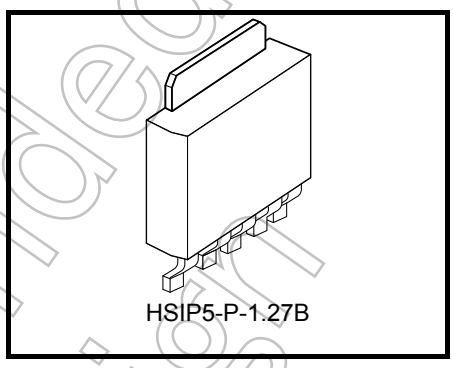
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

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.

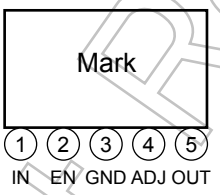


Weight : 0.36 g (Typ.)

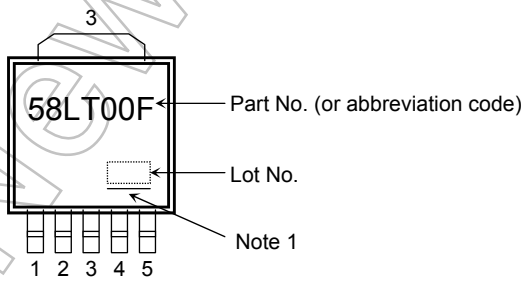
Features

- Built-in ON/OFF control function (active high)
- Maximum output current : 150 mA
- Output voltage : 2.5 V to 13.4 V
- Tracking voltage accuracy : ± 10 mV (@T_j = 25°C)
- Low standby current (output OFF mode) : 1 μA (Typ.)
- Protection function : Overcurrent protection / overheating protection / Reverse connection of power supply / 60 V load dump
- Package type : Surface-mount 5-pin New PW-Mold

Pin Assignment



Marking



Note 1: A line under a Lot No. identifies the indication of product Labels.
Not underlined: [[Pb]]/INCLUDES > MCV
Underlined: [[G]]/RoHS COMPATIBLE or [[G]]/RoHS [[Pb]]

Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

The product(s) in this document ("Product") contain functions intended to protect the Product from temporary small overloads such as minor short-term overcurrent, overvoltage, or overheating. The protective functions do not necessarily protect Product under all circumstances. When incorporating Product into your system, please design the system (1) to avoid such overloads upon the Product, and (2) to shut down or otherwise relieve the Product of such overload conditions immediately upon occurrence. For details, please refer to the notes appearing below in this document and other documents referenced in this document.

Start of commercial production
2005-06

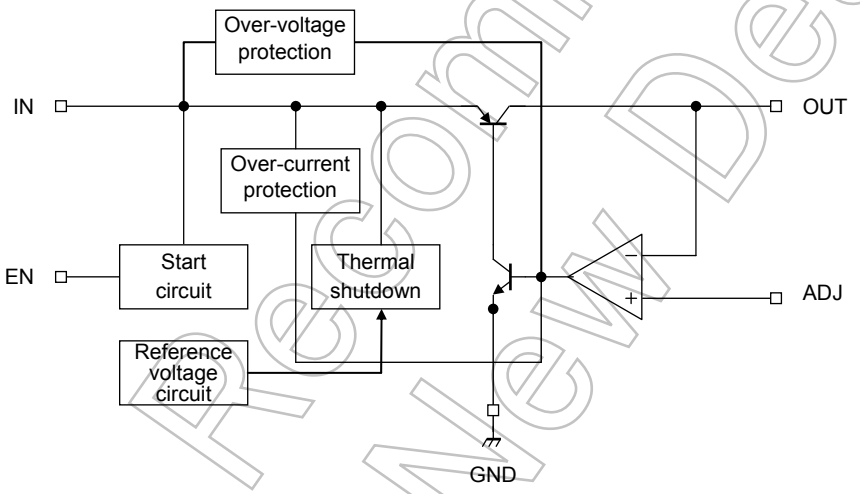
Pin Description

Pin No.	Symbol	Description
1	IN	Input terminal. Connected by capacitor (C_{IN}) to GND.
2	EN	Output ON/OFF control terminal. 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)	5-pin New PW-Mold : Surface-mount	Tape (2000 pcs/reel)

Block Diagram



Absolute Maximum Rating (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Input voltage		V_{IN}	-38 to 38	V
EN Input voltage		V_{EN}	-0.3 to 38	V
ADJ Input voltage		V_{ADJ}	-0.3 to 38	V
Output current		I_{OUT}	150	mA
Junction temperature		T_j	150	°C
Operating Junction temperature		T_{jopr}	−40 to 150	°C
Storage temperature		T_{stg}	−55 to 150	°C
Power dissipation	Ta = 25°C	P_D	1	W
	Tc = 25°C		10	

Note 2: Do not apply current and voltage (including reverse polarity) to any pin that is not specified.

