



**RELAYS, ELECTROMAGNETIC, LATCHING**

**28Vdc, 1A, 2PDT, TO5 CAN**

**ESCC Detail Specification No. 3602/002**

**ISSUE 1**

**October 2002**



	ESCC Detail Specification		PAGE ii ISSUE 1
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Pages 1 to 17

**RELAYS, ELECTROMAGNETIC, LATCHING**

**28Vdc, 1A, 2PDT, TO5 CAN**

**ESA/SCC Detail Specification No. 3602/002**



**space components  
coordination group**

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		SCCG Chairman	ESA Director General or his Deputy
Issue 7	January 2001		
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**DOCUMENTATION CHANGE NOTICE**

Rev. Letter	Rev. Date	Reference	CHANGE Item	Approved DCR No.
		<p>This Issue supersedes Issue 6 and incorporates all modifications defined in Revisions 'A', 'B' and 'C' to Issue 6 and the changes agreed in the following DCRs:-</p> <p>Cover page : Title amended DCN Para. 1.1 : 2nd line text amended Table 1(b) : No. 1, Symbol amended : No. 2, Characteristics, Symbol and Maximum Rating amended : Note 3, first sentence deleted</p>		<p>221599 None 221599 221599 221599</p>
'A'	Feb. '02	<p>P1. Cover page P2. DCN P12. Table 3</p>	<p>: No. 1, Values added to "Limits Min." column : No. 2, Values added to "Limits Min." column : New Note 2 added</p>	<p>None None 221617 221617 221617</p>
'B'	June '02	<p>P1. Cover page P2. DCN P7. Figure 2</p>	<p>: Physical Dimensions, <math>\varnothing</math>F amended</p>	<p>None None 221673</p>



## TABLE OF CONTENTS

	<u>Page</u>
<b>1. <u>GENERAL</u></b>	<b>5</b>
1.1 Scope	5
1.2 Component Type Variants	5
1.3 Maximum Ratings	5
1.4 Parameter Derating Information	5
1.5 Physical Dimensions	5
1.6 Circuit Schematic	5
<b>2. <u>APPLICABLE DOCUMENTS</u></b>	<b>5</b>
<b>3. <u>TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS</u></b>	<b>5</b>
<b>4. <u>REQUIREMENTS</u></b>	<b>8</b>
4.1 General	8
4.2 Deviations from Generic Specification	8
4.2.1 Deviations from Special In-process Controls	8
4.2.2 Deviations from Final Production Tests	8
4.2.3 Deviations from Screening Tests	8
4.2.4 Deviations from Qualification Tests	8
4.2.5 Deviations from Lot Acceptance Tests	8
4.3 Mechanical Requirements	8
4.3.1 Dimension Check	8
4.3.2 Weight	8
4.3.3 Terminal Strength	9
4.4 Materials and Finishes	9
4.4.1 Case	9
4.4.2 Lead Material and Finish	9
4.5 Marking	9
4.5.1 General	9
4.5.2 Lead Identification	9
4.5.3 The SCC Component Number	10
4.5.4 Electrical Characteristics	10
4.5.5 Traceability Information	10
4.6 Electrical Measurements	10
4.6.1 Electrical Measurements at Room Temperature	10
4.6.2 Electrical Measurements at High and Low Temperatures	10
4.6.3 Circuits for Electrical Measurements	10
4.7 Screening	10
4.7.1 Miss Test	10
4.7.2 Conditions for Screening	10
4.7.3 Electrical Circuits for Screening	10
4.8 Environmental and Endurance Tests	14
4.8.1 Measurements and Inspections on Completion of Environmental Tests	14
4.8.2 Measurements and Inspections during Endurance Tests	14
4.8.3 Measurements and Inspections on Completion of Endurance Tests	14
4.8.4 Conditions for Operating Life Tests	14
4.8.5 Electrical Circuits for Operating Life Tests	14



**TABLES**

	<u>Page</u>
1(a) Type Variants	6
1(b) Maximum Ratings	6
2 Electrical Measurements at Room Temperature	11
3 Electrical Measurements at High and Low Temperatures	12
4 Measurements during Screening	13
5(a) Conditions for Screening	13
5(b) Conditions for Operating Life Test	13
6 Measurements and Inspections on Completion of Environmental Tests and at Intermediate Points during and on Completion of Endurance Testing	15

