# 75 Ω VIDEO LINE DRIVER

## FEATURES

- **Fixed Gain (6 dB)**
- **Internal 75 Ω Drivers**
- **Very Small Output Capacitor Using SAG Function Pin**
- **Active High ON/OFF Control**
- **Very Low Standby Current (typ. $I_{STBY} \leq 25$ μA)**
- **Internal Summing Circuit of Y/C Signal**
- **Single +5 V Power Supply Operation**

## APPLICATIONS

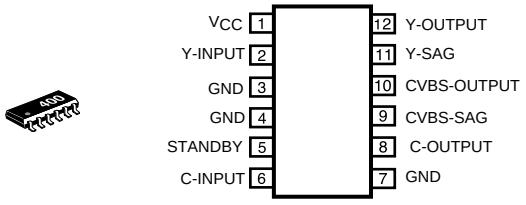
- **Video Equipment**
- **Digital Cameras**
- **CCD Cameras**
- **TV Monitors**
- **Video Tape Recorders**
- **LCD Projectors**

## DESCRIPTION

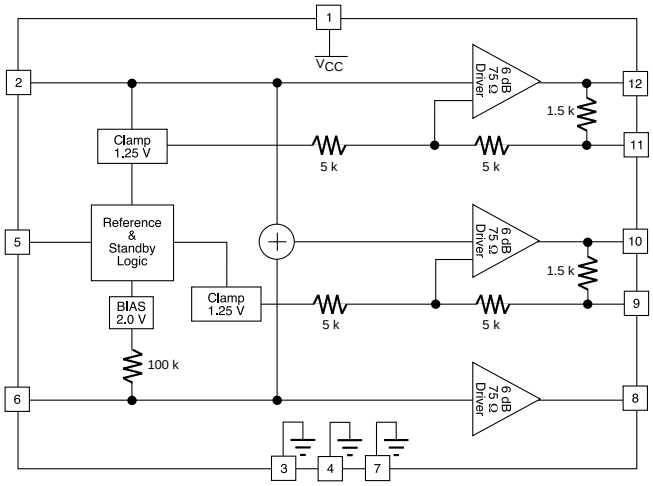
Operating from a single +5 V supply, the TK15400 is a triple video line driver IC that takes standard Y/C analog inputs and provides simultaneous Y/C and composite analog outputs for driving 75 Ω lines. Internal summing of the Y and C inputs is performed to produce the composite video output. The luminance (Y) input is clamped at 1.25 V and amplified 6 dB to produce 2 $V_{P-P}$ (typical) into a series 75 Ω resistor and 75 Ω cable load. The internal 1.5 k SAG function resistor provides gain compensation for low frequency signals. The chromanance (C) input is biased at 2.0 V and amplified 6 dB to produce 1.3 $V_{P-P}$ (typical) into a series 75 Ω resistor and 75 Ω cable load. During standby (Pin 5 grounded), the TK15400 consumes only 113 μW of power. Nominal power dissipation (no input) is typically 168 mW.

The TK15400M is available in the SSOP-12 Surface Mount Package.

**TK15400**




**BLOCK DIAGRAM**




## ORDERING INFORMATION

TK15400M □□

Tape/Reel Code

TAPE/REEL CODE
TL: Tape Left

## ABSOLUTE MAXIMUM RATINGS

Supply Voltage ..... 6 V
Operating Voltage ..... 4.5 to 5.5 V
Power Dissipation (Note 1) ..... 350 mW
Storage Temperature Range ..... -55 to +150 °C
Operating Temperature Range .....-25 to +75 °C

