NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC79N00 SERIES

THREE TERMINAL NEGATIVE VOLTAGE REGULATOR

DESCRIPTION

μPC79N00 series are monolithic three terminal positive regulators which employ internally current limiting, thermal shut-down, output transistor safe operating area protection make them essentially indestructible.

They are intended as fixed voltage regulators in a wide range of application including local on card regulation for elimination of distribution problems associated wide single point regulation.

FEATURES

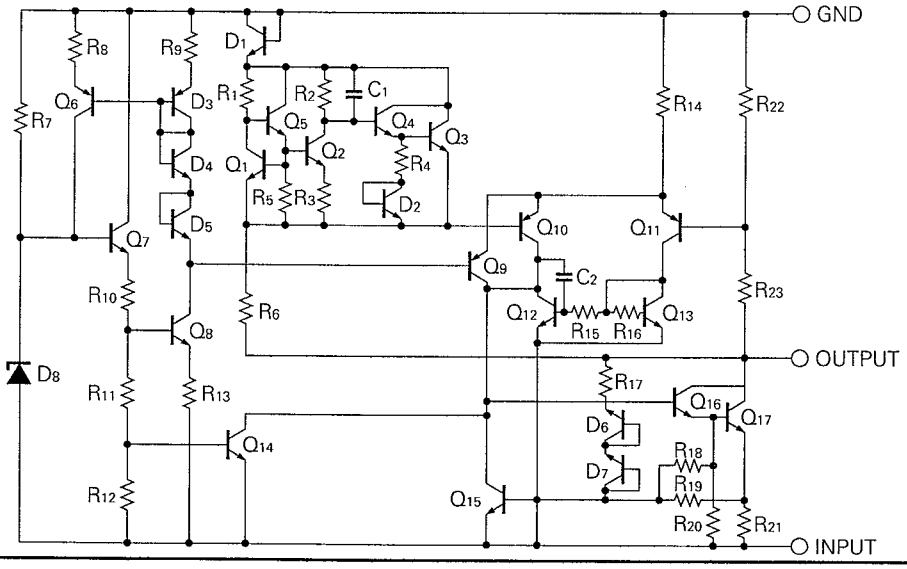
- Output current in excess of 300 mA.
- Built-in some protection circuits.
  (over current protection, SOA protection and thermal shut-down)
- Small package, TO-126.

ORDER INFORMATION

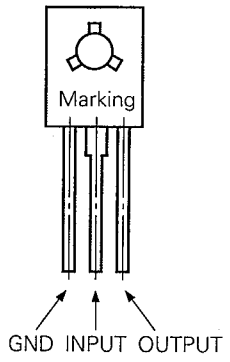
TYPE NUMBER	OUTPUT VOLTAGE	PACKAGE	QUALITY GRADE
μPC79N05H	−5 V	TO-126	Standard
μPC79N08H	−8 V		
μPC79N12H	−12 V		
μPC79N15H	−15 V		
μPC79N18H	−18 V		
μPC79N24H	−24 V		

Please refer to "Quality grade on NEC Semiconductor Devices" (Document number IEI-1209) published by NEC Corporation to know the specification of quality grade on the devices and its recommended applications.

EQUIVALENT CIRCUIT



CONNECTION DIAGRAM



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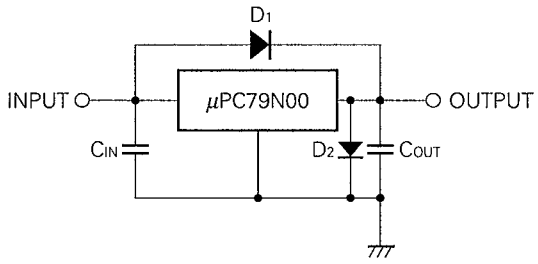
ABSOLUTE MAXIMUM RATINGS (T_a = 25 °C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Input Voltage	V_{IN}	−35/−40 (Note1)	V
Internal Power Dissipation	P_T	12.5 (Note2)	W
Operating Ambient Temperature Range	T_{opt}	−20 to +85	°C
Operating Junction Temperature Range	$T_{opt\ (j)}$	−20 to +150	°C
Storage Temperature Range	T_{stg}	−55 to +150	°C
Thermal Resistance (junction to case)	$R_{th\ (j-c)}$	10	°C/W
Thermal Resistance (junction to ambient)	$R_{th\ (j-a)}$	110	°C/W

(Note 1) μPC79N05, 08, 12, 15, 18 : −35 V, μPC79N24 : −40 V

(Note 2) Internally limited

TYPICAL CONNECTION



C_{IN}: More than 2.2 μF.

