



CED1188SA

800V ▲ 0.62Ω ▲ 6.8A ▲ Si MOSFET

SILICON Si MOSFET ▲ THT type

N-channel enhancement mode

UL94V-0 rated flame retardant epoxy

TO251 (E-PAK) 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} | 800V |
| Gate-Source Voltage | V_{GS} | $\pm 30\text{V}$ |
| Continuous Drain Current at $T_C = 25^\circ\text{C}$ | I_D | 6.8A |
| Pulsed Drain Current ^{Note 1} | I_{DM} | 27.2A |
| Maximum Power Dissipation at $T_C = 25^\circ\text{C}$ | P_D | 89W |
| Power Dissipation Derating above 25°C | ΔP_D | $0.71\text{W}/^\circ\text{C}$ |
| Single Pulsed Avalanche Energy ^{Note 4} | E_{AS} | 172.8mJ |
| Single Pulsed Avalanche Current ^{Note 4} | I_{AS} | 2.4A |
| Operating and Storage Temperature Range | T_J, T_{STG} | -55°C to $+150^\circ\text{C}$ |

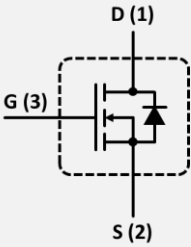
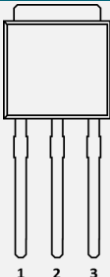
THERMAL CHARACTERISTICS

| Parameter | Symbol | Limit |
|---|--------------|------------------------------|
| Thermal Resistance, Junction-to-Case | R_{TH_JC} | $1.4^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | R_{TH_JA} | $50^\circ\text{C}/\text{W}$ |

APPLICATIONS

| Base Station Power | Battery Chargers | LED Lighting | Power Adapters | SMPS |
|---|---|---|---|---|
|  |  |  |  |  |

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} | 800 | | | V |
| Zero Gate Voltage Drain Current | $V_{DS} = 800V, V_{GS} = 0V$ | 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 | $V_{GS} = V_{DS}, I_D = 250\mu A$ | $V_{GS(th)}$ | 2 | | 4 | V |
| Static Drain-Source On-Resistance | $V_{GS} = 10V, I_D = 4A$ | $R_{DS(ON)}$ | | 0.62 | 0.72 | Ω |
| Gate Input Resistance | $f = 1\text{MHz}$, Open Drain | R_G | | 6.4 | | Ω |
| Dynamic Characteristics ^{Note 3} | | | | | | |
| Input Capacitance | $V_{DS} = 100V, V_{GS} = 0V, f = 1\text{MHz}$ | C_{ISS} | | 685 | | pF |
| Output Capacitance | $V_{DS} = 100V, V_{GS} = 0V, f = 1\text{MHz}$ | C_{OSS} | | 55 | | pF |
| Reverse Transfer Capacitance | $V_{DS} = 100V, V_{GS} = 0V, f = 1\text{MHz}$ | C_{RSS} | | 15 | | pF |
| Switching Characteristics ^{Note 3} | | | | | | |
| Turn-On Delay Time | $V_{DD} = 400V, V_{GS} = 10V, I_D = 4A, R_{G(ext)} = 10\Omega$ | $t_{D(ON)}$ | | 25 | | ns |
| Turn-On Rise Time | $V_{DD} = 400V, V_{GS} = 10V, I_D = 4A, R_{G(ext)} = 10\Omega$ | t_R | | 9 | | ns |
| Turn-Off Delay Time | $V_{DD} = 400V, V_{GS} = 10V, I_D = 4A, R_{G(ext)} = 10\Omega$ | $t_{D(OFF)}$ | | 45 | | ns |
| Turn-Off Fall Time | $V_{DD} = 400V, V_{GS} = 10V, I_D = 4A, R_{G(ext)} = 10\Omega$ | t_F | | 10 | | ns |
| Total Gate Charge | $V_{DD} = 640V, V_{GS} = 10V, I_D = 4A$ | Q_G | | 17 | | nC |
| Gate Source Charge | $V_{DD} = 640V, V_{GS} = 10V, I_D = 4A$ | Q_{GS} | | 3 | | nC |
| Gate Drain Charge | $V_{DD} = 640V, V_{GS} = 10V, I_D = 4A$ | Q_{GD} | | 6 | | nC |
| Drain-Source Diode Characteristics and Maximum Ratings | | | | | | |
| Drain-Source Diode Forward Current | | I_S | | | 6.8 | A |
| Drain-Source Diode Forward Voltage | $V_{GS} = 0V, I_S = 4A$ | V_{SD} | | | 1.5 | V |
| Reverse Recovery Time | $I_F = 4A, di/dt = 100A/\mu s$ | t_{RR} | | 341.4 | | ns |
| Reverse Recovery Charge | $I_F = 4A, di/dt = 100A/\mu s$ | Q_{RR} | | 1.89 | | μC |
| Peak Reverse Recovery Current | $I_F = 4A, di/dt = 100A/\mu s$ | I_{RR} | | 10.67 | | A |

