

8:1 CMOS Analog Signal Multiplexer

General Description

The ET74HC4851 is an 8-channel CMOS analog signal multiplexer. It operates from 2.5V to 5.5V single power supply and all digital inputs support 1.8V logic control.

The ET74HC4851 features low voltage, low on-resistance and low off-leakage current. The high performances make it very suitable for multiple applications, such as cellular phones, audio and video signal routing, etc.

The ET74HC4851 is available in Green SOP16, TSSOP16 and QFN16-3×3 packages. It operates over an ambient temperature range of -40°C to +85°C.

Features

- Single Supply Voltage Range: 2.5V to 5.5V
- On-Resistance: 48Ω(TYP) with 5V Supply
- Internal A, B, C Rise Time: 45ns (TYP), $V_{CC} = 5V$
- Internal A, B, C Fall Time: 50ns (TYP), $V_{CC} = 5V$
- 1.8V Logic Compatible
- Low On-Resistance Flatness
- High Off-Isolation: -83dB ($R_L = 50\Omega$, $f = 1MHz$)
- Low Off-Leakage Current: 1nA (TYP) at +25°C
- Low On-Leakage Current: 1nA (TYP) at +25°C
- Low Distortion: 0.7% ($R_L = 600\Omega$, $f = 20Hz$ to 20kHz)
- Package information:

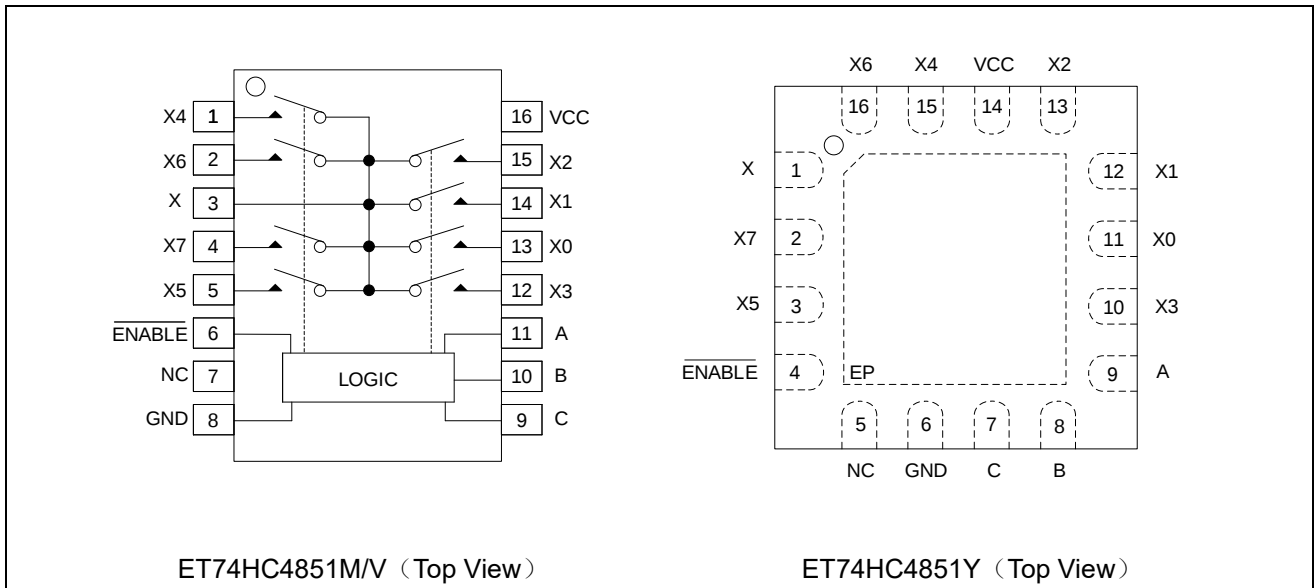
Part No.	Package	MSL
ET74HC4851M	SOP16 (10mm×6mm)	3
ET74HC4851V	TSSOP16 (5mm×6.4mm)	3
ET74HC4851Y	QFN16 (3mm×3mm)	3

Application

- Automotive
- Portable Equipment
- Sample-and-Hold Circuits
- Data-Acquisition Systems
- Battery-Powered Systems
- Audio and Video Signal Routing

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Pin Configuration



Pin Function

Pin No.		Pin Name	Description
ET74HC4851M/V	ET74HC4851Y		
13, 14, 15, 12, 1, 5, 2, 4	11, 12, 13, 10, 15, 3, 16, 2	X0-X7	Analog Switch Inputs X0-X7.
3	1	X	Analog Switch “X” Output Pin.
6	4	$\overline{\text{ENABLE}}$	Digital Enable Control Pin. Normally connected to GND.
7	5	NC	No Connect.
8	6	GND	Ground. Connect to digital ground.
9	7	C	Digital Address “C” Input Pin.
10	8	B	Digital Address “B” Input Pin.
11	9	A	Digital Address “A” Input Pin.
16	14	VCC	Positive Analog and Digital Supply Voltage Input Pin.
—	Exposed Pad	EP	Exposed Pad. Connect exposed pad to GND.

