



## 78DXXL

## LINEAR INTEGRATED CIRCUIT

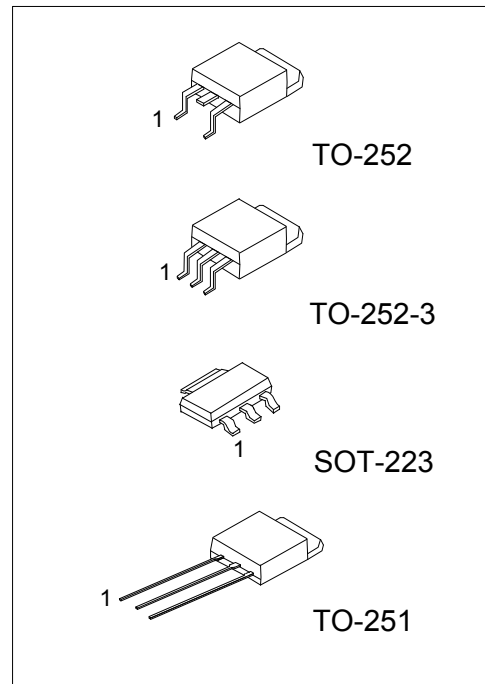
### 3-TERMINALS 0.5A POSITIVE VOLTAGE REGULATOR

#### DESCRIPTION

The UTC **78DXXL** family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 0.5 A.

#### FEATURE

- \* Output Current Up To 0.5 A
- \* Fixed Output Voltage Of 5V, 6V, 8V, 9V, 12V, 15V and 18V Available
- \* Thermal Overload Shutdown Protection
- \* Short Circuit Current Limiting
- \* Output Transistor SOA Protection



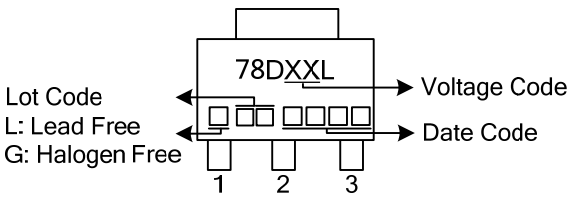
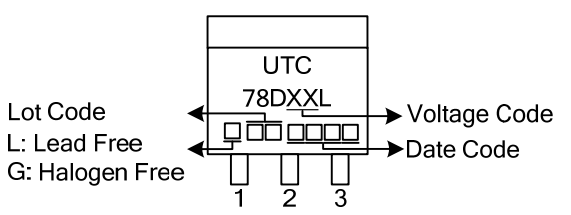
#### ORDERING INFORMATION

Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
78DXXLL-AA3-R	78DXXLG-AA3-R	SOT-223	I	G	O	Tape Reel
78DXXLL-TM3-T	78DXXLG-TM3-T	TO-251	I	G	O	Tube
78DXXLL-TN3-R	78DXXLG-TN3-R	TO-252	I	G	O	Tape Reel
78DXXLL-TN3-T	78DXXLG-TN3-T	TO-252	I	G	O	Tube
78DXXLL-TNA-R	78DXXLG-TNA-R	TO-252-3	I	G	O	Tape Reel
78DXXLL-TNA-T	78DXXLG-TNA-T	TO-252-3	I	G	O	Tube

