SynQor®

MILITARY COTS
VITA 62 COMPLIANT POWER SUPPLY

18V - 40V Continuous Input Voltage	Input EMI Filtering	5 Outputs	1000W Maximum Output Power	91% Typical Efficiency

Operation: -40°C to 85°C (at Card Edge)

VPX Features

◆ **Outputs:**

VS1: $\Big\}$+12V @ 80A = 960W
VS2:

VS3: +5.0V @ 30A = 150W
(AUX) +3.3V$_{AUX}$@ 15A = 50W
(AUX) +12V$_{AUX}$@ 1A = 12W
(AUX) -12V$_{AUX}$@ 1A = 12W

◆ **Maximum Total Output Power: 1000W**

◆ **Input EMI Filtering**

◆ **-40°C to 85°C Operating Temperature (at Card Edge)**

◆ **Over-current, over-voltage and over-temperature protection**

◆ **Current Sharing on +12V and +5.0V**

◆ **Remote Sense**

◆ **Standard VITA 62 Controls**

◆ **No Electrolytic Capacitors**

◆ **Compliance:**

(Full Load Operation Down to 18V$_{IN}$)

— VITA 62

— MIL-STD-704

— MIL-STD-461
  ▪ CE102   ▪ CS101   ▪ CS114
  ▪ CS115   ▪ CS116

— VITA 47 / MIL-STD-810G
  • ESD Protection
  • Shock
  • Vibration
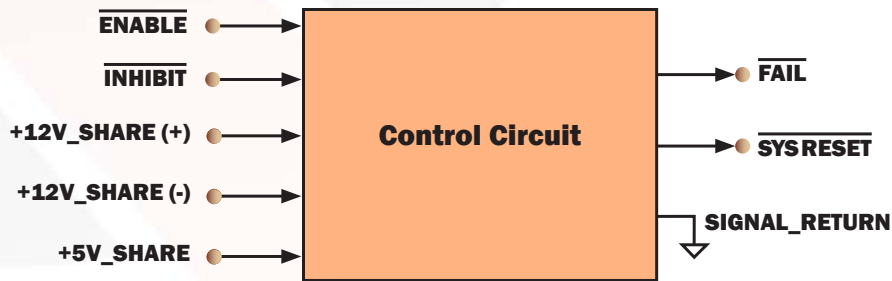 • Rapid Decompression
  • Corrosion Resistance
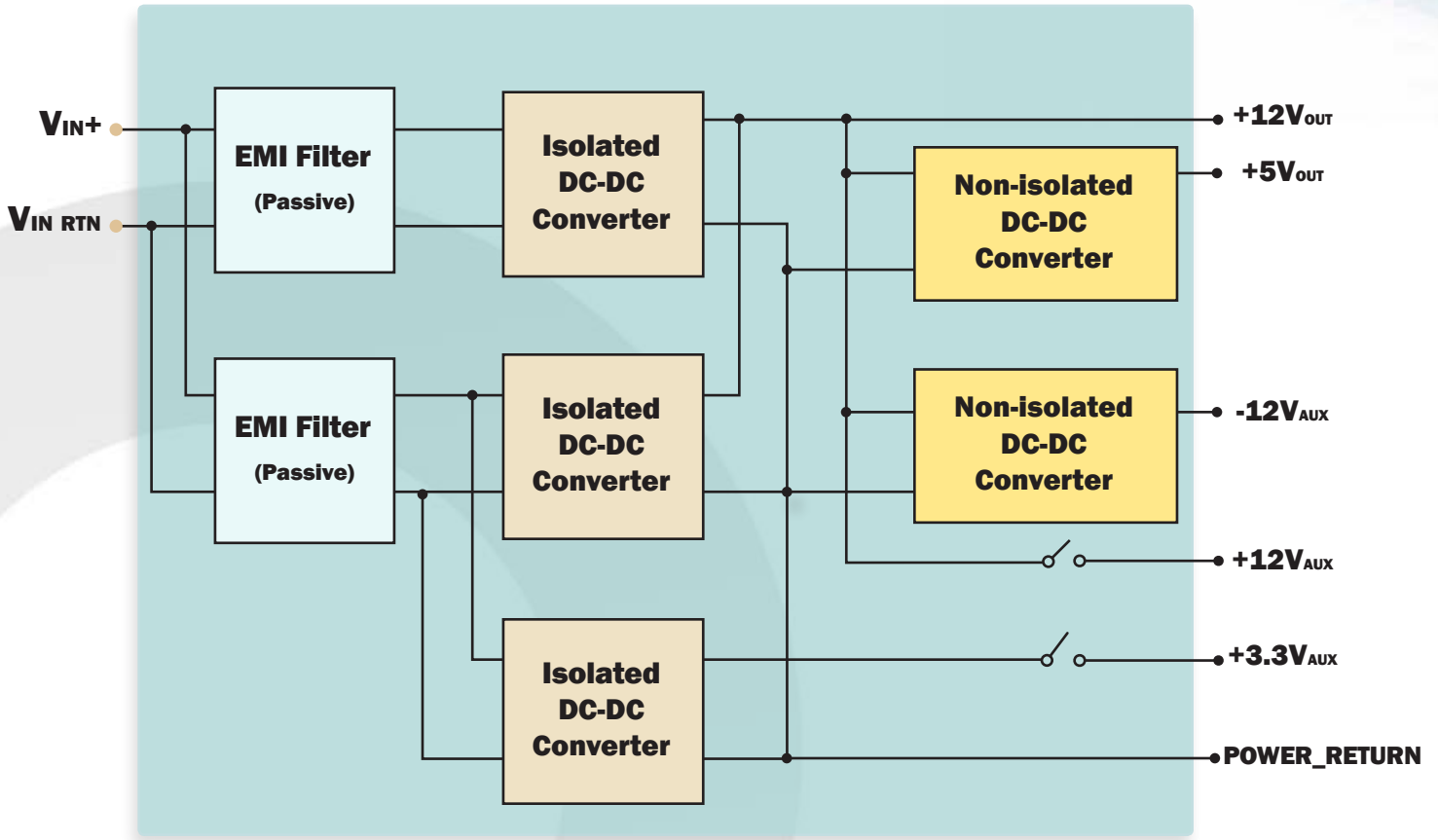 • Fungus Resistance
  • Altitude
  • Humidity

