2-Input 1-Output Video Driver

■ GENERAL DESCRIPTION

The **NJM41010** is a 2-Input 1-Output general-purpose video switch. It includes 6dB amplifier and 75ohm driver circuit.

The NJM41010 is suitable for a variety of AV equipment because of a small package and wide operating temperature range.

■ PACKAGE OUTLINE

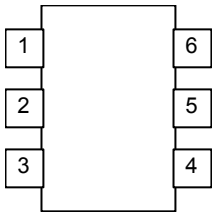
NJM41010F1

■ FEATURES

- Operating Voltage 4.5 to 9.5V
- Operating temperature range -40 to +85 °C*
- 2-Input 1-Output Video Switch
- 6dB Amplifier, 75Ω Driver Circuit
- Frequency Characteristics 0dB at 10MHz
- Sync-tip Clamp
- Bipolar Technology
- Small Package SOT-23-6-1 (MTP6-1)

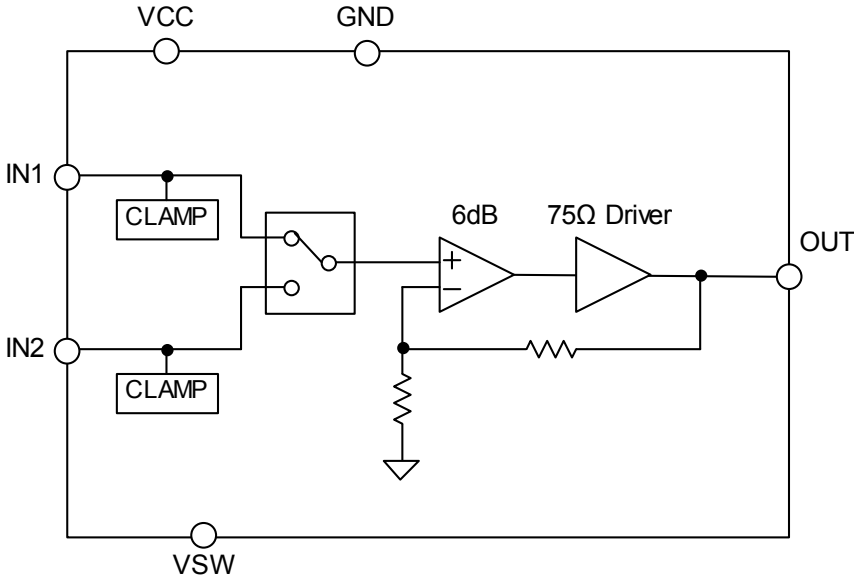
* NJM41010F1T : Wide operating temperature range type (-40 to +105°C)

■ PIN CONFIGURATION



1.OUT
2.GND
3.VCC
4.VIN1
5.VIN2
6.VSW

■ BLOCK DIAGRAM



■ **ABSOLUTE MAXIMUM RATINGS** (Ta=25°C)

PARAMETERS	SYMBOL	RATINGS	UNIT
Supply Voltage	Vcc	11.0	V
Power Dissipation	P_D	510 (Note1)	mW
Operating Temperature Range	Topr	-40 to +85(Note2)	°C
Storage Temperature Range	Tstg	-40 to +150	°C

(Note 1) At on a board of EIA/JEDEC specification. (114.3 x 76.2 x 1.6mm 2 layers, FR-4)
(Note 2) It has high operating temperature range product.(-40 to +105°C)

■ **RECOMMENDED OPEARATING CONDITION** (Ta= 25 °C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	Vopr		+4.5	+5.0	+9.5	V

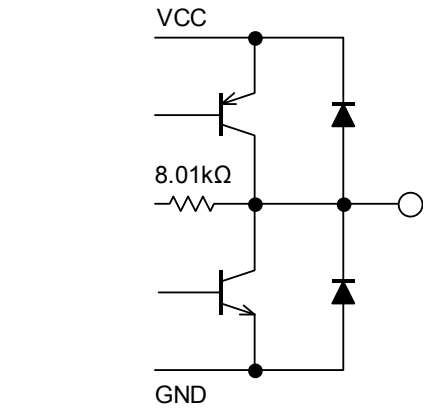
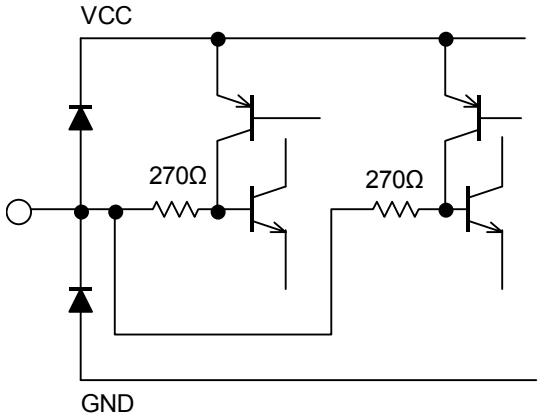
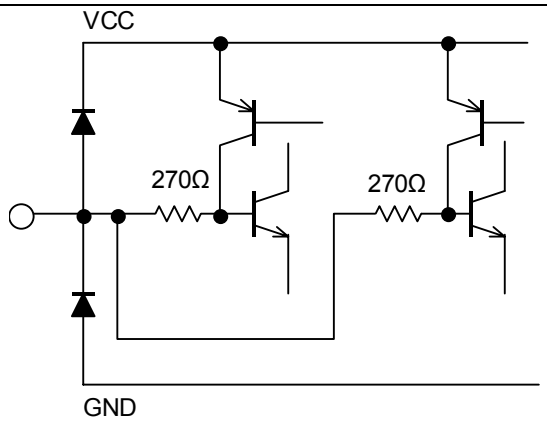
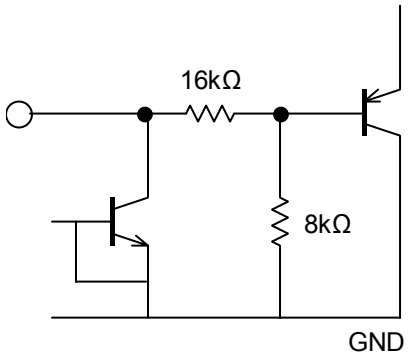
■**ELECTRICAL CHARACTERISTICS** (Vcc= 5.0V, R_L= 150Ω, Ta= 25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	No signal	-	8.0	15	mA
Voltage Gain	Gv	Vin=1MHz, 1.0Vp-p Sine-wave	5.5	6.0	6.5	dB
Maximum Output Voltage Swing	Vom	Vin=100kHz, Sine-wave, THD=1%	2.2	-	-	Vp-p
Frequency Characteristics	Gf	Vin=10MHz/1MHz, 1.0Vpp Sine-wave	-1.0	0	1.0	dB
Channel Cross talk	CT	Vin=4.43MHz, 1.0Vp-p, Sine-wave	-	-60	-50	dB
Differential Gain	DG	Vin=1.0Vpp 10step Video signal	-	0.5	-	%
Differential Phase	DP	Vin=1.0Vpp 10step Video signal	-	0.2	-	deg
Switch inflow current High Level	I_{SWH}	V=5V	-	-	300	μA
Switch inflow current Low Level	I_{SWL}	V=0.3V	-	-	30	μA
Switch Change Voltage High Level	V_{thH}	VSW	2.0	-	V^+	V
Switch Change Voltage Low Level	V_{thL}	VSW	0	-	1.0	V

