ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

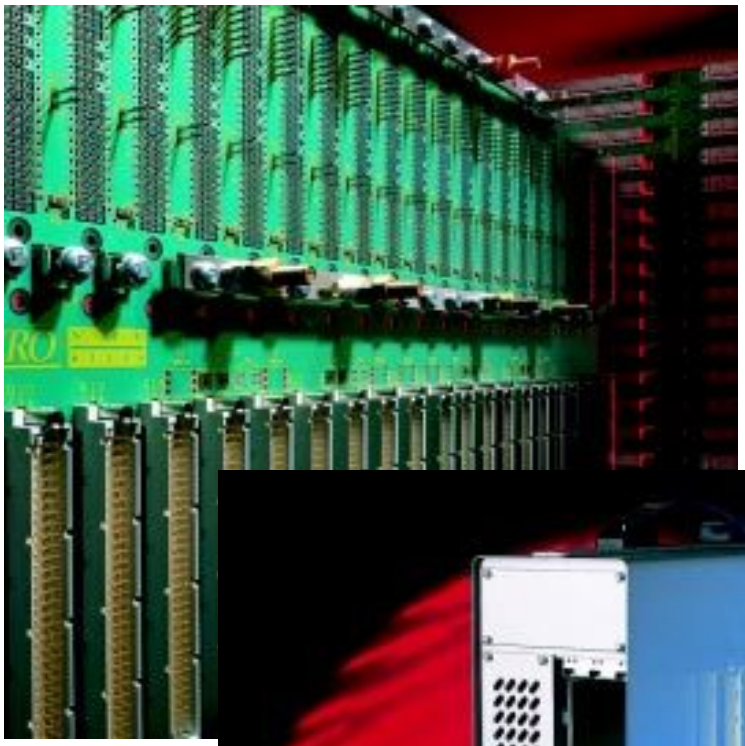
Find the *EPLAX / Bicc-Vero VME Bus J2 Compatible* at our website: *Click HERE*

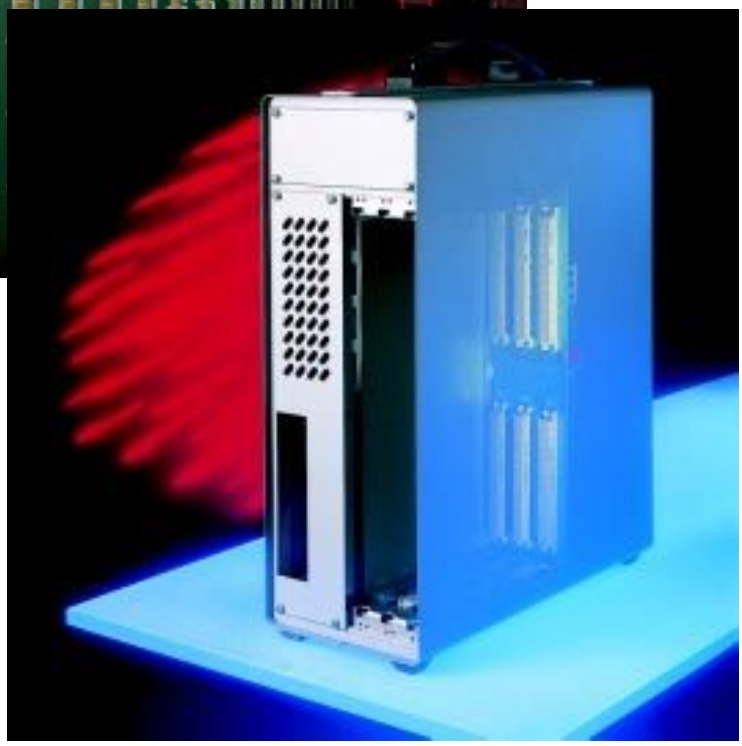
BUS BASED TECHNOLOGY

The Circuit Board Division of VERO Electronics offers products to support all internationally defined bus structures including Futurebus+, VMEbus, VME64, VME 64 Extensions, VXIbus, Compact PCI, Multibus and Multibus II, STEbus, G-64 bus and G-96 bus. The backplane range is made available in standard, modified standard and fully customised forms.

In addition to the backplanes supporting these bus structures a wide range of extender boards, terminator modules and other accessories are available together with an extensive range of Microrack development systems.

Customised versions of the Microracks offer an easy solution to implementation of specialised development systems. Please contact VERO Electronics for further details.





MANUFACTURING STANDARDS

All VERO Electronics backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQ PCQ88, with systems approval in accordance with BS EN ISO9001.

Certificate Number

Hedge End
FM 14253

BS EN ISO 9001
BS 9761 BS 9762 BS 9763
CECC 23 300-004
CECC 23 300 CECC 23 200 CECC 23 100
Underwriters Laboratories

NEW PRODUCTS

▲ In line with its stated policy of constant product development VERO Electronics regularly introduces new or enhanced products.

New to this edition of the Product Handbook are a full range of VME^2 VME64 Extensions backplanes, a 2U, 3 Slot VMEbus Microrack and CompactPCI Backplanes.

CE MARKING

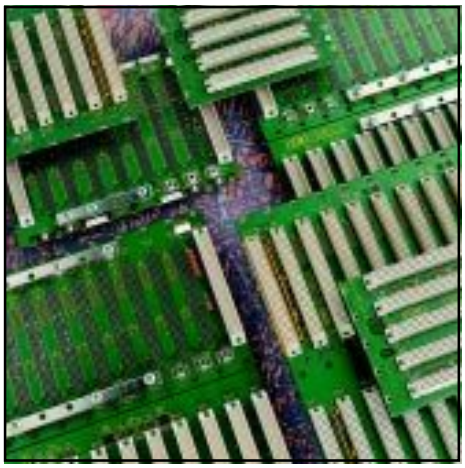
CE Marking according to the EMC directive 89/336/EEC became effective as of 1st January 1996.

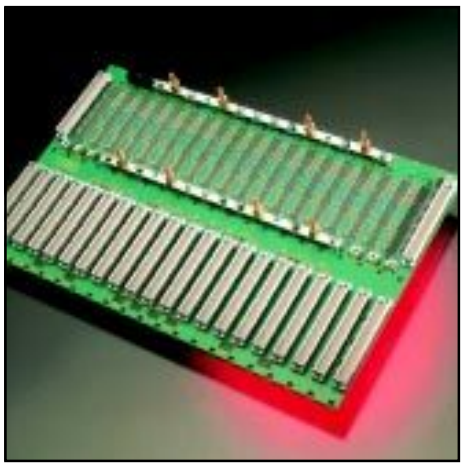
According to the directive, items included in this section are considered sub-assemblies, and as such are not CE marked. It remains the responsibility of the integrator to ensure compliance at the point of taking into service and to mark and declare as such.

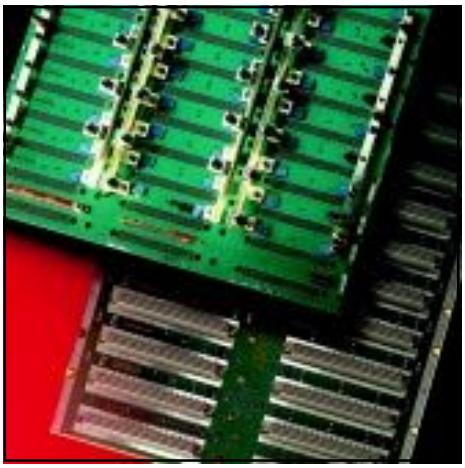
VERO Electronics Circuit Board Division have invested heavily in pre-compliance test facilities and have undertaken extensive representative measurements and participated in working groups and will continue to assist in achieving full compliance.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

From 1st January 1997 certain products will be covered by the Low Voltage Directive 73/23/EEC. In these







VMEbus 9.03-9.19
VMEXCEL J1 & J2 3U and 6U Monolithic backplanes 9.03-9.08
High Performance VMEELITE Monolithic backplanes 9.09-9.10
VME² - VME64 Extensions backplanes .. 9.11-9.12
High Performance VMEbus J1 backplanes 9.13
VMEbus Live Insertion Module 9.14
VMEbus Extender boards 9.15
BGRANT/IACK jumper board 9.15
120mm Adaptor 9.15
60mm Adaptor 9.15
VME Subsystem - VSB 9.15
VMEbus Powerfail module 9.15
VMEbus Modular Microrack System 9.16-9.18
VMEbus 3 slot Microracks 9.19

VXIbus 9.20-9.23
VXIbus backplanes 9.20
VXIbus Microracks 9.21-9.22
VXIbus prototyping boards 9.23
VXIbus Extender board 9.23
VXIbus Light and normal duty modules 9.23

CompactPCI 9.24
CompactPCI backplanes 9.24

FUTUREBUS+ 9.25-9.27
Multi-profile Futurebus + Backplanes 9.25
Futurebus+ 4 Slot Microracks - Entry level 9.26
Futurebus+ 4 Slot Microrack - Advanced 9.26
Futurebus+ 14 Slot Microrack - Entry level 9.27
Futurebus+ 14 Slot Microrack - Advanced 9.27

MULTIBUS 9.28
Multibus iPSB / iLBX backplanes 9.28

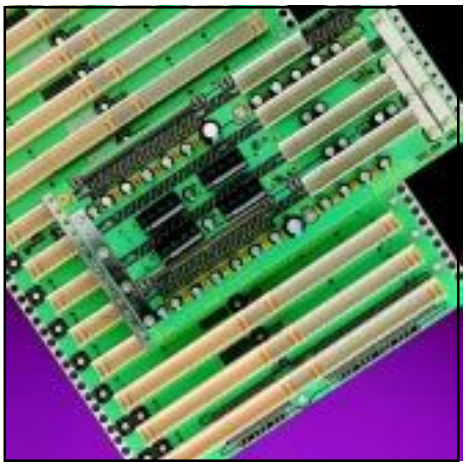
MULTIBUS II 9.29-9.30
Multibus II iPSB backplanes 9.29
Multibus II iLBX backplanes 9.30
Multibus II Extender board 9.30

STEbus 9.31
STEbus backplanes 9.31
STEbus terminator 9.31
STEbus extender board 9.31

G-64/G-96 ..... 9.32
G-64bus backplanes 9.32
G-96bus backplanes 9.32







Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VMEXCEL BACKPLANES

INTRODUCTION

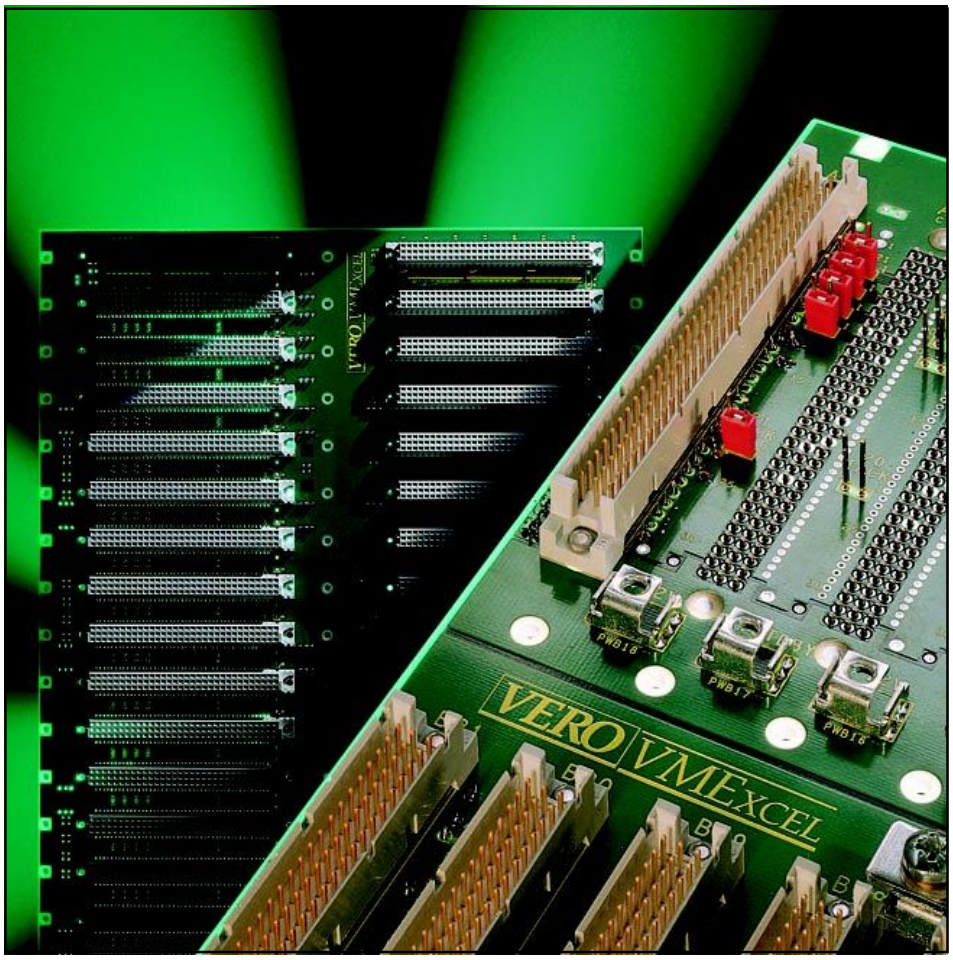
The VMEXCEL family of backplanes introduces a new concept of customer configured backplanes.

Just In Time (JIT) manufacturing techniques have been employed to improve production efficiency and quickly introduce a versatile product to the marketplace.

The ability to configure the backplane permits the user to tailor the product to suit his exact requirements and budget.

Value engineering, combined with the improved production methods, has resulted in a range of backplanes which are competitively positioned, but still enjoy the quality and performance advantages associated with backplane technology from VERO Electronics.

VMEXCEL offers excellent performance characteristics in the key areas of controlled impedance, power distribution and termination design.



FEATURES

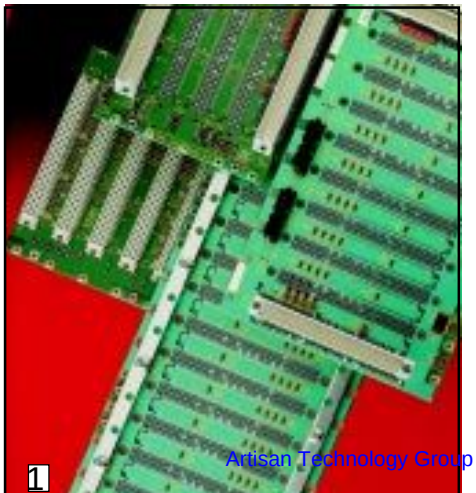
- Conforms to VME64 specification (ANSI/VITA1-1994)
- 6 Layer stripline construction - J1 and Monolithic
- 4 Layer stripline construction - J2
- 57 Ω characteristic impedance control
- Patented earth guard track design
- Excellent crosstalk performance
- Low ground shift
- Termination design features short stubs, decoupling capacitors and anti-crosstalk layout
- Auto Bus Grant (ABG) Connectors as an option
- Latchable services connector (Flying lead and mating connector supplied)
- Four power connector options -
  - Power Bug / Faston connectors
  - Busbars
  - Mate 'N' Lok
  - Faston
- Two power connection position options - Monolithic
- A decoupling capacitor position is provided for each slot position permitting fine tuning of the backplane to match system parameters
- Long tails and shrouds on slot 1 and "n" on J1 area of backplane
- Long tails and shrouds on all J2 slot positions
- Long tailed connectors are gold plated
- Mate 'N' Lok connectors supplied (including mating connector)
- On and Off-board termination
- Passive and active termination options
- Screw fixing option on J2 connectors for use with VSB backplanes
- VME 64 compatible - Monolithic

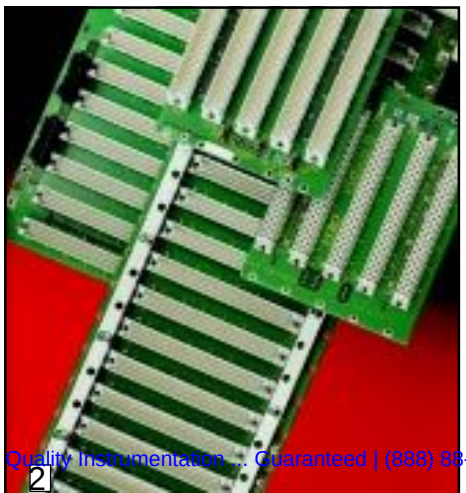
1 VMEXCEL J1 backplane

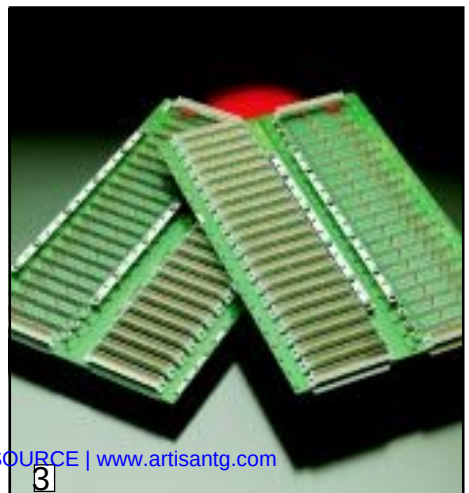
2 VMEXCEL J2 Backplane

3 VMEXCEL Monolithic Backplane

VMEXCEL is a trade mark of VERO Electronics Limited
Mate 'N' Lok is a trademark of AMP


1


2


3

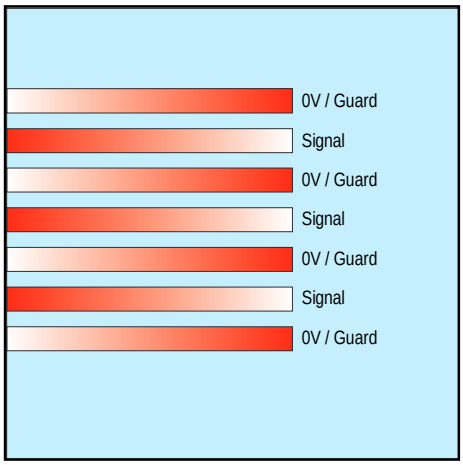
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

GUARD TRACKING

All VMEbus backplanes manufactured by VERO Electronics adopt the company's patented guard tracking layout. This layout guarantees the backplane a superior level of crosstalk (noise) performance.

The use of guard tracking, in addition to improving crosstalk performance, aids the reduction of layer count.

With the signal lines being shielded by power layers in one plane and by individual 0V guard tracks in the other, VERO's patented guard tracking gives a pseudo-coaxial style of protection.



VMEbus Guard Tracking

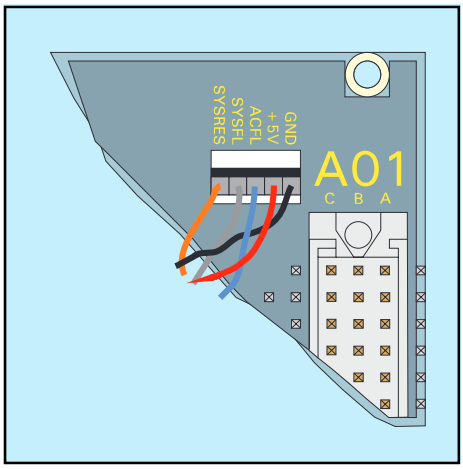
LATCHABLE SERVICES CONNECTOR

All VMExcel backplanes are supplied as standard with a latchable services header.

The 5 way header is located on the rear (wiring side) top corner of the backplane, above the space between connectors 1 and 2.

The mating half of the connector, with 1 metre of cable attached to each of the five lines, is also included.

The lines, and the relevant colour codings, are arranged as follows; GND - black, +5V - red, ACFL - blue, SYSFL - grey and SYSRES - orange.



Latchable Services Header

TERMINATION

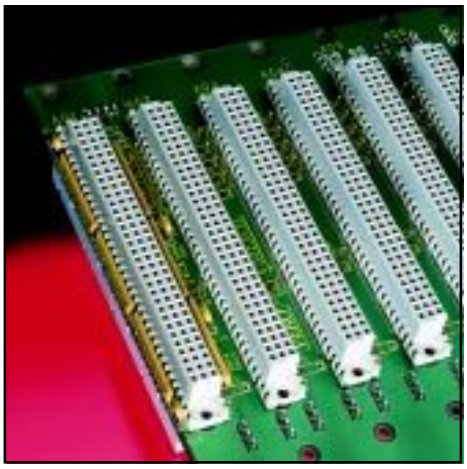
It is recommended that VMEbus backplanes are terminated at both ends, which is why VERO Electronics always provide backplanes which include two sets of terminators (except the 2 and 3 slot versions, which require only one).

VERO can supply termination in passive on- or off-board or active off-board formats.

All VMEbus termination modules from VERO are universal, thus they can be fitted to either end of the backplane without fouling the subrack on which the board is mounted.

ON-BOARD TERMINATION

On-board passive is the most popular - and cost effective - method of terminating because the resistors are fitted directly onto the backplane adjacent to the first and last slots. There is no loss of usable slots with VERO's on-board, inboard termination layout which is used as standard on all VMEXCEL backplanes.



OFF-BOARD TERMINATION

Off-board passive is popular where a quick "Mean Time to Repair" is required. This is because the termination is on separate modules which can easily be plugged in and out of the rear of a backplane.



Off-board active modules are supplied as standard. Contact VERO Electronics for details of on-board active termination, which can be supplied as a special option. Active termination offers a lower power method of termination due to its use of Op-Amp in conjunction actual savings afforded by active termination over passive termination can be as high as 5 Watts.

The main applications for active termination are portable battery operated systems or very small, low power systems.

Although termination is included as standard with all VMEbus backplanes supplied by VERO, additional terminator modules may be ordered separately.

JUMPER LINKS

Each backplane is supplied with 10 red jumper links for implementing "bus grant" and "IACK" when a daughter board is removed from a working system. These jumper links are fitted to the backplane during assembly and for correct operation they will need to be removed from the board. They should only be replaced when the user requires a slot to be left vacant between occupied slots during operation.



Jumper Links

TERMINATION **Ordering information**

Description	Qty.	Order code
Universal passive J1 terminator	2	**243-52821K**
Universal passive J2 terminator	2	**188-52865D**
Universal active J1 terminator	1	**243-310274L**
Universal active J2 terminator	1	**243-310276G**
Retainer/ejector kit	4	**188-53119H**
Jumper links / red	10	**188-39180G**

CONNECTOR TYPES

STANDARD (STD) - These are high quality DIN 41612 class 2 96/96 way connectors

AUTO BUS GRANT CONNECTOR (ABG) - The use of Auto Bus Grant Connectors (also known in some markets as Auto Daisy Chain Connectors) in the new VMEXCEL range negates the need to provide jumper links for empty slots or partially configured systems. Connectors have high reliability and are DIN 41612 conformant (Class 2).

