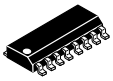
Advance Information

9-Bit Switchable Active SCSI Bus Terminator With Voltage Regulator

MCCS142239

9–BIT SWITCHABLE ACTIVE SCSI BUS TERMINATOR



D SUFFIX
PLASTIC SOIC PACKAGE
CASE 751B–05

DW SUFFIX
PLASTIC SOIC PACKAGE
CASE 751G–02

The MCCS142239™ is a precision 9–bit switchable active SCSI bus terminator with an on–board 2.85V regulator. The SCSI standards recommend the use of active terminations at both ends of every cable segment in a SCSI system with single–ended drivers and receivers. The MCCS142239 enables the designer to gain the benefits of active termination: greater immunity to voltage drops on the TERMPWR (TERMination PoWeR) line, enhanced high–level immunity, intrinsic TERMPWR decoupling, and very low quiescent current consumption. When the device is enabled (PD = HIGH), the MCCS142239 provides 118Ω precision resistor pull–ups to a 2.85V reference for termination of 9–bits in a SCSI standard bus system interface. When PD is LOW, the device is in the High Impedance State on all 9 bits.

- Complies With SCSI, Fast SCSI and Ultra SCSI Standards
- Functionally Compatible With DS2105, DS21S07A and MCCS142237
- 9 Switchable 118Ω Terminating Resistors
- Power–Down Mode Disengages Terminating Resistors
- Built–In 2.85V Regulator
- Guaranteed Maximum 1.0V Dropout Voltage
- 3pF Channel Capacitance During “Power–Down”
- Thermal Shutdown Circuitry
- Fully Supports Active Negation SCSI Signals
- Regulator Short Circuit Protection
- Available in 16–Pin Narrow and Wide SOIC Packages

TRUTH TABLE

$\overline{PD}$	Output
0	Z
1	Terminated

The regulator has a dropout voltage of less than 1.0V, allowing regulation of input voltages less than 4.0V. Internal protective features include thermal shutdown.

The regulator produces a 2.85V level and is capable of sourcing 24mA into each of the termination resistors when the signal line is low (asserted). When the driver for a given signal line turns off, the terminator will pull the signal line to 2.85V (quiescent state). To handle actively negated SCSI signals, the regulator can sink over 220mA. When the Power–Down pin (PD) is LOW, the power–down circuitry will turn off the transistors on each signal line. This isolates the MCCS142239 from the signal lines and effectively removes it from the bus. The PD pin has an internal pull–up resistor. To place the terminator into the active state, the PD pin should either be left open circuited or tied HIGH.

To ensure proper operation, both the TERMPWR1 and TERMPWR2 pins must be connected to the SCSI bus TERMPWR line and both the VREF1 and VREF2 pins must be tied together externally. Each MCCS142239 requires a minimum 2.2μF capacitor connected between the VREF pins and ground.

In 8–bit SCSI applications (“A” cable), two MCCS142239s are needed at each end of the SCSI cable in order to terminate the 18 active signal lines. In 16–bit WIDE SCSI applications (“P” cable), three MCCS142239s would be needed at each end of the SCSI cable in order to terminate the 27 active signal lines.

For information on “Power Dissipation for Active SCSI Terminators,” refer to Motorola Application Note AN1408/D, available through the Motorola Design–NET Fax System, or through the Motorola Literature Distribution Center.

MCCS is a trademark of Motorola, Inc.

This document contains information on a new product. Specifications and information herein are subject to change without notice.

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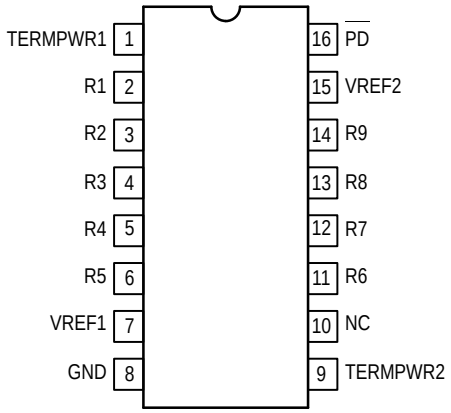
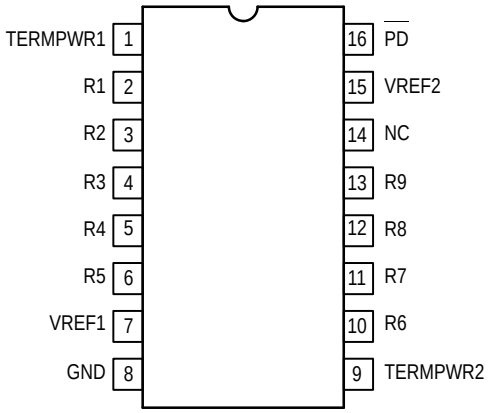


