



1 **EC TYPE-EXAMINATION CERTIFICATE**

2 Equipment intended for use in Potentially Explosive Atmospheres Directive 94/9/EC

3 Certificate Number: **Sira 02ATEX3418X** Issue: **6**

4 Equipment: **TX6648 3.5Ah UPS Power Supply**

5 Applicant: **Trolex Limited**

6 Address: **Newby Road
Hazel Grove
Stockport
Cheshire, SK7 5DY
UK**

7 This equipment and any acceptable variation thereto is specified in the schedule to this certificate and the documents therein referred to.

8 Sira Certification Service, notified body number 0518 in accordance with Article 9 of Directive 94/9/EC of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment intended for use in potentially explosive atmospheres given in Annex II to the Directive.

The examination and test results are recorded in the confidential reports listed in Section 14.2.

9 Compliance with the Essential Health and Safety Requirements, with the exception of those listed in the schedule to this certificate, has been assured by compliance with the following documents:

EN 60079-0:2006 EN 60079-5:2007 EN 60079-7:2007 EN 60079-11:2007
EN 50303:2000

10 If the sign 'X' is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

11 This EC type-examination certificate relates only to the design and construction of the specified equipment. If applicable, further requirements of this Directive apply to the manufacture and supply of this equipment.

12 The marking of the equipment shall include the following:



I M2(M1) * or I M1 **

Ex eq[ia Ma]Mb I * Ex ia Ma I **

* applies when the equipment is operating on mains power.

** applies when the equipment is operating on battery back-up.

Project Number 22160
C. Index 16

D R Stubbings BA MIET
Certification Manager

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

Sira 02ATEX3418X
Issue 6

13 DESCRIPTION OF EQUIPMENT

The TX6648 Un-interruptible Power Supply (UPS) incorporates a modified TX6641 Intrinsically Safe Power Supply Chassis (certificate no. Sira 01ATEX2229X and IECEx SIR 10.0107X) housed inside a metal enclosure that is powder filled and sealed, it also features a larger enclosure that includes a battery compartment. The battery compartment is a totally separate part of the main enclosure and is not powder filled. A battery timer switch circuit board is located in the powder filled part of the enclosure. The battery timer switch circuit detects if the battery is being used to supply power and can switch off the power after a pre-determined length of time.

Only the 0.5A and 1.0A versions of the TX6641 Chassis are used for the UPSs. The TX6648 uses two 3.5Ah batteries, these provide power to equipment located in a hazardous area if the mains power supply fails or is turned off for safety reasons.

When mains powered, this equipment is deemed to be Category M2(M1) or Mb(Ma) equipment, when battery powered, this equipment is deemed to be Category M1 or Ma equipment, however, overall the equipment is deemed to be Category M1 or Ma.

The electrical output parameters are as follows:

- Current output options - 0.5A, 1.0A
- Voltage output options - 7.5V and 12V
- Input supply options Um - 230 Vrms, 110 Vrms, 55 Vrms, 42 Vrms or 24 Vrms

I.S. Output Terminals +V and 0 V

7.5 V PSU (Uo = 8.5V o/p crowbar)	Short circuit current, Io in A	Max output Power, Po in W	Lo/Ro Ratio in $\mu\text{H}/\Omega$	Capacitance, Co in μF
0.5 A	0.873	5.28	72.69	646
1.0 A	1.76	10.63	36.17	560

12.0 V PSU (Uo = 13.0 V o/p crowbar)	Short circuit current, Io in A	Max output Power, Po in W	Lo/Ro Ratio in $\mu\text{H}/\Omega$	Capacitance, Co in μF
0.5 A	0.873	6.33	72.6	32.0
1.0 A	1.76	12.73	36.17	30.29

Output terminals C1 (V_sig) and C2 (0 V)

- Ui = 16.5 V
- Uo = 13.65 V
- Io = 25mA
- Po = 85.2 mW
- Ci = 12 nF
- Li = 0
- Co = 10 μF
- Lo = 700 mH
- Lo/Ro = 5470 $\mu\text{H}/\text{ohm}$

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

Sira 02ATEX3418X
Issue 6

Output terminals C3 (I_{sig}) and C2 (0 V)

