UMW FOD3182

3.0 Amp Output Current IGBT Gate Drive Optocouple

1.Description

The FOD3182 is a gate driven optocoupler with an output current of 3.0A, with an AlGaAs LED, which is coupled to a photosensitive integrated circuit through infrared light. This optocoupler can drive most low-power IGBTs and MOSFETs. In the motor control inverter and high-performance power system applications, it is very suitable for fast switching drive power IGBTs and MOSFETs.

2.Applications

- Uninterrupted Power Supply
- IGBT isolation / power MOSFET gate drive
- Induction heating
- Industrial inverters

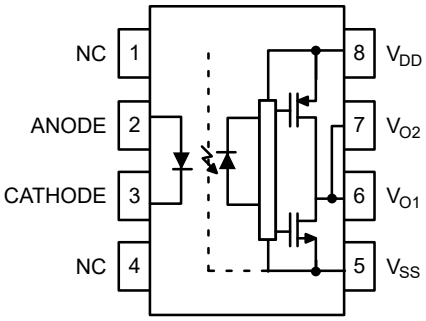
3.Features

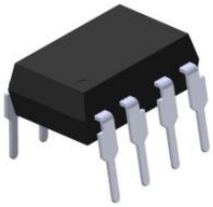
- 35kV/μs minimum Common Mode Rejection
- 3A maximum peak output current
- Wide operating V_{CC} Range: 10V~30V
- 400ns maximum propagation delay
- 100ns of pulse width distortion
- Under Voltage Lock-Out protection (UVLO) with hysteresis
- Operating temperature range: -40°C ~ +110°C

4.Truth Table

LED	V_{DD}-V_{SS} " POSITIVE GOING" (TURN-ON)	V_{DD}-V_{SS} " NEGATIVE GOING" (TURN-OFF)	VO
OFF	0~30V	0~30V	LOW
ON	0~7.4V	0~7V	LOW
ON	7.4~9V	7~8.5V	TRANSITION
ON	9~30V	8.5~30V	HIGH

5.Pinning Information





DIP-8

SOP- 8

Note: 0.1uF bypass capacitor must be connected between pins 5 and 8.

6.Insulation And Safety Related Specifications

Parameter	Symbol	Note	Value	Unit
Creepage Distance	L	Measured from input terminals to output terminals, shortest distance path along body	≥7	mm
Clearance Distance	L	Measured from input terminals to output terminals, shortest distance through air	≥7	mm
Insulation Thickness	DTI	Insulation thickness between emitter and detector	≥0.4	mm
Peak Isolation Voltage	V_{IORM}	DIN/EN/IEC EN60747-5-5.	1500	V_{peak}
Transient Isolation Voltage	V_{IOTM}	DIN/EN/IEC EN60747-5-5.	7000	V_{peak}
Isolation Voltage	V_{ISO}	For 1 min	5000	V_{rms}

7.Absolute Maximum Ratings T_A= 25°C

Parameter		Symbol	Value	Units
Input	Forward Input Current	I_{FM}	25	mA
	Reverse Voltage	V_R	5	V
Output	Peak Output Current (1)	$I_{O(PEAK)}$	3	A
	Supply Voltage	V_{DD} - V_{SS}	-0.5~35	V
	Output Voltage	V_O	-0.5~V_{DD}	V
Isolation Voltage		V_{ISO}	5000	V_{rms}
Output Power Dissipation (2)		P_O	250	mW
Total Power Dissipation (3)		P_D	295	mW
Operating Temperature		T_{opr}	-40 to 110	°C
Storage Temperature		T_{stg}	-55 to 125	°C
Soldering Temperature		T_{sol}	260	°C

8.Recommended Operating Conditions

Parameter	Symbol	Min	Max	Units
Power Supply Voltage	V_{DD} - V_{SS}	10	30	V
Input Current (ON)	$I_{F(ON)}$	7	16	mA
Input Voltage (OFF)	$V_{F(OFF)}$	-3.6	0.8	V
Operating Temperature	T_A	-40	110	°C

9.Electro-optical Characteristics (T_A=25°C)

All minimum and maximum specifications are at recommended operating conditions, unless otherwise noted
All typical values are at T_A=25°C, V_{DD}=30V, and V_{SS}=GND.

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Forward Voltage	V_F	I_F=10mA		1.2	1.5	1.8	V
Reverse Current	I_R	V_R=5V				10	μA
High Level Output Current	I_{OH}	V_O=V_{DD}-2.5V		0.5			A
		V_O=V_{DD}-10V		2.5			A
Low Level Output Current	I_{OL}	V_O=V_{SS}+2.5V		0.5	1		A
		V_O=V_{SS}+10V		2.5			A
High Level Output Voltage (3) (4)	V_{OH}	I_F=10mA	I_O=-100mA	V_{DD}-0.5V			V
Low Level Output Voltage (3) (4)	V_{OL}	I_F=0mA	I_O=100mA			V_{SS}+0.5V	V
High Level Power Supply Current	I_{ccH}	V_O=Open, I_F=7 to 16mA			1.8	3.8	mA
Low Level Power Supply Current	I_{ccL}	V_O=Open, V_F=0 to 0.8V			2.1	3.8	mA
Input The Tum On Current	I_{FLH}	I_O=0mA, V_O>5V			2.8	5	mA
Input The Turn Off Voltage	V_{FHL}	I_O=0mA, V_O<5V		0.8			V
Isolation Resistance	R_{ISO}	V_{I-O}=500V, 40~60%R.H.			10^{11}		Ω
Isolation Capacitance	C_{ISO}	V_{I-O}=0V, Freq=1MHZ			1		pF
Propagation Delay Time to Low Output Level (5)	T_{PHL}	I_F=7mA to 16mA Rg=10Ω Cg=10nF F=10KHZ Duty Cycle=50%			100	300	ns
Propagation Delay Time to High Output Level (5)	T_{PLH}				100	300	ns
Pulse Width Distortion (6)	PWD				3	100	ns
Propagation Delay Difference Between Any Two Parts (7)	P_{DD}			-250		250	ns

