PHILIPS

sense and simplicity

Philips MASTER LED Knowledge Document Set

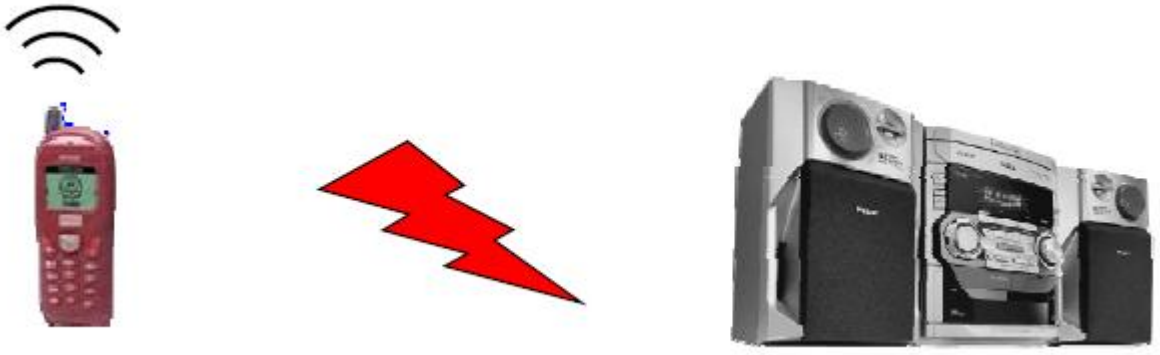
Ref.	Title	Ver	Dated	Applies to
KD01	**'Amoeba' Explained**		W2 2010	*MR16 4W, 7W, 10W*
KD02	**Dimming Mains Voltage Lamps**		*W2 2010*	*All MV Dimmable*
KD03	**Dimming Low Voltage Lamps**		*W2 2010*	*MR16 4W, 7W, 10W*
KD04	**Enhanced Red Effect**		*W2 2010*	GU10 PF, Novallure, and 250lm/470lm Bulb
KD05	**Active Cooling**		*W1 2010*	*MR16 7W & 10W*
KD06	**UV Radiation & Lamp Spectra**		Oct 2010	All LED Lamps
KD07	**Heat Gain of LED Lighting**		*Jan 2011*	*All LED Lamps*
KD08	**Electromagnetic Compatibility**	*0*	*Sept 2011*	*All LED Lamps*

Introduction: What is EMC/EMI?

