TAIWAN SEMICONDUCTOR

RoHS COMPLIANCE

Preliminary

TS178RL00 Series

1A Ultra Low Dropout Voltage Regulator with Enable Function

ITO-220-4L



Pin Definition:
1. Input
2. Output
3. Ground
4. Enable

TO-252-5L (PPAK)



Pin Definition:
1. Input
2. Enable
3. Output
4. N/C
5. Ground

General Description

The TS178RL00 Series is a low-dropout voltage regulator suitable for various electronic equipments. It provides constant voltage power source with ITO-220-4L full mold package and TO-252-5L.

Dropout voltage of TS178RL00 Series is below 0.5V in full rated current (1A). This regulator has various functions such as a peak current protection, thermal shut down, over voltage protection and an output disable function.

Features

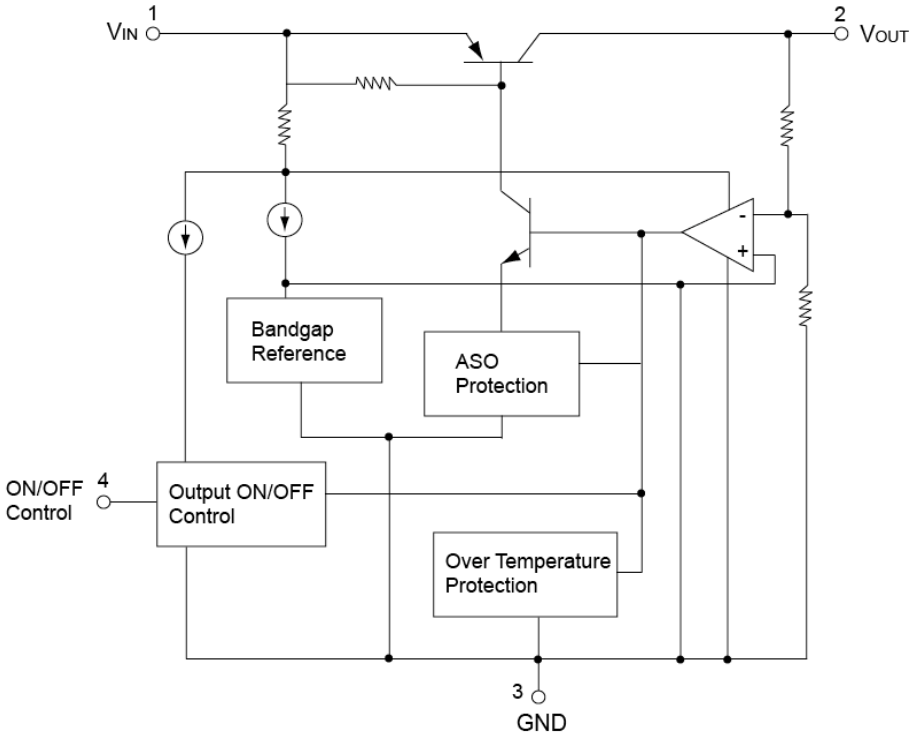
- Ultra Low Dropout performance 0.5Vmax. 1A
- Over Current Protection & Thermal Shutdown
- Short Circuit Protection
- Output Enable Function
- ±2.4% Typical Total output
- TO-220 Full-Mold Package (4Pin) and TO-25205L

Ordering Information

Part No.	Package	Packing
TS178RL**xx**CI4 C0	ITO-220-4L	50pcs / Tube
TS178RL**xx**CP5 RO	TO-252-5L	2.5Kpcs / 13” Reel

Note: Where **xx** denotes voltage option,
33=3.3V, **05**=5V, **08**=8V, **09**=9V, **12=12V**, **15**=15V

Block Diagram



Preliminary

TS178RL00 Series

1A Ultra Low Dropout Voltage Regulator with Enable Function

Absolute Maximum Rating

Parameter		Symbol	Value	Unit	Remark
Input Voltage		V_{IN}	18	V	--
Disable Voltage		V_{DIS}	18	V	--
Output Current		I_O	1	A	--
Power Dissipation 1	ITO-220-4L	P_D 1	1.5	W	No heat sink
Power Dissipation 2		P_D 2	15	W	With heat sink
Power Dissipation	TO-252-5L	P_D	8	W	Infinite heat Sink
Junction Temperature		T_J	-40~+125	ºC	--
Thermal Resistance, Junction-to Case (Note2)		$R\theta_{JC}$	4.31	ºC / W	--
Thermal Resistance, Junction-to Air (Note2)		$R\theta_{JA}$	48.83	ºC / W	--
Thermal Shutdown Temperature		T_{SD}	150	ºC	--

Electrical Specifications (V_{IN}=Note 6, Io=1.0A, Ta=25ºC, unless otherwise specified).

