TPHG550YFG

Quad 5V SPST Depletion Audio Switches with Negative Swing

Features

- Quad SPST depletion switches
- Normally closed when VCC<0.5V
- Vsw: -3V to +4.7V
- Ron: 1.1Ω @ Vsw from -3V to +3V
- Rflat (ON): Typical 14mΩ @ Vsw from -3V to +3V
- THD+N: -102dB
- operates over an ambient temperature range of -40℃ to +85℃
- Packaging: QFN 3x3 -16L

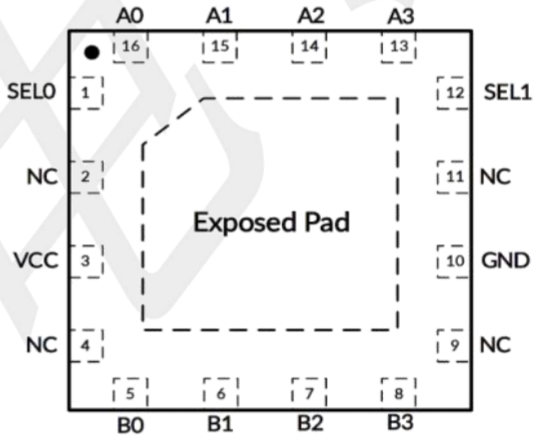
General Description

The is high-performance quad single-pole single-throw (SPST) depletion switches. The key feature of the is the depletion-mode isolation technology, which allows the device to conduct signals when there is no VCC available and to isolate the signals when VCC is present. In additional, select pins allow the internal oscillator frequency to be adjusted between 790 kHz and 1.12 MHz in 110 kHz steps when VCC is present. This feature can improve electromagnetic interference (EMI).

Applications

- Smart phones, Tablets, laptops
- Bluetooth headsets, Mobile accessories

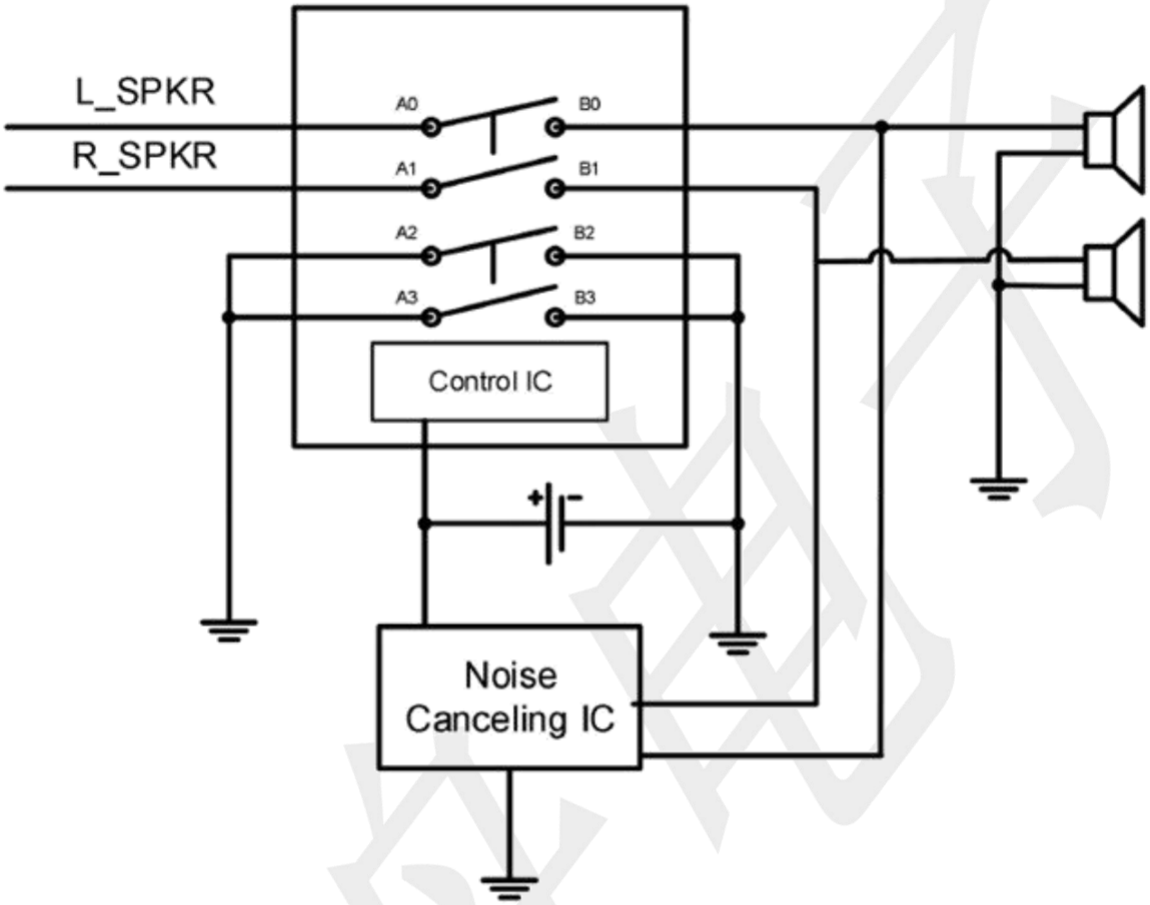
PIN CONFIGURATIONS (TOP VIEW)



