WAS4899Q

Low On Resistance, Quad SPDT Analog Switch

Http//:www.willsemi.com

Descriptions

The WAS4899Q is a high performance, quad, Single Pole Double Throw (SPDT) analog switch that features ultra-low Ron of 0.5 Ω (typical) at 3.0V VCC. The WAS4899Q operates over a wide VCC range of 2.3V to 4.5V and is designed for break-before-make operation. The select input is TTL-level compatible.

WAS4899Q is also featured with smart circuitry to minimize VCC leakage current even when the control voltage is lower than VCC supply voltage. This feature suits mobile handset applications by allowing direct interface with baseband processor general-purpose IO with minimal battery consumption. In other word, there is no need of additional device to shift control level to be the same as that of VCC in real application.

The WAS4899Q is available in QFN3x3-16L package. Standard Products are Pb-free and halogen-free.
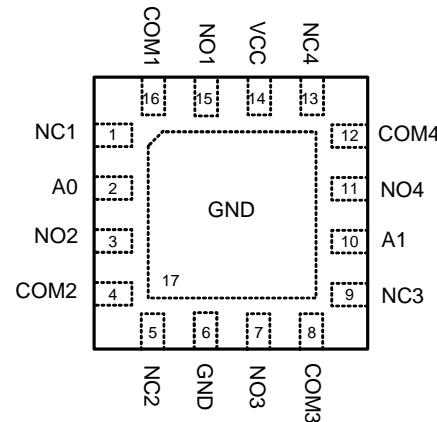
Pin configuration (Top view)

WA4899	= Device code
YY	= Year code
WW	= Week code
	Marking

Features

- Supply voltage : 2.3 ~ 4.5V
- ultra-low On Resistance : 0.5 Ω
- -3dB Bandwidth : 40MHz
- Rail-to-Rail Signal Range
- Break-Before-Make Switching
- Low quiescent current over an Expanded Control Input Range

Applications

- Cell phones, PDA, Digital Camera and Notebook
- LCD Monitor, TV and Set-Top Box
- Audio and Video Signal Routing
- Other electronics equipments

Order information

Device	Package	Shipping
WAS4899Q-16/TR	QFN3x3-16L	3000/Reel&Tape

Pin descriptions

Pin Number	Symbol	Descriptions
4,8,12,16	COMX	Common Data Port
1,5,9,13	NCX	Data Port(Normally closed)
3,7,11,15	NOX	Data Port(Normally open)
2,10	A0,A1	Logic Input Control
14	VCC	Positive Power Supply
6,17	GND	Ground

Note: X=1 or 2,3,4

Function descriptions

A0	Function
0	NC1 Connected to COM1, NC2 Connected to COM2
1	NO1 Connected to COM1, NO2 Connected to COM2

A1	Function
0	NC3 Connected to COM3, NC4 Connected to COM4
1	NO3 Connected to COM3, NO4 Connected to COM4

Functional Block Diagram
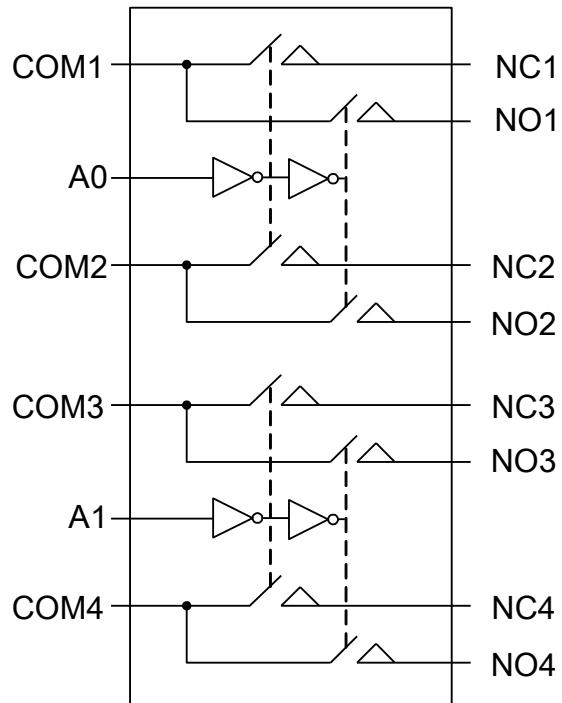
Absolute Maximum Ratings [1]

