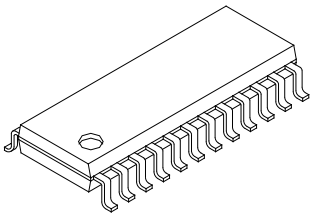
SONY

CXL1503M/1505M

CMOS-CCD Signal Processor

24 pin SOP (Plastic)



Description

CXL1503M/1505M are CMOS-CCD signal processors developed for CCD camera complementary color filter array processing system.

CXL1503M 1H × 4 301.5 bit CCD delay line
CXL1505M 1H × 4 453.5 bit CCD delay line

Features

- Single power supply 5V
- Low power consumption
  CXL1503M 100mW (Typ.)
  CXL1505M 150mW (Typ.)
- Built-in peripheral circuits
- Built-in CDS (Correlated Double Sampling) circuit

Function

- Clock driver
- Autobias circuit (center and black)
- Pedestal clamp circuit
- CDS circuit

Structure

CMOS-CCD

Absolute Maximum Ratings (Ta = 25°C)

• Supply voltage	V_{DD}	6	V
• Operating temperature	Topr	–10 to +60	°C
• Storage temperature	Tstg	–55 to +150	°C
• Allowable power dissipation	P_D	500	mW

Recommended Operating Conditions (Ta = 25°C)

Supply voltage	V_{DD}	5 ± 5%	V

Recommended Clock Conditions (Ta = 25°C)

Item		Symbol	Min.	Typ.	Max.	Unit	Remarks
Clock voltage Low		V_L	0		1.0	V	
Clock voltage High		V_H	V_{DD} – 1.0		V_{DD}	V	
Clock frequency	CXL1503M	f_{CL}		4.77		MHz	NTSC: $910f_H/3$ CCIR: $908f_H/3$
	CXL1505M	f_{CL}		7.16		MHz	NTSC: $455f_H$ CCIR: $454f_H$

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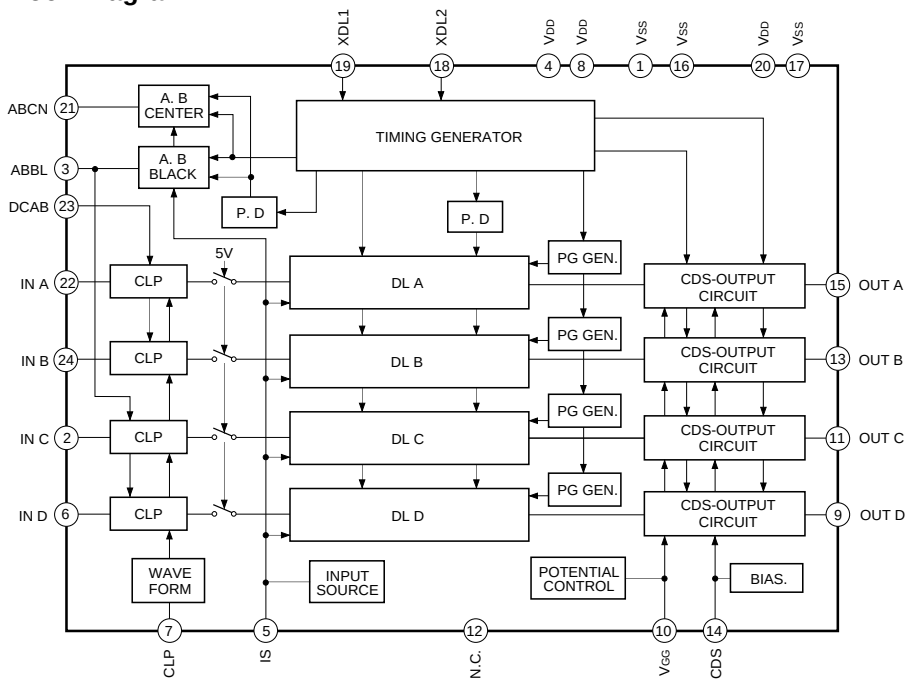
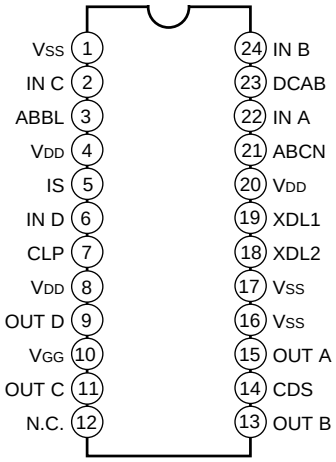
E89174A03-PS

