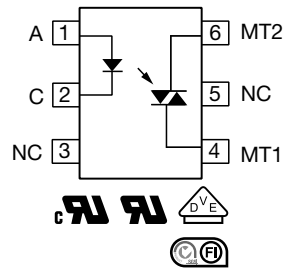


# Optocoupler, Phototriac Output, High dV/dt, Low Input Current



23128



## FEATURES

- Low trigger current  $I_{FT} = 0.7 \text{ mA (typ.)}$
- $I_{TRMS} = 300 \text{ mA}$
- High static  $dV/dt \geq 10\,000 \text{ V}/\mu\text{s}$
- Load voltage up to 800 V
- Material categorization:  
for definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## LINKS TO ADDITIONAL RESOURCES



3D Models



Design Tools



Related Documents



SPICE Models



Footprints



Schematics

## APPLICATIONS

- Solid-state relay
- Lighting controls
- Temperature controls
- Solenoid / valve controls
- AC motor drives / starters

## AGENCY APPROVALS

- [UL](#)
- [cUL](#)
- [DIN EN 60747-5-5 \(VDE 0884-5\)](#) available with option 1
- [FIMKO](#)

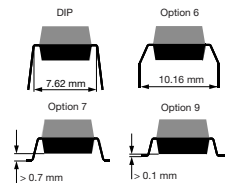
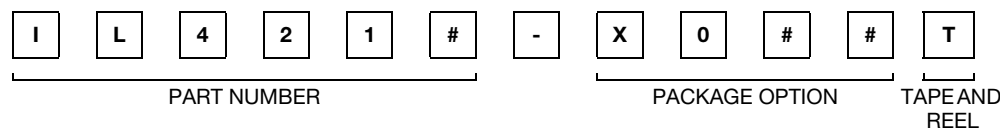
## DESCRIPTION

The IL4216, IL4217, and IL4218 product family consists of an optically coupled GaAs IRLED to a photosensitive thyristor system with integrated noise suppression circuit.

The thyristor system enables low trigger currents of 0.7 mA and features a  $dV/dt$  ratio of greater than 10 kV/ $\mu\text{s}$  and load voltages up to 800 V.

The IL4216, IL4217, and IL4218 product family is a perfect microcontroller friendly solution to isolate low voltage logic from high voltage 120 V<sub>AC</sub>, 240 V<sub>AC</sub>, and 380 V<sub>AC</sub> lines and to control resistive, inductive, or capacitive AC loads like motors, solenoids, high power thyristors or TRIACs, and solid-state relays.

## ORDERING INFORMATION



AGENCY CERTIFIED / PACKAGE	BLOCKING VOLTAGE $V_{DRM}$ (V)		
	600	700	800
<b>UL, cUL, FIMKO</b>			
DIP-6	IL4216	IL4217	IL4218
DIP-6, 400 mil, option 6	-	-	IL4218-X006
SMD-6, option 7	IL4216-X007T	-	-
<b>UL, cUL, FIMKO, VDE (Option 1)</b>			
DIP-6	IL4216-X001	-	IL4218-X001
DIP-6, 400 mil, option 6	IL4216-X016	-	-
SMD-6, option 7	-	-	IL4218-X017T <sup>(1)</sup>
SMD-6, option 9	-	-	IL4218-X019T <sup>(1)</sup>

### Note

<sup>(1)</sup> Also available in tubes, do not put T on the end



ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified)					
PARAMETER	TEST CONDITION	PART	SYMBOL	VALUE	UNIT
<b>INPUT</b>					
Reverse voltage			V <sub>R</sub>	6	V
Forward current			I <sub>F</sub>	60	mA
Surge current			I <sub>FSM</sub>	2.5	A
Power dissipation			P <sub>diss</sub>	100	mW
Derate linearly from 25 °C				1.33	mW/°C
Thermal resistance			R <sub>th</sub>	750	°C/W
<b>OUTPUT</b>					
Peak off-state voltage		IL4216	V <sub>DRM</sub>	600	V
		IL4217	V <sub>DRM</sub>	700	V
		IL4218	V <sub>DRM</sub>	800	V
RMS on-state current			I <sub>DRM</sub>	300	mA
Single cycle surge			I <sub>TSM</sub>	3	A
Power dissipation			P <sub>diss</sub>	300	mW
Derate linearly from 25 °C				6.6	mW/°C
Thermal resistance			R <sub>th</sub>	150	°C/W
<b>COUPLER</b>					
Storage temperature			T <sub>stg</sub>	-55 to +150	°C
Ambient temperature			T <sub>amb</sub>	-55 to +100	°C
Lead soldering temperature <sup>(1)</sup>	5 s		T <sub>slid</sub>	260	°C

