4-Channel/8-Channel Fault-Protected Analog Multiplexers

ADG508F/ADG509F 4” to 8” Transfer Evaluation Report

ADG508F/ADG509F 4” TO 8” TRANSFER EVALUATION SUMMARY

This document highlights the performance differences between the 4” and 8” Transfer for the ADG508F and ADG509F Fault Protected Analog Multiplexers.

There was no significant specification changes due to this transfer but some subtle changes are covered in this document. Latch-up, ESD classification, Power supply sequencing and Absolute maximum ratings evaluation were carried out without any issue.

This document is divided into 3 sections:

1. Datasheet specification changes from 4” to 8” process transfer

   Table 1 outlines a datasheet specification comparison of 4” and 8” material.

2. ABSOLUTE MAXIMUM RATINGS

   Tables 2 & 3 outline a comparison of the absolute maximum ratings between 4” and 8” processes.

3. TYPICAL PERFORMANCE CHARACTERISTICS

   The TYPICAL PERFORMANCE CHARACTERISTICS section (Figures 1 to 24) compares typical plots of 4” and 8” material

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SPECIFICATION CHANGES FROM 4” TO 8” PROCESS TRANSFER

DUAL SUPPLY

V_{DD} = +15 V ± 10%, V_{SS} = −15 V ± 10%, GND = 0 V, unless otherwise noted.

Table 1.

Parameter	4” Version +25°C	4” Version −40°C to +85°C	8” Version +25°C	8” Version −40°C to +85°C	Unit	Test Conditions/Comments
ANALOG SWITCH						
Analog Signal Range		V_{SS} + 3	V_{SS} + 1.4		V typ	Output open circuit
		V_{DD} − 1.5	V_{DD} − 1.4		V typ	
			V_{SS} + 2.2		V typ	Output loaded, 1 mA
			V_{DD} − 2.2		V typ	
R_{ON}	300	350	270	350	Ω typ	−10 V ≤ V_S ≤ +10 V, I_S = 1 mA; V_{DD} = +15 V ± 10%, V_{SS} = −15 V ± 10%
		400		390	Ω max	−10 V ≤ V_S ≤ +10 V, I_S = 1 mA; V_{DD} = +15 V ± 5%, V_{SS} = −15 V ± 5%
R_{ON} Drift	0.6		0.6		%/°C typ	V_S = 0 V, I_S = 1 mA
R_{ON} Match	5		2		% max	V_S = 0 V, I_S = 1 mA
LEAKAGE CURRENTS						
Source OFF Leakage I_S (OFF)	±0.02		±0.02		nA typ	V_D = ±10 V, V_S = ∓10 V;
	±1	±50	±1	±50	nA max	
Drain OFF Leakage I_D (OFF)	±0.04		±0.04		nA typ	V_D = ±10 V, V_S = ∓10 V;
ADG508F/ADG528F	±1	±60	±1	±60	nA max	
ADG509F	±1	±30	±1	±30	nA max	
Channel ON Leakage I_D, I_S (ON)	±0.04		±0.04		nA typ	V_S = V_D = ± 10 V;
ADG508F/ADG528F	±1	±60	±1	±60	nA max	
ADG509F	±1	±30	±1	±30	nA max	
FAULT						
Output Leakage Current	±0.02		±0.02		nA typ	V_S = ±33 V, V_D = 0 V,
(With Overvoltage)	±2	±2	±2	±2	μA max	
Input Leakage Current	±0.005		±0.005		μA typ	V_S = ±25 V, V_D = ∓10 V,
(With Overvoltage)	±2		±2		μA max	
Input Leakage Current	±0.001		±0.001		μA typ	V_S = ±25 V, V_D = V_{EN} = A0, A1, A2 = 0 V
(With Power Supplies OFF)	±2		±2		μA max	
DIGITAL INPUTS						
Input High Voltage, V_{INH}		2.4		2.0	V min	
Input Low Voltage, V_{INL}		0.8		0.8	V max	
Input Current, I_{INL} or I_{INH}		±1		±1	μA max	V_{IN} = 0 or V_{DD}
C_{IN}, Digital Input Capacitance	5		5		pF typ	
DYNAMIC CHARACTERISTICS[1]						
$t_{TRANSITION}$	200		175		ns typ	R_L = 1 MΩ, C_L = 35 pF;
	300	400	220	300	ns max	V_{S1} = ±10 V, V_{S8} = ∓10 V;
t_{OPEN}	50		90		ns typ	R_L = 1 kΩ, C_L = 35 pF;
	25	10	60	40	ns min	V_S = 5 V;
t_{ON} (EN)	200		180		ns typ	R_L = 1 kΩ, C_L = 35 pF;
	250	400	230	300	ns max	V_S = 5 V;
t_{OFF} (EN)	200		100		ns typ	R_L = 1 kΩ, C_L = 35 pF;

