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# HA179L00 Series

3-terminal Negative Fixed Voltage Regulators

# HITACHI

ADE-204-054 (Z)  
Rev. 0  
Dec. 2000

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## Description

The HA179L00 series are three-terminal fixed output voltage regulators. These are small outline packages which are useful ICs. For application example, as Zener diodes, easy stabilized power sources.

## Features

- Some kinds output voltage series
- Superior ripple rejection ratio for audio frequency
- Large maximum power dissipation: 800 mW
- Over current and over temperature protection

# HA179L00 Series

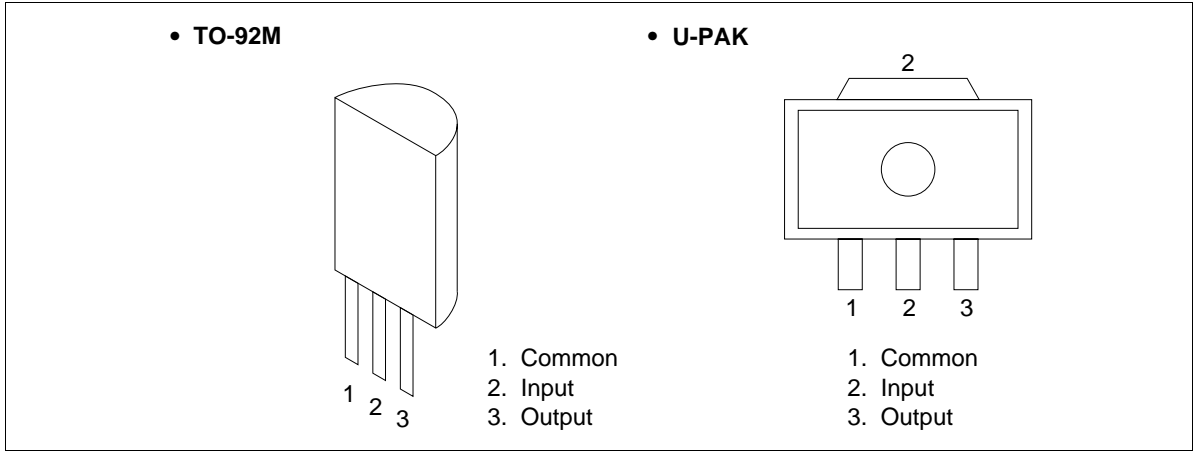
## Ordering Information

Application	OutputVoltage	TypeName	Package
Industrial use	-5	HA179L05P	TO-92M
	-6	HA179L06P	
	-8	HA179L08P	
	-9	HA179L09P	
	-10	HA179L10P	
	-12	HA179L12P	
	-15	HA179L15P	
Commercial use	-5	HA179L05	TO-92M
	-6	HA179L06	
	-8	HA179L08	
	-9	HA179L09	
	-10	HA179L10	
	-12	HA179L12	
	-15	HA179L15	
Commercial use	-5	HA179L05U	UPAK
	-6	HA179L06U	
	-8	HA179L08U	
	-9	HA179L09U	
	-10	HA179L10U	
	-12	HA179L12U	
	-15	HA179L15U	