Pinout: 16–Lead Narrow SOIC
(D–Suffix, Top View)



Pinout: 16–Lead Wide SOIC
(DW–Suffix, Top View)

PIN DESCRIPTIONS

Symbol	16–Lead Narrow (D Suffix)	16–Lead Wide (DW Suffix)	Description
TERMPWR1	1	1	**Termination Power 1.** Connect to the SCSI TERMPWR line. See Figure 1.
R1	2	2	**Signal Termination 1.** 118 ohm termination.
R2	3	3	**Signal Termination 2.** 118 ohm termination.
R3	4	4	**Signal Termination 3.** 118 ohm termination.
R4	5	5	**Signal Termination 4.** 118 ohm termination.
R5	6	6	**Signal Termination 5.** 118 ohm termination.
VREF1	7	7	**Reference Voltage 1.** Must be externally connected directly to the VREF2 pin. See Figure 1.
GND	8	8	**Ground.** Signal ground; 0.0V.
TERMPWR2	9	9	**Termination Power 2.** Should be connected to the SCSI TERMPWR line. See Figure 1.
R6	11	10	**Signal Termination 6.** 118 ohm termination.
R7	12	11	**Signal Termination 7.** 118 ohm termination.
R8	13	12	**Signal Termination 8.** 118 ohm termination.
R9	14	13	**Signal Termination 9.** 118 ohm termination.
NC	10	14	**No Connect.** Do not connect any signal to this pin.
VREF2	15	15	**Reference Voltage 2.** Must be externally connected directly to the VREF1 pin. See Figure 1.
$\overline{PD}$	16	16	**Power Down.** When tied low, the MCCS142239 enters power– down mode. Contains an internal 50kΩ pull–up. Tie low to de–activate the MCCS142239, leave open circuited or tie high to activate the MCCS142239.

$\overline{PD}$ Input Application	**Result**
A. No Connection to $\overline{PD}$	$\overline{PD}$ input will be pulled “HIGH” internally. This connects the termination resistors.
B. Single Pole Switch to GND	$\overline{PD}$ input will be pulled “HIGH” internally when the switch is open, which connects the termination resistors. PD input will be held “LOW” when the switch is closed, disconnecting the termination resistors and turning off the voltage regulator.
C. Hardwired “High”	The MCCS142239 will be permanently connected and provide termination on all outputs.
D. Hardwired “Low”	The MCCS142239 will be permanently disconnected.

MAXIMUM RATINGS*

Symbol	Parameter	Value	Unit
TERMPWR	DC Supply Voltage	7.0	V
V_{Line}	Voltage on Any Pin Relative to Ground	–1.0 to +7.0	V
I_{Reg}	Regulator Output Current	0.5	A
t_{stg}	Storage Temperature Range	–65 to +150	°C
V_{REF}	Reference Voltage	5.0	V

* Maximum Ratings are those values beyond which damage to the device may occur. Functional operation should be restricted to the Recommended Operating Conditions.

RECOMMENDED OPERATING CONDITIONS (0° to 70°C)

Symbol	Parameter	Min	Max	Unit
V_{TP}	TERMPWR Voltage	3.9	5.25	V
V_{PDA}	$\overline{PD}$ Active		0.8	V
V_{PDI}	$\overline{PD}$ Inactive	2.0	V_{TP} + 0.3	V
V_{Line}	Signal Line Voltage	0	3.0	V
T_A	Operating Temperature Range	0	70	°C

DC CHARACTERISTICS (0° to 70°C)

