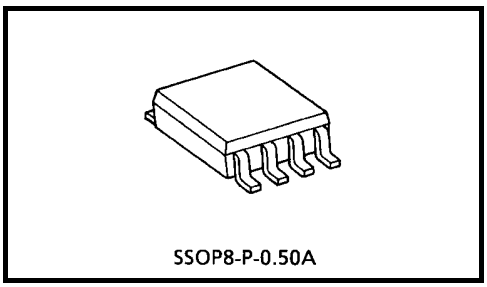
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

# T A R 8 H 0 6 K

Dual Low-Dropout Regulator

TAR8H06K is a bipolar type 2-system output power supply with a control pin. ON and OFF can be switched using the control pin.

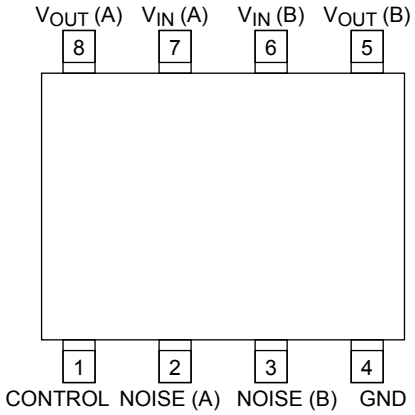



Weight: 0.01 g (typ.)

## Features

- Include 2-regulators (1.5 V, 2.5 V)
- Overtemperature/overcurrent protection
- Very small 8-pin package

## Pin Assignment (top view)




$V_{OUT}$ (A) = 1.5 V

$V_{OUT}$ (B) = 2.5 V

## Marking

8H06

Overtemperature protection and overcurrent protection functions are not necessary guarantee of operating ratings below the absolute maximum ratings.

Do not use devices under conditions in which their absolute maximum ratings will be exceeded.

## Absolute Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Supply Voltage | $V_{IN}$ | 12 | V |
| Output Current (A-channel) | $I_{OUT}$ (A) | 100 | mA |
| Output Current (B-channel) | $I_{OUT}$ (B) | 150 | |
| Power Dissipation | $P_D$ | 200 (Note 1) | mW |
| | | 400 (Note 2) | |
| Operation Temp. Range | $T_{opr}$ | −40 to 85 | °C |
| Storage Temp. Range | $T_{stg}$ | −55 to 150 | °C |

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings and the operating ranges.
Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook (“Handling Precautions”/“Derating Concept and Methods”) and individual reliability data (i.e. reliability test report and estimated failure rate, etc).

Note 1: Unit Rating

Note 2: Mounted on a glass epoxy circuit board of 30 × 30 mm Pad dimension of 70 $mm^2$

## Electrical Characteristics (unless otherwise specified, $V_{IN}$ = 3.6 V, $C_{IN}$ = 1 μF, $C_{OUT}$ = 10 μF, $C_{NOISE}$ = 0.01 μF, $V_{CT}$ = 3.6 V, $T_j$ = 25°C)

### 1.5 V Output Characteristics ($V_{OUT}$ (A))

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ (A) | $I_{OUT}$ (A) = 30 mA | 1.44 | 1.5 | 1.56 | V |
| Load Regulation | Reg·load (A) | $I_{OUT}$ (A) = 0 mA to 30 mA | — | 10 | 30 | mV |
| Line Regulation | Reg·line (A) | $V_{IN}$ = 4.0 V to 8.0 V | — | 1 | 20 | mV |
| Temp. Coefficient | $T_{CVO}$ (A) | Ta = −40°C to 85°C | — | 100 | — | ppm/°C |
| Ripple Rejection | R.R.$_1$ (A) | $V_{IN}$ = 5.0 V, $I_{OUT}$ (A) = 10 mA, f = 200 Hz, $V_{Ripple}$ = 1 $V_{p-p}$, Ta = 25°C | — | 65 | — | dB |
| | R.R.$_2$ (A) | $V_{IN}$ = 5.0 V, $I_{OUT}$ (A) = 10 mA, f = 200 kHz, $V_{Ripple}$ = 1 $V_{p-p}$, Ta = 25°C | — | 50 | — | dB |
| Output Noise Voltage | $V_{NO}$ (A) | $I_{OUT}$ (A) = 10 mA, 10 Hz ≦ f ≦ 10 kHz, Ta = 25°C | — | 30 | — | $\mu V_{rms}$ |
| Output Rise Time | $t_{rise}$ (A) | $I_{OUT}$ (A) = 30 mA, $V_{CT}$ = 0 V → 3 V ($t_r$ = 10 ns) | — | 1 | — | ms |