C_{OUT}: More than 1 μF.

D_1: Needed for $V_{IN} > V_O$.

D_2: Needed for $V_O >$ GND.

RECOMMENDED OPERATING CONDITIONS

CHARACTERISTIC	SYMBOL	TYPE NUMBER	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}	μPC79N05H	−7	−10	−25	V
		μPC79N08H	−10.5	−14	−25	
		μPC79N12H	−14.5	−19	−30	
		μPC79N15H	−17.5	−23	−30	
		μPC79N18H	−21	−27	−33	
		μPC79N24H	−27	−33	−38	
Output Current	I_O	All	5		300	mA
Operating Junction Temperature Range	$T_{opt\ (j)}$	All	−20		+125	°C

ELECTRICAL CHARACTERISTICS μPC79N05

(V_{IN} = −10 V, I_O = 200 mA, 0 °C ≦ T_j ≦ +125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

ITEM	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−4.8	−5.0	−5.2	V
		−7 V ≦ V_{IN} ≦ −25 V, 5 mA ≦ I_O ≦ 200 mA	−4.75		−5.25	
Line Regulation	REG_{IN}	T_j = 25 °C, −7 V ≦ V_{IN} ≦ −25 V		7	50	mV
		T_j = 25 °C, −8 V ≦ V_{IN} ≦ −18 V		4	30	
Load Regulation	REG_L	T_j = 25 °C, 5 mA ≦ I_O ≦ 300 mA		25	100	mV
		T_j = 25 °C, 5 mA ≦ I_O ≦ 200 mA		17		
Quiescent Current	I_{BIAS}	T_j = 25 °C		4.7	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−8 V ≦ V_{IN} ≦ −25 V			0.5	mA
		5 mA ≦ I_O ≦ 200 mA			0.4	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		45	200	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, f = 120 Hz, −8 V ≦ V_{IN} ≦ −18 V, I_O = 50 mA	54	74		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		1.1		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −25 V		310		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.1		mV/°C

ELECTRICAL CHARACTERISTICS μPC79N08

(V_{IN} = −14 V, I_O = 200 mA, 0 °C ≦ T_j ≦ +125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

ITEM	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−7.7	−8.0	−8.3	V
		−10.5 V ≦ V_{IN} ≦ −25 V, 5 mA ≦ I_O ≦ 200 mA	−7.6		−8.4	
Line Regulation	REG_{IN}	T_j = 25 °C, −10.5 V ≦ V_{IN} ≦ −25 V		10	80	mV
		T_j = 25 °C, −11 V ≦ V_{IN} ≦ −21 V		5	50	
Load Regulation	REG_L	T_j = 25 °C, 5 mA ≦ I_O ≦ 300 mA		30	160	mV
		T_j = 25 °C, 5 mA ≦ I_O ≦ 200 mA		20		
Quiescent Current	I_{BIAS}	T_j = 25 °C		4.8	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−10.5 V ≦ V_{IN} ≦ −25 V			0.5	mA
		5 mA ≦ I_O ≦ 200 mA			0.4	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		72	220	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, −11.5 V ≦ V_{IN} ≦ −21.5 V, f = 120 Hz, I_O = 50 mA	54	69		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		1.1		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −25 V		310		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.2		mV/°C

ELECTRICAL CHARACTERISTICS μPC79N12

(V_{IN} = −19 V, I_O = 200 mA, 0 °C ≦ T_j ≦ +125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

ITEM	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−11.5	−12	−12.5	V
		−14.5 V ≦ V_{IN} ≦ −30 V, 5 mA ≦ I_O ≦ 200 mA	−11.4		−12.6	
Line Regulation	REG_{IN}	T_j = 25 °C, −14.5 V ≦ V_{IN} ≦ −30 V		12	80	mV
		T_j = 25 °C, −15 V ≦ V_{IN} ≦ −25 V		6	50	
Load Regulation	REG_L	T_j = 25 °C, 5 mA ≦ I_O ≦ 300 mA		45	240	mV
		T_j = 25 °C, 5 mA ≦ I_O ≦ 200 mA		30		
Quiescent Current	I_{BIAS}	T_j = 25 °C		5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−14.5 V ≦ V_{IN} ≦ −30 V			0.5	mA
		5 mA ≦ I_O ≦ 200 mA			0.4	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		110	280	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, f = 120 Hz, −15 V ≦ V_{IN} ≦ −25 V, I_O = 50 mA	54	62		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		1.1		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −30 V		220		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.4		mV/°C