MADE IN USA

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BLOCK DIAGRAM FOR VPX-6U-DC28P-001

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VPX-6U-DC28P-001 INPUT CHARACTERISTICS

Parameter	Min.	Typ.	Max.	Units	Notes & Conditions
ABSOLUTE MAXIMUM RATINGS					
Input Voltage					
Non-Operating	-1		60	V	Continuous
Operating			40	V	Continuous
Operating Transient Protection			50	V	100ms transient, square wave
Isolation Voltage			1500	V	Input to Output and Input/Output to Case
Operating Temperature	-40		85	°C	Card edge temperature
Storage Temperature	-55		105	°C	
ELECTRICAL CHARACTERISTICS					
Input Voltage					
Continuous	18		40	V	
Transient	18		50	V	50V Transient for 100ms
Under-Voltage Lockout					
Turn-On Input Voltage Threshold	15	15.5	16	V	
FEATURE CHARACTERISTICS					
VITA 62 ON/OFF Control					Control signals referenced to SIGNAL_RETURN
ENABLE* high-state Voltage	2		3.6	V	ENABLE* regards a no-connect as a high
ENABLE* low-state Voltage			0.8	V	
INHIBIT* high-state Voltage	2		3.6	V	INHIBIT* regards a no-connect as a high
INHIBIT* low-state Voltage			0.8	V	

INPUT VOLTAGE SPIKE

INPUT VOLTAGE SPIKE SUPPRESSION	
Module Operates through these Spikes	
Input Voltage Spike (Centered on Vin)	
±250V, 100µs, Emax = 15mJ	MIL-STD-1275D
±200V, 10µs, Rs ≤ 0.5Ω	MIL-STD-461C (CS06); DEF-STAN 61-5
±400V, 5µs, Rs ≤ 0.5Ω	MIL-STD-461C (CS06)
±600V, 10µs, Rs = 50Ω	RTCA/DO-160E

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VPX-6U-DC28P-001 OUTPUT CHARACTERISTICS

