December 2004
Revised August 2005

FSAV450
800MHz 4 Channel 2:1 Video Switch

General Description

The FSAV450 is a high performance Quad SPDT (2-to-1 multiplexer/demultiplexer) video switch designed specifically for switching high definition YPbPr and computer RGB (up to UXGA) signals. The bandwidth of this device is 800MHz (Typ) which allows signals to pass with minimal edge and phase distortion. Image integrity is maintained with low crosstalk, high OFF-Isolation and low differential gain and phase. The low On Resistance (4Ω typical) minimizes signal insertion loss. Low voltage operation (3V), low power consumption (1uA maximum) and small scale packaging (including leadless DQFN) make this device ideal for a broad range of applications.

Features

- −50dB OFF Isolation at 30MHz
- −80dB non-adjacent channel crosstalk at 30MHz
- 4Ω typical On Resistance (R_{ON})
- −3dB bandwidth: 800MHz
- Low power consumption (1uA max)
- Control input: TTL compatible

Applications

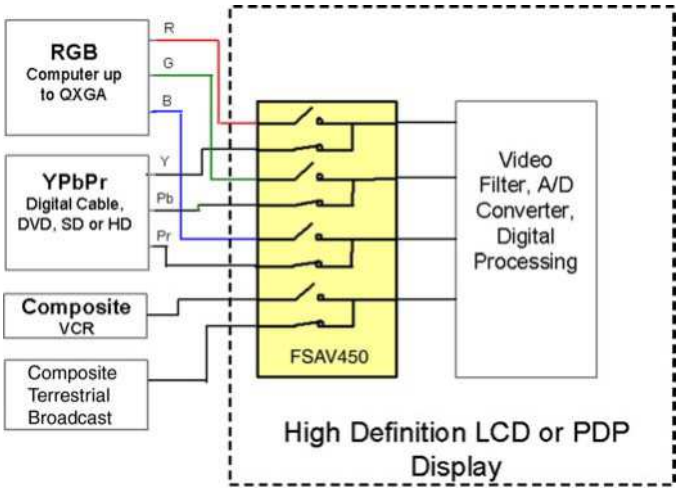
- RGB Video Switch in LCD, plasma and projector displays

Ordering Code:

Order Number	Package Number	Package Description
FSAV450BQX (Note 1)	MLP016E	Pb-Free 16-Terminal Depopulated Quad Very-Thin Flat Pack No Leads (DQFN), JEDEC MO-241, 2.5 x 3.5mm
FSAV450QSC	MQA16A	16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150 Wide
FSAV450MTC	MTC16	16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide

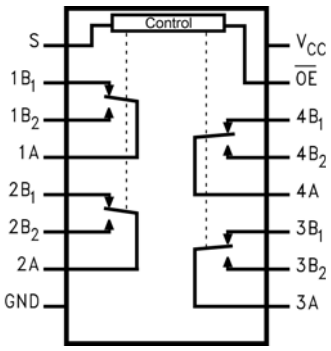
Devices also available in Tape and Reel. Specify by appending suffix letter "X" to the ordering code.
Pb-Free package per JEDEC J-STD-020B.

Note 1: DQFN package available in Tape and Reel only.



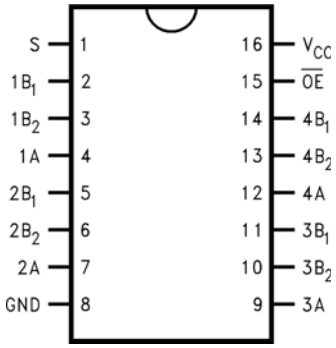
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Analog Symbol

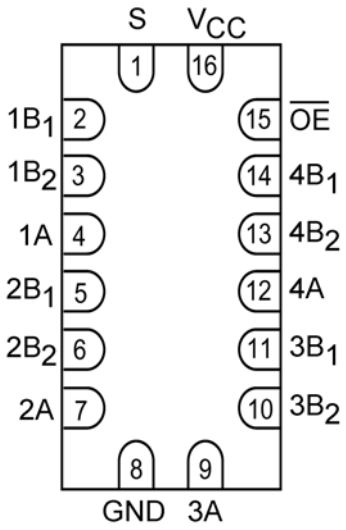


Connection Diagrams

Pin Assignments for QSOP and TSSOP



Pad Assignments for DQFN (Preliminary)



Pin Descriptions

Pin Name	Description
$\overline{OE}$	Bus Switch Enable
S	Select Input
A	Bus A
B_1–B_2	Bus B

Truth Table

S	$\overline{OE}$	Function
X	H	Disconnect
L	L	A = B_1
H	L	A = B_2

Absolute Maximum Ratings(Note 2)

