

### LED Lamps & Ballasts: - Dimmer Compatibility

d Good

Excellent

Not applicable Not Tested

Key

Bad

Neutral

1(10) Shows 1 unit was tested Figure in brackets = estimated max number of units per circuit

	TYPES					DIMMER TYPES							('			
Supplier	MODEL	DESCRIPTION	Date of test	RMT500	RDL250	RDL500	RAK4T	RAK4L	RAK4F	RADALI	RADSI	RDF800	RLED18-	RLED36-	RLED50-	RLED90-
													1ACI	3DCI	1DCV	3DCV
Ansell	BPGU10/DM/LED/UK	Titan LED Fire Rated Downlight	08/04/14	8(20)	8	8	8(30)									
Aurora																
Aurora																
Basislighting HH 1	Hedgehog Plus 15W 110Lm 3000k	With Lumotech LO5021 Ballast	05/08/14	2(15)		2(10)	2(20)									
Basislighting HH 2	Hedgehog Plus 15W 110Lm 3000k	With HEP Group LMTC10W ballast	05/08/14	2(15)		N/A	2(20)									
Bell	LED-GU10 CL-L13	7W Gu10 fitting bulb	05/08/14	5(15)		5(10)										
Civilight	DGU10 22164 7W 36degree	7W Gu10 fitting bulb	12/08/14	1(15)		1(10)	1(20)									
Detail	Tested with LED driver CIX-800D	7W MR16 with supplied driver	12/08/14	1(15)		N/A	1(20)									
Feit	BPGU10/DM/LED/UK	6.5W GU10 LED lamp	26/03/14	1(20)	1(10)	1(15)	1(30)									
HEWLED	FRD11WW	11.5W Fire Rated Downlight	12/05/14	5(15)		5(10)	5(25)									
JCC	FGLED6 JC94472	6W IP65 450lumen Fire rated light	09/05/14	10(20)	10(15)	10(20)	10(30)									
Kosnic	KDIM05SMD/GU10-W30	Powerspot 5W Gu10 bulb	01/09/14	10(15)		10(10)	10(15)									
Kosnic	KCOB05DIM/GU10-S27	5W Warm white dimmable 5W GU10	01/09/14	10(15)		10(10)	10(20)									
Kosnic	KDIM5.5CND	LED Dimmable Candle lamps	02/04/14	1/20	1	1	1/30									
LEDLite	LTCOB6 6.5W	COB 6.5W GU10	26/03/14	10(20)		10(20)	10(30)									
LEDLite	LT FRD12	11W Fire rated downlight	24/06/14	6/15	06/10/14	6/15	6/20									
Lumanex	LMX-6X-GU10	7W Gu10 fitting bulb	27/08/14	1(15)		1(8)	1(20)									
Lumilife	GU10-4.5-COB-WW-D	4.5W 320Im 3000K COB GU10 LED	01/08/14	1(15)		1(15)	1(20)									
Orluna	Orluna Quad 50 with Lightech Beetle ballast		26/03/14	5(15)	5(15)	5(20)	5(25)									
Orluna	Orluna Quad 50 with Ecopac ballast		26/03/14	5(20)	5(15)	5(20)	5(30)									
Orluna	Orluna Quad 50 with PowerLED ballast		26/03/14	5(20)			5(30)									
Pierlite	Pierlite Starburst Saber	Downlight & Ballast	19/02/14	5(20)		5(15)	5(30)									
Saving Light Bulbs	;	10W GS COB Ceiling Light	25/06/14	1(20)	1(10)	1(20)	1(30)									
Saving Light Bulbs	i	30W GS COB Ceiling Light	25/06/14	1(10)			1(20)									
Saving Light Bulbs		LED Ceiling Light COB 10W	26/06/14	9(20)		9	9(30)									
Saving Light Bulbs	;	LED Candle Light 3W E14	30/06/14	69(100)		69	69(150)									
Saving Light Bulbs	CB-E14-3X1WL-C-S-W-D-LENS	LED 3W Candle Flame Tip	30/06/14	20(50)		20(50)	20(100)									
Soraa	Vivid 2 MR16	9.5W 230V GU10 LED Spot	09/05/14	4/20	4	4	4(30)									
Soraa	MR16-50-B03-230-927-10/S3 360lm	9.8W 230V GU10 LED Spot	15/10/14	1/20	1	1	1(30)									
Soraa	MR16-50-B01-12-930-10	12V-10.4W 0.9A 50/60Hz LED lamp	15/10/14	1(20)	1(20)	1(20)	1(30)									
Spurlite	Starburst Crystal	15W LED Luminaire	09/04/14	1(20)		1(20)	1(30)									
Spurlite	Starburst Crystal	11W LED Luminaire	09/04/14	1(20)		1(20)	1(30)									
Starlite	TLED-444-3	8W intergrated ballast LED	17/01/14	10(20)		10(15)	10(30)									
Starlite	TLED-888	9W downlight with integrated ballast		15(15)		15(10)	15(20)									
Starlite	TLED-GU10 6W/DL/DIM	6W LED Downlight	09/07/14	10(20)		10(15)	10(30)									
Tamlite	ULT12LED0/WW	12W Ultaslim LED downlight	21/01/14	5(15)		5(10)	5(25)									
Tamlite	EURO8LED0/WW	8W Ulraslim LED downlight	21/01/14	5(20)		5(15)	5(30)									
TDLD6 Lamp	TDLD6-025-AH-NW-01 Lamp		20/03/14	1(10)			1(20)									
Ultraleds		4W DIM 299-240V GU10 2800-3200K	08/04/14	1	1	1	1									
Unbranded		6W COB GU10	07/01/14	9(20)	1(10)	9(15)	9(30)									
Unbranded	LL-UXSP/7-6W-D	6W COB GU10	12/05/14	1(20)	1(10)	1(15)	1(30)									

# Type Unbranded 6W GU10

6W COB GU10 Spotlight

Test Date 07 January 2014

Recommended Dimmers RDT500 RDL500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 1% Minimum Brightness dimming down to OFF: 1%

All dimmers achieved a minimum of around 1% of maximum output. The RAK4-T was capable of dimming to under 0.5% of maximum output

# **Smoothness of dimming**

With all dimmers some flickering occurs in the bottom 5% of output. With the RDL500 there is some slight variation between bulb activation but this only occurs when the initial output is low. Aside from this visual performance was good all round.

