

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC79Lxx Series

THREE TERMINAL NEGATIVE VOLTAGE REGULATOR

<R> DESCRIPTION

The μ PC79Lxx 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 : $31\text{ }\mu\text{V}$ r.m.s. (μ PC79L05)
- High ripple rejection : 85 dB (μ PC79L05)
- TO-92 package

<R> ORDERING INFORMATION

Part Number	Package	Output Voltage	Marking	Package Type
μ PC79L05J	3-PIN PLASTIC SIP (TO-92)	-5 V	79L05	Packed in envelope
μ PC79L05J-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-5 V	79L05	Packed in envelope
μ PC79L05J-T	3-PIN PLASTIC SIP (TO-92)	-5 V	79L05	Cube type taping 2500 pcs/cube
μ PC79L05J-T-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-5 V	79L05	Cube type taping 2500 pcs/cube
μ PC79L08J	3-PIN PLASTIC SIP (TO-92)	-8 V	79L08	Packed in envelope
μ PC79L08J-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-8 V	79L08	Packed in envelope
μ PC79L08J-T	3-PIN PLASTIC SIP (TO-92)	-8 V	79L08	Cube type taping 2500 pcs/cube
μ PC79L08J-T-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-8 V	79L08	Cube type taping 2500 pcs/cube
μ PC79L12J	3-PIN PLASTIC SIP (TO-92)	-12 V	79L12	Packed in envelope
μ PC79L12J-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-12 V	79L12	Packed in envelope
μ PC79L12J-T	3-PIN PLASTIC SIP (TO-92)	-12 V	79L12	Cube type taping 2500 pcs/cube
μ PC79L12J-T-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-12 V	79L12	Cube type taping 2500 pcs/cube
μ PC79L15J	3-PIN PLASTIC SIP (TO-92)	-15 V	79L15	Packed in envelope
μ PC79L15J-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-15 V	79L15	Packed in envelope
μ PC79L15J-T	3-PIN PLASTIC SIP (TO-92)	-15 V	79L15	Cube type taping 2500 pcs/cube
μ PC79L15J-T-A ^{Note}	3-PIN PLASTIC SIP (TO-92)	-15 V	79L15	Cube type taping 2500 pcs/cube

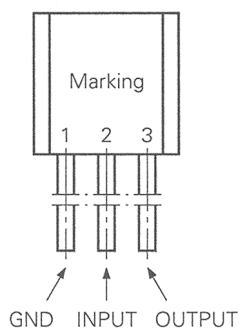
Note Pb-free (This product does not contain Pb in external electrode and other parts).

Remark Output voltage -5 V product is written in the text as μ PC79L05.
It applies to other output voltage products as same.

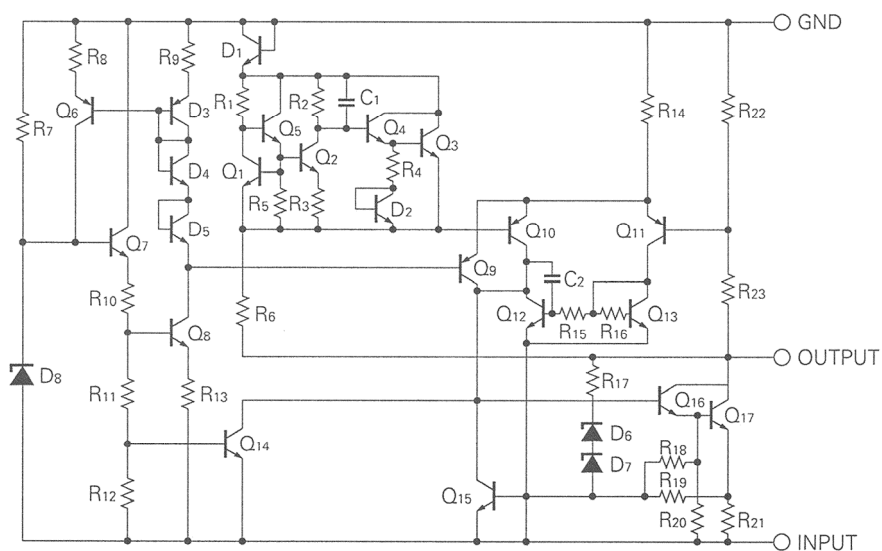
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PIN CONFIGURATION (Marking Side)