Supply Voltage (V_{CC})	−0.5V to +6.0V
DC Switch Voltage (V_S)	−0.5V to +6.0V
DC Input Voltage (V_{IN}) (Note 3)	−0.5V to +6.0V
DC Input Diode Current (I_{IK}) V_{IN} < 0V	−50 mA
DC Output (I_{OUT}) Sink Current	128 mA
DC V_{CC}/GND Current (I_{CC}/I_{GND})	±100 mA
Storage Temperature Range (T_{STG})	−65°C to +150 °C
ESD	
Human Body Model	2kV

Recommended Operating Conditions

(Note 4)

Power Supply Operating (V_{CC})	4.5V to 5.5V
Input Voltage (V_{IN})	0V to V_{CC}
Output Voltage (V_{OUT})	0V to V_{CC}
Input Rise and Fall Time (t_r, t_f)	
Switch Control Input	0 ns/V to 5 ns/V
Switch I/O	0 ns/V to DC
Free Air Operating Temperature (T_A)	−40 °C to +85 °C

Note 2: The Absolute Maximum Ratings are those values beyond which the safety of the device cannot be guaranteed. The device should not be operated at these limits. The parametric values defined in the Electrical Characteristics tables are not guaranteed at the absolute maximum rating. The Recommended Operating Conditions tables will define the conditions for actual device operation.

Note 3: The input and output negative voltage ratings may be exceeded if the input and output diode current ratings are observed.

Note 4: Unused control inputs must be held HIGH or LOW. They may not float.

DC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	T_A = −40 °C to +85 °C			Units	Conditions
			Min	Typ (Note 5)	Max		
	Analog Signal Range		0		2.0	V	
V_{IK}	Clamp Diode Voltage	4.5			−1.2	V	I_{IN} = −18 mA
V_{IH}	HIGH Level Input Voltage	4.5 to 5.5	2.0			V	
V_{IL}	LOW Level Input Voltage	4.5 to 5.5			0.8	V	
I_I	Input Leakage Current	5.5			±1.0	μA	0 ≤ V_{IN} ≤ 5.5V
I_{OFF}	OFF-STATE Leakage Current	5.5			±1.0	μA	0 ≤ A, B ≤ V_{CC}
R_{ON}	Switch On Resistance (Note 6)	4.5		4.0	6.0	Ω	V_{IN} = 1.0V, R_I = 75 Ω, I_{ON} = 13 mA
		4.5		5.0	7.0	Ω	V_{IN} = 2.0V, R_I = 75 Ω, I_{ON} = 26 mA
I_{CC}	Quiescent Supply Current	5.5			1.0	μA	V_{IN} = V_{CC} or GND, I_{OUT} = 0
ΔI_{CC}	Increase in I_{CC} per Input	5.5			1.5	mA	One Input at 3.4V, Other Inputs at V_{CC} or GND

Note 5: Typical values are at T_A = +25°C

Note 6: Measured by the voltage drop between A and B pins at the indicated current through the switch. On Resistance is determined by the lower of the voltages on the two (A or B) pins.

AC Electrical Characteristics

Symbol	Parameter	V_{CC} (V)	$T_A = -40°C$ to $+85°C$			Units	Conditions	Figure Number
			Min	Typ (Note 7)	Max			
t_{ON}	Turn ON Time S-to-Bus B	4.5 to 5.5		4.0	6.0	ns	VB = 2.0V	Figures 8, 9
	Output Enable Time OE-to-A or B	4.5 to 5.5		3.5	5.5			
t_{OFF}	Turn OFF Time S-to-Bus B	4.5 to 5.5		1.5	3.5	ns	VB = 2.0V	Figures 8, 9
	Output Disable Time OE-to-A or B	4.5 to 5.5		1.5	3.5			
DG	Differential Gain	4.5 to 5.5		0.2		%	$R_L = 75\Omega$, f= 3.58MHz	Figure 2
DP	Differential Phase	4.5 to 5.5		0.1		Degree	$R_L = 75\Omega$, f= 3.58MHz	Figure 3
O_{IRR}	Non-Adjacent OFF-Isolation	4.5 to 5.5		−50.0		dB	f = 30MHz, $R_L = 75\Omega$	Figures 4, 10
X_{TALK}	Non-Adjacent Channel Crosstalk	4.5 to 5.5		−80.0		dB	$R_L = 75\Omega$, f= 30MHz	Figures 5, 11
BW	−3dB Bandwidth	4.5 to 5.5		800		MHz	$R_L = 50\Omega$ (DQFN)	Figures 1, 12
		4.5 to 5.5		700			$R_L = 50\Omega$ (QSOP and TSSOP)	Figure 12
		4.5 to 5.5		650			$R_L = 75\Omega$ (DQFN)	
		4.5 to 5.5		600			$R_L = 75\Omega$ (QSOP and TSSOP)	

