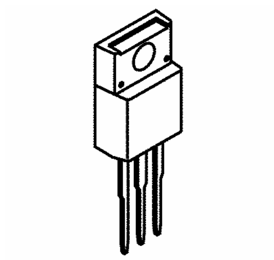
TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA58L05S, TA58L06S, TA58L08S, TA58L09S TA58L10S, TA58L12S, TA58L15S

250 mA Low Dropout Voltage Regulator

The TA58L**S Series consists of fixed-positive-output, low-dropout regulators with an output current of 250 mA (max) that utilize PNP transistors for the output stage. Low dropout voltage and standby current make the TA58L**S Series suitable for applications requiring low power consumption.



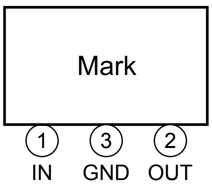
HSIP3-P-2.54A

Weight : 1.7 g (Typ.)

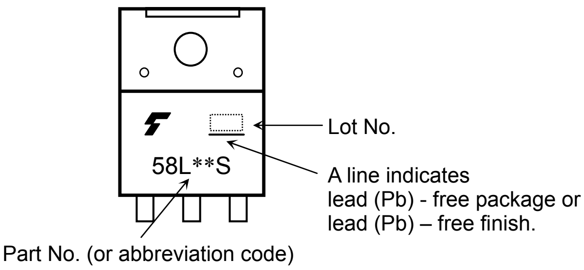
Features

- Maximum output current : 250 mA
- Output voltage : 5/ 6/ 8/ 9/ 10/ 12/ 15 V
- Output voltage accuracy : V_{OUT} ± 3% (@T_j = 25°C)
- Low-dropout voltage : 0.4 V (Max) (@I_{OUT} = 200mA)
- 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

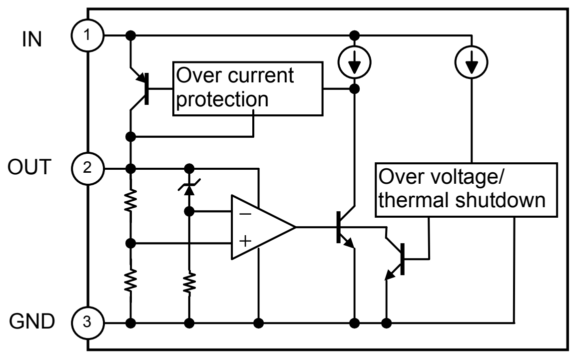
Pin No.	Symbol	Description
1	IN	Input terminal. Connected by capacitor (C_{IN}) to GND.
3	GND	Ground terminal
2	OUT	Output terminal. Connected by capacitor (C_{OUT}) to GND.

How to Order

Product No.	Package	Package Type and Capacity
TA58L**S(Q) (Note2)	TO-220NIS	Loose in bag: 50 (1 bag)

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	$V_{IN\ (DC)}$	29	V
	Pulse	$V_{IN\ (Pulse)}$	60(τ =200ms)	V
Output current		I_{OUT}	250	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	

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	$R_{th\ (j-a)}$	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
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	—	600	—	mA
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	—	330	—	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.

TA58L05S
Electrical Characteristics (unless otherwise specified, T_j = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 14 V, I_{OUT} = 10 mA	4.85	5.00	5.15	V
		5.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ Ta ≦ 105°C	4.8	5.0	5.2	
Line regulation	Reg·line	9 V ≦ V_{IN} ≦ 16 V, I_{OUT} = 10 mA	—	1	10	mV
		5.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	2	15	
Load regulation	Reg·load	V_{IN} = 14 V, 10 mA ≦ I_{OUT} ≦ 250 mA	—	10	30	mV
Quiescent current	I_B	6 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	0.45	1.00	mA
		6 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	25	50	
Dropout voltage	V_D	I_{OUT} = 50 mA	—	0.08	0.20	V
		I_{OUT} = 200 mA	—	0.22	0.40	

TA58L06S
Electrical Characteristics (unless otherwise specified, T_j = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 14 V, I_{OUT} = 10 mA	5.82	6.00	6.18	V
		6.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ Ta ≦ 105°C	5.76	6.00	6.24	
Line regulation	Reg·line	10 V ≦ V_{IN} ≦ 17 V, I_{OUT} = 10 mA	—	1	10	mV
		6.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	2	15	
Load regulation	Reg·load	V_{IN} = 14 V, 10 mA ≦ I_{OUT} ≦ 250 mA	—	10	30	mV
Quiescent current	I_B	7 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	0.5	1.0	mA
		7 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	25	50	
Dropout voltage	V_D	I_{OUT} = 50 mA	—	0.08	0.20	V
		I_{OUT} = 200 mA	—	0.22	0.40	