Parameter	+12V	+5V	+3.3V$_{AUX}$	+12V$_{AUX}$	-12V$_{AUX}$
OUTPUT CHARACTERISTICS					
Output Voltage Set Point See Note 1	12V (+/-1%)	5V (+/-1%)	3.3V (+/-1%)	12V (+/-1%)	-12V (+/-1%)
Total Output Voltage Range See Note 2	12V (+/-4%)	5V (+/-3%)	3.3V (+/-2%)	12V (+/-4%)	-12V (+/-3%)
Output Voltage Ripple (pk-pk) See Note 3	80mV	50mV	80mV	80mV	50mV
Operating Current Range Maximum Total Output Power = 1000W	0-80A	0-30A	0-15A	0-1A	0-1A
Over-Voltage Protection	14.8V	6.0V	4.0V	14.8V	NA
Current-Limit Inception	100.8A	40A	18A	2A	1.8A
Maximum Output Capacitance	10mF	10mF	10mF	1mF	10mF
MAXIMUM TOTAL OUTPUT POWER	1000W				

Note 1: 28Vin, 50% load
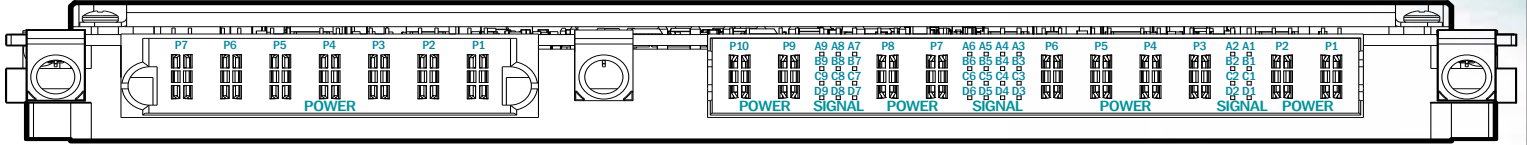
Note 2: Over line, load, temperature

Note 3: Full Load, measured with 1µF capacitor and 10uF tantalum capacitor

Maximum Total Output Power = 1000W (At 70°C Card Edge Temperature)

= 800W (At 85°C Card Edge Temperature)

Temperature specifications are relative to the temperature at the thermal interface, on the flange opposite the wedge locks.
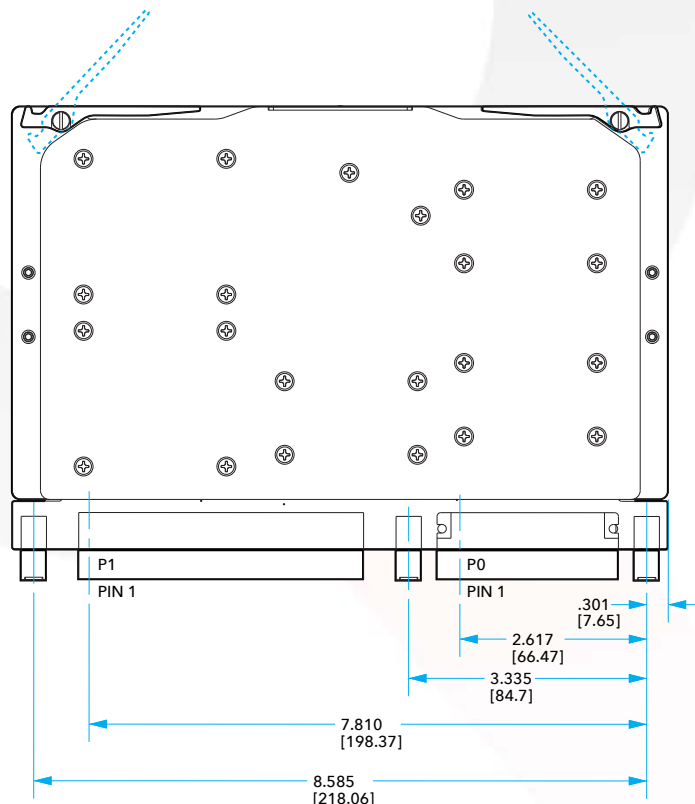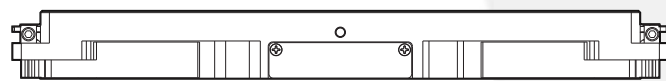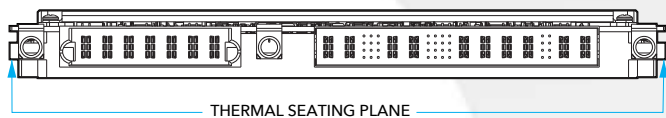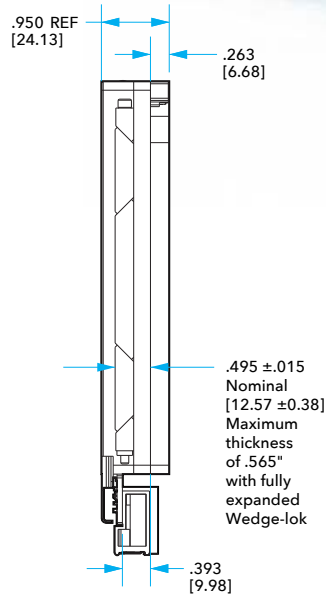
PIN DESCRIPTIONS

