2.5 Ω, High Bandwidth, Dual SPDT Analog Switch

DESCRIPTION

The DG2032E is a low-voltage dual single-pole / double-throw monolithic CMOS analog switch. Designed to operate from 1.8 V to 5.5 V power supply, the DG2032E achieves a bandwidth of 221 MHz while providing low on-resistance (2.5 Ω), excellent on-resistance matching (0.3 Ω) and flatness (1 Ω) over the entire signal range.

The DG2032E offers the advantage of high linearity that reduces signal distortion, making ideal for audio, video, and USB signal routing applications.

Built on Vishay Siliconix's proprietary sub-micron high-density process, the DG2032E brings low power consumption at the same time as reduces PCB spacing with the QFN12 package.

As a committed partner to the community and the environment, Vishay Siliconix manufactures this product with the lead (Pb)-free device terminations. The QFN12 package has a nickel-palladium-gold device termination and is represented by the lead (Pb)-free "-GE4" suffix. The nickel-palladium-gold device terminations meet all JEDEC® standards for reflow and MSL ratings.

FEATURES

- 1.8 V to 5.5 V single supply operation
- Low R_{ON}: 2.5 Ω at 4.5 V
- 221 MHz, -3 dB bandwidth
- Low off-isolation, -58 dB at 1 MHz
- +1.6 V logic compatible
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

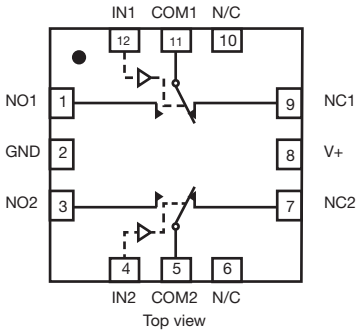
BENEFITS

- High linearity
- Low power consumption
- High bandwidth
- Full rail signal swing range

APPLICATIONS

- USB / UART signal switching
- Audio / video switching
- Cellular phone
- Media players
- Modems
- Hard drives
- PCMCIA

FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION



Top view

TRUTH TABLE		
LOGIC	NC1 AND NC2	NO1 AND NO2
0	ON	OFF
1	OFF	ON

ORDERING INFORMATION		
TEMP. RANGE	PACKAGE	PART NUMBER
-40 °C to +85 °C	12-Pin QFN (3 mm x 3 mm)	DG2032EDN-T1-GE4

ABSOLUTE MAXIMUM RATINGS			
PARAMETER		LIMIT	UNIT
Reference to GND			
V+		-0.3 to +6	V
IN, COM, NC, NO [a]		-0.3 to (V+ + 0.3)	
Continuous current (any terminal)		± 50	mA
Peak current (pulsed at 1 ms, 10 % duty cycle)		± 200	
Storage temperature (D suffix)		-65 to +150	°C
Power dissipation (packages) [b]	12-Pin QFN (3 mm x 3 mm) [c]	1295	mW
ESD / HBM	EIA / JESD22-A114-A	7.5k	V
ESD / CDM	EIA / JESD22-C101-A	1.5k	
Latch up	JESD78	300	mA

Notes

a. Signals on NC, NO, or COM or IN 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 4 mW/°C above 70 °C

