PRODUCTS FAMILY DECLARATION FOR KEYPAD MODULE AND ROUND PUSHBUTTON MODULE OF ABB

PRODUCT ENVIRONMENTAL PROFILE

Environmental Product Declaration

ORGANIZATION	WEBSITE
ABB Xiamen Smart Technology Co., Ltd	https://new.abb.com/cn/en/about/businesses/electrification/xiamen-smart-technology-co
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ABB Purpose & Embedding Sustainability

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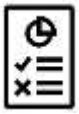

General Information

Reference product	The reference product is one unit of Keypad module produced by ABB, the representative product is 51381SP4 (2TMA130160N0002).
Description of the product	Through fixing in the OS frame, the keypad or push button module can give a signal to the people in the house and facilitate the function of communication between the visitors outside the building and the residents in the buildings.
Functional unit of the representative product	To give signals to the people in the buildings so that to facilitate the function of communication between the visitors outside the building and the residents in the buildings over a reference lifetime of 10 years.
Products concerned	The products covered by this PEP are:

	A251382K-S-04 (2TMA220160X0001), A251382K-A-04 (2TMA220160A0002), A251382K-W-04 (2TMA220160W0006), A251382K-S-03 (2TMA200160X0009), A251382K-A-03 (2TMA200160A0039), A251382K-W-03 (2TMA200160W0006), 51381K-S (2TMA130160X0001), 51381K-W (2TMA130010W0014), 51381K-S-03 (2TMA130160X0023), 51381K-W-03 (2TMA130010W0018), M251021K-A (2TMA070150A0005), M251021K-W (2TMA070120W0011), M251021K-A-02 (2TMA210010A0005), M251021K-W-02 (2TMA210010W0005), M251021K-B-02 (2TMA210160B0017), M251021K-B (2TMA210160B0008), 51381K-A (2TMA210160A0009), M251022K-A (2TMA070120A0001), M251022K-W (2TMA070120W0012), M251022K-A-02 (2TMA210010A0006), M251022K-W-02 (2TMA210010W0006), M251021K-S (2TMA070120X0001), M251021K-S-02 (2TMA210010X0010), 83171-660-101 (2TMA200160X0002), 83171-664-101 (2TMA200160W0002), A251382K-W-03 (2TMA200160W0006), 51382RP1 (2TMA130160N0006), 51382RP2 (2TMA130160N0007), 51382RP3 (2TMA130160N0008), 51382RP1-03 (2TMA130160N0026), 51382RP2-03 (2TMA130160N0027), 51382RP3-03 (2TMA130160N0028), 51381RP1 (2TMA130160N0003), 51381RP2 (2TMA130160N0004), 51381RP3 (2TMA130160N0005), 51381RP1-03 (2TMA130160N0023), 51381RP2-03 (2TMA130160N0024), 51381RP3-03 (2TMA130160N0025), 51011P1 (2TMA070120N0021), 51011P2 (2TMA070120N0022), 51011P3 (2TMA070120N0023), 51012P1(2TMA070120N0024), 51012P2 (2TMA070120N0025), 51012P3 (2TMA070120N0026), 51011P1-02 (2TMA210010N0024), 51011P2-02 (2TMA210010N0025), 51011P3-02 (2TMA210010N0026), 51012P1-02 (2TMA210010N0027), 51012P2-02 (2TMA210010N0028), 51012P3-02 (2TMA210010N0029), 51381DN (2TMA200160N0039), 51381DN-03(2TMA200160N0038), 51381SP3 (2TMA130160N0001), 51381SP3-03 (2TMA130160N0021), M251021P3 (2TMA070150N0039), M251021P3-02 (2TMA210010N0002), 51381SP4 (2TMA130160N0002), M251021P4 (2TMA070150N0040), 51381SP4-03 (2TMA130160N0022), M251021P4-02 (2TMA210010N0003), 51021DN (2TMA070150N0041) and 51021DN-02 (2TMA210010N0004) .

