IECEx Certificate of Conformity

INTERNATIONAL ELECTROTECHNICAL COMMISSION
IEC Certification Scheme for Explosive Atmospheres

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Certificate No.: IECEx BAS 04.0025 issue No.:7

Status: **Current**

Date of Issue: **2016-10-12** Page 1 of 4

Certificate history:
Issue No. 7 (2016-10-12)
Issue No. 6 (2015-6-18)
Issue No. 5 (2015-2-5)
Issue No. 4 (2010-4-28)
Issue No. 3 (2009-5-6)
Issue No. 2 (2005-4-20)

Applicant:
Eaton Electric Limited
Great Marlings
Butterfield
Luton
Bedfordshire
LU2 8DL
United Kingdom

Equipment:
MTL7700 Series Shunt Zener Diode Barriers
Optional accessory:

Type of Protection: **Intrinsic Safety**

Marking:
[Ex ia Ga] IIB (-20°C ≤ Ta ≤ +60°C)
[Ex ia Ga] IIC (-20°C ≤ Ta ≤ +60°C)
[Ex ia Da] IIIC (-20°C ≤ Ta ≤ +60°C)

Approved for issue on behalf of the IECEx Certification Body: R S Sinclair

Position: Technical Manager p p D BRADLEY

Signature:
(for printed version)

Date: 12/10/16

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:
SGS Baseefa Limited
Rockhead Business Park
Staden Lane
Buxton, Derbyshire, SK17 9RZ
United Kingdom

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Manufacturer:

Eaton Electric Limited
Great Marlings
Butterfield
Luton
Bedfordshire
LU2 8DL
United Kingdom

Additional Manufacturing location(s):

MTL Instruments PVT Ltd
No 3 Old Mahabalipuram
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 manufacturer'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 : 2011 Edition: 6.0	Explosive atmospheres - Part 0: General requirements
IEC 60079-11 : 2011 Edition: 6.0	Explosive atmospheres - Part 11: Equipment protection by 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, GB/BAS/ExTR10.0092/00, GB/BAS/ExTR14.0350/00 GB/BAS/ExTR16.0248/00

File Reference:
04/0438, 10/0300, 11/0301 16/0371

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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 Annex.

CONDITIONS OF CERTIFICATION: NO

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

Variation 7.1

To permit the manufacturer's name to be changed on the certificate and equipment marking. No other changes are made to the equipment design.

ExTR: **GB/BAS/ExTR16.0248/00**	File Reference: **16/0371**

Annex: IECEx BAS 04.0025 Annex Issue 3.pdf

SGS Baseefa Limited
Rockhead Business Park
Staden lane, Buxton, Derbyshire
SK17 9RZ
United Kingdom

MTL7700 Series Shunt Zener Diode Barriers

Input Parameters

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

Output Parameters

Single Channel 1 - Terminal 3 wrt 4 (including DIN Rail Foot)
Dual, Triple & Quad Channel 1 - Terminal 3 wrt to DIN Rail Foot

U_o = See a or a1 below
I_o = See a or a1 below
P_o = See a or a1 below

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

U_o = See a2 below
I_o = See a2 below
P_o = See a2 below

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

U_o = See a3 below
I_o = See a3 below
P_o = See a3 below

Quad Channel 4 - Terminal 8 wrt to DIN Rail Foot

U_o = See a4 below
I_o = See a4 below
P_o = See a4 below

Output parameters for Group IIC Barriers

Type	Description	DC/AC		U_o (V)	R_{min} (Ω)	I_o (mA)	P_o (W)	C_i (µF)
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	-

Type	Description	DC/AC		U_o (V)	R_{min} (Ω)	I_o (mA)	P_o (W)	C_i (µF)
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	-

Type	Description	DC/AC		U_o (V)	R_{min} (Ω)	I_o (mA)	P_o (W)	C_i (µF)
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	0.92	-
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	0.92	-
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	0.81	-

