APPLICATION MANUAL

3.3V Operation – Video Amplifier (6dB)
TK15465S

CONTENTS

MEETING YOUR NEEDS
TOKO, INC.

3.3V Operation – Video Amplifier (6dB)
TK15465S

1 DESCRIPTION

The TK15465S is 75Ω series Video amplifier to drive at the low voltage with the clamp circuit.

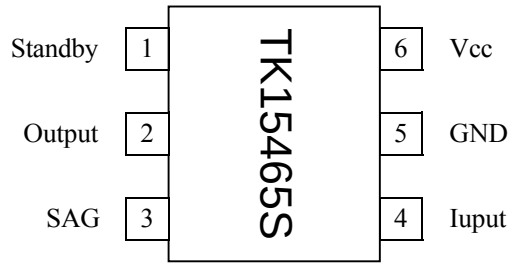
2 FEATURES

- Embedded clamp circuit.
- Enable ON/OFF control.
- Very small package.
- Very small output capacitor using SAG function pin.

3 APPLICATIONS

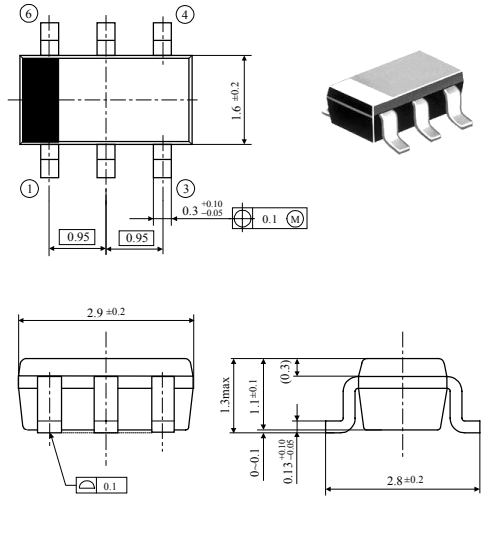
- DSC
- DVC, etc…

4 PIN CONFIGURATION



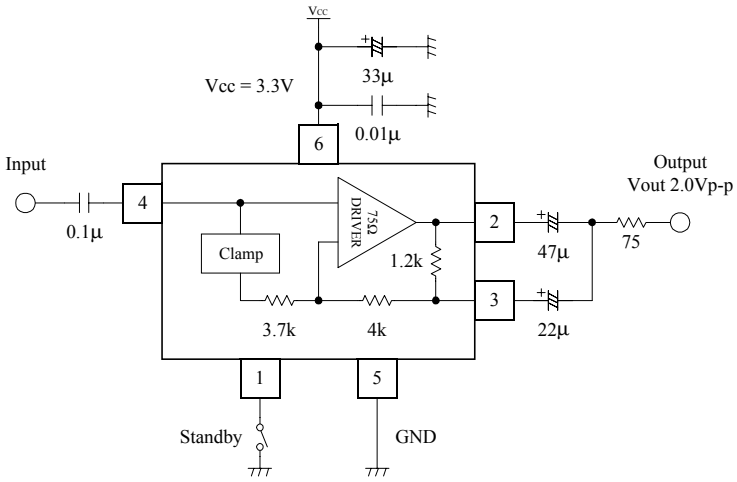
5 PACKAGE OUTLINE

■ SOT23-6



Unit : mm

6 BLOCK DIAGRAM



7 ABSOLUTE MAXIMUM RATINGS

T_a=25°C

Parameter	Symbol	Rating	Units	Conditions
Supply Voltage	V_{CC}	12.0	V	
Power Dissipation	P_D	500	mW	At a time mounting on the board*
Storage Temperature Range	T_{stg}	-55 ~ +150	°C	
Operating Temperature Range	T_{OP}	-40 ~ +85	°C	
Input Frequency	f_{MAX}	~ 100	MHz	
Operating Voltage Range	V_{OP}	2.8 ~ 10.0	V	

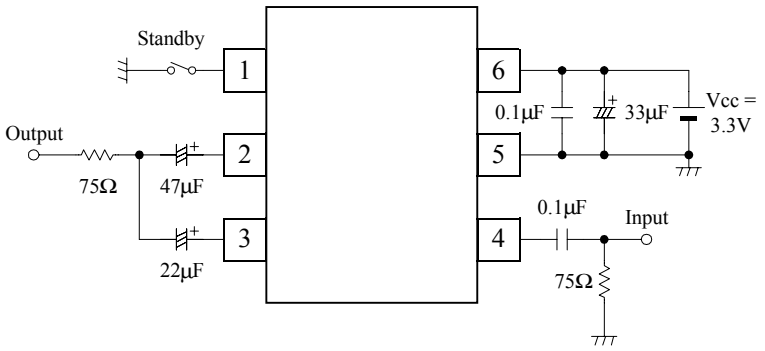
* P_D must be decreased at the rate of 4.0mW/°C for operation above 25°C.

