

Special
Feature

Solving Noise Problems –the TDK Way

Noise problems related to electronic devices are becoming a major issue in modern society. TDK offers a wide range of effective solutions to deal with various types of noise.



In the Communications Sector



In the Automotive Sector



In the Energy Sector



In the Medical Sector

Special Feature

Solving Noise Problems –the TDK Way

As the dimensions of electronic devices continue to shrink, their internal circuit boards are even more densely packed with a myriad of components. On the other hand, the radio frequencies used extend into the extremely high range, and the devices we use in our daily lives are increasingly exposed to various noise risks.

Regulations dealing with noise are being tightened in countries around the world, making it mandatory to implement sophisticated noise countermeasures. TDK's extensive experience with noise control technology enables us to offer a range of highly flexible and effective solutions in this field.

In the Communications Sector

Telecommunication methods and standards are becoming more complex on a worldwide scale, requiring advanced noise countermeasures.



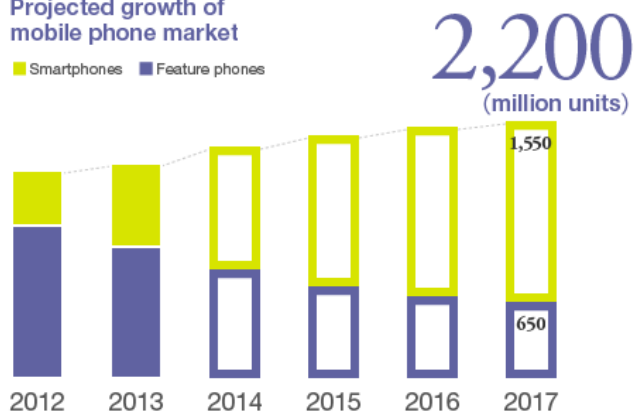
As the global mobile device market expands...

The market for smartphones with sophisticated functions is booming!

The mobile phone market is rapidly expanding all around the world. The spread of smartphones in particular has triggered an upsurge in mobile Internet use. In order to deal with the explosive growth in data volumes, telecommunication carriers are developing and implementing next-generation communication standards such as LTE-Long Term Evolution, employing higher frequencies.

Projected growth of mobile phone market

■ Smartphones ■ Feature phones



*Data prepared by TDK. Years are financial years ending March 31. Data for 2012 and 2013 are actual, 2014 and later are projections.

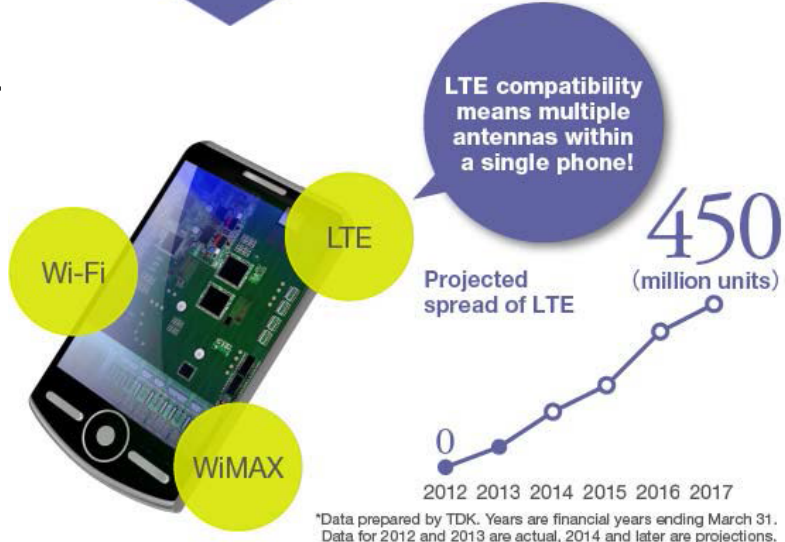
Consequently

Sophisticated LTE communications are spreading around the world.

The frequency bands used for mobile phone communication differ by country and by carrier. In recent years, as telecommunication carriers around the globe are trying to expand their range of frequency bands, there is a trend for so called multi-band support in mobile devices, allowing them to handle different communication standards and frequency bands. The spread

of LTE communications and the move towards higher frequency ranges also means that the risk of adverse effects due to noise is becoming even more of an issue.

