



CEP6044L

60V ▲ 4mΩ ▲ 110A ▲ 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 ($T_C = 25^\circ\text{C}$, unless otherwise noted) | | Characteristics |
|--|----------------------------|---|
| Drain-Source Voltage | V_{DS} | 60V |
| Gate-Source Voltage | V_{GS} | $\pm 20\text{V}$ |
| Continuous Drain Current at $T_C = 25^\circ\text{C}$ | I_D | 110A |
| Continuous Drain Current at $T_C = 100^\circ\text{C}$ | I_D | 79A |
| Pulsed Drain Current ^{Note 1} | I_{DM} ^{Note 5} | 440A |
| Maximum Power Dissipation at $T_C = 25^\circ\text{C}$ | P_D | 100W |
| Power Dissipation Derating above 25°C | ΔP_D | $0.66\text{W}/^\circ\text{C}$ |
| Single Pulsed Avalanche Energy ^{Note 4} | E_{AS} | 80mJ |
| Single Pulsed Avalanche Current ^{Note 4} | I_{AS} | 20A |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55°C to $+175^\circ\text{C}$ |

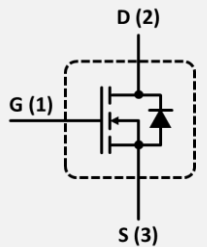
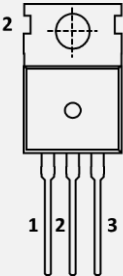
THERMAL CHARACTERISTICS

| Parameter | Symbol | Limit |
|---|--------------|-------------------------------|
| Thermal Resistance, Junction-to-Case | R_{TH_JC} | $1.5^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | R_{TH_JA} | $62.5^\circ\text{C}/\text{W}$ |

APPLICATIONS

| Battery Management Systems | DC/DC Converter | DC Fan | Industrial Control | Power Switches |
|---|---|---|---|---|
|  |  |  |  |  |

PIN DESCRIPTION

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

ELECTRICAL CHARACTERISTICS ▲ $T_C = 25^\circ\text{C}$, unless otherwise noted

| Item | Condition | Symbol | Min. | Typ. | Max. | Unit |
|---|--|--------------|------|------|------|------------|
| Off Characteristics | | | | | | |
| Drain-Source Breakdown Voltage | $V_{GS} = 0V, I_D = 250\mu A$ | BV_{DSS} | 60 | | | V |
| Zero Gate Voltage Drain Current | $V_{DS} = 60V, V_{GS} = 0V$ | I_{DSS} | | | 1 | μA |
| Gate Body Leakage Current, Forward | $V_{GS} = 20V, V_{DS} = 0V$ | I_{GSSF} | | | 100 | nA |
| Gate Body Leakage Current, Reverse | $V_{GS} = -20V, V_{DS} = 0V$ | I_{GSSR} | | | -100 | nA |
| On Characteristics ^{Note 2} | | | | | | |
| Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250\mu A$ | $V_{GS(th)}$ | 1 | | 3 | V |
| Static Drain-Source On-Resistance | $V_{GS} = 10V, I_D = 20A$ | $R_{DS(ON)}$ | | 4 | 5 | m Ω |
| Static Drain-Source On-Resistance | $V_{GS} = 4.5V, I_D = 20A$ | $R_{DS(ON)}$ | | 5.5 | 7.2 | m Ω |
| Dynamic Characteristics ^{Note 3} | | | | | | |
| Input Capacitance | $V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$ | C_{ISS} | | 1890 | | pF |
| Output Capacitance | $V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$ | C_{OSS} | | 765 | | pF |
| Reverse Transfer Capacitance | $V_{DS} = 30V, V_{GS} = 0V, f = 1MHz$ | C_{RSS} | | 5 | | pF |
| Switching Characteristics ^{Note 3} | | | | | | |
| Turn-On Delay Time | $V_{DD} = 30V, V_{GS} = 10V, I_D = 20A, R_{G(ext)} = 25\Omega$ | $t_{D(ON)}$ | | 24 | | ns |
| Turn-On Rise Time | $V_{DD} = 30V, V_{GS} = 10V, I_D = 20A, R_{G(ext)} = 25\Omega$ | t_R | | 15 | | ns |
| Turn-Off Delay Time | $V_{DD} = 30V, V_{GS} = 10V, I_D = 20A, R_{G(ext)} = 25\Omega$ | $t_{D(OFF)}$ | | 104 | | ns |
| Turn-Off Fall Time | $V_{DD} = 30V, V_{GS} = 10V, I_D = 20A, R_{G(ext)} = 25\Omega$ | t_F | | 81 | | ns |
| Total Gate Charge | $V_{DS} = 30V, V_{GS} = 4.5V, I_D = 20A$ | Q_G | | 19 | | nC |
| Gate Source Charge | $V_{DS} = 30V, V_{GS} = 4.5V, I_D = 20A$ | Q_{GS} | | 4.8 | | nC |
| Gate Drain Charge | $V_{DS} = 30V, V_{GS} = 4.5V, I_D = 20A$ | Q_{GD} | | 7.4 | | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| Drain-Source Diode Forward Current | | I_S | | | 100 | A |
| Drain-Source Diode Forward Voltage | $V_{GS} = 0V, I_S = 20A$ | V_{SD} | | | 1.2 | V |

