

MS6363

----- Low-Cost, Three-Channel, 6th-Order HDTV Video Filter Driver

PRODUCT DESCRIPTION

The MS6363 is a video buffer which integrates triple 6dB Gain rail-to-rail output driver and triple 3rd order reconstruction filter, it has 35MHz -3dB bandwidth and 160V/ μ s slew rate. MS6363 provides improved image quality compared with passive LC filters and discrete drivers solution. Operating from single supplies ranging from +2.5V to +5.5V and sinking an ultra-low 27.5mA quiescent current, the MS6363 is ideally suited for battery powered applications.

MS6363 can be DC-coupled or AC-coupled with input video signal, such as the output of DAC. Internal diode clamps and bias circuitry may be used if AC-coupled inputs are required. MS6363 also integrates an internal level shift circuit which avoids sync-pulse being clipped and allows DC-coupled output. The driver in MS6363 can drive DC or AC-coupled single (150 Ω) or dual (75 Ω) loads.

The MS6363 has lead (Pb) free SOIC-8 package and ESD(HBM) reaches 8KV.

FEATURES

- Three Sixth-order 35MHz (HD) Filter
- Transparent input clamping
- 6dB output driver Gain and drive dual video load
- Rail-to-Rail Output
- Input Voltage Range Includes Ground
- AC or DC Coupled Inputs
- AC or DC Coupled Outputs
- Operates from 2.5V to 5.5V Single power supply
- Low Power (9.2mA/channel) 27.5mA total Supply Current
- Lead (Pb) Free SOIC-8 package

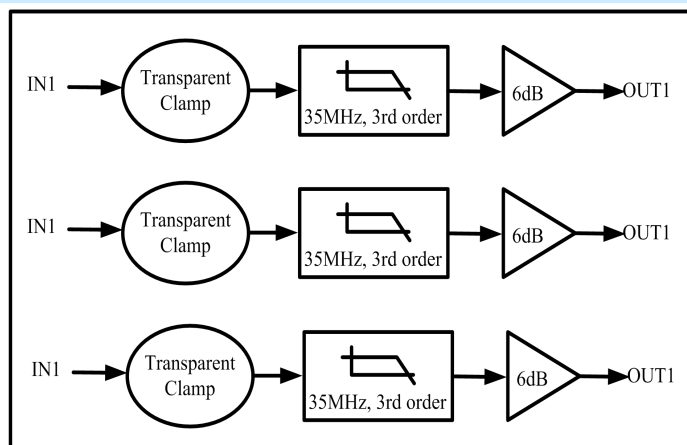
APPLICATIONS

- Video On Demand (VOD)
- Cable and Satellite Set-top Boxes
- DVD Players
- HDTV
- Personal Video Recorders (PVR)
- Communications device
- Portable and handheld product
- Personal video recorder
- Projector

MS6363
SOIC-8



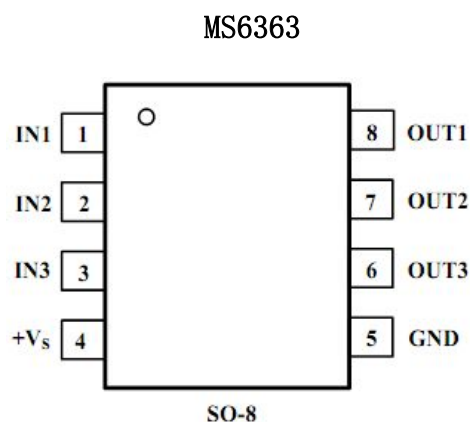
BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS

(At $R_L = 150\Omega$ connected to GND, $V_{in}=1V_{pp}$, and $C_{IN} = 0.1\mu F$, all outputs AC coupled with $220\mu F$, unless otherwise noted)。

