



**RELAY, ELECTROMAGNETIC, NON-LATCHING,  
28VDC, 2A, 2PDT, HALF-SIZE CRYSTAL CAN**

**ESCC Detail Specification No. 3601/003**

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DCR No.	CHANGE DESCRIPTION
1651 1656	Specification updated to incorporate changes per DCR.

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## 1 GENERAL

### 1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, and test and inspection data for the component type variants and/or the range of components specified below. It supplements the requirements of, and shall be read in conjunction with, the ESCC Generic Specification listed under Applicable Documents.

### 1.2 APPLICABLE DOCUMENTS

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

- (a) ESCC Generic Specification No. [3601](#).

### 1.3 TERMS, DEFINITIONS, ABBREVIATIONS, SYMBOLS AND UNITS

For the purpose of this specification, the terms, definitions, abbreviations, symbols and units specified in ESCC Basic Specification No. [21300](#) shall apply.

### 1.4 THE ESCC COMPONENT NUMBER AND COMPONENT TYPE VARIANTS

#### 1.4.1 The ESCC Component Number

The ESCC Component Number shall be constituted as follows:

Example: 36010030126V1

- Detail Specification Reference: 3601003
- Component Type Variant Number: 01 (as required)
- Characteristic code: Rated Coil Voltage and Coil Resistance (26.5Vdc, 900Ω): 26V1 (as required)

##### 1.4.1.1 *Characteristics and/or Ratings Codes*

Characteristics and/or ratings to be codified as part of the ESCC Component Number shall be as follows:

- (a) The Rated Coil Voltage and Coil Resistance are expressed by means of the following codes:

Rated Coil Voltage (Vdc)	Coil Resistance (Ω)	Code
26.5	900	26V1
26.5	700	26V2
12	190	12V1
12	150	12V2

1.4.2 Component Type Variants and Range of Components

The component type variants and range of components applicable to this specification are as follows:

Variant Number	Case and Terminal Description (Note 1)	Coil Characteristics	Weight max (g)
01	Plain Case (No Mount) Solder Pin Terminals	Note 2	8.1
02	Raised Vertical Flange Mount Solder Pin Terminals	Note 2	8.8
03	Horizontal Flange Mount Solder Hook Terminals	Note 2	10
04	Horizontal Flange Mount Solder Pin Terminals	Note 2	9.7
05	Plain Case (No Mount) Solder Hook Terminals	Note 2	8.4
06	Raised Vertical Flange Mount Solder Hook Terminals	Note 2	9.1
09	Plain Case (No Mount) Long Solder Pin Terminals	Note 2	8.5

**NOTES:**

1. See Para. 1.6.
2. The following Rated Coil Voltages and Coil Resistances are available and selectable for each Variant:

Rated Coil Voltage	Coil Resistance
26.5Vdc	900Ω
26.5Vdc	700Ω
12Vdc	190Ω
12Vdc	150Ω

1.5 MAXIMUM RATINGS

The maximum ratings shall not be exceeded at any time during use or storage.

Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

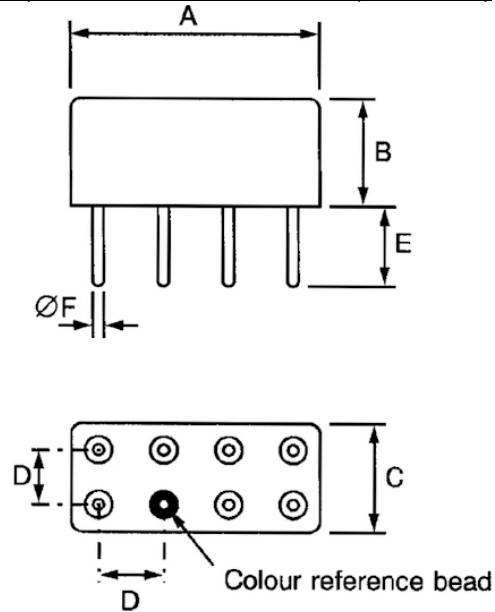
Characteristics	Symbols	Maximum Ratings	Units	Remarks
Coil Voltage Range	$V_{CR}$	25 to 32 11 to 15	Vdc	Rated Coil Voltage: 26.5Vdc Rated Coil Voltage: 12Vdc
Rated Resistive Load Contact Current	$I_{CR}$	2	A	28Vdc resistive Note 1
Rated Inductive Load Contact Current	$I_{CL}$	400	mA	28Vdc inductive Inductance: 320mH Note 1
Overload Current	$I_{OVERLOAD}$	4	A	28Vdc resistive
Operating Temperature Range	$T_{op}$	-65 to +125	°C	$T_{amb}$
Storage Temperature Range	$T_{stg}$	-65 to +125	°C	$T_{amb}$
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 100mA.
2. Duration 10 seconds maximum at a distance not less than 3mm from the device body. The same terminal shall not be resoldered until 3 minutes have elapsed.

