



## AF78XX Series Three-terminal positive voltage regulator

### ➤ Features

- Output Current up to 1.0A
- Fixed Output Voltages of 5V, 6V, 8V, 9V, 12V, 15V and 18V
- Internal Short Circuit Current Limiting
- Internal Thermal Overload Protection
- Output Transistor Safe Area Protection
- Package: TO252-2L, TO220-3L
- Low Load Regulation
- Stable Performance in High Temperature
- Output Voltage Accuracy: Tolerance  $\pm 4\%$

### ➤ General Description

The AF78XX series are three terminal positive voltage regulators designed for a wide variety of applications including local, on-card regulation.

The AF78XX series are complete with internal current limiting, thermal shutdown protection, and safe-area compensation which make them virtually immune from output overload. If adequate heat sinking is provided, these regulators can deliver output currents up to 1A.

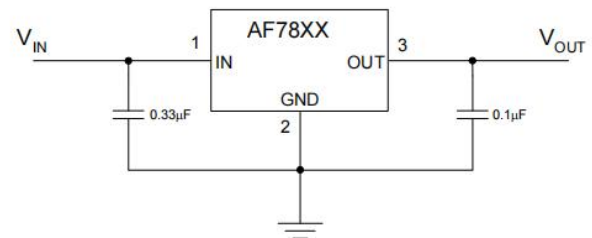
### ➤ Ordering Information

Device	Package	Shipping
AF78XXGT8	TO-252-2L	2500/Reel
AF78XXGT4	TO-220-3L	50/Tube

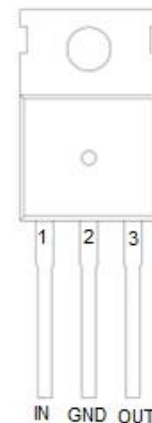
### ➤ Applications

- High Efficiency Linear Regular
- Post Regulation for Switching Supply
- Microprocess or Power Supply
- Mother Board

