ORDERING INFORMATION

Temp. Range	Package	Part Number
-40 °C to 125 °C	10 pin miniQFN	DG9636EN-T1-E4
-40 °C to 85 °C	10 pin miniQFN	DG9636DN-T1-E4

Note
- -40 °C to 85 °C datasheet limits apply.

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C, unless otherwise noted)

Parameter		Limit	Unit
V+ to GND		14	V
Digital Inputs [a], V_S, V_D		(V+) +0.3 or 30 mA, whichever occurs first	
Continuous Current (Any Terminal)		30	mA
Peak Current, S or D (Pulsed 1 ms, 10 % Duty Cycle)		100	
Storage Temperature		-65 to 150	°C
Power Dissipation (Package) [b]	10 pin miniQFN [c, d]	208	mW
Thermal Resistance (Package) [b]	10 pin miniQFN	357	°C/W

Notes
a. Signals on SX, DX, or AX exceeding V+ or 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.
d. Manual soldering with iron is not recommended for leadless components. The miniQFN-10 is a leadless package. The end of the lead terminal is exposed copper (not plated) as a result of the singulation process in manufacturing. A solder fillet at the exposed copper lip cannot be guaranteed and is not required to ensure adequate bottom side solder interconnection.

SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Otherwise Specified V+ = 12 V, $V_{A0, A1}$ = 1.65 V, 0.5 V [a]	Temp. [b]	Typ. [c]	-40 °C to 125 °C		-40 °C to 85 °C		Unit
					Min. [d]	Max. [d]	Min. [d]	Max. [d]	
Analog Switch									
Analog Signal Range [e]	V_{ANALOG}		Full	-	-	12	-	12	V
On-Resistance	$R_{DS(on)}$	I_S = 1 mA, V_D = +11.3 V	Room	83	-	110	-	110	Ω
			Full	-	-	140	-	125	
On-Resistance Match	ΔR_{on}	I_S = 1 mA, V_D = +11.3 V	Room	2	-	4	-	4	
			Full	-	-	9	-	6	
On-Resistance Flatness	$R_{FLATNESS}$	I_S = 1 mA, V_D = 0.7 V, 6.5 V, 11.3 V	Room	33	-	45	-	45	
			Full	-	-	55	-	50	
Switch Off Leakage Current	$I_{S(off)}$	V+ = 12 V, V_D = 1 V/11 V, V_S = 11 V/1 V	Room	± 0.01	-1	1	-1	1	nA
			Full	-	-18	18	-2	2	
	$I_{D(off)}$		Room	± 0.01	-1	1	-1	1	
			Full	-	-18	18	-2	2	
Channel On Leakage Current	$I_{D(on)}$	V+ = 12 V, V_D = V_S 11 V/1 V	Room	± 0.01	-1	1	-1	1	
			Full	-	-18	18	-2	2	
Digital Control									
Input Current, V_{IN} Low	I_{IL}	V_{AX} = 0.5 V	Full	0.005	-0.1	0.1	-0.1	0.1	µA
Input Current, V_{IN} High	I_{IH}	V_{AX} = 1.65 V	Full	0.005	-0.1	0.1	-0.1	0.1	
Input Capacitance [e]	C_{IN}	f = 1 MHz	Room	3	-	-	-	-	pF

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SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Otherwise Specified V+ = 12 V, $V_{A0, A1}$ = 1.65 V, 0.5 V [a]	Temp. [b]	Typ. [c]	-40 °C to 125 °C		-40 °C to 85 °C		Unit
					Min. [d]	Max. [d]	Min. [d]	Max. [d]	
Dynamic Characteristics									
Turn-On Time	t_{on}	R_L = 300 Ω, C_L = 35 pF see figure 1, 2	Room	30	-	70	-	70	ns
			Full	-	-	90	-	80	
Turn-Off Time	t_{off}		Room	15	-	55	-	55	
			Full	-	-	75	-	65	
Break-Before-Make	t_{BBM}		Room	15	5	-	5	-	
			Full	-	2	-	2	-	
Charge Injection [e]	Q_{INJ}	V_g = 0 V, R_g = 0 Ω, C_L = 1 nF	Room	23.5	-	-	-	-	pC
Off Isolation [e]	OIRR	R_L = 50 Ω, C_L = 5 pF, f = 10 MHz	Room	-58	-	-	-	-	dB
Bandwidth [e]	BW	R_L = 50 Ω	Room	720	-	-	-	-	MHz
Channel-to-Channel Crosstalk [e]	X_{TALK}	R_L = 50 Ω, C_L = 5 pF, f = 10 MHz	Room	-67	-	-	-	-	dB
Dynamic Characteristics									
Source Off Capacitance [e]	$C_{S(off)}$	f = 1 MHz	Room	2	-	-	-	-	pF
Channel On Capacitance [e]	$C_{D(on)}$		Room	7.7	-	-	-	-	
Total Harmonic Distortion [e]	THD	Signal = 1 V_{RMS}, 20 Hz to 20 kHz, R_L = 600 Ω	Room	0.01	-	-	-	-	%
Power Supplies									
Power Supply Current	I+	V_{IN} = 0 V, or V+	Room	0.001	-	0.5	-	0.5	μA
			Full	-	-	1	-	1	
Ground Current	I_{GND}		Room	-0.001	-0.5	-	-0.5	-	
			Full	-	-1	-	-1	-	

SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Otherwise Specified V+ = 5 V, $V_{A0, A1}$ = 1.4 V, 0.5 V [a]	Temp. [b]	Typ. [c]	-40 °C to 125 °C		-40 °C to 85 °C		Unit
					Min. [d]	Max. [d]	Min. [d]	Max. [d]	
Analog Switch									
Analog Signal Range [e]	V_{ANALOG}		Full	-	-	5	-	5	V
On-Resistance	$R_{DS(on)}$	I_S = 1 mA, V_D = +3.5 V	Room	120	-	170	-	170	Ω
			Full	-	-	250	-	200	
On-Resistance Match	ΔR_{on}		Room	3	-	5	-	5	
			Full	-	-	12	-	10	
Switch Off Leakage Current	$I_{S(off)}$	V+ = 5.5 V, V_D = 1 V/4.5 V, V_S = 4.5 V/1 V	Room	± 0.01	-1	1	-1	1	nA
			Full	-	-18	18	-2	2	
	$I_{D(off)}$		Room	± 0.01	-1	1	-1	1	
			Full	-	-18	18	-2	2	
Channel On Leakage Current	$I_{D(on)}$	V+ = 5.5 V, V_S = V_D = 1 V/4.5 V	Room	± 0.01	-1	1	-1	1	
			Full	-	-18	18	-2	2	
Digital Control									
Input Current, V_{IN} Low	I_L	V_{AX} = 0.5 V	Full	0.005	-0.1	0.1	-0.1	0.1	μA
Input Current, V_{IN} High	I_H	V_{AX} = 1.4 V	Full	0.005	-0.1	0.1	-0.1	0.1	
Input Capacitance	C_{IN}	f = 1 MHz	Room	3	-	-	-	-	pF

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SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Otherwise Specified V+ = 5 V, $V_{A0, A1}$ = 1.4 V, 0.5 V [a]	Temp. [b]	Typ. [c]	-40 °C to 125 °C		-40 °C to 85 °C		Unit
					Min. [d]	Max. [d]	Min. [d]	Max. [d]	
Dynamic Characteristics									
Turn-On Time	t_{on}	R_L = 300 Ω, C_L = 35 pF see figure 1, 2	Room	55	-	-	-	-	ns
			Full	-	-	-	-	-	
Turn-Off Time	t_{off}		Room	30	-	-	-	-	
			Full	-	-	-	-	-	
Break-Before-Make-Time	t_{BMM}		Room	36	-	-	-	-	
			Full	-	-	-	-	-	
Charge Injection [e]	Q_{INJ}	C_L = 1 nF, R_{GEN} = 0 Ω, V_{GEN} = 0 V	Full	10	-	-	-	-	pC
Off-Isolation [e]	OIRR	f = 10 MHz, R_L = 50 Ω, C_L = 5 pF	Room	-58	-	-	-	-	dB
Crosstalk [e]	X_{TALK}		Room	-68	-	-	-	-	
Bandwidth [e]	BW	R_L = 50 Ω	Room	610	-	-	-	-	MHz
Total Harmonic Distortion [e]	THD	Signal = 1 V_{RMS}, 20 Hz to 20 kHz, R_L = 600 Ω	Room	2.2	-	-	-	-	%
Source Off Capacitance [e]	$C_{S(off)}$	f = 1 MHz	Room	2.1	-	-	-	-	pF
Channel On Capacitance [e]	$C_{D(on)}$			8.1	-	-	-	-	
Power Supplies									
Power Supply Current	I+	V_{IN} = 0 V, or V+	Room	0.001	-	0.5	-	0.5	μA
			Full	-	-	1	-	1	
Ground Current	I_{GND}		Room	-0.001	-0.5	-	-0.5	-	
			Full	-	-1	-	-1	-	

SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Otherwise Specified V+ = 3 V, $V_{A0, A1}$ = 1.4 V, 0.5 V [a]	Temp. [b]	Typ. [c]	-40 °C to 125 °C		-40 °C to 85 °C		Unit
					Min. [d]	Max. [d]	Min. [d]	Max. [d]	
Analog Switch									
Analog Signal Range [e]	V_{ANALOG}		Full	-	-	3	-	3	V
On-Resistance	$R_{DS(on)}$	I_S = 1 mA, V_D = +1.5 V	Room	200	-	245	-	245	Ω
			Full	-	-	325	-	290	
On-Resistance Match	ΔR_{on}		Room	5	-	6	-	6	
			Full	-	-	13	-	11	
Switch Off Leakage Current (for 16 pin miniQFN)	$I_{S(off)}$	V+ = 3.3 V, V- = 0 V V_D = 1 V/3 V, V_S = 3 V/1 V	Room	± 0.01	-1	1	-1	1	nA
			Full	-	-18	18	-2	2	
	$I_{D(off)}$		Room	± 0.01	-1	1	-1	1	
			Full	-	-18	18	-2	2	
Channel On Leakage Current (for 16 pin miniQFN)	$I_{D(on)}$	V+ = 3.3 V, V- = 0 V, V_S = V_D = 1 V/3 V	Room	± 0.01	-1	1	-1	1	
			Full	-	-18	18	-2	2	
Digital Control									
Input Current, V_{IN} Low	I_L	V_{AX} = 0.5 V	Full	0.005	-0.1	0.1	-0.1	0.1	μA
Input Current, V_{IN} High	I_H	V_{AX} = 1.4 V	Full	0.005	-0.1	0.1	-0.1	0.1	
Input Capacitance	C_{IN}	f = 1 MHz	Room	3.1	-	-	-	-	pF

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SPECIFICATIONS

Parameter	Symbol	Test Conditions Unless Otherwise Specified V+ = 3 V, $V_{A0, A1}$ = 1.4 V, 0.5 V [a]	Temp.[b]	Typ. [c]	-40 °C to 125 °C		-40 °C to 85 °C		Unit
					Min. [d]	Max. [d]	Min. [d]	Max. [d]	
Dynamic Characteristics									
Enable Turn-On Time	t_{on}	R_L = 300 Ω, C_L = 35 pF see figure 1, 2	Room	96	-	-	-	-	ns
			Full	-	-	-	-	-	
Enable Turn-Off Time	t_{off}		Room	60	-	-	-	-	
			Full	-	-	-	-	-	
Break-Before-Make-Time	t_{BMM}		Room	77	-	-	-	-	
			Full	-	-	-	-	-	
Charge Injection [e]	Q_{INJ}	C_L = 1 nF, R_{GEN} = 0 Ω, V_{GEN} = 0 V	Full	6.6	-	-	-	-	pC
Off-Isolation [e]	OIRR	f = 10 MHz, R_L = 50 Ω, C_L = 5 pF	Room	-57	-	-	-	-	dB
Crosstalk [e]	X_{TALK}		Room	-69	-	-	-	-	
Bandwidth [e]	BW	R_L = 50 Ω	Room	525	-	-	-	-	MHz
Total Harmonic Distortion [e]	THD	Signal = 1 V_{RMS}, 20 Hz to 20 kHz, R_L = 600 Ω	Room	2.2	-	-	-	-	%
Source Off Capacitance [e]	$C_{S(off)}$	f = 1 MHz	Room	2.1	-	-	-	-	pF
Channel On Capacitance [e]	$C_{D(on)}$			8.3	-	-	-	-	
Power Supplies									
Power Supply Current	I+	V_{IN} = 0 V, or V+	Room	0.001	-	0.5	-	0.5	µA
			Full	-	-	1	-	1	
Ground Current	I_{GND}		Room	-0.001	-0.5	-	-0.5	-	
			Full	-	-1	-	-1	-	

Notes

a. V_{IN} = input voltage to perform proper function.
b. Room = 25 ºC, Full = as determined by the operating temperature.
c. Typical value are for DESIGN AID ONLY, not guaranteed nor subject to production testing.
d. The algebraic convention whereby the most negative value is a minimum and the most positive a maximum, is used in this datasheet.
e. Guaranteed by design, not subject to production test.

