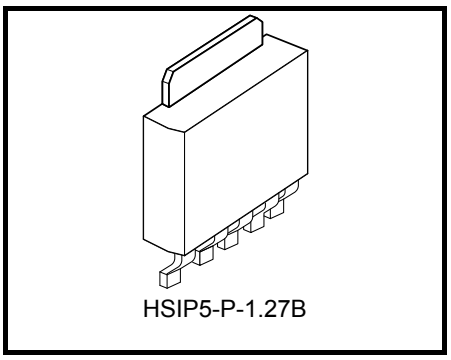
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

# TA58LT00F

## 150 mA Output Current and Tracking Regulator with ON/OFF Control Switch

The TA58LT00F consists of small-surface mount type tracking regulators with an output current of 150 mA (maximum) and an ON/OFF control switch. Control by an EN (ON/OFF) terminal enables the regulator to be operated only when required (output ON). The output voltage can be controlled to an arbitrary voltage between 2.5V and 13.4V by applying a necessary voltage to ADJ through a microcontroller, etc. It is also possible to enable or disable the regulator via the enable (ON/OFF) terminal. Enabling the regulator only when necessary contributes to the energy saving of equipment.



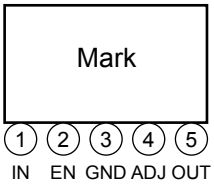
HSIP5-P-1.27B

Weight : 0.36 g (Typ.)

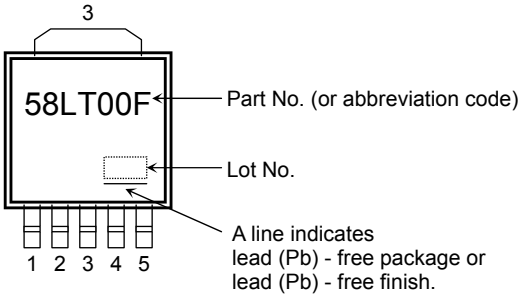
### Features

- Built-in ON/OFF control function (active high)
- Maximum output current : 150mA
- Output voltage : 2.5 V ~ 13.4 V
- Tracking voltage accuracy : ± 10mV (@$T_j$ = 25°C)
- Low standby current (output OFF mode) : 1μA (Typ.)
- Protection function : Over-current protection / thermal shutdown / Reverse connection of power supply / 60 V load dump
- Package type : Surface-mount New PW-Mold5pin

### Pin Assignment




### Marking



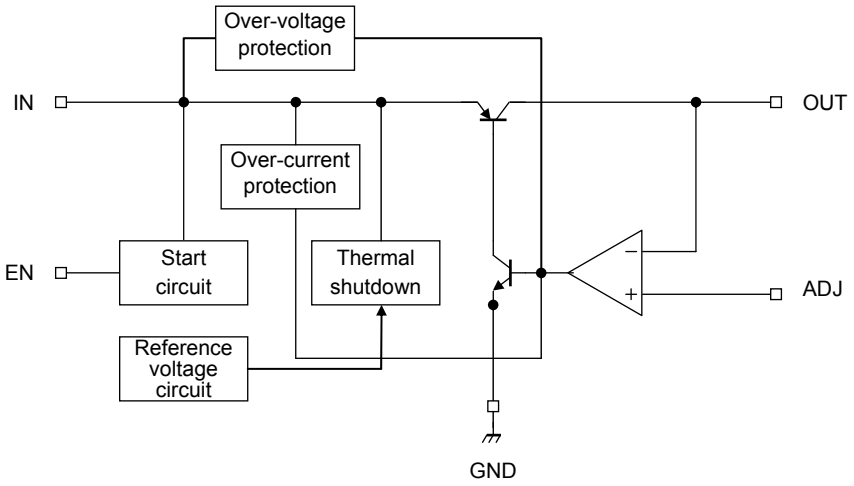
## Pin Description

| Pin No. | Symbol | Description |
|---|---|---|
| 1 | IN | Input terminal. Connected by capacitor ($C_{IN}$) to GND. |
| 2 | EN | Output ON/OFF control terminal.<br>Output is ON when this pin is set to “High”, OFF when this pin is open or set to “Low”. |
| 3 | GND | Ground terminal |
| 4 | ADJ | Adjustment terminal |
| 5 | OUT | Output terminal. Connected by capacitor ($C_{OUT}$) to GND. |

