To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

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RENESAS

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC1295C

2 PHASE BRUSHLESS MOTOR SPEED CONTROL

DESCRIPTION

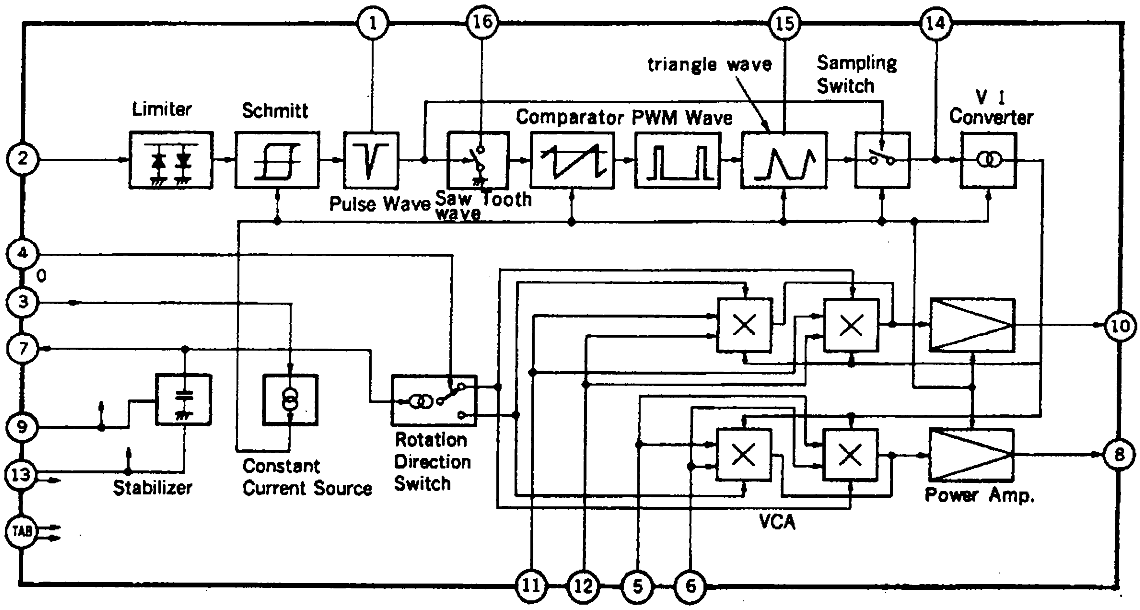
μPC1295C is a silicon monolithic integrated circuit designed for 2 phase brushless motor speed control circuit.

μPC1295C includes limiter circuit, shumitt circuit, pulse generator, saw tooth wave generator, comparator, PWM generator, triangle wave generator, sampling switch, V–I converter, power amplifier voltage stabilizer, constant current stabilizer and rotation direction switch.

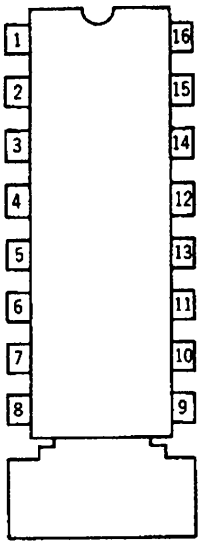
FEATURES

- High output current. ±300 mA (R_L = 25 Ω)
- Internal rotation direction switch.
- All from FG-Input to power output in 1 chip.

BLOCK DIAGRAM



CONNECTION DIAGRAM (Top View)



PIN No.	CONNECTION	PIN No.	CONNECTION
1	PULSE WIDTH TIME CONSTANT	9	$+V_{CC}$
2	FG INPUT	10	OUTPUT 1
3	CONSTANT CURRENT INPUT	11	HALL DEVICE INPUT 1
4	ROTATION DIRECTION SWITCH	12	HALL DEVICE INPUT 1'
5	HALL DEVICE INPUT 2'	13	GND
6	HALL DEVICE INPUT 2	14	SAMPLE HOLD
7	CONSTANT VOLTAGE OUTPUT	15	TRIANGLE WAVE TIME CONSTANT
8	OUTPUT 2	16	SAW TOOTH WAVE TIME CONSTANT
TAB	$-V_{CC}$		