ELECTRICAL CHARACTERISTICS μPC79N15

(V_{IN} = −23 V, I_O = 200 mA, 0 °C ≦ T_j ≦ +125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

ITEM	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	−14.4	−15	−15.6	V
		−17.5 V ≦ V_{IN} ≦ −30 V, 5 mA ≦ I_O ≦ 200 mA	−14.25		−15.75	
Line Regulation	REG_{IN}	T_j = 25 °C, −17.5 V ≦ V_{IN} ≦ −30 V		15	80	mV
		T_j = 25 °C, −18 V ≦ V_{IN} ≦ −28 V		8	50	
Load Regulation	REG_L	T_j = 25 °C, 5 mA ≦ I_O ≦ 300 mA		55	240	mV
		T_j = 25 °C, 5 mA ≦ I_O ≦ 200 mA		36		
Quiescent Current	I_{BIAS}	T_j = 25 °C		5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	−17.5 V ≦ V_{IN} ≦ −30 V			0.5	mA
		5 mA ≦ I_O ≦ 200 mA			0.4	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		140	360	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, f = 120 Hz, −18.5 V ≦ V_{IN} ≦ −28.5 V, I_O = 50 mA	52	59		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		1.1		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = −30 V		210		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.4		mV/°C

ELECTRICAL CHARACTERISTICS μPC79N18

(V_{IN} = –27 V, I_O = 200 mA, 0 °C ≦ T_j ≦ +125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

ITEM	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	–17.3	–18	–18.7	V
		–21 V ≦ V_{IN} ≦ –33 V, 5 mA ≦ I_O ≦ 200 mA	–17.1		–18.9	
Line Regulation	REG_{IN}	T_j = 25 °C, –21 V ≦ V_{IN} ≦ –33 V		18	80	mV
		T_j = 25 °C, –24 V ≦ V_{IN} ≦ –33 V		10	50	
Load Regulation	REG_L	T_j = 25 °C, 5 mA ≦ I_O ≦ 300 mA		65	300	mV
		T_j = 25 °C, 5 mA ≦ I_O ≦ 200 mA		43		
Quiescent Current	I_{BIAS}	T_j = 25 °C		5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	–21 V ≦ V_{IN} ≦ –33 V			0.5	mA
		5 mA ≦ I_O ≦ 200 mA			0.4	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		170	440	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, f = 120 Hz, –22 V ≦ V_{IN} ≦ –32 V, I_O = 50 mA	50	56		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		1.1		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = –33 V		150		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.6		mV/°C

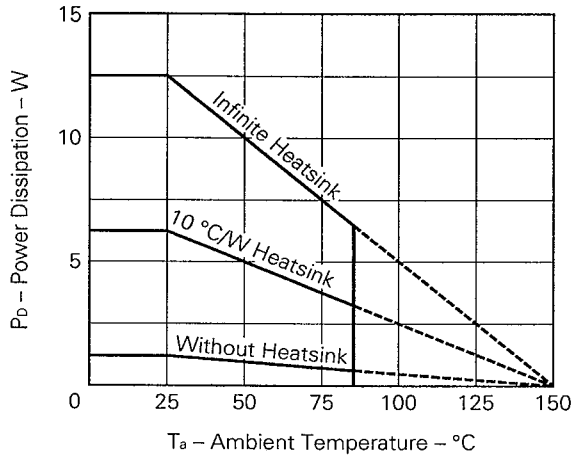
ELECTRICAL CHARACTERISTICS μPC79N24

(V_{IN} = –33 V, I_O = 200 mA, 0 °C ≦ T_j ≦ +125 °C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF)

