4:1 HIGH SPEED MULTIPLEXER

DEVICE DESCRIPTION

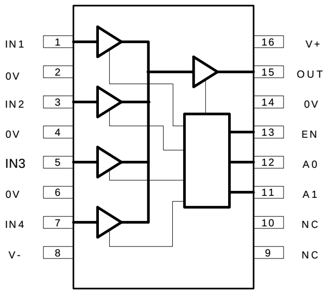
The ZXFV302 is a 4:1 high speed analog switch designed for use as a buffered video multiplexer and other high-speed applications.

It features low different gain and phase distortion. The high speed high output current capability provides 75Ω cable drive for use in high performance video applications.

The input channel is selected by means of two logic lines using an internal decoder. An output enable line allows expansion to eight channels using two devices ZXFV302 as shown in the example application figure 1.

An alternative device, ZXFV301 provides the same functionality and pin-out as the ZXFV302 but with four separate logic lines controlling the switch channels directly.

Connection Diagram



ZXFV302

Ordering information

Part Number	Container	Increment
ZXFV302N16TA	Reel 7″	500
ZXFV302N16TC	Reel 13″	2500

FEATURES AND BENEFITS

- 3dB Bandwidth 300MHz
- Slew rate 450V/ μs
- Differential gain 0.01%
- Differential phase 0.04°
- Output current 40mA
- Stable up to 100pF load
- ±5 Volt supply
- Supply current 17mA
- 16 pin SO package

APPLICATIONS

- Video routing and switching
- CCTV switching
- Video distribution selection
- RGB multiplexing
- High frequency instrumentation Data acquisition
- Data acquisition

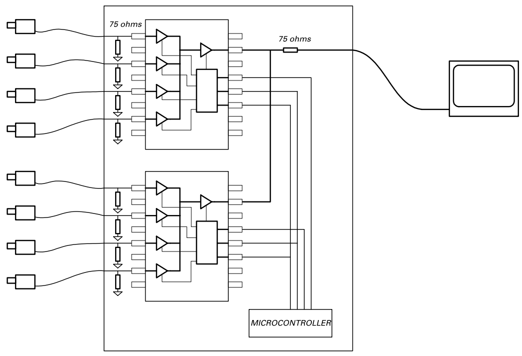


Fig.1:Typical Application for 8 channel CCTV

ABSOLUTE MAXIMUM RATINGS

Supply voltage V_{CC}	-0.5V to +6V
Supply voltage V_{EE}	-6V to +0.5V
Analog inputs to ground	V_{EE} -0.5V to V_{CC} +0.5V
Digital inputs to ground	-0.5V to V_{CC} +0.5V
Outputs to ground*	V_{EE} -0.5V to VCC +0.5V
Output current, max continous	40mA
Operating Ambient Temperature Range	-40°C to 85°C Storage -65°C to 150°C
Operating Junction temperature T_{JMAX}	150°C**

**The thermal resistance from the semiconductor die to ambient is typically 120°C/W when the SO16 package is mounted on a PCB in free air. The power dissipation of the device when loaded must be designed to keep the device junction temperature below T_{JMAX}.

*During power-up and power-down, these voltage ratings require an appropriate sequence of applying and removing signals and power supplies.

ELECTRICAL CHARACTERISTICS

±5V power supplies, T_{amb} = 25°C unless otherwise stated. R_L = 150Ω, C_L = 10pF
Characteristics apply to channel selected, and EN input HIGH unless otherwise stated