Audible Noise No audible noise with any dimmers

Multiple lamps per dimmer circuit: Number Tested: 9

Probably maximum number per circuit: RDT500: 20 RDL500: 15 RAK 4-T: 30

# **Electrical Performance:**

RDT500





**RDL500** 

# Notes:

Apart from the problems described in the smoothness of dimming section this lamp is generally good. No steps are visible when dimming and there is also no strobing or flickering across 95% of the output range



# Starlite 8W

# **LED Test Results**

# Туре **Starlite 8W COB LED**

TLED-444-3 Fixed fire-rated dimmable 8W LED downlight with attached ballast

Test Date 17/01/14

# **Recommended Dimmers**

RDT500 **RDL500** RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 5% Minimum Brightness dimming down to OFF: 2%

# **Smoothness of Dimming**

In general dimming performance was good although when turned on at a low output there was some inconsistency in activation. No significant flickering or strobing was observed but some steps in the dimming profile were visible although not significantly so.

# **Audible Noise**

No audible noise with any dimmers

# Multiple lamps per dimmer circuit:

Number tested: 10

Probably maximum number per circuit:

RDT500: 20 RDL500: 15 RAK 4-T: 30

# **Electrical Performance:**





# Notes:

This ballast and lamp combination dimmed smoothly in the main across its output range. There was no flickering or strobing of the lamp at any output and no audible noise was heard with any dimmer. While the minimum output achieved starting from both off and max was reasonable it may not be the correct choice of lamp for applications were very dim lighting is desired.



# Tamlite 12W Ultraslim

# **LED Test Results**

# Type Tamlite 12W Ultra Slim

ULT12LED0/WW Tested with Starlite CCD-1W12 ballast

Test Date 21/1/14

RAK 4-T

# Recommended Dimmers RDT500 RDL500



# **Dimming Performance**

Minimum brightness from OFF: 1% Minimum Brightness dimming down to OFF: 1%

While this lamp is capable of dimming to 1% of maximum output the bottom 5% or so is likely to be visually unacceptable to most due to flickering.

# **Smoothness of Dimming**

While overall the smoothness of dimming and visual performance of this lamp and ballast are good there is significant flickering in the lower end of the output range with all dimmers but in particular with the RDL500. However, there is no strobing or visible steps in the dimming profile and the lamps are synchronised during both turn on and when dimming between levels.

# Audible Noise

No audible noise with any dimmers

# Multiple lamps per dimmer circuit:

Number Tested: 5

Probably maximum number per circuit: RDT500: 15 RDL500: 10 RAK 4-T: 25

### **Electrical Performance:**



### Notes:

While all round visual performance is good the flickering means this lamp is probably not applicable where very low level lighting is desired.



# Tamlite 8W Ultraslim

# **LED Test Results**

# Type Tamlite 8W Ultraslim

Tested with Starlite CCD-1W12 ballast EURO8LED0/WW

Test Date 21/1/14

# Recommended Dimmers RDT500 RDL500 RAK 4-T



# **Dimming Performance**

Minimum brightness from OFF: 1% Minimum Brightness dimming down to OFF: 1%

# **Smoothness of Dimming**

This lamp and ballast combination performs well visually throughout its entire output range with no significant drawbacks. The only criticism that can be made is when used with the RDL500 some flickering was observed in the low output range.

# Audible Noise

No audible noise with RDT500 and RAK 4-T, slight humming from dimmer and ballast when used with the RDL500

# Multiple lamps per dimmer circuit:

Number Tested: 5

Probably maximum number per circuit:

RDT500: 20 RDL500: 15 RAK 4-T: 30

# **Electrical Performance:**



# Notes:

All round, when used with this ballast, this is a very good lamp dimming to around 1% of maximum output. Due to the flickering at low output levels it is probably not advisable to use the RDL500 with this lamp when low level dimming is required.

# Pierlite Starburst Saber MLEDSABER101

Test Date19/2/14

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF: 2% There was no sign of any flicker or shimmer

# **Smoothness of Dimming**

This lamp and ballast combination dims very smoothly indeed. The ballast appears to have some internal filtering which leads to a gentle transition between brightness levels.

# Audible Noise

No audible noise when used with trailing edge dimmers (RDT500 and RAK 4-T) Some buzzing from ballast when used with a leading edge dimmer (RDL500)

# Multiple lamps per dimmer circuit:

Number Tested: 5

Probably maximum number per circuit: RDT500: 20

RDL500: 15 RAK 4-T: 30

### **Electrical Performance:**

RDT500 RAK4T



RDL500



# Notes:

All round, this is a very good lamp/ballast dimming to around 2%

of maximum output. Visual performance is equal with trailing & leading edge dimmers A Trailing edge dimmer is preferred due to buzzing of ballast with leading edge A CONSTRUCTION OF CONSTRUCTUON OF CONSTRUCTUON



Pierlite

# TDLD6

# LED Test Results

Туре

# TDLD6-025-AH-NW-01 Lamp with TDLD6-025-AH Driver

Test Date 20/3/14

Recommended Dimmers RDT500 RAK 4-T



# **Dimming Performance**

Minimum brightness from OFF: 15% Minimum Brightness dimming down to OFF: 1.5% There was no sign of any flicker or shimmer using RAK4T or RDT500 dimmers. When using Leading Edge RDL500 dimmer there was some flicker at lowest levels **Smoothness of Dimming** 

This lamp and ballast combination dims smoothly indeed. Could not see any stepping between levels.

