

HA17800V/VP/VPJ Series

3-terminal Fixed Voltage Regulators

HITACHI

ADE-204-053 (Z)
Rev. 0
Dec. 2000

Description

HA17800V series is positive output 1 A three-terminal regulator IC. Which features are as follows. It is designed to suit to the power supply of various equipments and to stabilize the multi switching regulator voltage, and to supply power to some kind of control devices.

Features

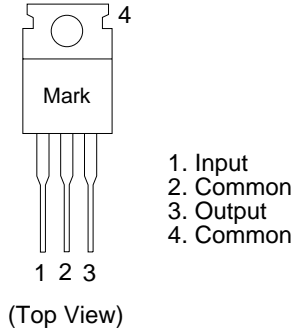
- High ripple rejection ratio up to high frequency
(f = 20 kHz): 60 dB(in the case of HA17805V/VP/VPJ)
- Protected against oscillation
- Regulated output voltage against temperature
(0 Ta 125°C, 80 ppm/°C typ)
- Hard to breakdown against irrelevant connection
- Built-in circuits as over current control circuit, temperature protection circuit, and area of safety operation control circuit

Ordering Information

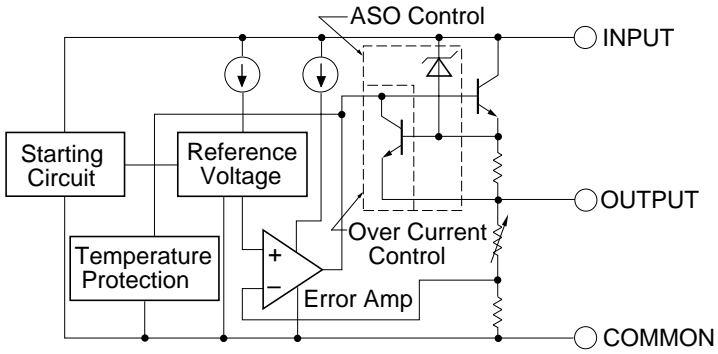
| Output Voltage (V) | Automotive Use | Industrial Use | Commercial Use | Package |
|--------------------|----------------|----------------|----------------|------------|
| 5 | HA17805VPJ | HA17805VP | HA17805V | TO - 220AB |
| 6 | HA17806VPJ | HA17806VP | HA17806V | |
| 7 | HA17807VPJ | HA17807VP | HA17807V | |
| 8 | HA17808VPJ | HA17808VP | HA17808V | |
| 12 | HA17812VPJ | HA17812VP | HA17812V | |
| 15 | HA17815VPJ | HA17815VP | HA17815V | |
| 18 | HA17818VPJ | HA17818VP | HA17818V | |
| 24 | HA17824VPJ | HA17824VP | HA17824V | |

HA17800V/VP/VPJ Series

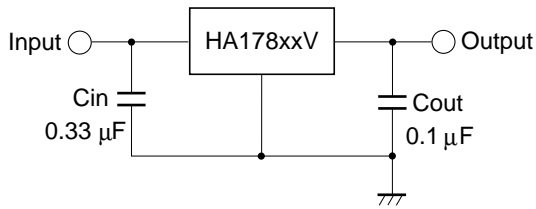
Pin Arrangement



Block Diagram



Standard Circuit

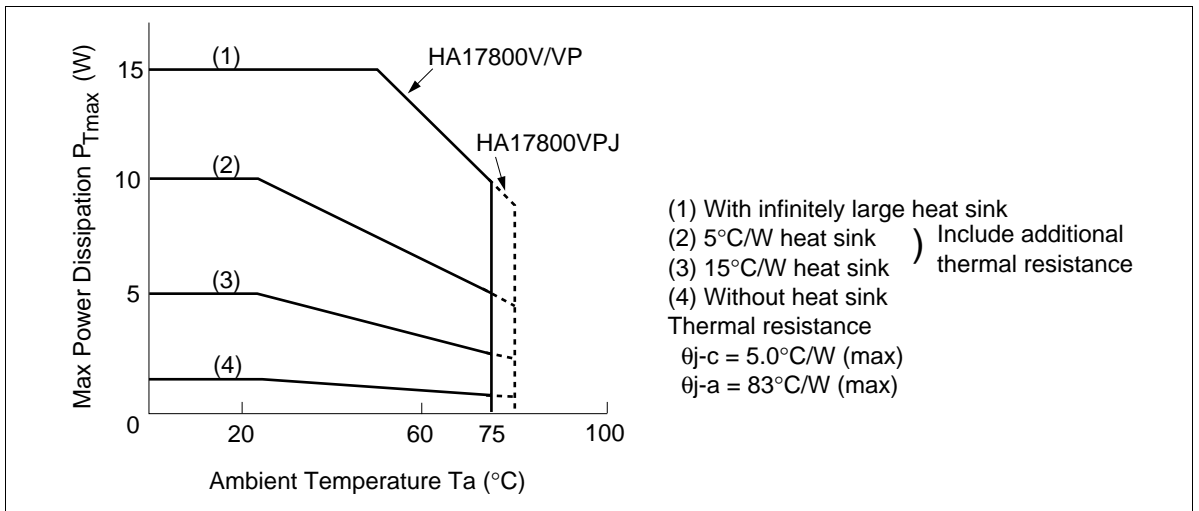


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Absolute Maximum Ratings ($T_a = 25^\circ\text{C}$)