## How to Order

| Product No. | Package | Package Type and Capacity |
|---|---|---|
| TA58LT00F(T6L1,Q) | New PW-Mold5pin : Surface-mount | Tape (2000 pcs/reel) |

## Block Diagram



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

| Characteristic | | Symbol | Rating | Unit |
|---|---|---|---|---|
| Input voltage | | $V_{IN}$ | -38~38 | V |
| EN Input voltage | | $V_{EN}$ | -0.3~38 | V |
| ADJ Input voltage | | $V_{ADJ}$ | -0.3~38 | V |
| Output current | | $I_{OUT}$ | 150 | mA |
| Junction temperature | | $T_j$ | 150 | °C |
| Storage temperature | | $T_{stg}$ | −55~150 | °C |
| Power dissipation | Ta = 25°C | $P_D$ | 1 | W |
| | Tc= 25°C | | 10 | |

Note 1: Do not apply current and voltage (including reverse polarity) to any pin that is not specified.

Note 2: If it is connected EN terminal to IN terminal, be careful so that the negative voltage is not impressed on EN terminal.

Note 3: 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).

## Thermal Characteristics

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal resistance, junction to ambient | $R_{th\ (j-a)}$ | 125 | °C/ W |
| Thermal resistance, junction to case | $R_{th\ (j-c)}$ | 12.5 | °C/ W |

## Recommended operating conditions

| Characteristic | Symbol | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|
| Input voltage | $V_{IN}$ | 6 | — | 26 | V |
| ADJ Input voltage | $V_{ADJ}$ | 2.5 | — | 13.4 | V |
| Operating junction temperature | $T_{j(opr)}$ | -40 | — | 135 | °C |

## Protection Function (Reference)

| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Thermal shutdown | $T_{SD}$ | $V_{IN}$ = 14 V | 150 | 175 | — | °C |
| Thermal shutdown hysteresis width | $T_{SD(hys)}$ | | — | 15 | — | °C |
| Peak circuit current | $I_{PEAK}$ | $V_{IN}$ = 14 V, $T_j$ = 25°C | — | 210 | — | mA |
| Short circuit current | $I_{SC}$ | $V_{IN}$ = 14 V, $T_j$ = 25°C | — | 210 | — | mA |
| Overvoltage protection | $V_{OV}$ | — | 38 | — | — | V |

Note 4: Ensure th at the devices operate within the limits of the maximum rating when in actual use.

Note 5: When the input vo ltage exceeds 38 V, the overvoltage protection circuit is activated to turn off the output voltage.

## Electrical Characteristics

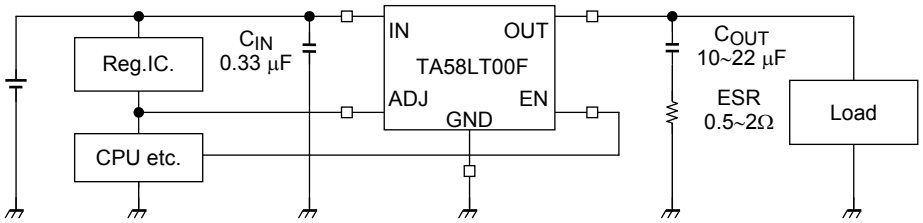
**(Unless otherwise specified, 2.5 V ≦$V_{ADJ}$≦ 13.4 V, $V_{EN}$ = H, $C_{IN}$ = 0.33 μF, $C_{OUT}$ = 10 μF, ESR = 1 Ω, $T_j$ = -40~125°C)**

