

GT4851

CMOS Single 8-Channel Analog Multiplexer/Demultiplexer

1 Features	2 Application
- High bandwidth: 390 MHz - High off-Isolation: -84 dB(RL=50 Ω, f=1 MHz) - Supply range: +2.5 V to +5.5 V - Low on-state resistance: 22Ω @4.5V - Break-before-make switching - Binary address decoding on chip - Operation temperature range: -40°C to +125°C - Micro size packages: SOP16, TSSOP16, QFN-3*3-16L	- Sensors - Analog and digital multiplexing and demultiplexing - A/D and D/A conversion - Signal gating - Battery-operated equipment - Factory automation - Communications circuits - Appliances

3 Description	Circuit Diagram
The GT4851 is a CMOS analog IC configured as an 8-channel multiplexer. This CMOS device can operate from 2.5 V to 5.5 V. The GT4851 device are digitally-controlled analog switches. It has low on-resistance (22Ω TYP) and very low off-leakage current (1nA TYP). The GT4851 is available in Green SOP16, TSSOP16 and QFN-3*3-16L packages. It operates over an ambient temperature range of -40°C to +125°C.	The circuit diagram illustrates the internal structure of the GT4851 as an 8-channel multiplexer. It features a central vertical column of eight switches, each controlled by a digital address line (A, B, C). The inputs are labeled X0 through X7, and the outputs are labeled Y0 through Y7. A central 'LOGIC' block is shown, which likely handles the address decoding and control logic for the switches. The diagram also shows the power supply connections: Vcc (pin 16) and GND (pin 8).

4 Revision History

Revision	Date	Note
Rev. A0. 1	2024. 07. 08	Original Version
Rev. A1. 0	2024. 10. 12	Official Version

The latest datasheet version should be checked on the GTIC official website, as the company does not actively inform customers about updates to the datasheet.

5 Device Summary, Pin and Packages

Table 5-1. Device Summary⁽¹⁾

Serial Name	Part Name	Package	Body Size (Nom)	Marking ⁽²⁾⁽⁴⁾	MSL ⁽³⁾	Package Qty
GT4851	GT4851PE	SOP16	4.90mm×3.90mm×1.55mm	GT4851 XXXXXXX	3	Tape and Reel,4000
	GT4851TE	TSSOP16	5.00mm×4.40mm×1.20mm	GT4851 XXXXXXX	3	Tape and Reel,4000
	GT4851QE	QFN-3×3-16L	3.00mm×3.00mm×0.75mm	GT4851 XXXXX	3	Tape and Reel,5000

(1) For all available packages, please contact product sales.

(2) There may be additional marking, which relates to the lot trace code information (data code and vendor code), the logo or the environmental category on the device.

(3) MSL, The Moisture Sensitivity Level rating according to the JEDEC industry standard classifications.

(4) "XXXXX" in Marking will be appeared as the batch code.

