

UTC 78DXX LINEAR INTEGRATED CIRCUIT

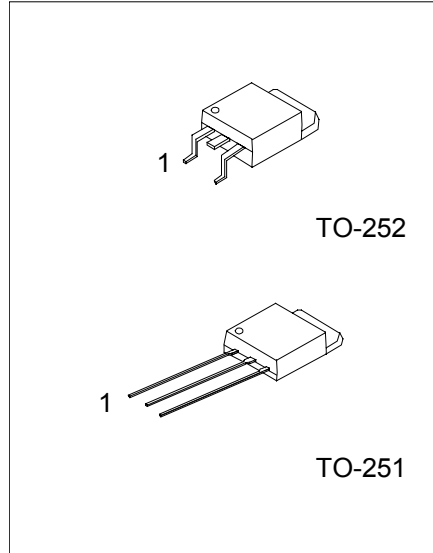
3-TERMINAL 0.5A POSITIVE VOLTAGE REGULATOR

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.

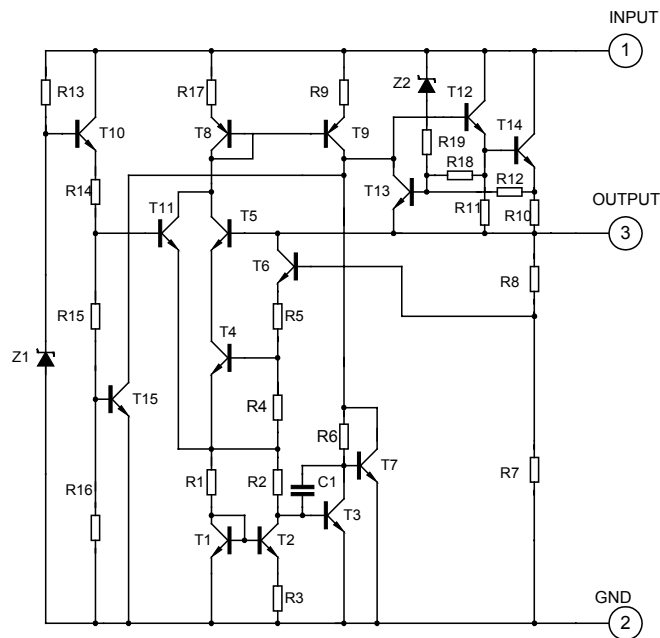
FEATURE

- *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



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ABSOLUTE MAXIMUM RATINGS

(Operating temperature range applies unless otherwise specified)

PARAMETER	SYMBOL	VALUE	UNIT
Input voltage(for Vo=5~18V) (for Vo=20~24V)	Vi	35	V
		40	V
Output Current	Io	0.5	A
Power Dissipation	PD	Internally Limited	W
Operating Junction Temperature Range	TJ	+150	°C
Storage Temperature Range	TSTG	-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, Io=5mA -0.5A	3.168	3.30	3.432	V
		Vi =5.8V to 18.3V Io=5mA- 0.5A PD<7W	3.135		3.465	V
Load Regulation	ΔVo	Tj=25°C,Io=5mA - 0.5A			33	mV
		Tj=25°C,Io=5mA - 200mA			17	mV
Line regulation	ΔVo	Vi =5.8V to 18.3V,Tj=25°C			33	mV
		Vi=5.8V to 18.3V,Tj=25°C,Io=0.5A			33	mV
Quiescent Current	Iq	Tj=25°C, Io=0.5A			8.0	mA
Quiescent Current Change	ΔIq	Vi =5.8V to 18.3V			1.0	mA
		Io=5mA - 0.5A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		55		μV
Temperature coefficient of Vo	ΔVo/ΔT	Io=5mA		-0.4		mV/°C
Ripple Rejection	RR	Vi=6.3V-16.3V,f=120Hz,Tj=25°C		57		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 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, Io=5mA - 0.5A	4.512	4.70	4.888	V
		Vi =7.2V to 19.7V Io=5mA- 0.5A, PD<7W	4.465		4.935	V
Load Regulation	ΔVo	Tj=25°C,Io=5mA - 0.5A			47	mV
		Tj=25°C,Io=5mA -200mA			24	mV
Line regulation	ΔVo	Vi =7.2V to 19.7V,Tj=25°C			47	mV
		Vi=7.2V to 19.7V,Tj=25°C,Io=0.5A			47	mV
Quiescent Current	Iq	Tj=25°C, Io=0.5A			8.0	mA
Quiescent Current Change	ΔIq	Vi =7.2V to 19.7V			1.0	mA
		Io=5mA - 0.5A			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 =7.7V 17.7V,f=120Hz,Tj=25°C	62	80		dB
Peak Output Current	IPK	Tj=25°C		1.8		A