Note: Any input terminal can be used as an output terminal, and any output terminal can also be used as an input terminal. Signal transmission in both directions is equally well.

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Truth Table

$\overline{\text{ENABLE}}$	SELECT INPUTS			ON SWITCHES
	C	B	A	
H	X	X	X	All Switches OFF
L	L	L	L	X-X0
L	L	L	H	X-X1
L	L	H	L	X-X2
L	L	H	H	X-X3
L	H	L	L	X-X4
L	H	L	H	X-X5
L	H	H	L	X-X6
L	H	H	H	X-X7

Note: X Don't care.

Absolute Maximum Ratings

over operating free-air temperature range (unless otherwise noted)

Characteristic	Symbol	Value	Unit
Input voltage range	V_{CC}	-0.3~ 6	V
	$V_{(X0-X7)}$	-0.3~ $V_{CC} + 0.3$	V
	$V_A, V_B, V_C, V_{ENABLE}$	-0.3~ $V_{CC} + 0.3$	V
Junction Temperature	T_J	150	°C
Lead Temperature (Soldering,10s)	T_L	260	°C
Storage temperature range	T_{STG}	-65~150	°C
ESD HBM	V_{ESD}	4000	V

Note. Voltages exceeding V_{CC} or GND on any signal terminal are clamped by internal diodes. Limit forward-diode current to maximum current rating.

Recommended Operating Conditions

Characteristic	Symbol	Min	Max	Unit
Supply Voltage Range	V_{CC}	2.5	5.5	V
Operating Temperature Range	T_A	-40	85	°C

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DC Electrical Characteristics

$V_{CC} = 5.0V$, Full = $-40^{\circ}C$ to $+85^{\circ}C$, typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

Parameter	Symbol	Conditions	Temp	Min	Typ	Max	Unit
ANALOG SWITCH							
Analog Signal Range	$V_{X_}, V_X$		Full	GND		V_{CC}	V
On-Resistance	R_{ON}	$V_{CC} = 5.0V, I_X = 1mA$	$25^{\circ}C$		44	65	Ω
			Full			85	
On-Resistance Match Between Channels	ΔR_{ON}	$V_{CC} = 5.0V, I_X = 1mA$	$25^{\circ}C$		1	5	Ω
			Full			5.3	
On-Resistance Flatness	$R_{FLAT(ON)}$	$V_{CC} = 5.0V, I_X = 1mA$	$25^{\circ}C$		14	26	Ω
			Full			35	
X_Off Leakage Current	$I_{X(OFF)}$	$V_{CC} = 5.0V, V_{X_} = 4.5V$ or $0V, V_X = 4.5V$ or $0V$	$25^{\circ}C$		1	1000	nA
X Off Leakage Current	$I_{X(OFF)}$	$V_{CC} = 5.0V, V_{X_} = 4.5V$ or $0V, V_X = 4.5V$ or $0V$	$25^{\circ}C$		1	1000	nA
X On Leakage Current	$I_{X(ON)}$	$V_{CC} = 5.0V, V_X = 4.5V$ or $0V$	$25^{\circ}C$		1	1000	nA
DIGITAL I/O							
Logic Input Logic Threshold High	$V_{AH}, V_{BH}, V_{CH}, V_{ENH}$		$25^{\circ}C$	1.46			V
Logic Input Logic Threshold Low	$V_{AL}, V_{BL}, V_{CL}, V_{ENL}$		$25^{\circ}C$			1	V
Input-Current High	$I_{AH}, I_{BH}, I_{CH}, I_{ENH}$	$V_A, V_B, V_C, V_{EN} = V_{CC}$	$25^{\circ}C$		1	1000	nA
Input-Current Low	$I_{AL}, I_{BL}, I_{CL}, I_{ENL}$	$V_A, V_B, V_C, V_{EN} = 0V$	$25^{\circ}C$		1	1000	nA
DYNAMIC CHARACTERISTICS							
Address Transition Time	t_{TRANS}	$V_{X_} = 3V/0V, R_L = 300\Omega, C_L = 35pF$, Figure 1	$25^{\circ}C$		85		ns
ENABLE Turn-On Time	t_{ON}	$V_{X_} = 3V, R_L = 300\Omega, C_L = 35pF$, Figure 2	$25^{\circ}C$		60		ns
ENABLE Turn-Off Time	t_{OFF}	$V_{X_} = 3V, R_L = 300\Omega, C_L = 35pF$, Figure 2	$25^{\circ}C$		20		ns
Internal A, B, C Rise Time	t_R		$25^{\circ}C$		45		ns
Internal A, B, C Fall Time	t_F		$25^{\circ}C$		50		ns
Break-Before-Make Time Delay	t_D	$V_{X_} = 3V, R_L = 300\Omega, C_L = 35pF$, Figure 3	$25^{\circ}C$		50		ns

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DC Electrical Characteristics(Continued)

$V_{CC} = 5.0V$, Full = $-40^{\circ}C$ to $+85^{\circ}C$, typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