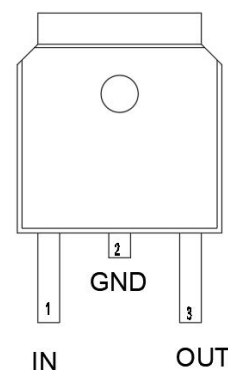
### ➤ Typical Applications



### ➤ Pin Configuration



TO-220-3L

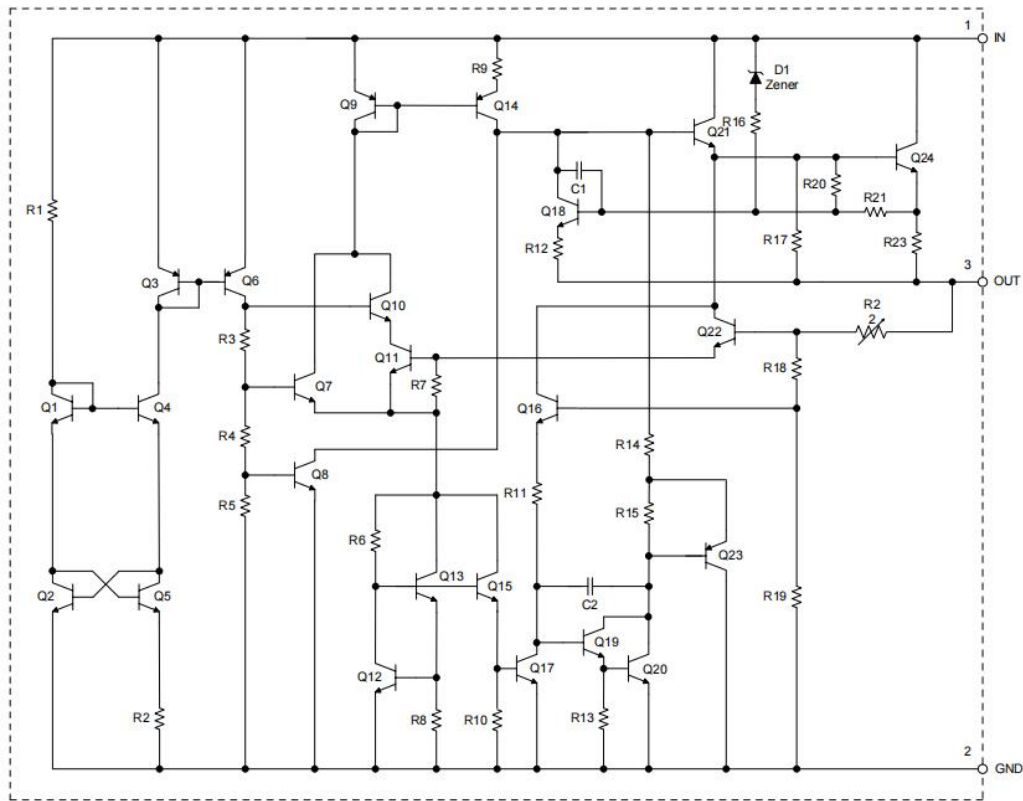


TO-252-2L



# AF78XX Series Three-terminal positive voltage regulator

## ➤ Block Diagram



## ➤ Pin Descriptions

Pin NO.	Pin Name	Function
1	IN	Voltage Input
2	GND	Ground
3	OUT	Voltage Output

## ➤ Absolute Maximum Rating <sup>Note1</sup>

Parameter	Symbol	Value	Unit
Input supply voltage	$V_{in}$	36	V
Lead Temperature (Soldering, 10sec)	$T_{LEAD}$	260	°C
Power Dissipation	$P_D$	Internally Limited	mA
Thermal Resistance from Junction to Air	$R_{\theta JA}$	TO-220-3	60
		TO-252-2	100
Storage Temperature Range	$T_{STG}$	-65 to +150	°C/W
Maximum junction temperature	$T_J$	150	°C

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.



## AF78XX Series Three-terminal positive voltage regulator

### ➤ Recommended Operating Condition

Parameter	Symbol	Type	Min.	Typ.	Max.	Unit
Input Voltage	$V_{IN}$	AF7805			25	V
		AF7806			26	V
		AF7808			28	V
		AF7809			29	V
		AF7812			32	V
		AF7815			32	V
		AF7818			32	V
Operating Junction Temperature Range	$T_J$		-40		125	°C

### ➤ Electrical Characteristics

**AF7805** (@  $V_{IN} = 10V$ ,  $I_{OUT} = 1A$ ,  $T_J = -40$  to  $+125^\circ C$ , unless otherwise specified.)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	UNIT
Output Voltage	$V_o$	$T_J = +25^\circ C$	4.9	5	5.1	V
		$I_o = 5mA$ to $1A$ , $P_o \leq 15W$ $V_i = 7.5V$ to $20V$	4.8		5.2	
Line Regulation	Regline	$T_J = +25^\circ C$ , $V_i = 10V$ to $20V$ , $I_o = 500mA$		25	50	mV
Load Regulation	Regload	$T_J = +25^\circ C$ , $V_i = 10V$ , $I_{OUT} = 5mA$ to $1A$ ,		20	50	mV
Quiescent Current	$I_q$	$T_J = +25^\circ C$		3.2	6	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5mA$ to $1A$		0.08	0.5	mA
		$T_J = +25^\circ C$ , $V_i = 8V$ to $25V$ , $I_o = 500mA$		1.0	2.0	
Output voltage Temperature Coefficient	$\Delta V_o / \Delta T$	-		0.8		mV/°C
	$(\Delta V_o / \Delta V_o) / \Delta T$	-		80		ppm/°C
Output Noise Voltage	NO	$f = 10Hz \sim 100KHz$ , $T_A = +25^\circ C$		42		$\mu V / V_o$
Ripple Rejection	PSRR	$f = 120Hz$ , $V_i = 8V$ to $18.5V$ , $I_o = 500mA$		70		dB
Dropout Voltage	$V_{DROP}$	$\Delta V_o = 1\%$ ; $I_o = 1A$ , $T_J = +25^\circ C$		2		V
Output Resistance	$R_o$	$f = 1KHz$		10		m $\Omega$
Short Circuit Current	$I_{SC}$	$T_J = +25^\circ C$ , $V_i = 35V$		0.23		A
Peak Current	$I_{PK}$	$T_J = +25^\circ C$ , $V_i = 10V$		2.2		A
Thermal Resistance	$R_{\theta JC}$	TO-220-3		9		°C/W
		TO-252-2		16		°C/W



