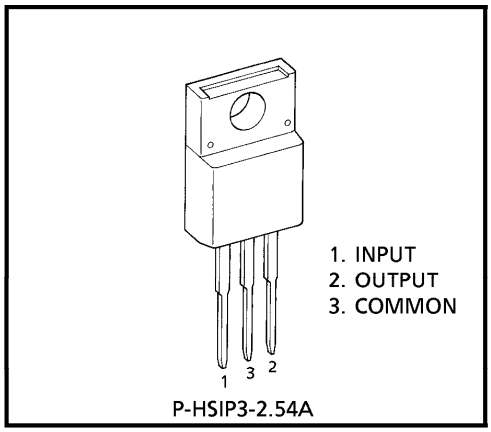
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA78DM05S, TA78DM08S, TA78DM09S, TA78DM12S

5 V, 8 V, 9 V, 12 V
LOW DROPOUT VOLTAGE REGULATOR

The TA78DMxxS series consists of positive fixed output voltage regulator IC capable of sourcing current up to 500mA.
Due to the features of low dropout voltage and low standby current, these devices are useful for battery powered equipment.



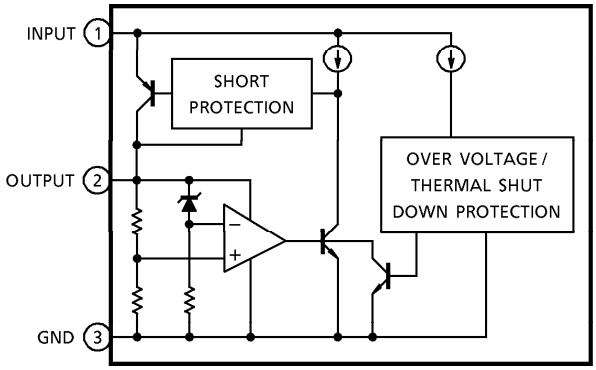
P-HSIP3-2.54A

Weight : 1.7 g (Typ.)

FEATURES

- Low Standby Current of 800 μA Typical.
- Maximum Output Current Up to 500 mA.
- Low Dropout Voltage of Less than 0.75 V (I_O = 0.5 A).
- Multi-protection : Reverse Connection of Power Supply, 60V Load Dump, Thermal Shut Down and Current Limiting.
- Metal Fin (Tab) is Fully Covered with Mold Resin. (TO-220 NIS package)

BLOCK DIAGRAM



MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC		SYMBOL	RATING	UNIT
Operating Input Voltage		V_{IN}	29	V
Input Voltage of Surge		V_{IN}	60	V
Power Dissipation	(Ta = 25°C)	P_D	2	W
	(Tc = 25°C)		20	
Operating Temperature		T_{opr}	−40~85	°C
Storage Temperature		T_{stg}	−55~150	°C
Thermal Resistance		$R_{th\ (j\text{-}c)}$	6.25	°C / W
		$R_{th\ (j\text{-}a)}$	62.5	
Storage Temperature·Time		T_{sol}	260 (10 s)	°C

TA78DM05S

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{IN} = 14 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 100 μF)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	—	4.75	5	5.25	V
			6 V ≦ V_{IN} ≦ 26 V, 5 mA ≦ I_{OUT} ≦ 250 mA	4.7	—	5.3	
Line Regulation	Reg·line	—	6 V ≦ V_{IN} ≦ 26 V	—	3	30	mV
Load Regulation	Reg·load	—	V_{IN} = 6 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	66	240	mV
			V_{IN} = 26 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	40	240	
Quiescent Current	I_B	—	6 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 mA	—	0.8	1.4	mA
			6 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	14	27	
Dropout Voltage	V_D	—	I_{OUT} = 250 mA	—	0.2	0.35	V
			I_{OUT} = 500 mA	—	0.4	0.75	
Short Circuit Current Limit	I_{SC}	—	—	—	0.7	—	A

TA78DM08S

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{IN} = 16 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 100 μF)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	—	7.6	8	8.4	V
			9 V ≦ V_{IN} ≦ 26 V, 5 mA ≦ I_{OUT} ≦ 250 mA	7.52	—	8.48	
Line Regulation	Reg·line	—	9 V ≦ V_{IN} ≦ 26 V	—	6	48	mV
Load Regulation	Reg·load	—	V_{IN} = 9 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	54	380	mV
			V_{IN} = 26 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	47	380	
Quiescent Current	I_B	—	9 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 mA	—	0.9	1.5	mA
			9 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	16	27	
Dropout Voltage	V_D	—	I_{OUT} = 250 mA	—	0.2	0.35	V
			I_{OUT} = 500 mA	—	0.4	0.75	
Short Circuit Current Limit	I_{SC}	—	—	—	0.7	—	A

