1A Positive Voltage Regulator



TO-220

RoHS Compliant

General Description

- The TCI LM78xxAT family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 1A.
- The LM78xxAT is available in TO-220 package.

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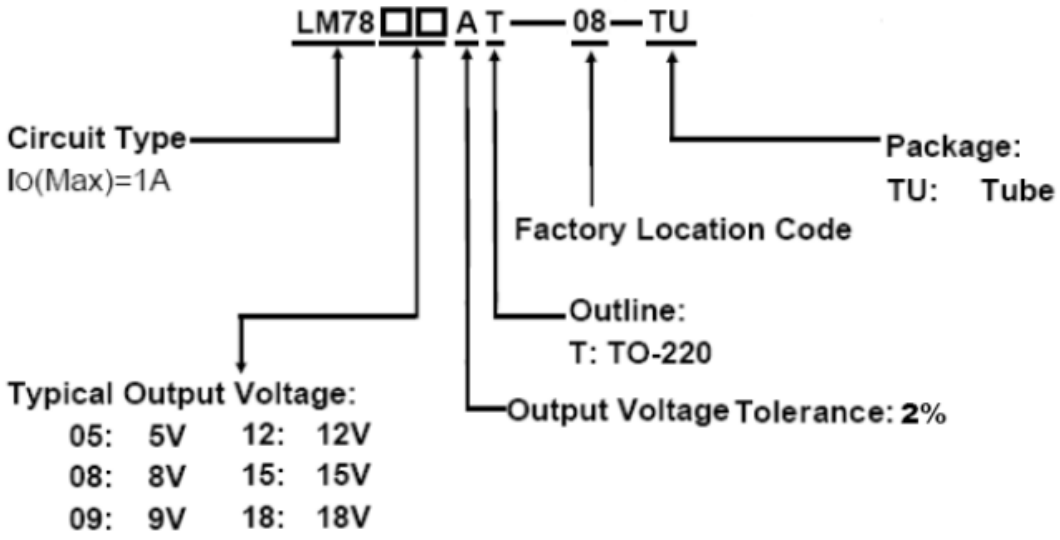
Features

- Output Current up to 1A
- Fixed Output Voltage of 5V, 8V, 9V, 12V,15V, 18V Available
- Thermal Overload Shutdown Protection
- Short Circuit Current Limiting
- Output Transistor SOA Protection
- RoHS Compliance

Applications

- High Efficiency Linear Regulator
- Post Regulation for Switching Supply
- Microprocessor Power Supply
- Mother Board

Ordering Information



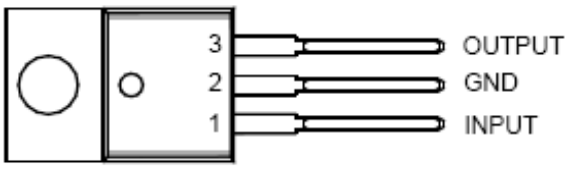
Marking Information

Outline	Temperature Range	PN	Marking Code	Package Type
TO-220	-40 to 125°C	LM7805AT	AS7805AT-E1	Tube
		LM7808AT	AS7808AT-E1	
		LM7809AT	AS7809AT-E1	
		LM7812AT	AS7812AT-E1	
		LM7815AT	AS7815AT-E1	
		LM7818AT	AS7818AT-E1	