1.6 PHYSICAL DIMENSIONS AND TERMINAL IDENTIFICATION

1.6.1 Plain Case (No Mount) with Solder Pin Terminals (Variant 01)



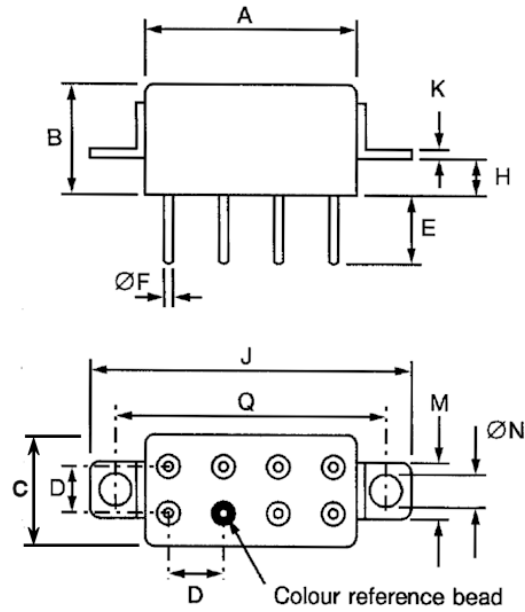
Symbols	Dimensions (mm)	
	Min	Max
A	-	20.57
B	-	10.41
C	-	10.41
D	4.95	5.21
E	4.24	5.4
ØF	0.66	0.86

**NOTES:**

- Terminal identification is specified by reference to the colour reference bead. See Para. 1.7.



1.6.2 Raised Vertical Flange Mount and Solder Pin Terminals (Variant 02)

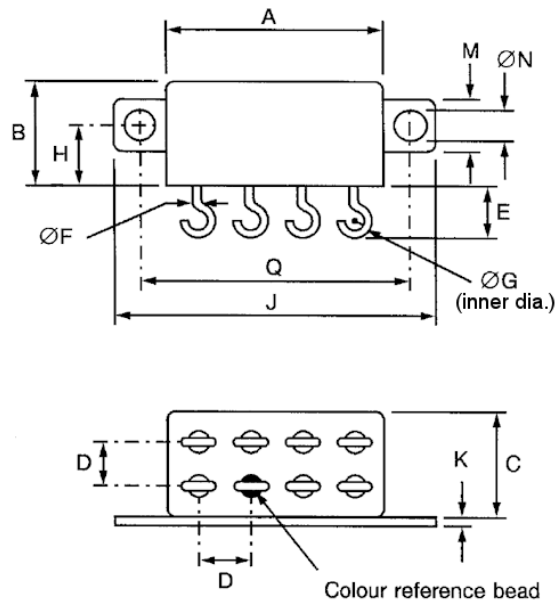


Symbols	Dimensions (mm)	
	Min	Max
A	-	20.57
B	-	10.41
C	-	10.41
D	4.95	5.21
E	4.24	5.4
ØF	0.66	0.86
H	3.1	3.3
J	-	32.9
K	0.5	0.8
M	6.22	8.1
ØN	3	3.55
Q	26.6	27.4

**NOTES:**

- Terminal identification is specified by reference to the colour reference bead. See Para. 1.7.

