

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

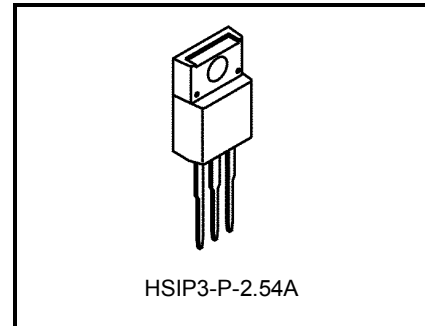
TA58M05S, TA58M06S, TA58M08S, TA58M09S TA58M10S, TA58M12S, TA58M15S

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.

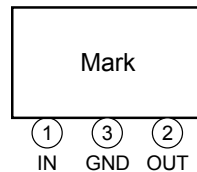
Features

- 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

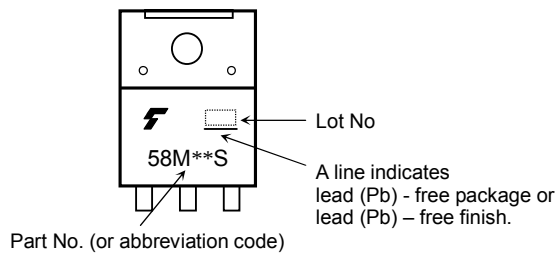


Weight : 1.7 g (Typ.)

Pin Assignment



Marking



Note1: The "**" in each product name is replaced with the output voltage of each product.

Pin Description

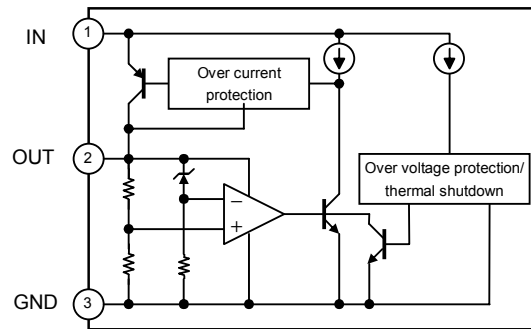
Pin No.	Symbol	Description
1	IN	Input terminal. Connected by capacitor (C_{IN}) to GND.
3	GND	Ground terminal
2	OUT	Output terminal. Connected by capacitor (C_{OUT}) to GND.

How to Order

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

Note2: The “**” in each product number is replaced with the output voltage of each product.

Block Diagram



Maximum Rating (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Input voltage	DC	V _{IN} (DC)	29	V
	Pulse	V _{IN} (Pulse)	60(τ =200ms)	V
Output current		I _{OUT}	500	mA
Operating temperature		T _{opr}	−40~105	°C
Junction temperature		T _j	150	°C
Storage temperature		T _{stg}	−55~150	°C
Power dissipation	Ta = 25°C	P _D	2	W
	Tc= 25°C		20	

Note3: Do not apply current and voltage (including reverse polarity) to any pin that is not specified.

Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal resistance, junction to ambient	R _{th} (j-a)	62.5	°C/ W
Thermal resistance, junction to case	R _{th} (j-c)	6.25	°C/ W

Protection Function (Reference)

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

Note4: Ensure that the devices operate within the limits of the maximum rating when in actual use.

Note5: 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	

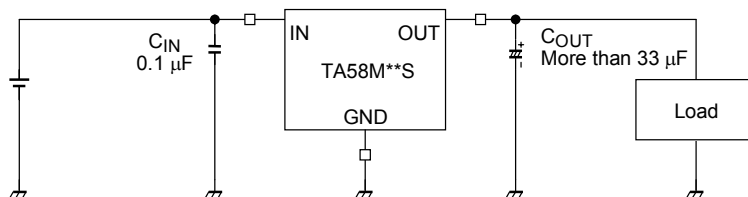
TA58M15S
Electrical Characteristics (unless otherwise specified, $T_j = 25^\circ\text{C}$)