| Characteristic | Symbol | Test Condition | Min | Typ. | Max | Unit |
|---|---|---|---|---|---|---|
| Tracking accuracy | $\Delta V_{OUT}$ | $V_{IN}$ = 14 V, $I_{OUT}$ = 50 mA | -10 | — | +10 | mV |
| | | 6 V ≦ $V_{IN}$ ≦ 26 V, 5 mA ≦ $I_{OUT}$ ≦ 100m A, -40°C ≦ Tj ≦ 125°C | -20 | — | +20 | |
| Line regulation | Reg·line | 6 V ≦ $V_{IN}$ ≦ 26 V, $I_{OUT}$ = 50 mA | — | — | 25 | mV |
| Load regulation | Reg·load | $V_{IN}$ = 14 V, 5 mA ≦ $I_{OUT}$ ≦ 100 mA | — | — | 35 | mV |
| Quiescent current | $I_B$ | 6 V ≦ $V_{IN}$ ≦ 26 V, $I_{OUT}$ = 0 A | — | — | 0.8 | mA |
| | | 6 V ≦ $V_{IN}$ ≦ 26 V, $I_{OUT}$ = 100 mA | — | — | 15 | |
| Quiescent current (OFF mode) | $I_{B(OFF)}$ | 6 V ≦ $V_{IN}$ ≦ 26 V, $V_{EN}$ = 0 V | — | — | 20 | μA |
| Dropout voltage | $V_D$ | $I_{OUT}$ = 50 mA | — | — | 0.3 | V |
| | | $I_{OUT}$ = 100 mA | — | — | 0.6 | |
| Output control voltage (ON) | $V_{EN(ON)}$ | $I_{OUT}$ = 50 mA | 3 | — | — | V |
| Output control voltage (OFF) | $V_{EN(OFF)}$ | — | — | — | 0.5 | V |
| Output control current (ON) | $I_{EN(ON)}$ | $V_{IN}$ = 14 V, $V_{EN}$ = 5 V, $I_{OUT}$ = 1mA | — | — | 120 | μA |

## Electrical Characteristics Common to All Products

- Tj = 25°C in the measurement conditions of each item is a regulation for where the standard condition when a pulse test is carried out, and any drift in the electrical characteristic due to a rise in the junction temperature of the chip may be disregarded.

## Standard Application Circuit

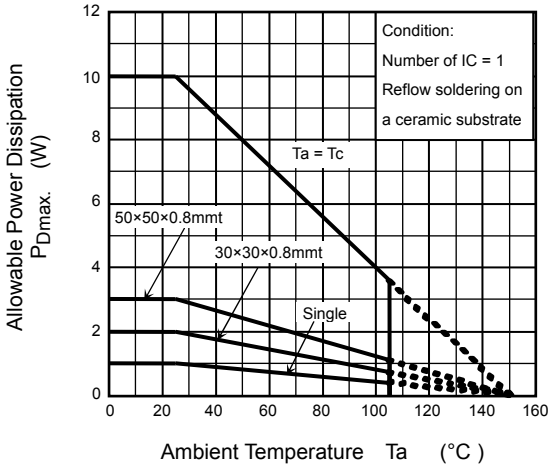



- Place $C_{IN}$ as close as possible to the input terminal and GND. Place $C_{OUT}$ as close as possible to the output terminal and GND. Although capacitor $C_{OUT}$ acts to smooth the dc output voltage during suspension of output oscillation or load change, it might cause output oscillation in a cold environment due to increased capacitor ESR. It is therefore recommended to use a capacitor with small temperature sensitivity. Please connect the resistance of 0.5~ 2Ω with the series when the ceramic capacitor is used.
  The IC may oscillate due to external conditions (output current, temperature, or the type of the capacitor used). The type of capacitor required must be determined by the actual application circuit in which the IC is used.

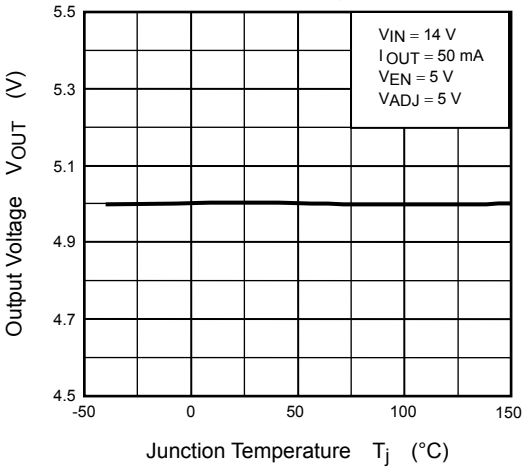
## The notice in case of application

- Note that, depending on the load conditions, a steep increase in the input voltage ($V_{IN}$) may cause a momentary rise in output voltage ($V_{OUT}$) even if the EN (enable) pin is Low.