**FIGURES**

1 Not applicable	N/A
2 Physical Dimensions	7
3 Circuit Schematic	7
4 Circuits for Electrical Measurements	13
5(a) Electrical Circuits for Screening	13
5(b) Electrical Circuits for Operating Life Test	13

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

'A' Agreed Deviations for R.E. Deutsch (F)	17
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**1. GENERAL****1.1 SCOPE**

This specification details the ratings, physical and electrical characteristics, test and inspection data for a Relay, Electromagnetic, Latching, 28Vdc, 1A, 2PDT in a TO5 Can. It shall be read in conjunction with ESA/SCC Generic Specification No. 3602, the requirements of which are supplemented herein.

**1.2 COMPONENT TYPE VARIANTS**

Variants of the basic type relays 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 relays 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 relays specified herein are shown in Figure 2.

**1.6 CIRCUIT SCHEMATIC**

The circuit schematic, showing lead identification etc. for the relays specified herein, is shown in Figure 3.

**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. 3602 for Relays, Electromagnetic, Latching.
- (b) MIL-STD-202, Test Methods for Electronic and Electrical Component Parts.

**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.

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

VARIANT	MIN. TERMINAL LENGTH (L) (mm)
01	38
02	4.75
03	3.20
04	38
05	4.75
06	3.20

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

No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATING	UNIT	REMARKS
1	Rated Coil Voltage:- 26V 18V 12V 9V 6V 5V	$V_{CR}$	26.5 18 12 9.0 6.0 5.0	Vdc	Note 3
2	Coil Voltage Range:- 26V 18V 12V 9V 6V 5V	$V_{CR}$	25 to 32 17 to 24 11 to 16 8.5 to 12 5.5 to 8.0 4.5 to 6.0	Vdc	
3	Rated Contact Current Resistive Load	$I_{CR}$	1.0	A	28Vdc resistive Note 1
4	Overload Current Resistive	$I_{overL}$	2.0	A	28Vdc resistive See Table 6
5	Rated Contact Current Inductive Load	$I_{CL}$	0.2	A	28Vdc inductive 0.32 Henry Note 1
6	Contact Resistance	$R_C$	100	m $\Omega$	
7	High Temperature	$T_{amb}$	+ 125	$^{\circ}C$	
8	Low Temperature	$T_{amb}$	- 65	$^{\circ}C$	
9	Soldering Temperature	$T_{sol}$	+ 260	$^{\circ}C$	Note 2

**NOTES**

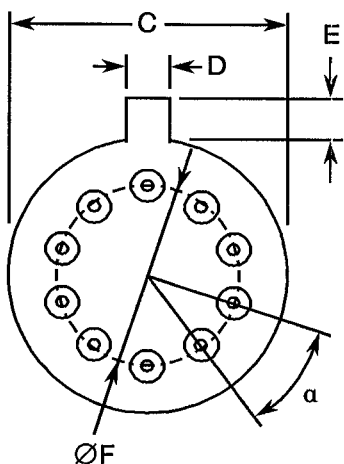
1. Relays should not be used in change over-mode where the potential difference between stationary contacts is greater than 10V and the switched current is greater than 0.1A.
2. Duration 10 seconds maximum at a distance of not less than 3.0mm from the device body and the same terminal shall not be resoldered until 3 minutes have elapsed.
3. The coil voltage rise time shall be less than  $0.1t_L$  or  $0.1t_r$ . The coil voltage shall be applied for a minimum time of  $10t_L$  or  $10t_r$ . Note that when the two coils are powered simultaneously, the relay may move to an intermediate position. In this case, application of the nominal voltage to either the latch or reset coil will restore to relay to its correct state.



