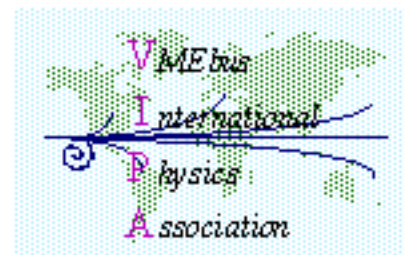


VIPA Modules, Transition Modules, Power & Cooling

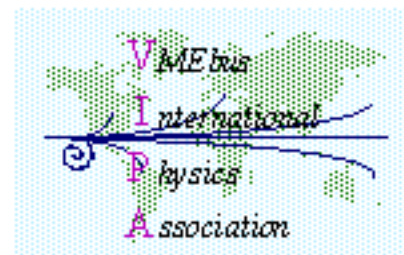
Robert Downing

Module & Transition Module Sizes



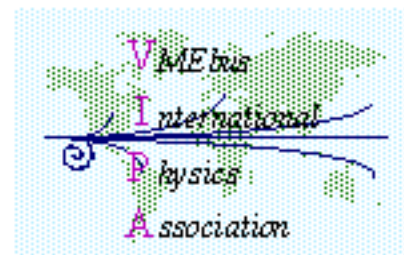
- 6U sizes per VME64x Standard
 - 160 mm x 233 mm
- 9U sizes per 9U x 400 mm Format Standard
 - 400 mm x 367 mm
- Preferred Transition Module Sizes
 - 6U T. M. per VME64x Standard
 - 80 mm x 233 mm
 - 9U T. M. per VIPA
 - 120 mm x 367 mm

J1 and J2 Connectors



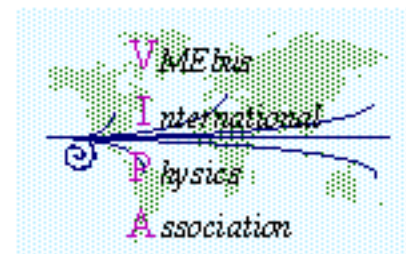
- J1 and J2: 160 pin 0.1 inch
 - IEC 60603-xx
 - Performance level 2
 - 400 mating cycles
- Conforms to VME64x on pins
- User pins undefined

J0 Connector



- J0: 5 x 19 with shield 2 mm Hard Metric style
 - IEC 61076-4-101, Type B
 - Class 2 or better
 - 250 mating cycles
- J0 pin usage:
 - Extra +5 power for 9U Modules
 - Other voltages
 - Special “Physics Signals”

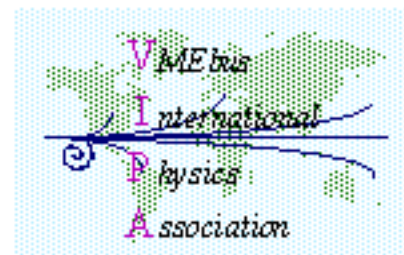
J0 Pin Assignment



- Rows 2 thru 21 on Backplane

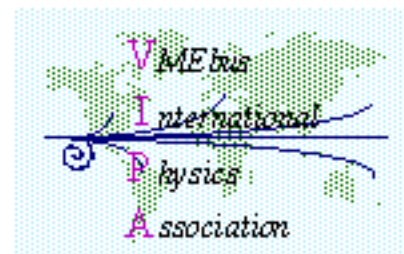
Pin #	Row z	Row a	Row b	Row c	Row d	Row e	Row f
1	COM	+5V	+5V	+5V	+5V	+5V	COM
2	COM	RET_WX	RESERVED	+5V	TBUS1+	TBUS1-	COM
3	COM	RET_WX	RESERVED	RESERVED	TBUS2+	TBUS2-	COM
4	COM	Vw	RESERVED	USER I/O	USER I/O	USER I/O	COM
5	COM	Vw	RESERVED	USER I/O	USER I/O	USER I/O	COM
6	COM	RET_WX	RESERVED	USER I/O	USER I/O	USER I/O	COM
7	COM	AREF_WX	RESERVED	USER I/O	USER I/O	USER I/O	COM
8	COM	RET_WX	RESERVED	USER I/O	USER I/O	USER I/O	COM
9	COM	Vx	RESERVED	USER I/O	USER I/O	USER I/O	COM
10	COM	Vx	RESERVED	USER I/O	USER I/O	USER I/O	COM
11	COM	Vy	RESERVED	USER I/O	USER I/O	USER I/O	COM
12	COM	Vy	RESERVED	USER I/O	USER I/O	USER I/O	COM
13	COM	RET_YZ	RESERVED	USER I/O	USER I/O	USER I/O	COM
14	COM	AREF_YZ	RESERVED	USER I/O	USER I/O	USER I/O	COM
15	COM	RET_YZ	RESERVED	USER I/O	USER I/O	USER I/O	COM
16	COM	Vz	RESERVED	USER I/O	USER I/O	USER I/O	COM
17	COM	Vz	RESERVED	RESERVED	TBUS3+	TBUS3-	COM
18	COM	RET_YZ	RESERVED	RESERVED	TBUS4+	TBUS4-	COM
19	COM	RET_YZ	RESERVED	RESERVED	TBUS_OC1	TBUS_OC2	COM

