

OK
26, 27

Opto isolators and opto coupled SCR/triacs

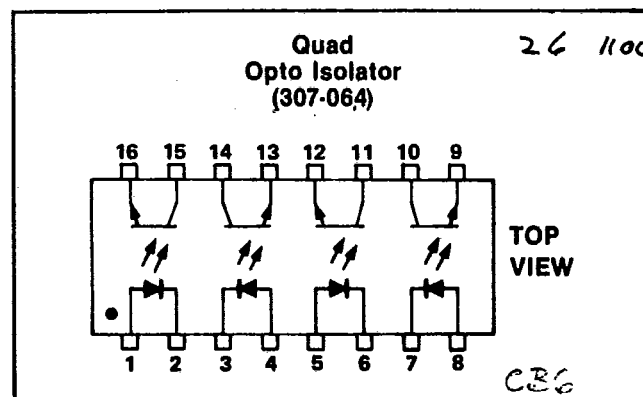
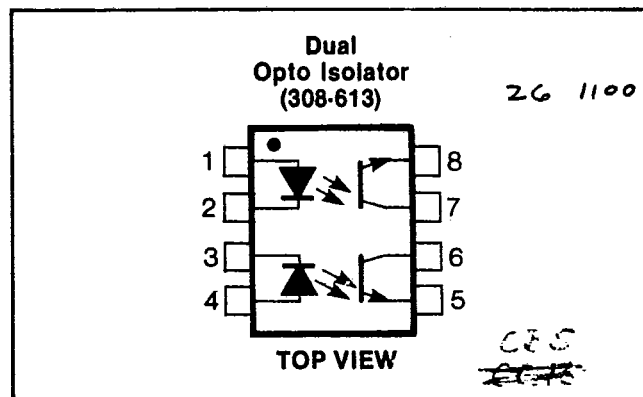
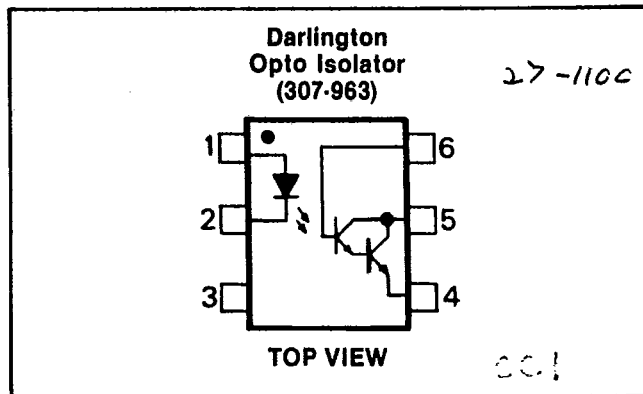
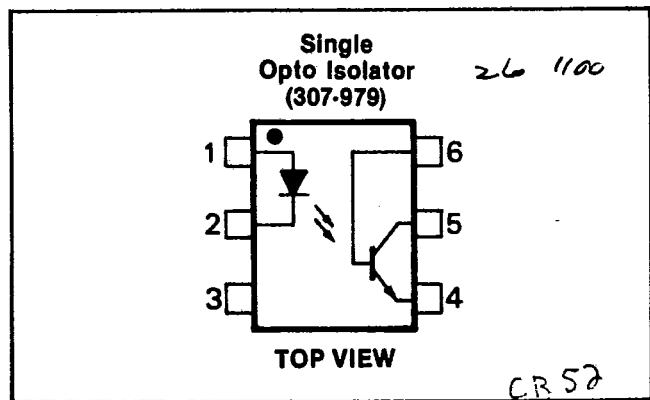
New
RSCB
030085

T-41-83
T-41-85
T-41-87

Four infra-red light emitting diode and silicon phototransistor couplers consisting of: (1) A single Opto Isolator in dual-in-line package suited for fast signal transfer and offering excellent noise immunity. (2) A single Opto Isolator also in a 6 pin dual-in-line package suited for fast signal transfer and offering a high transfer ratio and a darlington transistor output for greater drive capability which will respond to low power signal sources. (3) A dual Opto Isolator having two isolated light emitting diode-photo transistor couplers in one 8 pin dual-in-line Package. (4) A quad Opto Isolator having 4 isolated light emitting diode-photo transistor couplers in one 16 pin dual-in-line package. These last two items offer space and cost saving when multiple isolation is required. In addition an opto-coupled SCR and two opto-coupled triacs are available in 6-pin DIL packages. See pages 4 and 5. All of these couplers offer high voltage and AC isolation and are suited for interface applications in TTL and analogue circuits.