1.6.3 Horizontal Flange Mount and Solder Hook Terminals (Variant 03)

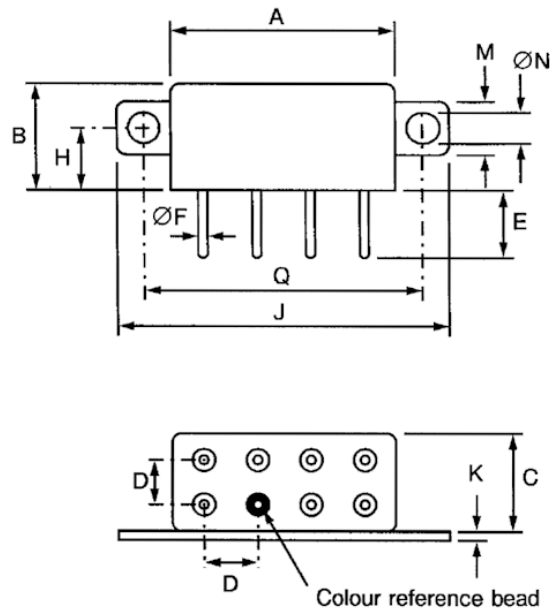


Symbols	Dimensions (mm)	
	Min	Max
A	-	20.57
B	-	10.41
C	-	10.41
D	4.95	5.21
E	4.11	4.83
ØF	0.66	0.86
ØG	-	1.8
H	5.97	6.73
J	-	32.64
K	0.38	0.9
M	6.22	8
ØN	3	3.55
Q	26.8	27.2

**NOTES:**

- Terminal identification is specified by reference to the colour reference bead. See Para. 1.7.

1.6.4 Horizontal Flange Mount and Solder Pin Terminals (Variant 04)

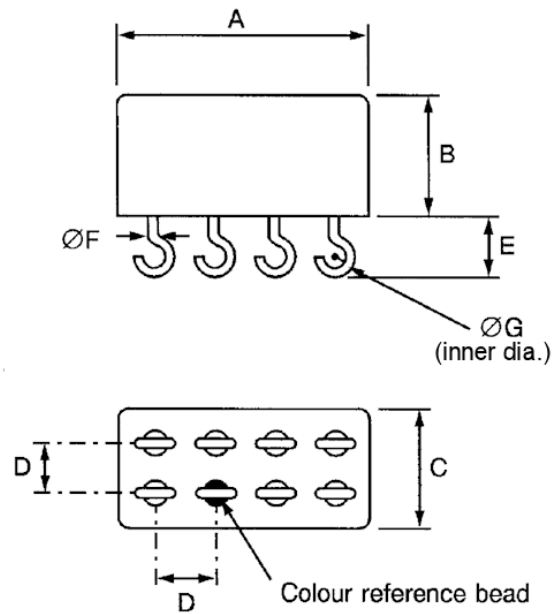


Symbols	Dimensions (mm)	
	Min	Max
A	-	20.57
B	-	10.41
C	-	10.41
D	4.95	5.21
E	4.24	5.4
ØF	0.66	0.86
H	5.97	6.73
J	-	32.64
K	0.38	0.9
M	6.22	8
ØN	3	3.55
Q	26.8	27.2

**NOTES:**

- Terminal identification is specified by reference to the colour reference bead. See Para. 1.7.