Block Diagram



Pin Configuration (Top View)



Pin Description

No.	Symbol	I/O	Description	Impedance (Ω)
1, 16, 17	V_{SS}	—	GND	
2	IN C	I	Signal input C channel	> 100k (at no clamp)
3	ABBL	O	Autobias DC output for Y signal	2k to 20k
4, 8, 20	V_{DD}	—	5V power supply	
5	IS	O	Input source DC output	5k
6	IN D	I	Signal input D channel	> 100k (at no clamp)
7	CLP	I	Clamp pulse input	> 100k
9	OUT D	O	Signal output D channel	50 to 500
10	V_{GG}	O	Gate bias DC output	2k to 10k
11	OUT C	O	Signal output C channel	50 to 500
12	N.C.	—	—	
13	OUT B	O	Signal output B channel	50 to 500
14	CDS	O	DC output for CDS	500 to 5k
15	OUT A	O	Signal output A channel	50 to 500
18	XDL2	I	Clock pulse input 2	> 100k
19	XDL1	I	Clock pulse input 1	> 100k
21	ABCN	O	Autobias DC output for C signal	2k to 20k
22	IN A	I	Signal input A channel	> 100k (at no clamp)
23	DCAB	I	DC bias input for A and B channel	> 100k
24	IN B	I	Signal input B channel	> 100k (at no clamp)

Electrical Characteristics

(Ta = 25°C, V_{DD} = 5.0V, V_{SS} = 0V) f_{CL} = 4.77MHz (CXL1503M), f_{CL} = 7.16MHz (CXL1505M)

Item		Symbol	Test Point	SW position				Bias condition	Conditions	Min.	Typ.	Max.	Unit
				SW1	SW2	SW3	SW4 to 7	E1					
Autobias center level		ABCN	V_1	a	b	a	a			1.0	2.0	4.0	V
Autobias black level		ABBL	V_2	a	b	a	a			1.2	2.2	4.2	V
Input source level		IS	V_3	a	a	a	a			0.3	0.6	3.0	V
CDS source level		CDS	V_4	a	a	a	a			1.2	2.3	3.5	V
Output circuit bias level		V_{GG}	V_5	a	a	a	a			0.3	0.8	3.0	V
Supply*1 current	CXL1503M	I_{DD}	A_1	b	a	a	a	V_1		—	20	35	mA
	CXL1505M									—	30	40	
Insertion gain		IG	V_6	b	b	a to d	a	A, Bch → V_1 C, Dch → V_2 – 0.2V	$20 \log \frac{\text{Output amplitude (mVp-p)}}{\text{Input amplitude (SIN 100kHz, 100mVp-p)}}$	–4.5	–3.5	–0.5	dB
Frequency*1 response	CXL1503M	f_G	V_6	c	b	a to d	a	↓	$20 \log \frac{\text{Output amplitude (SIN 1MHz, 100mVp-p)}}{\text{Output amplitude (SIN 100kHz, 100mVp-p)}}$	–1.8	–0.8	—	dB
	CXL1505M									–1.5	–0.4	—	
Linearity		Lin.	V_6	b	b	a to d	a	↓	**(Note 1)**	0	5	12	%
Insertion gain difference between channels		ΔG							**(Note 2)**	0	5	15	%
Linearity difference between channels	Ach ↔ Bch	ΔL_{AB}							**(Note 3)**	0	1	5	%
	Cch ↔ Dch	ΔL_{CD}							**(Note 3)**	0	1	5	%
Cross talk between channels		CRT	V_6	a	b	a to d	a ↔ b	A, Bch → V_1 C, Dch → V_2 – 0.2V	**(Note 4)**	0	1	3	%

*1 Standerd values are different between CXL1503M and CXL1505M.

Notes)

1. Linearity testing
   For A channel and B channel, set input bias E_1 to ABCN + 0.2 [V] first, and then set it to ABCN [V] and ABCN – 0.2 [V]. Then input a sine wave of 100kHz and 100mVp-p, and compare the three output amplitudes.