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Rise Time (10% To 90%)	T_R	I_F=7mA to 16mA,Rg=10Ω,Cg=10NF		50		ns
Output Drop Time(90%~10%)	T_F	F=10KHZ, Duty Cycle=50%		50		ns
UVLO Turn On Delay	$T_{UVLO\ ON}$	I_F=10mA, V_O>5V		2		μs
UVLO Turn Off Delay	$T_{UVLO\ OFF}$	I_F=10mA, V_O<5V		0.4		μs
Output High Level Common Mode Transient Immunity (8) (9)	$\|CM_H\|$	T_A=25°C, V_{CC}=30V V_{CM}=2000V, I_F=7~16mA, V_F=0V	35	50		KV/μs
Output Low Level Common Mode Transient Immunity (8) (10)	$\|CM_L\|$	T_A=25°C, V_{CC}=30V V_{CM}=2000V, I_F=7~16mA, V_F=0V	35	50		KV/μs
UVLO Threshold	U_{UVLO+}	V_O>5V, I_F=10mA	7	8.3	9	V
	U_{UVLO-}	V_O<5V, I_F=10mA	6.5	7.7	8.5	V
UVLO Hysteresis	$UVLO_{HYST}$			0.6		V

Notes:

1. Maximum pulse width = 10μs, maximum duty cycle = 11%.
2. No derating required across operating temperature range.
3. In this test, V_{OH} is measured with a dc load current of 100mA. When driving capacitive load V_{OH} will approach V_{DD} as I_{OH} approaches zero amps.
4. Maximum pulse width = 1ms, maximum duty cycle = 20%.
5. t_{PHL} propagation delay is measured from the 50% level on the falling edge of the input pulse to the 50% level of the falling edge of the V_O signal. t_{PLH} propagation delay is measured from the 50% level on the rising edge of the input pulse to the 50% level of the rising edge of the V_O signal.
6. PWD is defined as | t_{PHL} – t_{PLH} | for any given device.
7. The difference between t_{PHL} and t_{PLH} between any two FOD3182 parts under same operating conditions, with equal loads.
8. Pin 1 and 4 need to be connected to LED common.
9. Common mode transient immunity in the high state is the maximum tolerable dV_{CM}/dt of the common mode pulse V_{CM} to assure that the output will remain in the high state (i.e. V_O > 15V).
10. Common mode transient immunity in a low state is the maximum tolerable dV_{CM}/dt of the common mode pulse, V_{CM}, to assure that the output will remain in a low state (i.e. V_O < 1.0V).