SPECIFICATIONS (V+ = 3 V)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS OTHERWISE UNLESS SPECIFIED V+ = 3 V, ± 10 %, V_{INL} = 0.5 V, V_{INH} = 1.5 V [e]**	**TEMP. [a]**	**LIMITS -40 °C to +85 °C**			**UNIT**
				MIN. [c]	**TYP. [b]**	**MAX. [c]**	
Analog Switch							
Analog signal range [d]	V_{ANALOG}		Full	0	-	V+	V
Drain-source on-resistance	$R_{DS(on)}$	V+ = 1.8 V, $V_{NC/NO}$ = 0.4 V / V+, $I_{NC/NO}$ = 8 mA	Room	-	7	11	Ω
			Full	-	-	13	
		V+ = 2.7 V, V_{COM} = 0.8 V / 1.8 V, I_{COM} = 10 mA	Room	-	4.6	5.5	
			Full	-	-	6.5	
On-resistance matching	$\Delta R_{DS(on)}$	V+ = 2.7 V, V_{COM} = 0.8 V / 1.4 V / 1.8 V, I_{COM} = 10 mA	Room	-	0.02	0.3	
			Full	-	-	0.6	
On-resistance flatness [d, f]	$R_{flat(on)}$		Room	-	0.62	1	
			Full	-	-	1.5	
Off leakage current [g]	$I_{NC/NO(off)}$	V+ = 3.6 V, $V_{NC/NO}$ = 1 V / 3.2 V, V_{COM} = 3.2 V / 1 V	Room	-1	0.01	1	nA
			Full	-5	-	5	
Channel-on leakage current [g]	$I_{COM(on)}$	V+ = 3.3 V, V_{COM} = $V_{NC/NO}$ = 1 V / 3.2 V	Room	-1	0.01	1	
			Full	-5	-	5	
Digital Control							
Input current [d]	I_{INL} or I_{INH}		Full	-1	-	1	µA
Input high voltage [d]	V_{INH}		Full	1.5	-	-	V
Input low voltage [d]	V_{INL}		Full	-	-	0.4	
Digital input capacitance [d]	C_{IN}		Room	-	3	-	pF
Dynamic Characteristics							
Turn-on time	t_{ON}	$V_{NC/NO}$ = 3 V, C_L = 35 pF, R_L = 300 Ω	Room	-	19	45	ns
			Full	-	-	50	
Turn-off time	t_{OFF}		Room	-	9	35	
			Full	-	-	45	
Break-before-make time [d]	t_{BBM}		Room	4	11	-	
			Full	3	-	-	
Charge injection [d]	Q_{INJ}	C_L = 1 nF, V_{gen} = 1.5 V, R_{gen} = 0 Ω	Room	-	-9	-	pC
Bandwidth [d]	BW	C_L = 5 pF (set up capacitance)	Room	-	226	-	MHz
Off-isolation [d]	OIRR	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz	Room	-	-55	-	dB
		R_L = 50 Ω, C_L = 5 pF, f = 10 MHz	Room	-	-42	-	
Channel-to-channel crosstalk [d]	X_{TALK}	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz	Room	-	-61	-	
		R_L = 50 Ω, C_L = 5 pF, f = 10 MHz	Room	-	-44	-	
NO, NC off capacitance [d]	$C_{NO(off)}$	V+ = 2.7 V, f = 1 MHz	Room	-	7	-	pF
	$C_{NC(off)}$		Room	-	7	-	
Channel-on capacitance [d]	$C_{NO(on)}$		Room	-	23	-	
	$C_{NC(on)}$		Room	-	23	-	
Power Supply							
Power supply range	V+			2.7	-	3.3	V
Power supply current [d]	I+	V+ = 2.7 V, V_{IN} = 0 V or 2.7 V	Full	-	-	1	µA

Notes

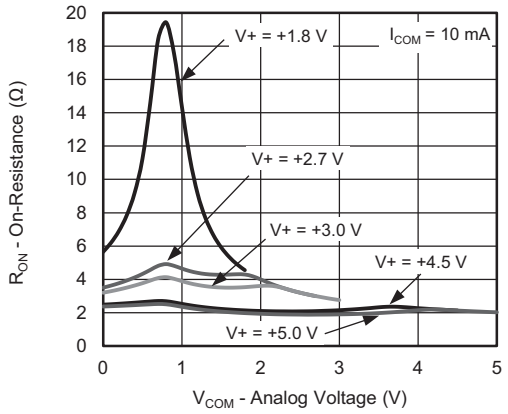
a. Room = 25 °C, Full = as determined by the operating suffix
b. Typical values are for design aid only, not guaranteed nor subject to production testing
c. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this datasheet
d. Guarantee by design, not subjected to production test
e. V_{IN} = input voltage to perform proper function
f. Difference of min. and max. values
g. Guaranteed by 5 V testing

