

CPS4048+

48V Cabinet Power System

4100W (75A) Temperature Hardened System
Input: 85 Vac to 264 Vac (Autoranging)
Output: -48 Vdc and Optional Ringing Generator

H569-422 Battery Plant **Model J85500R-1**



The low-maintenance, outside-plant CPS4048+ integrates advanced technology in an extremely efficient modular design capable of a variety of combinations in either stand-alone or multipleself configurations. The CPS4000 family also comes in a 24V version and a 19-inch version.

Wide Temperature Range

The CPS4048+ incorporates temperature hardened electronics and is suitable for use in remote applications at a wide temperature range, -40°C to $+65^{\circ}\text{C}$ (-40°F to $+149^{\circ}\text{F}$), with excursions up to $+75^{\circ}\text{C}$ (167°F).

Multiple Configurations

A single shelf measures 23 in. (584 mm) across, 5U (8.75 in., 222 mm) high and 12 in. (305 mm) deep and has convenient front access. CPS4048 also comes in a 19" shelf. Refer to datasheet DS03-039. The CPS4048+ is available in the following configurations:

- A rectifier plant capable of providing 48V power with a load range of up to 75 A in a oneshelf plant, up to 150A in a two-shelf plant, up to 225A in a three-shelf plant, or up to 300A in a four-shelf plant.
- A rectifier/ringer plant in which 48V rectifiers provide load power and also power 50 VA or 100 VA ringers. Two half-width ringers may be installed in the first rectifier shelf slot to provide 50 VA or 100 VA of redundant ringing power.

- A rectifier/converter plant in which 48V rectifiers provide power for the load as well as remote plant voltage adjustment, and remote power for dc-dc converters providing 24V at 25A or 130V at 4A.
- A converter only plant in which the 48V to 24V or the 48V to 130V converters are powered from a separately derived 48 Vdc source. It accommodates dual-output applications in a flexible, two-power-bus shelf design with as many as five plug-in power modules per shelf.

Plug-In Modules

The available plug-in power modules consist of the following:

- -48V , 15A rectifier, 88.5% efficient
- 50 VA or 100 VA ringing generator, at 20 Hz or 25 Hz.
- Basic (ACU) or enhanced (MCU) controllers
- 48V to 130V converter at 4A
- 48V to 24V converter at 25A
- Distribution modules

CPS4048+ offers low-voltage battery disconnect and thermal management as optional battery management features.

Applications

- Digital loop carrier
- Remote switching cabinets
- Personal communications services (PCS/GSM)
- Fiber-in-the-loop power node cabinets
- Intelligent Vehicle Highway System (IVHS)

Benefits

- Maximum Design Efficiency
 - The CPS4048+ increases power density and flexibility by incorporating five power modules in one shelf measuring 8.75 in. (222 mm, 5U) high by 12 in. (305 mm) deep.
 - Power modules, alarm module, low-voltage battery disconnect contactor, and battery thermal compensation are all housed in one compact shelf.
 - Modular growth capabilities of the CPS and distribution system means the initial system can be engineered to meet immediate power requirements and grow incrementally as system power demand increases.
 - All equipment is front-accessible, ideally suited for use in cabinets and other space-restrictive environments.
- Cost Efficiency
 - Unique, lightweight components and front-access system architecture reduce installation and maintenance time and expense.
 - Near-unity power factor corrected rectifiers can result in lower utility costs.
 - Incremental system expansion can minimize initial purchase outlay.
- Enhanced Reliability
 - The CPS4048+ Battery Plant has been designed using

switchmode technology, strictly controlled manufacturing processes, and the highest quality standards to ensure excellent performance, superior reliability, and an extended service life.

- Continuous Operation
 - Hot-pluggable rectifiers or converters can be easily added to the system without any interruption of service.
- System Safeguards
 - Low-voltage battery disconnect and thermal management options provide protection for using equipment and batteries.
 - All equipment is qualified to withstand Telcordia NEBS Zone 4 earthquake conditions (except the IR30C and IR40C battery trays).
- EMI Performance
 - The power systems EMI performance is CISPR Class B.
 - The CPS4048+ can be deployed in EMI-sensitive sites such as customer premise cabinets.
- Safety/Standards Compliance
 - Meets all applicable UL*, CSA†, and VDE‡ standards.
 - CE Marked.
 - Meets all applicable sections of NEBS.

