

**8-Bit HV Parallel Driver IC**



**FEATURES**

- High voltage driver with 8 parallel push-pull outputs
- Supply Voltage: 20VDC...300VDC (absolute max supply voltage is 320V)
- Output current per channel is  $\pm 40\text{mA}$  (sink/source)
- Direct transistor gate control input
- Switching time control for high speed applications by external resistance
- N-channel MOSFET outputs for lower power consumption

**APPLICATIONS**

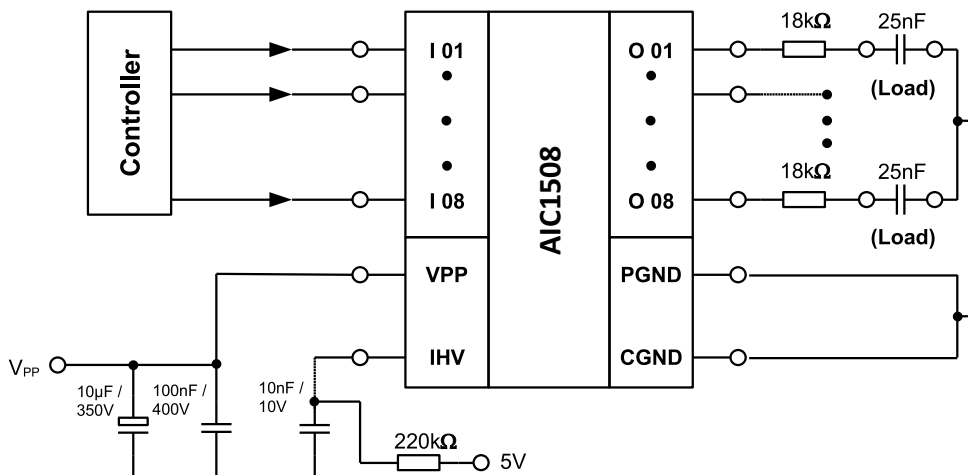
- Drive of Capacitive Actuators
- Piezo Transducer Excitation
- Electro-Luminescent Displays

**DESCRIPTION**

The AIC1508 is a rigid, low-cost general purpose high voltage driver IC with 8 high voltage push-pull outputs. The device has been designed for harsh industrial applications and allows a wide application area. The outputs can drive capacitive and resistive loads such as piezoelectric transducers, electroluminescent devices and micro-mechanical actuators. The maximum operating voltage is 300V, and each output has a source-sink capability of up to 40mA.

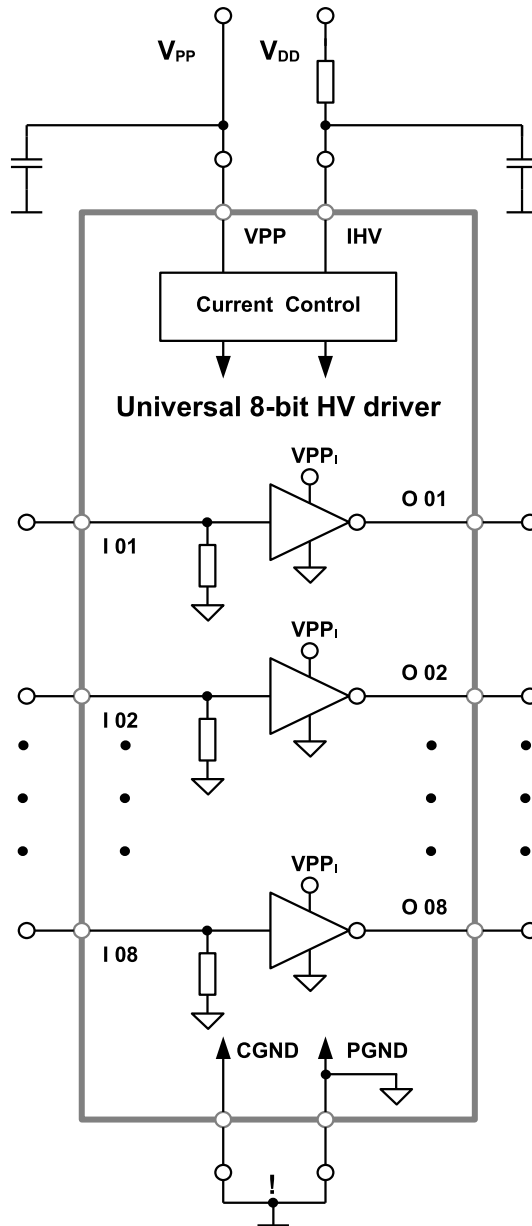
External output resistors can be used to limit the maximum power dissipation of the device, allowing the outputs to be run in parallel. The IC also allows the use of an external resistor to set the switch-on time of the outputs. The IC provides protected direct transistor gate inputs. The high voltage push-pull outputs are well protected against possible latch-up by using the bulk-drain diodes of the output MOSFETs and their full dielectric isolation.

