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Pages 1 to 24

**INVERTED, DUAL CHANNEL, OPTO COUPLER,**

**BASED ON TYPE 6N134**

**ESA/SCC Detail Specification No. 5401/003**

**SCC**


**space components  
coordination group**

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		SCCG Chairman	ESA Director General or his Deputy
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**DOCUMENTATION CHANGE NOTICE**

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
'A'	Jul. '88		<p>This Issue incorporates all modifications agreed on the basis of Policy DCR 21016 for adaptation to new qualification requirements.</p> <p>P1. Cover page  P2. DCN  P4. Table of Contents : Reference to Appendices added  P6. Table 1(a) : Table added  P11. Para. 2 : MIL-STD-1276 deleted  Para. 4.1 : Reference to Appendices added  P12. Para. 4.2.2 : PIND Test and Condition added  P13. Para. 4.4.2 : Text rewritten</p>	<p>None  None  21019  21022  21025  21019  22638  21025</p>
'B'	Feb. '92		<p>P1. Cover page  P2. DCN  P5. Para. 1.2 : Paragraph amended  P11. Para. 2 : "ESA/SCC Basic Spec. No. 23500" added  P12. Para. 4.2.2 : PIND deviation deleted  Para. 4.2.3 : X-Ray Inspection deviation deleted  P18. Table 3 : Reference to Note 2 deleted, Note 1 put under this table</p>	<p>None  None  21021  21025  21043  21049  21047</p>
			<p>This document has been transferred from hardcopy to electronic format. The content is unchanged but minor differences in presentation exist.</p>	

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**APPENDICES (Applicable to specific Manufacturers only)**

None.

**1. GENERAL****1.1 SCOPE**

This specification details the ratings, physical and electrical characteristics, test and inspection data for an Inverted Dual Channel Opto Coupler, based on Type 6N134. It shall be read in conjunction with ESA/SCC Generic Specification No. 5000, the requirements of which are supplemented herein.

**1.2 COMPONENT TYPE VARIANTS**

See 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 opto coupler specified herein, are scheduled in Table 1(b).

**1.4 PARAMETER DERATING INFORMATION (FIGURE 1)**

Not applicable.

**1.5 PHYSICAL DIMENSIONS**

The physical dimensions of the opto coupler specified herein are shown in Figure 2.

**1.6 PIN ASSIGNMENT**

As per Figure 3(a).

**1.7 TRUTH TABLE**

Not applicable.

**1.8 CIRCUIT SCHEMATIC**

As per Figure 3(b).

**1.9 FUNCTIONAL DIAGRAM**

As per Figure 3(c).



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**TABLE 1(a) - TYPE VARIANTS**

