GT4852
CMOS Two 4-Channel Analog Multiplexer/Demultiplexer

1 Features	2 Application
- High bandwidth: 440MHz	- Sensors
- High Off-Isolation:-84dB(RL=50 Ω,f=1 MHZ)	- Analog and digital multiplexing and demultiplexing
- Supply range: +2.5V to +5.5V	
- Low on-state resistance: 22Ω @4.5V	- A/D and D/A conversion
- Break-before-make switching	- Signal gating
- Binary address decoding on chip	- Battery-operated equipment
- Operation temperature range:-40°C to +125°C	- Factory automation
- Micro size packages:SOP16, TSSOP16, QFN-3*3-16L	- Communications circuits
	- Appliances

3 Description	Circuit Diagram
The GT4852 is a CMOS analog IC configured as two 4-channel multiplexers. This CMOS device can operate from 2.5 V to 5.5 V.	

The GT4852 device are digitally-controlled analog switches. It has low on-resistance (22Ω TYP) and very low off-leakage current (1nA TYP).

The GT4852 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.

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]

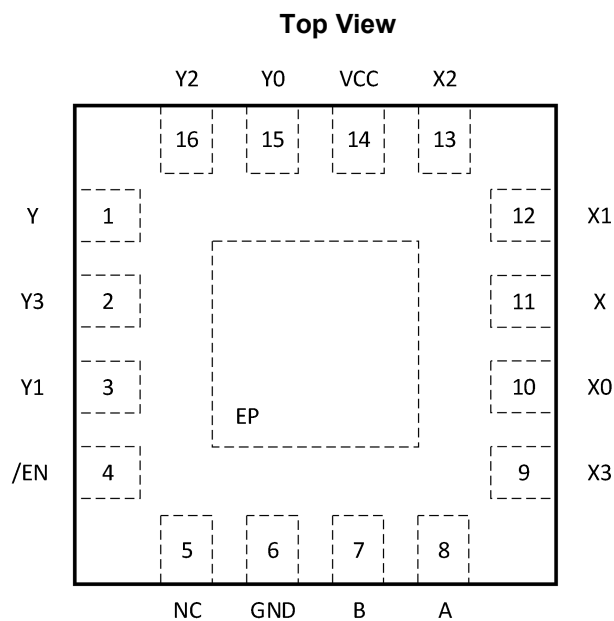| Serial Name	Part Name	Package	Body Size (Nom)	Marking[2][4]	MSL[3]	Package Qty
GT4852	GT4852PE	SOP16	4.90mm×3.90mm×1.55mm	GT4852 XXXXXXX	3	Tape and Reel,4000
	GT4852TE	TSSOP16	5.00mm×4.40mm×1.20mm	GT4852 XXXXXXX	3	Tape and Reel,4000
	GT4852QE	QFN-3×3-16L	3.00mm×3.00mm×0.75mm	GT4852 XXXXX	3	Tape and 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.

5 Device Summary, Pin and Packages(Continued)

Top View
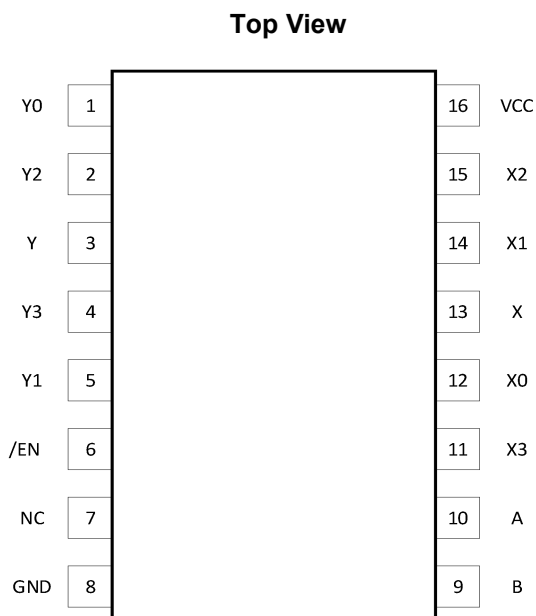
Fig.5-1. GT4852: PE (SOP16) Package

