DATA SHEET

NEC

BIPOLAR ANALOG INTEGRATED CIRCUIT

μPC79Lxx Series

THREE TERMINAL NEGATIVE VOLTAGE REGULATOR

<R> **DESCRIPTION**

The μPC79Lxx 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 four types of voltage value are −5 V, −8 V, −12 V, and −15 V, and they can be respectively used as power supply circuit with maximum current capacity 100 mA.

<R> **FEATURES**

- Output current : 100 mA
- On-chip some protection circuits
  (over current protection, thermal shut down)
- Low noise : 31 μV r.m.s. (μPC79L05)
- High ripple rejection : 85 dB (μPC79L05)
- TO-92 package

<R> **ORDERING INFORMATION**

Part Number	Package	Output Voltage	Marking	Package Type
μPC79L05J	3-PIN PLASTIC SIP (TO-92)	−5 V	79L05	Packed in envelope
μPC79L05J-A Note	3-PIN PLASTIC SIP (TO-92)	−5 V	79L05	Packed in envelope
μPC79L05J-T	3-PIN PLASTIC SIP (TO-92)	−5 V	79L05	Cube type taping 2500 pcs/cube
μPC79L05J-T-A Note	3-PIN PLASTIC SIP (TO-92)	−5 V	79L05	Cube type taping 2500 pcs/cube
μPC79L08J	3-PIN PLASTIC SIP (TO-92)	−8 V	79L08	Packed in envelope
μPC79L08J-A Note	3-PIN PLASTIC SIP (TO-92)	−8 V	79L08	Packed in envelope
μPC79L08J-T	3-PIN PLASTIC SIP (TO-92)	−8 V	79L08	Cube type taping 2500 pcs/cube
μPC79L08J-T-A Note	3-PIN PLASTIC SIP (TO-92)	−8 V	79L08	Cube type taping 2500 pcs/cube
μPC79L12J	3-PIN PLASTIC SIP (TO-92)	−12 V	79L12	Packed in envelope
μPC79L12J-A Note	3-PIN PLASTIC SIP (TO-92)	−12 V	79L12	Packed in envelope
μPC79L12J-T	3-PIN PLASTIC SIP (TO-92)	−12 V	79L12	Cube type taping 2500 pcs/cube
μPC79L12J-T-A Note	3-PIN PLASTIC SIP (TO-92)	−12 V	79L12	Cube type taping 2500 pcs/cube
μPC79L15J	3-PIN PLASTIC SIP (TO-92)	−15 V	79L15	Packed in envelope
μPC79L15J-A Note	3-PIN PLASTIC SIP (TO-92)	−15 V	79L15	Packed in envelope
μPC79L15J-T	3-PIN PLASTIC SIP (TO-92)	−15 V	79L15	Cube type taping 2500 pcs/cube
μPC79L15J-T-A Note	3-PIN PLASTIC SIP (TO-92)	−15 V	79L15	Cube type taping 2500 pcs/cube

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

Remark Output voltage −5 V product is written in the text as μPC79L05.
It applies to other output voltage products as same.

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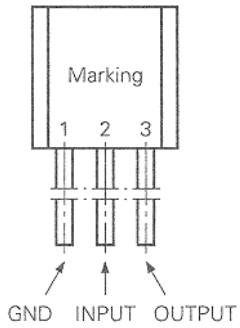
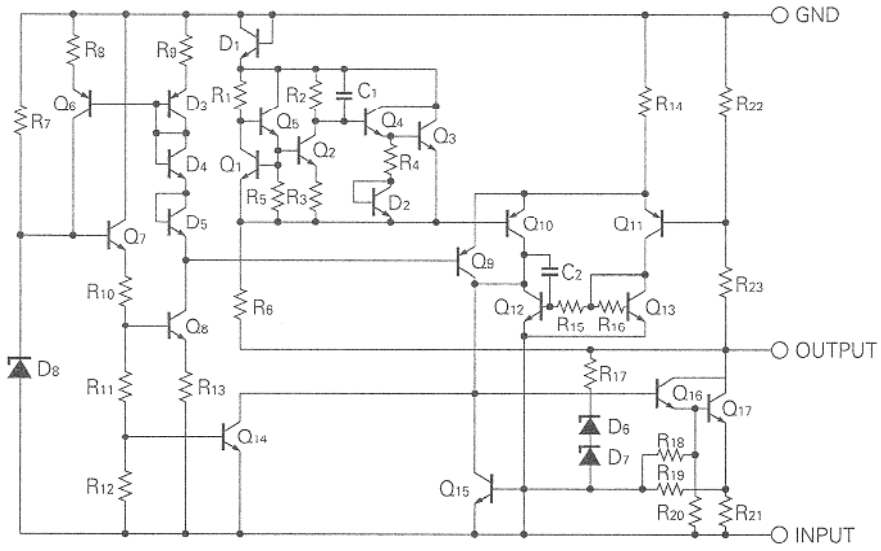
The mark <R> shows major revised points.
The revised points can be easily searched by copying an "<R>" in the PDF file and specifying it in the "Find what:" field.