## AF78XX Series Three-terminal positive voltage regulator

**AF7806** (@  $V_{IN} = 11V$ ,  $I_{OUT} = 1A$ ,  $T_J = -40$  to  $+125^{\circ}C$ , unless otherwise specified.)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	UNIT
Output Voltage	$V_o$	$T_J = +25^{\circ}C$	5.88	6	6.12	V
		$I_o = 5mA$ to $1A$ , $P_o \leq 15W$ $V_i = 10V$ to $21V$	5.76		6.24	
Line Regulation	Regline	$T_J = +25^{\circ}C$ , $V_i = 10V$ to $21V$ , $I_o = 500mA$		25	60	mV
Load Regulation	Regload	$T_J = +25^{\circ}C$ , $V_i = 11V$ , $I_{OUT} = 5mA$ to $1A$ ,		20	60	mV
Quiescent Current	$I_q$	$T_J = +25^{\circ}C$		3.2	6	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5mA$ to $1A$		0.08	0.5	mA
		$T_J = +25^{\circ}C$ , $V_i = 10V$ to $25V$ , $I_o = 500mA$		1.0	2.0	
Output voltage Temperature Coefficient	$\Delta V_o / \Delta T$	-		0.8		mV/ $^{\circ}C$
	$(\Delta V_o / \Delta V_o) / \Delta T$	-		80		ppm/ $^{\circ}C$
Output Noise Voltage	NO	$f = 10Hz \sim 100KHz$ , $T_A = +25^{\circ}C$		42		$\mu V / V_o$
Ripple Rejection	PSRR	$f = 120Hz$ $V_i = 9.5V$ to $19.5V$ , $I_o = 500mA$		65		dB
Dropout Voltage	$V_{DROP}$	$\Delta V_o = 1\%$ ; $I_o = 1A$ , $T_J = +25^{\circ}C$		2		V
Output Resistance	$R_o$	$f = 1KHz$		10		m $\Omega$
Short Circuit Current	$I_{SC}$	$T_J = +25^{\circ}C$ , $V_i = 35V$		0.25		A
Peak Current	$I_{PK}$	$T_J = +25^{\circ}C$ , $V_i = 10V$		2.2		A
Thermal Resistance	$R_{\theta JC}$	TO-220-3		9		$^{\circ}C/W$
		TO-252-2		16		$^{\circ}C/W$



## AF78XX Series Three-terminal positive voltage regulator

**AF7808** (@  $V_{IN} = 14V$ ,  $I_{OUT} = 1A$ ,  $T_J = -40$  to  $+125^\circ C$ , unless otherwise specified.)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	UNIT
Output Voltage	$V_o$	$T_J = +25^\circ C$	7.84	8	8.16	V
		$I_o = 5mA$ to $1A$ , $P_o \leq 15W$ $V_i = 10.6V$ to $23V$	7.7		8.3	
Line Regulation	Regline	$T_J = +25^\circ C$ , $V_i = 10.6V$ to $23V$ , $I_o = 500mA$		25	75	mV
Load Regulation	Regload	$T_J = +25^\circ C$ , $V_i = 14V$ , $I_{OUT} = 5mA$ to $1A$ ,		25	75	mV
Quiescent Current	$I_q$	$T_J = +25^\circ C$		3.2	6	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5mA$ to $1A$		0.08	0.5	mA
		$T_J = +25^\circ C$ , $V_i = 10.6V$ to $25V$ , $I_o = 500mA$		1.0	2.0	
Output voltage Temperature Coefficient	$\Delta V_o / \Delta T$	-		0.8		mV/ $^\circ C$
	$(\Delta V_o / \Delta V_o) / \Delta T$	-		80		ppm/ $^\circ C$
Output Noise Voltage	NO	$f = 10Hz \sim 100KHz$ , $T_A = +25^\circ C$		42		$\mu V / V_o$
Ripple Rejection	PSRR	$f = 120Hz$ , $V_i = 11.5V$ to $21.5V$ , $I_o = 500mA$		62		dB
Dropout Voltage	$V_{DROP}$	$\Delta V_o = 1\%$ ; $I_o = 1A$ , $T_J = +25^\circ C$		2		V
Output Resistance	$R_o$	$f = 1KHz$		10		m $\Omega$
Short Circuit Current	$I_{SC}$	$T_J = +25^\circ C$ , $V_i = 35V$		0.25		A
Peak Current	$I_{PK}$	$T_J = +25^\circ C$ , $V_i = 14V$		2.2		A
Thermal Resistance	$R_{\theta JC}$	TO-220-3		9		$^\circ C / W$
		TO-252-2		16		$^\circ C / W$



