

**8932**

T-52-13-25

**VOICE COIL MOTOR DRIVER**

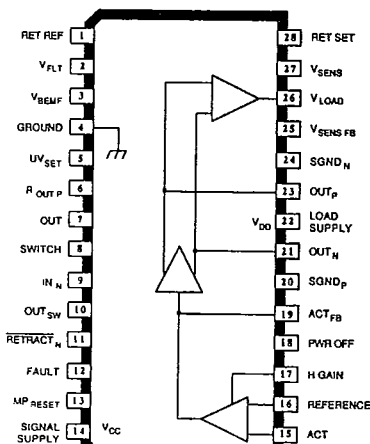
Providing control and drive of the voice coil motor used for head positioning in 5 V disk drive applications, the A8932CLW is a full-bridge driver which can be configured so that its output current is a direct function of an externally applied control voltage or current. This linear current control function is supplemented by additional circuitry to protect the heads and the data disk during system failure or normal system shutdown.

The two  $\pm 500$  mA MOS driver outputs provide very low saturation voltage and minimal power dissipation. Additional headroom is achieved by the sense-FET structure eliminating the need for an external current-sense resistor. Internal circuitry can be configured to provide closed-loop velocity control of the actuator by utilizing the generated back-EMF of the voice coil motor. Thermal protection and under-voltage lockout disables the system in a controlled sequence if a fault condition occurs.

The A8932CLW is supplied in a 28-lead SOIC for surface-mount applications.

**FEATURES**

- Internal Back-EMF Velocity Loop Option
- Lossless Current Sensing
- Zero Deadband
- High Transconductance Bandwidth
- User-Adjustable Transconductance Gain
- Digital Transconductance Gain Switch (4:1 Ratio)
- 5 Volt Monitor with Selectable UV Trip Point
- Retract Circuitry Functional to 0 Volts
- Chip Enable/Sleep Mode Function
- 1 V at 500 mA Output Saturation Voltage
- Internal Thermal Shutdown Circuitry



Dwg. PP-042

**ABSOLUTE MAXIMUM RATINGS**

Supply Voltages, $V_{CC}$ and $V_{DD}$	6.0 V
Output Current, $I_{OUT}$ (peak)	$\pm 600$ mA
(continuous)	$\pm 400$ mA
Analog Input Voltage Range,	
$V_{IN}$	-0.3 V to $V_{CC}$
Logic Input Voltage Range,	
$V_{IN}$	-0.3 V to +6.0 V
Package Power Dissipation, <sup>†</sup>	
$P_D$	See Graph
Operating Temperature Range,	
$T_A$	0°C to +70°C
Junction Temperature, $T_J$	+150°C†
Storage Temperature Range,	
$T_S$	-55°C to +150°C

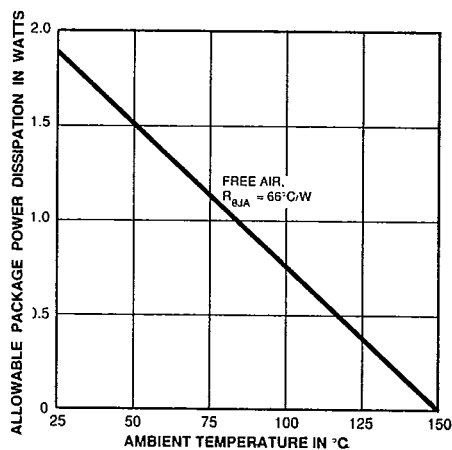
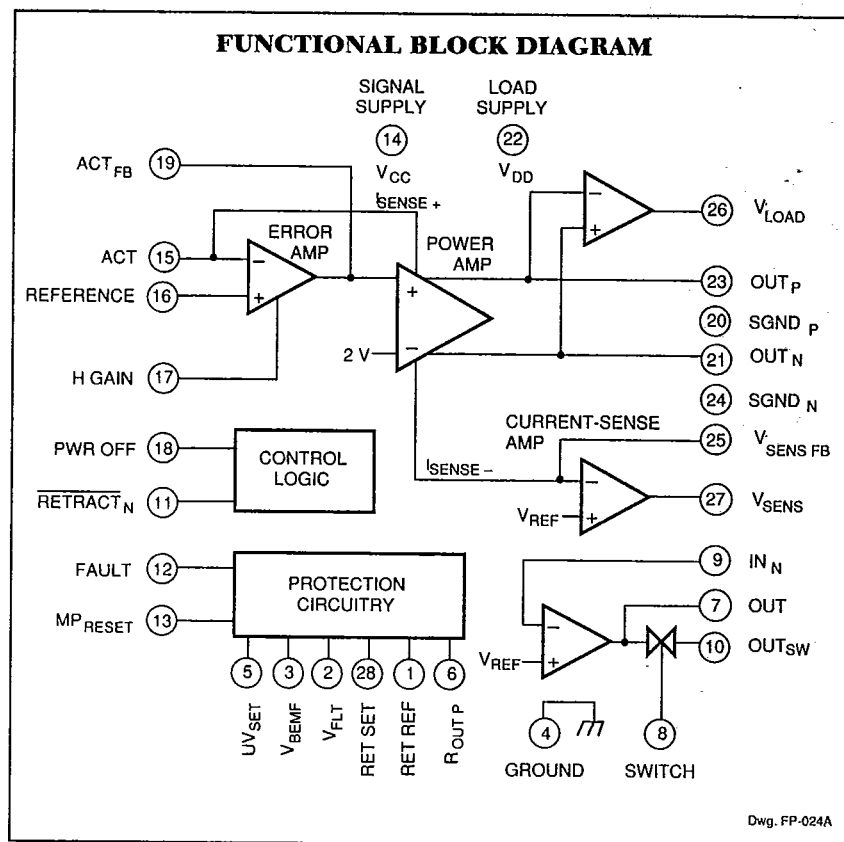
† Fault conditions that produce excessive junction temperature will activate device thermal shutdown circuitry. These conditions can be tolerated, but should be avoided.

