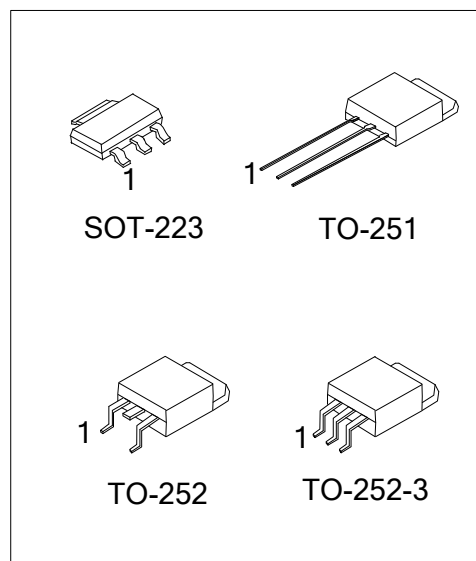


**78DXX****LINEAR INTEGRATED CIRCUIT****3-TERMINALS 0.5A POSITIVE
VOLTAGE REGULATOR****■ DESCRIPTION**

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 5V, 6V, 7V, 8V, 9V, 12V, 15V, 18V, 20V and 24V Available
- * Thermal Overload Shutdown Protection
- * Short Circuit Current Limiting
- * Output Transistor SOA Protection

**■ ORDERING INFORMATION**

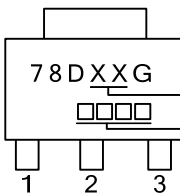
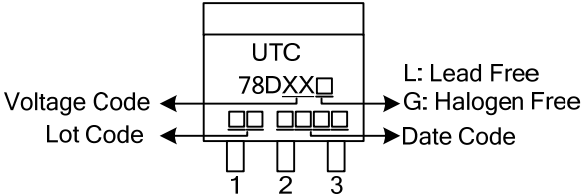
Ordering Number		Package	Pin Assignment			Packing
Lead Free	Halogen Free		1	2	3	
-	78DXXG-AA3-R	SOT-223	I	G	O	Tape Reel
78DXXL-TM3-T	78DXXG-TM3-T	TO-251	I	G	O	Tube
78DXXL-TN3-R	78DXXG-TN3-R	TO-252	I	G	O	Tape Reel
78DXXL-TNA-R	78DXXG-TNA-R	TO-252-3	I	G	O	Tape Reel