Phototransistor opto isolators

Pin configurations



Ratings	Single Opto Isolator (307-979)	Darlington Opto Isolator (307-963)	Dual Opto Isolator (308-613)	Quad Opto Isolator (307-064)
Isolation voltage (dc)	±4000V	±4000V	±1500V	±1500V
V _{CE} (max) Transistor (dc)	30V	30V	30V	30V
I _F (max) Diode (dc)	60mA	60mA	100mA	100mA
DC Current transfer Ratio (min)	20%	300%	12.5%	12.5%
	6-pin DIL packages with transistor connection for biasing.		8-pin DIL package	16-pin DIL package

T-41-85

Absolute maximum ratings	Single Opto Isolator (307-979)	Darlington Opto Isolator (307-963)	Dual Opto Isolator (308-613)	Quad Opto Isolator (307-064)	Unit
T _A TEMPERATURE RANGE	-50 to +100	-50 to +100	-55 to +100	-55 to +100	°C
V I/O ISOLATION	±4000	±4000	±1500	±1500	V
I _F DIODE	60	60	100	100	mA
V _R DIODE	3	3	3	3	V
P _d DIODE					
derate at 1.33mW/°C>25°C	100	100	150	150	mW
V _{CEO}	30	30	30	30	V
V _{ECO}	5	5	7	7	V
P _d TRANSISTOR					
derate at 2.0mW/°C>25°C	150	150	150	150	mW
TOTAL PACKAGE DISSIPATION					
derate at 5.33mW/°C>25°C	—	—	400	—	mW
derate at 6.67mW/°C>25°C	—	—	—	500	mW

Electrical characteristics Ta = 25°C

T-41-87

Parameter	Test conditions	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Min	Typ	Max	Units
DIODE														
V _F	I _F = 10mA	—	—	—	—	—	1.5	—	—	—	—	—	—	V
	I _F = 20mA	—	—	1.5	—	—	—	—	—	—	—	—	—	V
	I _F = 100mA	—	—	—	—	—	—	1.3	—	—	1.3	—	—	V
I _R	V _R = 3V	—	—	10	—	—	100	0.1	—	—	0.1	—	—	μA
TRANSISTOR														
BV _{CEO}	I _C = 1mA	30	—	—	30	—	—	10	—	—	10	—	—	V
	I _C = 100μA	—	—	—	—	—	—	—	—	—	—	—	—	V
BV _{ECO}	I _E = 10μA	5	—	—	5	—	—	—	—	—	—	—	—	V
	I _E = 100μA	—	—	—	—	—	—	—	—	—	—	—	—	V
BVC _{BO}	I _C = 10μA	70	—	—	—	30	—	—	—	—	—	—	—	V
I _{CEO} DARK CURRENT	V _{CE} = 5V I _F = 0	—	—	—	—	—	—	5	500	—	5	500	—	nA
	V _{CE} = 10V I _F = 0 H = 0	—	5	50	—	—	100	—	—	—	—	—	—	nA
I _{CBO}	V _{CE} = 10V I _E = 0	—	—	20	—	—	50	—	—	—	—	—	—	nA
h _{FE}	V _{CE} = 5V I _C = 100μA	100	200	—	—	20k	—	—	—	—	—	—	—	—
C _{CE}	V _{CE} = 0	—	8	—	—	5	—	—	2	—	—	2	—	pF
COUPLED														
I _C /I _F DC CURRENT TRANSFER RATIO	I _F = 10mA V _{CE} = 2V I _F = 16mA V _{CE} = 5V	20	—	—	300	—	—	12.5	35	—	12.5	35	—	%
R _{ISO} ISOLATION RESISTANCE	V = 500V	10 ¹¹	—	—	10 ¹¹	—	—	—	10 ¹¹	—	—	10 ¹¹	—	Ω
V _{CE} (SAT)	I _F = 10mA I _C = 10mA I _F = 16mA I _C = 2mA	—	—	0.4	—	1	—	—	0.5	—	—	0.5	—	V
C I/O INPUT/OUTPUT CAPACITANCE		2	—	—	—	0.5	—	—	0.5	—	—	0.5	—	pF
t _r RISE TIME	V _{CE} = 10V, I _B = 0, I _F = 10mA V _{CE} = 10V, R _L = 100Ω, I _F = 10mA	—	—	—	—	—	—	—	—	—	—	—	—	μs
	V _{CE} = 10V, R _L = 100Ω, I _F = 8mA	—	—	—	—	3	—	—	—	—	—	—	—	μs
t _f FALL TIME	V _{CE} = 10V, I _B = 0, I _F = 10mA V _{CE} = 10V, R _L = 100Ω, I _F = 10mA	—	—	—	—	—	25	—	—	—	—	—	—	μs
	V _{CE} = 10V, R _L = 100Ω, I _C = 8mA	—	—	—	—	—	—	—	2	—	—	2	—	μs

