ESCC
European Space Components Coordination

Pages 1 to 22

RELAYS, ELECTROMAGNETIC, LATCHING,

28Vdc, 15A, 2PDT,

ESCC Detail Specification No. 3602/009

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DCR No.	CHANGE DESCRIPTION
129	Specification upissued to incorporate technical and editorial changes per DCR.

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TABLES

FIGURES

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 a Relay, Electromagnetic, Latching, 28Vdc, 15A, 2PDT. 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 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 terminal 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 (NOTE 1)	DESCRIPTION	FIGURE
01, 11	Straight terminals and plain case	2(a)
02, 12	Hook terminals and plain case	2(b)
03, 13	Straight terminals and horizontal flange mount	2(c)
04, 14	Hook terminals and horizontal flange mount	2(d)
05, 15	Straight terminals and vertical flange mount	2(e)
06, 16	Hook terminals and vertical flange mount	2(f)
07, 17	As variant 01 + polarising pin	2(a)
08, 18	As variant 03 + polarising pin	2(c)
09, 19	As variant 05 + polarising pin	2(e)

NOTES

1. Variant differences are Coil Resistance (see Table 2, Item 9).

TABLE 1(b) - MAXIMUM RATINGS

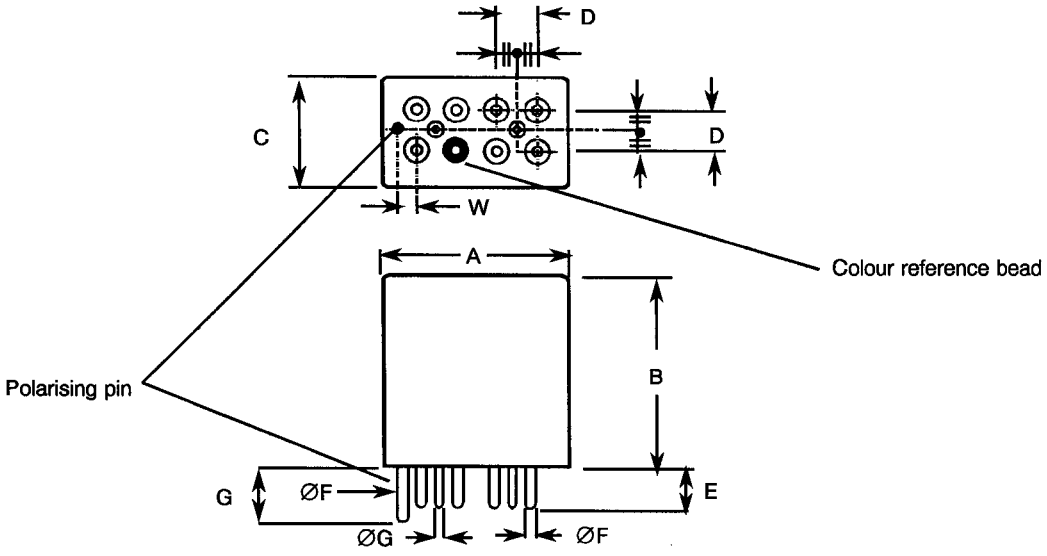
No.	CHARACTERISTICS	SYMBOL	MAXIMUM RATING	UNIT	REMARKS
1	Rated Coil Voltage:- 28V 12V 6V	V_{CR}	 28 12 6.0	Vdc	Note 3
2	Coil Voltage Range:- 28V 12V 6V	V_{CR}	 26.5 to 32 11 to 14.5 5.5 to 7.3	Vdc	
3	Rated Contact Current Resistive Load	I_{CR}	15	A	28Vdc resistive Note 1
4	Overload Current Resistive	I_{overL}	40	A	28Vdc resistive See Table 6
5	Rated Contact Current Inductive Load	I_{CL}	8.0	A	28Vdc inductive Note 1
6	Contact Resistance	R_C	10	mΩ	At rated current
7	High Temperature	T_{amb}	+125	°C	
8	Low Temperature	T_{amb}	−65	°C	
9	Soldering Temperature	T_{sol}	+260	°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 t_r. The coil voltage shall be applied for a minimum time of $10t_L$ or $10t_r$.

