

18-Line 3-5 Volt Low Capacitance SCSI Active Terminator

FEATURES

- Complies with SCSI, SCSI-2, SCSI-3 and FAST-20 (Ultra) Standards
- 2.75V to 7V Operation
- 1.8pF Channel Capacitance during Disconnect
- 0.5µA Supply Current in Disconnect Mode
- 110 Ohm/2.5k Programmable Termination
- Completely Meets SCSI Hot Plugging
- -650mA Sourcing Current for Termination
- +400mA Sinking Current for Active Negation Drivers
- Trimmed Termination Current to 4%
- Trimmed Impedance to 7%
- Current Limit and Thermal Shutdown Protection

DESCRIPTION

The UCC5610 provides 18 lines of active termination for a SCSI (Small Computer Systems Interface) parallel bus. The SCSI standard recommends active termination at both ends of the cable.

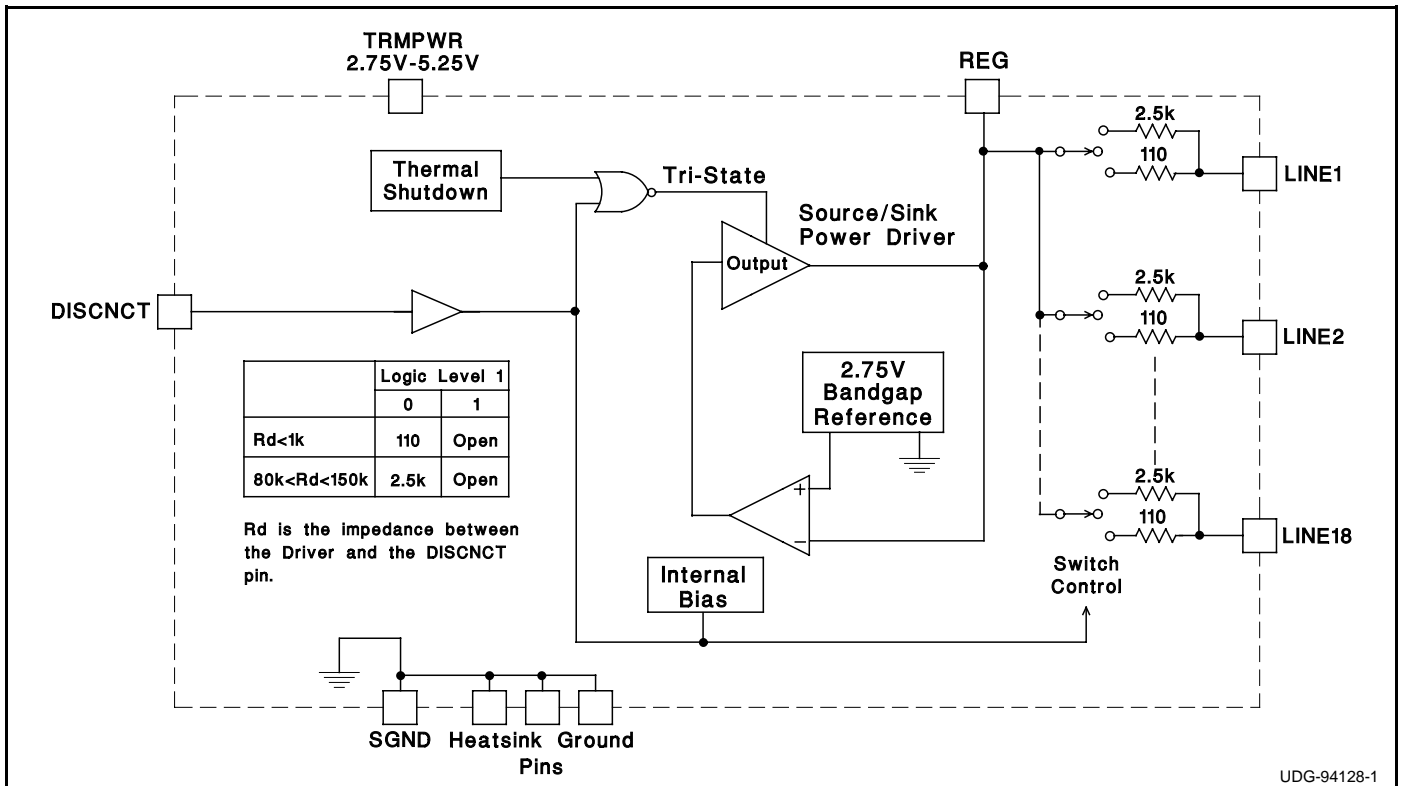
The UCC5610 is ideal for high performance 3.3V SCSI systems. The key features contributing to such low operating voltage are the 0.1V drop out regulator and the 2.75V reference. The reduced reference voltage was necessary to accommodate the lower termination current dictated in the SCSI-3 specification. During disconnect the supply current is typically only 0.5µA, which makes the IC attractive for battery powered systems.

