



## LM78XXS

## LINEAR INTEGRATED CIRCUIT

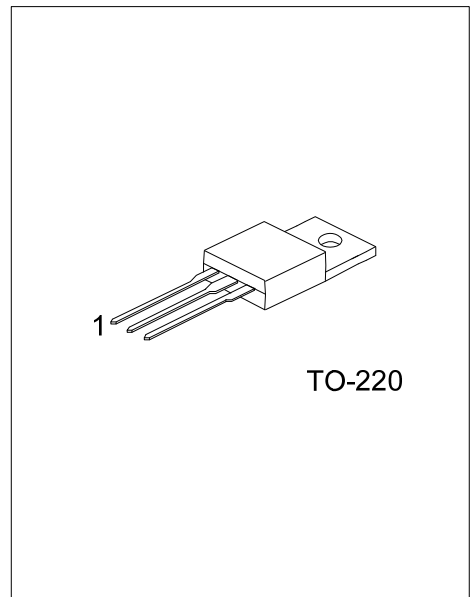
### 3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR

#### DESCRIPTION

The UTC **LM78XXS** family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 1 A.

#### FEATURES

- \* Output current up to 1A
- \* Fixed output voltage of 5V available
- \* Thermal overload shutdown protection
- \* Output transistor SOA protection



#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
LM78XXSL-TA3-T	LM78XXSG-TA3-T	TO-220	I	G	O	Tube

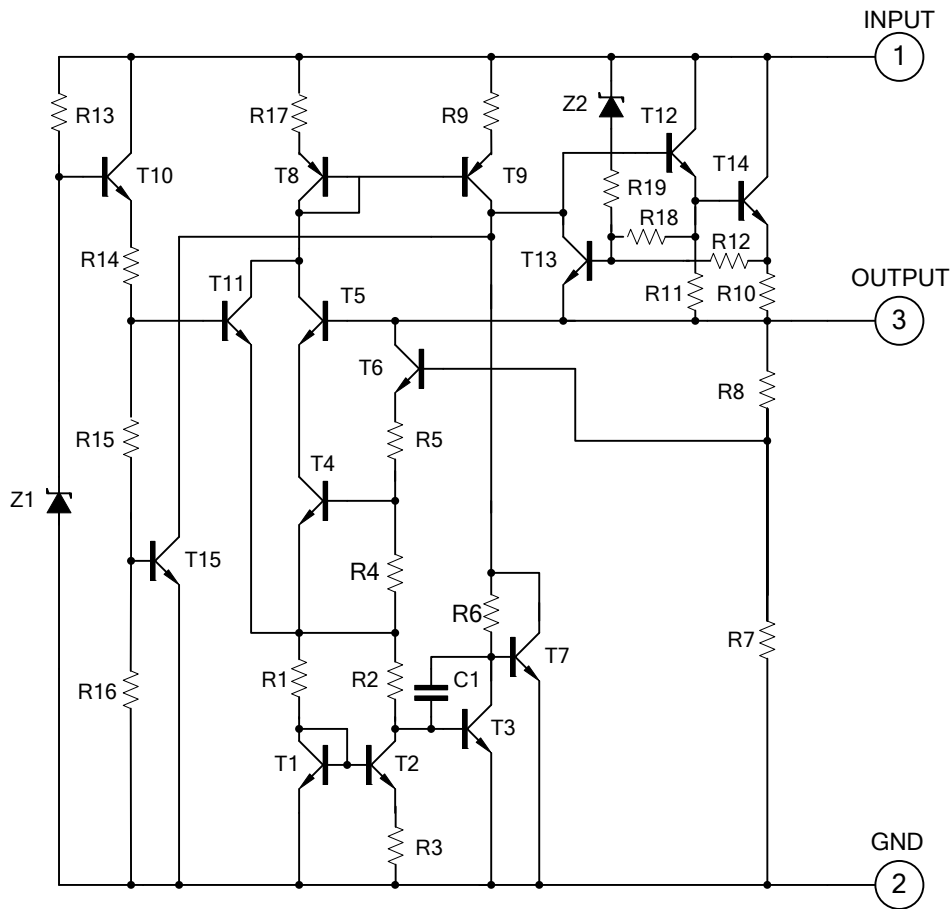
Note: Pin Assignment: O: Output G: GND I: Input

