

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.

3. Features

- 35kV/ μ s minimum Common Mode Rejection
- 3A maximum peak output current
- Wide operating V_{CC} Range: 10V~30V
- 400ns maximum propagation delay

2. Applications

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

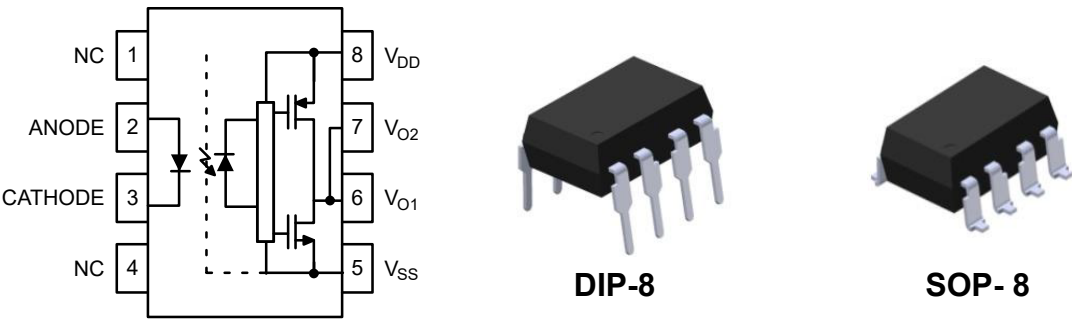
- 100ns of pulse width distortion
- Under Voltage Lock-Out protection (UVLO) with hysteresis
- Operating temperature range: -40°C ~ +110°C

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



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 $T_A = 25^\circ\text{C}$

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	$^\circ\text{C}$
Storage Temperature		T_{stg}	-55 to 125	$^\circ\text{C}$
Soldering Temperature		T_{sol}	260	$^\circ\text{C}$

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	$^\circ\text{C}$



9. Electro-optical Characteristics ($T_A=25^\circ\text{C}$)

All minimum and maximum specifications are at recommended operating conditions, unless otherwise noted

All typical values are at $T_A=25^\circ\text{C}$, $V_{DD}=30\text{V}$, and $V_{SS}=\text{GND}$.

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Forward Voltage	V_F	$I_F=10\text{mA}$		1.2	1.5	1.8	V
Reverse Current	I_R	$V_R=5\text{V}$				10	μA
High Level Output Current	I_{OH}	$V_O=V_{DD}-2.5\text{V}$		0.5			A
		$V_O=V_{DD}-10\text{V}$		2.5			A
Low Level Output Current	I_{OL}	$V_O=V_{SS}+2.5\text{V}$		0.5	1		A
		$V_O=V_{SS}+10\text{V}$		2.5			A
High Level Output Voltage ^{(3) (4)}	V_{OH}	$I_F=10\text{mA}$	$I_O=-100\text{mA}$	$V_{DD}-0.5\text{V}$			V
Low Level Output Voltage ^{(3) (4)}	V_{OL}	$I_F=0\text{mA}$	$I_O=100\text{mA}$			$V_{SS}+0.5\text{V}$	V
High Level Power Supply Current	I_{cch}	$V_O=\text{Open}$, $I_F=7$ to 16mA			1.8	3.8	mA
Low Level Power Supply Current	I_{ccl}	$V_O=\text{Open}$, $I_F=0$ to 0.8V			2.1	3.8	mA
Input The Turn On Current	I_{FLH}	$I_O=0\text{mA}$, $V_O>5\text{V}$			2.8	5	mA
Input The Turn Off Voltage	V_{FHL}	$I_O=0\text{mA}$, $V_O<5\text{V}$		0.8			V
Isolation Resistance	R_{ISO}	$V_{I-O}=500\text{V}$, 40~60% R.H.			10^{11}		Ω
Isolation Capacitance	C_{ISO}	$V_{I-O}=0\text{V}$, Freq=1MHZ			1		pF
Propagation Delay Time to Low Output Level ⁽⁵⁾	T_{PHL}	$I_F=7\text{mA}$ to 16mA $R_g=10\Omega$ $C_g=10\text{nF}$ $F=10\text{KHZ}$ 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