# Audible Noise

Slight buzz from ballast was not objectionable

# Multiple lamps per dimmer circuit:

Number Tested: 1

Probably maximum number per circuit: RDT500: 10 RAK 4-T: 20

# **Electrical Performance:**

RDT500 RAK4T



# Notes:

All round, this is a good lamp/ballast. Dimming ratio is not of the highest order Visual performance is better with trailing than leading edge dimmers A Trailing edge dimmer is preferred.

LEDLite

LED Test Results

Туре

# LEDLITE LTCOB6 6.5W LED COB GU10

Test Date 26/3/14

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: < 1% Minimum Brightness dimming down to OFF: < 1.5% There was no sign of any flicker or shimmer using RAK4T or RDT500 dimmers.

# **Smoothness of Dimming**

This lamp and ballast combination dims very smoothly indeed. Could not see any stepping between levels.

# Audible Noise

No noise was noticed

# Multiple lamps per dimmer circuit:

Number Tested: 10

<u>Probable</u> maximum number per circuit: RDT500: 20 RAK 4-T: 30

# **Electrical Performance:**

RDT500 RAK4T



RDL500



Notes:

All round, this is a good lamp. Dimming ratio is very good – down to very low level Performance is very good with trailing edge & with leading edge dimmers A Trailing edge dimmer is preferred.



# Orluna

# LED Test Results

# Туре

# **Orluna Quad 50**

# With Lightech Lite Beetle LED 15 CC 700mA ELBD Test Date 26/3/14

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 4% Minimum Brightness dimming down to OFF: 4% There was no sign of any flicker or shimmer using RAK4T or RDT500 dimmers. Sometimes see a flicker as it turns off with Leading Edge dimmer Smoothness of Dimming

This lamp and ballast combination dims smoothly. Could see little stepping between levels.

Audible Noise No noise was noticed

# Multiple lamps per dimmer circuit:

Number Tested: 5

<u>Probable</u> maximum number per circuit: RDT500: 15 RAK 4-T: 25

# **Electrical Performance:**

RDT500 RAK4T





# Notes:

All round, this is a good lamp/ballast combination. Dimming ratio is reasonable, but not of the highest order Performance is very good with trailing edge & good with leading edge dimmers.

There is fairly minor electrical noise on the current waveform. - We have downgraded the maximum number of lamps per circuit because of this.

A Trailing edge dimmer is preferred.





# Orluna 2

# LED Test Results

# Туре

# Orluna Quad 50 With Ecopac ELED-12-700T LED Driver Test Date 26/3/14

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 10% Minimum Brightness dimming down to OFF: 5% There is 50Hz shimmer present on the lamp light output.

# Smoothness of Dimming

This lamp and ballast combination dims smoothly. Could see little stepping between levels.

# Audible Noise

Only slight buzz from ballast which was not objectionable.

# Multiple lamps per dimmer circuit: Number Tested: 5

<u>Probable</u> maximum number per circuit: RDT500: 20 RAK 4-T: 30

# **Electrical Performance:**

RDT500 RAK4T





# Notes:

All round, this is a good lamp/ballast combination unless you want best dimming and light quality. Performance is equally good with trailing edge & with leading edge dimmers.

A Trailing edge dimmer is preferred.





# Orluna3

# LED Test Results

# Туре

# Orluna Quad 50 With PowerLED PCC70018TD LED Driver Test Date 26/3/14

Recommended Dimmers RDT500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 0.5% Minimum Brightness dimming down to OFF: 0.5% There was no sign of any flicker or shimmer using RAK4T or RDT500 dimmers.

# Smoothness of Dimming

This lamp and ballast combination dims very smoothly. Could not see stepping between levels.

Audible Noise No noise was noticed with Trailing Edge Dimmers

# Multiple lamps per dimmer circuit:

Number Tested: 5

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

# **Electrical Performance:**

RDT500 RAK4T



# Notes:

This Ballast is NOT suitable for Leading edge dimmers – will buzz loudly

Comments below relate to Trailing Edge dimmers only:

All round, this is a very good lamp/ballast combination. Dimming ratio is of the highest order

RAK4T (or RDT500) & PowerLED PCC70018TD Ballast are Rako's preferred solution for the Orluna Quad 50 lamp.





# Kosnic

# LED Test Results

# Type Kosnic LED Dimmable Candle LEDs KDIM5.5CND/E14-N30

KDIM5.5CND/E27-N30

Test Date 02/4/14

Recommended Dimmers RDT500 RAK 4-T

### Dimming Performance

Minimum brightness from OFF: 3% Minimum Brightness dimming down to OFF: 3% There was no sign of any flicker or shimmer using RAK4T or RDT500 dimmers.

### Smoothness of Dimming

This lamp and ballast combination dims reasonably smoothly. Could not see stepping between levels. There is a flat spot in the dimming response which makes the lamp seem to pause midway whilst dimming up/down

Audible Noise No noise was noticed with Trailing Edge Dimmers

Multiple lamps per dimmer circuit: Number Tested: 1 (Of each type)

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

Electrical Performance:

RDT500 RAK4T

### Notes:

No difference in performance between the two types

Lamps come on together at low level reasonably well – within ½ second of each other When using Leading edge Dimmer the lamps sometimes flash on/off at low light levels Peak currents with Leading Edge dimmers a quite high

All round, this is a good lamp when used with RAK4T or RDT500 dimmers





# Ansell

# **LED Test Results**

# Type Ansell ATILED/CW Titan LED Fire Rated Downlight

Test Date 8<sup>th</sup> April 2014 Recommended Dimmers RAK4T RDT500



# **Dimming Performance**

Minimum brightness from OFF 10%

Minimum Brightness dimming down to OFF 10%

# **Smoothness of Dimming**

There is no visible 50Hz shimmer

Dimming below 10% with two or more lamps on a single circuit causes flicker/flashing problems with Leading & Trailing (video below) http://www.youtube.com/watch?v=uz5jJX5Y8\_A&feature=youtu.be

# Audible Noise

Buzz from ballast with Leading Edge would be annoying. Silent with Trailing edge

Number of lamps tested per circuit 8

Probably maximum number per circuit 20 (on a trailing edge dimmer)

# **Electrical Performance**

Current Waveforms are typical for a reasonably well filtered ballast.