<p>LM78XXSG-TA3-T</p>	<p>(1) Packing Type (2) Package Type (3) Green Package (4) Output Voltage Code</p>	<p>(1) T: Tube (2) TA3: TO-220 (3) G: Halogen Free and Lead Free, L: Lead Free (4) XX: refer to Marking Information</p>
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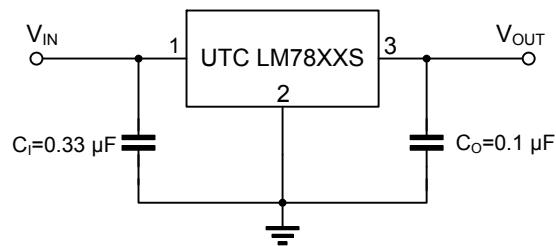
#### MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
TO-220	05:5.0V	<p>UTC LM78XXS</p> <p>Voltage Code ←      → Date Code</p> <p>Lot Code ←      →</p> <p>1      2      3</p> <p>L: Lead Free G: Halogen Free</p>

## ■ TEST CIRCUIT



## ■ APPLICATION CIRCUIT



Note 1: To specify an output voltage, substitute voltage value for "XX".

2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.

■ ABSOLUTE MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified)

PARAMETER	SYMBOL	RATING	UNIT
Input voltage	$V_{IN}$	35	V
Output Current	$I_{OUT}$	1	A
Power Dissipation	$P_D$	Internally Limited	W
Junction Temperature	$T_J$	+150	°C
Operating Temperature	$T_{OPR}$	-40 ~ +125	°C
Storage Temperature	$T_{STG}$	-55 ~ +150	°C

Note: 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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	$\theta_{JA}$	65	°C/W
Junction to Case	$\theta_{JC}$	5	°C/W

■ ELECTRICAL CHARACTERISTICS

( $I_{OUT}=0.5A$ ,  $T_J=0^{\circ}C\sim 125^{\circ}C$ ,  $C_I=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified)(Note 1)

For UTC LM7805S ( $V_{IN}=10V$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$T_J=25^{\circ}C$ , $I_{OUT}=5mA \sim 1.0A$	4.80	5.0	5.20	V
		$V_{IN}=7.5V \sim 20V$ , $I_{OUT}=5mA \sim 1.0A$ , $P_D \leq 15W$	4.75		5.25	V
Dropout Voltage	$V_D$	$T_J=25^{\circ}C$		2.5		V
Load Regulation	$\Delta V_{OUT}$	$T_J=25^{\circ}C$ , $I_{OUT}=5mA \sim 1.0A$			50	mV
		$T_J=25^{\circ}C$ , $I_{OUT}=0.25A \sim 0.75A$			25	mV
Line regulation	$\Delta V_{OUT}$	$V_{IN}=7V \sim 25V$ , $T_J=25^{\circ}C$			50	mV
		$V_{IN}=7.5V \sim 20V$ , $T_J=25^{\circ}C$ , $I_{OUT}=1.0A$			50	mV
Quiescent Current	$I_Q$	$T_J=25^{\circ}C$ , $I_{OUT} \leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=7.5V \sim 20V$			1.0	mA
		$I_{OUT}=5mA \sim 1.0A$			0.5	mA
Output Noise Voltage	eN	10Hz $\leq$ f $\leq$ 100kHz		40		$\mu V$
Ripple Rejection	RR	$V_{IN}=8V \sim 18V$ , f=120Hz, $T_J=25^{\circ}C$	59	80		dB
Peak Output Current	$I_{PEAK}$	$T_J=25^{\circ}C$		1.8		A

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 represents pulse test conditions with junction temperatures specified at the initiation of test.

2. Power dissipation < 0.5W

**■ NOTES FOR USE****1. Thermal design**

Use a thermal design that allows for a sufficient margin in light of the power dissipation ( $P_d$ ) in actual operating conditions.

**2. Absolute maximum ratings**

An excess in the absolute maximum ratings, such as supply voltage, temperature range of operating conditions, etc., can break down the devices, thus making impossible to identify breaking mode, such as a short circuit or an open circuit. If any over rated values will expect to exceed the absolute maximum ratings, consider adding circuit protection devices, such as fuses.

**3. GND voltage**

The potential of GND pin must be minimum potential in all operating conditions.

**4. Actions in strong electromagnetic field**

Use caution when using the IC in the presence of a strong electromagnetic field as doing so may cause the IC to malfunction.

**5. Inter-pin shorts and mounting errors**

Use caution when positioning the IC for mounting on printed circuit boards.

The IC may be damaged if there is any connection error or if pins are shorted together.

**6. Thermal shutdown circuit**

The IC incorporates a built-in thermal shutdown circuit (TSD circuit). The thermal shutdown circuit (TSD circuit) is designed only to shut the IC off to prevent thermal runaway. It is not designed to protect the IC or guarantee its operation. Do not continue to use the IC after operating this circuit or use the IC in an environment where the operation of this circuit is assumed.

