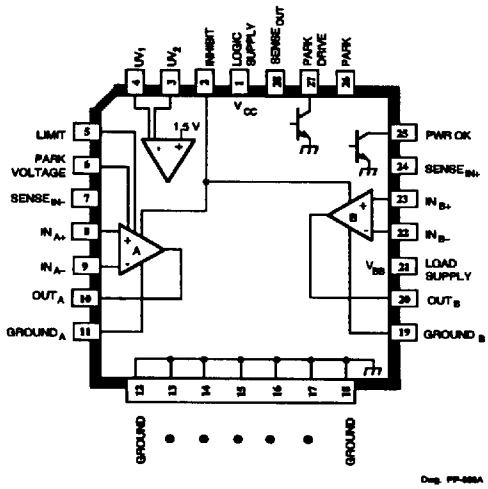
8958

Data Sheet
26300.5

VOICE COIL MOTOR DRIVER

A8958CEA



ABSOLUTE MAXIMUM RATINGS
at T_A = 25°C

Supply Voltages, V_{BB} and V_{CC} ..... **16 V**
Output Current, I_{OUT} ..... **±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} ..... **±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°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.

Providing control and drive of the voice coil motor used for head positioning in disk drive applications, the A8958– 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 ±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 A8958CEA is supplied in a 28-lead power PLCC for surface-mount applications; the A8958CLB is supplied in a 24-lead power SOIC. The copper half-batwing/batwing construction provides for maximum package power dissipation in a minimum package size. Both are rated for continuous operation over the temperature range of 0°C to +70°C.

FEATURES

- Controlled-Velocity Head Parking
- Zero Deadband
- High Transconductance Bandwidth
- User-Adjustable Transconductance Gain
- ±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:

Part Number	Package
A8958CEA	28-Lead Half-Batwing PLCC
A8958CLB	24-Lead Batwing SOIC

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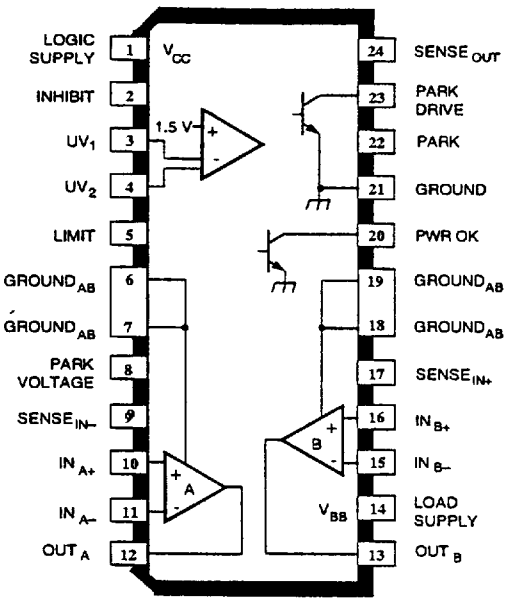
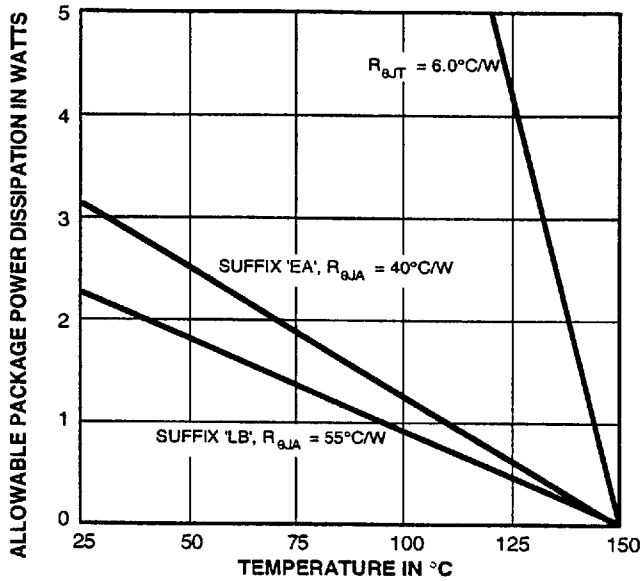
A8958CLB



