



## 78TXXA

## LINEAR INTEGRATED CIRCUIT

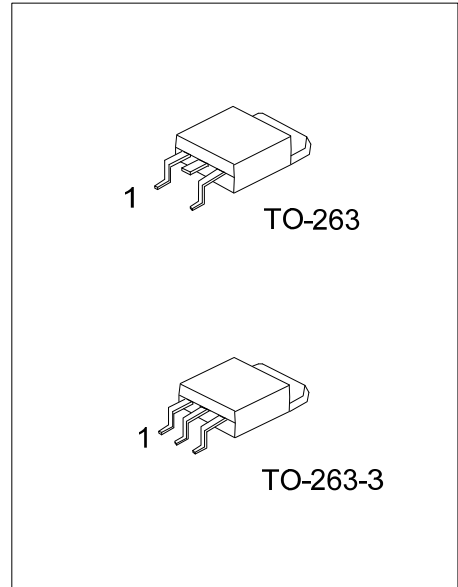
### 3-TERMINAL 1A POSITIVE VOLTAGE REGULATOR

#### DESCRIPTION

The UTC **78TXXA** 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 A
- \* Fixed Output Voltage Of 5V ~ 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	
78TXXAL-TQ2-R	78TXXAG-TQ2-R	TO-263	I	G	O	Tape Reel
78TXXAL-TQ2-T	78TXXAG-TQ2-T	TO-263	I	G	O	Tube
78TXXAL-TQ3-R	78TXXAG-TQ3-R	TO-263-3	I	G	O	Tape Reel
78TXXAL-TQ3-T	78TXXAG-TQ3-T	TO-263-3	I	G	O	Tube

Notes: 1. xx: output voltage, refer to Marking Information  
 2. Pin Code: I: Input G: GND O: Output

<p>78TXXAG-TQ2-R</p>	<p>(1) R: Tape Reel, T: Tube          (2) TO-263: TQ2, TO-263-3: TQ3          (3) G: Halogen Free and Lead Free, L: Lead Free          (4) XX: refer to Marking Information</p>
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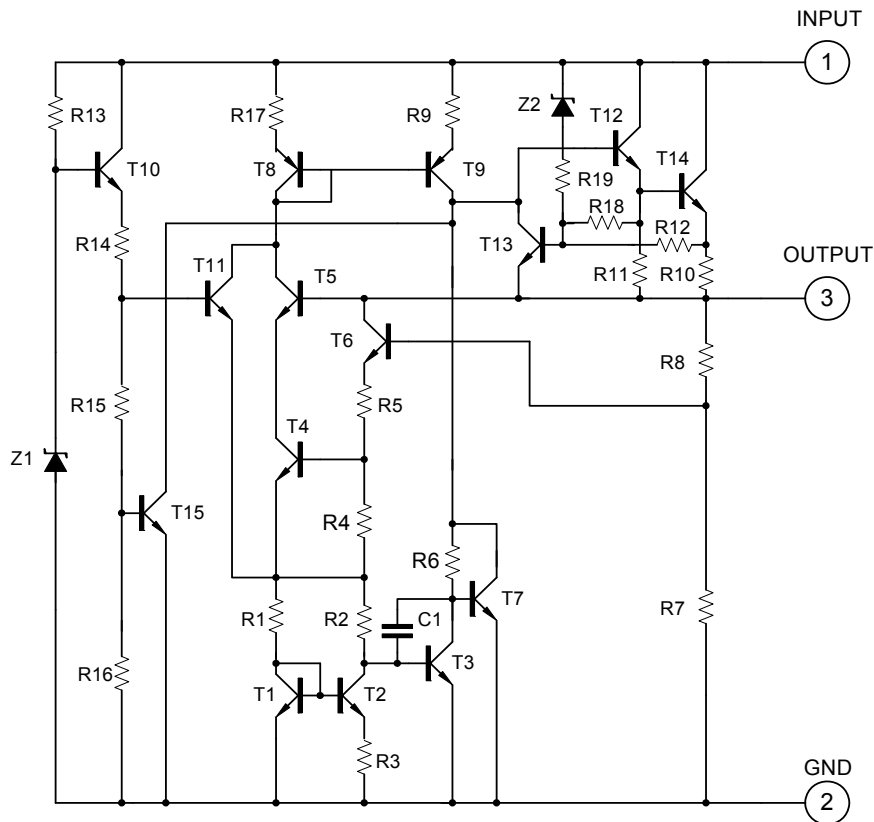
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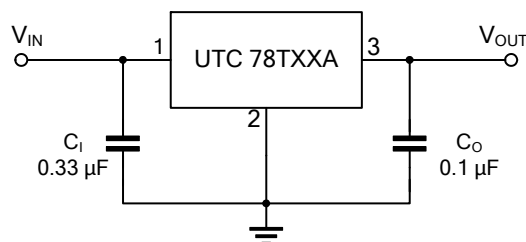
### MARKING INFORMATION