Features

CPS4048+ Shelf

- Complete plant in one, two, or three shelves
- Temperature hardened for harsh environments
- Available with one, two, or five ac feeds per shelf
- True n+1 redundancy, with five ac feeds per shelf
- Low-voltage battery disconnect option
- Thermal management option

- Field-replaceable fans integrated into modules

Rectifier

- Model ES660C rectifier operates from a nominal 100/120/200/208/240 Vac source (autoranging) and provides 48/52/54.5 Vdc at 15 A over the temperature range -40°C to +75°C
- Meets telecommunications power needs within the 15A to 225A range with capacity upgrades from one rectifier in a single shelf to three full shelves of 15 rectifiers

Converter

- Two converters are available:
 - ES680 Converter, 48 V/130V, 4A output
 - ES681 Converter, 48V/24V, 25A output
- Both converters are powered from the output of the shelf rectifier(s)
- Both converters are compatible with external 48V sources

Controllers

The controllers provide output alarms, alarm LEDs, and battery thermal management and set plant parameters.

- ES648B Enhanced Monitor and Control Unit (MCU) has a plant meter for local display of plant voltage and current and supports adjustment of various alarm setpoints. The MCU has an optional modem that can be used for remote monitor and control of plant functions and has a call-out-on-alarm feature.
- ES647 Basic Alarm Control Unit (ACU) provides basic monitor and control of plant functions.

* UL is a registered trademark of Underwriters Laboratories, Inc.

† CSA is a registered trademark of the Canadian Standards Association, Inc.

‡ VDE is a registered trademark of Verband Deutscher Elektrotechniker E.V.

Ringling Generator

The CPS4048+ can accommodate two half-width ringling generators that occupy half slots in the left-most power slot:

- ES620: 50 VA at 100 Vrms/20 Hz
- ES620B: 50 VA at 75 Vrms/25 Hz
- ES621 or ES622C: 100 VA at 100 Vrms/20 Hz CISPR Class B
- ES621B or ES622B: 100 VA at 90 Vrms/20 Hz

Distribution Modules

Three in-shelf distribution options are available; all take one full power module slot:

- ES610 module provides 12 primary bus outputs protected by GMT-type fuses.
- ES611 module provides six primary bus outputs; four are protected by 3A to 30A circuit breakers, and two by GMT-type fuses.
- The ES613 module provides 12 secondary bus outputs protected by 1/4A to 10A GMT-type fuses.

For low-power applications, the remote distribution panel can be replaced by the ES610 or the ES611 module.

Distribution Panels

Three different application-dependent distribution panels are available for use with the following CPS4048+ configurations:

- One CPS shelf with LVD or two CPS shelves without LVD (H569-422 Group 15)
 - A 7-in. panel that accepts up to 22 plug-in style circuit breakers or fuses
 - Panel rating, 300A
 - Breaker or fuse position rating, 50A maximum
 - All distribution panels accept both single-position circuit breakers and fuses in a range of sizes from 3A to 50A

- Each unit provides an LED indication and a contact closure to the CPS controller to indicate a tripped breaker or blown fuse

- Two CPS shelves with LVD (H569-422 Group 16)
 - A 10-in. (254 mm) panel (panel height is 7.5 in. (191 mm) with an additional 2.5 in. (64 mm) required for cabling) that accepts up to 11 plug-in style circuit breakers or fuses, 6 GMT-type fuses for dc loads, and 6 GMT-type fuses for ac (ringling) loads
 - Panel rating, 300A
 - Breaker or fuse position rating, 50A maximum
 - GMT fuse ratings up to 10A
- One or multiple CPS shelves without LVD (ED83135-30 Group 6)
 - A 10-in. (254 mm) panel (panel height is 7.5 in. (191 mm) with an additional 2.5 in. (64 mm) required for cabling) that accepts up to 22 plug-in style circuit breakers or fuses
 - Panel rating, 300A
 - Breaker or fuse position rating, 50A maximum
 - Includes a 400A low voltage battery disconnect contactor
 - Includes a 300A shunt with test points

Battery

- Accepts up to four strings of Tyco IR or VR batteries. The CPS4048+ can also be configured to work with most VRLA batteries.
- Battery Stands and Trays
 - A 7-ft. (2.1m)-high, seismic network bay frame can be used for applications that do not require batteries or where the batteries are located elsewhere, or where additional CPS shelves are required.
 - In non-seismic applications, 7-ft. (2.1m) trays can be

mounted in the frame to accommodate up to four strings of IR30C or IR40C batteries or two strings of 12IR125 batteries.