8 ELECTRICAL CHARACTERISTICS

V_{CC}=3.3V, T_a=25°C, V_{in}=1.0V_{P-P}, R_L=150Ω

Parameter	Symbol	Specification			Units	Conditions
		MIN	TYP	MAX		
Supply Current	I_{CC}	-	9.0	14.0	mA	No input
Standby Supply Current	I_{CCS}	-	44.0	80.0	µA	1pin GND
Standby Terminal Force Current	I_{fos}	-	10.0	40.0	µA	1pin GND
Threshold Voltage (H=>L)	V_{THL}	-	-	0.5	V	1pin Operate => Standby
Threshold Voltage (L=>H)	V_{TLH}	1.8	-	-	V	1pin Standby => Operate
Clamp Voltage	V_{CMP}	1.07	1.27	1.47	V	4pin
Voltage Gain	G_V	5.4	5.9	6.4	dB	f_{in}=1MHz
Differential Gain	DG	-	±1.5	±3.0	%	10StepStairs
Differential Phase	DP	-	±1.0	±3.0	deg	10StepStairs
Frequency Response	fr	-	0.1	-	dB	f_{in}=1MHz/5MHz

9 TEST CIRCUIT

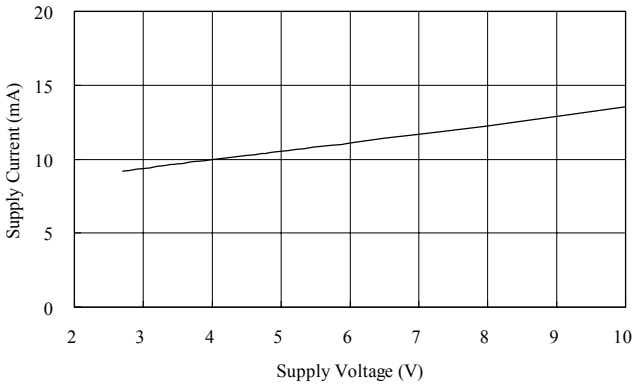


