

**MOC205-M**

**MOC206-M**

**MOC207-M**

**MOC208-M**

## DESCRIPTION

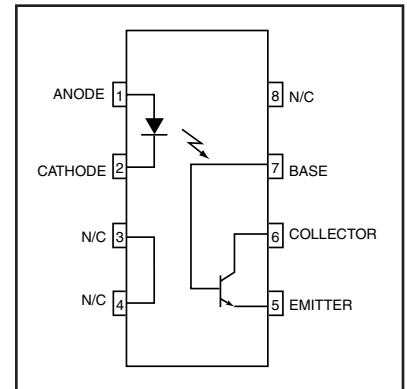
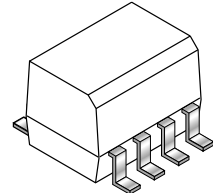
These devices consist of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector, in a surface mountable, small outline, plastic package. They are ideally suited for high density applications, and eliminate the need for through - the - board mounting.

## FEATURES

- U.L. Recognized (File #E90700, Volume 2)
- VDE Recognized (File #136616) (add option "V" for VDE approval, i.e, MOC205V-M)
- Closely Matched Current Transfer Ratios
- Convenient Plastic SOIC-8 Surface Mountable Package Style
- Minimum  $BV_{CEO}$  of 70 Volts Guaranteed
- Standard SOIC-8 Footprint, with 0.050" Lead Spacing
- Compatible with Dual Wave, Vapor Phase and IR Reflow Soldering
- High Input-Output Isolation of 2500  $V_{AC(rms)}$  Guaranteed

## APPLICATIONS

- Feedback Control Circuits
- Interfacing and coupling systems of different potentials and impedances
- General Purpose Switching Circuits
- Monitor and Detection Circuits



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| <b>ABSOLUTE MAXIMUM RATINGS (<math>T_A = 25^\circ\text{C}</math> Unless otherwise specified)</b> |                  |              |                            |
|--------------------------------------------------------------------------------------------------|------------------|--------------|----------------------------|
| <b>Rating</b>                                                                                    | <b>Symbol</b>    | <b>Value</b> | <b>Unit</b>                |
| <b>EMITTER</b>                                                                                   |                  |              |                            |
| Forward Current - Continuous                                                                     | $I_F$            | 60           | mA                         |
| Forward Current - Peak (PW = 100 $\mu\text{s}$ , 120 pps)                                        | $I_F(\text{pk})$ | 1.0          | A                          |
| Reverse Voltage                                                                                  | $V_R$            | 6.0          | V                          |
| LED Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$              | $P_D$            | 90<br>0.8    | mW<br>mW/ $^\circ\text{C}$ |
| <b>DETECTOR</b>                                                                                  |                  |              |                            |
| Collector-Emitter Voltage                                                                        | $V_{CEO}$        | 70           | V                          |
| Emitter-Collector Voltage                                                                        | $V_{ECO}$        | 7.0          | V                          |
| Collector-Base Voltage                                                                           | $V_{CBO}$        | 70           | V                          |
| Collector Current-Continuous                                                                     | $I_C$            | 150          | mA                         |
| Detector Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$         | $P_D$            | 150<br>1.76  | mW<br>mW/ $^\circ\text{C}$ |
| <b>TOTAL DEVICE</b>                                                                              |                  |              |                            |
| Input-Output Isolation Voltage (1,2,3)<br>(f = 60 Hz, t = 1 min.)                                | $V_{ISO}$        | 2500         | Vac(rms)                   |
| Total Device Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$     | $P_D$            | 250<br>2.94  | mW<br>mW/ $^\circ\text{C}$ |
| Ambient Operating Temperature Range                                                              | $T_A$            | -40 to +100  | $^\circ\text{C}$           |
| Storage Temperature Range                                                                        | $T_{stg}$        | -40 to +150  | $^\circ\text{C}$           |

