

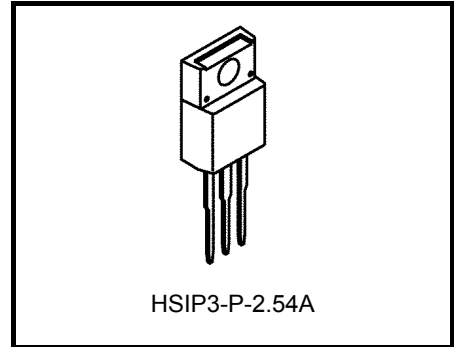
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

## TA58M05S, TA58M06S, TA58M08S, TA58M09S TA58M10S, TA58M12S, TA58M15S

### 500 mA Low Dropout Voltage Regulator

The TA58M\*\*S Series consists of fixed-positive-output, low-dropout regulators with an output current of 500 mA (max) that utilize PNP transistors for the output stage. Low dropout voltage and standby current make the TA58M\*\*S Series suitable for applications requiring low power consumption.

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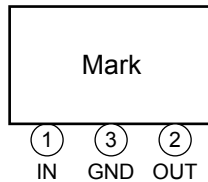


Weight : 1.7 g (Typ.)

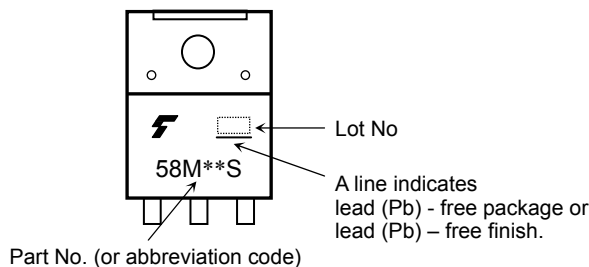
### Features

- Maximum output current : 500 mA
- Output voltage : 5 / 6 / 8 / 9 / 10 / 12 / 15 V
- Output voltage accuracy :  $V_{OUT} \pm 3\%$  (@ $T_j = 25^\circ\text{C}$ )
- Low-dropout voltage : 0.65 V (Max) (@ $I_{OUT} = 500\text{mA}$ )
- Protection function : Over current protection / thermal shutdown / Reverse connection of power supply / 60 V load dump
- Package type : TO-220NIS

### Pin Assignment



### Marking



Note 1: The “\*\*” in each product name is replaced with the output voltage of each product.

## Pin Description

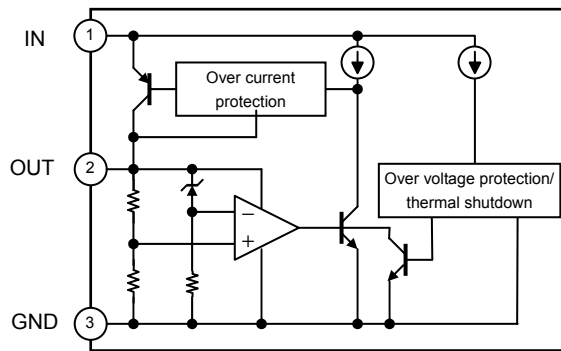
Pin No.	Symbol	Description
1	IN	Input terminal. Connected by capacitor ( $C_{IN}$ ) to GND.
3	GND	Ground terminal
2	OUT	Output terminal. Connected by capacitor ( $C_{OUT}$ ) to GND.

## How to Order

Product No.	Package	Package Type and Capacity
TA58M** S(Q) (Note2)	TO-220NIS	Sack (50 pcs./sack)

Note 2: The “\*\*” in each product number is replaced with the output voltage of each product.

## Block Diagram



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

Characteristic		Symbol	Rating	Unit
Input voltage	DC	V <sub>IN (DC)</sub>	29	V
	Pulse	V <sub>IN (Pulse)</sub>	60(τ = 200ms)	V
Output current		I <sub>OUT</sub>	500	mA
Operating temperature		T <sub>opr</sub>	-40~105	°C
Junction temperature		T <sub>j</sub>	150	°C
Storage temperature		T <sub>stg</sub>	-55~150	°C
Power dissipation	Ta = 25°C	P <sub>D</sub>	2	W
	Tc = 25°C		20	

Note 3: Do not apply current and voltage (including reverse polarity) to any pin that is not specified.