Symbol	Characteristic	Min	Typ	Max	Unit	Condition
I_{TP}	TERMPWR Current		 5	250 8	mA	4V < TERMPWR < 5.25V**1** 4V < TERMPWR < 5.25V**2**
I_{PD}	Power–Down Current		100		µA	4V < TERMPWR < 5.25V**4**
R_{TERM}	Termination Resistance	112	118	124	Ω	4V < TERMPWR < 5.25V
T_{SD}	Die Thermal Shutdown		150		°C	4V < TERMPWR < 5.25V
C_{PD}	Power–Down Termination Capacitance		3	5	pF	4V < TERMPWR < 5.25V**3,4**
H_{PD}	$\overline{PD}$ Hysteresis		280		mV	4V < TERMPWR < 5.25V
I_{IH}	Input Leakage HIGH	–1.0			µA	4V < TERMPWR < 5.25V**4,5**
I_{IL}	Input Leakage LOW			1.0	µA	4V < TERMPWR < 5.25V**4,5**

1. All signal lines = 0.0V
2. All signal lines open
3. Guaranteed by characterization; not production tested
4. $\overline{PD}$ = 0.0V
5. Resistors Only

REGULATOR CHARACTERISTICS (0° to 70°C)

Symbol	Characteristic	Min	Typ	Max	Unit	Condition
V_{REF}	Reference Voltage	2.7	2.85	3.0	V	4V < TERMPWR < 5.25V
V_{DROP}	Drop Out Voltage		0.75	1.00	V	Note **1**, **2**
I_{Out}	Output Current			24	mA	4V < TERMPWR < 5.25V**6**
LI_{Reg}	Line Regulation		<1.0	2.0	%	4V < TERMPWR < 5.25V**3**
LO_{Reg}	Load Regulation		<1.0	3.0	%	4V < TERMPWR < 5.25V
I_{Lim}	Current Limit		–350		mA	4V < TERMPWR < 5.25V**4**
I_{Sink}	Sink Current	200			mA	4V < TERMPWR < 5.25V**5**

1. All signal lines = 0.0V
2. Guaranteed by design; not production tested
3. All signal lines open
4. V_{REF} pins = 0V
5. V_{REF} pins = 3.5V
6. All signal lines = 0.2V

