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April 2014

FSA1259A

Low-Voltage, 1 Ω Dual SPST Analog Switch with Power-Off Isolation

Features

- Power-Off Isolation (V_{CC}=0 V)
- 1 Ω On Resistance (R_{ON}) for 4.5V V_{CC}
- 0.25 Ω Maximum R_{ON} Flatness for 4.5 V V_{CC}
- Space-Saving, US8 Surface Mount Package
- Broad V_{CC} Operating Range: 1.65 V to 5.50 V
- Fast Turn-On and Turn-Off Times
- Break-Before-Make Enable Circuitry

Applications

- Cellular Phone
- Portable Media Player
- PDA

Description

The FSA1259A is a high-performance, dual, Single-Pole / Single-Throw (SPST) analog switch. The device features ultra-low R_{ON} of 1 Ω at 4.5 V V_{CC} and operates over the wide V_{CC} range of 1.65 V to 5.50 V.

The FS1259A allows for reduced input thresholds on the select pins.

The device is fabricated with sub-micron CMOS technology to achieve fast switching speeds and is designed for break-before-make operation.

Ordering Information

Part Number	Top Mark	Operating Temperature Range	Package	Packing Method
FSA1259AK8X	59A	-40°C to +85°C	8-Lead US8, JEDEC MO-187, Variation CA, 3.0 mm Wide	3000 Units Tape and Reel

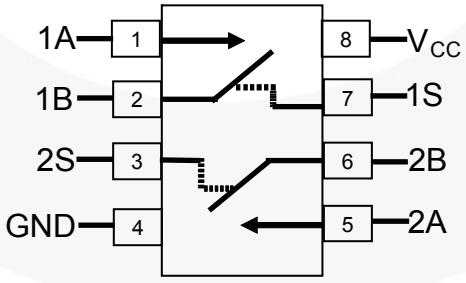


Figure 1. Analog Symbols

Pin Assignments

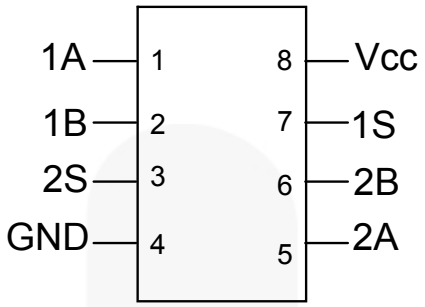


Figure 2. Pin Assignments (Top View)

Pin Definitions

Pin #	Name	Description
1	1A	Data Port
2	1B	Data Port
3	2S	Control Input
4	GND	Ground
5	2A	Data Port
6	2B	Data Port
7	1S	Control Input
8	V_{CC}	Supply Voltage

Truth Table

Control Input (S)	Function
LOW	Disconnected
HIGH	A Connected to B

Absolute Maximum Ratings

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	-0.5	7.0	V
V_{SW}	Switch Voltage[1]	-0.5	V_{CC} +-0.5	V
V_{IN}	Input Voltage[1]	-0.5	6.5	V
I_{IK}	Input Diode Current		-50	mA
I_{SW}	Switch Current (Continuous)		200	mA
I_{SWPEAK}	Peak Switch Current (Pulsed at 1 ms Duration, <10% Duty Cycle)		400	mA
P_D	Power Dissipation at 85°C		3.0	µW
T_{STG}	Storage Temperature Range	-65	+150	°C
T_J	Maximum Junction Temperature		+150	°C
T_L	Lead Temperature (Soldering, 10 seconds)		+260	°C
ESD	Human Body Model (JEDEC: JESD22-A114)		8000	V
	Charged Device Model (JEDEC: JESD22-C101)		2000	V
	Machine Model (JEDEC: JESD22-A115)		350	V

Note:
1. The input and output negative ratings may be exceeded if the input and output diode current ratings are observed.

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation. Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. Fairchild does not recommend exceeding them or designing to Absolute Maximum Ratings.