Note 7: Typical values are at $V_{CC} = 5.0V$ and $T_A = +25°C$

Capacitance

Symbol	Parameter	$T_A = -40°C$ to $+85°C$	Units	Conditions
		Typ		
C_{IN}	Control Pin Input Capacitance	3.0	pF	$V_{CC} = 0V$
C_{ON}	A/B ON Capacitance	8.5	pF	$V_{CC} = 5.0V$, $\overline{OE} = 0V$
C_{OFF}	Port B OFF Capacitance	3.0	pF	V_{CC} and $\overline{OE} = 5.0V$

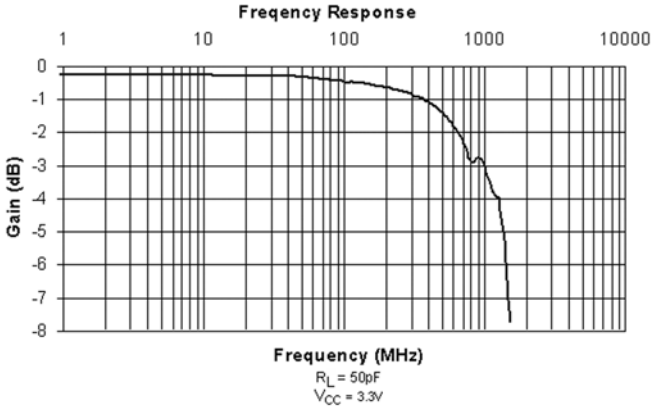


FIGURE 1. Gain vs. Frequency

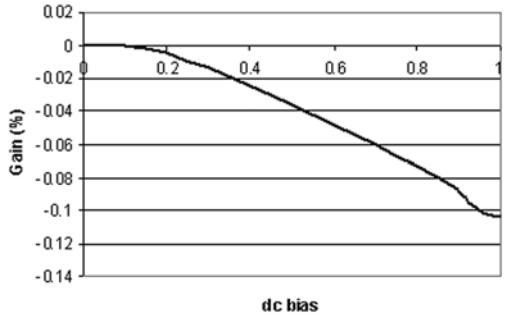


