

# 9-Line Low Capacitance SCSI Active Terminator

## FEATURES

- Complies with SCSI, SCSI-2 Standards
- 9pF Channel Capacitance during Disconnect
- 100µA Supply Current in Disconnect Mode
- Meets SCSI Hot Plugging Capability
- -300mA Sourcing Current for Termination
- +40mA Sinking Current for Active Negation
- Logic Command Disconnects all Termination Lines
- Trimmed Termination Current to 7%
- Trimmed Impedance to 7%
- Current Limit and Thermal Shutdown Protection

## DESCRIPTION

The UC5604 provides 9 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 segment.

The UC5604 provides a disconnect feature which, when opened or driven high, will disconnect all terminating resistors and disable the regulator, greatly reducing standby power. The output channels remain high impedance even without *Tempwr* applied.

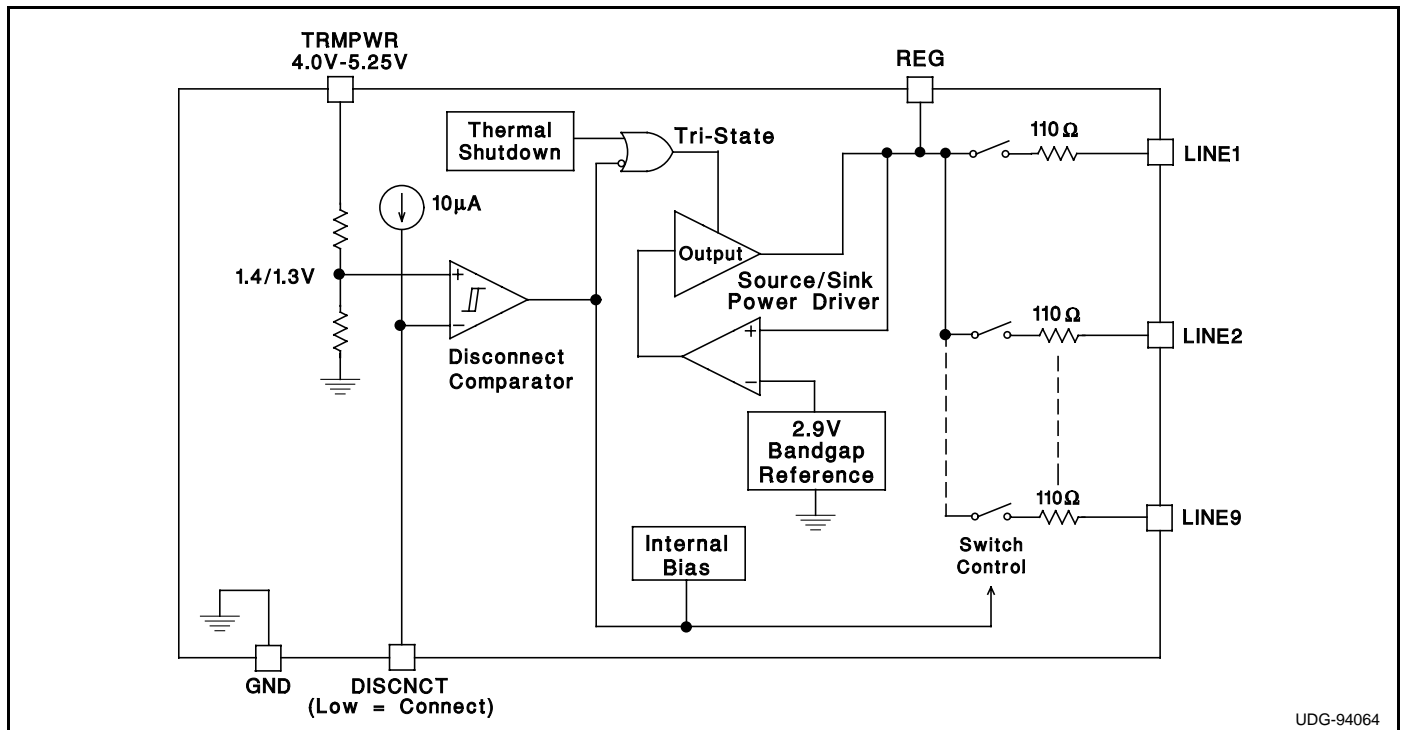
The UC5604 is pin-for-pin compatible with its predecessor, the UC5603 - 9 line Active Terminator. The only functional difference between the UC5604 and UC5603 is the absence of the negative clamps. Parametrically, the UC5604 has a 7% tolerance on impedance and current compared to a 3% tolerance on the UC5603 and the sink current is reduced from 300mA to 40mA. Custom power packages are utilized to allow normal operation at full power conditions (1.2 watts).