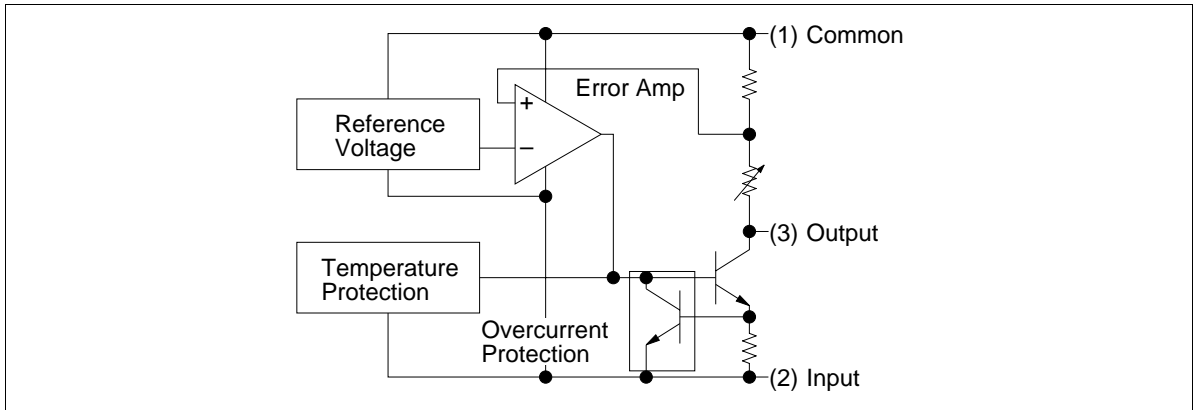
## Output Voltage Accuracy Grade

Use	Standard ( $\pm 4\%$ )
Industrial Use	HA179L00P
Commercial Use	HA179L00
	HA179L00U

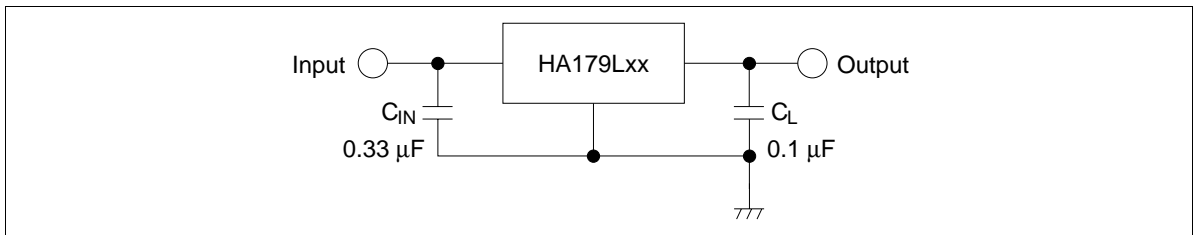
Pin Arrangement



Block Diagram



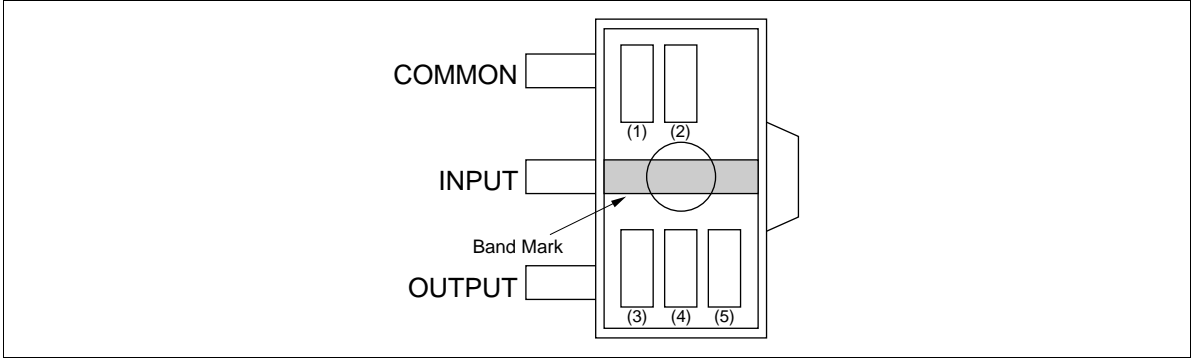
Standard Circuit



## UPAK Product (HA179L00U) Mark Patterns

The mark patterns shown below are used. on UPAK products, as the package is small. Note that the product code and mark pattern are different.

The pattern is laser-printed.



Notes: 1. Boxes (1) to (5) in the figures show the position of the letters or numerals, and are not actually marked on the package.

2. (1) and (2) show the product-specific mark pattern. (see table 1)

**Table 1**

Output Voltage(V)	Product No.	Mark Pattern(2 digit)
-5	HA179L05U	9B
-6	HA179L06U	9D
-8	HA179L08U	9E
-9	HA179L09U	9F
-10	HA179L10U	9G
-12	HA179L12U	9H
-15	HA179L15U	9J

3. (3) shows the production year code (the last digit of the year).

4. (4) shows the production month code (see table 2).