| Item | Symbol | Ratings | | Unit | Notes |
|--------------------------------|-----------|-------------|-------------|------------------|-------|
| | | HA17800V/VP | HA17800VPJ | | |
| Input voltage | V_{IN} | 35 | 35 | V | 1 |
| Power dissipation | P_T | 15 | 15 | W | 2 |
| Operating ambient temperature | T_{opr} | -20 to +75 | -40 to +85 | $^\circ\text{C}$ | |
| Storage temperature | T_{stg} | -55 to +125 | -50 to +125 | $^\circ\text{C}$ | |
| Operating junction temperature | T_j | -20 to +125 | -40 to +125 | $^\circ\text{C}$ | |

- Notes: 1. HA17824V/VP/VPJ, 40 V
 2. Follow derating curve



HA17800V/VP/VPJ Series

HA17805V/VP/VPJ Electrical Characteristics

($V_{IN} = 10\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 0.1\ \mu\text{F}$)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|------|------|------|---------------------|--|
| Output voltage | V_{OUT1} | 4.8 | 5.0 | 5.2 | V | $T_j = 25^\circ\text{C}$ |
| | V_{OUT2} | 4.75 | — | 5.25 | V | $7\text{ V} \leq V_{IN} \leq 20\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$, $P_T \leq 15\text{ W}$ |
| Line regulation | δV_{OLine1} | — | 30 | 100 | mV | $T_j = 25^\circ\text{C}$, $7\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δV_{OLine2} | — | 10 | 50 | mV | $T_j = 25^\circ\text{C}$, $8\text{ V} \leq V_{IN} \leq 12\text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 30 | 100 | mV | $T_j = 25^\circ\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5\text{ A}$ |
| | δV_{OLoad2} | — | 10 | 50 | mV | $T_j = 25^\circ\text{C}$, $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.5 | 7.0 | mA | $T_j = 25^\circ\text{C}$, $I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.3 | mA | $7\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ |
| Voltage drop | V_{drop} | — | 2.0 | 2.5 | V | $T_j = 25^\circ\text{C}$, $I_{OUT} = 1.0\text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 60 | — | dB | $T_j = 25^\circ\text{C}$, $f = 10\text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -0.5 | — | mV/°C | $I_{OUT} = 5\text{ mA}$ |
| Output noise voltage | V_n | — | 120 | — | μV_{rms} | $T_j = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 1.25 | — | A | $T_j = 25^\circ\text{C}$ |
| Peak output current | I_{op} | — | 2.2 | — | A | $T_j = 25^\circ\text{C}$ |

HA17806V/VP/VPJ Electrical Characteristics
 $(V_{IN} = 11\text{ V}, I_{OUT} = 500\text{ mA}, 0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}, C_{IN} = 0.33\ \mu\text{F}, C_{OUT} = 0.1\ \mu\text{F})$

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|------|------|------|------------------------|--|
| Output voltage | V_{OUT1} | 5.75 | 6.00 | 6.25 | V | $T_j = 25^{\circ}\text{C}$ |
| | V_{OUT2} | 5.7 | — | 6.3 | V | $8\text{ V} \leq V_{IN} \leq 21\text{ V},$ $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}, P_T \leq 15\text{ W}$ |
| Line regulation | δV_{OLine1} | — | 36 | 120 | mV | $T_j = 25^{\circ}\text{C}, 8\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δV_{OLine2} | — | 12 | 60 | mV | $T_j = 25^{\circ}\text{C}, 9\text{ V} \leq V_{IN} \leq 13\text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 36 | 120 | mV | $T_j = 25^{\circ}\text{C}, 5\text{ mA} \leq I_{OUT} \leq 1.5\text{ A}$ |
| | δV_{OLoad2} | — | 12 | 60 | mV | $T_j = 25^{\circ}\text{C}, 250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.5 | 7.0 | mA | $T_j = 25^{\circ}\text{C}, I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.3 | mA | $8\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ |
| Voltage drop | V_{drop} | — | 2.0 | 2.5 | V | $T_j = 25^{\circ}\text{C}, I_{OUT} = 1.0\text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 60 | — | dB | $T_j = 25^{\circ}\text{C}, f = 10\text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -0.5 | — | mV/ $^{\circ}\text{C}$ | $I_{OUT} = 5\text{ mA}$ |
| Output noise voltage | V_n | — | 120 | — | μV_{rms} | $T_j = 25^{\circ}\text{C}, 10\text{ Hz} \leq f \leq 100\text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 1.2 | — | A | $T_j = 25^{\circ}\text{C}$ |
| Peak output current | I_{op} | — | 2.2 | — | A | $T_j = 25^{\circ}\text{C}$ |