- A 38-in. (965 mm) or 42-in. (1067 mm) frame is available for applications where the CPS shelves and distribution will be mounted on top of battery stands.
- Battery stands are available to hold one string of 2VR250E batteries, one string of 2VR375E batteries, or four strings of 12IR125 batteries.

- The option for temperature compensating the battery float voltage over the temperature range of -20°C (-4°F) to +55°C (+131°F) is being offered. This switch-selectable option will provide a higher float voltage for temperatures below 25°C. (+77°F) By boosting the float voltage as battery temperatures decrease, the battery capacity reduction at low temperatures can be minimized. The conventional slope thermal compensation from 25°C (+77°F) to 55°C (+131°F) is a switch-selectable alternative.

Safety Requirements

Shelves equipped with rectifiers and/or converters are UL Listed per subject letter 1801: "Power Distribution Center for Communication Equipment."

Rectifiers* and converters are recognized per UL1950 and CSA 22.2 950 Certified and VDE Licensed to EN 60950/IEC 950. The plant primary output voltages meet SELV requirements.

Product must be installed only in restricted-access areas in accordance with Articles 110-16, 110-17, and 110-18 of the National Electric Code†, ANSI/NFPA Number 70 or per applicable local codes where the steady-state ambient

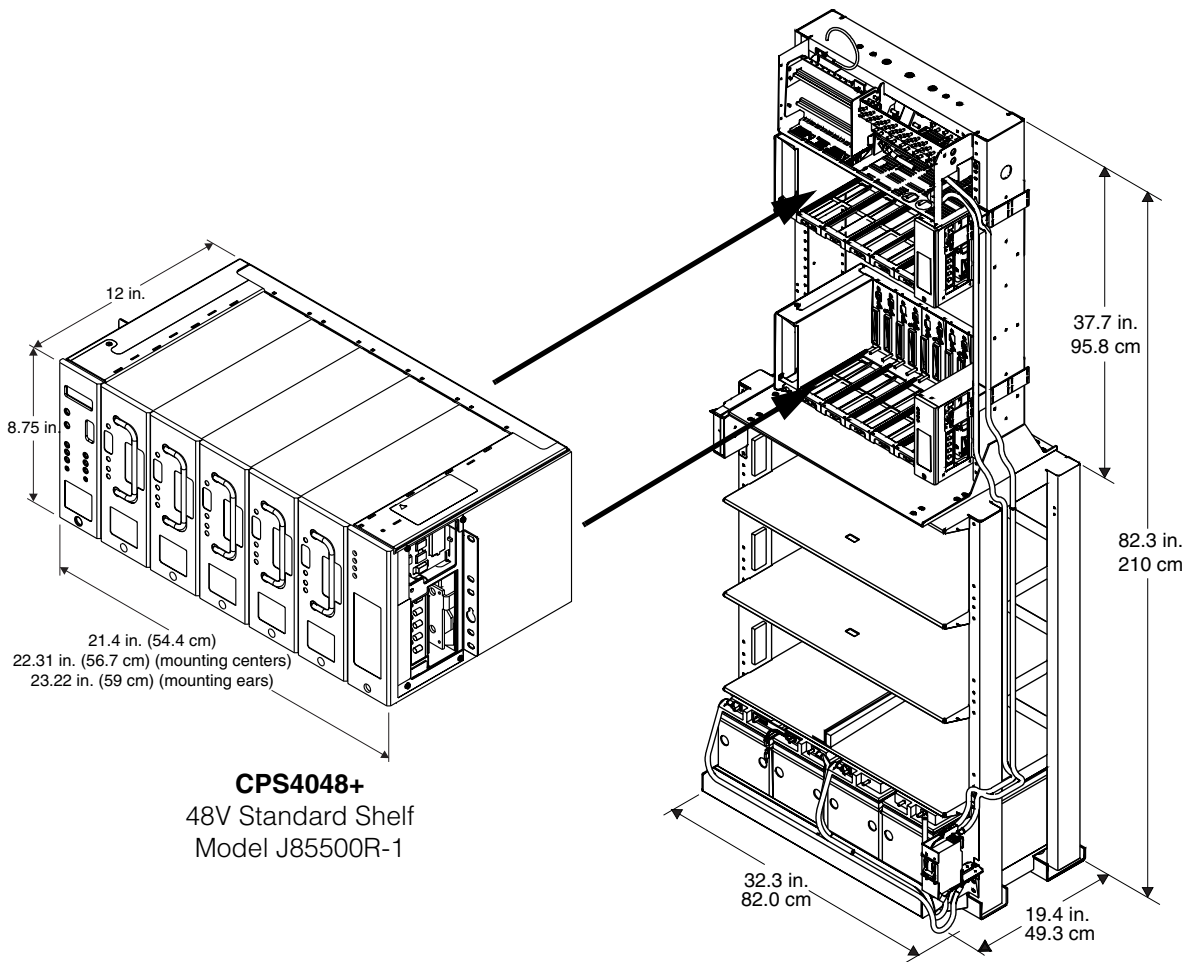
temperature does not exceed +65°C (+149°F) with excursions to +75°C. (+167°F) The output voltage of the ES660 rectifiers and the rectifier output of CPS shelves meet SELV requirements per UL1950 and IEC950. Secondary output can be equipped with converters or ringers with outputs >60 Vdc (not evaluated for VDE).

