RADIANT

(Actual Size is 1.35" X 2.5" X .35")

Video Processor Module

The Video Processor Module is the brain within a new generation of products for the security market based on Intelligent Video Processing. It incorporates adaptive digital processing technology to achieve highly sensitive detection in a wide range of operating environments with very low false alarm rates. This technology is especially good at handling noisy video sources such as infrared and light-intensified cameras. It allows the module to adapt to changes in lighting or weather that have traditionally caused video motion detectors to fail. Because it works with many types of cameras, it greatly enhances the effectiveness of video-based security systems twenty-four hours a day.

Inside the Video Processor Module, signal processing routines executed by its onboard Digital Signal Processor (DSP) allow it to rapidly learn (within 1 second) what is normal in a scene and then to detect significant changes, such as intrusions. It's adaptability means that it works without camera-specific setup or configuration. It is well suited for monitoring in outdoor environments. Because it adapts so rapidly, it can handle panning cameras with preset dwell positions, as well as fixed cameras.

The module is shown at its actual size. It is smaller, uses less power, is more reliable, and costs less than previous generations of video motion detectors. It brings a new level of intelligent processing to video security.

Benefits

Simple Setup
Low Cost   **Adapts to most Video Sources**
Highest Performance   **Probability of Detection > than 96% ***
Easy Embedded Design   **Nuisance Alarm Rate less than 2 per day ***

Features

Very Small, High Density SMD Package   **NTSC/PAL**
Low Power Consumption   **Video Loss Detection**
Very Low EMI   **Software Upgrades**
ESD Protected   **Commercial Temp Range**
On -Screen Display

2395 Kenwood Drive   **Boulder CO 80305**   **(303) 543-0440**

Video Processor Module Technical Specifications

Size	1.35" x 2.5" x .35" Weight: 1.1 oz.
Package	Aluminum extrusion filled with black non-conductive resin
Number of Channels	One video channel per module
I/O Connector	One 20 pin DIN header
Fasteners	Two 4:40 mounting screws
EMI Abatement	
Radiated	Black Anodized Aluminum Shield
Power Supply	Onboard regulators
Video Section	
Luma Processing	30 fields/second continuous
Video Standards	NTSC, PAL
Video Capture Resolution	720 pixels x 525 (NTSC) or 625 (PAL) Even Field Used
Video Output	Drives 75 ohm back terminated coax
Local Video	DSP generates local video. Alarm when no input video is present.
Digital Processing Section	
DSP	75 MIP 16 Bit Fixed Point DSP
Memory	EEPROM storage for software and configuration
Overlay	
Static Information	Channel Number, Time, Date, Module Address
Dynamic Information	Target Outline, PAN/LRN, ALARM logo
Serial I/O	
Host Format	NRZ 19.2K baud 5 volt logic compatible
PTZ Format	NRZ 19.2K baud (optional)
ESD Protection	
Serial I/O	TVS clamped and RC filtered
Video I/O	TVS clamped and RC filtered
Address I/0 (IIC)	TVS clamped and RC filtered
Alarm Output	TVS clamped and RC filtered NFET Open Drain
Auxiliary Input	TVS clamped and RC filtered
Addressing	
Local Address	Up to 16 addresses
Extended Address	Up to 4096 addresses
Performance	
Probability of detection **	>96%
Nuisance Alarm Rate**	< 2 per Day
Power	
Older +5VDC Black Modules	200 mA at +5VDC (1W typical)
+3.3VDC	130 mA at +3.3VDC (1/2 W typical)
+VBAT	100uA (Max) at 3.0VDC (Max)
Temperature	
Min/Max	0 deg C Min Max 55 deg C

*   **Technical specifications and or physical layout of the product may vary from photo.**
*   **Radiant reserves the right to make changes without prior notice.**
** **Radiant tested the DVMD1 against a tape library made of 12 SVHS tapes**
     (Available from Sandia National Laboratories) depicting various outdoor conditions,
     targets and ranges in a variety of environments.
** **Radiant performs ongoing tests in outdoor environments.**

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Video Processor Module Electrical Specifications