   For C channel and D channel, set input bias E_1 to ABBL – 0.4 [V] first, and then set it to ABBL – 0.2 [V] and ABBL [V]. Then input a sine wave of 100kHz and 100mVp-p, and compare the three output amplitudes.
   The maximum output amplitude for the respective A, B, C and D channels is taken as Sout max. and the minimum output amplitude as Sout min. The linearity of the respective channels is defined as

   $$\text{Lin} = \frac{\text{Sout max} - \text{Sout min}}{\text{Sout max} + \text{Sout min}} \times 200\ [\%]$$

2. Calculation of insertion gain difference
   As the max. insertion gain among A, B, C and D channels' is taken as Gmax and the min. as Gmin., the insertion gain difference between channels becomes:

   $$\Delta G = \text{ABS}\left(1 - 10^{\left(\frac{\text{Gmax} - \text{Gmin}}{20}\right)}\right) \times 100\ [\%]$$

3. Calculation of linearity difference
   Define A channel linearity as L_A, and B channel linearity as L_B. We obtain the difference ΔL_{AB} as follows.

   $$\Delta L_{AB} = | L_A - L_B |\ [\%]$$

   Similarly we obtain the linearity difference ΔL_{CD} of C channel and D channel as follows.

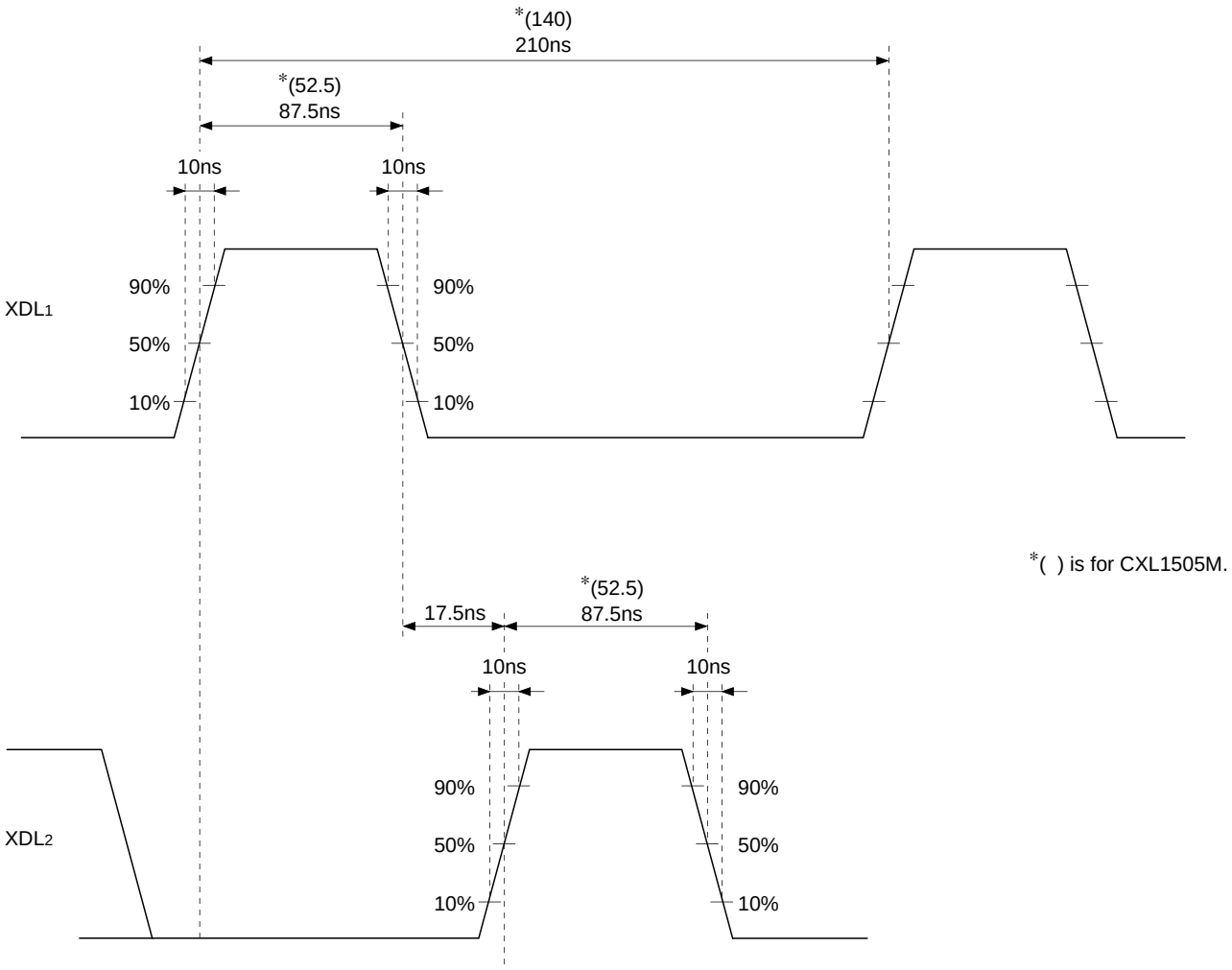
   $$\Delta L_{CD} = | L_C - L_D |\ [\%]$$

