NEC
ELECTRON DEVICE

DATA SHEET

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC662

3 CHANNEL D/A CONVERTER FOR VIDEO PROCESSING

DESCRIPTION

μPC662 is a video 8-bit 3-channel digital analog converter having the following features: High speed and high precision bipolar processing technology for excellent performance of 35 MHz, ±0.5 LSB (MAX.); three channels of identical digital analog converters; power consumption minimized to 200 mW (TYP.); because the three channels are laid out on the same chip, little deviation among the converters, ideal for processing RGB, R-Y, B-Y, and Y signals, where strict deviation control is essential; and reference voltage generating circuit for simplified circuit configuration.

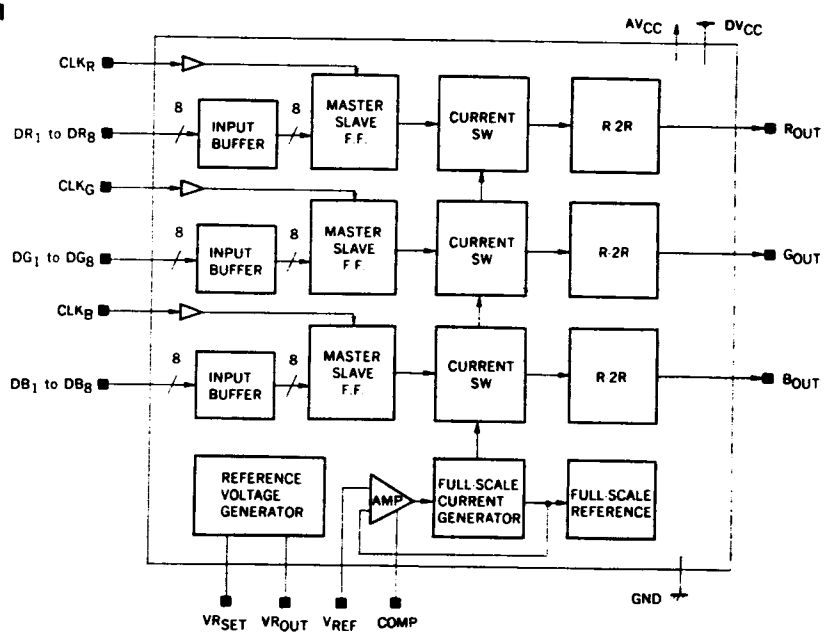
FEATURES

- 8-bit digital analog converter
- Clock rate: 35 Msps
- Conversion precision: ±0.5 LSB (MAX.)
- 5 V single power supply
- 3 channels incorporated
- Reference voltage generating circuit incorporated
- Power consumption: 200 mW (TYP.)

ORDERING INFORMATION

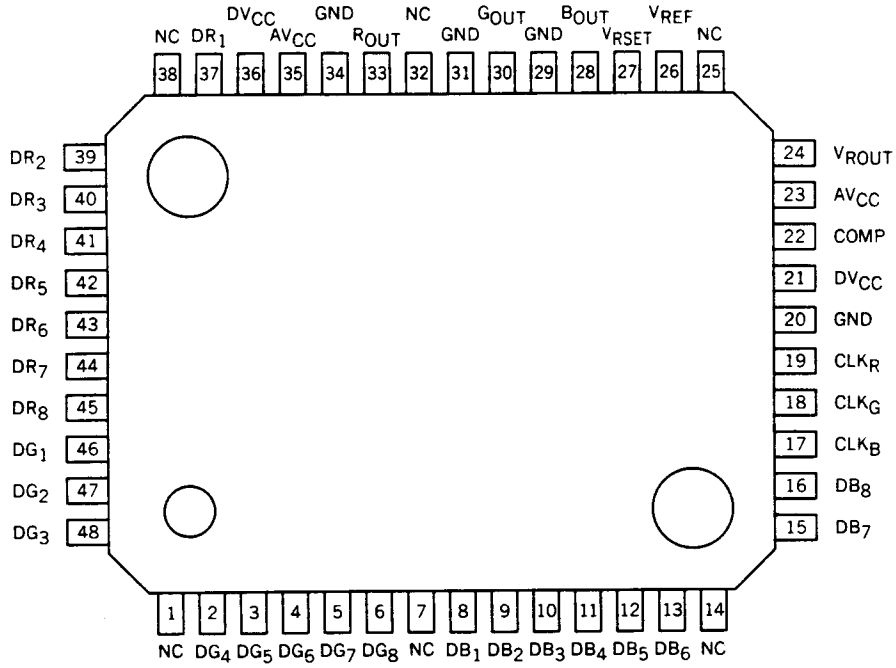
Part Number	Package
μPC662GH	48 Pin Plastic QFP