GT4852: TE (TSSOP16) Package

Top View

Fig.5-2. GT4852: QE (QFN-3×3-16L) Package

Table 5-3 Pin Definition

Pin			Description
Name	PE TE	QE	
X0-X3	12,14,15,11	10,12,13,9	Analog Switch Inputs X0-X3.
Y0-Y3	1,5,2,4	15,3,16,2	Analog Switch Inputs Y0-Y3.
X	13	11	Analog Switch "X" Output.
Y	3	1	Analog Switch "Y" Output.
Vcc	16	14	Power Supply
A	10	8	Digital Address "A" Input.
B	9	7	Digital Address "B" 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)
	B	A	
1	X	X	NONE
0	0	0	X-X0,Y-Y0
0	0	1	X-X1,Y-Y1
0	1	0	X-X2,Y-Y2
0	1	1	X-X3,Y-Y3

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
Vcc	Supply voltage range	-0.3	6.0	V
V_{IN}	Input voltage(All inputs)[2]	-0.3	(Vcc)+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
Vcc	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 Vcc 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

Vcc=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
Analog Switch								
Analog Signal Range	$V_{X\_}, V_X$ $V_{Y\_}, V_Y$				0		Vcc	V
On-Resistance	R_{ON}	Ix=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	$\triangle R_{ON}$	Ix=10mA	4.5V	+25°C		0.4	0.6	Ω
				Full			0.8	Ω
			3V	+25°C		0.6	1	Ω
				Full			1.5	Ω
On-Resistance Flatness	RFLAT (ON)	Ix=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 Y,Y_ Off,Y_ On Leakage Current	$I_{X\_(OFF)}, I_{X(OFF)}, I_{X(ON)}$, $I_{Y\_(OFF)}, I_{Y(OFF)}, I_{Y(ON)}$	$V_{X\_}, V_{Y\_}=0V, 4.5V, V_X, V_Y=4.5V, 0V$	5.5V	+25°C		1	100	nA
		$V_{X\_}, V_{Y\_}=1V, 3V, V_X, V_Y=1V, 3V$	3.6V	+25°C		1	100	nA
Digital Control Inputs								
Logic Input Logic Threshold High	V_{AH}, V_{BH}, V_{CH}, $V_{/ENH}$		5V	+25°C	1.6			V
			3.3V		1.2			V
Logic Input Logic Threshold Low	V_{AL}, V_{BL}, V_{CL}, $V_{/ENL}$		5V	+25°C			0.7	V
			3.3V				0.5	V
Input-Current High	I_{AH}, I_{BH}, I_{CH}, $I_{/ENH}$	$V_A, V_B, V_{/EN}=Vcc$	3.6 to 5.5V	+25°C		1	100	nA
Input-Current Low	I_{AL}, I_{BL}, I_{CL}, $I_{/ENL}$	$V_A, V_B, V_{/EN}=0V$	3.6 to 5.5V	+25°C		1	100	nA