Pin #	Type	Name	Description
A1	O	TXD1	Serial Data to Host (NRZ 19.2K baud)
B1	I	RXD1	Serial Data from Host (NRZ 19.2K baud)
A2	I USER	IN0	Local Address Bit 0 (0000 is address "0")
B2	I USER	IN1	Local Address Bit 1
A3	I USER	IN2	Local Address Bit 2
B3	I USER	IN3	Local Address Bit 3 (MSB)
A4	O	SCL	Serial Clock for IIC Bus (extended address)
B4	OD PU	SDA	Serial Data for IIC Bus (extended address)
A5	O	TXD2	Serial Data to PTZ (optional)
B5	I	RXD2	Serial Data From PTZ (optional)
A6	I	AUXIN*	Input from Opto-Isolated Input (active low)
B6	OD PU	ALARM	Open Drain Output to Relay MUST USE EXTERNAL CATCH DIODE
A7	I	MR*	Internally Generated Reset* (Connect to 3.3V if not used)
B7	3.3V	+V	3.3V 130mA (typical) Blue modules
A8	3.0V	+VBAT	+3.0 (MAX) VDC For RTC @ 100uA (Max) **(NOTE)**
B8	+5V	+V	+5VDC @ 200mA (typical) (Older Black modules)
A9	GND	GROUND	DC Return
B9	GND	GROUND	DC Return
A10	VIDEO IN	Video Input	Terminated in 75 ohms to GND
B10	VIDEO OUT	Video Output	75 ohm resistor after 2X gain Video Driver

| Code	Defined	Notes
*	Protected	See Note Below
OD	Open Drain	Internal 100mA Max 2N7002
OD PU	Open Drain Output	2N7002 w/ 1K pull up to +V
USER	User Must Drive high or low during power on reset to insure correct address is read by DSP	+ Supply or Ground by switch or hardwire

NOTE: Battery Recommendations:
Use a Panasonic BR1225 (Digi P183) for single and dual channel designs.
Use a Panasonic CR2477 (Digi P120) for 8 and 16 channel designs.

MODULE CONNECTOR

Hirose makes the 20-pin DIN connector used on the DVMD module. It is Hirose Part Number PCN10-20P-2.54DSA.   It is Digikey part number H2020. We modify it for this product.
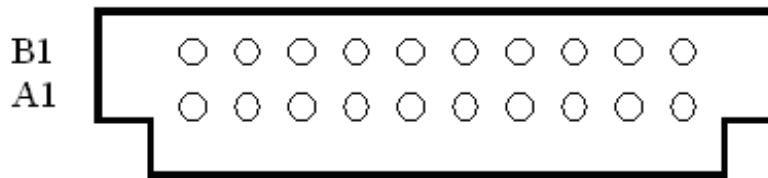
MOUNTING CONNECTOR

You will need to supply the Right Angle PCB mount mating connector. It is Hirose Part Number PCN10C-20S-2.54DS Digikey part number H2120, and costs approximately $3.00.
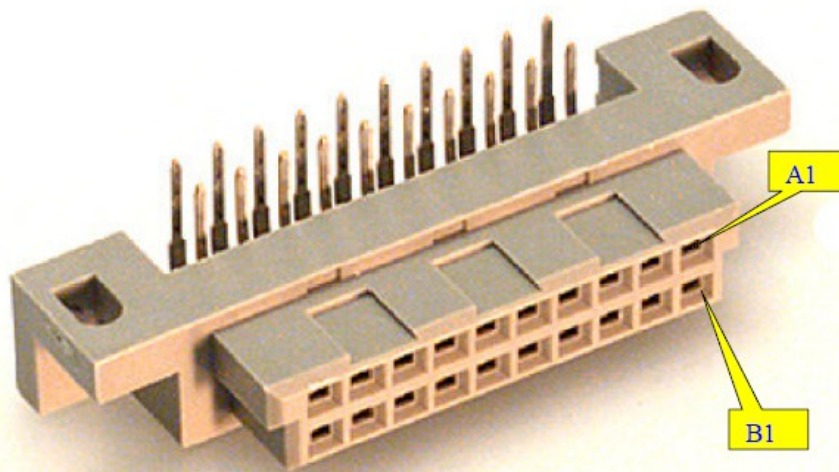
Video Processor PCB Layout

The Module connects to the PCB with a right angle 20 pin connector (Digikey H2120) and two PEM nuts (PEM KF2-440-ET) designed for 1/16" FR4. The module is secured with two pan head screws 4:40x3/16".

The PEM nut holes are .170" plated through with .220" pads to support the PEM shoulders and maintain an appropriate keep-out zone for routing. The top-side PCB should be a partial copper pour with many vias to a copper pour on the bottom of the PCB. The bottom copper pour should allow direct contact with a heat conductor to the case.

Reducing the temperature differential between the case and the Video Processor module increases the usable temperature operating range of the device.

