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REG5608

LOW CAPACITANCE 18-Line SCSI ACTIVE TERMINATOR

FEATURES

- ACTIVE 18-Line TERMINATOR
- 2pF CAPACITANCE PER LINE
IMPORTANT FOR SCSI FAST-20
- ON-CHIP TERMINATION RESISTORS
- ALL TERMINATIONS DISCONNECT WITH
SINGLE LOGIC SIGNAL
- 325mA CURRENT SINKING FOR ACTIVE
NEGATION
- 22.4mA PER LINE DURING ASSERTION
- CURRENT LIMIT AND THERMAL LIMIT
- HOT-SOCKET CAPABLE
- 28-Lead SOIC and SSOP PACKAGES

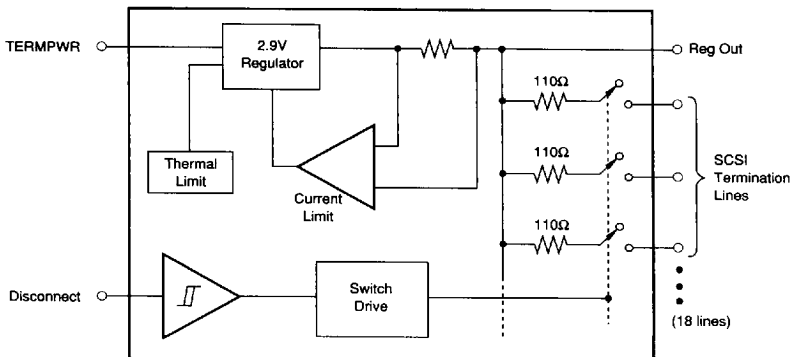
DESCRIPTION

The REG5608 is a low capacitance 18-line active terminator for SCSI (Small Computer Systems Interface) parallel bus systems. On-chip resistors and voltage regulator provide the prescribed SCSI bus termination. Low line capacitance (2pF) meets requirements for high data rate systems.

All terminations can be disconnected from the bus with a single logic control line. In the disconnect mode, output lines remain high impedance with or without power applied. This allows "hot socket" equipment plugging as required for "plug and play" applications.

The internal voltage regulator is temperature-compensated to assure proper termination characteristics over a wide operating range. Output current and thermal limit circuitry protect against damage.

The REG5608 is available in 28-lead SOIC and fine-pitch SSOP packages and is specified for 0°C to 70°C operation.



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SPECIFICATIONS

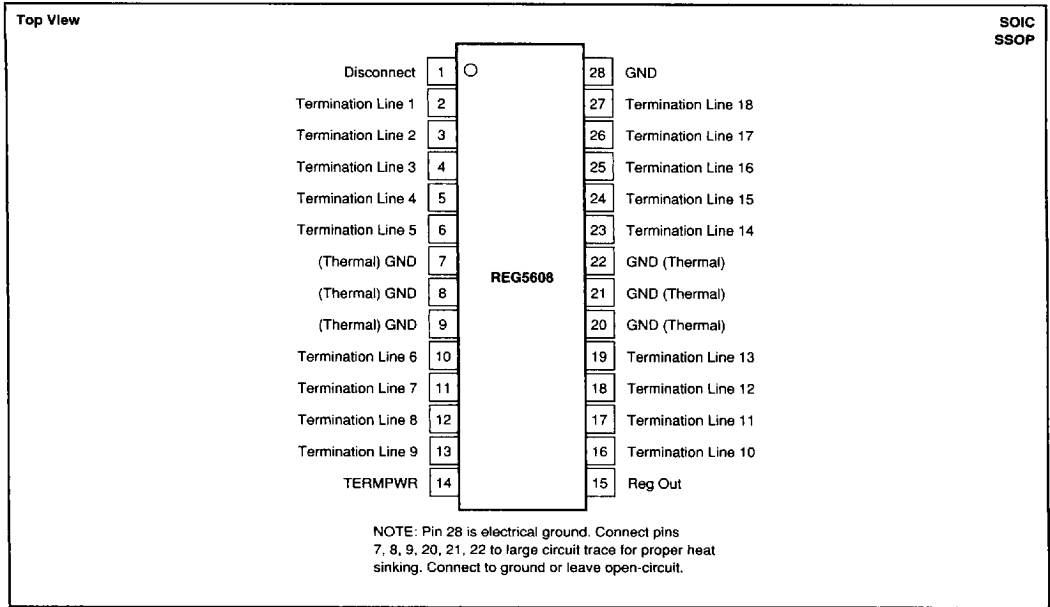
At $T_A = 0^\circ\text{C}$ to $+70^\circ\text{C}$, $\text{TERMPWR} = 4.75\text{V}$, and Disconnect = Low and $I_{\text{REG OUT}} = 0$, unless otherwise specified.

