

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/ μ s
- Inverse Parallel SCRs Provide Commutating $dv/dt >10$ kV/ μ s
- Very Low Leakage <10 μ A
- 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

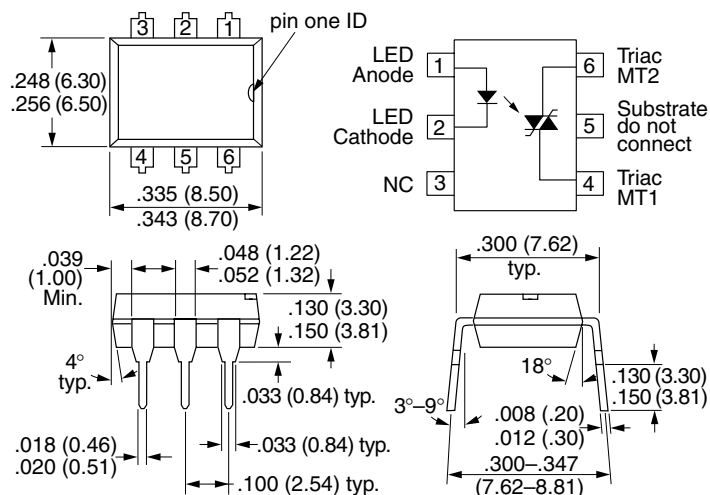
Peak Off-State Voltage

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, $T_A=25^\circ\text{C}$	$\geq 10^{12} \Omega$
$V_{IO}=500$ V, $T_A=100^\circ\text{C}$	$\geq 10^{11} \Omega$
Storage Temperature Range	-55°C to $+150^\circ\text{C}$
Ambient Temperature Range	-55°C to $+100^\circ\text{C}$
Soldering Temperature (max. ≤ 10 sec.dip soldering ≥ 0.5 mm from case bottom)	260°C

Dimensions in inches (mm)



DESCRIPTION

The IL420/4208 consists of a GaAs IRLED optically coupled to a photo-sensitive 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/ μ s. The use of a proprietary dv/dt clamp results in a static dv/dt of greater than 10 kV/ μ s. 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	$I_F=10\text{ mA}$
Reverse Current	I_R	—	0.1	10	μA	$V_R=6.0\text{ V}$
Capacitance	C_O	—	40	—	pF	$V_F=0\text{ V}$, $f=1.0\text{ MHz}$
Thermal Resistance, Junction to Ambient	R_{THJA}	—	750	—	K/W	—
Detector						
Off-State Voltage	IL420	$V_{D(RMS)}$	424	460	V	$I_{D(RMS)}=70\text{ }\mu\text{A}$
	IL4208		565	—		
Repetitive Peak Off-State Voltage	IL420	V_{DRM}	600	—	V	$I_{DRM}=100\text{ }\mu\text{s}$
	IL4208		800	—		
Off-State Current	$I_D(RMS)$	—	10	100	μA	$V_D=V_{DRM}$, $T_A=100^\circ\text{C}$
On-State Voltage	V_{TM}	—	1.7	3.0	V	$I_T=300\text{ mA}$
On-State Current	I_{TM}	—	—	300	mA	$PF=1.0$, $V_{T(RMS)}=1.7\text{ V}$
Surge (Non-Repetitive) On-State Current	I_{TSM}	—	—	3.0	A	$f=50\text{ Hz}$
Holding Current	I_H	—	65	500	μA	—
Latching Current	I_L	—	5.0	—	mA	$V_T=2.2\text{ V}$
LED Trigger Current	I_{FT}	—	1.0	2.0		$V_{AK}=5.0\text{ V}$
Trigger Current Temperature Gradient	$\Delta I_{FT}/\Delta T_j$	—	7.0	14	$\mu\text{A/K}$	—
Turn-On Time	t_{ON}	—	35	—	μs	$V_{RM}=V_{DM}=V_{D(RMS)}$
Turn-Off Time	t_{OFF}	—	50	—		$PF=1.0$, $I_T=300\text{ mA}$
Critical State of Rise of Off-State Voltage	dv/dt_{cr}	10000	—	—	$\text{V}/\mu\text{s}$	$V_D=0.67\text{ }V_{DRM}$, $T_j=25^\circ\text{C}$
		5000	—	—		$V_D=0.67\text{ }V_{DRM}$, $T_j=80^\circ\text{C}$
Critical Rate of Rise of Voltage at Current Commutation	dv/dt_{crq}	10000	—	—		$V_D=0.67\text{ }V_{DRM}$, $di/dt_{crq}\leq 15\text{ A/ms}$, $T_j=25^\circ\text{C}$
		5000	—	—		$V_D=0.67\text{ }V_{DRM}$, $di/dt_{crq}\leq 15\text{ A/ms}$, $T_j=80^\circ\text{C}$
Critical State of Rise of On-State Current	di/dt_{cr}	8.0	—	—	$\text{A}/\mu\text{s}$	—
Thermal Resistance, Junction to Ambient	R_{THJA}	—	150	—	K/W	—
Package						
Critical Rate of Rise of Coupled Input/Output Voltage	$dv_{(IO)}/dt$	—	5000	—	$\text{V}/\mu\text{s}$	$I_T=0\text{ A}$, $V_{RM}=V_{DM}=V_{D(RMS)}$
Package Capacitance	C_{IO}	—	0.8	—	pF	$f=1.0\text{ MHz}$, $V_{IO}=0\text{ V}$
Common Mode Coupling Capacitance	C_{CM}	—	0.01	—	pF	—
Isolation Resistance	R_{is}	—	$\geq 10^{12}$	—	Ω	$V_{IO}=500$, $T_A=25^\circ\text{C}$
		—	$\geq 10^{11}$	—		$V_{IO}=500$, $T_A=100^\circ\text{C}$