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	

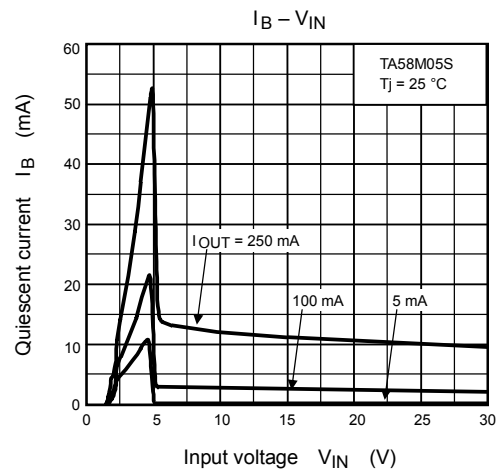
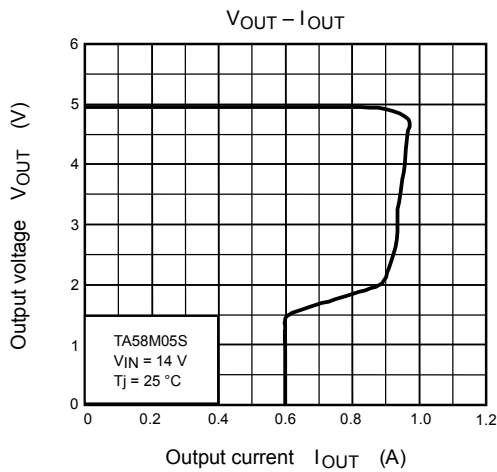
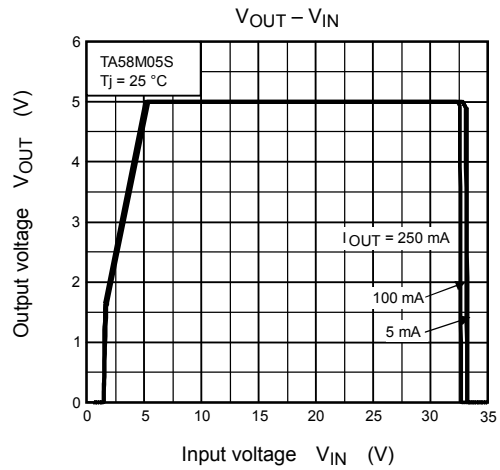
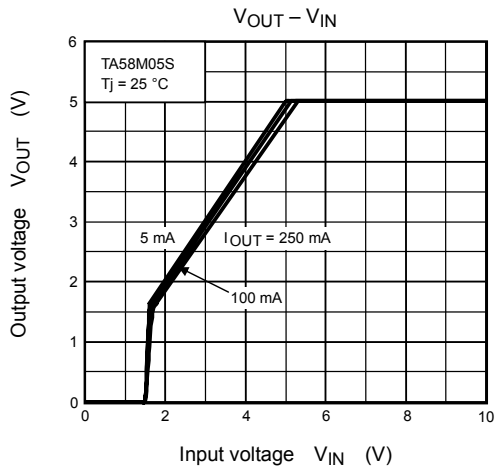
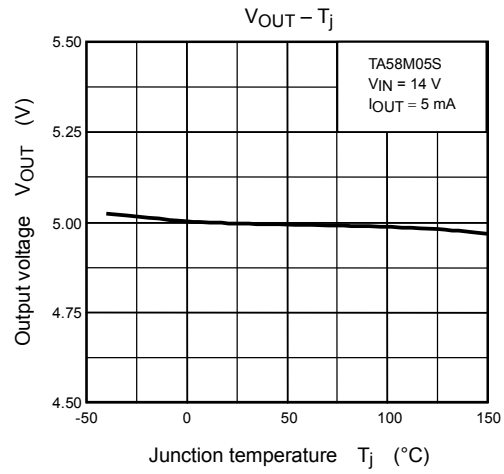
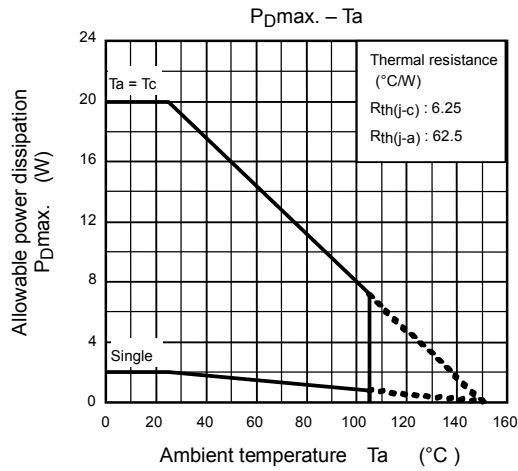
Electrical Characteristics Common to All Products

