# Technical Data Sheet
# 115.2Kbit/s Infrared Transceiver

**TM3204/TR2**

## Features

- Excellent Fluorescent Noise Immunity and Very High EMI Immunity
- Wide Operating Voltage Range from 2.7 to 3.6 Volts
- Independent IrED Operating Voltage Range from 2.0 to 6 Volts
- Ultra Small Surface Mount Package:
  - L8.1mm * W3.05mm * H2.15mm
- Data Rate :2.4k ~ 115.2kbit/s
- Operating Temperature Range : -25℃ to 85℃
- LED Drive Current : 60 mA Typical
- Low Shutdown Current :0.1 $\mu$ A Typical
- Few External Components Required
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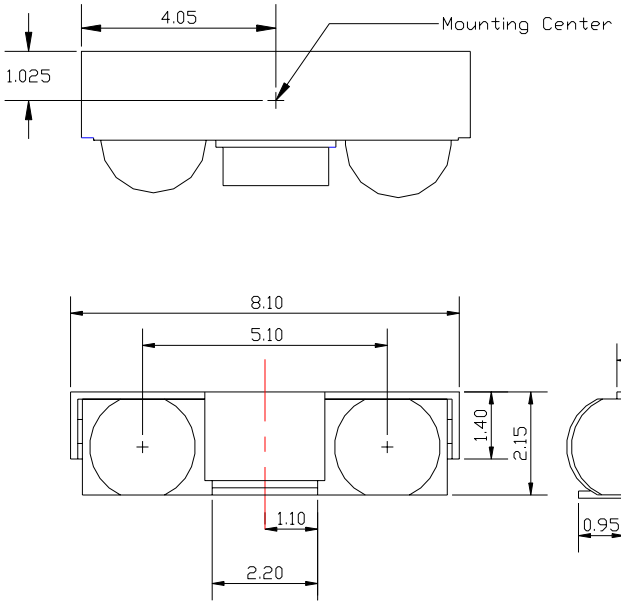
## Descriptions

The TM3204/TR2 is a new generation of low-cost infrared transceiver modules. The module is in ultra-small surface mount package. Although the operating voltage can range from 2.7 to 3.6 Volts, the LED drive current is internally compensated to a constant 60 mA to assure that link distances meet the low power standard of IrDA 1.4 physical layer specification.

## Applications

- Cellular Phones, Pagers, PDA
- Handheld Battery Operated Products, ex: Handheld Printers
- Others: Wrist Camera

## Package Dimensions




Unit : mm
Tolerance: ±0.2 mm

## Device Selection Guide

| Mode | Standard | | λ p (nm) | Operating Voltage (Vcc) | Data Rate (kbps) |
|---|---|---|---|---|---|
| | Link Distance | Angle 2θ 1/2 | | | |
| TM3204/TR2 | >80cm | +/-15~+/-30 | 850~900 | 2.7~3.6 Volts | 9.6~115.2 |

## Pin Descriptions

| Pin | Symbol | Function | Description | I/O | Active |
|---|---|---|---|---|---|
| 1 | NC | No Connect | | | |
| 2 | NC | No Connect | | | |
| 3 | Vcc | Supply Voltage | Supply Voltage from 2.7 to 3.6 Volts. *Note 1 | | |
| 4 | GND | Ground | Connect to system ground | | |
| 5 | SD | Shut Down | Must be driven either high or low. *Note 2 | I | High |
| 6 | RXD | Receiver Data Output | Output is a low pulse when a light pulse is seen. *Note 3 | O | Low |
| 7 | TXD | Transmitter Data Input | Logic High turn on the IrED. *Note 4 | I | High |
| 8 | $V_{LEDA}$ | IrED Supply Voltage | IrED Supply Voltage from 2.0 to 6 Volts. | | |

Note 1: Receives power supply from 2.7 to 3.6 Volts. This pin provides power for the receiver and transmitter drive section. Power supply noise in 100KHz to 2MHz range must have a dv/dt of less than 50mV/us in receive mode.

