



Quad 10 Ω SPDT Analog Switch

Features

- Low ON-State Resistance
- Low Charge Injection
- Excellent ON Resistance Matching
- +2.3V to +5.5V Single-Supply Operation
- Low Total Harmonic Distortion
- Low Supply Current (<1 μ A)
- Break-before-make Enable Circuitry
- Control Inputs are 5-V Tolerant
- TSSOP-16 and SSOP-16 Package are Available

Applications

- Cell Phones
- PDAs
- Portable Instrumentation
- Audio and Video Signal Routing
- Sample-and-Hold Circuit
- Battery-Powered Equipment
- Communication Circuit

General Description

The G3204 is a quad low on-resistance, SPDT (Single-Pole/Double-Throw) analog switch that operates from a 2.3V to 5.5V supply. The device offers an excellent ON-resistance matching, and low total harmonic distortion (THD) performance. These features make this device suitable for portable audio applications.

The G3204 is available in the TSSOP-16 and SSOP-16 package.

Ordering Information

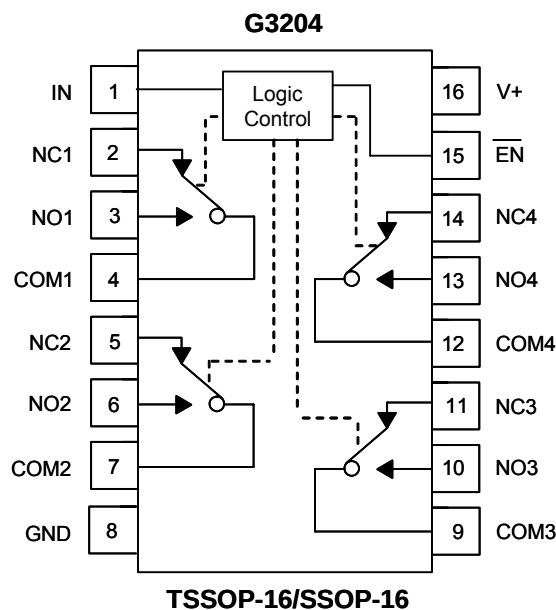
ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Pb free)
G3204D61U	G3204	-40°C to 85°C	TSSOP-16
G3204S11U	G3204	-40°C to 85°C	SSOP-16

Note: D6: TSSOP-16 S1: SSOP-16

1: Bonding Code

U: Tape & Reel

Pin Configuration



Pin Descriptions

PIN	NAME	FUNCTION
1	IN	Digital control to connect COM to NO or NC
2	NC1	Normally closed
3	NO1	Normally open
4	COM1	Common
5	NC2	Normally closed
6	NO2	Normally open
7	COM2	Common
8	GND	Digital ground
9	COM3	Common
10	NO3	Normally open
11	NC3	Normally closed
12	COM4	Common
13	NO4	Normally open
14	NC4	Normally closed
15	EN	Chip enable (active low)
16	V+	Power Supply

Summary of Characteristics ⁽¹⁾

CONFIGURATION	DUAL SPDT
Number of channels	4
Peak On-State resistance (r_{on})	10 Ω
On-State resistance match (Δr_{on})	0.3 Ω
On-State resistance flatness ($r_{on(flat)}$)	7 Ω
Turn-on / Turn-off time (t_{ON} / t_{OFF})	5ns / 4.5ns
Charge injection (Q_C)	1.6pC
Bandwidth (BW)	230MHz
OFF isolation (O_{ISO})	-58dB at 10MHz
Crosstalk (X_{TALK})	-58dB at 10MHz
Total harmonic distortion (THD)	0.2%
Power-supply current (I_+)	50nA
Package options	16-pin TSSOP, SSOP

⁽¹⁾ $V_+ = 3.3V$, $T_A = 25^\circ C$ and the value are the worst one.

