Type Test Certificate for Special Equipment (Lift)

Certificate Number：TSX F36002220220039

Applicant：	SHENYANG BLUELIGHT NEW GENERATION TECHNOLOGY CO., LTD.
Registered address of applicant：	No. 99A-31 (Gate 1, Gate 2) and No. 33 (Gate 1, Gate 2), Chuangxin 1st Road, Hunnan District, Shenyang City, Liaoning Province, P.R. China
Manufacturer：	SHENYANG BLUELIGHT NEW GENERATION TECHNOLOGY CO., LTD.
Registered address of manufacturer：	No. 99A-31 (Gate 1, Gate 2) and No. 33 (Gate 1, Gate 2), Chuangxin 1st Road, Hunnan District, Shenyang City, Liaoning Province, P.R. China
Category of equipment：	Lift safety protection component
Type of equipment：	Programmable electronic system in safety-related applications
Name of product：	Programmable electronic system in safety-related applications for lifts (PESSRAL)
Model of product：	SJT-STO-V2.1
Type test report No.：	ETC22F360039(1)、ETC26F360YZ046

After type test, it is confirmed that the product complies with the requirements of TSG T7007-2022 *Regulation for Type Test of Lifts*、GB/T 7588.1-2020、GB/T 7588.2-2020、ISO 8100-1:2019、ISO 8100-2:2019、EN 81-20:2020、EN 81-50:2020、GB/T 20438-2017、GB 28526-2012、GB/T 35850.1-2018、IEC 61508:2010、IEC 62061:2021、ISO 22201-1:2017.

Applicable product model(s) of the certificate：SJT-STO-V2.1

See appendix for applicable product parameters and configuration of the certificate.

（Stamp of organ）

Issue date： **2022-08-04**

Recertification date： **2026-07-03**

Revalidation date： **before 2030-08-04**

Shanghai Jiao Tong University Elevator Test Center

Note:

1. **The applicant has responsibilities to ensure that the products conform to the requirements of the safety technical specifications and relative standards, and to ensure that the quality and safety performance of products are consistent with the tested sample mentioned above.**
2. **This certificate is not applicable to product manufactured after the revalidation date.**
3. **If this certificate is revised, the validity period of the certificate remains unchanged.**

Appendix

Applicable Product Parameters and Configuration

Major parameters	Hardware model and version	SJT-STO-V2.1（≤36VDC safety circuit） SJT-STO-V2.1（≤110VAC safety circuit）
	Software model and version	2070_0002
	Programmable electronic device type	MCU
	Programmable electronic device model	STM32F103C8 or GD32C103C8 or STM32F103CB or GD32C103CB or APM32F103CBT6 or GD32FCESCBT6
	Working condition	-20℃~+65℃, humidity less than 95%, no water drop
	Working voltage	DC5V
	Pollution degree	3
System composition	SJT-STO-V2.1*1	

	Safety Function	Safety Integrity Level
1	Safe torque off (STO) function for traction and positive drive lift	SIL3(hardware fault tolerance (HFT)=1)

	Main component list：logic subsystem
1	Microprocessor：STM32F103C8 or GD32C103C8 or STM32F103CB or GD32C103CB or APM32F103CBT6 or GD32FCESCBT6 (*1)
2	Power chip：AP2204K-3.3TRG1 or TPL810F33-5TR or CJ6330A/B33M or JLZ7375S5-33 (*1)；B0505S-1WR3 or DS0.75-IB0505 or DS1-B0505 or H01B-05S05 (*1)
3	Optocoupler： TLP2362 (Toshiba) or HCPL-M601 or FODM611 or QXM611-CuH-S or OR-M611 or ELM611 (*1)、EL814(A)-V（Yiguang）or HCPL-814-00AE(AVAGO) or LTV-814A or QX814A-CuH-S (*2)、LTV-356T-B or FODM121A or TLP185GR or QX357B-CuH-SE (*1)
4	Triode： Leshan LBC817-25LT1G or MCC BC817-25-TP or BC817-25(NEXP) or BC817-25(CJ) or (YJ)BC817-25 (*1)
5	Logic chip：74LVC2G17GW or 74LVC2G17GW(NEXP) or SN74LVC2G17(TI) or U74LVC2G17(UTC) (*2)，74LVC1G57GW or 74LVC1G57GW(NEXP) or SN74LVC1G57(TI) or U74LVC1G57(UTC) (*2)
6	TVS：SMBJ5.0CA(Brightking) or SMBJ5.0CA(SPSEMI) or SMBJ5.0CA(CJ) or SMBJ5.0CA(YJ) (*1)
7	Zener diode：ZMM5B1(S.T.) or BZV55-5V1(NEXP) or BZV55B5V1(LGE)（*2）
8	PCB: GOLDENMAX INTERNATIONAL GROUP LTD -FR4 board or Nanya PCB (Kunshan) Co., Ltd. NY2150 board