EMC
Electromagnetic Compatibility

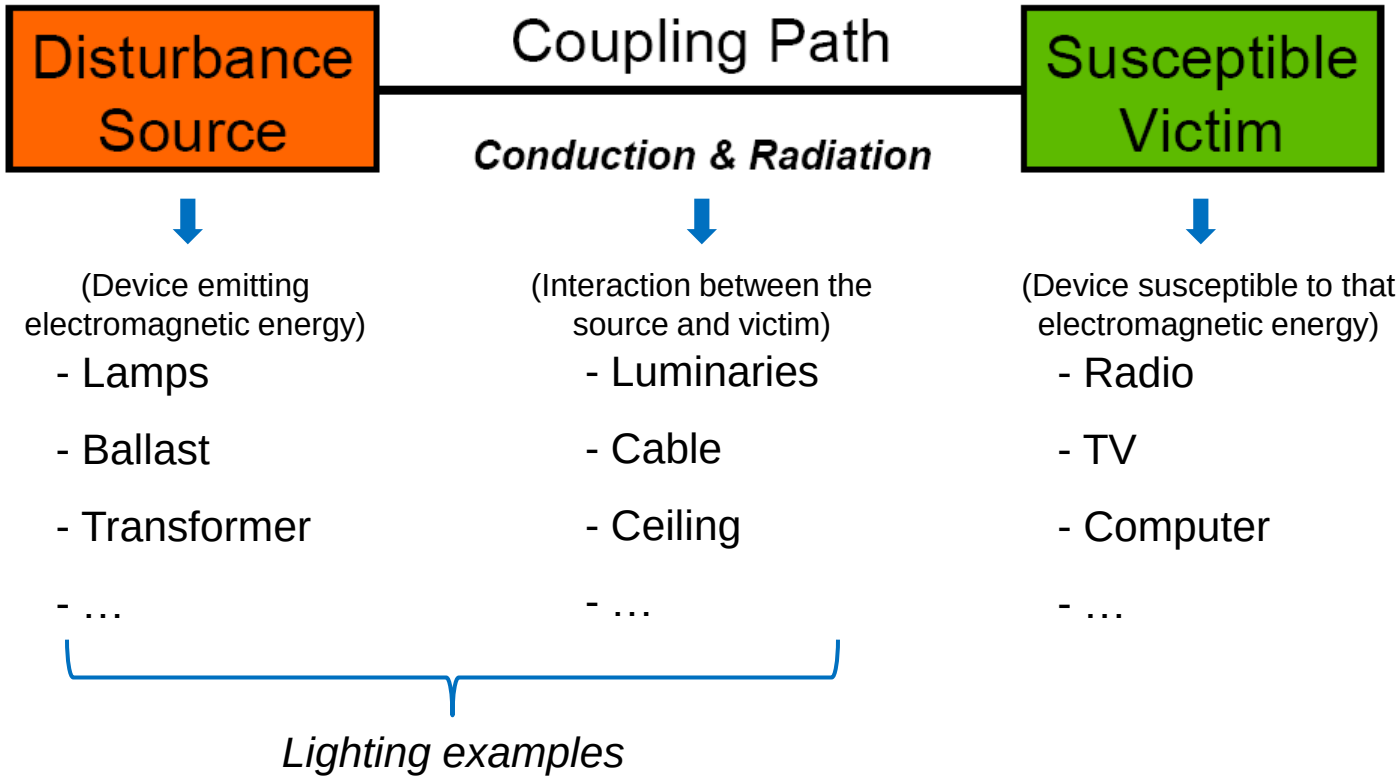
EMI
Electromagnetic Interference
(introducing interference)

EMS
Electromagnetic Susceptibility
(suffering interference)



Introduction: What influences EMC/EMI?

EMI Model



EMI is always a **system issue**:

- All of these parts have influence on system EMI performance
- 'Taking-away' one of two of these parts will solve the EMI problem

How do we certify our LED Lamps under EMI?

