

# PHOTO THYRISTOR COUPLER

## MT6450J

T-41-87

### APPLICATIONS

- OFFICE MACHINERY
- HOUSEHOLD APPLIANCES
- SOLID STATE RELAY
- SWITCHING POWER SUPPLY
- OVERVOLTAGE/CURRENT DETECTOR CIRCUIT

The MARKTECH MT6450J consists of a photothyristor optically coupled to a gallium arsenide infrared emitting diode in a six lead plastic DIP package.

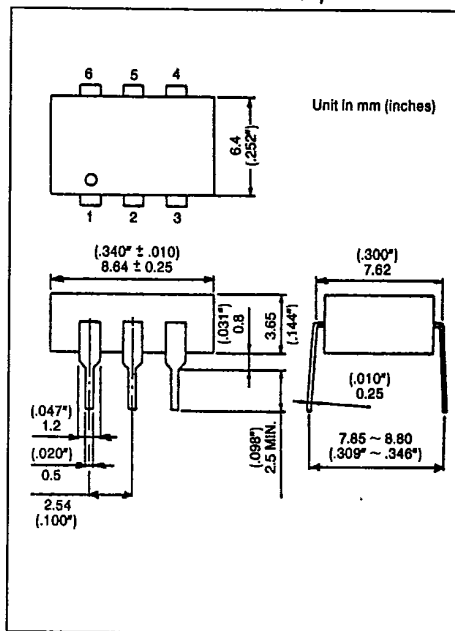
### FEATURES

- Peak Off-State Voltage : 600V Min.
- Trigger LED Current : 10mA Max.
- On-State Current : 150mA Max.
- Isolation Voltage : 5000V<sub>rms</sub> Min.
- Guaranteed Requirements of IEC380/VDE0806
- Climatic Test Class : 55/150/21
- Isolation Creepage Path : 8.0mm Min.
- Isolation Clearance : 7.3mm Min.
- Isolation Operating Voltage : 500V<sub>ac</sub> or 600V<sub>dc</sub> for Isolation Group C. \*1
- Creeping Current Resistance : Group I \*2

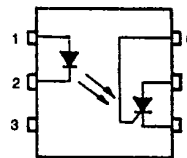
\*1 : According to VDE0110, table 4  
 \*2 : According to VDE0110, table 3

CONTAINS ALL MECHANICAL & OPTO ELECTRICAL PARAMETERS AS THE MTPC5450J, WITH HIGHER ISOLATION VOLTAGE.

CONTAINS ALL MECHANICAL & OPTO ELECTRICAL PARAMETERS AS THE MTPC6410J, WITH SAFETY FEATURES ADDED.



PIN CONFIGURATIONS (TOP VIEW)



- 1: ANODE
- 2: CATHODE
- 3: NC
- 4: COLLECTOR
- 5: ANODE
- 6: GATE

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## MAXIMUM RATINGS (Ta = 25°C)

|                                                      | CHARACTERISTIC                                | SYMBOL              | RATING    | UNIT             |
|------------------------------------------------------|-----------------------------------------------|---------------------|-----------|------------------|
| LED                                                  | Forward Current                               | I <sub>F</sub>      | 60        | mA               |
|                                                      | Forward Current Derating (Ta ≥ 39°C)          | ΔI <sub>F</sub> /°C | -0.7      | mA/°C            |
|                                                      | Peak Forward Current (100μs pulse, 100pps)    | I <sub>FP</sub>     | 1         | A                |
|                                                      | Power Dissipation                             | P <sub>D</sub>      | 100       | mW               |
|                                                      | Power Dissipation Derating (Ta ≥ 25°C)        | ΔP <sub>D</sub> /°C | -1.0      | mW/°C            |
|                                                      | Reverse Voltage                               | V <sub>R</sub>      | 5         | V                |
|                                                      | Junction Temperature                          | T <sub>J</sub>      | 125       | °C               |
| DETECTOR                                             | Peak Forward Voltage (R <sub>GK</sub> = 27kΩ) | V <sub>DRM</sub>    | 600       | V                |
|                                                      | Peak Reverse Voltage (R <sub>GK</sub> = 27kΩ) | V <sub>RRM</sub>    | 600       | V                |
|                                                      | On-State Current                              | I <sub>T(RMS)</sub> | 150       | mA               |
|                                                      | On-State Current Derating (Ta ≥ 25°C)         | ΔI <sub>T</sub> /°C | -2.0      | mA/°C            |
|                                                      | Peak On-State Current (100μs pulse, 120pps)   | I <sub>TP</sub>     | 3         | A                |
|                                                      | Peak One Cycle Surge Current                  | I <sub>TSM</sub>    | 2         | A                |
|                                                      | Peak Reverse Gate Voltage                     | V <sub>GM</sub>     | 5         | V                |
|                                                      | Power Dissipation                             | P <sub>D</sub>      | 150       | mW               |
|                                                      | Power Dissipation Derating (Ta ≥ 25°C)        | ΔP <sub>D</sub> /°C | -2.0      | mW/°C            |
|                                                      | Junction Temperature                          | T <sub>J</sub>      | 100       | °C               |
| Storage Temperature Range                            |                                               | T <sub>stg</sub>    | -55 ~ 150 | °C               |
| Operating Temperature Range                          |                                               | T <sub>opr</sub>    | -55 ~ 100 | °C               |
| Lead Soldering Temperature (10 sec.)                 |                                               | T <sub>sold</sub>   | 260       | °C               |
| Total Package Power Dissipation                      |                                               | P <sub>T</sub>      | 250       | mW               |
| Total Package Power Dissipation Derating (Ta ≥ 25°C) |                                               | ΔP <sub>T</sub> /°C | -3.3      | mW/°C            |
| Isolation Voltage (AC, 1 min., RH ≤ 60%)             |                                               | BV <sub>S</sub>     | 5000      | V <sub>rms</sub> |

