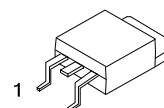


**78DXXA****LINEAR INTEGRATED CIRCUIT****3-TERMINALS 1A POSITIVE
VOLTAGE REGULATOR****■ DESCRIPTION**

The UTC **78DXXA** family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications that required supply current up to 1 A.

■ FEATURES

- * Peak output current up to 1A.
- * Fixed output voltage of 5V, 6V, 7V, 8V, 9V, 10V, 12V, 15V, 18V and 24V available.
- * Thermal overload shutdown protection.
- * Short circuit current limiting.
- * Output transistor SOA protection.



TO-252

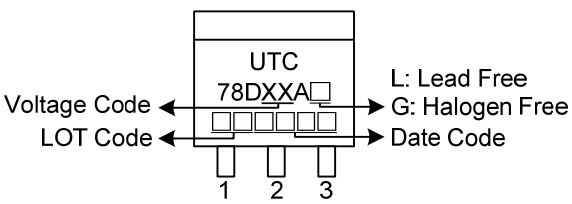
■ ORDERING INFORMATION

Ordering Number			Package	Pin Assignment			Packing
Normal	Lead Free	Halogen Free		1	2	3	
78DXXA-TN3-R	78DXXAL-TN3-R	78DXXAG-TN3-R	TO-252	I	G	O	Tape Reel

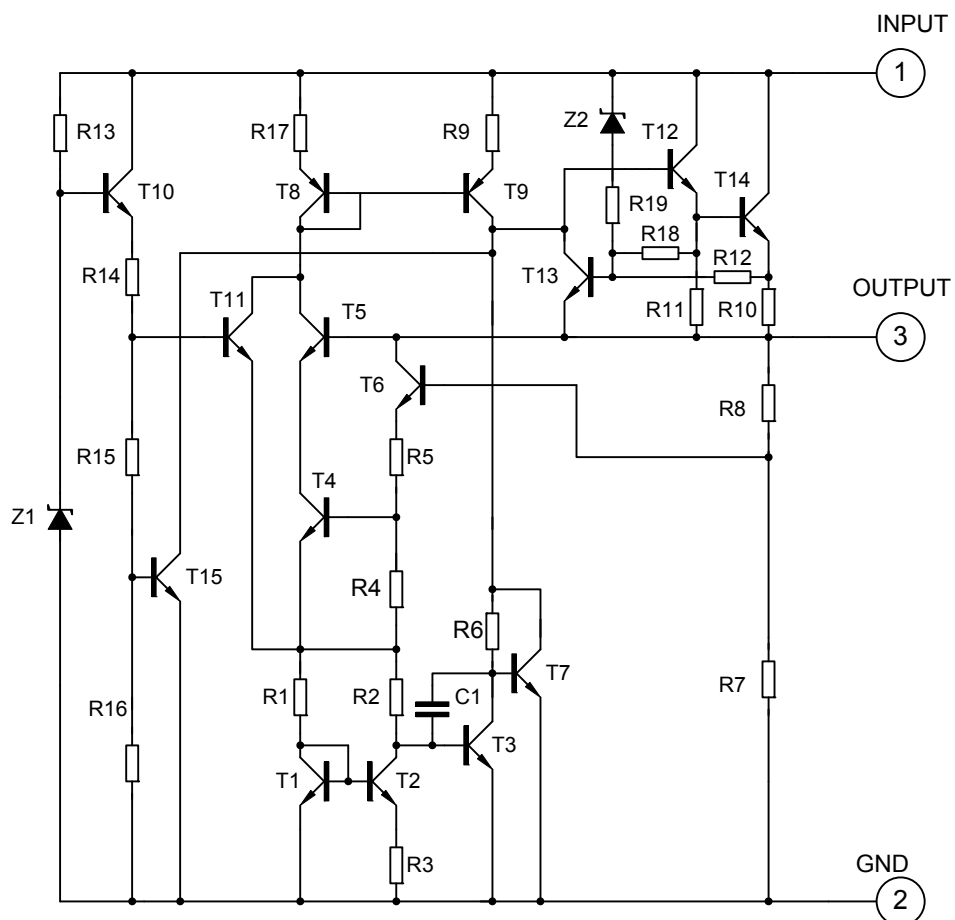
Note: Pin Code: I: Input G: GND O: Output

