Low Voltage, 0.6 Ω, Dual SPDT Analog Switch

DESCRIPTION

The DG2735A is low voltage, low on-resistance, dual single-pole/double-throw (SPDT) monolithic CMOS analog switches designed for high performance switching of analog signals. Combining low-power, high speed, low on-resistance, and small package size, the DG2735A is ideal for portable and battery power applications.

The DG2735A have an operation range from 1.65 V to 4.3 V single supply. The DG2735A has two separate control pins with for the separated two SPDT switched.

The DG2735A is guaranteed 1.65 V logic compatible, allowing the easy interface with low voltage DSP or MCU control logic and ideal for one cell Li-ion battery direct power.

The switch conducts signals within power rails equally well in both directions when on, and blocks up to the power supply level when off. Break-before-make is guaranteed.

The DG2735A is built on Vishay Siliconix's sub micron CMOS low voltage process technology and provides greater than 300 mA latch-up protection, as tested per JESD78.

As a committed partner to the community and the environment, Vishay Siliconix manufactures this product with lead (Pb)-free device terminations. DG2735A is offered in a miniQFN package. The miniQFN package has a nickel-palladium-gold device termination and is represented by the lead (Pb)-free “-E4” suffix. The nickel-palladium-gold device terminations meet all JEDEC standards for reflow and MSL ratings.

FEATURES

- Low voltage operation (1.65 V to 4.3 V)
- Low on-resistance - R_{ON}: 0.6 Ω at 2.7 V
- Fast switching: t_{ON} = 64 ns at 2.7 V
  t_{OFF} = 42 ns at 2.7 V
- Latch-up current > 300 mA (JESD78)
- **Halogen-free according to IEC 61249-2-21 definition**
- **Compliant to RoHS directive 2002/95/EC**

Pb-free
RoHS COMPLIANT
HALOGEN FREE

BENEFITS

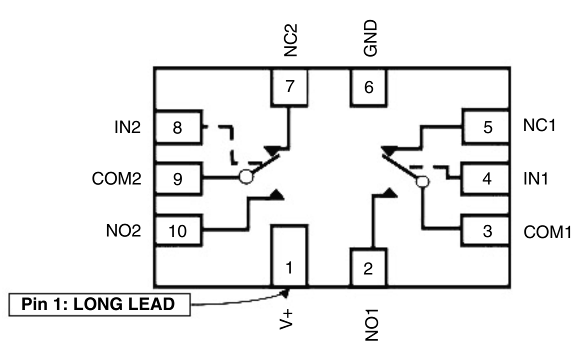
- Reduced power consumption
- High accuracy
- Reduce board space
- TTL/1.65 V logic compatible

APPLICATIONS

- Cellular phones
- Speaker headset switching
- Audio and video signal routing
- PCMCIA cards
- Battery operated systems
- Portable media player handheld test instruments

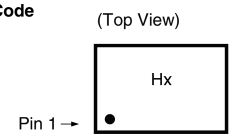
FUNCTIONAL BLOCK DIAGRAM AND PIN CONFIGURATION

DG2735A
miniQFN-10L



Device Marking: Hx for DG2735A
x = Date/Lot Traceability Code

(Top View)



Note: Pin 1 has long lead

TRUTH TABLE		
Logic	NC	NO
0	ON	OFF
1	OFF	ON

ORDERING INFORMATION		
Temp. Range	Package	Part Number
- 40 °C to 85°C	miniQFN10	DG2735ADN-T1-GE4

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Reference to GND	V+		- 0.3 to 5.0	V
	IN, COM, NC, NO[a]		- 0.3 to (V+ + 0.3)	
Current (Any terminal except NO, NC or COM)			30	mA
Continuous Current (NO, NC, or COM)			± 250	
Peak Current (Pulsed at 1 ms, 10 % duty cycle)			± 500	
Storage Temperature (D Suffix)			- 65 to 150	°C
Power Dissipation (Packages)[b]	miniQFN10[c]		208	mW

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 4.0 mW/C above 70 °C.