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## INDIVIDUAL ELECTRICAL CHARACTERISTICS (Ta=25°C)

| CHARACTERISTIC |                   | SYMBOL           | TEST CONDITION                                 | MIN.    | TYP. | MAX. | UNIT |    |
|----------------|-------------------|------------------|------------------------------------------------|---------|------|------|------|----|
| LED            | Forward Voltage   | V <sub>F</sub>   | I <sub>F</sub> =10mA                           | 1.0     | 1.15 | 1.3  | V    |    |
|                | Reverse Current   | I <sub>R</sub>   | V <sub>R</sub> =5V                             | —       | —    | 10   | μA   |    |
|                | Capacitance       | C <sub>T</sub>   | V=0, f=1MHz                                    | —       | 30   | —    | pF   |    |
| DETECTOR       | Off-State Current | I <sub>DRM</sub> | V <sub>AK</sub> =600V<br>R <sub>GK</sub> =27kΩ | Ta=25°C | —    | 10   | 5000 | nA |
|                |                   |                  |                                                | Ta=85°C | —    | 1    | 150  | μA |
|                | Reverse Current   | I <sub>RRM</sub> | V <sub>KA</sub> =600V<br>R <sub>GK</sub> =27kΩ | Ta=25°C | —    | 10   | 5000 | nA |
|                |                   |                  |                                                | Ta=85°C | —    | 1    | 150  | μA |
|                | On-State Voltage  | V <sub>TM</sub>  | I <sub>TM</sub> =100mA                         | —       | 0.9  | 1.3  | V    |    |
|                | Holding Current   | I <sub>H</sub>   | R <sub>GK</sub> =27kΩ                          | —       | 0.2  | —    | mA   |    |
|                | Off-State dv/dt   | dv/dt            | V <sub>D</sub> =420V, R <sub>GK</sub> =27kΩ    | —       | 10   | —    | V/μs |    |
| Capacitance    | C <sub>J</sub>    | V=0, f=1MHz      |                                                |         |      |      |      |    |
|                |                   | Anode to Gate    |                                                | —       | 20   | —    | pF   |    |
|                |                   | Gate to Cathode  |                                                | —       | 350  | —    |      |    |