6U P0 Connector

PIN	FUNCTION	DESCRIPTION
P7	+DC_IN	Vin+
P6	+DC_IN	Vin+
P5	-DC_IN	Vin-
P4	-DC_IN	Vin-
P3	Not currently used	
P2	Not currently used	
P1	CHASSIS	Chassis

6U P1 Connector

PIN	FUNCTION	DESCRIPTION
P10	+12V_MAIN	+12V main output voltage, 80A rated
P9	+12V_MAIN	
A9	+12V_SENSE(+)	Should be connected to +12V_MAIN either remotely or at the connector
B9	+12V_SENSE(+)	
C9	+5V_SENSE(+)	Should be connected to +5V_MAIN either remotely or at the connector
D9	LED_DISABLE	Internally pulled up to 3.3V, connect to SIGNAL_RETURN to disable LED
A8	+12V_SENSE(-)	Should be connected to POWER_RETURN either remotely or at the connector
B8	+12V_SENSE(-)	
C8	Not currently used	
D8	STARTUP_SYNC	Startup synchronization for +5V_MAIN
A7	+12V_SHARE(+)	Active current share differential pair for +12V_MAIN
B7	+12V_SHARE(-)	
C7	+5V_SHARE	Active current share for +5V_MAIN
D7	SIGNAL_RETURN	Ground pin for control signals
P8	POWER_RETURN	Common output voltage return pin, 40A rated per pin
P7	POWER_RETURN	
A6	Not currently used	
B6	Not currently used	
C6	-12V_AUX	-12V auxiliary output voltage, 1A rated
D6	SYSRESET*	System Reset is actively low. It will float when all outputs are within specification
A5	Not currently used	
B5	Not currently used	
C5	Not currently used	
D5	Not currently used	
A4	Not currently used	
B4	Not currently used	
C4	Not currently used	
D4	Not currently used	
A3	Not currently used	
B3	+12V_AUX	+12V auxiliary output voltage, 1A rated
C3	Not currently used	
D3	Not currently used	
P6	+5V_MAIN	+5V main output voltage, 30A rated
P5	+5V_MAIN	
P4	POWER_RETURN	Common output voltage return pin, 40A rated per pin
P3	POWER_RETURN	
A2	Not currently used	
B2	FAIL*	When any of the output is not within specification, FAIL* signal will be driven low
C2	INHIBIT*	Input control signal as defined in VITA 62, referenced to SIGNAL_RETURN
D2	ENABLE*	Input control signal as defined in VITA 62, referenced to SIGNAL_RETURN
A1	Not currently used	
B1	Not currently used	
C1	Not currently used	
D1	Not currently used	
P2	+3.3V_AUX	+3.3V auxiliary output voltage, 15A rated
P1	POWER_RETURN	Common output voltage return pin, 40A rated per pin

9.187 [233.35]

8.400 [213.36]

6.634 [168.49]

KEY 1   KEY 2   KEY 3

.950 REF [24.13]

.263 [6.68]

.495 ±.015 Nominal [12.57 ±0.38] Maximum thickness of .565" with fully expanded Wedge-lok

.393 [9.98]

