

UNISONIC TECHNOLOGIES CO., LTD

78DXXA

LINEAR INTEGRATED CIRCUIT

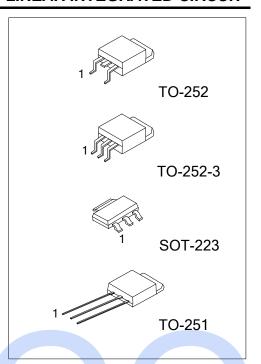
3-TERMINALS 1A POSITIVE **VOLTAGE REGULATOR**

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

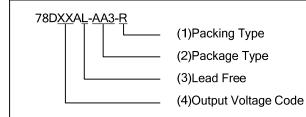
- * Peak output current up to 1A.
- * Fixed output voltage of 5V, 6V, 7V, 8V, 9V, 10V, 12V, 15V and 18V available.
- * Thermal overload shutdown protection.
- * Short circuit current limiting.
- * Output transistor SOA protection.



ORDERING INFORMATION

Ordering Number		Number	Dookaga	Pin /	Assignr	Dooking	
	Lead Free	Halogen Free	Package	1	2	3	Packing
	78DXXAL-AA3-R	78DXXAG-AA3-R	SOT-223	_	G	0	Tape Reel
	78DXXAL-TM3-T	78DXXAG-TM3-T	TO-251		G	0	Tube
	78DXXAL-TN3-R	78DXXAG-TN3-R	TO-252		G	0	Tape Reel
	78DXXAL-TN3-T	78DXXAG-TN3-T	TO-252	-	G	0	Tube
	78DXXAL-TNA-R	78DXXAG-TNA-R	TO-252-3	ı	G	0	Tape Reel
	78DXXAL-TNA-T	78DXXAG-TNA-T	TO-252-3	I	G	0	Tube

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



- (1) R: Tape Reel, T: Tube
- (2) AA3: SOT-223, TM3: TO-251, TN3: TO-252,

TNA: TO-252-3

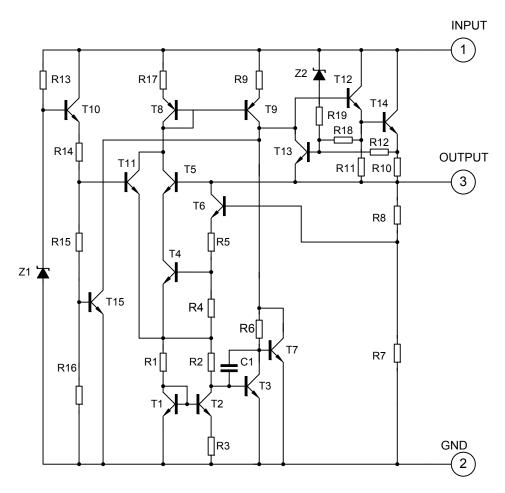
- (3) L: Lead Free, G: Halogen Free
- (4) XX: refer to Marking Information

www.unisonic.com.tw 1 of 9 QW-R101-010,P

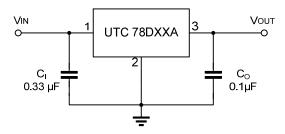
■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-223	05: 5V 06: 6V 08: 8V 09: 9V 10: 10V 12: 12V 15: 15V 18: 18V	Voltage Code 78DXXA L: Lead Free G: Halogen Free Date Code 1 2 3
TO-251 TO-252 TO-252-3		UTC 78DXXA ☐ C: Lead Free G: Halogen Free LOT 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 (T_A = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V_{IN}	35	٧
Output Current		l _{out}	1	Α
	SOT-223		8.3	
Power Dissipation (T _C =25°C)	TO-251/TO-252 TO-252-3	P _D	10	W
Junction Temperature		TJ	+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
	SOT-223		150	
Junction to Ambient	TO-251/TO-252	θ_{JA}	112	°C/W
	TO-252-3		112	
	SOT-223		15	
Junction to Case	TO-251/TO-252 TO-252-3	θ_{JC}	12.5	°C/W

■ ELECTRICAL CHARACTERISTICS

 $(T_J=25^{\circ}C, C_I=0.33uF, C_O=0.1uF, P_D\leq15W, unless otherwise specified)$