Notes

- 1: Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- 3: Guaranteed by design, not subject to production testing.
- 4: $L = 0.4mH, I_{AS} = 20A, V_{DD} = 24V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$.
- 5: Pulse width limited by safe operating area.

REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 • Output Characteristics

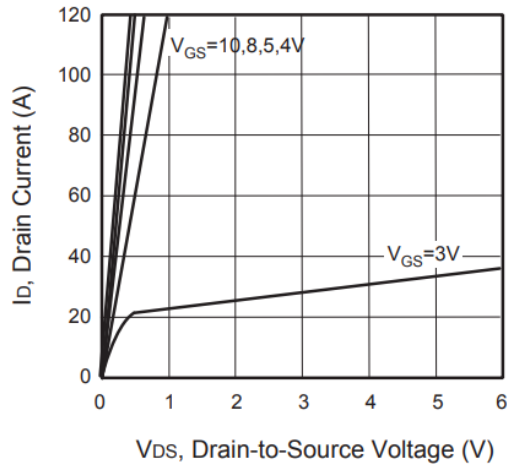


Fig. 2 • Transfer Characteristics

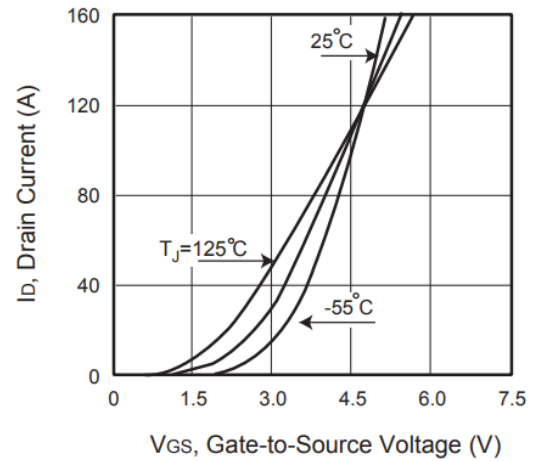


Fig. 3 • Capacitance

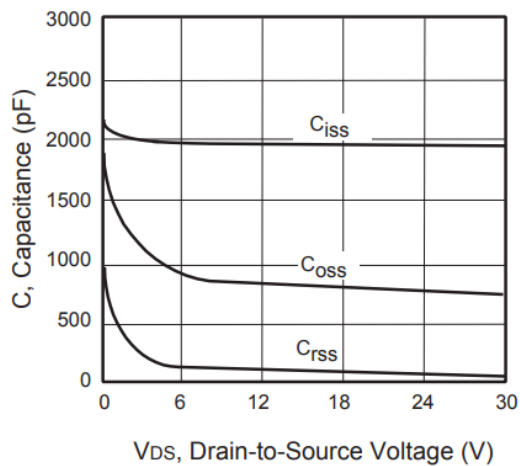


Fig. 4 • On-Resistance Variation with Temperature

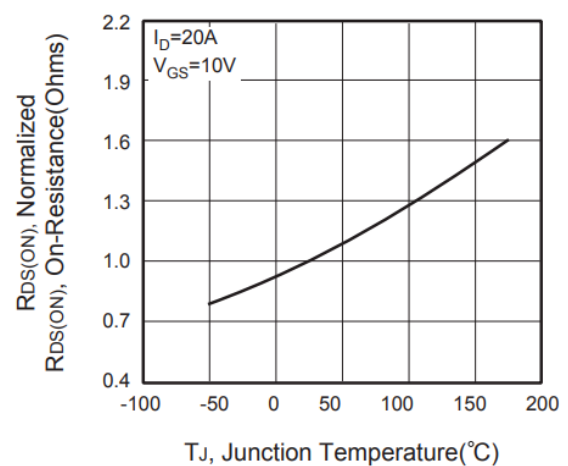


Fig. 5 • Gate Threshold Variation with Temperature

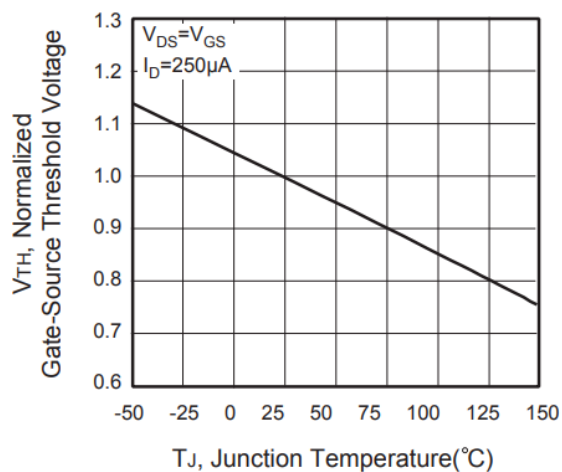
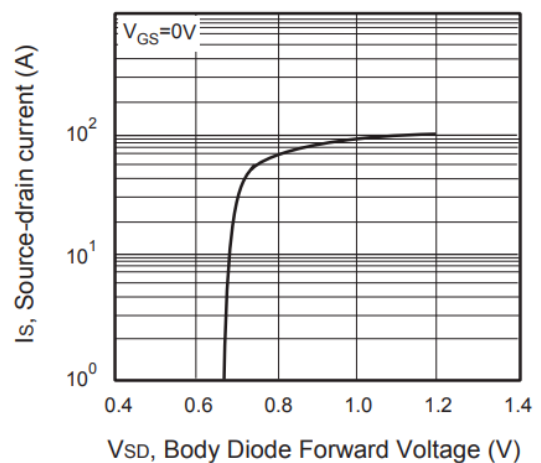