THERMAL SEATING PLANE
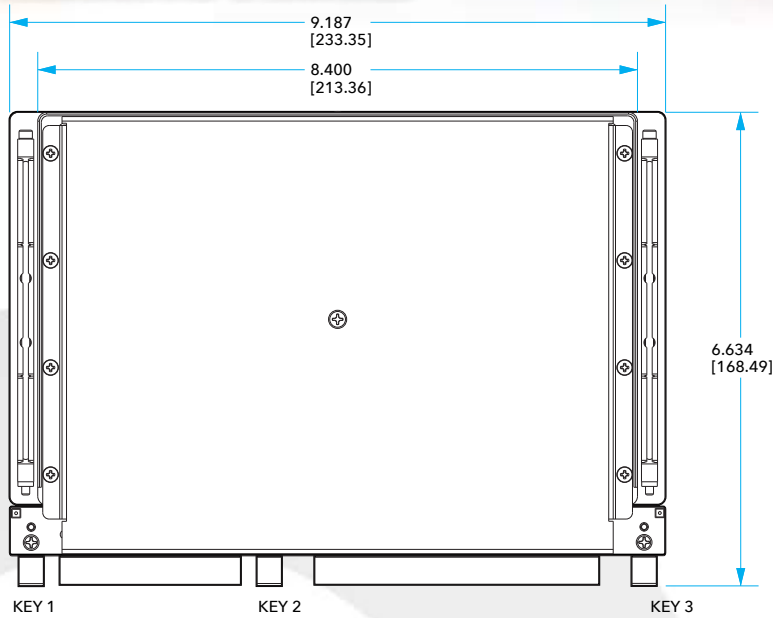
NOTES:
1. ALL DIMENSIONS IN INCHES

2. TOLERANCES: X.XX   ±0.02in [0.5mm]
                X.XXX ±.010in [0.25mm]

3. CONNECTOR PART NUMBERS:
   P0 - TE CONNECTIVITY 6450843-6 (or equivalent)
   P1 - TE CONNECTIVITY 6450849-6 (or equivalent)

4. WEIGHT: 3.59lbs (1.63kg)

5. SEE TABLE FOR KEYWAY POSITION AND ANGLE.

VPX-6U-DC28 [P,T] -001		
Key Position	Alignment Angle	TE Connectivity Part Number
1	0°	1-1469492-1
2	0°	1-1469492-1
3	0°	1-1469492-1

VPX-6-DC270P-001		
Key Position	Alignment Angle	TE Connectivity Part Number
1	315°	1-1469492-8
2	0°	1-1469492-1
3	0°	1-1469492-1

P1   P0
PIN 1   PIN 1

.301 [7.65]

2.617 [66.47]

3.335 [84.7]

7.810 [198.37]

8.585 [218.06]

APPLICATION NOTES

CONTROL FEATURES

ENABLE*	Standard VITA 62 control signal. It is used to turn off all of the output voltages when it is high, including +3.3V_AUX. When it is pulled low to SIGNAL_RETURN, +3.3V_AUX will be turned on and the status of the other outputs will be dependent on the state of INHIBIT*. ENABLE* signal regards a no-connect as a high.
INHIBIT*	Standard VITA 62 control signal. It is used to turn off all the output voltages except +3.3V_AUX. When it is pulled low to SIGNAL_RETURN, VS1, VS2, VS3, +12V_AUX and -12V_AUX will be turned off. INHIBIT* signal regards a no-connect as a high. At power-on, if ENABLE* and INHIBIT* are configured to turn all outputs on, +3.3V_AUX will be powered up 100ms prior to when the other outputs are powered up.
FAIL*	FAIL* signal is used to indicate a failure has occurred. It will be pulled low when any of the outputs are outside the voltage specification. FAIL* is an active low open-drain signal. It is expected there will be a pull-up resistor on the backplane to 3.3V. A typical resistor value is 4.7kΩ.
SYSRESET*	SYSRESET* signal is an output generated from the module. It is used to indicate that startup has completed. At power-on, SYSRESET* is pulled low. It will be high impedance when all outputs are within voltage specification. It will be pulled low if any failure has occurred or if the outputs are disabled by the user during operation. SYSRESET* signal is an active low open-drain signal. It is expected there will be a pull-up resistor on the backplane to 3.3V. A typical resistor value is 4.7kΩ.