Function Table

EN	IN	NO to COM, COM to NO	NC to COM, COM to NC
L	L	OFF	ON
L	H	ON	OFF
H	X	OFF	OFF

**Absolute Maximum Ratings**

VCC supply voltage to GND. -0.3V to +7V
 IN1, $\overline{\text{EN}}$ input voltage to GND. -0.3 to +7V
 NO, NC, COM switch I/O voltage to GND. . -0.3 to +7V
 Output Short-Current Indefinite
 Maximum Junction Temperature 150°C

Continuous Current NO_NC_COM $\pm 100\text{mA}$
 Operating Temperature Range -40°C to 85°C
 Storage Temperature Range. -65 °C to 150°C
 Reflow Temperature (soldering, 10sec) 260°C
 ESD(HBM)(Note 1) 2kV

Note 1 : Human body model is a 100pF capacitor discharged through a 1.5k Ω resistor into each pin.

Electrical Characteristics

$T_A=25^\circ\text{C}$, unless otherwise noted.

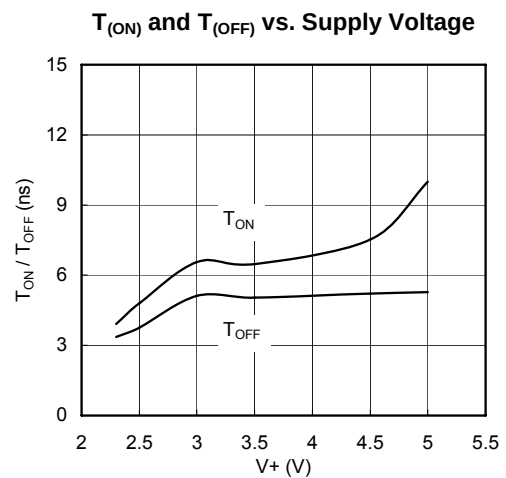
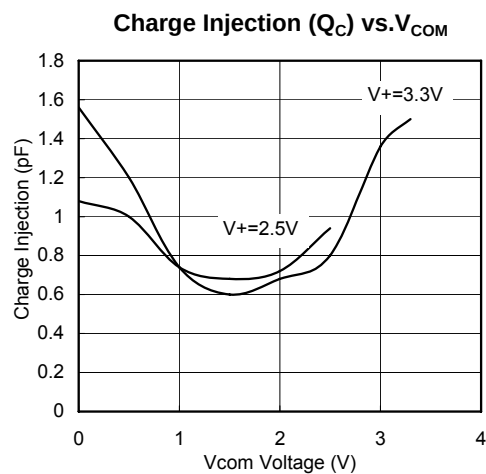
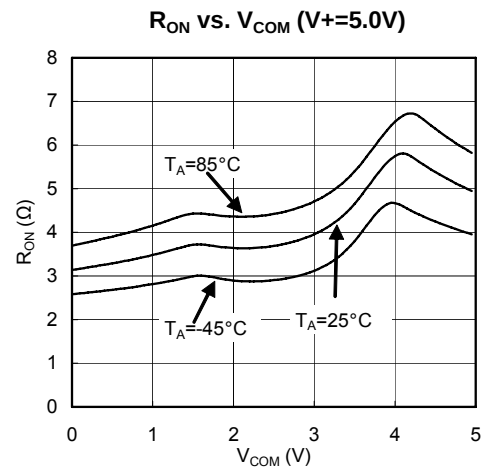
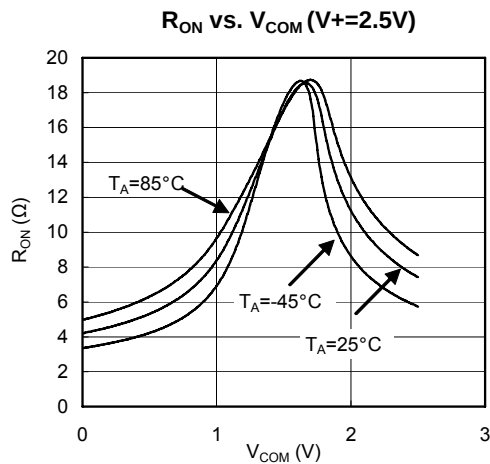
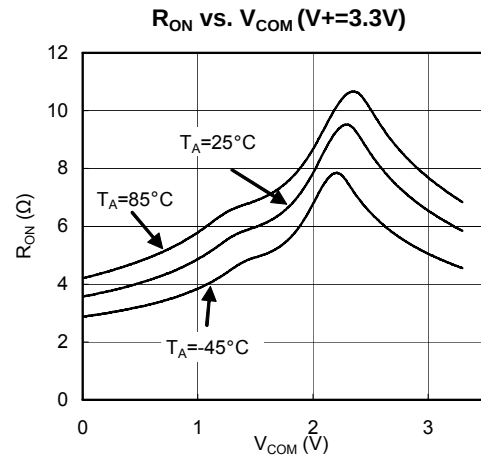
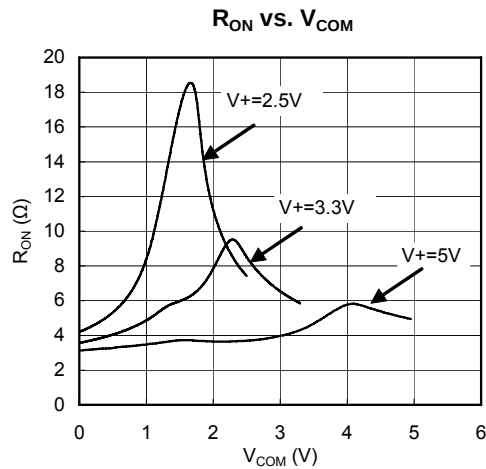
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
DC Characteristics					
Analog signal range		0	---	V+	V
Peak On-Resistance, $R_{\text{ON(} \text{NO)}}$	V+=2.3V, $I_{\text{COM}}=24\text{mA}$, V_{NC} or $V_{\text{NO}}=0$ to V+	---	20	25	Ω
	V+=3V, $I_{\text{COM}}=32\text{mA}$, V_{NC} or $V_{\text{NO}}=0$ to V+	---	10	13	
	V+=4.5V, $I_{\text{COM}}=100\text{mA}$, V_{NC} or $V_{\text{NO}}=0$ to V+	---	6	9	
On-Resistance Match Between Switches, ΔR_{ON}	V+=2.3V, $I_{\text{COM}}=24\text{mA}$, V_{NO} or $V_{\text{NC}}=1.6\text{V}$	---	0.2	0.9	Ω
