

Digital Comb Filter (NTSC)

Description

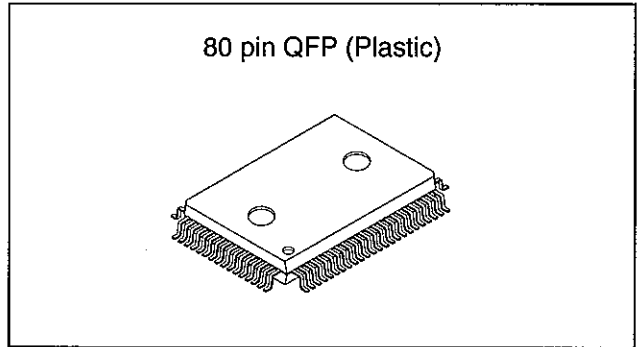
The CXD2043Q is an adaptive comb filter compatible with NTSC system, and can provide high-precision Y/C separation with a single-chip.

Features

- Y/C separation by adaptive processing
- Horizontal aperture compensation circuit
- 8-bit A/D converter (1-channel)
- 8-bit D/A converter (2-channel)
- Two 1H delay lines
- 4-PLL

Absolute Maximum Ratings (Ta = 25°C, Vss = 0V)

• Supply voltage	DVDD	Vss - 0.5 to +7.0	V
	YVDD	Vss - 0.5 to +7.0	V
	CVDD	Vss - 0.5 to +7.0	V
	PVDD	Vss - 0.5 to +7.0	V
• Input voltage	Vi	Vss - 0.5 to VDD + 0.5	V
• Output voltage	Vo	Vss - 0.5 to VDD + 0.5	V
• Operating temperature	Topr	-20 to +75	°C
• Storage temperature	Tstg	-55 to +150	°C



Recommended Operating Conditions

• Supply voltage	DVDD	5.0 ± 0.25	V
	YVDD	5.0 ± 0.25	V
	CVDD	5.0 ± 0.25	V
	PVDD	5.0 ± 0.25	V
• Operating temperature	Topr	-20 to +75	°C