PARAMETER	CONDITION	TYP	MIN/MAX OVER TEMPERATURE					
		+25℃	+25℃	0℃ to 70℃	-40℃to85℃	-40℃ to125℃	UNITS	MIN/MAX
INPUT CHARACTERISTICS								
Output Level Shift Voltage (VOLS)	Vin=0V, no load	235	327	330	340	370	mv	MAX
Input Bias Current (IB)							pA	TYP
Input Voltage Clamp (VCLAMP)	Iin= -1mA	-4.5	-15	-16	-19	-22	mV	MIN
Clamp Charge Current	Vin=Vclp-100mV	-5	-6.0	-6.1	-6.6	-7.2	mA	MIN
Input Resistance (Rin)	0.5V<Vin<1.0V						MΩ	MIN
Voltage Gain (AV)	RL=150	2	1.92	1.90	1.88	1.85	V/V	MIN
			2.04	2.06	2.08	2.1	V/V	MIN
OUTPUT CHARACTERISTICS								
Output Voltage High Swing	VIN = 3V, R = 150Ω to GNDL	4.5	4.3	4.28	4.25	4.2	V	MIN
Output Short-Circuit Current (ISC)	VIN = 3V, to GND through 10Ω	-105	-102				mA	MAX
	VIN = 100mV, out short to VDD through 10 Ω	115	103				mA	MIN
POWER SUPPLY								
Operating Voltage Range			2.5	2.7	2.7	2.7	V	MIN
			5.5	5.5	5.5	5.5	V	MAX
Power Supply Rejection Ratio(PSRR)	Vs=+2.7 to +5.5V	60	58	58	57	56	dB	MIN
Quiescent Current (Iq)	Vin=500mV	27.5	31.5	32	33	34	mA	MAX
DYNAMIC PERFORMANCE								
±0.1dB Bandwidth	Rl=150 Ω	11.8					MHz	TYP
-3dB Bandwidth	Rl=150 Ω	35					MHz	TYP
Filter Response	Fin=44.25MHz	-5.0					dB	TYP
	Fin=74.25MHz	-13.5					dB	TYP
Slew Rate	Vin=1Vstep, 20% to 80%	160					V/us	TYP
Differential Gain (DG)	NTSC & PAL DC	0.02					%	TYP
	NTSC & PAL AC	0.3					%	TYP
Differential Phase (DP)	NTSC & PAL DC	0.02						TYP
	NTSC & PAL AC	0.36						TYP
Group Delay Variation (D/DT)	f = 400KHz, 26.5MHz	1.2					ns	TYP
Crosstalk (channel - to - channel)	at 1MHz	-64					dB	TYP
Fall Time	2.0V step, 80%--20%	9.8					ns	TYP
Rise Time	2.0V step, 80%--20%	10.5					ns	TYP

PIN CONFIGURATIONS


1-2. SO-8

1. Pin Description

Pin	Name	Function
1	IN1	Video input ,channel 1
2	IN2	Video input ,channel 2
3	IN3	Video input ,channel 3
4	+Vs	Power supply
5	GND	Ground
6	OUT3	Filtered output ,channel 3
7	OUT2	Filtered output ,channel 2
8	OUT1	Filtered output ,channel 1

CAUTION

This integrated circuit can be damaged by ESD if you don't pay attention to ESD protection. ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

ABSOLUTE MAXIMUM RATINGS

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

PARAMETER	MAXIMUM
Supply Voltage, V+ to V-	7.5V
Input Voltage	GND-0.3V to (+VS)+0.3V
Storage Temperature Range	-65°C to +150°C
Junction Temperature	160°C
Operating Temperature Range	-40°C to +125°C
Power Dissipation, PD @ TA = 25°C SO-8	0.8W
Package Thermal Resistance SO-8, θ_{JA}	128°C/W
Lead Temperature Range (Soldering 10 sec)	260°C
ESD Susceptibility	
HBM	8000V
MM	400V

TYPICAL PERFORMANCE CHARACTERISTICS

At $V_S = +5.0V$, $T_A = +25^\circ C$, $R_L = 150\Omega$, all outputs AC coupled with $220\mu F$, unless otherwise noted.

