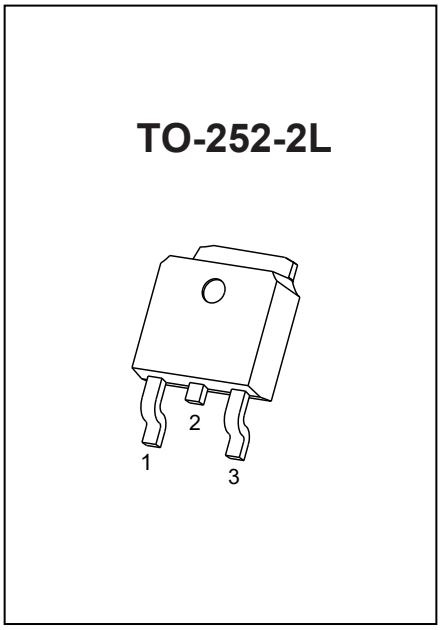
Description

The TK78MXX series of three-terminal positive regulators are available in TO-252 package. Each type employs internal current limiting, thermal shut-down and safe area protection, making it essentially indestructible. If adequate heat sinking is provided,It can deliver over 0.5A output current, Although designed as fixed voltage regulator, This device can be used with external components to obtain adjustable voltage and currents.



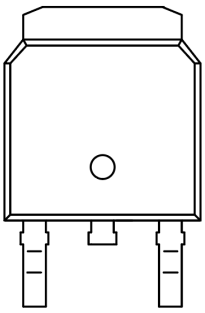
Features

- Input voltage: up to 35V
- Output voltage: 5V,6V,8V,9V,10V,12V,15V,18V,24V
- Output current up to 500 mA
- Thermal overload protection
- Short circuit current limiting

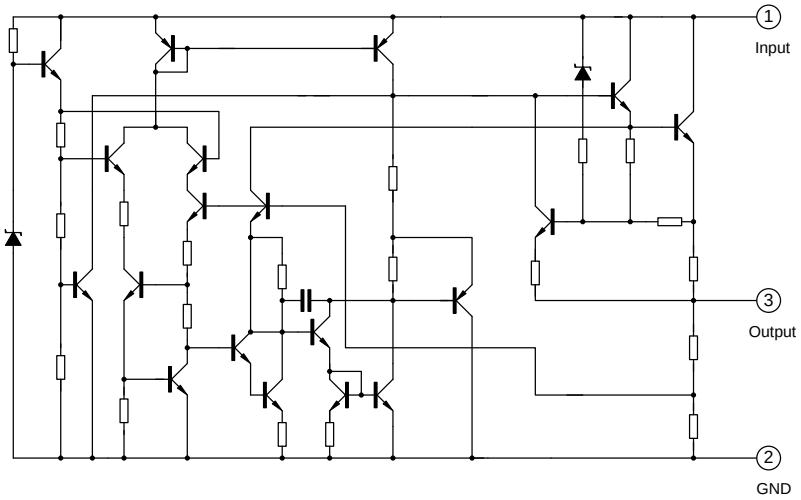
Applications

- DC motor drivers
- Household electric appliances
- Industrial power supplies
- Test and measurement equipment

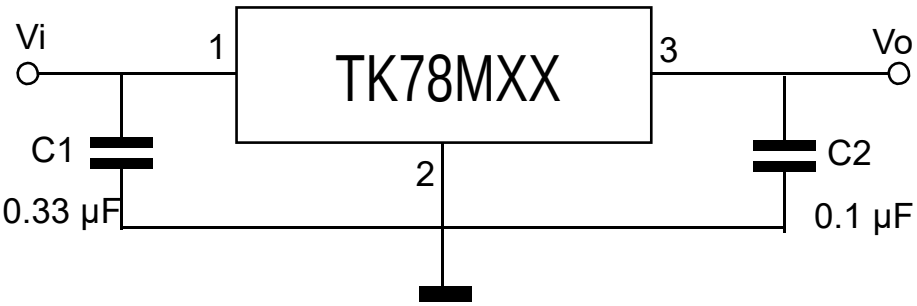
Ordering Information

Orderable Device	Package	Reel (inch)	Package Qty (PCS)	Eco Plan Note	MSL Level	Marking Code
TK78M05	TO-252	13	2500	RoHS & Green	MSL3	
TK78M06						
TK78M08						
TK78M09						
TK78M10						
TK78M12						
TK78M15						
TK78M18						
TK78M24						

Function Block Diagram



Typical Application Circuit



Absolute Maximum Ratings

Ratings at 25°C ambient temperature unless otherwise specified.

