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FSA3357

Low Voltage SP3T Analog Switch (3:1 Multiplexer/Demultiplexer)

General Description

The FSA3357 is a high performance, single-pole/triple-throw (SP3T) Analog Switch or 3:1 Multiplexer/Demultiplexer. The device is fabricated with advanced sub-micron CMOS technology to achieve high speed enable and disable times and low On Resistance. The break before make select circuitry prevents disruption of signals on the $\rm B_0,~B_1,~or~B_2$ Ports due to the switches temporarily being enabled during select pin switching. The device is specified to operate over the 1.65 to 5.5V $\rm V_{CC}$ operating range. The control input tolerates voltages up to 5.5V independent of the $\rm V_{CC}$ operating range.

Features

- Useful in both analog and digital applications
- Space saving US8 8-lead surface mount package
- Low On Resistance; $< 9\Omega$ on typ @ 3.3V V_{CC}
- Broad V_{CC} operating range; 1.65V to 5.5V
- Rail-to-Rail signal handling
- Power down high impedance control input
- Overvoltage tolerance of control input to 7.0V
- Break before make enable circuitry
- 250 MHz 3dB bandwidth
- Space saving Pb-Free MicroPak™ packaging

Applications

- Cell Phone
- PDA
- Video

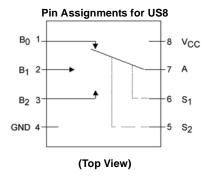
Ordering Code:

Product				
Order	Package	Code	Package Description	Supplied As
Number	Number	Top Mark		
FSA3357K8X	MAB08A	A357	8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide	3k Units on Tape and Reel
FSA3357L8X	MAC08A	FE	Pb-Free 8-Lead MicroPak, 1.6 mm Wide	5k Units on Tape and Reel

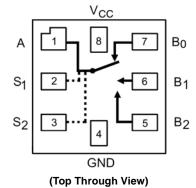
Pb-Free package per JEDEC J-STD-020B.

 $\label{eq:microPak} \mbox{MicroPak}^{\mbox{\tiny TM}} \mbox{ is a trademark of Fairchild Semiconductor Corporation.}$

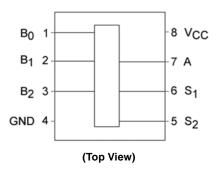
Analog Symbols



Pin Assignments for MicroPak



Connection Diagram



Pin Descriptions

Pin Names	Description
A ₁ , B ₀ , B ₁ , B ₂	Data Ports
S ₁ , S ₂	Control Input

Function Table

S ₁	S ₂	Function
0	0	No Connection
1	0	B ₀ Connected to A
0	1	B ₁ Connected to A
1	1	B ₂ Connected to A

Absolute Maximum Ratings(Note 1)

DC Input Voltage (V_{IN}) (Note 2) -0.5V to +7.0V

DC Input Diode Current (I_{IK})

Junction Lead Temperature (T_L)

(Soldering, 10 seconds) 260°C Power Dissipation (P_D) @ +85°C 180 mW

Recommended Operating Conditions

(Note 3)

Input Rise and Fall Time (t_r, t_f)

 $\label{eq:control_log_var} \begin{array}{lll} \text{Control Input V}_{\text{CC}} = 2.3 \text{V} - 3.6 \text{V} & 0 \text{ ns/V to 10 ns/V} \\ \text{Control Input V}_{\text{CC}} = 4.5 \text{V} - 5.5 \text{V} & 0 \text{ ns/V to 5 ns/V} \\ \text{Thermal Resistance } (\theta_{\text{JA}}) & 250^{\circ}\text{C/W} \\ \text{MicroPak 8L Package} & 224^{\circ}\text{C/W} \end{array}$

Note 1: Absolute maximum ratings are DC values beyond which the device may be damaged or have its useful life impaired. The datasheet specifications should be met, without exception, to ensure that the system design is reliable over its power supply, temperature, and output/input loading variables. Fairchild does not recommend operation outside datasheet specifications.

Note 2: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Note 3: Control inputs must be held HIGH or LOW, they must not float.

