

1. Description

The ACPL-T350 is a gate driven optocoupler with an output current of 2.5 A, 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.

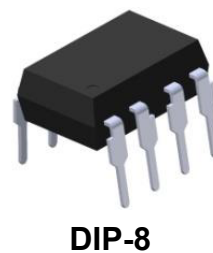
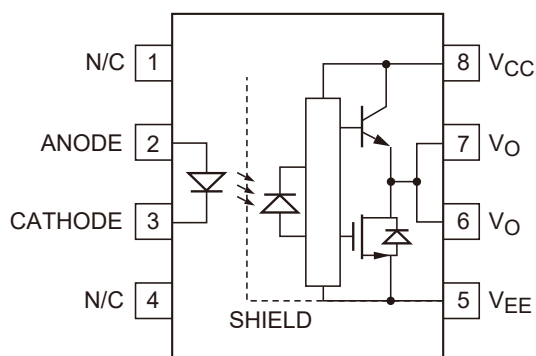
3. Features

- 35kV/ μ s minimum Common Mode Rejection
- 2.5A peak output current
- Wide operating V_{CC} Range: 15V~30V
- 400ns maximum propagation delay

2. Applications

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

4. Pinning Information



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



5.Truth Table

Input	LED	M1	M2	Output
H	ON	ON	OFF	H
L	OFF	OFF	ON	L

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 ⁽¹⁾	I_{FM}	25	mA
	Reverse Voltage	V_R	5	V
Output	Peak Output Current ⁽²⁾	$I_{O(PEAK)}$	2.5	A
	Supply Voltage	$V_{CC}-V_{EE}$	0 to 35	V
	Output Voltage	V_O	0 to V_{CC}	V
Isolation Voltage		V_{ISO}	5000	V_{rms}
Output Power Dissipation ⁽³⁾		P_O	250	mW
Total Power Dissipation ⁽⁴⁾		P_T	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	$^\circ\text{C}$

Notes:

1. Derate linearly above 70°C free-air temperature at a rate of $0.3\text{ mA}/^\circ\text{C}$.
2. Maximum pulse width = $10\text{ }\mu\text{s}$.
3. Derate linearly above 70°C free-air temperature at a rate of $4.8\text{ mW}/^\circ\text{C}$.
4. Derate linearly above 70°C free-air temperature at a rate of $5.4\text{ mW}/^\circ\text{C}$. The maximum LED junction temperature should not exceed 125°C .

8. Recommended Operating Conditions

Parameter	Symbol	Min	Max	Units
Power Supply Voltage	$V_{CC}-V_{EE}$	15	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 $T_A=25^\circ\text{C}$, $V_{CC}=30\text{V}$, and $V_{EE}=\text{GND}$.

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 ^{(1) (2)}	I_{OH}	$V_O=V_{CC}-3\text{V}$		-1	-2		A
		$V_O=V_{CC}-6\text{V}$		-2			A
Low Level Output Current ^{(1) (2)}	I_{OL}	$V_O=V_{EE}+3\text{V}$		1	2		A
		$V_O=V_{EE}+6\text{V}$		2			A
High Level Output Voltage ^{(3) (4)}	V_{OH}	$I_F=10\text{mA}$	$I_O=-2.5\text{A}$	$V_{CC}-6.25\text{V}$	$V_{CC}-2.5\text{V}$		V
			$I_O=-100\text{mA}$	$V_{CC}-0.3\text{V}$	$V_{CC}-0.1\text{V}$		V
Low Level Output Voltage	V_{OL}	$I_F=0\text{mA}$	$I_O=2.5\text{A}$		$V_{EE}+2.5\text{V}$	$V_{EE}+6.25\text{V}$	V
			$I_O=100\text{mA}$		$V_{EE}+0.1\text{V}$	$V_{EE}+0.3\text{V}$	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
UVLO Threshold	V_{UVLO+}	$I_F=10\text{mA}$, $V_O>5\text{V}$		11.5	12.7	13.5	V
	V_{UVLO-}	$I_F=10\text{mA}$, $V_O<5\text{V}$		10	11.2	12	V
UVLO Hysteresis	$UVLO_{HYS}$				1.5		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	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	$I_F=7mA$ to $16mA$, $R_g=10\Omega$, $C_g=10NF$ $F=10KHZ$, Duty Cycle=50%		80		ns
Output Drop Time(90%~10%)	T_F			80		ns
UVLO Turn On Delay	$T_{UVLO\ ON}$	$I_F=10mA$, $V_O>5V$		1.6		μs
UVLO Turn Off Delay	$T_{UVLO\ OFF}$	$I_F=10mA$, $V_O<5V$		0.4		μs
Output High Level Common (5) Mode Transient Immunity (8) (9)	$ CM_H $	$T_A=25^\circ C$, $V_{DD}=30V$ $V_{CM}=2000V$, $I_F=7\sim 16mA$, $V_F=0V$	35	50		KV/ μs
Output Low Level Common Mode Transient Immunity (8) (10)	$ CM_L $	$T_A=25^\circ C$, $V_{DD}=30V$ $V_{CM}=2000V$, $I_F=7\sim 16mA$, $V_F=0V$	35	50		KV/ μs

