INVERTED, DUAL CHANNEL, OPTO COUPLER,

BASED ON TYPE 6N134

ESCC Detail Specification No. 5401/003

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

TABLE OF CONTENTS

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).

TABLE 1(a) - TYPE VARIANTS

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

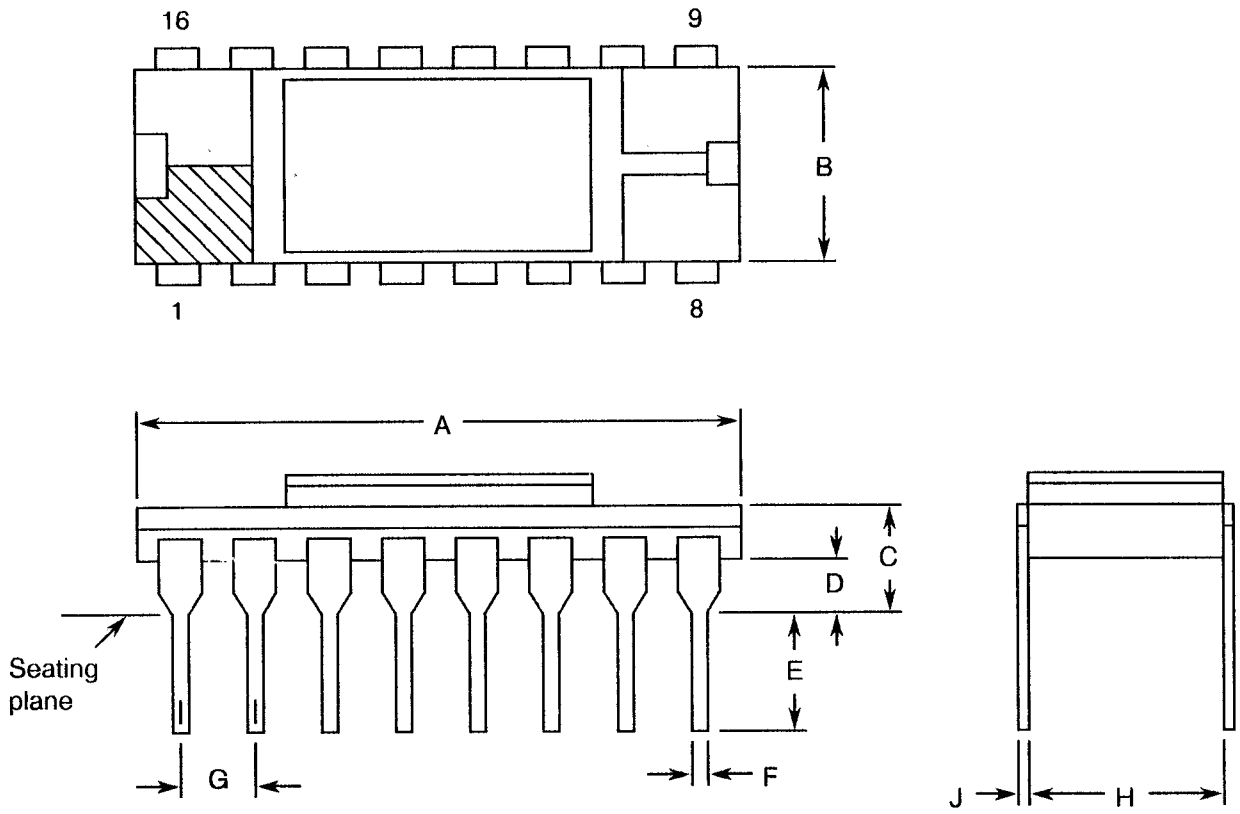
TABLE 1(b) - MAXIMUM RATINGS