Figure 1 Response time vs base resistance for 307-979

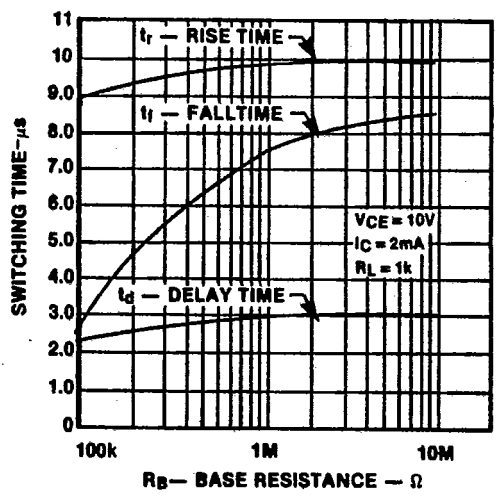


Figure 2 Rise and fall time vs load resistance for 307-979

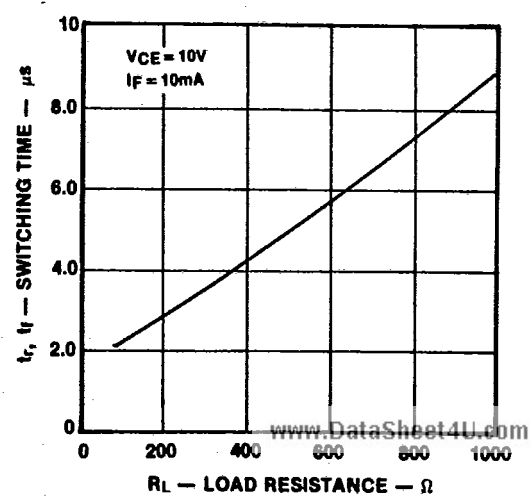
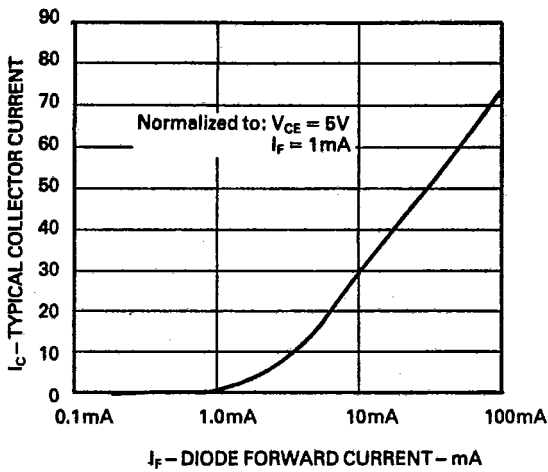


