DG2750



Vishay Siliconix

0.45 Ω, Low Voltage Dual SPDT Analog Switch with Negative Swing Audio Capability

DESCRIPTION

The DG2750 is a dual SPDT low on-resistance switch designed to from a single 1.6 V to 5.5 V power supply. It is a bi-directional switch, and is capable of switching negative swing audio without the need for a coupling capacitor. With a single power supply, the audio signal can swing over the range from ((V+) - 5) to V+.

Guaranteed to operate with 1.4 V logic when V+ is in the range of 2.7 V to 5.5 V, the DG2750 will allow an easy interface with low voltage DSP or ASIC control logic.

The DG2750 is built on sub micron CMOS low voltage process technology, has very low quiescent current, and provides greater than 600 mA latch-up protection, as tested per JESD78.

The DG2750 is assembled in compact mQFN10, 1.4 mm x 1.8 mm x 0.55 mm and ultra thin UTMQFN of 0.35 mm thickness.

As a committed partner to the community and the environment, Vishay Siliconix manufactures this product with lead (Pb)-free device termination. The miniQFN-10 package has a nickel-palladium-gold device termination and is represented by the lead (Pb)-free "-E4" suffix to the ordering part number. The nickel-palladium-gold device terminations meet all JEDEC[®] standards for reflow and MSL rating.

As a further sign of Vishay Siliconix's commitment, the DG2750 is fully RoHS-complaint and halogen-free.

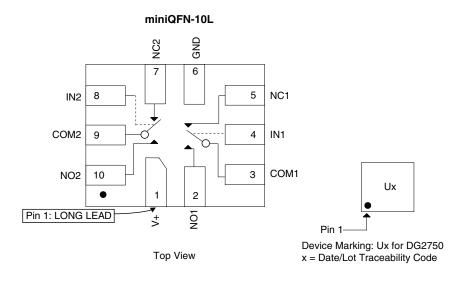
FEATURES

- 1.6 V to 5.5 V single power rail operation
- Capable to switch negative swing audio without
 DC blocking capacitor
 RoHS
 COMPLIANT
- Low signal distortion: THD+N < -98 dB
- Low on-resistance
- 1.4 V high logic
- Latch-up current > 600 mA (JESD78)
- ESD (HBM): 8 kV
- Reduced power consumption
- Reduce board space
- Material categorization: for definitions of compliance please see <u>www.vishay.com/doc?99912</u>

APPLICATIONS

- Cellular phones
- Portable media players
- Computer and game machine
- Handheld healthcare and instruments

FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



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ORDERING INFORMATION						
PART NUMBER	TEMPERATURE RANGE	PACKAGE	SIZE			
DG2750DN-T1-E4	40 °C to 185 °C	miniQFN-10	1.4 mm x 1.8 mm x 0.55 mm			
DG2750DN1-T1-GE4	-40 °C to +85 °C	UTMQFN-10	1.4 mm x 1.8 mm x 0.35 mm			

TRUTH TABLE, DG2750					
IN1 (PIN 4)	IN2 (PIN 8)	FUNCTION			
0	X	COM1 = NC1			
1	X	COM1 = NO1			
X	0	COM2 = NC2			
Х	1	COM2 = NO2			

PARAMETER		LIMIT	UNIT	
Reference to GND	V+, IN	-0.3 to +6	V	
Reference to GND	COM, NO, NC ^a	(V+) -5.5 or -2.5 whichever higher, (V+ + 0.3)	- v	
Current (Any Terminal except COM, NO, No	C, IN)	30		
Continuous Current (COM, NO, NC, IN)		± 250	mA	
Peak Current (Pulsed at 1 ms, 10 % Duty Cycle)		± 500	1	
Storage Temperature (D Suffix)		-65 to +150	°C	
Power Dissipation (Packages) ^b	miniQFN-10 ^c	208	mW	
ESD (Human Body Model) I/O to GND		8	kV	
Latch-up (per JESD78)		600	mA	

