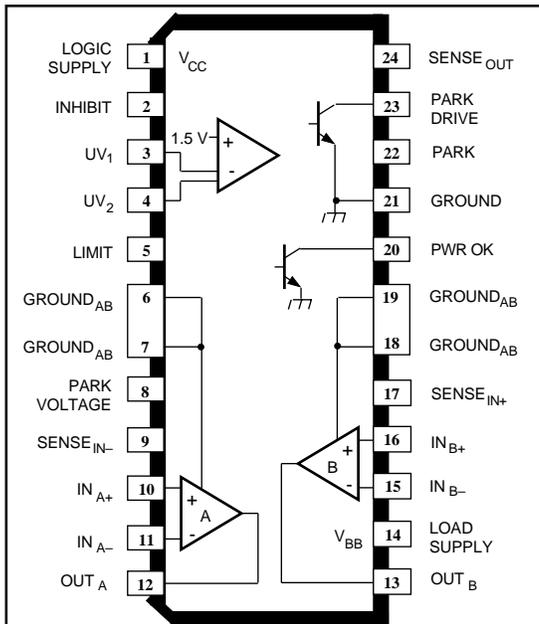


# 8958

## VOICE COIL MOTOR DRIVER



Dwg. PP-054

### ABSOLUTE MAXIMUM RATINGS at $T_A = 25^\circ\text{C}$

Supply Voltages, $V_{BB}$ and $V_{CC}$ .....	16 V
Output Current, $I_{OUT}$ .....	$\pm 1.0$ A
Park Drive Output Current, $I_{PARK}$	
Continuous .....	250 mA
Peak .....	1.0 A
Amplifier Input Voltage Range,	
$V_{IN}$ .....	-2.0 V to $V_{CC}$
Sense Input Voltage Range,	
$V_{SENSE\ IN}$ .....	-0.3 V to $V_{CC}$
Comparator and Digital Inputs,	
$V_{IN}$ .....	-0.3 V to 10 V
$I_{IN}$ .....	$\pm 10$ mA
Power OK Output, $V_{CEX}$ .....	20 V
$I_C$ .....	30 mA
Output Clamp Diode Current,	
$I_F$ (pulsed) .....	1.0 A
Package Power Dissipation, $P_D$ ..	See Graph
Operating Temperature Range,	
$T_A$ .....	$0^\circ\text{C}$ to $+70^\circ\text{C}$
Junction Temperature, $T_J$ .....	$150^\circ\text{C}^*$
Storage Temperature Range,	
$T_S$ .....	$-55^\circ\text{C}$ to $+150^\circ\text{C}$

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

Providing control and drive of the voice coil motor used for head positioning in disk drive applications, the A8958CLB 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  $\pm 800$  mA driver outputs provide very-low saturation voltage drops and precise current control utilizing a single current-sensing resistor connected in series with the load. Under-voltage lockout disables the system in a controlled sequence if a fault condition occurs.

When activated by the under-voltage comparator, or a park command, the output power drivers change from a controlled current to a user-determined constant park voltage. Other features include a power ok flag, a limit input to force the outputs to their maximum level in either polarity, an over-riding output disable to shut down both power amplifiers and reduce quiescent supply current, and internal thermal shutdown which disables the load (but still allowing the head to be parked) in the event of excessive junction temperatures. The load is re-enabled when the junction temperature returns to a safe level.

The A8958CLB is supplied in a 24-lead power SOIC for surface-mount applications. The copper batwing construction provides for maximum package power dissipation in a minimum package size. It is rated for continuous operation over the temperature range of  $0^\circ\text{C}$  to  $+70^\circ\text{C}$ .