**Figure 1: Common Application Circuit**



**BLOCK DIAGRAM**

Figure 2: Block Diagram



**PINOUT AND DESCRIPTION TABLE (SOP20L)**

Pin Number	Name	Description
1	VPP	Power supply of the 8 high voltage push-pull outputs
2	I 01	Input 01
3	I 02	Input 02
4	I 03	Input 03
5	I 04	Input 04
6	I 05	Input 05
7	I 06	Input 06
8	I 07	Input 07
9	I 08	Input 08
10	CGND	Capacitive ground (must connected to PGND)
11	PGND	Power ground of the 8 high voltage push-pull outputs
12	O 08	High voltage push-pull output 08
13	O 07	High voltage push-pull output 07
14	O 06	High voltage push-pull output 06
15	O 05	High voltage push-pull output 05
16	O 04	High voltage push-pull output 04
17	O 03	High voltage push-pull output 03
18	O 02	High voltage push-pull output 02
19	O 01	High voltage push-pull output 01
20	IHV	Input to connect an external resistor to adjust the switching speed of the high voltage push-pull outputs (if not necessary this pin can be left open)

**ABSOLUTE MAXIMUM RATINGS**

Parameter	Symbol	Min	Max	Unit
High voltage supply	$V_{PP}$	-0.3	320	V
Output voltages	$V_{OUT}$	-0.3	320	V
Slew rate of $V_{PP}$	$W_{VPP}$		160	V/ms
Input levels	$V_{IN}$	-0.3	12	V
IHV input level	$I_{IHV}$	-100	300	$\mu A$
Continuous total power dissipation	$P_{TOT}$		600	mW
Storage temperature range	$T_{stg}$	-55	150	$^{\circ}C$
Junction temperature range	$T_J$	-40	150	$^{\circ}C$
Thermal resistance	$R_{thja}$		90	K/W

**NORMAL OPERATING RANGE**

Parameter	Symbol	Min	Typ	Max	Units
High voltage supply	$V_{PP}$	30		300	V
Output voltages	$V_{OUT}$	0		300	V
High level input voltage <sup>1</sup>	$V_{INH}$	2.5		11	V
Low level input voltage <sup>1</sup>	$V_{INL}$	0		0.6	V
IHV input current	$I_{IHV}$	-0.1	25	200	$\mu A$
Operating junction temperature	$T_J$	-40		125	$^{\circ}C$
Operating temperature	$T_{amb}$	-40		70	$^{\circ}C$

