EPD

ENVIRONMENTAL PRODUCT DECLARATION

Production site: Xiamen City, Fujian Province, China

UEM5-250L/250-430501C-P13-002

UEM5Z1-250M/250-430001C-P13LSI-002

DOCUMENT KIND Environmental Product Declaration	IN COMPLIANCE WITH ISO 14025 and EN50693		
PROGRAM OPERATOR EPDItaly	PUBLISHER EPDItaly		
EPDITALY REGISTRATION NUMBER EPDITALY 0348	ISSUE DATE 2023-12-15		
VALID TO 2028-12-15	INTERNAL/ EXTERANL USE EXTERNAL		
OWNING ORGANIZATION HONGFA	DECLARATION NUMBER HFESC 20220617	REV. 1.0	LANG. EN

EPD Owner	HONGFA
Manufacturer name and address	Xiamen Hongfa Electrical Safety & Controls Co., Ltd. No.566 Donglin Road, Jimei North Industrial District, Xiamen,China
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Program operator	EPDItaly – info@epditaly.it via Gaetano De Castillia n° 10 - 20124 Milano, Italia
Declared product & Functional unit or declared unit	DU: The declared unit is specified in terms of pcs. The declared unit is 1pc of manufactured product incl. packaging material with RSL of 20 years
Product description	UEM5-250L/250-430501C-P13-002 & UEM5Z1-250M/250-430001C-P13LSI-002, 2 circuit breakers in 1 synthesis EPD report
CPC code	46212
Independent verification	INTERNAL ☒ EXTERNAL Third party verification carried out by: ICMQ accredited by: ACCREDIA. This declaration has been developed referring to EPDItaly, following the "REGULATIONS OF THE EPDItaly PROGRAMME" Revision 5.2; further information and the document itself are available at: www.epditaly.it. EPD document valid within the following geographical area: Italy. Independent verification of the declaration and data carried out according to ISO 14025: 2006.
Reference PCR and version number	Core PCR: EPDItaly007 – PCR for Electronic and Electrical Products and Systems, Rev. 3, 2023/01/13. Sub PCR: EPDItaly012 - Electronic and electrical products and systems –Switches, Rev. 0, 2020/03/16.
Other reference documents	EN 50693:2019 - Product category rules for life cycle assessments of electronic and electrical products and systems Regulations of the EPDItaly Programme rev. 5.2 published on 2022/02/16
Product RSL description	20 years
Markets of applicability	B2B, Italy
LCA study	This EPD study is based on the LCA study described in the LCA report
EPD type	Product specific

EPD scope	Cradle to grave
Year of reported primary data	2022/09~2023/08
Technical support	TÜV Rheinland (China) Ltd.
LCA software	SimaPro 9.5.0.0
LCI database	Ecoinvent v3.9.1 (2022)
LCIA methodology	EN 15804 + A2 Method V1.02/ EF 3.1
Comparability	EPDs published within the same product category, though originating from different programs, may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible.
Liability	EPDItaly declines any responsibility regarding the manufacturer's information, data and results of the life cycle assessment.

CONTENTS

HONGFA PURPOSE & EMBEDDING SUSTAINABILITY

Xiamen Hongfa Electroacoustic Co., Ltd. (The abbreviation is Hongfa Group) is in the process of seeking their own survival and sustainable development. HONGFA considers to achieve the goal of enterprise management and improve enterprise market position, and to keep the enterprise in the leading field of competition and the future expansion of the business environment always maintain sustained earnings growth and improvement of ability, ensure longevity enterprise for a long time.

Hongfa establishes CSR management manual to ensure compliance with laws, regulations and customer requirements and continuous improvement.

1. The CSR policy

People-oriented, green operation, to promote the harmonious and sustainable development of economy, society and environment

2. CSR vision

To build a sustainable social responsibility system and become a first-class enterprise in the global relay field respected by the society and loved by employe

3. The CSR strategy

Develop employee value, promote green environmental protection, pursue win-win ecology and create a better life.

4. CSR practice path

For employees, people-oriented, growth together

For the environment, green environmental protection, clean production

For partners, development together, to achieve win-win

For shareholders, stable operation, create value

For the government, honest and honest, legitimate business

For community, being selfless contribution

GENERAL INFORMATION

Hongfa Group has more than 30 subsidiaries worldwide, and its business covers more than 120 countries and regions, including relays, medium and low voltage products, high and low voltage switchgears, connectors, capacitors, precision parts and automation equipment. Hongfa is the only enterprise that owns postdoctorial working station and academician working station of the industry in China.