Symbol	Parameter	Min.	Max.	Unit
V_{CC}	Supply Voltage	1.65	5.50	V
A_{SEL}	Control Input Voltage[2]	0	V_{CC}	V
V_{SW}	Switch Input Voltage	0	V_{CC}	V
T_A	Operating Temperature	-40	+85	°C
θ_{JA}	Thermal Resistance, Still Air		215	°C/W

Note:
2. Control Input must be held HIGH or LOW; it must not float.

Electrical Characteristics

All typical values are at 25°C unless otherwise specified.

Symbol	Parameter	V_{CC} (V)	Conditions	T_A=+25°C			T_A=-40 to +85°C		Unit
				Min.	Typ.	Max.	Min.	Max.	
V_{IH}	Input Voltage High	4.50 to 5.50					1.0		V
		3.00 to 3.60					1.0		
		2.30 to 2.70					0.95		
		1.65 to 1.95					0.95		
V_{IL}	Input Voltage Low	4.50 to 5.50						0.75	V
		3.00 to 3.60						0.65	
		2.30 to 2.70						0.55	
		1.65 to 1.95						0.5	
I_{IN}	Control Input Leakage	5.50	V_{IN}=0 or V_{CC}	-10		10	-50	50	nA
		3.60	V_{IN}=0 or V_{CC}	-2		2	-20	20	
		2.70	V_{IN}=0 or V_{CC}	-2		2	-20	20	
		1.95	V_{IN}=0 or V_{CC}	-2		2	-20	20	
$I_{NO(0FF)}$	Off-Leakage Current	5.50	A=1 V, B=4.5V or B=4.5 V, A= 1V	-10		10	-50	50	nA
		3.60	A=1 V, B=3.0 V or B=3.0 V, A=1 V	-5		5	-50	50	
		2.70	A=0.5 V, B=2.3 V or B=2.3, A=0.5 V	-5		5	-50	50	
		1.95	A=0.3 V, B=1.65 V or B=1.65, A=0.3 V	-5		5	-50	50	
$I_{NO(On)}$	On-Leakage Current of Port B	5.50	A=Floating; B=4.5 V, 1 V	-5		5	-50	50	nA
		3.60	A=Floating; B=3.0 V, 1 V	-2		2	-20	20	
		2.70	A=Floating; B=2.3 V, 0.5 V	-2		2	-20	20	
		1.95	A=Floating; B=1.65 V, 0.3 V	-2		2	-20	20	
$I_{A(ON)}$	On-Leakage Current of Port A	5.50	A=1 V, 4.5 V; B=Floating	-5		5	-50	50	nA
		3.60	A=1 V, 3.0 V; B=Floating	-2		2	-20	20	
		2.70	A=0.5 V, 2.3; B=Floating	-2		2	-20	20	
		1.95	A=0.3 V, 1.65 V; B=Floating	-2		2	-20	20	
I_{OFF}	Power Off Leakage Current of Port A & Port B	0	A=0 to 5.5 V; B=0 to 5.5 V	-1		1	-10	10	µA

Electrical Characteristics (Continued)

All typical values are at 25°C unless otherwise specified.