ABSOLUTE MAXIMUM RATINGS ($T_a = 25\,°C$)

Supply Voltage (No Signal)	V_{CC}	±15	V
Supply Voltage (Operating)	V_{CC}	±12	V
Circuit Current	I_{CC}	±0.5	A
Power Dissipation	P_D	1.6*	W
Operating Temperature	T_{opt}	–20 to +75	°C
Storage Temperature	T_{stg}	–40 to +150	°C

* $T_a = 60\,°C$

RECOMMENDED OPERATING CONDITIONS

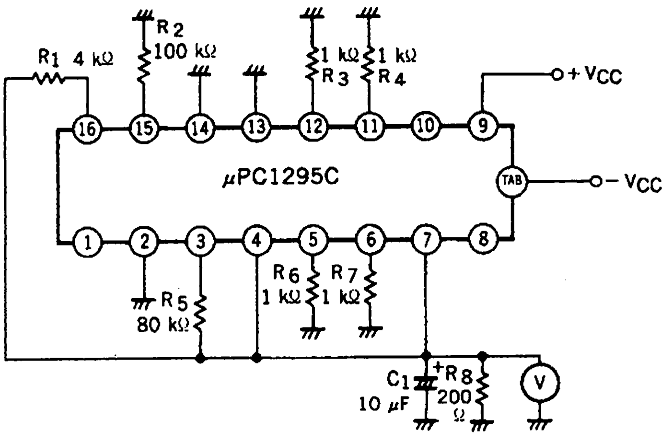
Supply Voltage	V_{CC} = ±9 to ±12 V
Input Voltage	V_{ha} = 100 to 200 $mV_{p\text{-}p}$

ELECTRICAL CHARACTERISTICS (V_{CC} = ±11 V, f = 400 Hz, T_a = 25 °C)

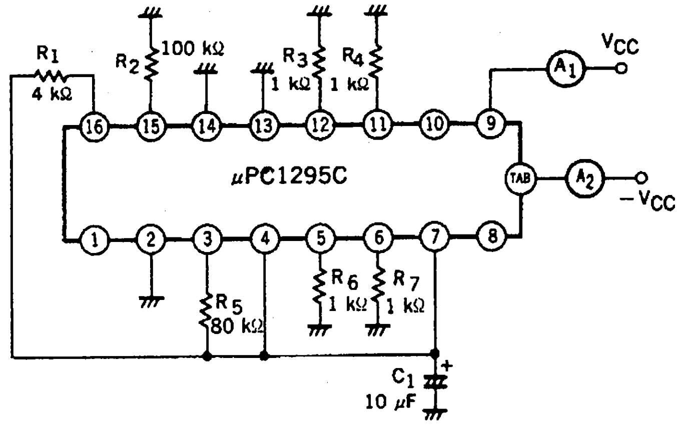
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITION
Constant Voltage Output	V_O	3.6	4.0	4.4	V	R_L = 200 Ω
Circuit Current	I_{CC}		±20	±30	mA	R_L = ∞
FG Input Threshold Voltage	V_{th}		0.14	0.5	V	
Constant Current Output	I_g	38	46	54	μA	R_2 = 10 kΩ SPEED (#7) = +4 V
Maximum Hold Voltage	$V_{h(MAX.)}$	2.8	3.2	3.7	V	R_2 = 100 kΩ, R_1 = 4 kΩ C_2 = 1 μF SPEED (#7) = +4 V
Voltage Gain (Power Stage)	A_v	39	42	45	dB	V_{ha} = 100 mV_{p-p}
Channel Balance (Power Stage)	ΔA_v		0	±1.5	dB	HOLD (#14) = 1 V
Offset Voltage (Power Stage)	V_{offset}	−0.7	0.3	1.3	V	V_{ha} = 0
Total Harmonic Distortion (Power Stage)	THD		0.2	1.5	%	
Maximum Output Voltage	V_{om}	+7.2 -7.2	+8.7 -8.5		V V	R_{L1} = R_{L2} = 25 Ω HOLD (#14) = 1 V
Saturation Voltage	V_{sat}		90	200	mW	I = 1 mA
Reference Voltage	V_{ref}		0	±5	%	