Company development history

1) In 1984, Xiamen Hongfa Electroacoustic Co., Ltd (Hongfa Group for short) was established.

2) In 1987, product and company orientation aligned, committed to be an export-oriented enterprise with relays as the main product.

3) In 1999, enterprise reform implemented; Employee stock ownership started.

4) In 2008, Hongfa is nominated as “China’s Most Well-Known Trademark.”

5) In 2012, Hognfa Group was Listed on Shanghai Stock Exchange. accelerated its capital structure adjustment, and started its business again.

6) In 2013, Xiamen Hongfa Electrical Safety & Controls Co.,Ltd (called HFESC for short) became fully own by Hongfa Group. HFESC is a professional low voltage device manufacturer of Hongfa Group.

Hongfa is committed to providing customers with satisfactory products and solutions through continuous innovation and unremitting pursuit of high quality to bring people a more comfortable and convenient life.

As a responsible company to society and environment, HFESC applied EPD Italy and conduct LCA study from September 2022 to August 2023 and are willing to disclosure the actual Environmental impact to the public and customers for low voltage products.

Declared in this EPD includes the following products and for each product the characteristics and composition were listed from table2-table5.

Table 1: LCA Study related types

Type for LCA Study	Related Types	code
UEM5-250L/250-430501C-P13-002	UEM5-250L/250-430501C-P13-002	131116
UEM5Z1-250M/250-430001C-P13LSI-002	UEM5Z1-250M/250-430001C-P13LSI-002	130001

The database used is regarded as representative on the basis of a comparative study, which examined the data for a reference product of the EPD Owner.

PRODUCT CHARACTERISTICS

Table 2: Product characteristics of UEM5-250L/250-430501C-P13-002

Product Model	UEM5-250L/250-430501C-P13-002
Frame maximum current Inm（A）	250
Rated current In（A）	250
current setting Ir（A）	/
rated insulation voltage Ui（V）	800
Rated impulse withstand voltage Uimp(kV)	8
Rated operating voltage Ue（V）	400
Poles	4P
Rated ultimate short circuit breaking capacity Icu (kA)	25
Mechanical life	7000 cycles
Electrical life	1000 cycles
mode of operation	Remote / local operations
additional function	Thermal magnetic + VDS + Mortorization

Table 3: Product characteristics of UEM5Z1-250M/250-430001C-P13LSI-002

Product Model	UEM5Z1-250M/250-430001C-P13LSI-002
Frame maximum rated current Inm（A）	250
Rated current In（A）	250
current setting Ir（A）	100、125、140、160、180、200、225、250
rated insulation voltage Ui（V）	800
Rated impulse withstand voltage Uimp(kV）	8
Rated operating voltage Ue（V）	400
Poles	4P
Rated ultimate short circuit breaking capacity Icu(kA）	25
Mechanical life	7000 cycles
Electrical life	1000 cycles
mode of operation	Remote / local operations
additional function	Electronic (Modbus TCP) + Mortorization

MATERIALS COMPOSITION

Table 4: The Switch UEM5-250L 250-430501A-P13-002 material composition

Materials	IEC62474 Material classes ID	Weight(g)
Copper products	M121	2009.4090
Polyvinylchloride, bulk polymerised	M200	1807.8830
Nylon 6	M208	855.7600
Steel sheet	M119	928.7885
Glass fibre reinforced plastic, polyester resin	M259	896.0400
Polycarbonate	M204	506.9416
Steel wire	M110	283.7500
Polyoxymethylene	M205	98.3287
Aluminium alloy, metal matrix composite	M120	90.0000
Nylon 6-6	M208	127.4113
Copper wire	M121	36.8000
Printed wiring board, surface mounted, unspecified, Pb free	/	27.4000
Electric board	/	0.0000
Epoxy resin	M302	22.0200
Electronics, for control units	/	21.0000
Polyphenylene sulfide	M213	16.5000
Silver	M159	11.7600
Steel	M119	11.0900
Melamine	M399	8.0000
Cable, unspecified	/	6.6700
Printed paper	M341	3.9900
Epoxy novolac	M249	3.1200
Chemical, inorganic	M199	1.5000
Kraft paper	M341	1.4400
Ink	M399	0.6000
Methanol	M399	0.1200
total		7776.3220