FIGURE 2. Differential Gain vs. dc bias

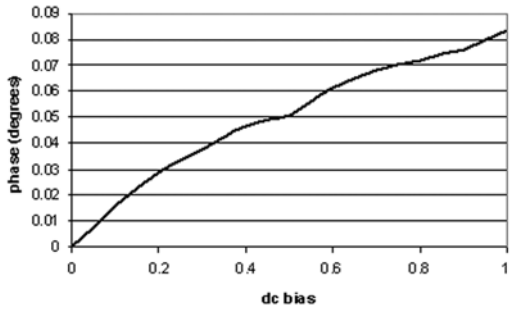


FIGURE 3. Differential Phase vs. dc bias

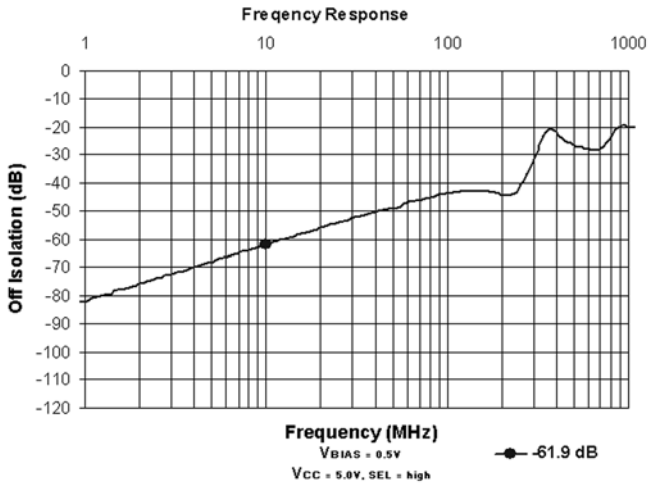


FIGURE 4. OFF Isolation

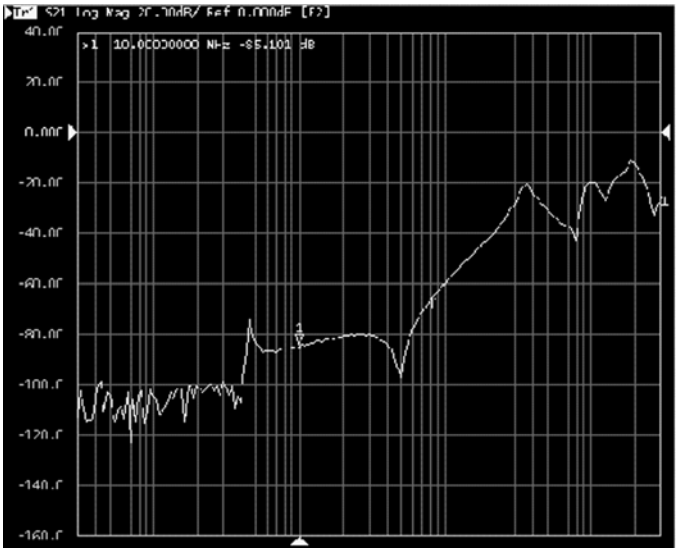


FIGURE 5. OFF Crosstalk vs. Frequency

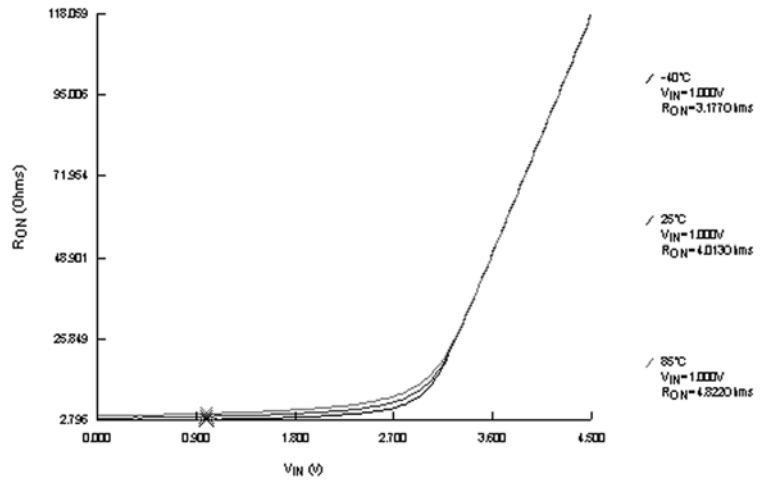


FIGURE 6. R_{ON} Switch On Resistance, I_{ON} = 13mA

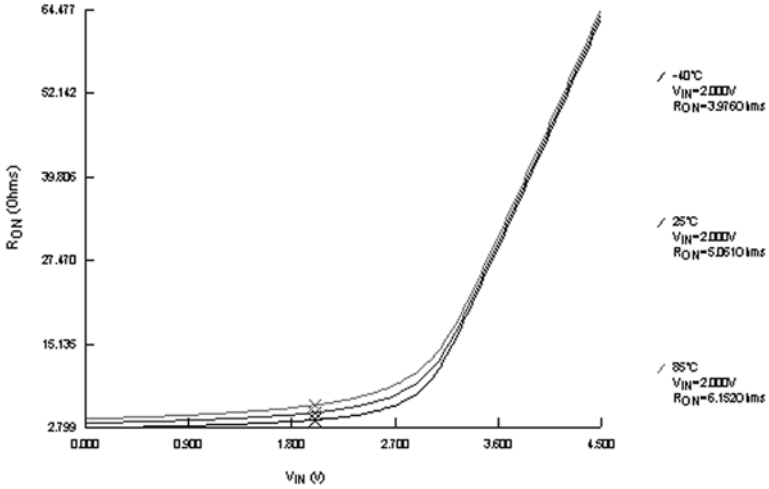
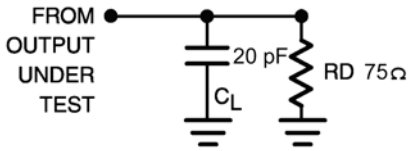