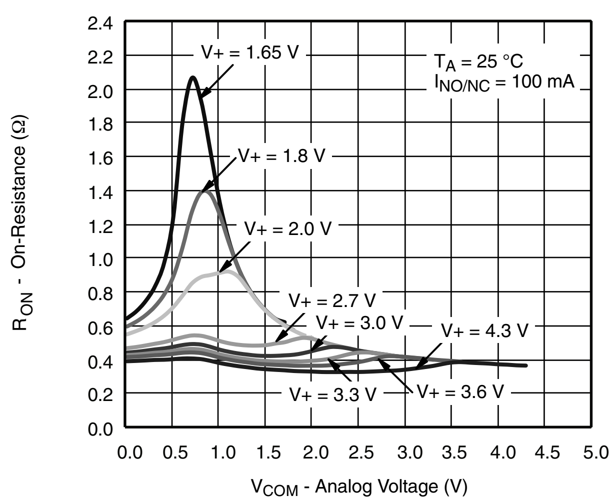
SPECIFICATIONS (V+ = 3 V)							
		Test Conditions Unless Otherwise Specified		Limits - 40 °C to 85 °C			
Parameter	Symbol	V+ = 3 V, ± 10 %, V_{IN} = 0.4 V or 1.65 V[e]	Temp.[a]	Min.[b]	Typ.[c]	Max.[b]	Unit
Analog Switch							
Analog Signal Range[d]	V_{ANALOG}	$r_{DS(on)}$	Full	0		V+	V
On-Resistance	$R_{DS(on)}$	V+ = 2.7 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 0.5 V	Room		0.5	0.6	Ω
		V+ = 2.7 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 1.5 V					
		V+ = 2.7 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 0.5 V	Full		0.6		
		V+ = 2.7 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 1.5 V					
		V+ = 4.3 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 0.9 V	Room		0.4	0.5	
		V+ = 4.3 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 2.5 V					
		V+ = 4.3 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 0.9 V	Full		0.4		
		V+ = 4.3 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 2.5 V					
R_{ON} Match[d]	ΔR_{ON}	V+ = 2.7 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 0.5 V, 1.5 V	Room		0.06	0.08	
		V+ = 4.3 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 0.9 V, 2.5 V					
R_{ON} resistance flatness[d]	R_{ON} flatness	V+ = 2.7 V, $I_{NO/NC}$ = 100 mA, V_{COM} = 0.5 V, 1.5 V	Room			0.15	
Switch Off Leakage Current	$I_{NO/NC(off)}$	V+ = 4.3 V, $V_{NO/NC}$ = 0.3 V/4.0 V, V_{COM} = 4.0 V/0.3 V	Room	- 10		10	nA
			Full	- 50		50	
	$I_{COM(off)}$		Room	- 10		10	
			Full	- 50		50	
Channel-On Leakage Current	$I_{COM(on)}$	V+ = 4.3 V, $V_{NO/NC}$ = V_{COM} = 4.0 V/0.3 V	Room	- 20		20	
			Full	- 100		100	
Digital Control							
Input High Voltage	V_{INH}		Full	1.65			V
Input Low Voltage	V_{INL}		Full			0.4	
Input Capacitance	C_{IN}		Full		6		pF
Input Current	I_{INL} or I_{INH}	V_{IN} = 0 or V+	Full	- 1		1	µA

SPECIFICATIONS (V+ = 3 V)							
Parameter	Symbol	Test Conditions Unless Otherwise Specified V+ = 3 V, ± 10 %, V_{IN} = 0.4 V or 1.65 V[e]	Temp.[a]	Limits - 40 °C to 85 °C Min.[b]	Typ.[c]	Max.[b]	Unit
Dynamic Characteristics							
Break-Before-Make Time[e]	t_{BBM}	V+ = 3.6 V, V_{NO}, V_{NC} = 1.5 V, R_L = 50 Ω, C_L = 35 pF	Room	1	11		ns
Turn-On Time[e]	t_{ON}		Room		44	75	
			Full			80	
Turn-Off Time[e]	t_{OFF}		Room		26	55	
			Full			60	
Off-Isolation[d]	O_{IRR}	R_L = 50 Ω, C_L = 5 pF, f = 100 kHz	Room		- 70		dB
Crosstalk[d]	X_{TALK}				- 70		
3dB bandwith[d]		R_L = 50 Ω, C_L = 5 pF	Room		30		MHz
NO, NC Off Capacitance[d]	$C_{NO(off)}$	V_{IN} = 0 V, or V+, f = 1 MHz	Room		52		pF
	$C_{NC(off)}$				52		
Channel On Capacitance[d]	$C_{NO(on)}$				168		
	$C_{NC(on)}$				168		
Power Supply							
Power Supply Range	V+			1.65		4.3	V
Power Supply Current	I+	V_{IN} = 0 or V+	Full			1.0	µA