Main component list：output subsystem	
1	Drive chip：UCC27517DBV(TI) or SGM48017XN5G/TR（SGMICRO）（*1）
Main manufacturing process	
1	PCB manufacturing: Liaoning Orita electronic Co., Ltd. or Beijing Handwell technology Co., Ltd. or Cangzhou Huanyu Circuits Co., Ltd.
2	PCBA production: Dalian Shengdong electronic Co., Ltd. or Shenyang Kehairongsheng technology Co., Ltd.

Note to attached table：

1. When the parameter or configuration listed in the attached table has been changed, The type test must be done again.

2. When a safety function is not used, the corresponding sensor or detector may not be configured. Apart from this, the major parameters, system composition, main components (brand, model and quantity) and main manufacturing process must all be completely consistent with the content of the above tables. If a component allows multiple brands and models, the brands and models can be used alternatively.

Type test change table

No.	Description	Before change	After change	Date of change
1	Registered address	No.37 Shiji Road, Hunnan New District, Shenyang, China	No. 99A-31 (Gate 1, Gate 2) and No. 33 (Gate 1, Gate 2), Chuangxin 1st Road, Hunnan District, Shenyang City, Liaoning Province, P.R. China	2025-12-04
2	Hardware model and version	SJT-STO-V2.1（24VDC safety circuit） SJT-STO-V2.1（110VAC safety circuit）	SJT-STO-V2.1（≤36VDC safety circuit） SJT-STO-V2.1（≤110VAC safety circuit）	2025-12-04
3	Programmable electronic device model, Microprocessor	Skip	Add：APM32F103CBT6 or GD32FCESCBT6	2025-12-04
4	Power chip	Skip	Add：TPL810F33-5TR or CJ6330A/B33M or JLZ7375S5-33（*1），DS0.75-IB0505 or DS1-B0505 or H01B-05S05（*1）	2025-12-04
5	Optocoupler	Skip	Add：QXM611-CuH-S or OR-M611 or ELM611（1 PCS），LTV-814A or QX814A-CuH-S （*2），QX357B-CuH-SE （*1）	2025-12-04

No.	Description	Before change	After change	Date of change
6	Triode	Skip	Add：BC817-25(NEXP) or BC817-25(CJ) or (YJ)BC817-25	2025-12-04
7	Logic chip	Skip	Add：74LVC2G17GW(NEXP) or SN74LVC2G17(TI) or U74LVC2G17(UTC)（*2），74LVC1G57GW(NEXP) or SN74LVC1G57(TI) or U74LVC1G57(UTC)（*2）	2025-12-04
8	TVS、Zener diode	N/A	Add	2025-12-04
9	PCB	Liaoning Orita electronic Co., Ltd. or Beijing Handwell technology Co., Ltd. or Cangzhou Huanyu Circuits Co., Ltd.	GOLDENMAX INTERNATIONAL GROUP LTD -FR4 board or Nanya PCB (Kunshan) Co., Ltd. NY2150 board	2025-12-04

Report No. ETC26F360YZ046

Special Equipment

Type Test Report

(Lift)

