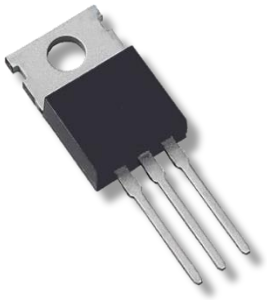


# CEP06N7

## 700V ▲ 1.65Ω ▲ 6A ▲ Si MOSFET

**SILICON Si MOSFET ▲** THT type
N-channel enhancement mode
UL94V-0 rated flame retardant epoxy
TO220-3L package
Super high dense cell density for extremely low $R_{DS(ON)}$
**High power and current handling capability**

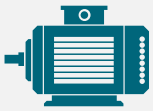
## MAXIMUM RATINGS

| Parameter ($T_C$ = 25°C, unless otherwise noted) | | Characteristics |
|---|---|---|
| Drain-Source Voltage | $V_{DS}$ | 700V |
| Gate-Source Voltage | $V_{GS}$ | ±30V |
| Continuous Drain Current at $T_C$ = 25°C | $I_D$ | 6A |
| Continuous Drain Current at $T_C$ = 100°C | $I_D$ | 4A |
| Pulsed Drain Current Note 1 | $I_{DM}$ Note 4 | 24A |
| Maximum Power Dissipation at $T_C$ = 25°C | $P_D$ | 150W |
| Power Dissipation Derating above 25°C | $\Delta P_D$ | 1W/°C |
| Single Pulsed Avalanche Energy Note 5 | $E_{AS}$ | 125mJ |
| Single Pulsed Avalanche Current Note 5 | $I_{AS}$ | 5A |
| Operating and Storage Temperature Range | $T_J$, $T_{STG}$ | -55°C to +175°C |

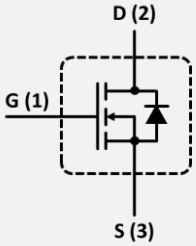
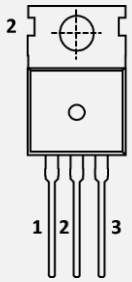
## THERMAL CHARACTERISTICS

| Parameter | Symbol | Limit |
|---|---|---|
| Thermal Resistance, Junction-to-Case | $R_{TH\_JC}$ | 1°C/W |
| Thermal Resistance, Junction-to-Ambient | $R_{TH\_JA}$ | 62.5°C/W |

## APPLICATIONS

| EV Charging | Industrial Inverters | Motors & Drives | Power Factor Correction | Renewable Energy | SMPS | UPS |
|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |

## PIN DESCRIPTION

| Circuit Diagram | Outline ▪ Front View | Pin No. | Description |
|---|---|---|---|
|  |  | 1<br>2<br>3 | Gate<br>Drain<br>Source |