PARAMETERS	CONDITIONS	REG5608U REG5608E			UNITS
		MIN	TYP	MAX	
POWER SUPPLY TERMPWR Supply Voltage TERMPWR Supply Current	All Termination Lines Open Circuit All $V_{\text{LINE}} = 0.5\text{V}$ Disconnect = High	4		5.25	V
			18	25	mA
			390	430	mA
			5		mA
TERMINATION LINES Termination Impedance Output Termination High Voltage ⁽¹⁾ Maximum Line Current Line Leakage Current Line Capacitance REG5608U SO-28 Package REG5608E SSOP-28	$\Delta I_{\text{LINE}} = 5$ to 15mA $\text{TERMPWR} = 4.0\text{V}$ $V_{\text{LINE}} = 0.5\text{V}$ $T_A = 0^\circ\text{C}$ to 70°C $T_A = 25^\circ\text{C}$ $\text{TERMPWR} = 4.0\text{V}$, $T_A = 0^\circ\text{C}$ to 70°C ⁽¹⁾ $\text{TERMPWR} = 4.0\text{V}$, $T_A = 25^\circ\text{C}$ ⁽¹⁾ Disconnect = High $\text{TERMPWR} = 5.25\text{V}$, $V_{\text{LINE}} = 0\text{V}$ $\text{TERMPWR} = 5.25\text{V}$, $V_{\text{LINE}} = 5.25\text{V}$ $\text{TERMPWR} = 0\text{V}$, $V_{\text{LINE}} = 5.25\text{V}$ Disconnect = High	104.5	110	115.5	Ω
		2.65	2.9	3.0	V
		19.8	21.5	22.4	mA
		20.3	21.5	22.4	mA
		19.0	21.5	22.4	mA
		19.5	21.5	22.4	mA
			10	400	nA
			10	400	nA
			10	400	nA
			2.5		pF
	1.8		pF		
REGULATOR Output Voltage Line Regulation Drop-Out Voltage Source Current Limit Sink Current Limit Thermal Shutdown, T_J	All $V_{\text{LINE}} = 0.5\text{V}$, $\Delta\text{Reg Out} = 100\text{mV}$ Reg Out = 0V Reg Out = 3.5V	2.8	2.9	3.0	V
			2	20	mV
			0.9	1.2	V
		400	550	950	mA
		100	325	500	mA
			145		$^\circ\text{C}$
DISCONNECT LOGIC INPUT Input High Voltage Input Low Voltage Input Low Current Threshold Hysteresis	(Logic High = Switches Open) (Logic Low = Switches Closed)	2		TERMPWR	V
		0		0.8	V
			10	20	μA
			50		mV
TEMPERATURE RANGE Specification Storage θ_{JA} (Junction to Lead)		0	25	70	$^\circ\text{C}$
		-40		150	$^\circ\text{C}$
			20		$^\circ\text{C/W}$

NOTE: (1) Measurement of each termination line while the other 17 lines are held low ($V_{\text{LINE}} = 0.5\text{V}$).

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CONNECTION DIAGRAM



ABSOLUTE MAXIMUM RATINGS

TERMPWR Voltage	+7V
Signal Line Voltage	0V to +7V
Junction Temperature	+150°C
Storage Temperature	-40°C to +150°C

PACKAGE/ORDERING INFORMATION

MODEL	PACKAGE	PACKAGE DRAWING NUMBER ⁽¹⁾
REG5608U	Plastic 28-Lead SOIC	217
REG5608E	Plastic 28-Lead SSOP	324

NOTE: (1) For detailed drawing and dimension table, please see end of data sheet, or Appendix C of Burr-Brown IC Data Book.