This is the current for 2 lamps. Note: RH trace for leading edge shows much greater peak current than for trailing edge



### Notes:

The sample lamps performed well at medium to high brightness levels. Probably not best for installations where subdued mood lighting is required due to limited dimming capability and low level flashing issue.

Lower peak currents when trailing edge dimmed mean that RAK4T or RDT500 are the recommended dimmers

# Ultraleds

LED Test Results

Туре

# ULTRALEDS U10SWWD

**4W DIM 299-240V GU10 2800-3200K** Test Date 08 April 2014

Recommended Dimmers RDT500 RAK 4-T RDL500

**Dimming Performance** 

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF: 2% There was no sign of any flicker using any of the dimmers. The light has 50Hz shimmer with any dimmer. Smoothness of Dimming

This lamp and ballast combination dims smoothly with some visible stepping between levels.

Audible Noise

Only very faint buzz heard – not an issue.

# Multiple lamps per dimmer circuit:

Number Tested: 1

Probable maximum number per circuit. See note below RMT500: 20 RAK 4-T: 30

### Electrical Performance:

The lamp has a noisy current waveform at all brightness levels.

This might cause radio interference and makes difficult accurate estimation of the maximum number of lamps that can be fitted to a single dimmer.

RMT500 RAK4T





# Notes:

Visually the lamp dimmed well. The 50Hz shimmer might annoy some users, but is not unusual amoungst lamps that we have seen. Electrical noise might be an issue in some installations – possibly causing radio interference, buzzing loudspeakers or telephone lines. It will depend on the installation itself. Estimation of the maximum number of lamps on a circuit is difficult due to the noisy waveform. We are stating 20 lamps on RMT500 – **but**– this is only an informed estimate



Feit

**LED Test Results** 

# **FEIT Electric BPGU10/DM/LED/UK** 6.5W 220-240VAC 50Hz 40mA 3000K 350lumens 38 degrees 260-13-27

Test Date 26/3/14

PETER

**Recommended Dimmers RDT500 RAK 4-T RDL500** 

# **Dimming Performance**

Minimum brightness from OFF: 0.1% Minimum Brightness dimming down to OFF: 0.1% There was no sign of any shimmer using RAK4T or RDT500 dimmers. Some slight flicker at very lowest brightness levels (below 1% of max brightness) **Smoothness of Dimming** 

This lamp dims smoothly. Could see some stepping between levels at low brightness. Visual performance is slightly better with trailing edge as leading edge a little "lumpy" at low end

# **Audible Noise**

Only slight buzz on trailing edge - audible about 150mm from the lamp. Louder with Leading edge audible at 300mm This is not a noisy lamp.

Multiple lamps per dimmer circuit: Number Tested: 1

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

# **Electrical Performance:**





# Notes:

RAK4T

All round, this is a nice little lamp. Dimming ratio is very good - down to very low level Performance is very good with trailing edge & with leading edge dimmers A Trailing edge dimmer is preferred.

# Lighting Council

# LED Test Results

# Type Spurlite

Lighting Council Australia LED Performance Solid State Lighting Luminaire 844Im 56Im/W 15W 3000K CRI, Ra 80

Test Date 9th April 2014

Recommended Dimmers RMT500 RAK 4-T RDL500

**Dimming Performance** 

Minimum brightness from OFF: 0.4% Minimum Brightness dimming down to OFF: 0.4% There was no sign of any shimmer using any dimmer. No flicker was seen at any level **Smoothness of Dimming** 



This lamp dims very smoothly. Could see no stepping between levels at any brightness. Visual performance is slightly better with trailing edge as leading edge very slight lump in dimming curve

# Audible Noise

Silence on trailing edge – inaudible. Slight buzz with Leading edge audible at 150mm This is not a very quite lamp with trailing edge. **Multiple lamps per dimmer circuit:** Number Tested: 1

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

# Electrical Performance: Nice, Power Factor corrected waveforms with little noise





# Notes:

All round, this is a very nice lamp/ballast combination. Dimming ratio is very good – down to very low level Performance is very good with trailing edge & with leading edge dimmers A Trailing edge dimmer is preferred.

# Lighting Council 2

LED Test Results

# Spurlite Lighting Council Australia LED Performance Solid State Lighting Luminaire 563Im 52Im/W 11W 3000K CRI, Ra 80

Test Date 9th April 2014

Recommended Dimmers RMT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 0.1% Minimum Brightness dimming down to OFF: 0.1% There was no sign of any shimmer using any dimmer. No flicker was seen at any level Smoothness of Dimming

This lamp dims very smoothly. Could see no stepping between levels at any brightness. Visual performance is slightly better with trailing edge as leading edge very slight lump in dimming curve

# Audible Noise

Silence on trailing edge – inaudible. Slight buzz with Leading edge audible at 150mm This is not a very quite lamp with trailing edge. **Multiple lamps per dimmer circuit:** Number Tested: 1

<u>Probable</u> maximum number per circuit: RDT500: 20 RAK 4-T: 30

# **Electrical Performance:**

RMT500 RAK4T





Notes:

All round, this is a very nice lamp/ballast combination. Dimming ratio is very good – down to very low level Performance is very good with trailing edge & with leading edge dimmers A Trailing edge dimmer is preferred.

Nice, Power Factor corrected waveforms with little noise

**RDL500** 



# Soraa GU10

LED Test Results

Туре

# Soraa Vivid 2 MR16 9.5W 230v 3000K 340Lm GU10 MR16-50-B03-230-930-36/S3

Test Date 09/05/2014

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF: 2% Noticeable 50Hz shimmer; particularly below 50% brightness. With 4 lamps on 1 circuit then (any) one lamp sometimes flickered below 10% max brightness Smoothness of Dimming

This lamp dims smoothly. Could see some stepping between levels at low brightness. Visual performance is similar with leading or trailing edge dimmer

# Audible Noise

Buzz on trailing edge – audible about 1 metre from the lamp. Louder with Leading edge - audible at 3 metres The buzz might be a problem for some users **Multiple lamps per dimmer circuit:** Number Tested: 4

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

# **Electrical Performance:**

RMT500 RAK4T





Peak currents are much lower with trailing edge dimming than with leading edge

# Notes:

Very attractive casing and front glass A Trailing edge dimmer is preferred.