Parameter	Symbol	Value	Unit
Input Voltage	V_I	35	V
Output Current	I_O	500	mA
Maximum Power Dissipation	P_D	1.25	W
Operating Temperature Range	T_{OPR}	-40 to +125	°C
Storage Temperature Range	T_{STG}	-65 to +150	°C

TK78M05 Electrical Characteristics

V_I=10V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		4.8	5.0	5.2	V
		I_O=5mA to 350mA, V_I=7V to 20V	4.75	--	5.25	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=7V to 25V	--	--	100	mV
		I_O=200mA,V_I=8V to 25V	--	--	50	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	100	mV
		I_O=5mA to 200mA	--	--	50	mV
Ripple Rejection	RR	V_I=8V to 18V, f=120Hz, I_O=300mA	62	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	0.5	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=8V to 25V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	40	--	μV

TK78M06 **Electrical Characteristics**

V_I=11V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		5.75	6.0	6.25	V
		I_O=5mA to 350mA, V_I=8V to 21V	5.7	6.0	6.3	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=8V to 25V	--	--	120	mV
		I_O=200mA,V_I=9V to 25V	--	--	60	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	120	mV
		I_O=5mA to 200mA	--	--	60	mV
Ripple Rejection	RR	V_I=9V to 19V, f=120Hz, I_O=300mA	59	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	0.6	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=9V to 25V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	45	--	μV

TK78M08 **Electrical Characteristics**

V_I=14V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		7.7	8.0	8.3	V
		I_O=5mA to 350mA, V_I=10.5V to 23V	7.6	8.0	8.4	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=10.5V to 25V	--	--	160	mV
		I_O=200mA,V_I=11V to 25V	--	--	80	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	160	mV
		I_O=5mA to 200mA	--	--	80	mV
Ripple Rejection	RR	V_I=11.5V to 21.5V, f=120Hz, I_O=300mA	56	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	0.7	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=10V to 25V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	52	--	μV

TK78M09 Electrical Characteristics

V_I=15V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		8.65	9.0	9.35	V
		I_O=5mA to 350mA, V_I=11.5V to 24V	8.55	9.0	9.45	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=11.5V to 25V	--	--	180	mV
		I_O=200mA,V_I=12V to 25V	--	--	90	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	180	mV
		I_O=5mA to 200mA	--	--	90	mV
Ripple Rejection	RR	V_I=12.5V to 23V, f=120Hz, I_O=300mA	56	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	0.9	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=11.5V to 25V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	58	--	μV

TK78M10 **Electrical Characteristics**

V_I=17V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		9.6	10	10.4	V
		I_O=5mA to 350mA, V_I=12.5V to 25V	9.5	10	10.5	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=12.5V to 28V	--	--	210	mV
		I_O=200mA,V_I=14V to 20V	--	--	120	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	210	mV
		I_O=5mA to 200mA	--	--	120	mV
Ripple Rejection	RR	V_I=12.5V to 28V, f=120Hz, I_O=300mA	55	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	1	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=12.5V to 28V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	75	--	μV

TK78M12 **Electrical Characteristics**

V_I=19V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		11.5	12	12.5	V
		I_O=5mA to 350mA, V_I=14.5V to 27V	11.4	12	12.6	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=14.5V to 30V	--	--	240	mV
		I_O=200mA,V_I=16V to 30V	--	--	120	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	240	mV
		I_O=5mA to 200mA	--	--	120	mV
Ripple Rejection	RR	V_I=15V to 25V, f=120Hz, I_O=300mA	55	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	1	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=14.5V to 30V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	75	--	μV

TK78M15 **Electrical Characteristics**

V_I=23V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		14.4	15	15.6	V
		I_O=5mA to 350mA, V_I=17.5V to 30V	14.25	15	15.75	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=17.5V to 30V	--	--	300	mV
		I_O=200mA,V_I=20V to 30V	--	--	150	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	300	mV
		I_O=5mA to 200mA	--	--	150	mV
Ripple Rejection	RR	V_I=18.5V to 28.5V, f=120Hz, I_O=300mA	53	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	1.2	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=17.5V to 30V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	100	--	μV

