NETWORK PRODUCT GUIDE

Pulse
A **YAGEO** Company

Industrial • Automotive • Communications
Medical • Consumer
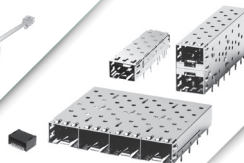
Connecting people now
and in the future

| ETHERNET | TELECOMMUNICATIONS | FIBER OPTICS | CONNECTORS |

Network Business Unit
Mission Statement

Our goal is to be the preferred technology partner for copper connectivity interface solutions to leading suppliers of communication network equipment & devices.

Core Skills

- Demonstrated design/engineering and high volume expertise
- Strong relationships with leading electronic OEM's, CEM's & PHY companies
- Excellent value and outstanding quality products delivered from high-volume production facilities
- Geographic proximity to customers' design and production sites
- Worldwide distribution support

Resources

- Pulse Networking Website
  - » Buy Now
  - » Sample Portal
  - » Datasheets, RoHS CoC, 3d Models
  - » Application Guides/Technical Papers/Videos
  - » Easy to use Product Finder
  - » New Product Releases
- Technical Support
  - » America's
    Prodinfonetworkamericas@pulseelectronics.com
  - » Europe, Middle East, Africa:
    Comms-Apps-Europe@pulseelectronics.com
  - » Asia, Austrailia (Pacific Rim), Korea
    Prodinfonetworkapac@pulseelectronics.com

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Focus Markets & Applications

Pulse Electronics is developing the next generation of networking components to support the future expansion of the following markets and applications. Pulse has full line of network products which include Ethernet Transformers, Ethernet Connector Modules, Connectors, RF Inductors, Common Mode Chokes, and Telecom Magnetics and Filters.

Transportation

Applications

- Infotainment
- Body Controls
- ADAS
- Cameras/Radar
- Battery Management Systems
- Telemetry

Consumer

Applications

- ONT
- Femtocell
- Gateway/Router
- Security
- Home Automation
- Displays/TV's

Industrial Market

Applications

- Automation
- Process Controls
- Communications
- Robot controls
- Security Displays
- Smart Grid

Medical

Applications

- In Fusion Pumps
- Imaging
- Ventilators
- Diagnostics
- Monitors

Communications

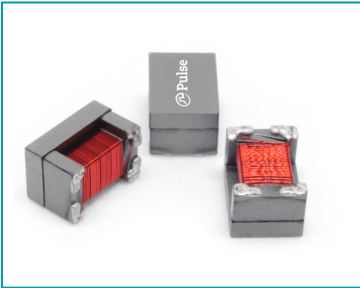### Applications

- Switches
- Routers
- Gateways
- Access points
- Basestations

1000Base-T1 Automotive Ethernet Common Mode Choke

AE5002 – 1000Base-T1

Pulse releases the AE5002 1000Base-T1 common mode choke for automotive Ethernet applications. In addition to the 1000Base-T1 Pulse has released AE2002 100Base-T1 CMC and is in process of releasing the 100Base-T1 Power over Data Lines (PoDL) AE3003/AE3005/AE3006 CMC. Pulse's parts are designed to operate from -40°C up to +125°C, have high reliability, high volume manufacturing, long term manufacturing support, and meet AEC-Q200 requirements.

■ Features and Benefits

- Designed to meet IEEE 802.3bp/bu/bw
- Qualified at Marvell, Broadcom, Valens
- Meets AEC-Q200 requirements
- IATF 16949:2016 Factory
- Operating Temp. from -40°C up to +125°C
- PPAP Documentation Available
- Fully Automated Production

■ Applications

- Infotainment
- Advanced Driver Assist Systems (ADAS) Body Control
- Camera/Radar
- Gateways
- Backbone Diagnostics
- Telemetry

Part Number	Speed	Part Type	PoDL Rating	Package Size	Production Status
AE2002	100Base-T1	CMC	Non-PoDL	1812	Released
AE5002	1000Base-T1	CMC	Non-PoDL	1812	Released
AE3003	100Base-T1	CMC	300mA	2518	Target Release Q2 '19
AE3005	100Base-T1	CMC	350mA	2518	Target Release Q2 '19
AE3006	100Base-T1	CMC	470mA	2518	Target Release Q2 '19
AL0470	100Base-T1	Dual Inductor	470mA	N/A	Target Release Q4 '19

1x2 Tab Down Pin-In-Paste (PIP) Ethernet Connectors

JXR8 1x2 Pin-In-Paste Series

Pulse's latest JXR8 PIP Tab down series of 1x2 Ethernet connector modules are designed to provide isolation and noise reduction in a single solution. Pulse parts operate with a wide range of industrial protocols. These 1x2 Tab Down connectors are compact and make it easy for designers to layout their PCB's. The PIP capability allows for these parts to be reflow soldered removing one step in the manufacturing process.

