Issue 1 / 2014

C H A R G E

January 2014

A Technical News Journal from Deki Electronics Ltd

Editor's Desk

Dear Reader,

At Deki, India's largest manufacturer of DC plastic film capacitors, we cherish the responsibility of offering our customers world class, globally competitive components. Today, Deki has a robust presence in the lighting segment contributing over 60% of our sales. This has been possible through regular updating of our product portfolio by developing new products.

In the CFL and the HF ballast applications the striking capacitor plays a critical role. Most CFL and the HF ballast manufacturers use Inductive polyester or polypropylene capacitors for this purpose. Some time ago Deki had developed the patented self healing inductive capacitor – DPSH and DTSH series. We are happy to announce that these capacitors are now being widely used by lighting manufacturers in India and abroad .

In our endeavour to add value we have now designed the PP/MPP and the MPP/MPP series of striking capacitors.

These capacitors increase the life of a CFL by a factor of 3, from the present 10,000 cycles to 30,000 cycles.

Both these products are discussed in this issue of Charge.

As you may be aware, Deki's X2 capacitors are ENEC approved. We are now pleased to introduce our UL approved range of X2 capacitors.

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

Anil Bali

External Customer Satisfaction Survey

Deki has been conducting an external customer satisfaction survey every six months for many years. The results of the latest survey for the period January-June 2013 indicate another term of a consistently improving trend. During the current period our customers have acknowledged the improvements made by Deki based on their suggestions. This is borne out by the improving trend in our score from 75% in July-December 2004 to 83.1% in January-June 2013.

External customer satisfaction survey results

Employee Motivation Survey

Readers may be aware 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.

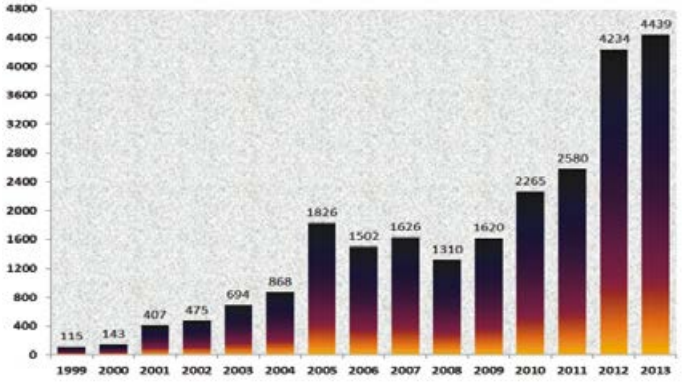
The scores for the August 2013 survey showed an improvement from 85% to 90%. Improvements were noticed by the employees in all fifteen areas with excellent results in:

1. work instructions/standard specifications, 2. availability of resources, 3. facilities, 4. salary, 5. cooperation of the section-incharge.

Training in Deki

Training in Deki receives utmost importance and, as an integral part of continual skill enhancement, it has been growing consistently. Detailed stage-wise training is being conducted in which knowledge of the process and the machines is being imparted. This is followed by a written test. An employee has to score a minimum of 80% at critical stages.

In 2012 there was a 64% jump in training hours from 2580 hours to 4234 hours. This works out to a very healthy 8.5 manhours per person per month. In 2013 this has gone up to 4439 hours.



Deki spends a considerable amount of time in training

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AC & Pulse Metallized Polypropylene Film Capacitors for Lighting Applications (Reduced Pitch Version)

Robust metallized polypropylene capacitors for CFL lighting applications

Application

In CFLs, the striking capacitor across the lamp is connected in series with the inductor. It resonates to generate a high voltage spike in order to trigger the lamp into operation. The voltage generated across the resonant capacitor during lamp start phase is very high at about 400 V_{RMS}. Also, the running phase RMS voltage is comparatively high at about 150 to 200 V_{RMS} at around 50 kHz. The high operating voltage and high frequency makes the application stringent for the capacitor. Since the start phase duration is small, more importance is given to the running phase.