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.
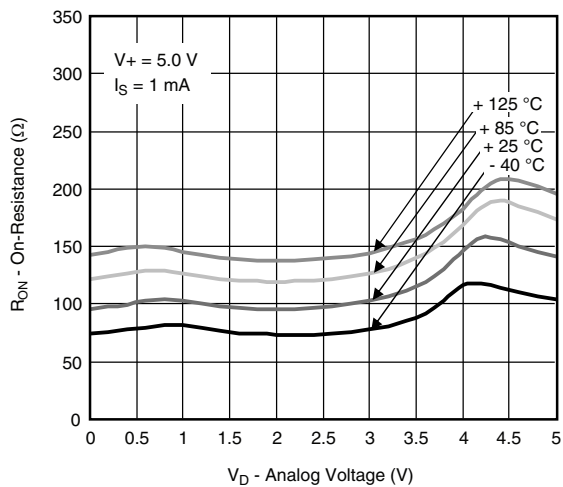
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TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)
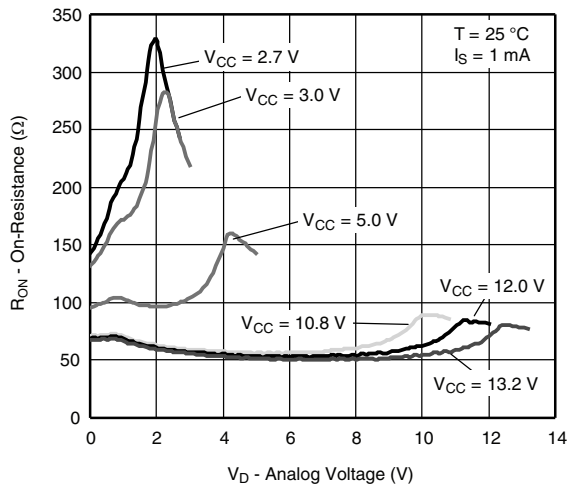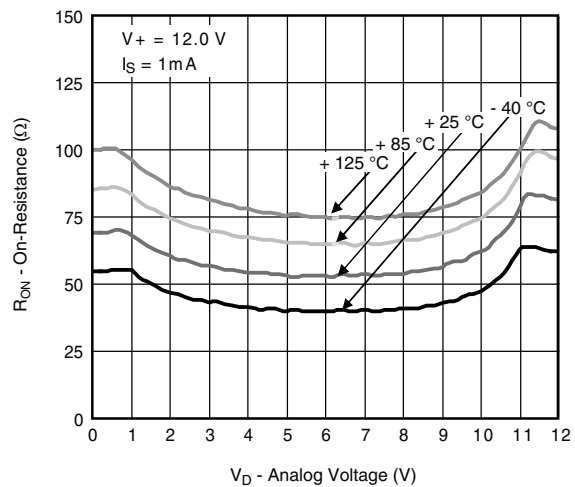

