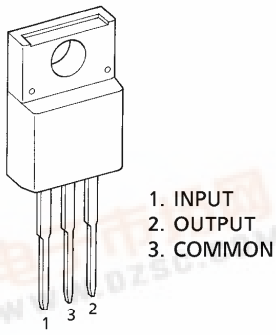
TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

TA78DM05S, TA78DM08S, TA78DM09S, TA78DM12S

5V, 8V, 9V, 12V
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.



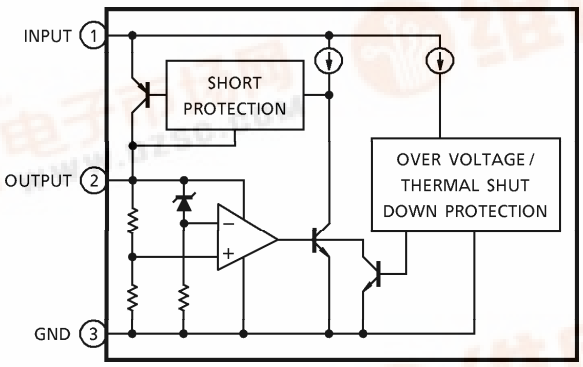
HSIP3-P-2.54A

Weight : 1.7g (Typ.)

FEATURES

- Low Standby Current of 800μA Typical.
- Maximum Output Current Up to 500mA.
- Low Dropout Voltage of Less than 0.75V (IO = 0.5A).
- 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



961001EBA1

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		$R_{th\ (j-c)}$	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} = 14V, I_{OUT} = 250mA, T_j = 25°C, C_{IN} = 0.1μF, C_{OUT} = 100μF)

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

TA78DM08S

ELECTRICAL CHARACTERISTICS

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

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

TA78DM09S

ELECTRICAL CHARACTERISTICS

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

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

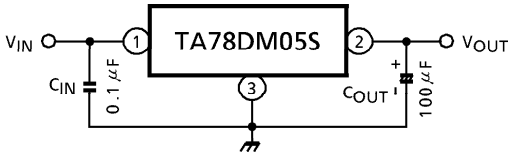
TA78DM12S

ELECTRICAL CHARACTERISTICS

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

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

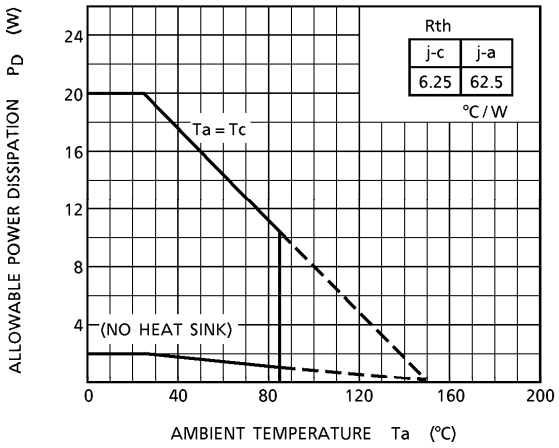
APPLICATION CIRCUITS



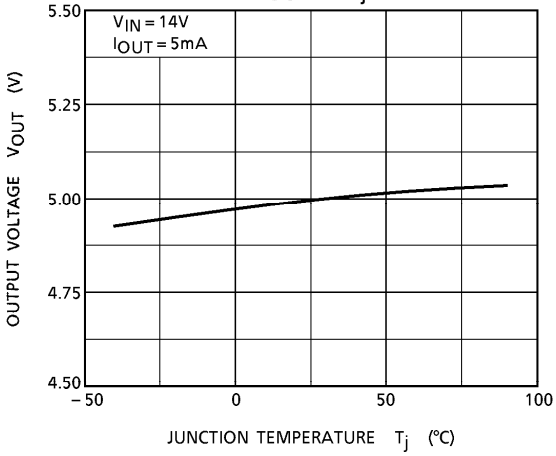
Capacitor C_2 must be guaranteed to operate of the temperature range that the regulator should be operated correctly.