DC Electrical Characteristics

Symbol	Parameter	V _{CC}		T _A = +25°C		T _A = -40°0	C to +85°C	Units	Conditions
Symbol	Farameter	(V)	Min	Тур	Max	Min	Max	Units	Conditions
V _{IH}	HIGH Level	1.65 – 1.95	0.75 V _{CC}			0.75 V _{CC}		V	
	Input Voltage	2.3 - 5.5	0.7 V _{CC}			0.7 V _{CC}		V	
V _{IL}	LOW Level	1.65 – 1.95			0.25 V _{CC}		0.25 V _{CC}	V	
	Input Voltage	2.3 - 5.5			0.3 V _{CC}		0.3 V _{CC}	V	
I _{IN}	Input Leakage Current	0 – 5.5			±0.1		±1.0	μА	$0 \leq V_{IN} \leq 5.5V$
I _{OFF}	OFF State Leakage Current	1.65 – 5.5			±0.1		±1.0	μА	$0 \le A, B_n \le V_{CC}$
R _{ON}	Switch On Resistance	4.5		5.0	7.0		7.0		$V_{IN} = 0V, I_{O} = 30 \text{ mA}$
	(Note 4)			6.0	12.0		12.0		$V_{IN} = 2.4V$, $I_{O} = -30 \text{ mA}$
				7.0	15.0		15.0		$V_{IN} = 4.5V$, $I_{O} = -30 \text{ mA}$
		3.0		6.5	9.0		9.0		V _{IN} = 0V, I _O = 24 mA
				9.0	20.0		20.0	Ω	$V_{IN} = 3V$, $I_{O} = -24 \text{ mA}$
		2.3		8.0	12.0		12.0		V _{IN} = 0V, I _O = 8 mA
				11.0	30.0		30.0		$V_{IN} = 2.3V, I_{O} = -8 \text{ mA}$
		1.65		10.0	20.0		20.0		V _{IN} = 0V, I _O = 4 mA
				17.0	50.0		50.0		V _{IN} = 1.65V, I _O = -4 mA
I _{CC}	Quiescent Supply Current	F. F.			1.0		10.0	^	V _{IN} = V _{CC} or GND
	All Channels ON or OFF	5.5			1.0		10.0	μΑ	I _{OUT} = 0
ASR	Analog Signal Range	V _{CC}	0.0		V _{CC}	0.0	V _{CC}	V	
ΔR_{ON}	On Resistance Match	4.5		0.15					$I_A = -30 \text{ mA}, V_{Bn} = 3.15$
	Between Channels	3.0		0.22				Ω	I _A = -24 mA, V _{Bn} = 2.1
	(Note 4)(Note 5)(Note 6)	2.3		0.31				1 12	$I_A = -8 \text{ mA}, V_{Bn} = 1.6$
		1.65		0.62					I _A = -4 mA, V _{Bn} = 1.15
R _{flat}	On Resistance Flatness	5.0		6.0					$I_A = -30 \text{ mA}, \ 0 \le V_{Bn} \le V_{CC}$
	(Note 4)(Note 5)(Note 7)	3.3		12.0					$I_A = -24 \text{ mA}, \ 0 \le V_{Bn} \le V_{CC}$
		2.5		40.0				Ω	$I_A = -8 \text{ mA}, 0 \le V_{Bn} \le V_{CC}$
		1.8		140.0					$I_A = -4 \text{ mA}, \ 0 \le V_{Bn} \le V_{CC}$

DC Electrical Characteristics (Continued)

Note 4: Measured by the voltage drop between A and B_n pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B_n Ports).

Note 5: Parameter is characterized but not tested in production.

Note 6: ΔR_{ON} = R_{ON} max - R_{ON} min measured at identical V_{CC} , temperature and voltage levels.

Note 7: Flatness is defined as the difference between the maximum and minimum value of On Resistance over the specified range of conditions.

