

# ON-BOARD CHARGER

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

# ON-BOARD CHARGER

## Characteristics

E-vehicles typically are offering two ways of recharging their batteries.

1. High-voltage DC charging systems promise very short charging times. But these also require a very powerful power connection, which many households and businesses do not have.
2. More widespread are 3-phase AC connections, which are often also available to private households.

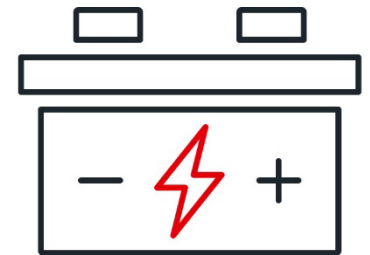
Alternating current (AC) firstly has to be converted to direct current (DC) on board of an electric vehicle in order to charge the vehicle's battery. Power conversion brings up challenges in power handling and EMC.

Würth Elektronik is offering a growing range of automotive-certified products matching the following industry standards:

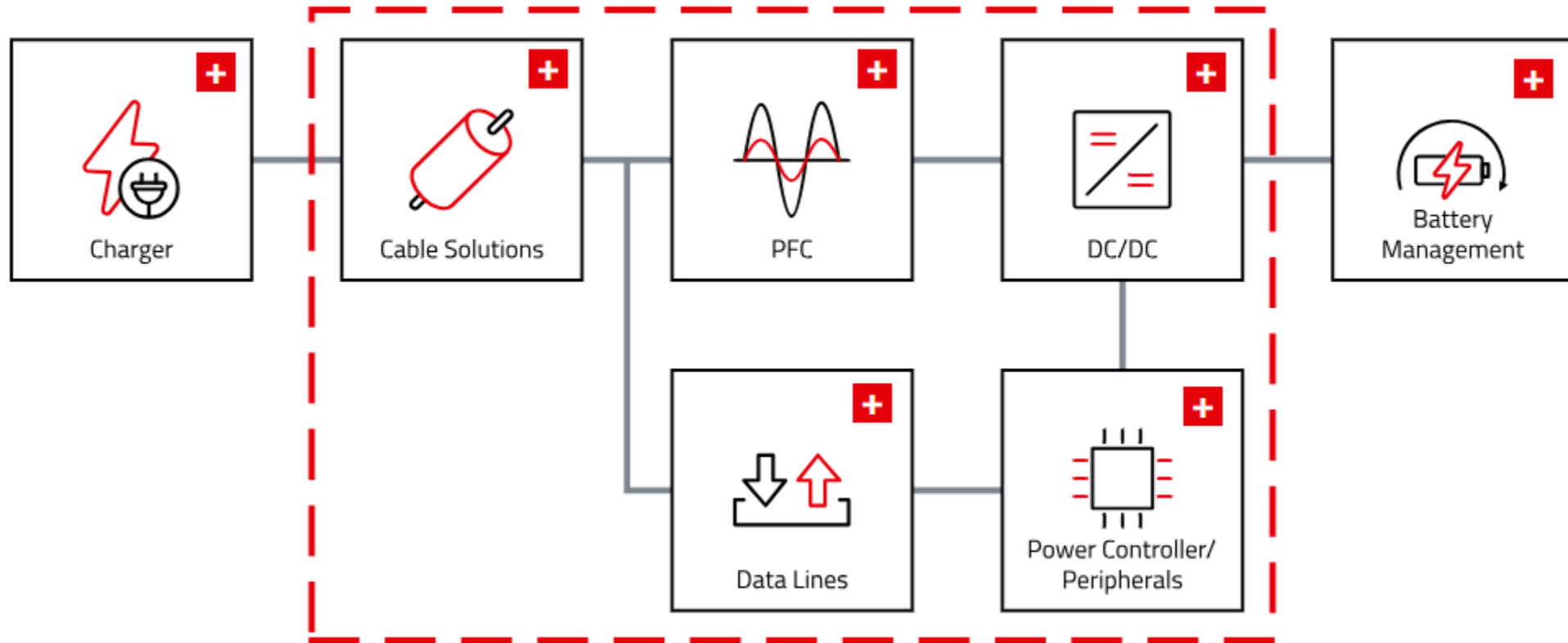
- AEC-Q 200 qualified products
- IATF 16949 certified production facilities
- PPAP Level 1-3
- IMDS, etc.