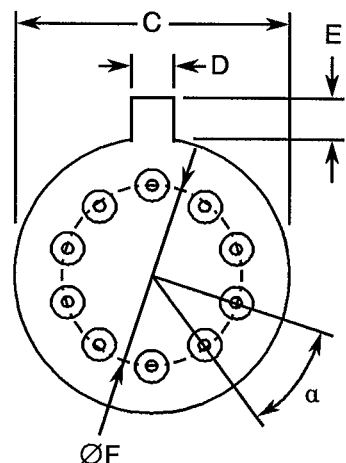


**FIGURE 2 - PHYSICAL DIMENSIONS**

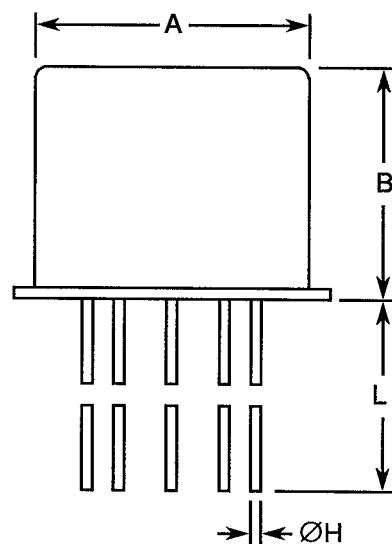
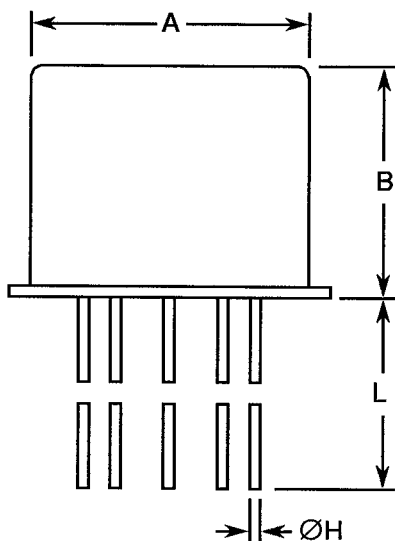
VARIANTS 01, 02, 03



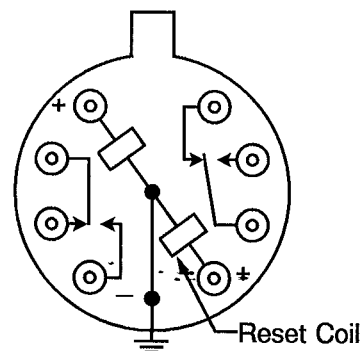
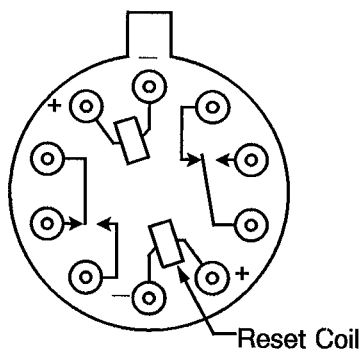
VARIANTS 04, 05, 06



SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	-	8.50
B	-	7.00
C	-	9.40
D	0.70	0.90
E	0.80	1.00
ØF	4.83	5.33
ØH	0.41	0.48
L	See Table 1(a)	
α	36°	



**FIGURE 3 - CIRCUIT SCHEMATIC**



AS VIEWED FROM TERMINAL SIDE

CONTACTS SHOWN IN POSITION RESULTING WHEN RESET COIL IS LAST ENERGISED



#### 4. REQUIREMENTS

##### 4.1 GENERAL

The complete requirements for procurement of the relays specified herein shall be as stated in this specification and ESA/SCC Generic Specification No. 3602 for Relays, Electromagnetic Latching. 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 Screening Tests (Chart III)

(a) Para. 9.6, Vibration Scan: Frequency Range: 10 - 3000 Hz.

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

(a) Para. 9.10, Vibration: Frequency Range: 10 - 3000 Hz.

(b) Para. 9.11, Mechanical Shock: Test Condition: 'C'.

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

(a) Para. 9.10, Vibration: Frequency Range: 10 - 3000 Hz.

(b) Para. 9.11, Mechanical Shock: Test Condition: 'C'.

##### 4.3 MECHANICAL REQUIREMENTS

###### 4.3.1 Dimension Check

The dimensions of the relays specified herein shall be verified in accordance with the requirements set out in Para. 9.5 of ESA/SCC Generic Specification No. 3602 and shall conform to those shown in Figure 2.

###### 4.3.2 Weight

The maximum weight of the relays specified herein shall be 2.9 grammes.



#### 4.3.3 Terminal Strength

The requirements for terminal strength testing are specified in Section 9 of ESA/SCC Generic Specification No. 3602. The test conditions shall be as follows:-

(a) **Pull Test:**

Applied Force: 4.4 Newtons.

Duration: 10 seconds.

(a) **Bend Test:**

Load: 227 grammes.

#### 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 relays 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 material shall be copper nickel, hermetically sealed.