TK78M18 Electrical Characteristics

V_I=26V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

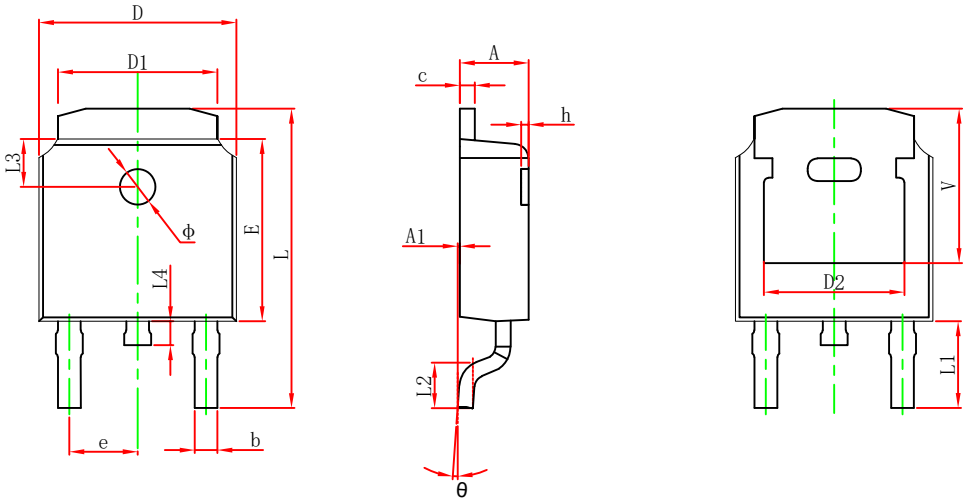
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		17.3	18	18.7	V
		I_O=5mA to 350mA, V_I=20.5V to 33V	17.1	18	18.9	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=21V to 33V	--	--	360	mV
		I_O=200mA,V_I=24V to 33V	--	--	180	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	360	mV
		I_O=5mA to 200mA	--	--	180	mV
Ripple Rejection	RR	V_I=22V to 32V, f=120Hz, I_O=300mA	53	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	-1.1	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=21V to 33V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	100	--	μV

TK78M24 **Electrical Characteristics**

V_I=33V, I_O=350mA, T_J=25℃, C_I=0.33μF,C_O=0.1μF,unless otherwise specified.

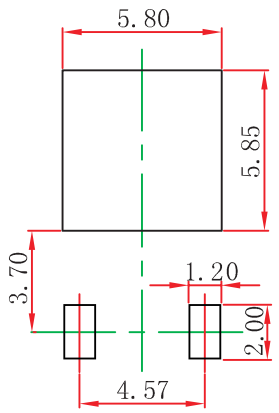
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Output Voltage	V_O		23	24	25	V
		I_O=5mA to 350mA, V_I=27V to 38V	22.8	24	25.2	V
Line Regulation	$\triangle V_O$	I_O=200mA,V_I=27V to 38V	--	--	480	mV
		I_O=200mA,V_I=28V to 38V	--	--	240	mV
Load Regulation	$\triangle V_O$	I_O=5mA to 500mA	--	--	480	mV
		I_O=5mA to 200mA	--	--	240	mV
Ripple Rejection	RR	V_I=28V to 38V, f=120Hz, I_O=300mA	50	--	--	dB
Dropout Voltage	V_D		--	2	--	V
Quiescent Current	I_Q		--	--	6	mA
Temperature coefficient of V_O	$\triangle V_O/\triangle T$	I_O=5mA,T_J=0°C~125°C	--	-1.2	--	mV/°C
Quiescent Current Change	$\triangle I_Q$	I_O=200mA, V_I=27V to 38V	--	--	0.8	mA
		I_O=5mA to 350mA	--	--	0.5	mA
Output Noise Voltage	V_N	10Hz≤f≤100kHz	--	170	--	μV

Package Dimension



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.700	0.860	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.300	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

TO-252-2L Suggest Pad Layout



NOTE:

1. Controlling dimension: in millimeters.
2. General tolerance: ±0.05mm.
3. The pad layout is for reference purposes only.