BLOCK DIAGRAM



ument No. IC-2400
te Published November 1989M
nted in Japan

PIN CONNECTION (Top View)



PIN NO.	SYMBOL	PIN NAME
1	NC	No Connection
2	DG_4	G channel digital input (4th)
3	DG_5	G channel digital input (5th)
4	DG_6	G channel digital input (6th)
5	DG_7	G channel digital input (7th)
6	DG_8	G channel digital input (LSB)
7	NC	No Connection
8	DB_1	B channel digital input (MSB)
9	DB_2	B channel digital input (2nd)
10	DB_3	B channel digital input (3rd)
11	DB_4	B channel digital input (4th)
12	DB_5	B channel digital input (5th)
13	DB_6	B channel digital input (6th)
14	NC	No Connection
15	DB_7	B channel digital input (7th)
16	DB_8	B channel digital input (LSB)
17	CLK_B	B channel clock input
18	CLK_G	G channel clock input
19	CLK_R	R channel clock input
20	GND	Ground
21	DV_{CC}	Digital power supply
22	COMP	Phase compensating pin
23	AV_{CC}	Analog power supply
24	V_{ROUT}	Reference voltage output

PIN NO.	SYMBOL	PIN NAME
25	NC	No Connection
26	V_{REF}	Reference voltage input
27	V_{RSET}	Reference voltage adjustment
28	B_{OUT}	B output
29	GND	Ground
30	G_{OUT}	G output
31	GND	Ground
32	NC	No Connection
33	R_{OUT}	R output
34	GND	Ground
35	AV_{CC}	Analog power supply
36	DV_{CC}	Digital power supply
37	DR_1	R channel digital input (MSB)
38	NC	No Connection
39	DR_2	R channel digital input (2nd)
40	DR_3	R channel digital input (3rd)
41	DR_4	R channel digital input (4th)
42	DR_5	R channel digital input (5th)
43	DR_6	R channel digital input (6th)
44	DR_7	R channel digital input (7th)
45	DR_8	R channel digital input (LSB)
46	DG_1	G channel digital input (MSB)
47	DG_2	G channel digital input (2nd)
48	DG_3	G channel digital input (3rd)

ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

Power Voltage	AV_{CC}, DV_{CC}	−0.3 to +6.0	V
Pin Input Voltage	V_{IN}	−0.3 to V_{CC}+0.3	V
Operation Temperature Range	T_{opt}	−20 to +70	°C
Storage Temperature Range	T_{stg}	−40 to +125	°C
Package Allowable Loss	P_d	333 (T_a = 75 °C)	mW