Category of equipment:	Lift safety protection component
Type of equipment:	Programmable electronic system in safety-related applications
Name of product:	Programmable electronic system in safety-related applications for lifts (PESSRAL)
Model of product:	SJT-STO-V2.1
Manufacturer:	SHENYANG BLUELIGHT NEW GENERATION TECHNOLOGY CO., LTD.
Applicant:	SHENYANG BLUELIGHT NEW GENERATION TECHNOLOGY CO., LTD.
Category of type test:	First verification
Test date:	2026-06-25

Shanghai Jiao Tong University Elevator Test Center

NOTICES

1、**This report is based on the type test that is carried out according to *Regulation for Type Test of Lifts* (TSG T7007-2022).**

2、**The report is printout via computer, and any modification is invalid.It is forbidden to copy the report partly without the permission of notified body. The partly copy is invalid.**

3、**The report will be invalid without the signature of tester, verifier, approver and the approval number, official seal (or dedicated report seal) or paging seal of the notified body.**

4、**The report is responsible for the sample lift (the sample) only.**

5、**Any dissent to the report must be put forward to notified body within 15 days from receiving it, otherwise, it is considered that this report is accepted.**

6、**The sample will not be handed back because of normal wear, the others will be dealt with according to regulation concerned.**

7、**Type test report and certificate should be subject to the Chinese version, while the English version is for reference only.**

8、**The addresses of Elevator Test Center, Shanghai Jiaotong University are as follows:**

(1) Dongchuan Road Laboratory

Room B210, School of Mechanical Engineering, Shanghai Jiaotong University

No.800, Dongchuan Road, Minhang District, Shanghai, P.R. China

Tel: +86-21-34207035/34207036

Fax: +86-21-34207035/34207036-814

Zip code: 200240

(2) Jindu Road Laboratory

Room 1001, Comprehensive Building, South Urban Park

No.123, lane 1165, Jindu Road, Minhang District, Shanghai, P.R. China

Tel : +86-21-61267037

Fax : +86-21-61267037 to 812

Zip code: 201108

Type Test Report

Category of equipment	Lift safety protection component	Type of equipment	Programmable electronic system in safety-related applications
Name of product	Programmable electronic system in safety-related applications for lifts (PESSRAL)		
Model of product	SJT-STO-V2.1	Structure type	PCB
Serial number of product	C-2604706	Date of manufacture	2026-04-01
Applicant	SHENYANG BLUELIGHT NEW GENERATION TECHNOLOGY CO., LTD.		
Registered address of applicant	No. 99A-31 (Gate 1, Gate 2) and No. 33 (Gate 1, Gate 2), Chuangxin 1st Road, Hunnan District, Shenyang City, Liaoning Province, P.R. China		
Unified social credit code	91210112MA0YDH0R63		
Manufacturer	SHENYANG BLUELIGHT NEW GENERATION TECHNOLOGY CO., LTD.		
Registered address of manufacturer	No. 99A-31 (Gate 1, Gate 2) and No. 33 (Gate 1, Gate 2), Chuangxin 1st Road, Hunnan District, Shenyang City, Liaoning Province, P.R. China		
Unified social credit code	91210112MA0YDH0R63		
Manufacturing address	No. 99A-31 (Gate 1, Gate 2) and No. 33 (Gate 1, Gate 2), Chuangxin 1st Road, Hunnan District, Shenyang City, Liaoning Province, P.R. China		
Location of test	SHENYANG BLUELIGHT NEW GENERATION TECHNOLOGY CO., LTD.		
State of sample	No abnormal	Test date	2026-06-25
Test conditions	No abnormal	Category of type test	First verification
Test basis	TSG T7007-2022 ***Regulation for Type Test of Lifts***, GB/T 7588.1-2020、GB/T 7588.2-2020、ISO 8100-1:2019、ISO 8100-2:2019、EN 81-20:2020、EN 81-50:2020 、GB/T 20438-2017、GB 28526-2012、GB/T 35850.1-2018、IEC 61508:2010 、IEC 62061:2021、 ISO 22201-1:2017		
Test Conclusion	Certificated.		