	V+=3V, $I_{\text{COM}}=32\text{mA}$, V_{NO} or $V_{\text{NC}}=2.1\text{V}$	---	0.2	0.6	
	V+=4.5V, $I_{\text{COM}}=100\text{mA}$, V_{NO} or $V_{\text{NC}}=2.5\text{V}$	---	0.1	0.5	
NC On-Resistance Flatness, $R_{\text{FLAT(NC)}}$	$0 \leq V_{\text{NC}}$ or $V_{\text{NC}} \leq V+$, $I_{\text{COM}}=24\text{mA}$, V+=2.3V	---	17	21	Ω
	$0 \leq V_{\text{NC}}$ or $V_{\text{NC}} \leq V+$, $I_{\text{COM}}=32\text{mA}$, V+=3V	---	7	9	
	$0 \leq V_{\text{NC}}$ or $V_{\text{NC}} \leq V+$, $I_{\text{COM}}=100\text{mA}$, V+=4.5V	---	3	5	
NO or NC Off leakage current, $I_{\text{NO(OFF)}}$ or $I_{\text{NC(OFF)}}$	V+=3.6V, V_{NO} or $V_{\text{NC}}=1\text{V}$, 3V, $V_{\text{COM}}=3\text{V}$, 1V	---	50	150	nA
	V+=5.5V, V_{NO} or $V_{\text{NC}}=1\text{V}$, 4.5V, $V_{\text{COM}}=4.5\text{V}$, 1V	---	50	150	
COM On Leakage Current, $I_{\text{COM(ON)}}$	V+=3.6V, $V_{\text{NO}}=1\text{V}$ or 3V with V_{NC} floating, or $V_{\text{NC}}=1\text{V}$ or 3V with V_{NO} floating, V_{COM} floating	---	50	150	nA
	V+=5.5V, $V_{\text{NO}}=1\text{V}$ or 4.5V with V_{NC} floating, or $V_{\text{NC}}=1\text{V}$ or 4.5V with V_{NO} floating, V_{COM} floating	---	50	150	
Input Logic High, V_{IH}	V+=2.3V to 2.7V	1.7	---	---	V
	V+=3V to 3.6V	2	---	---	
	V+=4.5V to 5.5V	2.4	---	---	
Input Logic Low, V_{IL}	V+=2.3V to 2.7V	---	---	0.7	V
	V+=3V to 3.6V	---	---	0.8	
	V+=4.5V to 5.5V	---	---	0.8	
Input leakage Current	$V_{\text{IN}}=5.5\text{V}$ or 0V, V+=5.5V	---	0.05	1	μA
Supply Current, I_+	$V_{\text{IN}}=0$ or 5.5V, V+=5.5V	---	0.05	1	μA