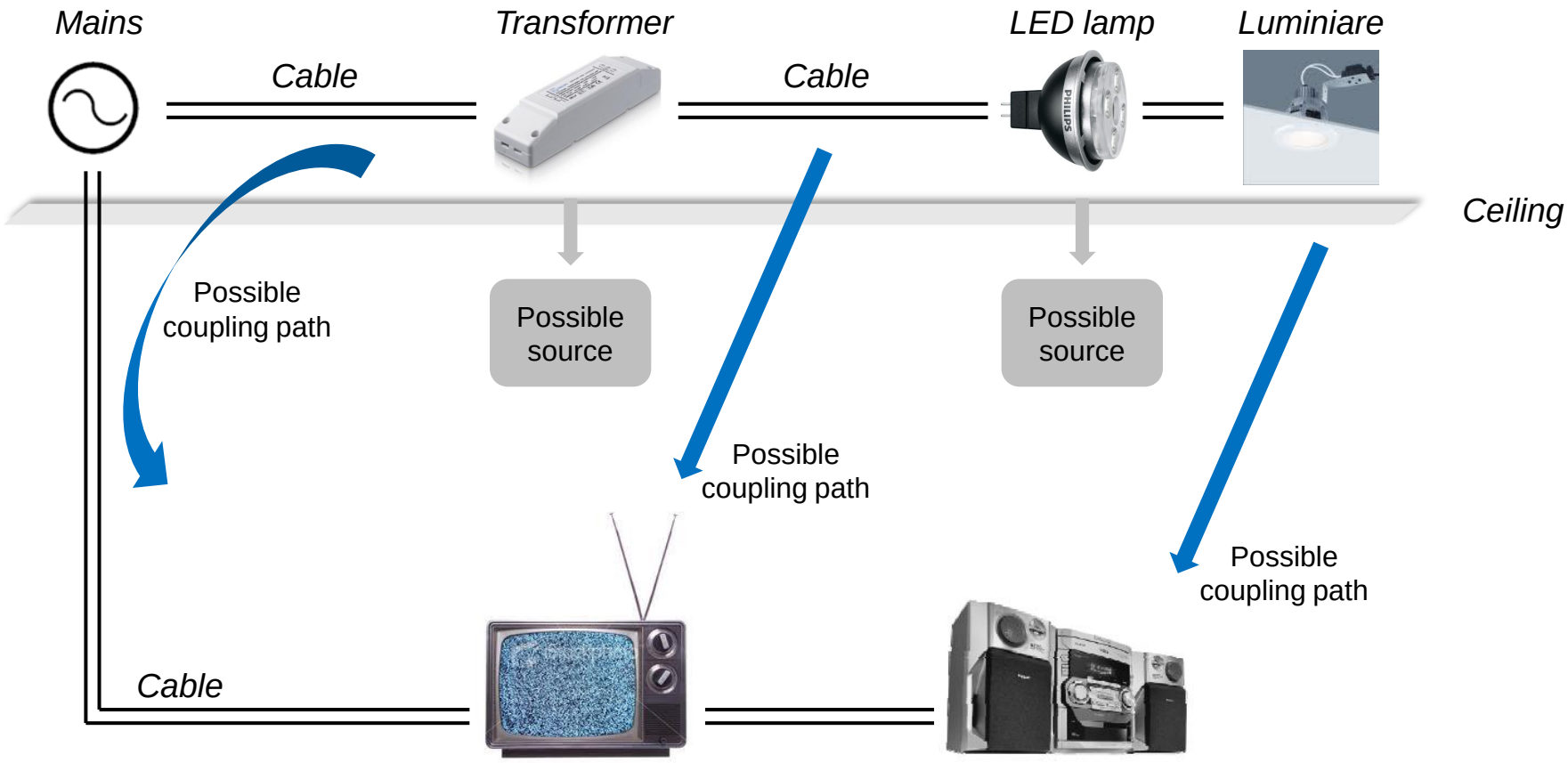
Example: MASTER LEDspot MR16

Philips MasterLED MR16 LED lamps are fully compliant with EMC harmonized standards and certificated by authorized third parties

Market region	EMC standard	Identification of authorized third party
	CISPR15	KEMA KEUR 
	FCC part 18	FC 

Possible EMI Issues with MR16 LED Retrofit Applications

Example: MASTER LEDspot MR16



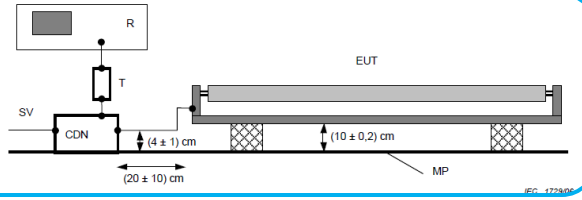
→ *LED lamp is **NOT the only** and **NOT necessarily the most dominant** root cause when an EMI issue is experienced: the full system influence must be considered*

Why possible EMI issues in MR16 LED retrofit applications?

