

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

## TA78DM05S, TA78DM08S, TA78DM09S, TA78DM12S

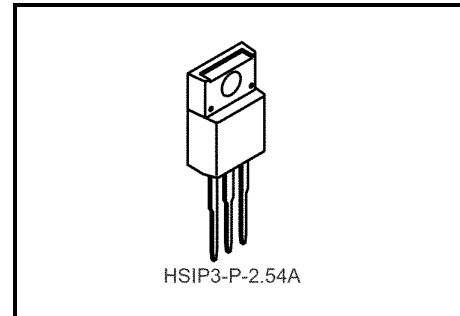
5 V, 8 V, 9 V, 12 V

Three-Terminal Low Dropout Voltage Regulator

The TA78DM××S series consists of fixed-positive-output voltage regulator ICs capable of sourcing current of up to 500 mA. Due to the features of low dropout voltage and low standby current, these devices are useful for battery-powered equipment.

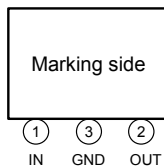
### Features

- Low standby current of 800  $\mu$ A typical.
- Maximum output current of 500 mA.
- Low dropout voltage: 0.75 V (max).
- Multi-protection:  
Reverse connection of power supply, 60 V load dump, thermal shut down and current limiting.
- Metal fin (tab) is fully covered with mold resin. (TO-220 NIS package)

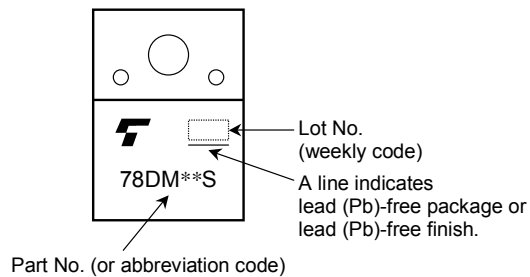


Weight: 1.7 g (typ.)

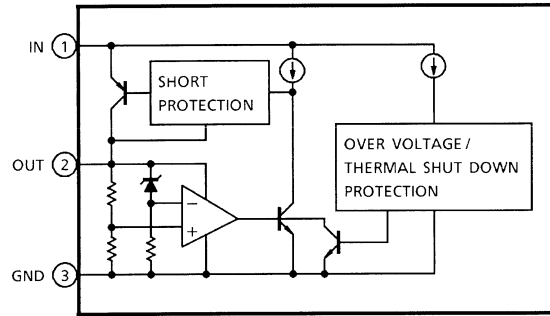
### Pin Assignment



### Marking



## Block Diagram



## Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Operating input voltage	$V_{IN}$	29	V
Input voltage of surge	$V_{IN}$	60	V
Power dissipation	$P_D$	(Ta = 25°C)	2
		(Tc = 25°C)	20
Operating temperature	$T_{opr}$	-40~85	°C
Storage temperature	$T_{stg}$	-55~150	°C
Thermal resistance	$R_{th(j-c)}$	6.25	°C/W
	$R_{th(j-a)}$	62.5	
Storage temperature-time	$T_{sol}$	260 (10s)	°C

## TA78DM05S

### Electrical Characteristics

(Unless otherwise specified,  $V_{IN} = 14\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 100\ \mu\text{F}$ )

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	4.75	5	5.25	V
			$6\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 250\text{ mA}$	4.7	—	5.3	
Line regulation	Reg-line	—	$6\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	3	30	mV
Load regulation	Reg-load	—	$V_{IN} = 6\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	66	240	mV
			$V_{IN} = 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	40	240	
Quiescent current	$I_B$	—	$6\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	0.8	1.4	mA
			$6\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	14	27	
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.2	0.35	V
			$I_{OUT} = 500\text{ mA}$	—	0.4	0.75	
Short circuit current limit	$I_{SC}$	—	—	—	0.7	—	A

## TA78DM08S

### Electrical Characteristics

(Unless otherwise specified,  $V_{IN} = 16\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 100\ \mu\text{F}$ )