Dwg. PP-054



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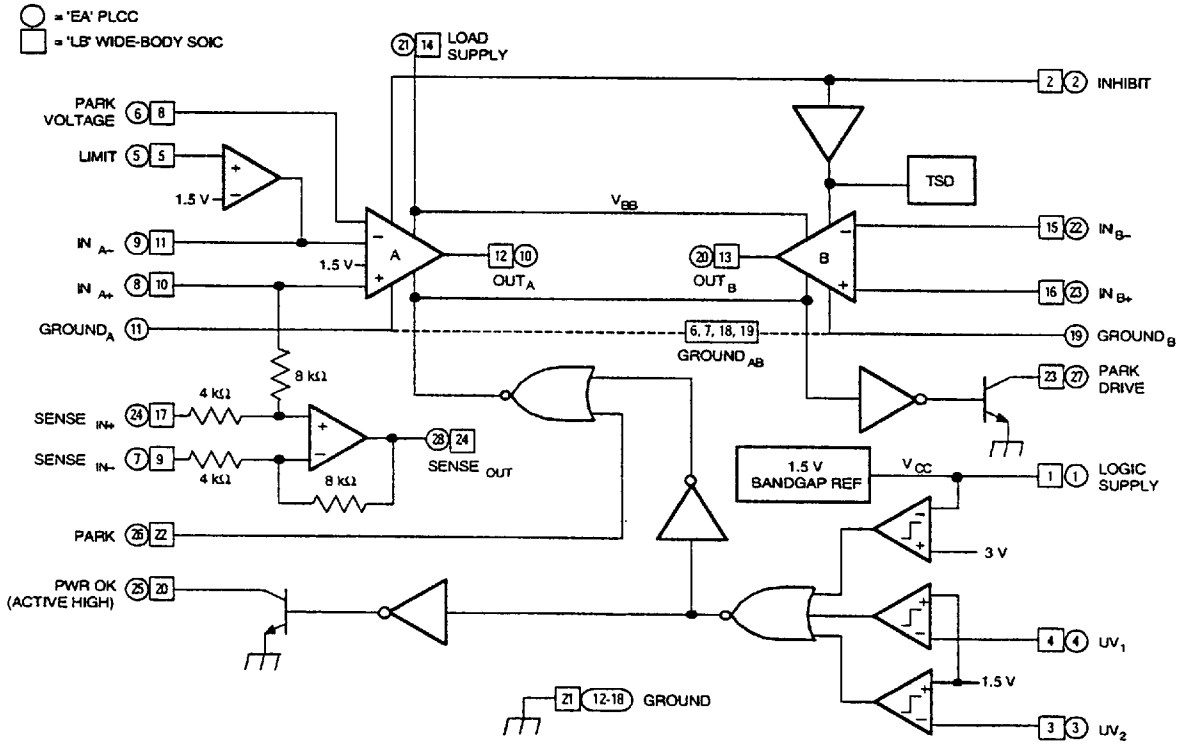
FUNCTIONAL BLOCK DIAGRAM



Dwg FP-020B

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ELECTRICAL CHARACTERISTICS at T_A = +25°C, V_{CC} = V_{BB} = 12 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	ΔV_{CC}		—	200	—	mV
Supply Current	I_{BB}	V_{OUT} = 6 V, no load	—	2.0	—	mA
	I_{CC}		—	23	—	mA
Inhibited Supply Current	—	I_{BB} + I_{CC}, $V_2 \geq 1.7$ V	—	3.0	8.0	mA
Thermal Shutdown Temp.	T_J		—	165	—	°C
Thermal Shutdown Hysteresis	ΔT_J		—	8.0	—	°C
Output Power Drivers						
Output Saturation Voltage	V_{SAT}	I_{OUT} = 250 mA	—	250	—	mV
		I_{OUT} = 800 mA	—	450	—	mV
		I_{OUT} = -250 mA	—	750	—	mV
		I_{OUT} = -800 mA	—	950	—	mV
Total Saturation Voltage (Source + Sink)	V_{SAT}	I_{LOAD} = 250 mA	—	1.0	1.4	V
		I_{LOAD} = 800 mA	—	1.4	2.0	V
Input Offset Voltage	V_{IO}	V_{CM} = 6 V	—	5.0	8.0	mV
Input Offset Drift	ΔV_{IO}		—	—	25	µV/°C
Input Bias Current	I_{IN}	Except IN_{A+}, V_{CM} = 6 V	—	-150	-500	nA
		IN_{A+} to $SENSE_{IN+}$ = 12 kΩ, T_J = 25°C	69	84	105	µA/V
Input Offset Current	I_{IO}	IN_B only, V_{CM} = 6 V	—	—	200	nA
Differential Sense Input Current	I_{ID}	I_{OUT} = 5 mA	—	±300	—	µA
		I_{OUT} = 500 mA	—	3.0	—	mA
Large Signal Gain	A_{VS}	V_{OUT} = 2 V to 10 V, I_{OUT} = ±500 mA	1.5	5.0	—	V/mV
Slew Rate	SR		—	4.0	—	V/µs
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 V to 10 V	70	90	—	dB
Clamp Diode Forward Voltage	V_F	I_F = 800 mA, $V_2 \geq 1.7$ V	—	1.0	1.2	V
High-Side Current Limit	I_{OUT}	T_J = 25°C	—	1.0	1.2	A
Power Supply Rejection	k_{SVR}	V_{CC} = 4 V to 15 V, V_{CM} = 1.5 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.