■ Features and Benefits

- Designed to meet IEEE802.3u (100BASE-TX) and 802.3ab (1000BASE-T) standards
- -40ºC to +85ºC operating temperature
- Pin-in-Paste (PIP) Soldering
- Suitable for CAT 3, CAT 5 UTP or higher
- Compact form factor optimizing board space
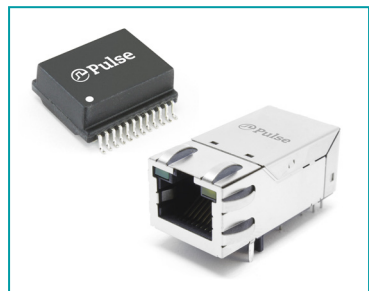- Supports all major PHY manufactures

■ Applications

- Industrial Automation
- Process or Remote Control and Monitoring
- Campus
- Factory or Rugged Communication Networks
- Power over Ethernet
- Touch Screen Display & Panels
- Security & Image processing
- Access Control

Part Number	Tab Location	No. of Ports	Speed	LED Left/Right	Contact Plating
Operating Temp. -40°C to +85°C					
JXR8-1001NL	DOWN	1x2	100Base-TX	Green/Yellow	15uinch
JXR8-1002NL	DOWN	1x2	1000Base-T	Green/Yellow	15uinch
JXR8-1003NL[*]	DOWN	1x2	Cat 5e	Green/Yellow	15uinch

[*]No Magnetics

HDBaseT Connector Module & Industrial Temperature Discrete Modules

HDX8004/5/8NL(top) and
JK0-8001NL(bottom)

Pulse Electronics expands their HDBaseT product portfolio with a series of industrial temperature -40°C to +85°C HDBaseT magnetic modules. Pulse HDBaseT magnetic modules include a transformer and common mode choke that offer safety isolation and EMI noise reduction in a single package. In addition, Pulse has released the first ever HDBaseT Integrated connector module. This offers designers option to reduce board space and simplify board layout. The HDBaseT technology enables 5Play feature set, which includes ultra-high definition 4k video, audio, 100Base-TX Ethernet, various control signals, and up to 100W of power, on a single 100m CAT5e/6 cable.

■ Features and Benefits

- Compatible with Valens chipsets
- Supports Power Over HDBaseT up to 140W
- Suitable for a variety of HDBaseT applications
- High volume production
- Industry standard footprint

■ Application

- Blu-ray, DVD, Recorders
- Displays
- Digital Set Top Box
- PC's
- Projectors
- A/V Receivers
- Game Consoles
- HDMI repeaters, Splitters, Switches

Part Number	Description	PoE (W)	Valens PHY
HDX8004NL	SIN, HDBaseT, SMT, -40°C to +85°C	60W	VS010, VS020, VS100, VS200, VS210, VS2000, VS2310
HDX8005NL	SIN, HDBaseT, SMT, -40°C to +85°C	100W	VS010, VS020, VS100, VS200, VS210, VS2000, VS2310
HDX8006NL	SIN, HDBaseT, SMT, -40°C to +85°C	140W	VS010, VS020, VS100, VS200, VS210, VS2000, VS2310
HDX8008NL	SIN, HDBaseT, SMT, -40°C to +85°C	60W	VS010, VS020, VS100, VS200, VS210, VS2000, VS2310
JK0-8001NL	1x1, HDBaseT, TH, 0°C to +85°C	30W	VS010, VS020, VS100, VS200, VS210, VS2000, VS2310

2.5G/5GBase-T PCMCIA 4P PoE Ethernet Magnetics

HX4110NL/HX51010NL

Pulse electronics introduces 2.5GBase-T and 5GBase-T Ethernet magnetics supporting 4P PoE connections in a new low profile package for multiple Ethernet applications. The parts are compatible with all major 2.5G/5GBase-T PHY suppliers. The parts are ideal for applications requiring higher bandwidth, PoE function, and lower overall package height such as LTE base stations, 802.11ac wireless access points, NIC cards, high speed routers, switches and video displays.