TA58L08S
Electrical Characteristics (unless otherwise specified, T_j = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 16 V, I_{OUT} = 10mA	7.76	8.00	8.24	V
		8.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ Ta ≦ 105°C	7.68	8.00	8.32	
Line regulation	Reg·line	12 V ≦ V_{IN} ≦ 19 V, I_{OUT} = 10 mA	—	1	10	mV
		8.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	2	15	
Load regulation	Reg·load	V_{IN} = 16 V, 10 mA ≦ I_{OUT} ≦ 250 mA	—	10	40	mV
Quiescent current	I_B	9 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	0.55	1.00	mA
		9 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	25	50	
Dropout voltage	V_D	I_{OUT} = 50 mA	—	0.08	0.20	V
		I_{OUT} = 200 mA	—	0.22	0.40	

TA58L09S
Electrical Characteristics (unless otherwise specified, T_j = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 16 V, I_{OUT} = 10 mA	8.73	9.00	9.27	V
		9.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ Ta ≦ 105°C	8.64	9.00	9.36	
Line regulation	Reg·line	13 V ≦ V_{IN} ≦ 20 V, I_{OUT} = 10 mA	—	1	12	mV
		9.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	2	20	
Load regulation	Reg·load	V_{IN} = 16 V, 10 mA ≦ I_{OUT} ≦ 250 mA	—	12	40	mV
Quiescent current	I_B	10 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	0.6	1.0	mA
		10 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	25	50	
Dropout voltage	V_D	I_{OUT} = 50 mA	—	0.08	0.20	V
		I_{OUT} = 200 mA	—	0.22	0.40	

TA58L10S
Electrical Characteristics (unless otherwise specified, T_j = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 16 V, I_{OUT} = 10 mA	9.7	10.0	10.3	V
		10.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ Ta ≦ 105°C	9.6	10.0	10.4	
Line regulation	Reg･line	14 V ≦ V_{IN} ≦ 21 V, I_{OUT} = 10 mA	—	1	12	mV
		10.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	2	20	
Load regulation	Reg･load	V_{IN} = 16 V, 10 mA ≦ I_{OUT} ≦ 250 mA	—	12	40	mV
Quiescent current	I_B	11 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	0.6	1.2	mA
		11 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	25	50	
Dropout voltage	V_D	I_{OUT} = 50 mA	—	0.08	0.20	V
		I_{OUT} = 200 mA	—	0.22	0.40	

TA58L12S
Electrical Characteristics (unless otherwise specified, T_j = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 18 V, I_{OUT} = 10 mA	11.64	12.00	12.36	V
		12.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ Ta ≦ 105°C	11.52	12.00	12.48	
Line regulation	Reg･line	16 V ≦ V_{IN} ≦ 23 V, I_{OUT} = 10 mA	—	1	12	mV
		12.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	2	20	
Load regulation	Reg･load	V_{IN} = 18 V, 10 mA ≦ I_{OUT} ≦ 250 mA	—	20	50	mV
Quiescent current	I_B	13 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	0.65	1.20	mA
		13 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	25	50	
Dropout voltage	V_D	I_{OUT} = 50 mA	—	0.08	0.20	V
		I_{OUT} = 200 mA	—	0.22	0.40	

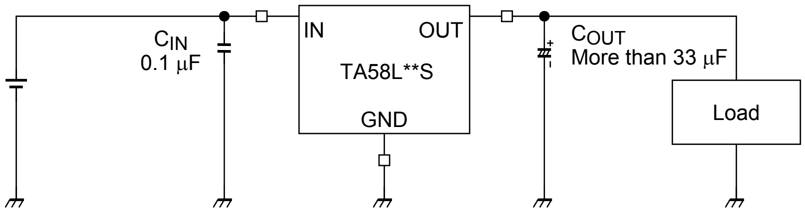
TA58L15S
Electrical Characteristics (unless otherwise specified, T_j = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	V_{IN} = 20 V, I_{OUT} = 10 mA	14.55	15.00	15.45	V
		15.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA, -40°C ≦ Ta ≦ 105°C	14.4	15.0	15.6	
Line regulation	Reg・line	19 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	1	12	mV
		15.35 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 10 mA	—	2	20	
Load regulation	Reg・load	V_{IN} = 20 V, 10 mA ≦ I_{OUT} ≦ 250 mA	—	20	60	mV
Quiescent current	I_B	16 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 A	—	0.75	1.40	mA
		16 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	25	50	
Dropout voltage	V_D	I_{OUT} = 50 mA	—	0.08	0.20	V
		I_{OUT} = 200 mA	—	0.22	0.40	