Electrical Characteristics (continued)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Dynamic					
Turn-On Time, t_{ON}	V+=2.5V, V_{NO} or V_{NC} =1.5V, R_L =300 Ω ; C_L =35pF	---	4.5	---	ns
	V+=3.3V, V_{NO} or V_{NC} =2V, R_L =300 Ω ; C_L =35pF	---	5	---	
	V+=5V, V_{NO} or V_{NC} =2.5V, R_L =300 Ω ; C_L =35pF	---	6	---	
Turn-Off Time, t_{OFF}	V+=2.5V, V_{NO} or V_{NC} =1.5V, R_L =300 Ω ; C_L =35pF	---	3.5	---	ns
	V+=3.3V, V_{NO} or V_{NC} =2V, R_L =300 Ω ; C_L =35pF	---	4.5	---	
	V+=5V, V_{NO} or V_{NC} =2.5V, R_L =300 Ω ; C_L =35pF	---	5.5	---	
Charge injection, Q_C	V+=2.5V, $COM_ =0V$; R_S =0V, C_L =0.1nF	---	1.2	---	pC
	V+=3.3V, $COM_ =0V$; R_S =0V, C_L =0.1nF	---	1.6	---	
	V+=5V, $COM_ =0V$; R_S =0V, C_L =0.1nF	---	1.8	---	
OFF isolation, O_{ISO}	V+=2.5V, 3.3V, R_L =50 Ω , f=10MHz, Switch OFF	---	-58	---	dB
Crosstalk, X_{Talk}	V+=2.5V, 3.3V, R_L =50 Ω , f=10MHz, Switch ON	---	-58	---	dB
Total harmonic distortion, THD	V+=2.5V, R_L =600 Ω , C_L =50pF, f= 20Hz to 20kHz	---	0.2	---	%
	V+=3.3V, R_L =600 Ω , C_L =50pF, f= 20Hz to 20kHz	---	0.3	---	
	V+=5V, R_L =600 Ω , C_L =50pF, f= 20Hz to 20kHz	---	0.4	---	
3 db Bandwidth, BW	V+=2.5V, R_L =50 Ω , Switch ON	---	230	---	MHz
	V+=3.3V, R_L =50 Ω , Switch ON	---	230	---	
		---	---	---	
NO,NC_ OFF capacitance, $C_{NO(OFF)}$	V+=2.5V	---	3.6	---	pF
	V+=3.3V	---	3.6	---	
	V+=5.5V	---	3.6	---	
NO,NC_ ON capacitance, $C_{NC(ON)}$	V+=2.5V	---	15.5	---	pF
	V+=3.3V	---	15.5	---	
	V+=5.5V	---	15.5	---	
COM_ OFF capacitance, $C_{COM(OFF)}$	V+=2.5V	---	7.5	---	pF
	V+=3.3V	---	7.5	---	
	V+=5.5V	---	7.5	---	
COM_ ON capacitance, $C_{COM(ON)}$	V+=2.5V	---	15	---	pF
	V+=3.3V	---	15	---	
	V+=5.5V	---	15	---	
Digital input	V+=2.5V, V_i =V+ or GND	---	2.5	---	pF
	V+=3.3V, V_i =V+ or GND	---	2.5	---	
	V+=5.5V, V_i =V+ or GND	---	2.5	---	