Packing Information

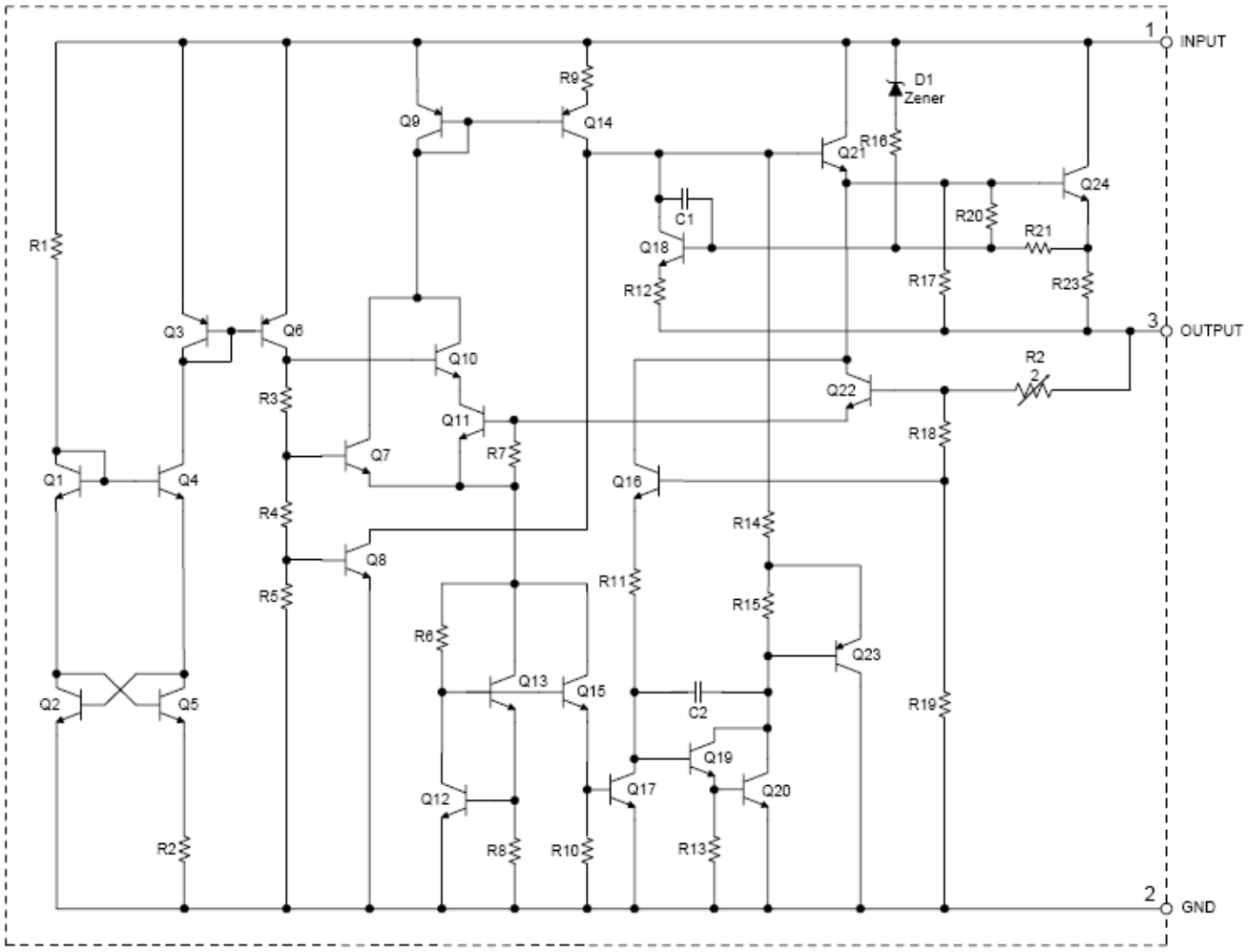
Package Type	Units/Tube	Tubes/Inner Box	Units/Inner Box	Inner Boxes /Outer Box
TO-220	50	20	1000	5

Pin Configuration



Outline: TO-220

Functional Block Diagram



Absolute Maximum Ratings (Note 1)

Symbol	Description	Ratings	Unit
V_{IN}	Input Voltage	36	V
I_{OUT}	Output Current	1	A
T_{LEAD}	Lead Temperature (Soldering 10sec)	260	° C
P_D	Power Dissipation	Internally Limited	W
T_J	Junction Temperature	150	° C
T_{STG}	Storage Temperature Range	-65 to 150	° C
θ_{JA}	Thermal Resistance	60	° C/ W
ESD	ESD (Human Body Model)	6000	V
ESD	ESD (Machine Model)	500	V

Note: **1. Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "Recommended Operating Conditions" is not implied. Exposure to "Absolute Maximum Ratings" for extended periods may affect device reliability.**

Recommended Operating Conditions

Symbol	Description		Ratings		Unit
			Min.	Max.	
V_{IN}	Input Voltage	LM7805AT	-	25	V
		LM7808AT	-	28	
		LM7809AT	-	29	
		LM7812AT	-	32	
		LM7815AT	-	32	
		LM7818AT	-	32	
T_J	Operating Junction Temperature Range		-40	125	° C

Electrical Characteristics

For LM7805AT (V_{IN}=10V, I_{OUT}=1A, T_J=-40 to 125° C, unless otherwise specified)

Symbol	Description	LM7805AT			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{OUT}	Output Voltage	4.9	5.0	5.1	V	T_J=25° C
		4.8	-	5.2		V_{IN}=7.5V to 20V, I_{OUT}=5mA to 1A, P_D≤15W
V_{RLINE}	Line Regulation	-	25	50	mV	V_{IN}=7.5V to 20V, I_{OUT}=500mA, T_J=25° C
V_{RLOAD}	Load Regulation	-	20	50	mV	V_{IN}=10V, I_{OUT}=5mA to 1A, T_J=25° C
I_Q	Quiescent Current	-	3.2	6.0	mA	V_{IN}=10V, I_{OUT}=0
ΔI_Q	Quiescent Current Change	-	0.3	0.8	mA	V_{IN}=8V to 25V, I_{OUT}=500mA, T_J=25° C
		-	0.08	0.5		I_{OUT}=5mA to 1A, T_J=25° C
PSRR	Ripple Rejection	-	70	-	dB	V_{IN}=8V to 18V, f=120Hz, I_{OUT}=500mA
V_{DROP}	Dropout Voltage	-	2.0	-	V	ΔV_{OUT}=1%, I_{OUT}=1A, T_J=25° C
N_O	Output Noise Voltage	-	10	-	μV/V_O	f=10Hz to 100kHz, T_A=25° C
R_O	Output Resistance	-	10	-	mΩ	f=1kHz
I_{SC}	Short Circuit Current	-	0.05	-	A	V_{IN}=35V, T_A=25° C
I_{PK}	Peak Output Current	-	2.2	-	A	V_{IN}=10V, T_J=25° C
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	-	0.4	-	mV/° C	
$(\Delta V_{OUT}/\Delta V_{OUT})/\Delta T$		-	80	-	ppm/° C	

