

6427525 N E C ELECTRONICS INC

05E 22561 D

BIPOLAR ANALOG INTEGRATED CIRCUITS

T-74-07-01

 μ PC1663, μ PC1664

ULTRA-WIDEBAND DIFFERENTIAL VIDEO AMPLIFIERS

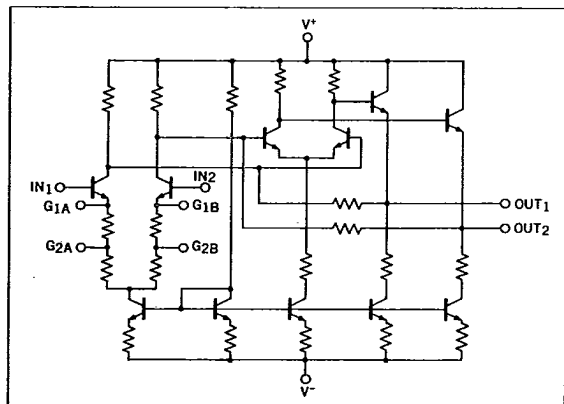
DESCRIPTION

The μ PC1663 and μ PC1664 are video amplifiers with differential input and output stages. An ultrahigh-frequency process ($f_T = 6$ GHz) improves AC performance compared with industry-standard type 733 video amplifiers. The μ PC1663 and μ PC1664 are excellent as sense amplifiers for high-density CCDs, as video or pulse amplifiers in high-resolution displays, and in communications equipment.

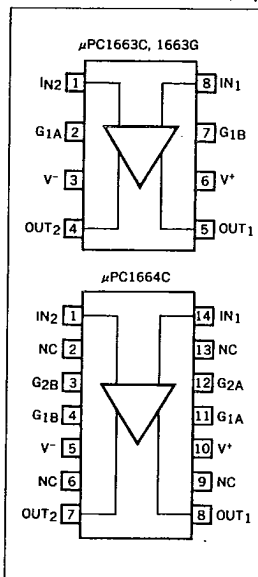
FEATURES

- Bandwidth and typical gain
120 MHz at $A_{VOL} = 300$
170 MHz at $A_{VOL} = 100$
700 MHz at $A_{VOL} = 10$
- Very small phase delay
- Gain adjustable from 10 to 300
- No frequency compensation required

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM (Top View)



ORDERING INFORMATION

Part Number	Package
μ PC1663C	8 PIN PLASTIC DIP (300 mil)
μ PC1663G	8 PIN PLASTIC SOP (225 mil)
μ PC1664C	14 PIN PLASTIC DIP (300 mil)

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 μ PC1163, μ PC1164
05E 22562 DABSOLUTE MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

T-74-07-01

PARAMETER	SYMBOL	μ PC1663C	μ PC1663G	μ PC1664C	UNIT
Voltage between V^+ and V^-	$V^{\pm}$	± 8	± 7	± 8	V
Power Dissipation	P_T	500	*280 ($T_a = 75^\circ\text{C}$)	570	mW
Differential Input Voltage	V_{ID}	± 5	± 5	± 5	V
Input Voltage	V_{ICM}	± 6	± 6	± 6	V
Output Current	I_O	35	35	35	mA
Operating Temperature Range	T_{opt}	-45 to +85	-45 to +75	-45 to +85	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-55 to +150	-55 to +150	-55 to +150	$^\circ\text{C}$

*Mounted on 5 cm x 5 cm x 0.16 mm glass epoxy PWB

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply Voltage	$V^{\pm}$ (1663C, 1664C)	± 2	± 6	± 7	V
Supply Voltage	$V^{\pm}$ (1663G)	± 2	± 6	± 6.5	V
Source Current	$I_{O \text{ source}}$			20	mA
Sink Current	$I_{O \text{ sink}}$			2.5	mA
Frequency Range		DC		200	MHz

ELECTRICAL CHARACTERISTICS ($T_a = 25^\circ\text{C}$, $V^{\pm} = \pm 6\text{V}$)