PIN DESCRIPTION

PIN	NAME	DESCRIPTION	PIN	NAME	DESCRIPTION
1	SEL0	Oscillator frequency control (see Table 2). Used to shift the electromagnetic interference (EMI) signature to meet the customer specifications.	9	NC	Not connection
2	NC	Not connection	10	GND	Ground
3	VCC	Supply Voltage	11	NC	Not connection
4	NC	Not connection	12	SEL1	Oscillator frequency control (see Table 2). Used to shift the electromagnetic interference (EMI) signature to meet the customer specifications.
5	B0	B Port	13	A3	A Port
6	B1	B Port	14	A2	A Port
7	B2	B Port	15	A1	A Port
8	B3	B Port	16	A0	A Port

Functional Diagram



Truth Table

VCC	Function
0 V to 0.5 V	B0-B3 connect to A0-A3
1.6 V to 4.5 V	B0-B3 disconnect to A0-A3

Oscillator Frequency Step Logic

SEL1	SEL0	Frequency (Typ.)
Low	Low	790 kHz
Low	High	900 kHz
High	Low	1010 kHz
High	High	1120 kHz

Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Supply Voltage		V_{CC}	-0.5~5.5	V
DC switch I/O voltage (switch conducting)		**Vsw**	-4.5~5.0	V
DC switch I/O voltage (switch isolated)			-4.5~5.0	
Storage Temperature			-65~150	°C
Maximum peak switch I/O current -pulsed at 1ms duration <10% duty cycle		I_{SW}	500	mA
HBM, JEDEC: JESD22-A114	I/O to GND	ESD	±4	kV
	Others		±6	

Note:
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

Recommend operating ratings

Paramenter	Symbol	Value	Unit
Supply Voltage	VCC	2.0 ~ 5.0	V
Isolating（VCC=2.0V, RL=32Ω, f<30kHz）	**Vsw** (OFF)	< 1.7	Vrms
Isolating（VCC=2.5V, RL=32Ω, f<30kHz）		< 2.0	
Isolating（VCC=3.0V, RL=32Ω, f<30kHz）		< 2.6	
Isolating（VCC=3.5V, RL=32Ω, f<30kHz）		< 2.8	
Isolating（VCC=4.0V, RL=32Ω, f<30kHz）		< 2.9	
Isolating（VCC=4.5V, RL=32Ω, f<30kHz）		< 3.0	
Isolating（VCC=5.0V, RL=32Ω, f<30kHz）		< 3.0	
Conducting （f<30kHz）	**Vsw** (ON)	< 3.0	Vrms
Ambient operating Temperature	TA	-40 ~ +85	°C

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

Electrical Characteristics 1

(Typical values are at VCC = 0V, T_A = +25℃, unless otherwise noted.)

Symbol	Parameter	Test Condition		Min	Typ	Max	Unit
Switch DC Characteristics							
Ioff	Switch Off Leakage Current	VCC= 5 V, Bx= GND	Ax = VCC		0.2		μA
			Ax = −1.5V ~ +1.5V		0.7		μA
		VCC=2~3.3V, Bx= GND	Ax = −1.5V ~ +1.5V		0.5		μA
Ron	Switch On Resistance	ISW=50mA, **Vsw** = −3V to +3V			1.1		Ω
Rflat(on)	On Resistance Flatness	ISW=50mA, **Vsw** = −3V to +3V			14		mΩ
Switch AC Characteristics							
THD+N	Total Harmonic Distortion plus Noise	**Vsw** =1Vrms, f=1kHz @R=32Ω,			-102		dB
OIRR	Off Isolation Rejection Ratio	VCC=2.0V **Vsw**<1.7Vrms, f=20kHz	RL=32Ω		-115		dB
			RL=1kΩ		-100		dB
		VCC=2.5V **Vsw**<2.0Vrms, f=20kHz	RL=32Ω		-115		dB
			RL=1kΩ		-100		dB
		VCC=3.0V **Vsw**<2.4Vrms, f=20kHz	RL=32Ω		-115		dB
			RL=1kΩ		-100		dB
		VCC=3.5V **Vsw**<2.6Vrms, f=20kHz	RL=32Ω		-115		dB
			RL=1kΩ		-100		dB
		VCC=4.0V **Vsw**<2.7Vrms, f=20kHz	RL=32Ω		-115		dB
			RL=1kΩ		-108		dB
		VCC=4.5V **Vsw**<2.8Vrms, f=20kHz	RL=32Ω		-115		dB
			RL=1kΩ		-108		dB
		VCC=5.0V **Vsw**<3.0Vrms, f=20kHz	RL=32Ω		-115		dB
			RL=1kΩ		-108		dB
BW	Band Width	RL = 50Ω, CL= 0 pF			90		MHz