Tested by: Date: 2026-07-03	Approval certificate of type test organ: TS7610022-2029
Verified by: Date: 2026-07-03	Shanghai Jiao Tong University Elevator Test Center
Approved by: Date: 2026-07-03	Issue date: 2026-07-03

1. The Configuration and Specifications of the Sample Lift (sample)

Major parameters	Hardware model and version	SJT-STO-V2.1（≤36VDC safety circuit） SJT-STO-V2.1（≤110VAC safety circuit）
	Software model and version	2070_0002
	Programmable electronic device type	MCU
	Programmable electronic device model	STM32F103C8 or GD32C103C8 or STM32F103CB or GD32C103CB or APM32F103CBT6 or GD32FCESCBT6
	Working condition	-20℃~+65℃, humidity less than 95%, no water drop
	Working voltage	DC5V
	PCB protective cover IP level	N/A
	Response time	N/A
	Pollution degree	3
System composition	SJT-STO-V2.1*1	

	Safety Function	Safety Integrity Level
1	Safe torque off (STO) function for traction and positive drive lift	SIL3(hardware fault tolerance (HFT)=1)

	Main component list：logic subsystem
1	Microprocessor：STM32F103C8 or GD32C103C8 or STM32F103CB or GD32C103CB or APM32F103CBT6 or GD32FCESCBT6 (*1)
2	Power chip：AP2204K-3.3TRG1 or TPL810F33-5TR or CJ6330A/B33M or JLZ7375S5-33 (*1)；B0505S-1WR3 or DS0.75-IB0505 or DS1-B0505 or H01B-05S05 (*1)
3	Optocoupler： TLP2362 (Toshiba) or HCPL-M601 or FODM611 or QXM611-CuH-S or OR-M611 or ELM611 (*1)、EL814(A)-V（Yiguang）or HCPL-814-00AE(AVAGO) or LTV-814A or QX814A-CuH-S (*2)、LTV-356T-B or FODM121A or TLP185GR or QX357B-CuH-SE (*1)
4	Triode： Leshan LBC817-25LT1G or MCC BC817-25-TP or BC817-25(NEXP) or BC817-25(CJ) or (YJ)BC817-25 (*1)
5	Logic chip：74LVC2G17GW or 74LVC2G17GW(NEXP) or SN74LVC2G17(TI) or U74LVC2G17(UTC) (*2)，74LVC1G57GW or 74LVC1G57GW(NEXP) or SN74LVC1G57(TI) or U74LVC1G57(UTC) (*2)
6	TVS：SMBJ5.0CA(Brightking) or SMBJ5.0CA(SPSEMI) or SMBJ5.0CA(CJ) or SMBJ5.0CA(YJ) (*1)

7	Zener diode：ZMM5B1(S.T.) or BZV55-5V1(NEXP) or BZV55B5V1(LGE)（*2）
8	PCB: GOLDENMAX INTERNATIONAL GROUP LTD -FR4 board or Nanya PCB (Kunshan) Co., Ltd. NY2150 board
Main component list： output subsystem	
1	Drive chip：UCC27517DBV(TI) or SGM48017XN5G/TR（SGMICRO）（*1）
Main manufacturing process	
1	PCB manufacturing: Liaoning Orita electronic Co., Ltd. or Beijing Handwell technology Co., Ltd. or Cangzhou Huanyu Circuits Co., Ltd.
2	PCBA production: Dalian Shengdong electronic Co., Ltd. or Shenyang Kehairongsheng technology Co., Ltd.