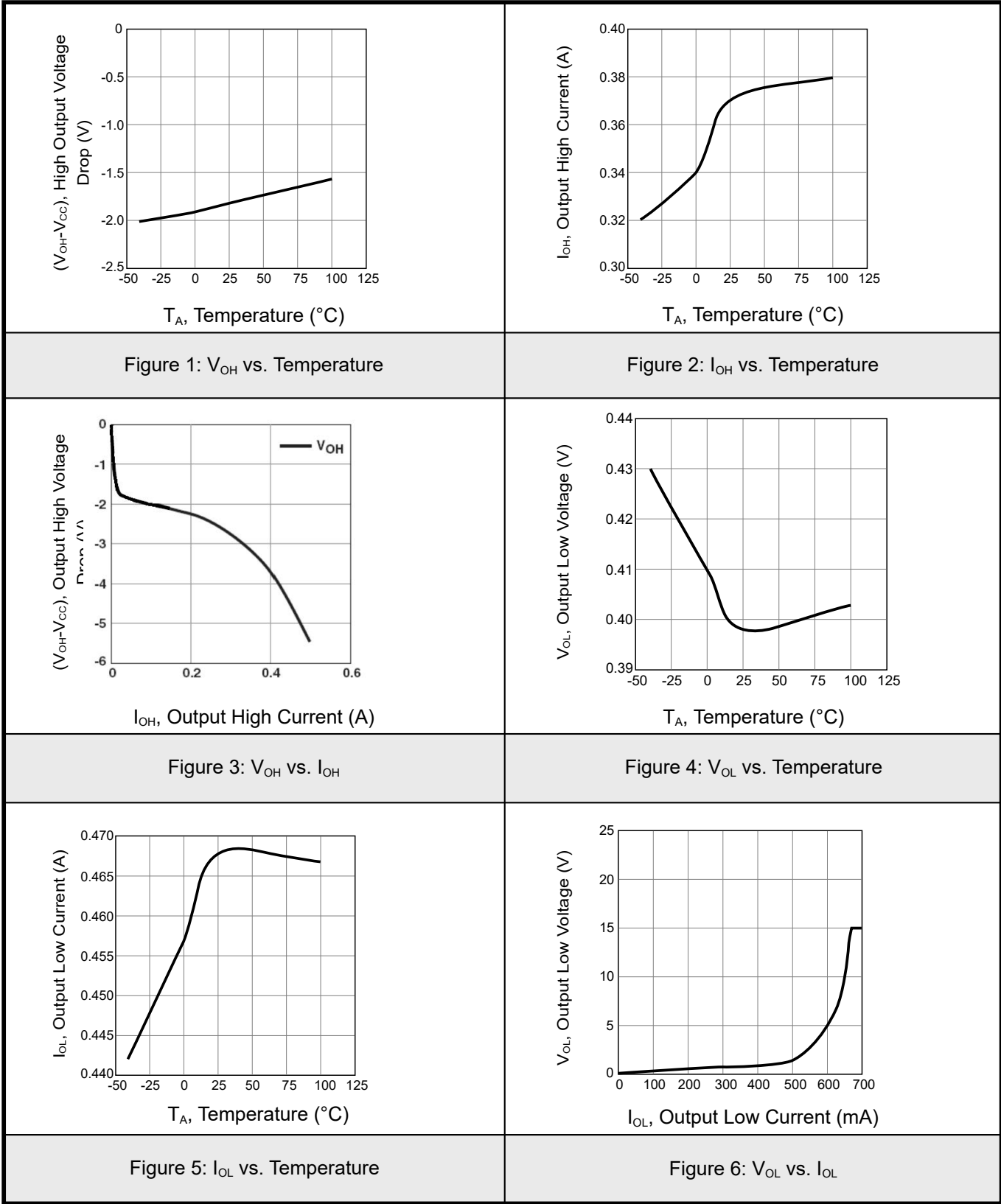
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Output Rise Time (10% To 90%)	T_R	$I_F=7\text{mA to }16\text{mA}, R_g=10\Omega, C_g=10\text{NF}$ $F=10\text{KHZ, Duty Cycle}=50\%$		50		ns
Output Drop Time(90%~10%)	T_F			50		ns
UVLO Turn On Delay	$T_{UVLO\ ON}$	$I_F=10\text{mA}, V_O>5\text{V}$		2		μs
UVLO Turn Off Delay	$T_{UVLO\ OFF}$	$I_F=10\text{mA}, V_O<5\text{V}$		0.4		μs
Output High Level Common Mode Transient Immunity ^{(8) (9)}	$ CM_H $	$T_A=25^\circ\text{C}, V_{CC}=30\text{V}$ $V_{CM}=2000\text{V}, I_F=7\sim16\text{mA}, V_F=0\text{V}$	35	50		KV/ μs
Output Low Level Common Mode Transient Immunity ^{(8) (10)}	$ CM_L $	$T_A=25^\circ\text{C}, V_{CC}=30\text{V}$ $V_{CM}=2000\text{V}, I_F=7\sim16\text{mA}, V_F=0\text{V}$	35	50		KV/ μs
UVLO Threshold	U_{UVLO+}	$V_O>5\text{V}, I_F=10\text{mA}$	7	8.3	9	V
	U_{UVLO-}	$V_O<5\text{V}, I_F=10\text{mA}$	6.5	7.7	8.5	V
UVLO Hysteresis	$UVLO_{HYST}$			0.6		V

Notes:

- Maximum pulse width = 10 μs , maximum duty cycle = 11%.
- No derating required across operating temperature range.
- 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.
- Maximum pulse width = 1ms, maximum duty cycle = 20%.
- 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.
- PWD is defined as $|t_{PHL} - t_{PLH}|$ for any given device.
- The difference between t_{PHL} and t_{PLH} between any two FOD3182 parts under same operating conditions, with equal loads.
- Pin 1 and 4 need to be connected to LED common.
- 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. $V_O > 15\text{V}$).
- 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. $V_O < 1.0\text{V}$).