Figure 3 Typical collector current vs diode forward current for 307 & 963

www.DataSheet4U.com

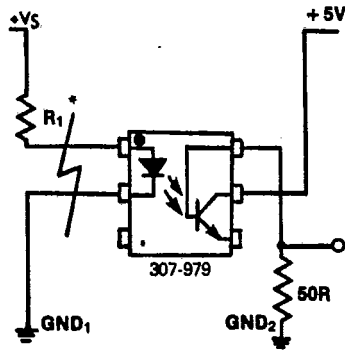
072

T-41-85
T-41-87



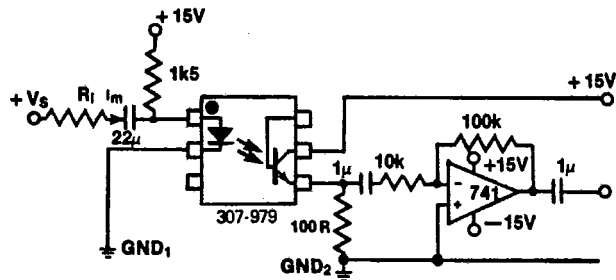
Applications

Figure 4 Fast pulse transfer



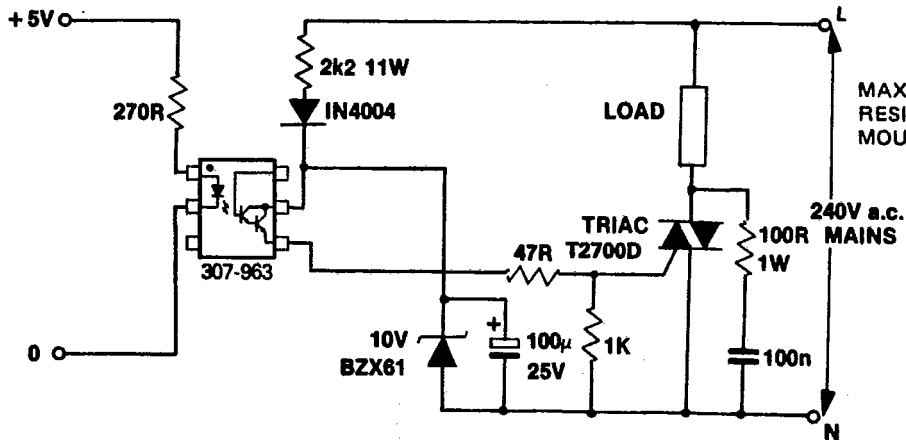
This mode of operation increases switching speed from about 2μs to about 100ns but reduces current transfer ratio to about 0.2%

Figure 5 A.C. signal isolation



Choose R_1 to limit modulating current (i_m) to 5mA max. Useful frequency range in the order of 20Hz to 20 kHz

Figure 6 Light activated solid state relay



MAXIMUM LOAD:- 540W
RESISTIVE/INDUCTIVE LOAD 6A
MOUNT TRIAC ON A 4°C/W HEAT SINK.

Figure 7 TTL interface

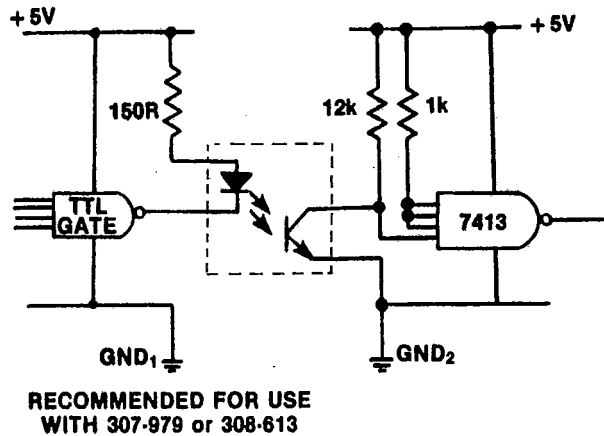
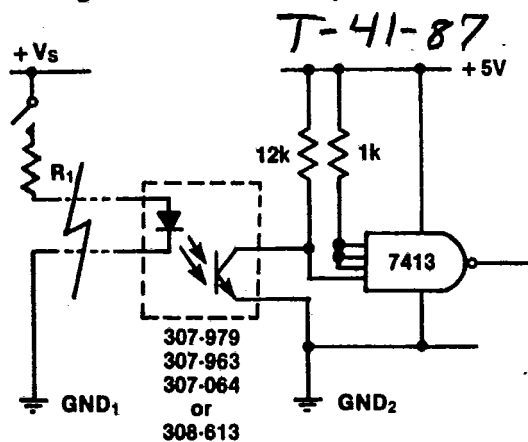


Figure 8 Switched input isolation offering good noise immunity



NOTE: *R₁ is chosen to limit I_F, $R_1 = \frac{V_s - V_F}{I_F}$

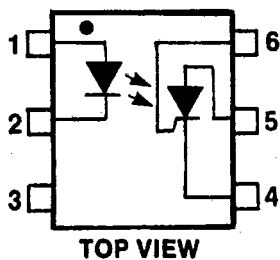
Where V_F—forward volts drop of diode
I_F—forward diode current
V_s—supply voltage

Opto-coupled SCR and Triacs

A gallium arsenide infra-red light emitting diode coupled with a light activated silicon controlled rectifier or triac in a 6 pin dual-in-line package.

