

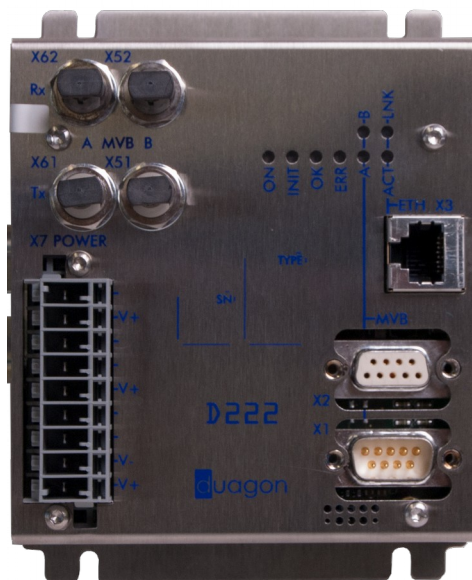


D222R Redundant Medium Converter

Data sheet

The D222R connects a wire based MVB segment to at least one, in maximum up to two OGF Optical Glass Fiber bus segments. The transferred telegrams are refreshed with respect to their jitter, frame timing and general plausibility.

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All product properties are fully described in the data sheet under express exclusion of any warranty for other properties. Of decisive relevance is the data sheet valid at the time of the order being placed. Duagon provides a warranty that the product properties are retained during the period of warranty. Evidence that the properties of the product have been retained will be brought, always and exclusively, on Duagon premises by means of a test construction pursuant to the type test.

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Document history:

Rev.	Creator Date	Creator Name	Released Date	Released Name	Comments	Ident-Number
1	17.02.2012	Kovács			See chapter	d-006197-012095
2	15.05.2015	Robert	15.05.2015	Robert	"Document History"	d-006197-021715

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1. General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or those connected to it. To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform installation, maintenance and service procedures

To avoid fire or personal injury

Connect and disconnect properly. This data sheet contains all relevant information for connecting the device.

Power On only with all connections made. All connectors on the device must be connected (unused connections should be covered with a dummy connector).

Ground the product. Ground connection is located on the device.

Observe all terminal ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult this data sheet before making connections to the product.

Avoid exposed circuitry. Do not touch exposed connections and components when power is present.

Do not operate with suspected failures. If you suspect there is a damage to this product, have it inspected by qualified service personnel, or return it to Duagon AG.

Safety Terms and Symbols

Terms in this data sheet. These terms may appear in this data sheet.



WARNING. Warning statements identify conditions or practices that could result in injury or loss of life.



CAUTION. Caution statements identify conditions or practices that could result in damage to this product or other property.

Service Safety Summary

Only qualified personnel should perform installation, maintenance and service procedures

Do not service with Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

2. Introduction

The D222R connects one OGF and one EMD or ESD+ MVB segment to each other through an MVB Repeater. One wire based MVB segment (EMD or ESD) as well as two OGF segments is standard.

The transferred telegrams are refreshed with respect to their -

- **jitter:** the signals are resynchronized to the ideal bit cell positions,
- **frame timing:** inter-frame timings are corrected by selective delay of certain frames,
- and **general plausibility:** elimination of jabber and continuously sending nodes.

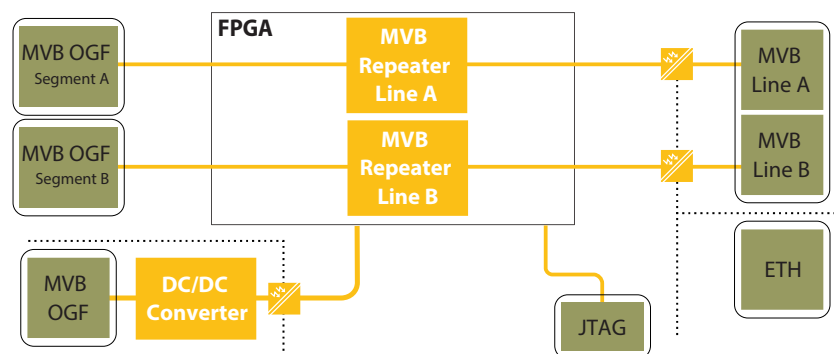
The contents of data transferred between two MVB segments is not changed. Therefore the D222R MVB medium interface is completely transparent to all kinds of bus traffic; i.e. it is a pure Layer 1 device.

The device complies to IEC61375, EN50155, EN50121-3-2, EN61373, e.g. by:

- -40 to +70°C operating temperature
- coating against humidity
- enhanced EMI and vibration robustness

Block Diagram

The picture below depicts the block diagram of the D222R device.