10 TYPICAL PERFORMANCE CHARACTERISTICS

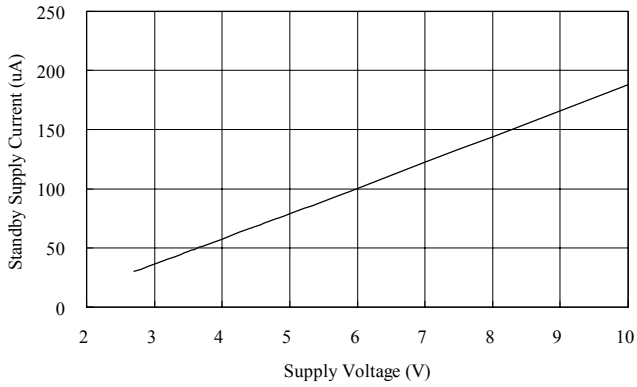
10-1 Supply voltage variation

V_{CC}=2.7 ~ 10.0V, T_a=25˚C, V_{in}=1.0V_{P-P}, R_L=150Ω

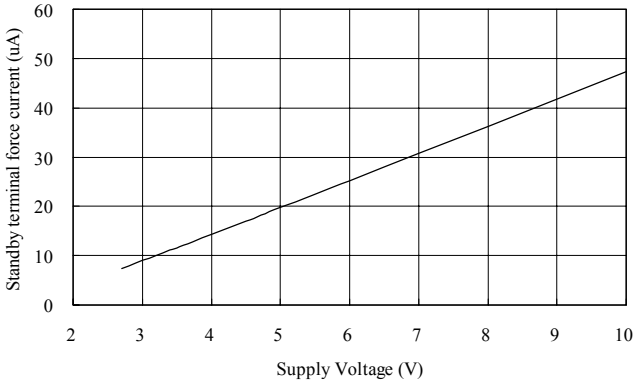
Supply Current



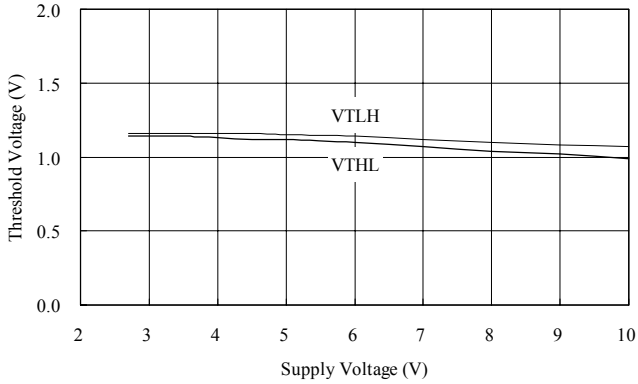
Standby Supply Current



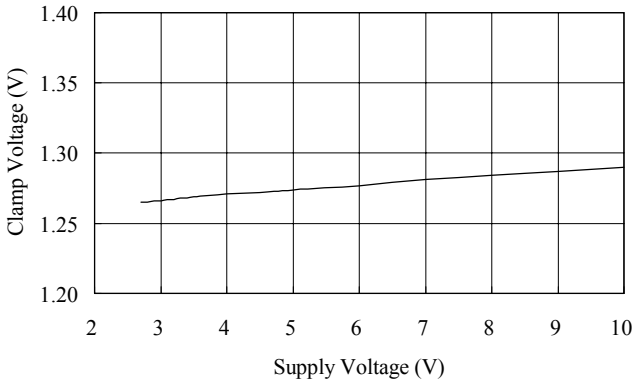
Standby Terminal Force Current



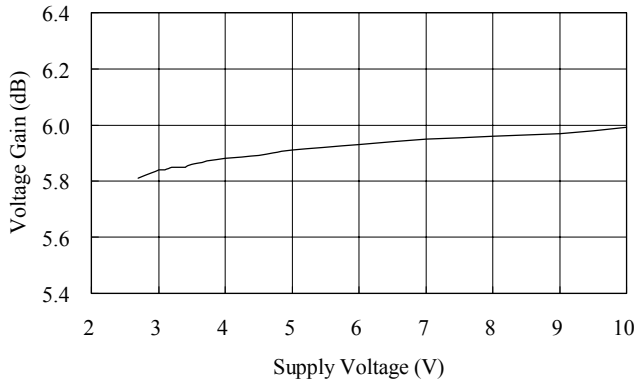
Threshold Voltage



Clamp Voltage

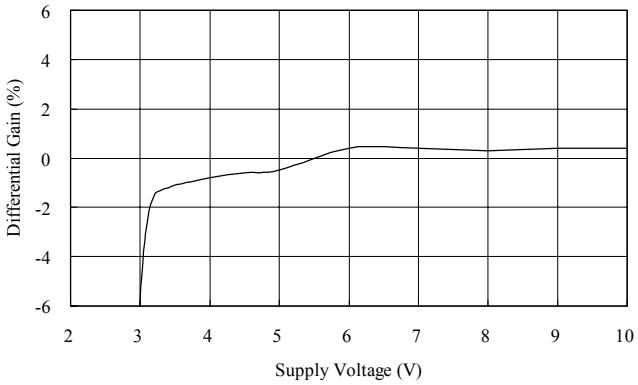


Voltage Gain

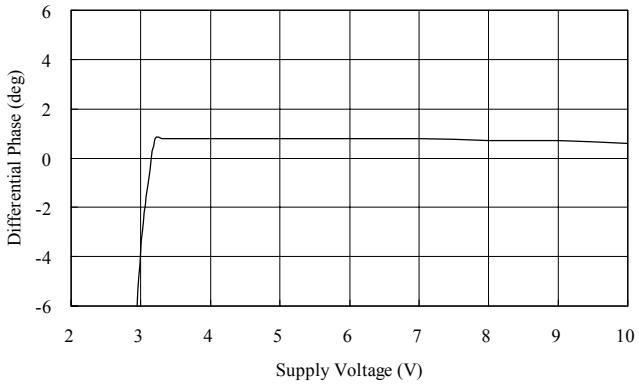


V_{CC}=2.7 ~ 10.0V, T_a=25˚C, V_{in}=1.0V_{P-P}, R_L=150Ω

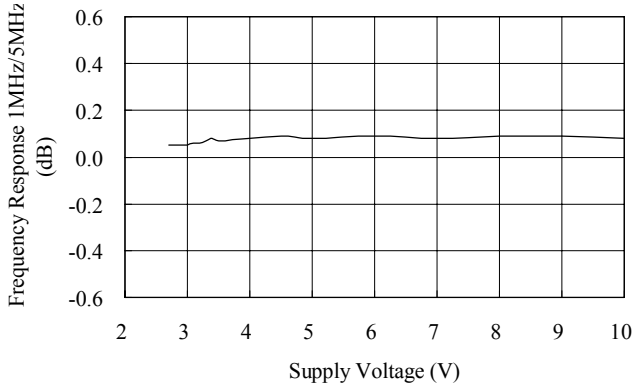
Differential Gain



Differential Phase



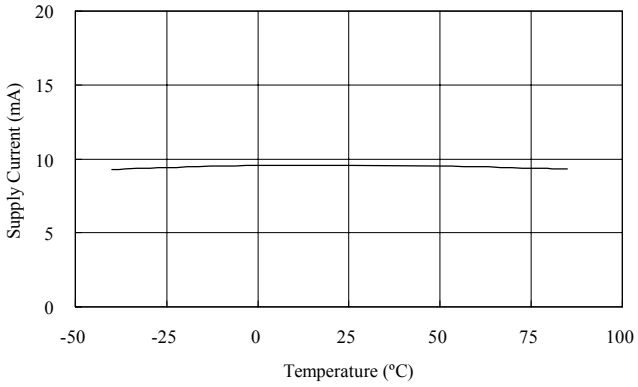
Frequency Response