Table 5: The Switch UEM5Z1-250M/250-430001C-P13LSI-002 material composition

Material	IEC62474 Material classes ID	Weight(g)
Copper products	M121	1440.919
Polyvinylchloride	M200	1117.217
Glass fibre reinforced plastic	M259	1019.16
Steel sheet	M119	929.3265
Nylon 6	M208	838.73
Polycarbonate	M204	559.9793
Low alloy steel	M119	330.42
Steel, chromium steel 18/8	M100	254.86
Electric connector	/	216.5
Nylon 6-6	M208	117.8036
Polyoxymethylene (POM)	M205	98.46964
Aluminium alloy	M120	90
Printed wiring board	/	89.5
Copper wire	M121	84
Synthetic rubber	M326	45.2
Steel wire	M119	41.82552
Melamine	M399	36.96
Polypropylene, granulate	M202	14
Electronics, for control units	/	14
Polyphenylene sulfide	M213	13.5
Silver	M159	11.76
Epoxy resin	M302	8.4
Printed paper	M341	7.12
Resistor, surface-mounted	/	4.5
Chemical, inorganic	M199	1.84
Cable	/	1.5
Steel, chromium steel 18/8	M100	0.2
Total		7387.69

LCA BACKGROUND INFORMATION

DECLARED UNIT (FUNCTIONAL UNIT)

The declared unit is specified in terms of pcs. The declared unit is 1 pcs of manufactured product incl. packaging material in a reference service life 20 years.

SYSTEM BOUNDARIES

The life cycle of the Switch, an EEPS (Electronic and Electrical Products and Systems), is a “from cradle to grave” analysis and covers the following main life cycle stages.

The following table shows the stages of the product life cycle and the information stages according to EN 50693 for the evaluation of electronic and electrical products and systems.

Table 6: System Boundaries

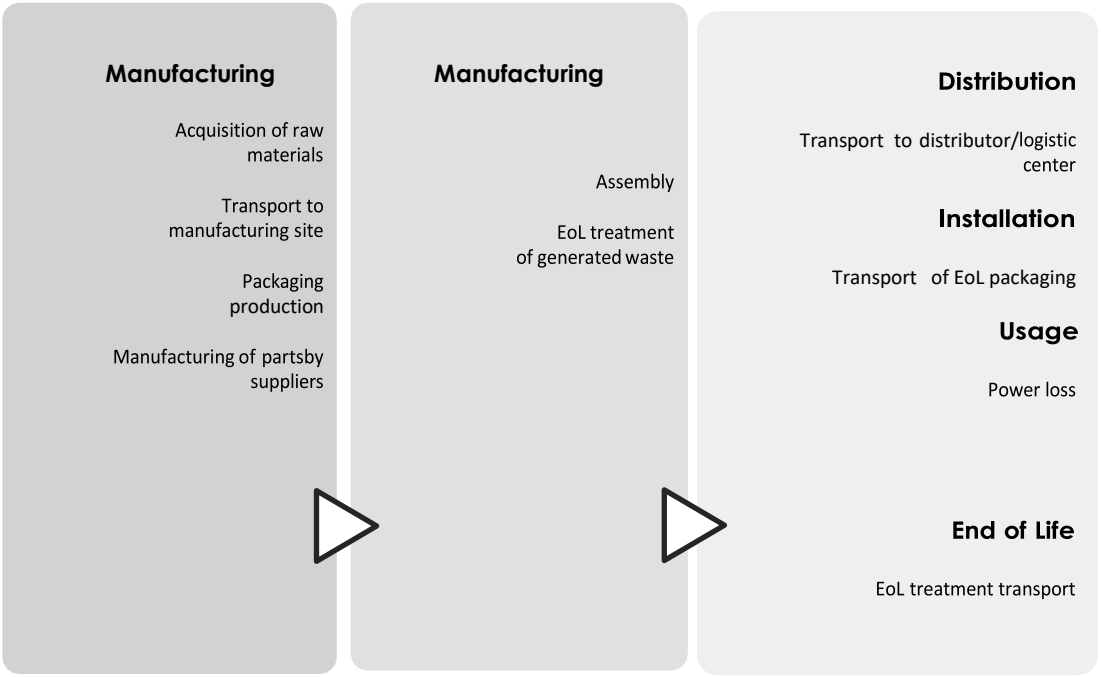
<table>
<tr><td colspan="2">MANUFACTURING STAGE</td><td>DISTRIBUTION
STAGE</td><td>INSTALLATION
STAGE</td><td colspan="2">USE &
Maintenance
STAGE</td><td>END-OF-LIFE
STAGE
De-installation</td></tr>
<tr><td>UPSTREAM
MODULE</td><td>CORE
MODULE</td><td colspan="5">DOWNSTREAM MODULE</td></tr>
<tr><td>extraction of raw materials, including waste recycling processes and the production of semi-finished and ancillary products, as well as their packaging</td><td>Manufacturing of the product constituents, including all the stages</td><td rowspan="4">DISTRIBUTION</td><td rowspan="4">INSTALLATION</td><td rowspan="4">USE</td><td rowspan="4">Maintenance</td><td rowspan="4">De-installation</td><td rowspan="4">END-OF-LIFE</td></tr>
<tr><td>Transportation of raw materials to the manufacturing company</td><td>Product assembly</td></tr>
<tr><td></td><td>packaging</td></tr>
<tr><td></td><td>waste recycling processes</td></tr>
</table>

