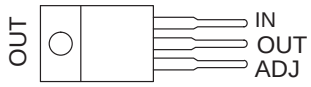
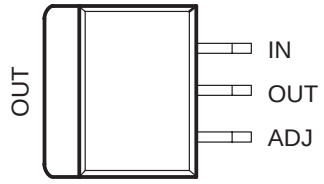
- **Output Adjustable From 1.25 V to 125 V When Used With an External Resistor Divider**
- **700-mA Output Current**
- **Full Short-Circuit, Safe-Operating-Area, and Thermal-Shutdown Protection**
- **0.001%/V Typical Input Voltage Regulation**
- **0.15% Typical Output Voltage Regulation**
- **76-dB Typical Ripple Rejection**

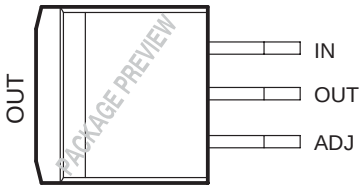
KC (TO-220) PACKAGE
(TOP VIEW)



KTE PACKAGE
(TOP VIEW)



KTT (TO-263) PACKAGE
(TOP VIEW)



description/ordering information

The TL783 is an adjustable three-terminal high-voltage regulator with an output range of 1.25 V to 125 V and a DMOS output transistor capable of sourcing more than 700 mA. It is designed for use in high-voltage applications where standard bipolar regulators cannot be used. Excellent performance specifications, superior to those of most bipolar regulators, are achieved through circuit design and advanced layout techniques.

As a state-of-the-art regulator, the TL783 combines standard bipolar circuitry with high-voltage double-diffused MOS transistors on one chip, to yield a device capable of withstanding voltages far higher than standard bipolar integrated circuits. Because of its lack of secondary-breakdown and thermal-runaway characteristics usually associated with bipolar outputs, the TL783 maintains full overload protection while operating at up to 125 V from input to output. Other features of the device include current limiting, safe-operating-area (SOA) protection, and thermal shutdown. Even if ADJ is disconnected inadvertently, the protection circuitry remains functional.

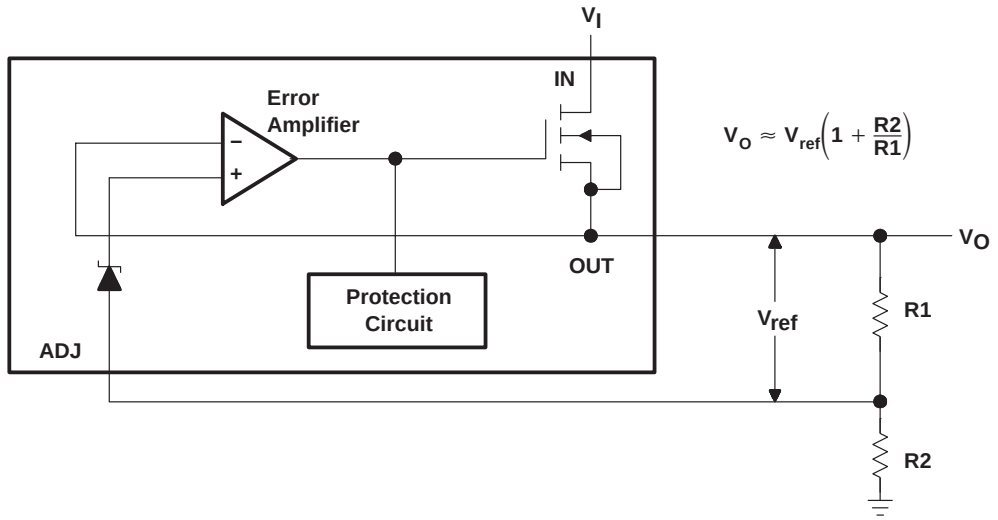
Only two external resistors are required to program the output voltage. An input bypass capacitor is necessary only when the regulator is situated far from the input filter. An output capacitor, although not required, improves transient response and protection from instantaneous output short circuits. Excellent ripple rejection can be achieved without a bypass capacitor at the adjustment terminal.

ORDERING INFORMATION

T_J	PACKAGE†		ORDERABLE PART NUMBER	TOP-SIDE MARKING
0°C to 125°C	Power Flex (KTE)	Reel of 2000	TL783CKTER	TL783
	TO-263 (KTT)	Tube of 50	TL783CKTT	PREVIEW
		Reel of 1000	TL783CKTTR	
	TO-220 (KC)	Tube of 50	TL783CKC	TL783C

† Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

functional block diagram



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

Input-to-output differential voltage, $V_I - V_O$ . . . . . 125 V
Operating virtual junction temperature, T_J . . . . . 150°C
Storage temperature range, T_{stg} . . . . . −65°C 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.

package thermal data (see Note 1)

PACKAGE	BOARD	θ_{JC}	θ_{JP}‡	θ_{JA}
Power Flex (KTE)	High K, JESD 51-5	–	2.7°C/W	23°C/W
TO-263 (KTT)	High K, JESD 51-5	TBD	TBD	TBD
TO-220 (KC)	High K, JESD 51-5	17°C/W	3°C/W	19°C/W

NOTE 1: 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 affect reliability. Due to variations in individual device electrical characteristics and thermal resistance, the built-in thermal overload protection may be activated at power levels slightly above or below the rated dissipation.