VARIANT	BASED ON TYPE	FIGURE	LEAD MATERIAL AND FINISH
01	6N134	2	D2

**TABLE 1(b) - MAXIMUM RATINGS**

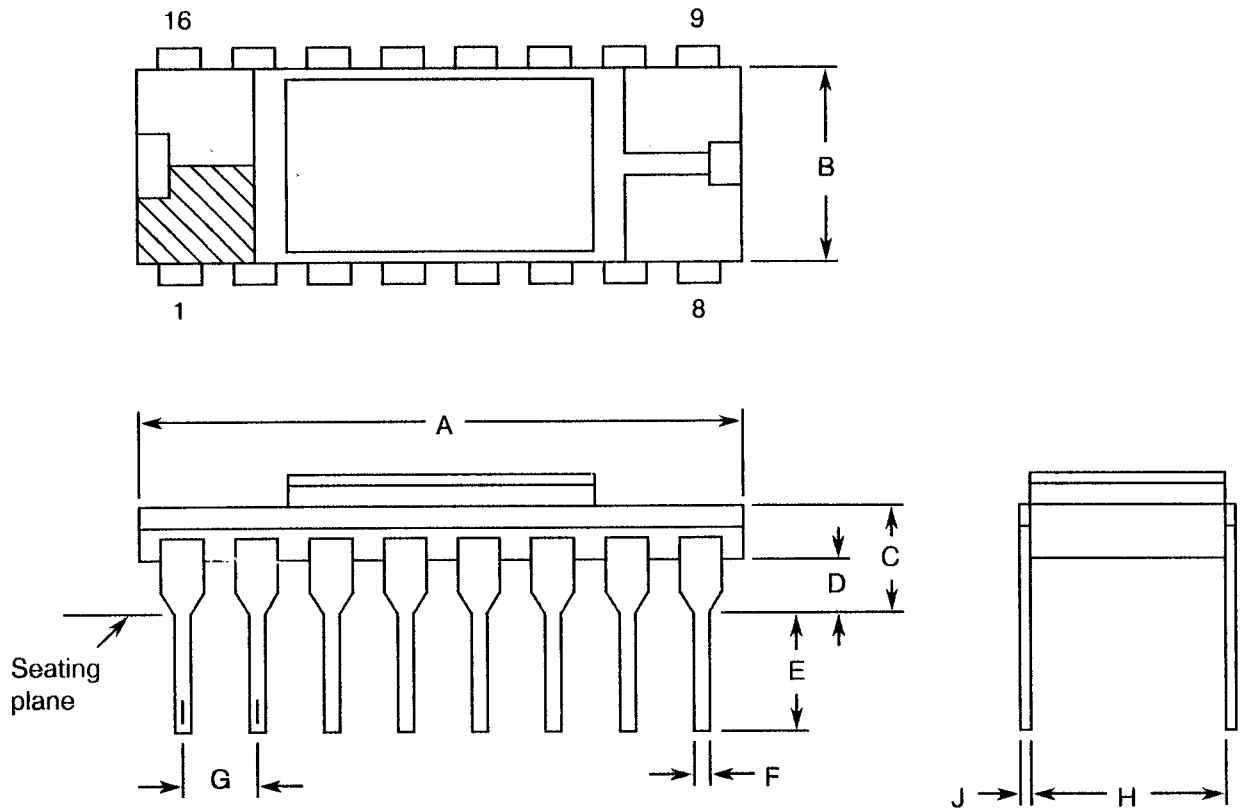
No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATINGS	UNIT	REMARKS
1	Reverse Voltage	$V_R$	5.0	V	Note 1
2	Supply Voltage	$V_{CC}$	7.0	V	
3	Forward Current	$I_F$	20	mA	Note 1
4	Peak Forward Current	$I_{FP}$	40	mA	Notes 1 and 2
5	Output Voltage	$V_O$	7.0	V	Note 1
6	Output Current (Continuous)	$I_O$	25	mA	Note 1
7	Output Power Dissipation	$P_O$	40	mW	Note 1
8	Power Dissipation	$P_{DISS}$	350	mW	Note 3
9	Operating Temperature Range	$T_{op}$	- 55 to + 125	°C	$T_{amb}$
10	Storage Temperature Range	$T_{stg}$	- 65 to + 150	°C	
11	Soldering Temperature	$T_{sol}$	+ 260	°C	Note 4

**NOTES**

1. Each channel.
2. Pulse width 1.0 msec.
3. Both channels.
4. Duration 10 seconds maximum at a distance of not less than 2.0mm from the device body and the same lead shall not be resoldered until 3 minutes have elapsed.



**FIGURE 2 - PHYSICAL DIMENSIONS**



SYMBOL	INCHES		MILLIMETRES		NOTES
	MIN.	MAX.	MIN.	MAX.	
A	0.79	0.82	20.06	20.83	
B	-	0.32	-	0.83	
C	-	0.17	-	4.32	
D	-	0.02	-	0.51	
E	0.15	-	3.81	-	
F	-	0.02	-	0.51	
G	0.09	0.11	2.29	2.79	
H	0.29	0.31	7.37	7.87	
J	0.007	0.013	0.18	0.33	