Figure 1. Forward voltage versus forward current

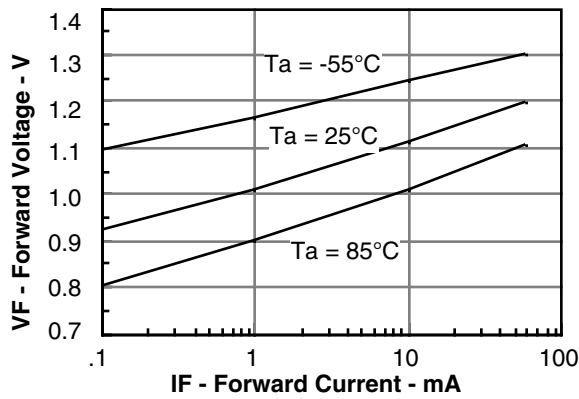


Figure 2. Peak LED current versus duty factor, Tau

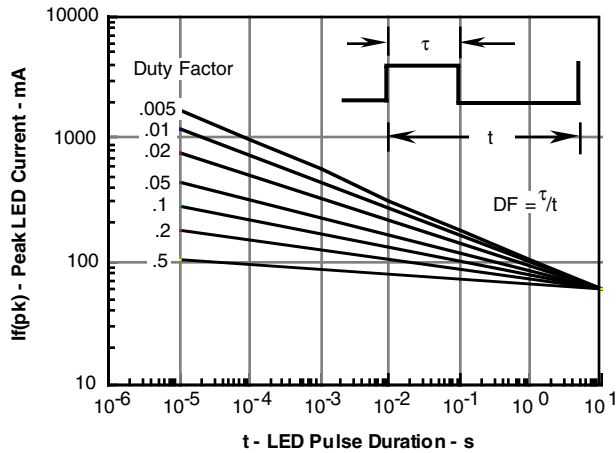


Figure 3. Maximum LED power dissipation

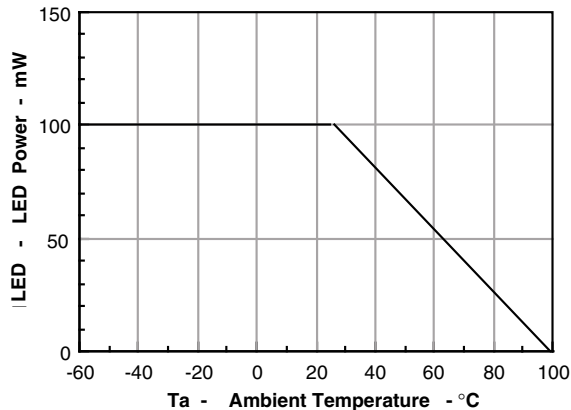


Figure 4. Typical output characteristics

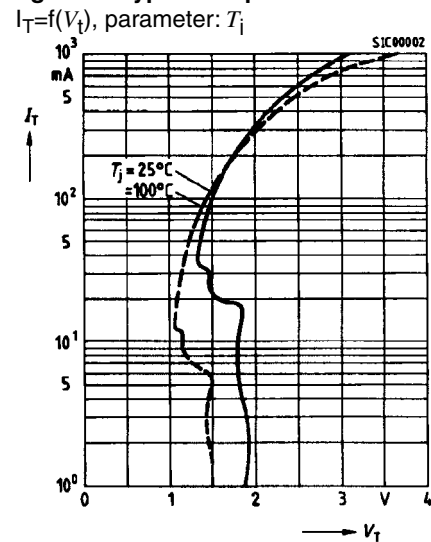


Figure 5. Current reduction

$I_{TRMS} = f(T_A)$ $R_{thJA} = 150 \text{ K/W}$
Device switch is soldered in PCB or base plate

