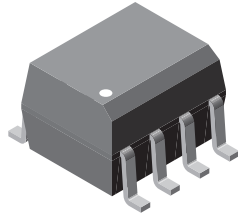
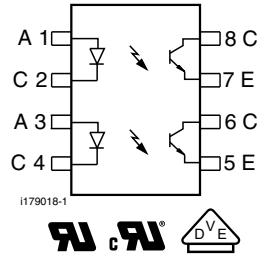




## Optocoupler, Phototransistor Output, Dual Channel, SOIC-8 Package



i179074



### FEATURES

- Two channel coupler
- SOIC-8 surface mountable package
- Standard lead spacing of 0.05"
- Available only on tape and reel option (conforms to EIA standard 481-2)
- Isolation test voltage, 4000 V<sub>RMS</sub>
- Compatible with dual wave, vapor phase and IR reflow soldering
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)



RoHS COMPLIANT

### DESCRIPTION

The VOD205T, VOD206T, VOD207T, VOD211T, VOD213T, VOD217T are optically coupled pairs with a gallium arsenide infrared LED and a silicon NPN phototransistor. Signal information, including a DC level, can be transmitted by the device while maintaining a high degree of electrical isolation between input and output.

### AGENCY APPROVALS

- UL1577, file no. E52744 system code Y
- cUL - file no. E52744, equivalent to CSA bulletin 5A
- DIN EN 60747-5-5 (VDE 0884-5) approved, contact customer service if this option is required

| ORDERING INFORMATION     |          |           |            |         |                      |                      |
|--------------------------|----------|-----------|------------|---------|----------------------|----------------------|
| V                        | O        | D         | 2          | #       | #                    | T                    |
| PART NUMBER              |          |           |            |         |                      |                      |
|                          |          |           |            |         |                      |                      |
| AGENCY CERTIFIED/PACKAGE | CTR (%)  |           |            |         |                      |                      |
| UL, cUL                  | 40 to 80 | 63 to 125 | 100 to 200 | > 20    | > 100 <sup>(1)</sup> | > 100 <sup>(2)</sup> |
| SOIC-8                   | VOD205T  | VOD206T   | VOD207T    | VOD211T | VOD213T              | VOD217T              |

### Notes

- (1) I<sub>F</sub> = 10 mA  
 (2) I<sub>F</sub> = 1 mA

| ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |                |                   |       |       |
|---|----------------|-------------------|-------|-------|
| PARAMETER   | TEST CONDITION | SYMBOL            | VALUE | UNIT  |
| <b>INPUT</b>  |                |                   |       |       |
| Peak reverse voltage  |                | V <sub>R</sub>    | 6     | V     |
| Peak pulsed current   | 1 μs, 300 pps  | I <sub>FM</sub>   | 1     | A     |
| Continuous forward current per channel  |                | I <sub>F</sub>    | 30    | mA    |
| Power dissipation   |                | P <sub>diss</sub> | 50    | mW    |
| Derate linearly from 25 °C  |                |                   | 0.66  | mW/°C |
| <b>OUTPUT</b>   |                |                   |       |       |
| Collector emitter breakdown voltage   |                | BV <sub>CEO</sub> | 70    | V     |
| Emitter collector breakdown voltage   |                | BV <sub>ECO</sub> | 7     | V     |
| Continuous output current   |                | I <sub>Cmax</sub> | 50    | mA    |
| Power dissipation per channel   |                | P <sub>diss</sub> | 125   | mW    |
| Derate linearly from 25 °C  |                |                   | 1.67  | mW/°C |



| ABSOLUTE MAXIMUM RATINGS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |                |                   |             |                  |
|---|----------------|-------------------|-------------|------------------|
| PARAMETER   | TEST CONDITION | SYMBOL            | VALUE       | UNIT             |
| <b>COUPLER</b>  |                |                   |             |                  |
| Isolation test voltage  | t = 1 s        | V <sub>ISO</sub>  | 4000        | V <sub>RMS</sub> |
| Total package dissipation ambient (2 LEDs and 2 detectors, 2 channels)          |                | P <sub>tot</sub>  | 300         | mW               |
| Derate linearly from 25 °C  |                |                   | 4           | mW/°C            |
| Storage temperature   |                | T <sub>stg</sub>  | -40 to +150 | °C               |
| Operating temperature   |                | T <sub>amb</sub>  | -40 to +100 | °C               |
| Soldering time from 260 °C <sup>(1)</sup>                                       |                | T <sub>slid</sub> | 10          | s                |

**Notes**

- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices.