Test level: P = 100% production test
C = characterised only

PARAMETER	CONDITIONS	TEST	MIN	TYP	MAX	UNIT
Supply Voltage V+			4.75	5	5.25	V
Supply Voltage V-			-5.25	-5	-4.75	V
Positive supply current		P	13	17	21	mA
Negative supply current		P	9	13	18	mA
Voltage gain DC		P	0.99	1.000	1.01	V/V
Input Common mode Voltage		P		±3		V
Input resistance		P		45		kΩ
Output offset Voltage	All channels held at 0V	P	-10	+11	+30	mV
Input bias current	Active channels held at 0V	P	-25	-11	+5	µA
Output Voltage swing		P		±3		V
Output drive current		P	40			mA
Output resistance		C			1	Ω
Output resistance	Disabled (EN low)	P	1.5	3	4.5	MΩ
Positive PSRR		P	40	54		dB
Negative PSRR		P	30	51		dB
Small signal bandwidth[1]		C		300		MHz
Slew rate, 25% to 75%	2V pk-pk	C		450		V/µs
Logic input HIGH V_{Hmin}		C			2	V
Logic input LOW V_{Lmax}		C	0.8			V
Logic input current I_{INHIGH}	logic input voltage = 5V	C		5		pA
Logic input current I_{INLOW}	logic input voltage = 0V	C		-70		µA

ELECTRICAL CHARACTERISTICS

±5V power supplies, T_{amb} = 25°C unless otherwise stated. R_L = 150Ω, C_L = 10pF
Characteristics apply to channel selected, and EN input HIGH unless otherwise stated

Test level:P = 100% production test
C = characterised only

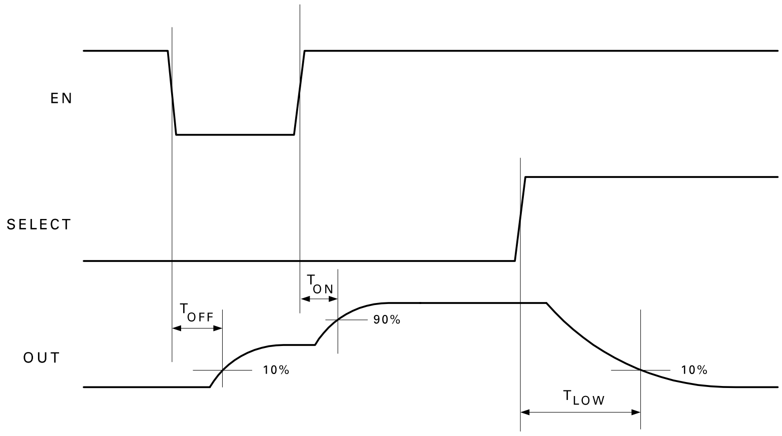
PARAMETER	CONDITIONS	TEST	MIN	TYP	MAX	UNIT
t_{ON}	Vout = ±2V, see timing diagram	C		35		ns
t_{OFF}	Vout = ±2V, see timing diagram	C		10		ns
t_{LOW}	Vout = ±2V, see timing diagram	C		50		ns
t_{HIGH}	Vout = ±2V, see timing diagram	C		40		ns
Cross-talk, all hostile[1]	10MHz, 0dBm in	C		75		dB
Differential Gain		C		0.01		%
Differential Phase		C		0.04		deg
Switching transients, magnitude	All channels held at 0V	C		50		mV
Switching transients, duration	All channels held at 0V	C		25		ns

Notes:
1. Bandwidth and cross talk measured using Zetex Evaluation Circuit Board detailed later in this datasheet.

Truth table for selection of input channel

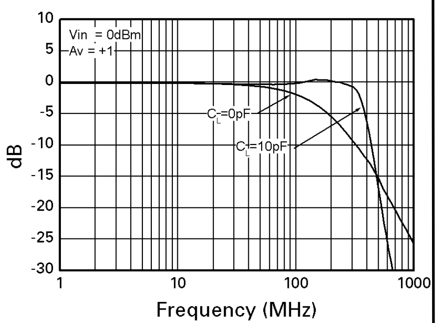
A1	A0	EN	OUT
X	X	0	Hi Z
0	0	1	IN 1
0	1	1	IN 2
1	0	1	IN 3
1	1	1	IN 4

Fig.2: TIMING DIAGRAM

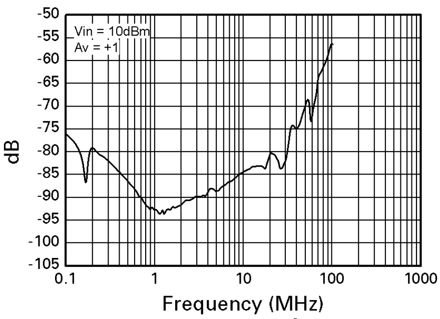


Notes: The ‘select’ waveform represents a change in the the 2 bit control word A0 and A1.
t_{HIGH} is equivalent to t_{LOW} but , applies for a positive going transition of OUT.