The UCC5610 is designed with an ultra low channel capacitance of 1.8pF, which eliminates effects on signal integrity from disconnected terminators at interim points on the bus.

The UCC5610 can be programmed for either a 110 ohm or 2.5k ohm termination. The 110 ohm termination is used for standard SCSI bus lengths and the 2.5k ohm termination is typically used in short bus applications. When driving the TTL compatible DISCNCT pin directly, the 110 ohm termination is connected when the DISCNCT pin is driven low, and disconnected when driven high. When the DISCNCT pin is driven through an impedance between 80k and 150k, the 2.5k ohm termination is connected when the DISCNCT pin is driven low, and disconnected when driven high.

continued

BLOCK DIAGRAM



UDG-94128-1

Circuit Design Patented

Description Continued

The power amplifier output stage allows the UCC5610 to source full termination current and sink active negation current when all termination lines are actively negated.

The UCC5610 is pin for pin compatible with Unitrode's other 18 line SCSI terminators, allowing lower capacitance and lower voltage upgrades to existing systems. The UCC5610, as with all Unitrode terminators, is completely hot pluggable and appears as high impedance at the terminating channels with $V_{TRMPWR} = 0V$ or open.

Internal circuit trimming is utilized, first to trim the 110

ohm termination impedance to a 7% tolerance, and then most importantly, to trim the output current to a 4% tolerance, as close to the max SCSI-3 spec as possible, which maximizes noise margin in FAST-20 SCSI operation.

Other features include thermal shutdown and current limit.

This device is offered in low thermal resistance versions of the industry standard 28 pin wide body SOIC, 24 pin wide body DIP and 28 pin PLCC.

ABSOLUTE MAXIMUM RATINGS

Tempwr Voltage +7V
Signal Line Voltage 0V to +7V
Regulator Output Current Self-regulating
Storage Temperature -65°C to +150°C
Operating Temperature -55°C to +150°C
Lead Temperature (Soldering, 10 Sec.) +300°C

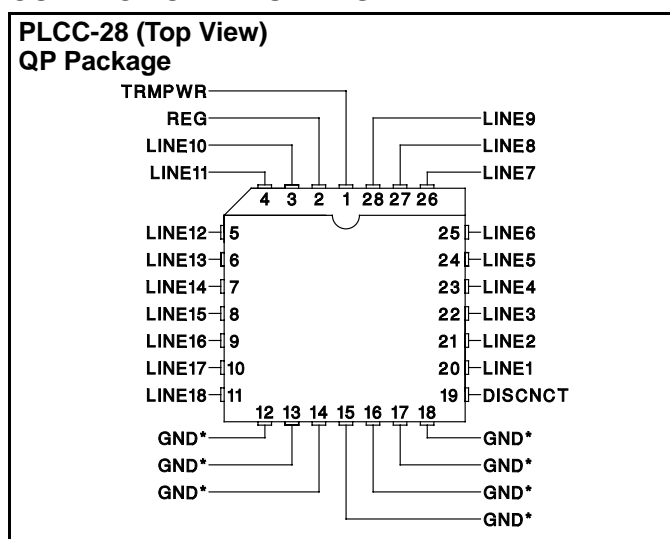
Unless otherwise specified all voltages are with respect to Ground. Currents are positive into, negative out of the specified terminal.

Consult Packaging Section of Unitrode Integrated Circuits databook for thermal limitations and considerations of packages.