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

101 1000A (VIN - 10V, 1001 -0.0/1)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Valtage		I _{OUT} =5mA~1.0A	4.80	5.0	5.20	V
Output Voltage	V_{OUT}	V _{IN} =7.5~20V, I _{OUT} =5mA~1.0A	4.75		5.25	V
Level Base Infrar	417	I _{OUT} =5mA~1.0A			50	mV
Load Regulation	ΔV_{OUT}	I _{OUT} =0.25A~0.75A			25	mV
Line Regulation	41/	V _{IN} =7~25V			50	mV
	ΔV_{OUT}	V _{IN} =7.5~20V, I _{OUT} =1.0A			50	mV
Quiescent Current	ΙQ	I _{OUT} ≤1.0A			8.0	mA
Outcome Commont Change	ΔI_Q	V _{IN} =7.5~20V			1.0	mA
Quiescent Current Change		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		Α
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	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	I _{OUT} =5mA~1.0A	5.76	6.0	6.24	V
Output Voltage	V _{OUT}	V _{IN} =8.5~21V, I _{OUT} =5mA~1.0A	5.7		6.3	V
Load Degulation	41/	I _{OUT} =5mA~1.0A			60	mV
Load Regulation	ΔV_{OUT}	I _{OUT} =0.25A~0.75A			30	mV
Line Regulation	41/	V _{IN} =8~25V			60	mV
	ΔV_{OUT}	V _{IN} =8.5~21V, I _{OUT} =1.0A			60	mV
Quiescent Current	ΙQ	I _{OUT} ≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V _{IN} =8.5~21V			1.0	mA
Quiescent Current Change		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		45		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-0.7		mV/°C
Ripple Rejection	RR	V _{IN} =9~19V,f=120Hz	59	75		dB
Peak Output Current	I _{PEAK}			1.8		Α
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		I _{OUT} =5mA~1.0A	6.72	7.0	7.28	V
	V_{OUT}	V _{IN} =9.5~22V, I _{OUT} =5mA~1.0A	6.65		7.35	V
Land Bara deffers	/	I _{OUT} =5mA~1.0A			70	mV
Load Regulation	ΔV_{OUT}	I _{OUT} =0.25A~0.75A			35	mV
Line Regulation		V _{IN} =9~25V			70	mV
	ΔV_{OUT}	V _{IN} =9.5~22V, I _{OUT} =1.0A			70	mV
Quiescent Current	IQ	I _{OUT} ≤1.0A			8.0	mA
Outlandant Comment Change	ΔlQ	V _{IN} =9.5~22V			1.0	mA
Quiescent Current Change		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		50		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-0.8		mV/°C
Ripple Rejection	RR	V _{IN} =10~20V,f=120Hz	59	75		dB
Peak Output Current	I _{PEAK}			1.7		Α
Short-Circuit Current	Isc	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 Valtage	.,	I _{OUT} =5mA~1.0A	7.68	8.0	8.32	V
Output Voltage	V _{OUT}	V _{IN} =10.5~23V, I _{OUT} =5mA~1.0A	7.6		8.4	V
Load Degulation	437	I _{OUT} =5mA~1.0A			80	mV
Load Regulation	ΔV_{OUT}	I _{OUT} =0.25A~0.75A			40	mV
Line Regulation	437	V _{IN} =10.5~25V			80	mV
	ΔV_{OUT}	V _{IN} =10.5~23V, I _{OUT} =1.0A			80	mV
Quiescent Current	IQ	I _{OUT} ≤1.0A			8.0	mA
Outposent Current Change	Δl_Q	V _{IN} =10.5~23V			1.0	mA
Quiescent Current Change		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		58		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-0.9		mV/°C
Ripple Rejection	RR	V _{IN} =11.5~21.5V,f=120Hz	56	72		dB
Peak Output Current	I _{PEAK}			1.8		Α
Short-Circuit Current	I _{SC}	V _{IN} =35V		250		mA
Dropout Voltage	V_D			2.0		V

■ ELECTRICAL CHARACTERISTICS(Cont.)

