

Attracting Tomorrow



# CeraCharge™

World's first rechargeable  
solid-state SMD battery

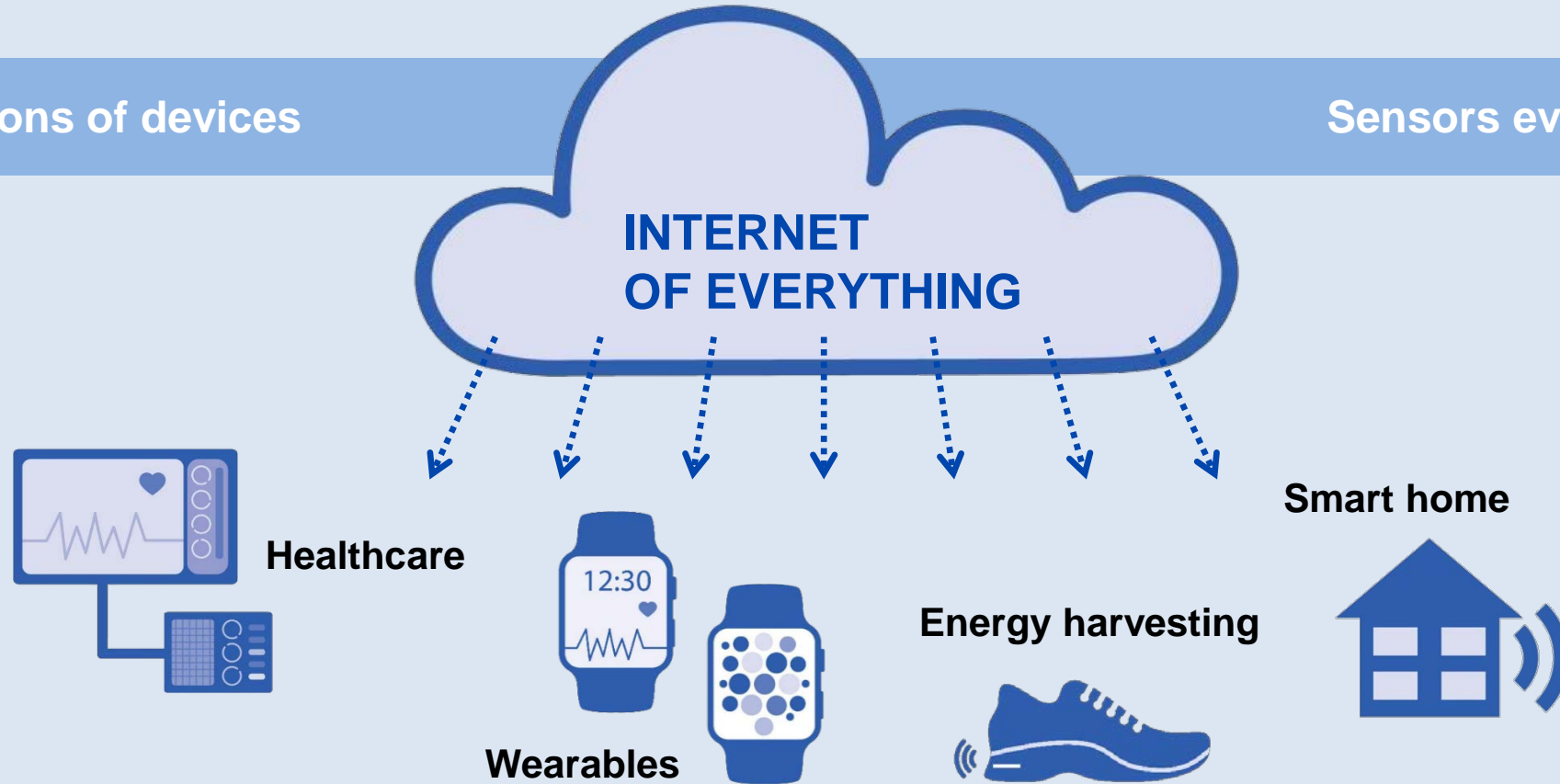
August 2019



# Demand for a new battery technology

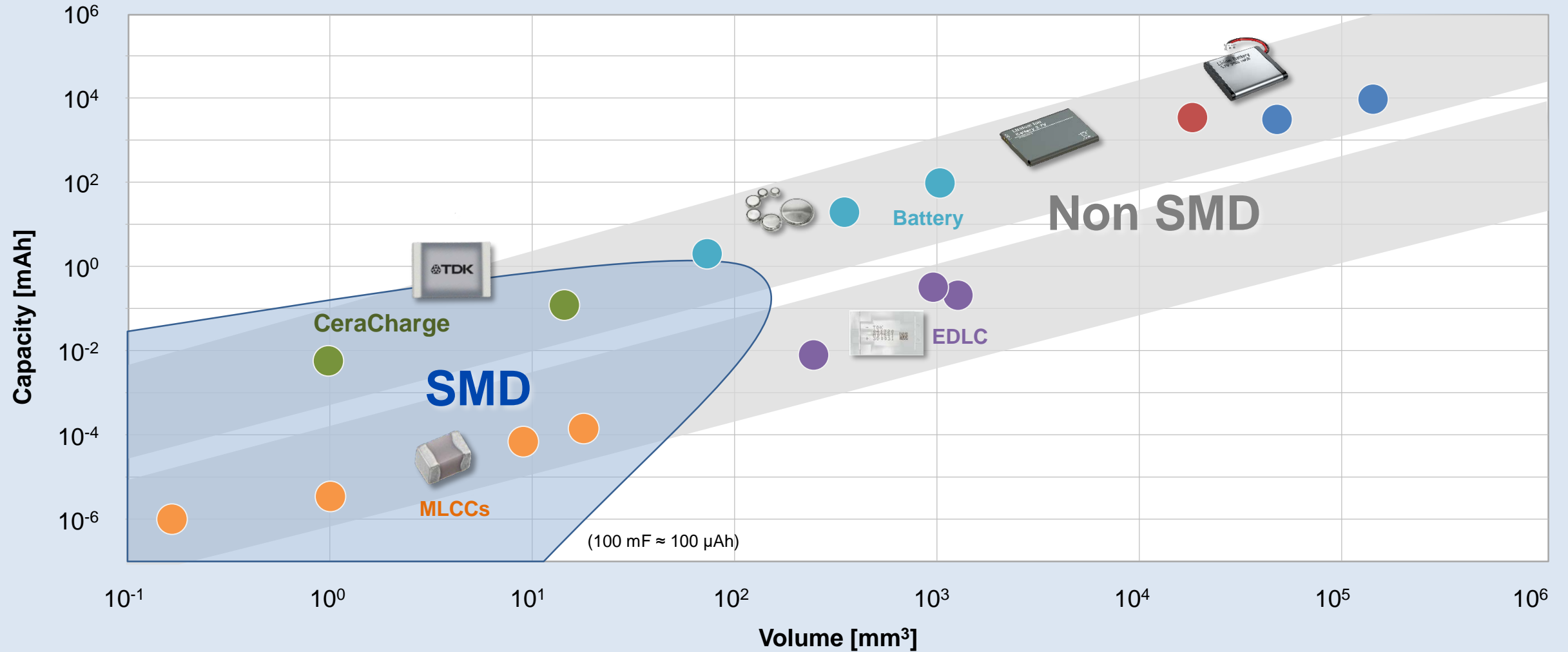
Billions of devices

Sensors everywhere

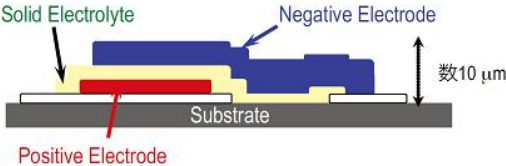
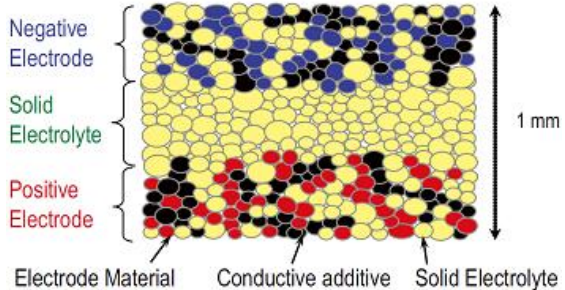
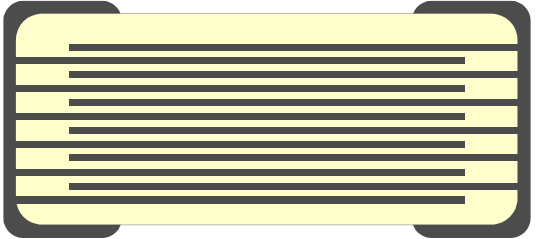


**New application fields drive the demand for compact, safe, rechargeable energy sources**

# Comparison of energy storage devices



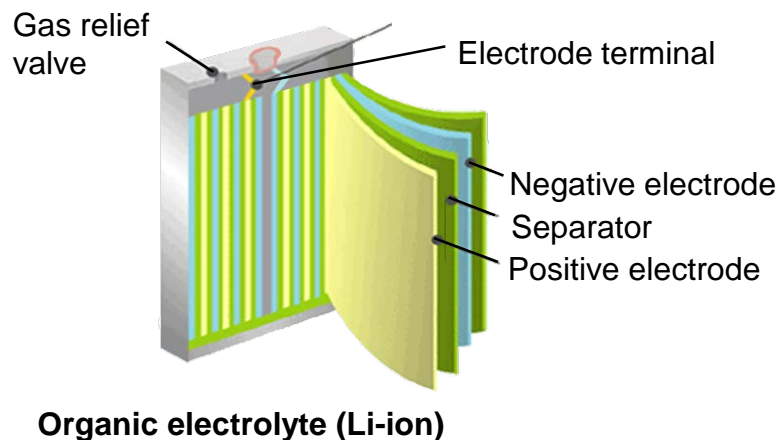
# Comparison of solid-state battery technologies

	Thin-film	Bulk (pouch cell)	Ceramic multilayer
<b>Structure</b>			
<b>Thickness</b>	0.2 mm to ~1 mm	>1 mm	0.2 mm to ~5 mm
<b>Smallest footprint</b>	4 mm <sup>2</sup>	>100 mm <sup>2</sup>	0.5 mm <sup>2</sup>
<b>Process cost</b>	High	Medium	Low
<b>Limitations</b>	Transport restrictions for Li metal (flights)	Must be waterproofed to prevent generation of H <sub>2</sub> S	None

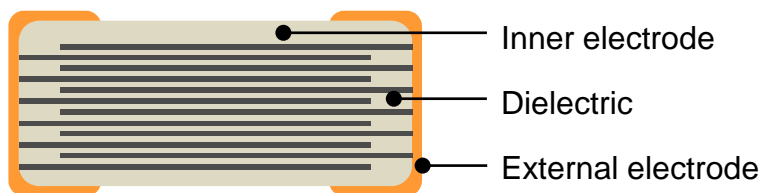
**Ceramic multilayer technology offers the cost-optimized, high volume manufacture of safe batteries for IoT devices**

