UTC 78DXX LINEAR INTEGRATED CIRCUIT

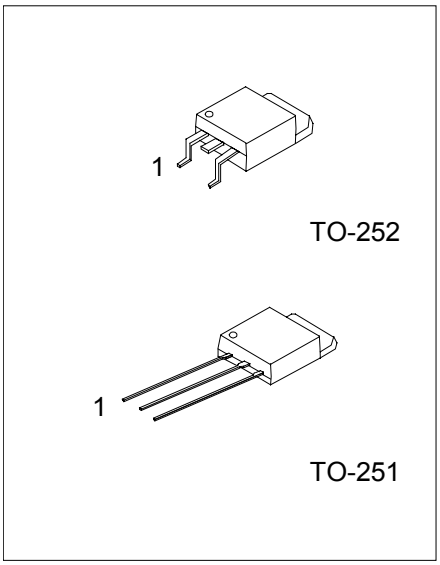
3-TERMINAL 0.5A POSITIVE VOLTAGE REGULATOR

DESCRIPTION

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

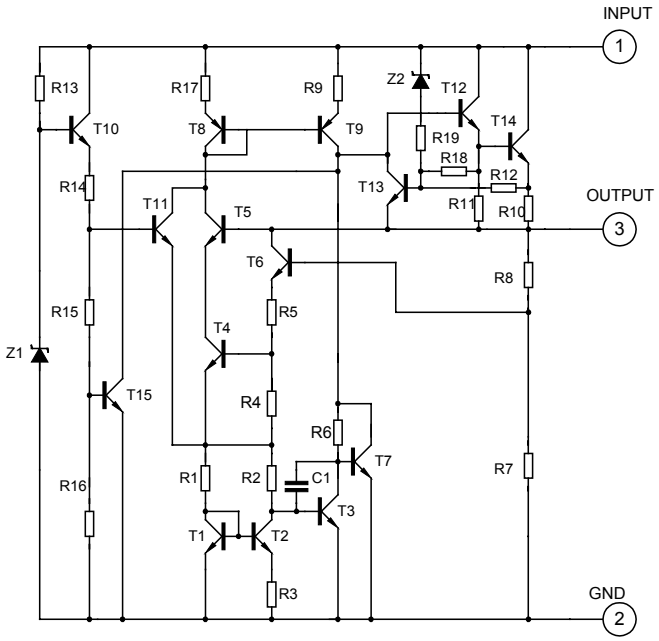
FEATURE

*Output current up to 0.5 A
*Fixed output voltage of 3.3V,4.7V,5V, 6V, 8V, 9V, 12V, 15V ,18V and 24V available
*Thermal overload shutdown protection
*Short circuit current limiting
*Output transistor SOA protection



1: Input 2: GND 3: Output

EQUIVALENT CIRCUIT



ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Input voltage(for Vo=5~18V) (for Vo=20~24V)	V_I	35 40	V V
Output Current	I o	0.5	A
Power Dissipation	PD	Internally Limited	W
Operating Junction Temperature Range	T_J	+150	°C
Storage Temperature Range	T_{STG}	-65 to+150	°C

UTC 78D33 ELECTRICAL CHARACTERISTICS

(VI=8.5V, 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 –0.5A	3.168	3.30	3.432	V
		V_I =5.8V to 18.3V I_O=5mA– 0.5A PD<7W	3.135		3.465	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA – 0.5A			33	mV
		Tj=25°C,I_O=5mA – 200mA			17	mV
Line regulation	ΔVo	V_I =5.8V to 18.3V,Tj=25°C			33	mV
		V_I=5.8V to18.3V,Tj=25°C,Io=0.5A			33	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =5.8V to 18.3V			1.0	mA
		I_O=5mA – 0.5A			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 78D47 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 – 0.5A	4.512	4.70	4.888	V
		V_I =7.2V to 19.7V I_O=5mA– 0.5A, PD<7W	4.465		4.935	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			47	mV
		Tj=25°C,I_O=5mA –200mA			24	mV
Line regulation	ΔVo	V_I =7.2V to 19.7V,Tj=25°C			47	mV
		V_I=7.2V to19.7V,Tj=25°C,Io=0.5A			47	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =7.2V to 19.7V			1.0	mA
		I_O=5mA – 0.5A			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

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D05 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, I_O=5mA - 0.5A	4.80	5.0	5.20	V
		V_I =7.5V to 20V, I_O=5mA – 0.5A,PD<7W	4.75		5.25	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			50	mV
		Tj=25°C,I_O=5mA - 200 mA			25	mV
Line regulation	ΔVo	V_I =7V to 25V,Tj=25°C			50	mV
		V_I =7.5V to 20V,Tj=25°C,Io=0.5A			50	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =7.5V to 20V			1.0	mA
		I_O=5mA - 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		40		uV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.6		mV/°C
Ripple Rejection	RR	V_I =8V -18V,f=120Hz,Tj=25°C	62	80		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D06 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, I_O=5mA - 0.5A	5.76	6.0	6.24	V
		V_I =8.5V to 21V, I_O=5mA – 0.5A, PD<7W	5.70		6.30	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			60	mV
		Tj=25°C,I_O=5mA - 200mA			30	mV
Line regulation	ΔVo	V_I =8V to 25V,Tj=25°C			60	mV
		V_I =8.5V to 21V,Tj=25°C,Io=0.5A			60	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =8.5V to 21V			1.0	mA
		I_O=5mA – 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		45		uV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.7		mV/°C
Ripple Rejection	RR	V_I =9V - 19V,f=120Hz,Tj=25°C	59	75		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D08 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
		Tj=25°C, I_O=5mA - 0.5A	7.68	8.0	8.32	V