Note 2: Asserting this pin above 1.4V causes the device to shut down, disabling transmitter and tri-stating the receiver output; however, it must be driven above Vdd-1.3V for shutdown current consumption to be less 1uA.

Note 3: Normally high goes low for duration of receive pulse. Output is a CMOS driver providing rail to rail operation. RXD may go low continuously if the DC ambient exceeds input capacity. During shutdown RXD output tri-states with a weak (500K) pull up.

Note 4: Asserting this pin above 1.4V turns on transmitter. This input is gated by the shutdown function and AC coupled. Maximum transmit pulse width is ~50usec. Input has 500K pull down which is active even during shutdown.

## Absolute Maximum Ratings (Ta=25℃) reference point Pin GND unless otherwise noted.

Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

| Parameters | Test Conditions | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Supply Voltage | All States | Vcc | -0.5 | | 7 | V |
| IrED Supply Voltage | SD=0, TXD=Vcc | $V_{LEDA}$ | -0.5 | | Vcc+4 | V |
| Receiver Data Output | All States | RXD | -0.5 | | Vcc+0.5 | V |
| Transmitter Data Input | All States | TXD | -0.5 | | Vcc+0.5 | V |
| Shut Down | All States | SD | -0.5 | | Vcc+0.5 | V |
| Operating Temperature Range | | Tamb | -25 | | +85 | ℃ |
| Storage Temperature Range | | Tstg | -40 | | 100 | ℃ |
| Soldering Temperature | See Recommended Solder Profile | | | - | 245 | ℃ |

## Recommended Operating Conditions

| Parameters | Test Conditions | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Operating Temperature Range | | Tamb | -25 | | +85 | ℃ |
| Supply Voltage | Vcc to GND | Vcc | 2.7 | | 3.6 | V |
| TXD,SD Input Threshold | Vcc=2.7 to 3.6V | | 2.7 | | 3.6 | V |
| Receiver Date Rate | | | 2.4 | | 115.2 | kbps |

## Electrical Characteristics

Tamb=25℃, Vcc=2.7V to 3.6V unless otherwise noted.

Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

| Parameters | Test Conditions / Pins | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Transceiver** | | | | | | |
| Supply Voltage | Vcc to GND | Vcc | 2.7 | | 3.6 | V |
| Supply Current Pin Vcc (No signal) | Vcc=3.6V | Icc | | 110 | | uA |
| Shut Down Current Pin SD | SD=Vcc, Vcc=2.7 to 3.6V | $I_{SD}$ | | 0.01 | 1.0 | uA |
| Transmit Receiver Latency | | $T_{TRL}$ | | 50 | 100 | uA |
| Transceiver Power on Latency | | $T_{PON}$ | | 100 | 150 | us |

