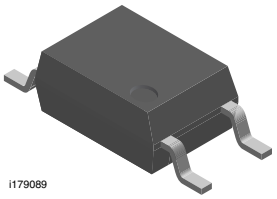
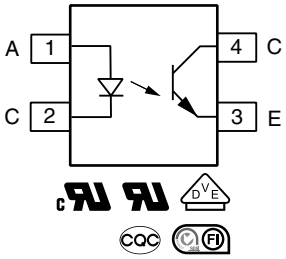
# Low Input Current, Phototransistor Output, SOP-4, Mini-Flat Package




## FEATURES

- Operating temperature from -55 °C to +110 °C
- SOP-4 mini-flat package
- Isolation test voltage, 3750 $V_{RMS}$
- Low saturation voltage
- Fast switching times
- Low coupling capacitance
- End-stackable, 0.100" (2.54 mm) spacing
- CTR range 50 % to 600 %, $I_F$ = 5 mA
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

e3

RoHS COMPLIANT

HALOGEN FREE GREEN (5-2008)

## LINKS TO ADDITIONAL RESOURCES

3D Models | Design Tools | Related Documents

## DESCRIPTION

The 110 °C rated VOM617A has a GaAs infrared emitting diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a 4 pin 100 mil lead pitch miniflat package. It features a high current transfer ratio, low coupling capacitance, and high isolation voltage.

These coupling devices are designed for signal transmission between two electrically separated circuits.

## APPLICATIONS

- PLCs
- Telecommunication
- Lighting control system
- Solar inverters
- AC drives

## AGENCY APPROVALS

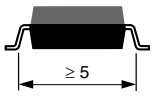
(All parts are certified under base model VOM617A)

- UL1577
- cUL
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- CQC
- FIMKO

## ORDERING INFORMATION

| V | O | M | 6 | 1 | 7 | A | - | # | X | 0 | 0 | 1 | T | # |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PART NUMBER | | | | | | | | CTR BIN | VDE OPTION | | | | TAPE AND REEL | |

SOP-4




| AGENCY CERTIFIED/ PACKAGE | CTR (%) 5 mA | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **UL, cUL, FIMKO, CQC** | **50 to 600** | **63 to 125** | **100 to 200** | **160 to 320** | **250 to 500** | **80 to 160** | **130 to 260** | **200 to 400** |
| SOP-4, mini-flat | VOM617AT | VOM617A-2T | VOM617A-3T | VOM617A-4T | VOM617A-6T | VOM617A-7T | VOM617A-8T | VOM617A-9T |
| **VDE, UL, cUL, FIMKO, CQC (option 1)** | **50 to 600** | **63 to 125** | **100 to 200** | **160 to 320** | **250 to 500** | **80 to 160** | **130 to 260** | **200 to 400** |
| SOP-4, mini-flat | VOM617A-X001T | VOM617A-2X001T | VOM617A-3X001T | VOM617A-4X001T | VOM617A-6X001T | VOM617A-7X001T | VOM617A-8X001T, VOM617A-8X001T2 (1) | VOM617A-9X001T |

**Notes**

- Available only on tape and reel

(1) Product is rotated 180° in tape and reel cavity



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| **ABSOLUTE MAXIMUM RATINGS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| **INPUT** | | | | |
| DC forward current | | $I_F$ | 60 | mA |
| Reverse voltage | | $V_R$ | 6 | V |
| Power dissipation | | $P_{diss}$ | 70 | mW |
| Surge forward current | $t_p \leq 10$ µs | $I_{FSM}$ | 2.5 | A |
| **OUTPUT** | | | | |
| Collector emitter voltage | | $V_{CEO}$ | 80 | V |
| Emitter collector voltage | | $V_{ECO}$ | 7 | V |
| Collector current | | $I_C$ | 50 | mA |
| | $t_p \leq 1$ ms | | 100 | mA |
| Power dissipation | | $P_{diss}$ | 150 | mW |
| **COUPLER** | | | | |
| | | | | |
| Total power dissipation | | $P_{tot}$ | 170 | mW |
| Operating temperature range | | $T_{amb}$ | -55 to +110 | °C |
| Storage temperature range | | $T_{stg}$ | -55 to +150 | °C |
| Junction temperature | | $T_j$ | 125 | °C |
| Soldering temperature [1] | | $T_{sld}$ | 260 | °C |

