CAPACITOR FILTERS, PI-TYPE, FEEDTHROUGH, ELECTROMAGNETIC INTERFERENCE SUPPRESSION

BASED ON TYPE SFP040

ESCC Detail Specification No. 3008/014

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DCR No.	CHANGE DESCRIPTION
1629	Specification upissued 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. 3008.
(b) MIL-STD-202, Test Methods for Electronic and Electrical Component Parts.

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: 300801401

- Detail Specification Reference: 3008014
- Component Type Variant Number: 01 (as required)

1.4.2 Component Type Variants

The Component Type Variants applicable to this specification are as follows:

Type Variants (Note 1)	Case Description and Terminal Configuration (Note 2)
01 to 10	Non-hermetically sealed feedthrough case with M4×0.70 thread and straight terminals
11 to 20	Non-hermetically sealed feedthrough case with M4×0.70 thread, button body-end terminal and straight thread-end terminal
21 to 30	Non-hermetically sealed feedthrough case with #8-32 UNC thread and straight terminals
31 to 40	Non-hermetically sealed feedthrough case with #8-32 UNC thread, button body-end terminal and straight thread-end terminal

NOTES:

1. Characteristics applicable to each set of Component Type Variants are as follows. See Para. 1.6 for Case Sizes:

Type Variants	Case Size	Rated DC Voltage U_R (V) (at $T_{amb} \leq +85°C$)	Insulation Resistance R_i (GΩ)		DC Resistance R_s (mΩ)	Voltage Drop V_{dr} (V)	Voltage Proof V_P (V)
			-55 / +25°C	+125°C			
01, 11, 21, 31	1	200	10	1	15	0.15	500
02, 12, 22, 32	2	200	10	1	5	0.05	500
03, 13, 23, 33	2	250	10	1	4	0.04	625
04, 14, 24, 34	3	100	3	0.3	15	0.15	250
05, 15, 25, 35	1	200	10	1	15	0.15	500
06, 16, 26, 36	1	200	10	1	10	0.1	500
07, 17, 27, 37	4	200	10	1	10	0.1	500
08, 18, 28, 38	4	250	10	1	10	0.1	625
09, 19, 29, 39	1	200	10	1	15	0.15	500
10, 20, 30, 40	1	200	10	1	15	0.15	500

Type Variants	Capacitance C (pF)	Insertion Loss I_L (dB) With No Load / Rated Current Applied					Weight Max. (g)
		10MHz	50MHz	100MHz	500MHz	1GHz	
01, 11, 21, 31	2400	10 / 10	36 / 20	47 / 25	70 / 70	75 / 75	2.7
02, 12, 22, 32	2400	5 / 5	30 / 25	40 / 30	54 / 54	60 / 60	2
03, 13, 23, 33	750	-	-	15 / 15	50 / 50	55 / 55	2
04, 14, 24, 34	44800	39 / 30	54 / 50	75 / 75	75 / 75	75 / 75	3.5
05, 15, 25, 35	1600	10 / 5	38 / 20	50 / 25	75 / 70	75 / 75	2.7
06, 16, 26, 36	4320	13 / 10	45 / 22	60 / 30	75 / 70	75 / 75	2.7
07, 17, 27, 37	2400	5 / 5	30 / 25	40 / 30	60 / 55	60 / 60	2
08, 18, 28, 38	750	-	-	15 / 15	50 / 45	55 / 55	2
09, 19, 29, 39	750	-	-	15 / 15	50 / 45	55 / 55	2.7
10, 20, 30, 40	160	-	-	4 / 4	40 / 35	54 / 54	2.7

2. See Para. 1.6 for physical dimensions.

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
Rated DC Voltage	U_R	See Note 1 of Para. 1.4.2	V	Note 1
Torque	T_{qe}	0.4	Nm	
Voltage Drop	V_{dr}	See Note 1 of Para. 1.4.2	V	DC
DC and Low Frequency Current	I_{LF}	10	A	
Operating Temperature Range	T_{op}	-55 to +125	°C	T_{amb}
Storage Temperature Range	T_{stg}	-55 to +125	°C	
Soldering Temperature	T_{sol}	+260	°C	Note 2