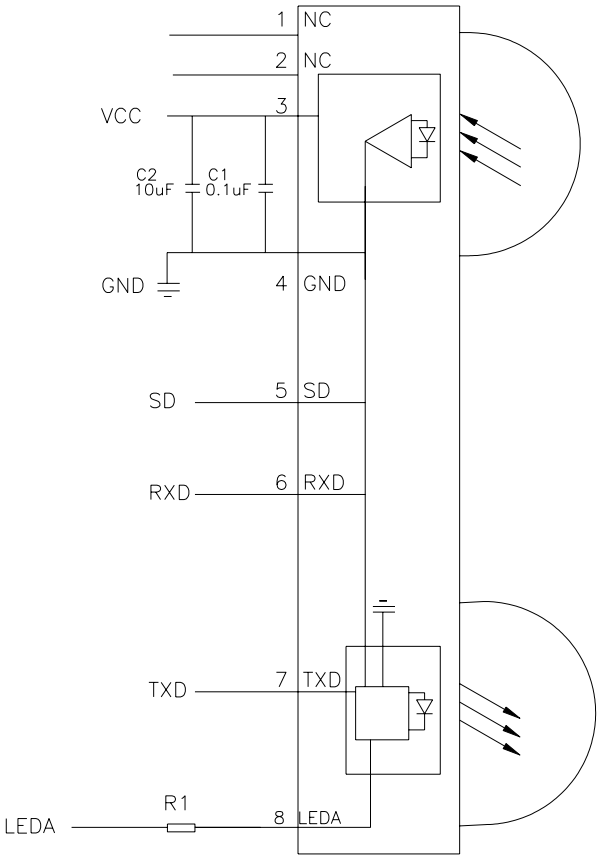
## Opto-electronic Characteristics

Tamb=25℃,Vcc=2.7V to 3.6V unless otherwise noted.

Typical values are for DESIGN AID ONLY, not guaranteed nor subject to production testing.

| Parameters | Test Conditions | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Receiver** | | | | | | |
| Minimum Detection Threshold Irradiance | SIR Mode, Vcc=3.6V | Ee | - | - | 4 | $uW/cm^2$ |
| | SIR Mode, Vcc=2.7V | Ee | - | - | 10 | $uW/m^2$ |
| Maximum Detection Threshold Irradiance | SIR Mode, Vcc=3.6V | Ee | - | 500 | | $uW/cm^2$ |
| | SIR Mode, Vcc=2.7V | Ee | - | 1000 | | $uW/cm^2$ |
| Logic LOW Receiver Input Irradiance | | Ee | | | 0.4 | $uW/cm^2$ |
| Output Voltage -Active | $I_{OH}$=-200 $\mu$ A, EI≦0.3 $uW/cm^2$ | $V_{OH}$ | Vcc-0.2 | | Vcc | V |
| | $I_{OL}$=200 $\mu$ A, | $V_{OL}$ | 0 | | 0.4 | V |
| Rise/Fall Time-RXD | Vcc=3.6V, C=15pF | $t_r/t_{f\ (RXD)}$ | | 40 | | ns |
| | Vcc=2.7V, C=15pF | $t_r/t_{f\ (RXD}$ | | 60 | | ns |
| **Transmitter** | | | | | | |
| IrED Operating Current | Vcc=2.7 to 3.6V | $I_{IrED}$ | | 60 | - | mA |
| Logic LOW Transmitter Input Voltage | | $V_{IL}$ | 0 | | 1/3Vcc | V |
| Logic HIGH Transmitter Input Voltage | | $V_{IH}$ | 2/3Vcc | | Vcc | V |
| Output Radiant Intensity | Vcc=2.7V | Ie | 4 | 5 | | mW/sr |
| | TXD Logic LOW Level | Ie | | | 0.04 | mW/sr |
| Angle of Half Intensity | | $2\theta_{1/2}$ | 30 | | | ° |
| Peak Wavelength of Emission | | $\lambda$ p | 850 | 870 | 900 | nm |
| Half-Width of Emission Spectrum | | $\Delta\lambda$ | | 40 | | nm |
| Average IrED Current | | $I_{IrED}$ (DC) | | 11.25 | | mA |
| Repetitive Pulsed IrED Current | t<50 $\mu$ s, $t_{on}$<20% | $I_{IrED}$ (RP) | | 60 | | mA |
| Optical Rise/Fall Time, | | $t_r/t_f$ | | 180 | 600 | ns |
| Optical Overshoot | | | | | 25 | % |