X	X	X	X	X	X	X	X

X = module include in EPD

The stages of the product life cycle and the information considered for the evaluation ofthe cluster are:

- Manufacturing upstream includes raw materials, and production activities ofHONGFA suppliers, including transport of semifinished items and subassemblies to HONGFA. This includes also the packaging production.
- Manufacturing core includes local consumptions due tomanufacturing of the products , the relevant assembling and waste due to manufacturing
- The distribution stage includes the impacts related to the distribution of the product from manufacture to the logistic center of the receiver
- The installation stage includes the impact related to the transportation of packaging waste to recycling place.
- The use stages include the impact related to energy consumption during the service life of the product.
- End of life includes the transportation and operations for the disposal of the product at the end of its service life.



TEMPORAL AND GEOGRAPHICAL BOUNDARIES

The HONGFA component suppliers are sourced: China. All primary data collected from HONGFA are from 2022.09~2023.08. Secondary data are also representative for this year, as provided by ecoinvent v3.9.1.

The selected ecoinvent processes in the LCA model have a global representativeness, due to the unclear origin of each component. In this way, a conservative approach has been adopted.

BOUNDARIES IN THE LIFE CYCLE

As indicated in the PCR EPDItaly012, capital goods, such as buildings, machinery, tools and infrastructure, the packaging for internal transport which cannot be allocated directly to the production of the reference product, may be excluded from the system boundary.

Infrastructures, when present, such as processes deriving from the ecoinvent database have not been excluded.

DATA QUALITY

In this EPD, both primary and secondary data are used. Site specific foreground data have been provided by HONGFA. Main data sources are the bill of materials available on theenterprise resource planning. For all processes for which primary are not available, generic data originating from the ecoinvent v3.9.1 database, allocation cut-off by classification, are used. The ecoinvent database is available in the SimaPro 9.5.0.0 software used for the calculations.

ENVIRONMENTAL IMPACT INDICATORS

The information obtained from the inventory analysis is aggregated according to theeffects related to the various environmental issues. According to PCR EPDItaly012 and EN 50693 the environmental impact indicators must be determined using the characterization factors and impact assessment EN 15804 + A2 (adapted) V1.00 / EF 3.1. The revision of this standard has aligned their methodology with the Environmental Footprint (EF) 3.1 method.

PCR EPDItaly012 and the EN 50693 standard establish four indicators for climate impact(GWP-GHG): GWP (total) which includes all greenhouse gases; GWP (fossil fuels); GWP(biogenic carbon) which includes the emissions and absorption of biogenic carbon dioxide and biogenic carbon stored in the product; GWP (land use).

ALLOCATION RULES

The energy demand and waste for products are allocated by mass on the basis of the total production amount from September 1, 2022 to August 31, 2023.

we choose to calculate 1kg of product power consumption and waste generation and then calculate the power and waste output data by product weight respectively.

LIMITATIONS AND SIMPLIFICATIONS

The data of energy consumption and pollutants emission in the raw material acquisition stage are from the Ecoinvent 3.9.1 database published by the European Ecoinvent Center.

