

***muRata***

*Innovator in Electronics*



*Advanced Electro-Ceramic Products*

# OUR PHILOSOPHY

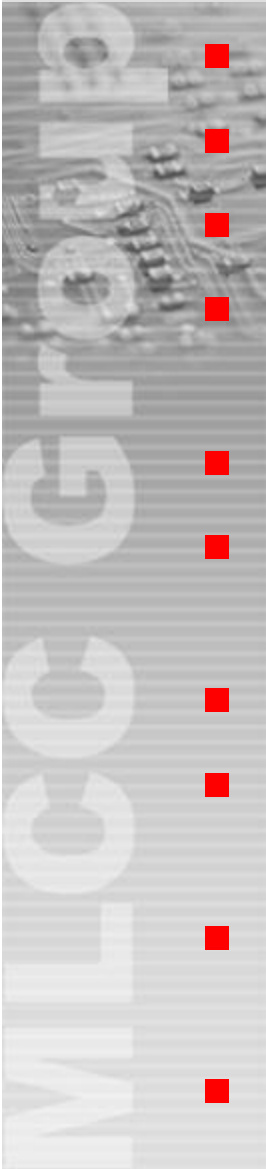


**“ New quality electronic equipment begins with new quality components, and new quality components begin with new quality materials”. This has been (and still is) muRata’s basic principle since its foundation. When new features are in demand, we always go back to our roots and the very basics to search for the most appropriate materials. This philosophy has enabled muRata to develop a number of unique products and maintain its position as “Innovator in Electronics”**

**The next couple of slides depict the various products made by muRata. The scope of this seminar would, however, be restricted to our advanced ceramic capacitor products.**

# Advanced Electro-Ceramic Products



- 
- **Multilayer Ceramic Capacitors:** *Described later on*
  - **EMI suppression products:** *Chip inductors & filters*
  - **Microwave Modules:** *VCO, PLL & RF modules*
  - **Microwave components:** *Dielectric antennas, coaxial connectors, isolators, dielectric resonators*
  - **Multilayer products:** *Multilayer antennas, RF LC filters*
  - **Piezoelectric products:** *Ceramic filters, piezoelectric speakers & buzzers*
  - **Sensors:** *Pyroelectric IR sensors*
  - **Surface Acoustic Wave Products:** *SAW filters (RF & IF), SAW resonators*
  - **Optical products:** *Optical transceiver, Transparent Ceramics "Lumicera"*
  - **Variable Products:** *Trimmer capacitors & potentiometers*

# Capacitors



- **Hi-Cap ( $\geq 1$  uF) Capacitors**
- **Standard Capacitors ( $< 1$  uF)**
- **Low Inductance Capacitors**
- **High Q (RF capacitors)**
- **High Q High power RF capacitors**
- **Medium to High Voltage caps**
- **High Voltage Safety Rated Capacitors**
- **2 & 4 element Cap Arrays**
- **High Reliability Caps: capacitors that are provided for markets where high reliability is required (space, tele-communications, medical, etc.)**
- **Capacitors for Optical applications**
- **Capacitors for Automotive applications**

# 2006 MARKET TRENDS FOR MLCC



- **Expected shipments** : >1,000 Billion pc (WW all vendors)
- **Size trends**: More than 75% of volume will be in 0603 and smaller case sizes
- **Growth**: Maximum growth is expected in 0402, 0201 sizes, cap arrays, low ESL and Hi-CV MLCC (> 10 uF for tantalum replacement)
- **Geographical trends**: Double digit growth in Asia; Healthy single digit growth in NA
- **Market Segment**: Communications, A/V, EDP and automotive market segments are expected to see double digit growth; specialized markets like medical, telecommunication infrastructure & security related industries will see healthy growth too.
- **Pricing Trend**: Pricing will stabilize, but still expect an average Y-O-Y % drop in single digits.
- **Pricing Sweet Spot**: Depends on many factors, but in general for capacitances  $\leq 0.1$  uF 0402 case size is the most cost effective; for high capacitance values, 0603 and 0805 are the sweet spot.