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PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Short-Circuit Current	Isc	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, Io=5mA - 0.5A	4.80	5.0	5.20	V
		VI =7.5V to 20V, Io=5mA – 0.5A, PD<7W	4.75		5.25	V
Load Regulation	ΔVo	Tj=25°C, Io=5mA - 0.5A			50	mV
		Tj=25°C, Io=5mA - 200 mA			25	mV
Line regulation	ΔVo	VI =7V to 25V, Tj=25°C			50	mV
		VI =7.5V to 20V, Tj=25°C, Io=0.5A			50	mV
Quiescent Current	Iq	Tj=25°C, Io=0.5A			8.0	mA
Quiescent Current Change	ΔIq	VI =7.5V to 20V			1.0	mA
		Io=5mA - 0.5A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		40		uV
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		1.2		A
Short-Circuit Current	Isc	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, Io=5mA - 0.5A	5.76	6.0	6.24	V
		VI =8.5V to 21V, Io=5mA – 0.5A, PD<7W	5.70		6.30	V
Load Regulation	ΔVo	Tj=25°C, Io=5mA - 0.5A			60	mV
		Tj=25°C, Io=5mA - 200mA			30	mV
Line regulation	ΔVo	VI =8V to 25V, Tj=25°C			60	mV
		VI =8.5V to 21V, Tj=25°C, Io=0.5A			60	mV
Quiescent Current	Iq	Tj=25°C, Io=0.5A			8.0	mA
Quiescent Current Change	ΔIq	VI =8.5V to 21V			1.0	mA
		Io=5mA – 0.5A			0.5	mA
Output Noise Voltage	VN	10Hz<=f<=100kHz		45		uV
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		1.2		A
Short-Circuit Current	Isc	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, Io=5mA - 0.5A	7.68	8.0	8.32	V

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Output Voltage	V_o	$V_i = 10.5V$ to $23V$, $I_o = 5mA - 0.5A$, $PD < 7W$	7.60		8.40	V
Load Regulation	ΔV_o	$T_j = 25^\circ C$, $I_o = 5mA - 0.5A$			80	mV
		$T_j = 25^\circ C$, $I_o = 5mA - 200mA$			40	mV
Line regulation	ΔV_o	$V_i = 10.5V$ to $25V$, $T_j = 25^\circ C$			80	mV
		$V_i = 10.5V$ to $3V$, $T_j = 25^\circ C$, $I_o = 0.5A$			80	mV
Quiescent Current	I_q	$T_j = 25^\circ C$, $I_o = 0.5A$			8.0	mA
Quiescent Current Change	ΔI_q	$V_i = 10.5V$ to $23V$			1.0	mA
		$I_o = 5mA - 0.5A$			0.5	mA
Output Noise Voltage	V_N	$10Hz < f < 100kHz$		58		μV
Temperature coefficient of V_o	$\Delta V_o / \Delta T$	$I_o = 5mA$		-0.9		$mV/^\circ C$
Ripple Rejection	RR	$V_i = 11.5V$ to $21.5V$, $f = 120Hz$, $T_j = 25^\circ C$	56	72		dB
Peak Output Current	I_{PK}	$T_j = 25^\circ C$		1.2		A
Short-Circuit Current	I_{SC}	$V_i = 35V$, $T_j = 25^\circ C$		250		mA
Dropout Voltage	V_d	$T_j = 25^\circ C$		2.0		V