Vw, Vx, Vy, Vz Usage



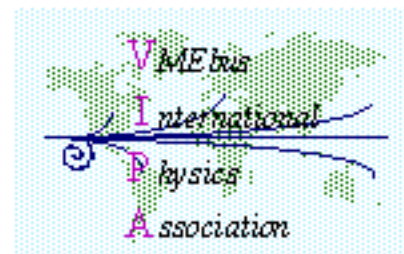
- VIPA recommended configuration (10U subracks):
 - Vw, Vx & Vy @ - 5.2 volts (180 amperes)
 - Vz @ - 2.0 volts (60 amperes)
 - RET_WX & RET_YZ connected to COM (digital return) in Modules
- Special systems, for example:
 - Vw & Vx @ +15 volts
 - Vy & Vz @ -15 volts
 - RET_WX & RET_YZ connected to provide +/- 15 return

6U Power Limits



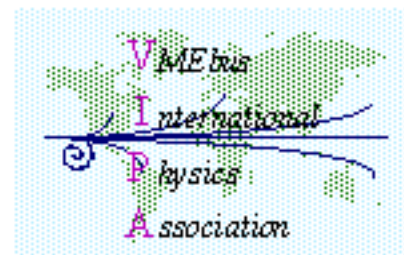
Voltage	Minimum Maximum Current Outputs
+3.3V	50A
+5 V STDBY	(connected at backplane to +5V)
VPC	(connected at backplane to +5V)
+5 V	100A
+12.0V	20A
-12.0V	20A
Vw	20A
Vx	20A
Vy	20A
Vz	20A
+V1 (nominal 48 volts)	20 A
+V2 (nominal 48 volts)	20 A
Return Connections	Current Rating
Digital Return	170 A
RET WX (return of Vw & Vx)	40 A
RET YZ (return of Vy & Vz)	40 A
-V1 (return of +V1)	20 A
-V2 (return of +V2)	20 A

9U Power Limits



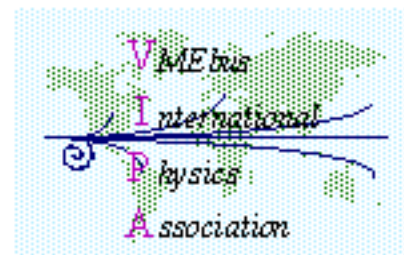
Voltage	Minimum Maximum Current Outputs
+3.3V	200A
+5 V STDBY	(connected to +5V at backplane)
VPC	(connected to +5V at backplane)
+5 V	300A
+12.0V	30 A
-12.0V	30 A
Vw	60A
Vx	60A
Vy	60A
Vz	60A
+V1 (nominal 48 volts)	30 A
+V2 (nominal 48 volts)	30 A
Return Connections	Current Rating
Digital Return	530 A
RET_WX (return of Vw & Vx)	120 A
RET_YZ (return of Vy & Vz)	120 A
-V1 (return of +V1)	30 A
-V2 (return of +V2)	30 A

Power Dissipation



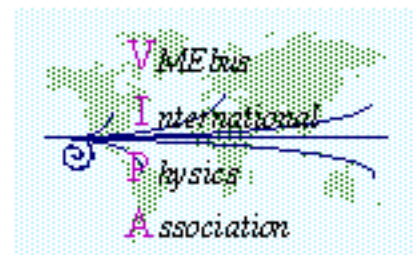
- Limits based on air cooling systems
 - 3U x 160 mm: 15 watts max.
 - 6U x 160 mm: 30 watts max.
 - 9U x 400 mm: 110 watts max.
- Power calculations do not include power drawn by an associated Transition Module
- Die temperatures are the most important measure of reliability
- Empty slots need fillers for air flow control