1.6.5 Plain Case (No Mount) and Solder Hook Terminals (Variant 05)

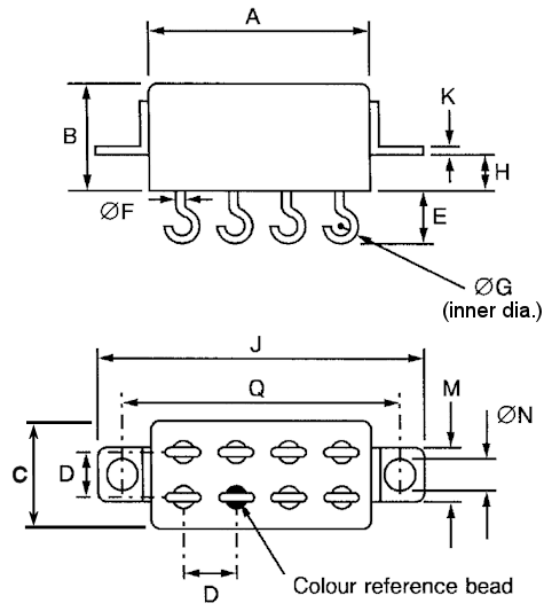


Symbols	Dimensions (mm)	
	Min	Max
A	-	20.57
B	-	10.41
C	-	10.41
D	4.95	5.21
E	4.11	4.83
ØF	0.66	0.86
ØG	-	1.8

**NOTES:**

- Terminal identification is specified by reference to the colour reference bead. See Para. 1.7.

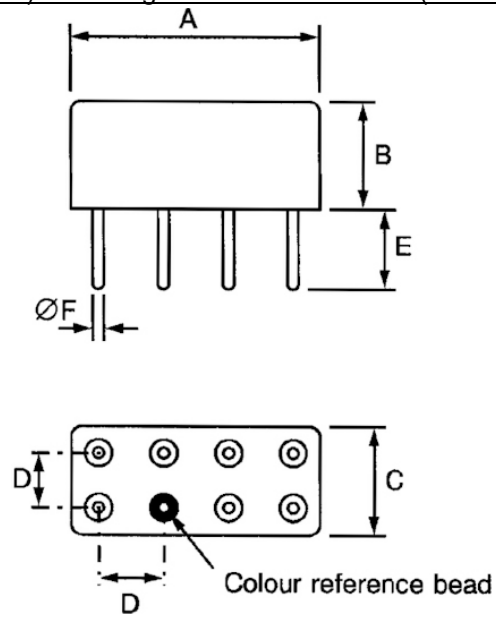
1.6.6 Raised Vertical Flange Mount and Solder Hook Terminals (Variant 06)



Symbols	Dimensions (mm)	
	Min	Max
A	-	20.57
B	-	10.41
C	-	10.41
D	4.95	5.21
E	4.11	4.83
ØF	0.66	0.86
ØG	-	1.8
H	3.1	3.3
J	-	32.9
K	0.5	0.8
M	6.22	8.1
ØN	3	3.55
Q	26.6	27.4

**NOTES:**

1. Terminal identification is specified by reference to the colour reference bead. See Para. 1.7.

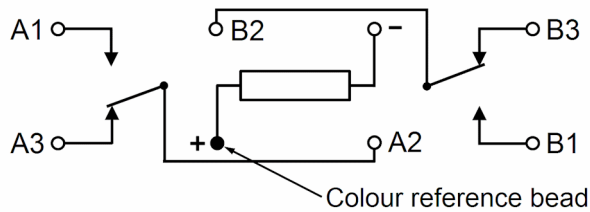
1.6.7 Plain Case (No Mount) with Long Solder Pin Terminals (Variant 09)


Symbols	Dimensions (mm)	
	Min	Max
A	-	20.57
B	-	10.41
C	-	10.41
D	4.95	5.21
E	6.2	6.86
ØF	0.66	0.86

**NOTES:**

- Terminal identification is specified by reference to the colour reference bead. See Para. 1.7.

## 1.7 FUNCTIONAL DIAGRAM



### **NOTES:**

1. As viewed from the terminal side with coil de-energised.
2. Individual terminal designations are for reference purposes only.

## 1.8 MATERIALS AND FINISHES

### 1.8.1 Case

Copper nickel, hermetically sealed. Tin-lead alloy plating may be used.

### 1.8.2 Terminals

The lead material and finish shall be by type D3, D4, D19, F3, F4 or F19 in accordance with the requirements of ESCC Basic Specification No. [23500](#).