In this paper, two robust capacitor designs are discussed which are ideally suited to handle high dv/dt of start up voltage spikes, continuous running RMS voltage at high frequencies and reduced pitch for easy fitment on the PCB.

Design 1: PP/MPP 10mm

1.1 Characteristics: Series construction, low inductive winding, coated by hard, water repellant, solvent resistant and flame retardant grade powder epoxy resin.

1.2 Features

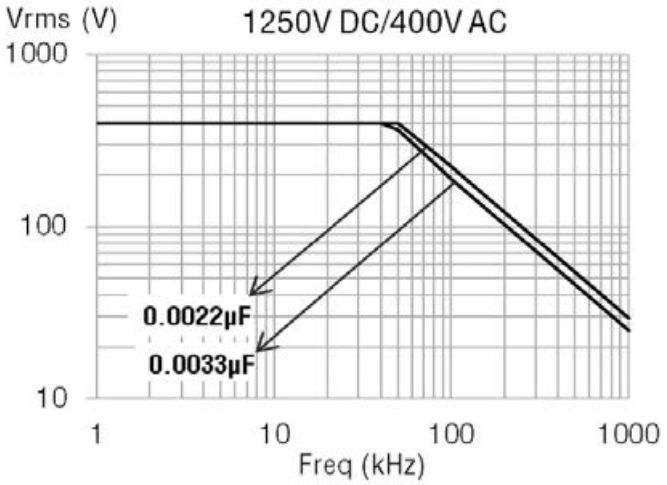
- Self healing
- High Vrms rating
- High dV/dt
- ROHS compliance
- Miniature size
- Higher cost compared to Inductive PP

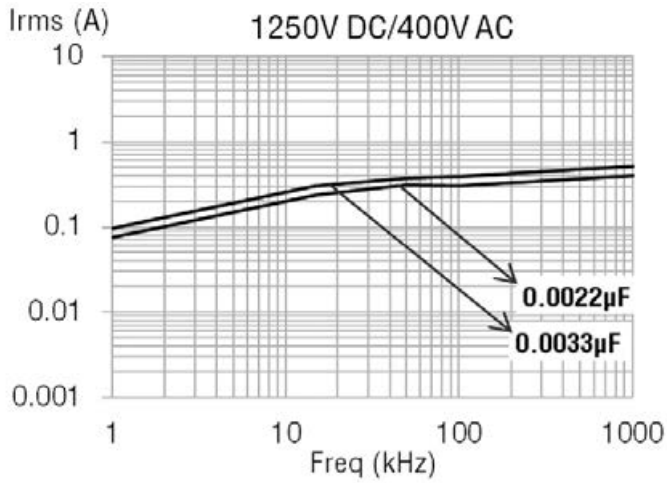
1.3 Technical data

Dielectric material	PP/MPP (10mm)
Capacitance @ 1 khz	0.0022 µF to 0.0068 µF
Rated Voltage (V_R)	1250V DC/400V AC
Pitch	10mm
Voltage proof	1.6 V_R for 2 sec
Dissipation factor	at f =1 kHz: 0.0008
tan δ value	at f =100 kHz: 0.003
Insulation resistance measured at 500V DC for 60s	> 100000 MΩ
Temperature operating range	-40°C to 100°C
Construction	Series constructed, impregnated polypropylene film, aluminum foil and metallised polypropylene film as internal electrodes wound in a non-inductive construction and coated by hard, water repellant, solvent resistant and flame retardant grade powder epoxy resin
Applicable specification	IEC 60384-16
Temperature derating	For temperature between +85˚C and 100˚C a decreasing factor of 1.25% per ˚C on the rated voltage V_R has to be applied
Endurance Test	Loaded at 1.25 times of rated voltage at 85° C for 1000 hours
After the test	
Δc/c	≤ 5% of initial value.
Increase in Tan δ	≤ 0.005
Insulation resistance	≥ 50% of the value mentioned in IR chart.

