5.4 TRANSFORMERS (08)

5.4.1 Exxelia SAS: Custom magnetics: linear and toroidal technology

5.4.1.1 Contact Information

Address	ESCC Chief Inspector
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5.4.1.2 Qualification

Current Qualification Certificate No.	In QML since:	Type Designation
	February 2019	Molded SMD custom magnetic components, toroidal (TO) or linear (CCM) winding technology

Applicable Documents

ESCC Generic Specification No.3201

ESCC Detail Specification Nos. 3201/011 (CCM technology), 3201/012 (TO technology)

Exxelia. Process Identification Document PID 100 (TO technology) and PID 101 (CCM technology)

5.4.1.3 List of Qualified Components

The component type variants and range of magnetic components applicable to the toroid TO technology are as follows:

Variant Number	Type	Design Domain	Electrical Characteristics	No. of Terminals	Terminal Finish	Weight Max (g)
01	TO10	Note 1	Note 2	10	Sn60Pb40	3.1
02	TO12	Note 1	Note 2	10	Sn60Pb40	5.9
03	TO16	Note 1	Note 2	12	Sn60Pb40	11.6
04	TO20	Note 1	Note 2	14	Sn60Pb40	21.8
05	TO25	Note 1	Note 2	18	Sn60Pb40	41.2
06	TO30	Note 1	Note 2	22	Sn60Pb40	80.4
07	TO36	Note 1	Note 2	24	Sn60Pb40	172.1

The component type variants and range of magnetics components applicable to the linear CCM technology are as follows:

Variant Number	Type	Design Domain	Electrical Characteristics	Total Power Max (W)	No. of Terminals (3)	Terminal Finish (4)	Weight Max (g)
01	CCM4	Note 1	Note 2	≤ 18	12	Sn60Pb40	5.1
02	CCM5	Note 1	Note 2	≤ 40	16	Sn60Pb40	7.4
03	CCM6	Note 1	Note 2	≤ 50	16	Sn60Pb40	12.1
04	CCM20	Note 1	Note 2	≤ 120	16	Sn60Pb40	21.4
05	CCM25	Note 1	Note 2	≤ 150	20	Sn60Pb40	44.2

NOTE 1

The design domain for components produced in accordance with these specifications includes the following items:

- Development of customized electrical functions:
  - Single or multi-coupled inductors
  - Common mode chokes
  - 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
- Temperature range: -55°C +125°C

- Power, losses, and component heating:

    - Maximum power depends on component heating. The heating is calculated from losses and thermal resistances for each Variant according to the electrical function. The thermal resistances are given in Maximum Rating.
    - The maximum temperature rise at Tamb = +100°C is +25°C.
    - Examples of maximum power per Variant are given above.

- Dielectric strength:

    - Single insulation: 500Vrms
    - Reinforced insulation for CCM technology: 1000Vrms

NOTE 2

All electrical characteristics applicable to a particular component design are specified in the document: Specific Component Design Sheet provided by the manufacturer.

5.4.1.4 Technology Flow abstract

General features

The Technology Flow covers the design, manufacturing, assembly, in-process inspection, screening and testing of custom magnetic components at Exxelia, Illange, France.

These SMD inductors, chokes and transformers use toroidal winding (TO technlogy) or linear winding (CCM technology) assembled on a lead frame and molded with epoxy resin.

Basic information

Leads: Brass with copper layer and SnPb finish

Molding: Epoxy resin

Wire: 180 °C magnet wire

Magnetic core: Chosen during design phase to meet customer requirements

Formats component types: See Details specifications 3201/011 and 3201/012

5.4.1.5 Technology Flow definition

1. **Design**

The magnetic components are designed according to design rules and following a design process both described in the Exxelia documents PID 100 and PID 101.

The design rules ensure maximum operating temperature below 125°C and dielectric strength

2. **Manufacturing process**

The manufacturing process is described in the documents PID 100 (TO technology) and PID 101 (CCM technology)

Process summary:

- Toroidal winding for TO technology
- Linear winding for CCM technology
- High temperature soldering on the lead frame
- Transfer molding
- Magnetic core assembly for CCM technology
- Leads forming
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3. **Control and testing**
The control and test are performed in Exxelia Illange.

They are performed according to the document Specific Component Design Sheet and the generic ESCC specification 3201 and the ESCC detail specification 3201/011 and 3201/012.

4. **Radiation characteristics**
TO and CCM magnetics components are not sensitive to radiations.

5.4.1.6 Manufacturing site

Exxelia 16 Parc d'Activités du Beau Vallon F57970 Illange France