Transition Module Power



- Cooling needed in rear just as in front
- Limits based on air cooling systems
 - 3U x 80 mm: 7 watts max.
 - 6U x 80 mm: 14 watts max.
 - 9U x 120 mm: 21 watts max.
- Empty slots need fillers for air flow control just as in front

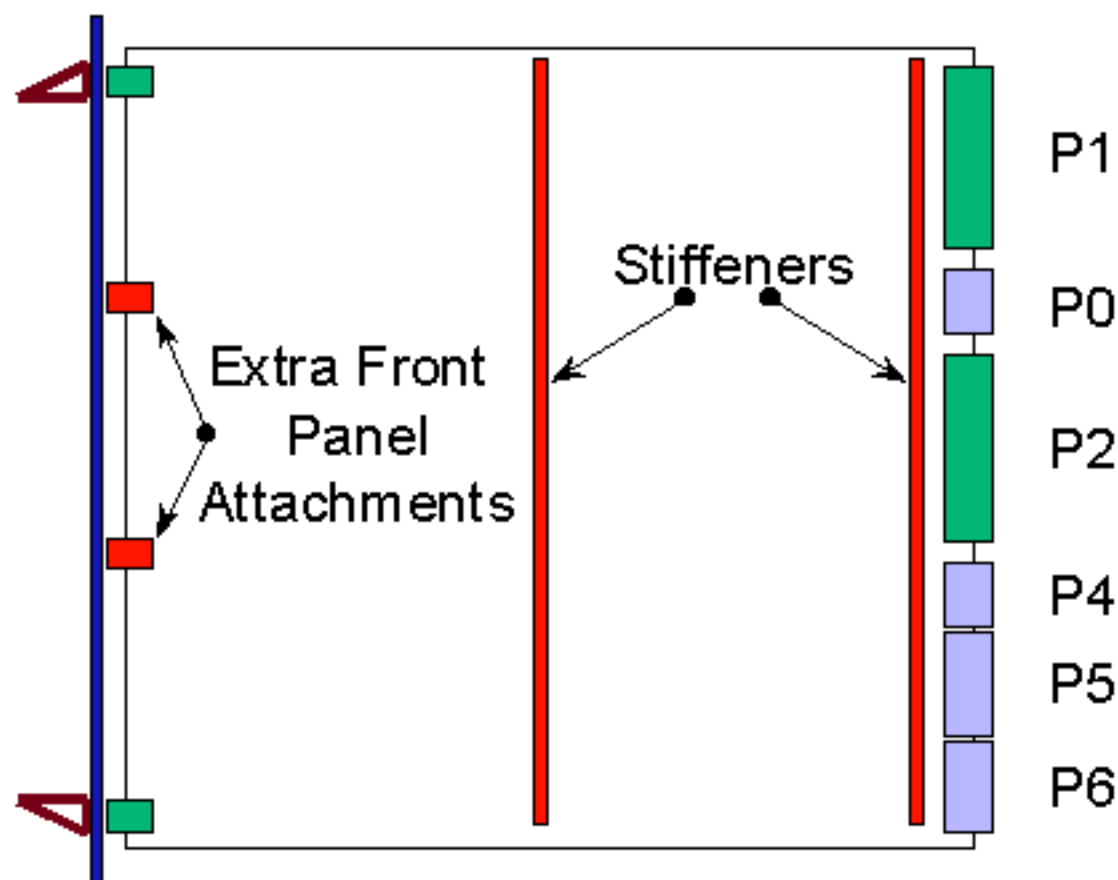
Circuit Boards



- 9U boards preferred thickness: 2.4 mm
 - board stability issue
 - stiffeners may be necessary
- 6U boards OK at 1.6 mm
- Thick boards milled on solder side to 1.6 mm thick for 2.5 mm along top and bottom edge
- Solder side insulator
- Multi-layer construction suggestions