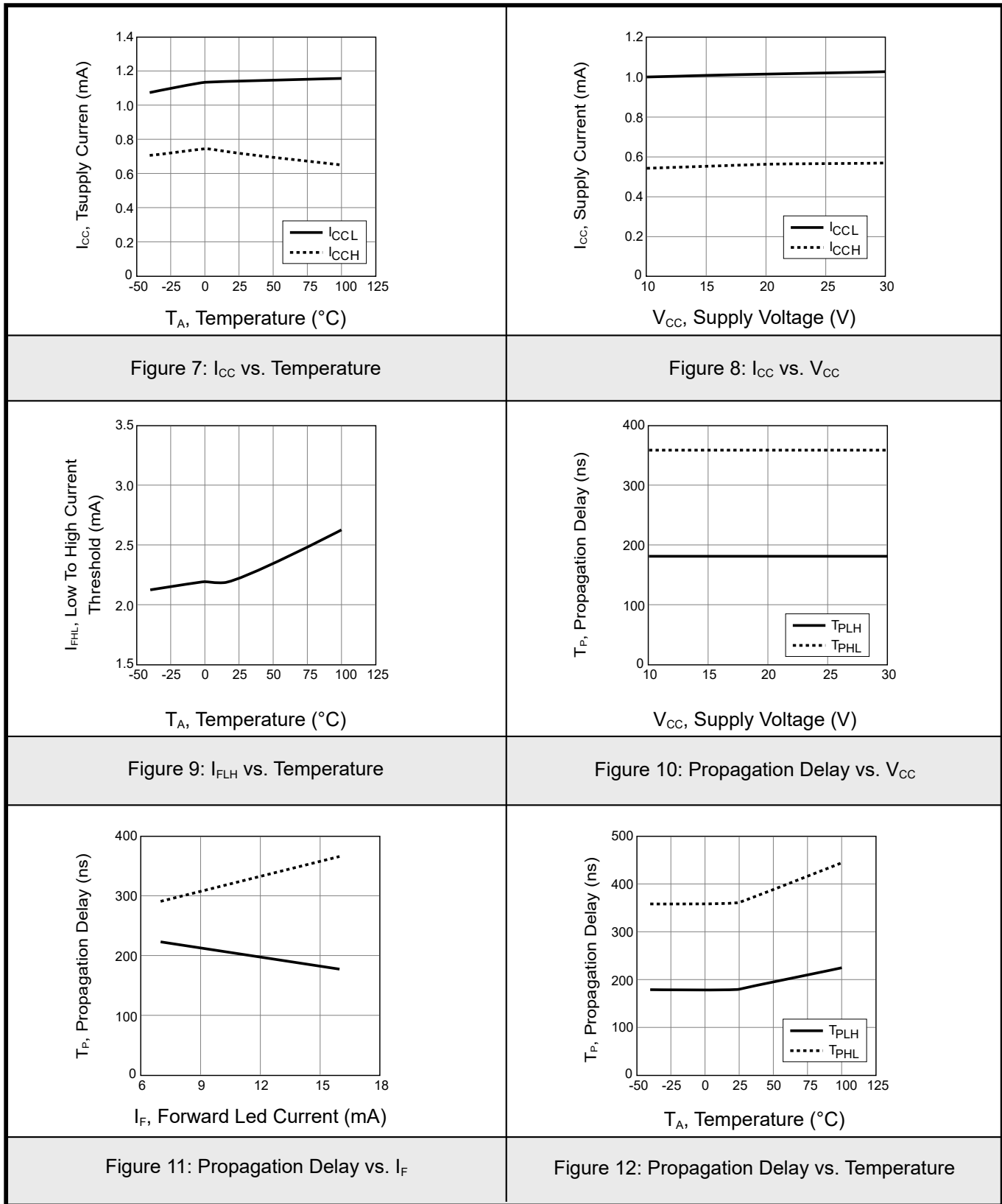


10.1 Typical Characteristic



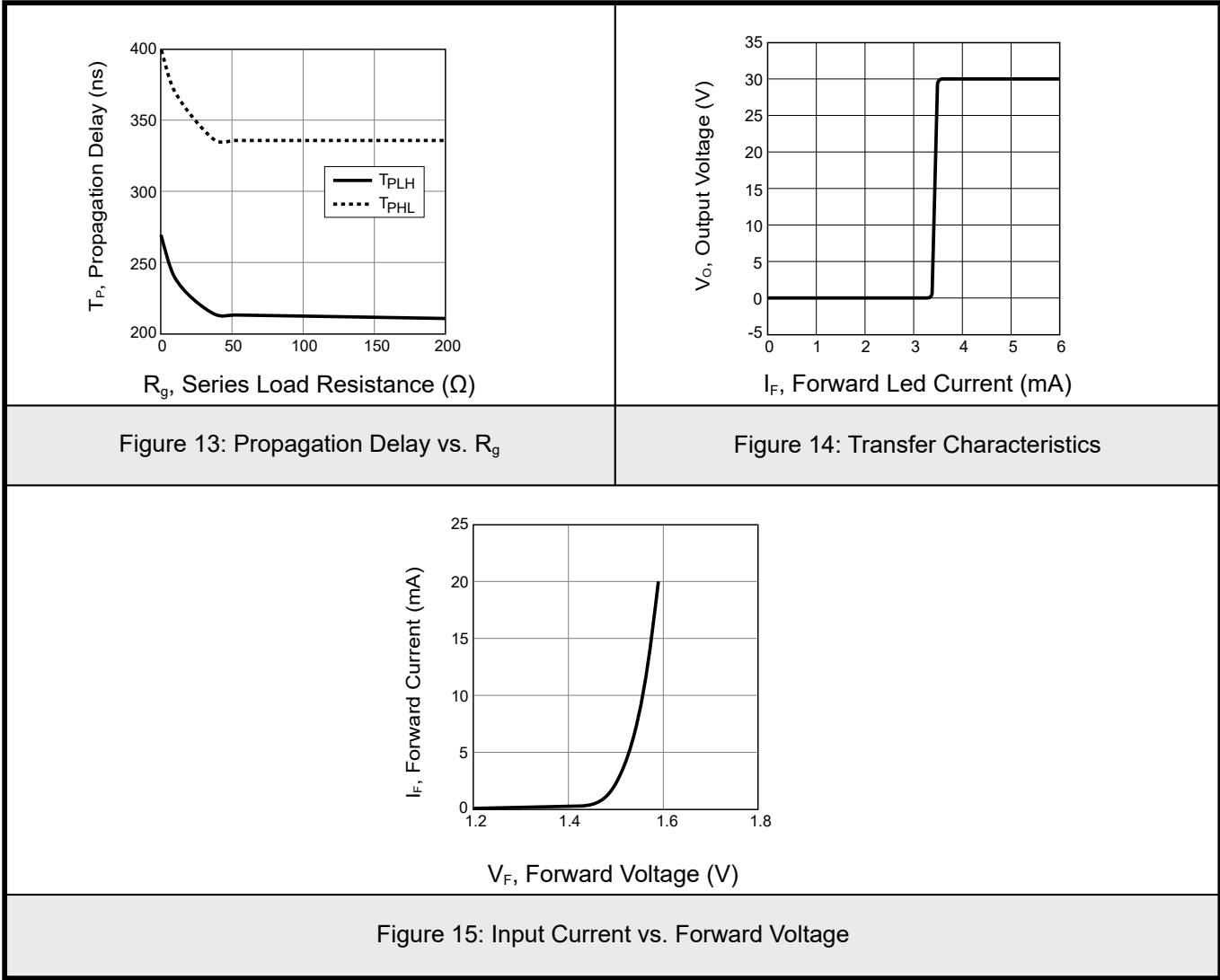