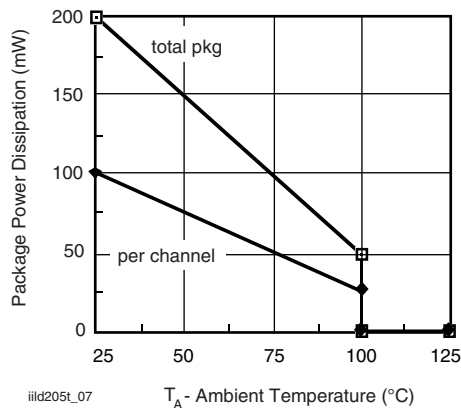


Fig. 1 - Power Dissipation vs. Ambient Temperature

| ELECTRICAL CHARACTERISTICS (T <sub>amb</sub> = 25 °C, unless otherwise specified) |   |      |                    |      |      |      |      |
|---|---|------|--------------------|------|------|------|------|
| PARAMETER   | TEST CONDITION                                  | PART | SYMBOL             | MIN. | TYP. | MAX. | UNIT |
| <b>INPUT</b>  |   |      |                    |      |      |      |      |
| Forward voltage   | I <sub>F</sub> = 10 mA                          |      | V <sub>F</sub>     |      | 1.2  | 1.55 | V    |
| Reverse current   | V <sub>R</sub> = 6 V                            |      | I <sub>R</sub>     |      | 0.1  | 100  | μA   |
| Capacitance   | V <sub>R</sub> = 0 V                            |      | C <sub>O</sub>     |      | 25   |      | pF   |
| <b>OUTPUT</b>   |   |      |                    |      |      |      |      |
| Collector emitter breakdown voltage   | I <sub>C</sub> = 100 μA                         |      | BV <sub>CEO</sub>  | 70   |      |      | V    |
| Emitter collector breakdown voltage   | I <sub>E</sub> = 100 μA                         |      | BV <sub>ECO</sub>  | 7    |      |      | V    |
| Collector emitter leakage current   | V <sub>CE</sub> = 10 V, I <sub>F</sub> = 0 A    |      | I <sub>CEO</sub>   |      | 5    | 50   | nA   |
| Collector emitter capacitance   | V <sub>CE</sub> = 0 V                           |      | C <sub>CE</sub>    |      | 10   |      | pF   |
| Collector emitter saturation voltage  | I <sub>F</sub> = 10 mA, I <sub>C</sub> = 2.5 mA |      | V <sub>CEsat</sub> |      |      | 0.4  | V    |
| <b>COUPLER</b>  |   |      |                    |      |      |      |      |
| Capacitance (input to output)   |   |      | C <sub>IO</sub>    |      | 0.5  |      | pF   |

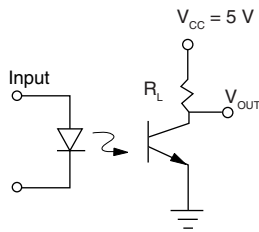
**Note**

- Minimum and maximum values were tested requirements. Typical values are characteristics of the device and are the result of engineering evaluations. Typical values are for information only and are not part of the testing requirements.