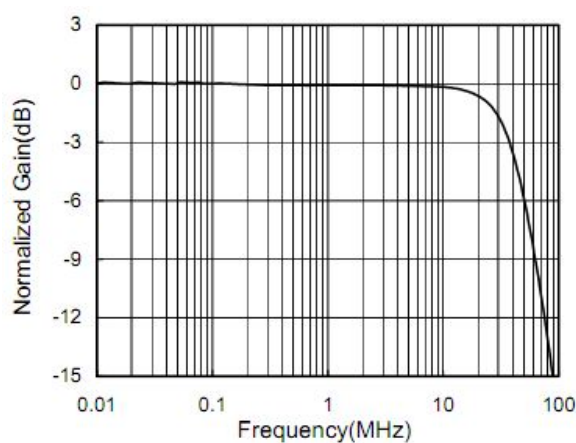


Figure 2. Frequency Response

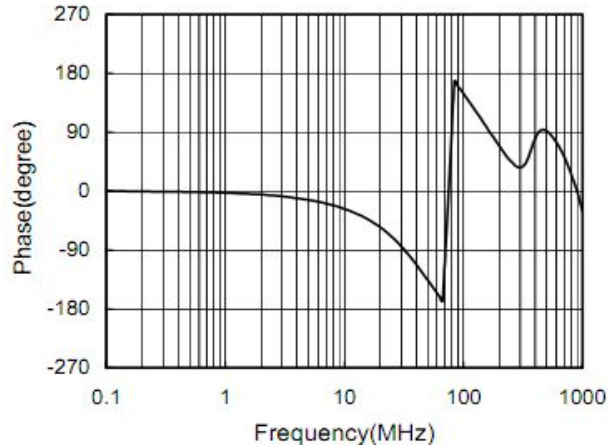


Figure 3. Phase vs. Frequency

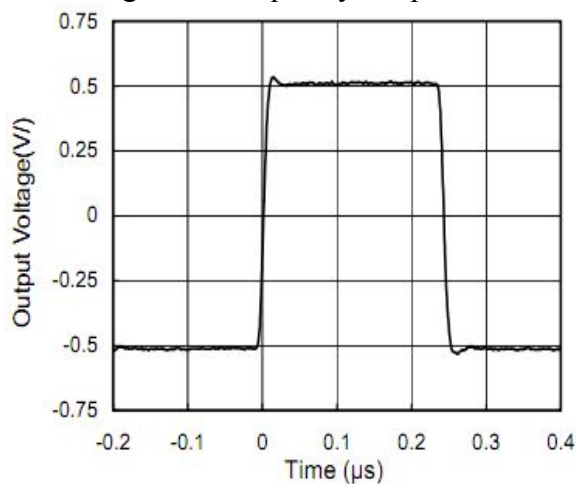


Figure 4. Large Signal Step Response

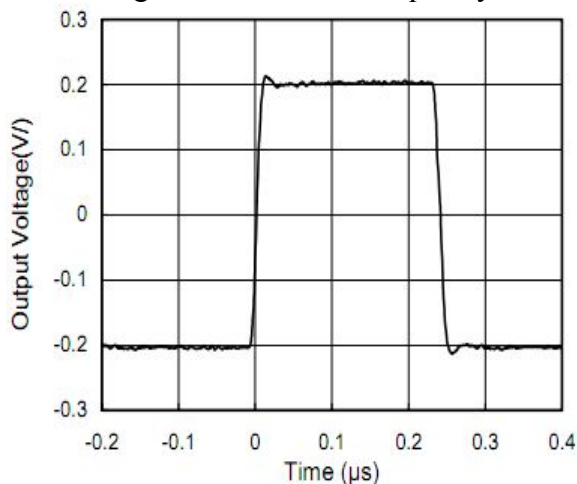


Figure 5. Large Signal Step Response

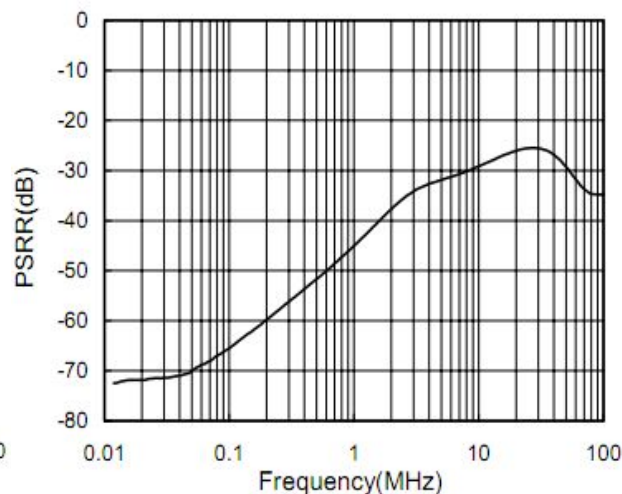
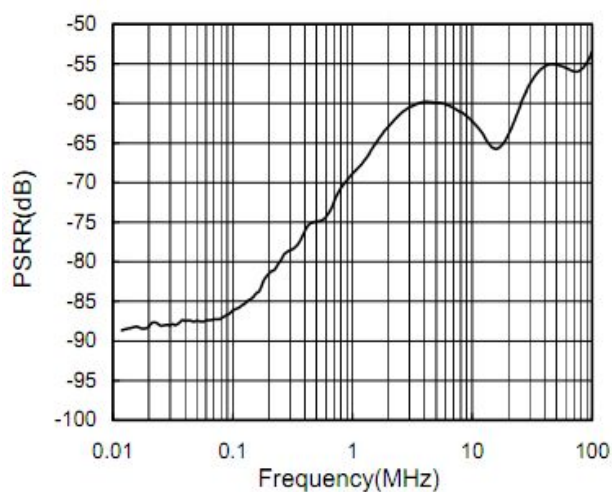


