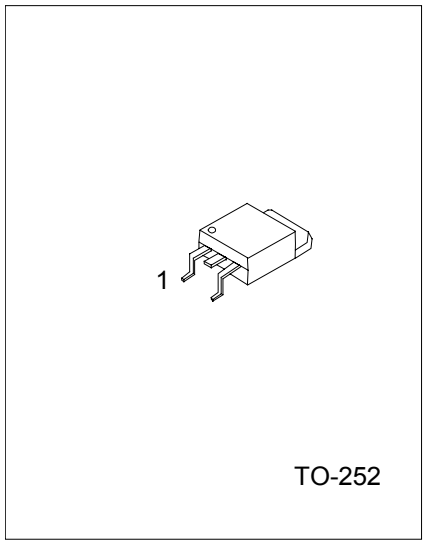
UTC 78DXXA LINEAR INTEGRATED CIRCUIT

3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR



1:Input 2:GND 3:Output

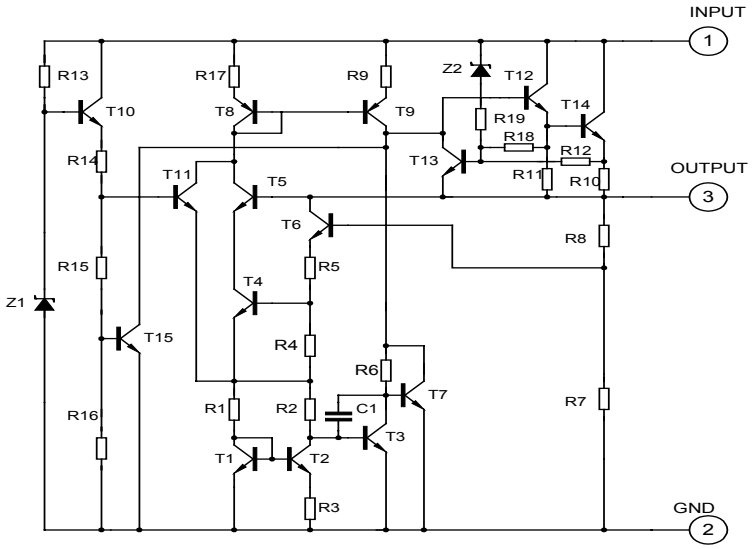
DESCRIPTION

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 1.5 A
*Fixed output voltage of 3.3V,4.7V,5V, 6V, 8V, 9V, 10V, 12V, 15V, 18V and 24V available
*Thermal overload shutdown protection
*Short circuit current limiting
*Output transistor SOA protection

TEST CIRCUIT



ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

PARAMETER	SYMBOL	RATING		UNIT
Input voltage(for Vo=5~18V) (for Vo=24V)	V_I		35 40	V V
Output Current	I o		1	A
Power Dissipation	PD	Internally	Limited	W
Operating Junction Temperature Range	T_{OPR}	-20	+150	°C
Storage Temperature Range	T_{STG}	-55	+150	°C

UTC 78D33A ELECTRICAL CHARACTERISTICS

(VI=5.8V, Io=0.5A, Tj= 0°C - 12°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, I_O=5mA - 1.0A	3.168	3.30	3.432	V
		V_I =5.8V to 18.3V,I_O=5mA - 1.0A	3.135		3.465	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 1.5A			33	mV
		Tj=25°C,I_O=0.25A - 0.75A			17	mV
Line regulation	ΔVo	V_I =5.8V to 18.3V,Tj=25°C			33	mV
		V_I =5.8V to 18.3V,Tj=25°C,Io=1A			33	mV
Quiescent Current	Iq	Tj=25°C, I_O=<1A			8.0	mA
Quiescent Current Change	ΔIq	V_I =5.8V to 18.3V			1.0	mA
		I_O=5mA - 1.0A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		55		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.4		mV/°C
Ripple Rejection	RR	V_I=6.3V–16.3V,f=120Hz,Tj=25°C		57		dB
Peak Output Current	I_{PK}	Tj=25°C		1.8		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D47A ELECTRICAL CHARACTERISTICS

