Voltage Amplifier Module (VTVM) Features:

- Single ended or Differential input for **VTVM** Precision series modules
- OUTPUT VOLTAGE RANGE:
  1.) Precision **VTVM** series Module Output impedance = 600Ω:
    a.) ±10V into a ≥1MΩ Load (Device)
    b.) ±5V into a 600Ω Load (Device)
  2.) High Speed **VTVM8P** Series Module (Output impedance = 50Ω):
    a.) ±5V into a 50Ω Load (Device)
    b.) ±10V into a ≥100KΩ Load (Device)
  3.) High Speed **VTVM8** Series Module (Output impedance = 50Ω):
    a.) ±1.4V into a 50Ω Load (Device)
    b.) ±2.8V into a ≥100KΩ Load (Device)
- **VTVM** Precision series module. Input Impedances better than 10TΩ
- **VTVM** Precision series module. **Accuracy = ±0.1%**
- **VTVM8** High Speed **(2 to 300MHz**) series
- Accommodate Source Impedances greater than a GΩ
- Digitally Selectable Gains: 0dB, 20dB, 40db, 60dB
- **VTVM** Prec. series modules: 80dB when enabling additional 20dB
- Low-pass filter (Enable/Disable) ... ~ 30Hz cut-off freq.
- Offset Voltage Null Capability
- ESD Protection available with certain models
- Low Drift
- Low Input Noise
- Short Circuit Protection
- Low Power Consumption
- Call for 2, 4, 6 & 8 Voltage Channel Modules.
- Call for PCB only, single supply/polarity, custom application specific or small scale product alternative options.

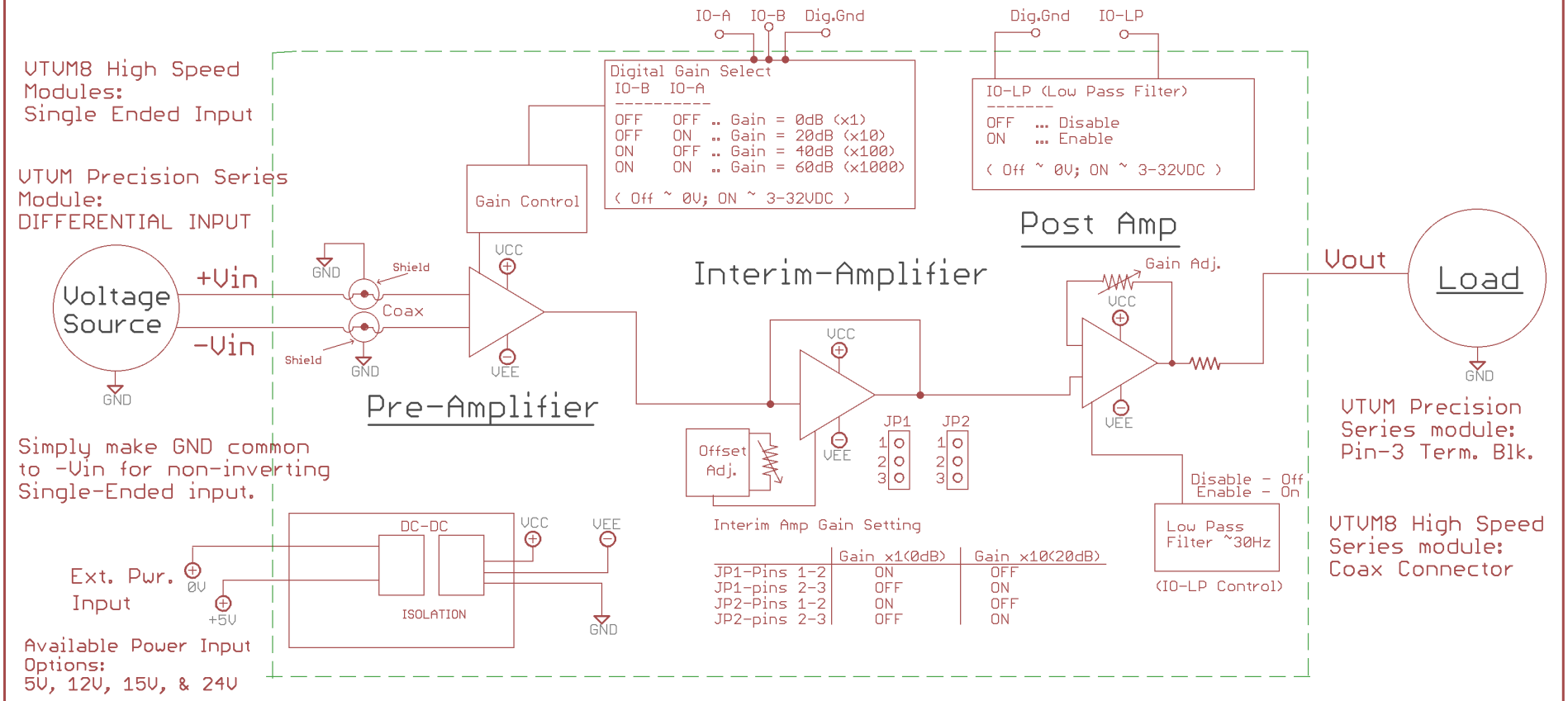
- **ECCN BIS classification:** EAR99
  Product Description: General Purpose Precision Op-Amp Circuit.