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP)

ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>INPUT</b>							
Forward voltage	I <sub>F</sub> = 20 mA		V <sub>F</sub>	-	1.3	1.5	V
Breakdown voltage	I <sub>R</sub> = 10 μA		V <sub>BR</sub>	6	30	-	V
Reverse current	V <sub>R</sub> = 6 V		I <sub>R</sub>	-	0.1	10	μA
Input capacitance	V <sub>F</sub> = 0 V, f = 1 MHz		C <sub>IN</sub>	-	40	-	pF
Thermal resistance, junction to lead			R <sub>thjl</sub>	-	750	-	°C/W
<b>OUTPUT</b>							
Repetitive peak off-state voltage	I <sub>DRM</sub> = 100 μA	IL4216	V <sub>DRM</sub>	600	650	-	V
		IL4217	V <sub>DRM</sub>	700	750	-	V
		IL4218	V <sub>DRM</sub>	800	850	-	V
Off-state voltage	I <sub>D(RMS)</sub> = 70 μA	IL4216	V <sub>D(RMS)</sub>	424	460	-	V
		IL4217	V <sub>D(RMS)</sub>	484	536	-	V
		IL4218	V <sub>D(RMS)</sub>	565	613	-	V
Off-state current	V <sub>D</sub> = 600 V, T <sub>amb</sub> = 100 °C		I <sub>D(RMS)</sub>	-	10	100	μA
Reverse current	V <sub>R</sub> = 600 V, T <sub>amb</sub> = 25 °C		I <sub>RMS</sub>	-	10	100	μA
On-state voltage	I <sub>T</sub> = 300 mA		V <sub>TM</sub>	-	1.7	3	V
On-state current	PF = 1, V <sub>T(RMS)</sub> = 1.7 V		I <sub>TM</sub>	-	-	300	mA
Surge (non-repetitive, on-state current)	f = 50 Hz		I <sub>TSM</sub>	-	-	3	A
Holding current	V <sub>T</sub> = 3 V		I <sub>H</sub>	-	65	200	μA
Latching current	V <sub>T</sub> = 2.2 V		I <sub>L</sub>	-	-	500	μA
LED trigger current	V <sub>AK</sub> = 5 V		I <sub>FT</sub>	-	0.7	-	mA



ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
<b>OUTPUT</b>							
Critical rate of rise of off-state voltage	V <sub>D</sub> = 0.67 V <sub>DRM</sub> , T <sub>amb</sub> = 25 °C		dV/dt <sub>cr</sub>	10 000	-	-	V/μs
	V <sub>D</sub> = 0.67 V <sub>DRM</sub> , T <sub>amb</sub> = 80 °C		dV/dt <sub>cr</sub>	5000	-	-	V/μs
Critical rate of rise of voltage at current commutation	V <sub>D</sub> = 230 V <sub>RMS</sub> , I <sub>D</sub> = 300 mA <sub>RMS</sub> , T <sub>J</sub> = 25 °C		dV/dt <sub>crq</sub>	-	8	-	V/μs
	V <sub>D</sub> = 230 V <sub>RMS</sub> , I <sub>D</sub> = 300 mA <sub>RMS</sub> , T <sub>J</sub> = 85 °C		dV/dt <sub>crq</sub>	-	7	-	V/μs
Critical rate of rise of on-state current commutation	V <sub>D</sub> = 230 V <sub>RMS</sub> , I <sub>D</sub> = 300 mA <sub>RMS</sub> , T <sub>J</sub> = 25 °C		dI/dt <sub>crq</sub>	-	12	-	A/ms
Thermal resistance, junction to lead			R <sub>thjl</sub>	-	150	-	°C/W
<b>COUPLER</b>							
Capacitance (input to output)	f = 1 MHz, V <sub>IO</sub> = 0 V		C <sub>IO</sub>	-	0.8	-	pF
Critical rate of rise of coupled input to output voltage	I <sub>T</sub> = 0, V <sub>RM</sub> = V <sub>DM</sub> = 300 V <sub>AC</sub>		dV <sub>(IO)</sub> /dt	5000	1	-	mA

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements

**POWER FACTOR CONSIDERATIONS**

A snubber is not needed to eliminate false operation of the TRIAC driver because of the IL4216, IL4217, IL4218 high static and commutating dV/dt with loads between 1 and 0.8 power factors. When inductive loads with power factors less than 0.8 are being driven, include a RC snubber or a single capacitor directly across the device to damp the peak commutating dV/dt spike. Normally a commutating dV/dt causes a turning-off device to stay on due to the stored energy remaining in the turning-off device.