FIGURE 2 - PHYSICAL DIMENSIONS

FIGURE 2(a) -
VARIANTS 01 AND 11, RELAY WITH STRAIGHT TERMINALS AND PLAIN CASE
VARIANT 07, IDENTICAL TO VARIANT 01 + POLARISING PIN
VARIANT 17, IDENTICAL TO VARIANT 11 + POLARISING PIN

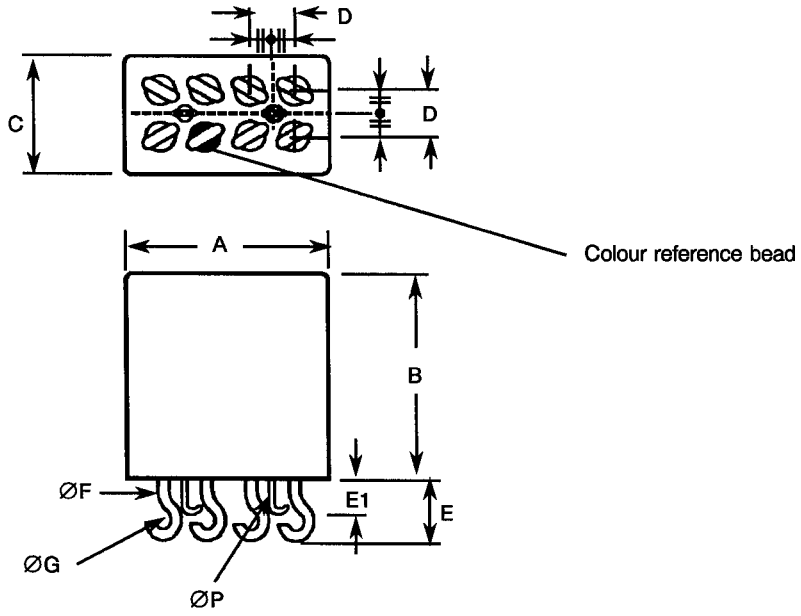


SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	-	26.00
B	-	25.70
C	-	13.30
D	4.98	5.18
E	6.70	7.10
ØF	1.55	1.62
G	7.40	8.00
ØG	0.60	0.80
W	2.34	2.74

NOTES
1. Symbols G and W are for Variants 07 & 17 only.

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

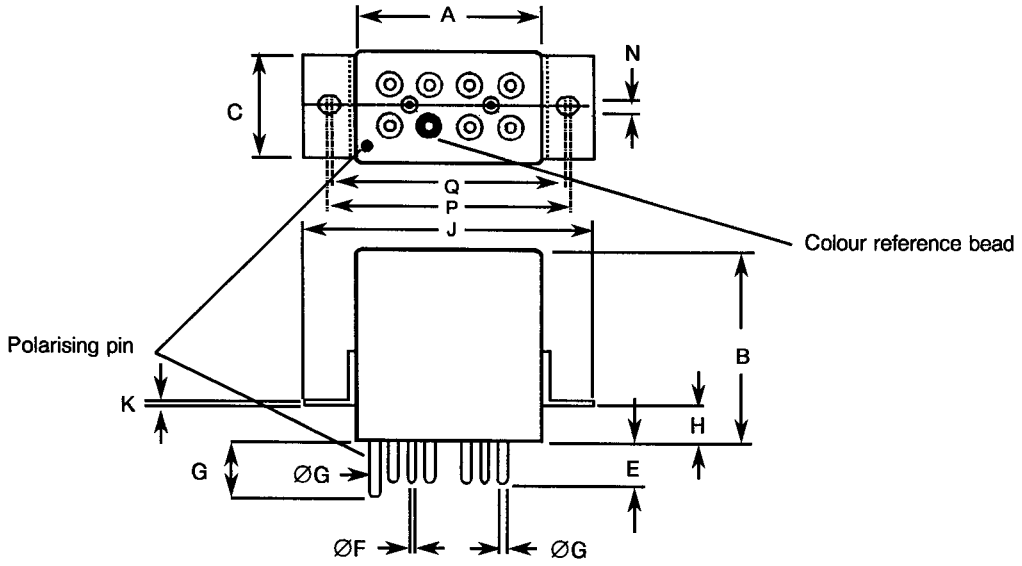
FIGURE 2(b) - VARIANTS 02 AND 12, RELAY WITH HOOK TERMINALS AND PLAIN CASE



SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	-	26.00
B	-	25.70
C	-	13.30
D	4.80	5.20
E	-	8.00
E1	-	4.50
ØF	1.52	1.63
ØG	1.75	2.25
ØP	0.60	0.80

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

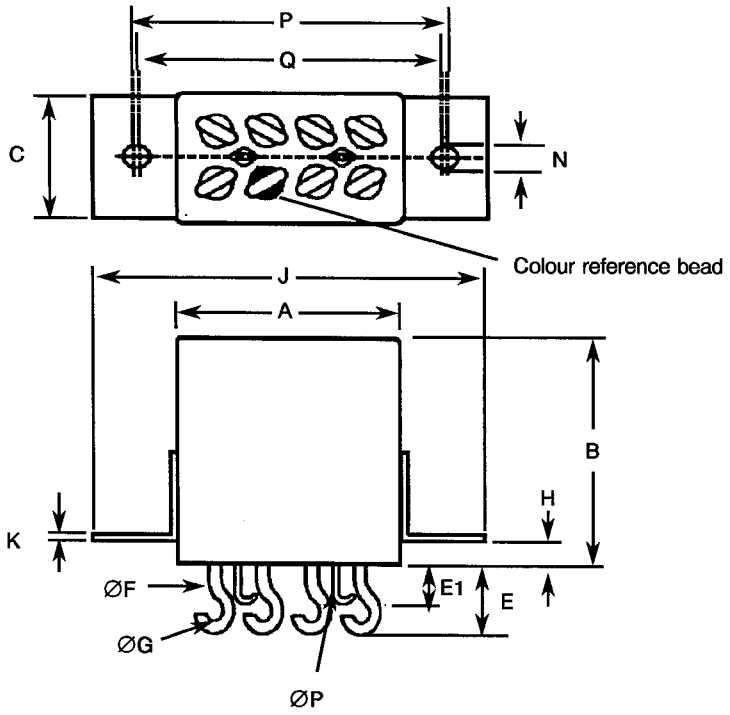
FIGURE 2(c) -
VARIANTS 03 AND 13, RELAY WITH STRAIGHT TERMINALS AND HORIZONTAL FLANGE MOUNT
VARIANT 08, IDENTICAL TO VARIANT 03 + POLARISING PIN
VARIANT 18, IDENTICAL TO VARIANT 13 + POLARISING PIN



SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	-	26.00
B	-	25.70
C	-	13.34
E	6.70	7.10
ØF	0.60	0.80
G	7.40	8.00
ØG	1.55	1.62
H	3.80	4.20
J	-	43.60
K	0.90	1.10
N	3.70	3.90
P	36.45	36.95
Q	35.20	35.70

