

# KA7632/KA7633

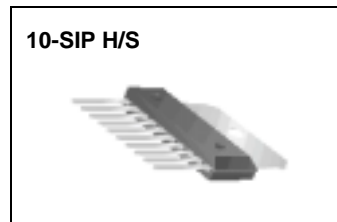
## Fixed Multi-output Regulator

### Features

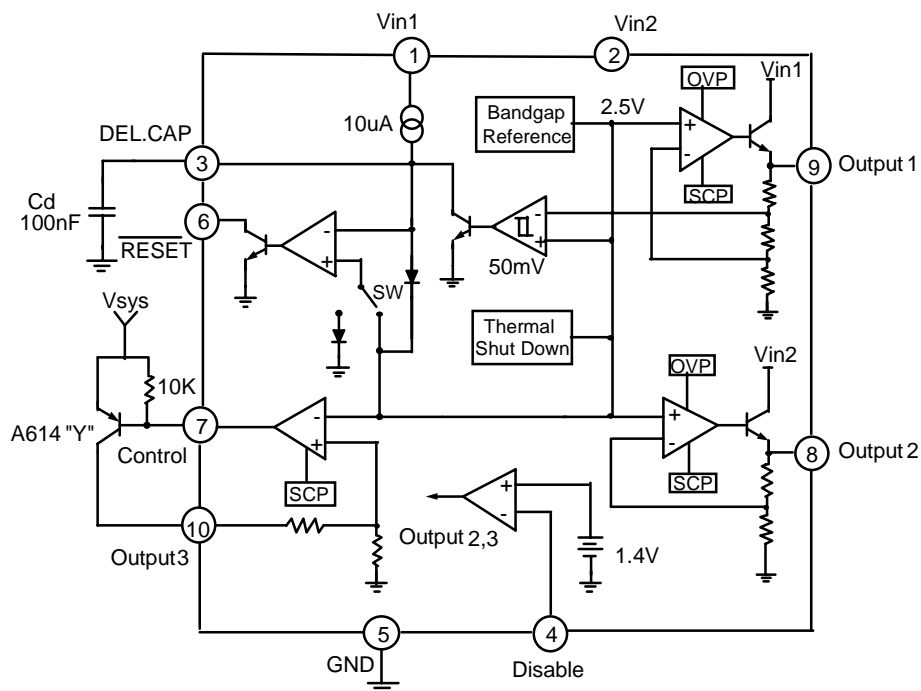
- Output Currents up to 0.5A (output1 & 2)
- Output Current up to 1A with External Transistor (output3)
- Fixed Precision Output 1 voltage  $3.3V \pm 2\%$
- Fixed Precision Output 2 voltage  $8V \pm 2\%$  (KA7632)
- Fixed Precision Output 2 voltage  $9V \pm 2\%$  (KA7633)
- Control Signal Generator for Output 3 voltage ( $5.1V \pm 2\%$ )
- Reset Facility for Output Voltage1
- Output 2,3 with Disable by TTL Input
- Current Limit Protection at Each Output
- Thermal Shut Down

### Description

The KA7632/KA7633 is a multi-output positive voltage regulator designed to provide fixed precision output voltages of 3.3V, 8V (KA7632) / 9V (KA7633) at current up to 0.5A and 5.1V at current up to 1A with external PNP transistor. An internal reset circuit generates a reset pulse when the output 1 decrease below the regulated value. Output2 & 3 can be disabled by TTL input. Protection features include over voltage protection, short circuit protection and thermal shutdown.



### Internal Block Diagram



## Absolute Maximum Ratings

| Parameter             | Symbol | Value  | Unit | Remark      |
|-----------------------|--------|--------|------|-------------|
| DC Input Voltage      | Vin    | 20     | V    | -           |
| Disable Input Voltage | Vc     | 20     | V    | -           |
| Output Current        | Io     | 0.5    | A    | -           |
| Power Dissipation     | Pd     | 1.5    | W    | No Heatsink |
| Junction Temperature  | Tj     | +150   | °C   | -           |
| Operating Temperature | Topr   | 0~+125 | °C   | -           |

