

### Features

- Floating High Side Driver with boot-strap Power supply along with a Low Side Driver.
- Fully operational to 650V
- $\pm 50\text{V/ns}$  dV/dt immunity
- Gate drive power supply range: 10 - 35V
- Undervoltage lockout for both output drivers
- Separate Logic power supply range: 3.3V to  $V_{CL}$
- Built using the advantages and compatibility of CMOS and IXYS HDMOS™ processes
- Latch-Up protected over entire operating range
- High peak output current: 600 mA
- Matched propagation delay for both outputs
- Low output impedance
- Low power supply current
- Immune to negative voltage transients

**Warning: The IXA611 is ESD sensitive.**

### General Description

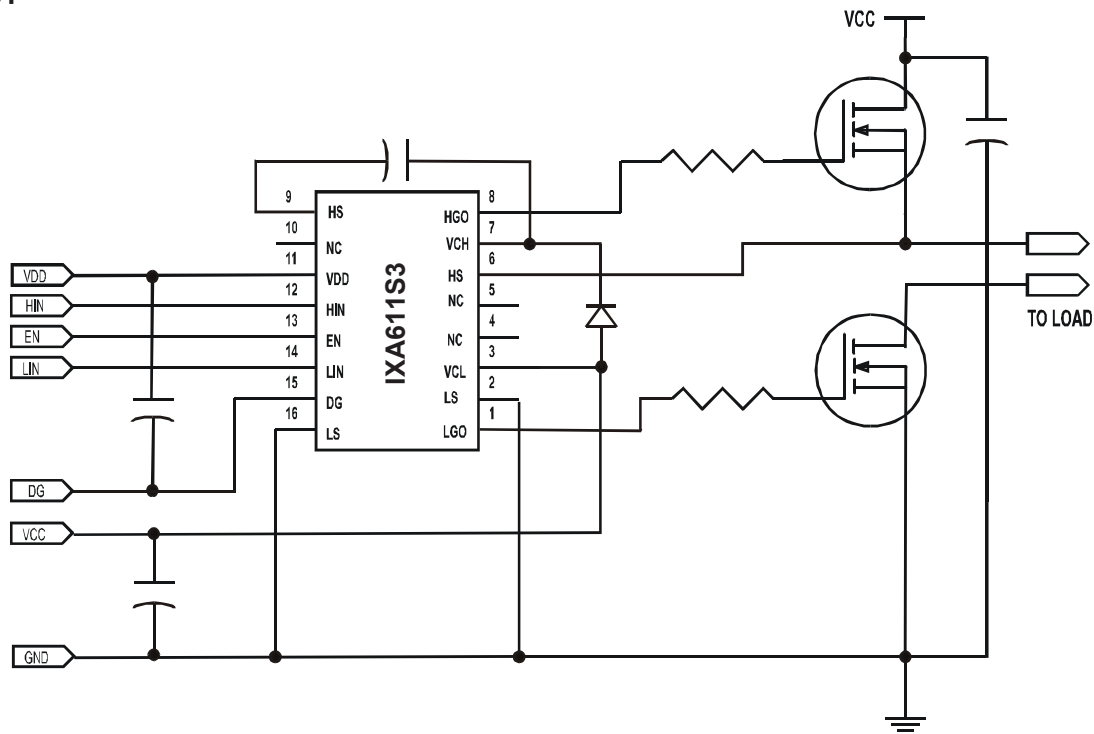
The IXA611 is a Bridge Driver for N-channel MOSFETs and IGBTs with a high side and low side output, whose input signals reference the low side. The High Side driver can control a MOSFET or IGBT connected to a positive buss voltage up to 650V. The logic input stages are compatible with TTL or CMOS, have built-in hysteresis and are fully immune to latch up over the entire operating range. The IXA611 can withstand dV/dt on the output side up to  $\pm 50\text{V/ns}$ .