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	

### TEST CIRCUIT



### 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	$V_{IN}$	35	V
Output Current	$I_{OUT}$	1	A
Power Dissipation	$P_D$	Internally Limited	W
Junction Temperature	$T_J$	+150	°C
Operating Junction Temperature	$T_{OPR}$	-40 ~ +125	°C
Storage Temperature	$T_{STG}$	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ( $C_1=0.33\mu F$ ,  $C_O=0.1\mu F$ , unless otherwise specified) (Note 1)

For 78T05A ( $V_{IN}=10V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	4.80	5.0	5.20	V
		$V_{IN}=7.5\sim 20V$ , $I_{OUT}=5mA\sim 1.0A$	4.75		5.25	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			50	mV
		$I_{OUT}=0.25A\sim 0.75A$			25	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=7\sim 25V$			50	mV
		$V_{IN}=7.5\sim 20V$ , $I_{OUT}=1.0A$			50	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=7.5\sim 20V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		40		$\mu V$
Ripple Rejection	RR	$V_{IN}=8\sim 18V$ , $f=120Hz$	59	80		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

For 78T06A ( $V_{IN}=11V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	5.76	6.0	6.24	V
		$V_{IN}=8.5\sim 21V$ , $I_{OUT}=5mA\sim 1.0A$	5.7		6.3	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			60	mV
		$I_{OUT}=0.25A\sim 0.75A$			30	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=8\sim 25V$			60	mV
		$V_{IN}=8.5\sim 21V$ , $I_{OUT}=1.0A$			60	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=8.5\sim 21V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		45		$\mu V$
Ripple Rejection	RR	$V_{IN}=9\sim 19V$ , $f=120Hz$	56	75		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T07A ( $V_{IN}=13V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	6.72	7.0	7.28	V
		$V_{IN}=9.5\sim 22V$ , $I_{OUT}=5mA\sim 1.0A$	6.65		7.35	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			70	mV
		$I_{OUT}=0.25A\sim 0.75A$			35	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=9\sim 25V$			70	mV
		$V_{IN}=9.5\sim 22V$ , $I_{OUT}=1.0A$			70	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=9.5\sim 22V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		50		$\mu V$
Ripple Rejection	RR	$V_{IN}=10\sim 20V$ , $f=120Hz$	56	75		dB
Peak Output Current	$I_{PEAK}$			1.7		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

For 78T08A ( $V_{IN}=14V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	7.68	8.0	8.32	V
		$V_{IN}=10.5\sim 23V$ , $I_{OUT}=5mA\sim 1.0A$	7.6		8.4	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			80	mV
		$I_{OUT}=0.25A\sim 0.75A$			40	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=10.5\sim 25V$			80	mV
		$V_{IN}=10.5\sim 23V$ , $I_{OUT}=1.0A$			80	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=10.5\sim 23V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		$\mu V$
Ripple Rejection	RR	$V_{IN}=11.5\sim 21.5V$ , $f=120Hz$	53	72		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