FIGURE 7. R_{ON} Switch On Resistance, I_{ON} = 26mA

AC Loading and Waveforms



Note: Input driven by 50 Ω source terminated in 50 Ω

Note: C_L includes load and stray capacitance

Note: Input PRR = 1.0 MHz, t_W = 500 ns

FIGURE 8. AC Test Circuit

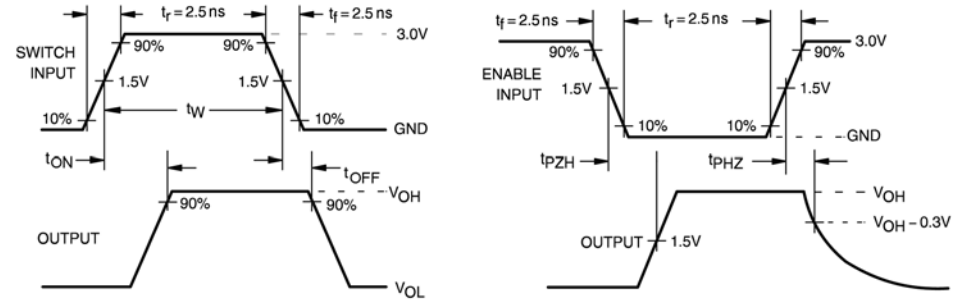


FIGURE 9. AC Waveforms

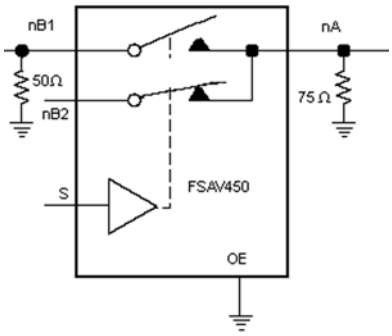


FIGURE 10. OFF Isolation Test

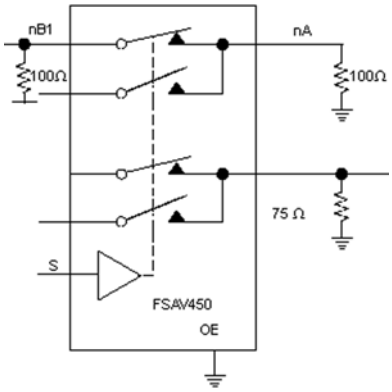


FIGURE 11. Crosstalk Test

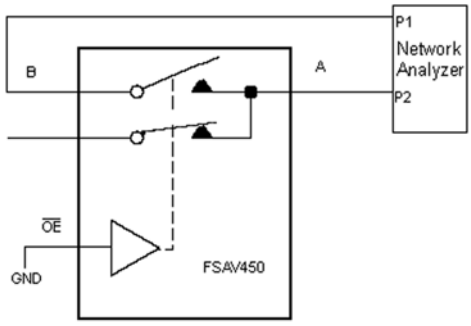


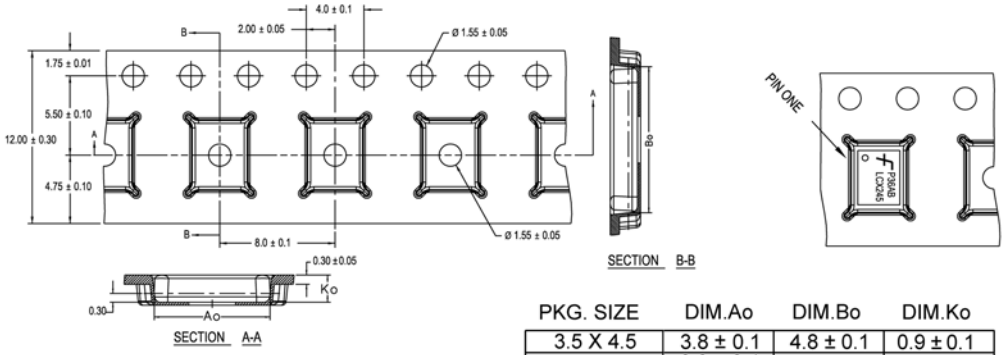
FIGURE 12. Bandwidth Test

Tape and Reel Specification

TAPE FORMAT for DQFN

Package Designator	Tape Section	Number Cavities	Cavity Status	Cover Tape Status
BQX	Leader (Start End)	125 (typ)	Empty	Sealed
	Carrier	2500/3000	Filled	Sealed
	Trailer (Hub End)	75 (typ)	Empty	Sealed

TAPE DIMENSIONS inches (millimeters)



