UFE Series of Front End
Power Supplies

Connections Application Note

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Revision	ECO#	Date	Description of Change
0A		20040805	Document creation
0B		20040924	1) **Section 1.1**: add Present_L signal to connector with explanation in **section 1.1.1** 2) Add Appendix B, 18 x UFEPS to 1 x system connector example.
0C		20050113	1) Adjust Figure 1.1 to make more sense (rows vs. columns) 2) Change description of PS-IDX I^2C addressing bits in **section 1.1.1**

1 UFE Front End Power Supply Connections:

The UFE series of front-end power supplies (referred to from here on simply as "**UFEPS**") have many useful connections for a system to interface with. However, not all of these connections are necessary for basic operation of the UFEPS. The AC version UFEPS will use Molex part number 87663-7006, with the recommended use of mating connector 87664-8004. Drawings of these connectors are attached in Appendix A.

1.1 UFEPS Small Signal Connections Layout, AC and DC Versions

Figure 1.1 details all of the small signal connections that the UFEPS uses by location grid, for the AC version connector. The DC version, while sharing the same pin functions, may not share the same layout. This grid is laid out as viewed from the connector output side of the UFEPS, as in drawing number 87663-7006, page 1.

Column / Row 1-6	#1	#2	#3	#4	#5	#6
D	Sense -	Present-L	PS-ID3	GND	I2C-SDA	GND
C	Sense +	GND	PS-ID2	I2C-SCL	GND	Ishare
B	GND	PS-ID0	GND	PS-ID1	GND	DC-OK-L
A	Short Pin	GND	12V-AUX	GND	I2C-En-H	PS-En

Figure 1.1: Small Signal Connections Layout, as seem from connector side of UFEPS

1.1.1 Small Signal Connection Definitions

Multiple ground pins are used to minimize noise and cross talk by ensuring a low impedance common signal return path to the UFEPS. The multiple ground pins also provide ESD protection in addition to the internal pin filters and clamps. Having a low impedance path from these ground signals to chassis ground internally in the UFEPS will help force any ESD directed at any of these signal pins away from those potentially damaging paths to chassis and through a harmless path to chassis. Logic "high" on any of these signal pins is considered to be +5V, and logic "low" is considered to be ground or 0V. These "**Gnd**" Pins should be referenced to chassis ground.

Short Pin = A1 - This pin is physically shorter than the rest. The purpose of this is for hot swapping the UFEPS. It is the last pin to engage and the first to disengage. For system connection, the mating pin should be grounded. When this ground signal gets into the supply, it enables the micro controller, which in turn enables the rest of the UFEPS.

12V-AUX = A3 – This pin provides an auxiliary voltage of 11.5V +/- 15% capable of sourcing up to 250mA. It is diode or'ed and may be paralleled with the 12V-AUX pin from other UFEPS's to provide additional power and/or redundancy.

I2C-En-H = A5 – This pin provides indication that the I^2C communication has been enabled as well as a means for disabling it. At startup, this pin is pulled high internally. If I^2C functionality is to be disabled for any reason, such as troubleshooting the I^2C lines, this pin should be pulled down to ground externally.

PS-En = A6 – This pin provides an enable function for the supply. At startup this pin is pulled high internal to the UFEPS through a 100K resistor to +5V. To enable the UFEPS, this pin should be pulled low. This can be done with a mechanical switch to ground, an open collector transistor to ground, or a CMOS or TTL compatible logic signal. If this feature is not used, the pin can be permanently grounded in the back plane or mating connector.

PS-ID0 = B2, PS-ID1 = B4, PS-ID2 = C3, PS-ID3 = D3 – These pins set up the I^2C addressing that is detailed in the "**I^2C application note**". They are pulled high inside the UFEPS to +5V with a 10kOhm resistor and may be grounded externally to change their state to logic low.

DC-OK-L = B6 – This pin provides an indication that the DC output voltage of the UFEPS, and the 12V-AUX output are both functioning properly. The exact nature of the fault can be determined from the I^2C system status bits. At startup this pin is pulled high, and as soon as the DC output is enabled and the 12V-AUX voltage is within it's specified range, this pin is pulled low to indicate everything is OK.

Sense + = C1, Sense - = D1 – These pins provide remote sensing capabilities for the UFEPS. Connecting these at the system load provides automatic compensation for voltage drops from the output of the UFEPS to the system load. This is designed to compensate for at least 0.5V total supply and return drop depending on the output voltage setting. The remote sense lines should be routed separately in a system back plane, or as twisted pair for best results.

I2C-SCL = C4, I2C-SDA = D5 – These pins provide the I2C data communication lines to the UFEPS as detailed in the "**I^2C application note**".

