

CEZ5515L

150V ▲ 56mΩ ▲ 17.2A ▲ Si MOSFET

SILICON Si MOSFET ▲ SMD type

N-channel enhancement mode

UL94V-0 rated flame retardant epoxy

PPAK5x6 package ▲ MSL 3

Super high dense cell density for extremely low $R_{DS(ON)}$

High power and current handling capability

MAXIMUM RATINGS

| Parameter ($T_A = 25^\circ\text{C}$, unless otherwise noted) | | Characteristics |
|--|----------------|---|
| Drain-Source Voltage | V_{DS} | 150V |
| Gate-Source Voltage | V_{GS} | $\pm 20\text{V}$ |
| Continuous Drain Current at R_{TH_JC} | I_D | 17.2A |
| Continuous Drain Current at R_{TH_JA} | I_D | 7.3A |
| Pulsed Drain Current at R_{TH_JC} ^{Note 1} | I_{DM} | 68.8A |
| Pulsed Drain Current at R_{TH_JA} ^{Note 1} | I_{DM} | 29.2A |
| Maximum Power Dissipation | P_D | 35W |
| Single Pulsed Avalanche Energy ^{Note 5} | E_{AS} | 29.6mJ |
| Single Pulsed Avalanche Current ^{Note 5} | I_{AS} | 7.7A |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55°C to $+150^\circ\text{C}$ |

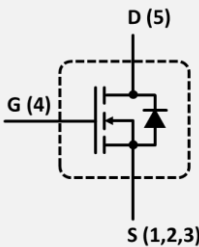
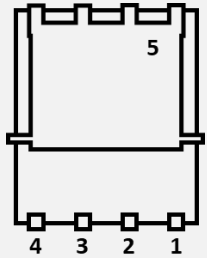
THERMAL CHARACTERISTICS

| Parameter | Symbol | Limit |
|---|--------------|-----------------------|
| Thermal Resistance, Junction-to-Case | R_{TH_JC} | 3.6°C/W |
| Thermal Resistance, Junction-to-Ambient ^{Note 2} | R_{TH_JA} | 20°C/W |

APPLICATIONS

| Battery Management Systems | E-Bike | Industrial Control | Power Inverter | UPS |
|---|---|---|---|---|
|  |  |  |  |  |

PIN DESCRIPTION

| Circuit Diagram | Outline - Bottom View | Pin No. | Description |
|---|---|-----------------------|---|
|  |  | 1 2 3 4 5 | Source Source Source Gate Drain |

ELECTRICAL CHARACTERISTICS ▲ $T_A = 25^\circ\text{C}$, 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} | 150 | | | V |
| Zero Gate Voltage Drain Current | $V_{DS} = 150V, V_{GS} = 0V$ | 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 3} | | | | | | |
| Gate Threshold Voltage | $V_{GS} = V_{DS}, I_D = 250\mu A$ | $V_{GS(th)}$ | 1 | | 3 | V |
| Static Drain-Source On-Resistance | $V_{GS} = 10V, I_D = 15A$ | $R_{DS(ON)}$ | | 56 | 65 | m Ω |
| Static Drain-Source On-Resistance | $V_{GS} = 4.5V, I_D = 15A$ | $R_{DS(ON)}$ | | 66 | 82 | m Ω |
| Dynamic Characteristics ^{Note 4} | | | | | | |
| Input Capacitance | $V_{DS} = 75V, V_{GS} = 0V, f = 1MHz$ | C_{ISS} | | 630 | | pF |
| Output Capacitance | $V_{DS} = 75V, V_{GS} = 0V, f = 1MHz$ | C_{OSS} | | 80 | | pF |
| Reverse Transfer Capacitance | $V_{DS} = 75V, V_{GS} = 0V, f = 1MHz$ | C_{RSS} | | 15 | | pF |
| Switching Characteristics ^{Note 4} | | | | | | |
| Turn-On Delay Time | $V_{DD} = 75V, V_{GS} = 10V, I_D = 1A, R_{G(ext)} = 10\Omega$ | $t_{D(ON)}$ | | 13 | | ns |
| Turn-On Rise Time | $V_{DD} = 75V, V_{GS} = 10V, I_D = 1A, R_{G(ext)} = 10\Omega$ | t_R | | 4 | | ns |
| Turn-Off Delay Time | $V_{DD} = 75V, V_{GS} = 10V, I_D = 1A, R_{G(ext)} = 10\Omega$ | $t_{D(OFF)}$ | | 28 | | ns |
| Turn-Off Fall Time | $V_{DD} = 75V, V_{GS} = 10V, I_D = 1A, R_{G(ext)} = 10\Omega$ | t_F | | 15 | | ns |
| Total Gate Charge | $V_{DS} = 75V, V_{GS} = 4.5V, I_D = 4.5A$ | Q_G | | 4.7 | | nC |
| Gate Source Charge | $V_{DS} = 75V, V_{GS} = 4.5V, I_D = 4.5A$ | Q_{GS} | | 1.7 | | nC |
| Gate Drain Charge | $V_{DS} = 75V, V_{GS} = 4.5V, I_D = 4.5A$ | Q_{GD} | | 1.9 | | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| Drain-Source Diode Forward Current ^{Note3} | | I_S | | | 17 | A |
| Drain-Source Diode Forward Voltage ^{Note3} | $V_{GS} = 0V, I_S = 20A$ | V_{SD} | | | 1.2 | V |