Applications:

- General Purpose / Universal Precision Voltage Amplifier
- Accurate Instrumentation Level Voltage Measurements
- Industrial and Scientific Sensors
- Detector Preamplifier
- Integrated Measurement Systems for Scientific and Industrial
- Applications
- Pulsed thermal EMF Analysis
- Chopped thermopiles & Bolometers
- Medical Instrumentation
- Transducer Interfaces
- Precision Data Acquisition
- Microphone Preamplification
- Vibration Analysis
- Multiplexed Input
- ADC Driver
- Analog Output Control applications:
  1.) Multiplication, Division, Squaring
  2.) Modulation or demodulation
  3.) Phase detection
  4.) Voltage-controlled amplifiers or attenuators or filters

CONTACT INFORMATION

Block Diagram – Precision Voltage Amplifier – Differential / Single-ended Input



Terminal Block – Analog Assignments

1	2	3	4	5	6	7	8	9	10
Gnd	Gnd	Vout	Gnd	0V	5V	IO-LP	IO-B	IO-A	IO-Gnd
				Pwr. In		Digital Control			

VTVM Precision Series Module TERM.BLK. Vout: Pin-3

RDM-Apps www.rdm-apps.com	
TITLE: VTVMD-Rev-8-2-1 Block Diagram	
Document Number:	REV: 8.2
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	Precision Series Module 4 Selectable Gain Ranges	**Precision Series Module** 4 Selectable Gain Ranges	**High Speed Series Module** 4 Selectable Gain Ranges	**High Speed Series Module** 4 Selectable Gain Ranges	**High Speed Series Module** Fixed Gain (20dB)
	VTVMD10FE4-30G **VTVMS10FE4-30G** **Recommended for most Apps.**	**VTVMD10FE4-1T** **VTVMS10FE4-1T**	**VTVM8PS10FE4-50**	**VTVM8S10FE4-50**	**Vtvm8-20-1-00**
Input Type - Bipolar	Differential / Single ended	Differential / Single Ended	Single ended	Single ended	Single ended
ESD Protection	None	4KV	None	None	None
Input Bias	< 100pA	< 3pA	< 10pA	< 10pA	< 10pA
Input Impedance	< 29GΩ	< 10TΩ	50Ω	50Ω	50Ω
Voltage Source Output impedance:	< 1GΩ	< 100GΩ	50Ω	50Ω	50Ω
Accuracy; Gain <= 60dB; @Spec. Gain Setting - better than	±0.1%	±0.1%	±1%	±1%	±1%
Accuracy; Gain <= 60dB; between Gain Settings - better than	±0.25%	±0.25%	±0.5%	±0.5%	±0.5%
Accuracy; Gain <= 60dB; Overall - better than	±0.50%	±0.50%	±1%	±1%	±1%
Accuracy; Gain = 80dB; Overall - better than	±1.0%	±1.0%			
Output Impedance	600**Ω**	600**Ω**	50**Ω**	50**Ω**	50**Ω**
BW (-3dB) ... Gain Setting: 0db	700Khz @ ±10Vpeak	500Khz @ ±10Vpeak	10Mhz @ ±10Vpeak	>10Mhz @ ±10Vpeak	
BW (-3dB) ... Gain Setting: 20db	300KHz @ ±10Vpeak	300Khz @ ±10Vpeak	10Mhz @ ±10Vpeak	>10Mhz @ ±10Vpeak	300Mhz @ ±1Vp
BW (-3dB) ... Gain Setting: 40db	100Khz @ ±10Vpeak	50Khz @ ±10Vpeak	6Mhz @ ±10Vpeak	>10Mhz @ ±10Vpeak	
BW (-3dB) ... Gain Setting: 60db	50Khz @ ±10Vpeak	35Khz @ ±10Vpeak	2Mhz @ ±10Vpeak	>2Mhz @ ±10Vpeak	
BW (-3dB) ... Gain Setting: 80db	5.0Khz @ ±10Vpeak	1.0Khz @ ±10Vpeak			
Low Pass Filter - Fixed	< 30Hz	< 30Hz	< 30Hz	< 30Hz	< 30Hz
Input Noise [nV/√Hz] @ gains 20db / 80dB ... less than	75 / 8	75 / 8	20 / 1	20 / 1	5
Input Drift [µV/°C]... less than	2.0	2.0	2.0	2.0	2.0
Output Voltage Range; Into a high impedance Load … Load impedance >100KΩ	±10Vdc; ±10Vpeak; ±7.07Vrms	±10Vdc; ±10Vpeak; ±7.07Vrms	±10Vdc; ±10Vpeak; ±7.07Vrms	±2.8 Vdc; ±2.8 Vpeak; ±1.98 Vrms	±2.8 Vdc; ±2.8 Vpeak; ±1.98 Vrms
Output Voltage Range; Into a 50Ω Load			±5Vdc; ±5Vpeak; ±3.5Vrms	±1.4 Vdc; ±1.4 Vpeak; ±1 Vrms;	±1.4 Vdc; ±1.4 Vpeak; ±1 Vrms;
Output Current - Max.; Zout=600Ω; Standard Module	±15mA	±15mA			
Output Current - Max.; Zout=50Ω			±200mA	±30mA	±30mA
Power Supply Voltage	+4.5V to +9Vdc	+4.5V to +9Vdc	+9V to +18Vdc	+9V to +36Vdc	+4.5V to 9Vdc
In / Out Connectors (Default: SMA)	BNC, SMA, SMB or SMC	BNC, SMA, SMB or SMC	BNC, SMA, SMB or SMC	BNC, SMA, SMB or SMC	BNC, SMA, SMB or SMC