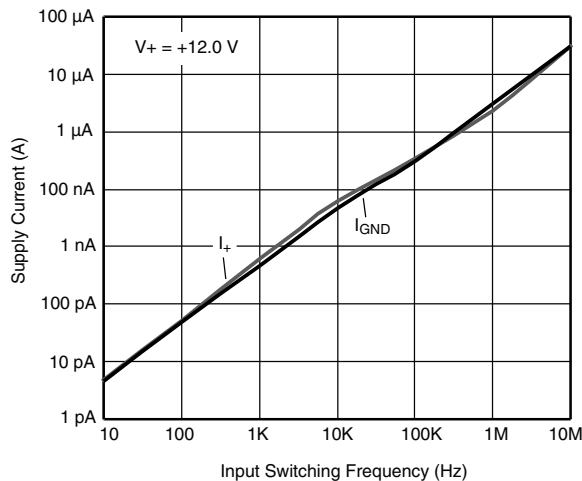
On-Resistance vs. Single Supply Voltage
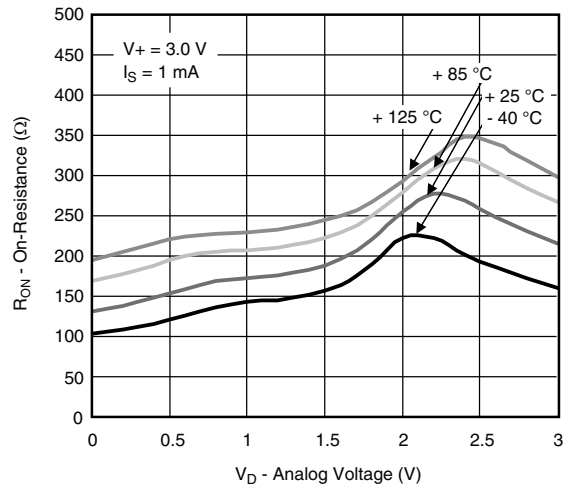
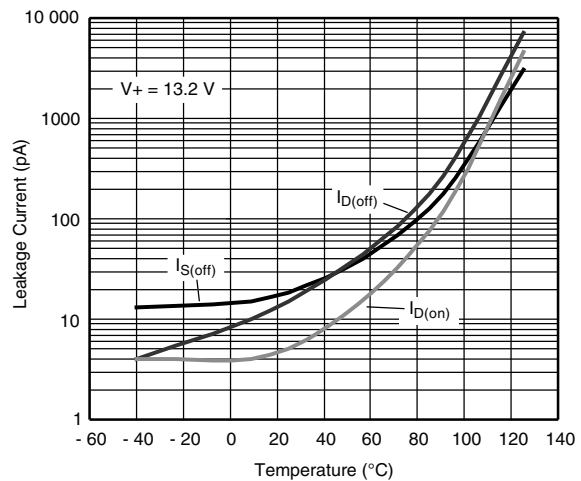**On-Resistance vs. Analog Voltage and Temperature**
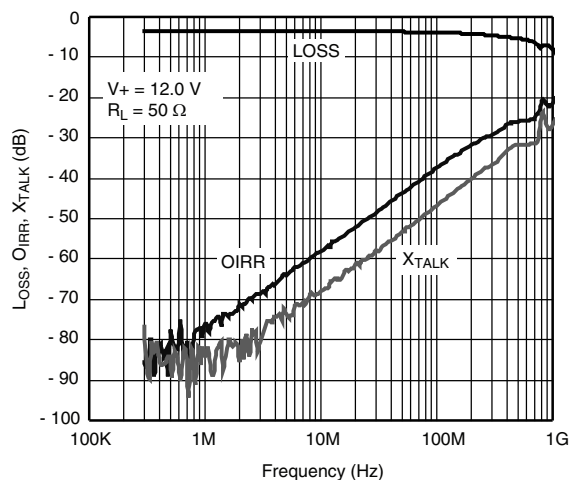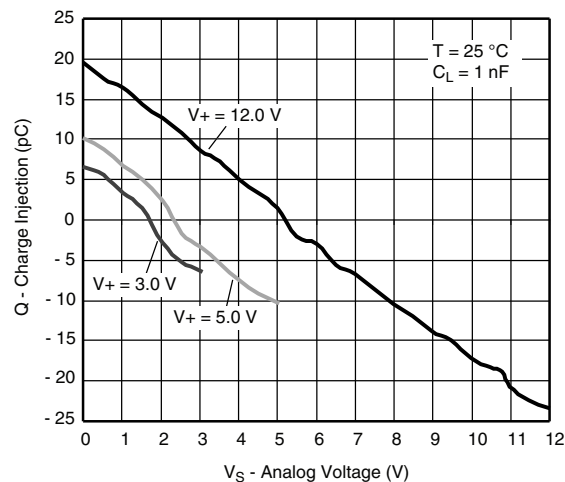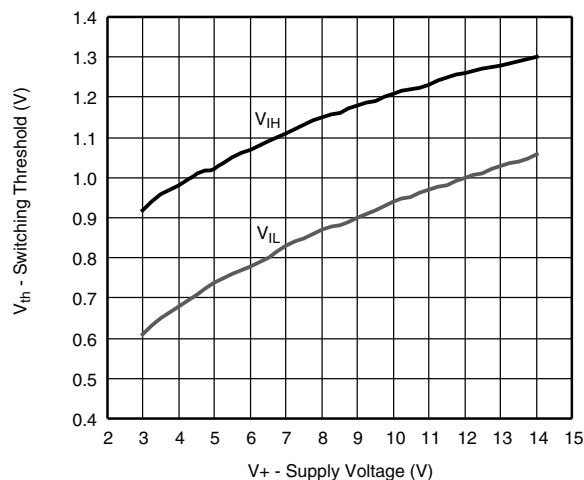

On-Resistance vs. Analog Voltage and Temperature

On-Resistance vs. Analog Voltage and Temperature

Supply Current vs. Input Switching Frequency

Leakage Current vs. Temperature

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Insertion Loss, Off-Isolation,
Crosstalk vs. Frequency