| CURRENT TRANSFER RATIO |   |         |            |      |      |      |      |
|------------------------|---|---------|------------|------|------|------|------|
| PARAMETER              | TEST CONDITION                            | PART    | SYMBOL     | MIN. | TYP. | MAX. | UNIT |
| $I_C/I_F$              | $V_{CE} = 5\text{ V}, I_F = 10\text{ mA}$ | VOD205T | $CTR_{DC}$ | 40   |      | 80   | %    |
|                        |   | VOD206T | $CTR_{DC}$ | 63   |      | 125  | %    |
|                        |   | VOD207T | $CTR_{DC}$ | 100  |      | 200  | %    |
|                        |   | VOD211T | $CTR_{DC}$ | 20   |      |      | %    |
|                        |   | VOD213T | $CTR_{DC}$ | 100  |      |      | %    |
|                        | $V_{CE} = 5\text{ V}, I_F = 1\text{ mA}$  | VOD205T | $CTR_{DC}$ | 13   | 30   |      | %    |
|                        |   | VOD206T | $CTR_{DC}$ | 22   | 45   |      | %    |
|                        |   | VOD207T | $CTR_{DC}$ | 34   | 70   |      | %    |
| VOD217T                | $CTR_{DC}$                                | 100     | 120        |      | %    |      |      |

| SWITCHING CHARACTERISTICS |   |           |      |      |      |               |  |
|---------------------------|---|-----------|------|------|------|---------------|--|
| PARAMETER                 | TEST CONDITION  | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |  |
| Turn-on time              | $I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$ | $t_{on}$  |      | 5    |      | $\mu\text{s}$ |  |
| Turn-off time             | $I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$ | $t_{off}$ |      | 4    |      | $\mu\text{s}$ |  |
| Rise time                 | $I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$ | $t_r$     |      | 5    |      | $\mu\text{s}$ |  |
| Fall time                 | $I_C = 2\text{ mA}, R_L = 100\ \Omega, V_{CC} = 5\text{ V}$ | $t_f$     |      | 4    |      | $\mu\text{s}$ |  |



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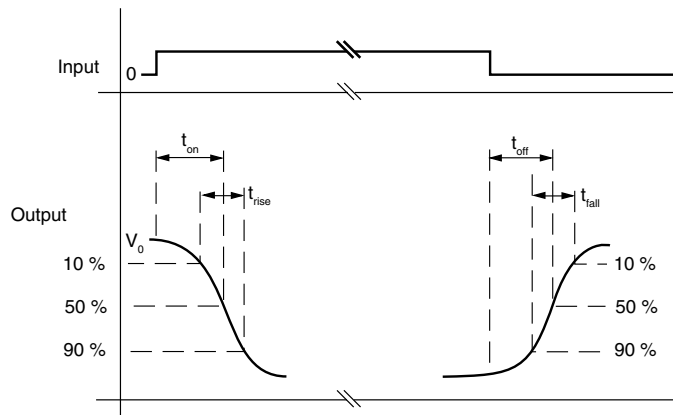


Fig. 2 - Switching Test Circuit

| COMMON MODE TRANSIENT IMMUNITY               |  |            |      |        |      |                        |  |
|--|--|------------|------|--------|------|------------------------|--|
| PARAMETER                                    | TEST CONDITION   | SYMBOL     | MIN. | TYP.   | MAX. | UNIT                   |  |
| Common mode transient immunity at logic high | $V_{CM} = 1000\text{ V}_{P-P}, R_L = 1\text{ k}\Omega, I_F = 0\text{ mA}$  | $ C_{MH} $ |      | 10 000 |      | $\text{V}/\mu\text{s}$ |  |
| Common mode transient immunity at logic low  | $V_{CM} = 1000\text{ V}_{P-P}, R_L = 1\text{ k}\Omega, I_F = 10\text{ mA}$ | $ C_{ML} $ |      | 10 000 |      | $\text{V}/\mu\text{s}$ |  |