2. Check and test of the sample lift (the sample)

No.	Item Number	Test Items	Results	Conclusions
1	R6.3	Function and safety checks of programmable systems: safety function test	Comply with requirements	Pass
2	R6.3	Function and safety checks of programmable systems: software static analysis	Refer to report ETC22F360039(1)	Pass
3	R6.3	Function and safety checks of programmable systems: software dynamic analysis and test	Refer to report ETC22F360039(1)	Pass
4	R6.3	Function and safety checks of programmable systems: fault insertion test	Refer to report ETC22F360039(1)	Pass
5	R6.3	Function and safety checks of programmable systems: response time test (for UCMP detection subsystem, 10 tests)	Refer to report ETC22F360039(1)	Pass
6	R6.4	Temperature and mechanical stress test: temperature test	Refer to report ETC22F360039(1)	Pass

No.	Item Number	Test Items	Results	Conclusions
7	R6.4	Temperature and mechanical stress test: vibration test	Refer to report ETC22F360039(1)	Pass
8	R6.4	Temperature and mechanical stress test: impact test	Refer to report ETC22F360039(1)	Pass
9	R6.5.1	EMC test: enclosure port	Refer to report ETC22F360039(1)	Pass
10	R6.5.2	EMC test: signal and control line port	Refer to report ETC22F360039(1)	Pass
11	R6.5.3	EMC test: DC power input / output port	N/A	/
12	R6.5.4	EMC test: AC power input / output port	N/A	/
13	R6.5.5	Loss of electricity while working	Comply with requirements	Pass
14	R6.6	Nameplate	Comply with requirements	Pass

3. Check of consistency

No.	Item Number	Review Items	Results	Conclusions
1	/	Consistency of quality control and inspection in manufacturing process	Comply with requirements	Pass
2	/	Consistency of documentation and technical data	Comply with requirements	Pass
3	/	Consistency of samples	Comply with requirements	Pass
4	/	Consistency of softwares	Comply with requirements	Pass

Appendix 1: Description and Assumption

1. How to obtain the failure rate of this product is described as follows:

1) The failure rate of this product is calculated by means of failure rate prediction. The data is from the manufacturer's data manual or general-purpose data manual GJB/Z299C-2006.

2) The working ambient temperature of the system is 60°C on average and the working condition is common indoor environment without protection.

2. The following assumptions are used for the failure modes, effects and diagnostics of the product:

1) Failure of any component in a channel will cause failure of the whole channel.

2) In the system service period, predicted failure rate of a component is a constant. Failure in the system wear-out period is not included.

3) Failure of each component is independent.

4) Failure of modules that do not compose or influence the safety functions is not included.

5) Failure of the external power supply is not included.

Appendix 2: List of Technical Documentations

No,	File number	File name	Version
1	D1.1	SJT-STO-V2.1 File list.docx	V1R0
2	D2.1	SJT-STO-V2.1 safety requirement standard (SRS) V0R0.docx	V1R0
3	D2.2	SJT-STO-V2.1 hardware design manual V0R0.docx	V1R0
4	D2.3	SJT-STO-V2.1 software design manual VOR0.doc	V1R0
5	D2.4	SJT-STO-V2.1 verification and validation plan (V&V) V0R0.doc	V1R0
6	D2.5	FMEDA FOR SJT-STO-V2.1.xls	V1R0
7	D2.6	SJT-STO-V2.1 creepage distance analysis V0R0.docx	V1R0
8	D2.7	SJT-STO-V2.1 schematic diagram.zip	V1R0
9	D2.8	SJT-STO-V2.1 wiring diagram.zip	V1R0
10	D2.9	SJT-STO-V2.1 component list.xls	V1R1
11	D2.10	Main replaceable component list.xls	V1R1
12	D2.11	SJT-STO-V2.1 software flow chart V0R0.vsd	V1R0
13	D2.12	SJT-STO-V2.1 source code.zip	V1R0
14	D3.1	SJT-STO-V2.1 hardware test plan.docx	V1R0
15	D3.2	SJT-STO-V2.1 software test plan.doc	V1R0
16	D3.3	SJT-STO-V2.1 actual running test plan.docx	V1R0
17	D3.4	SJT-STO-V2.1 hardware test report.docx	V1R0
18	D3.5	SJT-STO-V2.1 software static analysis report.docx	V1R0

