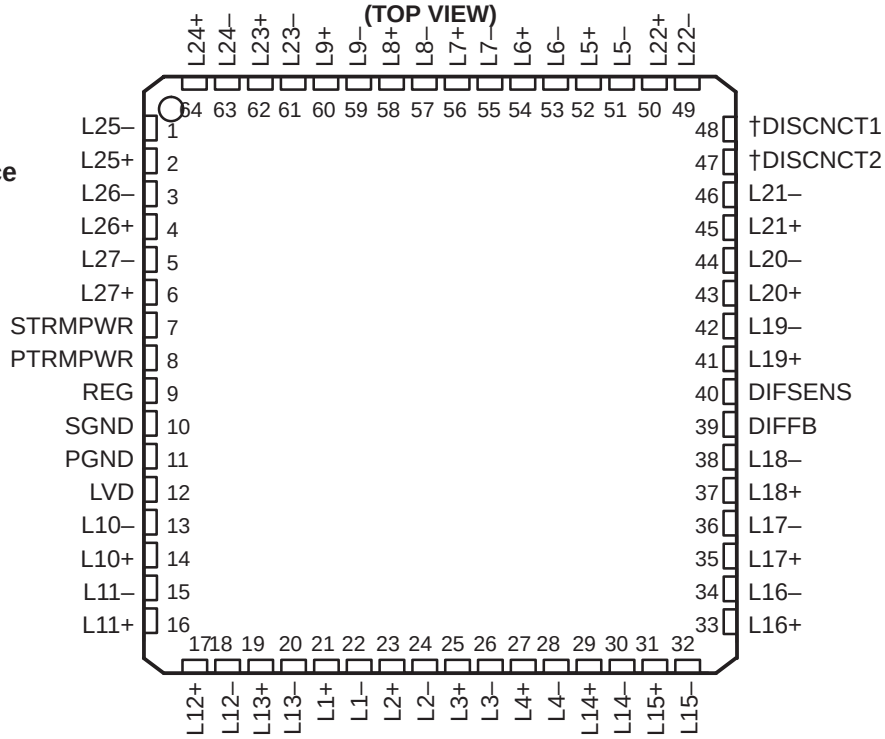
UCC5686, UCC5687
27–LINE 3-V – 5-V LVD TERMINATOR FOR WIDE ULTRA2 AND ULTRA3 SCSI WITH INTEGRATED SPI-3 DELAY

SLUS459A – OCTOBER 2000

- **SCSI SPI-2, SPI-3, Ultra160 Compliance**
- **Smallest Footprint**
- **Lowest Channel Capacitance, 2 pF**
- **Less than 0.5-pF Capacitance Differential Between Pairs**
- **2.7 V to 5.25 V Operation**
- **Differential Failsafe Bias**
- **Built–in SPI-3 Mode Change/Filter Delay**
- **64-Pin Low Profile QFP**

PM PACKAGE
(TOP VIEW)



†For the UCC5687, Pin 47 is $\overline{\text{DISCNCT1}}$ and Pin 48 is $\overline{\text{DISCNCT2}}$.

description

The UCC5686 is a twenty-seven line active terminator for low-voltage-differential (LVD) SCSI networks. This LVD SCSI-only design allows the user to reach peak bus performance, while reducing system cost. The device is designed as an active Y-terminator to improve the frequency response of the LVD SCSI Bus. Designed with a 2-pF (typical) channel capacitance, the UCC5686 allows for minimal bus loading for a maximum number of peripherals. With the UCC5686, the designer is able to comply with the Ultra2, Ultra3, and Ultra160 specifications. The UCC5686 also provides a much-needed system migration path for the ever improving SCSI system standards.

This device is available in the 64-pin low-profile QFP package for ease of layout use.

Single-ended (SE) and high-voltage differential (HVD) SCSI drivers are not supported.

AVAILABLE OPTIONS

T_A	DISCONNECT STATUS	PACKAGED DEVICES†
		LOW PROFILE QFP (PM)
0°C to 70°C	REGULAR	UCC5686PM
	REVERSE	UCC5687PM

† The PM package is available taped and reeled. Add TR suffix to device type (e.g. UCC5686PMTR) to order quantities of 1000 devices per reel.