1. The input voltage area between 0.6V to 2.5V is forbidden with respect to total power dissipation

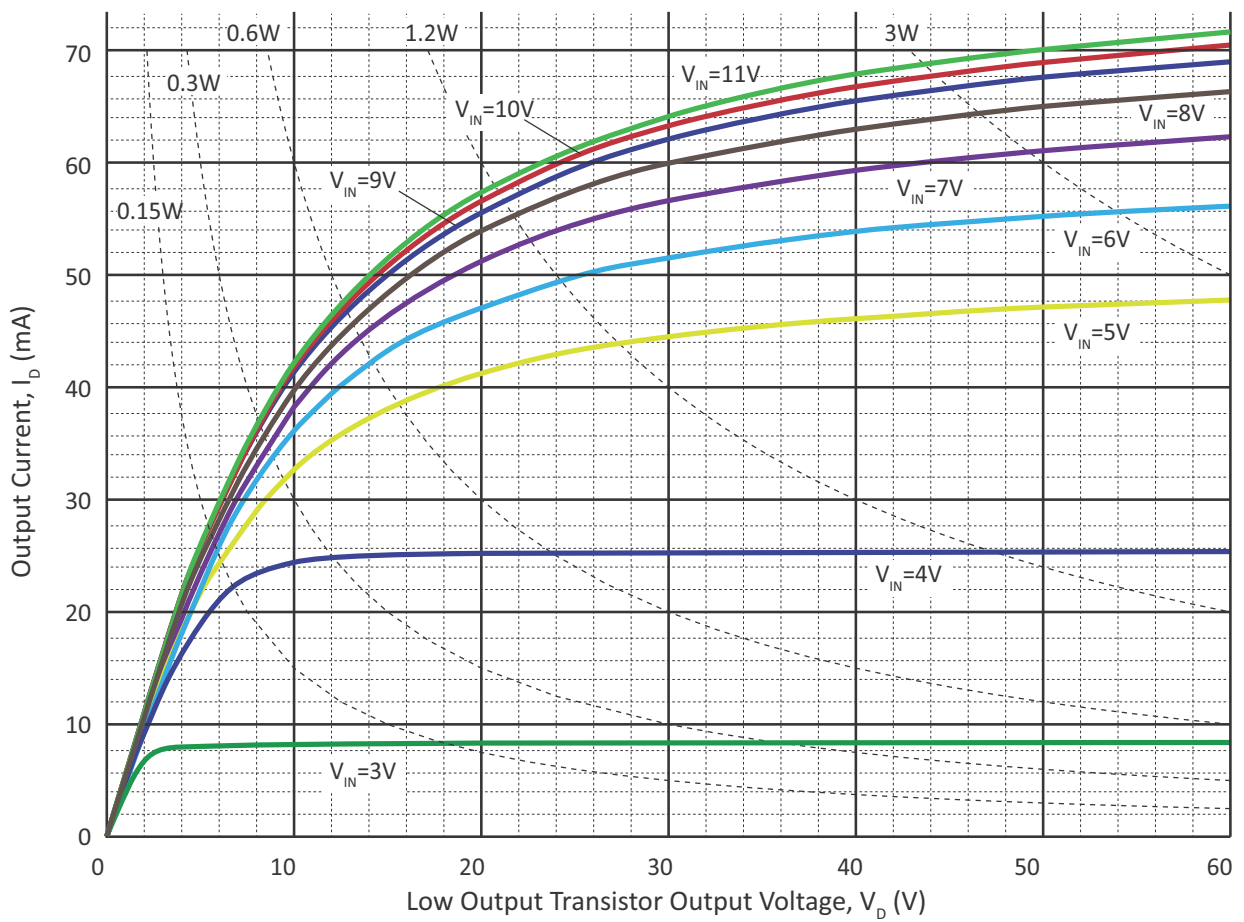
**DC CHARACTERISTICS**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Quiescent supply current with High level input	$I_{PPQH}$	$V_{IN} = 5.0V$		50	150	$\mu A$
Quiescent supply current with Low level input	$I_{PPQL}$	$V_{IN} = 0.1V$		6	20	$\mu A$
High level input current	$I_{INH}$	$V_{IN} = 5.0V$		17	50	$\mu A$
Low level input current	$I_{INL}$	$V_{IN} = 0.1V$		1	5	$\mu A$
Voltage drop over one lower output transistor	$\Delta V_{D LOT 5}$	$I_O = 10mA$ $V_{IN} = 5.0V$		2.5	10	V
Voltage drop over one lower output transistor	$\Delta V_{D LOT 11}$	$I_O = 10mA$ $V_{IN} = 11.0V$		2.0	8	V
Voltage drop over one upper output transistor	$\Delta V_{D UOT}$	$I_O = 10mA$ $V_{IN} = 0.1V$		3.5	12	V
Minimal output current of one lower output transistor	$I_{Dmin LOT 5}$	$V_{DS} = 30V$ $V_{IN} = 5.0V$	$20^1$		1	mA