Internal circuit trimming is utilized, first to trim the impedance to a 7% tolerance, and then most importantly, to trim the output current to a 7% tolerance, as close to the max SCSI spec as possible, which maximizes noise margin in fast SCSI operation.

Other features include thermal shutdown and current limit.

This device is offered in low thermal resistance versions of the industry standard 16 pin narrow body SOIC, 16 pin ZIP (zig-zag in line package) and 24 pin TSSOP.

## BLOCK DIAGRAM



Circuit Design Patented

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**ABSOLUTE MAXIMUM RATINGS**

Tempwr Voltage	.....	+7V
Signal Line Voltage	.....	0V to +7V
Regulator Output Current	.....	0.5A
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.

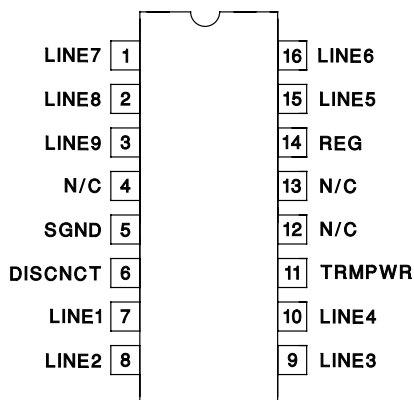
Consult Packaging Section of Unitrode Integrated Circuits databook for thermal limitations and considerations of packages.

**RECOMMENDED OPERATING CONDITIONS**

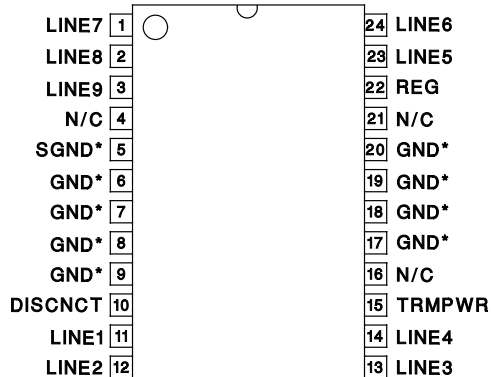
Tempwr Voltage	.....	3.8V to 5.25V
Signal Line Voltage	.....	0V to +5V
Disconnect Input Voltage	.....	0V to Tempwr

**CONNECTION DIAGRAMS**

**DIL-16 (Top View)  
N or J Package**

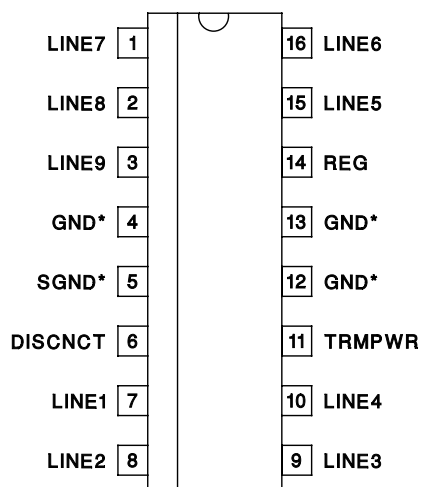


**TSSOP-24 (Top View)  
PWP Package**



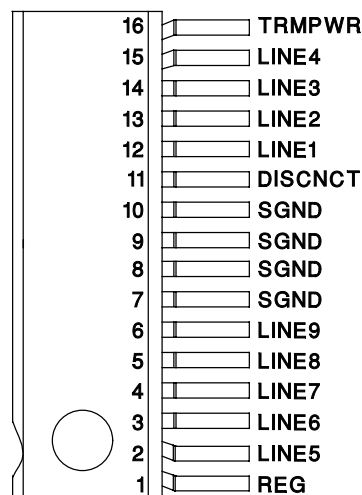
\* PWP package pin 5 serves as signal ground; pins 6, 7, 8, 9, 17, 18, 19, and 20 serve as heatsink/ground.

**SOIC-16 (Top View)  
DP Package**



\* DP package pin 5 serves as signal ground; pins 4, 12, 13 serve as heatsink/ground.

**ZIP-16 (Top View)  
Z Package**



Note: Drawings are not to scale.

