



4051

CMOS IC

8-CHANNEL ANALOG MULTIPLEXERS/DEMULTIPLEXERS

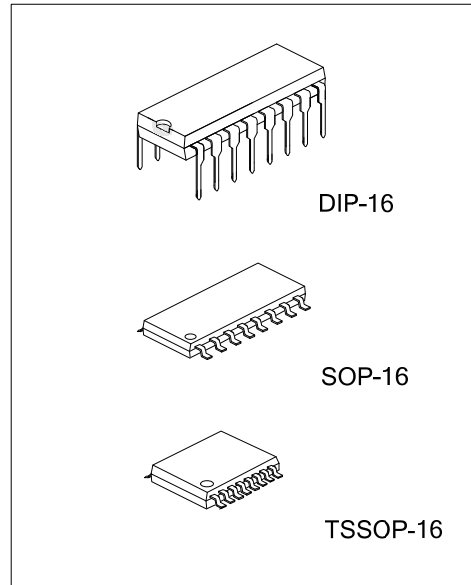
DESCRIPTION

UTC **4051** is single 8-channel analog multiplexers/demultiplexers for application as digitally-controlled analog switches.

The device has three binary control inputs and an inhibit input. It feature low ON impedance and very low OFF leakage current. Control of analog signals up to the complete supply voltage range can be achieved.

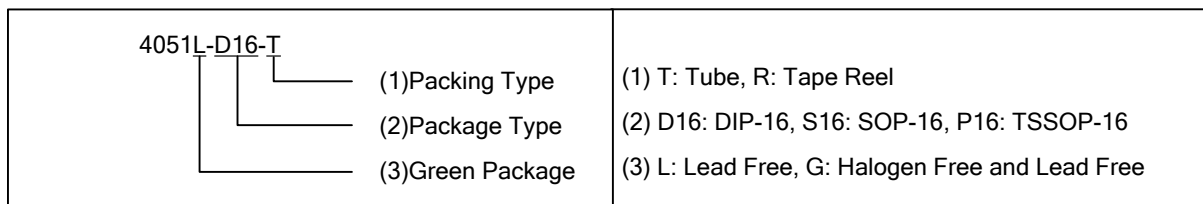
FEATURES

- * Wide Analog Voltage Range: $V_{DD}-V_{EE} = 3V\sim 18V$. (Note: V_{EE} must be $\leq V_{SS}$)
- * Break-Before-Make Switching Eliminates Channel Overlap.
- * Linearized Transfer Characteristics
- * Implement an SP8T solid state switch effectively.
- * Pin-to-Pin Replacement for CD4051

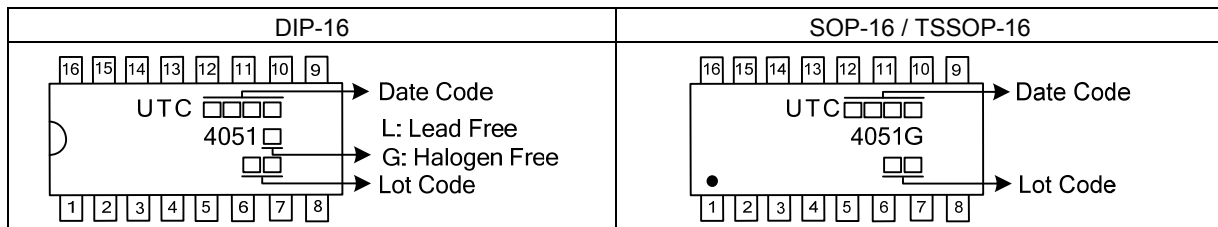


ORDERING INFORMATION

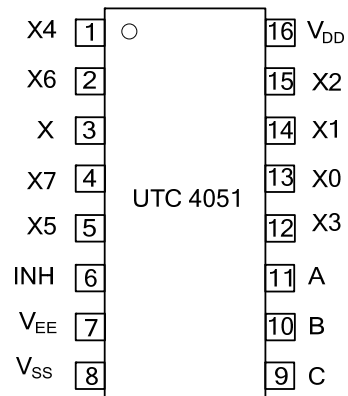
Ordering Number		Package	Packing
Lead Free	Halogen Free		
4051L-D16-T	4051G-D16-T	DIP-16	Tube
-	4051G-S16-R	SOP-16	Tape Reel
-	4051G-P16-R	TSSOP-16	Tape Reel