CHARACTERISTIC	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Differential Voltage Gain	Gain 1	200	320	500		(Note 1)
	Gain 2	80	100	120		(Note 2)
	Gain 3	8	10	12		(Note 3)
Bandwidth	Gain 1		120			$R_S = 50 \Omega$ (3 dB down point)
	Gain 2		170			
	Gain 3		700			
Rise Time	Gain 1		2.9			$R_S = 50 \Omega$, $V_{out} = 1 V_{p-p}$
	Gain 2		2.7			
	Gain 3		2.7			
Propagation Delay	Gain 1		2			$R_S = 50 \Omega$, $V_{out} = 1 V_{p-p}$
	Gain 2		1.6			
	Gain 3		1.2			
Input Impedance	Gain 1		4.0			
	Gain 2		6.7	13		
	Gain 3		50	180		
Input Capacitance	C_{in}		2		pF	
Input Offset Current	I_{IO}		0.4	5.0	μA	
Input Bias Current	I_B		20	40	μA	
Input Noise Voltage	V_n		3		$\mu\text{V}_{r.m.s.}$	$R_S = 50 \Omega$, 10 k to 10 MHz
Input Voltage Range	V_I	± 1.0			V	
Common Mode Rejection Ratio	CMR	55	70			$V_{cm} = \pm 1 \text{ V}$, $f \leq 100 \text{ kHz}$
		53	60			$V_{cm} = \pm 1 \text{ V}$, $f = 5 \text{ MHz}$
Supply Voltage Rejection Ratio	SVR	50	70			$\Delta V = \pm 0.5 \text{ V}$
Output Offset Voltage	Gain 1		0.3	1.5		$V_{O(off)} = OUT_1 - OUT_2 $
	Gain 2, 3		0.1	1.0		
Output Common Mode Voltage	$V_{O(CM)}$	2.4	2.9	3.4	V	
Output Voltage Swing	$V_{O(p-p)}$	3.0	4.0		V_{p-p}	
Output Sink Current	I_{sink}	2.5	3.6		mA	
Power Supply Current	I_{CC}		13	20	mA	

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μ PC1163, μ PC1164

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05E 22563 D

T-74-07-01

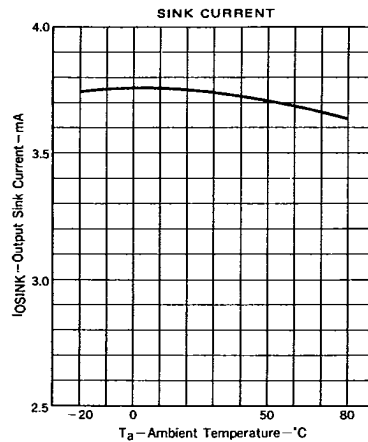
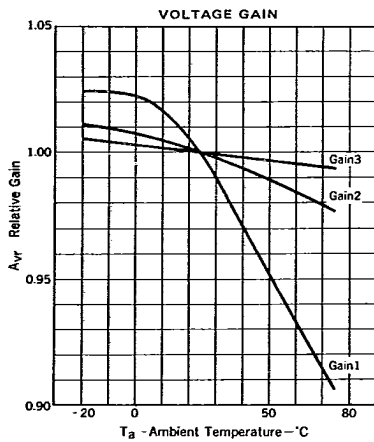
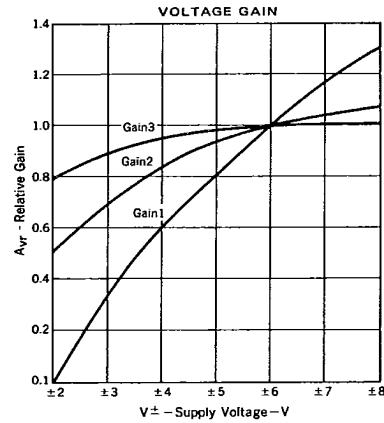
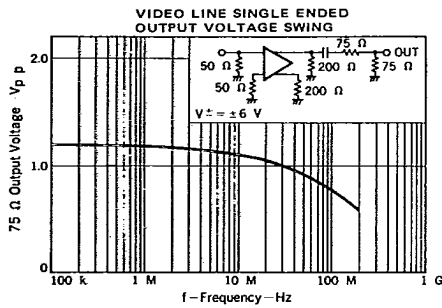
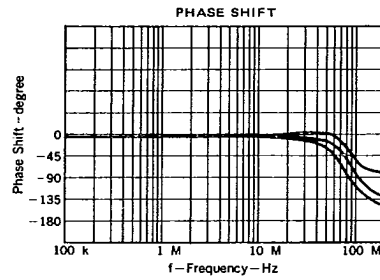
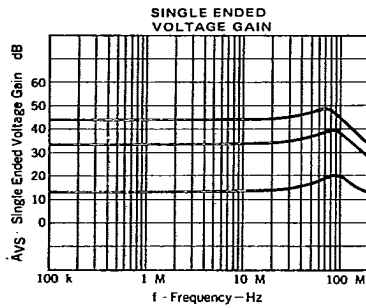
- Notes:
1. Gain select pins G1A and G1B are connected.
 2. Gain select pins G2A and G2B are connected.
 3. All gain select pins are open.
 4. Insert adjustment resistor (0 to 10 k Ω) between G1A and G1B when variable gain is necessary.