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

7 Electrical Specifications(Continued)

7.2 Switch And AC Characteristics

Vcc=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}	$V_{X\_},V_{Y\_}$=3V/0V, R_L=300Ω, C_L=35pF	5V	+25°C		28		ns
		$V_{X\_},V_{Y\_}$=3V/0V, R_L=300Ω, C_L=35pF	3.3V			69		ns
Turn-On Time	t_{ON}	$V_{X\_},V_{Y\_}$=3V, R_L=300Ω, C_L=35pF	5V	+25°C		26		ns
			3.3V			67		ns
Turn-Off Time	t_{OFF}	$V_{X\_},V_{Y\_}$=3V, R_L=300Ω, C_L=35pF	5V	+25°C		5		ns
			3.3V			7		ns
Input Transition RiseTime	t_R	$V_{X\_},V_{Y\_}$=3V, R_L=300Ω, C_L=35pF	5V	+25°C		7		ns
			3.3V			40		ns
Input Transition Fall Time	t_F	$V_{X\_},V_{Y\_}$=3V, R_L=300Ω, C_L=35pF	5V	+25°C		28		ns
			3.3V			30		ns
Break-Before-Make Time Delay	t_D	$V_{X\_},V_{Y\_}$= 3V,R_L=300Ω,C_L=35pF	5V	+25°C		8		ns
			3.3V			28		ns
Charge Injection	Q	R_S=0Ω, C_L=1nF	5V	+25°C		8		pC
		R_S=0Ω, C_L=1nF	3.3V			4		pC
Channel-to-Channel Crosstalk	XTALK	f=1MHZ	5V	+25°C		-85		dB
			3.3V			-84		dB
Off Isolation	O_{ISO}	R_L=50Ω,f=1MHZ	5V	+25°C		-84		dB
			3.3V			-84		dB
-3dB Bandwidth	BW	R_L=50Ω	5V	+25°C		440		MHZ
			3.3V			420		MHZ
Input Off-Capacitance	$C_{X\_(OFF)}$, $C_{Y\_(OFF)}$	$V_{X\_}$=0V, f=1MHz	5V	+25°C		8		pF
Output Off-Capacitance	$C_{X(OFF)}$, $C_{Y(OFF)}$	$V_{X\_}$=0V, f=1MHz	5V	+25°C		5		pF
Output On-Capacitance	$C_{X(ON)}$, $C_{Y(ON)}$	$V_{X\_}$=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	Vcc			Full	2.5		5.5	V
Power Supply Current	I_{CC}	V_A, V_B,$V_{/EN}$=Vcc or 0	5.5V	+25°C		0.001	2	μA
		V_A, V_B, $V_{/EN}$=Vcc or 0	3.6V			0.001	1	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)
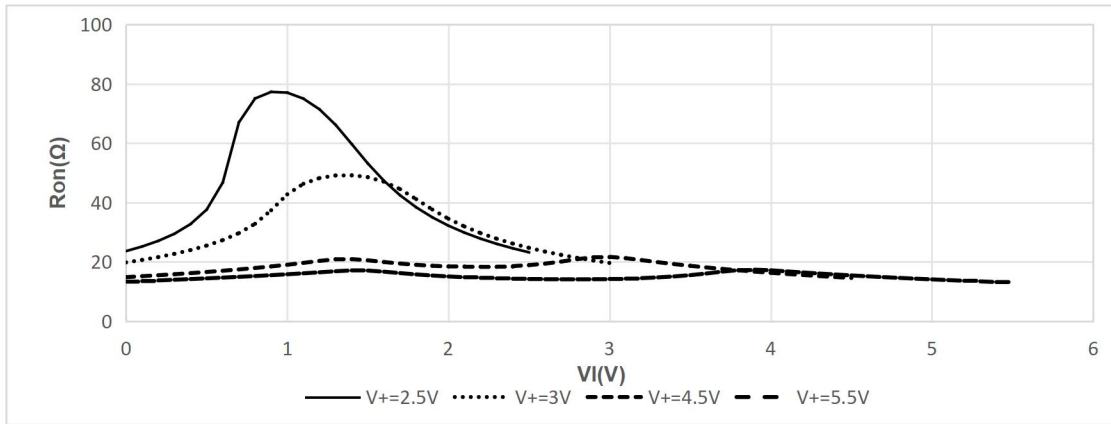
Fig.8-1.Ron VS Input Voltage
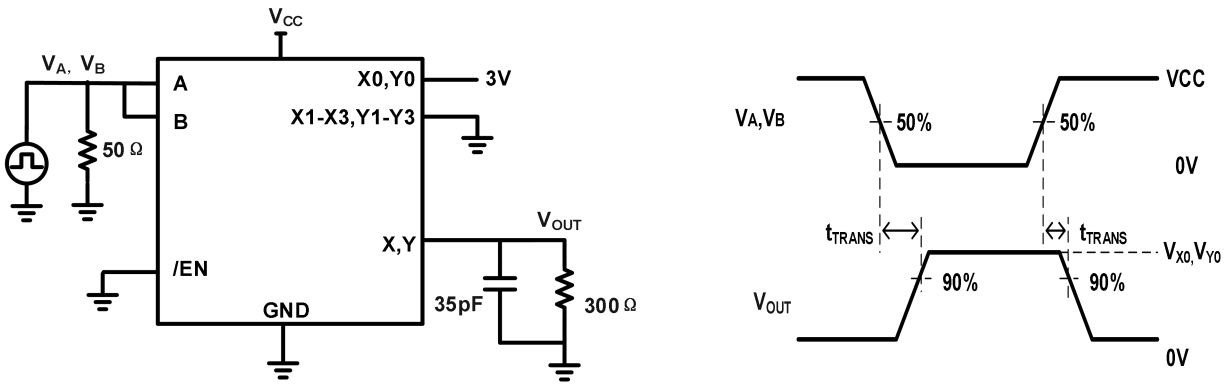
9 Measurement Information