Notes

a. Signals on COM, NO, NC, exceeding V+ will be clamped by internal diodes. Limit forward diode current to maximum current ratings

b. All leads welded or soldered to PC board

c. Derate 2.6 mW/°C above 70 °C

SPECIFICATIONS (V+ = $2.7 \text{ V}, \pm 10 \%$)							
PARAMETER	SYMBOL	TEST CONDITIONS OTHERWISE UNLESS SPECIFIED	TEMP. ^a	LIMITS -40 °C to +85 °C			UNIT
		OTHERWISE UNLESS SPECIFIED		MIN. ^b	TYP. °	MAX. ^b	
Analog Switch							
Analog Signal Range ^d	V _{ANALOG}		Full	-2.5	-	V+	V
On-Resistance	D		Room	-	0.45	1	
On-Resistance	R _{DS(on)}	$V_{+} = 2.7 V,$	Full	-	-	1.3	
On-Resistance Match	ΔR_{ON}	V _S = ((V+) -4.5 V, -1 V, 0 V, 1 V, 2 V, V+), I _S = 100 mA	Room	-	0.1	-	Ω
On-Resistance Flatness	R _{ON} Flatness	6	Room	-	0.3	-	1
Quitab Off Lashaga Quinant	I _{NO/NC(off)}		Room	-	50	-	
Switch Off Leakage Current	I _{COM(off)}	$V_{+} = 2.7 V,$	Full	-250	-	250	
Channel On Leakage Current		V _{NC/NO} = -2.5 V or 2.5 V, V _{COM} = 2.5 V or -2.5 V	Room	-	50	-	nA
Channel On Leakage Current	I _{COM(on)}		Full	-250	-	250	1
Digital Control					•	•	
Input Voltage High	V _{INH}		Full	1.4	-	-	v
Input Voltage Low	V _{INL}	V+ = 2.7 V to 4.3 V	Full	-	-	0.6	v
Input Capacitance	C _{IN}		Room	-	6.5	-	pF
Input Current	$I_{\rm INL}$ or $I_{\rm INH}$	$V_{IN} = 0 \text{ or } V+$	Full	-1	-	1	μA

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SPECIFICATIONS (V+ = $2.7 \text{ V}, \pm 10 \text{ \%}$)							
PARAMETER	SYMBOL	TEST CONDITIONS OTHERWISE UNLESS SPECIFIED	TEMP. ^a	LIMITS -40 °C to +85 °C			UNIT
		OTHERWISE ONLESS SPECIFIED		MIN. ^b	۲YP. ۵	MAX. ^b	
Dynamic Characteristics							
Break-Before-Make Time ^{e, d}	t		Room	800	1160	-	
Dieak-Deloie-Make Time	t _{BBM}		Full	1000	-	-	
Enable Turn-On Time ^{e, d}	+	V+ = 3 V, V _S = 1.5 V, R _L = 50 Ω,	Room	-	1200	2100	ns
Enable fulli-On fille 9, 9	t _{ON(EN)}	C _L = 35 pF	Full	-	-	2500	
Enable Turn-Off Time ^{e, d}	+		Room - 33	130	D		
Enable Turn-On Time 5, a	t _{OFF(EN)}		Full	-	-	150	1
Charge Injection ^d	Q _{INJ}	C_L = 1 nF, R_{GEN} = 0 Ω , V_{GEN} = 0 V		-	4	-	рС
Total Harmonic Distortion Plus Noise ^d	THD+N	f = 20 Hz to 20 kHz, V_{COM} = 0.5 V_{P-P} , R _S = R _L = 600 Ω ; DC bias = 0 V		-	< -98	-	dB
Off-Isolation ^d	OIRR	$V_{+} = 3 V, R_{L} = 50 \Omega, C_{L} = 5 pF,$		-	-54	-	dB
Crosstalk ^{d, f}	X _{TALK}	f = 300 kHz	Room	-	-60	-	uв
Bandwidth ^d	BW	V+ = 3 V, R_L = 50 Ω , -3 dB		-	49	-	MHz
Channel-Off Capacitance ^d	C _{NC/NO(off)}	V+ = 3 V, f = 1 MHz		-	36	-	рF
Channel-On Capacitance ^d	C _{COM/NC/NO(on)}	v + = 3 v, $i = 1 v + z$		-	106	-	p
Power Supply							
Power Supply Range	V+			1.6	-	5.5	V
Power Supply Current	l+	$V_{IN} = 0 V$, or V+	Full	-	-	2	μA