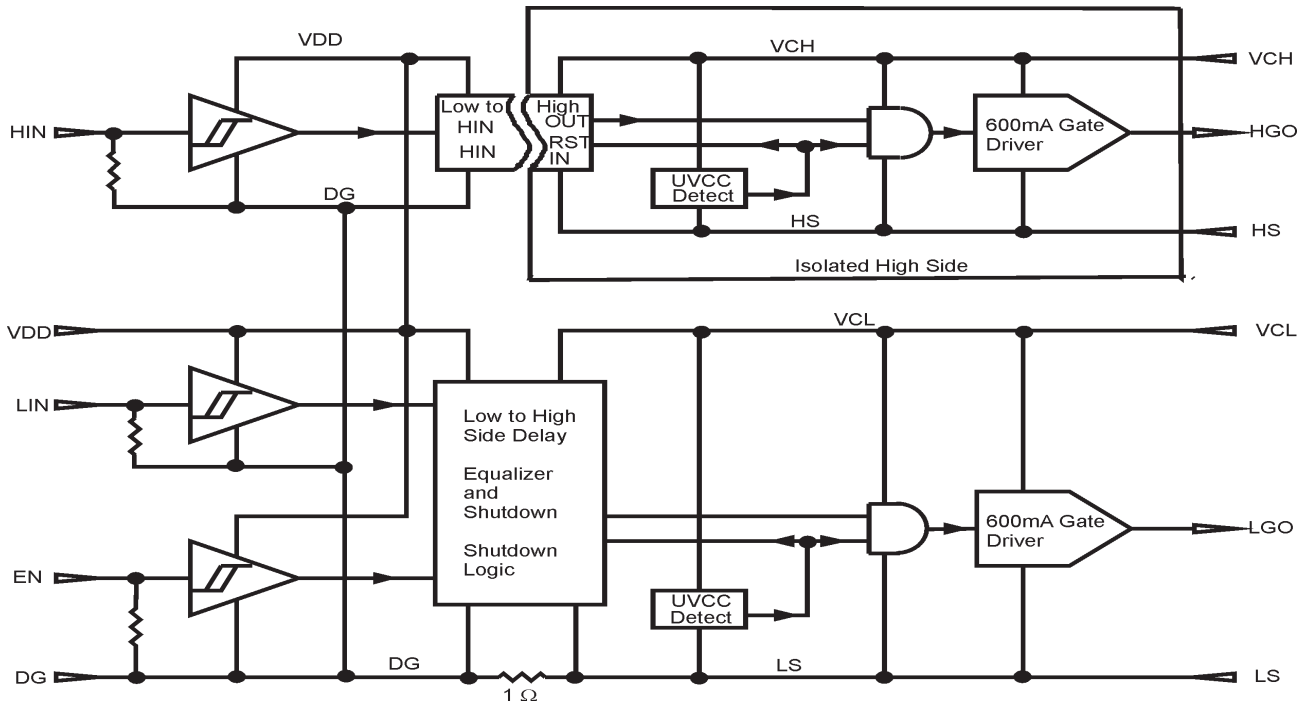
The IXA611 comes in either the 16-PIN SOIC package (IXA611S3) or the 14-PIN DIP through-hole package (IXA611P7)

### Applications

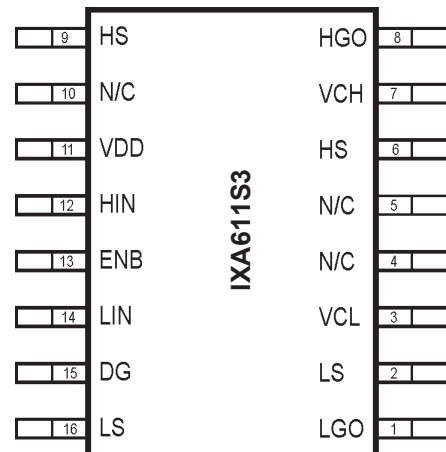
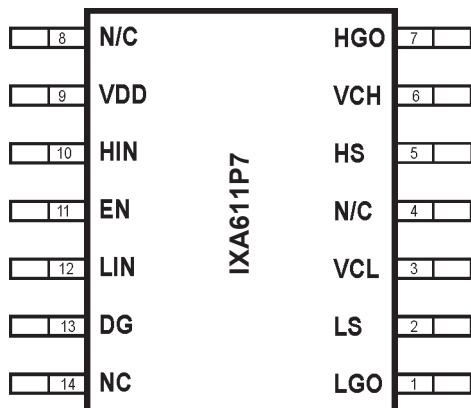
- Driving MOSFETs and IGBTs in half-bridge circuits
- High voltage, high side and low side drivers
- Motor Controls
- Switch Mode Power Supplies (SMPS)
- DC to DC Converters
- Class D Switching Amplifiers