## ELECTRICAL CHARACTERISTICS ▲ $T_C$ = 25°C, unless otherwise noted

| Item | Condition | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **Off Characteristics** | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS}$ = 0V, $I_D$ = 250µA | $BV_{DSS}$ | 700 | | | V |
| Zero Gate Voltage Drain Current | $V_{DS}$ = 700V, $V_{GS}$ = 0V | $I_{DSS}$ | | | 1 | µA |
| Gate Body Leakage Current, Forward | $V_{GS}$ = 30V, $V_{DS}$ = 0V | $I_{GSSF}$ | | | 100 | nA |
| Gate Body Leakage Current, Reverse | $V_{GS}$ = -30V, $V_{DS}$ = 0V | $I_{GSSR}$ | | | -100 | nA |
| **On Characteristics** Note 2 | | | | | | |
| Gate Threshold Voltage | $V_{GS}$ = $V_{DS}$, $I_D$ = 250µA | $V_{GS(th)}$ | 2 | | 4 | V |
| Static Drain-Source On-Resistance | $V_{GS}$ = 10V, $I_D$ = 3A | $R_{DS(ON)}$ | | 1.65 | 2 | Ω |
| Gate Input Resistance | f = 1MHz, Open Drain | $R_G$ | | 2 | | Ω |
| **Dynamic Characteristics** Note 3 | | | | | | |
| Input Capacitance | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1MHz | $C_{ISS}$ | | 1130 | | pF |
| Output Capacitance | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1MHz | $C_{OSS}$ | | 115 | | pF |
| Reverse Transfer Capacitance | $V_{DS}$ = 25V, $V_{GS}$ = 0V, f = 1MHz | $C_{RSS}$ | | 20 | | pF |
| **Switching Characteristics** Note 3 | | | | | | |
| Turn-On Delay Time | $V_{DD}$ = 560V, $V_{GS}$ = 10V, $I_D$ = 5A, $R_{G(ext)}$ = 25Ω | $t_{D(ON)}$ | | 30 | | ns |
| Turn-On Rise Time | $V_{DD}$ = 560V, $V_{GS}$ = 10V, $I_D$ = 5A, $R_{G(ext)}$ = 25Ω | $t_R$ | | 41 | | ns |
| Turn-Off Delay Time | $V_{DD}$ = 560V, $V_{GS}$ = 10V, $I_D$ = 5A, $R_{G(ext)}$ = 25Ω | $t_{D(OFF)}$ | | 77 | | ns |
| Turn-Off Fall Time | $V_{DD}$ = 560V, $V_{GS}$ = 10V, $I_D$ = 5A, $R_{G(ext)}$ = 25Ω | $t_F$ | | 42 | | ns |
| Total Gate Charge | $V_{DS}$ = 560V, $V_{GS}$ = 10V, $I_D$ = 5A | $Q_G$ | | 23 | | nC |
| Gate Source Charge | $V_{DS}$ = 560V, $V_{GS}$ = 10V, $I_D$ = 5A | $Q_{GS}$ | | 5 | | nC |
| Gate Drain Charge | $V_{DS}$ = 560V, $V_{GS}$ = 10V, $I_D$ = 5A | $Q_{GD}$ | | 8 | | nC |
| **Drain-Source Diode Characteristics and Maximum Ratings** | | | | | | |
| Drain-Source Diode Forward Current | | $I_S$ | | | 6 | A |
| Drain-Source Diode Forward Voltage Note 2 | $V_{GS}$ = 0V, $I_S$ = 6A | $V_{SD}$ | | | 1.5 | V |

**Notes**

**1: Repetitive Rating: Pulse width limited by maximum junction temperature**

**2: Pulse Test: Pulse Width ≤ 300µs, Duty Cycle ≤ 2%.**

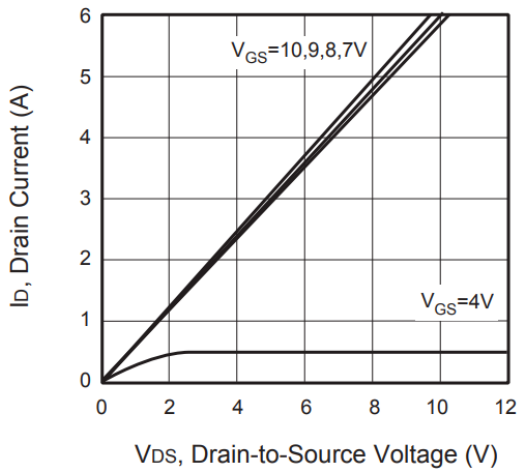
**3: Guaranteed by design, not subject to production testing.**

**4: Pulse width limited by safe operating area.**

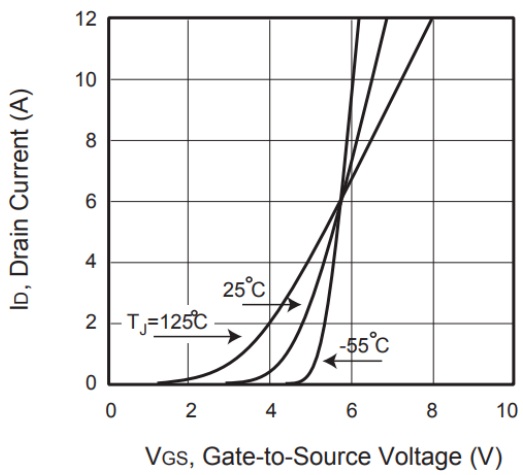
**5: L = 6mH, $I_{AS}$ = 3.6A, $V_{DD}$ = 50V, $R_G$ = 25Ω, Starting $T_J$ = 25°C.**

## REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

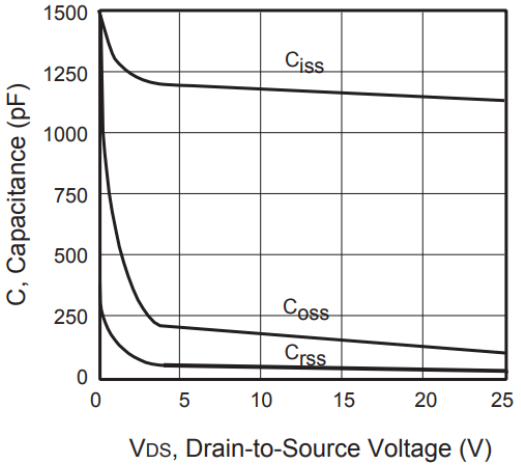
### Fig. 1 ▪ Output Characteristics



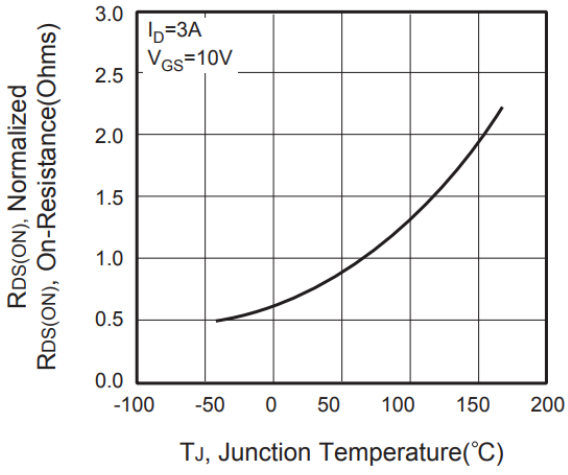

### Fig. 2 ▪ Transfer Characteristics



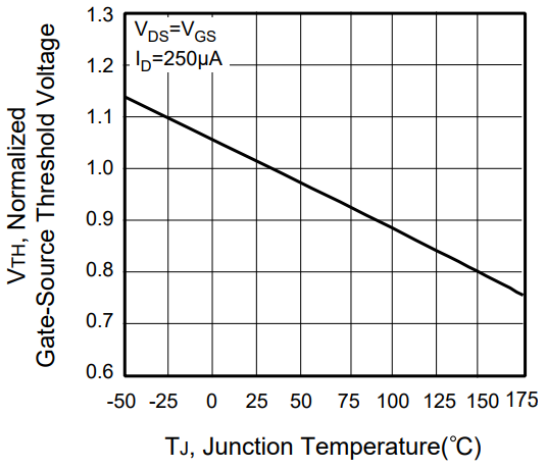

### Fig. 3 ▪ Capacitance



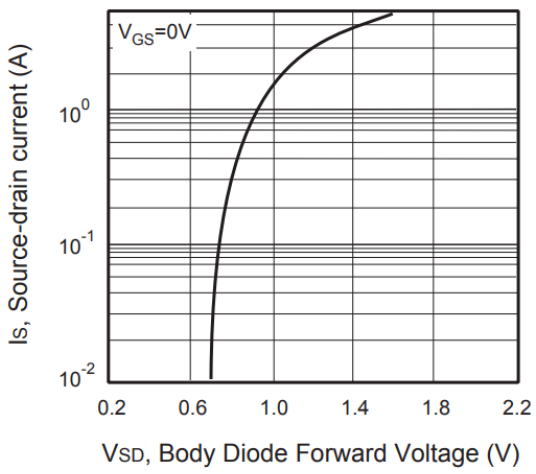

### Fig. 4 ▪ On-Resistance Variation with Temperature




### Fig. 5 ▪ Gate Threshold Variation with Temperature

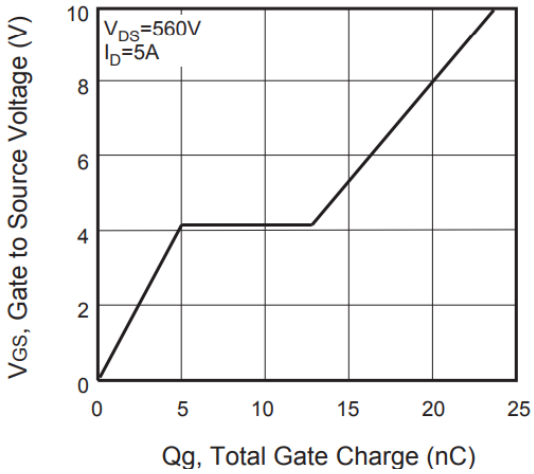



### Fig. 6 ▪ Body Diode Forward Voltage Variation with Source Current

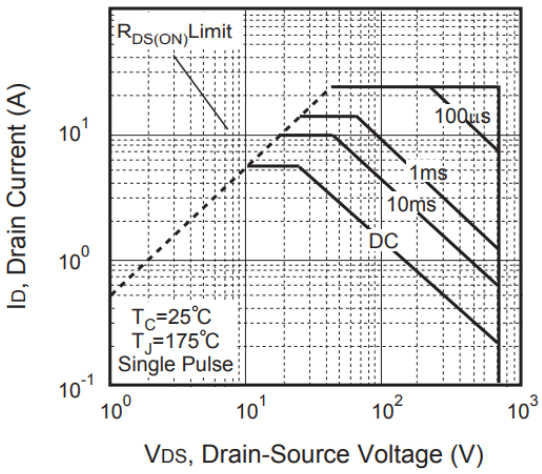


## REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

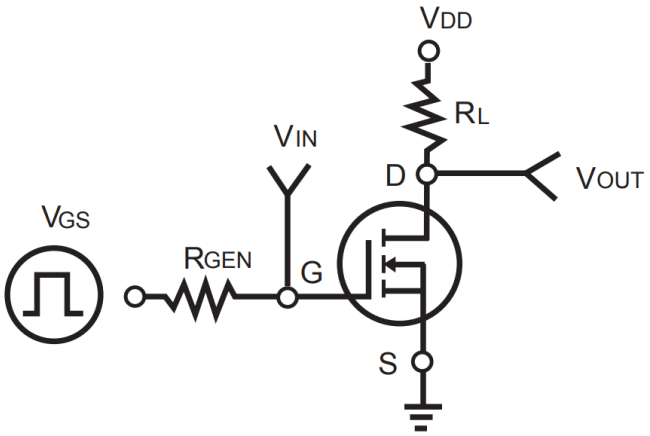
### Fig. 7 ▪ Gate Charge



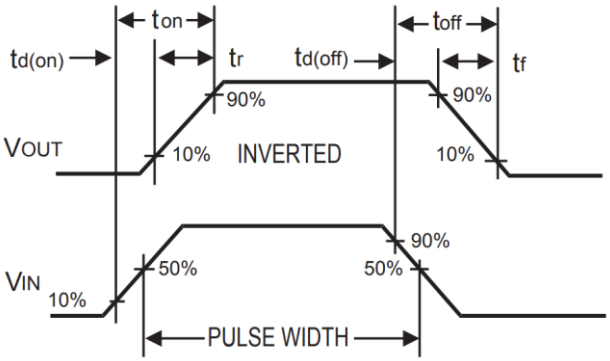

### Fig. 8 ▪ Maximum Safe Operating Area



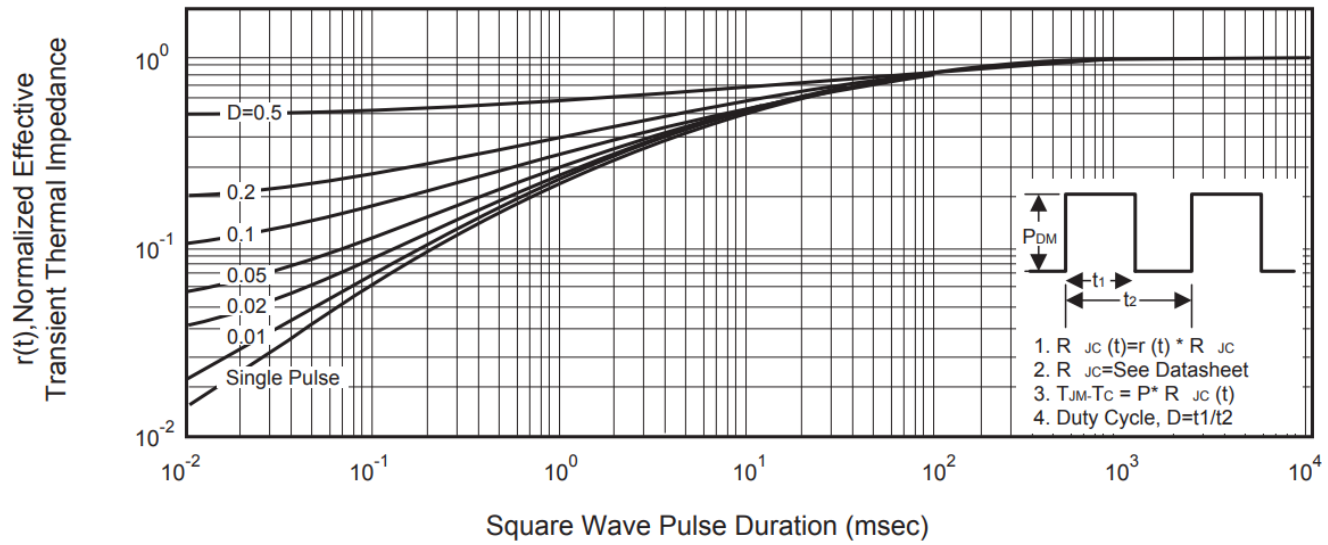

### Fig. 9 ▪ Switching Test Circuit



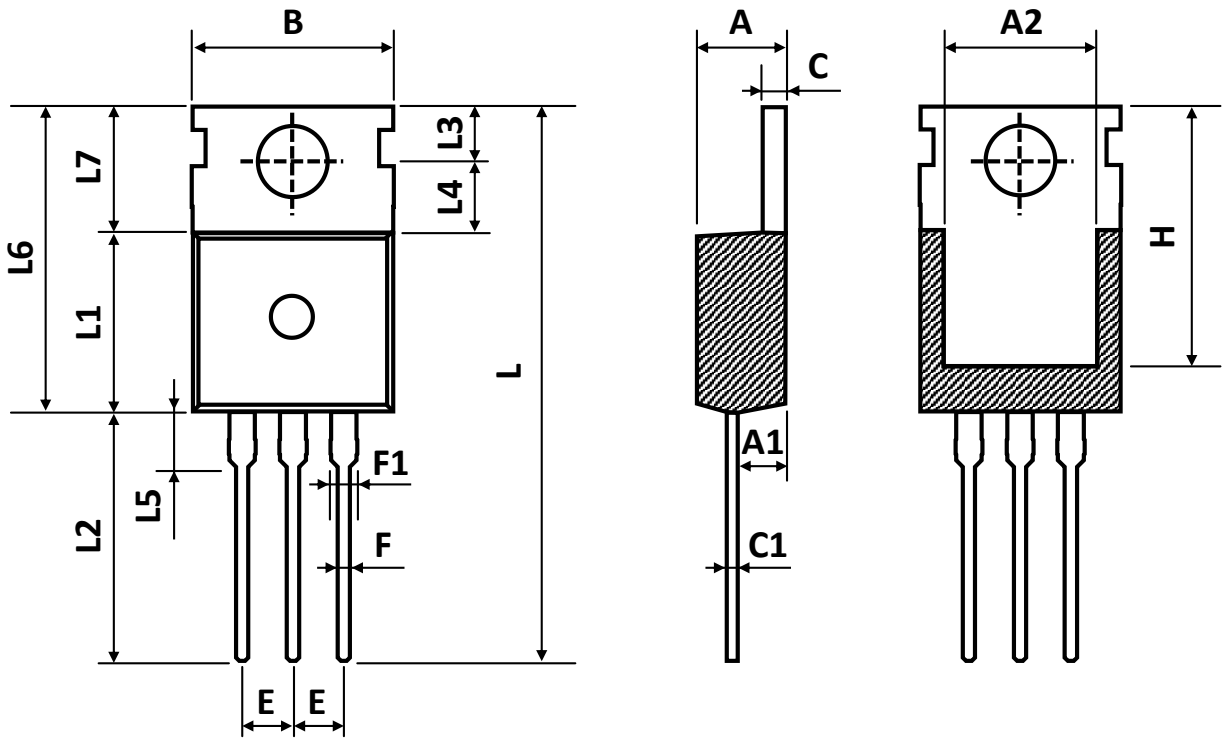

### Fig. 10 ▪ Switching Waveforms




### Fig. 11 ▪ Normalized Thermal Transient Impedance Curve



## PACKAGE OUTLINE

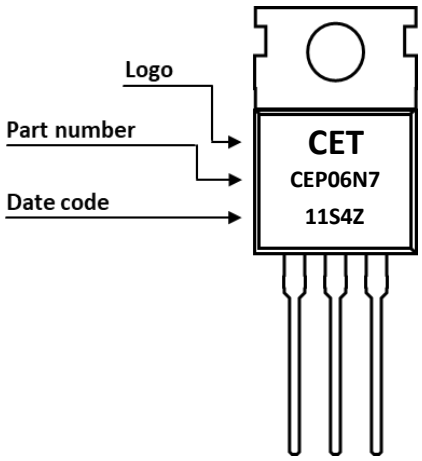



| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|---|---|---|---|