The CPS4048+ is CE Marked to show conformance to the requirements outlined in the European Union's Low Voltage Directive (72/73/EEC) and EMC Directive (93/336/EEC) both as amended by the CE Marking Directive (93/68/EEC). System meets all applicable sections of NEBS.

** ES660C rectifiers are intended for integration into end-user equipment. All required procedures for CE Marking of end-user equipment should be followed.*

† National Electrical Code is a registered trademark of the National Fire Protection Association.

Outline Drawing



CPS4048+
48V Standard Shelf
Model J85500R-1

CPS 48V Cabinet Power System
(H569-422) Include's CPS4048+
Shelves, Remote Distribution and
Battery Stand

Specifications

Electrical and Thermal	
Plant	One or multiple shelves per plant: One initial or master shelf per plant Up to three supplementary or slave shelves per plant
Power Slots	Five power slots per shelf; maximum of 20 power slots per plant
Power Units	One rectifier or one converter per power slot; maximum of five per shelf One secondary output power bus per shelf; maximum of two per shelf
Plant Architecture	One primary output power bus per shelf; maximum of 75A, per shelf One secondary output power bus per shelf, maximum of 50A, per shelf
Input Distribution:	
Primary Bus	Single ac feed Dual ac feed Separate ac feed provided to each rectifier slot
Secondary Bus	Single feed on primary bus provides dc input power to converter or ringer
Output Distribution:	
Primary Bus	Bulk power outputs (to loads or distribution and protection panels): double-hole lugs Battery inputs: double-hole lugs to terminate four battery strings
Secondary Bus	Panel-mounted mate-n-lock connector for converter or ringer outputs
Protection and Distribution:	
Primary Bus	ES610 plug-in protection and distribution module: 12 GMT-type fuses; module output limited to 25A ES611 plug-in protection and distribution module: four circuit breakers available from 3A to 30A, and two GMT-type fuses Remote protection and distribution modules; fuses or circuit breakers
Secondary Bus	ES613 plug-in and distribution module: 12 GMT-type fuses Remote protection and distribution modules; fuses or circuit breakers
Maximum Recharge Current	Installed plant 48V rectifier capacity minus plant 48V load
Low-Voltage Disconnect	40.5V ± 0.5V or 42V ± 0.5V (selectable)
Frame Options	7-ft. seismic frame 38-in. or 42-in. frame "top-hat" for mounting on battery stands
Battery Tray with Stand Options	2VR250E Battery Stand 2VR375E Battery Stand 12IR125 Battery Stand IR30C Battery Tray IR40C/12IR125 Battery Tray
Distribution Options	
H569-422	
Group 15	Panel with 22 positions for plug-in circuit breakers and/or fuse holders, available in 3A to 100A sizes, rated at 300A maximum
Group 16	Panel with 11 positions for plug-in circuit breakers and/or fuse holders, available in 30A to 50A sizes, 6 GMT-type fuses for ac (ringing) loads, and 6 GMT-type fuses for dc loads
ED83135-30 Group 6	Panel with 22 positions for plug-in circuit breakers and/or fuse holders, available in 3A to 50A sizes. Panel is also equipped with a 400A LVD contactor and 300A shunt with test points.