HA17800V/VP/VPJ Series

HA17807V/VP/VPJ Electrical Characteristics

($V_{IN} = 12.5\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\text{ }\mu\text{F}$, $C_{OUT} = 0.1\text{ }\mu\text{F}$)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|------|------|------|---------------------|--|
| Output voltage | V_{OUT1} | 6.72 | 7.00 | 7.28 | V | $T_j = 25^\circ\text{C}$ |
| | V_{OUT2} | 6.65 | — | 7.35 | V | $9\text{ V} \leq V_{IN} \leq 22\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$, $P_T \leq 15\text{ W}$ |
| Line regulation | δV_{OLine1} | — | 45 | 140 | mV | $T_j = 25^\circ\text{C}$, $9\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δV_{OLine2} | — | 15 | 70 | mV | $T_j = 25^\circ\text{C}$, $10\text{ V} \leq V_{IN} \leq 15\text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 45 | 140 | mV | $T_j = 25^\circ\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5\text{ A}$ |
| | δV_{OLoad2} | — | 15 | 70 | mV | $T_j = 25^\circ\text{C}$, $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.5 | 7.0 | mA | $T_j = 25^\circ\text{C}$, $I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.3 | mA | $9\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ |
| Voltage drop | V_{drop} | — | 2.0 | 2.5 | V | $T_j = 25^\circ\text{C}$, $I_{OUT} = 1.0\text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 58 | — | dB | $T_j = 25^\circ\text{C}$, $f = 10\text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -0.6 | — | mV/°C | $I_{OUT} = 5\text{ mA}$ |
| Output noise voltage | V_n | — | 140 | — | μV_{rms} | $T_j = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 1.1 | — | A | $T_j = 25^\circ\text{C}$ |
| Peak output current | I_{op} | — | 2.2 | — | A | $T_j = 25^\circ\text{C}$ |

HA17808V/VP/VPJ Electrical Characteristics
 $(V_{IN} = 14\text{ V}, I_{OUT} = 500\text{ mA}, 0^{\circ}\text{C} \leq T_j \leq 125^{\circ}\text{C}, C_{IN} = 0.33\text{ }\mu\text{F}, C_{OUT} = 0.1\text{ }\mu\text{F})$

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|------|------|------|---------------------|---|
| Output voltage | V_{OUT1} | 7.70 | 8.00 | 8.30 | V | $T_j = 25^{\circ}\text{C}$ |
| | V_{OUT2} | 7.6 | — | 8.4 | V | $10.5\text{ V} \leq V_{IN} \leq 23\text{ V},$ $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}, P_T \leq 15\text{ W}$ |
| Line regulation | δV_{OLine1} | — | 58 | 160 | mV | $T_j = 25^{\circ}\text{C}, 10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δV_{OLine2} | — | 20 | 80 | mV | $T_j = 25^{\circ}\text{C}, 11\text{ V} \leq V_{IN} \leq 17\text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 58 | 160 | mV | $T_j = 25^{\circ}\text{C}, 5\text{ mA} \leq I_{OUT} \leq 1.5\text{ A}$ |
| | δV_{OLoad2} | — | 20 | 80 | mV | $T_j = 25^{\circ}\text{C}, 250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.5 | 7.0 | mA | $T_j = 25^{\circ}\text{C}, I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.0 | mA | $10.5\text{ V} \leq V_{IN} \leq 25\text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ |
| Voltage drop | V_{drop} | — | 2.0 | 2.5 | V | $T_j = 25^{\circ}\text{C}, I_{OUT} = 1.0\text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 58 | — | dB | $T_j = 25^{\circ}\text{C}, f = 10\text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -0.6 | — | mV/C | $I_{OUT} = 5\text{ mA}$ |
| Output noise voltage | V_n | — | 150 | — | μV_{rms} | $T_j = 25^{\circ}\text{C}, 10\text{ Hz} \leq f \leq 100\text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 1.0 | — | A | $T_j = 25^{\circ}\text{C}$ |
| Peak output current | I_{op} | — | 2.2 | — | A | $T_j = 25^{\circ}\text{C}$ |

