Universal Switching Corporation

Specification Sheet LS16A-001
Linker System: Up to Sixteen Elements
Distribution, Buffering, Switching or Conversion
System LS16A

September 2017

General

Converting signal types, buffering them, and providing distribution or switching is all part of today's system build. Our LS16A "Linker System" provides a very cost effective means to provide all these functions in one modular 3RU design. Properly configured with the appropriate elements, it can be a "drop-in" replacement for units from APCOM, Apogee Labs, and other companies, but with our ISO9001-2008 quality, capability, and features while using the latest in component technology.

The 16-slot 3RU unit provides an efficient combination of modularity, performance and reliability. Our unique design allows any combination of elements to be installed from the rear of the unit. Most elements provide indicators, adjustments or test points to the user at the front, while having the actual signal connectors facing the rear. Some can be controlled or monitored via the optional controller.

Elements are hot-swappable and the frame can be populated with redundant (two) power supplies to deliver the ultimate in system reliability. The optional CPU (C3-Lite) can be added to remotely control various element features (switching, gain adjust, and LNB control). Digital, analog and conversion elements are available which can be mixed/matched within the same frame. The LXI certified CPU provides the user with web browser control, 10/100 port, TCP/IP, SNMP, SNTP, IPv4/6, realtime clock, and other features including unit health, power supply status and fans speeds.

NOTE: This product was originally introduced as the LS1601A. Since then, the model number has been reduced to LS16A to allow more options.

Applications

- Communication installations
- Telemetry & weapons system testing
- Antenna LNB power and 22kHz management
- RF-Over-Fiber antenna communication
- Airborne surveillance systems
- Digital broadcast facilities or production studios
- Protocol or interface converters
- Signal buffering and re-generation
- Remotely locate antennas using RF-Over Fiber
- Distribution, switching or conversion of signals
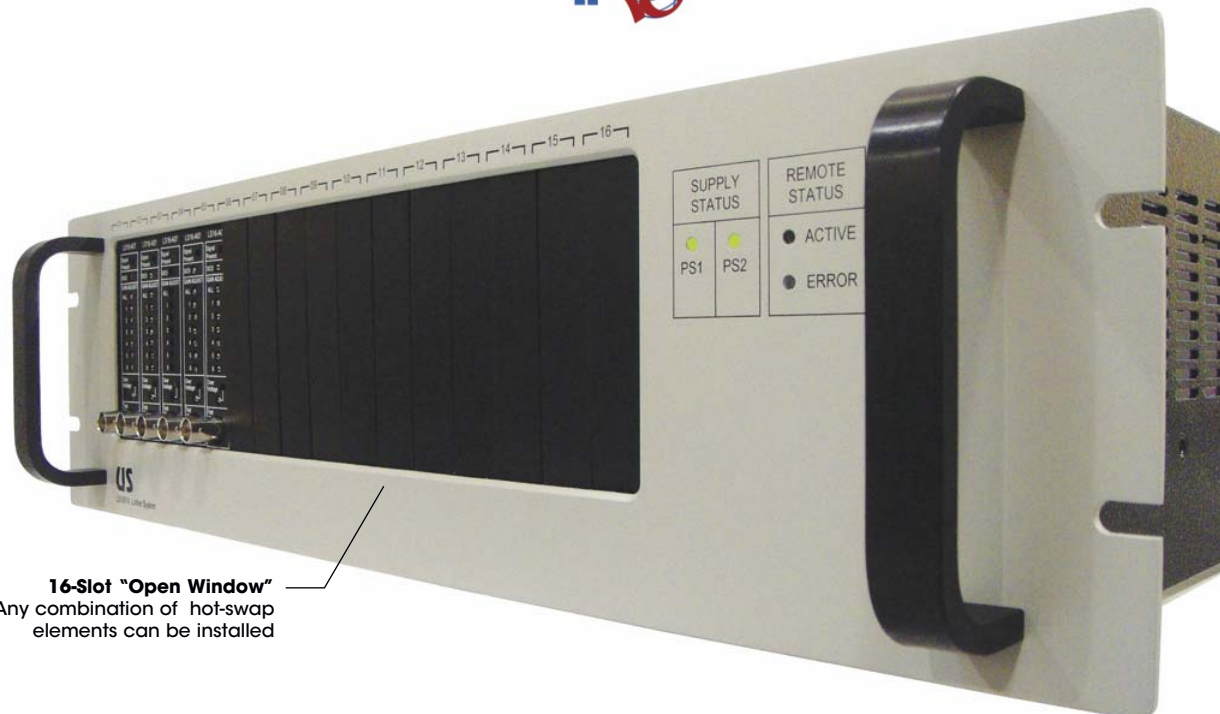- Analog, fiber, and digital elements available