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**ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$  unless otherwise specified)**

| Parameter                                  | Test Conditions                                                                                     | Symbol        | Min                   | Typ**            | Max                     | Unit          |
|--------------------------------------------|-----------------------------------------------------------------------------------------------------|---------------|-----------------------|------------------|-------------------------|---------------|
| <b>EMITTER</b>                             |                                                                                                     |               |                       |                  |                         |               |
| Input Forward Voltage                      | ( $I_F = 10\text{ mA}$ )                                                                            | $V_F$         | —                     | 1.15             | 1.5                     | V             |
| Reverse Leakage Current                    | ( $V_R = 6.0\text{ V}$ )                                                                            | $I_R$         | —                     | 0.001            | 100                     | $\mu\text{A}$ |
| Input Capacitance                          |                                                                                                     | $C_{IN}$      | —                     | 18               | —                       | pF            |
| <b>DETECTOR</b>                            |                                                                                                     |               |                       |                  |                         |               |
| Collector-Emitter Dark Current             | (V <sub>CE</sub> = 10 V, T <sub>A</sub> = 25°C)<br>(V <sub>CE</sub> = 10 V, T <sub>A</sub> = 100°C) | $I_{CEO1}$    | —                     | 1.0              | 50                      | nA            |
|                                            |                                                                                                     | $I_{CEO2}$    | —                     | 1.0              | —                       | $\mu\text{A}$ |
| Collector-Emitter Breakdown Voltage        | ( $I_C = 100\text{ }\mu\text{A}$ )                                                                  | $BV_{CEO}$    | 70                    | 100              | —                       | V             |
| Emitter-Collector Breakdown Voltage        | ( $I_E = 100\text{ }\mu\text{A}$ )                                                                  | $BV_{ECO}$    | 7.0                   | 10               | —                       | V             |
| Collector-Emitter Capacitance              | (f = 1.0 MHz, V <sub>CE</sub> = 0)                                                                  | $C_{CE}$      | —                     | 7.0              | —                       | pF            |
| <b>COUPLED</b>                             |                                                                                                     |               |                       |                  |                         |               |
| Collector-Output Current <sup>(4)</sup>    | MOC205-M<br>MOC206-M<br>MOC207-M<br>MOC208-M<br>( $I_F = 10\text{ mA}$ , V <sub>CE</sub> = 10 V)    | CTR           | 40<br>63<br>100<br>40 | —<br>—<br>—<br>— | 80<br>125<br>200<br>125 | %             |
| Isolation Surge Voltage <sup>(1,2,3)</sup> | (f = 60 Hz AC Peak, t = 1 min.)                                                                     | $V_{ISO}$     | 2500                  | —                | —                       | Vac(rms)      |
| Isolation Resistance <sup>(2)</sup>        | (V = 500 V)                                                                                         | $R_{ISO}$     | $10^{11}$             | —                | —                       | $\Omega$      |
| Collector-Emitter Saturation Voltage       | ( $I_C = 2\text{ mA}$ , $I_F = 10\text{ mA}$ )                                                      | $V_{CE(sat)}$ | —                     | —                | 0.4                     | V             |
| Isolation Capacitance <sup>(2)</sup>       | (V = 0 V, f = 1 MHz)                                                                                | $C_{ISO}$     | —                     | 0.2              | —                       | pF            |
| Turn-On Time                               | ( $I_C = 2.0\text{ mA}$ , V <sub>CC</sub> = 10 V,<br>R <sub>L</sub> = 100 $\Omega$ ) (Fig. 6)       | $t_{on}$      | —                     | 7.5              | —                       | $\mu\text{s}$ |
| Turn-Off Time                              | ( $I_C = 2.0\text{ mA}$ , V <sub>CC</sub> = 10 V,<br>R <sub>L</sub> = 100 $\Omega$ ) (Fig. 6)       | $t_{off}$     | —                     | 5.7              | —                       | $\mu\text{s}$ |
| Rise Time                                  | ( $I_C = 2.0\text{ mA}$ , V <sub>CC</sub> = 10 V,<br>R <sub>L</sub> = 100 $\Omega$ ) (Fig. 6)       | $t_r$         | —                     | 3.2              | —                       | $\mu\text{s}$ |
| Fall Time                                  | ( $I_C = 2.0\text{ mA}$ , V <sub>CC</sub> = 10 V,<br>R <sub>L</sub> = 100 $\Omega$ ) (Fig. 6)       | $t_f$         | —                     | 4.7              | —                       | $\mu\text{s}$ |

\*\* Typical values at  $T_A = 25^\circ\text{C}$

1. Isolation Surge Voltage,  $V_{ISO}$ , is an internal device dielectric breakdown rating.
2. For this test, Pins 1 and 2 are common and Pins 5, 6 and 7 are common.
3.  $V_{ISO}$  rating of 2500 V<sub>AC(rms)</sub> for t = 1 min. is equivalent to a rating of 3,000 V<sub>AC(rms)</sub> for t = 1 sec.
4. Current Transfer Ratio (CTR) =  $I_C/I_F \times 100\%$ .