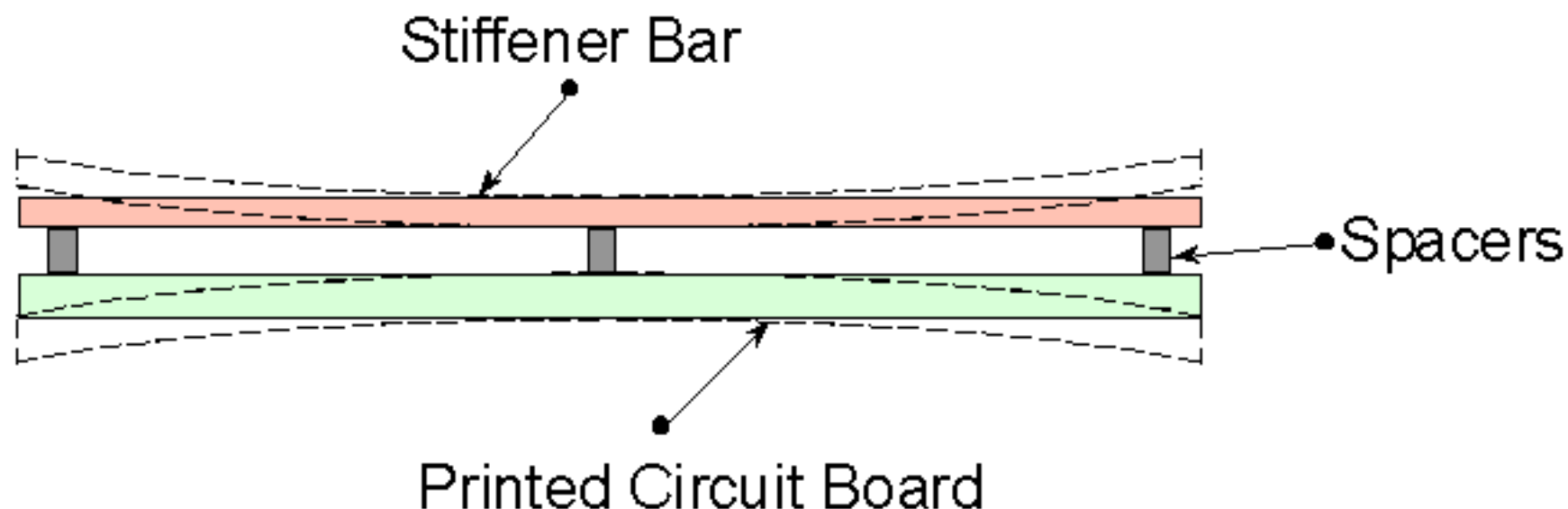
Board Stiffeners

- Component Side



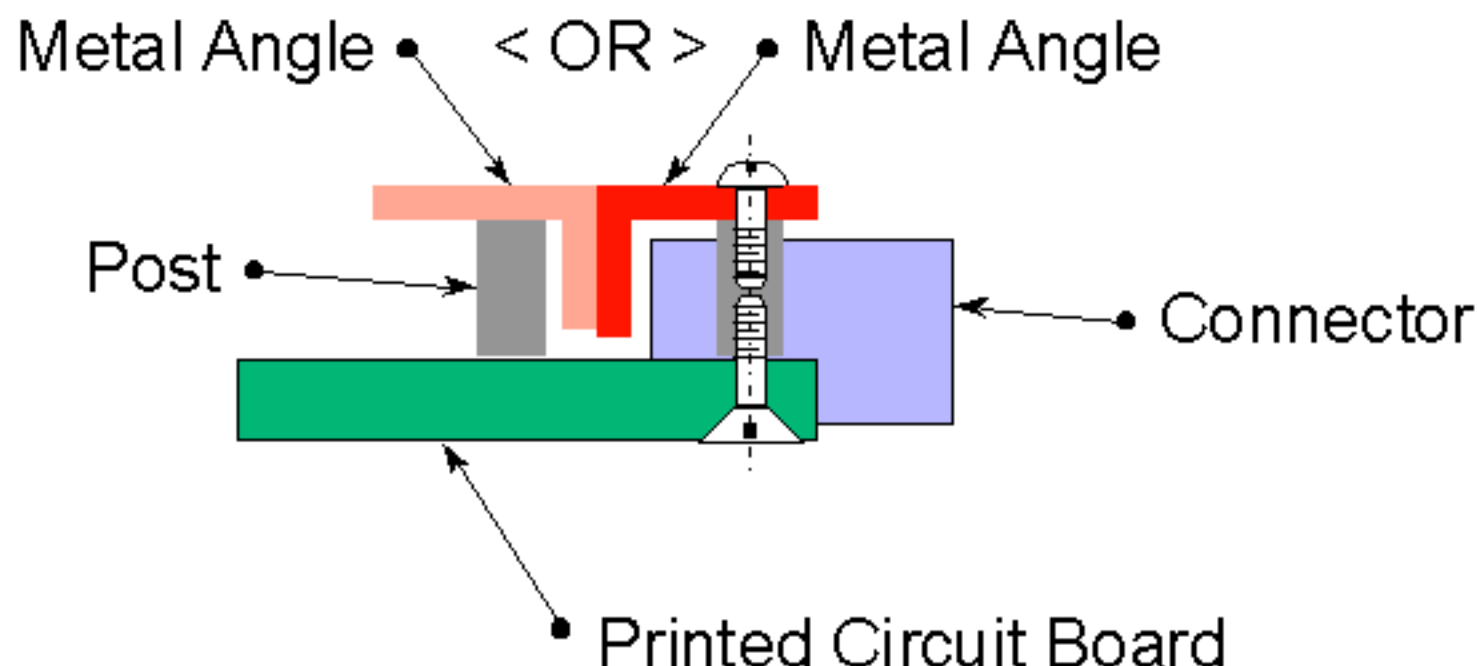
Board Stiffeners

- Pre-stress Technique for Straightening