Features

- Modular rugged 3RU aluminum frame
- Sixteen element capacity
- Built-in daisy chain bus for scalable distribution
- Monitored cooling fans (CPU not needed)
- Sum-bus available across all element slots
- Various signal connector types available
- Some elements have push-button controls
- Redundant monitored hot-swap power supplies
- Optional C3-Lite Controller (10/100) with browser
- International AC power input
- Certified CE EN61010 (LVD)
- LabVIEW drivers available

SNMP

C3 Powered

LXI

IPv6

ROUTEWARE PRO 5.0

Download our Monitor & Control software **RouteWarePRO** for a FREE 30-day trial today!

16-Slot "Open Window"
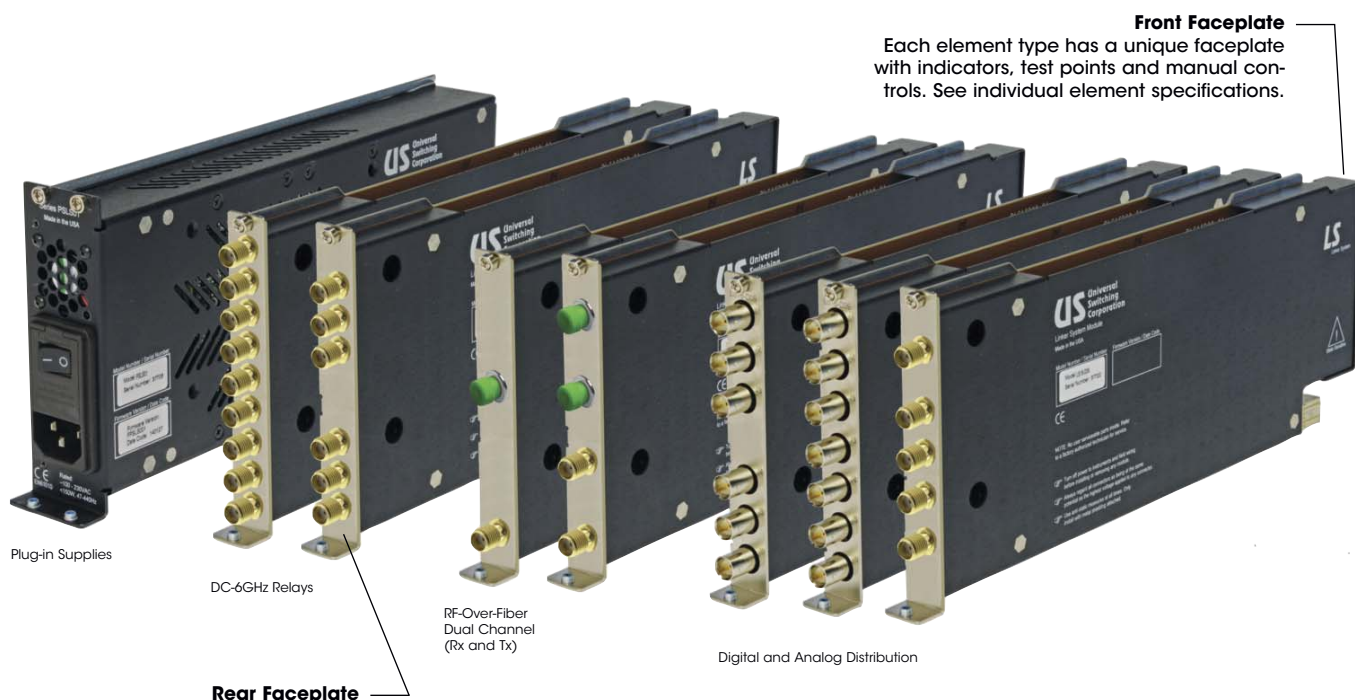Any combination of hot-swap elements can be installed

