SINGLE CHANNEL VCOM DRIVE BUFFER

FEATURES

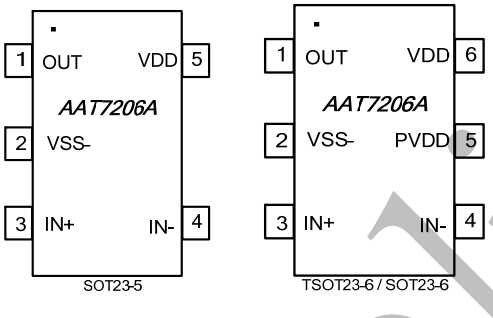
- **Peak Output Current of ±500mA (MAX);**
- **Unity Gain Buffer Capable of Driving Large Capacitive Loads**
- **Input Range Matched to LCD Reference Requirements**
- **Rail-to-Rail Input / Output**
- **$|V_{DD}–V_{SS–}|$ Specified for 4.5V to 16V**
- **Thermal Fault Protection**
- **SOT23-5(SOT25), SOT23-6(SOT26) and TSOT23-5(TSOT25), TSOT23-6(TSOT26) Package**

GENERAL DESCRIPTION

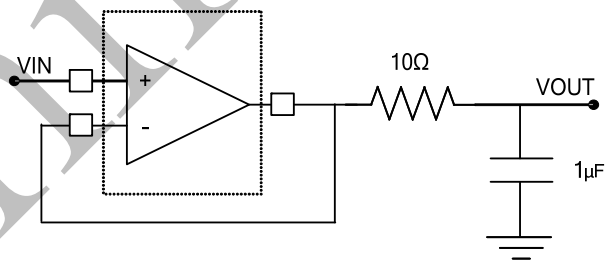
The AAT7206A is a rail-to-rail buffer amplifier designed for thin film transistor liquid crystal display (TFT-LCD). The AAT7206A has high slew rate, over 500mA peak-to-peak current to drive heavy capacitive loads and provides fast load current.

AAT7206A comes in a compact SOT23-5(SOT25), SOT23-6(SOT26) and TSOT23-5(TSOT25), TSOT23-6(TSOT26) package, which makes it an ideal component for space-sensitive designs of LCD monitors and LCD-TVs.

PIN CONFIGURATION



TYPICAL APPLICATION



ORDERING INFORMATION

DEVICE TYPE	PART NUMBER	PACKAGE	PACKING	TEMP. RANGE	MARKING	MARKING DESCRIPTION
AAT7206A	AAT7206A-S5-T	S5: SOT23-5 (SOT25)	T: Tape and Reel	–40°C to +85°C	206A	Device
AAT7206A	AAT7206A-S18-T	S18: TSOT23-5 (TSOT25)	T: Tape and Reel	–40°C to +85°C	206A	Device
AAT7206A	AAT7206A-S3-T	S3: SOT23-6 (SOT26)	T: Tape and Reel	–40°C to +85°C	206A	Device
AAT7206A	AAT7206A-S13-T	S13: TSOT 23-6(TSOT26)	T: Tape and Reel	–40°C to +85°C	206A	Device

Note: All AAT products are lead free and halogen free.

ABSOLUTE MAXIMUM RATINGS

CHARACTERISTICS	SYMBOL	VALUE	UNIT
Supply Voltage	$\lvert V_{DD}–V_{SS–}\rvert$	17	V
Input Voltage	V_I	$V_{SS–}$ –0.5 to V_{DD} +0.5	V
Output Voltage	V_O	$V_{SS–}$ –0.5 to V_{DD} +0.5	V
Package Thermal Resistance- SOT23-5	θ_{JA}	275	°C /W
Power Dissipation, @ T_A = +25°C , T_J = +125°C -SOT23-5	P_d	0.364	W
Package Thermal Resistance- SOT23-6/TSOT23-6	θ_{JA}	275	°C /W
Power Dissipation, @ T_C = +25°C , T_J = +125°C -SOT23-6/TSOT23-6	P_d	0.364	W
Maximum Junction Temperature	T_J	+125°C	°C
Operating Temperature	T_A	–40°C to +85°C	°C
Storage Temperature	$T_{STORAGE}$	–45°C to +125°C	°C
Lead Temperature (Soldering for 10 Seconds)	-	260°C	°C

Note: Stresses above those listed under ABSOLUTE MAXIMUM RATINGS may cause permanent damage to the devices. Exposure to ABSOLUTE MAXIMUM RATINGS conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

(V_{DD} = 10V, V_{SS-} = 0V, T_A = +25°C unless otherwise specified.)

Power Supply Performance

PARAMETER	SYMBOL	TEST CONDITIONS	MN	TYP	MAX	UNIT
Power Supply Rejection Ratio	PSRR	V_{DD} Varies from 4.5V to 16V	-	80	-	dB
Supply Current	I_S		-	450	-	µA

Input Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Input Offset Voltage	V_{OS}	$V_I = V_{DD} / 2$, $V_O = V_{DD} / 2$	-	2	12	mV
Input Bias Current	I_B	$V_I = V_{DD} / 2$, $V_O = V_{DD} / 2$	-	2	50	nA

Note: Slew rate is measured on rising and falling edges.