Electrical and Thermal	
Rectifier Output	48 Vdc to 56 Vdc at 0A to 15A
Efficiency (Rectifier)	88.5% typical at 208 Vac / 240 Vac
Power Factor	>0.98 for loads >60% full load
Regulation	±0.5%
AC Drain (per Rectifier)	10.2A at 90 Vac; 7.7A at 120 Vac; 5.1A at 180 Vac; 3.8A at 240 Vac
Temperature Range	-40°C to +75°C (-40°F to +167°F)

Specifications (continued)

Environmental	
Altitude	-200 ft. to +13,000 ft. (-61m to +3962m) For altitudes above 5000 ft, derate the temperature by 3.6°F per 1000 ft. For altitudes above 1524m, derate the temperature by 0.656°C per 100m
Humidity	10% - 95% noncondensing
Audible Noise	<65 dBA measured from 2 ft. or 0.6m from one-shelf plants

Safety/Standards Compliance	
Electrostatic Discharge	IEC 801-2 Level 3, EN 61000-4-2
Radiated and Conducted Emissions	CISPR 22, Class B
Electromagnetic Immunity	Meets Bellcore GR-001089-CORE
Earthquake Rating	Zone 4, upper floors
Rectifier Shelf Equipped with Rectifiers	UL Listed per Subject Letter 1801: "Power Distribution Center for Communications Equipment", VDE Licensed per EN 60950
Rectifiers	Recognized per UL1950 and CSA 22.2 950; VDE Licensed to EN 60950/IEC 950 CE Marked (meets 73/23/EEC as amended by 93/68/EEC directives)
System CE Marking	CE Marked per European Union Council Directives: Low Voltage Directive (73/23/EEC) and EMC Directive (89/336/EEC) as amended by CE Marking Directives (93/68/EEC)

Physical	Depth	Width	Height	Weight
Rectifier/Converter	10.75 in. (27.3 cm)	3.2 in. (8.1 cm)	8.75 in. (22.2 cm)	10 lb. (4.5 kg)
Single-Shelf Plant	12 in. (30.5 cm)	21.4 in. (54.4 cm)	8.75 in. (22.2 cm)	35 lb. (15.8 kg)
Single-Shelf Plant w/Five Rectifiers	12 in. (30.5 cm)	21.4 in. (54.4 cm)	8.75 in. (22.2 cm)	85 lb. (38.5 kg)
7-ft. Frame With Four IR30C Trays	15 in. (38.1 cm)	26 in. (66 cm)	84 in. (213.3 cm)	911 lb.* (413.2 kg)
7-ft. Frame With Four IR40C/12IR125 Trays	18 in. (45.7 cm)	26 in. (66 cm)	84 in. (213.3 cm)	1275 lb.* (578.3 kg)
42-in. Frame With 2VR250E Battery Stand	17.5 in. (44.4 cm)	26 in. (66 cm)	84 in. (213.3 cm)	1558.5 lb.* (706.92 kg)
42-in. Frame With 2VR375E Battery Stand	18 in. (45.7 cm)	26 in. (66 cm)	84 in. (213.3 cm)	1275 lb.* (578.3 kg)
42-in. Frame With 12IR125 Battery Stand	16.7 in. (42.4 cm)	32.3 in. (82 cm)	86.5 in. (219.7 cm)	2256 lb.* (1023.3 kg)

* Weights assume one distribution panel, one CPS4048+ with five rectifiers, and batteries. For a second CPS4048+ shelf, add 85 lbs.