ELECTROSTATIC DISCHARGE SENSITIVITY

This integrated circuit can be damaged by ESD. Burr-Brown recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

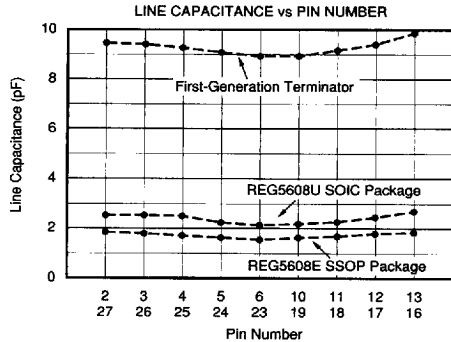
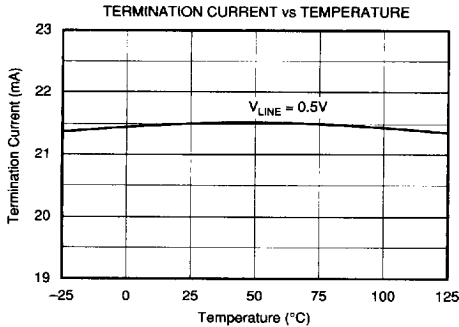
REG5608

REFERENCES AND REGULATORS



TYPICAL PERFORMANCE CURVES

$T_A = 25^\circ\text{C}$, $\text{TERMPWR} = 4.75\text{V}$ unless otherwise noted.



APPLICATION INFORMATION

Figure 1 shows a typical SCSI parallel bus termination circuit. Bypass capacitors should be connected to TERMPWR and Reg Out pins as shown.

Line capacitance of the REG5608 has been reduced to less than one-fourth that of the first-generation integrated terminator ICs. Capacitance difference between package types and variation by pin number is shown in the typical performance curve, "Line Capacitance vs Pin Number." It shows that the SSOP package provides the lowest capacitance with typical values under 2pF. This variation is produced primarily by the differences in the interconnection length to the IC. Of course, actual line capacitance on a circuit board is generally determined by circuit board layout. To achieve lowest line capacitance, minimize the total circuit board interconnection length from the interface cable to the SCSI transceiver IC and to the REG5608 terminator.

THERMAL CONSIDERATIONS

The REG5608 has internal current limit and thermal shutdown that protect it from damage in case of output short-circuit or overload. The current limit is approximately 550mA and thermal shutdown activates at a junction temperature of approximately 145°C. For good long-term reliability, the junction temperature should not exceed 125°C. Any tendency to activate the thermal

shutdown during normal operation is an indication of inadequate heat sinking and/or excessive power dissipation.

The terminator's internal power is dissipated primarily by conduction through the package leads to circuit board traces. It is important to connect the six thermal ground leads (7, 8, 9, 20, 21, 22) to a large circuit trace—see Figure 2. Typical measured values of thermal resistance for various circuit board materials are shown. These are approximate values. Variations in circuit board pattern, mounting techniques, air flow, proximity to other circuit boards and heat sources will affect thermal performance.

A simple experiment will determine whether the actual circuit board layout is adequate (i.e., θ_{BA} is low enough) so that the maximum recommended junction temperature of the REG5608 will not be exceeded. The procedure uses the internal thermal shutdown feature of the REG5608 (at $T_J \approx 145^\circ\text{C}$) to determine when the junction is approximately 20°C above the maximum recommended junction temperature ($T_J = 125^\circ\text{C}$). Operate the circuit with normal or other desired test electrical conditions. Increase the ambient temperature and determine the value at which thermal limit occurs (by sensing a sudden drop in V_{REG} output). At this point T_J is approximately 145°C. If this occurs at an ambient temperature of more than 20°C above the system ambient temperature design goal, the T_J will not exceed 125°C under the same electrical conditions when the ambient temperature is at the system design goal value.