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

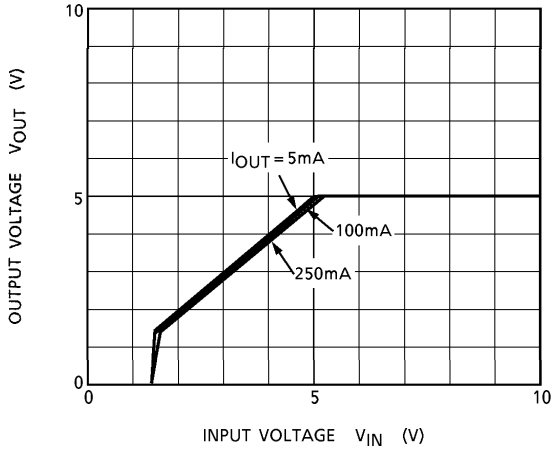
P_D – Ta



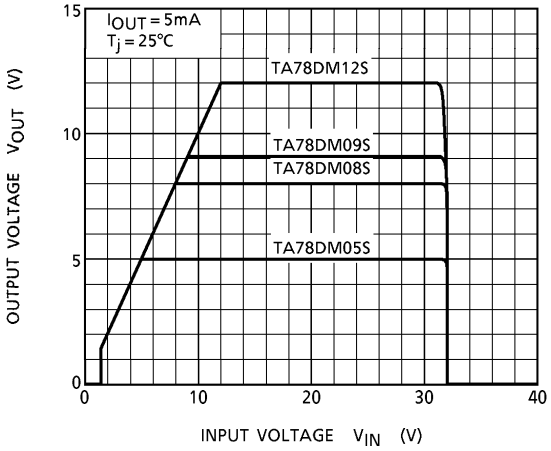
V_{OUT} – T_j



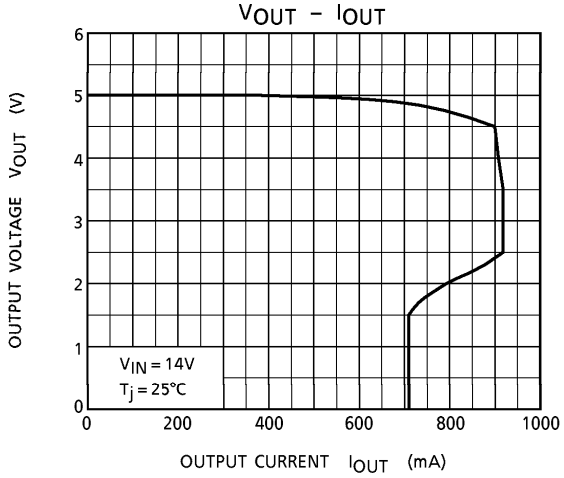
V_{OUT} – V_{IN}



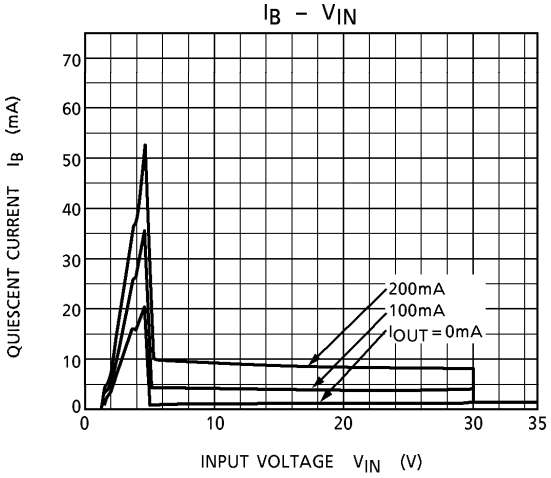
V_{OUT} – V_{IN}



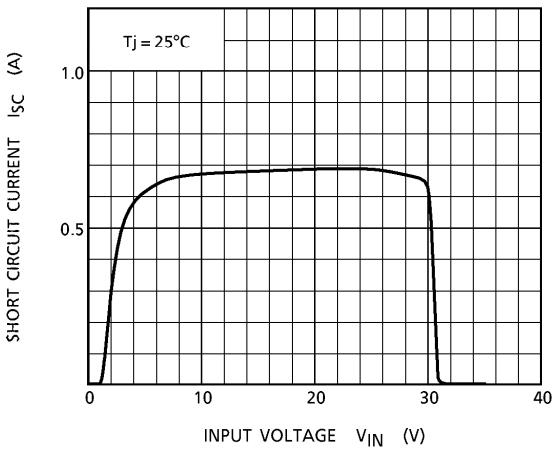