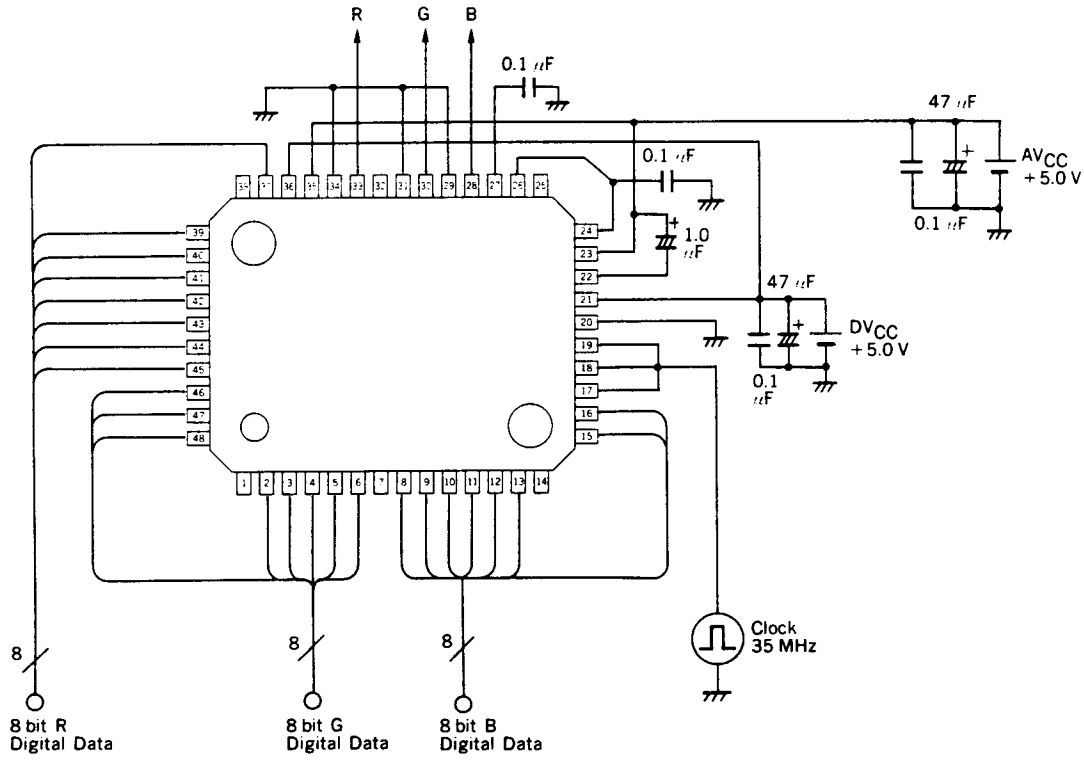
RECOMMENDED OPERATING CONDITIONS (T_a = −20 to +75 °C)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Power voltage	AV_{CC}, DV_{CC}	4.75	5.0	5.25	V	AGND = DGND = 0
Analog reference voltage	V_{REF}	3.70	4.00	4.30	V	
Digital input high level voltage	V_{INDH}	2.0	–	–	V	
Digital input low level voltage	V_{INDL}	–	–	0.8	V	
Sampling frequency	f_{samp}	–	–	35	MHz	
Data input set up time	t_s	12.0	–	–	ns	
Data input hold time	t_h	4.0	–	–	ns	
Sampling clock high pulse width	t_{PWH}	10		1000	ns	
Sampling clock low pulse width	t_{PWL}	10		1000	ns	

