

TL-SCSI285 FIXED-VOLTAGE REGULATORS FOR SCSI ACTIVE TERMINATION

SLVS065F – NOVEMBER 1991 – REVISED JULY 1999

- Fully Matches Parameters for SCSI Alternative 2 Active Termination
- Fixed 2.85-V Output
- $\pm 1\%$ Maximum Output Tolerance at $T_J = 25^\circ\text{C}$
- 0.7-V Maximum Dropout Voltage
- 620-mA Output Current
- $\pm 2\%$ Absolute Output Variation
- Internal Overcurrent-Limiting Circuitry
- Internal Thermal-Overload Protection
- Internal Overvoltage Protection

description

The TL-SCSI285 is a low-dropout (0.7-V) fixed-voltage regulator specifically designed for small computer systems interface (SCSI) alternative 2 active signal termination. The TL-SCSI285 0.7-V maximum dropout ensures compatibility with existing SCSI systems, while providing a wide TERMPWR voltage range. At the same time, the $\pm 1\%$ initial tolerance on its 2.85-V output voltage ensures a tighter line-driver current tolerance, thereby increasing the system noise margin.

The fixed 2.85-V output voltage of the TL-SCSI285 supports the SCSI alternative 2 termination standard, while reducing system power consumption. The 0.7-V maximum dropout voltage brings increased TERMPWR isolation, making the device ideal for battery-powered systems. The TL-SCSI285, with internal current limiting, overvoltage protection, ESD protection, and thermal protection, offers designers enhanced system protection and reliability.

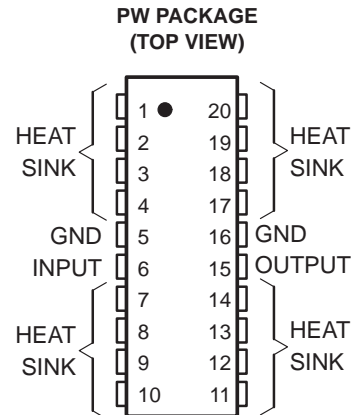
When configured as a SCSI active terminator, the TL-SCSI285 low-dropout regulator eliminates the 220- Ω and the 330- Ω resistors required for each transmission line with a passive termination scheme, reducing significantly the continuous system power drain. When placed in series with 110- Ω resistors, the device matches the impedance level of the transmission cable and eliminates reflections.

The TL-SCSI285 is characterized for operation over the virtual junction temperature range of 0°C to 125°C .

AVAILABLE OPTIONS

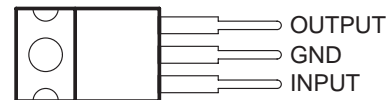
T _J	PACKAGED DEVICES		CHIP FORM (Y)
	PLASTIC POWER (KC)	SURFACE MOUNT (PW)	
0°C to 125°C	TL-SCSI285KC	TL-SCSI285PWR	TL-SCSI285Y

The PW package is only available taped and reeled. Chip forms are tested at 25°C .



HEAT SINK – These terminals have an internal resistive connection to ground and should be grounded or electrically isolated.

KC PACKAGE (TOP VIEW)



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



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

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

Continuous input voltage, V_I	7.5 V
Operating virtual junction temperature range, T_J	-55°C to 150°C
Package thermal impedance, θ_{JA} (see Notes 1 and 2): KC package	22°C/W
PW package	83°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 60 seconds: KC or PW package	260°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.

- NOTES:
- Maximum power dissipation is a function of $T_J(\text{max})$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(\text{max}) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can impact 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.
 - 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

		TL-SCSI285		UNIT
		MIN	MAX	
Input voltage, V_I	$T_J = 25^\circ\text{C}$			V
Input voltage, V_I	$T_J = 0^\circ\text{C}$ to 125°C	3.55	5.5	V
Output current, I_O	KC package	0	620	mA
	PW package	0	500	
Operating virtual junction temperature range, T_J		0	125	°C