Constituent materials

Total weight of Reference product	The net weight of the product is 110.9 g, and the total packed weight is 175.1 g (including product packaging and transportation packaging).

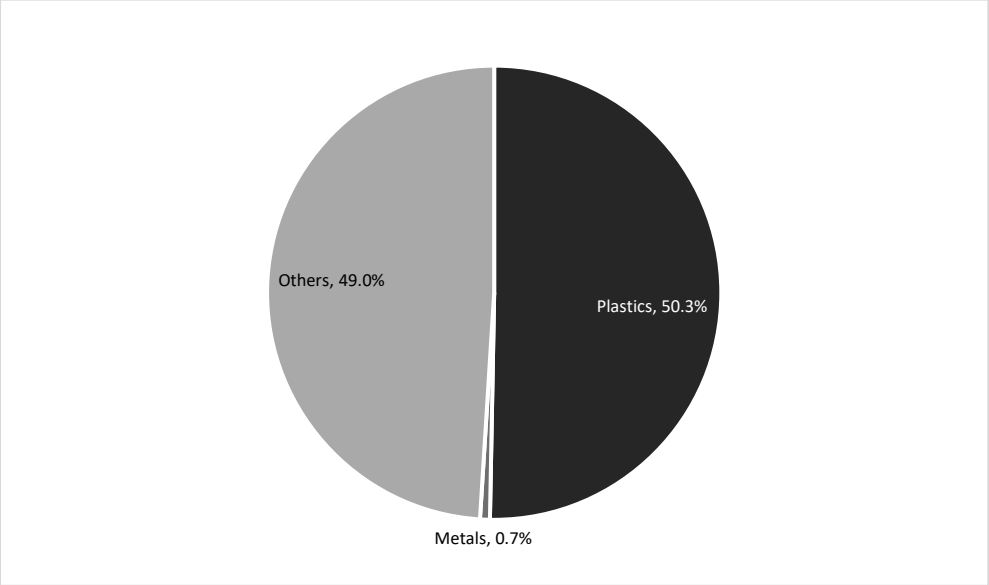

Figure 1 Constituent materials of the reference product 51381SP4 (2TMA130160N0002)

Table 1 Information on mass of reference product and its packaging

Components	2TMA130160N0002	Product weight, incl. product pack (g)	Product weight, incl. product pack and transportation pack (g)
Product (g)	110.9	173.7	175.1
Product packaging (g)	62.8		
Transportation packaging (g)	1.4		

Detailed constituent materials of the reference product were shown in Figure 1 and then listed in Table 2.

Table 2 Materials distribution of the reference product

Plastics as % of weight		Metals as % of weight		Paper as % of weight		Other as % of weight	
Name and CAS number	Weight-%	Name and CAS number	Weight-%	Name and CAS number	Weight-%	Name and CAS number	Weight-%
PC	38.9%	Low carbon steel	0.7%	Folding boxboard carton	17.2%	Electronic parts	14.3%
Silicone rubber	9.1%			Printed paper	11.3%	Acrylic adhesive	0.1%
PE	1.2%			Corrugated paper	6.1%		
PU foam	1.1%						

Environmental impacts

Reference lifetime		10 years

Product category		Round pushbutton module. According to the Specific rules for electrical switchgear and control gear Solutions (PSR-0005-ed3-EN-2023 06 06), the product is covered by other equipment - Category 2: active products.			
Installation elements		The product is installed manually. There is no input of materials / accessories and energy during the installation. The main environmental impact was caused by the waste generated in this stage.			
Use scenario		The use stage has been modeled based on the sales mix data in 2022. The corresponding low voltage electricity countries mix.			
Geographical representativeness		The studied product is produced in China but used in worldwide.			
Technological representativeness		In the manufacturing stage, specific data was collected to calculate the environmental impact caused by the manufacturing process. For the production of raw materials and parts, datasets from Ecoinvent 3.8 were used. During the dataset selection, the technological representation was considered carefully. Datasets with the same production processes were preferred. If not available, datasets with similar production processes were chosen.			
Software and databases used		Simapro version 9.4.04 & databases ecoinvent 3.8 & EF3.0			
Standards applied in ABB		ABB had used many recycling materials, e.g., plastic and metal. The products' standards applied include: EN 62368-1:2014/A11:2017 EN IC 61000-6-1:2019 EN 61000-6-3:2007/A1:2011			
Energy model used	**Manufacturing**	**Distribution**	**Installation**	**Use**	**End of life**
	Average electricity mix in China	Global	Non-applicable	Global	Global

