SONY® CXL1009P

CMOS-CCD Signal Processor for TBC

Description

CXL1009P is a CMOS-CCD signal processor developed for Time Base Corrector (TBC).

Features

- Low power consumption 160 mW (Typ.)
- Wide variable frequency range (15.2 to 27.2 MHz)
- Built-in peripheral circuits

Functions

- 680 bit CCD register x 2
- Clock drivers
- Autobias circuit (For Audio/Video)
- Sync tip clamp circuit
- T-type flip-flop circuit
- Timing generator circuit
- Output feedback circuit

Structure

CMOS-CCD

Absolute Maximum Ratings (Ta = 25°C)

- Supply voltage V_{DD} 11 V
- Supply voltage V_{CL} 6 V
- Operating temperature T_{opr} −10 to +60 °C
- Storage temperature T_{stg} −55 to +150 °C
- Allowable power dissipation P_D 1 W

Recommended Operating Conditions

- Supply voltage V_{DD} 9 V ±5%
- Supply voltage V_{CL} 9 V ±5%

Recommended Input Signal Conditions

Item	Symbol	Min.	Typ.	Max.	Unit
Input amplitude	V_{INP-P}	--	1.0	1.28	Vp-p

Package Outline

Unit: mm

20 pin DIP (Plastic)

DIP-20P-02

20 pin DIP (Plastic)

DIP-20P-121

Recommended Clock Conditions

Item	Symbol	Min.	Typ.	Max.	Unit	Remarks
Clock frequency	f_{CK}	15.2	21.4	27.2	MHz	Pulse or Sinewave*
Clock amplitude	V_{CKP-P}	1.0	2.0	4.0	Vp-p	
Duty (during pulse)	Dy	40	50	60	%	

Note) During pulse the clock requires a pulse as shown in Fig. 1.

- 1 -
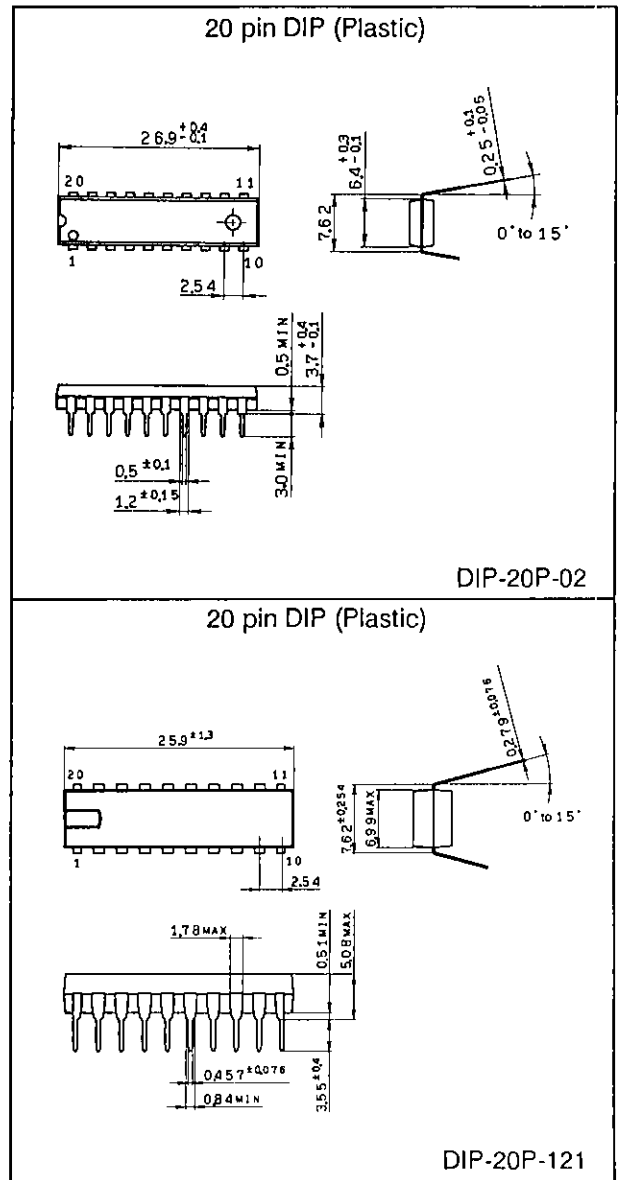
Recommended Clock Waveform (Pulse)