Note 3: If it is connected EN terminal to IN terminal, be careful so that the negative voltage is not impressed on EN terminal.

Note 4: 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

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

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 5: Ensure that the devices operate within the limits of the maximum rating when in actual use.

Note 6: The output voltage shuts down when the overvoltage protection circuit operates.

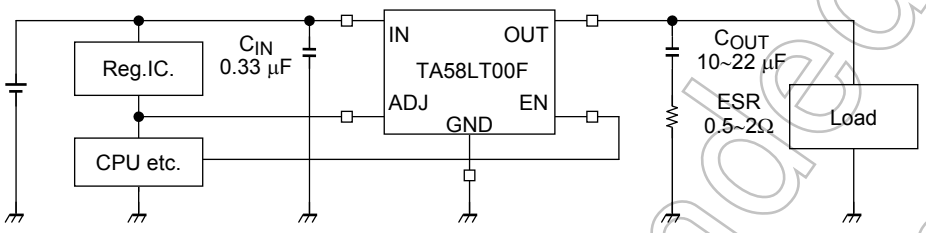
Electrical Characteristics
(Unless otherwise specified, 2.5 V ≤ V_{ADJ} ≤ 13.4 V, V_{EN} = H, C_{IN} = 0.33 μF, C_{OUT} = 10 μF, ESR = 1 Ω, T_j = -40 to 125°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Tracking accuracy	ΔV_{OUT}	V_{IN} = 14 V, I_{OUT} = 50 mA	-10	—	+10	mV
		6 V ≤ V_{IN} ≤ 26 V, 5 mA ≤ I_{OUT} ≤ 100 m 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} = 1 mA	—	—	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 to 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.

Usage Precautions

- 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.

- Low voltage

  Do not apply voltage to the Product that is lower than the minimum operating voltage, or the Product's protective functions will not operate properly and the Product may be permanently damaged.

- Overcurrent Protection

  The overcurrent protection circuits in the Product are designed to temporarily protect Product from minor overcurrent of brief duration. When the overcurrent protective function in the Product activates, immediately cease application of overcurrent to Product. Improper usage of Product, such as application of current to Product exceeding the absolute maximum ratings, could cause the overcurrent protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

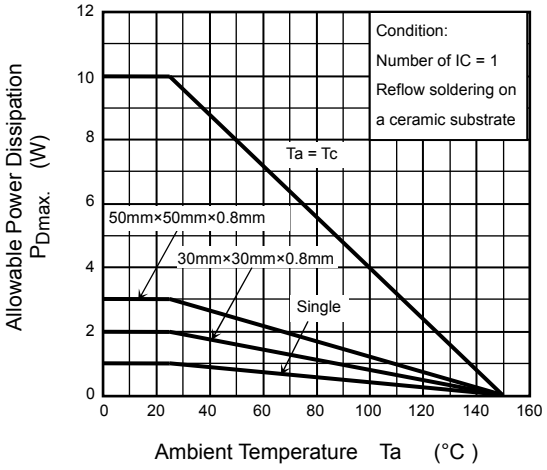
- Overheating Protection

  The thermal shutdown circuits in the Product are designed to temporarily protect Product from minor overheating of brief duration. When the overheating protective function in the Product activates, immediately correct the overheating situation. Improper usage of Product, such as the application of heat to Product exceeding the absolute maximum ratings, could cause the overheating protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

