

Universal Relay Driver

Features

- 10V to 450V Input Voltage Range
- Energy-saving Hold Current Mode
- Adjustable Microcontroller Supply
- Low Supply Current <1 mA
- Constant-current Coil Drive
- Programmable Pull-in Current, Pull-in Time and Hold Current

Applications

- Industrial Controls
- Relay Timers
- Solenoid Drivers
- Home Automation

General Description

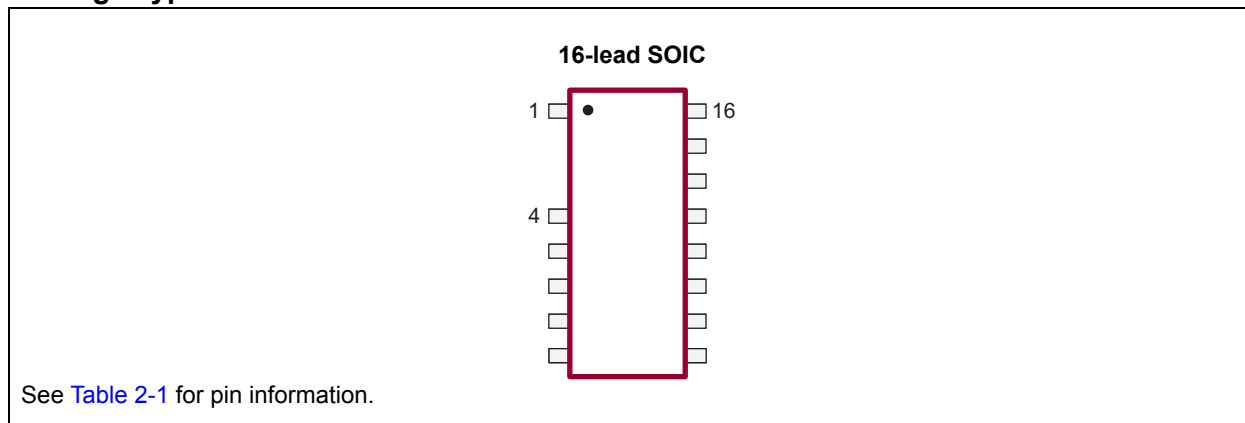
The HV9901 universal relay driver provides high-efficiency driving for low-voltage relays with supply voltages as high as 450V. For example, a relay with a 5V coil can be driven directly from the rectified 120 VAC or 230 VAC line.

The IC includes two high-voltage linear regulators. The first one is for providing power to internal control circuitry. The second one has an adjustable output voltage and a 1 mA output current capability to support external circuitry, such as a microcontroller control circuit.

The pull-in current, pull-in time and hold current for the relay are individually programmable through two resistors and a capacitor. PWM switching can be synchronized with an external clock or with another HV9901 operating at a higher frequency.

The relay is operated through the enable input ENI. Logic polarity is under control of the polarity input POL. Audible noise coming from the relay can be suppressed by operating at a PWM frequency exceeding 20 kHz.

Package Type

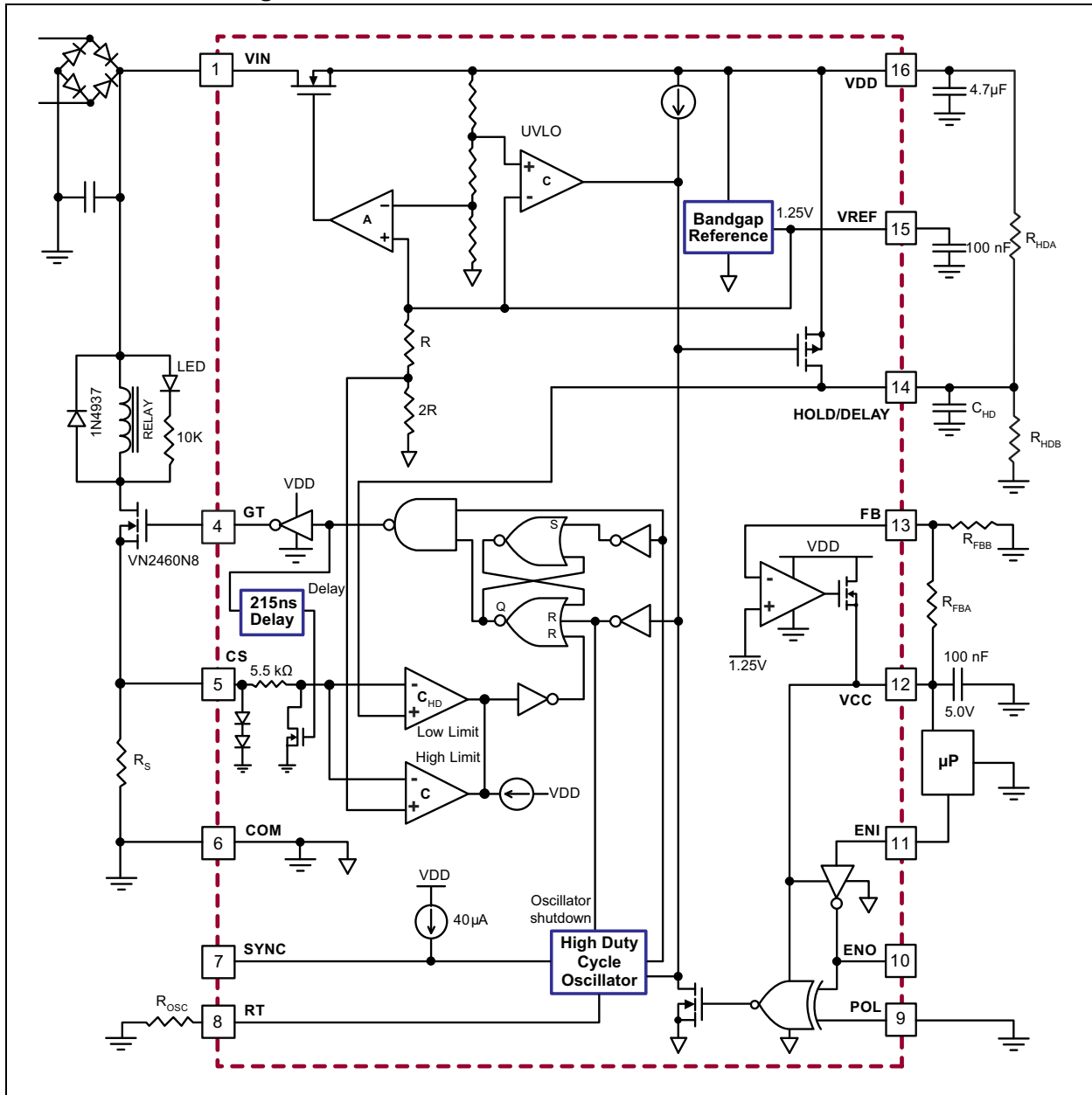


WARNING

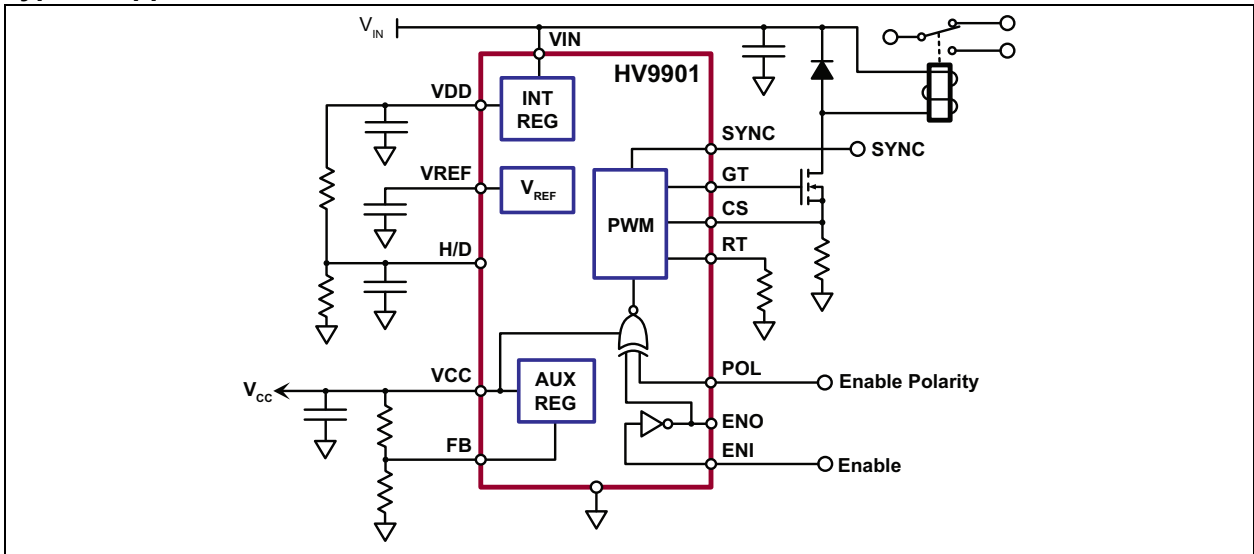
The HV9901 is suited for relay driving applications operating at hazardous voltage. Ensure that adequate safeguards are provided to protect the end user from electrical shock.

HV9901

Functional Block Diagram



Typical Application Circuit



HV9901

1.0 ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings†

Input Voltage, V_{IN} ¹	-0.5V to 470V
Input Voltage to any other Pin ¹	-0.3V to $V_{DD} + 0.3V$
Operating Junction Temperature Range	-40°C to +85°C
Continuous Power Dissipation ($T_A = +25^\circ C$) ²	750 mW

† **Notice:** Stresses above those listed under “Maximum Ratings” may cause permanent damage to the device. This is a stress rating only, and functional operation of the device at those or any other conditions above those indicated in the operational listings of this specification is not implied. Exposure to maximum rating conditions for extended periods may affect device reliability.

Note 1: All voltages are referenced to GND.

Note 2: For operation above 25°C ambient, derate linearly at 7.5 mW/°C.

ELECTRICAL CHARACTERISTICS

Electrical Specifications: $T_A = 25^\circ C$ unless otherwise noted.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
HIGH-VOLTAGE REGULATOR						
Input Voltage	V_{IN}	10	—	450	V	$I_{CC} = 0$ mA to 1 mA load
Supply Current	I_{IN}	—	—	2	mA	No load at V_{DD} (Note 1) load at $I_{CC} = 1$ mA, $C_{GT} = 500$ pF, $f_{OSC} = 25$ kHz
Internal Supply Voltage	V_{DD}	8.5	9	9.5	V	No load at V_{DD} (Note 1) $C_{GT} = 500$ pF, $f_{OSC} = 25$ kHz
V_{DD} UVLO, On	$UVLO_{(ON)}$	7.8	8.2	8.5	V	
V_{DD} UVLO, Hysteresis	$UVLO_{(HYST)}$	—	0.5	—	V	
ADJUSTABLE REGULATOR						
Regulator Output Voltage Range	V_{CC}	2	—	5.5	V	$I_{CC} = 1$ mA load
Regulator Output Current	I_{CC}	0	—	1	mA	No load at V_{DD} (Note 1)
Feedback Voltage	V_{FB}	0	V_{REF}	$V_{DD}-1V$	V	
Input Bias Current	I_{FB}	—	25	100	nA	$V_{FB} = V_{REF}$
REFERENCE						
Bandgap Reference Voltage	V_{REF}	1.2	1.25	1.3	V	$T_A = -40^\circ C$ to $+85^\circ C$
Load Regulation		—	—	7	mV	0 mA < $I_{REF} < 0.3$ mA
Line Regulation		—	10	15	mV	$8.5V < V_{DD} < 9.5V$
Short Circuit Current	$I_{REF(SHORT)}$	—	—	1	mA	
Reference Voltage Sink Current	$I_{REF(SINK)}$	—	—	20	μA	

ELECTRICAL CHARACTERISTICS (CONTINUED)

Electrical Specifications: $T_A = 25^\circ\text{C}$ unless otherwise noted.						
Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
OSCILLATOR						
PWM Oscillator Frequency	f_{OSC}	20	25	35	kHz	$R_T = 1\text{ M}\Omega$
		80	100	140	kHz	$R_T = 226\text{ k}\Omega$
Temperature Coefficient	—	—	170	—	ppm/ $^\circ\text{C}$	$T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$
Oscillator SYNC Frequency	f_{SYNC}	—	—	150	kHz	
SYNC Sourcing Current	I_{SYNC}	20	—	55	μA	
SYNC Sinking Current	I_{SYNC}	1	—	—	mA	$V_{\text{SYNC}} = 0.1\text{V}$
SYNC Input Logic Low Voltage	V_{SYNC}	—	—	1	V	
PWM						
Maximum Duty Cycle	D_{MAX}	96.5	—	99.5	%	$R_T = 1\text{ M}\Omega$
		86.5	—	97.5	%	$R_T = 226\text{ k}\Omega$
Blanking Time	t_{BLNK}	150	215	280	ns	
MOSFET DRIVER						
Gate Drive Output High	V_{GTH}	$V_{\text{DD}}-0.3$	—	—	V	$I_{\text{OUT}} = 10\text{ mA}$
Gate Drive Output Low	V_{GTL}	—	—	0.3	V	$I_{\text{OUT}} = -10\text{ mA}$
Rise Time	t_{R}	—	30	50	ns	$C_{\text{GT}} = 500\text{ pF}$
Fall Time	t_{F}	—	30	50	ns	
CURRENT SENSE						
Current Sense Voltage, High Limit	$V_{\text{CS(HL)}}$	0.775	0.833	0.891	V	
Current Limit Delay to GT, High Limit	$t_{\text{DELAY(HL)}}$	—	200	250	ns	50 mV overdrive
Input Bias Current	I_{CS}	—	25	1000	nA	POL = Low, ENI = Low
Low Limit Comparator Input Offset Voltage	V_{OS}	—	—	± 60	mV	
Current Limit Delay to GT, Low Limit	$t_{\text{DELAY(LL)}}$	—	200	250	ns	50 mV overdrive
Hold/Delay Output Voltage	$V_{\text{HOLD/DEL}}$	$V_{\text{DD}}-0.4$	—	—	V	$I_{\text{HOLD/DEL(sourcing)}} = 100\text{ }\mu\text{A}$ POL = Low, ENI = Low
Hold/Delay Input Bias Current	$I_{\text{HOLD/DEL}}$	—	25	500	nA	POL = Low, ENI = Low
Shutdown Delay	t_{ENI}	—	50	100	ns	$2\text{V} < V_{\text{CC}} < 5.5\text{V}$
Enable Input Voltage - High	V_{ENI}	$0.7 V_{\text{CC}}$	—	V_{CC}	V	
Enable Input Voltage - Low		0	—	$0.3 V_{\text{CC}}$	V	
Enable Input Current - High	I_{ENI}	—	1	5	μA	
Enable Input Current - Low		-5	-1	—	μA	
Polarity Voltage - High	V_{POL}	$0.7 V_{\text{CC}}$	—	V_{CC}	V	
Polarity Voltage - Low		0	—	$0.3 V_{\text{CC}}$	V	
Polarity Current - High	I_{POL}	—	1	5	μA	
Polarity Current - Low		-5	-1	—	μA	
Enable Output Voltage - High	V_{ENO}	$0.9 V_{\text{CC}}$	—	V_{CC}	V	
Enable Output Voltage - Low		0	—	$0.1 V_{\text{CC}}$	V	

Note 1: Maximum allowable load current limited by power dissipation and operating ambient temperature

HV9901

TEMPERATURE SPECIFICATIONS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
TEMPERATURE RANGE						
Operating Junction Temperature	T_J	-40	—	85	°C	
PACKAGE THERMAL RESISTANCE						
16-lead SOIC	θ_{JA}	—	83	—	°C/W	

1.1 Truth Table

ENABLE OUTPUT LOGIC TRUTH TABLE

POL	ENI	ENO	Gate Drive Output
Low	Low	High	V_{GT} = Oscillating output, duty cycle depends on inductive load
Low	High	Low	V_{GT} = Low, SYNC = High, oscillator shutdown
High	High	Low	V_{GT} = Oscillating output, duty cycle depends on inductive load
High	Low	High	V_{GT} = Low, SYNC = High, oscillator shutdown

2.0 PIN DESCRIPTION

The pin details of HV9901 are listed on [Table 2-1](#). See [Package Type](#) for the location of the pins.

TABLE 2-1: PIN TABLE

Pin Number	Pin Name	Description
1	VIN	Input supply
2	—	Pin not present
3	—	Pin not present
4	GT	Gate driver output for driving the external switching MOSFET
5	CS	Current sense input
6	GND	Ground
7	SYNC	Open-drain input/output for synchronizing the internal PWM oscillator to other HV9901s or to an external clock
8	RT	A resistor from this pin to ground sets the PWM switching frequency.
9	POL	Input that determines the polarity of the ENI input. See Truth Table .
10	ENO	Enable output. It is the logical inversion of the ENI signal.
11	ENI	Enable input. Whether ENI is active low or active high is determined by the POL input.
12	VCC	Output of the auxiliary regulator. Output voltage is determined by the resistive divider connected to the FB pin.
13	FB	Feedback input for the auxiliary regulator.
14	H/D	HOLD/DELAY input. An RC network connected to this pin controls the pull-in time and the holding current. See equations on page 4.
15	VREF	Reference voltage. Bypass locally with a 10 nF capacitor.
16	VDD	Output of the internal supply regulator. Bypass locally with a 10 nF capacitor.

3.0 APPLICATION INFORMATION

To calculate external component values, use the equations shown in [Equation 3-1](#) to [Equation 3-8](#) as well as [Figure 3-1](#) and [Figure 3-2](#).

EQUATION 3-1:

$$I_{CS(HI)} = 833mV_{NOM}$$

EQUATION 3-2:

$$V_{DD} = 9V_{NOM}$$

EQUATION 3-3:

$$I_{PULL-IN} = \frac{V_{CS}}{R_{SENSE}}$$

EQUATION 3-4:

$$V_{CS(LL)} = \frac{V_{DD}}{1 + \frac{R_{HDA}}{R_{HDB}}}$$

EQUATION 3-8:

$$t_{PULL-IN} = (R_{HDA} + R_{HDB}) \cdot C_{HD} \cdot \ln\left(1 - \frac{V_{CS(HI)} - V_{DD}}{V_{CS(LL)} - V_{DD}}\right)$$

EQUATION 3-5:

$$I_{HOLD} = \frac{V_{CS(LL)}}{R_{SENSE}}$$

EQUATION 3-6:

$$f_{PWM} \approx 3.23kHz + \frac{21.8GHz \cdot \Omega}{R_{OSC}}$$

valid for $f_{PWM} > 23 kHz$

EQUATION 3-7:

$$V_{CC} = 1.25V \cdot \left(1 + \frac{R_{FBA}}{R_{FBB}}\right)$$

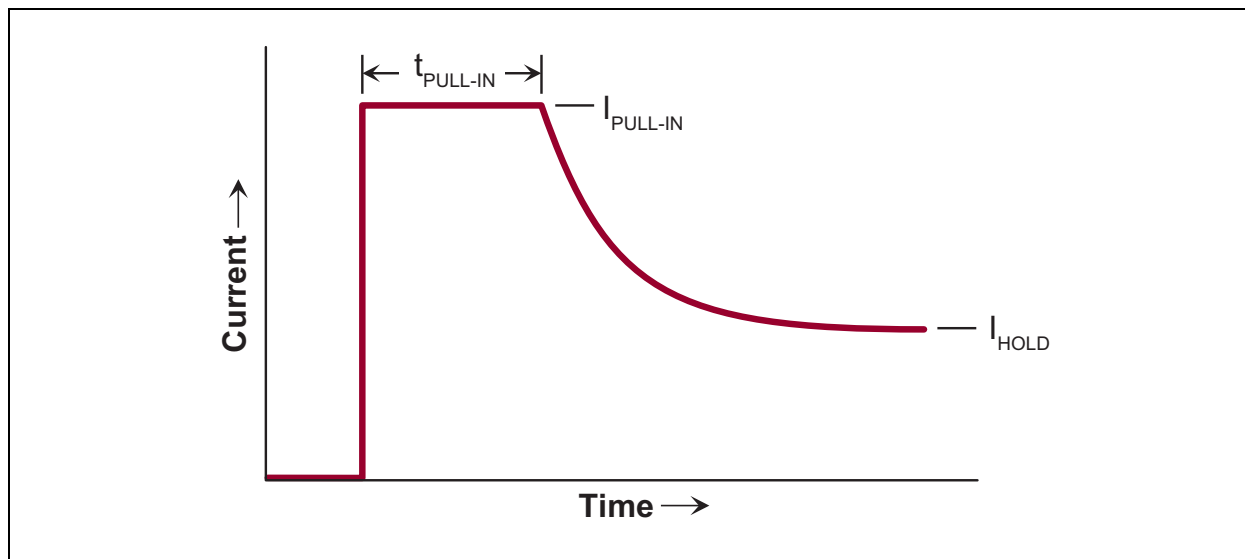


FIGURE 3-1: Current vs. Time.

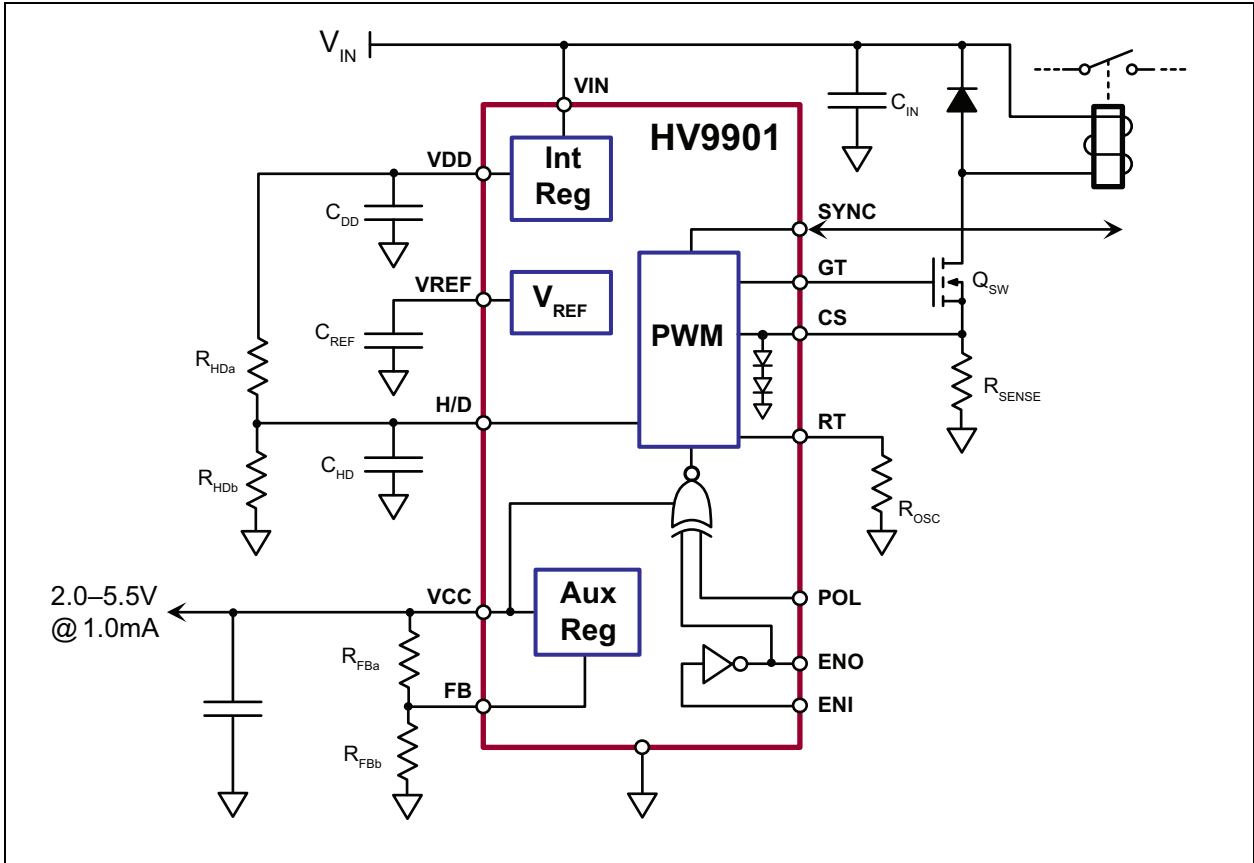
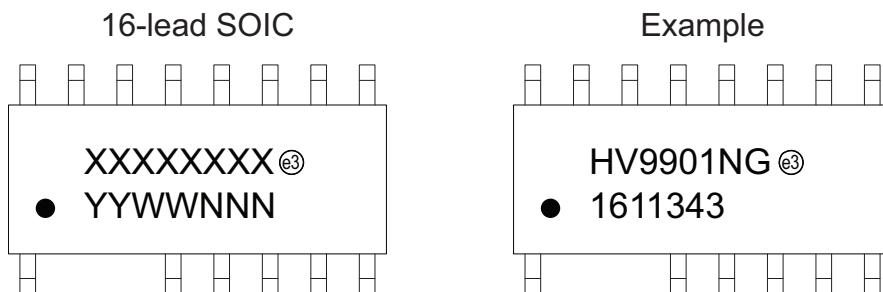


FIGURE 3-2: Typical Application Circuit.

HV9901

4.0 PACKAGING INFORMATION

4.1 Package Marking Information



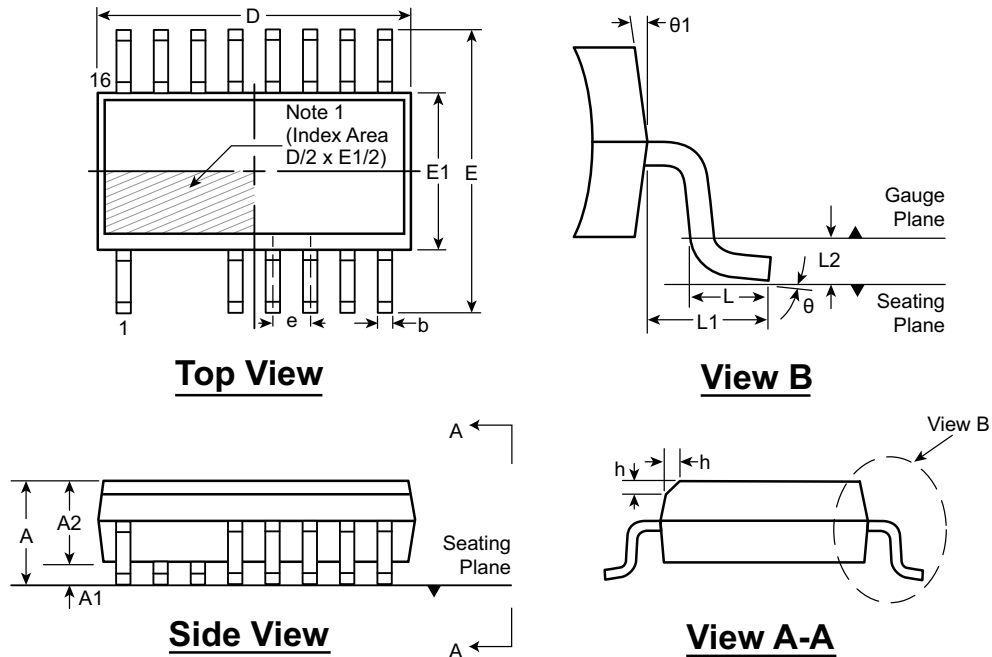
Legend:	XX...X	Product Code or Customer-specific information
	Y	Year code (last digit of calendar year)
	YY	Year code (last 2 digits of calendar year)
	WW	Week code (week of January 1 is week '01')
	NNN	Alphanumeric traceability code
	(e3)	Pb-free JEDEC® designator for Matte Tin (Sn)
	*	This package is Pb-free. The Pb-free JEDEC designator (e3) can be found on the outer packaging for this package.

Note: In the event the full Microchip part number cannot be marked on one line, it will be carried over to the next line, thus limiting the number of available characters for product code or customer-specific information. Package may or not include the corporate logo.

16-Lead SOIC (Narrow Body) Package Outline (NG)

Pins #2 and #3 Trimmed

9.90x3.90mm body, 1.75mm height (max), 1.27mm pitch



Note: For the most current package drawings, see the Microchip Packaging Specification at www.microchip.com/packaging.

Note:

1. This chamfer feature is optional. If it is not present, then a Pin 1 identifier must be located in the index area indicated. The Pin 1 identifier can be: a molded mark/identifier; an embedded metal marker; or a printed indicator.

Symbol	A	A1	A2	b	D	E	E1	e	h	L	L1	L2	θ	θ1		
Dimension (mm)	MIN	1.35*	0.10	1.25	0.31	9.80*	5.80*	3.80*	1.27 BSC	0.25	0.40	1.04 REF	0.25 BSC	0°	5°	
	NOM	-	-	-	-	9.90	6.00	3.90		-	-		-	-	-	-
	MAX	1.75	0.25	1.65*	0.51	10.00*	6.20*	4.00*		0.50	1.27		-	-	8°	15°

JEDEC Registration MS-012, Variation AC, Issue E, Sept. 2005.

* This dimension is not specified in the JEDEC drawing.

Drawings are not to scale.

HV9901

NOTES:

APPENDIX A: REVISION HISTORY

Revision A (August 2016)

- Updated file to Microchip format.
- Converted Supertex Doc # DSFP-HV9901 to Microchip DS20005550A.
- Minor text changes throughout.

HV9901

PRODUCT IDENTIFICATION SYSTEM

To order or obtain information, e.g., on pricing or delivery, refer to the factory or the listed sales office.

<u>PART NO.</u>	XX	-	X	-	X
Device	Package Options		Environmental		Media Type
<p>Device: HV9901 = Universal Relay Driver</p> <p>Package: NG = 16-lead SOIC</p> <p>Environmental: G = Lead (Pb)-free/RoHS-compliant Package</p> <p>Media Type: (blank) = 45/Tube for an NG Package M901 = 2600/Reel for an NG Package M934 = 2600/Reel for an NG Package</p> <p>Note: For media types M901 and M934, the base quantity for tape and reel was standardized to 2600/reel. Both options will result in delivery of the same number of parts/reel.</p>					
Examples:					
a)	HV9901NG-G:				Universal Relay Driver, 16-lead SOIC Package, 45/Tube
b)	HV9901NG-G-M901:				Universal Relay Driver, 16-lead SOIC Package, 2600/Reel
c)	HV9901NG-G-M934:				Universal Relay Driver, 16-lead SOIC Package, 2600/Reel

Note the following details of the code protection feature on Microchip devices:

- Microchip products meet the specification contained in their particular Microchip Data Sheet.
- Microchip believes that its family of products is one of the most secure families of its kind on the market today, when used in the intended manner and under normal conditions.
- There are dishonest and possibly illegal methods used to breach the code protection feature. All of these methods, to our knowledge, require using the Microchip products in a manner outside the operating specifications contained in Microchip's Data Sheets. Most likely, the person doing so is engaged in theft of intellectual property.
- Microchip is willing to work with the customer who is concerned about the integrity of their code.
- Neither Microchip nor any other semiconductor manufacturer can guarantee the security of their code. Code protection does not mean that we are guaranteeing the product as “unbreakable.”

Code protection is constantly evolving. We at Microchip are committed to continuously improving the code protection features of our products. Attempts to break Microchip's code protection feature may be a violation of the Digital Millennium Copyright Act. If such acts allow unauthorized access to your software or other copyrighted work, you may have a right to sue for relief under that Act.

Information contained in this publication regarding device applications and the like is provided only for your convenience and may be superseded by updates. It is your responsibility to ensure that your application meets with your specifications. MICROCHIP MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WHETHER EXPRESS OR IMPLIED, WRITTEN OR ORAL, STATUTORY OR OTHERWISE, RELATED TO THE INFORMATION, INCLUDING BUT NOT LIMITED TO ITS CONDITION, QUALITY, PERFORMANCE, MERCHANTABILITY OR FITNESS FOR PURPOSE. Microchip disclaims all liability arising from this information and its use. Use of Microchip devices in life support and/or safety applications is entirely at the buyer's risk, and the buyer agrees to defend, indemnify and hold harmless Microchip from any and all damages, claims, suits, or expenses resulting from such use. No licenses are conveyed, implicitly or otherwise, under any Microchip intellectual property rights unless otherwise stated.

Microchip received ISO/TS-16949:2009 certification for its worldwide headquarters, design and wafer fabrication facilities in Chandler and Tempe, Arizona; Gresham, Oregon and design centers in California and India. The Company's quality system processes and procedures are for its PIC® MCUs and dsPIC® DSCs, KEELOQ® code hopping devices, Serial EEPROMs, microperipherals, nonvolatile memory and analog products. In addition, Microchip's quality system for the design and manufacture of development systems is ISO 9001:2000 certified.

**QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
= ISO/TS 16949 =**

Trademarks

The Microchip name and logo, the Microchip logo, AnyRate, dsPIC, FlashFlex, flexPWR, Heldo, JukeBlox, KeeLoq, KeeLoq logo, Klear, LANCheck, LINK MD, MediaLB, MOST, MOST logo, MPLAB, OptoLyzer, PIC, PICSTART, PIC32 logo, RightTouch, SpyNIC, SST, SST Logo, SuperFlash and UNI/O are registered trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

ClockWorks, The Embedded Control Solutions Company, ETHERSYNCH, Hyper Speed Control, HyperLight Load, IntelliMOS, mTouch, Precision Edge, and QUIET-WIRE are registered trademarks of Microchip Technology Incorporated in the U.S.A.

Analog-for-the-Digital Age, Any Capacitor, AnyIn, AnyOut, BodyCom, chipKIT, chipKIT logo, CodeGuard, dsPICDEM, dsPICDEM.net, Dynamic Average Matching, DAM, ECAN, EtherGREEN, In-Circuit Serial Programming, ICSP, Inter-Chip Connectivity, JitterBlocker, KlearNet, KlearNet logo, MiWi, motorBench, MPASM, MPF, MPLAB Certified logo, MPLIB, MPLINK, MultiTRAK, NetDetach, Omniscient Code Generation, PICDEM, PICDEM.net, PICkit, PICtail, PureSilicon, RightTouch logo, REAL ICE, Ripple Blocker, Serial Quad I/O, SQL, SuperSwitcher, SuperSwitcher II, Total Endurance, TSHARC, USBCheck, VariSense, ViewSpan, WiperLock, Wireless DNA, and ZENA are trademarks of Microchip Technology Incorporated in the U.S.A. and other countries.

SQTP is a service mark of Microchip Technology Incorporated in the U.S.A.

Silicon Storage Technology is a registered trademark of Microchip Technology Inc. in other countries.

GestIC is a registered trademarks of Microchip Technology Germany II GmbH & Co. KG, a subsidiary of Microchip Technology Inc., in other countries.

All other trademarks mentioned herein are property of their respective companies.

© 2016, Microchip Technology Incorporated, Printed in the U.S.A., All Rights Reserved.

ISBN: 978-1-5224-0827-7



MICROCHIP

Worldwide Sales and Service

AMERICAS

Corporate Office

2355 West Chandler Blvd.
Chandler, AZ 85224-6199

Tel: 480-792-7200

Fax: 480-792-7277

Technical Support:

[http://www.microchip.com/
support](http://www.microchip.com/support)

Web Address:

www.microchip.com

Atlanta

Duluth, GA

Tel: 678-957-9614

Fax: 678-957-1455

Austin, TX

Tel: 512-257-3370

Boston

Westborough, MA

Tel: 774-760-0087

Fax: 774-760-0088

Chicago

Itasca, IL

Tel: 630-285-0071

Fax: 630-285-0075

Cleveland

Independence, OH

Tel: 216-447-0464

Fax: 216-447-0643

Dallas

Addison, TX

Tel: 972-818-7423

Fax: 972-818-2924

Detroit

Novi, MI

Tel: 248-848-4000

Houston, TX

Tel: 281-894-5983

Indianapolis

Noblesville, IN

Tel: 317-773-8323

Fax: 317-773-5453

Los Angeles

Mission Viejo, CA

Tel: 949-462-9523

Fax: 949-462-9608

New York, NY

Tel: 631-435-6000

San Jose, CA

Tel: 408-735-9110

Canada - Toronto

Tel: 905-695-1980

Fax: 905-695-2078

ASIA/PACIFIC

Asia Pacific Office

Suites 3707-14, 37th Floor
Tower 6, The Gateway
Harbour City, Kowloon

Hong Kong

Tel: 852-2943-5100

Fax: 852-2401-3431

Australia - Sydney

Tel: 61-2-9868-6733

Fax: 61-2-9868-6755

China - Beijing

Tel: 86-10-8569-7000

Fax: 86-10-8528-2104

China - Chengdu

Tel: 86-28-8665-5511

Fax: 86-28-8665-7889

China - Chongqing

Tel: 86-23-8980-9588

Fax: 86-23-8980-9500

China - Dongguan

Tel: 86-769-8702-9880

China - Guangzhou

Tel: 86-20-8755-8029

China - Hangzhou

Tel: 86-571-8792-8115

Fax: 86-571-8792-8116

China - Hong Kong SAR

Tel: 852-2943-5100

Fax: 852-2401-3431

China - Nanjing

Tel: 86-25-8473-2460

Fax: 86-25-8473-2470

China - Qingdao

Tel: 86-532-8502-7355

Fax: 86-532-8502-7205

China - Shanghai

Tel: 86-21-5407-5533

Fax: 86-21-5407-5066

China - Shenyang

Tel: 86-24-2334-2829

Fax: 86-24-2334-2393

China - Shenzhen

Tel: 86-755-8864-2200

Fax: 86-755-8203-1760

China - Wuhan

Tel: 86-27-5980-5300

Fax: 86-27-5980-5118

China - Xian

Tel: 86-29-8833-7252

Fax: 86-29-8833-7256

ASIA/PACIFIC

China - Xiamen

Tel: 86-592-2388138

Fax: 86-592-2388130

China - Zhuhai

Tel: 86-756-3210040

Fax: 86-756-3210049

India - Bangalore

Tel: 91-80-3090-4444

Fax: 91-80-3090-4123

India - New Delhi

Tel: 91-11-4160-8631

Fax: 91-11-4160-8632

India - Pune

Tel: 91-20-3019-1500

Japan - Osaka

Tel: 81-6-6152-7160

Fax: 81-6-6152-9310

Japan - Tokyo

Tel: 81-3-6880-3770

Fax: 81-3-6880-3771

Korea - Daegu

Tel: 82-53-744-4301

Fax: 82-53-744-4302

Korea - Seoul

Tel: 82-2-554-7200

Fax: 82-2-558-5932 or

82-2-558-5934

Malaysia - Kuala Lumpur

Tel: 60-3-6201-9857

Fax: 60-3-6201-9859

Malaysia - Penang

Tel: 60-4-227-8870

Fax: 60-4-227-4068

Philippines - Manila

Tel: 63-2-634-9065

Fax: 63-2-634-9069

Singapore

Tel: 65-6334-8870

Fax: 65-6334-8850

Taiwan - Hsin Chu

Tel: 886-3-5778-366

Fax: 886-3-5770-955

Taiwan - Kaohsiung

Tel: 886-7-213-7828

Taiwan - Taipei

Tel: 886-2-2508-8600

Fax: 886-2-2508-0102

Thailand - Bangkok

Tel: 66-2-694-1351

Fax: 66-2-694-1350

EUROPE

Austria - Wels

Tel: 43-7242-2244-39

Fax: 43-7242-2244-393

Denmark - Copenhagen

Tel: 45-4450-2828

Fax: 45-4485-2829

France - Paris

Tel: 33-1-69-53-63-20

Fax: 33-1-69-30-90-79

Germany - Dusseldorf

Tel: 49-2129-3766400

Germany - Karlsruhe

Tel: 49-721-625370

Germany - Munich

Tel: 49-89-627-144-0

Fax: 49-89-627-144-44

Italy - Milan

Tel: 39-0331-742611

Fax: 39-0331-466781

Italy - Venice

Tel: 39-049-7625286

Netherlands - Drunen

Tel: 31-416-690399

Fax: 31-416-690340

Poland - Warsaw

Tel: 48-22-3325737

Spain - Madrid

Tel: 34-91-708-08-90

Fax: 34-91-708-08-91

Sweden - Stockholm

Tel: 46-8-5090-4654

UK - Wokingham

Tel: 44-118-921-5800

Fax: 44-118-921-5820

06/23/16

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Microchip:](#)

[HV9901NG-G M901](#) [HV9901NG-G M934](#) [HV9901NG-G-M901](#)