TEST CIRCUITS

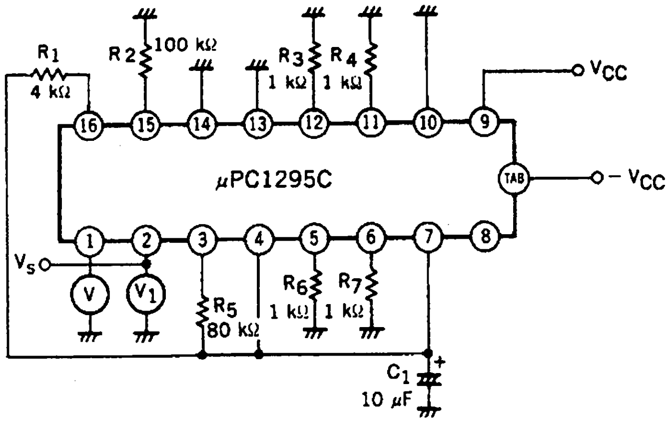
No. 1 $V_O = V$



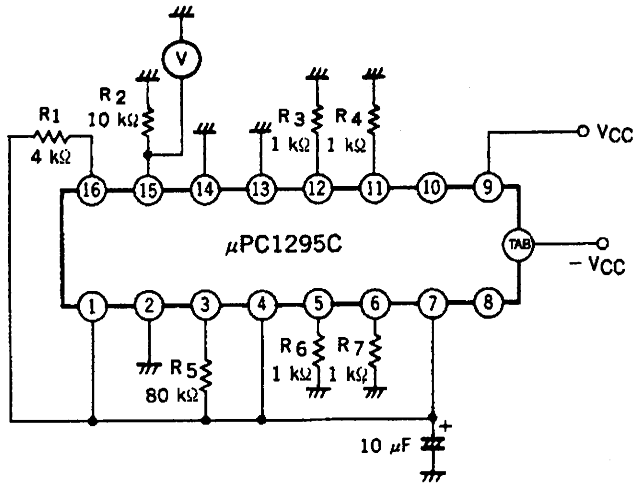
No. 2 $I_{CC} = A_1$, $-I_{CC} = A_2$



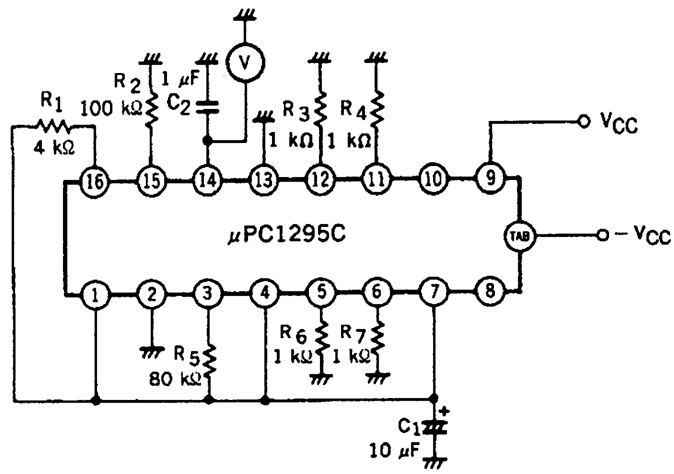
No. 3 $V_{th} = V_1$



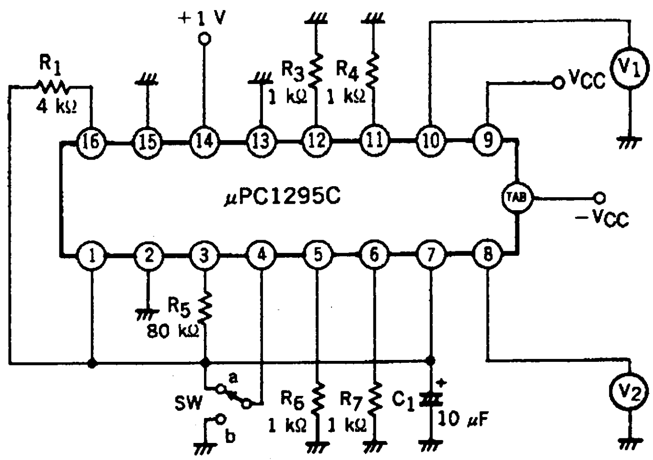
No. 4 $I_g = V/R_2$



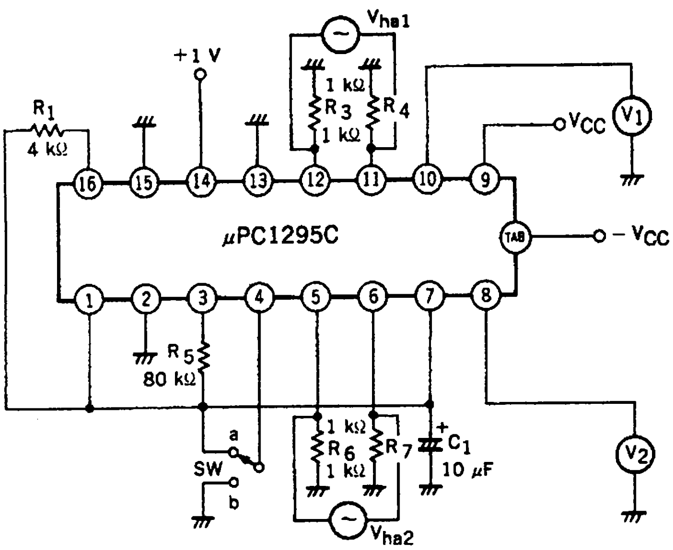
No. 5 V_h (MAX.) = V