## AF78XX Series Three-terminal positive voltage regulator

**AF7809** (@  $V_{IN} = 15V$ ,  $I_{OUT} = 1A$ ,  $T_J = -40$  to  $+125^\circ C$ , unless otherwise specified.)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	UNIT
Output Voltage	$V_o$	$T_J = +25^\circ C$	8.82	9	9.18	V
		$I_o = 5mA$ to $1A$ , $P_o \leq 15W$ $V_i = 11.5V$ to $23V$	8.65		9.35	
Line Regulation	Regline	$T_J = +25^\circ C$ , $V_i = 11.5V$ to $23V$ , $I_o = 500mA$		25	90	mV
Load Regulation	Regload	$T_J = +25^\circ C$ , $V_i = 15V$ , $I_{OUT} = 5mA$ to $1A$ ,		25	100	mV
Quiescent Current	$I_q$	$T_J = +25^\circ C$		3.2	6	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5mA$ to $1A$		0.08	0.5	mA
		$T_J = +25^\circ C$ , $V_i = 11.5V$ to $23V$ , $I_o = 500mA$		1.0	2.0	
Output voltage Temperature Coefficient	$\Delta V_o / \Delta T$	-		0.8		mV/ $^\circ C$
	$(\Delta V_o / \Delta V_o) / \Delta T$	-		80		ppm/ $^\circ C$
Output Noise Voltage	NO	$f = 10Hz \sim 100KHz$ , $T_A = +25^\circ C$		42		$\mu V / V_o$
Ripple Rejection	PSRR	$f = 120Hz$ $V_i = 11.5V$ to $21.5V$ , $I_o = 500mA$		61		dB
Dropout Voltage	$V_{DROP}$	$\Delta V_o = 1\%$ ; $I_o = 1A$ , $T_J = +25^\circ C$		2		V
Output Resistance	$R_o$	$f = 1KHz$		10		m $\Omega$
Short Circuit Current	$I_{SC}$	$T_J = +25^\circ C$ , $V_i = 35V$		0.25		A
Peak Current	$I_{PK}$	$T_J = +25^\circ C$ , $V_i = 15V$		2.2		A
Thermal Resistance	$R_{\theta JC}$	TO-220-3		9		$^\circ C/W$
		TO-252-2		16		$^\circ C/W$



## AF78XX Series Three-terminal positive voltage regulator

**AF7812** (@  $V_{IN} = 19V$ ,  $I_{OUT} = 1A$ ,  $T_J = -40$  to  $+125^{\circ}C$ , unless otherwise specified.)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	UNIT
Output Voltage	$V_o$	$T_J = +25^{\circ}C$	11.75	12	12.25	V
		$I_o = 5mA$ to $1A$ , $P_o \leq 15W$ $V_i = 14.8V$ to $27V$	11.5		12.5	
Line Regulation	Regline	$T_J = +25^{\circ}C$ , $V_i = 14.8V$ to $27V$ , $I_o = 500mA$		25	120	mV
Load Regulation	Regload	$T_J = +25^{\circ}C$ , $V_i = 19V$ , $I_{OUT} = 5mA$ to $1A$ ,		40	120	mV
Quiescent Current	$I_q$	$T_J = +25^{\circ}C$		3.4	6	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5mA$ to $1A$		0.08	0.5	mA
		$T_J = +25^{\circ}C$ , $V_i = 14.8V$ to $30V$ , $I_o = 500mA$		1.0	2.0	
Output voltage Temperature Coefficient	$\Delta V_o / \Delta T$	-		0.96		mV/ $^{\circ}C$
	$(\Delta V_o / \Delta V_o) / \Delta T$	-		80		ppm/ $^{\circ}C$
Output Noise Voltage	NO	$f = 10Hz \sim 100KHz$ , $T_A = +25^{\circ}C$		42		$\mu V / V_o$
Ripple Rejection	PSRR	$f = 120Hz$ , $V_i = 15V$ to $25V$ , $I_o = 500mA$		60		dB
Dropout Voltage	$V_{DROP}$	$\Delta V_o = 1\%$ ; $I_o = 1A$ , $T_J = +25^{\circ}C$		2		V
Output Resistance	$R_o$	$f = 1KHz$		11		m $\Omega$
Short Circuit Current	$I_{SC}$	$T_J = +25^{\circ}C$ , $V_i = 35V$		0.25		A
Peak Current	$I_{PK}$	$T_J = +25^{\circ}C$ , $V_i = 11V$		2.2		A
Thermal Resistance	$R_{\theta JC}$	TO-220-3		9		$^{\circ}C/W$
		TO-252-2		16		$^{\circ}C/W$