PIN CONFIGURATION (Marking Side)

3-PIN PLASTIC SIP (TO-92)



EQUIVALENT CIRCUIT



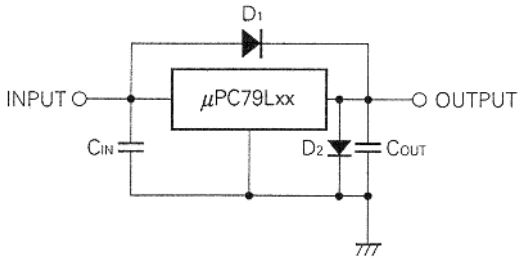
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

Parameter	Symbol	Rating	Unit
Input Voltage	V_{IN}	–30/–35 Note	V
Internal Power Dissipation	P_T	700	mW
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 ambient)	$R_{th(J-A)}$	180	°C/W

Note μPC79L05, 08 : –30 V, μPC79L12, 15 : –35 V

<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}	μPC79L05	–7	–10	–20	V
		μPC79L08	–10.5	–14	–23	V
		μPC79L12	–14.5	–19	–27	V
		μPC79L15	–17.5	–23	–30	V
Output Current	I_O	All	0	40	70	mA
Operating Ambient Temperature	T_A	All	–20		+85	°C
Operating Junction Temperature	T_J	All	–20	75	+125	°C

ELECTRICAL CHARACTERISTICS

μPC79L05 (V_{IN} = –10 V, I_O = 40 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} ≤ –20 V, 1 mA ≤ I_O ≤ 40 mA	–4.75		–5.25	V
Line Regulation	REG_{IN}	T_J = 25°C, –7 V ≤ V_{IN} ≤ –20 V		3	60	mV
Load Regulation	REG_L	T_J = 25°C, 1 mA ≤ I_O ≤ 100 mA		10	50	mV
Quiescent Current	I_{BIAS}	T_J = 25°C		4.2	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	–7 V ≤ V_{IN} ≤ –20 V, I_O = 40 mA			0.5	mA
		V_{IN} = –10 V, 1 mA ≤ I_O ≤ 40 mA			0.1	mA
Output Noise Voltage	V_n	T_J = 25°C, 10 Hz ≤ f ≤ 100 kHz		31	200	$\mu V_{r.m.s.}$
Ripple Rejection	R•R	T_J = 25°C, –8 V ≤ V_{IN} ≤ –18 V, f = 120 Hz	65	85		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		0.9		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –20 V		95		mA
Peak Output Current	I_{Opeak}	T_J = 25°C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.4		mV/°C

