



**CAPACITOR FILTERS, PI-TYPE, ELECTROMAGNETIC  
INTERFERENCE SUPPRESSION, SURFACE MOUNT**

**BASED ON TYPE SFCMS 35 TYPE PI**

**ESCC Detail Specification No. 3008/037**

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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: 300803701

- Detail Specification Reference: 3008037
- 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 Variant (Note 1)	Capacitance C (pF)	Case Description and Terminal Configuration (Note 2)	Weight Max. (g)
01	2400	Non-hermetically sealed case, surface mount, with square section body terminal and round section tab terminals	2
02	19200		
03	44800		
04	35200		

**NOTES:**

1. The characteristics applicable to each Component Type Variant are as follows:

Type Variant	Rated DC Voltage $U_R$ (V) (at $T_{amb} \leq +85^\circ C$ )	Insulation Resistance $R_i$ (GΩ)		Voltage Proof $V_P$ (V)
		-55 / +25°C	+125°C	
01	200	10	1	500
02	200	10	1	500

Type Variant	Rated DC Voltage $U_R$ (V) (at $T_{amb} \leq +85^\circ\text{C}$ )	Insulation Resistance $R_i$ (G $\Omega$ )		Voltage Proof $V_P$ (V)
		-55 / +25 $^\circ\text{C}$	+125 $^\circ\text{C}$	
03	100	3	0.3	250
04	50	5	0.5	125

Type Variant	Insertion Loss $I_L$ (dB) With No Current Applied			
	1MHz	10MHz	100MHz	1GHz
01	-	10	47	70
02	-	29	65	70
03	-	39	54	70
04	10	38	65	70

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.

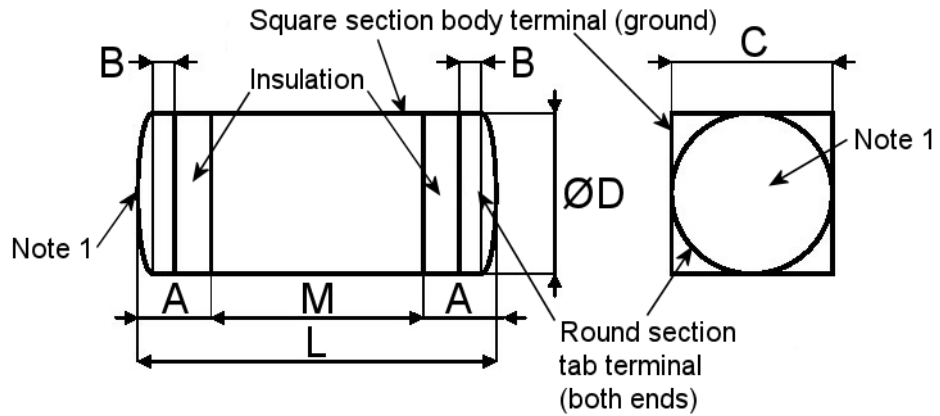
Maximum ratings shall only be exceeded during testing to the extent specified in this specification and when stipulated in Test Methods and Procedures of the ESCC Generic Specification.

Characteristics	Symbols	Maximum Ratings	Units	Remarks
Rated DC Voltage	$U_R$	See Note 1 of Para. 1.4.2	V	Notes 1, 2
Voltage Drop	$V_{dr}$	100	mV	
DC Resistance	$R_s$	10	m $\Omega$	
Rated Current	$I_R$	10	A	DC and Low Frequency
Operating Temperature Range	$T_{op}$	-55 to +125	$^\circ\text{C}$	$T_{amb}$
Storage Temperature Range	$T_{stg}$	-55 to +125	$^\circ\text{C}$	
Soldering Temperature	$T_{sol}$	+280	$^\circ\text{C}$	Note 3

**NOTES:**

- At  $T_{amb} \leq +85^\circ\text{C}$ . For  $T_{amb} > +85^\circ\text{C}$ , the following derating shall apply:
  - For Variants 01 and 02, derate linearly from 200V at  $T_{amb} = +85^\circ\text{C}$  to 100V at  $T_{amb} = +125^\circ\text{C}$ .
  - For Variant 03, derate linearly from 100V at  $T_{amb} = +85^\circ\text{C}$  to 70V at  $T_{amb} = +125^\circ\text{C}$ .
  - For Variant 04, derate linearly from 50V at  $T_{amb} = +85^\circ\text{C}$  to 25V at  $T_{amb} = +125^\circ\text{C}$ .
- The addition of DC applied voltage and ripple voltage shall never exceed the rated DC voltage.
- Duration 6 seconds maximum and the same terminal shall not be resoldered until 3 minutes have elapsed.