ELECTRICAL CHARACTERISTICS (continued)

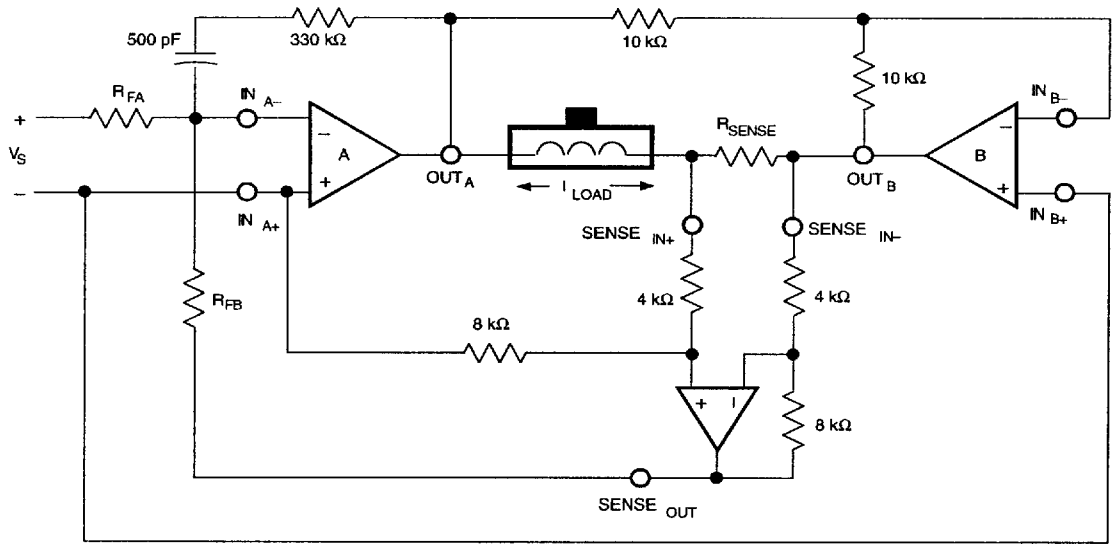
Characteristic	Symbol	Test Conditions	Limits			
			Min.	Typ.	Max.	Units
Current Sense Amplifier						
Input Offset Voltage	V_{IO}	V_{CM} = 6 V	—	—	2.0	mV
Input Offset Drift	ΔV_{IO}	V_{CM} = 0 V to 12 V	—	—	3000	µV/V
			—	—	8.0	µV/°C
Voltage Gain	A_{VS}	V_{ID} = -1 V to +1 V, V_{CM} = 6 V	1.95	2.00	2.05	—
Output Saturation Voltage	V_{SAT}	V_{OUT}, $I_{OUT(SINK)}$ = 1.5 mA	—	300	500	mV
		V_{CC} - V_{OUT}, $I_{OUT(SOURCE)}$ = -1.5 mA	—	400	700	mV
Park Function						
PARK DRIVE Leakage Current	I_{CEX}	V_{CEX} = 20 V	—	—	100	µA
PARK DRIVE Saturation Voltage	$V_{CE(SAT)}$	I_C = 200 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 V	—	—	100	µA
PARK VOLTAGE Input Current	$I_{PARK\ V}$		—	-150	-500	nA
Under-Voltage Protection						
UV Threshold	V_{UV}	Low-to-High Trans., Other Input = 6 V	1.48	1.50	1.52	V
UV Threshold Hysteresis	ΔV_{UV}		15	25	45	mV
UV Input Current	I_{UV}	V_{UV} = 1 V	—	-0.5	-1.5	µA
PWR OK Saturation Voltage	$V_{CE(SAT)}$	I_C = 5 mA	—	—	450	mV
PWR OK Leakage Current	I_{CEX}	V_{CEX} = 20 V	—	—	5.0	µA
Auxiliary Functions						
LIMIT Input Voltage	$V_{LIMIT(L)}$	OUT_A forced Low	0.7	0.8	—	V
	$V_{LIMIT(H)}$	OUT_A 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 V to 1.8 V	—	10	—	kΩ
INHIBIT Input Threshold	V_2		0.7	1.1	1.7	V
INHIBIT Input Current	I_2	V_2 = 1.7 V	—	—	200	µA