19	D3.6	SJT-STO-V2.1 software dynamic test sample.zip	V1R0
20	D3.7	SJT-STO-V2.1 actual running test report.docx	V1R0
21	D3.8	SJT-STO-V2.1 compliance description for appendix A & B of GB_T 20438.3.docx	V1R0
22	D3.9	SJT-STO-V2.1 certificate of comformity for PCB（Orita）.jpg	/
23	D4.1	STO function safety module _ environmental reliability _SET2021-10062.pdf	/
24	D4.2	STO function safety module _EMC_SET2021-10123.pdf	/
25	D5.1	SJT-STO-V2.1 Manual V1.0.docx	V1.0
26	D6.1	SJT-STO-V2.1 meeting minutes.zip	/

Appendix 3: Descriptions of Safety Functions

No.	Safety Function	Description
1	Safe torque off (STO) function for traction and positive drive lift	When safety circuit of elevator system is connected, the input signal of STO function board is valid, STO function board will make IGBT of up bridge breakover by outputting a line of 5v drive voltage to drive the optocoupler of up bridge arm through serial structure of control module 1 and control module 2. When safety circuit of elevator system is connected or STO function board detect fault during microcontroller diagnosis, and the input signal of STO function board is invalid, STO function board will close 5v drive voltage, shut off up bridge arm of IGBT, make integrated controller to enter safety status.