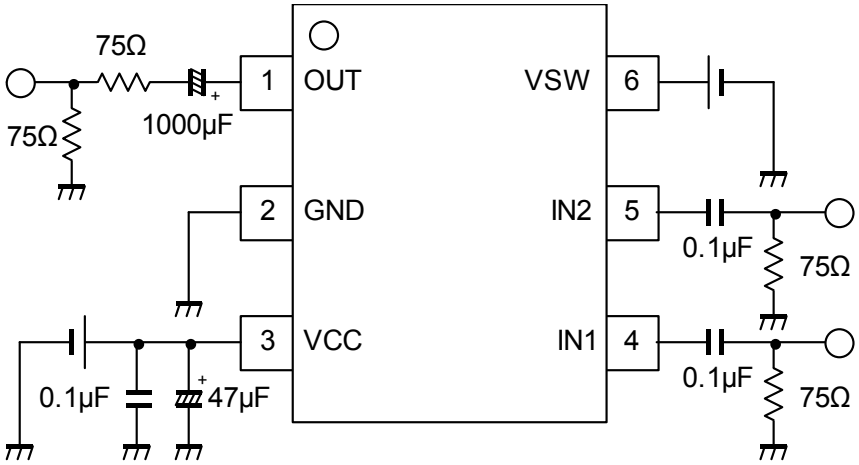
■ **SWITCH FUNCTION**

PIN	MODE	NOTES
VSW (Output signal select)	H	IN2 output
	L	IN1 output
	OPEN	IN1 output

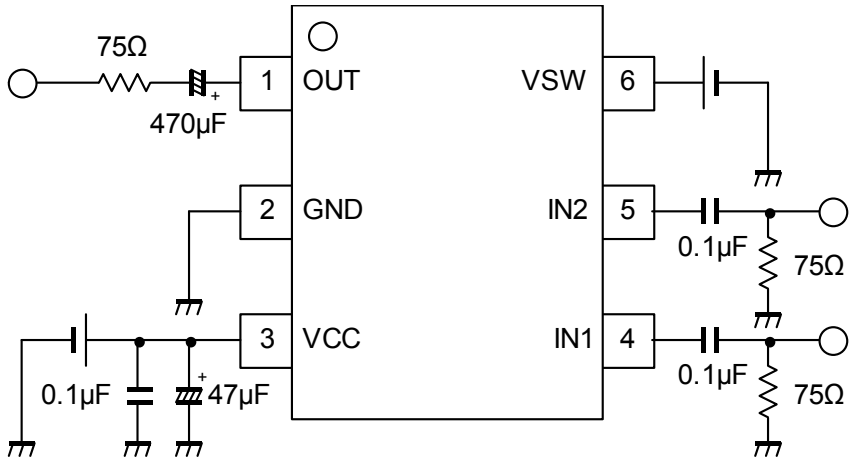
■ **TERMINAL FUNCTION**

PIN No.	PIN NAME	FUNCTION	EQUIVALENT CIRCUIT	DC VOLTAGE
1	OUT	OUTPUT		1.3V
2	GND	GND	-	-
3	VCC	VCC	-	-
4	IN1	INPUT 1		1.56V
5	IN2	INPUT 2		1.56V
6	VSW	SWITCH VOLTAGE INPUT		-