Parameter	Symbol	Value	Unit
Supply Voltage	V_{CC}	-0.3 ~ 6.5	V
Control Input Voltage	V_{IN}	-0.3 ~ 6.5	V
DC Input Voltage [2]	V_{INPUT}	-0.3 ~ 6.5	V
Continuous Current NO_NC_COM_		±300	mA
Peak Current NO_NC_COM_ (pulsed at 1ms 50% duty cycle)		±400	mA
Peak Current NO_NC_COM_ (pulsed at 1ms 10% duty cycle)		±500	mA
Storage Temperature Range	T_{STG}	-65 ~ 150	^{o}C
Junction Temperature under Bias	T_J	150	^{o}C
Lead Temperature (Soldering, 10 seconds)	T_L	260	^{o}C
Power Dissipation	P_D	250	mW

Recommend operating ratings [3]

Parameter	Symbol	Value	Unit
Supply Voltage Operating	V_{CC}	2.3 ~ 4.5	V
Control Input Voltage	V_{IN}	0.0 ~ V_{CC}	V
Input Signal Voltage	V_{IS}	0.0 ~ V_{CC}	V
Operating Temperature	T_A	-40 ~ 85	^{o}C
Input Raise and Fall Time(Control Input V_{CC}=2.3~3.6V)	t_r,t_f	0 ~ 10	ns/V
Thermal Resistance	$R_{\theta JA}$	350	$^{o}C/W$

Note:

1. "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions beyond those indicated in the operational sections of this specification is not implied.

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

3. Control input must be held high or Low, it must not float.

**DC Electronics Characteristics** (Ta=25°C, VCC=4.5V, unless otherwise noted)

| Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Input logic high level	V_{IH}	VCC: 3.0 ~ 4.5	1.6			V
		VCC: 2.3 ~ 3.0	1.4			V
Input logic low level	V_{IL}	VCC: 3.0 ~ 4.5			0.6	V
		VCC: 2.3 ~ 3.0			0.4	V
Supply quiescent current	I_{CC}	I_{OUT}=0, V_{IN} =0 or V_{IN} =VCC			1.0	uA
Increase in I_{CC} per input	I_{CCT}	I_{OUT}=0, VCC=4.5 V_{IN}>1.8 or V_{IN}<0.5			2.0	uA
Input leakage current	I_{IN}	V_{SEL}=VCC			±1.0	uA
Off state switch leakage current	I_{OFF}				±1.0	uA
On state switch leakage current	I_{ON}				±1.0	uA
On-Resistance	R_{ON}	VCC=4.5V, V_{IS}=0~4.5V, I_{ON}=100mA,		0.5		Ω
		VCC=3.0V, V_{IS}=0~3.0V, I_{OUT}=100mA,		0.6		Ω
On-Resistance Matching Between Channels	ΔR_{ON}	VCC=4.5V, V_{IS}=0.8V, I_{OUT}=100mA,		0.08		Ω
		VCC=3.0V, V_{IS}=0.8V, I_{OUT}=100mA,		0.12		Ω
On-Resistance Flatness	$R_{FLAT(ON)}$	VCC=4.5V, V_{IS}=0~4.5V, I_{OUT}=100mA,			0.2	Ω
		VCC=3.0V, V_{IS}=0~3.0V, I_{OUT}=100mA,			0.2	Ω

## AC Electronics Characteristics (Ta=25°C, VCC=4.5V, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Turn-On Time	T_{ON}	VCC=4.5V, V_{IS}=1.5V, C_L=35pF, R_L=50Ω		200		ns
Turn-Off Time	T_{OFF}	VCC=4.5V, V_{IS}=1.5V, C_L=35pF, R_L=50Ω		200		ns
Break-Before-Make time	T_{BBM}	Generate by design		100		ns
-3dB Bandwidth	BW	R_L=50Ω, C_L=0pF		40		MHz
Off isolation (Per Channel)	OIRR	F=100KHz, R_L=50Ω		-50		dB
Crosstalk (Channel to Channel)	Xtalk	F=100KHz, R_L=50Ω		-50		dB
Total Harmonic Distortion	THD	F=20Hz to 20KHz R_L=32Ω, V_{IS}=2Vp-p		0.02		%

Capacitance (Ta=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off capacitance	C_{OFF}	F=1MHz, VCC=3.3V		50		pF
On capacitance	C_{ON}	F=1MHz, VCC=3.3V		135		pF

Typical Characteristics (Ta=25°C, VCC=4.0V, unless otherwise noted)

Bandwidth (BW)

