



GSM-R Radio Module

MT5E-F

The **MT5E-F** is a **GSM Phase 2+** radio module with GSM-R and ASCII enhancements. The module can be operated within the GSM-R frequency band at a maximum output power of 8 watts (GSM Power Class 2). The MT5E-F is prepared for the 3 MHz ER-GSM-frequency band expansion.

Das MT5E-F supports the following specifications:

- GPRS Multi-Slot Class 10 with the operation modes Class B, C, CS (optional). The protocol software meets the requirements of the specification **Rel.97** GSM and is approved according GCF3.14.
- EDGE and GPRS Multi-Slot Class 12 with the operation mode Class B. The protocol software meets the requirements of the specification **Rel.4** GSM.

Both release versions cannot be operated at the same time.

The following tasks can be maintained:

- Interface configuration
- Software update
- Setup of Voice- and Data connections (Rel.97: Circuit-Switched Data | Rel.4: Circuit/Packet-Switched Data)
- GSM-R-protocol message tracing (optional)

The MT5E-F is connected via an TDMA bus towards the application.

Highlights:

- Characteristic values are more strictly specified than required by the GSM standard.
- Maximum reliability and availability
- Compact robust housing, especially engineered for the rough environmental conditions of railway operation
- Tx/Rx antenna port on the front and connector for the serial ports on the rear panel.
- Fulfils the railway specific receiver requirements according ETSI TS 102 933 V 2.1.1
- **Has improved characteristics against RF - blocking and interferences**
- The module is controlled via AT-commands according the GSM-specifications 3G 27.005, 3G 27.007 and MORANE.

Excellent characteristics against RF-blocking and interferences integrierte Filter

- Fulfilling of the ETSI standards, TS 102 933-1 V2.1.1 & TS 102 933-2 V2.1.1 for GSM-R improved receiver parameters

FR frequency (ARFCN of useful signal)	FB frequency (Blocking signal)	ETSI TS 102 933-2 V2.1.1 professional MS R-GSM 900/ER-GSM 900 Level in dBm	Funkwerk MT5E-F R-GSM 900/ER-GSM 900 typical values Level in dBm
924,2 MHz ARFCN 970	FR ± 600 kHz ... FR ± 800 kHz	-38	-29.5
	FR ± 800 kHz ... FR ± 1.6 MHz	-33	-25
	FR ± 1.6 MHz ... FR ± 5 MHz	-23	max. 0
	100 kHz ... < 835 MHz	-23	max. 0
	835 MHz ... < 873 MHz	+0	max. 0
	873 MHz ... < 880 MHz	+0	max. 0
	880 MHz ... < 912 MHz	-5	max. 0
	912 MHz ... < 915 MHz	-12	max. 0
	915 MHz ... FR - 5 MHz	-23	max. 0
	FR + 5 MHz ... 925.6 MHz	-23	-4.6
	> 925.6 MHz ... 927 MHz	-13	-8.7
	> 927 MHz ... 960 MHz	-10	max. 0
	> 960 MHz ... 1 000 MHz	+0	max. 0
	> 1 000 MHz ... 12.75 GHz	-23	max. 0

Table 1: Level of unwanted signals for professional MS from EN 102 933-2, chapter 4.2.1.4.2

Pegel Nutzsignal auf ARFCN 970 (dBm)	Interferer(s) characteristics				Comment
	ARFCN	Freq. (MHz)	ETSI TS 102 933-2 V2.1.1 Mobile input level (dBm/5MHz)	Funkwerk MT5E-F Mobile input level (dBm/5MHz) typical values	
-101	3476	927.6	-13	-2	LTE single interferer
	3476 & 3526	927.6 & 932.6	-13	-5.6	LTE dual interferer

Table 2: Blocking with Broadband interfering Signals from EN 102 933-2, chapter 4.3.1.4.2

Technical Data

GSM Services		Mechanical Data	
Tele Services		Height	Width
TS11: Telephony	TS12: Emergency calls	Body: 100mm	Body: 36.5mm
TS21: Short Message Service MT/PP	TS22: Short Message Service MO/PP		
TS23: Short Message Service Cell Broadcast	TS62: Automatic Facsimile Group 3	Front panel: 128.5mm	Front panel: 50.5mm (10HP)
TS91: Voice Group Call	TS92: Voice Broadcast Call		
Bearer Services		Depth	Weight
BS24: 2.4kbits T/NT, UID, 3.1kHz, V110	BS25: 4.8kbits T/NT, UID, 3.1kHz, V110	169.93mm	0.77kg
BS26: 9.6kbits T/NT, UDI, 3.1kHz, V110	BS70: GPRS Bearer Service		
EIRENE Specific Features			
Functional addressing		Location dependent addressing	
Call preemption and arbitration (eMLPP)		Railway Emergency Call (REC) enhanced Emergency Call (eREC)	
HF Characteristics			
Operating frequencies	R-GSM	876 to 915MHz	921 to 960MHz
	ER-GSM	873 to 876 MHz	918 to 921 MHz
Power transmission	8W (GSM Class 2)		
Sensitivity	-104dBm		
Environmental Conditions			
Protection class	IP20 according to EN 60529		
Vibration and shocks	according to EN 50155		
EMC	according to EN 50121-3-2 and EN 50155		
Climatic Conditions			
Operating Temperature	-25°C to 70°C	Maximal Gradient 1)	± 1 °C/min
Storage Temperature	-40°C to 85°C	Relative humidity	acc. to EN 50155
Electrical Data using Rel.97			
Input voltage		+5 VDC	+12 VDC
Power consumption (according to input voltage)	Operation-Mode	3.5 W	6 W ²⁾
Electrical Data using Rel.4			
Input voltage		+5 VDC	+12 VDC
Power consumption ³⁾	Idle-Mode	3.4 W	0.1 W
	GSM-Mode	2.2 W	2.4 W
	GPRS-Mode	4.5 W	6.3 W
	EDGE-Mode	3.5 W	4.8 W

1) of ambient temperature

2) 8 W transmission power, for single TX slot

3) by measuring: in GSM with 1Tx and 1Rx
 in GPRS with 4Tx and 1Rx
 in EDGE with 4Tx and 1Rx

(Tx / Rx refers to the number of occupied time slots)

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