



AK4250

Output Coupling Capacitor-less Video Amp with LPF

GENERAL DESCRIPTION

The AK4250 is a Video Amp with LPF. The output coupling capacitor can be removed because the AK4250 includes the negative power supply circuit. The AK4250 is housed in a space-saving 8-pin USON or 8-pin TMSOP package.

FEATURE

1. Video Function
 - A Composite Video Input
 - A Video-Amp (+6dB) for Composite Video Signal
 - Low Pass Filter
 - Charge pump circuit for negative power supply
2. Ta = -40 ~ 85 °C
3. Power Supply: 2.7 ~ 3.6V (typ. 3.0V)
4. Power Supply Current: 10 mA
5. Package: 8 pin USON (AK4250VU)
8 pin TMSOP (AK4250VT)

■ Block Diagram

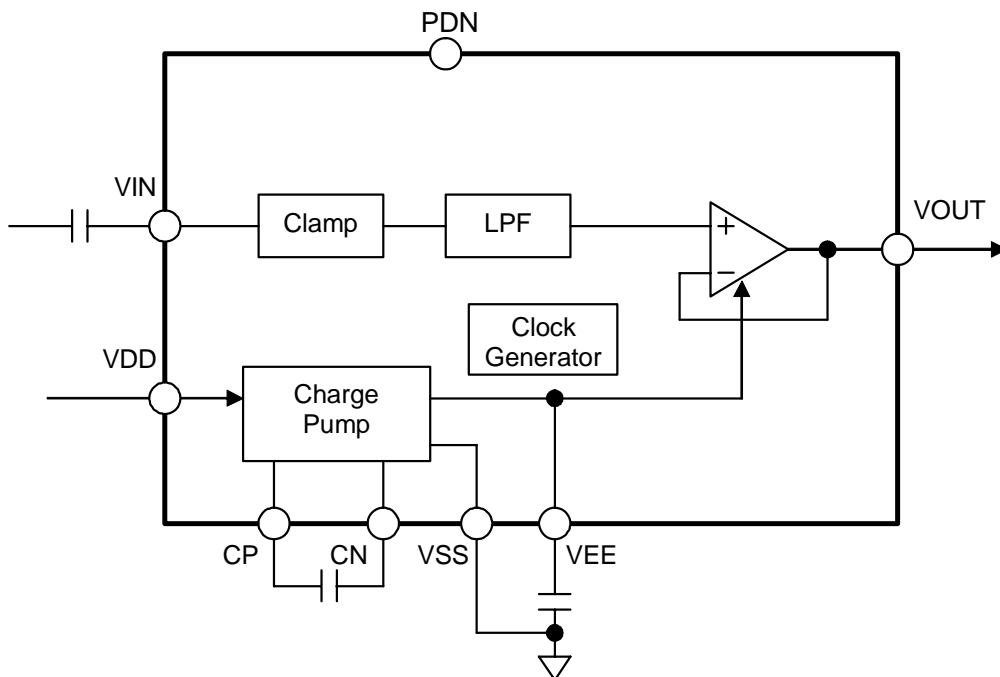


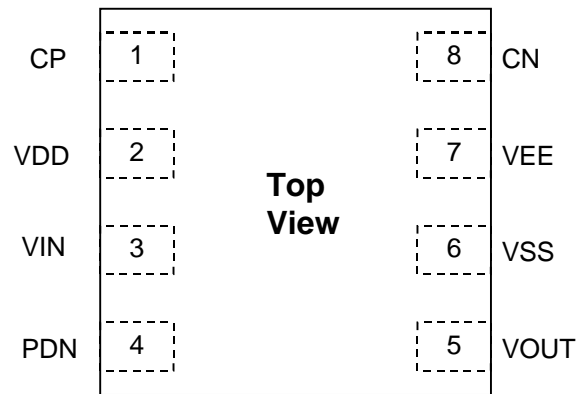
Figure 1. AK4250 Block Diagram

■ **Ordering Guide**

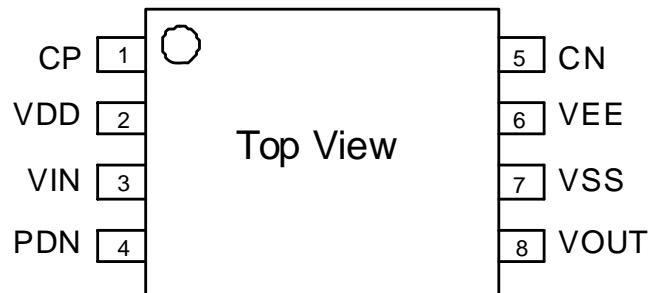
| | | |
|----------|-----------------------------|--------------------------|
| AK4250VU | -40 ~ +85°C | 8 pin USON (0.5mm pitch) |
| AK4250VT | -40 ~ +85°C | 8 pin TMSOP |
| AKD4250 | Evaluation board for AK4250 | |