10.1 Typical Characteristic

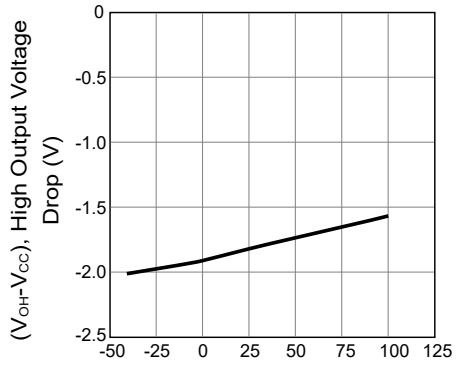


Figure 1: V_{OH} vs. Temperature

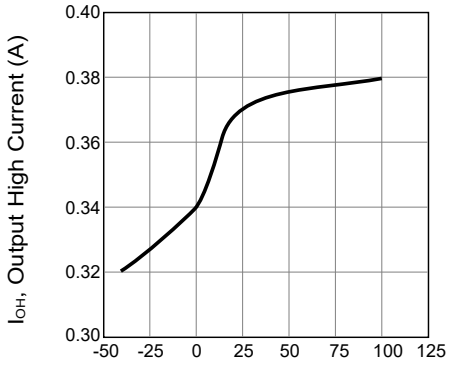


Figure 2: I_{OH} vs. Temperature

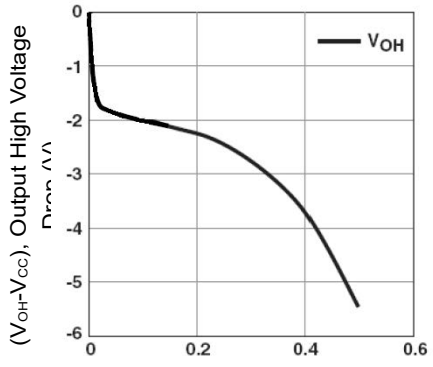


Figure 3: V_{OH} vs. I_{OH}

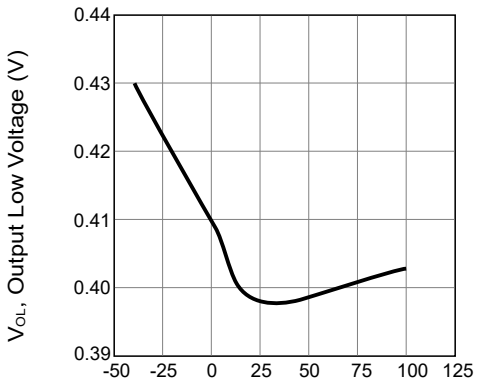


Figure 4: V_{OL} vs. Temperature

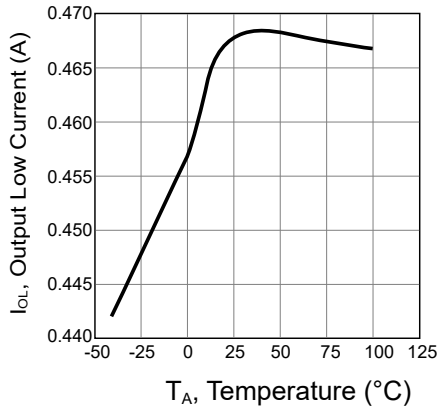


Figure 5: I_{OL} vs. Temperature

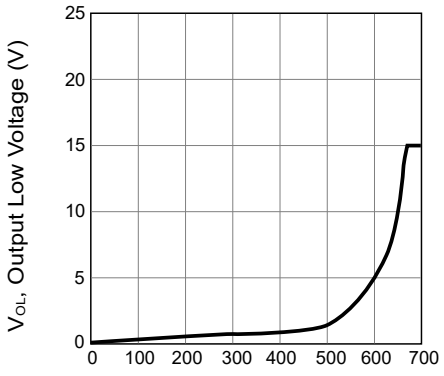


Figure 6: V_{OL} vs. I_{OL}