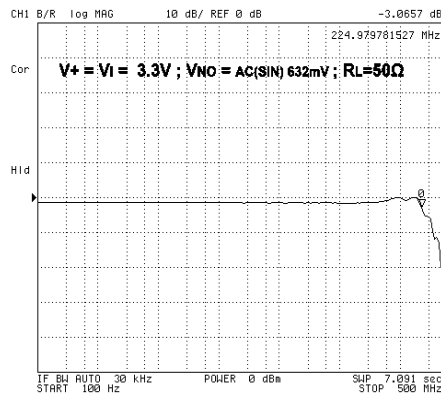
Typical Performance Characteristics

$T_A = 25^\circ\text{C}$ (unless otherwise noted)





Typical Performance Characteristics (continued)

Bandwidth ($V_+=3.3V$)

SELECT LETTER

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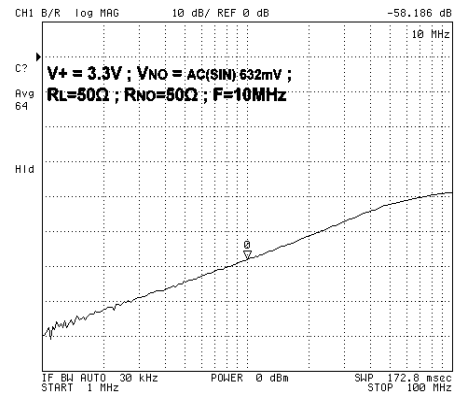
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DONE

STOR DEV [DISK]

CANCEL

OFF Isolation ($V_+=3.3V$)

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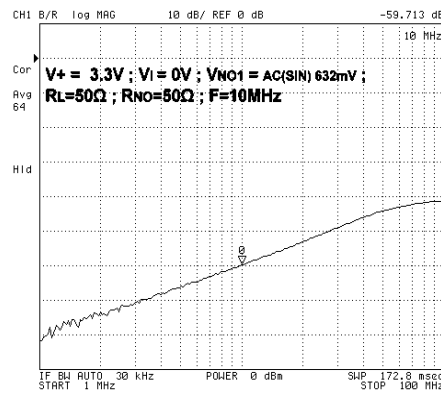
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CANCEL

Crosstalk ($V_+=5V$)

SELECT LETTER

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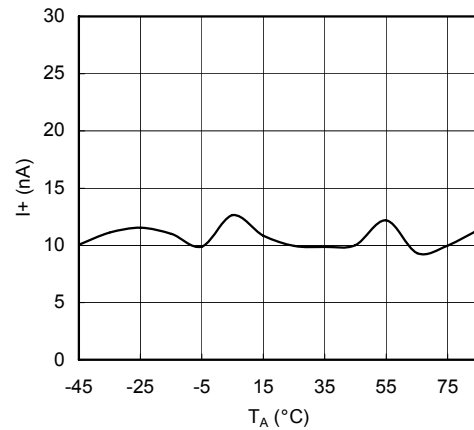
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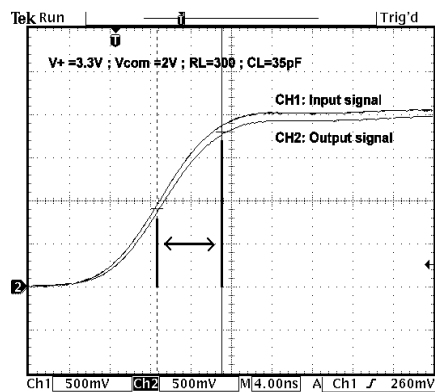
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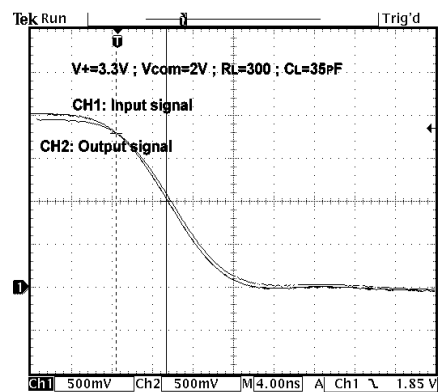
CANCEL