For LM7808AT (V_{IN}=14V, I_{OUT}=1A, T_J=-40 to 125° C, unless otherwise specified)

Symbol	Description	LM7808AT			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{OUT}	Output Voltage	7.84	8	8.16	V	T_J=25° C
		7.7	-	8.3		V_{IN}=10.6V to 23V, I_{OUT}=5mA to 1A, $P_D \leqslant$15W
V_{RLINE}	Line Regulation	-	25	75	mV	V_{IN}=10.6V to 23V, I_{OUT}=500mA, T_J=25° C
V_{RLOAD}	Load Regulation	-	25	75	mV	V_{IN}=14V, I_{OUT}=5mA to 1A, T_J=25° C
I_Q	Quiescent Current	-	3.2	6.0	mA	V_{IN}=14V, I_{OUT}=0
ΔI_Q	Quiescent Current Change	-	0.3	0.8	mA	V_{IN}=10.6V to 23V, I_{OUT}=500mA, T_J=25° C
		-	0.08	0.5		I_{OUT}=5mA to 1A, T_J=25° C
PSRR	Ripple Rejection	-	62	-	dB	V_{IN}=11.5V to 21.5V, f=120Hz, I_{OUT}=500mA
V_{DROP}	Dropout Voltage	-	2.0	-	V	ΔV_{OUT}=1%, I_{OUT}=1A, T_J=25° C
N_O	Output Noise Voltage	-	10	-	μV/V_O	f=10Hz to 100kHz, T_A=25° C
R_O	Output Resistance	-	10	-	mΩ	f=1kHz
I_{SC}	Short Circuit Current	-	0.2	-	A	V_{IN}=35V, T_A=25° C
I_{PK}	Peak Output Current	-	2.2	-	A	V_{IN}=14V, T_J=25° C
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	-	0.64	-	mV/° C	
$(\Delta V_{OUT}/\Delta V_{OUT})/\Delta T$		-	80	-	ppm/° C	

For LM7809AT (V_{IN}=15V, I_{OUT}=1A, T_J=-40 to 125° C, unless otherwise specified)

Symbol	Description	LM7809AT			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{OUT}	Output Voltage	8.82	9	9.18	V	T_J=25° C
		8.65	-	9.35		V_{IN}=11.5V to 23V, I_{OUT}=5mA to 1A, $P_D \leqslant$15W
V_{RLINE}	Line Regulation	-	25	90	mV	V_{IN}=11.5V to 23V, I_{OUT}=500mA, T_J=25° C
V_{RLOAD}	Load Regulation	-	25	100	mV	V_{IN}=14V, I_{OUT}=5mA to 1A, T_J=25° C
I_Q	Quiescent Current	-	3.2	6.0	mA	V_{IN}=15V, I_{OUT}=0
ΔI_Q	Quiescent Current Change	-	0.3	0.8	mA	V_{IN}=11.5V to 23V, I_{OUT}=500mA, T_J=25° C
		-	0.08	0.5		I_{OUT}=5mA to 1A, T_J=25° C
PSRR	Ripple Rejection	-	61	-	dB	V_{IN}=11.5V to 21.5V, f=120Hz, I_{OUT}=500mA
V_{DROP}	Dropout Voltage	-	2.0	-	V	ΔV_{OUT}=1%, I_{OUT}=1A, T_J=25° C
N_O	Output Noise Voltage	-	10	-	μV/V_O	f=10Hz to 100kHz, T_A=25° C
R_O	Output Resistance	-	10	-	mΩ	f=1kHz
I_{SC}	Short Circuit Current	-	0.2	-	A	V_{IN}=35V, T_A=25° C
I_{PK}	Peak Output Current	-	2.2	-	A	V_{IN}=15V, T_J=25° C
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	-	0.72	-	mV/° C	
$(\Delta V_{OUT}/\Delta V_{OUT})/\Delta T$		-	80	-	ppm/° C	

For LM7812AT (V_{IN}=19V, I_{OUT}=1A, T_J=-40 to 125° C, unless otherwise specified)