Notes

- 1: Repetitive Rating: Pulse width limited by maximum junction temperature
- 2: Surface Mounted on FR4 Board, $t \leq 10$ sec
- 3: Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
- 4: Guaranteed by design, not subject to production testing.
- 5: $L = 1mH, I_{AS} = 7.7A, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 • Output Characteristics

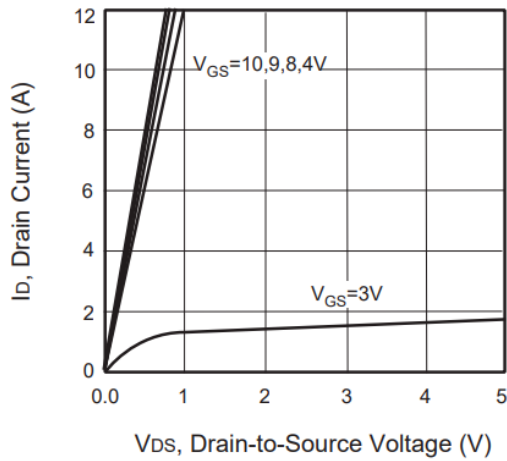


Fig. 2 • Transfer Characteristics

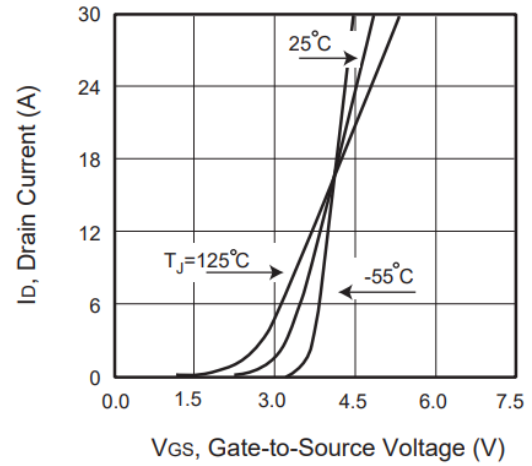


Fig. 3 • Capacitance

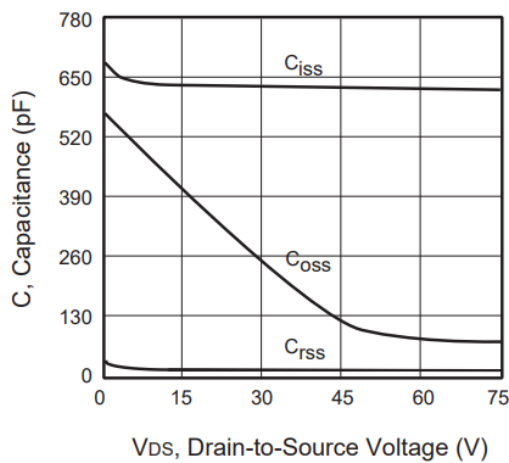


Fig. 4 • On-Resistance Variation with Temperature

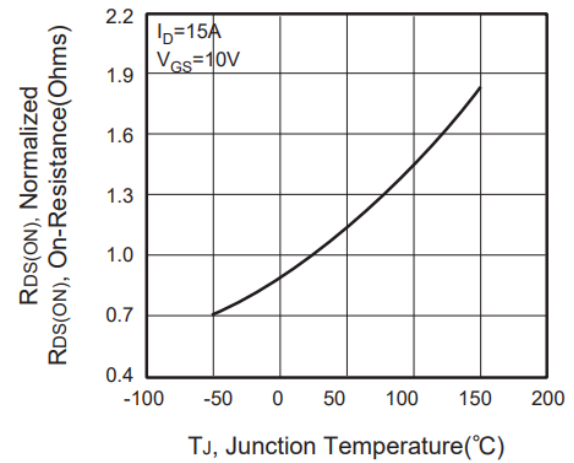


Fig. 5 • Gate Threshold Variation with Temperature

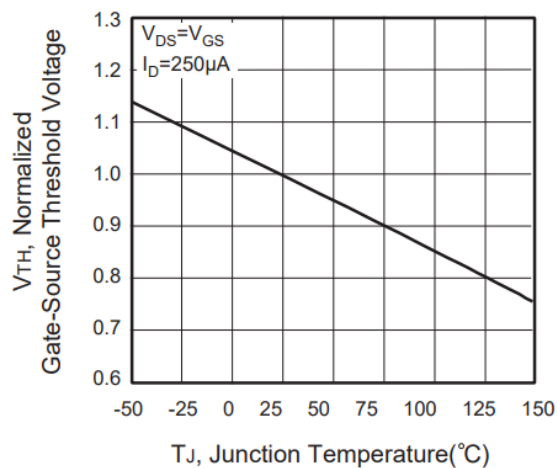
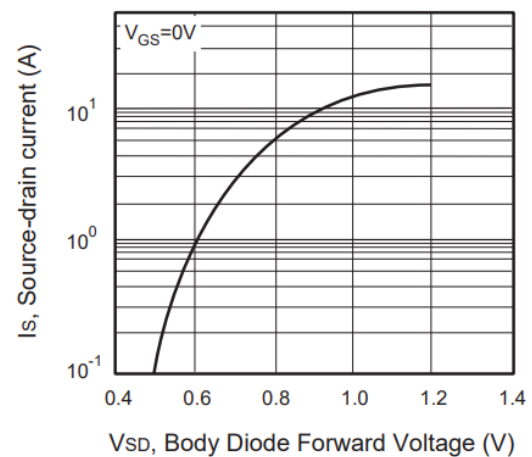