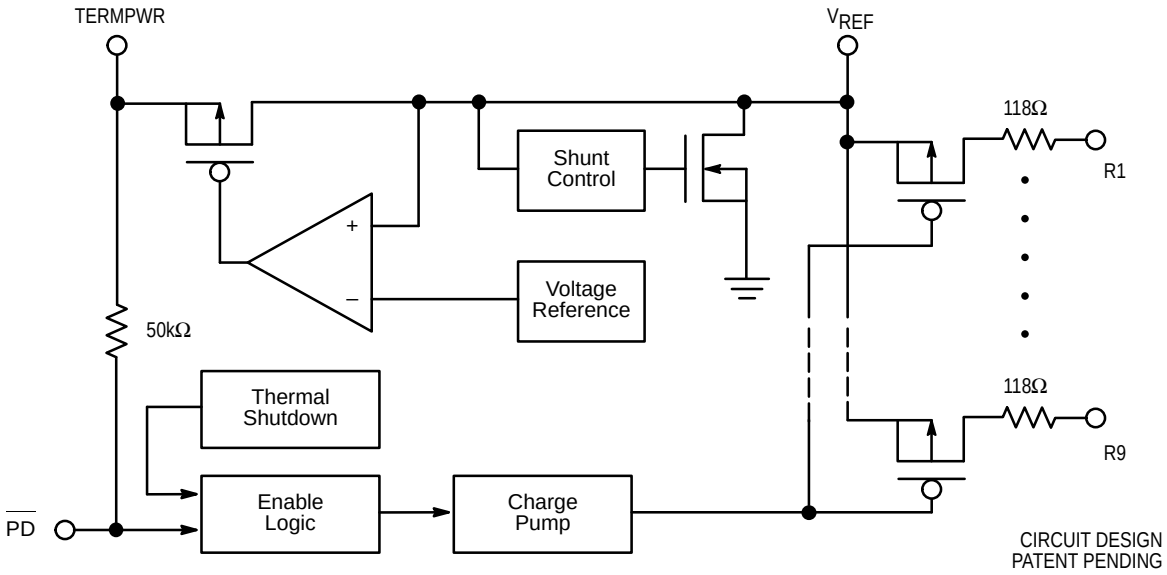


Figure 2. MCCS142239 Block Diagram

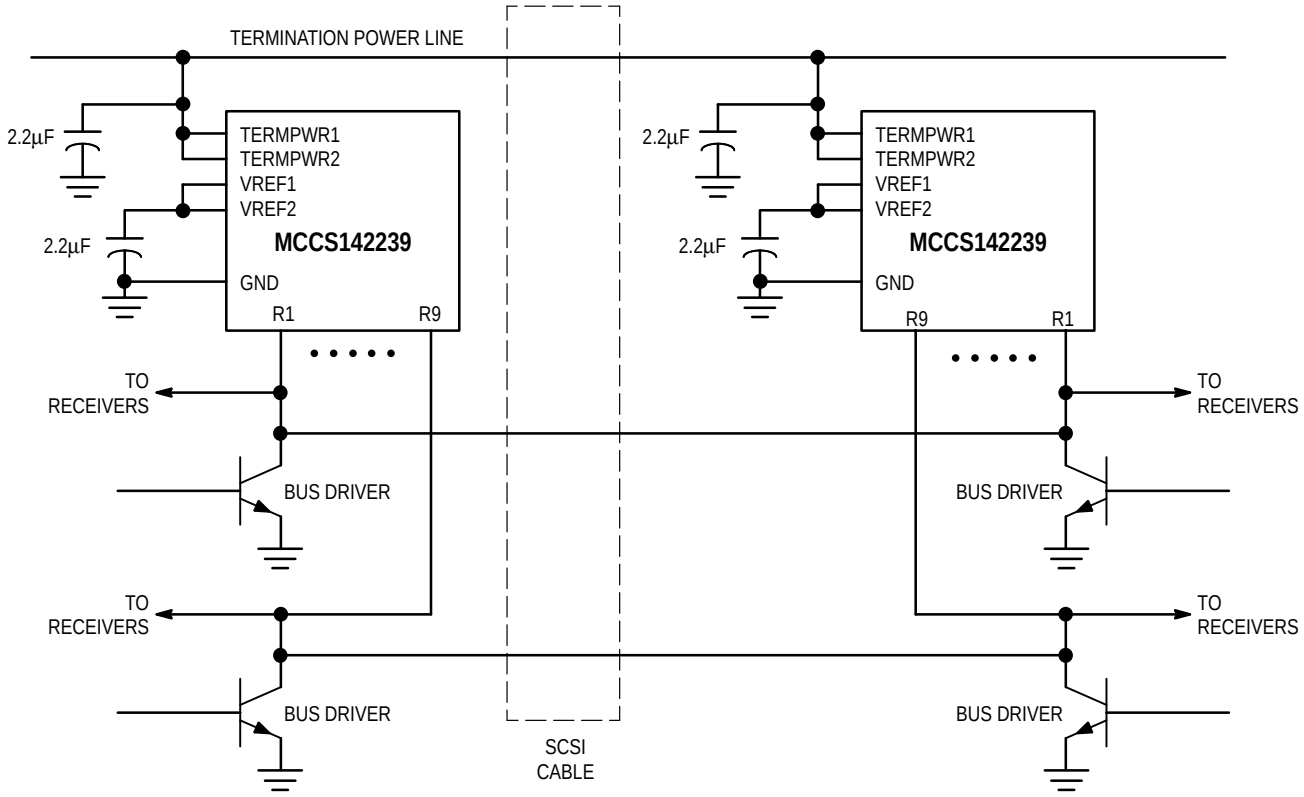


Figure 1. Typical SCSI Bus Configuration Using the MCCS142239

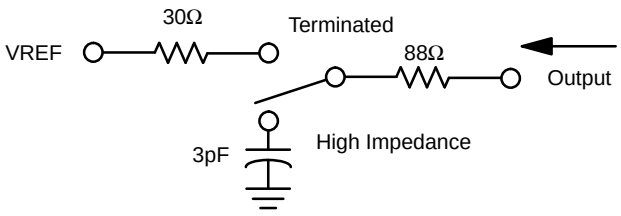


Figure 3. Output Impedance Model

AC CHARACTERISTICS (V_{REF} = 2.85, C_L = 50pF, $t_r = t_f$ = 6ns)

Symbol	Parameters	0°C to + 70°C	Unit	Condition
$t_{(connect)}$	Max Enable Time, High Impedance to Termination, PD to Outputs	100	µs	Per Truth Table
$t_{(disconnect)}$	Max Disable Time, Termination to High Impedance, PD to Outputs	20	µs	Per Truth Table