## COUPLED ELECTRICAL CHARACTERISTICS (Ta=25°C)

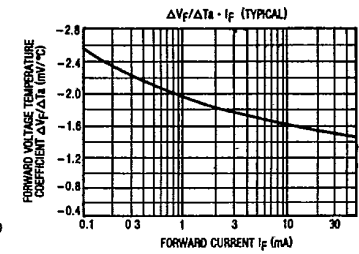
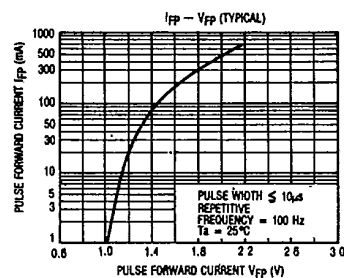
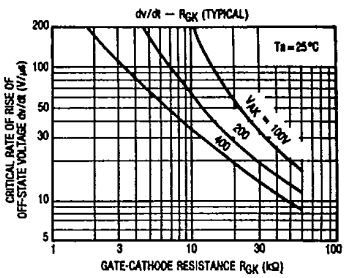
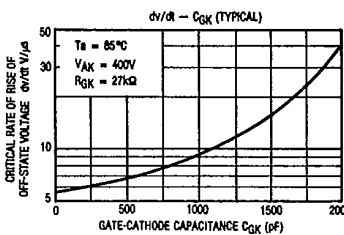
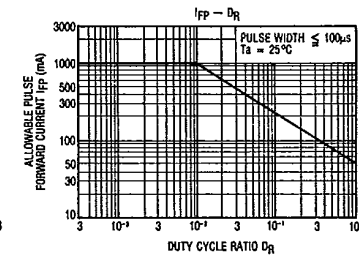
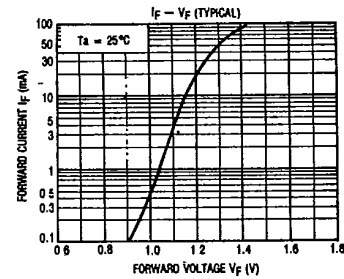
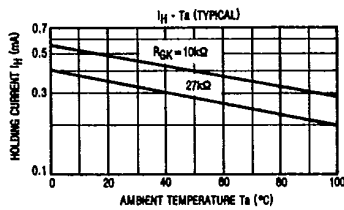
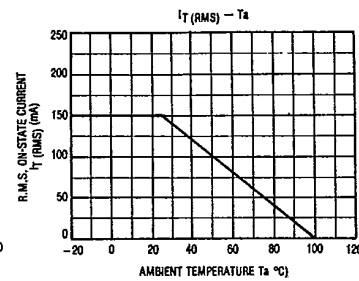
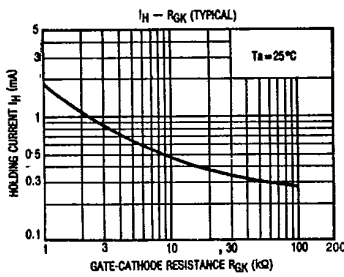
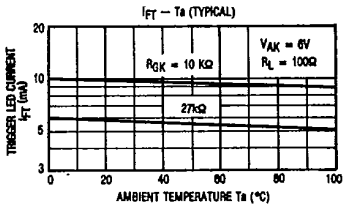
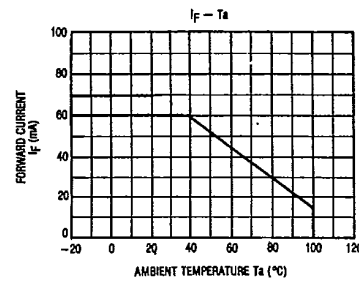
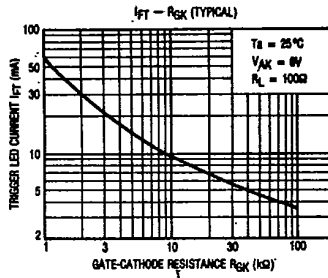
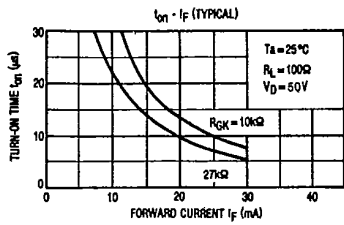
| CHARACTERISTIC              | SYMBOL          | TEST CONDITION                                                      | MIN.               | TYP.             | MAX. | UNIT             |
|-----------------------------|-----------------|---------------------------------------------------------------------|--------------------|------------------|------|------------------|
| Trigger LED Current         | I <sub>FT</sub> | V <sub>AK</sub> =6V, R <sub>GK</sub> =27kΩ                          | —                  | 5                | 10   | mA               |
| Turn-on Time                | t <sub>on</sub> | I <sub>F</sub> =30mA, V <sub>AA</sub> =50V<br>R <sub>GK</sub> =27kΩ | —                  | 10               | —    | μs               |
| Coupled dv/dt               | dv/dt           | V <sub>S</sub> =500V, R <sub>GK</sub> =27kΩ                         | 500                | —                | —    | V/μs             |
| Capacitance Input to Output | C <sub>S</sub>  | V <sub>S</sub> =0, f=1MHz                                           | —                  | 0.8              | —    | pF               |
| Isolation Resistance        | R <sub>S</sub>  | V <sub>S</sub> =500V                                                | 5x10 <sup>10</sup> | 10 <sup>14</sup> | —    | Ω                |
| Isolation Voltage           | BV <sub>S</sub> | AC, 1 minute                                                        | 5000               | —                | —    | V <sub>rms</sub> |
|                             |                 | AC, 1 second                                                        | —                  | 10000            | —    |                  |
|                             |                 | DC, 1 minute                                                        | —                  | 10000            | —    | V <sub>dc</sub>  |

## RECOMMENDED OPERATING CONDITIONS

| CHARACTERISTIC             | SYMBOL           | MIN. | TYP. | MAX. | UNIT            |
|----------------------------|------------------|------|------|------|-----------------|
| Supply Voltage             | V <sub>AC</sub>  | —    | —    | 240  | V <sub>ac</sub> |
| Forward Current            | I <sub>F</sub>   | 15   | 20   | 25   | mA              |
| Operating Temperature      | T <sub>opr</sub> | -25  | —    | 85   | °C              |
| Gate to Cathode Resistance | R <sub>GK</sub>  | —    | 10   | 27   | kΩ              |
| Gate to Cathode Capacity   | C <sub>GK</sub>  | —    | 0.01 | 0.1  | μF              |

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