SPECIFICATIONS (V+ = 5 V)							
PARAMETER	**SYMBOL**	**TEST CONDITIONS OTHERWISE UNLESS SPECIFIED V+ = 5 V, ± 10 %, V_{INL} = 0.5 V, V_{INH} = 2 V [e]**	**TEMP. [a]**	**LIMITS -40 °C to +85 °C**			**UNIT**
				MIN. [c]	**TYP. [b]**	**MAX. [c]**	
Analog Switch							
Analog signal range [d]	V_{ANALOG}		Full	0	-	V+	V
Drain-source on-resistance	$R_{DS(on)}$	V+ = 4.5 V, V_{COM} = 0.8 V / 3.5 V; I_{COM} = 10 mA	Room	-	2.5	3.1	Ω
			Full	-	-	4	
On-resistance matching	$\Delta R_{DS(on)}$	V+ = 4.5 V, V_{COM} = 0.8 V / 2.5 V / 3.5 V, I_{COM} = 10 mA	Room	-	0.01	0.4	
			Full	-	-	0.6	
On-resistance flatness [d, f]	$R_{flat(on)}$		Room	-	0.61	1	
			Full	-	-	1.5	
Off leakage current [g]	$I_{NC/NO(off)}$	V+ = 5.5 V, $V_{NC/NO}$ = 1 V / 4.5 V, V_{COM} = 4.5 V / 1 V	Room	-2	0.15	2	nA
			Full	-10	-	10	
Channel-on leakage current [g]	$I_{COM(on)}$	V+ = 5.5 V, V_{COM} = $V_{NC/NO}$ = 1 V / 4.5 V	Room	-2	0.20	2	
			Full	-10	-	10	
Power down leakage [d]	I_{PD}	V+ = 0 V, V_{COM} = 5.5 V, NC/NO open	Full	-	0.01	5	µA
		V+ = 0 V, $V_{NC/NO}$ = 5.5 V, COM, open	Full	-	0.01	3	mA
Digital Control							
Input current [d]	I_{INL} or I_{INH}		Full	-1	-	1	µA
Input high voltage [d]	V_{INH}		Full	2	-	-	V
Input low voltage [d]	V_{INL}		Full	-	-	0.5	
Digital input capacitance [d]	C_{IN}		Room	-	3	-	pF
Dynamic Characteristics							
Turn-on time	t_{ON}	$V_{NC/NO}$ = 3 V, C_L = 35 pF, R_L = 300 Ω	Room	-	13	40	ns
			Full	-	-	43	
Turn-off time	t_{OFF}		Room	-	7	33	
			Full	-	-	35	
Break-before-make time [d]	t_{BBM}		Room	3	6	-	
			Full	2	-	-	
Propagation delay [d]	tpd	V+ = 5 V, no R_L	Room	-	380	-	ps
Charge injection [d]	Q_{INJ}	C_L = 1 nF, V_{gen} = 2.5 V, R_{gen} = 0 Ω	Room	-	-19.4	-	pC
Bandwidth [d]	BW	C_L = 5 pF (set up capacitance)	Room	-	221	-	MHz
Off-isolation [d]	OIRR	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz	Room	-	-58	-	dB
		R_L = 50 Ω, C_L = 5 pF, f = 10 MHz	Room	-	-43	-	
Channel-to-channel crosstalk [d]	X_{TALK}	R_L = 50 Ω, C_L = 5 pF, f = 1 MHz	Room	-	-62	-	
		R_L = 50 Ω, C_L = 5 pF, f = 10 MHz	Room	-	-47	-	
NO, NC off capacitance [d]	$C_{NO(off)}$	V+ = 5 V, f = 1 MHz	Room	-	7	-	pF
	$C_{NC(off)}$		Room	-	7	-	
Channel-on capacitance [d]	$C_{NO(on)}$		Room	-	23	-	
	$C_{NC(on)}$		Room	-	23	-	
Power Supply							
Power supply range	V+			4.5	-	5.5	V
Power supply current [d]	I+	V+ = 5.5 V, V_{IN} = 0 V or 5.5 V	Full	-	-	1	µA

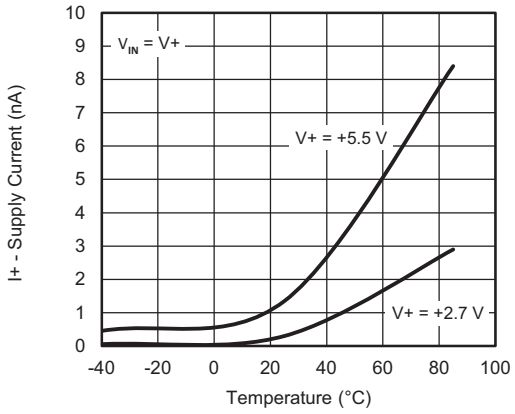
Notes
a. Room = 25 °C, Full = as determined by the operating suffix
b. Typical values are for design aid only, not guaranteed nor subject to production testing
c. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this datasheet
d. Guarantee by design, not subjected to production test
e. V_{IN} = input voltage to perform proper function
f. Difference of min. and max. values
g. Guaranteed by 5 V testing

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.

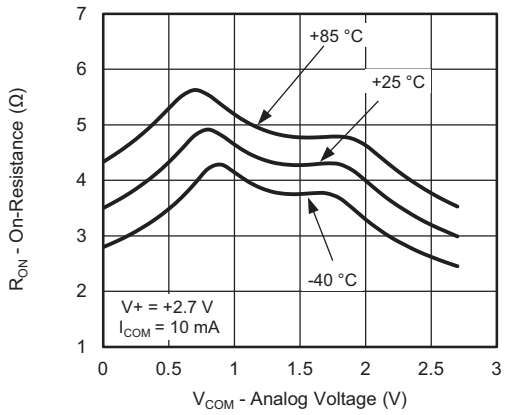
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



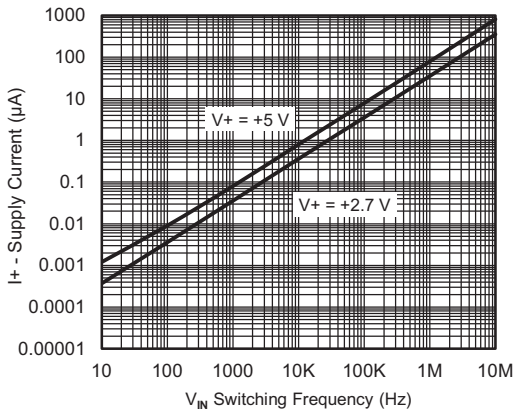
R_{ON} vs. V_{COM} and Single Supply Voltage