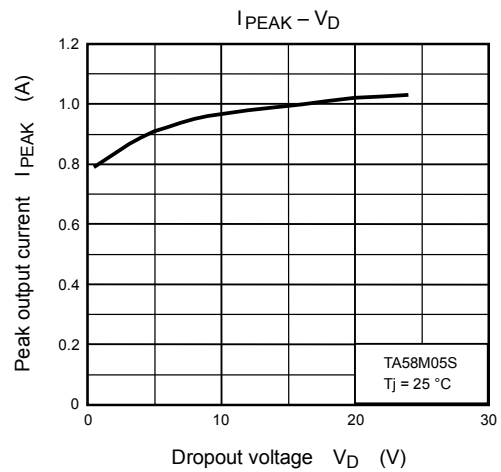
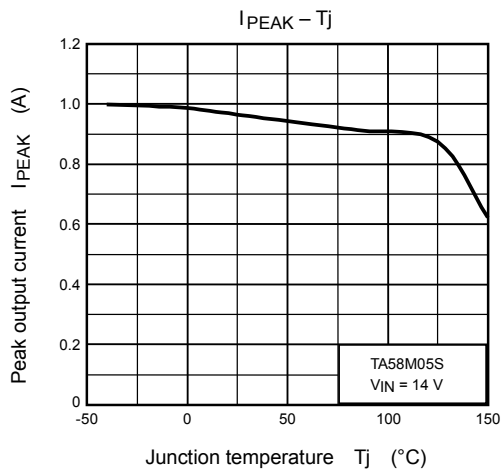
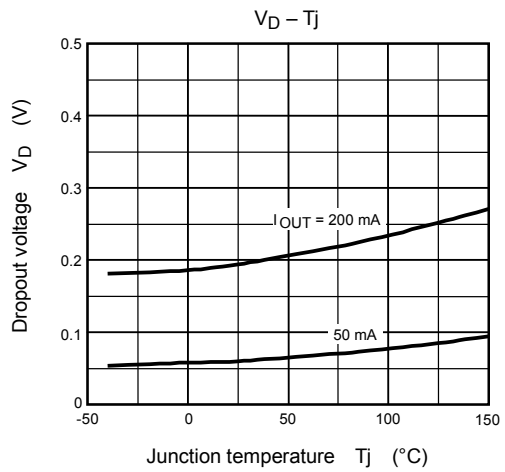
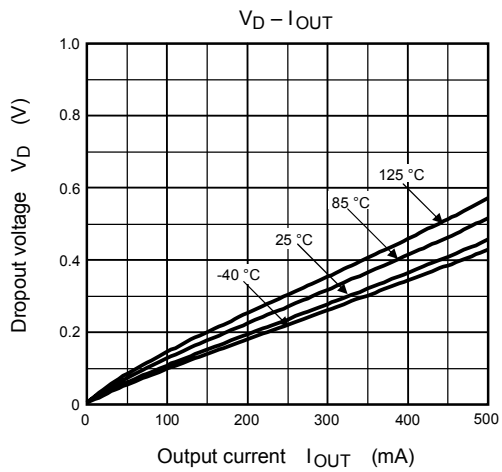
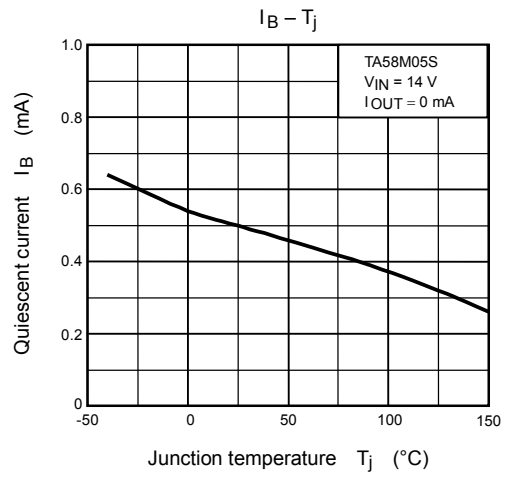
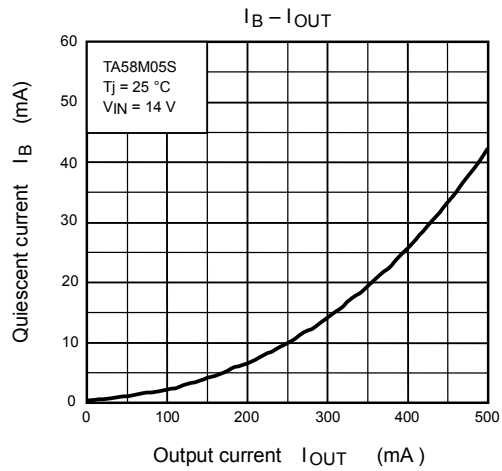
- $T_j = 25^\circ\text{C}$ in the measurement conditions of each item is a regulation for where the standard condition when a pulse test is carried out, and any drift in the electrical characteristic due to a rise in the junction temperature of the chip may be disregarded.