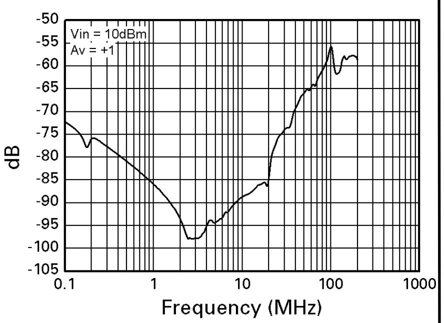
CHARACTERISTICS



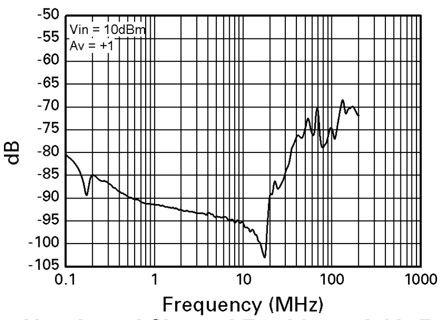
Frequency Response



Typical All Hostile Cross Talk



Typical Disabled Cross Talk



Unselected Channel Feedthrough Vs Freq

APPLICATIONS INFORMATION

Introduction

A typical circuit application is outlined in Figure 1, above, where two devices are combined to provide 8-to-1 multiplexing. A more detailed basic application circuit for 4 dc-coupled channels is given in Figure 3, and an AC coupled circuit for 8 channels is shown in Figure 4. These circuits are suitable for 75Ω transmission line connections at both the input and the output and are useful for distribution of wide-band signals such as video via cables. The 75Ω reverse terminating resistor at the output gives the correct matching condition to a terminated video cable. The amplifier load is then 150Ω.

The wide bandwidth of this device necessitates some care in the layout of the printed circuit. Partly for this reason, an Evaluation Circuit board is available and is described in a later paragraph. A continuous ground plane is required under the device and its signal connection paths, to provide the shortest possible ground return paths for signals and power supply filtering. A double-sided or multi-layer PCB construction is required, with plated-through via holes providing closely spaced low-inductance connections from some components to the continuous ground plane (some of these holes are not visible in the figures for the Evaluation Circuit Board – artworks and NC drill output can be provided if required).

For the power supply filtering, low inductance surface mount capacitors are normally required. It has been found that very good RF decoupling is provided on each supply using a 1000 pF NPO size 0805 ceramic surface mount capacitor, closest to the device pin, with an adjacent 0.1 µF X7R capacitor. Other configurations are possible and it may be found that a single 0.01 µF or 0.1 µF X7R capacitor, size 0805 or smaller, on each supply gives good results. However this should be supported by larger decoupling capacitors elsewhere on the printed circuit board. Values of 1 to 10 µF are recommended, particularly where the voltage regulators are located more than a few inches from the device. These larger capacitors are recommended to be solid tantalum electrolytic or ceramic types.

Evaluation Circuit

An evaluation circuit is available, constructed on a double-side printed circuit board. The circuit is suitable for both the ZXFV301 and ZXFV302 and either device may be fitted. Figures 5 and 6 show the circuit diagram, and the layout of components and copper. A parts list is provided below. This layout serves as a useful example for many applications, showing the practical implementation of the advice given above in the Introduction.

BNC connector sockets allow connection to test instruments via 50Ω cables. The output circuit includes a resistor matching circuit to present a load of 150Ω to the device and simultaneously provide 50Ω output impedance. The attenuation of this matching circuit is 15.45 dB. As the device has unity voltage gain, the overall loss when loaded by 75Ω is also 15.45 dB.