Ishare = C6 – This pin provides a method for a UFEPS to actively current share with other UFEPS's in a system. This pin should be directly connected to all other Ishare pins in a system if active current sharing will be used. For best results, this signal should be routed directly above a ground plane within a system back plane, or as a twisted pair with an adjacent GND pin. Ground potentials between UFEPS's should be minimized. The only way to enable active current sharing is with the use of I2C, as detailed in the "**I^2C application note**".

Present-L = D2 – This pin provides the capability for determining when a unit is inserted into a system. This pin is pulled low to GND internally in the UFEPS.

1.2 UFEPS Power Connections Layout

Figure 2 details all of the power connections that the UFEPS uses by location grid. This grid is laid out as viewed by facing the output connector from the outside of the UFEPS, as in drawing number 87663-7006, page 1.

Power Alpha AC Input Connections (3)			Signal Pins (24)						Power Beta DC Output Connections (4)			
1	2	3	1	2	3	4	5	6	1	2	3	4
AC Line 1	AC Line 2	PEGnd	D	D	D	D	D	D	DC Out -		DC Out +	
			C	C	C	C	C	C				
			B	B	B	B	B	B				
			A	A	A	A	A	A				

Figure 2: Power Connections Layout, as seem from connector side of UFEPS

1.2.1 Power Connection Definitions

AC Line 1, AC Line 2 – These are the AC input power connections. The input voltage is nominal 230Vac, high range only. Any connection to these lines should be rated for 15A. These connections are also physically shorter than all of the other power connections, for hot-swap and safety considerations. For more details about input power specifications refer to the "**UFE series AC-DC Front Ends**" main specification.

PEGnd – This is the Protective Earth Ground connection required by safety.

DC Out -, DC Out + - These are the main DC output connections. Like the signal "Gnd" of the small signal pins, one of these connections, either "DC Out +" or "DC Out –" should be referenced to chassis ground. The output is capable of either positive or negative polarity.

1.3 Connector Pin\Blade Engagement Sequencing

Connector pin\blade engagement sequencing is used to accommodate hot-swap and safety considerations. In the AC UFEPS connector, there are two different lengths of the power blade connectors, as well as two different lengths for the small signal pins.

1.3.1 Insertion and Desertion sequencing

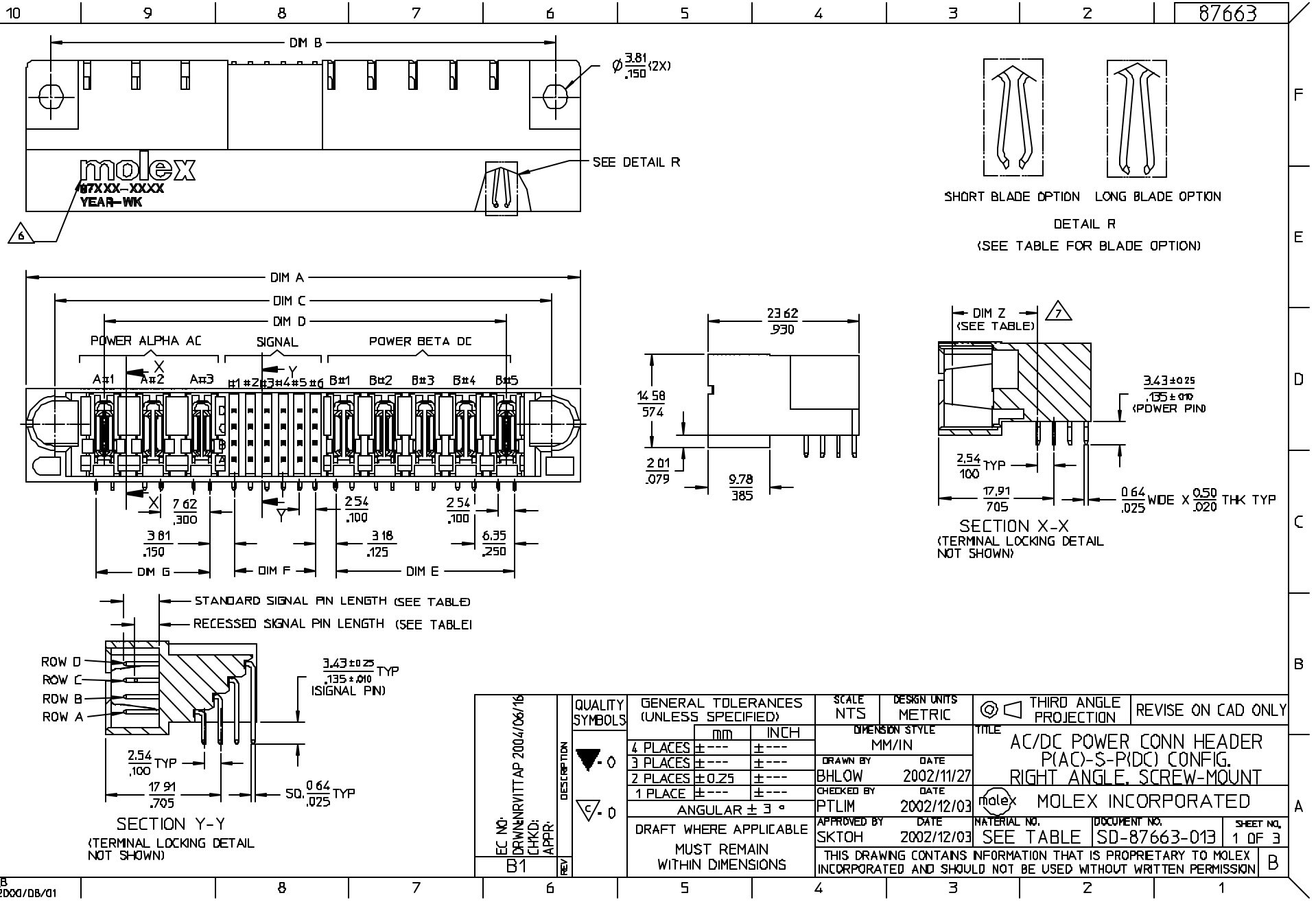
Upon insertion into a mating connector, the first connections that are made are the "DC OUT +/-" and the "PEGnd" blades. Next, the "AC Line 1/2" blades make a connection. Third to connect are all of the small signal pins except for the "Short Pin". Finally, the "Short Pin" makes a connection.