Off Isolation

VCC=4V, V_{IS}=2VP-P
RL=32ohm

THD+N

WAS4899Q

Test Circuits

$$Ron = V / I_O$$
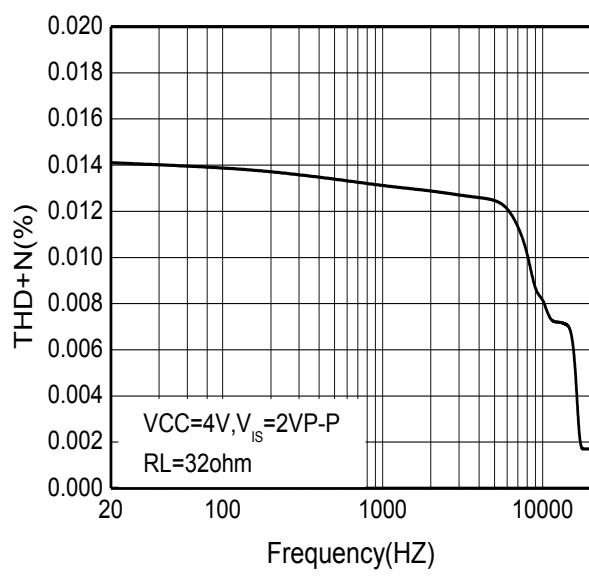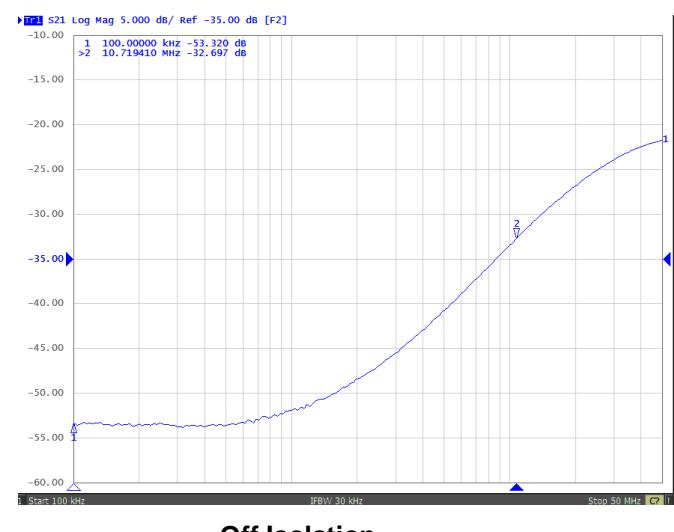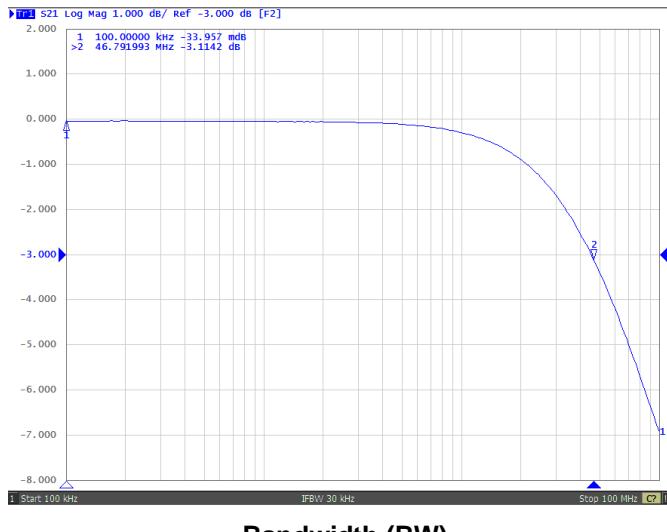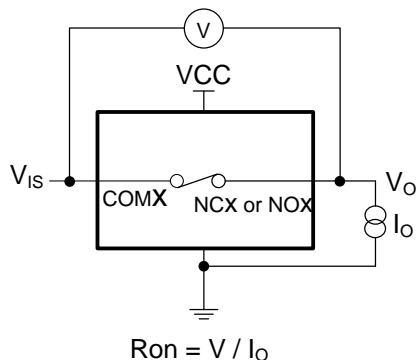
ON-Resistance (R$_{ON}$)
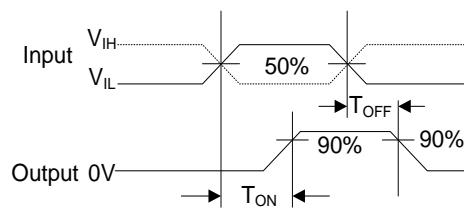
ON/OFF Time Waveforms (T$_{ON}$ / T$_{OFF}$)
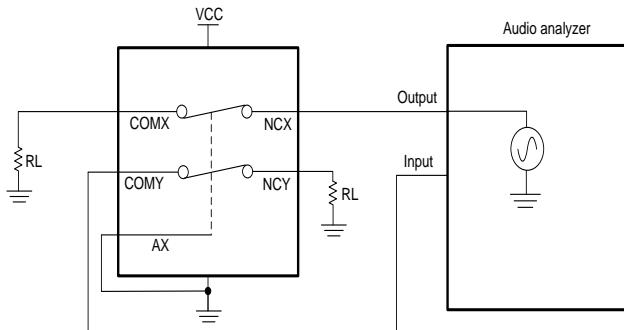
Crosstalk (Xtalk)
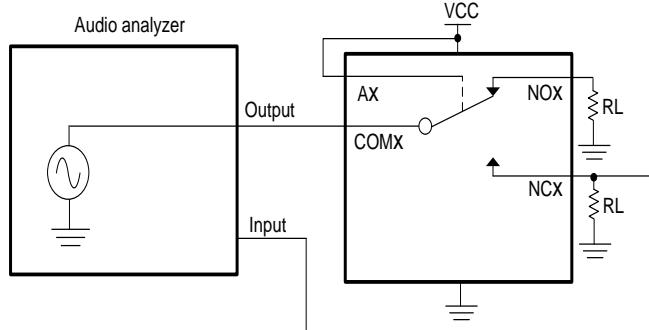
Off isolation (OIRR)
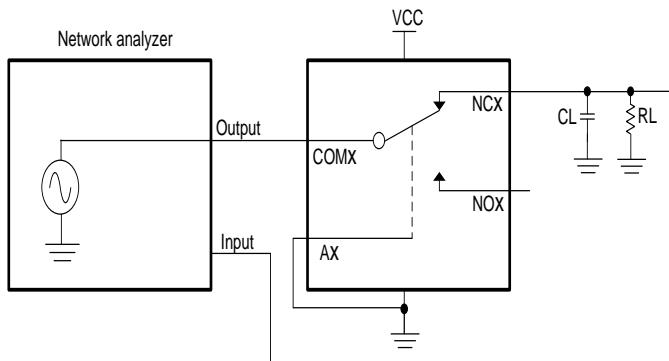
Bandwidth (BW)
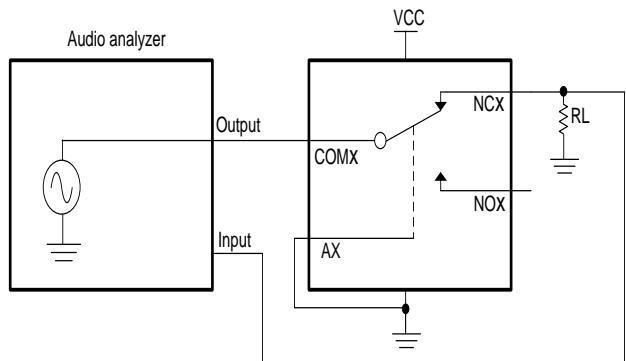
THD+N