* ethernet is not used and therefore not connected

Application Areas

The main application areas are as follows:

- The D222R enables **interoperability** between wire and fiber segments.
- If the routing of MVB has to cross EMI prone areas, the use of **optical fibers** perfectly protects against electromagnetic interferences.
- **The D222R with one OGF to a local EMD/ESD+ segment.**

Other Members of the MVB Repeater Family

Duagon provides a variety of MVB repeaters:

- D210: redundant MVB repeater EMD/ESD – EMD/ESD with housing
- D211: redundant MVB repeater EMD/ESD – EMD/ESD 3U board
- D212...F: MVB repeater EMD/ESD – OGF
- D212...5F: MVB star coupler EMD/ESD – OGF

Online Support

For additional information, please visit our web page www.duagon.com.

There you will find:

- up to date documents
- frequently asked questions
- description of new product versions

A link to the subscription form of the duagon email news service can be found on our website as well. The news service provides notifications of new product launches and all other news regarding duagon.

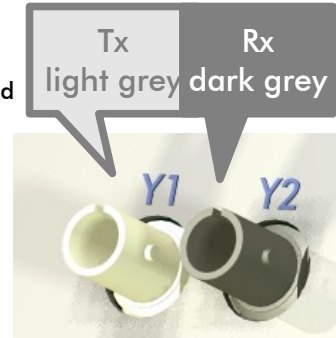
3. Physical Interfaces

3.1 Fiber (OGF) Segments

The used connectors for the OGF segment are called "ST-bayonet".

There are two glass fibers required, one for each direction (Rx, Tx).

Note: Be sure, that the Tx transmitter on one end of the cable is connected to the Rx receiver on the other end.



3.2 Wire (EMD/ESD+) Segments

The decision for the option EMD or ESD+ has to be taken by order code.

All wire segments have a signal continuity between their respective connectors. The D222R is a redundant device in general, therefore the pins for Line_A and for Line_B are used.

3.3 Wire (EMD/ESD+) Segments

The decision for the option EMD or ESD+ has to be taken by order code.

All wire segments have a signal continuity between their respective connectors. The D222R is a redundant device in general, therefore the pins for Line_A and for Line_B are used.

3.4 ESD+ Description

This paragraph applies to ESD- segments, only.

Pin #	Pin shortcut	Input / Output as seen from the D222R	Description
1	A.data.P	bidirectional	non- inverted MVB bus line A, with RS485- level
2	A.data.N	bidirectional	inverted MVB bus line A, with RS485- level
3	NC	-	Not connected
4	B.data.P	bidirectional	non- inverted MVB bus line B, with RS485- level
5	B.data.N	bidirectional	inverted MVB bus line B, with RS485- level
6	A.0V.term	power output	power supply from D222R to external terminator
8	A.5V.term	power output	
7	B.0V.term	power output	
9	B.5V.term	power output	
shell	Shield	-	Connection to shield resp. housing.

Both connectors have the same pinout, and all pins except pin "NC" are routed from one connector to the other one.

Terminator Supply ESD+

This paragraph applies to the ESD- segments, only.

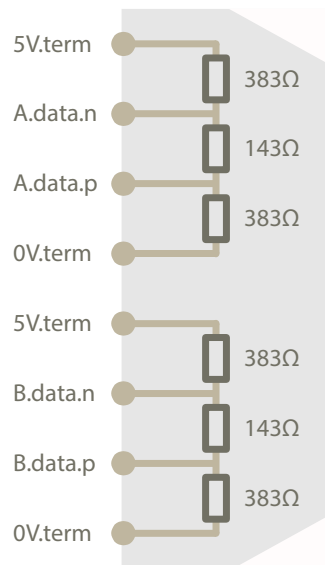
Item	Value	Unit	Remarks
------	-------	------	---------

Output voltage	5	V	+/-5% tolerance
Short circuit current limitation	300	mA	The terminator supply delivers for a short amount of time a higher current of up to 0.5A. After a short time period the current is limited to below 0.3A.
Maximum output current	25	mA	Output voltage still in 5V ±5% tolerance

The output power is sufficient for one terminator. Mounting two terminators makes no sense; but this at least does not cause harm to the D222R (voltage specifications not guaranteed).

Terminators ESD+

The following terminator is recommended for the use with the D222R version for ESD+:



Line A
Assumed, the D222R is the last of several MVB nodes, one of the D222R MVB connectors remains free. The terminator is mounted on this connector and delivers the correct line termination.

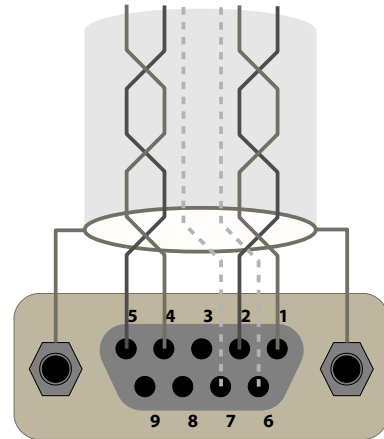
The resistors inside will offset an „idle“ line when not driven by a node transmitter. The effective line termination matches the recommended cable impedance of 120 Ω.

Line B
The terminator is not included within the D222R. Call duagon for availability and supply information.

MVB Cable Attachment ESD+

The figure shows the recommended cable attachment.

The dotted lines are the "potential equalization lines". They have the intention to connect all MVB nodes together.