## Electrical Characteristics(KA7632)

(Refer to test circuit Vin1=6V , Vin2=10.5V , Tj = +25 °C, unless otherwise specified)

| Parameter                             | Symbol  | Conditions                                       | Min.         | Typ.       | Max.         | Unit   |
|---------------------------------------|---------|--|--------------|------------|--------------|--------|
| Output Voltage 1                      | Vo1     | Io1=10mA<br>6V<Vin1<14V<br>5mA<Io1<500mA         | 3.22<br>3.14 | 3.3<br>3.3 | 3.38<br>3.46 | V      |
| Output Voltage 2                      | Vo2     | Io2=10mA<br>10.5V<Vin2<18V<br>5mA<Io2<500mA      | 7.84<br>7.7  | 8<br>8     | 8.16<br>8.3  | V      |
| Dropout Output Voltage 1,2            | Vd1,2   | Io1,2=500mA                                      | -            | -          | 2.5          | V      |
| Line Regulation 1,2                   | ΔVo 1,2 | 6V <Vin1<14V<br>10.5V <Vin2<18V<br>Io1,2 = 200mA | -            | -          | 40<br>80     | mV     |
| Load Regulation 1,2                   | ΔVo 1,2 | 5mA < Io1 < 500mA<br>5mA < Io2 < 500mA           | -            | -          | 70<br>160    | mV     |
| Output Voltage 3                      | Vo3     | Vsys=7V, Io3=100mA                               | 4.97         | 5.1        | 5.23         | V      |
| Line Regulation 3                     | ΔVo3    | 13V< Vin2 <18V, Io3 =100mA                       | -            | -          | 50           | mV     |
| Load Regulation 3                     | ΔVo3    | 5mA < Io3 < 1A                                   | -            | -          | 110          | mV     |
| Reset Pulse Delay                     | Trd     | Cd=100nF, Note1                                  | -            | 25         | -            | ms     |
| Saturation Voltage in Reset Condition | VrL     | I6=5mA   | -            | -          | 0.4          | V      |
| Leakage Current at Pin 6              | IrH     | V6=10V   | -            | -          | 10           | μA     |
| Output Voltage Thermal Drift          | STt     | 0 °C < Tj < +125 °C , Note 2                     | -            | 100        | -            | ppm/°C |
| Short Circuit Output Current          | Isc1,2  | Vin1=6V , Vin2 =10.5V                            | -            | -          | 1.6          | A      |
| Disable Voltage High                  | VdisH   | Output 2 Active                                  | 2            | -          | -            | V      |
| Disable Voltage Low                   | VdisL   | Output 2 Disabled                                | -            | -          | 0.8          | V      |
| Disable Bias Current                  | Idis    | 0V < Vdis < 7V                                   | -100         | -          | 2            | μA     |
| Junction Temperature for TSD          | Ttsd    | Note 2   | -            | 145        | -            | °C     |
| Quiescent Current                     | Iq      | Io1=10mA, Output2 Disabled                       | -            | -          | 2            | mA     |
| Reset Threshold Voltage               | Vr      | K=Vo1  | K-0.4        | K-0.25     | K-0.1        | V      |
| Reset Threshold Hysteresis            | Vrth    | Note 1   | 20           | 50         | 100          | mA     |

### Notes:

- To check the reset circuit ,the reset output is low to discharge the delay capacitor(=Cd). if it's less than Vo1-0.25V. And the reset output is high when the delay capacitor voltage linearly increased by the internal current source(10μA) if it's more than Vo1- 0.2V. The equations of delay time is same as below. Trd = (Cd × 2.5) / 10μA
- These parameters, although guaranteed, are not 100% tested in production.

## Electrical Characteristics(KA7633)

(Refer to test circuit  $V_{in1}=6V$  ,  $V_{in2}=11.5V$  ,  $T_j = +25\text{ }^\circ\text{C}$ , unless otherwise specified)