# SUPPLY CHAIN TRENDS

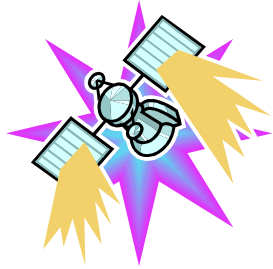
muRata

- **WW Capacity (ALL vendors) :** >1,000 Billion pc
- **Geographical Capacity:** 90% of capacity in Asia & Japan. This includes special application capacitors.
- **Lead Times:** Barring temporary spikes due to high seasonal demand for some Hi-Cap items, the L/T are 8 to 10 weeks. For some special application capacitors (cap arrays, Hi-Q, Low ESL, High voltage), shorter lead times are available.
- **Raw Material Issues:** Base metal technology for capacitors leads to lower cost of product, but also makes costs relatively *insensitive to market price fluctuations for precious metals* or sparsely available raw materials. Furthermore, all the high volume materials used (titanates, zirconates, nickel, copper, etc) in production are available in abundance. Thus, our products are *relatively immune to problems related to raw material availability*.
- **World Wide Support:** Most large vendors, including muRata have a global logistics operation and local warehouses wherever needed or requested by the customer.

# TECHNOLOGY TRENDS

muRata

## ● *Communication Market*



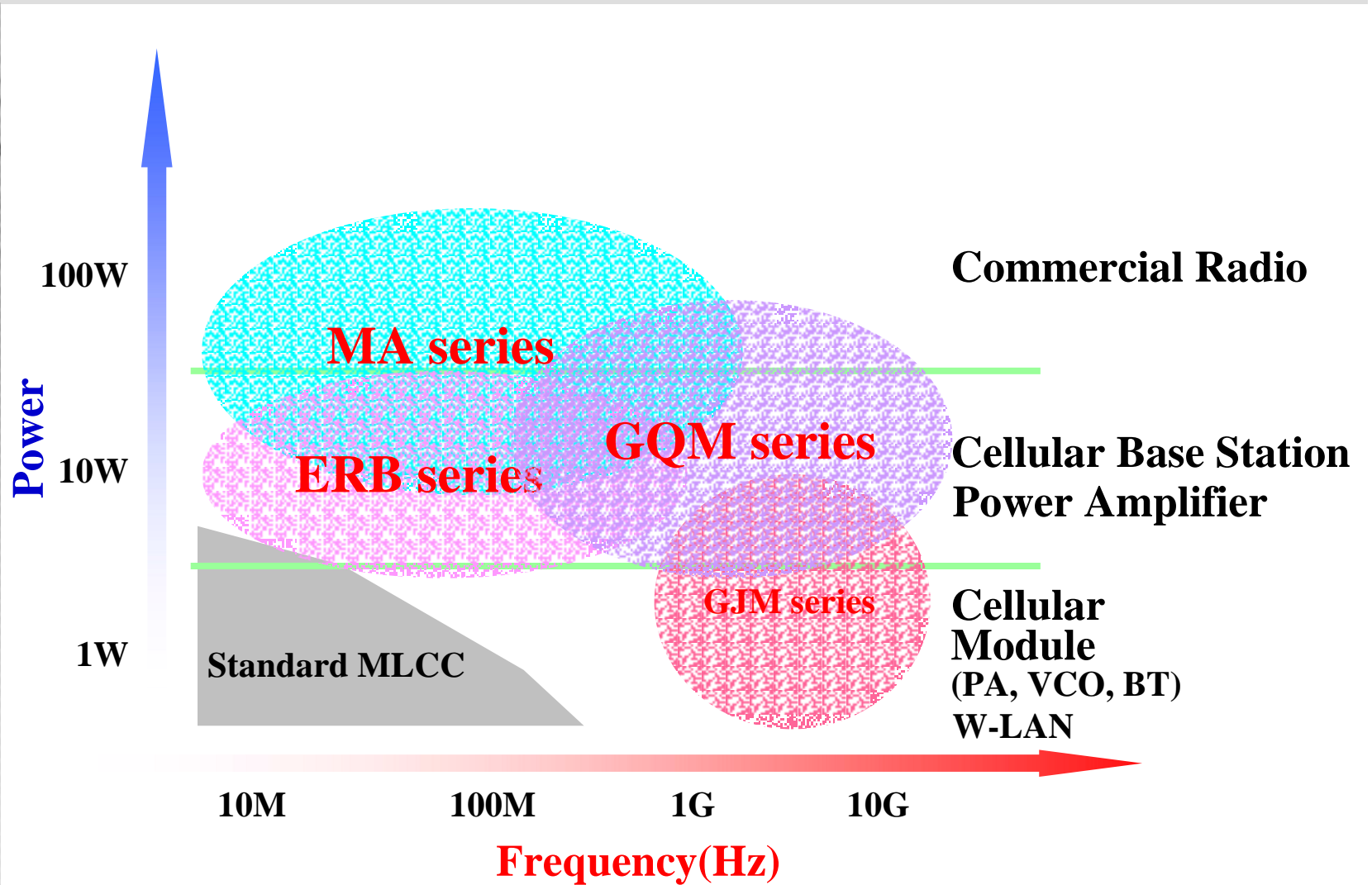
**Multi-Functionality** → **High density circuits** → **Down sizing**  
→ 0805/0603 (>1 uF); 0402, 0201, 01005 series

