



IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION IEC Certification Scheme for Explosive Atmospheres

for rules and details of the IECEx Scheme visit www.iecex.com

Certificate No.: **IECEx BAS 04.0025** Issue No.: **2**

Status: **Current**

Date of Issue: **2005-04-20** Page 1 of 4

Applicant: **Measurement Technology Limited**
Power Court
Luton
Bedfordshire
LU1 3JJ
United Kingdom

Electrical Apparatus: **MTL7700 Series Shunt Zener Diode Barriers**
Optional accessory:

Type of Protection: **Intrinsic Safety**

Marking: **IECEx BAS 04.0025**
[Ex ia] IIB (-20°C ≤ Ta ≤ +60°C)
[Ex ia] IIC (-20°C ≤ Ta ≤ +60°C)


*Approved for issue on behalf of the IECEx
Certification Body:*

R S Sinclair

Position:

Managing Director

*Signature:
(for printed version)*


22-4-05

Date:

1. This certificate and schedule may only be reproduced in full.
2. This certificate is not transferable and remains the property of the issuing body.
3. The Status and authenticity of this certificate may be verified by visiting the Official IECEx Website.

Certificate issued by:

Baseefa (2001) Ltd.
Health & Safety Laboratory Site
Buxton
Derbyshire
SK17 9JN
United Kingdom





IECEX Certificate of Conformity

Certificate No.: **IECEX BAS 04.0025**

Date of Issue: **2005-04-20**

Issue No.: **2**

Page **2** of **4**

Manufacturer: **Measurement Technology Limited**
 Power Court
 Luton
 Bedfordshire
 LU1 3JJ
 United Kingdom

Manufacturing location(s):

MTL Instruments PVT Ltd
 No 3 Old Mahabaiapuram
 Road
 Sholinganallur
 Chennai
 India

This certificate is issued as verification that a sample(s), representative of production, was assessed and tested and found to comply with the IEC Standard list below and that the manufacture's quality system, relating to the Ex products covered by this certificate, was assessed and found to comply with the IECEx Quality system requirements. This certificate is granted subject to the conditions as set out in IECEx Scheme Rules, IECEx 02 and Operational Documents as amended.

STANDARDS:

The electrical apparatus and any acceptable variations to it specified in the schedule of this certificate and the identified documents, was found to comply with the following standards:

IEC 60079-0 : 2000 Edition: 3.1	Electrical apparatus for explosive gas atmospheres - Part 0: General requirements
IEC 60079-11 : 1999 Edition: 4	Electrical apparatus for explosive gas atmospheres - Part 11: Intrinsic safety 'i'

*This Certificate **does not** indicate compliance with electrical safety and performance requirements other than those expressly included in the Standards listed above.*

TEST & ASSESSMENT REPORTS:

A sample(s) of the equipment listed has successfully met the examination and test requirements as recorded in

IECEX ATR:
UK/BAS/04/0438

File Reference:
04/0438



IECEX Certificate of Conformity

Certificate No.: **IECEX BAS 04.0025**

Date of Issue: **2005-04-20**

Issue No.: **2**

Page **3** of **4**

Schedule

EQUIPMENT:

Equipment and systems covered by this certificate are as follows:

The MTL7700 Series Shunt Zener Diode Barriers are designed to restrict the transfer of energy from unspecified safe area equipment to intrinsically safe circuits by the limitation of voltage and current.

The range which covers Group IIC and IIB consists of single, dual, triple and quad channel barriers covering polarised (positive and negative) and non-polarised (ac) barriers and diode return barriers. Certain versions of barriers may have the non-hazardous supply provided by a power bus, where adjacent barriers are connected together via bus power terminals (link).

The barriers consist of electronic components on a single printed circuit board encapsulated within a moulded plastic enclosure which incorporates one or two pairs of sockets at each end of the barrier. Circuits are connected to the socket via plugs which incorporate a screw terminal. When fitted with the screw terminals the enclosure meets the requirements of IP20. The barrier is connected to earth via a spring mounted foot on to a DIN rail or alternatively a single high integrity screw terminal.

The barriers are asymmetrical and have a blue label defining the hazardous area terminals. Barriers may be fitted adjacent to each other on the DIN rail.

For Barrier parameters see data in the Annexe.