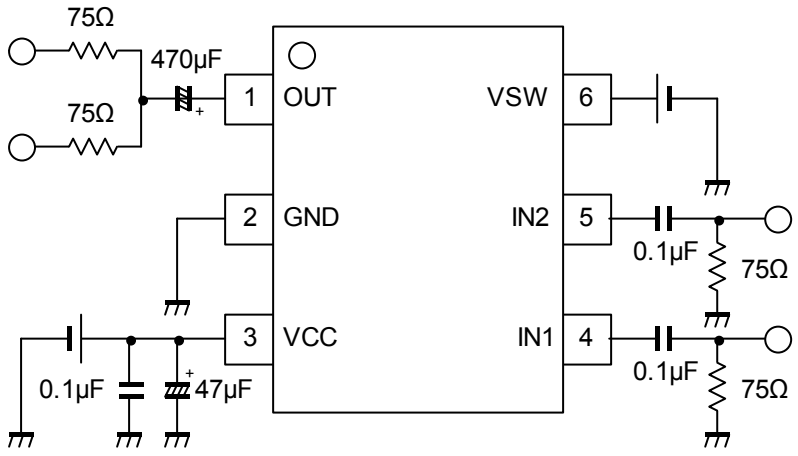
■ **TEST CIRCUIT**



■ **APPLICATION CIRCUIT1**



■ **APPLICATION CIRCUIT2 (Two-line driving circuit)**



Note

This circuit drives two-line of 150Ω. However, it may cause to lose synchronization by an input signal of large APL change (100% white signals more than 1Vp-p).
Confirm the large APL change waveform (100% white signals more than 1Vp-p) and evaluate sufficiently.

♦**Clamp circuit**

1. Operation of Sync-tip-clamp

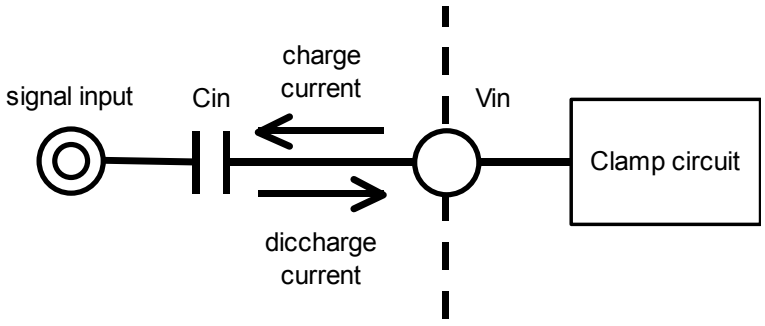
Input circuit will be explained. Sync-tip clamp circuit (below the clamp circuit) operates to keep a sync tip of the minimum potential of the video signal. Clamp circuit is a circuit of the capacitor charging and discharging of the external input Cin. It is charged to the capacitor to the external input Cin at sync tip of the video signal. Therefore, the potential of the sync tip is fixed.

And it is discharged charge by capacitor Cin at period other than the video signal sync tip. This is due to a small discharge current to the IC.

In this way, this clamp circuit is fixed sync tip of video signal to a constant potential from charging of Cin and discharging of Cin at every one horizontal period of the video signal.

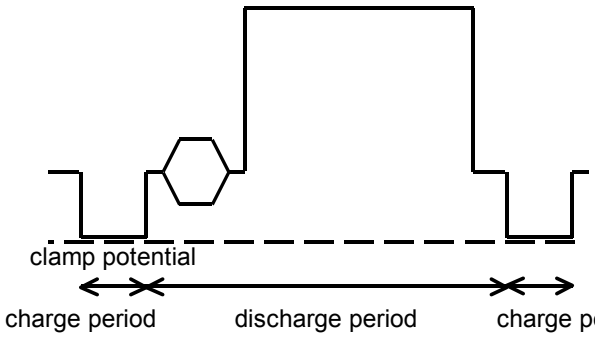
The minute current be discharged an electrical charge from the input capacitor at the period other than the sync tip of video signals. Decrease of voltage on discharge is dependent on the size of the input capacitor Cin.

If you decrease the value of the input capacitor, will cause distortion, called the H sag. Therefore, the input capacitor recommend on more than 0.1uF.

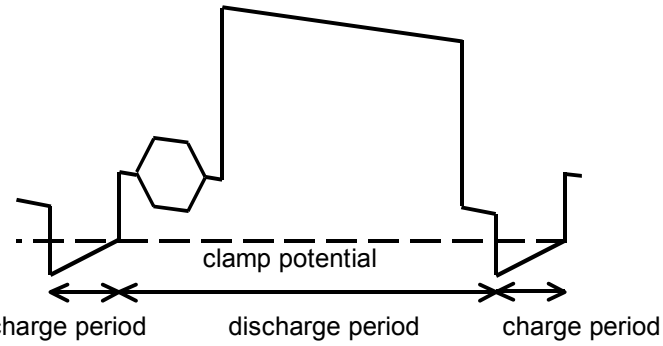


< Clamp circuit >

A. Cin is large



B. Cin is small (H sag experience)



< Waveform of input terminal >

2. Input impedance

The input impedance of the clamp circuit is different at the capacitor discharge period and the charge period.

The input impedance of the charging period is a few kΩ. On the other hand, the input impedance of the discharge period is several MΩ. Because is a small discharge-current through to the IC.

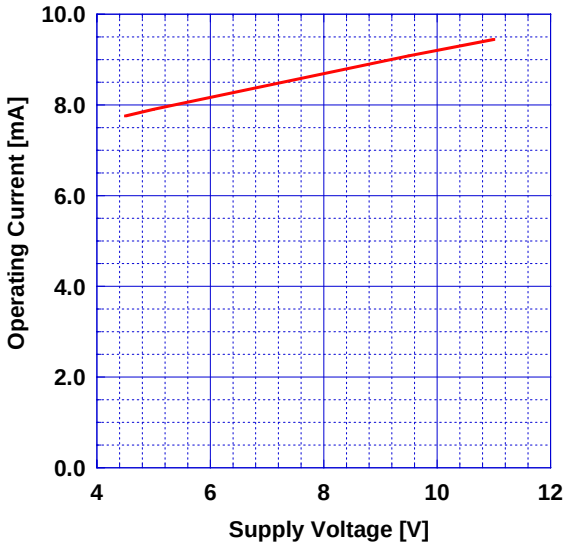
Thus the input impedance will vary depending on the operating state of the clamp circuit.