Power-Supply Current vs. Temp ($V_+=3.6V$)

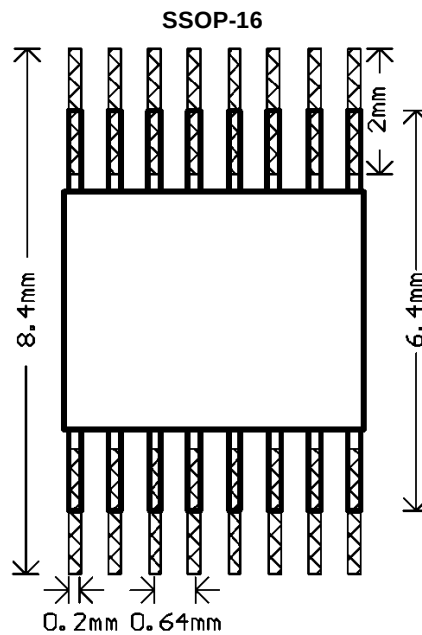
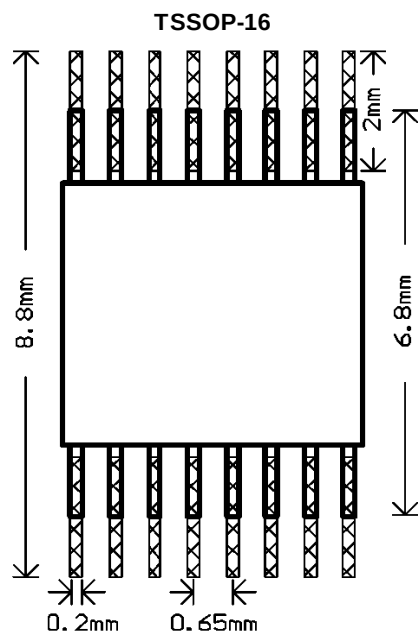
Input Transition Rise (Turn-on time)



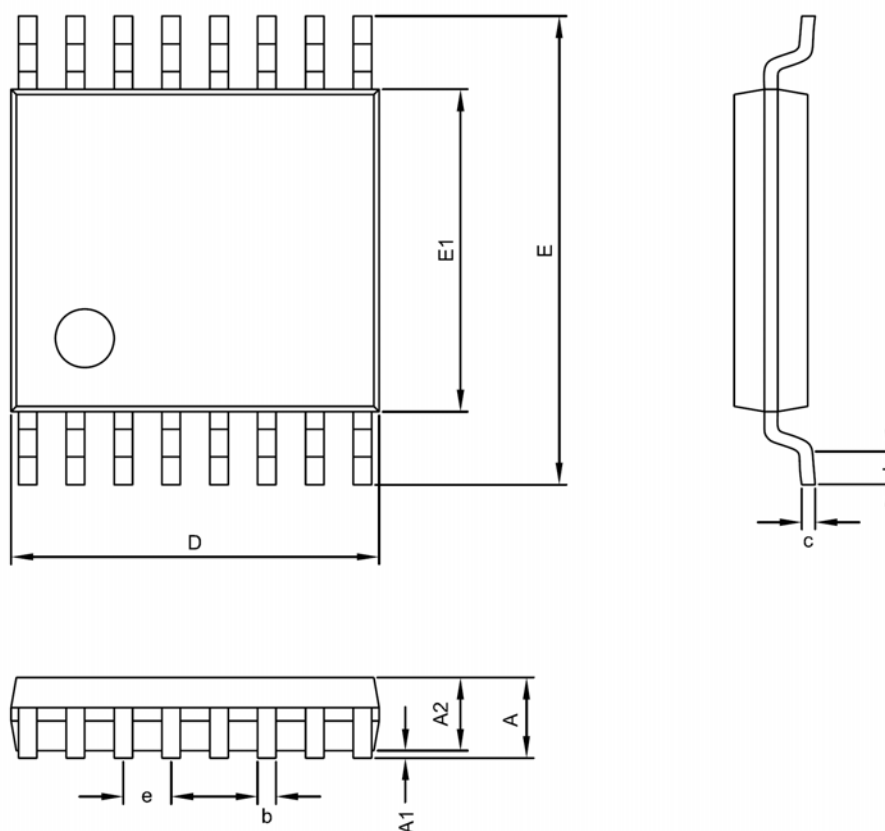
Input Transition Fall (Turn-off time)