10.2 Typical Characteristic



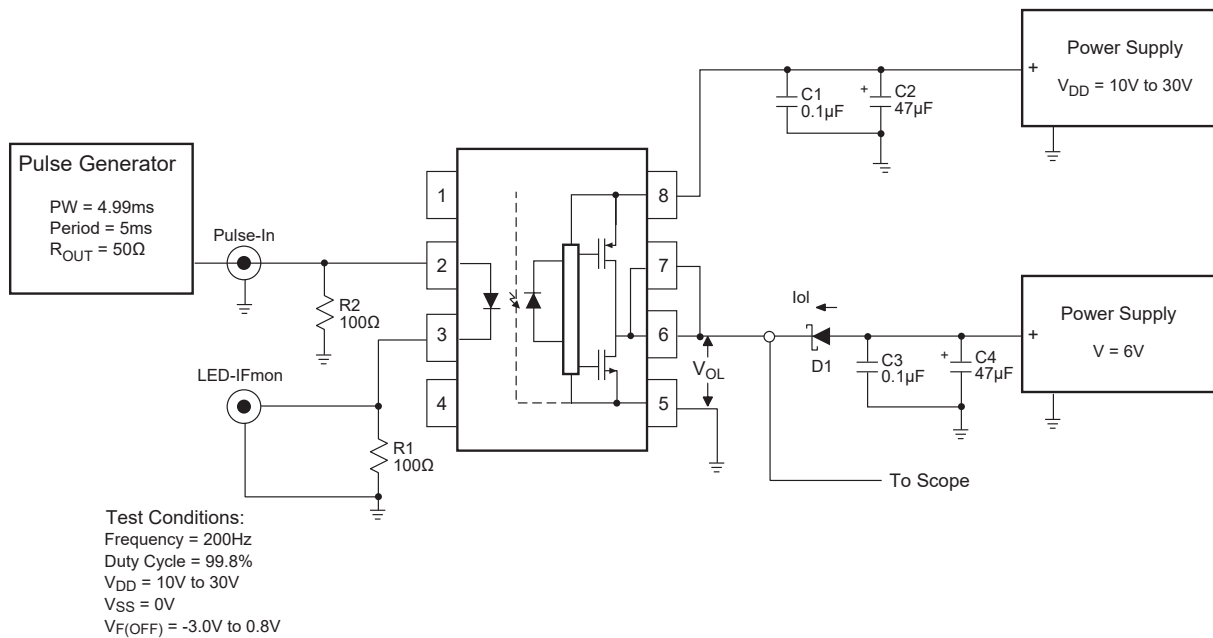
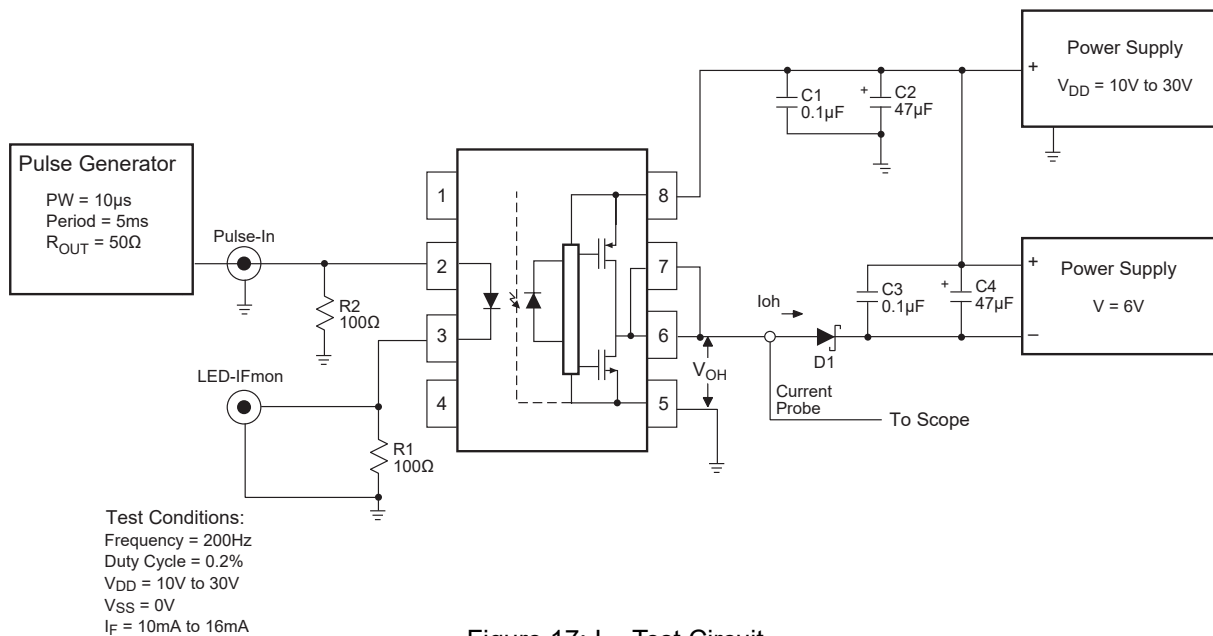


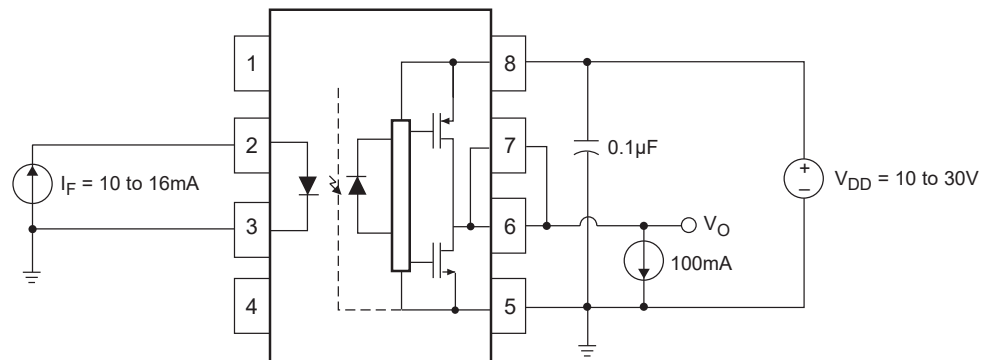