$36ns < T < 66ns$ $\quad$ $0.4 < \alpha < 0.6$

αT

6ns
90%
50%
10%

6ns
90%
50%
10%

2.0V
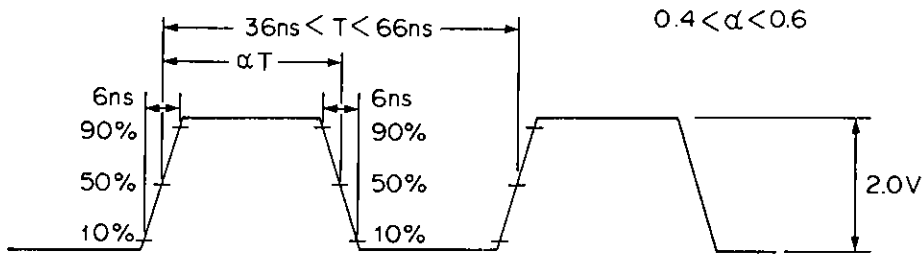
Fig. 1

Block Diagram and Pin Configuration (Top View)

OUT (1)

Vᴅᴅ (A) (2)

FEED IN1 (3)

IN1 (4)

Vɢɢ1 (5)

AUTO1 (6)

Vss (D) (7)

Vᴄʟ (8)

Vss (D) (9)

Vᴅᴅ(D) (10)

Output circuit

Feedback circuit

Feedback circuit

Sync tip clamp circuit

CCD 680 bit

CCD 680 bit

Sync tip clamp circuit

Autobias circuit (Center)

Autobias circuit (Clamp)

Clock drivers

Clock drivers

Timing generator circuit

Timing generator circuit

Q $\bar{Q}$

T

(20) Vss (A)

(19) Vᴅᴅ (A)

(18) FEED IN2

(17) IN2

(16) Vɢɢ2

(15) AUTO2

(14) Vss (D)

(13) Vᴄʟ

(12) CLK

(11) Vss (D)

Pin Description

No.	Symbol	I/O	Description
1	OUT	O	Output
2	V_DD (A)		Power supply 1 (Analog)
3	FEED IN1	I	Feedback input 1
4	IN1	I	Input 1
5	V_GG 1	I	Gate1
6	AUTO1	O	Autobias 1
7	V_SS (D)		GND (Digital)
8	V_CL		Power supply 2 (Digital)
9	V_SS (D)		GND (Digital)
10	V_DD (D)		Power supply 1 (Digital)
11	V_SS (D)		GND (Digital)
12	CLK	I	Clock input
13	V_CL		Power supply 2 (Digital)
14	V_SS (D)		GND (Digital)
15	AUTO2	O	Autobias 2
16	V_GG 2	I	Gate 2
17	IN2	I	Input 2
18	FEED IN2	I	Feedback input 2
19	V_DD (A)		Power supply 1 (Analog)
20	V_SS (A)		GND (Analog)

Electrical Characteristics 1

Ta = 25°C, V_{DD} = 9.0V, V_{CL} = 5.0V, See the Electrical Characteristics Test Circuit.

| Item	Symbol	Test conditions	SW condition				Test point	Min.	Typ.	Max.	Unit
			SW1	SW2	SW3	SW4					
Pin voltage	$V_{AUTO1-DC}$	Pin 6 voltage	b	a	a	a	V6	4.0	5.5	7.0	V
	$V_{AUTO2-DC}$	Pin 15 voltage	b	a	a	a	V5	3.5	5.0	6.5	V
	V_{IN-DC}	Pins 4 and 17 voltage	b	b	a	a	V7	3.5	5.0	6.5	V
	V_{GG-DC}	Pins 5 and 16 voltage	a / b / c	a	a	a	V8	1.0	2.0	3.0	V

Electrical Characteristics 2

Ta = 25°C, V$_{DD}$ = 9.0V, V$_{CL}$ = 5.0V, See the Electrical Characteristics Test Circuit.
Test conditions: Set the voltage of pins E1 and E2 as follows:
El = V$_{GG-DC}$, E2 = V$_{AUTO2-DC}$ + 0.65V or V$_{AUTO1-DC}$