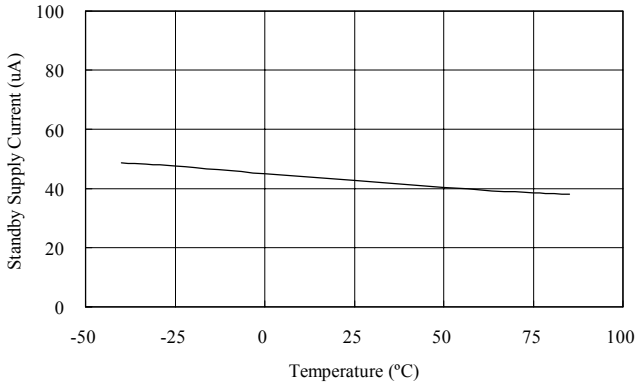
10-2 Ambient temperature variation

V_{CC}=3.3V, T_a=-40 ~ 85˚C, V_{in}=1.0V_{P-P}, R_L=150Ω

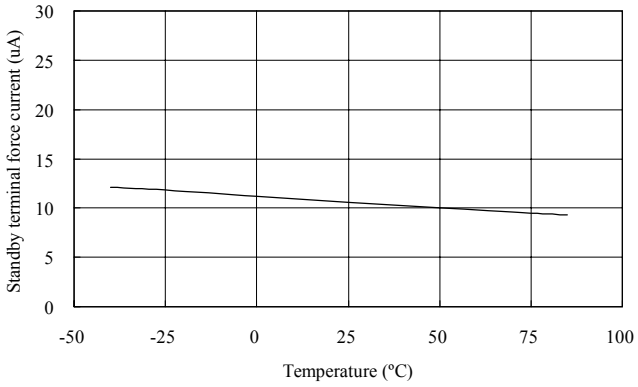
Supply Current



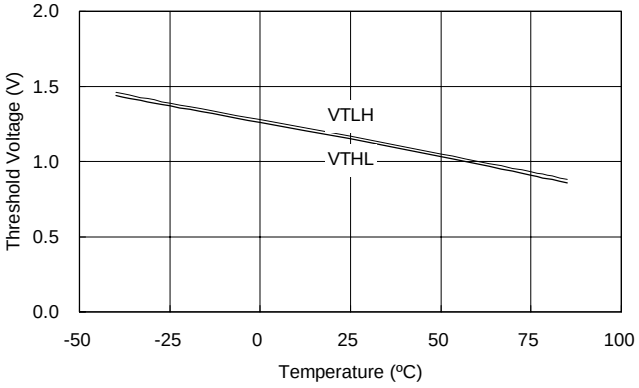
Standby Supply Current



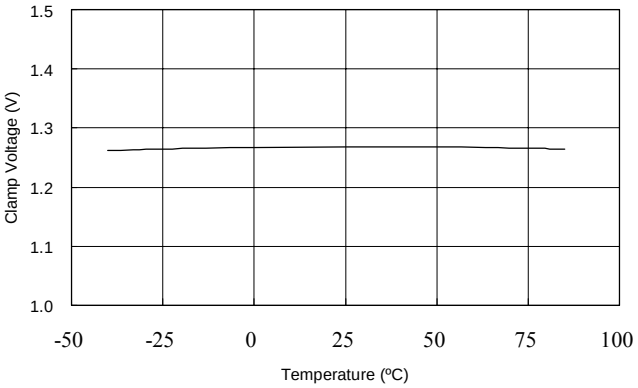
Standby Terminal Force Current



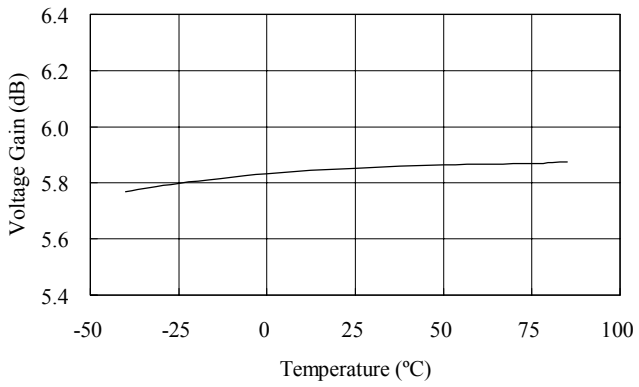
Threshold Voltage



Clamp Voltage

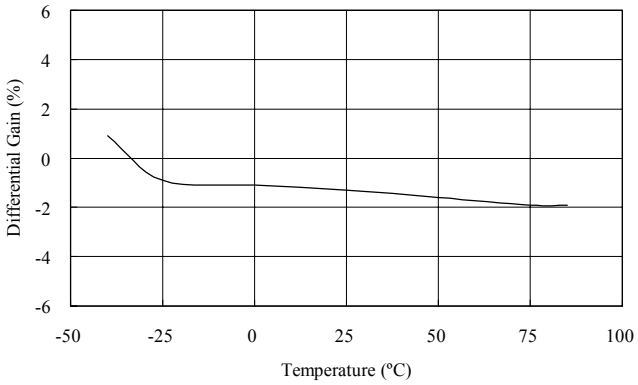


Voltage Gain

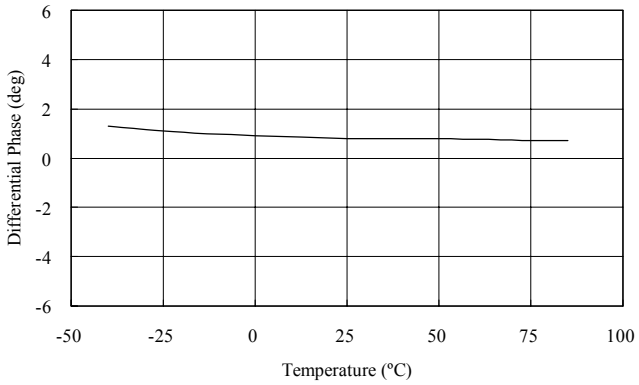


V_{CC}=3.3V, T_a=-40 ~ 85˚C, V_{in}=1.0V_{P-P}, R_L=150Ω

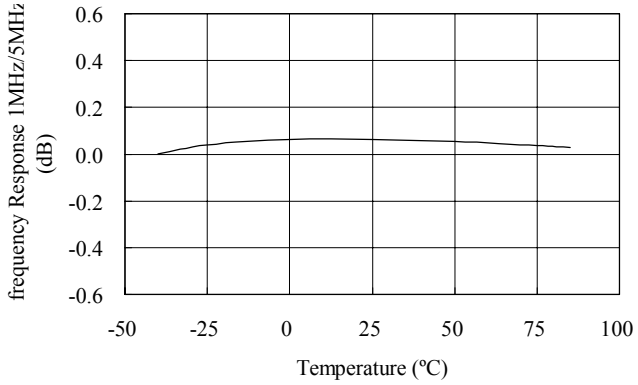
Differential Gain



Differential Phase



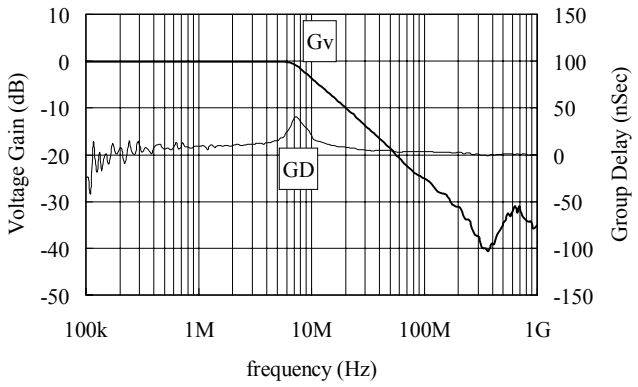
Frequency Response



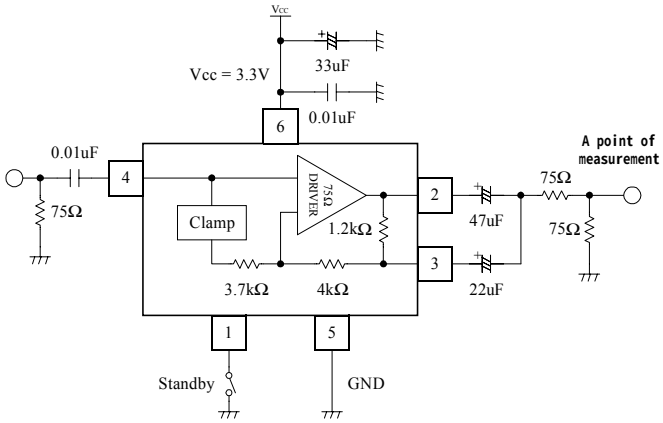