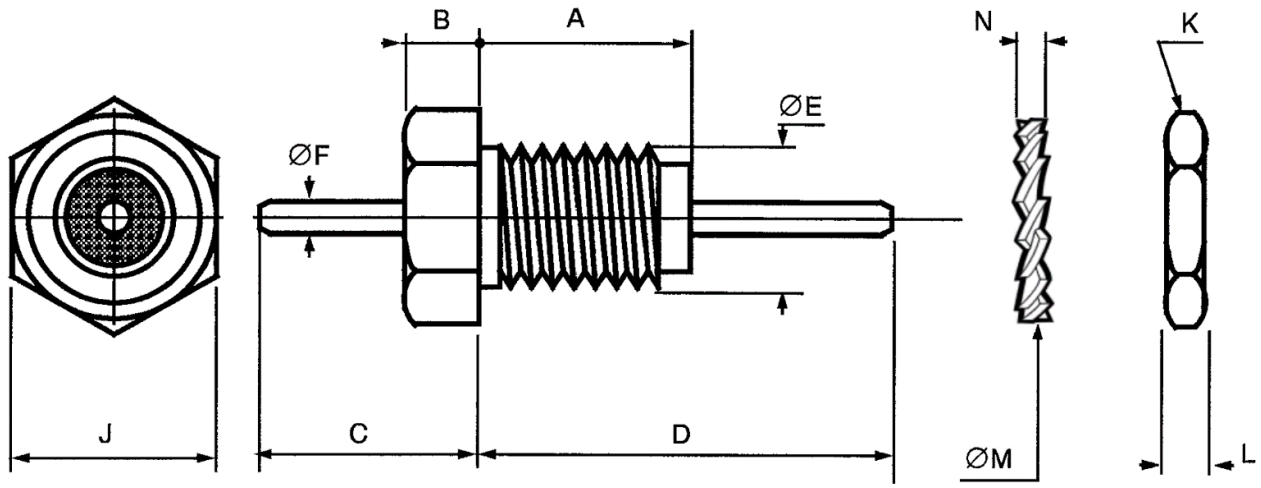
NOTES:

1. At $T_{amb} \leq +85°C$. For $T_{amb} > +85°C$, the following derating shall apply:
   - For Variants with $U_R = 250V$ at $T_{amb} \leq +85°C$, derate linearly to 150V at $T_{amb} = +125°C$.
   - For Variants with $U_R = 200V$ at $T_{amb} \leq +85°C$, derate linearly to 100V at $T_{amb} = +125°C$.
   - For Variants with $U_R = 100V$ at $T_{amb} \leq +85°C$, derate linearly to 70V at $T_{amb} = +125°C$.
2. Duration 10 seconds maximum at a distance of not less than 2mm from the body and the same lead shall not be resoldered until 3 minutes have elapsed.