Parameter		Symbol	Conditions	Min.	Typ.	Max.	Unit
Output Voltage	TS178RL33	Vo		3.22	3.3	3.38	V
	TS178RL05			4.88	5.0	5.12	
	TS178RL08			7.80	8.0	8.20	
	TS178RL09			8.78	9.0	9.22	
	TS178RL12			11.71	12	12.28	
	TS178RL15			14.64	15	15.36	
Load Regulation		REG_{LOAD}	Io =5mA~1A	--	0.1	2.0	%
Line Regulation		REG_{LINE}	Note 7	--	0.5	2.5	%
Ripple Rejection Ratio		RR	Note1	45	55	--	dB
Dropout Voltage		V_{DROP}	Io=1A	--	--	0.5	V
Disable Voltage High		V_{DIS} H	Output Active	2.0	--	--	V
Disable Voltage Low		V_{DIS} L	Output Disabled	--	--	0.8	V
Disable Bias Current High		I_{DIS} H	V_{DIS} =2.7V	--	--	20	uA
Disable Bias Current Low		I_{DIS} L	V_{DIS} =0.4V	--	--	-0.4	mA
Quiescent Current		Iq	Io=0A	--	--	10	mA

Note:

1.These parameters, although guaranteed, are not 100% tested in production.

2. Junction -to -case thermal resistance test environments.

3. Pneumatic heat sink fixture.

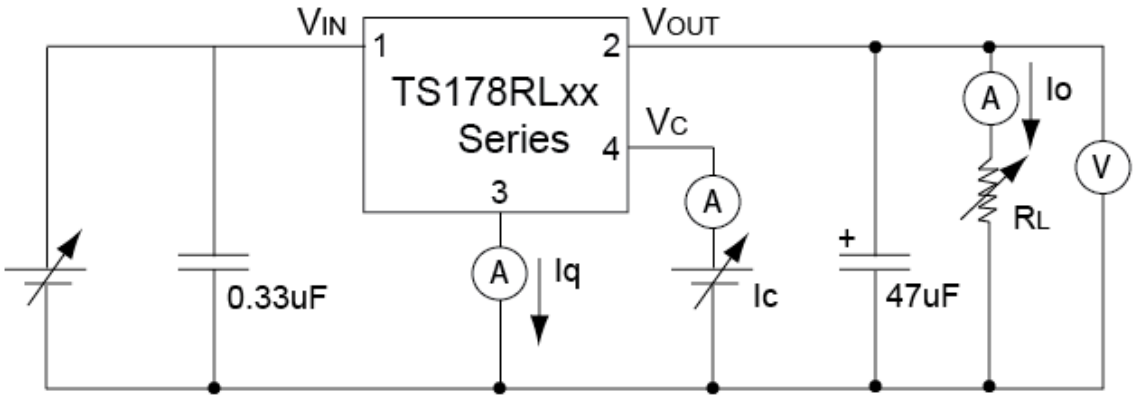
4. Clamping pressure 60psi through 12mm diameter cylinder.

5. Thermal grease applied between PKG and heat sink fixture

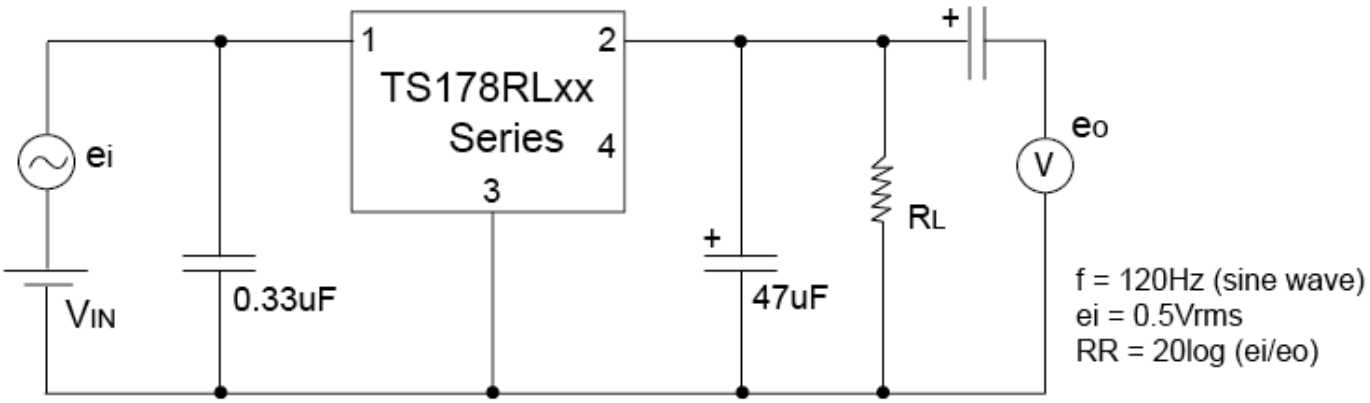
6. TS178RL33: V_{IN} =5V, TS178RL05: V_{IN} =7V, TS178RL08: V_{IN} =10V, TS178RL09: V_{IN} =11V, TS178RL12: V_{IN} =15V, TS178RL15: V_{IN} =18V