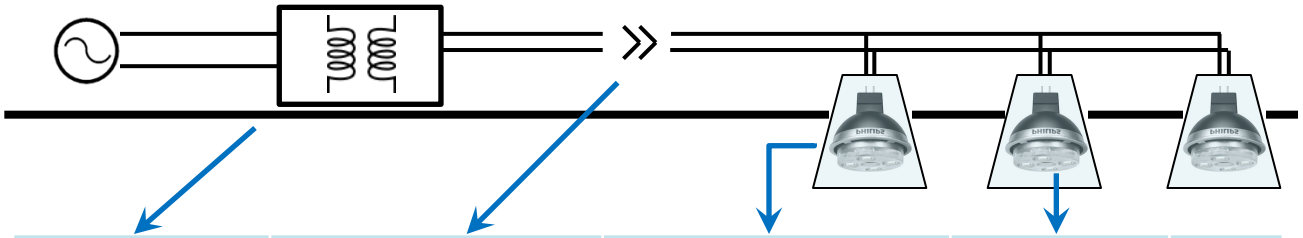
Example: MASTER LEDspot MR16

Compliance Test

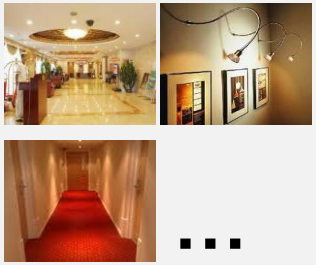
Tested to comply with Regulations & Norm requirements based on a **defined** transformer & test setup, since testing of all possible configurations is **impossible**



Actual Installation



system setup variation

Transformer type	Cable length	Luminary material & shape	x N lamps	…
 ...	 ...	 ...	 ...	

MR16 LED retrofit system

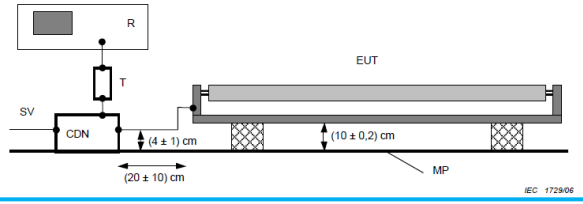
→ ***EMC performance influenced by large variations in the installation***

→ ***NOT possible to design a LED lamp, which is EMI proof for any variation***

Why possible EMI issues in MR16 LED retrofit applications?

Example: MASTER LEDspot MR16

Compliance Test



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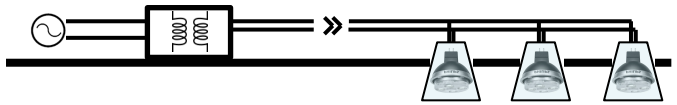
Actual Installation



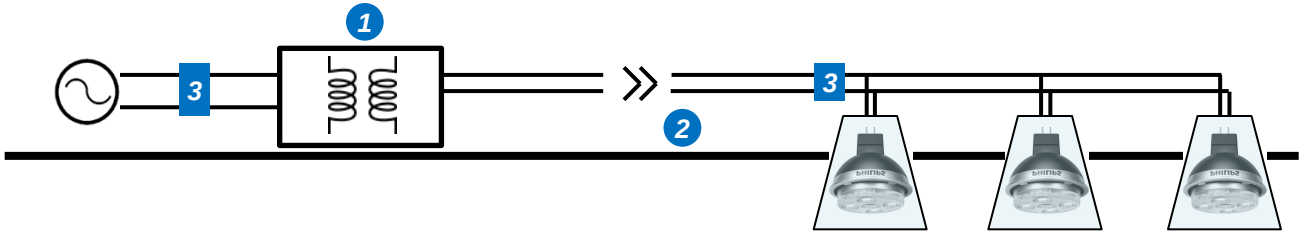
✓ No EMI

✘ EM Interference experienced

Influencing factors in the Actual Installation may impact the Electromagnetic Interference, and cause issues with other components in the surrounding system, such as TV/Radio/etc.

What can I do to improve the system EMI, if I experience a problem?