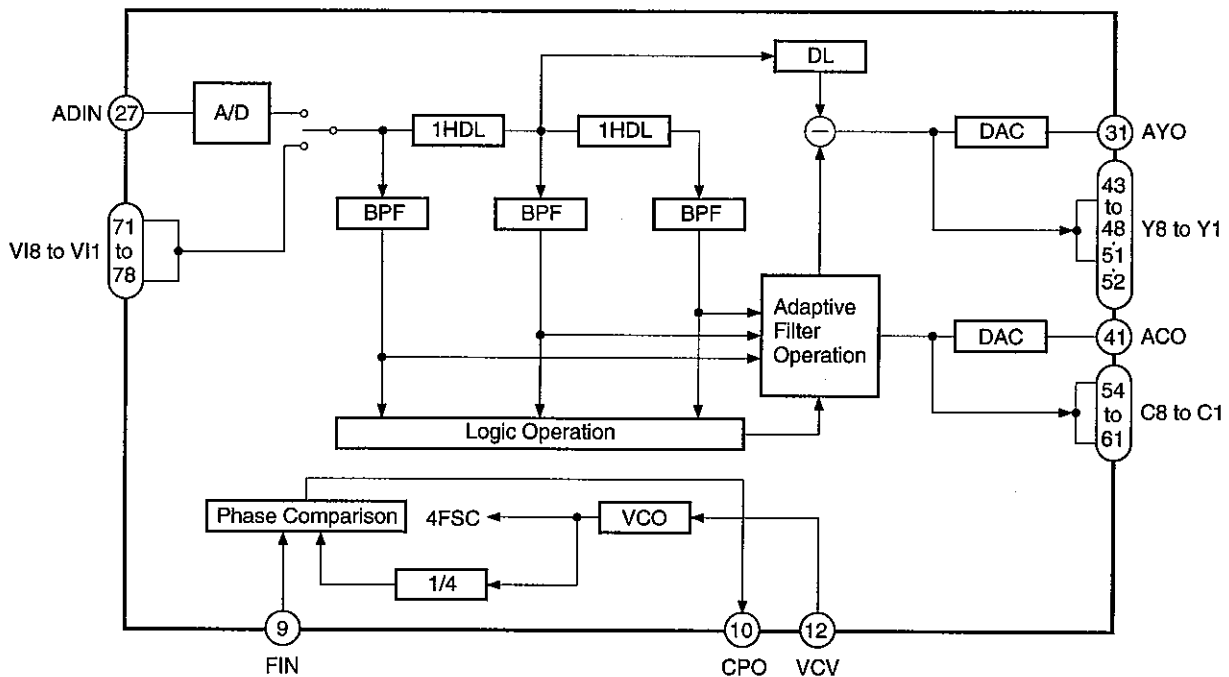
Structure

Silicon gate CMOS IC

Applications

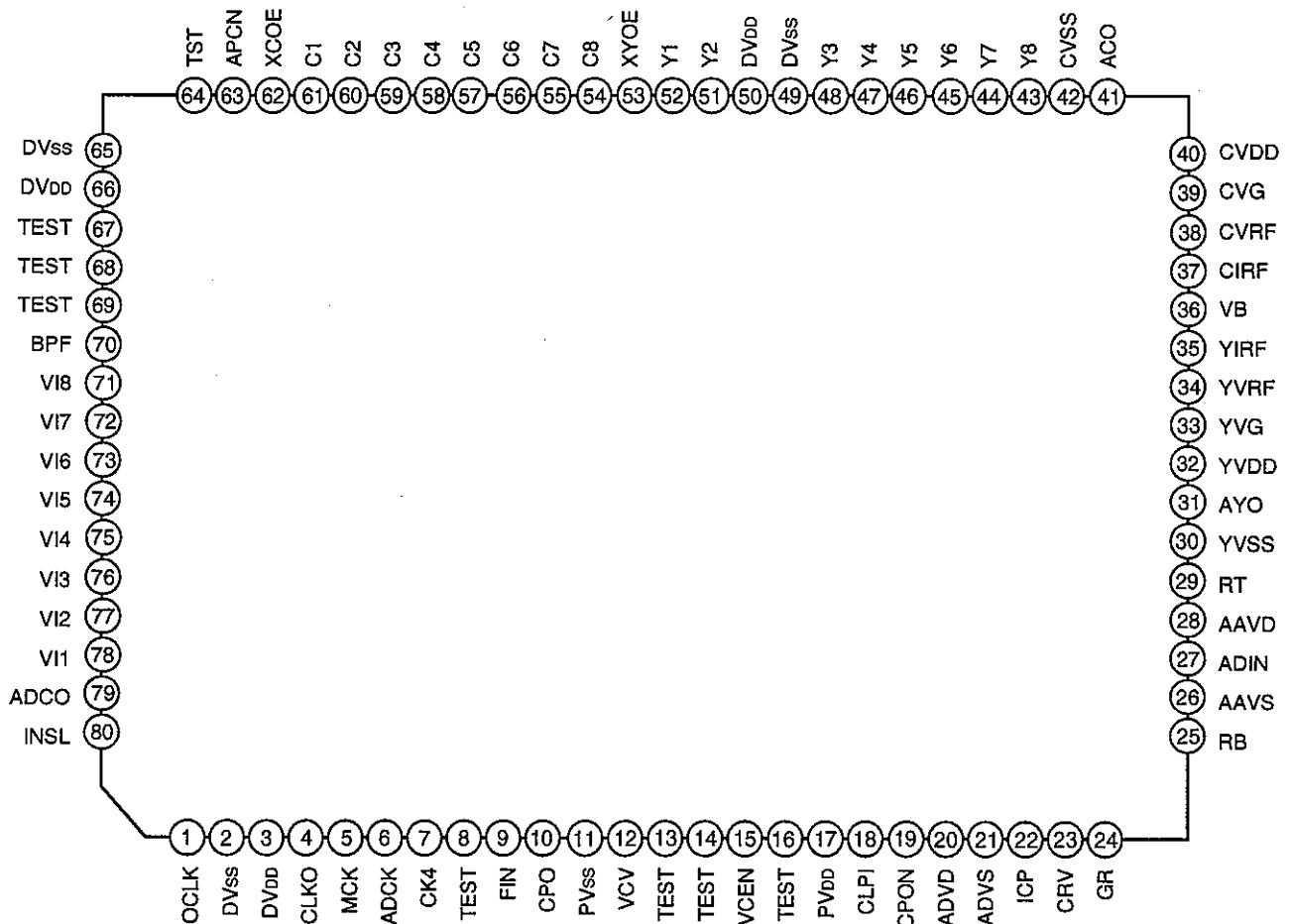
Y/C separation for color TVs and VCRs

Block Diagram



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Pin Configuration



Pin Description

Pin No.	Symbol	I/O	Description
1	OCLK	I	Clock amplifier input. Input at 0.8Vp-p or more by eliminating DC components with a capacitor.
2	DVSS	—	Digital ground
3	DVDD	—	Digital power supply
4	CLKO	O	Clock amplifier output. Left open when the clock amplifier is not used.
5	MCK	I	Master clock input
6	ADCK	I	Clock input for A/D converter. Input the same clock signal as for Pin 5.
7	CK4	O	4FSC clock output. Generated from the built-in 4-PLL.
8	TEST	I	Test. Fix to Low.
9	FIN	I	FSC clock input. Input FSC which is burst-locked. Connect to DVSS when the PLL is not used.
10	CPO	O	Phase comparison output for the built-in PLL. Left open when the PLL is not used.
11	PVSS	—	PLL analog ground

Pin No.	Symbol	I/O	Description
12	VCV	I	Control voltage input for the built-in VCO oscillation. Connect to PVSS when the PLL is not used.
13	TEST	I	Test. Fix to Low.
14	TEST	I	Test. Fix to Low.
15	VCEN	I	Built-in VCO oscillation enable. Connect to PVDD when using the PLL. Connect to PVSS when the PLL is not used.
16	TEST	O	Test. Left open.
17	PVDD	—	PLL analog power supply
18	CLPI	I	Clamp pulse input for A/D converter (negative polarity). Connect to DVDD when the clamp is off.