For desertion, this order is simply reversed. The “Short Pin” is the first pin to disconnect, followed by the rest of the signal pins, followed by the “AC Line 1/2 “ blades, and finally the “PEGnd” and “DC OUT +/-“ blades.

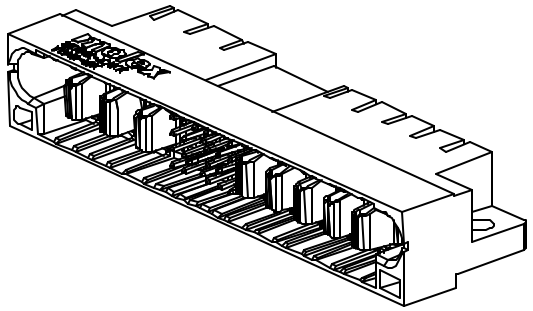
1.4 Artesyn Designed Chassis Connections

The Artesyn designed chassis takes care of a few of these small signal pins internally, in order to reduce user required involvement. For complete details on the Artesyn designed chassis and the benefits of using it in a system in conjunction with multiple UFEPS’s, refer to the document “**UFEPS Chassis Application Note**” (TBD).

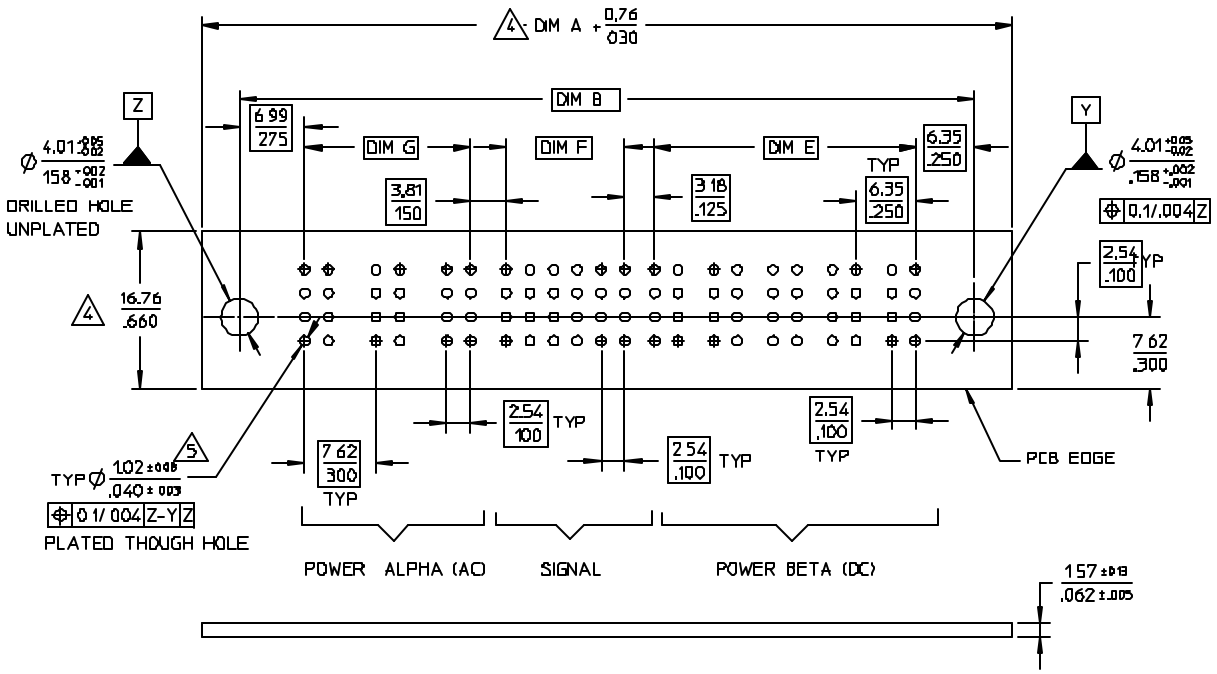
Appendix B also details an example of further reduction from 18 UFEPS’s to one single connection for all of the signal pins.