3. Impedance of signal source

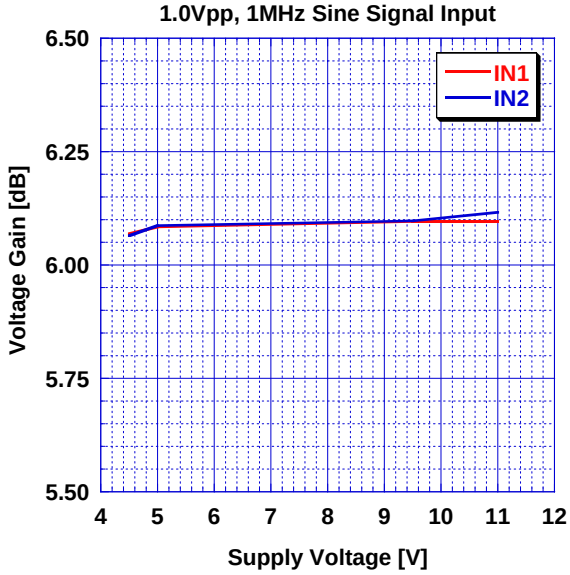
Source impedance to the input terminal, please lower than 200Ω. A high source impedance, the signal may be distorted. If so, please to connect a buffer for impedance conversion.

■ TYPICAL CHARACTERISTICS

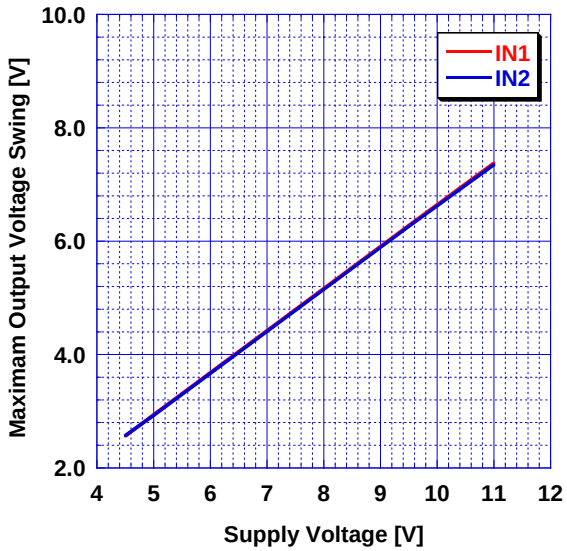
Operating Current vs. Supply Voltage



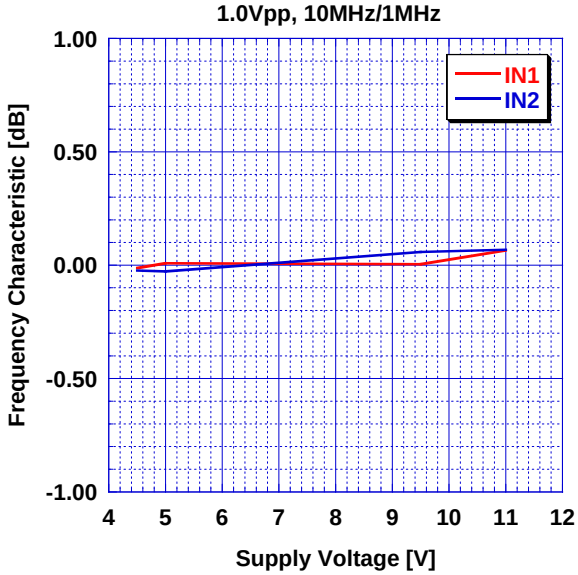
Voltage Gain vs. Supply Voltage
1.0Vpp, 1MHz Sine Signal Input



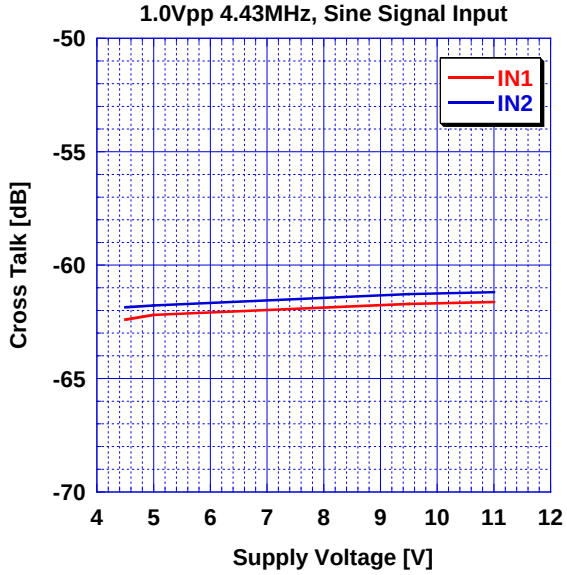
Maximam Output Voltage Swing vs. Supply Voltage
Total Harmonic Distortion=1%, 100kHz