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

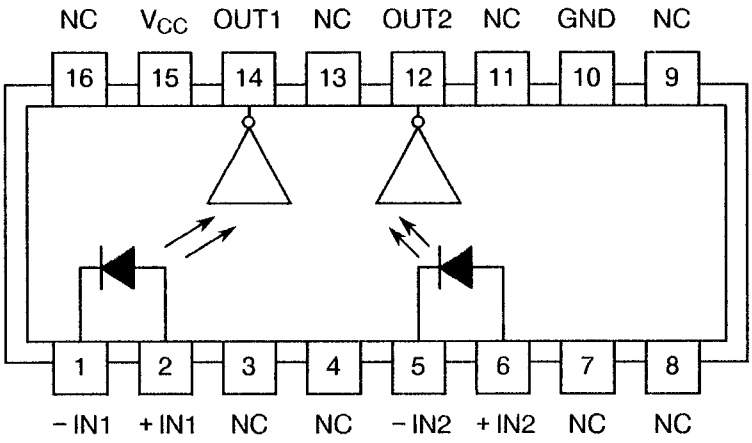
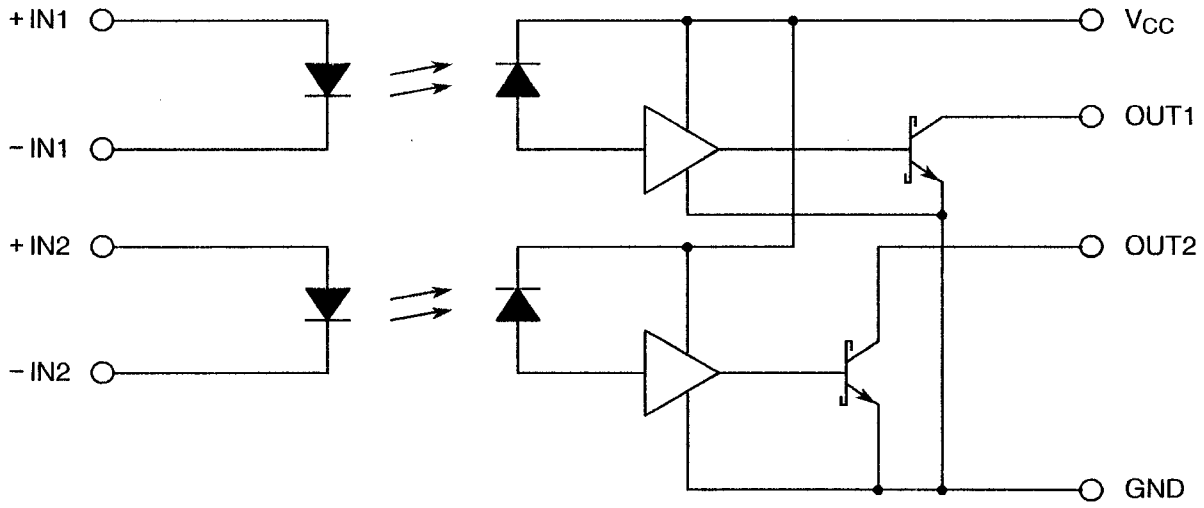


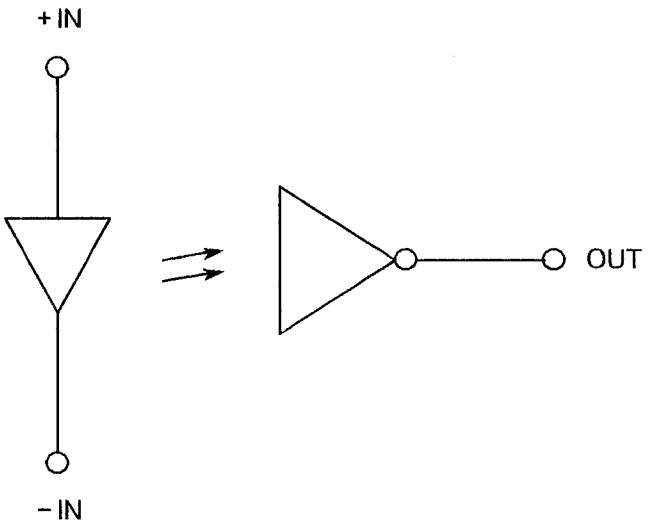
FIGURE 3(b) - CIRCUIT SCHEMATIC



NOTES

1. A 0.01 to 0.1µF bypass capacitor must be connected between pins 15 and 10.

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



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.