In addition to the Standard and Auto Bus Grant connectors other connector types are available by special request, subject to a minimum order quantity.

SCREW FIXINGS FOR VSB

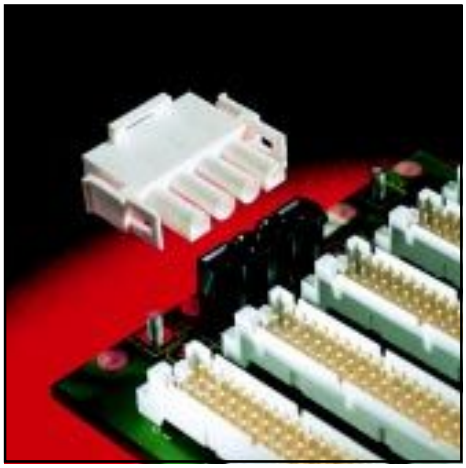
For VMEXCEL, the normal method of attaching the rear shrouds to the backplane is by riveting. If it is intended to use positive retention to hold connectors or boards which are plugged into the

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

POWER-ON OPTIONS

The VMEXCEL backplane range employs a variety of methods in which the power may be introduced to the backplane.

MATE 'N' LOK - A polarised, latchable connector with each contact rated at 10 Amps. Mating connectors are supplied with the backplanes.



Mate 'N' Lok Connectors

POWER BUG/FASTON - A combination connector system giving an M4 screw terminal with two 6,35mm faston tabs. The combined power bug/faston is rated at 18 Amps per connector.



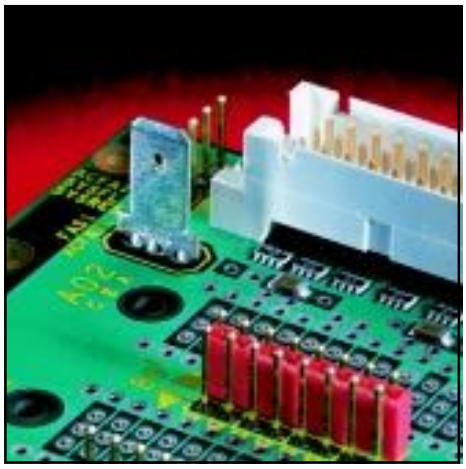
Power Bug / Faston Connectors

BUSBAR - A combination of up to 6 power bugs (without faston tabs) connected together via a 2mm thick x 10mm wide tin lead plated copper bar. This is a convenient form of power connection, particularly when used on larger backplanes. The busbar method improves power distribution and simplifies wiring. The maximum power rating of the busbar is up to 125A on a 21 slot backplane.



Busbar

FASTON - A simple 6,35mm faston spade connector, rated at 12 Amps.



Faston 6,35mm Spade Connector

POWER STRAP - The VMEXCEL range features, as a method of forming a continuous circuit between J1 and J2 backplanes only, an optional power connecting strap. The strap, which attaches to the power rails of the backplanes is tin-lead plated. This feature must be specified when ordering the backplane.



Power Strap

POWER BRACKET - The Power Bracket is offered as an accessory in order to allow an alternative connection of power to the busbar via a hole drilled to take M6 cable clamps. It is supplied as a pair complete with busbar mounting screws.

Power Bracket	**243-310367D**



Power Bracket

POWER POSITION OPTIONS - The VMEXCEL Monolithic has two positions in which the power may be introduced to the backplane.



Power Position Options (central position illustrated)

The connection for power, which is made by Mate 'N' Lok, Faston, Power Bug or busbar, is located either in the J1 area of the backplane or centrally between the J1 and the J2 areas.

By utilising the established VMEXCEL build criteria and offering this power-on position flexibility, VERO is able to tailor the backplane to exact requirements.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MECHANICAL SPECIFICATIONS

The VMEXCEL backplane range - J1, J2 and Monolithic - employs the following mechanical specifications

BACKPLANE HEIGHT

J1 and J2 3U (128,5 mm / 5,06")
Monolithic 6U (262 mm / 10,31")

BACKPLANE WIDTH

The width of all VMEXCEL backplanes can be calculated using the following formula;

Board width = 0.752" + ([N-1] x 0.8) inches
(x 25.4 = mm)

Where N = number of slots
0,752" is the sum of the overhang at either end of the backplane

CONNECTOR PITCH

All connectors mounted on VMEbus backplanes use a 4HP (20,32mm / 0,8") pitch

BOARD THICKNESS

All VMEXCEL backplanes are 2,7mm (0,11") thick multilayer constructions.

MOUNTING POSITIONS

VMEXCEL J1 and J2 backplanes have two rows of mounting holes, monolithic backplanes have three rows.

Each row of backplane mounting holes is aligned with the connector mounting holes. The connector mounting holes are 0,3mm (0,012") to the left of centre of row b pins when viewed from the front (connector side) of the backplane. Each backplane is supplied with enough screws (M2,5 x 6mm long cheese head) to secure it to the tie bars of a subrack.

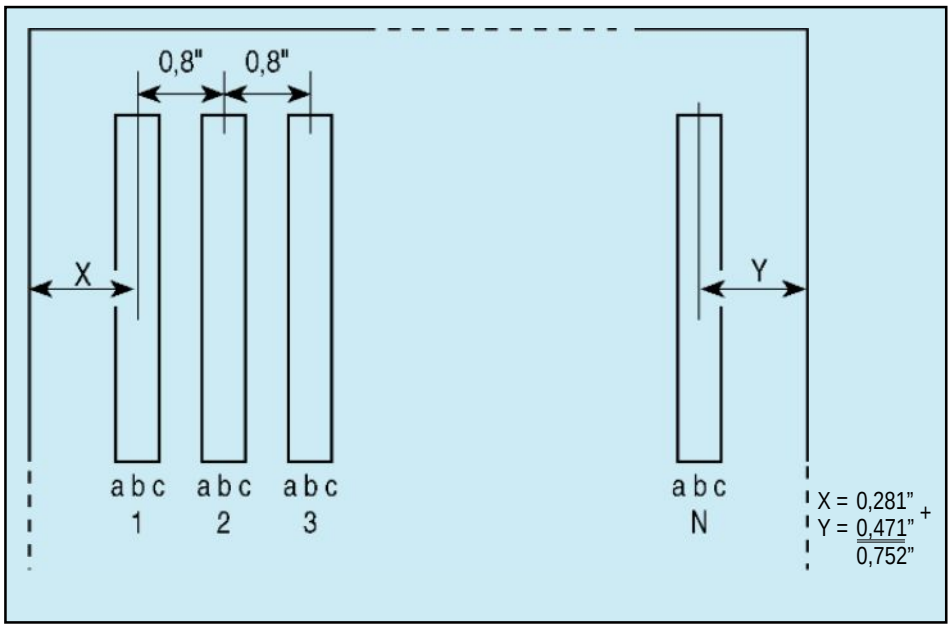
Backplane spacer strips are also required and must be ordered separately. Please refer to Subracks; section 4, page 4.31 for spacer details.

BACKPLANE ASSEMBLY DEPTH

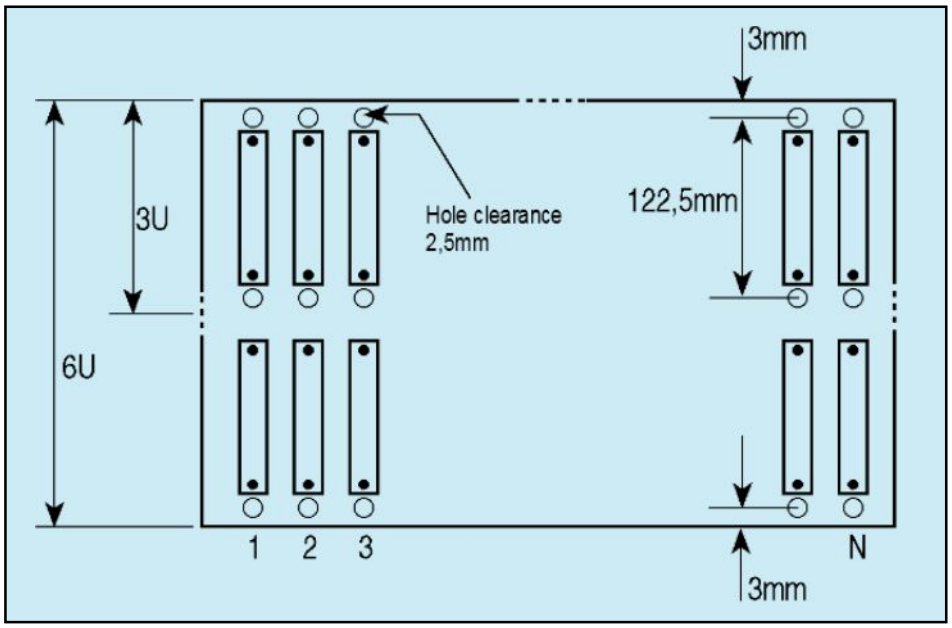
The overall depth of the J1 VMEXCEL off board terminated backplane assembly, X, covers the distance from the front face of the subrack tie bar spacer to the rear of the terminator module's pcb.

Off board terminated assembly depth, X = 22,5mm.

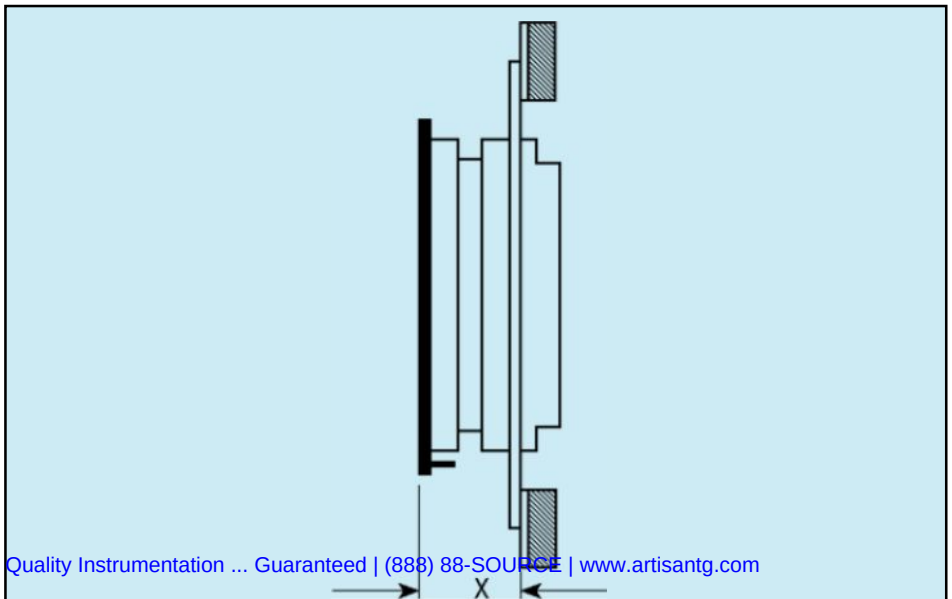
VMEXCEL J2 terminator modules are fitted with a DIN 41612 reverse connector shell which increases the overall depth of the backplane assembly by 13mm.



Backplane Width



Backplane Mounting Positions



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VMEXCEL BACKPLANES - 3U J1 and J2

To configure your VMEXCEL backplane, use the chart below to select the features and options you require:

Ordering Information

243 - 4 x x x xx

VMEXCEL J1 = q
VMEXCEL J2 = w

α Off Board Termination / STD Connector = p
On Board Termination / STD Connector = q
α Off Board Termination / ABG Connector = w
On Board Termination / ABG Connector = e
α Off Board Termination (Active) / STD Connector = r
α Off Board Termination (Active) / ABG Connector = t
β On Board Termination (Screw fixing for VSB) / STD Connector = h
α β Off Board Termination (Screw fixing for VSB) / STD Connector = j
α β Off Board Termination (Active, screw fixing for VSB) / STD Connector = i

τ Mate 'N' Lok = p
δ Power Bug/Faston = q
δ Busbar = w
ω Faston = e
τ Mate 'N' Lok - with Power Strap = r
δ Power Bug/Faston - with Power Strap = t
δ Busbar - with Power Strap = h
ω Faston - with Power Strap = j

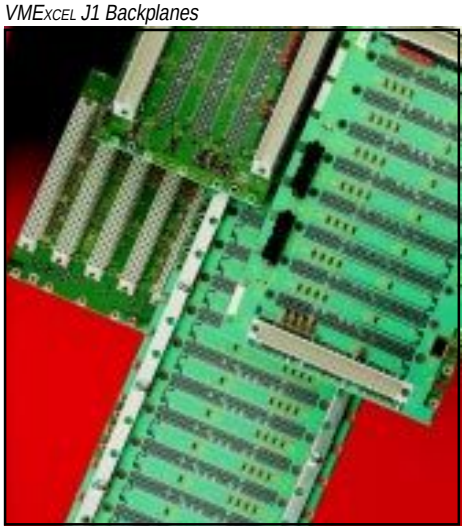
Preferred slot sizes pw qp
pe qw
pr qr
pt qh
ph wp
pu wq
po

Notes
α Includes terminator modules
β J2 only
δ 8 slot and above only
ω 7 slot and below only
τ 4 slot and above only

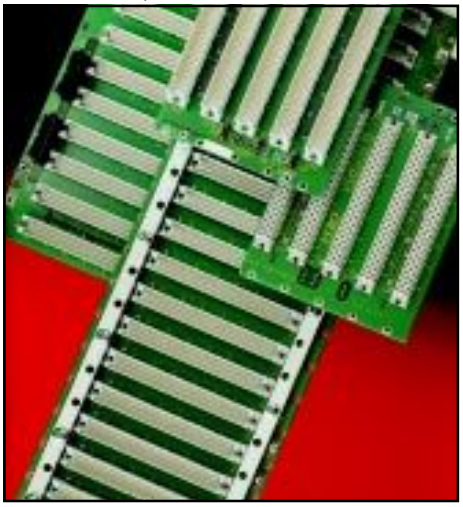
Example: **243-412121** is a VMEXCEL J1 backplane with off board termination, Auto BusGrant connectors, Power Bug/Faston power connection, 21 slots wide

For any other configuration or slot size, please contact VERO Electronics Sales Office.

VMEXCEL J1 Backplanes



VMEXCEL J2 Backplanes

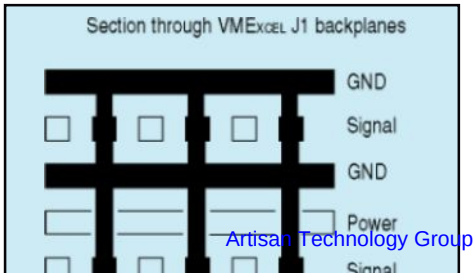


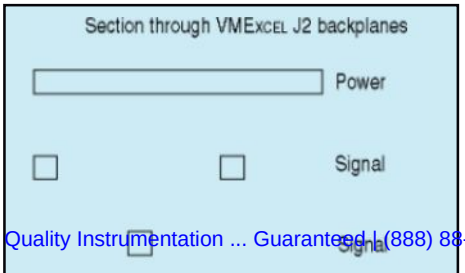
J1 AND J2 3U
POWER RATINGS (21 SLOT BACKPLANE)

Voltage	Max. per slot		Total power	
	J1	J2	J1	J2
5V	4,5A	4,5A	125A	125A
+12V	1.5A	n/a	24A	n/a
-12V	1.5A	n/a	24A	n/a
5VSTBY	1.5A	n/a	24A	n/a

The above figures are provided as an indication of the maximum power handling capabilities of VMEXCEL. The maximum per slot figures are taken from the VMEbus specification using a figure of 1,5A per pin for the DIN connectors.

The maximum figures are obtained from a 21 slot backplane with busbar power connection.





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

To configure your VMEXCEL Monolithic backplane, use the chart below to select the features and options you require:

Ordering Information

243 - 4 3 X X XX

J1/J2 Monolithic

α Off Board Termination / STD Connector = p
On Board Termination / STD Connector = q
α Off Board Termination / ABG Connector = w
On Board Termination / ABG Connector = e
α Off Board Termination (Active) / STD Connector = r
α Off Board Termination (Active) / ABG Connector = t
On Board Termination (Screw fixing for VSB) / STD Connector = h
α Off Board Termination (Screw fixing for VSB) / STD Connector = j
α Off Board Termination (Active, screw fixing for VSB) / STD Connector = i

Σ Option 1 (J1)
τ Mate 'N' Lok = p
δ Power Bug/Faston = q
δ Busbar = w
ω Faston = e

Σ Option 2 (Centre)
τ Mate 'N' Lok = r
δ Power Bug/Faston = t
δ Busbar = h
ω Faston = j

Preferred Slot Sizes
pq qw
pe qr
pt qh
pu wp
po wq
qp

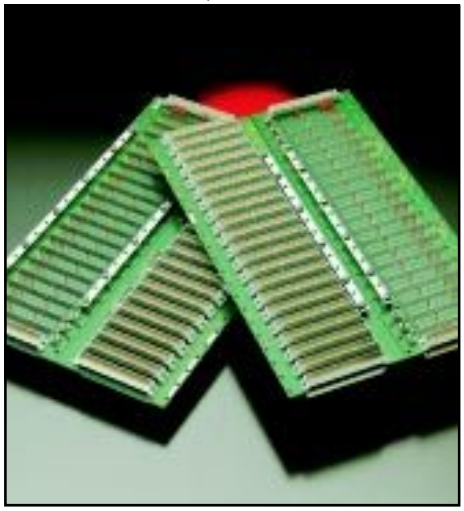
Notes

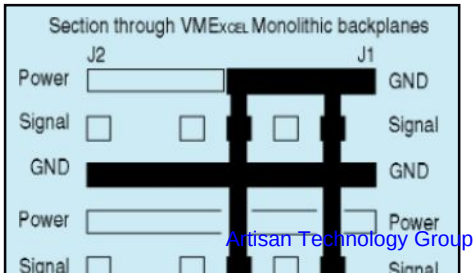
α Includes terminator modules
τ 4 slot and above only
δ 8 slot and above only
ω 7 slot and below only
Σ Option 1 locates the power connectors in the J1 position on the board
Σ Option 2 locates the power connectors centrally.

Example: **243-436614** is a VMEXCEL Monolithic backplane with on-board termination, screw fixings for VSB, standard connectors, busbar power connection in the centre position, 14 slots wide.

For any other configuration or slot size, please contact VERO Electronics Sales Office.

VMEXCEL Monolithic Backplanes





MONOLITHIC 6U
POWER RATINGS (21 SLOT BACKPLANE)

Voltage	Max. per slot	Total
5V	9A	125A
+12V	1.5A	24A
-12V	1.5A	24A
5VSTBY	1.5A	24A

The above figures are provided as an indication of the maximum power handling capabilities of VMEXCEL. The maximum per slot figures are taken from the VMEbus specification using a figure of 1,5A per pin for the DIN connectors.

The maximum figures are obtained from a 21 slot backplane with busbar power connection.

It is possible to modify standard product to provide in excess of 200A on the +5V line if required. Please contact VERO Electronics.

MATERIAL SPECIFICATIONS - VMEXCEL RANGE

Board

Epoxyglass fibre to BS 4584 EP-GC-CU-3 (FR4)
Material thickness 2.7mm nominal

Bare boards are UL 94V-0 rated.
File number E. 116551

Connectors - Standard DIN 41612 and Auto Bus Grant (ABG)

IEC 603-2 (DIN 41612) 96 way
Body material: glass filled polyester UL 94V-0 rated
Insertion force (mating)/pair: M90N
Withdrawal force (unmating)/pair: M90N
Min. pin to board retention force: 30N per contact

Environmental

Temperature range - storage: - 40°C to + 120°C
Temperature range - working: - 20°C to + 85°C
Altitude: 3000 m
Humidity: 90% R.H. non-condensing
Shock and vibration resistant: commercial
MTBF to MIL -HBK-217E: >225000 hours
Conditions: Ground benign Temperature 25°C
Insertion frequency: 0.5 to 5 per 1000 hours

QUALITY ASSURANCE

VMEXCEL backplanes are manufactured in

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

HIGH PERFORMANCE VMEELITE BACKPLANES

VMEELITE MONOLITHIC BACKPLANE

The VMEELITE high performance backplane range reaches new levels of performance for standard VMEbus backplanes.
Designed to cope with the ever increasing demands of high performance VME systems, VMEELITE backplanes should be used where very low noise, tightly controlled impedance or high power are important system requirements - VME64 being a typical application area.
Surface mount termination and VERO's unique additional ground track patterns through connector pins enables very low crosstalk figures to be achieved.

FEATURES
- VME64 compatible
- Conforms to VME64 specification (ANSI/VITA1-1994)
- High performance 80 M byte/sec systems capability.
- 10 layer strip line construction.
- 50 Ω controlled characteristic impedance.
- Excellent crosstalk performance.
- Patented earth guard tracking techniques with additional guard tracks through connector pin patterns
- Mechanically in-board, electrically out-board surface mount termination with Schottky clamp
- Surface mount termination to reduce inductive lead length and reduce crosstalk
- Autobahn termination positions available optionally
- Three power connection options:
  - Mate 'N' Lok connector
  - Powerbug with dual faston
  - Busbars
- New low-profile high performance busbars with M6 studs
- Extra power connectors available optionally for very high power applications
- Decoupling capacitors fitted for each slot on J1 and positions provided on J2
- Voltage smoothing capacitor positions are provided for each J1 slot position
- Two options for retained and latching header for system functions and remote power sensing.
- Gold plated rear plug-up connectors and shrouds fitted to all J2 and slots 1 & "n" J1 positions.
- Excellent ground shift performance.
- Auto bus grant connectors optional.