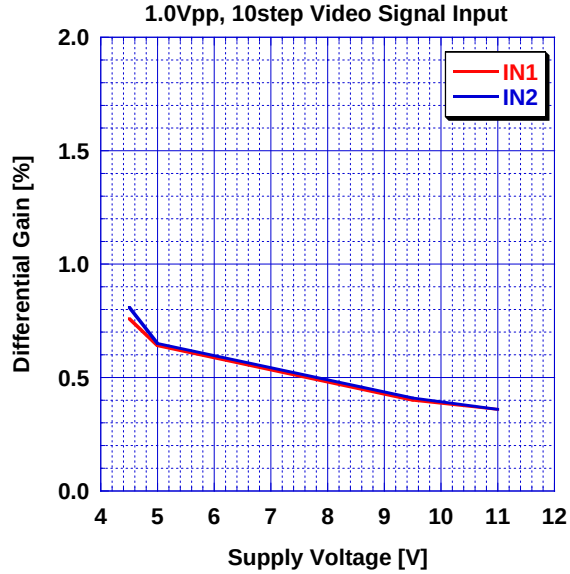
Frequency Characteristic vs. Supply Voltage
1.0Vpp, 10MHz/1MHz



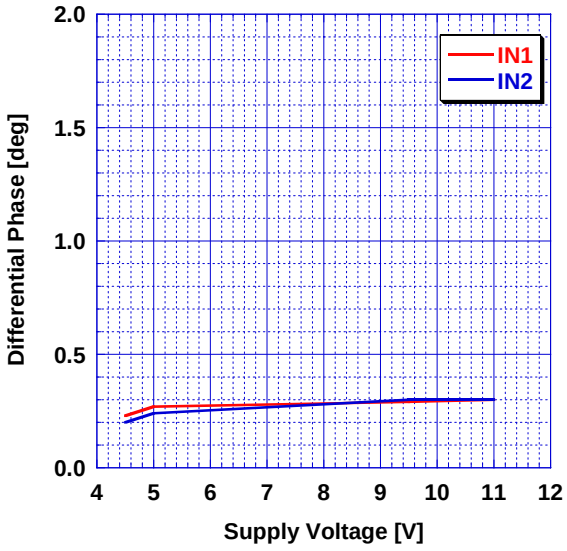
Cross Talk vs. Supply Voltage
1.0Vpp 4.43MHz, Sine Signal Input



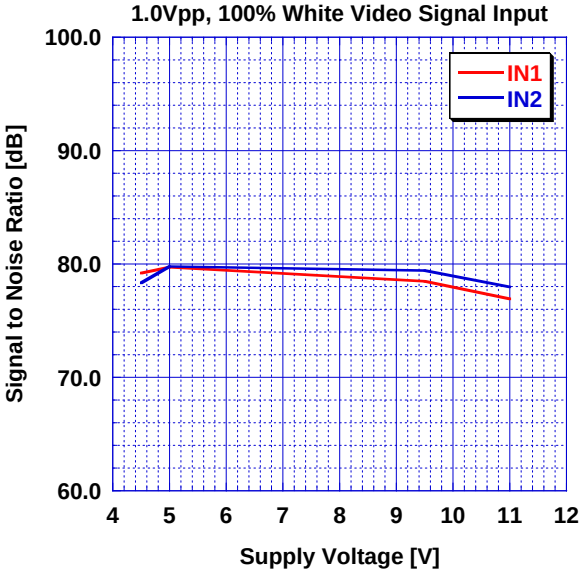
Differential Gain vs. Supply Voltage
1.0Vpp, 10step Video Signal Input



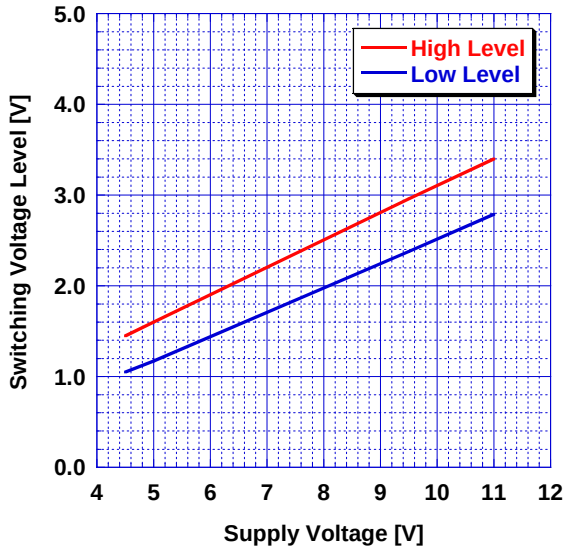
Differential Phase vs. Supply Voltage
1.0Vpp, 10step Video Signal Input



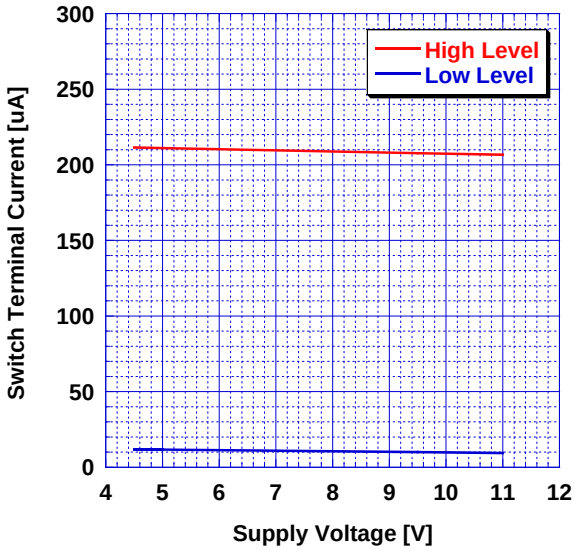
Signal to Noise Ratio vs. Suppply Voltage
1.0Vpp, 100% White Video Signal Input



