

Technical data sheet

Train Line Modem TLM-1 – Rail Application



Identification

Type	TLM-1 10TE DC 24V M12 SUB-D EINSCHUB
Part-No.	806000
Customer article no.	5010 1000 0010 (PICASO)

Product version

Hardware revision	B
Datasheet version	02

Use/Application/Properties

Description	The Train Line Modem (TLM) is used to transmit Ethernet network data in rail vehicles over existing lines. The TLM-1 transfers UDP packets with a maximum speed of 100 Mbps via 2 wires over a coupler.
Use	Cost-effective hardware expansion for fast Ethernet data transfer on trains, Easy connection of network devices, e.g. a video surveillance system (CCTV), Uses existing and occupied NF/ UIC lines, • Data security through AES encryption, No need to replace the coupling contacts, All connectors are accessible via the front panel, Maintenance-free, low life-cycle costs

Ethernet

Connection	X1: Front M12 Ethernet female D-coded Front: Sub-D 9 pole male connector for 2-wire connection (for train-line) Rear: F48 male connector acc. to DIN 41612 for power supply and ELA connection
Properties	IEEE 802.3 IEEE 802.3x IEEE 802.3u
Network topology	A continuous, shielded 2-wire cable from coupling to coupling is required. Line impedance between 50 and 200 Ohm Cross-section from 0.5 mm ² upwards Line capacity ≤ 160 pF/m
Data rate	max. gross full-duplex 200 Mbit/s (100RX/TX TCP) max. gross transfer rate 85 Mbit/s TCP (100 m cable) max. gross transfer rate 45 Mbit/s TCP (200 m cable) max. gross transfer rate 25 Mbit/s TCP (at 5 mm open clutch)

Lütze Transportation GmbH

Postfach 12 24 (PLZ 71366) • Bruckwiesenstraße 17-19 • D-71384 Weinstadt
Tel. +49 (0)7151 6053-545 • Fax +49 (0)7151 6053-6545
www.luetze-transportation.com • sales.transportation@luetze.de

25.03.2021 • Subject to technical modification

Part-No. 806000 • Datasheet version: 02

page 1 of 4



TRANSPORTATION

Technical data sheet

Train Line Modem TLM-1 – Rail Application

Modulation	OFDM-1155 carrier, 1024-QAM, QPSK
PE Connection	Grounding strap (grounding bolt)

Input (digital)

Number	2 bidirectional galvanically isolated
Rated voltage U_N	DC 24 V
Current @ DC 24 V	7 mA

Voltage range

Voltage range	DC 16 – 45 V
Current Consumption	200 mA (80 mA Standby) approx. @ DC 24 V with heating (3 min.) 700 mA (80 mA Standby) approx. @ DC 24 V

Electrical isolation

Potential groups	A: Housing (grounding bolt/18d) B: Power supply (F48 2dbz, 4dbz) C: Ethernet (X1) D: 2-3 Wire bus (X2, F48 16d/16b)
Isolating voltage	AC 500 V between A and B, C, D AC 500 V between B and A, C, D AC 500 V between C and A, B, D AC 500 V between D and A, B, C

Technical data

Protection device	Overvoltage protection Short-circuit protection
Class of supply voltage interruption	S1
Supply change-over class	C1: 100 ms
Temperature variation class	H1:no requirements
External back-up fuse	B10 for the power supply
Service life	L4: 20 years
Degree of pollution	PD2 acc. EN 50124-1
Over voltage category	OV2 acc. EN 50124-1
Housing material	Aluminum
Protective coating	class PC2: coated on both sides
Dimensions (w × h × d)	50.5 mm × 128.5 mm × 198.0 mm
Weight/unit	0.48 kg
Mounting	19" plug-in housing for installation in a 19" rack The device can be used in a 19" rack mounted anywhere within the vehicle.
Protection class	IP20 IP41 (front side)
Operating temperature class	OT3: -25°C ... +70°C with heating: OT4: -40 °C ... +70 °C
Storage temperature range	-40 °C ... +85 °C
Relative air humidity	10 – 90 %, non-condensing
Application height	2000 m max.
Encryption	Encryption

Technical data sheet

Train Line Modem TLM-1 – Rail Application

Frequency range	1.8–30 MHz
PCB (printed circuit board)	SMD technology with DSP controller
Switching characteristic	IN1: statically provided for "coupling occupied" IN2: dynamically designed for "train upgraded"
Heating	In order to be able to use the device in extremely cold ambient temperatures, the TLM can be equipped with a heater. This heats up the device before the start of data transmission to ensure trouble-free transmission.
Range	The range depends on the transmission behavior of the cable, the cable length, as well as of coupled faults in the transmission line. As a rule, the range is 200 m at approx. 32 Mbit/s.
Status indication	Power, LED gelb Ethernet-Link/Act, LED green TL-Link/Act, LED green
Connection type	X1: Front M12 Ethernet female D-coded Front: Sub-D 9 pole male connector for 2-wire connection (for train-line) Rear: F48 male connector acc. to DIN 41612 for power supply and ELA connection
Connecting lead	max. 200 m

Failure Rate Prediction (MTBF)

