SESUB (Semiconductor Embedded in SUBstrate) technique for embedding extremely low-profile chips into the substrate enables the creation of extremely compact, high-performance PMUs for smartphones, as well as the world's smallest class Bluetooth module.

** SESUB technology from TDK realizes ultra-miniaturized power management units (PMU), Bluetooth modules, and more! **

**Features**

- **Small size:** Higher integration of parts enables drastic miniaturization.
- **Low profile:** 4-layer substrate can be realized with a thickness of only 300 micron.
- **Thermal dissipation:** Efficient thermal dissipation provides higher degree of freedom for design.
- **Reduced noise emissions:** Chip connections within substrate enhance EMI performance.

**Major Applications**

- Smartphones, mobile phones, tablet devices
- Digital still cameras and other mobile devices
- Healthcare products, wearable devices, etc.

**Advantages**

Compact, low-profile, low power consumption, low noise

**PMU lineup**

- PMUs for smartphones
  - 11x11x1.65mm (Prototype)
  - 8.9x10.3x1.4mm (Prototype)
  - 6.6x5.3x1.4mm (Prototype)
  - 2.3x2.4x1.0mm
  - 2.9x2.3x1.0mm

- Battery Charger
  - Height 1.65mm (max.)

- Charge Pump
  - Height 2.3mm

- μDC-DC Converter
  - Height 2.5mm

**Bluetooth module (Bluetooth Low Energy)**

- 64% smaller mounting footprint
  (Compared to modular construction using packaged ICs)
- Laminate Module
  - 8.5x8.5mm (~72.3mm²)
  - Height 1.0mm
- SESUB module
  - 5.6x4.6mm (~25.8mm²)
  - Height 1.0mm

**Shielded switching DC-DC converter (prototype)**

Newly developed shielding structure for μDC-DC converter results in further reduced noise.

**Performance comparison**

- Without shield: 76.0 dBμV
- With shield: 64.6 dBμV

**Bluetooth module demonstration**

- Conventional small-size Bluetooth tag
  - Thickness 5 to 13mm
- Ultra low profile tag utilizing SESUB
  - Thickness 2mm
- Easily fits into any wallet