Symbol	Parameter	V_{CC} (V)	Conditions	T_A=+25°C			T_A=-40 to +85°C		Unit
				Min.	Typ.	Max.	Min.	Max.	
R_{PEAK}	Peak On Resistance	4.50	I_{OUT}=-100 mA, 1B or 2B=0 to V_{CC}		0.8	1.0		1.2	Ω
		3.00	I_{OUT}=-100 mA, 1B or 2B=0 to V_{CC}		1.0	1.5		1.8	
		2.30	I_{OUT}=-8 mA, 1B or 2B=0 to V_{CC}		1.5	2.0		2.5	
		1.65	I_{OUT}=-2 mA, 1B or 2B=0 to V_{CC}, T_A=25, 85°C		5.0	12.0		15.0	
			I_{OUT}=-2 mA, 1B or 2B=0 to V_{CC}, T_A=-40°C		20.0				
R_{ON}	Switch On Resistance(3)	4.50	I_{OUT}=-100 mA, 1B or 2B=2.5 V		0.70	0.85		1.00	Ω
		3.00	I_{OUT}=-100 mA, 1B or 2B=2.0 V		0.9	1.3		1.6	
		2.30	I_{OUT}=-8 mA, 1B or 2B=1.8V		1.4	2.0		2.4	
		1.65	I_{OUT}=-2 mA, 1B or 2B=1.5 V		2.0	2.5		3.5	
ΔR_{ON}	On Resistance Matching Between Channels(4)	4.50	I_{OUT}=-100 mA, 1B or 2B=2.5 V		0.05	0.10		0.10	Ω
		3.00	I_{OUT}=-100 mA, 1B or 2B=2.0 V		0.10	0.15		0.15	
		2.30	I=-8 mA, 1B or 2B=1.8 V		0.15	0.20		0.20	
		1.65	I_{OUT}=-2 mA 1B or 2B=1.5 V		0.15	0.40		0.40	
$R_{FLAT(ON)}$	On Resistance Flatness(5)	4.50	I_{OUT}=-100 mA, 1B or 2B=1.0 V, 1.5 V, 2.5 V		0.10	0.25		0.25	Ω
		3.00	I_{OUT}=-100 mA, 1B or 2B=0.8 V, 2.0 V		0.1	0.3		0.3	
		2.30	I_{OUT}=-8 mA, 1B or 2B=0.8 V, 1.8 V		0.2	1.0		1.0	
		1.65	I_{OUT}=-2 mA, 1B or 2B=0.6 V, 1.5 V		1.5				
I_{CC}	Quiescent Supply Current	5.50	V_{IN}=0 or V_{CC}, I_{OUT}=0		5	50		500	nA
		3.60	V_{IN}=0 or V_{CC}, I_{OUT}=0		1	25		300	
		2.70	V_{IN}=0 or V_{CC}, I_{OUT}=0		1	20		250	
		1.95	V_{IN}=0 or V_{CC}, I_{OUT}=0		1	15		150	
I_{CCT}	Increase in I_{CC} per Control Input	4.5 to 5.5	Asel=1.8 V		25			40	µA

Notes:

3. On resistance is determined by the voltage drop between the A and B pins at the indicated current through the switch.
4. $\Delta R_{ON}=R_{ON}$ maximum – R_{ON} minimum; measured at identical V_{CC}, temperature, and voltage.
5. Flatness is defined as the difference between the maximum and minimum value of on resistance over the specified range of conditions.

AC Electrical Characteristics

All typical values are at V_{CC}=1.8 V, 2.5 V, 3.0 V, 5.0 V at 25°C unless otherwise specified.

Symbol	Parameter	V_{CC} (V)	Conditions	T_A=+25°C			T_A=-40 to +85°C		Unit	Figure
				Min.	Typ.	Max.	Min.	Max.		
t_{ON}	Turn-On Time	4.50 to 5.50	1B or 2 B=V_{CC}, R_L=50 Ω, C_L=35 pF	1.0	4.0	7.5	1.0	9.0	ns	Figure 11
		3.00 to 3.60		1.5	6.0	9.5	1.0	10.0		
		2.30 to 2.70		2.0	8.0	10.0	1.0	12.0		
		1.65 to 1.95		3.0	14.0	18.0	1.0	20.0		
t_{OFF}	Turn-Off Time	4.50 to 5.50	1B or 2B=V_{CC}, R_L=50 Ω, C_L=35 pF	4.5	13.0	17.0	3.5	20.0	ns	Figure 11
		3.00 to 3.60		4.5	13.5	17.0	3.0	20.0		
		2.30 to 2.70		4.5	16.0	20.0	3.0	23.0		
		1.65 to 1.95		5.0	24.0	33.0	4.0	36.0		
Q	Charge Injection	4.50 to 5.50	C_L=1.0 nF, V_{GEN}=0 V, R_{GEN}=0 Ω		15				pC	Figure 13
		3.00 to 3.60			11					
		2.30 to 2.70			8					
		1.65 to 1.95			6					
OIRR	Off-Isolation	1.8 to 5.0	f=1 MHz, R_L=50 Ω		-60				dB	Figure 12
Xtalk	Crosstalk	1.8 to 5.0	f=1 MHz, R_L=50 Ω		-73				dB	Figure 12
BW	-3 db Bandwidth	4.50 to 5.50	R_L=50 Ω		240				MHz	Figure 15
		3.00 to 3.60			240					
		2.30 to 2.70			240					
		1.65 to 1.95			240					
THD	Total Harmonic Distortion	1.8	R_L=600 Ω, V_{IN}=0.5 V_{PP}, f=20 Hz to 20 kHz		.003				%	Figure 16
		5.0			.001					Figure 16