Standards	Electronic components – Reliability – Reference conditions for failure rates and stress models for conversion: EN/IEC 61709 Failure Rates of Components – Expected values: SN 29500
Failure rate at -40 °C	990 fit
Failure rate at +40 °C	1009897 1 fit equals one failure per 10 ⁹ component hours The indicated temperature is the mean component ambient temperature.
Comments	The results are valid under following conditions: Automotive environment or industrial areas without extreme dust levels and harmful substances Continuous operation 8760 h per year

Standards/Certifications

Standards	EN 50155:2007: Railway applications – Rolling stock – Electronic equipment EN 50121-3-2:2006: Railway applications – Electromagnetic compatibility – Part 3-2: Rolling stock – Apparatus EN 50124-1:2006-07: Railway applications – Insulation coordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment EN 61373:2010: Railway applications – Rolling stock equipment – Shock and vibration tests EN 45545-2+A1:2016: Railway applications – Fire protection on railway vehicles – Part 2: Requirements for fire behaviour of materials and components HN_Isolationsprüfung:2017: Company internal standard – Insulation test
Certifications	CE

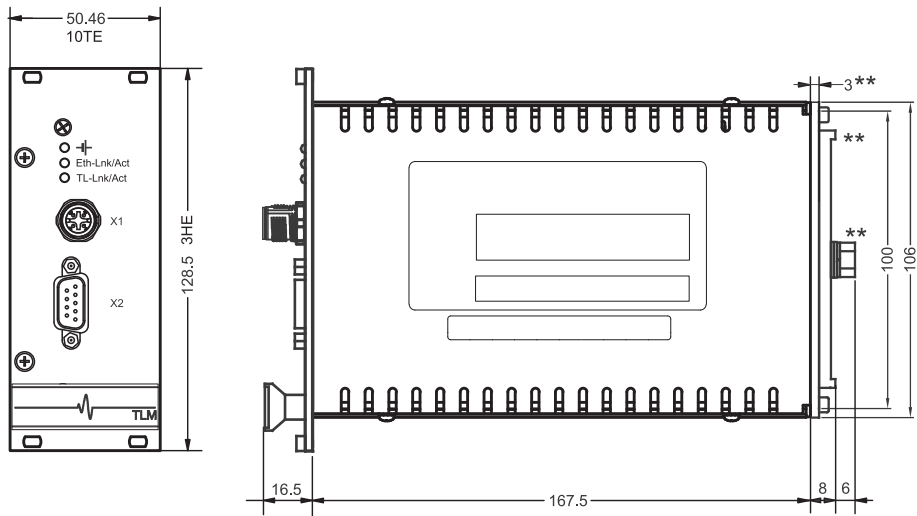
Accessories

Accessories	Accessories, additional mounting accessories, cable sets, installation services and engineering services on demand
-------------	--

Technical data sheet

Train Line Modem TLM-1 – Rail Application

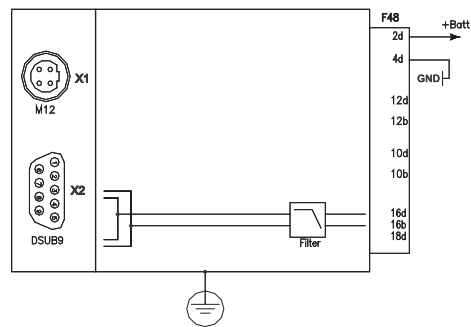
Dimensions



**product-dependent

PIN assignment

X1: Ethernet (M12)		X2: Data (D-Sub9)	
Pin/ Broche	Signal/ Signal	Pin/ Broche	Signal/ Signal
1	TD+	1	TrainLine -
2	RD+	2	-
3	TD-	3	-
4	RD-	4	-
	Housing Shield	5	TrainLine -
		6	TrainLine +
		7	-
		8	-
		9	TrainLine +
			Housing Shield



F48 (auf der Rückseite/ on the back side/ au verso)

HINWEIS: Wenn IN1 nicht verwendet wird, verbinden Sie Pin IN1 a mit Pin IN1 b
NOTE: When IN1 is not used, connect Pin IN1 a mit Pin IN1 b
AVIS: Lorsque IN1 n'est pas utilisé, connectez la broche IN1 a sur la broche IN1 b

Pin/ Broche	Signal/ Signal	Pin/ Broche	Signal/ Signal	Pin/ Broche	Signal/ Signal
02d	V+ Supply	02b	V+ Supply	02z	V+ Supply
04d	GND Supply	04b	GND Supply	04z	GND Supply
06d	-	06b	-	06z	-
08d	-	08b	-	08z	-
10d	IN2 a Cab On	10b	IN2 b Cab On	10z	-
12d	IN1 a Coupled	12b	IN1 b Coupled	12z	-
14d	-	14b	-	14z	-
16d	TrainLine PA+/ELA+	16b	TrainLine PA-/ELA-	16z	-
18d	TrainLine PA/ELA Shield	18b	-	18z	-
20d	-	20b	-	20z	-
22d	-	22b	-	22z	-
24d	-	24b	-	24z	-
26d	-	26b	-	26z	-
28d	-	28b	-	28z	-
30d	-	30b	-	30z	-
32d	-	32b	-	32z	-