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

TERMINAL FUNCTIONS

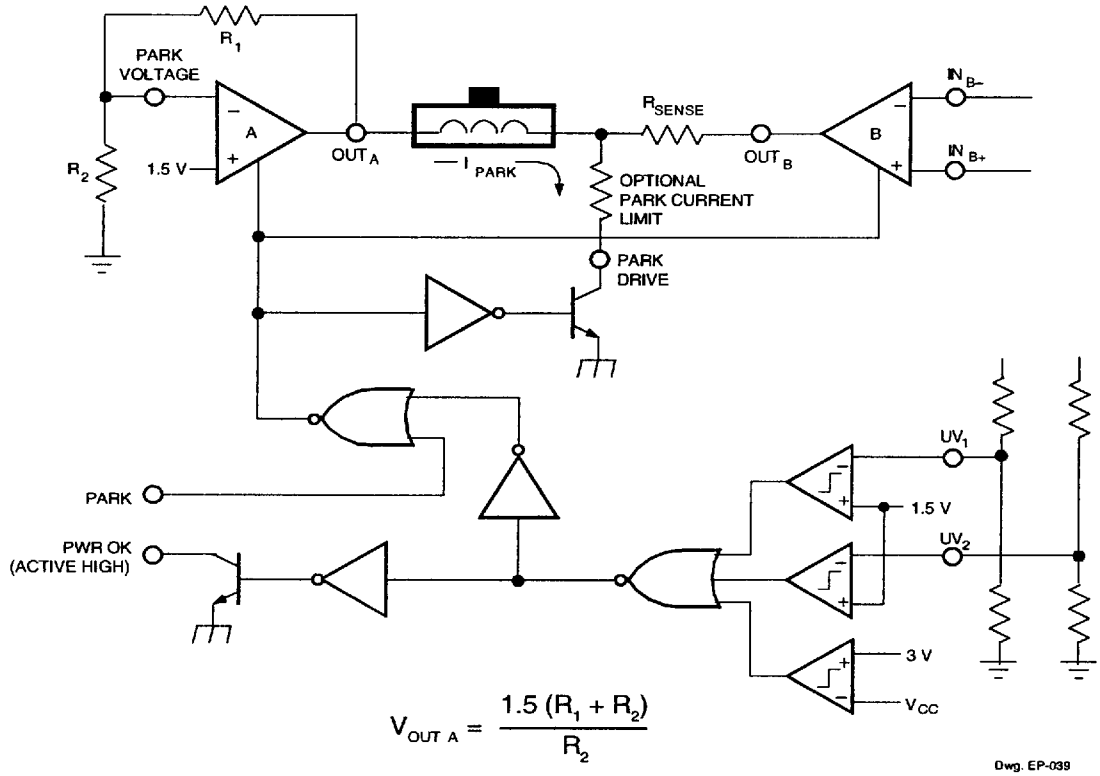
'EA' Term.	'LB' Term.	Terminal Name	Function
1	1	LOGIC SUPPLY	V_{CC}; logic supply voltage.
2	2	INHIBIT	An active-high logic input that inhibits the output stages without initiating a park.
3 & 4	3 & 4	UV_1 and UV_2	Under-voltage detection inputs. If not used, these terminals must be connected to the logic supply (V_{CC}).
5	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.
6	8	PARK VOLTAGE	Auxiliary inverting input to power amplifier A.
7	9	$SENSE_{IN-}$	Inverting input to current sense error amplifer.
8	10	IN_{A+}	Non-inverting input to power amplifier A.
9	11	IN_{A-}	Inverting input to power amplifier A.
10	12	OUT_A	Power amplifier A output to voice coil motor.
11	—	$GROUND_A$	Power ground of amplifier A.
12-18	—	GROUND	Circuit reference and thermal heat sink.
19	—	$GROUND_B$	Power ground of amplifier B.
20	13	OUT_B	Power amplifier B output to voice coil motor.
21	14	LOAD SUPPLY	V_{BB}; load supply voltage.
22	15	IN_{B-}	Inverting input to power amplifier B.
23	16	IN_{B+}	Non-inverting input to power amplifier B.
24	17	$SENSE_{IN+}$	Non-inverting input to current sense error amplifer.
—	18 & 19	$GROUND_{AB}$	Power amplifiers' ground and thermal heat sink.
25	20	PWR OK	A logic low at this output indicates an under-voltage condition.
—	21	GROUND	Circuit reference.
26	22	PARK	An active-high logic input that activates the park function.
27	23	PARK DRIVE	Power transistor for retract current control on power down or park command.
28	24	$SENSE_{OUT}$	Output of current sense error amplifier.