Capacitance

Symbol	Parameter	V_{CC} (V)	Conditions	T_A=+25°C			Unit
				Min.	Typ.	Max.	
C_{IN}	Control Pin Input Capacitance	0	f=1 MHz Figure 14		3		pF
C_{OFF}	B Port Off Capacitance	1.65 to 5.50	f=1 MHz Figure 14		21		pF
C_{ON}	A Port On Capacitance	1.65 to 5.50	f=1 MHz Figure 14		47		pF

Typical Performance Characteristics

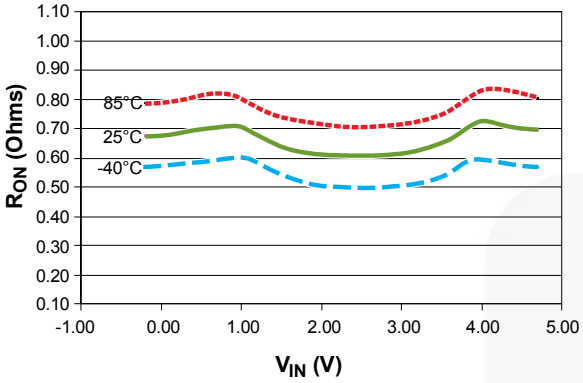


Figure 3. On Resistance (V_{CC}=4.5 V)

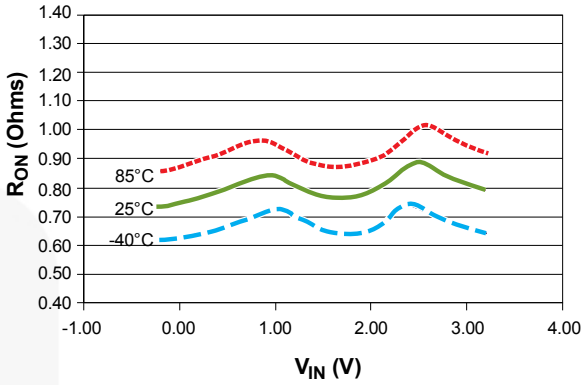


Figure 4. On Resistance (V_{CC}=3.0 V)

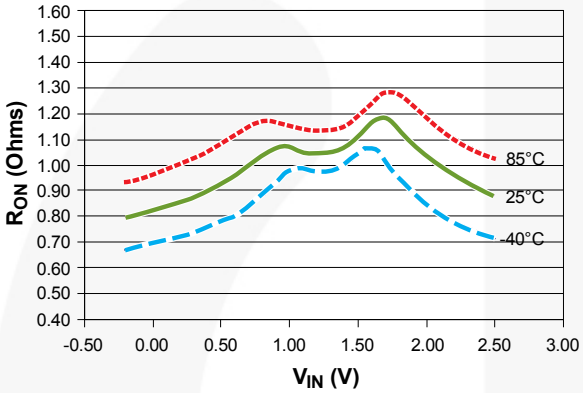


Figure 5. On Resistance (V_{CC}=2.3 V)