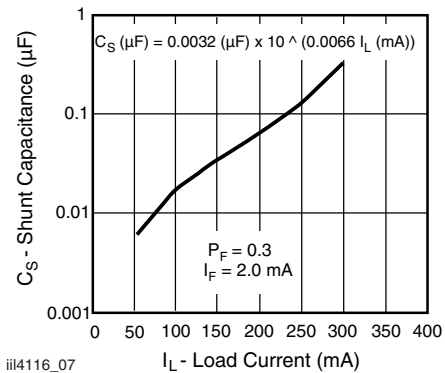


Fig. 1 - Shunt Capacitance vs. Load Current vs. Power Factor

SAFETY AND INSULATION RATINGS				
PARAMETER	TEST CONDITION	SYMBOL	VALUE	UNIT
Climatic classification	According to IEC 68 part 1		55 / 100 / 21	
Comparative tracking index		CTI	175	
Maximum rated withstanding isolation voltage	t = 1 min	V <sub>ISO</sub>	4420	V <sub>RMS</sub>
Maximum transient isolation voltage		V <sub>IOTM</sub>	8000	V <sub>peak</sub>
Maximum repetitive peak isolation voltage		V <sub>IORM</sub>	890	V <sub>peak</sub>
Isolation resistance	V <sub>IO</sub> = 500 V, T <sub>amb</sub> = 25 °C	R <sub>IO</sub>	≥ 10 <sup>12</sup>	Ω
	V <sub>IO</sub> = 500 V, T <sub>amb</sub> = 100 °C	R <sub>IO</sub>	≥ 10 <sup>11</sup>	Ω
Output safety power		P <sub>SO</sub>	500	mW
Input safety current		I <sub>SI</sub>	250	mA
Safety temperature		T <sub>S</sub>	175	°C
Creepage distance	DIP-6; SMD-6, option 7; SMD-6, option 9		≥ 7	mm
	DIP-6, 400 mil, option 6		≥ 8	mm
Clearance distance	DIP-6; SMD-6, option 7; SMD-6, option 9		≥ 7	mm
	DIP-6, 400 mil, option 6		≥ 8	mm
Insulation thickness		DTI	≥ 0.4	mm