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

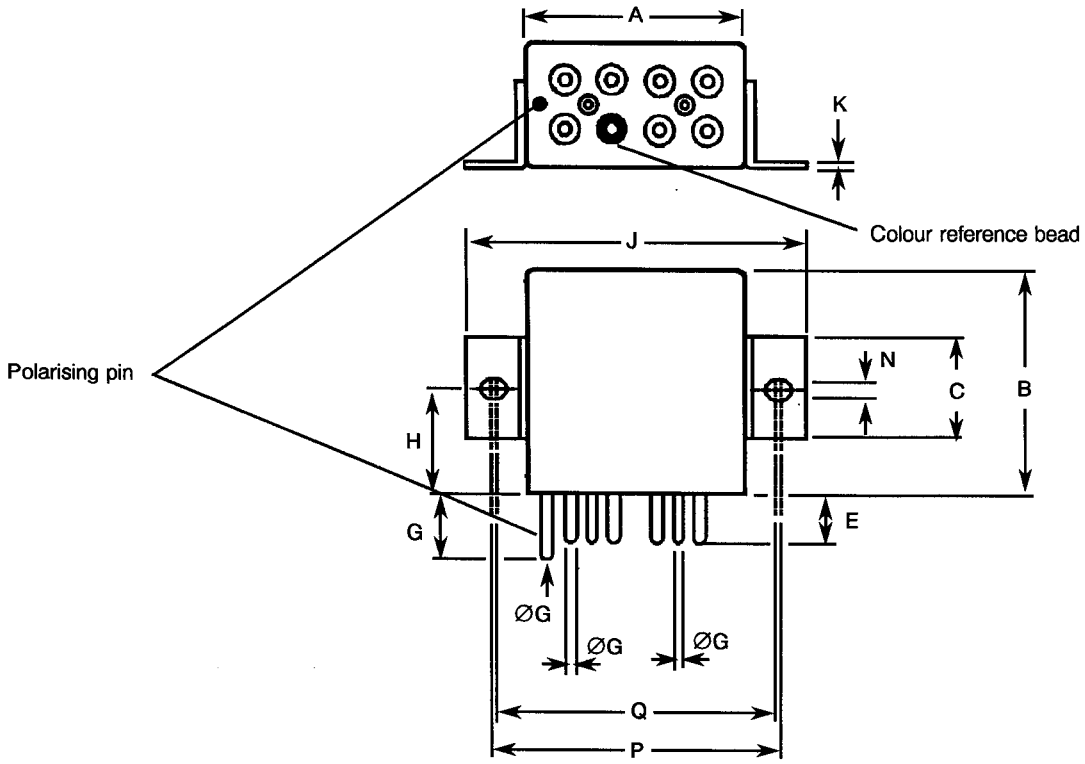
FIGURE 2(d) - VARIANTS 04 AND 14, RELAY WITH HOOK TERMINALS AND HORIZONTAL FLANGE MOUNT



SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	-	26.00
B	-	25.70
C	-	13.34
E	-	8.00
E1	-	4.50
ØF	1.52	1.63
ØG	1.75	2.25
H	3.80	4.20
J	-	43.60
K	0.90	1.10
N	3.70	3.90
P	36.45	36.95
ØP	0.60	0.80
Q	35.20	35.70

FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

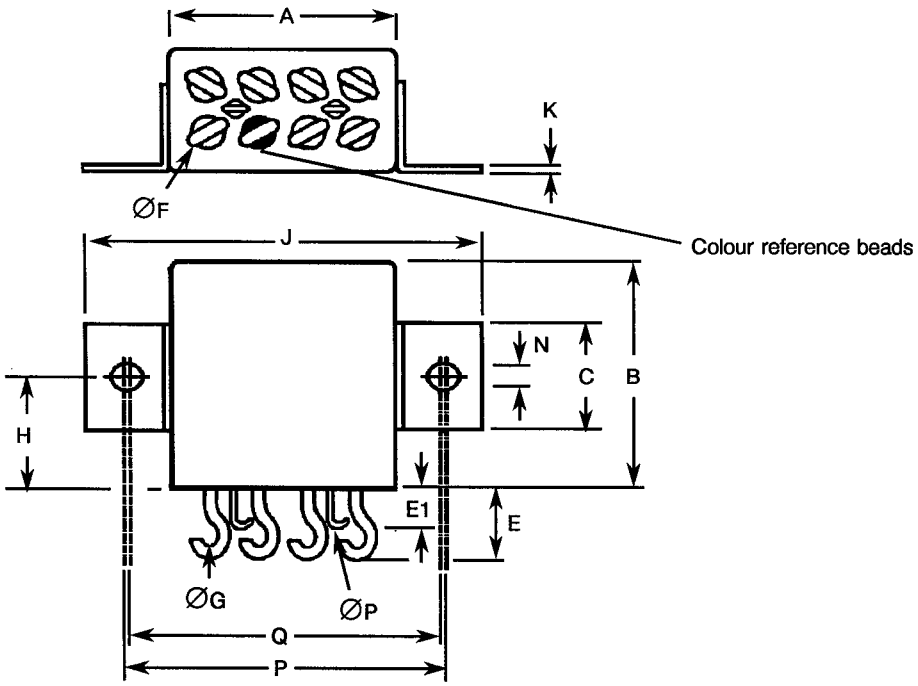
FIGURE 2(e) -
VARIANTS 05 AND 15, RELAY WITH PLUG-IN TERMINALS AND VERTICAL FLANGE MOUNT
VARIANT 09, IDENTICAL TO VARIANT 05 + POLARISING PIN
VARIANT 19, IDENTICAL TO VARIANT 15 + POLARISING PIN



SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	-	26.00
B	-	25.70
C	-	13.34
E	6.70	7.10
ØF	0.60	0.80
G	7.40	8.00
ØG	1.55	1.62
H	12.50	12.90
J	-	43.60
K	0.90	1.10
N	3.70	3.90
P	36.45	36.95
Q	35.20	35.70

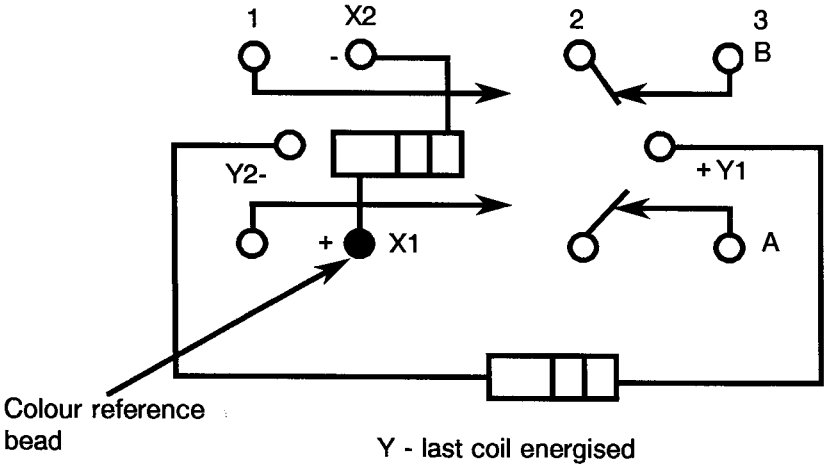
FIGURE 2 - PHYSICAL DIMENSIONS (CONTINUED)

FIGURE 2(f) - VARIANTS 06 AND 16, RELAY WITH HOOK TERMINALS AND VERTICAL FLANGE MOUNT



SYMBOL	MILLIMETRES	
	MIN.	MAX.
A	-	26.00
B	-	26.00
C	-	13.34
E	-	8.00
E1	-	4.50
ØF	1.52	1.63
ØG	1.75	2.25
H	12.50	12.90
J	-	43.60
K	0.90	1.10
N	3.70	3.90
P	36.45	36.95
ØP	0.60	0.80
Q	35.20	35.70

FIGURE 3 - CIRCUIT SCHEMATIC



As viewed from terminal side

NOTES

1. Numbers appear for reference purposes only.

4. REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the relays specified herein are 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 - 3000Hz.

4.2.4 Deviations from Qualification Tests (Chart IV)

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

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

(c) Para 9.12, Overload: Separate tests shall be performed for N/O and N/C contacts. Overload current shall be 40A resistive.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

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

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

(c) Para 9.12, Overload: Separate tests shall be performed for N/O and N/C contacts. Overload current shall be 40A resistive.

(d) Para. 9.16, Intermediate Current: The number of operations shall be 5000.

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 46 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:-

Pull Test

Applied Force: 50 Newtons minimum for 1.6mm diameter terminals.
15 Newtons minimum for 0.7mm diameter terminals.

Duration: 5 seconds minimum

Para's 9.17.2 and 9.17.3 are not applicable.

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

Copper nickel, welded construction, Sn/Pb plated. Neither electro-deposited tin nor any paint shall be used.

4.4.2 Terminal Material and Finish

The terminal material shall be Type 'H' with Type '3 or 4' 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 accomodate 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) Terminal Identification.

(b) The ESCC Component Number.

(c) Electrical Characteristics.

(d) Traceability Information.