19	CPON	I	High: Clamp function is set to off, and only the normal A/D converter function is enabled. Low: Clamp function is enabled.
20	ADVD	—	Digital power supply for A/D converter
21	ADVS	—	Digital ground for A/D converter
22	ICP	I	Clamp control voltage
23	CRV	I	Clamp reference voltage input
24	GR	—	Connect to analog ground.
25	RB	O	A/D converter reference voltage (bottom)
26	AAVS	—	Analog ground for A/D converter
27	ADIN	I	Comb filter analog input (A/D converter input)
28	AAVD	—	Analog power supply for A/D converter
29	RT	O	A/D converter reference voltage (top)
30	YVSS	—	Analog ground for Y-D/A converter
31	AYO	O	Analog luminance signal output
32	YVDD	—	Analog power supply for Y-D/A converter
33	YVG	O	Connect to YVDD via a capacitor of approximately 0.1 μ F.
34	YVRF	I	VRF for Y. Sets the output full-scale value for Y.
35	YIRF	I	Connect a resistor of 16 times (16R) that of the output resistor "R" of AYO pin.
36	VB	O	Connect to YVSS via a capacitor of approximately 0.1 μ F.
37	CIRF	O	Connect a resistor of 16 times (16R) that of the output resistor "R" of ACO pin.
38	CVRF	I	VRF for C. Sets the output full-scale value for C.
39	CVG	O	Connect to CVDD via a capacitor of approximately 0.1 μ F.
40	CVDD	—	Analog power supply for C-D/A converter
41	ACO	O	Analog chroma signal output
42	CVSS	—	Analog ground for C-D/A converter
43	Y8	O	Digital luminance signal output (MSB)
44	Y7	O	Digital luminance signal output
45	Y6	O	Digital luminance signal output