HA17800V/VP/VPJ Series

HA17812V/VP/VPJ Electrical Characteristics

($V_{IN} = 19\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 0.1\ \mu\text{F}$)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|------|------|------|---------------------|--|
| Output voltage | V_{OUT1} | 11.5 | 12.0 | 12.5 | V | $T_j = 25^\circ\text{C}$ |
| | V_{OUT2} | 11.4 | — | 12.6 | V | $14.5\text{ V} \leq V_{IN} \leq 27\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$, $PT \leq 15\text{ W}$ |
| Line regulation | δV_{OLine1} | — | 100 | 240 | mV | $T_j = 25^\circ\text{C}$, $14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ |
| | δV_{OLine2} | — | 33 | 120 | mV | $T_j = 25^\circ\text{C}$, $16\text{ V} \leq V_{IN} \leq 22\text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 100 | 240 | mV | $T_j = 25^\circ\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5\text{ A}$ |
| | δV_{OLoad2} | — | 33 | 120 | mV | $T_j = 25^\circ\text{C}$, $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.6 | 7.2 | mA | $T_j = 25^\circ\text{C}$, $I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.0 | mA | $14.5\text{ V} \leq V_{IN} \leq 30\text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ |
| Voltage drop | V_{drop} | — | 2.0 | 2.5 | V | $T_j = 25^\circ\text{C}$, $I_{OUT} = 1.0\text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 58 | — | dB | $T_j = 25^\circ\text{C}$, $f = 10\text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -0.8 | — | mV/°C | $I_{OUT} = 5\text{ mA}$ |
| Output noise voltage | V_n | — | 290 | — | μV_{rms} | $T_j = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 0.6 | — | A | $T_j = 25^\circ\text{C}$ |
| Peak output current | I_{op} | — | 2.1 | — | A | $T_j = 25^\circ\text{C}$ |

HA17815V/VP/VPJ Electrical Characteristics
 $(V_{IN} = 23 \text{ V}, I_{OUT} = 500 \text{ mA}, 0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, C_{IN} = 0.33 \mu\text{F}, C_{OUT} = 0.1 \mu\text{F})$

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|-------|------|-------|---------------------|--|
| Output voltage | V_{OUT1} | 14.4 | 15.0 | 15.6 | V | $T_j = 25^\circ\text{C}$ |
| | V_{OUT2} | 14.25 | — | 15.75 | V | $17.5 \text{ V} \leq V_{IN} \leq 30 \text{ V}$, $5 \text{ mA} \leq I_{OUT} \leq 1.0 \text{ A}$, $P_T \leq 15 \text{ W}$ |
| Line regulation | δV_{OLine1} | — | 144 | 300 | mV | $T_j = 25^\circ\text{C}$, $17.5 \text{ V} \leq V_{IN} \leq 30 \text{ V}$ |
| | δV_{OLine2} | — | 48 | 150 | mV | $T_j = 25^\circ\text{C}$, $20 \text{ V} \leq V_{IN} \leq 26 \text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 144 | 300 | mV | $T_j = 25^\circ\text{C}$, $5 \text{ mA} \leq I_{OUT} \leq 1.5 \text{ A}$ |
| | δV_{OLoad2} | — | 48 | 150 | mV | $T_j = 25^\circ\text{C}$, $250 \text{ mA} \leq I_{OUT} \leq 750 \text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.6 | 7.2 | mA | $T_j = 25^\circ\text{C}$, $I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.0 | mA | $17.5 \text{ V} \leq V_{IN} \leq 30 \text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5 \text{ mA} \leq I_{OUT} \leq 1.0 \text{ A}$ |
| Voltage drop | Vdrop | — | 2.0 | 2.5 | V | $T_j = 25^\circ\text{C}$, $I_{OUT} = 1.0 \text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 58 | — | dB | $T_j = 25^\circ\text{C}$, $f = 10 \text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -0.8 | — | mV/°C | $I_{OUT} = 5 \text{ mA}$ |
| Output noise voltage | Vn | — | 300 | — | μV_{rms} | $T_j = 25^\circ\text{C}$, $10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 0.4 | — | A | $T_j = 25^\circ\text{C}$ |
| Peak output current | lop | — | 2.1 | — | A | $T_j = 25^\circ\text{C}$ |

