



DIMMERABLE®



CL407d



CL809d



GSU111d



GSU418d



SLU111d



WL218d



BR1411d



BR0618d

Information Booklet

Contents

Section 1	Introduction
Section 2	Product Attributes
Section 3	Test Results on Dimmers
Section 4	Explanation on Touch Dimmers
Section 5	Explanation on Lamp Loading
Section 6	Explanation of dimming
Section 7	Explantion of different dimming manufacturers
Section 8	Conclusion

Section 1

Introduction

As we all know, almost all CFLi's (Integral compact fluorescent lamps) on the market are non-dimmable. This is because current dimmer switches or electronic dimmer systems on the market are initially designed for the dimming of incandescent or halogen lamps. To create a CFLi into a dimmable lamp, special extra components and modified circuitry are required.

With response to increasing demand for dimmable energy-saving lighting solutions, MEGAMAN[®] will launch the world's first family of energy-saving dimming series.

Preceding its success with the launch of the DorS DIMMING lamps, MEGAMAN[®] debuted its complete range of linear-dimming CFLis in 2007, herein named as "DIMMERABLE". These dimmable lamps are designed to be compatible with conventional dimmer switches and advanced digital dimmers. Lamp shapes include the Classic (GSU111d), Candle (CL407d & GL809d), Tubular (SLU111d & SLU218d), PAR38 (BR0618d) and GU10 (BR1411d), which parallel the appearances of commonly used incandescent and halogen applications.

Besides offering incredible energy-savings, the "Plug-and-Dim" attribute of the DIMMERABLE lamps save the hassles and extra-costs for retrofit. Users can conveniently perform dimming with existing dimmer switches.

As opposed to other competitors with similar offerings, the MEGAMAN[®] DIMMERABLEs have proved to deliver better performance in dimming that is truly linear and flicker-free.

The DIMMERABLE's are available in a complete range for wider application purposes (5 types altogether). The DIMMERABLE lamps come in smaller profiles, which allow them to be fitted into fixtures of various shapes and sizes. Moreover, the DIMMERABLE lamps are currently acclaimed as the world's smallest lamps in the category of dimmable CFLis.

Section 2

Product Attributes

The **DIMMERABLE** lamps offer a dimming range from 10% to 100% with extra energy-savings when dimmed.

Product Features:

- Plug-and-Dim
- Smooth dimming on ordinary dimmer switches*
- 10% to 100% dimmable range**
- Illuminates at 10% brightness without flickering
- Delivers 10,000 hours lamp life
- “A” Class Energy Label
- Saves energy while dimming
- Available in colour temperatures: 2700K, 3000K and 4000K
- Easy installation with no retrofit required
- Replaces conventional bulbs and halogen lamps
- Fits into standard luminaires

*Compatible with most electronic dimmers and digital dimmer for incandescent and halogens. Touch dimmers and Remote-controlled dimmers do not apply.

Dimming the lamp to 10% brightness level will depend on the specification of the dimmer switch. Fine-tuning the lamp to “Minimum Optimal Level**” of brightness can be performed using a dimmer switch equipped with a potentiometer.

Section 3

Test Results on Dimmers

The DIMMERABLE lamps underwent a compatibility test on over 100 types of dimmers from over 20 countries. Consequently, the DIMMERABLEs delivered excellent dimming performance during the tests. Here are the results:

Sample received date	Test no.	R&D code	Customer	Country	Brand	Voltage	Min load declared (if any)	Max. load declared (if any)	Potentiometer (Y/N)	QTY received	Photo	Max. Qty of 7W dimmerable supported by declared Max. load (Max load x 1/5)	Max. Qty of 18W dimmerable supported by declared Max. load (Max load x 1/5)	Flickering from min to brighter level? Flickering from brighter level to min? Basic set up 1) 1 dimmer x 1pc lamp (BR0618d, GK811d, CL407d, GSU111d) 2) 1 dimmer x Max. qty of 7W lamp (CL407d) 3) 1 dimmer x Max. qty of 18W lamp (BR0618d)	Lowest wattage of a single dimmerable lamp that can be used with the dimmer
29-May-07	Test 07128-137	DG07055	MVN	Vietname	LP	220V	N/A	1000W	N	10		28	11	no flickering, linear dimming,	7W
29-May-07	Test 07138-147	DG07058	MVN	Vietname	Nano	220V	N/A	700W	N/A	10		20	7	no flickering, linear dimming,	11W
29-May-07	Test 07148-157	DG07054	MVN	Vietname	Cheng Li	250V	N/A	N/A	N/A	10		20	7	no flickering, linear dimming,	7W
29-May-07	Test 07081-85	DG07045	MPH	Philippines	OLE	220V	N/A	1000W	N	5		28	11	no flickering, linear dimming,	7W
29-May-07	Test 07086-90	DG07052	MPH	Philippines	SwitchLight	220V	N/A	500W	N	5		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07091-95	DG07049	MPH	Philippines	OMINI	250V	N/A	500W	N/A	5		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07096-100	DG07047	MPH	Philippines	National	220V	N/A	500W	N/A	5		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07101-105	DG07048	MPH	Philippines	Royu	220V	N/A	200W	N	5		5	2	no flickering, linear dimming,	7W
29-May-07	Test 07075-76	DG07042	MHK	Hong Kong	MK Electric	240V	40W	500W	N	2		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07079, 168	DG07044	MHK	Hong Kong	Soben	200-25V	N/A	630W	N	2		18	7	no flickering, linear dimming,	7W
29-May-07	Test 07080, 169	DG07043	MHK	Hong Kong	Junon	200-25V	N/A	630W	N	2		18	7	no flickering, linear dimming,	7W
29-May-07	Test 07064-68	DG07056	MTH	Thailand	Panasonic	220V	60W	300W	N	5		8	3	no flickering, linear dimming,	7W
29-May-07	Test 07069-73	DG07040	MTH	Thailand	Biticino	230V	N/A	300W	N	5		8	3	no flickering, linear dimming,	7W
29-May-07	Test 07057-58	DG07046	MSG	Singapore	T&J Electric	230V	40W	630W	N	2		18	7	no flickering, linear dimming,	7W
29-May-07	Test 07059-60	DG07035	MSG	Singapore	Clipsal	250V	N/A	500W	N	2		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07060-61	DG07035	MSG	Singapore	MK Electric	240V	40W	500W	N	2		14	5	no flickering, linear dimming,	7W
28-May-07	Test 07054	DG07037	MMY	Malaysia	ERA	220V	60W	300W	N	5		8	3	no flickering, linear dimming,	7W
28-May-07	Test 07055	DG07035	MMY	Malaysia	Clipsal	250V	N/A	500W	N	5		14	5	no flickering, linear dimming,	7W
28-May-07	Test 07056	DG07036	MMY	Malaysia	PDL	250V	N/A	500W	N	5		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07062	DG07079	Dubai fair	Germany	Busch-Jaeger	230V	60W	600W	Y	1		17	6	no flickering, linear dimming,	7W
29-May-07	Test 07074	DG07028	Dubai Fair	Sweden	Legrand	230V	60W	500W	N	1		14	5	no flickering, linear dimming,	7W