Pin No.	Symbol	I/O	Description
46	Y5	O	Digital luminance signal output
47	Y4	O	Digital luminance signal output
48	Y3	O	Digital luminance signal output
49	DVss	—	Digital ground
50	DVDD	—	Digital power supply
51	Y2	O	Digital luminance signal output
52	Y1	O	Digital luminance signal output (LSB)
53	XYOE	I	Digital luminance signal output control High: High impedance Low: Standard output
54	C8	O	Digital chroma signal output (MSB)
55	C7	O	Digital chroma signal output
56	C6	O	Digital chroma signal output
57	C5	O	Digital chroma signal output
58	C4	O	Digital chroma signal output
59	C3	O	Digital chroma signal output
60	C2	O	Digital chroma signal output
61	C1	O	Digital chroma signal output (LSB)
62	XCOE	I	Digital chroma signal output control. High: High impedance Low: Standard output
63	APCN	I	Aperture compensation switching. High: Aperture compensation ON Low: Aperture compensation OFF
64	TST	I	Y output through mode. High: Outputs the input composite video signal from the Y output. At this time, there is 1H + 18 clock delay from the input. Low: Y/C separation mode
65	DVss	—	Digital ground
66	DVDD	—	Digital power supply
67	TEST	I	Test. Fix to Low.
68	TEST	I	Test. Fix to Low.
69	TEST	I	Test. Fix to Low.
70	BPF	I	High: Fixed to BPF separation Low: Standard mode
71	VI8	I	Digital composite video input (MSB)
72	VI7	I	Digital composite video input
73	VI6	I	Digital composite video input
74	VI5	I	Digital composite video input
75	VI4	I	Digital composite video input
76	VI3	I	Digital composite video input

Pin No.	Symbol	I/O	Description
77	VI2	I	Digital composite video input
78	VI1	I	Digital composite video input (LSB)
79	ADCO	I	High: Video signals taken into A/D converter are output from the Y output pins (Y8 to Y1) as 8-bit digital data with a 3.5 clock delay. Low: Normal mode
80	INSL	I	Input switching. High: Digital input Low: Analog input.

Electrical Characteristics

DC Characteristics

($V_{DD} = 5 \pm 0.25V$, $V_{SS} = 0V$, $T_a = -20$ to $+75^\circ C$)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Supply voltage	DV _{DD}	—	4.75	5.0	5.25	V
	AAVD					
	ADVD					
	YVDD					
	CVDD					
Operating temperature	Topr	—	-20	—	+75	°C
Supply current	I _{DD}	Clock 14MHz	—	—	80	mA
High level input voltage	V _{IH}	CMOS level	$V_{DD} \times 0.7$	—	V_{DD}	V
Low level input voltage	V _{IL}	CMOS level	V_{SS}	—	$V_{DD} \times 0.3$	V
High level output voltage	V _{OH}	I _{OH} = -2mA	$V_{DD} - 0.8$	—	V_{DD}	V
		I _{OH} = -4mA (Pins 4, 7)				
Low level output voltage	V _{OL}	I _{OL} = 4mA	V_{SS}	—	0.4	V
		I _{OL} = 8mA (Pins 4, 7)				
Logical V _{th}	LV _{th}	OCLK (Pin 1)	—	$V_{DD}/2$	—	V
Input voltage	V _{IN}		0.8	—	V_{DD}	V _{p-p}
Feedback resistor	R _{FB}		250K	1M	2.5M	Ω

AC Characteristics

($V_{DD} = 5 \pm 0.25V$, $V_{SS} = 0V$, $T_a = -20$ to $+75^\circ C$, $C_L = 20pF$)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Data setup time	t _{dsu}	MCK→VI [8 : 1]	15.0	—	—	ns
Data hold time	t _{dh}	MCK→VI [8 : 1]	10.0	—	—	ns
Propagation delay time	t _{pd}	MCK→Y [A : 1]	—	—	40	ns
		MCK→C [A : 1]				
Clock frequency	f	—	14	4fsc	15	MHz

Pin Capacitance

($T_a = 25^\circ C$, $f = 1MHz$, $V_{IN} = V_{OUT} = 0V$)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input capacitance	C _{IN}	—	—	—	9	pF
Output capacitance	C _{OUT}	—	—	—	11	pF

ADC Characteristics

($V_{DD} = 5V$, $T_a = 25^\circ C$, $f = 10MHz$)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Resolution	n		—	8	—	bit
Max. conversion speed	fmax		14.3	—	—	MSPS
Analog input band width	BW	-3dB	—	18	—	MHz
Self bias	VRB		0.48	0.52	0.56	V
	VRT - VRB		1.96	2.08	2.22	V
Propagation delay time	t _{pd}		—	—	45	ns
Differential linearity error	ED		-1.0	—	+1.0	LSB
Integral linearity error	EL		-3.0	—	+3.0	LSB
Clamp offset voltage	Eoc	V _{REF} = VRB	-20	0	+20	mV
		V _{REF} = VRT	-30	-10	+10	mV

