

Quad 10Ω 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 (<1μA)
- Break-before-make Enable Circuitry
- Control Inputs are 5-V Tolerant
- TSSOP-16 Package are Available

General Description

The G3204A 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 G3204A is available in the TSSOP-16 package.

Applications

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

Ordering Information

ORDER NUMBER	MARKING	TEMP. RANGE	PACKAGE (Green)
G3204AD61U	G3204	-40°C to 85°C	TSSOP-16

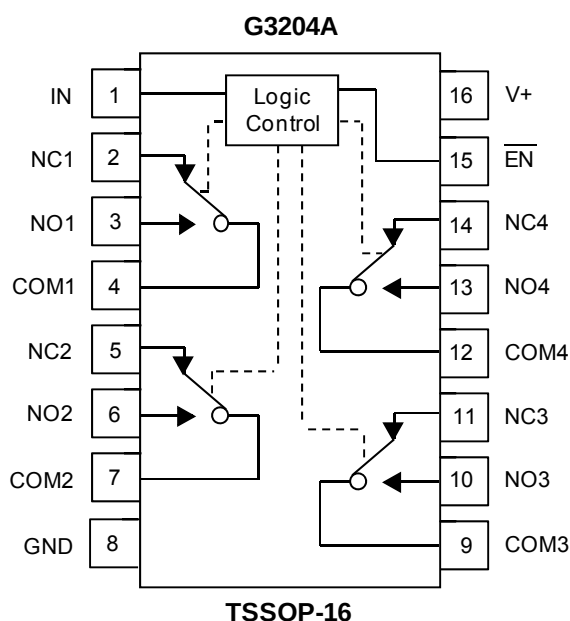
Note: D6: TSSOP-16

1: Bonding Code

U: Tape & Reel

Green : Lead Free / Halogen Free

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})	10Ω
On-State resistance match (Δr_{on})	0.3Ω
On-State resistance flatness ($r_{on(flat)}$)	7Ω
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

⁽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.

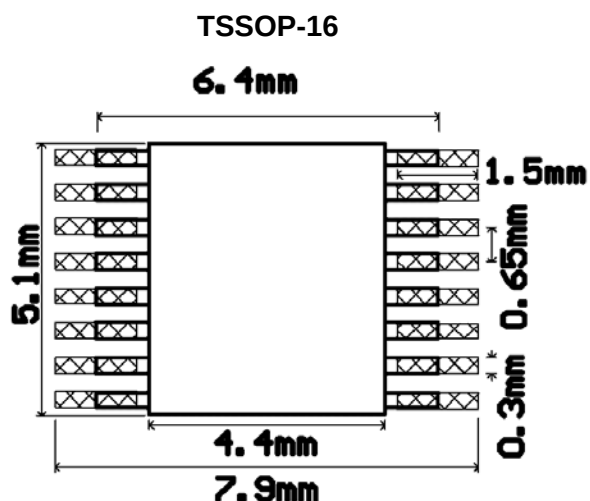
Electrical Characteristics

T_A=25°C, unless otherwise noted.

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

Electrical Characteristics (continued)