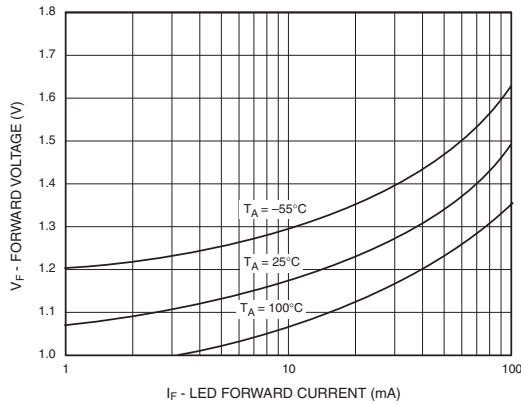
**MOC205-M**

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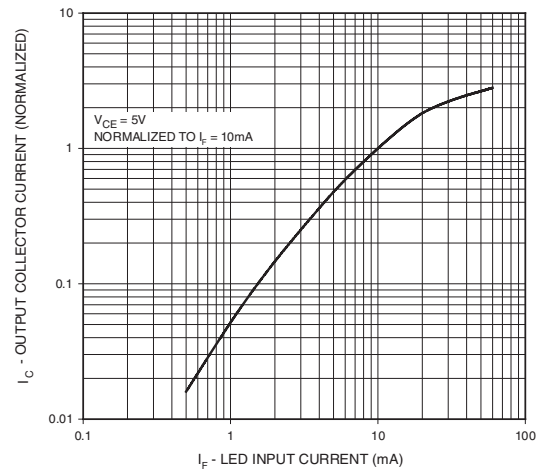
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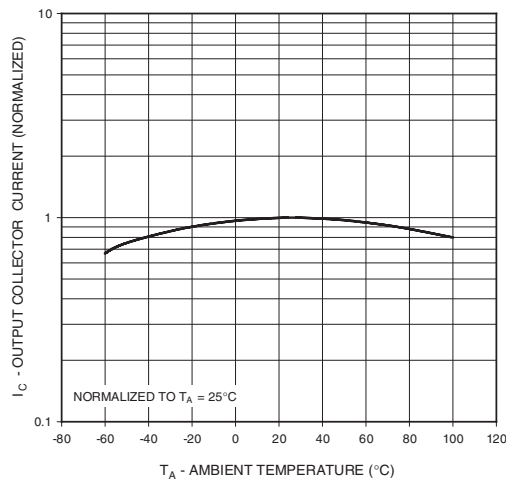
**Fig. 1 LED Forward Voltage vs. Forward Current**



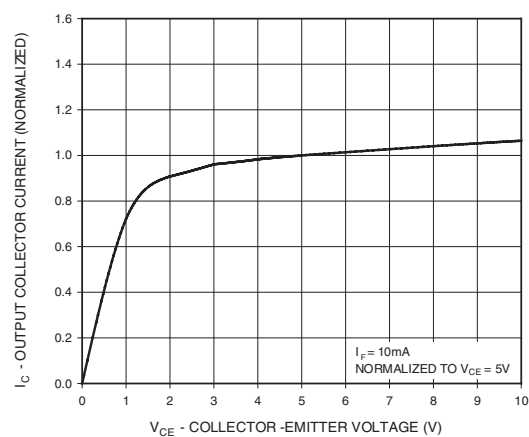
**Fig. 2 Output Current vs. Input Current**



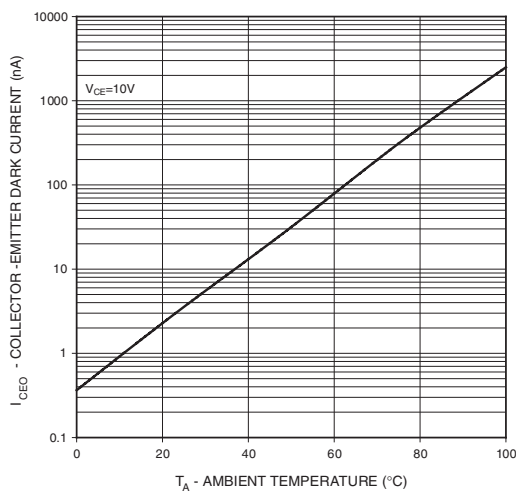
**Fig. 3 Output Current vs. Ambient Temperature**