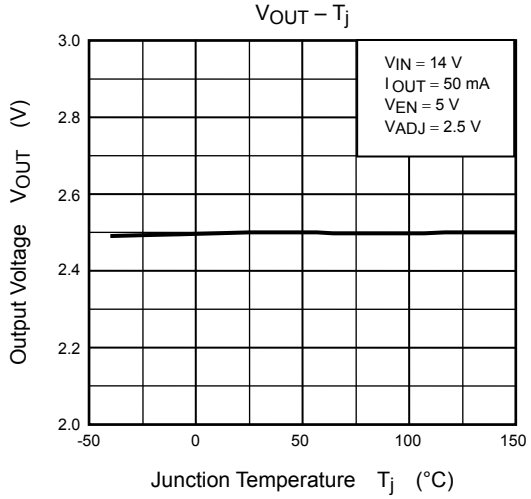
$P_D$max. – Ta



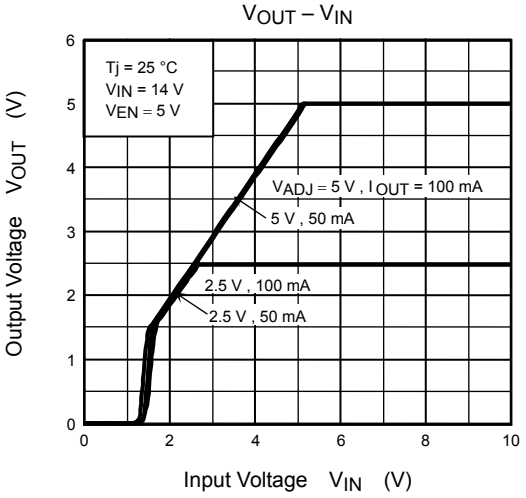

$V_{OUT}$ – $T_j$



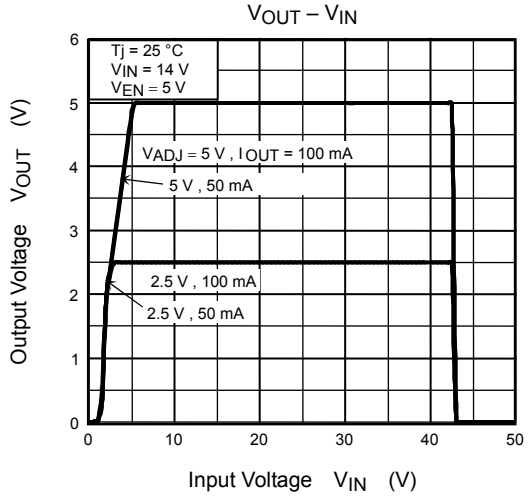

$V_{OUT}$ – $T_j$



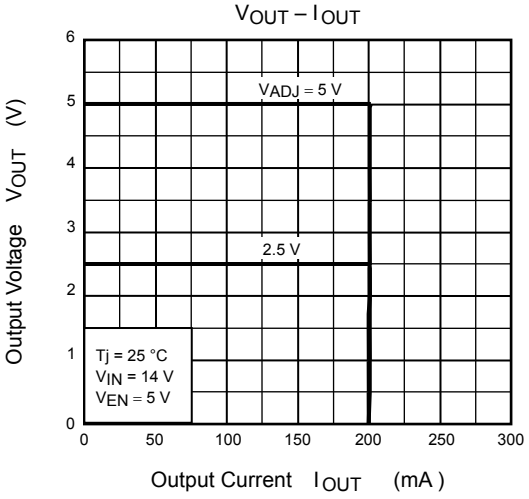

$V_{OUT}$ – $V_{IN}$



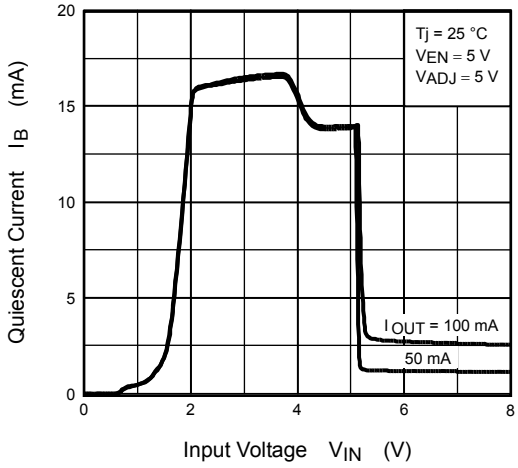