Parameter	4" Version +25°C	4" Version −40°C to +85°C	8" Version +25°C	8" Version −40°C to +85°C	Unit	Test Conditions/Comments
	250	400	130	150	ns max	V_S = 5 V;
t_{SETT}, Settling Time						
0.1%		1		1	µs typ	R_L = 1 kΩ, C_L = 35 pF;
0.01%		2.5		2.5	µs typ	V_S = 5 V
Charge Injection	4		15		pC typ	V_S = 0 V, R_S = 0 Ω,C_L= 1 nF;
OFF Isolation	68		93		dB typ	R_L = 1 kΩ, C_L = 15 pF, f = 100 kHz;
	50					V_S = 7 V rms;
C_S (OFF)	5		3		pF typ	
C_D (OFF)						
ADG508F/ADG528F	50		22		pF typ	
ADG509F	25		12		pF typ	
POWER REQUIREMENTS						
I_{DD}	0.1	0.2	0.05	0.2	mA max	V_{IN} = 0 V or 5 V
I_{SS}	0.1	0.1	0.1	1	uA max	

[1] Guaranteed by design, not subject to production test.

ABSOLUTE MAXIMUM RATINGS

4” Material

T_A = +25°C unless otherwise noted.

Table 2.

Parameter	Rating
V_{DD} to V_{SS}	44 V
V_{DD} to GND	−0.3 V to +25 V
V_{SS} to GND	+0.3 V to −25 V
Digital Input, EN, Ax	−0.3 V to V_{DD} + 2 V or 20 mA, whichever occurs first
V_S, Analog Input Overvoltage with Power On	V_{SS} − 25 V to V_{DD} + 40 V
V_S, Analog Input Overvoltage with Power Off	−40 V to +55 V
Continuous Current, S or D	20 mA
Peak Current, S or D	
(Pulsed at 1 ms, 10% Duty Cycle Max)	40 mA
Operating Temperature Range	
Industrial (B Version)	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C
Junction Temperature	150°C
TSSOP	
$θ_{JA}$, Thermal Impedance	112°C/W
Plastic Package	
$θ_{JA}$, Thermal Impedance	
16-Lead	117°C/W
18-Lead	110°C/W
Lead Temperature, Soldering (10 sec)	260°C
SOIC Package	
$θ_{JA}$, Thermal Impedance	
Narrow Body	77°C/W
Wide Body	75°C/W
Lead Temperature, Soldering	
Vapor Phase (60 sec)	215°C
Infrared (15 sec)	220°C
PLCC Package	
$θ_{JA}$, Thermal Impedance	90°C/W
Lead Temperature, Soldering	
Vapor Phase (60 sec)	215°C
Infrared (15 sec)	220°C

8” Material

T_A = +25°C unless otherwise noted.

Table 3.