Recommended Minimum Footprint



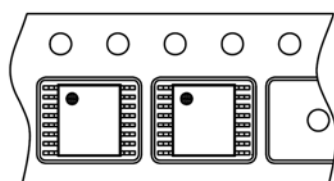
Package Information



TSSOP-16 Package

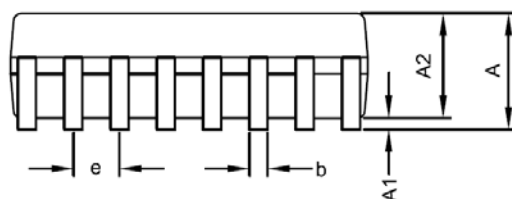
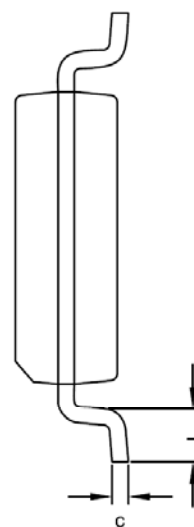
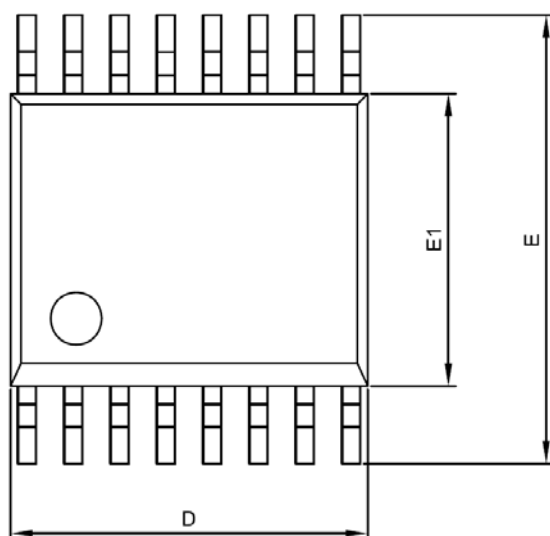
Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	---	---	1.20	---	---	0.048
A1	0.00	---	0.15	0.000	---	0.006
A2	0.85	1.00	1.05	0.033	0.039	0.041
D	4.90	5.00	5.10	0.193	0.197	0.201
E	6.20	6.40	6.60	0.244	0.252	0.260
E1	4.30	4.40	4.50	0.169	0.173	0.177
c	0.09	---	0.20	0.004	---	0.008
b	0.19	0.22	0.30	0.008	0.009	0.012
e	0.65 BSC			0.026 BSC		
L	0.45	0.60	0.75	0.018	0.024	0.030

Taping Specification



Feed Direction

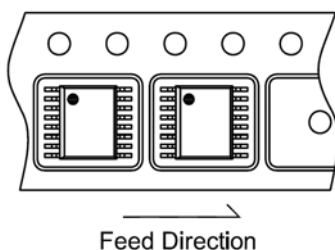
PACKAGE	Q'TY/REEL
TSSOP-16	3,000 ea



SSOP-16 (S1) Package

Symble	DIMENSION IN MM			DIMENSION IN INCH		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	1.35	1.55	1.75	0.053	0.061	0.069
A1	0.00	---	0.25	0.000	---	0.010
A2	1.15	1.35	1.50	0.045	0.053	0.059
D	4.80	4.90	5.00	0.189	0.192	0.197
E	5.80	6.00	6.20	0.228	0.236	0.244
E1	3.80	3.90	4.00	0.150	0.153	0.157
c	0.19	0.23	0.27	0.007	0.009	0.011
b	0.20	0.25	0.33	0.008	0.010	0.013
e	0.635 BSC			0.025 BSC		
L	0.40	0.7	1.00	0.016	0.028	0.039

Taping Specification



PACKAGE	Q'TY/ REEL
SSOP-16	2,500 ea