1.6 PHYSICAL DIMENSIONS

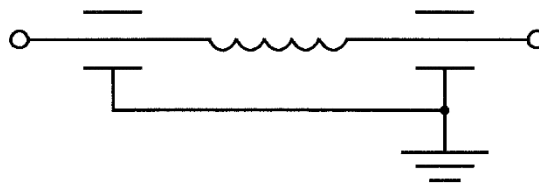


Symbols	Dimensions (mm)		Remarks
	Min	Max	
A	1.9	2.6	
B	0.7	0.9	
C	3.5	3.6	Note 2
ØD	3.5	3.6	Note 3
L	11.3	12.7	
M	7.4	7.6	

**NOTES:**

1. For both tab terminals, only the end-faces are solder plated.
2. This dimension applies to the square-section body terminal (ground), over dimension M. One of the four faces shall bear the marking defined in Para. 2.2.
3. This dimension (diameter) applies to both tab terminals and the body terminal.

1.7 FUNCTIONAL DIAGRAM



1.8 MATERIALS AND FINISHES

1.8.1 Terminal Material and Finish

The body terminal shall be silver plated brass. The end tab terminals' material shall be brass with each end-face plated with Sn5Pb95.

## 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) Rapid Change of Temperature: The components may not be mounted.
- (b) Vibration: Not applicable.
- (c) Room Temperature Electrical Measurements: Voltage Drop shall be replaced by a DC resistance measurement performed in accordance with [MIL-STD-202, Test Method 303](#).
- (d) Room, High and Low Temperature Electrical Measurements: Insertion Loss is considered destructive and therefore components so measured cannot be delivered as flight models. Insertion Loss may be measured after External Visual Inspection, and any parts rejected during External Visual Inspection or Radiographic Inspection, but electrically acceptable after Burn-in, may be used. Components subjected to Insertion Loss Measurements shall not be submitted to Check for Lot Failure, see Paras. 2.5.1 and 2.5.2.
- (e) External Visual Inspection: Any discolouration of the silver plating of the square section body terminal is acceptable.

##### 2.1.1.2 *Deviations from Qualification and Periodic Tests – Chart F4B*

- (a) Where Insertion Loss measurements are required during Qualification Testing and Periodic Testing for renewal of qualification after lapse, they shall be made at only four test frequencies. See Paras. 1.4.2 and 2.5.1.
- (b) 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](#).
- (c) Resistance to Soldering Heat: May be performed prior to Vibration. Capacitance shall be measured instead of Insertion Loss.
- (d) Accelerated Damp Heat: Voltage Proof and Insertion Loss shall not be measured.
- (e) Operating Life, Intermediate and Final Measurements: Insertion Loss measurements shall not be performed.
- (f) Robustness of Terminations: The components shall be mounted on a suitable substrate. After mounting, examination shall be made for good tinning as evidenced by flowing of the solder with wetting of the terminals. A force of 10N shall be applied normal to the line joining the terminals and in a plane parallel to the substrate, for a duration of  $10 \pm 1$ s. The components shall then be examined and there shall be no evidence of damage or loosening of the components from the substrate.



## 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 SOLDERABILITY AND RESISTANCE TO SOLDERING HEAT

The test conditions for Solderability and Resistance to Soldering Heat shall be as specified in the ESCC Generic Specification and as follows:

- Test Ta, Method 2
- Size of soldering iron tip: B
- Temperature of soldering iron tip: +350°C.
- Duration: 5 ±1 seconds

## 2.4 ROBUSTNESS OF TERMINATIONS

The tab terminals of the components are rigid.

The test conditions for Robustness of Terminations shall be as specified in the ESCC Generic Specification. Required deviations are as described in Para. 2.1.1.2.

2.5 ELECTRICAL MEASUREMENTS AT ROOM, HIGH AND LOW TEMPERATURES

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

2.5.1 Room Temperature Electrical Measurements

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

Characteristics	Symbols	Test Method and Conditions	Limits		Units
			Min	Max	
DC Resistance	$R_s$	MIL-STD-202, Test Method 303	-	10	m $\Omega$
Voltage Proof	$V_P$	ESCC No. 3008	Note 1	-	V
Insulation Resistance	$R_i$	ESCC No. 3008	Note 1	-	G $\Omega$
Insertion Loss	$I_{L1}$	ESCC No. 3008 f = 1MHz (Notes 2, 3)	Note 1	-	dB
	$I_{L2}$	f = 10MHz (Notes 2, 4, 5)	Note 1	-	dB
	$I_{L3}$	f = 100MHz (Notes 2, 4, 5)	Note 1	-	dB
	$I_{L4}$	f = 1GHz (Notes 2, 4, 5)	Note 1	-	dB
Capacitance	$C$	ESCC No. 3008 f = 1000 $\pm$ 100Hz V = 0.1 to 1.2Vrms	Note 1	-	pF

**NOTES:**

1. See 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,  $I_{L1}$  is guaranteed but not tested.
4. For Screening, measurements shall be made on a sample of 5 components. If one or more samples fail, another 5 samples shall be selected and measured. Lot failure will occur if any of these additional samples fail. Samples shall be mounted on a suitable substrate prior to the measurements.
5. For Screening and Periodic Testing for extension of qualification,  $I_{L2}$ ,  $I_{L3}$  and  $I_{L4}$  shall be measured with no load current applied.