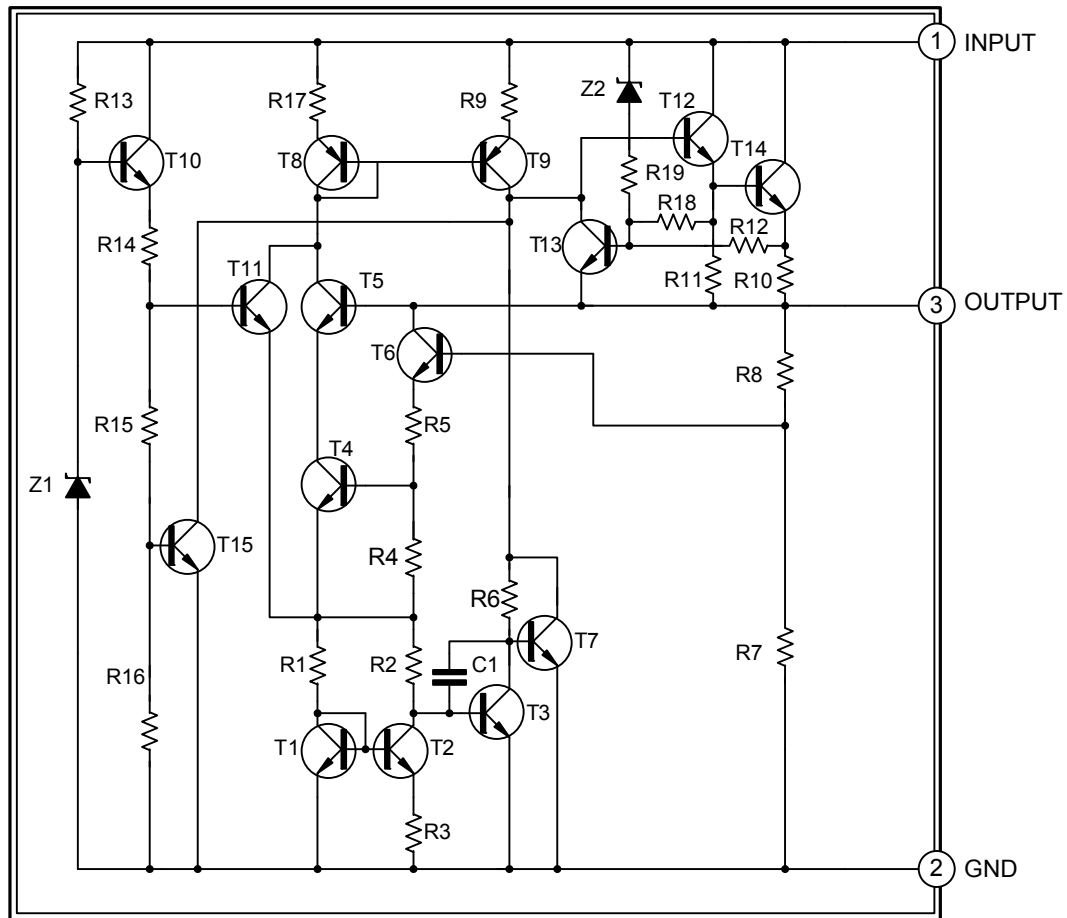
Note: 1. XX: Output Voltage, refer to Marking Information  
 2. Pin Code: I: Input G: GND O: Output

<p>78DXXLL-AA3-R</p> <p>(1)Packing Type        (2)Package Type        (3)Lead Free        (4)Output Voltage Code</p>	<p>(1) R: Tape Reel, T: Tube        (2) AA3: SOT-223, TM3: TO-251, TN3: TO-252, TNA: TO-252-3        (3) G: Halogen Free, L: Lead Free        (4) XX: refer to Marking Information</p>
--	--

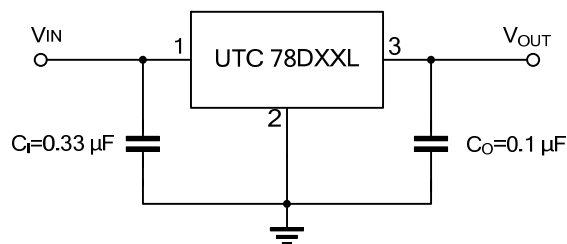
■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-223	05: 5V 06: 6V 08: 8V 09: 9V	 <p>Diagram of SOT-223 package marking. The package is labeled '78DXXL'. On the left side, there are three markings: 'Lot Code', 'L: Lead Free', and 'G: Halogen Free'. On the right side, there are two markings: 'Voltage Code' and 'Date Code'. The package has three pins labeled 1, 2, and 3.</p>
TO-251 TO-252 TO-252-3	12: 12V 15: 15V 18: 18V	 <p>Diagram of TO-251/252/252-3 package marking. The package is labeled 'UTC' and '78DXXL'. On the left side, there are three markings: 'Lot Code', 'L: Lead Free', and 'G: Halogen Free'. On the right side, there are two markings: 'Voltage Code' and 'Date Code'. The package has three pins labeled 1, 2, and 3.</p>

■ BLOCK DIAGRAM



■ TYPICAL APPLICATION CIRCUIT



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

■ ABSOLUTE MAXIMUM RATINGS ( $T_J=25^{\circ}\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	$V_{IN}$	35	V
Output Current	$I_{OUT}$	0.5	A
Power Dissipation ( $T_C=25^{\circ}\text{C}$ )	SOT-223	8.5	W
	TO-251 / TO-252	10	
Junction Temperature	$T_J$	-20~ +150	$^{\circ}\text{C}$
Storage Temperature	$T_{STG}$	-65 ~ +150	$^{\circ}\text{C}$