And since smartphones are usually held in the hand and operated by touch panel, measures to protect the circuitry from static electricity discharge caused by the human body are increasingly important.



Guarding against RF noise and static electricity is more important than ever!

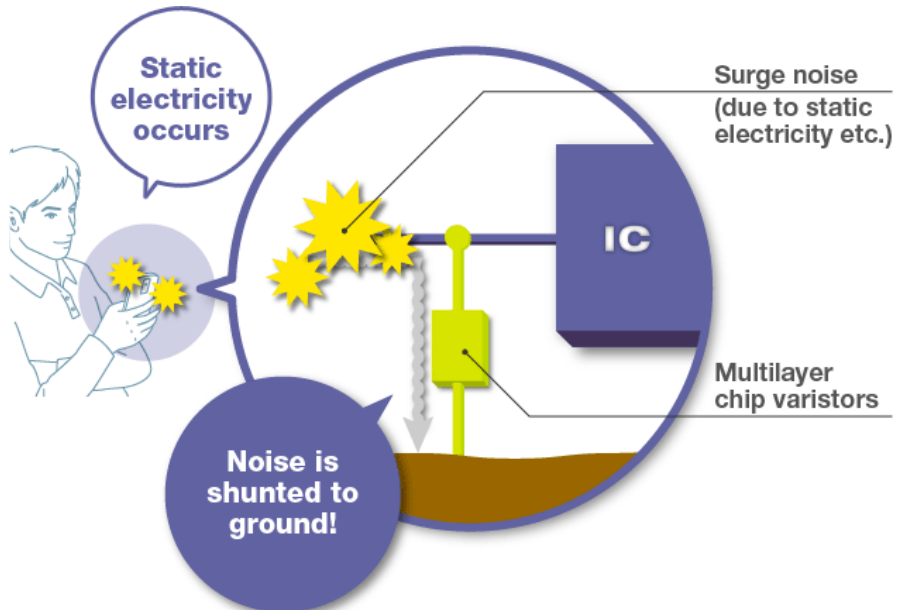
Therefore

For example, TDK multilayer chip varistors work like lightning rods!

When encountering surge noise such as caused by static electricity, multilayer chip varistors rapidly reduce their resistance value, thereby creating a bypass that routes the noise to ground and protects the other circuitry. Their function can be likened to that of a lightning rod. The devices are therefore extensively used in areas such as terminals, touch panels, as well as buttons and switches.

TDK also offers various other ways to protect mobile devices from noise, both through special technology and

dedicated products such as the proprietary flexible magnetic shield material "Flexield."





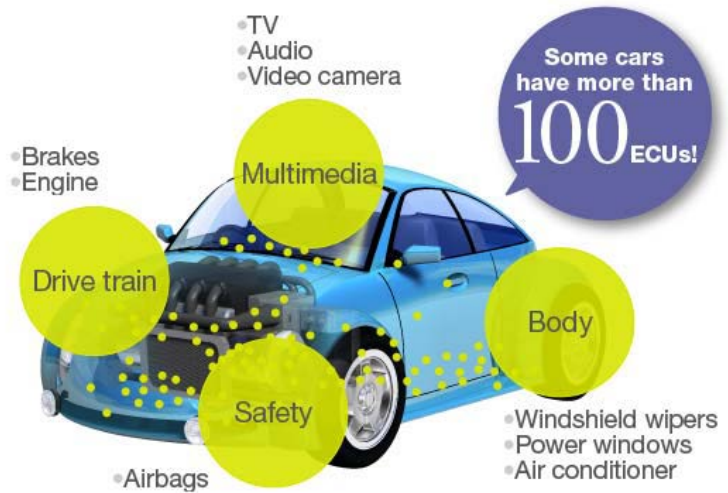
In the Automotive Sector

As cars become more and more dependent on electronics, noise countermeasure emerges as a key factor for safety.

The evolution of electrical equipment in the car is steadily progressing...

ECUs control many functions in an automobile.