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits

**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)

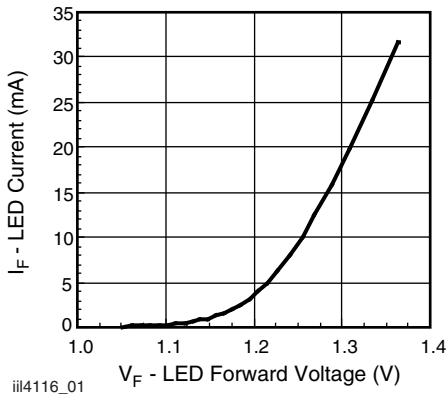


Fig. 2 - LED Forward Current vs. Forward Voltage

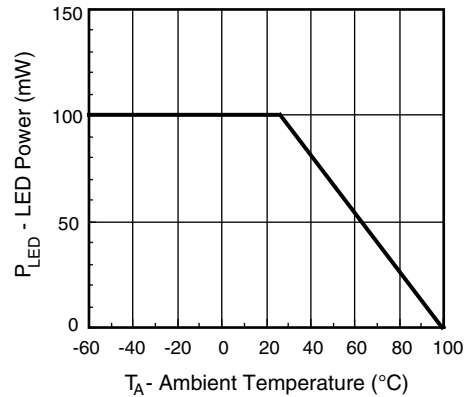


Fig. 5 - Maximum LED Power Dissipation

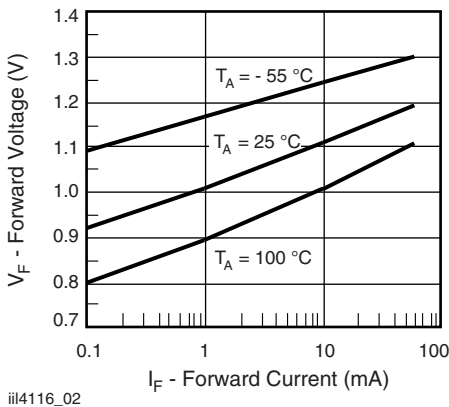


Fig. 3 - Forward Voltage vs. Forward Current

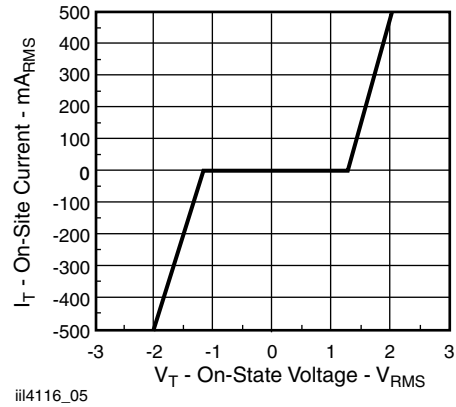


Fig. 6 - On-State Terminal Voltage vs. Terminal Current

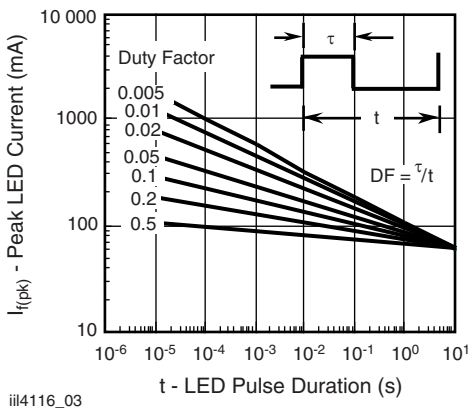


Fig. 4 - Peak LED Current vs. Duty Factor,  $\tau$

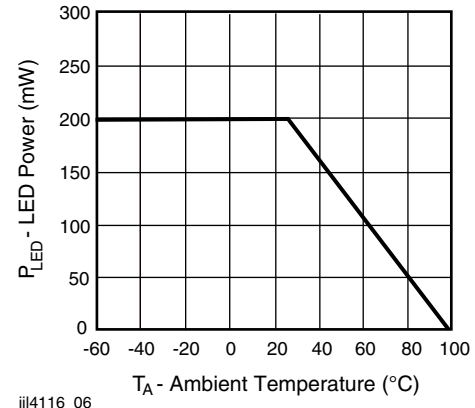
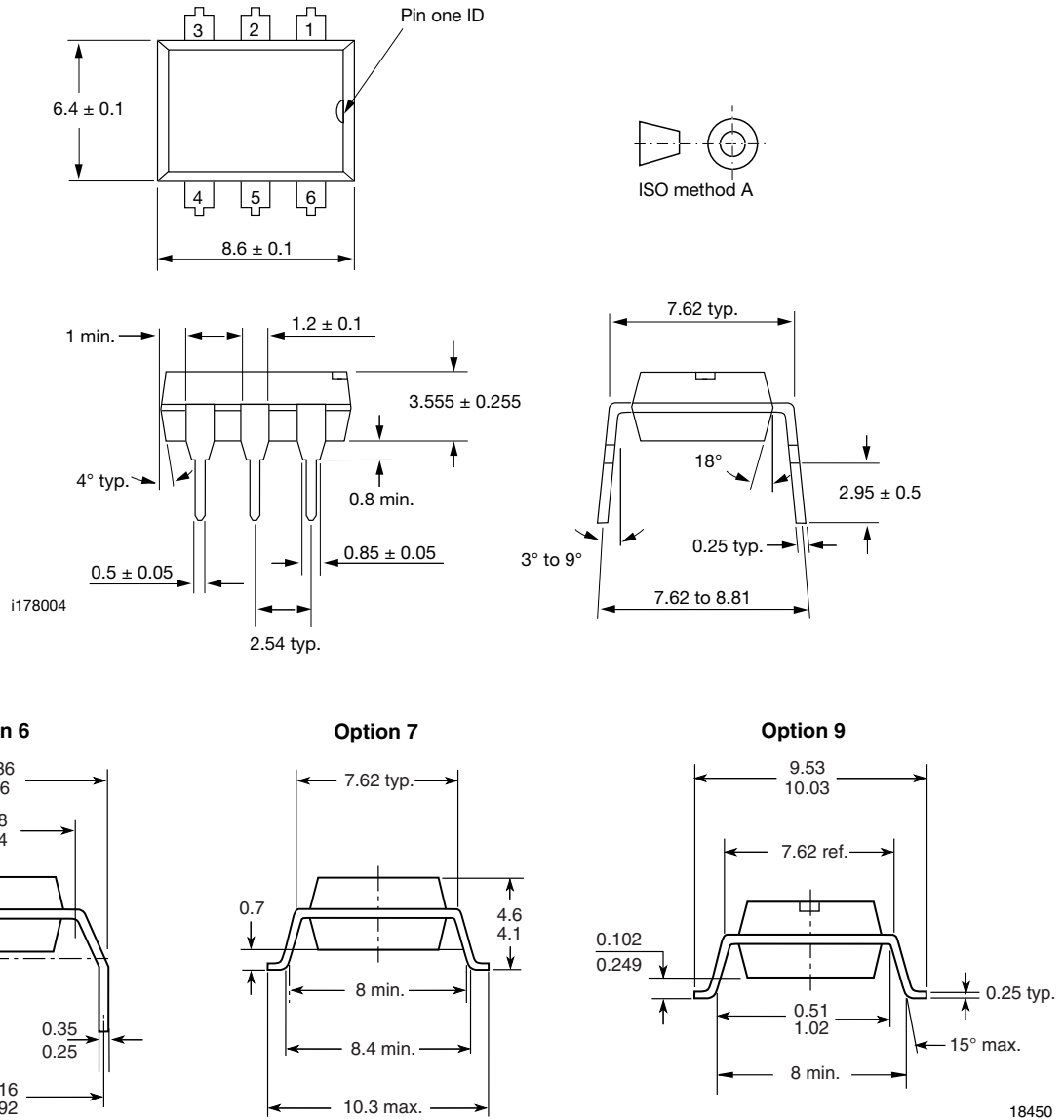