OE 28 1100

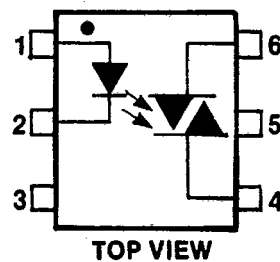
Opto-Coupled SCR H11C4 (308-001)



CD1

OE 28 1200

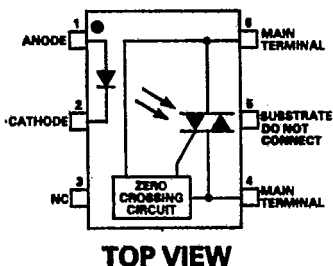
Opto-Coupled Triac 3020 (308-196)



CD3

OE 28 1200

Zero Voltage Crossing Opto-Coupled Triac 3041 (301-628)



CD8

Electrical characteristics $T_A = 25^\circ\text{C}$ unless otherwise stated

012

T-41-85

T-41-87

	308-001			308-196			301-628			Units
	Min.	Typ.	Max.	Min.	Typ.	Max.	Min.	Typ.	Max.	
LED										
V_F (at $I_F = 10\text{mA}$)	-	1.2	1.5	-	1.2	1.5	-	1.2	1.5	V
I_R (at $V_R = 3\text{V}$)	-	-	10	-	0.05	100	-	-	100	μA
Output switch (SCR or triac)										
V_{DRM}	400	-	-	400	-	-	400	-	-	V
V_{RRM}	400	-	-	400	-	-	400	-	-	V
V_{TM}	-	1.1	1.3	-	2.5	3.0	-	1.75	3.0	V
		(I _{TM} = 0.3A)			(I _{TM} = 0.1A)					
I_{DRM} (at 400V V_{DRM})	-	-	150	-	0.01	0.1	-	0.01	0.1	μA
			(T _A = 100°C)							
I_H	-	100	-	-	100	-	-	200	-	μA
		(R _{GK} = 10k Ω , V _{AK} = 50V)			(V _{AK} = 3V)					
dV/dt	-	20	-	-	2	-	-	100	-	V/ μs
		(R _{GK} = 10k Ω)								
Total device										
LED current to latch O/P switch	-	-	20	-	8	15	-	-	-	mA
		(V _{AK} = 50V, R _{GK} = 10k Ω)								
	-	-	11	-	-	-	-	-	-	
		(V _{AK} = 100V, R _{GK} = 27k Ω)			(V _{AK} = 3.0V, 10mA LED Drive)					
Isolation					Surge voltage (5s) 7,500V Peak					

Absolute maximum ratings

L.E.D.	308-001	308-196	301-628
Continuous forward current	60mA	50mA	50mA
Reverse voltage	6V	3V	6V
Output switch (SCR or triac)			
V_{DRM}	400V	400V	400V
V_{RRM}	400V	400V	400V
$I_{T(RMS)}$	300mA	100mA	50mA
I_{TSM}	5A	1.2A	1.2A
	[100 μs pulse 1% duty cycle]	[10 μs pulse 10% duty cycle]	[10ms pulse 10% duty cycle]
P_D at $T_A = 25^\circ\text{C}$	400mW	300mW	330mW
	[Derate 5.3 mW/°C above 25°C]	[Derate 4 mW/°C above 25°C]	[Derate 4.4 mW/°C above 25°C]