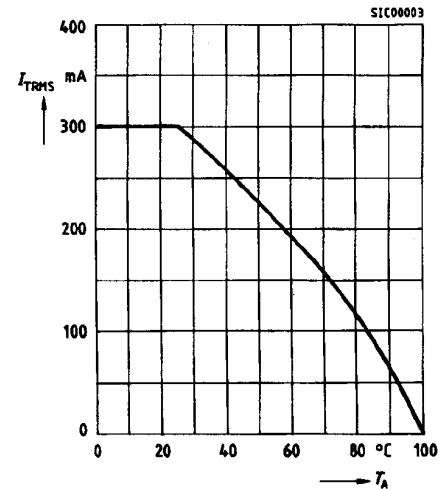


Figure 6. Current reduction

$I_{TRMS} = f(T_{PIN5})$ $R_{thJ} = 16.5 \text{ K/W}$
Thermocouple measurement must be performed potentially separated to A1 and A2. Measuring junction to be as near as possible at case.

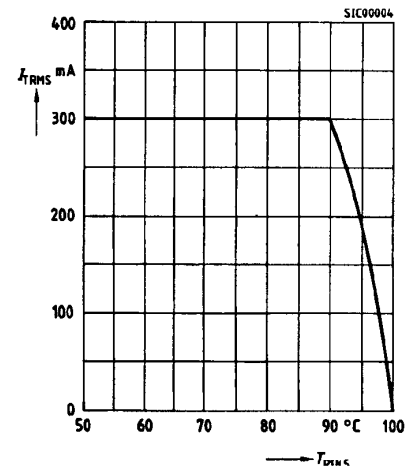


Figure 7. Typical trigger delay time
 $t_{gd}=f(I_F/I_{FT25^\circ C})$, $V_D=200$ V, parameter: T_j

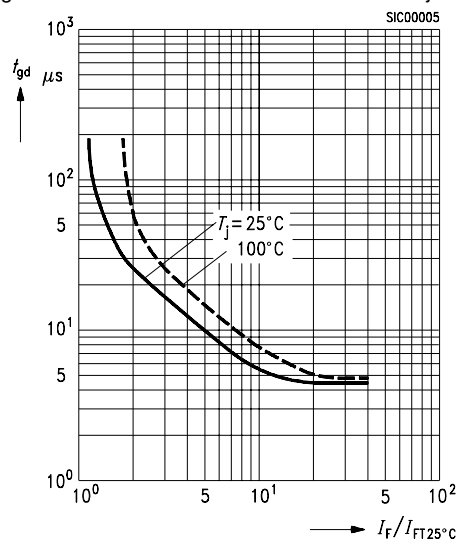


Figure 9. Power dissipation
for 40 to 60 Hz line operation, $P_{tot}=f(I_{TRMS})$

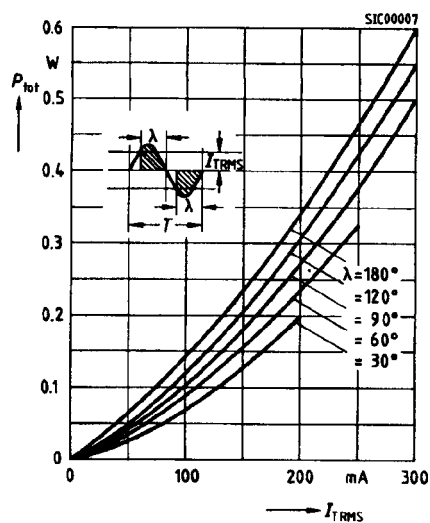


Figure 8. Typical off-state current
 $I_D=f(T_j)$, $V_D=600$ V, parameter: T_j

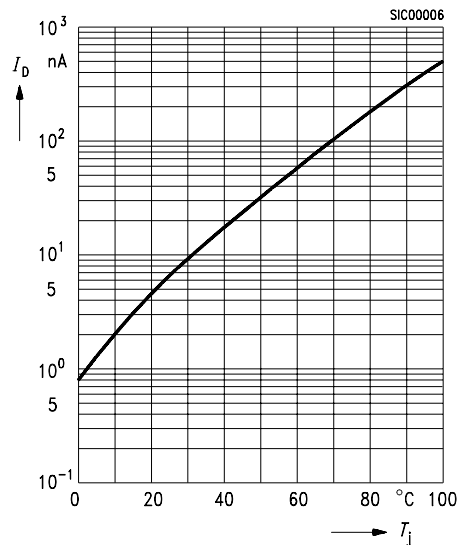


Figure 10. Pulse trigger current
 $I_{FTN}=f(t_{pIF})I_{FTN}$ normalized to I_{FT} , referring to $t_{pIF} \geq 1.0$ ms, $V_{OP}=200$ V, $f=40$ to 60 Hz typ.