FAE: 13148878879

5 Device Summary, Pin and Packages(Continued)

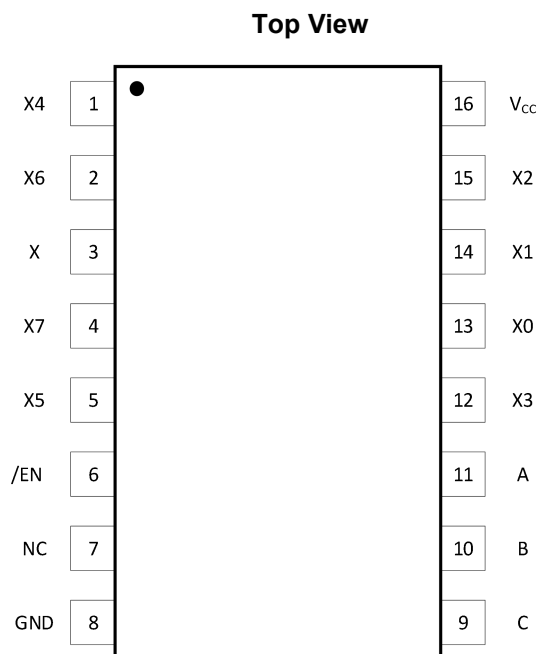


Fig.5-1. GT4851: PE (SOP16) Package

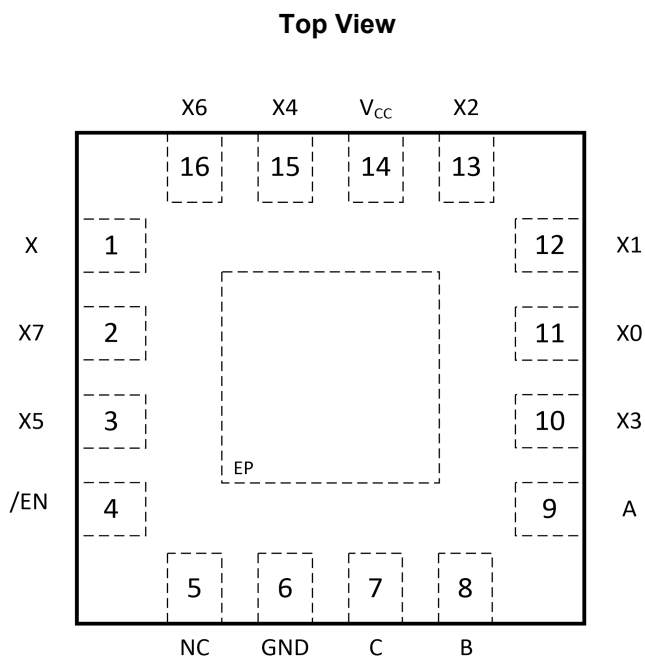


Fig.5-2. GT4851: QE (QFN-3x3-16L) Package

GT4851: TE (TSSOP16) Package

Table 5-3 Pin Definition

Pin			Description
Name	PE TE	QE	
X0-X7	13,14,15,12, 1,5,2,4	10,12,13,9, 15,3,16,2	Analog Switch Inputs X0-X7.
X	3	1	Analog Switch "X" Output.
Vcc	16	14	Power Supply
A	11	9	Digital Address "A" Input.
B	10	8	Digital Address "B" Input.
C	9	7	Digital Address "C" Input.
GND	8	6	Ground
NC	7	5	No Connect.
/EN	6	4	Digital Enable Input. Normally connected to GND.
EP	-	Exposed Pad	Exposed Pad. Connect EP to GND.

5 Device Summary, Pin and Packages(Continued)

Table 5-4 Function Table

/EN Input	Input Status			ON Channel(s)
	C	B	A	
1	X	X	X	NONE
0	0	0	0	X-X0
0	0	0	1	X-X1
0	0	1	0	X-X2
0	0	1	1	X-X3
0	1	0	0	X-X4
0	1	0	1	X-X5
0	1	1	0	X-X6
0	1	1	1	X-X7

X=Don't care

NOTE: Input and output pins are identical and interchangeable. Either may be considered an input or output; signals pass equally well in either direction.

6 Voltage, Temperature, ESD and Thermal Ratings

6.1 Absolute Maximum Ratings⁽¹⁾

Parameters		Min.	Max.	Unit
V _{CC}	Supply voltage range	-0.3	6.0	V
V _{IN}	Input voltage(All inputs) ⁽²⁾	-0.3	(V _{CC})+0.3	V
I _{IN}	Switch input current	-20	+20	mA
I _{PEAK}	Peak switch current	-40	+40	mA
T _J	Junction temperature under bias		150	°C
T _{stg}	Storage temperature range	-65	150	°C

(1) 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.

(2) The input and output negative-voltage ratings may be exceeded if the input and output current ratings are observed.

6.2 ESD Ratings

ESD			Value	Unit
V(ESD)	Electrostatic discharge	Human-Body Model (HBM) ⁽¹⁾	6K	V
		Charged-Device Model (CDM) ⁽²⁾	2K	V

(1) JEDEC document JEP155 states that 500-V HBM allows safe manufacturing with a standard ESD control process.

(2) JEDEC document JEP157 states that 250-V CDM allows safe manufacturing with a standard ESD control process.

6 Voltage, Temperature, ESD and Thermal Ratings(Continued)

6.3 Recommended Operating Conditions⁽¹⁾

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

Symbol	Parameter	Min	Max	Units
V _{CC}	Supply voltage	2.5	5.5	V
T _A	Ambient temperature	-40	125	°C

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

6.4 Thermal Information

Package Type	θ_{JA}	θ_{JC}	Unit
SOP16	76	42.1	°C/W
TSSOP16	111.3	45.3	°C/W
QFN-3×3-16L	51.9	53.3	°C/W

7 Electrical Specifications

7.1 DC Electrical Characteristics

V_{CC}=2.5V to 5.5V, FULL=−40°C to +125°C. Typical values are at T_A=+25°C (unless otherwise noted)

Parameter	Symbol	Conditions	V ₊	Temp	Min	Typ	Max	Units
Analog Switch								
Analog Signal Range	V _{X_} , V _X				0		V _{CC}	V
On-Resistance	R _{ON}	I _X =10mA	4.5V	+25°C		22	25	Ω
				Full			30	Ω
			3V	+25°C		50	55	Ω
				Full			60	Ω
On-Resistance Match Between Channels	Δ R _{ON}	I _X =10mA	4.5V	+25°C		0.3	0.5	Ω
				Full			0.8	Ω
			3V	+25°C		0.5	1	Ω
				Full			1.5	Ω
On-Resistance Flatness	R _{FLAT} (ON)	I _X =10mA	4.5V	+25°C		7	10	Ω
				Full			12	Ω
			3V	+25°C		30	33	Ω
				Full			35	Ω
X ₋ , X ₋ Off, X ₋ On Leakage Current	I _{X(OFF)} , I _{X(OFF)} , I _{X(ON)}),	V _{X_} =0V, 4.5V, V _X =4.5V, 0V	5.5V	+25°C		1	1000	nA
		V _{X_} =1V, 3V, V _X =1V, 3V	3.6V	+25°C		1	1000	nA
Digital Control Inputs								
Logic Input Logic Threshold High	V _{AH} , V _{BH} , V _{CH} , V _{/EN}		5V	+25°C	1.6			V
			3.3V		1.2			V
Logic Input Logic Threshold Low	V _{AL} , V _{BL} , V _{CL} , V _{/EN}		5V	+25°C			0.7	V
			3.3V				0.5	V
Input-Current High	I _{AH} , I _{BH} , I _{CH} , I _{/EN}	V _A , V _B , V _{/EN} =V _{CC}	3.6V to 5.5V	+25°C		1	1000	nA
Input-Current Low	I _{AL} , I _{BL} , I _{CL} , I _{/EN}	V _A , V _B , V _{/EN} =0V	3.6V to 5.5V	+25°C		1	1000	nA

(1) All unused digital inputs of the device must be held at V_{CC} or GND to ensure proper device operation.