■ Features and Benefits

- Designed to meet IEEE802.3bz for 2.5GBase-T and 5GBase-T
- Compatible with all Major PHYs
- Low profile package
- 4P PoE 60W
- Operates from -40°C to +85°C
- High volume, High reliability manufacturing

■ Applications

- 802.11ac Wireless Access Points
- NIC Cards
- LTE Base Stations
- Video Displays
- High Speed Routers & Switches

Part Number	Speed	Ports	PoE	Operating Temp.
HX4110NL	2.5GBASE-T	Single	60W	-40°C to +85°C
HX51010NL	5GBASE-T	Single	60W	-40°C to +85°C

1210 Size Automotive Chip Chokes

PE-1210ACCXXXSTS Series

Pulse Electronics has expanded its Chip Choke product range for Automotive CANbus applications. The PE-1210ACC size offers chip chokes accredited to the Automotive Reliability standard AEC-Q200 and complements our existing PE-1812ACC series. They combine small size with the same excellent suppression performance needed for automotive networks and transportation solutions using CAN, CAN-FD, A2B and isoSPI.

■ Features and Benefits

- Offers small size and big performance for filtering EMC on CANbus lines
- Meets AEC-Q200 requirements for Automotive Environments
- Operating temp. -40°C up to +150°C
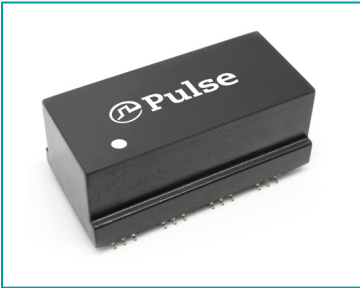- Multiple Impedance or Inductance value for optimizing EMC on other LVD Signal Lines

■ Applications

- In Vehicle Networks and Communications
- Battery Management Solutions
- Infotainment Systems
- Body Control

Electrical Specifications @ 25°C - Operating Temperature -55°C to +150°C							
Isolation Resistance (MΩ) Min - 10							
Part Number	Common Mode Impedence (10MHZ)		Inductance (uH)	Standard Tolerance	RDC (Ω Max)	IDC (A Max)	Rated Volatage (V) Max
	Min	Typ.					
PE-1210ACC110STS	300	550	11	+50/-30%	0.4	0.3	100
PE-1210ACC220STS	500	1100	22	+50/-30%	0.5	0.25	100
PE-1210ACC510STS	1000	2600	51	+50/-30%	0.7	0.2	100
PE-1210ACC101STS	2200	5100	100	+50/-30%	1.5	0.15	100

1000Base-T 4P PoE UL60601
Medical Grade Magnetics

HXU6200NL

Pulse releases the HXU6200NL four pair 30W ethernet magnetics for Medical applications. The part is qualified to UL 60601, 2 means of operator protection (2 MOOP), PoE capable up to 30W, operating temperature of -40°C to +85°C, voltage isolation of 3000Vrms, and provides 4.0mm Creepage and 2.5mm Air clearance.
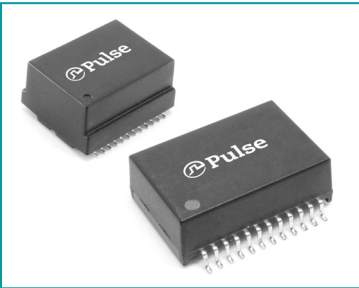
■ Features and Benefits

- UL60601-1 Qualified
- 2 MOOP
- 4P PoE 30W
- Operating Temp. from -40°C up to +85°C
- 3KVrms Voltage isolation
- 4mm Creepage
- 2.5mm Air Clearance
- +15 years production support

■ Applications

- MRI Machine
- Surgical Equipment
- CPAP
- Infusion Pumps
- Dialysis equipment

Part Number	Number of Ports	Max. Power	Voltage Isolation	Creepage	Clearance
HXU6200NL	Single	30W	3KVrms	4mm	2.5mm