## Learn more

- [Würth Elektronik Webinar: EMC components for automotive application](#)
- [Würth Elektronik Webinar: Automotive requirements to Passive Components – AEC-Q200](#)



# ON-BOARD CHARGER

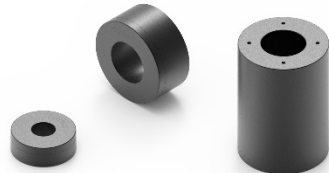


# CABLE SOLUTIONS



Cable Solutions

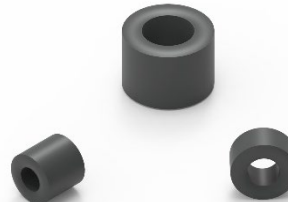
Cable ferrites are used especially for EMI suppression of external elements.



## WE-AENA Axial EMI Nanocrystalline Suppression Ferrite

### Characteristics

- Core made of Nanocrystalline, a material which works in a wider frequency range than NiZn
- Many different types for the best possible interference suppression in Automotive applications
- Operating temperature:  $-40^{\circ}\text{C}$  up to  $125^{\circ}\text{C}$
- AEC-Q200
- Automotive approved



## WE-TEFA Toroidal EMI MgZn Suppression Ferrite

### Characteristics

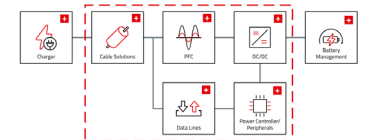
- Ferrite core made of MgZn, a material which works in a wider frequency range than NiZn
- Many different types for the best possible interference suppression in Automotive applications
- Operating temperature:  $-55^{\circ}\text{C}$  up to  $140^{\circ}\text{C}$
- Automotive approved



## WE-AEFA Axial EMI NiZn Suppression Ferrite

### Characteristics

- Ferrite core made of NiZn, a material which works in a wide frequency range
- Many different types for the best possible interference suppression
- Operating temperature:  $-55^{\circ}\text{C}$  up to  $+150^{\circ}\text{C}$
- Automotive approved



# CABLE SOLUTIONS



Cable Solutions

Cable ferrites are used especially for EMI suppression of external elements.



## WE-OEFA Oval EMI NiZn Supression Ferrite

### Characteristics

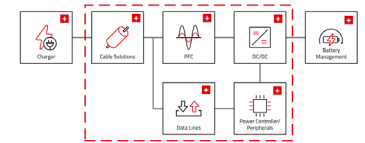
- Frequency range: From 1 MHz up to 100 MHz
- Operating temperature:  $-55\text{ }^{\circ}\text{C}$  up to  $+150\text{ }^{\circ}\text{C}$
- Material: NiZn
- AEC-Q200 qualified
- Automotive approved



## WE-CAR-TEC Snap Ferrite

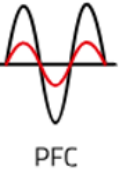
### Characteristics

- Pre-fixing cable system facilitates the assembly process
- Cable clamping protection
- Internal security locking system with key technology (WE-STAR-KEY PN: 74271) prevents unauthorized removing from the cable
- One key in each sample shipment
- Classification of the plastic housing: UL94 V0
- Operating temperature: from  $-50\text{ }^{\circ}\text{C}$  up to  $+105\text{ }^{\circ}\text{C}$
- Core material: NiZn
- AEC-Q200
- Automotive approved



# PFC

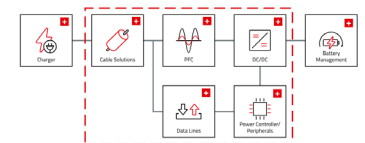
High current inductors for power factor correction uses.