**ELECTRICAL CHARACTERISTICS** Unless otherwise stated, these specifications apply for TA = 0°C to 70°C.  
 TRMPWR = 4.75V, DISCNCT = 0V. TA = TJ.

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS	
<b>Supply Current Section</b>						
Tempwr Supply Current	All termination lines = Open		14	20	mA	
	All termination lines = 0.5V		200	220	mA	
Power Down Mode	DISCNCT = Open		100	150	μA	
<b>Output Section (Terminator Lines)</b>						
Terminator Impedance	ΔI <sub>LINE</sub> = -5mA to -15mA	97	110	129	Ohms	
Output High Voltage	TRMPWR = 4V (Note 1)	0°C < TJ < 70°C	2.55		3.2	V
		TJ = 25°C	2.6	2.9	3.1	V
Max Output Current	V <sub>LINE</sub> = 0.5V	TJ = 25°C	-19.5	-21.9	-22.4	mA
		0°C < TJ < 70°C	-18.5	-21.9	-22.4	mA
Max Output Current	V <sub>LINE</sub> = 0.5V, TRMPWR = 4V (Note 1)	TJ = 25°C	-18.0	-21.9	-22.4	mA
		0°C < TJ < 70°C	-17.0	-21.9	-22.4	mA
Output Clamp Level	I <sub>LINE</sub> = -30mA	-0.2	-0.05	0.1	V	
Output Leakage	DISCNCT = 4V	TRMPWR = 0V to 5.25V REG = 0V		10	400	nA
					100	μA
		TRMPWR = 0V to 5.25V, REG = Open V <sub>LINE</sub> = 0V to 5.25V		10	400	nA
Output Capacitance	DISCNCT = Open (Note 2)		9	12	pF	
<b>Regulator Section</b>						
Regulator Output Voltage		2.5	2.9	3.2	V	
Regulator Output Voltage	All Termination Lines = 5V	2.55	2.9	3.1	V	
Line Regulation	TRMPWR = 4V to 6V		10	20	mV	
Load Regulation	I <sub>REG</sub> = +100mA to -100mA		20	50	mV	
Drop Out Voltage	All Termination Lines = 0.5V		1.0	1.2	V	
Short Circuit Current	V <sub>REG</sub> = 0V	-200	-400	-600	mA	
Sinking Current Capability	V <sub>REG</sub> = 3.5V	20	40		mA	
Thermal Shutdown			170		°C	
Thermal Shutdown Hysteresis			10		°C	
<b>Disconnect Section</b>						
Disconnect Threshold		1.1	1.4	1.7	V	
Threshold Hysteresis			100		mV	
Input Current	DISCNCT = 0V		150	200	μA	

Note 1: Measuring each termination line while other 8 are low (0.5V).