**Table 2**

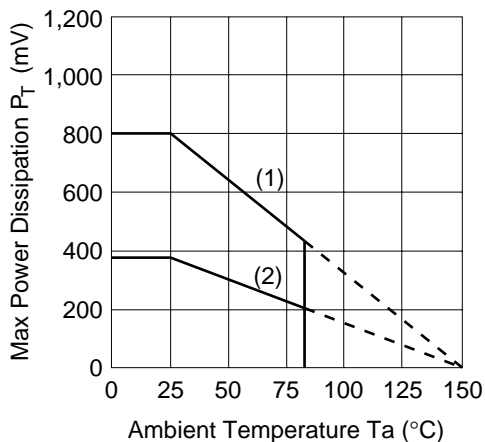
Production Month	1	2	3	4	5	6	7	8	9	10	11	12
Marked Code	A	B	C	D	E	F	G	H	J	K	L	M

5. (5) shows the production week code.

## Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

Item	Symbol	HA179L00P, HA179L00 Series	HA179L00U Series	Unit
Input voltage	$V_{IN}$	-35	-35	V
Max power dissipation	$P_T^{*1}$	800 <sup>*2</sup>	800 <sup>*2</sup>	mW
Operating ambient temperature	$T_{opr}$	-20 to +85	-20 to +85	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	-55 to +150	$^\circ\text{C}$

Notes: 1.  $T_a \leq 25^\circ\text{C}$ , If  $T_a > 25^\circ\text{C}$ , derate by  $6.4 \text{ mW}/^\circ\text{C}$   
 2.  $15 \text{ mm} \times 25 \text{ mm} \times 0.7 \text{ mm}$  glass epoxy board,  $T_a \leq 25^\circ\text{C}$



- (1) HA179L00P, HA179L00, HA179L00U  
 $15 \text{ mm} \times 25 \text{ mm} \times 0.7 \text{ mm}$  glass epoxy board
- (2) HA179L00U at non-mounted

# HA179L00 Series

## Electrical Characteristics

### HA179L05P, HA179L05, HA179L05U

( $V_{IN} = -10\text{ V}$ ,  $I_{OUT} = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ,  $C_{IN} = 0.33\text{ }\mu\text{F}$ ,  $C_L = 0.1\text{ }\mu\text{F}$ )

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage	$V_{OUT}$	-4.8	-5.0	-5.2	V	$T_j = 25^\circ\text{C}$
		-4.75	—	-5.25		$V_{IN} = -10\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 70\text{ mA}$
Line regulation	$\Delta V_{OLINE}$	—	55	150	mV	$T_j = 25^\circ\text{C}$ $-20\text{ V} \leq V_{IN} \leq -7\text{ V}$
		—	45	100		$-20\text{ V} \leq V_{IN} \leq -8\text{ V}$
Load regulation	$\Delta V_{OLOAD}$	—	16	—	mV	$T_j = 25^\circ\text{C}$ $1.0\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$
		—	11	60		$1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$
		—	5.0	30		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Quiescent current	$I_Q$	—	2.0	4.0	mA	$T_j = 25^\circ\text{C}$
Quiescent current change	$\Delta I_Q$	—	—	1.5	mA	$T_j = 25^\circ\text{C}$ $-20\text{ V} \leq V_{IN} \leq -8.0\text{ V}$
		—	—	1.0		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Voltage drop	$V_{DROP}$	—	1.3	—	V	$T_j = 25^\circ\text{C}$
Output short circuit current	$I_{OS}$	—	300	—	mA	$T_j = 25^\circ\text{C}$

## HA179L06P, HA179L06, HA179L06U

( $V_{IN} = -11\text{ V}$ ,  $I_{OUT} = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ,  $C_{IN} = 0.33\ \mu\text{F}$ ,  $C_L = 0.1\ \mu\text{F}$ )

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage	$V_{OUT}$	-5.76	-6.0	-6.24	V	$T_j = 25^\circ\text{C}$
		-5.70	—	-6.30		$V_{IN} = -11\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 70\text{ mA}$
Line regulation	$\Delta V_{OLINE}$	—	50	150	mV	$T_j = 25^\circ\text{C}$ $-21\text{ V} \leq V_{IN} \leq -8.1\text{ V}$
		—	45	110		$-21\text{ V} \leq V_{IN} \leq -9.0\text{ V}$
Load regulation	$\Delta V_{OLOAD}$	—	17.5	—	mV	$T_j = 25^\circ\text{C}$ $1.0\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$
		—	12	70		$1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$
		—	5.5	35		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Quiescent current	$I_Q$	—	2.0	4.0	mA	$T_j = 25^\circ\text{C}$
Quiescent current change	$\Delta I_Q$	—	—	1.5	mA	$T_j = 25^\circ\text{C}$ $-21\text{ V} \leq V_{IN} \leq -9.0\text{ V}$
		—	—	1.0		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Voltage drop	$V_{DROP}$	—	1.3	—	V	$T_j = 25^\circ\text{C}$
Output short circuit current	$I_{OS}$	—	300	—	mA	$T_j = 25^\circ\text{C}$