Minimal output current of one lower output transistor	$I_{Dmin\ LOT\ 11}$	$V_{DS} = 30V$ $V_{IN} = 11.0V$	$40^1$		1	mA
Minimal output current of one upper output transistor	$-I_{Dmin\ UOT}$	$V_{DS} = 30V$ $V_{IN} = 0.1V$	$40^1$		1	mA
Input capacitance	$C_{IN}$	$V_{IN} = 0V$ $f = 1MHz$		5.6	10	pF

1. With respect to total power dissipation, see figure 3

**Figure 3: One Low Output Transistor with Respect to Input Voltage and Power Dissipation**



**AC CHARACTERISTICS**

Conditions :  $T_{amb} = 25\text{ }^{\circ}\text{C} \pm 5\text{K}$ ,  $V_{pp} = 200\text{V}$ ,  $V_{IHV} = 0\text{V}$ ; unless otherwise specified

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Propagation delay time, $V_{IN} \rightarrow$ low to high	$t_{PLH}$	$V_{IN} = 0.0\text{V} - 5.0\text{V}$ $C_L = 20\text{pF}$ (Figure 4)		1		$\mu\text{s}$
Propagation delay time, $V_{IN} \rightarrow$ high to low	$t_{PHL}$	$V_{IN} = 5.0\text{V} - 0.0\text{V}$ $C_L = 20\text{pF}$ (Figure 4)		15		$\mu\text{s}$
Output Fall time	$t_{OFF}$	$V_{IN} = 0.0\text{V} - 5.0\text{V}$ $C_L = 20\text{pF}$ (Figure 4)		1		$\mu\text{s}$
Output Rise time	$t_{ON}$	$V_{IN} = 5.0\text{V} - 0.0\text{V}$ $C_L = 20\text{pF}$ (Figure 4)		30		$\mu\text{s}$