10.2 Typical Characteristic

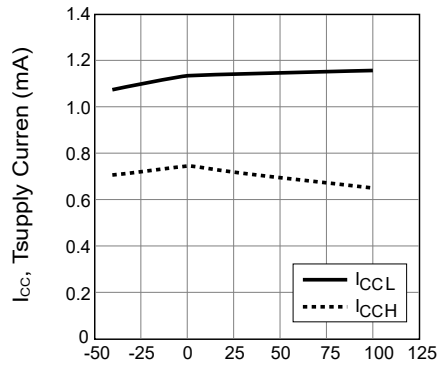


Figure 7: I_{CC} vs. Temperature

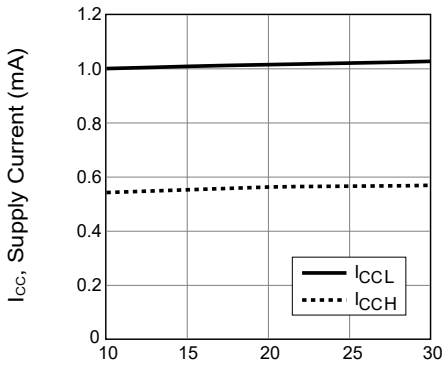


Figure 8: I_{CC} vs. V_{CC}

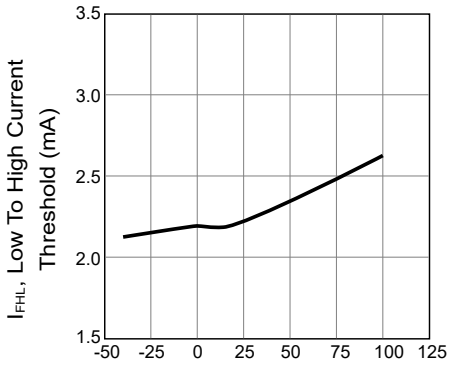


Figure 9: I_{FLH} vs. Temperature

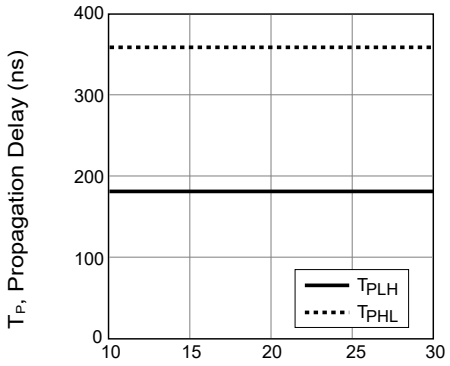


Figure 10: Propagation Delay vs. V_{CC}

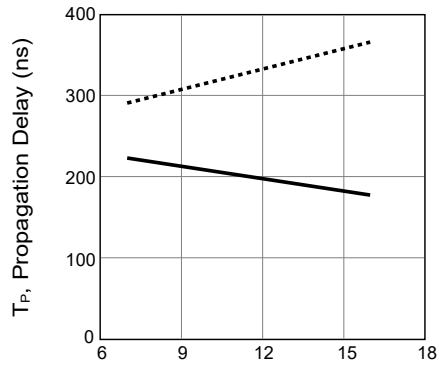


Figure 11: Propagation Delay vs. I_F

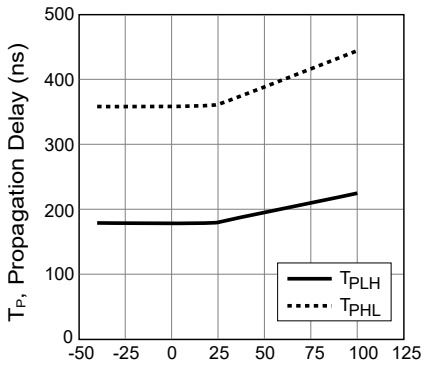


Figure 12: Propagation Delay vs. Temperature