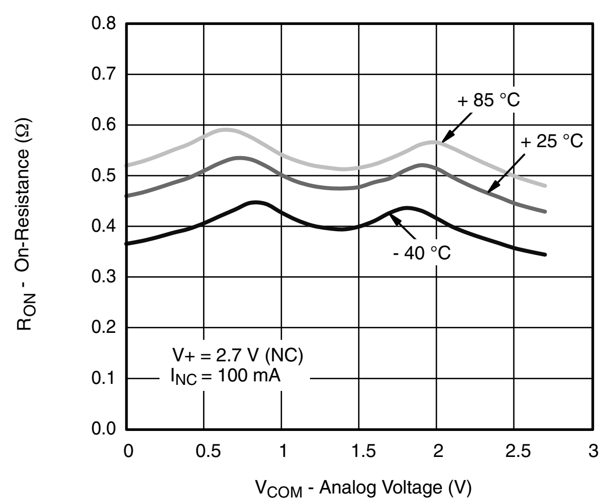
Notes:
a. Room = 25 °C, Full = as determined by the operating suffix.
b. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this data sheet.
c. Typical values are for design aid only, not guaranteed nor subject to production testing.
d. Guarantee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

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)

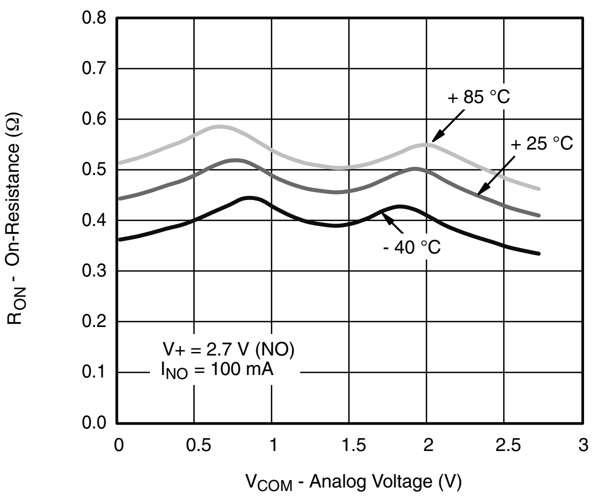


R_{ON} vs. V_{COM} and Single Supply Voltage

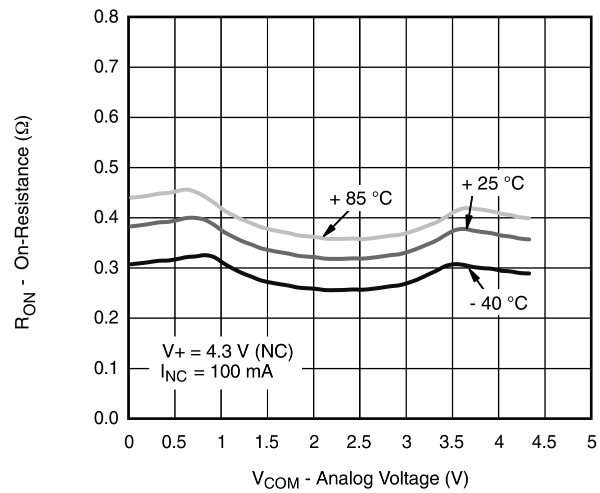


R_{ON} vs. V_{COM} and Single Supply Voltage

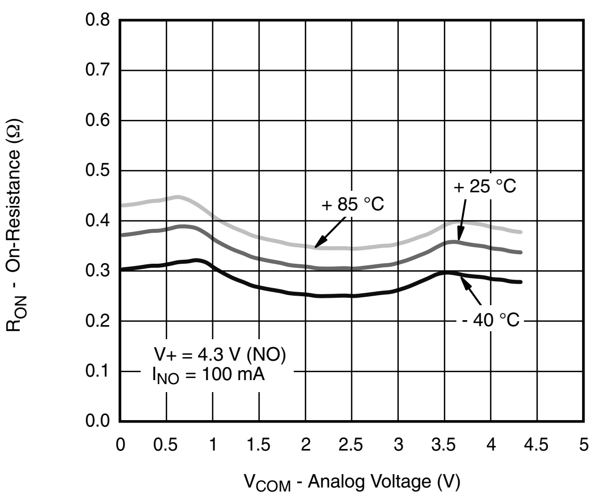
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