## 2 REQUIREMENTS

### 2.1 GENERAL

The complete requirements for procurement of the components specified herein are as stated in this specification and the ESCC Generic Specification. Permitted deviations from the Generic Specification, applicable to this specification only, are listed below.

Permitted deviations from the Generic Specification and this Detail Specification, formally agreed with specific Manufacturers on the basis that the alternative requirements are equivalent to the ESCC requirement and do not affect the component's reliability, are listed in the appendices attached to this specification.

#### 2.1.1 Deviations from the Generic Specification

None.

### 2.2 MARKING

The marking shall be in accordance with the requirements of ESCC Basic Specification No. [21700](#) and as follows.

The information to be marked on the component shall be:

- (a) The ESCC qualified components symbol (for ESCC qualified components only).
- (b) The ESCC Component Number (see Para. 1.4.1).
- (c) Traceability information.

2.3 TERMINAL STRENGTH

The terminals of all Variants are defined as rigid.

The test conditions for Terminal Strength, tested as specified in the ESCC Generic Specification, shall be as follows:

- (a) Pull Test:
  - Applied Force: 15N

2.4 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

Electrical measurements shall be performed at room, high and low temperatures.

2.4.1 Room Temperature Electrical Measurements

The measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}C$ .

Characteristics	Symbols	Test Method and Conditions	Rated Coil Voltage (Vdc)	Limits		Units
				Min	Max	
Pick-up Voltage	$U_C$	ESCC No. 3601	26.5 12	- -	13.5 6.8	V
Drop-out Voltage	$U_D$	ESCC No. 3601	26.5 12	1.5 0.7	6.5 3.5	V
Operate Time	$t_C$	ESCC No. 3601	All	-	4	ms
Release Time	$t_D$	ESCC No. 3601	All	-	4	ms
Bounce Time	$t_B$	ESCC No. 3601	All	-	2	ms
Insulation Resistance	$R_I$	ESCC No. 3601 $V_{TEST} = 100Vdc$	All	10	-	GΩ
Voltage Proof (Test Voltage)	VP	ESCC No. 3601 Maximum Leakage Current $I_{LVP} = 1mA$	All	1000 (Note 1) 500 (Note 2)	- -	Vrms
Voltage Proof Leakage Current	$I_{LVP}$	ESCC No. 3601 Note 3	All	-	1	mA
Contact Voltage Drop	$V_D$	ESCC No. 3601 $I_{TEST} = 100mA \text{ max}$	All	-	$0.05 \times I_{TEST}$	V
Coil Resistance	$R_B$	ESCC No. 3601 Coil resistance = 900Ω Coil resistance = 700Ω Coil resistance = 190Ω Coil resistance = 150Ω	26.5 26.5 12 12	810 630 170 135	990 770 210 165	Ω

**NOTES:**

1. Points of application (1000V):
  - Between terminals (except coil) and case, coil de-energised.
  - Between terminals (except coil) and case, coil energised with Rated Coil Voltage.
  - Between coil and other terminals.
  - Between switching circuits, coil de-energised.
  - Between switching circuits, coil energised with Rated Coil Voltage.
2. Points of application (500V):
  - Between coil and case.
  - Between open contacts, coil de-energised.
  - Between open contacts, coil energised with Rated Coil Voltage.
3. Measured during Voltage Proof test.