| A | 4.43 | 4.53 | 4.63 |
| A1 | 2.30 | 2.40 | 2.50 |
| A2 | 7.70 | 7.90 | 8.10 |
| B | 9.80 | 10.00 | 10.20 |
| C | 1.25 | 1.30 | 1.40 |
| C1 | 0.45 | 0.50 | 0.60 |
| D | 3.45 | 3.60 | 3.70 |
| E | 2.45 | 2.54 | 2.60 |
| F | 0.70 | 0.80 | 0.95 |
| F1 | 1.15 | 1.33 | 1.50 |
| L | 26.80 | 28.80 | 30.80 |
| L1 | 9.20 | 9.30 | 9.40 |
| L2 | 12.80 | 13.10 | 13.40 |
| L3 | 2.70 | 2.80 | 2.90 |
| L4 | 3.50 | 3.70 | 3.80 |
| L5 | 2.60 | 2.90 | 3.20 |
| L6 | 15.40 | 15.80 | 16.20 |
| L7 | 6.20 | 6.50 | 6.80 |
| H | 12.95 | 13.25 | 13.55 |

## ORDERING INFORMATION

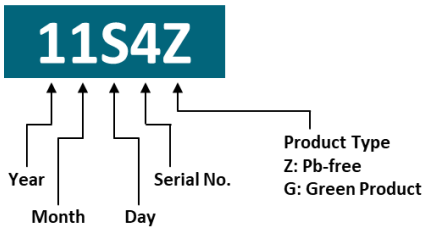
| Part Number | Package | Packing | Tube Qty. | Inner Box Qty. | Outer Box Qty. |
|---|---|---|---|---|---|
| CEP06N7 | TO-220-3L | Tube | 50pcs | 1,000pcs | 4,000pcs |

## PART MARKING




## DATE CODE

Example: 11S4Z




Coding list for „Day“

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A |
| 01 | 02 | 03 | 04 | 05 | 06 | 07 | 08 | 09 | 10 |
| B | C | D | E | F | G | H | I | J | K |
| 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| L | M | N | O | P | Q | R | S | T | U |
| 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| V | | | | | | | | | |
| 31 | | | | | | | | | |