Please note: Pin 3, 8 and 9 are not connected on the outside. Do not use cables where all pins are connected, this may impair proper functionality or even damage devices!

Please note: Each cable is fixed at the D222R by two screws. The TCN standard recommends to have an M3 thread at this point; therefore the screw locks have an inner threading M3 (not UNC4-40, as often used in other applications).

Do not try to mount the wrong thread, it will destroy the thread!

3.4.1 EMD Description

This paragraph applies to EMD- segments, only.

Pin #	Pin shortcut	Input / Output as seen from the D222R	Description
1	A.data.P	bidirectional	non- inverted MVB bus line A
2	A.data.N		inverted MVB bus line A
3	NC	-	Not connected
4	B.data.P	bidirectional	non- inverted MVB bus line B
5	B.data.N		inverted MVB bus line B
6, 7	A.term	Passive resistor	Termination resistor between two pins.
8, 9	B.term		
Shell	Shield	-	Connection to shield resp. housing.

According to the TCN standard, NC (pin 3) may optionally be used for a "TxE signal". This signal is intended for controlling bus couplers (for example interface from ESD+ to EMD). Since the D222R is available for both versions, i.e. EMD and ESD+, the TxE signal is not required.

The effective line termination matches the recommended cable impedance of 120Ω.

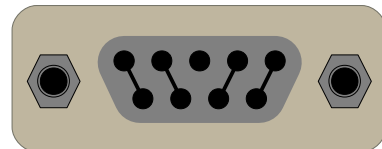
Note: If the D222R is equipped with two MVB connectors, both connectors have the same pinout, and all pins except pin "NC" are routed from one connector to the other.

Terminators EMD

The following terminator is recommended for the use with EMD- segments:

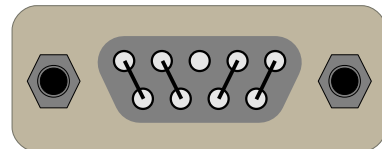
The appropriate pins from the MVB line are connected to the local terminating resistor within the D222R.

Assumed, the D222R is the last of several MVB nodes, one of the MVB connectors remains free. The terminator is mounted on this connector and delivers the correct line termination.



Please note:

- depending on the cabling concept, it is typically required to have two types of terminators: one with a male SUB-D-connector and one with a female connector.
- The terminator is not included within the D222R. Call duagon for availability and supply information.



MVB Cable Attachment for EMD

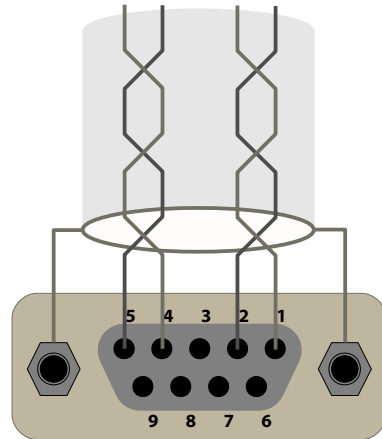
The schematic shows the recommended cable attachment.



Please note: Pin 3 and 6 to 9 are not connected on the outside. Do not use cables where all pins are connected, this may impair proper functionality or even damage devices!



Please note: Each cable is fixed at the D222R by two screws. The TCN standard recommends to have an M3 thread at this point; therefore the screw locks have an inner threading M3 (not UNC4-40, as often used in other applications). Do not try to mount the wrong thread, it will destroy the thread!

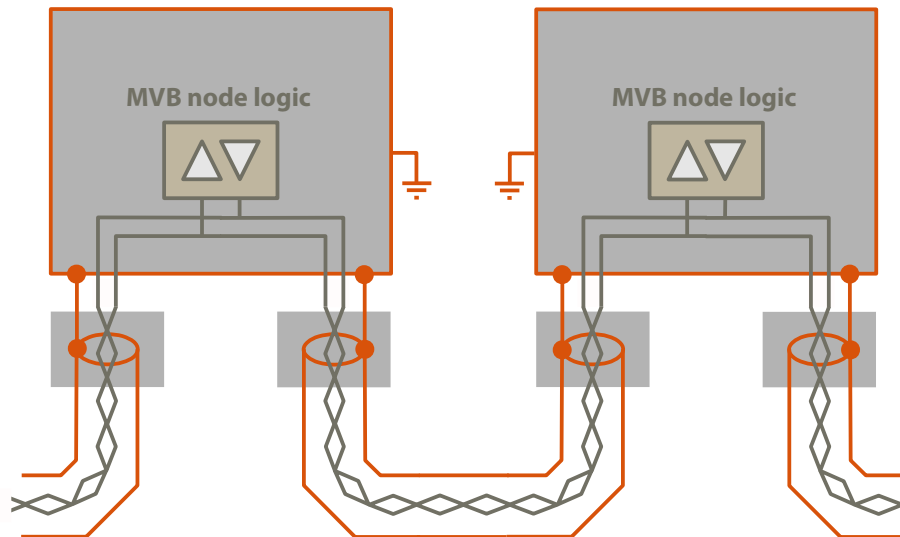


3.4.2 MVB Shielding Concept

There are basically two different shielding concepts used in TCN applications. The D222R is optimized to use the concept described below; therefore we recommend to use this concept.