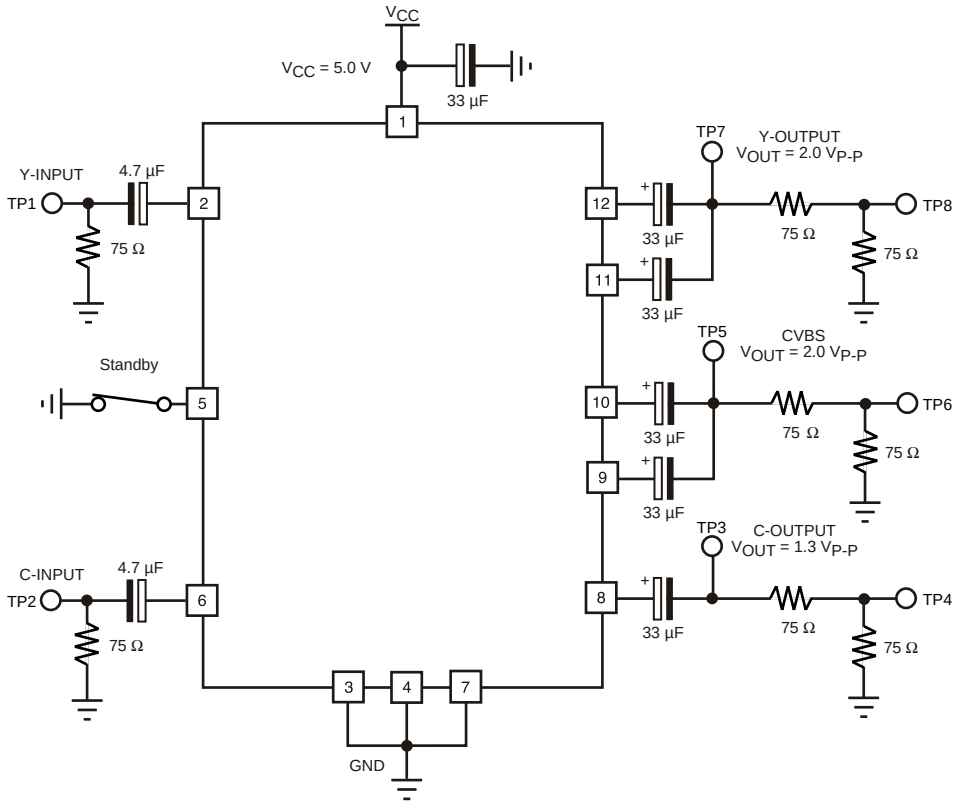
## TK15400M ELECTRICAL CHARACTERISTICS

Test conditions: $V_{CC}$ = 5.0 V, $V_{IN}$ = 1.0 $V_{P-P}$, $R_L$ = 150 Ω, $T_A$ = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | TEST CONDITIONS | MIN | TYP | MAX | UNITS |
|---|---|---|---|---|---|---|
| $I_{CC}$ | Supply Current | No input | | 33.5 | 45.0 | mA |
| $I_{STBY}$ | Standby Supply Current | Pin 5 Grounded | | 22.5 | 50.0 | µA |
| $I_{OS}$ | Standby Terminal Current | Pin 5 Standby mode | | 22.5 | 50.0 | µA |
| $V_{THL}$ | Threshold Voltage (High to Low) | Pin 5 Operating to Standby mode | GND | 0.1 | 0.3 | V |
| $V_{TLH}$ | Threshold Voltage (Low to High) | Pin 5 Standby to Operating mode | 1.8 | 2.0 | $V_{CC}$ | V |
| $V_{CMP}$ | Clamp Voltage | Pin 2 Y signal input terminal | 1.05 | 1.25 | 1.45 | V |
| $V_{BIAS}$ | Bias Voltage | Pin 6 C signal input terminal | 1.70 | 2.00 | 2.30 | V |
| GVA | Voltage Gain | $C_{IN}$ - $C_{OUT}$, $f_{in}$ = 1 MHZ | 5.5 | 6.0 | 6.5 | dB |
| DG | Differential Gain | Staircase wave input | -3.0 | -1.5 | +3.0 | % |
| DP | Differential Phase | Staircase wave input | -3.0 | -0.2 | +3.0 | deg |
| fr | Frequency Response | $f_{in}$ = 1 MHz / 5 MHz | | 0.0 | | dB |
| CT1 | Cross Talk 1 | $Y_{IN}$ - $C_{OUT}$ | | -40 | | dB |
| CT2 | Cross Talk 2 | $C_{IN}$ - $Y_{OUT}$ | | -40 | | dB |

Note 1: Power dissipation is 350 mW in free air. Derate at 2.8 mW/°C for operation above 25°C.