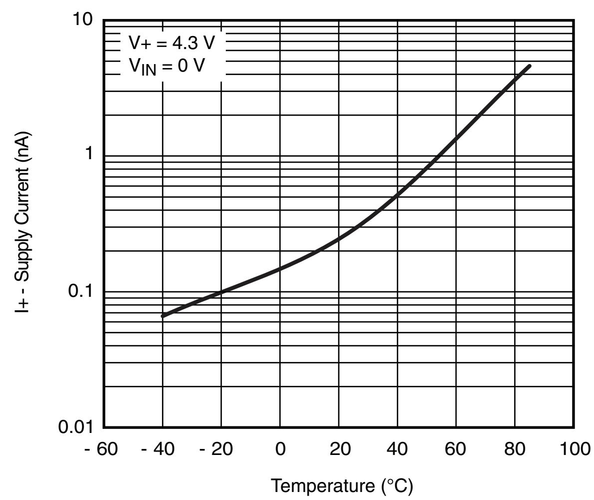
R_{ON} vs. V_{COM} and Single Supply Voltage



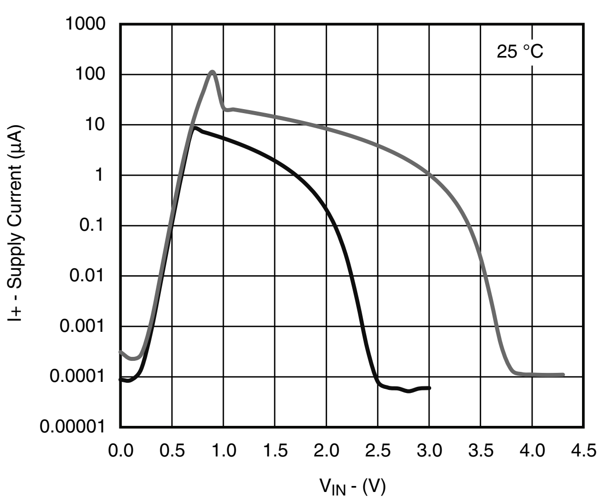
R_{ON} vs. V_{COM} and Single Supply Voltage



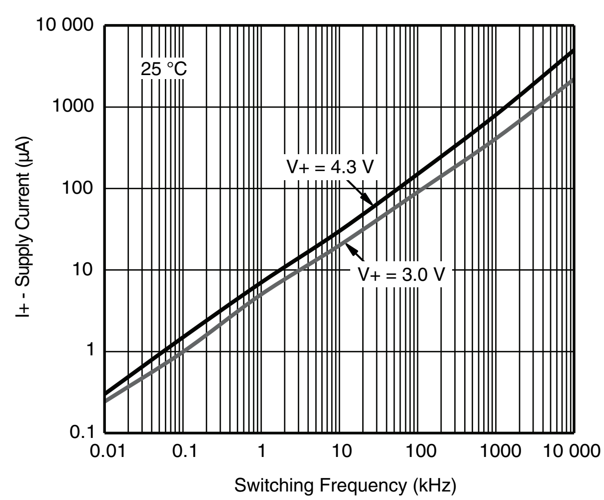
R_{ON} vs. V_{COM} and Single Supply Voltage