Output Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Swing Low	V_{OL}	I_L = 10mA, V_I = 1V	-	1.02	1.05	V
Output Swing High	V_{OH}	I_L = –10mA, V_I = 9V	8.95	8.98	-	V
Output Swing	V_{OL}	I_L = 50mA, V_I = 5V	-	5.03	5.05	V
	V_{OH}	I_L = –50mA, V_I = 5V	4.95	4.97	-	V
Peak Drive Current	I_{SC}	V_I = 5V , C_{OUT} = 0.47V	-	±500	-	mA

AC Characteristics

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
–3dB Bandwidth	BW		-	10	-	MHz
Slew Rate	SR	V_I = 2V to 8V, 20% to 80%	-	12	-	µs
Settling Time	t_S	V_I = 4.5V to 5.5V 0.1% V_I = 5.5V to 4.5V 0.1%	-	5	-	µs

Note: Slew rate is measured on rising and falling edges.

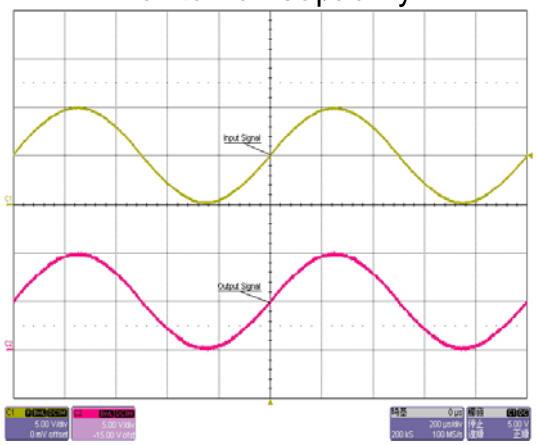
Fault Protection

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Thermal Shutdown			-	160	-	°C
Thermal Shutdown Hysteresis			-	15	-	°C

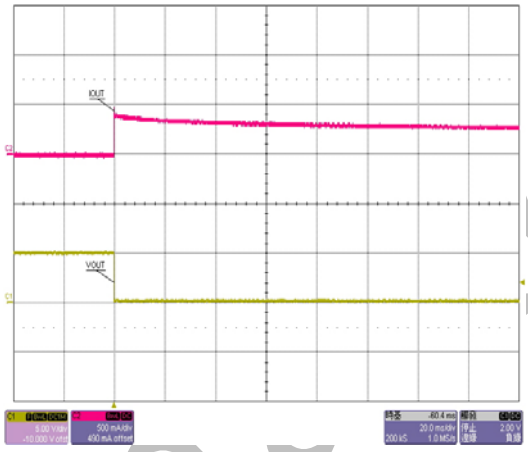
TYPICAL OPERATING CHARACTERISTICS

(V_{DD} = 10V, V_{OUT} = 5V, V_{SS-} = 0V, T_A = +25°C unless otherwise noted.)