CURRENT SENSING



Dwg. EP-034

PARKING FUNCTION



$$V_{OUT\ A} = \frac{1.5\ (R_1 + R_2)}{R_2}$$

Dwg. EP-039

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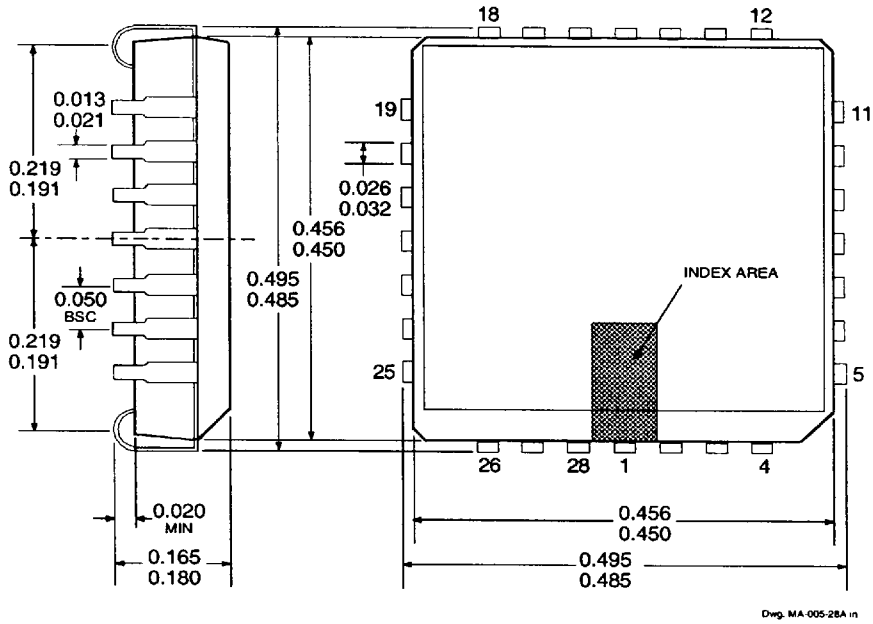
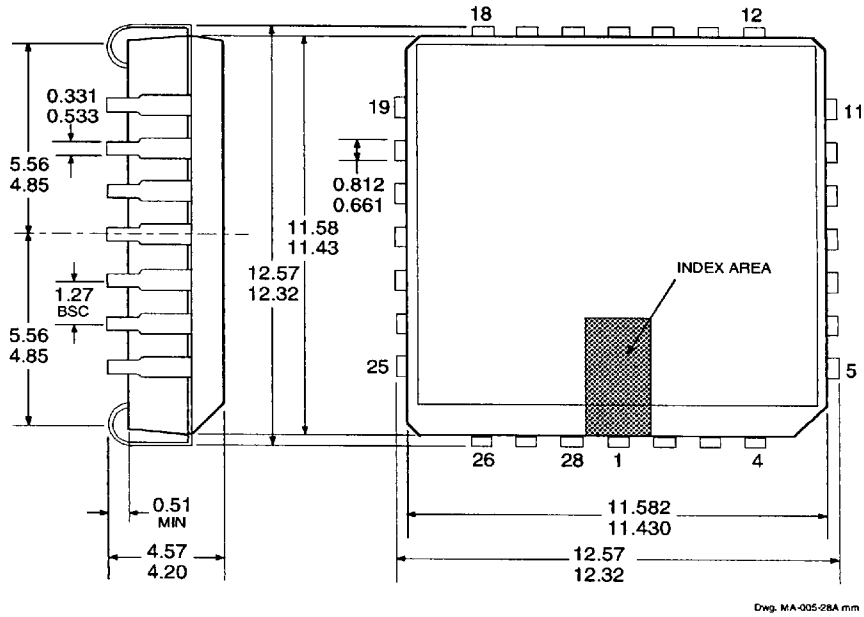
A8958CEA