Appendix A: Connector Details



ISOMETRIC VIEW
3P(AC)-24S-5P(DC) FOR ILLUSTRATION



NOTES:

1. MATERIALS:-
   HOUSING - HIGH TEMPERATURE THERMO-PLASTIC,
   GLASS FILLED, UL94V-0, COLOUR: BLACK
   SIGNAL TERMINAL - COPPER ALLOY
   POWER TERMINAL - COPPER ALLOY
2. FINISH :-
   SIGNAL & POWER CONTACTS
   0.76 MICROMETER MINIMUM GOLD (Au) AT CONTACT AREA AND
   2.54 MICROMETER MINIMUM TIN (Sn) AT SOLDERTAIL AREA
   OVER 1.27 MICROMETER MINIMUM NICKEL (Ni) UNDERPLATE.
3. PRODUCT SPECIFICATION : PS-87663-006.
4. COMPONENT STAY AWAY FROM CONNECTOR
5. PCB NOTE FOR DIAMETER 1.02/.040 PLATED HOLE.
   - DRILLED HOLE SIZE IS 1.15/ .0453.
   - PLATE WITH 0.007 / 0.003 MINIMUM TIN (Sn) OVER 0.03/.001
   TO 0.08/.003 COPPER PLATING TO ACHIEVE 1.02±0.08/.040±.003 HOLE.
6. MANUFACTURER LOGO, PART NUMBER AND YEAR-WEEK CODE.
7. LONG AND SHORT CONTACT POWER BLADE OPTIONS ARE AVAILABLE FOR DIFFERENT CUSTOMERS REQUIREMENT.

EC NO:	B1
DRWN:	NRVITTAP 2004/06/16
CHKD:	
APPR:	
DESCRIPTION	
REV	

QUALITY SYMBOLS

GENERAL TOLERANCES (UNLESS SPECIFIED)

	MM	INCH
4 PLACES	±---	±---
3 PLACES	±---	±---
2 PLACES	±0.25	±---
1 PLACE	±---	±---
ANGULAR ± 3 °		

DRAFT WHERE APPLICABLE
MUST REMAIN WITHIN DIMENSIONS

SCALE	NTS
DESIGN UNITS	METRIC
	THIRD ANGLE PROJECTION
	REVISE ON CAD ONLY
DIMENSION STYLE	MM/IN
DRAWN BY	BHLOW
DATE	2002/11/27
CHECKED BY	PTLIM
DATE	2002/12/03
APPROVED BY	SKTOH
DATE	2002/12/03
TITLE	AC/DC POWER CONN HEADER P(AC)-S-P(DC) CONFIG. RIGHT ANGLE, SCREW-MOUNT
	MOLEX INCORPORATED
MATERIAL NO.	SEE TABLE
DOCUMENT NO.	SD-87663-013
SHEET NO.	2 OF 3

B

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rev B1 2000/08/01

Appendix A: Connector Details

87663

PART NUMBER	P-S-P CONFIGURATION			DIM A	DIM B	DIM C	DIM D	DIM E	DIM F	DIM G	7 POWER BLADE OPTIONS		STANDARD SIGNAL PIN LENGTH	RECESSED SIGNAL PIN		PACKAGING
	POWER ALPHA AC	SIGNAL	POWER BETA DC								TYPE	DIM Z ±0.13/.005		LENGTH	LOCATION	
87663-7001	3	24	6	92.71 / 3.650	85.09 / 3.350	83.82 / 3.300	69.22 / 2.725	34.29 / 1.350	12.70 / .500	17.78 / .700	LONG CONTACT	14.12 / .556	6.86/.270	5.59/.220	A1	TRAY
87663-7002	3	24	6	92.71 / 3.650	85.09 / 3.350	83.82 / 3.300	69.22 / 2.725	34.29 / 1.350	12.70 / .500	17.78 / .700	LONG CONTACT	14.12 / .556	6.86/.270	NIL	NIL	TRAY
87663-7006	3	24	4	80.01 / 3.150	72.39 / 2.850	71.12 / 2.800	56.52 / 2.225	21.59 / 0.850	12.70 / .500	17.78 / .700	LONG CONTACT	14.12 / .556	6.86/.270	NIL	NIL	TRAY