Notes: 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	RATINGS	UNIT
Junction to Case	SOT-223	15	$^{\circ}\text{C}/\text{W}$
	TO-251 / TO-252	12.5	

■ ELECTRICAL CHARACTERISTICS

( $T_J=25^{\circ}\text{C}$ ,  $C_I=0.33\mu\text{F}$ ,  $C_O=0.1\mu\text{F}$ ,  $P_D\leq 7\text{W}$ , unless otherwise specified)

For 78D05L ( $V_{IN}=10\text{V}$ ,  $I_{OUT}=0.5\text{A}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5\text{mA}\sim 0.5\text{A}$	4.8	5	5.2	V
		$V_{IN}=7.5\sim 20\text{V}$ , $I_{OUT}=5\text{mA}\sim 0.5\text{A}$	4.75		5.25	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5\text{mA}\sim 0.5\text{A}$			100	mV
		$I_{OUT}=5\text{mA}\sim 200\text{mA}$			50	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=7\text{V}\sim 25\text{V}$			100	mV
		$V_{IN}=7.5\sim 20\text{V}$ , $I_{OUT}=0.5\text{A}$			100	mV
Quiescent Current	$I_Q$	$I_{OUT}=0.5\text{A}$			8	mA
Quiescent Current Change	$\Delta I_Q$	$V_{UT}=7.5\sim 20\text{V}$			1	mA
		$I_{OUT}=5\text{mA}\sim 0.5\text{A}$			0.5	mA
Output Noise Voltage	$e_N$	$10\text{Hz}\leq f\leq 100\text{kHz}$		40		$\mu\text{V}$
Temperature coefficient of $V_{OUT}$	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5\text{mA}$		-0.6		$\text{mV}/^{\circ}\text{C}$
Ripple Rejection	RR	$V_{IN}=8\sim 18\text{V}$ , $f=120\text{Hz}$	62	80		dB
Peak Output Current	$I_{PEAK}$			1.2		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35\text{V}$		250		mA
Dropout Voltage	$V_D$			2		V

For 78D06L ( $V_{IN}=11\text{V}$ ,  $I_{OUT}=0.5\text{A}$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5\text{mA}\sim 0.5\text{A}$	5.76	6	6.24	V
		$V_{IN}=8.5\sim 21\text{V}$ , $I_{OUT}=5\text{mA}\sim 0.5\text{A}$	5.7		6.3	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5\text{mA}\sim 0.5\text{A}$			120	mV
		$I_{OUT}=5\text{mA}\sim 200\text{mA}$			60	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=8\sim 25\text{V}$			120	mV
		$V_{IN}=8.5\sim 21\text{V}$ , $I_{OUT}=0.5\text{A}$			120	mV
Quiescent Current	$I_Q$	$I_{OUT}=0.5\text{A}$			8	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=8.5\sim 21\text{V}$			1	mA
		$I_{OUT}=5\text{mA}\sim 0.5\text{A}$			0.5	mA
Output Noise Voltage	$e_N$	$10\text{Hz}\leq f\leq 100\text{kHz}$		45		$\mu\text{V}$
Temperature coefficient of $V_{OUT}$	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5\text{mA}$		-0.7		$\text{mV}/^{\circ}\text{C}$
Ripple Rejection	RR	$V_{IN}=9\sim 19\text{V}$ , $f=120\text{Hz}$	59	75		dB
Peak Output Current	$I_{PEAK}$			1.2		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35\text{V}$		250		mA
Dropout Voltage	$V_D$			2		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78D08L ( $V_{IN}=14V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$	7.68	8	8.32	V
		$V_{IN}=10.5\sim 23V$ , $I_{OUT}=5mA\sim 0.5A$	7.6		8.4	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$			160	mV
		$I_{OUT}=5mA\sim 200mA$			80	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=10.5\sim 25V$			160	mV
		$V_{IN}=10.5\sim 23V$ , $I_{OUT}=0.5A$			160	mV
Quiescent Current	$I_Q$	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=10.5\sim 23V$			1	mA
		$I_{OUT}=5mA\sim 0.5A$			0.5	mA
Output Noise Voltage	$e_N$	$10Hz\leq f\leq 100kHz$		58		$\mu V$
Temperature coefficient of $V_{OUT}$	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.9		$mV/^\circ C$
Ripple Rejection	RR	$V_{IN}=11.5\sim 21.5V$ , $f=120Hz$	56	72		dB
Peak Output Current	$I_{PEAK}$			1.2		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2		V

