

TOSHIBA Bipolar Linear Integrated Circuit Silicon Monolithic

TA78DM05S, TA78DM08S, TA78DM09S, TA78DM12S

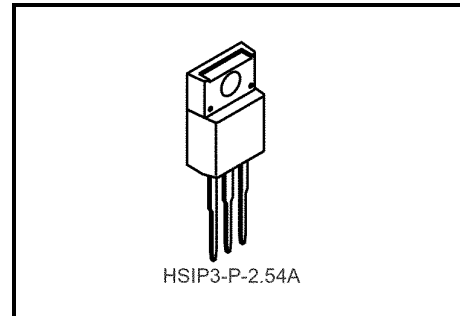
5 V, 8 V, 9 V, 12 V

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.

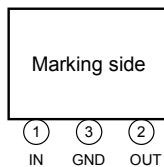
Features

- Low standby current of 800 μ 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)

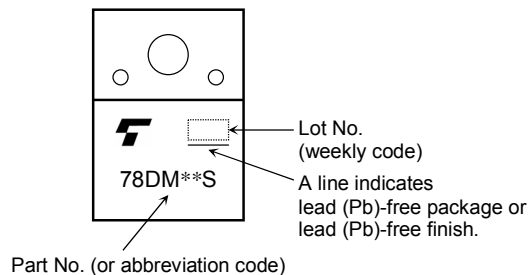


Weight: 1.7 g (typ.)

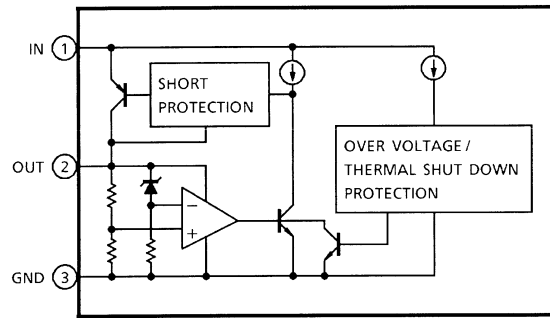
Pin Assignment



Marking



Block Diagram



Absolute 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	(Ta = 25°C)	2	W
	(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

Note: 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).