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 <sub>th (j-a)</sub>	62.5	°C/ W
Thermal resistance, junction to case	R <sub>th (j-c)</sub>	6.25	°C/ W

## Protection Function (Reference)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Thermal shutdown	T <sub>SD</sub>	V <sub>IN</sub> = 14 V (05~06S)/ 16 V (08~10S)/ 18 V (12S)/ 20 V (15S)	—	170	—	°C
Thermal shutdown hysteresis width	T <sub>SD(hys)</sub>		—	20	—	°C
Peak circuit current	I <sub>PEAK</sub>	V <sub>IN</sub> = 14 V (05~06S)/ 16 V (08~10S)/ 18 V (12S)/ 20 V (15S), T <sub>j</sub> = 25°C	—	1	—	A
Short circuit current	I <sub>SC</sub>	V <sub>IN</sub> = 14 V (05~06S)/ 16 V (08~10S)/ 18 V (12S)/ 20 V (15S), T <sub>j</sub> = 25°C	—	600	—	mA
Overvoltage protection	V <sub>IN</sub>	T <sub>j</sub> = 25°C	29	33	—	V

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

Note 6: When the input voltage exceeds 29 V, the overvoltage protection circuit is activated to turn off the output voltage.

## TA58M05S

### Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 14\text{ V}, I_{OUT} = 250\text{ mA}$	4.85	5.00	5.15	V
		$6\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}, -40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	4.8	5.0	5.2	
Line regulation	Reg·line	$9\text{ V} \leq V_{IN} \leq 16\text{ V}, I_{OUT} = 250\text{ mA}$	—	2	20	mV
		$6\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	5	30	
Load regulation	Reg·load	$V_{IN} = 14\text{ V}, 5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	20	60	mV
Quiescent current	$I_B$	$6\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 0\text{ A}$	—	0.5	1.0	mA
		$6\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 500\text{ mA}$	—	35	80	
Dropout voltage	$V_D$	$I_{OUT} = 250\text{ mA}$	—	0.22	0.35	V
		$I_{OUT} = 500\text{ mA}$	—	0.42	0.65	

## TA58M06S

### Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 14\text{ V}, I_{OUT} = 250\text{ mA}$	5.82	6.00	6.18	V
		$7\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}, -40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	5.76	6.00	6.24	
Line regulation	Reg·line	$10\text{ V} \leq V_{IN} \leq 17\text{ V}, I_{OUT} = 250\text{ mA}$	—	2	20	mV
		$7\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	5	30	
Load regulation	Reg·load	$V_{IN} = 14\text{ V}, 5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	20	60	mV
Quiescent current	$I_B$	$7\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 0\text{ A}$	—	0.5	1.0	mA
		$7\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 500\text{ mA}$	—	35	80	
Dropout voltage	$V_D$	$I_{OUT} = 250\text{ mA}$	—	0.22	0.35	V
		$I_{OUT} = 500\text{ mA}$	—	0.42	0.65	

## TA58M08S

### Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 16\text{ V}, I_{OUT} = 250\text{ mA}$	7.76	8.00	8.24	V
		$9\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}, -40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	7.68	8.00	8.32	
Line regulation	Reg·line	$12\text{ V} \leq V_{IN} \leq 19\text{ V}, I_{OUT} = 250\text{ mA}$	—	2	20	mV
		$9\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	5	30	
Load regulation	Reg·load	$V_{IN} = 16\text{ V}, 5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	20	70	mV
Quiescent current	$I_B$	$9\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 0\text{ A}$	—	0.5	1.0	mA
		$9\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 500\text{ mA}$	—	35	80	
Dropout voltage	$V_D$	$I_{OUT} = 250\text{ mA}$	—	0.22	0.35	V
		$I_{OUT} = 500\text{ mA}$	—	0.42	0.65	