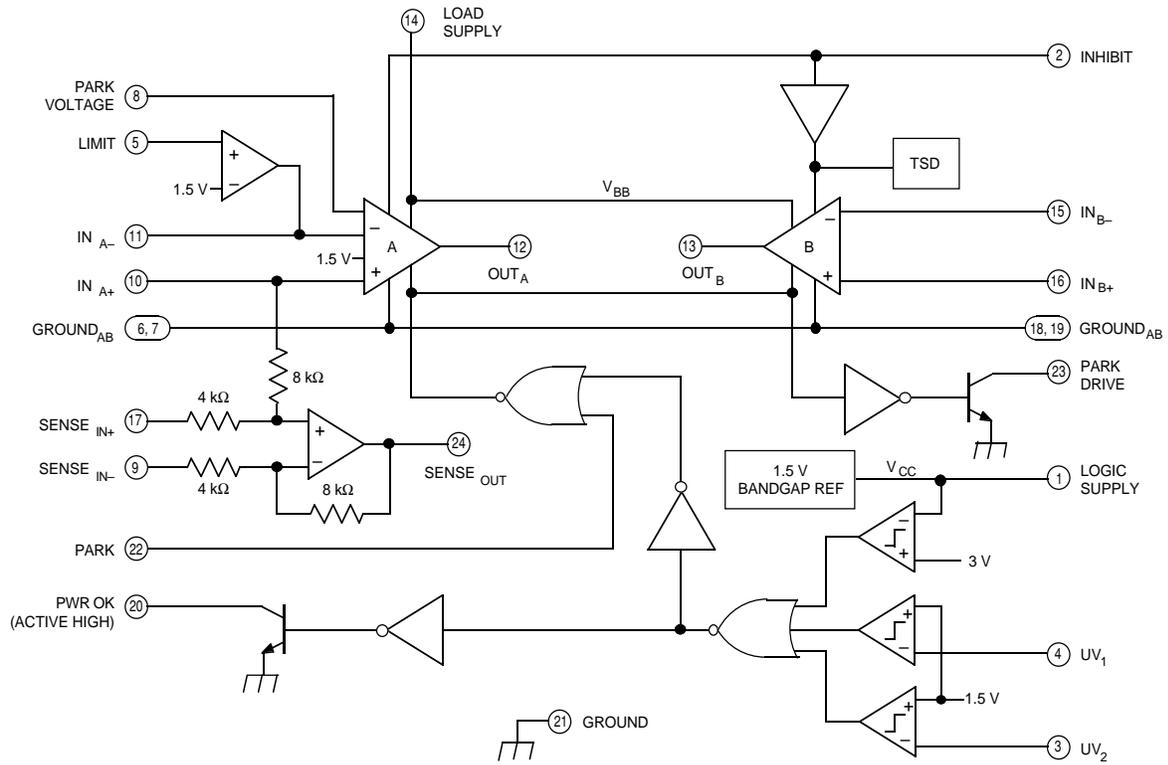
### FEATURES

- Controlled-Velocity Head Parking
- Zero Deadband
- High Transconductance Bandwidth
- User-Adjustable Transconductance Gain
- $\pm 800$  mA Load Current
- Dual Under-Voltage Monitors  
with Flag and User-Selectable Trip Points
- Internal Thermal Shutdown Circuitry
- Replaces UC3175

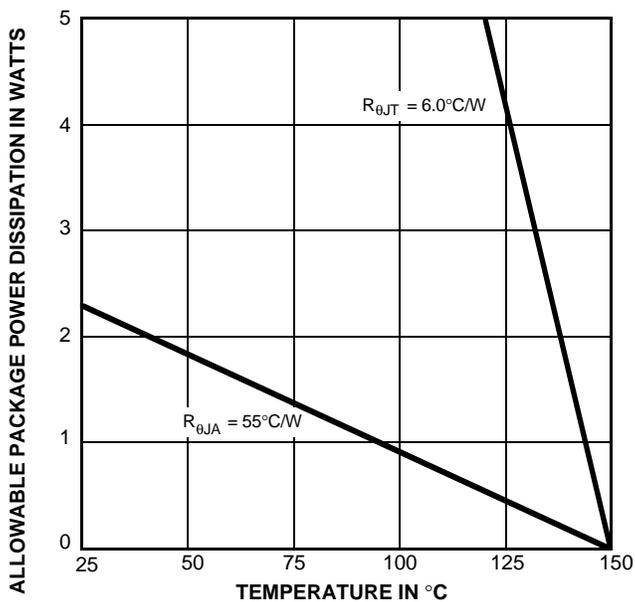
Always order by complete part number, e.g., **A8958CLB**.

# 8958 VOICE COIL MOTOR DRIVER

## FUNCTIONAL BLOCK DIAGRAM



Dwg. FP-020C



Dwg. GP-033A



115 Northeast Cutoff, Box 15036  
Worcester, Massachusetts 01615-0036 (508) 853-5000  
Copyright © 1990, 2000 Allegro MicroSystems, Inc.