2.4.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Test Method and Conditions	Rated Coil Voltage (Vdc)	Limits		Units
				Min	Max	
Pick-up Voltage	U <sub>C</sub>	ESCC No. 3601 T <sub>amb</sub> = +125(+0 -5)°C and -65 (+5 -0)°C	26.5 12	- -	19.8 9.9	V
Drop-out Voltage	U <sub>D</sub>	ESCC No. 3601 T <sub>amb</sub> = +125(+0 -5)°C and -65 (+5 -0)°C	26.5 12	1 0.6	14 6.5	V
Operate Time	t <sub>c</sub>	ESCC No. 3601 T <sub>amb</sub> = +125 (+0 -5)°C and -65 (+5 -0)°C	All	-	4	ms
Release Time	t <sub>D</sub>	ESCC No. 3601 T <sub>amb</sub> = +125 (+0 -5)°C and -65 (+5 -0)°C	All	-	4	ms
Bounce Time	t <sub>B</sub>	ESCC No. 3601 T <sub>amb</sub> = +125 (+0 -5)°C and -65 (+5 -0)°C	All	-	2	ms
Insulation Resistance	R <sub>I</sub>	ESCC No. 3601 T <sub>amb</sub> = +125 (+0 -5)°C V <sub>TEST</sub> = 100Vdc	All	100	-	MΩ
Contact Voltage Drop	V <sub>D</sub>	ESCC No. 3601 T <sub>amb</sub> = +125 (+0 -5)°C and -65 (+5 -0)°C I <sub>TEST</sub> = 100mA max	All	-	0.05 x I <sub>TEST</sub>	V

2.5 PARAMETER DRIFT VALUES

Parameter Drift Values shall be measured as specified in the ESCC Generic Specification.

Unless otherwise specified, the measurements shall be performed at T<sub>amb</sub> = +22 ±3°C.

The test methods and test conditions shall be as per the corresponding test defined in Para. 2.4.1 Room Temperature Electrical Measurements.

The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Limits			Units
		Drift Value Δ	Absolute		
			Min	Max	
Pick-up Voltage	U <sub>C</sub>	Note 1	Note 2	Note 2	V
Drop-out Voltage	U <sub>D</sub>	Note 1	Note 2	Note 2	V

**NOTES:**

1. Drift Value (Δ) limits are not specified. Drift Values shall be recorded for information purposes only.
2. The limit specified in Para. 2.4.1 shall apply.

2.6 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at  $T_{amb} = +22 \pm 3^{\circ}C$ .

Unless otherwise specified the test methods and test conditions shall be as per the corresponding test defined in Para. 2.4.1 Room Temperature Electrical Measurements.

Test Reference per ESCC No. 3601	Characteristics	Symbols	Limits		Units
			Min	Max	
Thermal Shock	<u>During 5th Cycle</u>				
	Pick-up Voltage	$U_c$	Note 2		V
	Drop-out Voltage	$U_D$	Note 2		V
	Operate Time	$t_c$	Note 2		ms
	Release Time	$t_D$	Note 2		ms
	<u>Final Measurements</u>				
	Voltage Proof	VP	Note 3		Vrms
Voltage Proof Leakage Current	$I_{LVP}$	Note 3		mA	
Low Level Sine Vibration	<u>Final Measurements</u>				
	Pick-up Voltage	$U_c$	Note 3		V
	Pick-up Voltage Drift	$\Delta U_c/U_c$	Note 1		%
	Drop-out Voltage	$U_D$	Note 3		V
Drop-out Voltage Drift	$\Delta U_D/U_D$	Note 1		%	
Random Vibration	<u>Final Measurements</u>				
	Pick-up Voltage	$U_c$	Note 3		V
	Pick-up Voltage Drift	$\Delta U_c/U_c$	Note 1		%
	Drop-out Voltage	$U_D$	Note 3		V
Drop-out Voltage Drift	$\Delta U_D/U_D$	Note 1		%	
High Level Sine Vibration	<u>Final Measurements</u>				
	Pick-up Voltage	$U_c$	Note 3		V
	Pick-up Voltage Drift	$\Delta U_c/U_c$	Note 1		%
	Drop-out Voltage	$U_D$	Note 3		V
Drop-out Voltage Drift	$\Delta U_D/U_D$	Note 1		%	
Low Level Mechanical Shock	<u>Final Measurements</u>				
	Contact Voltage Drop	$V_D$	Note 3		V
	Pick-up Voltage	$U_c$	Note 3		V
	Pick-up Voltage Drift	$\Delta U_c/U_c$	Note 1		%
	Drop-out Voltage	$U_D$	Note 3		V
	Drop-out Voltage Drift	$\Delta U_D/U_D$	Note 1		%
	Voltage Proof	VP	Note 3		Vrms
Voltage Proof Leakage Current	$I_{LVP}$	Note 3		mA	

