

# UTC M2950/2951 LINEAR INTEGRATED CIRCUIT

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## 250 mA LOW-DROPOUT VOLTAGE REGULATOR

### DESCRIPTION

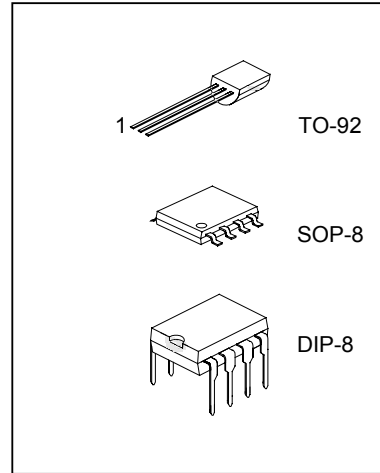
The UTC M2950/2951 is a monolithic integrated voltage regulator with low dropout voltage, and low quiescent current. It includes many features that suitable for different applications. Available in 3-pin TO-92, DIP-8 and SOP-8 packages.

### FEATURES

- \*High accuracy 2.5, 3.0, 3.3, 3.6 or 5V fixed output for TO-92, SOP-8 package.
- \*Extremely low quiescent current and dropout voltage.
- \*Extremely tight load and line regulation.
- \*Current and thermal limiting.
- \*Very low temperature coefficient.
- \*Logic controlled shutdown and error flag available for DIP and SOP package.
- \*Output voltage programmable for DIP and SOP package.

### APPLICATIONS

- \*Battery powered equipment.
- \*High efficient linear regulator down to 1.24V.
- \*Cellular phones.



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## PIN CONFIGURATIONS

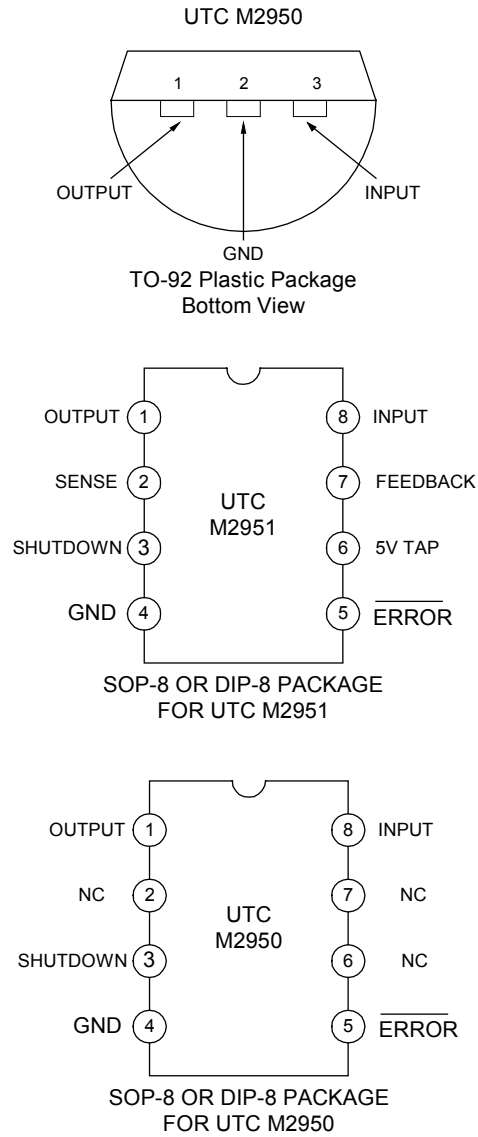
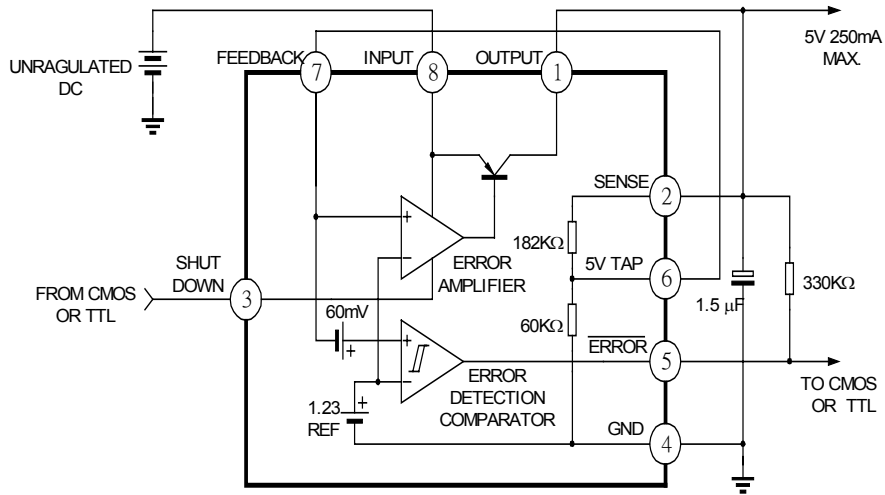