**7. Overcurrent Protection Circuit**

An overcurrent protection circuit is incorporated in order to prevention destruction due to short-time overload currents.

Continued use of the protection circuits should be avoided. Please note that the current increases negatively impact the temperature.

**8. Testing on application boards**

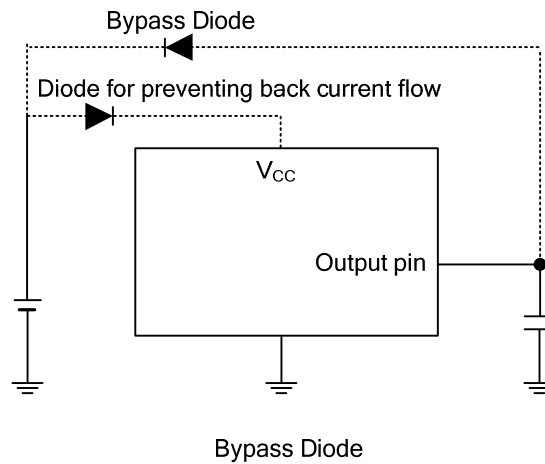
When testing the IC on an application board, connecting a capacitor to a pin with low impedance subjects the IC to stress. Always discharge capacitors after each process or step. Always turn the IC's power supply off before connecting it to or removing it from a jig or fixture during the inspection process. Ground the IC during assembly steps as an antistatic measure. Use similar precaution when transporting or storing the IC.

**9. Ground Wiring Pattern**

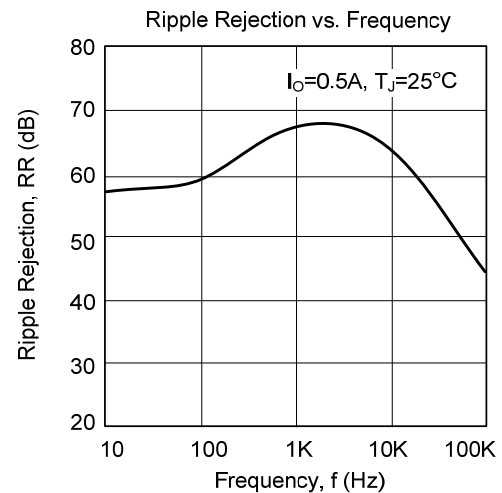
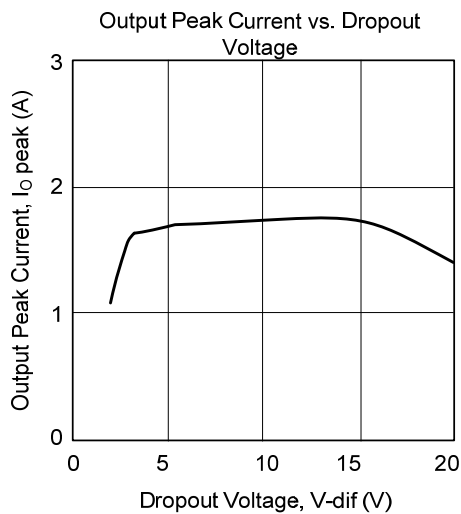
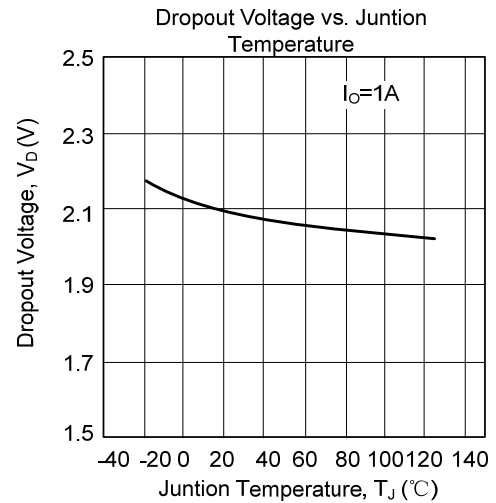
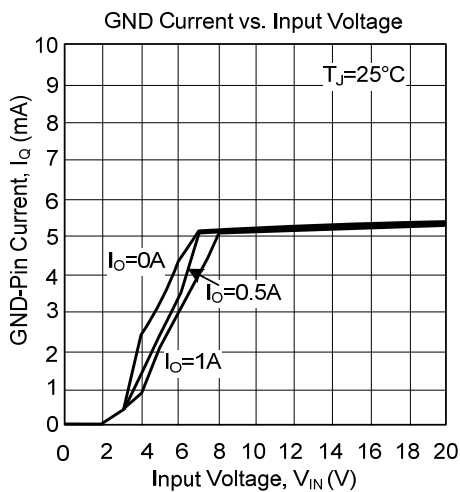
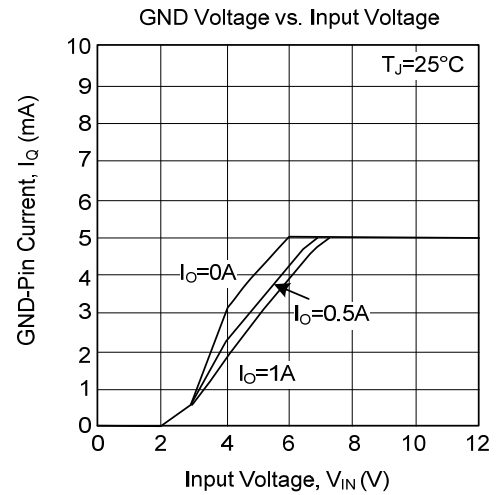
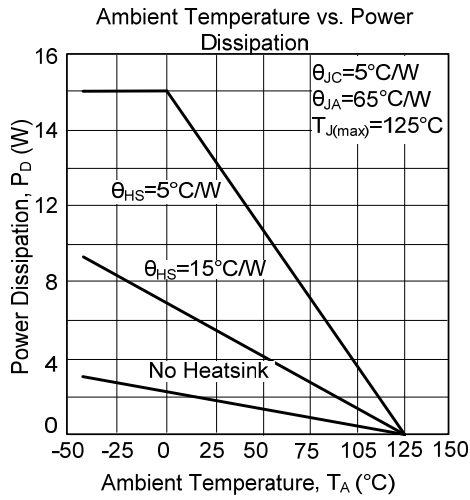
When using both small signal and large current GND patterns, it is recommended to isolate the two ground patterns, placing a single ground point at the ground potential of application so that the pattern wiring resistance and voltage variations caused by large currents do not cause variations in the small signal ground voltage. Be careful not to change the GND wiring pattern of any external components, either.