Table 3 Environmental impact indicators of life cycle Impact assessment

Compulsory Indicators

Impact indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Climate change	kg CO2 eq	9.37E+00	3.29E+00	1.43E+00	1.04E-01	4.29E+00	2.51E-01
Climate change - Fossil	kg CO2 eq	9.11E+00	3.35E+00	1.43E+00	9.05E-03	4.07E+00	2.51E-01
Climate change - Biogenic	kg CO2 eq	2.48E-01	-5.49E-02	5.30E-04	9.52E-02	2.07E-01	2.37E-04
Climate change - Land use and LU change	kg CO2 eq	1.60E-02	4.46E-03	1.85E-04	1.18E-06	1.13E-02	2.03E-05
Ozone depletion	kg CFC11 eq	8.30E-07	1.11E-07	3.23E-07	4.19E-10	3.87E-07	7.31E-09
Acidification	mol H+ eq	5.13E-02	2.13E-02	7.26E-03	2.27E-05	2.17E-02	1.05E-03
Eutrophication, freshwater	kg P eq	3.09E-03	1.70E-03	3.56E-05	3.37E-07	1.35E-03	2.91E-06
Eutrophication, marine	kg N eq	1.04E-02	3.57E-03	2.57E-03	1.07E-05	3.49E-03	7.18E-04
Eutrophication, terrestrial	mol N eq	1.04E-01	3.81E-02	2.82E-02	9.61E-05	3.72E-02	7.84E-04
Photochemical ozone formation	kg NMVOC eq	2.88E-02	1.09E-02	7.44E-03	2.45E-05	1.02E-02	2.56E-04
Resource use, minerals and metals	kg Sb eq	4.33E-04	3.94E-04	1.27E-06	9.51E-09	3.77E-05	8.49E-08
Resource use, fossils	MJ	1.32E+02	3.79E+01	2.02E+01	3.09E-02	7.29E+01	6.53E-01

Water use	m3 depriv.	3.10E+00	9.24E-01	2.50E-02	2.57E-03	2.13E+00	2.26E-02

Note: the recycled content and the scrape rates of raw materials of the products and products' packaging are adjusted to 0% and 30% respectively according to the PSR.

Table 4 Resource use indicators of life cycle Impact assessment

Compulsory Indicators

Resource use indicators	Unit	Total	Manufac-turing	Distri-bution	Installa-tion	Use	End of life
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	2.43E+01	4.40E+00	9.60E-02	7.74E-04	1.97E+01	5.83E-02
Use of renewable primary energy resources as raw materials	MJ	7.18E-01	7.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.50E+01	5.12E+00	9.60E-02	7.74E-04	1.97E+01	5.83E-02
Use of non-renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1.29E+02	3.53E+01	2.02E+01	3.09E-02	7.26E+01	6.53E-01
Use of non-renewable primary energy resources as raw materials	MJ	2.59E+00	2.59E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	1.31E+02	3.79E+01	2.02E+01	3.09E-02	7.26E+01	6.53E-01
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Freshwater	m^3	9.34E-02	2.51E-02	9.23E-04	8.56E-05	6.66E-02	6.92E-04

Table 5 Waste category indicators of life cycle Impact assessment

Compulsory Indicators

Waste category indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Hazardous waste disposed	kg	8.05E-04	6.65E-04	5.37E-05	7.54E-08	8.59E-05	1.12E-06
Non-hazardous waste disposed	kg	1.29E+00	4.59E-01	2.36E-01	6.51E-02	2.62E-01	2.68E-01
Radioactive waste disposed	kg	6.08E-04	6.14E-05	1.41E-04	1.39E-07	4.01E-04	3.72E-06

Table 6 Output flow indicators

Compulsory Indicators

Output flow indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	9.20E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.20E-04
Materials for energy recovery	kg	4.24E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.24E-02
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Note: The recovery of materials for materials and energy was calculated according to Annex D of the PCR.