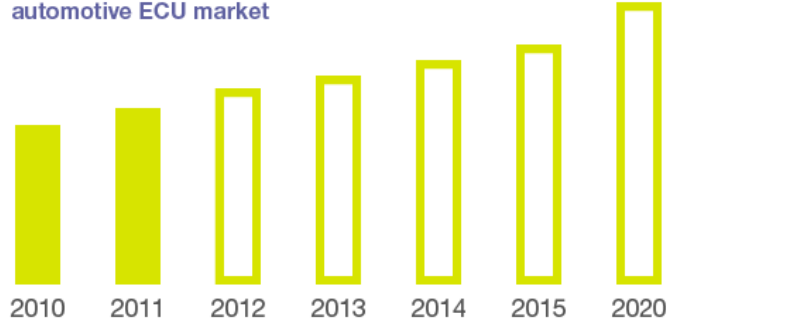
Modern cars increasingly rely on electronic systems, and sometimes incorporate as many as 100 or more electronic control units (ECU). These units are linked by networks referred to as in-vehicle LANs. Unless proper countermeasures are implemented, the cables for these networks can act as antennas that radiate noise which potentially poses a risk to driving safety.



Then

Worldwide automotive ECU market is growing rapidly!

Projected growth of automotive ECU market



*Data prepared by TDK, based on "Vehicle ECU Analyzing & Market Report 2012" by Fuji Chimera Research Institute, Inc. Surveyed in 2011, the data for 2011 are expected, and data for 2012 and later are projections.

For highly "electrified" cars, noise countermeasures are even more essential!

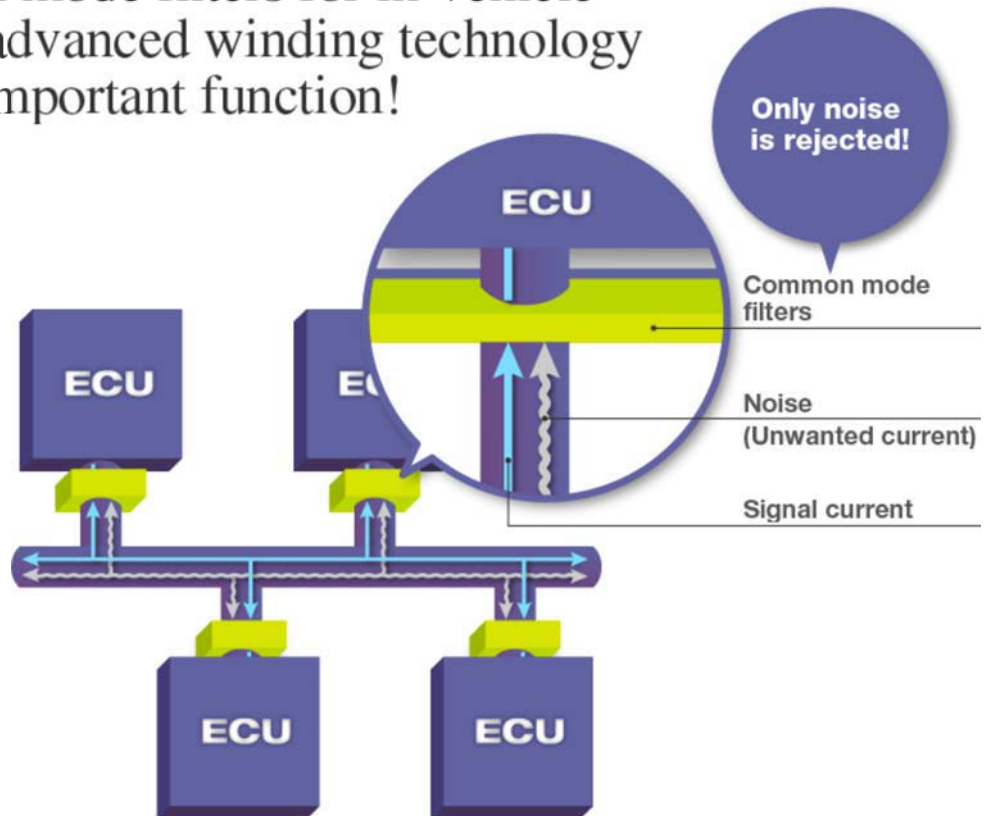
Therefore

For example,

TDK's common mode filters for in-vehicle LANs employ advanced winding technology and realize an important function!