# Introducing CeraCharge™ – the world's first solid-state, SMT-compatible Li-ion battery

## Li-ion battery



## Multilayer ceramic



High-energy Li-ion battery technology

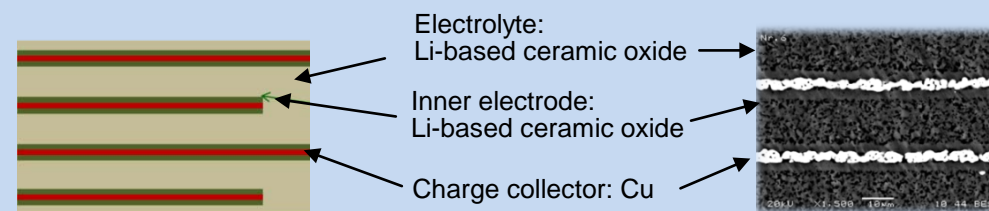
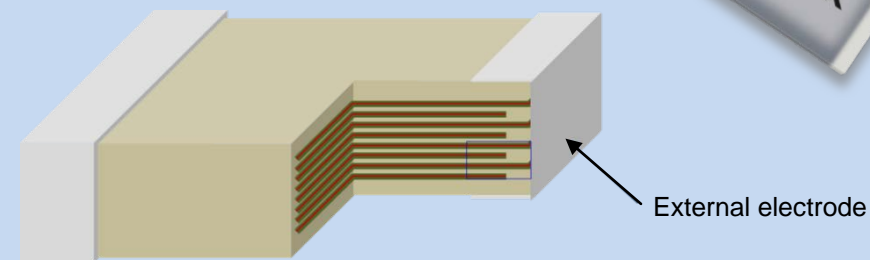
High-volume production process