CONDITIONS OF CERTIFICATION: NO



IECEX Certificate of Conformity

Certificate No.: IECEx BAS 04.0025

Date of Issue: 2005-04-20

Issue No.: 2

Page 4 of 4

DETAILS OF CERTIFICATE CHANGES (for issues 1 and above):

Variation 1.1

The addition of Shunt Zener Diode Safety Barriers Types MTL7715, MTL7715P and MTL7767.

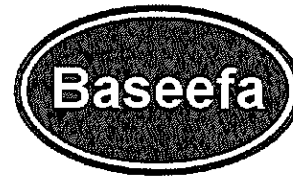
IECEX ExTR UK/BAS/04/0438/1 File Ref: 04/0438

Refer to Annexe Issue 1 for Barrier parameters.

Variation 2.1

This new Issue of the Certificate is to cover the addition of a further manufacturing location.
There are no changes to the product covered by the previous Issues.

Annexe: IECEx-BAS-04-0025.pdf



ANNEXE to IECEx BAS 04.0025
 Issue 1 replacing Issue 0

For all versions of the MTL7700 Shunt Zener Barriers

Single Channel - Terminal 1 wrt 2 (including DIN Rail Foot)

Dual Channel - Terminal 1 & 2 wrt to DIN Rail Foot

Triple Channel - Terminals 1, 2 & 5 wrt to DIN Rail Foot

Quad Channel - Terminals 1, 2, 5 & 6 wrt DIN Rail Foot

$$U_m = 250V$$

Single Channel 1 - Terminal 3 wrt 4 (including DIN Rail Foot)

Dual, Triple & Quad Channel 1 - Terminal 3 wrt to DIN Rail Foot

For output parameters U_o , I_o & P_o , see 'a' or 'a1' in the output parameter table below.

Dual, Triple, & Quad Channel 2 - Terminal 4 wrt to DIN Rail Foot

For output parameters U_o , I_o & P_o , see 'a2' in the output parameter table below.

Triple & Quad Channel 3 - Terminal 7 wrt to DIN Rail Foot

For output parameters U_o , I_o & P_o , see 'a3' in the output parameter table below.

Quad Channel 4 - Terminal 8 wrt to DIN Rail Foot

For output parameters U_o , I_o & P_o , see 'a4' in the output parameter table below.

Output Parameters for Group IIC Barriers:

Type	Description	DC/AC		U_o (V)	R_{min} (Ω)	I_o (mA)	P_o (W)
MTL7706	28V, 300R	+(PB)	a	28	300	93	0.65
MTL7707	28V, 300R	+(PB)	a1	28	300	93	0.65
	Diode		a2	28		† (see note 4)	
			b	28	300	93	0.65
MTL7710	10V, 50R	+/-	a	10	50	200	0.50
MTL7715	15V, 100R	+/-	a	15	100	150	0.56
MTL7715P	15V, 50R	+/-	a	15	51.5	291	1.09
MTL7722	22V, 150R	+/-	a	22	150	147	0.81
MTL7728	28V, 300R	+/-/ac	a	28	300	93	0.65
MTL7728P	28V, 237R	+/-	a	28	234.6	119	0.83
MTL7755	3V, 10R	ac	a1	3	10	300	0.225
	3V, 10R		a2	3	10	300	0.225
			b	3	5	600	0.45
			c	6	20	300	0.45
MTL7756	3V, 10R	ac	a1	3	10	300	0.225
	3V, 10R		a2	3	10	300	0.225
	3V, 10R		a3	3	10	300	0.225
			b1	3	5	600	0.45
			b2	3	3.3	900	0.675
			c1	6	20	300	0.45