Parameter	Rating
V_{DD} to V_{SS}	48 V
V_{DD} to GND	−0.3 V to +48 V
V_{SS} to GND	+0.3 V to −48 V
Digital Input, EN, Ax	−0.3 V to V_{DD} + 2 V or 20 mA, whichever occurs first
V_S, Analog Input Overvoltage with Power On	V_{SS} − 25 V to V_{DD} + 40 V
V_S, Analog Input Overvoltage with Power Off	−40 V to +55 V
Continuous Current, S or D	20 mA
Peak Current, S or D	
(Pulsed at 1 ms, 10% Duty Cycle Max)	40 mA
Operating Temperature Range	
Industrial (B Version)	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C
Junction Temperature	150°C
TSSOP	
$θ_{JA}$, Thermal Impedance	112°C/W
Plastic Package	
$θ_{JA}$, Thermal Impedance	
16-Lead	117°C/W
18-Lead	110°C/W
Lead Temperature, Soldering (10 sec)	260°C
SOIC Package	
$θ_{JA}$, Thermal Impedance	
Narrow Body	77°C/W
Wide Body	75°C/W
Lead Temperature, Soldering	
Vapor Phase (60 sec)	215°C
Infrared (15 sec)	220°C
PLCC Package	
$θ_{JA}$, Thermal Impedance	90°C/W
Lead Temperature, Soldering	
Vapor Phase (60 sec)	215°C
Infrared (15 sec)	220°C

TYPICAL PERFORMANCE CHARACTERISTICS

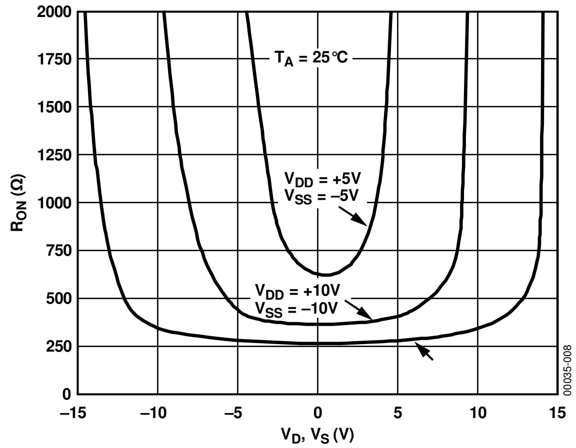

Figure 1. On Resistance as a Function of V_D (V_S) (4″ Material)

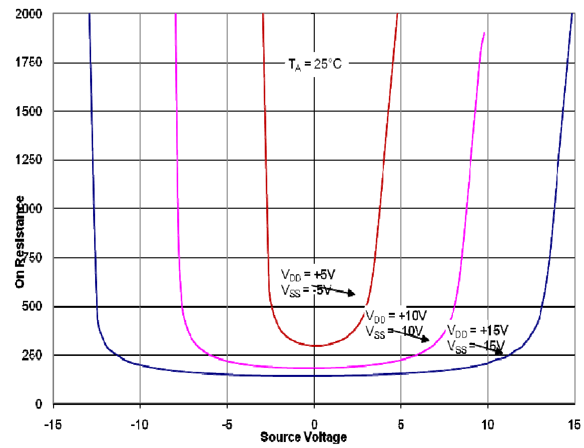

Figure 2. On Resistance as a Function of V_D (V_S) (8″ Material)

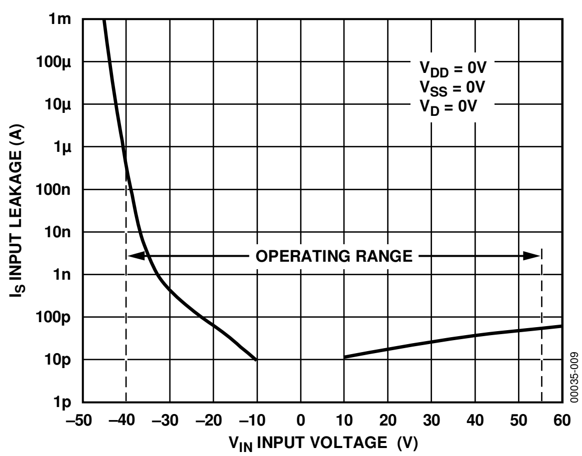

Figure 3. Input Leakage Current as a Function of V_S (Power Supplies Off) During Overvoltage Conditions (4″ Material)