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12-Jun-07	Test 07244	DG07104	AEM	Kuwait	Standard White	240V	5W	500W	N	1		14	5	no flickering, linear dimming,	11W
8-Jun-07	Test 07224	DG07095	DUYULMUŞ A.S.	Turkey	MAKEL	220V	-	600W	N	1		17	6	no flickering, linear dimming,	7W
8-Jun-07	Test 07225	DG07098	DUYULMUŞ A.S.	Turkey	Viko (in line switch)	220V	-	600W	N	1		17	6	no flickering, linear dimming,	7W
8-Jun-07	Test 07226	DG07096	DUYULMUŞ A.S.	Turkey	dmr	220V	60W	1000W	N	1		28	11	Switching on & off when dimmed to the lowest level & at the point of almost switching off	11W
8-Jun-07	Test 07227	DG07097	DUYULMUŞ A.S.	Turkey	Unknown	220V	-	80W	N	1		2	0	- under 1 dimmer x 1pc of CL407d, when dimmed to a lower brightness level, flickering happened. - other set up: no flickering, linear dimming	11W
8-Jun-07	Test 07228	DG07094	DUYULMUŞ A.S.	Turkey	Viko	220V	-	600W	N	1		17	6	no flickering, linear dimming,	7W
11-Jun-07	Test 07240		MSV	Sweden	IKEA	220V	25W	300W	Y	1		8	3	no flickering, linear dimming,	7W
18-Jun-07	Test 07245	DG07099	Megaman Sverige	Sweden	Eljo E1901807	230V	10W	630W	Y	9		18	7	no flickering, linear dimming,	11W
18-Jun-07	Test 07246	DG07101	Megaman Sverige	Sweden	Busch-Jaeger	230V	60W	600W	Y	9		17	6	no flickering, linear dimming,	7W
18-Jun-07	Test 07247	DG07100	Megaman Sverige	Sweden	Merten E1900107	230V	60W	600W	N	10		17	6	- slight flickering during dimming process - no flickering from tuning from off to light up & from light up to off	7W
18-Jun-07	Test 07251	DG07102	Megaman Denmark	Denmark	FUGA(106 7003146)	230V	20W	300W	N	6		6	3	no flickering, linear dimming,	7W
7-Jun-07	Test 07209	DG07081	Nortronic	Germany	Ensto 6513	230V	-	420W	N	10		12	4	no flickering, linear dimming,	7W
7-Jun-07	Test 07210	DG07082	Nortronic	Germany	Ensto 6519	230V	40W	550W	N	10		15	6	no flickering, linear dimming,	7W
7-Jun-07	Test 07211	DG07079	Nortronic	Germany	Ensto Dobbel dimmer	230V	40VA	315W/VA	N	10		-	-	Touch dimmer, cannot work normally with dimmerable lamp	-
7-Jun-07	Test 07212	DG07083	Nortronic	Denmark	Micromatic	230V	10VA	420VA	N	10		-	-	Touch dimmer, cannot work normally with dimmerable lamp	-
7-Jun-07	Test 07213	DG07080	Nortronic	Germany	Ensto 2210	230V	-	400W	N	10		11	4	no flickering, linear dimming,	7W
7-Jun-07	Test 07214	DG07085	Nortronic	Norway	Nortronic AS ATD 500 GLE	230V	50W	500W	N	10		14	5	no flickering, linear dimming,	11W
7-Jun-07	Test 07215	DG07084	Nortronic	Norway	Nortronic AS AD500/300	230V	40W	500W	N	10		14	5	no flickering, linear dimming,	7W
7-Jun-07	Test 07216	DG07086	Nortronic	Norway	Norwesco ATD 315RC	230V	40W	315W	Y	10		9	3	no flickering, linear dimming,	7W
7-Jun-07	Test 07217	DG07089	Nortronic	Norway	Micromatic GK493 18	230V	20W	360W	N	10		10	4	no flickering, linear dimming,	7W
7-Jun-07	Test 07218	DG07090	Nortronic	Norway	Micromatic GI 493 53	230V	60W	400W	N	10		11	4	no flickering, linear dimming,	7W
7-Jun-07	Test 07219	DG07088	Nortronic	Norway	Micromatic GI 493 17	230V	20W	525W	N	10		15	5	no flickering, linear dimming,	7W