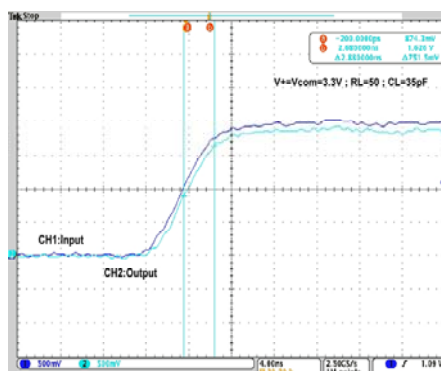
PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Dynamic					
Turn-On Time, t_{ON}	$V_+ = 2.5V$, V_{NO} or $V_{NC} = 1.5V$, $R_L = 300\Omega$; $C_L = 35pF$	---	4.5	---	ns
	$V_+ = 3.3V$, V_{NO} or $V_{NC} = 2V$, $R_L = 300\Omega$; $C_L = 35pF$	---	5	---	
	$V_+ = 5V$, V_{NO} or $V_{NC} = 2.5V$, $R_L = 300\Omega$; $C_L = 35pF$	---	6	---	
Turn-Off Time, t_{OFF}	$V_+ = 2.5V$, V_{NO} or $V_{NC} = 1.5V$, $R_L = 300\Omega$; $C_L = 35pF$	---	3.5	---	ns
	$V_+ = 3.3V$, V_{NO} or $V_{NC} = 2V$, $R_L = 300\Omega$; $C_L = 35pF$	---	4.5	---	
	$V_+ = 5V$, V_{NO} or $V_{NC} = 2.5V$, $R_L = 300\Omega$; $C_L = 35pF$	---	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}	$V_+ = 2.5V, 3.3V$, $R_L = 50\Omega$, $f = 10MHz$, Switch OFF	---	-58	---	dB
Crosstalk, X_{Talk}	$V_+ = 2.5V, 3.3V$, $R_L = 50\Omega$, $f = 10MHz$, Switch ON	---	-58	---	dB
Total harmonic distortion, THD	$V_+ = 2.5V$, $R_L = 600\Omega$, $C_L = 50pF$, $f = 20Hz$ to $20kHz$	---	0.2	---	%
	$V_+ = 3.3V$, $R_L = 600\Omega$, $C_L = 50pF$, $f = 20Hz$ to $20kHz$	---	0.3	---	
	$V_+ = 5V$, $R_L = 600\Omega$, $C_L = 50pF$, $f = 20Hz$ to $20kHz$	---	0.4	---	
3 db Bandwidth, BW	$V_+ = 2.5V$, $R_L = 50\Omega$, Switch ON	---	230	---	MHz
	$V_+ = 3.3V$, $R_L = 50\Omega$, 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	---	

Minimum Footprint PCB Layout Section


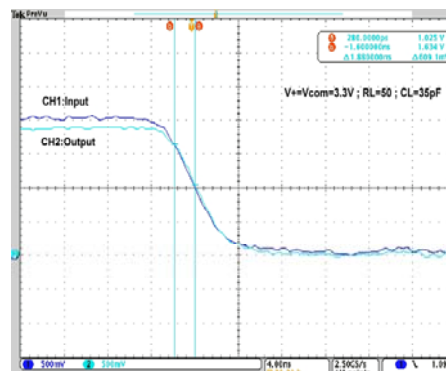
Typical Performance Characteristics

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

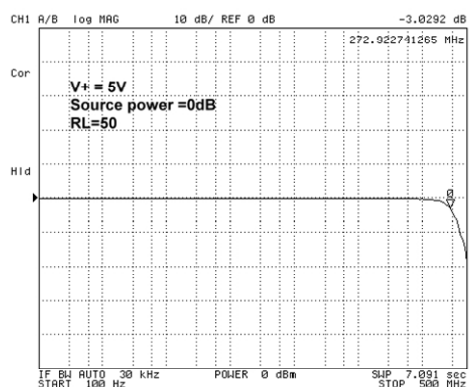
Input transition rise (Turn-on time)



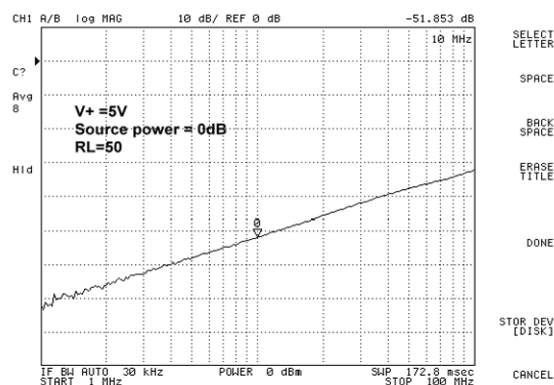
Input transition fall (Turn-off time)