Terminal Block Plug-In:
Part# OSTTJ105153 (Digikey) or
Part# 1757093 (Mouser)

Pluggable Terminal Blocks 10 Pos 5.08mm pitch Plug 24-12 AWG Screw

LINKS TO ENCLOSURE DETAILS:

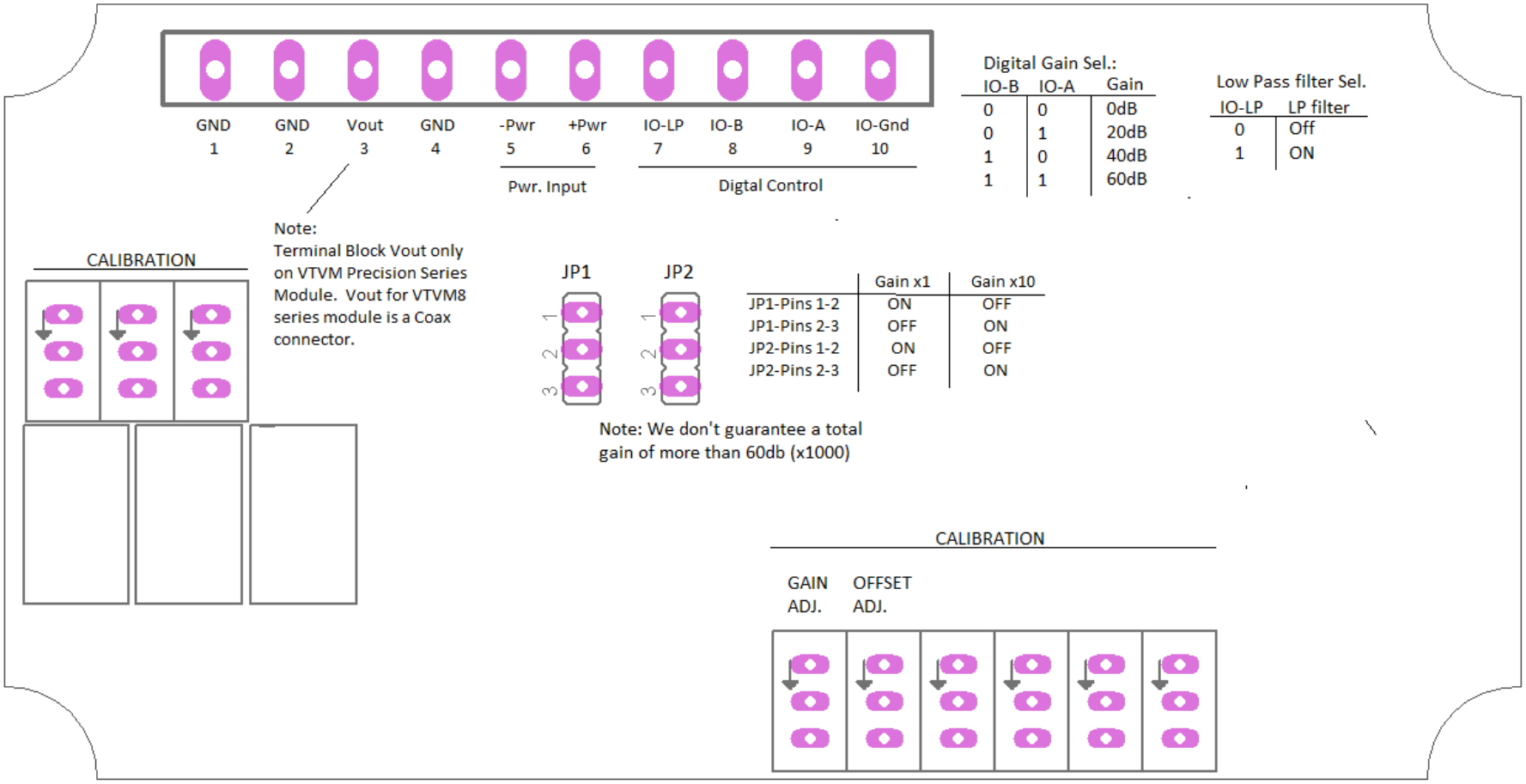
VTVM Precision Series Module Enclosure
VTVM8S10FE4-50 Module Enclosure
VTVM8-20-1-50 Module Enclosure

