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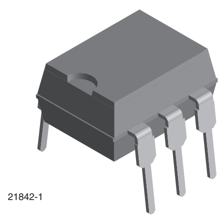
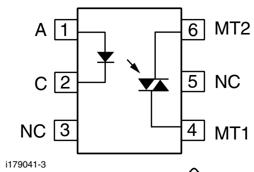
Optocoupler, Phototriac Output, High dV/dt, Low Input Current





DESCRIPTION

The IL4216, IL4217, IL4218 consists of an AlGaAs IRLED optically coupled to a pair of photosensitive non-zero crossing SCR chips and are connected inversely parallel to form a TRIAC. These three semiconductors are assembled in a six pin 0.3 inch dual in-line package.

High input sensitivity is achieved by using an emitter follower phototransistor and a cascaded SCR predriver resulting in an LED trigger current of less than 1.3 mA (DC).

The use of a proprietary dV/dt clamp results in a static dV/dt of greater than 10 kV/μs. This clamp circuit has a MOSFET that is enhanced when high dV/dt spikes occur between MT1 and MT2 of the TRIAC. The FET clamps the base of the phototransistor when conducting, disabling the internal SCR predriver.

The blocking voltage of up to 800 V permits control of off-line voltages up to 240 V_{AC}, with a safety factor more than two, and is sufficient for as much as 380 V_{AC}. Current handling capability is up to 300 mA RMS, continuous at 25 °C.

The IL4216, IL4217, IL4218 isolates low-voltage logic from 120, 240, and 380 VAC lines to control resistive inductive, or capacitive loads including motors solenoids, high current thyristors or TRIAC and relays.

FEATURES

- High input sensitivity I_{FT} = 1.3 mA
- 300 mA on-state current
- High static dV/dt 10000 V/μs, typical
- Very low leakage < 10 μA
- Isolation test voltage 5300 V_{RMS}
- Compliant to RoHS Directive 2002/95/EC and in accordance to WEEE 2002/96/EC

Pb-free
e3
RoHS COMPLIANT

APPLICATIONS

- Solid state relay
- Industrial controls
- Office equipment
- Consumer appliances

AGENCY APPROVALS

- UL1577, file no. E52744 system code J
- CSA 93751
- DIN EN 60747-5-5 (VDE 0884) available with option 1
- BSI IEC60950; IEC60065
- FIMKO

ORDERING INFORMATION

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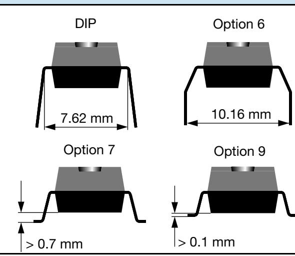
PART NUMBER — PACKAGE OPTION — TAPE AND REEL



AGENCY CERTIFIED/PACKAGE	BLOCKING VOLTAGE V_{DRM} (V)		
UL, cUL, BSI, FIMKO	**600**	**700**	**800**
DIP-6	IL4216	IL4217	IL4218
DIP-6, 400 mil, option 6	IL4216-X006	-	IL4218-X006
SMD-6, option 7	IL4216-X007T	IL4217-X007	-
SMD-6, option 9	IL4216-X009T (1)	IL4217-X009	-
VDE, UL, cUL, BSI, FIMKO	**600**	**700**	**800**
DIP-6	IL4216-X001	-	IL4218-X001
DIP-6, 400 mil, option 6	IL4216-X016	-	IL4218-X016
SMD-6, option 7	-	-	IL4218-X017T (1)
SMD-6, option 9	-	-	IL4218-X019T (1)

Note
(1) Also available in tubes, do not put T on the end.