Dimensions in Inches



Dwg. MA-005-28A in

Dimensions in Millimeters
(Based on 1" = 25.4 mm)

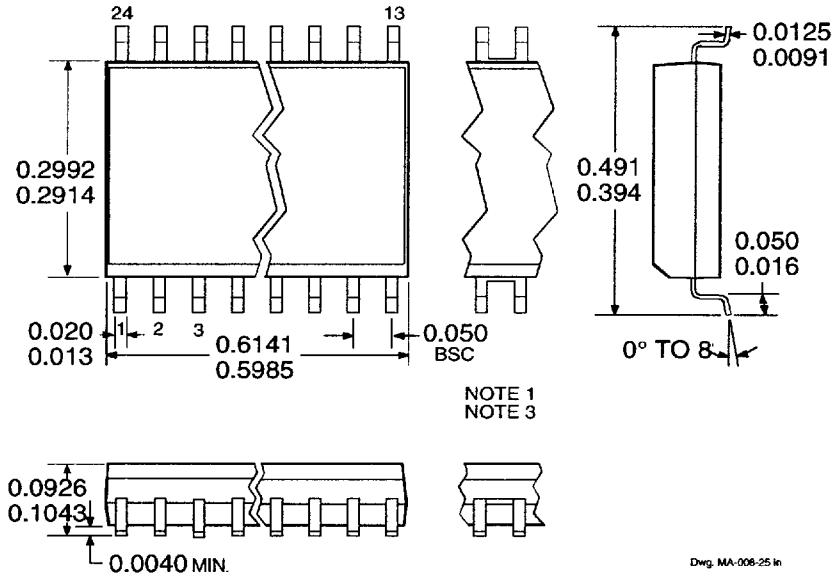


Dwg. MA-005-28A mm

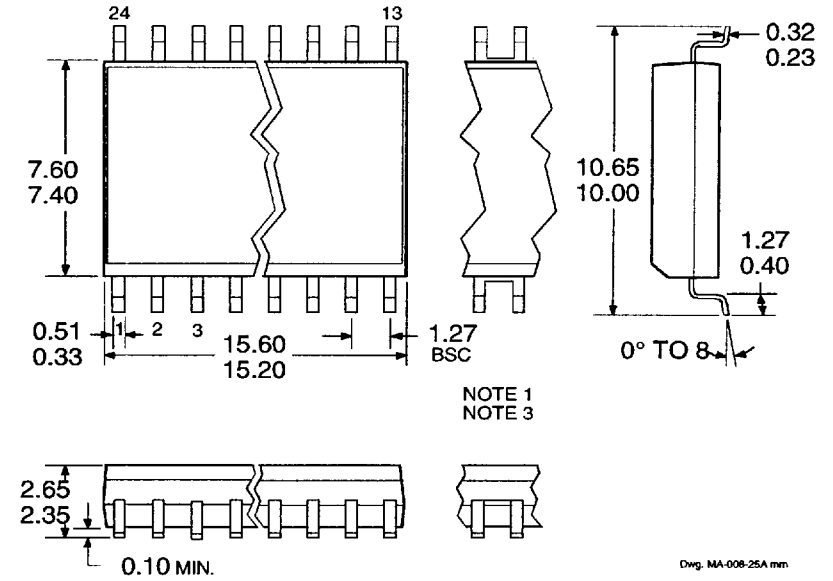
NOTES: 1. Webbed lead frame. Leads 12-18 are internally one piece.
2. Lead spacing tolerance is non-cumulative.
3. Exact body and lead configuration at vendor's option within limits shown.

A8958CLB

Dimensions in Inches
(Based on 1 mm = 0.03937")



Dimensions in Millimeters



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.

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