Electrical Characteristics Common to All Products

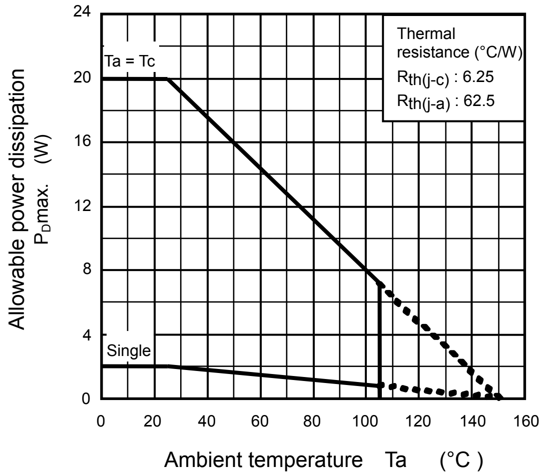
- T_j = 25°C in the measurement conditions of each item is the standard condition when a pulse test is carried out, and any drift in the electrical characteristic due to a rise in the junction temperature of the chip may be disregarded.

Standard Application Circuit

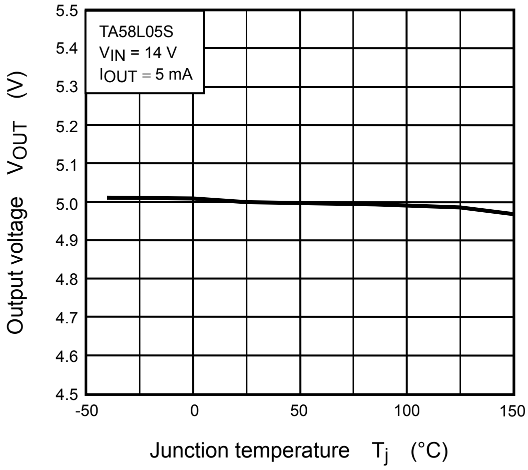


- Place C_{IN} as close as possible to the input terminal and GND. Place C_{OUT} as close as possible to the output terminal and GND. Although capacitor C_{OUT} acts to smooth the dc output voltage during suspension of output oscillation or load change, it might cause output oscillation in a cold environment due to increased capactor ESR. It is therefore recommended to use a capacitor with small variations temperature sensitivity. Also, ensure that the regulator performance is satisfactory over the operating temperature range of the target system..