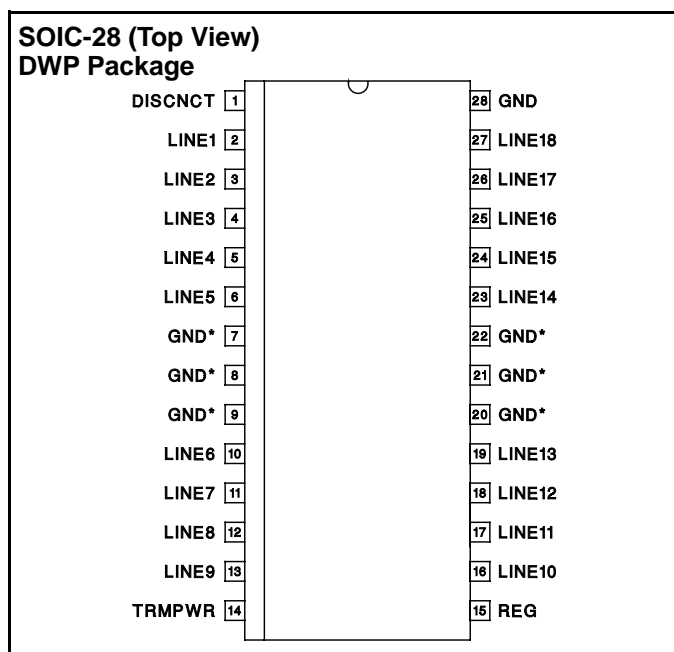
RECOMMENDED OPERATING CONDITIONS

Tempwr Voltage 2.75V to 5.25V
Signal Line Voltage 0V to +5V
Disconnect Input Voltage 0V to Tempwr

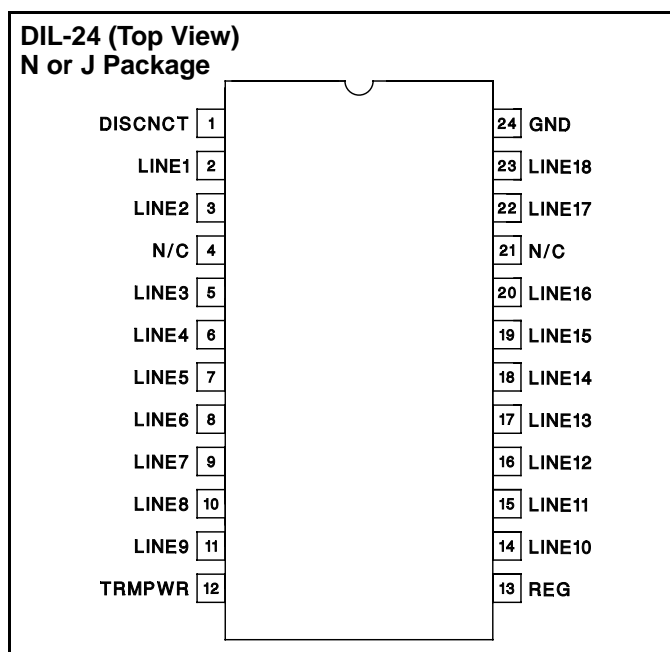
CONNECTION DIAGRAMS



* QP package pins 12 - 18 serve as both heatsink and signal ground.



* DWP package pin 28 serves as signal ground; pins 7, 8, 9, 20, 21, 22 serve as heatsink/ground.



Note: Drawings are not to scale.