Fig. 6 • Body Diode Forward Voltage Variation with Source Current



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 • Gate Charge

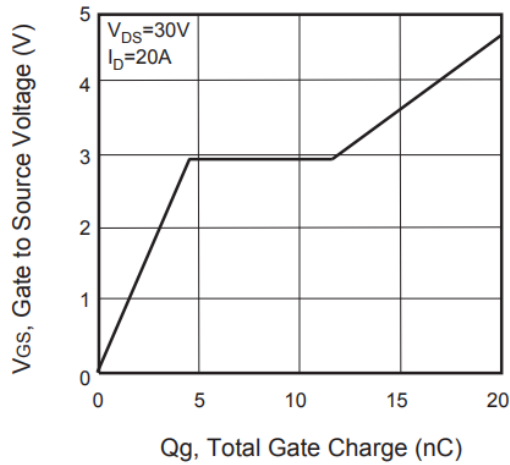


Fig. 8 • Maximum Safe Operating Area

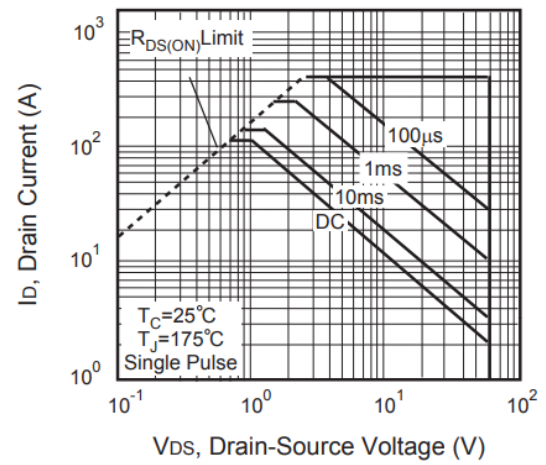


Fig. 9 • Breakdown Voltage Variation vs. Temperature