MATERIAL SPECIFICATIONS
Board

Dielectric epoxy glass to	BS 4584 EP-GC-CU-3 (FR4)
Nominal thickness :	4,5 mm
Base copper thickness :	35 µm
Finish: Plated copper -	40 µm average
Tin lead -	5 µm approximately

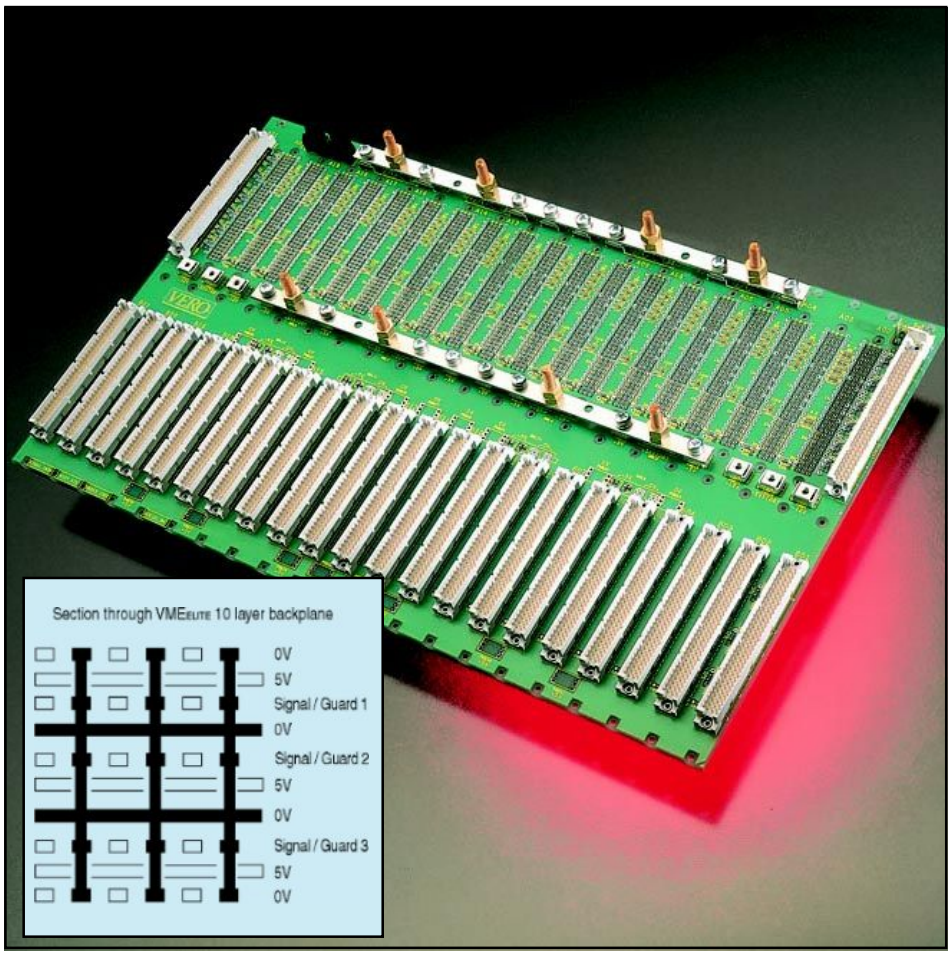
Bare boards are UL 94V-0 rated components, File number E. 116551

Connectors - Standard DIN 41612 and Auto Bus Grant (ABG)

IEC 603-2 (DIN 41612) 96 way	
Body material:	glass filled polyester UL 94V-0 rated
Insertion force (mating)/pair:	M90N
Withdrawal force (unmating)/pair:	M90N
Min. pin to board retention force:	30N per contact

Environmental

Temperature range - storage	- 40°C to + 120°C
Temperature range - working	- 20°C to + 85°C
Altitude:	3000 m
Humidity:	90% R.H. non-condensing
Shock and vibration resistant:	commercial
MTBF to MIL -HBK-217E:	>225000 hours



CROSSTALK PERFORMANCE

VERO's VMEELITE design incorporates a completely new latticed guard track layout that further enhances the backplanes' crosstalk performance.

The design of VMEELITE has increased the space in the connector area of the tracking interconnect so that guard tracks are now continuous down the entire length of the backplane. Previously, the guard track stopped short on either side of a slot position.

The new layout ensures that not only is each signal trace completely guard tracked, creating a quasi-coaxial transmission line, but each signal pin on the connectors is surround by an annular earth ring.

VMEELITE incorporates an advanced surface mount termination layout. Using SMD components improves crosstalk performance by reducing lead lengths and stub lengths, which in turn reduces inductive coupling between the termination elements.

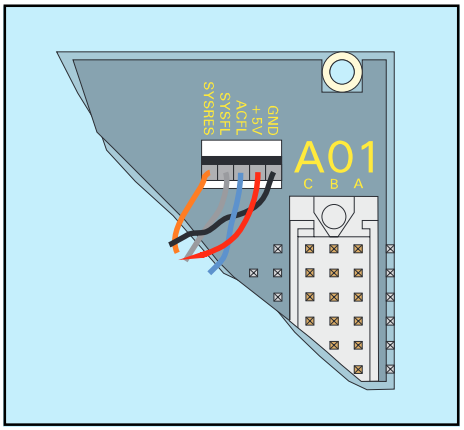
The features described above have contributed to making VMEELITE the highest performing standard VMEbus backplane ever offered by VERO Electronics.

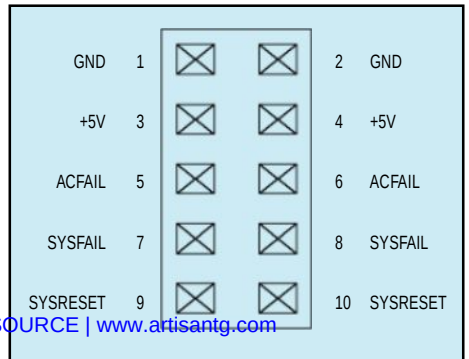
CROSSTALK PERFORMANCE OF FOUR GENERATIONS OF VMEbus BACKPLANE

Standard VME Backplane	% of 5 layer crosstalk	Decibel
5 layer (1981)	Reference	0dB
VMEXCEL (1992)	90%	-0,9dB
High Performance	% of 5 layer	Decibel

LATCHABLE SERVICES HEADER

All VMEELITE backplanes are supplied as standard with two services headers: a 5 way header with mating half and flying leads to allow simple upgrade from VMEXCEL monolithics to VMEELITE, and a 10 way header to provide backward compatibility with VERO's VME 64 backplane range.





Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VMEELITE HIGH PERFORMANCE BACKPLANES WITH STANDARD CONNECTORS **Ordering information**

Preferred Slot width	Order code		
	Mate "n" lok	Power bug/spade	Busbar
5	**243-451005B**	**243-451105J**	**243-451205E**
7	**243-451007J**	**243-451107E**	**243-451207A**
9	**243-451009E**	**243-451109A**	**243-451209H**
10	**243-451010J**	**243-451110E**	**243-451210A**
12	**243-451012E**	**243-451112A**	**243-451212H**
14	**243-451014A**	**243-451114H**	**243-451214D**
16	**243-451016H**	**243-451116D**	**243-451216L**
20	**243-451020F**	**243-451120B**	**243-451220J**
21	**243-451021D**	**243-451121L**	**243-451221G**

VMEELITE HIGH PERFORMANCE BACKPLANES WITH ABG CONNECTORS **Ordering information**

Preferred Slot width	Order code		
	Mate "n" lok	Power bug/spade	Busbar
5	**243-453005C**	**243-452105D**	**243-453205F**
7	**243-453007K**	**243-453107F**	**243-453207B**
9	**243-453009F**	**243-453109B**	**243-453209J**
10	**243-453010K**	**243-453110F**	**243-453210B**
12	**243-453012F**	**243-453112B**	**243-453212J**
14	**243-453014B**	**243-453114J**	**243-453214E**
16	**243-453016J**	**243-453116E**	**243-453216A**
20	**243-453020G**	**243-453120C**	**243-453220K**
21	**243-453021E**	**243-453121A**	**243-453221H**

For any other configuration or slot size please contact VERO Electronics Sales Office.

MECHANICAL SPECIFICATIONS

The VMEELITE backplane range employs the following mechanical specifications

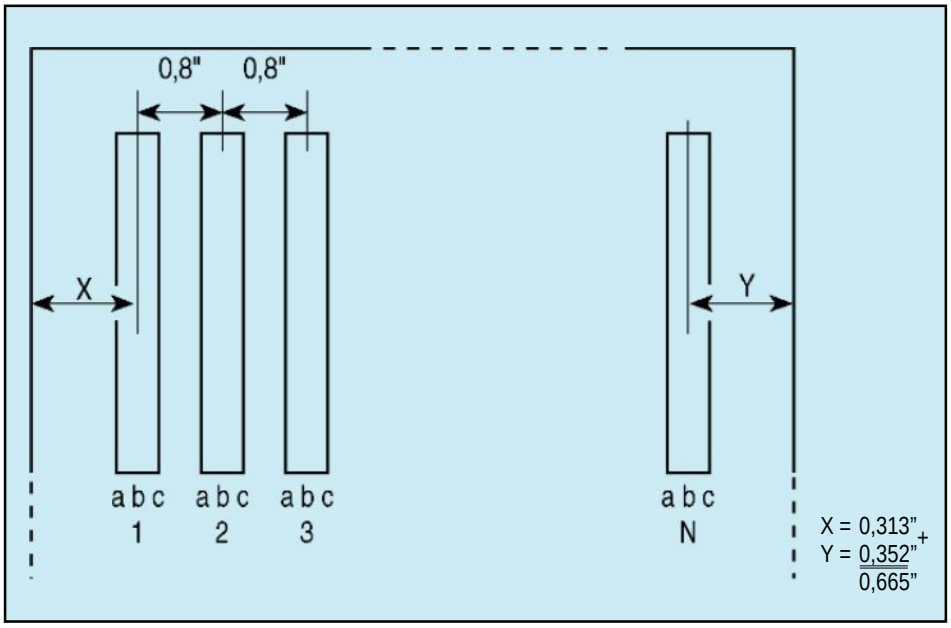
BACKPLANE HEIGHT

Monolithic 6U = 262 mm (10,31")

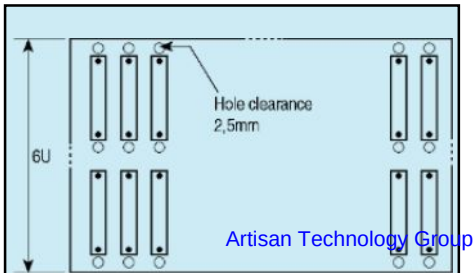
BACKPLANE WIDTH

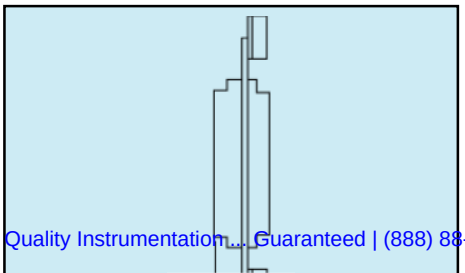
The width of all VMEELITE backplanes can be calculated using the following formula;

Board width = 0,665" + ([N-1] x 0,8) inches
(x 25,4 = mm)



Backplane Width





MONOLITHIC 6U
POWER RATINGS (21 SLOT BACKPLANE)

Voltage	Max. per slot	Total Std.	Total Optional
5V	9A	160A	300A
+12V	1.5A	40A	40A
-12V	1.5A	40A	40A
5VSTBY	1.5A	40A	40A

The above figures are provided as an indication of the maximum power handling capabilities of VMEELITE. The maximum per slot figures are taken from the VMEbus specification using a figure of 1,5A per pin for the DIN connectors.

The maximum figures are obtained from a 21 slot backplane with busbar power connection.

It is possible to modify standard product to provide in excess of 300A on the +5V line if required. Please contact VERO Electronics.

To maximise power distribution efficiency the VMEELITE backplane has three 5V power planes and four 0V ground planes.

Where N = number of slots
0,665" is the sum of the overhang at either end of the backplane

CONNECTOR PITCH

All connectors mounted on VMEbus backplanes use a 4HP (20,32mm / 0,8") pitch

BOARD THICKNESS

All VMEELITE backplanes are 4,5mm (0,177") thick multilayer constructions.

MOUNTING POSITIONS

VMEELITE backplanes have three rows of mounting holes.

Each row of backplane mounting holes is aligned with the connector mounting holes. The connector mounting holes are 0,3mm (0,012") to the left of centre of row b pins when viewed from the front (connector side) of the backplane. Each backplane is supplied with enough screws (M2,5 x 6mm long cheese head) to secure it to the tie bars of a subrack.

Backplane spacer strips are also required and must be ordered separately. Please refer to Subracks; section 4, page 4.31 for spacer details.

BACKPLANE ASSEMBLY DEPTH

The overall depth of the VMEELITE backplane assembly, X, covers the distance from the front face of the subrack tie bar to the rear of the rear connector shroud, where X = 18mm.

QUALITY ASSURANCE

VMEELITE backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQ PCQ88, with systems approval in accordance with BS EN ISO 9001, ISO

Artisan Technology Group - Quality Instrumentation... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VME² BACKPLANE FOR VME 64 x

VME² - VME64 EXTENSIONS BACKPLANE

VERO's new VME² backplane represents the cutting edge of VMEbus board technology.

VERO Electronics Circuit Board Division has confirmed its long tradition of early support for new open architecture busses by manufacturing VME², the World's first VME64x backplane, as part of its contribution to the development of the VME64x specifications. VERO's involvement with the VITA Standards Organisation (VSO), ensures both its contribution to the design process and its awareness of the evolution of the draft specifications.

The VME64 Standard, VITA1-1994, defines a set of features that can be added to VME and VME64 boards. The major new features which affect the backplane design are as follows:

The introduction of a 160 pin DIN connector with row "z" and "d" pin rows in both the P1/J1 and P2/J2 areas. These new connectors are backward compatible so that a 96 pin DIN connector can mate with the 160 pin VME64x connector.

An optional P0/J0 connector can be used between the P1/J1 and P2/J2 to provide an extra 95 user definable pins on a 2mm hard metric connector.

Improved supply voltages of +3,3V and 48V plus more +5V power.

Thirty-five more ground returns between VME64x boards and VME64x backplanes, providing - in total - 47 ground returns.

User defined I/O pins on the P2/J2 increased by 46.

Ten spare bussed pins and 2 unbussed on the P1/J1 for future use.

An optional test and maintenance bus interface to give improved manufacturability, testability, maintenance and diagnostics of VME64x boards.

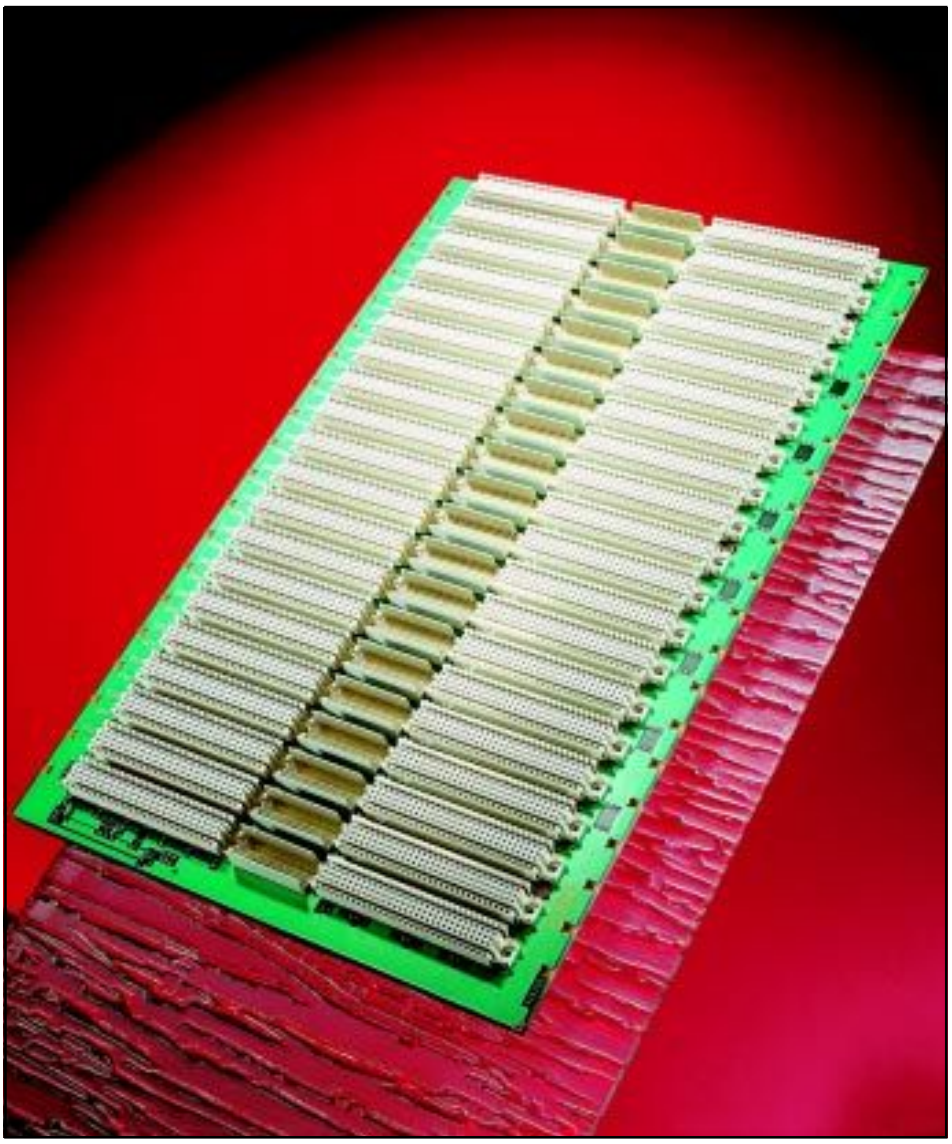
Geographical address pins GA0 - GA4 and GAP shall be tied to ground or left open on the J1 connector on the backplane to give slot geographic addressing.

Development work is in progress on a supporting specification for live insertion and incident wave switching via the (optional) use of ETL devices.

FEATURES

- 12 layer stripline construction
- Tightly controlled impedance
- Surface mount passive termination with Schottky clamp
- Electronic on-board Auto Bus Grant
- Power connections via busbars and power studs
- Decoupling capacitors fitted
- All long tails gold plated
- Cast +3,3V busbar and stiffener available optionally

NOTE: Due to the width of the 160 pin connector and the increased number of lines requiring termination, it is necessary to "grow" the backplane slightly. As a result of this growth one slot position before slot 1 is lost (to the left of the backplane when viewed from the connector side).



VME² VME64x BACKPLANES (WITHOUT P0/J0 CONNECTOR) **Ordering information**

Preferred Slot width	Order code: Busbars 0V, +5V plus +3,3V busbars/stiffeners	Order code: Busbars 0V, +5V
7	**243-479607K**	**243-479207D**
10	**243-479610K**	**243-479210D**
14	**243-479614B**	**243-479214G**
17	**243-479617G**	**243-479217A**
20	**243-479620G**	**243-479220A**

VME² VME64x BACKPLANES (WITH P0/J0 CONNECTOR) **Ordering information**

Preferred Slot width	Order code: Busbars 0V, +5V plus +3,3V busbars/stiffeners	Order code: Busbars 0V, +5V
7	**243-470607L**	**243-470207E**
10	**243-470610L**	**243-470210E**
14	**243-470614C**	**243-470214H**
17	**243-470617H**	**243-470217B**
20	**243-470620H**	**243-470220B**

For any other configuration or slot size please contact VERO Electronics Sales Office.

MATERIAL SPECIFICATIONS

Board

Dielectric epoxy glass to	BS 4584 EP-GC-CU-3 (FR4)
Nominal thickness :	4,5 mm
Base copper thickness :	35 µm
Finish:	Plated copper - 40 um average

Environmental

Temperature range - storage	- 40°C to + 120°C
Temperature range - working	- 20°C to + 85°C
Altitude:	3000 m
Humidity:	90% R.H. non-condensing
Shock and vibration resistant:	commercial
MTBF to MIL -HBK-217F:	>225000 hours

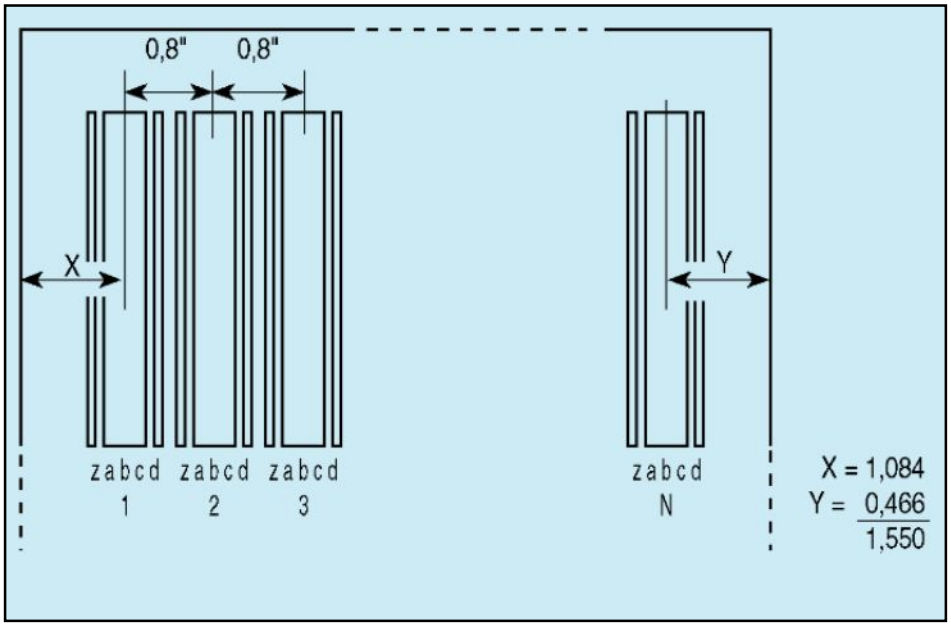
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MECHANICAL SPECIFICATIONS

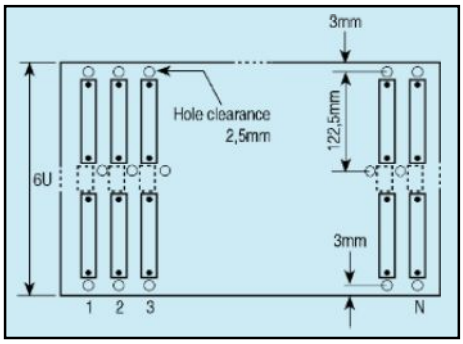
The VME² backplane range employs the following mechanical specifications

BACKPLANE HEIGHT

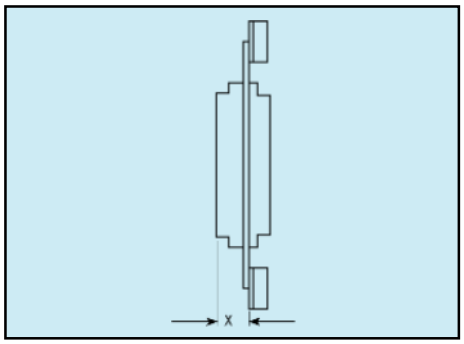
Monolithic 6U = 262 mm (10,31")



Backplane Width



Backplane Mounting Positions



Backplane Assembly Depth

BACKPLANE WIDTH

The width of all VME² backplanes can be calculated using the following formula;

Board width = 1,550" + ([N-1] x 0,8) inches
(x 25,4 = mm)

Where N = number of slots
1,550" is the sum of the overhang at either end of the backplane

CONNECTOR PITCH

All connectors mounted on VMEbus backplanes use a 4HP (20,32mm / 0,8") pitch

BOARD THICKNESS

All VME² backplanes are 4,5mm (0,177") thick multilayer constructions.

