

CHARGE

February 2013

A Technical News Journal from Deki Electronics Ltd

Editor's Desk

Dear Reader,

The Department of Electronics and Information Technology (DeitY), Government of India has notified a list of 15 items for compulsory registration under safety standards. The list includes laptops, tablets, notebooks, plasma/LED/LCD TVs, microwave ovens, set top boxes, printers and scanners. This is under the guidelines for series approval of products for implementation of "Electrical and Information Technology Goods (Requirement for Compulsory Registration) Order 2012." This means that all the above goods have to be checked for EMI/EMC compliance, besides other safety requirements. This implies that all manufacturers of electronic goods will now require interference suppression capacitors. This is bound to increase the use of UL/VDE/ENEC approved X2 and Y2 capacitors. We at Deki, have installed a new box capacitor line in order to meet this growing demand. You will find some pictures of the new line on page 4.

It is necessary that the equipment manufacturers have updated knowledge regarding these capacitors. They must not only ensure that the product is suitably marked but must check if the marking matches the certificate from the certifying agency. As an illustration, if the certifying agency has given a certificate for 250V AC capacitors then the manufacturer cannot mark 275V AC or 305V AC.

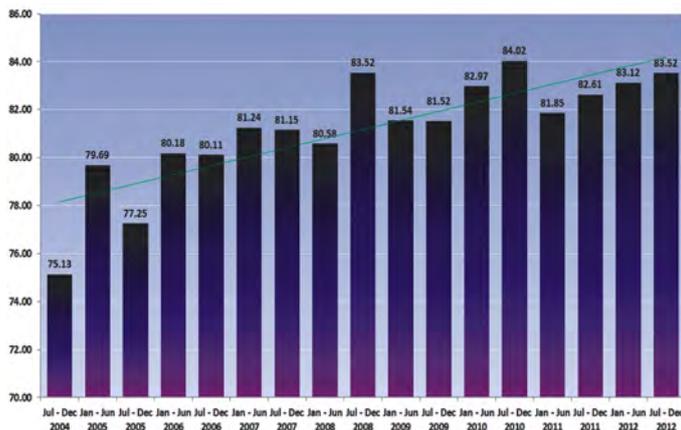
This issue of the Charge offers details regarding Interference Suppression capacitors.

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

Anil Bali

External Customer Satisfaction Survey

Deki conducts an external customer satisfaction survey every six months and the results of the last survey for the period Jul-Dec 2012 indicated another term of a consistently improving trend. We have been carrying out this survey for eight years and our customers have acknowledged the improvements made by Deki on their suggestions. This is borne out by the improving trend in our score from 75% in Jul-Dec 2004 to 83.52% in Jul-Dec 2012.



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 of the questions and this is then consolidated and made into a report that compares the results of the most recent survey with that of the previous months. The consolidated 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.

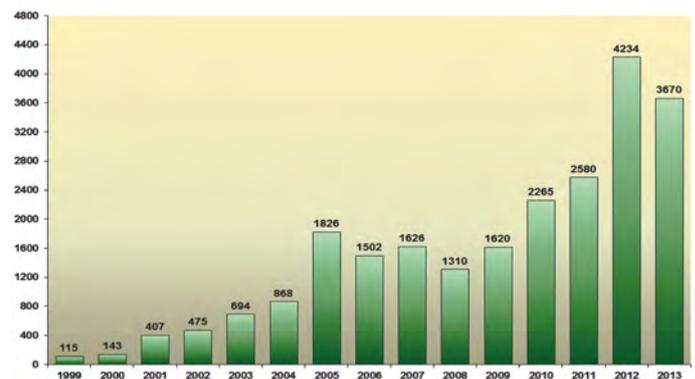
The scores for the August 2012 survey showed a slight reduction from 88% to 87%. Areas where improvements need to be made are:

1. facilities like lunch room, toilets, etc.
2. company doing its bit to help employees in their job
3. engagement as a part of Deki's advancement
4. Deki's progressive culture
5. over all satisfaction of employees.

Necessary corrective actions have been initiated in all relevant areas.

Training in Deki

Training in Deki has been growing consistently. There was a jump of 64% in training hours in 2012, from 2580 hours to 4234 hours. This comes to a very healthy 8.4 manhours per person per month. The Deki training system entails detailed, stage-wise training covering knowledge of the process and machines. This is followed by a written test. Only employees scoring over 80% in the test are allowed to run critical-to-quality machines.



Deki spends a considerable amount of time in training

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Capacitors for Radio Frequency EM Interference Suppression Application

Introduction

Noise suppression capacitors can improve the reliability, safety and performance in radio circuits. This paper gives an idea of what is noise suppression, the importance of noise suppression and noise suppression capacitor types.

Index terms: RFI/EM Interference, Noise suppression.