TA78DM09S

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{IN} = 16 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 100 μF)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	—	8.55	9	9.45	V
			10 V ≦ V_{IN} ≦ 26 V, 5 mA ≦ I_{OUT} ≦ 250 mA	8.46	—	9.54	
Line Regulation	Reg·line	—	10 V ≦ V_{IN} ≦ 26 V	—	9	54	mV
Load Regulation	Reg·load	—	V_{IN} = 10 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	47	430	mV
			V_{IN} = 26 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	50	430	
Quiescent Current	I_B	—	10 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 mA	—	0.9	1.6	mA
			10 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	16	27	
Dropout Voltage	V_D	—	I_{OUT} = 250 mA	—	0.2	0.35	V
			I_{OUT} = 500 mA	—	0.4	0.75	
Short Circuit Current Limit	I_{SC}	—	—	—	0.7	—	A

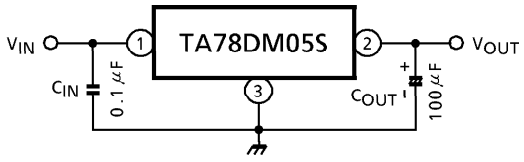
TA78DM12S

ELECTRICAL CHARACTERISTICS

(Unless otherwise specified, V_{IN} = 18 V, I_{OUT} = 250 mA, T_j = 25°C, C_{IN} = 0.1 μF, C_{OUT} = 100 μF)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	—	11.4	12	12.6	V
			13 V ≦ V_{IN} ≦ 26 V, 5 mA ≦ I_{OUT} ≦ 250 mA	11.28	—	12.72	
Line Regulation	Reg·line	—	13 V ≦ V_{IN} ≦ 26 V	—	10	72	mV
Load Regulation	Reg·load	—	V_{IN} = 13 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	84	580	mV
			V_{IN} = 26 V, 5 mA ≦ I_{OUT} ≦ 500 mA	—	45	580	
Quiescent Current	I_B	—	13 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 0 mA	—	1.0	1.7	mA
			13 V ≦ V_{IN} ≦ 26 V, I_{OUT} = 250 mA	—	16	27	
Dropout Voltage	V_D	—	I_{OUT} = 250 mA	—	0.2	0.35	V
			I_{OUT} = 500 mA	—	0.4	0.75	
Short Circuit Current Limit	I_{SC}	—	—	—	0.7	—	A

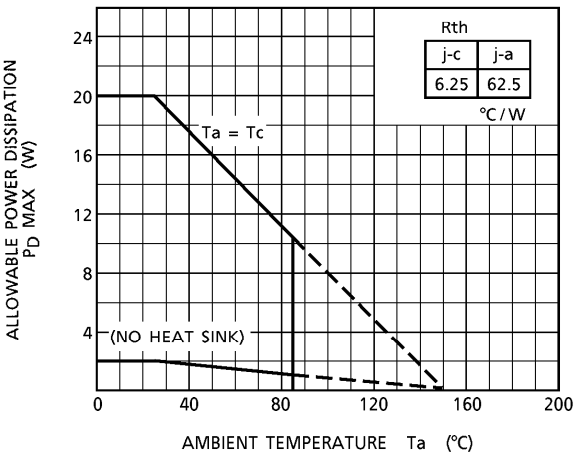
APPLICATION CIRCUITS



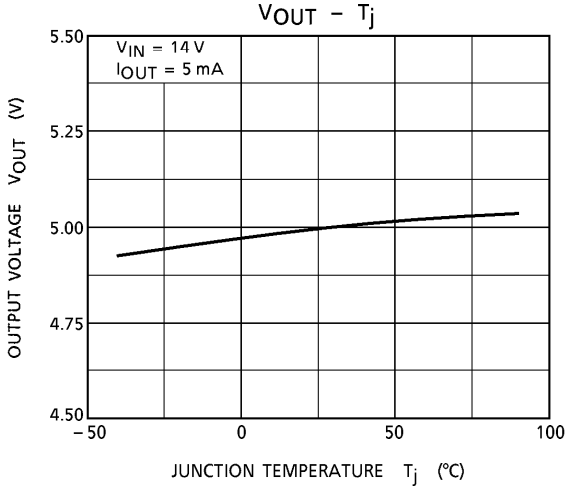
Capacitor C_2 must be guaranteed to operate of the temperature range that the regulator should be operated correctly.

100 μF is a suitable value to suppress the oscillation phenomenon at the output terminal.