Common mode filters are highly effective at separating electrical signals from noise, making it possible to suppress only the unwanted noise components. This is achieved by making use of the "reflection" (blocking) effect of coils. TDK's extensive know-how in magnetic materials and advanced winding technology is an indispensable asset in this area.

TDK also offers ring varistors for suppressing DC motor noise, clamp filters for automotive use, and many other effective tools for countering noise in the automotive environment.



In the Energy Sector

A crucial issue: how to protect electrical equipment in the home from RF noise generated during the power conversion process.

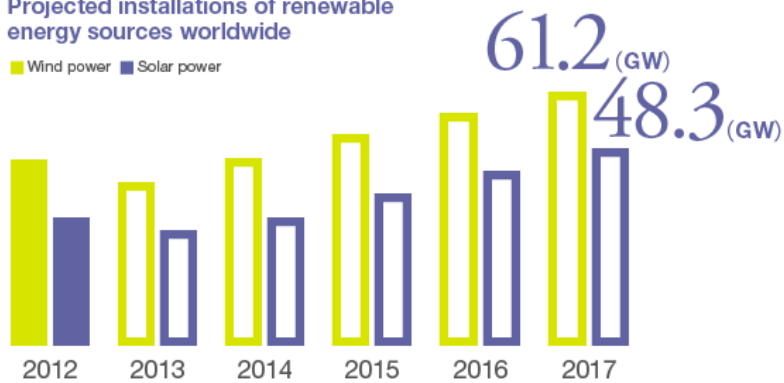


Use of renewable energy sources is spreading...

Utilization of renewable energy will grow!

Projected installations of renewable energy sources worldwide

■ Wind power ■ Solar power



*Data prepared by TDK, based on "Global Wind Report Annual Market Update2012, GWEC" and "Global Market Outlook For Photovoltaics 2013-2017, EPIA."

Consequently

Safe power management is a vital requirement for smart houses.

The so-called "smart house" is designed to both conserve and generate energy, and to make more efficient use of power. Power management in a smart house is handled by a power conditioner whose task is to convert the direct current (DC) power from renewable energy sources into alternating current (AC)

Conversion of DC into AC produces noise!



required by appliances in the house. This process involves a high-speed switching stage which produces radio frequency (RF) noise that can adversely affect the operation of electronic devices in or around the house. Power conditioners therefore must implement reliable noise suppression measures.

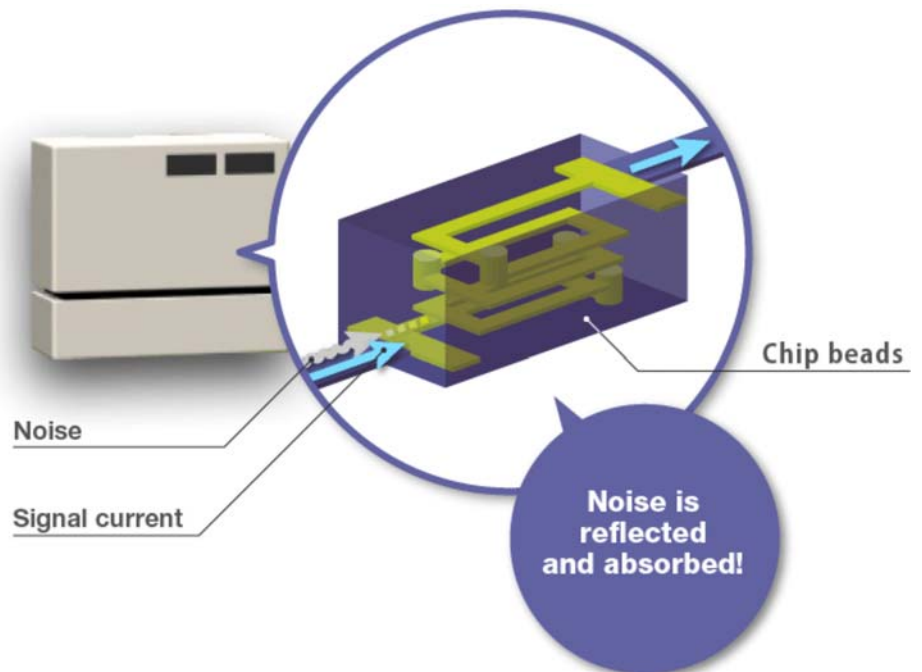
Noise countermeasure is even more essential for power management in a smart house!