Figure 6. PSRR vs. Frequency (By pass Caps) Figure 7. PSRR vs. Frequency (No by pass Caps)

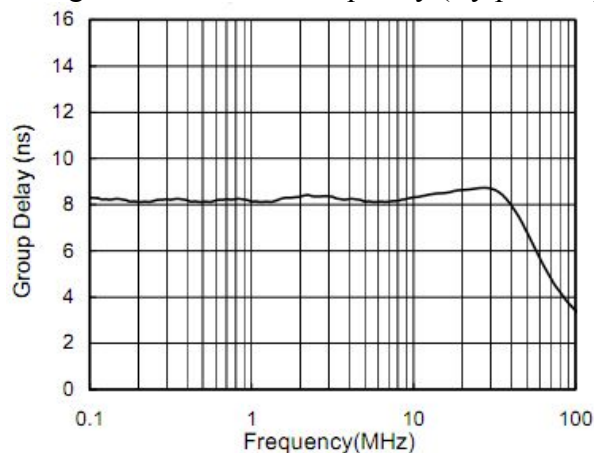


Figure 8. Group Delay vs. Frequency

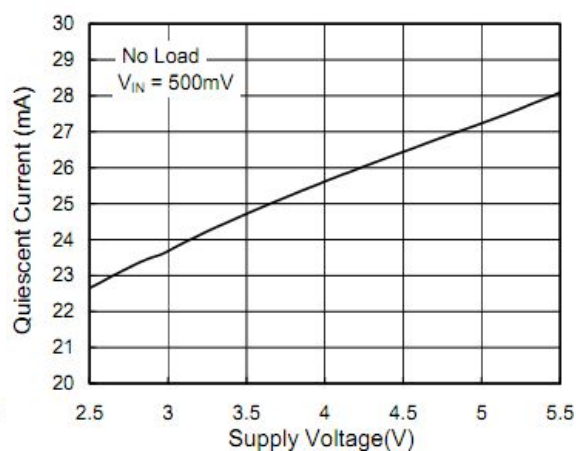


Figure 9 . Group Delay vs. Frequency

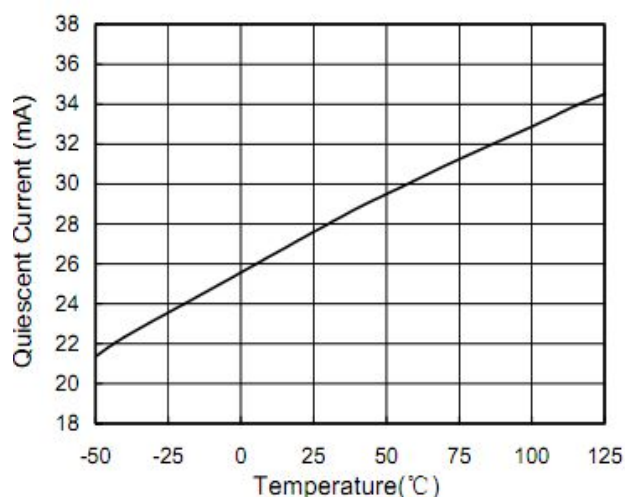


Figure 10. Quiescent Current vs. Temperature

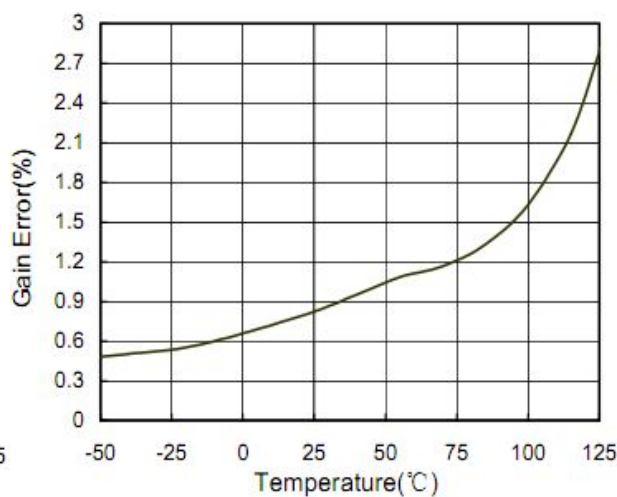


Figure 11. Gain Error vs. Temperature

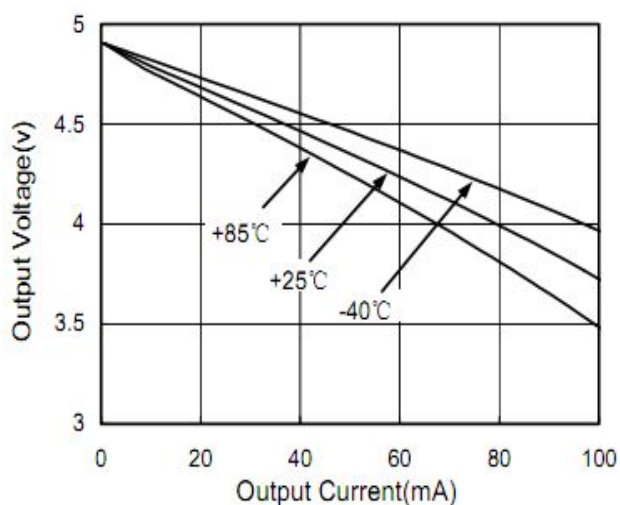


Figure 12. Output Voltage Swing to The Positive Rail vs. Output Current

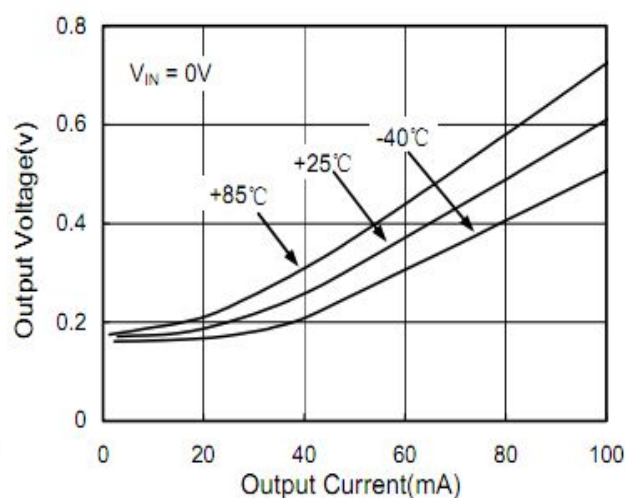


Figure 13. Output Voltage Swing to The Negative Rail vs. Output Current

APPLICATIONS INFORMATION

Functional Description

MS6363 operates from a single +2.5V to +5V supply. In application, MS6363 is a fully integrated solution for filtering and buffering HDTV signals in front of video decoder or behind video encoder. For example, MS6363 can replace three passive LC filters and three amplifier drivers at R\G\B and Y\Pb\Pr output side in set-top box and DVD player, this solution can help you save PCB size and production cost, it also improves video signal performance comparing with traditional design using discrete components. MS6363 features a DC-coupled input buffer, 3-pole low-pass filter to eliminate out-of-band noise of video encoder, and a gain of +6dB in the output amplifier to drive 75 Ω load. The AC or DC-coupled input buffer eliminates sync crush, droop, and field tilt. The output of MS6363 also can be DC-coupled or AC-coupled.

Input Considerations

Besides AC coupling, the MS6363 inputs also can be DC-coupled. In DC coupling application, No input coupling capacitors are needed because the amplitude of input video signal from DAC includes ground and extends up to 1.4V, then MS6363 can be directly connected to the output of a single-supply, current-output DAC without any external bias network. Some time, if DAC's output level exceeds the range of 0V to 1.4V, or MS6363 is driven by an unknown external source or a SCART switch which has its own clamping circuit, AC coupling is needed in such application.