| Parameter                             | Symbol            | Conditions  | Min.         | Typ.       | Max.         | Unit                  |
|---------------------------------------|-------------------|---|--------------|------------|--------------|-----------------------|
| Output Voltage 1                      | $V_{o1}$          | $I_{o1}=10\text{mA}$<br>$6V < V_{in1} < 14V$<br>$5\text{mA} < I_{o1} < 500\text{mA}$    | 3.22<br>3.14 | 3.3<br>3.3 | 3.38<br>3.46 | V                     |
| Output Voltage 2                      | $V_{o2}$          | $I_{o2}=10\text{mA}$<br>$11.5V < V_{in2} < 18V$<br>$5\text{mA} < I_{o2} < 500\text{mA}$ | 8.82<br>8.65 | 9<br>9     | 9.18<br>9.35 | V                     |
| Dropout Output Voltage 1,2            | $V_{d1,2}$        | $I_{o1,2}=500\text{mA}$   | -            | -          | 2.5          | V                     |
| Line Regulation 1,2                   | $\Delta V_{o1,2}$ | $6V < V_{in1} < 14V$<br>$11.5V < V_{in2} < 18V$<br>$I_{o1,2} = 200\text{mA}$            | -            | -          | 40<br>80     | mV                    |
| Load Regulation 1,2                   | $\Delta V_{o1,2}$ | $5\text{mA} < I_{o1} < 500\text{mA}$<br>$5\text{mA} < I_{o2} < 500\text{mA}$            | -            | -          | 70<br>160    | mV                    |
| Output Voltage 3                      | $V_{o3}$          | $V_{sys}=7V$ , $I_{o3}=100\text{mA}$  | 4.97         | 5.1        | 5.23         | V                     |
| Line Regulation 3                     | $\Delta V_{o3}$   | $13V < V_{in2} < 18V$ , $I_{o3} = 100\text{mA}$   | -            | -          | 50           | mV                    |
| Load Regulation 3                     | $\Delta V_{o3}$   | $5\text{mA} < I_{o3} < 1\text{A}$   | -            | -          | 110          | mV                    |
| Reset Pulse Delay                     | Trd               | $C_d=100\text{nF}$ , Note1  | -            | 25         | -            | ms                    |
| Saturation Voltage in Reset Condition | $V_{rL}$          | $I_6=5\text{mA}$  | -            | -          | 0.4          | V                     |
| Leakage Current at Pin 6              | $I_{rH}$          | $V_6=10V$   | -            | -          | 10           | $\mu\text{A}$         |
| Output Voltage Thermal Drift          | STt               | $0\text{ }^\circ\text{C} < T_j < +125\text{ }^\circ\text{C}$ , Note 2                   | -            | 100        | -            | ppm/ $^\circ\text{C}$ |
| Short Circuit Output Current          | $I_{sc1,2}$       | $V_{in1}=6V$ , $V_{in2} = 11.5V$  | -            | -          | 1.6          | A                     |
| Disable Voltage High                  | $V_{disH}$        | Output 2 Active   | 2            | -          | -            | V                     |
| Disable Voltage Low                   | $V_{disL}$        | Output 2 Disabled   | -            | -          | 0.8          | V                     |
| Disable Bias Current                  | $I_{dis}$         | $0V < V_{dis} < 7V$   | -100         | -          | 2            | $\mu\text{A}$         |
| Junction Temperature for TSD          | $T_{tsd}$         | Note 2  | -            | 145        | -            | $^\circ\text{C}$      |
| Quiescent Current                     | $I_q$             | $I_{o1}=10\text{mA}$ , Output2 Disabled   | -            | -          | 2            | mA                    |
| Reset Threshold Voltage               | $V_r$             | $K=V_{o1}$  | K-0.4        | K-0.25     | K-0.1        | V                     |
| Reset Threshold Hysteresis            | $V_{rth}$         | Note 1  | 20           | 50         | 100          | mA                    |

### Notes:

- To check the reset circuit ,the reset output is low to discharge the delay capacitor(= $C_d$ ). if it's less than  $V_{o1}-0.25V$ . And the reset output is high when the delay capacitor voltage linearly increased by the internal current source( $10\mu\text{A}$ ) if it's more than  $V_{o1}-0.2V$ . The equations of delay time is same as below.  $Trd = (C_d \times 2.5) / 10\mu\text{A}$
- These parameters, although guaranteed, are not 100% tested in production.