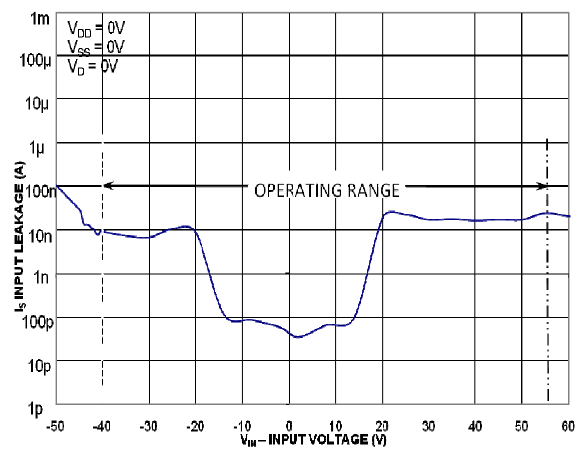

Figure 4. Input Leakage Current as a Function of V_S (Power Supplies Off) During Overvoltage Conditions (8″ Material)

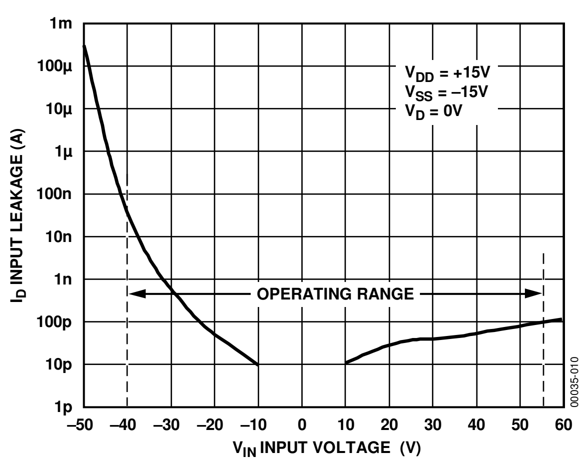

Figure 5. Output Leakage Current as a Function of V_S (Power Supplies On) During Overvoltage Conditions (4″ Material)

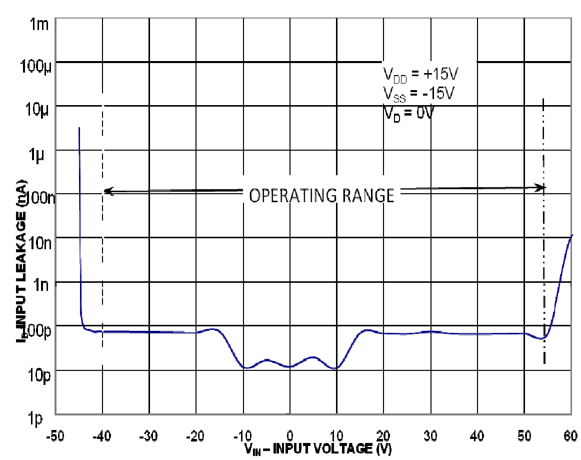

Figure 6. Output Leakage Current as a Function of V_S (Power Supplies On) During Overvoltage Conditions (8″ Material)

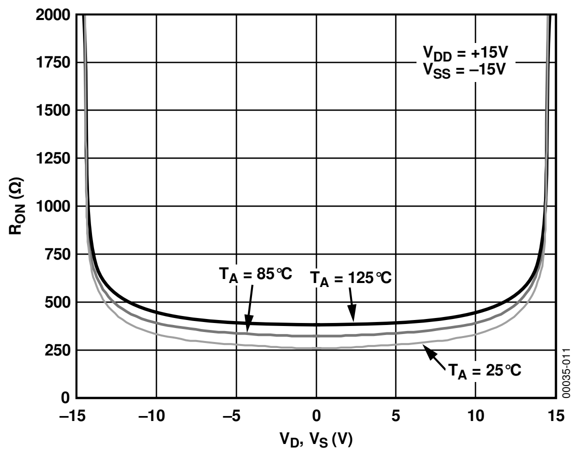

Figure 7. On Resistance as a Function of V_D (V_S) for Different Temperatures (4″ Material)