4. Crosstalk calculation
   We take CRTa as: A channel crosstalk value only during B channel input
   CRTb as: B channel crosstalk value only during A channel input
   CRTc as: C channel crosstalk value only during D channel input
   CRTd as: D channel crosstalk value only during C channel input

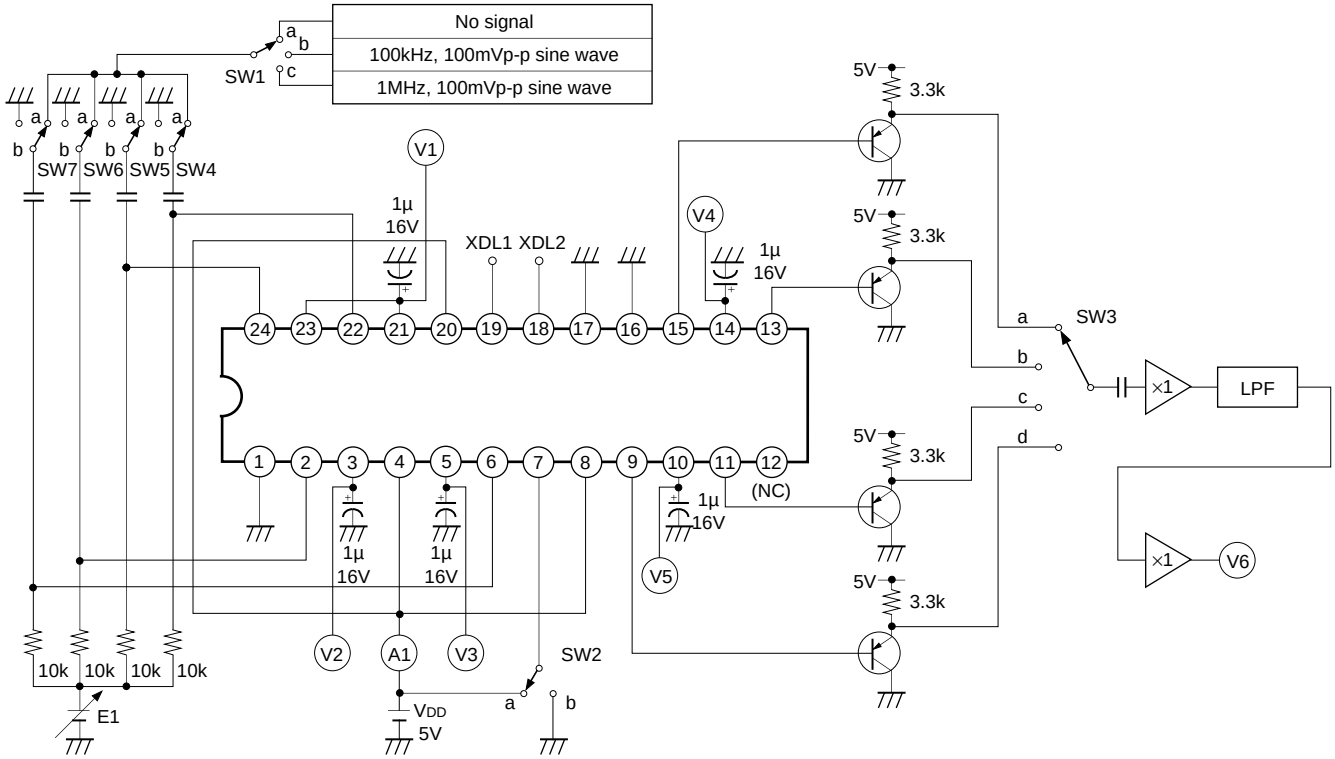
   The crosstalk value of respective channels becomes:

   $$\text{CRTa to d} = \frac{\text{Crosstalk component}}{\text{Each channel output value}} \times 100\ [\%]$$