**Compactness (limited board space)** → **Cap Arrays, 0402, 0201, 01005**

**Bandwidth** → **GHz transmission rates** → **High Q parts**

**Infrastructure** → **High power high S/N ratio** → **Hi Power Hi Q parts**

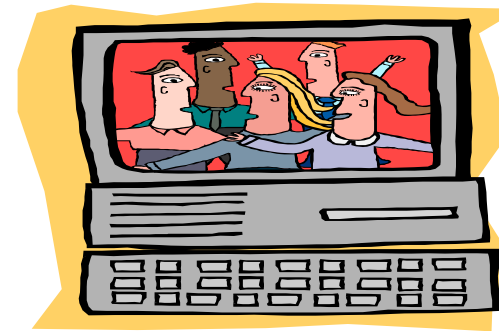
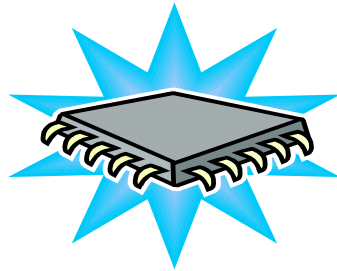
# Our Hi-Q MLCC Coverage



# TECHNOLOGY TRENDS

muRata

## ● PC & Gaming Market



**Faster** ||| → Higher processor speeds ||| → Low inductance ||| →  
Low Inductance Chips (LLL/LLA/LLM series)

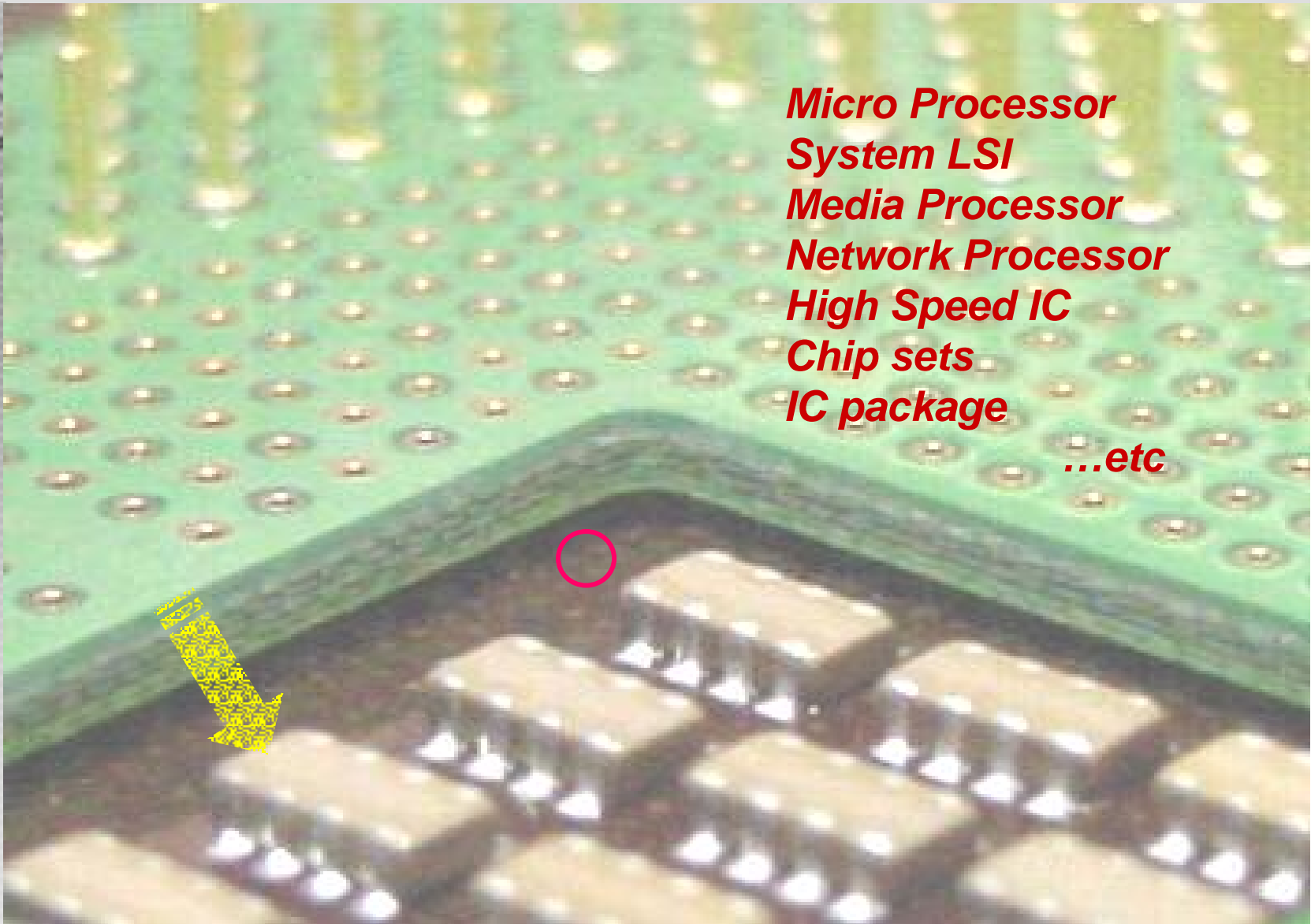
**Lighter** ||| → Smaller/Fewer components ||| → Downsizing ||| →  
Cap Arrays (GNM series), 0805/ 0603/0402 (>1 uF), 0603, 0402, 0201

**Multi-Functionality** ||| → Higher Density circuits ||| → Smaller  
components ||| → Higher Temperatures ||| → High reliability ||| →  
MLCC Hi Caps (X6S, X7T), 0603, 0402

# Low ESL (Inductance) Capacitors



MILCC GROUP



*Micro Processor  
System LSI  
Media Processor  
Network Processor  
High Speed IC  
Chip sets  
IC package  
...etc*

# TECHNOLOGY TRENDS

muRata

## ● Automotive Market



Increased Functionality (navigation, telematics, entertainment) →

Down sizing → 0402, 0201, 01005 series

Increased Safety & Sophisticated Engine Control → fast

processors, higher temperatures, high reliability →

(automotive grade standard capacitors), Low inductance chips (LLC), Cap arrays, X8R dielectrics