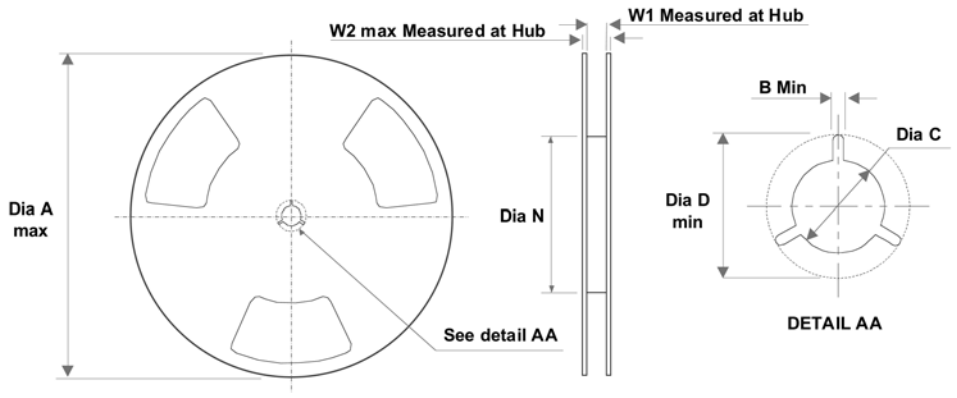
PKG. SIZE	DIM.Ao	DIM.Bo	DIM.Ko
3.5 X 4.5	3.8 ± 0.1	4.8 ± 0.1	0.9 ± 0.1
3.0 X 3.0	3.3 ± 0.1	3.3 ± 0.1	0.9 ± 0.1
2.5 X 4.5	2.8 ± 0.1	4.8 ± 0.1	0.9 ± 0.1
2.5 X 3.5	2.8 ± 0.1	3.8 ± 0.1	0.9 ± 0.1
2.5 X 3.0	2.8 ± 0.1	3.3 ± 0.1	0.9 ± 0.1
2.5 X 2.5	2.8 ± 0.1	2.8 ± 0.1	0.9 ± 0.1

DIMENSIONS ARE IN MILLIMETERS

NOTES: unless otherwise specified

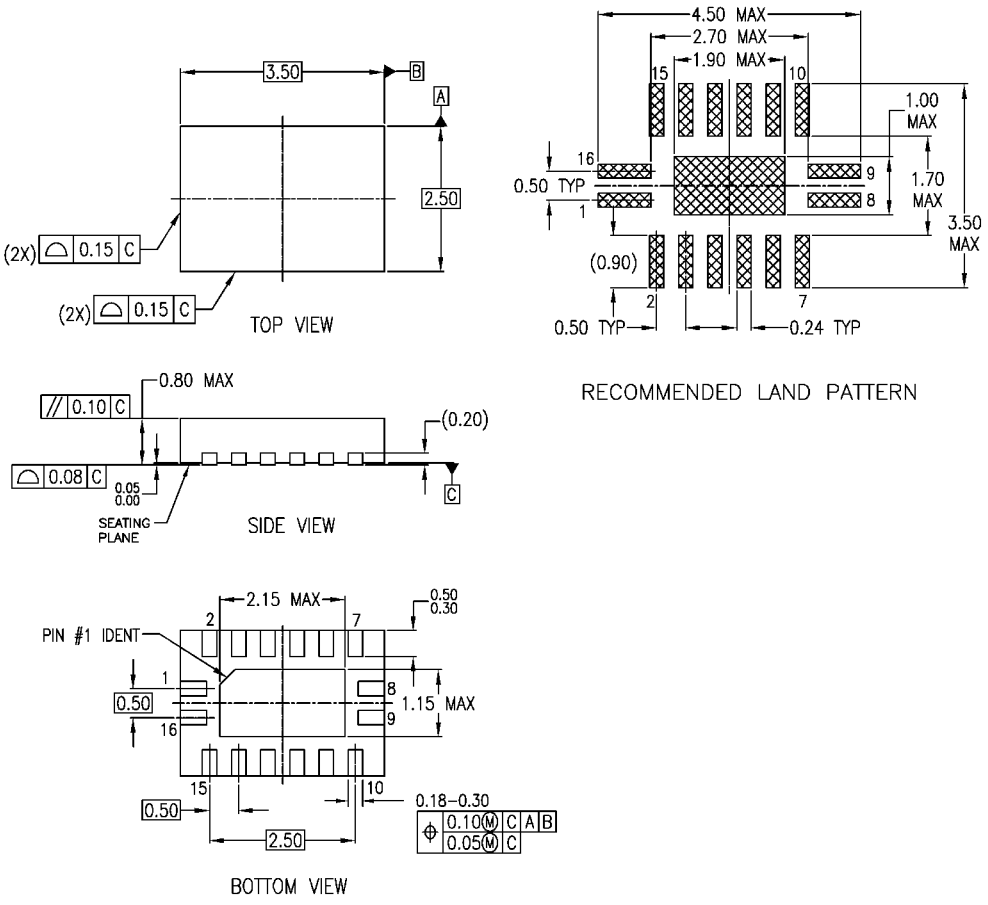
1. Cummulative pitch for feeding holes and cavities (chip pockets) not to exceed 0.008[0.20] over 10 pitch span.
2. Smallest allowable bending radius.
3. Thru hole inside cavity is centered within cavity.
4. Tolerance is ±0.002[0.05] for these dimensions on all 12mm tapes.
5. Ao and Bo measured on a plane 0.120[0.30] above the bottom of the pocket.
6. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
7. Pocket position relative to sprocket hole measured as true position of pocket. Not pocket hole.
8. Controlling dimension is millimeter. Diemension in inches rounded.