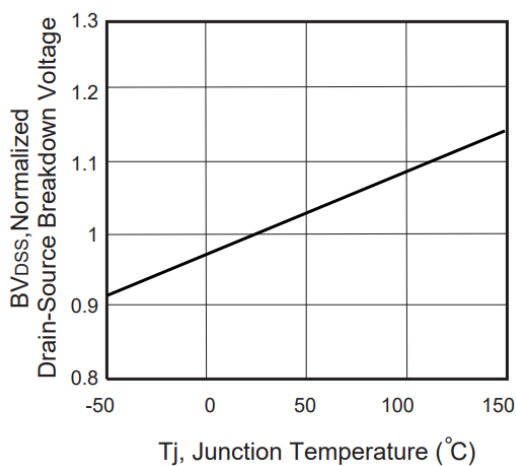


Fig. 10 • Switching Test Circuit

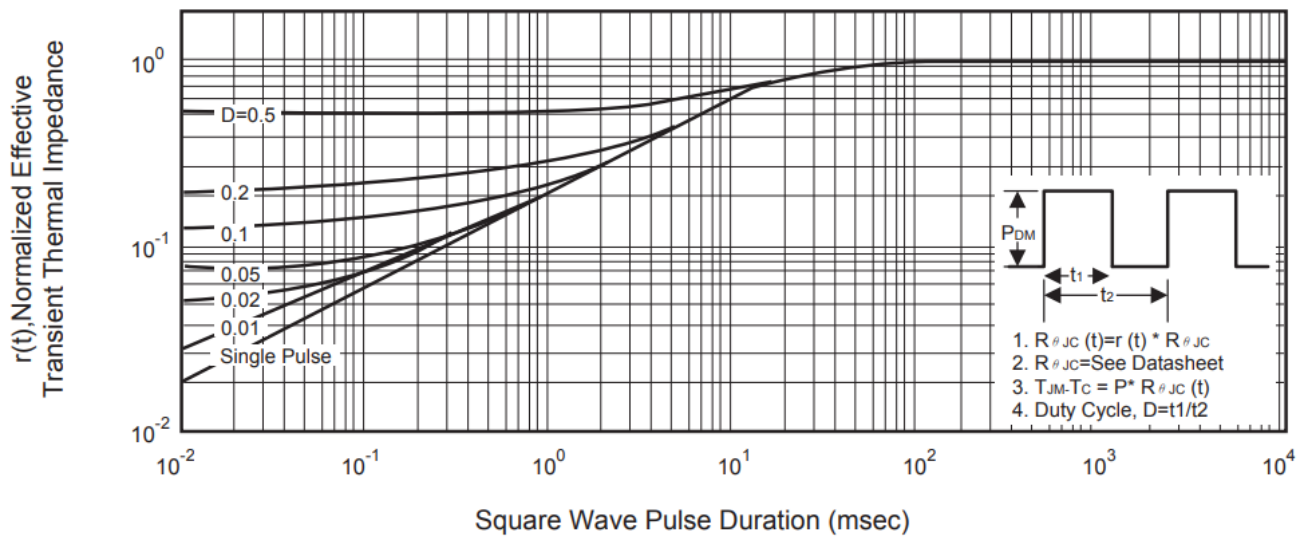


Fig. 11 • Switching Waveforms

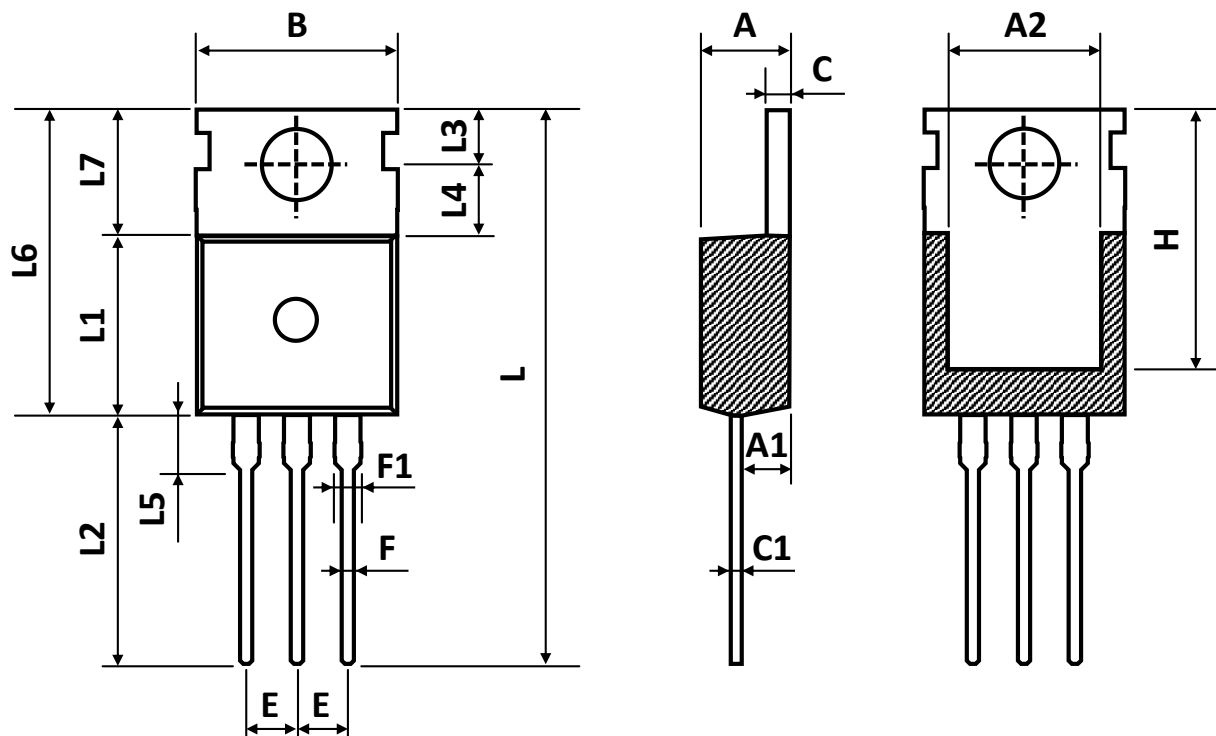


REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 12 • Normalized Thermal Transient Impedance Curve