## TA58M09S

### Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 16\text{ V}, I_{OUT} = 250\text{ mA}$	8.73	9.00	9.27	V
		$10\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}, -40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	8.64	9.00	9.36	
Line regulation	Reg·line	$13\text{ V} \leq V_{IN} \leq 20\text{ V}, I_{OUT} = 250\text{ mA}$	—	2	20	mV
		$10\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	5	30	
Load regulation	Reg·load	$V_{IN} = 16\text{ V}, 5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	20	70	mV
Quiescent current	$I_B$	$10\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 0\text{ A}$	—	0.6	1.0	mA
		$10\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 500\text{ mA}$	—	35	80	
Dropout voltage	$V_D$	$I_{OUT} = 250\text{ mA}$	—	0.22	0.35	V
		$I_{OUT} = 500\text{ mA}$	—	0.42	0.65	

## TA58M10S

### Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 16\text{ V}, I_{OUT} = 250\text{ mA}$	9.7	10.0	10.3	V
		$11\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}, -40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	9.6	10.0	10.4	
Line regulation	Reg·line	$14\text{ V} \leq V_{IN} \leq 21\text{ V}, I_{OUT} = 250\text{ mA}$	—	2	30	mV
		$11\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	5	40	
Load regulation	Reg·load	$V_{IN} = 16\text{ V}, 5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	20	80	mV
Quiescent current	$I_B$	$11\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 0\text{ A}$	—	0.6	1.2	mA
		$11\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 500\text{ mA}$	—	35	80	
Dropout voltage	$V_D$	$I_{OUT} = 250\text{ mA}$	—	0.22	0.35	V
		$I_{OUT} = 500\text{ mA}$	—	0.42	0.65	

## TA58M12S

### Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 18\text{ V}, I_{OUT} = 250\text{ mA}$	11.64	12.00	12.36	V
		$13\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}, -40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	11.52	12.00	12.48	
Line regulation	Reg·line	$16\text{ V} \leq V_{IN} \leq 23\text{ V}, I_{OUT} = 250\text{ mA}$	—	2	30	mV
		$13\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	5	40	
Load regulation	Reg·load	$V_{IN} = 18\text{ V}, 5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	20	80	mV
Quiescent current	$I_B$	$13\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 0\text{ A}$	—	0.7	1.2	mA
		$13\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 500\text{ mA}$	—	35	80	
Dropout voltage	$V_D$	$I_{OUT} = 250\text{ mA}$	—	0.22	0.35	V
		$I_{OUT} = 500\text{ mA}$	—	0.42	0.65	

## TA58M15S

### Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$ )

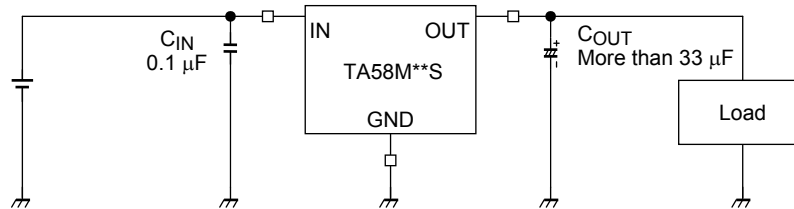
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	$V_{IN} = 20\text{ V}, I_{OUT} = 250\text{ mA}$	14.55	15.00	15.45	V
		$16\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}, -40^\circ\text{C} \leq T_j \leq 105^\circ\text{C}$	14.4	15.0	15.6	
Line regulation	Reg·line	$19\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	2	30	mV
		$16\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 250\text{ mA}$	—	5	40	
Load regulation	Reg·load	$V_{IN} = 20\text{ V}, 5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	30	100	mV
Quiescent current	$I_B$	$16\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 0\text{ A}$	—	0.7	1.4	mA
		$16\text{ V} \leq V_{IN} \leq 26\text{ V}, I_{OUT} = 500\text{ mA}$	—	35	80	
Dropout voltage	$V_D$	$I_{OUT} = 250\text{ mA}$	—	0.22	0.35	V
		$I_{OUT} = 500\text{ mA}$	—	0.42	0.65	

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## Electrical Characteristics Common to All Products