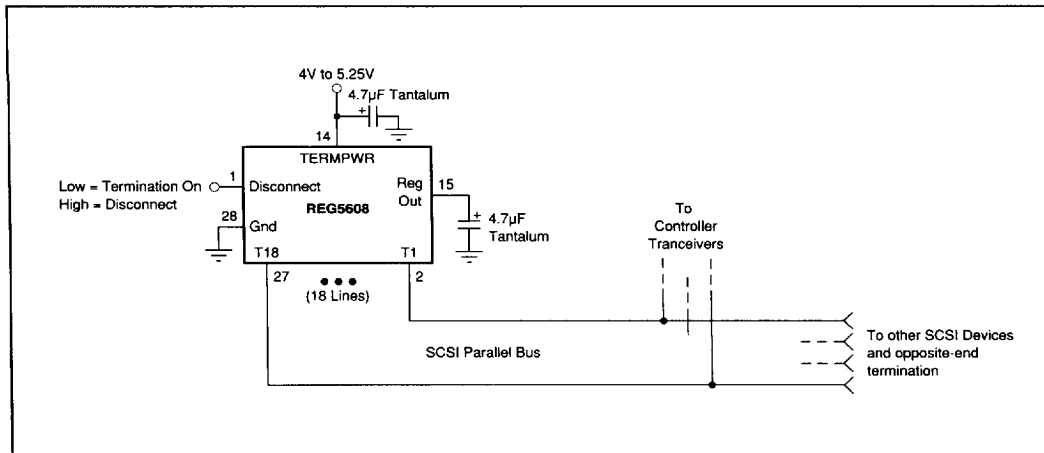
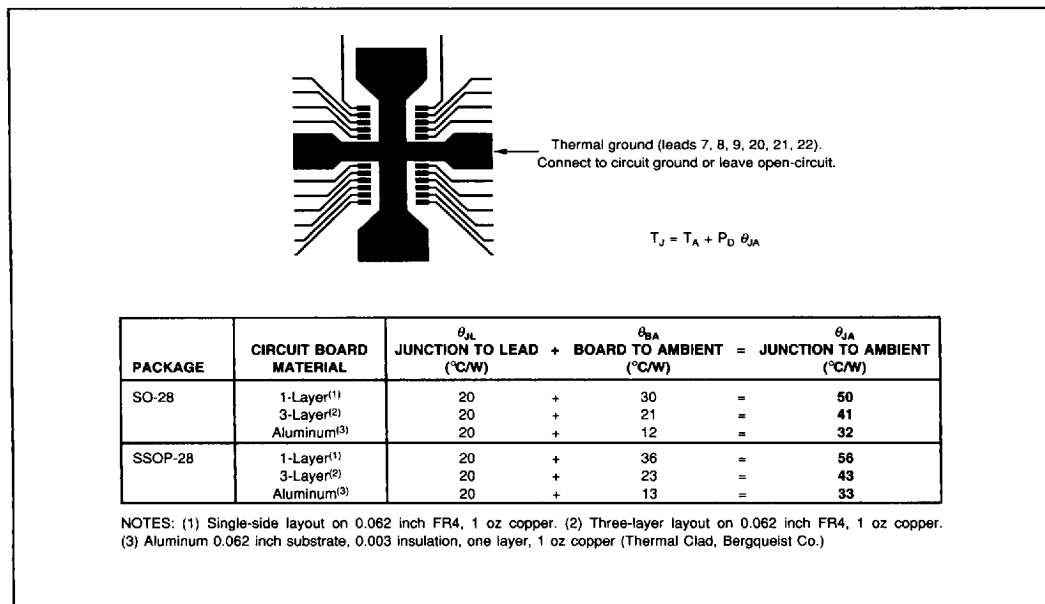


FIGURE 1. SCSI Parallel Bus Termination.



PACKAGE	CIRCUIT BOARD MATERIAL	θ_{jL} JUNCTION TO LEAD (°C/W)	+	θ_{bA} BOARD TO AMBIENT (°C/W)	=	θ_{jA} JUNCTION TO AMBIENT (°C/W)
SO-28	1-Layer ⁽¹⁾	20	+	30	=	50
	3-Layer ⁽²⁾	20	+	21	=	41
	Aluminum ⁽³⁾	20	+	12	=	32
SSOP-28	1-Layer ⁽¹⁾	20	+	36	=	56
	3-Layer ⁽²⁾	20	+	23	=	43
	Aluminum ⁽³⁾	20	+	13	=	33

NOTES: (1) Single-side layout on 0.062 inch FR4, 1 oz copper. (2) Three-layer layout on 0.062 inch FR4, 1 oz copper. (3) Aluminum 0.062 inch substrate, 0.003 insulation, one layer, 1 oz copper (Thermal Clad, Bergquist Co.)

FIGURE 2. Circuit Board Layout.