7 Electrical Specifications(Continued)

7.2 Switch And AC Characteristics

V_{CC}=2.5V to 5.5V, FULL=−40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

Parameter	Symbol	Conditions	V ₊	Temp	Min	Typ	Max	Units
Address Transition Time	t _{TRANS}	V _X =3V/0V, R _L =300Ω, C _L =35pF	5V	+25°C		34		ns
		V _X =3V/0V, R _L =300Ω, C _L =35pF	3.3V			75		ns
Turn-On Time	t _{ON}	V _X =3V, R _L =300Ω, C _L =35pF	5V	+25°C		30		ns
			3.3V			72		ns
Turn-Off Time	t _{OFF}	V _X =3V, R _L =300Ω, C _L =35pF	5V	+25°C		5		ns
			3.3V			7		ns
Input Transition RiseTime	t _R	V _X =3V, R _L =300Ω, C _L =35pF	5V	+25°C		8		ns
			3.3V			41		ns
Input Transition Fall Time	t _F	V _X =3V, R _L =300Ω, C _L =35pF	5V	+25°C		42		ns
			3.3V			42		ns
Break-Before-Make Time Delay	t _D	V _X =3V, R _L =300Ω, C _L =35pF	5V	+25°C		11		ns
			3.3V			29		ns
Charge Injection	Q	R _S =0Ω, C _L =1nF	5V	+25°C		10		pC
		R _S =0Ω, C _L =1nF	3.3V			7		pC
Off Isolation	O _{ISO}	R _L =50Ω, f=1MHZ	5V	+25°C		-84		dB
		R _L =50Ω, f=1MHZ	3.3V	+25°C		-84		dB
-3dB Bandwidth	BW	R _L =50Ω	5V	+25°C		390		MHZ
			3.3V			370		MHZ
Input Off-Capacitance	C _{X(OFF)}	V _X =0V, f=1MHz	5V	+25°C		10		pF
Output Off-Capacitance	C _{X(OFF)}	V _X =0V, f=1MHz	5V	+25°C		6		pF
Output On-Capacitance	C _{X(ON)}	V _X =0V, f=1MHz	5V	+25°C		3		pF
Total Harmonic Distortion	THD	R _L =600Ω, 5V _{P-P} , f=20Hz to 20kHz	5V	+25°C		0.1		%
Power Supply Range	V _{CC}			Full	2.5		5.5	V
Power Supply Current	I _{CC}	V _A , V _B , V _C , V _{IEN} =V _{CC} or 0	5V	+25°C		1	6	μA
		V _A , V _B , V _C , V _{IEN} =V _{CC} or 0	3.3V			1	3	μA

8 Typical Characteristics

Vcc=2.5V to 5.5V, FULL=-40°C to +125°C. Typical values are at TA=+25°C (unless otherwise noted)