Fig. 7 - Maximum Output Power Dissipation



### PACKAGE DIMENSIONS in millimeters



### PACKAGE MARKING (example)

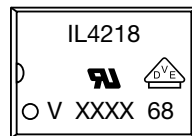
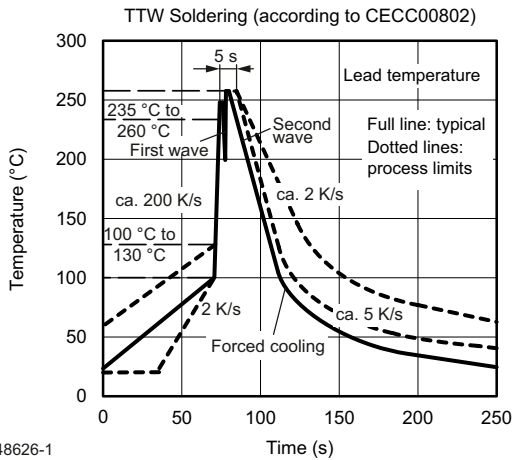


Fig. 8 - Example of IL4218-X017T

#### Notes

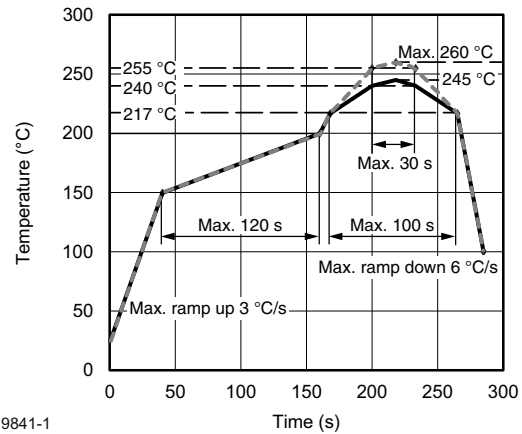
- XXXX = LMC (lot marking code)
- VDE logo is only marked on option 1 parts
- Tape and reel suffix (T) is not part of the package marking

**SOLDER PROFILES**



948626-1

Fig. 9 - Wave Soldering Double Wave Profile According to J-STD-020 for DIP Devices



19841-1

Fig. 10 - Lead (Pb)-free Reflow Solder Profile According to J-STD-020 for SMD Devices

**HANDLING AND STORAGE CONDITIONS**

ESD level: HBM class 2

Floor life: unlimited

Conditions:  $T_{amb} < 30\text{ °C}$ ,  $RH < 85\%$

Moisture sensitivity level 1, according to J-STD-020



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