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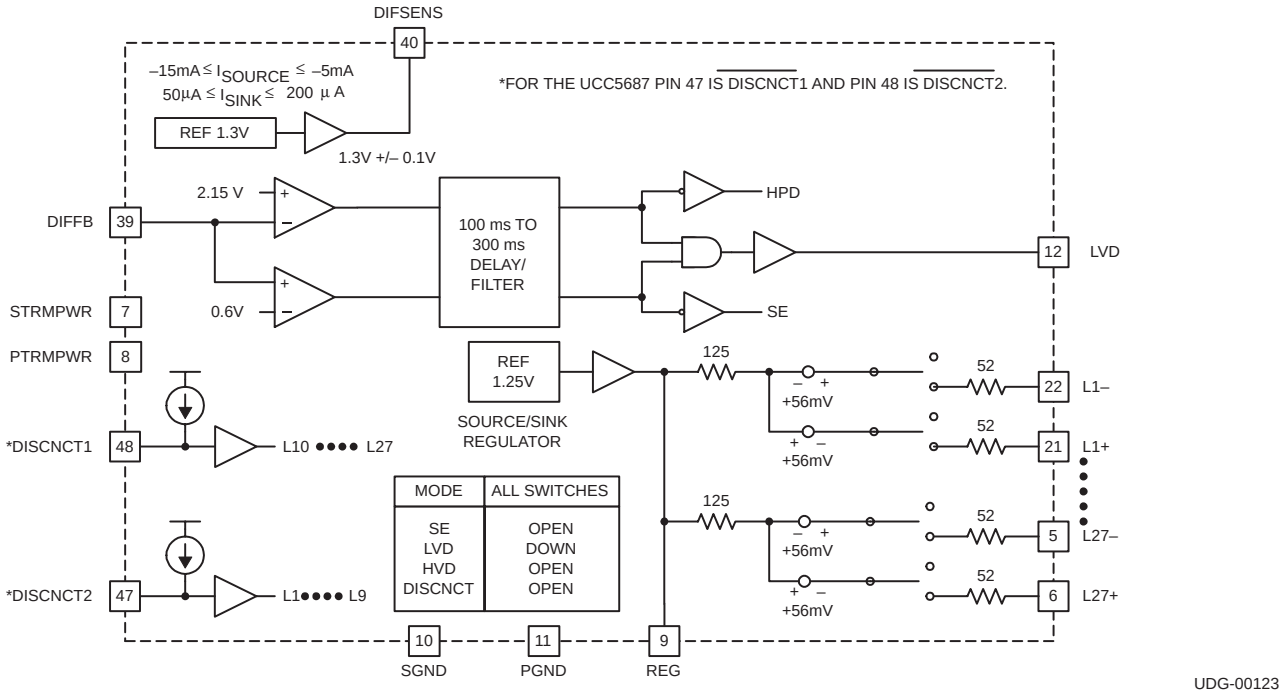
block diagram



absolute maximum ratings over operating free-air temperature range (unless otherwise noted)†‡

Input voltage V_{IN} (STRMPWR, PTRMPWR)	6 V
Signal line input voltage	0 V to 5 V
Regulator output current	0.75 A
Storage temperature range, T_{stg}	–55°C to 150°C
Operating virtual junction temperature range, T_J	–55°C to 150°C
Lead temperature (soldering, 10 seconds)	300°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.