Figure 9 On-state current vs maximum allowable temperature

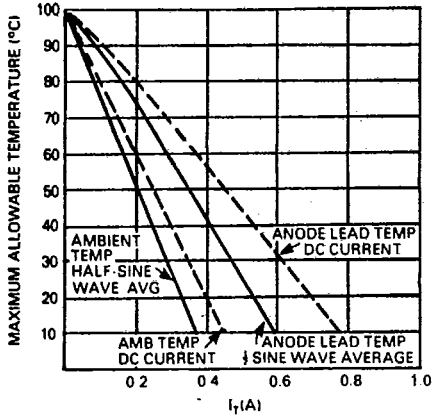
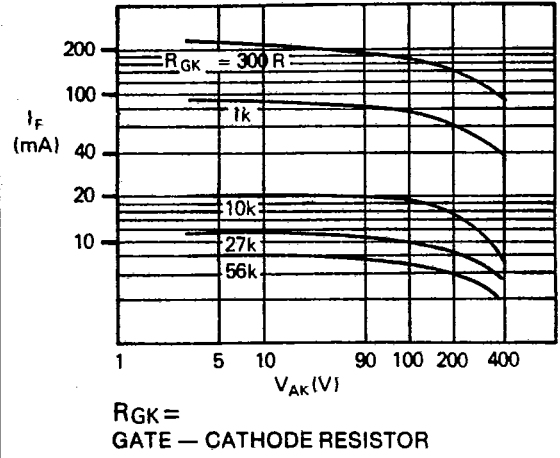


Figure 10 Input current to trigger vs anode-cathode voltage



Applications

Figure 11 Lamp driver with TTL input

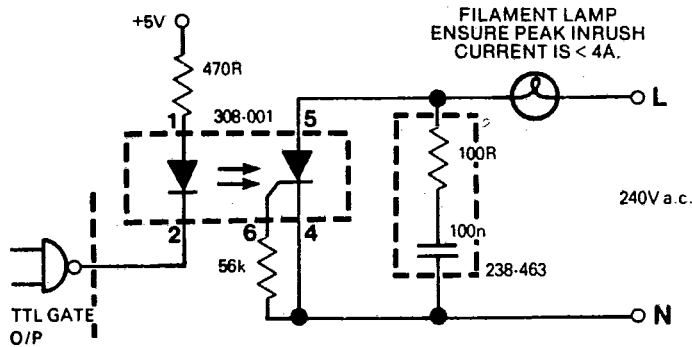
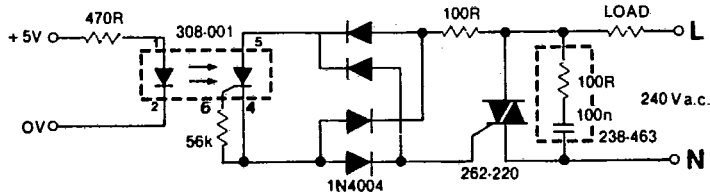


Figure 12 Solid state relay



Opto-coupled triac

Figure 13 On-state characteristics

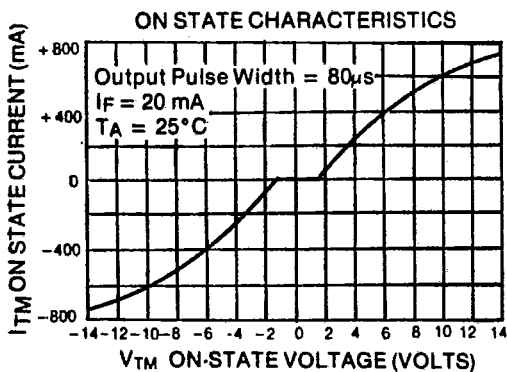
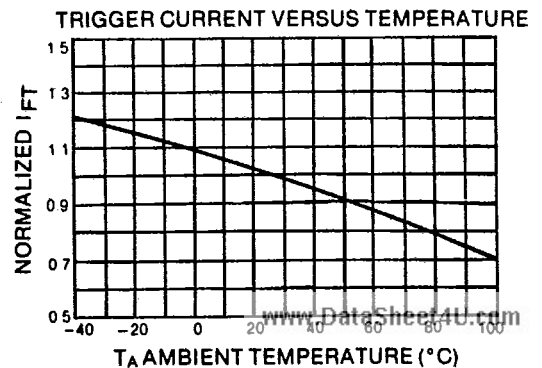