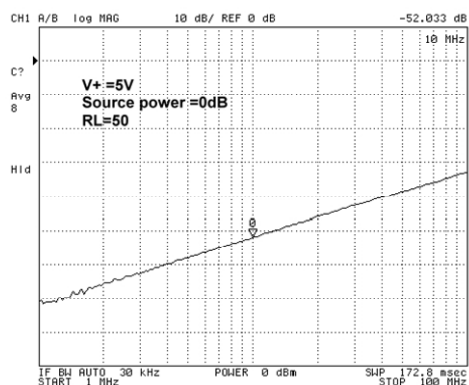
Bandwidth



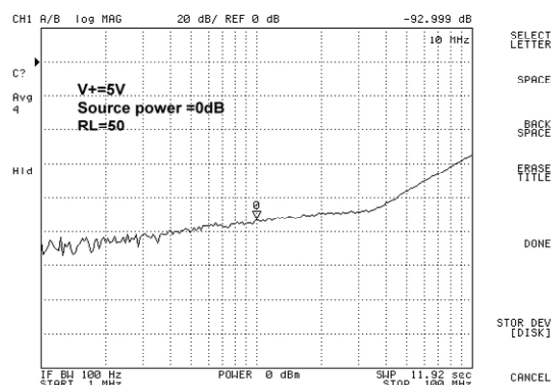
OFF Isolation



Corsstalk

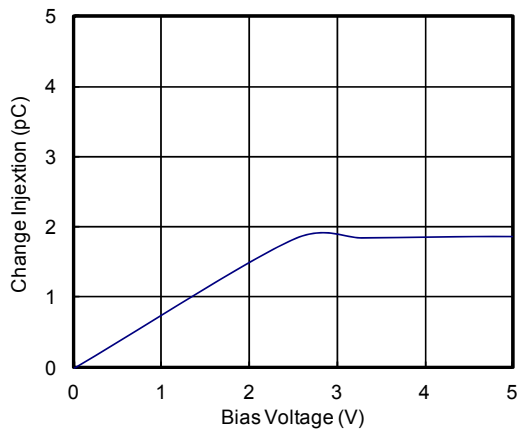


Crosstalk adjacent

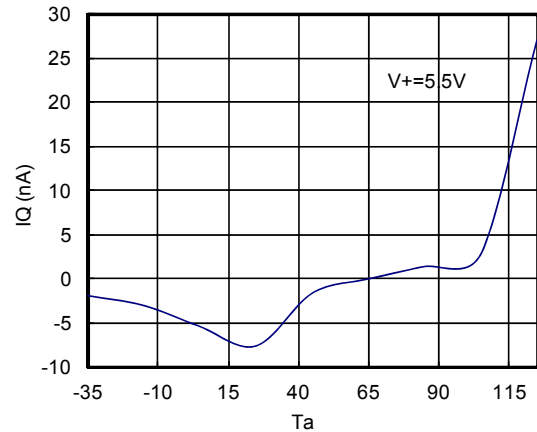


Typical Performance Characteristics (continued)