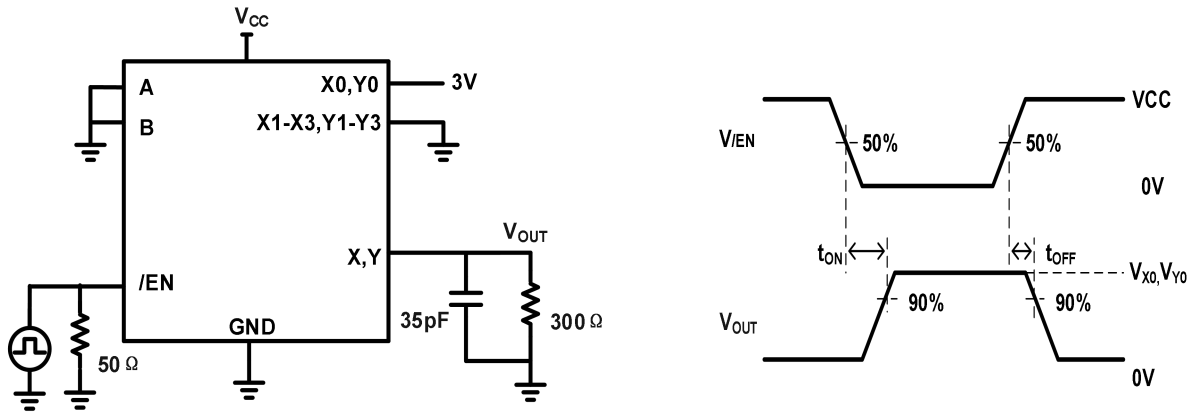Fig.9-1. Address Transition Times (t_{TRANS})
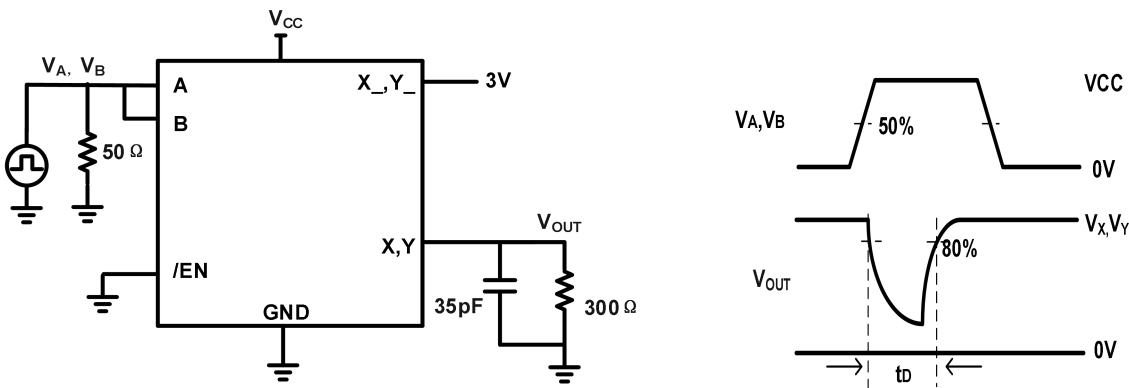

Fig.9-2. Switching Times (t_{ON}, t_{OFF})

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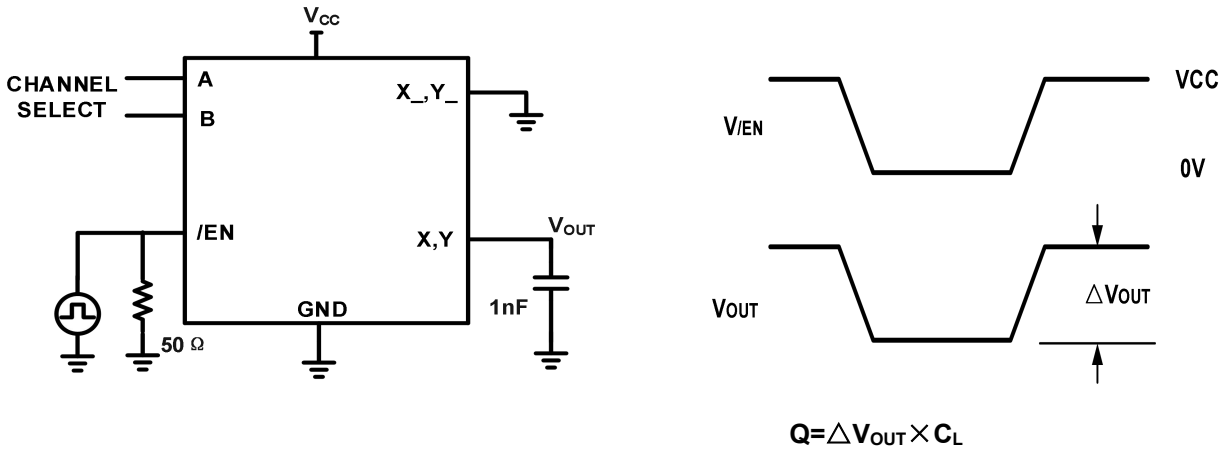
9 Measurement Information(Continued)