Package outline dimensions

QFN3*3-16L
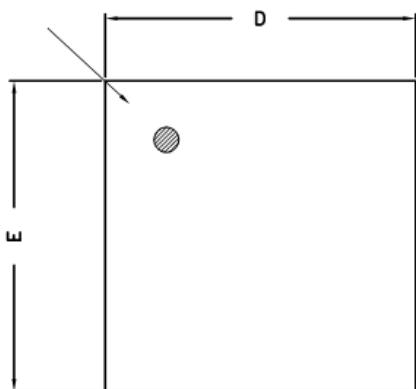
TOP VIEW
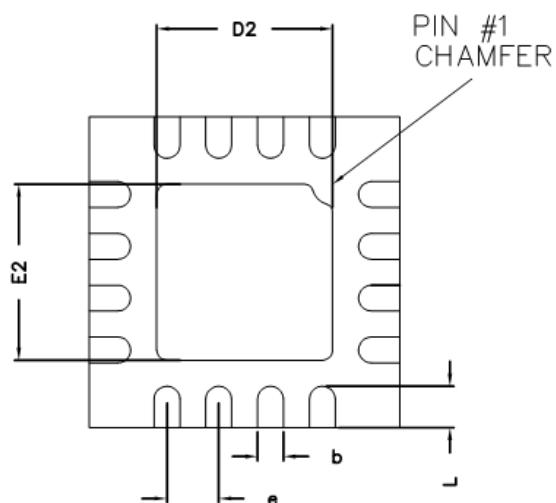
BOTTOM VIEW
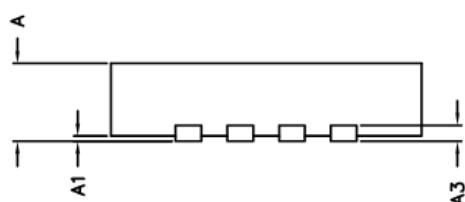
SIDE VIEW

Symbol	Dimension in Millimeters	
	Min.	**Max.**
A	0.700	0.800
A1	0.000	0.050
A3	0.200 Ref.	
D	2.950	3.050
E	2.950	3.050
b	0.180	0.300
e	0.500 Typ.	
L	0.300	0.500
D2	1.550	1.800
E2	1.550	1.800