

Smartive Server

CE technical file

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1. Product Identification

This technical file applies to the Smartive Server SM-MS Rev. 1.3.0 final main-board release configuration.

Field	Value
Product	Smartive Server
Model / revision	SM-MS / 1.3.0
Manufacturer	Apptive Kft, 9932 Viszák, Fő út 56, Hungary
Intended use	DIN-rail building-automation server and I/O controller in a closed electrical/control cabinet, installed by qualified personnel.
PCB size	75.95 x 85.72 mm, final Gerber outline
BOM / PnP	29 BOM lines, 97 components; 97 pick-and-place positions.
Manufacturing sources	BOM, Pick-and-Place, Gerber and drill sources are included in the final package.

2. Electrical Configuration

Item	Final data
Base system	Raspberry Pi 4 Model B or Raspberry Pi 5 variant through the 40-pin main-board connector.
Supply	5 VDC SELV input; the TPS259472 eFuse protects the MCU/Raspberry supply rail with reverse-polarity, overvoltage, undervoltage, current-limit and inrush-control functions.
Input isolation	Field inputs are coupled through TLP290/TLP290-4 optocouplers; the optocoupled side has a dedicated B0505S-1WR3 isolated DC-DC converter, so the input side and MCU/Raspberry side are galvanically isolated.
Optocoupler data	TLP290-4 isolation voltage: 2500 Vrms min; TLP290 isolation voltage: 3750 Vrms min. according to the referenced Toshiba datasheets.
Isolated DC-DC data	B0505S-1WR3: 1 W isolated 5 V / 5 V DC-DC, 1.5 kVDC I/O isolation test voltage according to the referenced datasheet.
Relay outputs	6 x HRS3FNH-S-DC5V-A mechanical dry-contact relays; installation rating max. 10 A @ 230 VAC per channel with external OCPD.
230 VAC traces	Per channel, 2 x 2.8 mm wide parallel copper routing; minimum 2 mm clearance and 5 mm creepage between 230 VAC traces.
Relay-coil protection	Each relay coil uses an SM4007PL flyback diode and SS8050 driver.
Extender / sensor	RJ45 Smartive extender connection and AHT30 temperature/humidity sensor according to the BOM.

3. Insulation and Current-Carrying Controls

Control	Final release data
Input-MCU galvanic isolation	Optocouplers and a separate isolated DC-DC supply separate the input and MCU/Raspberry sides.
230 VAC trace width	2 x 2.8 mm per channel
230 VAC clearance	min. 2.0 mm
230 VAC creepage	min. 5.0 mm
Channel current	Max. 10 A @ 230 VAC per channel, with mandatory external miniature circuit breaker or fuse.
Supply protections	Reverse polarity, overvoltage, undervoltage, current limiting and inrush transient control in the TPS259472 eFuse circuit.

4. Legislation and Standards Mapping

Area	Legislation	Standard / method	Release application
Radio / RED	2014/53/EU RED	EN 300 328; EN 301 893; EN 301 489-1/-17; EN 62311	Raspberry Pi radio function with supplier evidence; final-product integration boundary addressed.
Safety	RED 3.1(a)	EN IEC 62368-1; EN 61010-1; EN IEC 61010-2-201; EN 60664-1	5 V SELV supply, closed enclosure, optocoupled inputs, 230 VAC relay branches, accessibility and thermal safety.
EMC	RED 3.1(b)	EN 61000-6-1/-6-2/-6-3/-6-4; EN 61000-4-x	Wired I/O, relay and radio base system in representative configuration.
RoHS	2011/65/EU + (EU) 2015/863	EN IEC 63000:2018	Component, PCB and manufacturer material documentation.

5. BOM and Component Functions

ID	Component	Qty	Function
1	CL10A105KB8NNNC C1	1	Supply decoupling capacitor
2	CL10A106KP8NNNC C2,C6	2	Supply decoupling capacitor
3	1206B475K500NT C3	1	Supply decoupling capacitor
4	CL05B104KB54PNC C4	1	Supply decoupling capacitor
5	CL21A226MAQNNNE C5	1	Supply decoupling capacitor
6	DB125A-3.5-2*2P-GN-S CN2,CN3,CN4,CN7,CN8,CN9,CN10,CN11,CN12	9	Low-voltage field-input terminal
7	DB128V-5.08-2P-GN-S CN_B2,CN_B3,CN_B4,CN_B5,CN_B6,CN_B7	6	230 VAC relay-branch terminal
8	SM4007PL D_B2,D_B3,D_B4,D_B5,D_B6,D_B7	6	Relay-coil flyback diode
9	HRS3FNH-S-DC5V-A K_B2,K_B3,K_B4,K_B5,K_B6,K_B7	6	5 VDC coil mechanical relay for 230 VAC switched branch
10	KT-0603R LED16,LED_B2,LED_B3,LED_B4,LED_B5,LED_B6,LED_B7	7	Status LED
11	TLP290-4(GB-TP,E O0,O1,O2,O3,O4,O5,O6,O7	8	Four-channel optocoupler for galvanic isolation of field inputs
12	2.54-2*20P□ P1	1	Raspberry Pi 40-pin main-board connector
13	SS8050(RANGE:200-350) Q_B2,Q_B3,Q_B4,Q_B5,Q_B6,Q_B7	6	Relay-driver NPN transistor
14	0603WAF3003T5E R1	1	Series, pull-up or signal-conditioning resistor
15	0402WGF1001TCE R2	1	Series, pull-up or signal-conditioning resistor
16	0603WAF6800T5E R3	1	Series, pull-up or signal-conditioning resistor
17	0603WAF1203T5E R4	1	Series, pull-up or signal-conditioning resistor
18	0402WGF4701TCE R5	1	Series, pull-up or signal-conditioning resistor
19	0805W8F4701T5E R6	1	Series, pull-up or signal-conditioning resistor
20	0402WGF3300TCE R16,R_B2,R_B3,R_B4,R_B5,R_B6,R_B7,U_B2,U_B3,U_B4,U_B5,U_B6,U_B7	13	Series, pull-up or signal-conditioning resistor
21	R-RJ45R08P-A004 RJ10	1	Smartive RJ45 extender connection
22	4D03WGI0472T5E RN1,RN4,RN6,RN8,RN10,RN11,RN13,RN16	8	Series, pull-up or signal-conditioning resistor
23	4D03WGI0681T5E RN2,RN3,RN5,RN7,RN9,RN12,RN14,RN15	8	Series, pull-up or signal-conditioning resistor
24	TLP290(GB-TP,SE U1	1	Single-channel optocoupler for input / supervision isolation
25	AHT30 U2	1	Temperature and humidity sensor
26	TPS259472LRPWR U4	1	5 V supply eFuse: reverse-polarity, overvoltage/undervoltage and inrush-current control
27	B0505S-1WR3 U6	1	Isolated 5 V / 5 V DC-DC supply for the optocoupled input side
28	DB301V-5.0-2P-GN-S U7	1	5 VDC SELV supply input terminal
29	MCP23017-E/SS U9	1	16-bit I2C GPIO expander for relay and input-state handling

