

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC
TA78DL05S, TA78DL06S, TA78DL08S, TA78DL09S
TA78DL10S, TA78DL12S, TA78DL15S

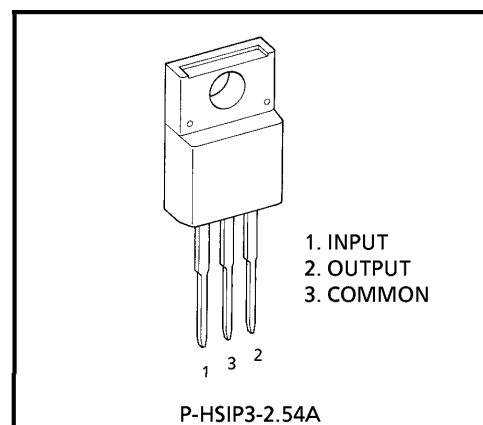
5 V, 6 V, 8 V, 9 V, 10 V, 12 V, 15 V

LOW DROPOUT VOLTAGE REGULATOR.

The TA78DL×S series consists of positive fixed output voltage regulator IC capable of sourcing current up to 250 mA.

Due to the features of low dropout voltage and low standby current, these devices are useful for battery powered equipment.

This series includes current limiting, thermal shutdown, overvoltage protection, input fault protection and excessive transient protection circuits internally.

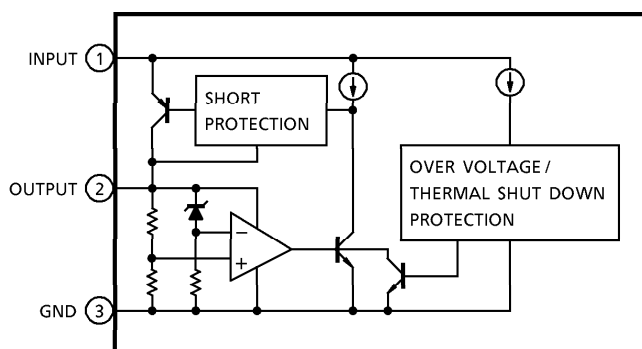


Weight : 1.7 g (Typ.)

FEATURES

- Low Standby Current of 500 μ A Typical.
- Maximum Output Current Up to 250 mA.
- Low Dropout Voltage of Less than 0.6 V (@ $I_{OUT} = 0.2$ 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



980910EBA2

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MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

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

TA78DL05S

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{IN} = 14\text{ V}$, $I_{OUT} = 10\text{ mA}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$5.35\text{ V} \leq V_{IN} \leq 26\text{ V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	4.5	5.0	5.5	V
Line Regulation	Reg·line	—	$9\text{ V} \leq V_{IN} \leq 16\text{ V}$	—	2	10	mV
			$6\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	4	30	
Load Regulation	Reg·load	—	$10\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	14	50	mV
Quiescent Current	I_B	—	$I_{OUT} \leq 10\text{ mA}$, $6\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	0.5	1	mA
Dropout Voltage	V_D	—	$I_{OUT} = 50\text{ mA}$	—	0.15	0.3	V
			$I_{OUT} = 200\text{ mA}$	—	0.4	0.6	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DL06S

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{IN} = 14\text{ V}$, $I_{OUT} = 10\text{ mA}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$6.35\text{ V} \leq V_{IN} \leq 26\text{ V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	5.4	6.0	6.6	V
Line Regulation	Reg·line	—	$10\text{ V} \leq V_{IN} \leq 17\text{ V}$	—	2	12	mV
			$7\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	5	36	
Load Regulation	Reg·load	—	$10\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	17	60	mV
Quiescent Current	I_B	—	$I_{OUT} \leq 10\text{ mA}$, $7\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	0.55	—	mA
Dropout Voltage	V_D	—	$I_{OUT} = 50\text{ mA}$	—	0.15	0.3	V
			$I_{OUT} = 200\text{ mA}$	—	0.4	0.6	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DL08S

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{IN} = 16\text{ V}$, $I_{OUT} = 10\text{ mA}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$8.35\text{ V} \leq V_{IN} \leq 26\text{ V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	7.2	8	8.8	V
Line Regulation	Reg·line	—	$12\text{ V} \leq V_{IN} \leq 19\text{ V}$	—	3	16	mV
			$9\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	6	45	
Load Regulation	Reg·load	—	$10\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	22	80	mV
Quiescent Current	I_B	—	$I_{OUT} \leq 10\text{ mA}$, $9\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	0.6	—	mA
Dropout Voltage	V_D	—	$I_{OUT} = 50\text{ mA}$	—	0.15	0.3	V
			$I_{OUT} = 200\text{ mA}$	—	0.4	0.6	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DL09S