ABSOLUTE MAXIMUM RATINGS (1) (T_{amb} = 25 °C, unless otherwise specified)					
PARAMETER	**TEST CONDITION**	**PART**	**SYMBOL**	**VALUE**	**UNIT**
INPUT					
Reverse voltage			V_R	6	V
Forward current			I_F	60	mA
Surge current			I_{FSM}	2.5	A
Power dissipation			P_{diss}	100	mW
Derate linearly from 25 °C				1.33	mW/°C
Thermal resistance			R_{th}	750	°C/W
OUTPUT					
Peak off-state voltage		IL4216	V_{DRM}	600	V
		IL4217	V_{DRM}	700	V
		IL4218	V_{DRM}	800	V
RMS on-state current			I_{DRM}	300	mA
Single cycle surge			I_{TSM}	3	A
Power dissipation			P_{diss}	300	mW
Derate linearly from 25 °C				6.6	mW/°C
Thermal resistance			R_{th}	150	°C/W
COUPLER					
Creepage distance				≥ 7	mm
Clearance				≥ 7	mm
Storage temperature			T_{stg}	- 55 to + 150	°C
Ambient temperature			T_{amb}	- 55 to + 100	°C
Isolation test voltage			V_{ISO}	5300	V_{RMS}
Isolation resistance	V_{IO} = 500 V, T_{amb} = 25 °C		R_{IO}	$\geq 10^{12}$	Ω
	V_{IO} = 500 V, T_{amb} = 100 °C		R_{IO}	$\geq 10^{11}$	Ω
Lead soldering temperature (2)	5 s		T_{sld}	260	°C

Notes

(1) 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.

(2) 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_{amb} = 25 °C, unless otherwise specified)							
PARAMETER	TEST CONDITION	PART	SYMBOL	MIN.	TYP.	MAX.	UNIT
INPUT							
Forward voltage	I_F = 20 mA		V_F		1.3	1.5	V
Breakdown voltage	I_R = 10 µA		V_{BR}	6	30		V
Reverse current	V_R = 6 V		I_R		0.1	10	µA
Input capacitance	V_F = 0 V, f = 1 MHz		C_{IN}		40		pF
Thermal resistance, junction to lead			R_{thjl}		750		°C/W
OUTPUT							
Repetitive peak off-state voltage	I_{DRM} = 100 µA	IL4216	V_{DRM}	600	650		V
		IL4217	V_{DRM}	700	750		V
		IL4218	V_{DRM}	800	850		V
Off-state voltage	$I_{D(RMS)}$ = 70 µA	IL4216	$V_{D(RMS)}$	424	460		V
		IL4217	$V_{D(RMS)}$	484	536		V
		IL4218	$V_{D(RMS)}$	565	613		V
Off-state current	V_D = 600 V, T_{amb} = 100 °C		$I_{D(RMS)}$		10	100	µA
Reverse current	V_R = 600 V, T_{amb} = 25 °C		I_{RMS}		10	100	µA
On-state voltage	I_T = 300 mA		V_{TM}		1.7	3	V
On-state current	PF = 1, $V_{T(RMS)}$ = 1.7 V		I_{TM}			300	mA
Surge (non-repetitive, on-state current)	f = 50 Hz		I_{TSM}			3	A
Holding current	V_T = 3 V		I_H		65	200	µA
Latching current	V_T = 2.2 V		I_L			500	µA
LED trigger current	V_{AK} = 5 V		I_{FT}		0.7		mA
Critical rate of rise of off-state voltage	V_D = 0.67 V_{DRM}, T_{amb} = 25 °C		dV/dt_{cr}	10 000			V/µs
	V_D = 0.67 V_{DRM}, T_{amb} = 80 °C		dV/dt_{cr}	5000			V/µs
Critical rate of rise of voltage at current commutation	V_D = 230 V_{RMS}, I_D = 300 mA_{RMS}, T_J = 25 °C		dV/dt_{crq}		8		V/µs
	V_D = 230 V_{RMS}, I_D = 300 mA_{RMS}, T_J = 85 °C		dV/dt_{crq}		7		V/µs
Critical rate of rise of on-state current commutation	V_D = 230 V_{RMS}, I_D = 300 mA_{RMS}, T_J = 25 °C		dI/dt_{crq}		12		A/ms
Thermal resistance, junction to lead			R_{thjl}		150		°C/W
COUPLER							
Capacitance (input to output)	f = 1 MHz, V_{IO} = 0 V		C_{IO}		0.8		pF
Critical rate of rise of coupled input to output voltage	I_T = 0, V_{RM} = V_{DM} = 300 VAC		$dV_{(IO)}/dt$	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.