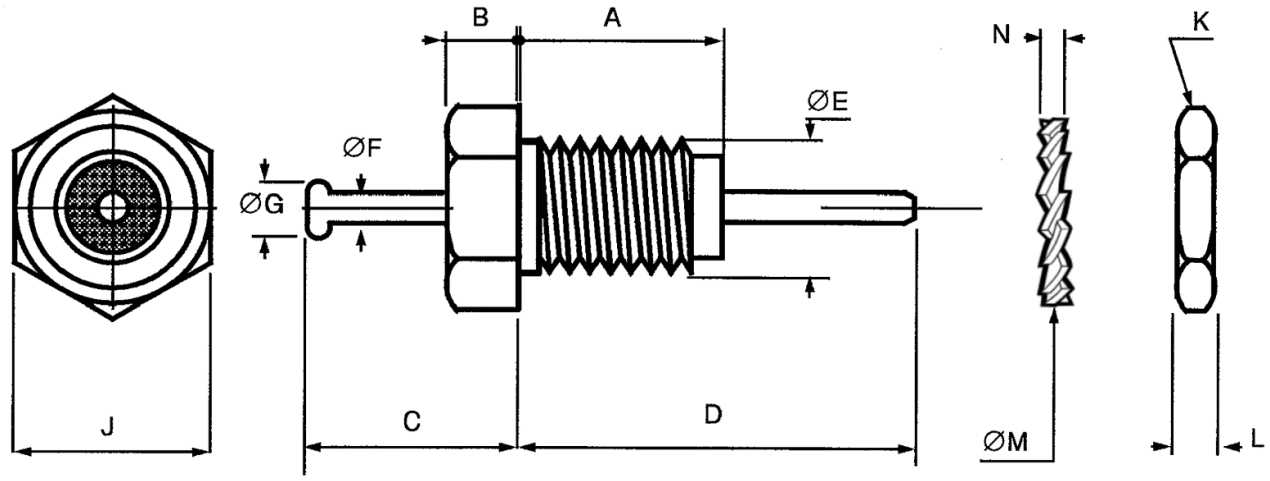
1.6 PHYSICAL DIMENSIONS

Consolidated Dimensions and Notes follow the case drawings.

1.6.1 Straight Terminals – Type Variants 01 to 10 and 21 to 30



1.6.2 Button Body-End Terminal – Type Variants 11 to 20 and 31 to 40



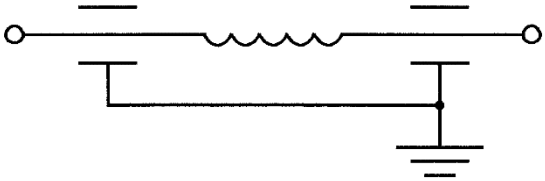
1.6.3 Consolidated Dimensions and Notes

Symbols	Dimensions (mm)							
	Case Size 1		Case Size 2		Case Size 3		Case Size 4	
	Min	Max	Min	Max	Min	Max	Min	Max
A	6.9	7.1	3.4	3.6	7.8	8.4	3.4	3.6
B	2.4	2.6	1.5	1.7	3.5	4.1	1.5	1.7
C	7	12	3.5	4.5	8	9	8	13
D	17	19	5.5	6.5	13	14	8	13
∅E (Note 1)	Note 2		Note 2		Note 2		Note 2	
∅F (Notes 1, 3)	0.72	0.88	0.72	0.88	0.72	0.88	0.72	0.88
∅G	1	1.4	1	1.4	1	1.4	1	1.4
J	-	5	-	5	-	5	-	5
K	-	6.3	-	6.3	-	6.3	-	6.3
L	-	2.6	-	1.6	-	2.6	-	1.6
∅M (Note 4)	-	6.5	-	6.5	-	6.5	-	6.5
N (Note 4)	-	1.3	-	1.3	-	1.3	-	1.3

NOTES:

1. Lead finish shall commence not more than 1.5mm from encapsulant.
2. This dimension shall be that of the applicable thread, which is either M4×0.70 or #8-32 UNC, depending on the Component Type Variant. See Para. 1.4.2.
3. Applies to both leads.
4. External fan lock-washer.

1.7 FUNCTIONAL DIAGRAM



1.8 MATERIALS AND FINISHES

1.8.1 Case
The case shall be silver plated brass with potting encapsulant sealing the filter element.

1.8.2 Lead Material and Finish
The lead material shall be Type B with Type 10 finish in accordance with the requirements of ESCC Basic Specification No. 23500.

1.8.3 Accessories
The materials and finishes of the accessories shown in Paras. 1.6.1 and 1.6.2 shall be as follows:

- Nut: silver plated brass.
- Lock-washer: silver plated bronze.

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

2.1.1.1 Deviations from Screening Tests - Chart F3

(a) Vibration: Shall not be performed.

(b) Room Temperature Electrical Measurements: Voltage Drop shall be replaced by a DC resistance measurement performed in accordance with MIL-STD-202, Test Method 303.

(c) External Visual Inspection: Any discolouration of the silver plating of the case is acceptable.