UTC78D09 ELECTRICAL CHARACTERISTICS

($V_i = 15V$, $I_o = 0.5A$, $T_j = 0^\circ C - 125^\circ C$, $C_1 = 0.33\mu F$, $C_o = 0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_o	$T_j = 25^\circ C$, $I_o = 5mA - 0.5A$	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	ΔV_o	$T_j = 25^\circ C$, $I_o = 5mA - 0.5A$			90	mV
		$T_j = 25^\circ C$, $I_o = 5mA - 200mA$			45	mV
Line regulation	ΔV_o	$V_i = 11.5V$ to $25V$, $T_j = 25^\circ C$			90	mV
		$V_i = 11.5V$ to $24V$, $T_j = 25^\circ C$, $I_o = 0.5A$			90	mV
Quiescent Current	I_q	$T_j = 25^\circ C$, $I_o = 0.5A$			8.0	mA
Quiescent Current Change	ΔI_q	$V_i = 11.5V$ to $24V$			1.0	mA
		$I_o = 5mA - 0.5A$			0.5	mA
Output Noise Voltage	V_N	$10Hz < f < 100kHz$		58		μV
Temperature coefficient of V_o	$\Delta V_o / \Delta T$	$I_o = 5mA$		-1.1		$mV/^\circ C$
Ripple Rejection	RR	$V_i = 12.5V$ to $22.5V$, $f = 120Hz$, $T_j = 25^\circ C$	56	72		dB
Peak Output Current	I_{PK}	$T_j = 25^\circ C$		1.2		A
Short-Circuit Current	I_{SC}	$V_i = 35V$, $T_j = 25^\circ C$		250		mA
Dropout Voltage	V_d	$T_j = 25^\circ C$		2.0		V

UTC78D12 ELECTRICAL CHARACTERISTICS

($V_i = 19V$, $I_o = 0.5A$, $T_j = 0^\circ C - 125^\circ C$, $C_1 = 0.33\mu F$, $C_o = 0.1\mu F$, unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_o	$T_j = 25^\circ C$, $I_o = 5mA - 0.5A$	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	ΔV_o	$T_j = 25^\circ C$, $I_o = 5mA - 0.5A$			120	mV
		$T_j = 25^\circ C$, $I_o = 5mA - 200mA$			60	mV

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Line regulation	ΔV_o	$V_i = 14.5V$ to $30V, T_j = 25^\circ C$			120	mV
		$V_i = 14.6V$ to $27V, T_j = 25^\circ C,$ $I_o = 0.5A$			120	mV
Quiescent Current	I_q	$T_j = 25^\circ C, I_o = 0.5A$			8.0	mA
Quiescent Current Change	ΔI_q	$V_i = 14.5V$ to $30V$			1.0	mA
		$I_o = 5mA - 0.5A$			0.5	mA
Output Noise Voltage	V_N	$10Hz < f < 100kHz$		75		μV
Temperature coefficient of V_o	$\Delta V_o / \Delta T$	$I_o = 5mA$		-1.5		$mV / ^\circ C$
Ripple Rejection	RR	$V_i = 15V - 25V, f = 120Hz, T_j = 25^\circ C$	55	72		dB
Peak Output Current	I_{PK}	$T_j = 25^\circ C$		1.2		A
Short-Circuit Current	I_{sc}	$V_i = 35V, T_j = 25^\circ C$		250		mA
Dropout Voltage	V_d	$T_j = 25^\circ C$		2.0		V

UTC78D15 ELECTRICAL CHARACTERISTICS

($V_i = 23V, I_o = 0.5A, T_j = 0^\circ C - 125^\circ C, C_1 = 0.33\mu F, C_o = 0.1\mu F,$ unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_o	$T_j = 25^\circ C, I_o = 5mA - 0.5A$	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	ΔV_o	$T_j = 25^\circ C, I_o = 5mA - 0.5A$			150	mV
		$T_j = 25^\circ C, I_o = 5mA - 200mA$			75	mV
Line regulation	ΔV_o	$V_i = 18.5V$ to $30V, T_j = 25^\circ C$			150	mV
		$V_i = 17.5V$ to $30V,$ $T_j = 25^\circ C, I_o = 0.5A$			150	mV
Quiescent Current	I_q	$T_j = 25^\circ C, I_o = 0.5A$			8.0	mA
Quiescent Current Change	ΔI_q	$V_i = 17.5V$ to $30V$			1.0	mA
		$I_o = 5mA - 0.5A$			0.5	mA
Output Noise Voltage	V_N	$10Hz < f < 100kHz$		90		μV
Temperature coefficient of V_o	$\Delta V_o / \Delta T$	$I_o = 5mA$		-1.8		$mV / ^\circ C$
Ripple Rejection	RR	$V_i = 18.5V$ to $28.5V$ $f = 120Hz, T_j = 25^\circ C$	54	70		dB
Peak Output Current	I_{PK}	$T_j = 25^\circ C$		1.2		A
Short-Circuit Current	I_{sc}	$V_i = 35V, T_j = 25^\circ C$		250		mA
Dropout Voltage	V_d	$T_j = 25^\circ C$		2.0		V