## Typical Performance Characteristics

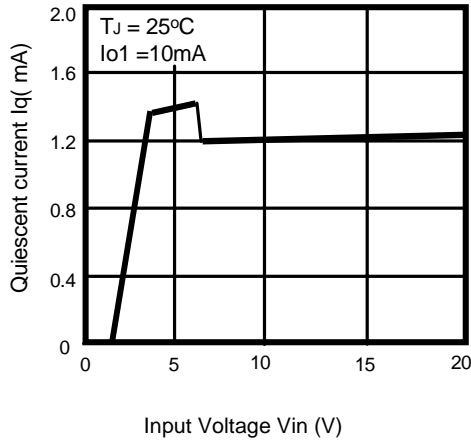


Figure 1. Quiescent Current vs. Input Voltage

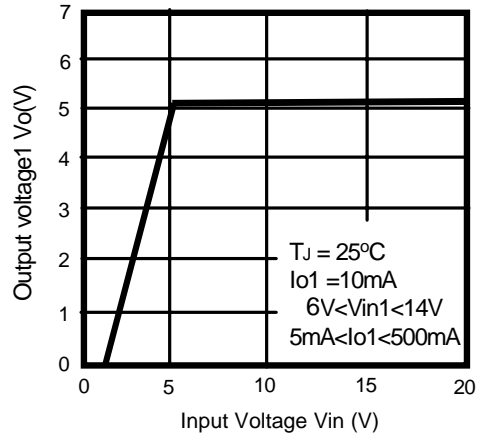


Figure 2. Output Voltage1 vs. Input Voltage

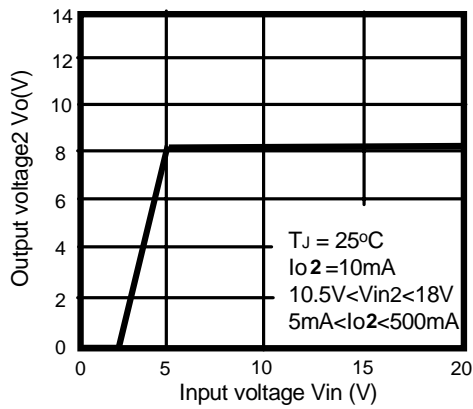


Figure 3. Output Voltage2 vs. Input Voltage

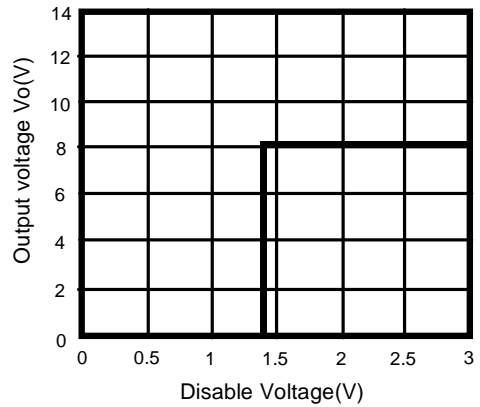


Figure 4. Output Voltage vs. Disable Voltage High(Low)

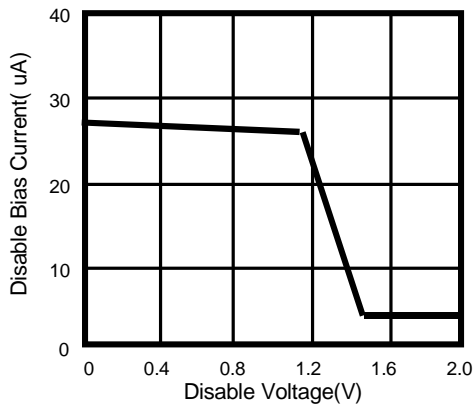


Figure 5. Disable Bias Current vs. Disable Voltage

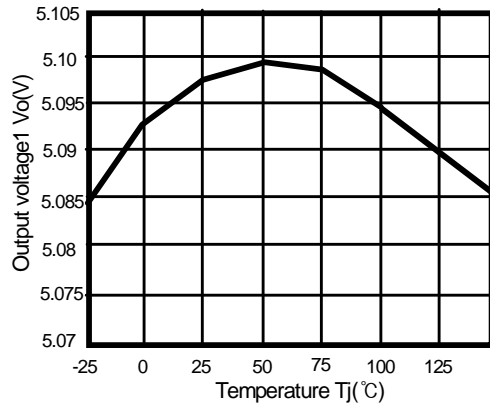


Figure 6. Output Voltage1 vs. Temperature(Tj)