$V_{OUT}$ – $V_{IN}$



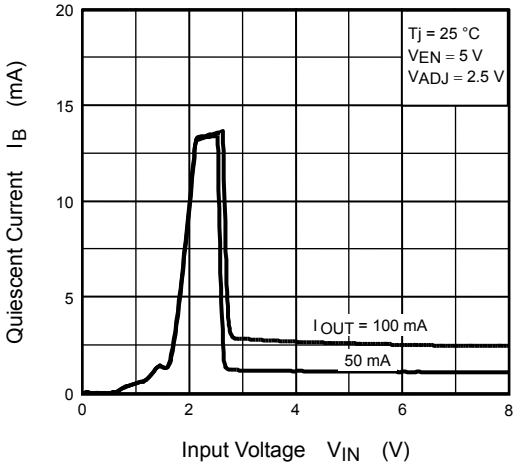

$V_{OUT}$ – $I_{OUT}$



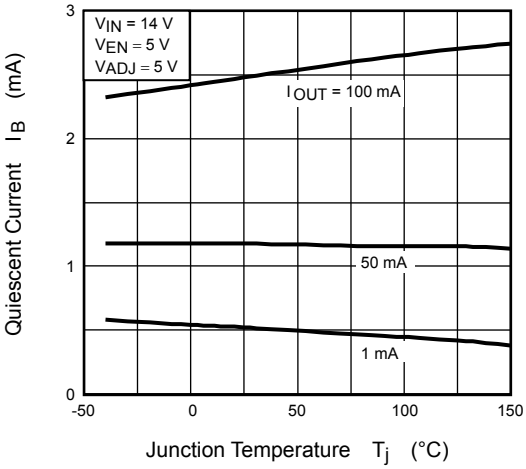
$I_B - V_{IN}$



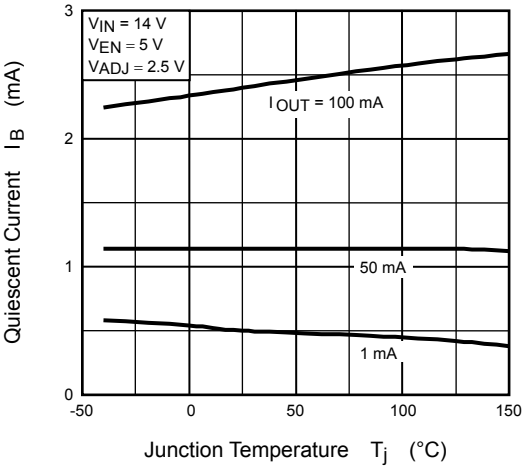

$I_B - V_{IN}$



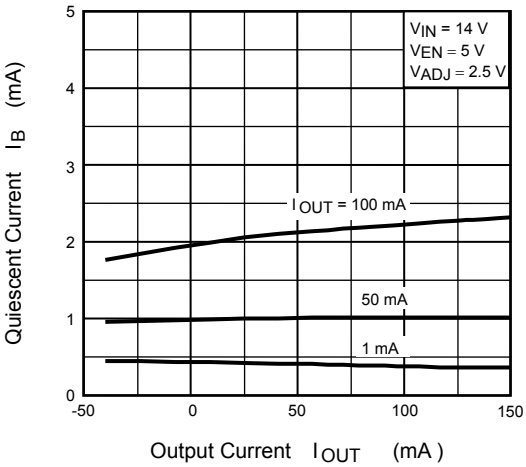

$I_B - T_j$



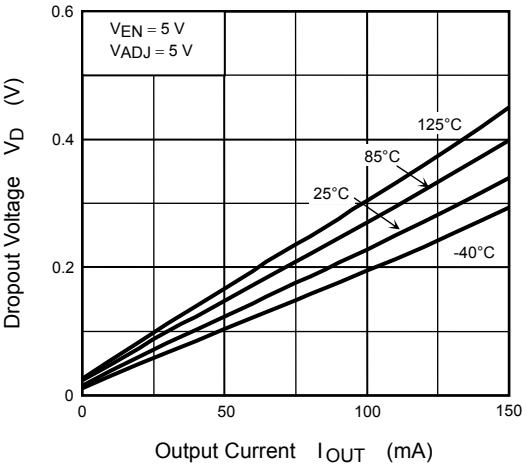