I+ Supply Current vs. Temperature

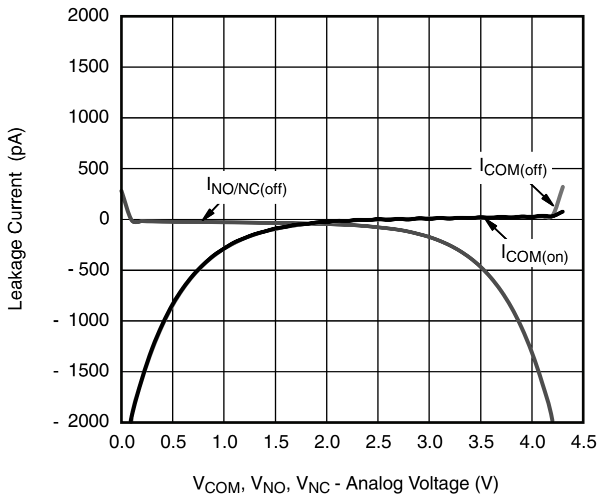


Supply Current vs. V_{IN}

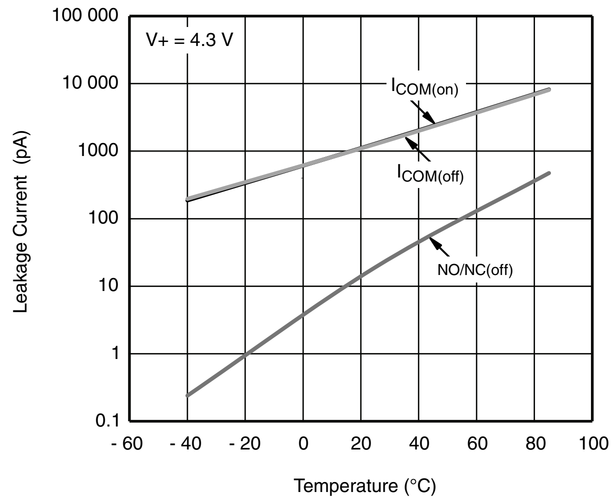


Supply Current vs. Switching Frequency

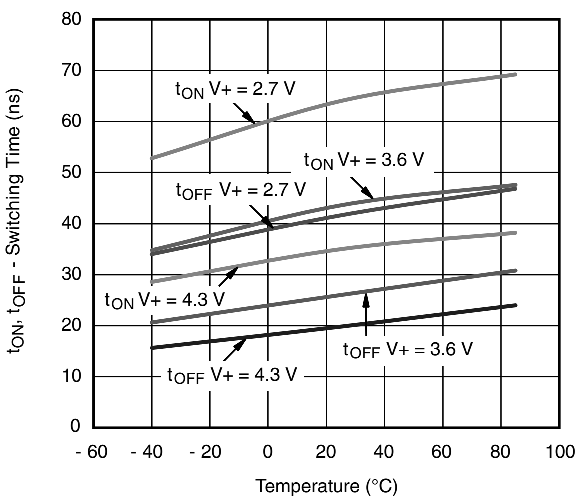
TYPICAL CHARACTERISTICS (T_A = 25 °C, unless otherwise noted)