| Item	Symbol	Test conditions	SW condition				Test point	Min.	Typ.	Max.	Unit
			SW1	SW2	SW3	SW4					
Supply current	I$_{DD}$	250 kHz, 1.0Vp-p sine wave input	b	a	a	a	A1	–	7	12	mA
	I$_{CL}$						A2	–	20	28	mA
Insertion gain	IG	250 kHz, 1.0Vp-p sine wave input $$IG = 20\log\left[\frac{\text{Output voltage (Vp-p)}}{1\text{Vp-p}}\right]$$	a to c	a	a	b	V2	–3	0	3	dB
Frequency response	fG	Dissipation at 3.58 MHz vs. 250 kHz fG = 20log (V3.58MHz/V250kMz) V3.58MHz: Output signal voltage during 3.58 MHz input V250kMz: Output signal voltage during 250 kHz input	a to c	a	b	b	V2	–3	–1	0	dB
Differential gain	DG	5-staircase wave (See Fig.) input Y = 140IRE (= 1.0Vp-p) Measuring with vectorscope.*¹	a to c	a	c	b	S	–	3	5	%
Differential phase	DP							–	3	5	Deg
Noise	S/N1	S: Input = 250 kHz, 1.0Vp-p sine wave	b	a	a	c	V3	50	55	–	dB
		N: Input = Alternating grounding point (rms)	b	a	d	c					
Aliasing noise	S/N2	Input = 3.58 MHz, 1.0Vp-p sine wave *²	d	a	b	d	SA	35	50	–	dB
Insertion gain difference	ΔIG	250 kHz, 1.0Vp-p sine wave *³	a to c	a	a	b	V2	–	1	2.4	%
DC output voltage difference	ΔVo-DC	250 kHz, 1.0Vp-p sine wave *⁴	a to c	a	a	a	V1	–	–	0.3	V

Note)

*1. Differential gain and differential phase conditions.
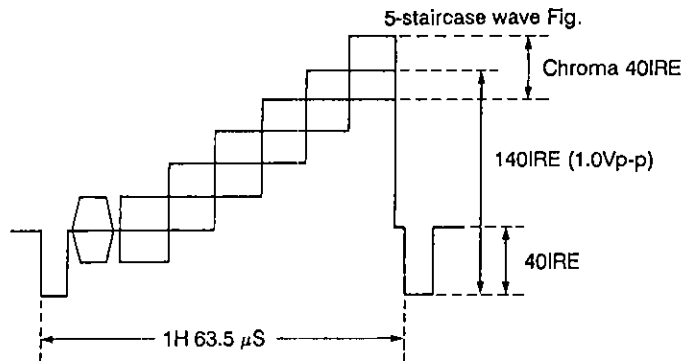
*2. Aliasing noise
Measure with a spectrum analyzer the 4.43 MHz output signal voltage at 3.58 MHz input (clock frequency 16.02 MHz).

Frequency (MHz)
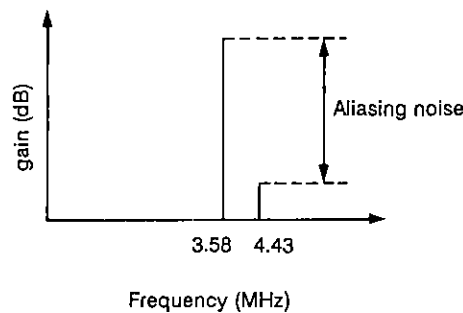
*3. Insertion gain difference
With the insertion gain of clock frequencies of 15.2 MHz, 21.4 MHz and 27.2 MHz, determine maximum value as IGmax [dB] and minimum value as IGmin [dB]. Insertion gain difference ΔIG is defined as follows.
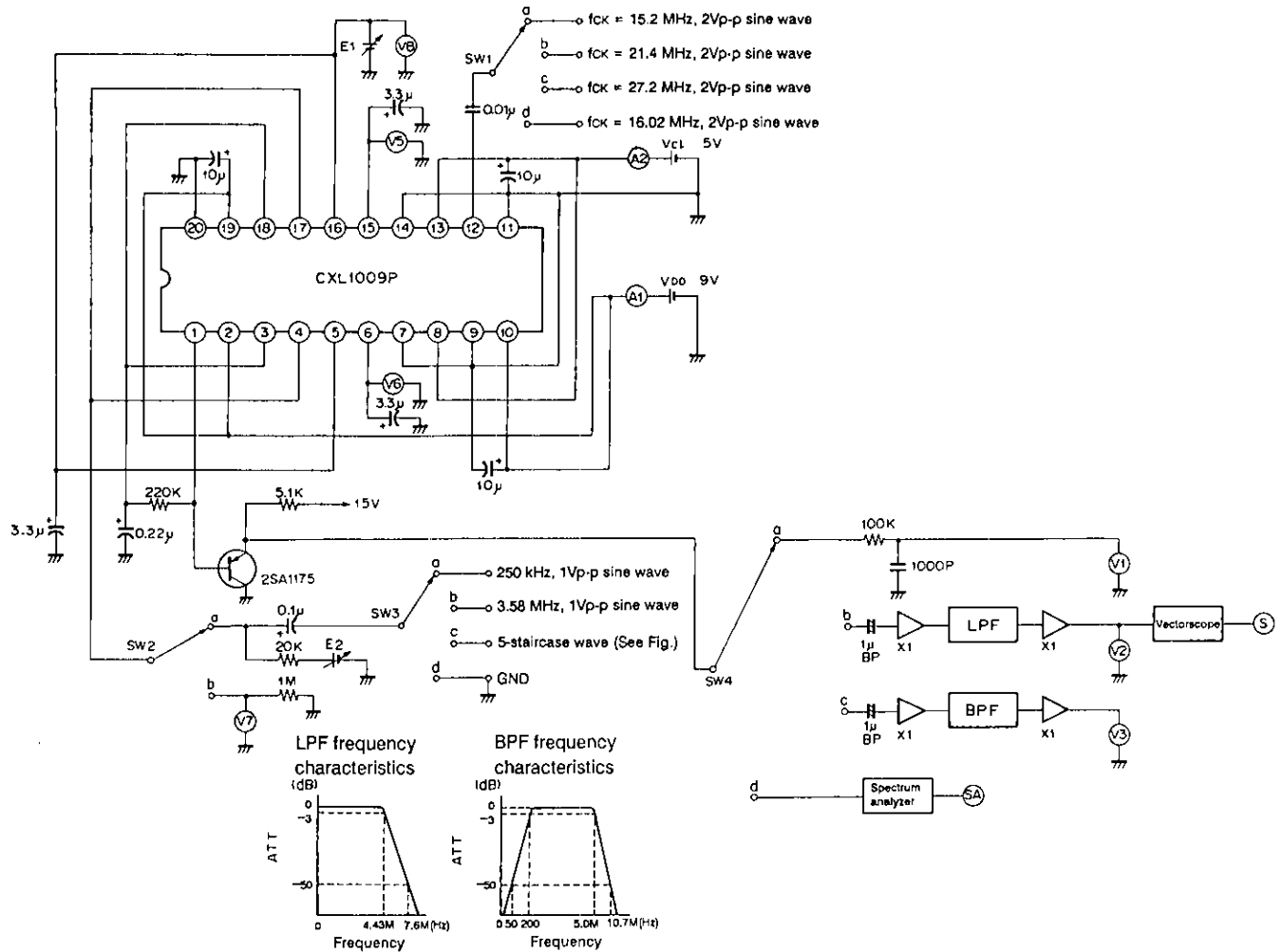
$$\Delta IG = \frac{10^{(IGmax/20)} - 10^{(IGmin/20)}}{10^{(IGmax/20)} + 10^{(IGmin/20)}} \times 200 \ [\%]$$