ORCAD PCB LAYOUT LIBRARY

Contact Radiant to obtain the Orcad library with the part below. The module mounts with 4:40 hardware using PEM KF2-440-ET.

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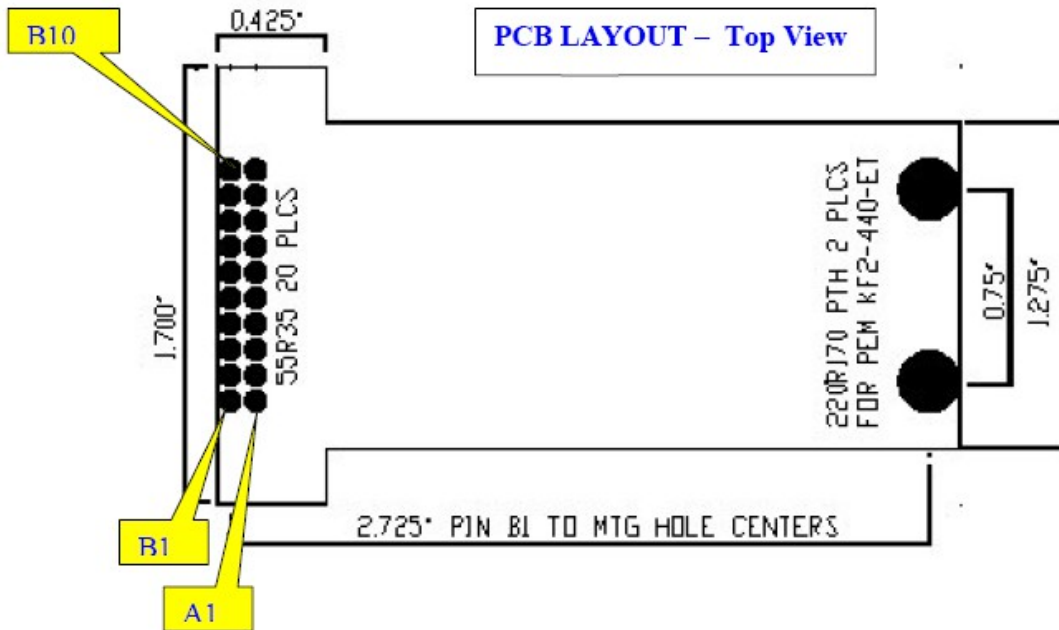
Video Processor Noise Floor
All DSP based system have noise generated by the active devices. The video decoders are affected by the system noise on the ground and analog power supplies. Isolation techniques on the PCB are used to reduce the system noise and each DSP based product has different noise floors inherent in the design.

The following chart shows the A/D noise from the Video Processor from a single line of gray-scale data generated by a generator. You can see the single A/D bit of system noise on the 8-bit luma data.