**WAVEFORMS AND TEST CIRCUIT**

**Figure 4: Switching Wave Forms**

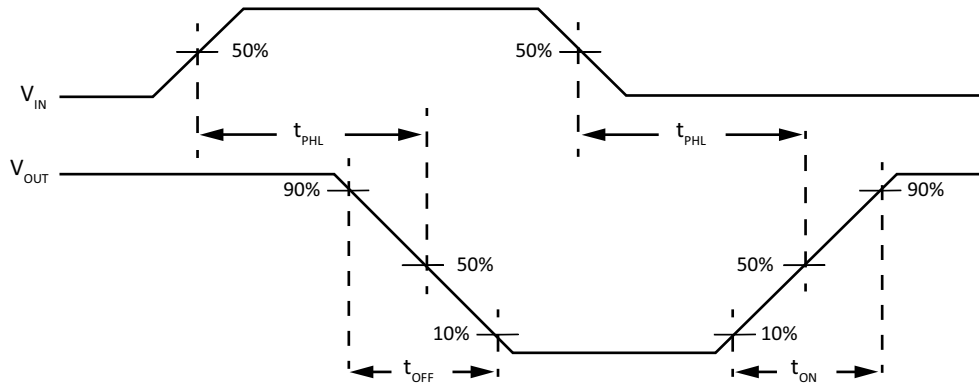


Figure 5: Test Circuit

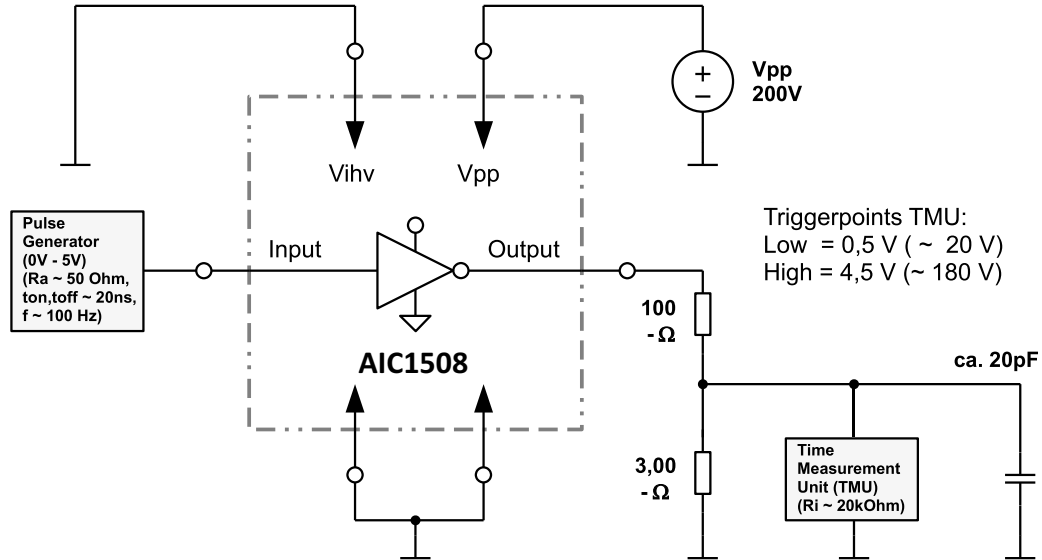
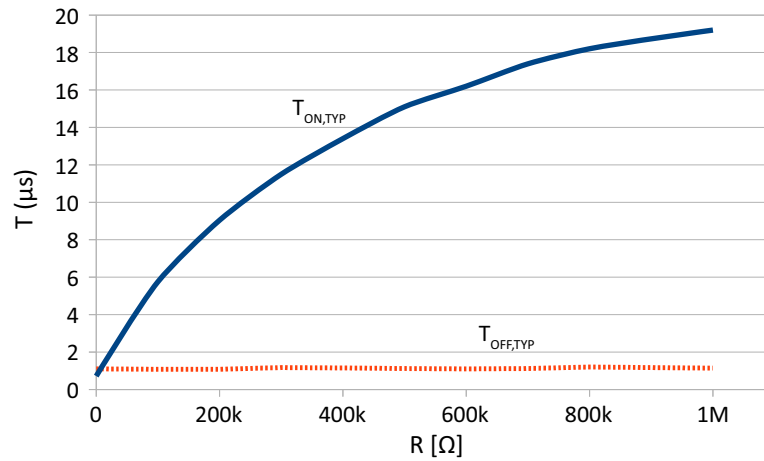
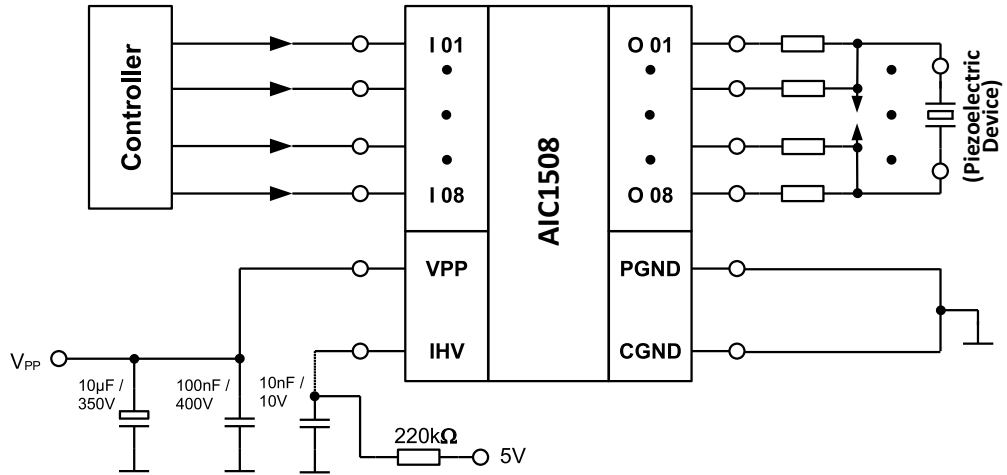


Figure 6: Dependence of rise - and fall time ( $t_{on}$ ,  $t_{off}$ ) on  $R_{IHV}$  at  $V_{DD} = 5V$

