DATA SHEET

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC79Nxx Series

THREE TERMINAL NEGATIVE VOLTAGE REGULATOR

<R> **DESCRIPTION**

The μPC79Nxx 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
μPC79N05H	3-PIN PLASTIC SIP (TO-126) (MP-5)	–5 V	C79N05	Packed in envelope
μPC79N05H-AZ Note	3-PIN PLASTIC SIP (TO-126) (MP-5)	–5 V	C79N05	Packed in envelope
μPC79N08H	3-PIN PLASTIC SIP (TO-126) (MP-5)	–8 V	C79N08	Packed in envelope
μPC79N08H-AZ Note	3-PIN PLASTIC SIP (TO-126) (MP-5)	–8 V	C79N08	Packed in envelope
μPC79N12H	3-PIN PLASTIC SIP (TO-126) (MP-5)	–12 V	C79N12	Packed in envelope
μPC79N12H-AZ Note	3-PIN PLASTIC SIP (TO-126) (MP-5)	–12 V	C79N12	Packed in envelope
μPC79N15H	3-PIN PLASTIC SIP (TO-126) (MP-5)	–15 V	C79N15	Packed in envelope
μPC79N15H-AZ Note	3-PIN PLASTIC SIP (TO-126) (MP-5)	–15 V	C79N15	Packed in envelope
μPC79N18H	3-PIN PLASTIC SIP (TO-126) (MP-5)	–18 V	C79N18	Packed in envelope
μPC79N18H-AZ Note	3-PIN PLASTIC SIP (TO-126) (MP-5)	–18 V	C79N18	Packed in envelope
μPC79N24H	3-PIN PLASTIC SIP (TO-126) (MP-5)	–24 V	C79N24	Packed in envelope
μPC79N24H-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 μPC79N05.
It applies to other output voltage products as same.

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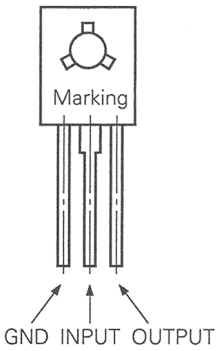
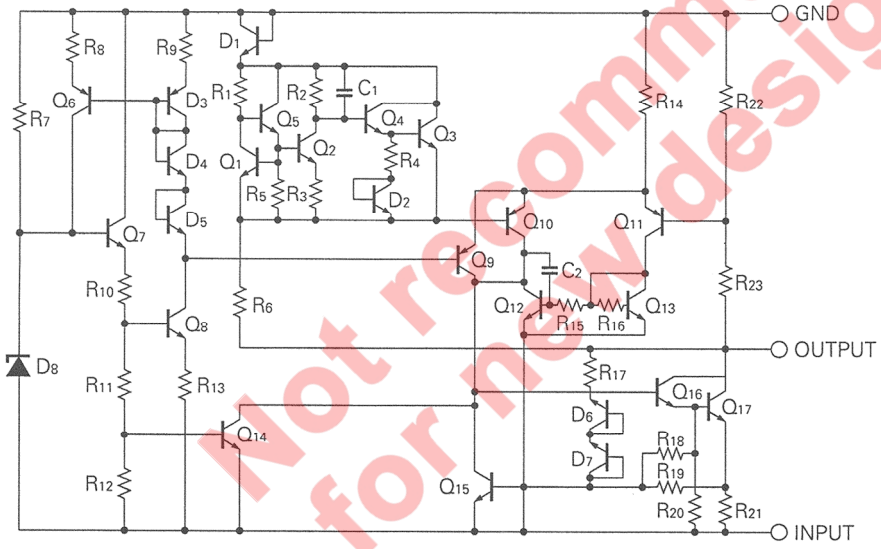
The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PIN CONFIGURATION (Marking Side)

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



EQUIVALENT CIRCUIT



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

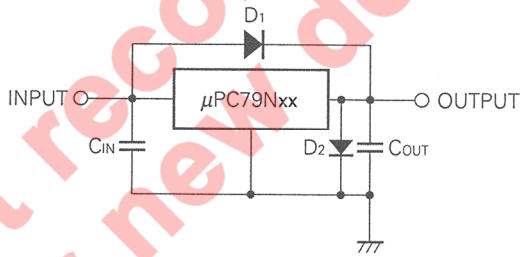
Parameter	Symbol	Rating	Unit
Input Voltage	V_{IN}	–35/–40 Note1	V
Internal Power Dissipation (T_C = 25°C)	P_T	12.5 Note2	W
Operating Ambient Temperature	T_A	–20 to +85	°C
Operating Junction Temperature	T_J	–20 to +150	°C
Storage Temperature	T_{stg}	–55 to +150	°C
Thermal Resistance (junction to case)	$R_{th(J-C)}$	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).