10-3 Frequency characteristics

V_{CC}=3.3V, T_a=25˚C, V_{in}=1.0V_{P-P}, R_L=150Ω

Voltage Gain, Group Delay



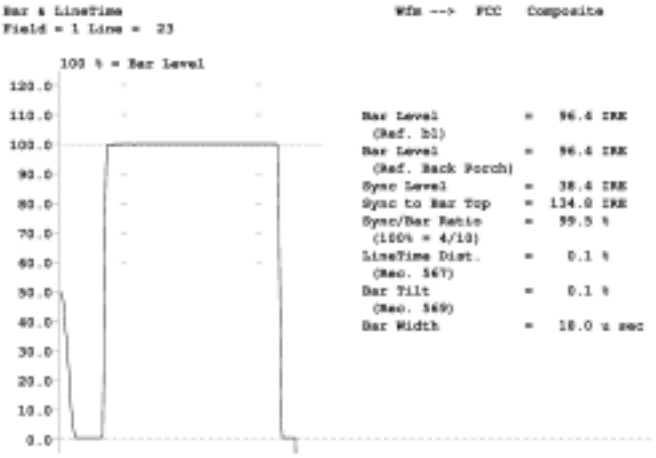
Test Circuit



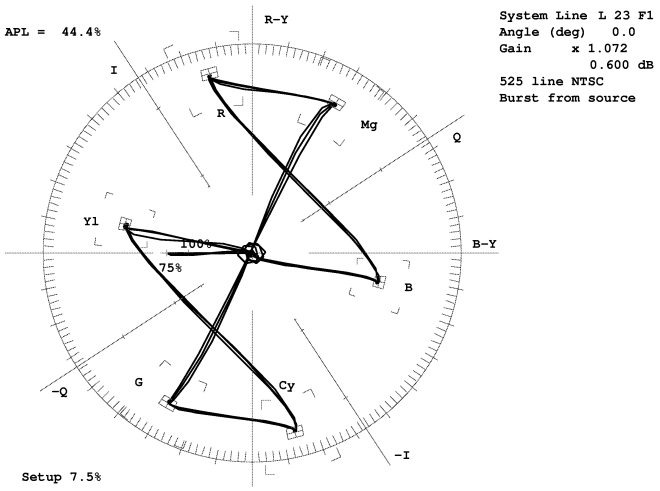
10-4 Video signal characteristics

V_{CC}=3.3V, T_a=25˚C, V_{in}=1.0V_{P-P}, R_L=150Ω

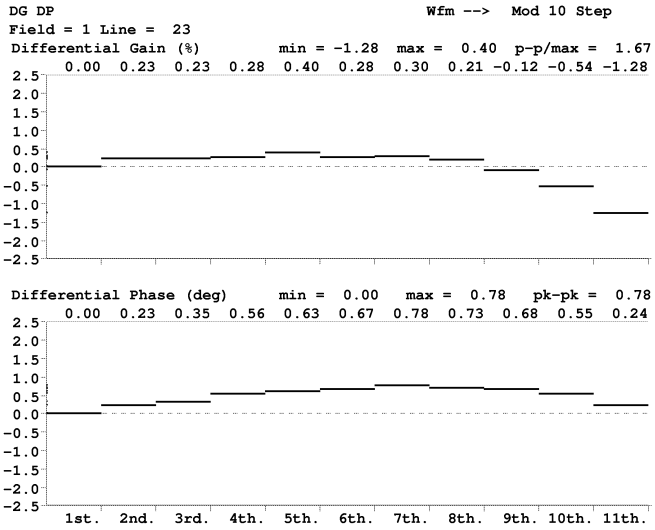
Bar and Line Time



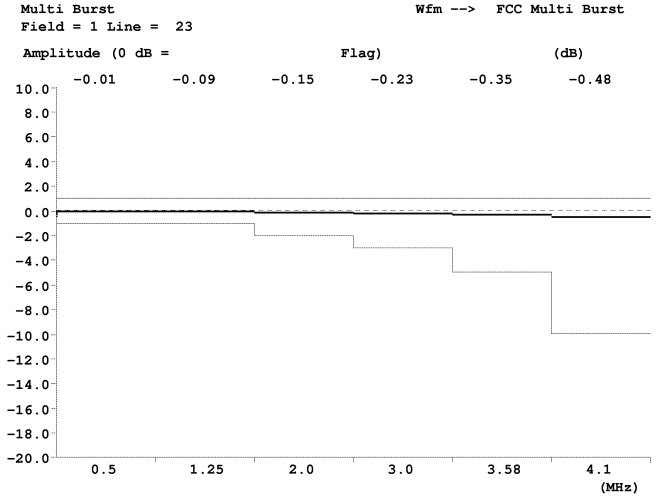
Color Bar



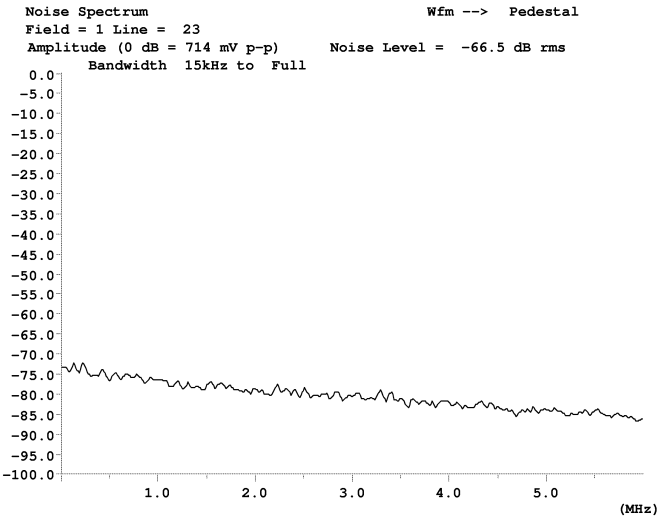
DG, DP



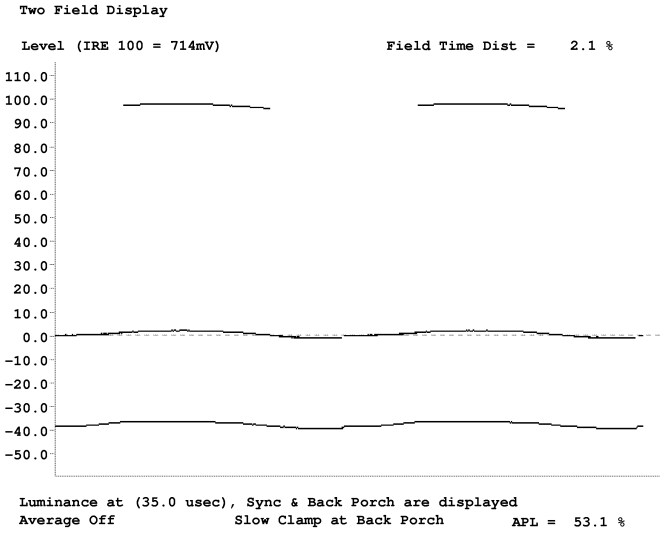
Multi Burst



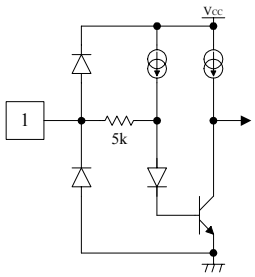
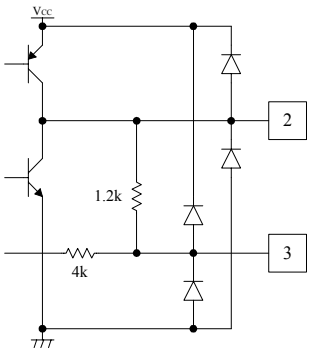
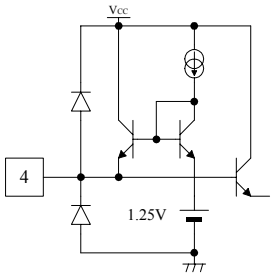
Noise Spectrum



Two Field



11 PIN DESCRIPTION

Pin No.	Pin Description	Internal Equivalent Circuit	Description
