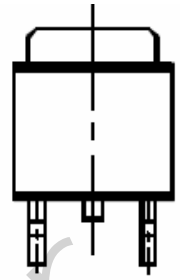## ■ DESCRIPTION

The L78MxxCDT family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications requiring supply current up to 500mA.

■ FEATURES

· Output Current up to 500mA
· Fixed Output Voltage of 5V, 6V, 8V,9V,10V,12V,15V,18V,24V
· Thermal Overload Shutdown Protection
· Short Circuit Current Limiting

1.INPUT

2. GND

3. OUTPUT

■ ABSOLUTE MAXIMUM RATING

(Operating temperature range applies unless otherwise specified.) (Note 1)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	30	V
Output Current	I_{OUT}	500	mA
Power Dissipation	P_D	500	mW
Operating Temperature (Note 2)	T_{OPR}	-40~+150	°C
Storage Temperature	T_{STG}	-55~+150	°C

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. It is guarantee by design, not 100% be tested.

■ ELECTRICAL CHARACTERISTICS

(0°C<T_J<125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified) (Note 1)
For L78M05CDT-TR (V_{IN}=10V,I_{OUT}=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	T_J=25°C	4.80	5.0	5.20	V
		$7V \leqq V_{IN} \leqq V_{MAX}$ I_{OUT}=1mA-500mA	4.75		5.25	V (Note 2)
Load Regulation	ΔV_{OUT}	T_J=25°C,I_{OUT}=1mA - 500mA		11	60	mV
		T_J=25°C,I_{OUT}=1mA - 40mA		5.0	30	mV
Line Regulation	ΔV_{OUT}	$7V \leqq V_{IN} \leqq 20V$,$T_J$=25°C		8	150	mV
		$8V \leqq V_{IN} \leqq 20V$,$T_J$=25°C		6	100	mV
Quiescent Current	I_Q			2.0	5.5	mA
Quiescent Current Change	ΔI_Q	$8V \leqq V_{IN} \leqq 20V$			1.5	mA
		$1mA \leqq V_{IN} \leqq 40mA$			0.1	mA
Output Noise Voltage	eN	$10Hz \leqq f \leqq 100kHz$		40		uV
Temperature Coefficient of V_{OUT}	$\Delta Vo/\Delta T$	I_{OUT}=5mA		-0.65		mV/°C
Ripple Rejection	RR	$8V \leqq V_{IN} \leqq 20V$, f=120Hz, T_J=25°C	41	80		dB
Dropout Voltage	V_D	T_J=25°C		1.7		V

For L78M06CDT-TR (V$_{IN}$=12V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	5.76	6.0	6.24	V
		8.5V≦V$_{IN}$≦V$_{MAX}$, I$_{OUT}$=1mA - 500mA	5.7		6.3	V (note 2)
Load Regulation	Δ V$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		12.8	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		5.8	40	mV
Line Regulation	Δ V$_{OUT}$	8.5V≦V$_{IN}$≦20V,T$_J$=25°C		64	175	mV
		9V≦V$_{IN}$≦20V,T$_J$=25°C		54	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	9V≦V$_{IN}$≦20V			1.5	mA
		1mA≦V$_{IN}$≦40mA			0.1	mA
Output Noise Voltage	eN	10Hz≦f≦100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	10V≦V$_{IN}$≦20V,f=120Hz,T$_J$=25°C	40	46		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For L78M08CDT-TR (V$_{IN}$=14V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	7.68	8.0	8.32	V
		10.5V≦V$_{IN}$≦V$_{MAX}$, I$_{OUT}$=1mA - 500mA	7.60		8.40	V (note 2)
Load Regulation	ΔV$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		15	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		8.0	40	mV
Line Regulation	ΔV$_{OUT}$	10.5V≦V$_{IN}$≦23V,TJ=25°C		10	175	mV
		11V≦V$_{IN}$≦23V,TJ=25°C		8	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	11V≦V$_{IN}$≦23V			1.5	mA
		1mA≦V$_{IN}$≦40mA			0.1	mA
Output Noise Voltage	eN	10Hz≦f≦100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	11V≦V$_{IN}$≦23V,f=120Hz,T$_J$=25°C	39	70		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