3-PIN PLASTIC SIP (TO-92)



EQUIVALENT CIRCUIT



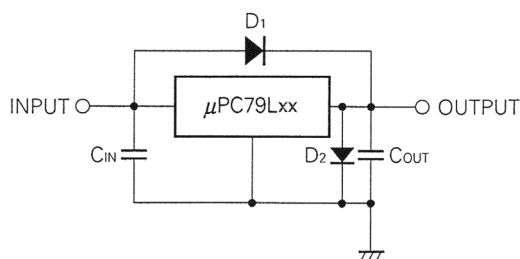
ABSOLUTE MAXIMUM RATINGS (T_A = 25°C, unless otherwise specified)

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).

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}	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

μ PC79L05 ($V_{IN} = -10\text{ V}$, $I_O = 40\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, 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
		$-7\text{ V} \leq V_{IN} \leq -20\text{ V}$, $1\text{ mA} \leq I_O \leq 40\text{ mA}$	-4.75		-5.25	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-7\text{ V} \leq V_{IN} \leq -20\text{ V}$		3	60	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $1\text{ mA} \leq I_O \leq 100\text{ mA}$		10	50	mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		4.2	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-7\text{ V} \leq V_{IN} \leq -20\text{ V}$, $I_O = 40\text{ mA}$			0.5	mA
		$V_{IN} = -10\text{ V}$, $1\text{ mA} \leq I_O \leq 40\text{ mA}$			0.1	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		31	200	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-8\text{ V} \leq V_{IN} \leq -18\text{ V}$, $f = 120\text{ Hz}$	65	85		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		0.9		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -20\text{ V}$		95		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.4		mV/ $^\circ\text{C}$

μ PC79L08 ($V_{IN} = -14\text{ V}$, $I_O = 40\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, 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
		$-10.5\text{ V} \leq V_{IN} \leq -23\text{ V}$, $1\text{ mA} \leq I_O \leq 40\text{ mA}$	-7.6		-8.4	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-10.5\text{ V} \leq V_{IN} \leq -23\text{ V}$		5	60	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $1\text{ mA} \leq I_O \leq 100\text{ mA}$		12	80	mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		4.3	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-10.5\text{ V} \leq V_{IN} \leq -23\text{ V}$, $I_O = 40\text{ mA}$			0.5	mA
		$V_{IN} = -14\text{ V}$, $1\text{ mA} \leq I_O \leq 40\text{ mA}$			0.1	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		56	220	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-12\text{ V} \leq V_{IN} \leq -22\text{ V}$, $f = 120\text{ Hz}$	63	75		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		0.9		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -23\text{ V}$		75		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		0.6		mV/ $^\circ\text{C}$