Made in the USA

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"Linker System" Elements and Assemblies

The LS16A has different element types available with various capabilities. Below are some popular elements and options. Contact the factory for custom options.
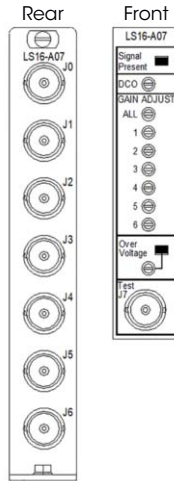
Model	Description	Page
LS16-A07	Single 1x6 DC-40MHz Analog Distribution Amplifier: BNC connectors, 75 ohm impedance, six outputs with individual gain adjustment, DC offset control, wide-band (DC-40MHz min), over voltage detector with set-point adjustment, signal detector	3
LS16-A18	Single 1x4 Wideband (50-3000MHz) Multicoupler: BNC connectors, 50 ohm impedance, isolated outputs, input gain control with -10dB to +20dB gain in 1/2dB steps	3
LS16-A19	Single 1x4 L-Band (850-2150MHz) Multicoupler: BNC connectors, 50 ohm impedance, isolated outputs, input gain control with -10dB to +20dB gain in 1/2dB steps, with LNB power (0V/13V/18V), LO control 22kHz on/off, LNB current monitoring	3
LS16-D05	Single 1x6 Digital Distribution & Convertor: Twinax/BNC connectors, jumper selectable input impedance, bal/unbal input selection, 3 differential (422) outputs and 3 single-ended outputs, front panel monitor test point (Equivalent to APCOM 5000-DDS)	4
LS16-D09	Dual 1x2 Digital TTL Distribution: BNC connectors, jumper selectable input impedance (50 or 75 ohm), single-ended TTL outputs, front panel BNC monitor test points, and signal presence indicators	4
LS16-FR2	Dual Section RF-Over-Fiber Rx: FC inputs, SMA output RF connectors, 50 ohm impedance, 50MHz-3000MHz, front panel indicators, signal presence and alarm indicators	4
LS16-FT2	Dual Section RF-Over-Fiber Tx: SMA inputs, FC output connectors, 50 ohm impedance, 50MHz-3000MHz, front panel coupler monitor test point, signal presence and alarm indicators	5
LS16-L02	Dual Section LNB DC Power Injector: BNC connectors, 50 ohm (75 opt), LNB power (0V/13V/18V), LO control 20kHz on/off, LNB current monitoring (850-2450MHz)	5
LS16-L03	Dual Section LNB DC Power Injector: BNC connectors, 50 ohm (75 opt), LNB power (0V/13V/18V), LO control 20kHz on/off, LNB current monitoring, RF power monitor and gain control, (850-2450MHz)	5
LS16-R12	Dual 1x2 Relay: (bidirectional redundancy switch), BNC connectors, 50 ohm impedance, self-terminating	5
LS16-FFP	Front filler plate (single slot)	N/A
LS16-RFP	Rear filler plate (single slot)	N/A
PSLS16-150	Plug-in hot-swap "smart" power supply assembly	N/A
LS1601A	Empty 16-slot element chassis assembly with fans (no elements, power supplies, filler plates or CPU)	N/A
C3L-LS16A	Plug-in control CPU with FLASH memory, TCP/IP, SNMP v1/v2, SNTP, web access and microSD slot	N/A

Front Faceplate
Each element type has a unique faceplate with indicators, test points and manual controls. See individual element specifications.