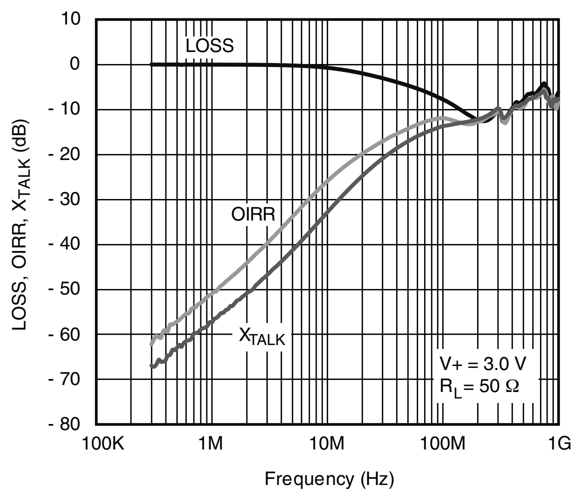
Leakage vs. Analog Voltage



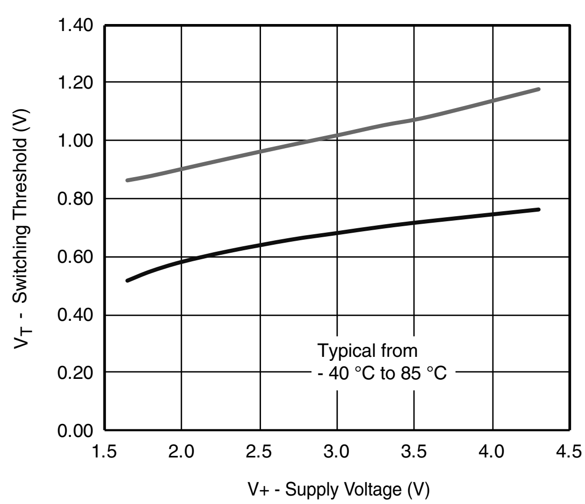
Leakage Current vs. Temperature



Switching Time vs. Temperature

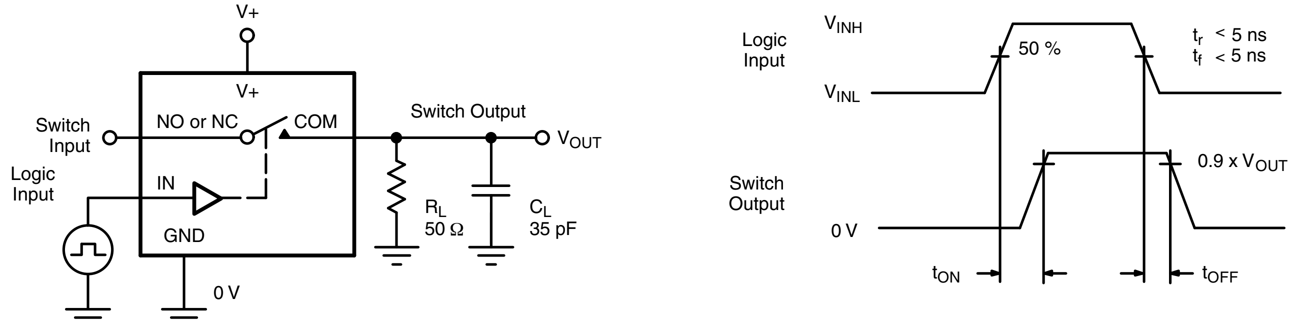


Insertion Loss, Off-Isolation Crosstalk vs. Frequency



Switching Threshold vs. Supply Voltage

TEST CIRCUITS

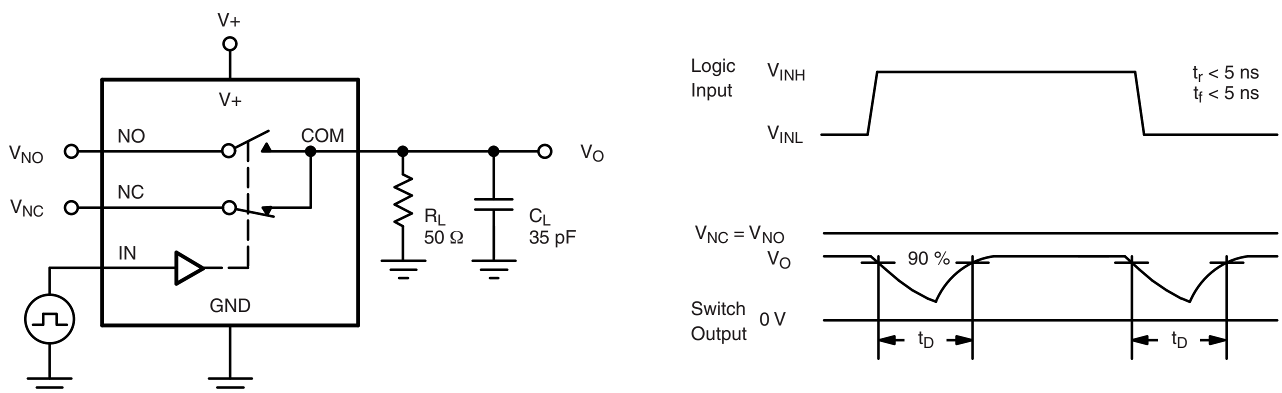


C_L (includes fixture and stray capacitance)

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

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

Figure 1. Switching Time



C_L (includes fixture and stray capacitance)