Fig. 6 • Body Diode Forward Voltage Variation with Source Current



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 • Gate Charge

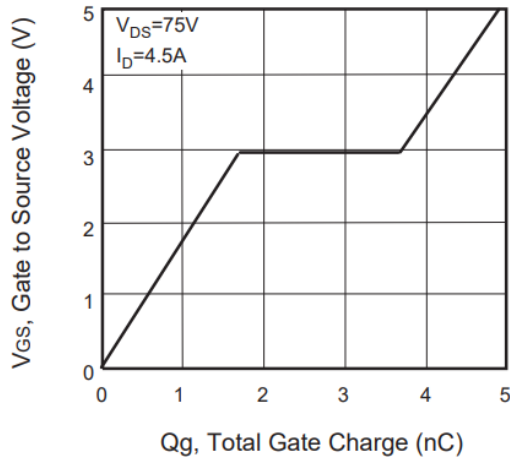


Fig. 8 • Maximum Safe Operating Area

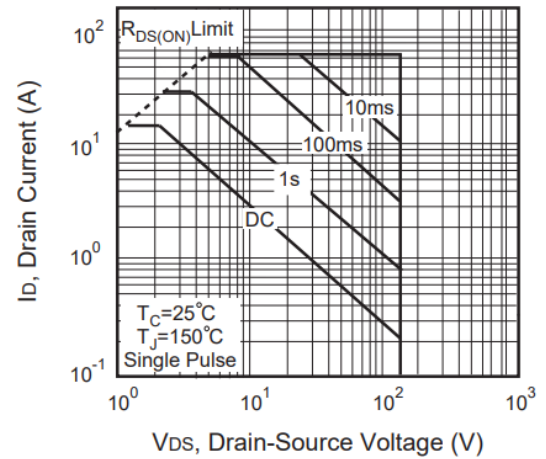


Fig. 9 • Breakdown Voltage Variation vs. Temperature