For L78M09CDT-TR (V$_{IN}$=15V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	8.64	9.0	9.36	V
		12.5V $\leqq$ V$_{IN}$ $\leqq$ V$_{MAX}$, I$_{OUT}$=1mA - 500mA	8.55		9.45	V (note 2)
Load Regulation	Δ V$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		12.8	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		5.8	40	mV
Line Regulation	Δ V$_{OUT}$	12.5V$\leqq$V$_{IN}$ $\leqq$ 24V,T$_J$=25°C		64	175	mV
		12.5V$\leqq$V$_{IN}$ $\leqq$ 24V,T$_J$=25°C		54	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	12.5V $\leqq$ V$_{IN}$ $\leqq$ 24V			1.5	mA
		1mA $\leqq$ V$_{IN}$ $\leqq$ 40mA			0.1	mA
Output Noise Voltage	eN	10Hz $\leqq$ f $\leqq$ 100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	12V $\leqq$ V$_{IN}$ $\leqq$ 24V,f=120Hz,T$_J$=25°C	40	46		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For L78M10CDT-TR (V$_{IN}$=16V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	9.60	10.0	10.40	V
		14.5V $\leqq$ V$_{IN}$ $\leqq$ V$_{MAX}$, I$_{OUT}$=1mA - 500mA	9.50		10.50	V (note 2)
Load Regulation	ΔV$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		15	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		8.0	40	mV
Line Regulation	ΔV$_{OUT}$	14.5V $\leqq$ V$_{IN}$ $\leqq$ 25V,TJ=25°C		10	175	mV
		11V $\leqq$ V$_{IN}$ $\leqq$ 25V,TJ=25°C		8	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	11V $\leqq$ V$_{IN}$ $\leqq$ 25V			1.5	mA
		1mA $\leqq$ V$_{IN}$ $\leqq$ 40mA			0.1	mA
Output Noise Voltage	eN	10Hz $\leqq$ f $\leqq$ 100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	13V $\leqq$ V$_{IN}$ $\leqq$ 25V,f=120Hz,T$_J$=25°C	39	70		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

For L78M12CDT-TR (V$_{IN}$=19V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	11.52	12.0	12.48	V
		14.5V $\leq$ V$_{IN}$ $\leq$ V$_{MAX}$, I$_{OUT}$=1mA - 500mA	11.4		12.6	V (note 2)
Load Regulation	Δ V$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		12.8	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		5.8	40	mV
Line Regulation	Δ V$_{OUT}$	14.5V $\leq$ V$_{IN}$ $\leq$ 29V,T$_J$=25°C		64	175	mV
		14.5V $\leq$ V$_{IN}$ $\leq$ 29V,T$_J$=25°C		54	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	14.5V $\leq$ V$_{IN}$ $\leq$ 29V			1.5	mA
		1mA $\leq$ V$_{IN}$ $\leq$ 40mA			0.1	mA
Output Noise Voltage	eN	10Hz $\leq$ f $\leq$ 100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	15V $\leq$ V$_{IN}$ $\leq$ 29V,f=120Hz,T$_J$=25°C	40	46		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For L78M15CDT-TR (V$_{IN}$=23V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	14.40	15.0	15.60	V
		18.5V $\leq$ V$_{IN}$ $\leq$ V$_{MAX}$, I$_{OUT}$=1mA - 500mA	14.25		15.75	V (note 2)
Load Regulation	ΔV$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		15	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		8.0	40	mV
Line Regulation	ΔV$_{OUT}$	18.5V $\leq$ V$_{IN}$ $\leq$ 30V,TJ=25°C		10	175	mV
		18.5V $\leq$ V$_{IN}$ $\leq$ 30V,TJ=25°C		8	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	18.5V $\leq$ V$_{IN}$ $\leq$ 30V			1.5	mA
		1mA $\leq$ V$_{IN}$ $\leq$ 40mA			0.1	mA
Output Noise Voltage	eN	10Hz $\leq$ f $\leq$ 100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	18V $\leq$ V$_{IN}$ $\leq$ 30V,f=120Hz,T$_J$=25°C	39	70		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

For L78M18CDT-TR (V$_{IN}$=27V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	17.28	18.0	18.72	V
		21V ≦ V$_{IN}$ ≦ V$_{MAX}$, I$_{OUT}$=1mA - 500mA	17.10		18.90	V (note 2)
Load Regulation	Δ V$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		12.8	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		5.8	40	mV
Line Regulation	Δ V$_{OUT}$	21V ≦ V$_{IN}$≦32V,T$_J$=25°C		64	175	mV
		21V≦ V$_{IN}$≦32V,T$_J$=25°C		54	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	21V≦V$_{IN}$≦32V			1.5	mA
		1mA≦V$_{IN}$≦40mA			0.1	mA
Output Noise Voltage	eN	10Hz≦f≦100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	20V≦V$_{IN}$≦32V,f=120Hz,T$_J$=25°C	40	46		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For L78M24CDT-TR (V$_{IN}$=32V,I$_{OUT}$=40mA)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V$_{OUT}$	T$_J$=25°C	23.04	24.0	24.96	V
		27V≦V$_{IN}$≦V$_{MAX}$, I$_{OUT}$=1mA - 500mA	22.80		25.20	V (note 2)
Load Regulation	ΔV$_{OUT}$	T$_J$=25°C,I$_{OUT}$=1mA - 500mA		15	80	mV
		T$_J$=25°C,I$_{OUT}$=1mA - 40mA		8.0	40	mV
Line Regulation	ΔV$_{OUT}$	27V≦V$_{IN}$≦38V,TJ=25°C		10	175	mV
		27V≦V$_{IN}$≦38V,TJ=25°C		8	125	mV
Quiescent Current	I$_Q$			2.0	5.5	mA
Quiescent Current Change	ΔI$_Q$	27V≦V$_{IN}$≦38V			1.5	mA
		1mA≦V$_{IN}$≦40mA			0.1	mA
Output Noise Voltage	eN	10Hz≦f≦100kHz		49		uV
Temperature Coefficient of V$_{OUT}$	ΔVo/ΔT	I$_{OUT}$=5mA		0.75		mV/°C
Ripple Rejection	RR	28V≦V$_{IN}$≦38V,f=120Hz,T$_J$=25°C	39	70		dB
Dropout Voltage	V$_D$	T$_J$=25°C		1.7		V