HA17800V/VP/VPJ Series

HA17818V/VP/VPJ Electrical Characteristics

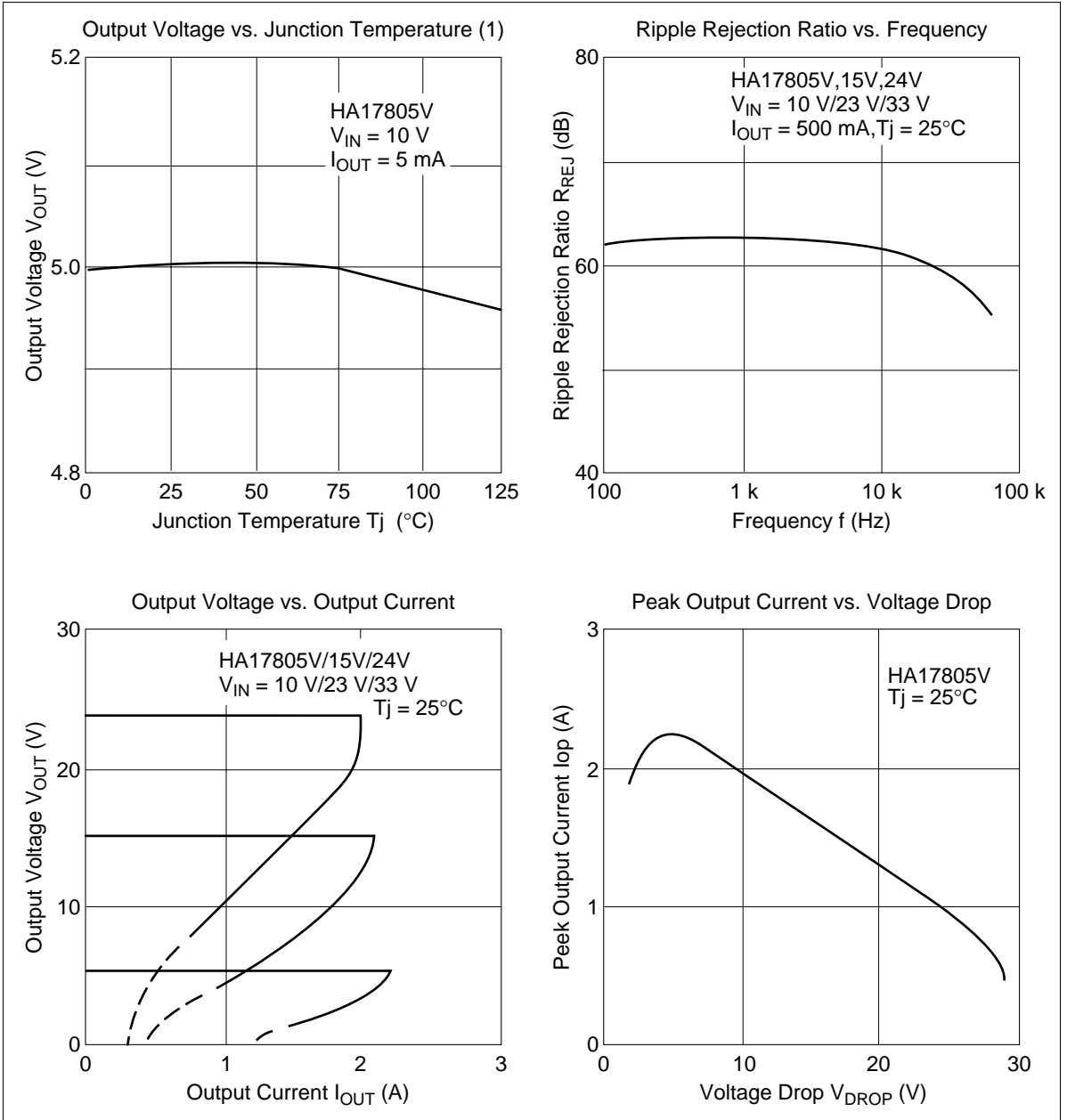
($V_{IN} = 27\text{ V}$, $I_{OUT} = 500\text{ mA}$, $0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}$, $C_{IN} = 0.33\ \mu\text{F}$, $C_{OUT} = 0.1\ \mu\text{F}$)

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|------|------|------|---------------------|---|
| Output voltage | V_{OUT1} | 17.3 | 18.0 | 18.7 | V | $T_j = 25^\circ\text{C}$ |
| | V_{OUT2} | 17.1 | — | 18.9 | V | $21\text{ V} \leq V_{IN} \leq 33\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$, $P_T \leq 15\text{ W}$ |
| Line regulation | δV_{OLine1} | — | 195 | 360 | mV | $T_j = 25^\circ\text{C}$, $21\text{ V} \leq V_{IN} \leq 33\text{ V}$ |
| | δV_{OLine2} | — | 65 | 180 | mV | $T_j = 25^\circ\text{C}$, $24\text{ V} \leq V_{IN} \leq 30\text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 195 | 360 | mV | $T_j = 25^\circ\text{C}$, $5\text{ mA} \leq I_{OUT} \leq 1.5\text{ A}$ |
| | δdV_{OLoad2} | — | 65 | 180 | mV | $T_j = 25^\circ\text{C}$, $250\text{ mA} \leq I_{OUT} \leq 750\text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.6 | 7.2 | mA | $T_j = 25^\circ\text{C}$, $I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.0 | mA | $21\text{ V} \leq V_{IN} \leq 33\text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5\text{ mA} \leq I_{OUT} \leq 1.0\text{ A}$ |
| Voltage drop | V_{drop} | — | 2.0 | 2.5 | V | $T_j = 25^\circ\text{C}$, $I_{OUT} = 1.0\text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 56 | — | dB | $T_j = 25^\circ\text{C}$, $f = 10\text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -0.8 | — | mV/C | $I_{OUT} = 5\text{ mA}$ |
| Output noise voltage | V_n | — | 430 | — | μV_{rms} | $T_j = 25^\circ\text{C}$, $10\text{ Hz} \leq f \leq 100\text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 0.35 | — | A | $T_j = 25^\circ\text{C}$ |
| Peak output current | I_{op} | — | 2.1 | — | A | $T_j = 25^\circ\text{C}$ |