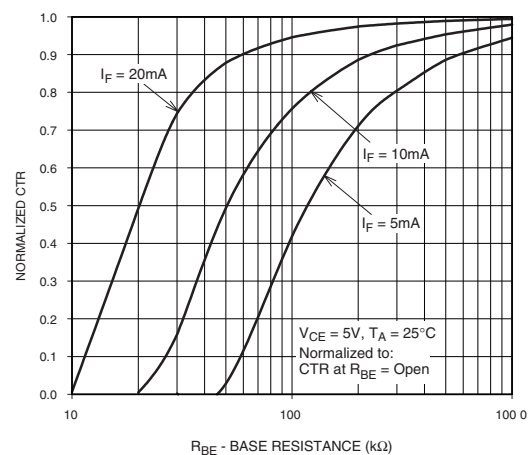
**Fig. 4 Output Current vs. Collector - Emitter Voltage**



**Fig. 5 Dark Current vs. Ambient Temperature**



**Fig. 6 CTR vs. R<sub>BE</sub> (Unsaturated)**



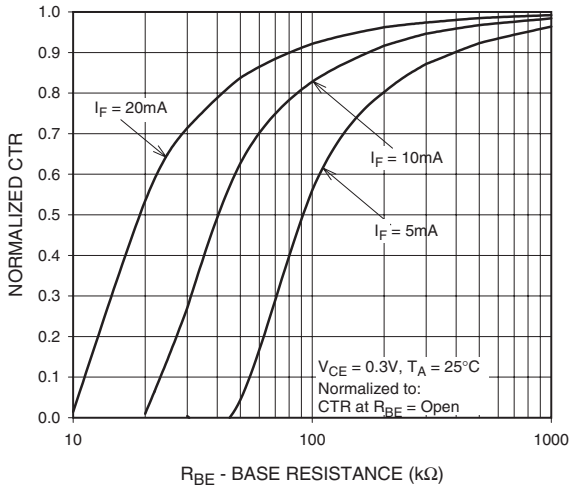
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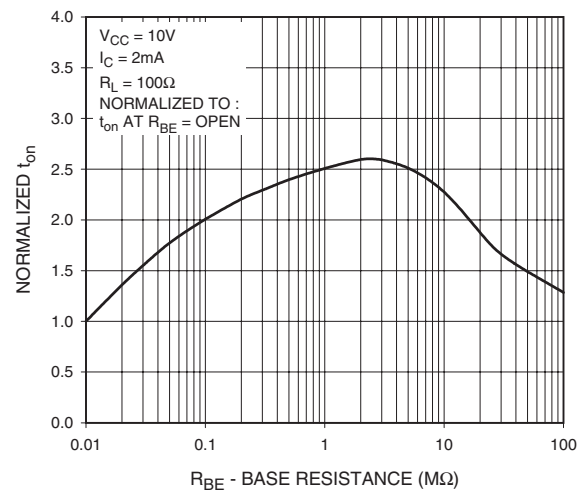
**MOC207-M**

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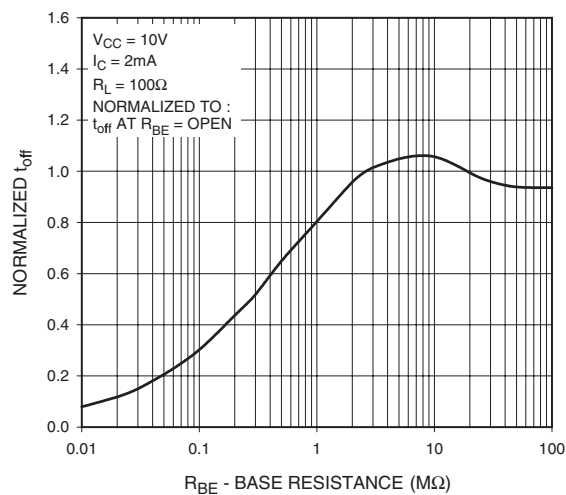
**Fig. 7 CTR vs.  $R_{BE}$  (Saturated)**



