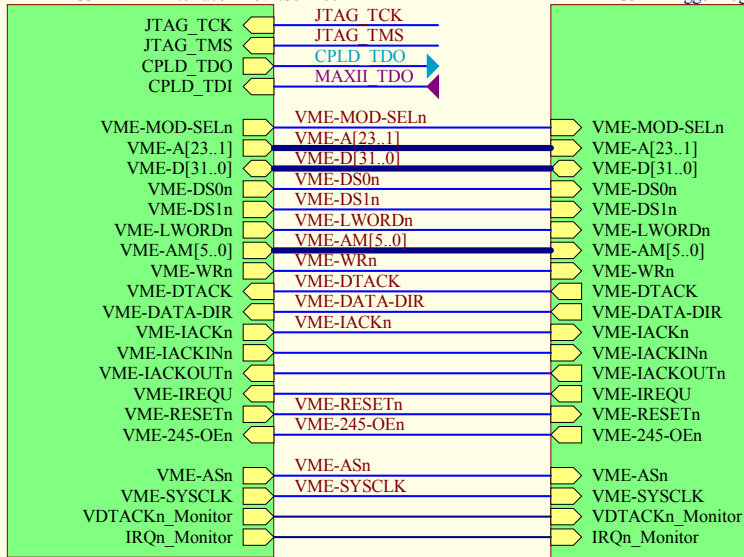


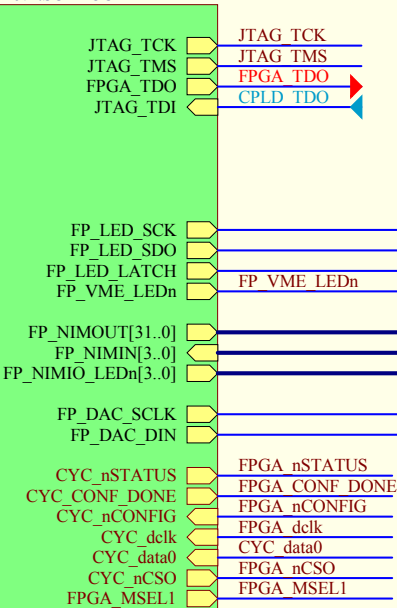
VME

VME-PPG32 - VME Interface - Rev1.SchDoc



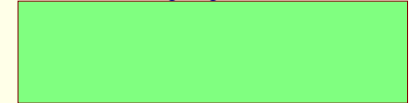
FPGA

VME-PPG32 - Trigger Logic - Rev1.SCHDOC



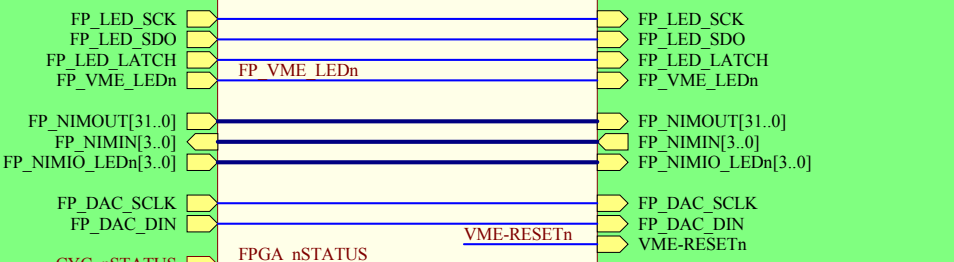
REG

VME-PPG32 - Voltage Regulators - Rev1.SCHDOC



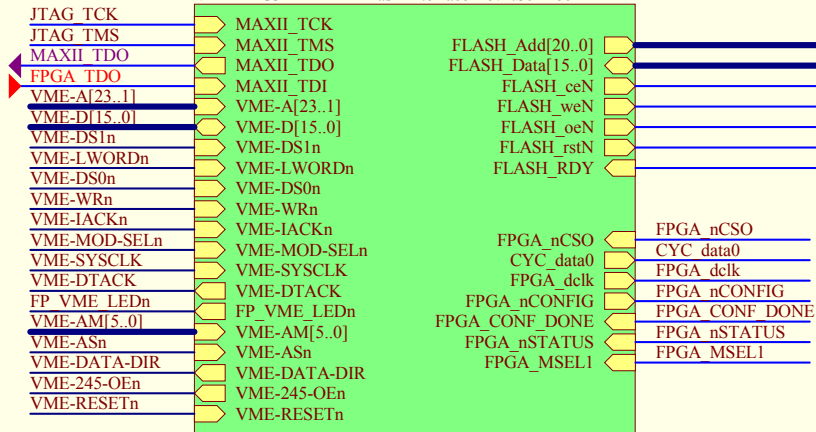
FP

VME-PPG32 - Front Panel - Rev1.SCHDOC



MAXII

VME-PPG32 - MAXII Flash Interface Rev1.SchDoc



FLASH

VME-PPG32 - Flash Memory - Rev1.SchDoc

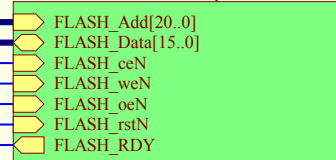


Table 9-7. Cyclone III Device Family Configuration Schemes (Note 1) (Part 1 of 2)

Configuration Scheme	MSEL				Configuration Voltage Standard (V) (2),(3)
	3	2	1	0	
Fast Active Serial Standard (AS Standard POR)	0	0	1	0	3.3
Fast Active Serial Standard (AS Standard POR)	0	0	1	1	3.0/2.5
Fast Active Serial Fast (AS Fast POR)	1	1	0	1	3.3
Fast Active Serial Fast (AS Fast POR)	0	1	0	0	3.0/2.5
Active Parallel ×16 Standard (AP Standard POR, for Cyclone III devices only)	0	1	1	1	3.3
Active Parallel ×16 Standard (AP Standard POR, for Cyclone III devices only)	1	0	1	1	3.0/2.5
Active Parallel ×16 Standard (AP Standard POR, for Cyclone III devices only)	1	0	0	0	1.8
Active Parallel ×16 Fast (AP Fast POR, for Cyclone III devices only)	0	1	0	1	3.3
Active Parallel ×16 Fast (AP Fast POR, for Cyclone III devices only)	0	1	1	0	1.8
Passive Serial Standard (PS Standard POR)	0	0	0	0	3.3/3.0/2.5
Passive Serial Fast (PS Fast POR)	1	1	0	0	3.3/3.0/2.5
Fast Passive Parallel Fast (FPP Fast POR) (4)	1	1	1	0	3.3/3.0/2.5