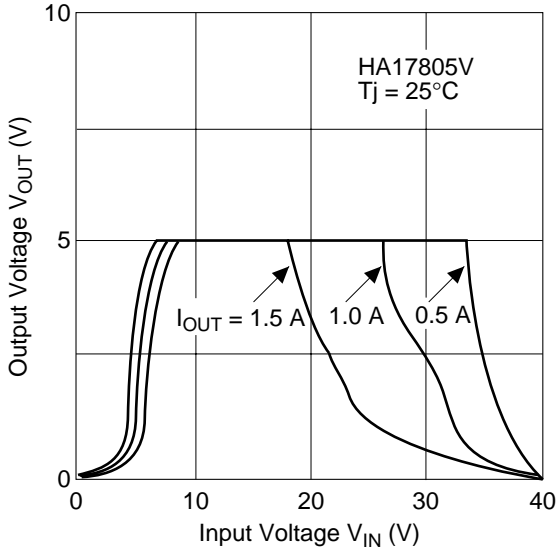
HA17824V/VP/VPJ Electrical Characteristics
 $(V_{IN} = 33 \text{ V}, I_{OUT} = 500 \text{ mA}, 0^\circ\text{C} \leq T_j \leq 125^\circ\text{C}, C_{IN} = 0.33 \mu\text{F}, C_{OUT} = 0.1 \mu\text{F})$

| Item | Symbol | Min | Typ | Max | Unit | Test Conditions |
|---|-----------------------------|------|------|------|---------------------|--|
| Output voltage | V_{OUT1} | 23.0 | 24.0 | 25.0 | V | $T_j = 25^\circ\text{C}$ |
| | V_{OUT2} | 22.8 | — | 25.2 | V | $27 \text{ V} \leq V_{IN} \leq 38 \text{ V},$ $5 \text{ mA} \leq I_{OUT} \leq 1.0 \text{ A}, P_T \leq 15 \text{ W}$ |
| Line regulation | δV_{OLine1} | — | 260 | 480 | mV | $T_j = 25^\circ\text{C}, 27 \text{ V} \leq V_{IN} \leq 38 \text{ V}$ |
| | δV_{OLine2} | — | 86 | 240 | mV | $T_j = 25^\circ\text{C}, 30 \text{ V} \leq V_{IN} \leq 36 \text{ V}$ |
| Load regulation | δV_{OLoad1} | — | 260 | 480 | mV | $T_j = 25^\circ\text{C}, 5 \text{ mA} \leq I_{OUT} \leq 1.5 \text{ A}$ |
| | δV_{OLoad2} | — | 86 | 240 | mV | $T_j = 25^\circ\text{C}, 250 \text{ mA} \leq I_{OUT} \leq 750 \text{ mA}$ |
| Quiescent current | I_Q | 0.8 | 3.7 | 7.4 | mA | $T_j = 25^\circ\text{C}, I_{OUT} = 0$ |
| Quiescent current change | δI_{Q1} | — | — | 1.0 | mA | $27 \text{ V} \leq V_{IN} \leq 38 \text{ V}$ |
| | δI_{Q2} | — | — | 0.5 | mA | $5 \text{ mA} \leq I_{OUT} \leq 1.0 \text{ A}$ |
| Voltage drop | V_{drop} | — | 2.0 | 2.5 | V | $T_j = 25^\circ\text{C}, I_{OUT} = 1.0 \text{ A}$ |
| Ripple rejection ratio | R_{REJ} | — | 50 | — | dB | $T_j = 25^\circ\text{C}, f = 10 \text{ kHz}$ |
| Temperature coefficient of output voltage | $\delta V_{OUT}/\delta T_a$ | — | -1.2 | — | mV/C | $I_{OUT} = 5 \text{ mA}$ |
| Output noise voltage | V_n | — | 570 | — | μV_{rms} | $T_j = 25^\circ\text{C}, 10 \text{ Hz} \leq f \leq 100 \text{ kHz}$ |
| Output short circuit current | I_{OS} | — | 0.25 | — | A | $T_j = 25^\circ\text{C}$ |
| Peak output current | I_{op} | — | 2.0 | — | A | $T_j = 25^\circ\text{C}$ |

