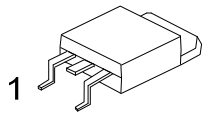
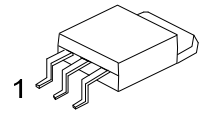
3-TERMINAL 1.5A POSITIVE VOLTAGE REGULATOR



TO-263



TO-263-3

■ DESCRIPTION

The UTC **78TXXAA** family is monolithic fixed voltage regulator integrated circuit. They are suitable for applications requiring supply current up to 1.5A.

■ FEATURES

* Output current up to 1.5A
* 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

■ ORDERING INFORMATION

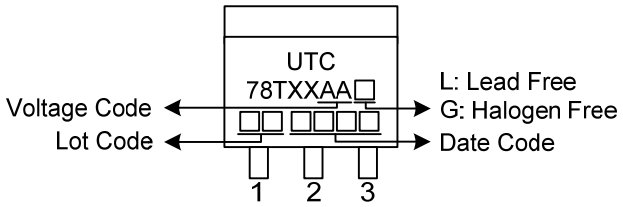
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
78TXXAAL-TQ2-T	78TXXAAG-TQ2-T	TO-263	I	G	O	Tube
78TXXAAL-TQ2-R	78TXXAAG-TQ2-R	TO-263	I	G	O	Tape Reel
78TXXAAL-TQ3-T	78TXXAAG-TQ3-T	TO-263-3	I	G	O	Tube
78TXXAAL-TQ3-R	78TXXAAG-TQ3-R	TO-263-3	I	G	O	Tape Reel

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

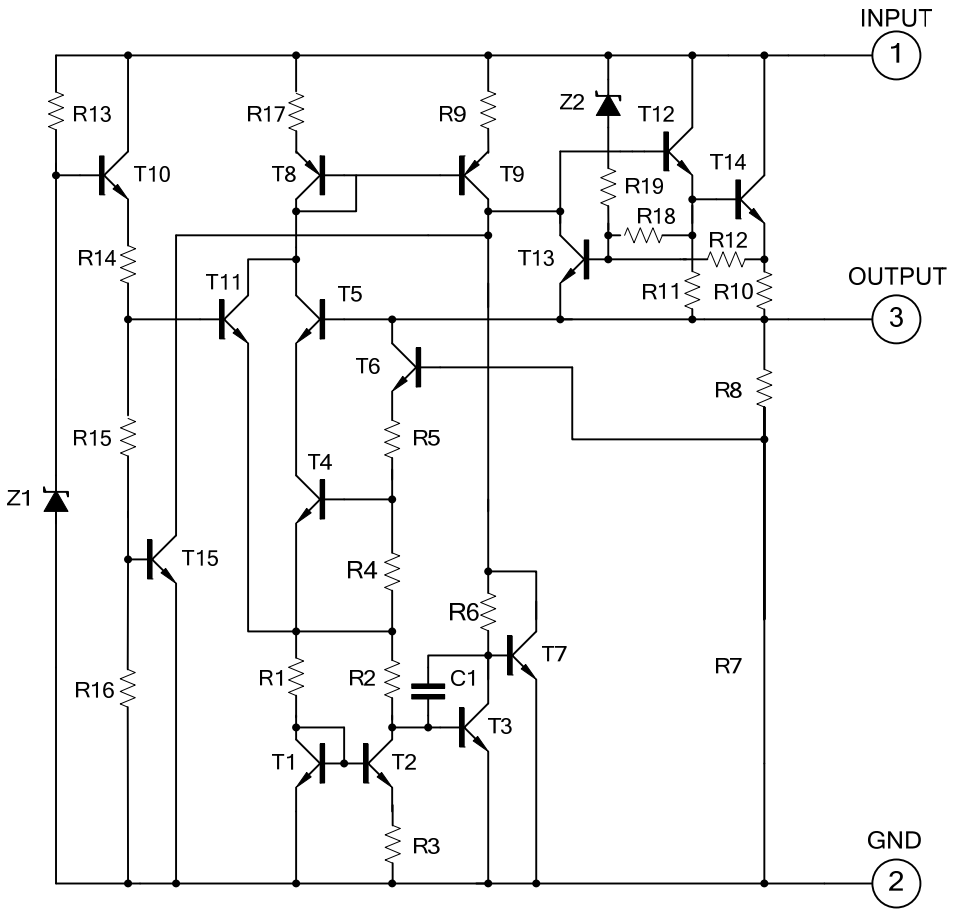
78TXXAAG-TQ2-T

(1)Packing Type	(1) T: Tube, R: Tape Reel
(2)Package Type	(2) TQ2: TO-263, TQ3: TO-263-3
(3)Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free
(4)Output Voltage Code	(4) XX: refer to Marking Information