Electrical Characteristics 2

(Typical values are at VCC = 0V, T_A = +25℃, unless otherwise noted.)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
Supply Current						
IDD	Quiescent Current	VCC = 1.8V		43		μA
		VCC = 2.5V		61		μA
		VCC = 3.3V		85		μA
		VCC = 4.2V		113		μA
		VCC = 5.0V		141		μA
IDIS	Disable Current	VCC ≤ 0.2 V		0.1		μA
Control Logic						
Rpd	VCC Pull-Down Resistance	VCC ≤ 0.2 V		5.5		MΩ
VCCH	VCC High Voltage		1.6			V
VCCL	VCC Low Voltage				0.4	V
Timing						
Toff	Switch Turn-Off Time	RL=1kΩ, CL=10pF VCC = 0V to 2V, **Vsw** = 1.5V		1		ms
Ton	Switch Turn-On Time	RL=1kΩ, CL=10pF, VCC = 2V to 0V, **Vsw** = 1.5V		10		μs
Capacitance						
Con	On Capacitance	**Vsw** = 0 dBm, f = 1 MHz		22		pF
Coff	Off Capacitance	**Vsw** = 0 dBm, f = 1 MHz		35		pF
Oscillator frequency						
Fosc	On-Chip Oscillator Frequency	For reference only		3.3		MHz

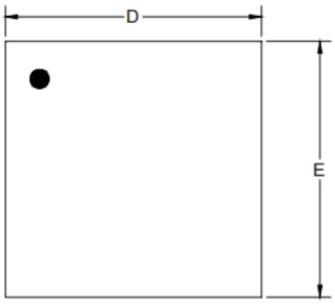
Note:

(1) Flatness is defined as the difference between maximum and minimum value of ON-resistance at the specified analog signal voltage points.

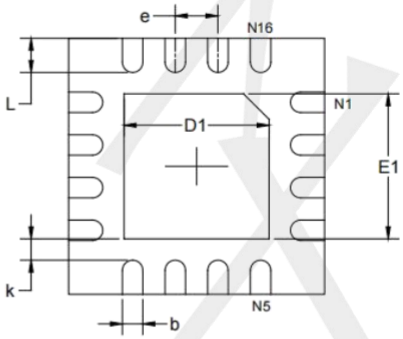
(2) R_{ON} matching between channels is calculated by subtracting the channel with the lowest max Ron value from the channel with the highest max Ron value.

Package information

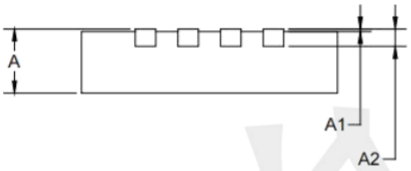
QFN 3x3 -16L



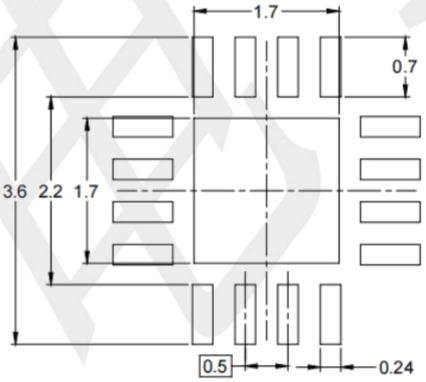
TOP VIEW



BOTTOM VIEW



SIDE VIEW



RECOMMENDED LAND PATTERN (Unit: mm)

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	MIN	MAX	MIN	MAX
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A2	0.203 REF		0.008 REF	
D	2.900	3.100	0.114	0.122
D1	1.600	1.800	0.063	0.071
E	2.900	3.100	0.114	0.122
E1	1.600	1.800	0.063	0.071
k	0.200 MIN		0.008 MIN	
b	0.180	0.300	0.007	0.012
e	0.500 TYP		0.020 TYP	
L	0.300	0.500	0.012	0.020