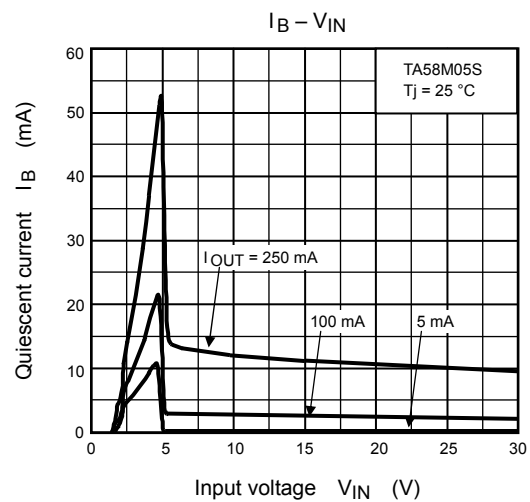
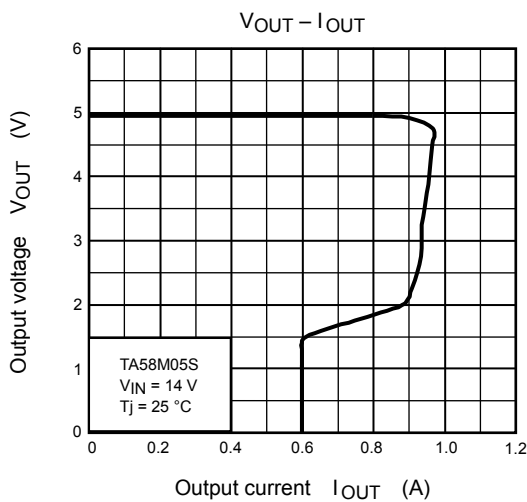
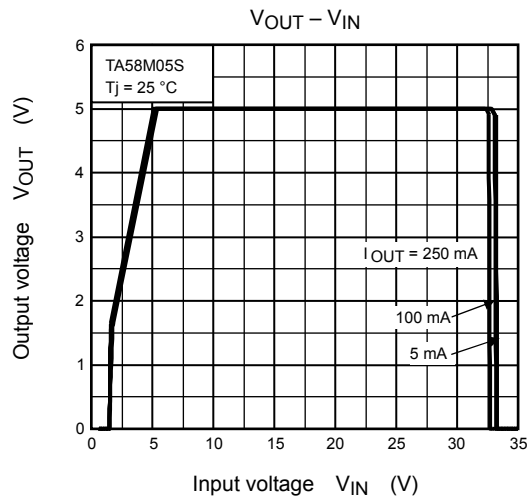
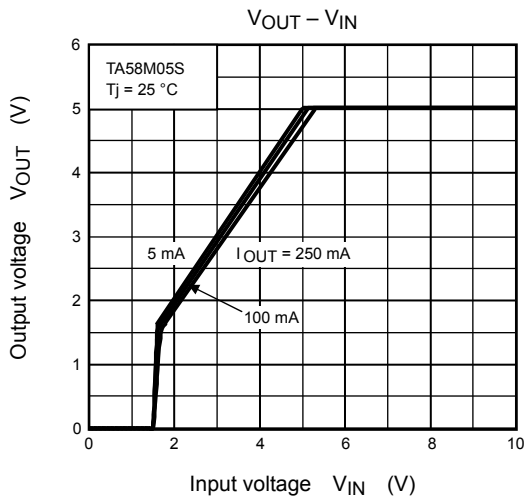
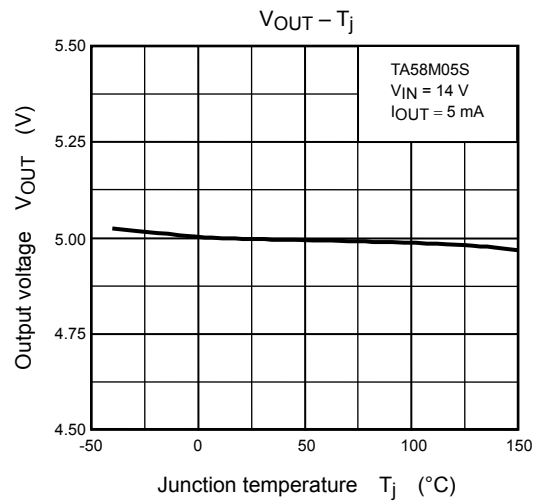
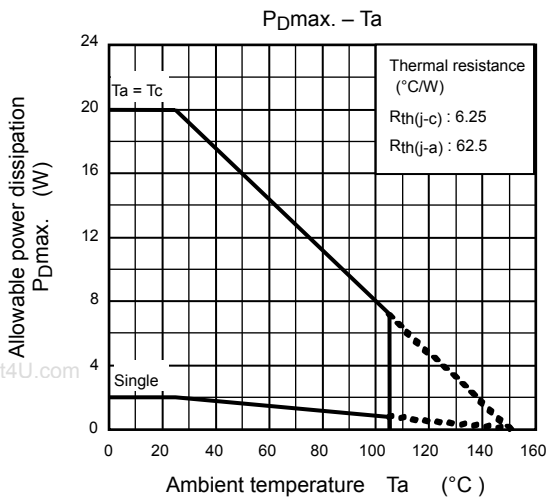
- $T_j = 25^\circ\text{C}$  in the measurement conditions of each item is a regulation for where the standard condition when a pulse test is carried out, and any drift in the electrical characteristic due to a rise in the junction temperature of the chip may be disregarded.

