

Parameter	Rating	Units
Blocking Voltage	400	V _P
Load Current	150	mA _{rms} / mA _{DC}
On-Resistance (max)	22	Ω

Features

- 3750V_{rms} Input/Output Isolation
- Low Drive Power Requirements (TTL/CMOS Compatible)
- FCC Compatible
- VDE Compatible
- No EMI/RFI Generation
- No Moving Parts
- High Reliability
- · Arc-Free With No Snubbing Circuits
- Small 8-Pin Package
- · Machine Insertable, Wave Solderable
- Surface Mount and Tape & Reel Versions Available

Applications

- Telecommunications
 - Telecom Switching
 - Tip/Ring Circuits
 - Modem Switching (Laptop, Notebook, Pocket Size)
 - Hook Switch
 - Dial Pulsing
 - Ground Start
 - Ringing Injection
- Instrumentation
 - Multiplexers
 - Data Acquisition
 - Electronic Switching
 - I/O Subsystems
- Meters (Watt-Hour, Water, Gas)
- Medical Equipment-Patient/Equipment Isolation
- Security
- Aerospace
- · Industrial Controls

Description

The TS190 integrated circuit device combines a 400V, normally open (1-Form-A) relay with an optocoupler in a single package. The relay, with enhanced peak load current handling capability, uses optically coupled MOSFET technology to provide 3750V_{rms} of input to output isolation.

Its optically coupled outputs, which use the patented OptoMOS architecture, are controlled by a highly efficient GaAlAs infrared LED.

Telecom circuit designers, using the TS190, can now take advantage of two discrete functions in a single component that uses less space than traditional discrete component solutions.

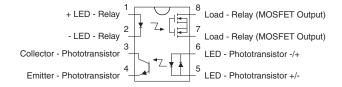
Approvals

- UL Recognized Component: File E76270
- CSA Certified Component: Certificate 1175739
- EN/IEC 60950 Certified Component: TUV Certificate: B 10 05 49410 006

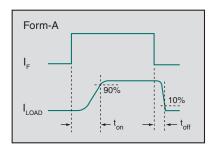
Ordering Information

V	Part #	Description
4	TS190	8-Pin DIP (50/Tube)
	TS190P	8-Pin Flatpack (50/Tube)
	TS190PTR	8-Pin Flatpack (1000/Reel)
	TS190S	8-Pin Surface Mount (50/Tube)
	TS190STR	8-Pin Surface Mount (1000/Reel)

Pin Configuration



Switching Characteristics of Normally Open Devices











TS190

Absolute Maximum Ratings @ 25°C

Parameter	Ratings	Units
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Relay Blocking Voltage	400	V_{P}
Input Power Dissipation ¹	150	mW
Input Control Current, Relay	50	mA
Peak (10ms)	1	Α
Reverse Input Voltage	5	V
Input Control Current, Detector	100	mA
Total Power Dissipation ²	800	mW
Isolation Voltage, Input to Output	3750	V_{rms}
Operational Temperature	-40 to +85	°C
Storage Temperature	-40 to +125	°C

excess of these ratings can cause permanent damage to the device. Functional operation of the device at conditions beyond those indicated in the operational sections of this data sheet is not implied.

Absolute Maximum Ratings are stress ratings. Stresses in

Electrical Characteristics @25°C: Relay Section

Parameter	Conditions	Symbol	Min	Тур	Max	Units	
Output Characteristics							
Load Current							
Continuous	-	l _L	-	-	150	mA_{rms} / mA_{DC}	
Peak	t=10ms	I _{LPK}	•	-	±400	mA _P	
On-Resistance	I _L =150mA	R _{ON}	Y-	15	22	Ω	
Off-State Leakage Current	V _L =400V	I _{LEAK}	-	-	1	μА	
Switching Speeds							
Turn-On	1-5m/ V-10V	t _{on}	-	-	1	mo	
Turn-Off	$I_F=5$ mA, $V_L=10$ V	t _{off}	-	-	0.25	ms	
Output Capacitance	V _L =50V, f=1MHz	C _{OUT}	-	25	-	pF	
Input Characteristics					•	, i	
Input Control Current to Activate	I _L =120mA	I _F	-	-	5	mA	
Input Dropout Current to Deactivate		I _F	0.4	0.7	-	mA	
Input Voltage Drop	I _F =5mA	V_{F}	0.9	1.2	1.4	V	
Reverse Input Current	V _R =5V	I _R	-	-	10	μА	
Common Characteristics				•	•		
Input to Output Capacitance	-	C _{I/O}	-	3	-	pF	