Note: 1. XX: Output Voltage, refer to Marking Information

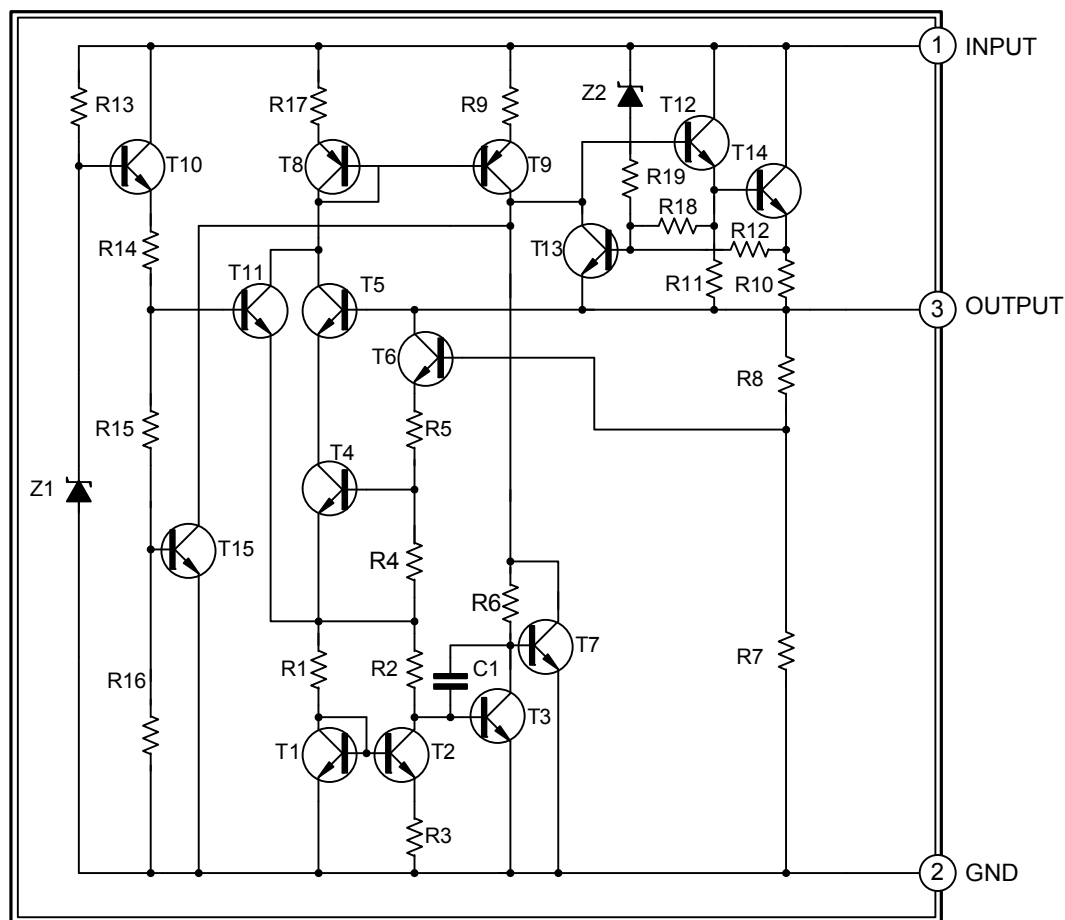
2. Pin Code: I: Input G: GND O: Output

	(1) Packing Type	(1) R: Tape Reel, T: Tube
	(2) Package Type	(2) AA3: SOT-223, TM3: TO-251, TN3: TO-252, TNA: TO-252-3
	(3) Green Package	(3) G: Halogen Free and Lead Free, L: Lead Free
	(4) Output Voltage	(4) XX: refer to Marking Information

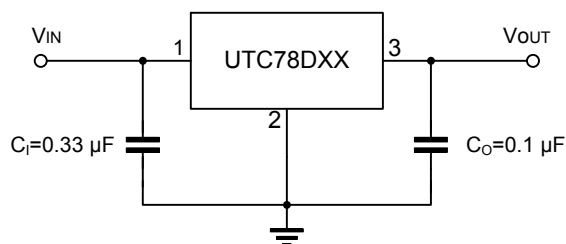
MARKING INFORMATION

PACKAGE	VOLTAGE CODE	MARKING
SOT-223	05: 5V 06: 6V 07: 7V 08: 8V 09: 9V	 Diagram of SOT-223 package marking. The top surface shows the text '78DXXG'. Below it are three small squares representing the date code. Arrows point from the text 'Voltage Code' to the 'X' and from 'Date Code' to the squares. The package has three pins labeled 1, 2, and 3.
TO-251 TO-252 TO-252-3	12: 12V 15: 15V 18: 18V 20: 20V 24: 24V	 Diagram of TO-251/252/252-3 package marking. The top surface shows the text 'UTC' and '78DXX'. Below it are two small squares representing the voltage code and two more small squares representing the date code. Arrows point from the text 'Voltage Code' to the first square, 'Lot Code' to the second square, 'L: Lead Free' to the 'L' in 'UTC', 'G: Halogen Free' to the 'G' in '78DXX', and 'Date Code' to the last two squares. The package has three pins labeled 1, 2, and 3.