‡ For packages with exposed thermal pads, such as QFN, PowerPAD, or PowerFLEX, θ_{JP} is defined as the thermal resistance between the die junction and the bottom of the exposed pad.

recommended operating conditions

			MIN	MAX	UNIT
$V_I - V_O$	Input-to-output voltage differential			125	V
I_O	Output current		15	700	mA
T_J	Operating virtual junction temperature	TL783C	0	125	°C

electrical characteristics at $V_I - V_O = 25$ V, $I_O = 0.5$ A, $T_J = 0°C$ to $125°C$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS†			TL783C			UNIT
				MIN	TYP	MAX	
Input voltage regulation‡	$V_I - V_O$ = 20 V to 125 V,	P ≤ rated dissipation	T_J = 25°C		0.001	0.01	%/V
			T_J = 0°C to 125°C		0.004	0.02	
Ripple rejection	$\Delta V_{I(PP)}$ = 10 V,	V_O = 10 V,	f = 120 Hz	66	76		dB
Output voltage regulation	I_O = 15 mA to 700 mA,	T_J = 25°C	$V_O \le 5$ V		7.5	25	mV
			$V_O \ge 5$ V		0.15	0.5	%
	I_O = 15 mA to 700 mA,	P ≤ rated dissipation	$V_O \le 5$ V		20	70	mV
			$V_O \ge 5$ V		0.3	1.5	%
Output voltage change with temperature					0.4		%
Output voltage long-term drift	1000 hours at T_J = 125°C,	$V_I - V_O$ = 125 V			0.2		%
Output noise voltage	f = 10 Hz to 10 kHz,	T_J = 25°C			0.003		%
Minimum output current to maintain regulation	$V_I - V_O$ = 125 V					15	mA
Peak output current	$V_I - V_O$ = 25 V,	t = 1 ms			1100		mA
	$V_I - V_O$ = 15 V,	t = 30 ms			715		
	$V_I - V_O$ = 25 V,	t = 30 ms		700	900		
	$V_I - V_O$ = 125 V,	t = 30 ms		100	250		
ADJ input current					83	110	μA
Change in ADJ input current	$V_I - V_O$ = 15 V to 125 V,	I_O = 15 mA to 700 mA,	P ≤ rated dissipation		0.5	5	μA
Reference voltage (OUT to ADJ)	$V_I - V_O$ = 10 V to 125 V, See Note 2	I_O = 15 mA to 700 mA,	P ≤ rated dissipation,	1.2	1.27	1.3	V

† Pulse-testing techniques maintain the junction temperature as close to the ambient temperature as possible. Thermal effects must be taken into account separately.

‡ Input voltage regulation is expressed here as the percentage change in output voltage per 1-V change at the input.

NOTE 2: Due to the dropout voltage and output current-limiting characteristics of this device, output current is limited to less than 700 mA at input-to-output voltage differentials of less than 25 V.

PACKAGING INFORMATION

Orderable Device	Status (1)	Package Type	Package Drawing	Pins	Package Qty	Eco Plan (2)	Lead/Ball Finish	MSL Peak Temp (3)
TL783CKC	ACTIVE	TO-220	KC	3		TBD	Call TI	Call TI
TL783CKTER	ACTIVE	PFM	KTE	3	2000	TBD	CU SNPB	Level-1-220C-UNLIM

(1) The marketing status values are defined as follows:
ACTIVE: Product device recommended for new designs.
LIFEBUY: TI has announced that the device will be discontinued, and a lifetime-buy period is in effect.
NRND: Not recommended for new designs. Device is in production to support existing customers, but TI does not recommend using this part in a new design.
PREVIEW: Device has been announced but is not in production. Samples may or may not be available.
OBSOLETE: TI has discontinued the production of the device.

(2) Eco Plan - The planned eco-friendly classification: Pb-Free (RoHS) or Green (RoHS & no Sb/Br) - please check http://www.ti.com/productcontent for the latest availability information and additional product content details.
TBD: The Pb-Free/Green conversion plan has not been defined.
Pb-Free (RoHS): TI's terms "Lead-Free" or "Pb-Free" mean semiconductor products that are compatible with the current RoHS requirements for all 6 substances, including the requirement that lead not exceed 0.1% by weight in homogeneous materials. Where designed to be soldered at high temperatures, TI Pb-Free products are suitable for use in specified lead-free processes.
Green (RoHS & no Sb/Br): TI defines "Green" to mean Pb-Free (RoHS compatible), and free of Bromine (Br) and Antimony (Sb) based flame retardants (Br or Sb do not exceed 0.1% by weight in homogeneous material)

(3) MSL, Peak Temp. -- The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications, and peak solder temperature.