



GSM-R Radio Module

MT5E-B

The **MT5E-B** is a **GSM Phase 2+** radio module with GSM-R and ASCI 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 MT5 is prepared for the 3 MHz ER-GSM-frequency band expansion. It supports GPRS Multi-Slot Class 10 with the operation modes Class B, C, CS (optional). The protocol software meets the requirements of the specification R97 GSM and is approved according GCF3.14.

The following tasks can be maintained:

- Interface configuration
- Software update
- Setup of Voice- and Data connections (Circuit/Packet)
- GSM-R-protocol message tracing (optional)

The MMT5E-B 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
- Electronic is housed in a sturdy chassis that can withstand against the poor conditions in the harsh environment of railway operations.
- Basic **GSM-** und **GPRS-Software** had been extended by railway specific functions (such as functional addressing, USS1 and USSD)
- Combined Tx/Rx connector at the front side as well as a connector for the serial interfaces at the rear side
- 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.
- switchable Rx / Tx

Excellent characteristics against RF-blocking and interferences integrierte Filter

- Special filter banks in the GSM-R module
- Intelligent actuation via software
- Adaptation of the protocol stack (Layer 1) to operate the filter bank, depending on the BCCH information (Broadcast Control Channel)
- Fulfilling of the new ETSI standards, TS 102 933-1 V2.1.1 & TS 102 933-2 V2.1.1 for professional Mobiles

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-B 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) Mobile input level (dBm/200kHz)	Interferer(s) characteristics				Comment
	ARFCN	Freq. (MHz)	ETSI TS 102 933-2 V2.1.1 Mobile input level (dBm/5MHz)	Funkwerk MT5E-B 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			Front panel: 128.5mm	Front panel: 50.5mm (10HP)
TS23: Short Message Service Cell Broadcast	TS62: Automatic Facsimile Group 3				
TS91: Voice Group Call	TS92: Voice Broadcast Call			Depth	Weight
Bearer Services					
BS24: 2.4kbits T/NT, UID, 3.1kHz, V110	BS25: 4.8kbits T/NT, UID, 3.1kHz, V110				
BS26: 9.6kbits T/NT, UDI, 3.1kHz, V110	BS70: GPRS Bearer Service			169.93mm	0.77kg
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	-104 dBm				
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					
Input voltage	+12 VDC	Input power (according to input voltage)	ca. 6W 2)		
	5 VDC		ca. 3.5W		
Backplane Connector					
Power Supply	Reset	Data / Service (TTL)	Analogue audio in/out		
TDMA					

1) of ambient temperature

2) 8 W transmission power, for single TX slot

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