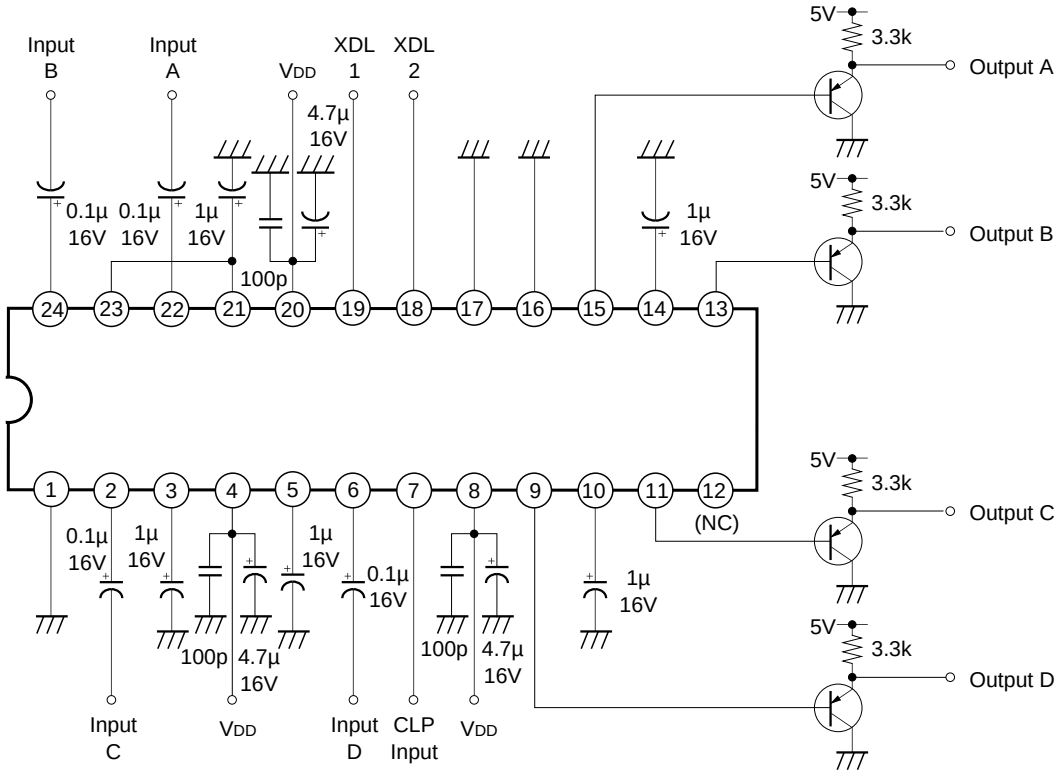
Clock Waveform Timing



Electrical Characteristics Test Circuit

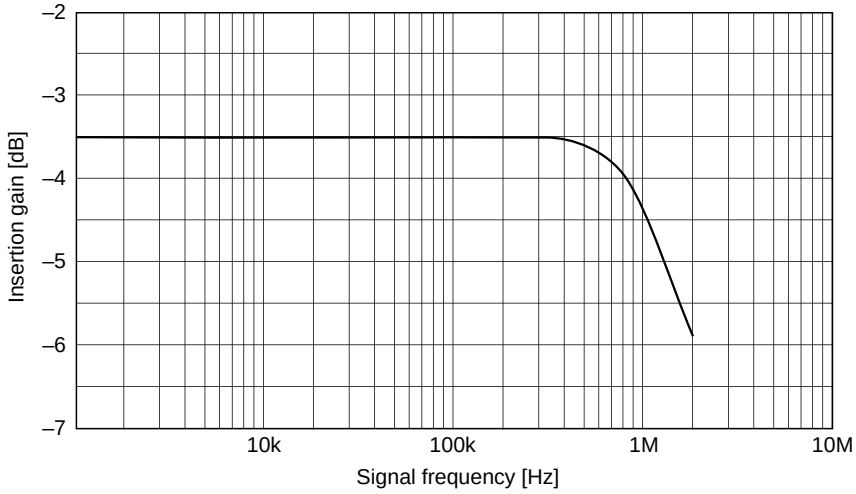


Application Circuit

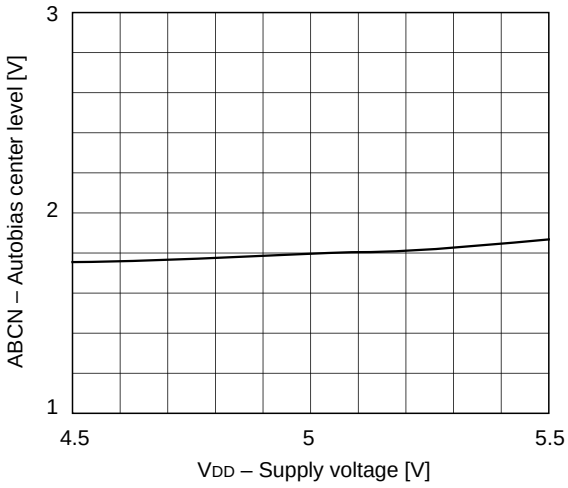


Application circuits shown are typical examples illustrating the operation of the devices. Sony