μPC79L08 (V_{IN} = –14 V, I_O = 40 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} ≤ –23 V, 1 mA ≤ I_O ≤ 40 mA	–7.6		–8.4	V
Line Regulation	REG_{IN}	T_J = 25°C, –10.5 V ≤ V_{IN} ≤ –23 V		5	60	mV
Load Regulation	REG_L	T_J = 25°C, 1 mA ≤ I_O ≤ 100 mA		12	80	mV
Quiescent Current	I_{BIAS}	T_J = 25°C		4.3	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	–10.5 V ≤ V_{IN} ≤ –23 V, I_O = 40 mA			0.5	mA
		V_{IN} = –14 V, 1 mA ≤ I_O ≤ 40 mA			0.1	mA
Output Noise Voltage	V_n	T_J = 25°C, 10 Hz ≤ f ≤ 100 kHz		56	220	$\mu V_{r.m.s.}$
Ripple Rejection	R•R	T_J = 25°C, –12 V ≤ V_{IN} ≤ –22 V, f = 120 Hz	63	75		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		0.9		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –23 V		75		mA
Peak Output Current	I_{Opeak}	T_J = 25°C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.6		mV/°C

μPC79L12 (V_{IN} = –19 V, I_O = 40 mA, 0°C ≤ T_J ≤ +125°C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, unless otherwise specified)

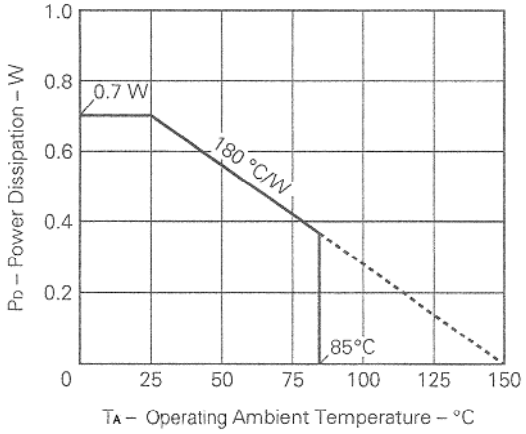
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	T_J = 25°C	–11.5	–12.0	–12.5	V
		–14.5 V ≤ V_{IN} ≤ –27 V, 1 mA ≤ I_O ≤ 40 mA	–11.4		–12.6	V
Line Regulation	REG_{IN}	T_J = 25°C, –14.5 V ≤ V_{IN} ≤ –27 V		8	45	mV
Load Regulation	REG_L	T_J = 25°C, 1 mA ≤ I_O ≤ 100 mA		15	100	mV
Quiescent Current	I_{BIAS}	T_J = 25°C		4.4	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	–14.5 V ≤ V_{IN} ≤ –30 V, I_O = 40 mA			0.5	mA
		V_{IN} = –19 V, 1 mA ≤ I_O ≤ 40 mA			0.1	mA
Output Noise Voltage	V_n	T_J = 25°C, 10 Hz ≤ f ≤ 100 kHz		88	280	$\mu V_{r.m.s.}$
Ripple Rejection	R•R	T_J = 25°C, –15 V ≤ V_{IN} ≤ –25 V, f = 120 Hz	55	70		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		0.9		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –27 V		50		mA
Peak Output Current	I_{Opeak}	T_J = 25°C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		0.8		mV/°C

μPC79L15 (V_{IN} = –23 V, I_O = 40 mA, 0°C ≤ T_J ≤ +125°C, C_{IN} = 2.2 μF, C_{OUT} = 1 μF, unless otherwise specified)