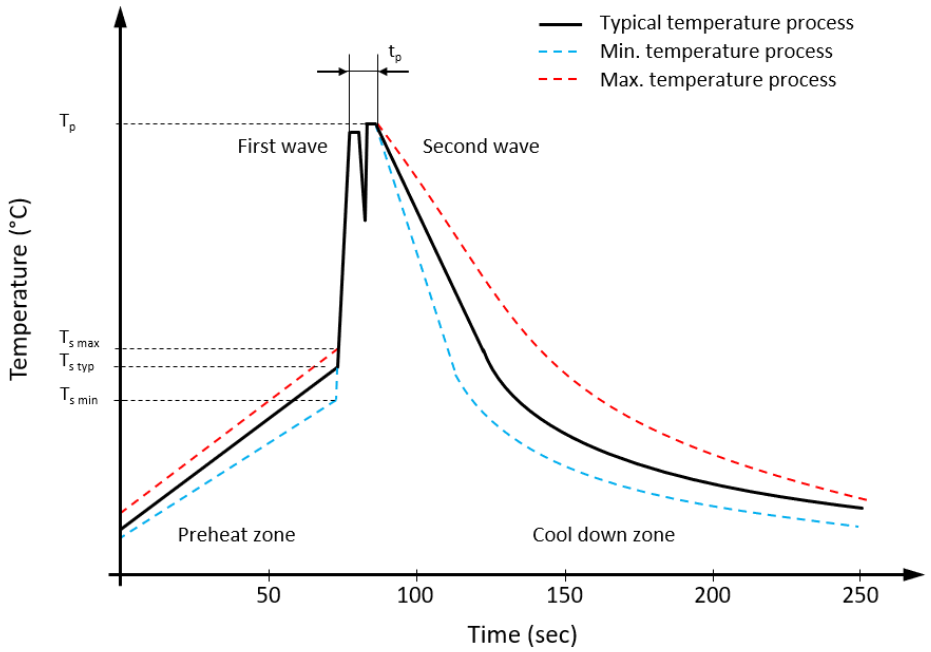
Coding list for „Month“

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Jan | Feb | Mar | Apr | May | Jun |
| 7 | 8 | 9 | A | B | C |
| Jul | Aug | Sep | Oct | Nov | Dec |

Coding list for „Year“

| | | | | |
|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 |
| 2020 | 2021 | 2022 | 2023 | 2024 |
| 5 | 6 | 7 | 8 | 9 |
| 2025 | 2026 | 2027 | 2028 | 2029 |

## RECOMMENDED WAVE SOLDERING PROFILE ▲ THT PACKAGE




### Classification wave soldering profile ▲ Refer to EN 61760-1: 2006

| Profile Features | | Value ▲ Sn-Pb Assembly | Value ▲ Pb-free Assembly |
|---|---|---|---|
| Preheat temperature min. | $T_{s\ min}$ | 100 °C | 100 °C |
| Preheat temperature typical | $T_{s\ typ}$ | 120 °C | 120 °C |
| Preheat temperature max. | $T_{s\ max}$ | 130 °C | 130 °C |
| Preheat time $t_s$ from $T_{s\ min}$ to $T_{s\ max}$ | $t_s$ | 70 seconds | 70 seconds |
| Peak temperature | $T_p$ | 235 °C to 260 °C | 245 °C to 260 °C |
| Time of actual peak temperature | $t_p$ | Max. 10 seconds<br>Max. 5 second each wave | Max. 10 seconds<br>Max. 5 second each wave |
| Ramp-down date min. | | ~ 2 °C/second | ~ 2 °C/second |
| Ramp-down rate typical | | ~ 3.5 °C/second | ~ 3.5 °C/second |
| Ramp-down rate max. | | ~ 5 °C/second | ~ 5 °C/second |
| Time 25°C to 25°C | | 4 minutes | 4 minutes |

## REVISION TABLE

| Revision | Date | Status | Notes |
|---|---|---|---|
| 001 | 30/09/2022 | Initial release | Initial publication |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

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