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

D_2 : 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
<R> Operating Ambient Temperature	T_A	All	–20		+85	°C
Operating Junction Temperature	T_J	All	–20	80	+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, unless otherwise specified)

Parameter	Symbol	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	V
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	mV
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		mV
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	mA
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, –8 V ≤ V_{IN} ≤ –18 V, f = 120 Hz, I_O = 50 mA	54	74		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		1.1		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –25 V		310		mA
Peak Output Current	I_{Opeak}	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

μPC79N08 (V_{IN} = –14 V, I_O = 200 mA, 0°C ≤ T_J ≤ +125°C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, unless otherwise specified)

Parameter	Symbol	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	V
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	mV
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		mV
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	mA
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_{Oshort}	T_J = 25°C, V_{IN} = –25 V		310		mA
Peak Output Current	I_{Opeak}	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

μPC79N12 (V_{IN} = –19 V, I_O = 200 mA, 0°C ≤ T_J ≤ +125°C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	T_J = 25°C	–11.5	–12.0	–12.5	V
		–14.5 V ≤ V_{IN} ≤ –30 V, 5 mA ≤ I_O ≤ 200 mA	–11.4		–12.6	V
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	mV
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		mV
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	mA
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, –15 V ≤ V_{IN} ≤ –25 V, f = 120 Hz, I_O = 50 mA	54	62		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		1.1		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –30 V		220		mA
Peak Output Current	I_{Opeak}	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

μPC79N15 (V_{IN} = –23 V, I_O = 200 mA, 0°C ≤ T_J ≤ +125°C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, unless otherwise specified)

Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	T_J = 25°C	–14.4	–15.0	–15.6	V
		–17.5 V ≤ V_{IN} ≤ –30 V, 5 mA ≤ I_O ≤ 200 mA	–14.25		–15.75	V
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	mV
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		mV
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	mA
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, –18.5 V ≤ V_{IN} ≤ –28.5 V, f = 120 Hz, I_O = 50 mA	52	59		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		1.1		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –30 V		210		mA
Peak Output Current	I_{Opeak}	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

μPC79N18 (V_{IN} = –27 V, I_O = 200 mA, 0°C ≤ T_J ≤ +125°C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, unless otherwise specified)

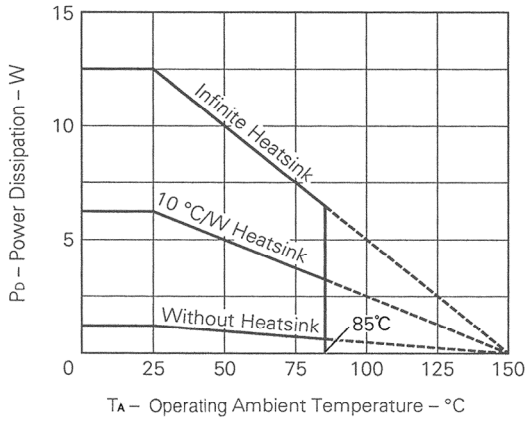
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	T_J = 25°C	–17.3	–18.0	–18.7	V
		–21 V ≤ V_{IN} ≤ –33 V, 5 mA ≤ I_O ≤ 200 mA	–17.1		–18.9	V
Line Regulation	REG_{IN}	T_J = 25°C, –21 V ≤ V_{IN} ≤ –33 V		18	80	mV
		T_J = 25°C, –24 V ≤ V_{IN} ≤ –33 V		10	50	mV
Load Regulation	REG_L	T_J = 25°C, 5 mA ≤ I_O ≤ 300 mA		65	300	mV
		T_J = 25°C, 5 mA ≤ I_O ≤ 200 mA		43		mV
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	mA
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, –22 V ≤ V_{IN} ≤ –32 V, f = 120 Hz, I_O = 50 mA	50	56		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		1.1		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –33 V		150		mA
Peak Output Current	I_{Opeak}	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

μPC79N24 (V_{IN} = –33 V, I_O = 200 mA, 0°C ≤ T_J ≤ +125°C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, unless otherwise specified)

