

ESM-140 Mobile-Phone Dosimeter

Personal Dosimetry for
the Mobile Radio Frequencies



maschek.

► What is Private Mobile Radio?

The desire of individuals for mobility has also swept the telecommunications field throughout the world. Since the beginnings of mobile radiotelephony, with the clumsy mobile telephones of the analogue C Network, the cell-phone industry has boomed, expanding into one of the world's largest growth markets.

The introduction of digital transmission technology with pulsed high-frequency signals made mobile telephones smaller and more capable. Above all, they became cheaper, and thus conquered the mass market.

Because of the undiminished demand, after the GSM-900 and GSM-1800 bands, further frequencies have been approved for private mobile radio, such as the UMTS band. The desire to access data from anywhere, as well as holding conversations, promptly arose. Thus data are also transmitted to laptop computers over the mobile-phone wavelengths today.

► Why personal dosimetry for Private mobile radio?

The spread of these technologies everywhere creates an increase in the exposure to electromagnetic radiation, especially near the transmitters. Both the base stations and the cellular phones themselves are sources of high-frequency radiation.

Modern digital radio networks reduce the transmission power to a minimum. However, in the vicinity of base stations operating to full capacity, if there are large numbers of cell phones or base stations in an area, or under unfavourable reception conditions, increased exposure can occur.

Throughout the world, numerous studies have been and are being conducted on the possible hazards and effects on people and the environment. These are usually performed under laboratory conditions, so the results are not directly applicable, or epidemiological field studies are conducted without knowing the exact exposure dose.

But this does not reflect reality. People usually move around indoors, and are thus subject to lower exposures from the base stations than out of doors. When they telephone themselves, the opposite is true: the worse the reception from outdoors, the higher their exposure is.

► Are there any limit values?

In national and international standards, limits have been set for these fields, which must not be exceeded for health reasons. In Germany and most of the world, the ICNIRP limits apply. In Switzerland and Austria, other stricter precautionary values apply in some localities.

The City of Salzburg (Austria) and the Bund für Umwelt und Naturschutz (the German affiliate of Friends of the Earth) recommend 0.6 V/m and 0.5 V/m respectively as the limit value. But only the ICNIRP limits mentioned are of a legally binding nature.

The WLAN band, which has been approved for telecommunication between computers, is also spreading like wildfire, and is already competing with the classical mobile-radio bands today in some locations. WLAN is also known under the name of the corresponding communication protocols, such as Bluetooth, WiFi, Zigbee or IEEE 802. While the mobile-radio bands make use of a blanket network of base transceiver stations for the radio links, for WLAN, "access points" are set up in public places to provide the necessary radio links more and more often.

The DECT band, which is also widespread, has special characteristics. Equipment using this band transmits at low power without power regulation. DECT is used mainly for wireless portable phones with a land-line connection. In this case, the stationary component emits radiation constantly.

Base stations transmit as a function of the traffic volume. This applies in particular to UMTS. One tenant's WLAN can sometimes be received in the entire apartment building. Nearby phone calls in a packed train can cause a high unintentional exposure.

All these influences lead to extremely varying and individual exposure profiles for each one of us.

These can only be registered correctly by means of a continuous-reading mobile-radio dosimeter worn on the body.

This makes studies which take into account the actual field strength in the mobile-phone bands under real environmental and living conditions possible for the first time.

For the first time, feelings of not being well or impairments to health can be correlated epidemiologically with the local field strength in the mobile-phone bands in an unambiguous manner.

Stationary measurements are only informative here in a qualitative fashion.

Limit values of mobile radio frequencies

	Germany	Switzerland	BUND
GSM900	42V/m	4V/m	0,5V/m
GSM1800	59V/m	6V/m	0,5V/m
DECT	60V/m	-	0,5V/m
UMTS	61V/m	6V/m	0,5V/m
WLAN	61V/m	-	0,5V/m

► The personal dosimeter

The ESM-140 is an innovative instrument for frequency-selective registration close to the body of all relevant private-mobile-radio bands, including DECT and WLAN (patents pending).

It measures the correct value of the electric field strength for selected frequencies over a large solid angle close to the body.

The ESM-140 does not generate any high-frequency radiation itself, and is therefore especially suitable for electrosensitive persons and for epidemiological studies at minimal field strengths.