Charge Injection vs. Analog voltage

Switching Threshold vs. Supply Voltage

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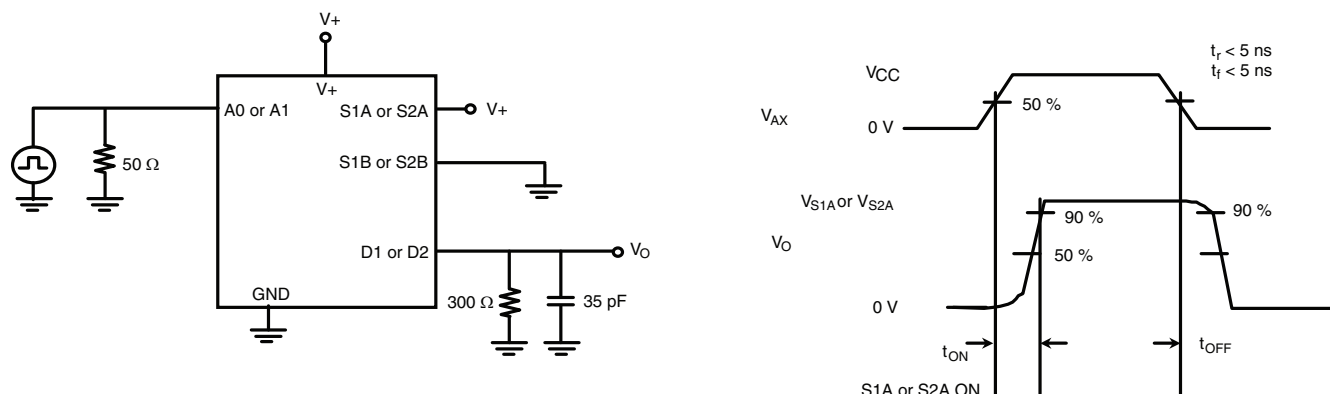
TEST CIRCUITS

Figure 1. Enable Switching Time
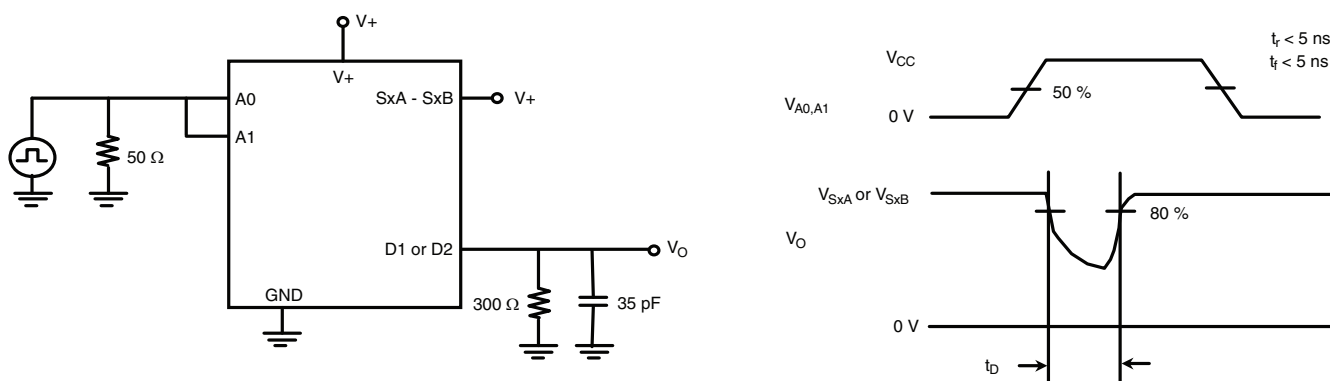
Figure 2. Break-Before-Make
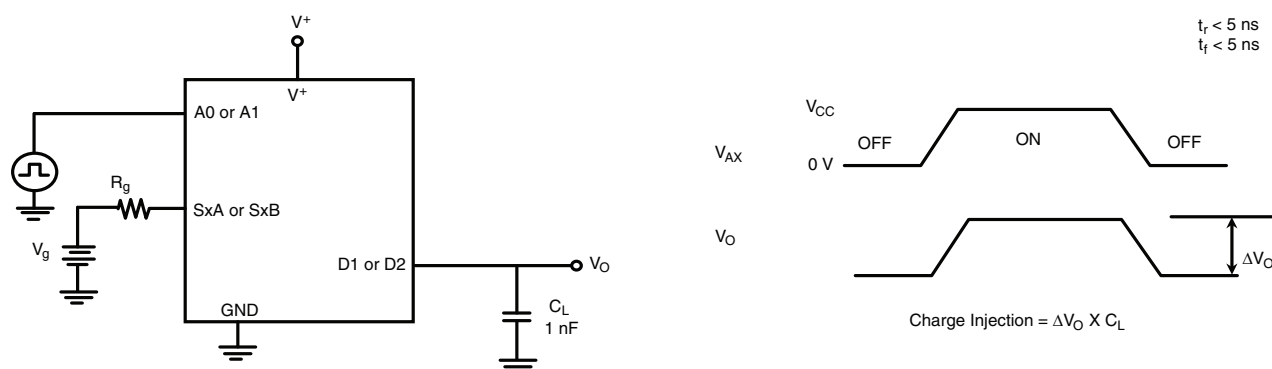
Figure 3. Charge Injection

