

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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BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC79Nxx Series

THREE TERMINAL NEGATIVE VOLTAGE REGULATOR

<R> DESCRIPTION

The μ PC79Nxx Series are three-terminal negative output voltage stabilization power supply circuit of fixed output voltage. It regulates non-stabilized DC input voltage to output stabilized fixed voltage.

The six types of voltage value are -5 V, -8 V, -12 V, -15 V, -18 V and -24 V, and they can be respectively used as power supply circuit with maximum current capacity 300 mA.

FEATURES

- Output current : 300 mA
- On-chip some protection circuits
(over current protection, thermal shut down)

- <R> • TO-126 package

<R> ORDERING INFORMATION

Part Number	Package	Output Voltage	Marking	Package Type
μ PC79N05H	3-PIN PLASTIC SIP (TO-126) (MP-5)	-5 V	C79N05	Packed in envelope
μ PC79N05H-AZ ^{Note}	3-PIN PLASTIC SIP (TO-126) (MP-5)	-5 V	C79N05	Packed in envelope
μ PC79N08H	3-PIN PLASTIC SIP (TO-126) (MP-5)	-8 V	C79N08	Packed in envelope
μ PC79N08H-AZ ^{Note}	3-PIN PLASTIC SIP (TO-126) (MP-5)	-8 V	C79N08	Packed in envelope
μ PC79N12H	3-PIN PLASTIC SIP (TO-126) (MP-5)	-12 V	C79N12	Packed in envelope
μ PC79N12H-AZ ^{Note}	3-PIN PLASTIC SIP (TO-126) (MP-5)	-12 V	C79N12	Packed in envelope
μ PC79N15H	3-PIN PLASTIC SIP (TO-126) (MP-5)	-15 V	C79N15	Packed in envelope
μ PC79N15H-AZ ^{Note}	3-PIN PLASTIC SIP (TO-126) (MP-5)	-15 V	C79N15	Packed in envelope
μ PC79N18H	3-PIN PLASTIC SIP (TO-126) (MP-5)	-18 V	C79N18	Packed in envelope
μ PC79N18H-AZ ^{Note}	3-PIN PLASTIC SIP (TO-126) (MP-5)	-18 V	C79N18	Packed in envelope
μ PC79N24H	3-PIN PLASTIC SIP (TO-126) (MP-5)	-24 V	C79N24	Packed in envelope
μ PC79N24H-AZ ^{Note}	3-PIN PLASTIC SIP (TO-126) (MP-5)	-24 V	C79N24	Packed in envelope

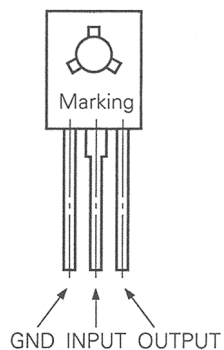
Note Pb-free (This product does not contain Pb in external electrode).

Remark Output voltage -5 V product is written in the text as μ PC79N05.
It applies to other output voltage products as same.

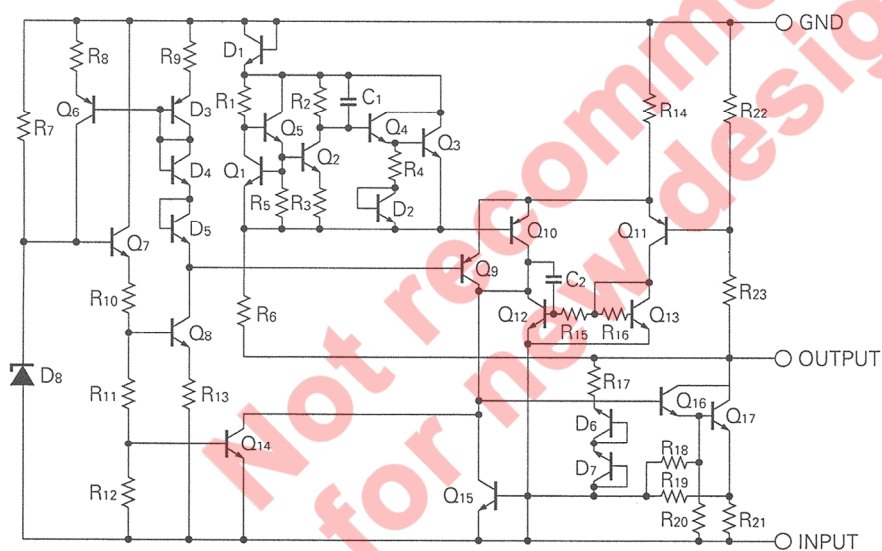
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PIN CONFIGURATION (Marking Side)