Output Considerations

The MS6363 outputs can be DC-coupled or AC-coupled. While 0V is input, the MS6363 output voltage is 260mV typically. In DC coupling design, one 75 Ω resistor is used to Connect MS6363's output pin with external load directly, this serial back-termination resistor is used to match the impedance of the transmission line between MS6363 and external load to cancel the signal reflection. The MS6363 outputs can sink and source current allowing the device to be AC-coupled with external load, in AC coupling, 220 μ F at least capacitor will be used in order to cancel field tilt.

Power-Supply Bypassing and Layout

Correct power supply bypassing is very important for optimizing video performance in design. One 0.1 μ F and one 10 μ F capacitors are always used to Bypass VCC pin of MS6363, please place these two capacitors as close to the MS6363 output pin as possible, a large ground plane is also needed to ensure optimum performance. The input and output termination resistors should be placed as close to the related pin of MS6363 as possible to avoid performance degradation. The PCB traces at the output side should have 75 Ω characteristic impedance in order to match the 75 Ω characteristic impedance cable connecting external load. In design, please keep the board trace at the inputs and outputs of the MS6363 as short as possible to minimize the parasitic stray capacitance and noise pickup.

Typical Application Diagram

The following schematic in Figure 15 is normally used for AC coupled output and DC-coupled input with DAC which has an output voltage range of 0V to 1.4V. AC coupled output offer slightly lower power dissipation and high ESD protection ability. The schematics in Figure 14 is are also popular in design. Figure 16 is a kind of special application in STB.

In the use of optical transceiver and other solutions, all input and output ports need to add TVS tube.