**8958**  
**VOICE COIL**  
**MOTOR DRIVER**

**ELECTRICAL CHARACTERISTICS at  $T_A = +25^\circ\text{C}$ ,  $V_{CC} = V_{BB} = 12\text{ V}$**

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Logic Supply Voltage Range	$V_{CC}$	Operating	8.0	12	16	V
Logic Supply UV Threshold	$V_{CC}$	High-to-low transition	—	2.8	3.0	V
Logic Supply UV Hysteresis	$\Delta V_{CC}$		—	200	—	mV
Supply Current	$I_{BB}$	$V_{OUT} = 6\text{ V}$ , no load	—	2.0	—	mA
	$I_{CC}$		—	23	—	mA
Inhibited Supply Current	—	$I_{BB} + I_{CC}$ , $V_2 \geq 1.7\text{ V}$	—	3.0	8.0	mA
Thermal Shutdown Temp.	$T_J$		—	165	—	$^\circ\text{C}$
Thermal Shutdown Hysteresis	$\Delta T_J$		—	8.0	—	$^\circ\text{C}$

**Output Power Drivers**

Output Saturation Voltage	$V_{SAT}$	$I_{OUT} = 250\text{ mA}$	—	250	—	mV
		$I_{OUT} = 800\text{ mA}$	—	450	—	mV
		$I_{OUT} = -250\text{ mA}$	—	750	—	mV
		$I_{OUT} = -800\text{ mA}$	—	950	—	mV
Total Saturation Voltage (Source + Sink)	$V_{SAT}$	$I_{LOAD} = 250\text{ mA}$	—	1.0	1.4	V
		$I_{LOAD} = 800\text{ mA}$	—	1.4	2.0	V
Input Offset Voltage	$V_{IO}$	$V_{CM} = 6\text{ V}$	—	5.0	8.0	mV
Input Offset Drift	$\Delta V_{IO}$		—	—	25	$\mu\text{V}/^\circ\text{C}$
Input Bias Current	$I_{IN}$	Except $IN_{A+}$ , $V_{CM} = 6\text{ V}$	—	-150	-500	nA
		$IN_{A+}$ to $SENSE_{IN+} = 12\text{ k}\Omega$ , $T_J = 25^\circ\text{C}$	69	84	105	$\mu\text{A}/\text{V}$
Input Offset Current	$I_{IO}$	$IN_B$ only, $V_{CM} = 6\text{ V}$	—	—	200	nA
Differential Sense Input Current	$I_{ID}$	$I_{OUT} = 5\text{ mA}$	—	$\pm 300$	—	$\mu\text{A}$
		$I_{OUT} = 500\text{ mA}$	—	3.0	—	mA
Large Signal Gain	$A_{VS}$	$V_{OUT} = 2\text{ V to } 10\text{ V}$ , $I_{OUT} = \pm 500\text{ mA}$	1.5	5.0	—	V/mV
Slew Rate	SR		—	4.0	—	V/ $\mu\text{s}$
Unity Gain Bandwidth	BW	Amplifier A	0.5	1.0	1.7	MHz
		Amplifier B	0.5	2.0	2.2	MHz
Common-Mode Rejection	$k_{CMR}$	$V_{CM} = 1\text{ V to } 10\text{ V}$	70	90	—	dB
Clamp Diode Forward Voltage	$V_F$	$I_F = 800\text{ mA}$ , $V_2 \geq 1.7\text{ V}$	—	1.0	1.2	V
High-Side Current Limit	$I_{OUT}$	$T_J = 25^\circ\text{C}$	—	1.0	1.2	A
Power Supply Rejection	$k_{SVR}$	$V_{CC} = 4\text{ V to } 15\text{ V}$ , $V_{CM} = 1.5\text{ V}$	70	90	—	dB

Negative current is defined as coming out of (sourcing) the specified device terminal.

Continued next page...

Typical Data is for design information only.