Notes

a. Room = 25 °C, Full = as determined by the operating suffix

b. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet

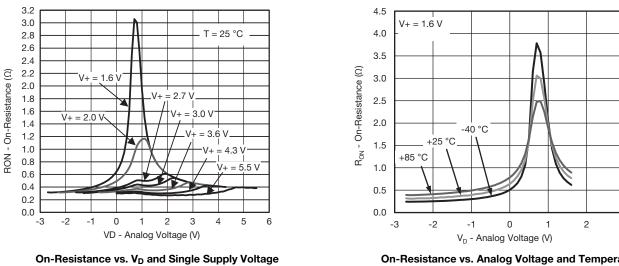
c. Typical values are for design aid only, not guaranteed nor subject to production testing

d. Guarantee by design, not subjected to production test

e. V_{IN} = V+ voltage to perform proper function

f. Crosstalk measured between channels

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 in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

On-Resistance vs. Analog Voltage and Temperature

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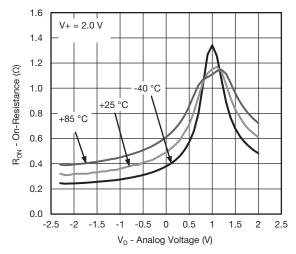
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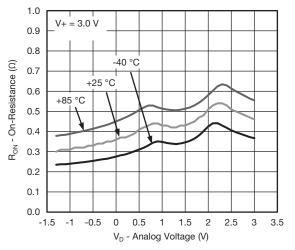


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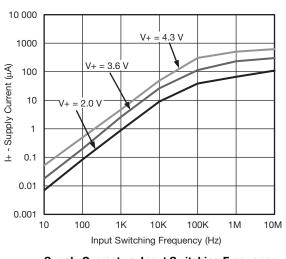
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



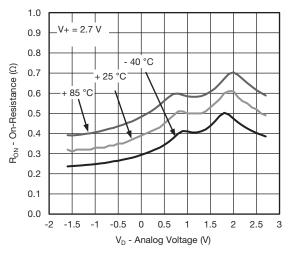
On-Resistance vs. Analog Voltage and Temperature



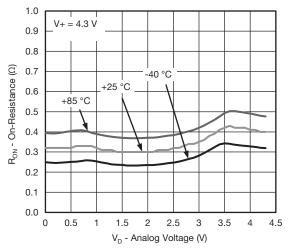
On-Resistance vs. Analog Voltage and Temperature



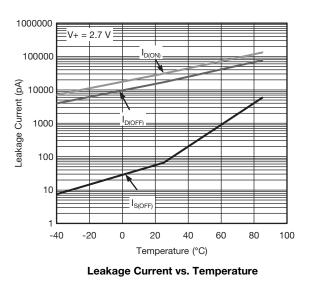
Supply Current vs. Input Switching Frequency



On-Resistance vs. Analog Voltage and Temperature



On-Resistance vs. Analog Voltage and Temperature



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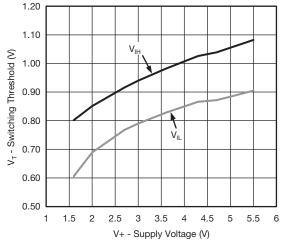
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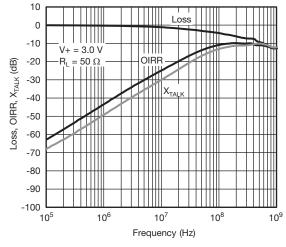
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

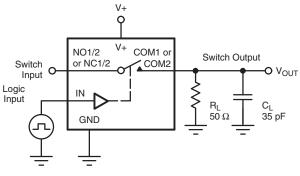


Switching Threshold vs. Supply Voltage



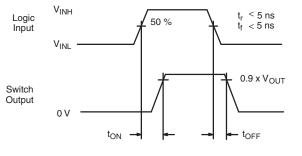
Insertion Loss, Off-Isolation, Crosstalk vs. Frequency

TEST CIRCUITS

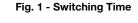


C_L (includes fixture and stray capacitance)

$$v_{OUT} = v_{COM} \left(\frac{R_L}{R_L + R_{ON}} \right)$$



Logic "1" = Switch on Logic input waveforms inverted for switches that have the opposite logic sense.