electrical characteristics, $V_I = 4.5\text{ V}$, $I_O = 500\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS‡	TL-SCSI285KC			UNIT
		MIN	TYP	MAX	
Output voltage	$I_O = 20\text{ mA}$ to 500 mA , $V_I = 3.55\text{ V}$ to 5.5 V , $T_J = 25^\circ\text{C}$	2.82	2.85	2.88	V
	$I_O = 500\text{ mA}$ to 620 mA , $V_I = 3.65\text{ V}$ to 5.5 V , $T_J = 0$ to 125°C	2.79		2.91	
Input regulation	$V_I = 3.55\text{ V}$ to 5.5 V		5	15	mV
Ripple rejection	$f = 120\text{ Hz}$, $V_{\text{ripple}} = 1 V_{O(\text{PP})}$		-62		dB
Output regulation	$I_O = 20\text{ mA}$ to 620 mA		5	30	mV
	$I_O = 20\text{ mA}$ to 500 mA		5	30	
Output noise voltage	$f = 10\text{ Hz}$ to 100 kHz		500		μV
Dropout voltage	$I_O = 500\text{ mA}$			0.7	V
	$I_O = 620\text{ mA}$			0.8	
Bias current	$I_O = 0$		2	5	mA
	$I_O = 27\text{ mA}$, equivalent 1 line asserted		3	6	
	$I_O = 500\text{ mA}$, equivalent 18 lines asserted (8-bit)		26	49	
	$I_O = 620\text{ mA}$		37	62	

‡ Pulse-testing techniques are used to maintain the virtual 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 22.0- μF tantalum capacitor with equivalent series resistance of 1.5 Ω on the output.



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electrical characteristics, $V_I = 4.5\text{ V}$, $I_O = 500\text{ mA}$, $T_J = 25^\circ\text{C}$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS†	TL-SCSI285PW			UNIT	
		MIN	TYP	MAX		
Output voltage	$I_O = 20\text{ mA to }500\text{ mA}$, $V_I = 3.55\text{ V to }5.5\text{ V}$	$T_J = 25^\circ\text{C}$	2.82	2.85	2.88	V
		$T_J = 0\text{ to }125^\circ\text{C}$	2.79		2.91	
Input regulation	$V_I = 3.55\text{ V to }5.5\text{ V}$		5	15	mV	
Ripple rejection	$f = 120\text{ Hz}$, $V_{\text{ripple}} = 1\text{ V}_O(\text{PP})$		-62		dB	
Output regulation	$I_O = 20\text{ mA to }500\text{ mA}$		5	30	mV	
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$		500		μV	
Dropout voltage	$I_O = 500\text{ mA}$			0.7	V	
Bias current	$I_O = 0$		2	5	mA	
	$I_O = 27\text{ mA}$, equivalent 1 line asserted		3	6		
	$I_O = 500\text{ mA}$, equivalent 18 lines asserted (8-bit)		26	49		

† Pulse-testing techniques are used to maintain the virtual 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 22.0- μF tantalum capacitor with equivalent series resistance of 1.5 Ω on the output.

electrical characteristics, $V_I = 4.5\text{ V}$, $I_O = 500\text{ mA}$, $T_J = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS†	TL-SCSI285Y			UNIT
		MIN	TYP	MAX	
Output voltage	$I_O = 20\text{ mA to }500\text{ mA}$, $V_I = 3.55\text{ V to }5.5\text{ V}$		2.85		V
Input regulation	$V_I = 3.55\text{ V to }5.5\text{ V}$		5		mV
Ripple rejection	$f = 120\text{ Hz}$, $V_{\text{ripple}} = 1\text{ V}_O(\text{PP})$		-62		dB
Output regulation	$I_O = 20\text{ mA to }620\text{ mA}$		5		mV
	$I_O = 20\text{ mA to }500\text{ mA}$		5		
Output noise voltage	$f = 10\text{ Hz to }100\text{ kHz}$		500		μV
Bias current	$I_O = 0$		2		mA
	$I_O = 27\text{ mA}$, equivalent 1 line asserted		3		
	$I_O = 500\text{ mA}$, equivalent 18 lines asserted (8-bit)		26		
	$I_O = 620\text{ mA}$		37		

† Pulse-testing techniques are used to maintain the virtual 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 22.0- μF tantalum capacitor with equivalent series resistance of 1.5 Ω on the output.