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.

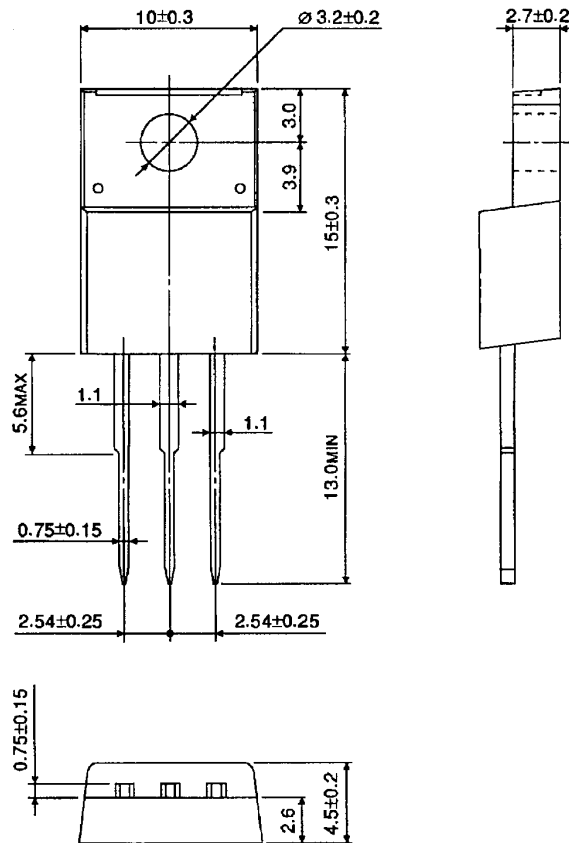




Package Dimensions

HSIP3-P-2.54A

Unit : mm



Weight: 1.7 g (Typ.)

RESTRICTIONS ON PRODUCT USE

060116EBA

- The information contained herein is subject to change without notice. 021023_D
- TOSHIBA is continually working to improve the quality and reliability of its products. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing TOSHIBA products, to comply with the standards of safety in making a safe design for the entire system, and to avoid situations in which a malfunction or failure of such TOSHIBA products could cause loss of human life, bodily injury or damage to property.
In developing your designs, please ensure that TOSHIBA products are used within specified operating ranges as set forth in the most recent TOSHIBA products specifications. Also, please keep in mind the precautions and conditions set forth in the "Handling Guide for Semiconductor Devices," or "TOSHIBA Semiconductor Reliability Handbook" etc. 021023_A
- The TOSHIBA products listed in this document are intended for usage in general electronics applications (computer, personal equipment, office equipment, measuring equipment, industrial robotics, domestic appliances, etc.). These TOSHIBA products are neither intended nor warranted for usage in equipment that requires extraordinarily high quality and/or reliability or a malfunction or failure of which may cause loss of human life or bodily injury ("Unintended Usage"). Unintended Usage include atomic energy control instruments, airplane or spaceship instruments, transportation instruments, traffic signal instruments, combustion control instruments, medical instruments, all types of safety devices, etc. Unintended Usage of TOSHIBA products listed in this document shall be made at the customer's own risk. 021023_B
- The products described in this document shall not be used or embedded to any downstream products of which manufacture, use and/or sale are prohibited under any applicable laws and regulations. 060106_Q
- The information contained herein is presented only as a guide for the applications of our products. No responsibility is assumed by TOSHIBA for any infringements of patents or other rights of the third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of TOSHIBA or others. 021023_C
- The products described in this document are subject to the foreign exchange and foreign trade laws. 021023_E