**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

(2) See “Assembly Instructions” for surface mounted devices (www.vishay.com/doc?80054)

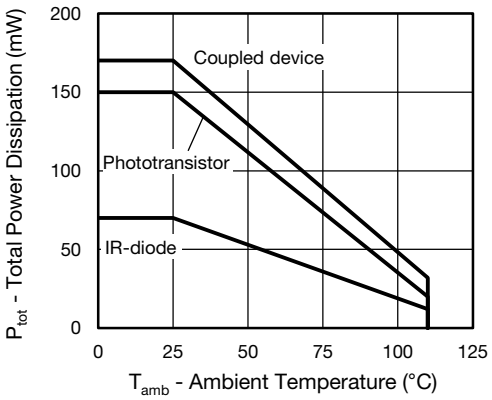



Fig. 1 - Total Power Dissipation vs. Ambient Temperature


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| **ELECTRICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **INPUT** | | | | | | |
| Forward voltage | $I_F$ = 5 mA | $V_F$ | - | 1.1 | 1.6 | V |
| Reverse current | $V_R$ = 6 V | $I_R$ | - | 0.01 | 10 | µA |
| Capacitance | $V_R$ = 0 V, f = 1 MHz | $C_j$ | - | 9 | - | pF |
| **OUTPUT** | | | | | | |
| Collector emitter leakage current | $V_{CE}$ = 20 V | $I_{CEO}$ | - | 0.3 | 100 | nA |
| Collector emitter breakdown voltage | $I_C$ = 100 µA | $BV_{CEO}$ | 80 | - | - | V |
| Emitter collector breakdown voltage | $I_E$ = 10 µA | $BV_{ECO}$ | 7 | - | - | V |
| Collector emitter capacitance | $V_{CE}$ = 5 V, f = 1 MHz | $C_{CE}$ | - | 2.8 | - | pF |
| **COUPLER** | | | | | | |
| Coupling capacitance | f = 1 MHz | $C_{IO}$ | - | 0.3 | - | pF |
| Collector emitter saturation voltage | $I_F$ = 10 mA, $I_C$ = 2.5 mA | $V_{CEsat}$ | - | 0.12 | 0.4 | V |
| Cut-off frequency | $I_F$ = 10 mA, $V_{CC}$ = 5 V, $R_L$ = 100 Ω | $f_{ctr}$ | - | 110 | - | kHz |

**Note**

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

| **CURRENT TRANSFER RATIO** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **PART** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| $I_C/I_F$ | $I_F$ = 5 mA, $V_{CE}$ = 5 V | VOM617A | CTR | 50 | - | 600 | % |
| | | VOM617A-2 | CTR | 63 | - | 125 | % |
| | | VOM617A-3 | CTR | 100 | - | 200 | % |
| | | VOM617A-4 | CTR | 160 | - | 320 | % |
| | | VOM617A-6 | CTR | 250 | - | 500 | % |
| | | VOM617A-7 | CTR | 80 | - | 160 | % |
| | | VOM617A-8 | CTR | 130 | - | 260 | % |
| | | VOM617A-9 | CTR | 200 | - | 400 | % |

| **SWITCHING CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified) | | | | | | |
|---|---|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **MIN.** | **TYP.** | **MAX.** | **UNIT** |
| **NON-SATURATED** | | | | | | |
| Rise and fall time | $I_C$ = 2 mA, $V_{CC}$ = 5 V, $R_L$ = 100 Ω | $t_r$ | - | 3 | - | µs |
| Fall time | | $t_f$ | - | 3 | - | µs |
| Turn-on time | | $t_{on}$ | - | 6 | - | µs |
| Turn-off time | | $t_{off}$ | - | 4 | - | µs |
| **SATURATED** | | | | | | |
| Rise and fall time | $I_F$ = 1.6 mA, $V_{CC}$ = 5 V, $R_L$ = 1.9 kΩ | $t_r$ | - | 7 | - | µs |
| Fall time | | $t_f$ | - | 12 | - | µs |
| Turn-on time | | $t_{on}$ | - | 9 | - | µs |
| Turn-off time | | $t_{off}$ | - | 15 | - | µs |


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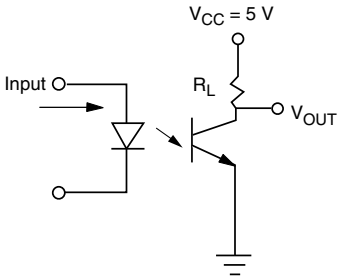