1.4 Derating graph of PP/MPP (10mm)

Max. Voltage (Vrms) vs. Frequency
(Sinusoidal Waveform at T ≤ 85° C)





Design 2: MPP/MPP 7.5mm

2.1 Characteristics: Series construction, low inductive winding, coated by hard, water repellant, solvent resistant and flame retardant grade powder epoxy resin.

2.2 Features

- Self healing
- High Vrms rating
- ROHS compliance
- Miniature size
- Higher cost compared to Inductive PP

2.3 Technical data

Dielectric material	MPP/MPP (7.5mm)
Capacitance @ 1 khz	0.0022 µF to 0.0033 µF
Rated Voltage (V_R)	1250V DC/400V AC
Pitch	7.5mm
Voltage proof	1.6 V_R for 2 sec
Dissipation factor	at f =1 kHz: 0.0008
tan δ value	at f =100 kHz: 0.0015
Insulation resistance measured at 500V DC for 60s	> 100000 MΩ
Temperature operating range	-40°C to 100°C

Construction Series constructed, impregnated metallized polypropylene film as internal electrodes wound in a non-inductive construction and coated by hard, water repellant, solvent resistant and flame retardant grade powder epoxy resin

Applicable specification IEC 60384-16

Temperature derating For temperature between +85˚C and 100˚C a decreasing factor of 1.25% per ˚C on the rated voltage V_R has to be applied

Endurance Test Loaded at 1.25 times of rated voltage at 85° C for 1000 hours.

After the test

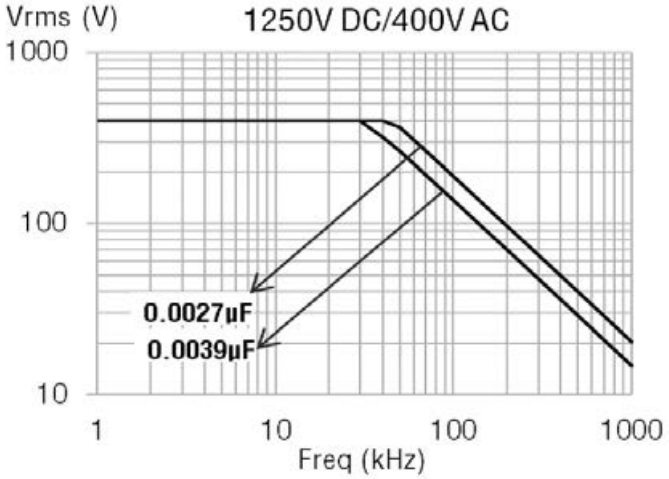
Δc/c ≤ 5% of initial value.

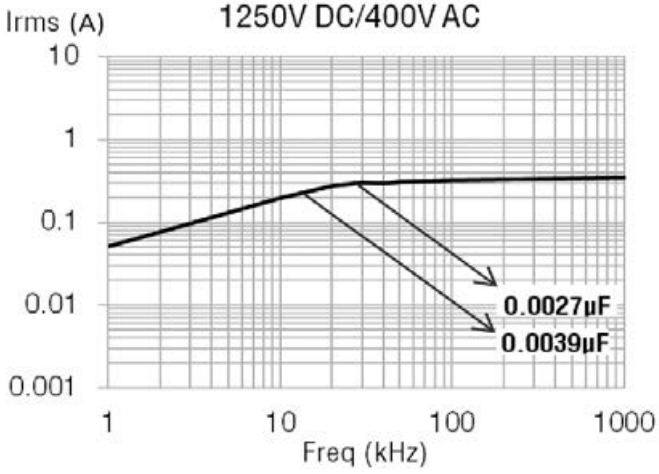
Increase in Tan δ ≤ 0.005

Insulation resistance ≥ 50% of the value mentioned in IR chart.