‡ Unless otherwise indicated, voltages are reference to ground and currents are positive into and negative out of the specified terminals. Consult Packaging Section of the *Interface Products Data Book* (TI Literature Number SLUD002) for thermal limitations and considerations of packages. All voltages are referenced to GND.

electrical characteristics over recommended operating free-air temperature range, xTRMPWR = 2.7 V to 5.25 V, T_A = 0°C to 70°C, DISCNCT1 = DISCNCT2 = 0 V for UCC5686, DISCNCT1 = DISCNCT2 = open for UCC5687, $T_A = T_J$. (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
xTRMPWR Supply Current Section					
xTRMPWR supply current	LVD mode			65	mA
	Disabled terminator			500	µA
1.25 V Regulator Section					
1.25 V regulator	0.5 V ≤ V_{CM} ≤ 2.0 V, See Note 1	1.15	1.25	1.35	V
Regulator source current	V_{REG} = 0 V		–300	–240	mA
Regulator sink current	V_{REG} = 3.0 V	240	300		mA
1.3 V (DIFSENS) Regulator Section					
1.3 V regulator	–5mA ≤ $I_{DIFSENS}$ ≤ 50 µA	1.2	1.3	1.4	V
Short-circuit source current	$V_{DIFSENS}$ = 0 V	–5	–8	–15	mA
Short-circuit sinkcurrent	$V_{DIFSENS}$ = 2.75 V	50		200	µA
Differential Termination Section (Applies to each line pair 1–27)					
Differential bias voltage		100		125	mV
Differential impedance		100	105	110	Ω
Common-mode bias voltage	L+ and L– shorted together	1.15	1.25	1.35	V
Common-mode impedance	L+ and L– shorted together, See Note 2	110	140	165	Ω
Disconnected Termination Section					
Output leakage current			10	400	nA
Output capacitance	SE measurement to GND, See Note 3			3	pF
Disconnect Control (DISCNCT1) or (DISNCNT2) and DIFFB Input Section					
DISCNCT threshold voltage		0.8	1.3	2.0	V
DISCNCT input current	$V_{DISCNCT}$ = 0 V and 2.0 V	–30		–10	µA
DIFFB SE to LVD threshold voltage		0.5	0.6	0.7	V
DIFFB LVD to HPD threshold voltage		1.9	2.05	2.2	V
DIFFB Input current	0 V ≤ V_{DIFFB} ≤ 2.75 V	–10		10	µA
Low-Voltage Differential (LVD) Status Bit Section					
Source current	V_{LOAD} = 2.4 V		–6	–4	mA
Sink current	V_{LOAD} = 0.4 V	2	5		mA
Time Delay/Filter Section					
Mode change delay	(See Note 4)	100	190	300	ms
Thermal Shutdown Section					
Thermal shutdown threshold	For increasing temperature	140	155	170	°C
Thermal shutdown hysteresis			10		°C

NOTES: 1. VCM is applied to all L+ and L– lines simultaneously.

2. $Z_{CM} = \dfrac{2.0\ V - 0.5\ V}{\left[I_{VCM\ (max)} - I_{VCM\ (max)}\right]}$, $V_{CM(max)}$ = 2.0 V, $V_{CM(min)}$ = 0.5 V

3. Ensured by design, not production tested.

4. A new mode change can begin any time after a previous mode change has been detected.

pin descriptions

STRMPWR: 2.7 V to 5.25 V power supply for all circuitry except the 1.25-V regulator.

SGND: Ground reference for all circuitry except the 1.25-V regulator.

PTRMPWR: 2.7 V to 5.25 V power supply for the 1.25-V regulator.

PGND: Ground reference for the 1.25-V regulator.

REG: Output of the internal 1.25-V regulator; must be connected to a 4.7-μF bypass capacitor and a high-frequency, low-ESR 0.01-μF capacitor to GND.

DIFSENS: Drives the SCSI bus DIFF SENSE line to 1.3 V to detect what types of devices are tied to the bus.

DIFFB: DIFF SENSE input pin. Connect through a 20-kΩ resistor to DIFSENS and through a 0.1-μF capacitor to GND. Input to comparators that detect what type of drives are connected to the SCSI bus.

DISCNCT1: Disconnect one controls termination lines 10–27 (control and low byte).