10.3 Typical Characteristic

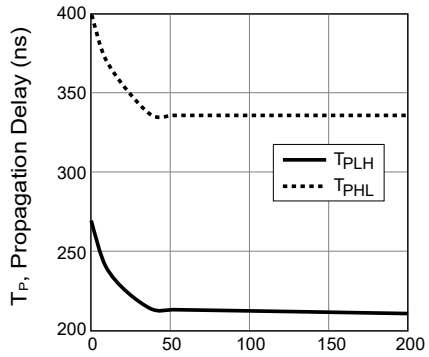


Figure 13: Propagation Delay vs. R_g

Figure 14: Transfer Characteristics

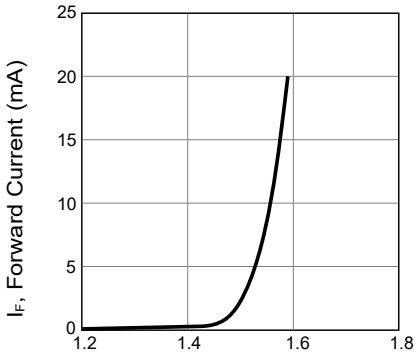


Figure 15: Input Current vs. Forward Voltage

11.Test Circuits Diagrams

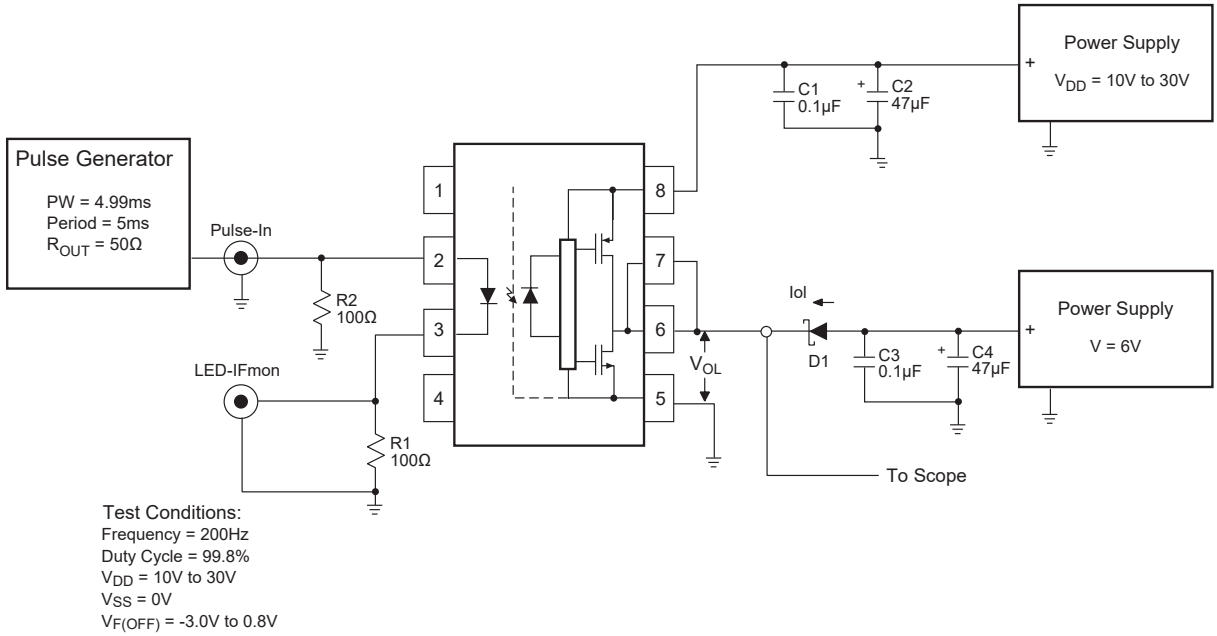


Figure 16: I_{OL} Test Circuit

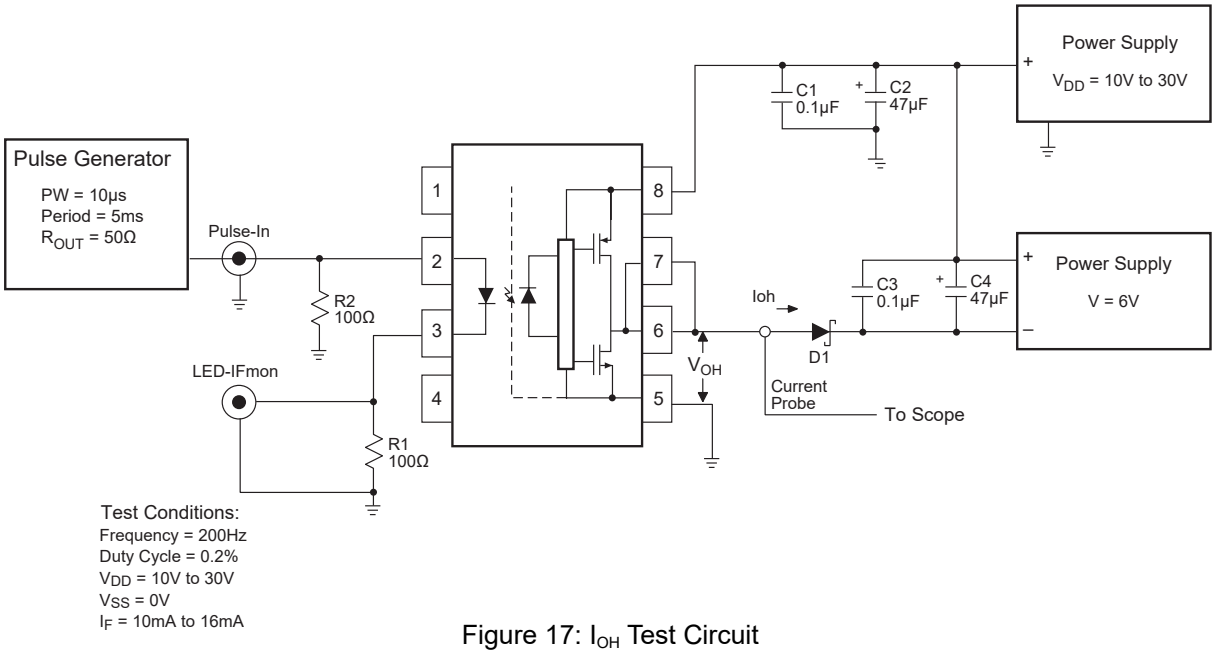


Figure 17: I_{OH} Test Circuit

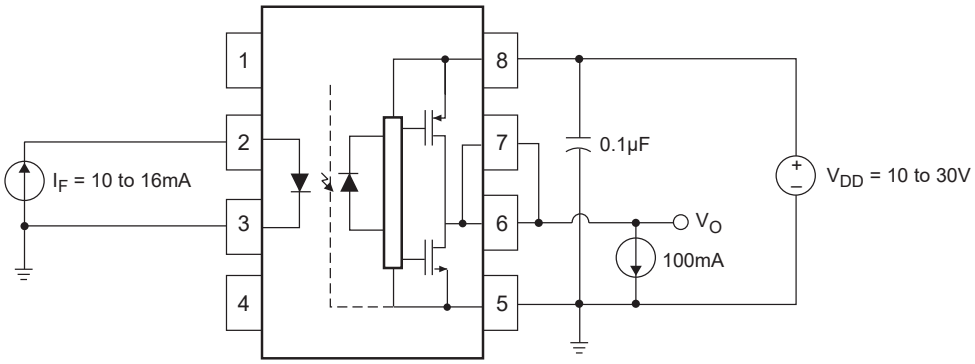