## WE-HCFAT Low Loss THT High Current Inductor

### Characteristics

- THT version to assure the mechanical stability
- Inductance ranging from 1.5  $\mu\text{H}$  up to 47  $\mu\text{H}$
- Current capability up to 75 A (Saturation up to 175 A)
- Extremely low DCR
- Extra low core losses version available
- Operating temperature  $-40\text{ }^{\circ}\text{C}$  to  $+150\text{ }^{\circ}\text{C}$





DC/DC

# DC/DC

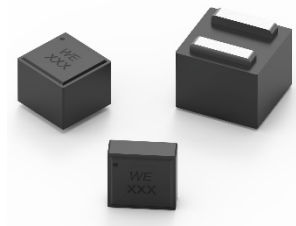
Select between several automotive-qualified high current power Inductors for different power supply topologies.



## WE-HCIA SMD Flat Wire High Current Inductor

### Characteristics

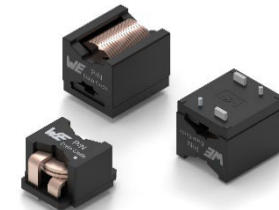
- Magnetically shielded
- Flat wire coil for low losses
- Low stray field
- Operating temperature: -55 °C up to +150 °C
- Current capability up to 36 A
- AEC-Q200
- Automotive approved



## WE-XHMA SMD Power Inductor

### Characteristics

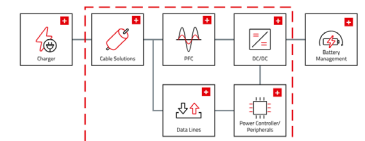
- Flat wire coil for low copper losses
- Composite core material allows high saturation currents
- Compact design
- Magnetically shielded
- High current capability and handles high transient current spikes
- Low leakage flux noise
- Operating temperature: -40 °C up to +125 °C
- AEC-Q200
- Automotive approved



## WE-HCFAT Low Loss THT High Current Inductor

### Characteristics

- THT version to assure the mechanical stability
- Inductance ranging from 1.5  $\mu$ H up to 47  $\mu$ H
- Current capability up to 75 A (Saturation up to 175 A)
- Extremely low DCR
- Extra low core losses version available
- Operating temperature -40 °C to +150 °C



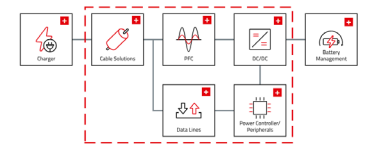
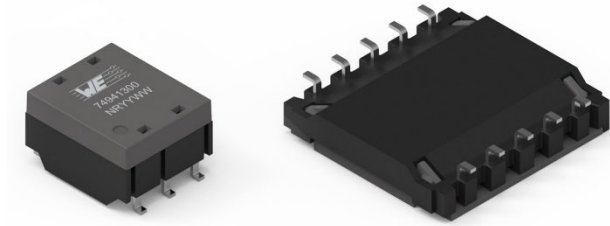
# BATTERY MANAGEMENT (NON AUTOMOTIVE)

Achieve optimum battery utilisation with a successful Battery Management System (BMS).

## WE-BMS Transformer for Battery Management Systems

### Characteristics

- Test voltage of 6400 VDC / 1 min.
- Construction: reinforced insulation
- Up to 1500 VDC working voltage
- Integrated filter chokes for common mode interference suppression
- Supports serial daisy chain isoSPI and SPI
- Available in different footprints
- Versionen mit niedrigem Profil
- Operating temperature: -40°C up to +125°C





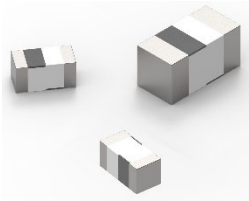
# DATA LINES

Choose CMCs and multilayer ferrites for EMI filtering and noise reduction.