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: $L = 60\text{mH}$, $I_{AS} = 2.4A$, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$

REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 1 • Output Characteristics

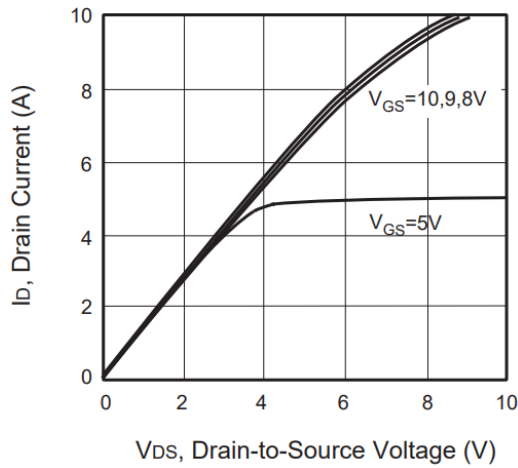


Fig. 2 • Transfer Characteristics

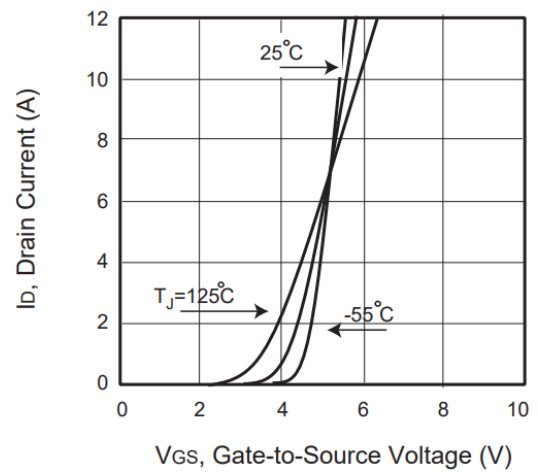


Fig. 3 • Capacitance

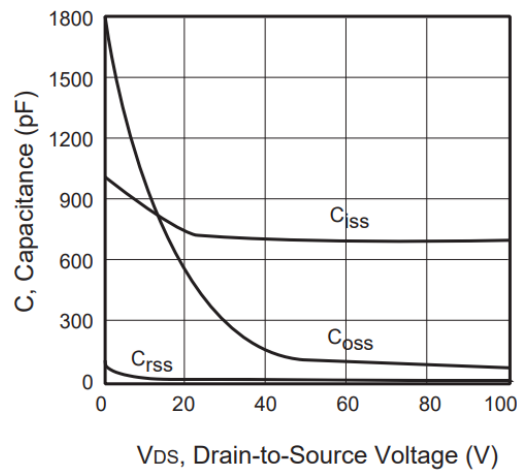


Fig. 4 • On-Resistance Variation with Temperature

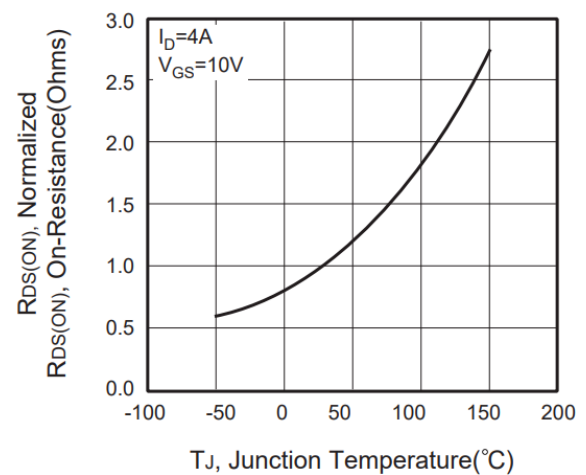


Fig. 5 • Gate Threshold Variation with Temperature

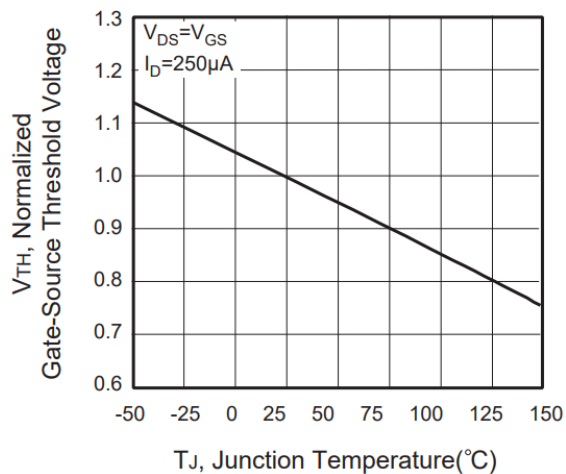
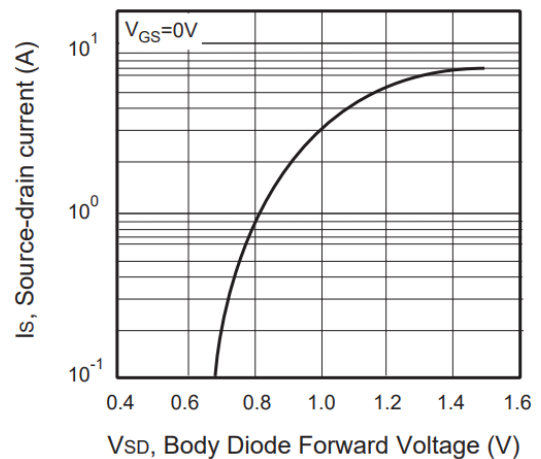


