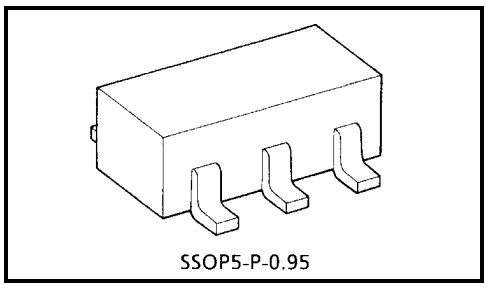
**Preliminary** TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

# TAR5SB15, TAR5SB18, TAR5SB23, TAR5SB24, TAR5SB25, TAR5SB27, TAR5SB28, TAR5SB29, TAR5SB30, TAR5SB33

Point Regulators (Low-Dropout Regulator)

The TAR5SBxx Series is comprised of general-purpose bipolar single-power-supply devices incorporating a control pin which can be used to turn them ON/OFF.

Overtemperature and overcurrent protection circuits are built into the devices' output circuit.

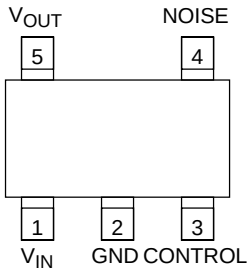



Weight: 0.014 g (typ.)

## Features

- Low stand-by current
- Over-temperature/over-current protection
- Operation voltage range is wide.
- Maximum output current is high.
- Low dropout voltage
- Small package (SOT-23 5 pin)
- Ceramic capacitors can be used.

## Pin Assignments (top view)




Over-temperature/over-current protection functions are NOT guarantee maximum-ratings of these devices. Do not use devices under conditions in which their maximum ratings will be exceeded.

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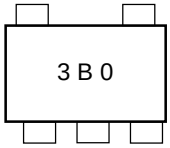
## List of Products Number and Marking

| Products No. | Marking |
|---|---|
| TAR5SB15 | 1B5 |
| TAR5SB18 | 1B8 |
| TAR5SB23 | 2B3 |
| TAR5SB24 | 2B4 |
| TAR5SB25 | 2B5 |
| TAR5SB27 | 2B7 |
| TAR5SB28 | 2B8 |
| TAR5SB29 | 2B9 |
| TAR5SB30 | 3B0 |
| TAR5SB33 | 3B3 |

## Marking on the Product

Example: TAR5SB30 (3.0 V output)




## Maximum Ratings (Ta = 25°C)

| Characteristics | Symbol | Rating | Unit |
|---|---|---|---|
| Supply voltage | $V_{IN}$ | 15 | V |
| Output current | $I_{OUT}$ | 200 | mA |
| Power dissipation | $P_D$ | 200 (Note 1) | mW |
| | | 380 (Note 2) | |
| Operation temperature range | $T_{opr}$ | −40 to 85 | °C |
| Storage temperature range | $T_{stg}$ | −55 to 150 | °C |

Note 1: Unit Ratintg

Note 2: Mounted on a glass epoxy circuit board of 30 × 30 mm. Pad dimension of 50 $mm^2$