3-PIN PLASTIC SIP (TO-126) (MP-5)



EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

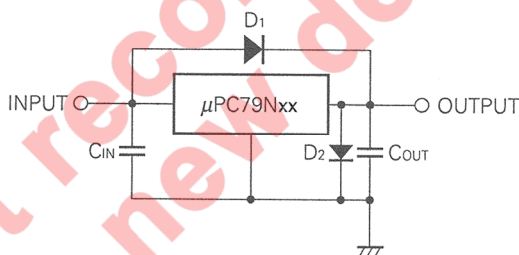
Parameter	Symbol	Rating	Unit
Input Voltage	V _{IN}	-35/-40 ^{Note1}	V
Internal Power Dissipation (T _C = 25°C)	P _T	12.5 ^{Note2}	W
Operating Ambient Temperature	T _A	-20 to +85	°C
Operating Junction Temperature	T _J	-20 to +150	°C
Storage Temperature	T _{stg}	-55 to +150	°C
Thermal Resistance (junction to case)	R _{th(J-C)}	10	°C/W
Thermal Resistance (junction to ambient)	R _{th(J-A)}	110	°C/W

Notes 1. μPC79N05, 08, 12, 15, 18 : -35 V, μPC79N24 : -40 V

2. Internally limited. When operating junction temperature rise above 150°C, the internal protection circuit shutdown output voltage.

<R> **Caution** Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter. That is, the absolute maximum ratings are rated values at which the product is on the verge of suffering physical damage, and therefore the product must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

<R> **TYPICAL CONNECTION**



C_{IN} : Required if regulator is located an appreciable distance from power supply filter (More than 2.2 μF).

C_{OUT}: Connect it within 2 cm from OUTPUT pin and GND pin (More than 1 μF).

D₁ : Needed for V_{IN} > V_O.

D₂ : Needed for V_O > GND.

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Type Number	MIN.	TYP.	MAX.	Unit
Input Voltage	V _{IN}	μPC79N05	-7	-10	-25	V
		μPC79N08	-10.5	-14	-25	V
		μPC79N12	-14.5	-19	-30	V
		μPC79N15	-17.5	-23	-30	V
		μPC79N18	-21	-27	-33	V
		μPC79N24	-27	-33	-38	V
Output Current	I _O	All	5		300	mA
Operating Ambient Temperature	T _A	All	-20		+85	°C
Operating Junction Temperature	T _J	All	-20	80	+125	°C

ELECTRICAL CHARACTERISTICS

μ PC79N05 ($V_{IN} = -10\text{ V}$, $I_O = 200\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-4.8	-5.0	-5.2	V
		$-7\text{ V} \leq V_{IN} \leq -25\text{ V}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$	-4.75		-5.25	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-7\text{ V} \leq V_{IN} \leq -25\text{ V}$		7	50	mV
		$T_J = 25^\circ\text{C}$, $-8\text{ V} \leq V_{IN} \leq -18\text{ V}$		4	30	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 300\text{ mA}$		25	100	mV
		$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$		17		mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		4.7	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-8\text{ V} \leq V_{IN} \leq -25\text{ V}$			0.5	mA
		$5\text{ mA} \leq I_O \leq 200\text{ mA}$			0.4	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		45	200	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-8\text{ V} \leq V_{IN} \leq -18\text{ V}$, $f = 120\text{ Hz}$, $I_O = 50\text{ mA}$	54	74		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		1.1		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -25\text{ V}$		310		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.1		mV/ $^\circ\text{C}$