■ **Pin Layout**

AK4250VU



AK4250VT



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|---------------------|
| PIN/FUNCTION |
|---------------------|

| No. | Pin Name | I/O | Function |
|-----|----------|-----|---|
| 1 | CP | O | Positive Charge Pump Capacitor Terminal Pin |
| 2 | VDD | - | Power Supply Pin. |
| 3 | VIN | I | Composite Video Signal Input Pin |
| 4 | PDN | I | Power-Down Mode Pin. Internal Pull Down 100kΩ. “H”: Power up, “L”: Power down. |
| 5 | VOUT | O | Composite Video Signal Driver Pin |
| 6 | VSS | - | Ground Pin |
| 7 | VEE | O | Negative Voltage Output Pin for Video Amplifier |
| 8 | CN | I | Negative Charge Pump Capacitor Terminal Pin |

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| ABSOLUTE MAXIMUM RATINGS |
|---------------------------------|

(VSS=0V; Note 1)

| Parameter | Symbol | min | max | Units |
|--|--------|------|------------------|-------|
| Power Supplies: | VDD | -0.3 | 4.0 | V |
| Input Current, Any Pin Except Supplies | IIN | - | ±10 | mA |
| Input Voltage (Note 2) | VIN | -0.3 | (VDD+0.3) or 4.0 | V |
| Ambient Temperature (powered applied) | Ta | -40 | 85 | °C |
| Storage Temperature | Tstg | -65 | 150 | °C |

Note 1. All voltages are with respect to ground.

Note 2. VIN, PDIN pins. Max is smaller value between (VDD+0.3)V and 4.0V

VOUT pin becomes Hi-Z at the PDN pin = “L”. Therefore the VOUT pin is available to signal line from another device by Wired-OR. The input signal to the VOUT pin must not exceed this input voltage range.
Any voltage must not be applied to the CN pin.

WARNING: Operation at or beyond these limits may result in permanent damage to the device.
Normal operation is not guaranteed at these extremes.

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| RECOMMENDED OPERATING CONDITIONS |
|---|

(VSS=0V; Note 1)

| Parameter | Symbol | min | typ | max | Units |
|----------------|--------|-----|-----|-----|-------|
| Power Supplies | VDD | 2.7 | 3.0 | 3.6 | V |

Note 1. All voltages with respect to ground.

* AKM assumes no responsibility for the usage beyond the conditions in this datasheet.

ANALOG CHARACTERISTICS

(Ta=25°C; VDD =3.0V; VSS = 0V; unless otherwise specified)

| Parameter | Conditions | min | typ | max | Units |
|--|--|--------|--------|--------|-------|
| V Input Characteristics | | | | | |
| Input Voltage | | - | - | 1.5 | Vpp |
| Input Sync Chip Clamp Voltage | (Note 3) | -0.386 | -0.286 | -0.186 | V |
| V Output Characteristics (Note 4) | | | | | |
| Output Gain | VIN=100kHz, 0.2Vpp | 5.0 | 6.0 | 7.0 | dB |
| Maximum output voltage | VIN=100kHz, THD=-30dB | 2.52 | - | - | Vpp |
| S/N | BW=100kHz ~ 6MHz, (Note 5) | - | 65 | - | dB |
| Secondary Distortion | VIN=3.58MHz, 0.2Vpp (Sin Wave) | - | -45 | - | dB |
| Load Resistance | | 140 | 150 | - | Ω |
| Load Capacitance | C1 (Figure 2) | - | - | 15 | pF |
| | C2 (Figure 2) | - | - | 400 | pF |
| LPF | | | | | |
| Frequency Response Input= 0.2Vpp, Sin Wave (0dB at 100kHz) | Response at 6.75MHz | -3 | -0.5 | - | dB |
| | Response at 27MHz | - | -40 | -20 | dB |
| Group Delay | GD3MHz - GD6MHz | - | 10 | 100 | nsec |
| Power Supplies | | | | | |
| Power Up | Black signal is output and no load resistance. | - | 10 | 15 | mA |
| Power Down | PDN pin = 0V | - | 1 | 2 | μA |

Note 3. The Charge Pump circuit will not work well, if the sync chip clamp voltage input to the VIN pin is not within this voltage range. This sync chip clamp voltage is the voltage from the pedestal voltage

Note 4. The measurement point is the point A in Figure 2

Note 5. The reference signal is the 100% white signal.