Table 9-1. Cyclone III Device Family Configuration Features

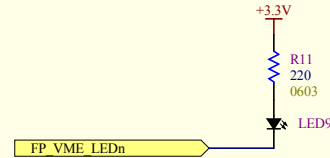
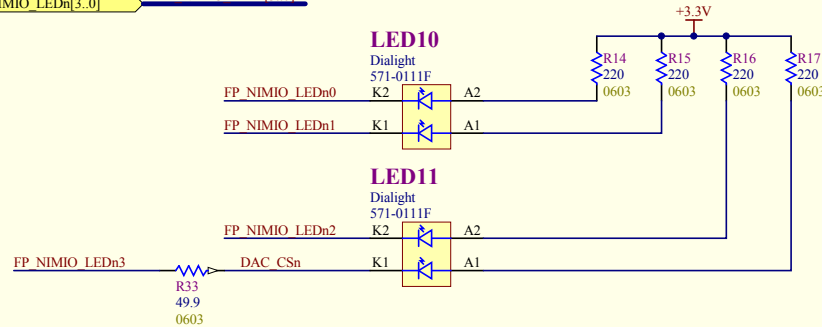
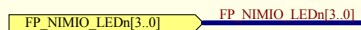
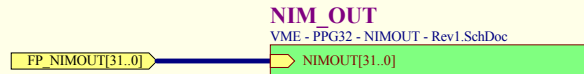
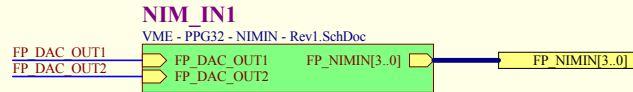
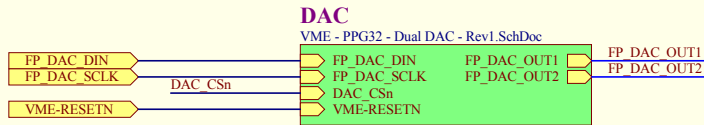
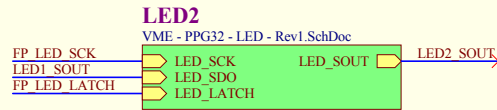
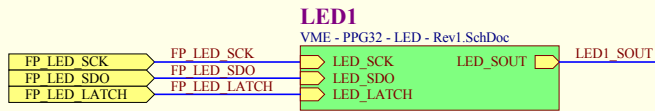
Configuration Scheme	Configuration Method	Decompression	Remote System Upgrade (1)	Design Security (Cyclone III LS Devices Only)
Fast Active Serial Standard (AS Standard POR)	Serial Configuration Device	✓	✓	✓
Fast Active Serial Fast (AS Fast POR)	Serial Configuration Device	✓	✓	✓
Active Parallel ×16 Standard (AP Standard POR, for Cyclone III devices only)	Supported Flash Memory (2)	—	✓	—
Active Parallel ×16 Fast (AP Fast POR, for Cyclone III devices only)	Supported Flash Memory (2)	—	✓	—
Passive Serial Standard (PS Standard POR)	External Host with Flash Memory	✓	—	—
Passive Serial Standard (PS Standard POR)	Download Cable	✓	—	✓ (3)
Passive Serial Fast (PS Fast POR)	External Host with Flash Memory	✓	—	—
Passive Serial Fast (PS Fast POR)	Download Cable	✓	—	✓ (3)
Fast Passive Parallel Fast (FPP Fast POR)	External Host with Flash Memory	—	—	✓
Fast Passive Parallel Fast (FPP Fast POR)	External Host with Flash Memory	—	—	—
JTAG based configuration	Download Cable	—	—	—

Notes to Table 9-1:
 (1) Remote update mode is supported when using the remote system upgrade feature. You can enable or disable remote update mode with an option setting in the Quartus® II software. For more information about the remote system upgrade feature, refer to "Remote System Upgrade" on page 9-77.
 (2) For more information about the supported families for the memory commonly parallel flash, refer to Table 9-11 on page 9-24.
 (3) The design security feature is not supported using a JTAG Object File (.cdf).

VME - PPG32 - Top Level

TRIUMF
LOGO


Revision 1	Drawing #: REA - 198		TRIUMF 4004 Wesbrook Mall Vancouver, B.C. Canada V6T 2A3	
	Sheet #: 1 of 11	Size: A		
	Drawn by: D.Bishop	Date: 3/18/2011		



CHICAGO MINIATURE LIGHTING, LLC
5350T5LC
Round, 2mm, T-3/4



VME - PPG32 - Front Panel

Revision 1	Drawing #: REA - 198	TRIUMF 4004 Wesbrook Mall Vancouver, B.C. Canada V6T 2A3	
	Sheet #: 2 of 11 Size: A		
	Drawn by: D.Bishop	Date: 3/18/2011	
File: G:\VME-PPG32\ALTIUM\Altium\VME-PPG32 Rev1\VME-PPG32 - Front Panel - Rev1.SCHDC7:47:43 PM			

Iset = 5ma

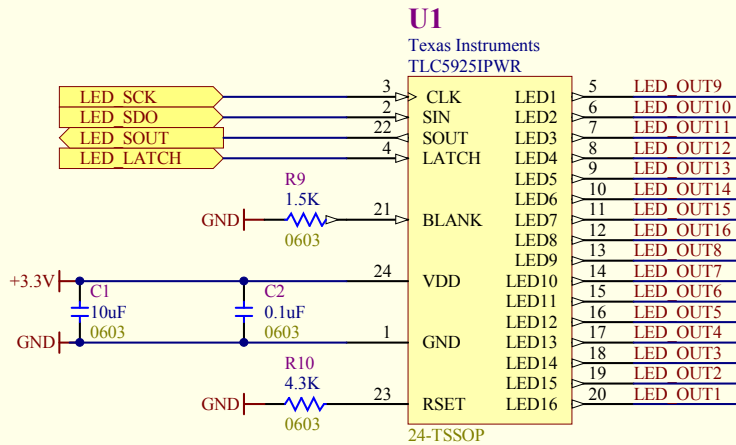
TLC5925: R10 = 4.3K

STP16CP05TTR: R10 = 4.3K

A6282ELP-T: R10 = 4.3K

CAT4016Y-T2: R10 = 12K

Alternate Part Numbers:
 ST Microelectronics - STP16CP05TTR
 Catalyst Semiconductor - CAT4016Y-T2
 Allegro - A6282ELP-T

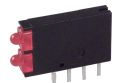


OUTPUTS

Red LEDs: 571-0111F

INPUTS

Green LEDs: 571-0122F



Adjusting Output Current

TLC5925 sets I_{OUT} based on the external resistor R_{ext}. Users can follow the below formulas to calculate the target output current I_{OUT,target} in the saturation region:

$$I_{OUT,target} = (1.21 \text{ V} / R_{ext}) \times 18, \text{ where } R_{ext} \text{ is the external resistance connected between R-EXT and GND.}$$

Therefore, the default current is approximately 26 mA at 840 Ω and 13 mA at 1680 Ω. The default relationship after power on between I_{OUT,target} and R_{ext} is shown in Figure 5.

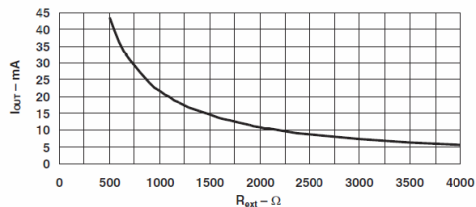
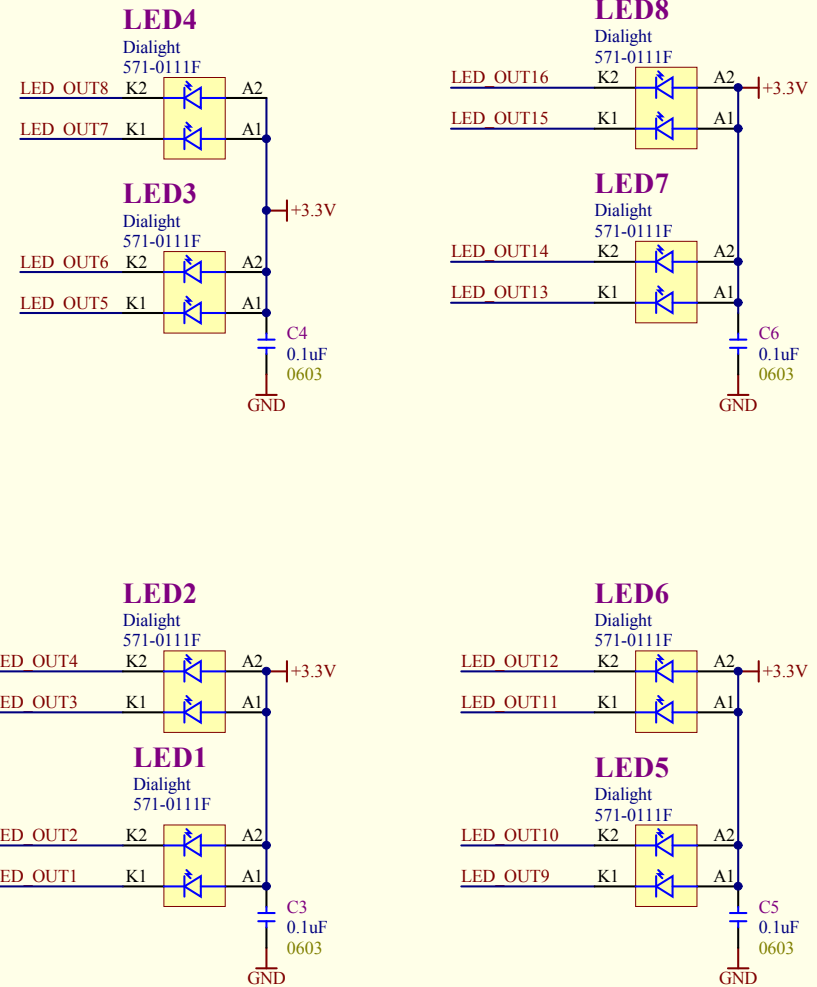
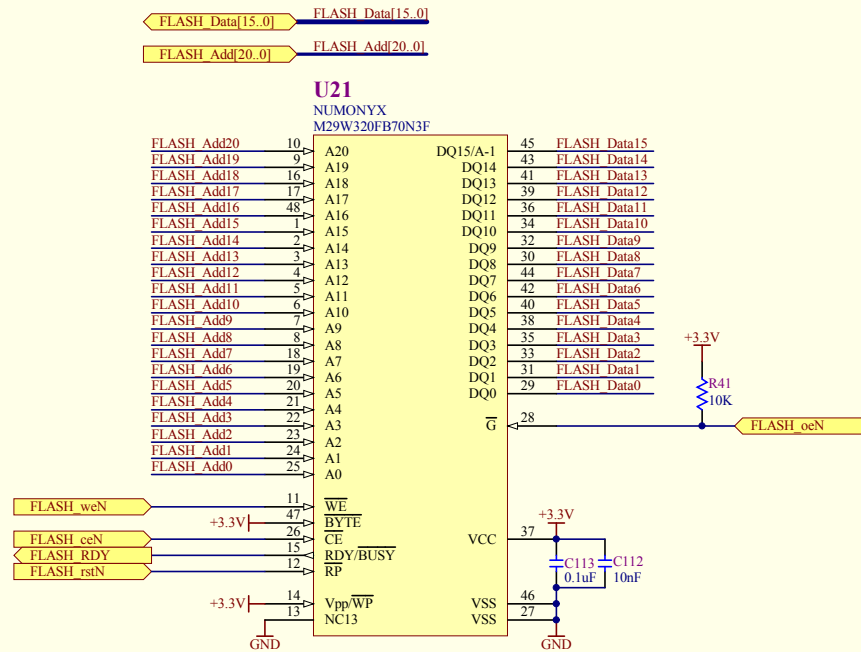