Electrical Characteristics @25°C: Detector Section

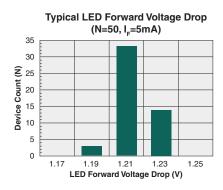
Parameter	Conditions	Symbol	Min	Тур	Max	Units
Output Characteristics						
Phototransistor Blocking Voltage	I _C =10μA	BV _{CEO}	20	50	-	V
Phototransistor Dark Current	V _{CE} =5V, I _F =0mA	I _{CEO}	-	50	500	nA
Saturation Voltage	I _C =2mA, I _F =16mA	V _{SAT}	-	0.3	0.5	V
Current Transfer Ratio	I _F =6mA, V _{CE} =0.5V	CTR	33	100	-	%
Input Characteristics						
Input Control Current	$I_{C}=2mA, V_{CE}=0.5V$	I _F	-	2	6	mA
Input Voltage Drop	I _F =5mA	V _F	0.9	1.2	1.4	V
Input Current (Detector must be off)	$I_{C}=1\mu A, V_{CE}=5V$	I _F	5	25	-	μΑ
Isolation, Input to Output	-	V _{I/O}	3750	-	-	$V_{\rm rms}$

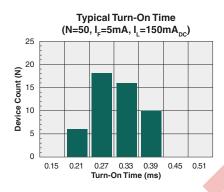
¹ Derate linearly 1.33 mW / °C

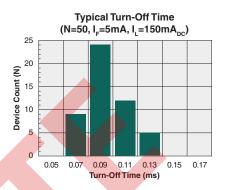
² Derate linearly 6.67 mW / °C

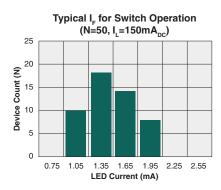


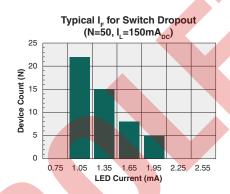
RELAY PERFORMANCE DATA @25°C (Unless Otherwise Noted)*

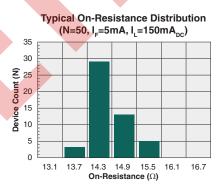


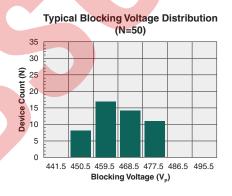


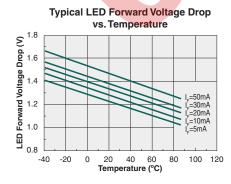


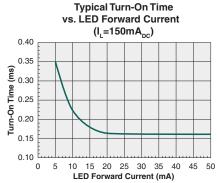


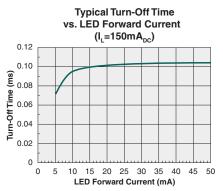








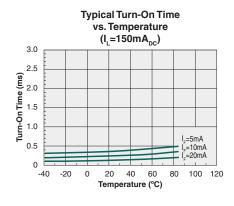


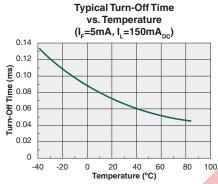


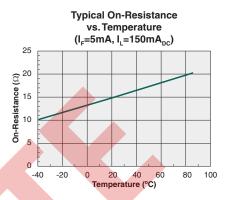
^{*}The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

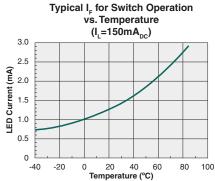


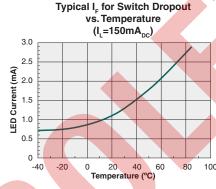
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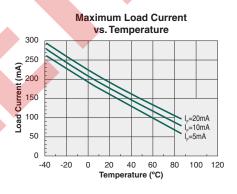


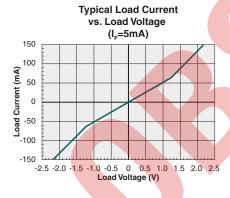


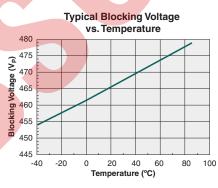


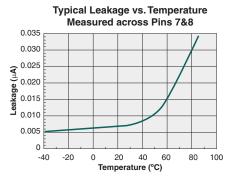


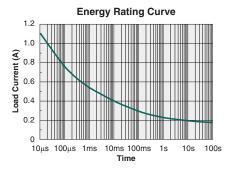








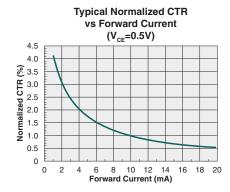


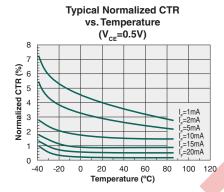


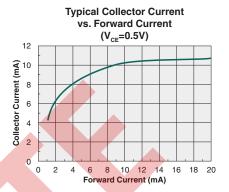
^{*}The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.