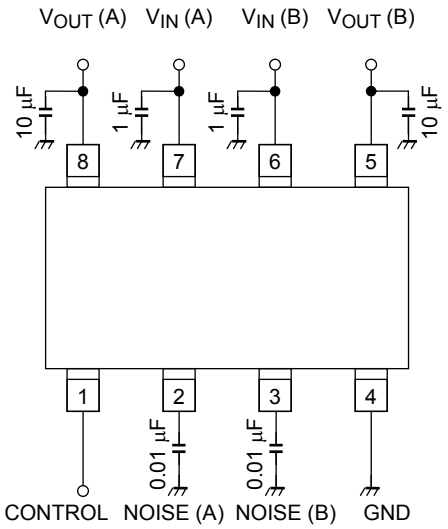
## 2.5 V Output Characteristics ($V_{OUT}$ (B))

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Output Voltage | $V_{OUT}$ (B) | $I_{OUT}$ (B) = 60 mA | 2.43 | 2.5 | 2.57 | V |
| Dropout Voltage | $V_{IN}$-$V_{OUT}$ (B) | $V_{IN}$ = 2.6 V, $I_{OUT}$ (B) = 60 mA | — | 150 | 300 | mV |
| Load Regulation | Reg·load (B) | $I_{OUT}$ (B) = 0 mA to 60 mA | — | 10 | 60 | mV |
| Line Regulation | Reg·line (B) | $V_{IN}$ = 4.0 V to 8.0 V | — | 1 | 20 | mV |
| Temp. Coefficient | $T_{CVO}$ (B) | Ta = −40°C to 85°C | — | 100 | — | ppm/°C |
| Ripple Rejection | R.R.$_1$ (B) | $V_{IN}$ = 5.0 V, $I_{OUT}$ (B) = 10 mA, f = 200 Hz, $V_{Ripple}$ = 1 $V_{p-p}$, Ta = 25°C | — | 65 | — | dB |
| | R.R.$_2$ (B) | $V_{IN}$ = 5.0 V, $I_{OUT}$ (B) = 10 mA, f = 200 kHz, $V_{Ripple}$ = 1 $V_{p-p}$, Ta = 25°C | — | 50 | — | dB |
| Output Noise Voltage | $V_{NO}$ (B) | $I_{OUT}$ (B) = 10 mA, 10 Hz ≦ f ≦ 10 kHz, Ta = 25°C | — | 30 | — | $\mu V_{rms}$ |
| Output Rise Time | $t_{rise}$ (B) | $I_{OUT}$ (B) = 60 mA, $V_{CT}$ = 0 V → 3 V ($t_r$ = 10 ns) | — | 1 | — | ms |

## Common Characteristics

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Stand-by Current | $I_{B\ (OFF)}$ | $V_{CT}$ = 0 V | — | — | 10 | μA |
| Quiescent Current | $I_B$ | $I_{OUT}$ (A) = 30 mA, $I_{OUT}$ (B) = 60 mA | — | 1 | 2 | mA |
| Control Voltage (ON) | $V_{CT\ (ON)}$ | — | 2.2 | — | — | V |
| Control Voltage (OFF) | $V_{CT\ (OFF)}$ | — | — | — | 0.4 | V |
| Control Input Current | $I_{CT}$ | $V_{CT}$ = 3 V (output ON) | — | — | 30 | μA |

### Application Note · Recommended Application circuit




The noise capacitor should be connected to NOISE pin to GND for stable operation.
The recommended value is higher than 0.0047μF.

| Control level | A-channel | B-channel |
|---|---|---|
| HIGH | ON | ON |
| LOW | OFF | OFF |

The figure above shows commended configuration for using a point regulator. Insert a capacitor for stable input/output operation.

If the control function is not to be used, Toshiba recommended that the control pin be connected to the $V_{CC}$ pin.