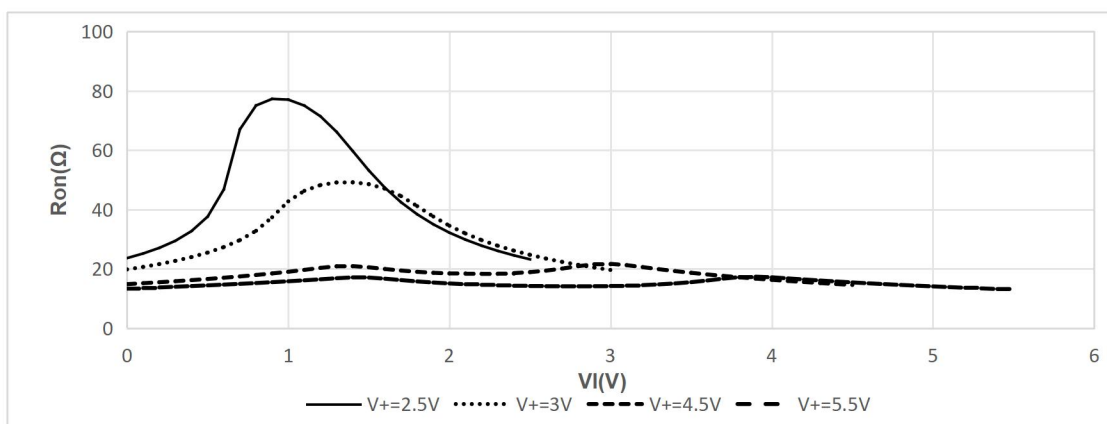


Fig.8-1. R_{on} VS Input Voltage

9 Measurement Information

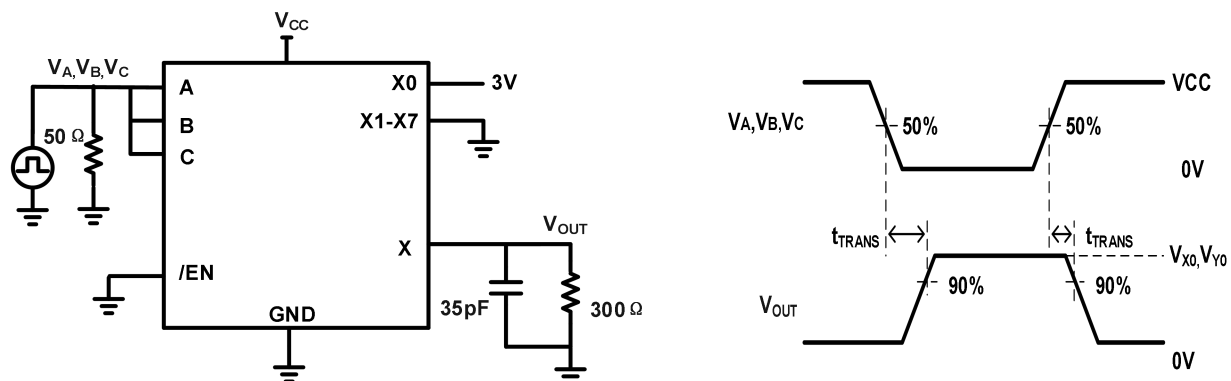


Fig.9-1. Address Transition Times (t_{TRANS})

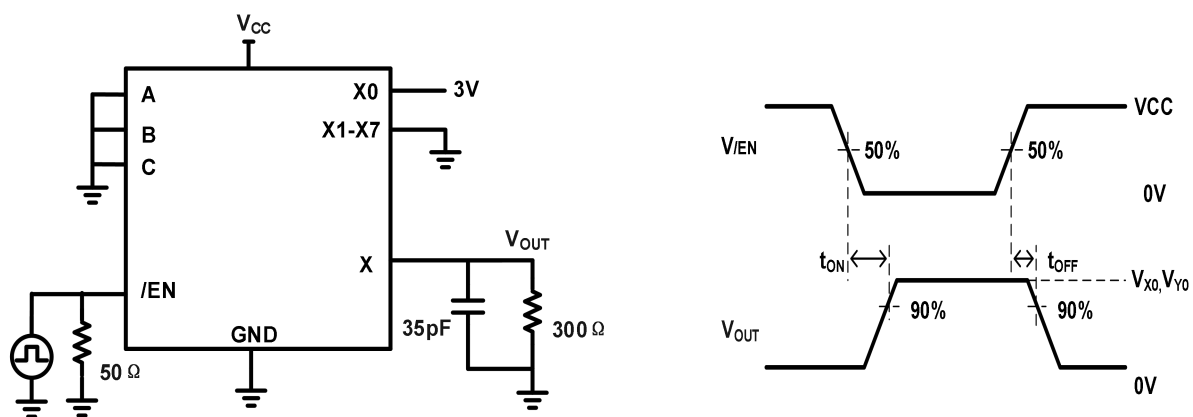


Fig.9-2. Switching Times (t_{ON}, t_{OFF})

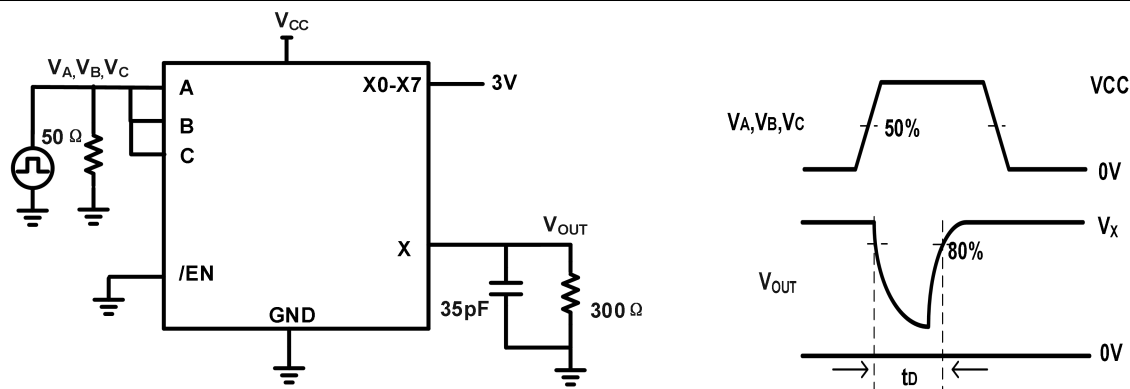


Fig.9-3. Break-Before-Make Time Delay (t_D)

