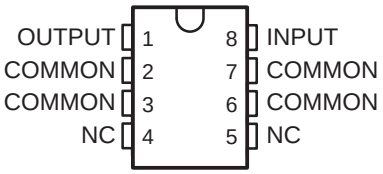
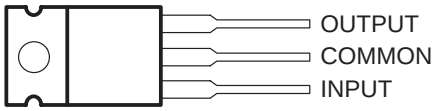
- **Very Low Dropout Voltage, Less Than 0.6 V at 150 mA**
- **Very Low Quiescent Current**
- **TTL- and CMOS-Compatible Enable on TL751L Series**
- **60-V Load-Dump Protection**
- **Reverse Transient Protection Down to –50 V**
- **Internal Thermal-Overload Protection**
- **Overvoltage Protection**
- **Internal Overcurrent-Limiting Circuitry**
- **Less Than 500-μA Disable (TL751L Series)**

TL750L . . . D PACKAGE
(TOP VIEW)



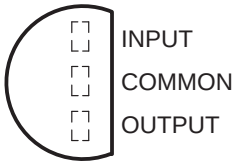
TL750L . . . KC PACKAGE
(TOP VIEW)



The common terminal is in electrical contact with the mounting base.

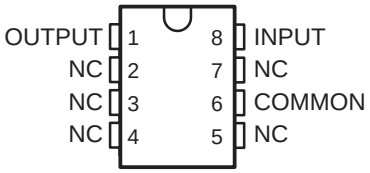
TO-220AB

TL750L . . . LP PACKAGE
(TOP VIEW)

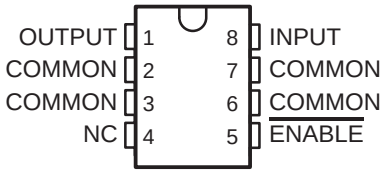


TO-226AA

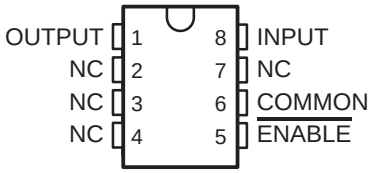
TL750L . . . P PACKAGE
(TOP VIEW)



TL751L . . . D PACKAGE
(TOP VIEW)



TL751L . . . P PACKAGE
(TOP VIEW)



NC – No internal connection

DEVICE COMPONENT COUNT	
Transistors	20
JFETs	2
Diodes	5
Resistors	16

description

The TL750L and TL751L series are low-dropout positive-voltage regulators specifically designed for battery-powered systems. These devices incorporate overvoltage and current-limiting protection circuitry, along with internal reverse-battery protection circuitry to protect the devices and the regulated system. The series is fully protected against 60-V load-dump and reverse-battery conditions. Extremely low quiescent current during full-load conditions makes these devices ideal for standby power systems.

The TL750L and TL751L series of fixed-output voltage regulators offers 5-V, 8-V, 10-V, and 12-V options. The TL751L series has the addition of an enable ($\overline{\text{ENABLE}}$) input. When $\overline{\text{ENABLE}}$ is high, the regulator output is placed in the high-impedance state. This gives the designer complete control over power up, power down, or emergency shutdown.

Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

description (continued)

The TL750LxxC and the TL751LxxC series are characterized for operation over the virtual junction temperature range of 0°C to 125°C . The TL750L05Q and TL751L05Q are characterized for operation over the virtual junction temperature range of –40°C to 125°C.

AVAILABLE OPTIONS

T_J	V_O TYP AT 25°C	PACKAGED DEVICES				
		SMALL OUTLINE (D)	HEAT-SINK MOUNTED (KC)	PLASTIC CYLINDRICAL (LP)	PLASTIC DIP (P)	CHIP FORM (Y)
0°C to 125°C	5 V	TL750L05CD TL751L05CD	TL750L05CKC	TL750L05CLP	TL750L05CP TL751L05CP	TL750L05Y
	8 V	TL750L08CD TL751L08CD	TL750L08CKC	TL750L08CLP	TL750L08CP TL751L08CP	TL750L08Y
	10 V	TL750L10CD TL751L10CD	TL750L10CKC	TL750L10CLP	TL750L10CP TL751L10CP	TL750L10Y
	12 V	TL750L12CD TL751L12CD	TL750L12CKC	TL750L12CLP	TL750L12CP TL751L12CP	TL750L12Y
–40°C to 125°C	5 V	TL750L05QD TL751L05QD	–	–	–	–

The D, KTE, and LP packages are available taped and reeled. The KTP is only available taped and reeled. Add R suffix to device type (e.g., TL750L05CDR). Chip forms are tested at 25°C.

absolute maximum ratings over operating junction temperature range (unless otherwise noted)†

