600 V **IL420**
800 V **IL4208**

Triac Optocoupler

FEATURES

- **High Input Sensitivity I_{FT}=2.0 mA**
- **600/800 V Blocking Voltage**
- **300 mA On-State Current**
- **High Static dv/dt 10 kV/μs**
- **Inverse Parallel SCRs Provide Commutating dv/dt >10 kV/μs**
- **Very Low Leakage <10 μA**
- **Isolation Test Voltage from Double Molded Package 5300 V_{RMS}**
- **Small 6-Pin DIP Package**
- **Underwriters Lab File #E52744**
- **VDE Approval #0884 Available with Option 1**

Maximum Ratings

Emitter

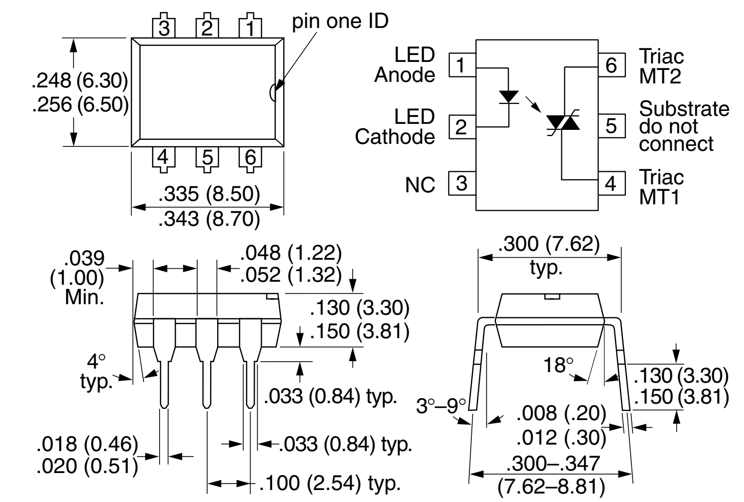
Reverse Voltage ....6.0 V
Forward Current .... 60 mA
Surge Current .... 2.5 A
Power Dissipation..100 mW
Derate from 25°C ....1.33 mW/°C

Detector

Peak Off-State Voltage
IL420 ....600 V
IL4208 ....800 V
RMS On-State Current..................................... 300 mA
Single Cycle Surge Current................................. 3.0 A
Total Power Dissipation ....500 mW
Derate from 25°C ....6.6 mW/°C

Package

Isolation Test Voltage (between emitter and detector, climate per DIN 50014, part 2, Nov. 74, t=1.0 sec.)..................... 5300 V_{RMS}
Pollution Degree (DIN VDE 0109) 2
Creepage Distance .... ≥7.0 mm
Clearance.. ≥7.0 mm
Comparative Tracking Index per DIN IEC 112/VDE 0303 part 1, Group IIIa per DIN VDE 6110... ≥175
Isolation Resistance
V_{IO}=500 V, T_A=25°C .... $\geq 10^{12}\ \Omega$
V_{IO}=500 V, T_A=100°C .... $\geq 10^{11}\ \Omega$
Storage Temperature Range ....–55°C to +150°C
Ambient Temperature Range ....–55°C to +100°C
Soldering Temperature (max. ≤10 sec.dip soldering ≥0.5 mm from case bottom)............260°C



DESCRIPTION

The IL420/4208 consists of a GaAs IRLED optically coupled to a photosensitive non-zero crossing TRIAC network. The TRIAC consists of two inverse parallel connected monolithic SCRs. These three semiconductors are assembled in a six pin 0.3 inch dual in-line package, using high insulation double molded, over/under leadframe construction.

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 2.0 mA (DC).

The IL420/4208 uses two discrete SCRs resulting in a commutating dv/dt of greater than 10 kV/μs. 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. When conducting, the FET clamps the base of the phototransistor, disabling the first stage SCR predriver.

The 600/800 V blocking voltage permits control of off-line voltages up to 240 VAC, with a safety factor of more than two, and is sufficient for as much as 380 VAC.