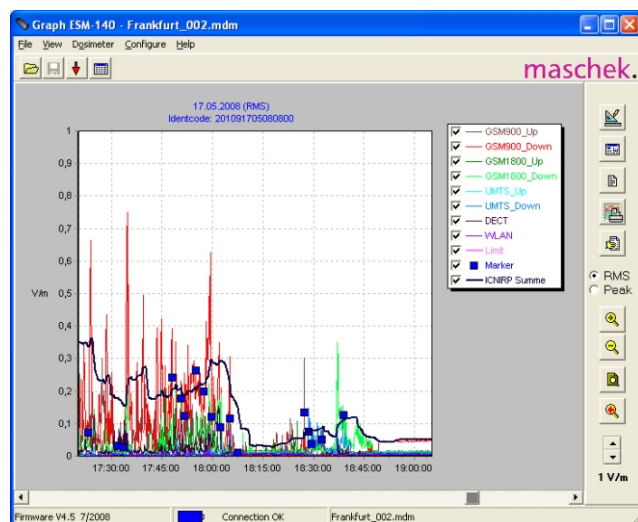
Special features

- Frequency-selective measurement of the bands
- High sensitivity of 10 mV/m
- Generates no high-frequency radiation itself
- Measures mean and peak values simultaneously
- Continuous measuring of all frequency bands
- Low weight of 87 g
- Measures GSM-900 & 1800, DECT, UMTS, WLAN
- Large range, from 0.01 V/m to 70 V/m
- Marking function for events
- 35 hours operating time without interruption
- Dust-proof and splash-proof to IP65

► The software

The Windows™-compatible software included allows up to eight measurement jobs with specified starting and finishing times to be programmed. At the specified time, down to the second, the ESM-140 starts the measurement automatically, and ends it as specified. Eight signal channels are always measured in parallel, and the readings stored in a memory with space for 260,000 records each.

In addition, all the relevant information, such as the time, temperature, and calibration data, are stored in the mobile-radio dosimeter.



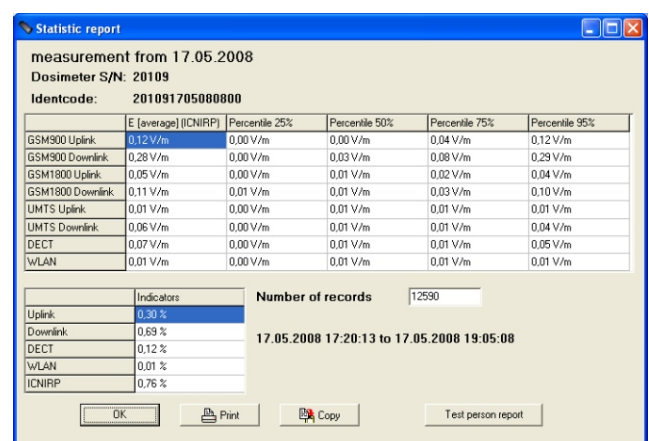
Problems in critical environments, such as in trains, planes, tunnels, or cars, can now be measured extremely easily. In such places, the transmitted power is increased in order to maintain the radio link, because of the shielding effects.

The ESM-140 has a USB interface for both data transfer and recharging the battery. The meter is calibrated, and equipped with ultramodern signal-processing circuitry. Events can be marked in the recording by means of a pushbutton. A monitor LED indicates all important operating states.



GPS-based presentation of readings on a digital aerial

Every measurement job is given a unique identification number. The data are plotted as a graph on screen automatically. Periods of interest can be enlarged with the mouse.



Specifically for epidemiological studies, the program Graph ESM-140 possesses special statistical evaluating and reporting functions.

Individual bands can be suppressed by means of the legend. The readings can be exported in common file formats.

► Technical Specifications

Measurement range:	0.010V/m - 70V/m (mean value, CW)
Range selection:	automatic (auto-range)
Frequency range:	GSM900 (mid-range frequency, 900MHz uplink 935MHz downlink) GSM1800 (mid-range frequency, 1750MHz uplink 1850MHz downlink) DECT (mid-range frequency, 1895MHz up and downlink) UMTS (mid-range frequency, 1950MHz uplink 2140MHz downlink) WLAN (mid-range frequency 2440MHz up and downlink)
Accuracy:	±2dB in free field (mid-range frequency of respective band) (3.5V/m) ±4 dB with dosimeter worn on upper arm (3.5V/m)
Measuring rate:	20kHz, internal
Measuring method:	HF sensor, detector,
Memory:	260 000 records for each of the 8 channels, both mean and peak value
Recording rate:	0.5 to 10 secs
Recording mode:	mean and peak value
Functions:	marking function by means of push-button, acoustic signal when pressed
Status display:	LED indicates measuring, battery state, standby, data transfer
Operating time:	approx. 37 hours with one battery charge
Standby:	6 months
Charging time:	90 minutes (if battery completely discharged)
PC interface:	USB
Operating temperature:	-10 to 45°C
Storage temperature:	-20 to 50°C
Dimensions:	45mm X 115mm X 29mm
Weight:	87 g with battery (not including strap)

All technical specifications at 20°C

► Scope of supply

- Mobile Phone Dosimeter
- Graph ESM-140 software
- USB data-transfer and charging cable
- Operating instructions
- Calibration certificate
- Fastening strap and pouch
- Carrying case

► Manufacturer

Maschek Elektronik
www.maschek.de
Germany

► Sales

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