For 78T09A ( $V_{IN}=15V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	8.64	9.0	9.36	V
		$V_{IN}=11.5\sim 24V$ , $I_{OUT}=5mA\sim 1.0A$	8.55		9.45	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			90	mV
		$I_{OUT}=0.25A\sim 0.75A$			45	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=11.5\sim 25V$			90	mV
		$V_{IN}=11.5\sim 24V$ , $I_{OUT}=1.0A$			90	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=11.5\sim 24V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		$\mu V$
Ripple Rejection	RR	$V_{IN}=12.5\sim 22.5V$ , $f=120Hz$	53	72		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T10A ( $V_{IN}=16V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	9.60	10.0	10.40	V
		$V_{IN}=12.5\sim 25V$ , $I_{OUT}=5mA\sim 1.0A$	9.5		10.5	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			100	mV
		$I_{OUT}=0.25A\sim 0.75A$			50	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=13\sim 25V$			100	mV
		$V_{IN}=13\sim 25V$ , $I_{OUT}=1.0A$			100	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=12.6V\sim 25V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		$\mu V$
Ripple Rejection	RR	$V_{IN}=13\sim 23V$ , $f=120Hz$	53	72		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

For 78T12A ( $V_{IN}=19V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	11.52	12.0	12.48	V
		$V_{IN}=14.5\sim 27V$ , $I_{OUT}=5mA\sim 1.0A$	11.4		12.6	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			120	mV
		$I_{OUT}=0.25A\sim 0.75A$			60	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=14.5\sim 30V$			120	mV
		$V_{IN}=14.6\sim 27V$ , $I_{OUT}=1.0A$			120	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=14.5\sim 30V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		75		$\mu V$
Ripple Rejection	RR	$V_{IN}=15\sim 25V$ , $f=120Hz$	52	72		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

For 78T15A ( $V_{IN}=23V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	14.40	15.0	15.60	V
		$V_{IN}=17.5\sim 30V$ , $I_{OUT}=5mA\sim 1.0A$	14.25		15.75	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			150	mV
		$I_{OUT}=0.25A\sim 0.75A$			75	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=18.5\sim 30V$			150	mV
		$V_{IN}=17.7\sim 30V$ , $I_{OUT}=1.0A$			150	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=17.5\sim 30V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		90		$\mu V$
Ripple Rejection	RR	$V_{IN}=18.5\sim 28.5V$ , $f=120Hz$	51	70		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78T18A ( $V_{IN}=27V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	17.28	18.0	18.72	V
		$V_{IN}=21\sim 33V$ , $I_{OUT}=5mA\sim 1.0A$	17.1		18.9	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			180	mV
		$I_{OUT}=0.25A\sim 0.75A$			90	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=21\sim 33V$			180	mV
		$V_{IN}=21\sim 33V$ , $I_{OUT}=1.0A$			180	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=21.5\sim 33V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		110		$\mu V$
Ripple Rejection	RR	$V_{IN}=22\sim 32V$ , $f=120Hz$	50	69		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