Fig.9-4. Charge Injection (Q)

OFF ISOLATION=20log(V_{OUT}/V_{IN})
CROSSTALK=20log(V_{OUT}/V_{IN})

OFF ISOLATION IS MEASURED BETWEEN COMMAND AND OFF NO TERMINAL ON EACH SWITCH.
CROSSTALK IS MEASURED FROM ONE CHANNEL(A,B,C) TO ALL OTHER CHANNELS.
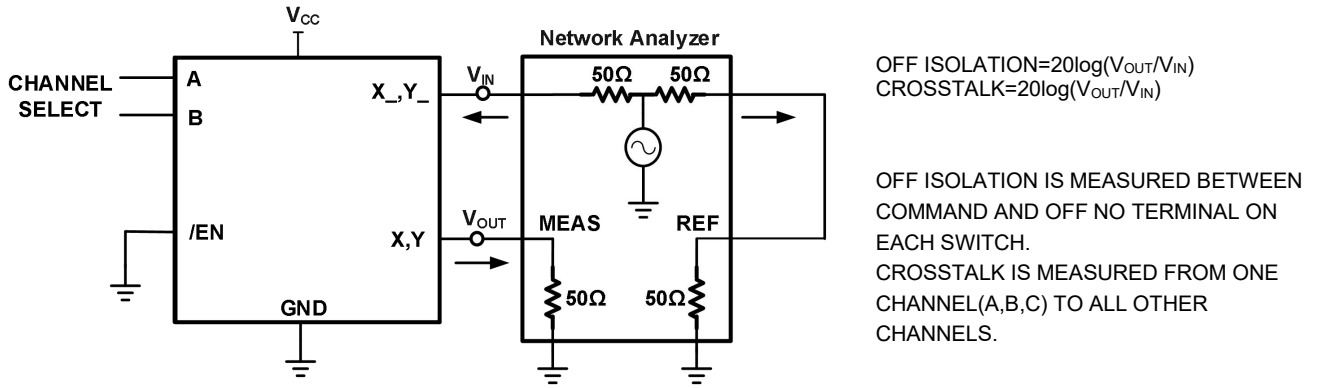
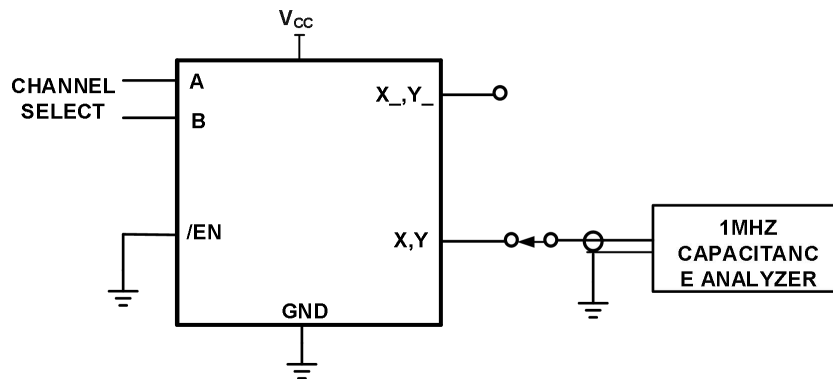**Fig.9-5. Off Isolation and Crosstalk**

Fig.9-6. Capacitance

10 Application Note

The GT4852 device is a differential 4-channel multiplexer having two binary control inputs, A and B, and an inhibit input. The two binary input signals select 1 of 4 pairs of channels to be turned on and connect the analog inputs to the outputs.