The emission factor of China electricity is from the Ecoinvent 3.9.1 database.

The emission factor of Italy electricity is from the Ecoinvent 3.9.1 database.

The uncertainty has been adjusted accordingly. This dataset describes the electricity available on the low voltage level in China and Italy. This is done by showing the distribution of 1kWh electricity at low voltage.

The transport of raw material were very different kinds of lorry so that choosing unspecified lorry to cover all situation.

Some chemical raw material can`t find the specific dataset in Ecoinvent 3.9.1 so choose “Chemical, inorganic {GLO}| market for chemical, inorganic | Cut-off, S” or “SimaPro process (Manager)-Chemical, organic {GLO} market for chemical, organic | Cut-off, S” to replace.

INVENTORY ANALYSIS

The ecoinvent v3.9.1 by classification system processes are used to model the background system of the processes.

Due to the large amounts of components in the Switch, raw material inputs are modelled with data from ecoinvent representing a global market coverage. These datasets are assumed to be representative.

MANUFACTURING STAGE

Copper is the most frequently used material, followed by steel and steel and other plastics.

The single use packaging is also included in the analysis in the manufacturing stage-core. HONGFA receives packaging components from outside suppliers and packages the Switchs before shipping them.

The transport distances and weight from raw materials suppliers to the manufacturing are assumed as below:

- Transport, freight, lorry: 2.4501E+00 tkm for UEM5-250L/250-430501C-P13-002
- Transport, freight, lorry: 3.0763E+00 tkm for UEM5Z1-250M/250-430001C-P13LSI-002

The factory of the Switch is located in HONGFA facility of Xiamen, China. In the factory, the different components and subassemblies are assembled into the Switch.

For the manufacturing phase, the general China low voltage electricity mix from ecoinvent v3.9.1 is used.

The waste generated by the production and assembly processes is included in the calculation.

DISTRIBUTION

The transport distances and weight from HONGFA plant to the place of use are showed as below:

Table 7: Transportation activity data

UEM5-250L/250-430501C-P13-002	Transport, freight, lorry: 5.38E+01 tkm Transport, freight, sea: 1.49E+02 tkm
UEM5Z1-250M/250-430001C-P13LSI-002	Transport, freight, lorry: 5.12E+01 tkm Transport, freight, sea: 1.42E+02 tkm

USE

Use and maintenance are modelled according to the PCR EPDItaly012 - Switches.

For the use phase, the general Italy low voltage electricity mix from ecoinvent v3.9.1 is used.

During the use phase, the Switches dissipates some electricity due to ohmic losses. They are calculated according to the own internal resistance of the Switch and the following PCR rules:

- nominal current reduced by a factor of 0.5;
- RSL of 20 year;
- functioning time of 30% of the RSL.

The formula for the calculation of the electricity consumed is shown in sub-PCR EPDItaly012 and it is described as follows, where P_{use} is the power consumed by the Switch at a given value of current:

$$E_{use}\ [kWh] = \frac{P_{use} * 8760 * RSL * \alpha}{1000}$$

Table 8: Power eletricty losses of the swithces

	UEM5-250L/250-430501C-P13-002	UEM5Z1-250M/250-430001C-P13LSI-002
P_{use} [W]	19.75	20.25
E_{use} [kWh]	1038.06	1064.34

Since no maintenance happens during the use phase, the environmental impacts linked this procedure have been omitted from the analysis.

END OF LIFE

The end-of-life stage is modelled according to PCR EPDItaly012 and WEEE Directive (2012/19/EU). The percentages for end-of-life treatments of Switchs are taken from WEEE Directive (2012/19/EU).

ENVIRONMENTAL INDICATORS

The following tables show the environmental impact indicators of the life cycle of a single Switch, as indicated by PCR EPDItaly007, sub-PCR EPDItaly012 and EN 50693:2019.

The indicators are divided into the contribution of the processes to the different modules (upstream, core and downstream) and stages (manufacturing, distribution, use and end-of-life).