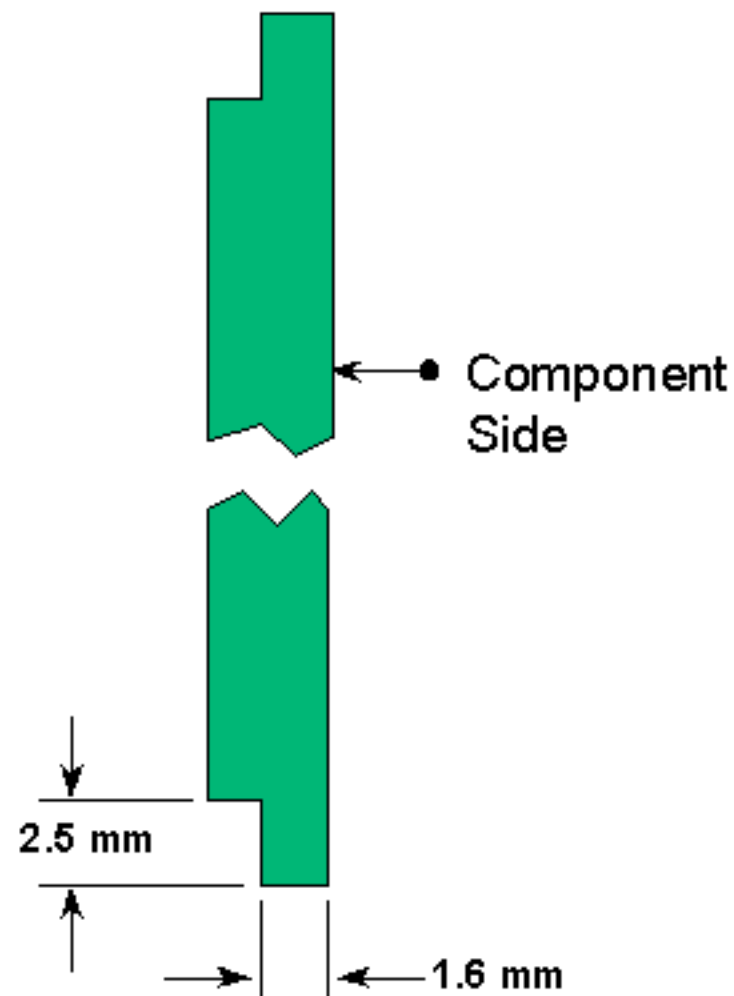


Board Stiffeners

- Connector Area Stiffener



Board Edge Milling



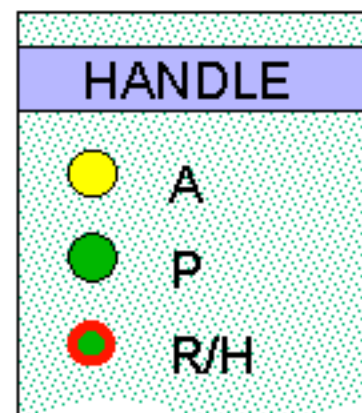
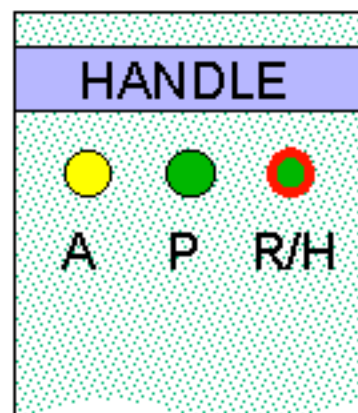
Front Panel Labeling