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APPLICATION INFORMATION

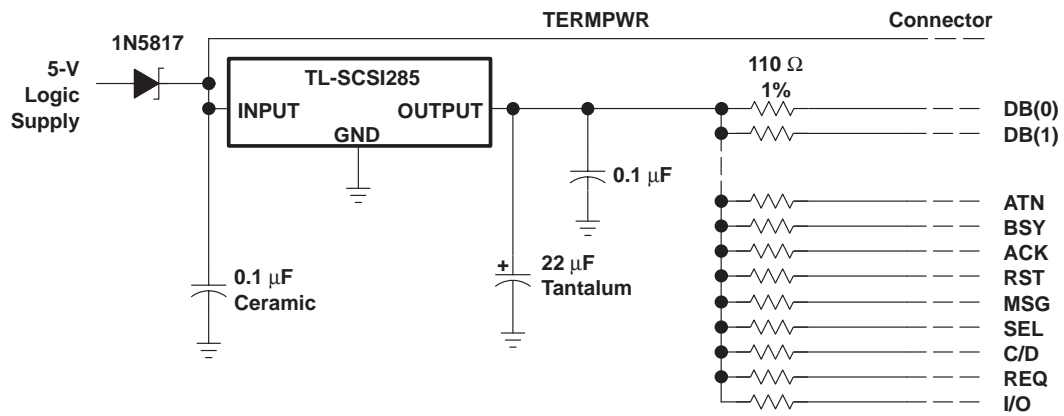


Figure 1. Typical Application Schematic

COMPENSATION CAPACITOR SELECTION INFORMATION

The TL-SCSI285 is a low-dropout regulator. This means that the capacitance loading is important to the performance of the regulator because it is a vital part of the control loop. The capacitor value and the equivalent series resistance (ESR) both affect the control loop and must be defined for the load range and the temperature range. Figures 2 and 3 can be used to establish the capacitance value and ESR range for best regulator performance.

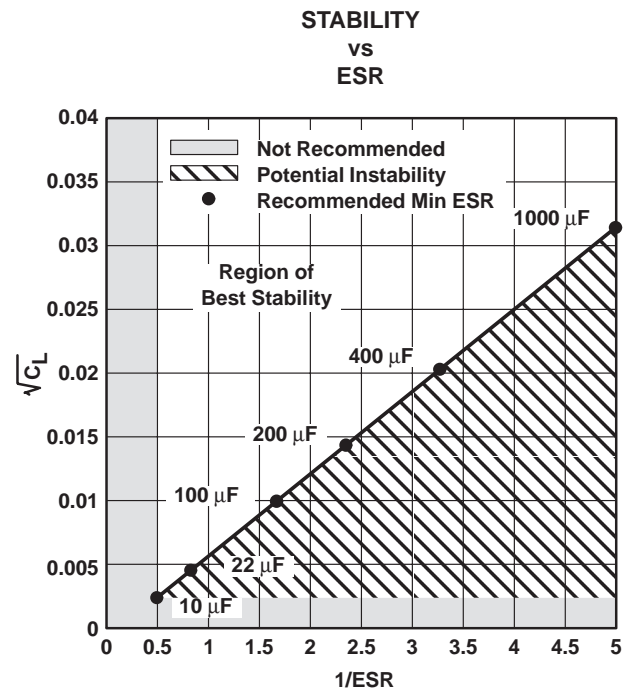
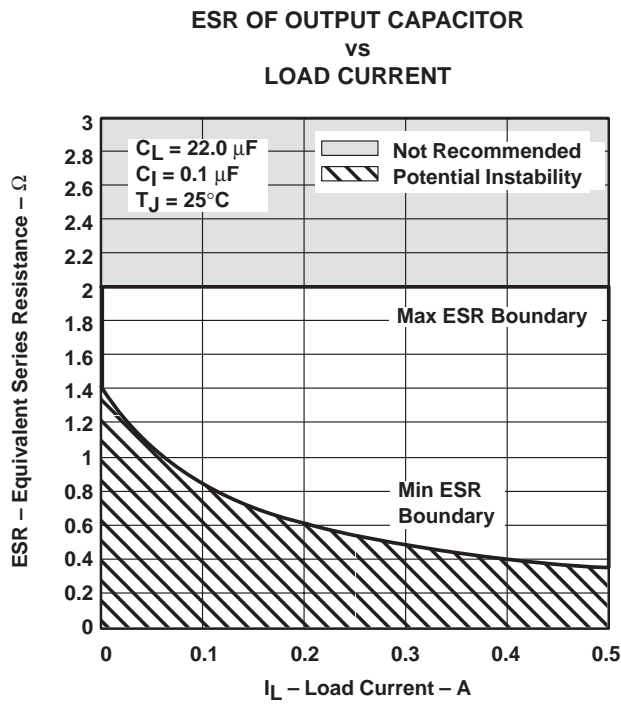


Figure 3

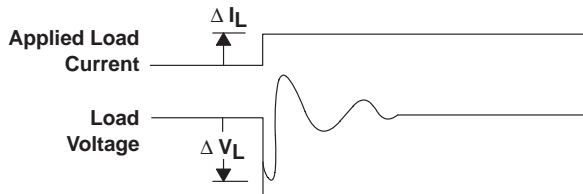


Figure 2

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