μ PC79N08 ($V_{IN} = -14\text{ V}$, $I_O = 200\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-7.7	-8.0	-8.3	V
		$-10.5\text{ V} \leq V_{IN} \leq -25\text{ V}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$	-7.6		-8.4	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-10.5\text{ V} \leq V_{IN} \leq -25\text{ V}$		10	80	mV
		$T_J = 25^\circ\text{C}$, $-11\text{ V} \leq V_{IN} \leq -21\text{ V}$		5	50	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 300\text{ mA}$		30	160	mV
		$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$		20		mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		4.8	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-10.5\text{ V} \leq V_{IN} \leq -25\text{ V}$			0.5	mA
		$5\text{ mA} \leq I_O \leq 200\text{ mA}$			0.4	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		72	220	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-11.5\text{ V} \leq V_{IN} \leq -21.5\text{ V}$, $f = 120\text{ Hz}$, $I_O = 50\text{ mA}$	54	69		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		1.1		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -25\text{ V}$		310		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.2		mV/ $^\circ\text{C}$

μ PC79N12 ($V_{IN} = -19\text{ V}$, $I_O = 200\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-11.5	-12.0	-12.5	V
		$-14.5\text{ V} \leq V_{IN} \leq -30\text{ V}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$	-11.4		-12.6	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-14.5\text{ V} \leq V_{IN} \leq -30\text{ V}$		12	80	mV
		$T_J = 25^\circ\text{C}$, $-15\text{ V} \leq V_{IN} \leq -25\text{ V}$		6	50	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 300\text{ mA}$		45	240	mV
		$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$		30		mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-14.5\text{ V} \leq V_{IN} \leq -30\text{ V}$			0.5	mA
		$5\text{ mA} \leq I_O \leq 200\text{ mA}$			0.4	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		110	280	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-15\text{ V} \leq V_{IN} \leq -25\text{ V}$, $f = 120\text{ Hz}$, $I_O = 50\text{ mA}$	54	62		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		1.1		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -30\text{ V}$		220		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.4		mV/ $^\circ\text{C}$

μ PC79N15 ($V_{IN} = -23\text{ V}$, $I_O = 200\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-14.4	-15.0	-15.6	V
		$-17.5\text{ V} \leq V_{IN} \leq -30\text{ V}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$	-14.25		-15.75	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-17.5\text{ V} \leq V_{IN} \leq -30\text{ V}$		15	80	mV
		$T_J = 25^\circ\text{C}$, $-18\text{ V} \leq V_{IN} \leq -28\text{ V}$		8	50	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 300\text{ mA}$		55	240	mV
		$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$		36		mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-17.5\text{ V} \leq V_{IN} \leq -30\text{ V}$			0.5	mA
		$5\text{ mA} \leq I_O \leq 200\text{ mA}$			0.4	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		140	360	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-18.5\text{ V} \leq V_{IN} \leq -28.5\text{ V}$, $f = 120\text{ Hz}$, $I_O = 50\text{ mA}$	52	59		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		1.1		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -30\text{ V}$		210		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.4		mV/ $^\circ\text{C}$