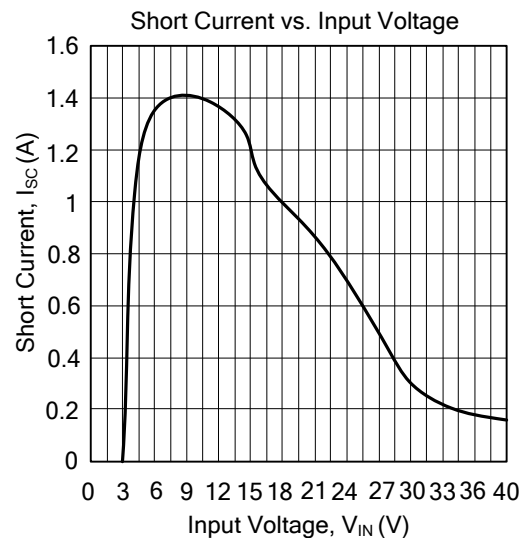
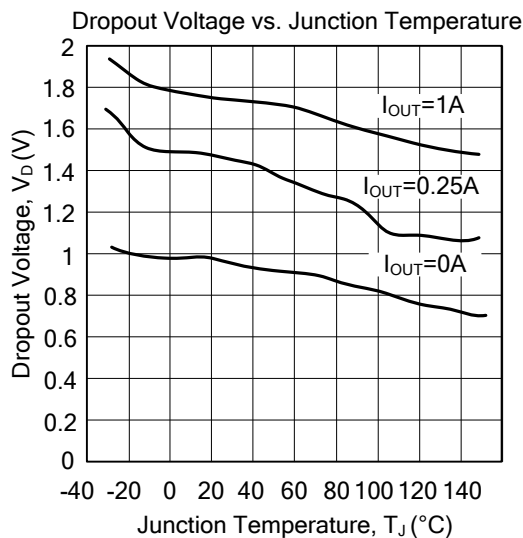
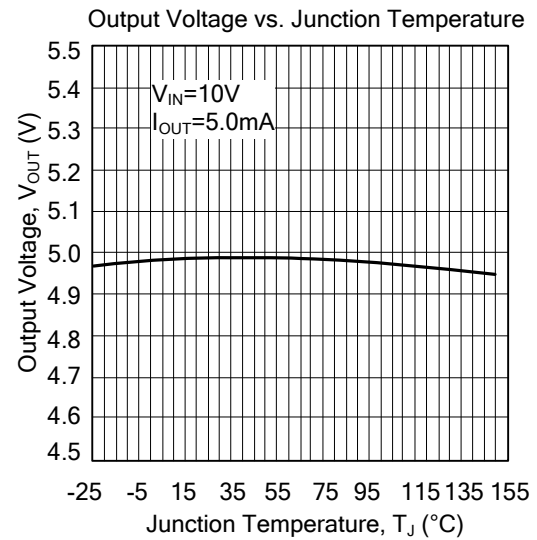
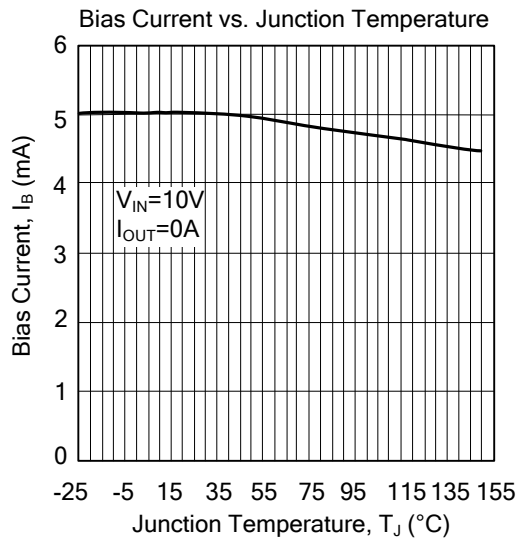
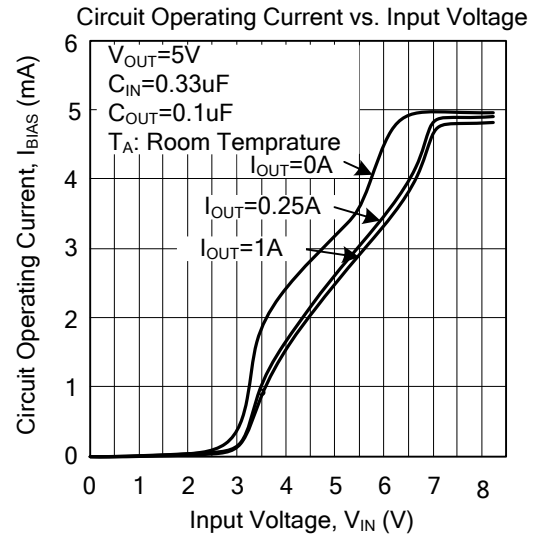
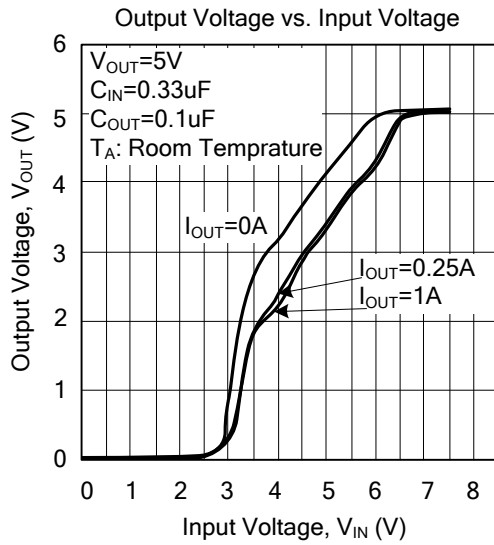
For 78T24A ( $V_{IN}=33V$ ,  $I_{OUT}=0.5A$ )