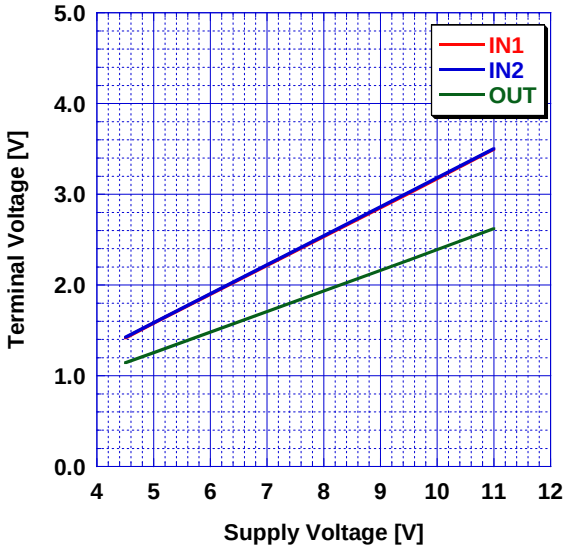
Switching Voltage Level vs. Supply Voltage



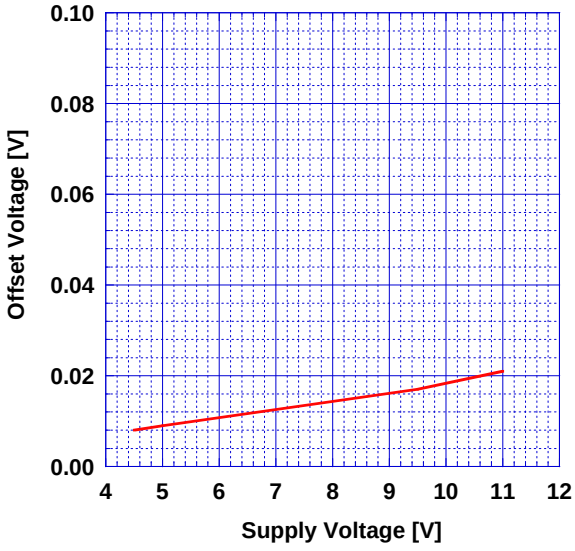
Switch Terminal Current vs. Supply Voltage