AC Electrical Characteristics

Symbol	Parameter	V _{CC}		T _A = +25°C		T _A = -40°	C to +85°C	Units	Conditions	Figure
Symbol	Parameter	(V)	Min	Тур	Max	Min	Max	Units	Conditions	Number
t _{PHL}	Propagation Delay	1.65 – 1.95		2.0						
t _{PLH}	Bus to Bus	2.3 – 2.7		1.1					V OPEN	Figures
	(Note 8)	3.0 - 3.6		0.7				ns	V _I = OPEN	1, 2
		4.5 – 5.5		0.4						
t _{PZL}	Output Enable Time	1.65 – 1.95	5.0		32.0	5.0	34.0			
t _{PZH}	Turn on Time	2.3 – 2.7	3.0		15.0	3.0	16.5		$V_I = 2 \times V_{CC}$ for t_{PZL}	Figures
	(A to B _n)	3.0 - 3.6	2.0		9.5	2.0	11.0	ns	$V_I = 0V$ for t_{PZH}	1, 2
		4.5 – 5.5	1.5		6.5	1.5	7.0			
t _{PLZ}	Output Disable Time	1.65 – 1.95	3.0		14.0	3.0	14.5			
t _{PHZ}	Turn Off Time	2.3 – 2.7	2.0		7.2	2.0	7.8		$V_I = 2 \times V_{CC}$ for t_{PLZ}	Figures
	(A Port to B _n Port)	3.0 - 3.6	1.5		5.1	1.5	5.5	ns	$V_I = 0V$ for t_{PHZ}	1, 2
		4.5 – 5.5	0.8		3.7	0.8	4.0			
t _{B-M}	Break Before Make Time	1.65 – 1.95	0.5			0.5				
	(Note 9)	2.3 – 2.7	0.5			0.5				F: 0
		3.0 - 3.6	0.5			0.5		ns		Figure 3
		4.5 – 5.5	0.5			0.5				
Q	Charge Injection (Note 9)	5.0		3.0				_	$C_L = 0.1 \text{ nF}, V_{GEN} = 0V$	
		3.3		2.0				pC	$R_{GEN} = 0\Omega$	Figure 4
OIRR	Off Isolation (Note 10)	1.65 - 5.5		-58.0					$R_L = 50\Omega$	
								dB	f = 10MHz	Figure 5
Xtalk	Crosstalk	1.65 - 5.5		-60.0					$R_L = 50\Omega$	F: 0
								dB	f = 10MHz	Figure 6
BW	-3dB Bandwidth	1.65 - 5.5		250.0				MHz	$R_L = 50\Omega$	Figure 9
THD	Total Harmonic Distortion								$R_L = 600\Omega$	
	(Note 9)	5.0		.01				%	0.5 V _{P-P}	
									f = 600 Hz to 20 KHz	

Note 8: This parameter is guaranteed by design but not tested. The bus switch contributes no propagation delay other than the RC delay of the On Resistance of the switch and the 50 pF load capacitance, when driven by an ideal voltage source (zero output impedance).

Note 9: Guaranteed by Design.

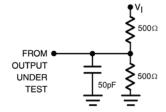
Note 10: Off Isolation = $20 \log_{10} [V_A / V_{Bn}]$

Capacitance (Note 11)

Symbol	Parameter	Тур	Max	Units	Conditions	Figure Number
C _{IN}	Control Pin Input Capacitance	2.0		pF	V _{CC} = 0V	
C _{IO-B}	B Port Off Capacitance			pF	V _{CC} = 5.0V	Figure 7
C _{IOA-ON}	A Port Capacitance When Switch Is Enabled	14.5		pF	V _{CC} = 5.0V	Figure 8

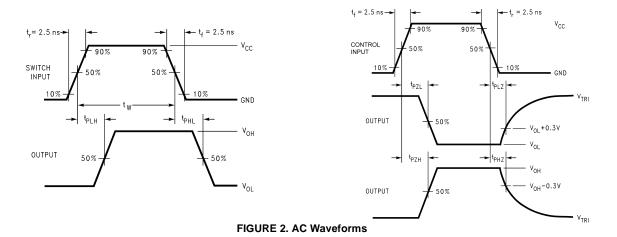
Note 11: $T_A = +25\,^{\circ}C$, f = 1 MHz, Capacitance is characterized but not tested in production.