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

**APPLICATION INFORMATION**

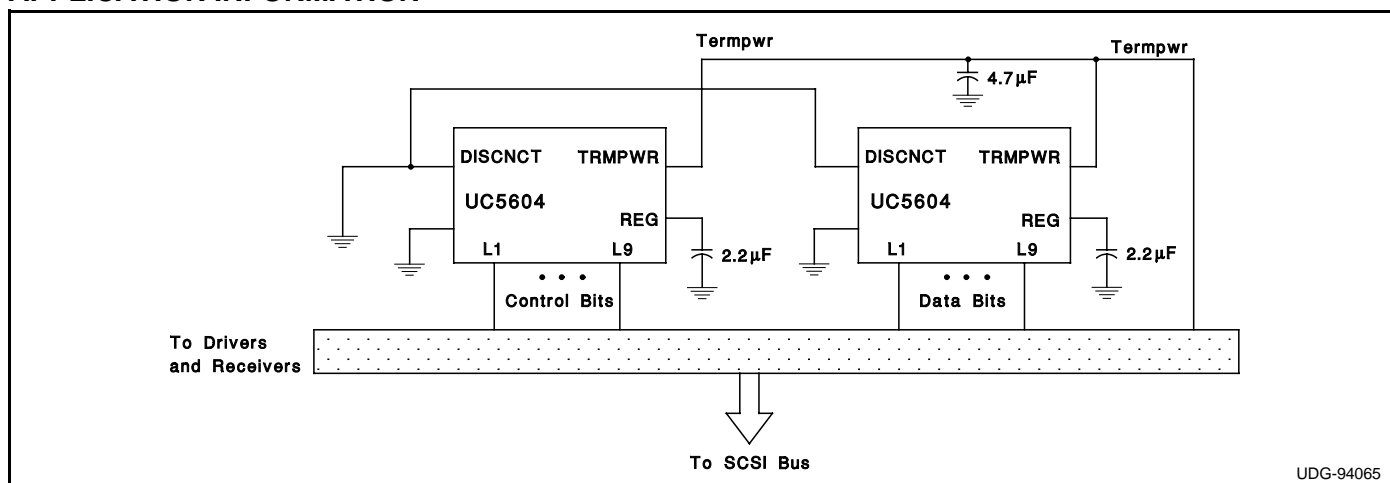


Figure 1: Typical SCSI Bus Configurations Utilizing 2 UC5604 Devices

APPLICATION INFORMATION (cont.)

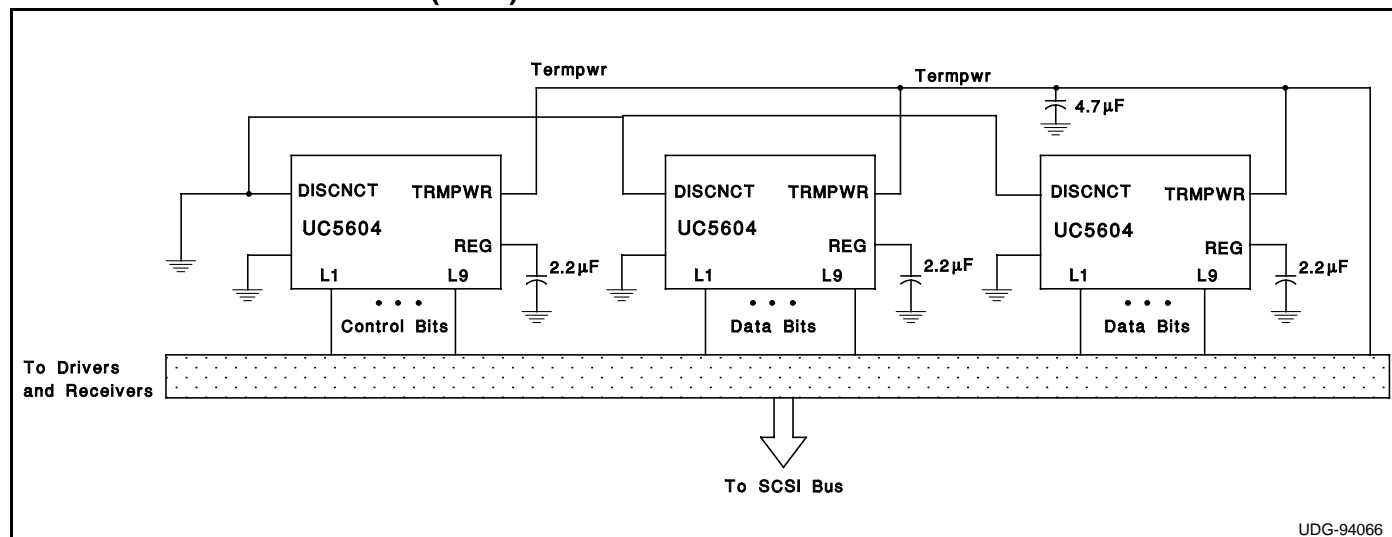


Figure 2: Typical Wide SCSI Bus Configurations Utilizing 3 UC5604 Devices.

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**PACKAGING INFORMATION**

Orderable Device	Status <sup>(1)</sup>	Package Type	Package Drawing	Pins	Package Qty	Eco Plan <sup>(2)</sup>	Lead/Ball Finish	MSL Peak Temp <sup>(3)</sup>
UC5604DP	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI
UC5604DPTR	OBSOLETE	SOIC	D	16		TBD	Call TI	Call TI
UC5604J	OBSOLETE		UTR	16		TBD	Call TI	Call TI
UC5604N	OBSOLETE	PDIP	N	16		TBD	Call TI	Call TI
UC5604QP	OBSOLETE	PLCC	FN	28		TBD	Call TI	Call TI
UC5604QPTR	OBSOLETE	PLCC	FN	28		TBD	Call TI	Call TI
UC5604Z	OBSOLETE		UTR	16		TBD	Call TI	Call TI

<sup>(1)</sup> 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.

<sup>(2)</sup> 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)

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

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