6. Risk Analysis and Controls

Risk / fault state	Consequence	Control	Verification
230 VAC relay branch overloaded above 10 A	Overheating of relay, terminal or PCB trace	External max. 10 A @ 230 VAC MCB/fuse mandatory per channel; the product does not replace an overcurrent protective device.	Label, installation guide, thermal review
Arcing/tracking between mains traces	Electric shock, fire or hazardous operation	Min. 2 mm clearance and 5 mm creepage between 230 VAC traces; closed electrical-cabinet installation.	Gerber review and safety construction review
Field-input side fault	Disturbance of MCU/Raspberry side or hazardous potential transfer	TLP290/TLP290-4 optocoupling and separate B0505S isolated DC-DC supply for the input side.	Functional input test and isolation review
5 V supply reverse polarity / overvoltage or undervoltage	Electronic damage, unstable operation or thermal fault	TPS259472 eFuse reverse-polarity, OV/UV and current-limit protection; CE-marked 5 V SELV supply only.	Supply-protection and functional test
Relay contact welding or sticking	Load may remain energised	Relay is a functional switching element; critical loads require external isolation point and installation protection.	FMEA and relay switching test
Radio/EMC integration deviation	Emission or immunity non-conformity	Final enclosure, supply, cable harness, Pi variant and firmware release fixed.	EMC/RED documentation review
RoHS unverified component	Material-conformity non-compliance	EN IEC 63000 BOM evidence, supplier datasheets and JLCPCB RoHS certificate.	Source-documentation review

7. Verification and Production Final Test Plan

Test	Method	Acceptance
Visual inspection	Check PCB, terminals, relays, optocouplers, DC-DC, RJ45, soldering and label.	No damage, missing part, soldering defect or marking error.
5 V supply protections	Check reverse polarity, OV/UV thresholds and rated-load operation with a safe test fixture.	Protection operates; no abnormal heating or damage.
Optocoupled inputs	Toggle every documented input channel between open/closed or active/inactive state.	Raspberry/MCU side reads the correct state; galvanic isolation boundary remains intact.
Relay functional test	Switch all six relays; measure contact continuity with a safe fixture.	Each relay pulls in/releases reliably; no stuck contact.
230 VAC branch condition review	Review installation documentation and label.	Max. 10 A @ 230 VAC external OCPD per channel is stated.
Extender / sensor / Pi	RJ45 extender, AHT30 and Raspberry Pi host communication check.	Communication is stable with error-free initialization.
RoHS document review	Check BOM, supplier datasheets, Pi/JLCPCB certificates and PCB sources.	The material-conformity claim is supported by documented sources.

8. Sources Used

This document is based on the final release sources, manufacturer component datasheets, Raspberry Pi supplier conformity documents and the referenced EU sources.

Source	URL
TPS259472 eFuse	https://www.ti.com/lit/ds/symlink/tps25947.pdf
TLP290-4 optocoupler	https://toshiba.semicon-storage.com/info/TLP290-4_datasheet_en_20191129.pdf?did=12855&prodName=TLP290-4
TLP290 optocoupler	https://toshiba.semicon-storage.com/info/TLP290_datasheet_en_20190520.pdf?did=14207&prodName=TLP290
B0505S-1WR3 isolated DC-DC	https://www.mornsun-power.com/public/uploads/pdf/B_S-1WR3.pdf
Relay datasheet	https://www.zhejianghke.com/wp-content/uploads/2021/09/HRS3FN.pdf
JLPCB RoHS certificate	https://rs.jlpcb.com/static/file/rohs-certificate-of-conformity.pdf
EU technical documentation	https://europa.eu/youreurope/business/product-requirements/compliance/preparing-technical-documentation/index_en.htm
EU CE marking	https://europa.eu/youreurope/business/product-requirements/labels-markings/ce-marking/index_en.htm
RED harmonised standards	https://single-market-economy.ec.europa.eu/single-market/european-standards/harmonised-standards/radio-equipment_en
RoHS harmonised standards list	https://ec.europa.eu/docsroom/documents/41283/attachments/1/translations/en/renditions/native

Viszák, Hungary, 2026-07-03

company signature / stamp

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