## CeraCharge

## All solid state

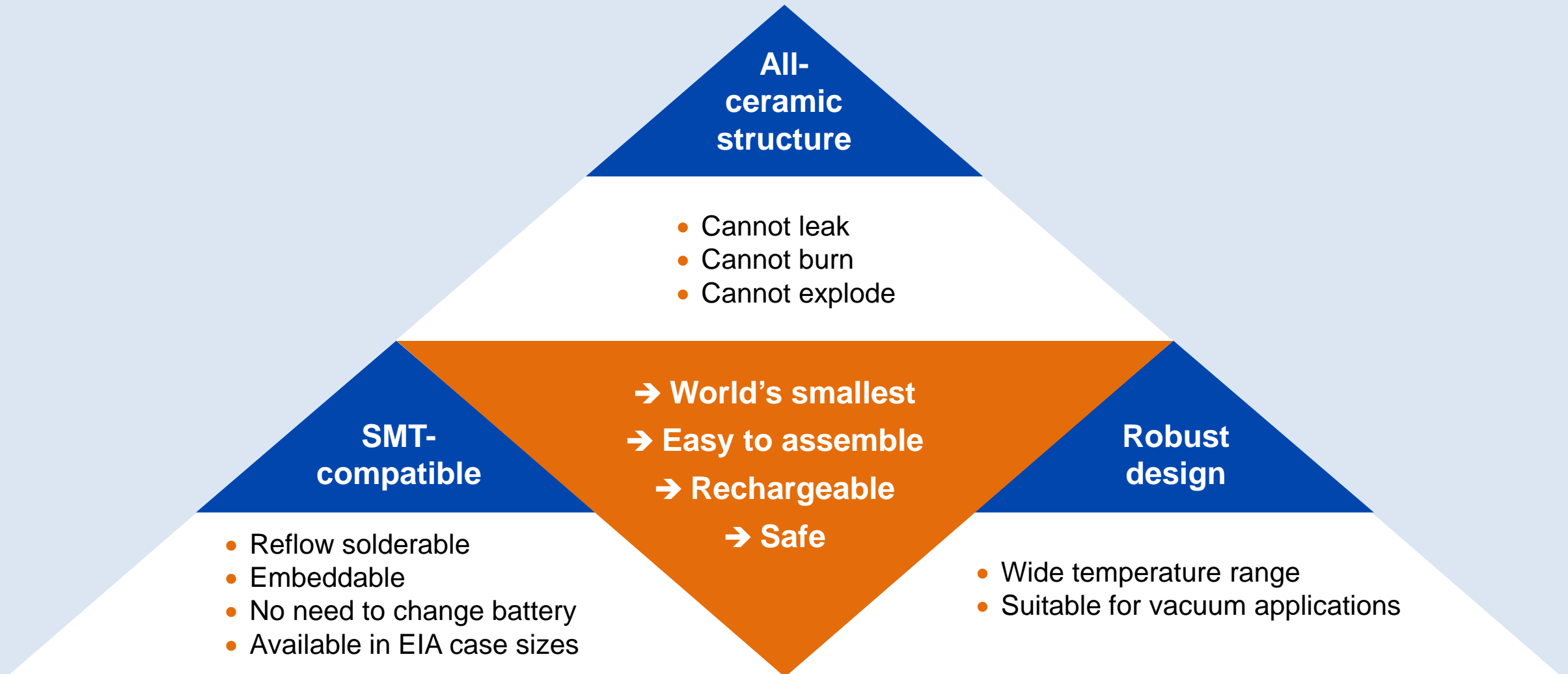
### All-ceramic multilayer battery

- High safety
- SMT-compatible
- Suitable for reflow soldering



**CeraCharge combines the advantages of Li-ion batteries with the safety and manufacturing benefits of ceramic multilayer components**

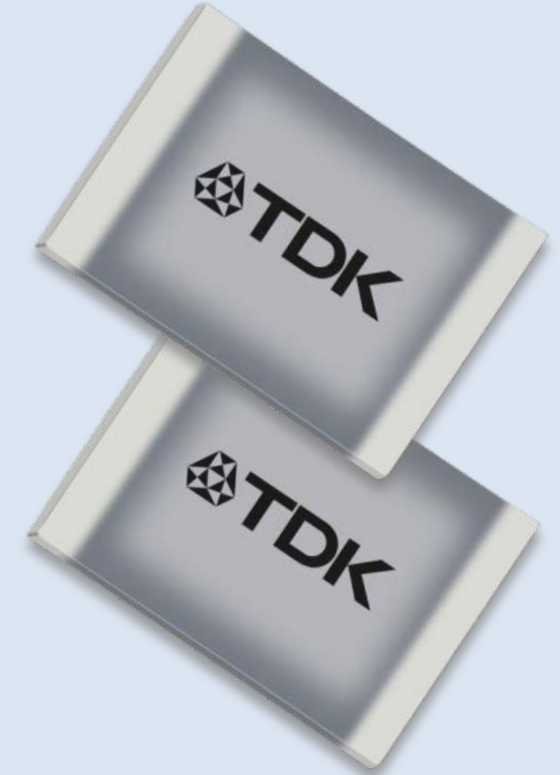