The main properties of the used concept are:

- The cable shield is connected to the device housing.
- The cable shield has in all nodes the same connection to the device housing.

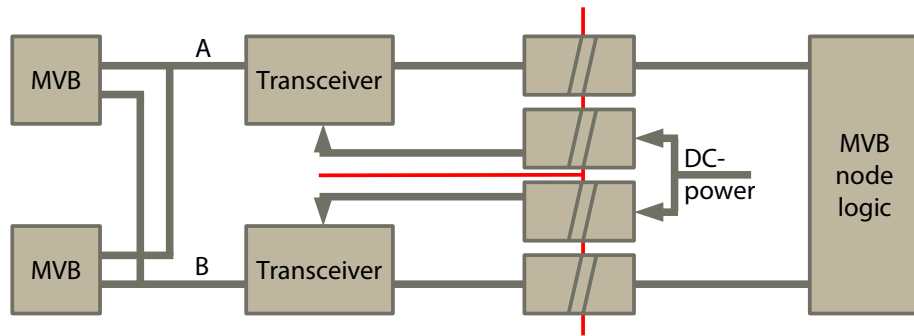


As a result, all housings are connected together. Within the vehicle concept, it must be ensured that there are no ground potential differences that may harm the cable shield or the connectors.

The connection between the cable shield and the device housing is done via the cable connector housing and the fixing screw / cable lock (as prescribed by the TCN standard).

3.4.3 Insulation

The two MVB lines A and B are galvanically insulated to the logic/IO and to each other.



3.4.4 MVB Cabling

There is a wide variety of different manufacturers for "sub-D" cable connectors. For the cable connector itself, the user may choose a supplier to his own requirements: the various versions are selected according to obvious quality level versus cost considerations. There are no big issues left being special with the use of the MVB or the D222R.

However, for the connector hoods, duagon recommends to check some issues more deep:

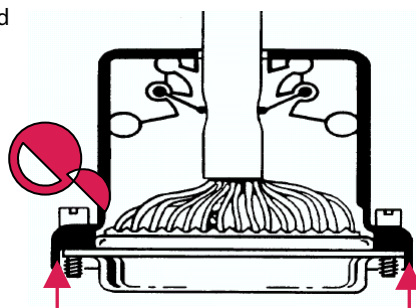
- **Shield continuity:** The MVB requires to have a shield being routed through the nodes. Therefore the user has to make sure, that the connector has a good conducting path between the cable shield and the connector shell on D222R.

In this sense, a metallic hood is the best solution. Plastic hoods with metallization are less than perfect; pure plastic is recommended for special purposes, only (e.g. in-rack- cabling, lab use).

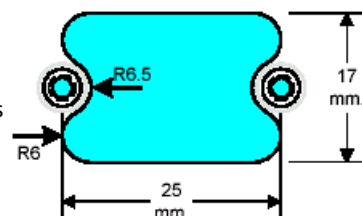
Some connectors have "dimples" with the intention to install a conductive path between the two metal shells. These are of benefit, but it is good design practice, not to rely completely on these contacts (almost never, they are specified with e.g. contact resistance). Always consider the screw cable locks as the main shield contact.

- **Mechanical compatibility:** The hood must not interfere with the D222R housing.

The example on the right side is not useful, since the connector's flanges should lie flat on the D222R surface (this example does not allow the connectors to mate completely; compare to the picture e.g. on the front page).



The drawing on the right side shows the dimensions of the cutout on D222R. This is the area where the connector hood will dive below the D222R surface.



- **Cable locks:** The MVB uses M3- thread for the cable locks. Be sure not to apply the UNC4/40 thread to it; it will damage the thread. The maximum torque for the screw locks is 40cNm. A higher torque may destroy the thread!

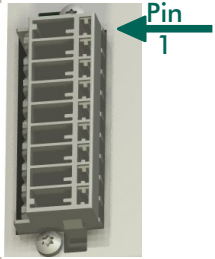
For cable hood examples, please refer to the Duagon technical note "Material and Components for wiring", d-000842-nnnnnn

3.5 Power Supply

The D222R is powered directly from the vehicle battery via WAGO connector X3.

3.5.1 Pin Definitions

Pin #	Pin shortcut	Description
1	-	Do not connect
2	+Vbat	Positive power supply
3	-	Do not connect
4	-	Do not connect
5	+Vbat	Positive power supply
6	-	Do not connect
7	Not connected	Not connected
8	-Vbat	Negative power supply
9	+Vbat	Positive power supply



Note: The respective pins for the battery lines are internally connected. Since the device requires minor power, it is OK to connect only one of the V_{bat} lines, but do not connect other devices on the empty V_{bat} line.