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.

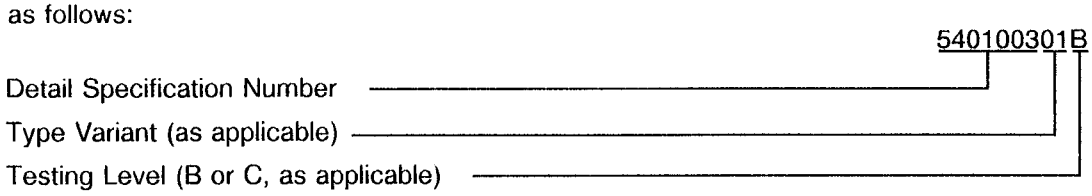
(c) Traceability Information.

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 $T_{amb} = +22 \pm 3$ °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 $T_{amb} = +125$°C and -55°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 (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 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 = 250µA V_O = 5.5V Note 1	-	250	µA
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 = 10µA Note 1	5.0	-	V
7	Insulation Voltage Input/Output	V_{I-O}	-	t = 5.0 sec. Input leak < 5.0µA Note 4	1500	-	V
8	Insulation Voltage Input/Input	V_{I-I}	-	t = 5.0 sec. Input leak < 5.0µA Note 4	500	-	V
9	Resistance Input/Output	R_{I-O}	-	V_{I-O} = 500V Note 3	10^{12}	-	Ω
10	Resistance Input/Input	R_{I-I}	-	V_{I-I} = 500V Note 3	10^{12}	-	Ω

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 = 0mA f = 1.0MHz Note 3	-	150	pF
12	Capacitance Input/Output	C_{I-O}	-	4(a)	f = 1.0MHz Note 3	-	4.0	pF
13	Capacitance Input/Input	C_{I-I}	-	4(a)	f = 1.0MHz Note 3	-	2.0	pF
14	Rise Time (Note 4)	t_r	-	4(b)	R_L = 510Ω C_L = 15pF I_F = 13mA Note 2	-	75	ns
15	Fall Time (Note 4)	t_f	-	4(b)	R_L = 510Ω C_L = 15pF I_F = 13mA Note 2	-	75	ns
16	Delay Time to High Output Level	t_{PLH}	-	4(b)	R_L = 510Ω C_L = 15pF I_F = 13mA Note 2	-	90	ns
17	Delay Time to Low Output Level	t_{PHL}	-	4(b)	R_L = 510Ω C_L = 15pF I_F = 13mA 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.

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 = 250µA V_O = 5.5V Note 1	-	250	µA
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°C T_{amb} = −55°C Note 1	 - -	 1.75 1.85	V