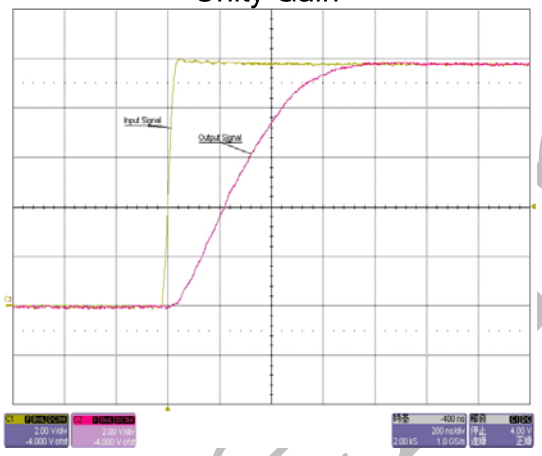
Rail to Rail Capability



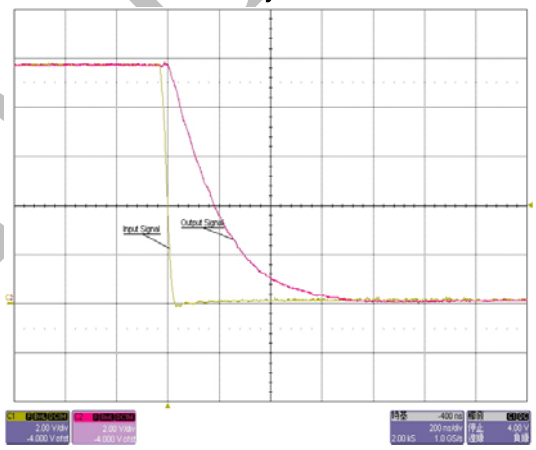
Output Short-Circuit Waveforms



Large Signal Transient Response For Unity Gain



Large Signal Transient Response For Unity Gain

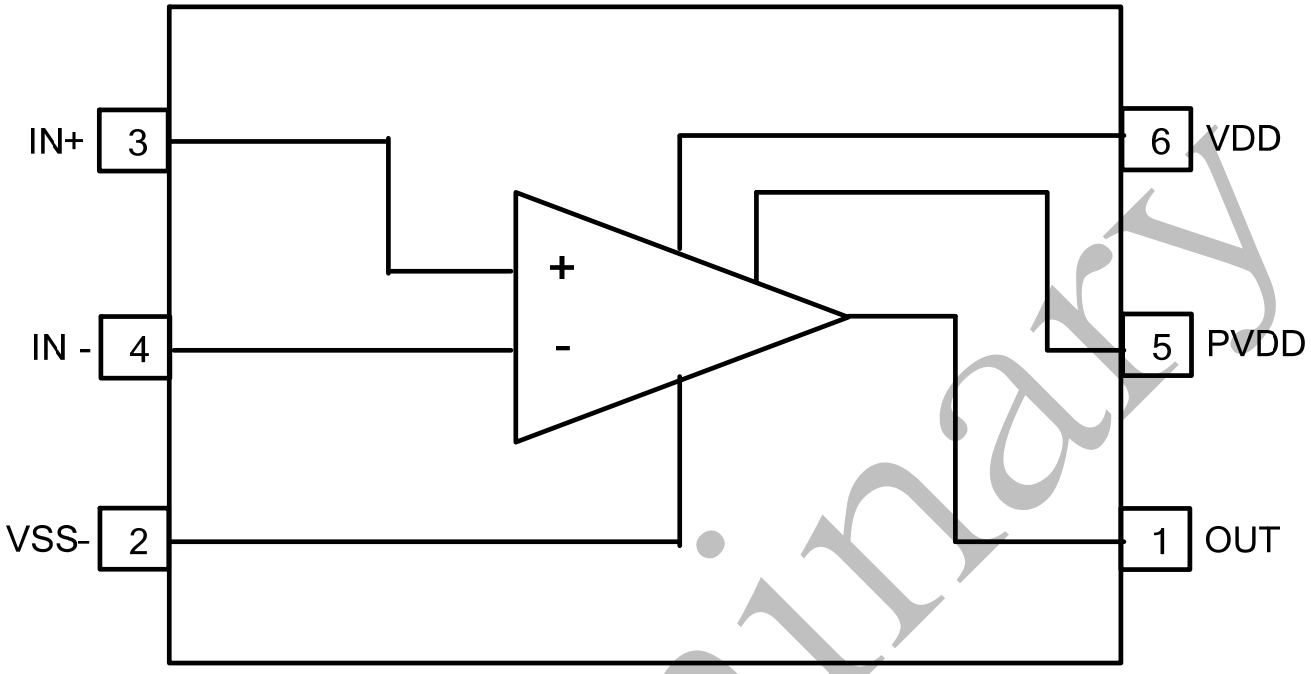


PIN DESCRIPTION

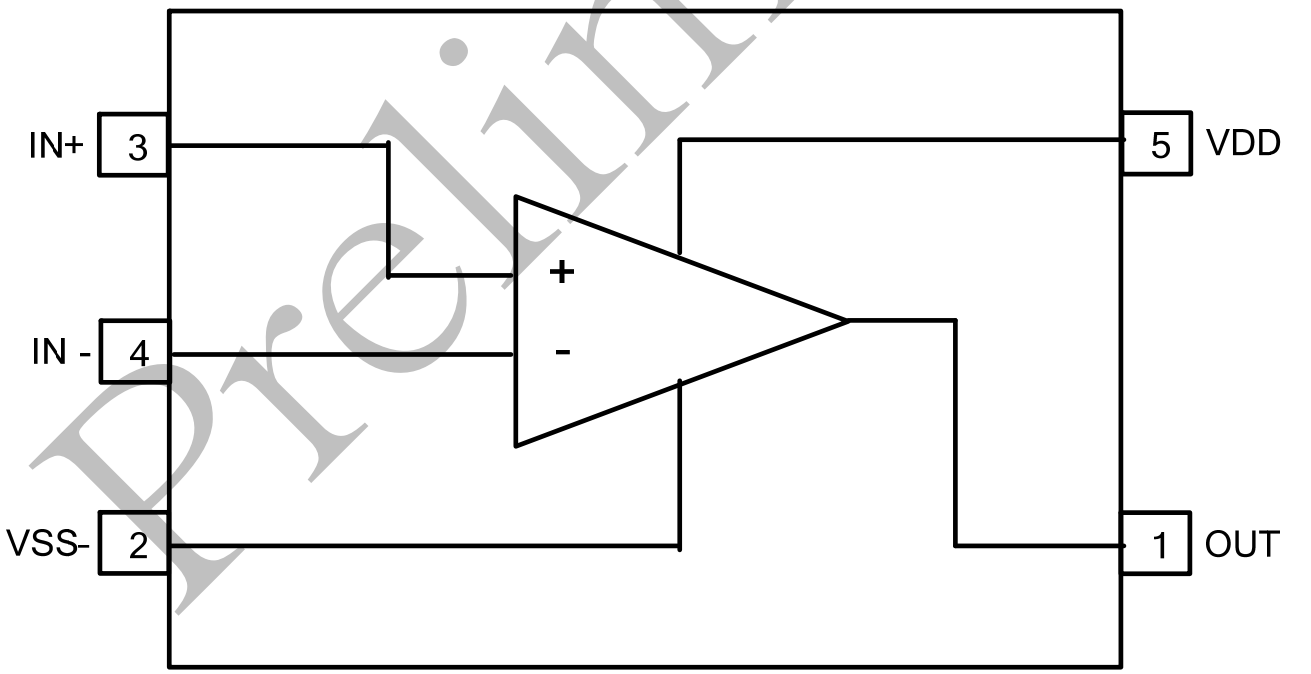
PIN NO.		NAME	I/O	DESCRIPTION
SOT23-6/TSOT23-6	SOT23-5			
1	1	OUT	O	Buffer Output
2	2	VSS–	-	Negative Power Supply
3	3	IN+	I	Non-Inverting Input to Buffer Amplifier
4	4	IN-	I	Inverting Input to Buffer Amplifier
5	-	PVDD	-	Output Stage Supply Input
6	5	VDD	-	Power Supply