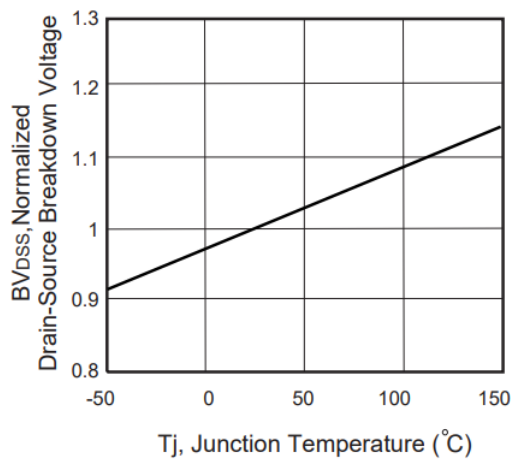
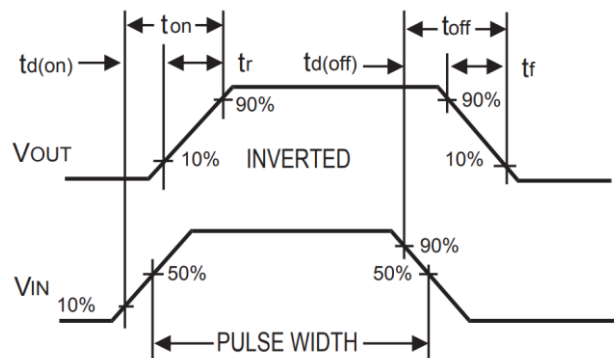


Fig. 10 • Switching Test Circuit

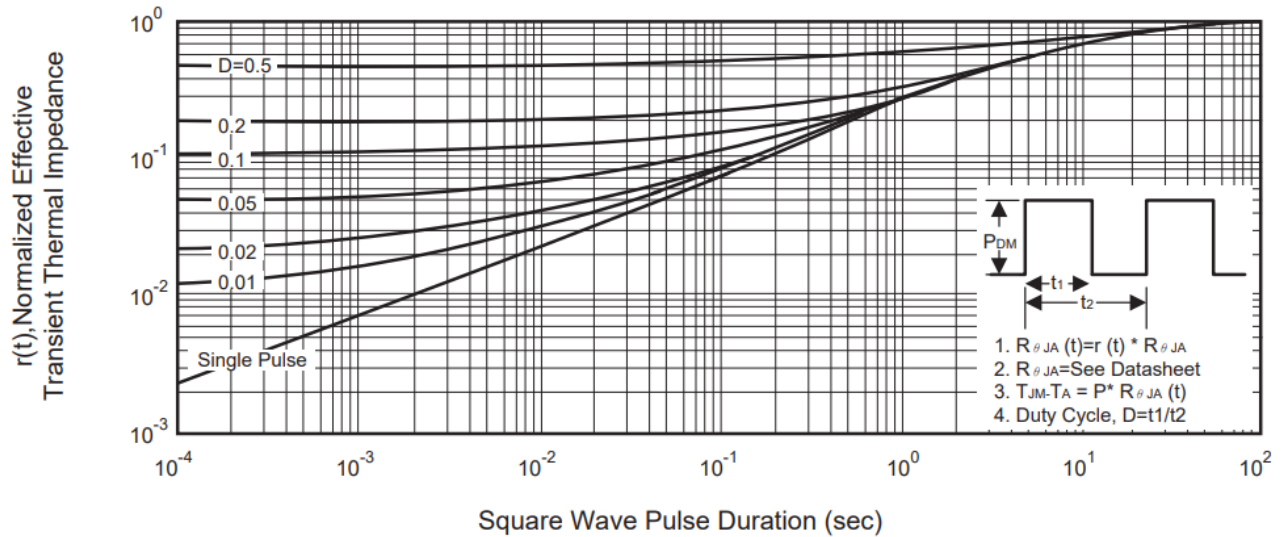


Fig. 11 • Switching Waveforms

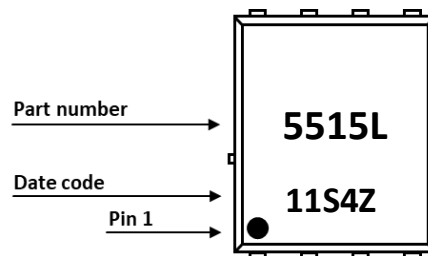


REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 12 • Normalized Thermal Transient Impedance Curve