Therefore

For example,
TDK multilayer chip beads help to fight RF noise!

The power conditioner sits at the boundary to the power grid and is both an entry and exit point for noise. TDK offers EMC filters for power supplies, film capacitors for DC links, and various other technology solutions and products to protect electronic devices from noise.

Multilayer chip beads are highly miniaturized electronic components that selectively absorb only RF noise riding on a signal current. TDK's extensive experience with ferrite technology accumulated over many years is put into practice here.





In the Medical Sector

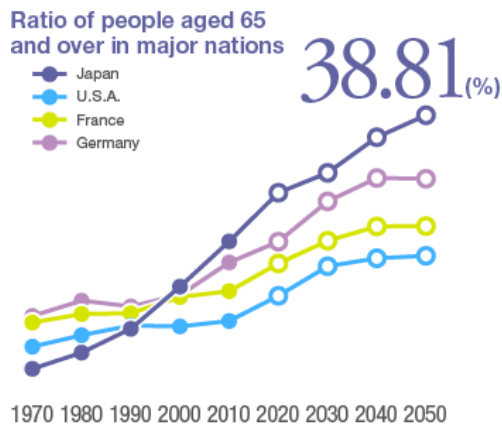
Safety and dependability are essential concerns for medical equipment. This also means flawless noise countermeasure.

Medical equipment increasingly goes digital...

As our society ages, the market for medical equipment is rapidly expanding.

Demographic changes are happening not only in developed nations but also in emerging economies. Medical care is required by more and more people around the world, and the market for medical equipment is expanding accordingly.

On the other hand, medical equipment such as imaging diagnosis devices increasingly rely on digital technology. Hospitals in many countries have come to make use of the latest technology in the electronics sector.



*Data prepared by TDK, based on "Ratio of people aged 65 and over in major nations" (2013 version) by National Institute of Population and Social Security Research.

Projected demand for health care and other medical services

49
(trillion yen)



*Data prepared by TDK, based on "Survey of Trends in Major Sectors" by Japan Electronics and Information Technology Industries Association.

Consequently

Compliance with stringent international standards is a necessity

Safety standards for medical equipment must conform to especially high levels, as this is an area where human life is at stake. Quality assurance standards for medical equipment such as ISO 13485 and the IEC 60601 series of standards for safety of medical electrical equipment therefore set stringent conditions that must be met on an international basis.



Noise control is also subject to strict regulations!

Therefore

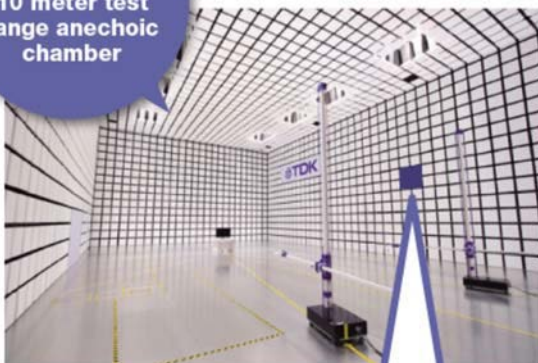
For example,

TDK's anechoic chambers provide world-leading performance and help customer design effective noise countermeasures!

More than
1,100
units delivered

A radio wave anechoic chamber is an indispensable piece of facilities for EMC testing. As electronic devices use ever higher frequencies and are built to deliver higher performance, the demands for anechoic chamber performance also have risen accordingly. TDK has developed an anechoic chamber with a level of performance that is hardly surpassed anywhere. As a leading manufacturer of anechoic chambers, TDK is able to supply the most advanced EMC testing environments to medical equipment companies.

Ultra-high-performance
10 meter test
range anechoic
chamber



The TDK advantage :
development starts
from materials level!



Composite type radio wave absorbers

Noise can be targeted already from product development stage!