*4. DC output voltage difference
With the DC output voltage of clock frequencies of 15.2 MHz, 21.4MHz and 27.2 MHz, determine maximum value as VO-DCmax and minimum value as VO-DCmin. DC output voltage difference ΔVo-DC is defined as follows.

$$\Delta V_{O-DC} = V_{O-DC} \max - V_{O-DC} \min \ [V]$$

Electrical Characteristics Test Circuit

SW1
a —o fCK = 15.2 MHz, 2Vp-p sine wave
b —o fCK = 21.4 MHz, 2Vp-p sine wave
c —o fCK = 27.2 MHz, 2Vp-p sine wave
d —o fCK = 16.02 MHz, 2Vp-p sine wave

VCL 5V
VDD 9V

SW3
a —o 250 kHz, 1Vp-p sine wave
b —o 3.58 MHz, 1Vp-p sine wave
c — 5-staircase wave (See Fig.)
d —o GND

LPF frequency characteristics
(dB)

BPF frequency characteristics
(dB)

Vectorscope (S)

Spectrum analyzer (SA)

Application Circuit (Video)

Input signal

Clock input

CXL1009P

Output signal

2SA1175

Application Circuit (Audio)

Input signal

Clock input

CXL1009P

Output signal

2SA1175
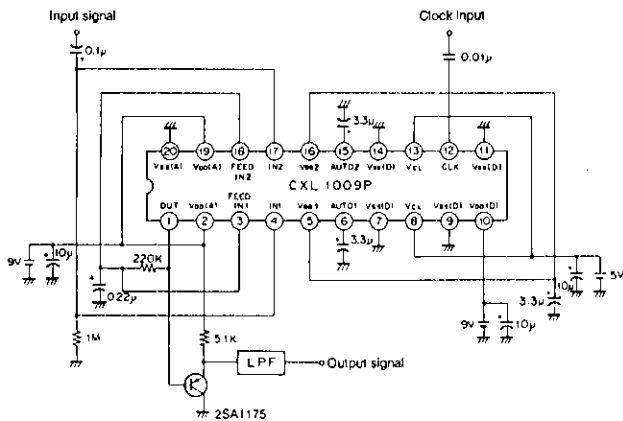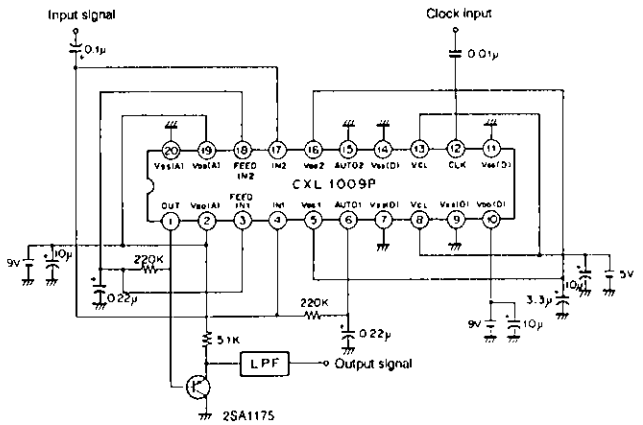
Frequency characteristics
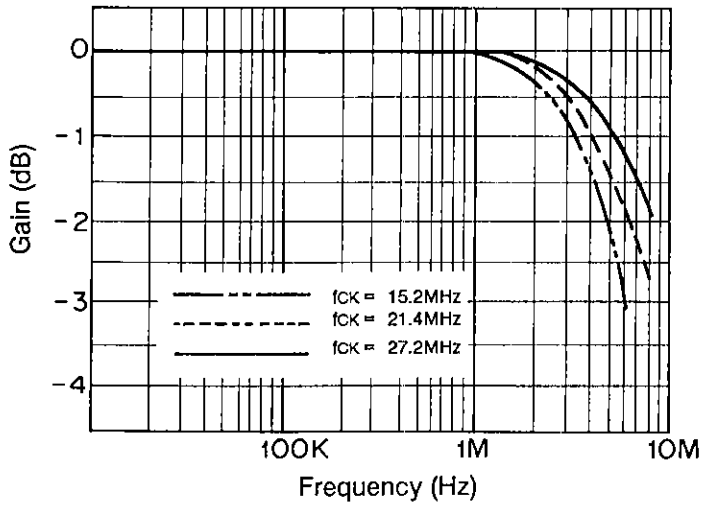
Delay time vs. Clock frequency