Plug-in Supplies

DC-6GHz Relays

RF-Over-Fiber Dual Channel (Rx and Tx)

Digital and Analog Distribution
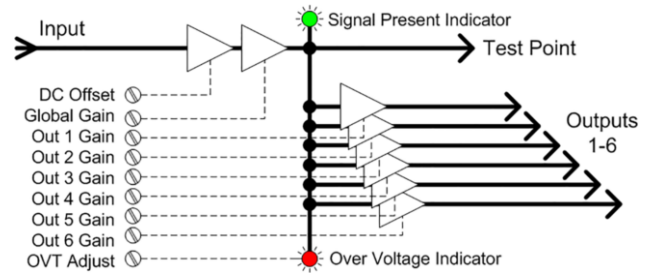
Rear Faceplate
Each hot-swap element type has a unique rear faceplate with all signal connectivity. See individual element specifications.

Element LS16-A07
Analog Distribution Amplifier (1x6): DC-50MHz

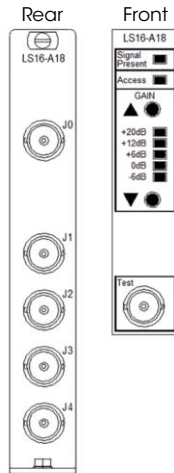|	
Function	1x6 distribution
Frequency	DC-50MHz
Impedance	75 ohm
Nominal input	+/-5VDC
Maximum input	+/-15V (no damage)
Maximum output	+/-5VDC (terminated)
Input return loss	>20dB typ
Gain adjust	Global and individual (+/-6dB min)
DC offset adjust	Yes (+/-50%)
Over voltage adjust	Yes
Indicators	Signal present, and overvoltage
Signal connectors	BNC (including test point)
Sum-bus access	Yes
Size	Single slot

Rear   Front

LS16-A07

LS16-A07
Analog DC-50MHz distribution amplifier with 1 input, 6 outputs, individual and global gain adjustments, test point, DC offset adjustments, and indicators.
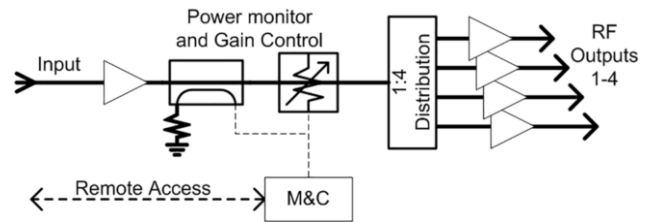
A07

Element LS16-A18
Wideband Multicoupler (1x4): 50-3000MHz

Function	1x4 distribution
Frequency	50MHz - 3000MHz
Impedance	50 ohm (75 ohm optional -7)
Flatness	+/-2.5dB typ (full range)
-1dB compression	+5dBm
Maximum input	+24dBm (no damage)
Input return loss	>20dB
Gain adjust	-10dB to +20dB in 1/2dB steps
Test point	Yes (-24dB)
Faceplate controls	Yes (gain push-buttons)
Indicators	Signal present, access, gain setting
Signal connectors	BNC standard, SMA (add "A" suffix)
Control	Remote C3L via Ethernet
Size	Single slot

Rear   Front

LS16-A18

LS16-A18
Wideband 50-3000MHz multicoupler (distribution amplifier) with 1 input, 4 outputs, programmable and manual input gain control, signal detect, power monitoring, BNC test point (-24dB).
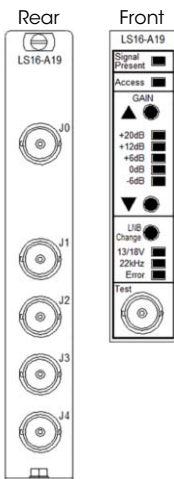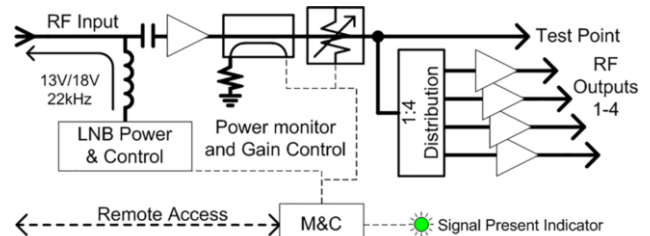
A18