Appendix 4: Hardware Structure Block Diagram

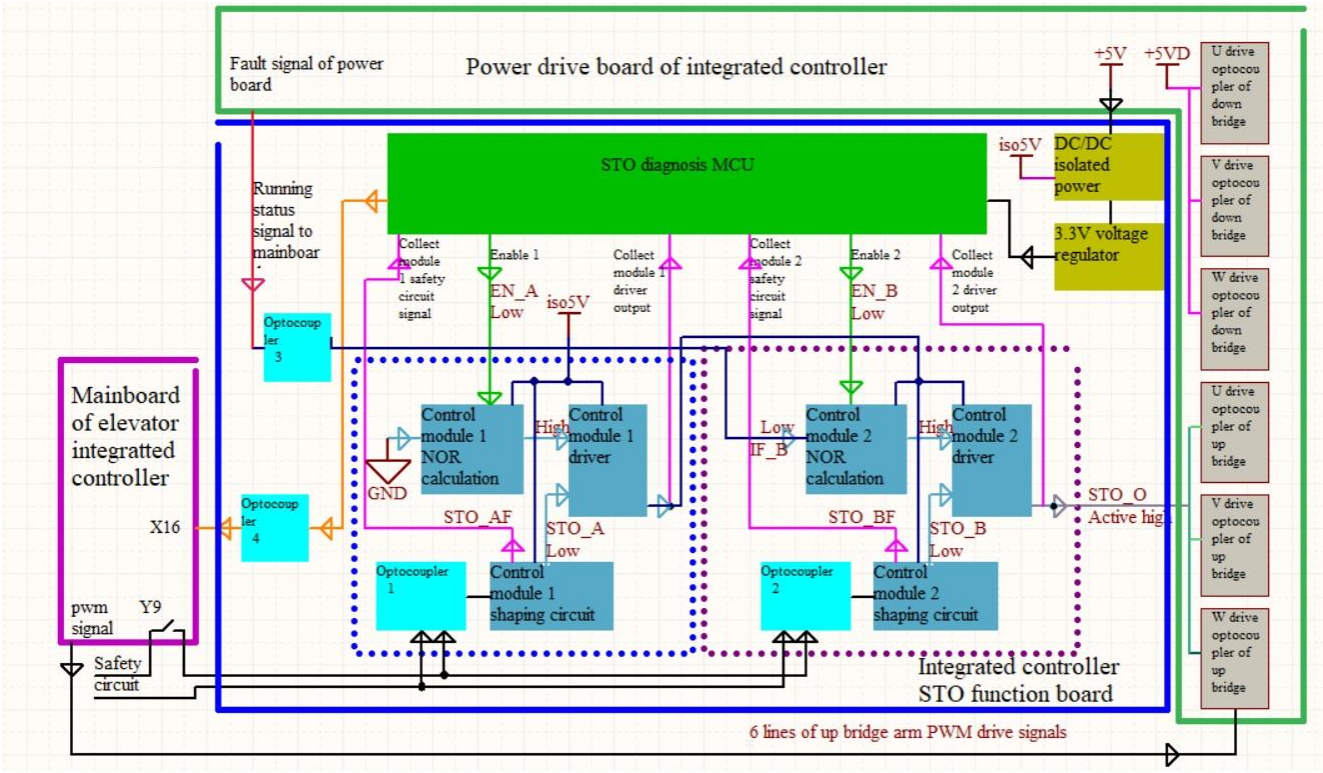
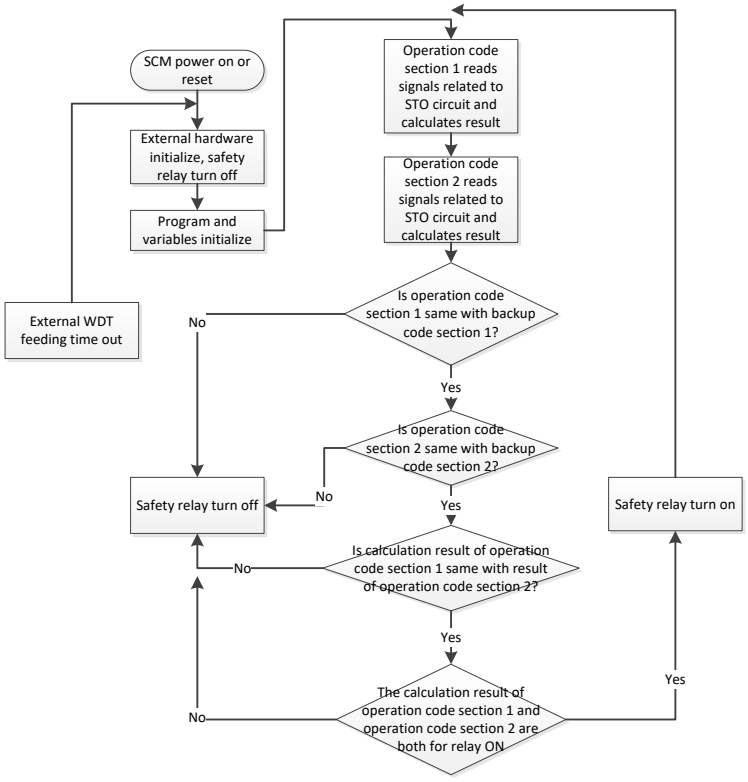


Figure 1: Block diagram of hardware structure

Appendix 5: Software Function Module



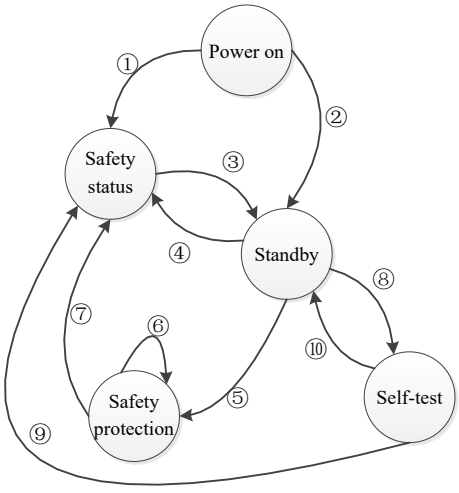


Figure 2: Software function module diagram

Appendix 6: Hardware SIL Calculation Result (Structural Constraint and Random Hardware Failure)