The IL420/4208 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.

Applications include solid-state relays, industrial controls, office equipment, and consumer appliances.

Characteristics

Parameter		Symbol	Min.	Typ.	Max.	Unit	Condition
Emitter							
Forward Voltage		V_F	—	1.16	1.35	V	I_F=10 mA
Reverse Current		I_R	—	0.1	10	µA	V_R=6.0 V
Capacitance		C_O	—	40	—	pF	V_F=0 V, f=1.0 MHz
Thermal Resistance, Junction to Ambient		R_{THJA}	—	750	—	K/W	—
Detector							
Off-State Voltage	IL420	$V_{D(RMS)}$	424	460	—	V	$I_{D(RMS)}$=70 µA
	IL4208		565		—		
Repetitive Peak Off-State Voltage	IL420	V_{DRM}	600	—	—	V	I_{DRM}=100 µs
	IL4208		800	—	—		
Off-State Current		$I_{D\ (RMS)}$	—	10	100	µA	V_D=V_{DRM}, T_A=100°C
On-State Voltage		V_{TM}	—	1.7	3.0	V	I_T=300 mA
On-State Current		I_{TM}	—	—	300	mA	PF=1.0, $V_{T(RMS)}$=1.7 V
Surge (Non-Repetitive) On-State Current		I_{TSM}	—	—	3.0	A	f=50 Hz
Holding Current		I_H	—	65	500	µA	—
Latching Current		I_L	—	5.0	—	mA	V_T=2.2 V
LED Trigger Current		I_{FT}	—	1.0	2.0		V_{AK}=5.0 V
Trigger Current Temperature Gradient		$\Delta I_{FT}/\Delta T_j$	—	7.0	14	µA/K	—
Turn-On Time		t_{ON}	—	35	—	µs	V_{RM}=V_{DM}=$V_{D(RMS)}$
Turn-Off Time		t_{OFF}	—	50	—		PF=1.0, I_T=300 mA
Critical State of Rise of Off-State Voltage		dv/dt_{cr}	10000	—	—	V/µs	V_D=0.67 V_{DRM}, T_j=25°C
			5000	—	—		V_D=0.67 V_{DRM}, T_j=80°C
Critical Rate of Rise of Voltage at Current Commutation		dv/dt_{crq}	10000	—	—		V_D=0.67 V_{DRM}, di/dt_{crq}≤15 A/ms T_j=25°C
			5000	—	—		V_D=0.67 V_{DRM}, di/dt_{crq}≤15 A/ms T_j=80°C
Critical State of Rise of On-State Current		di/dt_{cr}	8.0	—	—	A/µs	—
Thermal Resistance, Junction to Ambient		R_{THJA}	—	150	—	K/W	—
Package							
Critical Rate of Rise of Coupled Input/Output Voltage		$dv_{(IO)}/dt$	—	5000	—	V/µs	I_T=0 A, V_{RM}=V_{DM}=$V_{D(RMS)}$
Package Capacitance		C_{IO}	—	0.8	—	pF	f=1.0 MHz, V_{IO}= 0 V
Common Mode Coupling Capacitance		C_{CM}	—	0.01	—	pF	—
Isolation Resistance		R_{is}	—	$\geq 10^{12}$	—	Ω	V_{IO}=500, T_A=25°C
			—	$\geq 10^{11}$	—		V_{IO}=500, T_A=100°C