Element LS16-A19
L-Band Multicoupler (1x4) w/LNB: 850-2450MHz

Function	1x4 distribution
Frequency	850MHz - 2450MHz
Impedance	50 ohm (75 ohm optional -7)
Flatness	+/-2dB typ (full range)
-1dB compression	+5dBm
Maximum input	+24dBm (no damage)
Input return loss	>20dB
Gain adjust	-10dB to +20dB in 1/2dB steps
LNB features	0V/13V/18V & 20kHz, 400mA
Test point	Yes (-24dB)
Faceplate controls	Yes (gain and LNB push-buttons)
Indicators	Signal present, access, gain setting 13V/18V, 22kHz, LNB error
Signal connectors	BNC standard, SMA (add "A" suffix)
Control	Remote C3L via Ethernet
Size	Single slot

Rear   Front

LS16-A19

LS16-A19
L-Band 850-2450MHz multicoupler (distribution amplifier) with 1 input, 4 outputs, programmable and manual input gain control, signal detect, power monitoring, programmable and manual LNB control features, BNC test point (-24dB).
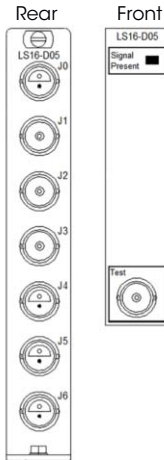
A19

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Element LS16-D05
Digital TTL/422 Distribution (1x6): DC-50Mbps

Function . . . . .1x6 digital distribution/conversion
Data rate DC-50Mbps
Input impedance . . . . .50/75/100 ohm selectable
Input type . . . . .TTL or 422 selectable
Output types . . . . .3x TTL, 3x "422"
Indicators . . . . .Signal present
Input connector . . . . .Twinax (polarized)
Output connectors . . . . .BNC x3 and Twinax x3
Test port . . . . .BNC
Size . . . . .Single slot

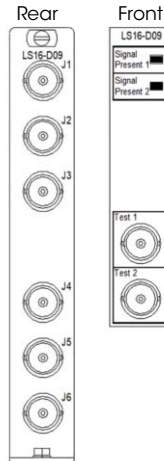Rear   Front

LS16-D05
Signal Present

Test

LS16-D05
Digital DC-50Mbps distribution with 1 input, 6 outputs, selectable input type (TTL or "422", selectable input impedance, test point, signal present indicator.
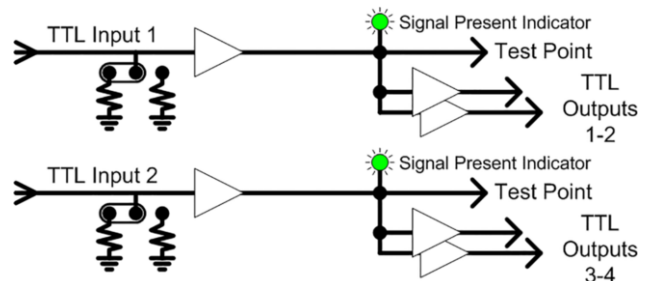

Digital Input — Signal Present Indicator — Test Point — TTL Outputs 1-3 — '422 Outputs 4-6 — Selectable Balanced/ Unbalanced Input and Termination

D05

NOTE: This element provides same function as discontinued APCOM #5000-DDS

Element LS16-D09
Digital TTL Distribution (Dual 1x2): DC-50Mbps

Function . . . . .Dual 1x2 digital TTL distribution
Data rate DC-50Mbps
Input impedance . . . . .50/75 ohm selectable
Input type . . . . .TTL
Output types . . . . .TTL
Indicators . . . . .Signal present
Input connector . . . . .BNC
Output connectors . . . . .BNC
Test port . . . . .BNC
Size . . . . .Single slot