UEM5-250L/250-430501C-P13-002

Table 9: UEM5-250L/250-430501C-P13-002

	Potential environmental impacts for 1 switch						
STAGE/ MODULE / ITEMS	Total	MANUFACTURING STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE STAGE	END-OF-LIFE STAGE
		UPSTREAM MODULE	CORE MODULE	DOWNSTREAM MODULE			
GWP-total (kgCO2 eq)	5.20E+02	6.67E+01	9.78E+00	9.55E+00	3.30E+00	4.27E+02	3.41E+00
GWP -fossil (kgCO2 eq)	4.85E+02	7.00E+01	9.83E+00	9.51E+00	3.38E-02	3.92E+02	3.40E+00
GWP -biogenic (kgCO2 eq)	3.42E+01	-3.49E+00	-5.60E-02	1.22E-02	3.27E+00	3.44E+01	1.26E-02
GWP -luluc (kgCO2 eq)	2.89E-01	1.68E-01	4.01E-03	2.97E-02	1.20E-04	8.68E-02	3.24E-04
ODP(kgCFC11 eq)	1.30E-05	3.39E-06	2.18E-08	1.65E-07	6.02E-10	9.34E-06	3.57E-08
AP(mol H+ eq.)	3.34E+00	1.51E+00	5.42E-02	8.35E-02	1.62E-04	1.69E+00	1.77E-03
EP -freshwater (kg P eq.)	2.19E-01	1.32E-01	1.97E-03	7.26E-04	2.85E-06	8.49E-02	8.20E-05
EP – marine (kg N eq)	4.35E-01	1.39E-01	1.11E-02	2.60E-02	6.20E-05	2.59E-01	6.44E-04
EP – terrestrial (mol N eq)	4.95E+00	1.59E+00	1.19E-01	2.80E-01	6.56E-04	2.96E+00	5.82E-03
POCP (kg NMVOC eq.)	1.82E+00	4.68E-01	3.16E-02	8.67E-02	2.24E-04	1.23E+00	1.74E-03
ADP –minerals and metals (kg Sb eq.)	3.33E-02	2.87E-02	4.02E-05	2.65E-05	1.06E-07	4.52E-03	1.40E-06
ADP –fossil (MJ)	7.34E+03	9.88E+02	9.57E+01	1.33E+02	4.84E-01	6.12E+03	3.39E+00
WDP(m^3 eq.)	2.94E+02	3.84E+01	1.14E+00	6.67E-01	2.64E-03	2.51E+02	2.48E+00

	GWP total= Global Warming Potential total; GWP fossil=Global Warming Potential fossil; GWP biogenic=Global Warming Potential biogenic; GWP luluc= Global Warming Potential land use and land use change; ODP= Depletion potential of the stratospheric ozone layer; AP=Acidification potential; EP freshwater= Eutrophication potential freshwater compartment; EP marine = Eutrophication potential marine compartment; EP terrestrial = Eutrophication potential terrestrial compartment; POCP= Formation potential of tropos pheric ozone; ADP minerals & metals= Abiotic Depletion for non fossil resources potential; ADP fossil=Abiotic Depletion for non fossil resources potential, WDP=Water deprivation potential.
	Use of resources for 1 switch

STAGE/ MODULE / ITEMS	Total	MANUFACTURING STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE STAGE	END-OF-LIFE STAGE
		UPSTREAM MODULE	CORE MODULE	DOWNSTREAM MODULE			
PENRE (MJ)	7.20E+03	8.51E+02	9.57E+01	1.33E+02	4.85E-01	6.12E+03	3.39E+00
PERE (MJ)	2.22E+03	1.70E+02	1.15E+01	1.75E+00	6.84E-03	2.04E+03	2.72E-01
PENRM (MJ)	1.37E+02	1.37E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM (MJ)	4.84E-02	4.84E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT (MJ)	7.34E+03	9.88E+02	9.57E+01	1.33E+02	4.85E-01	6.12E+03	3.39E+00
PERT (MJ)	2.22E+03	1.70E+02	1.15E+01	1.75E+00	6.84E-03	2.04E+03	2.72E-01
FW (m3)	7.97E+00	1.00E+00	2.76E-02	2.92E-02	1.17E-04	6.84E+00	7.59E-02
SM (kg)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