Parameter	Symbol	Conditions	Temp	Min	Typ	Max	Unit
Charge Injection	Q	$R_S = 0\Omega$, $C_L = 1nF$, Figure 4	$25^{\circ}C$		6		pC
Off Isolation	V_{ISO}	$R_L = 50\Omega$, $f = 1MHz$, Figure 5	$25^{\circ}C$		-83		dB
Input Off-Capacitance	$C_{X(OFF)}$	$V_{X-} = 0V$, $f = 1MHz$, Figure 6	$25^{\circ}C$		4.7		pF
Output Off-Capacitance	$C_{X(OFF)}$	$V_{X-} = 0V$, $f = 1MHz$, Figure 6	$25^{\circ}C$		12.7		pF
Output On-Capacitance	$C_{X(ON)}$	$V_{X-} = 0V$, $f = 1MHz$, Figure 6	$25^{\circ}C$		16		pF
-3dB Bandwidth	BW	$R_L = 50\Omega$	$25^{\circ}C$		180		MHz
Total Harmonic Distortion	THD	$R_L = 600\Omega$, $5V_{P-P}$, $f = 20Hz$ to $20kHz$	$25^{\circ}C$		0.7		%
POWER SUPPLY							
Power Supply Range	V_{CC}		Full	2.5		5.5	V
Power Supply Current	I_{CC}	$V_{CC} = 5.0V$, V_A , V_B , V_C , $V_{EN} = V_{CC}$ or 0	$25^{\circ}C$		0.005	1	μA

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DC Electrical Characteristics

$V_{CC} = 3.3V$, Full = $-40^{\circ}C$ to $+85^{\circ}C$, typical values are at $T_A = +25^{\circ}C$, unless otherwise noted.)

Parameter	Symbol	Conditions	Temp	Min	Typ	Max	Unit
ANALOG SWITCH							
Analog Signal Range	$V_{X_}, V_X$		Full	GND		V_{CC}	V
On-Resistance	R_{ON}	$I_X = 1mA$	$25^{\circ}C$		102	202	Ω
			Full			234	
X_Off Leakage Current	$I_{X_ (OFF)}$	$V_{X_} = 1V, 3V,$ $V_X = 3V, 1V$	$25^{\circ}C$		1	1000	nA
X Off Leakage Current	$I_{X(OFF)}$	$V_{X_} = 1V, 3V,$ $V_X = 3V, 1V$	$25^{\circ}C$		1	1000	nA
X On Leakage Current	$I_{X(ON)}$	$V_X = 3V, 1V$	$25^{\circ}C$		1	1000	nA
DIGITAL I/O							
Logic Input Logic Threshold High	$V_{AH}, V_{BH},$ V_{CH}, V_{ENH}		$25^{\circ}C$	1.8			V
Logic Input Logic Threshold Low	$V_{AL}, V_{BL},$ V_{CL}, V_{ENL}		$25^{\circ}C$			0.5	V
Input-Current High	$I_{AH}, I_{BH},$ I_{CH}, I_{ENH}	$V_A, V_B, V_C, V_{EN} = V_{CC}$	$25^{\circ}C$		1	1000	nA
Input-Current Low	$I_{AL}, I_{BL},$ I_{CL}, I_{ENL}	$V_A, V_B, V_C, V_{EN} = 0V$	$25^{\circ}C$		1	1000	nA
DYNAMIC CHARACTERISTICS							
Address Transition Time	t_{TRANS}	$V_{X_} = 3V/0V,$ $R_L = 300\Omega, C_L = 35pF,$ Figure 1	$25^{\circ}C$		150		ns
ENABLE Turn-On Time	t_{ON}	$V_{X_} = 3V, R_L = 300\Omega,$ $C_L = 35pF$, Figure 2	$25^{\circ}C$		110		ns
ENABLE Turn-Off Time	t_{OFF}	$V_{X_} = 3V, R_L = 300\Omega,$ $C_L = 35pF$, Figure 2	$25^{\circ}C$		50		ns
Internal A, B, C Rise Time	t_R		$25^{\circ}C$		80		ns
Internal A, B, C Fall Time	t_F		$25^{\circ}C$		85		ns
Break-Before-Make Time Delay	t_D	$V_{X_} = 3V, R_L = 300\Omega,$ $C_L = 35pF$, Figure 3	$25^{\circ}C$		80		ns
-3dB Bandwidth	BW	$R_L = 50\Omega$	$25^{\circ}C$		180		MHz
Charge Injection	Q	$R_S = 0\Omega, C_L = 1nF,$ $V_S = 2.5V$, Figure 4	$25^{\circ}C$		4		pC
POWER SUPPLY							
Power Supply Current	I_{CC}	$V_A, V_B, V_C,$ $V_{EN} = V_{CC}$ or 0	$25^{\circ}C$		0.003	1	μA