3.5.2 Cabling

The IO connectors X3 are from the "XCOM"- family made by Wago; see www.wago.com for reference. For more information about matching connectors, please refer to the Duagon technical note "Material and Components for wiring", d-000842-nnnnnn.



3.5.3 Power Operating Conditions

Symbol	Parameter / Conditions	Min	Nom	Max	Unit	EN50155:2007
V_{bat+}	Variations, supply change over, supply related surge	0.6 *)	1	1.4 *)	* Un	5.1.1.1 5.1.3 (Class C1) 5.2
V_{bat+} Version LV	Supply voltage with respect to Vbat- - operating -	14.4	24 36 (Un)	50.4	V	Nominal value according to 5.1.1; outer limits include the "variations", "supply change over" and "supply related surge"
	Supply voltage with respect to Vbat- - non-operating -	-50.4		50.4	V	Survives erroneous polarity reversal 7.2.6
V_{bat+} Version HV	Supply voltage with respect to Vbat- - operating -	28.8	48 72 96 110 (Un)	154	V	Nominal value according to 5.1.1; outer limits include the "variations", "supply change over" and "supply related surge"

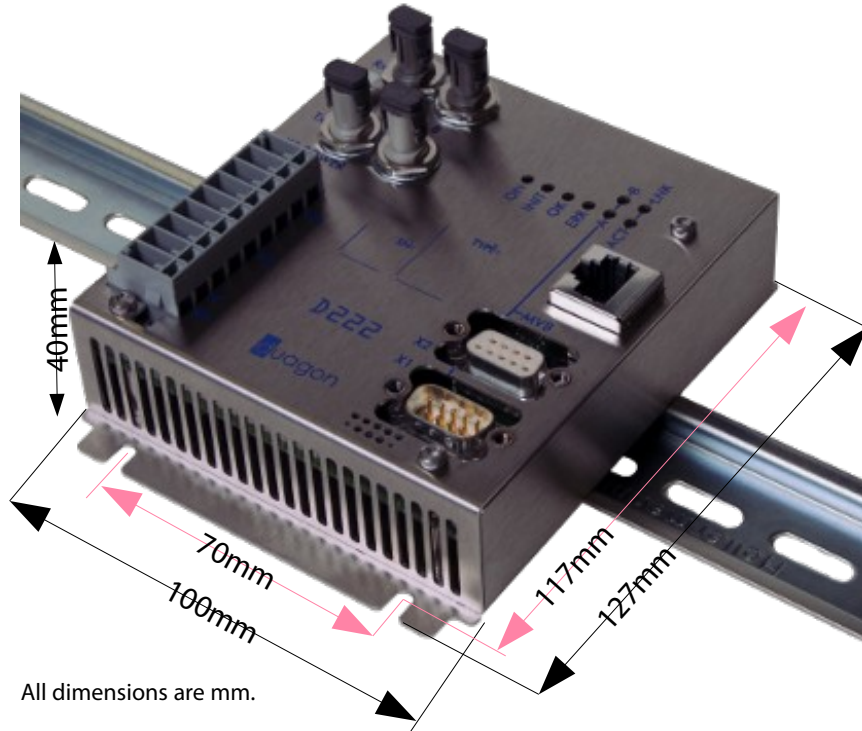
	Supply voltage with respect to V_{bat} - non-operating -	-154		154	V	Survives erroneous polarity reversal 7.2.6
-	Interruptions of voltage supply		10		ms	5.1.1.2 Class S2
U_i	Withstanding voltage over galvanic insulation		1000		V_{eff}	12.2.9.2
P_{idle}	Power drawn from V_{bat} with MVB operational		2 3	4 5.75	W	For D222R.F For D222R.5F
P_{max}	Power drawn from V_{bat} with MVB terminator voltage short circuit			tbd	W	For D222R.F For D222R.5F

“Supply related surge”: In extension to the standard reference, there is no limitation with respect to time of application.

4. Mechanical Data

The mass of the complete D222R is approximately 410g.
The weight of the housing only is approx. 265g.

The material of the housing shell is stainless steel. The thickness of the sheet metal is 1mm.



All dimensions are mm.

Mounting by four Screws

The D222R is proposed to be mounted with four M4 screws. The picture shows the dimensions for the fixture holes.