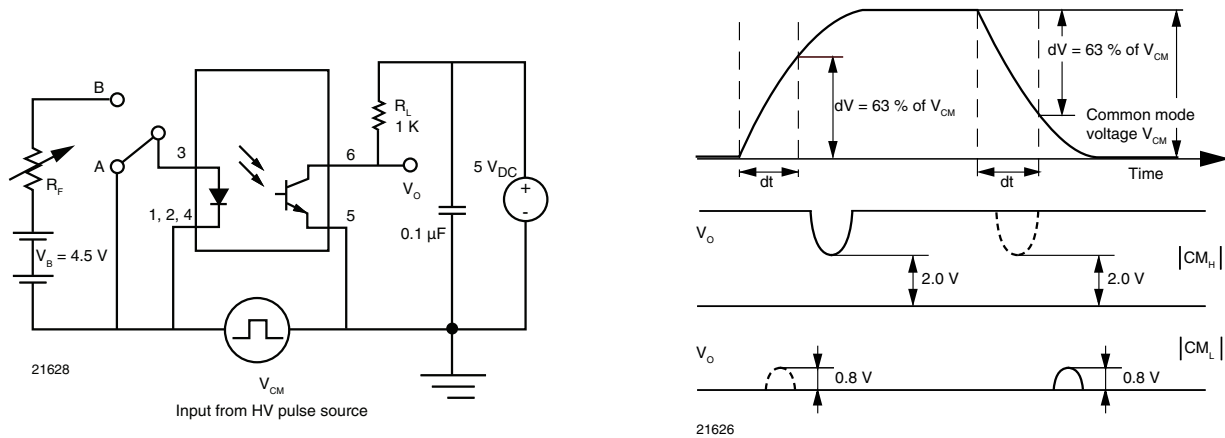


Fig. 3 - Test Circuit for Common Mode Transient Immunity

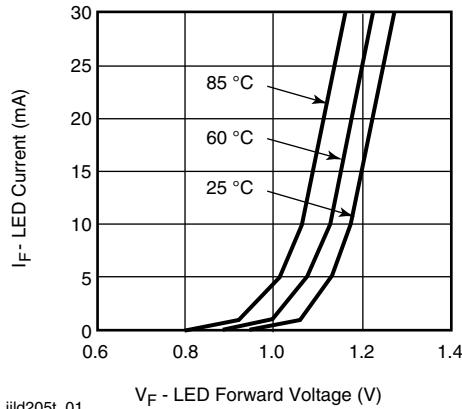
| SAFETY AND INSULATION RATINGS |                            |            |      |           |      |      |
|-------------------------------|----------------------------|------------|------|-----------|------|------|
| PARAMETER                     | TEST CONDITION             | SYMBOL     | MIN. | TYP.      | MAX. | UNIT |
| Climatic classification       | according to IEC 68 part 1 |            |      | 40/100/21 |      |      |
| Polution degree               |                            |            |      | 2         |      |      |
| Comparative tracking index    |                            | CTI        | 175  |           | 399  |      |
| Peak transient overvoltage    |                            | $V_{IOTM}$ | 6000 |           |      | V    |
| Peak insulation voltage       |                            | $V_{IORM}$ | 560  |           |      | V    |
| Resistance (input to output)  |                            | $R_{IO}$   |      | 100       |      | GΩ   |
| Apparent charge method a      |                            | $q_{pd}$   |      |           |      | C    |
| Apparent charge method b      |                            | $q_{pd}$   |      |           |      | C    |
| Safety rating - power output  |                            | $P_{SO}$   |      |           | 350  | mW   |
| Safety rating - input current |                            | $I_{SI}$   |      |           | 150  | mA   |
| Safety rating - temperature   |                            | $T_{SI}$   |      |           | 165  | °C   |
| External creepage distance    |                            |            | 4    |           |      | mm   |
| Internal creepage distance    |                            |            | 4    |           |      | mm   |
| External clearance distance   |                            |            | 4    |           |      | mm   |
| Insulation thickness          |                            |            | 0.2  |           |      | mm   |

**Note**

- As per IEC 60747-5-5, §7.4.3.8.2, this optocoupler is suitable for “safe electrical insulation” only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