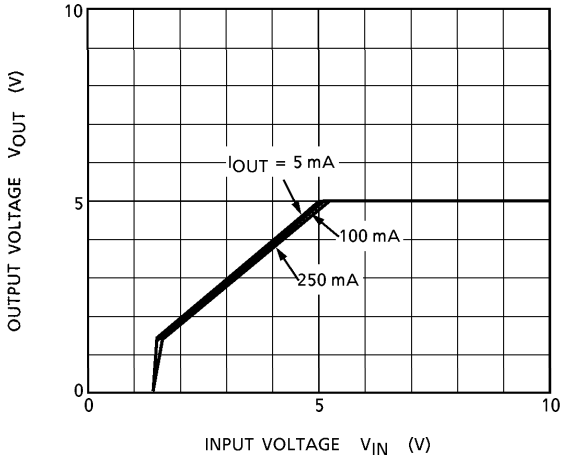
P_D MAX – Ta



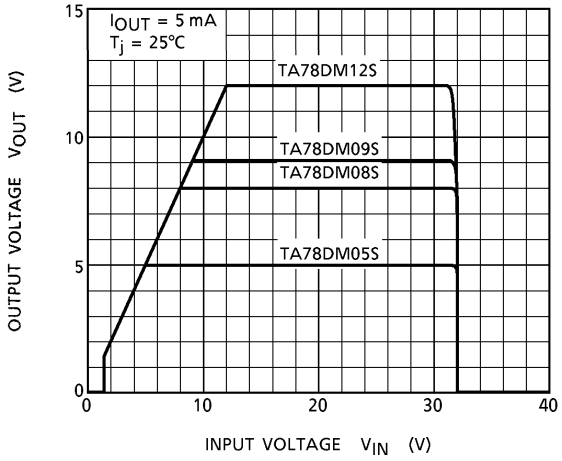
V_{OUT} – T_j



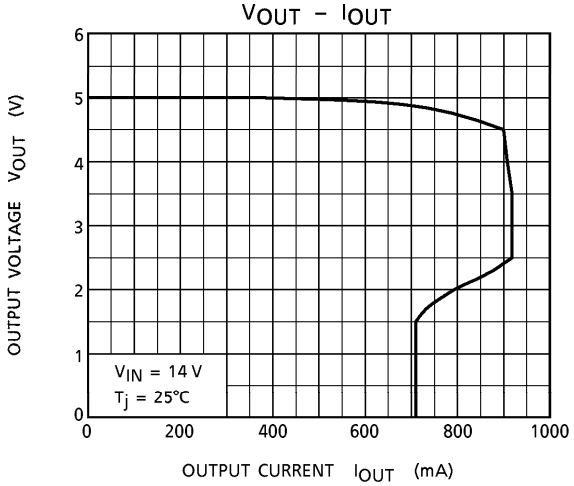
V_{OUT} – V_{IN}



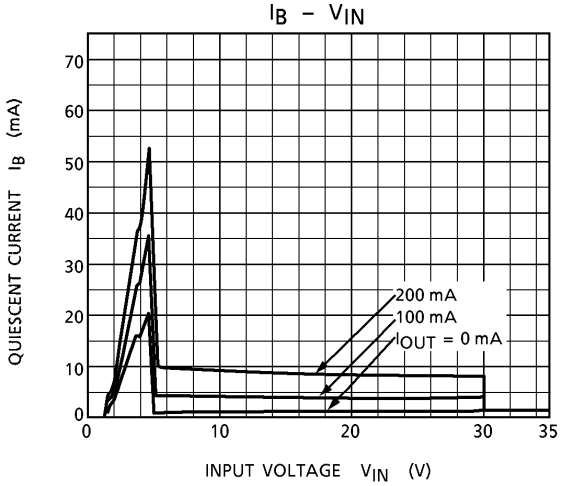
V_{OUT} – V_{IN}



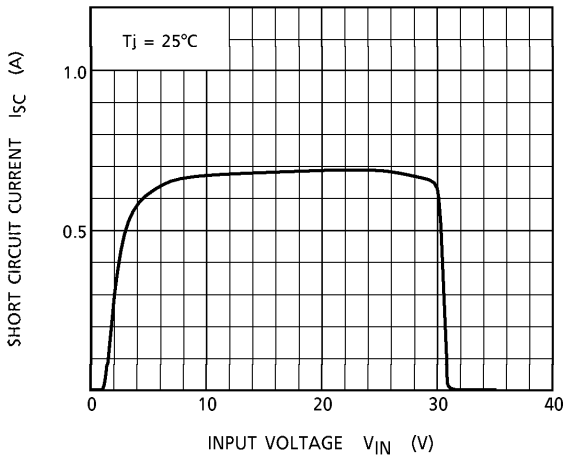
V_{OUT} – I_{OUT}