1、Safe torque off (STO) function for traction and positive drive lift

Test Time Interval	T1 = 1 Year (8760h)	T1 = 5 Years (43800h)	T1= 10 Years (87600h)	T1 = 15 Years (131400h)
Average Probability of Failure on Demand (PFDav)	2.87×10^{-7}	1.43×10^{-6}	2.85×10^{-6}	4.27×10^{-6}
Probability of Failure per Hour (PFH) (h-1)	2.23×10^{-10}	2.23×10^{-10}	2.23×10^{-10}	2.23×10^{-10}
Conditions of Structural Constraint	HFT=1			
SIL	SIL3 (GB/T 20438, IEC61508)			

Appendix 7: System integration test result

No.	Test item	Test result	Conclusion
1	Inspection running test	1. Eliminate all faults after connecting integrated controller according to schematic diagram. 2. Turn to inspection mode 3. Press Up button to perform inspection up running. 4. Release Up button, brake will turn off and elevator stops running. 5. Repeat above step 2~4 for 20 times. 6. Turn to inspection mode. 7. Press Down button to perform inspection down running. 8. Release Down button, brake will turn off and elevator stops running. 9. Repeat above step 6~8 for 20 times.	Pass
2	Auto running test	1. Eliminate all faults after connecting integrated controller according to schematic diagram. 2. Turn to AUTO mode. 3. Use operator to make car call, elevator will run to selected floor automatically. 4. Repeat above 3 steps for 20 times.	Pass
3	Long time running test	1. Eliminate all faults after connecting integrated controller according to schematic diagram. 2. Turn to AUTO mode.	Pass

		3. Set elevator to automatic loop running. 4. Running time is set to 10 days.	

Appendix 8: Sample Photo

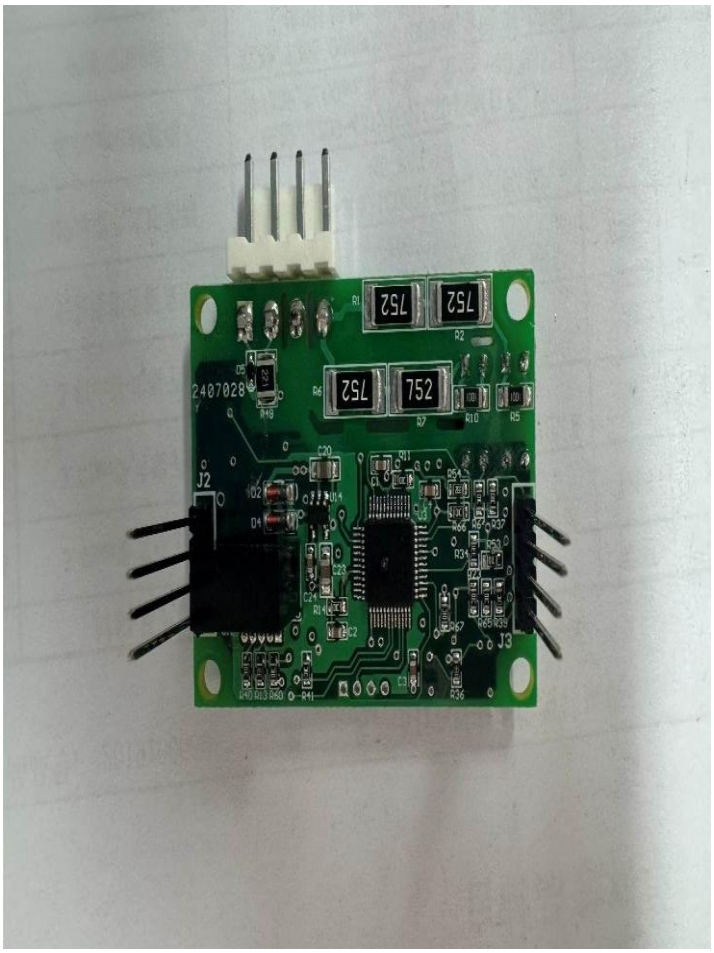


Figure 3: Photo of test sample

Appendix 15: Other information

(1) Because the test need to use the special process equipment, this component test was conducted in manufacturing address

(2) This English report is a translated version of the Chinese report and is issued on the same date as the Chinese report.

Appendix 16: Revise(s) of the type test report

None