MOUNTING POSITIONS

VME² backplanes have three rows of mounting holes, only two of which (the top and bottom) are usable when the optional P0/J0 connector is installed.

The top and bottom row of backplane mounting holes are aligned with the connector mounting holes, but the centre row of mounting holes is offset by 2HP (0,4" or 10,16mm). The connector mounting holes are 0,3mm (0,012") to the left of centre of row b pins when viewed from the front (connector side) of the backplane. Each backplane is supplied with enough screws (M2,5 x 6mm long cheese head) to secure it to the tie bars of a subrack.

Backplane spacer strips are also required and must be ordered separately. Please refer to Subracks; section 4, page 4.31 for spacer details.

BACKPLANE ASSEMBLY DEPTH

The overall depth of the VME² backplane assembly, X, covers the distance from the front face of the subrack tie bar to the rear of the rear connector shroud, where X = 18mm.

QUALITY ASSURANCE

VME² backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQ PCQ88, with systems approval in accordance with BS EN ISO 9001, ISO 9002 and EN 29002.

VME² - VME64 EXTENSIONS EXTENDER

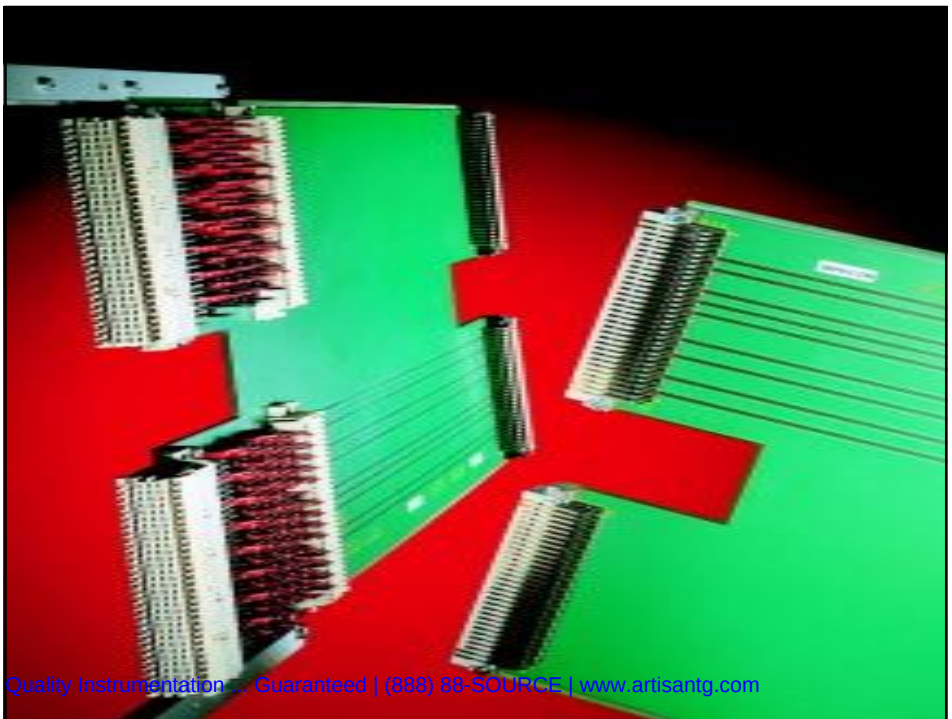
VERO introduces a new 6U high extender for use with VME64x product applications.

Designed to extend all J1 and J2 positions, all signal tracks are provided with jumper links. The extender is also fitted with a connector to allow the fitting of logic analyser or terminator modules.

FEATURES

- 10 layer stripline construction
- Individual signal track screening
- Jumper links on all signal tracks for interrogation purposes
- Connector position for logic analyser or terminator
- Cutout in P0/J0 area to allow dedicated cable assemblies to be connected to J0 on backplane to P0 on boards - improves flexibility of use
- Card support frame with ejector mechanism provided

NOTE: For details of the P0/J0 fully tracked version please contact VERO Electronics



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

HIGH PERFORMANCE VMEbus J1 BACKPLANES

Born from the design concepts utilised in the development of 64 bit VMEbus products VERO have brought the same high performance, low noise attributes found in larger systems to the 16 bit arena.

FEATURES

- Conforms to VME64 specification (ANSI/VITA1-1994)
- 11 layer strip line construction.
- 50 Ω controlled characteristic impedance.
- Patented earth guard tracking techniques.
- Mechanically in-board, electrically out-board termination.
- Three power connection options:
  - Mate 'N' Lok connector
  - Powerbug with dual faston
  - Busbars
- Excellent ground shift performance
- Excellent crosstalk performance
- Auto bus grant connectors optional
- Latchable header for system functions and remote power sensing.
- Gold plated rear plug-up connectors and shrouds fitted to slot 1 and slot 'n'

MATERIAL SPECIFICATIONS

Board

Dielectric epoxy glass to BS 4584 EP-GC-CU-3 (FR4)
Nominal thickness : 4,7mm
Base copper thickness : 35 µm
Finish: Plated copper - 40 µm average
Tin lead - 5 µm approximately
Bare boards are UL 94V-0 rated components, File number E. 116551

Connectors - Standard DIN 41612 and Auto Bus Grant (ABG)

IEC 603-2 (DIN 41612) 96 way
Body material: glass filled polyester UL 94V-0 rated
Insertion force (mating)/pair: M90N
Withdrawal force (unmating)/pair: M90N
Min. pin to board retention force: 30N per contact

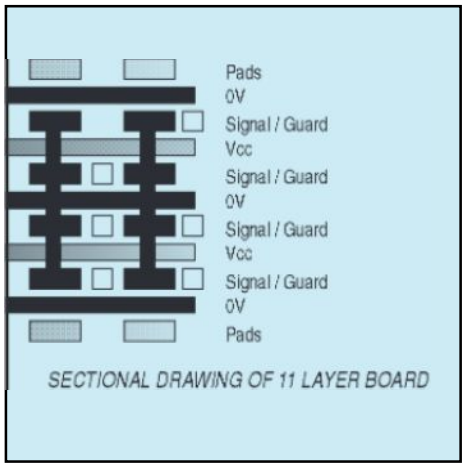
Environmental

Temperature range - storage - 40°C to + 120°C
Temperature range - working - 20°C to + 85°C
Altitude: 3000 m
Humidity: 90% R.H. non-condensing
Shock and vibration resistant: commercial
MTBF to MIL -HBK-217E: >225000 hours
Conditions: Ground benign Temperature 25°C
Insertion frequency: 0.5 to 5 per 1000 hours

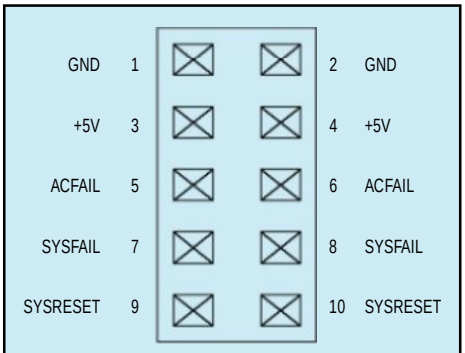
QUALITY ASSURANCE

High performance VMEbus J1 backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQ PCQ88, with systems approval in accordance with BS EN ISO 9001, ISO 9002 and EN 29002.





SECTIONAL DRAWING OF 11 LAYER BOARD



PIN ALLOCATION 10 WAY HEADER ASSEMBLY
Note: Header is polarised at pin 1

HIGH PERFORMANCE VMEbus J1 BACKPLANES **Ordering information**

Slot width	Power distribution	**Order code**
21	Mate "n" lok	**243-305821L**
	Power bug/spade	**243-305921G**
	Bus bar kit	**243-305658G**

For any other slot size or configuration please contact VERO Electronics Sales Office

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VMEbus LIVE INSERTION MODULE

VERO's new LIModule allows individual daughter boards to be plugged into a powered and operating VME system.

The LIModule is totally transparent in operation - even under worst case conditions - and is usable with active VME boards, VMEbus backplanes and extenders and Microracks. The module may also be adapted to support J2 mezzanines such as VSB, VXI and many others with the use of a special I/O mezzanine module. For further details contact VERO Electronics Technical Enquiries.

LIModule fully conforms to IEEE P1014 R rev D, the VMEbus specification.

Active signal buffering technology is employed to preserve VME compatibility.

The LIModule improves productivity in the production, development and maintenance environments by allowing boards to be hot swapped whilst the system is running, avoiding shutdown with the corresponding loss of security and productivity.

With the exception of the controller slot, the LIModule can be used in any slot position.

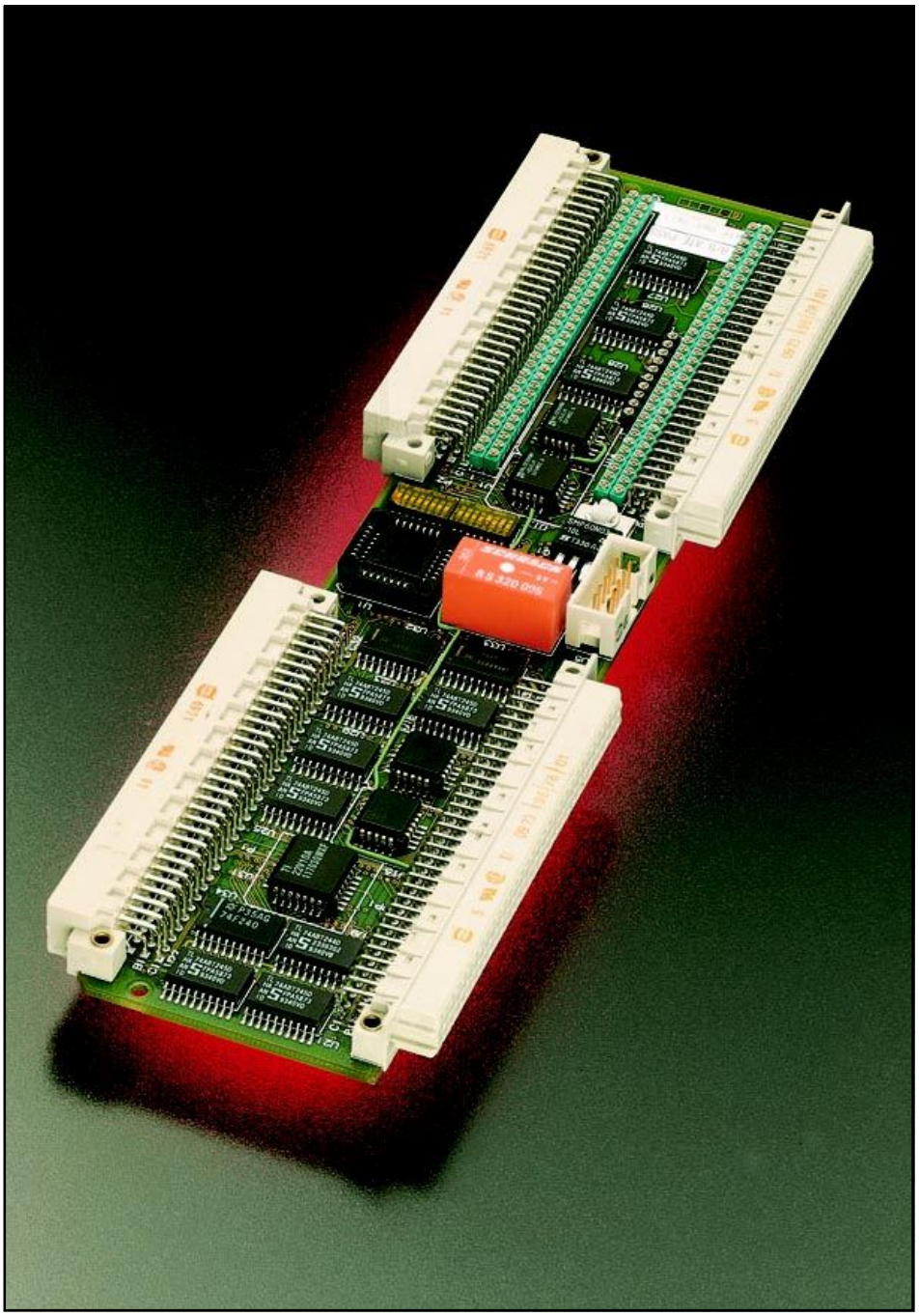
LIModule is a 60mm deep x 6U active extender card second generation live insertion module, employing a combination of tri-state drivers and analog switches.

Once inserted, board connection is by software control or mechanical switching. In either case, power-up and bus synchronisation is automatic. The use of the LIModule introduces an insertion delay of 25ns, which is insignificant - even in a 21 slot system.

FEATURES

- Conforms to VME64 specification (ANSI/VITA1-1994)
- 6U x 60mm deep extender board
- Tri-state, high speed 3ns, 64mA drivers on critical uni-directional lines i.e. address, data and control signals
- Analog Quickswitches on bi-directional lines such as interrupts and bus request
- Compatible with all VMEbus backplanes, extenders and systems

Note: If standard J2 I/O pins are used on slots where the LIModule is employed, an I/O mezzanine module is also required.



LIMODULE

Ordering information

Description	Dimensions	Order Code
Live Insertion Module	6U x 60mm	**243-312082K**
I/O Mezzanine Module	-	**243-313122H**

For VSB and VXI mezzanine module please contact VERO Electronics Sales Office

VMEbus 60mm ADAPTORS

When the LIModule is employed in a 220mm deep subrack, standard 160mm deep VME cards are

VMEbus ADAPTORS

Ordering information

Description	Order code
J1 60mm Adaptor	**243-42629C**

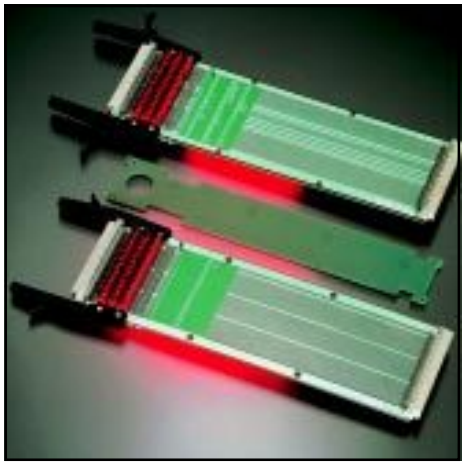
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VMEbus SUPPORT

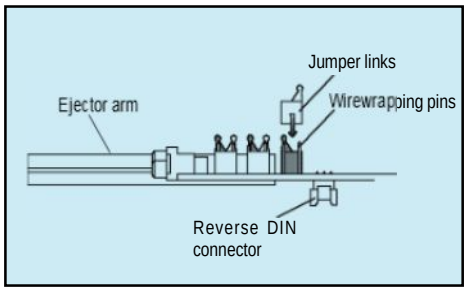
VMEbus EXTENDER BOARDS

FEATURES

- Excellent performance with a multilayer design
- Full ground plane plus individual signal track screening
- Signal pin-out identification silk screened onto outer layers
- Jumper links provided to allow signal line interrogation
- Facility for logic analyser or terminator module connection
- Card eject/support mechanism provided
- Conversion kit for combining J1 and J2 extender boards to 6U high

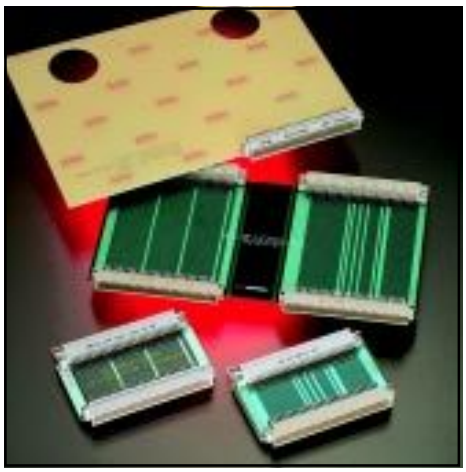


VMEbus Extender Boards



EXTENDER BOARDS **Ordering information**

Description	Order code
J1 Extender board	**243-26487G**
J2 Extender board	**243-26499H**
6U Conversion kit	**188-27542E**



BUSGRANT / IACK Jumper Board

BUS GRANT/IACK JUMPER BOARD

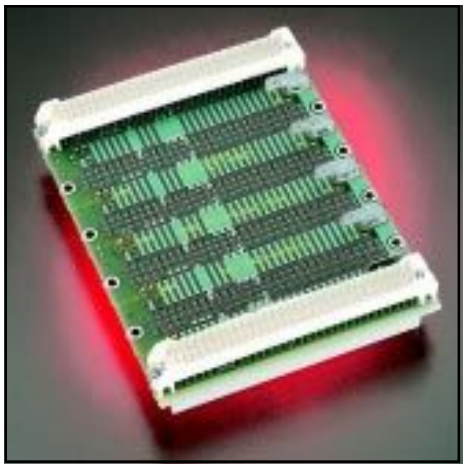
FEATURES

- 6U double height board
- Simplifies access for field service
- Eliminated the use of small jumper links
- Maintains integrity of thermal management - no empty slot

VMEbus ADAPTORS

FEATURES

- Single piece 120mm J1/J2 design
- Separate 60mm J1 and J2 designs
- Multilayer construction
- Patented earth guard tracking



VSB Backplane

BUS GRANT/IACK JUMPER BOARD

Ordering information

Description	Order code
Bus Grant/IACK board	**188-47862A**
Enhanced BGRANT/IACK board	**188-308047K**

VMEbus ADAPTORS **Ordering information**

Description	Order code
J1/J2 120mm Adaptor	**243-47628J**
J1 60mm Adaptor	**243-42629C**
J2 60mm Adaptor	**243-42628F**



VSB BACKPLANES

FEATURES

- Implements VME Subsystem Bus (VSB)
- Fully conforms to the VSB specification - Revision C - November 1986
- Reliability of multilayer construction with solder resist protection
- Patented earth guard tracking
- Rear shrouds in slots 1 & n allow for “off-board” termination
- Rear pluggable onto VME J2 backplanes
- Jumper positions for BGIN*/BGOUT* daisy chain

ADDITIONAL FEATURES - OFF-BOARD VERSION

- Off-board terminator modules included
- Retainer/Ejector kit included
- Fastons for power-on connection

ADDITIONAL FEATURES - ECONOMY ON-BOARD VERSION

- Passive on-board termination

VSB BUS BACKPLANES **Ordering information**

No. of Positions	Order Code	
	Off-board	On-board
2 Slot	**243-56102D**	**243-312912F**
3 Slot	**243-56100K**	**243-312913D**
4 Slot	**243-56098K**	**243-312914B**
5 Slot	**243-56096E**	**243-312915L**
6 Slot	**243-56094L**	**243-312916J**

ACCESSORIES **Ordering information**

Description	Pkt. size	Order code
Retainer/Ejector kits	Pkt. 4	**188-53118L**
IEC connector shroud	Pkt. 5	**188-39181D**
VSB/J2 terminator	Pkt. 1	**243-53179F**

VMEbus POWERFAIL MODULE REV. D

FEATURES

- Conforms to VMEbus specification IEEE 1014 Rev. D
- Outputs for ACFAIL and SYSRESET
- Special input for external reset button
- Universal mounting
- Aluminium cassette

VMEbus POWERFAIL MODULE

Ordering information

Description	Order code
VMEbus powerfail module	**145-44690F**

SPECIFICATION

Mains input:	220V (+10%, -15%)
Output:	
ACFAIL	open collector
SYSFAIL	open collector
Power failure timing:	
SYSRESET - L after ACFAIL L	3 ms ±0,5 ms
System restart timing:	
SYSRESET - H after ACFAIL H	300 ms ±50ms
SYSRESET - H after DC within spec	300 ms ±50ms
Manual reset timing:	

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MODULAR MICRORACK SYSTEM

VERO's VMEbus Microrack range has been comprehensively upgraded with the introduction of the Modular Microrack System - a new concept in the provision of customer specific development system requirements.

The modular nature of this new Microrack system allows a customised product to be made available to the user in the shortest possible time. The ability to configure the Microrack for specific applications allows the user to tailor the product exactly to his requirements and budget.

Value-engineering, combined with optimised production methods, has resulted in a range of systems that is competitively positioned, but which still enjoys the quality and performance associated with Microrack systems manufactured by VERO Electronics.

The Modular Microrack System "MMS" offers excellent performance characteristics in the key areas of VME card depths, ventilation, power supply technology, desktop version and EMC protection.

FEATURES

- Modular design
- Short lead times
- Available in 6U, 7U and 8U. 3U and 4U are under development and due to be available during 1997
- Optimised ventilation
- Rack mount or desktop version
- VMEXCEL backplanes with ABG
- Various power supply options
- Standard 19" accessories from the KM6-II range can be used
- Quick change air filter element
- Ventilation systems for boards and power supplies operate independently from one another
- Recessed front panel assembly for EMC shielding
- Assembly to EMC standard
- EMC front panel available on 6U subrack version
- User and display controls at the front on 7U and 8U versions
- Card depths of 160mm and 220mm available
- Easy access to J2 area at rear of unit
- Integral cable management channels
- Supplied fully assembled, wired and tested

QUALITY ASSURANCE

VMEXCEL backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQPCQ88 with approval in accordance with BS EN ISO 9001, ISO9002 and EN29002.

VMEbus MODULAR MICRORACKS
3U and 4U versions of the Modular Microrack are also available. Please contact VERO Electronics further details.

VMEbus MICRORACKS
VERO can also manufacture Microracks to suit specific customer requirements. Please direct your enquiries to VERO Electronics in Hedge End, Bremen, Beauvais, Hamden, Turin, Stockholm or Værløse

SUBRACK MODULE / COVERS

A universal subrack forms the basis of all versions of the Modular Microrack. The assembly of a range of covers and panels allows the easy construction of a 6U subrack, a 7U (½U top + 6U + ½U bottom) subrack and an 8U (½ top + 6 + 1½ bottom) desk-top caseframe or subrack.
The standard VMEbus card depths of 160mm, 220mm and 60/160mm (60mm front recess) can be accommodated.

Specification

Extrusions:	Aluminium alloy BS 1474HE9TF, conductive
End plates:	1,5mm MS zinc plate
6U Cover:	0,5mm MS zinc plate (ventilated)
7U/8U Cover:	1,25mm MS zinc plate

Visible surface spray coated (RAL 7035 pale grey)
Base cover ventilated
Handles included on subrack versions
500mm total depth

VENTILATION/COOLING MODULE

6U VERSION

4 different rear fan panels are available for optimised system ventilation in the 7U and 8U versions. All fan panels are filtered.

