

5.4.2 Flux A/S: Custom Magnetics (Inductors, Chokes and Transformers)

5.4.2.1 Contact Information

Address	ESCC Chief Inspector
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5.4.2.2 Qualification

Current Qualification Certificate No.	In QML since:	Type Designation
364A	March 2020	Custom Magnetics (Inductors, Chokes and Transformers)

APPLICABLE DOCUMENTS

ESCC Generic Specification No. [3201](#)

ESCC Detail Specification Nos. [3201/013](#)

Process Identification Document PID 088699015-4, ESCC DML 08699003, ESCC DPL 08699004

5.4.2.3 List of Qualified Components

The part number is 3201/01301F[12345678-#] and has been generated in accordance with ESCC 3201/013. Flux A/S component identification is as follows: 12345678-#-C

The component types and range of magnetic components applicable to the inductors and chokes technology are defined herein:

Variant Number	Design Domain	Electrical Characteristics	Number of Terminals	Finish	Weight
Based on core size and type of termination 12345xxx	Note 1	Note 2	Note 3	Note 4	Note 5
	Note 1	Note 2	Note 3	Note 4	Note 5
	Note 1	Note 2	Note 3	Note 4	Note 5
	Note 1	Note 2	Note 3	Note 4	Note 5
	Note 1	Note 2	Note 3	Note 4	Note 5

The component types and range of magnetic components applicable to the transformers technology are defined herein:

Variant Number	Design Domain	Electrical Characteristics	Number of Terminals	Finish	Weight
	Note 1	Note 2	Note 3	Note 4	Note 5

Variant Number	Design Domain	Electrical Characteristics	Number of Terminals	Finish	Weight	
14345xxx	Based on core size and type of termination	Note 1	Note 2	Note 3	Note 4	Note 5
		Note 1	Note 2	Note 3	Note 4	Note 5
		Note 1	Note 2	Note 3	Note 4	Note 5
		Note 1	Note 2	Note 3	Note 4	Note 5

NOTE 1 - DOMAIN

The design domain for the components manufactured includes the following:

- Development of customized electrical functions:
 - Single or multi-coupled inductors
 - Common mode chokes /Differential
 - Power transformers (flyback, forward, push-pull, half/full bridge, specific architectures)
 - Signal transformers
 - Pulse transformers
 - Current/voltage measurement transformers
 - Specific magnetic functions within environment and thermal requirements
 - Integrated Magnetics
 - Spike Killer (high frequency filter)
 - High Frequency
 - High Voltage

- Temperature Range -55°C to +130°C, depending on temperature class
- Maximum Power - See Note 2
- Temperature rise – See Note 2
- Dielectric Strength – See Note 2

The multi-element assemblies featuring multiple transformers/inductors assembled on substrate, that Flux are capable of manufacturing, are not included into ESCC QML domain.

NOTE 2 - ELECTRICAL CHARACTERISTICS

All electrical characteristics to a particular design are specified in the magnetics sheet, which is either produced or verified by the manufacturer.

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 (Note 1)	Units	Remarks
Power	P	See Magnetic Sheet	W	Upto 2.5kW
Rated DC Current	I _R	See Magnetic Sheet	mA	Upto 35A
Dielectric Withstanding Voltage	DWV	See Magnetic Sheet	Vrms	
Operating Frequency	f	See Magnetic Sheet	Hz	Upto 0.5Mhz
Operating Temperature Range	T _{op}	See Magnetic Sheet (-55 to +130°C)	°C	T _{amb}
Storage Temperature Range	T _{stg}	See Magnetic Sheet (-55 to +155°C)	°C	
Soldering Temperature	T _{sol}	+260 for SnPb +300 for SnAg	°C	Note 2

NOTES:

1. This Maximum Rating for a particular component will be specified in the Magnetic Sheet for that component
2. The maximum operating temperature shall not exceed the derated material temperature– (Temperature rise+Hotspot)
3. The maximum storage temperature shall not exceed the derated material temperature
4. Unless otherwise specified in the applicable Magnetic Duration 5 seconds maximum, the same terminal shall not be resoldered until 3 minutes have elapsed.

NOTE 3 – NUMBER OF TERMINALS

The number of terminals or leads are specified in the magnetics sheet, which is either produced or verified by the manufacturer.

NOTE 4 – MATERIAL AND FINISHES

The minimum wire size shall be Ø0.10mm

The materials and finishes including case and terminals for a particular component will be specified in the Magnetic Sheet for that component. All materials shall meet the requirements of ECSS-Q-ST-70-71 and are detailed in FT08699004.