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7-Jun-07	Test 07220	DG07084	Nortronic	Norway	Norwesco AD400UTT Eliko RS315GLE	230V	60W	400W	Y	10		11	4	no flickering, linear dimming,	7W
7-Jun-07	Test 07221	DG07091	Nortronic	Norway	Stromfors SD300	230V	40W	300W	Y	10		8	3	no flickering, linear dimming,	7W
2-Jun-07	Test 07205	DG07060	Airam	Finland	Stromfors SD300		60W	300W	Y	1		8	3	no flickering, linear dimming,	7W
2-Jun-07	Test 07206	DG07059	Airam	Finland	Stromfors ATD315R		40W	315W	Y	1		9	3	no flickering, linear dimming,	7W
6-Jun-07	Test 07229	DG07071	MMUK	UK	GET	200-240V	60W	400W	N	1		11	4	no flickering, linear dimming,	7W
6-Jun-07	Test 07230	DG07066	MMUK	UK	Varilight 2 Gang Chrome	200-240V	40W	250W	N	1		7	2	no flickering, linear dimming,	7W
6-Jun-07	Test 07231	DG07063	MMUK	UK	Marbo White 1 Gang Chrome	200-240V	60W	250W	N	1		7	2	no flickering, linear dimming,	7W
6-Jun-07	Test 07232	DG07064	MMUK	UK	Marbo White 2 way	240V	60W	400W	N	1		11	4	no flickering, linear dimming,	7W
6-Jun-07	Test 07233	DG07072	MMUK	UK	Mk Logic Plus 1 or 2 way	230V	40W	400W	N	1		11	4	no flickering, linear dimming,	7W
6-Jun-07	Test 07234	DG07071	MMUK	UK	Gang Chrome (BNQ???) Contactless	200-240V	60W	400W	N	1		11	4	no flickering, linear dimming,	7W
6-Jun-07	Test 07235	DG07065	MMUK	UK	1 Gang White Eurolite 1	253V	60W	400W	N	1		11	4	no flickering, linear dimming,	7W
6-Jun-07	Test 07236	DG07070	MMUK	UK	1 Gang Chrome Click (Scolmore)	230V	60W	400W	N	1		11	4	no flickering, linear dimming,	7W
6-Jun-07	Test 07237	DG07069	MMUK	UK	1 Gang Sweet Electrical (Philax)	220-240V	60W	400W	N	1		11	4	no flickering, linear dimming,	7W
6-Jun-07	Test 07238	DG07068	MMUK	UK	Varilight Touch Dimmer	220-240V	40W	250W	N	1		7	2	no flickering, linear dimming,	7W
6-Jun-07	Test 07239	DG07073	MMUK	UK	Varilight Touch Dimmer	230V	40W	400W	N	1		11	4	Touch dimmer, cannot work normally with dimmerable lamp	/
5-Jul-07	Test 07254	DG07108	MMUK	UK	Digitrac	220-240V	40VA	250VA	no	2	 manual	7	2	no flickering, linear dimming,	7W
31-May-07	Test 07188	DG07038	Hape	Netherlands	Praxis	230V	60W	400W	N	1		11	4	no flickering, linear dimming,	7W
31-May-07	Test 07189	DG07039	Hape	Netherlands	Berker	230V	20W	300W	N	1		8	3	no flickering, linear dimming,	7W
31-May-07	Test 07170-178	DG07040	La Filometallica s.r.l.	Italy	bticino	230V	60W	500W	N	9		14	5	no flickering, linear dimming,	7W
31-May-07	Test 07179-187	DG07041	La Filometallica s.r.l.	Italy	Reko	230V	100W	500W	N	9		14	5	no flickering, linear dimming,	7W
30-May-07	Test 07158-162	DG07051	SBC	Indonesia	Broco	N/A	N/A	N/A	Y	5		14	5	no flickering, linear dimming,	7W
30-May-07	Test 07163-167	DG07050	SBC	Indonesia	Panasonic	220V	40W	500W	N	5		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07106-115	DG07053	MVN	Vietnam	Megaman	250V	N/A	500W	N	10		14	5	no flickering, linear dimming,	7W
29-May-07	Test 07118-127	DG07057	MVN	Vietnam	Sanshe	220V	N/A	100W	N	10		2	1	no flickering, linear dimming,	7W

Section 4

Explanation on Touch Dimmers

Most Touch Dimmers are designed with either an Integrated Circuit (IC) or with a built-in Micro-controller (MCU) in some cases to detect certain waveforms during the dimming process. Touch dimmers are designed to detect the waveforms generated by the incandescent lamps and such a waveform is sinusoidal in nature.