Symbol	Description	LM7812AT			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{OUT}	Output Voltage	11.75	12	12.25	V	T_J=25° C
		11.5	-	12.5		V_{IN}=14.8V to 27V, I_{OUT}=5mA to 1A, $P_D \leqslant$15W
V_{RLINE}	Line Regulation	-	25	120	mV	V_{IN}=14.8V to 27V, I_{OUT}=500mA, T_J=25° C
V_{RLOAD}	Load Regulation	-	40	120	mV	V_{IN}=19V, I_{OUT}=5mA to 1A, T_J=25° C
I_Q	Quiescent Current	-	3.4	6.0	mA	V_{IN}=19V, I_{OUT}=0
ΔI_Q	Quiescent Current Change	-	0.3	0.8	mA	V_{IN}=14.8V to 30V, I_{OUT}=500mA, T_J=25° C
		-	0.08	0.5		I_{OUT}=5mA to 1A, T_J=25° C
PSRR	Ripple Rejection	-	60	-	dB	V_{IN}=15V to 25V, f=120Hz, I_{OUT}=500mA
V_{DROP}	Dropout Voltage	-	2.0	-	V	ΔV_{OUT}=1%, I_{OUT}=1A, T_J=25° C
N_O	Output Noise Voltage	-	10	-	μV/V_O	f=10Hz to 100kHz, T_A=25° C
R_O	Output Resistance	-	11	-	mΩ	f=1kHz
I_{SC}	Short Circuit Current	-	0.2	-	A	V_{IN}=35V, T_A=25° C
I_{PK}	Peak Output Current	-	2.2	-	A	V_{IN}=18V, T_J=25° C
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	-	0.96	-	mV/° C	
$(\Delta V_{OUT}/\Delta V_{OUT})/\Delta T$		-	80	-	ppm/° C	

For LM7815AT (V_{IN}=23V, I_{OUT}=1A, T_J=-40 to 125° C, unless otherwise specified)

Symbol	Description	LM7815AT			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{OUT}	Output Voltage	14.7	15	15.3	V	T_J=25° C
		14.4	-	15.6		V_{IN}=17.9V to 30V, I_{OUT}=5mA to 1A, $P_D \leqslant$15W
V_{RLINE}	Line Regulation	-	35	150	mV	V_{IN}=17.9V to 30V, I_{OUT}=500mA, T_J=25° C
V_{RLOAD}	Load Regulation	-	70	150	mV	V_{IN}=23V, I_{OUT}=5mA to 1A, T_J=25° C
I_Q	Quiescent Current	-	3.4	6.0	mA	V_{IN}=23V, I_{OUT}=0
ΔI_Q	Quiescent Current Change	-	0.3	0.8	mA	V_{IN}=17.9V to 30V, I_{OUT}=500mA, T_J=25° C
		-	0.08	0.5		I_{OUT}=5mA to 1A, T_J=25° C
PSRR	Ripple Rejection	-	58	-	dB	V_{IN}=18.5V to 28.5V, f=120Hz, I_{OUT}=500mA
V_{DROP}	Dropout Voltage	-	2.0	-	V	ΔV_{OUT}=1%, I_{OUT}=1A, T_J=25° C
N_O	Output Noise Voltage	-	10	-	μV/V_O	f=10Hz to 100kHz, T_A=25° C
R_O	Output Resistance	-	11	-	mΩ	f=1kHz
I_{SC}	Short Circuit Current	-	0.2	-	A	V_{IN}=35V, T_A=25° C
I_{PK}	Peak Output Current	-	2.2	-	A	V_{IN}=21V, T_J=25° C
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	-	1.2	-	mV/° C	
$(\Delta V_{OUT}/\Delta V_{OUT})/\Delta T$		-	80	-	ppm/° C	

For LM7818AT (V_{IN}=27V, I_{OUT}=1A, T_J=-40 to 125° C, unless otherwise specified)

Symbol	Description	LM7818AT			Unit	Test Conditions
		Min.	Typ.	Max.		
V_{OUT}	Output Voltage	17.64	18	18.36	V	T_J=25° C
		17.3	-	18.7		V_{IN}=21V to 33V, I_{OUT}=5mA to 1A, $P_D \leqslant$15W
V_{RLINE}	Line Regulation	-	45	180	mV	V_{IN}=21V to 33V, I_{OUT}=500mA, T_J=25° C
V_{RLOAD}	Load Regulation	-	85	180	mV	V_{IN}=27V, I_{OUT}=5mA to 1A, T_J=25° C
I_Q	Quiescent Current	-	3.6	6.0	mA	V_{IN}=27V, I_{OUT}=0
ΔI_Q	Quiescent Current Change	-	0.3	0.8	mA	V_{IN}=21V to 33V, I_{OUT}=500mA, T_J=25° C
		-	0.08	0.5		I_{OUT}=5mA to 1A, T_J=25° C
PSRR	Ripple Rejection	-	57	-	dB	V_{IN}=22V to 32V, f=120Hz, I_{OUT}=500mA
V_{DROP}	Dropout Voltage	-	2.0	-	V	ΔV_{OUT}=1%, I_{OUT}=1A, T_J=25° C
N_O	Output Noise Voltage	-	10	-	μV/V_O	f=10Hz to 100kHz, T_A=25° C
R_O	Output Resistance	-	11	-	mΩ	f=1kHz
I_{SC}	Short Circuit Current	-	0.2	-	A	V_{IN}=35V, T_A=25° C
I_{PK}	Peak Output Current	-	2.2	-	A	V_{IN}=24V, T_J=25° C
$\Delta V_{OUT}/\Delta T$	Output Voltage Temperature Coefficient	-	1.44	-	mV/° C	
$(\Delta V_{OUT}/\Delta V_{OUT})/\Delta T$		-	80	-	ppm/° C	

