Paired Reference Design
Handheld Battery Operated Medical Indicating Device for Personal/Home Use

Characteristics:

- Handheld
- Battery operated
- Plastic case
- One button
- One display
- **Cost:** ~$35
- No EM immunity standards apply in the United States
- Tested to IEC 61000-4-2, Air discharge, level 2 (4 kV), to meet European CE mark requirements for consumer/commercial home-based ITE products (CISPR 24)

Problem:

- Return rate unacceptably high
- Electrostatic Discharge (ESD) from user to electronic chip inside unit resulted in failures

Initial response:

- Modifications allowed unit to pass IEC 61000-4-2, Air discharge, level 3 (8 kV) (CISPR 24 requirement for products in industrial environments)
- Still had some returns – still unacceptably high

Further response:

- Further modifications allowed unit to pass IEC 61000-4-2, Air discharge, level 4 (15 kV)
- Returns due to ESD eliminated

Modifications:

- An extra “wrap” on the case seam extended the path required for an ESD to reach the chips
- The chips were moved slightly on the board to center them, extending the path required for an ESD to reach the chips
• The case molding around the button and the display was modified to extended the path required for an ESD to reach the chips

• An electrically isolating sheet was added under the button

• The resin/polymer content of the case was NOT changed

Cost of the reliable product:

• Cost: ~$35