## Typical Performance Characteristics (continued)

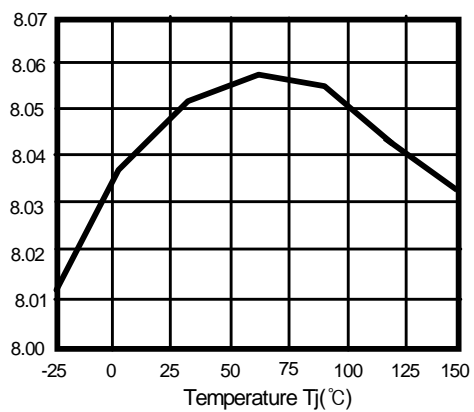


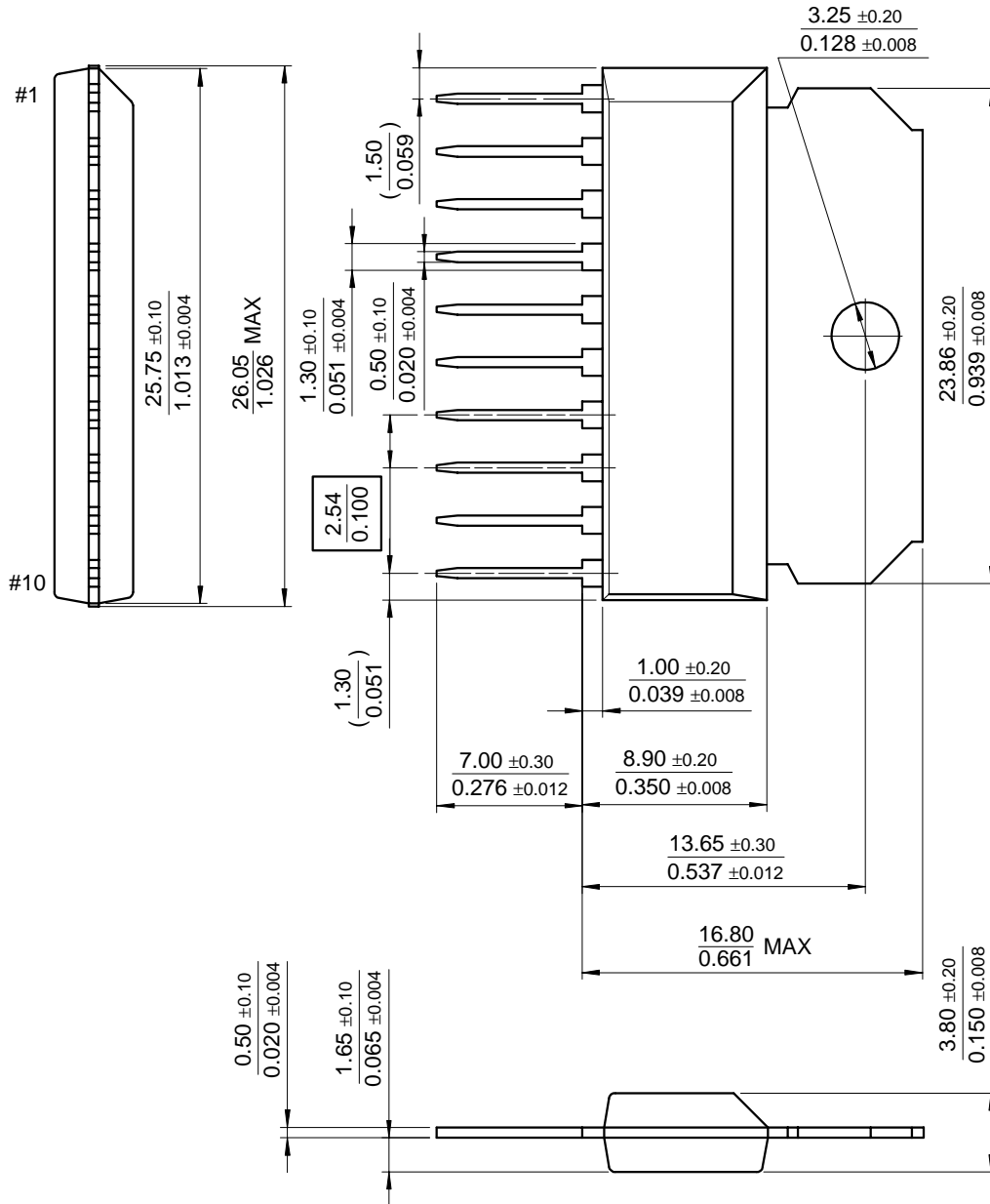
Figure 7. Output Voltage2 vs. Temperature(Tj)

# Mechanical Dimensions

Package

Dimensions in millimeters

## 10-SIP H/S



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## Ordering Information

| Product Number | Package    | Operating Temperature |
|----------------|------------|-----------------------|
| KA7632         | 10-SIP H/S | 0°C to +125°C         |
| KA7633         |            |                       |

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