1. Maximum pulse width = 50 μs .
2. Maximum pulse width = 10 μs .
3. In this test V_{OH} is measured with a dc load current. When driving capacitive loads V_{OH} will approach V_{CC} as I_{OH} approaches zero amps.
4. Maximum pulse width = 1ms.
5. This load condition approximates the gate load of a 1200 V/100A IGBT.
6. Pulse Width Distortion (PWD) is defined as $|t_{PHL} - t_{PLH}|$ for any given device.
7. The difference between t_{PHL} and t_{PLH} between any two ACPL-T350 parts under the same test condition.
8. Pins 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., $V_O > 15.0V$).
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., $V_O < 2.0 V$).



10.1 Typical Characteristic

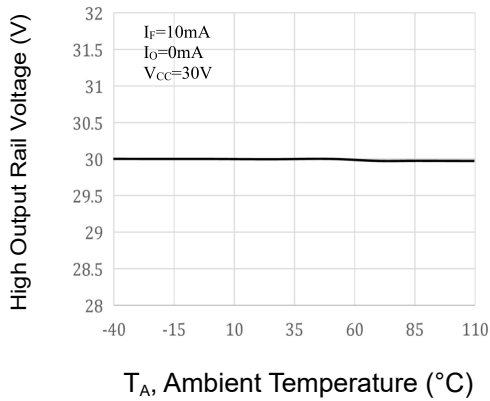


Figure 1: High Output Rail Voltage vs Ambient Temperature

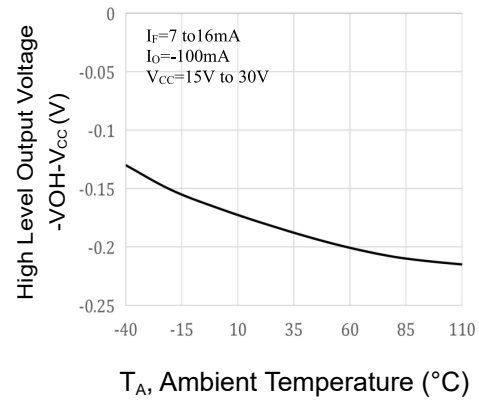


Figure 2: High Level Output Voltage vs Ambient Temperature

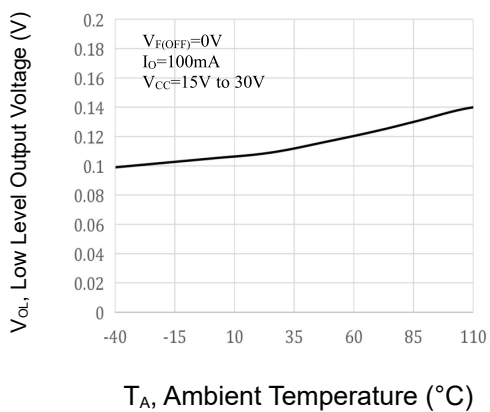


Figure 3: Low Level Output Voltage vs Ambient Temperature

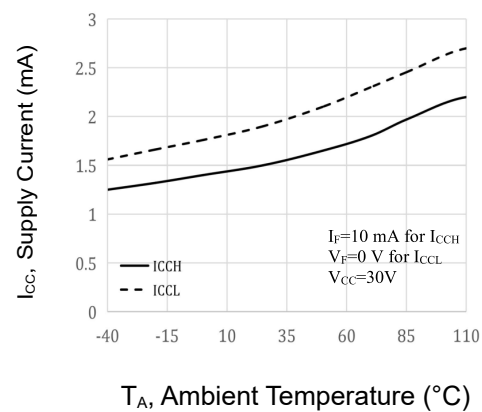


Figure 4: Supply Current vs Ambient Temperature

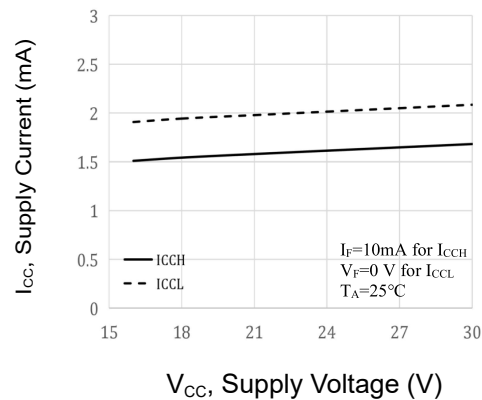


Figure 5: Supply Current vs Supply Voltage

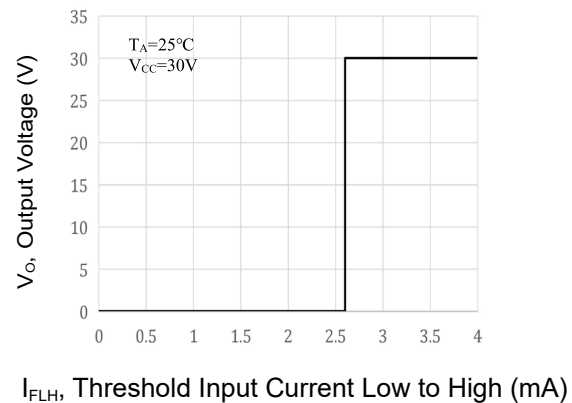
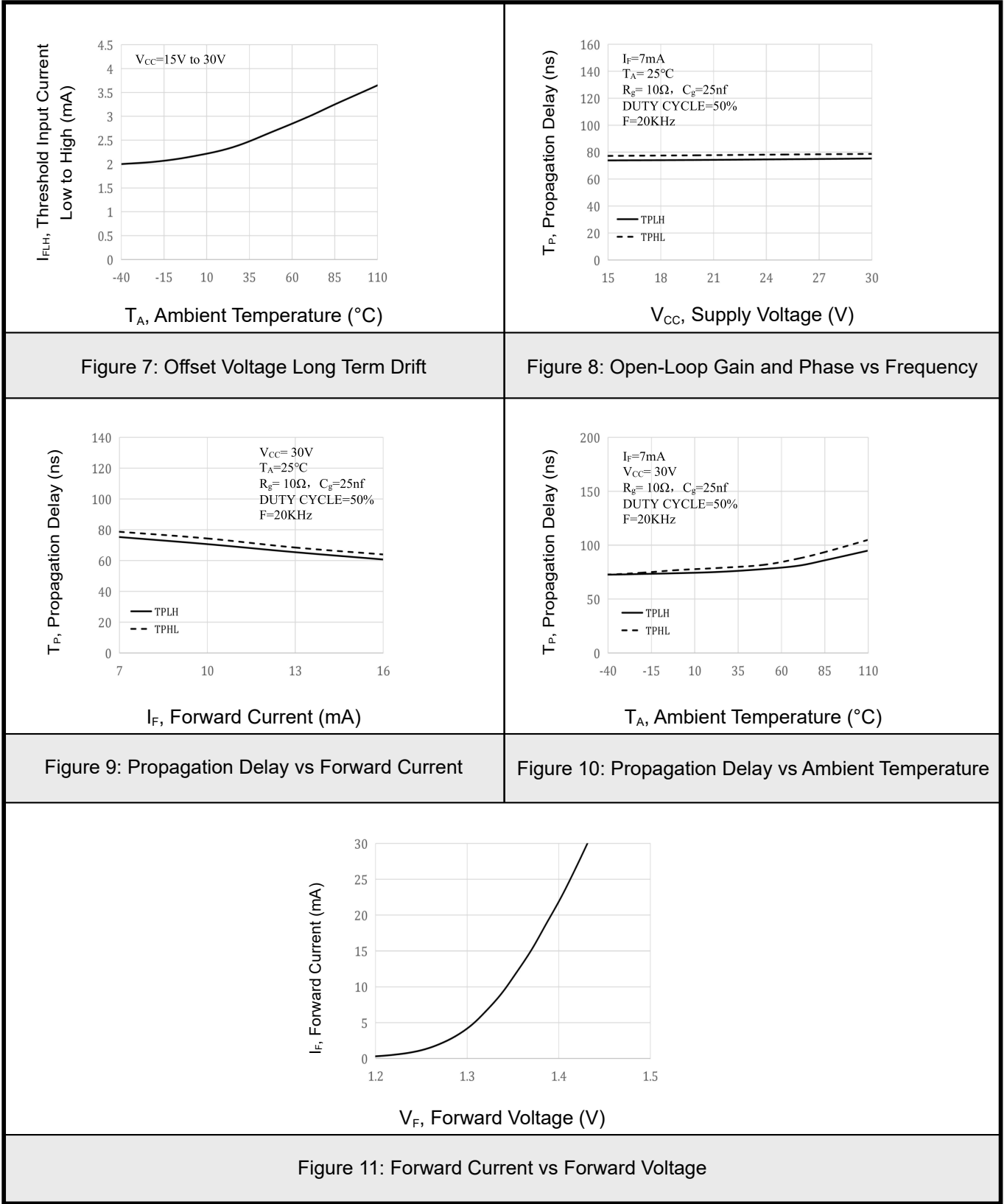