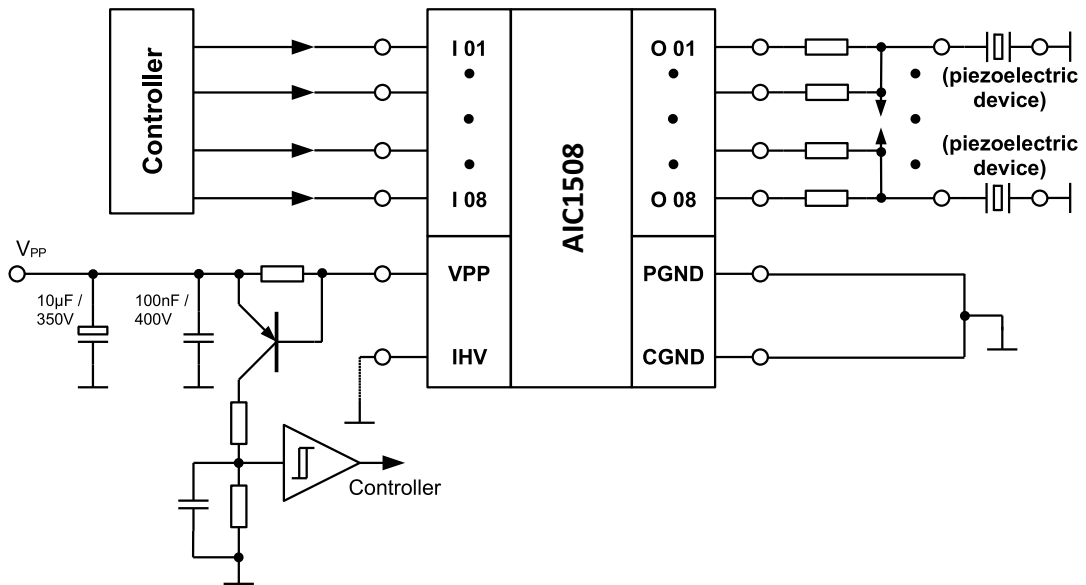


**APPLICATION**

**Figure 7: Example application with full bridge (basic circuit)**

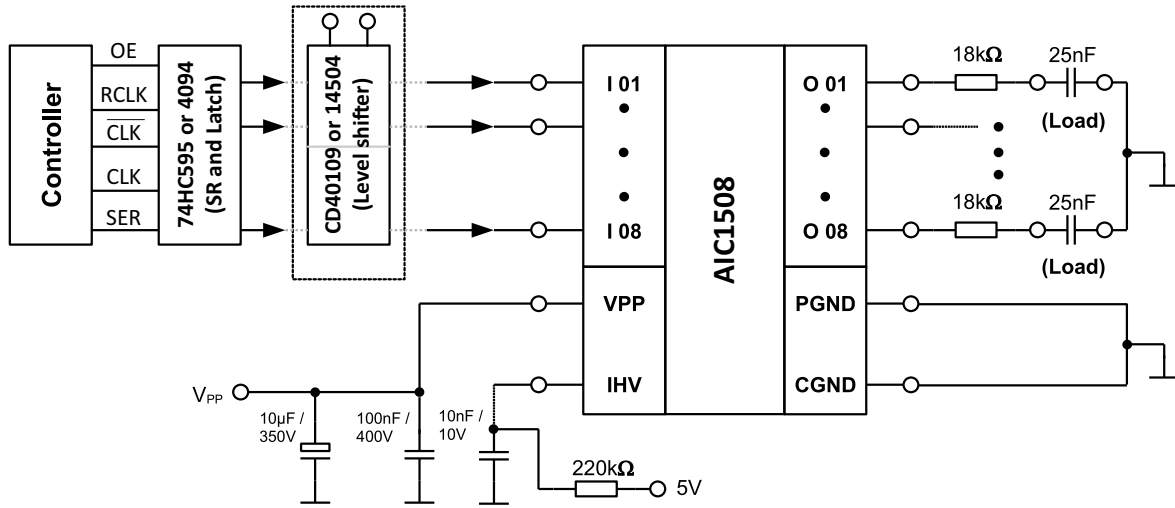


**Figure 8: Example application with over current protection (basic circuit)**





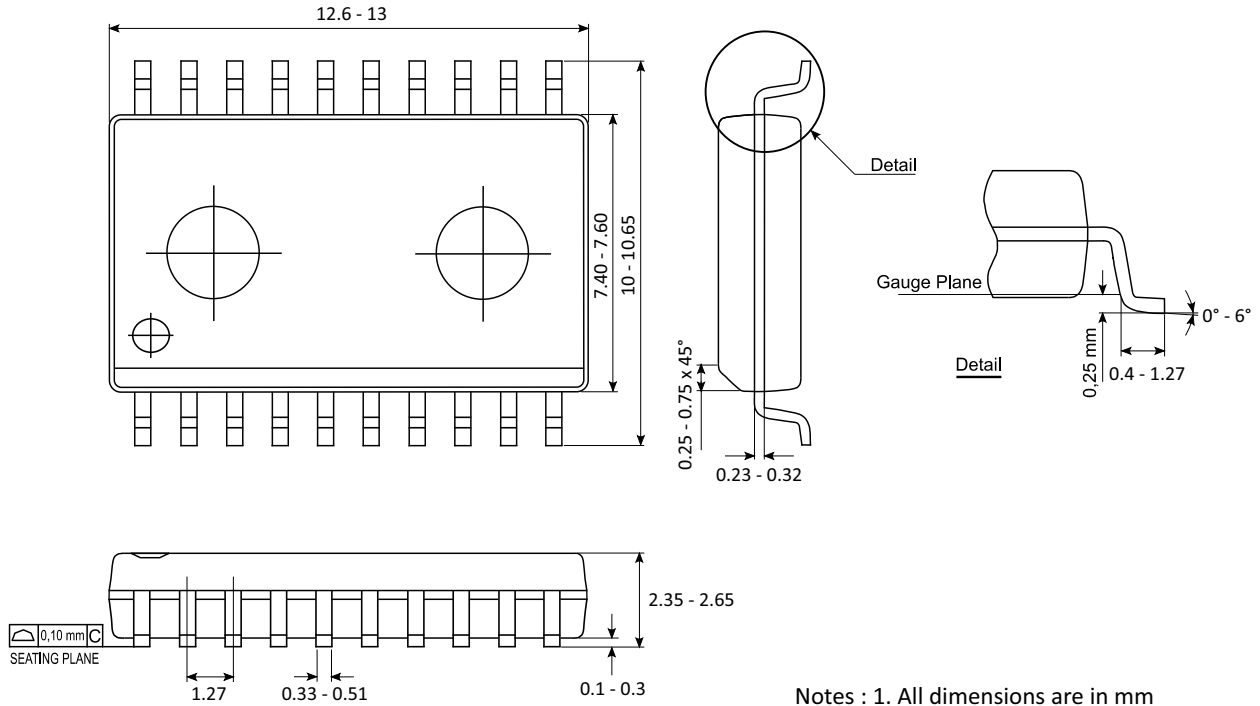
**Figure 9: Example Application with controller with serial outputs (basic circuit)**



**PACKAGE OPTIONS**

Part Number	Apex Package Style	Description
AIC1508	ZF	20-pin SOP

**20-PIN SOP PACKAGE STYLE**



Notes : 1. All dimensions are in mm

## ***ESD PROTECTION***

The Requirements for Handling Electrostatic Discharge Sensitive Devices are described in the JEDEC standard JESD625-A. Please note the following recommendations:

- When handling the device, operators must be grounded by wearing a for the purpose designed grounded wrist strap with at least 1M $\Omega$  resistance and direct skin contact.
- Operators must at all times wear ESD protective shoes or the area should be surrounded by for ESD protection intended floor mats.
- Opening of the protective ESD package that the device is delivered in must only occur at a properly equipped ESD workbench. The tape with which the package is held together must be cut with a sharp cutting tool, never pulled or ripped off.
- Any unnecessary contact with the device or any unprotected conductive points should be avoided.
- Work only with qualified and grounded tools, measuring equipment, casing and workbenches.
- Outside properly protected ESD-areas the device or any electronic assembly that it may be part of should always be transported in EGB/ESD shielded packaging.

## ***STORAGE CONDITIONS***

The AIC1508 corresponds to moisture sensitivity classification MSL3, according to JEDEC standard J-STD-020, and should be handled and stored according to J-STD-033.

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## NEED TECHNICAL HELP? CONTACT APEX SUPPORT!

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