Fig. 2 - Test Circuit

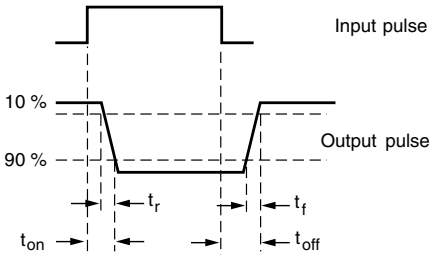



Fig. 3 - Test Circuit and Waveforms

| SAFETY AND INSULATION RATINGS | | | | |
|---|---|---|---|---|
| **PARAMETER** | **TEST CONDITION** | **SYMBOL** | **VALUE** | **UNIT** |
| Climatic classification | According to IEC 68 part 1 | | 55 / 110 / 21 | |
| Pollution degree | According to DIN VDE 0109 | | 2 | |
| Comparative tracking index | | CTI | 175 | |
| Maximum rated withstanding isolation voltage | According to UL1577, t = 1 min | $V_{ISO}$ | 3750 | $V_{RMS}$ |
| Maximum transient isolation voltage | According to DIN EN 60747-5-5 | $V_{IOTM}$ | 6000 | $V_{peak}$ |
| Maximum repetitive peak isolation voltage | According to DIN EN 60747-5-5 | $V_{IORM}$ | 565 | $V_{peak}$ |
| Isolation resistance | $V_{IO}$ = 500 V, $T_{amb}$ = 25 °C | $R_{IO}$ | $\geq 10^{12}$ | Ω |
| | $V_{IO}$ = 500 V, $T_{amb}$ = 100 °C | $R_{IO}$ | $\geq 10^{11}$ | Ω |
| Output safety power | | $P_{SO}$ | 300 | mW |
| Input safety current | | $I_{SI}$ | 200 | mA |
| Input safety temperature | | $T_S$ | 175 | °C |
| Creepage distance | | | ≥ 5 | mm |
| Clearance distance | | | ≥ 5 | mm |
| Insulation thickness | | DTI | ≥ 0.4 | mm |

**Note**

- As per DIN EN 60747-5-5 (VDE 0884), § 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


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**TYPICAL CHARACTERISTICS** ($T_{amb}$ = 25 °C, unless otherwise specified)

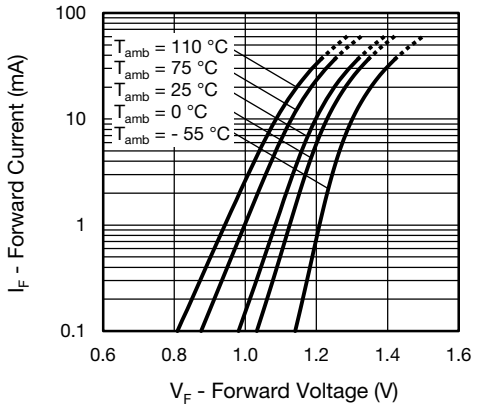



Fig. 4 - Forward Voltage vs. Forward Current

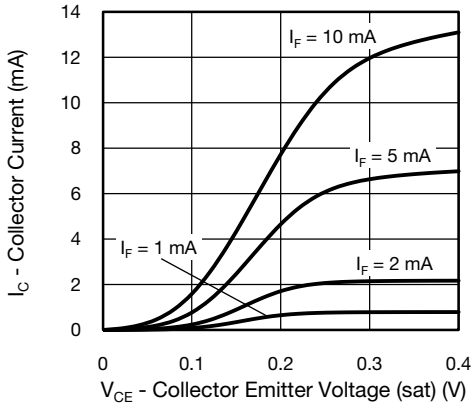



Fig. 7 - Collector Current vs. Collector Emitter Voltage (saturated)

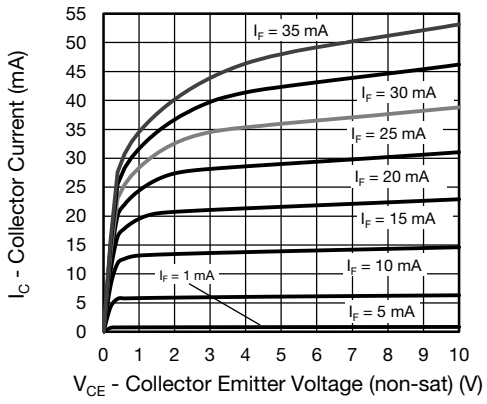



Fig. 5 - Collector Current vs. Collector Emitter Voltage (non-saturated)