Ordering Information

CPS4048 PLUS 48V Cabinet Power System

Shelf Description	J-Code	Comcode
48V/24V shelf, five 100-240Vac feeds, no LVD/slope thermal	J85500R1 L-1, 21, 31	601451875
48V/24V shelf, five 100-240Vac feeds, 100A LVD contactor,	J85500R1 L-1, 21, 35	601787757
48V rectifier/ringer shelf, five 100-240Vac feeds, no LVD/slope thermal	J85500R1 L-3, 21, 31	601451891
48V rectifier/ringer shelf, five 100-240Vac feeds, 100A LVD contactor,	J85500R1 L-3, 21, 35	601787773
48V rectifier/ringer shelf, five 100-240Vac feeds, 150A LVD Contactor,	J85500R1 L-3, 21, 36	601787781
48V rectifier/ringer shelf, five 100-240Vac feeds, supplementary shelf, no thermal probes/battery connections	J85500R1 L-3, 21B, 34	601803166
48V rectifier/ringer shelf, one 200-240Vac feed, 100A LVD contactor,	J85500R1 L-3, 22, 35	108675000
48V rectifier/ringer shelf, two 200-240Vac feeds, AMP mate-n-lock II connector, no LVD/slope thermal	J85500R1 L-3, 25, 31	601783723
48V rectifier/ringer shelf, two 200-240Vac feeds, AMP mate-n-lock II connector, no thermal probes/battery connections	J85500R1 L-3, 25, 34	601784465
48V rectifier/ringer shelf, two 200-240Vac feeds, AMP mate-n-lock II connector, 100A LVD contactor,	J85500R1 L-3, 25, 35	601797798
48V rectifier/ringer shelf, two 200-240Vac feeds, AMP mate-n-lock II connector, 150A LVD Contactor, ,	J85500R1 L-3, 25, 36	601787799
48V rectifier/ringer shelf, two 200-240Vac 10ft feeds, 150A LVD Contactor,	J85500R1 L-3, 25R, 36	108950999
48V rectifier/ringer shelf, two 200-240Vac 10ft feeds, with slope thermal mgmt./no LVD,	J85500R1 L-3, 25R, 37	107973174
48V rectifier/ringer shelf, two 200-240Vac 10ft feeds, supplementary shelf, no LVD/slope thermal	J85500R1 L-3, 25RB, 31	107973166
48V rectifier/ringer shelf, two 200-240Vac 10ft feeds, supplementary shelf, no thermal probes/battery connections	J85500R1 L-3, 25RB, 34	109023002
48V rectifier/ringer shelf, one 200-240Vac feed, no thermal probes/battery connections	J85500R1 L-3, 26, 34	601787617
48V rectifier/ringer shelf, one 200-240Vac feed, 100A LVD contactor,	J85500R1 L-3, 26, 35	601787807
48V rectifier/ringer shelf, one 200-240Vac feed, 150A LVD Contactor,	J85500R1 L-3, 26, 36	601787815
48V rectifier/ringer shelf, one 200-240Vac feed, supplementary shelf, no thermal probes/battery connections	J85500R1 L-3, 26B, 34,	601803174
Kit Cable to connect 2 shelves	J85500R1 K2	847409695
Kit Cable to connect 3 shelves	J85500R1 K3	847409703

Plug-In Modules and Miscellaneous Equipment

Shelf Description	Module	Comcode
48V, 15A Rectifier	ES660C	108286055
48/24V, 25A, Converter	ES681	107128571
Alarm Control Unit	ES647	107335069
Monitor & Control Unit	ES648B	108344508
Monitor & Control Unit w/modem	ES648BZ	108344524
Ringer, 50VA, 100V, 20Hz	ES620	107138679
Ringer, 50VA, 75V, 25Hz	ES620B	107864845
Ringer, 100VA, 90V, 20Hz	ES621B	108276601
Ringer, 100VA, 100V, 20Hz	ES622C	108541517
Distribution Module	ES610	107266397
Distribution Module	ES611	107502825
Distribution Module	ES613	107966616
AC Input Cable Kit 14ft		847415825
AC Cord w/straight plug 14ft		847861192
Thermal probe kit including cable		847198751

Ordering Information (continued)

Battery Stand Description	Comcode
H569-422 G1, 9A, 13, 16, B	108601337
H569-422 G-2, 9A, 13, 15, A, B	107994725
H569-422 G-1, 5A, 15, A, 31	108527060
H569-422 G-50, 15, 8A, 10, A, B	108542267
H569-422 G-1, 7A, 16, (2) G-32	108550872
H569-422 G-50, 5A, 16, 33	108610643
H569-422 G-1, 5A, A, (4) G-32	108633108
H569-422 G2, 15, 33, 8A.10.A, B	108672478
H569-422 G-50, 5A, 10, 15, 33, A, B	108728312
H569-422 G-50, 5A, 15, 33, A	108766676
H569-422 G-50, 8A, 15, 33, A	108772187
H569-422 G50 E/W 7A, 13, 15, 33, A, B	108951948
H569-422 G-50, 9A, 16, 33	108959214
H569-422 G-1, 12, 15, A	601788821
H569-422 G32	601794035
H569-422 G-1, 15, A, 9A	601795057
H569-422 G-2, 3, 15, A, 8A	601822109
H569-422 G-1, 16, (2) G-32, 5A	601827496
H569-422 G-2, 15, A, 9A	601863970
H569-422 G-15, A	601932247

Related Product Literature and Information	Document Number
CPS4024+, +24 V Cabinet Power System datasheet	DS03-037
CPS4048+, -48 V, 23in Cabinet Power System datasheet	DS03-038
CPS4048+, -48V, 19in Cabinet Power System datasheet	DS03-039
CPS4000+ Plug-In Distribution Modules datasheet	DS03-036
Product Manual CPS4048+ 48V	107222135



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