One application of the GT4852 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.
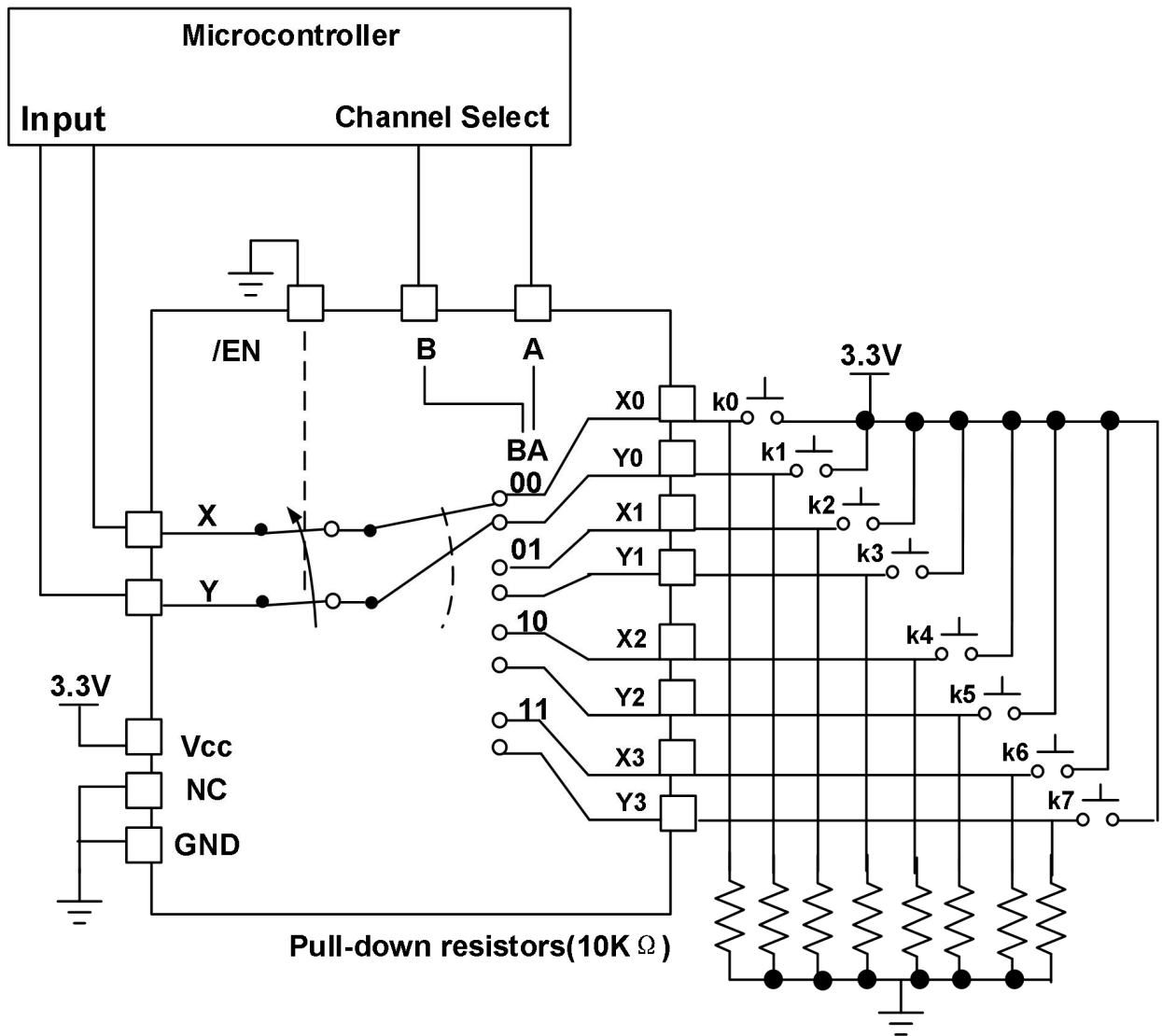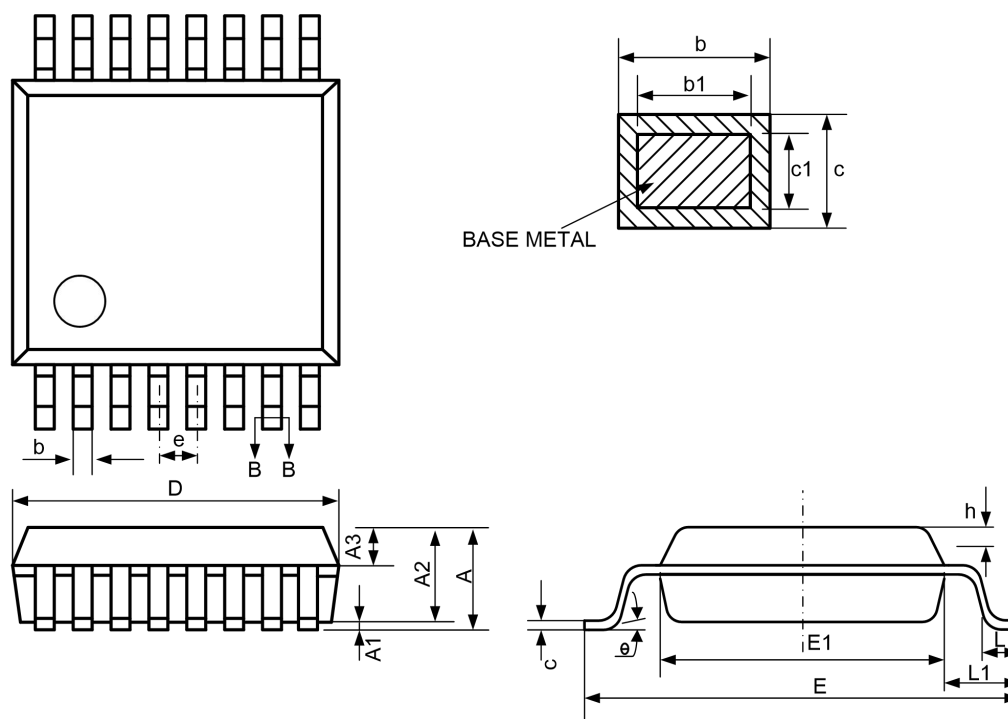