■ BLOCK DIAGRAM



■ TYPICAL APPLICATION CIRCUIT



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

■ ABSOLUTE MAXIMUM RATINGS (T_J=25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Input Voltage		V _{IN}	35	V
Output Current		I _{OUT}	0.5	A
Power Dissipation (T _C =25°C)	SOT-223	P _D	8.5	W
	TO-251/TO-252		10	
	TO-252-3			
Operating Junction Temperature		T _J	-20~ +150	°C
Storage Temperature		T _{STG}	-65 ~ +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.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Case	SOT-223	θ_{JC}	15	°C/W
	TO-251/TO-252		12.5	
	TO-252-3			

■ ELECTRICAL CHARACTERISTICS

(T_J=25°C, C_I=0.33μF, C_O=0.1μF, P_D≤7W, unless otherwise specified)

For 78D05 (V_{IN}=10V, I_{OUT}=0.5A)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V _{OUT}	I _{OUT} =5mA~0.5A	4.8	5	5.2	V
		V _{IN} =7.5~20V, I _{OUT} =5mA~0.5A	4.75		5.25	V
Load Regulation	ΔV _{OUT}	I _{OUT} =5mA~0.5A			50	mV
		I _{OUT} =5mA~200 mA			25	mV
Line Regulation	ΔV _{OUT}	V _{IN} =7V~25V			50	mV
		V _{IN} =7.5~20V, I _{OUT} =0.5A			50	mV
Quiescent Current	I _Q	I _{OUT} =0.5A			8	mA
Quiescent Current Change	ΔI _Q	V _{UT} =7.5~20V			1	mA
		I _{OUT} =5mA~0.5A			0.5	mA
Output Noise Voltage	e _N	10Hz≤f≤100kHz		40		μV
Temperature coefficient of V _{OUT}	ΔV _{OUT} /ΔT	I _{OUT} =5mA		-0.6		mV/°C
Ripple Rejection	RR	V _{IN} =8~18V, f=120Hz	62	80		dB
Peak Output Current	I _{PEAK}			1.2		A
Short-Circuit Current	I _{SC}	V _{IN} =V _{OUT} +19V		250		mA
Dropout Voltage	V _D			2		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78D06 ($V_{IN}=11V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	5.76	6	6.24	V
		$V_{IN}=8.5\sim21V$, $I_{OUT}=5mA\sim0.5A$	5.7		6.3	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			60	mV
		$I_{OUT}=5mA\sim200mA$			30	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=8\sim25V$			60	mV
		$V_{IN}=8.5\sim21V$, $I_{OUT}=0.5A$			60	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=8.5\sim21V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		45		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.7		mV/°C
Ripple Rejection	RR	$V_{IN}=9\sim19V$, $f=120Hz$	59	75		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=V_{OUT}+19V$		250		mA
Dropout Voltage	V_D			2		V

For 78D07 ($V_{IN}=13V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	6.72	7	7.28	V
		$V_{IN}=9.5\sim22V$, $I_{OUT}=5mA\sim0.5A$	6.65		7.35	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			70	mV
		$I_{OUT}=5mA\sim200mA$			35	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=10.5\sim25V$			70	mV
		$V_{IN}=10.5\sim23V$, $I_{OUT}=0.5A$			70	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=10.5\sim23V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		50		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.8		mV/°C
Ripple Rejection	RR	$V_{IN}=11.5\sim21.5V$, $f=120Hz$	59	75		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=V_{OUT}+19V$		250		mA
Dropout Voltage	V_D			2		V

For 78D08 ($V_{IN}=14V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	7.68	8	8.32	V
		$V_{IN}=10.5\sim23V$, $I_{OUT}=5mA\sim0.5A$	7.6		8.4	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			80	mV
		$I_{OUT}=5mA\sim200mA$			40	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=10.5\sim25V$			80	mV
		$V_{IN}=10.5\sim23V$, $I_{OUT}=0.5A$			80	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=10.5\sim23V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-0.9		mV/°C
Ripple Rejection	RR	$V_{IN}=11.5\sim21.5V$, $f=120Hz$	56	72		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=V_{OUT}+19V$		250		mA
Dropout Voltage	V_D			2		V

■ ELECTRICAL CHARACTERISTICS (Cont.)