(VI=9.7V, Io=0.5A, Tj= 0°C - 12°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, I_O=5mA - 1.0A	4.512	4.70	4.888	V
		V_I =7.2V to 19.7V,I_O=5mA - 1.0A	4.465		4.935	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 1.5A			47	mV
		Tj=25°C,I_O=0.25A - 0.75A			24	mV
Line regulation	ΔVo	V_I =7.2V to 19.7V,Tj=25°C			47	mV
		V_I =7.2V to 19.7V,Tj=25°C,Io=1A			47	mV
Quiescent Current	Iq	Tj=25°C, I_O=<1A			8.0	mA
Quiescent Current Change	ΔIq	V_I =7.2V to 19.7V			1.0	mA
		I_O=5mA - 1.0A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		40		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.6		mV/°C
Ripple Rejection	RR	V_I =7.7V -17.7V, f=120Hz, Tj=25°C	62	80		dB
Peak Output Current	I_{PK}	Tj=25°C		1.8		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D05A ELECTRICAL CHARACTERISTICS

(VI=10V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	4.80	5.0	5.20	V
		VI =7.5V to 20V, IO=5mA - 1.0A,PD<15W	4.75		5.25	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			50	mV
		Tj=25°C,IO=0.25A - 0.75A			25	mV
Line regulation	ΔVo	VI =7V to 25V,Tj=25°C			50	mV
		VI =7.5V to 20V,Tj=25°C,Io=1A			50	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =7.5V to 20V			1.0	mA
	ΔIq	IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		40		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.6		mV/°C
Ripple Rejection	RR	VI =8V - 18V,f=120Hz,Tj=25°C	62	80		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D06A ELECTRICAL CHARACTERISTICS

(VI=11V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	5.76	6.0	6.24	V
		VI =8.5V to 21V, IO=5mA - 1.0A, PD<15W	5.70		6.30	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			60	mV
		Tj=25°C,IO=0.25A - 0.75A			30	mV
Line regulation	ΔVo	VI =8V to 25V,Tj=25°C			60	mV
		VI =8.5V to 21V,Tj=25°C,Io=1A			60	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =8.5V to 21V			1.0	mA
	ΔIq	IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		45		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.7		mV/°C
Ripple Rejection	RR	VI =9V - 19V,f=120Hz,Tj=25°C	59	75		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D08A ELECTRICAL CHARACTERISTICS

(VI=14V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	7.68	8.0	8.32	V
		VI =10.5V to 23V, IO=5mA - 1.0A, PD<15W	7.60		8.40	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			80	mV
		Tj=25°C,IO=0.25A - 0.75A			40	mV
Line regulation	ΔVo	VI =10.5V to 25V,Tj=25°C			80	mV
		VI =10.5V to 23V,Tj=25°C,Io=1A			80	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =10.5V to 23V			1.0	mA
	ΔIq	IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		58		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.9		mV/°C
Ripple Rejection	RR	VI =11.5V to 21.5V, f=120Hz,Tj=25°C	56	72		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D09A ELECTRICAL CHARACTERISTICS

(VI=15V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	8.64	9.0	9.36	V
		VI =11.5V to 24V, IO=5mA - 1.0A,PD<15W	8.55		9.45	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			90	mV
		Tj=25°C,IO=0.25A - 0.75A			45	mV
Line regulation	ΔVo	VI =11.5V to 25 V, Tj=25°C, PD<15W			90	mV
		VI =11.5V to 24V,Tj=25°C, Io<=1A			90	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =11.5V to 24V			1.0	mA
	ΔIq	IO=5mA – 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		58		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.1		mV/°C
Ripple Rejection	RR	VI =12.5V to 22.5V, f=120Hz,Tj=25°C	56	72		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D10A ELECTRICAL CHARACTERISTICS