## TEST CIRCUIT




**MEASUREMENT METHOD**

1. Supply Current ($I_{CC}$)
The Pin 1 current is measured with no input signal and the Standby Pin (Pin 5) open.

2. Standby Supply Current ($I_{STBY}$)
The Pin 1 current is measured when the Standby Pin (Pin 5) is connected to ground.

3. Standby Terminal Current ($I_{OS}$)
The Pin 5 current is measured when Pin 5 is connected to ground.

4. Threshold Voltage (High to Low) ($V_{THL}$)
The Pin 5 voltage is measured at the point which changes the device from operating mode into standby mode.

5. Threshold Voltage (Low to High) ($V_{TLH}$)
The Pin 5 voltage is measured at the point which changes the device from standby mode into operating mode.
6. Clamp Voltage ($V_{CMP}$)
The DC voltage at Pin 2 is measured with no input signal.

**MEASUREMENT METHOD (CONT.)**

7. Bias Voltage ($V_{BIAS}$)
The DC voltage at Pin 6 is measured with no input signal.

8. Voltage Gain (GVA)
The voltage gain equation is as follows:
GVA = 20 $\log_{10}$ V2/V1
Where V1 is the input voltage at TP1 and V2 is the measured voltage at TP5 (TP7). Furthermore, V1 is the input voltage at TP2 and V2 is the measured voltage at TP3 (TP5).

9. Differential Gain (DG)
The differential gain is measured at TP5 (TP7) when a staircase waveform of 10 steps is applied to TP1.

10. Differential Phase (DP)
The differential phase is measured at TP5 (TP7) when a staircase waveform of 10 steps is applied to TP1.

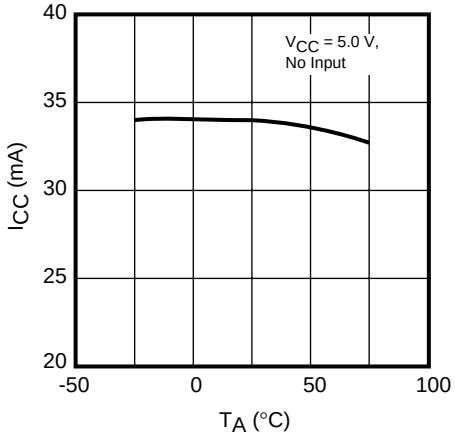
11. Frequency Response (fr)
The frequency response equation is as follows:
fr = 20 $\log_{10}$ V2/V1
Where V1 is the measured TP7 voltage when the TP1 input frequency is set to 1 MHz and V2 is the measured TP7 voltage when the TP1 input frequency is set to 5 MHz. Furthermore, V1 is the measured TP3 (TP5) voltage when the TP2 input frequency is set to 1 MHz and V2 is the measured TP3 (TP5) voltage when the TP2 input frequency is set to 5 MHz.

12. Cross Talk 1 (CT1)
The cross talk equation is as follows:
CT1 = 20 $\log_{10}$ V1/V2
Where V1 is measured at TP3 when a 1 MHz 1 $V_{P-P}$ input signal is applied to TP1 and V2 is measured at TP3 when a 1 MHz 1 $V_{P-P}$ input signal is applied to TP2.

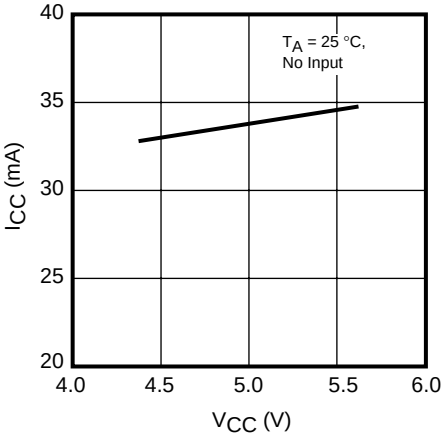
13. Cross Talk 2 (CT2)
The cross talk equation is as follows:
CT2 = 20 $\log_{10}$ V1/V2
Where V1 is measured at TP7 when a 1 MHz 1 $V_{P-P}$ input signal is applied to TP2 and V2 is measured at TP7 when a 1 MHz 1 $V_{P-P}$ input signal is applied to TP1.