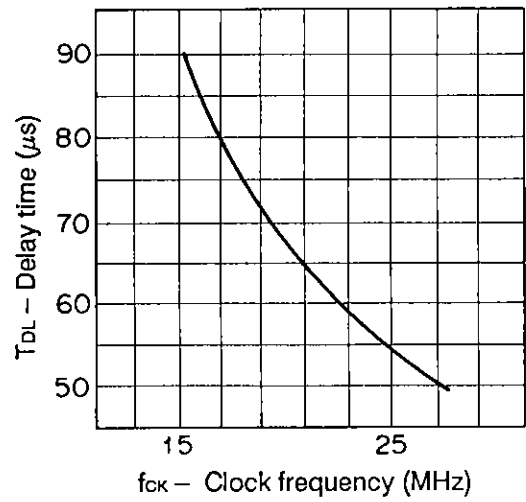
Insertion gain vs. Clock frequency
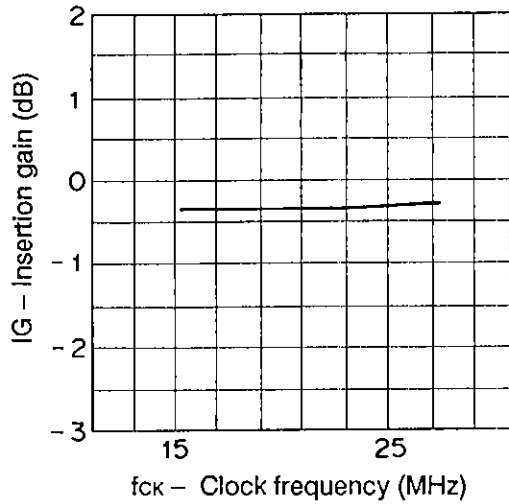
Frequency response vs. Clock frequency
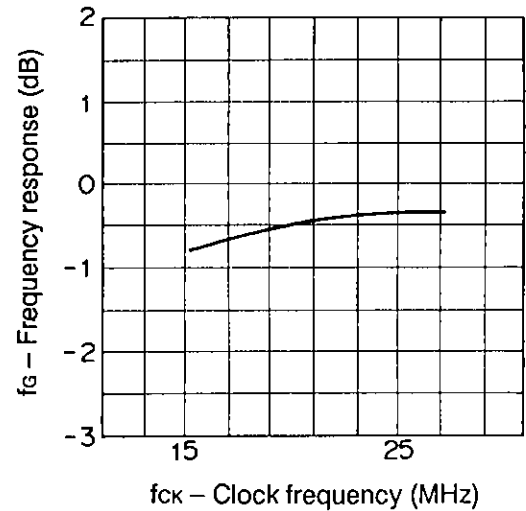
Differential gain vs. Clock frequency
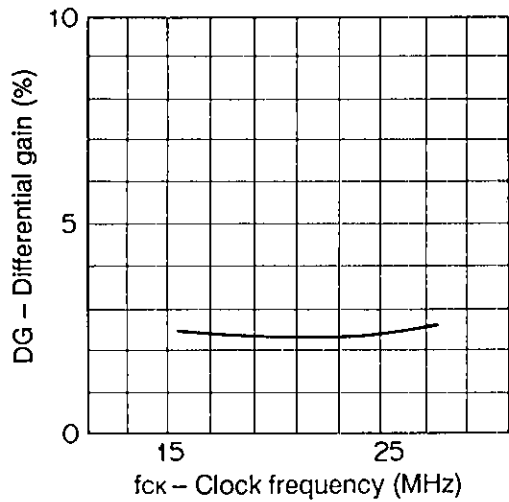
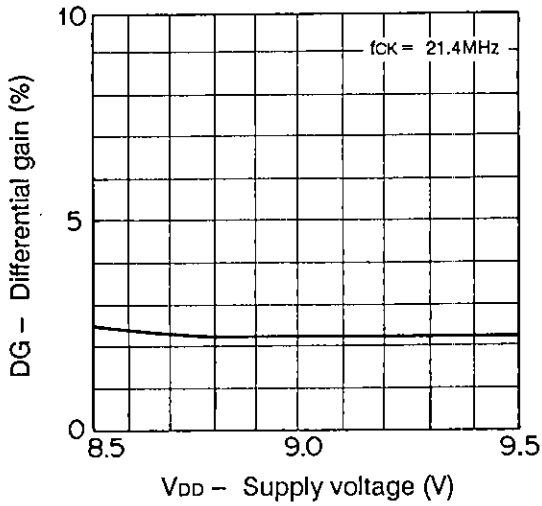### Gate voltage vs. Clock frequency
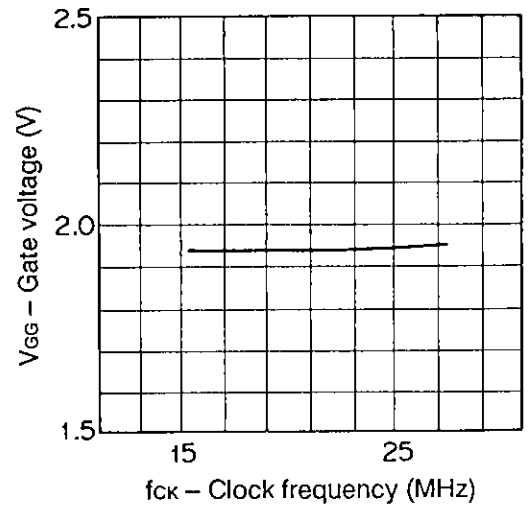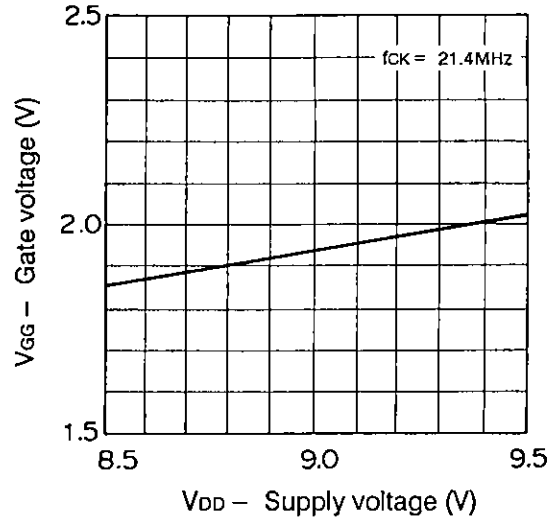
Insertion gain vs. Supply voltage
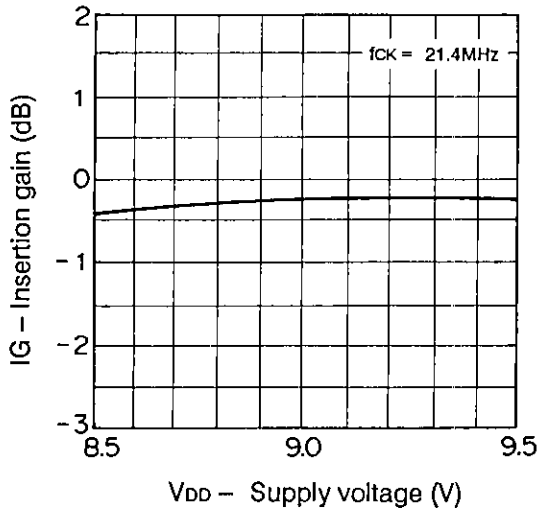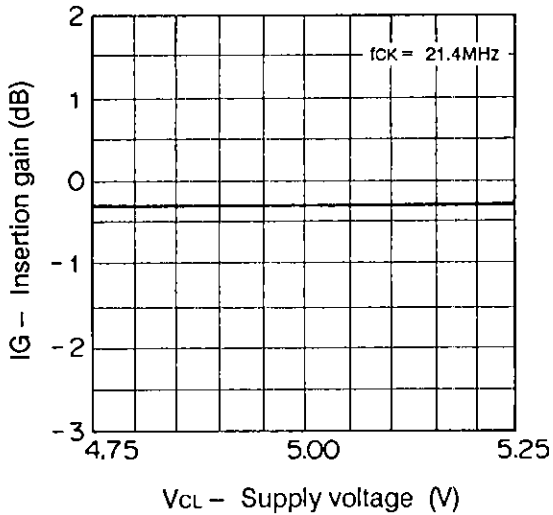