Figure 5. Default Relationship Curve Between I_{OUT,target} and R_{ext} After Power Up



VME - PPG32 - Front Panel LEDs and driver

Revision 1	Drawing #: REA - 198	TRIUMF 4004 Wesbrook Mall Vancouver, B.C. Canada V6T 2A3		
	Sheet #: 3 of 11			Size: A
	Drawn by: D.Bishop			Date: 3/18/2011
File: G:\VME-PPG32\ALTIUM\Altium\VME-PPG32 Rev1\VME - PPG32 - LED - Rev1.SchDoc		7:47:43 PM		



WBTN Mezzanine Pattern Generator: FLASH

Revision	Drawing #:	TRUMF	Cannot open file
1	Sheet #: 4 of 4	4004 Wesbrook Mall	G:\AHW\PR
	Size: A	Vancouver, B.C.	OTEL\SCH
	Drawn by: D.Bishop	Canada	TEL: 604-273-1111
	Date: 3/18/2011	V6T 2A3	FAX: 604-273-1111
File: G:\VME-PPG32\ALTUM\Altium\VME-PPG32 Rev1\VME-PPG32 -Flash Memory-Rev1.SchDoc			

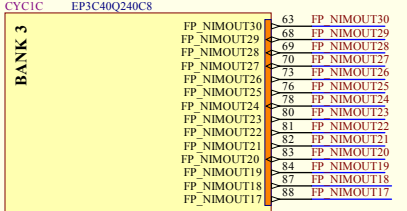
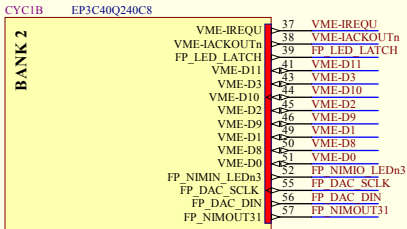
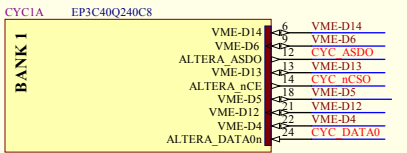
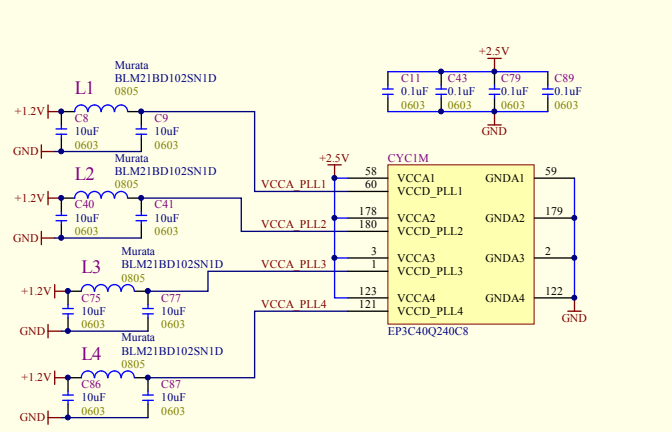
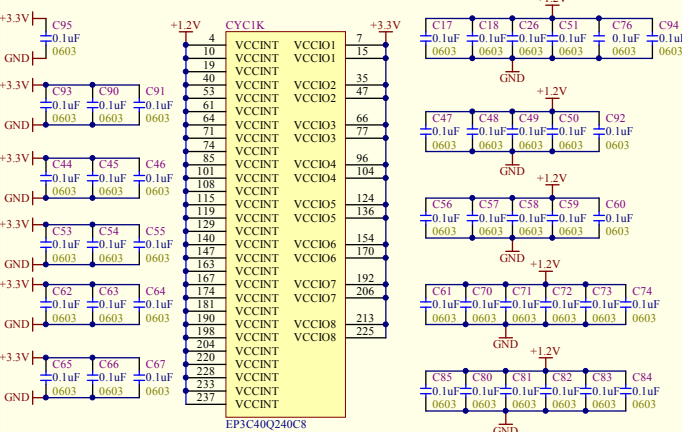
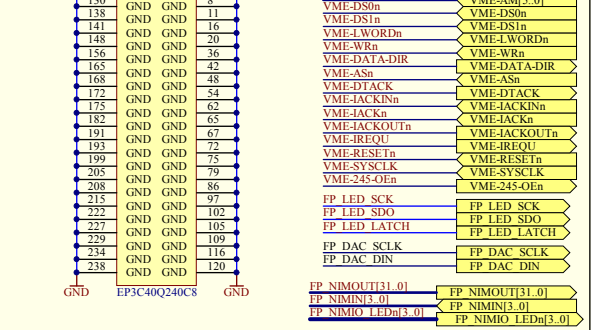
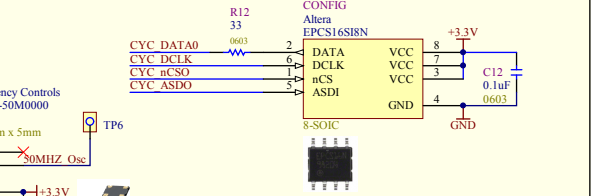
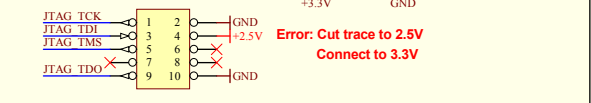
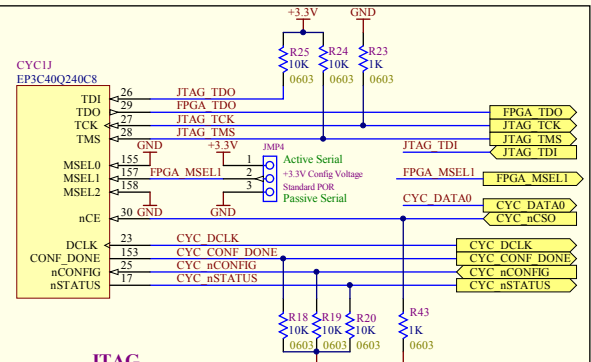
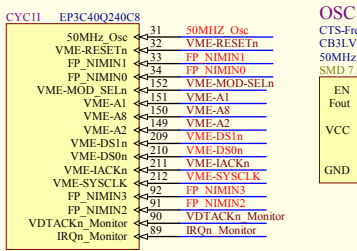
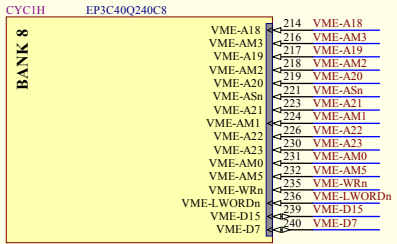
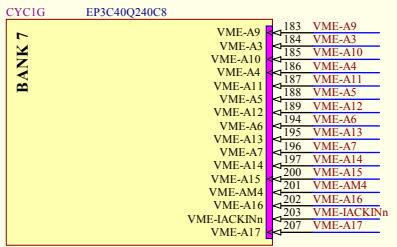
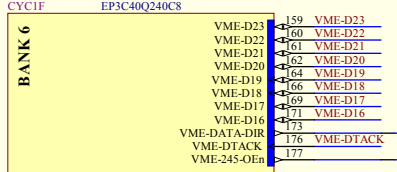
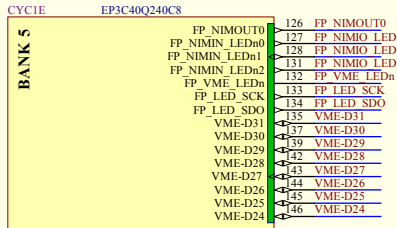
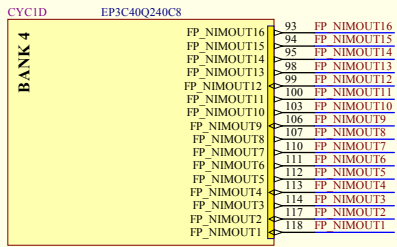