cannot assume responsibility for any problems arising out of the use of these circuits or for any infringement of third party patent and other right due to same.

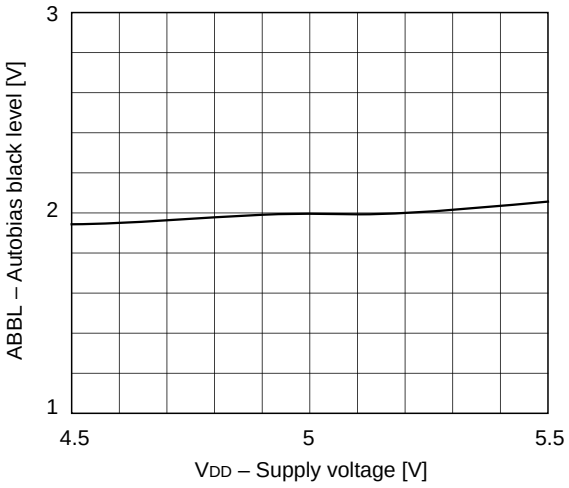
Frequency response



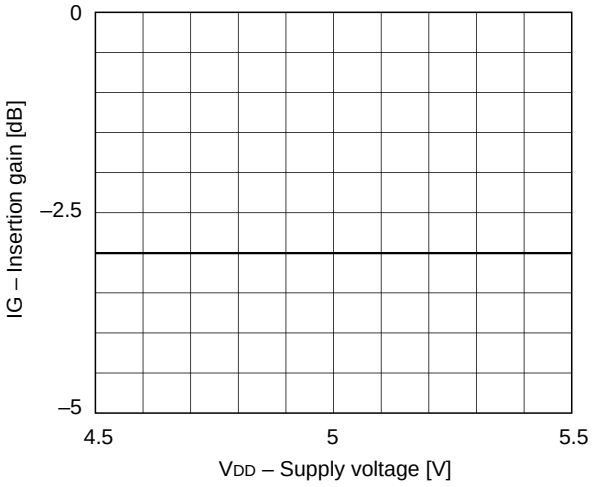
Autobias center level vs. Supply voltage