# TYPICAL PERFORMANCE CHARACTERISTICS

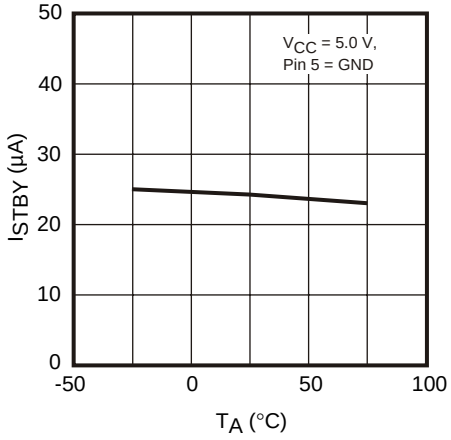
**SUPPLY CURRENT vs. TEMPERATURE**



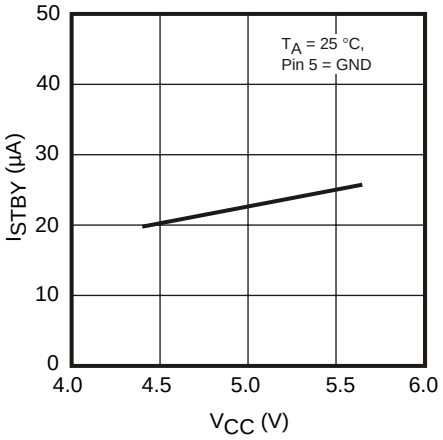

**SUPPLY CURRENT vs. SUPPLY VOLTAGE**



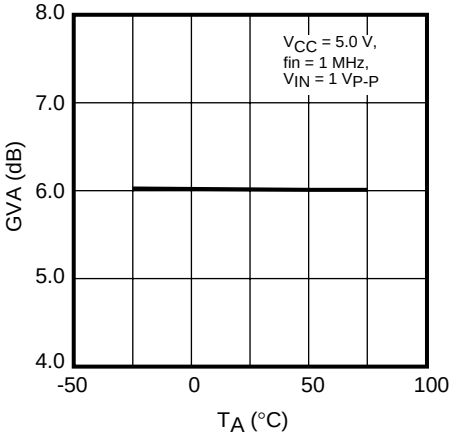

**STANDBY SUPPLY CURRENT vs. TEMPERATURE**



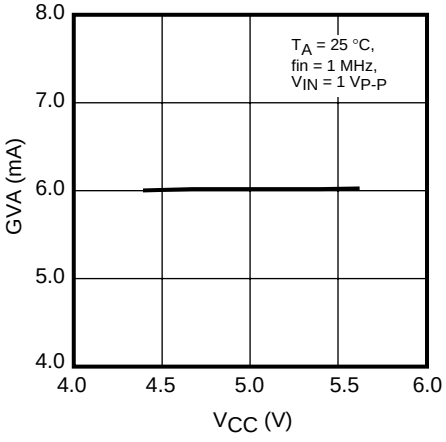

**STANDBY SUPPLY CURRENT vs. SUPPLY VOLTAGE**




**VOLTAGE GAIN vs. TEMPERATURE**

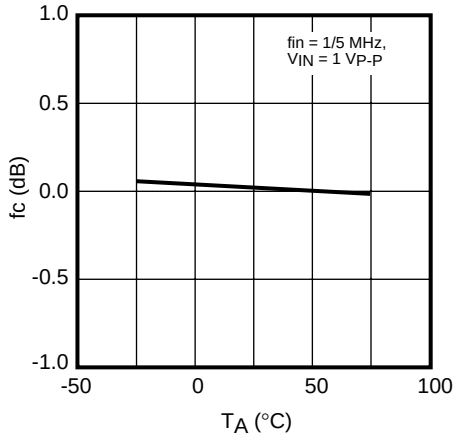