FUNCTION BLOCK DIAGRAM

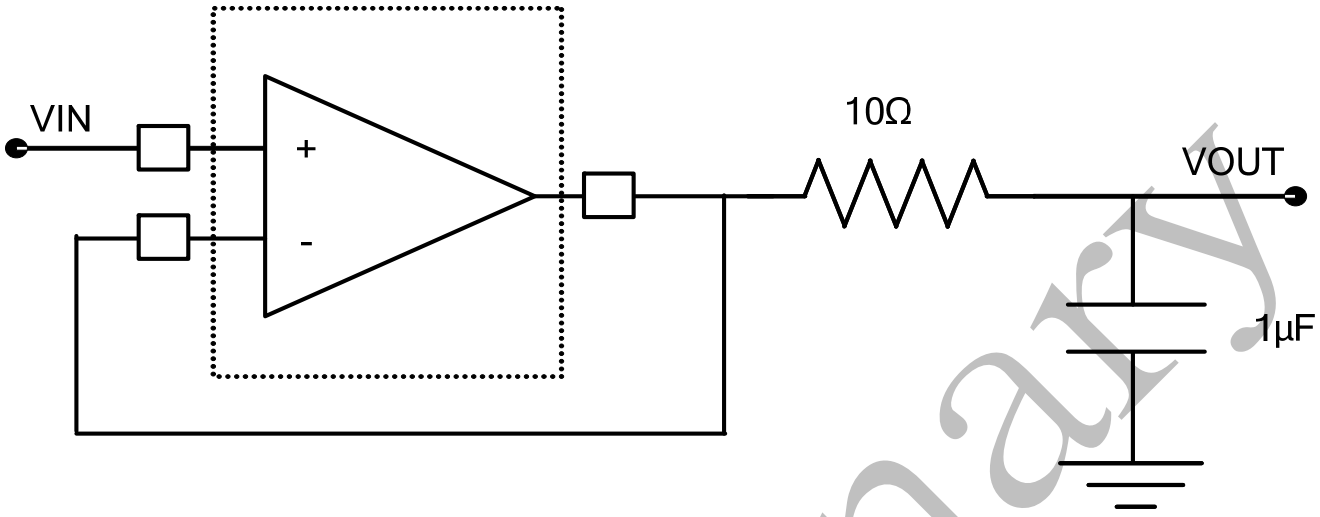
SOT23-6/TSOT23-6



SOT23-5



TYPICAL APPLICATION CIRCUIT



DETAILED DESCRIPTION

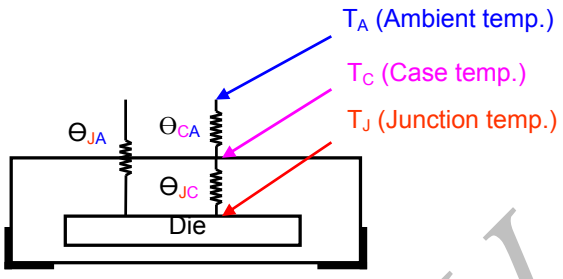
The AAT7206A is a one channel rail-to-rail amplifier made with advanced high voltage CMOS process. It's an ideal solution for a wide range of general-purpose applications as it has beyond rails input capability. It features high slew rate measured on rising and falling edges of 12V/μs, 10MHz of –3dB bandwidth, and proven high output driving capability. AAT7206A is a convenient voltage reference buffer for V_{COM} or gamma in a TFT-LCD system. High phase margin and low power consumption makes AAT7206A a power-smart solution for applications which requires lower power consumption.

Power Supply Performance, Input Characteristics and Output Characteristics

The AAT7206A operates with a single nominal wide supply voltage ranging from 4.5V to 16V under temperature from –40 °C to +85 °C . With an 80dB power supply rejection ratio, AAT7206A provides a wider scope of sensing in a variety of applications without compromising accuracy. The output characteristics of the AAT7206A extend to within 60mV of positive and negative supply rails with load current of 50mA. AAT7206A is designed with a 500mA output short circuit limit to control operation, if the output is directly shorted to grounds. This device is also equipped with protective mechanism to prevent continuous output current from exceeding 150mA to maintain maximum reliability.

Power Dissipation

AAT7206A is designed to provide maximum output current. However, it is crucial to give careful consideration in calculating maximum junction temperature for different loading when using a powerful device like AAT7206A. Users of this device should follow below instructions for calculating maximum power dissipation allowed in a package to determine if current loading should be adjusted to ensure AAT7206A operates in a safe condition.



$$P_{DMAX} = \frac{T_{JAMAX} - T_{AMAX}}{\theta JA}$$

Where:

T_{JAMAX} = Maximum Junction Temperature

T_{AMAX} = Maximum Ambient Temperature

J_A = Thermal Resistance of the Package

P_{DMAX} =Maximum Power Dissipation in the Package

Driving Capacitive Loads

Designed to operate with a wide range of capacitive loads, AAT7206A is an ideal solution for application such as TFT-LCD panels, grayscale reference voltage buffers, and ADC input amplifiers. When load capacitance increases, -3dB bandwidth decreases, and peaking increases.