			c2	6	15	400	0.60
MTL7758	7.5V, 10R	+/-	a1	7.5	10	750	1.40
	7.5V, 10R		a2	7.5	10	750	1.40
			b	7.5	5	1,500	2.80
MTL7760	10V, 50R	ac*	a1	10	50	200	0.5
	10V, 50R		a2	10	50	200	0.5
			b	10	25	400	1.00
MTL7761	9V, 90R	ac	a1	9	90	100	0.225
	9V, 90R		a2	9	90	100	0.225
			b	9	45	200	0.45
			c	18	180	100	0.45
MTL7761P	9V, 350R	ac	a1	9	351.5	26	0.058
	9V, 350R		a2	9	351.5	26	0.058
			b	9	175.5	52	0.115
			c	18	702.9	26	0.115
MTL7764	12V, 1K	+/-	a1	12	1,000	12	0.036
	12V, 1K		a2	12	1,000	12	0.036
			b	12	500	24	0.072
MTL7764	12V, 1K	ac	a1	12	1,000	12	0.036
	12V, 1K		a2	12	1,000	12	0.036
			b	12	500	24	0.072
			c	24	2,000	12	0.072
MTL7765	15V, 100R	ac*	a1	15	100	150	0.56
	15V, 100R		a2	15	100	150	0.56
			b	15	50	300	1.125
MTL7766	12V, 150R	ac	a1	12	150	80	0.24
	12V, 150R		a2	12	150	80	0.24
			b	12	75	160	0.48
			c	24	300	80	0.48
MTL7766P	12V, 75R	ac	a1	12	76.4	157	0.471
	12V, 75R		a2	12	76.4	157	0.471
			b	12	38.2	314	0.942
			c	24	152.9	157	0.942
MTL7767	15V, 100R	+/-	a1	15	100	150	0.56
	15V, 100R		a2	15	100	150	0.56
			b	15	50	300	1.125
MTL7778	28V, 600R	ac*	a1	28	600	47	0.33
	28V, 600R		a2	28	600	47	0.33
			b	28	300	93	0.654
MTL7779	28V, 300R	+/-	a1	28	300	93	0.65
	28V, 300R		a2	28	300	93	0.65
			b	Not permitted † (see note 3)			
MTL7787	28V, 300R	+/- (PB)	a1	28	300	93	0.65
	28V (Diode)		a2	28	† (see note 4)		
			b	28	300	93	0.65
MTL7787P	28V, 237R	+/- (PB)	a1	28	234.6	119	0.835
	28V (Diode)		a2	28	† (see note 4)		
			b	28	234.6	119	0.835
MTL7788	28V, 300R	+/- (PB)	a1	28	300	93	0.65
	10V, 50R		a2	10	50	200	0.5
			b	28	42.85	294@12.57V	
MTL7788R	28V, 300R	+/- (PB)	a1	28	300	93	0.65
	10V, 50R		a2	10	50	200	0.5
			b	28	42.85	294@12.57V	
MTL7789	28V, 600R	+/- (PB)	a1	28	600	46.5	0.33
	Diode		a2	28	† (see note 4)		
	28V, 600R		a3	28	600	46.5	0.33
	Diode		a4	28	† (see note 4)		
			b3	28	300	93	0.65
			c	28	600	46.5	0.33
MTL7796	26V, 300R	+/-	a1	26	300	87	0.56
	20V, 390R		a2	20	390	51	0.26
			b	26	169.56	138@23.4V	

Reference to data in the standard shows that with the maximum output current and voltage as defined in the above table, such values have a factor of safety of at least 1.5 for Group IIC.

Output Parameters for Group IIB Barriers

Type	Description	DC/AC		U_o (V)	R_{min} (Ω)	I_o (mA)	P_o (W)
MTL7707P	28V, 164R	+ (PB)	a1	28	164	171	1.20
	Diode		a2	28	† (see note 4)		
			b	28	164	171	1.20
MTL7729P	28V, 164R	+ (PB)	a	28	164	171	1.20

Reference to data in the standard shows that with the maximum output current and voltage as defined in the above table, such values have a factor of safety of at least 1.5 for Group IIB.

Notes for both Group IIC and Group IIB Barriers:

1. +/- - shunt zener diode barriers may be of positive or negative polarity dependant on the configuration of the zener diodes. The certification label will detail the exact type.
 - ac - non-polarised barriers
 - ac* - non-polarised star-connected
 - Diode - diode return barrier
 - (PB) - shunt zener diode barriers may have the non-hazardous supply provided by a power bus. Adjacent barriers are connected together via bus power terminals.
2. Circuit configuration for output parameters:
 - a - Single channel
 - a1 - First channel of a dual channel barrier
 - a2 - Second channel of a dual/triple channel barrier
 - a3 - Third channel of a triple channel barrier
 - a4 - Forth channel of a quad channel barrier
 - b - Both channels of a dual channel barrier connected in parallel, w.r.t. earth.
 - b1 - Two channels of a triple channel barrier connected in parallel, w.r.t. earth.
 - b2 - Three channels of a triple channel barrier connected in parallel, w.r.t. earth.
 - b3 - Four channels of a four channel barrier connected in parallel, w.r.t. earth.
 - c - Both channels of a dual channel barrier interconnected, with no earth return.
 - c1 - Two channels of a triple channel barrier interconnected, with no earth return.
 - c2 - Three channels of a triple channel barrier interconnected, with no earth return (this assumes two of the channels are in parallel).
3. The intrinsically safe terminals of the two channels of the MTL7779 dual barrier must not be interconnected in Group IIC atmospheres. It is acceptable for these barriers to be interconnected in Group IIB/IIA atmospheres.
4. The hazardous area terminals of each of the barrier outputs marked † must be considered at the voltage U_o . This is considered as the theoretical maximum to which a capacitive load across the hazardous area terminals could become charged by leakage through the series blocking diodes. This voltage does not contribute to the output current.