EC NO:
DRWN: NRV ITTAP 2004/06/16
CHKD:
APPR:
DESCRIPTION
REV
B1

QUALITY SYMBOLS
▼ - 0
Ⓒ - 0

GENERAL TOLERANCES (UNLESS SPECIFIED)

	mm	INCH
4 PLACES	± ---	± ---
3 PLACES	± ---	± ---
2 PLACES	± 0.25	± ---
1 PLACE	± ---	± ---
ANGULAR ± 3 °		

DRAFT WHERE APPLICABLE
MUST REMAIN WITHIN DIMENSIONS

SCALE: NTS
DESIGN UNITS: METRIC
DIMENSION STYLE: MM/IN
THIRD ANGLE PROJECTION
REVISE ON CAD ONLY

DRAWN BY: BHLOW — DATE: 2002/11/27
CHECKED BY: PTLIM — DATE: 2002/12/03
APPROVED BY: SKTOH — DATE: 2002/12/03

TITLE: AC/DC POWER CONN HEADER P(AC)-S-P(DC) CONFIG. RIGHT ANGLE, SCREW-MOUNT

MOLEX INCORPORATED

MATERIAL NO.: SEE TABLE
DOCUMENT NO.: SD-87663-013
SHEET NO.: 3 OF 3

B

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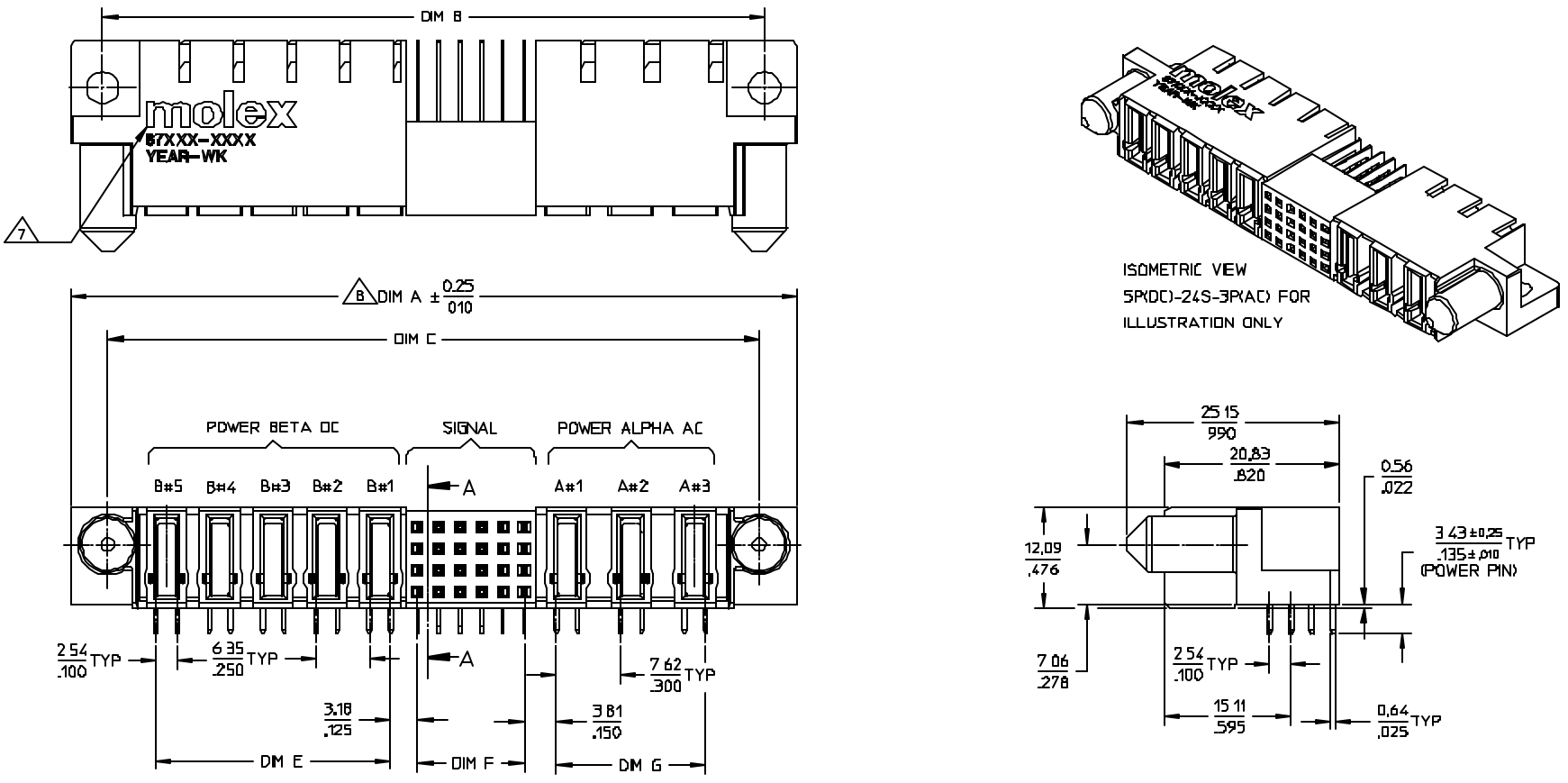
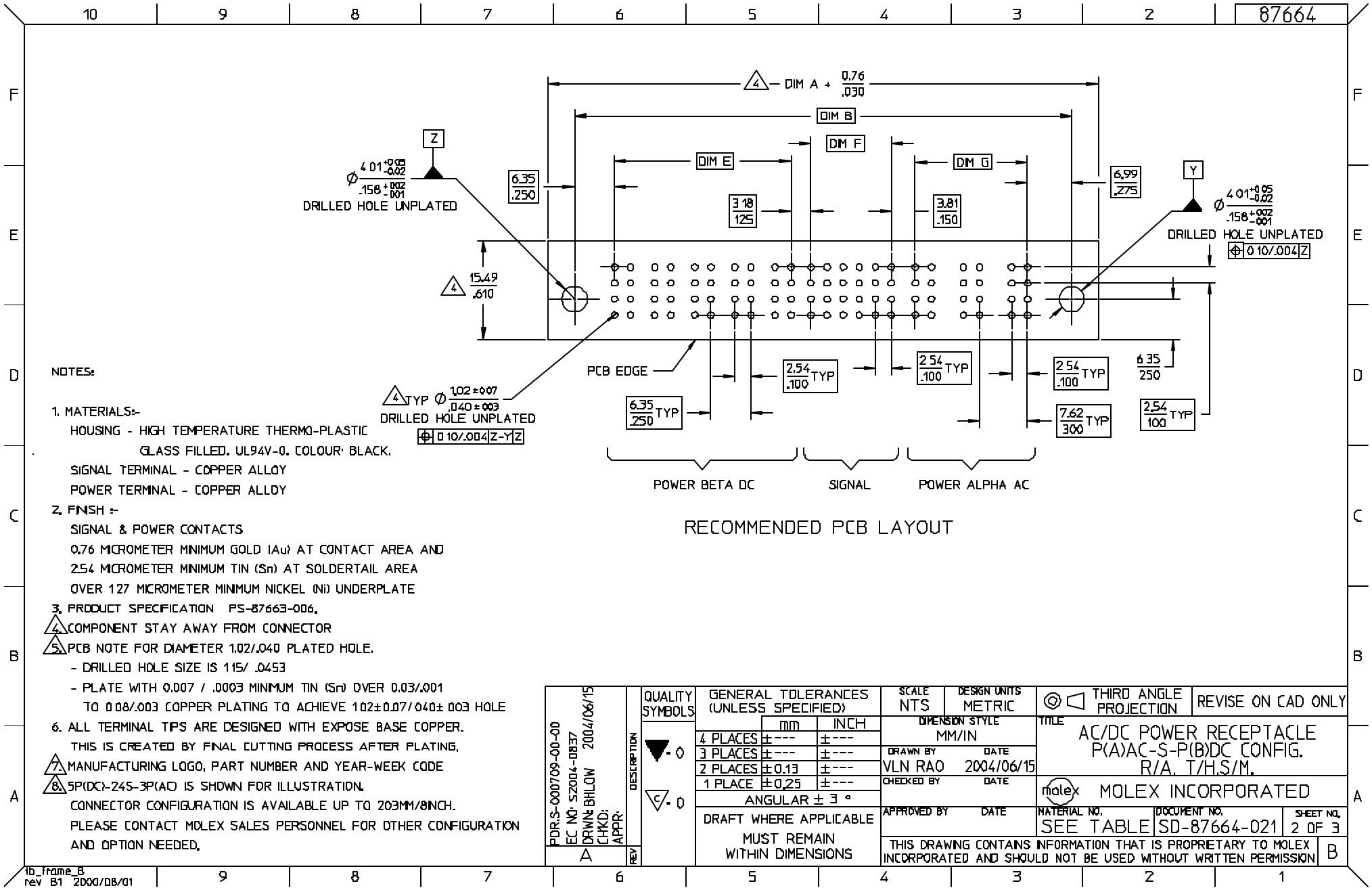
rev B1 2000/08/01

Appendix A: Connector Details



Appendix A: Connector Details



Appendix A: Connector Details

87664

PART NUMBER	P-S-P CONFIGURATION			DIM A	DIM B	DIM C	DIM D	DIM E	DIM F	DIM G	RECESSED POWER PIN LOCATION		PACKAGING
	POWER BETA DC	SIGNAL	POWER ALPHA AC										
87664-8004	3	24	4	80.01 / 3.150	72.39 / 2.850	71.12 / 2.800	56.52 / 2.225	21.59 / 0.850	12.70 / .500	17.78 / .700	A	2, 3	TRAY
											B	---	