EVALUATION CIRCUIT PARTS LIST:

QTY	CCT-REF	VALUE	DESCRIPTION
Resistors, surface mount			
4	R1,R2,R3,R4	51R	0805
4	R5,R6,R7,R8	22k	0805
1	R9	120R	0805
1	R10	62R	0805
1	R11	10R	0805
5	R12 to R16	47k	0805
Capacitors, surface mount			
6		100nF	25V ceramic 0805 X7R
2		1nF	50V ceramic 0805 NPO
2		10µF	16V Tant Elec size C
Integrated Circuits			
1	U1	—	Zetex ZXF 301N16 or ZXFV302N16
Miscellaneous			
5		—	BNC Socket, PCB straight flange, e.g. Tyco B35N14H999X99
1		—	3-way PCB screw terminal block IMO 20.501/3SB
1	SW1	—	DIL switch, 8 way
10	TP1 to TP10	—	PCB test terminal, red, W.Hughes 100-107

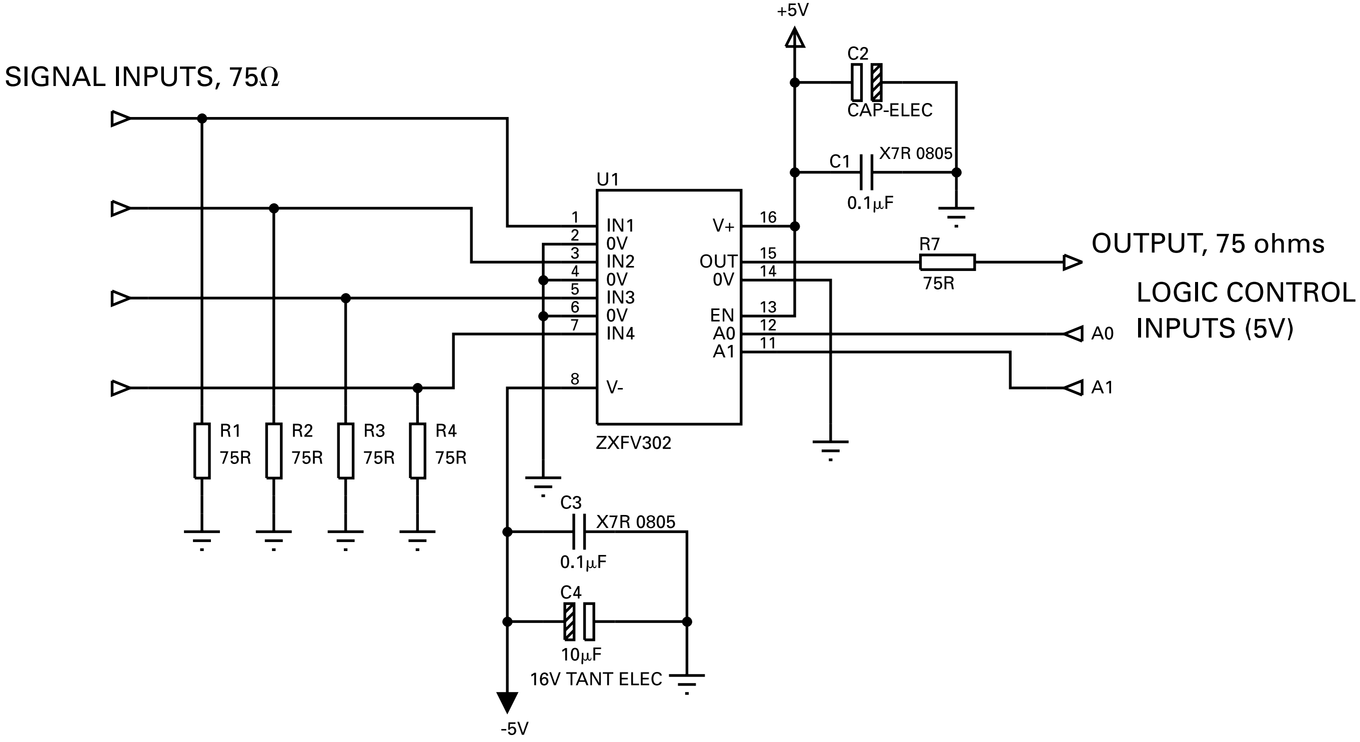


Figure 3: BASIC APPLICATION CIRCUIT, 4 CHANNEL DC COUPLED, DUAL SUPPLIES

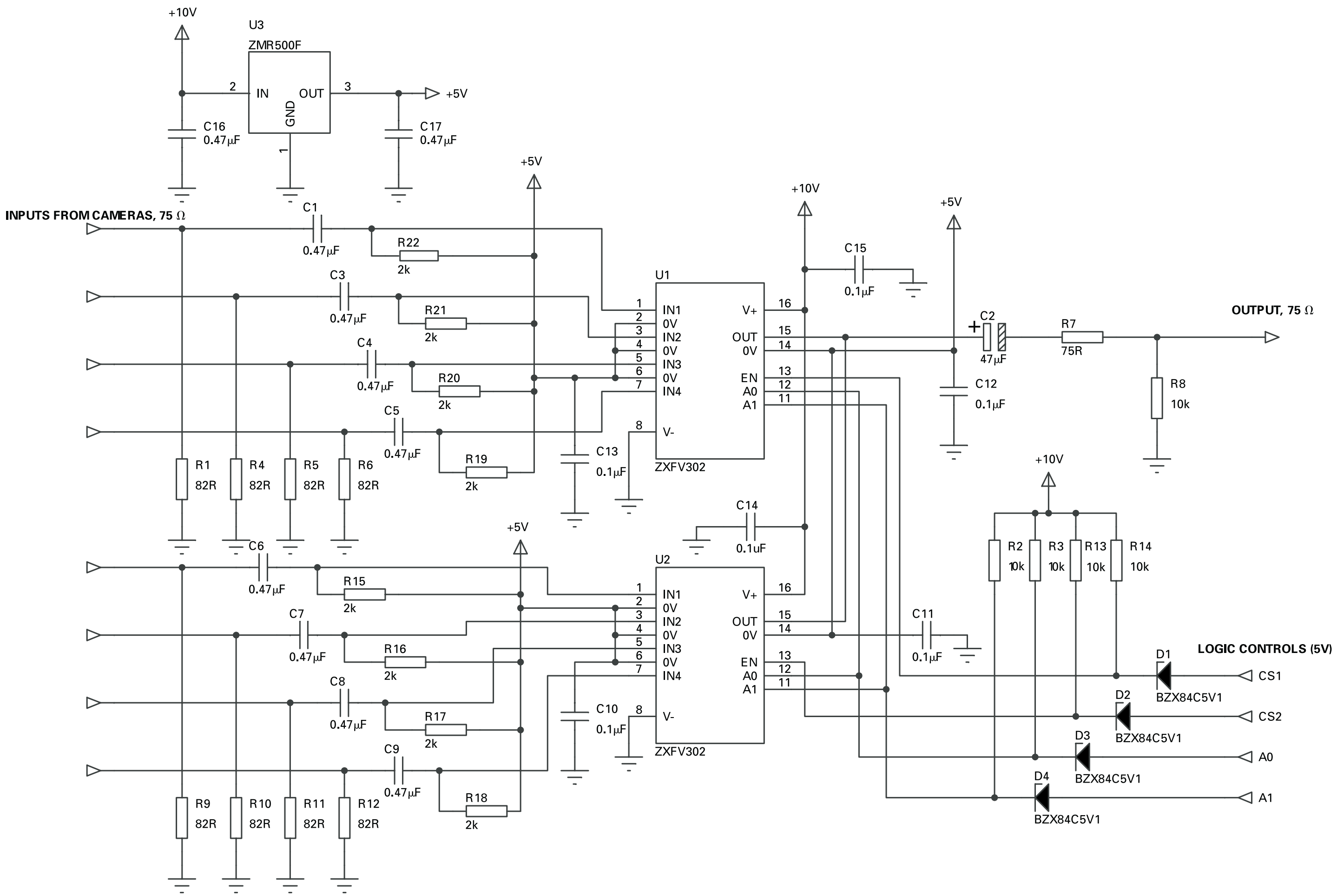
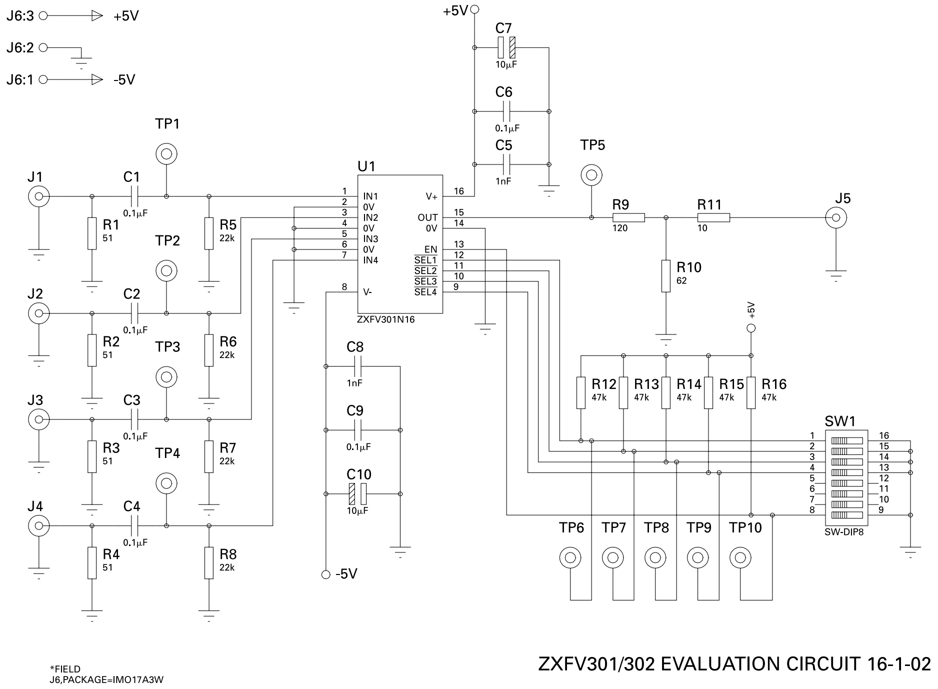