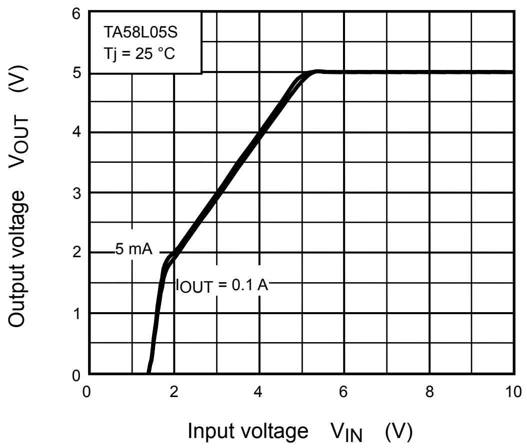
$P_D$max. – Ta



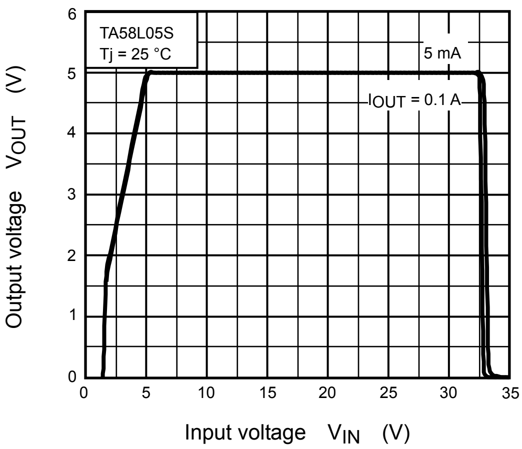
V_{OUT} – T_j



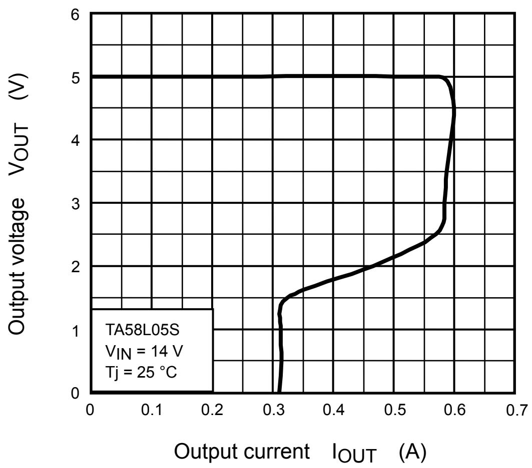
V_{OUT} – V_{IN}



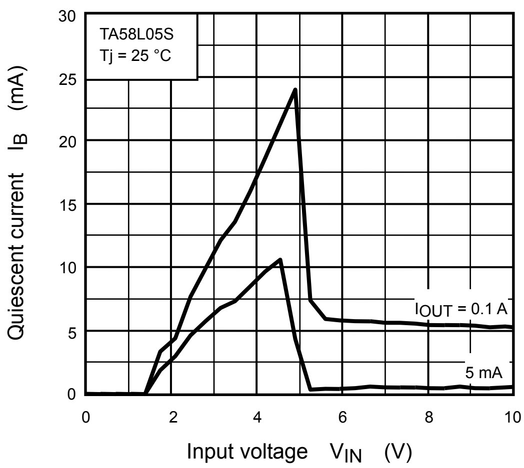
V_{OUT} – V_{IN}



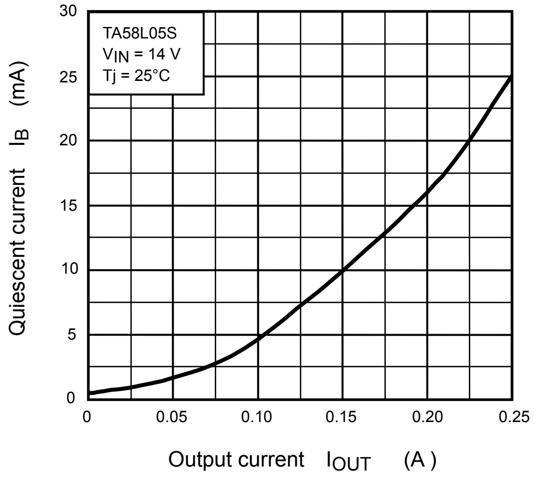
V_{OUT} – I_{OUT}



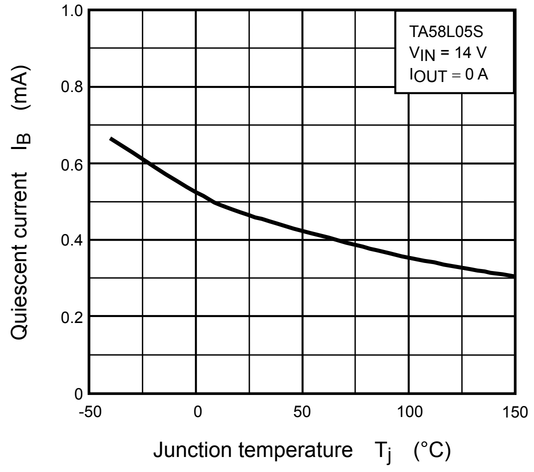
I_B – V_{IN}



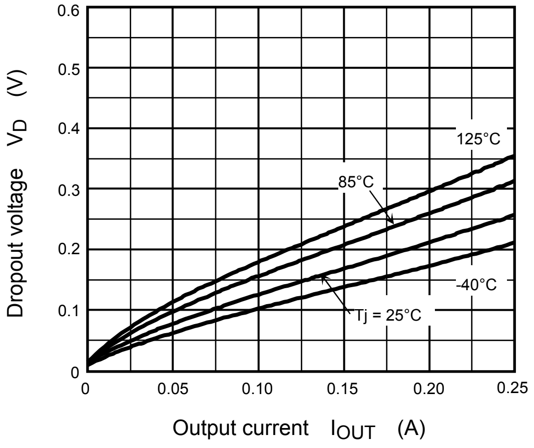
$I_B – I_{OUT}$