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### TAR5SB15, TAR5SB18
### Electrical Characteristic (unless otherwise specified, $V_{IN} = V_{OUT} + 1$ V, $I_{OUT} = 50$ mA, $C_{IN} = 1$ μF, $C_{OUT} = 10$ μF, $C_{NOISE} = 0.01$ μF, $T_j = 25°C$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | Please refer to the Output Voltage Accuracy table. | | | | |
| Line regulation | Reg·line | $V_{OUT} + 1$ V ≦ $V_{IN}$ ≦ 15 V, $I_{OUT} = 1$ mA | — | 3 | 15 | mV |
| Load regulation | Reg·load | 1 mA ≦ $I_{OUT}$ ≦ 150 mA | — | 25 | 75 | mV |
| Quiescent current | $I_{B1}$ | $I_{OUT} = 0$ mA | — | 170 | — | μA |
| | $I_{B2}$ | $I_{OUT} = 50$ mA | — | 550 | 850 | |
| Stand-by current | $I_{B\ (OFF)}$ | $V_{CT} = 0$ V | — | — | 0.1 | μA |
| Output noise voltage | $V_{NO}$ | $I_{OUT} = 10$ mA, 10 Hz ≦ f ≦ 100 kHz, Ta = 25°C | — | 30 | — | $\mu V_{rms}$ |
| Temperature coefficient | $T_{CVO}$ | −40°C ≦ $T_{opr}$ ≦ 85°C | — | 100 | — | ppm/°C |
| Input voltage | $V_{IN}$ | — | 2.4 | — | 15 | V |
| Ripple rejection | R.R. | $I_{OUT} = 10$ mA, f = 1 kHz, $V_{Ripple} = 500\ mV_{p-p}$, Ta = 25°C | — | 70 | — | dB |
| Control voltage (ON) | $V_{CT\ (ON)}$ | — | 1.5 | — | $V_{IN}$ | V |
| Control voltage (OFF) | $V_{CT\ (OFF)}$ | — | — | — | 0.4 | V |
| Control current (ON) | $I_{CT\ (ON)}$ | $V_{CT\ (ON)} = 1.5$ V | — | 3 | 10 | μA |
| Control current (OFF) | $I_{CT\ (OFF)}$ | $V_{CT\ (OFF)} = 0$ V | — | 0 | 0.1 | μA |

### TAR5SB23~TAR5SB33
### Electrical Characteristic (unless otherwise specified, $V_{IN} = V_{OUT} + 1$ V, $I_{OUT} = 50$ mA, $C_{IN} = 1$ μF, $C_{OUT} = 10$ μF, $C_{NOISE} = 0.01$ μF, $T_j = 25°C$)

| Characteristics | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Output voltage | $V_{OUT}$ | Please refer to the Output Voltage Accuracy table. | | | | |
| Line regulation | Reg·line | $V_{OUT} + 1$ V ≦ $V_{IN}$ ≦ 15 V, $I_{OUT} = 1$ mA | — | 3 | 15 | mV |
| Load regulation | Reg·load | 1 mA ≦ $I_{OUT}$ ≦ 150 mA | — | 25 | 75 | mV |
| Quiescent current | $I_{B1}$ | $I_{OUT} = 0$ mA | — | 170 | — | μA |
| | $I_{B2}$ | $I_{OUT} = 50$ mA | — | 550 | 850 | |
| Stand-by current | $I_{B\ (OFF)}$ | $V_{CT} = 0$ V | — | — | 0.1 | μA |
| Output noise voltage | $V_{NO}$ | $I_{OUT} = 10$ mA, 10 Hz ≦ f ≦ 100 kHz, Ta = 25°C | — | 30 | — | $\mu V_{rms}$ |
| Dropout voltage | $V_{IN}$-$V_{OUT}$ | $I_{OUT} = 50$ mA | — | 130 | 200 | mV |
| Temperature coefficient | $T_{CVO}$ | −40°C ≦ $T_{opr}$ ≦ 85°C | — | 100 | — | ppm/°C |
| Input voltage | $V_{IN}$ | — | $V_{OUT}$ + 0.2 V | — | 15 | V |
| Ripple rejection | R.R. | $I_{OUT} = 10$ mA, f = 1 kHz, $V_{Ripple} = 500\ mV_{p-p}$, Ta = 25°C | — | 70 | — | dB |
| Control voltage (ON) | $V_{CT\ (ON)}$ | — | 1.5 | — | $V_{IN}$ | V |
| Control voltage (OFF) | $V_{CT\ (OFF)}$ | — | — | — | 0.4 | V |
| Control current (ON) | $I_{CT\ (ON)}$ | $V_{CT\ (ON)} = 1.5$ V | — | 3 | 10 | μA |
| Control current (OFF) | $I_{CT\ (OFF)}$ | $V_{CT\ (OFF)} = 0$ V | — | 0 | 0.1 | μA |