Output current rating may be restricted to a value determined by system concerns and factors. These include: system duty cycle and timing, ambient temperature, and use of any heatsinking and/or forced cooling. For reliable operation the specified maximum junction temperature should not be exceeded.

Always order by complete part number: **A8932CLW**.

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Dwg. GP-034

**8932****VOICE COIL MOTOR DRIVER****T-52-13-25****ELECTRICAL CHARACTERISTICS at  $T_A = +25^\circ\text{C}$ ,  $V_{CC} = V_{DD} = 4.5\text{ V to }5.5\text{ V}$ ,  $V_{REF} = 2.0\text{ V}$  (unless otherwise noted).**

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Input Bias Current	$I_{IB}$		—	500	—	nA
Input Offset Voltage	$V_{IO}$		—	5.0	—	mV
Input Resistance	$R_{IN}$		—	100	—	$\Omega$
Current Gain	$A_i$	H GAIN $\geq V_{CC}/2$	—	6240	—	—
		H GAIN $\leq V_{CC}/2$	—	1560	—	—
Reference Voltage Range	$V_{REF}$		0.5	—	3.0	V
Power Supply Rejection Ratio	$k_{SVR}$		—	60	—	dB

Output Saturation Voltage (Source + Sink)	$V_{DS(SAT)}$	$I_{LOAD} = 100\text{ mA}$	—	0.2	—	V
		$I_{LOAD} = 500\text{ mA}$	—	1.0	—	V
Retract Output Voltage	$V_{DS(SAT)}$	$I_{OUT} \leq 150\text{ mA}$	—	0.5	—	V
Output Current	$I_{OM}$	Pulse Test, $\pm 600\text{ mA}$ Limited	—	—	$\pm 500$	mA
Gain Bandwidth	BW	-3 dB	—	100	—	kHz

**Miscellaneous**

Under-Voltage Lockout Voltage	$V_{CC}$		4.24	4.30	4.38	V
Supply Current	$I_{CC}$	Outputs Balanced, No Load	—	—	10	mA
Logic Input Voltage	$V_{IN(0)}$		—	—	0.7	V
	$V_{IN(1)}$		3.5	—	—	V
Thermal Shutdown Temperature	$T_J$		—	165	—	$^\circ\text{C}$
Thermal Shutdown Hysteresis	$\Delta T_J$		—	20	—	$^\circ\text{C}$

Negative current is defined as coming out of (sourcing) the specified device terminal.  
 Typical Data is for design information only.

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**TERMINAL FUNCTIONS**

Term.	Terminal Name	Function
1	RET REF	The reference supply for setting the voltage across the load during retract.
2	$V_{FLT}$	Reservoir (energy storage) capacitor used to operate fault circuitry.
3	$V_{BEMF}$	Back-EMF voltage from spindle motor used to retract heads during loss of power.
4	GROUND	Circuit reference.
5	$UV_{SET}$	Under-voltage trip point reference input. Set internally to 4.3 V but may be overridden by external resistor divider. (Equation 6).
6	$R_{OUTP}$	Source driver used for retract; externally connected to $OUT_P$ .
7	OUT	Output of uncommitted operational amplifier.
8	SWITCH	Logic input for transmission gate; a high level connects OUT to $OUT_{SW}$ .
9	$IN_N$	Inverting input to uncommitted operational amplifier.
10	$OUT_{SW}$	Transmission-gated output of uncommitted operational amplifier.
11	RETRACT <sub>N</sub>	An active-low logic input that initiates the retract sequence.
12	FAULT	A logic low at this MOS output indicates a thermal shutdown, under-voltage fault, or retract command.
13	$MP_{RESET}$	(Power-On Reset) A logic low at this open-collector output may be used to reset the system on under-voltage fault or power ON.
14	SIGNAL SUPPLY	$V_{CC}$ ; low-current supply voltage in the range of 4.5 V to 5.5 V.
15	ACT	Input which controls the current in the load. Transconductance gain is set with an external resistor in series with this input (Equation 1).
16	REFERENCE	$V_{REF}$ ; reference input for all amplifiers; ac ground.
17	H GAIN	Logic input to switch the error amplifier transconductance gain: LOW = 1560, HIGH = 6240.
18	PWR OFF	An active-high logic input that puts the device in a "sleep mode". All fault circuitry remains active.
19	$ACT_{FB}$	Input connection for feedback network which sets the error amplifier gain and bandwidth (Equations 2 and 3).
20	$SGND_P$	Power ground for the $OUT_P$ sink driver.
21	$OUT_N$	Power output. Sinks current when $V_{ACT} < V_{REF}$ .
22	LOAD SUPPLY	$V_{DD}$ ; high-current supply voltage for the voice-coil motor.
23	$OUT_P$	Power output. Sinks current when $V_{ACT} > V_{REF}$ .
24	$SGND_N$	Power ground for the $OUT_N$ sink driver.
25	$V_{SENSFB}$	Input connection for feedback network which sets the current-sense amplifier gain and bandwidth.
26	$V_{LOAD}$	An output voltage proportional to the load voltage. Used in conjunction with closed-loop velocity control.
27	$V_{SENS}$	Voltage output representing load current (Equation 4).
28	RET SET	An external resistor divider to set the retract voltage across the load. Used in conjunction with $V_{RET-REF}$ (Equation 5).



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