U _i	=	16.5 V	C _i	=	12 nF
P _i	=	0.3 W	L _i	=	0
U _o	=	13.65 V	C _o	=	10 µF
I _o	=	213.6 mA, transient	L _o	=	9.4 mH
I _o	=	105.4 mA, continuous	L _o /R _o	=	312 µH/ohm
P _o	=	1.25 W			

Relay contact terminals P1 (common), P2 (Normally closed) and P3 (Normally open)

U _i	=	90 V
I _i	=	0.25 A
P _i	=	3.0 W

Switch terminals T1 and T2

Connect to a volt free switch

U _i	=	0 V
I _i	=	0 A
P _i	=	0 W

Variation 1 - This variation introduced the following changes:

- To permit the circuits to be modified to allow the equipment to be powered from a nominal 55 Vdc power source as an alternative to the mains power supply; therefore, the input voltage, U_m, for this version is changed to 55 Vdc.
- The use of a re-settable regulator circuit that resets the crowbar circuits if they are triggered by electrical noise or spurious transients is authorised.
- The recognition that the breaking current value, I_n, of fuses F1 and F4 is to be increased to 5 A.
- The value of fuse F8 has been authorised to be increased to 250 mA, in addition, the power rating of resistor R40 is raised to 2 W.

Variation 2 - This variation introduced the following change:

- The crowbar circuits to be modified to increase the operational voltage and speed, the value of the output resistor R26 has been also changed; the electrical parameters for the power supplies are modified as follows:

7.5 V PSU (8.5 V o/p crowbar)	Short circuit current, I _o in A	Max output Power, P _o in W	L _o /R _o Ratio in µH/W	Capacitance, C _o in µF
0.5 A	0.873	5.28	72.69	646
1.0 A	1.76	10.63	36.17	560
12.0 V PSU (13.0 V o/p crowbar)	Short circuit current, I _o in A	Max output Power, P _o in W	L _o /R _o Ratio in µH/W	Capacitance, C _o in µF
0.5 A	0.873	6.33	72.6	32.0
1.0 A	1.76	12.73	36.17	30.29

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

Sira 02ATEX3418X
Issue 6

Variation 3 - This variation introduced the following changes:

- i. The introduction of a revised printed circuit board (PCB) that incorporates salvage modifications that include the removal of two capacitors and the connection of a third capacitor using insulated wire links is recognised.
- ii. The introduction of salvage modifications to the re-settable regulator is endorsed.

Variation 4 - This variation introduced the following change:

- i. The re-settable regulator is authorised to be modified.

Variation 5 - This variation introduced the following change:

- i. The use of an alternative supply transformer with an input voltage of 42Vac for the TX6648, 3.5Ah UPS Power Supply is approved.

Variation 6 - This variation introduced the following changes:

- i. Following appropriate re-assessment to demonstrate compliance with the requirements of the EN 60079 series of standards, the documents originally listed in section 9, EN 50014:1997 (amendments 1 and 2), EN 50020:2002, EN 50017:1998, EN 50019:1994 and EN 50303:2000, were replaced by those currently listed, the markings in section 12 were updated accordingly, as a result of the re-assessment, Special Conditions for Safe Use were introduced and therefore an 'X' suffix was added to the certificate number.

14 DESCRIPTIVE DOCUMENTS

14.1 Drawings

Refer to Certificate Annexe.

14.2 Associated Sira Reports and Certificate History

Issue	Date	Report number	Comment
0	28 April 2003	R52A8386A	The release of the prime certificate.
1	25 June 2003	R52A9995A	The introduction of Variation 1
2	3 November 2004	R52A11948A	The introduction of Variation 2
3	3 November 2004	R52A11035A	The introduction of Variation 3
4	4 April 2005	R52A13139A	The introduction of Variation 4
5	23 May 2006	R52A14904A	The introduction of Variation 5
6	9 September 2010	R22160B/00	This Issue covers the following changes: <ul style="list-style-type: none"> • All previously issued certification was rationalised into a single certificate, Issue 6, Issues 0 to 5 referenced above are only intended to reflect the history of the previous certification and have not been issued as documents in this format. • The introduction of Variation 6

15 SPECIAL CONDITIONS FOR SAFE USE (denoted by X after the certificate number)

- 15.1 All cables used for external connections shall be made by the use of suitably certified Ex e cable glands. The use of conduit is not permitted.