Figure 4: CCTV CIRCUIT WITH 8 CAMERA FROM SINGLE SUPPLY



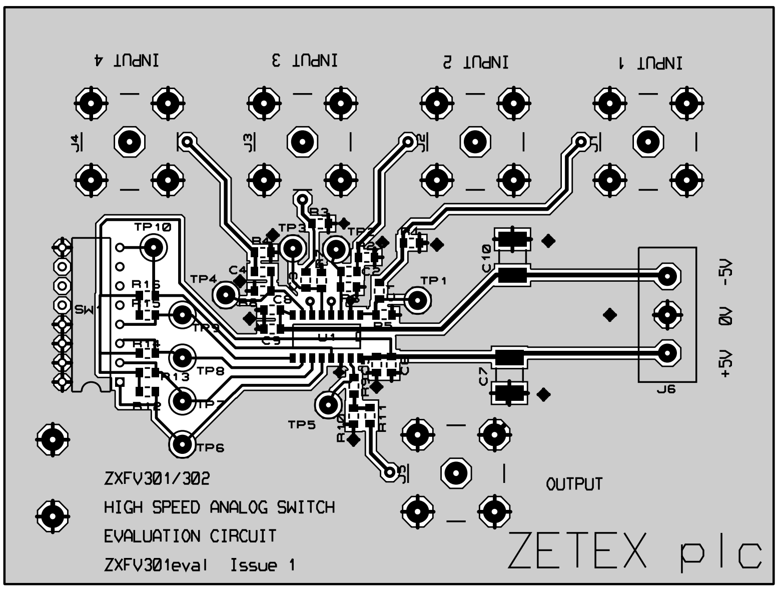


Figure 5: EVALUATION CIRCUIT & PRINTED BOARD LAYOUT SHOWING TOP COPPER (overall dimensions 4x3 inches)