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

101 102001 (1111 101, 1001 0:01)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		I _{OUT} =5mA~1.0A	8.64	9.0	9.36	V
	V _{OUT}	V _{IN} =11.5~24V, I _{OUT} =5mA~1.0A	8.55		9.45	V
Load Degulation	41/	I _{OUT} =5mA~1.0A			90	mV
Load Regulation	ΔV_{OUT}	I _{OUT} =0.25A~0.75A			45	mV
Line Regulation	41/	V _{IN} =11.5~25V			90	mV
	ΔV_{OUT}	V _{IN} =11.5~24V, I _{OUT} =1.0A			90	mV
Quiescent Current	IQ	I _{OUT} ≤1.0A			8.0	mA
Ovices and Comment Change	Δl_Q	V _{IN} =11.5~24V			1.0	mA
Quiescent Current Change		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		58		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-1.1		mV/°C
Ripple Rejection	RR	V _{IN} =12.5~22.5V,f=120Hz	56	72		dB
Peak Output Current	I _{PEAK}			1.8		Α
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
		I _{OUT} =5mA~1.0A	9.60	10.0	10.40	V
Output Voltage	V _{OUT}	V _{IN} =12.5~25V, I _{OUT} =5mA~1.0A	9.5		10.5	V
Level Base Jeffer		I _{OUT} =5mA~1.0A			100	mV
Load Regulation	ΔV_{OUT}	I _{OUT} =0.25A~0.75A			50	mV
Line Deculation	4)/	V _{IN} =13~25V			100	mV
Line Regulation	ΔV_{OUT}	V _{IN} =13~25V, I _{OUT} =1.0A			100	mV
Quiescent Current	IQ	I _{OUT} ≤1.0A			8.0	mΑ
Quiaccant Current Change	ΔI_Q	V _{IN} =12.6V~25V			1.0	mΑ
Quiescent Current Change		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		58		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-1.1		mV/°C
Ripple Rejection	RR	V _{IN} =13~23V,f=120Hz	56	72		dB
Peak Output Current	I _{PEAK}			1.8		Α
Short-Circuit Current	I _{SC}	V _{IN} =35V		250		mA
Dropout Voltage	V_D			2.0		V

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

1 01 1 02 1 2 1 (V N 1 0 V , 100 0 1 0 1 V)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage		I _{OUT} =5mA~1.0A	11.52	12.0	12.48	V
	V_{OUT}	V _{IN} =14.5~27V, I _{OUT} =5mA~1.0A	11.4		12.6	V
	41/	I _{OUT} =5mA~1.0A			120	mV
Load Regulation	ΔV_OUT	I _{OUT} =0.25A~0.75A			60	mV
Line Regulation	417	V _{IN} =14.5~30V			120	mV
	ΔV_{OUT}	V _{IN} =14.6~27V, I _{OUT} =1.0A			120	mV
Quiescent Current	ΙQ	I _{OUT} ≤1.0A			8.0	mA
Quiaccant Current Change	Δl_Q	V _{IN} =14.5~30V			1.0	mA
Quiescent Current Change		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		75		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-1.5		mV/°C
Ripple Rejection	RR	V _{IN} =15~25V,f=120Hz	55	72		dB
Peak Output Current	I _{PEAK}			1.8		Α
Short-Circuit Current	I _{SC}	V _{IN} =35V		250		mA
Dropout Voltage	V_D			2.0		V

■ ELECTRICAL CHARACTERISTICS(Cont.)

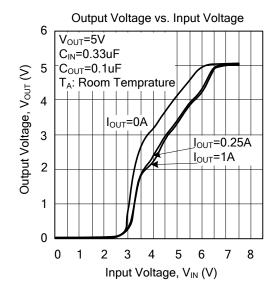
For 78D15A $(V_{IN} = 23V, I_{OUT} = 0.5A)$