Biogenic Carbon of product and packaging

As no biogenic carbon in the product, thus, only the biogenic carbon in the packaging was calculated. Of the product packaging and packaging for transportation, the materials containing biogenic carbon are wood pallet and paper board.

Table 7 Amount of biogenic carbon of product and packaging

Item	Unit (kg of C)	Total
Biogenic carbon content of the product	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	1.86E-02	1.86E-02

Extrapolation to a homogeneous environmental family

To determine the environmental impact of a product covered by the PEP other than the representative product, the following rules apply:

1) Manufacturing stage

The impact for this phase of a product covered by the PEP other than the representative product is proportional to weight of the product, thus, the impacts should be calculated by multiple the coefficients factor_1 in Table 8 by the environmental impact for this phase of the representative product.

2) Distribution

The impact for this phase of a product covered by the PEP other than the representative product is proportional to the packaged product weight, thus, the impacts should be calculated by multiple the coefficients factor_2 in Table 8 by the environmental impact for those phases of the representative product.

3) Installation

The impact for this phase of a product covered by the PEP other than the representative product is proportional to weight of the product packaging, thus, the impacts should be calculated by multiple the coefficients factor_3 in Table 8 by the environmental impact for those phases of the representative product.

4) Use

The environmental impact for B1-B6 stage of a product covered by the PEP other than the representative product should be calculated by multiple the factor_4 in Table 8 by the environmental impact for this phase of the representative product. Factor_4 is proportional to the amount of energy consumption.

5) End of life phases

The impacts of the representing product from the end-of-life are less than 2% of the total impact. However, the impact for this phase of a product covered by the PEP other than the representative product is calculated by multiple the coefficients factor_1 in Table 8 by the environmental impact for this phase of the representative product.

Table 8 Extrapolation rules for homogeneous family products

SAP number	Article Number	Factor_1	Factor_2	Factor_3	Factor_4
2TMA200160N0038	51381DN-03	0.91	0.97	1.06	0.80
2TMA200160N0039	51381DN	0.91	0.97	1.06	0.80
2TMA070150N0041	51021DN	0.98	0.87	0.67	0.80
2TMA210010N0002	M251021P3-02	0.98	0.93	0.85	1.00
2TMA210010N0004	51021DN-02	0.99	0.87	0.67	0.80
2TMA130160N0001	51381SP3	0.99	0.99	0.99	1.00
2TMA130160N0021	51381SP3-03	0.99	0.99	0.98	1.00
2TMA070150N0039	M251021P3	0.99	0.93	0.83	1.00
2TMA130160N0002	51381SP4	1.00	1.00	1.00	1.00
2TMA130160N0022	51381SP4-03	1.01	1.00	0.98	1.00
2TMA210010N0003	M251021P4-02	1.01	0.95	0.85	1.00
2TMA070120N0022	51011P2	1.02	0.97	0.89	1.20
2TMA210010N0025	51011P2-02	1.02	0.98	0.90	1.20
2TMA070150N0040	M251021P4	1.02	0.95	0.83	1.00
2TMA070120N0023	51011P3	1.03	0.98	0.89	1.20