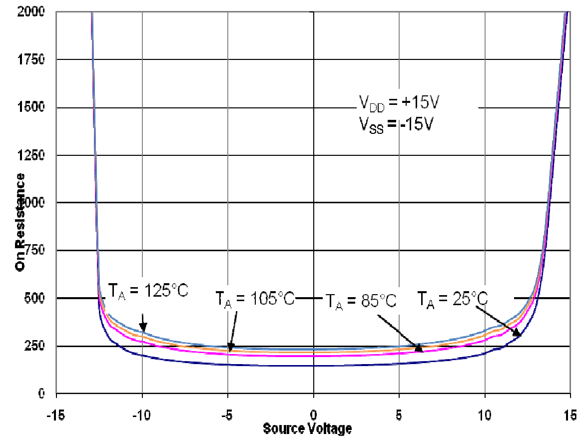

Figure 8. On Resistance as a Function of V_D (V_S) for Different Temperatures (8″ Material)

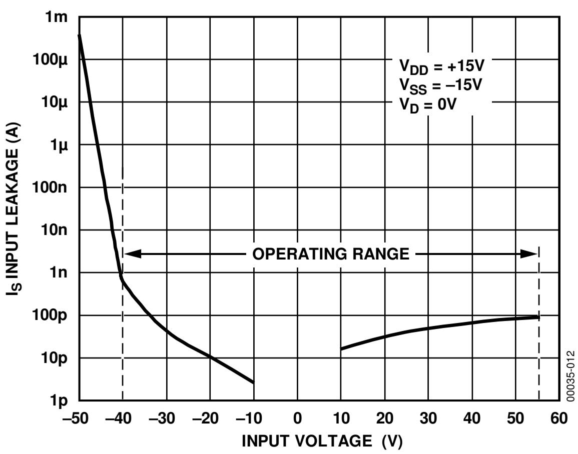

Figure 9. Input Leakage Current as a Function of V_S (Power Supplies On) During Overvoltage Conditions (4″ Material)

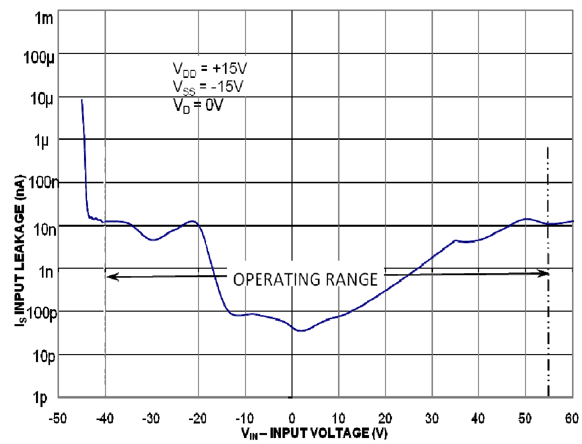

Figure 10. Input Leakage Current as a Function of V_S (Power Supplies On) During Overvoltage Conditions (8″ Material)

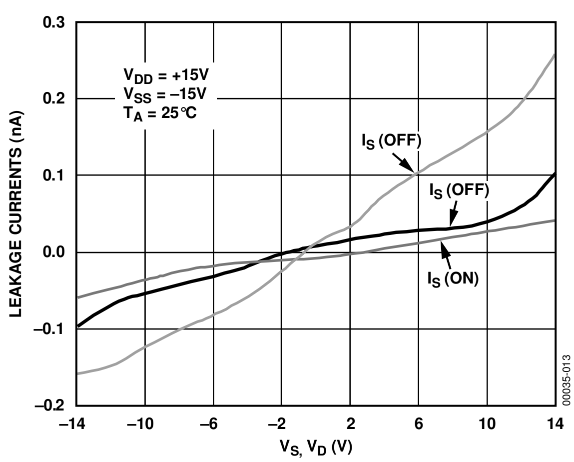

Figure 11. Leakage Currents as a Function of V_D (V_S) (4″ Material)