2.4 Derating graph of MPP/MPP (7.5mm)

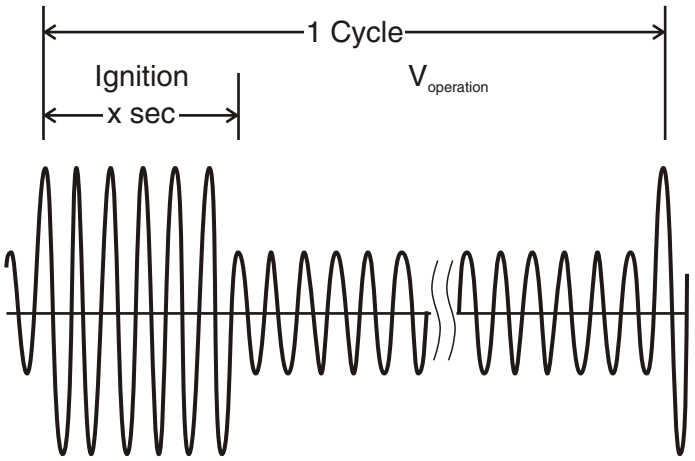
Max. Current (Irms) vs. Frequency
(Sinusoidal Waveform at T ≤ 55° C)





Both the designs perform well in the high frequency AC CFL application. The designs are tested with a special switching test to generate the real time operating conditions of CFL.

Switching test



Time duration 1: 0.1 second → 400V AC (similar to start/ignition phase)

Time duration 2: 2 seconds → 200V AC (similar to running phase)

Criteria after the test:

Capacitance change Δc/c ± 5% of initial value

Increase in Tan δ ≤ 0.003

Insulation resistance ≥ 50% of the value mentioned in IR chart.

Conclusion

Both capacitor designs perform well in the real time switching test for about 30000 cycles; this means that the resonant capacitor can with stand 30000 lamp switches ON/OFF transitions.

The MPP/MPP capacitors available in 7.5mm and PP/MPP capacitors are also available in formed version with pitch reduced from 10mm to 7.5mm. In future, the design can be modified to direct 7.5mm straight lead miniature versions (without forming) to make the capacitor more compact for easy fitment on the CFL PCBs.

Comparison of Designs of Striking Capacitor for CFL Lighting application

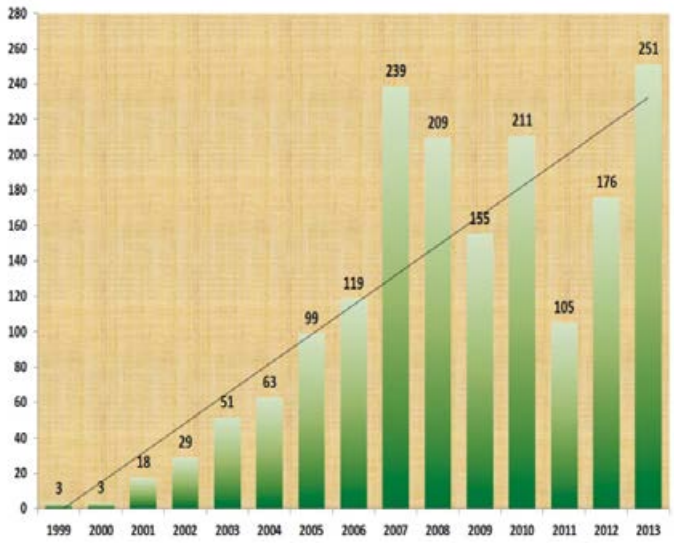
Designs	Higher V_{rms} rating	Self-healing	dv/dt	Inductance	Dimension / Cost Increasing order
PET (Polyester film/foil)	No	No	High	Low	
PP (Polypropylene, film/foil)	No	No	High	Low	
DTSH (Polyester self healing)	Yes	Yes	High	Low	
DPSH (Polypropylene self healing)	Yes	Yes	High	Low	
MPP-MPP 7.5mm (New)	Yes	Yes	Low	Very Low	
PP-MPP 10mm (New)	Yes	Yes	Very high	Very Low	

Employee Suggestion Scheme

The suggestion scheme at Deki has been growing continuously. The year 2012 saw an increase of nearly 68% over 2011 and in 2013 it increased further by 60% to a monthly average of 251 approved and implemented suggestions. The suggestion committee is forever looking at novel ways to motivate the employees to give more and more suggestions. The scheme is very simple. An employee fills up a suggestion form mentioning:

a. the present process
b. the proposed process
c. the savings/benefits from the proposed process.