## AF78XX Series Three-terminal positive voltage regulator

**AF7815** (@  $V_{IN} = 23V$ ,  $I_{OUT} = 1A$ ,  $T_J = -40$  to  $+125^\circ C$ , unless otherwise specified.)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	UNIT
Output Voltage	$V_O$	$T_J = +25^\circ C$	14.7	15	15.3	V
		$I_O = 5mA$ to $1A$ , $P_O \leq 15W$ $V_I = 17.9V$ to $30V$	14.4	15	15.6	
Line Regulation	Regline	$T_J = +25^\circ C$ , $V_I = 17.9V$ to $30V$ , $I_O = 500mA$		35	150	mV
Load Regulation	Regload	$T_J = +25^\circ C$ , $V_I = 23V$ , $I_{OUT} = 5mA$ to $1A$ ,		70	150	mV
Quiescent Current	$I_Q$	$T_J = +25^\circ C$		3.4	6	mA
Quiescent Current Change	$\Delta I_Q$	$I_O = 5mA$ to $1A$		0.08	0.5	mA
		$T_J = +25^\circ C$ , $V_I = 17.9V$ to $30V$ , $I_O = 500mA$		1.0	2.0	
Output voltage Temperature Coefficient	$\Delta V_O / \Delta T$	-		1.2		mV/ $^\circ C$
	$(\Delta V_O / \Delta V_O) / \Delta T$	-		80		ppm/ $^\circ C$
Output Noise Voltage	NO	$f = 10Hz \sim 100KHz$ , $T_A = +25^\circ C$		42		$\mu V / V_O$
Ripple Rejection	PSRR	$f = 120Hz$ $V_I = 18.5V$ to $28.5V$ , $I_O = 500mA$		58		dB
Dropout Voltage	$V_{DROP}$	$I_O = 1A$ , $T_J = +25^\circ C$		2		V
Output Resistance	$R_O$	$f = 1KHz$		11		m $\Omega$
Short Circuit Current	$I_{SC}$	$T_J = +25^\circ C$ , $V_I = 35V$		0.25		A
Peak Current	$I_{PK}$	$T_J = +25^\circ C$ , $V_I = 21V$		2.2		A
Thermal Resistance	$R_{\theta JC}$	TO-220-3		9		$^\circ C/W$
		TO-252-2		16		$^\circ C/W$





## AF78XX Series Three-terminal positive voltage regulator

**AF7818** (@  $V_{IN} = 27V$ ,  $I_{OUT} = 1A$ ,  $T_J = -40$  to  $+125^\circ C$ , unless otherwise specified.)

Parameter	Symbol	Test Condition	MIN	TYP	MAX	UNIT
Output Voltage	$V_o$	$T_J = +25^\circ C$	17.64	18	18.36	V
		$I_o = 5mA$ to $1A$ , $P_o \leq 15W$ $V_i = 21V$ to $33V$	17.3		18.7	
Line Regulation	Regline	$T_J = +25^\circ C$ , $V_i = 21V$ to $33V$ , $I_o = 500mA$		45	180	mV
Load Regulation	Regload	$T_J = +25^\circ C$ , $V_i = 27V$ , $I_{OUT} = 5mA$ to $1A$		85	180	mV
Quiescent Current	$I_q$	$T_J = +25^\circ C$		3.6	6	mA
Quiescent Current Change	$\Delta I_q$	$I_o = 5mA$ to $1A$		0.08	0.5	mA
		$T_J = +25^\circ C$ , $V_i = 21V$ to $33V$ , $I_o = 500mA$		1.0	2.0	
Output voltage Temperature Coefficient	$\Delta V_o / \Delta T$	-		1.44		mV/ $^\circ C$
	$(\Delta V_o / \Delta V_o) / \Delta T$	-		80		ppm/ $^\circ C$
Output Noise Voltage	NO	$f = 10Hz \sim 100KHz$ , $T_A = +25^\circ C$		42		$\mu V / V_o$
Ripple Rejection	PSRR	$f = 120Hz$ , $V_i = 22V$ to $32V$ , $I_o = 500mA$		57		dB
Dropout Voltage	$V_{DROP}$	$\Delta V_o = 1\%$ ; $I_o = 1A$ , $T_J = +25^\circ C$		2		V
Output Resistance	$R_o$	$f = 1KHz$		11		m $\Omega$
Short Circuit Current	$I_{SC}$	$T_J = +25^\circ C$ , $V_i = 35V$		0.25		A
Peak Current	$I_{PK}$	$T_J = +25^\circ C$ , $V_i = 11V$		2.2		A
Thermal Resistance	$R_{\theta JC}$	TO-220-3		9		$^\circ C/W$
		TO-252-2		16		$^\circ C/W$