High Isolation Industrial & Medical Magnetics

Pulse Electronics Networking has released products dedicated to supporting the safety requirements where high working voltages, surges and transient voltages are present. Especially aimed towards the Energy, Smart Metering, Industrial control and Measurement, and Medical market sectors. Pulse parts have multiple options for working voltages, isolation voltages, and surge/impulse. In addition, we can meet functional, basic, supplementary and reinforced insulation requirements. Our parts are designed to meet the most stringent safety standards.
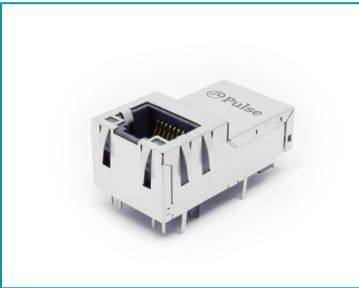
HXXXXXXNL Series

■ Features and Benefits

- Small footprint for High Isolation
- Meets or exceeds relevant safety standards for Industrial and medical applications
- Insulation supports >4KV for 1 minute.
- Added Surge or Impulse Tested options
- Operate temperature -40°C up to +85°C
- Optimized for use in Industrial Fast Ethernet, 1 and 2.5 Gigabit, TSN and other LVDS links
- Supports remote DC power feeding by PoE/PoE+ over Cat5 Cabling

■ Applications

- Electricity Meters - 2 & 3 Phase
- Battery Management Solutions
- Instrumentation and Measurement Links
- AC Motor Drives
- MRI Machine, CPAP, Dialysis Equipment
- Industrial Remote Access Points & Sensors

Part Number	Speed	Insulation	IEC STD (working voltage)	Surge or Impulse	Voltage Breakdown	Size (mm) (L x W x H)
HX1224CNL	100Base-TX	Reinforced >4mm Creepage >5mm Clearance	IEC60950 250Vrms UL file# E133523	-	4KV rms / 60s	13.6 x 15.0 x 6.2
HX1333NL	100Base-TX	Reinforced >8.6mm C/C	IEC60950 600V	12KV Impulse per IEC61010	4.5KV rms / 60s	17.1 x 14.7 x 8.6
HX1339NL	100Base-TX	Supplementary >10mm Creepage >7mm Clearance	IEC61010-1 250V	-	4.5KV rms / 60s	15.2 x 15.2 x 7.6
H5187NL	1000Base-T	Functional	IEC60950	-	5KV rms / 60s	18.5 x 15.9 x 9.8
HX5026NL	1000Base-T	Functional	IEC60950	-	4KV rms / 60s	18.2 x 16.0 x 6.6
HX5224CNL	1000Base-T	Reinforced >4mm Creepage >5mm Clearance	IEC60950 250Vrms UL file# E133523	-	4KV rms / 60s	18.5 x 15.9 x 9.8
HX4019NL	2.5GBase-T	Functional	IEC60950	4KV impulse	3KV rms / 60s	18.2 x 16.0 x 6.6

1X1 1G/2.5G/5G/10GBase-T 4P PoE Top Entry Series

1x1 Top Entry 1000BASE-T,
2.5GBASE-T, 5GBASE-T, 10GBASE-T
4P POE Ethernet Connector Modules

Pulse Electronics introduces the J1V series of 1x1 Top Entry 1000Base-T to 10GBASE-T 4P PoE Pin-in-Paste Ethernet Connector Modules. These parts have options for LED's and 4 and 5 channel magnetics for 10GBase-T. The package is ideal for applications requiring higher bandwidth and higher power such as Base Stations, IPTV, Gateways, Video Displays, and Thin Clients.

■ Features and Benefits

- 1x1 Top Entry
- 1000Base-T, 2.5GBase-T, 5GBase-T, 10GBase-T performance
- 4P PoE up to 100W
- Pin-in-Paste (PIP) Soldering
- 4 & 5 Channel available
- RoHS 6/6 capable
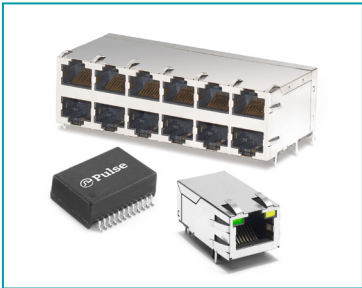- Compatible with all major PHY's