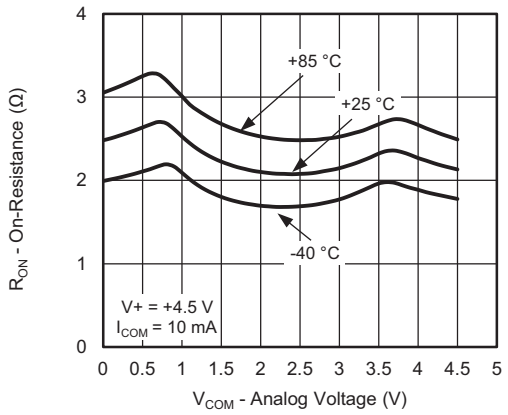
Supply Current vs. Temperature



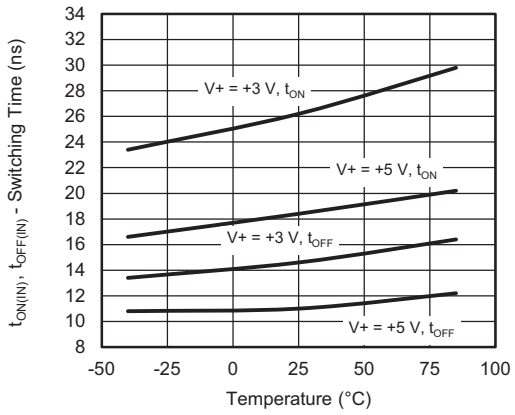
R_{ON} vs. Analog Voltage and Temperature



Positive Supply Current vs. Switching Frequency

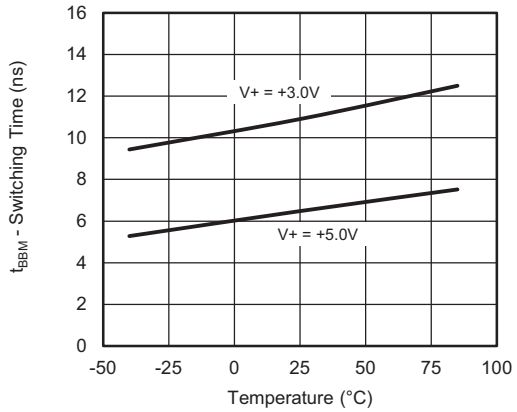


R_{ON} vs. Analog Voltage and Temperature

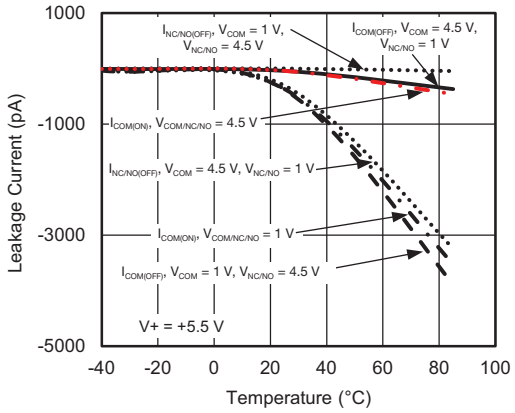


Switching Time vs. Temperature

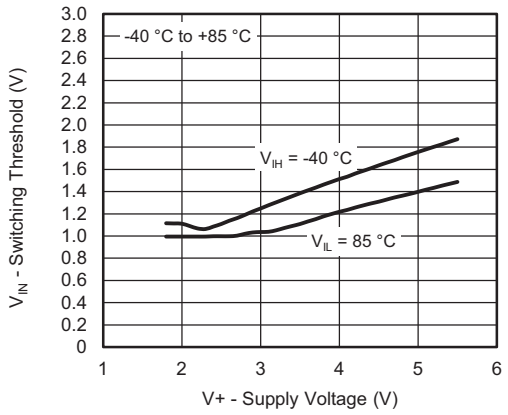
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