Mounting on Rail TH35

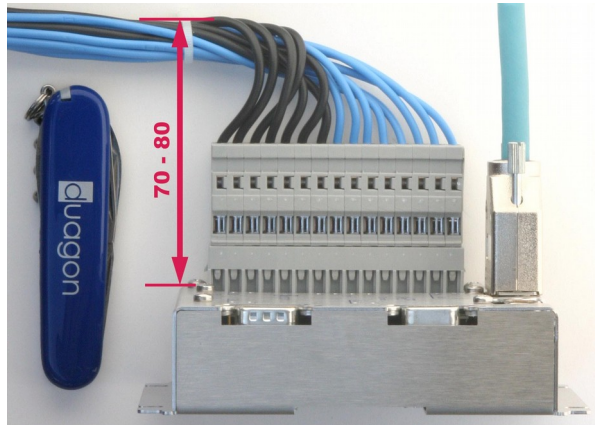
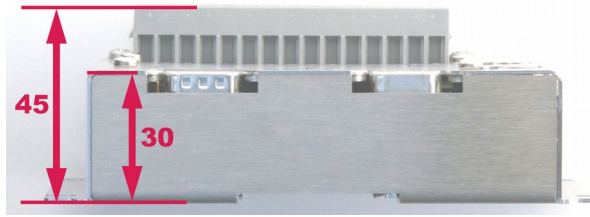
The mounting rail TH35 is available in two different thicknesses, the TH35-7.5 and TH35-15. We recommend the more stable TH35-15, due to the omnipresent vibrations on railway vehicles. However, the D222R will also fit on the lighter mounting rail.



Note: Be sure to have approximately 5mm headroom on both sides in addition to the 127mm in the picture above: it is required for placement on TS35 – DIN-rail.

Thickness

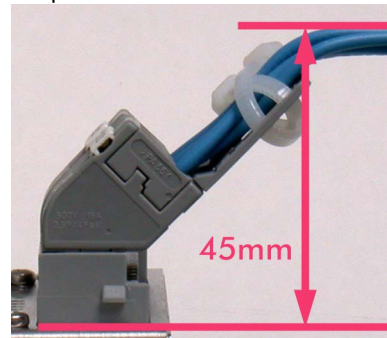
The picture shows the "height" of the D222R case **without connectors**, all dimensions in mm.



Please note:

- When calculating the required "height" of the module, be aware that the cables will require space (additional 70 – 80mm from the box surface should be OK, see picture).
- This should be usually sufficient for the MVB-connectors (Sub-D- type), too.
- Add an extra 16mm if you want to plug and unplug the cable within this space.

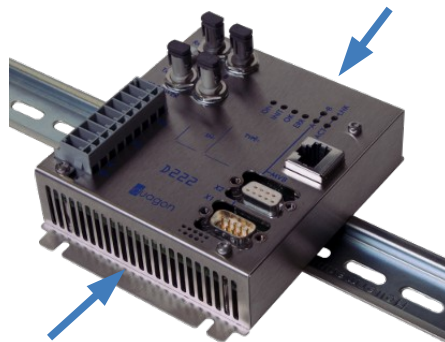
- Bended connectors require less space. Be aware of the MVB- connectors, they may be higher now.



Convection Cooling

Leave the space next to the ventilation holes on both sides empty.

The module does not need active ventilation by a fan; but natural passive convection must be possible.



Picture only to show where room for convection shall be left.

5. Environmental Data

Issue	min.	typ.	max.	Unit	EN50155:2007
Operational temperature range, "internal cubicle temperature", i.e. outside of D222R housing	-40	+25	+70	°C	4.1.2 Class TX.
Air temperature surrounding the PCB	-40	+25	+85	°C	4.1.2 For information, only.
Altitude above sea level			1800	m	4.1.1 For derating of maximum temperature with respect to altitude levels in excess please call Duagon.
Relative humidity		<75%	95%		Typical value for yearly average, max value for 30 consecutive days per year. Short term moisture condensation without malfunction (DIN EN 60068-2-30:2006-05)
Vibration			2 50	mm m/s ²	12.2.11 for 5-25 Hz for 25- 150 Hz
Shock			50	m/s ²	duration 50ms
RFI susceptibility from 0.15 to 2000 MHz.	20			V/m	

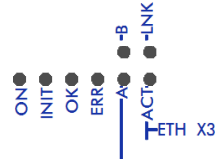
6. Application Hints

6.1 General

- As a direct consequence from the “repeater” function: there is no configuration needed for “MVB Device Addresses”, PD Traffic- or Bus Administrator lists, and the like. The internal logic function is completely automatic and does not need any application specific user interaction for configuration.
- The repeater is completely implemented in hardware (programmable logic). There is no local CPU, and, as result, no software for it.

6.2 Diagnostic by LEDs

The D222R implements LEDs that facilitate the system diagnostics. The picture on the right depicts the various LEDs present on the device.



6.2.1 General Status LEDs

The status LEDs "SYSTEM" and "INIT" display the general state of the D222R module:

"INIT" Yellow LED	Meaning
ON	Initialization or firmware update ongoing: Not the full functionality available
OFF	normal operation mode

"SYSTEM" Bicolor LED Red/Green	Meaning
Green ON	Power on, no error
Red ON	An error occurred (see application specific error code description)
OFF	device not powered

6.2.2 Communication Interfaces

For every communication interface, a pair of LEDs is used to indicate activity on the bus.

MVB

A	Meaning
ON	The interface is receiving/transmitting data on line A (wire or fiber).
OFF	The interface is not receiving/transmitting data on line A (wire or fiber).

B	Meaning
ON	The interface is receiving/transmitting data on line B (wire or fiber).
OFF	The interface is not receiving/transmitting data on line B (wire or fiber).