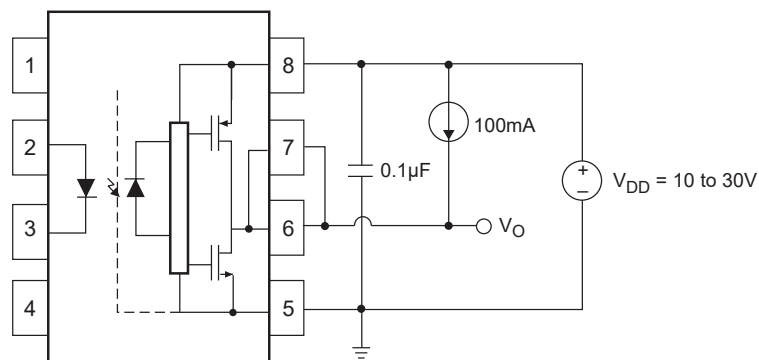
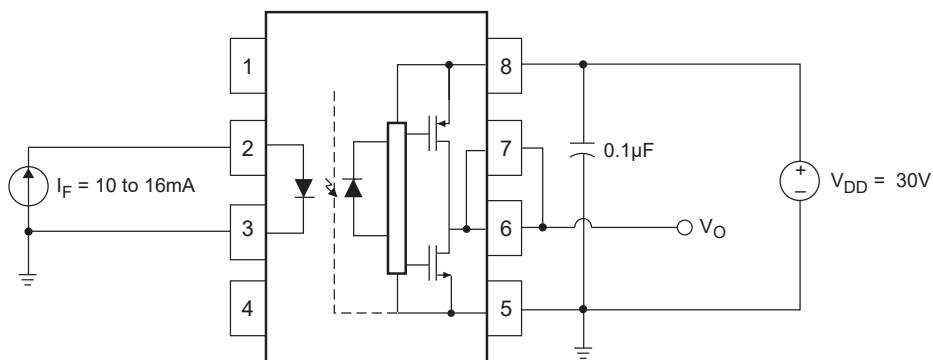
10.3 Typical Characteristic