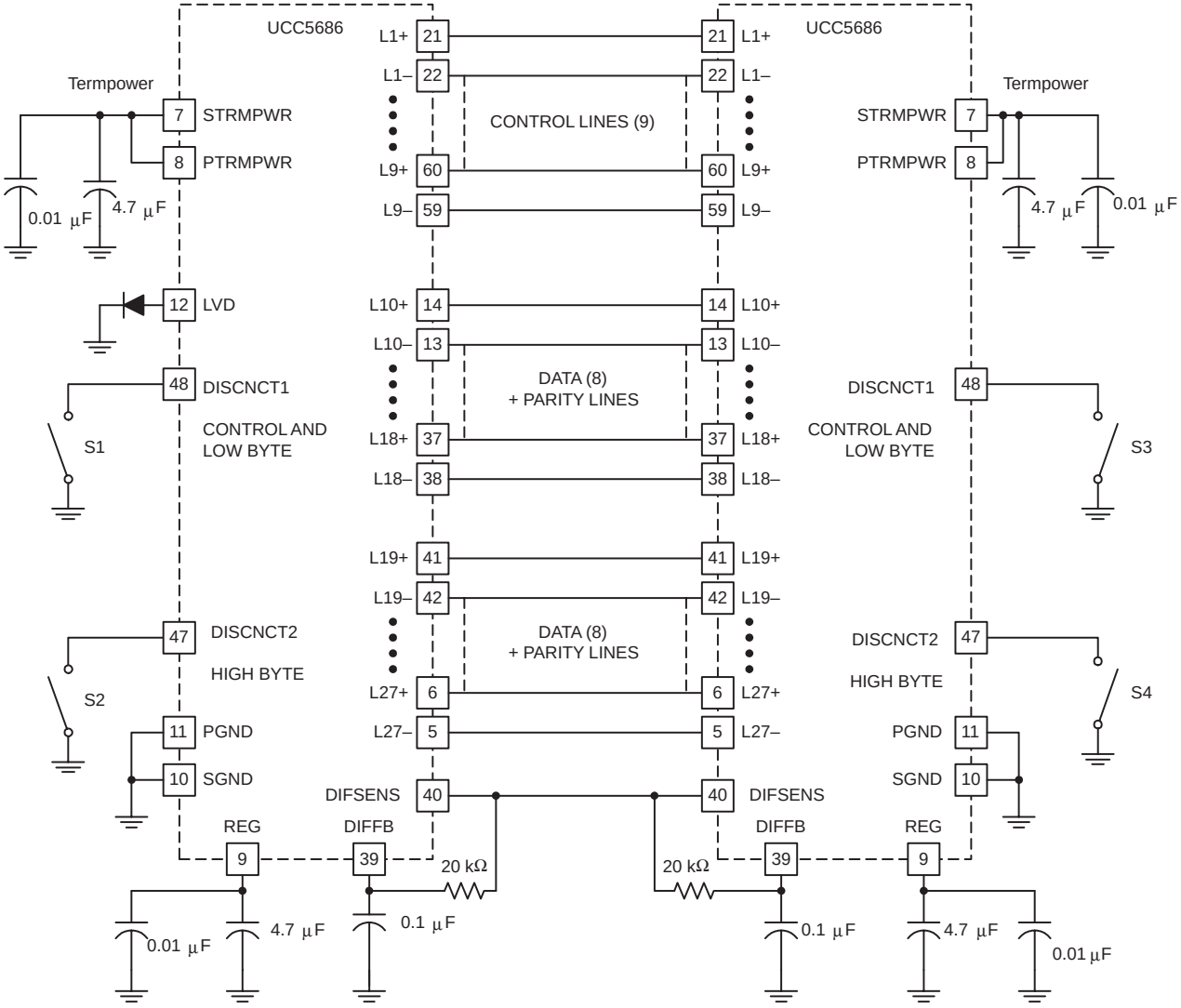
DISCNCT2: Disconnect two controls termination lines 1–9 (high byte).

LVD: TTL compatible status bit indicating when low-voltage-differential voltage is present on DIFFB.

L1– thru L27–: Negative lines for the SCSI bus.

L1+ thru L27+: Positive lines for the SCSI bus.

APPLICATION INFORMATION



NOTE A: Close S1, S2, S3, and S4 to connect terminators in UCC5686. Open S1, S2, S3, and S4 to connect terminators in UCC5687.

Figure 1. Typical Application Diagram

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