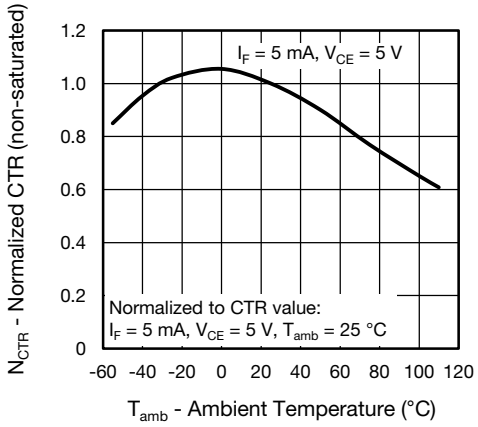



Fig. 8 - Normalized Current Transfer Ratio (non-saturated) vs. Ambient Temperature

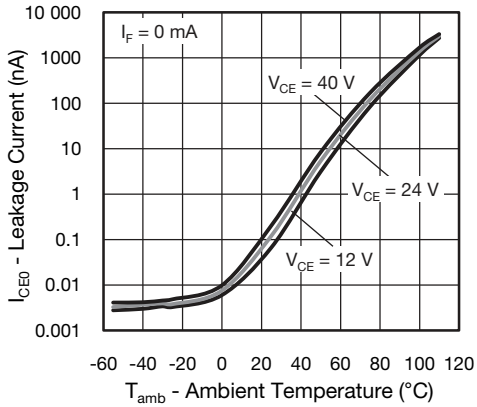



Fig. 6 - Leakage Current vs. Ambient Temperature

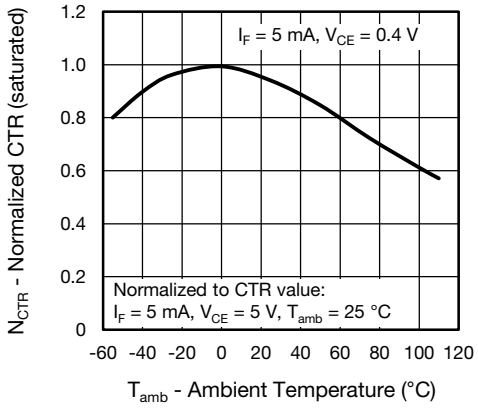



Fig. 9 - Normalized Current Transfer Ratio (saturated) vs. Ambient Temperature


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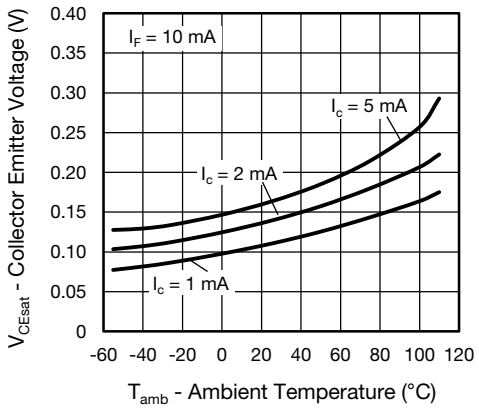



Fig. 10 - Collector Emitter Voltage vs. Ambient Temperature (saturated)