Table 9-3. Cyclone III Device Family Uncompressed Raw Binary File (Left Side) (Part 1 of 2)

Device	EP3C3	Data Size (Mbits)
Cyclone III	EP3C3	3,000,000
	EP3C10	3,000,000
	EP3C16	4,000,000
	EP3C25	5,000,000
	EP3C40	6,000,000
	EP3C55	14,900,000
	EP3C80	26,000,000
	EP3C120	28,600,000

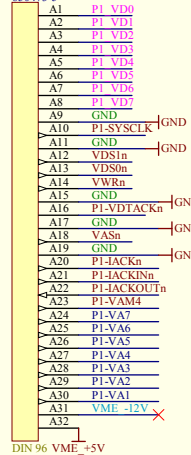


VME - PPG32 - Trigger Logic & VME Interface

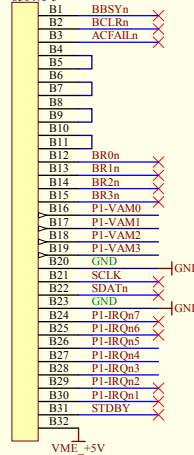
Revision	Drawing #	TRU/MF	Cannot open file
1	RE-A - 198	4004 Westbrook Mall Vancouver, B.C. Canada V6T 2A3	G:\AHW\PR O\ELSCH I\BTRU/MF
Sheet #: 4 of 11		Date: 3/18/2011	
Drawn by: D.Bishop			

File: G:\VME-PPG32\ALTIUM\Altium\VME-PPG32 Rev1\VME-PPG32 - Trigger Logic - Rev1 8/6/2008

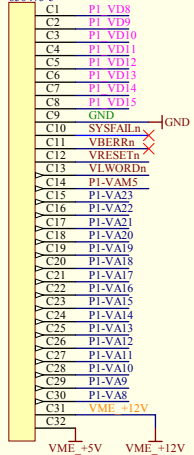
P1A
Tyco Electronics
650473-5



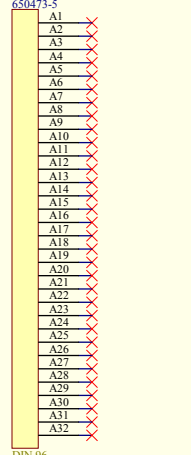
P1B
Tyco Electronics
650473-5



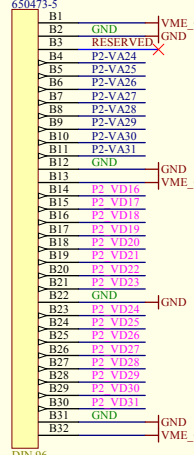
P1C
Tyco Electronics
650473-5



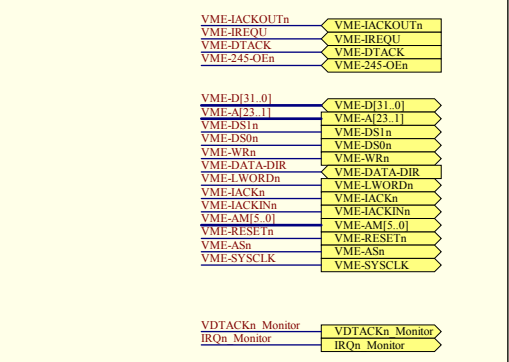
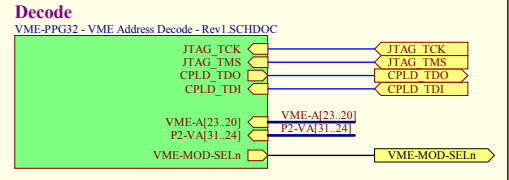
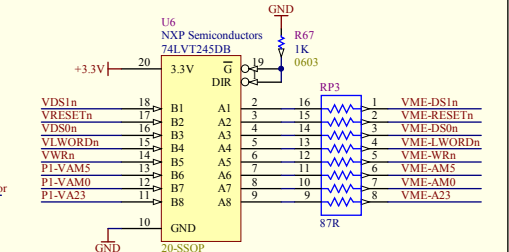
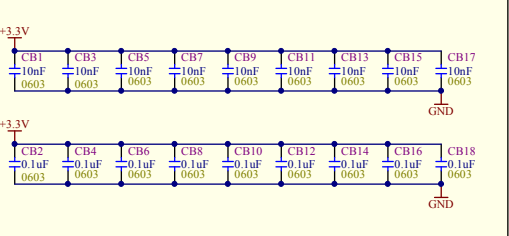
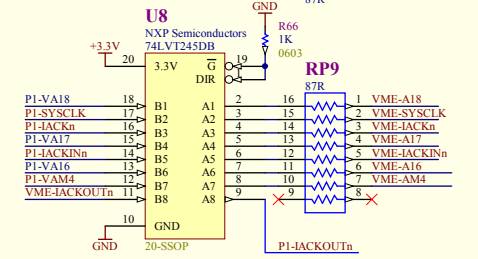
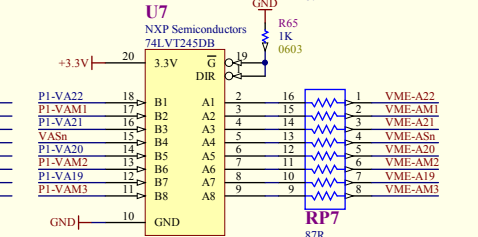
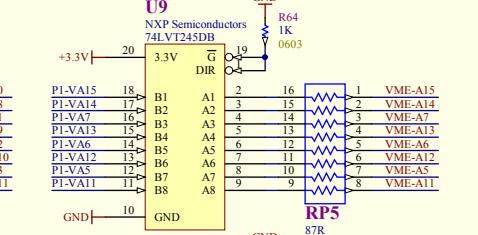
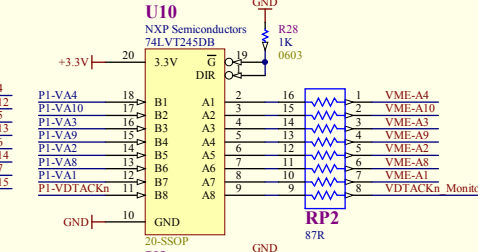
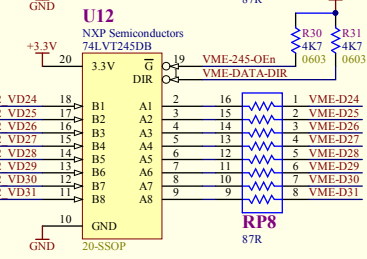
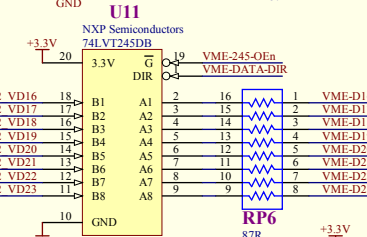
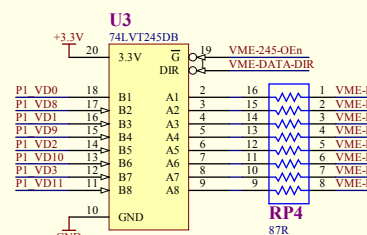
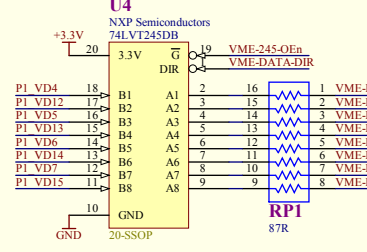
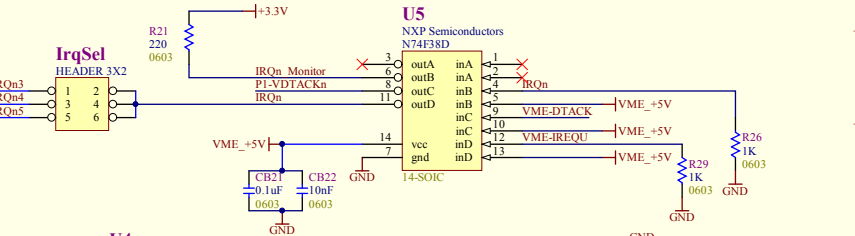
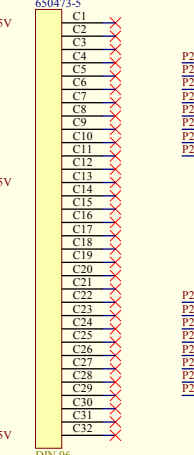
P2A
Tyco Electronics
650473-5