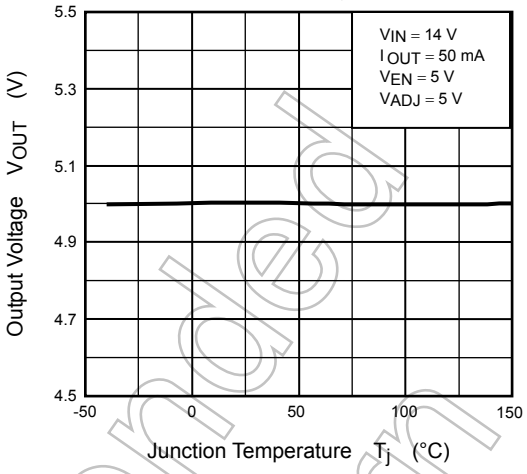
- Overvoltage Protection

  The overvoltage protection circuits in the Product are designed to temporarily protect Product from minor overvoltage of brief duration. When the overvoltage protective function in the Product activates, immediately cease application of overvoltage to Product. Improper usage of Product, such as application of voltage to Product exceeding the absolute maximum ratings, could cause the overvoltage protection circuit not to operate properly and/or damage Product permanently even before the protection circuit starts to operate.

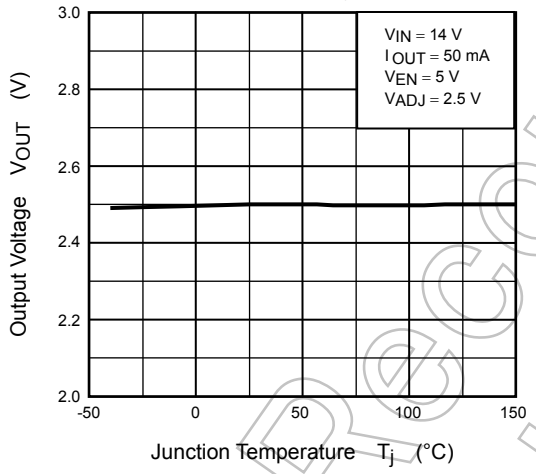
$P_D$max. – Ta



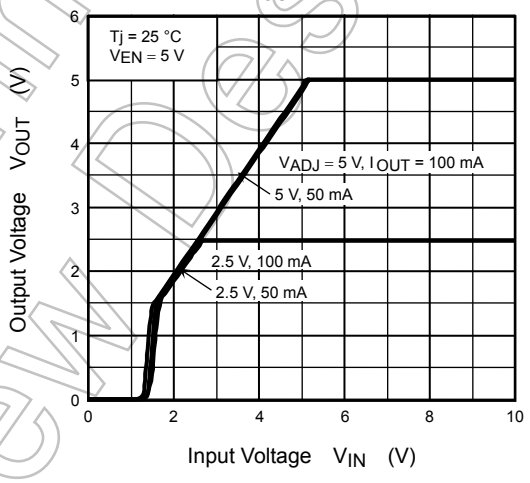
V_{OUT} – T_j



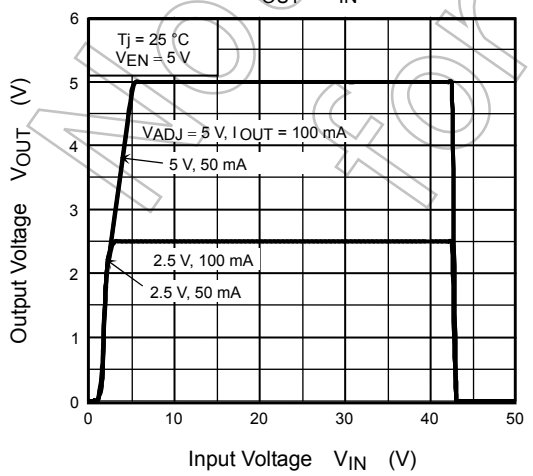
V_{OUT} – T_j



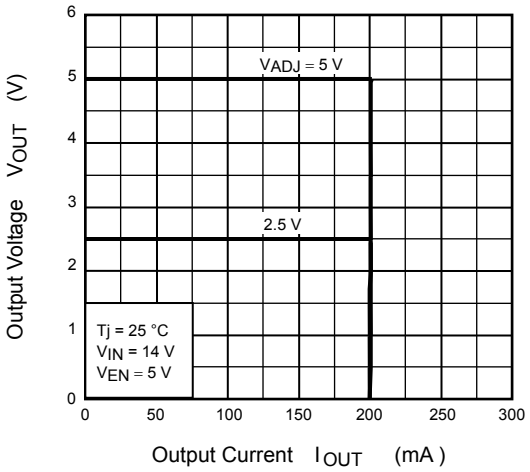
V_{OUT} – V_{IN}



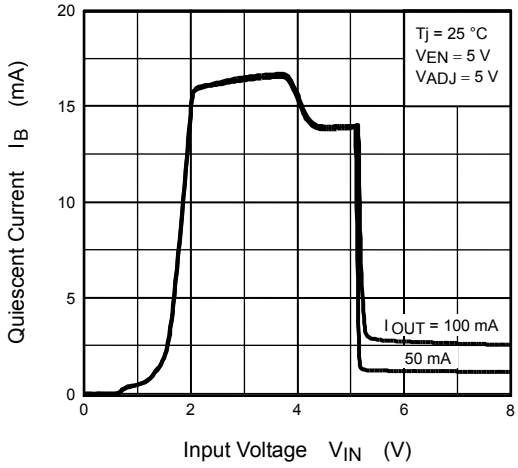