REEL DIMENSIONS inches (millimeters)



Tape Size	A	B	C	D	N	W1	W2
12 mm	13.0 (330)	0.059 (1.50)	0.512 (13.00)	0.795 (20.20)	7.008 (178)	0.488 (12.4)	0.724 (18.4)

Physical Dimensions inches (millimeters) unless otherwise noted



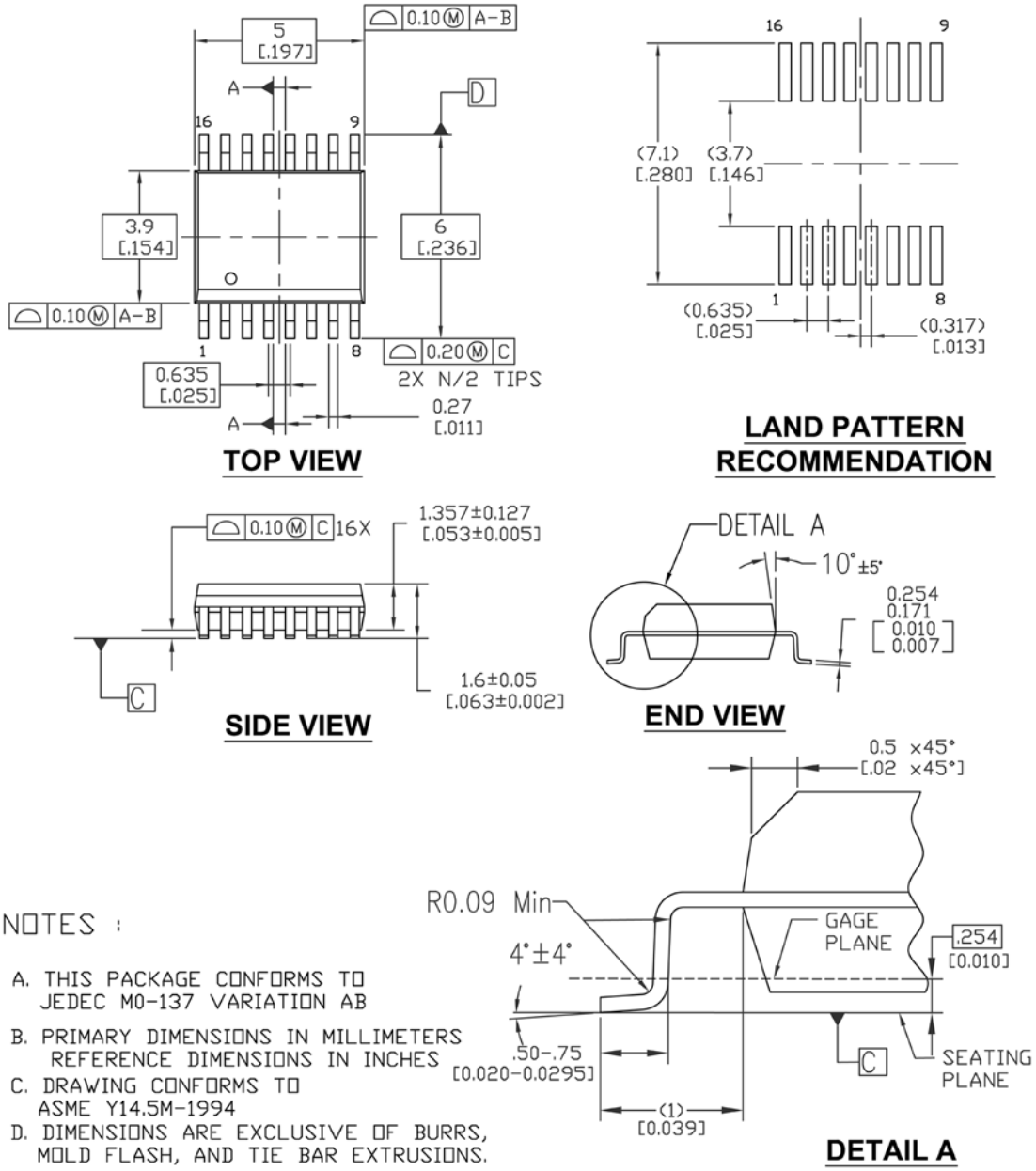
NOTES:

A. CONFORMS TO JEDEC REGISTRATION MO–241, VARIATION AB
B. DIMENSIONS ARE IN MILLIMETERS.
C. DIMENSIONS AND TOLERANCES PER ASME Y14.5M, 1994