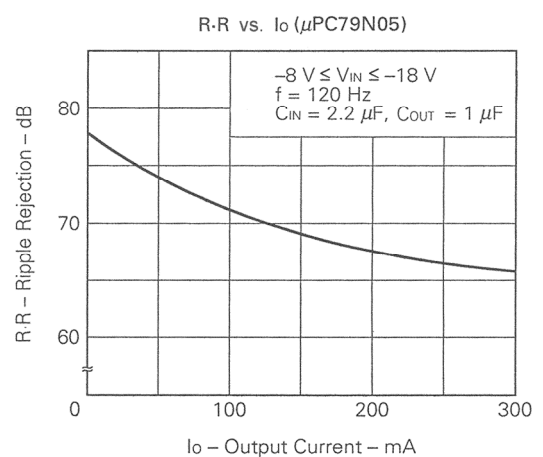
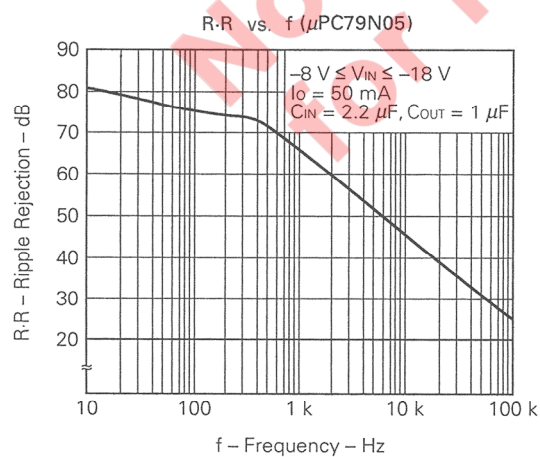
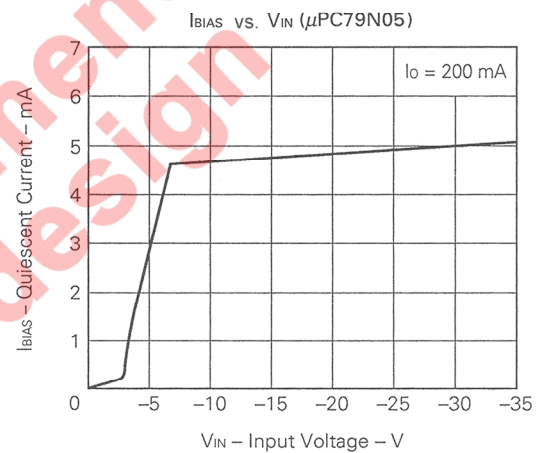
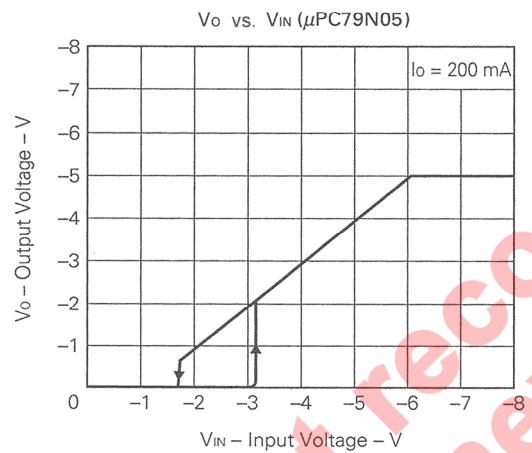
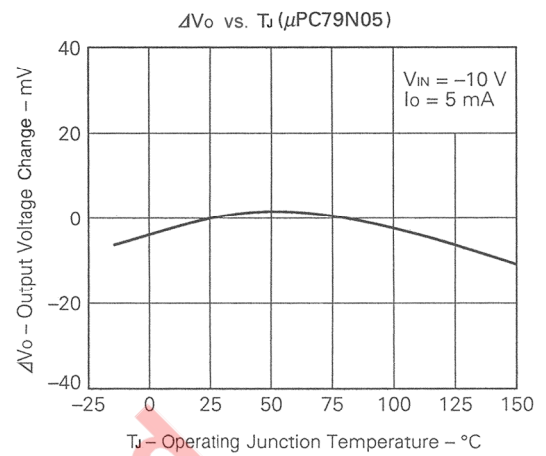
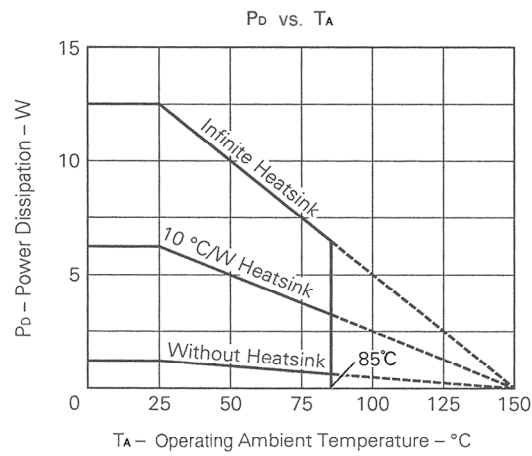
μPC79N18 ($V_{IN} = -27\text{ V}$, $I_O = 200\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, unless otherwise specified)