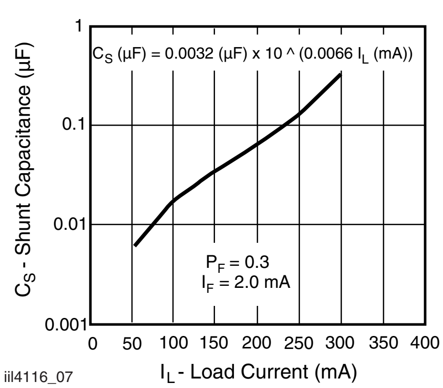


Fig. 1 - Shunt Capacitance vs. Load Current vs. Power Factor

TYPICAL CHARACTERISTICS (T_{amb} = 25 °C, unless otherwise specified)

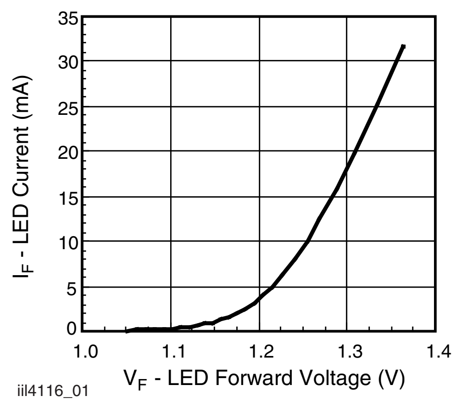


Fig. 2 - LED Forward Current vs. Forward Voltage

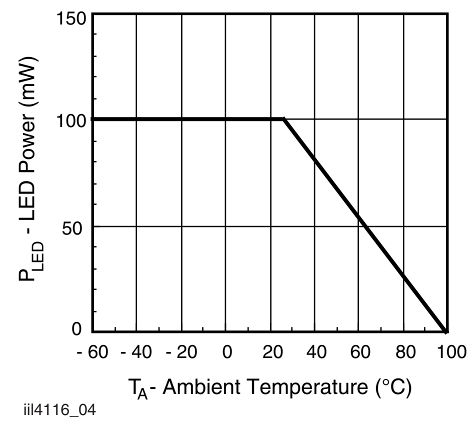


Fig. 5 - Maximum LED Power Dissipation

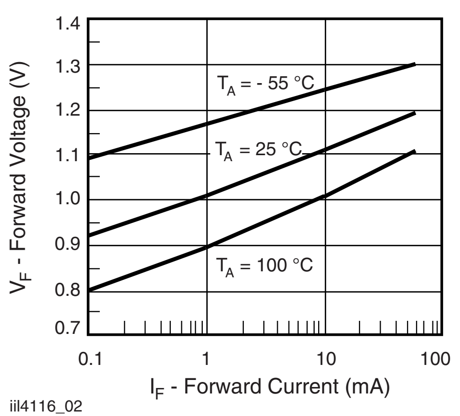


Fig. 3 - Forward Voltage vs. Forward Current