Notes: 1. The Maximum steady state usable output current are dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB. The data above represent pulse test conditions with junction temperatures specified at the initiation of test.

2. Power dissipation<0.5W

TO-252 Package Information

单位:mm
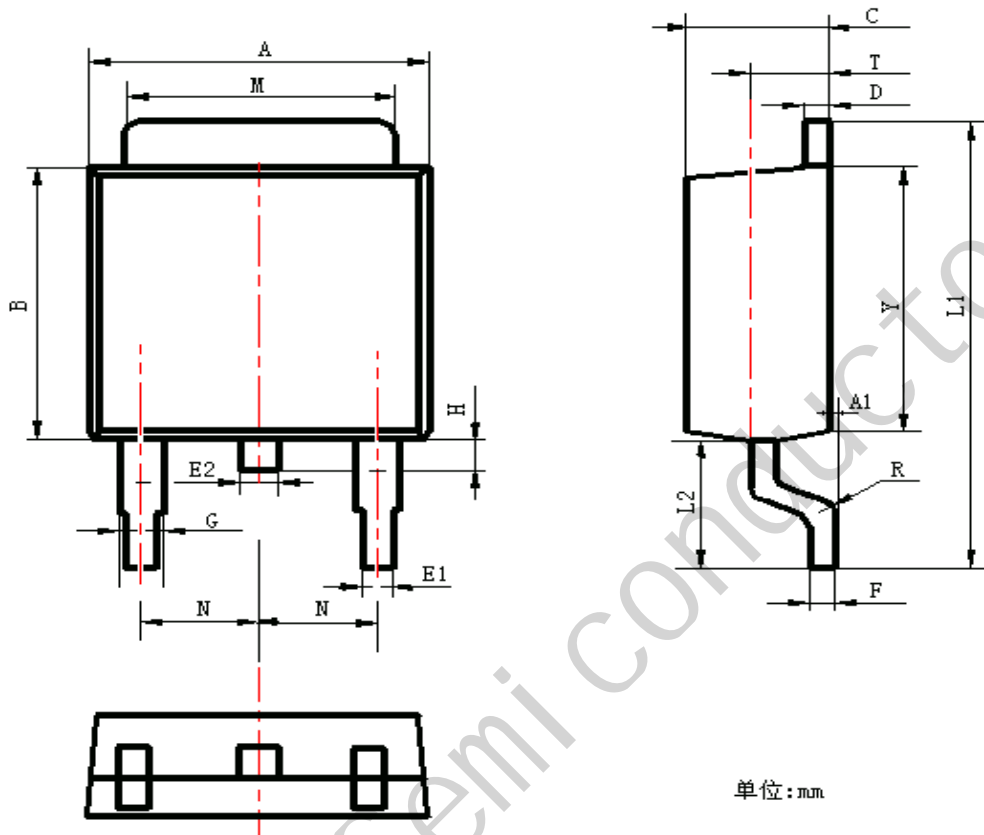
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	6.30	6.90	0.248	0.272
A1	0.00	0.16	0.000	0.006
B	5.70	6.30	0.224	0.248
C	2.10	2.50	0.083	0.098
D	0.30	0.70	0.012	0.028
E1	0.60	0.90	0.024	0.035
E2	0.70	1.00	0.028	0.039
F	0.30	0.60	0.012	0.024
G	0.70	1.20	0.028	0.047
L1	9.60	10.50	0.378	0.413
L2	2.70	3.10	0.106	0.122
H	0.40	1.00	0.016	0.039
M	5.10	5.50	0.201	0.217
N	2.09	2.49	0.082	0.098
R	0.30		0.012	
T	1.40	1.60	0.055	0.063
Y	5.10	6.30	0.201	0.248