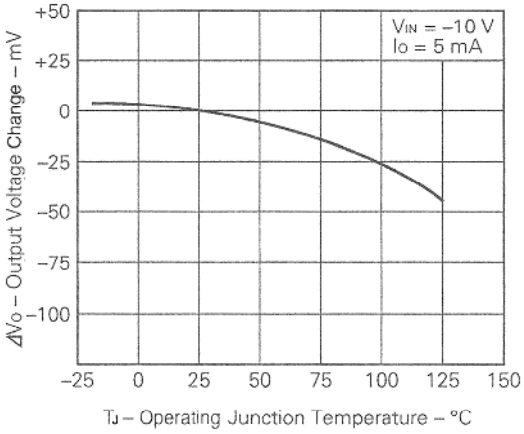
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	T_J = 25°C	–14.4	–15.0	–15.6	V
		–17.5 V ≤ V_{IN} ≤ –30 V, 1 mA ≤ I_O ≤ 40 mA	–14.25		–15.75	V
Line Regulation	REG_{IN}	T_J = 25°C, –17.5 V ≤ V_{IN} ≤ –30 V		10	45	mV
Load Regulation	REG_L	T_J = 25°C, 1 mA ≤ I_O ≤ 100 mA		20	125	mV
Quiescent Current	I_{BIAS}	T_J = 25°C		4.5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	–17.5 V ≤ V_{IN} ≤ –30 V, I_O = 40 mA			0.5	mA
		V_{IN} = –23 V, 1 mA ≤ I_O ≤ 40 mA			0.1	mA
Output Noise Voltage	V_n	T_J = 25°C, 10 Hz ≤ f ≤ 100 kHz		100	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	55	65		dB
Dropout Voltage	V_{DIF}	T_J = 25°C		0.9		V
Short Circuit Current	I_{Oshort}	T_J = 25°C, V_{IN} = –30 V		25		mA
Peak Output Current	I_{Opeak}	T_J = 25°C	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O/\Delta T$	I_O = 5 mA		1.0		mV/°C

TYPICAL CHARACTERISTICS (T_J = 25°C, unless otherwise specified)

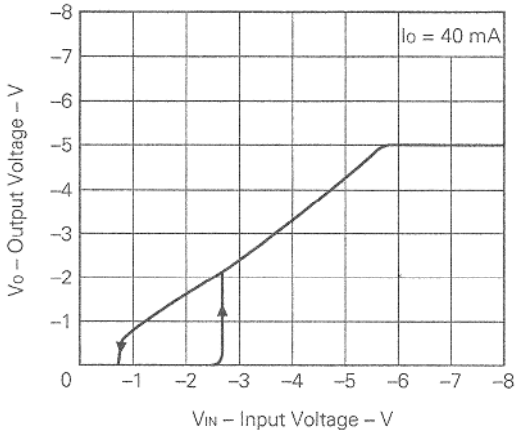
P_D vs. T_A



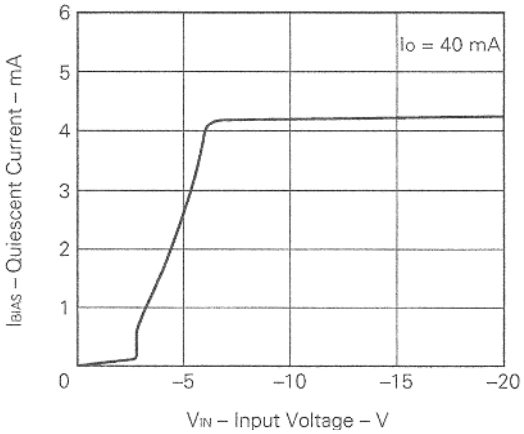
ΔV_O vs. T_J (μPC79L05)



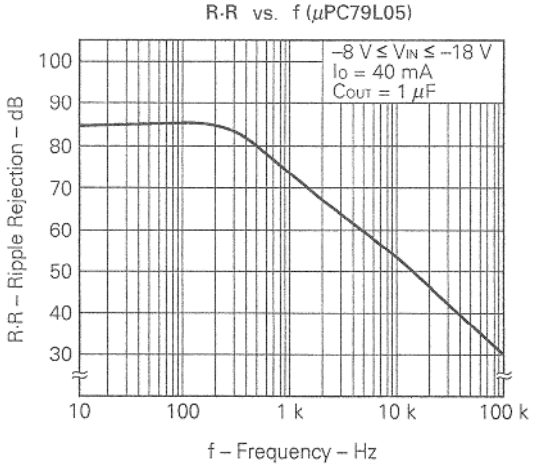
V_O vs. V_{IN} (μPC79L05)



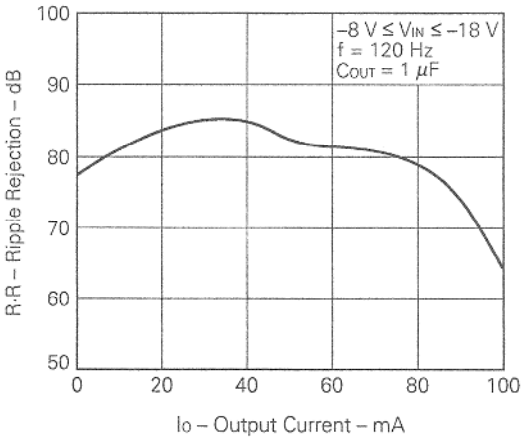
I_{BIAS} vs. V_{IN} (μPC79L05)