In many instances changing some parameters in the system can solve EMI issues, as follow:



Recommended solutions:		**Applicable to:**
1 Change to the transformer with better EMI suppression. *e.g. Philips Certaline 60*		LV LED Lamps eg. MR16, MR11
2 Shorten the cable length if possible, and use shielded the cable *e.g. BELDEN shielded cable*		All LED Lamps
3 Add EMI filter/choke at input / output of transformer *e.g. WURTH ELEKTRONIK EMC Ferrites for cable assembly*		All LED Lamps

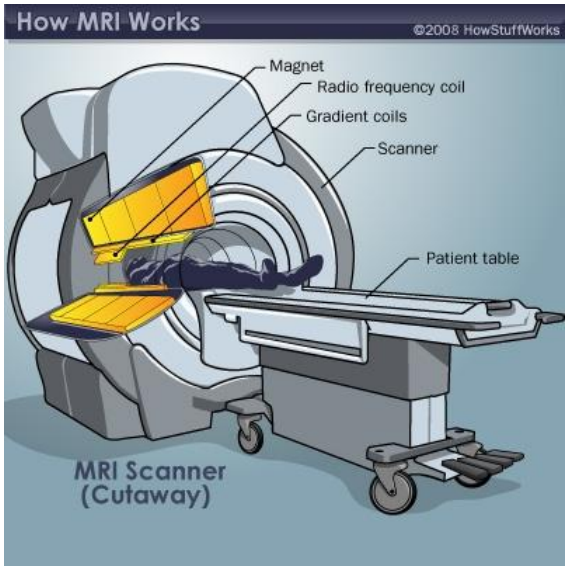
EMI and sensitive environments, such as Magnetic Resonance Rooms

Some system environments are extremely sensitive to Electromagnetic Emissions, and require special standards of EMC. An example of such an environment is in Magnetic Resonance Imaging (MRI) Rooms in hospitals.

MRI machines operate by initially generating a very high magnetic field (DC and RF) and then “listening” to the response of the atoms in the body to create an image, following the switching-off of the RF pulse. This response is very weak. The receiver of the machine detects narrowband signals in the 30-300 MHz range at levels **far below** (100 dB = 100.000x) the emission limits specified in standard EMC Regulations (eg. CISPR 15).

It is therefore **not allowed to use any electronic self-ballasted lamps in a MRI room during the measurement**.

Lester Lefkowitz/Photographer's Choice/Getty Images



http://science.howstuffworks.com/mri1.htm

Conclusions

➢All Philips LED Lamps are fully compliant with EMC harmonized standards for each Market Region. This is ensured through certification by authorized third party laboratories. Certification can be found on the LED Portal for each product type

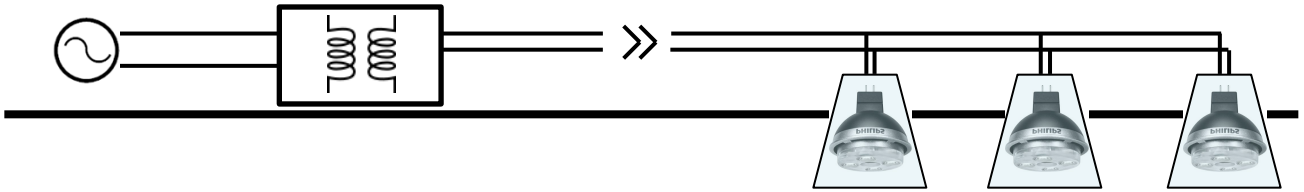
➢EMI is always a system issue, and LED lamps are NOT the only and NOT necessarily the most dominant disturbance source in the system

➢EMI performance of retrofit system is influenced by large variations in system setups

➢It is not feasible to design nor test a lamp, which can be EMI proof for all system variations, as many of these variations are outside of the lamp design/control

➢EMI issues with LED Lamp retrofit installations should be solved on system level, and changing system variables other than the lamp can lead to improvement

➢Use of LED Lamps in highly sensitive environments such as MRI rooms is not recommended

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