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{IN} = 16\text{ V}$, $I_{OUT} = 10\text{ mA}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$9.35\text{ V} \leq V_{IN} \leq 26\text{ V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	8.1	9	9.9	V
Line Regulation	Reg·line	—	$13\text{ V} \leq V_{IN} \leq 20\text{ V}$	—	3	18	mV
			$10\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	7	50	
Load Regulation	Reg·load	—	$10\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	25	90	mV
Quiescent Current	I_B	—	$I_{OUT} \leq 10\text{ mA}$, $10\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	0.65	—	mA
Dropout Voltage	V_D	—	$I_{OUT} = 50\text{ mA}$	—	0.15	0.3	V
			$I_{OUT} = 200\text{ mA}$	—	0.4	0.6	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

TA78DL10S

ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{IN} = 16\text{ V}$, $I_{OUT} = 10\text{ mA}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$10.35\text{ V} \leq V_{IN} \leq 26\text{ V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	9	10	11	V
Line Regulation	Reg·line	—	$14\text{ V} \leq V_{IN} \leq 21\text{ V}$	—	4	20	mV
			$11\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	8	60	
Load Regulation	Reg·load	—	$10\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	28	100	mV
Quiescent Current	I_B	—	$I_{OUT} \leq 10\text{ mA}$, $11\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	0.7	—	mA
Dropout Voltage	V_D	—	$I_{OUT} = 50\text{ mA}$	—	0.15	0.3	V
			$I_{OUT} = 200\text{ mA}$	—	0.4	0.6	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

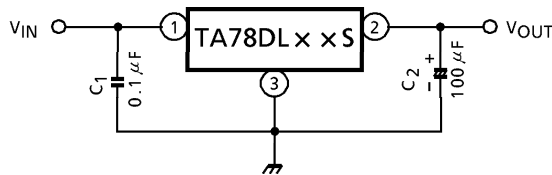
TA78DL12S
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{IN} = 18\text{ V}$, $I_{OUT} = 10\text{ mA}$, $T_j = 25^\circ\text{C}$)

CHARACTERISTIC	SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$12.35\text{ V} \leq V_{IN} \leq 26\text{ V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	10.8	12	13.2	V
Line Regulation	Reg·line	—	$16\text{ V} \leq V_{IN} \leq 23\text{ V}$	—	5	24	mV
			$13\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	10	70	
Load Regulation	Reg·load	—	$10\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	33	120	mV
Quiescent Current	I_B	—	$I_{OUT} \leq 10\text{ mA}$, $13\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	0.8	—	mA
Dropout Voltage	V_D	—	$I_{OUT} = 50\text{ mA}$	—	0.15	0.3	V
			$I_{OUT} = 200\text{ mA}$	—	0.4	0.6	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