2.1.1.2 Deviations from Qualification and Periodic Tests – Chart F4B

(a) Intermediate and End-Point Electrical Measurements: Voltage Drop shall be replaced by a DC resistance measurement performed in accordance with MIL-STD-202, Test Method 303.

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 or its primary package 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 ROBUSTNESS OF TERMINATIONS

The leads of the components are rigid.

The test conditions for Robustness of Terminations shall be as specified in the ESCC Generic Specification and as follows:

- Test Ua_1, tensile, with an applied force of 10N and a duration of 10 ±1 seconds.

2.4 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

The 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 ±3°C.

Characteristics	Symbols	Test Method and Conditions	Limits		Units
			Min	Max	
DC Resistance	R_s	MIL-STD-202, Test Method 303	-	Note 1	mΩ
Voltage Proof	V_P	ESCC No. 3008 2.5 × U_R	Note 1	-	V
Insulation Resistance	R_i	ESCC No. 3008	Note 1	-	GΩ
Insertion Loss		ESCC No. 3008			
	I_{L1}	f = 10MHz (Notes 2, 3)	Note 1	-	dB
	I_{L2}	f = 50MHz (Notes 2, 4)	Note 1	-	dB
	I_{L3}	f = 100MHz (Notes 2, 4)	Note 1	-	dB
	I_{L4}	f = 500MHz (Notes 2, 3)	Note 1	-	dB
	I_{L5}	f = 1GHz (Notes 2, 4)	Note 1	-	dB
Capacitance	C	ESCC No. 3008 f = 1000 ±100Hz V = 0.1 to 1.2Vrms	Note 1	-	pF

NOTES:

1. See Note 1 of Para. 1.4.2.
2. For Qualification Testing and Periodic Testing for renewal of qualification after lapse, measurements shall be made with a load current of zero and, during either Subgroup 1B or Subgroup 1C of Chart F4B in the Generic Specification, measurements shall also be made at the rated current specified in Para. 1.5.

3. For Screening and Periodic Testing for extension of qualification, I_{L1} and I_{L4} are guaranteed but not tested.
4. For Screening and Periodic Testing for extension of qualification, I_{L2}, I_{L3} and I_{L5} shall be measured with no load current applied.

2.4.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Test Method and Conditions (Note 1)	Limits		Units
			Min	Max	
Insulation Resistance	R_i	ESCC No. 3008 T_{amb} = +125 (+0 -3)°C	Note 2	-	GΩ
Insertion Loss		ESCC No. 3008 T_{amb} = +125 (+0 -3)°C and T_{amb} = -55 (+3 -0)°C			
	I_{L2}	f = 50MHz (Note 3)	Note 2	-	dB
	I_{L3}	f = 100MHz (Note 3)	Note 2	-	dB
	I_{L5}	f = 1GHz (Note 3)	Note 2	-	dB

NOTES:
1. Measurements shall be performed on a sample of 5 components. In the event of any failure a 100% inspection shall be performed.
2. See Note 1 of Para. 1.4.2.
3. Measurements shall be made with no load current applied.

2.5 PARAMETER DRIFT VALUES

The measurements shall be performed at T_{amb} = +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 drift values (Δ) shall not be exceeded for each characteristic where specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Characteristics	Symbols	Drift Value Δ	Units
Change in Capacitance	ΔC/C	±10	%

2.6 INTERMEDIATE AND END-POINT ELECTRICAL MEASUREMENTS

Unless otherwise specified, the measurements shall be performed at T_{amb} = +22 ±3°C.

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

The drift values (Δ) shall not be exceeded for each characteristic where specified. The corresponding absolute limit values for each characteristic shall not be exceeded.