- 1U fan tray, 250mm deep, fitted with 3 AC axial fans
- 1U filtered fan tray, 250mm deep, fitted with 3 AC axial fans

7U/8U VERSION

Ventilation of the 6U subrack is achieved by the use of 2 different fan trays. Both fan panels are filtered.

- 3 AC axial fans 120mm x 120mm
- 3 DC axial fans 120mm x 120mm
- 3 DC temperature dependent variable speed fans
- 3 DC temperature dependent variable speed fans with fan fail indication

POWER SUPPLY/MAINS FILTER MODULE

6 different open frame power supply and mains filter combinations are available for the Modular Microrack System. The mains input is supplied through an IEC connector with a double fuse and an additional mains filter for maintaining interference suppression level B. Models BVM354, 504 and 754 feature power factor correction. A 2-way mains switch is integrated in the top cover for the 7U and 8U versions.

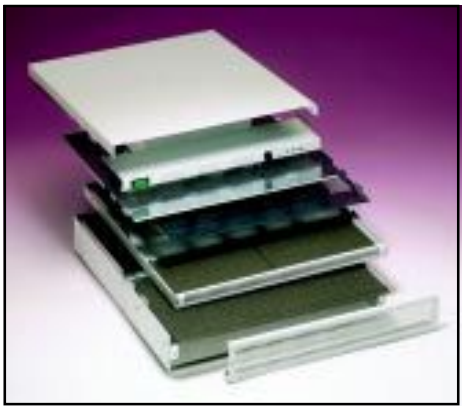
- BVM 200 5V/30A; +12V/8A; -12V/4A
- BVM 350 5V/50A; +12V/12A; -12V/5A
- BVM 450 5V/60A; +12V/20A; -12V/15A
- BVM 354 5V/50A; +12V/8A; -12V/4A
- BVM 504 5V/75A; +12V/8A; -12V/4A
- BVM 754 5V/120A; +12V/12A; -12V/10A
- Other power supplies available on request

VMEXCEL BACKPLANES

VMEXCEL backplanes offer excellent performance characteristics in the key areas of controlled impedance, power distribution and termination design.

- 6 Layer stripline construction J1 and monolithic
- 4 Layer stripline construction J2
- 50Ω characteristic impedance control











Artisan Technology Group - Quality Instrumentation... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MMS - MODULAR MICRORACK SYSTEM

To configure your Modular Microrack System, use the chart below to select the features and options you require:

Ordering Information

146 - X X X X XX

Subrack Module
6U 84HP 160mm = q
6U 84HP 220mm = w
6U 84HP 160mm (60mm recessed) = e

Cover Module
No covers = p
160mm ventilated covers 6U = q
220mm ventilated covers 6U = w
160mm (60mm recessed) ventilated covers 6U = e
½U top, ½U bottom front ventilated covers 7U = r
½U top, 1½U bottom front ventilated covers 8U = t
7U Desktop Version (with side covers) = h
8U Desktop Version (with side covers) = j

Ventilation Module
No cooling = p
Rear fan panel, AC fans = q
Rear fan panel, DC fans = w
Rear fan panel, variable speed fans = e
1U fan tray = r
1U filtered fan tray = t
Rear fan panel, variable speed fans with FANFAIL indication ¶ = h

Power Supply Module
BVM 200 + Filter = q
BVM 350 + Filter = w
BVM 450 + Filter = e
BVM 354 + Filter = r
BVM 504 + Filter = t
BVM 754 + Filter = h

Backplane Module §
J1 10 slot ABG = qp
J1 12 slot ABG = qw
J1 16 slot ABG = qh
J1 20 slot ABG = wp
J1 21 slot ABG = wq
J1/J2 10 slot ABG = r p
J1/J2 12 slot ABG = r w
J1/J2 16 slot ABG = r h
J1/J2 20 slot ABG = t p
J1/J2 21 slot ABG = t q
Mono. 10 slot ABG = i p
Mono. 12 slot ABG = i w
Mono. 16 slot ABG = i h
Mono. 20 slot ABG = op
Mono. 21 slot ABG = oq

¶ Special option
§ VMExcel backplanes

Example: **146 - 152391** is a Modular Microrack System assembled to the following configuration:
6U x 84HP subrack for 160mm deep boards with a ½ U top cover and a 1½ U ventilated base cover with a filter fitted. At the back is a rear fan panel with three DC fans. An open frame power supply - BVM450 - with an additional mains filter is included, together with a VMExcel 21 slot monolithic backplane.



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MODULAR MICRORACK ACCESSORIES

There is a wide range of accessories available for the various types of Modular Microrack including EMC front panels, side covers and filter kits.

The Modular Microrack System can also be fitted with an extensive range of standard KM6-II accessories. Please see Section 4 for full details of all compatible divider kits, plug-in modules, guides etc.



Horizontal Mounting Frame

HORIZONTAL MOUNTING FRAME

Mounted in the unused 3U area at the rear of the microrack, the horizontal mounting frame accommodates up to 5 I/O modules of 6U x 4HP format.

HORIZONTAL MOUNTING FRAME

Ordering information

Description	Order code
Horizontal Mounting Frame	**146-010506L**

SIDE COVERS FOR DESKTOP VERSION

These side covers can be fitted to a MMS frame assembly to enable its use as a desktop version. Supplied as a kit.

SIDE COVERS FOR DESKTOP VERSION

Ordering information

Description	Order code
Side cover 7U	**146-010502A**
Side cover 8U	**146-010503J**



End plate for desktop version

KM6-II DIVIDER KITS

KM6-II divider kits can be mounted in the front of a microrack after assembly. They allow the combination of 3U and 6U boards and the mounting of 3U plug-in-units in the front of the rack. Please see Section 4 for full details.

KM6-II FRONT DIVIDER KITS **Ordering information**

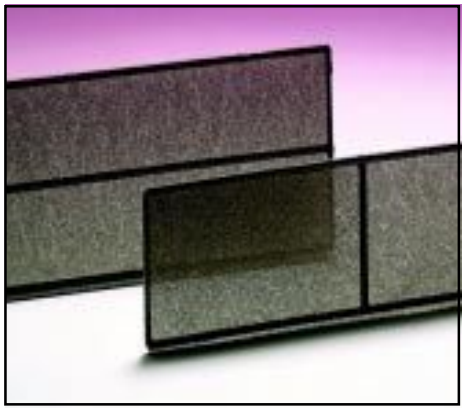
Divider Width	Left hand	Right hand
21HP	**950-202604H**	**950-202609J**
24HP	**950-202605F**	**950-202610B**
36HP	**-**	**950-202615C**
42HP	**950-202605D**	**950-202611L**
84HP incl. FP	**950-201275F**	

FILTER KIT

Replacement filters are available for card depths of 160mm and 220mm.

FILTERS **Ordering information**

Description	Order code
Filter for MMS 6U x 160mm	**146-010501D**
Filter for MMS 6U x 220mm	**146-010500G**



Filter

PLUG-IN DISC DRIVE MODULES

Plug-in disc drive modules can be mounted in a Microrack in conjunction with front divider kits. The modules have a height of 3U and a width of 8HP (FD 3½"), 12HP (HD 3½") and 30HP (HD 5¼"). Please see Section 4 for full details.

KM6-II PLUG-IN DISC-DRIVE MODULES

Ordering information

Description	Order code
Module FD 3½"	**174-010198L**
Module HD 3½"	**174-010199H**
Module HD 5¼"	**174-010001G**

EMC FRONT PANEL

The EMC front panel can be fitted for increased EMC screening on 6U, 7U and 8U recessed versions of Modular Microrack Systems. The painted (RAL 7035) front panel has cutouts on the bottom flange to accommodate cabling on the 7U and 8U version. The anodised front panel has no cabling cutouts and is intended for use on the 6U version only.

EMC-FRONTPANELS **Ordering information**

Description	Order code
EMC-FP anodised	**146-010504F**
EMC-FP RAL 7035	**146-010505C**



EMC Frontpanel

GUIDES

Eurocard guides are suitable for boards of 1,6mm thickness and plug-in units for 3½" disk drives. For 5¼" disk drive modules guides for plug-in-units must be used. Please see Section 4 for full details.

GUIDES **Ordering information**

Guide type	Board length	Order code
Eurocard	100	**950-242850B**
	160	**950-232662J**
Plug-in unit	160	**950-232664E**
	220	**950-232665C**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

3 SLOT VMEbus MICRORACK

VMEBUS 3 SLOT DEVELOPMENT MICRORACKS

These 3 slot Microracks are intended to compliment the development of emerging single board computer products, which can easily be integrated into complete systems with only a few cards, disk drives and I/O connectors.

The new Microracks have been designed to offer all the features and flexibility of larger Microracks, but in a more compact form.

EMC shielding and airflow management were key design priorities and, in this respect, the 3 slot system is comparable with VERO's larger Microracks.

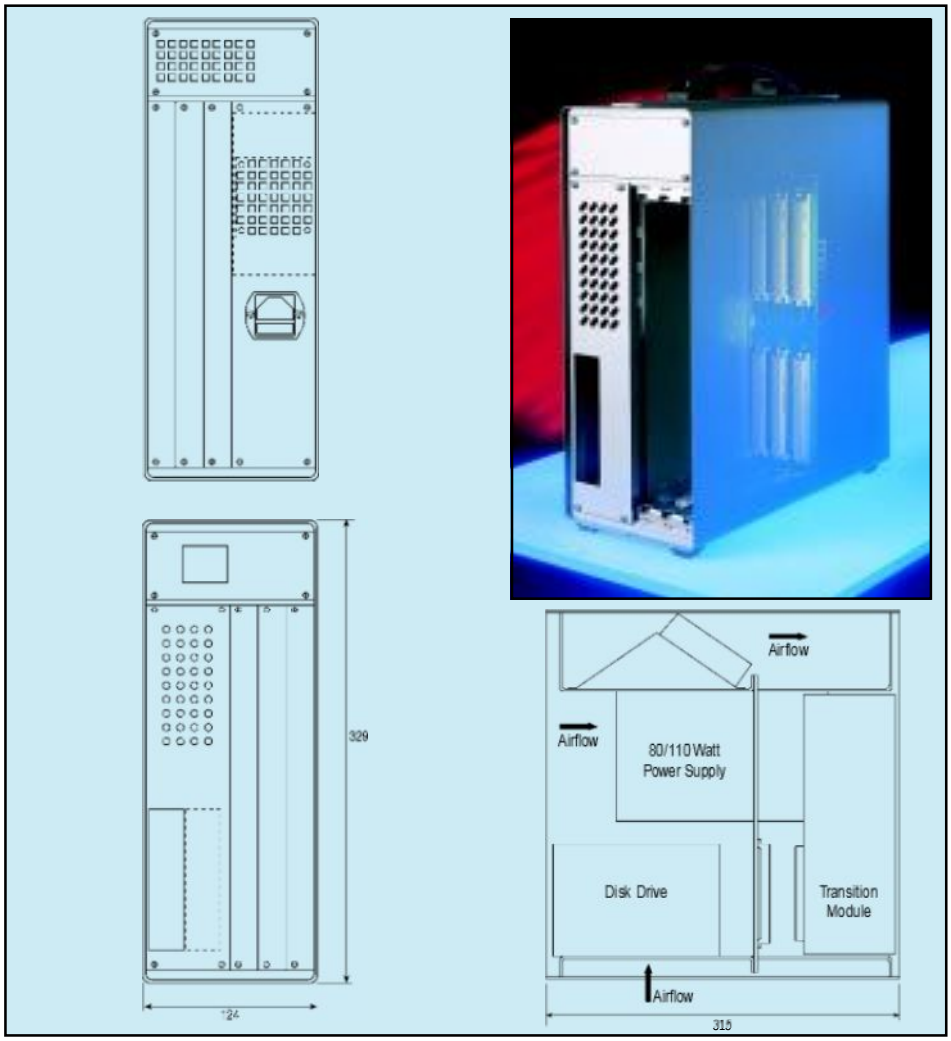
The new Microracks can accommodate three 4HP x 160mm 6U boards which plug directly into a high quality 3 slot VMExcel backplane fitted with auto Bus Grant connectors.

There is adequate space in the tower system for 1 x 3½" floppy disk drive and one hard disk drive. The rack mount version can accommodate 2 x 3½" floppy disk drives and one hard disk drive. The rear of both racks have three 6U x 4HP blank panels which can be used for I/O modules, transition modules or can be punched to facilitate the mounting of connectors.

The tower rack is fitted with an 80 Watt power supply (110 Watt if additional cooling is supplied) which is suitable for the requirements of most small systems. The rack mount 3 slot Microrack is fitted with a 200 Watt power supply.

FEATURES

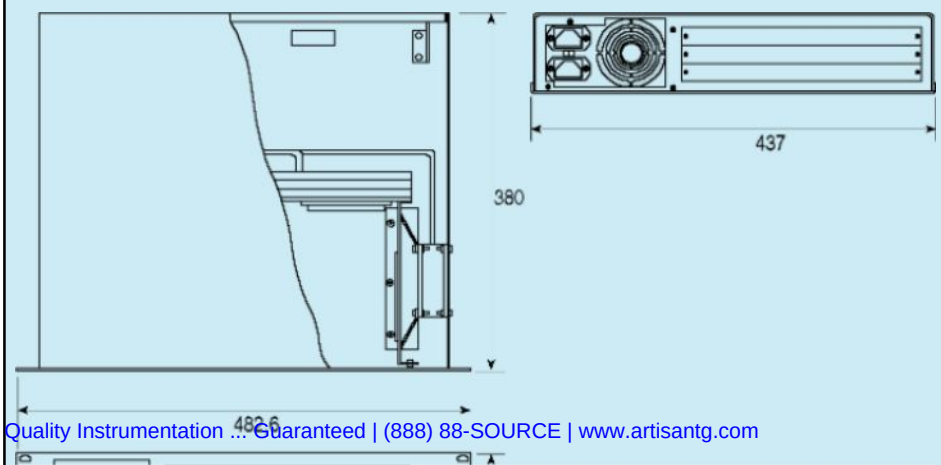
- Conforms to the VME64 specification (ANSI/VITA 1-1994)
- 80/110 Watt, 85 - 264 VAC universal input power supply - tower version
- 200 Watt, 115/230VAC switchable power supply - rack mount version
- 3 6U x 4HP card slots
- 3 6U x 4HP rear I/O positions
- 1 or 2 x 3½" floppy disk and one hard disk mounting position
- Removable disk drive housing
- 3 slot VMExcel Monolithic backplane
- Auto Bus Grant connectors



DIVIDER KIT

Available for the 2U rack mount version is a divider kit which allows the 3off 6U x 4HP rear I/O positions to be split into 6off 3U x 4HP positions.





3 SLOT VMEbus MICRORACKS **Ordering information**

Description	Order code
3Slot 2U Rack Mount Microrack	**224-315100G**
3Slot 3U Tower Microrack	**224-314400L**
Divider Kit - Rack Mount	**224-315410C**

QUALITY ASSURANCE

VMExcel backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQPCQ88 with approval in accordance with BS EN ISO 9001, ISO9002 and EN29002.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

INTRODUCTION

VMEbus has become well established over the last decade, with many thousands of active cards being made available by hundreds of manufacturers.

VERO Electronics has been closely involved with VMEbus since its inception and, from 1987, with its generic instrumentation architecture - VXIbus.

The specification governing VXIbus - an acronym for **V**MEbus e**X**tensions for **I**nstrumentation - defines the use of four bus module sizes (Fig. 1), with the A and B modules the same size as 3U and 6U VMEbus cards. Any size module may be place in a card cage of a larger size, for example, A and B size cards may be used in a C or D size Microrack. This allows the use of standard VMEbus modules within a VXI System, providing a high degree of flexibility.

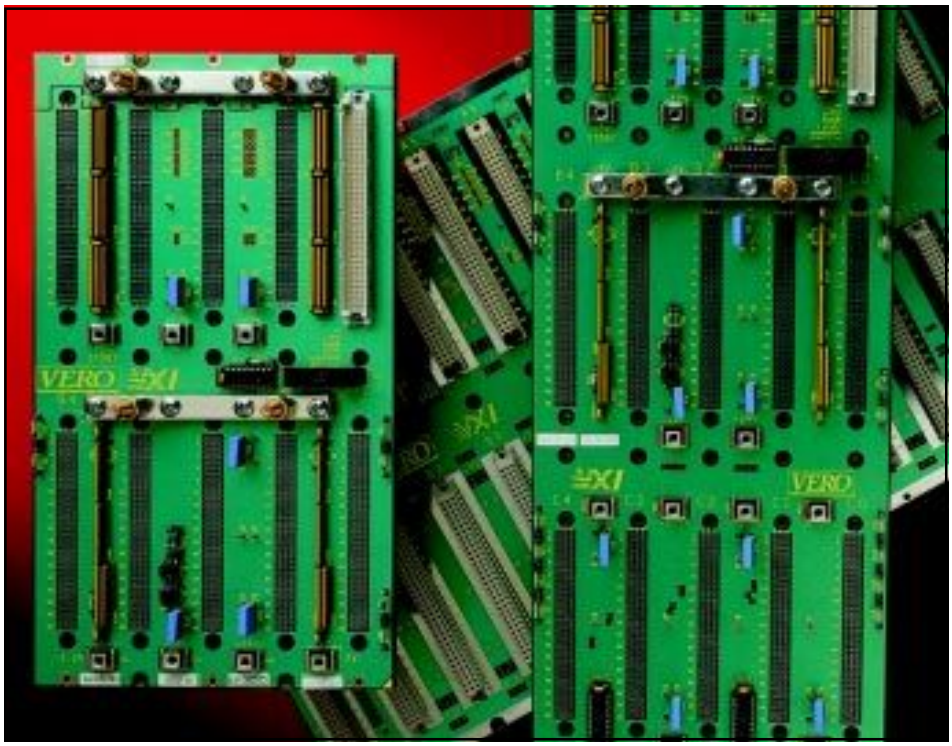
Although the VXIbus specification, broadly speaking, follows the VME standards, it includes defined functions on the P2 connector and a further set of functions on the P3 connector.

The most important variation in the two standards arises from the fact that any VXIbus instruments incorporated into a system must be capable of being physically screened against EMC on all sides with a provision for additional chassis screening between instruments.

VERO's range of VXIbus products - multilayer backplanes, extender boards, prototyping boards, Microracks and modules - fully conforms with the latest revision (rev. 1.4) to the VXIbus specifications.

The total in-house design, manufacture and customising capabilities within the manufacturing divisions of VERO enables the provision of semi- or fully customised versions of the VXIbus product range.

For in-depth details or a discussion of the customising possibilities please contact VERO Electronics Technical Sales.



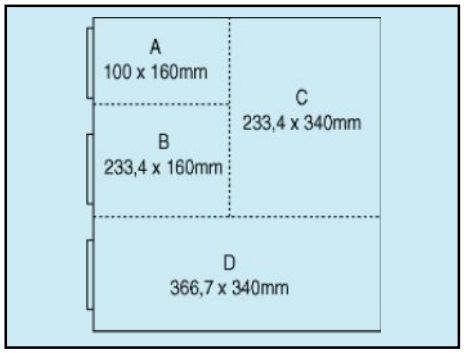
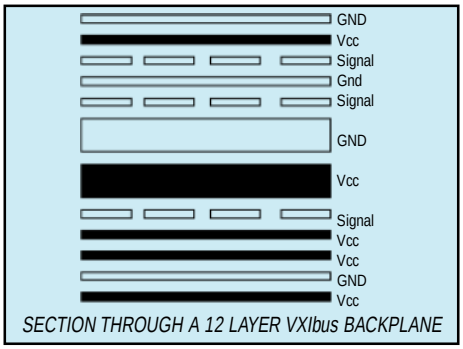


Figure 1



SECTION THROUGH A 12 LAYER VXIbus BACKPLANE

VXIbus BACKPLANES

FEATURES

- Fully conforms to the VXIbus specification, revision 1.4
- 12 layer stripline construction ensures precisely controlled characteristic impedance.
- Auto bus grant connectors fitted as standard
- Differential tracking and line length equalization techniques utilized to minimise signal skew on all high speed lines.
- On-board socketed ECL buffers for CLK10 & CLK100 distribution.
- High-speed decoupling capacitors positioned between termination networks.
- Exposed ground plane area to facilitate RFI grounding of plug-in instrument modules.
- Additional decoupling capacitor positions provided between each connector slot. This permits fine tuning of the system
- Monolithic design offering continuous ground and voltage planes providing even power distribution and minimising IR shift.

VXIbus BACKPLANES **Ordering information**

Description	Dimensions	Order Code
"C" size 5 slot	262,00 x 152,40	**63-310535G**
"C" size 6 slot	262,00 x 182,88	**63-310536D**

VXIbus HIGH POWER BACKPLANES

A high power option is available on 13 slot C and D size backplanes.

Extra power positions are added to the backplane to ensure that every voltage can have the maximum current drawn as specified by the VXIbus specifications.

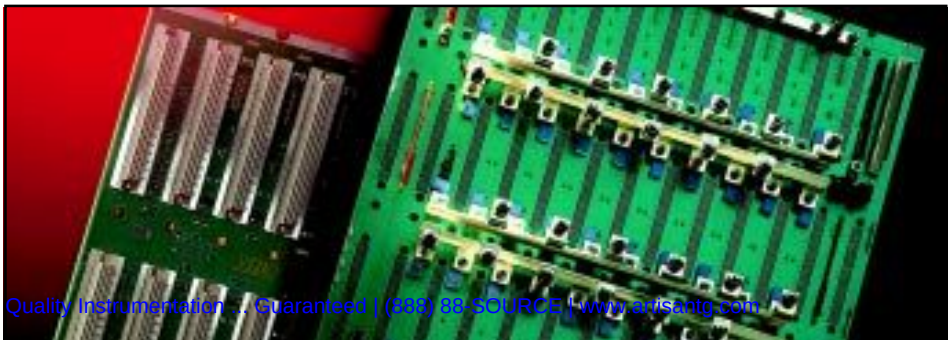
To introduce the power to the backplane, two 9,53mm^2 copper busbars are provided, plus laminated busbars for the remaining voltages; two laminated busbars for the C size backplane and four on the D size.

All other features, dimensions and specifications are identical to the standard VXIbus backplane.

VXIbus HIGH POWER BACKPLANES

Ordering information

Description	Power rating	Order Code
"C" size 13 slot	1,9kW	**63-314297A**
"D" size 13 slot	3,0kW	**63-314295G**



Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VXIbus MICRORACKS

The name “Microrack” is synonymous with well engineered, ready-to-run microprocessor support systems. The VXIbus Microrack range continues VERO’s tradition of offering a total solution to the hardware requirements of the exacting VXIbus standard.