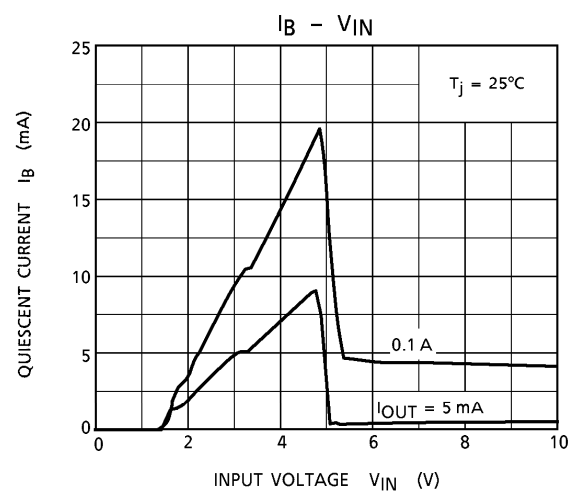
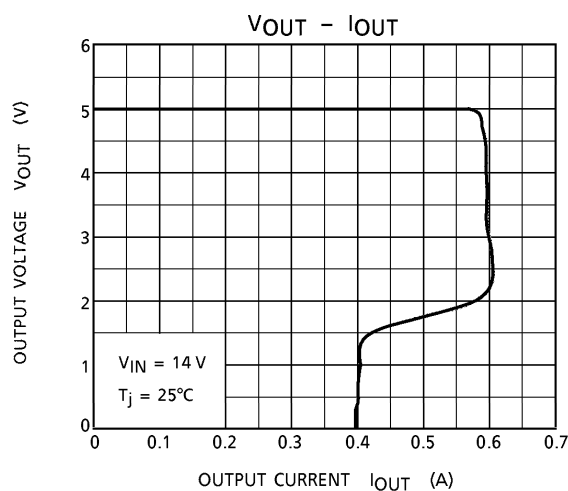
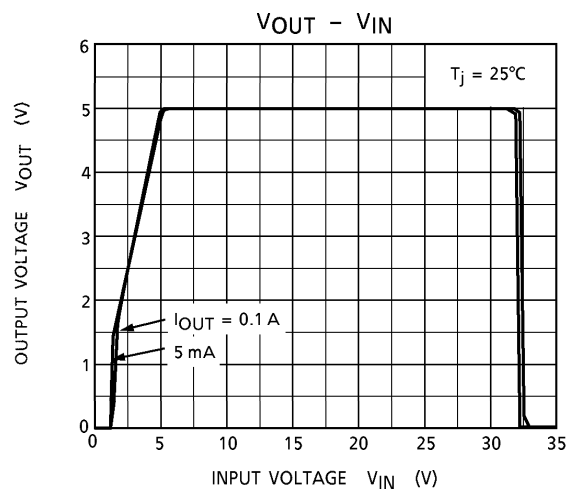
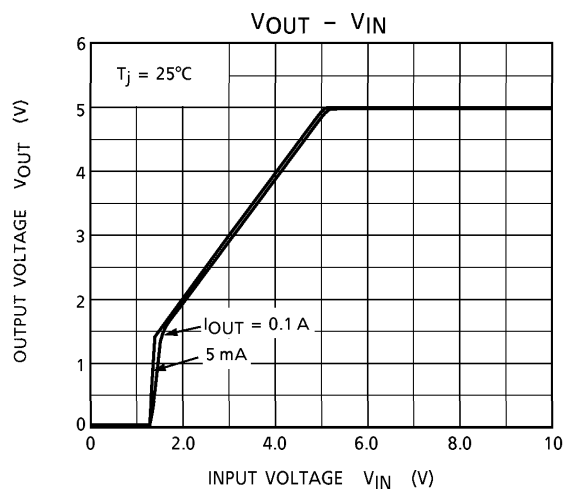
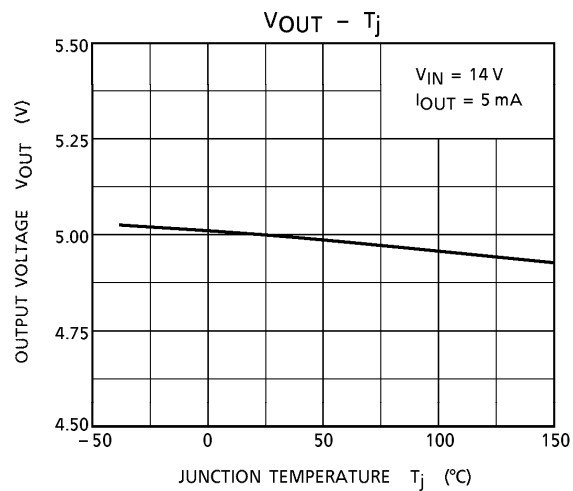
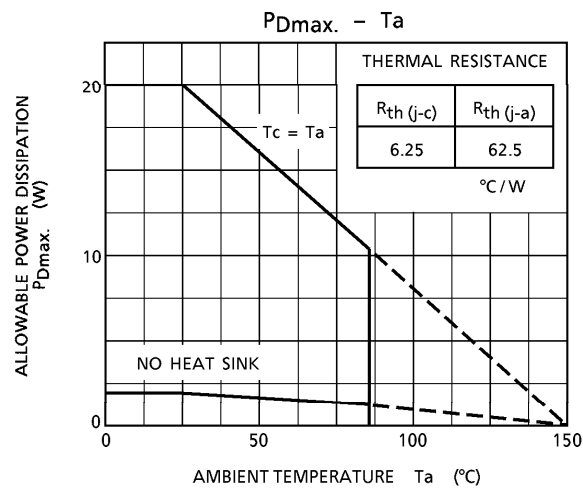
TA78DL15S
ELECTRICAL CHARACTERISTICS (Unless otherwise specified, $V_{IN} = 20\text{ V}$, $I_{OUT} = 10\text{ mA}$, $T_j = 25^\circ\text{C}$)