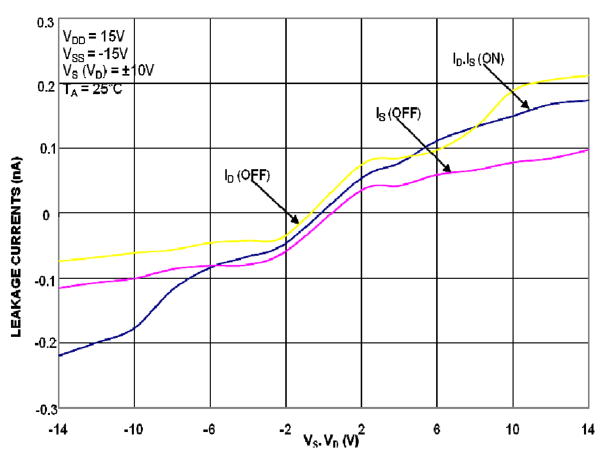

Figure 12. Leakage Currents as a Function of V_D (V_S) (8″ Material)

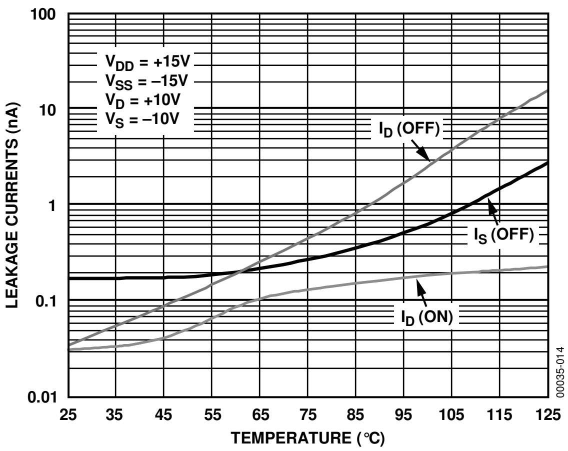

Figure 13. Leakage Currents as a Function of Temperature (4" Material)

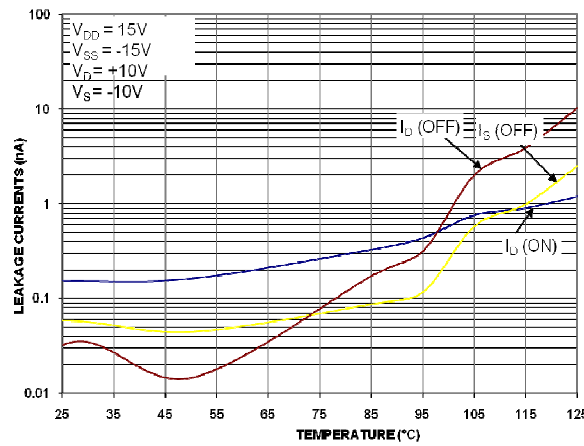

Figure 14. Leakage Currents as a Function of Temperature (8" Material)

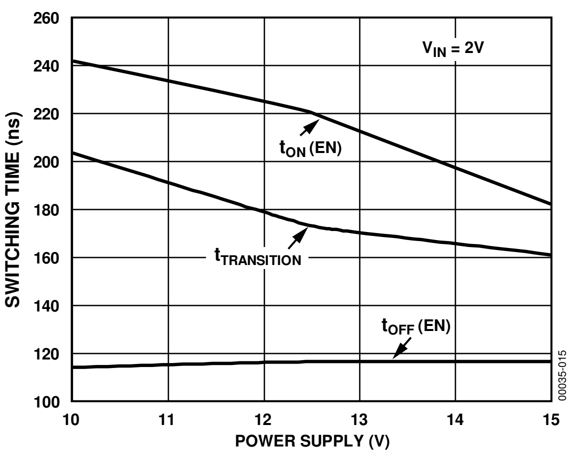

Figure 15. Switching Time vs. Dual Power Supply (4" Material)