No. 6 $V_{offset} = V_1 - V_2$



No. 7 A_v, ΔA_v, THD

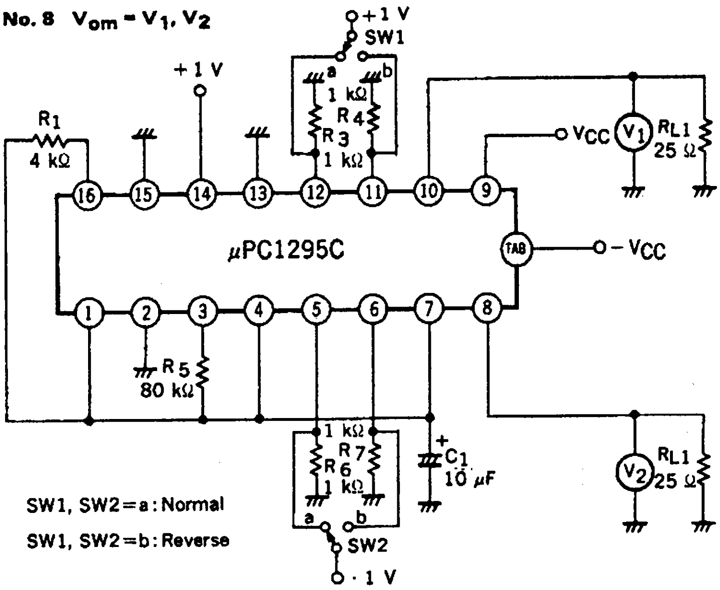


SW ; a $A_{v1}(\text{normal}) = 20 \log \frac{V_1}{V_{ha1}}$, $A_v 2(\text{normal}) = 20 \log \frac{V_2}{V_{ha2}}$

SW ; b $A_{v1}(\text{reverse}) = 20 \log \frac{V_1}{V_{ha1}}$, $A_v 2(\text{reverse}) = 20 \log \frac{V_2}{V_{ha2}}$