# Unique features of CeraCharge



# CeraCharge – World's first rechargeable solid-state SMD battery

## CeraCharge 1812

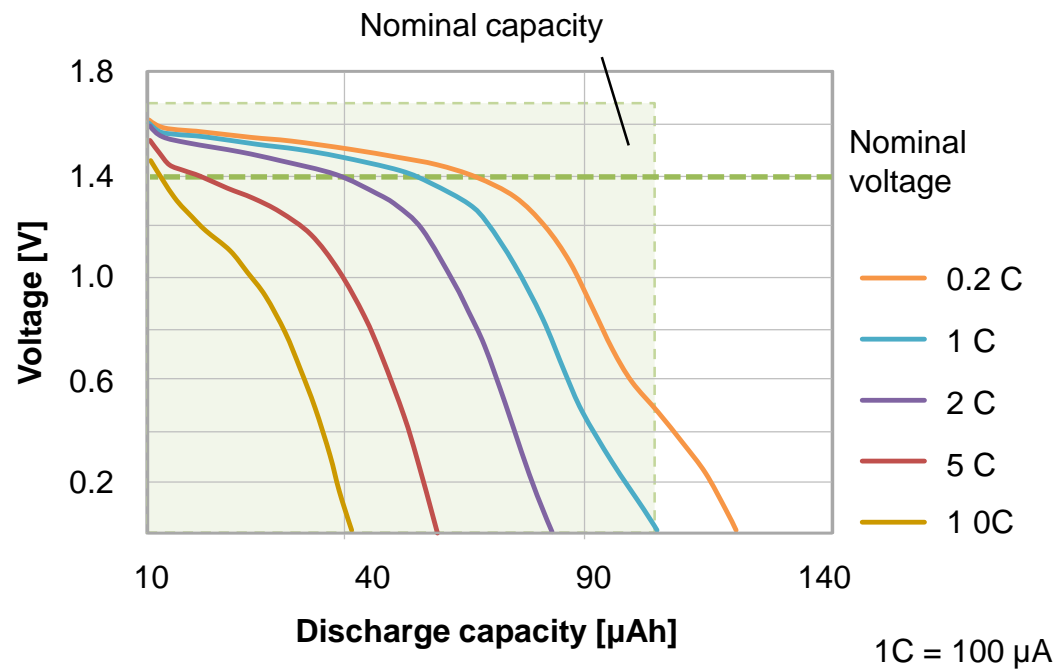
Nominal voltage	[V]	1.5
Operating voltage	[V <sub>op</sub> ]	0 to 1.6
Nominal capacity	[μAh]	100
Nominal discharge current	[μA]	20
Operating temperature	[°C]	-20 to +80
Case size	[EIA]	1812
Dimensions	[mm]	4.4 x 3.0 x 1.1