Figure 1. Forward voltage versus forward current

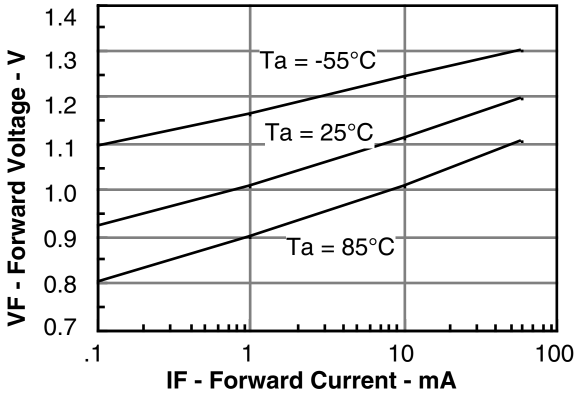


Figure 2. Peak LED current versus duty factor, Tau

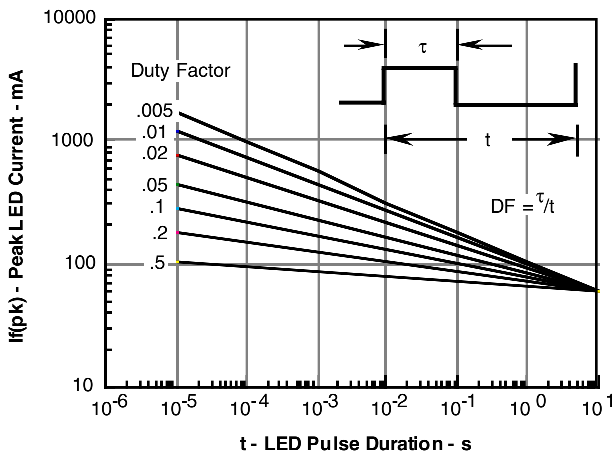


Figure 3. Maximum LED power dissipation

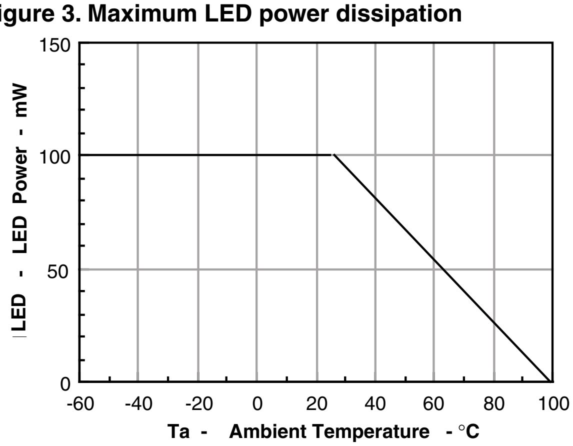


Figure 4. Typical output characteristics

I_T=f(V_t), parameter: T_j

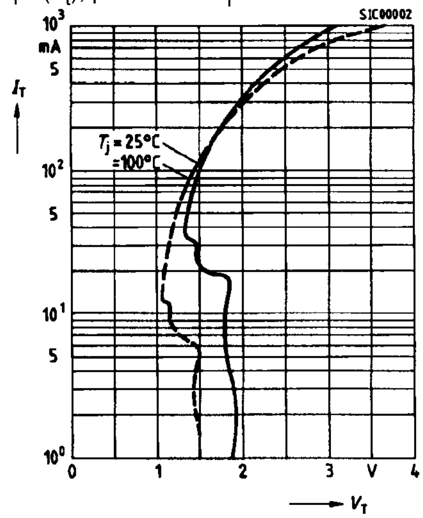


Figure 5. Current reduction

I_{TRMS}=f(T_A) R_{thJA}=150 K/W

Device switch is soldered in PCB or base plate

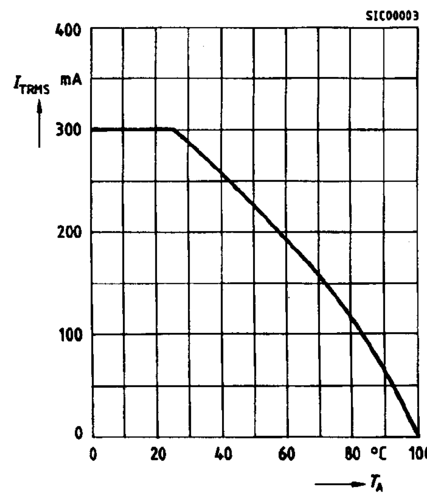


Figure 6. Current reduction

I_{TRMS}=f(T_{PIN5}), R_{thJ}=16.5 K/W

Thermocouple measurement must be performed potentially separated to A1 and A2. Measuring junction to be as near as possible at case.