# JCC JGLED6

LED Test Results

Туре

# JCC FGLED6 JC94472 6W Mains voltage fire rated downlight IP65

Test Date 09/05/2014

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 6% Minimum Brightness dimming down to OFF: 2% No visible 50Hz shimmer. Attempt to switch on multiple lamps on single circuit at less than 6% brightness means that only some lamps are lit **Smoothness of Dimming** This lamp dims smoothly. Could see no stepping between levels.

Visual performance is similar with leading or trailing edge dimmer

# Audible Noise

Some buzz with any dimmer – audible about 50cm metre from the lamp.

Multiple lamps per dimmer circuit: Number Tested: 10

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

# Electrical Performance:

RMT500 RAK4T





Peak currents are lower with trailing edge dimming than with leading edge

### Notes:

There was a slight, but visible difference in the colour temperature between lamp samples The main issue is with switching multiple lights on together at low levels. This will be fine as long as the scene levels are kept above 6% of maximum brightness



# 6W COB LED

LED Test Results

Туре

# LL-UXSP77-6W-D 9.5W 230v 3000K 340Lm GU10 6W COB LED SPOTLIGHT

Test Date 12 May 2014

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: <1% Minimum Brightness dimming down to OFF: <1% No noticeable shimmer at any brightness level No flicker seen at any brightness level Smoothness of Dimming

This lamp dims smoothly. Could barely see stepping between levels at low brightness. Visual performance is similar with leading or trailing edge dimmer

# Audible Noise

Silent with trailing edge dimmers Very slight buzz with leading edge dimmers – inaudible at 10cm distance

# Multiple lamps per dimmer circuit:

Number Tested: 1

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

# **Electrical Performance:**

RMT500 RAK4T



RDL500



Lamp has clean waveforms typical for this general type of lamp

# Notes:

Based on the single sample, this lamp seemed to perform very well

The lamp and packaging look professional, but there is no indication anywhere of a manufacturers or distributors name A Trailing edge dimmer is preferred.





Туре

# HEWLED Lighting FRD11WW 11.5W IP66 LED Fire Rated Downlight

Test Date 09/05/2014

Recommended Dimmers RDT500 RAK 4-T RDL500

# **Dimming Performance**

<text>

Minimum brightness from OFF: 3% Minimum Brightness dimming down to OFF: <1% No visible 50Hz shimmer. Attempt to switch on multiple lamps on single circuit at less than 3% brightness means that only some lamps are lit **Smoothness of Dimming** This lamp dime smoothly. Could acc some stepping between levels with logding edge, but bordly any stepping with t

This lamp dims smoothly. Could see some stepping between levels with leading edge, but hardly any stepping with trailing edge dimmer. Otherwise, visual performance is similar with leading or trailing edge dimmer

### Audible Noise

Some buzz with Leading edge dimmer – audible about 2 metres metre from the lamp. Silent with Trailing edge dimmers **Multiple lamps per dimmer circuit:** Number Tested: 5

Probable maximum number per circuit: RDT500: 15 RAK 4-T: 20

# **Electrical Performance:**

RMT500 RAK4T





Peak currents are much lower with trailing edge dimming than with leading edge

### Notes:

A good lamp. Definitely favour use with Trailing Edge dimmer (RMT500 or RAK4T) due to buzz when used with Leading Edge (Triac) dimmers Slight issue switching multiple lights on together at low levels. This will be fine as long as the scene levels are kept above 3% of maximum brightness. (Hardly worth mentioning).

Туре

# LEDLite LT FRD12 11W Fire rated downlight

Test Date 24/06/2014

Recommended Dimmers RMT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 7% Minimum Brightness dimming down to OFF: 1% No visible 50Hz shimmer. Lights all come on together within less than 1 second of each other when dimmed up from off

Lights all go off almost simultaneously when dimmed down to off

# Smoothness of Dimming

This lamp dims smoothly. Could see very slight stepping between levels with leading edge, but none stepping with trailing edge dimmer.

Otherwise, visual performance is similar with leading or trailing edge dimmer

# Audible Noise

Tiny buzz with Leading edge dimmer – audible about 20cm metre from the lamp. Silent with Trailing edge dimmers **Multiple lamps per dimmer circuit:** Number Tested: 6

<u>Probable</u> maximum number per circuit: RDT500: 15 RAK 4-T: 20

# **Electrical Performance:**

RMT500 RAK4T





FRD12

Peak currents are much lower with trailing edge dimming than with leading edge

### Notes:

On the basis of the six samples this seems like a good lamp. Favour use with Trailing Edge dimmer (RMT500 or RAK4T) due to lower peak current and silent operation The low level switch on brightness is fairly high and it may be necessary to make sure that low brightness scenes are set above the 7% of maximum brightness



# SLB10W

LED Test Results

Туре

# Saving Light Bulbs 10W GS COB Ceiling Light

Test Date 25/06/2014

# Recommended Dimmers RMT500 RAK 4-T RDL500

# **Dimming Performance**

Minimum brightness from OFF: 8% Minimum Brightness dimming down to OFF: 8% No visible 50Hz shimmer.

# Smoothness of Dimming

This lamp dims smoothly. Could see only very slight stepping between levels with either leading edge or trailing edge dimmer.

Visual performance is very similar with leading or trailing edge dimmer

# Audible Noise

Tiny buzz with Leading edge dimmer – audible about 20cm metre from the lamp. Silent with Trailing edge dimmers **Multiple lamps per dimmer circuit:** Number Tested: 1

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30 RDL500: 20 Electrical Performance: RMT500 RAK4T





Peak currents are (unusually) similar with trailing edge dimming and with leading edge.