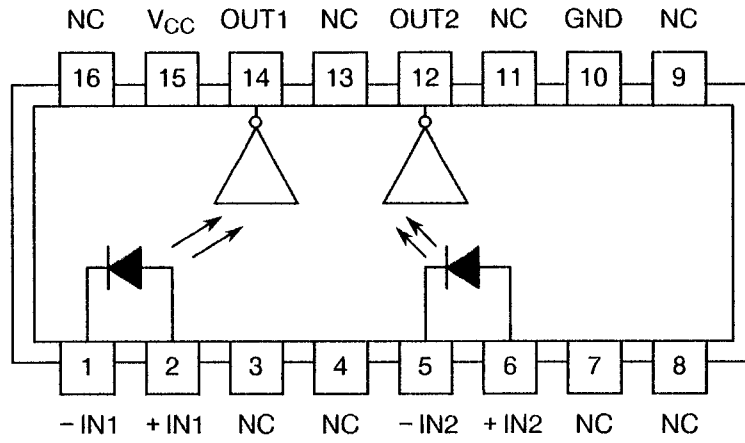
**NOTES**

1. Index area: A notch or dot shall be located adjacent to Pin 1 and shall be within the shaded area shown.



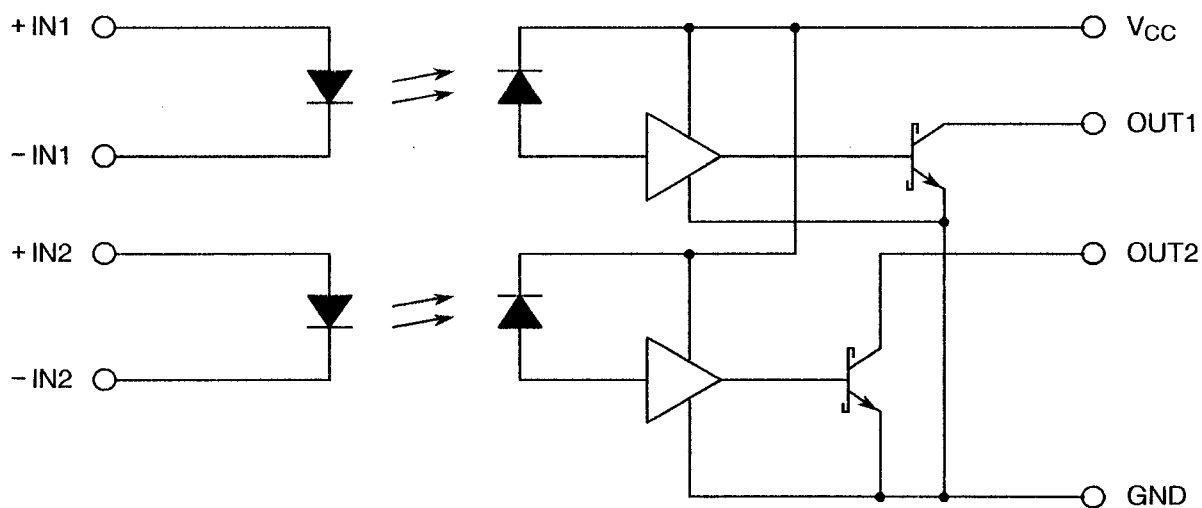


**FIGURE 3(a) - PIN ASSIGNMENT**





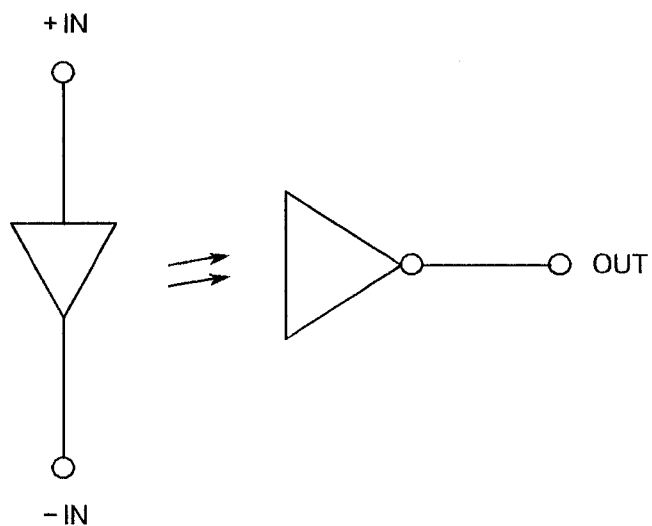
**FIGURE 3(b) - CIRCUIT SCHEMATIC**





**NOTES**

1. A 0.01 to 0.1 $\mu$ F bypass capacitor must be connected between pins 15 and 10.

**FIGURE 3(c) - FUNCTIONAL DIAGRAM (EACH CHANNEL)**



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**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. 5000 for Discrete Semiconductor Components.
- (b) MIL-STD-750, Test Methods and Procedures for Semiconductor Devices.
- (c) ESA/SCC Basic Specification No. 23500, Requirements for Lead Materials and Finishes for Components for Space Application.

**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:-

- $I_{FP}$  = Peak Forward Current.
- $V_{OL}$  = Low Level Output Voltage.
- $I_{OH}$  = High Level Output Current.
- $I_{CCH}$  = High Level Supply Current.
- $V_{I-O}$  = Input/Output Insulation Volts.
- $I_{CCL}$  = Low Level Supply Current.
- $V_{I-I}$  = Input/Input Insulation Volts.
- $R_{I-O}$  = Input/Output Resistance.
- $R_{I-I}$  = Input/Input Resistance.

**4. REQUIREMENTS**

**4.1 GENERAL**

The complete requirements for procurement of the opto couplers specified herein shall be as stated in this specification and ESA/SCC Generic Specification No. 5000 for Discrete Semiconductors. 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.

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## 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)

(a) Para. 9.1, Internal (Pre-encapsulation) Visual Inspection: Shall be performed in accordance with HP Documents 72-4063 and 72-4064.

(b) Para. 9.6, Constant Acceleration: The acceleration level shall be 5 000g.

### 4.2.3 Deviations from Burn-in Tests (Chart III)

None.