Figure 6: Output Voltage vs Threshold Input Current Low to High



10.2 Typical Characteristic





11.1 Test Circuits Diagrams

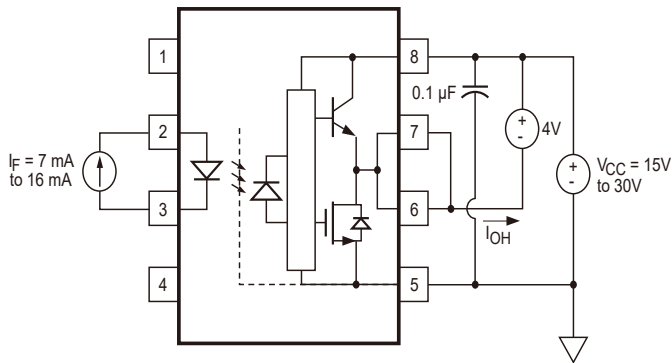
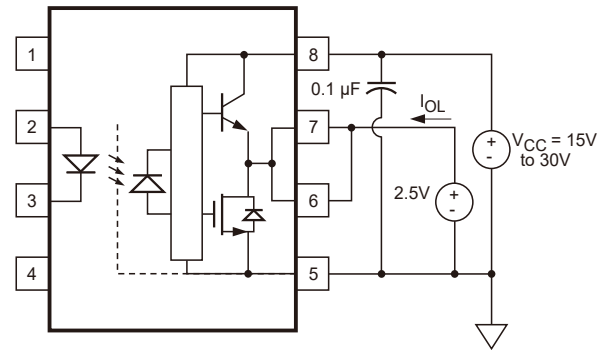
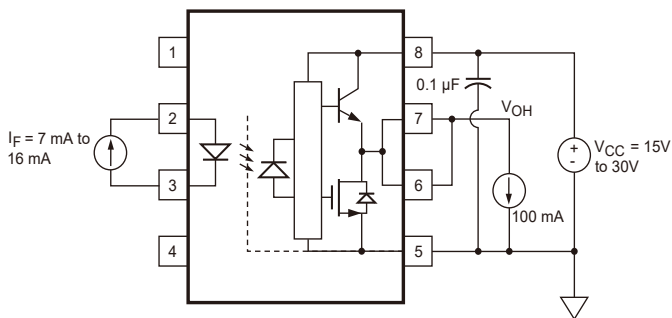
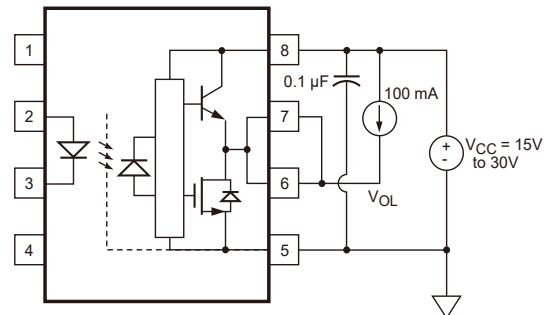
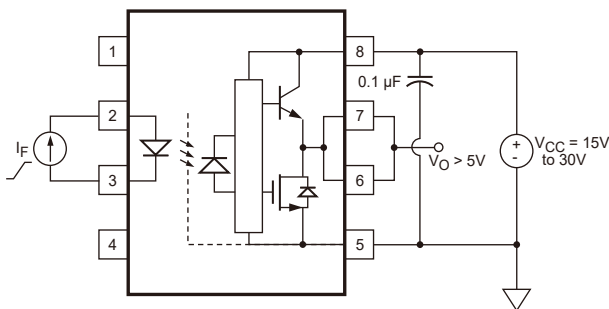
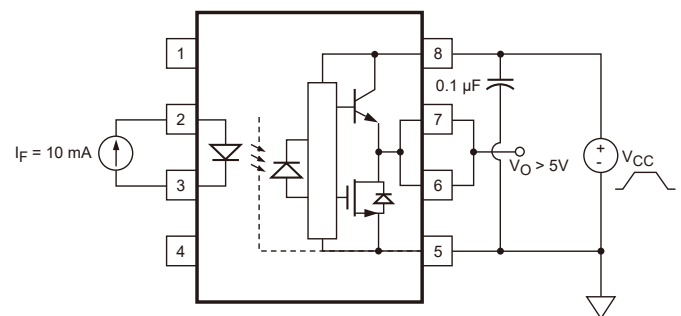
Figure 12: I_{OH} Test CircuitFigure 13: I_{OL} Test CircuitFigure 14: V_{OH} Test CircuitFigure 15: V_{OL} Test CircuitFigure 16: I_{FLH} Test Circuit