Attention: Due to ultrahigh-frequency characteristics, the physical circuit layout is very critical. Supply voltage line bypass, double-sided printed-circuit board, and wide-area ground line layout are necessary for stable operation. Two signal resistors connected to both inputs and two load resistors connected to both outputs should be balanced for stable operation.

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 μ PC1663, μ PC1664
05E 22564 D

T-74-07-01

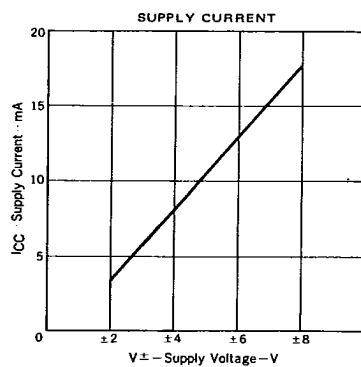
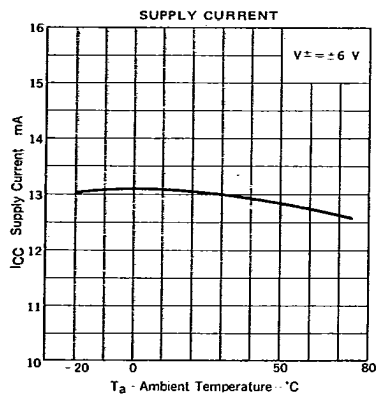
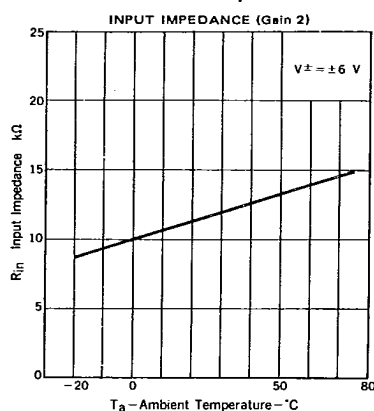
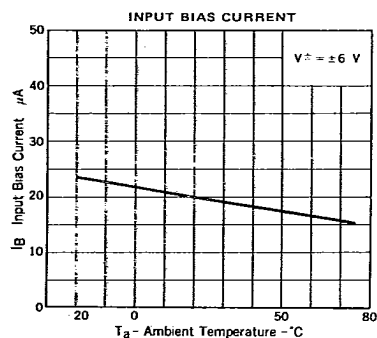
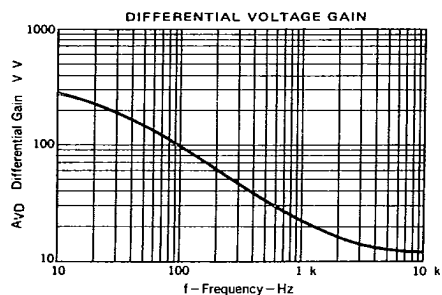
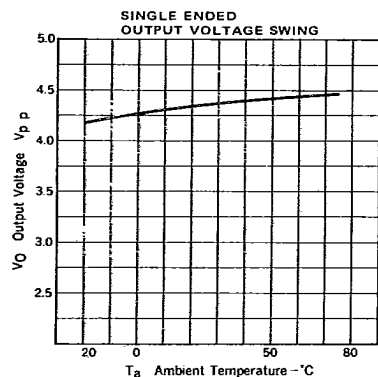
TYPICAL PERFORMANCE CHARACTERISTICS ($T_a = 25^\circ\text{C}$)