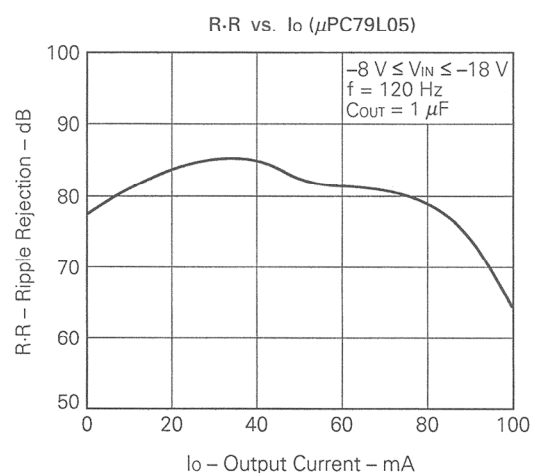
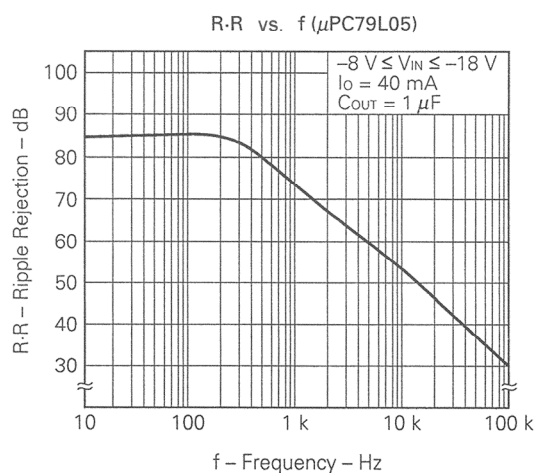
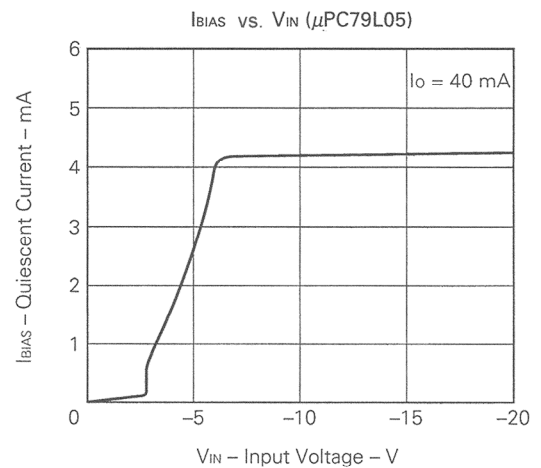
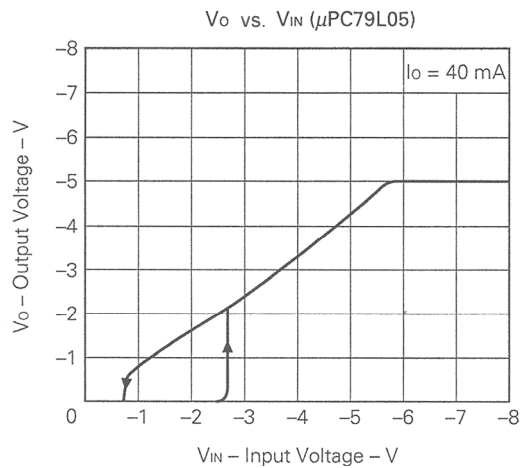
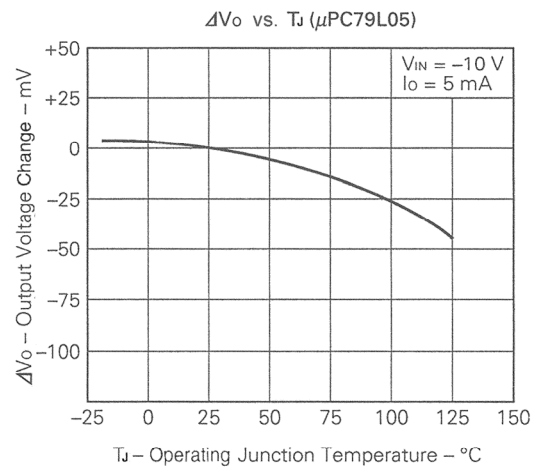
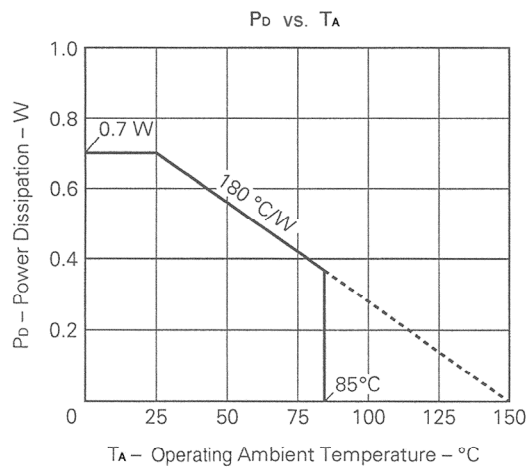
μPC79L12 ($V_{IN} = -19\text{ V}$, $I_O = 40\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, unless otherwise specified)