P2B
Tyco Electronics
650473-5



P2C
Tyco Electronics
650473-5



VME - PPG32 - VME Interface

Revision	Drawing # REA - 198	TRU/AF	Cannot open
1	Sheet # 5 of 11	Size: B	file
Drawn by: Hubert Hui	Date: 3/18/2011	404 Westbrook Mall	G:\AHW\PR
		Vancouver, B.C.	O\ELSCH
		Canada	1\B\TRU/AF
		V6T 2A3	
File: G:\VME-PPG32\2\TIUM\alium\WME-PPG32 Rev1\VME-PPG32 - VME Interface - Rev1.34800b.c			

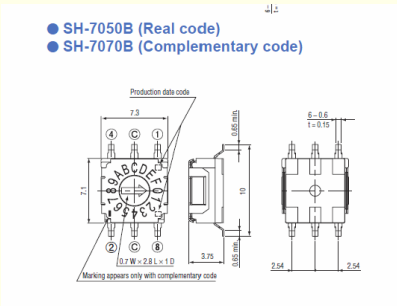
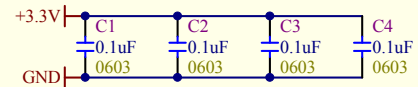
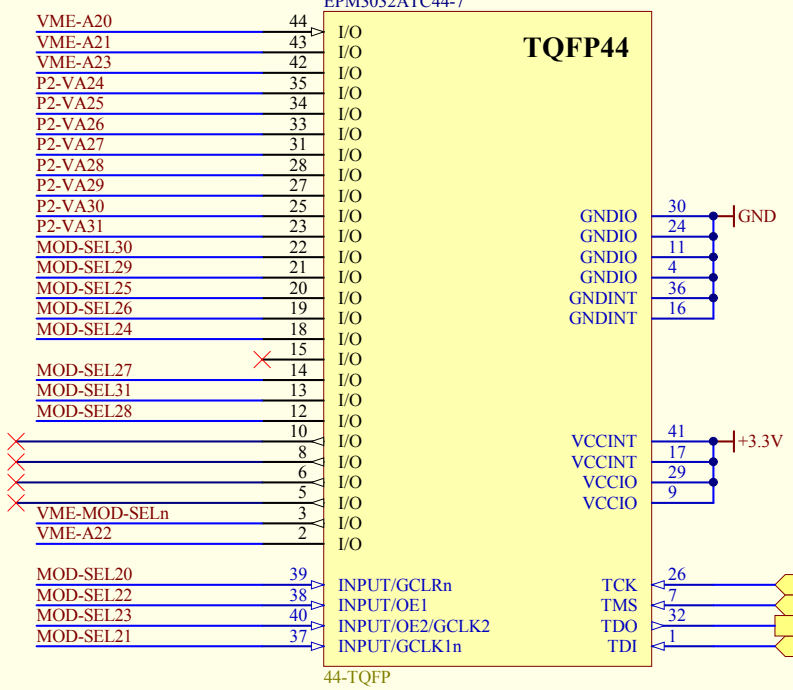
P2-VA[31..24] → P2-VA[31..24]
 VME-A[23..20] → VME-A[23..20]

VME-MOD-SELn → VME-MOD-SELn

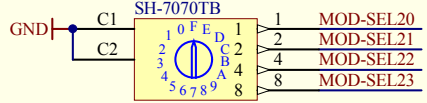


U1
 ALTERA
 EPM3032ATC44-7

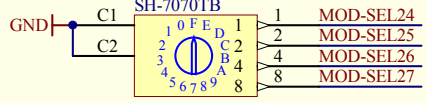
TQFP44



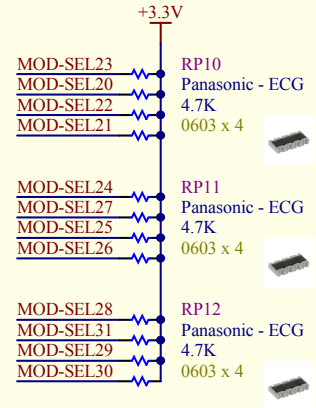
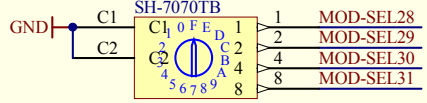
SW3
 Copal Electronics Inc
 SH-7070TB



SW2
 Copal Electronics Inc
 SH-7070TB

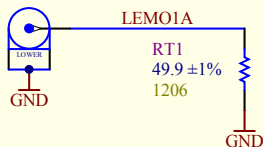


SW1
 Copal Electronics Inc
 SH-7070TB

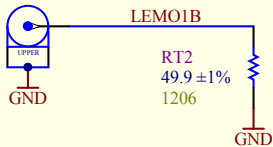


VME - PPG32 - VME Address Decode			
Revision	Drawing #: REA - 198	TRIUMF	
1	Sheet #: 6 of 11	Size: A	4004 Wesbrook Mall
Drawn by: D.Bishop	Date: 3/18/2011	Vancouver, B.C.	
		Canada	
		V6T 2A3	
File:	G:\VME-PPG32\ALTUM\Altium\VME-PPG32 Rev1\VME-PPG32 - VME Address Decode.PPR	Cannot open file	G:\AHW\ALTUM\SCH\LIB\TRIUM