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 | | | | | | | | | |

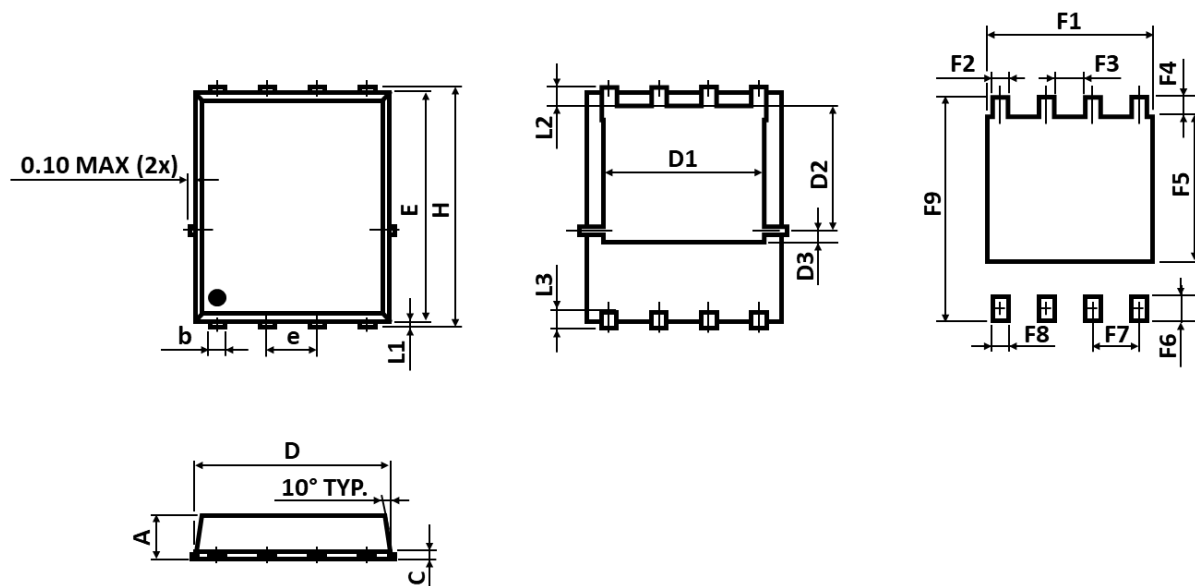
Coding list for „Month“

| | | | | | |
|-----|-----|-----|-----|-----|-----|
| 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 |

PACKAGE OUTLINE AND RECOMMENDED PAD LAYOUT



| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|-----|--------------------|--------------------|--------------------|
| A | 0.800 | - | 1.170 |
| b | 0.340 | - | 0.490 |
| c | 0.200 | - | 0.340 |
| D | 4.800 | - | 5.100 |
| D1 | 3.800 | - | 4.200 |
| D2 | 3.180 | - | 3.780 |
| D3 | 0.150 | - | 0.360 |

| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|-----|--------------------|--------------------|--------------------|
| E | 5.650 | - | 5.900 |
| e | 1.270 TYP | | |
| H | 5.900 | - | 6.150 |
| L1 | 0.050 | - | 0.250 |
| L2 | 0.380 | - | 0.620 |
| L3 | 0.380 | - | 0.750 |

| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|-----|--------------------|--------------------|--------------------|
| F1 | - | 4.500 | - |
| F2 | - | 0.500 | - |
| F3 | - | 0.770 | - |
| F4 | - | 0.550 | - |
| F5 | - | 3.650 | - |

| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|-----|--------------------|--------------------|--------------------|
| F6 | - | 0.800 | - |
| F7 | - | 1.270 | - |
| F8 | - | 0.500 | - |
| F9 | - | 6.250 | - |

- Notes: 1. The suggested land pattern dimensions have been provided for reference only.
2. For further information, please reference document IPC-7351A.