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	7.6	8	8.4	V
			$9\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 250\text{ mA}$	7.52	—	8.48	
Line regulation	Reg-line	—	$9\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	6	48	mV
Load regulation	Reg-load	—	$V_{IN} = 9\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	54	380	mV
			$V_{IN} = 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	47	380	
Quiescent current	$I_B$	—	$9\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	0.9	1.5	mA
			$9\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	16	27	
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.2	0.35	V
			$I_{OUT} = 500\text{ mA}$	—	0.4	0.75	
Short circuit current limit	$I_{SC}$	—	—	—	0.7	—	A

## TA78DM09S

### Electrical Characteristics

(Unless otherwise specified,  $V_{IN} = 16\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 100\ \mu\text{F}$ )

Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	8.55	9	9.45	V
			$10\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 250\text{ mA}$	8.46	—	9.54	
Line regulation	Reg-line	—	$10\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	9	54	mV
Load regulation	Reg-load	—	$V_{IN} = 10\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	47	430	mV
			$V_{IN} = 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	50	430	
Quiescent current	$I_B$	—	$10\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	0.9	1.6	mA
			$10\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	16	27	
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.2	0.35	V
			$I_{OUT} = 500\text{ mA}$	—	0.4	0.75	
Short circuit current limit	$I_{SC}$	—	—	—	0.7	—	A

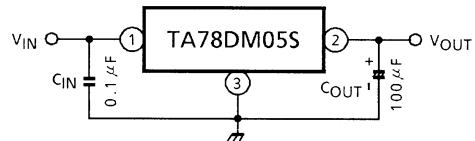
## TA78DM12S

### Electrical Characteristics

(Unless otherwise specified,  $V_{IN} = 18\text{ V}$ ,  $I_{OUT} = 250\text{ mA}$ ,  $T_j = 25^\circ\text{C}$ ,  $C_{IN} = 0.1\ \mu\text{F}$ ,  $C_{OUT} = 100\ \mu\text{F}$ )