Fig. 1

# UTC M2950/2951 LINEAR INTEGRATED CIRCUIT

## BLOCK DIAGRAM



FOR UTC M2951

## ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	VALUE	UNIT
Supply Voltage	V <sub>cc</sub>	-0.3~+18	V
Feedback Voltage	V <sub>feedback</sub>	-1.5~+18	V
Shutdown Voltage	V <sub>shutdown</sub>	-0.3~+18	V
Comparator Output Voltage	V <sub>co</sub>	-0.3~+18	V
Storage Temperature	T <sub>str</sub>	-65~+150	°C
Operating Junction Temperature	T <sub>j</sub>	-40~+125	°C

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## ELECTRICAL CHARACTERISTICS

(Tested at  $T_j=25^{\circ}\text{C}$ ,  $V_{IN}=6\text{V}$ ,  $I_L=100\mu\text{A}$  and  $C_L=1\mu\text{F}$ , unless otherwise specified)

PARAMETER	PART NUMBER	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Output Voltage	UTC M2950-2.5	$T_j=25^{\circ}\text{C}$	2.45	2.5	2.55	V	
	UTC M2950-3.0		2.94	3.0	3.06		
	UTC M2950-3.3		3.23	3.3	3.36		
	UTC M2950-3.6		3.53	3.6	3.67		
	UTC M2950-5.0		4.90	5.0	5.10		
		UTC M2951	(note 1)				
		UTC M2950-2.5	$-25^{\circ}\text{C}\leq T_j\leq +85^{\circ}\text{C}$	2.45	2.5	2.55	V
		UTC M2950-3.0		2.94	3.0	3.06	
		UTC M2950-3.3		3.23	3.3	3.36	
		UTC M2950-3.6		3.53	3.6	3.67	
	UTC M2950-5.0	4.90		5.0	5.10		
	UTC M2951	(note 1)					
Output Voltage	UTC M2950-2.5	$100\mu\text{A}\leq I_L\leq 250\text{mA}$ $T_j\leq T_j(\text{max})$	2.45	2.5	2.55	V	
	UTC M2950-3.0		2.94	3.0	3.06		
	UTC M2950-3.3		3.23	3.3	3.36		
	UTC M2950-3.6		3.53	3.6	3.67		
	UTC M2950-5.0		4.90	5.0	5.10		
	UTC M2951		(note 1)				
Output Voltage Temperature Coefficient			20		100	ppm/ $^{\circ}\text{C}$	
Line Regulation		$6\text{V}\leq V_{IN}\leq 18\text{V}$	0.03	0.1	0.2	%	
Load Regulation		$100\mu\text{A}\leq I_L\leq 250\text{mA}$	0.04	0.1	0.2	%	
Dropout Voltage		$I_L=100\mu\text{A}$	50	80	150	mV	
		$I_L=250\text{mA}$ (note 2)	380	450	600		
Ground Current		$I_L=100\mu\text{A}$	75	120	140	$\mu\text{A}$	
		$I_L=250\text{mA}$	8	12	22	mA	
Dropout Ground Current		$V_{IN}=4.5\text{V}, I_L=100\mu\text{A}$	110	170	200	$\mu\text{A}$	
Current Limit		$V_{out}=0$	160	200	300	mA	
Output Noise 10Hz to 100KHz		$C_L=1\mu\text{F}$  $C_L=200\mu\text{F}$ $C_L=3.3\mu\text{F}$ (Bypass=0.01 $\mu\text{F}$ pins 7 to (UTC M2951))	260	280	430	$\mu\text{V}$	
	160						
			100				
For M2951 8-Pin version only							
Reference Voltage			1.22	1.235	1.25	V	
Reference Voltage		(Note 4)	1.19		1.27	V	
Feedback pin Bias Current				20	40	nA	
Reference Voltage Temperature Coefficient				50		ppm/ $^{\circ}\text{C}$	
Feedback Bias Current temperature Coefficient				0.1		nA/ $^{\circ}\text{C}$	
Error Comparator							