Continue to next page …

Insufficient input shielding applied to the VTVM module could increase the noise-signal ratio which could result in VTVM input or output inaccuracy.

Required VTVM & VTVM8 power input(s): +4.9VDC to +9VDC

Module VTVM & VTVM8 PCB diagram:



Continue to next page for Set up & calibration procedures …

Differential Input Gain / Offset Adjustment Procedure:

Required Conditions:

1.) Vtvm Module must have required DC power applied.
2.) Allow Vtvm module to warm up for at least 2-3 mins. Before continuing to the procedure.

Procedure:

1.) Refer to the Gain Selection Settings Table and set the gain closest to your required value.
2.) Depending on your application either short both Vtvm inputs to Gnd or set your voltage source to 0.0V and then connect to both Vtvm inputs. Adjust the Offset potentiometer until the Vtvm output is approximately 0.000V.
3.) With known voltages applied to the Vtvm inputs use the Gain potentiometer to adjust the output voltage to the required value. For example, if you require a gain of 40dB (100x) and the +Vin input is 20mV and the -Vin input is 10mV then adjust the gain until the output is 1V = 100 x (20mV – 10mV) … Vout = Gain x (Difference of the inputs).

Note(s): you will probably have to repeat procedure steps 2 and 3 a couple of times to assure proper calibration. If one of the Gain adjustment potentiometers is set to one of the extreme top or bottom extents extremely high or low gain states can occur which may cause confusion when making sequential offset and gain adjustments. Also, we advise you adjust the gain such that the difference of the input voltages results in a mid-range output value. For example, if the desired gain is 40dB (x100) and the maximum output is 10V and the difference of the Vtvm inputs is 50mV then adjust the gain so the Vtvm output is 5V. You can conversely do this when the difference of the inputs is -50mV and the output is a corresponding -5V, respectively.

Single Ended Input Gain / Offset Adjustment Procedure:

Required Conditions:

3.) Vtvm Module must have required DC power applied.
4.) Allow Vtvm module to warm up for at least 2-3 mins. Before continuing to the procedure.

Procedure:

4.) Refer to the Gain Selection Settings Table and set the gain closest to your required value.
5.) Depending on your application either short the Vtvm input to Gnd-1 or set your voltage source to 0.0V and then connect to the Vtvm input. Adjust the Offset potentiometer until the Vtvm output is approximately 0.000V.
6.) With a known voltage applied to the Vtvm module use the Gain potentiometer to adjust the output voltage to the required value. For example, if you require a gain of 40dB (100x) and the input is 10mV then adjust the gain until the output is 1V.

Note(s): you will probably have to repeat procedure steps 2 and 3 a couple of times to assure proper calibration. If one of the Gain adjustment potentiometers is set to one of the extreme top or bottom extents extremely high or low gain states can occur which may cause confusion when making sequential offset and gain adjustments. Also, we advise you adjust the gain using input voltages that are mid-range values. For example, if the desired gain is 40dB and the maximum output is 10V then apply 50mV to the Vtvm input and adjust the gain so the Vtvm output is 5V. You can conversely do this using a -50mV and -5V, respectively.