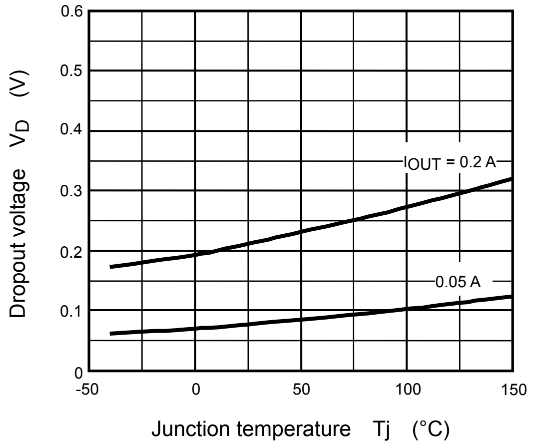
$I_B – T_j$



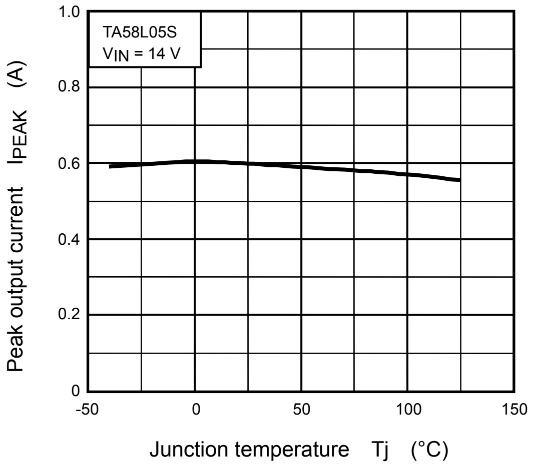
$V_D – I_{OUT}$



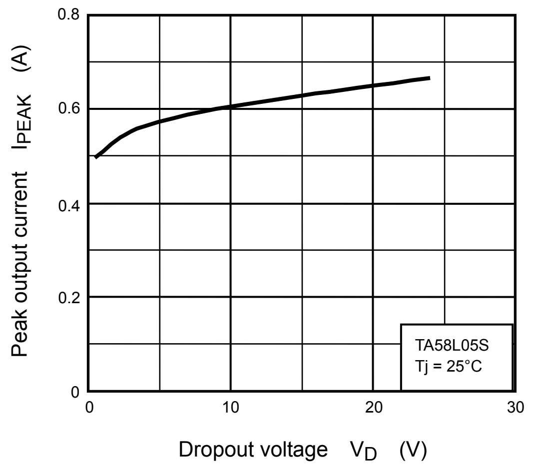
$V_D – T_j$



$I_{PEAK} – T_j$

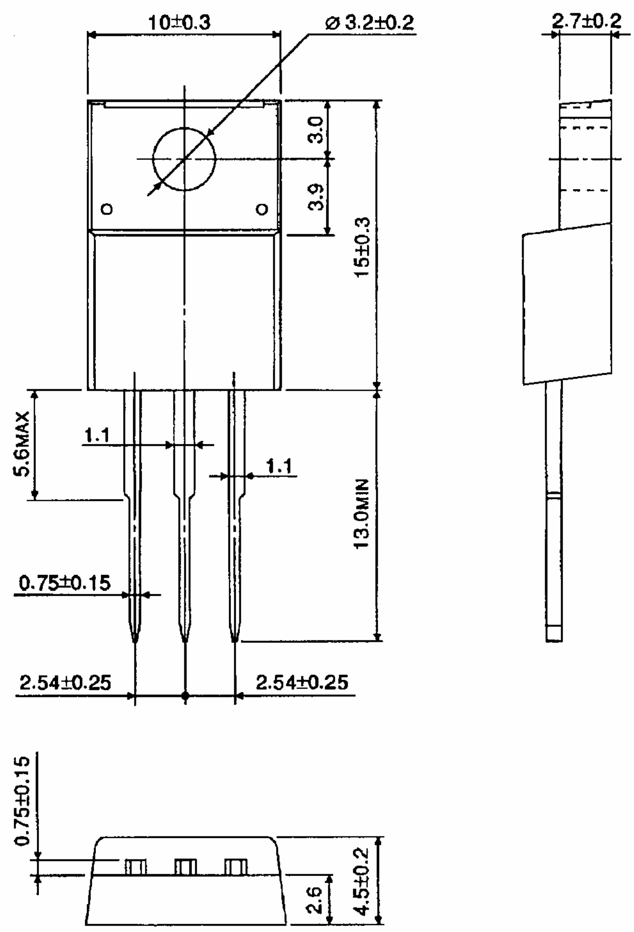


$I_{PEAK} – V_D$



Package Dimensions

HSIP3-P-2.54A Unit : mm



Weight: 1.7 g (Typ.)

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20070701-EN

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