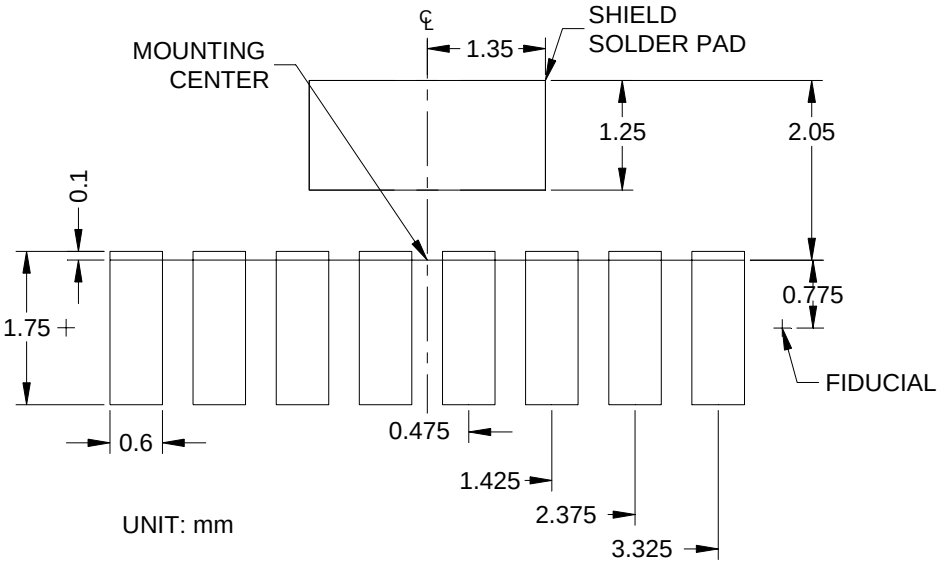
## Recommended Circuit Diagram



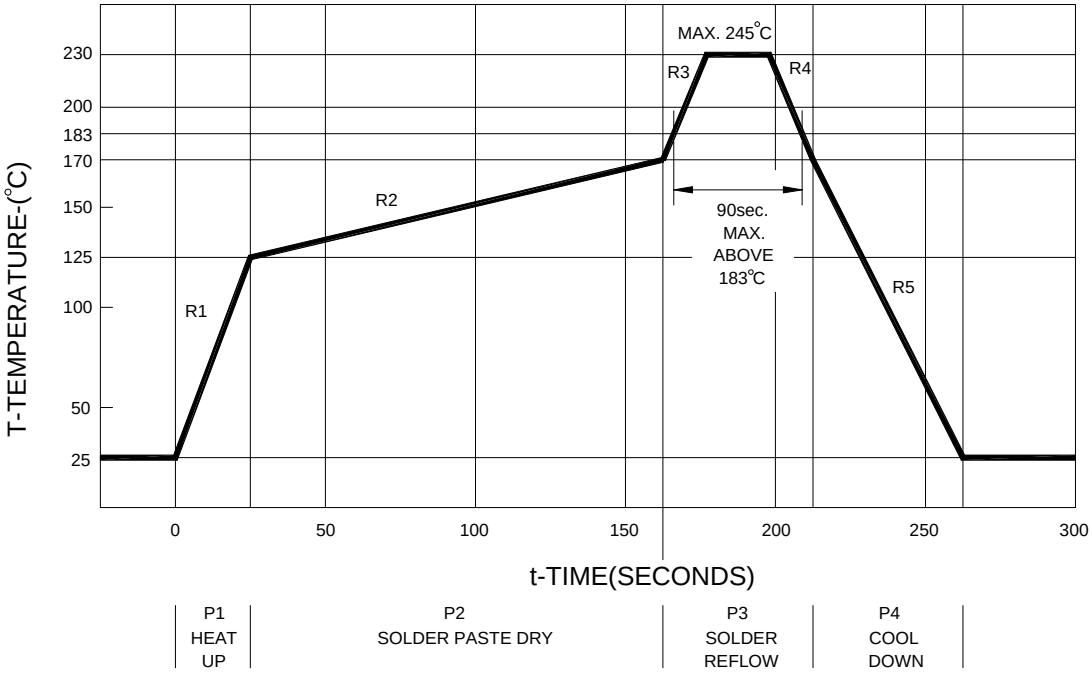

Note:Outlined components are optional depending on the quality of the power supply.