# 8958

## VOICE COIL MOTOR DRIVER

### ELECTRICAL CHARACTERISTICS (continued)

Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
<b>Current Sense Amplifier</b>						
Input Offset Voltage	$V_{IO}$	$V_{CM} = 6\text{ V}$	—	—	2.0	mV
Input Offset Drift	$\Delta V_{IO}$	$V_{CM} = 0\text{ V to }12\text{ V}$	—	—	3000	$\mu\text{V/V}$
			—	—	8.0	$\mu\text{V}/^\circ\text{C}$
Voltage Gain	$A_{VS}$	$V_{ID} = -1\text{ V to }+1\text{ V}, V_{CM} = 6\text{ V}$	1.95	2.00	2.05	—
Output Saturation Voltage	$V_{SAT}$	$V_{OUT}, I_{OUT(SINK)} = 1.5\text{ mA}$	—	300	500	mV
		$V_{CC} - V_{OUT}, I_{OUT(SOURCE)} = -1.5\text{ mA}$	—	400	700	mV
<b>Park Function</b>						
PARK DRIVE Leakage Current	$I_{CEX}$	$V_{CEX} = 20\text{ V}$	—	—	100	$\mu\text{A}$
PARK DRIVE Saturation Voltage	$V_{CE(SAT)}$	$I_C = 200\text{ mA}$	—	300	500	mV
PARK Input Threshold	$V_{PARK}$		0.7	1.1	1.7	V
PARK Input Current	$I_{PARK}$	$V_{PARK} = 1.7\text{ V}$	—	—	100	$\mu\text{A}$
PARK VOLTAGE Input Current	$I_{PARK V}$		—	-150	-500	nA
<b>Under-Voltage Protection</b>						
UV Threshold	$V_{UV}$	Low-to-High Trans., Other Input = 6 V	1.48	1.50	1.52	V
UV Threshold Hysteresis	$\Delta V_{UV}$		15	25	45	mV
UV Input Current	$I_{UV}$	$V_{UV} = 1\text{ V}$	—	-0.5	-1.5	$\mu\text{A}$
PWR OK Saturation Voltage	$V_{CE(SAT)}$	$I_C = 5\text{ mA}$	—	—	450	mV
PWR OK Leakage Current	$I_{CEX}$	$V_{CEX} = 20\text{ V}$	—	—	5.0	$\mu\text{A}$
<b>Auxiliary Functions</b>						
LIMIT Input Voltage	$V_{LIMIT(L)}$	OUT <sub>A</sub> forced Low	0.7	0.8	—	V
	$V_{LIMIT(H)}$	OUT <sub>A</sub> forced High	—	2.2	2.3	V
	$V_{LIMIT}$	Limit inactive	1.2	—	1.8	V
		Open circuit	1.45	1.50	1.55	V
LIMIT Input Resistance	$R_{LIMIT}$	$V_{LIMIT} = 1.2\text{ V to }1.8\text{ V}$	—	10	—	k $\Omega$
INHIBIT Input Threshold	$V_2$		0.7	1.1	1.7	V
INHIBIT Input Current	$I_2$	$V_2 = 1.7\text{ V}$	—	—	200	$\mu\text{A}$

Negative current is defined as coming out of (sourcing) the specified device terminal.

Typical Data is for design information only.



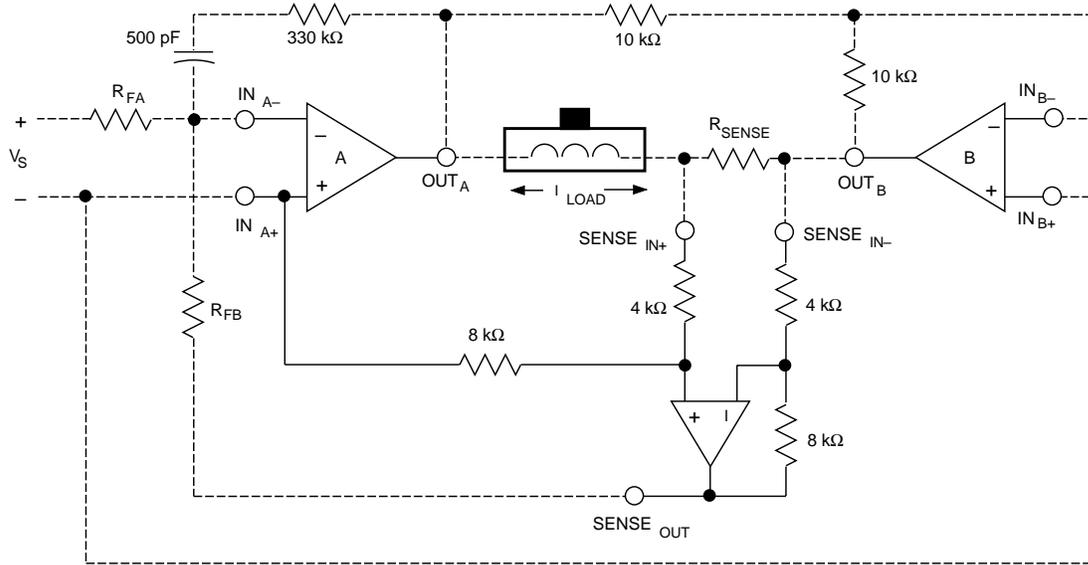
**8958**  
**VOICE COIL**  
**MOTOR DRIVER**