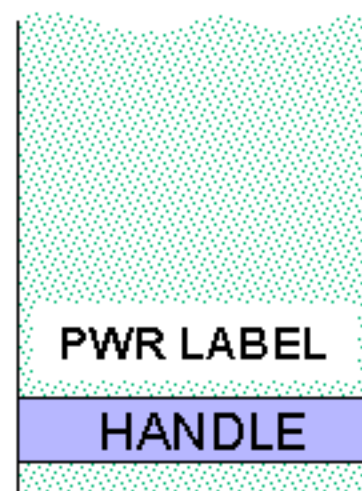
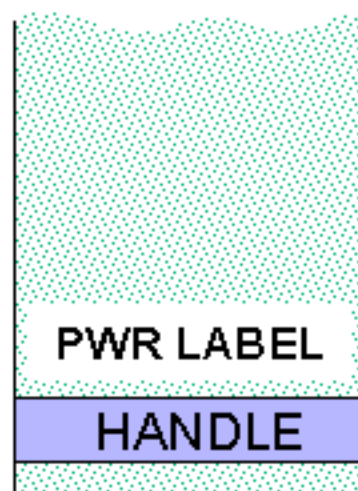
A = Activity

P = Power

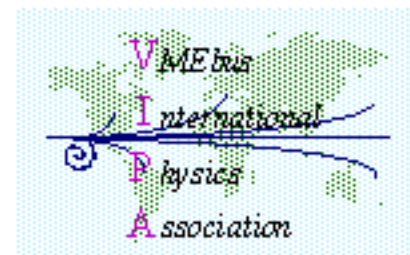
R/H = Run (Green)
or
Halt (Red)



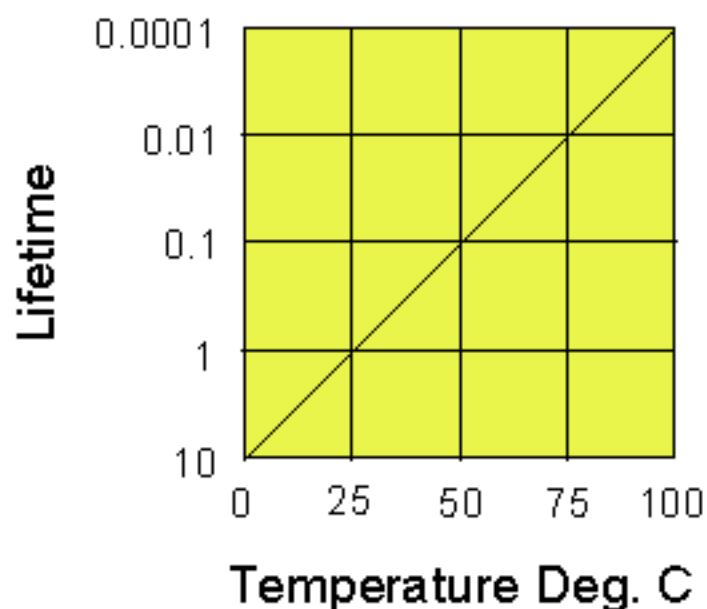
OR



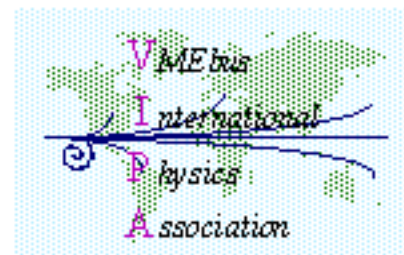
Die Temperature



- Die temperature 85 deg. C max.
 - Arrhenius diagram

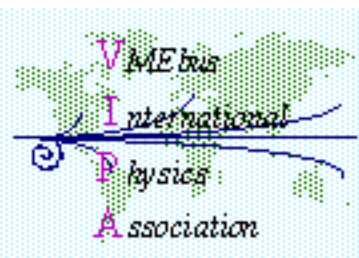


Air Cooling



- Air should not exceed 60 deg. C
- Temperature rise 20 deg. C max.
- Air flow 2.0 m/s (400 ft/min)
- Measurements made with maximum power modules on either side of test unit

Fuses



- Fuses can be a safety enhancement
- Fuse at 150% of rated load maximum
- No slow blow fuses
- Potential problems with fuses
 - High frequency return paths
 - CMOS and segmented power
- Beware of simple solutions!

Keying