6.3 Reset Mechanism

The device will reset itself after power-up or when the power supply voltage drops below a what level? level and comes back again.

Please note: Since the D222R device also operates with very low voltages (-LV: far below 14V), the device may be still "up and running", even if other devices have already fallen out of operation.

Power Up

As with all electronic equipment, the D222R will need a certain time to start up. This procedure takes in typical MVB systems up to approx. 0.5 to 4 seconds (depending on version) and is automatically performed. However, the device is completely passive to the outside during this time.

6.4 EMI Considerations

We assume the following integration for the D222R with respect to EMI:

- The D222R signal lines have no connection with unshielded cables to the outside.
- The device case is properly connected to protective earth.

7. Standards Reference

The "D222R" product complies to the standards EN50155, EN50121-3-2, EN61373 and IEC61375 in general. For exceptions, not applicable subclauses etc. please refer to the following paragraphs and, in more detail, to the "Type Test Report" with the document number d-006308-nnnnnn:

Immunity

EN50121-3-2:2006 7.1 Battery referenced ports: Conducted radio frequency EN61000-4-6, $10V_{rms}$ (carrier voltage), 150kHz – 80MHz, 1kHz, 80% AM, Source impedance 150Ω

EN50121-3-2:2006 7.2 Battery referenced ports: Fast transients bursts according to EN61000-4-4, $\pm 2kV$ 5/50ns t_r/t_f , 5kHz repetition frequency.

EN50121-3-2:2006 7.3 Battery referenced ports: Surges according to EN61000-4-5, waveform 1.2/50 μs , wire vs grounding $\pm 2kV$ 42Ω 0.5 μF , wire vs wire $\pm 1kV$ 42Ω 0.5 μF

EN50121-3-2:2006 8.1 Signal I/O: Conducted radio frequency EN61000-4-6 $10V_{rms}$ (carrier voltage) 150kHz – 80MHz, 1kHz, 80% AM, Source impedance 150Ω

EN50121-3-2:2006 8.2 Signal I/O: Fast transients bursts according to EN61000-4-4, $2kV$ $\pm 5/50ns$ t_r/t_f , 5kHz repetition frequency

EN50121-3-2:2006 9.1 Enclosure port: Radio frequency EN61000-4-3, 20V/m (rms carrier voltage) 80MHz – 1GHz, 1kHz 80% AM.

EN50121-3-2:2006 9.2 Enclosure port: Radio frequency EN61000-4-3, 20V/m (rms carrier voltage) 800MHz – 1GHz, 1kHz 80% AM; 10V/m (rms carrier voltage) 1.4GHz – 2.1GHz, 1kHz 80% AM; 5V/m (rms carrier voltage) 2.1GHz – 2.5GHz, 1kHz 80% AM;

EN50121-3-2:2006 9.3 Enclosure port: Electrostatic discharge EN61000-4-2, 6kV contact discharge, 8kV air discharge.

Emission

EN50121-3-2:2006 4.1 and 5.1 Battery referenced ports, process measurement and control ports: EN55011, 150kHz – 500 kHz 99dB $\mu V/m$ quasipeak; 500kHz – 30MHz 93 dB $\mu V/m$ quasipeak.

EN50121-3-2:2006 6.1 Enclosure port: EN55011, 30MHz – 230 MHz 40dB $\mu V/m$ quasipeak measured at 10m; 230MHz – 1GHz 47 dB $\mu V/m$ quasipeak measured at 10m distance.

Insulation

IEC61375:2007 MVB physical layer, applied to EMD and ESD in the same way, according to IEC60571, 707V $_{rms}$, $1M\Omega$ for 1 minute. **Routine testing is done with the higher voltages defined in EN50155 (see below).**

EN50155:2007 12.2.9: Insulation measurement test / Voltage withstand test. 1000V $_{rms}$, $1M\Omega$ for 1 minute. During routine testing, the testing is optionally changed to sinusoidal 1500V $_{rms}$, $1M\Omega$ for 10sec. Each individual device is tested prior to shipment (routine testing).

Useful Life

EN50155:2007 6.2: Reprogrammable components (Flash Memory) are components with a limited useful life. These are specified from the manufacturer with 20 years data retention at 125° Celsius, which fits clause 6.2. The actual "useful life" can be extended by reprogramming these devices.

Particularly, there are no electrolytic capacitors, which typically introduce a limitation to useful life.

Polarity Reversal

EN50155:2007 7.2.6: Polarity reversal. The D222R is protected against polarity reversal of the vehicle battery.

Components

EN50155:2007 8.1.5 and 8.1.7: There may be specialized components/ single source components included in the product. Contact Duagon for more information about repair and long term shipment procedures.

Shock and Vibration

EN61373:1999: There is no specific definition of the mounting direction in the vehicle, i.e. the highest requirement is to be applied to all directions of the D222R. The D222R applies to mounting location "Category 1, Class B".