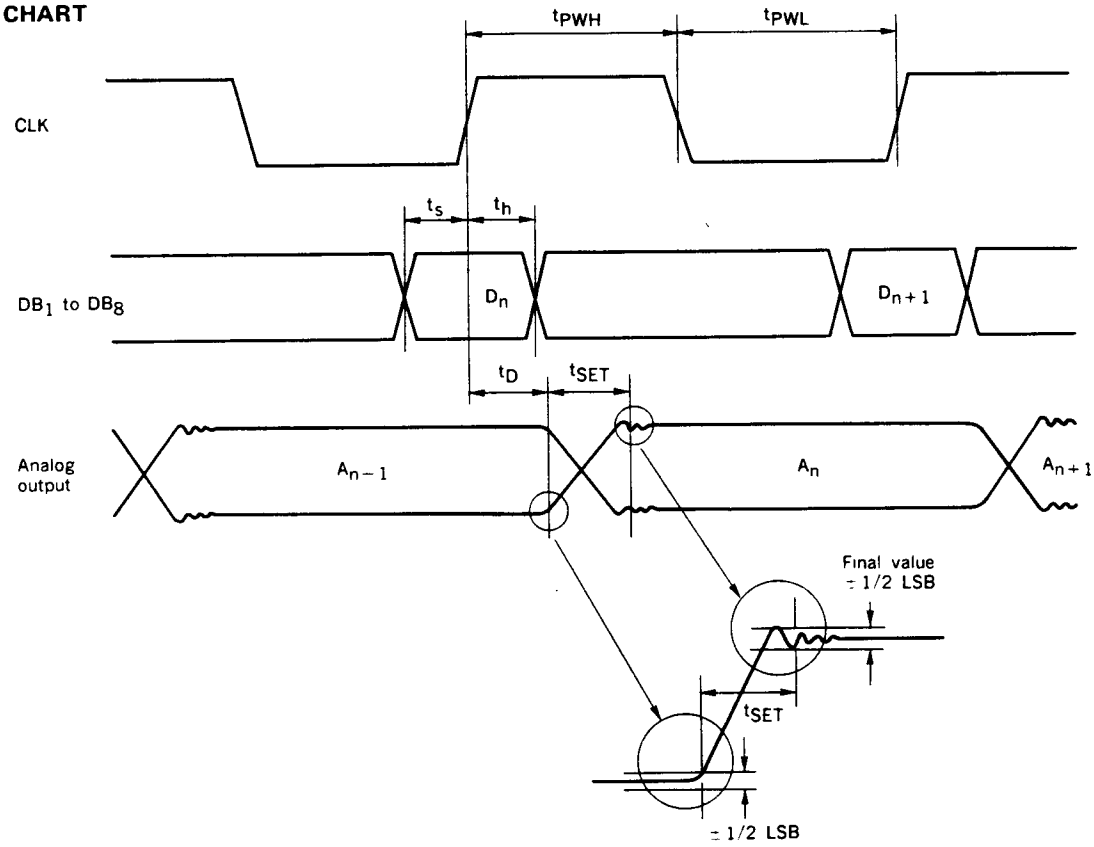
ELECTRIC CHARACTERISTICS (T_a = −20 to +75 °C, AV_{CC} = DV_{CC} = 5±0.25 V)

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	TEST CONDITION
Power consumption	I_{CC}	25	40	60	mA	T_a = 25 °C
Integral linearity error	ILE			±0.5	LSB	T_a = 0 to +75 °C
Differential linearity error	DLE			±0.5	LSB	T_a = 0 to +75 °C
Output voltage full scale precision	V_{OFS}	0.85	1.0	1.15	V	AV_{CC} = DV_{CC} = 5.0 V, V_{REF} = 4.0 V This precision is the difference between the full-scale output voltage and zero-scale output voltage.
RGB output voltage ratio	FSR	−0.8	0	+8.0	%	
Reference power supply output voltage	V_{ROUT}	3.8	4.0	4.2	V	AV_{CC} = DV_{CC} = 5.0 V
Output delay time	t_D		15		ns	
Settling time	t_{SET}		25		ns	C_L = 5 pF

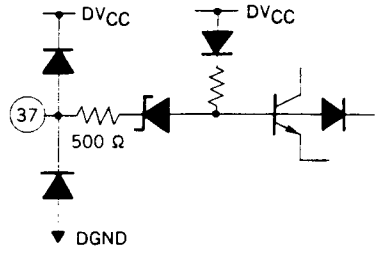
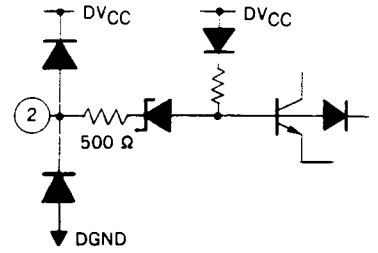
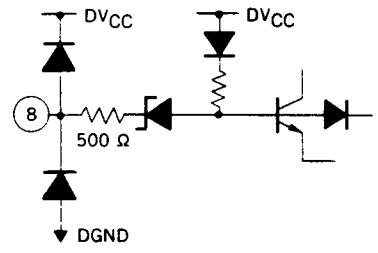
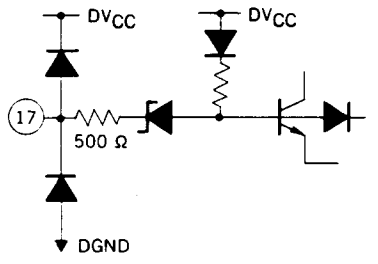
MEASUREMENT CIRCUIT