ORDERING INFORMATION

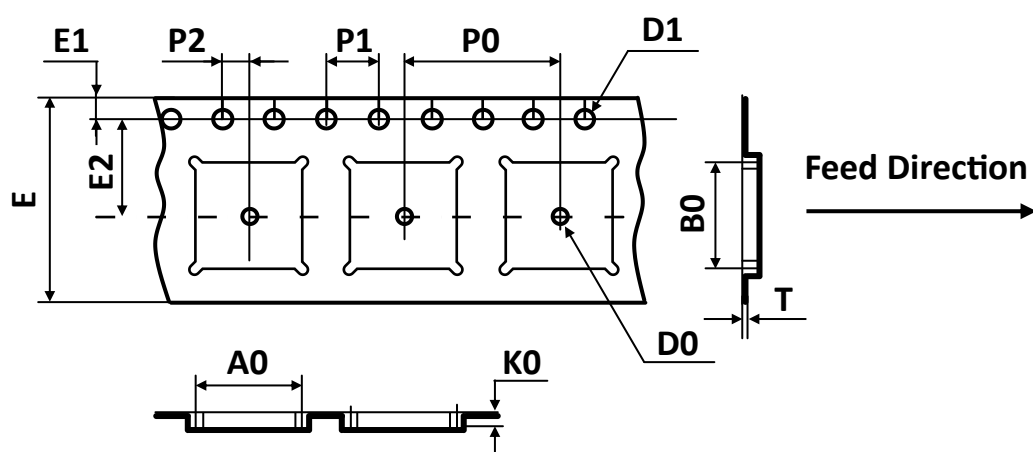
| Part Number | Package | Packing | Reel Qty. | Inner Box Qty. | Outer Box Qty. |
|-------------|----------|---------|-----------|----------------|----------------|
| CEZ5515L | PPAK 5x6 | Reel | 2,500pcs | 5,000pcs | 40,000pcs |

REEL DIMENSIONS ▲ All dimensions in mm



| Tape Size | Reel Size | M | N | T | H | K | S |
|-----------|-----------|---------|---------|-------|-------|----------------|-------|
| 12mm | Ø330 | Ø330.00 | Ø100.00 | 2.10 | 22.00 | 13.00 | 2.00 |
| | | ±2.00 | ±1.00 | ±0.20 | ±0.50 | +0.50 -0.20 | ±0.50 |

TAPE DIMENSIONS ▲ All dimensions in mm



| Package | A0 | B0 | K0 | D0 | D1 | E | E1 | E2 | P0 | P1 | P2 | T |
|----------|-------|-------|-------|-------|-------|----------------|-------|-------|-------|-------|-------|-------|
| PPAK 5x6 | 6.50 | 5.28 | 2.00 | 1.50 | 1.50 | 12.00 | 1.75 | 5.50 | 8.00 | 4.00 | 2.00 | 0.25 |
| | ±0.10 | ±0.10 | ±0.10 | ±0.25 | ±0.10 | +0.30 -0.10 | ±0.10 | ±0.05 | ±0.10 | ±0.10 | ±0.05 | ±0.02 |

Note: All dimensions meet EIA-481-D requirements.

RECOMMENDED REFLOW SOLDERING PROFILE



Recommended reflow soldering conditions ▲ Refer to JEDEC J-STD-020E

| Profile Features | | Sn-Pb Eutetic Assembly | Pb-Free Assembly |
|--|--------------|------------------------|------------------|
| Preheat temperature min. | $T_{s \min}$ | 100 °C | 150 °C |
| Preheat temperature max. | $T_{s \max}$ | 150 °C | 200 °C |
| Preheat time t_s from $T_{s \min}$ to $T_{s \max}$ | t_s | 120 seconds | 120 seconds |
| Ramp-up rate (T_L to T_p) | | max. 3 °C/second | max. 3 °C/second |
| Liquidous temperature | T_L | 183 °C | 217 °C |
| Time t_L maintained above T_L | t_L | 150 seconds max. | 150 seconds max. |
| Peak package body temperature | T_p | 235°C | 260°C |
| Timeframe of within 5°C below and up to max actual peak body temperature | t_p | 20 seconds max. | 30 seconds max. |
| Ramp-down rate (T_L to T_p) | | max. 6 °C/second | max. 6 °C/second |
| Time 25°C to peak temperature | | max. 6 minutes | max. 8 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.