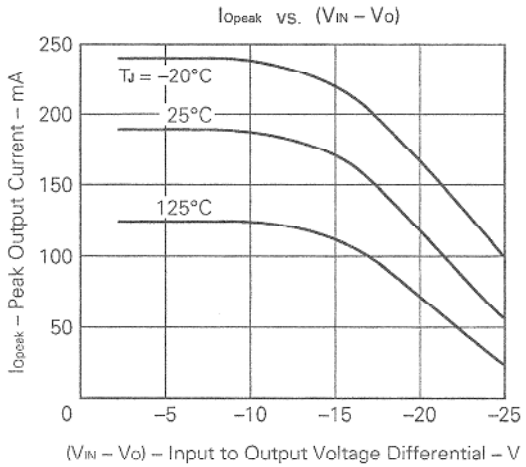


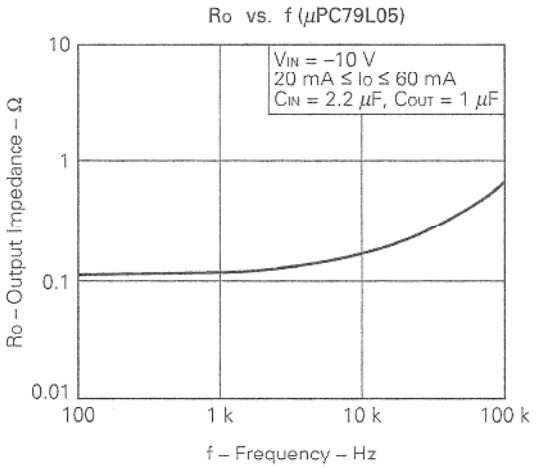
R·R vs. f (μPC79L05)

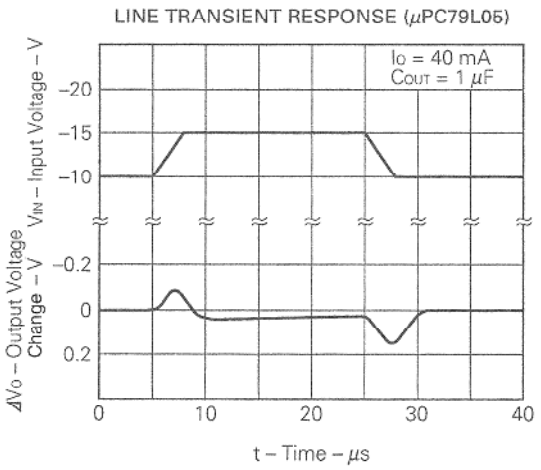


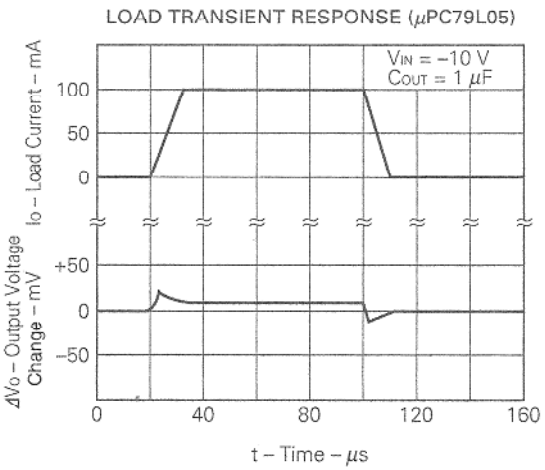
R·R vs. I_O (μPC79L05)




I_{Opeak} vs. (V_{IN} – V_O)
T_J = –20°C
25°C
125°C
I_{Opeak} – Peak Output Current – mA
250
200
150
100
50
0
–5
–10
–15
–20
–25
(V_{IN} – V_O) – Input to Output Voltage Differential – V