Typical Characteristics Curves

Fig.1- Peak Output Current vs. Input/Output Differential Voltage

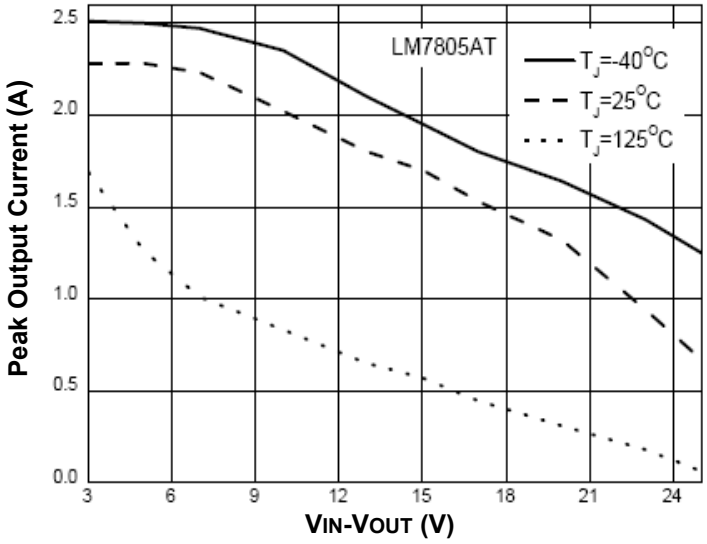


Fig.2- Output Voltage vs. Junction Temperature

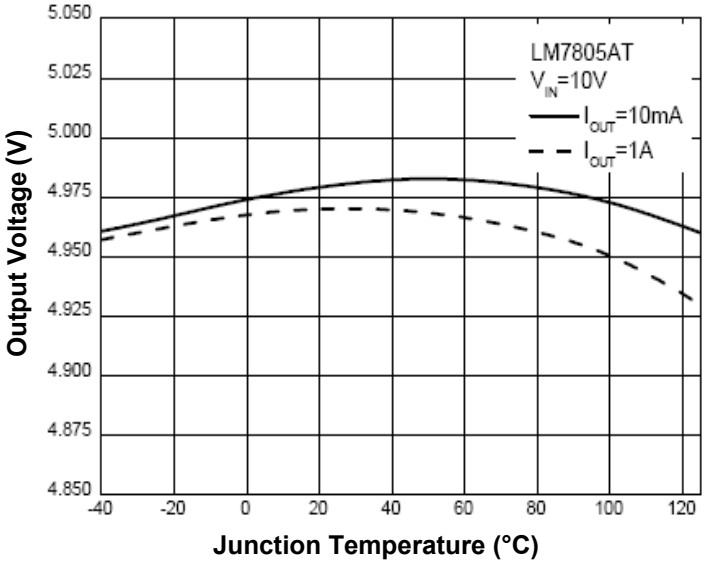


Fig.3- Output Voltage vs. Output Current

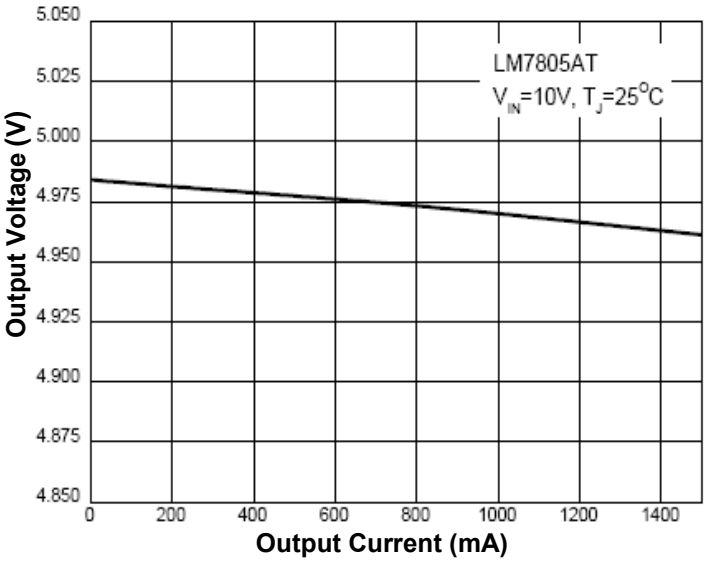
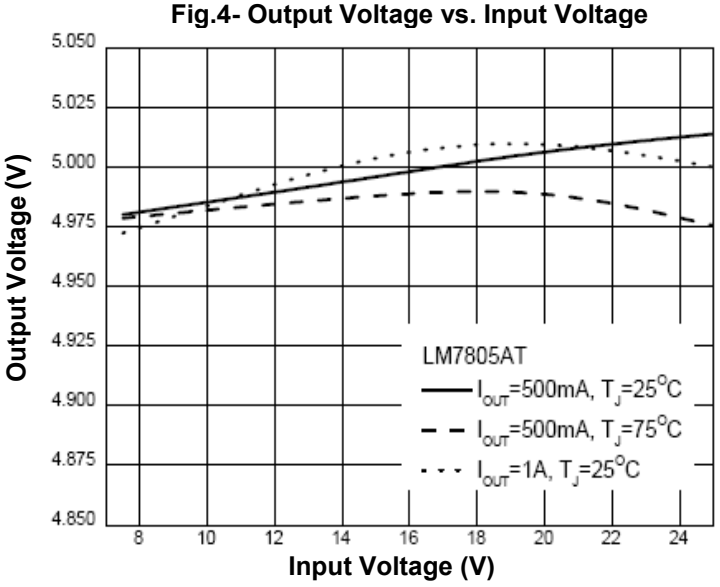