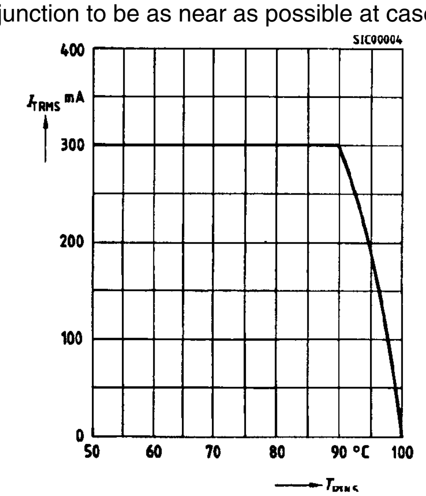


Figure 7. Typical trigger delay time
t_{gd}=f(I_F/$I_{FT25°C}$), V_D=200 V, parameter: T_j

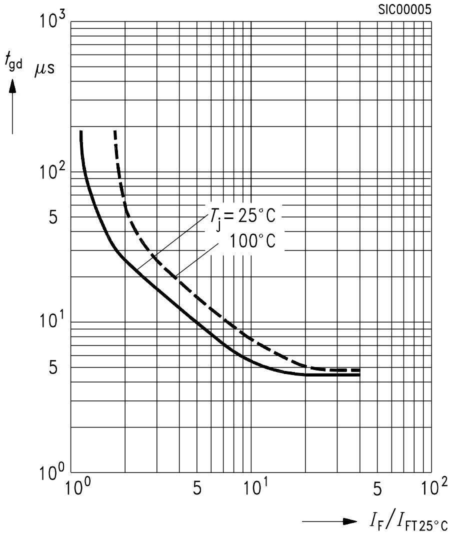


Figure 8. Typical off-state current
I_D=f(T_j), V_D=600 V, parameter: T_j

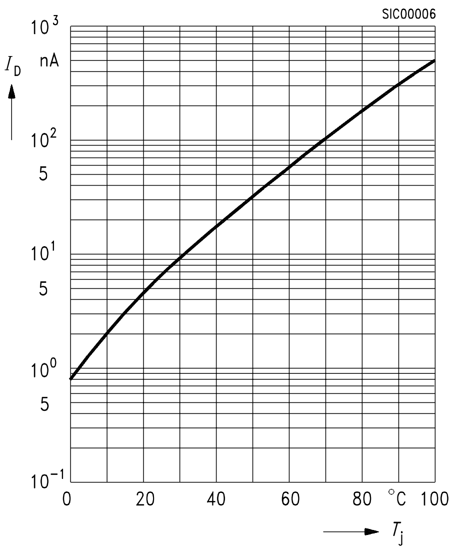


Figure 9. Power dissipation
for 40 to 60 Hz line operation, P_{tot}=f(I_{TRMS})

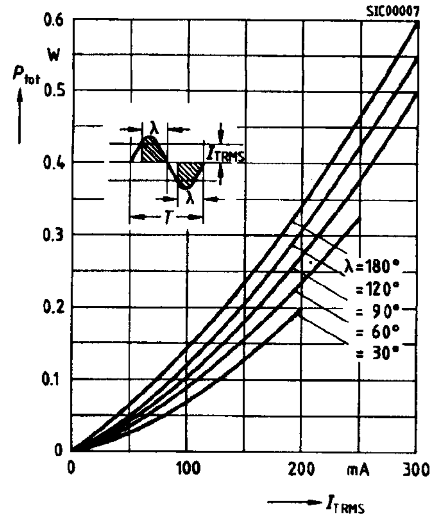


Figure 10. Pulse trigger current
I_{FTN}=f(t_{pIF})I_{FTN} normalized to I_{FT}, referring to t_{pIF}≥1.0 ms, V_{OP}=200 V, f=40 to 60 Hz typ.