DAC Characteristics

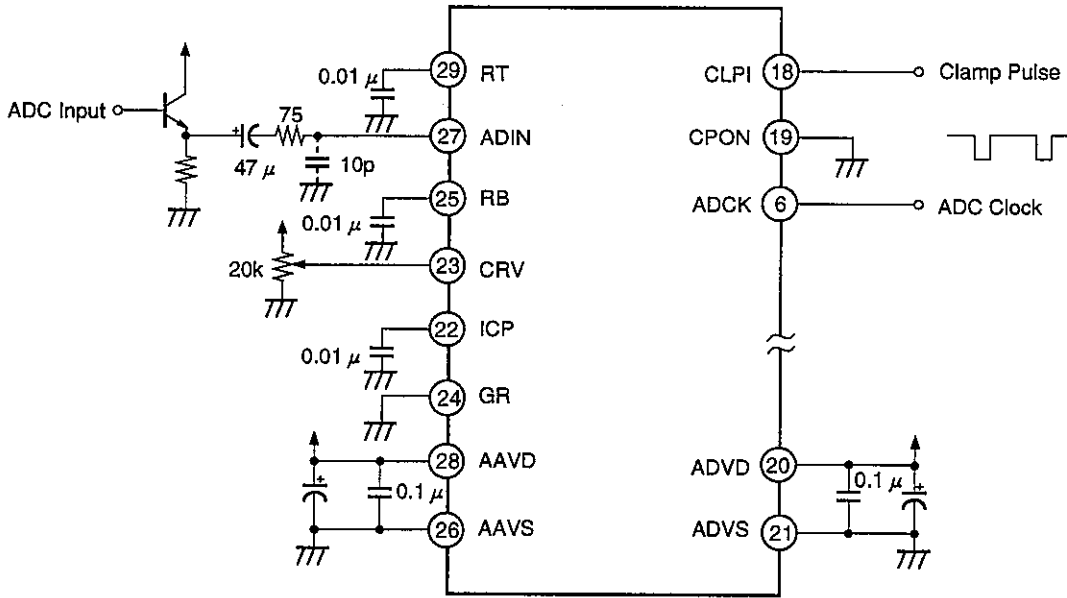
($V_{DD} = 5V$, $V_{RF} = 2V$, $I_{RF} = 3.3k\Omega$, $R = 200\Omega$, $T_a = 25^\circ C$, $f = 10MHz$)

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Resolution	n	—	—	8	—	bit
Max. conversion speed	fmax	—	14.3	—	—	MSPS
Differential linearity error	ED	—	-0.5	—	+0.5	LSB
Integral linearity error	EL	—	-1.5	—	+1.5	LSB
Output full-scale voltage	V _{FS}	—	1.805	1.90	1.995	V
Output full-scale current	I _{FS}	—	—	9.5	15	mA
Output offset voltage	V _{OS}	—	—	—	1.0	mV
Precision guaranteed output voltage range	V _{OC}	—	1.8	—	2.1	V
Glitch energy	GE	*1	—	30	—	pV-s