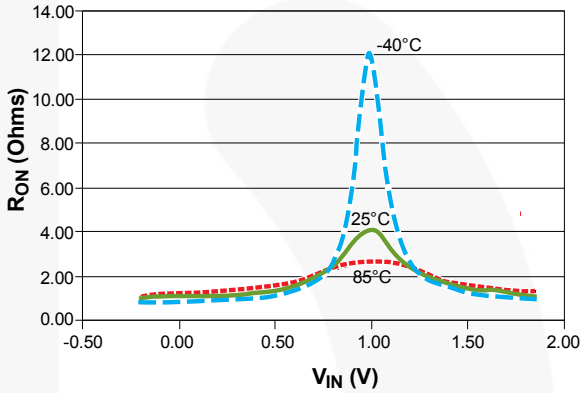


Figure 6. On Resistance (V_{CC}=1.65 V)

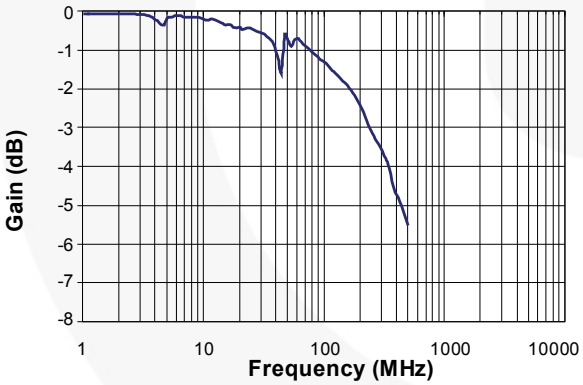


Figure 7. Frequency Response (V_{CC}=5.5 V, C_L=0 pF)

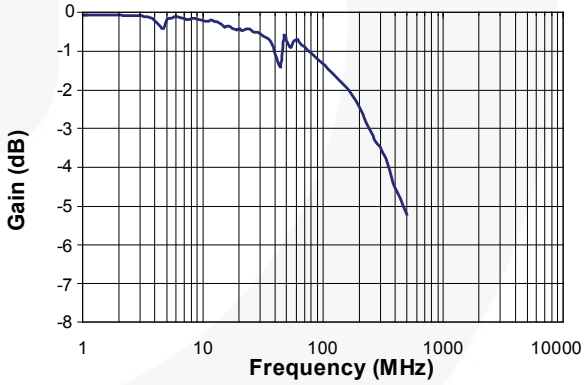


Figure 8. Frequency Response (V_{CC}=3.3 V, C_L=0 pF)

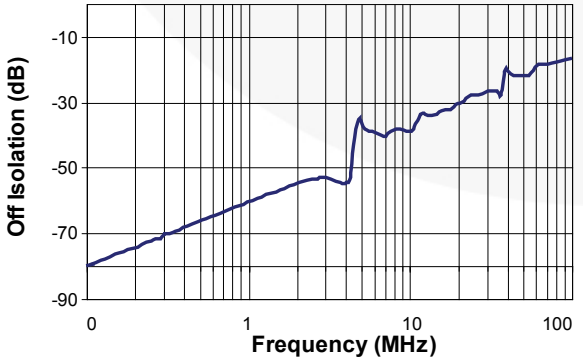


Figure 9. Frequency Response (V_{CC}=5.0 V, C_L=0 pF)