$V_{ha1} = V_{ha2} = 35.4$ mVrms (100 mVp-p)

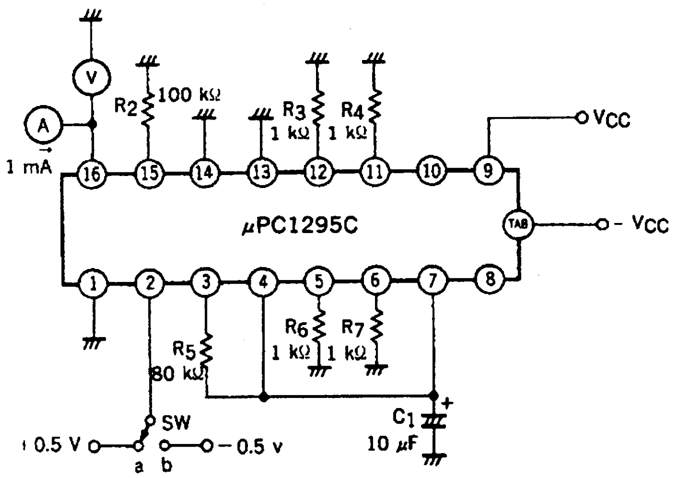
No. 8 $V_{om} = V_1, V_2$



SW1, SW2 = a : Normal

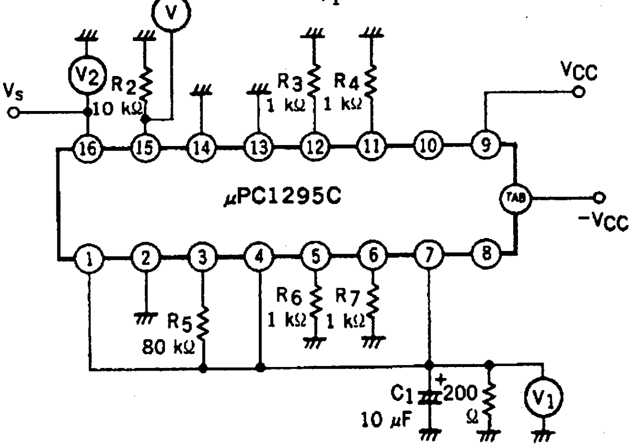
SW1, SW2 = b : Reverse

No. 9 $V_{sat} = V$ at SW = b

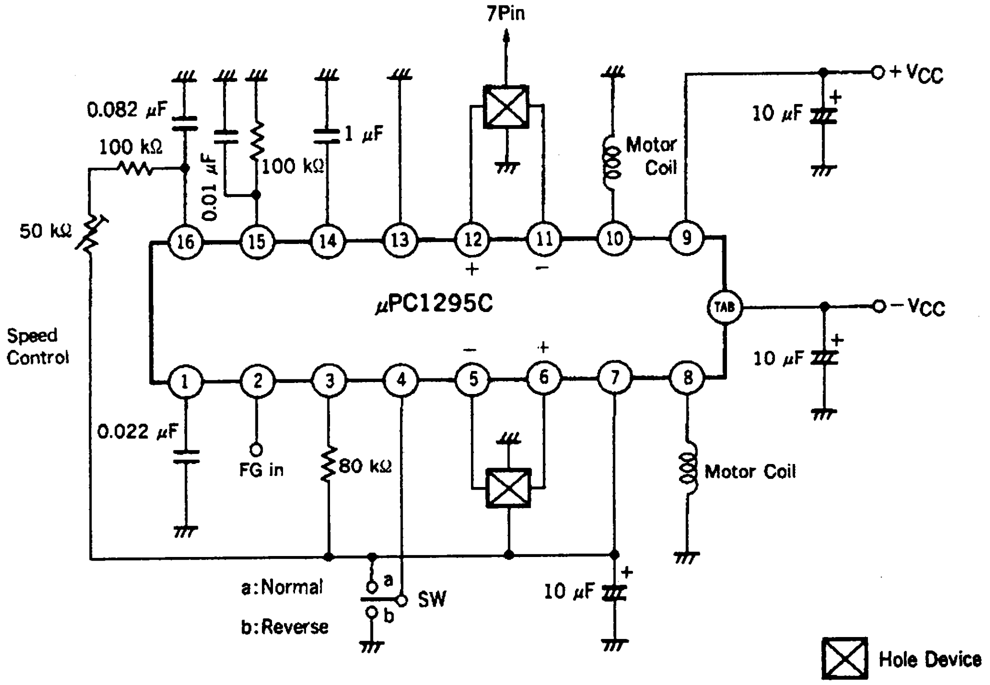


No. 10 V_{ref}

$V_{ref} = (1 \quad \frac{V_2}{V_1} \quad 0.5) \times 100$ %