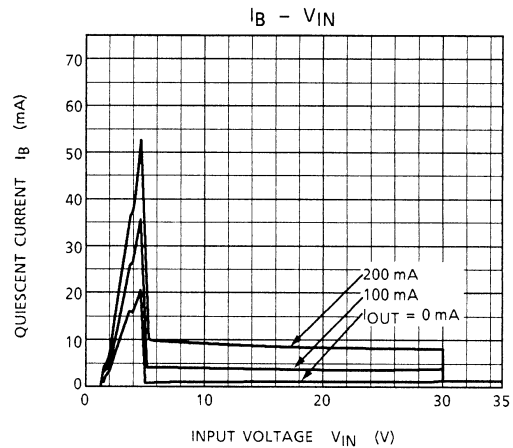
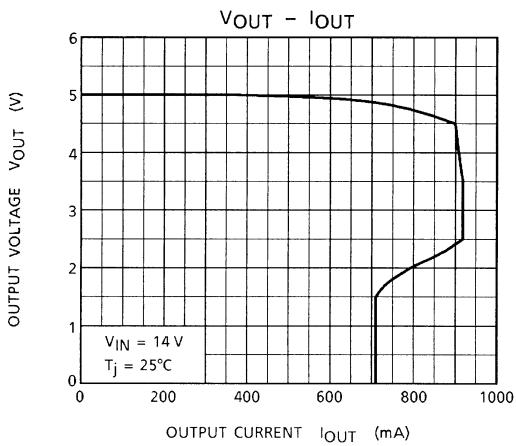
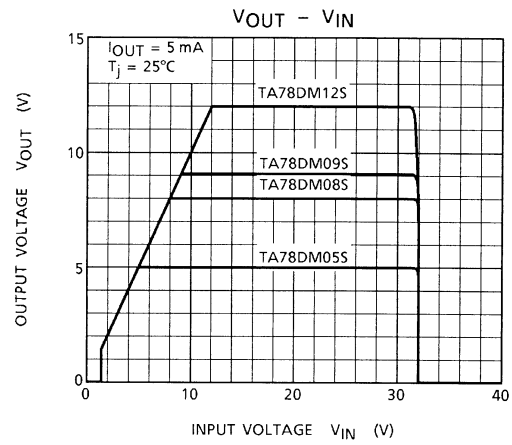
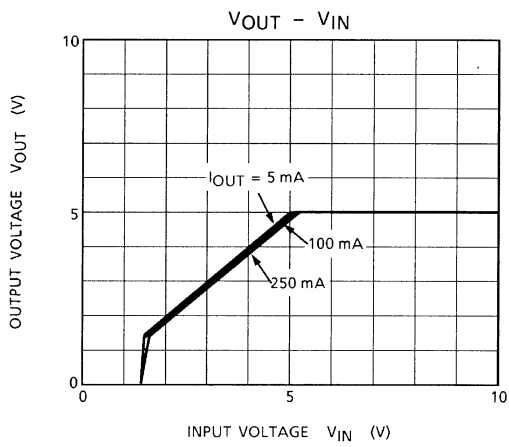
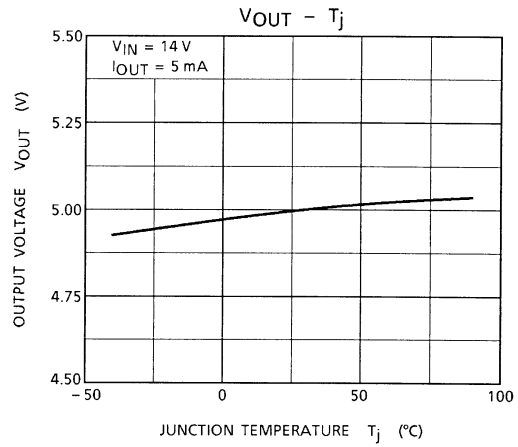
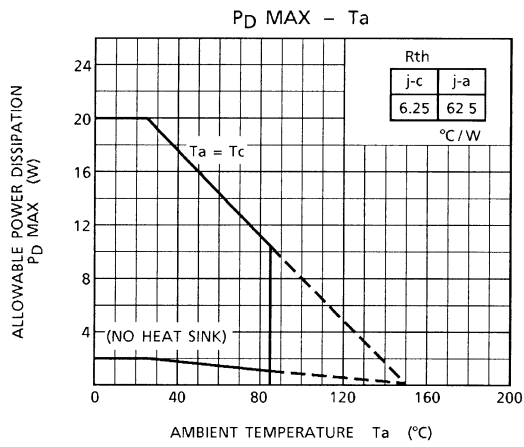
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	$V_{OUT}$	—	—	11.4	12	12.6	V
			$13\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 250\text{ mA}$	11.28	—	12.72	
Line regulation	Reg-line	—	$13\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	10	72	mV
Load regulation	Reg-load	—	$V_{IN} = 13\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	84	580	mV
			$V_{IN} = 26\text{ V}$ , $5\text{ mA} \leq I_{OUT} \leq 500\text{ mA}$	—	45	580	
Quiescent current	$I_B$	—	$13\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 0\text{ mA}$	—	1.0	1.7	mA
			$13\text{ V} \leq V_{IN} \leq 26\text{ V}$ , $I_{OUT} = 250\text{ mA}$	—	16	27	
Dropout voltage	$V_D$	—	$I_{OUT} = 250\text{ mA}$	—	0.2	0.35	V
			$I_{OUT} = 500\text{ mA}$	—	0.4	0.75	
Short circuit current limit	$I_{SC}$	—	—	—	0.7	—	A