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Test Circuit and Waveform

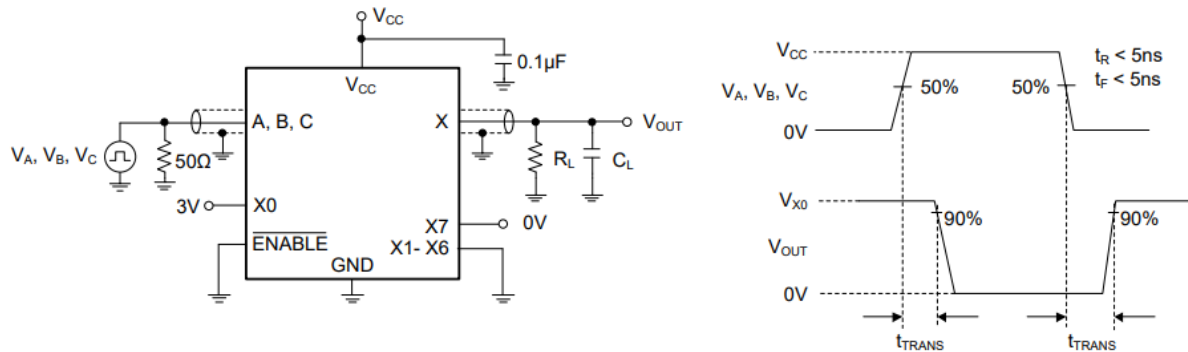


Figure 1. Address Transition Times (t_{TRANS})

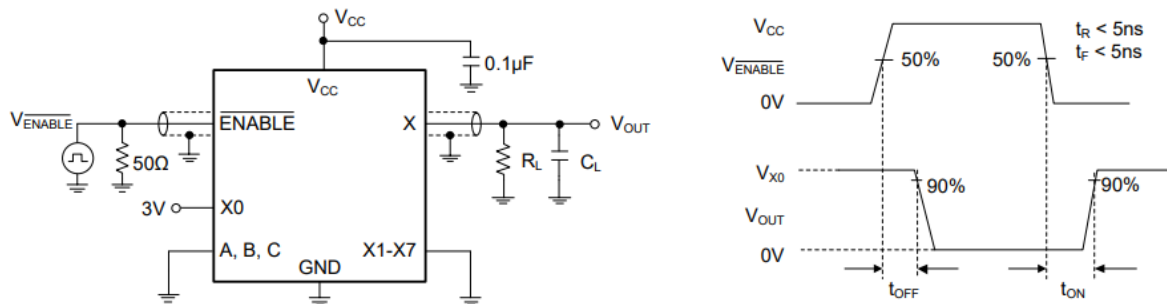


Figure 2. Switching Times (t_{ON} , t_{OFF})

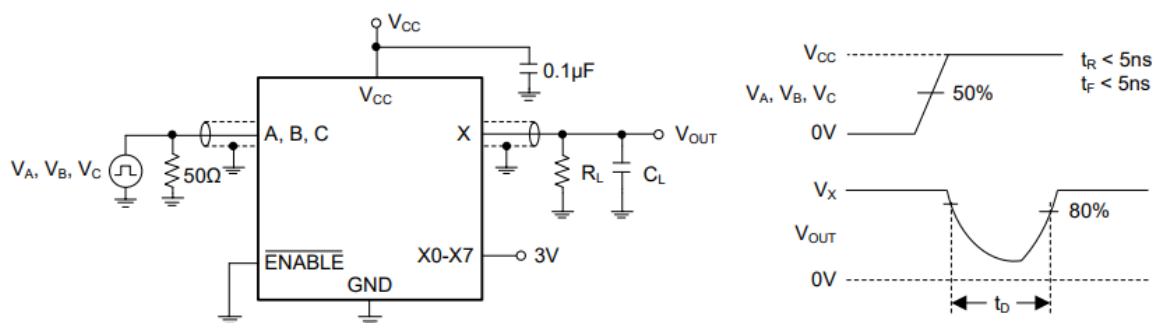


Figure 3. Break-Before-Make Time Delay (t_D)

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Test Circuit and Waveform(Continued)

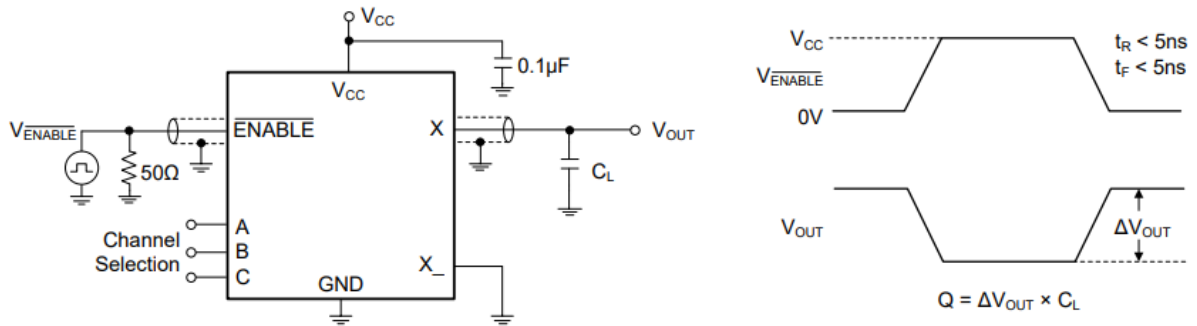
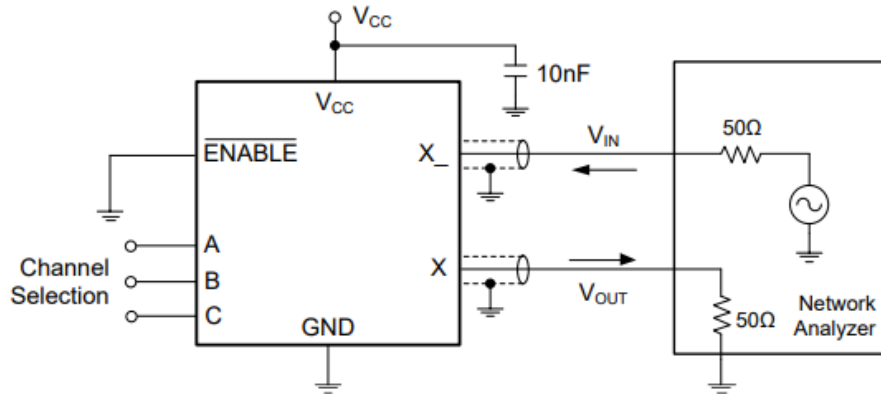