9 Measurement Information(Continued)

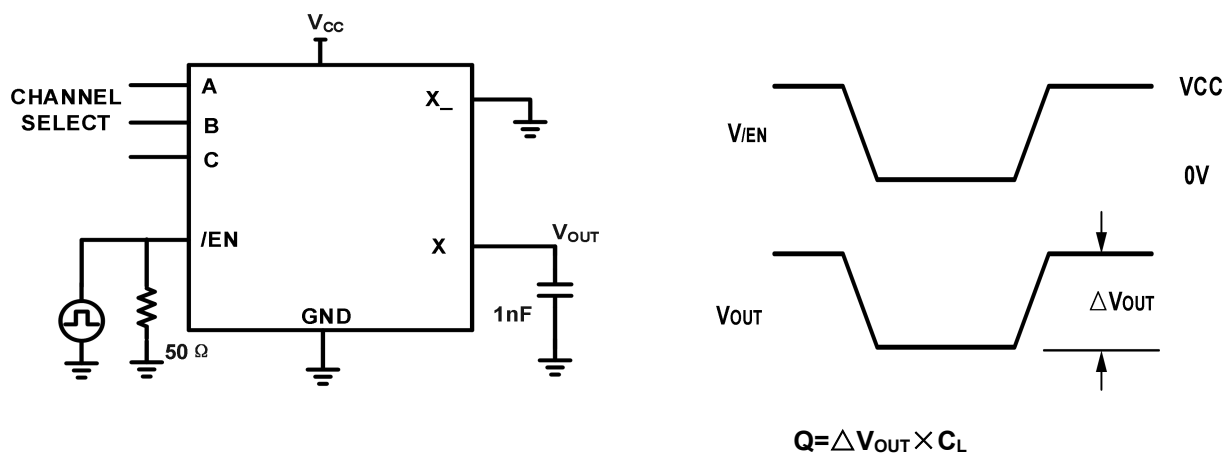


Fig.9-4. Charge Injection (Q)

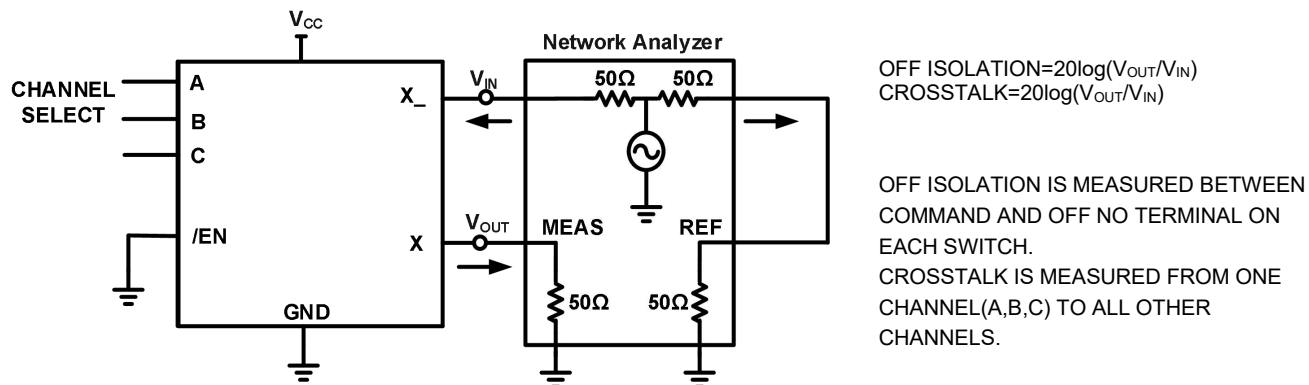


Fig.9-5. Off Isolation

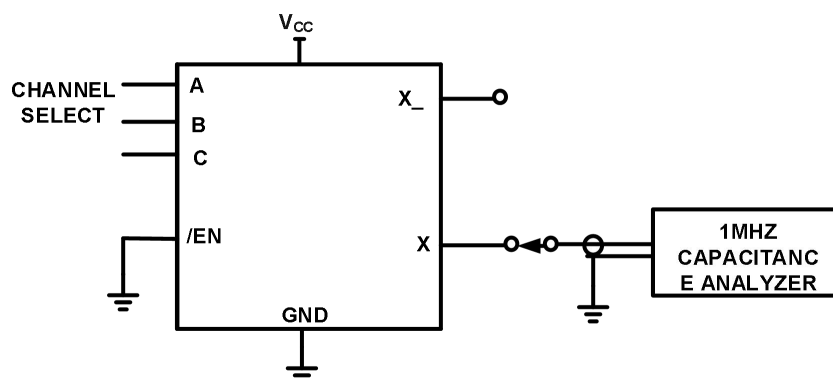


Fig.9-6. Capacitance

10 Application Note

The GT4851 device is a single 8-channel multiplexer having three binary control inputs, A, B, and C, and an inhibit input. The three binary signals select 1 of 8 channels to be turned on and connect one of the 8 inputs to the output.

One application of the GT4851 is to use it in conjunction with a microcontroller to poll a keypad. Fig.10-1 shows the basic schematic for such a polling system. The microcontroller uses the channel select pins to cycle through the different channels while reading the input to see if a user is pressing any of the keys. This is a very robust setup, allowing for multiple simultaneous key-presses with very little power consumption. It also utilizes very few pins on the microcontroller. The down side of polling is that the microcontroller must continually scan the keys for a press and can do little else during this process.