Lower noise floors are needed to detect low contrast targets without causing a high variance in each cell of the low-level image processing routines. This allows the system to accurately measure the noise inherent in a variety of video devices ranging from a video generator, to any type of video camera, IR or thermal camera. The system noise plus the camera noise determines the lowest contrast targets that can be detected.
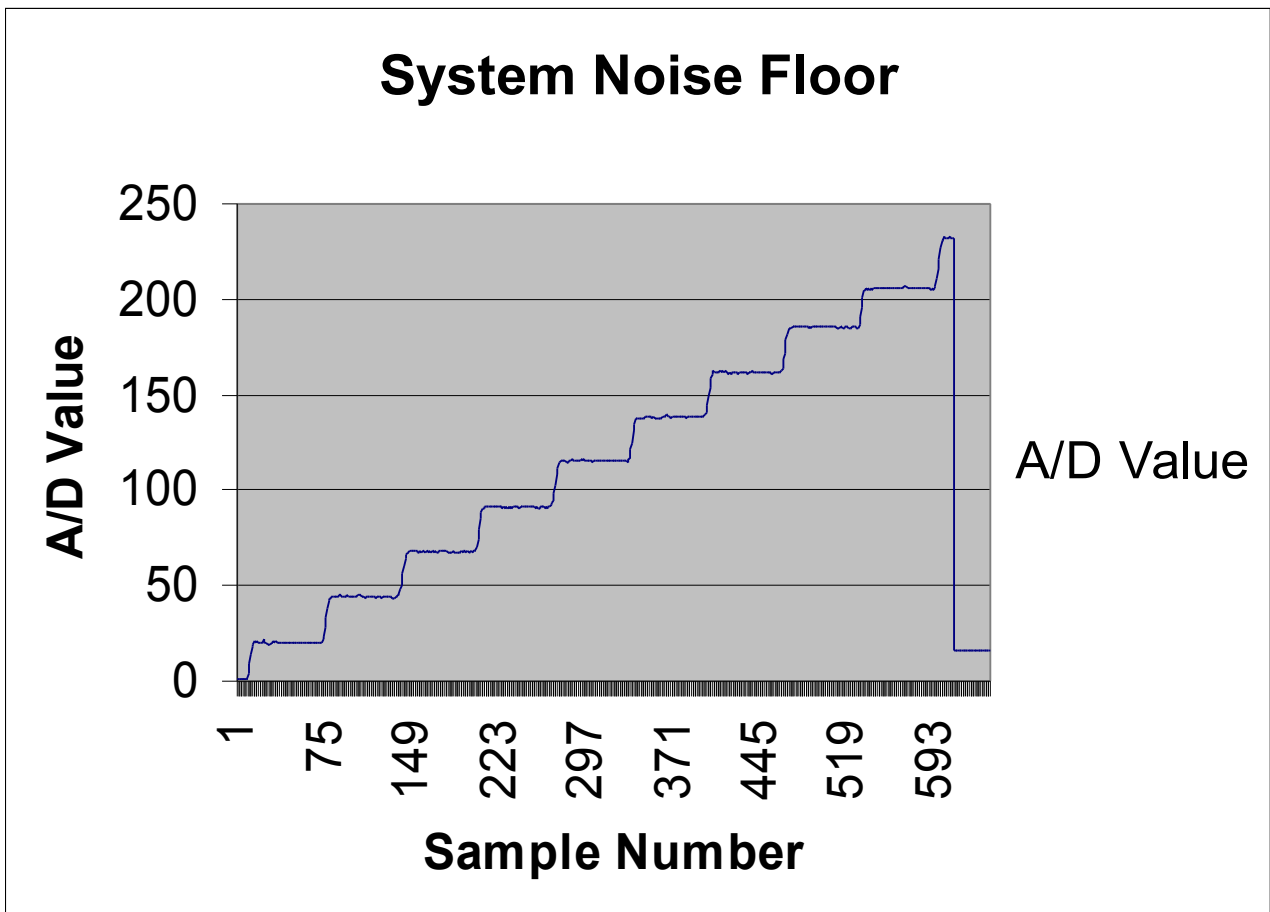
System Noise Floor

A/D Value

Sample Number

A/D Value

Frequency Response of Video Generator and Video Decoder (Luma)

This graph shows the A/D values from a video generator producing high frequency vertical bars. The video was captured with an ADV1783B video decoder in CCIR656 NTSC mode. Each CCIR video line contains 720 pixels. The data clearly shows the effects on luma of the notch filter at 3.58MHZ (NTSC). This provides chroma separation with the digital filters in the decoder. The chirp goes up to about 5 MHZ.
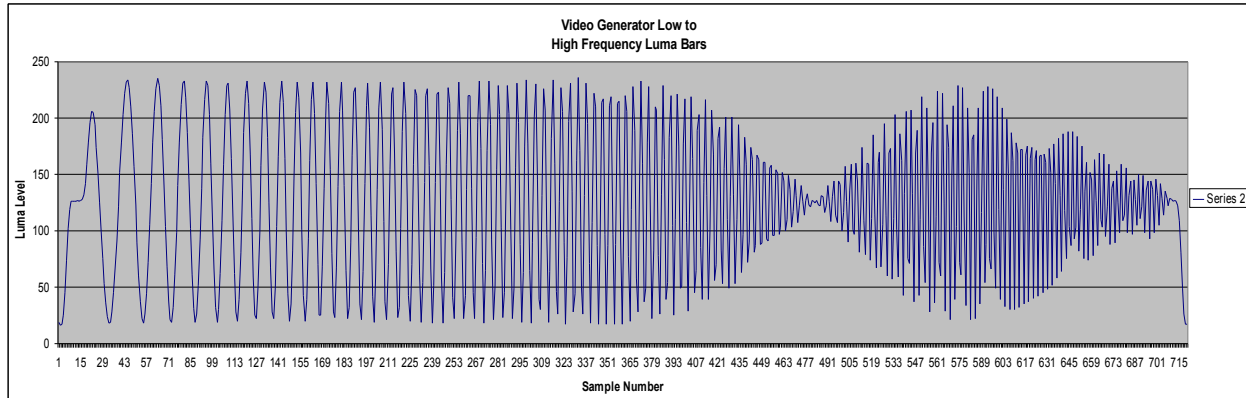
Frequency Response of Video Processor in Series with Video Generator (Luma)