Rear   Front

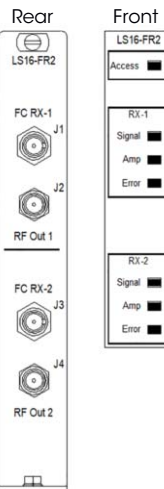LS16-D09
Signal Present 1
Signal Present 2

Test 1
Test 2

LS16-D09
Digital DC-50Mbps TTL distribution with dual 1 input, 2 output, selectable input impedance, test point, signal present indicator.
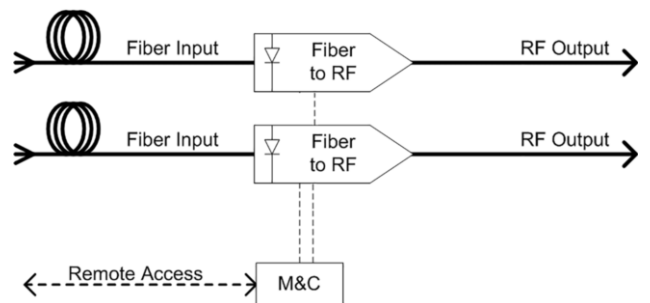

TTL Input 1 — Signal Present Indicator — Test Point — TTL Outputs 1-2
TTL Input 2 — Signal Present Indicator — Test Point — TTL Outputs 3-4

D09

Element LS16-FR2
Wideband RF-Over Fiber Receiver: 50-3000MHz

Function . . . . .Dual section RFOF
Frequency . . . . .50MHz - 3000MHz
Output impedance . . . . .50 ohm
Flatness . . . .+/-2dB typ (full range)
-1dB compression . . . .+5dBm
Gain adjust . . . . .0 to +12dB
Wavelength . . . . .1310 nm
Indicators . . . . .Signal present, access, amp health, error
Signal connectors . . . . .FC fiber, SMA RF
Control . . . . .Remote C3L via Ethernet
Size . . . . .Single slot

Rear   Front

LS16-FR2
Access

FC RX-1
J1
RX-1
Signal
Amp
Error

J2

RF Out 1

FC RX-2
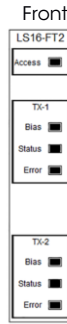J3
RX-2
Signal
Amp
Error

J4

RF Out 2

LS16-FR2
Dual wideband 50-3000MHz RF-Over-Fiber receivers, programmable gain control, signal detect, signal monitoring, single-mode FC fiber connectors, SMA output connectors.

C3L Powered

Fiber Input — Fiber to RF — RF Output
Fiber Input — Fiber to RF — RF Output
Remote Access — M&C

FR2

NOTE: This element is designed to be paired with the LS16A-FT2 element or USRM-FT1 ruggedized transmitter unit.

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Element LS16-FT2
Wideband RF-Over Fiber Transmit: 50-3000MHz

Function . . . . .Dual section RFOF Transmitter
Frequency . . . . .50MHz - 3000MHz
Input impedance . . . . .50 ohm
Flatness . . . .+/-2dB typ (full range)
-1dB compression . . . .+5dBm
Gain adjust . . . . .0 to +12dB
Wavelength . . . . .1310 nm
Indicators . . . . .Signal present, access,
                                            amp health, error
Signal connectors . . . . .FC fiber, SMA RF
Control . . . . .Remote C3L via Ethernet
Size . . . . .Single slot

FT2

NOTE: This element is designed to be paired with LS16A-FR2, or USRM-FR1 ruggedized receiver unit.