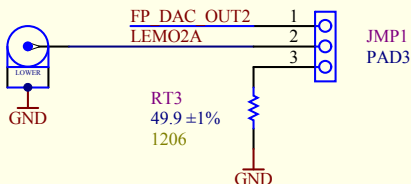
LEMO1A
NIM Input 1



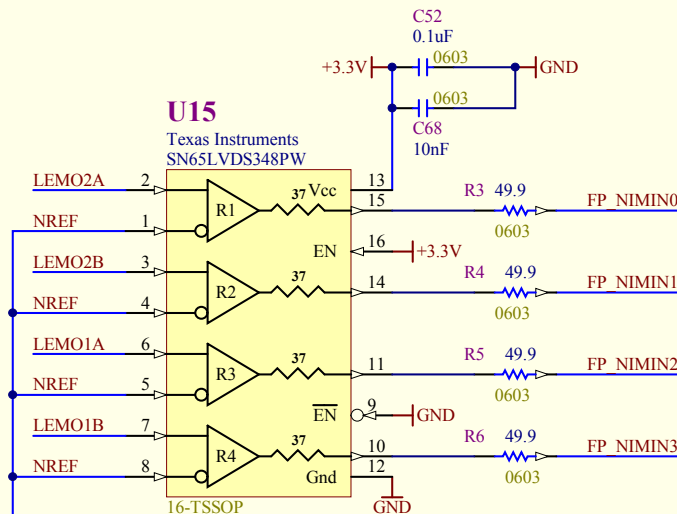
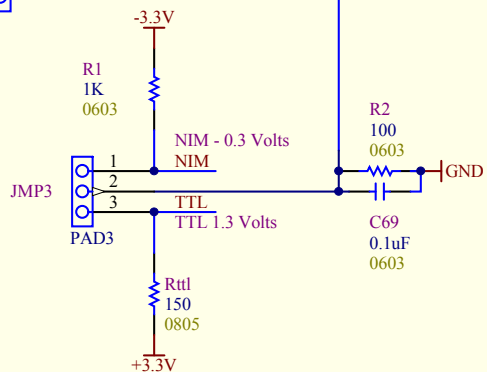
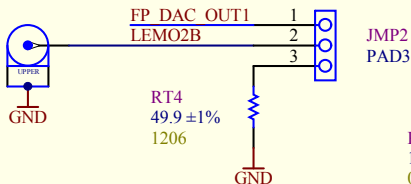
LEMO1B
NIM Input 2




LEMO2A
NIM Input 3

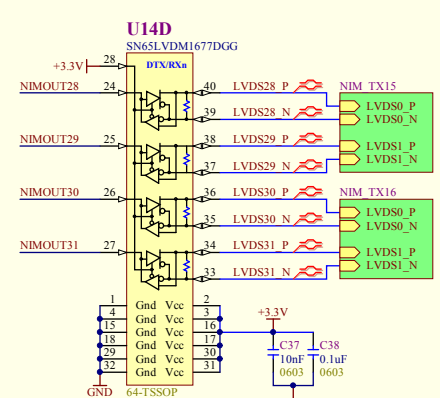
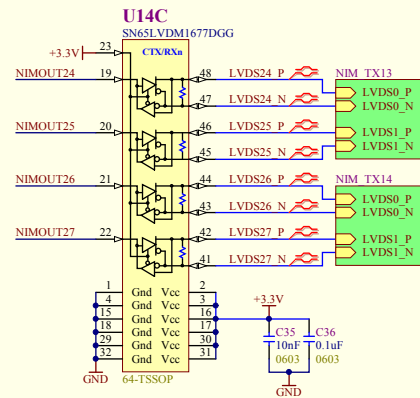
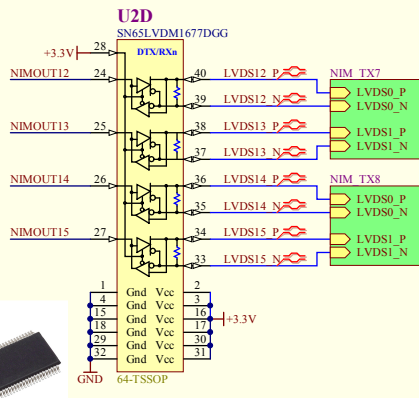
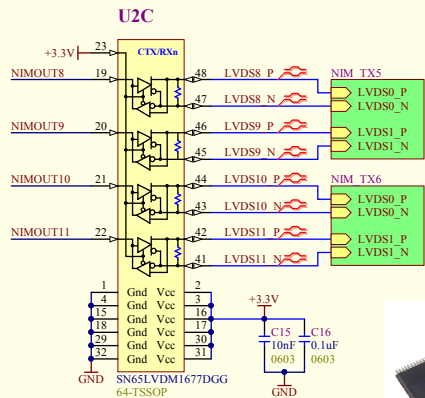
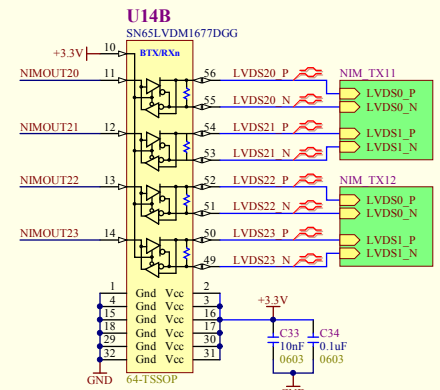
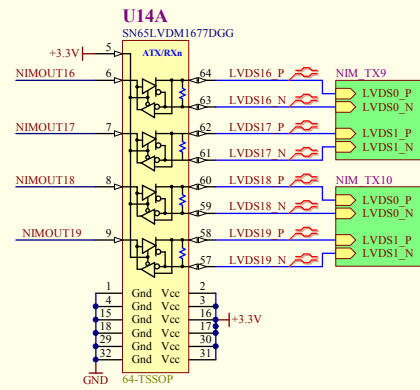
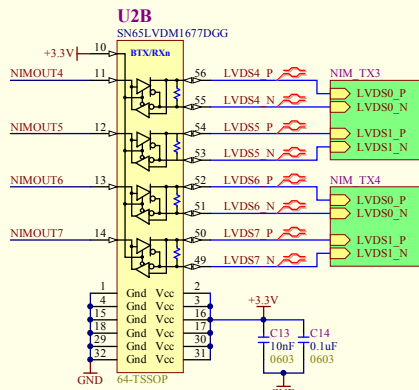
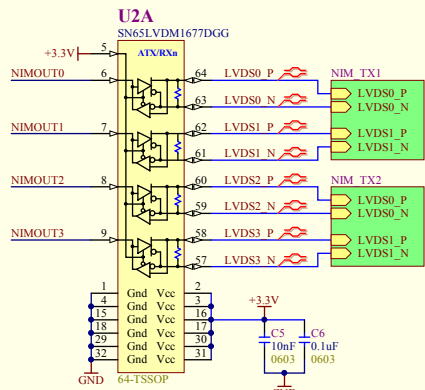


LEMO2B
NIM Input 4



VME - PPG32 NIM INPUT

Revision 1	Drawing #: REA - 198		TRIUMF 4004 Wesbrook Mall Vancouver, B.C. Canada V6T 2A3	
	Sheet #: 7 of 11	Size: A		
	Drawn by: D.Bishop	Date: 3/18/2011		
File: G:\VME-PPG32\ALT\Altium\VME-PPG32 Rev1\VME - PPG32 - NIMIN - Rev1.SchDoc 7:47:44 PM				



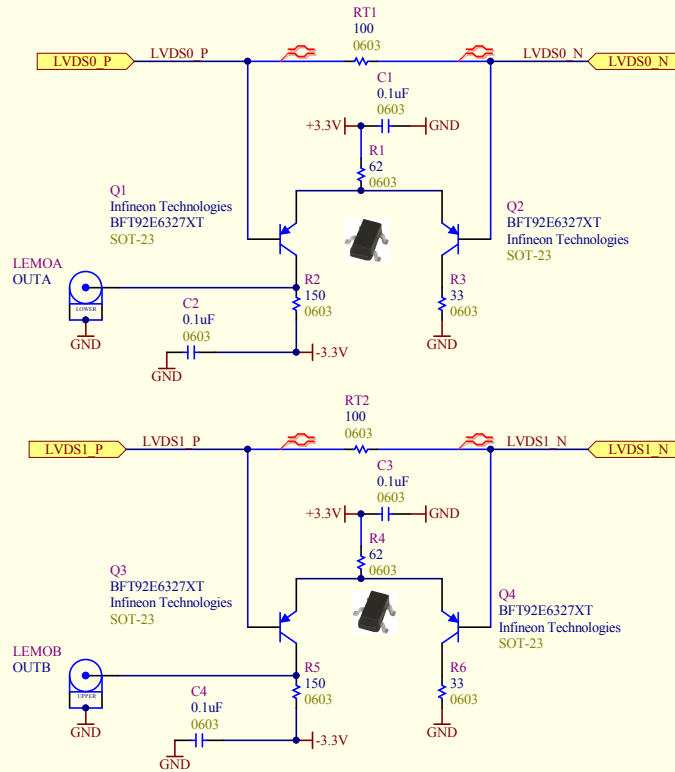
NIMOUT131_01 NIMOUT131_01

VME - PPG32 - NIMOUT			
Revision	Drawing # : REA - 198	TRUMF	Cannot open file
0	Sheet #: 8 of 11	4004 Westbrook Mall	G:AHWP
Drawn by: D.Bishop	Size: B	Vancouver, B.C.	ROTEL/SC
Date: 3/18/2011		Canada	V6T 2A3
File: G:\VME-PPG32\ALTIUM\Altium-VME-PPG32 Rev1VME - PPG32 - NIMOUT - Rev1 2011.dwg			