■ Applications

- Base Stations
- IPTV
- Video Displays
- Gateways
- Thin Clients

Part Number	Description	Speed	IEEE Specification	PoE Watts
J1V-U2100NL	1x1 Top Entry	1000Base-T	802.3ab	75W
J1V-U2500NL	1x1 Top Entry	2.5GBase-T	802.3bz	100W
J1V-U5000NL	1x1 Top Entry	5GBase-T	802.3bz	72W
J1V-U7000NL	1x1 Top Entry	10GBase-T	802.3an	60W

140W 4P PoE Ethernet Transformers and Ethernet Connector Modules

Ethernet Discrete and Connector Modules that operate up to 140W of maximum power

Pulse has designed our 1000BASE-T PoE parts to allow for maximun power of 140W. Pulse has both Ethernet magnetics and Ethernet connector modules that accommodate the higher power. The parts are compatible with all major 1000BASE-T PHY's. The parts are ideal for applications requiring higher power like Notebooks, Base stations, Access points, Video Displays, and Gateways.

■ Features and Benefits

- 140W max. power
- Multiple package options
- Compatible with all major PHY's
- In Volume Production
- Industry Standard Footprint

■ Applications

- Base Stations
- Access Points
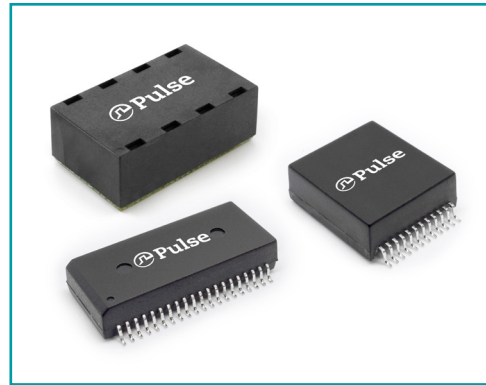- Notebooks
- Video Displays
- Gateways

Part Number	# of Ports	Max. Power	Speed
HX6098NL	Single	140W	1000BASE-T
JK0-0229NL	1x1	140W	1000BASE-T
J0B-3563NL	2x6	140W	1000BASE-T

Ethernet Transformers

■ Specifications

- IEEE 802.3 compliant to 10G
- HDBaseT Compliant
- High Isolation up to 6kV
- Higher reliability (Carrier class & AEC-Q200)
- Single, Dual, Quad packages
- SMT & BGA options
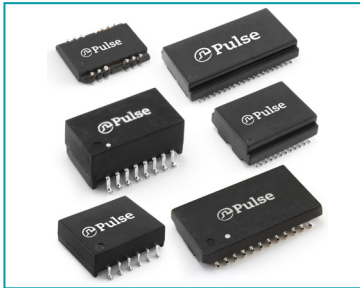- Extended Temperature -40ºC to +85ºC
- PoE++ Capable up to 140W

Ethernet Connector Modules

■ Specifications

- IEEE 802.3 compliant to 10G
- Thru-Hole, Press Fit, Pin-In-Paste, SMT options
- Multiple platforms - 1x1, 1xN, 2xN Tab up, Tab down, Side entry, Top entry, Low Profile, Offset
- Higher isolation (TVSS, surge)
- With and without LED's
- Extended temperature -40ºC to +85ºC
- PoE++ Capable up to 140W

Battery Management Isolation Transformers

BMS Isolation transformers and common mode chokes

■ Specificatons

- Support serial Daisy Chain isoSPI, SPI and other signal isolation
- Meets AEC-Q200 requirements
- Operating temp. -40°C up to +125°C
- Multiple options for working voltages and voltage isolation
- Safety Isolation and EMI Noise Suppression

RJ45 Connectors

■ Specifications

- Multiple Platforms - 1x1, 1xN, 2xN, Side entry, Top entry, Offset, Low profile
- CAT3 to CAT5e connectors available
- With & without LED's
- With & without shields
- Cat 6a coming soon

IO Connectors

■ Specifications

- USB 3.1 Type C,
  USB 3.0, Thunderbolt
- High Speed (5G/s ~ 10G/s
- performance)
- Right Angle/Vertical, THT/SMT
  options