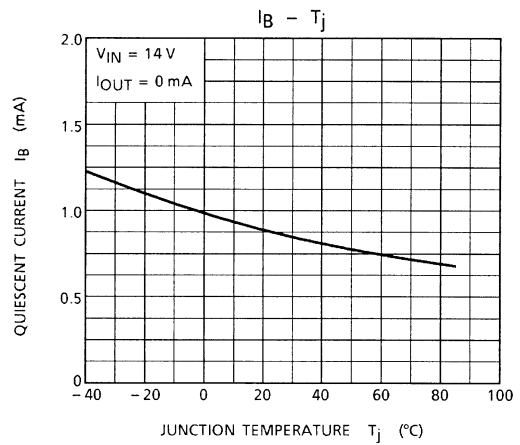
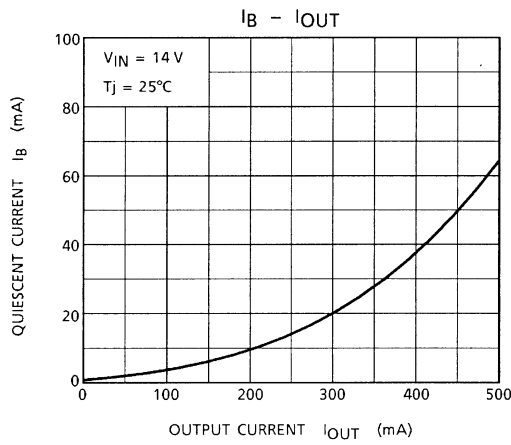
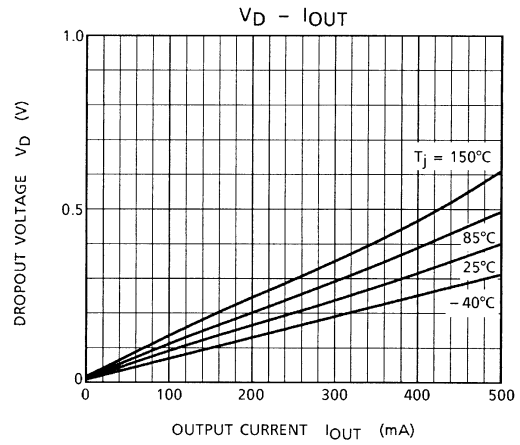
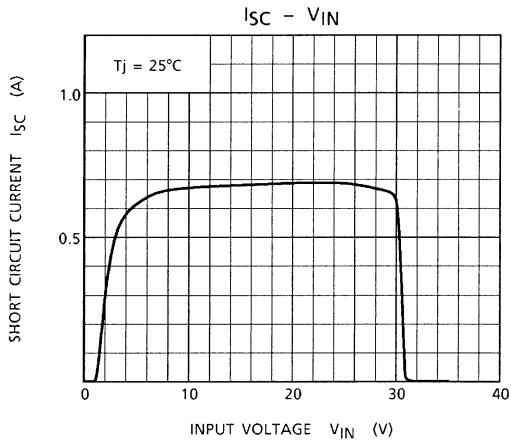
### Application Circuit



The capacitors  $C_{IN}/C_{OUT}$  must be guaranteed to operate within the temperature range in which the regulator operates correctly.

The equivalent series resistance (ESR) of  $C_{OUT}$  must be less than  $1\ \Omega$  inside the operating temperature range.

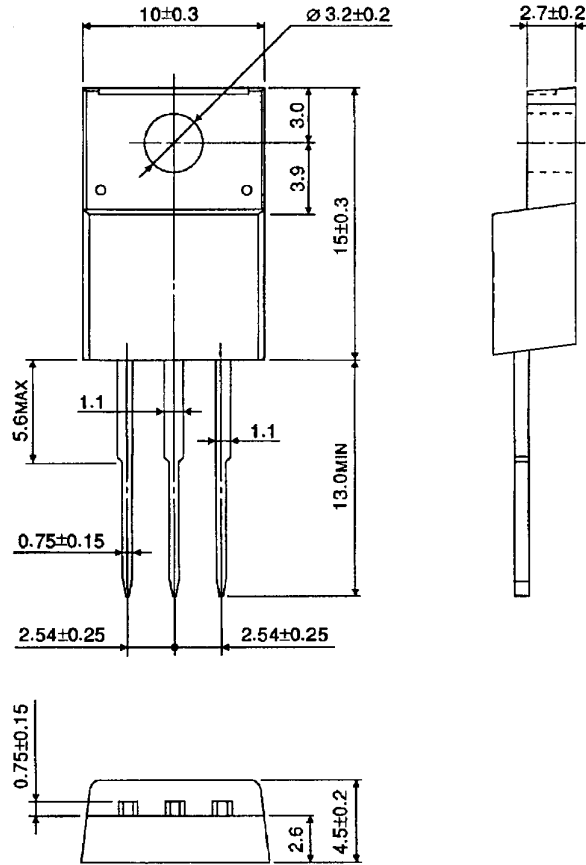




## Package Dimensions

HSIP3-P-2.54A

Unit: mm



Weight: 1.7 g (typ.)

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