## HA179L08P, HA179L08, HA179L08U

( $V_{IN} = -14\text{ V}$ ,  $I_{OUT} = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ,  $C_{IN} = 0.33\ \mu\text{F}$ ,  $C_L = 0.1\ \mu\text{F}$ )

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage	$V_{OUT}$	-7.68	-8.0	-8.32	V	$T_j = 25^\circ\text{C}$
		-7.60	—	-8.40		$V_{IN} = -14\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 70\text{ mA}$
Line regulation	$\Delta V_{OLINE}$	—	65	175	mV	$T_j = 25^\circ\text{C}$ $-23\text{ V} \leq V_{IN} \leq -10.5\text{ V}$
		—	55	125		$-23\text{ V} \leq V_{IN} \leq -11\text{ V}$
Load regulation	$\Delta V_{OLOAD}$	—	22	—	mV	$T_j = 25^\circ\text{C}$ $1.0\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$
		—	15	80		$1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$
		—	7.0	40		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Quiescent current	$I_Q$	—	2.0	4.0	mA	$T_j = 25^\circ\text{C}$
Quiescent current change	$\Delta I_Q$	—	—	1.5	mA	$T_j = 25^\circ\text{C}$ $-23\text{ V} \leq V_{IN} \leq -11\text{ V}$
		—	—	1.0		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Voltage drop	$V_{DROP}$	—	1.3	—	V	$T_j = 25^\circ\text{C}$
Output short circuit current	$I_{OS}$	—	270	—	mA	$T_j = 25^\circ\text{C}$

# HA179L00 Series

## HA179L09P, HA179L09, HA179L09U

( $V_{IN} = -15\text{ V}$ ,  $I_{OUT} = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ,  $C_{IN} = 0.33\text{ }\mu\text{F}$ ,  $C_L = 0.1\text{ }\mu\text{F}$ )

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage	$V_{OUT}$	-8.64	-9.0	-9.36	V	$T_j = 25^\circ\text{C}$
		-8.55	—	-9.45		$V_{IN} = -15\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 70\text{ mA}$
Line regulation	$\Delta V_{OLINE}$	—	80	200	mV	$T_j = 25^\circ\text{C}$ $-24\text{ V} \leq V_{IN} \leq -11.4\text{ V}$
		—	70	160		$-24\text{ V} \leq V_{IN} \leq -12\text{ V}$
Load regulation	$\Delta V_{OLOAD}$	—	24.5	—	mV	$T_j = 25^\circ\text{C}$ $1.0\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$
		—	17	90		$1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$
		—	8.0	45		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Quiescent current	$I_Q$	—	2.6	4.6	mA	$T_j = 25^\circ\text{C}$
Quiescent current change	$\Delta I_Q$	—	—	1.5	mA	$T_j = 25^\circ\text{C}$ $-24\text{ V} \leq V_{IN} \leq -12\text{ V}$
		—	—	1.0		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Voltage drop	$V_{DROP}$	—	1.3	—	V	$T_j = 25^\circ\text{C}$
Output short circuit current	$I_{OS}$	—	270	—	mA	$T_j = 25^\circ\text{C}$

## HA179L10P, HA179L10, HA179L10U

( $V_{IN} = -16\text{ V}$ ,  $I_{OUT} = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ,  $C_{IN} = 0.33\text{ }\mu\text{F}$ ,  $C_L = 0.1\text{ }\mu\text{F}$ )

Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage	$V_{OUT}$	-9.6	-10	-10.4	V	$T_j = 25^\circ\text{C}$
		-9.50	—	-10.50		$V_{IN} = -16\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 70\text{ mA}$
Line regulation	$\Delta V_{OLINE}$	—	80	230	mV	$T_j = 25^\circ\text{C}$ $-25\text{ V} \leq V_{IN} \leq -12.5\text{ V}$
		—	70	170		$-25\text{ V} \leq V_{IN} \leq -13\text{ V}$
Load regulation	$\Delta V_{OLOAD}$	—	26	—	mV	$T_j = 25^\circ\text{C}$ $1.0\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$
		—	18	90		$1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$
		—	8.5	45		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Quiescent current	$I_Q$	—	2.6	4.6	mA	$T_j = 25^\circ\text{C}$
Quiescent current change	$\Delta I_Q$	—	—	1.5	mA	$T_j = 25^\circ\text{C}$ $-25\text{ V} \leq V_{IN} \leq -13\text{ V}$
		—	—	1.0		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Voltage drop	$V_{DROP}$	—	1.3	—	V	$T_j = 25^\circ\text{C}$
Output short circuit current	$I_{OS}$	—	260	—	mA	$T_j = 25^\circ\text{C}$



## HA179L12P, HA179L12, HA179L12U

( $V_{IN} = -19\text{ V}$ ,  $I_{OUT} = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ,  $C_{IN} = 0.33\text{ }\mu\text{F}$ ,  $C_L = 0.1\text{ }\mu\text{F}$ )