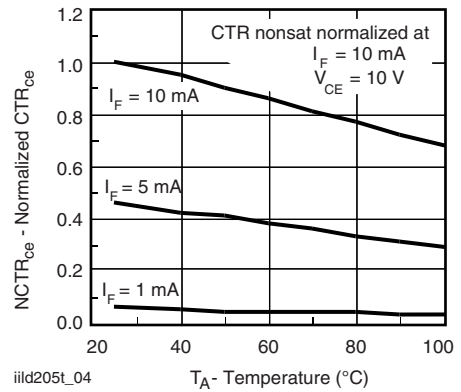


TYPICAL CHARACTERISTICS (T<sub>amb</sub> = 25 °C, unless otherwise specified)



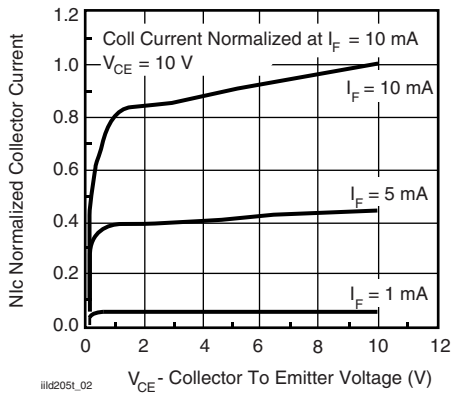
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Fig. 4 - Forward Current vs. Forward Voltage



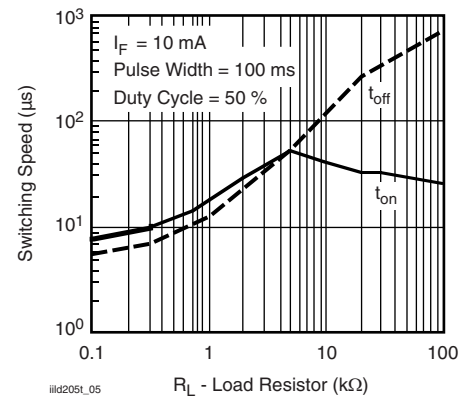
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Fig. 7 - Current Transfer Ratio (normalized) vs. Ambient Temperature



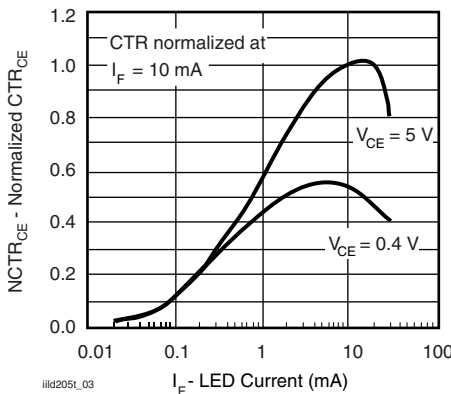
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Fig. 5 - Collector Emitter Current vs. V<sub>CE</sub>



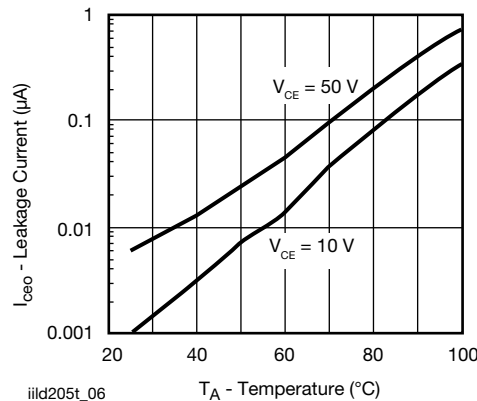
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Fig. 8 - Switching Speed vs. Load Resistor



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Fig. 6 - Normalized CTR<sub>CE</sub> vs. Forward Current