MARKING



■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN No.	SYMBAL	I/O	NAME AND FUNCTION
3	X	I/O	Common Input/Output
6	INH	I	Inhibit Inputs
7	V_{EE}		Supply Voltage
8	V_{SS}		Ground
11,10,9	A,B,C	I	Binary Control Inputs
13,14,15,12,1,5,2,4	X0~X7	I/O	Independent Inputs/Outputs
16	V_{DD}		Positive Supply Voltage

■ ABSOLUTE MAXIMUM RATING

PARAMETER	SYMBOL	RATINGS	UNIT
DC Supply Voltage (Referenced to V_{EE} , $V_{SS} \geq V_{EE}$)	V_{DD}	-0.5 ~ +18	V
Input or Output Voltage (DC or Transient) (Referenced to V_{SS} for Control Inputs and V_{EE} for Switch I/O)	V_{IN} , V_{OUT}	-0.5 ~ $V_{DD} + 0.5$	V
Input Current (DC or Transient), per Control Pin	I_{IN}	± 10	mA
Switch Through Current	I_{SW}	± 25	mA
Power Dissipation	P_D	500	mW
Derating above 65°C		7	mW/°C
Junction Temperature	T_J	125	°C
Operating Temperature	T_{OPR}	-40 ~ +125	°C
Storage Temperature	T_{STG}	-40 ~ +150	°C

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified.)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
SUPPLY REQUIREMENTS (Voltages Referenced to V_{EE})						
Power Supply Voltage Range	V_{DD}	$V_{DD} - 3.0 \geq V_{SS} \geq V_{EE}$	3		18	V
Quiescent Current per Package	$V_{DD}=5\text{V}$	Control Inputs: $V_{IN} = V_{SS}$ or V_{DD} Switch I/O: $V_{EE} \leq V_{I/O} \leq V_{DD}$, $\Delta V_{SW} \leq 500\text{mV}$ (Note 2)		0.005	5	μA
	$V_{DD}=10\text{V}$			0.010	10	
	$V_{DD}=15\text{V}$			0.015	20	
Total Supply Current (Dynamic Plus Quiescent, Per Package)	$V_{DD}=5\text{V}$	$T_A=25^\circ\text{C}$ only (The channel component, $(V_{IN}-V_{OUT})/R_{on}$, is not included.)	$(0.07 \mu\text{A}/\text{kHz}) f + I_Q$		μA	
	$V_{DD}=10\text{V}$		$(0.20 \mu\text{A}/\text{kHz}) f + I_Q$			
	$V_{DD}=15\text{V}$		$(0.36 \mu\text{A}/\text{kHz}) f + I_Q$			
SWITCHES IN/OUT AND COMMONS OUT/IN -- X, Y, Z (Voltages Referenced to V_{EE})						
Recommended Peak-to-Peak Voltage Into or Out of the Switch	$V_{I/O}$	Channel On or Off	0		V_{DD}	V_{PP}
Recommended Static or Dynamic Voltage Across the Switch	ΔV_{SW}	Channel On	0		600	mV
Output Offset Voltage	$V_{O(OFF)}$	$V_{IN} = 0\text{V}$, No Load		10		μV
ON Resistance	$V_{DD}=5\text{V}$	$\Delta V_{SW} \leq 500\text{mV}$ $V_{IN} = V_{IL}$ or V_{IH} (Control), $V_{IN} = 0$ to V_{DD} (Switch)		250	1050	Ω
	$V_{DD}=10\text{V}$			120	500	
	$V_{DD}=15\text{V}$			80	280	
Δ ON Resistance Between Any Two Channels in the Same Package	$V_{DD}=5\text{V}$	ΔR_{ON}		25	70	Ω
	$V_{DD}=10\text{V}$			10	50	
	$V_{DD}=15\text{V}$			10	45	
Off-Channel Leakage Current	I_{OFF}	$V_{IN} = V_{IL}$ or V_{IH} (Control) Channel to Channel or Any One Channel, $V_{DD}=15\text{V}$		± 0.05	± 100	nA
Capacitance, Switch I/O	$C_{I/O}$	Inhibit = V_{DD}		10		pF
Capacitance, Common O/I	$C_{O/I}$	Inhibit = V_{DD}		17		pF
Capacitance, Feedthrough (Channel Off)	$C_{I/O}$	Pins Not Adjacent		0.15		pF
		Pins Adjacent		0.47		