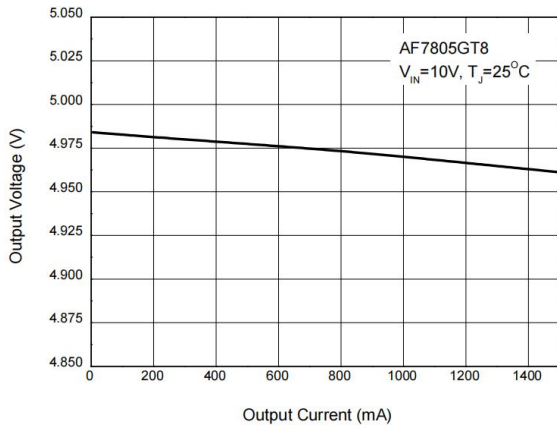


# AF78XX Series Three-terminal positive voltage regulator

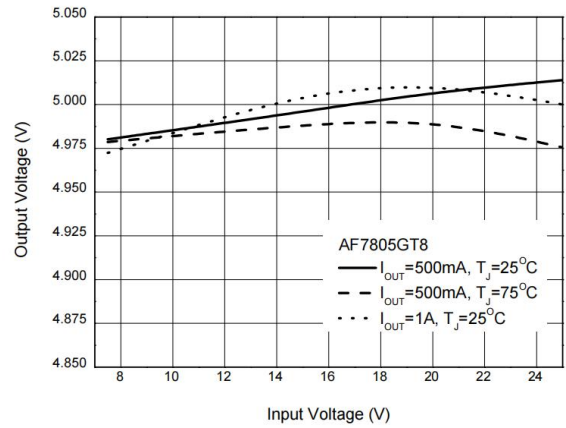
## ➤ Typical Performance Characteristics

$T_J = 25^\circ\text{C}$ , unless otherwise specified.

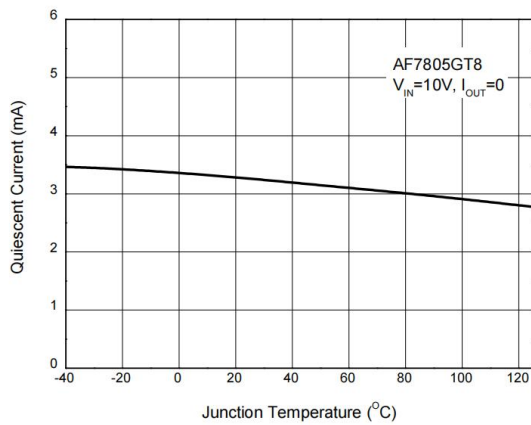
### Output Voltage vs. Output Current



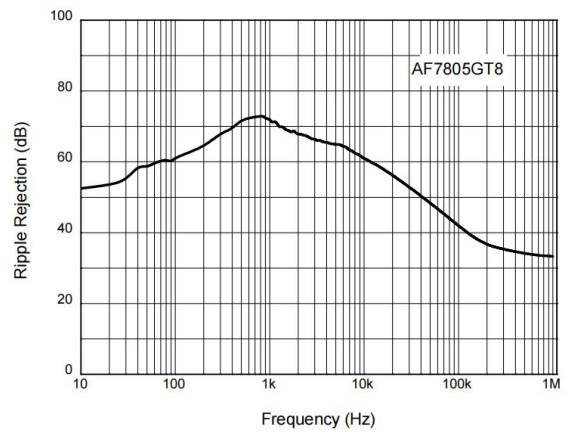
### Output Voltage vs. Input Voltage



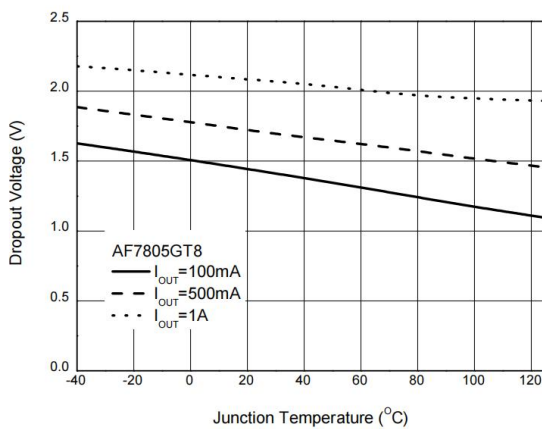
### Quiescent Current vs. Junction Temperature