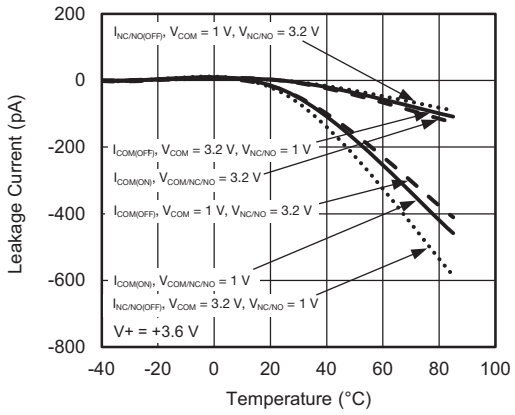
Switching Time vs. Temperature



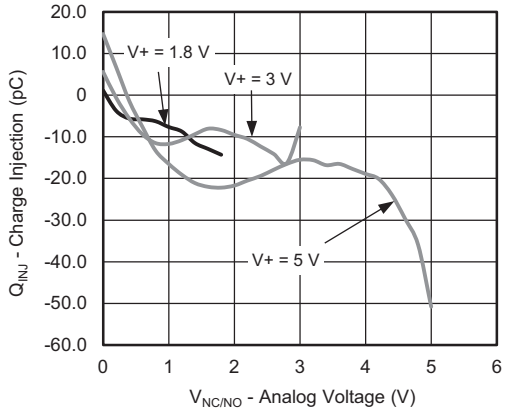
Leakage Current vs. Temperature



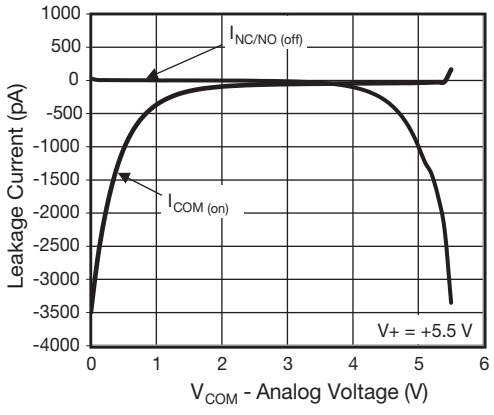
Switching Threshold vs. Supply Voltage



Leakage Current vs. Temperature

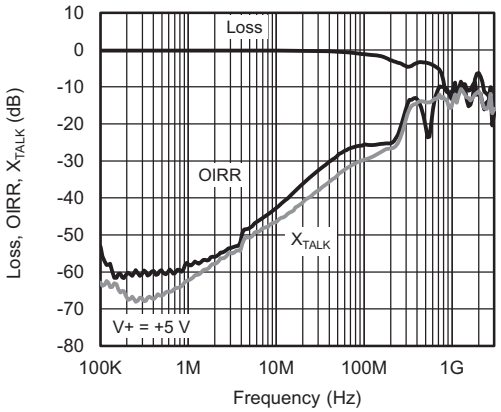


Charge Injection vs. Source Voltage



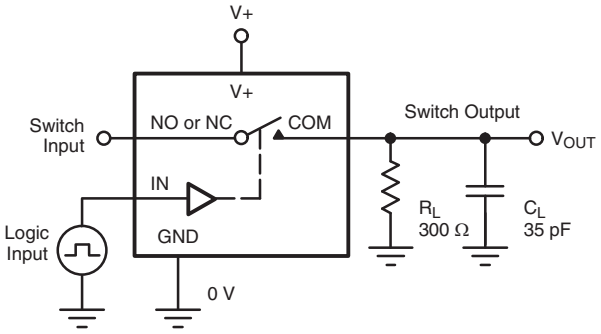
Leakage Current vs. Analog Voltage

TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



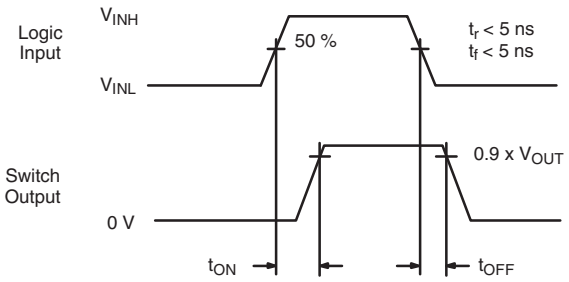
Loss, OIRR, X_{TALK} vs. Frequency

TEST CIRCUITS



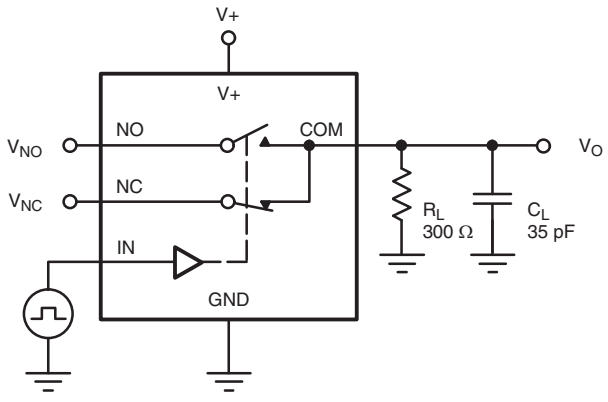
C_L (includes fixture and stray capacitance)