Frequency response vs. Supply voltage
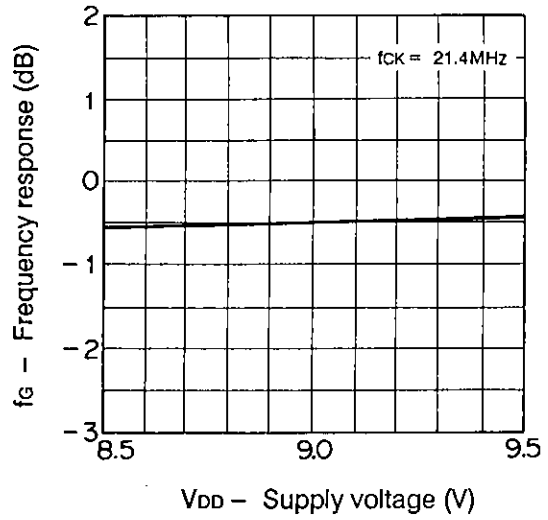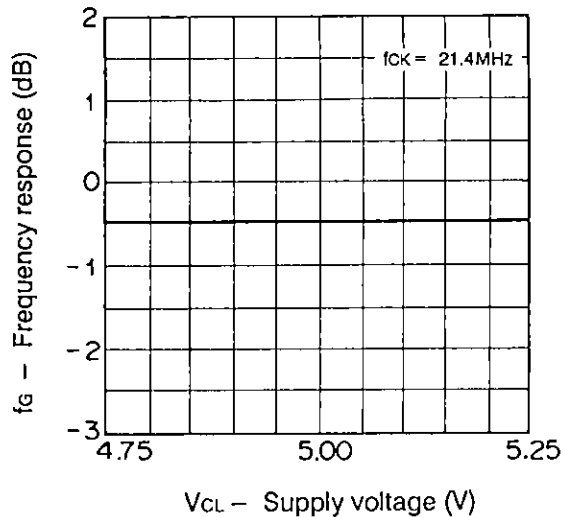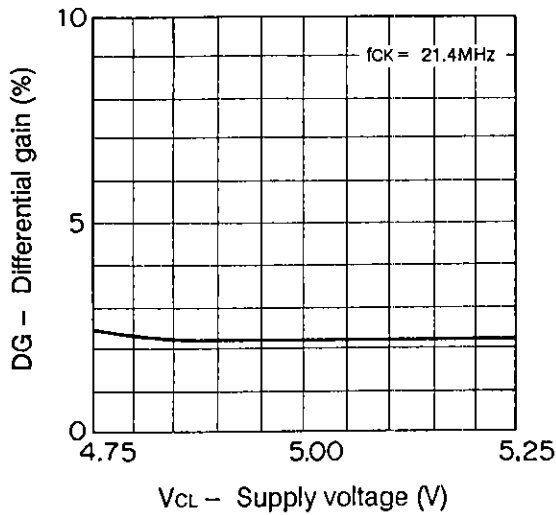