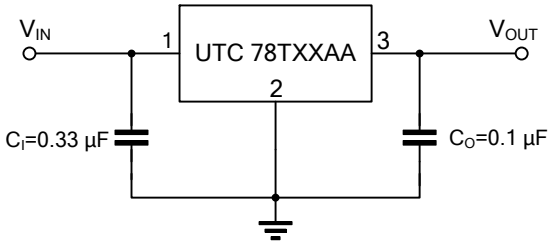
■ MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
TO-263 TO-263-3	05:5.0V 06:6.0V 07:7.0V 08:8.0V 09:9.0V 10:10V 12:12V 15:15V 18:18V 24:24V	

■ BLOCK DIAGRAM



■ APPLICATION CIRCUIT



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

■ ABSOLUTE MAXIMUM RATINGS (Operating temperature range applies unless otherwise specified)

PARAMETER		SYMBOL	RATING	UNIT
Input voltage	V_{OUT}=5~18V	V_{IN}	35	V
	V_{OUT}=24V		40	V
Output Current		I_{OUT}	1.5	A
Power Dissipation		P_D	Internally Limited	W
Operating Junction Temperature		T_{OPR}	-40 ~ +150	°C
Storage Temperature		T_{STG}	-55 ~ +150	°C

■ THERMAL DATA

PARAMETER	SYMBOL	RATING	UNIT
Junction to Ambient	θ_{JA}	65	°C/W
Junction to Case	θ_{JC}	5	°C/W

■ ELECTRICAL CHARACTERISTICS

(I_{OUT}=0.5A, C_I =0.33μF, C_O=0.1μF, unless otherwise specified)(Note 1)

For 78T05AA (V_{IN} =10V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	4.9	5.0	5.1	V
		V_{IN} =7.5~20V, I_{OUT} =5mA~1.0A	4.85		5.15	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			100	mV
		I_{OUT} =0.25A~0.75A			50	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
Ripple Rejection	RR	V_{IN} =8~18V,f=120Hz	59	80		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

For 78T06AA (V_{IN} =11V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	5.88	6.0	6.12	V
		V_{IN} =8.5~21V, I_{OUT} =5mA~1.0A	5.82		6.18	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			120	mV
		I_{OUT} =0.25A~0.75A			60	mV
Line Regulation	ΔV_{OUT}	V_{IN} =8~25V			60	mV
		V_{IN} =8.5~21V, I_{OUT} =1.0A			60	mV
Quiescent Current	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =8.5~21V			1.0	mA
		I_{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		45		μV
Ripple Rejection	RR	V_{IN} =9~19V,f=120Hz	56	75		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T07AA (V_{IN} =13V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	6.86	7.0	7.14	V
		V_{IN} =9.5~22V, I_{OUT} =5mA~1.0A	6.79		7.21	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			140	mV
		I_{OUT} =0.25A~0.75A			70	mV
Line Regulation	ΔV_{OUT}	V_{IN} =9~25V			70	mV
		V_{IN} =9.5~22V, I_{OUT} =1.0A			70	mV
Quiescent Current	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =9.5~22V			1.0	mA
		I_{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		50		μV
Ripple Rejection	RR	V_{IN} =10~20V,f=120Hz	56	75		dB
Peak Output Current	I_{PEAK}			1.7		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

For 78T08AA (V_{IN} =14V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	7.84	8.0	8.16	V
		V_{IN} =10.5~23V, I_{OUT} =5mA~1.0A	7.76		8.24	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			160	mV
		I_{OUT} =0.25A~0.75A			80	mV
Line Regulation	ΔV_{OUT}	V_{IN} =10.5~25V			80	mV
		V_{IN} =10.5~23V, I_{OUT} =1.0A			80	mV
Quiescent Current	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =10.5~23V			1.0	mA
		I_{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		58		μV
Ripple Rejection	RR	V_{IN} =11.5~21.5V,f=120Hz	53	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