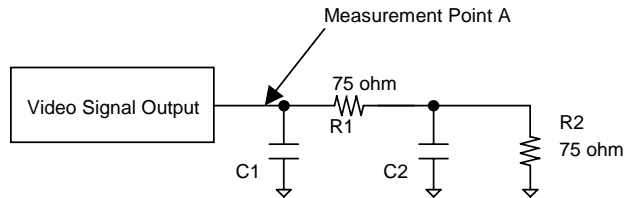


Figure 2. Load Capacitance C1 and C2

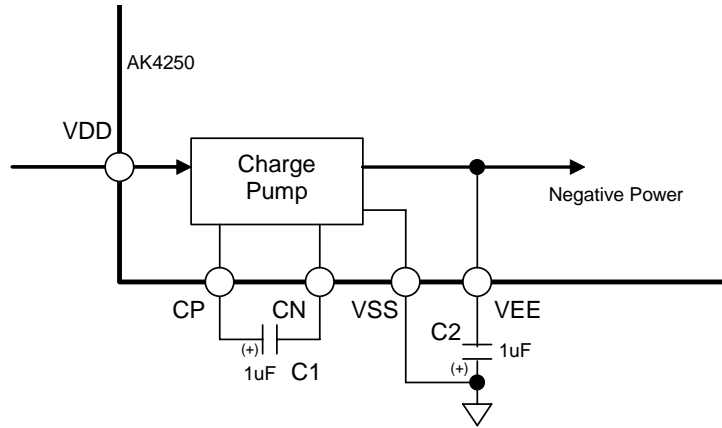
DC CHARACTERISTICS

(Ta=25°C; VDD=2.7 ~ 3.6V)

| Parameter | | Symbol | min | typ | max | Units |
|--------------------------|-----------|--------|-----|-----|-----|-------|
| High-Level Input Voltage | (PDN pin) | VIH | 1.5 | - | - | V |
| Low-Level Input Voltage | (PDN pin) | VIL | - | - | 0.6 | V |

■ Video Block

The Video Amp has a drivability for a load resistance of 150Ω. The AK4250 has a composite input and output and includes a low pass filter (LPF). Internal negative power supply circuit supplies negative voltage to the video amp and video amp 0V output is used for a pedestal level. Therefore, the output coupling capacitor can be removed.



Note 6. C1 and C2 capacitors should have the low ESR (Equivalent Series Resistance) over all temperature range. When these capacitors have the polarity, the positive polarity pin should be connected to the CP pin and the VSS pin. Non polarity capacitors can also be used.

Figure 3. Negative Power Supply circuit

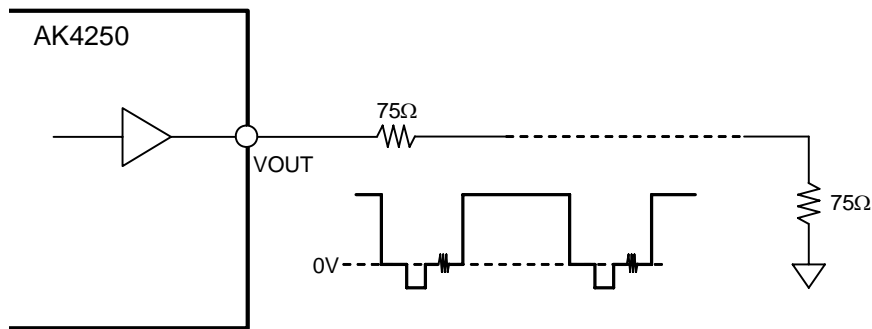


Figure 4. Video signal output

■ Power Down Control

When the PDN pin is “L”, the AK4250 is forced to the Power Down Mode (Power consumption: typ 1μA). The VOUT pin becomes Hi-Z at the PDN pin = “L”. The AK4250 includes a power-on-reset function. Therefore any reset is not required externally.