		TL750Lxx TL751Lxx	UNIT
Continuous input voltage		26	V
Transient input voltage, T_A = 25°C (see Note 1)		60	V
Continuous reverse input voltage		–15	V
Transient reverse input voltage: t ≤ 100 ms		–50	V
Package thermal impedance, θ_{JA} (see Notes 2 and 3)	D package	97	°C
	KC package	22	
	LP package	156	
	P package	127	
Virtual junction temperature range, T_J		–40 to 150	°C
Lead temperature 1,6 mm (1/16 inch) for 10 seconds		260	°C
Storage temperature range, T_{stg}		–65 to 150	°C

† Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

NOTES: 1. The transient input voltage rating applies to the waveform shown in Figure 1.
2. Maximum power dissipation is a function of T_J(max), θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) – T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can impact reliability.
3. The package thermal impedance is calculated in accordance with JESD 51, except for through-hole packages, which use a trace length of zero.

recommended operating conditions over recommended operating junction temperature range (unless otherwise noted)

			MIN	MAX	UNITS
Input voltage, V_I		TL75xL05	6	26	V
		TL75xL08	9	26	
		TL75xL10	11	26	
		TL75xL12	13	26	
High-level $\overline{\text{ENABLE}}$ input voltage, V_{IH}		TL751Lxx	2	15	V
Low-level ENABLE input voltage, V_{IL}†	T_A = 25°C	TL751Lxx	–0.3	0.8	V
	T_A = full range‡	TL751Lxx	–0.15	0.8	
Output current range, I_O		TL75xLxx	0	150	mA
Operating virtual junction temperature, T_J		TL75xLxxC	0	125	°C
		TL75xL05Q	–40	125	

† The algebraic convention, in which the least positive (most negative) value is designated minimum, is used in this data sheet for $\overline{\text{ENABLE}}$ voltage levels and temperature only.
‡ Full range is 0°C to 125°C for the TL75xLxxC devices, and –40°C to 125°C for the TL75L05Q devices.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted) (see Note 4)

PARAMETER	TEST CONDITIONS§	TL750L05 TL751L05			UNIT
		MIN	TYP	MAX	
Output voltage		4.80	5	5.2	V
	T_J = T_J(min) to 125°C¶	4.75		5.25	
Input regulation voltage	V_I = 9 V to 16 V		5	10	mV
	V_I = 6 V to 26 V		6	30	
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz	60	65		dB
Output regulation voltage	I_O = 5 mA to 150 mA		20	50	mV
Dropout voltage	I_O = 10 mA			0.2	V
	I_O = 150 mA			0.6	
Output noise voltage	f = 10 Hz to 100 kHz		500		μV
Input bias current	I_O = 150 mA		10	12	mA
	V_I = 6 V to 26 V, I_O = 10 mA, T_J = T_J(min) to 125°C¶		1	2	
	$\overline{\text{ENABLE}}$ > 2 V			0.5	

§ Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.
¶ T_J(min) is 0°C for the TL75xLxxC devices, and –40°C for the TL75xLxxQ devices.
NOTE 4: For TL750L05Q/TL751L05Q, all characteristics are measured with a 0.1-μF tantalum capacitor on the output with equivalent series resistance within the guidelines shown in Figure 4.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			TL750L08 TL751L08			UNIT
				MIN	TYP	MAX	
Output voltage				7.68	8	8.32	V
	T_J = 0°C to 125°C			7.6		8.4	
Input regulation voltage	V_I = 10 V to 17 V				10	20	mV
	V_I = 9 V to 26 V				25	50	
Ripple rejection	V_I = 11 V to 21 V,	f = 120 Hz		60	65		dB
Output regulation voltage	I_O = 5 mA to 150 mA				40	80	mV
Dropout voltage	I_O = 10 mA					0.2	V
	I_O = 150 mA					0.6	
Output noise voltage	f = 10 Hz to 100 kHz				500		μV
Input bias current	I_O = 150 mA				10	12	mA
	V_I = 9 V to 26 V,	I_O = 10 mA,	T_J = 0°C to 125°C		1	2	
	$\overline{\text{ENABLE}}$ > 2 V					0.5	

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			TL750L10 TL751L10			UNIT
				MIN	TYP	MAX	
Output voltage				9.6	10	10.4	V
	T_J = 0°C to 125°C			9.5		10.5	
Input regulation voltage	V_I = 12 V to 19 V				10	25	mV
	V_I = 11 V to 26 V				30	60	
Ripple rejection	V_I = 12 V to 22 V,	f = 120 Hz		60	65		dB
Output regulation voltage	I_O = 5 mA to 150 mA				50	100	mV
Dropout voltage	I_O = 10 mA					0.2	V
	I_O = 150 mA					0.6	
Output noise voltage	f = 10 Hz to 100 kHz				700		μV
Input bias current	I_O = 150 mA				10	12	mA
	V_I = 11 V to 26 V,	I_O = 10 mA,	T_J = 0°C to 125°C		1	2	
	$\overline{\text{ENABLE}}$ > 2 V					0.5	