For 78D09L ( $V_{IN}=15V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$	8.64	9	9.36	V
		$V_{IN}=11.5\sim 24V$ , $I_{OUT}=5mA\sim 0.5A$	8.55		9.45	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$			180	mV
		$I_{OUT}=5mA\sim 200mA$			90	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=11.5\sim 25V$			180	mV
		$V_{IN}=11.5\sim 24V$ , $I_{OUT}=0.5A$			180	mV
Quiescent Current	$I_Q$	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=11.5\sim 24V$			1	mA
		$I_{OUT}=5mA\sim 0.5A$			0.5	mA
Output Noise Voltage	$e_N$	$10Hz\leq f\leq 100kHz$		58		$\mu V$
Temperature coefficient of $V_{OUT}$	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.1		$mV/^\circ C$
Ripple Rejection	RR	$V_{IN}=12.5\sim 22.5V$ , $f=120Hz$	56	72		dB
Peak Output Current	$I_{PEAK}$			1.2		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2		V

For 78D12L ( $V_{IN}=19V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$	11.52	12	12.48	V
		$V_{IN}=14.5\sim 27V$ , $I_{OUT}=5mA\sim 0.5A$	11.4		12.6	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$			240	mV
		$I_{OUT}=5mA\sim 200mA$			120	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=14.5\sim 30V$			240	mV
		$V_{IN}=14.6\sim 27V$ , $I_{OUT}=0.5A$			240	mV
Quiescent Current	$I_Q$	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=14.5\sim 30V$			1	mA
		$I_{OUT}=5mA\sim 0.5A$			0.5	mA
Output Noise Voltage	$e_N$	$10Hz\leq f\leq 100kHz$		75		$\mu V$
Temperature coefficient of $V_{OUT}$	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.5		$mV/^\circ C$
Ripple Rejection	RR	$V_{IN}=15\sim 25V$ , $f=120Hz$	55	72		dB
Peak Output Current	$I_{PEAK}$			1.2		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2		V

■ ELECTRICAL CHARACTERISTICS(Cont.)

For 78D15L ( $V_{IN}=23V$ ,  $I_{OUT}=0.5A$ ,  $C_1=0.33\mu F$ ,  $C_0=0.1\mu F$ .)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$	14.4	15	15.6	V
		$V_{IN}=17.5\sim 30V$ , $I_{OUT}=5mA\sim 0.5A$	14.25		15.75	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$			300	mV
		$I_{OUT}=5mA\sim 200mA$			150	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=18.5\sim 30V$			300	mV
		$V_{IN}=17.5\sim 30V$ , $I_{OUT}=0.5A$			300	mV
Quiescent Current	$I_Q$	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=17.5\sim 30V$			1	mA
		$I_{OUT}=5mA\sim 0.5A$			0.5	mA
Output Noise Voltage	$e_N$	$10Hz \leq f \leq 100kHz$		90		$\mu V$
Temperature coefficient of $V_{OUT}$	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.8		$mV/^\circ C$
Ripple Rejection	RR	$V_{IN}=18.5\sim 28.5V$ , $f=120Hz$	54	70		dB
Peak Output Current	$I_{PEAK}$			1.2		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2		V

For 78D18L ( $V_{IN}=27V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$	17.28	18	18.72	V
		$V_{IN}=21\sim 33V$ , $I_{OUT}=5mA\sim 0.5A$	17.1		18.9	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 0.5A$			360	mV
		$I_{OUT}=5mA\sim 200mA$			180	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=21\sim 33V$			360	mV
		$V_{IN}=21\sim 33V$ , $I_{OUT}=0.5A$			360	mV
Quiescent Current	$I_Q$	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=21.5\sim 33V$			1	mA
		$I_{OUT}=5mA\sim 0.5A$			0.5	mA
Output Noise Voltage	$e_N$	$10Hz \leq f \leq 100kHz$		110		$\mu V$
Temperature coefficient of $V_{OUT}$	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-2.2		$mV/^\circ C$
Ripple Rejection	RR	$V_{IN}=22\sim 32V$ , $f=120Hz$	53	69		dB
Peak Output Current	$I_{PEAK}$			1.2		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2		V

UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.