## WE-MCI Multilayer Ceramic SMT Inductor

### Characteristics

- Multilayer inductor with ceramic body
- Operating temperature range: -55 °C up to +125 °C
- Double side polarity marking
- Inductive tolerances of 5%; 0,3 nH
- AEC-Q200
- Automotive approved



## WE-CBA SMT EMI Suppression Ferrite Bead

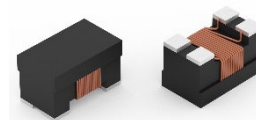
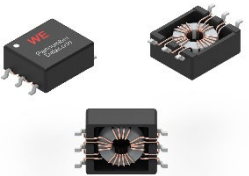
### Characteristics

- EMI suppression and noise reduction
- High rated current up to 7.5 A
- Available in 7 different sizes
- Reliable Ni-Sn electrodes
- Operating temperature: -55 °C up to +125 °C
- AEC - Q 200

## WE-PSPA Push Pull & Gate Drive Transformer

### Characteristics

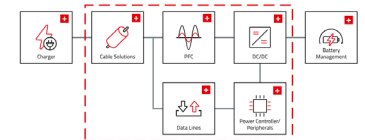
- Surface mount
- AEC-Q200
- Variety of turn ratios
- Output voltages from 5 V up to 23 V
- Operating temperature: -40 °C up to +125 °C
- Automotive approved



## WE-CNSA SMD Common Mode Line Filter

### Characteristics

- Current compensated data line filter
- High common mode noise suppression at high frequencies
- Low RDC design
- AEC-Q200
- Automotive approved



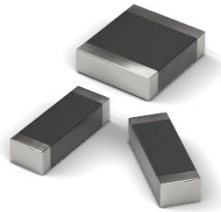
# POWER CONTROLLER/PERIPHERALS

Select between different automotive-qualified power inductors, push-pull transformers and EMC multilayer chip beads.

## WE-MPSA EMI Multilayer Power Suppression Bead

### Characteristics

- Specified peak current capability
- Ultra low RDC
- High rated current up to 10 A
- Operating temperature: - 55 °C to +125 °C
- AEC-Q200 certified
- Automotive approved



## WE-CBA SMT EMI Suppression Ferrite Bead

### Characteristics

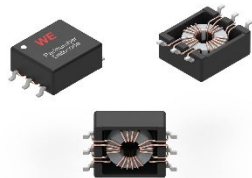
- EMI suppression and noise reduction
- High rated current up to 7.5 A
- Available in 7 different sizes
- Reliable Ni-Sn electrodes
- Operating temperature:-55 °C up to +125 °C
- AEC - Q 200



## WE-PSPA Push Pull & Gate Drive Transformer

### Characteristics

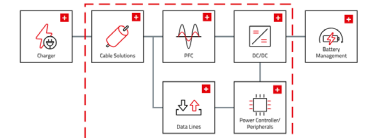
- Surface mount
- AEC-Q200
- Variety of turn ratios
- Output voltages from 5 V up to 23 V
- Operating temperature:-40 °C up to +125 °C
- Automotive approved



## WE-MAIA SMT Power Inductor

### Characteristics

- Magnetic iron alloy allows high rated currents
- Compact design
- Magnetically shielded
- No acoustic noise and no leakage flux noise
- Operating temperature range: -40°C up to +125°C
- AEC-Q 200



# POWER CONTROLLER/PERIPHERALS

Select between different automotive-qualified power inductors, push-pull transformers and EMC multilayer chip beads.



## WE-CHSA SMT High Current Inductor

### Characteristics

- Magnetically shielded rod core inductor
- Operating temperature:  $-55^{\circ}\text{C}$  to  $+150^{\circ}\text{C}$
- Current capability up to 28A
- Ideal coplanarity due to embedded solder pads
- Automotive approved