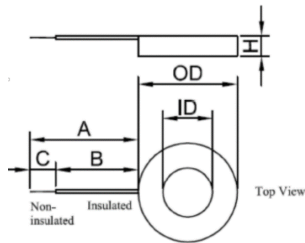
NOTE 5 – WEIGHT AND PHYSICAL DIMENSIONS

The weight and physical dimension are specified in the magnetics sheet.

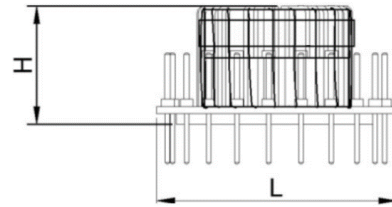
The overall dimensions for the range of cores used in components, depending on the design type used, are as follows:

- For toroid based designs: effective core (The minimum physical area which the total flux runs through the core) area of 2mm² to 199mm²; see examples below:

Toroid with flying leads

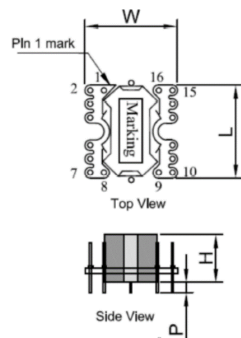


Toroid on base with pins

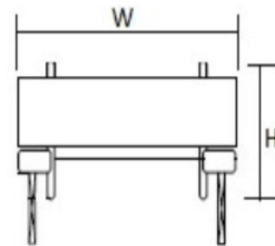


- For coil former based designs: effective core area 2.66mm² to 146mm²; see examples below:

RM (Rectangular Module) based design with pins

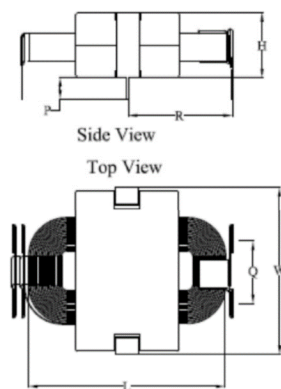


EFD (Economic Flat Design) based design with pins

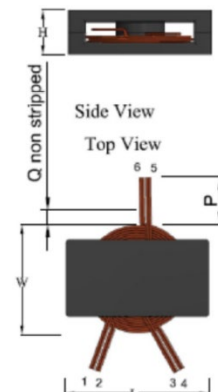


- For custom designs: effective core area 0.14mm² to 484mm²; see examples below:

Planar design with foil



Planar design with wire



Unless otherwise specified in the applicable Magnetic Sheet and where applicable, terminals shall be colour coded.

5.4.2.4 *Technology Flow abstract*

GENERAL FEATURES

The Technology Flow covers the design, manufacturing, assembly, in-process inspection, screening and testing of custom magnetic components at Flux A/S, Denmark.

BASIC INFORMATION

Leads: As per ECSS-Q-ST-70-08

Molding: As specified and listed in DML

Wire: As specified and listed in DML

Magnetic core: Chosen during design phase to meet customer requirements and listed in DML.

Formats component types: See Detail specification [3201/013](#) and magnetic sheets.

5.4.2.5 *Technology Flow definition*

1. Design

The magnetic components are designed according to design rules and following a design process described in the PID FT088699015. The design rules ensures operation within specified temperature class, see magnetic sheet.

During the electrical design the specified voltage, current, frequency, and power is ensured the design is within the domain.

With the electrical design in place the core and mechanical design is checked against the physical domain constraints.

Finally the materials and production processes are compared to the ESCC DML and DPL to ensure the complete design is within the domain.

Electrical rule set:

Parameter	Inductor	Transformer
Output Power [W]	$0 \leq P \leq 2,5kW$	$0 \leq P \leq 2,5kW$
Voltage [V]	$0 \leq V \leq 110V$	$0 \leq V \leq 3kV$
Current [A]	$0 \leq I \leq 35A$	$0 \leq I \leq 35A$
Dielectrical Breakdown	$950 \leq V \leq 8kV$	$950 \leq V \leq 8kV$
Temperature [°C]	$-55 \leq T \leq 155$	$-55 \leq T \leq 155$
Dimensions[mm ³] (Core Volume)	$1 \leq V \leq 164000$	$2 \leq V \leq 234000$

NOTE: Voltage and current values are absolute values.

2. Manufacturing process

The manufacturing process is described in the PID FT088699015 and DPL FT08699004. Materials and Processes are selected from Flux's ESCC DML and DPL respectively.

3. Control and testing

Control and testing are performed at Flux A/S.

They are performed according to the part specific magnetic sheet and the generic ESCC specification [3201](#) and the ESCC detail specification [3201/013](#)

4. Radiation characteristics

These magnetic components are not sensitive to radiation.

5.4.2.6 Manufacturing site

Flux A/S, Industrivangen 5, 4550 Asnaes, Denmark