4.5.2 Terminal Identification

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

4.5.3 The ESCC Component Number

Each component shall bear the ESCC Component Number which shall be constituted and marked

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Detail Specification Number

Type Variant (see Table 1(a))

Testing Level

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
	Variants 01 to 09	Variants 11 to 19	
28Vdc	300Ω	600Ω	28V
12Vdc	60Ω	150Ω	12V
6.0Vdc	15Ω	38Ω	6V

4.5.5 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.

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 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 Circuit 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:- 28V 12V 6V	U_L	Para. 9.3.1	Para. 9.3.1	 9.1 3.6 1.8	 14 6.6 3.3	V
2	Reset Voltage:- 28V 12V 6V	U_R	Para. 9.3.2	Para. 9.3.2	 9.1 3.6 1.8	 14 6.6 3.3	V
3	Latch Time	t_L	Para. 9.3.4	Para. 9.3.4	-	15	ms
4	Reset Time	t_r	Para. 9.3.4	Para. 9.3.4	-	15	ms
5	Bounce Time	t_b	Para. 9.3.4	Para. 9.3.4	-	1.0	ms
6	Insulation Resistance	Ri	Para. 9.3.7	Para. 9.3.7 at 500Vdc	100	-	MΩ
7	Voltage Proof	VP	Para. 9.3.6	Para. 9.3.6 Note 1	1250	-	Vrms
8	Contact Voltage Drop	V_d	Para. 9.3.3	Para. 9.3.3 15A - 6.0Vdc	-	150	mV
9	Coil Resistance Latch and Reset Variants 01 to 09: 28V 12V 6V Variants 11 to 19: 28V 12V 6V	R_B	Para. 9.3.5	Para. 9.3.5	 270 54 13.5 540 135 34	 330 66 16.5 660 165 42	Ω

NOTES

1. 1000V between coil and case, between open contacts; 350V between coils.

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:- 28V 12V 6V	U_L	Para. 9.3.1	Para. 9.3.1	 6.3 2.5 1.3	 19.8 9.0 4.5	V
2	Reset Voltage:- 28V 12V 6V	U_R	Para. 9.3.2	Para. 9.3.2	 6.3 2.5 1.3	 19.8 9.0 4.5	V
3	Latch Time	t_L	Para. 9.3.4	Para. 9.3.4	-	15	ms
4	Reset Time	t_r	Para. 9.3.4	Para. 9.3.4	-	15	ms
5	Bounce Time	t_b	Para. 9.3.4	Para. 9.3.4	-	1.0	ms
6	Insulation Resistance	Ri	Para. 9.3.7	Para. 9.3.7 at 500Vdc Note 1	50	-	MΩ

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
10	Miss Test, Contact Resistance	R_C	Para. 9.8	Para. 9.8	100	Ω

TABLE 5(a) - CONDITIONS FOR SCREENING

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient High Temperature	T_{amb}	+125(+0−3)	°C
2	Ambient Low Temperature	T_{amb}	−65(+3−0)	°C
3	Ambient Room Temperature	T_{amb}	+22±3	°C

TABLE 5(b) - CONDITIONS FOR OPERATING LIFE TEST

No.	CHARACTERISTICS	SYMBOL	CONDITION	UNIT
1	Ambient Temperature	T_{amb}	+125(+0−3)	°C
2	Contact Load Resistive	V I	28 15	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 $T_{amb} = +22 \pm 3$ °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 $T_{amb} = +22 \pm 3$ °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 $T_{amb} = +22 \pm 3$ °C.

