CHOKES, COMMON MODE, FIXED, MOULDED, SMD,

BASED ON SERIES CMC15, 18 AND 22

ESCC Detail Specification No. 3201/010

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DCR No.	CHANGE DESCRIPTION
813	Specification upissued to incorporate editorial and technical changes per DCR. Specification produced in MSWORD. Changes in presentation are possible.

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1 GENERAL

1.1 SCOPE

This specification details the ratings, physical and electrical characteristics, test and inspection data for Chokes, Common Mode, Fixed, Moulded, SMD, based on Series CMC15, 18 and 22. It shall be read in conjunction with ESCC Generic Specification No. 3201, the requirements of which are supplemented herein.

1.2 COMPONENT TYPE VARIANTS AND RANGE OF COMPONENTS

Variants and range of components 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 chokes specified herein, are scheduled in Table 1(b).

1.4 PARAMETER DERATING INFORMATION

Not applicable.

1.5 PHYSICAL DIMENSIONS

The physical dimensions of the chokes specified herein are shown in Figure 2.

1.6 FUNCTIONAL DIAGRAM

The functional diagram for the chokes 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) ESCC Generic Specification No. 3201 for RF Coils, Fixed.

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.

TABLE 1(a) – TYPE VARIANTS AND RANGE OF COMPONENTS

Variant	Type Number	Nominal Inductance Each Winding L (mH)	Inductance Measurement Voltage Test Condition V_T (mV)	Minimum Inductance Each Winding L (µH)	Maximum DC Resistance Each Winding R_{DC} (mΩ)	Rated RMS Current Each Winding I_R (Arms)	Lead/Terminal Finish	Maximum Weight (g)
01	CMC15 52K	52	10	31	15	5.2	See Para. 4.4.2	5
	CMC15 M11	110	10	66	35	3.4	See Para. 4.4.2	5
	CMC15 M22	220	10	134	65	2.5	See Para. 4.4.2	5
	CMC15 M47	470	10	279	150	1.7	See Para. 4.4.2	5
	CMC15 1M0	1000	20	597	350	1.1	See Para. 4.4.2	5
	CMC15 2M0	2000	25	1210	770	0.7	See Para. 4.4.2	5
	CMC15 4M0	4000	35	2430	1750	0.5	See Para. 4.4.2	5
03	CMC18 60K	60	10	36	7	7.7	See Para. 4.4.2	10
	CMC18 M13	130	10	75	15	5.3	See Para. 4.4.2	10
	CMC18 M27	270	20	160	35	3.5	See Para. 4.4.2	10
	CMC18 M54	540	25	324	75	2.3	See Para. 4.4.2	10
	CMC18 1M1	1100	35	675	175	1.5	See Para. 4.4.2	10
	CMC18 2M4	2400	50	1440	415	1	See Para. 4.4.2	10
	CMC18 4M9	4900	70	2910	920	0.7	See Para. 4.4.2	10
05	CMC22 58K	60	10	35	5	11	See Para. 4.4.2	26
	CMC22 M14	140	20	86	10	7.3	See Para. 4.4.2	26
	CMC22 M34	340	30	205	20	4.5	See Para. 4.4.2	26
	CMC22 M74	740	45	443	40	3.3	See Para. 4.4.2	26
	CMC22 1M6	1600	65	970	95	2.1	See Para. 4.4.2	26
	CMC22 3M3	3300	90	1990	205	1.4	See Para. 4.4.2	26

TABLE 1(b) - MAXIMUM RATINGS

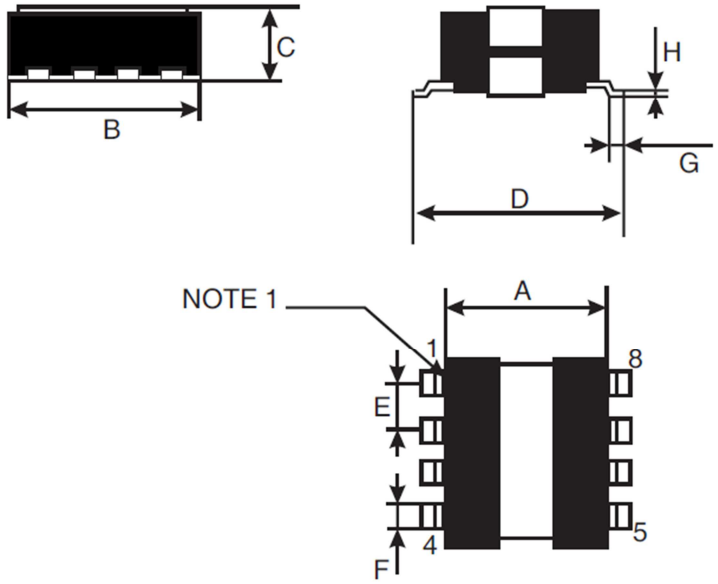
No.	Characteristics	Symbol	Maximum Ratings	Unit	Remarks
1	Rated Current	I_R	See Table 1(a)	Arms	Over the entire operating temperature range
2	Dielectric Withstanding Voltage (Note 1)	DWV	500	Vrms	
3	Operating Temperature Range	T_{op}	-55 to +125	°C	T_{amb}
4	Storage Temperature Range	T_{stg}	-55 to +175	°C	
5	Soldering Temperature	T_{sol}	+260	°C	Note 2