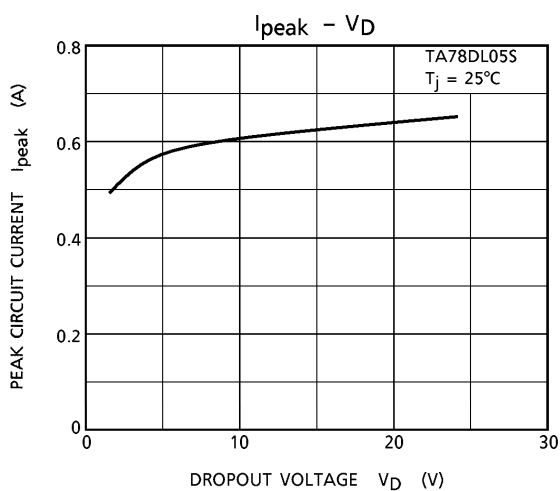
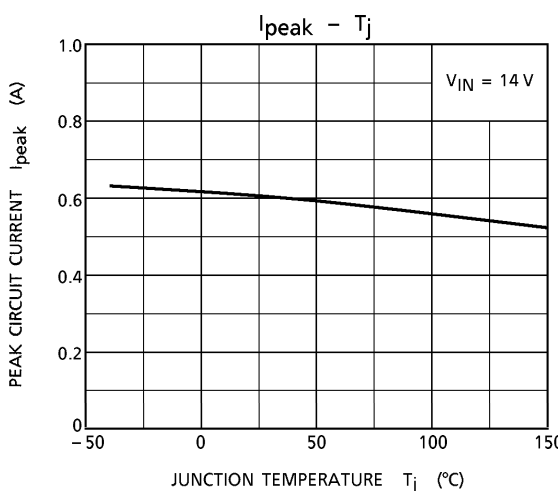
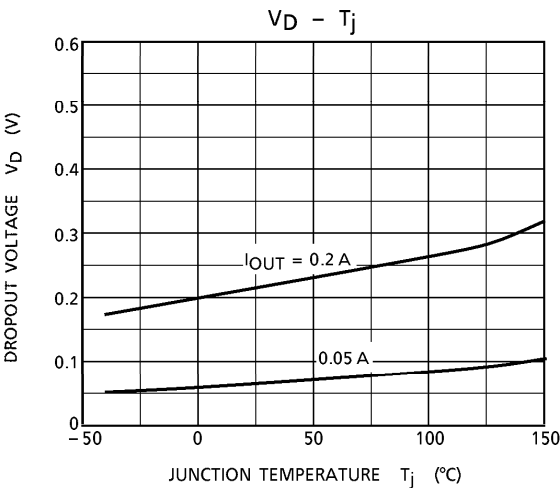
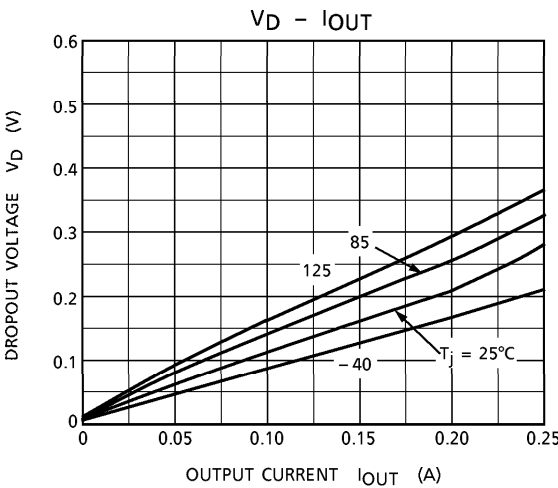
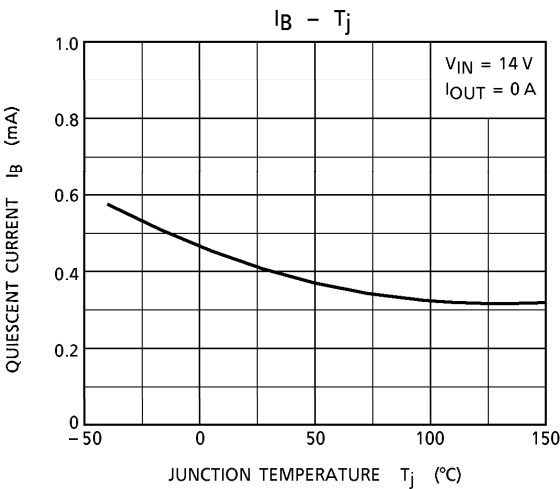
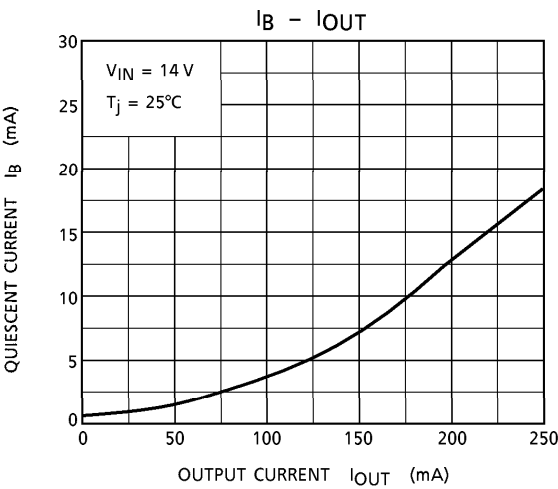
CHARACTERISTIC	SYMBOL	TEST CIR- CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage	V_{OUT}	—	$15.35\text{ V} \leq V_{IN} \leq 26\text{ V}$ $-40^\circ\text{C} \leq T_a \leq 85^\circ\text{C}$	13.5	15	16.5	V
Line Regulation	Reg·line	—	$19\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	6	30	mV
			$16\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	12	80	
Load Regulation	Reg·load	—	$10\text{ mA} \leq I_{OUT} \leq 200\text{ mA}$	—	40	150	mV
Quiescent Current	I_B	—	$I_{OUT} \leq 10\text{ mA}$, $16\text{ V} \leq V_{IN} \leq 26\text{ V}$	—	0.9	—	mA
Dropout Voltage	V_D	—	$I_{OUT} = 50\text{ mA}$	—	0.15	0.3	V
			$I_{OUT} = 200\text{ mA}$	—	0.4	0.6	
Max. Operating Voltage	V_{IN}	—	—	29	33	—	V