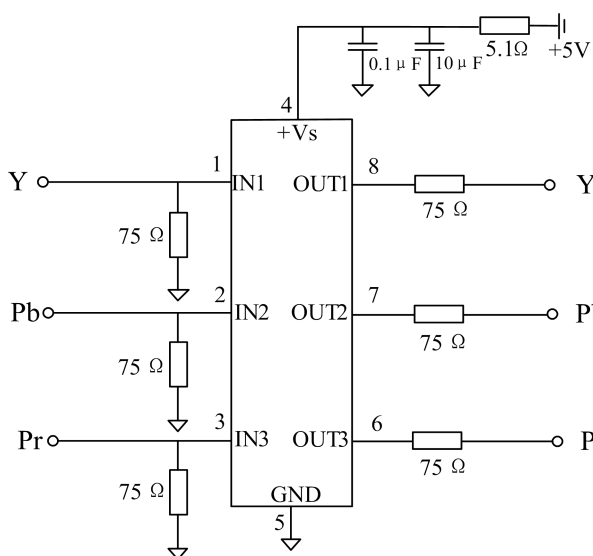


Figure 14. DC Coupling Application Schematic

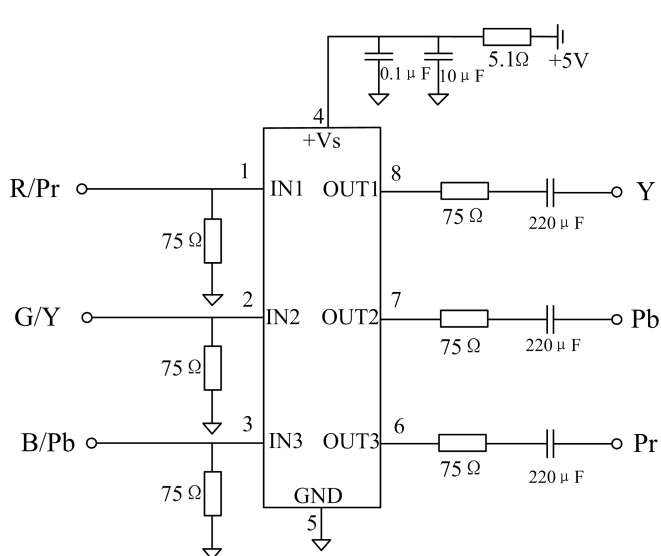
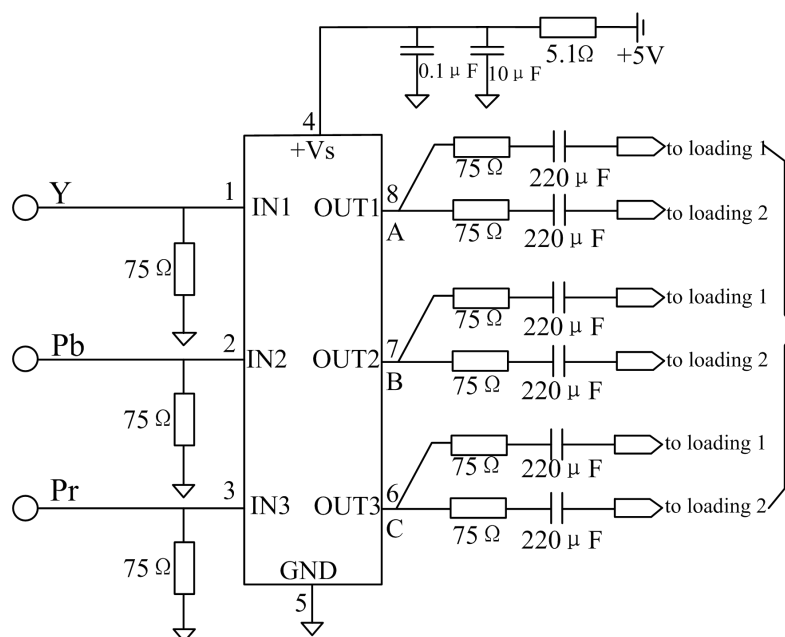


Figure 15. Input DC Coupling and Output AC Coupling Application Schematic



The three ports of A, B and C should be immediate as signal output pin in layout

Figure 16. The DC Coupling Circuit Schematic is recommended in applications of STB

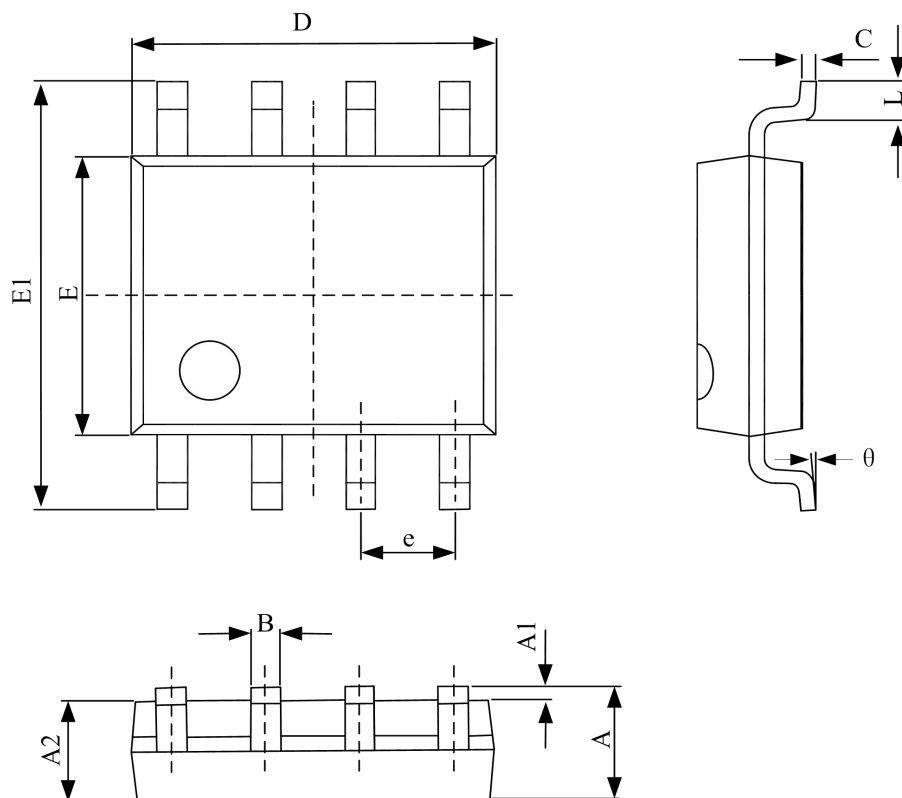
PACKAGE OUTLINE DIMENSIONS


Figure 17. SOIC-8 Package outline

Table3. SOIC-8 Package outline dimensions

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°