1	Standby		Standby logic terminal. Low → Standby. Open, or High → Operate.
2 3	Output SAG		Output terminal. It is impossible to drive 150Ω(75Ω+75Ω). SAG terminal.
4	Input		Input terminal. The Sink-tip-bottom is clamped at input.
5	GND		GND terminal.
6	V_{CC}		V_{CC} terminal.

12 APPLICATIONS INFORMATION

The low voltage operation is achieved with TK15465S. Therefore, please pay attention to the output capacitor. In case of changing V_{CC} by changing the video driver, refer this data sheet and reconsider the external components.

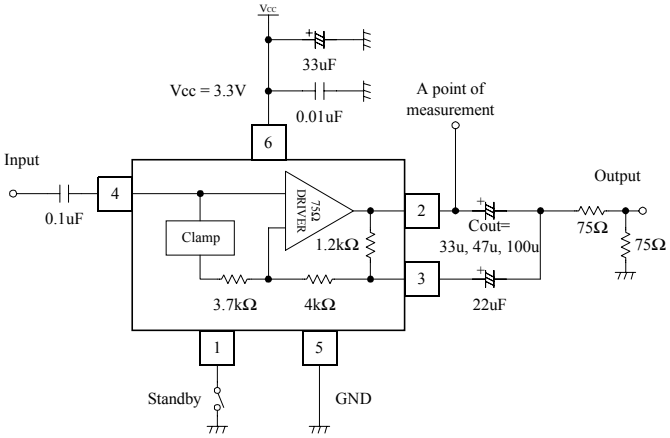
12-1 Output coupling capacity

Cout=47µF, and Csag=22µF are recommended as a standard value. In case of changing capacity value, please refer to the characteristics shown below.