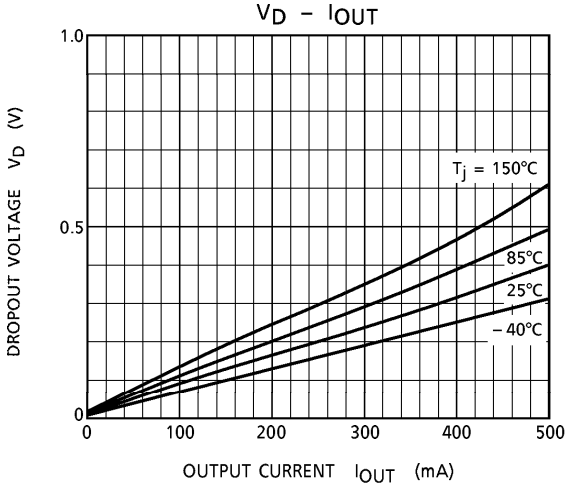
I_B – V_{IN}



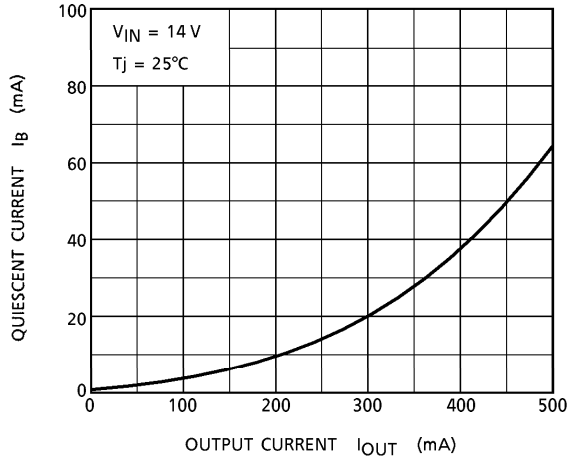
I_{SC} – V_{IN}



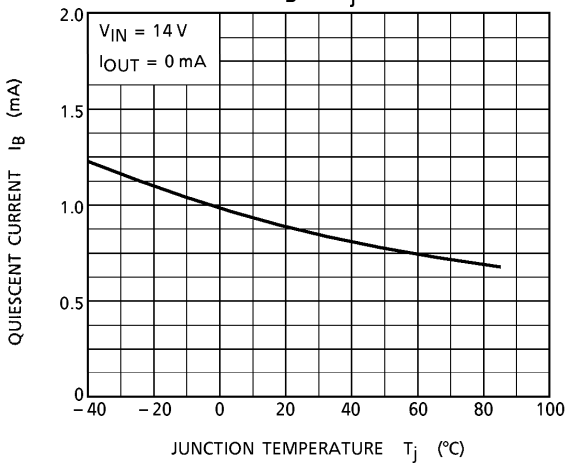
V_D – I_{OUT}



I_B – I_{OUT}



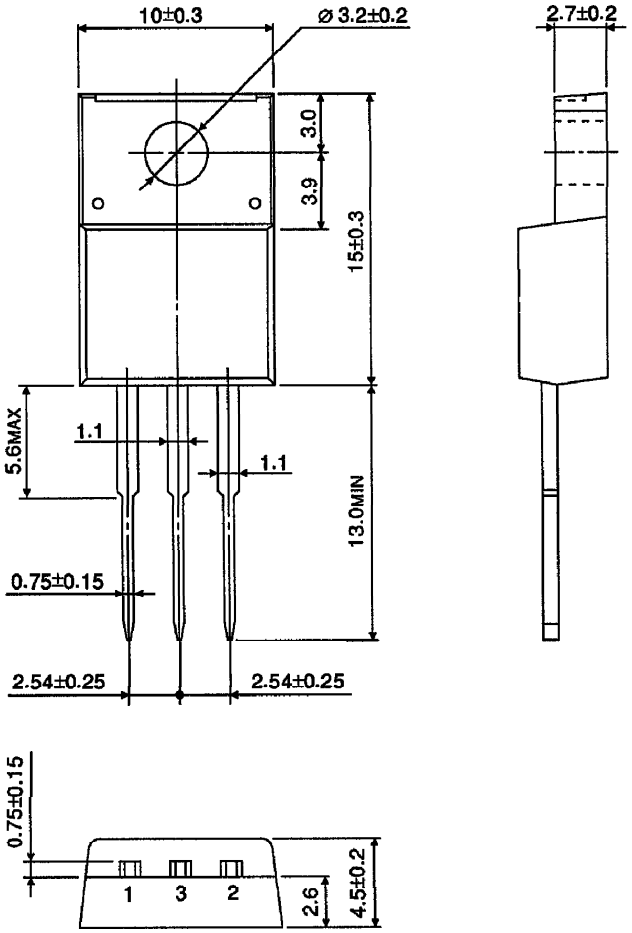
I_B – T_j



PACKAGE DIMENSIONS

P-HSIP3-2.54A

Unit : mm



Weight : 1.7 g (Typ.)