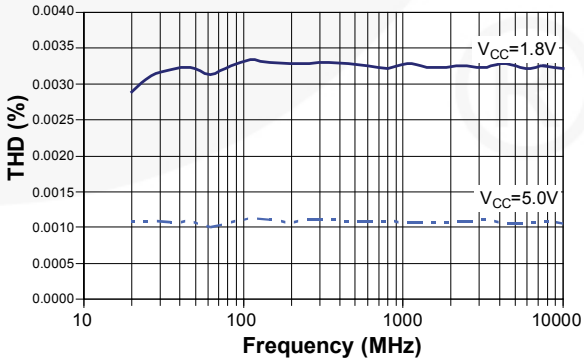
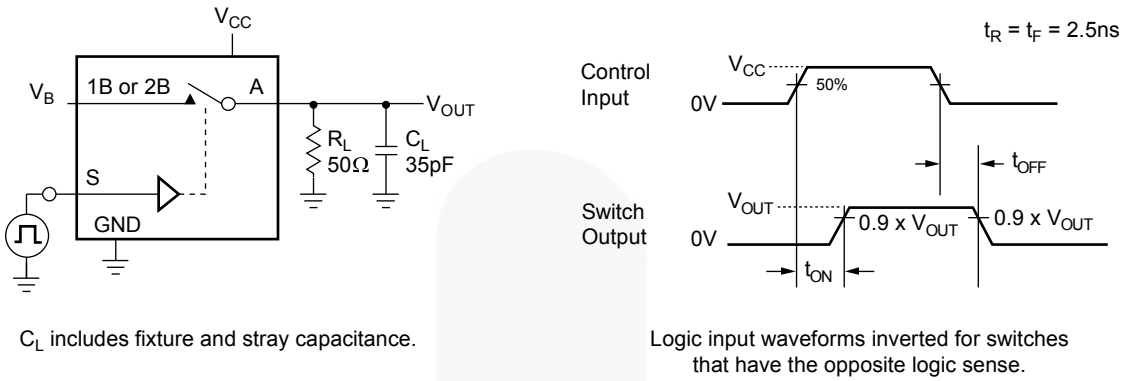


Figure 10. Total Harmonic Distortion

Test Diagrams



C_L includes fixture and stray capacitance.

Logic input waveforms inverted for switches that have the opposite logic sense.

Figure 11. Turn On / Off Timing

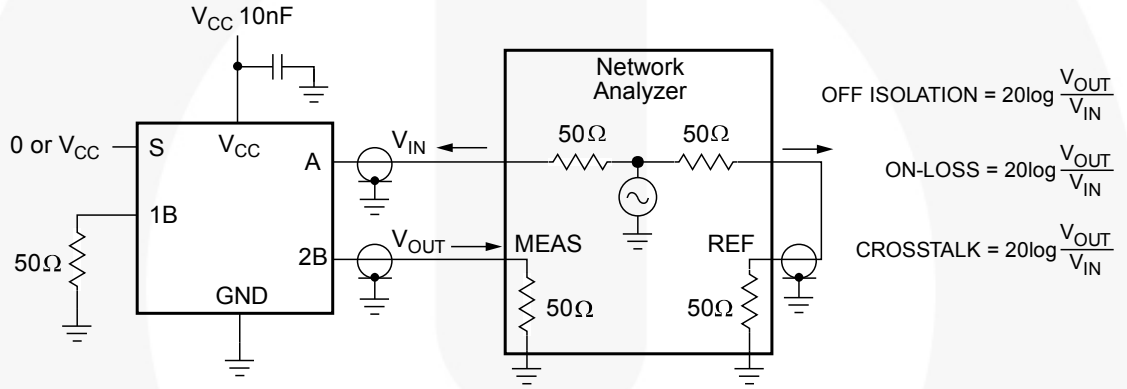


Figure 12. Off Isolation and Crosstalk

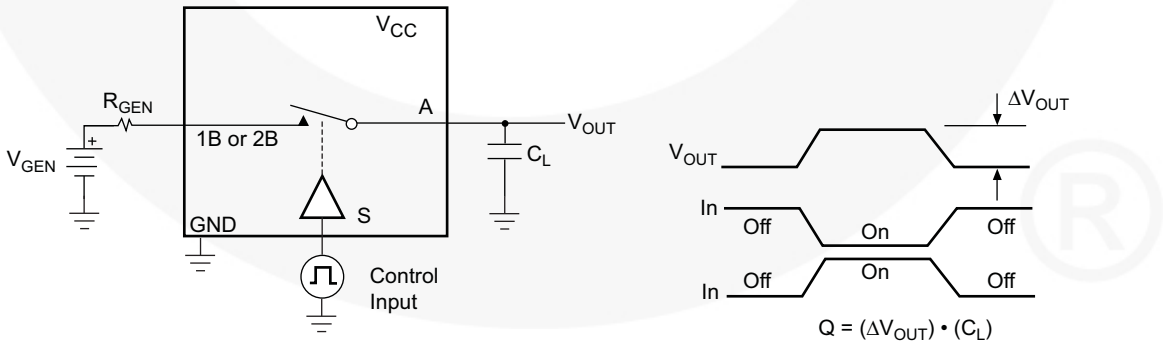


Figure 13. Charge Injection

Test Diagrams (Continued)