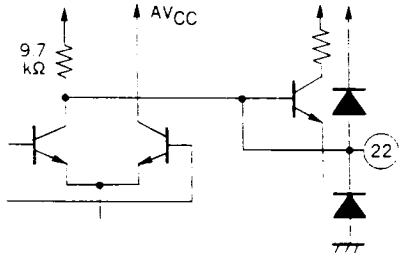
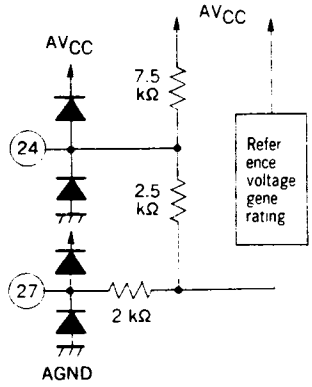
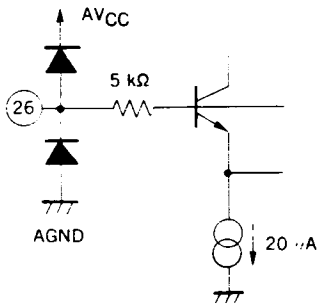
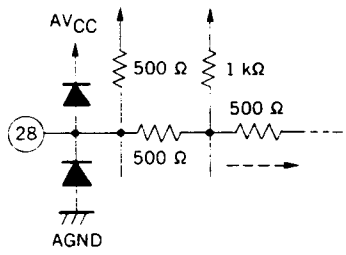


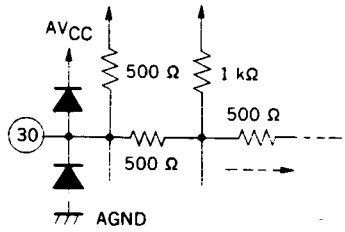
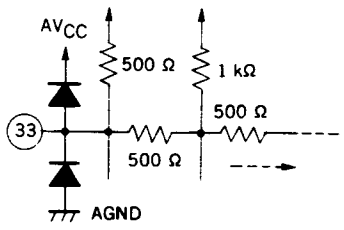
TIMING CHART