Test Reference per ESCC No. 3601	Characteristics	Symbols	Limits		Units
			Min	Max	
High Level Mechanical Shock	<u>Final Measurements</u>				
	Contact Voltage Drop	$V_D$		Note 3	V
	Pick-up Voltage	$U_C$		Note 3	V
	Pick-up Voltage Drift	$\Delta U_C/U_C$		Note 1	%
	Drop-out Voltage	$U_D$		Note 3	V
	Drop-out Voltage Drift	$\Delta U_D/U_D$		Note 1	%
	Voltage Proof	VP		Note 3	Vrms
Voltage Proof Leakage Current	$I_{LVP}$		Note 3	mA	
Resistance to Soldering Heat	<u>Final Measurements</u>				
	Insulation Resistance	$R_I$		Note 3	GΩ
	Contact Voltage Drop	$V_D$		Note 3	V
	Pick-up Voltage	$U_C$		Note 3	V
	Drop-out Voltage	$U_D$		Note 3	V
Coil Resistance	$R_B$		Note 3	Ω	
Low Level Life	<u>Final Measurements</u>				
	Contact Voltage Drop	$V_D$	-	$0.1 \times I_{TEST}$	V
	Insulation Resistance	$R_I$	5000	-	MΩ
	Voltage Proof	VP		Note 3	Vrms
	Voltage Proof Leakage Current	$I_{LVP}$		Note 3	mA
	Pick-up Voltage	$U_C$		Note 3	V
	Pick-up Voltage Drift	$\Delta U_C/U_C$		Note 1	%
	Drop-out Voltage	$U_D$		Note 3	V
	Drop-out Voltage Drift	$\Delta U_D/U_D$		Note 1	%
	Operate Time	$t_C$		Note 3	ms
	Release Time	$t_D$		Note 3	ms
	Bounce Time	$t_B$		Note 3	ms
Coil Resistance	$R_B$		Note 3	Ω	

Test Reference per ESCC No. 3601	Characteristics	Symbols	Limits		Units
			Min	Max	
Resistive Life	<u>During Monitoring</u>				
	Contact Voltage Drop	$V_D$	-	2.8	V
	<u>Final Measurements</u>				
	Contact Voltage Drop	$V_D$	-	$0.1 \times I_{TEST}$	V
	Insulation Resistance	$R_I$	5000	-	$M\Omega$
	Voltage Proof	$V_P$	Note 3		Vrms
	Voltage Proof Leakage Current	$I_{LVP}$	Note 3		mA
	Pick-up Voltage	$U_C$	Note 3		V
	Pick-up Voltage Drift	$\Delta U_C / U_C$	Note 1		%
	Drop-out Voltage	$U_D$	Note 3		V
	Drop-out Voltage Drift	$\Delta U_D / U_D$	Note 1		%
	Operate Time	$t_C$	Note 3		ms
	Release Time	$t_D$	Note 3		ms
	Bounce Time	$t_B$	Note 3		ms
	Coil Resistance	$R_B$	Note 3		$\Omega$
Coil Life	<u>During Step 1 of each Cycle</u>				
	Contact Voltage Drop	$V_D$	Note 3		V
	Coil Resistance	$R_B$	Note 3		$\Omega$
	<u>During Step 3 of 1st Cycle</u>				
	Contact Voltage Drop	$V_D$	Note 2		V
	Operate Time	$t_C$	Note 2		ms
	Release Time	$t_D$	Note 2		ms
	<u>During Steps 4 &amp; 5 of 4th Cycle</u>				
	Pick-up Voltage	$U_C$	Note 2		V
	Drop-out Voltage	$U_D$	Note 2		V
	<u>Final Measurements</u>				
	Voltage Proof	$V_P$	Note 3		Vrms
	Voltage Proof Leakage Current	$I_{LVP}$	Note 3		mA
	Insulation Resistance	$R_I$	Note 3		$G\Omega$
	Contact Voltage Drop	$V_D$	Note 3		V
	Coil Resistance	$R_B$	Note 3		$\Omega$
	Operate Time	$t_C$	Note 3		ms
Release Time	$t_D$	Note 3		ms	
Bounce Time	$t_B$	Note 3		ms	