MLP016ErevA

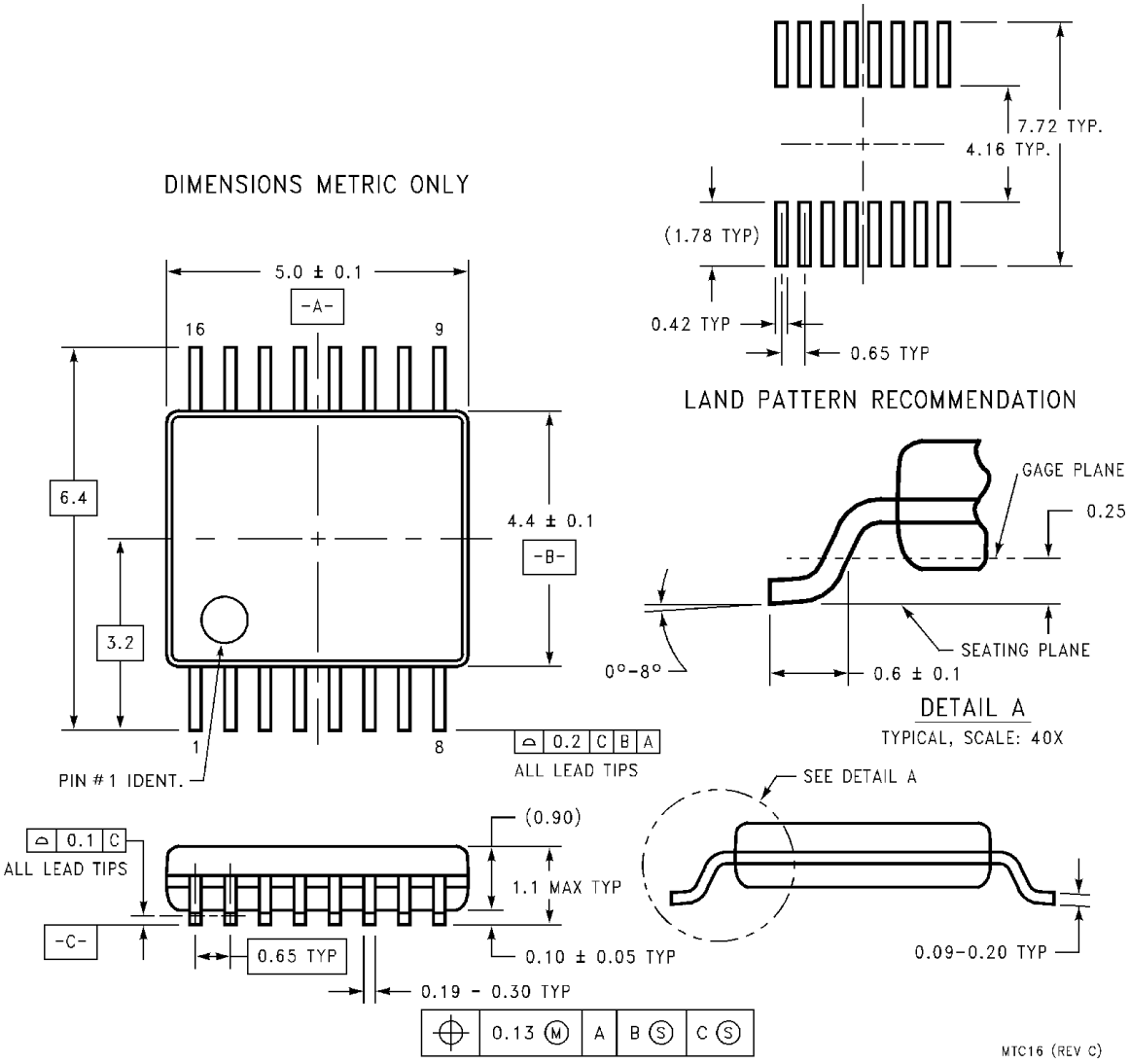
Pb-Free 16-Terminal Depopulated Quad Very-Thin Flat Pack No Leads (DQFN), JEDEC MO-241, 2.5 x 3.5mm
Package Number MLP016E

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



16-Lead Quarter Size Outline Package (QSOP), JEDEC MO-137, 0.150 Wide
Package Number MQA16A

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



16-Lead Thin Shrink Small Outline Package (TSSOP), JEDEC MO-153, 4.4mm Wide
Package Number MTC16

Technology Description

The Fairchild Switch family derives from and embodies Fairchild's proven switch technology used for several years in its 74LVX3L384 (FST3384) bus switch product.

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Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
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