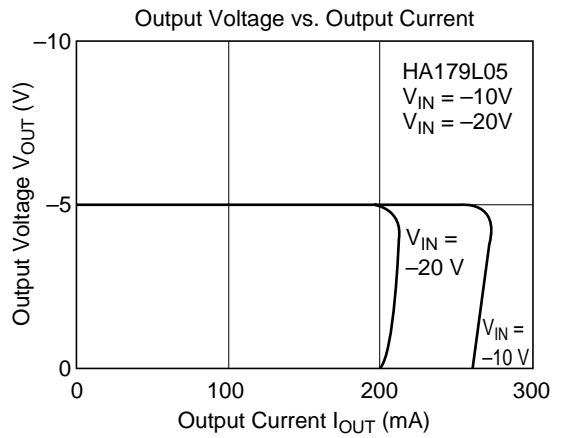
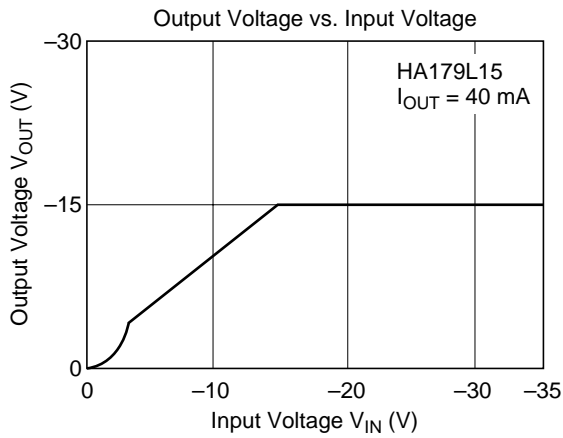
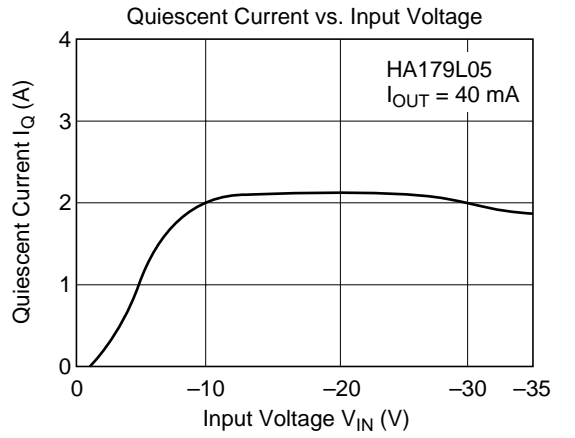
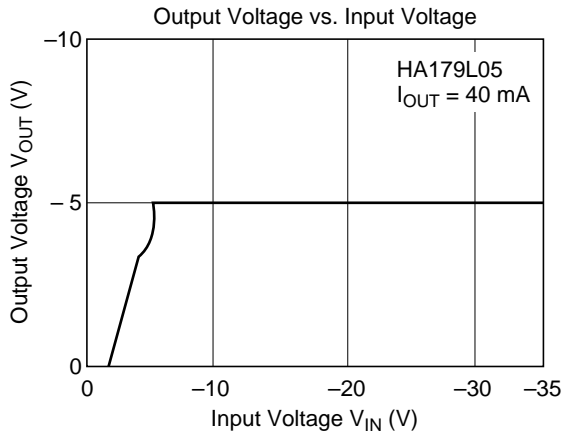
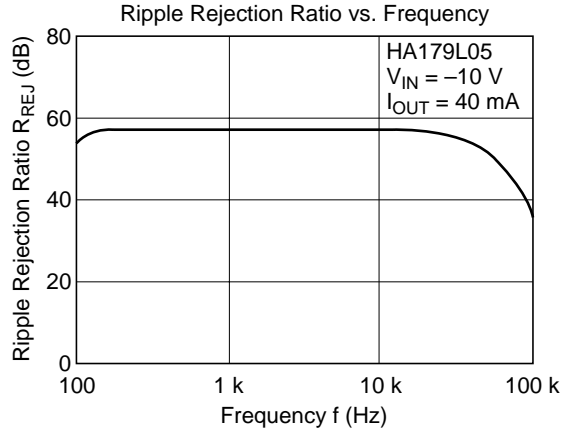
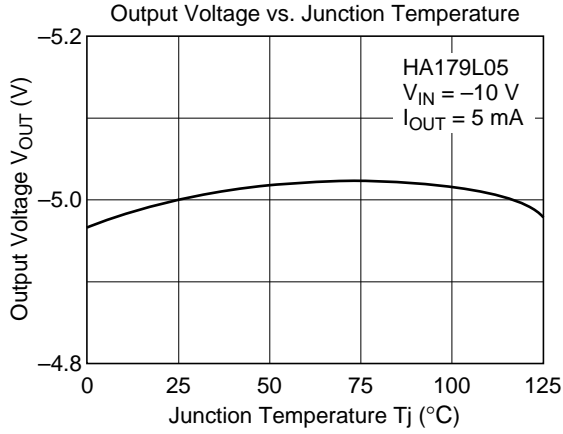
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage	$V_{OUT}$	-11.52	-12	-12.48	V	$T_j = 25^\circ\text{C}$
		-11.40	—	-12.60		$V_{IN} = -19\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 70\text{ mA}$
Line regulation	$\Delta V_{OLINE}$	—	120	250	mV	$T_j = 25^\circ\text{C}$ $-27\text{ V} \leq V_{IN} \leq -14.5\text{ V}$
		—	100	200		$-27\text{ V} \leq V_{IN} \leq -16\text{ V}$
Load regulation	$\Delta V_{OLOAD}$	—	28.5	—	mV	$T_j = 25^\circ\text{C}$ $1.0\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$
		—	20	100		$1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$
		—	10	50		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Quiescent current	$I_Q$	—	2.6	4.6	mA	$T_j = 25^\circ\text{C}$
Quiescent current change	$\Delta I_Q$	—	—	1.5	mA	$T_j = 25^\circ\text{C}$ $-27\text{ V} \leq V_{IN} \leq -16\text{ V}$
		—	—	1.0		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Voltage drop	$V_{DROP}$	—	1.3	—	V	$T_j = 25^\circ\text{C}$
Output short circuit current	$I_{OS}$	—	250	—	mA	$T_j = 25^\circ\text{C}$

## HA179L15P, HA179L15, HA179L15U

( $V_{IN} = -23\text{ V}$ ,  $I_{OUT} = 40\text{ mA}$ ,  $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$ ,  $C_{IN} = 0.33\text{ }\mu\text{F}$ ,  $C_L = 0.1\text{ }\mu\text{F}$ )