For 78D09 ($V_{IN}=15V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	8.64	9	9.36	V
		$V_{IN}=11.5\sim24V, I_{OUT}=5mA\sim0.5A$	8.55		9.45	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			90	mV
		$I_{OUT}=5mA\sim200mA$			45	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=11.5\sim25V$			90	mV
		$V_{IN}=11.5\sim24V, I_{OUT}=0.5A$			90	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=11.5\sim24V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		58		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.1		mV/°C
Ripple Rejection	RR	$V_{IN}=12.5\sim22.5V, f=120Hz$	56	72		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=V_{OUT}+19V$		250		mA
Dropout Voltage	V_D			2		V

For 78D12 ($V_{IN}=19V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	11.52	12	12.48	V
		$V_{IN}=14.5\sim27V, I_{OUT}=5mA\sim0.5A$	11.4		12.6	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			120	mV
		$I_{OUT}=5mA\sim200mA$			60	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=14.5\sim30V$			120	mV
		$V_{IN}=14.6\sim27V, I_{OUT}=0.5A$			120	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=14.5\sim30V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		75		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.5		mV/°C
Ripple Rejection	RR	$V_{IN}=15\sim25V, f=120Hz$	55	72		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=V_{OUT}+19V$		250		mA
Dropout Voltage	V_D			2		V

For 78D15 ($V_{IN}=23V$, $I_{OUT}=0.5A$, $C_I=0.33\mu F$, $C_O=0.1\mu F$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	14.4	15	15.6	V
		$V_{IN}=17.5\sim30V, I_{OUT}=5mA\sim0.5A$	14.25		15.75	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			150	mV
		$I_{OUT}=5mA\sim200mA$			75	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=18.5\sim30V$			150	mV
		$V_{IN}=17.5\sim30V, I_{OUT}=0.5A$			150	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=17.5\sim30V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	$10Hz\leq f\leq 100kHz$		90		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-1.8		mV/°C
Ripple Rejection	RR	$V_{IN}=18.5\sim28.5V, f=120Hz$	54	70		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=V_{OUT}+19V$		250		mA
Dropout Voltage	V_D			2		V

■ ELECTRICAL CHARACTERISTICS(Cont.)

For 78D18 ($V_{IN}=27V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	17.28	18	18.72	V
		$V_{IN}=21\sim33V$, $I_{OUT}=5mA\sim0.5A$	17.1		18.9	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			180	mV
		$I_{OUT}=5mA\sim200mA$			90	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=21\sim33V$			180	mV
		$V_{IN}=21\sim33V$, $I_{OUT}=0.5A$			180	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=21.5\sim33V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	10Hz $\leq f \leq$ 100kHz		110		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-2.2		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=22\sim32V$, $f=120Hz$	53	69		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2		V