78DXXAL-TN3-R		(1)Packing Type	(1) R: Tape Reel
		(2)Package Type	(2) TN3: TO-252
		(3)Lead Free	(3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn
		(4)Output Voltage Code	(4) XX: refer to Marking Information

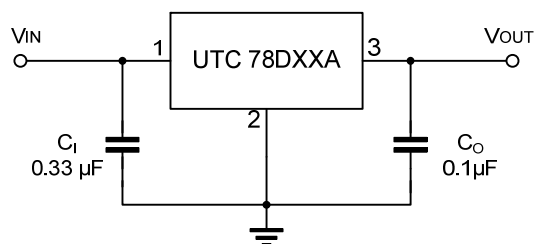
■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
TO-252	05: 5V 06: 6V 08: 8V 09: 9V 10: 10V 12: 12V 15: 15V 18: 18V 24: 24V	 UTC 78DXXA Voltage Code ← LOT Code ← 1 2 3 → L: Lead Free → G: Halogen Free → Date Code

■ BLOCK DIAGRAM



■ 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 (Ta = 25°C, unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Input Voltage	V_{IN}	35	V
		40	V
Output Current	I_{OUT}	1	A
Power Dissipation (T _C =25°C)	P _D	15	W
Junction Temperature	T _J	+150	°C
Operating Temperature	T _{OPR}	-40 ~ +85	°C
Storage Temperature	T _{STG}	-55 ~ +150	°C

Notes: 1. Absolute maximum ratings are stress ratings only and functional device operation is not implied. The device could be damaged beyond Absolute maximum ratings.

2. 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 are showed as electrical characteristics table represents pulse test conditions with junction temperatures specified at the initiation of test.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	61.54	°C/W
Junction to Case	θ_{JC}	7.48	°C/W

■ ELECTRICAL CHARACTERISTICS

(T_J=25°C, C_I=0.33μF, C_O=0.1μF, P_D≤15W, unless otherwise specified)

For 78D05A (V_{IN} =10V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I _{OUT} =5mA~1.0A	4.80	5.0	5.20	V
		V _{IN} =7.5~20V, I _{OUT} =5mA~1.0A	4.75		5.25	V
Load Regulation	ΔV_{OUT}	I _{OUT} =5mA~1.0A			50	mV
		I _{OUT} =0.25A~0.75A			25	mV
Line Regulation	ΔV_{OUT}	V _{IN} =7~25V			50	mV
		V _{IN} =7.5~20V, I _{OUT} =1.0A			50	mV
Quiescent Current	I _Q	I _{OUT} ≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V _{IN} =7.5~20V			1.0	mA
		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		40		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-0.6		mV/°C
Ripple Rejection	RR	V _{IN} =8~18V, f=120Hz	62	80		dB
Peak Output Current	I _{PEAK}			1.8		A
Short-Circuit Current	I _{SC}	V _{IN} =35V		250		mA
Dropout Voltage	V _D			2.0		V

■ ELECTRICAL CHARACTERISTICS(Cont.)

For 78D06A ($V_{IN}=11V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	5.76	6.0	6.24	V
		$V_{IN}=8.5\sim21V$, $I_{OUT}=5mA\sim1.0A$	5.7		6.3	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			60	mV
		$I_{OUT}=0.25A\sim0.75A$			30	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=8\sim25V$			60	mV
		$V_{IN}=8.5\sim21V$, $I_{OUT}=1.0A$			60	mV
Quiescent Current	I_Q	$I_{OUT}\leq1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=8.5\sim21V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		45		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.7		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=9\sim19V$, $f=120Hz$	59	75		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

For 78D07A ($V_{IN}=13V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	6.72	7.0	7.28	V
		$V_{IN}=9.5\sim22V$, $I_{OUT}=5mA\sim1.0A$	6.65		7.35	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			70	mV
		$I_{OUT}=0.25A\sim0.75A$			35	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=9\sim25V$			70	mV
		$V_{IN}=9.5\sim22V$, $I_{OUT}=1.0A$			70	mV
Quiescent Current	I_Q	$I_{OUT}\leq1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=9.5\sim22V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		50		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.8		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=10\sim20V$, $f=120Hz$	59	75		dB
Peak Output Current	I_{PEAK}			1.7		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