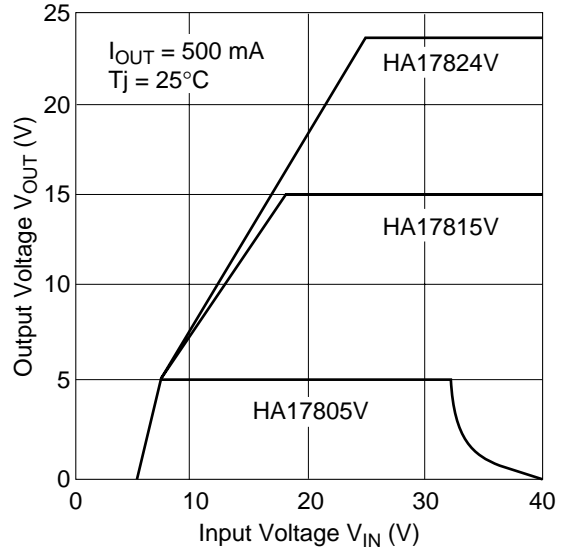
Characteristic Curves



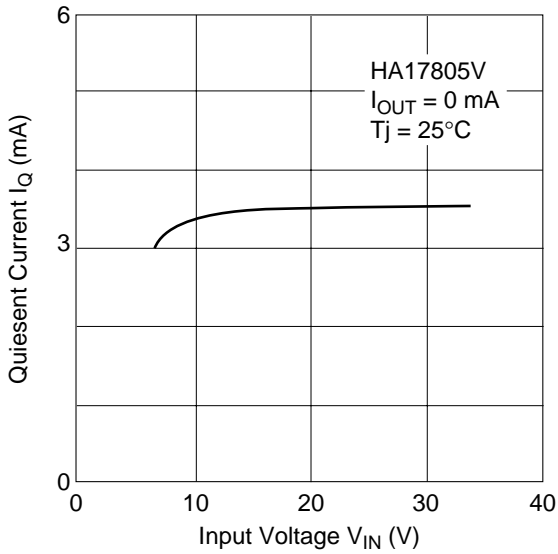
Output Voltage vs. Input Voltage (1)



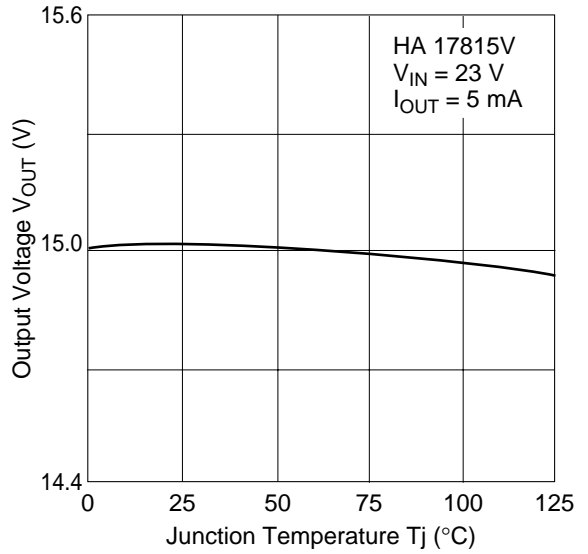
Output Voltage vs. Input Voltage (2)