11. Test Circuits Diagrams

Figure 16: I_{OL} Test CircuitFigure 17: I_{OH} Test Circuit

Figure 18: V_{OH} Test CircuitFigure 19: V_{OL} Test CircuitFigure 20: I_{DDH} Test Circuit

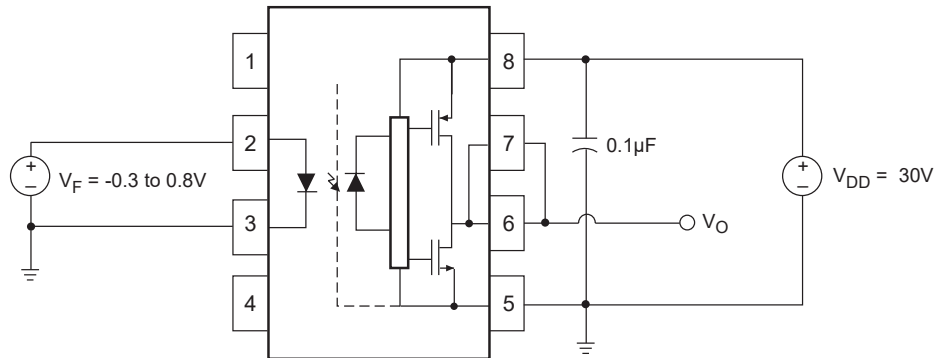


Figure 21: I_{DDL} Test Circuit

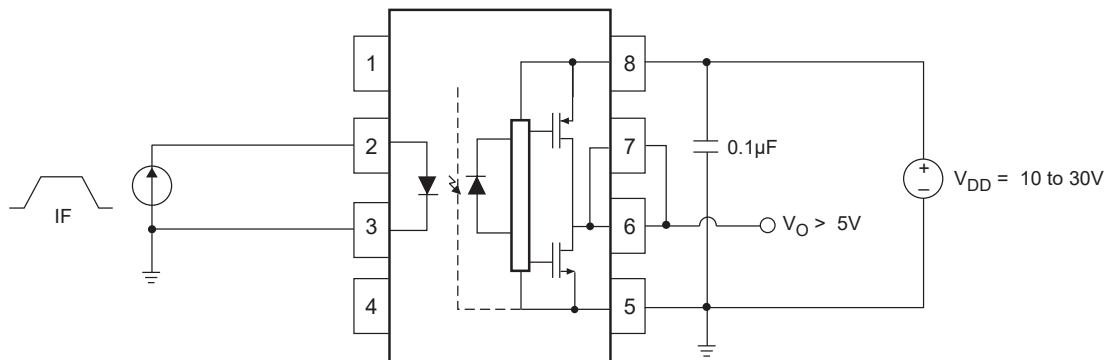


Figure 22: I_{FLH} Test Circuit

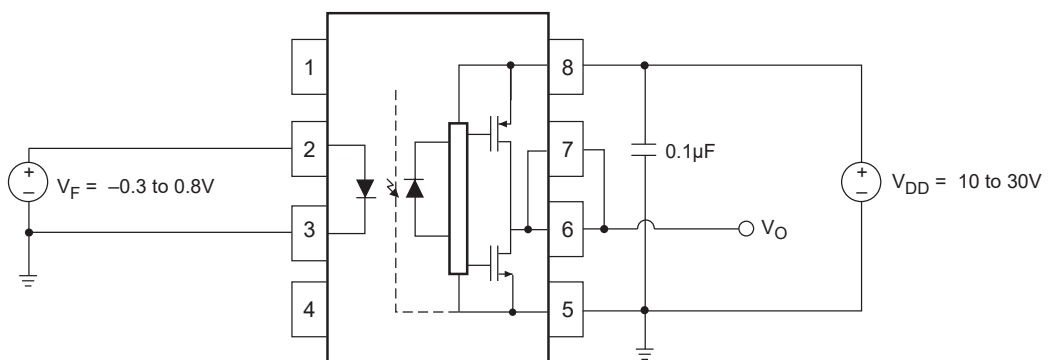


