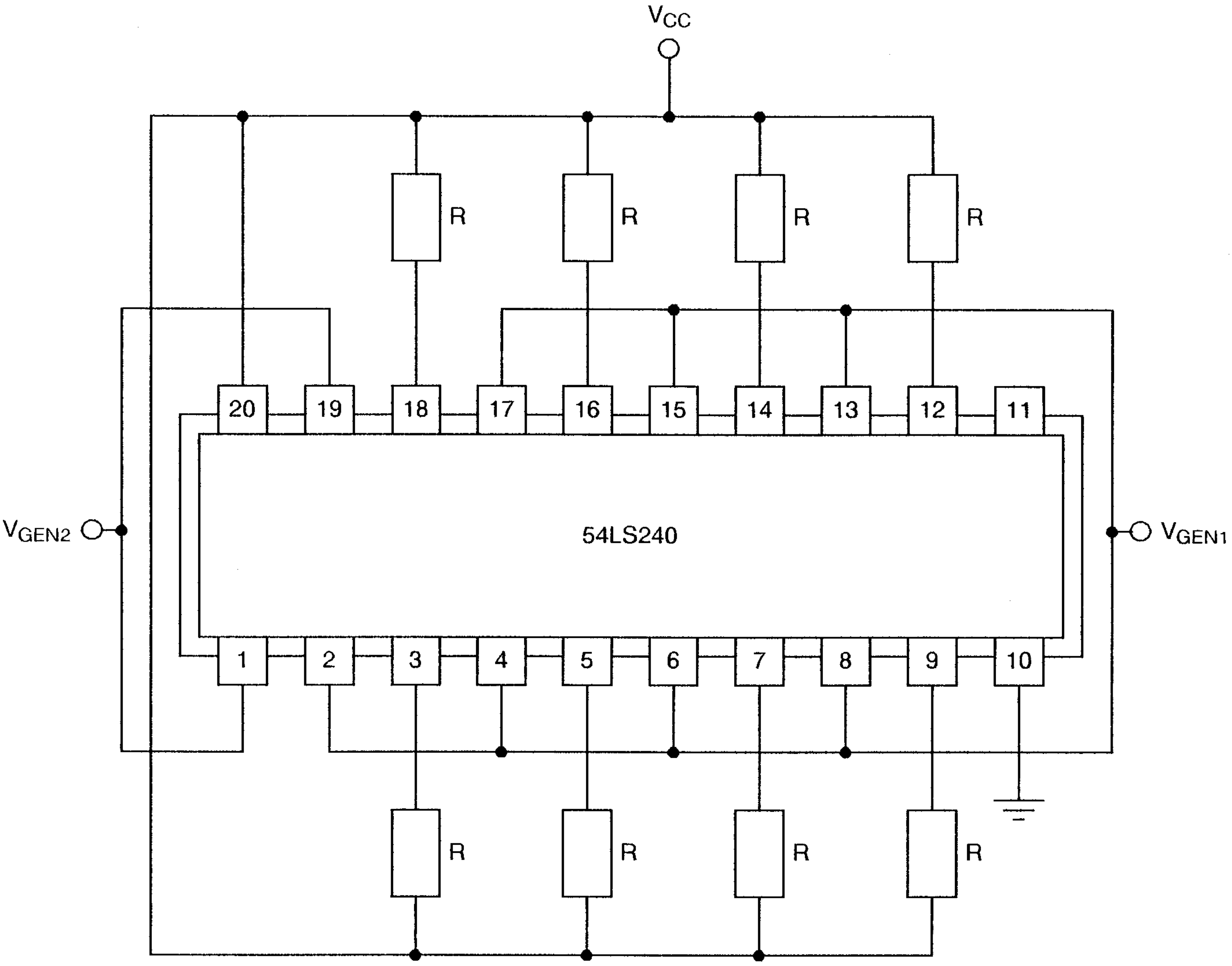
TABLE 5 - CONDITIONS FOR POWER BURN-IN AND OPERATING LIFE TEST

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+125(+0−5)	°C
2	Power Supply Voltage	V_{CC}	5(+0.5−0)	V
3	Pulse Voltage	V_{GEN}	0.5 max. to 3.0 min.	V
4	Frequency	f_{GEN1} GEN2	100 50 (Note 1)	Hz
5	Fan-out	-	10	-
6	Rise Time	t_r	50 max.	μs
7	Fall Time	t_f	50 max.	μs
8	Duty Cycle	-	20 min.	%

NOTES

1. Tolerance ±10%.

FIGURE 5 - ELECTRICAL CIRCUIT FOR POWER BURN-IN AND OPERATING LIFE TEST



NOTES

1. R = 1.2kΩ.

4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION NO. 9000)

4.8.1 Electrical Measurements on Completion of Environmental Tests

The parameters to be measured on completion of environmental tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.2 Electrical Measurements at Intermediate Points during Endurance Tests

The parameters to be measured at intermediate points during endurance tests are as scheduled in Table 6 of this specification.

4.8.3 Electrical Measurements on Completion of Endurance Tests

The parameters to be measured on completion of endurance testing are as scheduled in Table 6 of this specification. Unless otherwise stated, the measurements shall be performed at $T_{amb} = +22 \pm 3$ °C.

4.8.4 Conditions for Operating Life Tests

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 9000. The conditions for operating life testing shall be as specified in Table 5 of this specification.

4.8.5 Electrical Circuits for Operating Life Tests

Circuits for use in performing the operating life tests are shown in Figure 5.

4.8.6 Conditions for High Temperature Storage Test

The requirements for the high temperature storage test are specified in ESA/SCC Generic Specification No. 9000. The conditions for high temperature storage shall be $T_{amb} = +150(+0\text{-}5)$ °C.

TABLE 6 - ELECTRICAL MEASUREMENTS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTS

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS		UNIT
					(Δ)	ABSOLUTE	
2 to 11	Input Current High Level 1	I_{IH1}	As per Table 2	As per Table 2	± 1.0	-	µA
12 to 21	Input Current High Level 2	I_{IH2}	As per Table 2	As per Table 2	-	100	µA
32 to 41	Input Current Low Level	I_{IL}	As per Table 2	As per Table 2	± 12	-	µA
42 to 49	Output Voltage Low Level	V_{OL}	As per Table 2	As per Table 2	± 60	-	mV
50 to 57	Output Voltage High Level 1	V_{OH1}	As per Table 2	As per Table 2	± 240	-	mV
90	Supply Current Outputs High	I_{CCH}	As per Table 2	As per Table 2	± 20	-	%
91	Supply Current Outputs Low	I_{CCL}	As per Table 2	As per Table 2	± 20	-	%

APPENDIX 'A'

AGREED DEVIATIONS FOR TEXAS INSTRUMENTS (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 4.2.1	Scanning Electron Microscope (SEM) Inspection may be performed using TIF document TIF 3.61.610.001.
Para. 4.2.2	Prior to Die Shear Test TIF may perform a Radiographic Inspection on the randomly chosen samples to be subjected to this test, using TIF document TIF 50.42-3002.
Para. 4.2.3	Radiographic Inspection may be performed using TIF document TIF 50.42-3002.