

**T&J ELECTRIC (SINGAPORE) PTE LTD**

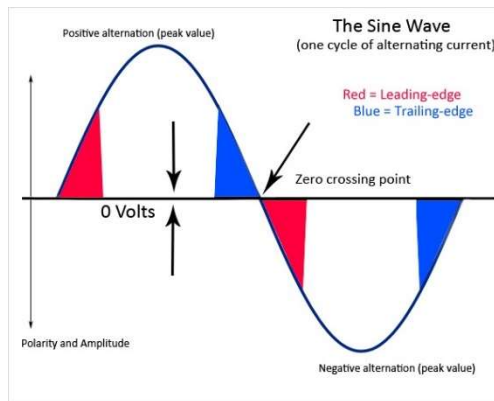
Company Registration No: 200205797Z  
10 Ubi Crescent, #02-24, Ubi Techpark, Singapore 408564  
Telephone: +65 6547-4333 Fax: +65 6547-4666

Date: 09/05/2018

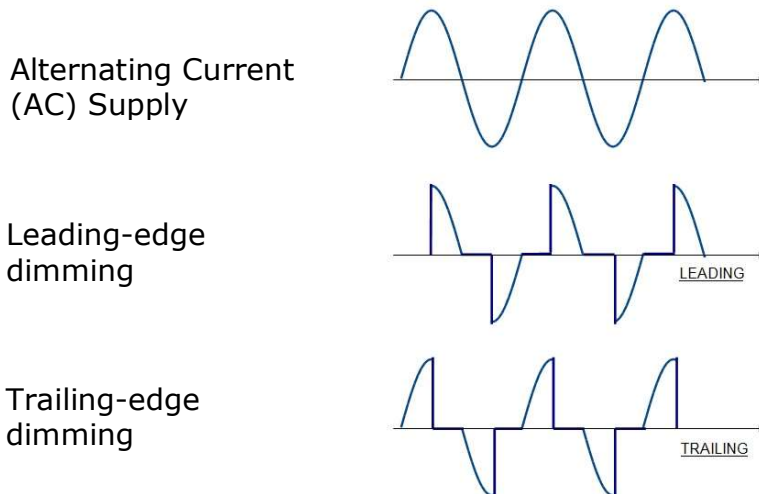
**Subject: Product Info: TM-020043.4 Dimmers for Radiance/Dazzle/Deco Range**

**Overview - Dimming Method**

Difference between leading-edge & trailing-edge of Alternating Current (AC) supply:



Leading-edge & Trailing-edge Dimming:



- In the diagram above shows a few cycles of the normal 230VAC waveform.
- If the dimmer delays the turn on of the cycle, it is a leading-edge dimmer.
- If the dimmer delays the turn off of the cycle, it is a trailing-edge dimmer.
- Leading edge dimming produces a rather sharp inrush of voltage into the load during each beginning of a half cycle, which in turn causes a high inrush current into the lamp filaments or the electronic components of solid state lighting such as LED Driver.
- Trailing edge dimming does not cause a high inrush voltage or current after the initial few cycles and is therefore, in general, results in less spikes on the supply lines and load.






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**Technical Data:**

Product Code	Product Image	Minimum Wattage	Maximum Wattage	Dimming Method	Output Power Device
K211-M2 HA211-M2 HB211-M2		40W	630W	Leading-edge	TRIAC
K211-1KM2 HA211-1KM2 HB211-1KM2		25W	1000W	Leading-edge	TRIAC
K2521-250 K2521-2-250 (Obsolete)		60W	250W	Leading-edge	TRIAC
K2521-400 K2521-2-400 (Obsolete)		60W	400W	Leading-edge	TRIAC
K2522-250 K2522-2-250 (Obsolete)		60W	250W	Leading-edge	TRIAC

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K2522-400 K2522-2-400 (Obsolete)		60W	400W	Leading-edge	TRIAC
K211S-2M2		40W	630W	Leading-edge	TRIAC
K212S-2M2		40W* (each)	630W* (each)	Leading-edge	TRIAC
W2747 (Details refer to TM-020039)		3W	400W	Trailing-edge	MOSFET