### 4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.15, Constant Acceleration: The acceleration level shall be 5 000g.

### 4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.15, Constant Acceleration: The acceleration level shall be 5 000g.



#### 4.3 MECHANICAL REQUIREMENTS

##### 4.3.1 Dimension Check

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

##### 4.3.2 Weight

The maximum weight of the opto couplers specified herein shall be 1.7 grammes.

##### 4.3.3 Terminal Strength

The requirements for terminal strength testing are specified in Section 9 of ESA/SCC Generic Specification No. 5000. The test conditions shall be as follows:-

Test Condition: 'E', Lead Fatigue.

#### 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 opto couplers 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 ceramic body with side brazed leads.

##### 4.4.2 Lead Material and Finish

The lead material shall be Type 'D' with Type '2' finish in accordance with the requirements of ESA/SCC Basic Specification No. 23500.



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:-

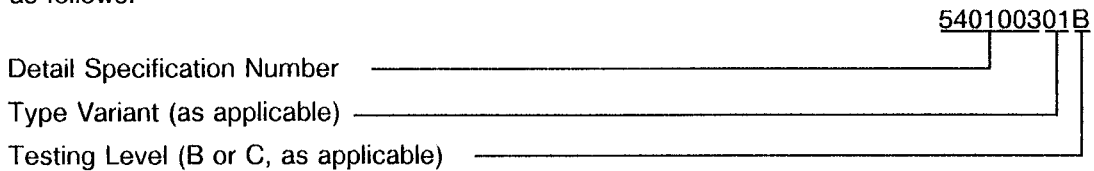
- (a) Lead Identification.
- (b) The SCC Component Number.
- (c) Traceability Information.

4.5.2 Lead Identification

A notch or dot shall be located adjacent to Pin 1, as defined in Note 1 to Figure 2.

4.5.3 The SCC Component Number

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



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 at room temperature are scheduled in Table 2. Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3 \text{ }^\circ\text{C}$ .

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  $T_{amb} = +125^\circ\text{C}$  and  $-55^\circ\text{C}$  respectively.



#### 4.6.3 Circuits for Electrical Measurements

Circuits and functional test sequence for use in performing the electrical measurements listed in Table 2 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 ( $\Delta$ ) 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 Burn-in

The requirements for burn-in are specified in Section 7 of ESA/SCC Generic Specification No. 5000. The conditions for burn-in shall be as specified in Table 5 of this specification.