This is given to his section in charge who puts his remarks and hands it over to the committee which decides and rewards acceptable suggestions every week.



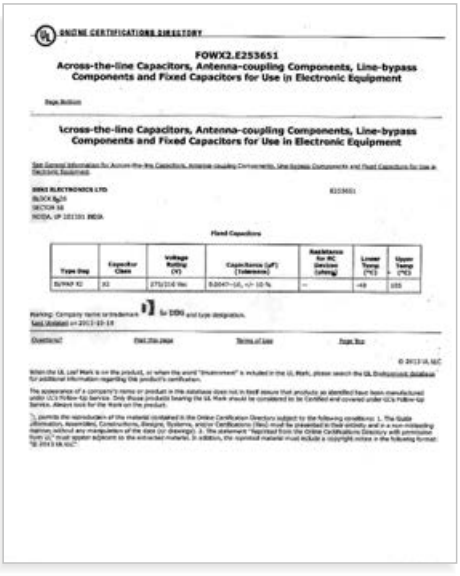
The suggestion scheme at Deki sees a lot of participation

Deki Gets UL Certificate

Our customers have been using our ENEC approved X 2 range of capacitors for the last few years.

We are now pleased to introduce the UL approved range of X2 capacitors.

Deki's X2 range is from 0.0047 to 10µF with temp rating of -40° C to +105° C and voltage rating of 275V AC & 310V AC.


ENGINE CERTIFICATIONS DIRECTORY

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Across-the-line Capacitors, Antenna-coupling Components, Line-bypass Components and Fixed Capacitors for Use in Electronic Equipment

Across-the-line Capacitors, Antenna-coupling Components, Line-bypass Components and Fixed Capacitors for Use in Electronic Equipment

Cancer Awareness Program at Deki on World Cancer Day

Deki organised a Cancer Awareness Lecture on World Cancer Day on February 4, 2013 in the factory campus for its employees in association with Dharamshila Hospital and Research Centre, Vasundhara, Delhi.

Dr S K Kocher (MS) of Dharamshila delivered the lecture on the burning issue of cancer and explained not only what cance is but also common cancers in India, warning signs, causes, steps for prevention of cancer and early detection.

While explaining about mouth, lung, abdomen and gall bladder cancer, he identified the use of tobacco - chewing or smoking, excessive alcohol intake and unhealthy lifestyles as some of the reasons for the growth of cancer. “Neither do people follow any physical fitness regimen nor do they eat healthy, thus inviting diseases like cancer,” according to him.

Dr Kocher informed the audience that the earlier the cancer is detected/diagnosed, the better are the chances of cure and complete recovery. It is important to realise that most cancers today are curable. He advised males above 50 years and women above 40 years to go for annual cancer screening tests like PSA, DRE, pap smears and mammogram for early detection of cancer.

One of our employee’s wife had a cyst and after this session he realised that it could be cancerous. After medical consultation the cyst was removed surgically.

Dr S K Kocher delivering his talk on cancer and its prevention

Health Project at Deki

Deki initiated a health project with the help of Delhi based research scholar Ms Aparna Kohli for its executive staff in July 2013. The aim of this project was to create awareness about life style diseases, monitor blood parameters and motivate the staff to inculcate healthy habits.

The health project has created awareness about life style diseases and their prevention as well increased awareness about dietary matters and the importance of a physically active lifestyle and exercises among the executive staff at Deki. We hope they will follow this through to ensure a healthy life.