Figure 23: V_{FHL} Test Circuit

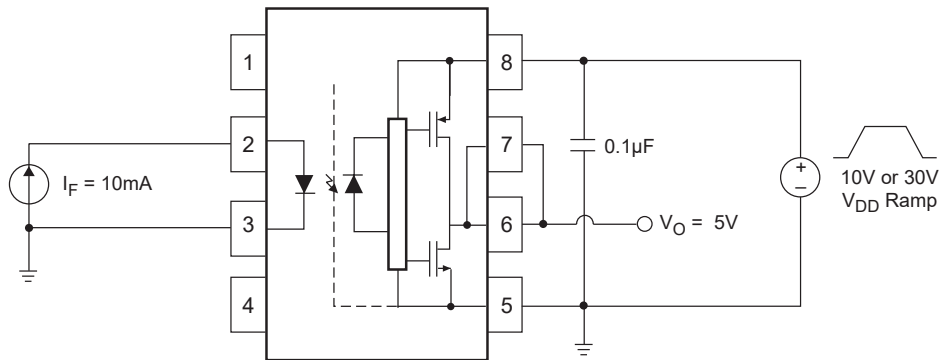
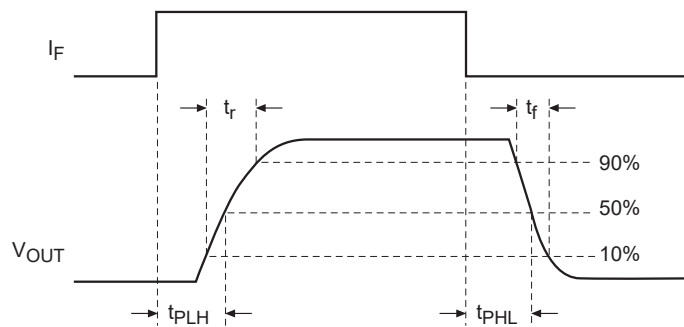
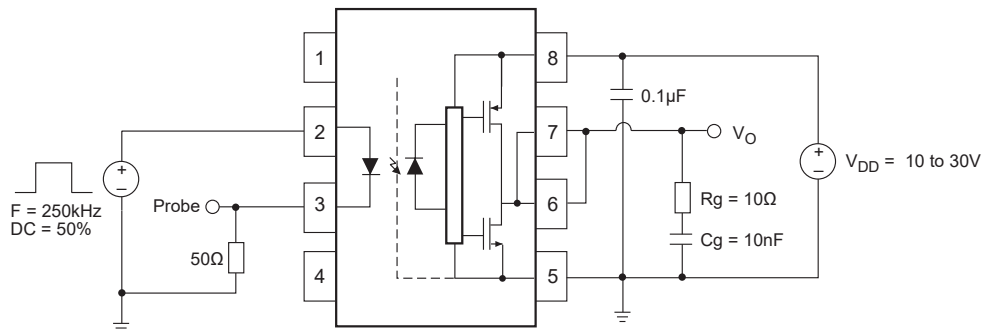


Figure 24: UVLO Test Circuit

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

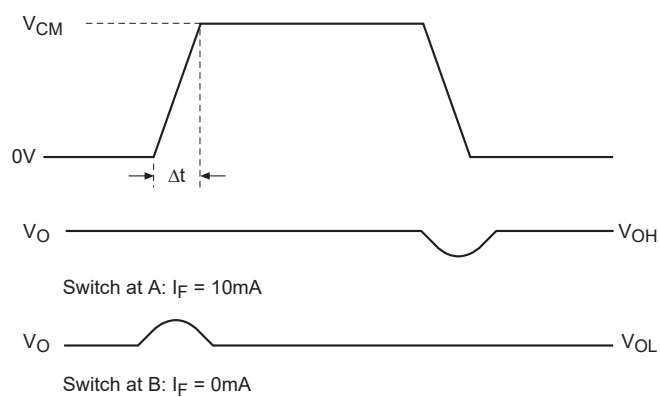
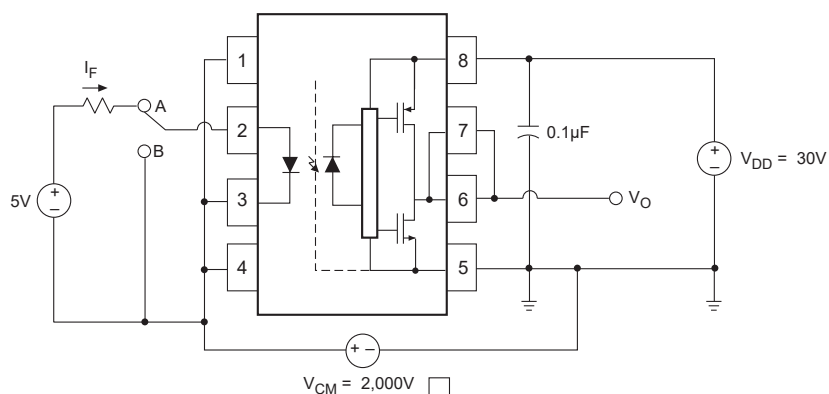
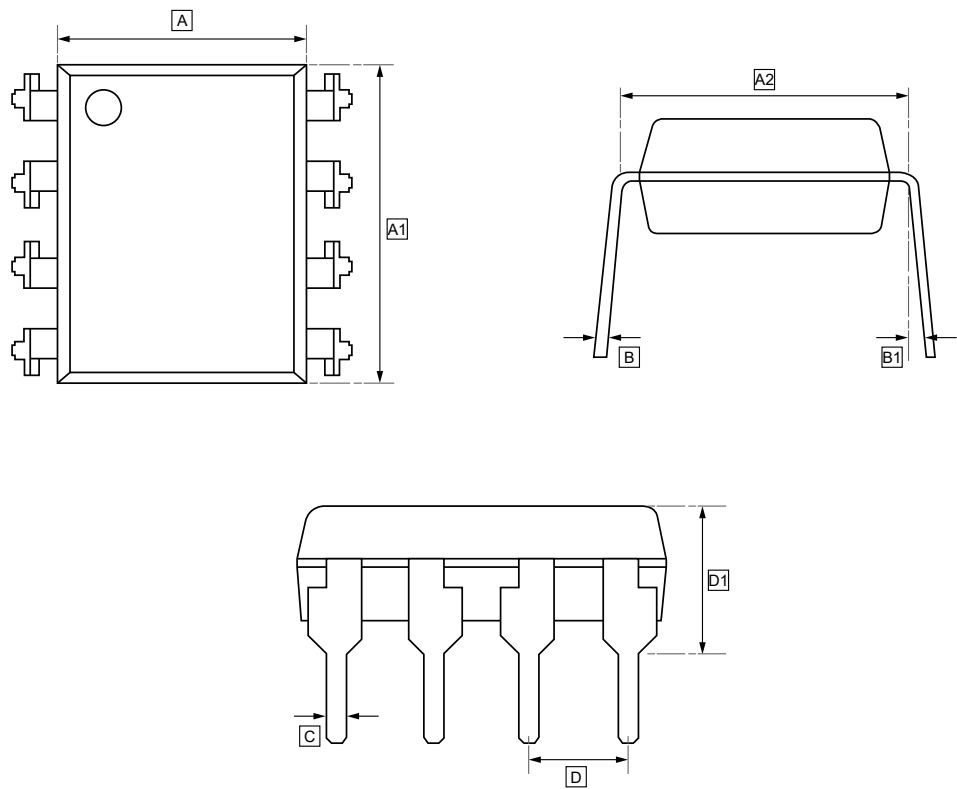