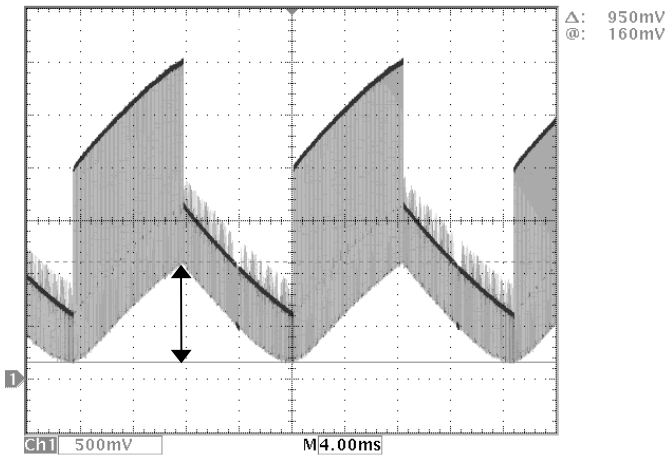
Following waveforms are measured by with different Cout. "Field Square Wave" is used as input signal for measurement whose output alternately black and white color in same screen as stripe, with the Csag capacity no change.

V_{CC}=3.3V, T_a=25˚C, V_{in}=1.0V_{P-P}(Field Square Wave), R_L=150Ω

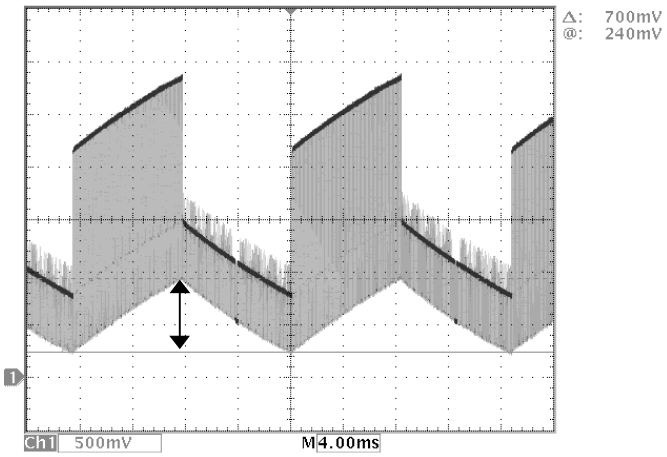
Test Circuit



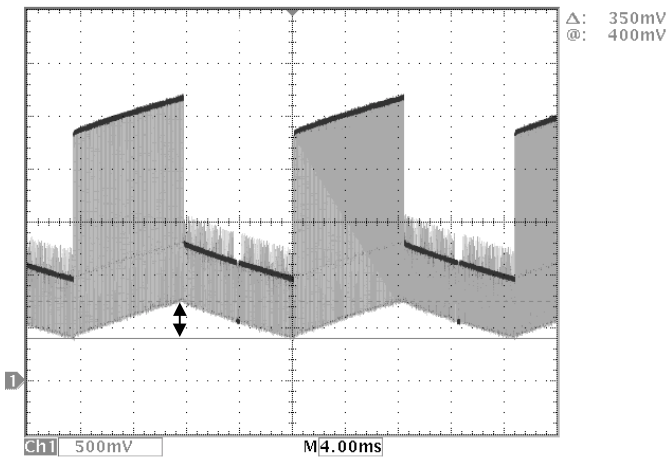
C_{OUT}=33µF, C_{SAG}=22µF



C_{OUT}=47µF, C_{SAG}=22µF



C_{OUT}=100µF, C_{SAG}=22µF



Different SAG waveforms can be seen at the output when the Cout value was changed.

The SAG waveform will be smaller with larger value of Cout. The SAG voltage is 350mV with Cout 100µF, and 950mV with 33µF.

Actually, the waveforms appeared at the IC terminal are the mixed signal of the SAG voltage and Video signal. For example, output amplitude is 2.95V with Cout 33µF (SAG voltage 0.95V and video signal amplitude 2.0V).

When 47µF or larger value was used, SAG is compensated. Therefore we recommend to use larger than 47µF.

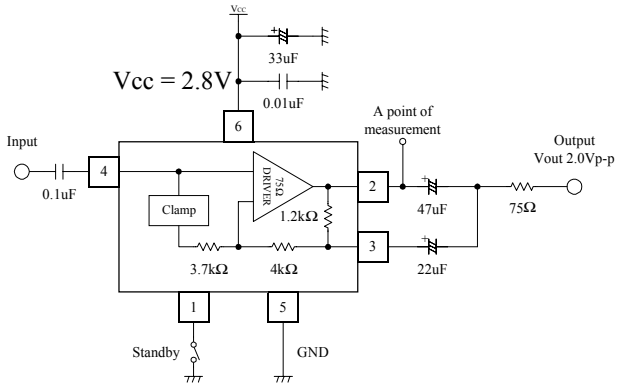
12-2 Low voltage operation

The internal bias voltage of the TK15465S is independent of V_{CC}. If this IC is used with lower V_{CC} than standard application, and output dynamic range is not enough, please reduce the bias voltage of the output terminal.