##### 4.7.3 Conditions for High Temperature Reverse Bias

The requirements for high temperature reverse bias are specified in Section 7 of ESA/SCC Generic Specification No. 5000. The conditions for high temperature reverse bias shall be as specified in Table 5(a) of this specification.



**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - d.c. PARAMETERS**

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	High Level Output Current	$I_{OH}$	-	$V_{CC} = 5.5V$ , $I_F = 250\mu A$ $V_O = 5.5V$ Note 1	-	250	$\mu A$
2	Low Level Output Voltage	$V_{OL}$	-	$V_{CC} = 5.5V$ , $I_F = 10mA$ $I_{OL} = 10mA$ (Sinking) Note 1	-	0.6	V
3	Supply Current at High Level	$I_{CCH}$	-	$V_{CC} = 5.5V$ , $I_F = 0mA$	-	28	mA
4	Supply Current at Low Level	$I_{CCL}$	-	$V_{CC} = 5.5V$ , $I_F = 20mA$	-	36	mA
5	Diode Forward Voltage	$V_F$	4011	$I_F = 20mA$ Note 1	-	1.75	V
6	Diode Reverse Voltage	$B_{VR}$	4022	$I_R = 10\mu A$ Note 1	5.0	-	V
7	Insulation Voltage Input/Output	$V_{I-O}$	-	$t = 5.0$ sec. Input leak $< 5.0\mu A$ Note 4	1500	-	V
8	Insulation Voltage Input/Input	$V_{I-I}$	-	$t = 5.0$ sec. Input leak $< 5.0\mu A$ Note 4	500	-	V
9	Resistance Input/Output	$R_{I-O}$	-	$V_{I-O} = 500V$ Note 3	$10^{12}$	-	$\Omega$
10	Resistance Input/Input	$R_{I-I}$	-	$V_{I-I} = 500V$ Note 3	$10^{12}$	-	$\Omega$

**NOTES:** See Page 17.



**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE - a.c. PARAMETERS**

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST FIG.	TEST CONDITIONS	LIMITS		UNIT
						MIN.	MAX.	
11	Input Capacitance	$C_i$	-	4(a)	$V_F = 0\text{mA}$ $f = 1.0\text{MHz}$ Note 3	-	150	pF
12	Capacitance Input/Output	$C_{i-o}$	-	4(a)	$f = 1.0\text{MHz}$ Note 3	-	4.0	pF
13	Capacitance Input/Input	$C_{i-i}$	-	4(a)	$f = 1.0\text{MHz}$ Note 3	-	2.0	pF
14	Rise Time (Note 4)	$t_r$	-	4(b)	$R_L = 510\Omega$ $C_L = 15\text{pF}$ $I_F = 13\text{mA}$ Note 2	-	75	ns
15	Fall Time (Note 4)	$t_f$	-	4(b)	$R_L = 510\Omega$ $C_L = 15\text{pF}$ $I_F = 13\text{mA}$ Note 2	-	75	ns
16	Delay Time to High Output Level	$t_{PLH}$	-	4(b)	$R_L = 510\Omega$ $C_L = 15\text{pF}$ $I_F = 13\text{mA}$ Note 2	-	90	ns
17	Delay Time to Low Output Level	$t_{PHL}$	-	4(b)	$R_L = 510\Omega$ $C_L = 15\text{pF}$ $I_F = 13\text{mA}$ Note 2	-	90	ns

**NOTES**

1. To be measured on each channel.
2. Test performed on a sample basis, Inspection Level II, Table IIA, AQL = 1.0% of MIL-STD-105.
3. Guaranteed but not tested.
4. Go-no-go test.