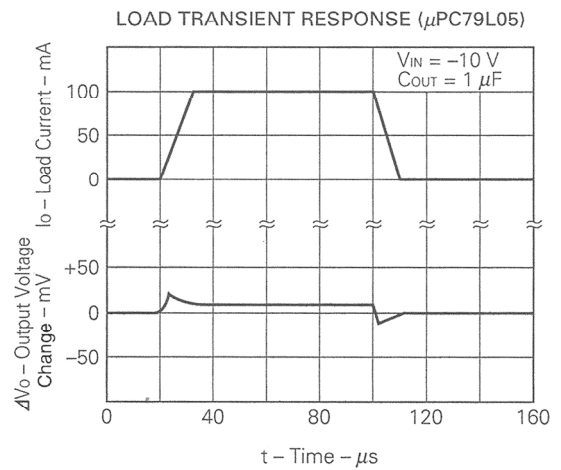
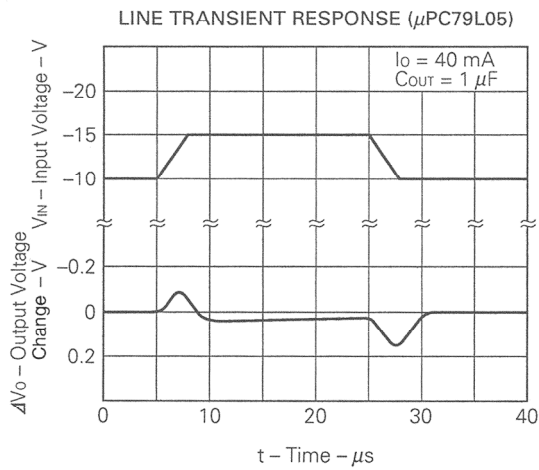
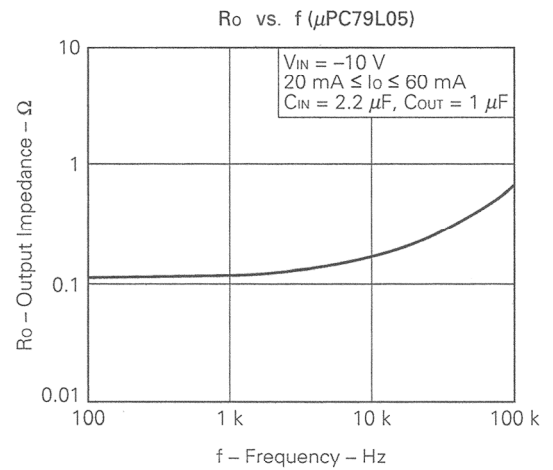
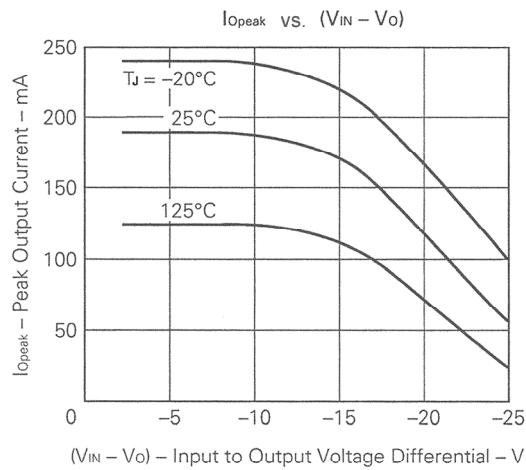
Parameter	Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Output Voltage	V_O	$T_J = 25^\circ\text{C}$	-11.5	-12.0	-12.5	V
		$-14.5\text{ V} \leq V_{IN} \leq -27\text{ V}$, $1\text{ mA} \leq I_O \leq 40\text{ mA}$	-11.4		-12.6	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-14.5\text{ V} \leq V_{IN} \leq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