AC Loading and Waveforms



Note: Input driven by 50Ω source terminated in 50Ω Note: C_L includes load and stray capacitance Note: Input PRR = 1.0 MHz; t_W = 500 ns

FIGURE 1. AC Test Circuit



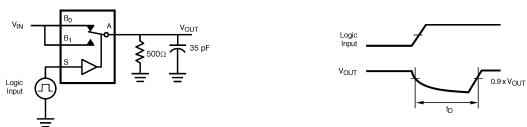
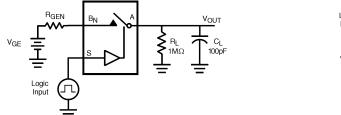


FIGURE 3. Break Before Make Interval Timing

AC Loading and Waveforms (Continued)



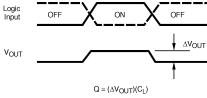


FIGURE 4. Charge Injection Test

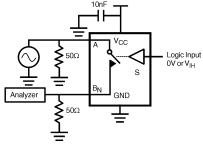
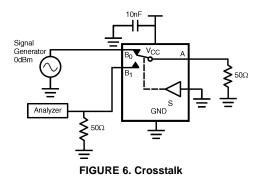


FIGURE 5. Off Isolation



Capacitance Meter f = 1MHZ

FIGURE 7. Channel Off Capacitance

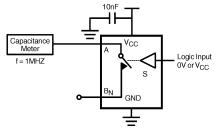


FIGURE 8. Channel On Capacitance

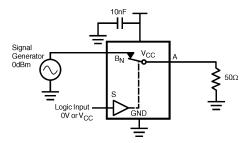


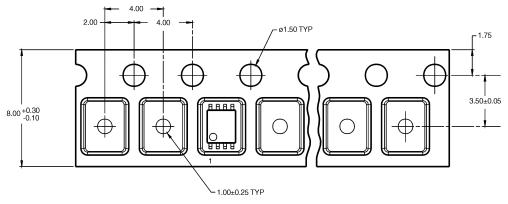
FIGURE 9. Bandwidth

Tape and Reel Specification

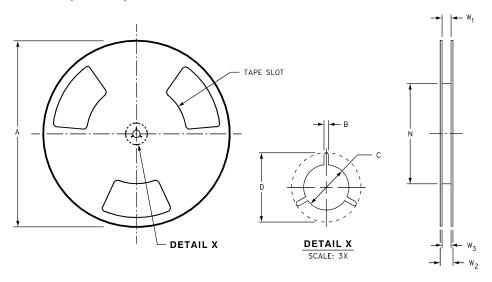
TAPE FORMAT for US8

Package	Package Tape		Cavity	Cover Tape
Designator	Section	Cavities	Status	Status
	Leader (Start End)	125 (typ)	Empty	Sealed
K8X	Carrier	250	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)



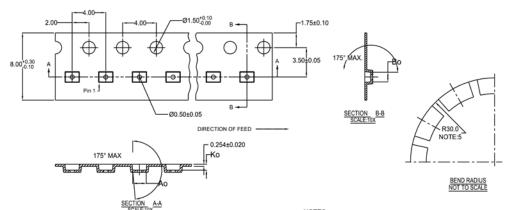
REEL DIMENSIONS inches (millimeters)



Tape Size	A	В	O	D	Z	W1	W2	W3
8 mm	7.0	0.059	0.512	0.795	2.165	0.331 + 0.059/- 0.000	0.567	W1 + 0.078/-0.039
	(177.8)	(1.50)	(13.00)	(20.20)	(55.00)	(8.40 + 1.50/-0.00)	(14.40)	(W1 + 2.00/-1.00)

TAPE FORMAT for MicroPak

Package	Package Tape		Cavity	Cover Tape
Designator	Section	Cavities	Status	Status
	Leader (Start End)	125 (typ)	Empty	Sealed
L8X	Carrier	5000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed



10	300056	2.30±0.05	1.78±0.05	0.68 ± 0.05
8	300038	1.78±0.05	1.78±0.05	0.68 ± 0.05
6	300033	160+0.05	1 15+0 05	0.70 + 0.05

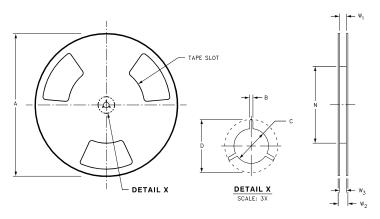
NOTES: UNLESS OTHERWISE SPECIFIED

- 1. ACCUMULATED 50 SPROCKETS, SPROCKET HOLE PITCH IS 200.00 ±0.30MM
- 2. NO INDICATED CORNER RADIUS IS 0.127MM
- 3. CAMBER NOT TO EXCEED 1MM IN 100MM
- 4. SMALLEST ALLOWABLE BENDING RADIUS
- 5. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET, NOT POCKET HOLE