NOTES:
1. This rating applies both between separate windings and between the windings and the case.
2. Duration 5 seconds maximum, the same terminal shall not be resoldered until 3 minutes have elapsed.

FIGURE 1 - PARAMETER DERATING INFORMATION

Not applicable.

FIGURE 2 - PHYSICAL DIMENSIONS

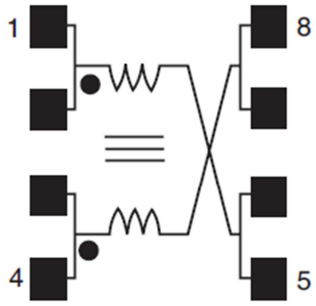


Dimensions (mm)						
Symbol	Variant 01		Variant 03		Variant 05	
	Min	Max	Min	Max	Min	Max
A	16	16.5	21.7	22.3	30.4	30.9
B	-	16	-	19.8	-	23.5
C	-	8	-	8.9	-	12.5
D	21.1	22	25.5	26.4	36.1	37
E	3.7	3.9	3.7	3.9	2.45	2.65
F	1	1.2	1.9	2.1	1.9	2.1
G	1.3	1.6	1.3	1.6	1.3	1.6
H	0.2	0.4	0.2	0.4	0.2	0.4

NOTES:

1. Pin 1 shall be identified with a contrasting coloured identification mark or indent in the area shown.

FIGURE 3 - FUNCTIONAL DIAGRAM



(Top View)

4 REQUIREMENTS

4.1 GENERAL

The complete requirements for procurement of the components specified herein are stated in this specification and ESCC Generic Specification No. 3201 for RF Coils, Fixed. Deviations from the Generic Specification, applicable to this specification only, are detailed in Para. 4.2.

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 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 Burn-in and Electrical Measurements (Chart III)

(a) Para. 9.3.2, Parameter Drift Value, Final Measurements: Shall be performed after a recovery period of 24 ±2 hours post Burn-In.
(b) Para. 9.4, Radiographic Inspection: Shall not be performed.

4.2.4 Deviations from Qualification Tests (Chart IV)

(a) Para. 9.17, Immersion: Shall not be performed.
(b) Para. 9.18, Moisture Resistance: There shall be no polarisation voltage during test.

4.2.5 Deviations from Lot Acceptance Tests (Chart V)

(a) Para. 9.18, Moisture Resistance: There shall be no polarisation voltage during test.

4.3 MECHANICAL REQUIREMENTS

4.3.1 Dimension Check
The dimensions of the chokes specified herein shall be verified in accordance with the requirements set out in Para. 9.6 of ESCC Generic Specification No. 3201 and shall conform to those shown in Figure 2.

4.3.2 Weight
The maximum weight of the chokes specified herein shall be as given in Type Variants and Range of Components.

4.3.3 Terminal Strength
The requirements for terminal strength testing are specified in Para. 9.12 of ESCC Generic Specification No. 3201.

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 connectors 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
As a minimum, a resin moulding shall ensure the chokes protection.

4.4.2 Terminal Material and Finish
The terminal material shall be brass, plated with 2 to 4µm of Nickel. The final finish shall be Sn60Pb40.

4.5 MARKING

4.5.1 General
The marking of all components delivered to this specification shall be in accordance with the requirements of ESCC 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) The ESCC Component Number.
(b) Electrical Characteristics and Ratings.
(c) Traceability Information.

4.5.2 The ESCC Component Number

The ESCC Component Number shall be constituted and marked as follows:

320101001B

- Detail Specification Number: 3201010
- Type Variant Number (see Table 1(a)): 01
- Testing Level (B or C, as applicable): B

4.5.3 Electrical Characteristics and Ratings

The electrical characteristics and ratings to be marked in the following order of precedence are:

(a) Numerical Value.

The information shall be constituted and marked as follows:

52K

- Numerical value: 52µH

4.5.3.1 Inductance Values

The numerical values for inductance shall be expressed by means of the following codes. The unit quantity for marking shall be in microhenries.

Numerical Value	Code
XX	XX0
XXX	XX1
XXXX	XX2

The inductance values available for each Type Variant are specified in Type Variants and Range of Components.

4.5.4 Traceability Information

Each component shall be marked in respect of traceability information in accordance with the requirements of ESCC 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, measurements shall be performed at T_{amb} = +22 ±3 ^{o}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. Unless otherwise specified, measurements shall be performed at T_{amb} = +125 (+0 -5) and -55 (+5 -0) ^{o}C respectively.

4.6.3 Circuits for Electrical Measurements (Figure 4)
Not applicable.

4.7 BURN-IN TESTS

4.7.1 Parameter Drift Values
The parameter drift values applicable to burn-in are specified in Table 4 of this specification. Unless otherwise stated, measurements shall be performed at T_{amb} = +22 ±3 ^{o}C.

The parameter drift values (Δ) applicable to the parameters scheduled shall not be exceeded. In addition to these drift value requirements for a given parameter, the appropriate limit value specified in Table 2 shall not be exceeded.

4.7.2 Conditions for Burn-in
The requirements for burn-in are specified in Section 7 of the ESCC Generic Specification No. 3201. The conditions for burn-in shall be as specified in Table 5(a) of this specification.

4.7.3 Electrical Circuit for Burn-in (Figure 5(a))
Not applicable.

TABLE 2 - ELECTRICAL MEASUREMENTS AT ROOM TEMPERATURE

No.	Characteristics	Symbol	ESCC 3201 Test Method	Test Condition	Limits		Unit
					Min	Max	
01	Inductance	L	Para. 9.3.1.1	Magnetic Field < 10mT f=10kHz V_T=Note 1	Note 2	-	µH
02	DC Resistance	R_{DC}	Para. 9.3.1.4	Para. 9.3.1.4	-	Note 3	mΩ
03	Dielectric Withstanding Voltage Leakage Current (Note 4)	I_L	Para. 9.3.1.5	500 Vrms	-	100	µA

NOTES:
1. The test voltage conditions shall be as specified in Table 1(a).
2. The limits for Inductance for each winding are as specified in Table 1(a).
3. The limits for DC Resistance for each winding are as specified in Table 1(a).
4. Tested both between the windings and between the windings and the case.

TABLE 3 - ELECTRICAL MEASUREMENTS AT HIGH AND LOW TEMPERATURES (NOTE 1)

No.	Characteristics	Symbol	ESCC 3201 Test Method	Test Condition	Limits		Unit
					Min	Max	
01	Inductance (Note 2)	ΔL/L	As per Table 2	As per Table 2	-75	+100	%

NOTES:
1. To be performed on 5 components. In the event of any failure a 100% inspection shall be performed.
2. For each winding.
3. ΔL/L is calculated from the difference between the high or low temperature inductance value and the room temperature inductance value divided by the room temperature inductance value.

FIGURE 4 - CIRCUITS FOR ELECTRICAL MEASUREMENTS

Not applicable.

TABLE 4 - PARAMETER DRIFT VALUES

No.	Characteristics	Symbol	Spec and/or Test Method	Test Condition	Change Limits (Δ)	Unit
01	Inductance (Note 1)	ΔL/L	As per Table 2	As per Table 2	±10	%

NOTES:
1. For each winding.

TABLE 5(a) - CONDITIONS FOR BURN-IN

No.	Characteristics	Symbol	Conditions	Unit
01	Ambient Temperature	T_{amb}	+125 (+0 -3)	^{o}C

TABLE 5(b) - CONDITIONS FOR OPERATING LIFE TEST

No.	Characteristics	Symbol	Conditions	Unit
01	Ambient Temperature	T_{amb}	+125(+0 -3)	^{o}C
02	Loading and Cycling	-	Para. 9.19 of ESCC 3201 Rated RMS Current shall be applied to both windings in series (Note 1)	-

NOTES:
1. The Rated RMS Current for each winding as specified in Table 1(a).

FIGURE 5(a) - ELECTRICAL CIRCUIT FOR BURN-IN

Not applicable.

FIGURE 5(b) - ELECTRICAL CIRCUIT FOR OPERATING LIFE TEST

Not applicable.

4.8 ENVIRONMENTAL AND ENDURANCE TESTING (CHARTS IV AND V OF ESCC GENERIC SPECIFICATION NO. 3201)

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 testing are scheduled in Table 6. Unless otherwise stated, the measurements shall be performed at T_{amb} = +22 ±3 ^{o}C.