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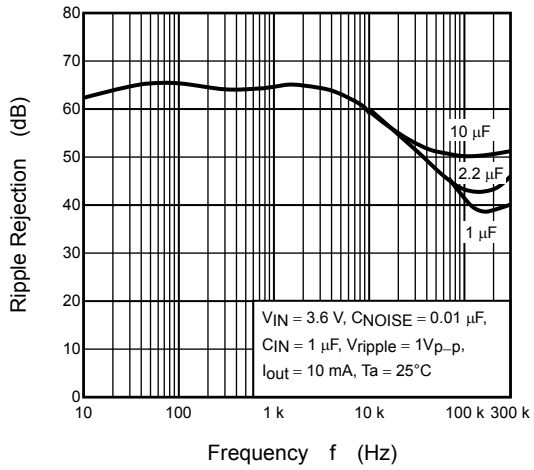
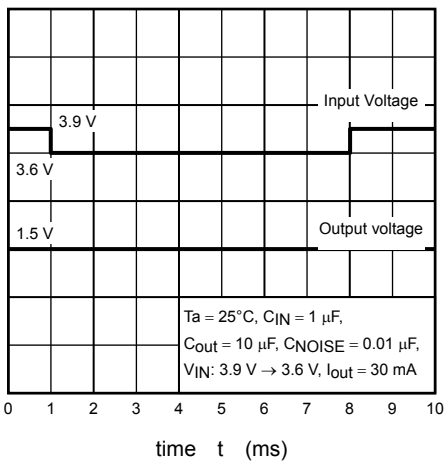
## Ripple Rejection

TAR8H06K feature a circuit with an excellent ripple rejection characteristic. Because the circuit also features an excellent output fluctuation characteristic for sudden supply voltage drops, the circuit is ideal for in the RF blocks incorporated in all mobile telephones.

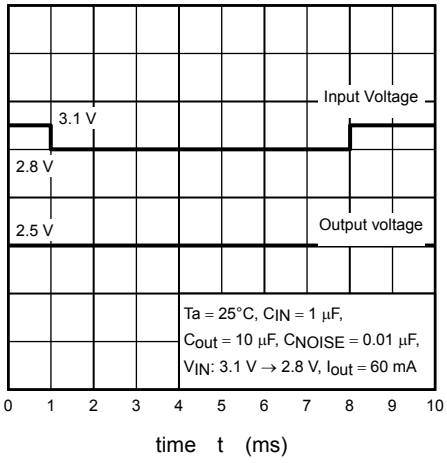
Ripple Rejection – f




Input Transient Responce $V_{OUT(A)}$



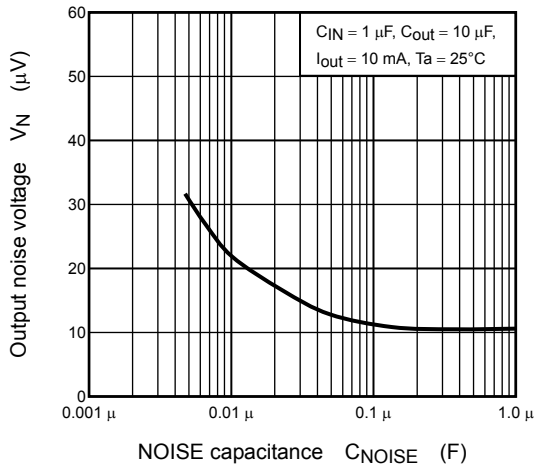

Input Transient Responce $V_{OUT(B)}$



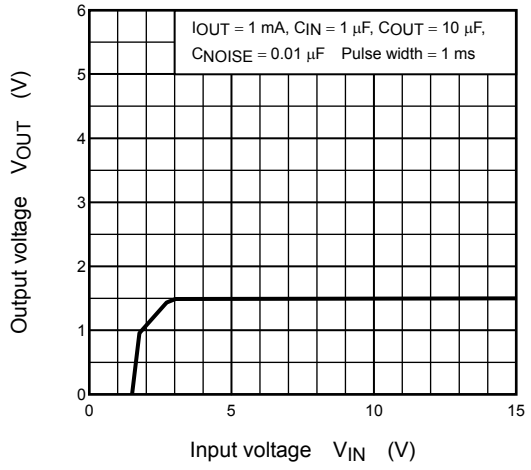

## NOISE Pin

TAR8H06K device incorporate a NOISE pin to reduce output noise voltage. Inserting a capacitor between the NOISE pin and GND reduces output noise. To ensure stable operation, insert a capacitor of 0.0047 μF or more between the NOISE pin and GND.