PDR.S-000709-00-00
EC NO: S2004-0837
DRWN: BHLOW 2004/06/15
CHKD:
APPR:
DESCRIPTION
REV
A

QUALITY SYMBOLS
▼ 0
Ⓒ 0

GENERAL TOLERANCES (UNLESS SPECIFIED)

	mm	INCH
4 PLACES	± ---	± ---
3 PLACES	± ---	± ---
2 PLACES	± 0.13	± ---
1 PLACE	± 0.25	± ---
ANGULAR ± 3 °		

DRAFT WHERE APPLICABLE
MUST REMAIN WITHIN DIMENSIONS

SCALE: NTS
DESIGN UNITS: METRIC
THIRD ANGLE PROJECTION
REVISE ON CAD ONLY
DIMENSION STYLE: MM/IN
DRAWN BY: VLN RAO
DATE: 2004/06/15
CHECKED BY
DATE
APPROVED BY
DATE

TITLE: AC/DC POWER RECEPTACLE P(A)AC-S-P(B)DC CONFIG. R/A, T/H,S/M.

molex MOLEX INCORPORATED

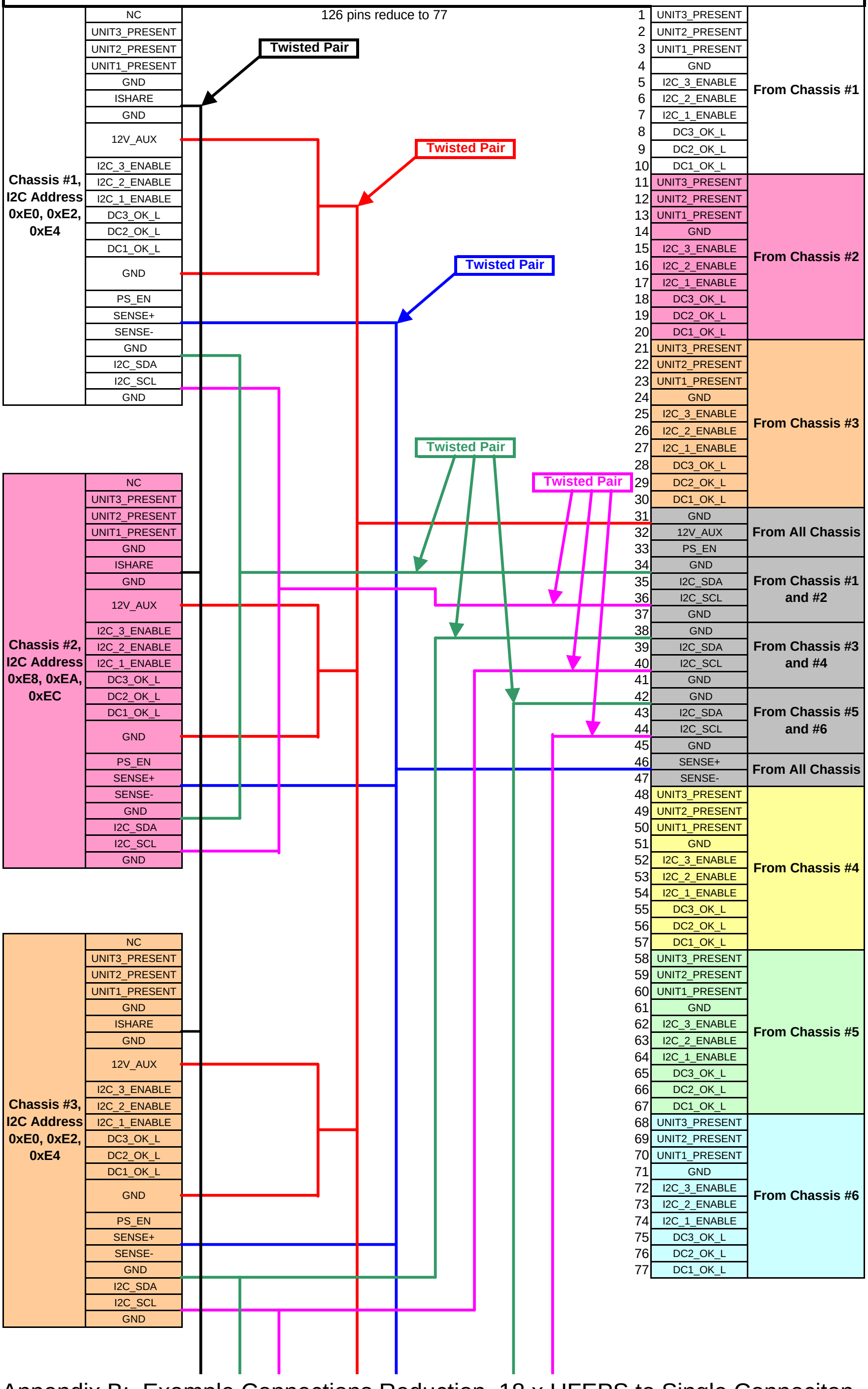
MATERIAL NO.: SEE TABLE
DOCUMENT NO.: SD-87664-021
SHEET NO.: 3 OF 3

