Issue 2 / 2015

C H A R G E

December 2015

A Technical News Journal from Deki Electronics Ltd

Editor's Desk

Dear Reader,

More than 60% of Deki's sales comes from the lighting segment. Whilst the growth of the CFL has declined of late, LEDs are fast gaining ground.

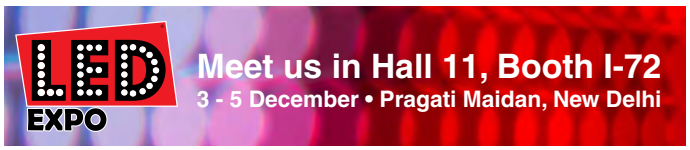
The production of LED lamps, 80% more energy efficient than incandescent bulbs, has increased 30 times to three crore lamps per month against a figure of ten lakhs just a year ago. This increase is thanks to the government's LED lamp distribution programme being coordinated by Energy Effeciency Services Ltd (EESL). EESL is a joint venture of the state run NTPC, Power Finance Corporation, Rural Electrification Corporation and Power Grid Corporation.

LED lamp production is likely to grow further as the distribution programme goes countrywide with the reduction in price from Rs 310 to Rs 73 for a 7 watt LED lamp.

Deki has a full range of capacitors for the LED driver. The technical write up on pages 2 and 3 talks of the various types of drivers available in the market and the film capacitors required for different applications. Deki has developed two special series for LEDs called the Fusible MPP and Fusible MPET. These have become a big hit in the market as they meet the twin demand of smallest size and highest reliability.

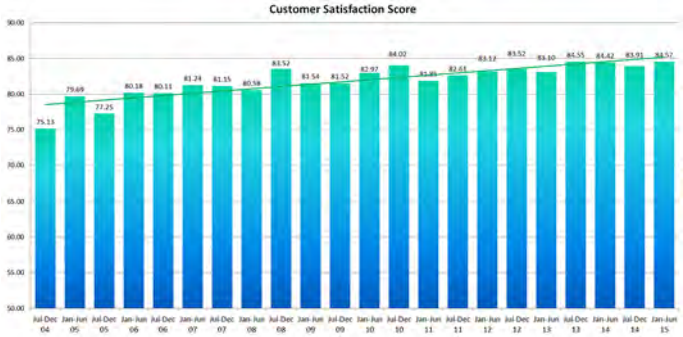
And, as always, we look forward to your comments and suggestions.

Anil Bali



External Customer Satisfaction Survey

Readers must be aware that Deki conducts an external customer satisfaction survey every six months. The results of the most recent survey for the period January to June 2015 indicated another term of a consistently improving trend. In fact, we achieved the highest ever score of 84.57% this time. We have been carrying out this survey for past eleven years and our customers have acknowledged the improvements made by Deki based on their feedback and suggestions. This is borne out by the improving trend in our score from 75% in July-December 2004 to the highest ever in the current survey.



External customer satisfaction survey results

Employee Motivation Survey

Readers may also remember that Deki also conducts an employee satisfaction survey every six months. In this survey all the direct employees are asked fifteen questions pertaining to:

1. their work environment
2. salary
3. satisfaction level
4. growth opportunity
5. knowledge of targets, standard specifications, operating procedures, etc.

They give marks to each question and this is then consolidated into a report that compares the results of the most recent survey with that of the previous months. The report, along with the action points for improvement, are discussed with all the employees in an "Open House" by our Managing Director, Mr Vinod Sharma.

The August 2015 survey score showed a slight reduction to 85% from the previous 86% with salary being an area of focus.

Innovative Cooling System at Deki

A unique cooling system has been installed to cool the hot exhaust of the 1.1MVA DG set. The innovative system is a custom-made, terracotta based design in which the hot air of the DG set gets cooled by water circulating in conical terracotta pipes.

Not only is it effective, the cooling system even looks good!

People working in front of the DG set are saved from the hot exhaust.