Fig. 6 • Body Diode Forward Voltage Variation with Source Current



REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 7 • Gate Charge

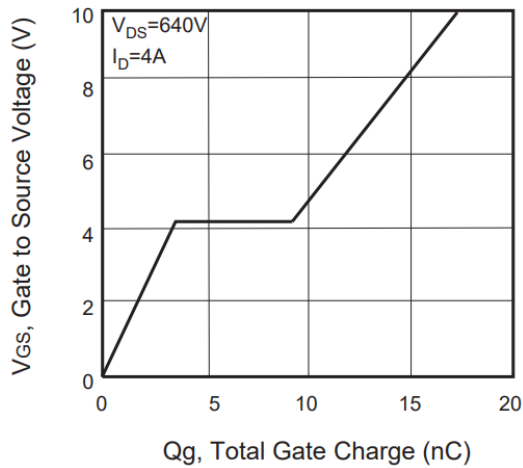


Fig. 8 • Maximum Safe Operating Area

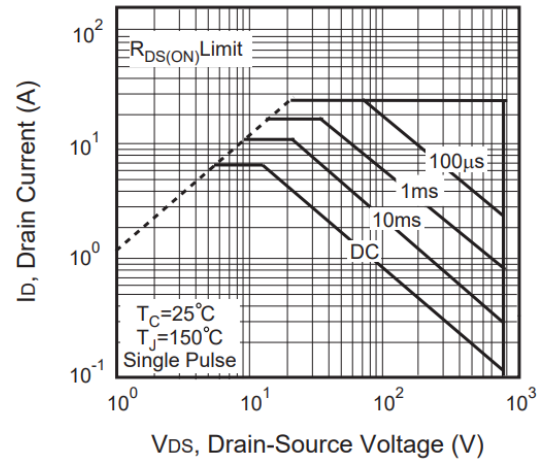


Fig. 9 • Breakdown Voltage Variation vs. Temperature

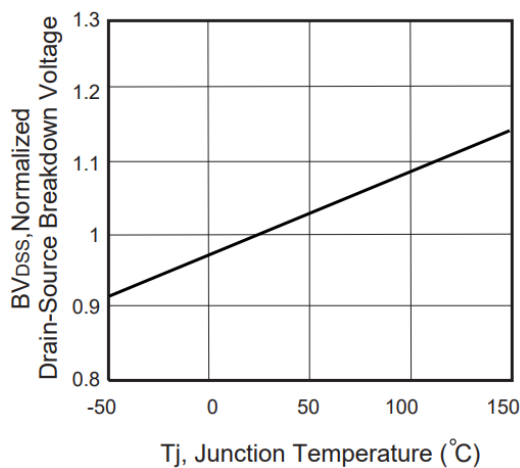
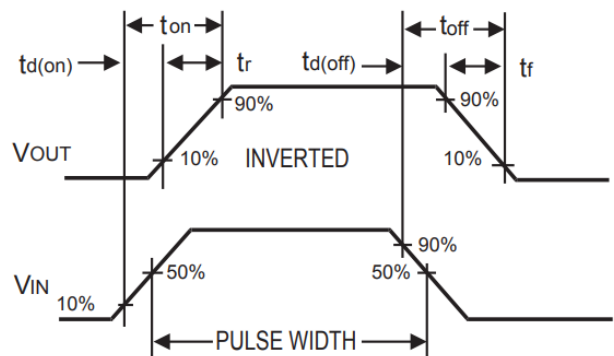