	PENRE = Use of non-renewable primary energy excluding raw materials, PERE = Use of renewable primary energy excluding raw materials, PENRM = Use of non-renewable primary energy resources used as raw materials, PERM = Use of renewable primary energy resources used as raw materials, PENRT = Total use of non-renewable primary energy resources, PERT = Total use of renewable primary energy resources, FW = Use of net fresh water, SM = Use of secondary material, RSF = Use of renewable secondary fuels, NRSF = Use of non-renewable secondary fuels, INA = Indicator not accessed due to a limitation of the LCA tools and databases used to calculate the required resource flows. INA does not imply zero impact.
	Generation of waste for 1 switch

STAGE/ MODULE ITEMS	Total	MANUFACTURING STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE STAGE	END-OF-LIFE STAGE
		UPSTREAM MODULE	CORE MODULE	DOWNSTREAM MODULE			
HWD (kg)	4.99E-01	9.54E-02	4.05E-03	3.32E-03	1.30E-05	3.20E-01	7.62E-02
NHWD (kg)	5.04E+01	1.20E+01	8.22E-01	7.61E+00	3.20E-02	2.94E+01	5.23E-01
RWD (kg)	1.46E-02	1.30E-03	1.03E-04	2.82E-05	1.11E-07	1.31E-02	3.30E-06
MER (kg)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR (kg)	4.37E+00	0.00E+00	9.18E-02	0.00E+00	0.00E+00	0.00E+00	4.28E+00
CRU (kg)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

		HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, MER= Materials for energy recovery, MFR =Material for recycling, CRU =Components for reuse, ETE =Exported thermal energy, EEE= Exported electricity energy. INA = Indicator not accessed due to a limitation of the LCA tools and databases used to calculate the required resource flows. INA does not imply zero impact.

UEM5Z1-250M/250-430001C-P13LSI-002

Table 10: UEM5Z1-250M/250-430001C-P13LSI-002

	Potential environmental impacts for 1 switch						
STAGE/ MODULE ITEMS	Total	MANUFACTURING STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE STAGE	END-OF-LIFE STAGE
		UPSTREAM MODULE	CORE MODULE	DOWNSTREAM MODULE			
GWP-total (kgCO2 eq)	5.43E+02	8.23E+01	9.29E+00	9.07E+00	3.11E+00	4.38E+02	2.00E+00
GWP -fossil (kgCO2 eq)	5.08E+02	8.51E+01	9.34E+00	9.03E+00	2.00E-02	4.02E+02	1.98E+00
GWP -biogenic (kgCO2 eq)	3.53E+01	-3.09E+00	-5.32E-02	1.15E-02	3.09E+00	3.53E+01	2.52E-02
GWP -luluc (kgCO2 eq)	4.28E-01	3.07E-01	3.81E-03	2.82E-02	7.12E-05	8.90E-02	1.09E-04
ODP(kgCFC11 eq)	1.40E-05	4.24E-06	2.07E-08	1.57E-07	3.56E-10	9.57E-06	1.29E-09
AP(mol H+ eq.)	3.26E+00	1.39E+00	5.15E-02	7.93E-02	9.57E-05	1.73E+00	4.69E-04
EP -freshwater (kg P eq.)	2.36E-01	1.46E-01	1.87E-03	6.89E-04	1.69E-06	8.71E-02	1.71E-05
EP – marine (kg N eq)	4.52E-01	1.51E-01	1.06E-02	2.47E-02	3.67E-05	2.65E-01	2.30E-04
EP – terrestrial (mol N eq)	5.17E+00	1.76E+00	1.13E-01	2.66E-01	3.88E-04	3.03E+00	2.22E-03
POCP (kg NMVOC eq.)	1.90E+00	5.21E-01	3.00E-02	8.24E-02	1.32E-04	1.27E+00	6.18E-04

ADP –minerals and metals (kg Sb eq.)	4.03E-02	3.56E-02	3.82E-05	2.52E-05	6.26E-08	4.64E-03	1.48E-07
ADP –fossil (MJ)	7.65E+03	1.15E+03	9.10E+01	1.26E+02	2.86E-01	6.28E+03	7.21E-01
WDP(m^3 eq.)	2.92E+02	3.26E+01	1.08E+00	6.34E-01	1.56E-03	2.57E+02	4.97E-03

GWP total= Global Warming Potential total;

GWP fossil=Global Warming Potential fossil;

GWP biogenic=Global Warming Potential biogenic;

GWP luluc= Global Warming Potential land use and land use change;

ODP= Depletion potential of the stratospheric ozone layer;

AP=Acidification potential;

EP freshwater= Eutrophication potential freshwater compartment;

EP marine = Eutrophication potential marine compartment;

EP terrestrial = Eutrophication potential terrestrial compartment;

POCP= Formation potential of tropos pheric ozone;

ADP minerals & metals= Abiotic Depletion for non fossil resources potential;

ADP fossil=Abiotic Depletion for non fossil resources potential,

WDP=Water deprivation potential.