Figure 4. Charge Injection (Q)



Off Isolation = $20\log(V_{OUT}/V_{IN})$ (Measured between X and "OFF" X_- Terminal on Each Switch)

On Loss = $20\log(V_{OUT}/V_{IN})$ (Measured between X and "ON" X_- Terminal on Each Switch)

Figure 5. Off Isolation, On Loss

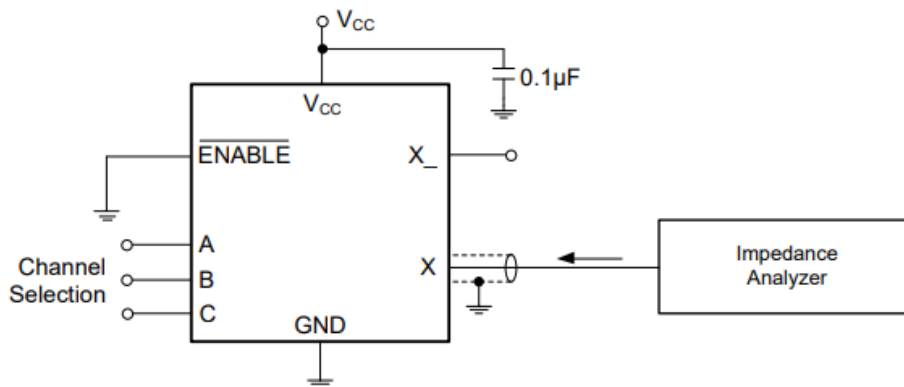


Figure 6. Capacitance

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Typical Characteristics

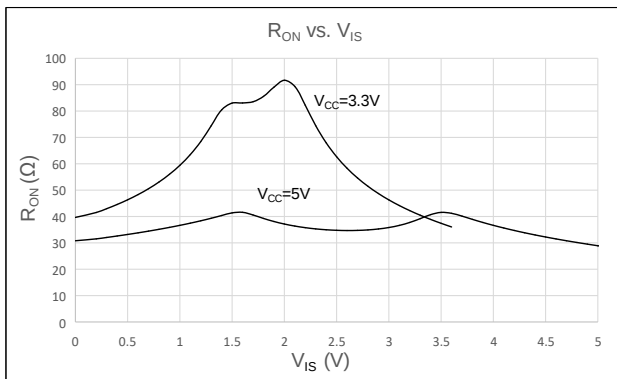


Figure 7. On-Resistance vs. V_{IS}

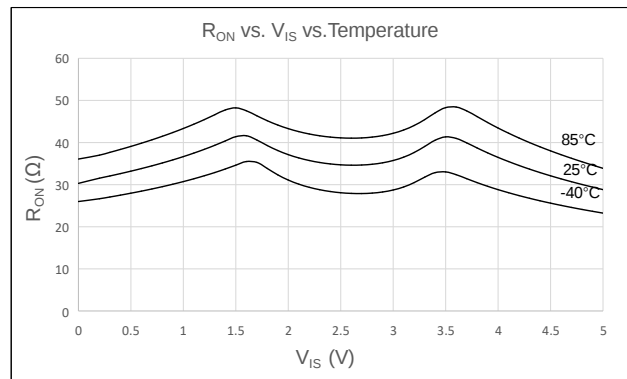


Figure 8. On-Resistance vs. V_{IS} vs. Temp (V_{CC} = 5.0V)

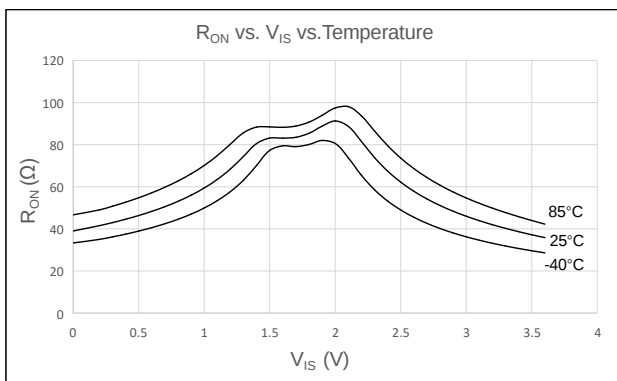


Figure 9. On-Resistance vs. V_{IS} vs. Temp (V_{CC} = 3.3V)