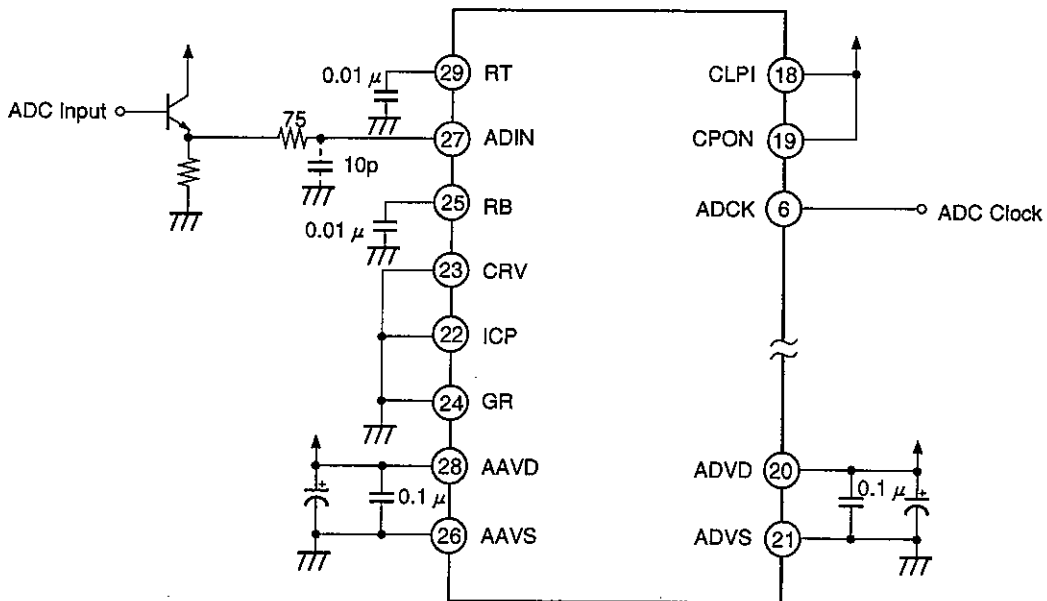
*1 R = 75Ω, 1Vp-p output

Application Circuit for A/D Converter

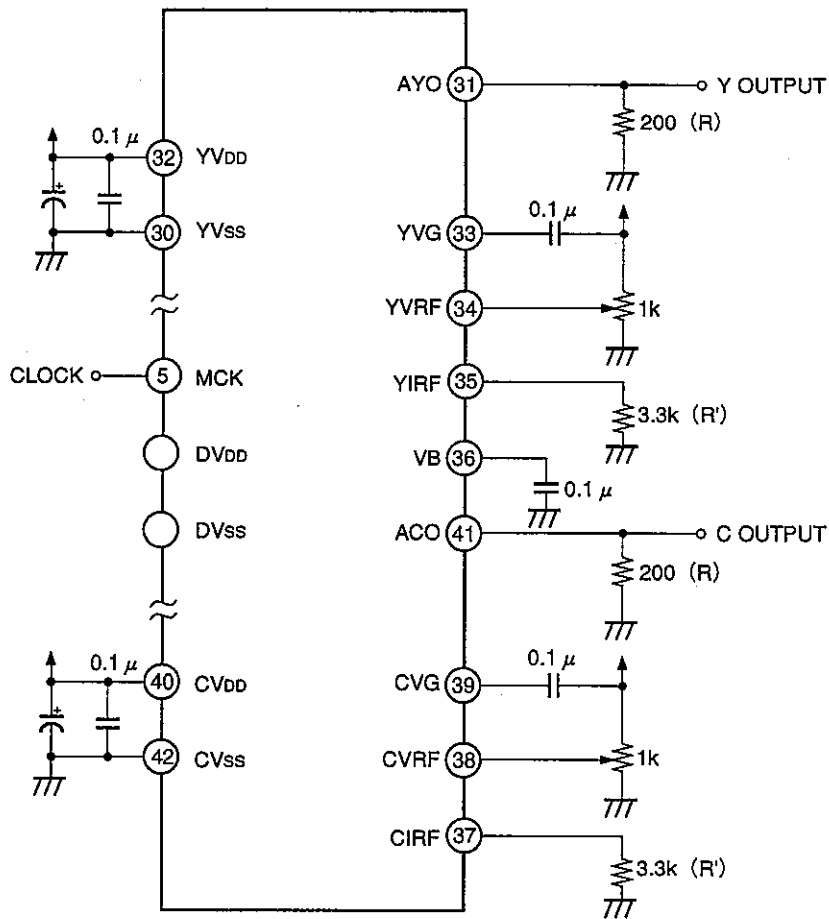
(1) In the case of input clamp pulse directly.



(2) In the case of not using the internal clamp circuit



Application Circuit for D/A Converter



• Method of Selecting Output Resistance

The CXD2043Q has a built-in current output-type D/A converter. To obtain the output voltages, connect resistances to AYO and ACO pins.

The voltage and current specifications are:

Output full-scale voltage: $V_{FS} = 0.5$ to $2.0V$

Output full-scale current: $I_{FS} = 0$ to $15mA$

Calculate the output resistance using the relationship $V_{FS} = I_{FS} \times R$. In addition, connect a resistance of 16 times the output resistance to the reference current pin (YIRF, CIRF). In the case where the value comes to be impractical, use a value of resistance as close to the value calculated as possible.