On the other hand, dimming a CFL lamp with an incandescent touch dimmer is not encouraged because the waveform of the CFL during the dimming process differs largely from the waveform which the touch dimmers are designed to detect. The inconsistent signals detected by the touch dimmers will cause the CFL dimming lamp to be erratic in operation.

Remarks:

The incandescent lamp is an impedance load with a power factor of 1. Hence, their waveform is in phase and sinusoidal. However, the power factor of CFLs is much lower. Hence, the waveform for a CFL is neither sinusoidal nor regular.

Section 5

Explanation on Lamp Loading

Since there are several types of dimmers in the market with variation in wattage declarations, it would be difficult to determine the loading requirements for each dimmer. Taking safety and dimming effects into consideration, we have come up with the following: The “Min. Loading” will be set at $1/6^{\text{th}}$ of the minimum declaration; whereas the “Max. Loading” will be set at $1/5^{\text{th}}$ of the maximum declaration.

Most dimmers available in the market are designed for incandescent lamps. The current drawn by the DIMMERABLE[®] lamps varies largely from those drawn by the incandescent lamps. After performing tests on several dimmers, it would be appropriate to make the above declaration which guarantees that all dimmers used will be operating under a secure loading range.

Theoretically speaking, we take $1/5$ as the factor for the minimum loading. But based on the test results, using $1/6$ as the factor for the minimum loading would guarantee that the DIMMERABLE[®] lamp is compatible with various dimmers.

For Example

A 250VA dimmer might have a minimum load of 40VA (i.e. 40W). This means 40W divided by $1/5^{\text{th}} = 8\text{W}$. Therefore 1 x 11W GU10 for example will work on a 250Va dimmer. A 400VA dimmer's minimum load may be 60VA (60W) so following the same methodology 60W divided by $1/5^{\text{th}} = 12\text{W}$ so two lamps will be required on this circuit to function properly.

Section 6

Explanation on Lamp Dimming

When Incadescent lamps are dimmed they operate a linear dimming capability. This means a 60W GLS lamp running at 240V when dimmed to 10% output is running at 24V i.e. 10% of 240V.

For CFL's this is not possible as the traditional voltage / current / amperage formulae do not apply. CFL's need a certain current to maintain the arc in the lamp.

Therefore new Dimmerable lamps do save energy when dimmed it is not in a linear format. For example an 11W GU10 lamp dimmed at 10% still uses around 6W, the energy saving is still half of normal operation but the key factor is the light output – Lumens are being dimmed and not the power in the lamp as for incandescent types.

Section 7

Explanation on Lamp Dimming by Competitors

Dimmerable lamps operate differently to other dimming lamps due to their design. Our Ingenium technology means we operate lamps very differently to the market and can achieve strong lumen output (due to the cooling tube) and longer lamp life due to the semi Conductor (IC Chip). Our Dimming technology is based in a programme on the chip to do the dimming, we find in the test so far that this means smoother dimming over a wider range than competitors who's lamp design and operation is different. Don't forget we are the only company to put dimming capability in to a whole family of lamps with their own characteristics – we have studied more than others who simply have a tubular type.

Conclusion

From the context in previous sections, we can see that the DIMMERABLEs have proven to be fully functional on various dimmers with exceptional linear dimming capability during the dimming process.

To make the product user-friendly, the DIMMERABLEs is engineered with a "Plug-and-Dim" feature that allows users to mount the lamp into various fittings to perform instant dimming on existing dimmer switches.

Moreover, the current range of the DIMMERABLEs is more than adequate to replace various incandescent applications for dimming purposes.

It is safe to say that for general domestic applications in the home the min load requirements should not be an issue at all and most dimmers will accept quite happily 2/3 lamps in a room. The formulae $1/5^{\text{th}}$ and $1/6^{\text{th}}$ only apply for small commercial applications where there are 10-20 lamps and care should be taken to ensure we specify the right dimmer for the customer. In most commercial applications a new dimmer board for the scene setter can be bought without the need for a whole new system so there are plenty of other solutions.

To summarise, the MEGAMAN[®] DIMMERABLE CFLs is the most viable solution to replace current incandescent applications where dimming is desired.