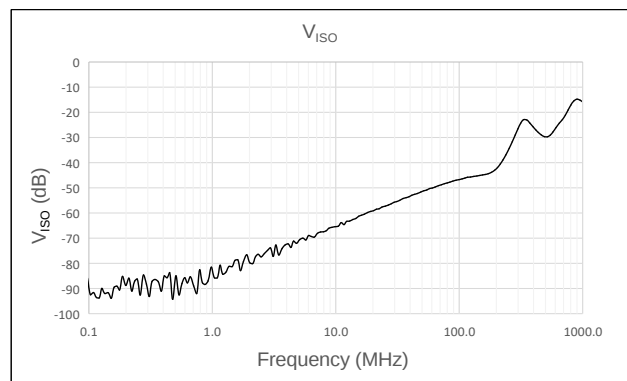
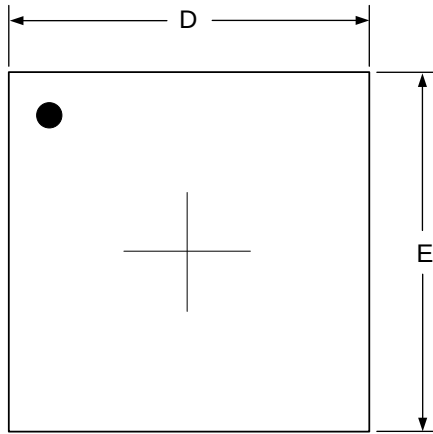


Figure 10. V_{ISO} vs. Frequency

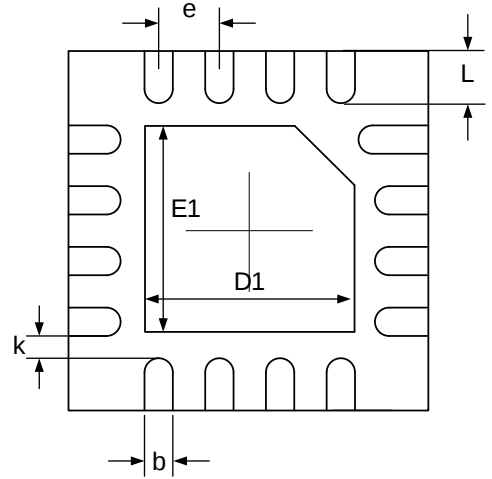
ET74HC4851

Package Dimension

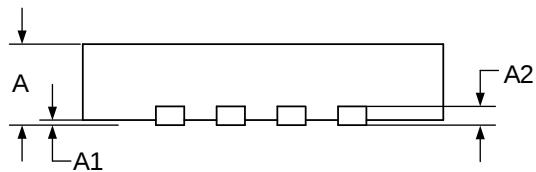
QFN16 (3mm×3mm)



TOP VIEW



BOTTOM VIEW



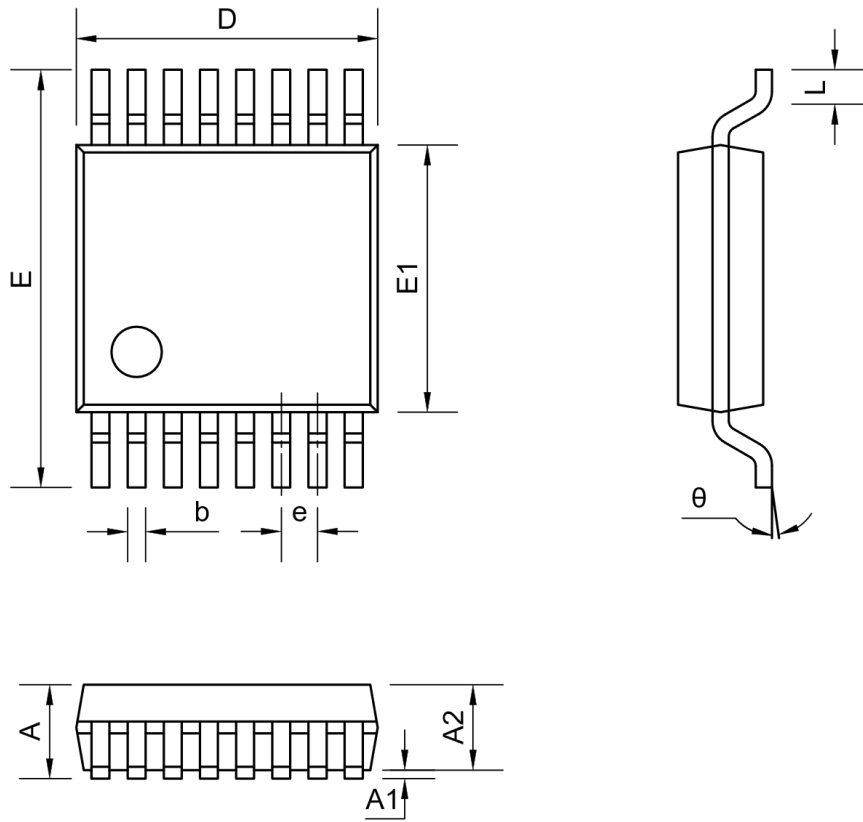
SIDE VIEW

Dimensions Table (Units:mm)