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**TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES, +125°C, -55°C**

No.	CHARACTERISTICS	SYMBOL	MIL-STD-750 TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	High Level Output Current	$I_{OH}$	-	$V_{CC} = 5.5V, I_F = 250\mu A$ $V_O = 5.5V$ Note 1	-	250	$\mu A$
3	Supply Current at High Level	$I_{CCH}$	-	$V_{CC} = 5.5V, I_F = 0mA$	-	28	mA
5	Diode Forward Voltage	$V_F$	4011	$I_F = 20mA$ $T_{amb} = +125^\circ C$ $T_{amb} = -55^\circ C$ Note 1	- -	1.75 1.85	V

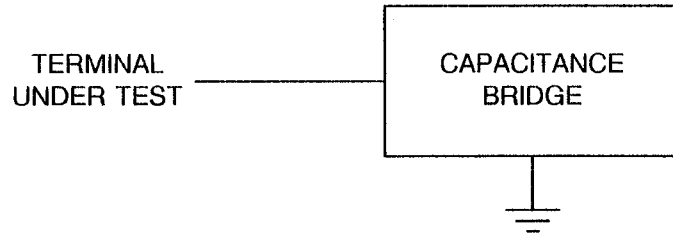
**NOTES**

- To be measured on each channel.



**FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS**

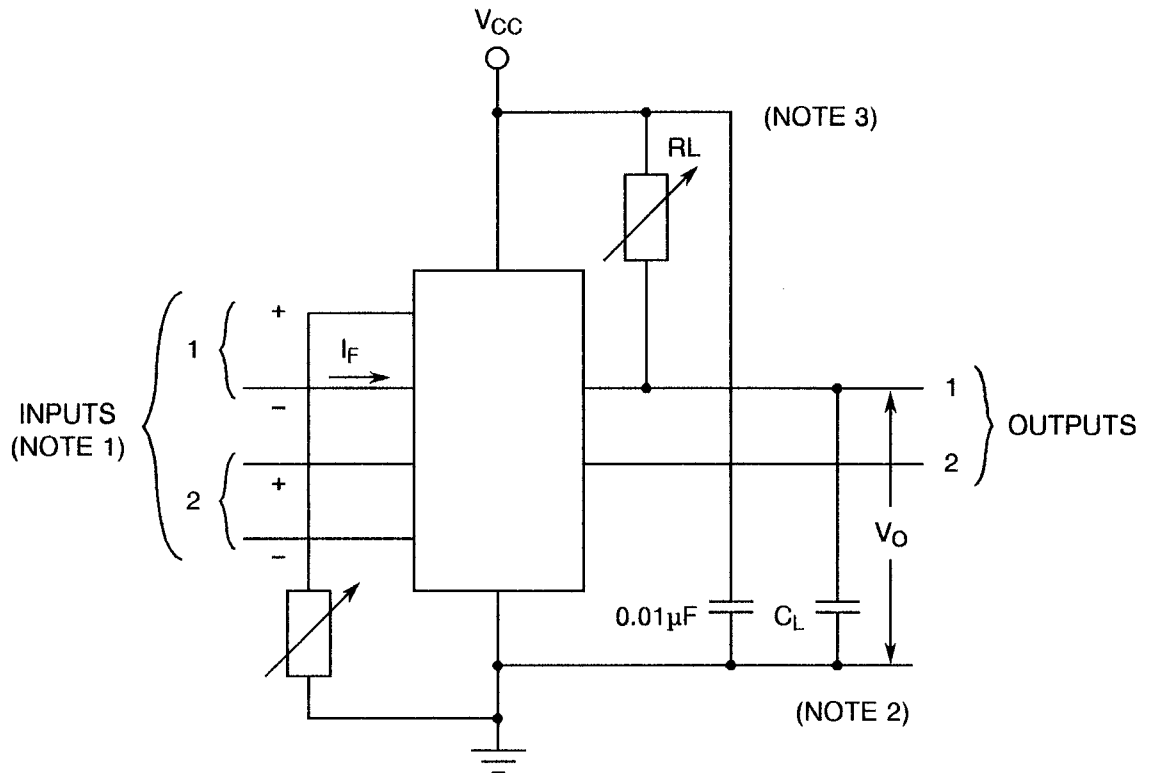
FIGURE 4(a) - CAPACITANCE



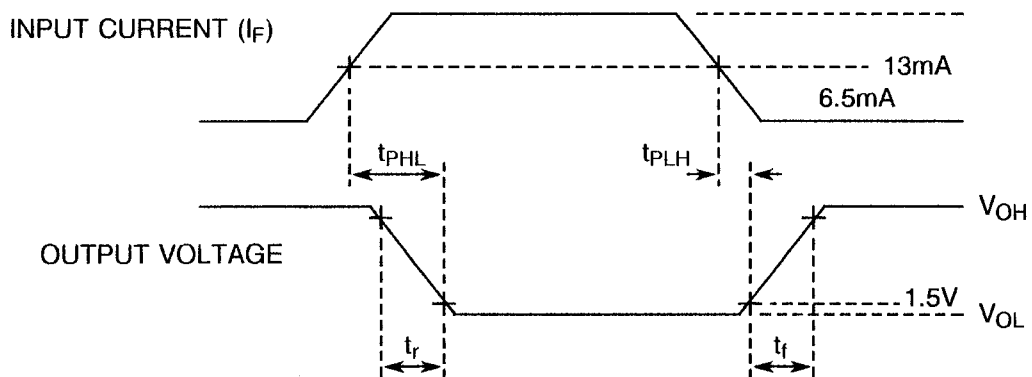


**FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)**

**FIGURE 4(b) - DYNAMIC TESTS AND SWITCHING WAVEFORMS**



**VOLTAGE WAVEFORMS**



**NOTES**

- 1. Pulse generator:  $Z_O = 50\Omega$ ,  $t_r = 5.0ns$ .
- 2.  $C_L = 15pF$ , including all probe and stray wiring capacitance.
- 3.  $R_L = 510\Omega$ .

**TABLE 4 - PARAMETER DRIFT VALUES**

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	CHANGE LIMITS ( $\Delta$ )	UNIT
1	High Level Output Current	$I_{OH}$	As per Table 2	As per Table 2	$\pm 100$ or (1) $\pm 25$	%  $\mu A$
3	Supply Current at High Level	$I_{CCH}$	As per Table 2	As per Table 2	$\pm 25$	%
5	Diode Forward Voltage	$V_F$	As per Table 2	As per Table 2	$\pm 100$	mV

**NOTES**

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

**TABLE 5(a) - CONDITIONS FOR BURN-IN AND OPERATING LIFE TESTS**

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	$T_{amb}$	+ 125(+ 0 - 5)	$^{\circ}C$