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	TL750L12 TL751L12			UNIT
		MIN	TYP	MAX	
Output voltage		11.52	12	12.48	V
	T_J = 0°C to 125°C	11.4		12.6	
Input regulation voltage	V_I = 14 V to 19 V		15	30	mV
	V_I = 13 V to 26 V		20	40	
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz	50	55		dB
Output regulation voltage	I_O = 5 mA to 150 mA		50	120	mV
Dropout voltage	I_O = 10 mA			0.2	V
	I_O = 150 mA			0.6	
Output noise voltage	f = 10 Hz to 100 kHz		700		μV
Input bias current	I_O = 150 mA		10	12	mA
	V_I = 13 V to 26 V, I_O = 10 mA, T_J = 0°C to 125°C		1	2	
	$\overline{\text{ENABLE}}$ > 2 V			0.5	

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	TL750L05Y			UNIT
		MIN	TYP	MAX	
Output voltage			5		V
Input regulation voltage	V_I = 9 V to 16 V		5		mV
	V_I = 6 V to 26 V		6		
Ripple rejection	V_I = 8 V to 18 V, f = 120 Hz		65		dB
Output regulation voltage	I_O = 5 mA to 150 mA		20		mV
Output noise voltage	f = 10 Hz to 100 kHz		500		μV
Input bias current	I_O = 150 mA		10		mA
	V_I = 6 V to 26 V, I_O = 10 mA		1		

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	TL750L08Y			UNIT
		MIN	TYP	MAX	
Output voltage			8		V
Input regulation voltage	V_I = 10 V to 17 V		10		mV
	V_I = 9 V to 26 V		25		
Ripple rejection	V_I = 11 V to 21 V, f = 120 Hz		65		dB
Output regulation voltage	I_O = 5 mA to 150 mA		40		mV
Output noise voltage	f = 10 Hz to 100 kHz		500		μV
Input bias current	I_O = 150 mA		10		mA
	V_I = 9 V to 26 V, I_O = 10 mA		1		

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	TL750L10Y			UNIT
		MIN	TYP	MAX	
Output voltage			10		V
Input regulation voltage	V_I = 12 V to 19 V		10		mV
	V_I = 11 V to 26 V		30		
Ripple rejection	V_I = 12 V to 22 V, f = 120 Hz		65		dB
Output regulation voltage	I_O = 5 mA to 150 mA		50		mV
Output noise voltage	f = 10 Hz to 100 kHz		700		μV
Input bias current	I_O = 150 mA		10		mA
	V_I = 11 V to 26 V, I_O = 10 mA		1		

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.

electrical characteristics, V_I = 14 V, I_O = 10 mA, T_J = 25°C (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	TL750L12Y			UNIT
		MIN	TYP	MAX	
Output voltage			12		V
Input regulation voltage	V_I = 14 V to 19 V		15		mV
	V_I = 13 V to 26 V		20		
Ripple rejection	V_I = 13 V to 23 V, f = 120 Hz		55		dB
Output regulation voltage	I_O = 5 mA to 150 mA		50		mV
Output noise voltage	f = 10 Hz to 100 kHz		700		μV
Input bias current	I_O = 150 mA		10		mA
	V_I = 13 V to 26 V, I_O = 10 mA		1		

† Pulse-testing techniques are used to maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately. All characteristics are measured with a 0.1-μF capacitor across the input and a 10-μF capacitor, with equivalent series resistance of less than 0.4 Ω, across the output.