Fig.10-1.Being Used to Help Read Button Presses on a Keypad.

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
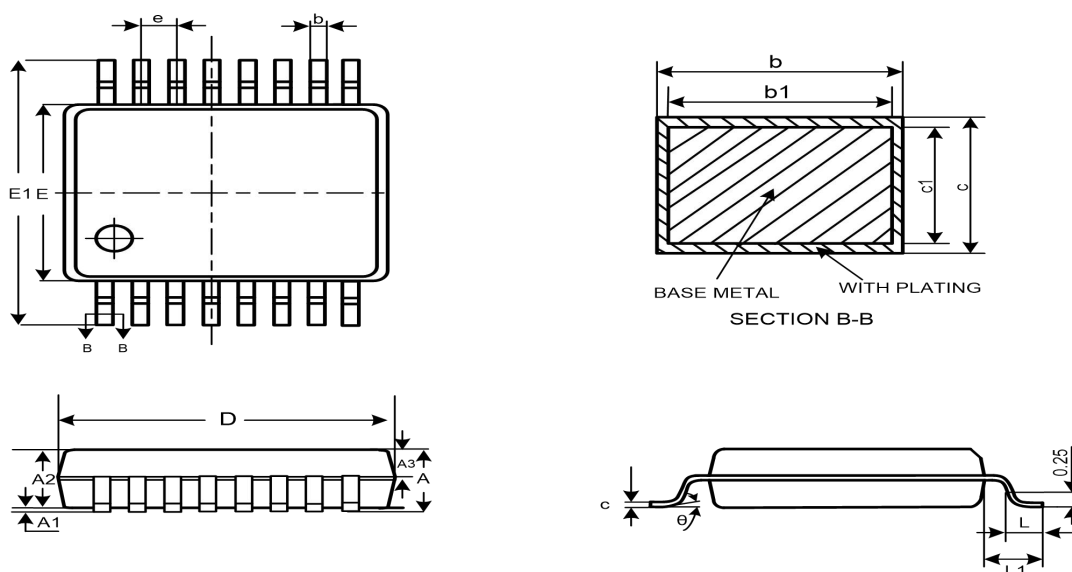
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Min	Nom	Min	Nom
A	——	——	1.20	——	——	0.047
A1	0.05	——	0.15	0.002	——	0.006
A2	0.80	1.00	1.05	0.031	0.039	0.041
A3	0.39	0.44	0.49	0.015	0.017	0.019
b	0.19	——	0.30	0.007	——	0.012
b1	0.19	0.22	0.25	0.007	0.009	0.010
c	0.13	——	0.18	0.005	——	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