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### Output Voltage Accuracy

**($V_{IN}$ = $V_{OUT}$ + 1 V, $I_{OUT}$ = 50 mA, $C_{IN}$ = 1 μF, $C_{OUT}$ = 10 μF, $C_{NOISE}$ = 0.01 μF, $T_j$ = 25°C)**

| Product No. | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| TAR5SB15 | $V_{OUT}$ | 1.44 | 1.5 | 1.56 | V |
| TAR5SB18 | | 1.74 | 1.8 | 1.86 | |
| TAR5SB23 | | 2.24 | 2.3 | 2.36 | |
| TAR5SB24 | | 2.34 | 2.4 | 2.46 | |
| TAR5SB25 | | 2.43 | 2.5 | 2.57 | |
| TAR5SB27 | | 2.63 | 2.7 | 2.77 | |
| TAR5SB28 | | 2.73 | 2.8 | 2.87 | |
| TAR5SB29 | | 2.83 | 2.9 | 2.97 | |
| TAR5SB30 | | 2.92 | 3.0 | 3.08 | |
| TAR5SB33 | | 3.21 | 3.3 | 3.39 | |

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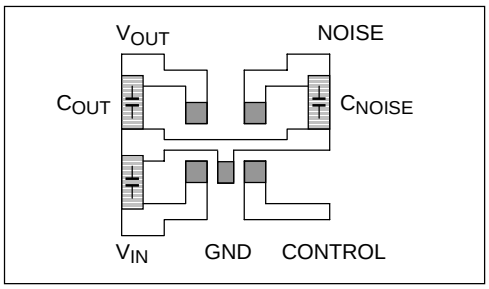
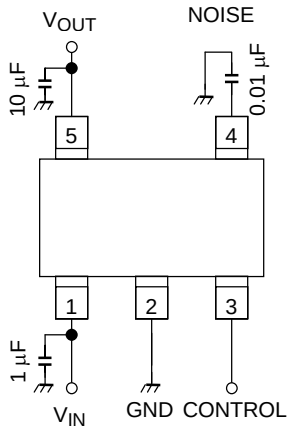
## Thermal Resistance Evaluation Board




Circuit board material: glass epoxy,
Circuit board dimension: 30 mm × 30 mm,
Copper foil pad area: 50 $mm^2$ (t = 0.8 mm)

## Recommended Application Circuit




| Control Level | Operation |
|---|---|
| HIGH | ON |
| LOW | OFF |

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

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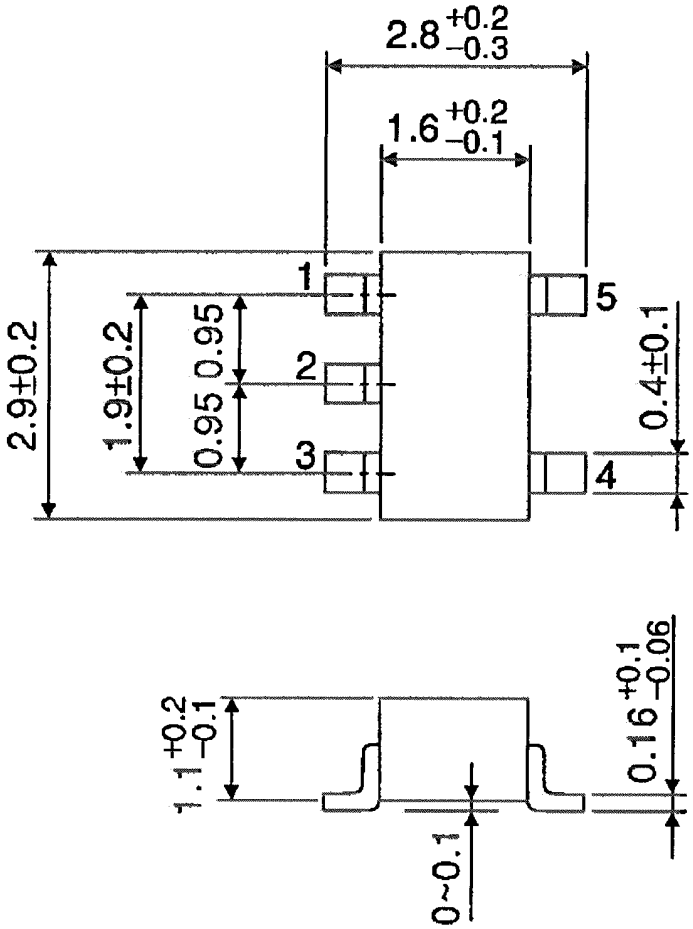
### Package Dimensions

SSOP5-P-0.95 Unit : mm




Weight: 0.014 g (typ.)

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