LAYOUT CONSIDERATION

Power Supply Bypassing and PCB Layout

AAT7206A performs stable gain at high frequency. Users of this device is highly recommended to employ ground plane construction. To reduce oscillation, lead lengths should be as short as possible and the power supply pins must be well bypassed.

Voltage Reference

The linear regulator will reject the ripple voltage produced by the source driver voltage (See Figure 1.). The output of this linear regulator can also be used for the gamma correction reference voltage.

High-Current V_{COM} Drive Buffer

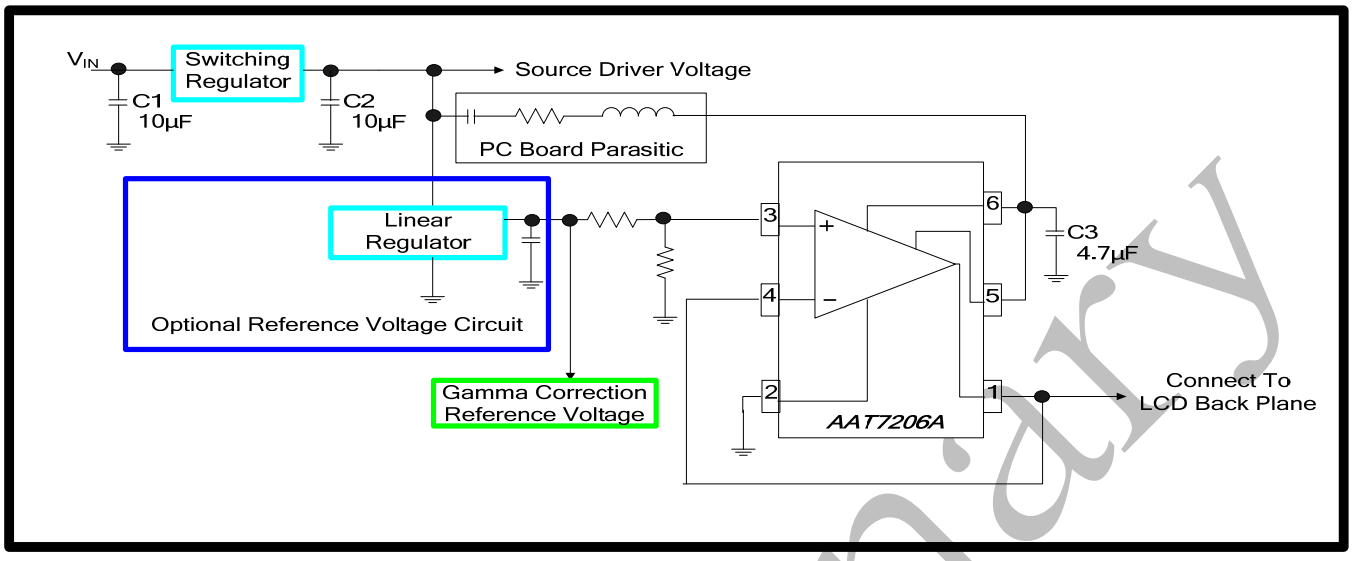


Figure 1. Typical TFT LCD Back Plane Drive Circuit

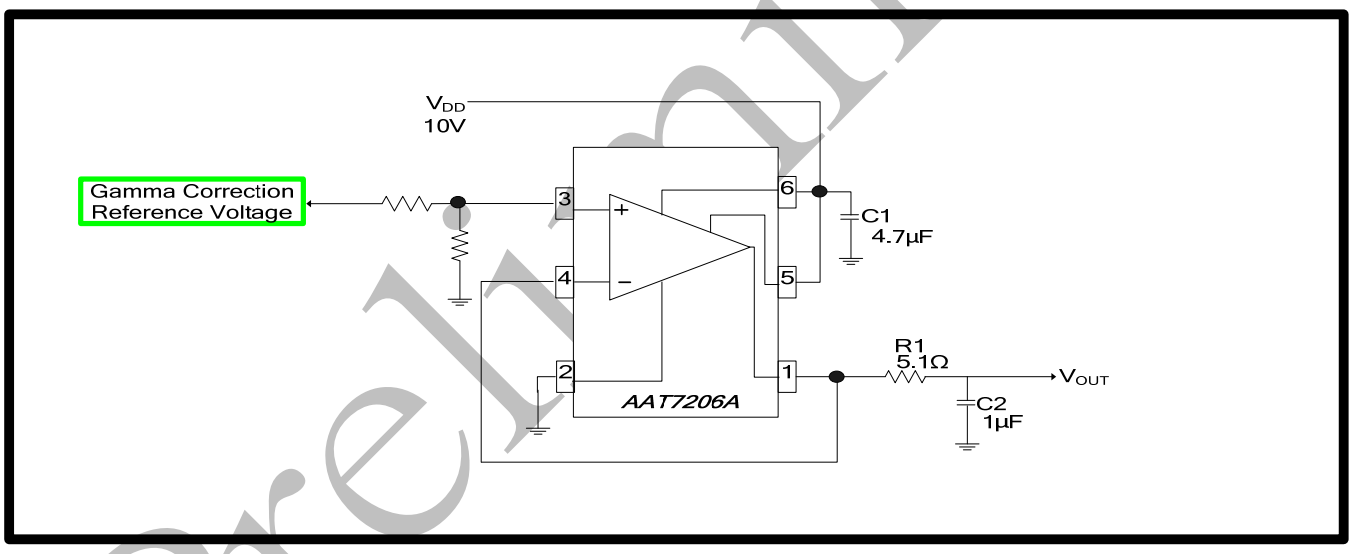
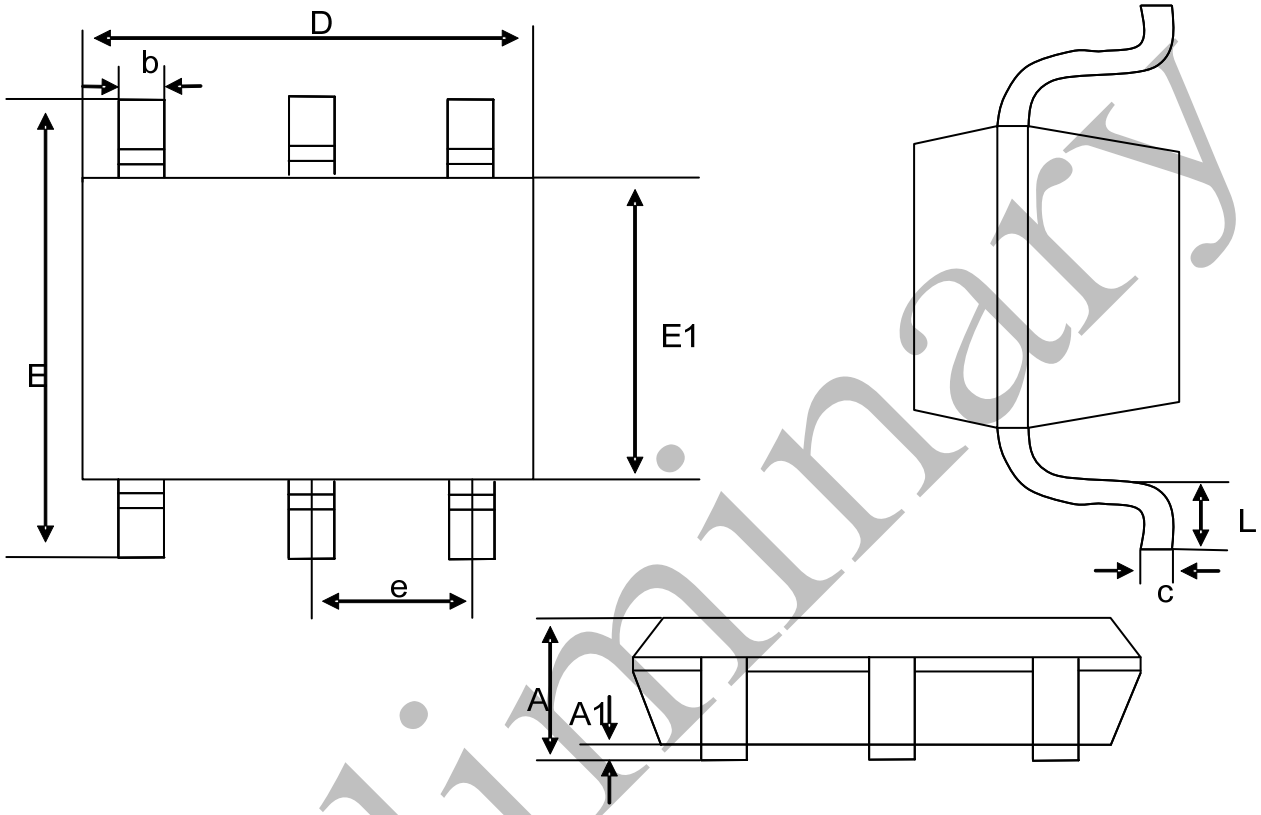