## WE-PDA SMT Shielded Power Inductor

### Characteristics

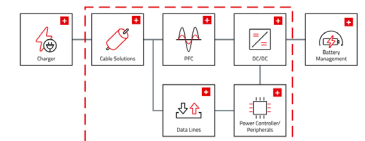
- Magnetically shielded version which results in a low leakage field High storage capacity
- Very low self-losses at high switching frequency's
- Wide inductance spectrum available at all sizes
- Core Material: NiZn
- Wire connection: welding technology
- Automotive approved
- Size 1050: Operating temperature  $-50^{\circ}\text{C}$  up to  $+150^{\circ}\text{C}$
- Size 7332, 7345, 1260: Operating temperature  $-40^{\circ}\text{C}$  up to  $+125^{\circ}\text{C}$



## WE-LQSA SMD Semi-Shielded Power Inductor

### Characteristics

- Magnetically shielded by use of a magnetic resin
- Compact design compared to standard power inductors for high density mounting
- Robust design qualified with AEC-Q200 Grade 0
- Operating temperature:  $-50^{\circ}\text{C}$  up to  $+150^{\circ}\text{C}$
- Automotive approved



# ON-BOARD CHARGER

## Top Sellers for On-Board Charger

### WE-PDA SMT Shielded Power Inductor

#### *Characteristics*

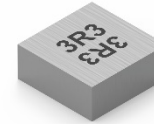
- Magnetically shielded version
- High Saturation currents up to 23 A
- Very low self-losses at high switching frequency's
- Wide inductance spectrum available at all sizes
- Operating Temperature -40 °C up to +125 °C



### WE-MAIA SMT Power Inductor

#### *Characteristics*

- Magnetic iron alloy
- Compact design
- Magnetically shielded
- Operating temperature range: -40°C up to +125°C



### WE-CBA SMT EMI Suppression Ferrite Bead

#### *Characteristics*

- Reliable Ni-Sn electrodes
- High rated current up to 5 A
- Operating temperature: -55 °C to +125 °C
- Automotive approved



### WE-AEFA Axial EMI Suppression Ferrite

#### *Characteristics*

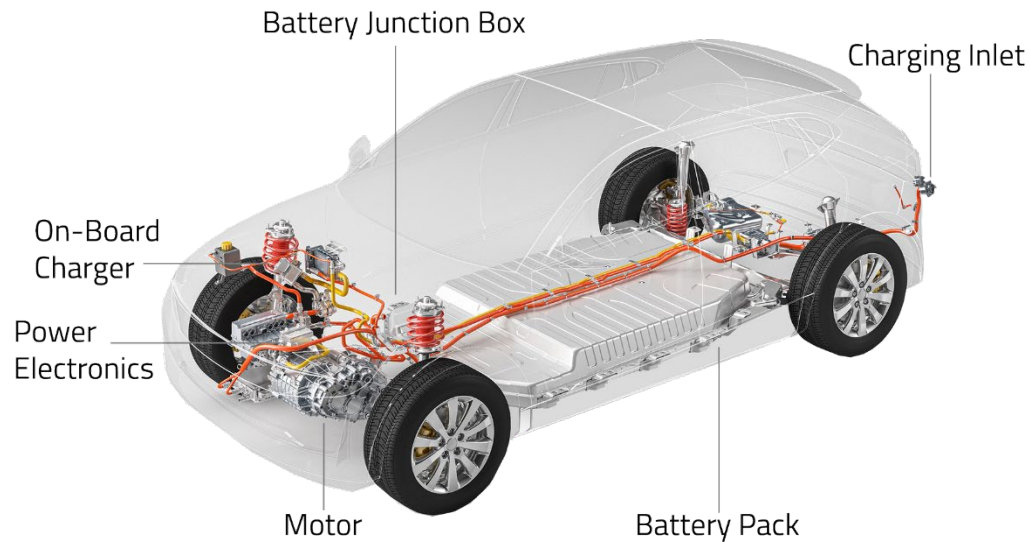
- Ferrite core made of NiZn
- Many different types for the best possible interference suppression
- Operating temperature: -55°C up to +150°C
- Automotive approved



# EV EMI SUPPRESSION

EMC noise cancellation for new EV & HEV applications

The rising electrification of motor vehicles is inevitably accompanied by an increase in electromagnetic interference. The use of cable ferrites can significantly reduce these in electric and hybrid vehicles, whether interference signals on lines or electromagnetic field coupling effects. High-performance inductive materials in cable ferrites significantly improve EMC performance. Standard ferrite cable core suppression elements in axial as well in toroidal form are suitable for a wide range of applications with medium and high frequencies. For higher frequencies, these contain a magnesium component. A very wide frequency range is covered by cable ferrites with a new nanocrystalline material (NC).