Use of resources for 1 switch

STAGE/ MODULE / ITEMS	Total	MANUFACTURING STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE STAGE	END-OF-LIFE STAGE
		UPSTREAM MODULE	CORE MODULE	DOWNSTREAM MODULE			
PENRE (MJ)	7.58E+03	1.08E+03	9.10E+01	1.27E+02	2.87E-01	6.28E+03	7.21E-01
PERE (MJ)	2.30E+03	1.99E+02	1.09E+01	1.66E+00	4.05E-03	2.09E+03	1.35E-02
PENRM (MJ)	7.10E+01	7.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM (MJ)	1.17E-01	1.17E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT (MJ)	7.65E+03	1.15E+03	9.10E+01	1.27E+02	2.87E-01	6.28E+03	7.21E-01
PERT (MJ)	2.30E+03	1.99E+02	1.09E+01	1.66E+00	4.05E-03	2.09E+03	1.35E-02

FW (m3)	8.02E+00	9.59E-01	2.62E-02	2.77E-02	6.92E-05	7.01E+00	3.31E-04
SM (kg)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

PENRE = Use of non-renewable primary energy excluding raw materials,

PERE = Use of renewable primary energy excluding raw materials,

PENRM = Use of non-renewable primary energy resources used as raw materials,

PERM = Use of renewable primary energy resources used as raw materials,

PENRT = Total use of non-renewable primary energy resources,

PERT = Total use of renewable primary energy resources,

FW = Use of net fresh water,

SM = Use of secondary material,

RSF = Use of renewable secondary fuels,

NRSF = Use of non-renewable secondary fuels,

INA = Indicator not accessed due to a limitation of the LCA tools and databases used to calculate the required resource flows. INA does not imply zero impact.

Generation of waste for 1 switch

STAGE/ MODULE / ITEMS	Total	MANUFACTURING STAGE		DISTRIBUTION STAGE	INSTALLATION STAGE	USE STAGE	END-OF-LIFE STAGE
		UPSTREAM MODULE	CORE MODULE	DOWNSTREAM MODULE			
HWD (kg)	8.69E-01	9.35E-02	3.85E-03	3.15E-03	7.70E-06	3.28E-01	4.41E-01
NHWD (kg)	5.19E+01	1.36E+01	7.81E-01	7.23E+00	1.89E-02	3.02E+01	5.39E-02
RWD (kg)	1.55E-02	1.91E-03	9.79E-05	2.68E-05	6.55E-08	1.35E-02	1.89E-07
MER (kg)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR (kg)	4.15E+00	0.00E+00	8.72E-02	0.00E+00	0.00E+00	0.00E+00	4.06E+00
CRU (kg)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETE (MJ)	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

EEE (MJ)		0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
		HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, MER= Materials for energy recovery, MFR =Material for recycling, CRU =Components for reuse, ETE =Exported thermal energy, EEE= Exported electricity energy. INA = Indicator not accessed due to a limitation of the LCA tools and databases used to calculate the required resource flows. INA does not imply zero impact.						

REFERENCES

- ISO 14025:2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- ISO 14040:2006/Amd 1:2020Environmental management — Life cycle assessment — Principles and framework — Amendment 1
- ISO 14044:2006/Amd 2:2020Environmental management — Life cycle assessment — Requirements and guidelines — Amendment 2
- EN 50693:2019 - Product category rules for life cycle assessments of electronicand electrical products and systems

  EN 15804:2012+A2:2019, Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products
- PCR EPDItaly007 - Electronic and electrical products and systems (rev.3),13, January 2023
- PCR EPDItaly012 - Electronic and electrical products and systems - Switches,16, March 2020
- HONGFA_Switchs_LCA Project Report_UEM5 250M250L_20231212
- https://www.isprambiente.gov.it/it
- https://www.mise.gov.it/index.php/it/
- EPDItaly regulations rev. 5.2
- WEEE Directive(2012/19/EU)