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

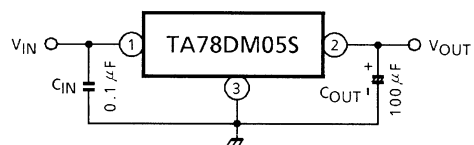
TA78DM12S

Electrical Characteristics

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

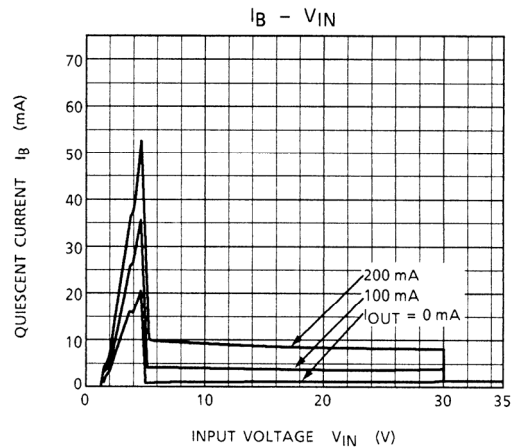
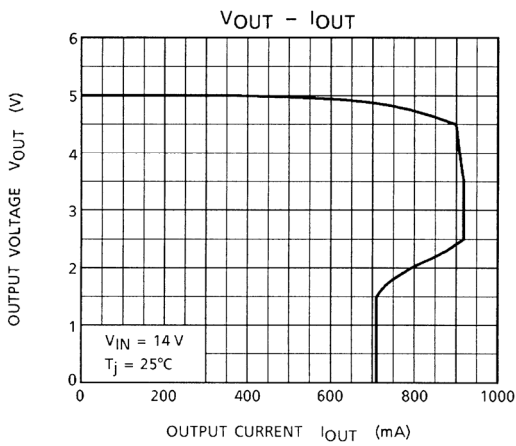
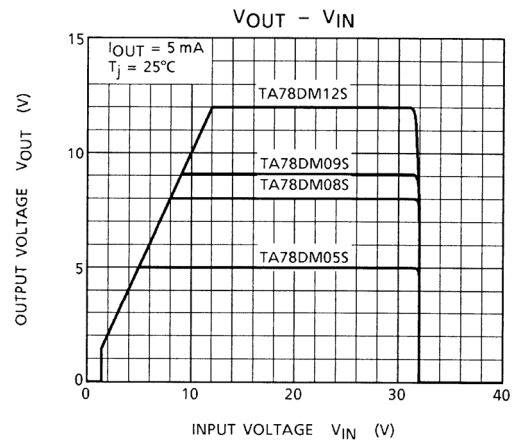
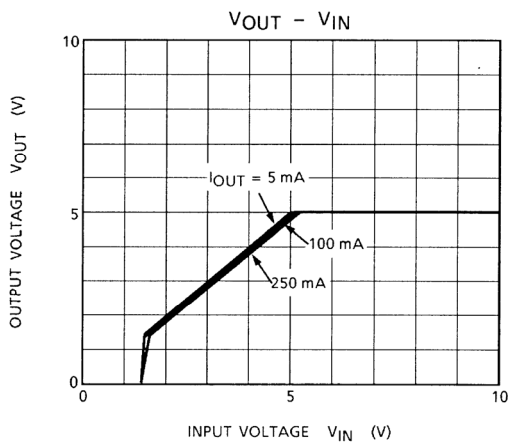
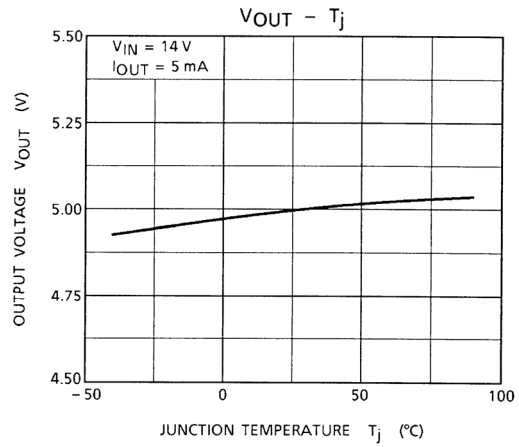
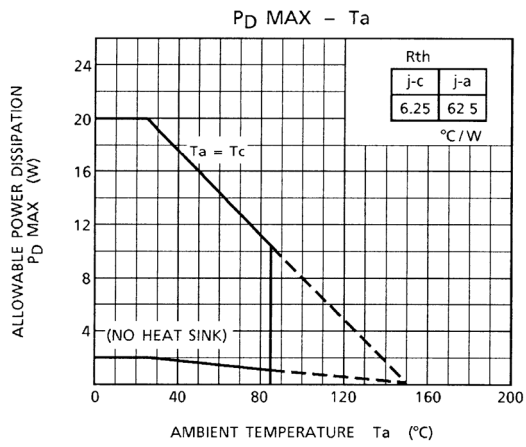
Characteristics	Symbol	Test Circuit	Test Condition	Min	Typ.	Max	Unit
Output voltage	V_{OUT}	—	—	11.4	12	12.6	V
			$13\text{ V} \leq V_{IN} \leq 26\text{ V}$, $5\text{ mA} \leq I_{OUT} \leq 250\text{ mA}$	11.28	—	12.72	
Line regulation	Reg-line	—	$13\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	10	72	mV
Load 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