# Notes:

On the basis of the single sample this seems like a good lamp. No real advantage between trailing/leading dimming. Minimum brightness level of 8% is un-outstanding & is the only negative point seen



Туре

# Saving Light Bulbs 30W GS COB Ceiling Light

Test Date 25/06/2014

Recommended Dimmers RMT500 RAK 4-T RDL500

# Dimming Performance

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF:2% No visible 50Hz shimmer. Lamp will pulsate if dimmed below 2% (Dimming below 2% only seems to happen with trailing edge)

### **Smoothness of Dimming**

This lamp dims smoothly. Could see only very slight stepping between levels with either leading edge or trailing edge dimmer. Visual performance is very similar with leading or trailing edge dimmer

# Audible Noise

Some buzz with Leading edge dimmer – audible about 20cm metre from the lamp. Silent with Trailing edge dimmers **Multiple lamps per dimmer circuit:** Number Tested: 1

Probable maximum number per circuit: RMT500: 10 RAK 4-T: 20

### Electrical Performance:

RMT500 RAK4T



Nice power factor corrected waveform means peak currents are relatively low

# Notes:

On the basis of the single sample this seems like a good lamp. Trailing edge dimming preferred to avoid lamp buzz

The lamp has unusual yellow/green hue which could be an issue for some users

The pulsating at very low dim levels can be avoided by adjusting the minimum dim level of the dimmer

Very good electrical waveforms mean that multiple lamps per circuit should be fine. However, we have only tested a single lamp.



Туре

# Saving Light Bulbs LED Ceiling Light COB 10W

Test Date 26/06/2014

Recommended Dimmers RMT500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 5% Minimum Brightness dimming down to OFF:1.2% There is some visible 50Hz shimmer.

# **Smoothness of Dimming**

This lamp dims smoothly. Could see only very slight stepping between levels with trailing edge dimmer.

# Audible Noise

Bad buzz with Leading edge dimmer Silent with Trailing edge dimmers

# Multiple lamps per dimmer circuit:

Number Tested: 9 Lamps all came on within half a second of each other when slowly dimmed up <u>Probable</u> maximum number per circuit: RMT500: 20 RAK 4-T: 30

### Electrical Performance:

RMT500 RAK4T



Nice power factor corrected waveform means peak currents are relatively low

## Notes:

Only use Trailing Edge dimmers as lamps flicker & buzz with Leading Edge Very good electrical waveforms mean that multiple lamps per circuit should be fine.

# <complex-block>

SLB 10W Spot



Туре

# Saving Light Bulbs LED Candle Light 3W E14

Test Date 30/06/2014

Recommended Dimmers RMT500 RAK 4-T

# Dimming Performance

Minimum brightness from OFF: 0.5% Minimum Brightness dimming down to OFF: 0.5% There is visible 50Hz shimmer.

# Smoothness of Dimming

This lamp dims smoothly. Could see only very slight stepping between lowest levels with trailing edge dimmer.

# Audible Noise

Some buzz with Leading edge dimmer Silent with Trailing edge dimmers

### Multiple lamps per dimmer circuit:

Number Tested: 69 Lamps all came on together when slowly dimmed up <u>Probable</u> maximum number per circuit: RMT500: 100 RAK 4-T: 150

### **Electrical Performance:**



This is the current for 69 lamps connected to a single RMT500. Current is almost constant across the entire ac cycle

### Notes:

Good performance with trailing & leading edge dimmers. Trailing edge preferred due to silent operation. 69 lamps tested with RMT500 caused only modest warming of the dimmer. Well within its ratings.

# SLB 3W Candle



# SLB 3W Candle Tip

LED Test Results

Туре

# Saving Light Bulbs CB-E14-3X1WL-C-S-W-D-LENS LED Candle Flame Tip

Test Date 30/06/2014

# Recommended Dimmers RAK 4-T RMT500 RDL500

Dimming Performance Minimum brightness from OFF: 3% Minimum Brightness dimming down to OFF: 3% There is visible 50Hz shimmer.

# Smoothness of Dimming

This lamp dims smoothly. Could see only very slight stepping between lowest levels.

# Audible Noise

Buzz with Leading edge dimmer. Silent with Trailing edge dimmers

# Multiple lamps per dimmer circuit:

Number Tested: 20 Lamps all came on together when slowly dimmed up <u>Probable</u> maximum number per circuit: RMT500: 50 RAK 4-T: 100

# Electrical Performance:



This is the current for 20 lamps connected to a single dimmer. Waveform is very noisy with Trailing edge dimmer, but quite clean with Leading edge

## Notes:

Visually there is good performance with trailing & leading edge dimmers. Trailing edge preferred due to silent operation. The electrical waveform for Trailing edge is noisy & this may cause some issue with radio interference. That's as shame as otherwise seems quite good.



Туре

# Starlight TLED-GU10 6W/DL/DIM 390Lm 6W Downlight

Test Date 09/06/14

# Recommended Dimmers RAK 4-T RMT500 RDL500

# Dimming Performance

Minimum brightness from OFF: 1.5% Minimum Brightness dimming down to OFF: 1.5% There is no visible 50Hz shimmer. No flicker seen at any level

# Smoothness of Dimming

This lamp dims smoothly. Could not see any significant stepping between levels.

Audible Noise Buzz with both Trailing and Leading edge dimmer.

# Multiple lamps per dimmer circuit:

Number Tested: 10 Lamps all came on together when slowly dimmed up <u>Probable</u> maximum number per circuit: RMT500: 20 RAK 4-T: 30

Electrical Performance:





Visually there is equally good performance with trailing & leading edge dimmers.

# Starlite GU10





Туре

# Lumilife GU10-4.5-COB-WW-D 4.5W 320lm 3000K

Test Date 01/08/14

# Recommended Dimmers RAK 4-T RMT500 RDL500

# Dimming Performance

Minimum brightness from OFF: 1.5% Minimum Brightness dimming down to OFF: 1.5% There is visible 50Hz shimmer. Worse with Leading edge at low brightness. No flicker seen at any level

### Smoothness of Dimming

This lamp dims smoothly. Could not see any significant stepping between levels.