At the heart of each Microrack is a VERO VXIbus backplane, fitted as standard with Auto Bus Grant connectors and offering the perfect environment for transmitting sensitive, high speed electronic signals. The basis of these Microracks is a purpose built heavy-duty chassis system, designed around the successful KM6-II and HD-167 subrack systems.

Various high performance power sources are used to deliver up to 1100W of closely regulated power.

Computer Aided Design has been employed, ensuring the most effective compromise between the differing and conflicting interests of efficient thermal management and RFI shielding.

Fully wired and ready for use, the Microracks are available in a number of options to integrate into larger systems, as part of a rack mounted system, or housed in an attractive enclosure for free-standing office or laboratory applications.

GPIB MONITOR BOARD

The GPIB Monitor Board offers the user the capability of remotely monitoring the operating parameters of a VXIbus Microrack using the GPIB data bus. The parameters measured include all power supply rails and a spot temperature, which is measured via an active temperature probe.

The spot temperature is monitored digitally and compared against a value pre-set on a switch register.

OPTIONS

- A spare analogue input is available to allow the user to monitor an extra parameter (configured for positive voltage monitoring).
- The module can be used without the GPIB interface, indicating validity of the measured parameters on LEDs, which may be mounted either on the module or remotely.
- The GPIB controller can remotely command the VXI GPIB1 module to initiate MICRORACK SYSTEM RESET. A watchdog function may also be used,

VXIbus 6 SLOT PORTABLE “C” SIZE MICRORACK



The 6 slot portable VXIbus Microrack is a fully configured, yet cost-effective, system solution providing space for up to six C size VXIbus modular instruments in an EMC screened, fully wired, ready-to-run environment.

FEATURES

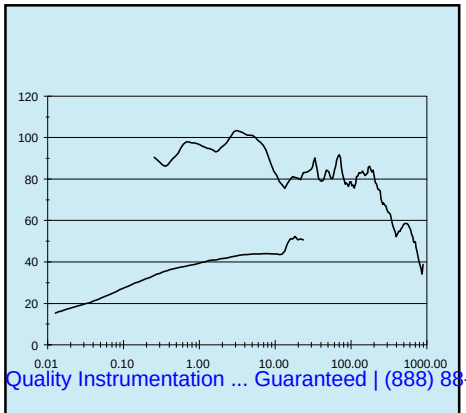
- Rugged, portable 204 x 433 x 560mm enclosure
- C size portable chassis with 60mm recessed front panels for cable management
- Usable in desktop or tower configurations
- Weight 15Kg
- EMC upgradable by the addition of copper fingers
- 12 layer stripline backplane with Automatic Bus Grant connectors conforming to VXIbus specification revision 1.4
- Standard 600 Watt wide input power suppply
- Easily removable side cover allows for testing
- Average 50 Watts per slot power allowance
- Lockable, EMC shielded door
- 2 rear mounted AC fans with 35cfm throughput

Ordering information

Description	Dimensions	Order code
6 Slot Portable	433 x 204 x 560	**203-313400J**

SUPPLY VOLTAGE - 6 SLOT PORTABLE

+5V	+12V	-12V	+24V	-24V	-5.2V	-2V
40A	6A	4A	6A	4A	15A	8A



VXIbus 5 SLOT “C” AND “D” SIZE MICRORACKS



At the heart of all 5 slot VXIbus Microracks from VERO is a high performance 12 layer backplane, supported by a conductive KM6-II subrack making the upgrade to a fully screened EMC rack easily accomplished.

The C and D size Microracks are available in three formats; tower, desktop and rack mount.

FEATURES

- Accepts 5 “C” or “D” size modules
- KM6-II conductive cardframe
- 4U x 622 mm deep Diplomat enclosure
- Weight 25 Kg desktop / tower, 18 Kg rack mount
- Bus reset timing module
- Removable service access panels
- 550W power supply
- Optional GPIB monitor available

Ordering information

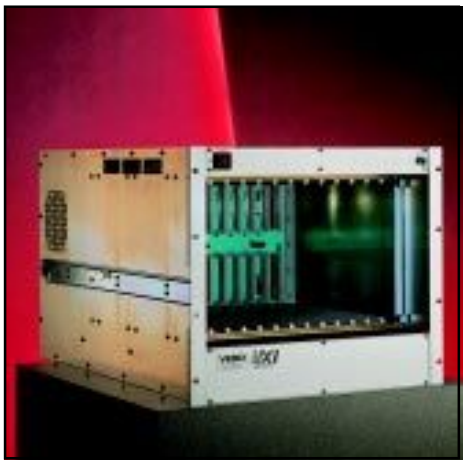
Description	Order code
5 Slot “C” Size Desk Top	**203-304014B**
5 Slot “C” Size Tower	**203-304016L**
5 Slot “C” Size rack mount	**203-304012H**
5 Slot “D” Size Desk Top	**203-304015B**
5 Slot “D” Size Tower	**203-304017J**
5 Slot “D” Size rack mount	**203-304013F**

SUPPLY VOLTAGE - 5 SLOT C/D

+5V	+12V	-12V	+24V	-24V	-5.2V	-2V
40A	6A	6A	6A	6A	30A	6A

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VXIbus 13 SLOT "C" SIZE MICRORACK WITH CABLE MANAGEMENT



A rack identical in basic construction to standard 13 slot C size units except that the rack has been extended by 60mm, allowing the heavy duty shock and vibration resistant HD-167 subrack to be recessed, freeing an area for cable management. Available in rack mount format with slide mounting positions, rear I/O cable exit panel, MacPanel and Virginia Panel test interface mounting positions, additional optional fan locations and optional GPIB monitor.

FEATURES

- Accepts 13 "C " size modules
- Depth 622mm desktop, 603mm rack mount
- Heavy duty cardframe system (HD 167)
- Bus reset timing module
- 800W power supply (1100 optional)
- Weight 29 Kg
- Mac Panel and Virginia Panel compatible
- 9U high x 671 mm deep, cardframe recessed by 75mm
- 1U removable rear panel for cable exit or I/O connector mounting
- Optional GPIB monitor available
- Optional third fan for extra cooling

Ordering information

Description	**Order code**
13 Slot Rack Mount	**203-311550L**

SUPPLY VOLTAGE - 13 SLOT C

+5V	+12V	-12V	+24V	-24V	-5.2V	-2V
60A	6A	6A	6A	6A	40A	6A

VXIbus 13 SLOT "C" SIZE MICRORACK



Both racks are constructed around VERO's 12 layer high performance VXIbus backplane and the HD-167 military specification, heavy duty subrack - providing a system able to withstand severe shock and vibration.

Airflow management has recently been upgraded to cope with the ever increasing demands of heat dissipation from the VXIbus modules.

The 13 slot C size Microrack is available in two formats; desktop or rack mount.

FEATURES

- Accepts 13 "C " size modules
- Depth 622mm desktop, 603mm rack mount
- 9U high
- Heavy duty cardframe system (HD 167)
- Bus reset timing module
- Removable service access panels
- 800W power supply (1100 optional)
- Weight 42,5 Kg desktop, 26 Kg rack mount
- Optional GPIB monitor available

Ordering information

Description	**Order code**
13 Slot Desk Top	**203-302533A**
13 Slot Rack Mount	**203-303169B**

SUPPLY VOLTAGE - 13 SLOT C

+5V	+12V	-12V	+24V	-24V	-5.2V	-2V
60A	6A	6A	6A	6A	40A	6A

VXIbus 13 SLOT "D" SIZE MICRORACK



Constructed around VERO's 12 layer high performance VXIbus backplane, supported by a conductive KM6-II subrack making the upgrade to a fully screened EMC rack easily accomplished.

The fan tray, located at the base of the unit, isremoveable allowing easy access for routine maintenance or repair.

The 13 slot D size Microrack is supplied with pre-fitted heavy duty carrying handles.

FEATURES

- Accepts 13 "D " size modules
- 13U x 533 mm deep
- KM6-II conductive cardframe
- Bus reset timing module
- 2U removable fan tray
- 1100W power supply
- Weight 40 Kg

Ordering information

Description	**Order code**
13 Slot "D" SizeRack Mount	**203-306842A**

SUPPLY VOLTAGE - 13 SLOT D

+5V	+12V	-12V	+24V	-24V	-5.2V	-2V
80A	5A	5A	4A	4A	40A	20A

QUALITY ASSURANCE

VXIbus backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQPCQ88 with approval in accordance with BS EN ISO 9001, ISO9002 and EN29002.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

VXIbus PROTOTYPING AND EXTENDER BOARDS

VXIbus PROTOTYPING BOARDS

A high density multilayer prototyping board fully loaded with socketed pressfit wire wrap pins. The board pattern allows the use of 7.62 mm, 10.16 mm, 12.70 mm or 15.24 mm pitch integrated circuits.

FEATURES
- Fully conforms to the VXIbus specification revision 1.4
- Full VMEbus interface available
- High density wire wrap prototyping pattern.
- Compatible with the VXIbus "C" size format.
- Multilayer construction.
- Socketed pins for ease of component assembly.
- Surface mount de-coupling capacitors.
- Suitable for P.G.A. style devices up to 17 x 17 pin.
- Easy access to distributed power planes.
- Full RFI screening capability.

VXIbus EXTENDER BOARD

The VERO VXIbus extender card is a 4 layer multilayer board utilising signal guard track technology, to minimise induced crosstalk. It is compatible with B or C size cards or modules.

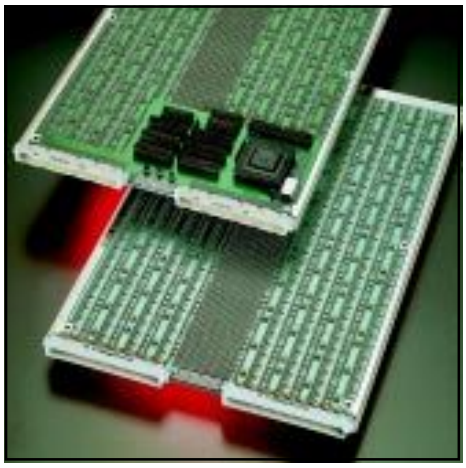
FEATURES
- Fully conforms to the VXIbus specification revision 1.4
- Earth guard tracking utilised to minimise cross-talk.
- Compatible with single and double width VXIbus screened modules
- 4 layer multilayer construction
- Cantilever bracket to support instrument and minimise connector stress.
- Test points provided at front edge of card.
- Card eject mechanism provided.
- Compatible with VXIbus screened modules to maximise protection against externally generated noise.

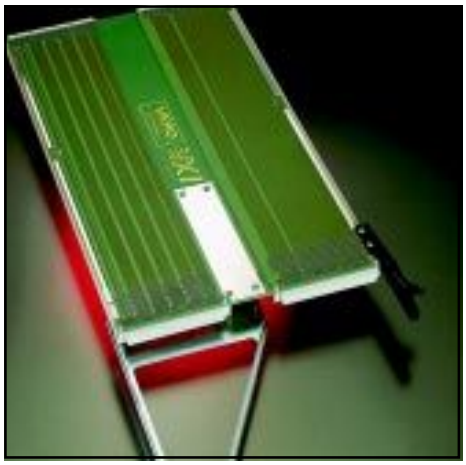
NORMAL DUTY VXI MODULE

FEATURES
- C and D size
- Single and double width
- Channel section front panel
- Ejector handles
- Ventilated covers
- EMC sealing
- Card mounting brackets
- Beryllium copper fingers

LIGHT DUTY VXI MODULE

A low cost option similar to normal duty module but with two part front panel and no EMC seals.







VXIbus PROTOTYPING BOARDS **Ordering information**

Description	Dimensions	Order code
VIC/VXI board	233,34 x 340,00	**63-303103A**
VXI board	233,34 x 340,00	**63-302203B**

VXIbus EXTENDER **Ordering information**

Description	Order code
VXIbus "C" size extender	**63-302270E**

VXIbus NORMAL DUTY MODULE **Ordering information**

Description	Order code
C size, single width	**207-203543A**
D size, single width	**207-222524J**
C size, double width	**207-203544K**

VXIbus LIGHT DUTY MODULE **Ordering information**

Description	Order code
C size, single width	**207-222002F**

MATERIAL SPECIFICATIONS - VXIbus BACKPLANES

BOARD SPECIFICATION

Dielectric Epoxy glass to	BS 4584 EP-GC-CU-3 (FR4)
Nominal thickness :	5,35 mm
Base copper thickness :	35 mm.
Finish :	Plated copper - 40mm average. Tin lead - 5mm.
Total :	80mm outside layers only.

Connectors - Standard DIN 41612 and Auto Bus Grant (ABG)

IEC 603-2 (DIN 41612) 96 way

Body material:	glass filled polyester UL 94V-0 rated
Insertion force (mating)/pair:	M90N
Withdrawal force (unmating)/pair:	M90N

QUALITY ASSURANCE

VXIbus backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQ PCQ88.

Systems approval in accordance with BS EN ISO 9001, ISO 9002 and EN 29002.

CONNECTOR SHROUD

FEATURES
- Enhances performance
- Beryllium copper fingers
- Fits to backplane connector

CONNECTOR SHROUDS **Ordering information**

Description	Order code
Connector shroud	**207-203582B**
Beryllium copper fingers	**950-203353B**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

COMPACTPCI BACKPLANE

VERO's new CompactPCI backplanes are fully compatible with the CompactPCI specification (Rev. 1.0, 1 November, 1995).

Due to the vast experience that VERO has gained from designing and manufacturing densely tracked backplanes with high layer counts and metric connector systems, producing a high performance CompactPCI backplane range that is fully compliant with the latest specification became a natural extension to the Company's product offering.

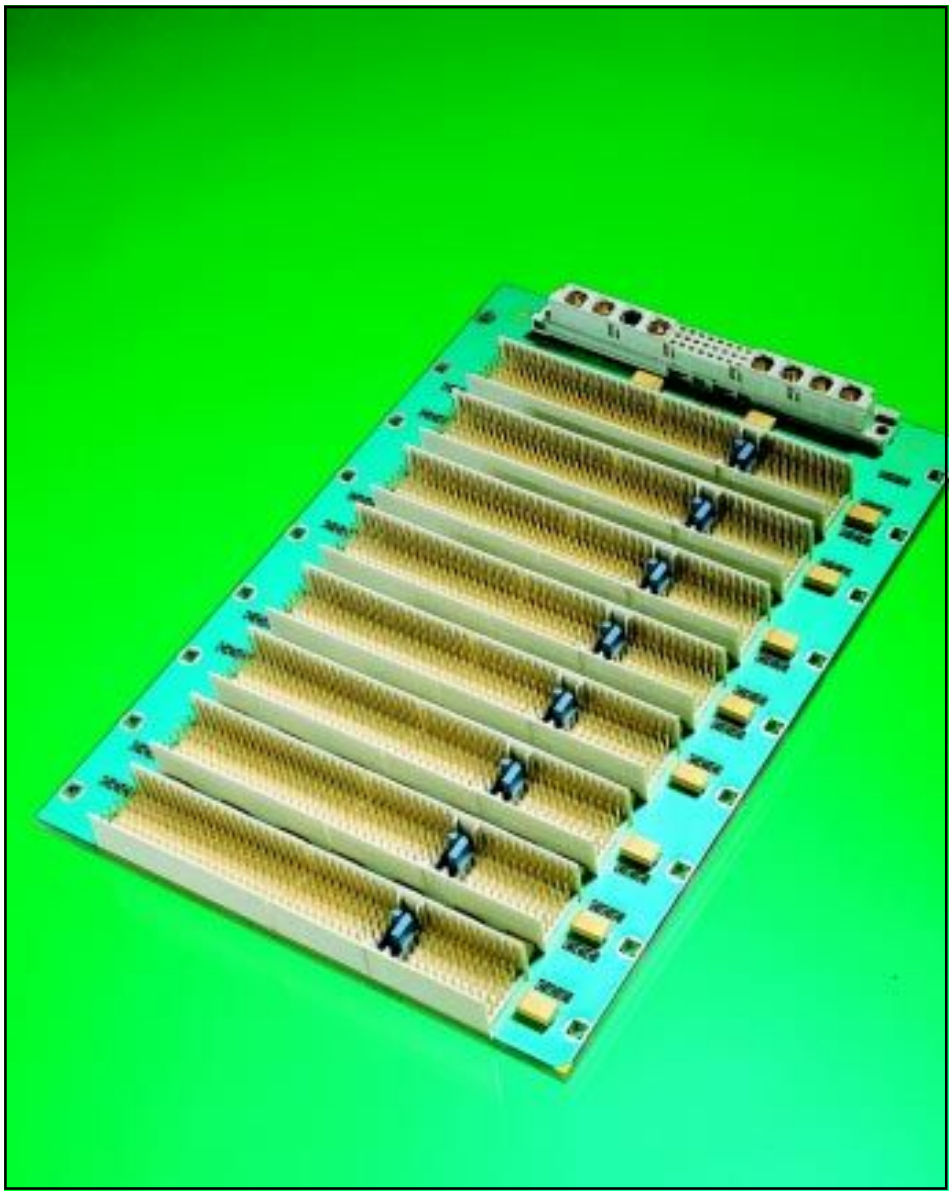
CompactPCI is an adaptation of the Peripheral Component Interconnect (PCI) specification for industrial and/or embedded applications requiring a more robust mechanical form factor than the Desktop PCI.

CompactPCI is electrically compatible with PCI, allowing standard PCI components to be adapted to the Eurocard format and used in applications where the standard Desktop PCI would be unsuitable.

Initially, two backplanes will be available. During 1997 a full range of product including 3U and 6U backplanes, mixed technology backplanes, packaging and power supplies will be developed and phased into production. Please contact VERO Electronics for further details.

FEATURES

- 10 layer stripline construction
- Supports 32 or 64bit PCI transfers
- Supports 5V and 3,3V technology
- Available with or without on-board modular power supply connector



MATERIAL SPECIFICATIONS

Board

Dielectric epoxy glass to	BS 4584 EP-GC-CU-3 (FR4)
Nominal thickness :	4,5 mm
Base copper thickness :	35 µm
Finish: Plated copper -	40 µm average
Tin lead -	5 µm approximately

Bare boards are UL 94V-0 rated components, File number E. 116551

Connectors

Modular Power Connector	24 + 8
Max. current per pin - power:	40A
Max. current per pin - signal:	1,5A
Insertions:	500 minimum (DIN Class 1)

CompactPCI Connector

Max. current per slot -5V:	12A
Max. current per slot -3,3V:	15A

Environmental

Temperature range - storage	- 40°C to + 120°C
Temperature range - working	- 20°C to + 85°C
Altitude:	3000 m
Humidity:	90% R.H. non-condensing
Shock and vibration resistant:	commercial
MTBF to MIL -HBK-217E:	>225000 hours
Conditions:	Ground benign

COMPACTPCI BACKPLANE

Ordering information

Description	Slot Size	Order Code
3U CompactPCI backplane	8 Slots	**425-315737J**
3U CompactPCI backplane with PSU connector	8 Slots	**425-315337C**

For other slots sizes, heights or for details of custom versions please contact VERO Electronics Sales Office

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

FUTUREBUS+ MULTI-PROFILE BACKPLANES

FEATURES

- Designed to IEEE 896.2, rev 5.5, July 1991, profile specifications
- 10 layer stripline technology
- Hard metric IEEE 1301.1 compatible
- Supports central and distributed arbitration
- Utilises curved track technology, thereby permitting elimination of cornered or angled bends in signal traces which would otherwise create partial reflection of the incident signal.
- Geographical encoding can be user selected by means of jumpers, to provide profile 'A' or 'F'.
- High performance surface mount termination using a VERO 'patented' design. This avoids excessive stub lengths and inductive traces associated with packaged termination design.
- Fully compliant termination voltage design offering a passive solution via the use of a range of cascading capacitors. These operate in conjunction with a conventional switch mode power supply, supplied integrally as part of the microrack.
- Controlled characteristic impedance
- Choice of power distribution systems
  - LOMET Connector System (optional on request)
  - M4 Power Studs

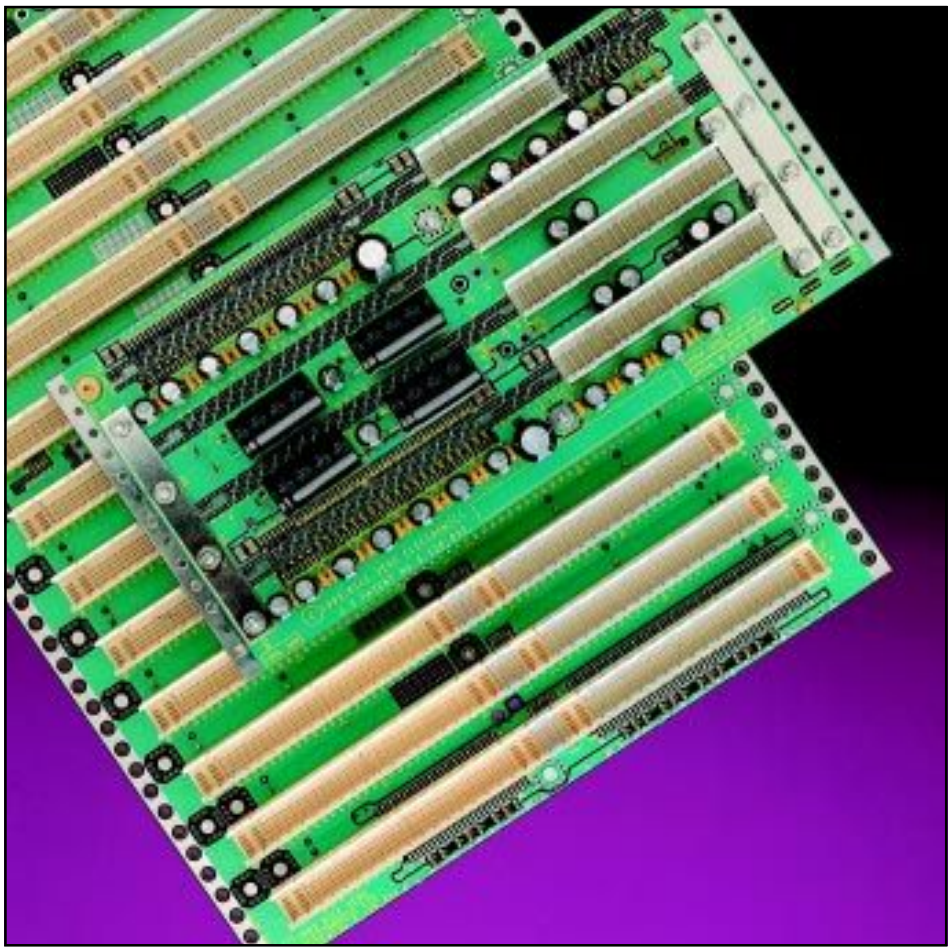
The Futurebus+ Multi-profile backplanes are supplied fully assembled with 2mm pitch IEEE 1301.1 compatible metric connectors, allowing multiple power and ground connections, a full 128bit or 64bit screened databus and I/O connections from each slot.