Rear **Front**

LS16-FT2
Dual wideband 50-3000MHz RF-Over-Fiber transmitter, programmable gain control, signal detect, signal monitoring, single-mode FC fiber connectors, SMA input connectors.
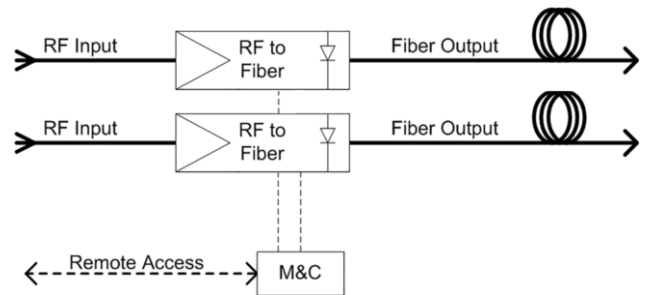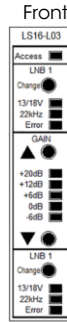

Elements LS16-L02, LS16-L03
Dual LNB power/control/gain: 850-2450MHz

Function . . . . .Dual LNB power/control/gain
Frequency 850-2450MHz
Input impedance . . . . .50 ohm (75 ohm optional -7)
Input .Antenna RF, LNB power and control
Output . . . . .RF
Indicators . . . . .13V/18V, 22kHz, error, acess
Faceplate controls . . . . .Yes (gain & LNB push-buttons)
Gain . . . . .L03 version has power monitor and
                                            gain control
Signal connector . . . . .BNC standard, SMA (add "A" suffix)
Control . . . . .Remote C3L via Ethernet
Size . . . . .Single slot

L02
L03

Rear **Front**

LS16-L02 and LS16-L03
LNB power injector (0V/13V/18V) and 22kHz control with BNC connectors. The L03 version adds RF power monitor, programmable and manual input gain control.
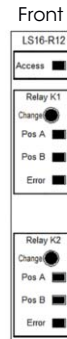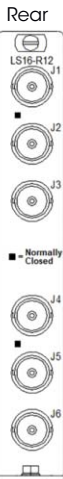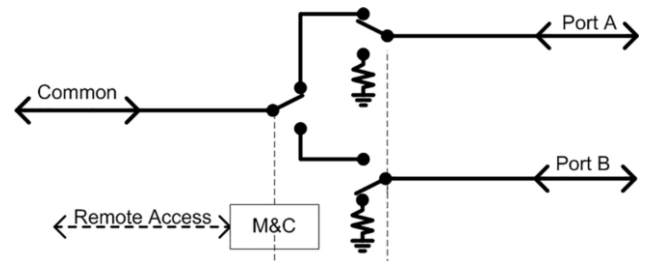