NOTES

1. To be measured on each channel.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

FIGURE 4(a) - CAPACITANCE

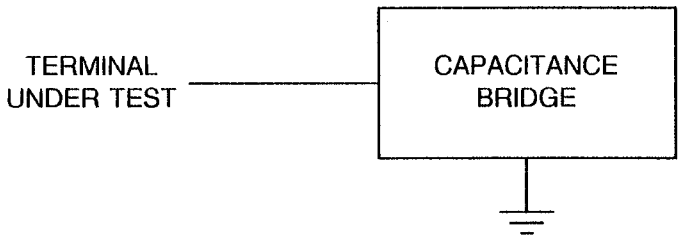
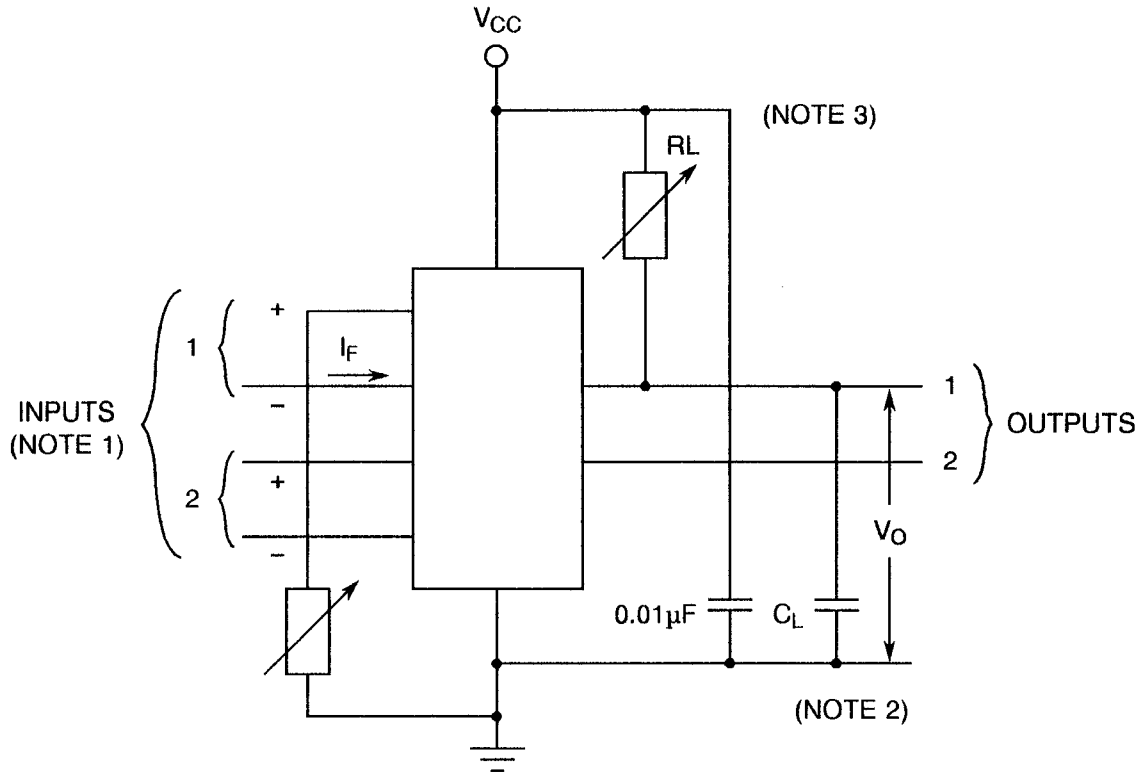
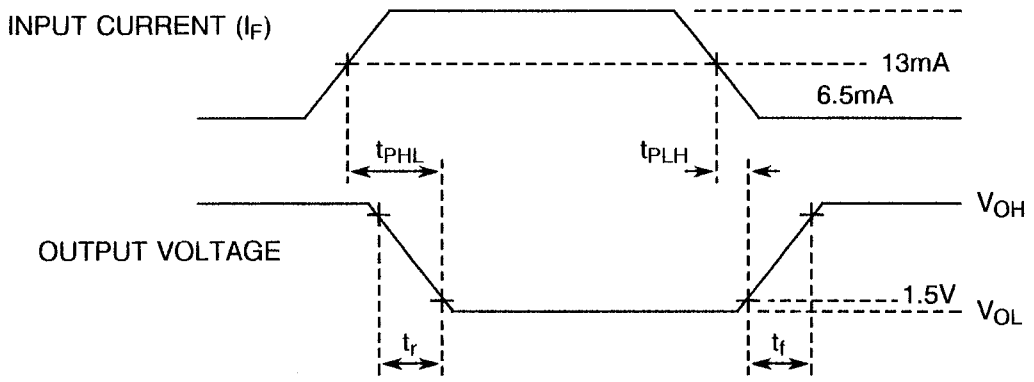


FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS (CONTINUED)

FIGURE 4(b) - DYNAMIC TESTS AND SWITCHING WAVEFORMS



VOLTAGE WAVEFORMS



NOTES

1. Pulse generator: $Z_O = 50\Omega$, $t_r = 5.0$ns.
2. $C_L = 15$pF, 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 (Δ)	UNIT
1	High Level Output Current	I_{OH}	As per Table 2	As per Table 2	± 100 or (1) ± 25	% µA
3	Supply Current at High Level	I_{CCH}	As per Table 2	As per Table 2	± 25	%
5	Diode Forward Voltage	V_F	As per Table 2	As per Table 2	± 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)	°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	µA
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