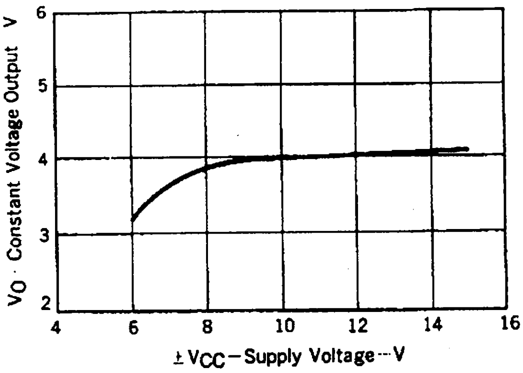


APPLICATION CIRCUIT

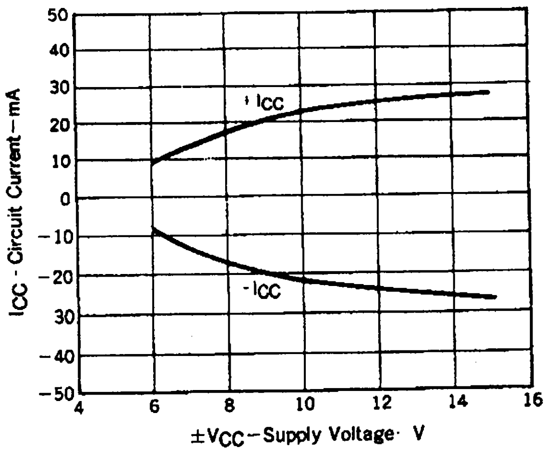


TYPICAL CHARACTERISTICS

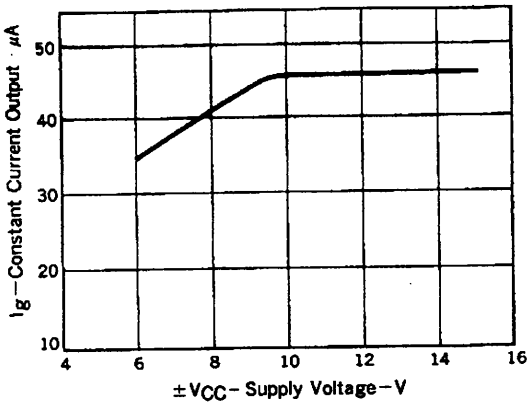
CONSTANT VOLTAGE OUTPUT vs. SUPPLY VOLTAGE



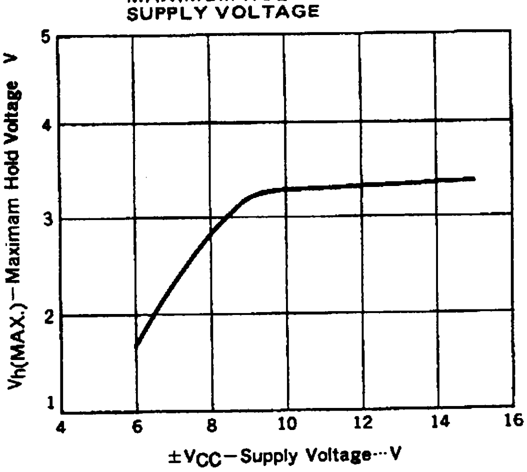
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