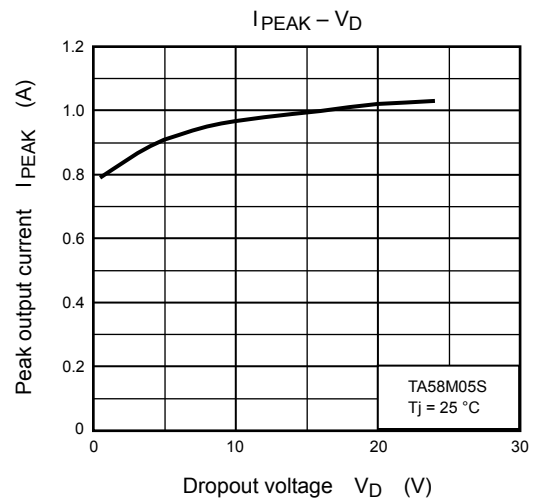
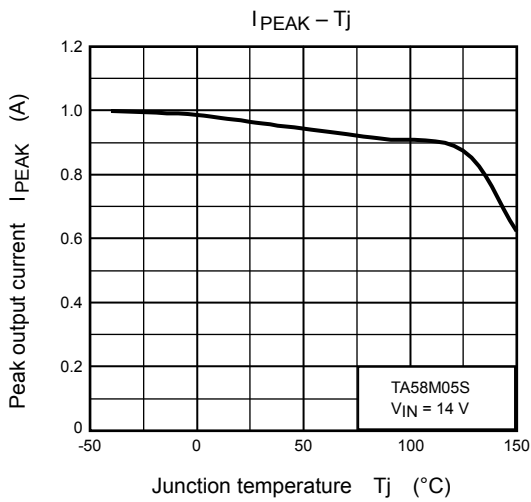
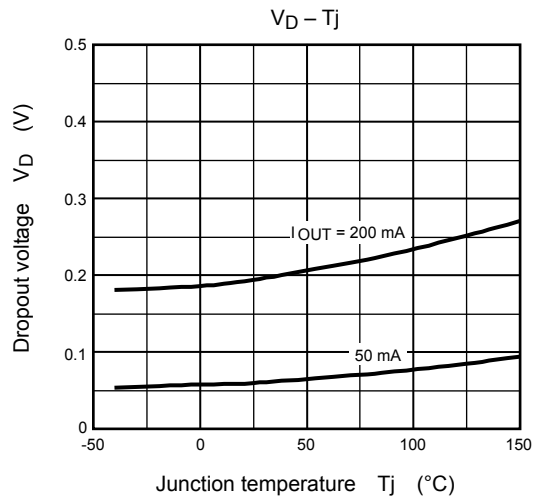
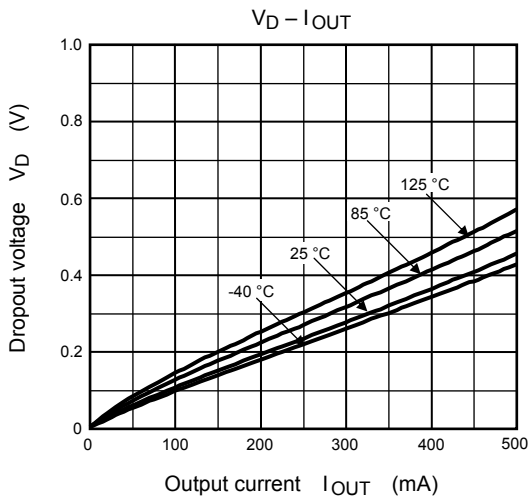
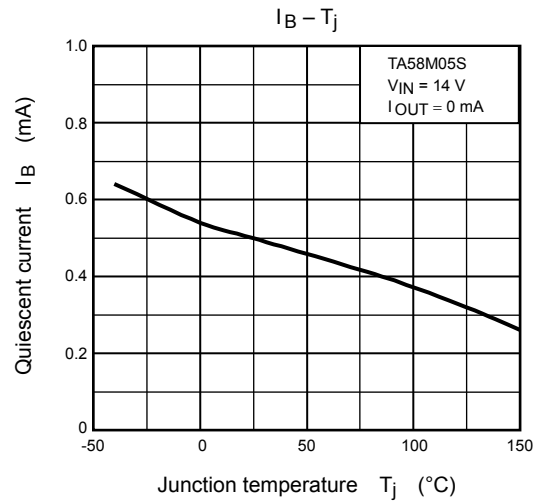
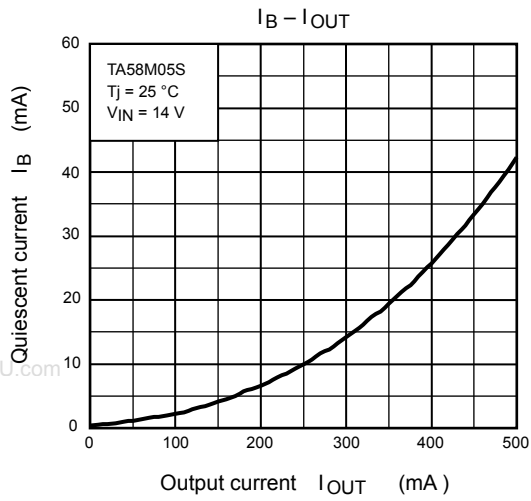
## Standard Application Circuit