Figure 18: V_{OH} Test Circuit

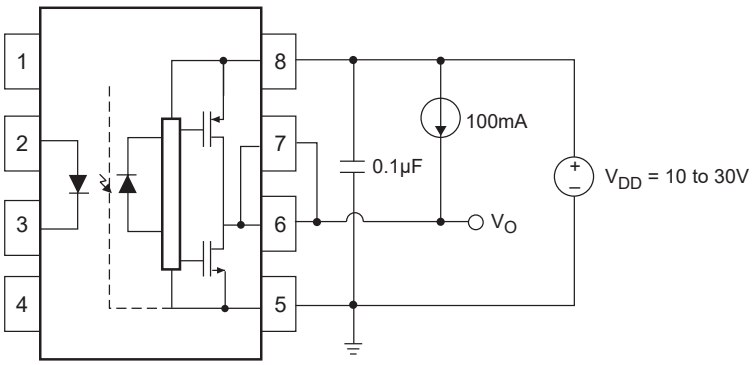


Figure 19: V_{OL} Test Circuit

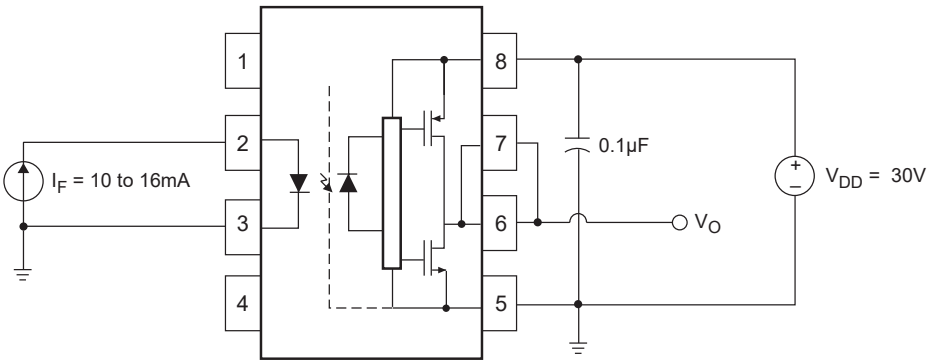


Figure 20: I_{DDH} Test Circuit

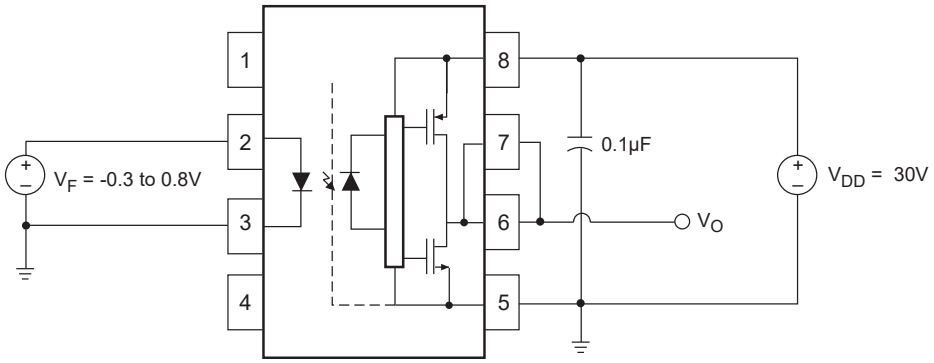


Figure 21: I_{DDL} Test Circuit

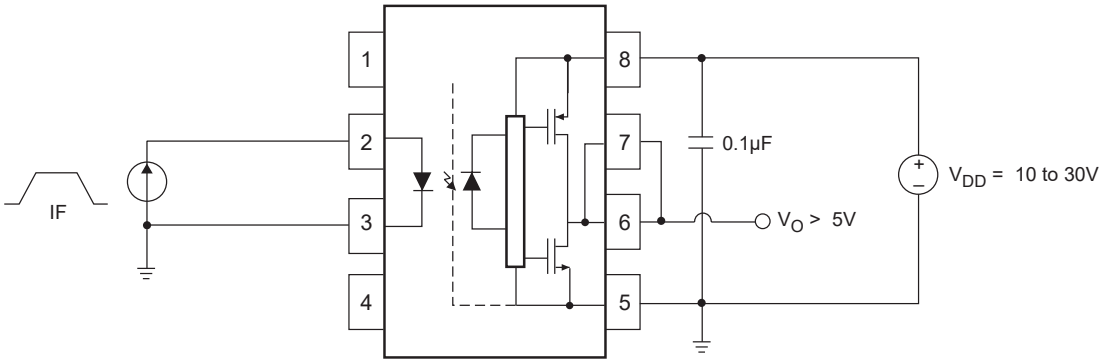


Figure 22: I_{FLH} Test Circuit

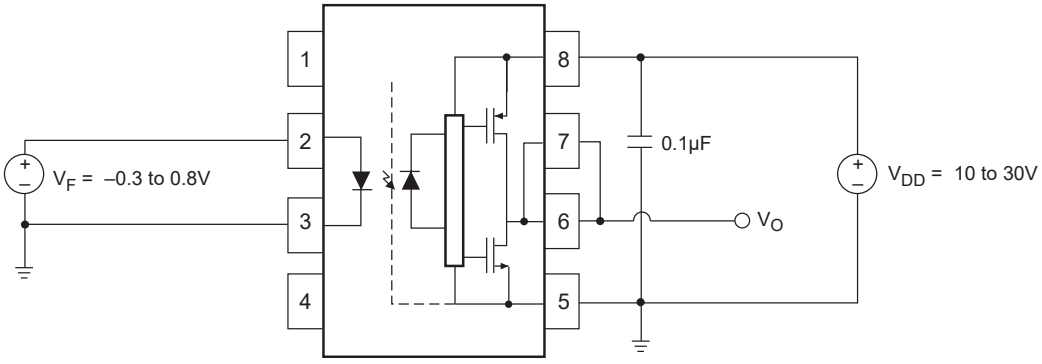


Figure 23: V_{FHL} Test Circuit

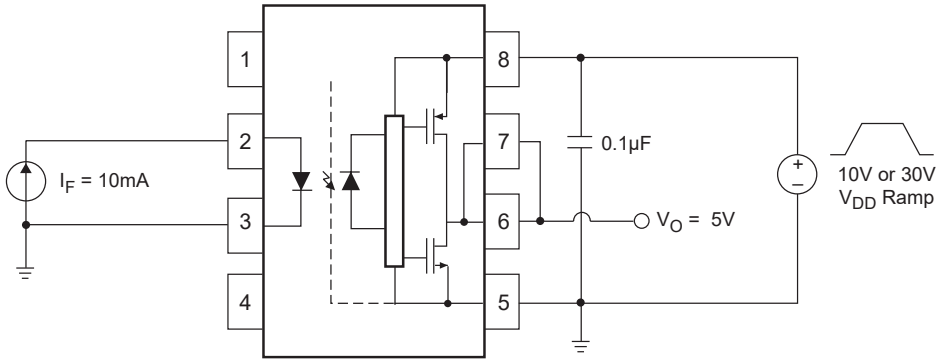
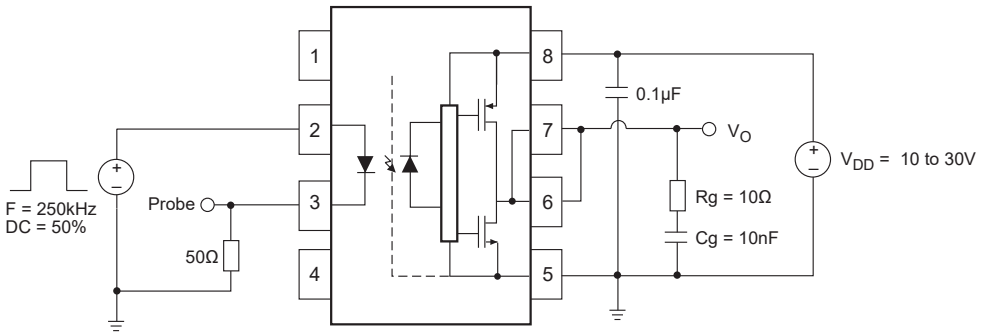