2.5.2 High and Low Temperatures Electrical Measurements

Characteristics	Symbols	Test Method and Conditions	Limits		Units
			Min	Max	
Insulation Resistance	R <sub>i</sub>	ESCC No. 3008 T <sub>amb</sub> = +125 (+0 -3)°C (Note 1)	Note 2	-	GΩ
Insertion Loss	I <sub>L2</sub> I <sub>L3</sub> I <sub>L4</sub>	ESCC No. 3008 T <sub>amb</sub> = +125 (+0 -3)°C and T <sub>amb</sub> = -55 (+3 -0)°C f = 10MHz (Notes 3, 4) f = 100MHz (Notes 3, 4) f = 1GHz (Notes 3, 4)	Note 2	-	dB
			Note 2	-	dB
			Note 2	-	dB

**NOTES:**

1. Insulation Resistance measurements shall only be performed immediately on completion of Burn-in, as specified in the ESCC Generic Specification. Insulation Resistance shall not be measured again during testing per Chart F3 of the ESCC Generic Specification.
2. See Para. 1.4.2.
3. Measurements shall be made on a sample of 5 components. If one or more samples fail, another 5 samples shall be selected and measured. Lot failure will occur if any of these additional samples fail. Samples shall be mounted on a suitable substrate prior to the measurements.
4. Measurements shall be made with no load current applied.

2.6 PARAMETER DRIFT VALUES

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. 2.5.1, 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	%

2.7 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, test methods and test conditions shall be as per the corresponding test defined in Para. 2.5.1, Room Temperature Electrical Measurements.

The drift values ( $\Delta$ ) 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	
Low Air Pressure	Voltage Proof	$V_P$	125% $U_R$	-	V
Overload	DC Resistance	$R_s$	-	Note 1	m $\Omega$
	Insulation Resistance	$R_i$	Note 2	-	G $\Omega$
Damp Heat	Insulation Resistance (applied voltage = 1.5V)	$R_i$	Note 3	-	G $\Omega$
Vibration	Insertion Loss (applied current = minimum required for monitoring purposes)	$I_L$	Note 2	-	dB
Resistance to Soldering Heat	Insulation Resistance	$R_i$	Note 2	-	G $\Omega$
	Capacitance	C	Note 2	-	pF
Shock	Insertion Loss	$I_L$	Note 2	-	dB
Accelerated Damp Heat	Insulation Resistance	$R_i$	Note 3	-	G $\Omega$
Operating Life					
Initial Measurements	Capacitance	C	Note 2	-	pF
Intermediate Measurements (at 500 hours (Note 4)) / (at 1000 hours (Note 5))	Insulation Resistance at +125 (+0 -3) $^{\circ}C$ After recovery	$R_i$	Note 2	-	G $\Omega$
	Capacitance	C	Note 2	-	pF
	Change in Capacitance	$\Delta C/C$	-	$\pm 10$	%
	Voltage Proof	$V_P$	90% $U_R$	-	V
	Insulation Resistance	$R_i$	Note 6	-	G $\Omega$
Final Measurements (at 1000 or 2000 hours (Note 7))	Insulation Resistance at +125 (+0 -3) $^{\circ}C$ After recovery	$R_i$	Note 2	-	G $\Omega$
	Capacitance	C	Note 2	-	pF
	Change in Capacitance	$\Delta C/C$	-	$\pm 10$	%
	Voltage Proof	$V_P$	90% $U_R$	-	V
	Insulation Resistance	$R_i$	Note 6	-	G $\Omega$
Robustness of Terminations	DC Resistance	$R_s$	-	Note 1	m $\Omega$

**NOTES:**

1. See Para. 2.5.1.
2. See Para. 1.4.2.
3. > 10% of the value given in 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. > 50% of the value given in Para. 1.4.2.
7. 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.

2.8

**BURN-IN CONDITIONS**

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T <sub>amb</sub>	+125 (+0 -3)	°C
Applied Voltage	U <sub>A</sub>		V
Variants 01, 02		200 (Note 1)	
Variant 03		140 (Note 1)	
Variant 04		70 (Note 1)	

**NOTES:**

1. Between one tab terminal and the body terminal.

2.9

**OPERATING LIFE CONDITIONS**

Characteristics	Symbols	Test Conditions	Units
Ambient Temperature	T <sub>amb</sub>	+125 (+0 -3)	°C
Applied Voltage	U <sub>A</sub>		V
Variants 01, 02		200 (Note 1)	
Variant 03		140 (Note 1)	
Variant 04		70 (Note 1)	
Rated Current	I <sub>R</sub>	10 (Note 2)	A

**NOTES:**

1. Between one tab terminal and the body terminal.
2. Current to flow between the tab terminals.