Fig. 10 • Switching Test Circuit

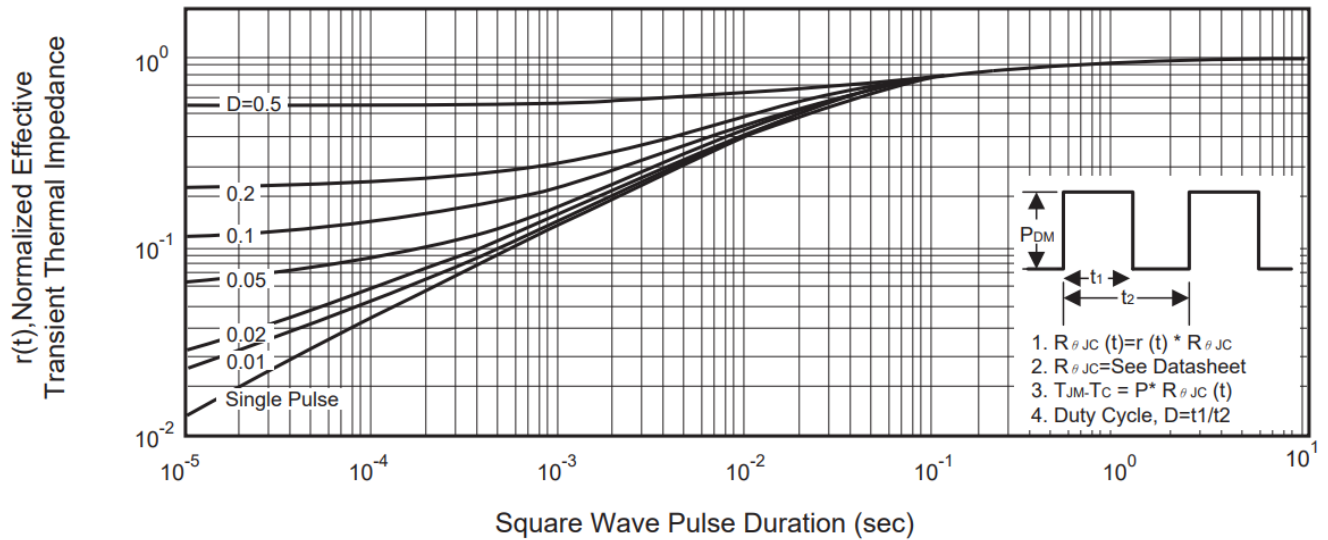


Fig. 11 • Switching Waveforms

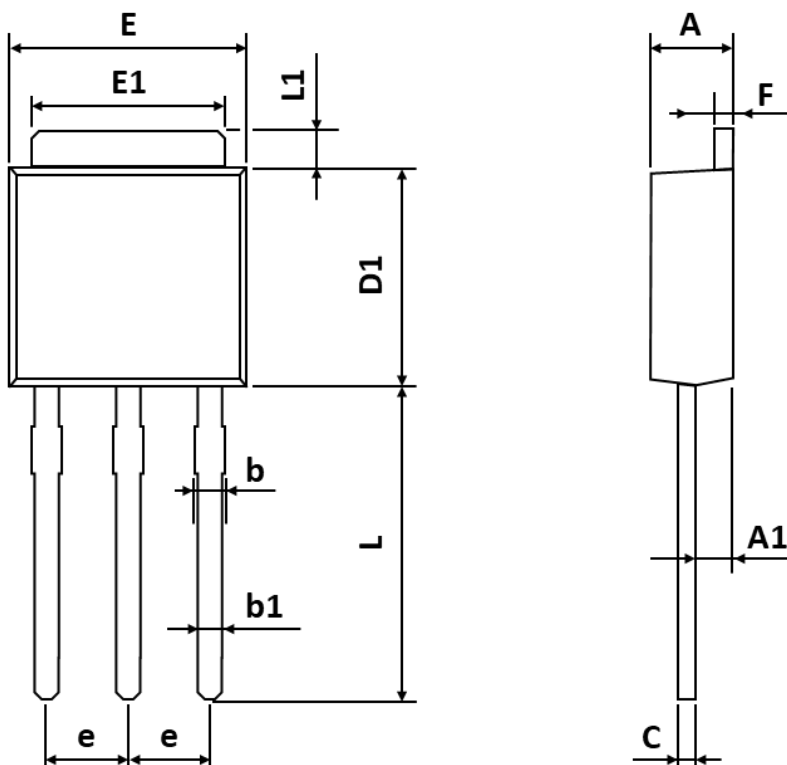


REFERENCE DATA ▲ TYPICAL DEVICE PERFORMANCE

Fig. 12 • Normalized Thermal Transient Impedance Curve



PACKAGE OUTLINE

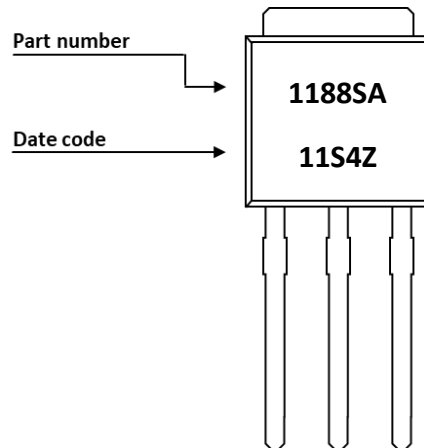


| Sym | Millimeters (Min.) | Millimeters (Typ.) | Millimeters (Max.) |
|-----|-----------------------|-----------------------|-----------------------|
| A | 2.180 | - | 2.400 |
| A1 | 0.860 | - | 1.500 |
| b | 0.700 | - | 0.960 |
| b1 | 0.700 | - | 0.860 |
| C | 0.400 | - | 0.610 |
| D1 | 5.400 | - | 6.630 |
| E | 6.050 | - | 7.010 |
| E1 | 4.950 | - | 5.460 |
| e | 1.980 | - | 2.590 |
| F | 0.400 | - | 0.890 |
| L | 8.500 | - | 9.650 |
| L1 | 0.500 | - | 1.800 |

ORDERING INFORMATION

| Part Number | Package | Packing | Tube Qty. | Inner Box Qty. | Outer Box Qty. |
|-------------|---------------|---------|-----------|----------------|----------------|
| CED1188SA | TO251 (E-PAK) | Tube | 80pcs | 4,000pcs | 16,000pcs |

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 |
| | | | |
| | | | |
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