Noise Suppression: EMI/RFI is a high frequency/low energy noise. It is, typically, of a continuous nature that does not destroy electronic equipment directly, but distorts the normal signal within the electrical circuitry. There are capacitors that are used mainly in industrial, consumer and lighting applications for RFI noise suppression caused by electrical or electronic equipment or other sources like lightning and prevention of electric shock to humans.

Types of noise suppression using capacitors

The noise suppression capacitor is a specially designed capacitor used in an AC input filter circuit on the AC mains input. Its impedance decreases with the increase in frequency so that a short circuit path is created between the mains terminals or between the terminals and ground at high frequency.

Noise suppression capacitors are used in one of two methods: 1) across the line (line-to-line: class X) and, 2) line by-pass (line-to-ground: class Y).

Noise suppression capacitors are subjected to not only AC mains supply voltage but also high voltage transient pulses and abnormal surges caused by lightning.

Thus, noise suppression capacitors are designed to withstand the above stresses existing on the 50/60Hz AC mains and remain safe without degradation of performance.

Voltage spikes can easily occur several times a day in AC mains with amplitudes of more than 2kV. Peak values can go even more than 5kV.

Noise suppression capacitors are used to block and attenuate these voltage spikes.

Class X capacitors

A Class X capacitor is used in across-the-line applications, as shown in fig.1

In this configuration, a failure of the capacitor will not cause any electrical shock and usually will open the fuse and turn the equipment off.

Hence the name “X” capacitor which comes from “where the damage to the capacitor will not lead to the danger of electrical shock”.

Class Y capacitors

A Class Y capacitor is used in line-by pass applications, as shown in fig.1

In this location, a failure of the capacitor will lead to electrical shock.

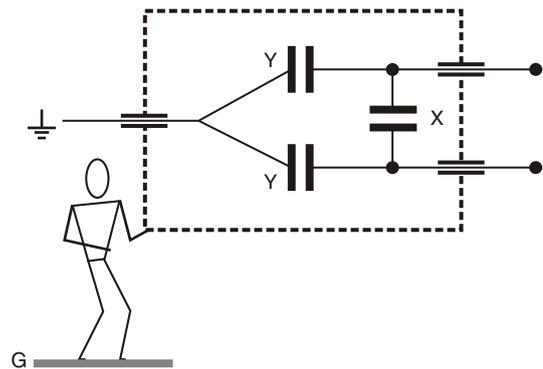


Fig. 1

If lightning should strike the AC power line, Y-capacitors would be the most likely to be affected. If damage occurs, they will not activate any safety fuse.

Hence the name "Y" capacitor which comes from “where the damage to the capacitor may involve the danger of electrical shock”.

By-pass capacitor connection methods

A noise suppression capacitor is a by-pass capacitor where the radio-frequency interference currents are by-passed. There are three forms of connections: single, delta and T-connection.



Fig. 2

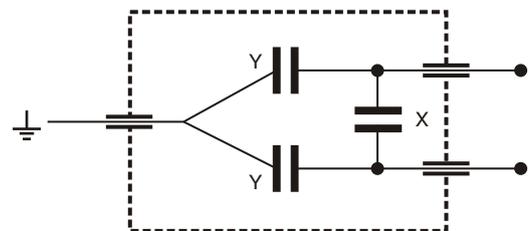


Fig. 3

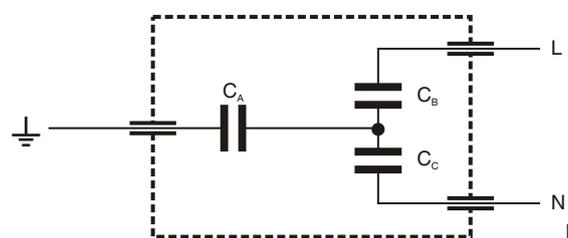


Fig. 4

A single capacitor consists of a capacitor in a metal case with one termination connected to the case as in fig. 2; the delta form consists of an X-capacitor and two Y-capacitors arranged in a delta network as in fig. 3; the T connected form consists of three capacitors C_A , C_B and C_C connected in T as shown in fig. 4.

The delta and T-connected forms are electrically equivalent (star-delta transformation). In the T-connected form the X-capacitor is the result of the series connection of $C_B - C_C$ and the Y-capacitors are the results of the series connections of $C_A - C_B$ and $C_A - C_C$.

When T-connected capacitors are submitted to tests, and it is stated that voltage shall be applied across the X-capacitors, such voltages shall be applied between the line and neutral terminations. Similarly, when it is stated that voltages shall be applied across the Y-capacitors, such voltages shall be applied between the line and the earth termination.

Classification of X-capacitors

X-capacitors are further classified into three types based on the application or the spike voltages withstand capability.