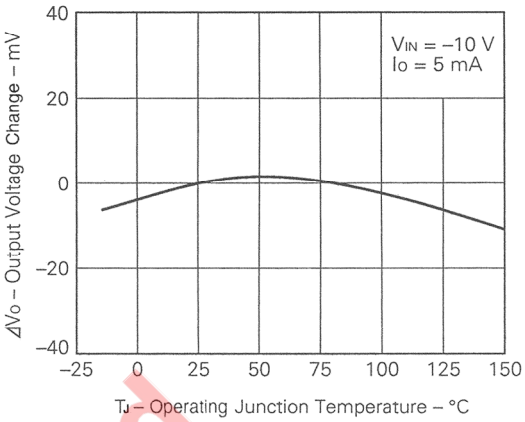
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	T_J = 25°C	–23.0	–24.0	–25.0	V
		–27 V ≤ V_{IN} ≤ –38 V, 5 mA ≤ I_O ≤ 200 mA	–22.8		–25.2	V
Line Regulation	REG_{IN}	T_J = 25°C, –27 V ≤ V_{IN} ≤ –38 V		25	80	mV
		T_J = 25°C, –30 V ≤ V_{IN} ≤ –36 V		15	50	mV
Load Regulation	REG_L	T_J = 25°C, 5 mA ≤ I_O ≤ 300 mA		80	360	mV
		T_J = 25°C, 5 mA ≤ I_O ≤ 200 mA		53		mV
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	mA
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, –28 V ≤ V_{IN} ≤ –38 V, f = 120 Hz, I_O = 50 mA	46	53		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		1.1		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –38 V		70		mA
Peak Output Current	I_{Opeak}	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_J = 25°C, unless otherwise specified)

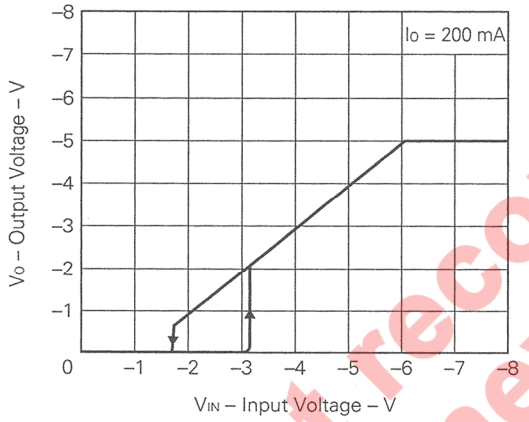
P_D vs. T_A



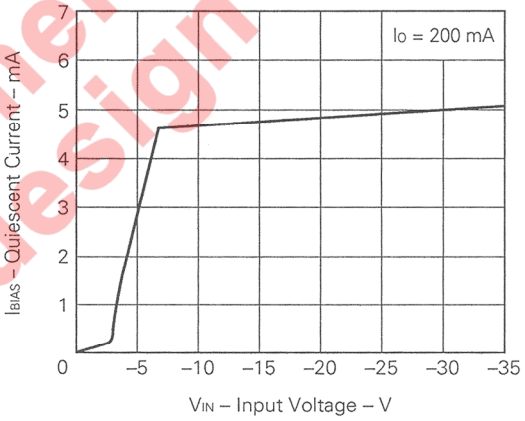
ΔV_O vs. T_J (μPC79N05)



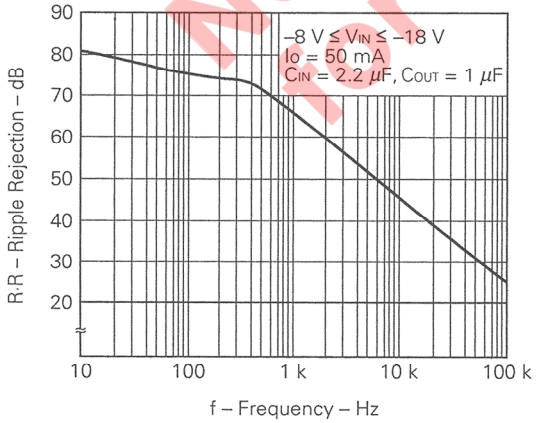
V_O vs. V_{IN} (μPC79N05)



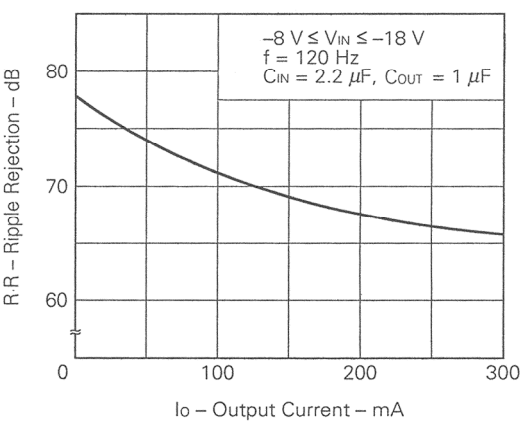
I_{BIAS} vs. V_{IN} (μPC79N05)



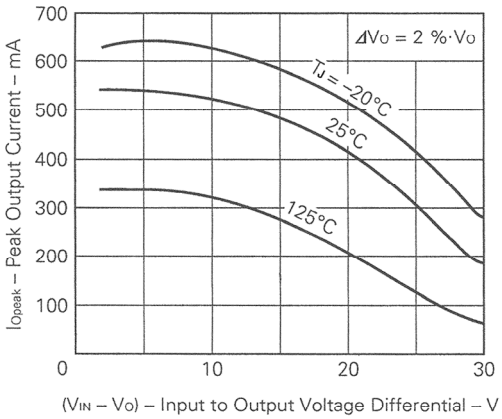
R·R vs. f (μPC79N05)