##### 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 and the following paragraphs. When the component is too small to accommodate all of the marking specified, as much as space permits shall be marked and the marking information, in full, shall accompany the component in its primary package.

The information to be marked and the order of precedence, shall be as follows:-

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

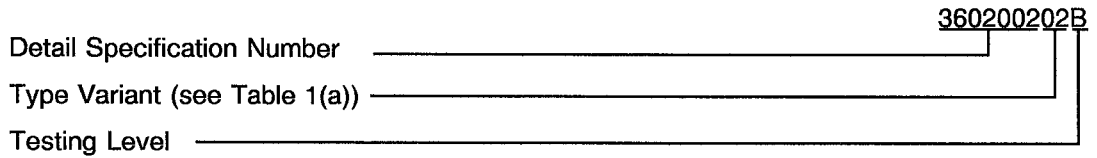
##### 4.5.2 Lead Identification

Lead identification shall be marked on the relay can in accordance with Figure 3.



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 Electrical Characteristics

The electrical characteristic to be marked is the rated coil voltage. The information shall be constituted and marked as follows:-

Coil Voltage	Coil Resistance	Code
26.5Vdc	2000Ω	26V
18Vdc	1130Ω	18V
12Vdc	500Ω	12V

Coil Voltage	Coil Resistance	Code
9.0Vdc	285Ω	9V
6.0Vdc	120Ω	6V
5.0Vdc	61Ω	5V

4.5.5 Traceability Information

Each component shall be marked in respect of traceability information as defined in 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.

4.6.3 Circuits for Electrical Measurements (Figure 4)

Not applicable.

4.7 SCREENING

4.7.1 Miss Test

During the miss test, the contact resistance shall be continuously monitored and shall not exceed the values specified in Table 4 of this specification.

4.7.2 Conditions for Screening

The requirements for screening are specified in Section 7 of ESA/SCC Generic Specification No. 3602. The conditions for screening shall be as specified in Table 5(a) of this specification.

4.7.3 Electrical Circuits for Screening (Figure 5(a))

Not applicable.



**TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE**

No.	CHARACTERISTICS	SYMBOL	ESA/SCC 3602 TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Latch Voltage:- 26V 18V 12V 9V 6V 5V	$U_L$	Para. 9.3.1	Para. 9.3.1 Note 1	9.5 6.9 4.6 3.5 2.3 1.6	14.2 10.5 7.0 5.3 3.5 2.8	V
2	Reset Voltage:- 26V 18V 12V 9V 6V 5V	$U_R$	Para. 9.3.2	Para. 9.3.2 Note 1	9.5 6.9 4.6 3.5 2.3 1.6	14.2 10.5 7.0 5.3 3.5 2.8	V
3	Latch Time	$t_L$	Para. 9.3.4	Para. 9.3.4	-	1.5	ms
4	Reset Time	$t_r$	Para. 9.3.4	Para. 9.3.4	-	1.5	ms
5	Bounce Time	$t_b$	Para. 9.3.4	Para. 9.3.4	-	2.0	ms
6	Insulation Resistance	$R_i$	Para. 9.3.7	Para. 9.3.7 At 100Vdc	10 000	-	M $\Omega$
7	Voltage Proof	VP	Para. 9.3.6	Para. 9.3.6	500	-	Vrms
8	Contact Voltage Drop	$V_d$	Para. 9.3.3	Para. 9.3.3 Measured on leads 3.0mm from header	-	10	mV
9	Coil Resistance Latch Coil - 26V - 18V - 12V - 9V - 6V - 5V Reset Coil - 28V - 18V - 12V - 9V - 6V - 5V	$R_{BL}$          $R_{BR}$	Para. 9.3.5	Para. 9.3.5	1800 1017 450 262 108 55 1800 1017 450 262 108 55	2200 1243 550 308 132 67 2200 1243 550 308 132 67	$\Omega$

**NOTES**

- The difference between the latch and reset voltage measurements shall not exceed 10% of the rated coil voltage.

**TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES**

No.	CHARACTERISTICS	SYMBOL	ESA/SCC 3602 TEST METHOD	TEST CONDITION	LIMITS		UNIT
					MIN.	MAX.	
1	Latch Voltage:- 26V 18V 12V 9V 6V 5V	$U_L$	Para. 9.3.1	Para. 9.3.1	6.3 4.7 3.0 2.3 1.5 1.0	18 13.5 9.0 6.8 4.5 3.5	V
2	Reset Voltage:- 26V 18V 12V 9V 6V 5V	$U_R$	Para. 9.3.2	Para. 9.3.2	6.3 4.7 3.0 2.3 1.5 1.0	18 13.5 9.0 6.8 4.5 3.5	V
3	Latch Time	$t_L$	Para. 9.3.4	Para. 9.3.4	-	1.5	ms
4	Reset Time	$t_r$	Para. 9.3.4	Para. 9.3.4	-	1.5	ms
5	Bounce Time	$t_b$	Para. 9.3.4	Para. 9.3.4	-	2.0	ms
6	Insulation Resistance	$R_i$	Para. 9.3.7	Para. 9.3.7 At 100Vdc Note 1	100	-	M $\Omega$
8	Contact Voltage Drop	$V_d$	Para. 9.3.3	Para. 9.3.3 Measured on leads 3.0mm from header	-	10	mV

**NOTES**

1. This measurement shall be made only at the high temperature condition.
2. Limits Min. apply to measurements at -55°C and Limits Max. to +125°C.

**FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS**

Not applicable.

**TABLE 4 - MEASUREMENTS DURING SCREENING**

No.	CHARACTERISTICS	SYMBOL	ESA/SCC 3602 TEST METHOD	TEST CONDITIONS	MAXIMUM LIMIT	UNIT
1	Miss Test, Contact Resistance	$R_C$	Para. 9.8	Para. 9.8	50	$\Omega$

**TABLE 5(a) - CONDITIONS FOR SCREENING**

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient High Temperature	$T_{amb}$	+ 125( + 0 - 3)	$^{\circ}\text{C}$
2	Ambient Low Temperature	$T_{amb}$	- 65( + 3 - 0)	$^{\circ}\text{C}$
3	Ambient Room Temperature	$T_{amb}$	+ 22 $\pm$ 3	$^{\circ}\text{C}$

**TABLE 5(b) - CONDITIONS FOR OPERATING LIFE TEST**

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	$T_{amb}$	+ 125( + 0 - 3)	$^{\circ}\text{C}$
2	Contact Load, Resistive	V I	28 1.0	Vdc Adc

**FIGURE 5(a) - ELECTRICAL CIRCUITS FOR SCREENING**

Not applicable.

**FIGURE 5(b) - ELECTRICAL CIRCUITS FOR OPERATING LIFE TEST**

Not applicable.



4.8 ENVIRONMENTAL AND ENDURANCE TESTS (CHARTS IV AND V OF ESA/SCC GENERIC SPECIFICATION No. 3602)

4.8-1 Measurements and Inspections on Completion of Environmental Tests

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

4.8.2 Measurements and Inspections during Endurance Tests

The parameters to be measured and inspections to be performed during endurance tests are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}\text{C}$ .

4.8.3 Measurements and Inspections on Completion of Endurance Tests

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

4.8.4 Conditions for Operating Life Tests (Part of Endurance Testing)

The requirements for operating life testing are specified in Section 9 of ESA/SCC Generic Specification No. 3602. The conditions for operating life testing shall be as specified in Table 5(b) of this specification.

4.8.5 Electrical Circuits for Operating Life Tests (Figure 5(b))

Not applicable.





**TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING**

No.	ESA/SCC GENERIC SPEC. NO. 3602		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
01	Vibration	Para. 9.10 and Para. 4.2.4 of this spec.	<b>Measurements during Test</b> Contact Monitoring <b>Final Measurements</b> Visual Examination	ESA/SCC 3602 Para. 9.10 -	- -	- -	- -	- -
02	Mechanical Shock	Para. 9.11 and Para. 4.2.4 of this spec.	<b>Measurements during Test</b> Contact Monitoring <b>Final Measurements</b> Electrical Measurements Visual Examination	ESA/SCC 3602 Para. 9.11 Table 2 Items 7-8-1-2 -	- -	- -	Table 2 -	- -
03	Overload	Para. 9.12 and Table 1(b) Item 4 of this spec.	<b>Measurements during Test</b> Contact Voltage Drop <b>Final Measurements</b> Fuse Continuity Contact Voltage Drop Insulation Resistance Voltage Proof (all Points) Electrical Measurements	ESA/SCC 3602 Para. 9.12.1 - Table 2 Item 8 Table 2 Item 6 Table 2 Item 7 Table 2 Items 1-2-3-4-5-9	V <sub>d</sub> - V <sub>d</sub> R <sub>i</sub> VP	Para. 9.12.1 - 40 5000 -	Continuity -	mV mV MΩ Vrms
04	Thermal Shock	Para. 9.13	<b>During 5th Cycle</b> Electrical Measurements at +125°C Electrical Measurements at -65°C <b>Final Measurements</b> Visual Examination Voltage Proof (all Points)	In Conditioning Chamber Table 3 Items 1-2-3-4-6 Table 3 Items 1-2-3-4 - Table 2 Item 7	- - VP	- -	Table 3 Table 3 -	- - Vrms
05	Salt Spray	Para. 9.14	<b>Final Measurements</b> Visual Examination Electrical Measurements Voltage Proof (all Points)	- Table 2 Items 1-2-3-4-5-6-8-9 Table 2 Item 7	- - VP	- -	Table 2 Table 2	- - Vrms
06	Intermediate Current	Para. 9.16	<b>Measurements during Test</b> Contact Voltage Drop <b>Final Measurements</b> Insulation Resistance Voltage Proof (all Points) Electrical Measurements Contact Voltage Drop	ESA/SCC 3602 Para. 9.16.1 Table 2 Item 6 Table 2 Item 7 Table 2 Items 1-2-3-4-5-9 ESA/SCC 3602 Para. 9.16.1	V <sub>d</sub> - R <sub>i</sub> VP V <sub>d</sub>	Para. 9.16.1 - 5000 -	Table 2 Table 2	mV MΩ Vrms mV
07	Terminal Strength	Para. 9.17 and Para. 4.3.3 of this spec.	Visual Examination	ESA/SCC 3602 Para. 9.17.3	-	-	-	-

**NOTES**

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.



**TABLE 6 - MEASUREMENTS AND INSPECTIONS ON COMPLETION OF ENVIRONMENTAL TESTS AND AT INTERMEDIATE POINTS AND ON COMPLETION OF ENDURANCE TESTING (CONT'D)**

No.	ESA/SCC GENERIC SPEC. NO. 3602		MEASUREMENTS AND INSPECTIONS		SYMBOL	LIMITS		UNIT
	ENVIRONMENTAL AND ENDURANCE TESTS (1)	TEST METHOD AND CONDITIONS	IDENTIFICATION	CONDITIONS		MIN.	MAX.	
08	Resistance to Soldering Heat	Para. 9.18	Electrical Measurements	Table 2 Items 1-2-6-8-9		Table 2		
09	Operating Life Resistive	Para's 9.19, 9.19.1 and Table 5(b) of this spec.	<b>Measurements during Test</b> Contact Voltage Drop  <b>Final Measurements</b> Fuse Continuity Contact Voltage Drop Insulation Resistance Voltage Proof (all Points) Electrical Measurements	ESA/SCC 3602 Para. 9.19.1  - Table 2 Item 8 Table 2 Item 6 Table 2 Item 7 Table 2 Items 1-2-3-4-5-9	V <sub>d</sub>  - V <sub>d</sub> R <sub>i</sub> VP	Para. 9.19.1  Continuity -   40 5000   - Table 2 Table 2	mV  mV MΩ Vrms	
10	Operating Life Low Level Load and Mechanical Life	Para. 9.19.2	<b>Measurements during Test</b> Contact Voltage Drop  <b>Final Measurements</b> Contact Voltage Drop Insulation Resistance Voltage Proof (all Points) Electrical Measurements	ESA/SCC 3602 Para. 9.19.2  Table 2 Item 8 Table 2 Item 6 Table 2 Item 7 Table 2 Items 1-2-3-4-5-9	V <sub>d</sub>  V <sub>d</sub> R <sub>i</sub> VP	Para. 9.19.2  -   20 5000   - Table 2 Table 2	mV  mV MΩ Vrms	

**NOTES**

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.



**SCC**

ESA/SCC Detail Specification  
No. 3602/002

PAGE 17  
ISSUE 7

**APPENDIX 'A'**

Page 1 of 1

AGREED DEVIATIONS FOR R.E. DEUTSCH (F)

ITEM AFFECTED	DESCRIPTION OF DEVIATIONS
Table 2 of this specification	Note 1 is not applicable due to specific construction.