Symbol	Min	Nom	Max
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	0.203 REF		
b	0.19	0.24	0.29
D	2.90	3.00	3.10
E	2.90	3.00	3.10
e	0.50 TYP		
L	0.30	0.40	0.50
k	0.20 MIN		
D1	1.60	1.70	1.80
E1	1.60	1.70	1.80

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TSSOP16 (5mm×6.4mm)

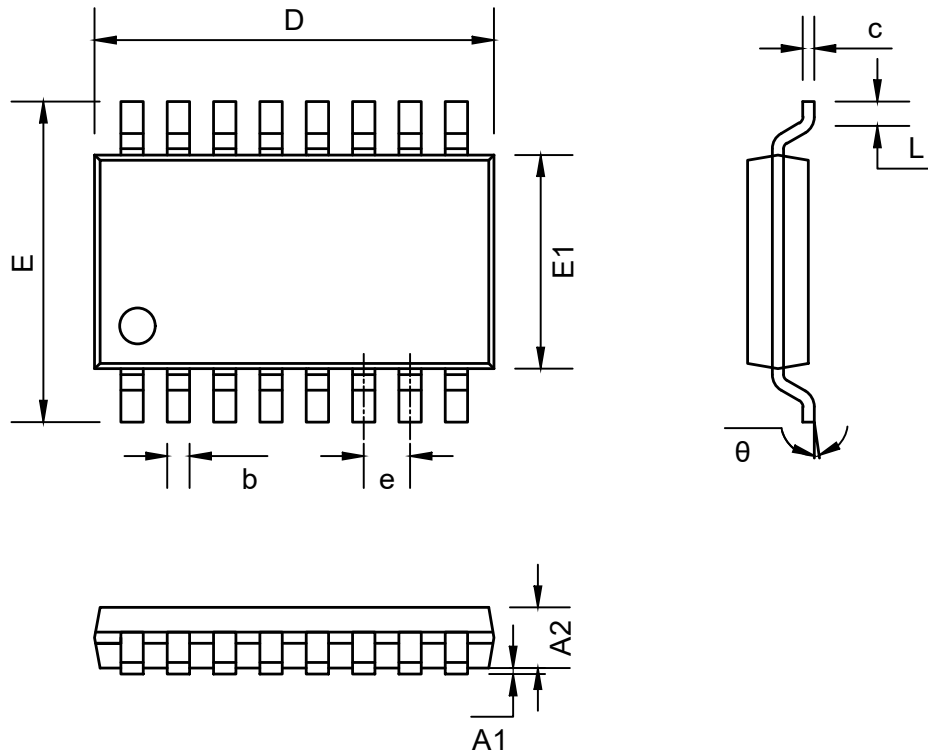


Dimensions Table (Units:mm)

Symbol	Min	Nom	Max
A	--	--	1.20
A1	0.05	--	0.15
A2	0.80	--	1.05
b	0.19	--	0.30
D	4.86	4.98	5.1
E	6.20	6.40	6.60
E1	4.30	4.40	4.50
e	0.65BSC		
L	0.50	0.60	0.70
θ	1°	--	7°

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SOP16 (6mm×10mm)



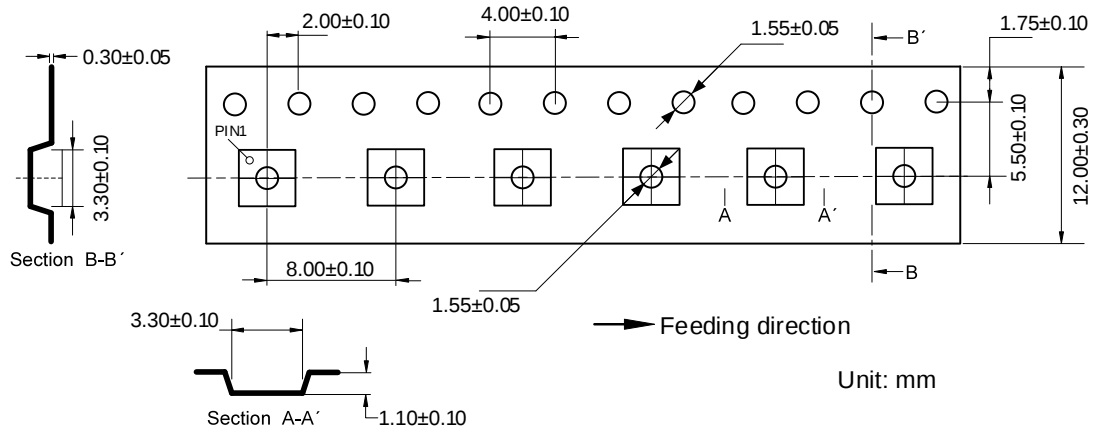
Dimensions Table (Units:mm)