Figure 14 Trigger current vs temperature



812 T-41-85
T-41-87

Figure 15 Resistive load with TTL input

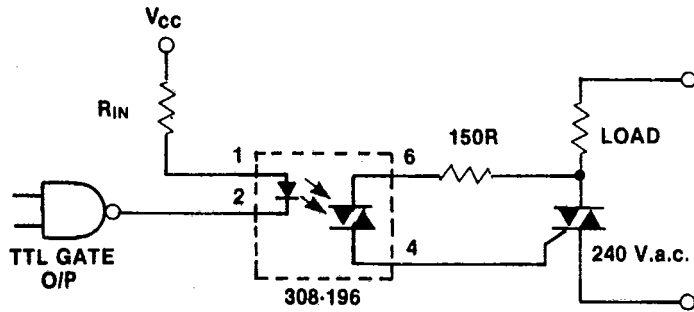
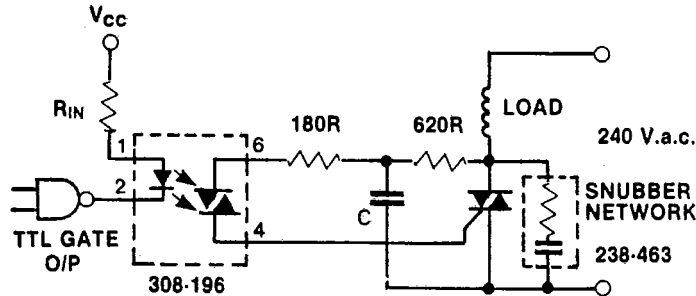
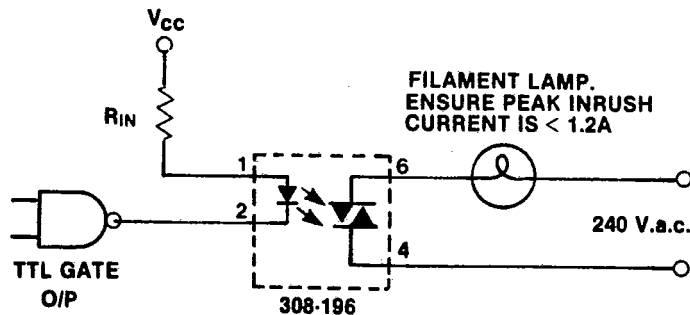


Figure 16 Inductive load with TTL input



C	LOAD POWER FACTOR
220n	0.75
330n	0.5

Figure 17 Low power filament lamp driver with TTL input



T-41-85
T-41-87

Zero voltage crossing opto-coupled triac

Figure 18 Trigger current vs temperature

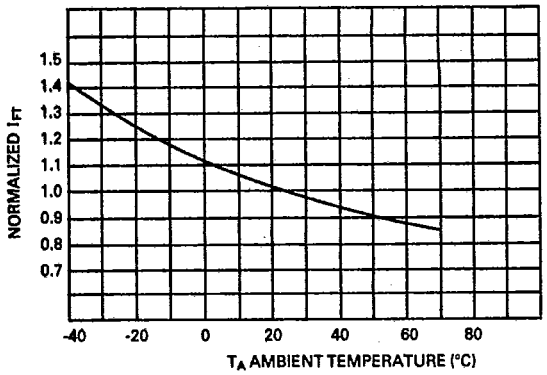
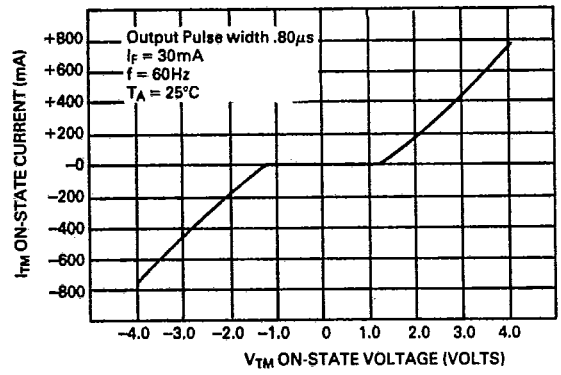


Figure 19 On-state characteristics



Applications

Figure 20 Mains switching

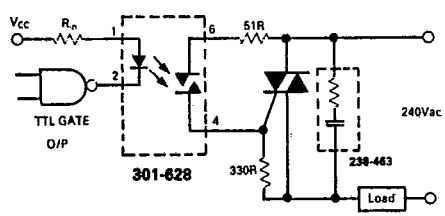


Figure 21 Inverse - parallel SCR driver circuit