OUTLINE DIMENSIONS

D SUFFIX
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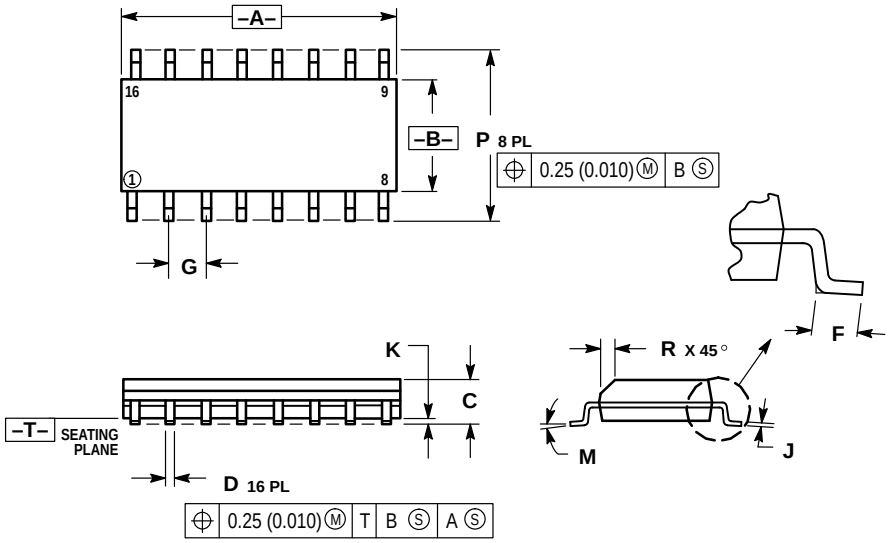
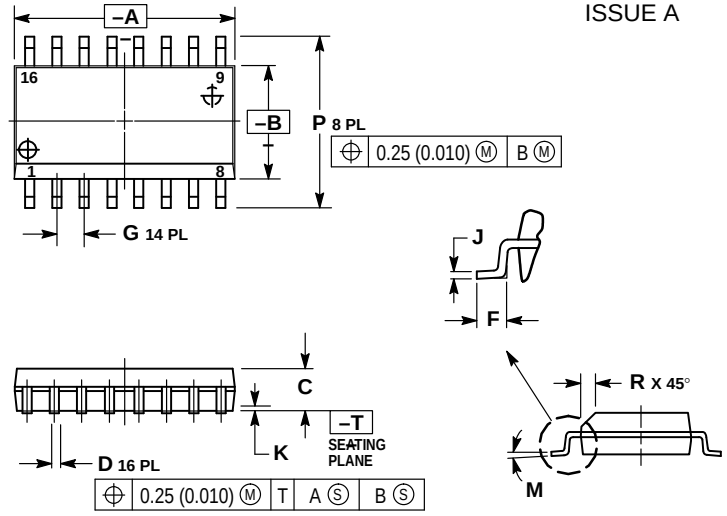
CASE 751B–05
ISSUE J



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.
3. DIMENSIONS A AND B DO NOT INCLUDE MOLD PROTRUSION.
4. MAXIMUM MOLD PROTRUSION 0.15 (0.006) PER SIDE.
5. DIMENSION D DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.127 (0.005) TOTAL IN EXCESS OF THE D DIMENSION AT MAXIMUM MATERIAL CONDITION.

	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.393
B	3.80	4.00	0.150	0.157
C	1.35	1.75	0.054	0.068
D	0.35	0.49	0.014	0.019
F	0.40	1.25	0.016	0.049
G	1.27 BSC		0.050 BSC	
J	0.19	0.25	0.008	0.009
K	0.10	0.25	0.004	0.009
M	0 °	7 °	0 °	7 °
P	5.80	6.20	0.229	0.244
R	0.25	0.50	0.010	0.019

DW SUFFIX
PLASTIC SOIC PACKAGE
CASE 751G–02
ISSUE A



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	MILLIMETERS		INCHES	
DIM	MIN	MAX	MIN	MAX
A	10.15	10.45	0.400	0.411
B	7.40	7.60	0.292	0.299
C	2.35	2.65	0.093	0.104
D	0.35	0.49	0.014	0.019
F	0.50	0.90	0.020	0.035
G	1.27 BSC		0.050 BSC	
J	0.25	0.32	0.010	0.012
K	0.10	0.25	0.004	0.009
M	0°	7°	0°	7°
P	10.05	10.55	0.395	0.415
R	0.25	0.75	0.010	0.029

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