Note that, at this time, $V_{FS} = V_{RF} \times 16R/R'$ (V_{RF} : Pin voltage of YVRF and CVRF).

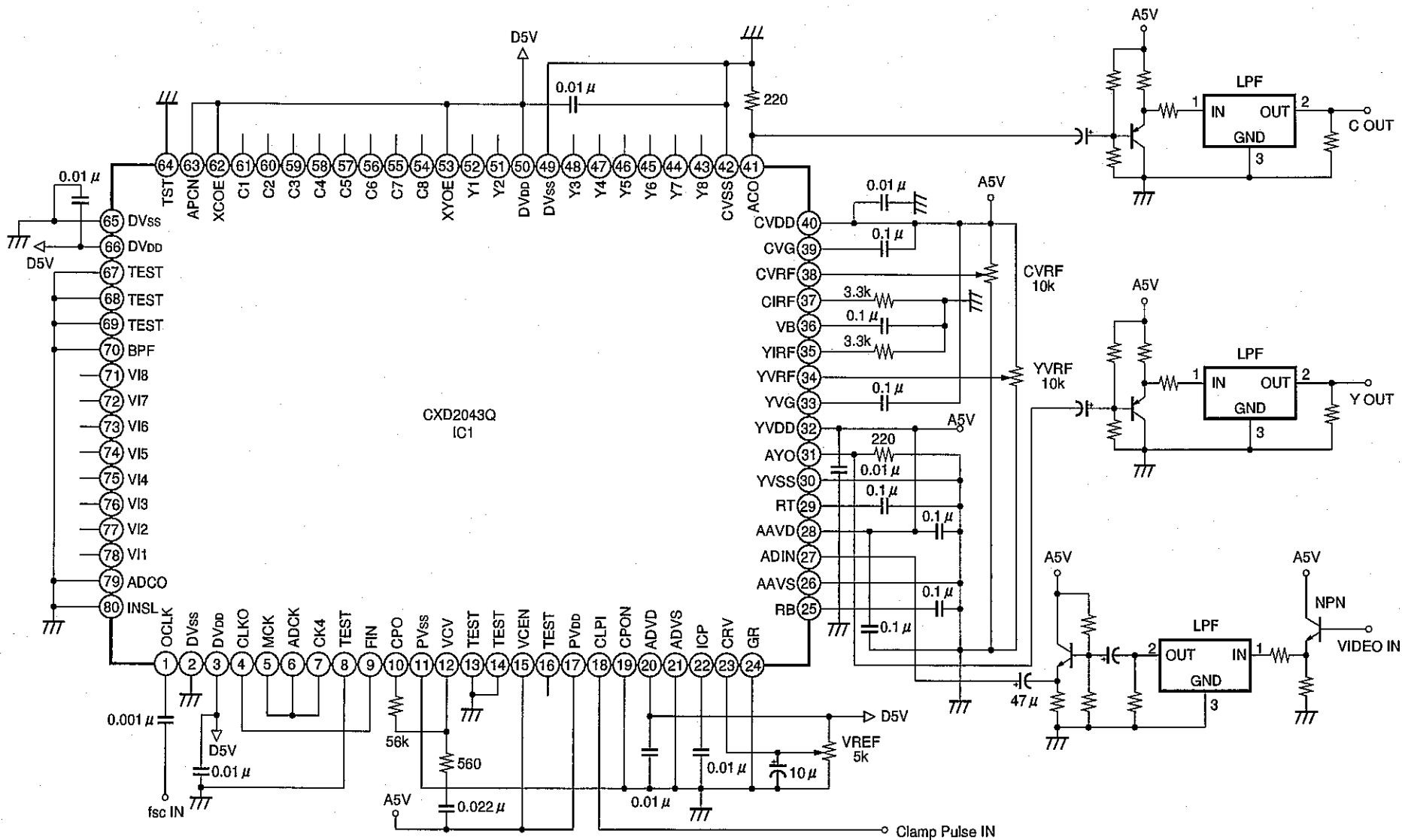
R is the resistance connected to AYO/ACO, and R' is the resistance connected to YIRF/CIRF. Power consumption can be reduced by using higher resistance values, but then glitch energy and data settling time increase contrastingly. Select optimum resistance values according to the system applications.