\*Derating required

**Technical Specifications:**

Input Voltage : 230VAC 50Hz

Dimension : 86mm x 86mm

Fix Center : 60.3mm

Fix Screws : M3.5 \* 25mm

Mounting Box:

B1125 ( Surface Mounting)

M1025 ( Flush Mounting)

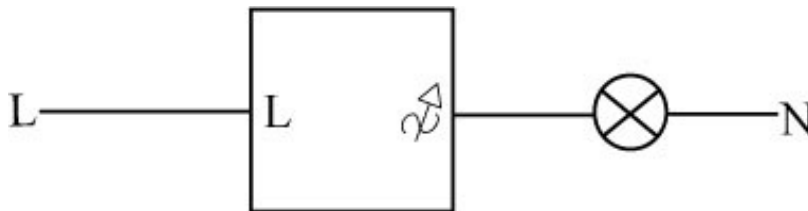
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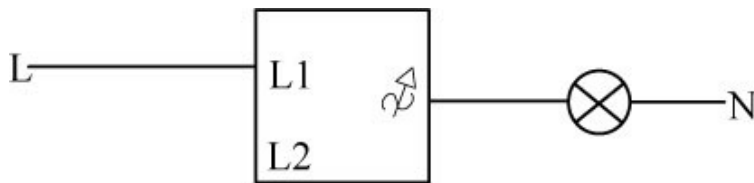
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**Wiring Diagram:**



**Applicable Products**

- K211-M2
- K211-1KM2
- HB211-M2
- HA211-M2
- HB211-1KM2
- HA211-1KM2
- K2521-250
- K2521-400
- K2522-250
- K2522-400



1 Gang Dimmer with 2-way switch (1-way configuration)

**Applicable Products**

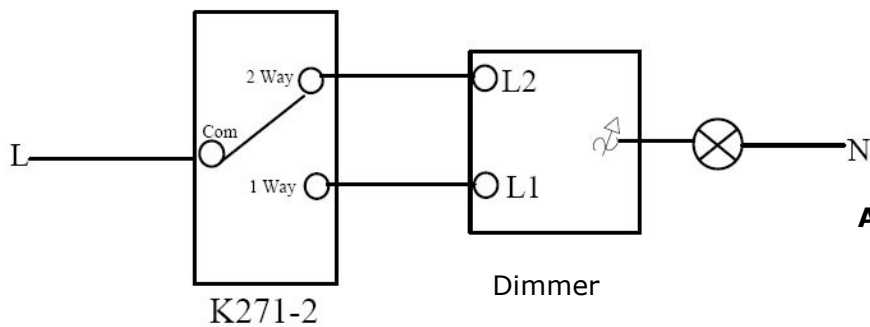
- K2521-2-250
- K2521-2-400
- K2522-2-250
- K2522-2-400
- W2747

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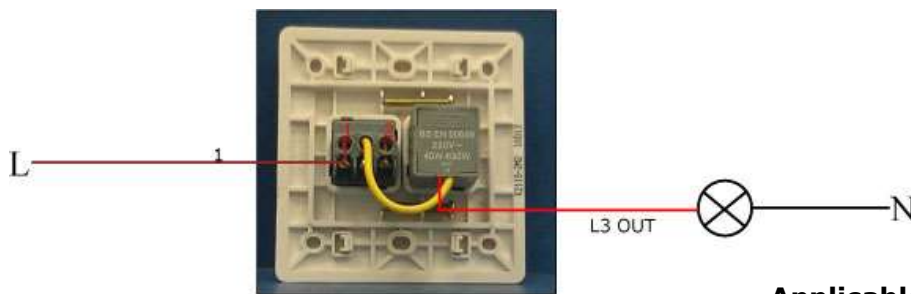
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1 Gang Dimmer with 2-way switch (2-way configuration)

**Applicable Products**

- K2521-2-250
- K2521-2-400
- K2522-2-250
- K2522-2-400
- W2747



K211S-2M2 (Back View)