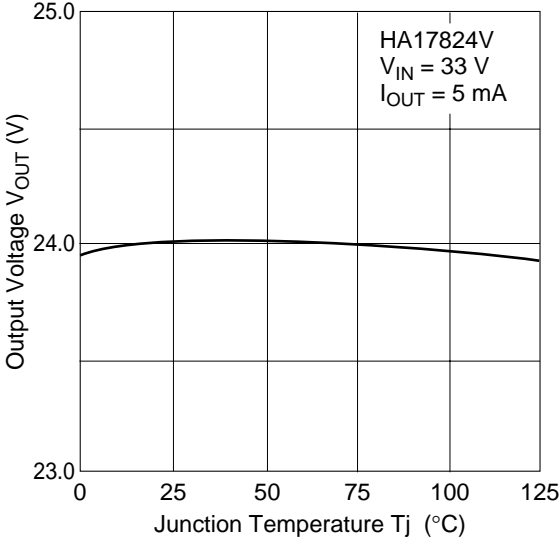
Quiescent Current vs. Input Voltage



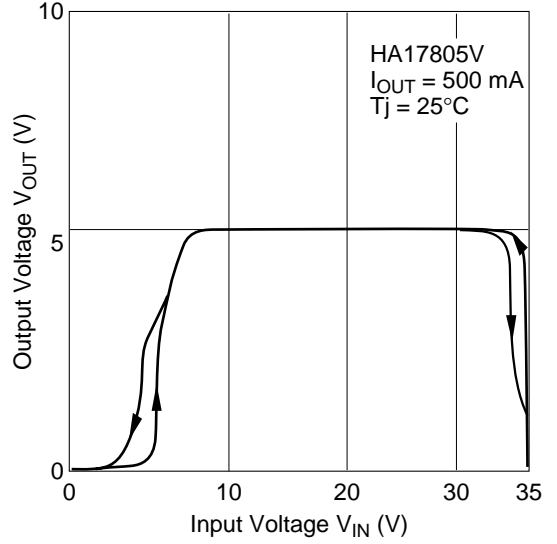
Output Voltage vs. Junction Temperature (2)



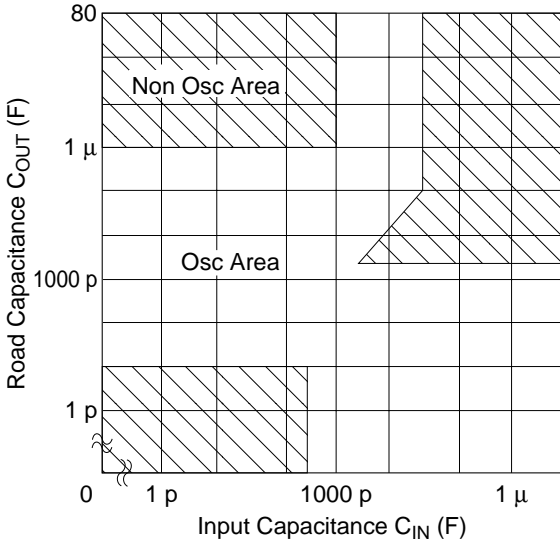
Output Voltage vs. Junction Temperature (3)



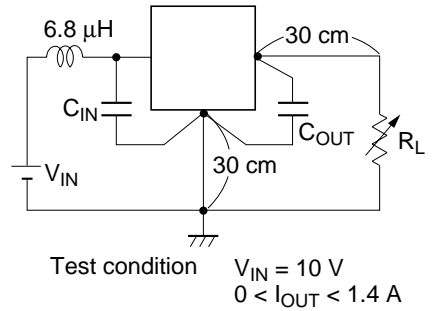
Output Voltage vs. Input Voltage (3)



Oscillation Area

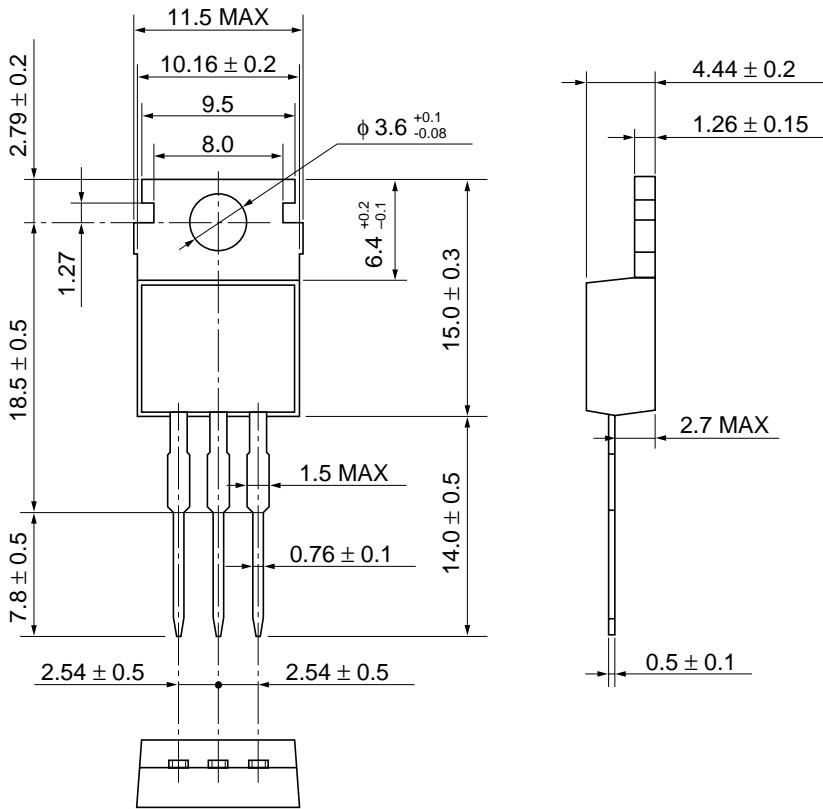


Measurement Circuit



Package Dimensions

Unit: mm



| | |
|------------------------|----------|
| Hitachi Code | TO-220AB |
| JEDEC | Conforms |
| EIAJ | Conforms |
| Mass (reference value) | 1.8 g |

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