Fig.4- Output Voltage vs. Input Voltage



Typical Characteristics Curves (Continued)

Fig.5- Quiescent Current vs. Junction Temperature

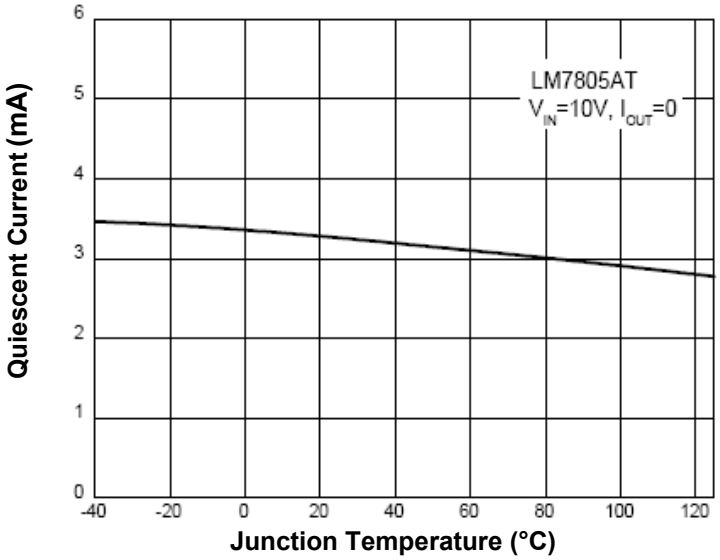


Fig.6- Ripple Rejection vs. Frequency

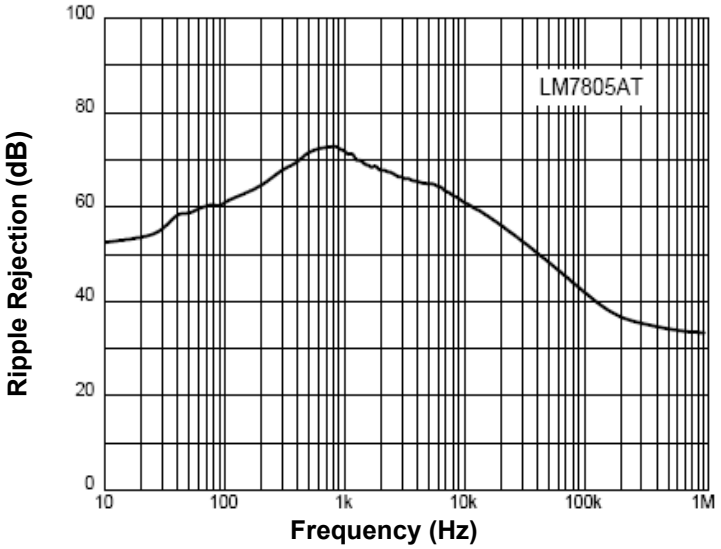


Fig.7- Dropout Voltage vs. Junction Temperature

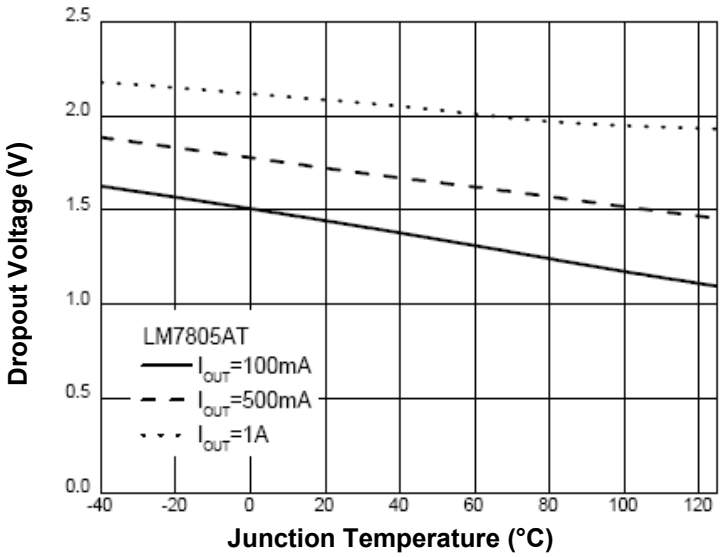