Audible Noise Nothing heard

Multiple lamps per dimmer circuit: Number Tested: 1

<u>Probable</u> maximum number per circuit: RMT500: 15 RAK 4-T: 20

# Electrical Performance:

Trailing





Due to the extreme noise on this signal it is difficult to recommend this lamp as it may affect electrical equipment in the vicinity. It is also possible that when more than one lamp is used this noisy signal could detriment the dimming performance of the lamps. However as only one lamp was tested this cannot be said with certainty.

Notes:

Visually there is equally good performance with trailing & leading edge dimmers.

# Lumilife GU10



# Bell 7W GU10

LED Test Results

# Type Bell LED 7W GU10

LED-GU10 CL-L-13

Test Date 5/08/14

Recommended Dimmers RDT500 RDL500



# **Dimming Performance**

Minimum brightness from OFF: 1% Minimum Brightness dimming down to OFF: 1%

# **Smoothness of Dimming**

All round visual performance is in the good range but some issues were observed. The dimming profile was heavily skewed towards the top end, and flickery at lower dimming levels. While the lamps performed consistently together some strobing was also present in the lower output range.

# Audible Noise

No audible noise with any dimmers

Multiple lamps per dimmer circuit:

Number Tested: 5

Probably maximum number per circuit:

RDT500:	15
RDL500:	15

# **Electrical Performance:**

RDT500





# Notes:

While this lamp would be perfectly suitable for most applications if very low level dimming is required then another lamp should be considered.

**RDL500** 

# Basislighting HH 1

# LED Test Results

# Type Basislighting "hedgehog"

Hedgehog Plus 15W 110Lm 3000k Tested with Lumotech LO5021 Test Date 5/08/14

Recommended Dimmers RDT500 RDL500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF: 1%

# **Smoothness of Dimming**

With both dimmers was very flickery in the bottom 10% output, meaning this light and ballast would not be acceptable for low level dimming applications. Aside from this the lamp ballast combination performed well with no strobing or steps in dimming profile.

# Audible Noise

No audible noise with any dimmers

Multiple lamps per dimmer circuit: Number Tested: 2

Probably maximum number per circuit:

RDT500: 15 RDL500: 10 RAK 4-T: 20

# **Electrical Performance:**





# Basislighting HH 2

# **LED Test Results**

# Type Basislighting "hedgehog"

Hedgehog Plus 15W 110Lm 3000k Tested with HEP Group LMTC 10W350-Z Test Date 5/08/14

Recommended Dimmers RDT500 RDL500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 1% Minimum Brightness dimming down to OFF: <1%

# **Smoothness of Dimming**



When tested with this ballast the visual performance was very good overall. No flickering was observed at any dimming level, nor was there strobing and the lamps performed consistently with one another. There was a small amount of stepping in the dimming profile in the mid range of the output although this was not significant.

# **Audible Noise**

No audible noise with any dimmers

Multiple lamps per dimmer circuit: Number Tested: 2

Probably maximum number per circuit:

RDT500: 15 RDL500: N/A RAK 4-T: 20

# **Electrical Performance:**

RDT500

RAK 4-T



# Notes:

Only suitable for trailing edge dimming, confirmed by testing with RDL500.

# Lumanex 7W GU10

# LED Test Results

# Type Lumanex 7W GU10

# LMX-6X-GU10

Test Date 27/08/14

Recommended Dimmers RMT500 RDL500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 3% Minimum Brightness dimming down to OFF: 3%

# **Smoothness of Dimming**

While this lamp was capable of dimming to a reasonably low level some problems where observed. The bottom 10% of the output range displayed significant flickering and the dimming profile had visible steps. No high frequency strobing was observed at any stage with this lamp.

# Audible Noise

No audible noise with any dimmer

# Multiple lamps per dimmer circuit:

Number tested: 1

Probably maximum number per circuit:

RMT500: 15 RDL500: 8 RAK 4-T: 20

# **Electrical Performance:**



# Notes:

This lamp could be used if very low lighting applications were not required, as apart from the low level flickering the visual performance was in the "good" range. The problem observed were less marked when the lamp is used with a trailing edge dimmer (RMT500 or RAK 4-T).

# Type Kosnic Powerspot 5W GU10

# KDIM05SMD/GU10-W30

Test Date 1/09/14

Recommended Dimmers RMT500 RDL500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 1% Minimum Brightness dimming down to OFF: 1%

# **Smoothness of Dimming**

While this bulb easily dims to 1% of its maximum output without flickering significant steps can be observed when dimming from off to 100%. There is also a small amount of 50Hz strobing and some inconsistency across the ten bulbs. While these problems existed in all dimmers the RMT500 and RAK 4-T noticeable outperformed the RDL500.

# Audible Noise

This bulb emits a noticeable buzzing noise at all output levels

# Multiple lamps per dimmer circuit:

Number tested: 10

Probably maximum number per circuit:

RMT500: 15 RDL500: 10 RAK 4-T: 15

# **Electrical Performance:**



# Notes:

I have stated a conservative estimate for the maximum number per circuit due to the noisy signal pictured above. As well as this the inconsistency between the bulbs means using a very large number of fittings per circuit is not advisable.



# Type Kosmic Dimmable 5W GU10

# KCOB05DIMGU10-S27

Test Date 1/09/14

Recommended Dimmers RMT500 RDL500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 3% Minimum Brightness dimming down to OFF: 4%

# **Smoothness of Dimming**

While this bulb only dims to 3-4% of maximum about there are few criticism to be made of its visual performance. No flickering was observed at any output level and the dimming profile was continuous with no visible steps. Aside from this a small amount of strobing is present and there is some inconsistency during turn on.