**Figure 1. Typical Circuit Connection**



**Figure 2 - IXA611 Functional Block Diagram**

**Pin Description And Configuration**

SYMBOL	FUNCTION	DESCRIPTION
VDD	Logic Supply	Positive power supply for the chip CMOS functions
HIN	HS Input	High side Input signal, TTL or CMOS compatible; HGO in phase
LIN	LS Input	Low side Input signal, TTL or CMOS compatible; LGO in phase
ENB	Enable	Chip enable. When driven high, both outputs go low.
DG	Ground	Logic Reference Ground
VCH	Supply Voltage	High Side Power Supply
HGO	Output	High side driver output
HS	Return	High side voltage return pin
VCL	Supply Voltage	Low side power supply. This power supply provides power for both outputs. Voltage range is from 4.5 to 25V.
LGO	Output	Low side driver output
LS	Ground	Low side return



IXYS ICs are covered by US Patent No. 6,759,692

**Absolute Maximum Ratings**

Symbol	Definition	Min	Max	Units
$V_{CH}$	High side floating supply voltage	-25	650	V
$V_{HS}$	High side floating supply offset voltage	$V_{CH}-200$	$V_{CH}+3$	V
$V_{HGO}$	High side floating output voltage	$V_{HS}-3$	$V_{CH}+3$	V
$V_{CL}$	Low side fixed supply voltage	-0.3	35	V
$V_{LGO}$	Low side output voltage	-0.3	$V_{CL}+3$	V
$V_{DD}$	Logic supply voltage	-0.3	$V_{DG}+35$	V
$V_{DG}$	Logic supply offset voltage	$V_{LS}-3.8$	$V_{LS}+3.8$	V
$V_{IN}$	Logic input voltage(HIN & LIN)	$V_{SS}-3$	$V_{DD}+3$	V
$dV_S/dt$	Allowable offset supply voltage transient		50	V/ns
$P_D$	Package power dissipation@ $T_A \leq 25C$		1	W
$P_D$	Package power dissipation@ $T_C \leq 25C$		2.1	W
$R_{THJA}$	Thermal resistance, junction-to-ambient		125	K/W
$R_{THJc}$	Thermal resistance, junction-to-case		60	K/W
$T_J$	Junction Temperature		150	°C
$T_S$	Storage temperature	-55	150	°C
$T_L$	Lead temperature (soldering, 10 s)		300	°C

**Recommended Operating Conditions**

Symbol	Definition	Min	Max	Units
$V_{CH}$	High side floating supply absolute voltage	$V_{HS}+10$	$V_{HS}+20$	V
$V_{HS}$	High side floating supply offset voltage	-20	650	V
$V_{HGO}$	High side floating output voltage	$V_{HS}$	$V_{CH}+20$	V
$V_{CL}$	Low side fixed supply voltage	10	20	V
$V_{LGO}$	Low side output voltage	0	$V_{CC}$	V
$V_{DD}$	Logic supply voltage	$V_{DG}+3$	$V_{DG}+20$	V
$V_{DG}$	Logic supply voffset voltage	$V_{LS}-1$	$V_{LS}+1$	V
$V_{IN}$	Logic input voltage(HIN, LIN, ENbar)	$V_{DG}$	$V_{DD}$	V
$T_A$	Ambient Temperature	-40	125	°C

Ordering Information	
Part Number	Package Type
IXA611P7	14-PIN DIP
IXA611S3	16-PIN SOIC

**Dynamic Electrical Characteristics**

Symbol	Definition	Test Conditions	Min	Typ	Max	Units
$t_{on}$	Turn-on propagation delay	$V_{HS} = 0V, C_{load} = 2nF$		120		ns
$t_{off}$	Turn-off propagation delay	$V_{HS} = 600V, C_{load} = 2nF$		87		ns
$t_{en}$	Device enable delay			202		ns
$t_r$	Turn-on rise time	$C_{load} = 2nF$		23		ns
$t_f$	Turn-off fall time	$C_{load} = 2nF$		22		ns
$t_{dm}$	Delay matching, HS & LS turn-on/off	$C_{load} = 2nF$		50		ns

**Static Electrical Characteristics**

Symbol	Definition	Test Conditions	Min	Typ	Max	Units
$V_{INH}$	Logic "1" input voltage	$V_{DD} = V_{CL} = 15V$	7.0			V
$V_{INL}$	Logic "0" input voltage				6	V
$V_{HLGO} / V_{HHGO}$	High level output voltage, $V_{CH} - V_{HGO}$ or $V_{CL} - V_{LGO}$	$I_O = 0A$		0.28		V
$V_{LLGO} / V_{LHGO}$	High level output voltage, $V_{HGO}$ or $V_{LGO}$	$I_O = 0A$		.23		V
$I_{HL}$	HS to LS bias current.	$V_{HS} = V_{CH} = 600V$		.17		mA
$I_{QHS}$	Quiescent $V_{CH}$ supply current	$V_{IN} = 0V$ or $V_{DD}$		.77		mA
$I_{QLS}$	Quiescent $V_{CL}$ supply current	$V_{IN} = 0V$ or $V_{DD}$		.79		mA
$I_{QDD}$	Quiescent $V_{DD}$ supply current	$V_{IN} = 0V$ or $V_{DD}$		36		uA
$I_{IN+}$	Logic "1" input bias current	$V_{IN} = V_{DD}$		2		uA
$I_{IN-}$	Logic "0" input voltage	$V_{IN} = 0V$		1		uA
$V_{CHUV+}$	$V_{CH}$ supply undervoltage positive going threshold.			8.3		V
$V_{CHUV-}$	$V_{CH}$ supply undervoltage negative going threshold.			8.2		V
$V_{CLUV+}$	$V_{CL}$ supply undervoltage positive going threshold			8.1		V
$V_{CLUV-}$	$V_{CL}$ supply undervoltage negative going threshold.			8.0		V
$I_{GO}$	HS or LS Output low short circuit current; $V_{GO} = 15V, V_{IN} = 0V, PW < 10\mu s$			$\pm 0.6$		A

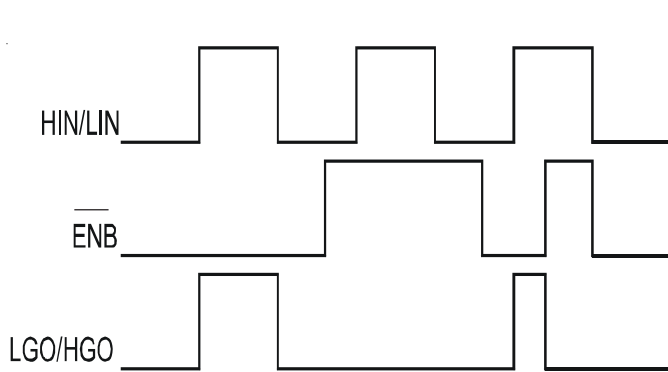
**Timing Waveform Definitions**


Figure 3. INPUT/OUPUT Timing Diagram

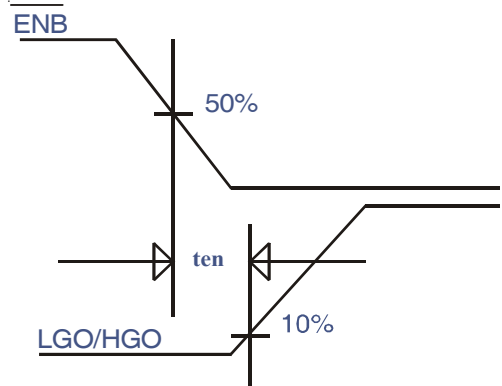


Figure 4. ENABLE Waveform Definitions

## Timing Waveform Definitions

Figure 5. Definitions of Switching Time Waforms

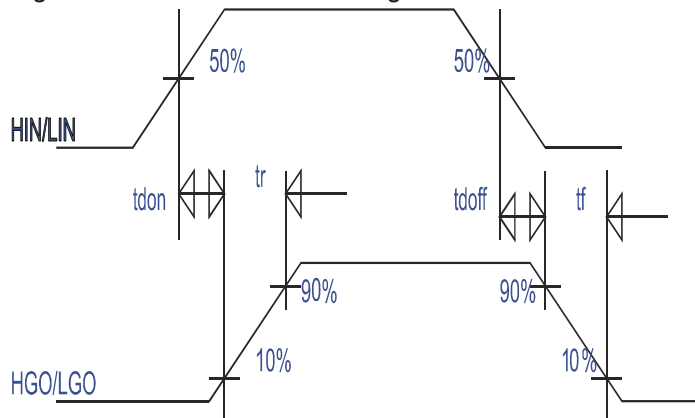


Figure 6. Definitions of Delay Matching Waveforms

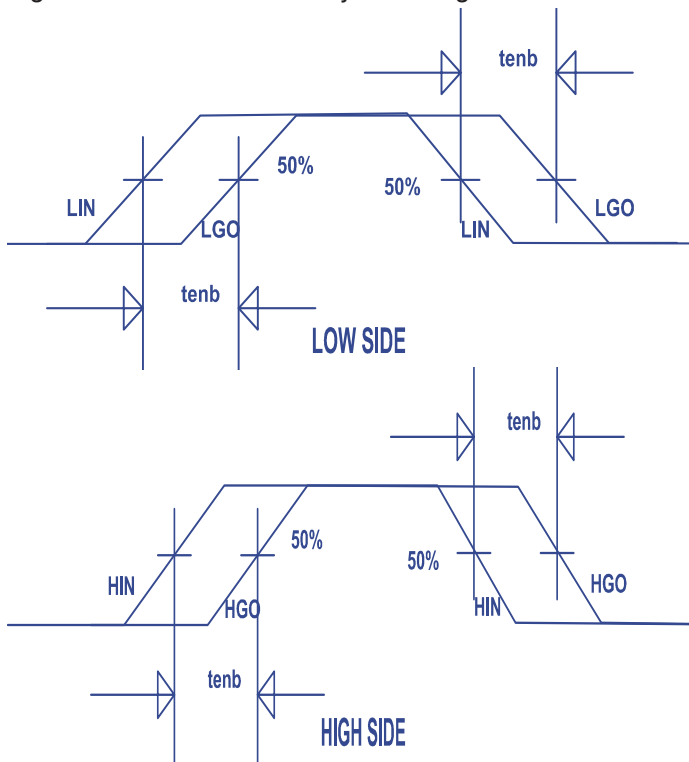
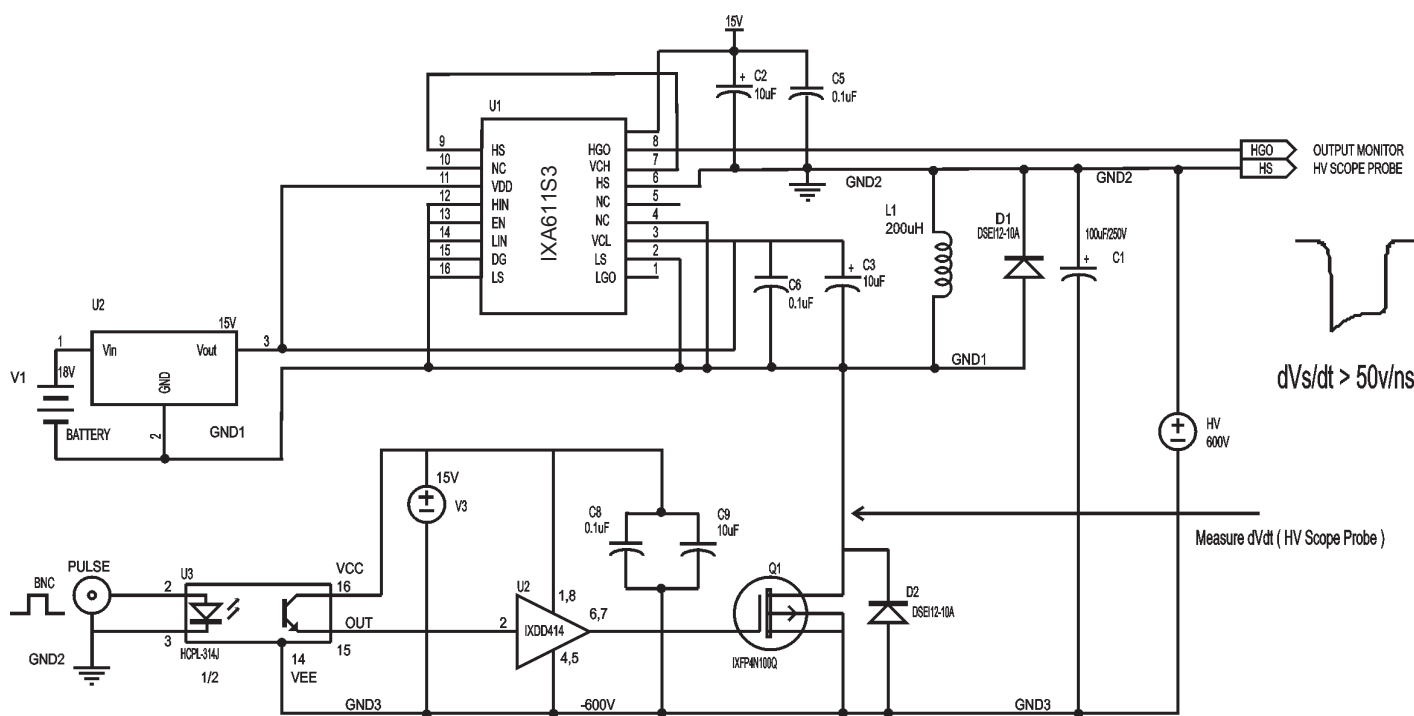
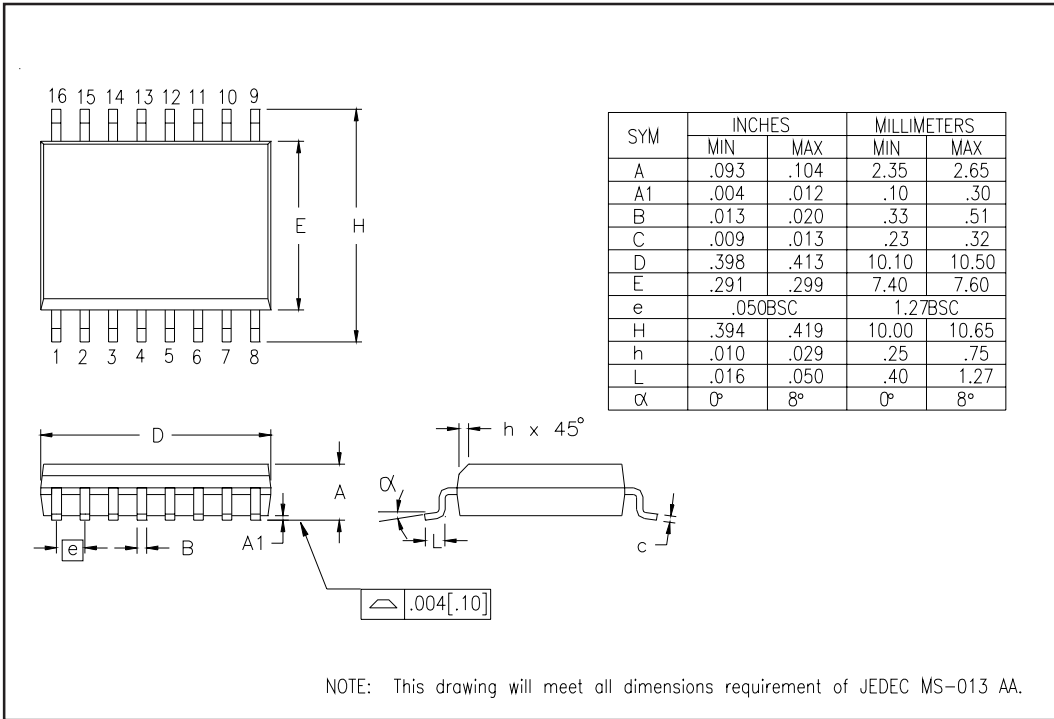