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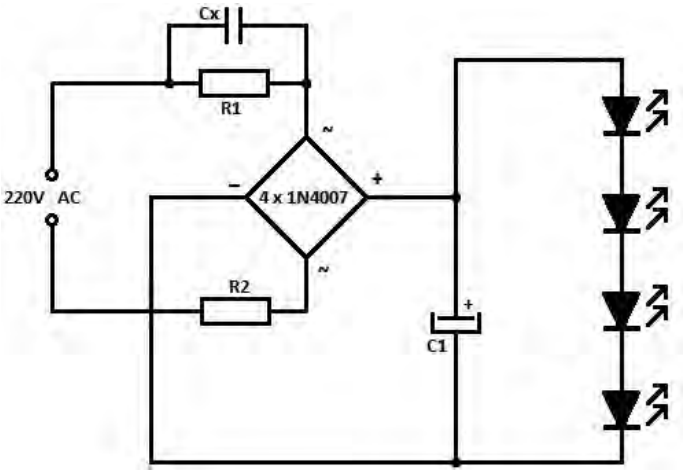
LED Drivers

Low Cost LED Driver

The capacitive power supply is the economic version of low power LED driver. It has less component count and more efficient for low power LED drivers. The capacitor Cx acts as a voltage dropper.



Film capacitor requirement

Cap	Function	Type	Voltage Requirement	Cap Range
Cx	Voltage dropping	MPET / MPP-AC MPET-F / MPP-F MPET-AC (High Reliability)	400VDC / 500VDC 275VAC / 305VAC 310VAC	0.1 to 2.2uF

High End LED Driver (Power factor corrected Flyback)

The Flyback power supply is the most commonly used high end LED medium power LED driver up to 150W. It consist of following sections, EMI filter, Input Bridge rectification, PFC and Gate Drive section, Snubber, Power Transformer, Output rectification, Output filter.

Film capacitor requirement

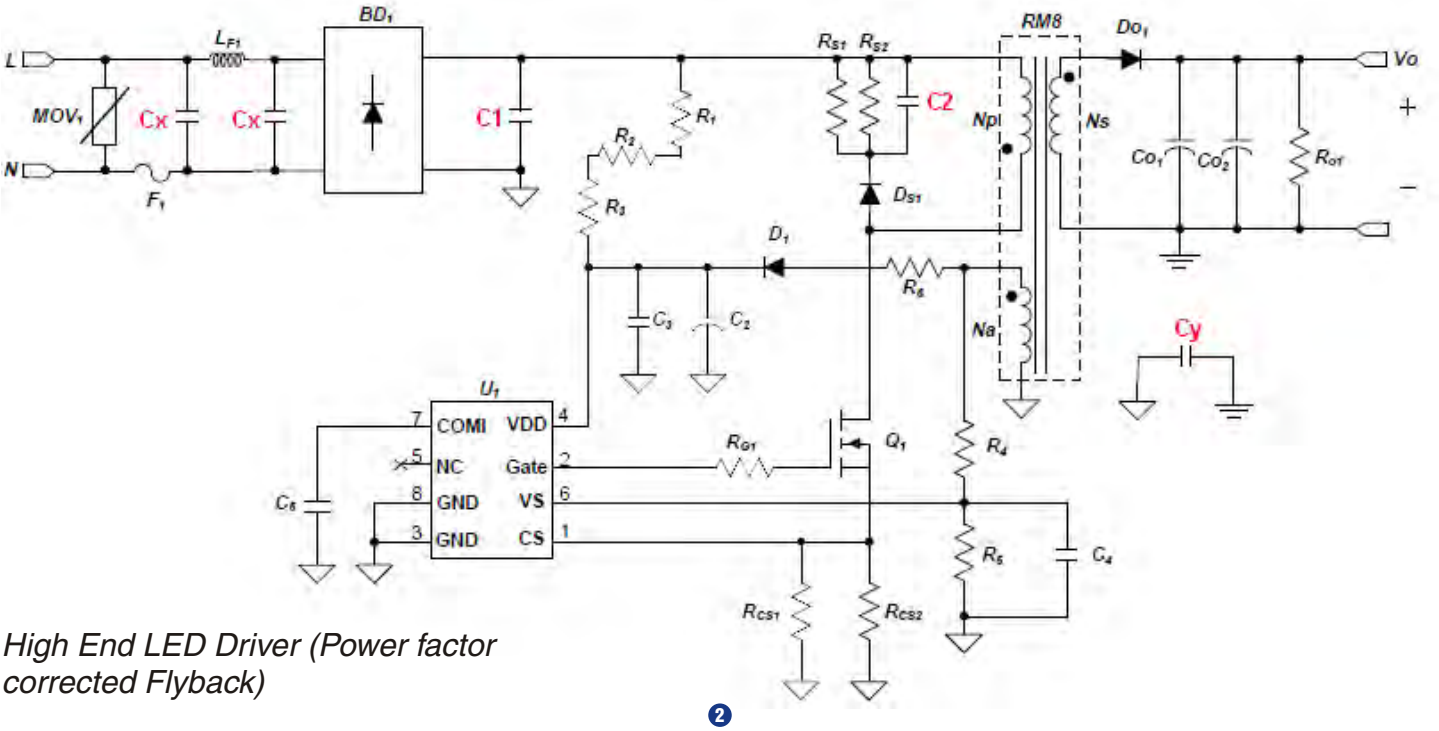
Cap	Function	Type	Voltage Requirement	Cap Range
Cx	EMI Suppression	MKP-X2	275/305/310VAC	0.004 to 10uF
Cy	EMI Suppression	MKP-Y2	250/275VAC	0.001 to 0.1uF
C1	Smoothing	MPET / MPP-AC MPET-F / MPP-F MPP-DC	400/450/500/ 630VDC	0.1 to 2.2uF
C2	Snubber	MPP-DC/PP-MPP	400/630/1000/ 1250/1600VDC	0.0022 to 0.47uF

