TEGAM

M E M S   A M P L I F I E R

Four Channel MEMS Engine Driver Amplifier

- Precise signal amplification for MEMS engine drivers or other unipolar applications.
- -7 to +150 V with 20 mA output current
- Full power bandwidth, from DC to 5 kHz (-0.1 dB)
- Four Independent Channels with selectable splitter mode
- Voltage monitor outputs for each channel
- Compatible with any standard arbitrary waveform or function generators

Applications

The Model 2375 is specifically designed for use with the TEGAM 9070 MEMS Engine Driver System (formerly Pragmatic 9014). This system was codeveloped with Sandia National Laboratories for driving electrostatic, comb-type, rotating MEMS micro engines.

Model 2375 is a four-channel amplifier that may be used for other applications requiring precise signal amplification of unipolar or DC biased AC waveforms.

Two Modes of Operation

There are two modes of operation. The first is normal (or splitter bypass) mode, where each of the four positive input signals is amplified by a factor of 15 and accurately produced at each respective output as in ordinary amplifier operation.

The second mode of operation is the splitter mode. The signal splitter precision rectifies a bipolar input signal generated by Sandia's µDriver Software into a set of waveforms required to operate the UP/DOWN and RIGHT/LEFT actuators of a typical MEMS micro engine. The splitter may be used for other applications that require precise rectification of a bipolar input into two unipolar outputs. See figure 4 for details.

Performance that Matters

Each channel is rated for 20 mA continuous current with 0.2 Ω output impedance. The amplifiers can drive capacitive loads up to 200 pF while maintaining a full power bandwidth, exceeding 5 kHz. The outputs are shortcircuit protected.

Each channel has an independent, voltage monitor output for applications that require a low level representation of the output signal in a closed loop system. The buffers produce a reduction of 100:1 of the output voltage for measurement devices with a 1 MΩ or higher input impedance.

Contact TEGAM for additional information on Driver Systems for special applications, high-voltage amplifiers, and arbitrary waveform generators for MEMS devices.

Figure 1:
Splitter Operation for Channels 1 & 2
Channels 3 & 4 duplicate this operation

Channel 1 Output
Clip V (0 V or -7 V)

Input Signal to Channel 1

Channel 2 Output
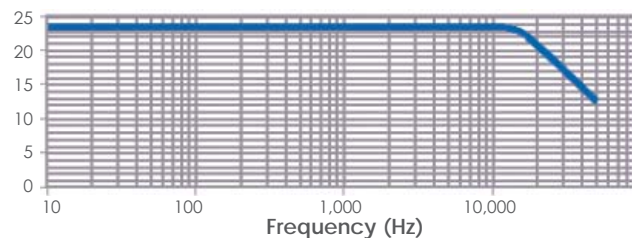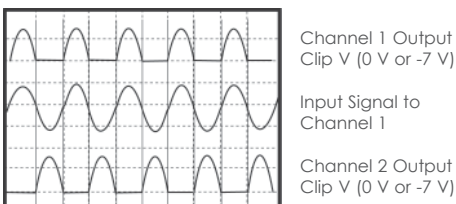Clip V (0 V or -7 V)

Figure 2:
Full-Power Frequency Response (Typical)
150 V @ 20 mA load.
Sine Wave with 75 VDC
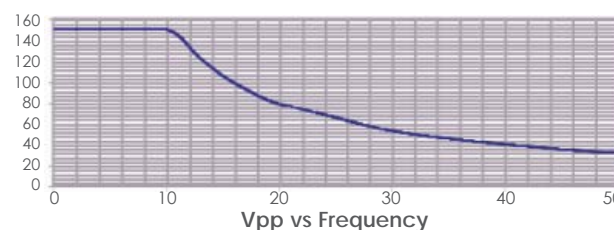Typical (-0.1 dB) (CL<200 pF)

Figure 3:
Maximum Vpp vs. Frequency
Amplifier's maximum peak to peak output roll off with frequency. This is due to the amplifier's slew rate of 5 V/µgSec.

Prices and specifications subject to change without notice.

Specifications

Electrical

Number of Channels	4
Input Impedance	10 kΩ
Output Voltage Range	0 to +150 VDC (Splitter Mode) -7 to +150 VDC (Splitter Bypass Mode)
Maximum Output Current	20 mA per channel
Output Impedance	< 0.2 Ω
Voltage Gain	+15 Fixed
Sine Wave Distortion (THD)	< 0.1 % for DC to 5 kHz. 150 Vp-p sine wave with 75 VDC offset
Full Power Bandwidth	5 kHz / 150 Vp-p sine wave with 75 VDC offset typical, (-0.1 dB) (CL<200 pF)
Slew Rate	> 5 V/μSec
Square Wave Response	< 25 μSec for 150 Volt Step (10-90 %)
Aberrations	< 2 %
Voltage Monitor Outputs	Source impedance 2 kΩ (100:1 Ratio)

Environmental

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Operating Temperature	0 °C to +45 °C (+32 °F to +113 °F) Ambient
Storage Temperature	-20 °C to +50 °C (-4 °F to +122 °F)
Humidity Range	80 % RH Non-Condensing

General

Input Supply Voltage	110/220 50/60 Hz – Rear Panel Selectable
Power Rating	100 VA; 80 W
Dimensions: (H x W x L)	11.5 x 25.8 x 30.0 cm (4.51 in x 10.14 in x 11.81 in)
Weight (approximate)	4.5 kg (10 lb)
Warranty	1 year parts and labor

Included Accessories	CD User's Manual	P/N 810045-CD
	Four High Voltage BNC Cables	P/N 740949
	1-Power Cord	P/N 600014
Optional Accessories	Rack Mount Kit	P/N 740532
	Standard BNC Cable	P/N CBL-3102
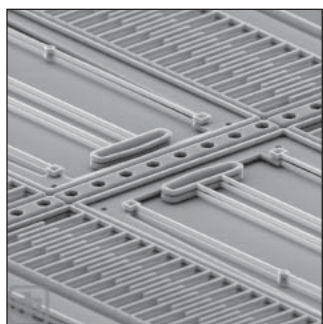
Comb Drives
Courtesy Sandia National Laboratories,
SUMMiT™ Technologies,
www.mems.sandia.gov

Figure 4: Operational Diagram of Model 2375,
High-Voltage Driver amplifier for MEMS Engines