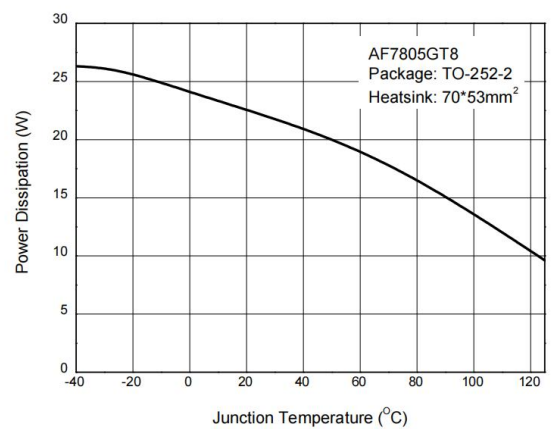
### Ripple Rejection vs. Frequency



### Dropout Voltage vs. Junction Temperature



### Power Dissipation vs. Junction Temperature

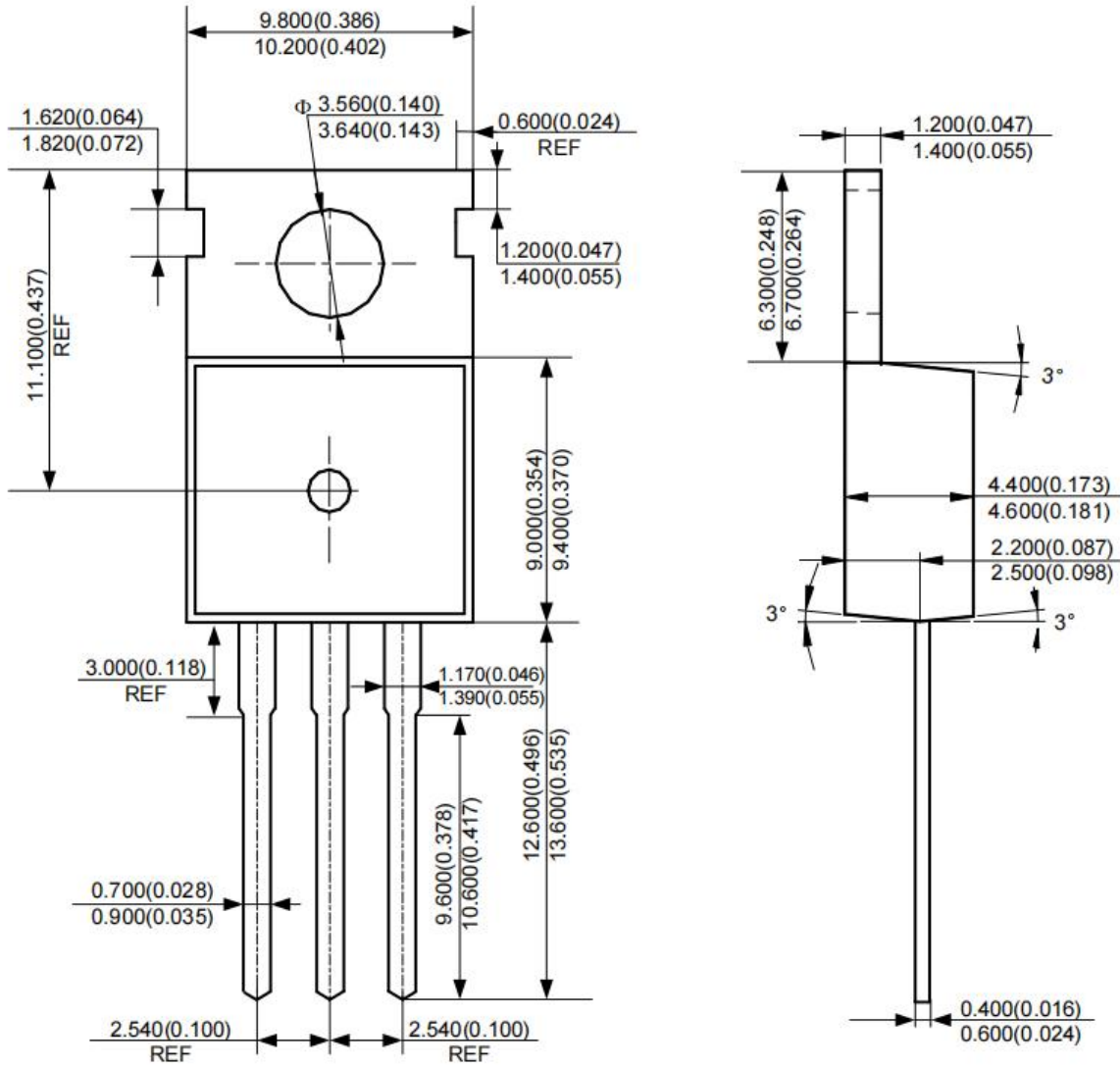




# AF78XX Series Three-terminal positive voltage regulator

## ➤ Package Information

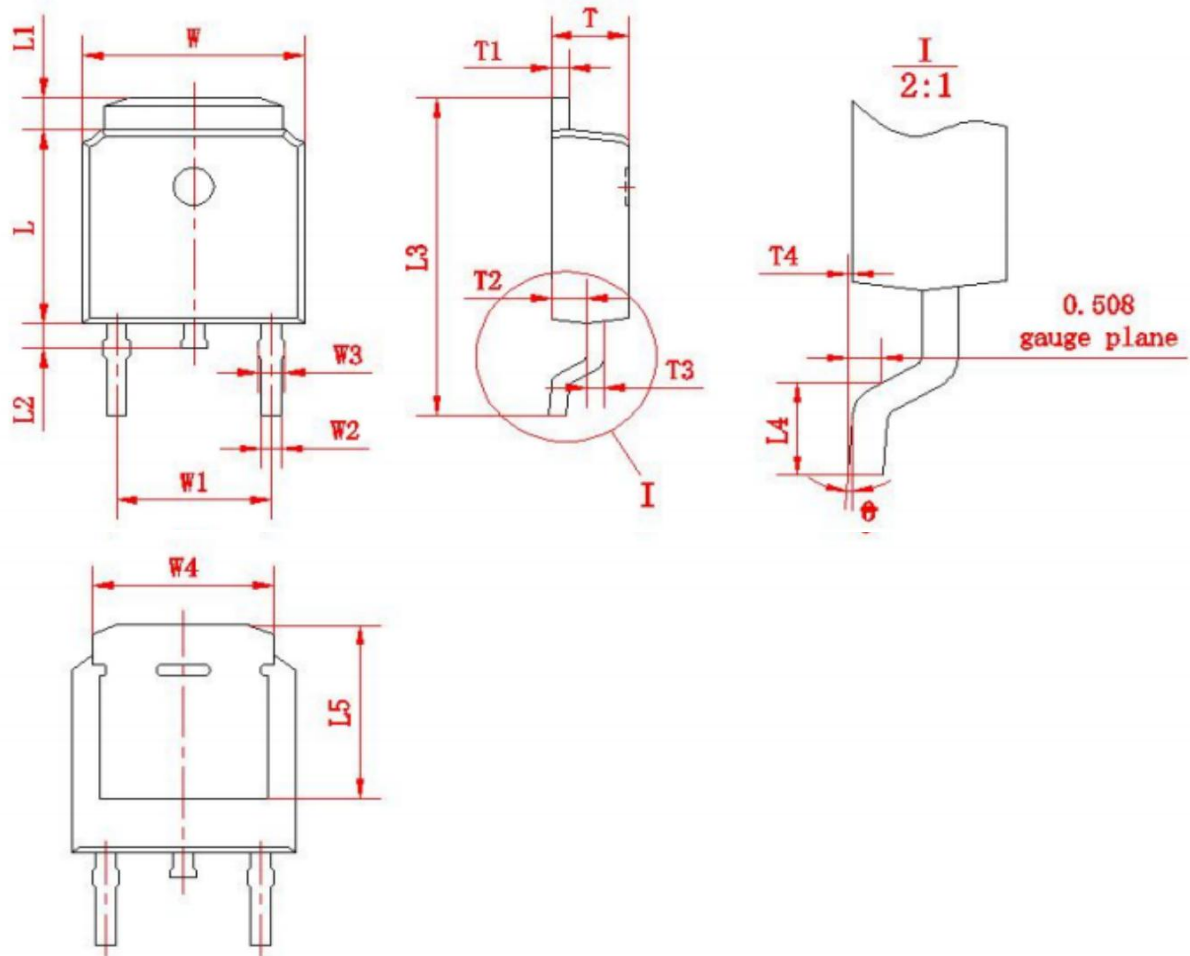
TO-220-3L





# AF78XX Series Three-terminal positive voltage regulator

TO-252-2L



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max		Min	Max
W	6.50	6.70	L1	0.8	1.2	T1	0.48	0.58
W1	(4.572)		L2	0.60	1.00	T2	0.95	1.15
W2	0.60	0.80	L3	9.70	10.30	T3	0.48	0.58
W3	0.68	0.88	L4	1.30	1.70	T4	0	0.15
W4	(5.3)		L5	(5.20)		θ	0°	8°
L	6.00	6.20	T	2.20	2.40			



## **AF78XX Series** ***Three-terminal positive voltage regulator***

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