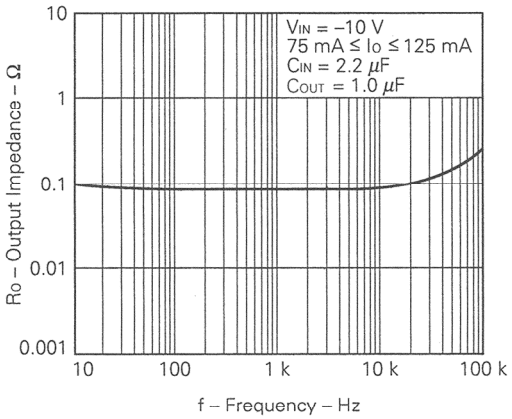
R·R vs. I_O (μPC79N05)



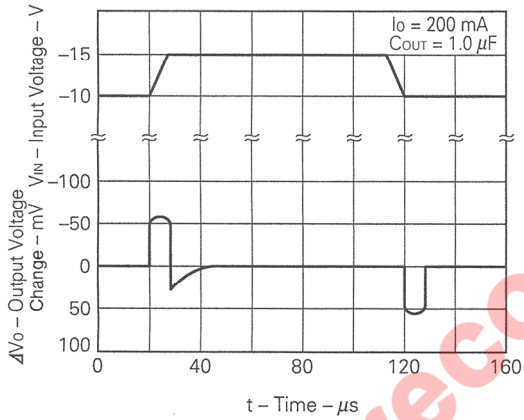
I_{opeak} vs. $(V_{IN} - V_O)$



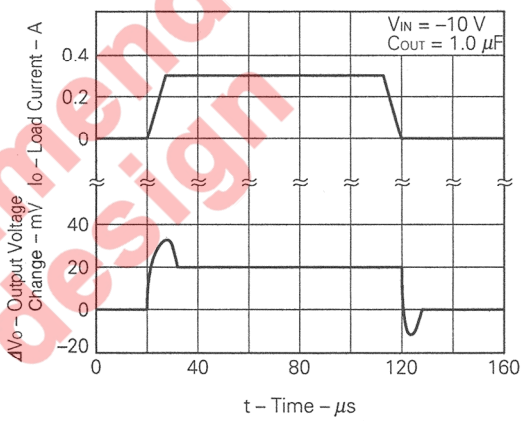
R_O vs. f (μPC79N05)



LINE TRANSIENT RESPONSE

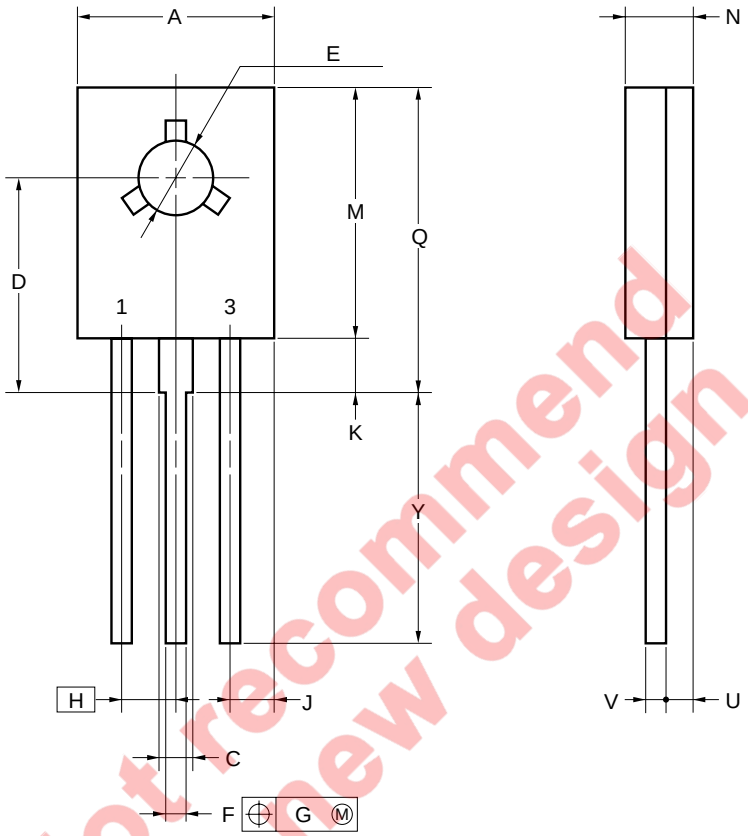


LOAD TRANSIENT RESPONSE



<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	φ3.2±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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