TERMINATION VOLTAGE DROOP

An array of electrolitic capacitors is included to prevent termination voltage droop. This ensures that the 2.1V supply remains within specification - even at extreme operating speeds.

POWER DISTRIBUTION SYSTEMS

In order to counteract the skin effect caused by high current demand from fast leading edge waveforms, VERO has introduced this multiple power and ground plane design. External connections are provided to these planes via either the LOMET Connector System or a series of M4 Power Studs.



BOARD SPECIFICATION

Dielectric epoxy glass to BS 4584
EP-GC-Cu-3 (FR4)

Nominal thickness:		6,4mm
Base copper thickness:		35µm
Finish:	Plated copper -	25µm
	Tin Lead -	5µm approximately
	Total -	33 µm

Connector specification: EIA IS 64 2mm pitch metric connector

Bare boards are UL recognised components, file number E 116551

FUTUREBUS+ BACKPLANES **Ordering Information**

Description	Power distribution	Dimensions	Order code
Futurebus+ Multi-profile 4 slot backplane 64-bit	M4 Stud	295 x 139	**819-309905C**
Futurebus+ Multi-profile 4 slot backplane 128-bit	M4 Stud	295 x 139	**819-309805G**
Futurebus+ Multi-profile 14 slot backplane 128-bit	M4 Stud	295 x 426	**819-309615A**
Futurebus+ Multi-profile 14 slot backplane 64-bit	M4 Stud	295 x 426	**819-310945H**

LOMET LOW IMPEDANCE CONNECTOR SYSTEM

The development of Futurebus+, and the introduction of B.T.L. drivers has highlighted notable problems in the area of power distribution such as "skin effect" and "wipe out". To counter these problems VERO developed the LOMET System. This allows power to be brought from the integrated power module to the backplane with minimum high frequency losses. The LOMET, a latching, codeable connector, is based on a 48 pin, 2mm pitch EIA IS 64 connector, and provides a low inductance path between the power source and the multiple power planes within the backplane. Pressfit technology enables the LOMET to interface with high layer count



LOMET CONNECTOR **Ordering information**

Description	Order code
Lomet Connector	**820-307836C**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

FUTUREBUS+ 4 SLOT MICRORACK

The result of VERO's understanding of the Futurebus+ development forum - and our ability to value engineer high specification, high performance products - is the introduction of a number of low cost entry level systems for development projects and advanced, fully specified Futurebus+ development systems.

ENTRY-LEVEL FUTUREBUS+ 4 SLOT MICRORACK DEVELOPMENT SYSTEM

- Multi-profile 10 layer stripline backplane (64-bit)
- Full access for development
- 350W power supply standard
- Supplied with 2,1V and 5V to backplane
- 3,3V optional
- 64-bit operation standard, 128-bit optional
- Available in Tower, rack mount and desktop options

SYSTEM OPTIONS

The 4 slot development system forms a building block to which a number of modifications can be made:-

- Additional voltage may be required from the power supply (e.g. 3.3V). However, in order to avoid damaging voltages being presented to active cards, the Futurebus + specification requires provision of power sequencing. A module is available to meet this requirement.
- A system management module is available to control bus reset and system reset.
- A battery back up and charging circuit module is also available.
- A module to control fan speed in line with environmental conditions, minimising fan noise and maximising fan life is available. The sense position for this module can be placed as needed.
- A fan fail module can be provided which monitors satisfactory operation of each fan with an audible/visible (via front panel LED's)/TTL output of failure condition.
- 128 bit backplanes.

POWER SUPPLY

- 5V at 40A
  12V at 12A
  2.1V at 10A
- Autoranging 115V/230V
- Meets UL 478, IEC 950, VDE 0805/6, EN 60950 (safety)
- Short circuit protection with auto-reset
- Over voltage protection
- Power supply can be optionally upgraded

THERMAL MANAGEMENT

- High capacity, positive pressure card area cooling (2 x 110 CFM fans), with isolated power supply chamber (1 x 30 CFM fan).

CHASSIS

- Removable panels fitted to both sides to permit ready access to boards during development work.
- Available in three formats:-
  - Tower case
  - Rack mount
  - Desktop



ADVANCED FUTUREBUS+ 4 SLOT MICRORACK DEVELOPMENT SYSTEM

- Multi-profile 10 layer stripline backplane (128-bit standard, 64-bit optional)
- Power Sequencing board
  - Correct power up and power down
  - Enabled only when voltages in spec.
  - Compliant shutdown procedure in the event of line failure
  - Fail-safe operation
- Thermal management control
  - Intelligent fan control
  - Fan performance increases linearly with temperature
  - Temperature sensed in two positions
  - Audible alarm
  - Visual alarm
  - Fail-safe operation
- Advanced airflow design
- System management module
  - Bus reset
  - System reset
  - Power monitor
  - Battery back up
  - Battery recharge
- Mass storage - 3½" disk drive mounting kit
- Fully EMC screened subrack

POWER SUPPLY

- 5V at 60A
  12V at 20A
  2.1V at 4A
- Autoranging 115V/230V
- Meets UL 478, IEC 950, VDE 0805/6, EN 60950 (safety)
- Short circuit protection with auto-reset
- Over voltage protection
- Power supply can be optionally upgraded

4 SLOT ENTRY LEVEL FUTUREBUS+ MICRORACK

Ordering information

Description	Order code
Tower case	**820-309891G**
Rack mount	**820-309890J**
Desktop	**820-309892E**

ADVANCED 4 SLOT FUTUREBUS+ MICRORACK

Ordering information

Description	Order code
Multi-profile Microrack	**820-310533F**

ACCESSORIES - FUTUREBUS+ MICRORACKS

Description	Order code
EMC 12SU x 6SP front panel	**932-235081E**
EMC 12SU x 12SP front panel	**932-235082C**

For any of the above special options please contact your local VERO Sales Office.

QUALITY ASSURANCE

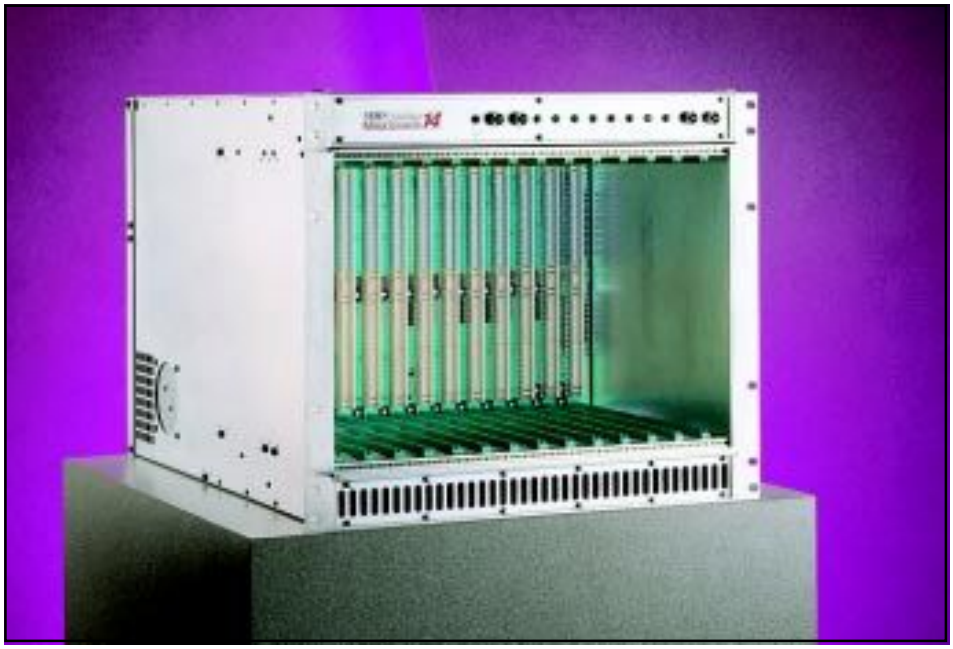
Futurebus+ backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQPCQ88 with approval in accordance with BS EN ISO 9001, ISO9002 and EN29002.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

FUTUREBUS+ MICRORACKS

FUTUREBUS+ 14 SLOT MICRORACK

The recent introduction of a number of advanced 14 slot systems is the result of VERO's understanding of the Futurebus+ development forum and our ability to engineer high specification, high performance products.



FEATURES

- Multi-profile 10 layer stripline backplane (128-bit, 64-bit optional)
  - Utilises curved track technology, thereby permitting elimination of cornered or angled bends in signal traces which would otherwise create partial reflection of the incident signal.
  - Geographical encoding can be user selected by means of jumpers, to provide profile 'A' or 'F'.
  - High performance surface mount termination using a VERO 'patented' design. This avoids excessive stub lengths and inductive traces associated with packaged termination design.
  - 128 bit data line with I/O connectors on the rear.
  - 10 layer stripline construction.
  - Fully compliant termination voltage design offering a passive solution via the use of a range of cascading capacitors. These operate in conjunction with a conventional switch mode power supply, supplied integrally as part of the microrack (see below).
- Power Sequencing board
  - Correct power up and power down
  - Enabled only when voltages in spec.
  - Compliant shutdown procedure in the event of line failure
  - Fail-safe operation
- Thermal management control
  - Intelligent fan control
  - Fan performance increases linearly with temperature
  - Temperature sensed in two positions
  - Audible alarm
  - Visual alarm
  - Fail-safe operation
  - High capacity, ducted cooling (3 x 110 CFM fans), with isolated power supply chamber (power supply has integral fan).
  - Thermal safety trips are provided above the board area and within the power supply exhaust area.
  - A module to control fan speed in line with environmental conditions, minimising fan noise and maximising fan life. The sense positions for this module can be placed as needed.
  - A fan fail module is provided which monitors satisfactory operation of each fan with an audible / visible (via front panel LED's) / TTL output of failure condition.
- System management module
  - Bus reset
  - System reset
  - Power monitor
  - Battery back up
  - Battery recharge
- Rechargeable battery pack
- Hard metric (KM25) chassis

POWER SUPPLY

- 5V at 120A
  2.1V at 20A
  3.3V at 10A
  12V at 4A
- 115V / 230V (strappable)
- Meets VDE 0871, FCC 20780 Class A
- Short circuit protection with auto-reset
- Over voltage protection
- Current limit on all outputs

CHASSIS

- Supplied in rack mount format.

ADVANCED FUTUREBUS+ 14 SLOT MICRORACK

Ordering information

Description	Order code
Multi-profile Microrack	**820-310425J**

ACCESSORIES - FUTUREBUS+ MICRORACKS

Description	Order code
EMC 12SU x 6SP front panel	**932-235081E**
EMC 12SU x 12SP front panel	**932-235082C**

ENTRY LEVEL 14 SLOT FUTUREBUS+ MICRORACK

A 14 slot Futurebus+ Development Microrack (excluding the Power Sequencing Module, System Management Module, battery back-up, fan fail, fan control, and thermal trips) is also available. This unit features a lower power PSU (5V/70A, 2.1V/10A, +12V/4A) and a 128-bit backplane as standard. A 64-bit backplane is available as an option.

ENTRY LEVEL 14 SLOT FUTUREBUS+ MICRORACK

Ordering information

Description	Order code
Multi-profile Microrack	**820-310843B**

For any of the above special options please contact VERO Electronics Sales Office

QUALITY ASSURANCE

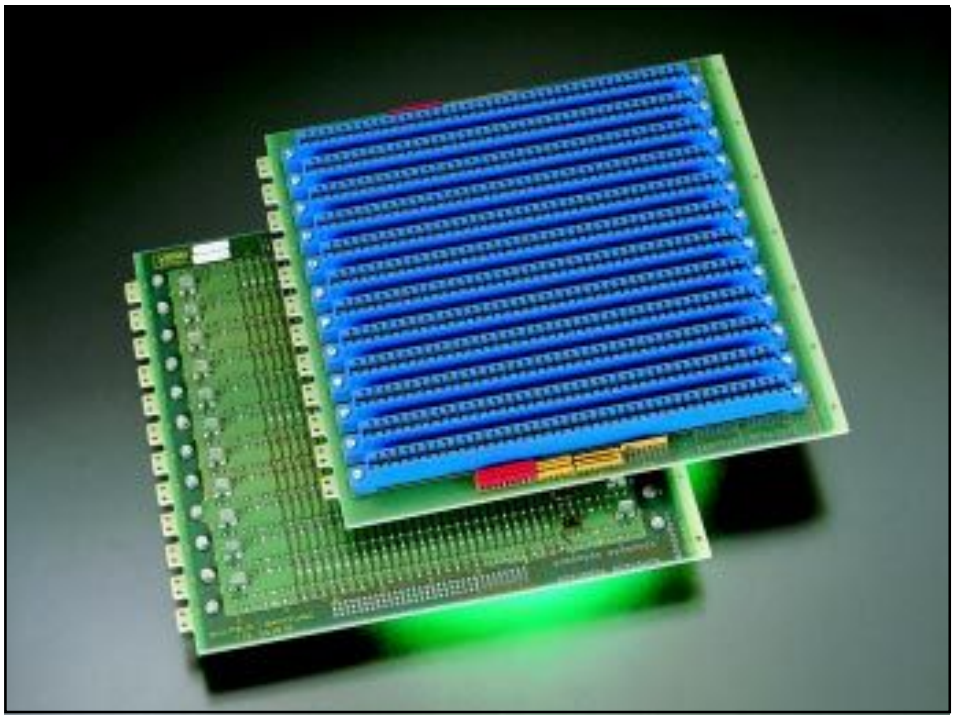
Futurebus+ backplanes are manufactured in accordance with quality assurance levels to BS9000, CECC 23000 and IECQPCQ88 with approval in accordance with BS EN ISO 9001, ISO9002 and EN29002.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MULTIBUS iPSB BACKPLANES

FEATURES

- Fully conforms to the Intel Multibus specification revision 04 - June 1982, IEEE 796
- Reliability of multilayer construction with solder resist protection
- Available in 6 and 12 slot widths
- Option provided for either serial or parallel priority
- Supplied fully assembled complete with termination
- 6,3mm power pick-up tabs
- Interlocking fingers allow positive location of iLBX



MULTIBUS iPSB BACKPLANE

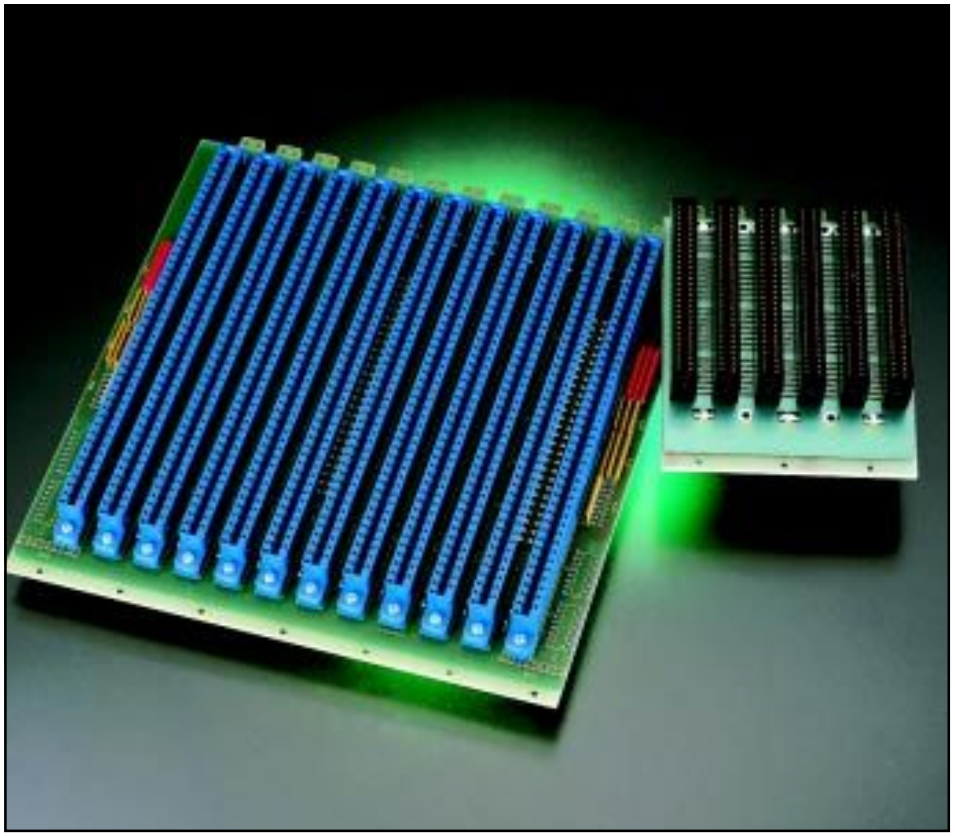
Ordering information

No.of Positions	Backplane dimensions Width x Length(mm)	No. of Layers	**Order code**
6 slots	218,41 x 113,38	6	**408-56386C**
12 slots	218,41 x 204,8	5	**408-56387L**

MULTIBUS iLBX BACKPLANE

FEATURES

- Fully conforms to the Intel Multibus specification revision 04 - June 1982, IEEE796
- Double sided construction with solder resist protection
- Earth guard tracking
- Interlocking design to ensure alignment with iPSB backplanes
- 6,3 mm power pick-up tabs



BOARD SPECIFICATION - iPSB AND iLBX

Dielectric Epoxy Glass to		BS 4584 EP-GC-CU-3(FR4)
Nominal thickness:		2,4 mm
Base Copper thickness:		30 µm
Finish:	Plated copper	25 µm average
	Tin lead	10 µm max
	Total	70 µm - outside layers only
Maximum working temperature		85°C

iLBX BACKPLANE

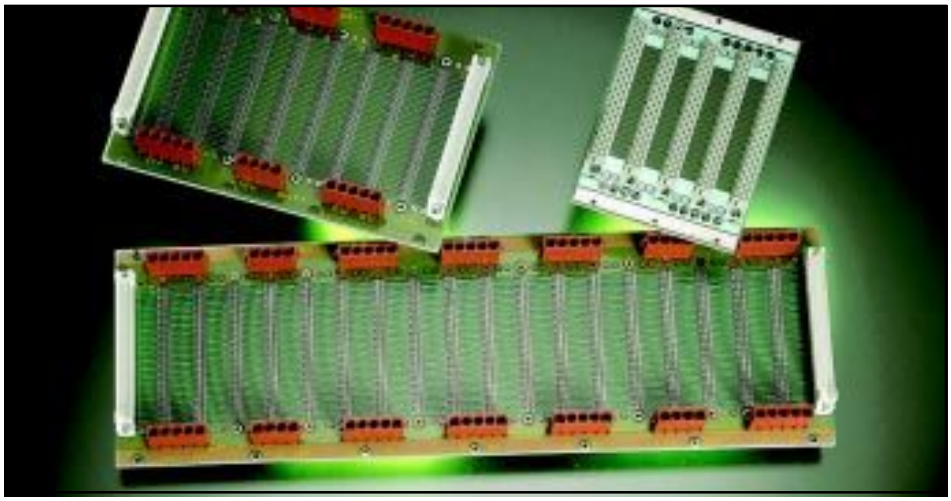
Ordering information

No. of positions	Backplane dimensions (mm) Width x Length(mm)	No. of Layers	**Order code**
6 slots	218,41 x 113,38	6	**408-56388C**
12 slots	218,41 x 204,8	5	**408-56389L**

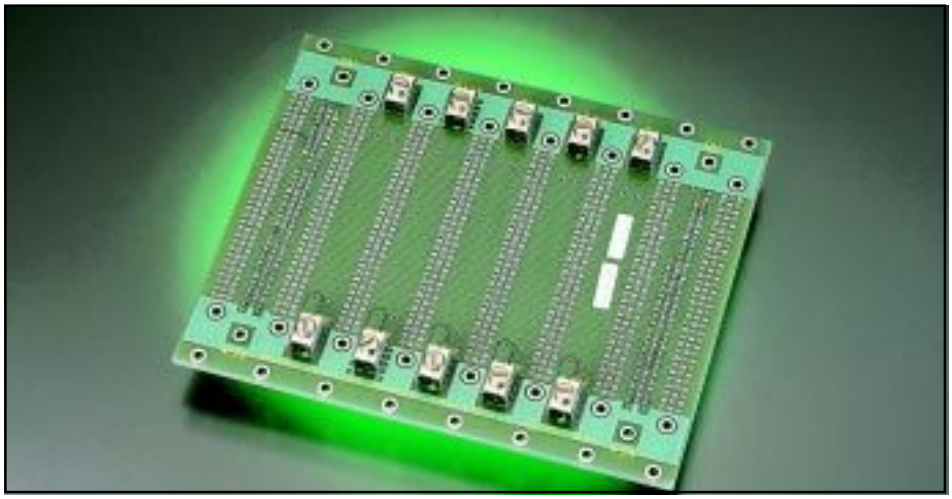
Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

MULTIBUS II BACKPLANES

iPSB BACKPLANE
WITH "OFF-BOARD" TERMINATION



iPSB BACKPLANE
WITH "ON-BOARD" TERMINATION



ACCESSORIES
iPSB TERMINATOR MODULE



Each **iPSB off-board backplane** is supplied complete with two terminator modules which are rear mounted at right angles to the backplane. Additional terminator modules may be ordered separately and are supplied in pairs.

iPSB TERMINATOR MODULE

Ordering information

Description	Dimensions	**Order code**
iPSB terminator	95,00 x 26,50	**188-39027D**

FEATURES - OFF-BOARD TERMINATION

- Fully conforms to Multibus II Specification - IEEE 1296
- Reliability of multilayer construction using 6 layers with solder resist protection
- Completely assembled using high reliability pressfit IEC 603-2 connectors
- Full "off-board" termination with facilities to implement BCLK and CCLK termination requirements
- High speed de-coupling capacitors provided between resistor networks

iPSB BACKPLANES "OFF BOARD"

Ordering information

Number of positions	Dimensions width x length(mm)	**Order code**
5 slot iPSB	128,55 x 95,68	**34-39019E**
7 slot iPSB	128,55 x 136,32	**34-56178L**
10 slot iPSB	128,55 x 197,28	**34-39020C**
15 slot iPSB	128,55 x 298,88	**34-53176G**
20 slot iPSB	128,55 x 400,49	**34-39021K**

FEATURES - ON-BOARD TERMINATION

- Fully conforms to Multibus II Specification - IEEE 1296
- Reliability of multilayer construction using 6 layers with solder resist protection
- Power connection via 25A rated power taps
- All termination lines fully bussed
- High speed de-coupling capacitors provided between resistor networks

iPSB BACKPLANES "ON BOARD"

Ordering information

8 slot iPSB	128,55 x 156,64	**34-302144J**
10 slot iPSB	128,55 x 197,28	**34-302847J**
20 slot iPSB	128,55 x 400,48	**34-301381J**

Note: All iPSB off-board terminated backplanes are supplied complete with polarized mating power connectors and two terminator modules.