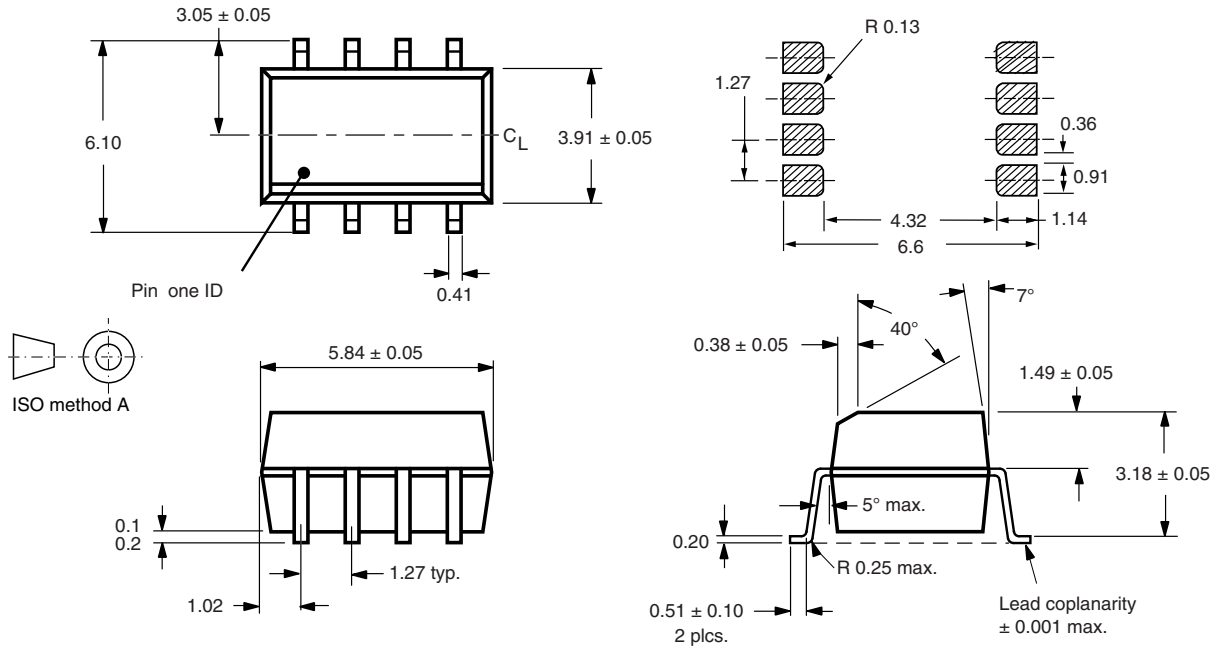


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Fig. 9 - Collector Current vs. Ambient Temperature

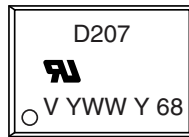


**PACKAGE DIMENSIONS** in millimeters



i178020

**PACKAGE MARKING** (example of VOD207T)



**TAPE AND REEL PACKAGING**

Dimensions in millimeters

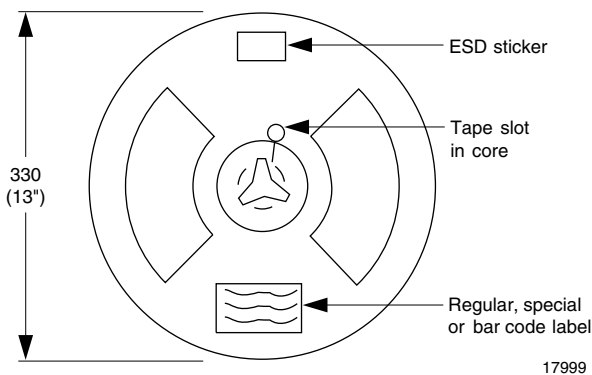


Fig. 10 - Tape and Reel Shipping Medium (EIA-481, revision A, and IEC 60286), 2000 units per reel

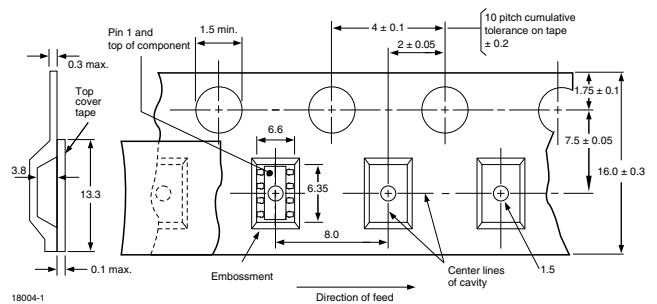


Fig. 11 - Tape Dimensions, 2000 Parts per Reel



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