Figure 24: UVLO Test Circuit



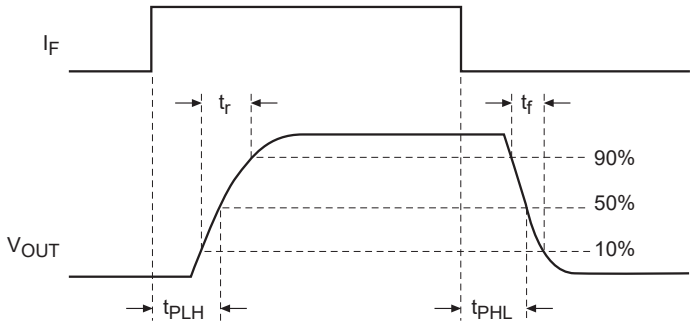


Figure 25: t_{PHL}, t_{PLH}, t_r and t_f Test Circuit and Waveforms

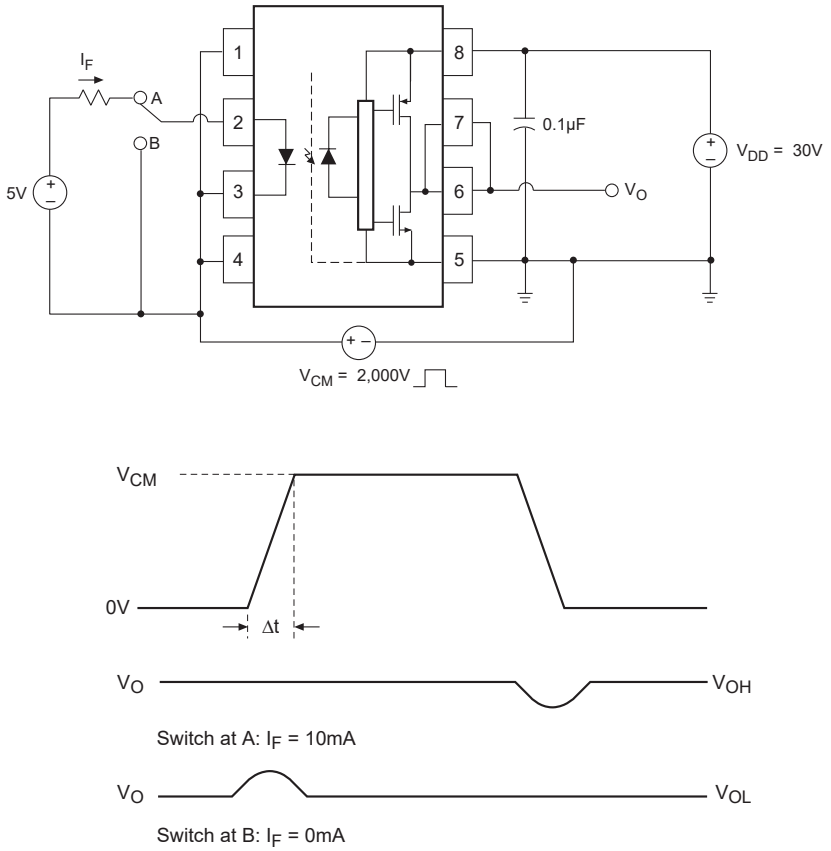
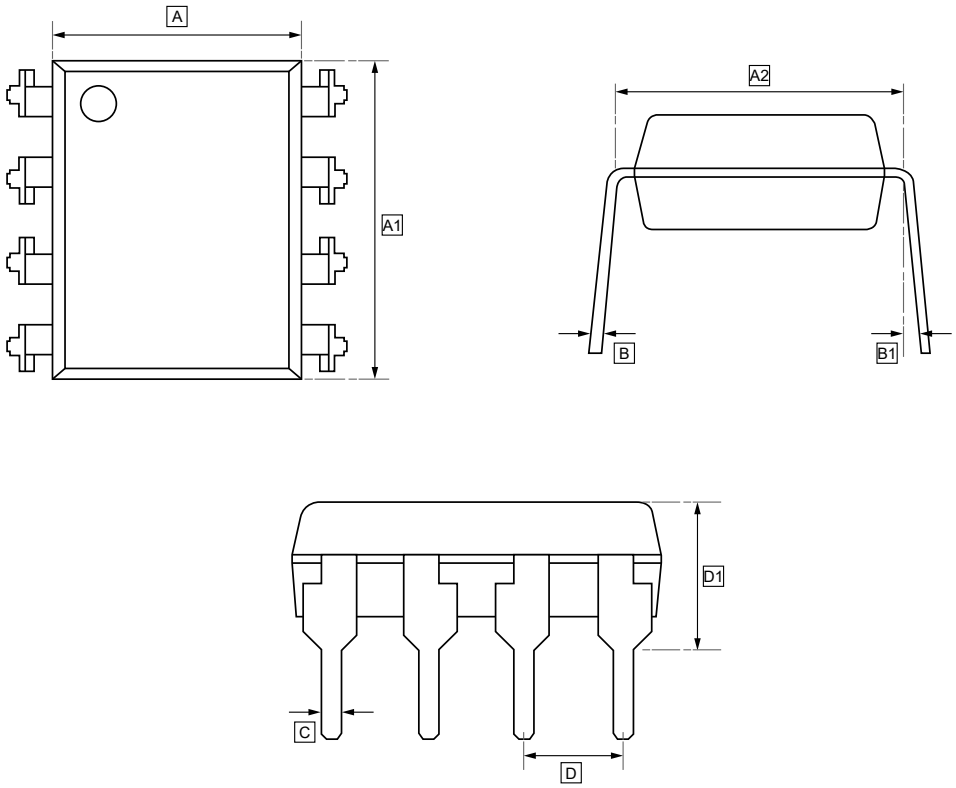