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I _{CEO}	collector cut-off current	I _E = 0; V _{CB} = -10 V;	-	-	-50	nA
h _{FE}	DC current gain	I _C = -14 mA; V _{CE} = -10 V	20	50	-	
f _T	transition frequency	I _C = -14 mA; V _{CE} = -10 V; f = 500 MHz	-	5	-	GHz
C _c	collector capacitance	I _E = I _C = 0; V _{CB} = -10 V; f = 1 MHz	-	0.75	-	pF
C _e	emitter capacitance	I _C = I _E = 0; V _{EB} = -0.5 V; f = 1 MHz	-	0.8	-	pF
C _{FB}	feedback capacitance	I _C = -2 mA; V _{CE} = -10 V; f = 1 MHz	-	0.7	-	pF
G _{UM}	maximum unilateral power gain (note 1)	I _C = -14 mA; V _{CE} = -10 V; f = 500 MHz; T _{amb} = 25 °C	-	18	-	dB
F	noise figure	I _C = -5 mA; V _{CE} = -10 V; f = 500 MHz; T _{amb} = 25 °C	-	2.5	-	dB
V ₀	output voltage	note 2	-	150	-	mV



Cyclone - LVDS

Output Offset Voltage

Vos Max: 1.375
 Vos Typ: 1.25
 Vos Min: 1.125

Diff Output Voltage

Vod Min: 250mv
 Vod Max: 600mv

VME - PPG32 - LVDS to NIM Converter			
Revision	Drawing #: REA - 198	TRUMF	Cannot open file
1	Sheet #: 9 of 11 Size: A	4004 Wesbrook Mall	G:\AHW\PR
Drawn by: D.Bishop	Date: 3/18/2011	Vancouver, B.C.	OTEL\SCH
		Canada	V6T 2A3
File: G:\VME-PPG32\ALTIUM\Altium\VME-PPG32 Rev1\VME-PPG32 - LVDS to NIM Rev1\SCH.DOC			

U16

MAX6192BESA+
8-SOIC (3.9mm Width)

Features

- ±2mV (max) Initial Accuracy
- 5ppm/°C (max) Temperature Coefficient
- 35µA (max) Supply Current
- 100mV Dropout at 500µA Load Current
- 0.12µV/µA Load Regulation
- 8µV/V Line Regulation

U17

OP1177ARZ
8-SOIC (3.9mm Width)

FEATURES

Low offset voltage: 60 µV maximum
Very low offset voltage drift: 0.7 µV/°C maximum
Low input bias current: 2 nA maximum
Low noise: 8 nV/√Hz typical
CMRR, PSRR, and A_{vo} > 120 dB minimum
Low supply current: 400 µA per amplifier
Dual supply operation: ±2.5 V to ±15 V
Unity-gain stable
No phase reversal
Inputs internally protected beyond supply voltage

FEATURES

10 MHz multiplying bandwidth
INL of ±0.25 LSB @ 8 bits
16-lead TSSOP package
2.5 V to 5.5 V supply operation
±10 V reference input
50 MHz serial interface
2.47 MSPS update rate
Extended temperature range: -40°C to +125°C
4-quadrant multiplication
Power-on reset
0.5 µA typical current consumption
Guaranteed monotonic
Daisy-chain mode
Readback function



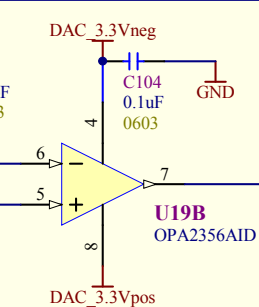
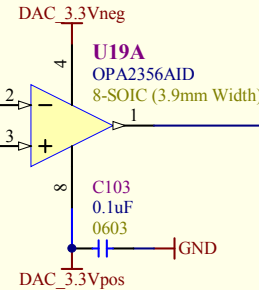
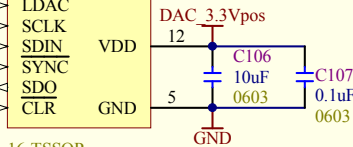
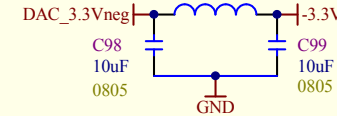
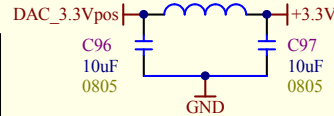
16-TSSOP

L7

BLM21BD102SN1D
Murata

L8

BLM21BD102SN1D
Murata



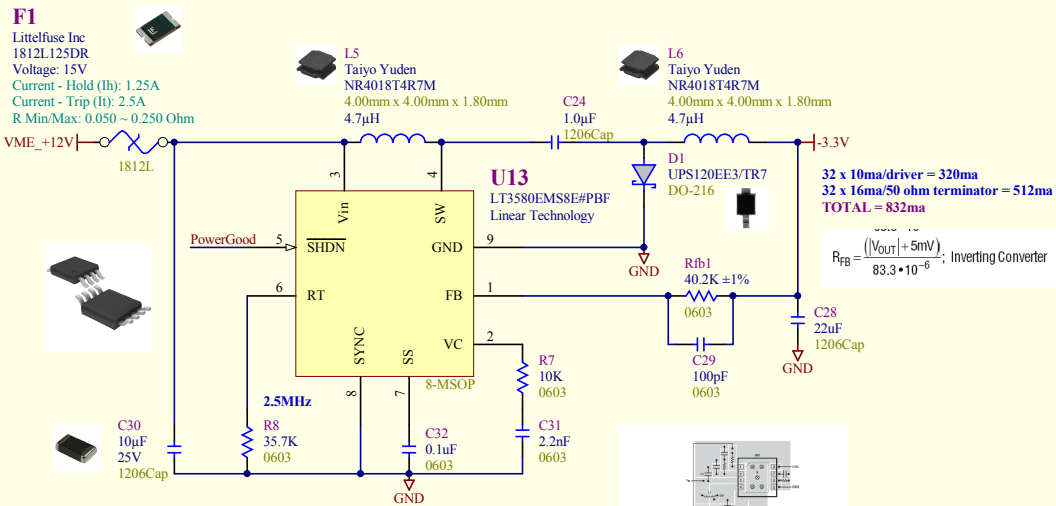
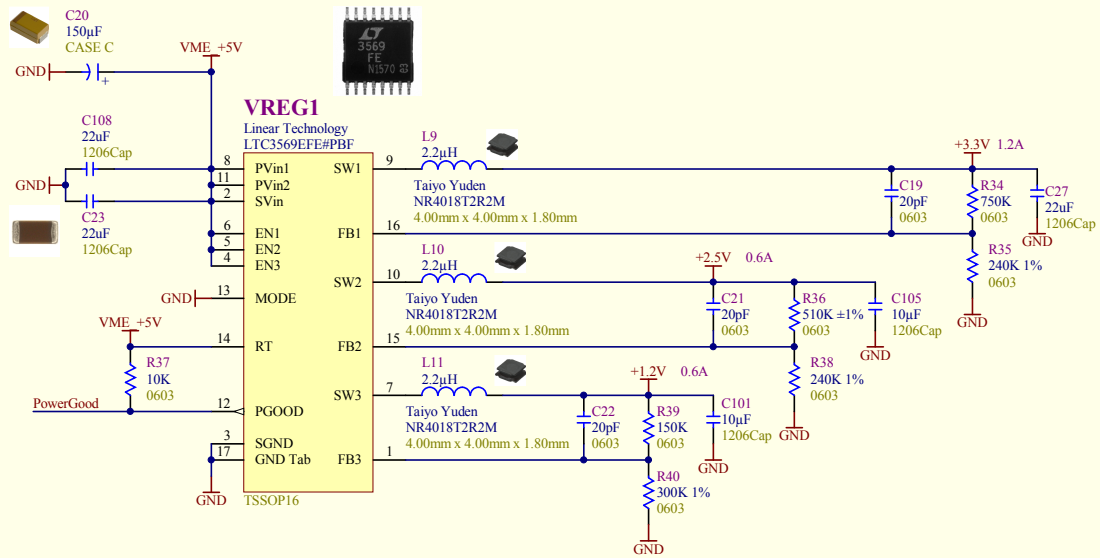
FEATURES