Figure 17: UVLO Test Circuit



11.2 Test Circuits Diagrams

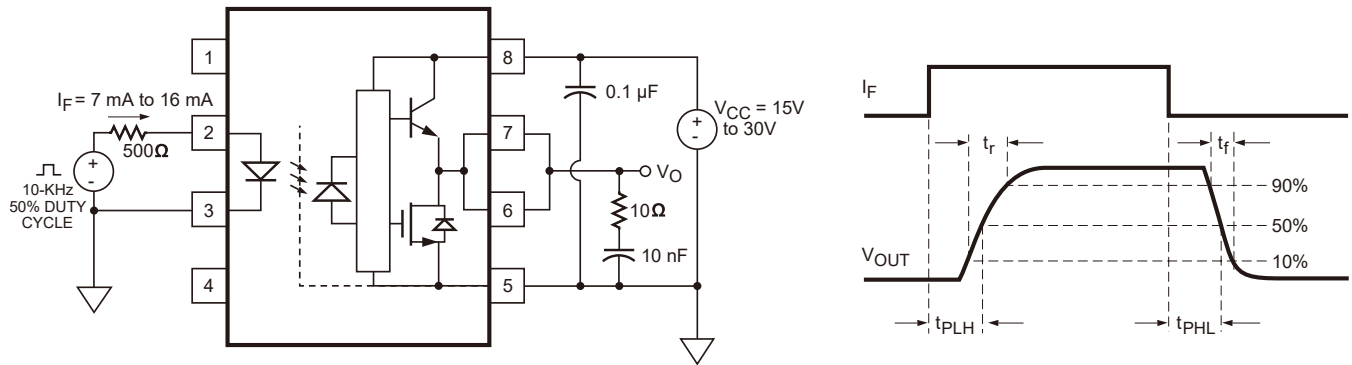


Figure 18: t_{PLH} , t_{PHL} , t_r , and t_f Test Circuit and Waveforms

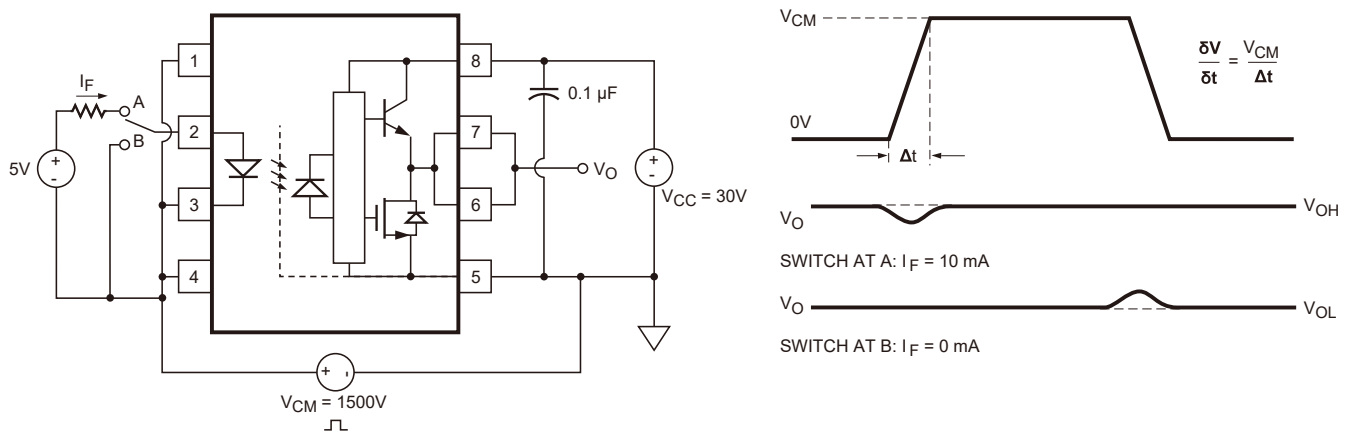
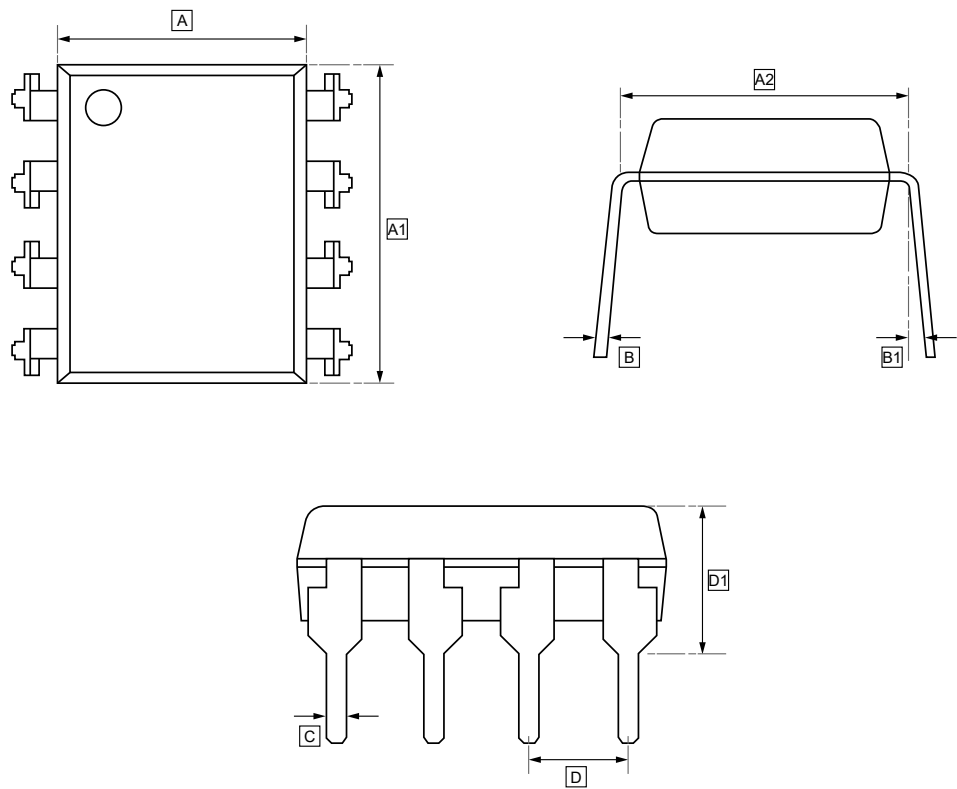