4.8.4 Conditions for Operating Life Test (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 Circuit for Operating Life Test (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.	**Measurements during Test** Contact Monitoring	ESA/SCC 3602 Para. 9.10	-	-	-	-
			Final Measurements Visual Examination	-	-	-	-	-
02	Mechanical Shock	Para. 9.11 and Para. 4.2.4 of this spec.	**Measurements during Test** Contact Monitoring	ESA/SCC 3602 Para. 9.11	-	-	-	-
			Final Measurements Electrical Measurements	Table 2 Items 7-8-1-2		Table 2		
			Visual Examination	-	-	-	-	-
03	Overload	Para. 9.12 and Table 1(b) Item 4 and Para. 4.2.4 of this spec.	**Measurements during Test** Contact Voltage Drop	ESA/SCC 3602 Para. 9.12.2	V_d	Para. 9.12.2		mV
			Final Measurements Fuse Continuity	-	-	Continuity		
			Contact Voltage Drop (3)	Table 2 Item 8	V_d	-	175	mV
			Insulation Resistance	Table 2 Item 6	Ri	50	-	MΩ
			Voltage Proof (all Points) (2)	Table 2 Item 7	VP	1000	-	Vrms
			Electrical Measurements	Table 2 Items 1-2-3-4-5-9		Table 2		
04	Thermal Shock	Para. 9.13	**During 5th Cycle**	In Conditioning Chamber				
			Electrical Measurements at +125°C	Table 3 Items 1-2-3-4-6		Table 3		
			Electrical Measurements at −65°C	Table 3 Items 1-2-3-4		Table 3		
			Final Measurements Visual Examination	-	-	-	-	-
			Voltage Proof (all Points)	Table 2 Item 7	VP	Table 2		Vrms
05	Salt Spray	Para. 9.14	**Final Measurements** Visual Examination	-	-	-	-	-
			Electrical Measurements	Table 2 Items 1-2-3-4-5-6-8-9		Table 2		
			Voltage Proof (all Points) (2)	Table 2 Item 7	VP	1000	-	Vrms
06	Intermediate Current	Para. 9.16 and Para. 4.2.5 of this spec.	**Measurements during Test** Contact Voltage Drop	ESA/SCC 3602 Para. 9.16.2	V_d	Para. 9.16.2		mV
			Final Measurements Insulation Resistance	Table 2 Item 6	Ri	50	-	MΩ
			Voltage Proof (all Points) (2)	Table 2 Item 7	VP	1000	-	Vrms
			Electrical Measurements	Table 2 Items 1-2-3-4-5-9		Table 2		
			Contact Voltage Drop (3)	ESA/SCC 3602 Para. 9.16.2	V_d	Para. 9.16.2		mV
07	Terminal Strength	Para. 9.17 and Para. 4.3.3 of this spec.	Visual Examination	ESA/SCC 3601 Para. 9.17.3	-	-	-	-

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.
2. 350Vrms between coils.
3. Reading time 5 to 10 seconds, if required.

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.	**Measurements during Test**					
			Contact Voltage Drop	ESA/SCC 3602 Para. 9.19.1	V_d	Para. 9.19.1		mV
			Final Measurements					
			Fuse Continuity	-	-	Continuity		
			Contact Voltage Drop (3)	Table 2 Item 8	V_d	-	175	mV
			Insulation Resistance	Table 2 Item 6	Ri	50	-	MΩ
			Voltage Proof (all Points) (2)	Table 2 Item 7	VP	1000	-	Vrms
			Electrical Measurements	Table 2 Items 1-2-3-4-5-9		Table 2		
10	Inductive Life	Para. 9.19.3 and Table 1(b) Item 5 of this spec.	**Measurements during Test**					
			Contact Voltage Drop	ESA/SCC 3602 Para. 9.19.1	V_d	Para. 9.19.1		mV
			Final Measurements					
			Fuse Continuity	-	-	Continuity		
			Contact Voltage Drop (3)	Table 2 Item 8	V_d	-	175	mV
			Insulation Resistance	Table 2 Item 6	Ri	50	-	MΩ
			Voltage Proof (all Points) (2)	Table 2 Item 7	VP	1000	-	Vrms
			Electrical Measurements	Table 2 Items 1-2-3-4-5-9		Table 2		
11	Mechanical Life	Para. 9.19.4	**Final Measurements**					
			Contact Voltage Drop	Table 2 Item 8		-	175	mV
			Electrical Measurements	Table 2 Items 1-2-3-4-5-9		Table 2		

NOTES

1. The tests in this table refer to either Chart IV or V and shall be used as applicable.
2. 350Vrms between coils.
3. Reading time 5 to 10 seconds, if required.