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Sira Certification Service

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SCHEDULE

EC TYPE-EXAMINATION CERTIFICATE

Sira 02ATEX3418X
Issue 6

16 ESSENTIAL HEALTH AND SAFETY REQUIREMENTS OF ANNEX II (EHSRs)

The relevant EHSRs that are not addressed by the standards listed in this certificate have been identified and individually assessed in the reports listed in Section 14.2.

17 CONDITIONS OF CERTIFICATION

- 17.1 The use of this certificate is subject to the Regulations Applicable to Holders of Sira Certificates.
- 17.2 Holders of EC type-examination certificates are required to comply with the production control requirements defined in Article 8 of directive 94/9/EC.
- 17.3 Any labels that are affixed to the printed circuit board, e.g. QA labels, shall not be placed on any of the electrical components in the equipment.
- 17.4 The mains transformer shall be subjected to routine tests and be able to withstand a test voltage of at least 2500Vrms applied between primary and secondary windings and at least 1500Vrms applied between all windings and the core or screen.

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Certificate Annexe

Certificate Number: Sira 02ATEX3418X
Equipment: TX6648 3.5Ah UPS Power Supply
Applicant: Trolex Limited



Issue 0

Drawing No.	Sheet	Rev.	Date	Description
P5531-02-04	1 of 1	A	08 Apr 03	TX6648 series PSU, general arrangement
P5531.65	1 of 1	B	18 Nov 02	IS output terminal board, PCB artwork, UPS
P5531.49	1 of 1	B	18 Nov 02	Mains input terminal board, PCB artwork
P5531.61	1 of 2	C	15 Apr 03	Power supply, certified circuit diagram and parts list
P5531.61	2 of 2	B	08 Apr 03	Power supply, certified circuit diagram and parts list
P5531.62.01	1 of 1	B	18 Oct 02	PCB bottom layer
P5531.62.02	1 of 1	B	18 Oct 02	PCB bottom overlay
P5531.62.03	1 of 1	B	18 Oct 02	PCB inner layer 1
P5531.62.04	1 of 1	B	18 Oct 02	PCB inner layer 2
P5531.62.05	1 of 1	B	18 Oct 02	PCB Top layer
P5531.62.06	1 of 1	B	18 Oct 02	PCB Top overlay
P5531.108	1 of 1	A	07 Apr 03	Fuse, potted
P5531.09	1 of 1	A	26 Mar 03	Certification labelling
P5531-10	1 and 2	C	20 Nov 02	Battery timer switch certified circuit diagram and parts list
P5531.05	1 of 1	C	04 Sep 02	Battery timer switch PCB artwork
P5093.27	1 of 1	C	21 Jan 97	Reed relay (RL1)
P5531-83	1 of 1	A	21 Nov 02	Relay details (RL2) battery switching
P5531.04	1 of 1	C	16 Jan 02	Transformer, 110V, 230V
P5531.04.01	1 of 1	C	16 Jan 02	Transformer, 24V

Issue 1

Drawing No.	Sheet	Rev	Date	Description
P5531.61*	1 and 2	D	03 Jun 03	UPS Master circuit diagram and parts list
P5531.62.01	1 of 1	C	12 Jun 03	PCB bottom layer
P5531.62.02	1 of 1	C	12 Jun 03	PCB bottom overlay
P5531.62.03	1 of 1	C	12 Jun 03	UPS, PCB inner layer 1
P5531.62.04	1 of 1	C	12 Jun 03	PCB inner layer 2
P5531.62.05	1 of 1	C	12 Jun 03	PCB Top layer
P5531.62.06	1 of 1	C	12 Jun 03	PCB Top overlay
P5531-09	1 of 1	B	17 Jun 03	Certification labelling
P5531.107	1 and 2	A	11 Mar 03	Input regulator and reset circuit diagram, and parts list
P5531.106	1 of 1	A	04 Jun 03	Regulator reset PCB
P5531-02-01	1 of 1	C	16 Jun 03	General arrangement, Chassis
P5531-108	1 of 1	B	12 Jun 03	Fuse potted