High End LED Driver (High Efficiency Resonant Power supply)

In order to achieve very high efficiency of >95%, a resonance based power supply is employed in the high power LED drivers for street light, high bay light applications, etc. Resonant elements L, C employed. Combination of L and C forms various types of circuits out of which typical popular designs are Series resonant power supply, Parallel resonant power supply, LLC resonant power supply *(LLC- Schematic on page 3).*

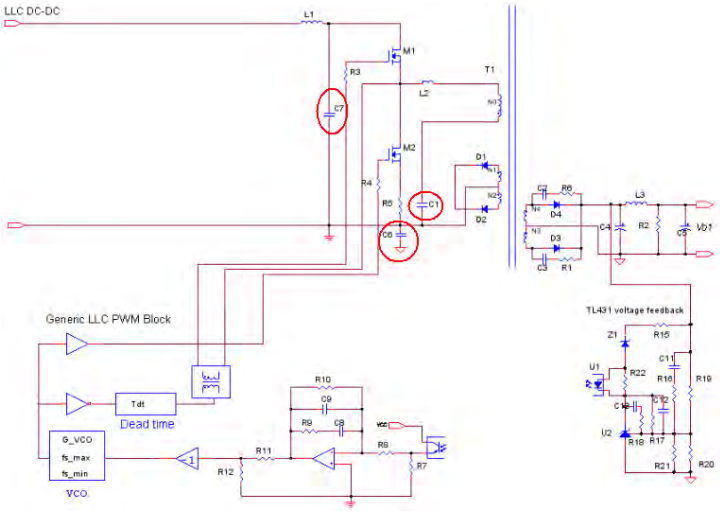
Film capacitor requirement

Cap	Function	Type	Voltage Requirement	Cap Range
C1	Resonant Capacitor	MPP-DC/DPSH / MPP-MPP / PP-MPP	630/1000/1250 1600VDC	0.001 to 0.47uF
C6	EMI Suppression	MKP-Y2	250/275VAC	0.001 to 0.1uF
C7	Smoothing	MPET/MPP-AC/ MPET-F/ MPP-F/ MPP-DC	400/450/500 /630VDC	0.1 to 2.2uF