UTC78D18 ELECTRICAL CHARACTERISTICS

($V_i = 27V, I_o = 0.5A, T_j = 0^\circ C - 125^\circ C, C_1 = 0.33\mu F, C_o = 0.1\mu F,$ unless otherwise specified)(Note 1)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_o	$T_j = 25^\circ C, I_o = 5mA - 0.5A$	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	ΔV_o	$T_j = 25^\circ C, I_o = 5mA - 0.5A$			180	mV
		$T_j = 25^\circ C, I_o = 5mA - 200mA$			90	mV
Line regulation	ΔV_o	$V_i = 21V$ to $33V, T_j = 25^\circ C$			180	mV
		$V_i = 21V$ to $33V,$ $T_j = 25^\circ C, I_o = 0.5A$			180	mV
Quiescent Current	I_q	$T_j = 25^\circ C, I_o = 0.5A$			8.0	mA
Quiescent Current Change	ΔI_q	$V_i = 21.5V$ to $33V$			1.0	mA

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		I _O =5mA - 0.5A			0.5	mA
Output Noise Voltage	V _N	10Hz<=f<=100kHz		110		uV
Temperature coefficient of V _o	ΔV _o /ΔT	I _o =5mA		-2.2		mV/°C
Ripple Rejection	RR	V _I =22V - 32V, f=120Hz, T _J =25°C	53	69		dB
Peak Output Current	I _{PK}	T _J =25°C		1.2		A
Short-Circuit Current	I _{SC}	V _I =35V, T _J =25°C		250		mA
Dropout Voltage	V _d	T _J =25°C		2.0		V

UTC78D24 ELECTRICAL CHARACTERISTICS

(V_I=33V, I_o=0.5A, T_J= 0°C - 125°C, C₁=0.33uF, C_o=0.1uF, unless otherwise specified)(Note 1)

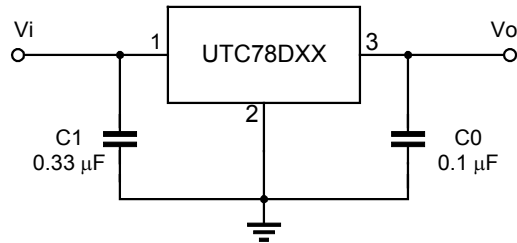
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V _o	T _J =25°C, I _o =5mA - 0.5A	23.04	24.0	24.96	V
		V _I =27V to 38V, I _o =5mA - 0.5A, PD<7W	22.80		25.20	V
Load Regulation	ΔV _o	T _J =25°C, I _o =5mA - 0.5A			240	mV
		T _J =25°C, I _o =5mA - 200mA			120	mV
Line regulation	ΔV _o	V _I =27V to 38V, T _J =25°C			240	mV
		V _I =27V to 38V, T _J =25°C, I _o =0.5A			240	mV
Quiescent Current	I _q	T _J =25°C, I _o =0.5A			8.0	mA
Quiescent Current Change	ΔI _q	V _I =28V to 38V			1.0	mA
	ΔI _q	I _o =5mA - 0.5A			0.5	mA
Output Noise Voltage	V _N	10Hz<=f<=100kHz		170		uV
Temperature coefficient of V _o	ΔV _o /ΔT	I _o =5mA		-2.8		mV/°C
Ripple Rejection	RR	V _I =28V - 38V, f=120Hz, T _J =25°C	50	66		dB
Peak Output Current	I _{PK}	T _J =25°C		1.2		A
Short-Circuit Current	I _{SC}	V _I =35V, T _J =25°C		250		mA
Dropout Voltage	V _d	T _J =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

UTC78DXX LINEAR INTEGRATED CIRCUIT

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.