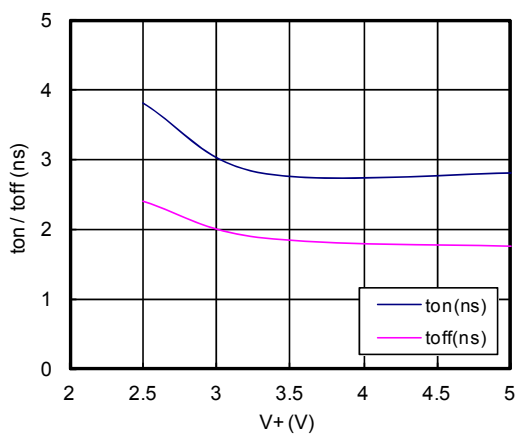
Charge Injection (Qc) vs. Vcom



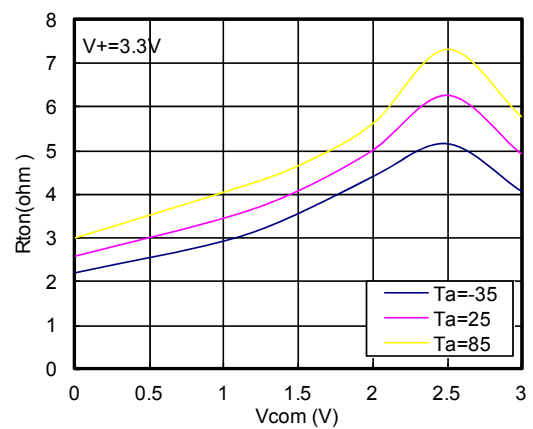
IQ vs. Ta



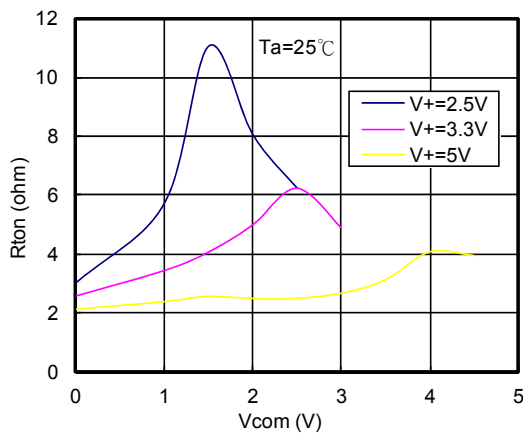
Ton and Toff vs. Supply Voltage



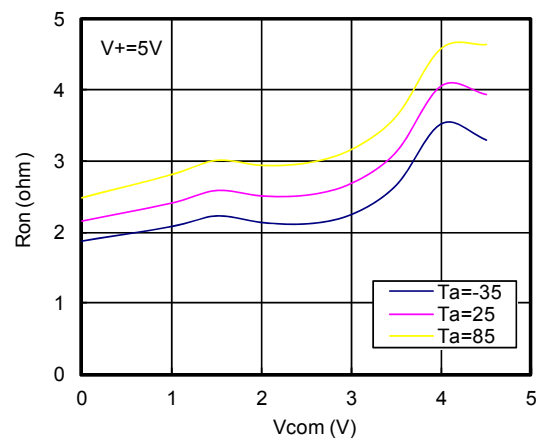
Ron vs. Vcom



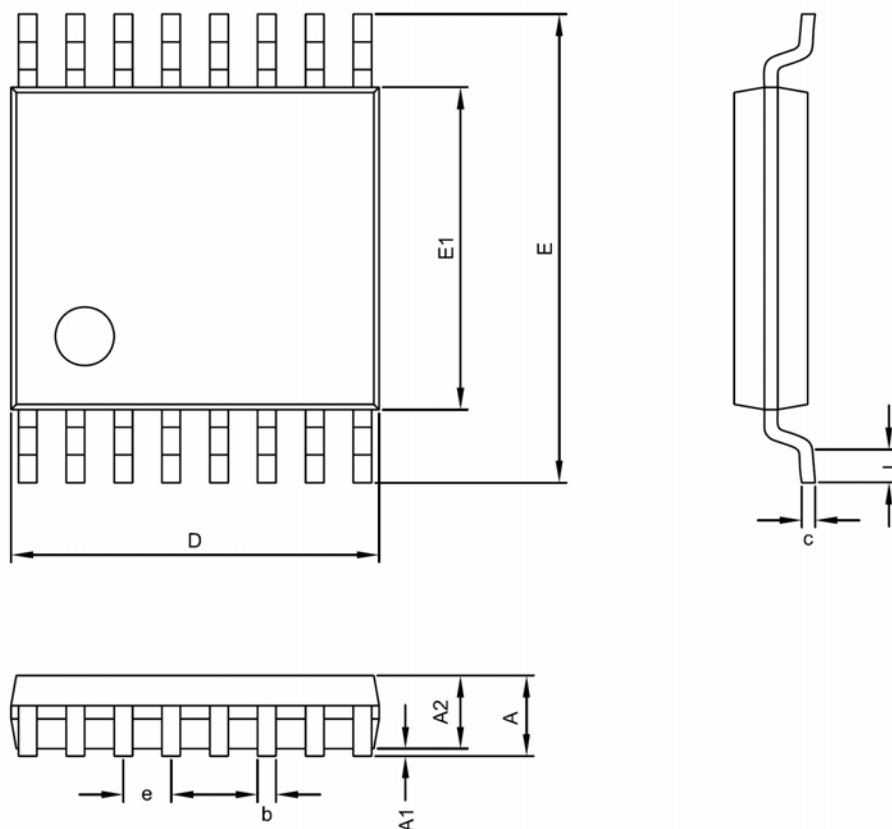
Ron vs. Vcom



Ron vs. Vcom



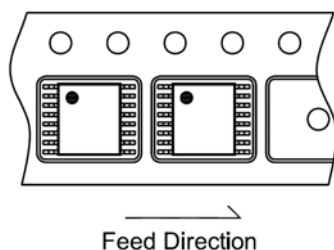
Package Information



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



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

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