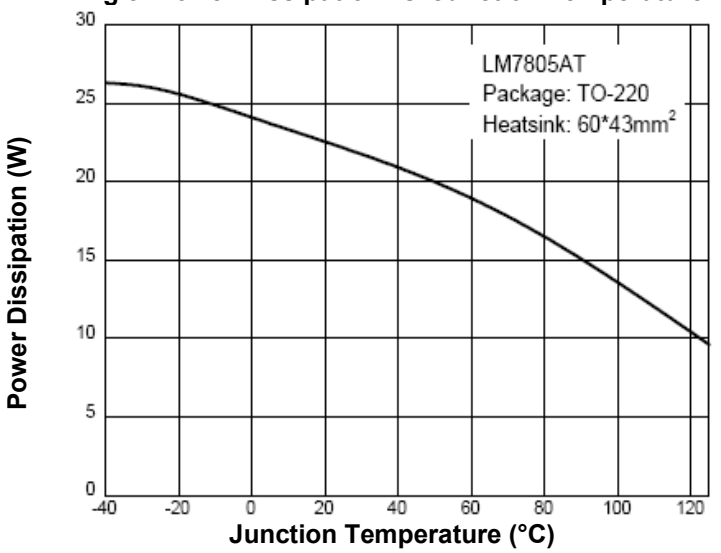


Fig.8- Power Dissipation vs. Junction Temperature



Typical Performance Characteristics

Fig.9- Line Transient
(Conditions: I_{OUT}=500mA, C_{OUT}=0.1μF)

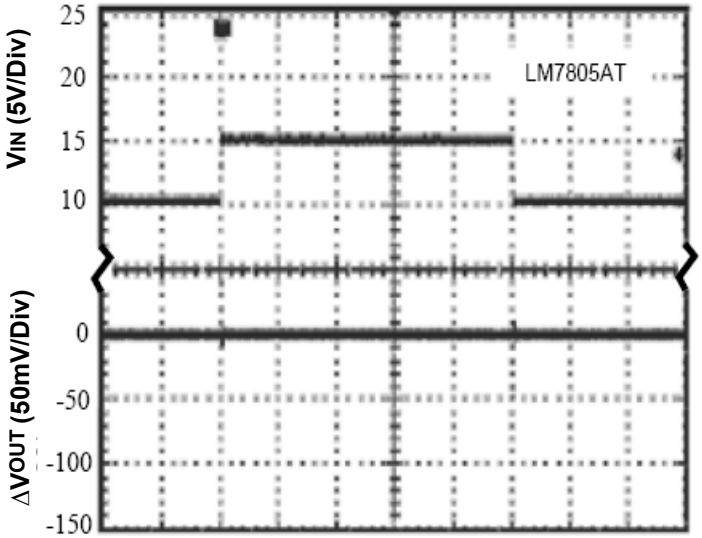
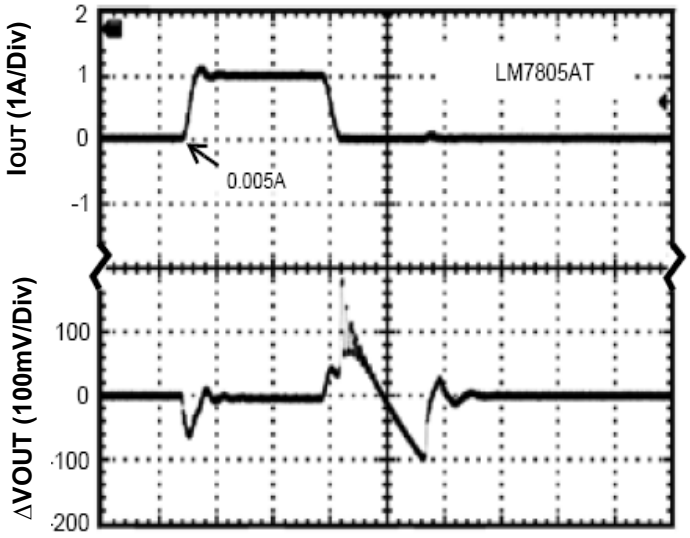
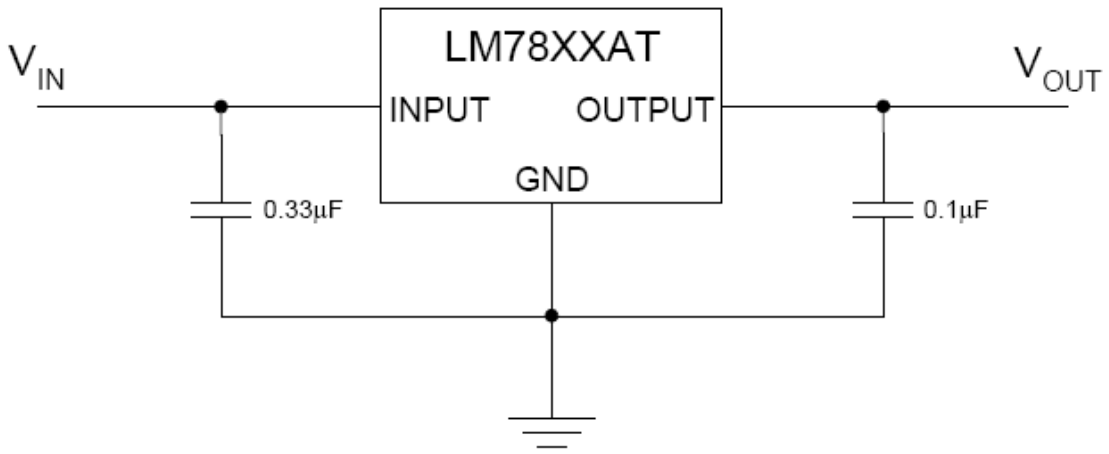