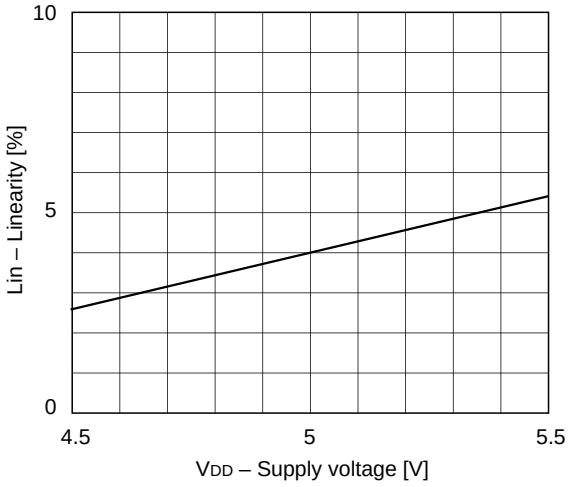
Autobias black level vs. Supply voltage



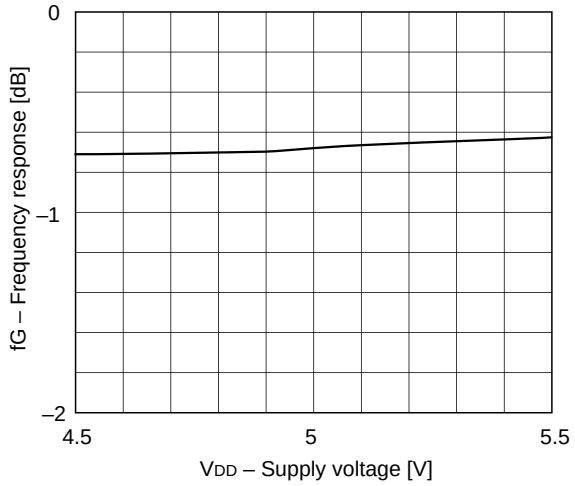
Insertion gain vs. Supply voltage



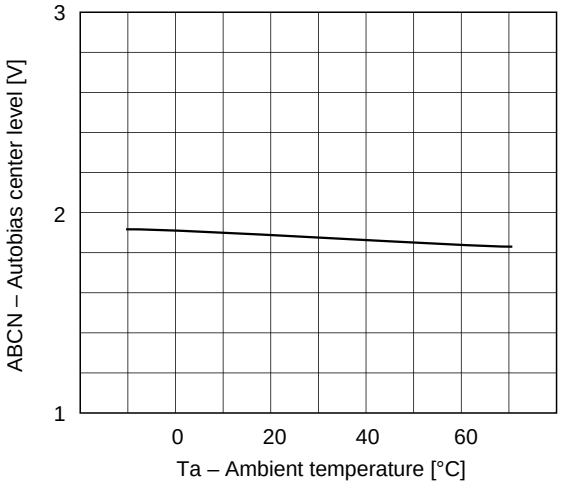
Linearity vs. Supply voltage



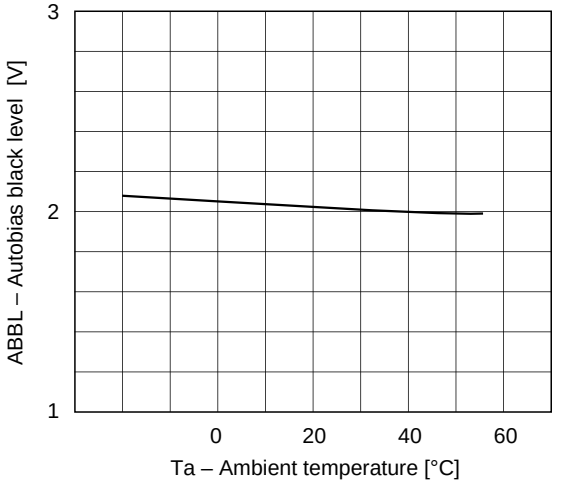
Frequency response vs. Supply voltage



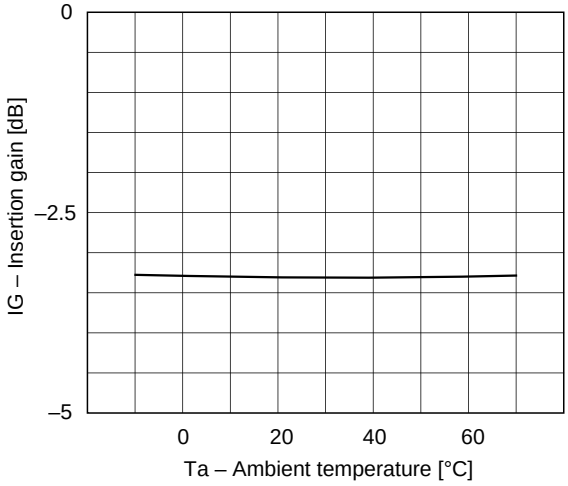
Autobias center level vs. Ambient temperature