**TERMINAL FUNCTIONS**

Term.	Terminal Name	Function
1	LOGIC SUPPLY	$V_{CC}$ ; logic supply voltage.
2	INHIBIT	An active-high logic input that inhibits the output stages without initiating a park.
3 & 4	$UV_1$ and $UV_2$	Under-voltage detection inputs. If not used, these terminals must be connected to the logic supply ( $V_{CC}$ ).
5	LIMIT	A tri-state input that forces the output of amplifier A into saturation in either direction, or allows normal linear operation.
6 & 7	$GROUND_{AB}$	Power amplifiers' ground and thermal heat sink.
8	PARK VOLTAGE	Auxiliary inverting input to power amplifier A.
9	$SENSE_{IN-}$	Inverting input to current sense error amplifier.
10	$IN_{A+}$	Non-inverting input to power amplifier A.
11	$IN_{A-}$	Inverting input to power amplifier A.
12	$OUT_A$	Power amplifier A output to voice coil motor.
13	$OUT_B$	Power amplifier B output to voice coil motor.
14	LOAD SUPPLY	$V_{BB}$ ; load supply voltage.
15	$IN_{B-}$	Inverting input to power amplifier B.
16	$IN_{B+}$	Non-inverting input to power amplifier B.
17	$SENSE_{IN+}$	Non-inverting input to current sense error amplifier.
18 & 19	$GROUND_{AB}$	Power amplifiers' ground and thermal heat sink.
20	PWR OK	A logic low at this output indicates an under-voltage condition.
21	GROUND	Circuit reference.
22	PARK	An active-high logic input that activates the park function.
23	PARK DRIVE	Power transistor for retract current control on power down or park command.
24	$SENSE_{OUT}$	Output of current sense error amplifier.