Figure 26: CMR Test Circuit and Waveforms



12.1 DIP-8 Package Outline Dimensions

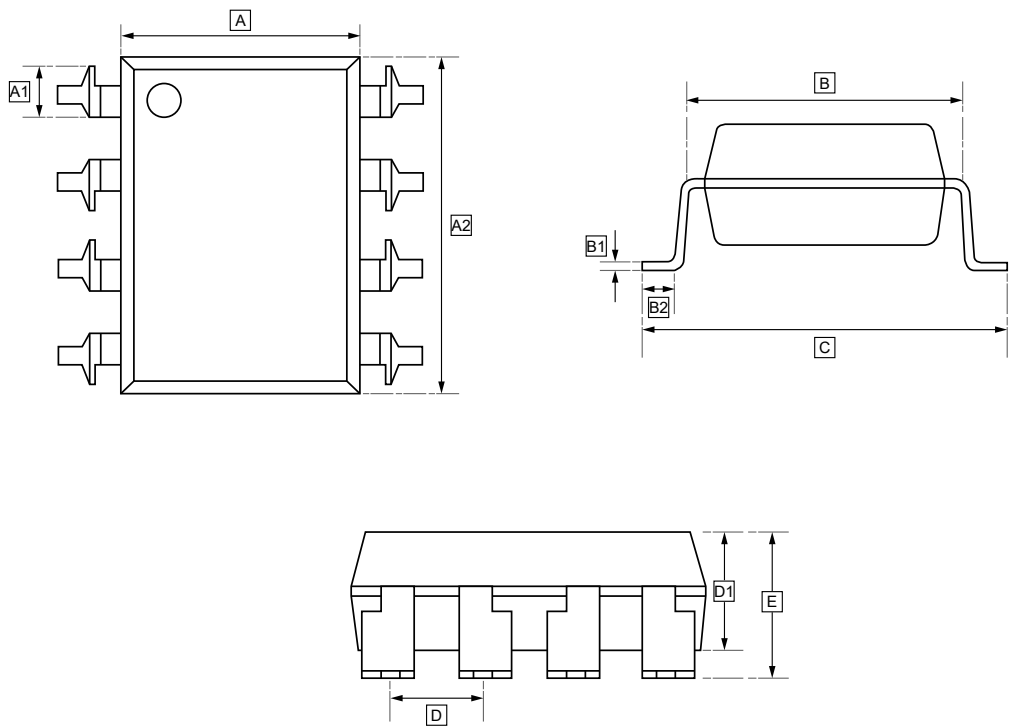


DIMENSIONS (mm are the original dimensions)

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

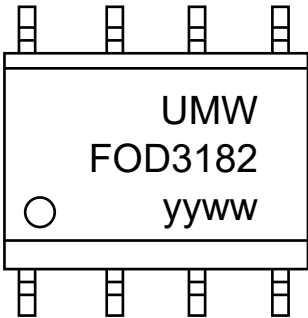


DIMENSIONS (mm are the original dimensions)

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

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