$I_B - T_j$



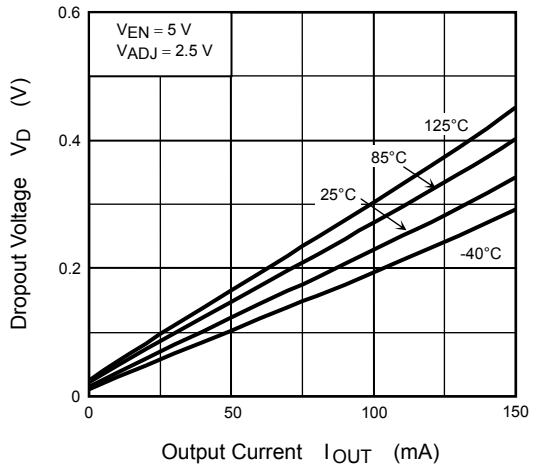

$I_B - I_{OUT}$



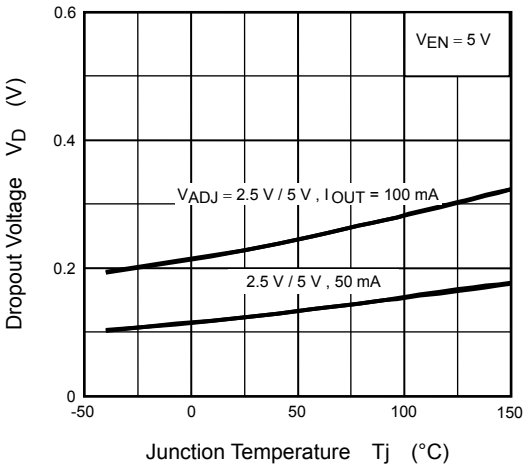

$V_D - I_{OUT}$



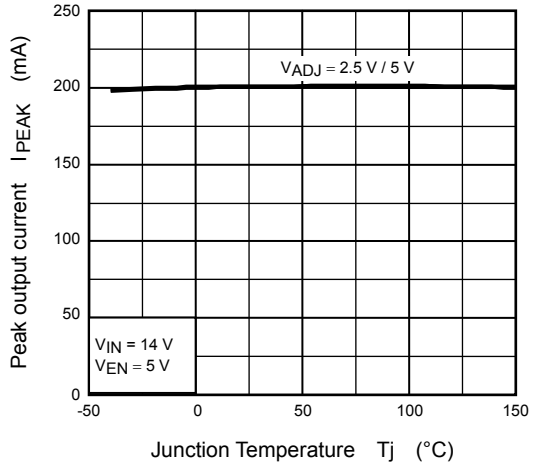
$V_D - I_{OUT}$



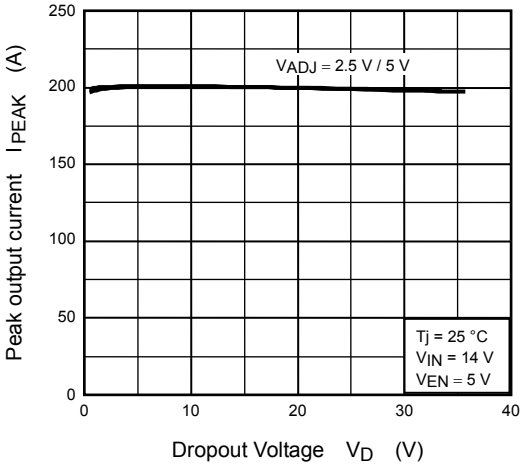

$V_D - Tj$



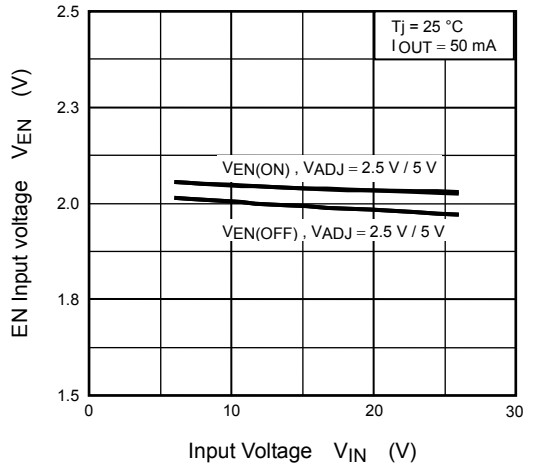