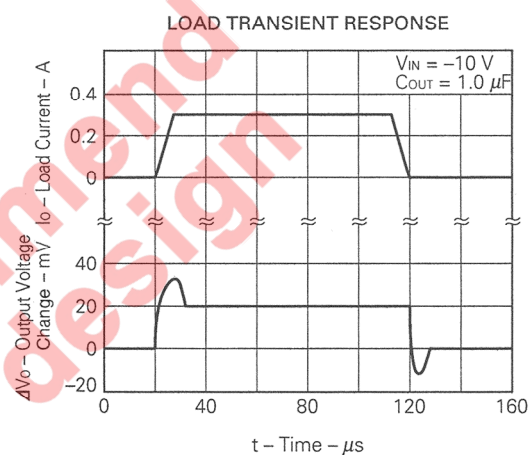
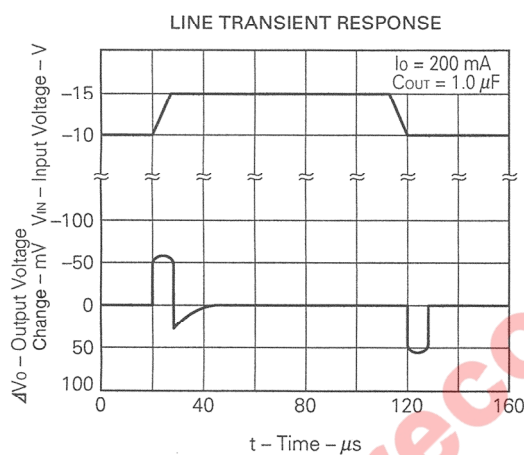
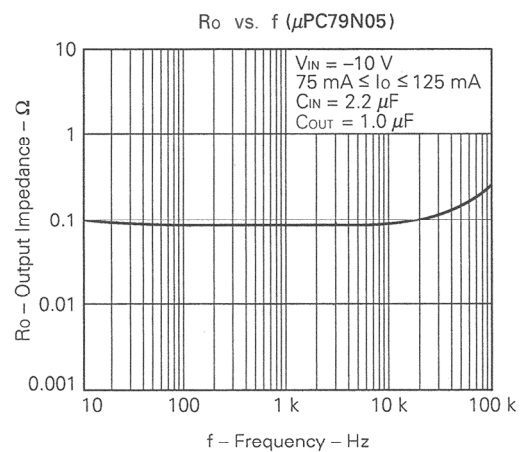
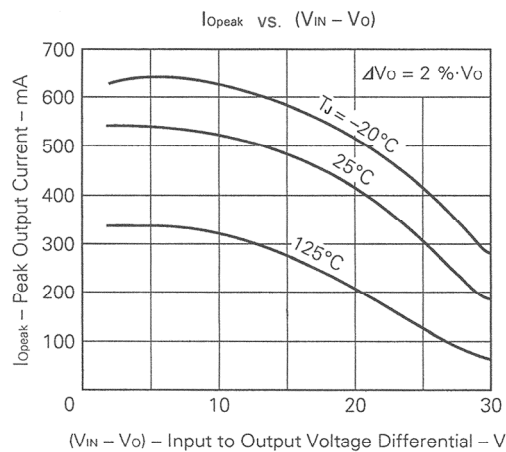
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-17.3	-18.0	-18.7	V
		$-21\text{ V} \leq V_{IN} \leq -33\text{ V}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$	-17.1		-18.9	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-21\text{ V} \leq V_{IN} \leq -33\text{ V}$		18	80	mV
		$T_J = 25^\circ\text{C}$, $-24\text{ V} \leq V_{IN} \leq -33\text{ V}$		10	50	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 300\text{ mA}$		65	300	mV
		$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$		43		mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-21\text{ V} \leq V_{IN} \leq -33\text{ V}$			0.5	mA
		$5\text{ mA} \leq I_O \leq 200\text{ mA}$			0.4	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		170	440	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-22\text{ V} \leq V_{IN} \leq -32\text{ V}$, $f = 120\text{ Hz}$, $I_O = 50\text{ mA}$	50	56		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		1.1		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -33\text{ V}$		150		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.6		mV/ $^\circ\text{C}$

μPC79N24 ($V_{IN} = -33\text{ V}$, $I_O = 200\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-23.0	-24.0	-25.0	V
		$-27\text{ V} \leq V_{IN} \leq -38\text{ V}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$	-22.8		-25.2	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-27\text{ V} \leq V_{IN} \leq -38\text{ V}$		25	80	mV
		$T_J = 25^\circ\text{C}$, $-30\text{ V} \leq V_{IN} \leq -36\text{ V}$		15	50	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 300\text{ mA}$		80	360	mV
		$T_J = 25^\circ\text{C}$, $5\text{ mA} \leq I_O \leq 200\text{ mA}$		53		mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		5.1	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-27\text{ V} \leq V_{IN} \leq -38\text{ V}$			0.5	mA
		$5\text{ mA} \leq I_O \leq 200\text{ mA}$			0.4	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		230	600	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-28\text{ V} \leq V_{IN} \leq -38\text{ V}$, $f = 120\text{ Hz}$, $I_O = 50\text{ mA}$	46	53		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		1.1		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -38\text{ V}$		70		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	390	540	640	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.8		mV/ $^\circ\text{C}$