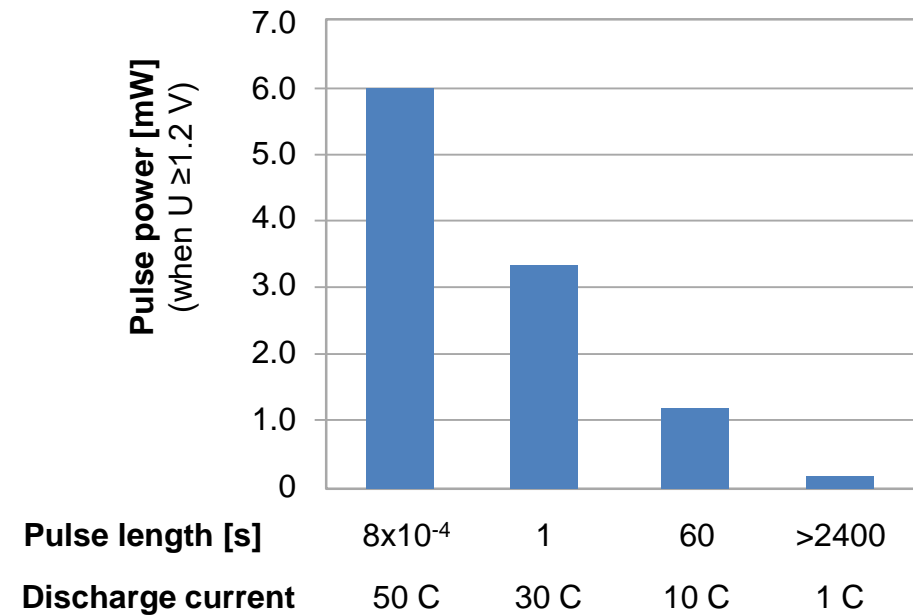
**CeraCharge offers 1000 times the capacity of a capacitor in the same case size**

# CeraCharge features fast and pulsed discharging

## Typical discharge curves



## Typical pulse power



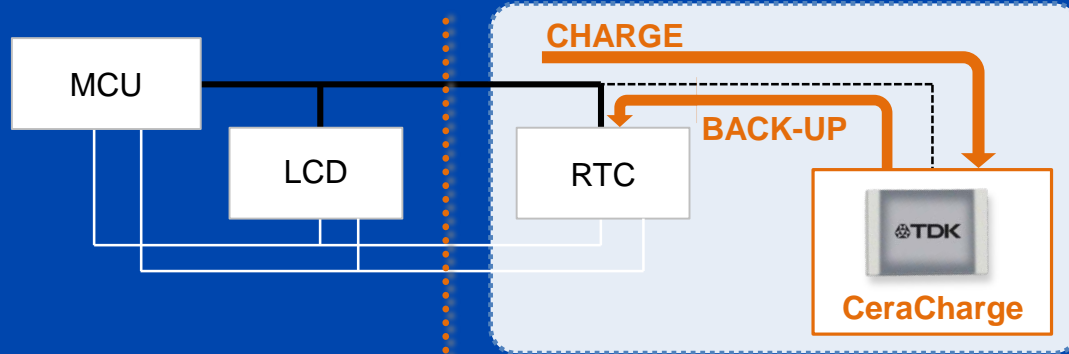
Can be connected in both series and parallel for maximum design flexibility