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



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

Fig. 1 - Switching Time



C_L (includes fixture and stray capacitance)

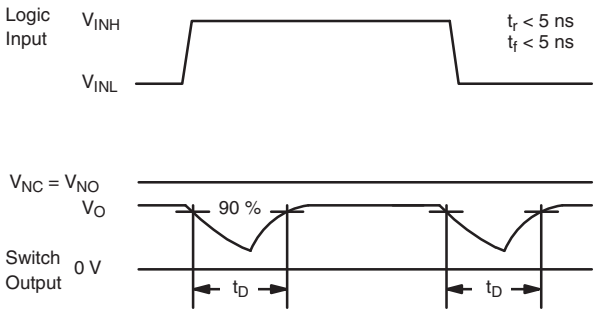


Fig. 2 - Break-Before-Make Interval

TEST CIRCUITS

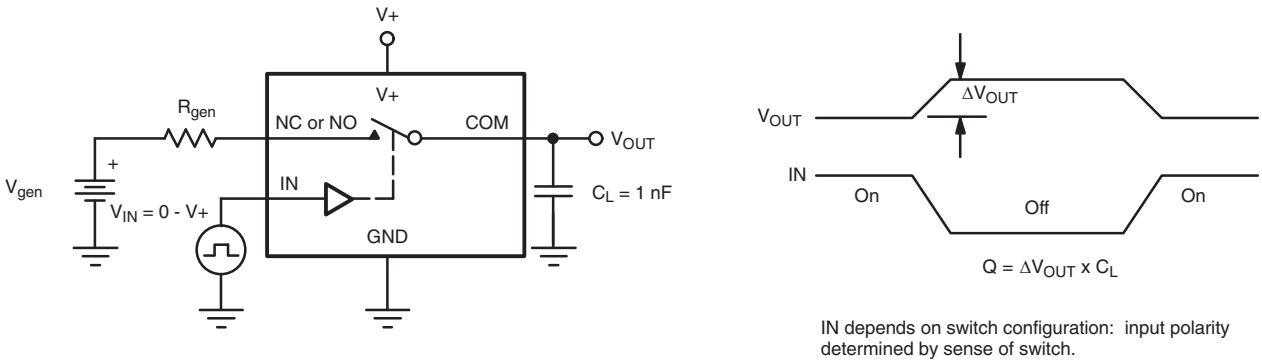


Fig. 3 - Charge Injection

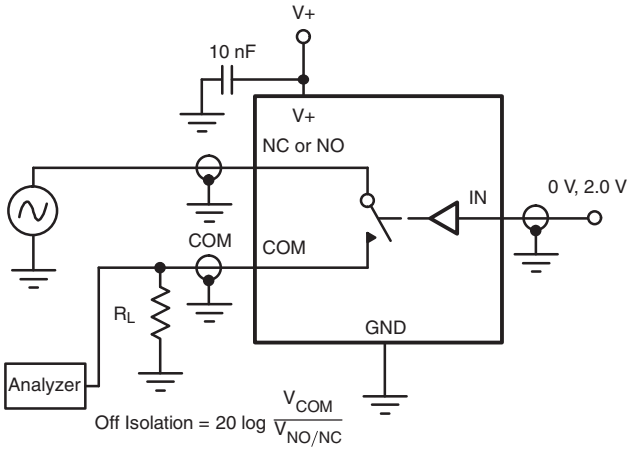


Fig. 4 - Off-Isolation

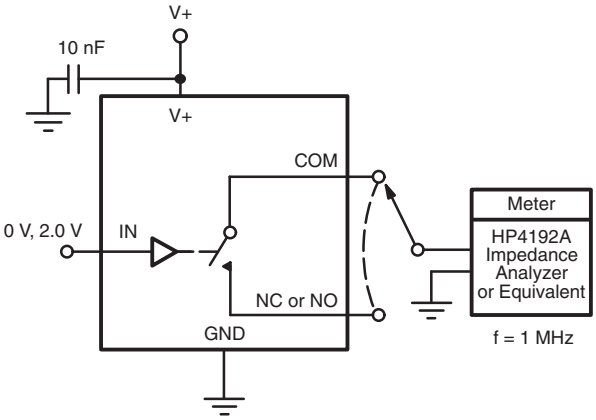


Fig. 5 - Channel Off / On Capacitance