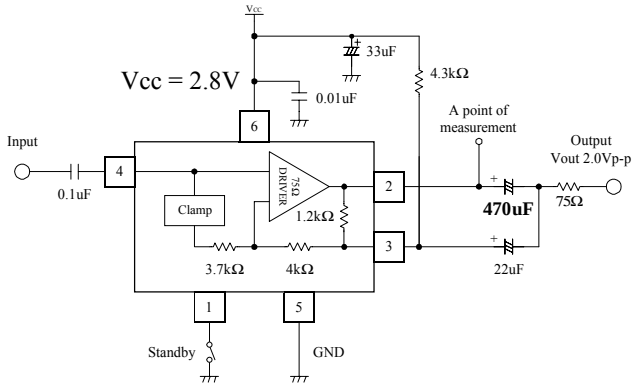
By reducing the value of V_{CC}, difference between necessary maximum amplitude of the video signal and the available maximum amplitude voltage will be small. It is necessary to reduce SAG voltage to enlarge the dynamic range at the output. For example, increase Cout value, and connect resistance between SAG terminal (3Pin) and V_{CC} terminal (6Pin) to reduce output terminal voltage.

Below shows the output waveforms at V_{CC}=2.8V by changing the application. "100% Color Bar" signal was used for measurement.

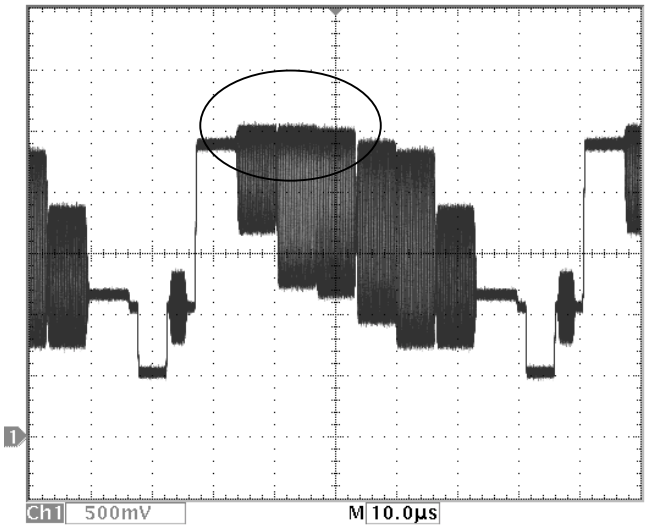
Test circuit (Normal)



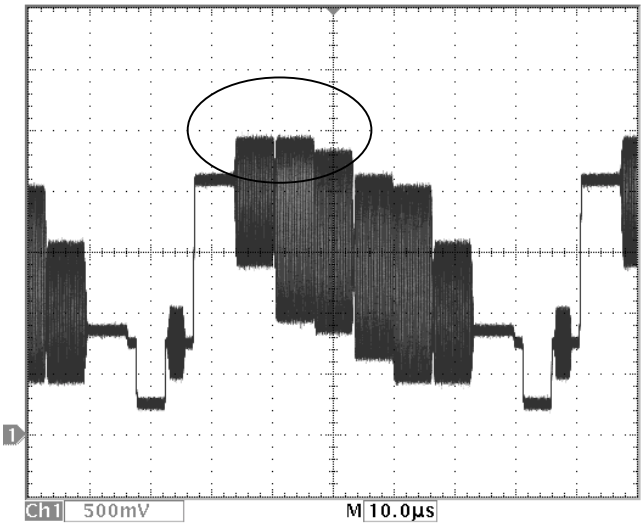
Test circuit (Modified application)



Waveforms of the standard application



Waveforms of the modified application



The waveform of the standard application shows supply-side signal is saturated. On the other hand, the waveform shows no problem with the modified application. In this case, we set V_{CC} at extremely low voltage (V_{CC}=2.8V), but it is available to use in low voltage with different value of external components. Please check and select the most suitable value for your application.

13. NOTES

■ Please be sure that you carefully discuss your planned purchase with our office if you intend to use the products in this application manual under conditions where particularly extreme standards of reliability are required, or if you intend to use products for applications other than those listed in this application manual.

- Power drive products for automobile, ship or aircraft transport systems; steering and navigation systems, emergency signal communications systems, and any system other than those mentioned above which include electronic sensors, measuring, or display devices, and which could cause major damage to life, limb or property if misused or failure to function.
- Medical devices for measuring blood pressure, pulse, etc., treatment units such as coronary pacemakers and heat treatment units, and devices such as artificial organs and artificial limb systems which augment physiological functions.
- Electrical instruments, equipment or systems used in disaster or crime prevention.

■ Semiconductors, by nature, may fail or malfunction in spite of our devotion to improve product quality and reliability. We urge you to take every possible precaution against physical injuries, fire or other damages which may cause failure of our semiconductor products by taking appropriate measures, including a reasonable safety margin, malfunction preventive practices and fire-proofing when designing your products.

■ This application manual is effective from Oct. 2003. Note that the contents are subject to change or discontinuation without notice. When placing orders, please confirm specifications and delivery condition in writing.

■ TOKO is not responsible for any problems nor for any infringement of third party patents or any other intellectual property rights that may arise from the use or method of use of the products listed in this application manual. Moreover, this application manual does not signify that TOKO agrees implicitly or explicitly to license any patent rights or other intellectual property rights which it holds.

■ None of the ozone depleting substances(ODS) under the Montreal Protocol are used in our manufacturing process.

14. OFFICES

If you need more information on this product and other TOKO products, please contact us.

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■ TOKO Europe
Web site: http://www.tokoeurope.com/

■ TOKO Hong Kong
Web site: http://www.toko.com.hk/

■ TOKO Taiwan
Web site: http://www.tokohc.com.tw/

■ TOKO Singapore
Web site: http://www.toko.com.sg/

■ TOKO Seoul
Web site: http://www.toko.co.kr/

■ TOKO Manila
Web site: http://www.toko.com.ph/

■ TOKO Brazil
Web site: http://www.toko.com.br/