Element LS16-R12
Dual Coaxial 2x1 Relay: DC-3000MHz

Function . . . . .Two 2x1 relay sections
Frequency . . . . .DC - 3000MHz
Impedance . . . . .50 ohm (75 ohm optional -7)
Transmission loss . . . .<1dB typ
Isolation . . . .>60dB typ
Termination . . . . .50 ohm, 1/8W (75 ohm optional)
Indicators . . . . .Switch position
Faceplate controls . . . . .Yes (switch position push-buttons)
Signal connectors . . . . .BNC standard, SMA (add "A" suffix)
Control . . . . .Remote C3L via Ethernet
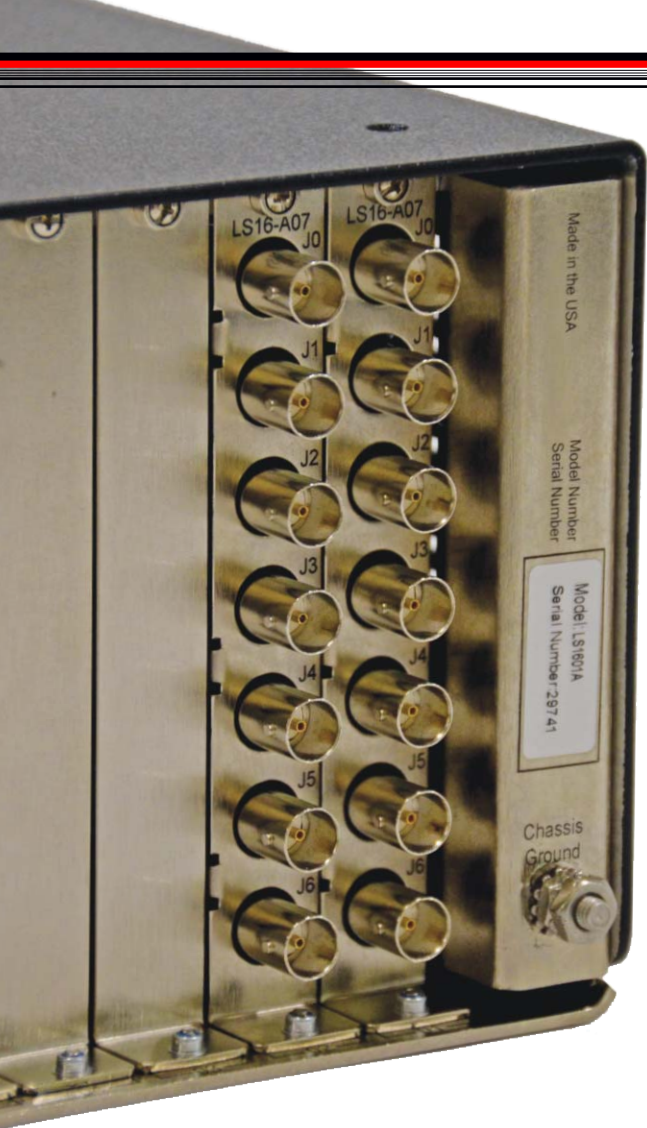Size . . . . .Single slot

R12

Rear **Front**

LS16-R12
Two sections of 2x1 coaxial DC-3000MHz with 50 ohm terminations (internal), programmable and manual switch control.

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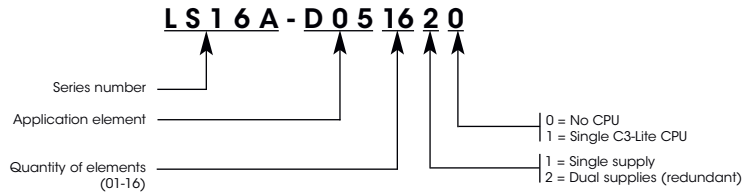
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System Number Definition

Must all be the same type of element. If a mix of elements are needed, contact the factory for a unique easy order part number (example: LS16A-xxxxx), or just order the items you want and assemble your own unique system.

L S 1 6 A - D 0 5 16 2 0

- Series number
- Application element
- Quantity of elements (01-16)

- 0 = No CPU
- 1 = Single C3-Lite CPU
- 1 = Single supply
- 2 = Dual supplies (redundant)

NOTE: This product was originally introduced as the LS1601A. Since then, the model number has been reduced to LS16A to allow more options.

Specifications

Capacity	Sixteen application elements
Signal connector location . . .	Rear facing
Element installation	Rear
Element types	Digital, analog and fiber
Power supply section	Plug-in type, redundant available
Power supply monitoring	Included
Controller	Optional 10/100BaseT (C3-Lite)
Status LED's	Front panel and individual faceplates
Front panel type	Open window
Configuration memory	FLASH (C3-Lite optional)
Cooling	Dual fan assisted (monitored)
AC power requirements	90-264VAC, 47-440Hz, 160Watts (max)
Fuse protection	2A, 5mm (dual)

Weight	<20lbs (configuration dependent)
Size	3.72H x 10.50D x 19.00W (3RU)
Operating temp	0 to +60C
Non-operating temp	-20 to +85C
Humidity	0 to 95% (NC @ +25C)
MTBF	>125,000 hours
Warranty	2 years
Certifications	CE EN61010

Universal Switching's policy is one of continuous development. Consequently, the company reserves the right to vary from the descriptions and specifications shown in this publication.