For 78T09AA (V_{IN} =15V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	8.82	9.0	9.18	V
		V_{IN} =11.5~24V, I_{OUT} =5mA~1.0A	8.73		9.27	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			180	mV
		I_{OUT} =0.25A~0.75A			90	mV
Line Regulation	ΔV_{OUT}	V_{IN} =11.5~25V			90	mV
		V_{IN} =11.5~24V, I_{OUT} =1.0A			90	mV
Quiescent Current	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =11.5~24V			1.0	mA
		I_{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		58		μV
Ripple Rejection	RR	V_{IN} =12.5~22.5V,f=120Hz	53	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T10AA (V_{IN} =16V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	9.8	10	10.2	V
		V_{IN} =12.5~25V, I_{OUT} =5mA~1.0A	9.7		10.3	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			200	mV
		I_{OUT} =0.25A~0.75A			100	mV
Line Regulation	ΔV_{OUT}	V_{IN} =13~25V			100	mV
		V_{IN} =13~25V, I_{OUT} =1.0A			100	mV
Quiescent Current	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =12.6V~25V			1.0	mA
		I_{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		58		μV
Ripple Rejection	RR	V_{IN} =13~23V,f=120Hz	53	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

For 78T12AA (V_{IN} =19V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	11.76	12	12.24	V
		V_{IN} =14.5~27V, I_{OUT} =5mA~1.0A	10.64		12.36	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			240	mV
		I_{OUT} =0.25A~0.75A			120	mV
Line Regulation	ΔV_{OUT}	V_{IN} =14.5~30V			120	mV
		V_{IN} =14.6~27V, I_{OUT} =1.0A			120	mV
Quiescent Current	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =14.5~30V			1.0	mA
		I_{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		75		μV
Ripple Rejection	RR	V_{IN} =15~25V,f=120Hz	52	72		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

For 78T15AA (V_{IN} =23V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT} =5mA~1.0A	14.7	15	15.3	V
		V_{IN} =17.5~30V, I_{OUT} =5mA~1.0A	14.55		15.45	V
Load Regulation	ΔV_{OUT}	I_{OUT} =5mA~1.5A			300	mV
		I_{OUT} =0.25A~0.75A			150	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	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =17.5~30V			1.0	mA
		I_{OUT} =5mA~1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		90		μV
Ripple Rejection	RR	V_{IN} =18.5~28.5V,f=120Hz	51	70		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T18AA (V_{IN} =27V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	I_{OUT}=5mA~1.0A	17.64	18	18.36	V
		V_{IN} =21~33V, I_{OUT}=5mA~1.0A	17.46		18.54	V
Load Regulation	ΔV_{OUT}	I_{OUT}=5mA~1.5A			360	mV
		I_{OUT}=0.25A~0.75A			180	mV
Line Regulation	ΔV_{OUT}	V_{IN} =21~33V			180	mV
		V_{IN} =21~33V, I_{OUT} =1.0A			180	mV
Quiescent Current	I_Q	I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	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
Ripple Rejection	RR	V_{IN} =22~32V,f=120Hz	50	69		dB
Peak Output Current	I_{PEAK}			1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V		250		mA
Dropout Voltage	V_D	I_{OUT}=1.5A		2.5		V

For 78T24AA (V_{IN} =33V, I_{OUT} =0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	T_J =25°C, I_{OUT}=5mA ~ 1.0A	23.52	24	24.48	V
		V_{IN} =27V ~ 38V,I_{OUT}=5mA ~ 1.0A,	23.28		24.72	V
Load Regulation	ΔV_{OUT}	T_J =25°C,I_{OUT}=5mA ~ 1.5A			480	mV
		T_J =25°C,I_{OUT}=0.25A ~ 0.75A			240	mV
Line Regulation	ΔV_{OUT}	V_{IN} =27V ~ 38V, T_J =25°C			240	mV
		V_{IN} =27V ~ 38V, T_J =25°C,I_{OUT}=1.0A			240	mV
Quiescent Current	I_Q	T_J =25°C, I_{OUT}≤1.0A			8.0	mA
Quiescent Current Change	ΔI_Q	V_{IN} =28V ~ 38V			1.0	mA
		I_{OUT}=5mA ~ 1.0A			0.5	mA
Output Noise Voltage	eN	10Hz≤f≤100kHz		170		μV
Ripple Rejection	RR	V_{IN} =28V ~ 38V, f=120Hz, T_J=25°C	47	66		dB
Peak Output Current	I_{PEAK}	T_J =25°C		1.8		A
Short-Circuit Current	I_{SC}	V_{IN} =35V, T_J =25°C		250		mA
Dropout Voltage	V_D	T_J =25°C		2.0		V

Notes: 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.

2. Power dissipation < 0.5W.

■ TYPICAL CHARACTERISTICS