Subclass	Peak Impulse Voltage (PIV)	PIV (U_p) applied before endurance test
X1 High pulse application	> 2.5kV ≤ 4.0kV	$C_R \leq 1.0\mu F, U_p=4.0kV$ $C_R > 1.0\mu F,$ $U_p = \frac{4}{\sqrt{\frac{C_R}{10^{-6} F}}}$
X2 General purpose application	≤ 2.5kV	$C_R \leq 1.0\mu F, U_p=2.5kV$ $C_R > 1.0\mu F,$ $U_p = \frac{2.5}{\sqrt{\frac{C_R}{10^{-6} F}}}$
X3 General purpose application	≤ 1.2kV	None

Classification of Y-capacitors

Y-capacitors are further classified into four types based on the application or the spike voltages withstand capability.

Subclass	Range of Rated Voltage	PIV (U_p) applied before endurance test
Y1	≤ 500V	8.0kV
Y2	≥ 150V ≤ 300V	5.0kV
Y3	≥ 150V ≤ 250V	None
Y4	< 150	2.5kV

INTERFERENCE SUPPRESSION CAPACITORS (Safety Capacitors)

Deki offers a range of (RFI/EMI) noise suppression capacitors. Deki X2 capacitors are ENEC approved.

Sub-class	Capacitance range	Rated voltage range	Approvals
X1	0.01μF to 2.2μF	250V AC ~ 440V AC	-
X2	0.01μF to 2.2μF	275/305V AC	ENEC
Y1	-	-	-
Y2	0.001μF to 0.1μF	250/275V AC	-

Safety Approval for Class X2 Capacitor	Rated Voltage	Capacitance Range/Value	Certificate Numbers
EN 60384-14:2005 (ENEC) (= IEC 60384-14:2005 ed-3)	275/305 V AC	0.01μf to 2.2 μf	2011031 A1
CB Test Certificate			STIEP-1956

The ENEC-approval together with the CB- Certificate replaces all national marks of the following countries (they have already signed the ENEC-Agreement): Austria; Belgium; Czech. Republic; Denmark; Finland; France; Germany; Greece; Hungary; Ireland; Italy; Luxembourg; Netherlands; Norway; Portugal; Slovenian; Spain; Sweden; Switzerland and United Kingdom

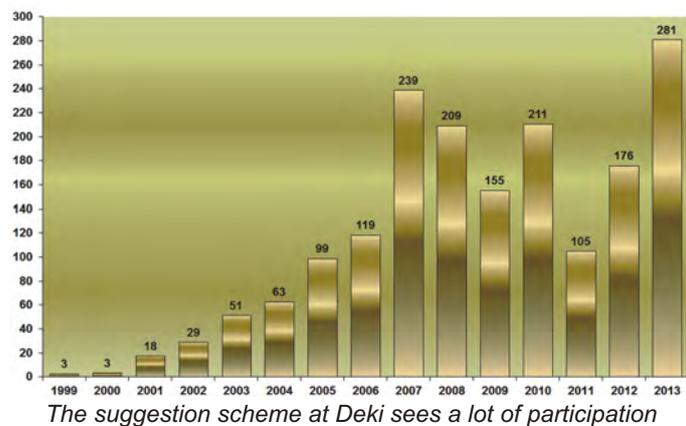



Employee Suggestion Scheme

The employee suggestion scheme at Deki has been growing continuously. 2012 witnessed an increase of nearly 68% over 2011 and in the month of January 2013 alone it has increased further by 60% to 281 approved and implemented suggestions per month. The suggestion committee is forever looking at novel ways to motivate the employees to give more suggestions. The scheme itself is very simple. An employee fills up a suggestion form mentioning:

- the present process
- the proposed process
- 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.



Leadership Programme at Deki

Mr Vinod Sharma, Managing Director, Deki Electronics Ltd has started a new, in-house initiative – Deki Leadership Programme.

The programme is aimed at Heads of Departments and he uses an interactive method to motivate the audience and get them thinking.

All heads have taken up leadership projects within the company as a result of the programme. These projects will not only enhance theoretical learning but also help in achieving their departmental goals.

It will not be out of place to mention here that our Managing Director is a senior trainer with CBI, a Dutch government organisation that trains members from developing countries to export to Europe.

Deki is a TS 16949 Company

Deki was awarded the TS 16949:2009 certificate in December 2012. The certification applies to the design/development, production and, when relevant, installation and servicing of automotive-related products. Though we have been supplying to the auto industry in India and abroad for more than thirteen years now, this certificate vindicates the confidence of our customers in our products and processes.

You will be interested to note that Deki is the only company in India that is exporting CDI capacitors for use in two-wheelers. Our CDI capacitors are being used in

Daelim motorcycles of South Korea for ten years now. We are also exporting CDI capacitors to Vespa, Italy for the past three years. Both these customers are more than happy with the quality of our capacitors and have sent us letters of appreciation.



The New Box Capacitors Line at Deki

We are happy to share with you some images of the new machines that are part of our new box capacitors line.



Epoxy filling and curing machine



Box assembly machine



Box tamper printing machine