V_{OUT} – I_{OUT}



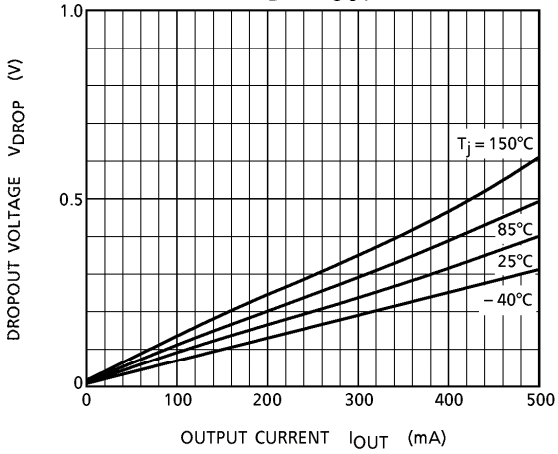
I_B – V_{IN}



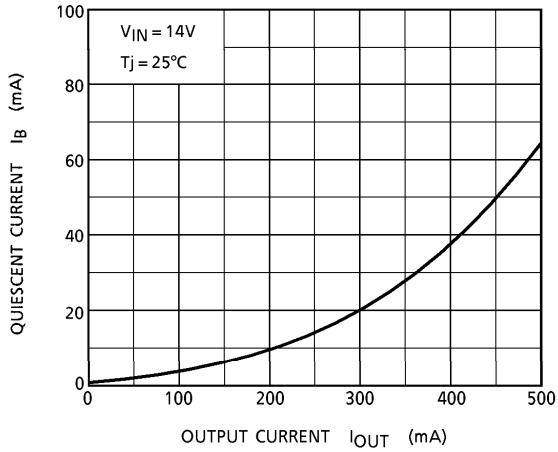
I_{SC} – V_{IN}



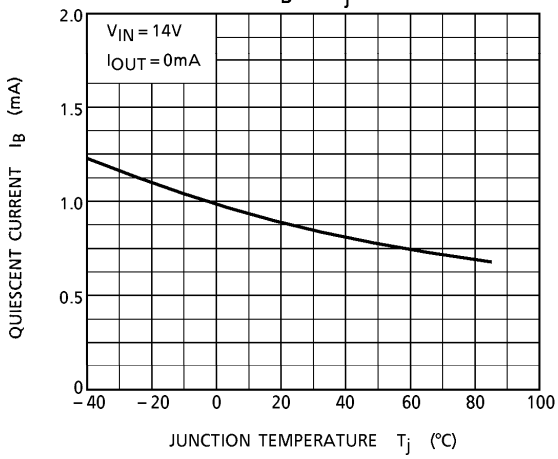
V_D – I_{OUT}



I_B – I_{OUT}



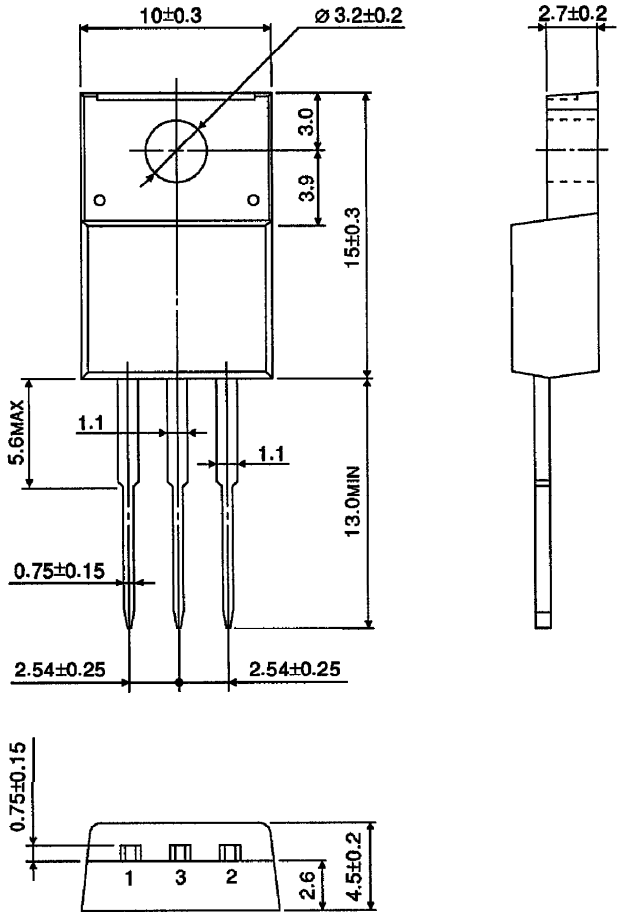
I_B – T_j



OUTLINE DRAWING

HSIP3-P-2.54A

Unit : mm



Weight : 1.7g (Typ.)