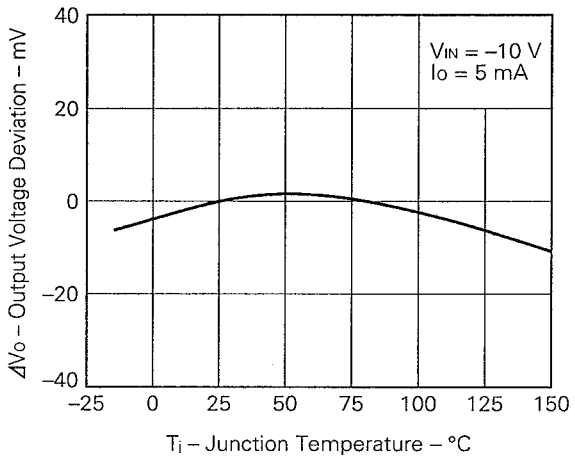
ITEM	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_O	T_j = 25 °C	–23.0	–24	–25.0	V
		–27 V ≦ V_{IN} ≦ –38 V, 5 mA ≦ I_O ≦ 200 mA	–22.8		–25.2	
Line Regulation	REG_{IN}	T_j = 25 °C, –27 V ≦ V_{IN} ≦ –38 V		25	80	mV
		T_j = 25 °C, –30 V ≦ V_{IN} ≦ –36 V		15	50	
Load Regulation	REG_L	T_j = 25 °C, 5 mA ≦ I_O ≦ 300 mA		80	360	mV
		T_j = 25 °C, 5 mA ≦ I_O ≦ 200 mA		53		
Quiescent Current	I_{BIAS}	T_j = 25 °C		5.1	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	–27 V ≦ V_{IN} ≦ –38 V			0.5	mA
		5 mA ≦ I_O ≦ 200 mA			0.4	
Output Noise Voltage	V_n	T_j = 25 °C, 10 Hz ≦ f ≦ 100 kHz		230	600	$\mu V_{r.m.s.}$
Ripple Rejection	R·R	T_j = 25 °C, f = 120 Hz, –28 V ≦ V_{IN} ≦ –38 V, I_O = 50 mA	46	53		dB
Dropout Voltage	V_{DIF}	T_j = 25 °C		1.1		V
Short Circuit Current	$I_{O\ short}$	T_j = 25 °C, V_{IN} = –38 V		70		mA
Peak Output Current	$I_{O\ peak}$	T_j = 25 °C	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.8		mV/°C

TYPICAL CHARACTERISTICS (T_a = 25 °C)

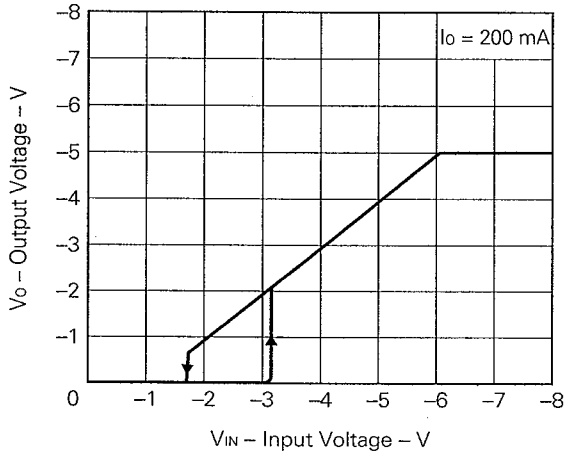
P_d – T_a



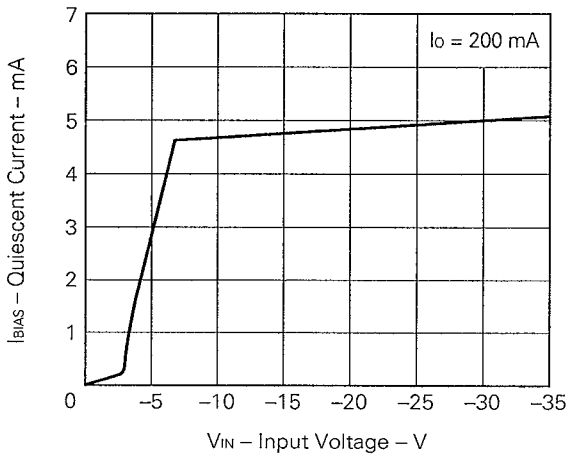
ΔVo – T_j (μPC79N05H)



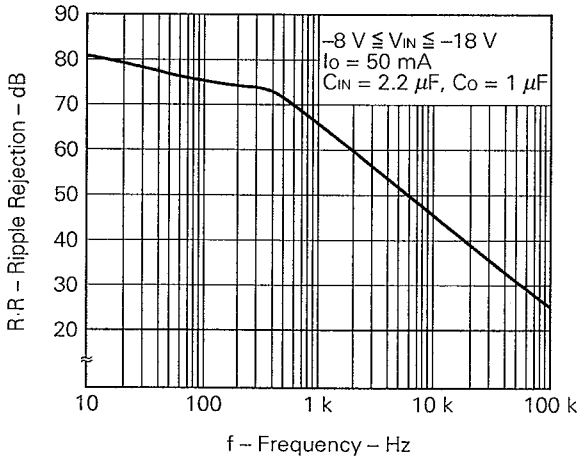
Vo – V_{IN} (μPC79N05H)