B

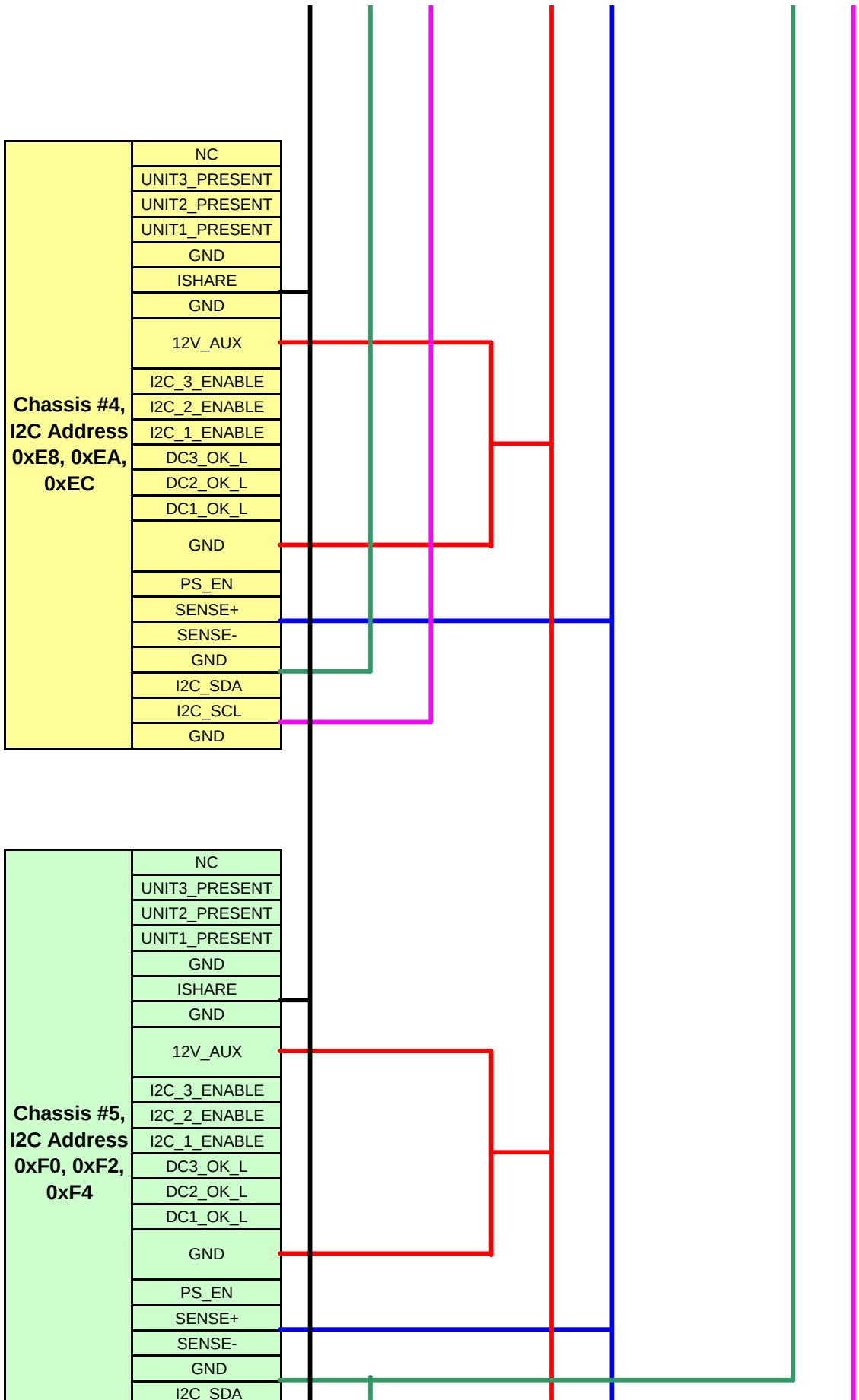
tb_frame_B
rev B1 2000/08/01

Appendix A: Connector Details

Recommended connection scheme for a 6 chassis (18 UFEPSs) system



Appendix B: Example Connections Reduction, 18 x UFEPS to Single Conneciton



Appendix B: Example Connections Reduction, 18 x UFEPS to Single Conneciton