TEST CIRCUITS

$$\text{Insertion Loss} = 20 \log \frac{V_{OUT}}{V_{IN}}$$

Figure 4. Insertion Loss

$$\text{Off Isolation} = 20 \log \frac{V_{OUT}}{V_{IN}}$$
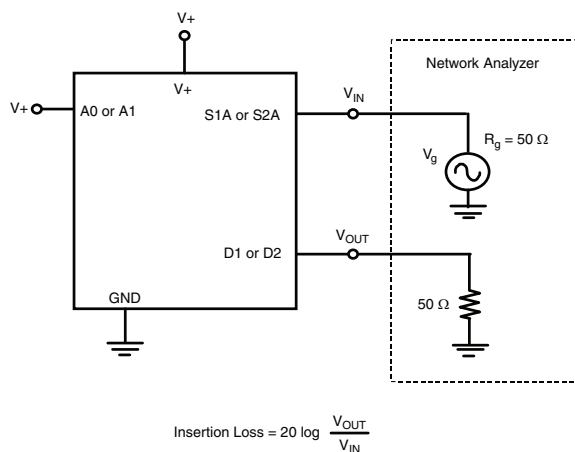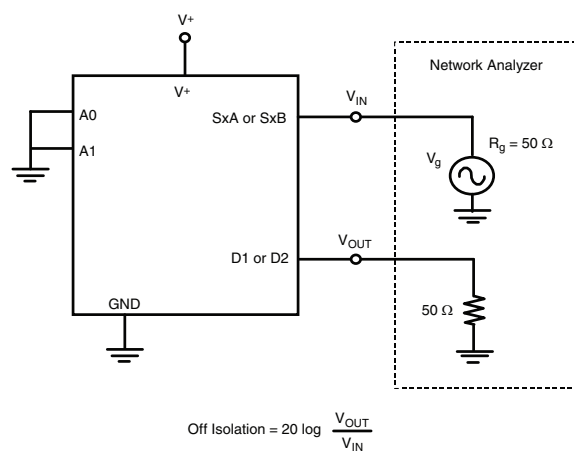
Figure 5. Off-Isolation

$$\text{Cross Talk} = 20 \log \frac{V_{OUT}}{V_{IN}}$$
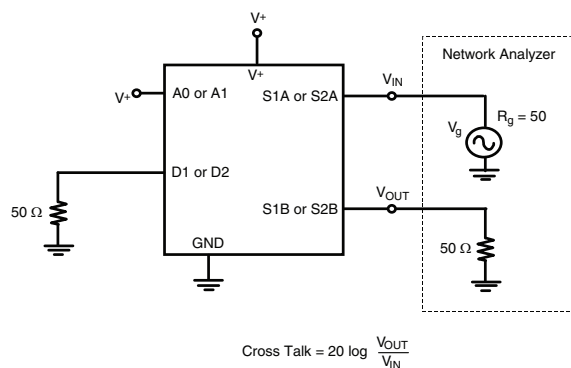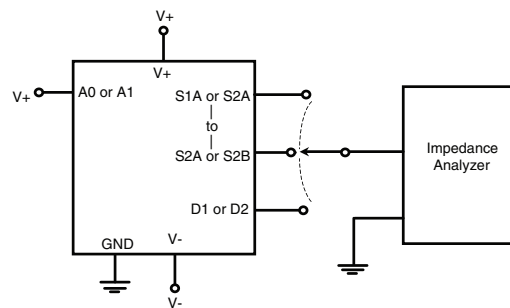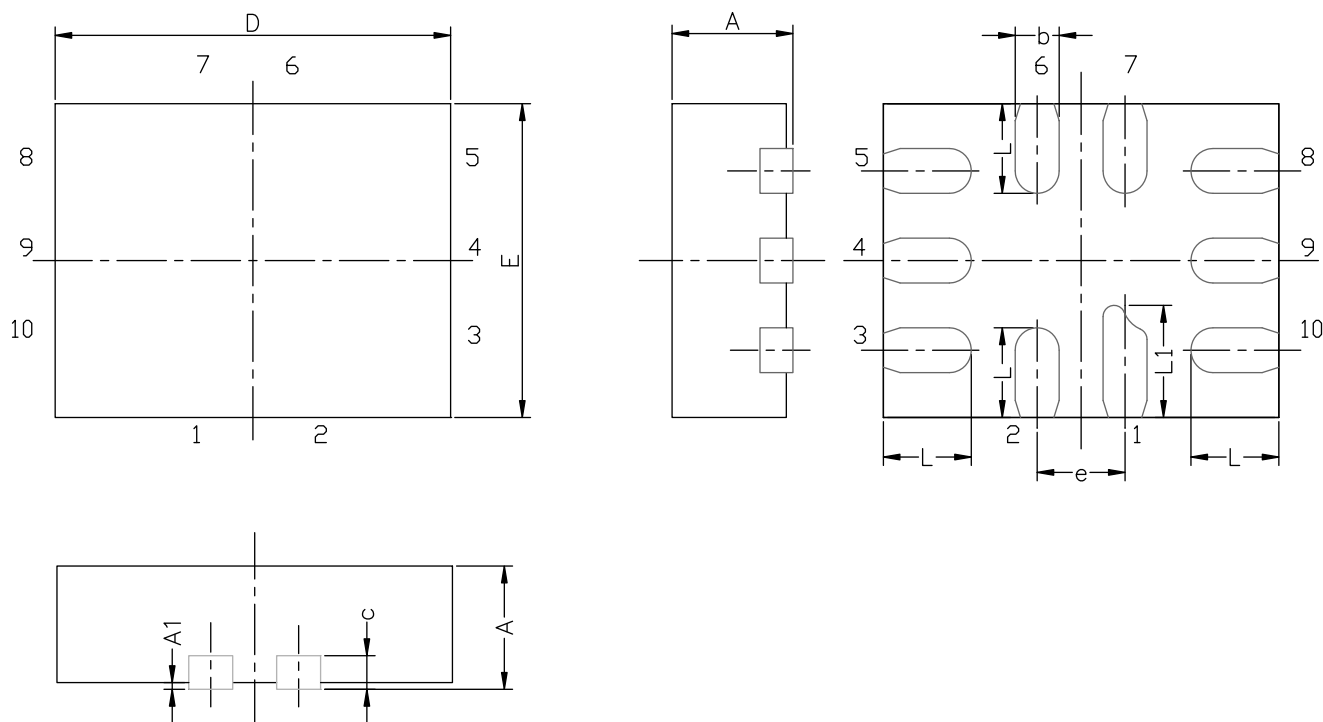
Figure 6. Crosstalk