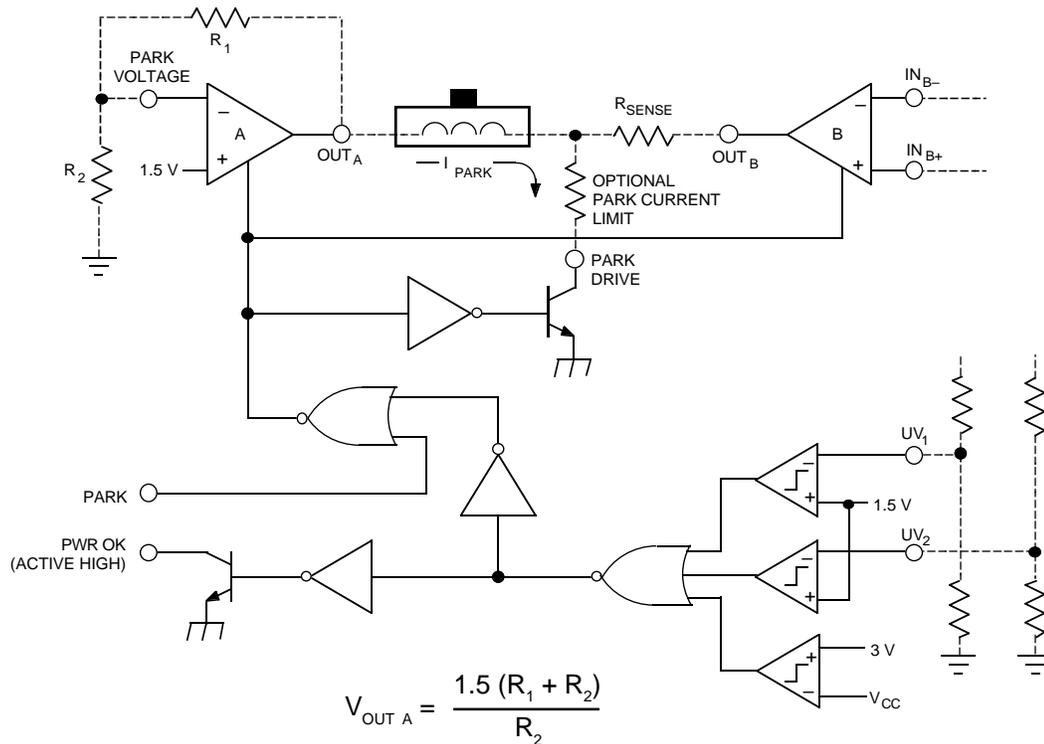
# 8958 VOICE COIL MOTOR DRIVER

## CURRENT SENSING



Dwg. EP-034

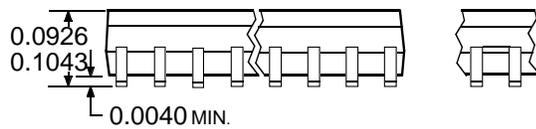
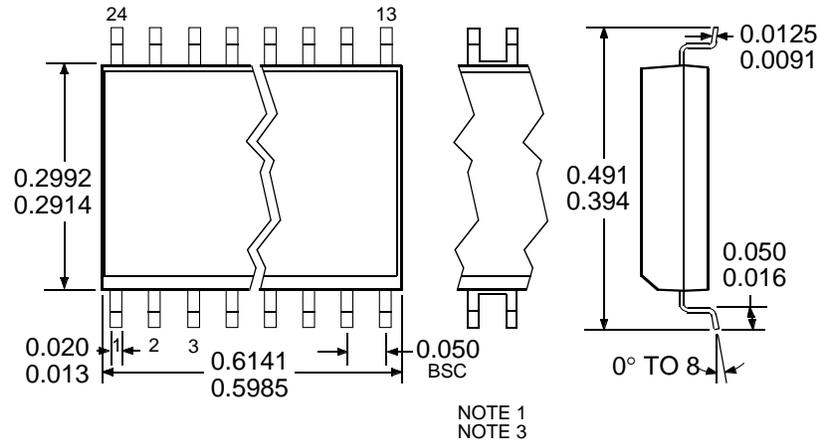
## PARKING FUNCTION



Dwg. EP-039

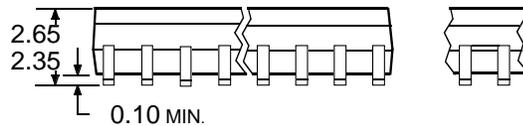
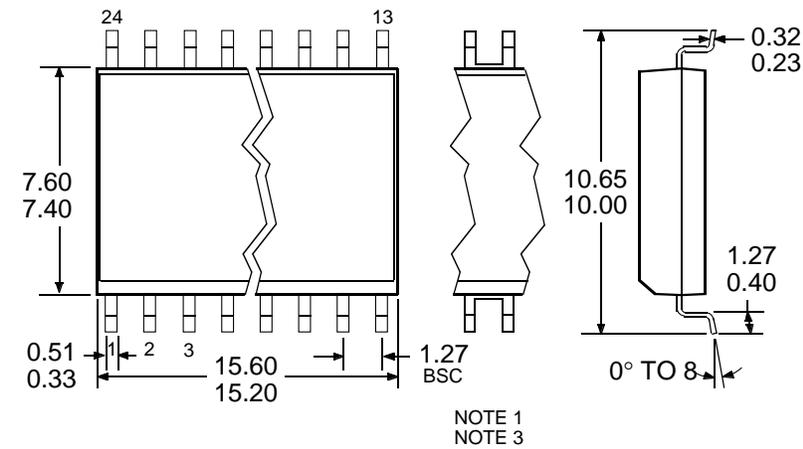
# 8958 VOICE COIL MOTOR DRIVER

## Dimensions in Inches (for reference only)



Dwg. MA-008-25 in

## Dimensions in Millimeters (controlling dimensions)



Dwg. MA-008-25A mm

- NOTES:
1. Webbed lead frame. Leads 6, 7, 18, and 19 are internally one piece.
  2. Lead spacing tolerance is non-cumulative.
  3. Exact body and lead configuration at vendor's option within limits shown.

**8958**  
**VOICE COIL**  
**MOTOR DRIVER**

*The products described here are manufactured under one or more U.S. patents or U.S. patents pending.*

*Allegro MicroSystems, Inc. reserves the right to make, from time to time, such departures from the detail specifications as may be required to permit improvements in the performance, reliability, or manufacturability of its products. Before placing an order, the user is cautioned to verify that the information being relied upon is current.*

*Allegro products are not authorized for use as critical components in life-support devices or systems without express written approval.*

*The information included herein is believed to be accurate and reliable. However, Allegro MicroSystems, Inc. assumes no responsibility for its use; nor for any infringement of patents or other rights of third parties which may result from its use.*