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05E 22565 D

T-74-07-01



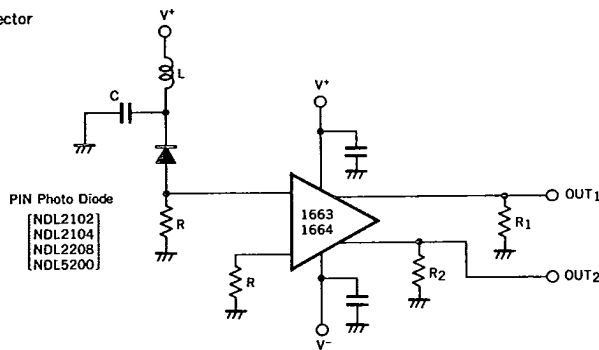
μ PC1663, μ PC1664
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TYPICAL APPLICATIONS

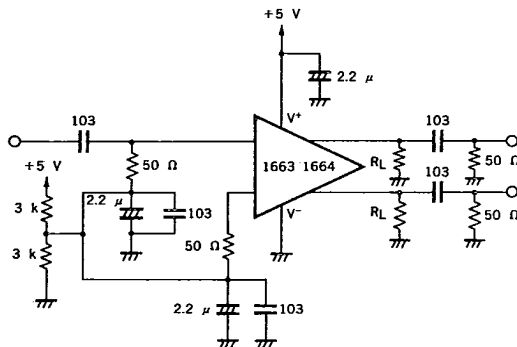
T-74-07-01

● Photo Signal Detector



FET source follower buffer is necessary, when input impedance of μ PC1663/1664 is critical.

● Application for +5 V Single Supply



PERFORMANCE UNDER +5 V OPERATION

PARAMETER		CONDITIONS	PERFORMANCE	UNIT
Differential Gain	Gain 1	15 MHz	35	dB
	Gain 3		11	
Bandwidth	Gain 1	3 dB down point	106	MHz
	Gain 3		115	
Rise Time	Gain 1	$R_S = 50 \Omega$, $V_{OUT} = 80 \text{ mV}_{p-p}$	2.2	ns
Propagation Delay	Gain 1	$R_S = 50 \Omega$, $V_{OUT} = 80 \text{ mV}_{p-p}$	2.8	ns
	Gain 3	$R_S = 50 \Omega$, $V_{OUT} = 60 \text{ mV}_{p-p}$	1.8	
Phase Shift	Gain 1	100 MHz	-123	degree
	Gain 3		-93	
Output Power	$R_L = 240 \Omega$	$Z_L = 50 \Omega$ 15 MHz	5.0	dBm
	$R_L = 910 \Omega$		0	
	$R_L = 80 \Omega$		-11.5	

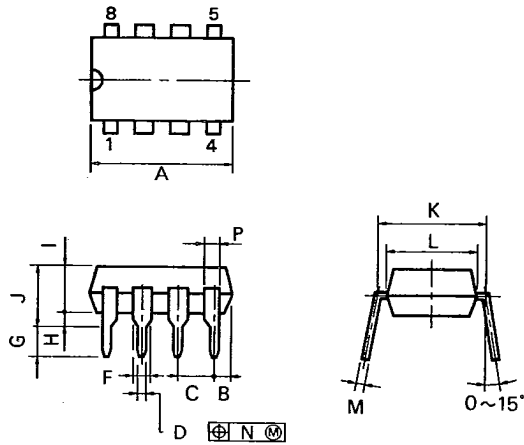
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T-74-07-01

8 PIN PLASTIC DIP (300 mil)



P8C-100-300B,C

NOTES

- Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.
- Item "K" to center of leads when formed parallel.