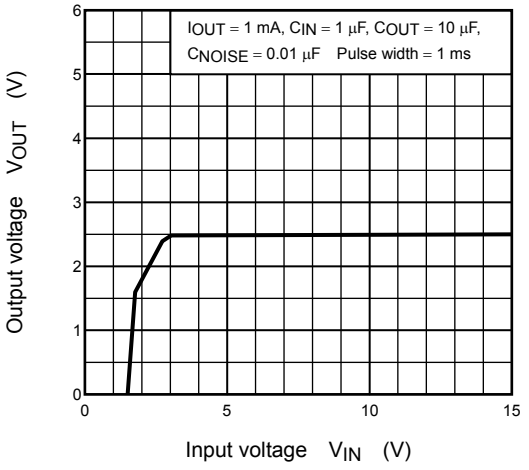
$C_{NOISE}$ – $V_N$



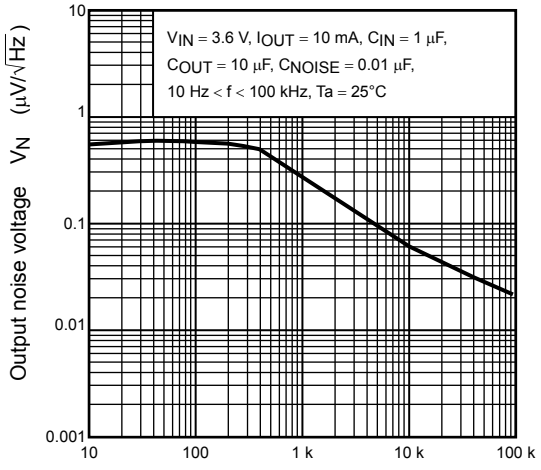
$V_{OUT(A)} – V_{IN}$



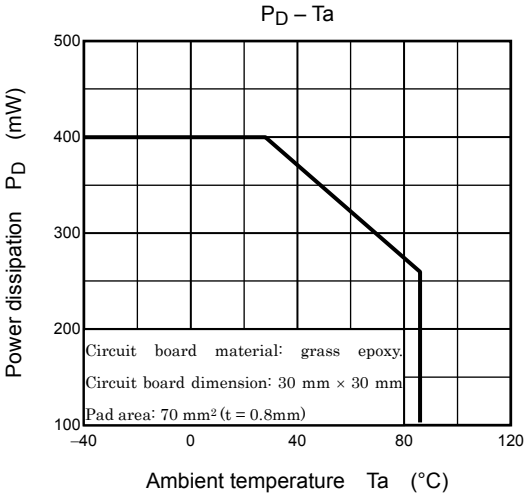

$V_{OUT(B)} – V_{IN}$




$V_N – f$

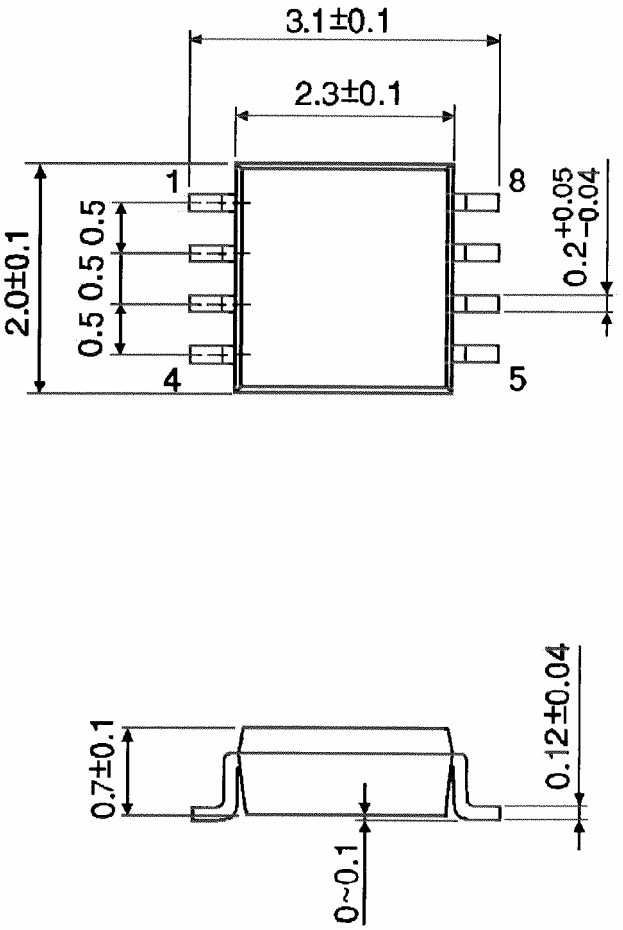



$P_D – Ta$



## Package Dimensions

SSOP8-P-0.50A Unit : mm




Weight: 0.01 g (Typ.)

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20070701-EN GENERAL

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