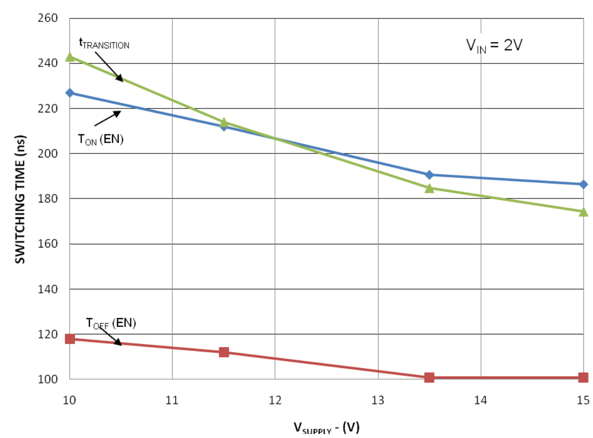

Figure 16. Switching Time vs. Dual Power Supply (8" Material)

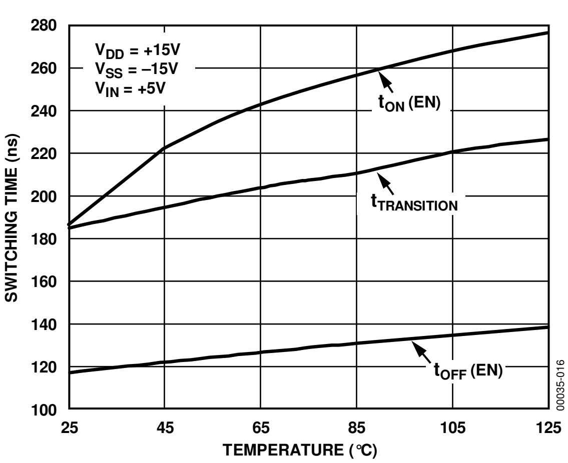

Figure 17. Switching Time vs. Temperature (4" Material)

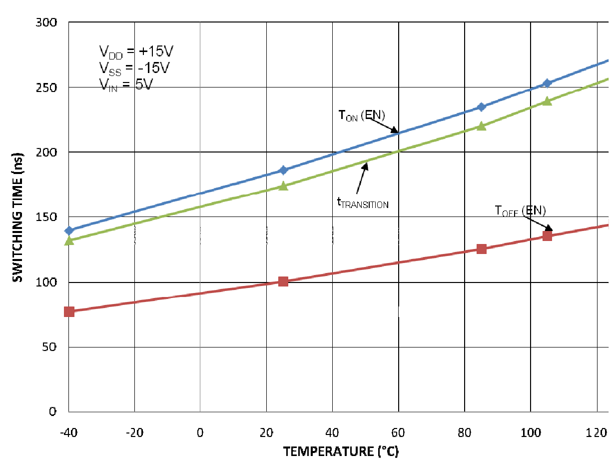

Figure 18. Switching Time vs. Temperature (8" Material)

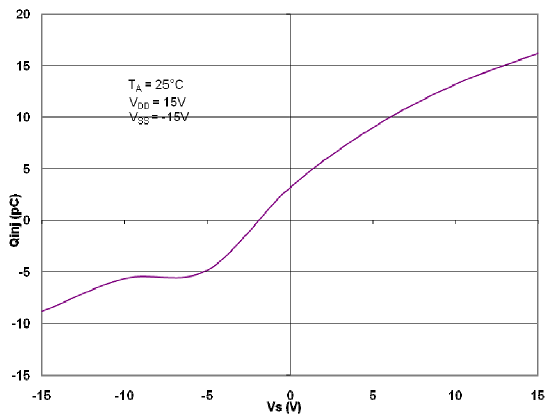

Figure 19. Charge injection (4" Material)

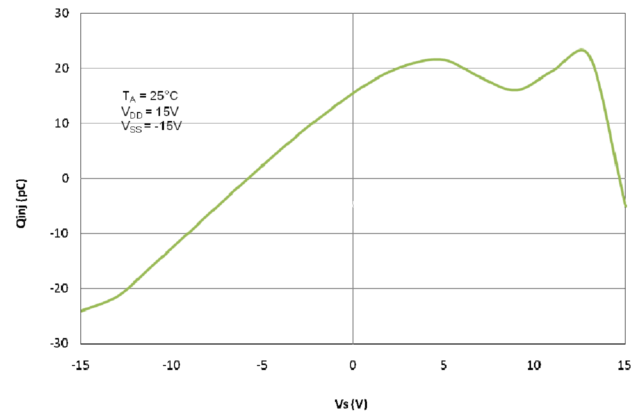

Figure 20. Charge Injection (8" Material)