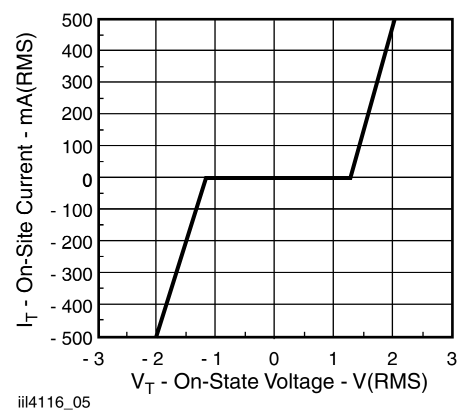


Fig. 6 - On-State Terminal Voltage vs. Terminal Current

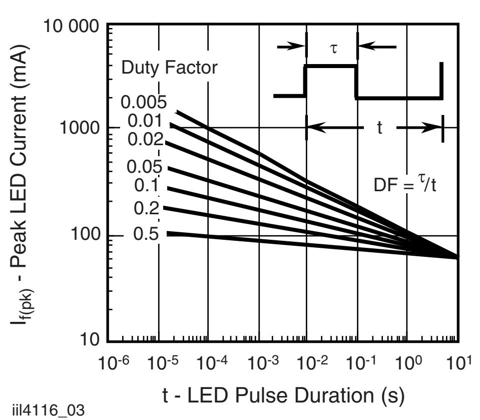


Fig. 4 - Peak LED Current vs. Duty Factor, τ

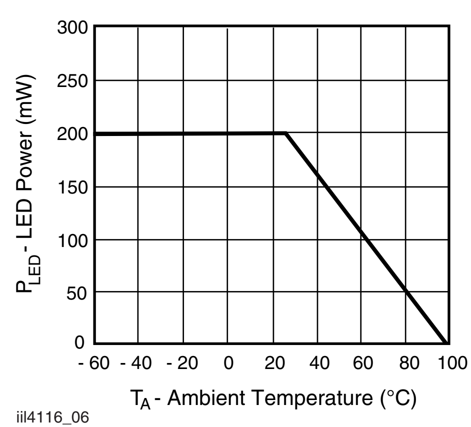
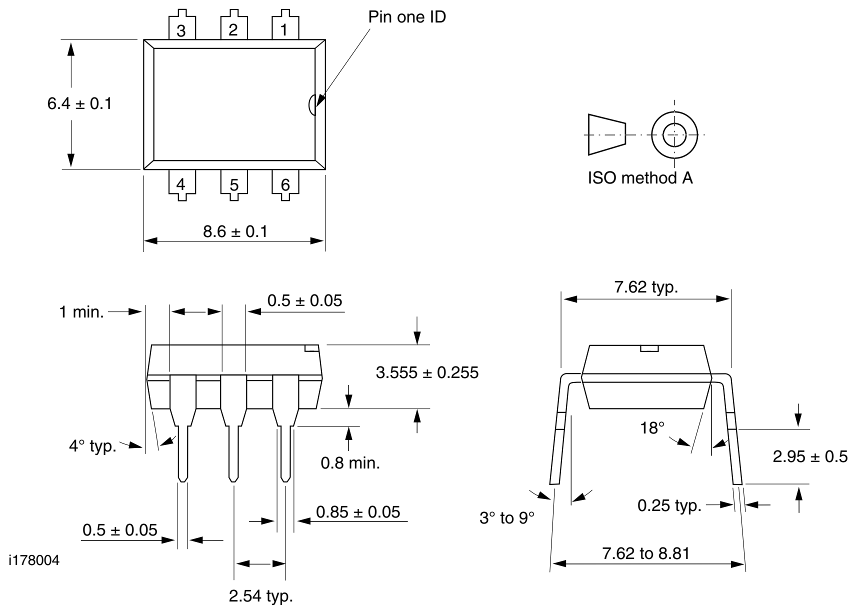
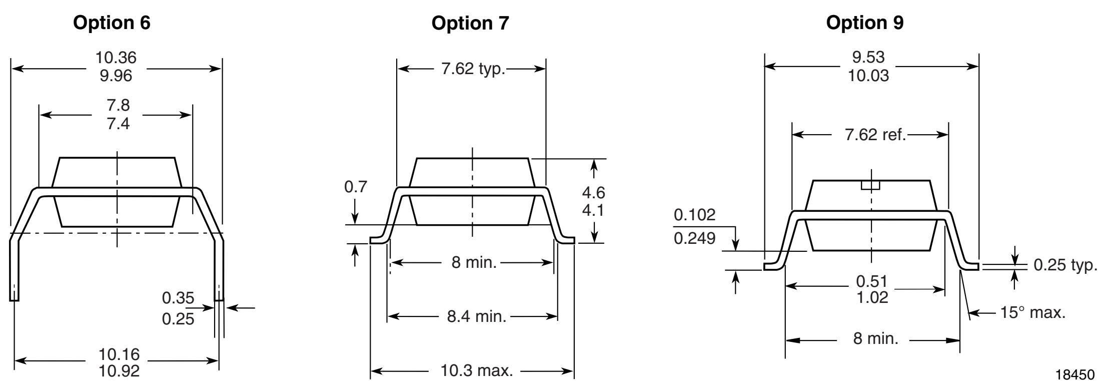


Fig. 7 - Maximum Output Power Dissipation

PACKAGE DIMENSIONS in millimeters





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