2TMA210010N0026	51011P3-02	1.03	0.98	0.90	1.20
2TMA130160N0004	51381RP2	1.03	1.04	1.06	1.20
2TMA130160N0024	51381RP2-03	1.03	1.04	1.07	1.20
2TMA130160N0005	51381RP3	1.04	1.05	1.06	1.20
2TMA130160N0025	51381RP3-03	1.04	1.05	1.07	1.20
2TMA070120N0021	51011P1	1.05	0.99	0.89	1.20
2TMA210010N0024	51011P1-02	1.05	0.99	0.90	1.20
2TMA130160N0023	51381RP1-03	1.06	1.06	1.07	1.20
2TMA130160N0003	51381RP1	1.06	1.06	1.06	1.20
2TMA210010W0005	M251021K-W-02	1.06	0.99	0.86	3.00
2TMA130160X0001	51381K-S	1.10	1.06	0.99	3.00
2TMA220160X0001	A251382K-S-04	1.10	1.06	0.98	3.00
2TMA130010W0014	51381K-W	1.10	1.06	0.99	3.00
2TMA130010W0018	51381K-W-03	1.10	1.06	0.98	3.00
2TMA130160X0023	51381K-S-03	1.10	1.06	0.98	3.00
2TMA200160X0005	A251382K-W-03	1.10	1.06	0.98	3.00
2TMA200160X0009	A251382K-S-03	1.10	1.06	0.98	3.00
2TMA210160A0009	51381K-A	1.10	1.06	0.99	3.00
2TMA220160A0002	A251382K-A-04	1.10	1.06	0.98	3.00
2TMA200160A0039	A251382K-A-03	1.10	1.06	0.98	3.00
2TMA220160W0006	A251382K-W-04	1.10	1.06	0.98	3.00
2TMA070120A0001	M251022K-A	1.10	1.01	0.83	3.00
2TMA070120W0011	M251021K-W	1.10	1.01	0.83	3.00
2TMA070120W0012	M251022K-W	1.10	1.01	0.83	3.00
2TMA070120X0001	M251021K-S	1.10	0.97	0.74	3.00
2TMA070150A0005	M251021K-A	1.10	1.01	0.83	3.00
2TMA210010A0005	M251021K-A-02	1.10	1.01	0.86	3.00
2TMA210010A0006	M251022K-A-02	1.10	1.01	0.86	3.00
2TMA210010X0010	M251021K-S-02	1.10	0.97	0.73	3.00
2TMA210160B0008	M251021K-B	1.10	1.01	0.83	3.00
2TMA210160B0017	M251021K-B-02	1.10	1.01	0.83	3.00
2TMA210010W0006	M251022K-W-02	1.10	1.01	0.86	3.00
2TMA210010N0028	51012P2-02	1.13	1.05	0.90	8.00
2TMA070120N0025	51012P2	1.14	1.05	0.89	8.00
2TMA070120N0026	51012P3	1.14	1.05	0.89	8.00
2TMA130160N0007	51382RP2	1.15	1.12	1.06	8.00
2TMA130160N0027	51382RP2-03	1.15	1.12	1.07	8.00
2TMA130160N0008	51382RP3	1.16	1.12	1.06	8.00
2TMA130160N0028	51382RP3-03	1.16	1.12	1.07	8.00
2TMA210010N0029	51012P3-02	1.16	1.07	0.90	8.00
2TMA070120N0024	51012P1	1.16	1.07	0.89	8.00
2TMA210010N0027	51012P1-02	1.16	1.07	0.90	8.00
2TMA130160N0006	51382RP1	1.18	1.13	1.06	8.00
2TMA130160N0026	51382RP1-03	1.18	1.14	1.07	8.00
2TMA200160W0002	83171-664-101	1.19	1.17	1.14	5.00
2TMA200160X0002	83171-660-101	1.19	1.17	1.14	5.00
2TMA200160W0006	A251382K-W-03	1.10	1.06	0.98	3.00

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Internal: ☐	External: ☒
The PCR review was conducted by a panel of experts chaired by Julie Orgelet (DDemain)	
PEPs are compliant with XP C08-100-1:2016 or EN 50693:2019 The components of the present PEP may not be compared with components from any other program.	
Document complies with ISO 14025:2006 "Environmental labels and declarations. Type III environmental declarations"	