Differential gain vs. Supply voltage

Gate voltage vs. Supply voltage

Insertion gain vs. Supply voltage
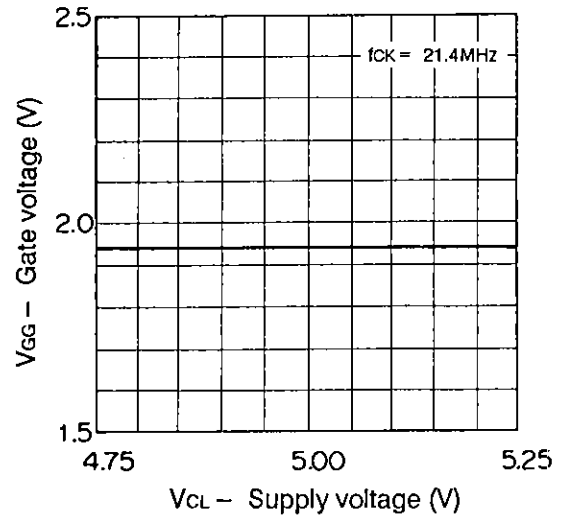

Frequency response vs. Supply voltage

Differential gain vs. Supply voltage
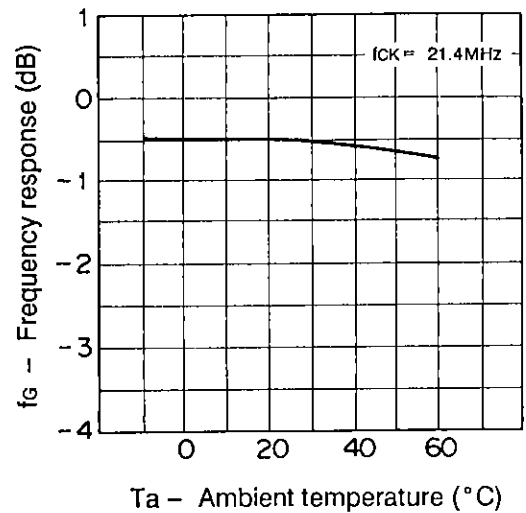
DG – Differential gain (%)

fCK = 21.4MHz

VCL – Supply voltage (V)

Gate voltage vs. Supply voltage

VGG – Gate voltage (V)

fCK = 21.4MHz

VCL – Supply voltage (V)

Insert gain vs. Ambient temperature

IG – Insertion gain (dB)

fCK = 21.4MHz

Ta – Ambient temperature (°C)
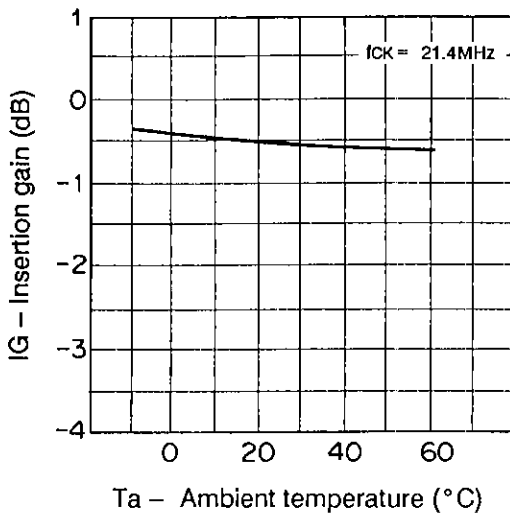
Frequency response vs. Ambient temperature

fG – Frequency response (dB)

fCK = 21.4MHz

Ta – Ambient temperature (°C)

Differential gain vs. Ambient temperature

DG – Differential gain (%)

fCK = 21.4MHz

Ta – Ambient temperature (°C)
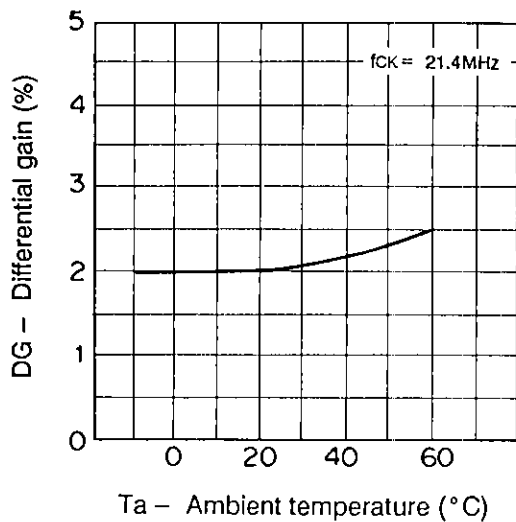
Gate voltage vs. Ambient temperature

VGG – Gate voltage (V)

fCK = 21.4MHz

Ta – Ambient temperature (°C)