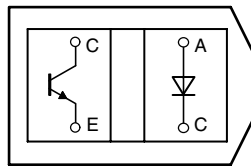


Reflective Optical Sensor with Transistor Output



19156_2



Top view

19156_1

FEATURES

- Package type: leaded
- Detector type: phototransistor
- Dimensions (L x W x H in mm): 10.2 x 5.8 x 7
- Peak operating distance: 2.5 mm
- Operating range within > 20 % relative collector current: 0.2 mm to 15 mm
- Typical output current under test: $I_C = 1$ mA
- Daylight blocking filter
- Emitter wavelength: 950 nm
- Lead (Pb)-free soldering released
- Compliant to RoHS directive 2002/95/EC and in accordance to WEEE 2002/96/EC



RoHS
COMPLIANT

DESCRIPTION

The TCRT5000 and TCRT5000L are reflective sensors which include an infrared emitter and phototransistor in a leaded package which blocks visible light. The package includes two mounting clips. TCRT5000L is the long lead version.

APPLICATIONS

- Position sensor for shaft encoder
- Detection of reflective material such as paper, IBM cards, magnetic tapes etc.
- Limit switch for mechanical motions in VCR
- General purpose - wherever the space is limited

PRODUCT SUMMARY

| PART NUMBER | DISTANCE FOR MAXIMUM CTR _{rel} (1) (mm) | DISTANCE RANGE FOR RELATIVE I _{out} > 20 % (mm) | TYPICAL OUTPUT CURRENT UNDER TEST (2) (mA) | DAYLIGHT BLOCKING FILTER INTEGRATED |
|-------------|--------------------------------------------------|----------------------------------------------------------|--------------------------------------------|-------------------------------------|
| TCRT5000 | 2.5 | 0.2 to 15 | 1 | Yes |
| TCRT5000L | 2.5 | 0.2 to 15 | 1 | Yes |

Notes

(1) CTR: current transfere ratio, I_{out}/I_{in}

(2) Conditions like in table basic characteristics/sensors

ORDERING INFORMATION

| ORDERING CODE | PACKAGING | VOLUME (1) | REMARKS |
|---------------|-----------|----------------------------|--------------------|
| TCRT5000 | Tube | MOQ: 4500 pcs, 50 pcs/tube | 3.5 mm lead length |
| TCRT5000L | Tube | MOQ: 2400 pcs, 48 pcs/tube | 15 mm lead length |

Note

(1) MOQ: minimum order quantity

ABSOLUTE MAXIMUM RATINGS (1)

| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
|------------------------|---------------------------|-----------|-------|------------|
| INPUT (EMITTER) | | | | |
| Reverse voltage | | V_R | 5 | V |
| Forward current | | I_F | 60 | mA |
| Forward surge current | $t_p \leq 10 \mu s$ | I_{FSM} | 3 | A |
| Power dissipation | $T_{amb} \leq 25^\circ C$ | P_V | 100 | mW |
| Junction temperature | | T_j | 100 | $^\circ C$ |

| ABSOLUTE MAXIMUM RATINGS (1) | | | | |
|------------------------------|-----------------------------------------|-----------|---------------|------------------|
| PARAMETER | TEST CONDITION | SYMBOL | VALUE | UNIT |
| OUTPUT (DETECTOR) | | | | |
| Collector emitter voltage | | V_{CEO} | 70 | V |
| Emitter collector voltage | | V_{ECO} | 5 | V |
| Collector current | | I_C | 100 | mA |
| Power dissipation | $T_{amb} \leq 55\text{ }^\circ\text{C}$ | P_V | 100 | mW |
| Junction temperature | | T_j | 100 | $^\circ\text{C}$ |
| SENSOR | | | | |
| Total power dissipation | $T_{amb} \leq 25\text{ }^\circ\text{C}$ | P_{tot} | 200 | mW |
| Ambient temperature range | | T_{amb} | - 25 to + 85 | $^\circ\text{C}$ |
| Storage temperature range | | T_{stg} | - 25 to + 100 | $^\circ\text{C}$ |
| Soldering temperature | 2 mm from case, $t \leq 10\text{ s}$ | T_{sd} | 260 | $^\circ\text{C}$ |

Note

(1) $T_{amb} = 25\text{ }^\circ\text{C}$, unless otherwise specified

ABSOLUTE MAXIMUM RATINGS

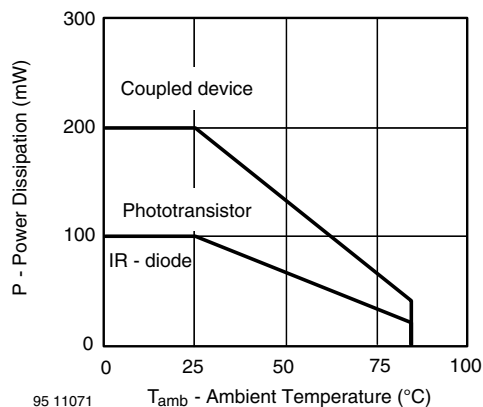


Fig. 1 - Power Dissipation Limit vs. Ambient Temperature

| BASIC CHARACTERISTICS (1) | | | | | | |
|--------------------------------------|-------------------------------------------------------------------|----------------------|------|------|------|-------|
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| INPUT (EMITTER) | | | | | | |
| Forward voltage | $I_F = 60\text{ mA}$ | V_F | | 1.25 | 1.5 | V |
| Junction capacitance | $V_R = 0\text{ V}$, $f = 1\text{ MHz}$ | C_j | | 17 | | pF |
| Radiant intensity | $I_F = 60\text{ mA}$, $t_p = 20\text{ ms}$ | I_e | | | 21 | mW/sr |
| Peak wavelength | $I_F = 100\text{ mA}$ | λ_P | 940 | | | nm |
| Virtual source diameter | Method: 63 % encircled energy | d | | 2.1 | | mm |
| OUTPUT (DETECTOR) | | | | | | |
| Collector emitter voltage | $I_C = 1\text{ mA}$ | V_{CEO} | 70 | | | V |
| Emitter collector voltage | $I_e = 100\text{ }\mu\text{A}$ | V_{ECO} | 7 | | | V |
| Collector dark current | $V_{CE} = 20\text{ V}$, $I_F = 0\text{ A}$, $E = 0\text{ lx}$ | I_{CEO} | | 10 | 200 | nA |
| SENSOR | | | | | | |
| Collector current | $V_{CE} = 5\text{ V}$, $I_F = 10\text{ mA}$, $D = 12\text{ mm}$ | $I_C^{(2)(3)}$ | 0.5 | 1 | 2.1 | mA |
| Collector emitter saturation voltage | $I_F = 10\text{ mA}$, $I_C = 0.1\text{ mA}$, $D = 12\text{ mm}$ | $V_{CEsat}^{(2)(3)}$ | | | 0.4 | V |

Note

(1) $T_{amb} = 25\text{ }^\circ\text{C}$, unless otherwise specified

(2) See figure 3

(3) Test surface: mirror (Mfr. Spindler a. Hoyer, Part No. 340005)