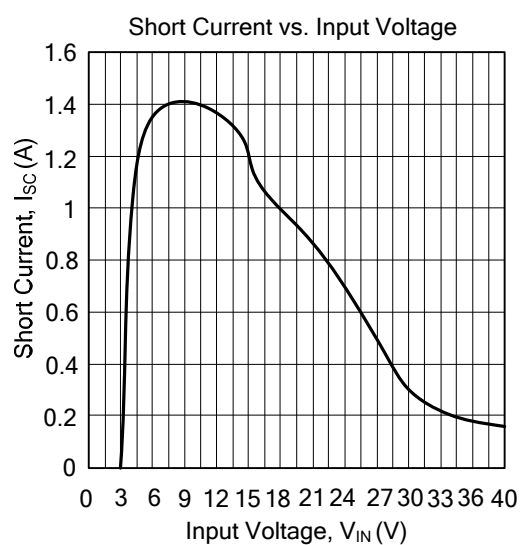
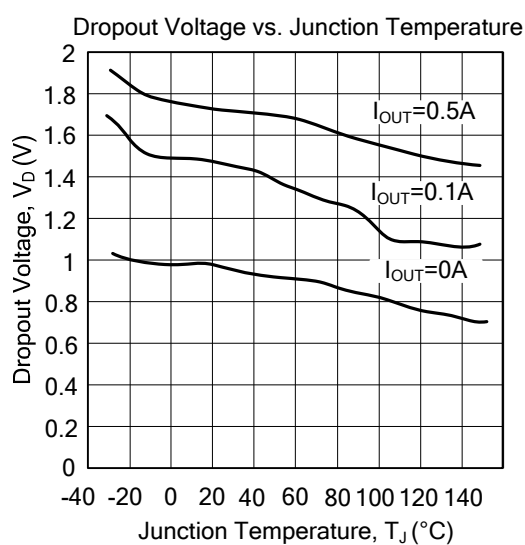
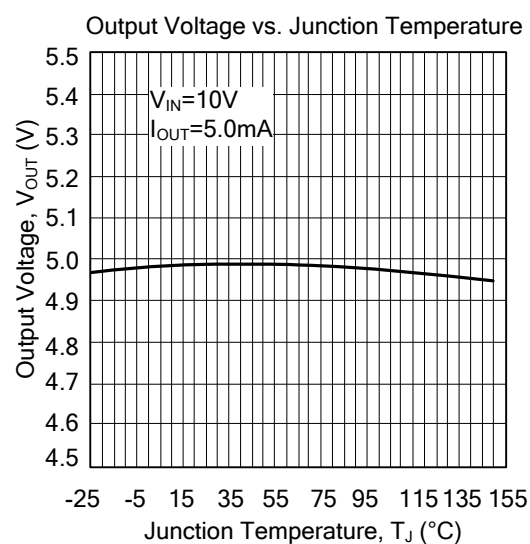
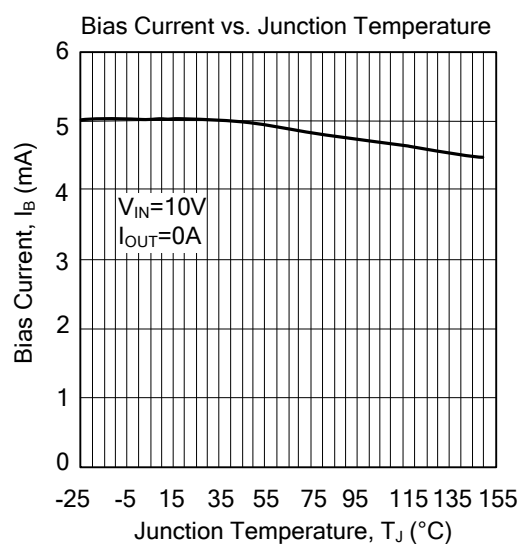
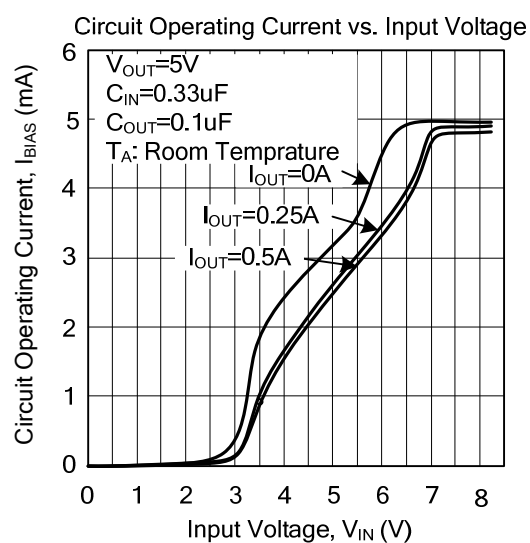
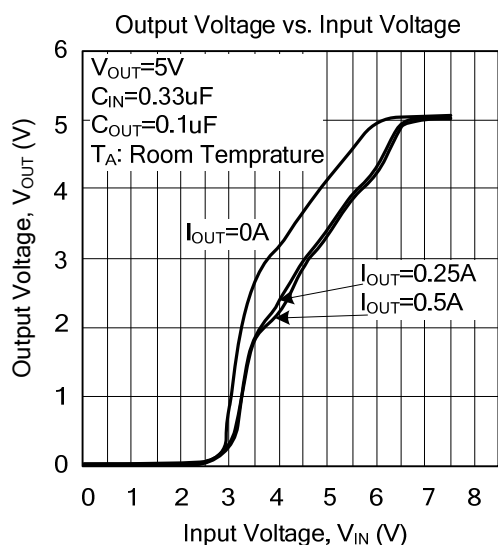
For 78D20 ($V_{IN}=29V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	19.20	20.0	20.80	V
		$V_{IN}=23\sim35V$, $I_{OUT}=5mA\sim0.5A$	19.00		21.00	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			200	mV
		$I_{OUT}=5mA\sim200mA$			100	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=23\sim35V$			200	mV
		$V_{IN}=23\sim35V$, $I_{OUT}=0.5A$			200	mV
Quiescent Current	I_Q	$I_{OUT}\leq 0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=23.5\sim35V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	10Hz $\leq f \leq$ 100kHz		130		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-2.6		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=24\sim34V$, $f=120Hz$	52	68		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2.0		V