V_{OUT} – V_{IN}



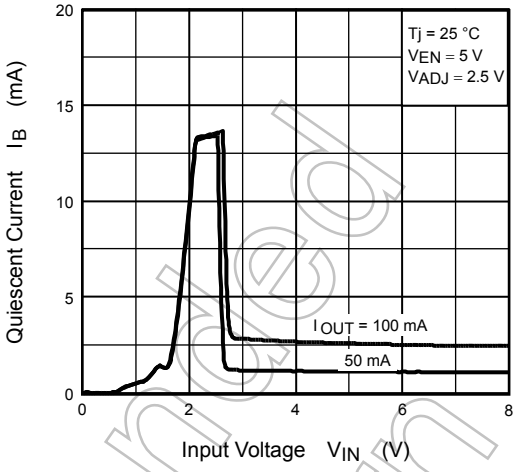
V_{OUT} – I_{OUT}



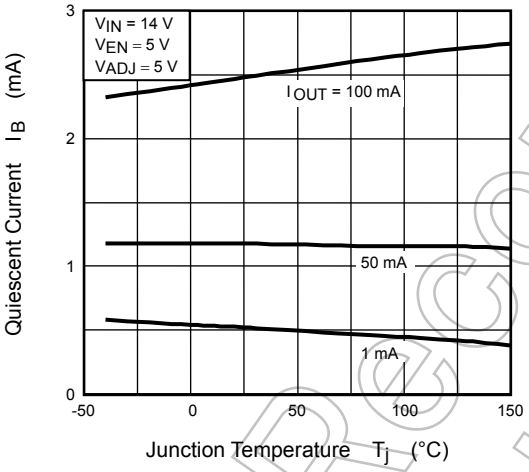
$I_B - V_{IN}$



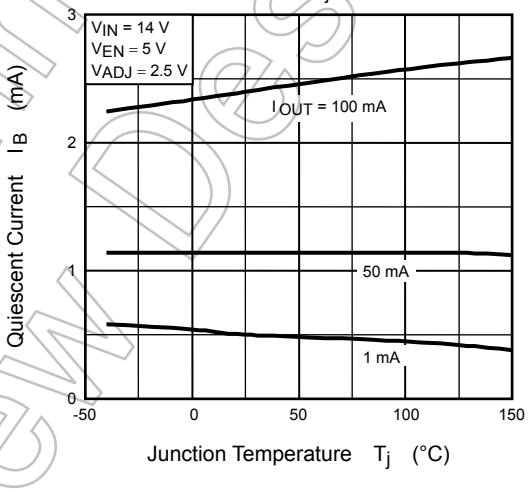
$I_B - V_{IN}$



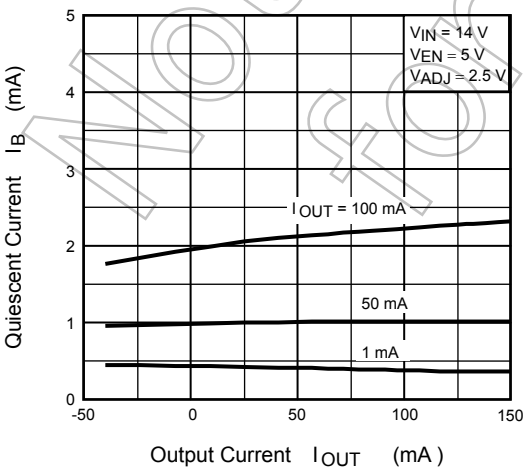
$I_B - T_j$



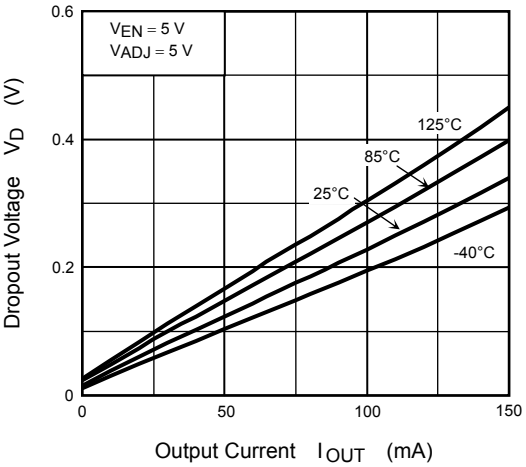
$I_B - T_j$



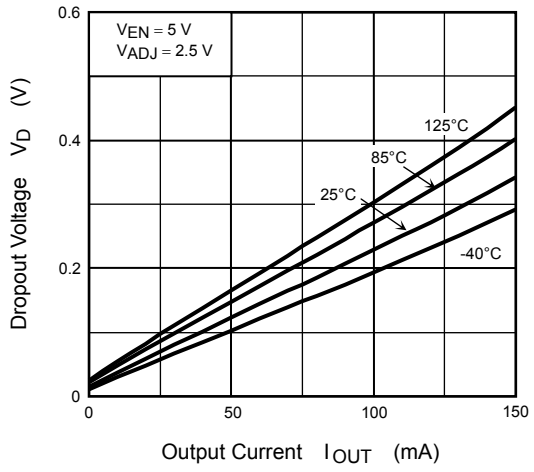
$I_B - I_{OUT}$



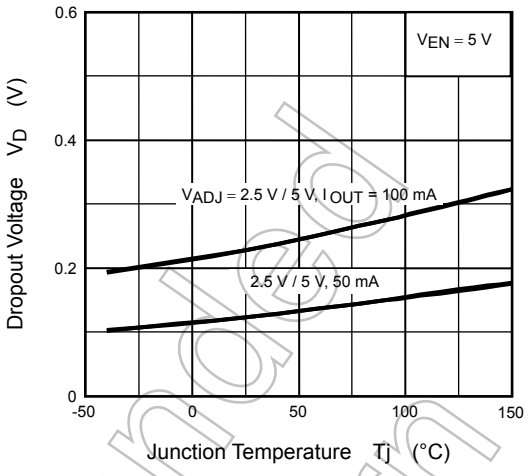
$V_D - I_{OUT}$