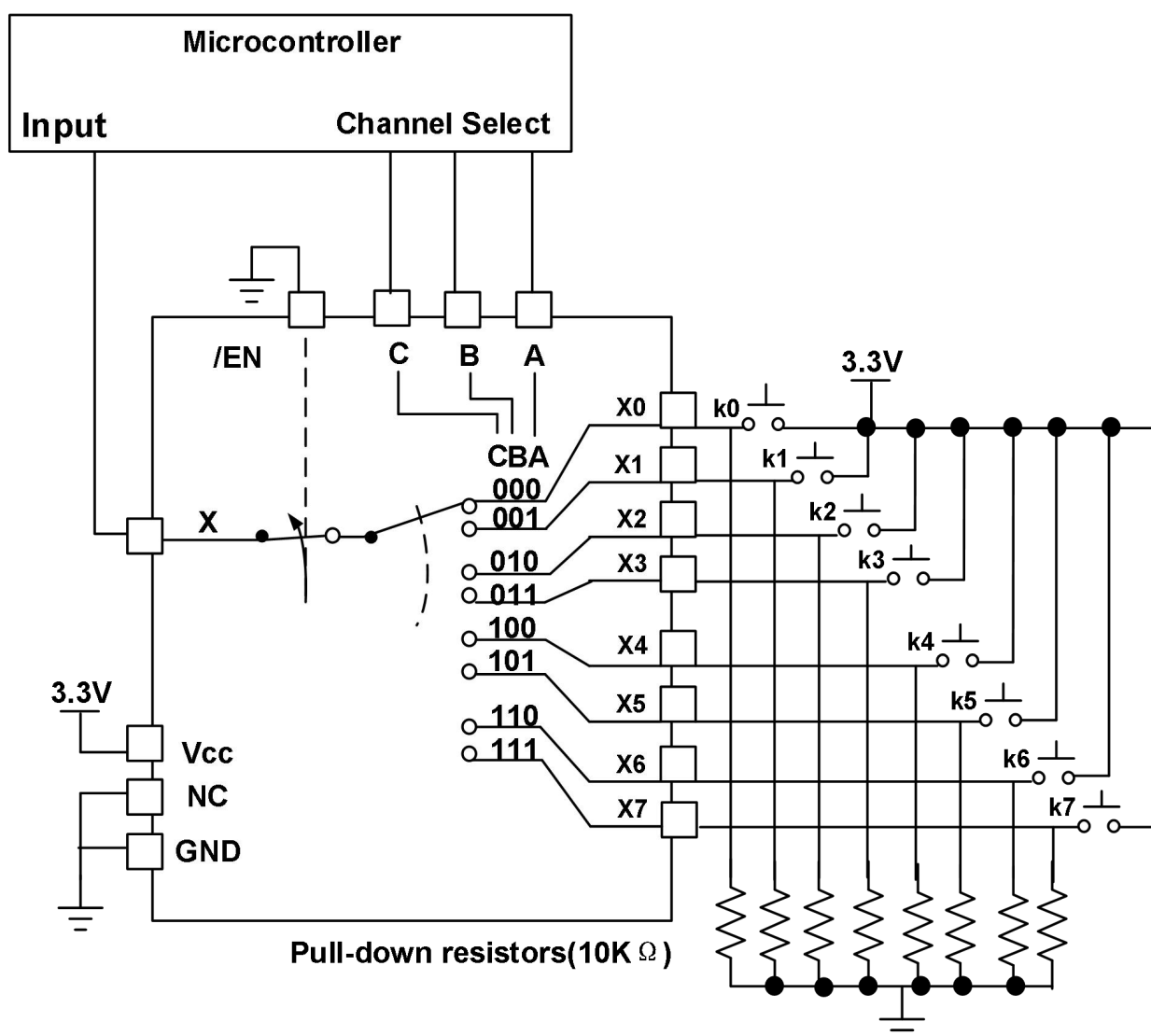
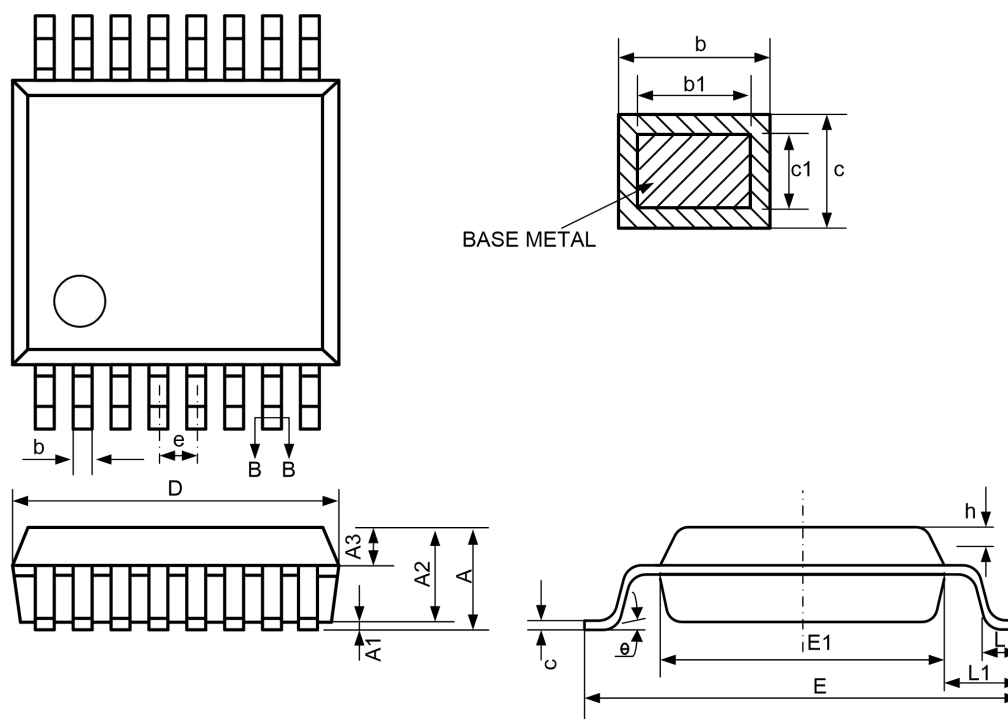


Fig.10-1.Being Used to Help Read Button Presses on a Keypad.