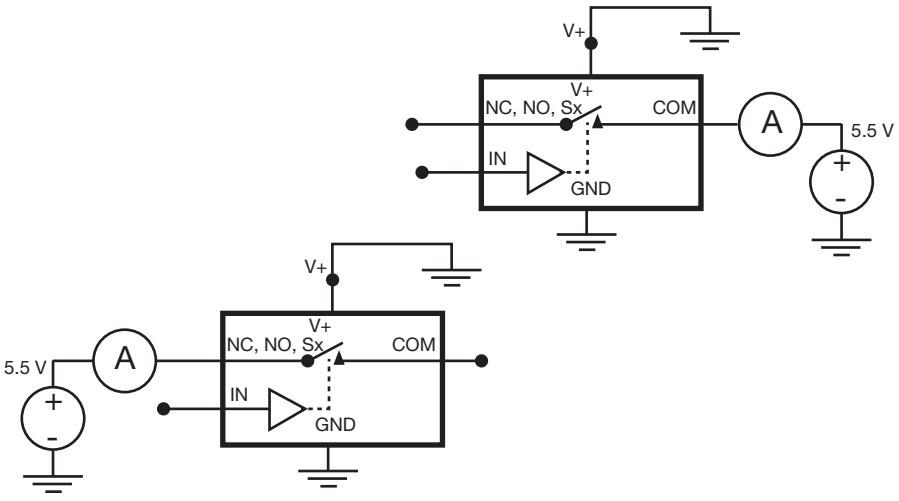
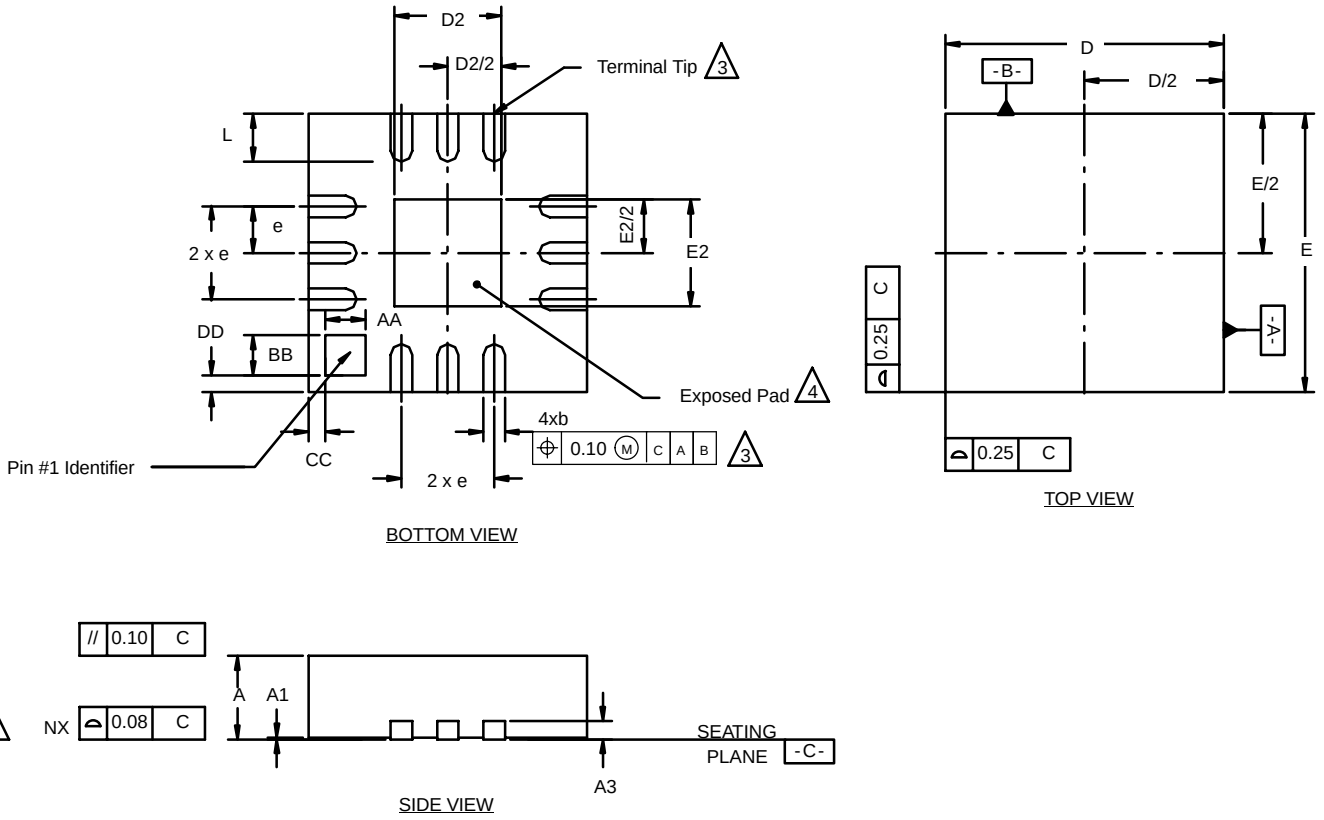


Fig. 6 - Source / Drain Power Down Leakage

Vishay Siliconix maintains worldwide manufacturing capability. Products may be manufactured at one of several qualified locations. Reliability data for Silicon Technology and Package Reliability represent a composite of all qualified locations. For related documents such as package / tape drawings, part marking, and reliability data, see www.vishay.com/ppg?78604.