Figure 2. Application Circuit for Unity Gain Buffer

PACKAGE DIMENSION

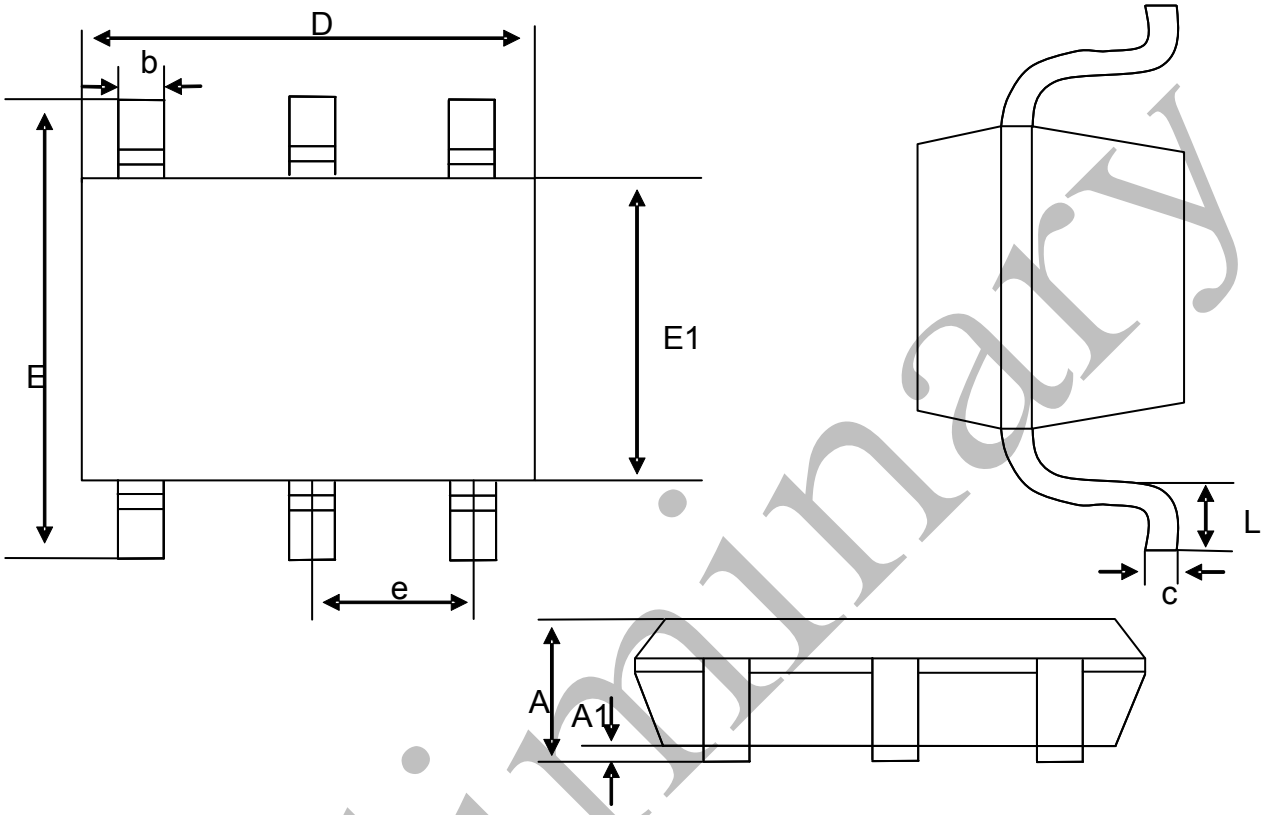
TSOT23-6 (TSOT26)



Symbol	Dimensions In Millimeters		
	MIN	TYP	MAX
A	0.75	-----	0.90
A1	0.00	-----	0.10
b	0.40	-----	0.50
c	0.08	-----	0.20
D	2.80	2.90	3.00
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	-----	0.95	-----
L	0.30	0.45	0.60

PACKAGE DIMENSION

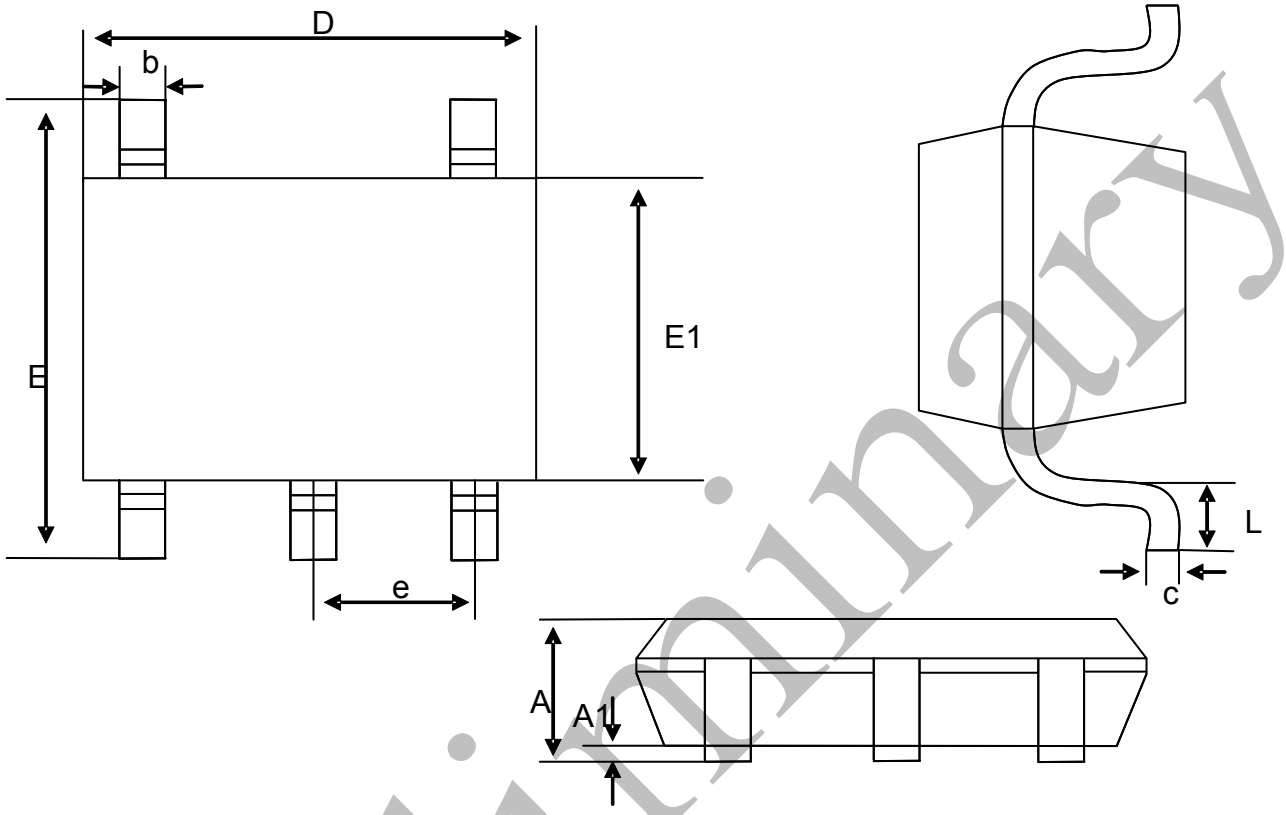
SOT23-6 (SOT26)