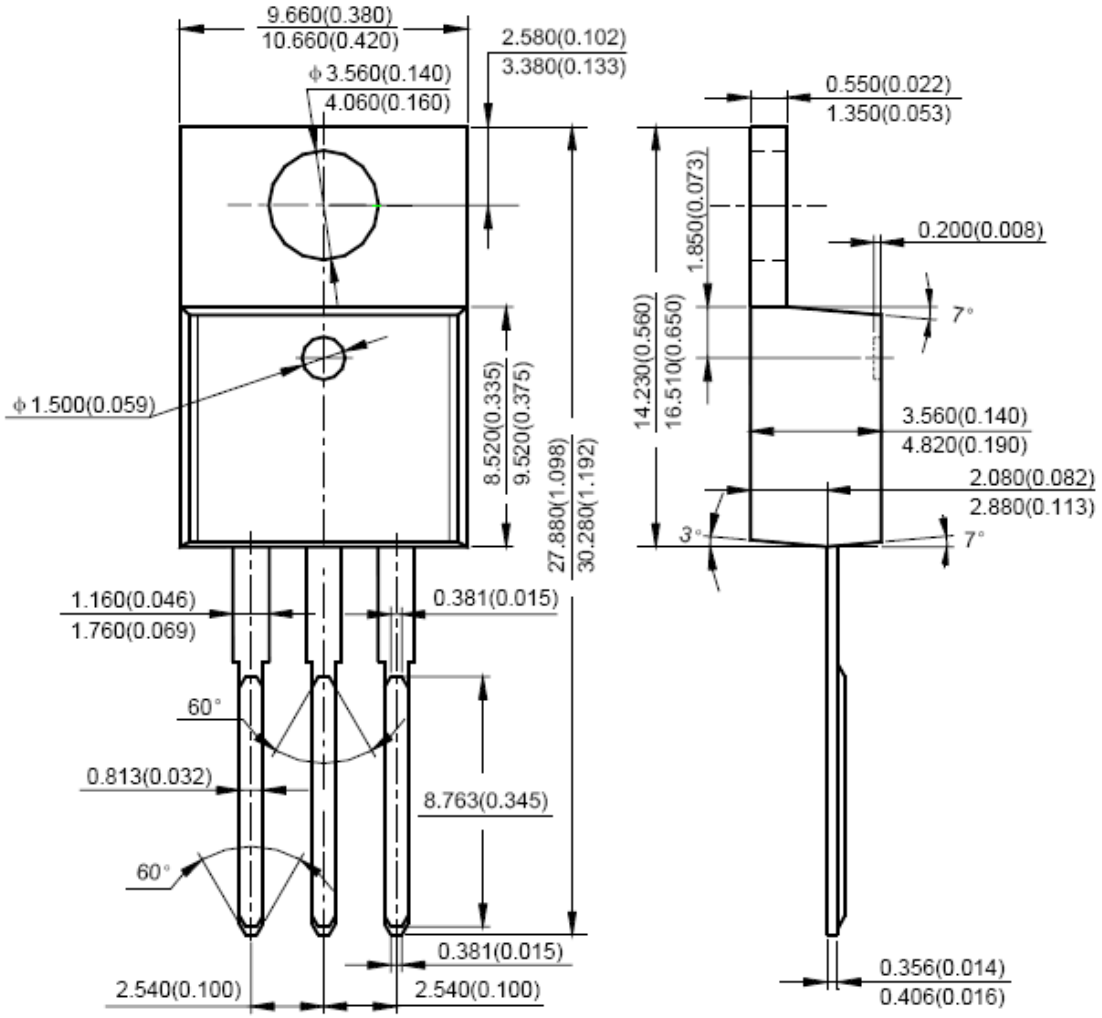
Fig.10- Load Transient
(Conditions: V_{IN}=10V, C_{IN}=0.33μF, C_{OUT}=0.1μF)



Typical Application



Dimensions in mm (inches)



TO-220

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