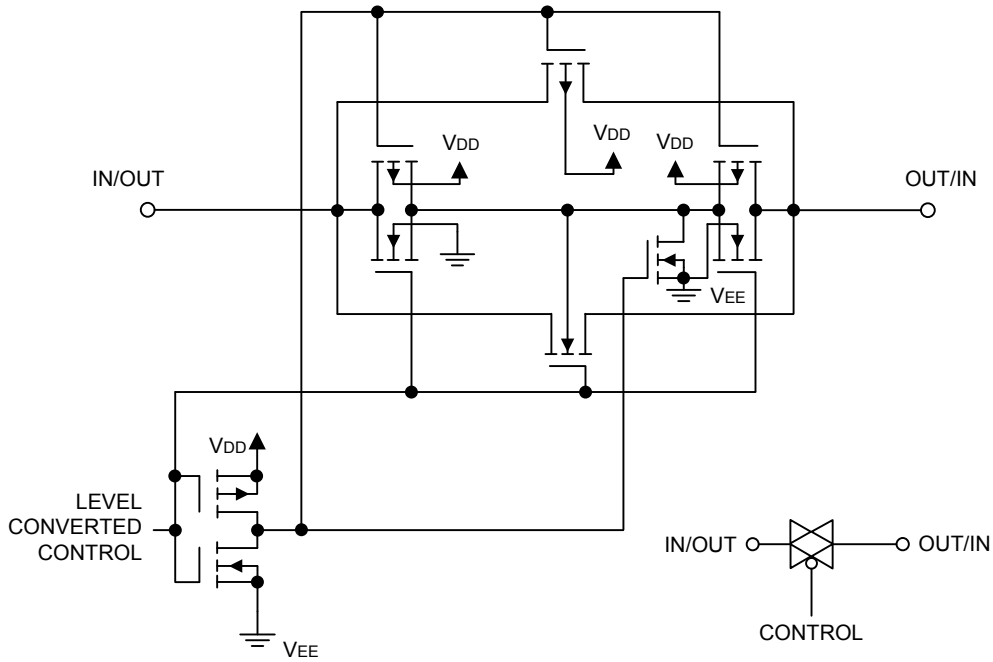
- ELECTRICAL CHARACTERISTICS(Cont.)

PARAMETER SYMBOL TEST
 CONDITIONS MIN TYP MAX UNIT CONTROL
INPUTS – INHIBIT A, B, C
(Voltages Referenced to
V_{SS}) •• Low Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec,
 SYMBOL TEST
 CONDITIONS MIN TYP MAX UNIT CONTROL
INPUTS – INHIBIT A, B, C
(Voltages Referenced to
V_{SS}) •• Low Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec,
 TEST
 CONDITIONS MIN TYP MAX UNIT CONTROL
INPUTS – INHIBIT A, B, C
(Voltages Referenced to
V_{SS}) •• Low Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec,
 MIN TYP MAX UNIT CONTROL
CONTROL INPUTS – INHIBIT
A, B, C (Voltages
Referenced to V_{SS}) •• Low
 Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec,
 TYP MAX UNIT CONTROL
CONTROL INPUTS – INHIBIT A,
B, C (Voltages
Referenced to V_{SS}) •• Low
 Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec,
 MAX UNIT CONTROL
INPUTS – INHIBIT A, B, C
(Voltages Referenced to
V_{SS}) •• Low Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec,
 UNIT CONTROL INPUTS
– INHIBIT A, B, C
(Voltages Referenced to
V_{SS}) •• Low Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec,
 CONTROL INPUTS –
INHIBIT A, B, C (Voltages
Referenced to V_{SS}) •• Low
 Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec.

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CONTROL INPUTS – INHIBIT A, B, C (Voltages
Referenced to V_{SS}) •• Low
 Level Input
 Voltage V_{DD}=5V V_{IL} R_{ON}=
 per spec.

- Notes: 1. Data of "TYP" is intended as an indication of the IC's potential performance.
2. For voltage drops across the switch(ΔV_{SW})>600mV (>300mV at high temperature), excessive V_{DD} current may be drawn, i.e. the current out of the switch may contain both V_{DD} and switch input components. The reliability of the device will be unaffected unless the Maximum Ratings are exceeded.