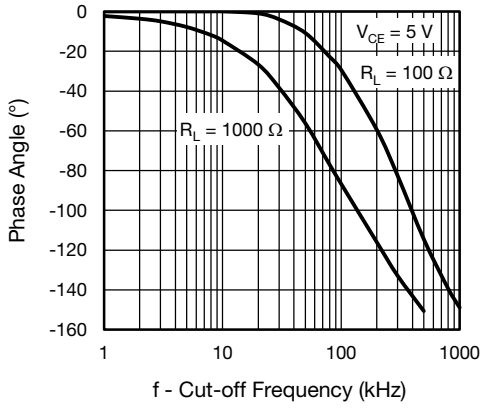



Fig. 13 - $F_{CTR}$ vs. Phase Angle

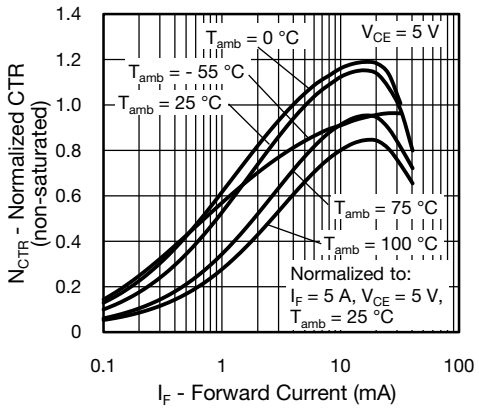



Fig. 11 - Normalized CTR (non-saturated) vs. Forward Current

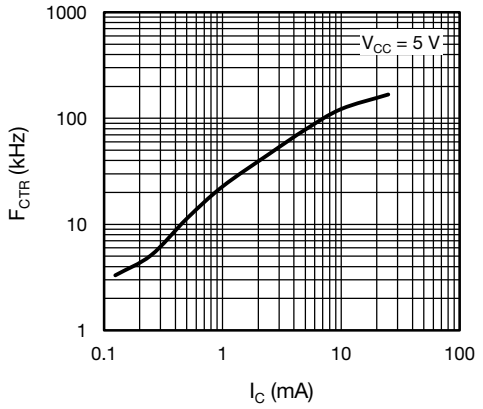



Fig. 14 - $F_{CTR}$ vs. Collector Current

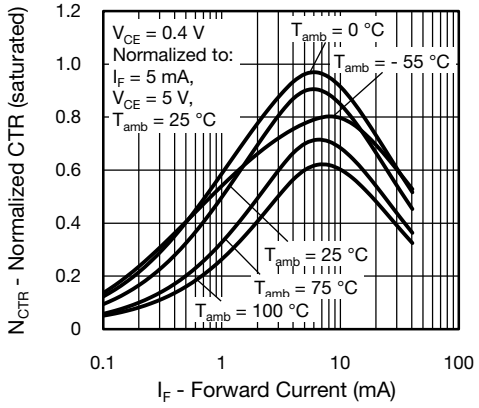



Fig. 12 - Normalized CTR (saturated) vs. Forward Current

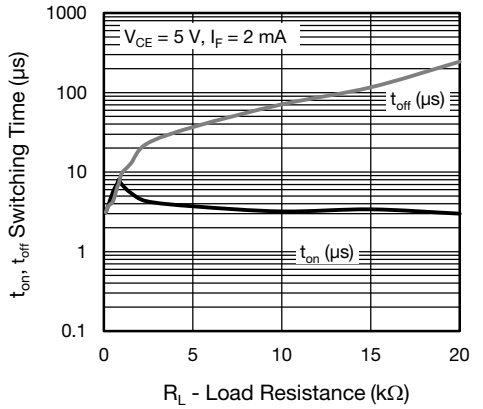
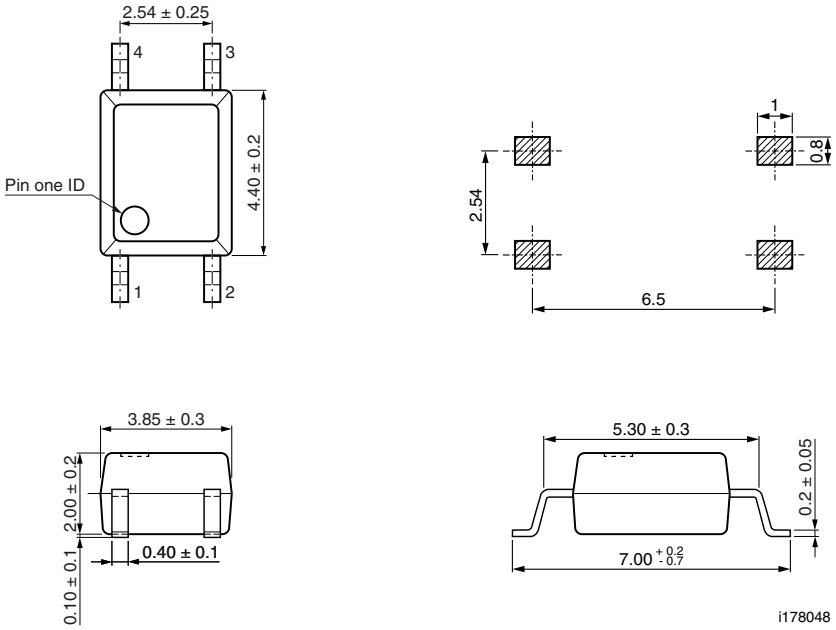