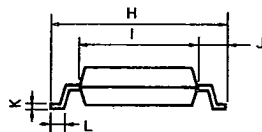
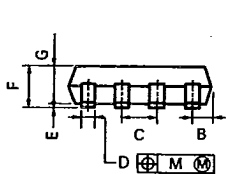
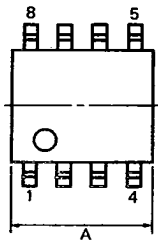
ITEM	MILLIMETERS	INCHES
A	10.16 MAX.	0.400 MAX.
B	1.27 MAX.	0.050 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	0.50 ± 0.10	0.020 ± 0.004
F	1.4 MIN.	0.055 MIN.
G	3.2 ± 0.3	0.126 ± 0.012
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	7.62 (T.P.)	0.300 (T.P.)
L	6.4	0.252
M	0.25 ± 0.08	0.010 ± 0.003
N	0.25	0.01
P	0.9 MIN.	0.035 MIN.

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05E 22568 D

T-74-07-01

8 PIN PLASTIC SOP (225 mil)



S8GM-50-225B

NOTE

Each lead centerline is located within 0.12 mm (0.005 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	5.70 MAX.	0.225 MAX.
B	0.94 MAX.	0.037 MAX.
C	1.27 (T.P.)	0.050 (T.P.)
D	0.40 ± 0.08	0.016 ± 0.003
E	0.1 ± 0.1	0.004 ± 0.004
F	1.8 MAX.	0.071 MAX.
G	1.49	0.059
H	6.5 ± 0.3	0.256 ± 0.012
I	4.4	0.173
J	1.1	0.043
K	0.15 ± 0.08	0.006 ± 0.003
L	0.6 ± 0.2	0.024 ± 0.008
M	0.12	0.005

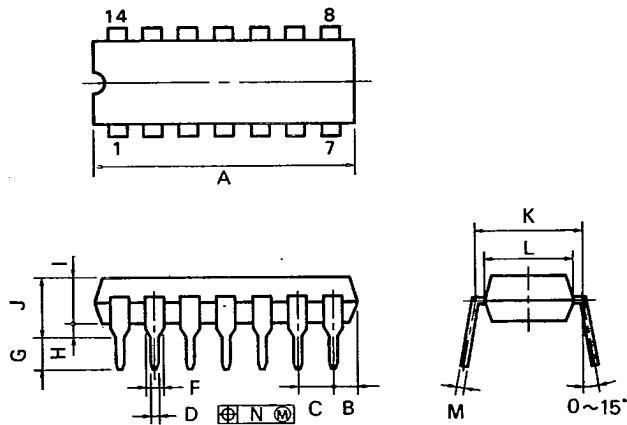
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T-74-07-01

14 Pin Plastic DIP (300 mil)



P14C-100-300B1

NOTES

- Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.
- Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.800 MAX.
B	2.54 MAX.	0.100 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
D	0.50 ± 0.10	0.020 ± 0.004
F	1.2 MIN.	0.047 MIN.
G	3.6 ± 0.3	0.142 ± 0.012
H	0.51 MIN.	0.020 MIN.
I	4.31 MAX.	0.170 MAX.
J	5.08 MAX.	0.200 MAX.
K	7.62 (T.P.)	0.300 (T.P.)
L	6.4	0.252
M	0.25 ± 0.10	0.010 ± 0.004
N	0.25	0.01