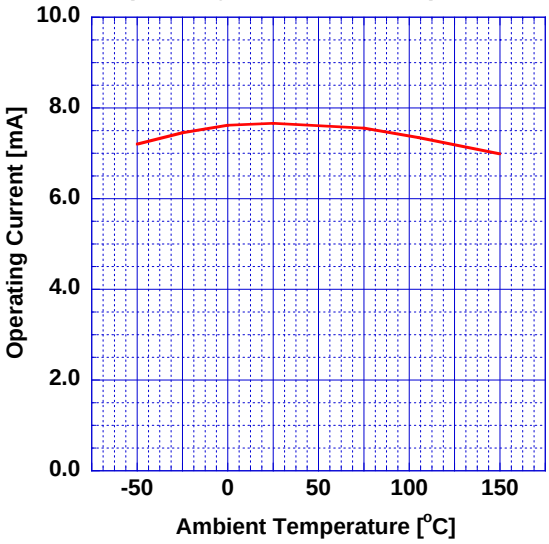
Terminal Voltage vs. Supply Voltage



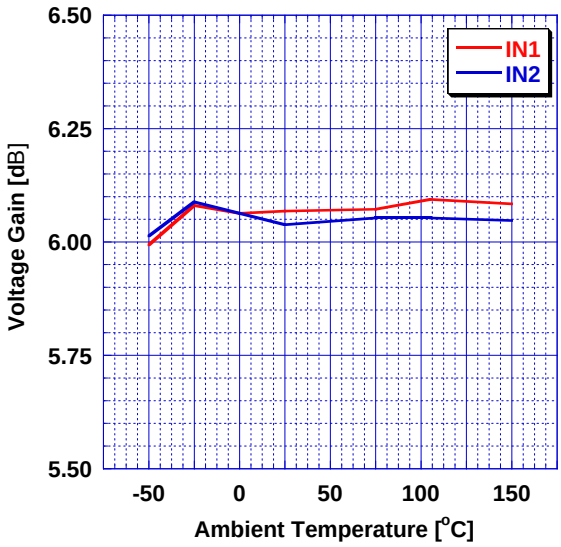
Offset Voltage vs. Supply Voltage



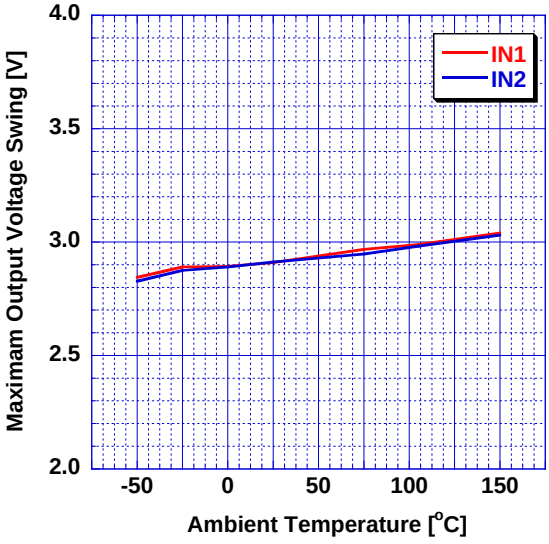
Operating Current vs. Temperature



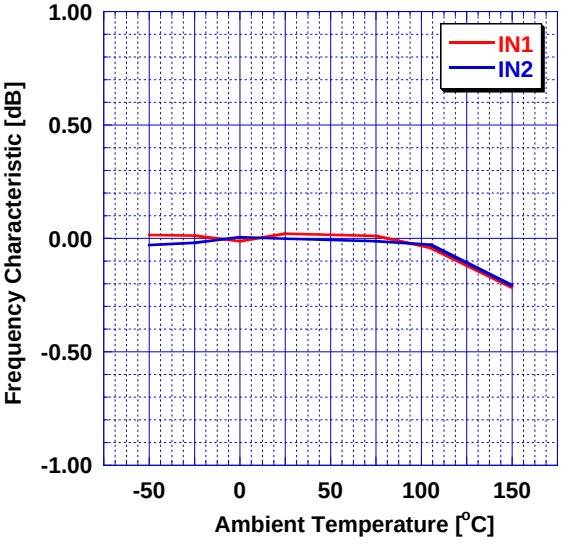
Voltage Gain vs. Temperature
1.0Vpp, 1MHz Sine Signal Input



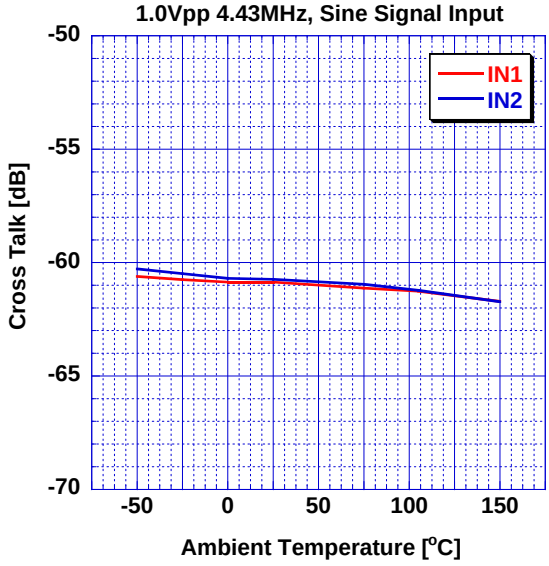
Maximam Output Voltage Swing vs. Temperature
Total Harmonic Distortion=1%, 100kHz



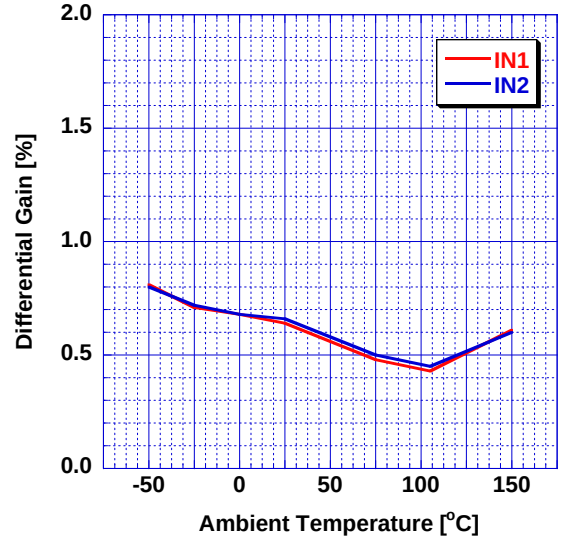
Frequency Characteristic vs. Temperature
1.0Vpp, 10MHz/1MHz



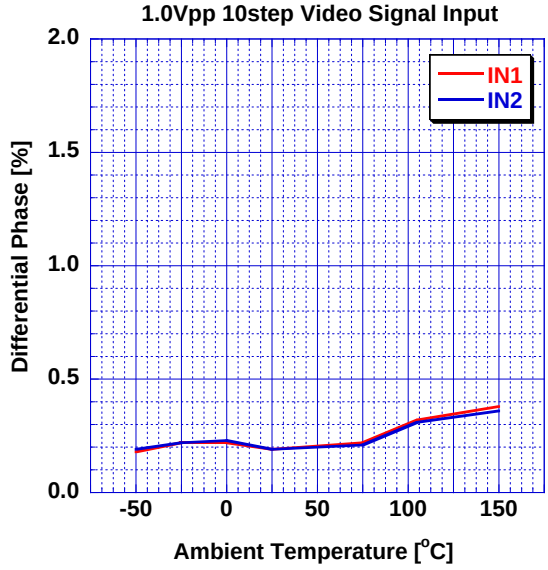
Cross Talk vs. Temperature
1.0Vpp 4.43MHz, Sine Signal Input



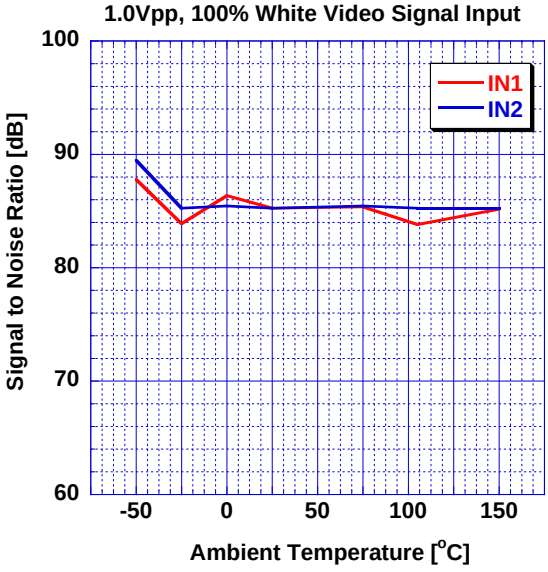
Differential Gain vs. Temperature
1.0Vpp 10step Video Signal Input