- 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 variations temperature sensitivity. 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.



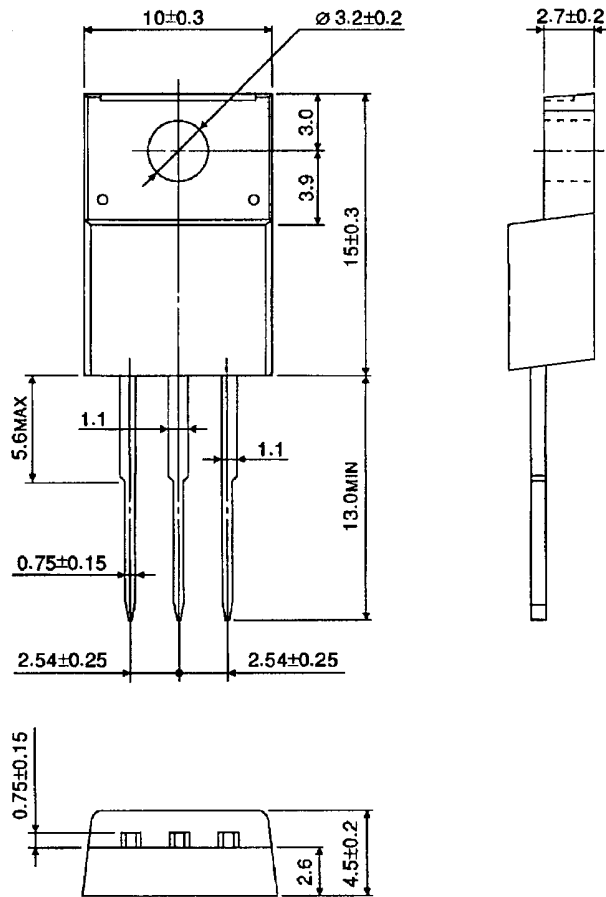




### Package Dimensions

HSIP3-P-2.54A

Unit : mm



Weight: 1.7 g (Typ.)

**RESTRICTIONS ON PRODUCT USE**

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