11 Package Outline Dimension

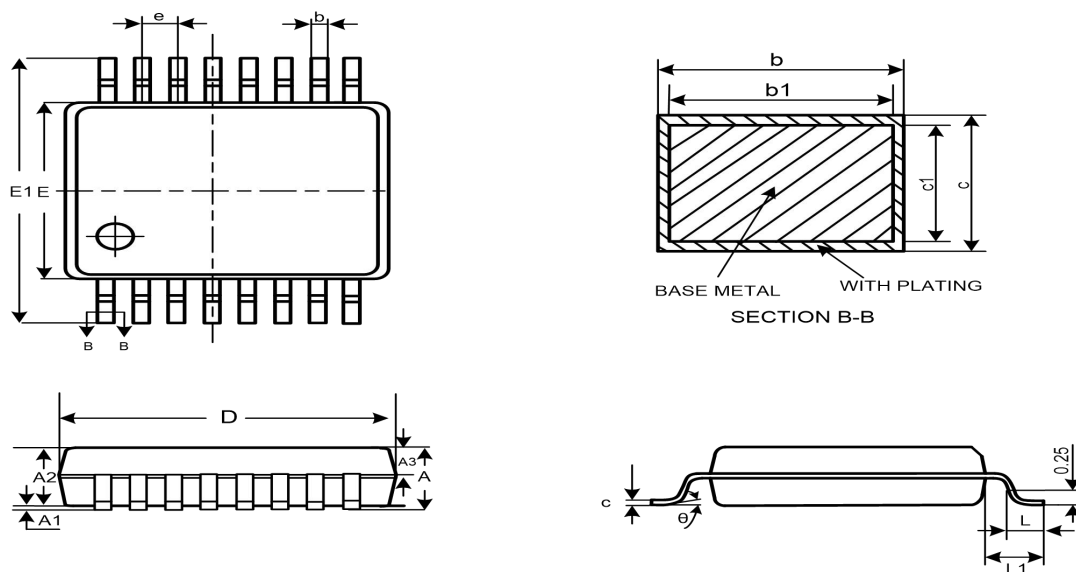
SOP16



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	--	--	1.75	--	--	0.069
A1	0.10	--	0.225	0.004	--	0.009
A2	1.30	1.40	1.50	0.051	0.055	0.059
b	0.39	--	0.47	0.015	--	0.019
b1	0.38	0.41	0.44	0.015	0.016	0.017
c	0.20	--	0.24	0.008	--	0.009
c1	0.19	0.20	0.21	0.007	0.008	0.008
D	9.80	9.90	10.00	0.386	0.390	0.394
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.154	0.157
e	1.27(BSC)			0.05(BSC)		
h	0.25	--	0.50	0.010	--	0.020
L	0.50	--	0.80	0.020	--	0.031
L1	1.05REF			0.041REF		
θ	0°	--	8°	0°	--	8°

