Electric Car Charging Solution

### AC Charging (Slow Charge):
- **Level 1**: 120V, Single phase 2kW and below
  - Typically takes 8-12 hours to charge fully depleted battery
- **Level 2**: 208-204V, Single phase (3kW–20kW)
  - Requires a 40A circuit; takes 4-6 hours typically to charge up fully depleted battery
- **Level 3**: 380V, 3-phase (~20kW)
  - Requires a 30A circuit; takes 4-6 hours typically to charge up fully depleted battery

### DC Charging (Quick Charge):
- **INPUT**: 480VAC, 3-phase
- **OUTPUT**: 500VDC/1000V, 200A+, 100kW+
  - Typically provides 80% charge within 30 minutes

### BMS and Safety Standards
- **FMVSS 305**
  - Retention of propulsion battery protection during a crash

#### BMS Need to meet ASIL C or D
- **ASIL C or D**
  - Automotive Safety Integrity Level

- **ISO26262**
  - Functional safety for automotive electronics and electrical safety-related systems

#### To meet ISO26262 in BMS:
- Single Multiple points of failures must be considered
  - Sensing line fuse disconnect the cells from the BMS board, when short circuit occurs due to components failure or dendrite growth on PCB.

### Electric Vehicles

#### Charging and Battery Management System

**Battery Management System Block Diagram**

**Charging Solution Block Diagram**

**Two/Three Wheeler**

- **Deobard Charger**:
  - Onboard Charger:
    - TPSMB/TPSMC/TVS
    - Fuses
    - NTC for Temperature Sensing
- **Power Distribution Unit**:
  - Boltdown Fuses
  - Blade Fuses
- **Battery Pack**:
  - Fuses: Senseline & Cell
  - SPxx, TVS for OLV/ESD
  - CAN bus protection
  - NTC for Temperature Sensing
- **ECU/Motor Drive**:
  - TPSMB Series
  - AUMLA – SMD MOV
- **Onboard Charger**:
  - SMD Fuse: 881 Series
  - TPSMB TVS diode
- **Proprietary Sense Lines**
  - High voltage TVS across battery
- **Li Cells**
  - Monitoring
  - Proprietary
  - Cell
  - Cell
  - Cell
  - Cell Balancing & Protect.
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**Mobile Charger**

- **Main Switch**
  - Charge Controller
  - Reedswitch/Hall based monitoring
- **Overcurrent Protection**
  - Overvoltage Protection
  - Sensing Products