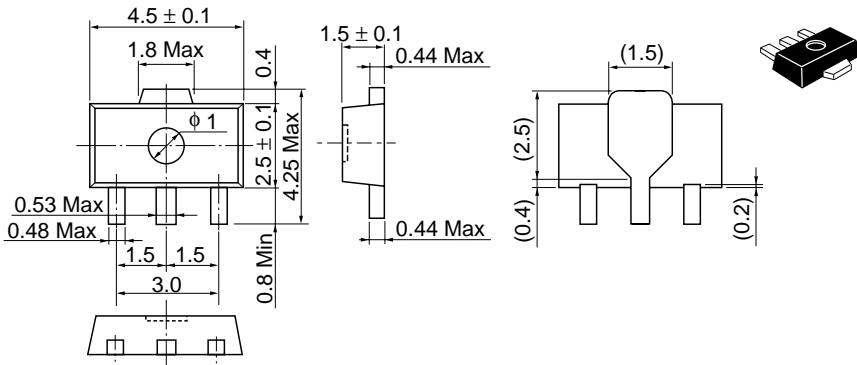
Item	Symbol	Min	Typ	Max	Unit	Test Condition
Output voltage	$V_{OUT}$	-14.4	-15	-15.6	V	$T_j = 25^\circ\text{C}$
		-14.25	—	-15.75		$V_{IN} = -23\text{ V}$ , $1.0\text{ mA} \leq I_{OUT} \leq 70\text{ mA}$
Line regulation	$\Delta V_{OLINE}$	—	130	300	mV	$T_j = 25^\circ\text{C}$ $-30\text{ V} \leq V_{IN} \leq -17.5\text{ V}$
		—	110	250		$-30\text{ V} \leq V_{IN} \leq -20\text{ V}$
Load regulation	$\Delta V_{OLOAD}$	—	36	—	mV	$T_j = 25^\circ\text{C}$ $1.0\text{ mA} \leq I_{OUT} \leq 150\text{ mA}$
		—	25	150		$1.0\text{ mA} \leq I_{OUT} \leq 100\text{ mA}$
		—	12	75		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Quiescent current	$I_Q$	—	2.6	4.6	mA	$T_j = 25^\circ\text{C}$
Quiescent current change	$\Delta I_Q$	—	—	1.5	mA	$T_j = 25^\circ\text{C}$ $-30\text{ V} \leq V_{IN} \leq -20\text{ V}$
		—	—	1.0		$1.0\text{ mA} \leq I_{OUT} \leq 40\text{ mA}$
Voltage drop	$V_{DROP}$	—	1.3	—	V	$T_j = 25^\circ\text{C}$
Output short circuit current	$I_{OS}$	—	240	—	mA	$T_j = 25^\circ\text{C}$

## Characteristic Curves



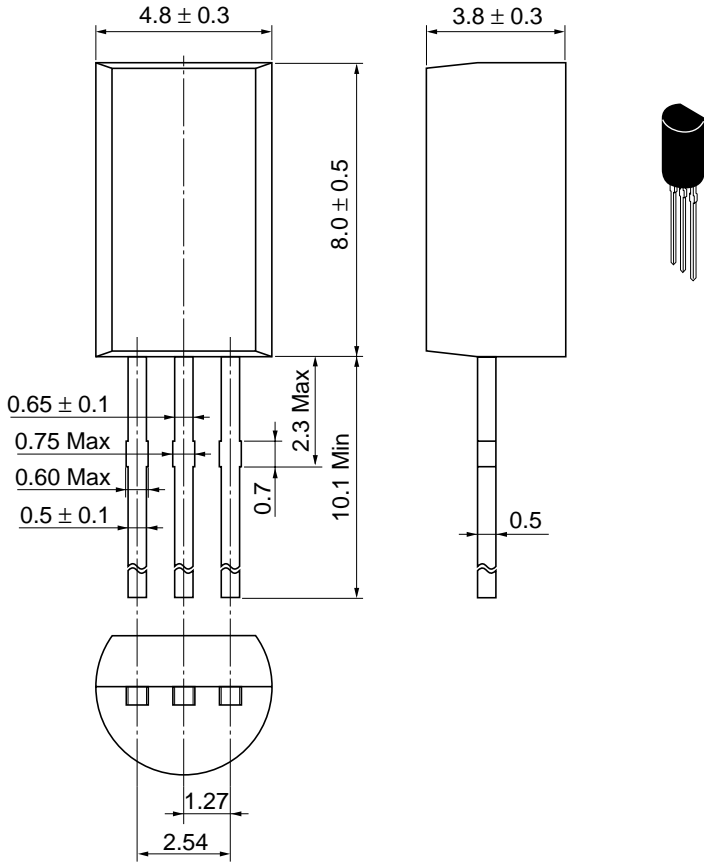
Package Dimensions

Unit: mm



Hitachi Code	UPAK
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.050 g

Unit: mm



Hitachi Code	TO-92 Mod
JEDEC	—
EIAJ	Conforms
Mass (reference value)	0.35 g

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