SYSTEM DESIGN

Figure 5 shows the system connection diagram for the AK4250. An evaluation board [AKD4250] is available which demonstrates the optimum layout, power supply arrangements and measurement results.

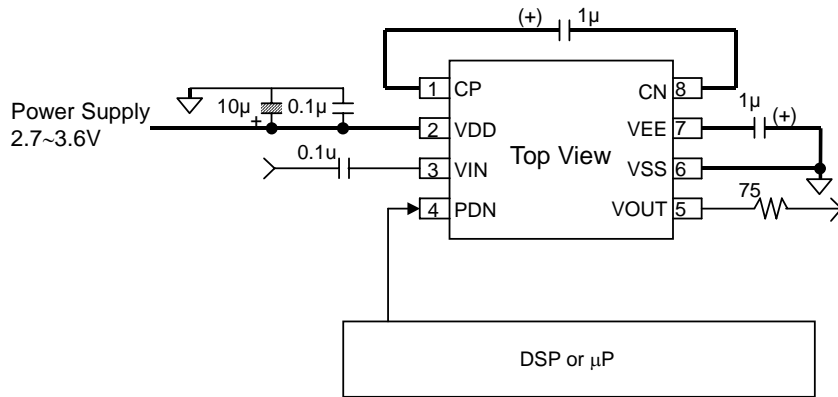


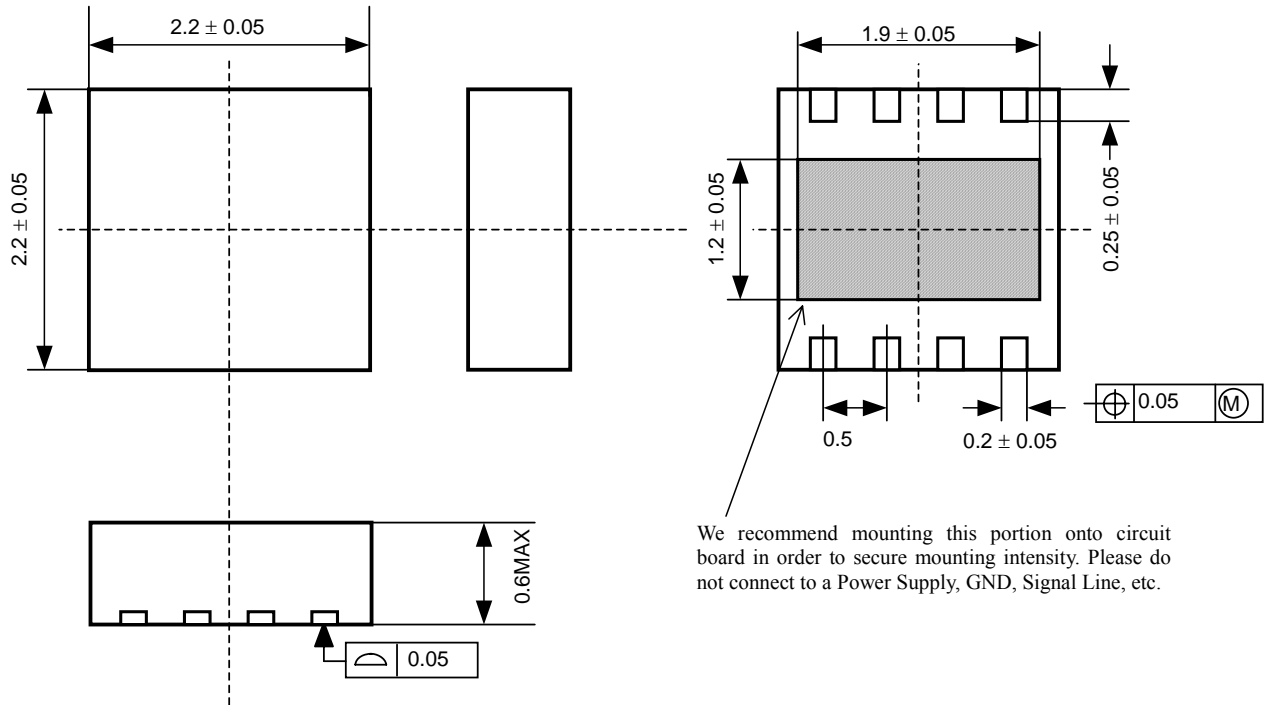
Figure 5. Typical Connection Diagram

Note:

- Any voltage must not be applied to the CN pin.