# Main applications for CeraCharge

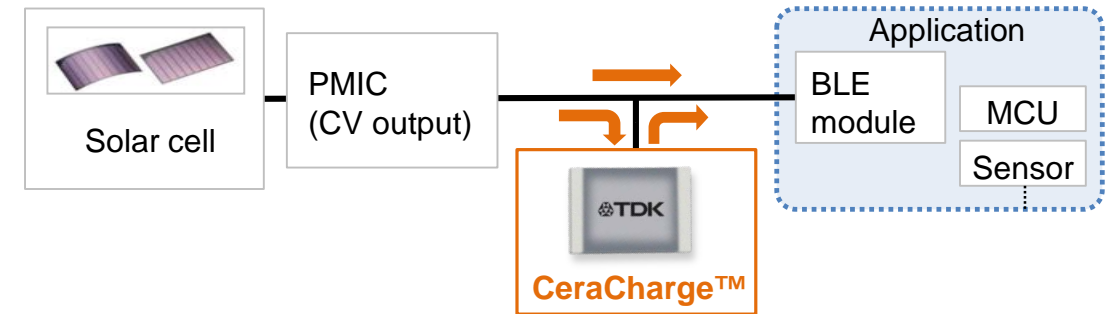
## Real-time clock

Backup battery



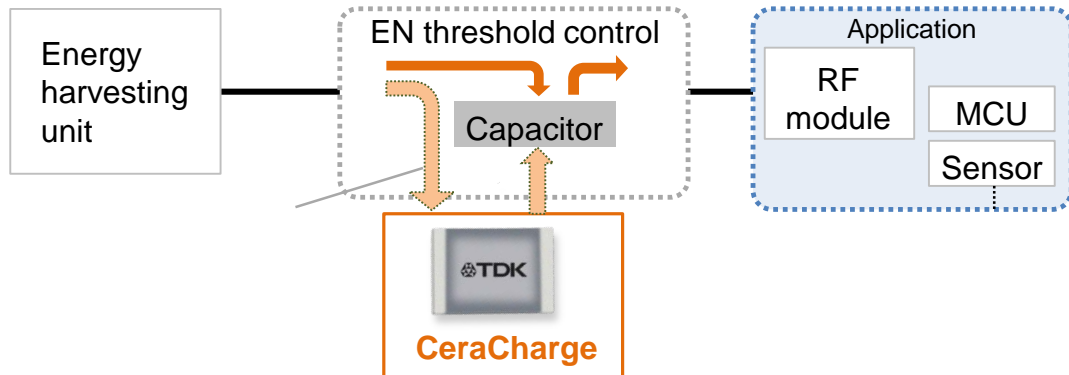
## Internet of Things: Beacon

Energy storage (battery)



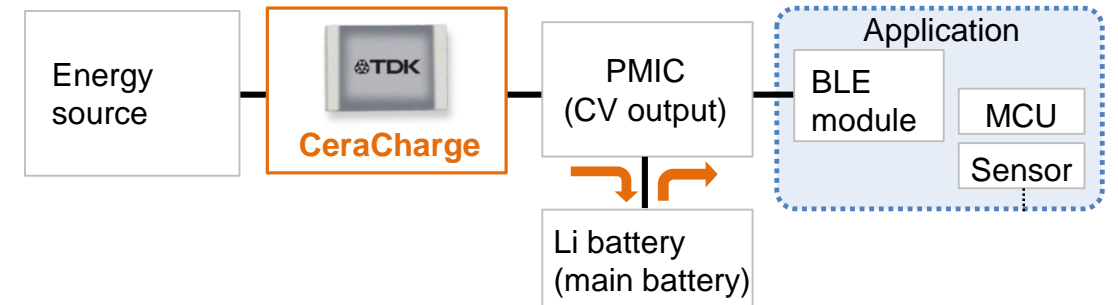
## Energy harvesting

Energy storage



## Wearables

Sub-battery for voltage and current smoothing





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