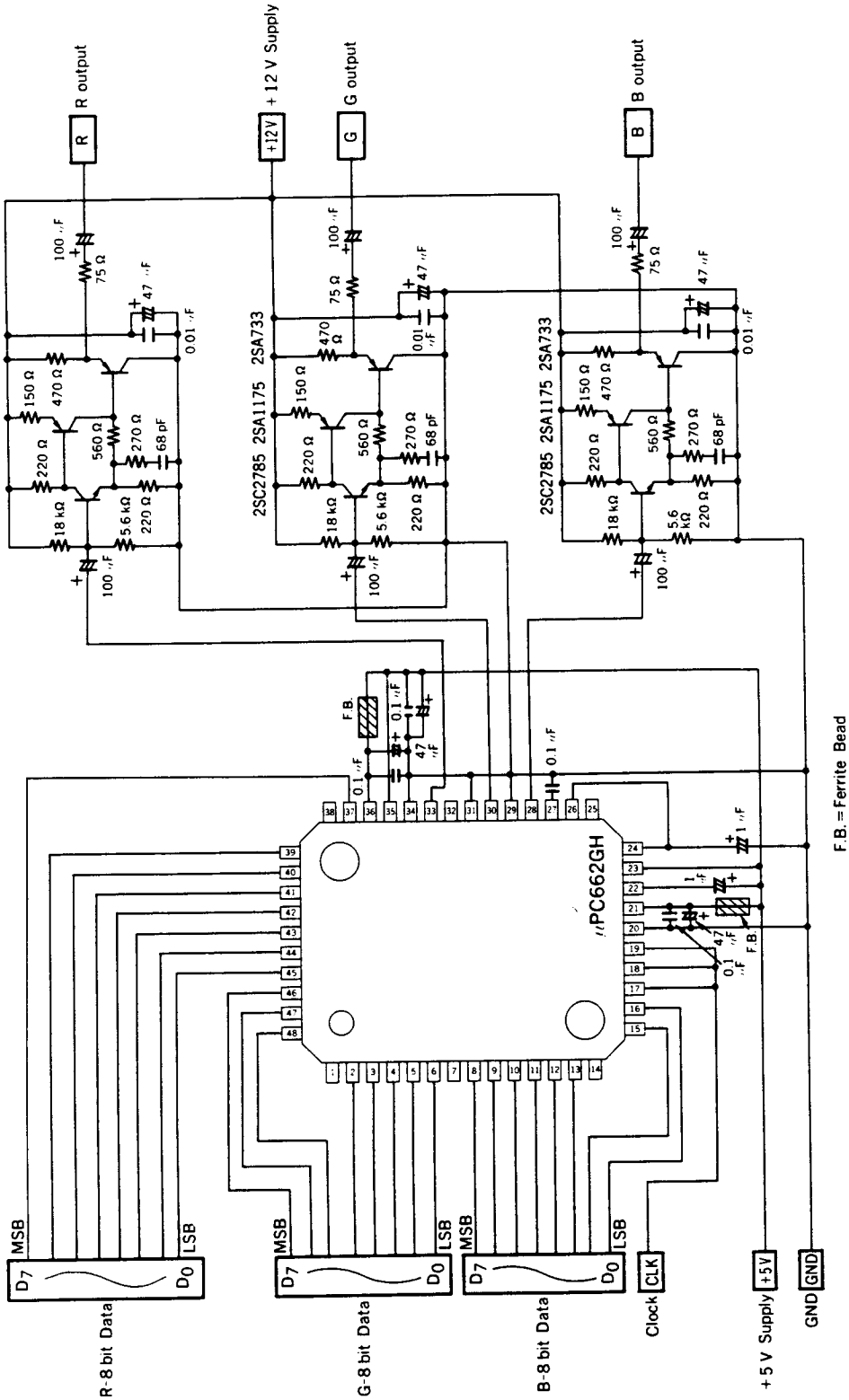
DESCRIPTION OF PINS

PIN NO.	EQUIVALENT CIRCUIT	FUNCTIONS
37, 39, 40, 41, 42, 43, 44, 45		37: R channel digital input (MSB) 39: R channel digital input (2nd) 40: R channel digital input (3rd) 41: R channel digital input (4th) 42: R channel digital input (5th) 43: R channel digital input (6th) 44: R channel digital input (7th) 45: R channel digital input (LSB)
2, 3, 4, 5, 6, 46, 47, 48		46: G channel digital input (MSB) 47: G channel digital input (2nd) 48: G channel digital input (3rd) 2: G channel digital input (4th) 3: G channel digital input (5th) 4: G channel digital input (6th) 5: G channel digital input (7th) 6: G channel digital input (LSB)
8, 9, 10, 11, 12, 13, 15, 16		8: B channel digital input (MSB) 9: B channel digital input (2nd) 10: B channel digital input (3rd) 11: B channel digital input (4th) 12: B channel digital input (5th) 13: B channel digital input (6th) 15: B channel digital input (7th) 16: B channel digital input (LSB)
17, 18, 19		17: B channel clock input 18: G channel clock input 19: R channel clock input
21, 36		Digital power pin