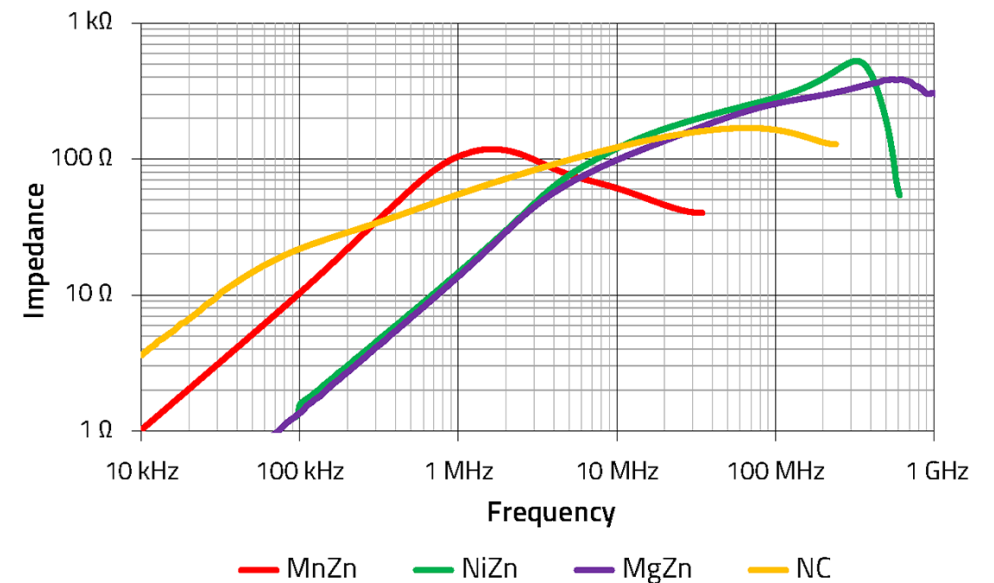
# APPLICATIONS MATRIX

We offer the complete frequency range

Würth Elektronik cable ferrites are designed to work in all different frequency ranges with best attenuation.

**It is essential for the following automotive applications:**

- In EMI suppression against Inverter spikes
- Attenuate EMI noise induced by the rotor of the electric motor
- Minimize NVH (Noise vibrations harshness) in the EMC spectrum at power train
- Special EMI suppression for the junction box interconnections



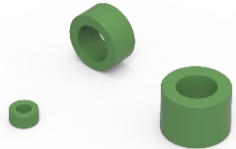
# CABLE FERRITE FOR ALL DIFFERENT EMI SUPPRESSION SCENARIOS

Würth Elektronik offers four different series capable to meet all requirements for your application:



## **EMI suppression for medium-high freq. range**

WE-AEFA ring core is an EMC cable ferrite suppressor in an axial as well in toroidal form, special designed for many kinds of applications. The special spectrum suppression is for medium and high frequency noise. Also available in larger designs.



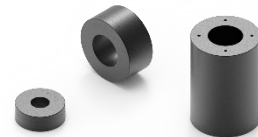
## **EMI suppression for medium-low freq. range**

WE-TEMA ring core is an EMC cable ferrite suppressor specially designed for the medium frequency range with very high suppression.



## **EMI suppression for higher freq. range**

WE-TEFA ring core is an EMC cable ferrite suppressor with a component of Mg, the Impedance supports a higher frequency than a standard type.



## **EMI suppression for a wide-band spectrum**

WE-AENA cable ferrites with the latest NC core (nanocrystalline) material technology to provide noise suppression across a very wide frequency range. Available in many different standard sizes.