**VOLTAGE GAIN vs. SUPPLY VOLTAGE**

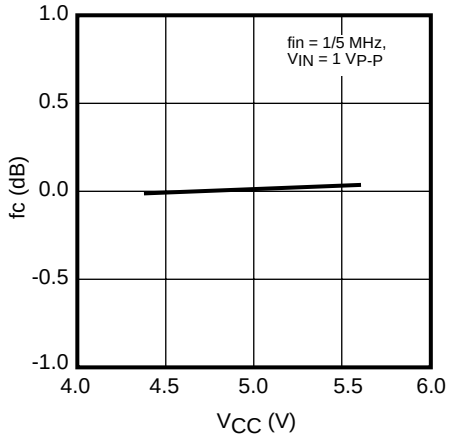


## TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

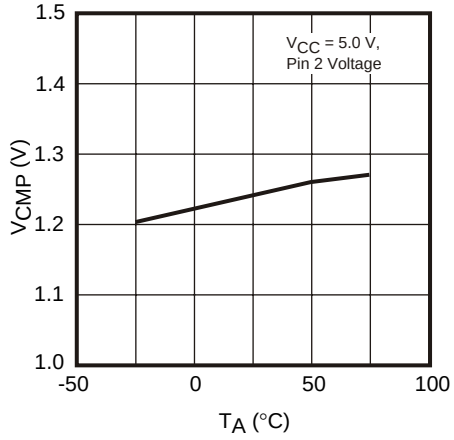
**FREQUENCY RESPONSE vs. TEMPERATURE**



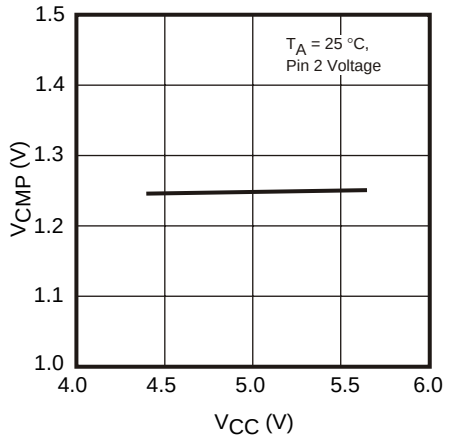

**FREQUENCY RESPONSE vs. SUPPLY VOLTAGE**



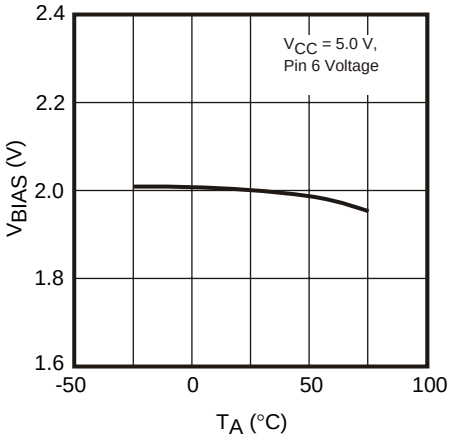

**CLAMP VOLTAGE vs. TEMPERATURE**



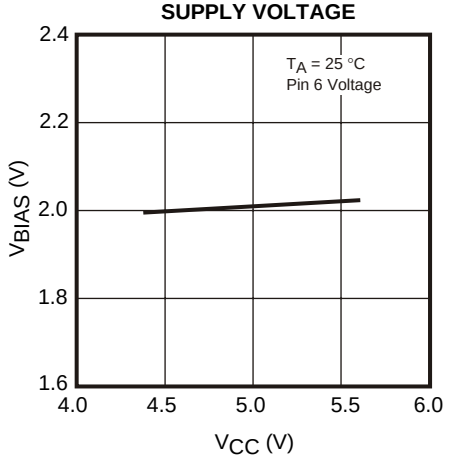

**CLAMP VOLTAGE vs. SUPPLY VOLTAGE**




**BIAS VOLTAGE vs. TEMPERATURE**

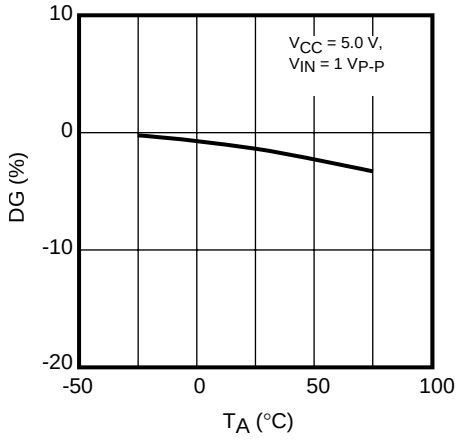