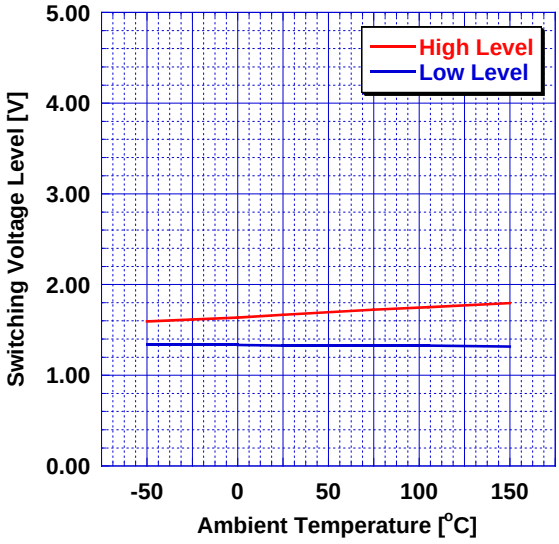
Differential Phase vs. Temperature
1.0Vpp 10step Video Signal Input



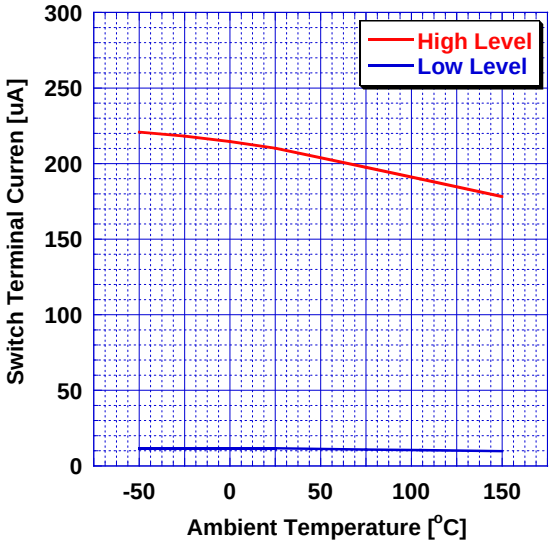
Signal to Noise Ratio vs. Temperature
1.0Vpp, 100% White Video Signal Input



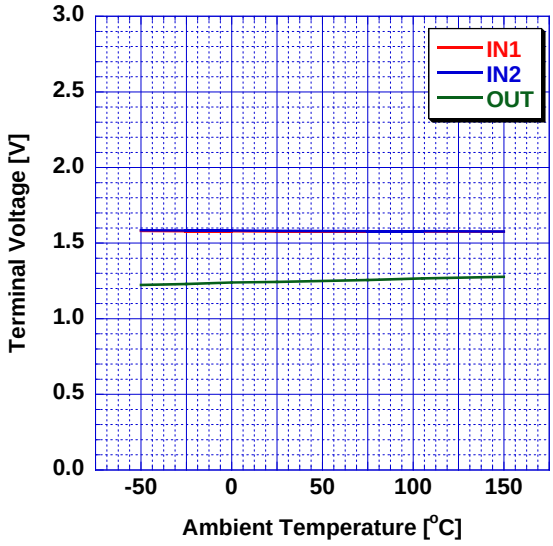
Switching Voltage Level vs. Temperature



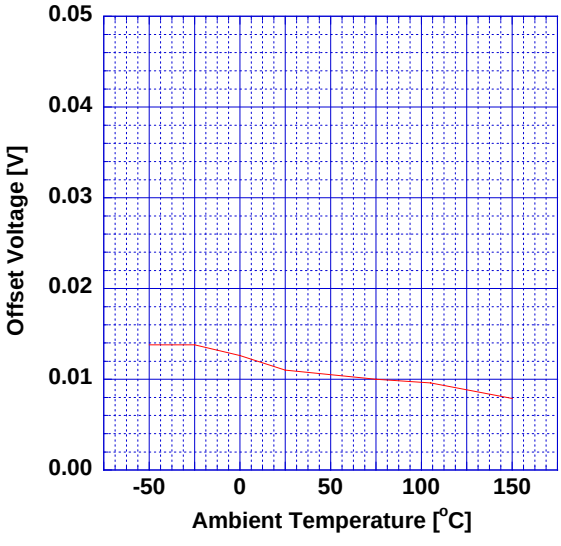
Switch Terminal Current vs. Temperature

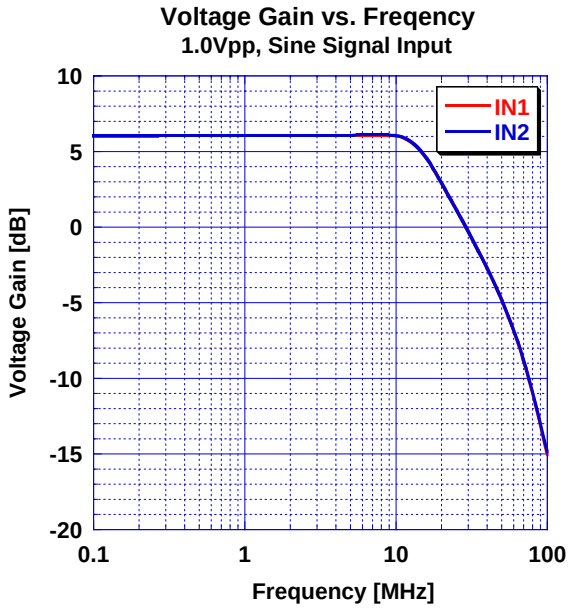


Terminal Voltage vs. Temperature



Offset Voltage vs. Temperature





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