APPLICATION CIRCUIT

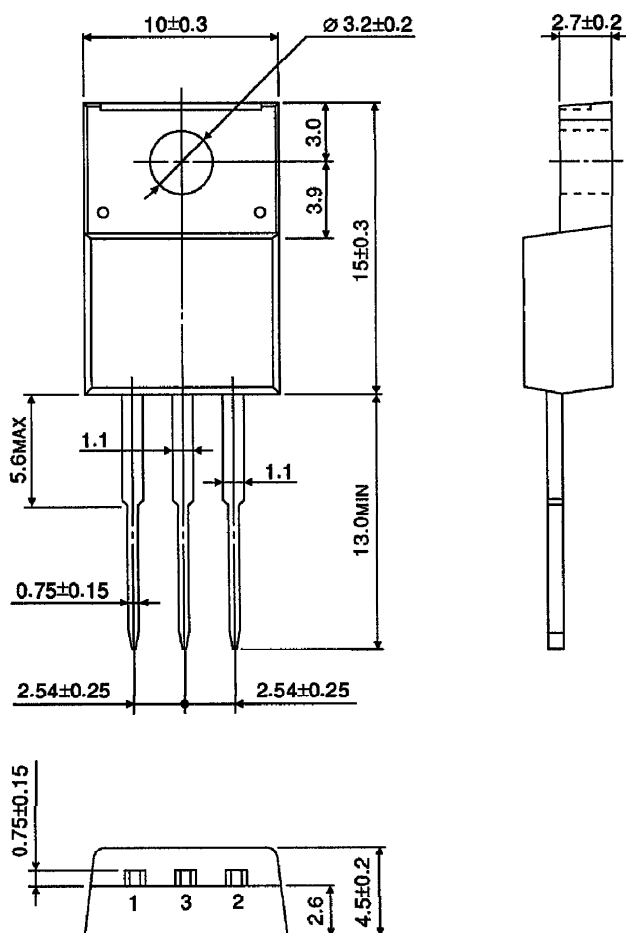


Capacitor C_2 must be guaranteed to operate of the temperature range that the regulator should be operated correctly.
 $100\ \mu\text{F}$ is a suitable value to suppress the oscillation phenomenon at the output terminal.





Unit : mm



Weight : 1.7 g (Typ.)