ELECTRICAL CHARACTERISTICS Unless otherwise stated, these specifications apply for $T_A = 0^{\circ}\text{C}$ to 70°C .
 $\text{TRMPWR} = 3.3\text{V}$, $\text{DISCNCT} = 0\text{V}$, $\text{RDISCNCT} = 0\text{ ohms}$. $T_A = T_J$.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
Supply Current Section					
Tempwr Supply Current	All termination lines = Open		1	2	mA
	All termination lines = 0.2V		415	455	mA
Power Down Mode	DISCNCT = Tempwr		0.5	5	μA
Output Section (110 ohms - Terminator Lines)					
Terminator Impedance	(Note 4)	102.3	110	117.7	Ohms
Output High Voltage	(Note 1)	2.5	2.7	3.0	V
Max Output Current	$V_{\text{LINE}} = 0.2\text{V}$, $T_J = 25^{\circ}\text{C}$	-22.1	-23	-24	mA
	$V_{\text{LINE}} = 0.2\text{V}$	-21	-23	-24	mA
	$V_{\text{LINE}} = 0.2\text{V}$, $\text{TRMPWR} = 3\text{V}$, $T_J = 25^{\circ}\text{C}$ (Note 1)	-20.2	-23	-24	mA
	$V_{\text{LINE}} = 0.2\text{V}$, $\text{TRMPWR} = 3\text{V}$ (Note 1)	-19	-23	-24	mA
	$V_{\text{LINE}} = 0.5\text{V}$			-22.4	mA
Output Leakage	DISCNCT = 2.4V, $\text{TRMPWR} = 0\text{V}$ to 5.25V		10	400	nA
Output Capacitance	DISCNCT = 2.4V (Note 2, 3) (DWP Package)		1.8	2.5	pF
Output Section (2.5k ohms - Terminator Lines) ($\text{RDISCNCT} = 80\text{k ohms}$)					
Terminator Impedance		2	2.5	3	k Ω
Output High Voltage	$\text{TRMPWR} = 3\text{V}$ (Note 1)	2.5	2.7	3.0	V
Max Output Current	$V_{\text{LINE}} = 0.2\text{V}$	-0.7	-1	-1.4	mA
	$V_{\text{LINE}} = 0.2\text{V}$, $\text{TRMPWR} = 3\text{V}$ (Note 1)	-0.6	-1	-1.5	mA
Output Leakage	DISCNCT = 2.4V, $\text{TRMPWR} = 0$ to 5.25V		10	400	nA
Output Capacitance	DISCNCT = 2.4V (Note 2, 3) (DWP Package)		1.8	2.5	pF
Regulator Section					
Regulator Output Voltage	$5.25\text{V} > \text{TRMPWR} > 3\text{V}$	2.5	2.7	3.0	V
Drop Out Voltage	All Termination Lines = 0.2V		0.1	0.2	V
Short Circuit Current	$V_{\text{REG}} = 0\text{V}$	-450	-650	-800	mA
Sinking Current Capability	$V_{\text{REG}} = 3\text{V}$	200	400	800	mA
Thermal Shutdown	(Note 2)		170		$^{\circ}\text{C}$
Thermal Shutdown Hysteresis	(Note 2)		10		$^{\circ}\text{C}$
Disconnect Section					
Disconnect Threshold	$\text{RDISCNCT} = 0$ & 80k	0.8	1.5	2.0	V
Input Current	DISCNCT = 0V		30	50	μA

Note 1: Measuring each termination line while other 17 are low (0.2V).

Note 2: Guaranteed by design. Not 100% tested in production.

Note 3: Output capacitance is measured at 0.5V.

Note 4: Tested by measuring I_{OUT} with $V_{\text{OUT}} = 0.2\text{V}$ and $V_{\text{OUT}} = V_{\text{REG}} - 0.1\text{V}$ then calculating the impedance.

APPLICATION INFORMATION

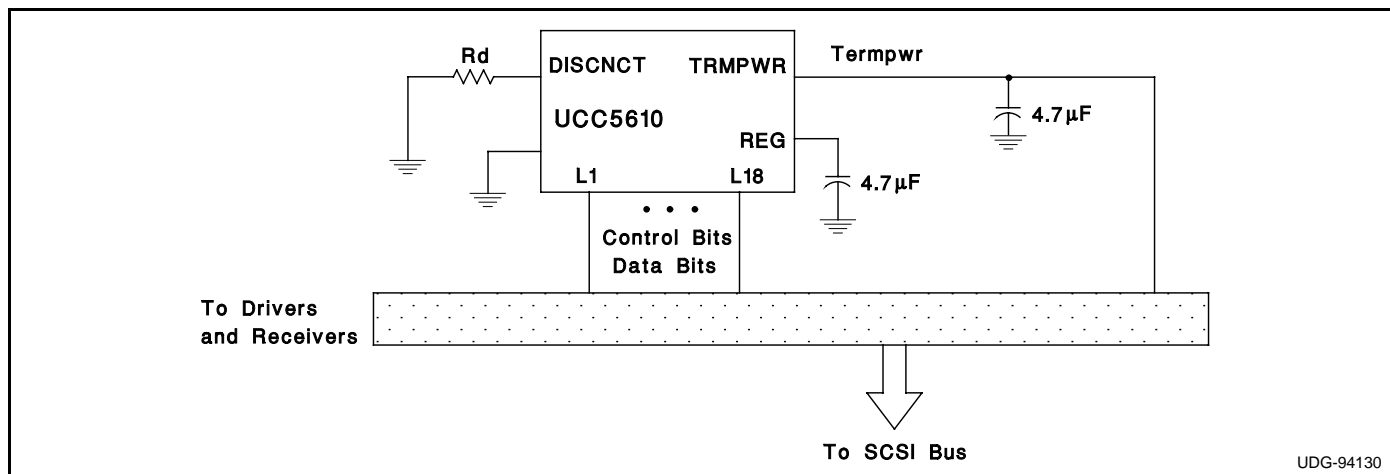


Figure 1: Typical SCSI Bus Configurations Utilizing A UCC5610 Device