(VI=16V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	9.60	10.0	10.40	V
		VI =12.5V to 25V, IO=5mA - 1.0A,PD<=15W	9.50		10.50	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			100	mV
		Tj=25°C,IO=0.25A - 0.75A			50	mV
Line regulation	ΔVo	VI =13V to 25V,Tj=25°C			100	mV
		VI =13V to 25V, Tj=25°C,Io<=1A			100	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =12.6V to 25V			1.0	mA
	ΔIq	IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		58		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.1		mV/°C
Ripple Rejection	RR	VI =13V - 23V,f=120Hz,Tj=25°C	56	72		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D12A ELECTRICAL CHARACTERISTICS

(VI=19V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	11.52	12.0	12.48	V
		VI =14.5V to 27V, IO=5mA - 1.0A,PD<15W	11.40		12.60	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			120	mV
		Tj=25°C,IO=0.25A - 0.75A			60	mV
Line regulation	ΔVo	VI =14.5V to 30V,Tj=25°C			120	mV
		VI =14.6V to 27V,Tj=25°C, Io=1A			120	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =14.5V to 30V			1.0	mA
	ΔIq	IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		75		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.5		mV/°C
Ripple Rejection	RR	VI =15V - 25V,f=120Hz,Tj=25°C	55	72		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D15A ELECTRICAL CHARACTERISTICS

(VI=23V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	14.40	15.0	15.60	V
		VI =17.5V to 30V, IO=5mA - 1.0A,PD<15W	14.25		15.75	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			150	mV
		Tj=25°C,IO=0.25A - 0.75A			75	mV
Line regulation	ΔVo	VI =18.5V to 30V,Tj=25°C			150	mV
		VI =17.7V to 30V, Tj=25°C, IO =1A			150	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =17.5V to 30V			1.0	mA
	ΔIq	IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		90		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.8		mV/°C
Ripple Rejection	RR	VI =18.5V to 28.5V f=120Hz,Tj=25°C	54	70		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D18A ELECTRICAL CHARACTERISTICS

(VI=27V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	17.28	18.0	18.72	V
		VI =21V to 33V,IO=5mA - 1.0A	17.10		18.90	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			180	mV
		Tj=25°C,IO=0.25A - 0.75A			90	mV
Line regulation	ΔVo	VI =21V to 33V,Tj=25°C			180	mV
		VI =21V to 33V, Tj=25°C, IO =<1A,PD<15W			180	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =21.5V to 33V			1.0	mA
	ΔIq	IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		110		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-2.2		mV/°C
Ripple Rejection	RR	VI =22V - 32V,f=120Hz,Tj=25°C	53	69		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC 78D24A ELECTRICAL CHARACTERISTICS

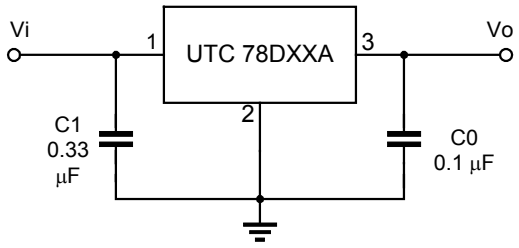
(VI=33V, Io=0.5A, Tj= 0°C - 12°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, IO=5mA - 1.0A	23.04	24.0	24.96	V
		VI =27V to 38V,IO=5mA - 1.0A	22.80		25.20	V
Load Regulation	ΔVo	Tj=25°C,IO=5mA - 1.5A			240	mV
		Tj=25°C,IO=0.25A - 0.75A			120	mV
Line regulation	ΔVo	VI =27V to 38V,Tj=25°C			240	mV
		VI =27V to 38V,Tj=25°C,Io=1A			240	mV
Quiescent Current	Iq	Tj=25°C, IO=<1A			8.0	mA
Quiescent Current Change	ΔIq	VI =28V to 38V			1.0	mA
		IO=5mA - 1.0A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		170		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-2.8		mV/°C
Ripple Rejection	RR	VI =28V - 38V,f=120Hz,Tj=25°C	50	66		dB
Peak Output Current	IPK	Tj=25°C		1.8		A
Short-Circuit Current	ISC	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

Note 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.

Note 2: Power dissipation<0.5W

APPLICATION CIRCUIT



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

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