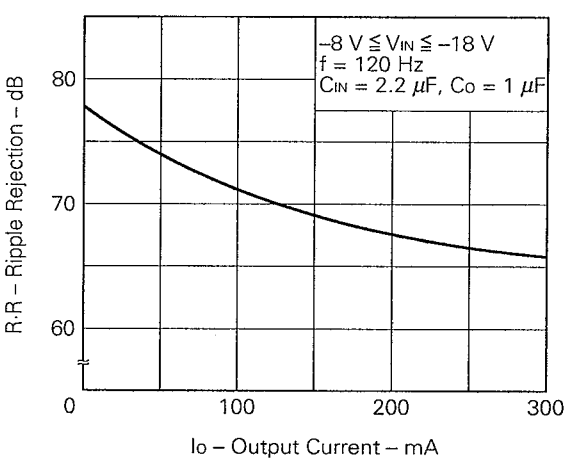
I_{BIAS} – V_{IN} (μPC79N05H)



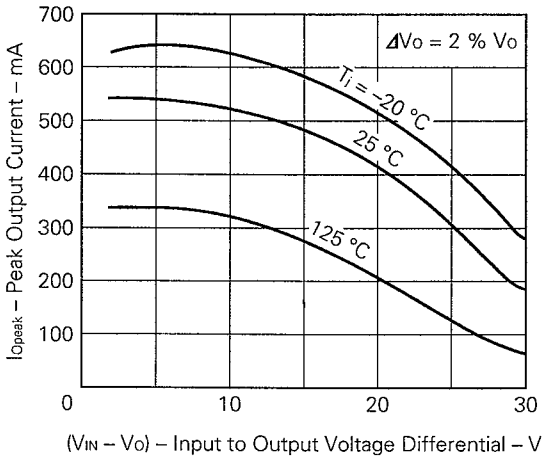
R·R – f (μPC79N05H)



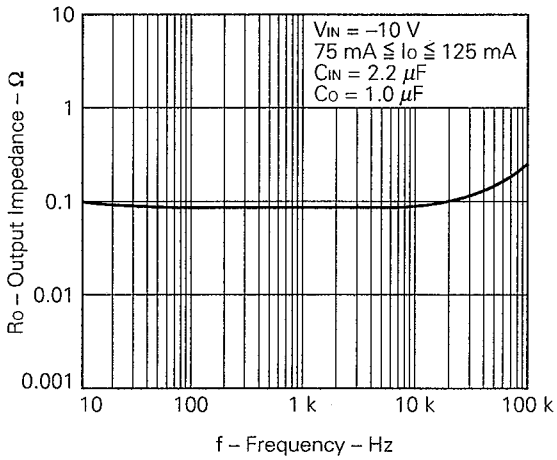
R·R – Io (μPC79N05H)



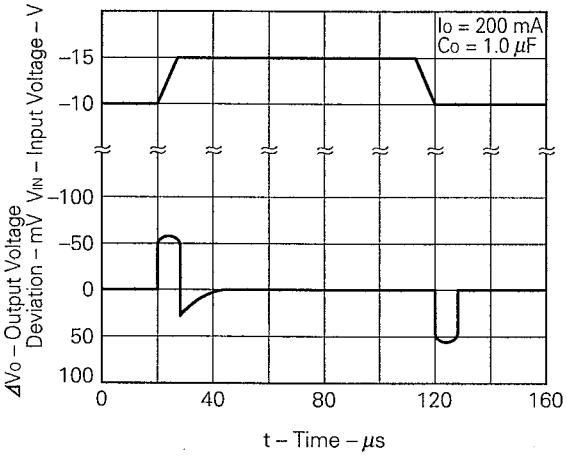
I_{Opeak} – (V_{IN} – V_O)