| Component | Recommended Value |
|---|---|
| C1 | 0.1uF(Ceramic). It must be placed within 1.0cm of the TM3204/TR2 |
| C2 | 10uF(Electrolytic). It must be placed within 15cm of the TM3204/TR2 |
| R1 | Recommended R1=5.1Ω .<br>Resistor must have a positive temperature coefficient of 0.47% per degree C |

## Recommended SMD Pad Layout

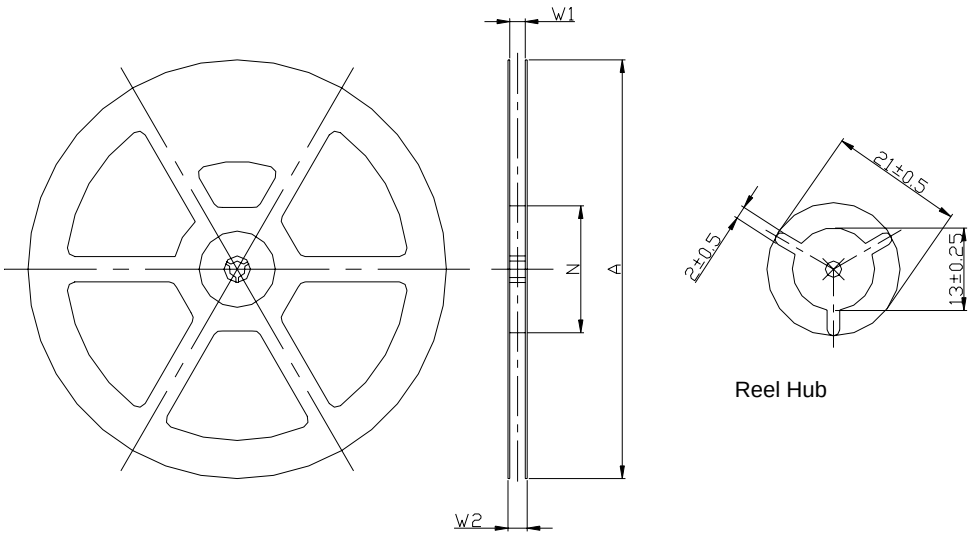



## Recommended Solder Profile



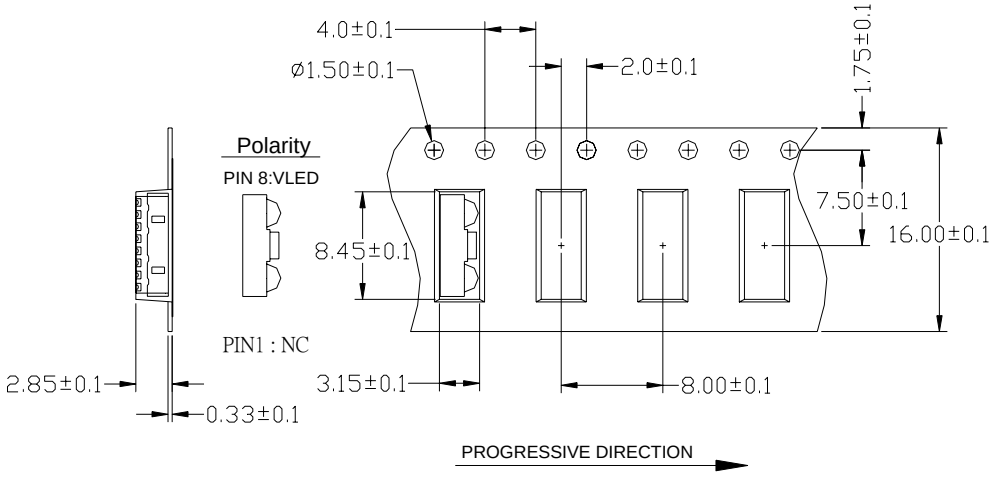
# Taping and Packing Information

## Shape of Reel and Dimensions

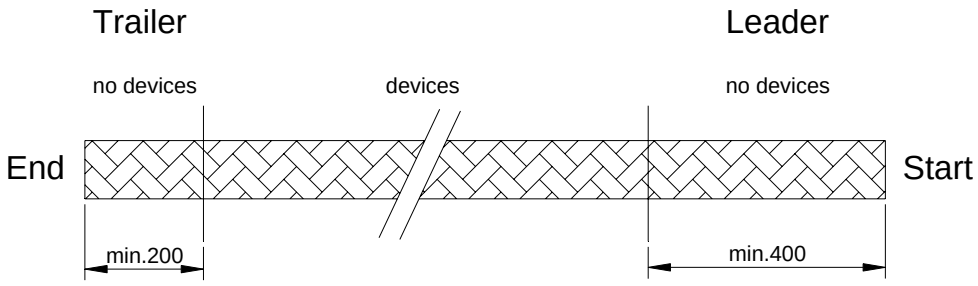



| Version | Tape Width | A | N | W1 | W2max |
|---|---|---|---|---|---|
| C | 16 | 330±1 | 99±1.5 | 17.4±2 | 22 |

## Tape Dimensions



## Leader and Trailer




## Quantity

TM3204/TR2  2500 pcs. per reel

## Cover Tape Peel Strength

According to IEC 286

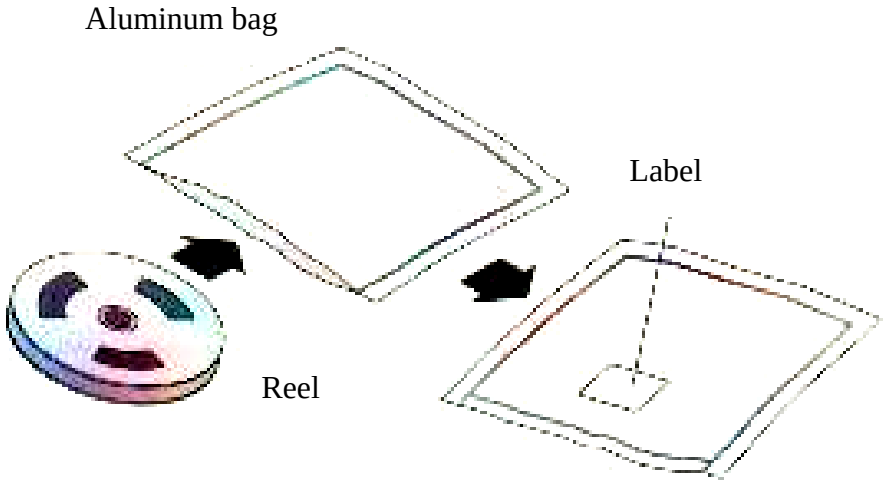
0.1 to 1.3N

300±10%mm/min

165°-180°peel angle

## Damp Proof Packing.

The reel is packed in a damp proof aluminum bag to protect the devices from absorbing moisture during transportation and storage.



## Recommended Method of Storage

Dry box storage is recommended as soon as the aluminum bag has been opened to prevent moisture absorption. The following conditions should be observed, if dry boxes are not available:

- Storage temperature 10℃ to 30℃
- Storage humidity ≦60%RH max.

After more than 72hours under these conditions moisture content will be too high for reflow soldering.

In case of moisture absorption, the devices will recover to the former condition by drying under the following condition:

192 hours at 40℃+5℃/-0℃ and 5% RH(dry air/nitrogen) or

96 hours at 60℃+5℃ and <5% RH for all device containers or

24 hours at 125℃+5℃ not suitable for reel or tubes.

## ESD Precaution

Proper storage and handling procedures should be followed to prevent ESD damage to the devices especially when they are removed from the Antistatic Shielding Bag. Electro-Static Sensitive Devices warning labels are on the packing.

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