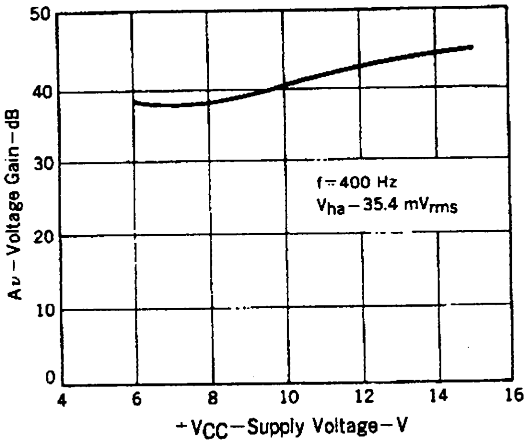
CONSTANT CURRENT OUTPUT vs. SUPPLY VOLTAGE



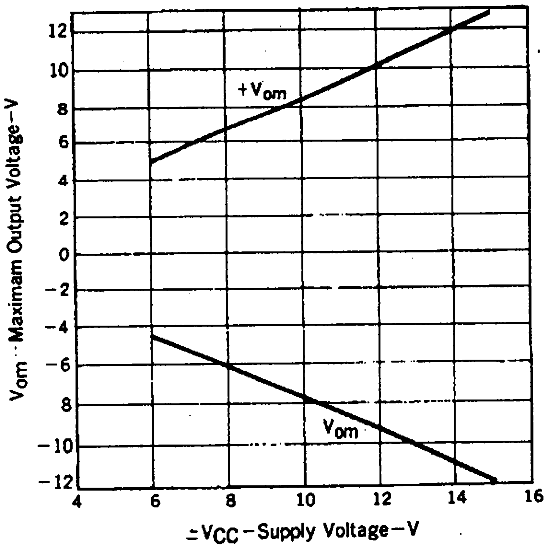
MAXIMUM HOLD VOLTAGE vs. SUPPLY VOLTAGE



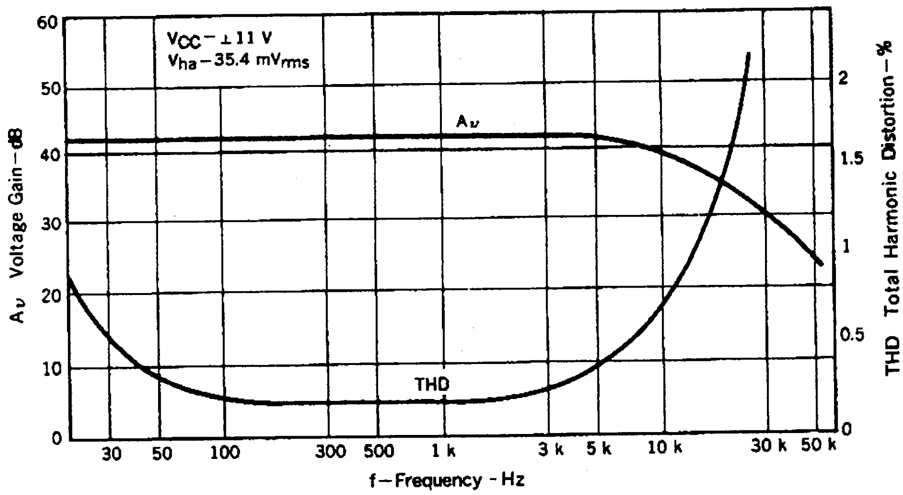
VOLTAGE GAIN vs. SUPPLY VOLTAGE



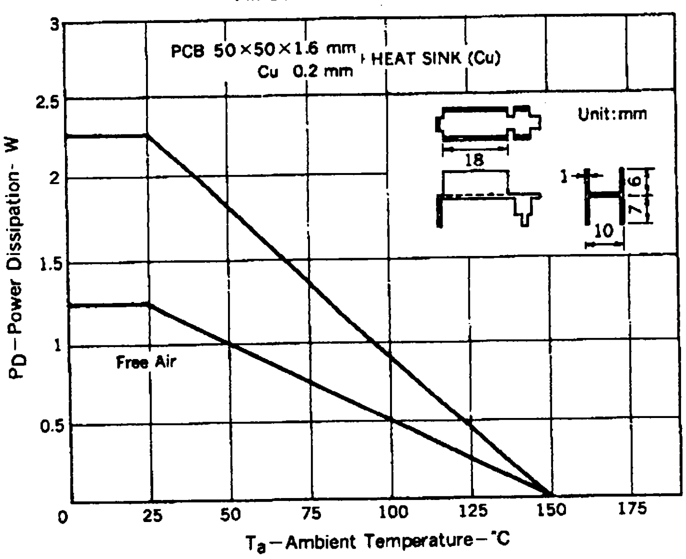
MAXIMUM OUTPUT VOLTAGE vs. SUPPLY VOLTAGE



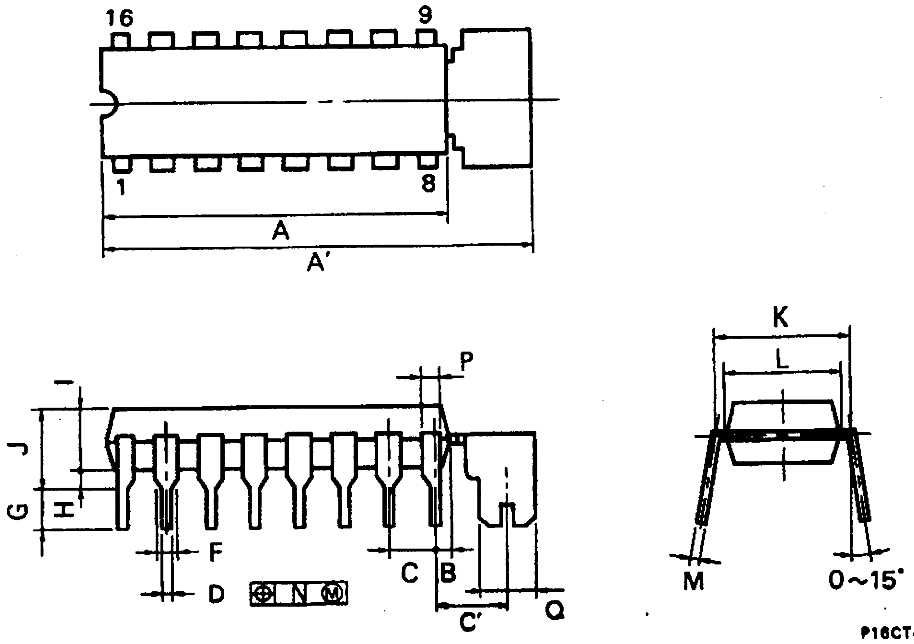
VOLTAGE GAIN, TOTAL HARMONIC DISTATION vs. FREQUENCY



POWER DISSIPATION vs. AMBIENT TEMPERATURE



16PIN PLASTIC DIP WITH TAB (300 mil)



P16CT-100-300B

NOTES

1) Each lead centerline is located within 0.25 mm (0.01 inch) of its true position (T.P.) at maximum material condition.

2) Item "K" to center of leads when formed parallel.

ITEM	MILLIMETERS	INCHES
A	20.32 MAX.	0.800 MAX.
A'	24.60 MAX.	0.969 MAX.
B	1.27 MAX.	0.050 MAX.
C	2.54 (T.P.)	0.100 (T.P.)
C'	4.12	0.162
D	0.50 ± 0.10	$0.020^{+0.004}_{-0.005}$
F	1.1 MIN.	0.043 MIN.
G	3.4 ± 0.3	0.134 ± 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	6.5	0.256
M	$0.30^{+0.10}_{-0.05}$	$0.012^{+0.004}_{-0.003}$
N	0.25	0.01
P	1.0 MIN.	0.039 MIN.
Q	3.17 ± 0.50	0.125 ± 0.020

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