MVB

IEC61375-1:2007: IEC International Electrotechnical Commission, "Electric Railway Equipment, Train bus, Part 1, Train communication network". Especially Clause 3: Multifunction Vehicle Bus.

Fire and Smoke

EN45545-2:2010: The D222R falls in the category of "not-listed" products. There are no special requirements for products with a mass lower than 100g (interior location) and 400g (exterior location).

The relevant mass of the D222R, i.e. excluding the steel housing (125g, "functional necessity" EN45545-2:4.6) and the PCB (60g, "functional necessity" EN45545-2:4.6) is approximately 65g.

NF F16-102:1992: According to the French standard NF F16-102 no requirements are necessary for electrical systems with a mass lower than 300g, which are situated in a technical compartment, in the open air, a box, a cabinet or as a block equipment.

Degree of Protection

EN60529:2000: The degree of protection is IP 30C.

Manufacturing

The manufacturing of the PCB assembly is done according to **IPC-A-610D:2005 level 2**.

The product complies to the European Union directive **EC/2002/95 (RoHS)** compliance).

REACH

Concerning the European Union directive **EC/1907/2006 (REACH)** compliance), Duagon does not need to register any substance. Duagon's products do not use quantities of more than 1 ton of a certain substance and the substances are not released under normal conditions of use. For a registration, both criteria would have to be fulfilled.

Humidity

EN60068-2-30:2006: Provides a composite test procedure, primarily intended for component type specimens, to determine, in an accelerated manner, the resistance of specimens to the **deteriorative effects** of high temperature/humidity and cold conditions.

8. Links to other Duagon Documents

In general, most of the documents are located on www.duagon.com, and may be downloaded from there in the most up to date version.

D222R Type Test – Report, d-006308-nnnnnn

This document covers the type testing performed with the D222R device.

MVB System User's Guide, d-000656-nnnnnn

This document includes a lot of background knowledge for the work with MVB. It also includes hints for practical solutions, like finding & fixing of failures.

Labeling and Packaging – Specification, d-000778-nnnnnn

This document describes all product labels (e.g. serial number label) used in relation with customers. It describes furthermore how Duagon packs the products for shipment.

Quality Plan for Duagon Products – Specification, d-000796-nnnnnn

This document is a specification about test procedures for series testing of duagon products. It is valid for all duagon products in general. For each specific product an applicable subset of the described tests is selected; according to the procedures specified here.

Life Cycle of Duagon's Products – Technical Note, d-000526-nnnnnn

Opens up some MTBF and Life Cycle considerations. In a very general way, the "Life Cycle"- document may be used for planning the life time repair stock in order to ensure long support times

Material and Components for wiring – Technical Note, d-000842-nnnnnn

This document is intended for engineers to help them select the right MVB components.

9. D222R Order Information

The D222R is available in a variety of versions:

D222R	-T	-HV
Product Type: Platform D222R		
MVB Type on Segment X: EMD T ESD+ D		
Power Supply: Nominal battery voltage: 24V, 36V Nominal battery voltage: 48V, 72V, 96V, 110V		-LV -HV

Please note:

- All options are reflected in internal hardware, they have to be selected prior to manufacturing.
There is no option, which could be changed by software download later on.
- The two segment sides (wire and OGF) are always powered by the same supply voltage.

10. Document History

d-006197-021715

- Replaced some pictures by the real ones.

d-006197-012095

First preliminary release

11. Index

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Appendix A: Document Numbering System

All Duagon documents have a unique identification number. The identification number has a certain internal structure in order to ease the tracking of different documents. In general, there are two parts:

Prefix	Document number	Filing number
d	-000310	-001952
Always constant	<p>Specifies a certain purpose of a document with the intention to link several documents with different filing number.</p> <p>Please note, that the purpose of the document number is not stored for each document number, but can be derived from the document title, which is stored for each Filing number.</p> <p>The format is either 6 digits or not available.</p>	<p>Unique number, that identifies a particular document. Released in sequential manner as the documents are filed in the archive. A Duagon- internal data base contains exactly one document title text for each filing number.</p> <p>Always 6 digits.</p>

Examples for identification numbers

Identification number	Document Title / Remarks
d-000310-001606	„DXIO data sheet Rev 2.2“
d-000310-001952	<p>„DXIO data sheet Rev 2.3“</p> <p>A document, that is updated from time to time: the document number has the purpose to link several versions of the „DXIO data sheet“ together. The filing number distinguishes between different versions.</p> <p>Please note, that the document number part is kept the same, as long as the basic intention of the early versions is still kept, for example during revisions due to debugging or manufacturing updates.</p> <p>In case a significant change happens, another document number would be applied.</p>
d-000719	<p>„Notes from prototype meeting ...“</p> <p>A document, that is obviously not updated after release. The „document number“ part is missing and the filing number remains the only used part for identification.</p>

Recommendation:

In your order, you may specify for example "d-000584-nnnnnn" in order to get the "newest" version of a specific product. When you do not want to follow the sequence of newer versions, i.e. you want to stick to a specific version, then specify the full identification number like "d-000584-002043".