7. TS178RL33: V_{IN} =4~10V, TS178RL05: V_{IN} =6~12V, TS178RL08: V_{IN} =9~18V, TS178RL09: V_{IN} =10~18V, TS178RL12: V_{IN} =13~18V, TS178RL15: V_{IN} =16~18V

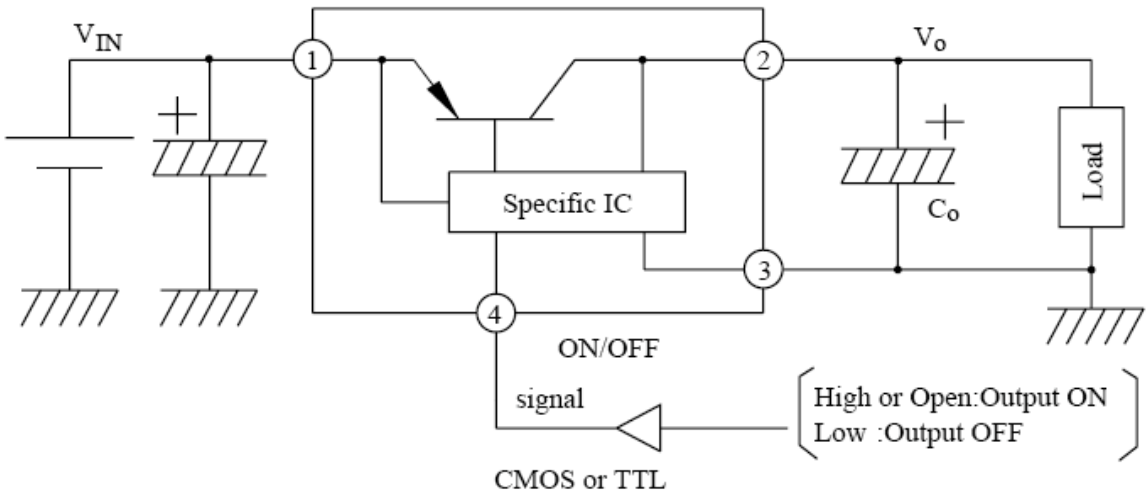
Standard Test Circuit



Ripple Rejection Test Circuit



Standard Application Circuit

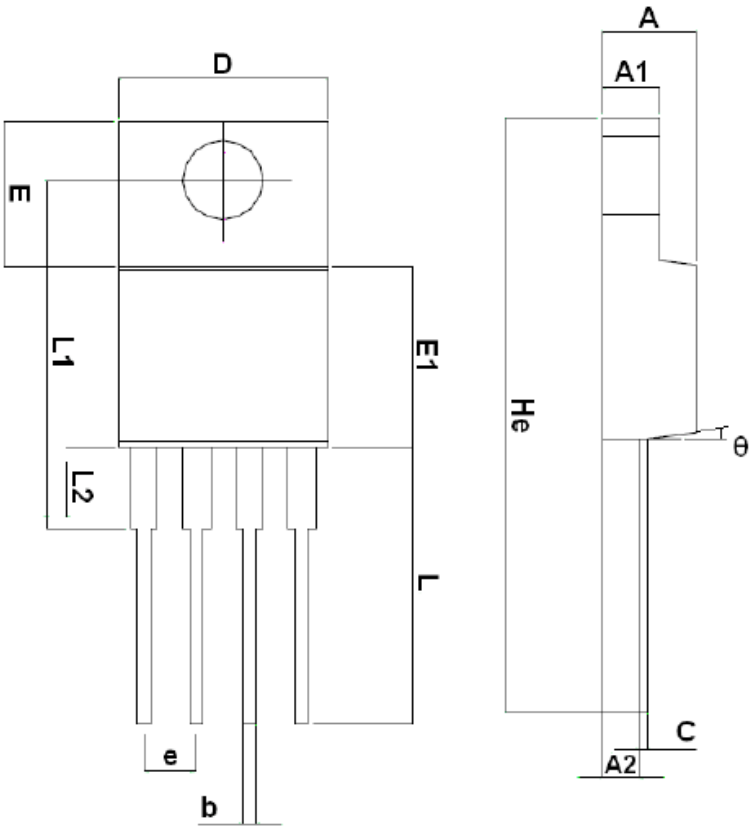


Preliminary

TS178RL00 Series

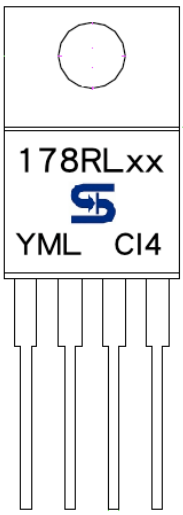
1A Ultra Low Dropout Voltage Regulator with Enable Function

ITO-220-4L Mechanical Drawing



ITO-220-4L DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	4.42	4.72	0.174	0.186
A1	2.69	2.89	0.136	0.114
A2	1.68	1.88	0.066	0.074
D	10.00	10.20	0.394	0.402
E	6.85	7.05	0.269	0.278
E1	8.54	8.74	0.336	0.344
L	13.15	13.55	0.518	0.533
L2	16.56	16.76	0.652	0.660
L2	3.60	3.80	0.142	0.150
He	28.44	28.92	1.119	1.159
C	0.48		0.019	
E	2.54(TYP)		0.1(TYP)	
b	0.635(TYP)		0.025(TYP)	
θ	4°	7°	4°	7°

Marking Diagram

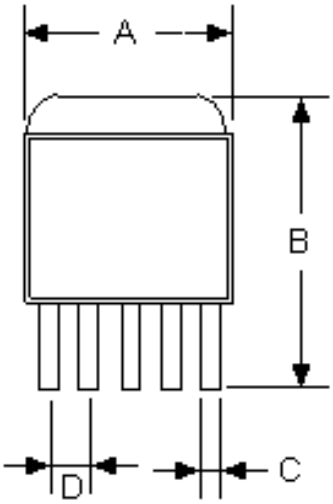


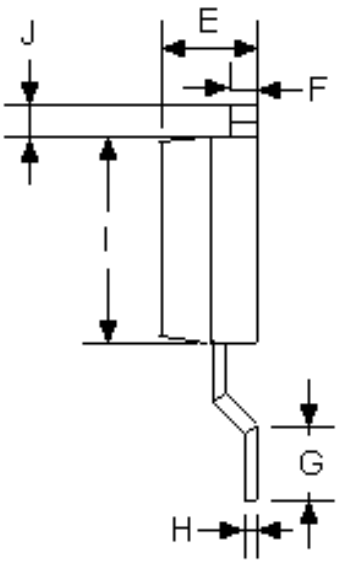
XX = Voltage Code
(33=3.3V, 05=5V, 08=8V, 09=9V, 12=12V, 15=15V)