**BIAS VOLTAGE vs. SUPPLY VOLTAGE**

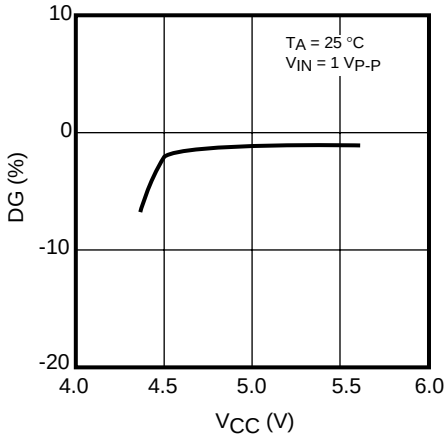


## TYPICAL PERFORMANCE CHARACTERISTICS (CONT.)

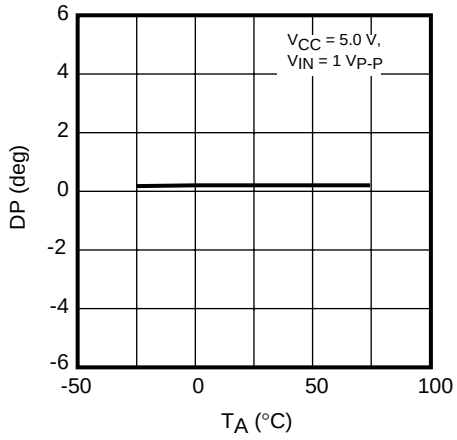
**DIFFERENTIAL GAIN vs. TEMPERATURE**



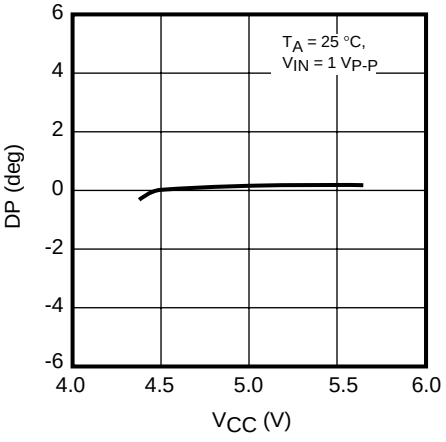

**DIFFERENTIAL GAIN vs. SUPPLY VOLTAGE**



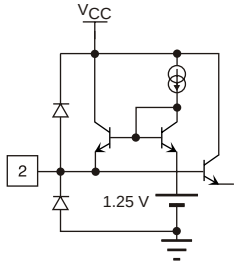
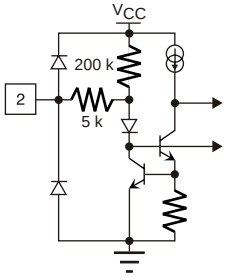
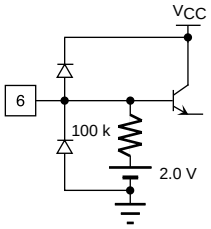
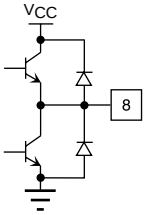