The capacitance or either the inductance or the inductance to resistance ratio (L/R) of the load connected to the output terminals must not exceed the following values:

Load Parameters for Group IIC Barriers:

Type	ac/dc		FOS	IIC			IIB			IIA		
			IIC	C (μ F)	L (mH)	L/R (μ H/ Ω)	C (μ F)	L (mH)	L/R (μ H/ Ω)	C (μ F)	L (mH)	L/R (μ H/ Ω)
MTL7706	+	a	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	218	2.15	24.4 (33.6)	435
MTL7707	+	a1	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	218	2.15	24.4 (33.6)	435
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
		b	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	218	2.15	24.4 (33.6)	435
MTL7710	+/-	a	25	3	0.91	71	20	2.72	284	100	7.25	569
MTL7715	+/-	a	9	0.58	1.45	63	3.55	7.22	252	14	14	505
MTL7715P	+/-	a	4.64	0.58	0.33	32	3.55	0.99	130	14	2.64	260
MTL7722	+/-	a	2.29	0.165	1.65	44	1.14	7.22	176	4.2	14	353
MTL7728	+/-/ac	a	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	218	2.15	24.4 (33.6)	435
MTL7728P	+/-	a	1.51	0.062 (0.083)	1.82 (2.51)	44	0.65	5.46 (7.53)	168	2.15	14.5 (20.0)	340
MTL7755	ac	a1	16	100	0.37	158	1000	1.37	632	1000	3.66	1264
		a2	16	100	0.37	158	1000	1.37	632	1000	3.66	1264
		b	8	100	0.13	79	1000	0.39	316	1000	1.03	632
		c	16	40	0.37	79	1000	1.37	316	1000	3.28	632
MTL7756	ac	a1	16	100	0.37	158	1000	1.37	632	1000	3.66	1264
		a2	16	100	0.37	158	1000	1.37	632	1000	3.66	1264
		a3	16	100	0.37	158	1000	1.37	632	1000	3.66	1264
		b1	8	100	0.13	79	1000	0.39	316	1000	1.03	632
		b2	5.5	100	0.06	52	1000	0.19	208	1000	0.49	417
		c1	16	40	0.37	79	1000	1.37	316	1000	3.28	632
		c2	12	40	0.23	59	1000	0.70	237	1000	1.86	474
MTL7758	+/-	a1	6.7	11.1	0.07	25	174	0.20	101	1000	0.54	202
		a2	6.7	11.1	0.07	25	174	0.20	101	1000	0.54	202
		b	3.3	11.1	0.02	12	174	0.05	50	1000	0.14	101
MTL7760	ac*	a1	25	3.0	0.91	71	20	2.72	284	100	7.25	568
		a2	25	3.0	0.91	71	20	2.72	284	100	7.25	568
		b	13	3.0	0.20	35	20	0.60	142	100	1.61	284
MTL7761	ac	a1	50	4.9	3.72	158	40	15	632	500	31	1264
		a2	50	4.9	3.72	158	40	15	632	500	31	1264
		b	25	4.9	0.91	79	40	2.72	316	500	7.2	632
		c	6.6	0.31	3.72	79	1.78	15	316	7.6	31	632
MTL7761P	ac	a1	192.3	4.9	56	617	40	208	2468	500	419	4937
		a2	192.3	4.9	56	617	40	208	2468	500	419	4937
		b	96.2	4.9	14	308	40	55	1232	500	116	2465
		c	25.3	0.31	56	308	1.78	208	1234	7.6	419	2468
MTL7764	+/-	a1	416	1.41	240	987	9	932	3950	36	1000	7901
		a2	416	1.41	240	987	9	932	3950	36	1000	7901
		b	208	1.41	61	493	9	226	1975	36	452	3950
MTL7764	ac	a1	416	1.41	240	987	9	932	3950	36	1000	7901
		a2	416	1.41	240	987	9	932	3950	36	1000	7901
		b	208	1.41	61	493	9	226	1975	36	452	3950
		c	21	0.125	240	493	0.93	932	1975	3.35	1000	3950
MTL7765	ac*	a1	9	0.580	1.45	63	3.55	7.22	252	14.0	14.42	505
		a2	9	0.580	1.45	63	3.55	7.22	252	14.0	14.42	505
		b	4.5	0.580	0.32	31	3.55	0.95	126	14.0	2.54	252
MTL7766	ac	a1	62	1.41	5.8	148	9	23	592	36	48	1185
		a2	62	1.41	5.8	148	9	23	592	36	48	1185
		b	31	1.41	1.47	74	9	4.4	296	36	11	592
		c	3.26	0.125	5.8	74	0.93	23	296	3.35	48	592
MTL7766P	ac	a1	31	1.41	1.47	75	9	4.4	301	36	11	603

