# GSM Trainer (SMT-401)

This ESOLS Engineering product **GSM Trainer (SMT-401)** is a specialized learning system designed to provide students with in-depth knowledge of modern mobile communication technology. It functions as a GSM modem, enabling users to understand the core operations of mobile devices and their communication protocols. By utilizing standard **AT commands**, students can interact with the GSM module to explore various functionalities such as messaging, calling, and network registration. This hands-on approach helps in building a strong foundation in wireless communication and embedded system integration.

To enhance the learning experience, the trainer comes with **PC-based software**, allowing students to experiment with and analyze different GSM module features in real time. Through this interface, they can study how SIM card functionalities are controlled via AT commands and gain practical exposure to mobile communication systems. This comprehensive setup makes the GSM Trainer an essential tool for students and professionals looking to develop expertise in GSM-based applications and wireless communication technologies.

# TECHNICAL SPECIFICATIONS

## Specifications:

- **GSM capability:** GSM 900 / 1800, E – GSM SIM Interface
- **EGSM Sensitivity:** < -104 dBm
- **DCS Sensitivity:** < -102 dBm
- **Selectivity:** >+9 dBc @ 200 KHz
- **Selectivity:** >+41 dBc @ 400 KHz
- **Dynamic range:** 63 dB
- **Inter modulation:** >-43 dBm
- **Maximum output power:** 33 dBm ± 2 dB (EGSM)
- **Maximum output power:** 30 dBm ± 2 dB (DCS)
- **Minimum output power:** 5 dBm ± 5 dB (EGSM)
- **Minimum output power:** 0 dBm ± 5 dB (DCS 1800)
- **Noise in 925 - 935 MHz:** < -67 dBm
- **Noise in 935 - 960 MHz:** < -79 dBm
- **Noise in 1805 - 1880 MHz:** < -71 dBm
- **Phase error at peak power:** < 5° RMS
- **Frequency error:** ± 0,1ppm max
- **Interconnections:** 2mm gold plated pins
- **Accessories:** USB cable, GSM Antenna with SMA connector, Hands free kit, Software CD and Experiment Manual
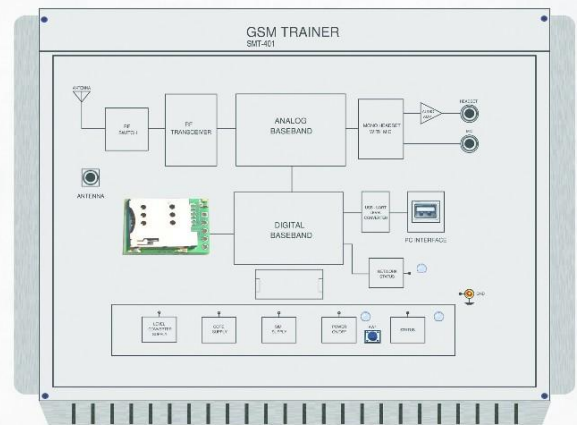
## Technical Data:

### GSM Capability

- Supports GSM 900 / 1800 and E-GSM frequency bands
- SIM Interface: Compatible with standard GSM SIM cards

### Receiver Performance

- **EGSM Sensitivity**: **< -104 dBm** (ensures reliable signal reception in low-signal areas)
- **DCS Sensitivity**: **< -102 dBm** (for high-frequency GSM bands)
- **Selectivity at 200 KHz**: **>+9 dBc** (ability to filter adjacent channel interference)
- **Selectivity at 400 KHz**: **>+41 dBc** (ensures clear signal reception by rejecting unwanted frequencies)
- **Dynamic Range**: **63 dB** (supports a wide range of signal strengths)
- **Intermodulation**: **>-43 dBm** (resistance to interference from multiple signals)

### Transmitter Performance

- Maximum Output Power (EGSM)**:** 33 dBm ± 2 dB **(power output in lower GSM band)**
- Maximum Output Power (DCS)**:** 30 dBm ± 2 dB **(power output in higher frequency GSM band)**
- Minimum Output Power (EGSM)**:** 5 dBm ± 5 dB **(low power transmission for short-range communication)**
- Minimum Output Power (DCS 1800)**:** 0 dBm ± 5 dB **(reduces power consumption in close proximity networks)**

### Noise Performance

- Noise in 925 - 935 MHz**:** < -67 dBm **(low interference within the GSM 900 band)**
- Noise in 935 - 960 MHz**:** < -79 dBm **(ensures signal clarity in extended GSM band)**
- Noise in 1805 - 1880 MHz**:** < -71 dBm **(minimizes interference in the DCS band)**

### Signal Accuracy & Stability

- **Phase Error at Peak Power**: **< 5° RMS** (ensures minimal signal distortion)
- **Frequency Error**: **± 0.1 ppm max** (maintains precise frequency stability)

### Interconnections & Accessories

- **Interconnections**: **2mm gold-plated pins** (ensures reliable and corrosion-resistant connections)
- **Accessories**:
    - **USB Cable** (for PC communication and power supply)
    - **GSM Antenna with SMA Connector** (for enhanced signal reception)
    - **Hands-Free Kit** (enables voice communication experiments)
    - **Software CD** (provides a user interface for AT command testing)
    - **Experiment Manual** (detailed instructions for practical learning)

## Experimental Data:

- Introduction to Sections of GSM Trainer
- Introduction to GSM Trainer Software
- Exploring Call Options using AT Commands
- Exploring Call Log Options using AT Commands
- Exploring SMS Options using AT Commands
- Exploring Volume Control Options using AT Commands
- Exploring Phone Book Options using AT Commands
- Exploring Network and Clock Options using AT Commands
- DTMF Tone generating using AT Commands
- Software Application using GSM Trainer