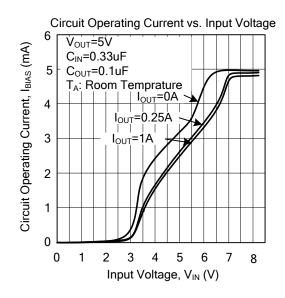
101 70D 1071 (VIII 20V, 1001 0.071)						
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V _{OUT}	I _{OUT} =5mA~1.0A	14.40	15.0	15.6	V
		V _{IN} =17.5~30V, I _{OUT} =5mA~1.0A	14.25		15.75	V
Load Regulation	ΔV_OUT	I _{OUT} =5mA~1.0A			150	mV
		I _{OUT} =0.25A~0.75A			75	mV
Line Regulation	ΔV_OUT	V _{IN} =18.5~30V			150	mV
		V _{IN} =17.7~30V, I _{OUT} =1.0A			150	mV
Quiescent Current	IQ	I _{OUT} ≤1.0A			8.0	mΑ
Quiescent Current Change	Δl_Q	V _{IN} =17.5~30V			1.0	mΑ
		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		90		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-1.8		mV/°C
Ripple Rejection	RR	V _{IN} =18.5~28.5V,f=120Hz	54	70		dB
Peak Output Current	I _{PEAK}			1.8		Α
Short-Circuit Current	I _{SC}	V _{IN} =35V		250		mA
Dropout Voltage	V_D			2.0		V

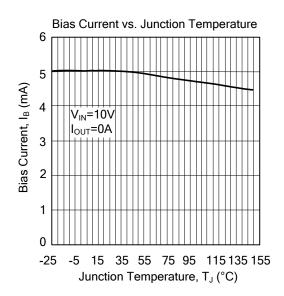
For 78D18A $(V_{IN} = 27V, I_{OUT} = 0.5A)$

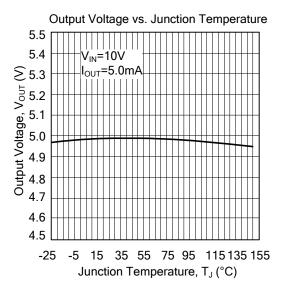
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V _{OUT}	I _{OUT} =5mA~1.0A	17.28	18.0	18.72	V
		V _{IN} =21~33V, I _{OUT} =5mA~1.0A	17.1		18.9	V
Load Regulation	ΔV_{OUT}	I _{OUT} =5mA~1.0A			180	mV
		I _{OUT} =0.25A~0.75A			90	mV
Line Regulation	ΔV_{OUT}	V _{IN} =21~33V			180	mV
		V _{IN} =21~33V, I _{OUT} =1.0A			180	mV
Quiescent Current	IQ	I _{OUT} ≤1.0A			8.0	mA
Quiescent Current Change	ΔlQ	V _{IN} =21.5~33V			1.0	mA
		I _{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		110		μV
Temperature coefficient of V _{OUT}	$\Delta V_{OUT}/\Delta T$	I _{OUT} =5mA		-2.2		mV/°C
Ripple Rejection	RR	V _{IN} =22~32V,f=120Hz	53	69		dB
Peak Output Current	I _{PEAK}			1.8		Α
Short-Circuit Current	I _{SC}	V _{IN} =35V		250		mA
Dropout Voltage	V_D			2.0		V

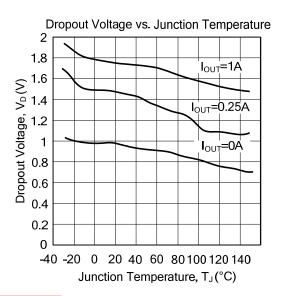
■ TYPICAL CHARACTERISTICS

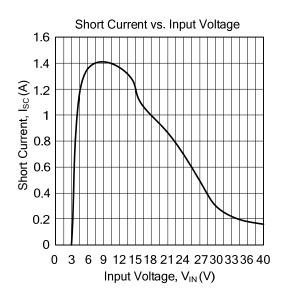




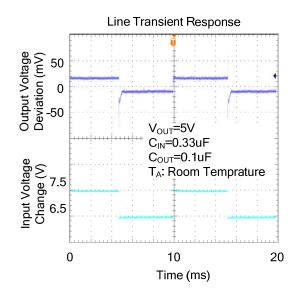


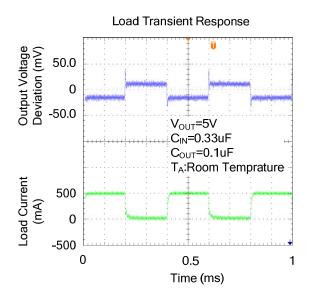






■ TYPICAL CHARACTERISTICS(Cont.)





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