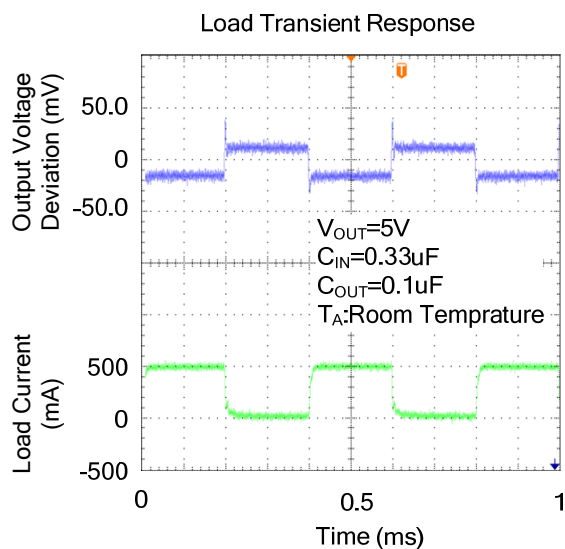
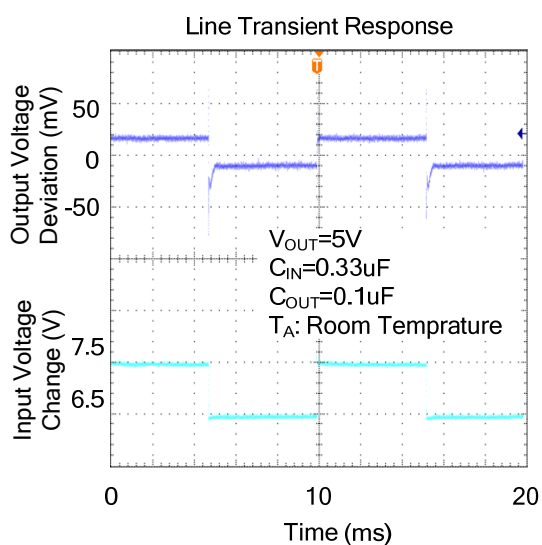
For 78D24 ($V_{IN}=33V$, $I_{OUT}=0.5A$)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Voltage	V_{OUT}	$I_{OUT}=5mA\sim0.5A$	23.04	24	24.96	V
		$V_{IN}=27\sim38V$, $I_{OUT}=5mA\sim0.5A$	22.8		25.2	V
Load Regulation	ΔV_{OUT}	$I_{OUT}=5mA\sim0.5A$			240	mV
		$I_{OUT}=5mA\sim200mA$			120	mV
Line Regulation	ΔV_{OUT}	$V_{IN}=27\sim38V$			240	mV
		$V_{IN}=27\sim38V$, $I_{OUT}=0.5A$			240	mV
Quiescent Current	I_Q	$I_{OUT}=0.5A$			8	mA
Quiescent Current Change	ΔI_Q	$V_{IN}=28\sim38V$			1	mA
		$I_{OUT}=5mA\sim0.5A$			0.5	mA
Output Noise Voltage	eN	10Hz $\leq f \leq$ 100kHz		170		μV
Temperature coefficient of V_{OUT}	$\Delta V_{OUT}/\Delta T$	$I_{OUT}=5mA$		-2.8		mV/ $^{\circ}C$
Ripple Rejection	RR	$V_{IN}=28\sim38V$, $f=120Hz$	50	66		dB
Peak Output Current	I_{PEAK}			1.2		A
Short-Circuit Current	I_{SC}	$V_{IN}=35V$		250		mA
Dropout Voltage	V_D			2		V

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS (Cont.)



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.