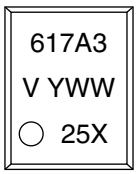

Fig. 15 - Switching Time vs. Load Resistance


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## PACKAGE DIMENSIONS in millimeters




## PACKAGE MARKING (example of VOM617A-3X001T)




**Notes**

- Only option 1 is reflected in the package marking with the characters “X”
- Tape and reel suffix (T) is not part of the package marking

## TAPE AND REEL DIMENSIONS in millimeters

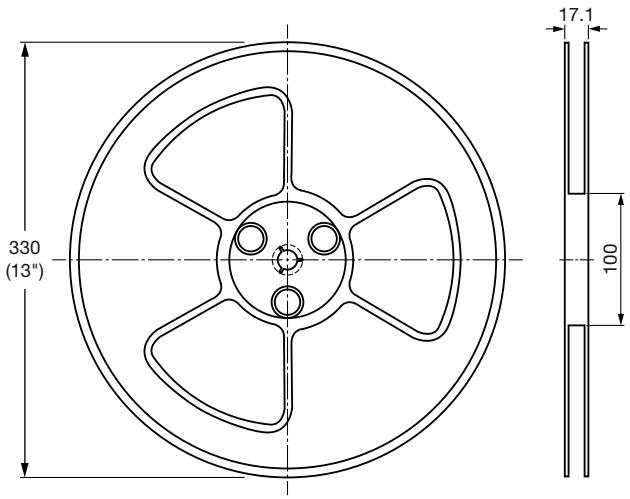



Fig. 16 - Reel Dimensions (3000 units per reel)


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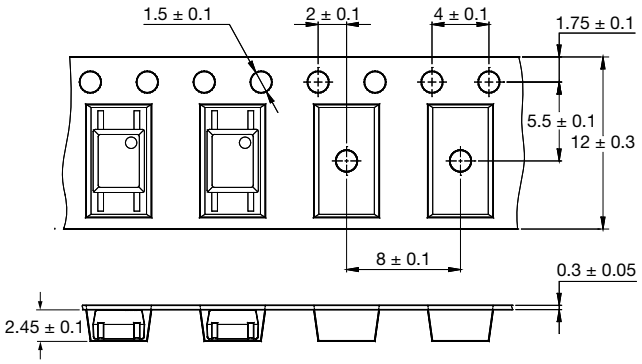



Fig. 17 - Tape Dimensions

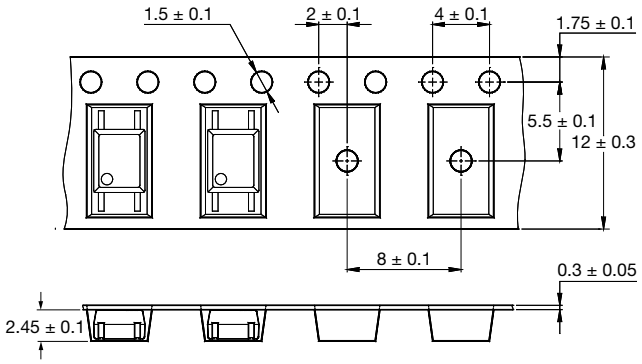



Fig. 18 - Tape Dimensions for 180° Rotation (T2)

## SOLDER PROFILE

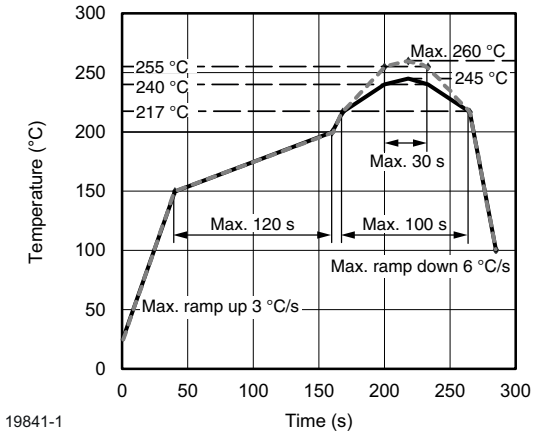



Fig. 19 - Lead (Pb)-free Reflow Solder Profile
According to J-STD-020

## HANDLING AND STORAGE CONDITIONS

ESD level: HBM class 2

Floor life: unlimited

Conditions: $T_{amb}$ < 30 °C, RH < 85 %

Moisture sensitivity level 1, according to J-STD-020


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