4.8.2 Measurements and Inspections at Intermediate Points 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 ±3 ^{o}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 ±3 ^{o}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 ESCC Generic Specification No. 3201. 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.	ESCC Generic Spec. No. 3201		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Method and Conditions	Identification	Conditions		Min	Max	
01	Thermal Shock	Para. 9.2	Visual Examination	Evidence of damage or loosening of terminals	-	-	-	-
02	Solderability	Para. 9.7	Visual Examination	MIL-STD 202 Method 208 Solid Wire Termination Criteria	-	-	-	-
03	Barometric Pressure	Para. 9.8	**During Test**	While still at low pressure				
			Dielectric Withstanding Voltage Leakage Current	Table 2 Item 3	I_L	Table 2 Item 3		mA
04	Temperature Rise	Para. 9.9 and Table 1(a) of this spec. at + 90 °C	Temperature Rise	Within 30 seconds of removal of power Temperature Change	ΔT	-	25	°C
05	Overload	Para. 9.10 of this spec.	**After Test** Visual Examination	Evidence of cracked cases, charred windings, destroyed or softened insulation or loosening of terminals	-	-	-	-
			Final Measurements	After 24 hours				
			DC Resistance	Table 2 Item 2	R_{DC}	Table 2 Item 2		mΩ
			Dielectric Withstanding Voltage Leakage Current	Table 2 Item 3	I_L	Table 2 Item 3		µA
06	Resistance to Soldering Heat	Para. 9.11	**Final Measurements**					
			Inductance	Table 2 Item 1	L	Table 2 Item 1		µH
			DC Resistance	Table 2 Item 2	R_{DC}	Table 2 Item 2		mΩ
			Dielectric Withstanding Voltage Leakage Current	Table 2 Item 3	I_L	Table 2 Item 3		µA
			After Test					
			Visual Examination	Evidence of damage or loosening of terminals	-	-	-	-

No.	ESCC Generic Spec. No. 3201		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Method and Conditions	Identification	Conditions		Min	Max	
07	Terminal Strength	Para. 9.12.2	Visual Examination	Evidence of damage	-	-	-	-
08	Low Temperature Storage	Para. 9.14 and Table 1(b) of this spec.	Visual Examination	Evidence of damage or loosening of terminals	-	-	-	-
09	Vibration	Para. 9.15	Visual Examination	Evidence of damage	-	-	-	-
10	Shock (Specified Pulse)	Para. 9.16	Visual Examination	Evidence of damage	-	-	-	-
11	Immersion	Para. 9.17	Not applicable	-	-	-	-	-
12	Moisture Resistance	Para. 9.18 and Pars. 4.2.4 and 4.2.5 of this spec. Before Tests, Thermal Shock per MIL-STD-202 Method 107 Cond. A.	**Final Measurements**	Within 30 mins of removal from 1.5 to 3.5 hr. Conditioning	-	-	-	-
			Dielectric Withstanding Voltage Leakage Current	Table 2 Item 3	I_L	Table 2 Item 3		µA
			Inductance	Table 2 Item 1	L	Table 2 Item 1		µH
			DC Resistance	Table 2 Item 2	R_{DC}	Table 2 Item 2		mΩ
			After Test					
			Visual Examination	No evidence of corrosion	-	-	-	-

No.	ESCC Generic Spec. No. 3201		Measurements and Inspections		Symbol	Limits		Unit
	Environmental and Endurance Tests (Note 1)	Test Method and Conditions	Identification	Conditions		Min	Max	
13	Operating Life	Para. 9.19	**Initial Measurements**					
			Inductance	Table 2 Item 1	ΔL/L	Table 2 Item 1		µH
			Intermediate Measurements (when applicable)	At 1000 hours After a recovery period of 30 mins	-	-	-	-
			Dielectric Withstanding Voltage Leakage Current	Table 2 Item 3	I_L	Table 2 Item 3		µA
			Inductance Change	Table 2 Item 1	ΔL	-10	+10	%
			Final Measurements	At 1000 hours or 2000 hours, as applicable, after a recovery period of 30 mins				
			Dielectric Withstanding Voltage Leakage Current	Table 2 Item 3	I_L	Table 2 Item 3		µA
			Inductance Change	Table 2 Item 1	ΔL/L	-10	+10	%
			DC Resistance	Table 2 Item 2	R_{DC}	Table 2 Item 2		mΩ

NOTES:

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

APPENDIX A

AGREED DEVIATIONS FOR MICROSPIRE (F)

ITEMS AFFECTED	DESCRIPTION OF DEVIATIONS
Deviations from Qualification Tests (Chart IV)	Para. 9.15 Vibration, Test condition shall be G (30g peak)
Deviations from Lot Acceptance Tests (Chart V)	Para. 9.15 Vibration, Test condition shall be G (30g peak)