$I_{PEAK} - Tj$



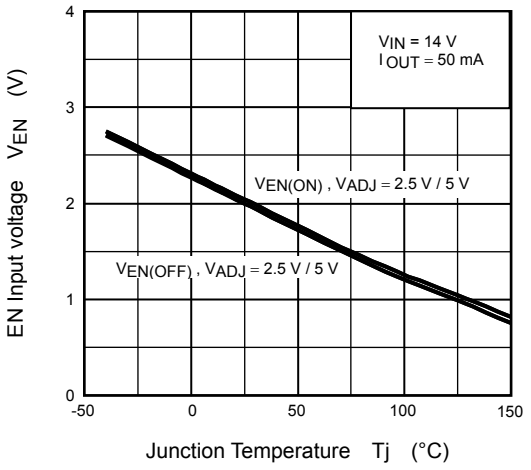

$I_{PEAK} - V_D$




$V_{EN} - V_{IN}$

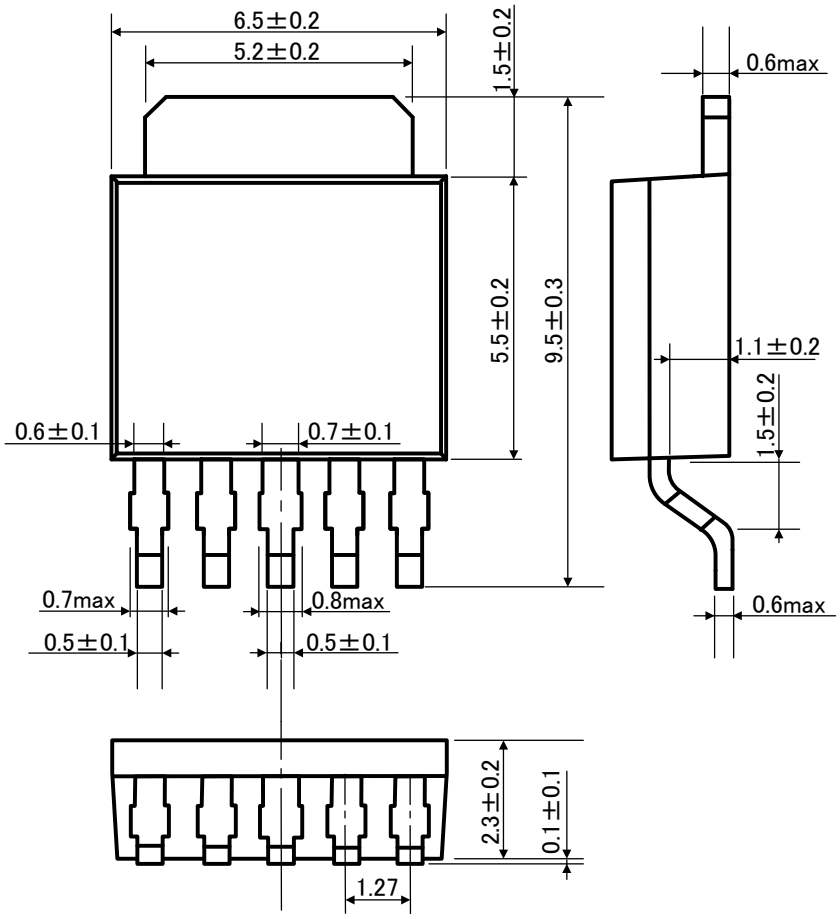



$V_{EN} - Tj$



## Package Dimensions

HSIP5-P-1.27B Unit : mm




Weight: 0.36 g (Typ.)

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