Figure 2. Break-Before-Make Interval

TEST CIRCUITS

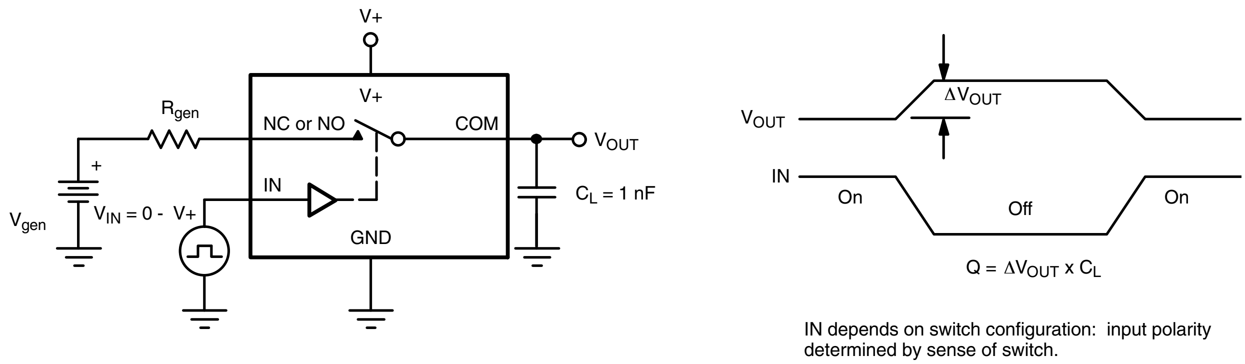


Figure 3. Charge Injection

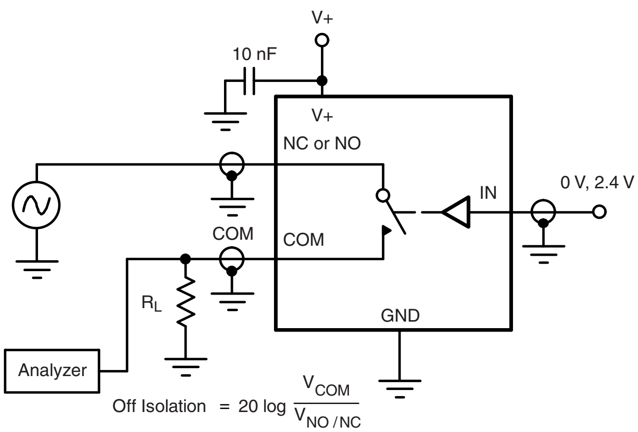


Figure 4. Off-Isolation

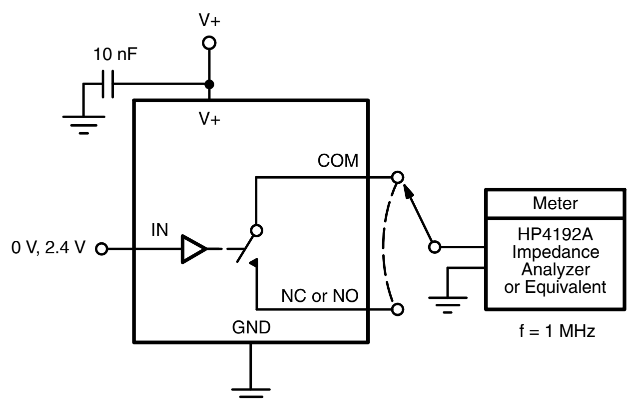
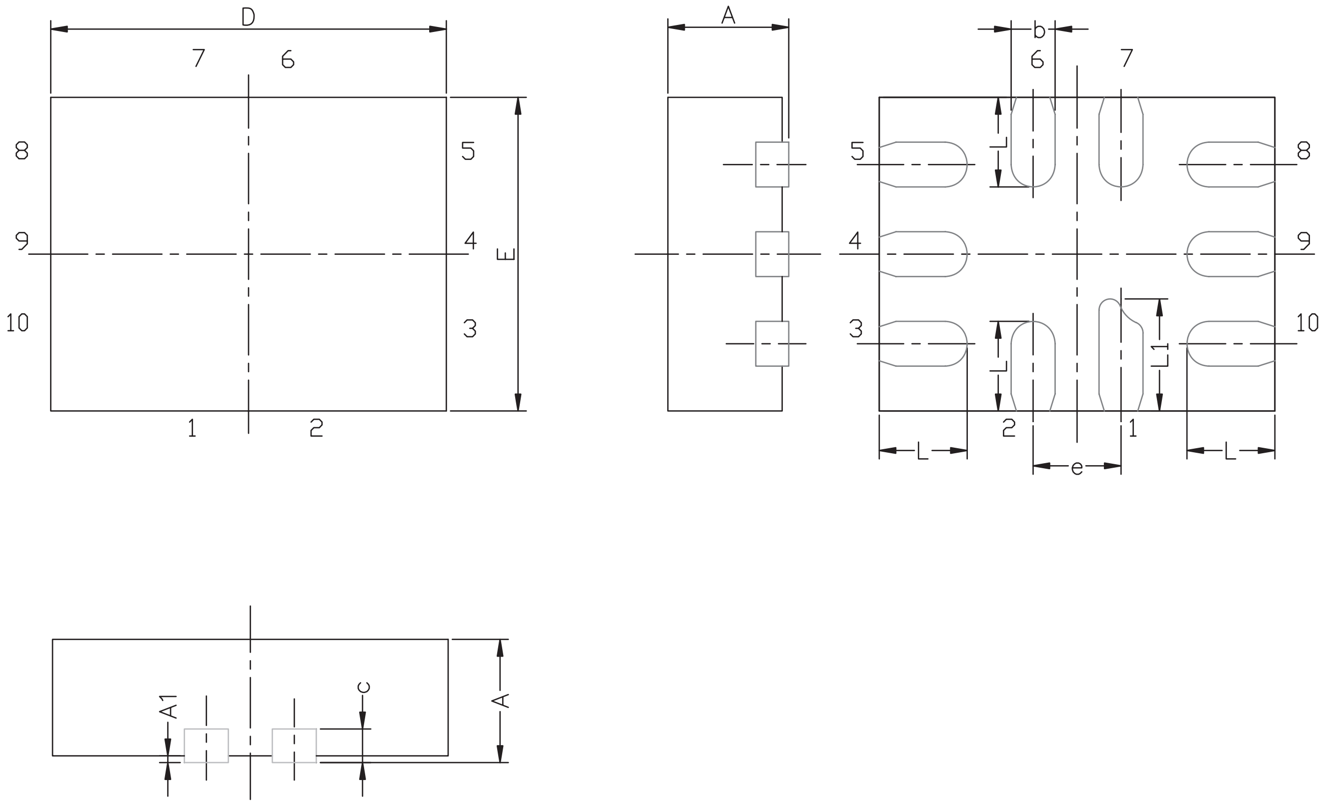