Type	ac/dc		FOS	IIC			IIB			IIA		
			IIC	C (μF)	L (mH)	L/R (μH/Ω)	C (μF)	L (mH)	L/R (μH/Ω)	C (μF)	L (mH)	L/R (μH/Ω)
		a2	31	1.41	1.47	75	9	4.4	301	36	11	603
		b	15	1.41	0.34	37	9	1.02	150	36	2.71	301
		c	1.67	0.125	1.15	37	0.93	3.44	151	3.35	9.1	302
MTL7767	+/-	a1	9	0.58	1.45	63	3.55	7.22	252	14	14	505
		a2	9	0.58	1.45	63	3.55	7.22	252	14	14	505
MTL7778	ac*	B	4.5	0.58	0.32	31	3.55	0.95	126	14	2.54	252
		a1	3.82	0.083	16	108	0.65	62	435	2.15	130	870
		a2	3.82	0.083	16	108	0.65	62	435	2.15	130	870
MTL7779	+/-	b	1.94 / 1	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
		a1	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
		a2	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
MTL7787	+/-	b	-	Not permitted								
		a1	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
MTL7787P	+/-	b	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
		a1	1.51	0.062 (0.083)	1.82 (2.51)	42	0.65	5.46 (7.53)	170	2.15	14.5 (20.0)	340
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
MTL7788	+/-	b	1.51	0.062 (0.083)	1.82 (2.51)	42	0.65	5.46 (7.53)	170	2.15	14.5 (20.0)	340
		a1	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
		a2	25	3.0	0.91	71	20	2.72	284	100	7.25	568
MTL7788R	+/-	b	12	0.083	0.33	38	0.65	0.99	154	2.15	2.64	308
		a1	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
		a2	25	3.0	0.91	71	20	2.72	284	100	7.25	568
MTL7789	+/-	b	12	0.083	0.33	38	0.65	0.99	154	2.15	2.64	308
		a1	3.87	0.083	16	108	0.65	63	435	2.15	133	870
		a2	-	0.083	-	-	0.65	-	-	2.15	-	-
		a3	3.87	0.083	16	108	0.65	63	435	2.15	133	870
		a4	-	0.083	-	-	0.65	-	-	2.15	-	-
MTL7796	+/-	b3	1.94	0.062 (0.083)	3.05 (4.2)	54	0.65	9.15 (12.6)	217	2.15	24.4 (33.6)	435
		c	3.87	0.083	16	108	0.65	63	435	2.15	133	870
		a1	2.47	0.1	4.91	63	0.77	20	252	2.60	40	504
MTL7796	+/-	a2	9.1	0.22	13	138	1.41	51	554	5.50	108	1109
		b	2	0.1	1.94	44	0.77	8.5	176	2.60	16	352

When the external circuit contains no lumped inductance greater than 10μH i.e. the L_i of any attached apparatus is less than 10μH, the cable inductance may be increased to the values within parentheses.

When the external circuit contains no lumped capacitance greater than 1nF i.e. the C_i of any attached apparatus is less than 1nF, the cable capacitance may be increased to the values within parentheses.

Load Parameters for Group IIB Barriers:

Type	ac/dc		FOS	IIB			IIA		
			IIB	C (μF)	L (mH)	L/R (μH/Ω)	C (μF)	L (mH)	L/R (μH/Ω)
MTL7707P	+	a1	2.64	0.65	5.34	119	2.15	10.73	238
		a2	-	0.65	-	-	2.15	-	-
		b	2.64	0.65	5.34	119	2.15	10.73	238
MTL7729P	+	a	2.64	0.65	5.65	119	2.15	11.34	238