Figure 7. Source/Drain Capacitance

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MINI QFN-10L CASE OUTLINE

DIM	MILLIMETERS			INCHES		
	MIN.	NAM.	MAX.	MIN.	NAM.	MAX.
A	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
c	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
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

Note

[1] The dimension depends on the leadframe that assembly house used.

ECN T16-0163-Rev. B, 16-May-16
DWG: 5957

RECOMMENDED MINIMUM PADS FOR MINI QFN 10L
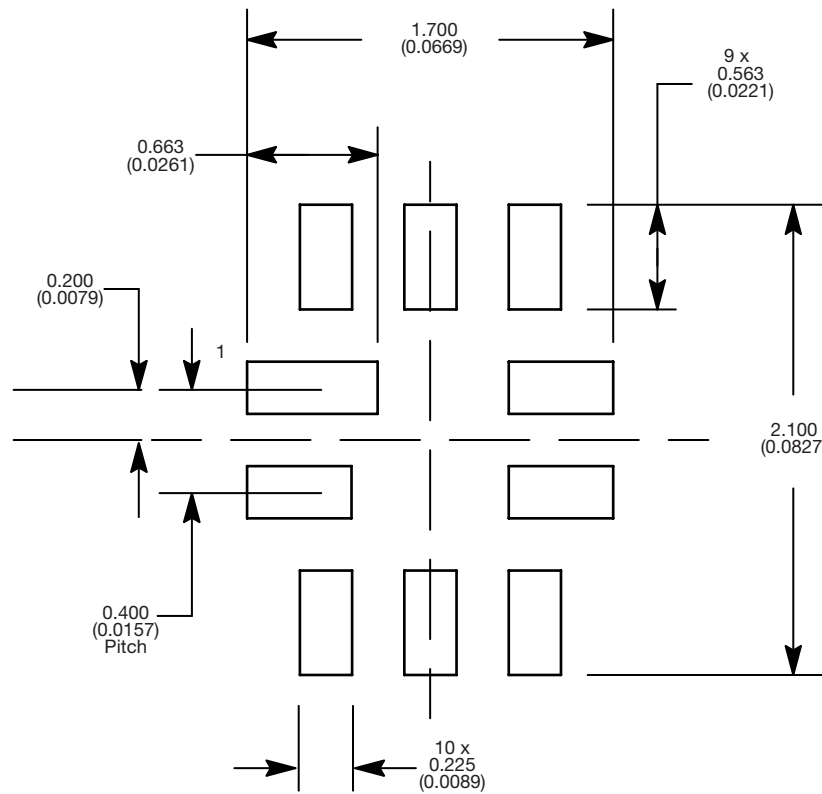
Mounting Footprint
Dimensions in mm (inch)

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