GSM-R Radio Module

MT5E

The MT5E 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 MT5E operates also in the ER-GSM-frequency band. It is able to 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/R99 GSM.

Additionally a software according GSM Rel. 04 is available.

The following tasks can be maintained:

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

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.

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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 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 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
Mobile input level (dBm/200kHz)	ARFCN	Freq. (MHz)	ETSI TS 102 933-2 V2.1.1 Mobile input level (dBm/5MHz)	Funkwerk MT5E 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			
Tele Services			
TS11: Telephony		TS12: Emergency calls	
TS21: Short Message Service MT/PP		TS22: Short Message Service MO/PP	
TS23: Short Message Service Cell Broadcast		TS62: Automatic Facsimile Group 3	
TS91: Voice Group Call		TS92: Voice Broadcast Call	
Bearer Services			
BS24: 2.4 kbits T/NT, UID, 3.1 kHz, V110		BS25: 4.8 kbits T/NT, UID, 3.1 kHz, V110	
BS26: 9.6 kbits T/NT, UDI, 3.1 kHz, 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 915 MHz	921 to 960 MHz
	ER-GSM	873 to 915 MHz	918 to 960 MHz
Power transmission	8 W (GSM Class 2)		
Sensitivity	-104 dBm		
Environmental Conditions			
Protection class	IP 20 according to EN 60529		
Vibration and shocks	according to EN 50155		
EMC	according to EN 50121-3-2 and EN 50155		
Fire Protection Properties			
Fire protection	according to EN 45545-2:2020-10 and EN 45545-5		
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)	max. 6 W [2]
	5 VDC		max. 4 W
Backplane Connector			
Power Supply	Reset	Data / Service (TTL)	Analogue audio in/out

Mechanical Data	
Height	Width
Body: 110 mm	Body: 36.6 mm
Front panel: 3U	Front panel: 10 HP
Depth	Weight
169.9 mm	0.75 kg

1) of ambient temperature

2) 8 W transmission power, for single TX slot

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Subject to change without notice MS / GSM-R Radio Module / MT5E / EN / V4.7