Symbol	Dimensions In Millimeters		
	MIN	TYP	MAX
A	1.05	-----	1.30
A1	0.05	-----	0.15
b	0.30	-----	0.50
c	0.08	-----	0.20
D	2.70	2.90	3.10
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.85	0.95	1.05
L	0.35	0.45	0.55

PACKAGE DIMENSION

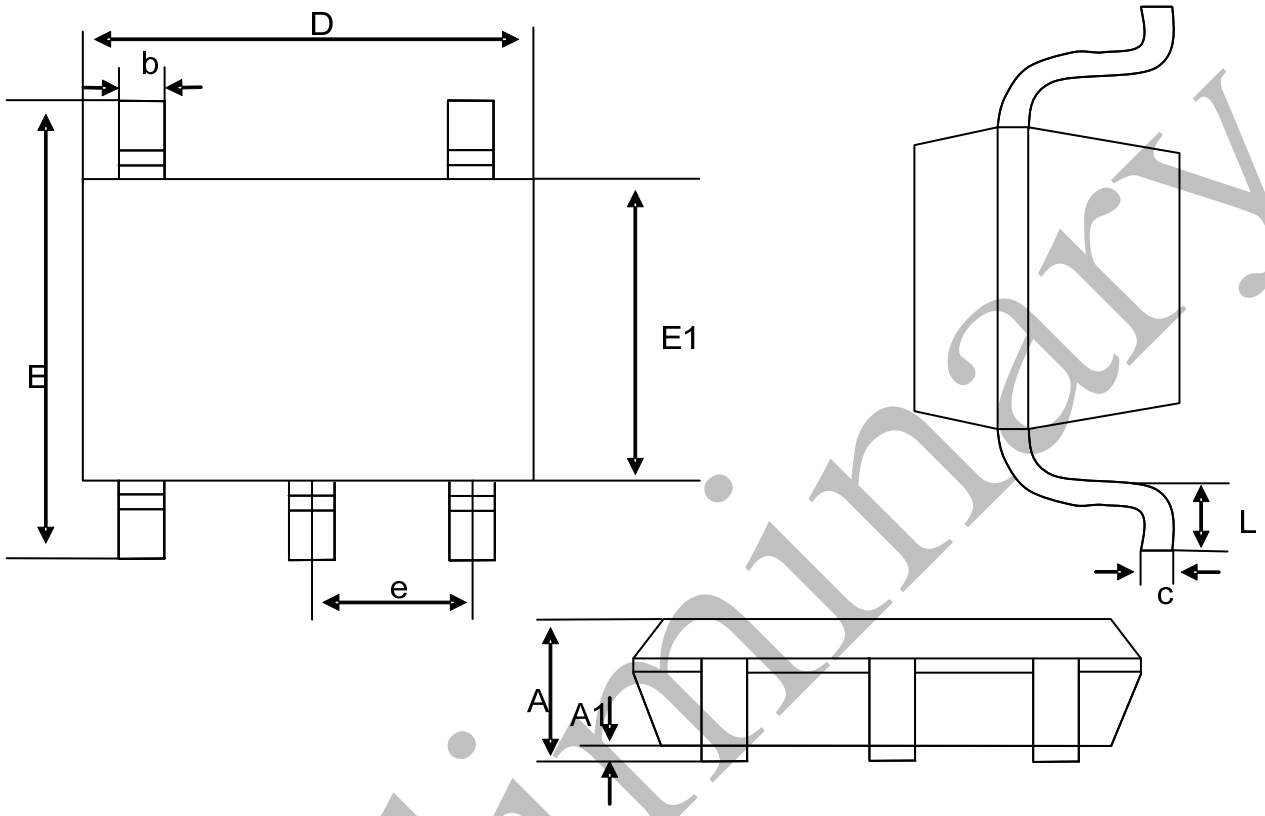
SOT23-5 (SOT25)



Symbol	Dimensions In Millimeters		
	MIN	TYP	MAX
A	0.90	-----	1.30
A1	0.05	-----	0.15
b	0.30	-----	0.50
c	0.08	-----	0.20
D	2.70	2.90	3.10
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.85	0.95	1.05
L	0.35	0.45	0.55

PACKAGE DIMENSION

TSOT23-5(TSOT25)



Symbol	Dimensions In Millimeters		
	MIN	TYP	MAX
A	0.75	-----	0.90
A1	0.00	-----	0.10
b	0.30	-----	0.50
c	0.08	-----	0.20
D	2.80	2.90	3.00
E	2.60	2.80	3.00
E1	1.50	1.60	1.70
e	-----	0.95	-----
L	0.30	0.45	0.60