μPC79L15 ($V_{IN} = -23\text{ V}$, $I_O = 40\text{ mA}$, $0^\circ\text{C} \leq T_J \leq +125^\circ\text{C}$, $C_{IN} = 2.2\text{ }\mu\text{F}$, $C_{OUT} = 1\text{ }\mu\text{F}$, 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
		$-17.5\text{ V} \leq V_{IN} \leq -30\text{ V}$, $1\text{ mA} \leq I_O \leq 40\text{ mA}$	-14.25		-15.75	V
Line Regulation	REG_{IN}	$T_J = 25^\circ\text{C}$, $-17.5\text{ V} \leq V_{IN} \leq -30\text{ V}$		10	45	mV
Load Regulation	REG_L	$T_J = 25^\circ\text{C}$, $1\text{ mA} \leq I_O \leq 100\text{ mA}$		20	125	mV
Quiescent Current	I_{BIAS}	$T_J = 25^\circ\text{C}$		4.5	6.0	mA
Quiescent Current Change	ΔI_{BIAS}	$-17.5\text{ V} \leq V_{IN} \leq -30\text{ V}$, $I_O = 40\text{ mA}$			0.5	mA
		$V_{IN} = -23\text{ V}$, $1\text{ mA} \leq I_O \leq 40\text{ mA}$			0.1	mA
Output Noise Voltage	V_n	$T_J = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$		100	360	$\mu\text{V}_{r.m.s.}$
Ripple Rejection	$R \cdot R$	$T_J = 25^\circ\text{C}$, $-18.5\text{ V} \leq V_{IN} \leq -28.5\text{ V}$, $f = 120\text{ Hz}$	55	65		dB
Dropout Voltage	V_{DIF}	$T_J = 25^\circ\text{C}$		0.9		V
Short Circuit Current	I_{Oshort}	$T_J = 25^\circ\text{C}$, $V_{IN} = -30\text{ V}$		25		mA
Peak Output Current	I_{Opeak}	$T_J = 25^\circ\text{C}$	140	190	230	mA
Temperature Coefficient of Output Voltage	$\Delta V_O / \Delta T$	$I_O = 5\text{ mA}$		1.0		mV/ $^\circ\text{C}$

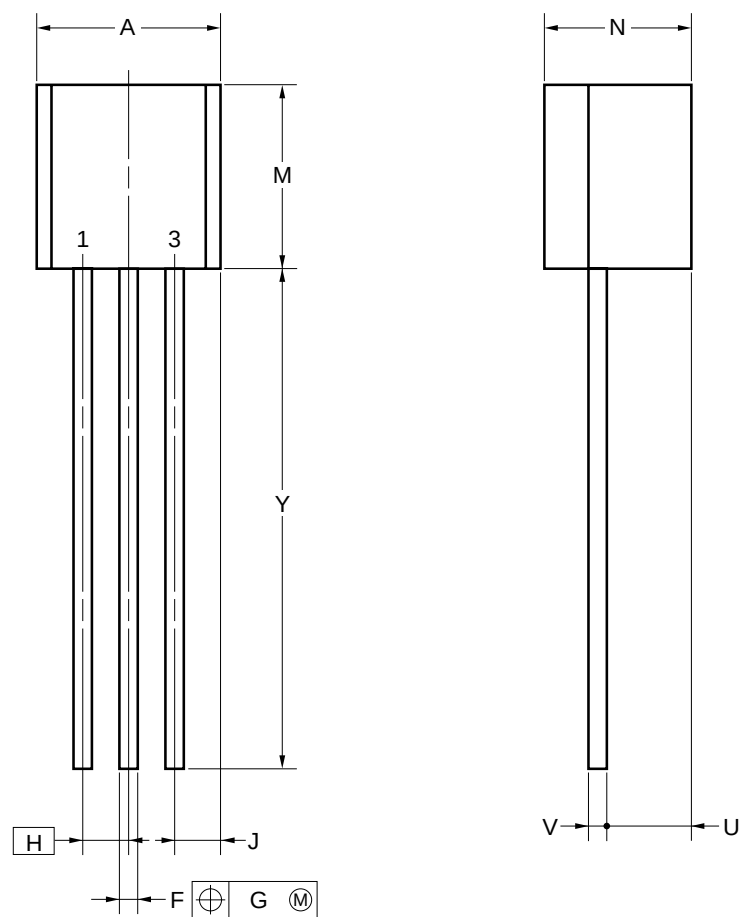
TYPICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$, unless otherwise specified)





<R> PACKAGE DRAWING (Unit: mm)

3-PIN PLASTIC SIP (TO-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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