Fiber Optic Connectors, Cages & Transceivers

■ Specifications

SFP/SFP+ Connectors & Cages
- 1G & 10G performance
- 1xN & 2xN Platforms
- Standard industry footprints
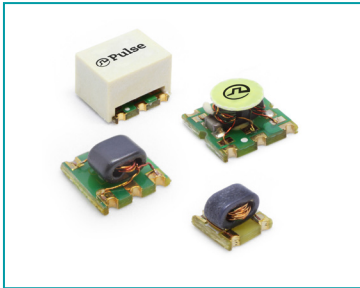- EMI shielding options
- Signal integrity simulations

Transceivers
- Hot Pluggable SFP and SFP+ footprints
- Compliant to Ethernet and Fiber Channel
  standards
- Standard reaches from very short to long haul
- SFF-8472 compliant Diagnostic Monitoring
  Interface
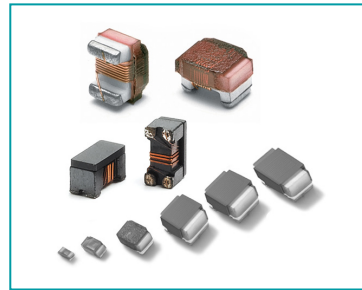- Support up to 11.1Gbps

RF Modules & Baluns

■ Specifications

- Multi band filter & modules (SMT,TH)
- Diplexers/Triplexers
- High rejection, low loss
- Excellent return loss
- Compliant to Docsis & MoCA
- Transmission line Baluns & Splitters
- Isolation matching Baluns
- IOT antenna matching Baluns

Filter Components

■ Specifications

- RF Chip Inductors
- EMI Suppression Ferrite Beads
- Chip Chokes
- Array type beads
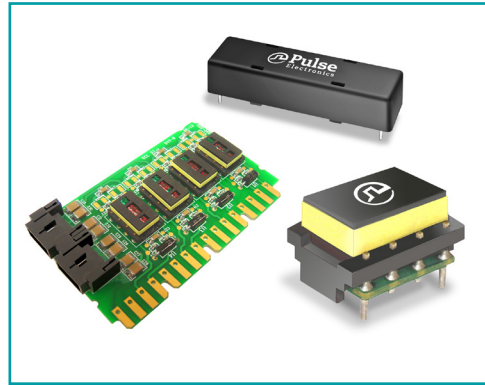
Telecommunication Transformers

■ Specifications

- T1/E1, T2/E2, ISDN, VDSL2, G. Fast(106MHz, 212MHz)
- Smallest Footprint
- Custom & Catalog Solutions
- Surface Mount and Thru-Hole
- Functional, Basic, Supplementary, and Reinforced options
- Extended Temperature options
- RoHS-6 Compliant

MSAN Filters

■ Specifications

- VDSL2 up to 30 MHz
- Extended temperature options
- Low profile options
- Single & Dual
- Standards: Europe, US, UK, China
- Integrated protection option
- Surface Mount and Thru-Hole
- Standard Footprints
- RoHS-6 Compliant

Broadband Filters

CPE VDSL2 Splitters

CPE Filters: Z-300 Series

■ Specifications

- VDSL2 up to 30MHz
- Video grade
- ANSI & ETSI spec. compliance

- Single & Dual In-Line
- Dual In-Line with DSL Jack
- Alarm Filters

Pulse Authorized Distributors

North America:

Arrow, Avnet, Digi-Key, Mouser, Sager, TTI, Master, Newark-E14, Future

Europe:

EMEA Partners: Arrow, Avnet Abacus, TTI, Rutronik

Local Partners:

Austria	- Ineltro Halmer
Belgium	- Alcom Electronics
Ireland	- FMG Electronics Ltd
Israel	- Eldis
Netherlands	- Alcom Electronics
Poland	- Gamma
Russia	- Macro, MT-System, Petro-in-Trade, EFO
UK	- Solid State Supplies AB

Asia:

China: Fortune, Avnet, Arrow, Lestina, Jolun, Bilway, TTI
Taiwan: Avnet, Arrow, Quadrep, Lestina, TTI
Japan: Avnet, Takachiho, Chip1stop, Mouser, Okaya Electronics
Korea: Avnet, Arrow, Changnam, Taekyung
India: Arrow, Avnet, TTI, WE
South Asia: Avnet, Arrow, Quadrep, TTI

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