PACKAGE (AK4250VU)

8pin USON (Unit: mm)

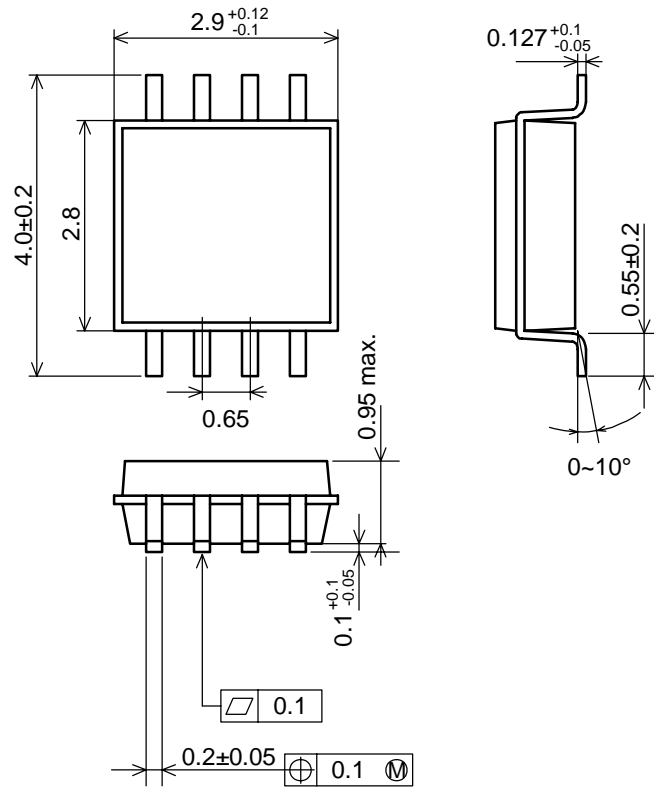


■ Material & Lead finish

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|-------------------------------|----------|
| Package molding compound: | Epoxy |
| Lead frame material: | Ni |
| Lead frame surface treatment: | Au plate |

PACKAGE (AK4250VT)

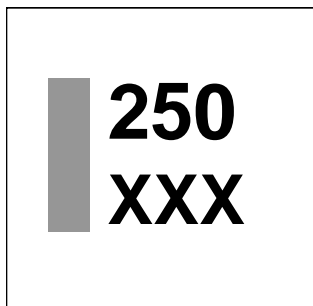
8pin TMSOP (Unit: mm)



■ Material & Lead finish

| | |
|-------------------------------|-----------------|
| Package molding compound: | Epoxy |
| Lead frame material: | Cu |
| Lead frame surface treatment: | Sn-Bi (Pb free) |

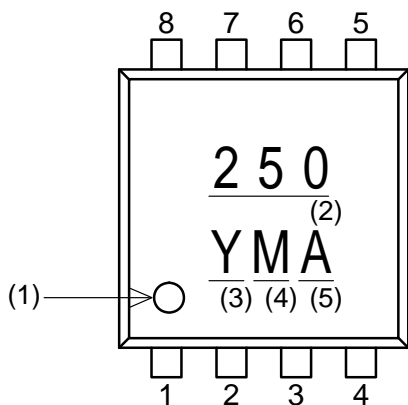
MARKING (AK4250VU)



1

XXX: Date code (3 digit)

MARKING (AK4250VT)



- (1) #1Pin Indicator
- (2) Chip No. (AK4xxx=xxx)
- (3) Year 1 Digit
- (4) Month 1 Digit
- (5) Manage Code (Internal use)

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| REVISION HISTORY |
|-------------------------|

| Date (YY/MM/DD) | Revision | Reason | Page | Contents |
|-----------------|----------|----------------------|------|---|
| 07/03/28 | 00 | First Edition | | |
| 07/11/05 | 01 | Spec Change | 4 | Power supply current consumption at power down max 20 μ A \rightarrow 2 μ A |
| 08/09/05 | 02 | Error Correct | 8 | Marking was changed. |
| 10/04/08 | 03 | Error Correct | 7 | ■ Material & Lead finish Lead frame surface treatment: Ag plate \rightarrow Au plate |
| 10/06/07 | 04 | Description Addition | | The AK4250VT was added. |

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