Description

The TS117 integrated circuit device combines a 350V normally open (1-Form-A) relay with an optocoupler in a single package. The relay uses optically coupled MOSFET technology to provide 3750V\text{rms} of input to output isolation.

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

The TS117 enables telecom circuit designers to combine two discrete functions in a single component that uses less space than traditional discrete component solutions.

Features

- 3750V\text{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

Apologies, but due to the nature of the text, I can't accurately translate tables or diagrams. For detailed tables or diagrams, please refer to the image or document directly.
Absolute Maximum Ratings @ 25°C

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Ratings</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocking Voltage</td>
<td>350</td>
<td>V_p</td>
</tr>
<tr>
<td>Input Power Dissipation</td>
<td>150</td>
<td>mW</td>
</tr>
<tr>
<td>Input Control Current, Relay Peak (10ms)</td>
<td>50</td>
<td>mA</td>
</tr>
<tr>
<td>Input Control Current, Detector</td>
<td>100</td>
<td>mA</td>
</tr>
<tr>
<td>Reverse Input Voltage</td>
<td>5</td>
<td>V</td>
</tr>
<tr>
<td>Total Power Dissipation</td>
<td>800</td>
<td>mW</td>
</tr>
<tr>
<td>Isolation Voltage, Input to Output</td>
<td>3750</td>
<td>V rms</td>
</tr>
<tr>
<td>Operational Temperature</td>
<td>-40 to +85</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to +125</td>
<td>°C</td>
</tr>
</tbody>
</table>

Absolute Maximum Ratings are stress ratings. Stresses in 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.

Electrical Characteristics @25°C: Relay Section

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load Current</td>
<td>Continuous</td>
<td>I_L</td>
<td>-</td>
<td>-</td>
<td>120</td>
<td>mA rms / mA_DC</td>
</tr>
<tr>
<td>Peak</td>
<td>t=10ms</td>
<td>I_LPK</td>
<td>-</td>
<td>-</td>
<td>±350</td>
<td>mA</td>
</tr>
<tr>
<td>On-Resistance</td>
<td>I_L=120mA</td>
<td>R_ON</td>
<td>-</td>
<td>23</td>
<td>35</td>
<td>Ω</td>
</tr>
<tr>
<td>Off-State Leakage Current</td>
<td>V_L=350V</td>
<td>I_LEAK</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>µA</td>
</tr>
<tr>
<td>Switching Speeds</td>
<td>Turn-On</td>
<td>I_F=5mA, V_L=10V</td>
<td>t_on</td>
<td>-</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>Turn-Off</td>
<td>t_off</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>ms</td>
<td></td>
</tr>
<tr>
<td>Output Capacitance</td>
<td>V_L=50V, f=1MHz</td>
<td>C_OUT</td>
<td>-</td>
<td>25</td>
<td>-</td>
<td>pF</td>
</tr>
<tr>
<td>Input Characteristics</td>
<td>Input Control Current to Activate</td>
<td>I_L=120mA</td>
<td>I_F</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Input Control Current to Deactivate</td>
<td>-</td>
<td>I_F</td>
<td>0.4</td>
<td>0.7</td>
<td>-</td>
<td>mA</td>
</tr>
<tr>
<td>Input Voltage Drop</td>
<td>I_F=5mA</td>
<td>V_F</td>
<td>0.9</td>
<td>1.2</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Reverse Input Current</td>
<td>V_R=5V</td>
<td>I_R</td>
<td>-</td>
<td>-</td>
<td>10</td>
<td>µA</td>
</tr>
<tr>
<td>Common Characteristics</td>
<td>Input to Output Capacitance</td>
<td>-</td>
<td>C_I/O</td>
<td>-</td>
<td>3</td>
<td>-</td>
</tr>
</tbody>
</table>