• VDD, VSS

Separate the analog and digital systems around the device to reduce noise effect. YVDD and CVDD are respectively by-passed to YVSS and CVSS as close to each other as possible through ceramic capacitor of approximately $0.1\mu F$.

Application Circuit

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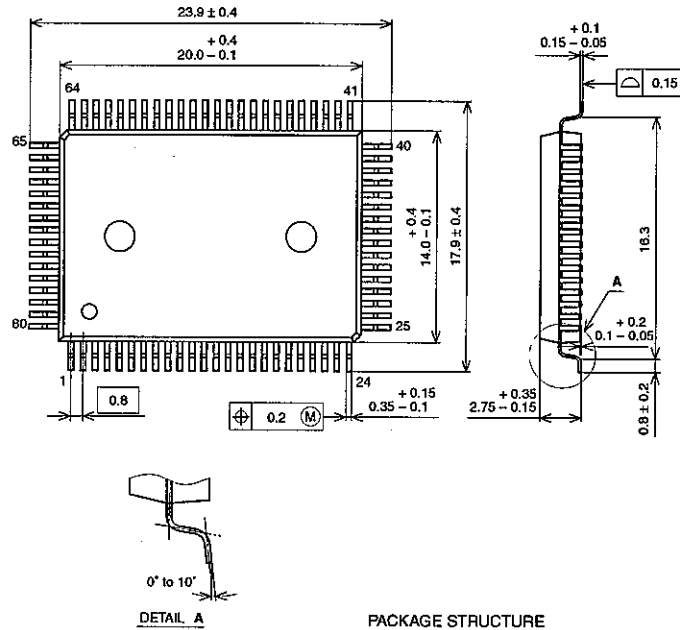
SONY

CXD2043Q

Package Outline

Unit: mm

80PIN QFP (PLASTIC)

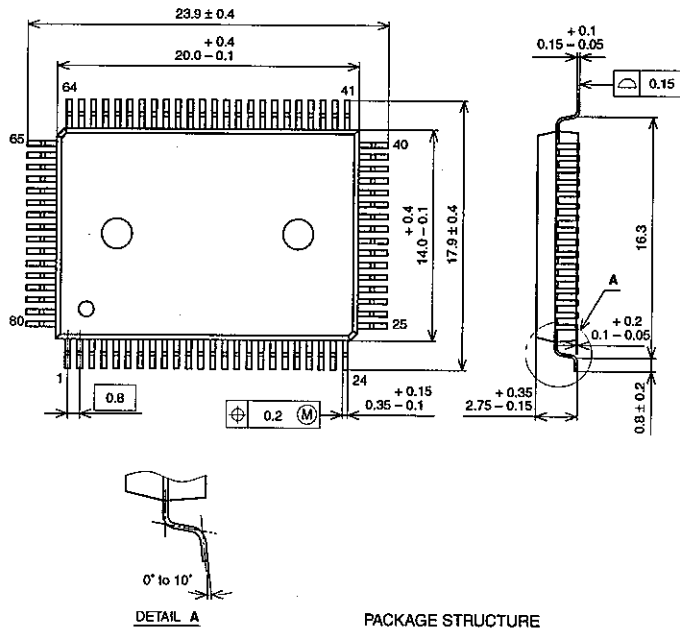


SONY CODE	QFP-80P-L01
EIAJ CODE	QFP080-P-1420
JEDEC CODE	

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	1.6g

80PIN QFP (PLASTIC)



SONY CODE	QFP-80P-L01
EIAJ CODE	QFP080-P-1420
JEDEC CODE	

PACKAGE STRUCTURE

PACKAGE MATERIAL	EPOXY RESIN
LEAD TREATMENT	SOLDER PLATING
LEAD MATERIAL	42/COPPER ALLOY
PACKAGE MASS	1.6g

LEAD SPECIFICATIONS

ITEM	SPEC.
LEAD MATERIAL	ALLOY 42
LEAD TREATMENT	Sn-BI 2.5%
LEAD TREATMENT THICKNESS	5-18μm