High End LED Driver (Power factor corrected Flyback)

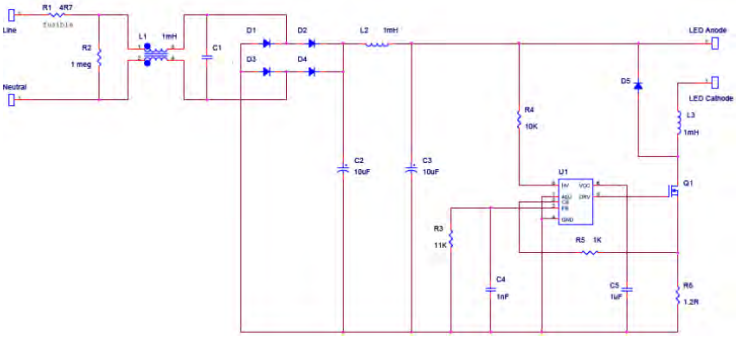
LED Drivers



LLC- Schematic

High End LED Driver (Buck Power supply)

In case of high end low power applications where very low output voltage is required, buck based (step down) LED driver is employed to handle larger output currents as well.



Film capacitor requirement

Cap	Function	Type	Voltage Requirement	Cap Range
C1	EMI Suppression	MKP-X2	275/305/310VAC	0.004 to 10uF

Recommended Capacitors for Applications:

Application/ Function	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Voltage dropping	MPP-AC (High reliability)	MPET-AC (High reliability)	MPP-AC	MPP-F-AC	MPET-F-AC
Smoothing	MPP-DC	MPP-F	MPET-F	MPET-DC	–
Snubbing	PP-MPP	MPP-DC	–	–	–
Resonance	PP-MPP	MPP-MPP	DPSH	MPP-DC	–
EMI Suppression Line to Line	IS/MKP-X2	MPP-AC	MPET-AC	–	–
EMI Suppression Line to Ground	IS/MKP-Y2	–	–	–	–

Miniature MPP-F Series for LED: Deki has developed a series for LED lamps. This series is a flame proof series and will fail in the safe mode. Capacitor size is also very compact and can easily fit in the LED lamp.

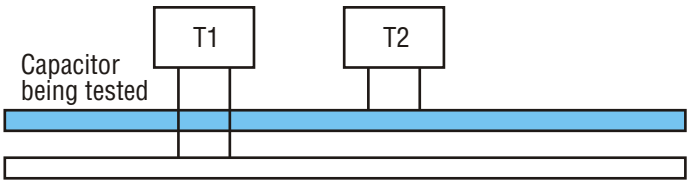
To validate capacitor for any power application we need to test
1. Self temperature rise of capacitor due to electrical stress.
2. Surface temperature of the capacitor body (hotspot) inside the enclosure at normal working condition and with highest stress level condition for LED light.

Procedure to test self temperature rise: The measurement must be made in free air convection. The capacitor being tested must be supplied by the working voltage and frequency. At a distance of about 50 mm it is necessary to place another capacitor (without any electrical stress) on which the ambient temperature (T2 is measured.

The temperature (T1) must be measured in the hottest part of the capacitor being tested by using a thermocouple with a small heating capacity (< 0.25mm)

Or an infrared thermometer.