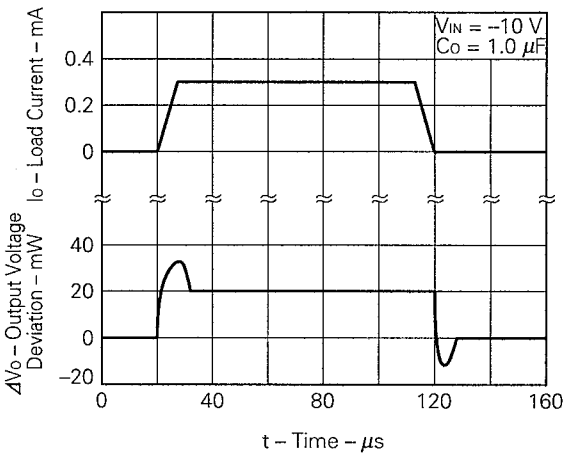
R_O – f (μPC79N05H)



LINE TRANSIENT RESPONSE

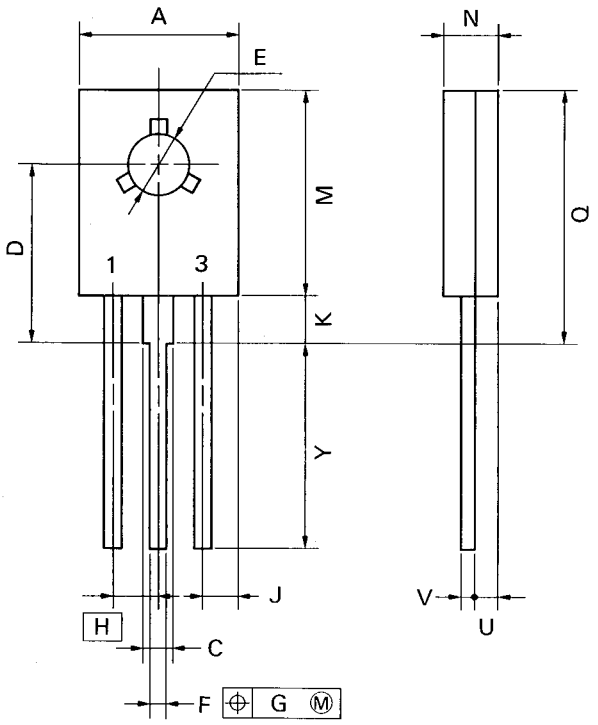


LOAD TRANSIENT RESPONSE



PACKAGE DIMENSIONS

3 PIN PLASTIC SIP (TO-126)



P3HP-230B

NOTE

Each lead centerline is located within 0.23 mm (0.009 inch) of its true position (T.P.) at maximum material condition.

ITEM	MILLIMETERS	INCHES
A	8.5 MAX.	0.335 MAX.
C	1.1 MIN.	0.043 MIN.
D	$9.7^{\pm 0.3}$	$0.382^{\pm 0.012}$
E	$\phi 3.2^{\pm 0.1}$	$\phi 0.126^{\pm 0.004}$
F	$0.80^{\pm 0.1}$	$0.031^{+0.005}_{-0.004}$
G	0.23	0.009
H	2.3	0.091
J	1.95 MAX.	0.077 MAX.
K	2.3 MIN.	0.09 MIN.
M	11.5 MAX.	0.453 MAX.
N	$2.7^{\pm 0.2}$	$0.106^{+0.009}_{-0.008}$
Q	14.5 MAX.	0.571 MAX.
U	1.7 MAX.	0.067 MAX.
V	$0.55^{\pm 0.1}$	$0.022^{+0.004}_{-0.005}$
Y	$13.5^{\pm 0.7}$	$0.531^{+0.029}_{-0.028}$

RECOMMENDED SOLDERING CONDITIONS

The following conditions (see table below) must be met when soldering this product.
Please consult with our sales offices in case other soldering process is used, or in case soldering is done under different conditions.

TYPES OF THROUGH HOLE MOUNT DEVICE

μPC79N00H Series

Soldering process	Soldering conditions	Symbol
Wave soldering	Solder temperature: 260 °C or below. Flow time: 10 seconds or below.	

Reference

Application note name	No.
Quality control of NEC semiconductor devices	TEM-1202
Quality control guide of semiconductor devices	MEI-1202
Assembly manual of semiconductor devices	IEI-1207
NEC semiconductor device reliability/quality control system	IEI-1212

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Application examples recommended by NEC Corporation.

Standard: Computer, Office equipment, Communication equipment, Test and Measurement equipment, Machine tools, Industrial robots, Audio and Visual equipment, Other consumer products, etc.

Special: Automotive and Transportation equipment, Traffic control systems, Antidisaster systems, Anticrime systems, etc.

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