For 78D08A ($V_{IN}=14V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	7.68	8.0	8.32	V
		$V_{IN}=10.5\sim23V$, $I_{OUT}=5mA\sim1.0A$	7.6		8.4	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			80	mV
		$I_{OUT}=0.25A\sim0.75A$			40	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=10.5\sim25V$			80	mV
		$V_{IN}=10.5\sim23V$, $I_{OUT}=1.0A$			80	mV
Quiescent Current	I_Q	$I_{OUT}\leq1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=10.5\sim23V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.9		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=11.5\sim21.5V$, $f=120Hz$	56	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

■ ELECTRICAL CHARACTERISTICS(Cont.)

For 78D09A ($V_{IN}=15V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	8.64	9.0	9.36	V
		$V_{IN}=11.5\sim24V$, $I_{OUT}=5mA\sim1.0A$	8.55		9.45	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			90	mV
		$I_{OUT}=0.25A\sim0.75A$			45	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=11.5\sim25V$			90	mV
		$V_{IN}=11.5\sim24V$, $I_{OUT}=1.0A$			90	mV
Quiescent Current	I_Q	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=11.5\sim24V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.1		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=12.5\sim22.5V$, $f=120Hz$	56	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

For 78D10A ($V_{IN}=16V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	9.60	10.0	10.40	V
		$V_{IN}=12.5\sim25V$, $I_{OUT}=5mA\sim1.0A$	9.5		10.5	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			100	mV
		$I_{OUT}=0.25A\sim0.75A$			50	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=13\sim25V$			100	mV
		$V_{IN}=13\sim25V$, $I_{OUT}=1.0A$			100	mV
Quiescent Current	I_Q	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=12.6V\sim25V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.1		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=13\sim23V$, $f=120Hz$	56	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

For 78D12A ($V_{IN}=19V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	11.52	12.0	12.48	V
		$V_{IN}=14.5\sim27V$, $I_{OUT}=5mA\sim1.0A$	11.4		12.6	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			120	mV
		$I_{OUT}=0.25A\sim0.75A$			60	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=14.5\sim30V$			120	mV
		$V_{IN}=14.6\sim27V$, $I_{OUT}=1.0A$			120	mV
Quiescent Current	I_Q	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=14.5\sim30V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		75		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.5		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=15\sim25V$, $f=120Hz$	55	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

■ ELECTRICAL CHARACTERISTICS(Cont.)

For 78D15A ($V_{IN}=23V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	14.40	15.0	15.6	V
		$V_{IN}=17.5\sim30V$, $I_{OUT}=5mA\sim1.0A$	14.25		15.75	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			150	mV
		$I_{OUT}=0.25A\sim0.75A$			75	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=18.5\sim30V$			150	mV
		$V_{IN}=17.7\sim30V$, $I_{OUT}=1.0A$			150	mV
Quiescent Current	I_Q	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=17.5\sim30V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		90		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.8		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=18.5\sim28.5V$, $f=120Hz$	54	70		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

For 78D18A ($V_{IN}=27V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	17.28	18.0	18.72	V
		$V_{IN}=21\sim33V$, $I_{OUT}=5mA\sim1.0A$	17.1		18.9	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			180	mV
		$I_{OUT}=0.25A\sim0.75A$			90	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=21\sim33V$			180	mV
		$V_{IN}=21\sim33V$, $I_{OUT}=1.0A$			180	mV
Quiescent Current	I_Q	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=21.5\sim33V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		110		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-2.2		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=22\sim32V$, $f=120Hz$	53	69		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

For 78D24A ($V_{IN}=33V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim1.0A$	23.04	24.0	24.96	V
		$V_{IN}=27\sim38V$, $I_{OUT}=5mA\sim1.0A$	22.8		25.2	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim1.0A$			240	mV
		$I_{OUT}=0.25A\sim0.75A$			120	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=27\sim38V$			240	mV
		$V_{IN}=27\sim38V$, $I_{OUT}=1.0A$			240	mV
Quiescent Current	I_Q	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=28\sim38V$			1.0	mA
		$I_{OUT}=5mA\sim1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		170		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-2.8		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=28\sim38V$, $f=120Hz$	50	66		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

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