BOARD SPECIFICATION iPSB BACKPLANES

Dielectric Epoxy Glass to BS4584 EP-GU-CU3(FR4)
Nominal thickness: 3,2mm
Base copper thickness:
70µm for inner layers
35µm for outer layers
Finish: Plated copper 30µm average
Tin lead 5µm min.
Total 70µm - outside layers only (av.)

Note: bare boards are UL95 V-0 recognised components. File number E116551.

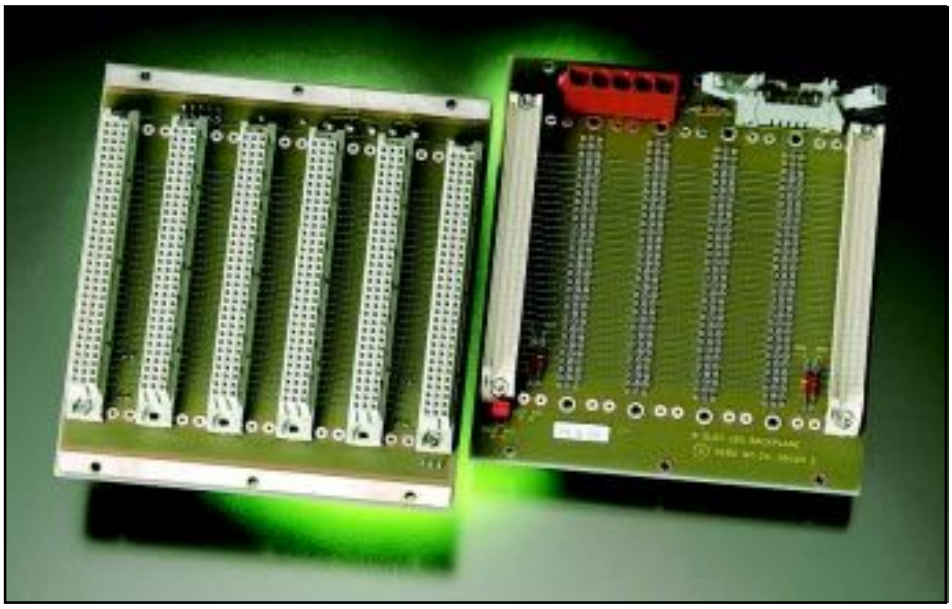
BACKPLANE TERMINATION REQUIREMENTS FOR iPSB

Note:Signal lines BCLK and CCLK are required to be terminated at the furthest point from the driver. The iPSB terminator module has the required terminating resistors (110W and 120W) fitted and is suitable for use at either end of all the iPSB backplanes which have 13 through 20 slots:slot "0" being centralised on these backplanes.The four terminating resistors (110Ω and 120Ω) NEED TO BE REMOVED from the terminator module when it is fitted to slot position "0" on all iPSB backplanes with 12 slots or less.

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

iLBX II BACKPLANE

WITH "OFF-BOARD" TERMINATION



FEATURES

- Fully conforms to Multibus II Specification - Revision C, August 1984 - IEEE P1296
- Reliability of multilayer construction, with solder resist protection
- Available in four backplane slot widths
- Completely assembled using high reliability pressfit IEC 603-2 connector
- Removable "off-board" termination
- High speed de-coupling capacitors provided between resistor networks

BOARD SPECIFICATION ILBX BACKPLANE

Dieletric Epoxy Glass to		BS4584 EP-GC-CU-3(FR4)
Nominal thickness:		3,2 mm
Base copper thickness:		70 µm for inner layers 35 µm for outer layers
Finish:	Plated copper	30 µm average
	Tin lead	5 µm max.
	Total	70 µm - outside layers only

Note:bare boards are UL94 V-0 recognised components. File number E116551

iLBX BACKPLANES **Ordering information**

No.of Positions	Board Dimensions (mm)	**Order code**
2 Slot iLBX II	128,55 x 39,80	**34-42854J**
3 Slot iLBX II	128,55 x 60,12	**34-52881J**
4 Slot iLBX II	128,55 x 80,44	**34-52883A**
6 Slot iLBX II	128,55 x 110,92	**34-39025E**

Note: All iLBX II backplanes are supplied with polarized mating power connectors and one terminator board.

ACCESSORIES

iLBX II TERMINATOR MODULE



iLBX TERMINATOR MODULE **Ordering information**

Description	Dimensions (mm)	**Order code**
iLBX II Terminator	95,00 x 36,50	**188-39028A**

iLBX II TERMINATOR MODULE

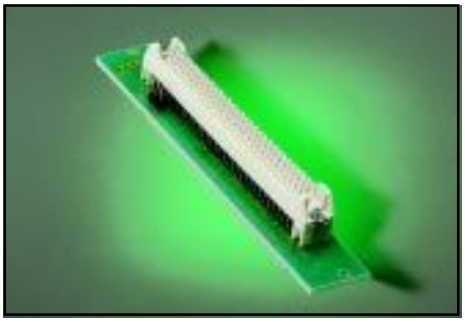
Each **iLBX II backplane** is supplied complete with one terminator module which is rear mounted at right angles to the backplane at the opposite end to slot position "0".

REMOTE INTERFACE PANEL

The **Remote Interface Panel** is a single slot backplane for use in the lower position of slot position "0" of the Central Services Module. Wired connections to the appropriate points in the Multibus II System can be easily made as it has three signal lines tracked out to a pin header assembly.

These signals are:
- ACLO - A.C. Low
- CRST - Cold start
- WRST - Warm start

REMOTE INTERFACE PANEL



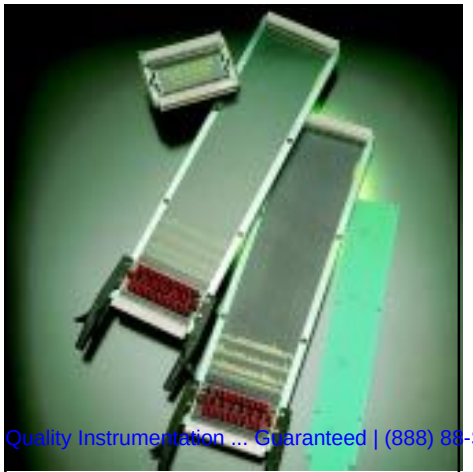
REMOTE PANEL INTERFACE **Ordering information**

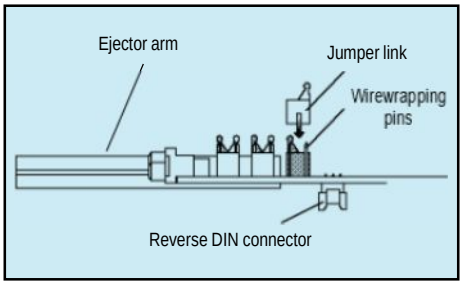
Description	Dimensions (mm)	**Order code**
Remote Panel Interface	128,55 x 19,46	**110-42777A**

MULTIBUS II EXTENDER BOARDS

FEATURES

- Reliability of multilayer construction using balanced five layer design
- Solder resist protection on outer layers
- Patented earth guard tracking
- Signal pin-out identification silk screened onto outer layers
- Jumper links provided to allow signal line interrogation
- Facility for logic analyser or "stub" terminator connection
- Card ejector/support mechanism provided
- Conversion kit for combining iPSB and iLBX II extender boards into 6U high





MULTIBUS II EXTENDER BOARDS

Ordering information

Description	**Order code**
iPSB Extender board	**34-39022F**
iLBX II Extender board	**34-39026A**
6U Conversion kit	**188-39120J**

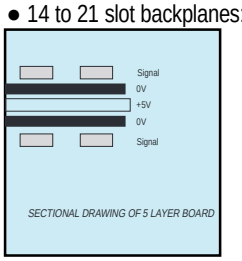
Arrow Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.atginet.com

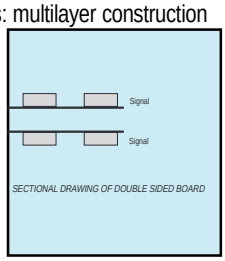
STEbus BACKPLANES, TERMINATORS AND EXTENDERS

STEbus BACKPLANES

FEATURES

- Fully conforms to the STEbus specification IEEE 1000
- Available in a wide range of backplane slot widths
- Pick-up positions provided by pin header for SYSRST, ATNRQO, TFRERR, 0V and +5V
- Connector rows “a” and “c” fully bussed and terminated
- Constant characteristic impedance of signal track achieved with board construction
- Off-board termination
- Fully assembled using high reliability IEC 603-2 press-fit connectors
- Double sided or multilayer construction dependent upon slot width
- Patented earth guard tracking arrangement on multilayer designs
- Additional 96 / 96 way rear plug-up connector provided for remote diagnostics
- 3 to 10 slot backplanes: double sided construction
- 14 to 21 slot backplanes: multilayer construction



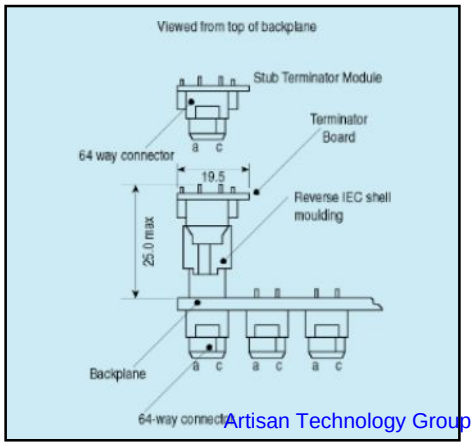


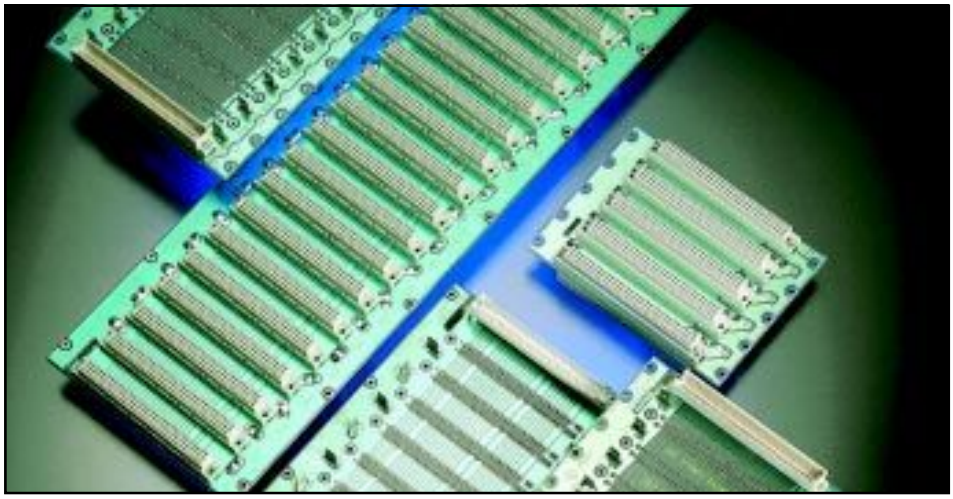
STEbus TERMINATOR MODULE

FEATURES

- 3 layer multilayer construction
- Small, 4HP wide detachable module
- Active termination design
- Rear pluggable and reversible
- Max. 25mm protrusion from backplane
- All 49 signal lines terminated via a 270 Ω series resistor
- Four signal lines diode clamped







BOARD SPECIFICATION - DOUBLE SIDED BACKPLANES

Copper clad epoxy glass to	BS 4584 EP-GC-CU3(FR4)
Nominal thickness:	1,6mm
Base copper thickness:	35 µm
Finish: Plated copper	30 µm average
Tin lead	5 µm min.

BOARD SPECIFICATION - MULTILAYER BACKPLANES

Dielectric Epoxy Glass to	BS 4584 EP-GC-CU-3(FR4)
Nominal thickness:	2,4mm
Base copper thickness:	35 µm
Finish: Plated copper	30 µm average
Tin lead	5 µm min.
Total	70 µm - outside layers only

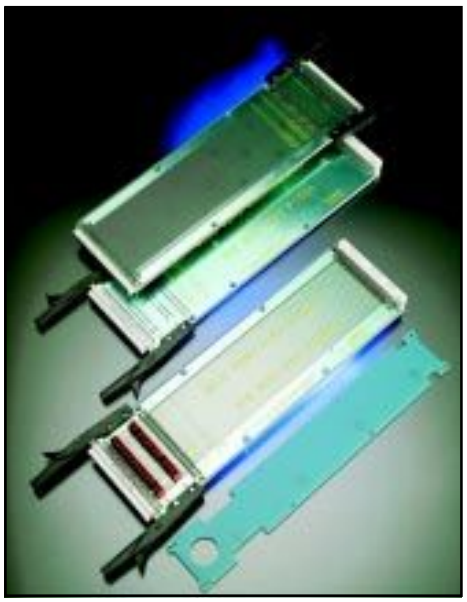
Note: All STEbus bare boards are UL94 V-0 recognised components. File number E116551

STEbus DOUBLE SIDED BACKPLANES — **Ordering information**

No. of positions	Board dimensions width x length(mm)	No. of Layers	**Order code**
3 slot	128,55 x 55,04	2	**159-56138D**
4 slot	128,55 x 75,36	2	**159-56140B**
5 slot	128,55 x 95,86	2	**159-52886A**
7 slot	128,55 x 132,51	2	**159-42792K**
10 slot	128,55 x 193,47	2	**159-42639G**

STEbus MULTILAYER BACKPLANES — **Ordering Information**

No. of positions	Board dimensions width x length(mm)	No. of Layers	**Order code**
14 slot	128,55 x 274,75	5	**161-42794D**
21 slot	128,55 x 416,99	5	**161-42796J**



STANDARD AND SUPER EXTENDER BOARDS

FEATURES

- Standard version - double sided
- Super version - multilayer
- Jumper linked access to each signal line
- Signal resist protection on outer layers
- Signal pin-out identification silk screened onto outer layers
- Facility for logic analyser or “stub” terminator connection

In order to address the widely differing applications of the STEbus, VERO Electronics has designed two types of extender board - a double sided, standard version for basic, low cost applications and a multilayer, super version for high performance, sophisticated applications.

EXTENDER CARDS — **Ordering information**

Description	Board dim. W x L (mm)	No. of Layers	**Order code**
Standard	100,00 x 305,24	2	**159-42787K**
Super	100,00 x 305,24	3	**161-53172B**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

G-64 BUS

FEATURES

- Fully conforms to G-64 bus specification, Revision 02.Nov.1984.
- Reliability of double sided PTH board with solder resist protection
- Available in five standard backplane slot widths
- Completely assembled using high reliability press-fit IEC 603-2 (DIN 41612) type "B"connectors
- Board construction allows constant characteristic impedance of signal tracks
- Full ground plane screen
- 6,3mm tabs provided for power pick-up

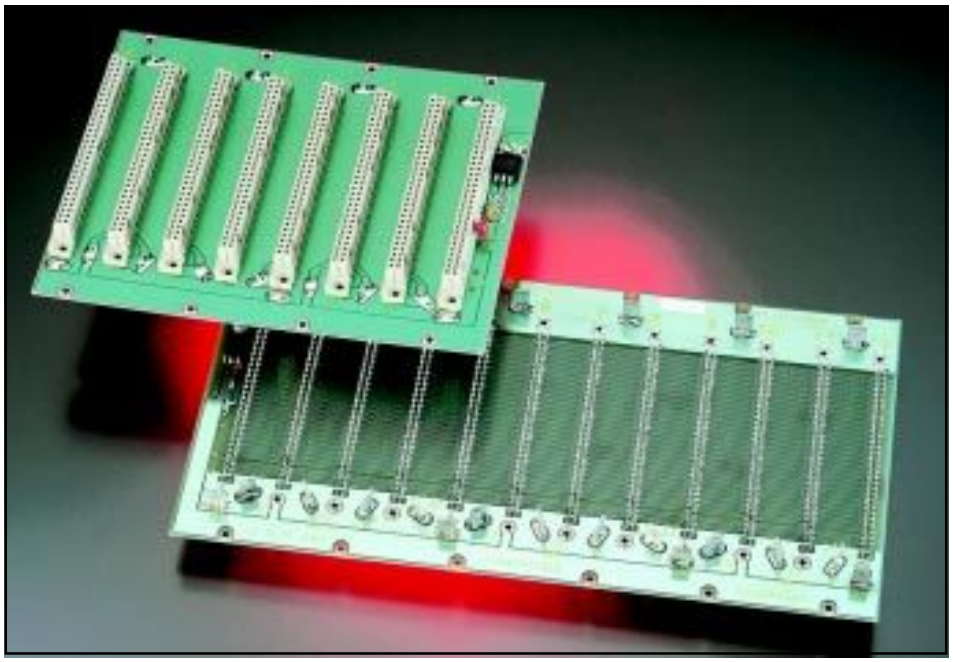
The backplane is supplied completely with a -5V, voltage regulator already assembled.

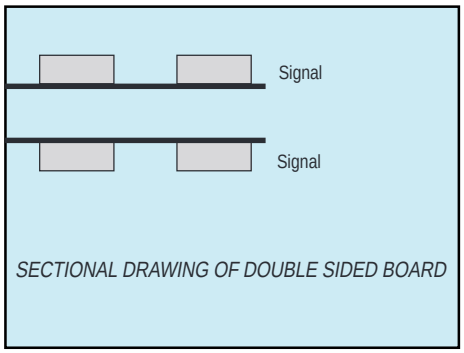
BOARD SPECIFICATION

Double sided copper clad epoxy glass to BS 4584 EP-GC-CU-3(FR4)

Nominal thickness:		1.6 mm
Base copper thickness:		35 µm
Finish:	Plated copper	30 µm average
	Tin lead	5 µm min.
	Total	70 µm

Note:bare boards are UL94 V-0 recognised components. File number E116551.





SECTIONAL DRAWING OF DOUBLE SIDED BOARD

G-64 BUS **Ordering information**

No.of slots	Backplane dim. width x length	Order code
4	128,55 x 82,7	**162-53124H**
8	128,55 x 164,0	**162-42807G**
12	128,55 x 245,0	**162-42808D**
16	128,55 x 326,3	**162-42809A**
20	128,55 x 407,6	**162-53125E**

G-96BUS MULTILAYER BACKPLANES

FEATURES

- Fully conforms to G-96 specification, revision 02 - November 1984
- Reliability of multilayer construction with solder resist protection on both sides
- Available in five standard backplane widths
- Completely assembled using high reliability press-fit IEC 603-2 (DIN 41612) type C connectors
- On-board passive termination
- Board construction allows for constant characteristic impedance of signal tracks
- 6,3 mm tabs provided for power pick-up

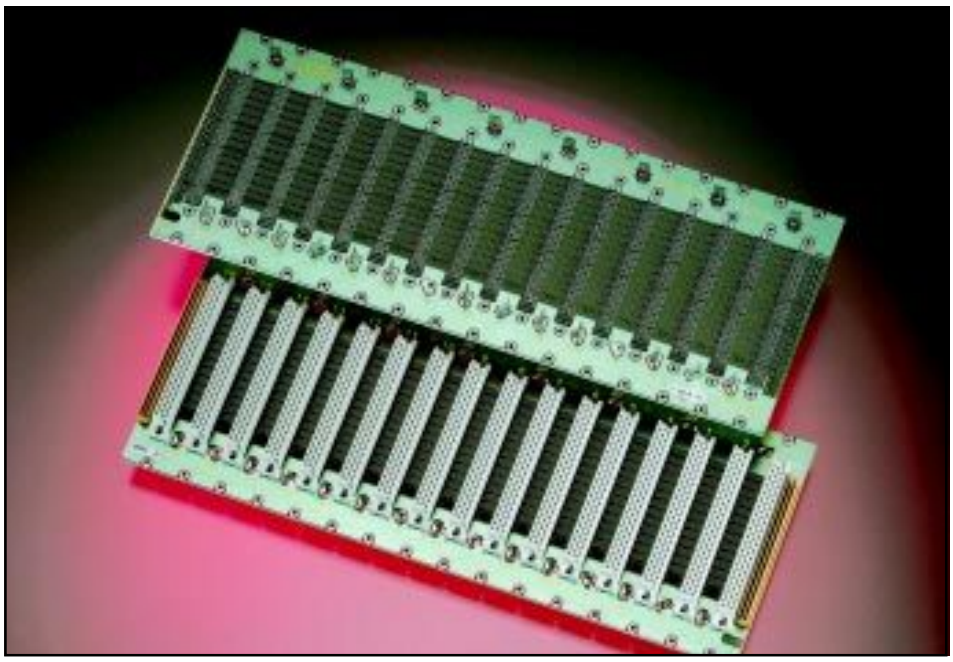
The connector pin definitions are so arranged as to allow a mixture of G-64 and G-96 boards within a G-96 system (a revised connector was introduced 1st January 1985 to ensure compatibility).

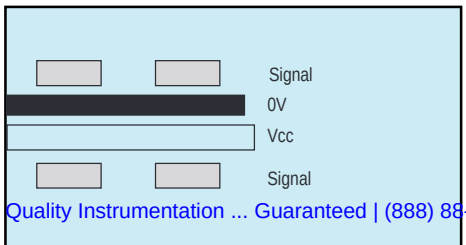
BOARD SPECIFICATION

Double sided copper clad epoxy glass to BS 4584 EP-GC-CU-3(FR4)

Nominal thickness:		2,4 mm
Base copper thickness:		35 µm
Finish:	Plated copper	30 µm average
	Tin lead	5 µm min.
	Total	70 µm

Note:bare boards are UL94 V-0 recognised components. File number E116551.





G-96 BUS **Ordering information**

No.of slots	Backplane dim. width x length	Order code
4	128,55 x 88,95	**410-59956L**
8	128,55 x 170,23	**410-59960C**
12	128,55 x 251,51	**410-59964B**
16	128,55 x 332,79	**410-59968A**

Artisan Technology Group - Quality Instrumentation ... Guaranteed | (888) 88-SOURCE | www.artisantg.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP