UNI-SEMICONDUCTOR CO.,LTD

宇 力 半 导 体 有 限 公 司

U2103/6 Data Sheet

V 1.1

High Current IO+/- 0.5/0.8A HALF-BRIDGE DRIVER

General Description

The U2103/U2106 Fully operated to +600V is high voltage, high speed power MOSFET and IGBT driver with dependent high and low side referenced output channels.

The logic input is compatible with standard CMOS or LSTTL output, down to 3.3V logic. The output drivers feature a high pulse current buffer stage designed for minimum driver cross-conduction. The floating channel can be used to drive an N-channel power MOSFET or IGBT in the high side configuration which op-erates up to 600 volts.

Key Features

- Floating channel designed for bootstrap operation
- Fully operational to +600V
- Tolerant to negative transient voltage dV/dt immune
- Gate drive supply range from 9 to 21V
- Under voltage lockout
- 3.3V, 5V and 15V input logic compatible
- Cross-conduction prevention logic
- Matched propagation delay for both channels

Applications

- Home appliances
- Industrial applications and drives
- Motor drivers
- DC- AC Converter, PMDC and PMAC motors
- Induction heating
- HVAC

Product Summary

V_{OFFSET}	600V max
I_O+/-	0.5A / 0.8A
V_{OUT}	9V ~ 21V
$t_{on/off}$ (typ.)	320 & 260ns
Deadtime (typ.)	570 & 60ns
Work Tem	-40 ~150 °C

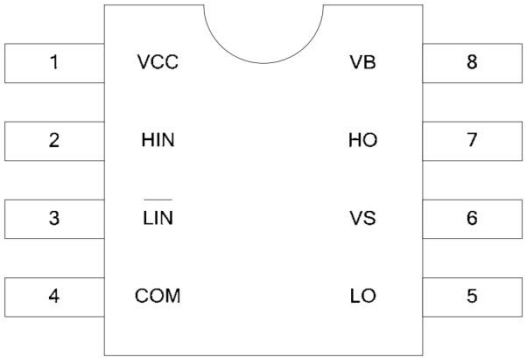
Packages

8-Lead SOP

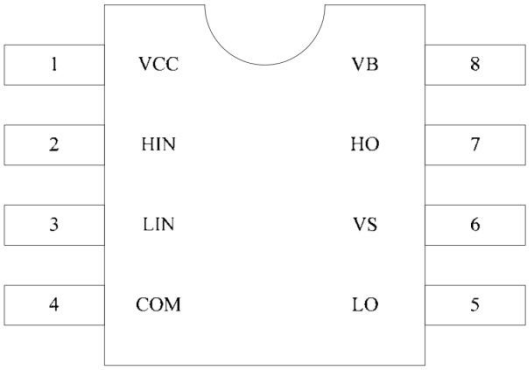
Products Information

Base Part Number	Package Type	Standard OUT		VOFFSET	Logic Control
		IO+	IO-		
U2103	SOP8	0.5A	0.8A	600V	HIN & $\overline{\text{LIN}}$
U2106	SOP8	0.5A	0.8A	600V	HIN & LIN

Pin Assignments



U2103

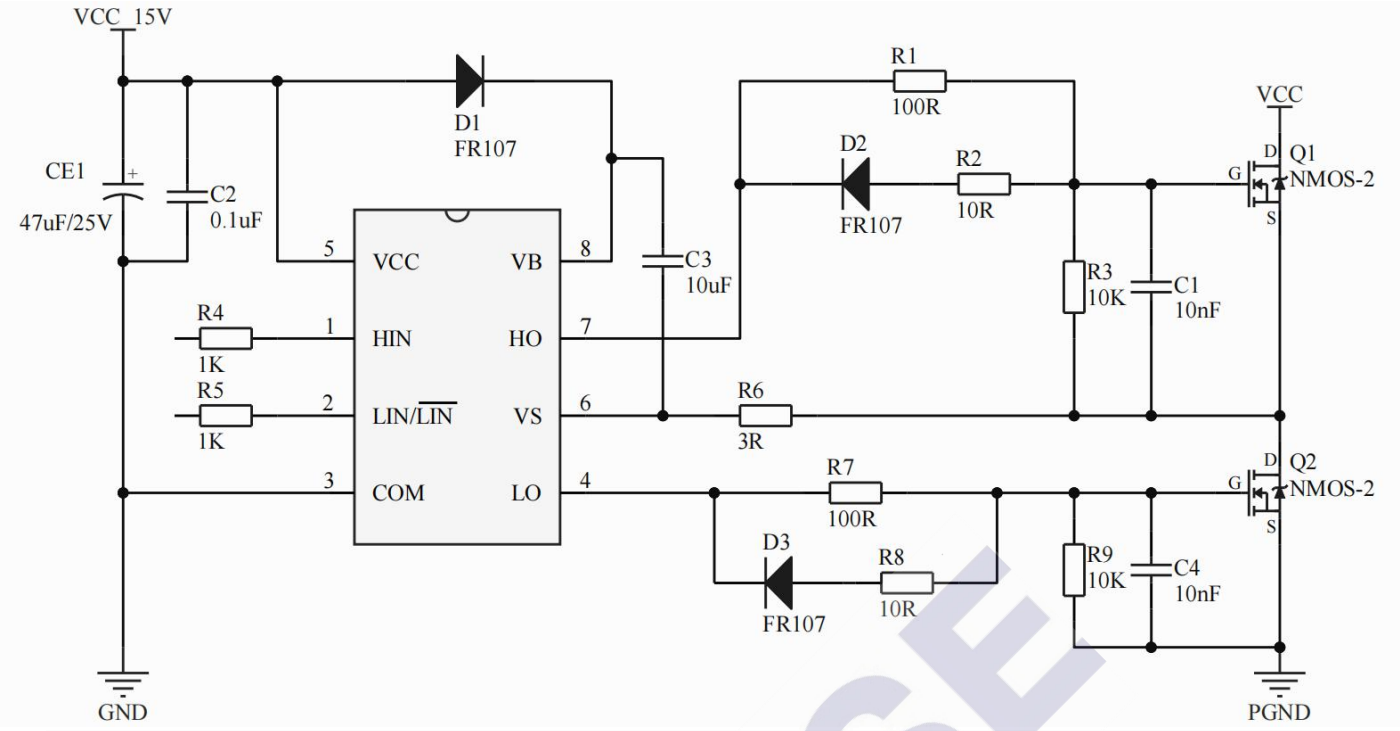


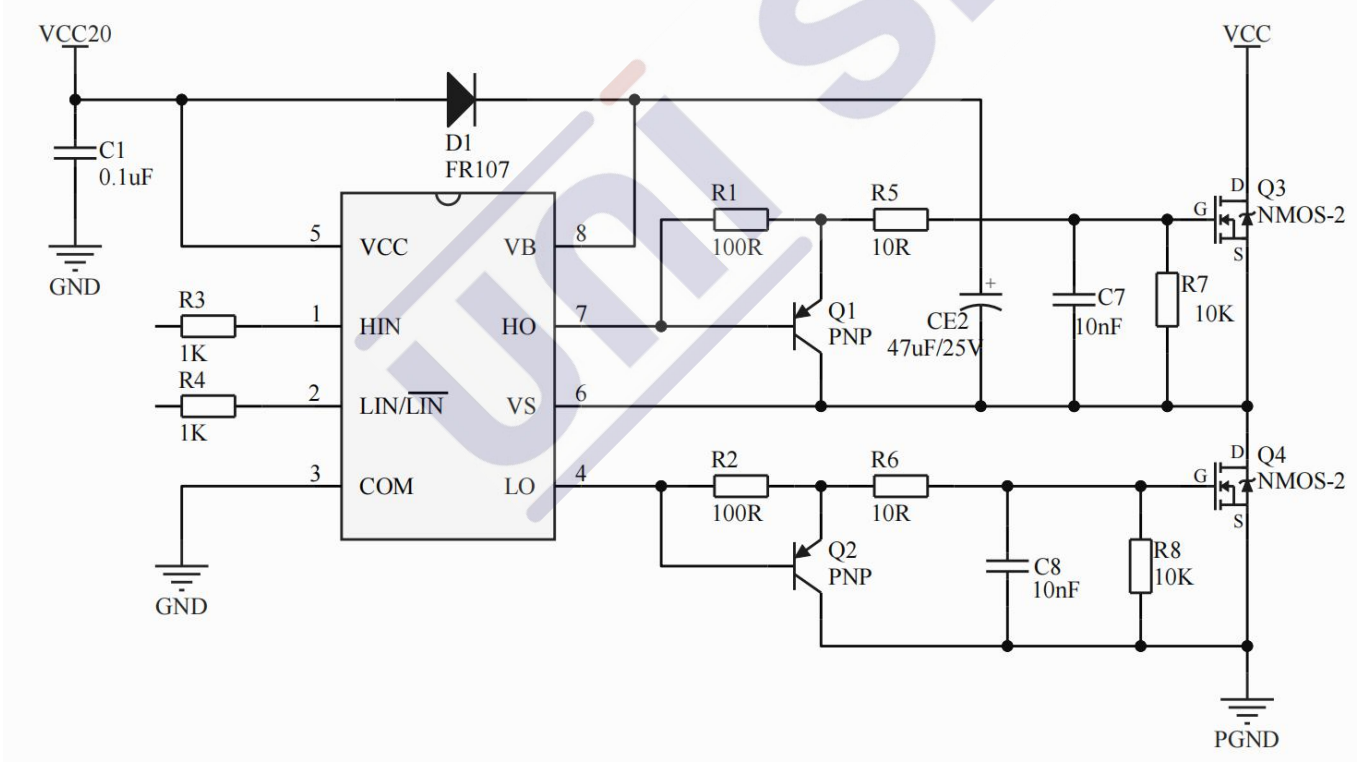
U2106

Pin Function

Number	Symbol	Description
1	VCC	Low side and logic fixed supply
2	HIN	Logic input for high side gate driver outputs (HO), in phase
3	LIN	Logic input for low side gate driver outputs (LO), in phase
	$\overline{\text{LIN}}$	Logic input for low side gate driver outputs (LO), out of phase
4	COM	Low side return
5	LO	Low side gate drive output
6	VS	High side floating supply return
7	HO	High side gate drive output
8	VB	High side floating supply

Typical Connection





Much Big POWER application

Absolute Maximum Ratings

Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to COM. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Definition	Min.	Max.	Units
VB	High side floating absolute voltage	-0.3	600	V
VS	High side floating supply offset voltage	VB-25	VB+0.3	
VHO	High side floating output voltage	VS-0.3	VB+0.3	
VLO	Low side output voltage	-0.3	Vcc+0.3	
Vcc	Low side and logic fixed supply voltage	-0.3	25	
VIN	Logic input voltage (HIN & LIN)	-0.3	Vcc+0.3	
dVS/dt	Allowable offset supply voltage transient	—	55	V/ns
P_D	Package power dissipation @ TA ≤ +25°C	—	0.625	W
Rth_{JA}	Thermal resistance, junction to ambient	—	200	°C/W
TJ	Junction temperature	-35	150	°C
TS	Storage temperature	-55	175	
TL	Lead temperature (soldering, 10 seconds)	—	300	

Recommended Operating Conditions

The Input/Output logic timing diagram is shown in Figure 1. For proper operation the device should be used within the recommended conditions. The VS offset rating is tested with all supplies biased at 15V differential.

Symbol	Definition	Min.	Max.	Units
VB	High side floating supply absolute voltage	VS + 9	VS + 21	V
VS	High side floating supply offset voltage	-25	600	
VHO	High side floating output voltage	VS	VB	
VLO	Low side output voltage	0	VCC	
VCC	Low side and logic fixed supply voltage	9.0	21	
VIN	Logic input voltage (HIN&LIN)	0	VCC	
TA	Ambient temperature	-40	125	°C

Electrical Characteristic

V_{CC} = V_{BS} = V_{BIAS} = 15V, C_L＝1000pF， T_A = 25°C , unless otherwise specified.

Symbol	Definition		Min.	Typ.	Max.	Units	Test Conditions
tr	Turn-on rise time		—	72	120	ns	
tf	Turn-off fall time		—	15	45		
ton	Turn-on propagation delay		—	320	360		VS = 0V
toff	Turn-off propagation delay		—	260	280		VS =400V
DT	Deadtime, LS turn-off to HS turn-on & HS turn-on to LS turn-off	U2103	—	570	—		
		U2106	—	60	—		
MT	Delay matching, HS & LS turn-on/off		—	—	70		

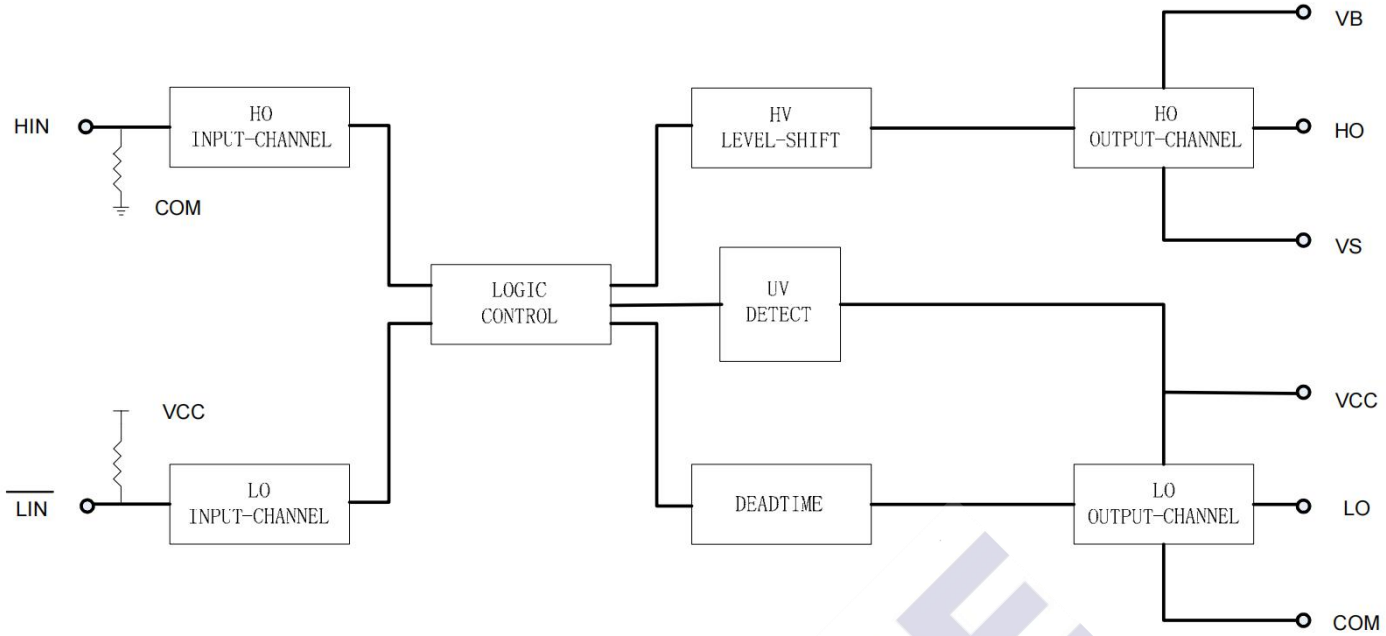
Electrical Characteristic

V_{CC} = V_{BS} = V_{BIAS} = 15V， T_A = 25°C ， unless otherwise specified.

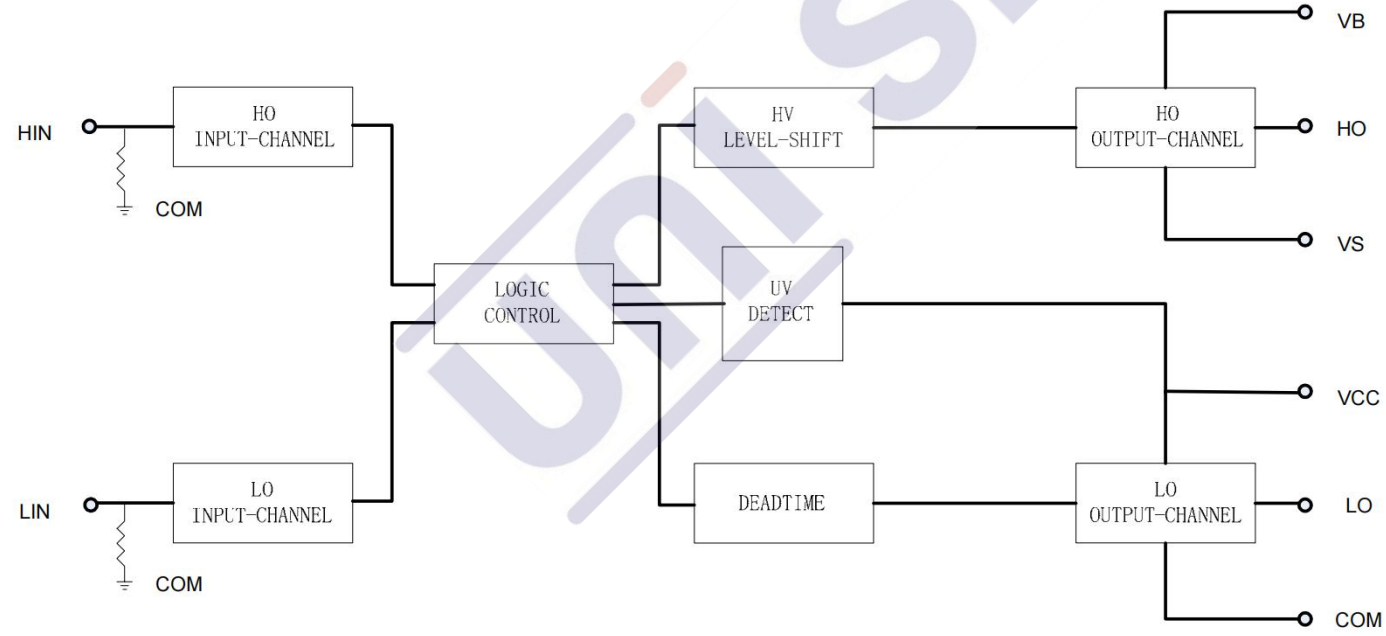
Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
Low Side Power Supply Characteristics						
V_{CCUV+}	VCC supply undervoltage positive going threshold（U2103）	7.7	8.5	9.3	V	
V_{CCUV-}	VCC supply undervoltage negative going threshold（U2103）	7.1	7.9	8.7		
V_{CCHYS}	VCC supply under-voltage lockout hysteresis（U2103）	0.4	0.6	—		
V_{CCUV+}	VCC supply undervoltage positive going threshold（U2106）	7.7	8.5	9.3		
V_{CCUV-}	VCC supply undervoltage negative going threshold（U2106）	7.1	7.9	8.7		
V_{CCHYS}	VCC supply under-voltage lockout hysteresis（U2106）	0.4	0.6	—		
High Side Floating Power Supply Characteristics						
V_{BSUV+}	VBS supply undervoltage positive going threshold（U2103）	7.6	8.4	9.2	V	
V_{BSUV-}	VBS supply undervoltage negative going threshold（U2103）	7.0	7.8	8.6		
V_{BSUVHS}	High side VBS supply under-voltage lockout hysteresis6（U2103）	0.4	0.6	—		
V_{BSUV+}	VBS supply undervoltage positive going threshold（U2106）	7.6	8.4	9.2		
V_{BSUV-}	VBS supply undervoltage negative going threshold（U2106）	7.0	7.8	8.6		
V_{BSUVHS}	High side VBS supply under-voltage lockout hysteresis6（U2106）	0.4	0.6	—		

IQCC	Quiescent VCC supply current	—	300	500	uA	V_{IN} =0V or 5V
IQBS	Quiescent VBS supply current	—	100	200		V_{IN} =0V or 5V
ILK	Offset supply leakage current	—	—	3		VB =VS =400V
VIH	Logic “1” (HO) & Logic “0” (LO) input voltage	3	—	—	V	VCC =10V to 20V
VIL	Logic “0” (HO) & Logic “1” (LO) input voltage	—	—	0.8		VCC =10V to 20V
IIN+	Logic “1” input bias current	—	3	10	uA	V_{IN}=5V L_{IN}= 0V
IIN-	Logic “0” input bias current	—	—	1		V_{IN}=5V L_{IN}= 0V
VOH	High level output voltage, V_{BIAS} - VO	—	—	100	mV	Io = 0A
VOL	Low level output voltage, VO	—	—	100		Io =0A
IO+	Output high short circuit pulsed current	—	500	—	mA	VO= 0V, V_{IN} = V_{IH} PW ≤10 us
IO-	Output low short circuit pulsed current	—	800	—		VO = 15V, V_{IN}= V_{IL} PW ≤10 us

Block Diagram

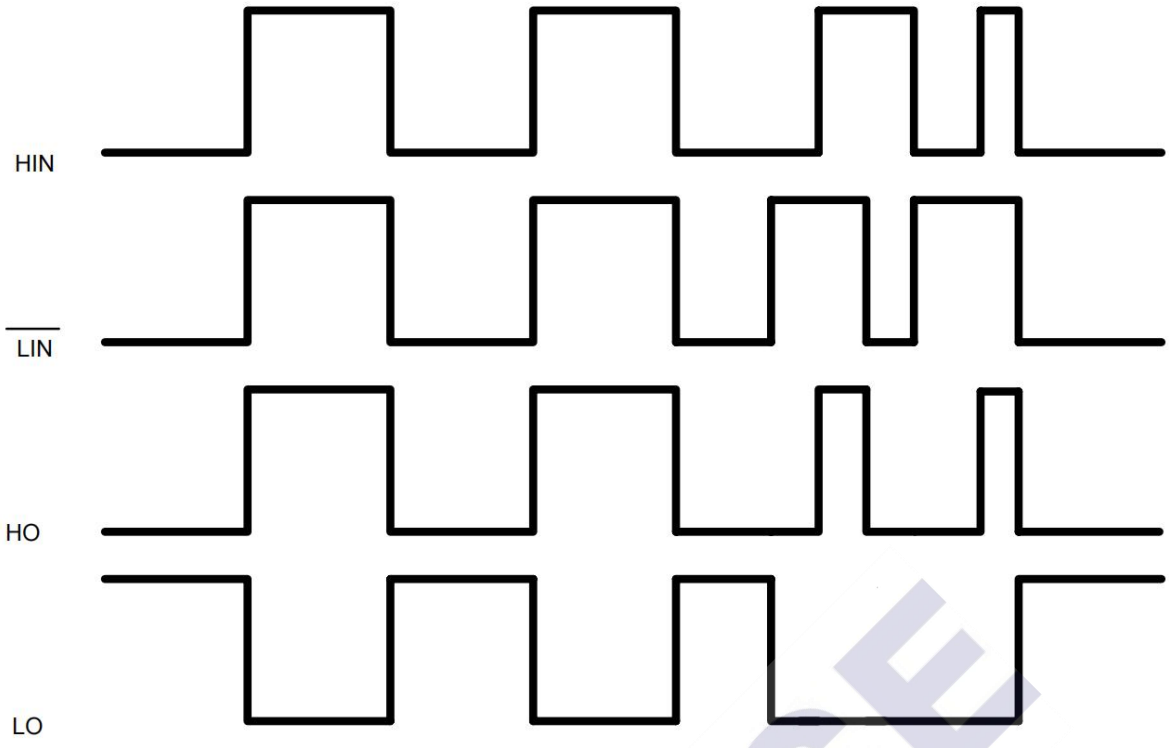


U2103

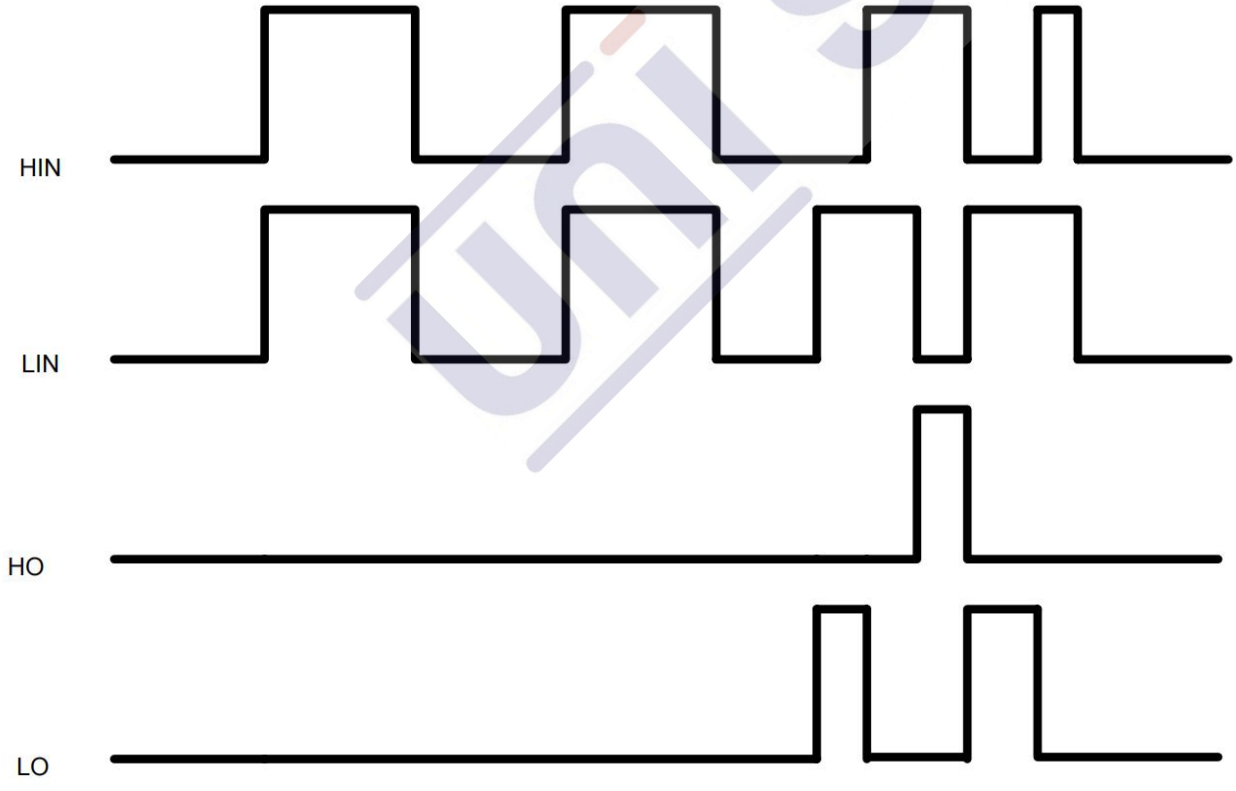


U2106

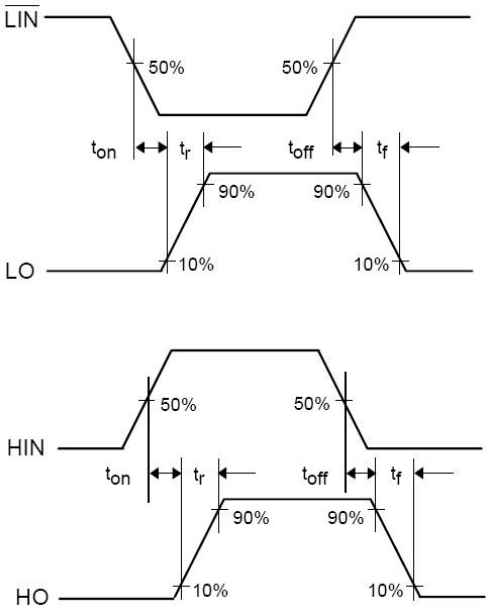
Time waveform



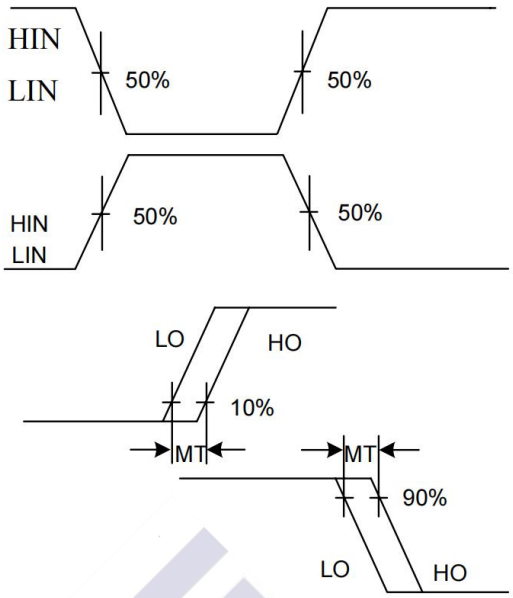
U2103



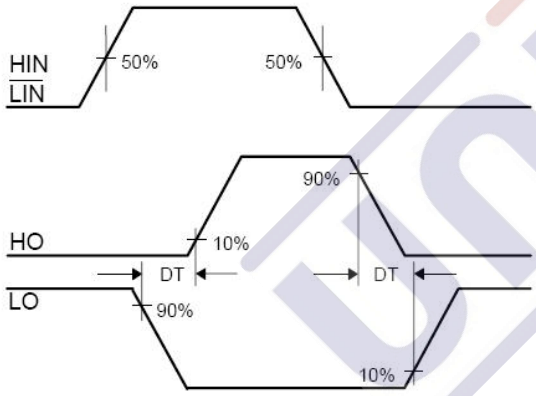
U2106



Switching Time Waveform Definitions



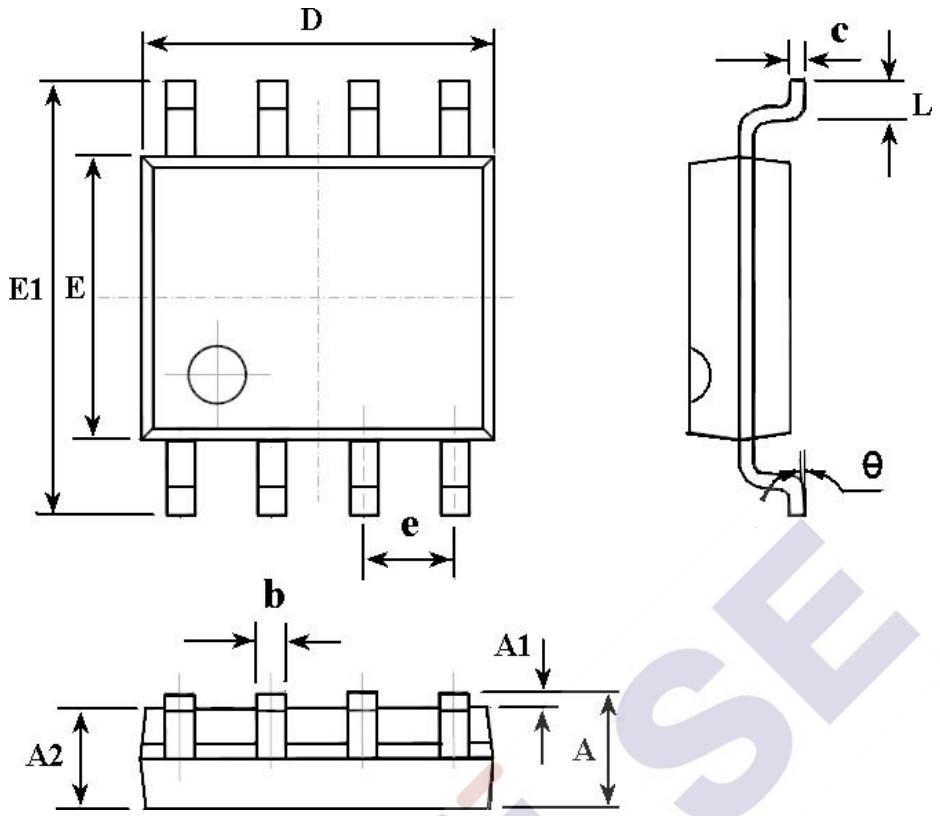
Delay matching time Definitions



Deadtime Waveform Definitions

Packaging information

SOP 8



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
D	4.700	5.100
E	3.800	4.000
E1	5.800	6.200
e	1.270(BSC)	
L	0.400	1.270
θ	0°	8°

IMPORTANT NOTICE

UNI-SEMICONDUCTOR CO.,LTD(UNI) reserves the right to make corrections, modifications, enhancements, improvements, and other changes to its products and to discontinue any product without notice at any time.

UNI cannot assume responsibility for use of any circuitry other than circuitry entirely embodied in a UNI product. No circuit patent licenses are implied.

Tel: 86-0575-85087896

Fax: 86-0575-88125157
http://www.uni-semic.com

Revision History

DATE	REV.	DESCRIPTION
2018/04/19	1.0	First Release
2020/05/21	1.1	Change the package