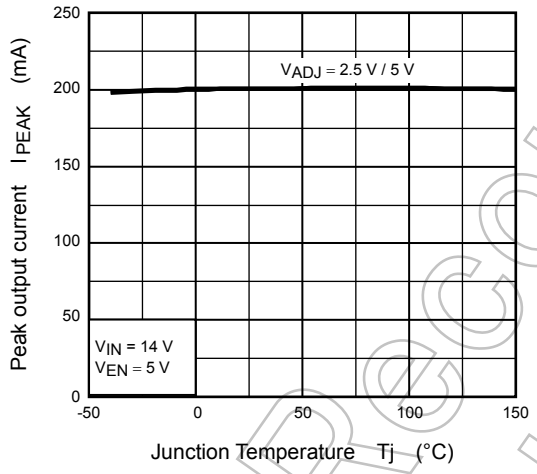
$V_D - I_{OUT}$



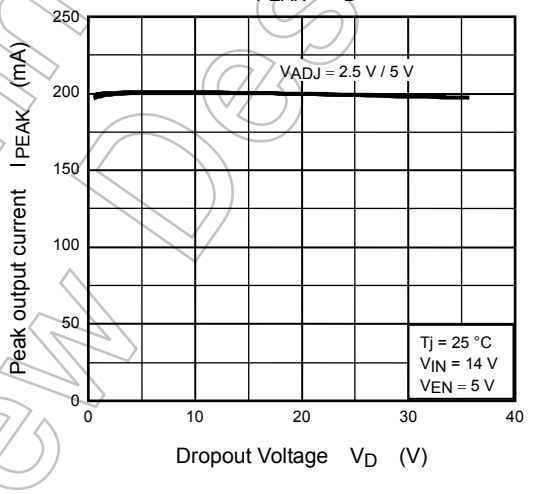
$V_D - Tj$



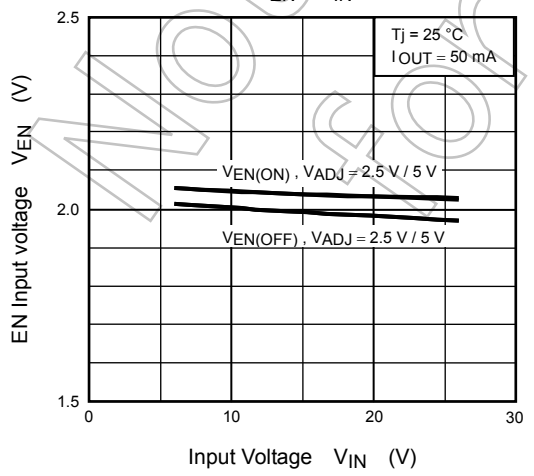
$I_{PEAK} - Tj$



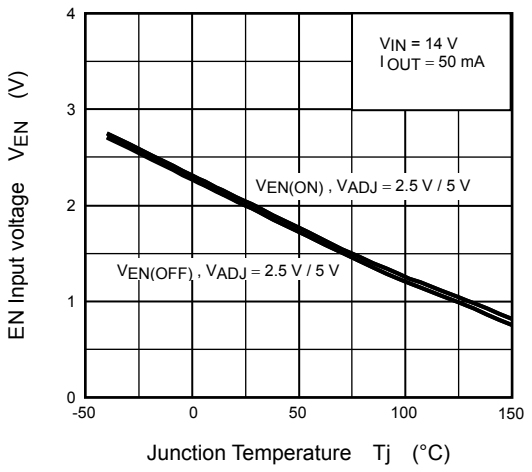
$I_{PEAK} - V_D$



$V_{EN} - V_{IN}$

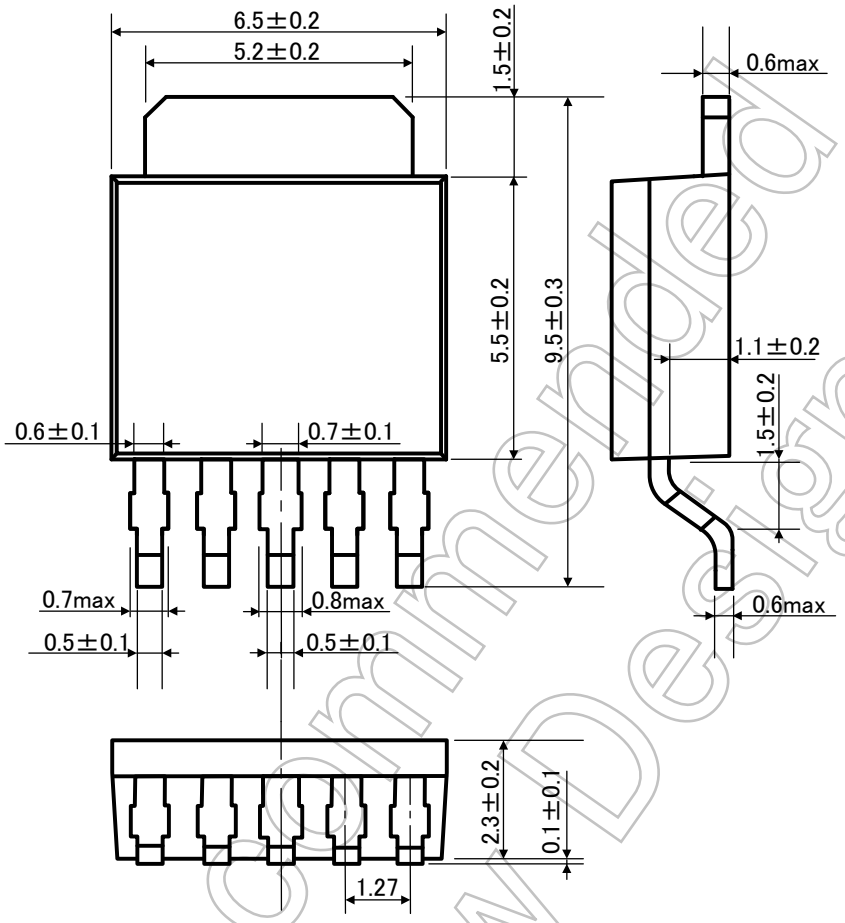


$V_{EN} - Tj$



Package Dimensions

HSIP5-P-1.27B Unit: mm



Weight: 0.36 g (Typ.)

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