PACKAGE OUTLINE

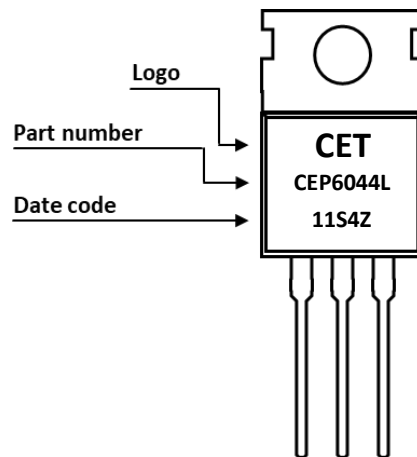


| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|-----|-----------------------|-----------------------|-----------------------|
| A | 4.43 | 4.53 | 4.63 |
| A1 | 2.30 | 2.40 | 2.50 |
| A2 | 7.70 | 7.90 | 8.10 |
| B | 9.80 | 10.00 | 10.20 |
| C | 1.25 | 1.30 | 1.40 |
| C1 | 0.45 | 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. |
|-------------|-----------|---------|-----------|----------------|----------------|
| CEP6044L | 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 | | | | | | | | | |

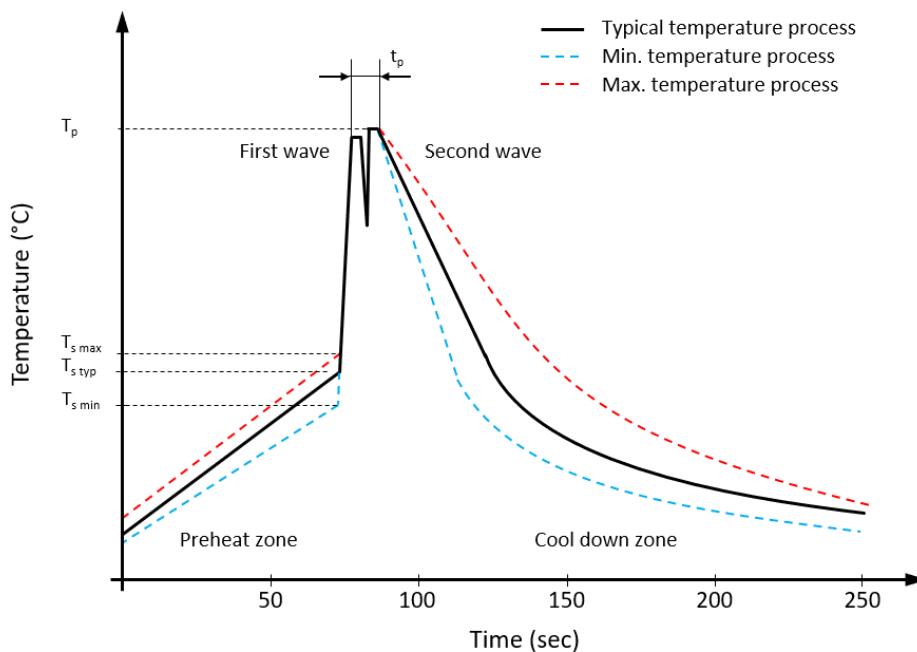
Coding list for „Month“

| | | | | | |
|-----|-----|-----|-----|-----|-----|
| 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 Max. 5 second each wave | Max. 10 seconds Max. 5 second each wave |
| Ramp-down rate 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 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

DISCLAIMER

Except for the written expressed warranties, MGT does not implicitly, by assumption or whatever else, warrant, under-take, promise any other warranty or guaranty for any MGT product.

All information and technical specifications made available by MGT are for guidance only and we reserve the right to change or modify them without prior notice. Unless expressly stated in writing by MGT, we reject any guarantees, obligations, or warranties.

All MGT products with the technical specifications described are suitable for use in certain applications. Operating, production, storage and environmental conditions can have a massive influence on the parameters mentioned in the data sheets, which cause the performance to vary over time.

It is subject to the user's duty of care to design and validate his products in such a way that appropriate measures are taken, such as protective circuits or redundant systems to ensure the safety standards required in the application.

MGT components are not designed or rated for use in life support, rescue, safety critical, military, or aerospace applications where failure or malfunction could result in property or environmental damage, serious injury or death. In the aforementioned cases, please contact us before using MGT products.

In principle, we reserve all rights and MGT's general terms and conditions apply. You can find them on our website www.mgt.co.com.