Reference to data in the standard shows that with the maximum supply current and voltage as defined in the above table, such a value has 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 supply current and voltage as defined in the above table, such a value has 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 a bus power terminals

2. Circuit configuration for output parameters

   a - Single channel
   a1 - First channel of a dual/triple/quad channel barrier
   a2 - Second channel of a dual/triple/quad channel barrier
   a3 - Third channel of a triple/quad channel barrier
   a4 - Fourth channel of a quad channel barrier
   b - Both channels of a dual channel barrier connected in parallel, with respect to earth.
   b1 - Two channels of a triple channel barrier connected in parallel, with respect to earth.
   b2 - Three channels of a triple channel barrier connected in parallel, with respect to earth.
   b3 - Four channels of a four channel barrier connected in parallel, with respect to 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 two channels of any MTL7700 Series dual barrier which are marked ‡, must not be interconnected in Group IIC atmospheres. It is acceptable for these barriers to be interconnected in Group IIB 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 short circuit

Load Parameters

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		IIC			IIB**			IIA		
			C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL7706	+	a	0.083	4.2	54	0.65	12.6	218	2.15	33.6	435
MTL7707	+	a1	0.083	4.2	54	0.65	12.6	218	2.15	33.6	435
		a2	0.083	-	-	0.65	-	-	2.15	-	-

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

Type	ac/dc		IIC			IIB**			IIA		
			C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL7767	+/-	a1	0.58	1.45	63	3.55	7.22	252	14	14	505
		a2	0.58	1,45	63	3.55	7.22	252	14	14	505
		b	0.58	0.32	31	3.55	0.95	126	14	2.54	252
MTL7766P	ac	a1	1.41	1.47	75	9	4.4	301	36	11	603
		a2	1.41	1.47	75	9	4.4	301	36	11	603
		b	1.41	0.34	37	9	1.02	150	36	2.71	301
		c	0.125	1.15	37	0.93	3.44	151	3.35	9.1	302
MTL7778	ac*	a1	0.083	16	108	0.65	62	435	2.15	130	870
		a2	0.083	16	108	0.65	62	435	2.15	130	870
		b	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
MTL7779	+/-	a1	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
		a2	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
		b	Not permitted								
MTL7787	+/-	a1	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
		a2	0.083	-	-	0.65	-	-	2.15	-	-
		b	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
MTL7787P	+/-	a1	0.083	2.51	42	0.65	7.53	170	2.15	20.0	340
		a2	0.083	-	-	0.65	-	-	2.15	-	-
		b	0.083	2.51	42	0.65	7.53	170	2.15	20.0	340
MTL7788	+/-	a1	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
		a2	3.0	0.91	71	20	2.72	284	100	7.25	568
		b	0.083	0.33	38	0.65	0.99	154	2.15	2.64	308
MTL7788R	+/-	a1	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
		a2	3.0	0.91	71	20	2.72	284	100	7.25	568
		b	0.083	0.33	38	0.65	0.99	154	2.15	2.64	308
MTL7789	+/-	a1	0.083	16	108	0.65	63	435	2.15	133	870
		a2	0.083	-	-	0.65	-	-	2.15	-	-
		a3	0.083	16	108	0.65	63	435	2.15	133	870
		a4	0.083	-	-	0.65	-	-	2.15	-	-
		b3	0.083	4.2	54	0.65	12.6	217	2.15	33.6	435
		c	0.083	16	108	0.65	63	435	2.15	133	870
MTL7796	+/-	a1	0.1	4.91	63	0.77	20	252	2.60	40	504
		a2	0.22	13	138	1.41	51	554	5.50	108	1109
		b	0.1	1.94	44	0.77	8.5	176	2.60	16	352

** Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
   - the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
   - the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
   - the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
   - the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB & IIA and 600nF for Group IIC.

Load Parameters for Group IIB Barriers.

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

** Group IIB parameters also applicable for associated apparatus [Ex ia Da] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB & IIA.