Test Reference per ESCC No. 3601	Characteristics	Symbols	Limits		Units
			Min	Max	
Intermediate Current	<u>During Monitoring</u>				
	Contact Voltage Drop	$V_D$	-	300	mV
	<u>Final Measurements</u>				
	Insulation Resistance	$R_I$	5000	-	$M\Omega$
	Voltage Proof	$V_P$	Note 3		Vrms
	Voltage Proof Leakage Current	$I_{LVP}$	Note 3		mA
	Pick-up Voltage	$U_C$	Note 3		V
	Pick-up Voltage Drift	$\Delta U_C/U_C$	Note 1		%
	Drop-out Voltage	$U_D$	Note 3		V
	Drop-out Voltage Drift	$\Delta U_D/U_D$	Note 1		%
	Operate Time	$t_C$	Note 3		ms
	Release Time	$t_D$	Note 3		ms
	Bounce Time	$t_B$	Note 3		ms
	Coil Resistance	$R_B$	Note 3		$\Omega$
	Contact Voltage Drop	$V_D$	-	$0.1 \times I_{TEST}$	V
Overload	<u>During Monitoring</u>				
	Contact Voltage Drop	$V_D$	-	1.4	V
	<u>Final Measurements</u>				
	Contact Voltage Drop	$V_D$	-	$0.1 \times I_{TEST}$	V
	Insulation Resistance	$R_I$	5000	-	$M\Omega$
	Voltage Proof	$V_P$	Note 3		Vrms
	Voltage Proof Leakage Current	$I_{LVP}$	Note 3		mA
	Pick-up Voltage	$U_C$	Note 3		V
	Pick-up Voltage Drift	$\Delta U_C/U_C$	Note 1		%
	Drop-out Voltage	$U_D$	Note 3		V
	Drop-out Voltage Drift	$\Delta U_D/U_D$	Note 1		%
	Operate Time	$t_E$	Note 3		ms
	Release Time	$t_D$	Note 3		ms
	Bounce Time	$t_B$	Note 3		ms
	Coil Resistance	$R_B$	Note 3		$\Omega$

**NOTES:**

- Parameter Drift shall be calculated referenced to the measurement immediately prior to the test in question. An additional initial measurement may be performed prior to the test in question if considered necessary. Drift limits are not specified. Drift Values shall be recorded for information purposes only.
- The limits specified in Para. 2.4.2, as applicable to the same test temperature, shall apply.
- The limits specified in Para. 2.4.1 shall apply.

2.7 RUN-IN CONDITIONS

The test conditions for Run-in, tested as specified in the ESCC Generic Specification, shall be as follows:

- (a) Test Temperature:  $+22 \pm 3^{\circ}\text{C}$ .

**APPENDIX A****AGREED DEVIATIONS FOR LEACH INTERNATIONAL EUROPE (F)**

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Para. 2.1.1 Deviations from the Generic Specification: Screening Tests - Chart F3	Para. 8.6 Vibration Scan: The vibration amplitude and frequency range shall be: <ul style="list-style-type: none"><li>• 30g (peak); 10 to 2000Hz</li><li>• 20g (peak); 2000 to 3000Hz</li></ul>
Para. 2.1.1 Deviations from the Generic Specification: Lot Validation Testing - Chart F4	Para. 8.8.1 Low Level Sine Vibration: The vibration amplitude and frequency range shall be: <ul style="list-style-type: none"><li>• 30g (peak); 10 to 2000Hz</li><li>• 20g (peak); 2000 to 3000Hz</li></ul>