# Audible Noise

No noticeable audible noise from any lamp

# Multiple lamps per dimmer circuit:

Number tested: 10

Probably maximum number per circuit:

RMT500: 15 RDL500: 15 RAK 4-T: 20

# **Electrical Performance:**



Notes:



# Starlite

# LED Test Results

# Type Starlite Firestar

**9W CoB downlight with integrated ballast** Test Date 1/09/14

Recommended Dimmers RMT500 RDL500 RAK 4-T



# **Dimming Performance**

Minimum brightness from OFF: 3% Minimum Brightness dimming down to OFF: 2%

# **Smoothness of Dimming**

When used with a trailing edge dimmer this fitting dims to a good minimum level with no flickering or significant steps. With the RDL dimmer it has significant flickering in the bottom 20% of output. The fittings are inconsistent with one another in both turn on and when manually faded. It is worthy of note that this inconsistency is less noticeable when dimming from off to max.

# Audible Noise

No noticeable audible noise from any lamp

# Multiple lamps per dimmer circuit:

Number tested: 10

Probably maximum number per circuit:

RMT500: 15 RDL500: 10 RAK 4-T: 20

# **Electrical Performance:**



Notes:

# Civilight

# LED Test Results

# Type Civilight 7W GU10

# DGU10 22164 7W 36degree

Test Date 12/08/14

# **Recommended Dimmers**

RMT500 RDL500 RAK 4-T



# Dimming Performance

Minimum brightness from OFF: <1% Minimum Brightness dimming down to OFF: <1%

# **Smoothness of Dimming**

The all round visual performance of this lamp was very good. It easily dimmed to below 1% of its maximum output with no visible steps in the dimming profile observed. When dimmed to a very low level some flickering occurred but as this was Below 1% of maximum output it is not of concern. Very minor strobing occurred with all dimmers.

# **Audible Noise**

No audible noise from any dimmer

# Multiple lamps per dimmer circuit:

Number tested: 1

Probably maximum number per circuit:

RMT500: 15 RDL500: 10 RAK 4-T: 20

# Electrical Performance:



# Notes:

The RDL500 flickered less than the two trailing edge dimmers when nearing minimum ouput, but the performance in this area with the RMT500 and RAK4-T was still in the "very good" range.

# Type Detail 7W MR16

Tested with provided driver: Detail Dimmable LED driver CIX-800D Test Date 12/08/14

Recommended Dimmers RMT500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF: 2%

# **Smoothness of Dimming**

This lamp and driver combination performed fairly well, dimming to 2% of its maximum output. Below 2% the lamp flickers significantly and therefore would not be suitable for very low light level applications. The dimming profile is smooth except for one significant step around 25%, no strobing was observed from this lamp.

# **Audible Noise**

No audible noise when tested with either unit

Multiple lamps per dimmer circuit:

Number tested: 1

Probably maximum number per circuit:

RMT500: 15 RDL500: 10 RAK 4-T: 20

# **Electrical Performance:**



RAK 4-T



Notes:

This lamp and driver combination is not suitable for use with leading edge dimmers. When tested with the RDL500 the lamp did not turn off.

# Detail



# Aurora C10

LED Test Results

# Type Aurora C10

10W MV dimmable integrated LED downlight

Test Date 05/10/14

# **Recommended Dimmers**

RMT500 RDL500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: Minimum Brightness dimming down to OFF:

# **Smoothness of Dimming**

**Audible Noise** 

# Multiple lamps per dimmer circuit:

Number tested:

Probably maximum number per circuit:

RMT500: RDL500: RAK 4-T:

# **Electrical Performance:**



Notes:



# Туре

Test Date 05/10/14

# **Recommended Dimmers**

RMT500 RAK 4-T

# **Dimming Performance**

Minimum brightness from OFF: Minimum Brightness dimming down to OFF:

# **Smoothness of Dimming**

Audible Noise

# Multiple lamps per dimmer circuit:

Number tested:

Probably maximum number per circuit:

RMT500: RDL500: RAK 4-T:

# **Electrical Performance:**

RMT500

RDL500

RAK4-T:

Туре

# Soraa MR16-AD1-C3-927-10 MR16-50-B03-230-927-10/S3 360lm 230v 9.8W 0.06A 50.60Hz

Test Date 15th Oct 2014

Recommended Dimmers RDT500 RAK 4-T RDL500

Dimming Performance

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF: 2% Noticeable 50Hz shimmer; particularly below 50% brightness.

### Smoothness of Dimming

This lamp dims smoothly. Could see some stepping between levels at low brightness. Visual performance is similar with leading or trailing edge dimmer

### Audible Noise

Buzz on trailing edge - audible about 1 metre from the lamp. Louder with Leading edge - audible at 3 metres The buzz might be a problem for some users Multiple lamps per dimmer circuit: Number Tested: 1

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

# Electrical Performance:

RMT500 RAK4T





Peak currents are much lower with trailing edge dimming than with leading edge

### Notes:

Very attractive casing and front glass A Trailing edge dimmer is preferred. This lamp is very similar indeed to the 9.5W version tested in May 2014

### soraa gu10 9.8w



Туре

Soraa MR16-50-B01-12-930-10 MR16-AD1-A1-930-10T-10-S1 12V-10.4W 0.9A 50/60Hz LED lamp Supplied with Mode ET-015-C-230-RD and Varilight YT50L ballasts

Test Date 15/10/2014

Recommended Dimmers RDT500 RAK 4-T RDL500

### Dimming Performance

Minimum brightness from OFF: 2% Minimum Brightness dimming down to OFF: 2% Noticeable 50Hz shimmer; particularly below 50% brightness.

### Smoothness of Dimming

This lamp dims smoothly. Could see some stepping between levels at low brightness. Visual performance is similar with leading or trailing edge dimmer

Audible Noise No buzzing noticed

Multiple lamps per dimmer circuit: Number Tested: 1

Probable maximum number per circuit: RDT500: 20 RAK 4-T: 30

### Electrical Performance:

Varilight



https://www.youtube.com/watch?v=PTVk62XsCc8 https://www.youtube.com/watch?v=t9i5sRbV-nA



Mode

Both the waveforms shown are for RMT500 trailing edge operation

### Notes:

Very attractive casing and front glass

With either Ballast the lamp gives a good performance. A little ragged at the lowest dim levels, but this is about as good as it gets with MR16 LED replacements A Trailing edge dimmer is preferred.