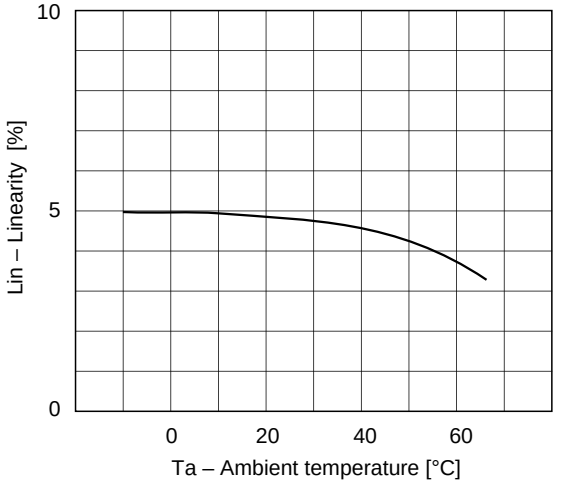
Autobias black level vs. Ambient temperature



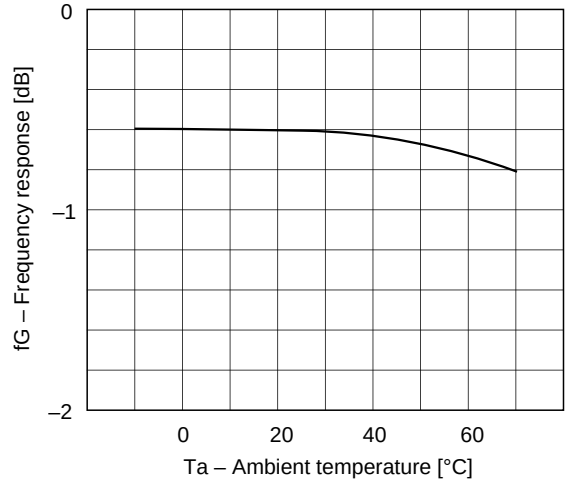
Insertion gain vs. Ambient temperature



Linearity vs. Ambient temperature

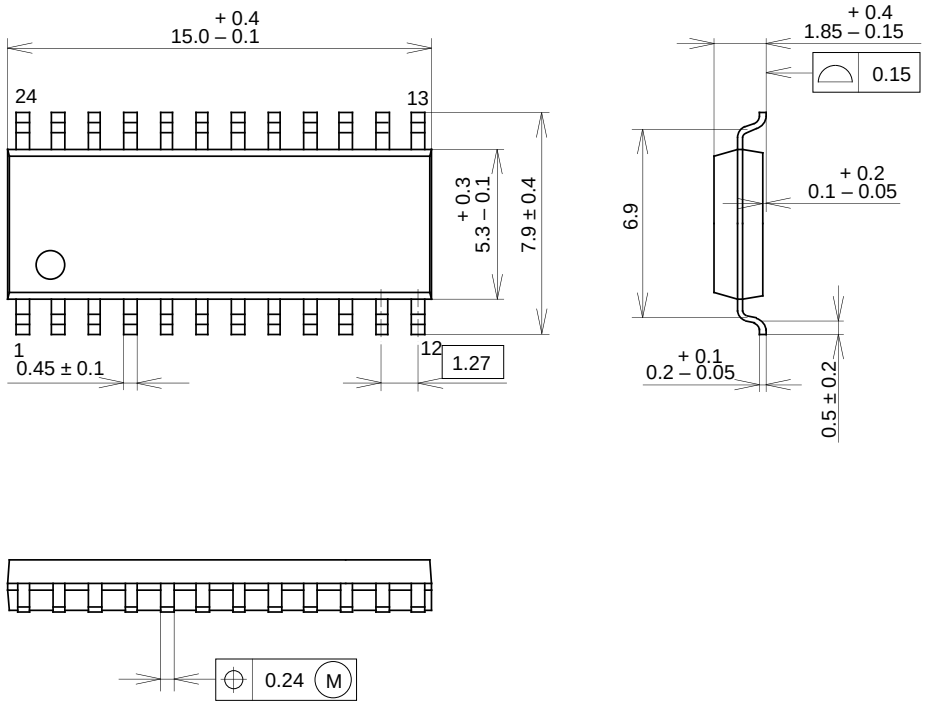


Frequency response vs. Ambient temperature



Package Outline Unit: mm

24PIN SOP (PLASTIC)



SONY CODE	SOP-24P-L01
EIAJ CODE	SOP024-P-0300
JEDEC CODE	————

PACKAGE STRUCTURE

MOLDING COMPOUND	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	0.3g