Electrical Characteristics @25°C: Detector Section

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conditions</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phototransistor Blocking Voltage</td>
<td>I_C=10µA</td>
<td>BV CEO</td>
<td>20</td>
<td>50</td>
<td>-</td>
<td>V</td>
</tr>
<tr>
<td>Phototransistor Dark Current</td>
<td>V_CE=5V, I_F=0mA</td>
<td>I_CEO</td>
<td>-</td>
<td>50</td>
<td>500</td>
<td>nA</td>
</tr>
<tr>
<td>Saturation Voltage</td>
<td>I_F=2mA, I_P=16mA</td>
<td>V_SAT</td>
<td>-</td>
<td>0.3</td>
<td>0.5</td>
<td>V</td>
</tr>
<tr>
<td>Current Transfer Ratio</td>
<td>I_P=6mA, V_CE=0.5V</td>
<td>CTR</td>
<td>33</td>
<td>100</td>
<td>-</td>
<td>%</td>
</tr>
<tr>
<td>Input Characteristics</td>
<td>Input Control Current</td>
<td>I_C=2mA, V_CE=0.5V</td>
<td>I_F</td>
<td>-</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Input Voltage Drop</td>
<td>I_F=5mA</td>
<td>V_F</td>
<td>0.9</td>
<td>1.2</td>
<td>1.4</td>
<td>V</td>
</tr>
<tr>
<td>Input Current (Detector Must be Off)</td>
<td>I_C=1µA, V_CE=5V</td>
<td>I_F</td>
<td>5</td>
<td>25</td>
<td>-</td>
<td>µA</td>
</tr>
<tr>
<td>Isolation, Input to Output</td>
<td>-</td>
<td>V_VO</td>
<td>3750</td>
<td>-</td>
<td>-</td>
<td>V rms</td>
</tr>
</tbody>
</table>
* 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.
* 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.
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.

* 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.
INTEGRATED CIRCUITS DIVISION

Manufacturing Information

Moisture Sensitivity

All plastic encapsulated semiconductor packages are susceptible to moisture ingestion. IXYS Integrated Circuits Division classified all of its plastic encapsulated devices for moisture sensitivity according to the latest version of the joint industry standard, IPC/JEDEC J-STD-020, in force at the time of product evaluation. We test all of our products to the maximum conditions set forth in the standard, and guarantee proper operation of our devices when handled according to the limitations and information in that standard as well as to any limitations set forth in the information or standards referenced below.

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.

<table>
<thead>
<tr>
<th>Device</th>
<th>Moisture Sensitivity Level (MSL) Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS117 / TS117P / TS117S</td>
<td>MSL 1</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Device</th>
<th>Maximum Temperature x Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS117 / TS117S</td>
<td>250°C for 30 seconds</td>
</tr>
<tr>
<td>TS117P</td>
<td>260°C for 30 seconds</td>
</tr>
</tbody>
</table>

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.
TS117STR Tape & Reel

330.2 DIA. (13.00 DIA.)
Top Cover
Tape Thickness
0.102 MAX.
(0.004 MAX.)

Embossed Carrier
Embossment

K1 = 4.90
(0.193)
K0 = 4.20
(0.165)

Bo = 10.30
(0.406)
Ao = 10.30
(0.406)
P = 12.00
(0.472)

NOTES:
1. Dimensions carry tolerances of EIA Standard 481-2
2. Tape complies with all "Notes" for constant dimensions listed on page 5 of EIA-481-2

TS117PTR Tape & Reel

330.2 DIA. (13.00 DIA.)
Top Cover
Tape Thickness
0.102 MAX.
(0.004 MAX.)

Embossed Carrier
Embossment

K1 = 2.70
(0.106)
K0 = 2.00
(0.079)

P = 12.00
(0.472)
Ao = 10.30
(0.406)

NOTES:
1. All dimensions carry tolerances of EIA Standard 481-2
2. The tape complies with all "Notes" for constant dimensions listed on page 5 of EIA-481-2

For additional information please visit our website at: www.ixysic.com

IXYS Integrated Circuits Division makes no representations or warranties with respect to the accuracy or completeness of the contents of this publication and reserves the right to make changes to specifications and product descriptions at any time without notice. Neither circuit patent licenses nor indemnity are expressed or implied. Except as set forth in IXYS Integrated Circuits Division's Standard Terms and Conditions of Sale, IXYS Integrated Circuits Division assumes no liability whatsoever, and disclaims any express or implied warranty, relating to its products including, but not limited to, the implied warranty of merchantability, fitness for a particular purpose, or infringement of any intellectual property right.

The products described in this document are not designed, intended, authorized or warranted for use as components in systems intended for surgical implant into the body, or in other applications intended to support or sustain life, or where malfunction of IXYS Integrated Circuits Division's product may result in direct physical harm, injury, or death to a person or severe property or environmental damage. IXYS Integrated Circuits Division reserves the right to discontinue or make changes to its products at any time without notice.