■ TEST CIRCUIT

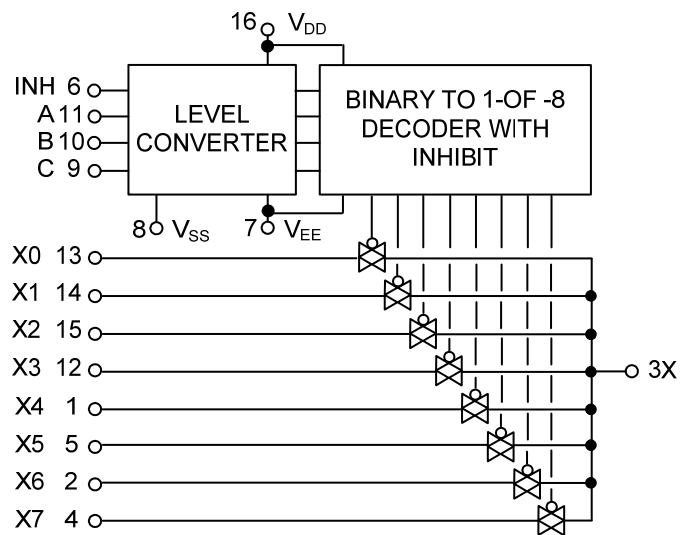


Switch Circuit Schematic

■ TRUTH TABLE

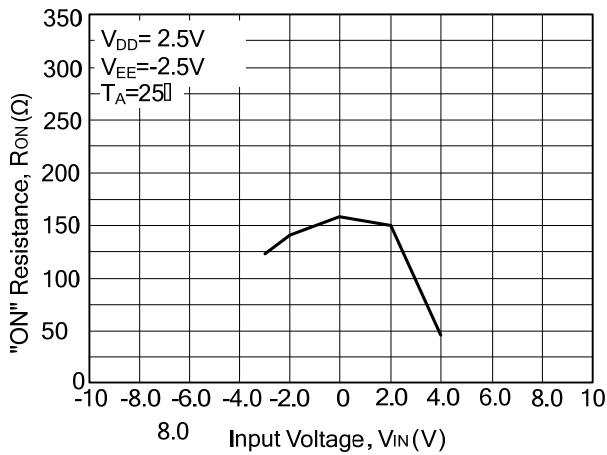
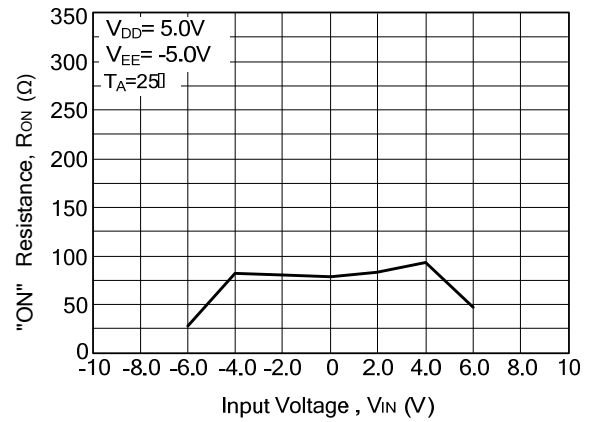
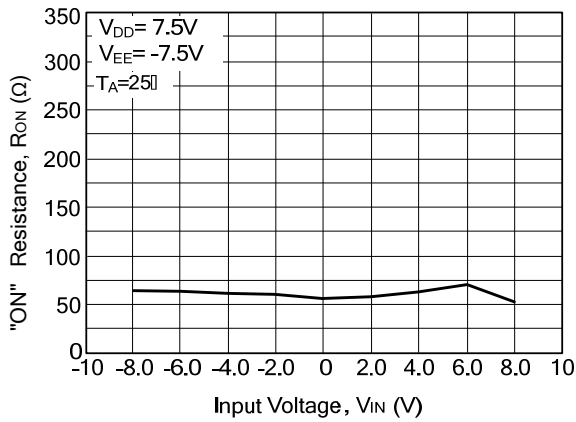
Control Inputs				ON Switches
INHIBIT	C	B	A	
0	0	0	0	X0
0	0	0	1	X1
0	0	1	0	X2
0	0	1	1	X3
0	1	0	0	X4
0	1	0	1	X5
0	1	1	0	X6
0	1	1	1	X7
1	x	x	x	None

x = Don't Care



UTC 4051 Functional Diagram

■ TYPICAL CHARACTERISTICS



UTC assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all UTC products described or contained herein. UTC products are not designed for use in life support appliances, devices or systems where malfunction of these products can be reasonably expected to result in personal injury. Reproduction in whole or in part is prohibited without the prior written consent of the copyright owner. The information presented in this document does not form part of any quotation or contract, is believed to be accurate and reliable and may be changed without notice.