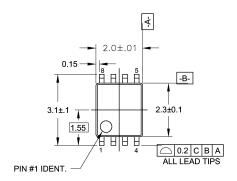
SCALE: 6X

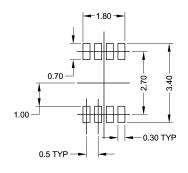
REEL DIMENSIONS inches (millimeters)



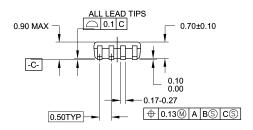
Tape Size	Α	В	С	D	N	W1	W2	W3
0 mm	7.0	0.059	0.512	0.795	2.165	0.331 + 0.059/-0.000	0.567	W1 + 0.078/-0.039
8 mm	(177.8)	(1.50)	(13.00)	(20.20)	(55.00)	(8.40 + 1.50/-0.00)	(14.40)	(W1 + 2.00/-1.00)

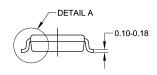
Physical Dimensions inches (millimeters) unless otherwise noted

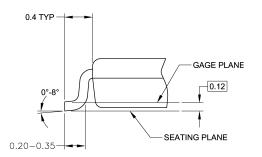




LAND PATTERN RECOMMENDATION







DETAIL A

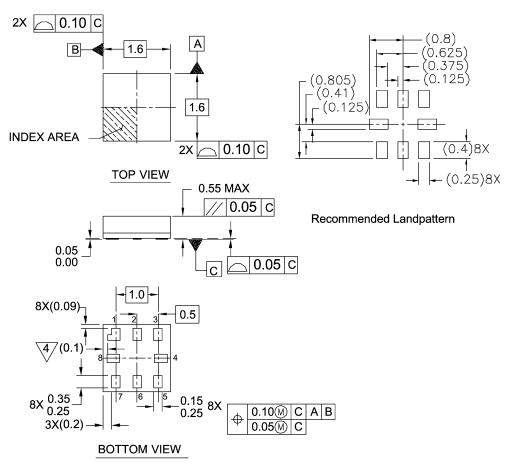
NOTES:

- A. CONFORMS TO JEDEC REGISTRATION MO-187 B. DIMENSIONS ARE IN MILLIMETERS.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- D. DIMENSIONS AND TOLERANCES PER ANSI Y14.5M, 1982.

MAB08AREVC

8-Lead US8, JEDEC MO-187, Variation CA 3.1mm Wide Package Number MAB08A

Physical Dimensions inches (millimeters) unless otherwise noted (Continued)



Notes:

- 1. PACKAGE CONFORMS TO JEDEC MO-255 VARIATION UAAD
- 2. DIMENSIONS ARE IN MILLIMETERS
- 3. DRAWING CONFORMS TO ASME Y.14M-1994

4/PIN 1 FLAG, END OF PACKAGE OFFSET.

MAC08AREVC

Pb-Free 8-Lead MicroPak, 1.6 mm Wide Package Number MAC08A

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provided in the labeling, can be reasonably expected to result in significant injury to the user.

2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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FSA3051TMX NLAS4684FCTCG NLAS5223BLMNR2G NLX2G66DMUTCG 425541DB 425528R 099044FB NLAS5123MNR2G
PI5A4157CEX NLAS4717EPFCT1G PI5A3167CCEX SLAS3158MNR2G PI5A392AQE PI5A4157ZUEX PI5A3166TAEX FSA634UCX
XS3A1T3157GMX 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 NLASB3157MTR2G TS3A4751PWR NLAST4599DFT2G NLAST4599DTT1G DG300BDJ-E3
DG2503DB-T2-GE1 TC4W53FU(TE12L,F) HV2201FG-G 74HC2G66DC.125 DG3257DN-T1-GE4 ADG619BRMZ-REEL
ADG1611BRUZ-REEL7 DG2535EDQ-T1-GE3 LTC201ACN#PBF 74LV4066DB,118 ISL43410IUZ FSA2275AUMX