Y = Year Code
M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
L = Lot Code
CI4 = Package Code for Adjustable type
(CI4 = ITO-220-4L)

Preliminary **TS178RL00 Series**

1A Ultra Low Dropout Voltage Regulator with Enable Function

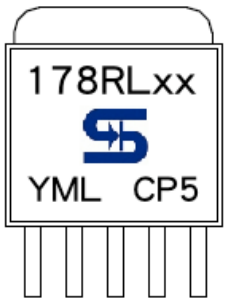
TO-252-5L Mechanical Drawing





TO-252-5L DIMENSION				
DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX.
A	6.350	6.730	0.250	0.265
B	9.080	10.440	0.357	0.411
C	0.460	0.640	0.018	0.025
D	1.27BSC		0.05BSC	
E	2.19	2.380	0.086	0.094
F	0.460	0.570	0.018	0.022
G	1.400	1.780	0.055	0.070
H	0.460	0.570	0.018	0.022
I	5.34	5.550	0.210	0.219
J	1.520	2.030	0.060	0.080

Marking Diagram



XX = Voltage Code
(33=3.3V, 05=5V, 08=8V, 09=9V, 12=12V, 15=15V)
Y = Year Code
M = Month Code
(**A**=Jan, **B**=Feb, **C**=Mar, **D**=Apl, **E**=May, **F**=Jun, **G**=Jul, **H**=Aug, **I**=Sep, **J**=Oct, **K**=Nov, **L**=Dec)
L = Lot Code
CP5 = Package Code for Adjustable type
(CP5 = TO-252-5L)

Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.