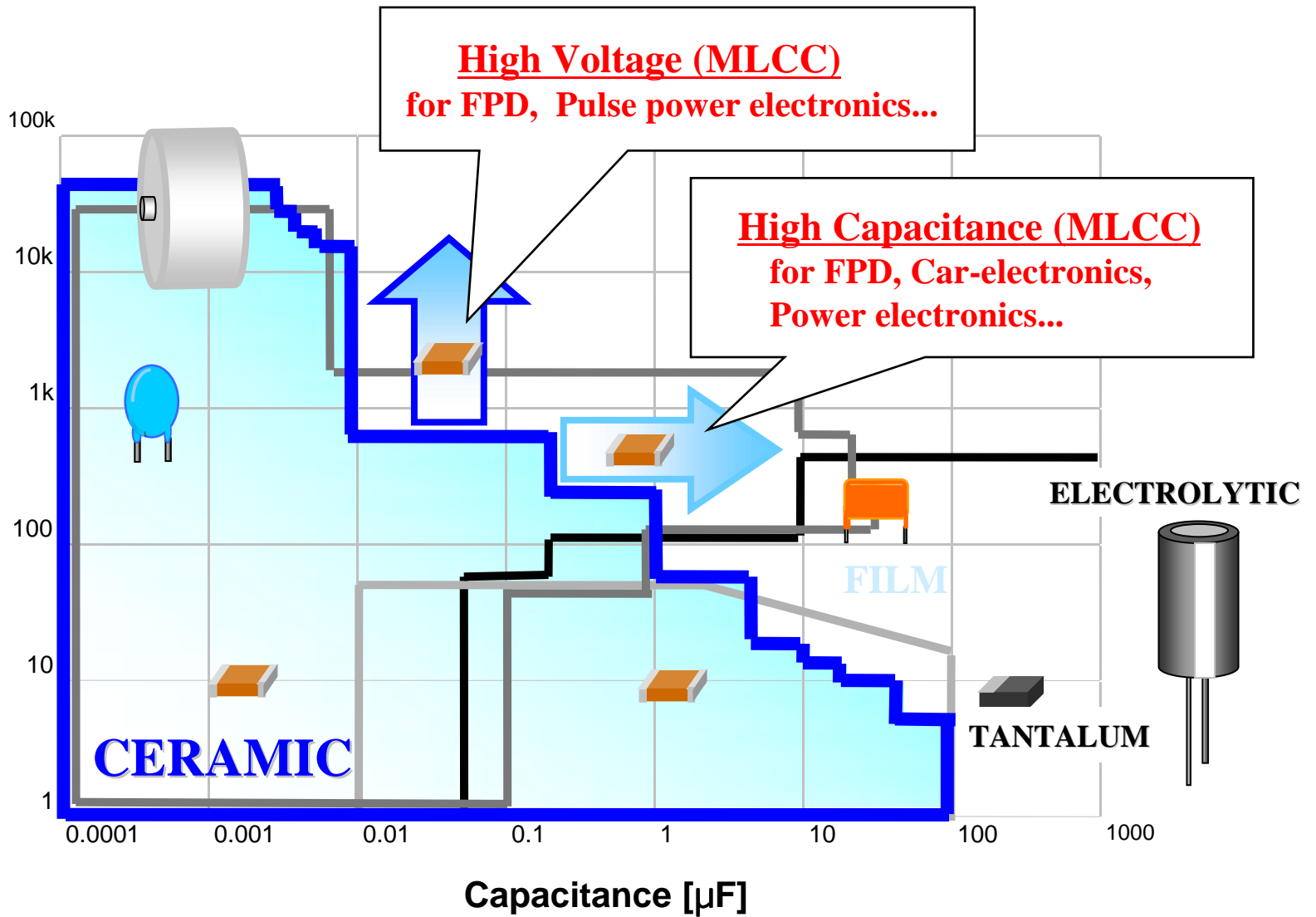
Hybrid Electric Vehicles & Drive-by-Wire → HiCV, Low ESL,

Low ESR, High Temperature, Small Size, High voltage → Medium -

to - High Voltage ( $\geq 250V$ )

HID Lamps → High Voltage pulse power → Med Voltage

# Medium to High Voltage Capacitors



# ROHS UPDATE



- ***Company Policy:*** To be RoHS compliant by Dec 2005
- ***Current Status:*** All Capacitors offered by muRata are fully RoHS compliant.
- ***Since when:*** muRata has been supplying RoHS compliant products (especially lead free) for over 10 years now.
- ***Product Changes:*** Except for elimination of lead from outer plating layer of some smaller case sizes, changes to the product itself was very minimal.
- ***Electrical Performance/ Specifications:*** No change
- ***Part Number Change:*** In most cases NO CHANGE. In some cases minor change. However, the part numbering system HAS NOT CHANGED (i.e. same Global Part Numbering System as before)
- ***Labeling:*** Mentions RoHS compliance. Otherwise no change in labels.
- ***Availability:*** No restrictions (globally)
- ***RoHS non-compliant parts availability:*** In principle NO. Exceptions may exist for very special cases where exempted by RoHS directive.

# CONCLUDING REMARKS



- ❑ **leading edge products using cutting edge technology key to future success. This includes products that are smaller, have higher performance & functionality and products for new applications.**
- ❑ **We encourage our customers to bring us challenging problems to help define new products to satisfy their applications**
- ❑ **very high level of customer satisfaction is key. This includes quick response to customer needs, highly competitive pricing and lead times, sharing technical expertise and providing win-win solutions.**