Figure 19: CMR Test Circuit and Waveforms



12.1 DIP-8 Package Outline Dimensions

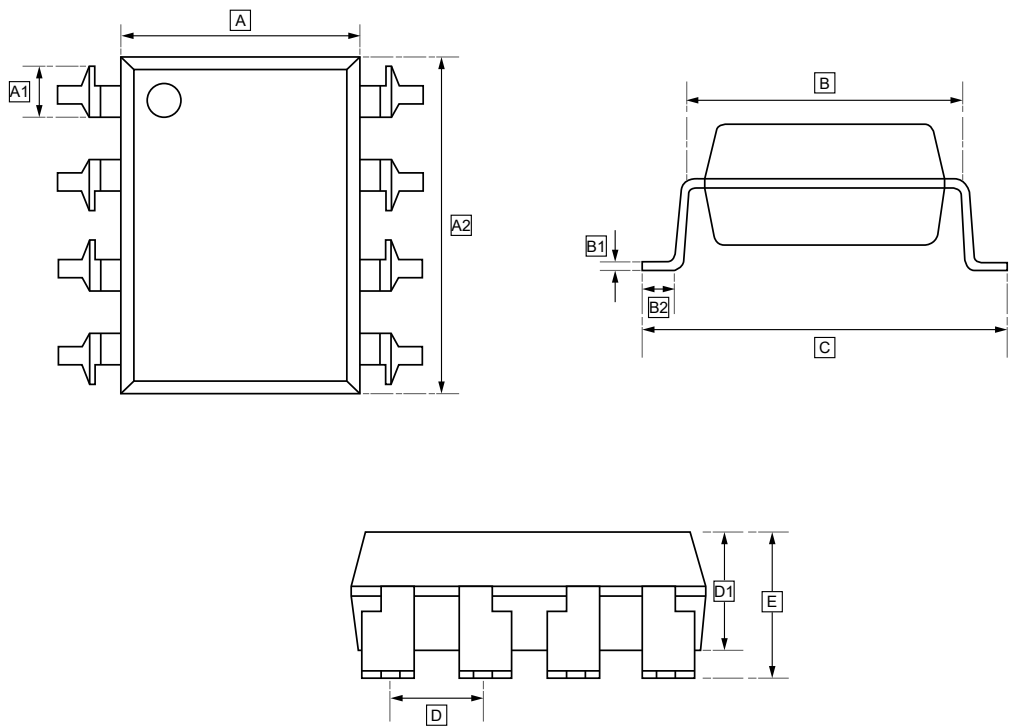


DIMENSIONS (mm are the original dimensions)

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

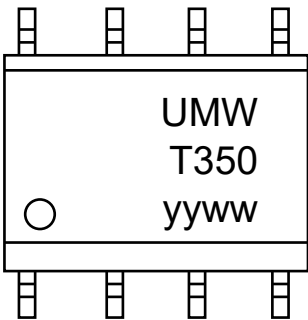


DIMENSIONS (mm are the original dimensions)

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 ACPL-T350-000E	T350	DIP-8	2250	Tape and reel
UMW ACPL-T350-500E	T350	SOP-8	1000	Tape and reel



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