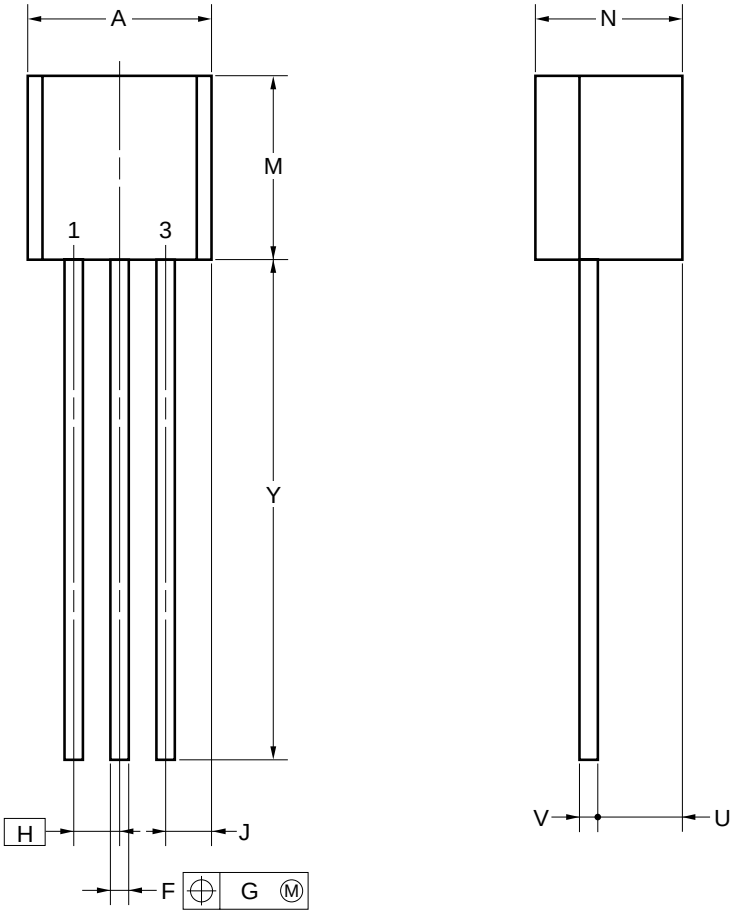

R_O vs. f (μPC79L05)
V_{IN} = –10 V
20 mA ≤ I_O ≤ 60 mA
C_{IN} = 2.2 μF, C_{OUT} = 1 μF
R_O – Output Impedance – Ω
10
1
0.1
0.01
100
1 k
10 k
100 k
f – Frequency – Hz


LINE TRANSIENT RESPONSE (μPC79L05)
I_O = 40 mA
C_{OUT} = 1 μF
V_{IN} – Input Voltage – V
–20
–15
–10
ΔV_O – Output Voltage Change – V
–0.2
0
0.2
0
10
20
30
40
t – Time – μs


LOAD TRANSIENT RESPONSE (μPC79L05)
V_{IN} = –10 V
C_{OUT} = 1 μF
I_O – Load Current – mA
100
50
0
ΔV_O – Output Voltage Change – mV
+50
0
–50
0
40
80
120
160
t – Time – μs

<R> **PACKAGE DRAWING (Unit: mm)**

3-PIN PLASTIC SIP (TO-92)



NOTE

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

ITEM	MILLIMETERS
A	5.0±0.2
F	$0.50^{+0.30}_{-0.10}$
G	0.12
H	1.27
J	1.33 MAX.
M	5.0±0.5
N	4.0±0.2
U	2.8 MAX.
V	0.50±0.10
Y	15.0±0.7

P3J-127B-3

<R> RECOMMENDED SOLDERING CONDITIONS

The μPC79Lxx 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

μPC79L05J, 79L08J, 79L12J, 79L15J,
μPC79L05J-A, 79L08J-A, 79L12J-A, 79L15J-A : 3-PIN PLASTIC SIP (TO-92)

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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