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PARAMETER	PART NUMBER	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Leakage Current		$V_{OH}=18V$			1	$\mu A$
Output Low Voltage		$V_{IN}=4.5V$ $I_{OL}=400\mu A$			250	mV
Upper Threshold Voltage		(Note 3)	3.2			% $V_O$
Lower Threshold Voltage		(Note 3)			7.6	% $V_O$
Hysteresis		(Note 3)		15		mV
Shutdown Input						
Input Logic Voltage		Low(Regulator ON) High(Regulator OFF)	2.0	1.3	0.70	V
Shutdown Pin Input Current		$V_{shutdown}=2.4V$		30	50	$\mu A$
		$V_{shutdown}=18V$		450	600	$\mu A$
Regulator Output Current Shutdown		$V_{shutdown}\geq 2V, V_{IN}\leq 18V,$ $V_{out}=0,$ Feedback pin tied to 5V Tap.		3	10	$\mu A$

Note 1: Additional conditions for 8-pin versions are feedback tied to 5V Tap an Output tied to Output Sense ( $V_{out}=5V$ ) and  $V_{shutdown}\leq 0.8V$ .

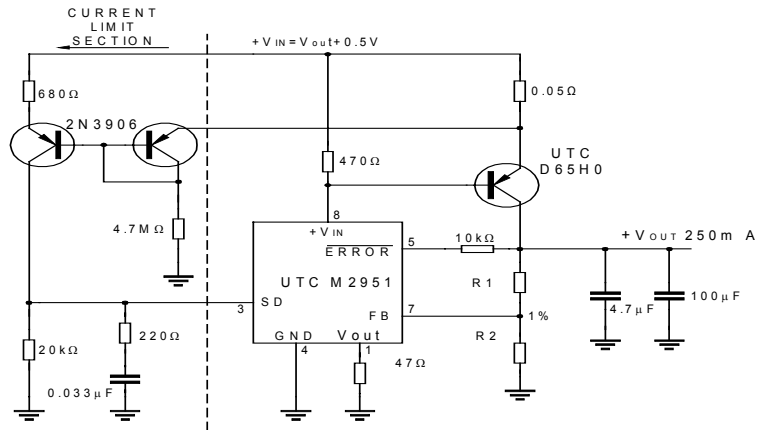
Note 2: Dropout Voltage is defined as the input to output differential at which the output voltage drops 100mV below its nominal value measured at 1V differential.

Note 3: Comparator thresholds are expressed in terms of percentage value of voltage output.