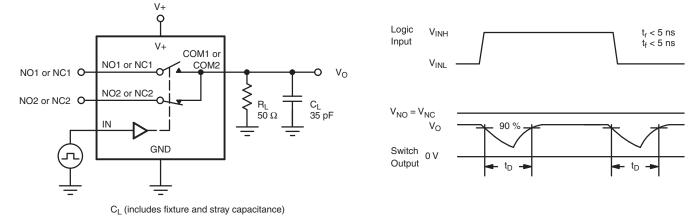


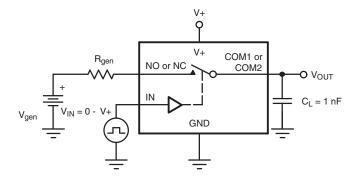
Fig. 2 - Break-Before-Make Interval

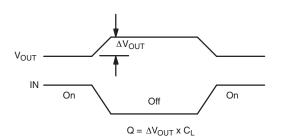


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TEST CIRCUITS





IN depends on switch configuration: input polarity determined by sense of switch.

Fig. 3 - Charge Injection

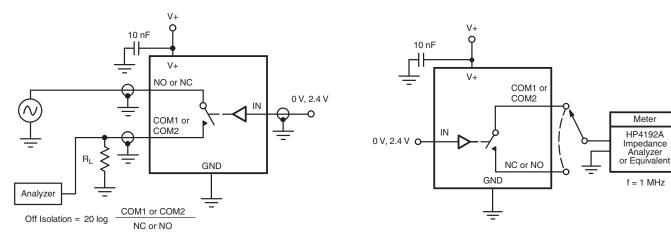


Fig. 4 - Off-Isolation

Fig. 5 - Channel Off/On Capacitance

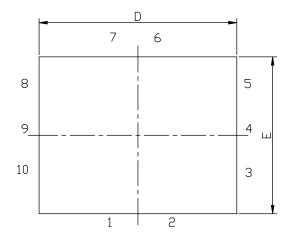
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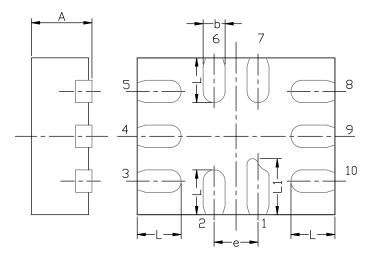
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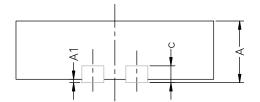


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MINI QFN-10L CASE OUTLINE







DIM		MILLIMETERS			INCHES		
DIM	MIN.	NAM.	MAX.	MIN.	NAM.	MAX.	
А	0.45	0.55	0.60	0.0177	0.0217	0.0236	
A1	0.00	-	0.05	0.000	-	0.002	
b	0.15	0.20	0.25	0.006	0.008	0.010	
С		0.150 or 0.127 REF ⁽¹⁾			0.006 or 0.005 REF ⁽¹⁾		
D	1.70	1.80	1.90	0.067	0.071	0.075	
E	1.30	1.40	1.50	0.051	0.055	0.059	
е		0.40 BSC			0.016 BSC		
L	0.35	0.40	0.45	0.014	0.016	0.018	
L1	0.45	0.50	0.55	0.0177	0.0197	0.0217	

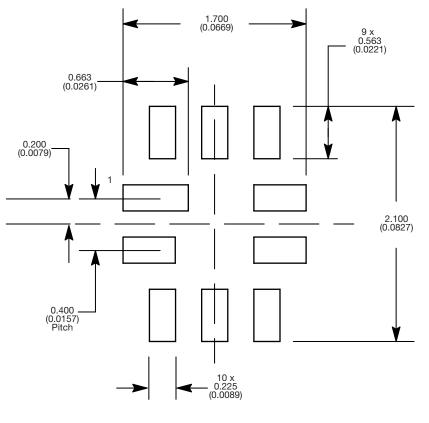
Note

⁽¹⁾ The dimension depends on the leadframe that assembly house used.

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RECOMMENDED MINIMUM PADS FOR MINI QFN 10L



Mounting Footprint Dimensions in mm (inch)



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