Issue 2

Drawing No.	Sheet	Rev.	Date	Description
P5531.61	1 of 2	F	27 Apr 04	UPS circuit diagram
P5531.61	1 of 2	F	27 Apr 04	UPS circuit parts list

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Certificate Annexe

Certificate Number: Sira 02ATEX3418X
 Equipment: TX6648 3.5Ah UPS Power Supply
 Applicant: Trolex Limited



Issue 3

Drawing No.	Sheet	Rev.	Date	Description
P5531-120	1 of 1	A	08 Jan 04	P5531.62 Issue C PCB salvage modifications
P5531-123	1 of 1	A	11 Mar 04	P5531.03 salvage modifications
P5531.61*	1 and 2	F	27 Apr 04	UPS, master certified circuit diagram and parts list
P5531.62.01	1 of 1	D	18 Nov 03	PCB bottom layer
P5531.62.02	1 of 1	D	18 Nov 03	PCB bottom overlay
P5531.62.03	1 of 1	D	18 Nov 03	PCB inner layer 1
P5531.62.04	1 of 1	D	18 Nov 03	PCB inner layer 2
P5531.62.05	1 of 1	D	18 Nov 03	PCB top layer
P5531.62.06	1 of 1	D	18 Nov 03	PCB top overlay
P5531.122	1 of 1	A	06 Feb 04	Input regulator and reset salvage schematic excluding 1.8A version
P5531-111	1 of 1	C	07 Oct 03	Input regulator and reset PCB salvage drawing excluding 1.8A version

Issue 4

Drawing No.	Sheet	Rev.	Date	Description
P5531-106	1 of 1	B	15 Jan 04	Regulator reset PCB
P5531-107	1 and 2	C	20 Nov 03	Input regulator and reset PCB circuit diagram and parts list

Issue 5

Number	Sheet	Rev.	Date	Description
P5531.04.02	1 of 1	A	17 Mar 06	Transformer 42Vac
P5531-09	1 of 1	C	11 May 06	Certification Label

Issue 6

Drawing	Sheets	Rev.	Date (Sira stamp)	Description
P5531-02-04	1 of 1	B	25 Aug 10	TX6648 series PSU, general arrangement
P5531.65	1 of 1	B	25 Aug 10	IS output terminal board, PCB artwork, UPS
P5531.49	1 of 1	B	25 Aug 10	Mains input terminal board, PCB artwork
P5531-10	1 and 2	C	25 Aug 10	Battery timer switch certified circuit diagram and parts list
P5531.05	1 of 1	C	25 Aug 10	Battery timer switch PCB artwork
P5093.27	1 of 1	C	25 Aug 10	Reed relay (RL1)
P5531-83	1 of 1	A	25 Aug 10	Relay details (RL2) battery switching
P5531.04	1 of 1	C	25 Aug 10	Transformer, 110V, 230V
P5531-04-01	1 of 1	C	25 Aug 10	Transformer, 24V
P5531-02-01	1 of 1	C	25 Aug 10	General arrangement, Chassis
P5531-108	1 of 1	B	25 Aug 10	Fuse potted
P5531.61	1 and 2	F	25 Aug 10	UPS, master certified circuit diagram and parts list
P5531.62.01	1 of 1	D	25 Aug 10	PCB bottom layer
P5531.62.02	1 of 1	D	25 Aug 10	PCB bottom overlay
P5531.62.03	1 of 1	D	25 Aug 10	PCB inner layer 1
P5531.62.04	1 of 1	D	25 Aug 10	PCB inner layer 2
P5531.62.05	1 of 1	D	25 Aug 10	PCB top layer
P5531.62.06	1 of 1	D	25 Aug 10	PCB top overlay
P5531-106	1 of 1	B	25 Aug 10	Regulator reset PCB
P5531-107	1 and 2	C		Input regulator and reset PCB circuit diagram and parts list
P5531.04.02	1 of 1	A		Transformer, 42Vac
P5531-155	1 of 1	A		Certification Label

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