Variation 2.1

To permit the use of the following load parameters when connecting to an Ex ic System. These parameters give a factor of safety of at least 1 for Gas Group IIC.

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		IIC			IIB**			IIA		
			C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL7706	+	a	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
MTL7707	+	a1	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
		a2	0.272	-	-	1.65	-	-	6.60	-	-
		b	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
MTL7710	+/-	a	20	2.00	160	450	8.00	640	1000	16	1280
MTL7715	+/-	a	3.0	3.55	142	20.2	14.2	568	100	28.4	1137
MTL7715P	+/-	a	3.0	0.94	73	20.2	3.77	292	100	7.55	585
MTL7722	+/-	a	0.63	3.70	98	3.90	14.8	395	15.0	29.6	791
MTL7728	+/-/ac	a	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979

Type	ac/dc		IIC			IIB**			IIA		
			C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL7728P	+/-	a	0.272	5.64	96	1.65	22.5	384	6.60	45.1	768
MTL7755	ac	a1	1000	0.88	355	1000	3.55	1422	1000	7.11	2844
		a2	1000	0.88	355	1000	3.55	1422	1000	7.11	2844
		b	1000	0.22	177	1000	0.88	711	1000	1.77	1422
		c	600	0.88	177	1000	3.55	711	1000	7.11	1422
MTL7756	ac	a1	1000	0.88	355	1000	3.55	1422	1000	7.11	2844
		a2	1000	0.88	355	1000	3.55	1422	1000	7.11	2844
		a3	1000	0.88	355	1000	3.55	1422	1000	7.11	2844
		b1	1000	0.22	177	1000	0.88	711	1000	1.77	1422
		b2	1000	0.09	118	1000	0.39	474	1000	0.79	948
		c1	600	0.88	177	1000	3.55	711	1000	7.11	1422
		c2	600	0.50	133	1000	2.00	533	1000	4.00	1066
MTL7758	+/-	a1	100	0.13	56	1000	0.56	227	1000	1.13	455
		a2	100	0.13	56	1000	0.56	227	1000	1.13	455
		b	100	0.03	28	1000	0.14	113	1000	0.28	227
MTL7760	ac*	a1	20	2.00	160	450	8.00	640	1000	16	1280
		a2	20	2.00	160	450	8.00	640	1000	16	1280
		b	20	0.50	80	450	2.00	320	1000	4.00	640
MTL7761	ac	a1	40	8.00	355	1000	32	1422	1000	64	2844
		a2	40	8.00	355	1000	32	1422	1000	64	2844
		b	40	2.00	177	1000	8.00	711	1000	16	1422
		c	1.41	8.00	177	9	32	711	36	64	1422
MTL7761P	ac	a1	40	118	1388	1000	473	5554	1000	946	11109
		a2	40	118	1388	1000	473	5554	1000	946	11109
		b	40	29.5	693	1000	118	2773	1000	236	5546
		c	1.41	118	694	9	473	2776	36	946	5553
MTL7764	+/-	a1	8.4	555	2222	100	1000	8888	1000	1000	17777
		a2	8.4	555	2222	100	1000	8888	1000	1000	17777
		b	8.4	138	1111	100	555	4444	1000	1000	8888
MTL7764	ac	a1	8.4	555	2222	100	1000	8888	1000	1000	17777
		a2	8.4	555	2222	100	1000	8888	1000	1000	17777
		b	8.4	138	1111	100	555	4444	1000	1000	8888
		c	0.46	555	1111	2.75	1000	4444	11.0	1000	8888
MTL7765	ac*	a1	3.0	3.55	142	20.2	14.2	568	100	28.44	1137
		a2	3.0	3.55	142	20.2	14.2	568	100	28.44	1137
		b	3.0	0.88	71	20.2	3.55	284	100	7.11	568
MTL7766	ac	a1	8.4	12.5	333	100	50	1333	1000	100	2666
		a2	8.4	12.5	333	100	50	1333	1000	100	2666
		b	8.4	3.12	166	100	12.5	666	1000	25	1333
		c	0.46	12.5	166	2.75	50	666	11.0	100	1333
MTL7766P	ac	a1	8.4	3.24	169	100	12.9	679	1000	25.9	1358
		a2	8.4	3.24	169	100	12.9	679	1000	25.9	1358
		b	8.4	0.81	84	100	3.24	339	1000	6.49	679
		c	0.46	3.24	84	2.75	12.9	339	11.0	25.9	679