**Fig. 8 Normalized  $t_{on}$  vs.  $R_{BE}$**



**Fig. 9 Normalized  $t_{off}$  vs.  $R_{BE}$**

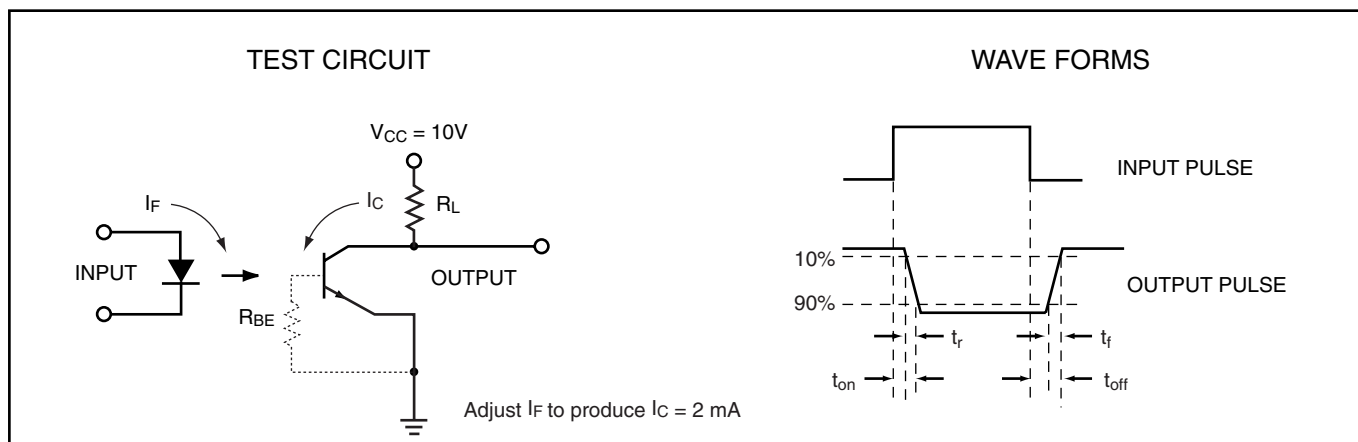


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**Figure 6. Switching Time Test Circuit and Waveforms**

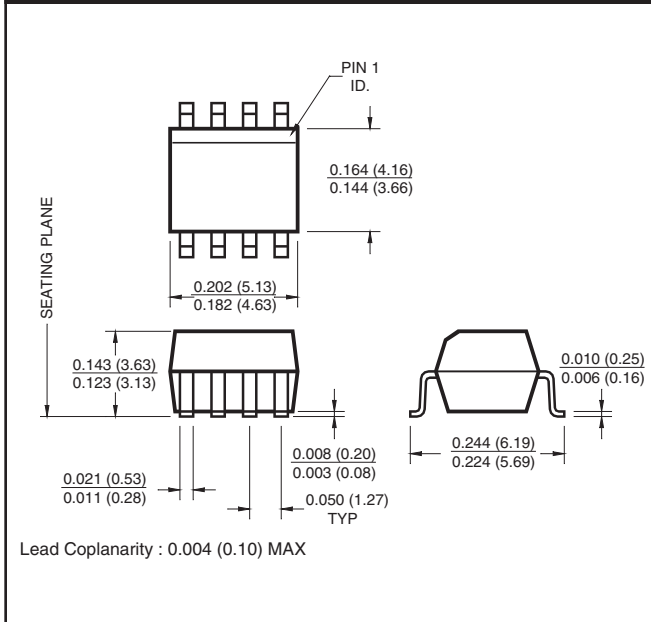
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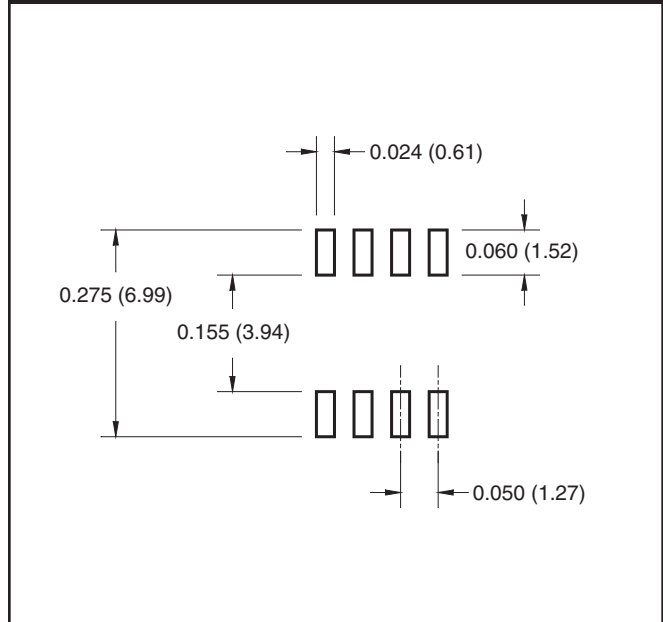
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**Package Dimensions (Surface Mount)**