Figure 5. Channel Off/On Capacitance

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?67590.

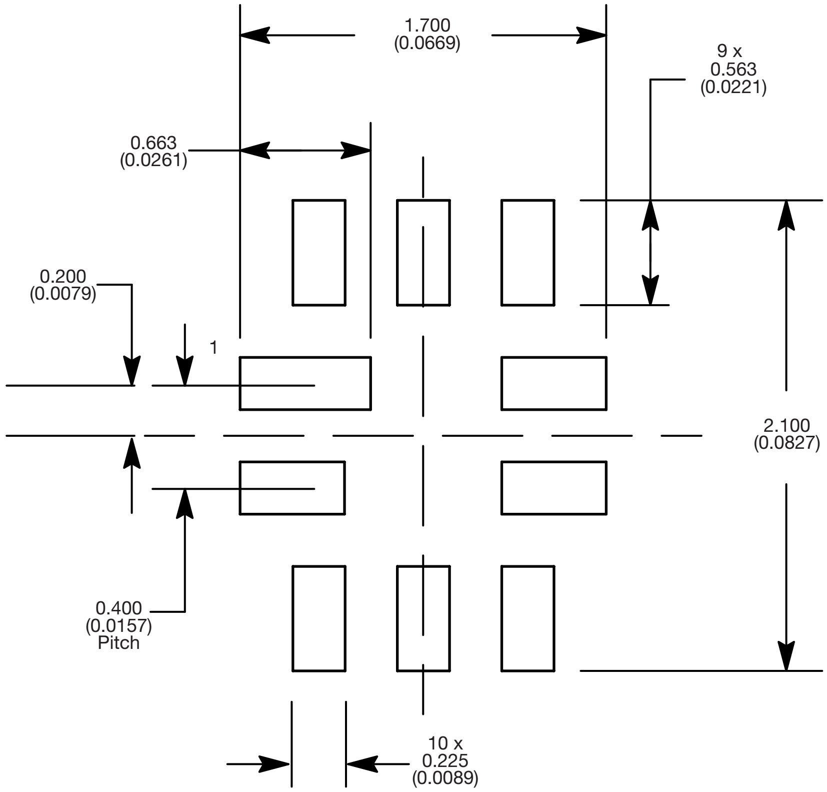
MINI QFN-10L CASE OUTLINE



DIM	MILLIMETERS			INCHES		
	MIN.	NAM.	MAX.	MIN.	NAM.	MAX.
A	0.50	0.55	0.60	0.0197	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
c	0.15 REF			0.006 REF		
D	1.75	1.80	1.85	0.069	0.071	0.073
E	1.35	1.40	1.45	0.053	0.055	0.057
e	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

ECN T-07039-Rev. A, 12-Feb-07
DWG: 5957

RECOMMENDED MINIMUM PADS FOR MINI QFN 10L



Mounting Footprint
Dimensions in mm (inch)

Disclaimer

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