Output Voltage	Vo	V_I =10.5V to 23V, I_O=5mA – 0.5A, PD<7W	7.60		8.40	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			80	mV
		Tj=25°C,I_O=5mA - 200mA			40	mV
Line regulation	ΔVo	V_I =10.5V to 25V,Tj=25°C			80	mV
		V_I =10.5V to 3V,Tj=25°C,Io=0.5A			80	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =10.5V to 23V			1.0	mA
		I_O=5mA - 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		58		uV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.9		mV/°C
Ripple Rejection	RR	V_I =11.5V to 21.5V, f=120Hz,Tj=25°C	56	72		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D09 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, I_O=5mA - 0.5A	8.64	9.0	9.36	V
		V_I =11.5V to 24V, I_O=5mA - 0.5A,PD<7W	8.55		9.45	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			90	mV
		Tj=25°C,I_O=5mA - 200mA			45	mV
Line regulation	ΔVo	V_I =11.5V to 25 V,Tj=25°C			90	mV
		V_I =11.5V to 24V,Tj=25°C, Io=0.5A			90	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =11.5V to 24V			1.0	mA
		I_O=5mA – 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		58		uV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.1		mV/°C
Ripple Rejection	RR	V_I =12.5V to 22.5V, f=120Hz,Tj=25°C	56	72		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D12 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, I_O=5mA - 0.5A	11.52	12.0	12.48	V
		V_I =14.5V to 27V, I_O=5mA – 0.5A,PD<7W	11.40		12.60	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			120	mV
		Tj=25°C,I_O=5mA - 200mA			60	mV

Line regulation	ΔVo	V_I =14.5V to 30V,Tj=25°C			120	mV
		V_I =14.6V to 27V,Tj=25°C, I_O=0.5A			120	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =14.5V to 30V			1.0	mA
		I_O=5mA – 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		75		uV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.5		mV/°C
Ripple Rejection	RR	V_I =15V - 25V,f=120Hz,Tj=25°C	55	72		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D15 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, I_O=5mA - 0.5A	14.40	15.0	15.60	V
		V_I =17.5V to 30V, I_O=5mA - 0.5A,PD<7W	14.25		15.75	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			150	mV
		Tj=25°C,I_O=5mA - 200mA			75	mV
Line regulation	ΔVo	V_I =18.5V to 30V,Tj=25°C			150	mV
		V_I =17.5V to 30V, Tj=25°C, I_O =0.5A			150	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =17.5V to 30V			1.0	mA
		I_O=5mA – 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		90		uV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-1.8		mV/°C
Ripple Rejection	RR	V_I =18.5V to 28.5V f=120Hz,Tj=25°C	54	70		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D18 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, I_O=5mA - 0.5A	17.28	18.0	18.72	V
		V_I =21V to 33V, I_O=5mA - 0.5A,PD<7W	17.10		18.90	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			180	mV
		Tj=25°C,I_O=5mA - 200mA			90	mV
Line regulation	ΔVo	V_I =21V to 33V,Tj=25°C			180	mV
		V_I =21V to 33V, Tj=25°C, I_O =0.5A			180	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =21.5V to 33V			1.0	mA

		I_O=5mA - 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		110		uV
Temperature coefficient of Vo	$\Delta Vo/\Delta T$	Io=5mA		-2.2		mV/°C
Ripple Rejection	RR	V_I =22V - 32V,f=120Hz,Tj=25°C	53	69		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	VI=35V, Tj=25°C		250		mA
Dropout Voltage	Vd	Tj=25°C		2.0		V

UTC78D24 ELECTRICAL CHARACTERISTICS

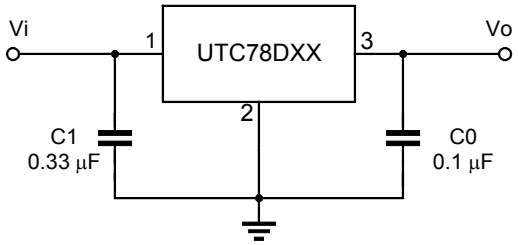
(VI=33V, Io=0.5A, Tj= 0°C - 125°C, C1=0.33uF, Co=0.1uF, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	Vo	Tj=25°C, I_O=5mA - 0.5A	23.04	24.0	24.96	V
		V_I =27V to 38V, I_O=5mA - 0.5A, PD<7W	22.80		25.20	V
Load Regulation	ΔVo	Tj=25°C,I_O=5mA - 0.5A			240	mV
		Tj=25°C,I_O=5mA - 200mA			120	mV
Line regulation	ΔVo	V_I =27V to 38V,Tj=25°C			240	mV
		V_I =27V to 38V,Tj=25°C,Io=0.5A			240	mV
Quiescent Current	Iq	Tj=25°C, I_O=0.5A			8.0	mA
Quiescent Current Change	ΔIq	V_I =28V to 38V			1.0	mA
	ΔIq	I_O=5mA - 0.5A			0.5	mA
Output Noise Voltage	V_N	10Hz<=f<=100kHz		170		uV
Temperature coefficient of Vo	$\Delta Vo/\Delta T$	Io=5mA		-2.8		mV/°C
Ripple Rejection	RR	V_I =28V - 38V,f=120Hz,Tj=25°C	50	66		dB
Peak Output Current	I_{PK}	Tj=25°C		1.2		A
Short-Circuit Current	I_{SC}	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

TYPICAL APPLICATION CIRCUIT



Note 1: To specify an output voltage, substitute voltage value for "DXX".
Note 2: Bypass capacitors are recommended for optimum stability and transient response and should be located as close as possible to the regulators.