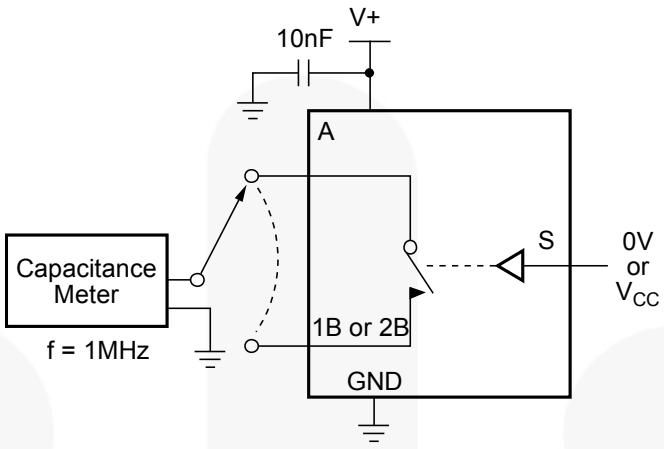


Figure 14. On / Off Capacitance Measurement Setup

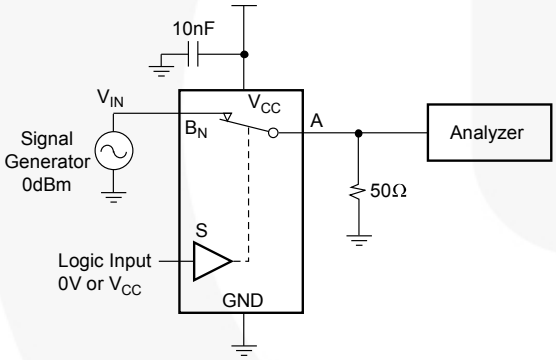


Figure 15. Bandwidth

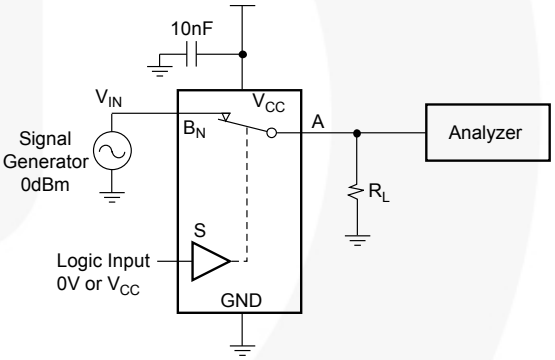


Figure 16. Harmonic Distortion

Physical Dimensions

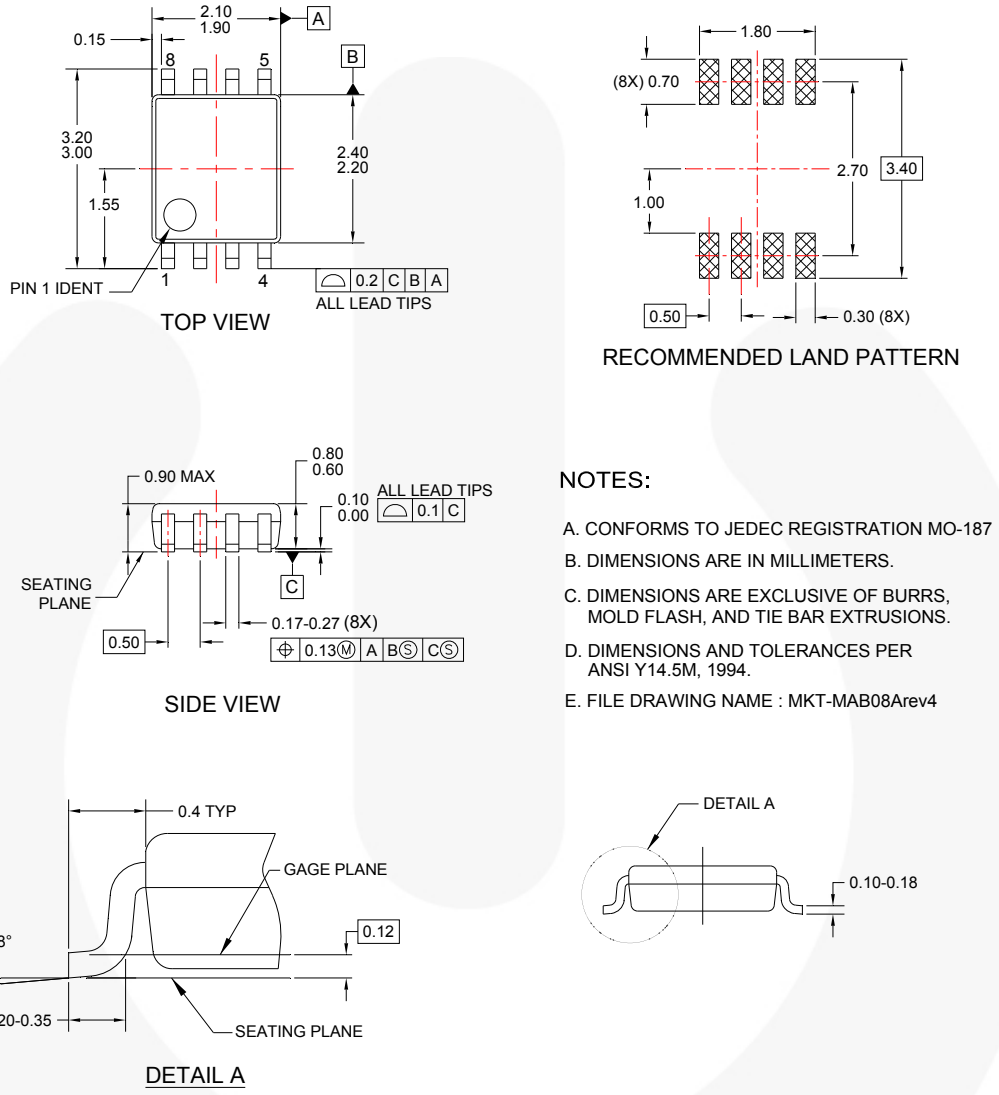


Figure 17. 8-Lead US8, JEDEC MO-187, Variation CA, 3.0 mm Wide Package

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http://www.fairchildsemi.com/dwg/MA/MAB08A.pdf

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Counterfeiting of semiconductor parts is a growing problem in the industry. All manufacturers of semiconductor products are experiencing counterfeiting of their parts. Customers who inadvertently purchase counterfeit parts experience many problems such as loss of brand reputation, substandard performance, failed applications, and increased cost of production and manufacturing delays. Fairchild is taking strong measures to protect ourselves and our customers from the proliferation of counterfeit parts. Fairchild strongly encourages customers to purchase Fairchild parts either directly from Fairchild or from Authorized Fairchild Distributors who are listed by country on our web page cited above. Products customers buy either from Fairchild directly or from Authorized Fairchild Distributors are genuine parts, have full traceability, meet Fairchild's quality standards for handling and storage and provide access to Fairchild's full range of up-to-date technical and product information. Fairchild and our Authorized Distributors will stand behind all warranties and will appropriately address any warranty issues that may arise. Fairchild will not provide any warranty coverage or other assistance for parts bought from Unauthorized Sources. Fairchild is committed to combat this global problem and encourage our customers to do their part in stopping this practice by buying direct or from authorized distributors.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

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PUBLICATION ORDERING INFORMATION

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Стандарт Электрон Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

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