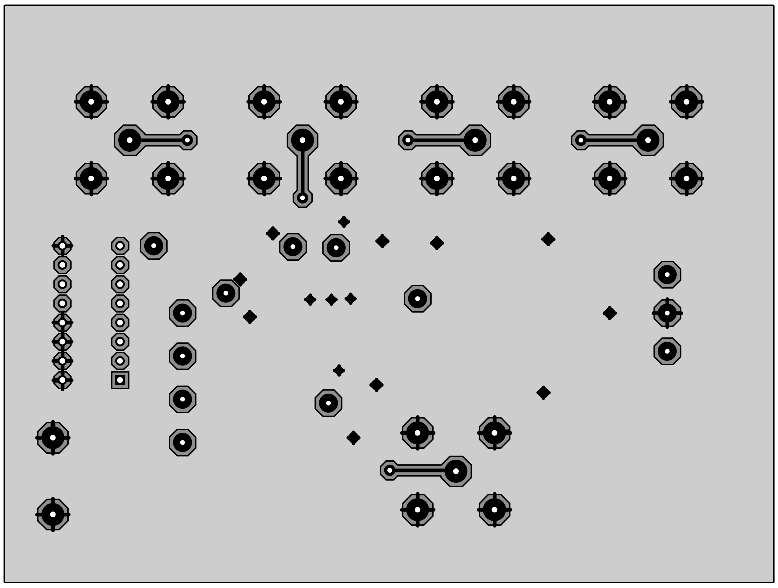
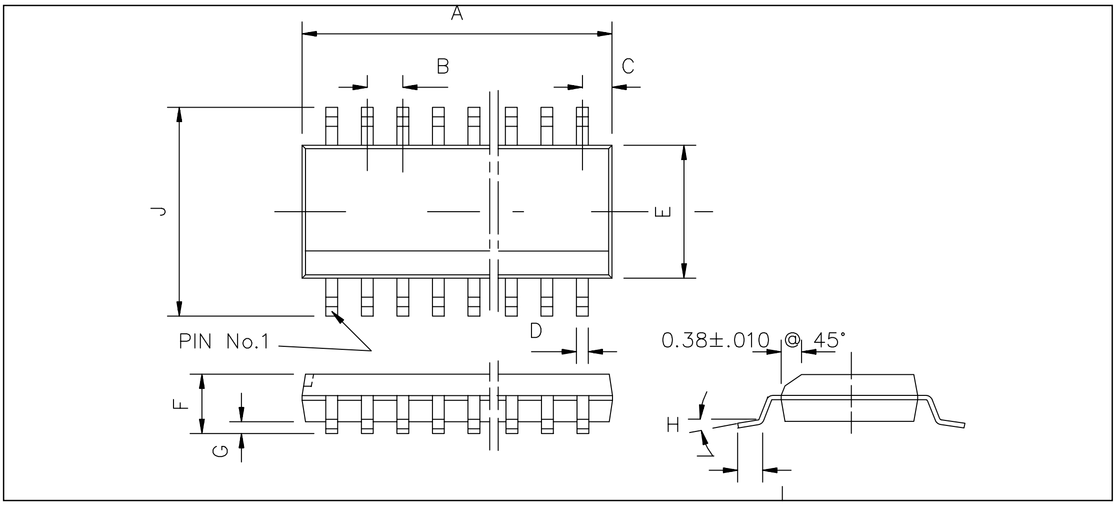


Figure 6: EVALUATION CIRCUIT BOARD BOTTOM COPPER
(viewed through from top)

Notes

Notes

PACKAGE OUTLINE



DIM	Millimetres		Inches	
	MIN	MAX	MIN	MAX
A	9.80	10.00	0.386	0.394
B	1.27 BSC		0.05 BSC	
C	0.53 REF		0.02 REF	
D	0.33	0.51	0.013	0.020
E	3.80	4.00	0.15	0.157
F	1.35	1.75	0.053	0.069
G	0.10	0.25	0.004	0.01
H	0°	8°	0°	8°
I	0.40	1.27	0.016	0.05
J	5.80	6.20	0.228	0.244

Conforms to JEDEC MS-012AC Iss C (SO16N)

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