Top View

Bottom View

Side View
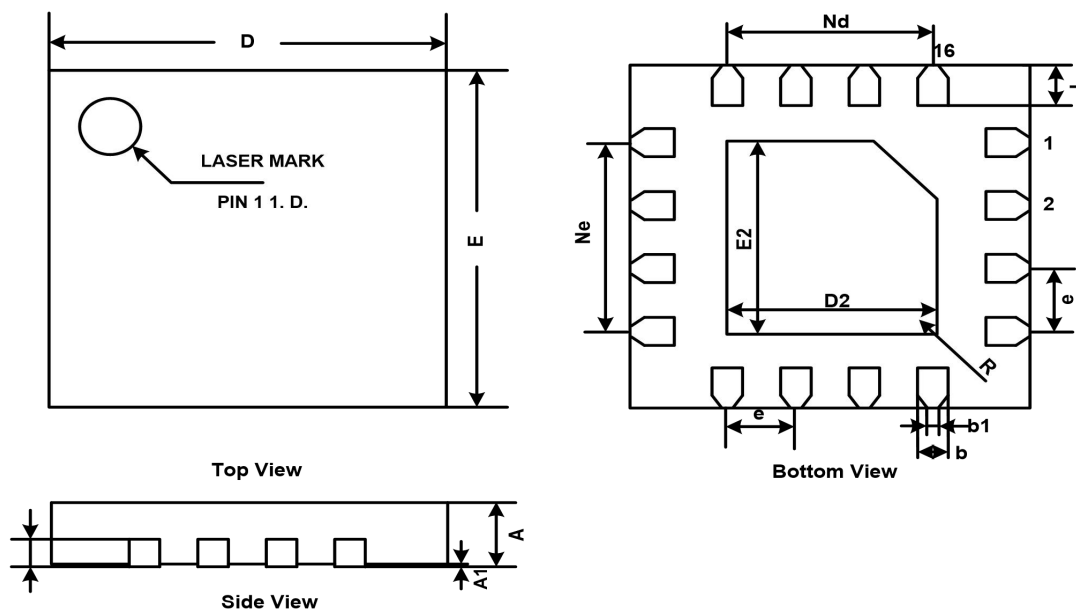
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Min
A	0.700	0.800	0.028	0.032
A1	0.000	0.050	0.000	0.002
b	0.200	0.300	0.008	0.012
b1	0.230REF		0.009REF	
c	0.203REF		0.008REF	
D	2.900	3.100	0.116	0.124
D2	1.600	1.700	0.064	0.068
e	0.500BSC		0.020BSC	
Nd	1.500BSC		0.060BSC	
Ne	1.500BSC		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

Reel Dimensions

Reel Dimensions

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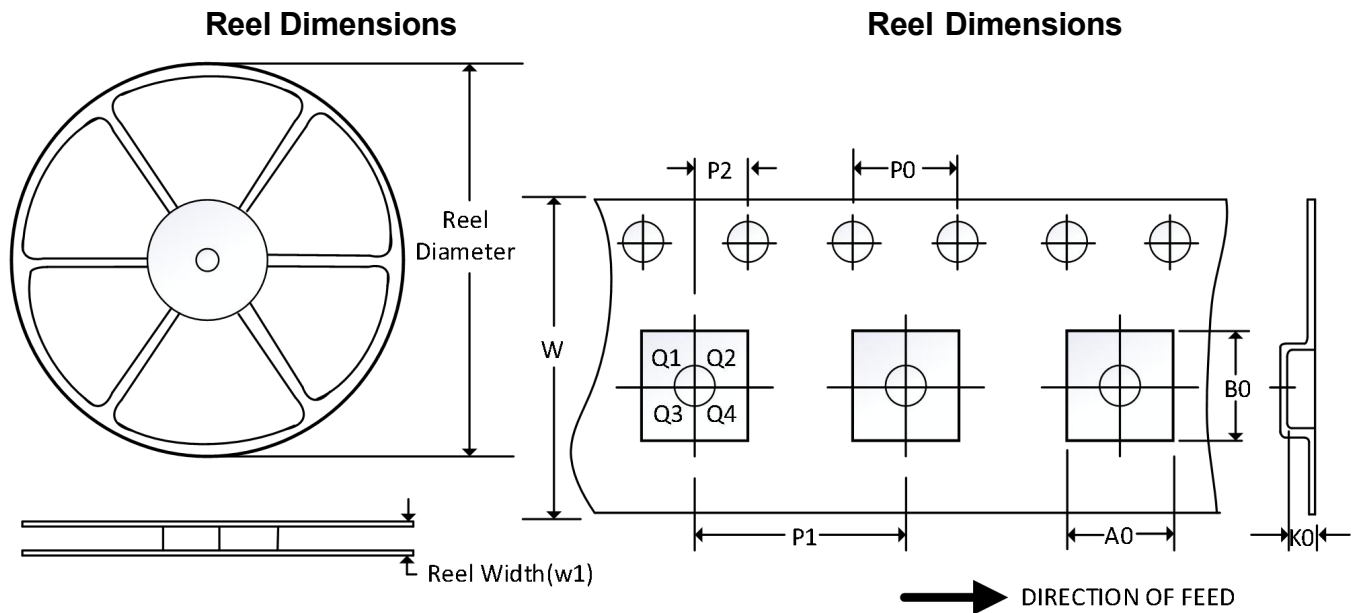
NOTE: The picture is only for reference. Please make the object as the standard.

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.