QFN-12 LEAD (3 X 3)



NOTES:

1. All dimensions are in millimeters.
2. N is the total number of terminals.
3. Dimension b applies to metallized terminal and is measured between 0.25 and 0.30 mm from terminal tip.
4. Coplanarity applies to the exposed heat sink slug as well as the terminal.
5. The pin #1 identifier may be either a mold or marked feature, it must be located within the zone iindicated.

Dim	MILLIMETERS			INCHES		
	Min	Nom	Max	Min	Nom	Max
A	0.80	0.90	1.00	0.032	0.035	0.039
b	0.18	0.23	0.30	0.007	0.009	0.012
D		3.00 BSC			0.118 BSC	
D2	1.00	1.15	1.25	0.039	0.045	0.049
E		3.00 BSC			0.118 BSC	
E2	1.00	1.15	1.25	0.039	0.045	0.049
e		0.50 BSC			0.02 BSC	
L	0.45	0.55	0.65	0.018	0.022	0.026
AA		0.435			0.017	
BB		0.435			0.017	
CC		0.18			0.007	
DD		0.18			0.007	

ECN: C-03092—Rev. A, 14-Apr-03
DWG: 5898

Disclaimer

ALL PRODUCT, PRODUCT SPECIFICATIONS AND DATA ARE SUBJECT TO CHANGE WITHOUT NOTICE TO IMPROVE RELIABILITY, FUNCTION OR DESIGN OR OTHERWISE.

Vishay Intertechnology, Inc., its affiliates, agents, and employees, and all persons acting on its or their behalf (collectively, “Vishay”), disclaim any and all liability for any errors, inaccuracies or incompleteness contained in any datasheet or in any other disclosure relating to any product.

Vishay makes no warranty, representation or guarantee regarding the suitability of the products for any particular purpose or the continuing production of any product. To the maximum extent permitted by applicable law, Vishay disclaims (i) any and all liability arising out of the application or use of any product, (ii) any and all liability, including without limitation special, consequential or incidental damages, and (iii) any and all implied warranties, including warranties of fitness for particular purpose, non-infringement and merchantability.

Statements regarding the suitability of products for certain types of applications are based on Vishay’s knowledge of typical requirements that are often placed on Vishay products in generic applications. Such statements are not binding statements about the suitability of products for a particular application. It is the customer’s responsibility to validate that a particular product with the properties described in the product specification is suitable for use in a particular application. Parameters provided in datasheets and / or specifications may vary in different applications and performance may vary over time. All operating parameters, including typical parameters, must be validated for each customer application by the customer’s technical experts. Product specifications do not expand or otherwise modify Vishay’s terms and conditions of purchase, including but not limited to the warranty expressed therein.

Except as expressly indicated in writing, Vishay products are not designed for use in medical, life-saving, or life-sustaining applications or for any other application in which the failure of the Vishay product could result in personal injury or death. Customers using or selling Vishay products not expressly indicated for use in such applications do so at their own risk. Please contact authorized Vishay personnel to obtain written terms and conditions regarding products designed for such applications.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document or by any conduct of Vishay. Product names and markings noted herein may be trademarks of their respective owners.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Analogue Switch ICs ***category:***

Click to view products by Vishay ***manufacturer:***

Other Similar products are found below :

FSA3051TMX NLAS4684FCTCG NLAS5223BLMNR2G NLVAS4599DTT1G NLX2G66DMUTCG 425541DB 425528R 099044FB NLAS5123MNR2G PI5A4157CEX PI5A4599BCEX NLAS4717EPFCT1G PI5A3167CCEX SLAS3158MNR2G PI5A392AQE PI5A4157ZUEX PI5A3166TAEX FSA634UCX TC4066BP(N,F) DG302BDJ-E3 PI5A100QEX HV2605FG-G HV2301FG-G RS2117YUTQK10 RS2118YUTQK10 RS2227XUTQK10 ADG452BRZ-REEL7 MAX4066ESD+ MAX391CPE+ MAX4730EXT+T MAX314CPE+ BU4066BCFV-E2 MAX313CPE+ BU4S66G2-TR NLAS3158MNR2G NLASB3157MTR2G TS3A4751PWR NLAS4157DFT2G NLAS4599DFT2G NLASB3157DFT2G NLAST4599DFT2G NLAST4599DTT1G DG300BDJ-E3 DG2503DB-T2-GE1 DG2502DB-T2-GE1 TC4W53FU(TE12L,F) 74HC2G66DC.125 ADG619BRMZ-REEL ADG1611BRUZ-REEL7 LTC201ACN#PBF