TYPICAL CHARACTERISTICS

TRANSIENT INPUT VOLTAGE vs TIME

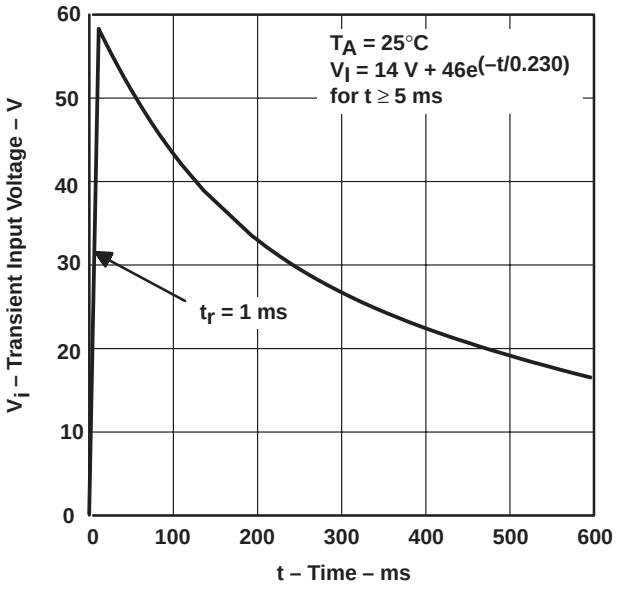


Figure 1

TL750L05 INPUT CURRENT vs INPUT VOLTAGE

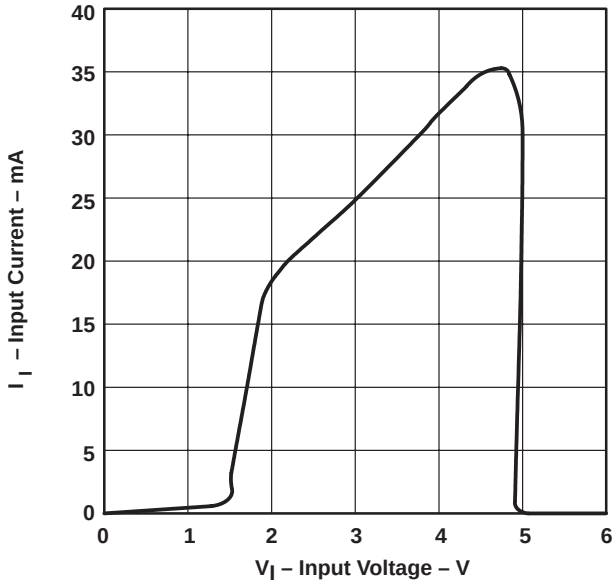


Figure 2

TL750L12 INPUT CURRENT vs INPUT VOLTAGE

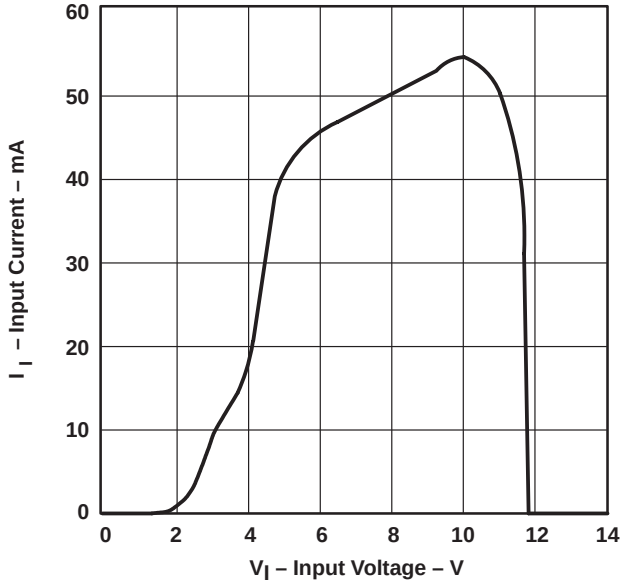


Figure 3

TYPICAL CHARACTERISTICS

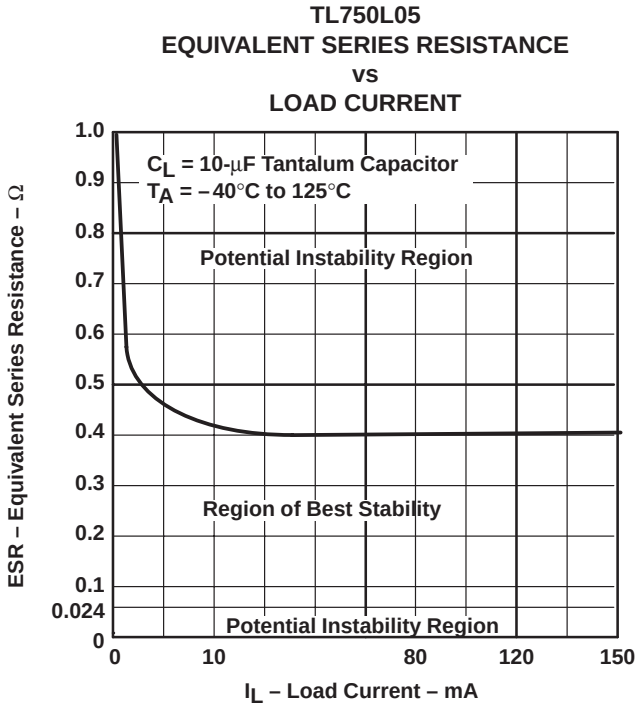


Figure 4

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