Note 4:  $V_{ref}\leq V_{out}\leq (V_{in}-1V)$ ,  $2.3V\leq V_{in}\leq 30V$ ,  $100\mu A\leq I_L\leq 250mA$ ,  $T_J\leq T_{JMAX}$

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APPLICATION CIRCUIT (10 Ampere Low Dropout Regulator)



$$V_{out} = 1.23V * (1 + R_1/R_2)$$

For 5V output use internal resistors. Wire pin 6 to 7 and wire pin 2 to +Vout

Fig.2

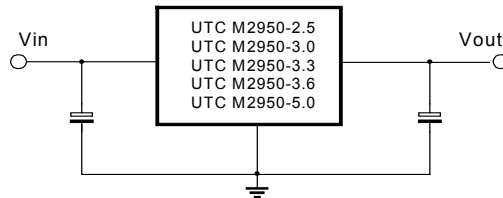


Fig.3

# UTC M2950/2951 LINEAR INTEGRATED CIRCUIT

## TYPICAL PERFORMANCE CHARACTERISTICS

Fig.4 Dropout Characteristics

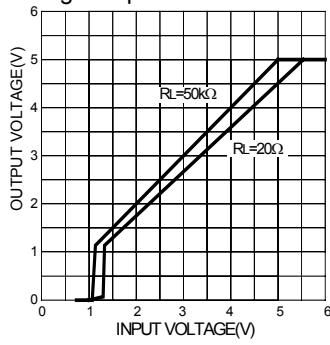


Fig.5 Input Current

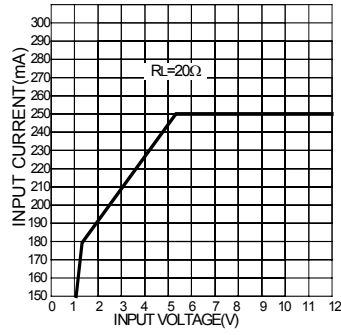


Fig. 6 Dropout Voltage

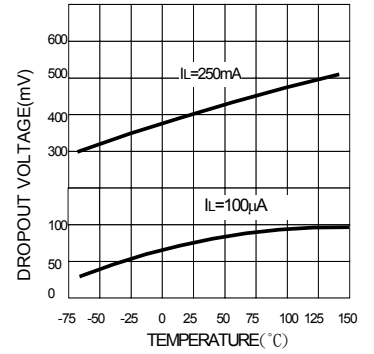


Fig. 7 Ground Pin Current

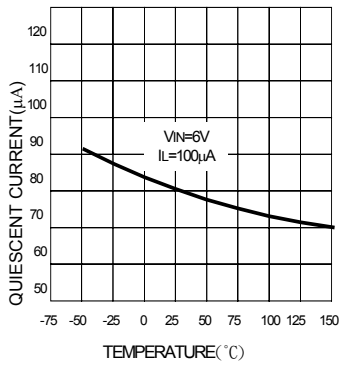


Fig. 8 Ground Pin Current

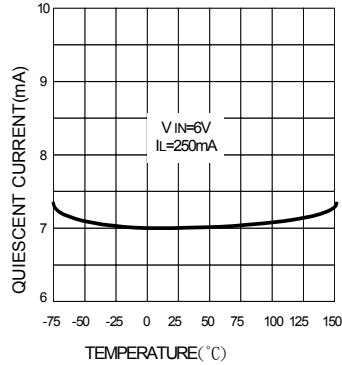


Fig. 9 Shutdown Threshold Voltage

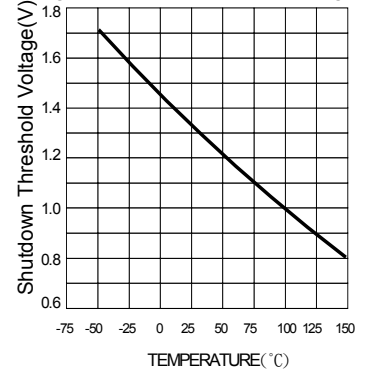


Fig. 10 Short Circuit Current

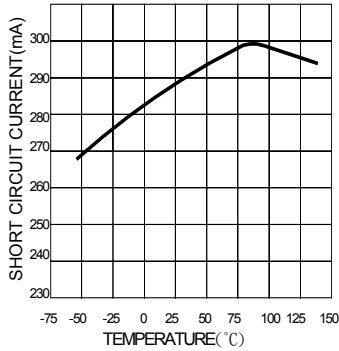


Fig. 11 Dropout Voltage