1 Gang Dimmer with 2-way switch (1-way configuration)

**Applicable Products**

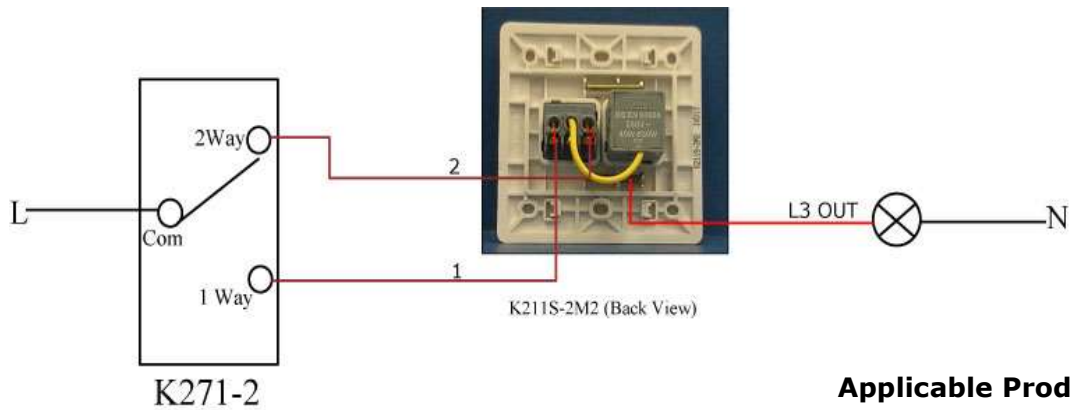
- K211S-2M2
- K212S-2M2

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1 Gang Dimmer with 2-way switch  
(2-way configuration)

**Applicable Products**

- K211S-2M2
- K212S-2M2



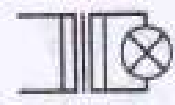





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**Compatible lamp source for Dimmers**










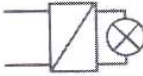





Typical Symbol	Sample Lamp Image	Leading-edge Dimmer	Trailing-edge Dimmer	Remarks:
		✓	✓	Incandescent Lamps
	 	✓		12V Halogen Lamps with transformer type ballast. Its recommended derated factor is 0.65 . eg: max wattage of K211-M2 is 630W, in application, the max watt is $630W * 0.65 = 400W$
 		✓		Dimmable LED lamp with leading-edge dimming method

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 				<p>Dimmable LED lamp with Trailing-edge dimming method</p>
 				<p>LED lamp/Driver dimmable with both Leading &amp; Trailing-edge dimming method - may need to test which method give a better dimming range and smooth performance</p>
				<p>12V Halogen Lamp with electronic ballast. Some electronic ballasts may not be dimmable.</p>
				<p>Dimmable Compact Fluorescent Lamp – due to its low watt (&lt;20W), trailing-edge dimmer is recommended for dimming</p>




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**Non-Compatible Lamp Source for Dimmers**

Typical Symbol	Sample Lamp Image	Leading-edge Dimmer	Trailing-edge Dimmer	Remarks:
		<b>x</b>	<b>x</b>	Non-dimmable LED
		<b>x</b>	<b>x</b>	Non-dimmable Compact Fluorescent Lamps
		<b>x</b>	<b>x</b>	Small Motor Loads, Exhaust Fans, Ceiling Fans