ΔT = hot spot temperature – ambient temperature



T1 is the capacitor under test,
T2 is capacitor which has no connection

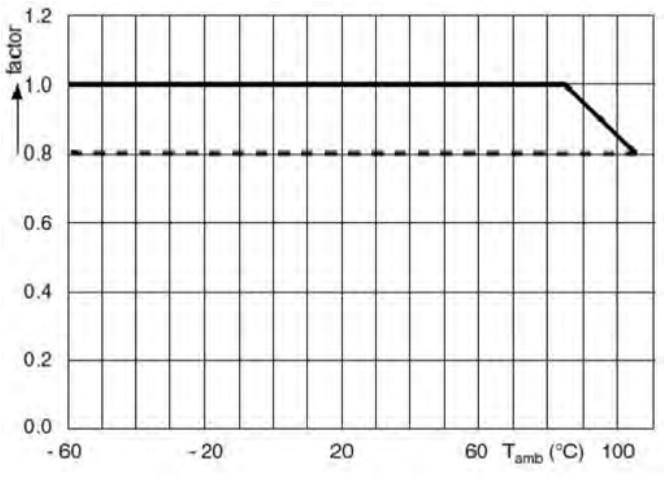
Distance between T1 and T2 should be about 50mm and 100mm from other components.

$$\Delta T_{max} = T1 - T2$$

ΔT_{max} should be less than 10°C.

And surface temperature on capacitor body inside the enclosure should not be more than 85°C.

Suggestion to Improve the life of the capacitor which in turn will improve the working life of LED light:
1. Make sure that there are no hot-spots near the capacitor.(To be taken care of at the time of PCB layout design)
2. Select the capacitor as per the guideline given above.
3. Voltage across the capacitor should not be more than the rated voltage of the capacitor.
4. Ambient working temperature should not be more than the maximum operating temperature of the capacitor.
5. For ambient temperatures in excess of 85° C please apply the derating factor as mentioned below



Deki now OHSAS 18001:2007 Certified

In addition to being ISO 9001:2008, TS 16949:2009 and ISO 14001:2004 certified, Deki's occupational health and safety system was recently certified by American System Registrar LLC as being 18001:2007 compliant.

Another Expansion at Deki

In April 2015 Deki expanded the metallised capacitor line by 50%. In order to accommodate this increase the RM and FG stores, offices and the R&D centre have moved to the adjoining B-19 building. As a result, the existing B-20 building is now an exclusive manufacturing hub, housing the inductive and non-inductive lines. At B-19, the RM store is in the basement, the FG store on the ground floor, offices on the 1st floor and the R&D centre occupies the 2nd floor.

Annual Day and Deepawali Celebration

Deki celebrated Annual Day and Deepawali function on 10th November 2015 in the factory premises. The function started at 10am with a pooja followed by a cultural program and lunch. All these activities were organised by the cultural committee of the company. The employees took part very enthusiastically and put a lot of efforts in preparing the songs and the dances. Their performance was excellent and well appreciated by the Deki family. The cultural program began with lighting the lamp and a patriotic song "Hum Karen Rashtra Aaradhan". Also, the employees were awarded for the best performance at work, attendance, participation in suggestions, SGA, etc. The programme ended with a vote of thanks after speeches by the Vice President, Vice President (Technical) and Managing Director, Mr Vinod Sharma. The employees enjoyed a delicious lunch together at the end. In the evening, gifts and sweets were distributed to the employees.

The cultural programme in progress


The proud awardwinners

Special Aadhaar Card Camp

A special, four-day Aadhar registration camp was organised at the Deki premises for the employees and their families. This initiative once again illustrates the dedication that the organisation has towards the wellbeing of its workforce. As a result of the camp being held inside the office premises, the registration process was made faster, easier and less cumbersome.

Good Deed Day

Deki celebrated Good Deed Day during November 2015. On this occasion, Deki employees collected school stationery items such as notebook, pencil, eraser, geometry box, pen, etc., during the first week of November 2015 and the same was donated by the employees on 19th November 2015 to the school children of Basti School near DND Flyover, Yamuna Khadar, Delhi. This Basti School is an informal school set up by the Gyan Shakti Vidyalaya at the basti/jhuggies near Yamuna Belt with three temporary sheds that provide space to run the school for children of under-privileged community leaving in jhuggies at Yamuna Belt.

Deki employees visited the Basti School to handover the stationary items, spent few hours with the children, encouraged them to focus on study and cleanliness specially self-hygiene.


The stationery all packed up at the Deki factory.


The goodies being handed out to the children.