- UNITY-GAIN BANDWIDTH: 450MHz
- WIDE BANDWIDTH: 200MHz GBW
- HIGH SLEW RATE: 360V/µs
- LOW NOISE: 5.8nV/√Hz
- EXCELLENT VIDEO PERFORMANCE: DIFF GAIN: 0.02%, DIFF PHASE: 0.05°, 0.1dB GAIN FLATNESS: 75MHz
- INPUT RANGE INCLUDES GROUND
- RAIL-TO-RAIL OUTPUT (within 100mV)
- LOW INPUT BIAS CURRENT: 3pA
- THERMAL SHUTDOWN
- SINGLE-SUPPLY OPERATING RANGE: 2.5V to 5.5V
- MicroSIZE PACKAGES


Substitutes:
LT1813 - Ib +/- 4uA: 100MHz 750V/uS
LT1819 - Ib +/- 2uA: 400MHz 2500V/uS
LT1361 - Ib 0.3uA: 50MHz 800V/uS
AD8038 - Ib 400nA: 350MHz 425V/uS
AD8058 - Ib 5uA: 325MHz 1000V/uS
OPA2356 - Ib 3pA: 450MHz 360V/uS

VME - PPG32 - Dual DAC

Revision 1	Drawing #: REA - 198		TRIUMF 4004 Wesbrook Mall Vancouver, B.C. Canada V6T 2A3	
	Sheet #: 10 of 11	Size: A		
	Drawn by: D.Bishop	Date: 3/18/2011		
File: G:\VME-PPG32\ALTium\Altium\VME-PPG32 Rev1\VME - PPG32 - Dual DAC - Rev1.SchDoc17:44 PM				

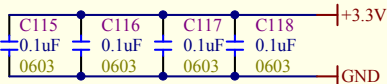
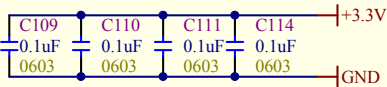
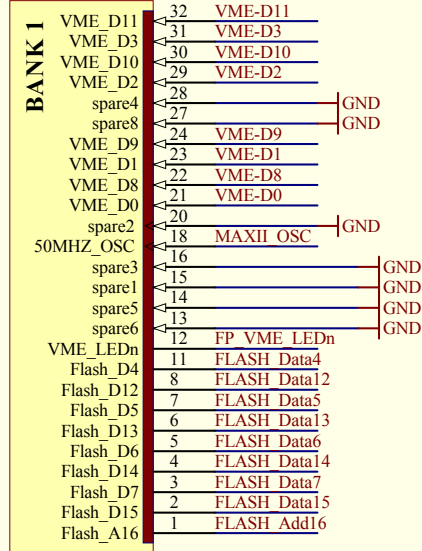


VME - PPG32 - Voltage Regulators

Revision	Drawing #: REA - 198	TRUMF	
1	Sheet #: 11 of 11 Size: A	4004 Wesbrook Mall	
	Drawn by: D.Bishop Date: 3/18/2011	Vancouver, B.C.	
		Canada V6T 2A3	
File: G:\VME-PPG32\ALTIUM\Altiium\VME-PPG32 Rev1\VME-PPG32 - Voltage Regulators - Rev1\SCHDOC PM			

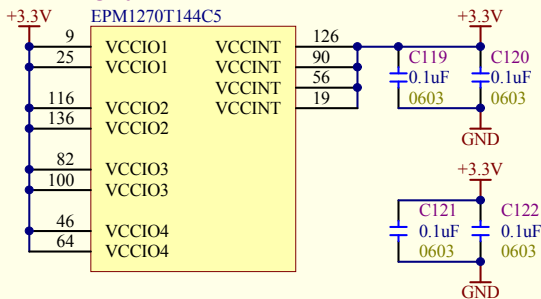
U20A

EPM1270T144CS



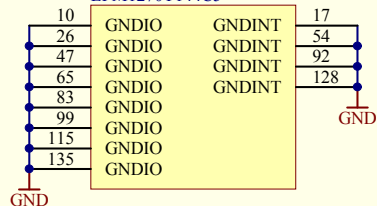
U20F

EPM1270T144CS



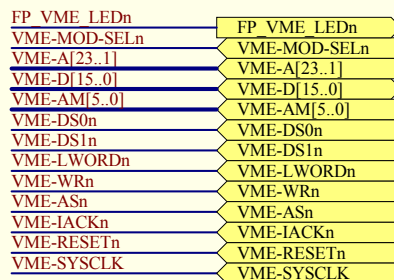
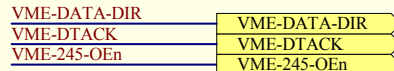
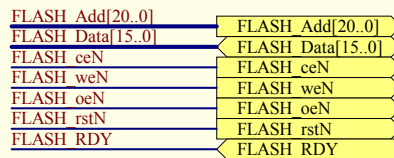
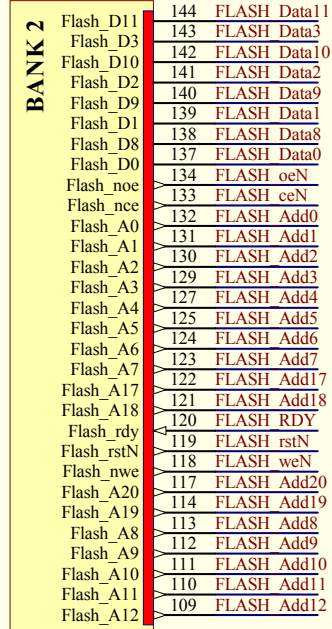
U20G

EPM1270T144CS



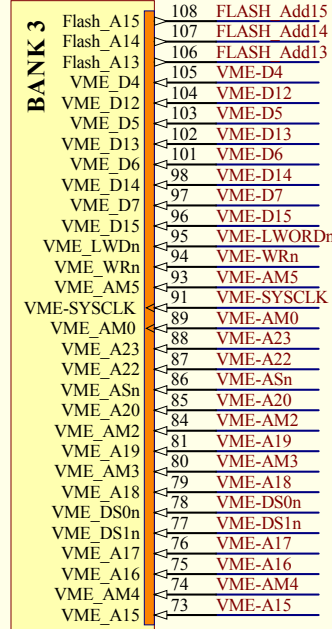
U20B

EPM1270T144CS



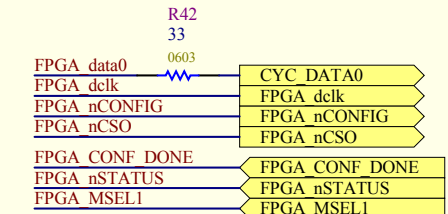
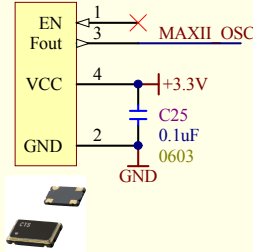
U20C

EPM1270T144CS

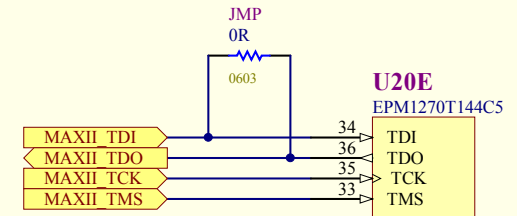


OSC2

CTS-Frequency Controls
CB3LV-3C-50M0000
50MHz
SMD 7.5mm x 5mm



Install only if U20 (MAXII) not used



VME - PPG32 - MAXII Flash Interface

Revision 1	Drawing #: REA-198		TRIUMF 4004 Wesbrook Mall Vancouver, B.C. Canada V6T 2A3	
	Sheet #: * of *	Size: A		
	Drawn by: D.Bishop	Date: 3/18/2011		
File: G:\VME-PPG32\ALT\Altium\VME-PPG32 Rev1\VME-PPG32 - MAXII Flash Interface Rev1.SchDoc				