**DIFFERENTIAL PHASE vs. TEMPERATURE**



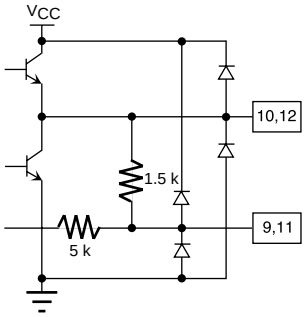

**DIFFERENTIAL PHASE vs. SUPPLY VOLTAGE**



## PIN FUNCTION DESCRIPTION

| TERMINAL | | | INTERNAL EQUIVALENT CIRCUIT | DESCRIPTION |
|---|---|---|---|---|
| PIN NO. | SYMBOL | VOLTAGE | | |
| 1 | $V_{CC}$ | $V_{CC}$ | | Power supply terminal |
| 2 | Y-INPUT | 1.25 V |  | Pin 2 is the Y signal input terminal.<br>The clamp circuit fixes the synchronous voltage to 1.25 V. |
| 3,4 | GND | GND | | GND terminal |
| 5 | STANDBY | 1.4 V |  | Pin 5 is the standby logic terminal.<br>The device is in the active state when Pin 5 is pulled up to high level or open.<br>The device is in the standby state when Pin 5 is pulled down to low level. |
| 6 | C-INPUT | 2.0 V |  | Pin 6 is the C signal input terminal.<br>The bias circuit fixes the C signal to 2.0 V by the 100 kΩ bias resistor. |
| 7 | GND | GND | | GND terminal |
| 8 | C-OUTPUT | 2.0 V |  | Pin 8 is the C signal output terminal.<br>Pin 8 is available to drive a 75 Ω + 75 Ω load. |

## PIN FUNCTION DESCRIPTION

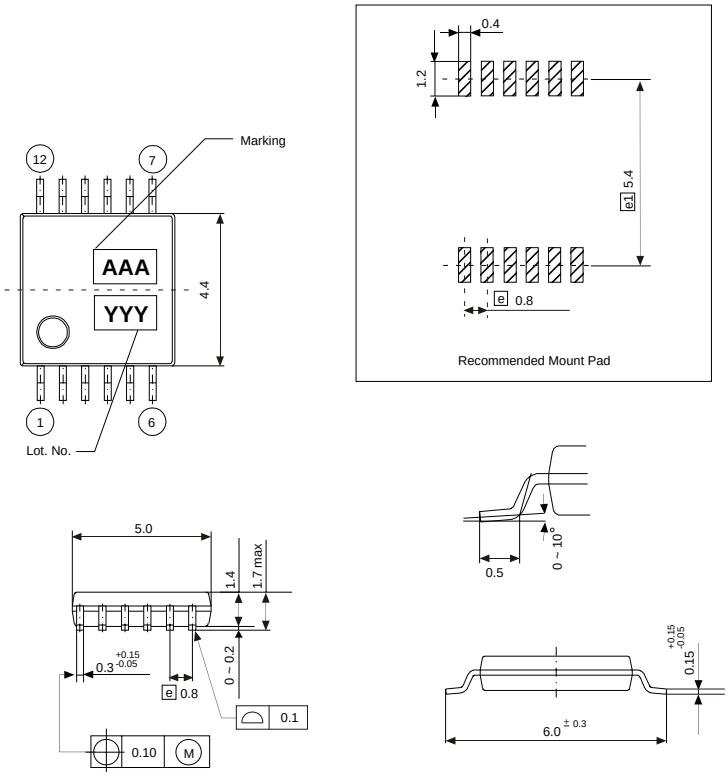
| TERMINAL | | | INTERNAL EQUIVALENT CIRCUIT | DESCRIPTION |
|---|---|---|---|---|
| PIN NO. | SYMBOL | VOLTAGE | | |
| 9<br>10<br>11<br>12 | CVBS-SAG<br>CVBS-OUTPUT<br>Y-SAG<br>Y-OUTPUT | 1.25 V<br>1.25 V<br>1.25 V<br>1.25 V |  | Pin 9 and Pin 10 are the CVBS signal output terminal and the CVBS-SAG terminal.<br>Pin 11 and 12 are the Y signal output terminal and the Y-SAG terminal.<br>These pins are available to drive 75 Ω + 75 Ω loads. |

## NOTES

## NOTES

# PACKAGE OUTLINE

## SSOP-12




Dimensions are shown in millimeters
Tolerance: x.x = ± 0.2 mm (unless otherwise specified)

## Marking Information

| | Marking |
|---|---|
| TK15400 | 400 |

TOKO

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