This graph shows a slight high-frequency degradation of A/D values AFTER going through one 3.3V Video Processor on a DVMD1 mounting card. The video was captured with the same ADV1783B video decoder in CCIR656 NTSC mode.   There is a slight processing delay in the Video Processor analog path due to AGC, Overlay Mux, and Buffer Amp, however it is less than one sample time at 27MHZ. There is no degradation in the low frequency response. The 3.58MHZ notch is still quite clear. The high frequency response is phase shifted and slightly reduced over the original data sampled previously. It is hard to see degradation with an oscilloscope at 5MHZ but there is some.

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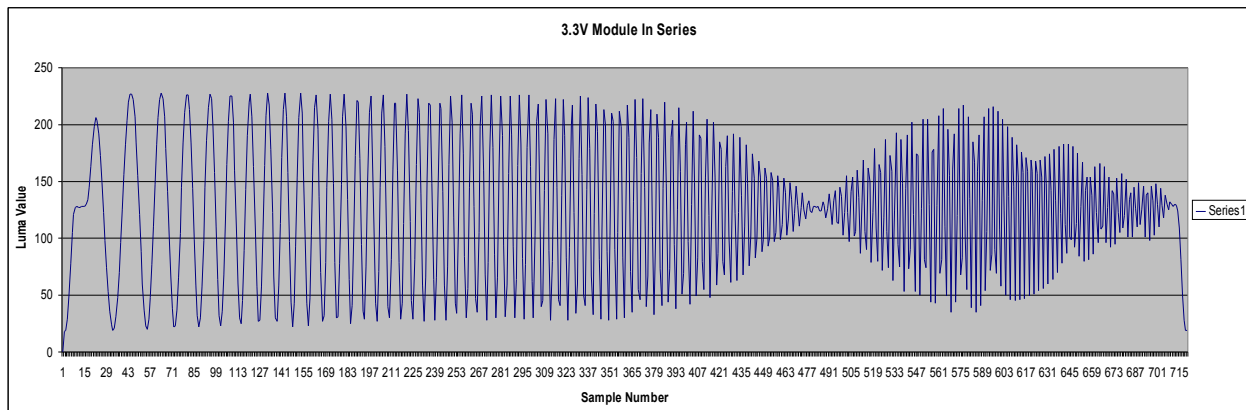
Frequency Response of Video Generator and Video Decoder (Luma)

This graph shows the A/D values from a video generator producing high frequency vertical bars. The video was captured with an Picolo framegrabber from Euresys that does not produce CCIR656 data.

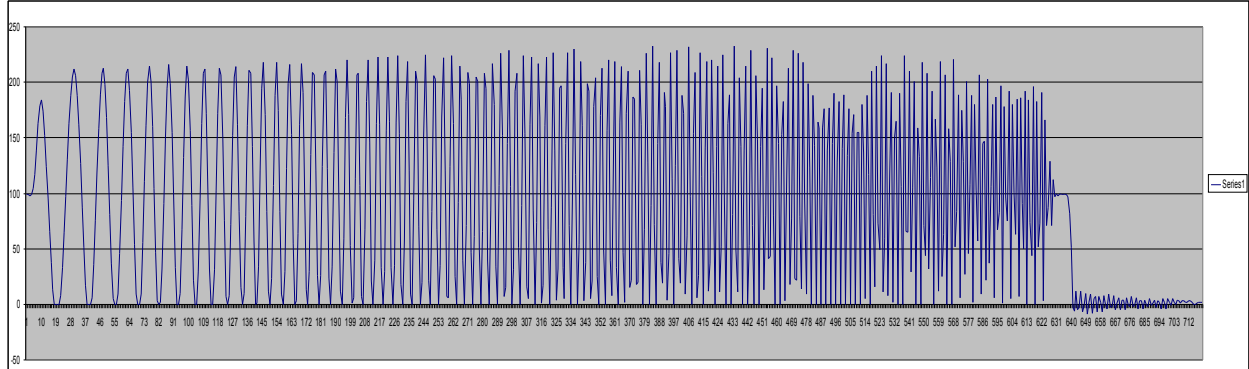**Frequency Response of Video Processor in Series with Video Generator (Luma)**

This graph shows the slight high-frequency degradation of A/D values AFTER going through one 3.3V Video Processor on a DVMD1 mounting card. The video was captured with the Picolo Framegrabber.