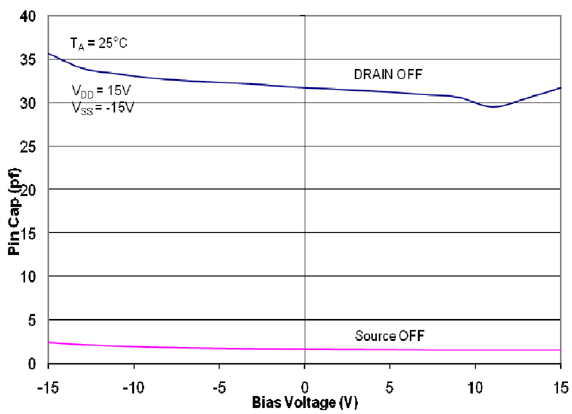

Figure 21. Capacitance Vs Source voltage (4" Material)

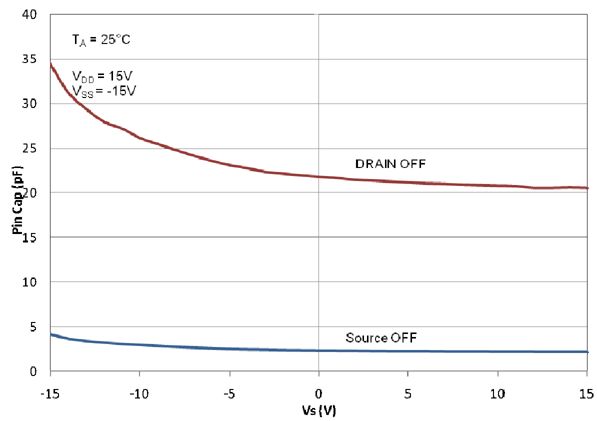

Figure 22. Capacitance Vs Source voltage (8" Material)

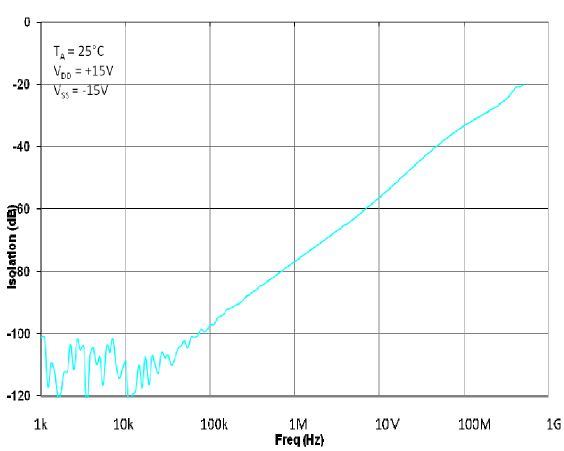

Figure 23. Off Isolation vs. Frequency (4" Material)

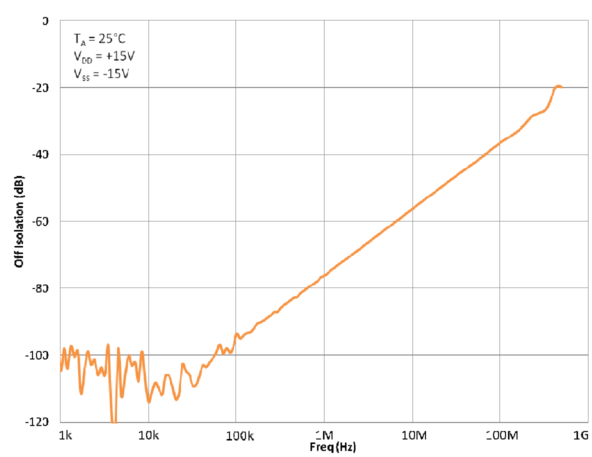

Figure 24. Off Isolation vs. Frequency (8" Material)