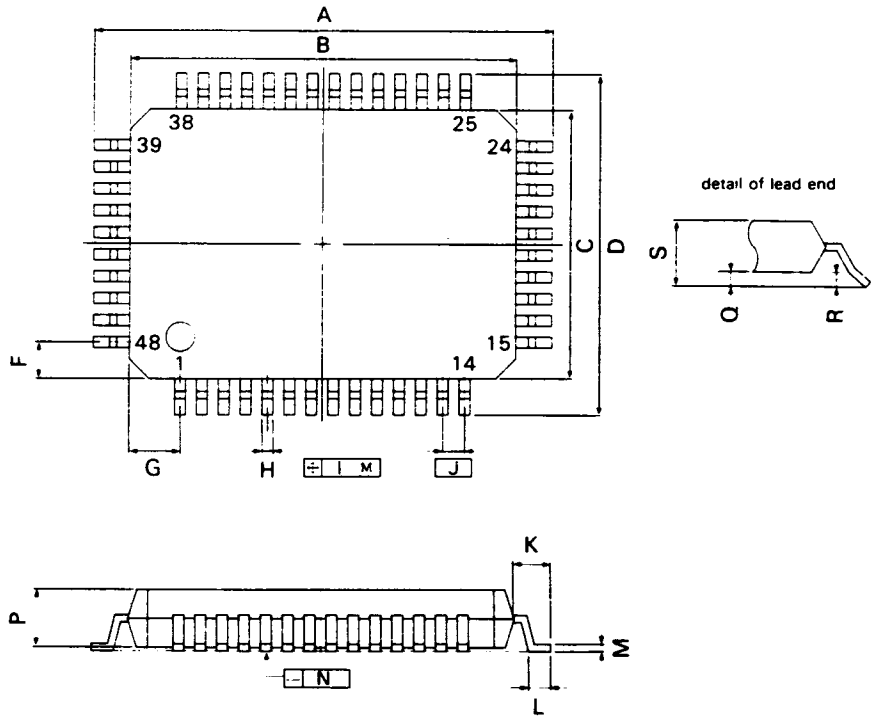
PIN NO.	EQUIVALENT CIRCUIT	FUNCTIONS
22		Phase compensating capacitor connection pin for full-scale amplifier. The capacitor must be connected between this pin and analog power supply.
23, 35		Analog power pin
24 27		24: Voltage output pin of the incorporated reference voltage generating circuit. This pin has high output impedance, and must be connected with a high impedance element. 27: Voltage adjusting pin for the incorporated reference voltage generating circuit. The output voltage from pin 26 is varied depending on the voltage applied to pin 28. When no particular adjustment is necessary, connect approx. 0.1 μF capacitance between pin 28 and the analog ground.
26		Reference voltage input pin. The output full-scale range is set according to the voltage applied to this pin. Apply standard 4.0 V. When no adjustment is necessary, connect the output from pin 24 directly to this pin.
28		B signal output pin. The output resistance is approximately 333 Ω (TYP.).
20, 29, 31, 34		Grounding pin

PIN NO.	EQUIVALENT CIRCUIT	FUNCTIONS
30		G signal output pin. The output resistance is approx. 333 Ω (TYP.).
33		R signal output pin. The output resistance is approx. 333 Ω (TYP.).

APPLICATION



48 PIN PLASTIC QFP



P48GH-80-2A5-1

NOTE

Each lead centerline is located within 0.15 mm (0.006 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	$16.8^{\pm 0.4}$	$0.661^{+0.017}_{-0.016}$
B	$14.0^{\pm 0.2}$	$0.551^{\pm 0.008}$
C	$10.0^{\pm 0.2}$	$0.394^{+0.008}_{-0.009}$
D	$12.8^{\pm 0.4}$	$0.504^{\pm 0.016}$
F	1.4	0.055
G	1.8	0.071
H	$0.35^{\pm 0.10}$	$0.014^{+0.004}_{-0.005}$
I	0.15	0.006
J	0.8 (T.P.)	0.031 (T.P.)
K	$1.4^{\pm 0.2}$	$0.055^{\pm 0.008}$
L	$0.6^{\pm 0.2}$	$0.024^{+0.008}_{-0.009}$
M	$0.20^{+0.10}_{-0.05}$	$0.079^{+0.068}_{-0.073}$
N	0.15	0.006
P	$2.2^{\pm 0.1}$	$0.087^{+0.004}_{-0.005}$
Q	$0.1^{\pm 0.1}$	$0.004^{\pm 0.004}$
R	$0.1^{\pm 0.1}$	$0.004^{\pm 0.004}$
S	2.5 MAX.	0.099 MAX.

[MEMO]