2	Diode Forward Current	$I_F$	20	mA
3	Output Current (Each Channel)	$I_O$	25	mA

**TABLE 5(b) - CONDITIONS FOR HIGH TEMPERATURE REVERSE BIAS TEST**

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	$T_{amb}$	+ 125( + 0 – 5)	°C
2	Reverse Voltage	$V_R$	3.0	V
3	Duration	-	48	Hrs



- 4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION No. 5000)
- 4.8.1 Electrical Measurements on Completion of Environmental Tests  
The parameters to be measured on completion of environmental tests are scheduled in Table 2. 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 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 scheduled in Table 6. 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. 5000. 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 (Figure 5)  
Not applicable.
- 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. 5000. The conditions for high temperature storage shall be  $T_{amb} = +125(+0-5)$  °C.

**TABLE 6 - ELECTRICAL MEASUREMENTS AT INTERMEDIATE POINTS  
AND ON COMPLETION OF ENDURANCE TESTING**

No.	CHARACTERISTICS	SYMBOL	SPEC. AND/OR TEST METHOD	TEST CONDITIONS	LIMITS		UNIT
					MIN.	MAX.	
1	High Level Output Current	$I_{OH}$	As per Table 2	As per Table 2	-	250	$\mu A$
2	Low Level Output Voltage	$V_{OL}$	As per Table 2	As per Table 2	-	0.6	V
5	Diode Forward Voltage	$V_F$	As per Table 2	As per Table 2	-	1.75	V
6	Diode Reverse Voltage	$B_{VR}$	As per Table 2	As per Table 2	5.0	-	V
16	Delay Time to High Output Level	$t_{PLH}$	As per Table 2	As per Table 2	-	90	ns
17	Delay Time to Low Output Level	$t_{PHL}$	As per Table 2	As per Table 2	-	90	ns