Type	ac/dc		IIC			IIB**			IIA		
			C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL7767	+/-	a1	3.0	3.55	142	20.2	14.2	568	100	28.4	1137
		a2	3.0	3.55	142	20.2	14.2	568	100	28.4	1137
		b	3.0	0.88	71	20.2	3.55	284	100	7.11	568
MTL7778	ac*	a1	0.272	36.2	244	1.65	144	979	6.60	289	1959
		a2	0.272	36.2	244	1.65	144	979	6.60	289	1959
		b	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
MTL7779	+/-	a1	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
		a2	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
		b	Not permitted								
MTL7787	+/-	a1	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
		a2	0.272	-	-	1.65	-	-	6.60	-	-
		b	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
MTL7787P	+/-	a1	0.272	5.64	96	1.65	22.5	384	6.60	45.1	768
		a2	0.272	-	-	1.65	-	-	6.60	-	-
		b	0.272	5.64	96	1.65	22.5	384	6.60	45.1	768
MTL7788	+/-	a1	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
		a2	20	2.00	160	450	8.00	640	1000	16	1280
		b	0.272	0.92	86	1.65	3.70	347	6.60	7.40	694
MTL7788R	+/-	a1	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
		a2	20	2.00	160	450	8.00	640	1000	16	1280
		b	0.272	0.92	86	1.65	3.70	347	6.60	7.40	694
MTL7789	+/-	a1	0.272	36.9	244	1.65	147	979	6.60	295	1959
		a2	0.272	-	-	1.65	-	-	6.60	-	-
		a3	0.272	36.9	244	1.65	147	979	6.60	295	1959
		a4	0.272	-	-	1.65	-	-	6.60	-	-
		b3	0.272	9.24	122	1.65	36.9	489	6.60	73.9	979
		c	0.272	36.9	244	1.65	147	979	6.60	295	1959
MTL7796	+/-	a1	0.35	10.5	142	2.05	42.2	568	8.5	84.5	1136
		a2	0.90	30.7	312	5.6	123	1248	20	246	2496
		b	0.35	4.20	99	2.05	16.8	396	8.5	33.6	792

** Group IIB parameters also applicable for associated apparatus [Ex ic Dc] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB & IIA and 600nF for Group IIC.

Load Parameters for Group IIB Barriers.

Type	ac/dc		IIB**			IIA		
			C (µF)	L (mH)	L/R (µH/Ω)	C (µF)	L (mH)	L/R (µH/Ω)
MTL7707P	+	a1	1.65	10.21	267	6.60	21.88	535
		a2	1.65	-	-	6.60	-	-
		b	1.65	10.21	267	6.60	21.88	535
MTL7729P	+	a	1.65	10.21	267	6.60	21.88	535

** Group IIB parameters also applicable for associated apparatus [Ex ic Dc] IIIC

Notes:

1) The above load parameters apply when one of the two conditions below is given:
- the total L_i of the external circuit (excluding the cable) is < 1% of the L_o value or
- the total C_i of the external circuit (excluding the cable) is < 1% of the C_o value.

2) The above parameters are reduced to 50% when both of the two conditions below are given:
- the total L_i of the external circuit (excluding the cable) is ≥ 1% of the L_o value and
- the total C_i of the external circuit (excluding the cable) is ≥ 1% of the C_o value.

The reduced capacitance of the external circuit (including cable) shall not be greater than 1µF for Groups IIB & IIA.