Test Reference per ESCC No. 3008	Characteristics	Symbols	Limits		Units
			Min	Max	
Overload	DC Resistance	R_s	-	Note 1	mΩ
	Insulation Resistance	R_i	Note 1	-	GΩ
Low Air Pressure	Voltage Proof	V_P	125% U_R	-	V
Damp Heat	Insulation Resistance	R_i	Note 2	-	GΩ
Resistance to Soldering Heat	Insulation Resistance	R_i	Note 1	-	GΩ
	Insertion Loss	I_L	Note 1	-	dB
Shock	Insertion Loss	I_L	Note 1	-	dB
Vibration	Insertion Loss	I_L	Note 1	-	dB
Accelerated Damp Heat	Voltage Proof	V_P	90% U_R	-	V
	Insulation Resistance	R_i	Note 3	-	GΩ
	Insertion Loss	I_L	Note 1	-	dB
Operating Life					
Initial Measurements	Capacitance	C	Note 1	-	pF
Intermediate Measurements (at 500 hours (Note 4)) / (at 1000 hours (Note 5))	Insulation Resistance at +125 (+0 -3)°C	R_i	Note 1	-	GΩ
	After recovery				
	Capacitance	C	Note 1	-	pF
	Change in Capacitance	ΔC/C	-	±10	%
	Voltage Proof	V_P	90% U_R	-	V
	Insulation Resistance	R_i	Note 3	-	GΩ
	Insertion Loss	I_L	Note 1	-	dB
Final Measurements (at 1000 or 2000 hours (Note 6))	Insulation Resistance at +125 (+0 -3)°C	R_i	Note 1	-	GΩ
	After recovery				
	Capacitance	C	Note 1	-	pF
	Change in Capacitance	ΔC/C	-	±10	%
	Voltage Proof	V_P	90% U_R	-	V
	Insulation Resistance	R_i	Note 3	-	GΩ
	Insertion Loss	I_L	Note 1	-	dB
Robustness of Terminations	DC Resistance	R_s	-	Note 1	mΩ

NOTES:

1. See Note 1 of Para. 1.4.2.
2. > 10% of the value given in Note 1 of Para. 1.4.2.
3. > 50% of the value given in Note 1 of Para. 1.4.2.
4. 500 hours is applicable to Qualification Testing, Periodic Testing for extension of qualification and to Periodic Testing for renewal of qualification after lapse.
5. 1000 hours is applicable to Qualification Testing, and to Periodic Testing for renewal of qualification after lapse.
6. 1000 hours is applicable to Periodic Testing for extension of qualification. 2000 hours is applicable to Qualification Testing, and to Periodic Testing for renewal of qualification after lapse.

2.7 BURN-IN CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T_{amb}	+125 (+0 -3)	°C
Applied Voltage	U_A		V
Variants 03, 08, 13, 18, 23, 28, 33, 38		300	
Variants 01, 02, 05, 06, 07, 09, 10, 11, 12, 15, 16, 17, 19, 20, 21, 22, 25, 26, 27, 29, 30, 31, 32, 35, 26, 37, 39, 40		200	
Variants 04, 14, 24, 34		140 (Note 1)	

NOTES:

1. Between terminal and case. The voltage polarity shall be positive on the case during the first 24 to 72 hours and then negative on the case for the remaining burn-in period.

2.8 OPERATING LIFE CONDITIONS

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T_{amb}	+125 (+0 -3)	°C
Applied Voltage	U_A		V
Variants 03, 08, 13, 18, 23, 28, 33, 38		300	
Variants 01, 02, 05, 06, 07, 09, 10, 11, 12, 15, 16, 17, 19, 20, 21, 22, 25, 26, 27, 29, 30, 31, 32, 35, 26, 37, 39, 40		200	
Variants 04, 14, 24, 34		140 (Note 1)	
Current	I_{LF}	10 (Note 2)	A

NOTES:

1. Between terminal and case. The voltage polarity shall be positive on the case during the first 24 to 72 hours and then negative on the case for the remaining operating life period.
2. Current flow between the terminals.

APPENDIX 'A'

AGREED DEVIATIONS FOR EXXELIA TECHNOLOGIES (F)

Item Affected	Description of Deviations
Para. 2.1.1.1, Deviations from Screening Tests - Chart F3	Room Temperature Electrical Measurements: Insertion Loss may be performed on a sample of 5 components. In the event of any failure a 100% inspection shall be performed.