## ■ NOTES FOR USE (Cont.)

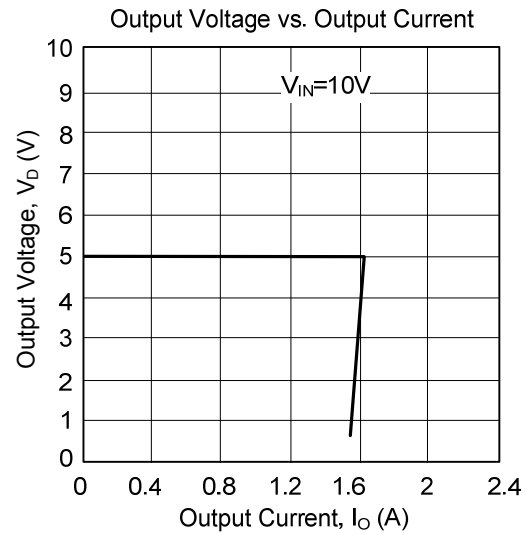
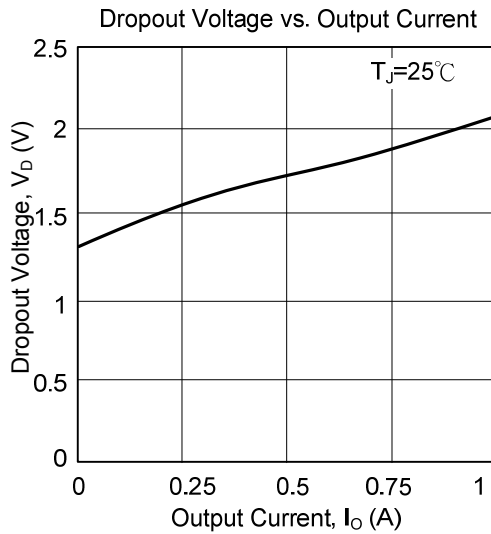
10. **Damage to the internal circuit or element may occur when the polarity of the  $V_{CC}$  pin is opposite to that of the other pins in applications.** (I.e.  $V_{CC}$  is shorted with the GND pin while an external capacitor is charged.) Use a maximum capacitance of  $1000\mu\text{F}$  for the output pins. Inserting a diode to prevent back-current flow in series with  $V_{CC}$  or bypass diodes between  $V_{CC}$  and each pin is recommended.



### TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



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