Figure 26: CMR Test Circuit and Waveforms

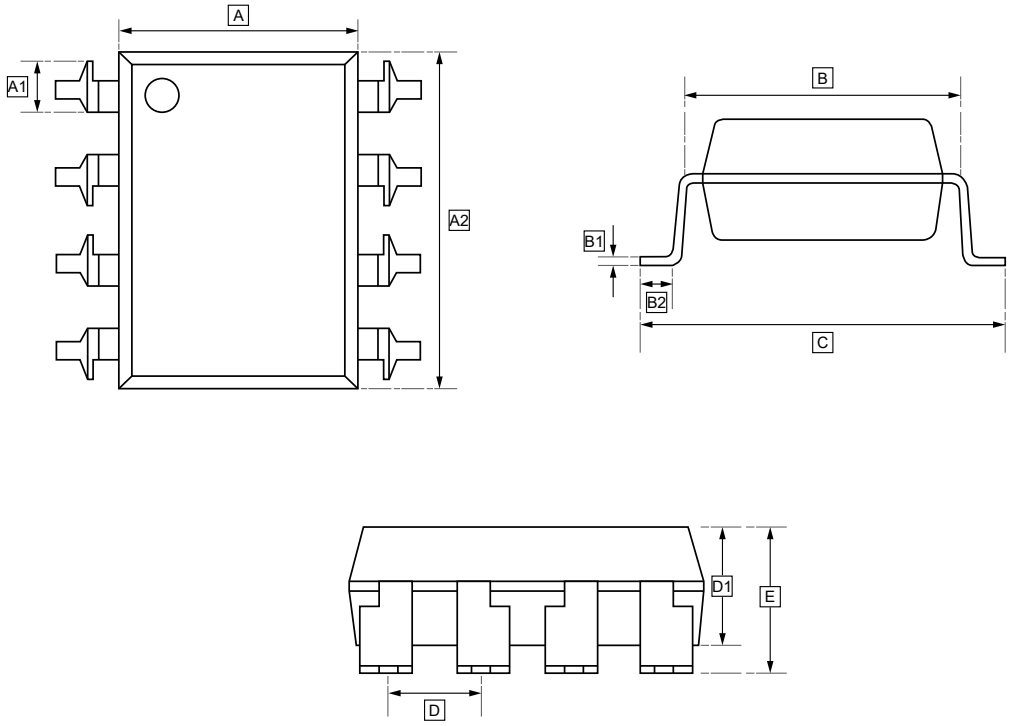
12.1 DIP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	B	B1	C	D	D1
Min	6.30	9.46	7.62	0.25	5°	0.40	2.54	4.20
Max	6.90	10.06	TYP.		15°	0.60	TYP.	4.80

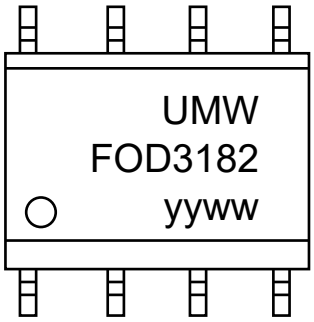
12.2 SOP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	B	B1	B2	C	D	D1	E
Min	6.30	1.45	9.46	7.62	0.25	0.6	-	2.54	3.20	4.00
Max	6.90		10.06	TYP		-	10.3	TYP	3.80	4.60

13.Ordering Information



yy: Year Code
ww: Week Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW FOD3182	FOD3182	DIP-8	2250	Tube and box
UMW FOD3182S	FOD3182S	SOP-8	1000	Tape and reel

14.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

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