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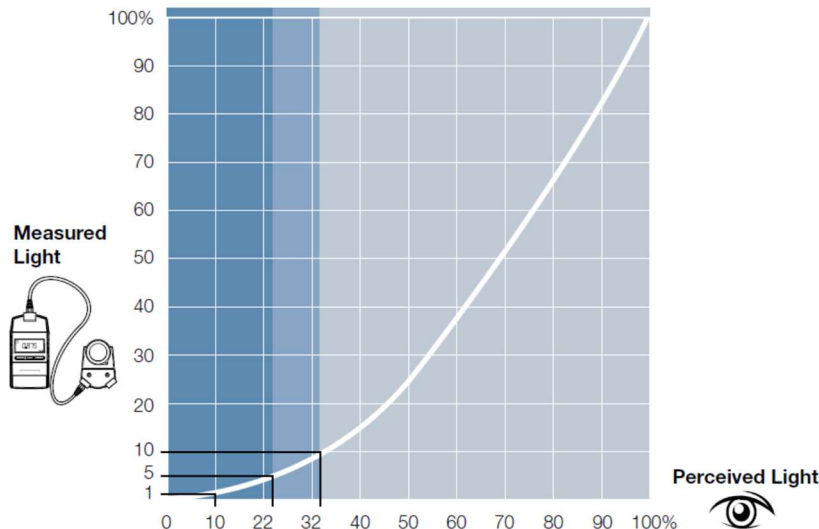
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**Dimming performance & expectation:**

Even if the lamp is dimmable with the appropriate dimmer, there may be some differences in actual dimming performance:

1. Brightness non-linearity – The human eye responds to low light levels by enlarging the pupil, allowing more light to enter the eye. This response results in a difference between measured and perceived light levels. For example, a lamp dimmed to 5% level is perceived to be at 22% brightness level.



2. Drop and Pop – When sliding the dimmer to a lower light output, the light may suddenly cut out altogether (Drop-out), or, when sliding the dimmer to get a higher light level, the light unexpectedly jumps to full brightness (Pop-on).
3. Flicker – Unstable brightness or pulsating bursts of light when dimmer is at minimum or maximum level. T&J W2747 dimmer has a low-end trim adjustment to minimize this issue. This symptom could be a sign of incompatibility.
4. Audible Noise – Leading-edge dimmer with its TRIAC output can produce spikes in current at certain dimming levels and cause dimmed light/driver to hum. This can be minimized by using a trailing-edge dimmer.
5. Dimming compatibility sample testing – a) If a trailing-edge LED driver sample is tested working with a leading-edge dimmer, the reliability of dimmer may be compromised due to factors such as Inrush current or Repetitive Peak current over a period of time. b) Testing for dimmer-driver compatibility may result in misleading conclusion due to variations of driver electronics, that is, the sample used to test is working fine while performance of actual sets may not be as expected.

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### LED Dimming Selection & Consideration

#### LED lamp situation

- Some manufacturers design and test their LED lamps to be compatible with leading-edge dimmers because they realized many LED retrofit lamps are more likely to be installed on existing dimmers used for incandescent or halogen lamps.
- Some dimmable LED lamps in the market that can be dimmed either by leading-edge or trailing-edge dimmer.
- Due the variety of different electronic designs of the LED dimming drivers, compatibility with the dimming control is an issue.

#### Minimum wattage requirement

- There are various factors affecting the smoothness of leading-edge dimming for dimmable LED, one such factor is the minimum wattage requirement (e.g. 40W – refer to T&J dimmer product list). This wattage is too high when dimming a single LED lamp which usually in range of 5W to 15W.
- If the LED lamp wattage is too low, one possible option is to use a trailing-edge dimmer (such as T&J W2747), that is, with a lower minimum wattage requirement (e.g. 3W).

#### De-rated Wattage

- For high wattage LED dimming applications, the dimmers need to be de-rated, as the load is not pure resistive, for example, the maximum wattage of K211-M2 is 630W, with a derating factor of 0.4, the applicable maximum wattage is about 300W.

#### 1-10V Dimmer

- To avoid the issue of leading/trailing- edge dimmer compatibility, one option is to consider the use of 1-10V DC dimming method (T&J Deco module W2847 – details refer to TM-020090), in this case the LED dimming driver needs to have 1-10V dimming input.

#### Flickering at high or low dimming range

- There are situations where the LED lamp flickering at the lower brightness or higher brightness – for trailing-edge dimmer (W2747), an in-built trimmer can be adjusted to minimize or eliminate such annoyance.

### Product Warranty

- Under normal operating environment (within the specified temperature and humidity) and specified power supply and lamp loading, T&J electronic dimming products carry a 1-year warranty.