11 Package Outline Dimension(Continued)

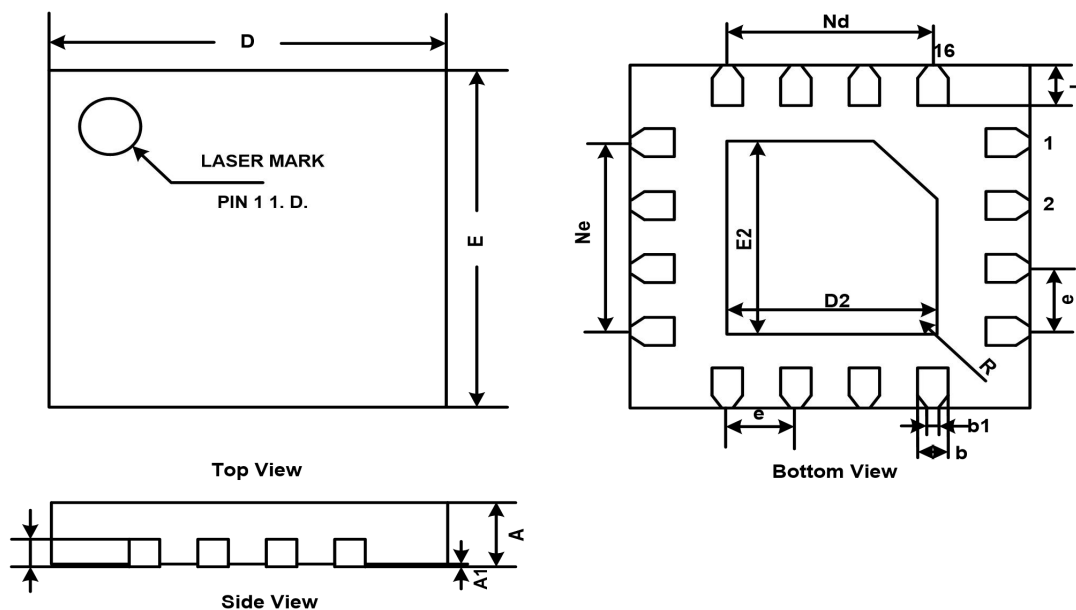
TSSOP16



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Min	Nom	Min	Nom
A	—	—	1.20	—	—	0.047
A1	0.05	—	0.15	0.002	—	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
A3	0.39	0.44	0.49	0.015	0.017	0.019
b	0.19	—	0.30	0.007	—	0.012
b1	0.19	0.22	0.25	0.007	0.009	0.010
c	0.13	—	0.18	0.005	—	0.007
c1	0.12	0.13	0.14	0.005	0.005	0.006
D	4.86	4.98	5.10	0.191	0.196	0.201
E	4.30	4.40	4.50	0.169	0.173	0.177
E1	6.20	6.40	6.60	0.244	0.252	0.260
e	0.65BSC			0.026BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030
L1	1.00BSC			0.039BSC		
θ	0°	—	8°	0°	—	8°

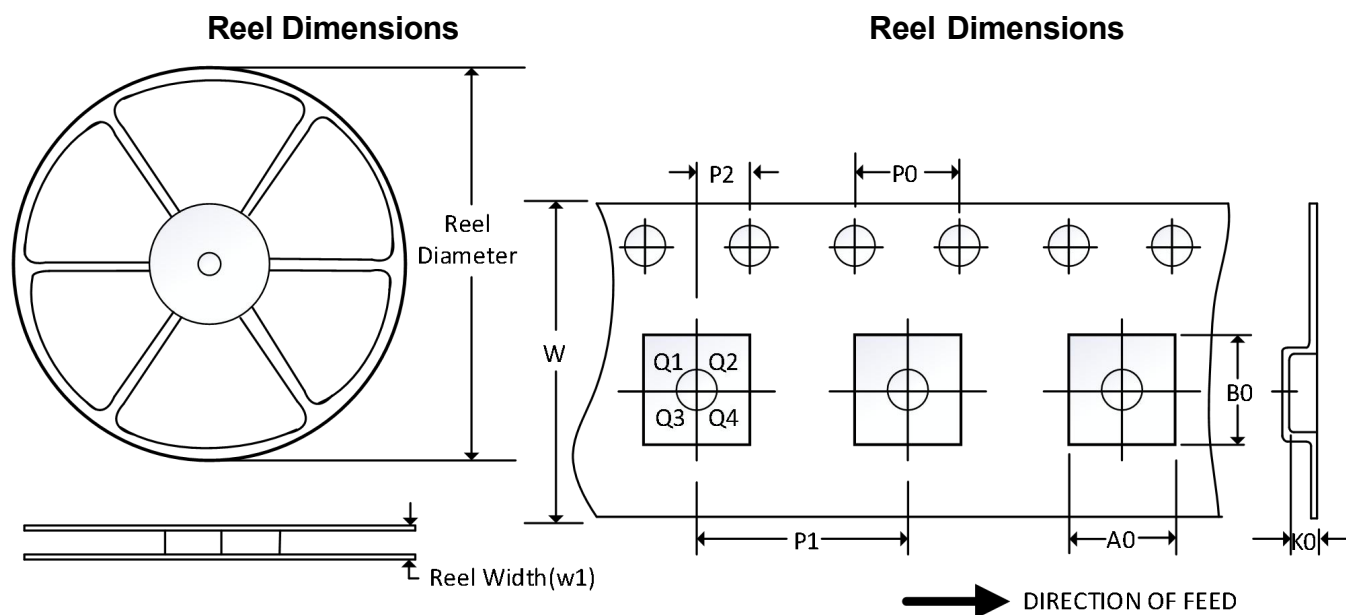
11 Package Outline Dimension(Continued)

QFN-3×3-16L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Min
A	0.700	0.800	0.028	0.032
A1	0.000	0.050	0.000	0.002
b	0.200	0.300	0.008	0.012
b1	0.230REF		0.009REF	
c	0.203REF		0.008REF	
D	2.900	3.100	0.116	0.124
D2	1.600	1.700	0.064	0.068
e	0.500BSC		0.020BSC	
Nd	1.500BSC		0.060BSC	
Ne	1.500BSC		0.060BSC	
E	2.900	3.100	0.116	0.124
E2	1.600	1.700	0.064	0.068
L	0.350	0.450	0.014	0.018
h	0.250	0.350	0.010	0.014
K	0.225	0.325	0.009	0.013
R	0.075REF		0.003REF	

12 Tape and Reel Information



NOTE: The picture is only for reference. Please make the object as the standard.

Key Parameter List of Tape and Reel

Package Type	Reel Diameter	Reel Width(mm)	A0 (mm)	B0 (mm)	K0 (mm)	P0 (mm)	P1 (mm)	P2 (mm)	W (mm)	Pin1 Quadrant
SOP16	13"	16.4	6.5	10.3	2.1	4	8	2	16	Q1
TSSOP16	13"	12.4	6.9	5.6	1.2	4	8	2	12	Q1
QFN-3×3-16L	13"	12.4	3.35	3.35	1.13	4	8	2	12	Q1

NOTE:

1. All dimensions are nominal.
2. Plastic or metal protrusions of 0.15mm maximum per side are not included.