**8-Pin Small Outline**



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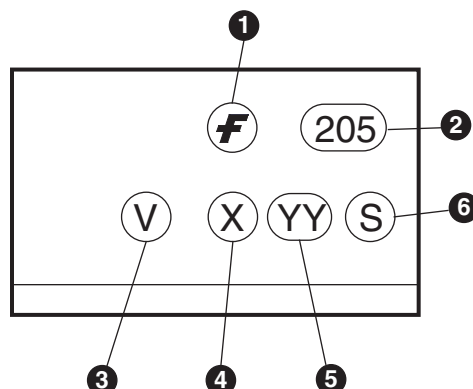
**MOC207-M**

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## ORDERING INFORMATION

| Option | Order Entry Identifier | Description                                   |
|--------|------------------------|-----------------------------------------------|
| V      | V                      | VDE 0884                                      |
| R1     | R1                     | Tape and reel (500 units per reel)            |
| R1V    | R1V                    | VDE 0884, Tape and reel (500 units per reel)  |
| R2     | R2                     | Tape and reel (2500 units per reel)           |
| R2V    | R2V                    | VDE 0884, Tape and reel (2500 units per reel) |

## MARKING INFORMATION



| Definitions |                                                                                        |
|-------------|----------------------------------------------------------------------------------------|
| 1           | Fairchild logo                                                                         |
| 2           | Device number                                                                          |
| 3           | VDE mark (Note: Only appears on parts ordered with VDE option – See order entry table) |
| 4           | One digit year code, e.g., '3'                                                         |
| 5           | Two digit work week ranging from '01' to '53'                                          |
| 6           | Assembly package code                                                                  |

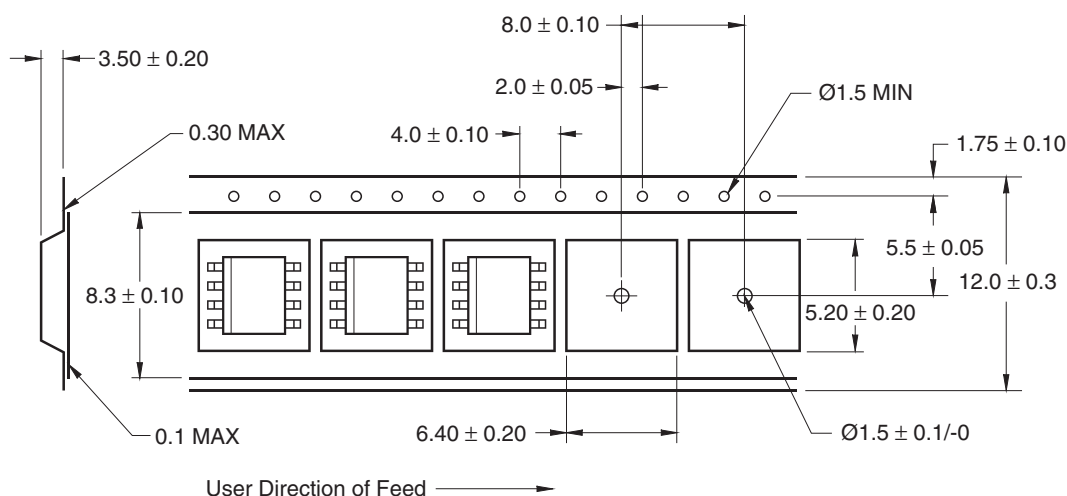
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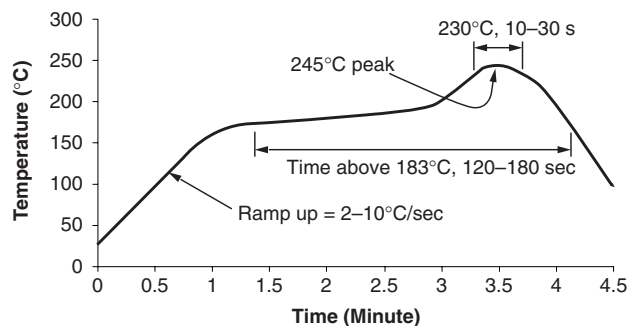
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**Carrier Tape Specifications**



**Reflow Profile**



- Peak reflow temperature: 245°C (package surface temperature)
- Time of temperature higher than 183°C for 120-180 seconds
- One time soldering reflow is recommended

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