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	$V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$	23.04	24.0	24.96	V
		$V_{IN}=27\sim 35V$ , $I_{OUT}=5mA\sim 1.0A$	22.8		25.2	V
Load Regulation	$\Delta V_{OUT}$	$I_{OUT}=5mA\sim 1.0A$			240	mV
		$I_{OUT}=0.25A\sim 0.75A$			120	mV
Line Regulation	$\Delta V_{OUT}$	$V_{IN}=27\sim 35V$			240	mV
		$V_{IN}=27\sim 35V$ , $I_{OUT}=1.0A$			240	mV
Quiescent Current	$I_Q$	$I_{OUT}\leq 1.0A$			8.0	mA
Quiescent Current Change	$\Delta I_Q$	$V_{IN}=28\sim 35V$			1.0	mA
		$I_{OUT}=5mA\sim 1.0A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		170		$\mu V$
Ripple Rejection	RR	$V_{IN}=28\sim 35V$ , $f=120Hz$	47	66		dB
Peak Output Current	$I_{PEAK}$			1.8		A
Short-Circuit Current	$I_{SC}$	$V_{IN}=35V$		250		mA
Dropout Voltage	$V_D$			2.0		V

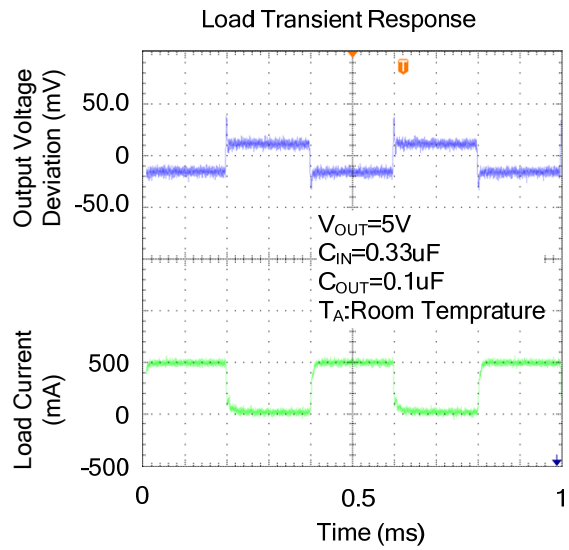
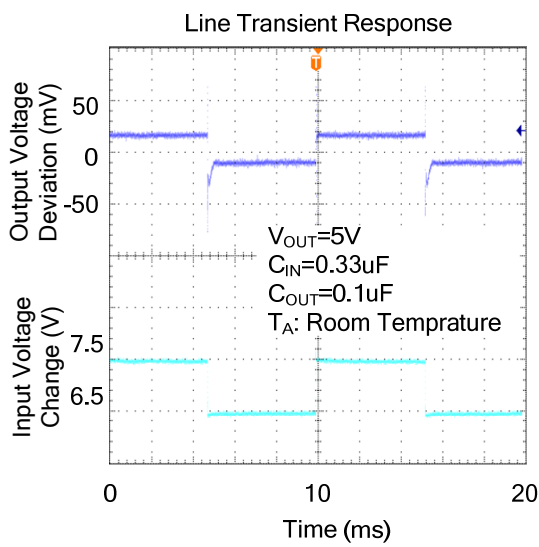
Note 1: The Maximum steady state usable output current are dependent on input voltage, heat sinking, lead length of the package and copper pattern of PCB. The data above represents pulse test conditions with junction temperatures specified at the initiation of test.

2: Power dissipation < 0.5W

### TYPICAL CHARACTERISTICS



### ■ TYPICAL CHARACTERISTICS(Cont.)



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