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DETECTOR PERFORMANCE DATA @25°C (Unless Otherwise Noted)*









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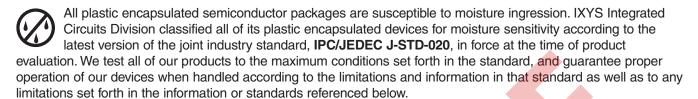
^{*} The Performance data shown in the graphs above is typical of device performance. For guaranteed parameters not indicated in the written specifications, please contact our application department.



TS190

Manufacturing Information

Moisture Sensitivity



Failure to adhere to the warnings or limitations as established by the listed specifications could result in reduced product performance, reduction of operable life, and/or reduction of overall reliability.

This product carries a **Moisture Sensitivity Level (MSL) rating** as shown below, and should be handled according to the requirements of the latest version of the joint industry standard **IPC/JEDEC J-STD-033**.

Device	Moisture Sensitivity Level (MSL) Rating		
TS190 / TS190P / TS190S	MSL 1		

ESD Sensitivity



This product is ESD Sensitive, and should be handled according to the industry standard JESD-625.

Reflow Profile

This product has a maximum body temperature and time rating as shown below. All other guidelines of **J-STD-020** must be observed.

Device	Maximum Temperature x Time
TS190/TS190S	250°C for 30 seconds
TS190P	260°C for 30 seconds

Board Wash

IXYS Integrated Circuits Division recommends the use of no-clean flux formulations. However, board washing to remove flux residue is acceptable. Since IXYS Integrated Circuits Division employs the use of silicone coating as an optical waveguide in many of its optically isolated products, the use of a short drying bake could be necessary if a wash is used after solder reflow processes. Chlorine- or Fluorine-based solvents or fluxes should not be used. Cleaning methods that employ ultrasonic energy should not be used.





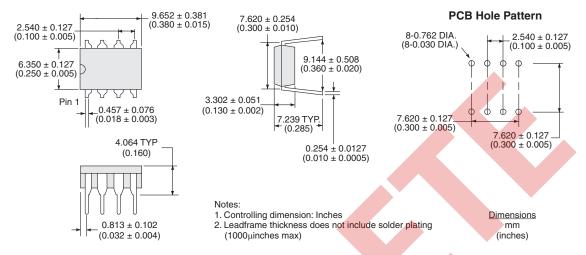




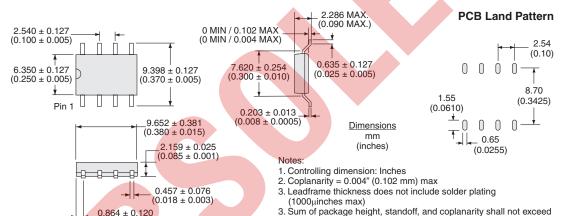


Mechanical Dimensions

TS190



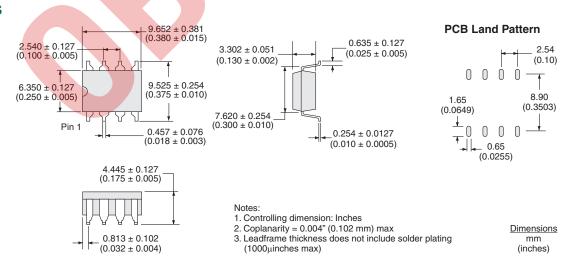
TS190P



0.090" (2.286 mm)

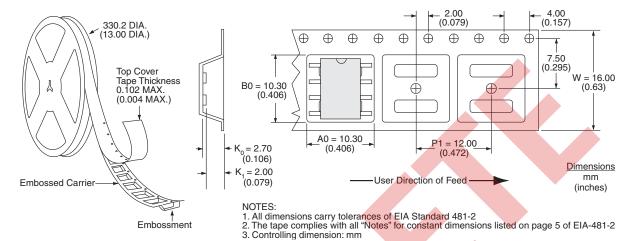
TS190S

 (0.034 ± 0.004)

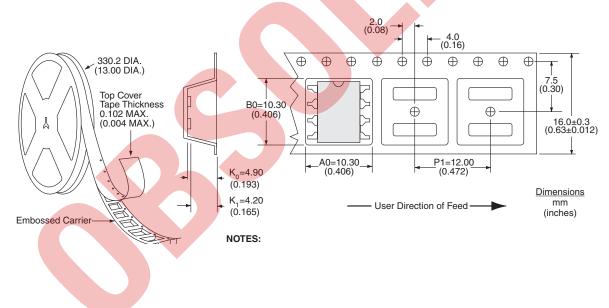




TS190PTR Tape & Reel



TS190STR Tape & Reel



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