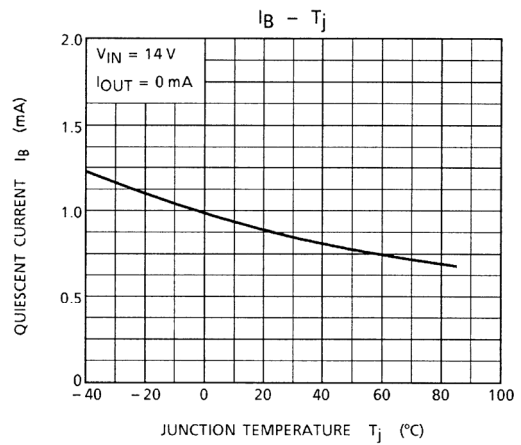
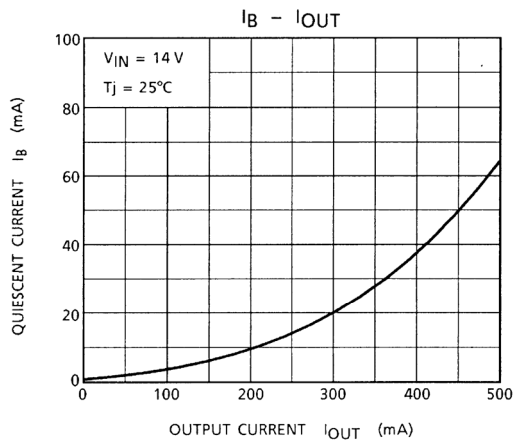
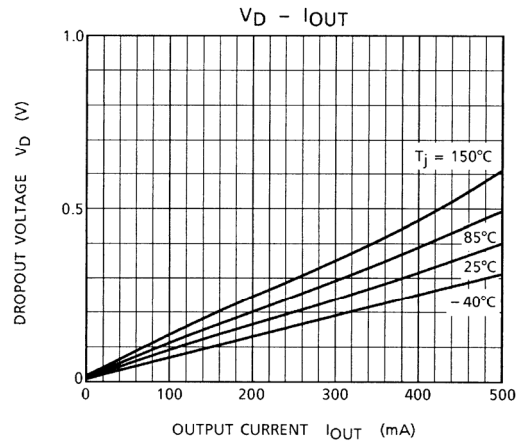
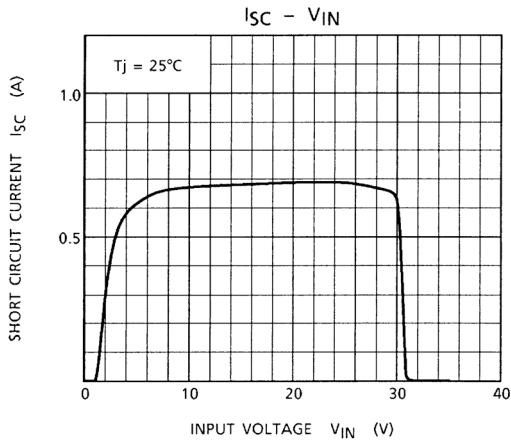
Application Circuit



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.

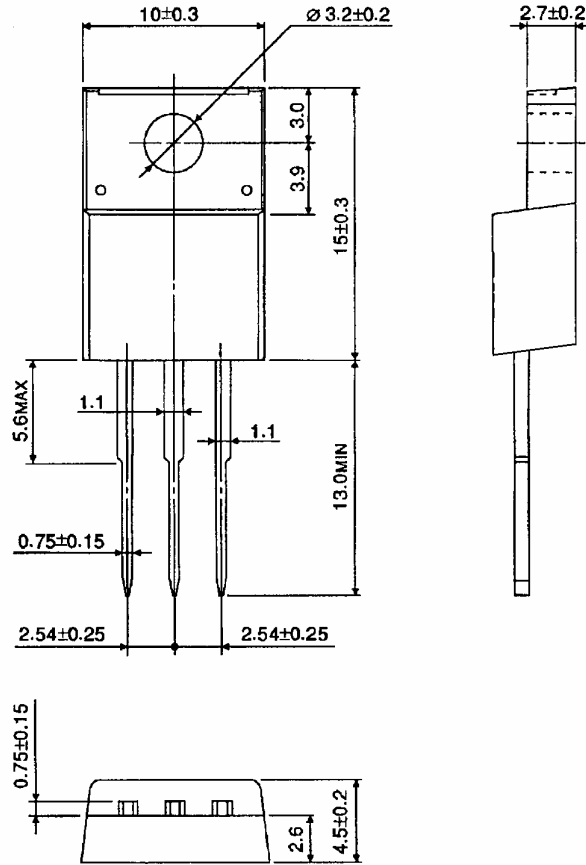




Package Dimensions

HSIP3-P-2.54A

Unit: mm



Weight: 1.7 g (typ.)

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