VITA 62 CONTROL STATES

ENABLE*	INHIBIT*	+3.3V_AUX	VS1, VS2, VS3, +12V_AUX, -12V_AUX
HIGH	HIGH	OFF	OFF
LOW	HIGH	ON	ON
HIGH	LOW	OFF	OFF
LOW	LOW	ON	OFF

PARALLEL OPERATION

+12V_MAIN	Active current sharing on +12V_MAIN is supported. To implement the current sharing function, +12V_SHARE(+) and +12V_SHARE(-) pins should be routed between all paralleled modules as a differential pair. ENABLE* and INHIBIT* should be connected together. High speed data communication is transmitted on these two lines. Control state is transmitted between the master unit and slave units on a cycle-by-cycle basis. Adding capacitance to these share lines must be avoided.
+5V_MAIN	Active current sharing on +5V_MAIN is also supported, but with an analog sharing scheme that is different than the digital sharing scheme for the +12V_MAIN. To implement the current sharing function, +5V_SHARE, ENABLE*, INHIBIT* and STARTUP_SYNC should be connected together between all paralleled modules. These SHARE pins are referenced to POWER_RETURN. A clean ground plane is important, and ground drop between each module should be minimized.
+3.3V_AUX, +12V_AUX & -12V_AUX	Active current sharing is not supported on auxiliary outputs. However, all these auxiliary rails have OR'ing MOSFETs or OR'ing diodes implemented, so that they can still be operated in parallel. Total output current on these rails should not exceed the current rating of a single module.

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VPX MODULE QUALIFICATION (VITA 47 COMPLIANT)

Test Name	Method
Random Vibration	MIL-STD-810, 514.6 - Procedure I, Class V3
Shock	MIL-STD-810, 516.6 - Procedure I, VI, Class OS2
Altitude	MIL-STD-810, 500.5 - Procedure I, II, III
Fungus Resistance	MIL-STD-810, 508.6
Corrosion Resistance	ASTM G85, Annex A4
Humidity	MIL-STD-810, 507.5 - Procedure II
High Temperature	MIL-STD-810, 501.5 - Procedure I, II
Low Temperature	MIL-STD-810, 502.5 - Procedure I, II
Temperature Cycling	MIL-STD-202, 107 - Class C4
ESD	EN61000-4-2, Level 4; 15kV Air Discharge

DC-DC CONVERTER AND FILTER SCREENING

Screening	Process Description	S-Grade	M-Grade
Baseplate Operating Temperature		-55˚C to +100˚C	-55˚C to +100˚C
Storage Temperature		-65˚C to +135˚C	-65˚C to +135˚C
Pre-Cap Inspection	IPC-610, Class III	Yes	Yes
Temperature Cycling	Method 1010, Condition B, 10 Cycles		Yes
Burn-In	100˚C Baseplate	12 Hours	96 Hours
Final Electrical Test	100%	25˚C	-55˚C, +25˚C, +100˚C
Final Visual Inspection	MIL-STD-2008	Yes	Yes

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ORDERING INFORMATION / PART NUMBERING

Series	Package Size (U)	Input Range	Mil Std Filtering	Output Voltage Combination Code	Packaging Options
VPX	- 6U	- DC28	P	- 001	- Y₁Y₂Y₃
VPX	3U 6U	DC28: 28V DC270: 270V	P: P -MIL-STD-704 (B-F) T: T -MIL-STD-704 A MIL-STD-1275 (B,D) DEF-STAN 61-5 (P6)/6	001: 001	Y1: Screening S - Standard (MCOTS) M - Military (MCOTS) Y2: Conformal Coating N - No Conformal Coating C - Conformal Coating Y3: TBD

In header row Y₁Y₂Y₃: $Y_1Y_2Y_3$

Examples: **VPX-6U-DC28P-001-SN**

APPLICATION NOTES

A variety of application notes and technical white papers can be downloaded in PDF format from our website.

PATENTS

SynQor holds the following U.S. patents, one or more of which apply to each product listed in this document. Additional patent applications may be pending or filed in the future.

5,999,417	6,222,742	6,545,890	6,577,109	6,594,159	6,731,520
6,894,468	6,896,526	6,927,987	7,050,309	7,072,190	7,085,146
7,119,524	7,269,034	7,272,021	7,272,023	7,558,083	7,564,702
7,765,687	7,787,261	8,023,290	8,149,597	8,493,751	8,644,027

CONTACT SYNQOR FOR FURTHER INFORMATION AND TO ORDER:

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