Symbol	Min	Non	Max
A1	0.10	--	0.25
A2	1.35	1.45	1.55
b	0.33	0.42	0.51
c	0.17	--	0.25
D	9.80	10.00	10.20
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.40	--	1.27
θ	0°	--	8°

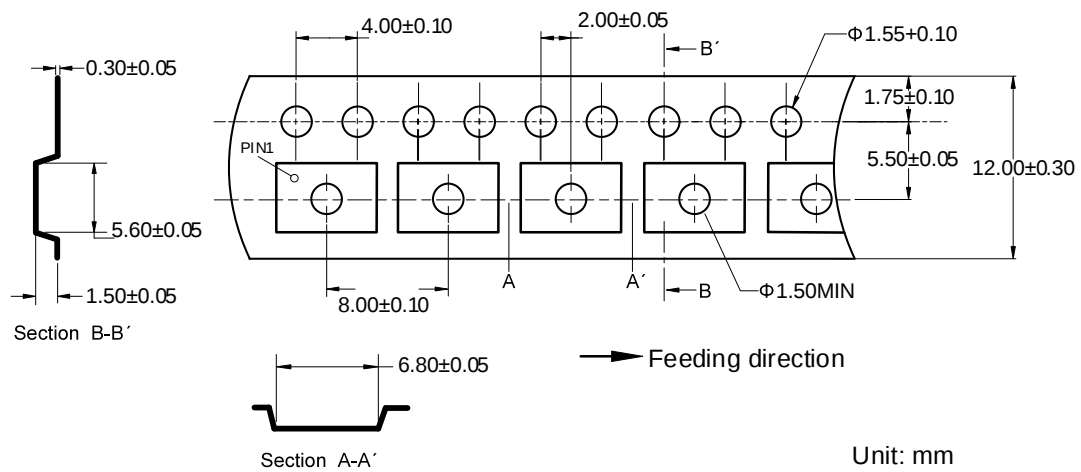
ET74HC4851

Tape Information

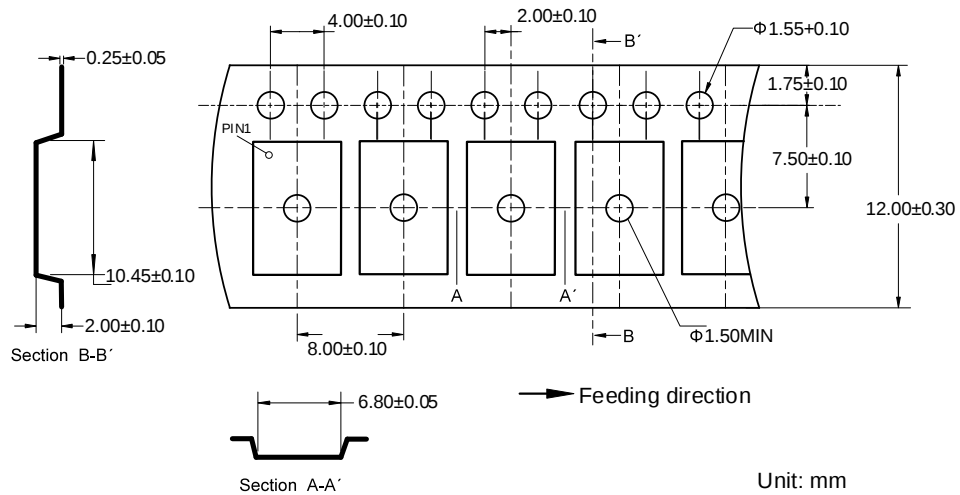
ET74HC4851Y



ET74HC4851V



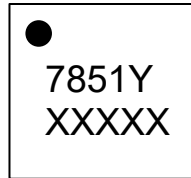
ET74HC4851M



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Marking Information

ET74HC4851Y

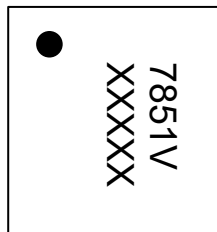


7851Y - Part Number

XXXXX - Tracking Number

Note: X (Tracking Number) is variable, according to the wafer lot number.

ET74HC4851V

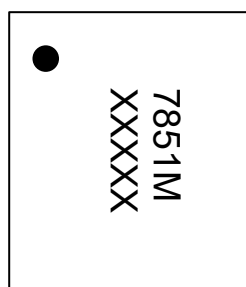


7851V - Part Number

XXXXX - Tracking Number

Note: X (Tracking Number) is variable, according to the wafer lot number.

ET74HC4851M



7851M - Part Number

XXXXX - Tracking Number

Note: X (Tracking Number) is variable, according to the wafer lot number.

ET74HC4851

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2022-11-01	Preliminary Version	Gong Ling Feng	Gong Ling Feng	Gong Ling Feng
1.1	2023-01-05	Update Typeset	Yin Peng	Gong Ling Feng	Yin Peng
1.2	2025-06-11	Update R_{ON} , V_{IH} / V_{IL} spec Add Tape and Marking Information	Gong Ling Feng	Gong Ling Feng	Gong Ling Feng
1.2.a	2025-10-16	Update words	Shib		