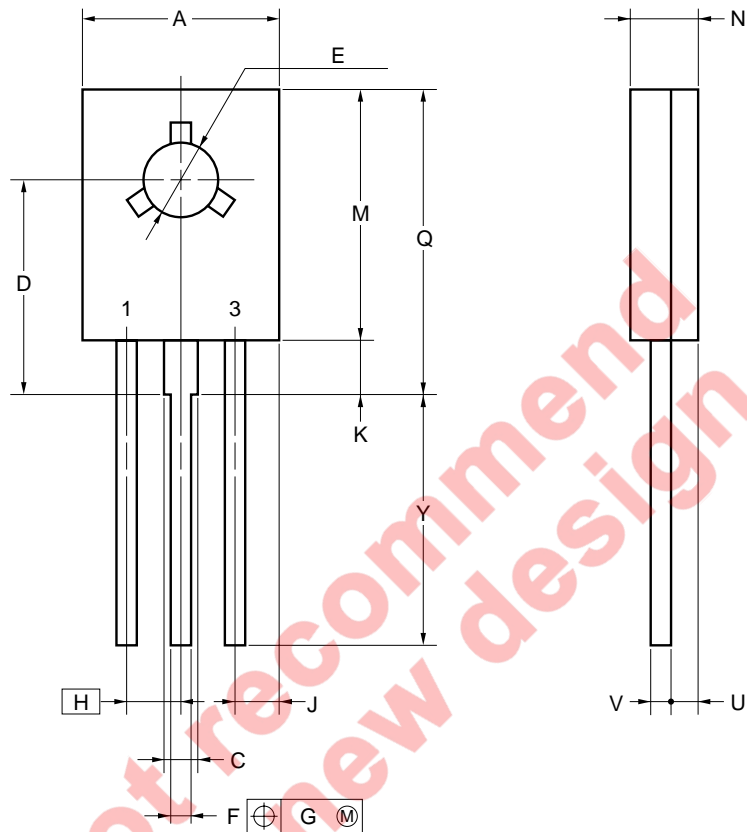
TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)





<R> PACKAGE DRAWING (Unit: mm)

3-PIN PLASTIC SIP (TO-126)



NOTE

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

ITEM	MILLIMETERS
A	8.5 MAX.
C	1.1 MIN.
D	9.7±0.3
E	φ 3.2±0.1
F	0.80±0.1
G	0.23
H	2.3
J	1.95 MAX.
K	2.3 MIN.
M	11.5 MAX.
N	2.7±0.2
Q	14.5 MAX.
U	1.7 MAX.
V	0.55±0.1
Y	13.5±0.7

P3HP-230B-2

<R> **RECOMMENDED SOLDERING CONDITIONS**

The μPC79Nxx Series should be soldered and mounted under the following recommended conditions.

For soldering methods and conditions other than those recommended below, contact an NEC Electronics sales representative.

For technical information, see the following website.

Semiconductor Device Mount Manual (<http://www.necel.com/pkg/en/mount/index.html>)

Through-hole devices

μPC79N05H, 79N08H, 79N12H, 79N15H, 79N18H, 79N24H,

μPC79N05H-AZ, 79N08H-AZ, 79N12H-AZ, 79N15H-AZ, 79N18H-AZ, 79N24H-AZ : 3-PIN PLASTIC SIP (TO-126) (MP-5)

Process	Conditions	Symbol
Wave soldering (only to leads)	Solder temperature: 260°C or below, Flow time: 10 seconds or less, Maximum number of flow processes: 1 time.	WS60-00-1
Partial heating method	Pin temperature: 350°C or below, Heat time: 3 seconds or less (Per each pin).	P350

Caution For through-hole device, the wave soldering process must be applied only to leads, and make sure that the package body does not get jet soldered.

<R> **REFERENCE DOCUMENTS**

Document Name	Document No.
Usage of Three-Terminal Regulators User's Manual	G12702E
Semiconductor Device Mount Manual	http://www.necel.com/pkg/en/mount/index.html
Review of Quality and Reliability Handbook Information	C12769E

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