+3.3V

K1
+ NO   NO
C1 C2 NC NC
-
GND

VOUT
CH1
CH2
VOUT
GND

VIN
CH1
CH2
VIN
GND

BT1
P183

DIN   H2120 SOCKET
+3.3V   +3.3V   VMODULE
VIN   A10 A10 B10 B10
+VBAT A9   A9   B9   B9
       A8   A8   B8   B8
AUX   A7   A7   B7   B7   ALARM_OC
TXD2   A6   A6   B6   B6   RXD2
       A5   A5   B5   B5
IN2   A4   A4   B4   B4   IN3
IN0   A3   A3   B3   B3   IN1
TXD1   A2   A2   B2   B2   RXD1
       A1   A1   B1   B1
BH1
500K
GND

+3.3V
C103
.1uF
GND

TX   2 A1   VCC 16
       3 B1   RC1 15
       4 CLR1 CEXT1 14 EN_TX
EN_TXD2 5 Q1   Q1   13 EN_TX#
       6 Q2   CLR2 12 C5
       7 CEXT2 B2 11 .1uF
R7   8 RC2 A2   10
100K   GND   9   TXD2
C4   U3
.1uF   74VHC123AM
GND

R6
10K

+V   +3.3V
C103
       1 NC   VOUT 8   DH33016P-220uH
       2 NC   VIN 7   L1
       3 NC   GND 6
       4 FB   ON/OFF 5
U2   C2   D3   C3
LM2594HVM-3.3 100 uF 63V 100uF 6.3V
GND

+3.3V
C105
.1uF
GND
C8   C1+ VCC 16
.1uF   1
C9   C1-   V+ 2 C11
.1uF   C2+   - .1uF
       C2-   V- 6 C10
TXD2   T1IN   T1OUT 14 .1uF GND
       T2IN 10   T2OUT 7
       R1OUT 12 R1IN 13
       R2OUT 9   R2IN
       GND
U8 LTC1386CS
GND

+3.3V
C106 .1uF   XPORT
              H1 H1
              H2 H2
              H3 H3
TXD_HOST   H4 H4
RXD1   H5 H5
              H6 H6
GND   H7 H7
              H8 H8
              S4 S3 S2 S1

C107
.1uF
C100
.1uF
GND

U4B
TC7W08FCT
3
         6
         5

C7 .1uF +3.3V
GND
       RO VCC 8
       RE RS- 7 DI-
R9   DE RS+ 6 DI+
10K   DI GND 5
U6
ENABLE
       1 +3.3V
EN_TXD2 R5 634
       RO VCC 8
TXD2   RE RS- 7 DO-
R11   DE RS+ 6 DO+
10K   DI GND 5
U7
GND

C6 .1uF
GND
RXD1   RO VCC 8
EN_TX RE RS- 7
TXD1   DE RS+ 6
TXD_HOST DI GND 4
TX
U5
GND
U4A
TC7W08FCT
7

RS232/RS422 PTZ
C12 1000pF
GND
U3

RJ11 H9065
C1 C1
C2 C2
C3 C3
C4 C4
C5 C5
C6 C6 CHAIN
P1 P1
P2 P2
P3 P3 DO-
P4 P4 DO+ PTZ
P5 P5
P6 P6

R12 133
GND
C108 .1uF 634 R19
C104 .1uF
R18 133
CHAIN TERM
R17 634

+V
BRIDGE
HD01DICT
JMP1 929950-00
JMP2 929950-00
C102 .1uF   C101 .1uF
B2   B1
TVS P470ZSC
J1 277-1111
1
2
3
4
5
6
7
T1   T2 NC
     COM COM
T3   NC   NO
277-1111 MATES

+3.3V
LED1 LED3 LED2
RPU 10K
AUX
U1
COLLECT +LED
EMITTER -LED
PS2702-1NEC
R4 634
R1   R3   R2
634 133 133
GND GND
D1 BAT54A
EN_TX#
Q1 2N7002
S D G
D2
K2
+ NO NO
C1 C2 COM
- NC NC
ALARM_OC
GND
+3.3V

Title
DVMD1-X
Size Document Number   Rev
B   DVMD1-XDSN   A
Date: Monday, May 15, 2006   Sheet 1 of 1