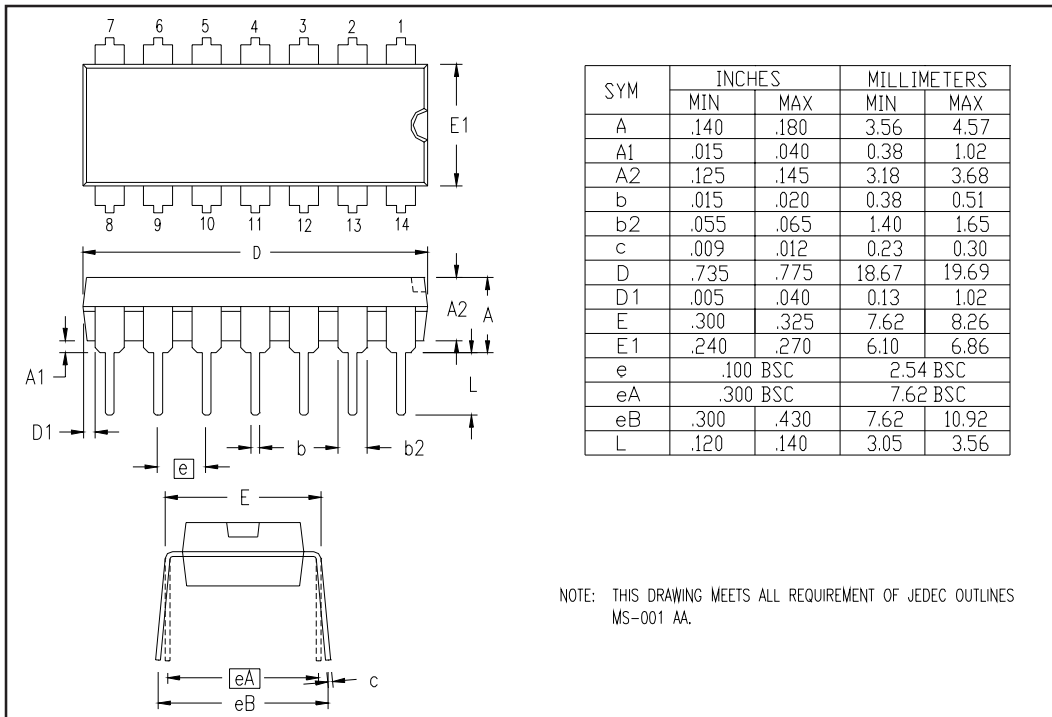


Figure 7. Test circuit for allowable offset supply voltage transient.



**IXA611S3 Package Outline**

**IXA611P7 Package Outline**


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