# N-Channel 80V MOSFET

**TO-220**

### E080N8P7AH1

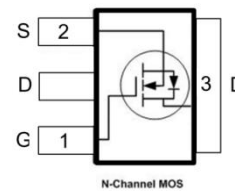| $V_{DS}$ (V) | $R_{DS(on),max}$ (mΩ) | $I_D$ (A) |
|---|---|---|
| 80V | 8.7 @ $V_{GS}$ = 10V | 81 |

## Features

- Low $R_{DS(on)}$ trench technology

- Low thermal impedance

- Fast switching speed

- 100% avalanche tested

## Applications

- DC/DC conversion

- Power switch

- PD charger

- Moto driver

S 2
D
G 1
3 D

N-Channel MOS

Pb-free
RoHS COMPLIANT
HALOGEN FREE

## Package And Ordering Information

| Ordering code | Package | Marking |
|---|---|---|
| E080N8P7AH1 | TO-220 | E080N8P7AH1 |

## Ordering Information

| Package | Units/ Tube | Tubes/ Inner Box | Units/ Inner Box |
|---|---|---|---|
| TO-220 | 50 | 20 | 1000 |

## Key Performance Parameters

| Parameter | Value | Unit |
|---|---|---|
| VDS, min @ Tj(max) | 80 | V |
| ID, pulse | 324 | A |
| RDS(ON), max @ VGS=10V | 8.7 | mΩ |
| Qg | 112 | nC |

## Absolute Maximum Ratings at Tj=25°C Unless Otherwise Noted

| Parameter | | Symbol | Limit | Unit |
|---|---|---|---|---|
| Drain-source voltage | | $V_{DS}$ | 80 | V |
| Gate-source voltage | | $V_{GS}$ | ±20 | |
| Continuous drain current | $T_C$=25°C | $I_D$ | 81 | A |
| | $T_C$=100°C | | 51 | |
| Pulsed drain current | | $I_{D,pulse}$ | 324 | |
| Avalanche energy, single pulse | | $E_{AS}$ | 361 | mJ |
| Power dissipation | $T_C$=25°C | $P_D$ | 125 | W |
| | $T_C$=100°C | | 50 | |
| Operating junction and storage temperature range | | $T_J$, $T_{stg}$ | -55 To 150 | ℃ |

## Thermal Characteristics

| Parameter | | Symbol | Max. | Unit |
|---|---|---|---|---|
| Thermal resistance, junction-to-case | Steady state | $R_{\theta JC}$ | 1 | °C/W |
| Thermal resistance, junction-to-ambient | Steady state | $R_{\theta JA}$ | - | |

## Electrical Characteristics at Tj=25°C unless otherwise specified

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Test conditions |
|---|---|---|---|---|---|---|
| **Static** | | | | | | |
| Drain to source breakdown voltage | $V_{(BR)DSS}$ | 80 | | | V | $V_{GS}$ = 0, $I_D$ = 250 μA |
| Gate-source threshold voltage | $V_{GS(th)}$ | 2 | 2.85 | 4 | V | $V_{DS}$ = $V_{GS}$, $I_D$ = 250 μA |
| Gate-body leakage | $I_{GSS}$ | | | ±100 | nA | $V_{DS}$ = 0 V, $V_{GS}$ = ±20 V |
| Zero gate voltage drain current | $I_{DSS}$ | | | 1 | μA | $V_{DS}$ = 80 V, $V_{GS}$ = 0 V |
| Drain-source on-resistance | $R_{DS}(on)$ | | 7.6 | 8.7 | mΩ | $V_{GS}$ = 10 V, $I_D$ = 40 A |
| Forward transconductance | gfs | | 36 | | S | $V_{DS}$ = 10 V, $I_D$ = 40 A |
| Gate resistance | Rg | | 0.5 | | Ω | f=1MHz |

| Gate Charge | | | | | | |
|---|---|---|---|---|---|---|
| Total gate charge | $Q_g$ | | 112 | | | |
| Gate-source charge | $Q_{gs}$ | | 15 | | nC | $V_{DS}$ = 40 V, $I_D$ = 20 A, $V_{GS}$ = 10 V |
| Gate-drain charge | $Q_{gd}$ | | 45 | | | |
| **Dynamic** | | | | | | |
| Turn-on delay time | $t_{d(on)}$ | | 30 | | | |
| Rise time | $t_r$ | | 18 | | | $V_{DS}$ = 40 V, $V_{GS}$ = 10 V, |
| Turn-off delay time | $t_{d(off)}$ | | 65 | | ns | $R_L$ = 2 Ω, $R_{GEN}$ = 6 Ω |
| Fall time | $t_f$ | | 30 | | | |
| Input capacitance | $C_{iss}$ | | 4450 | | | |
| Output capacitance | $C_{oss}$ | | 210 | | pF | $V_{DS}$ =40 V, $V_{GS}$ = 0 V, f = 1.0MHz |
| Reverse transfer capacitance | $C_{rss}$ | | 180 | | | |
| **Body Diode** | | | | | | |
| Diode forward voltage | $V_{SD}$ | | | 1.2 | V | $V_{GS}$ = 0 V, $I_F$ = 20 A |
| Reverse recovery time | $t_{rr}$ | | 7 | | ns | $I_S$ =20 A, di/dt = 100 A/μs |
| Reverse recovery charge | $Q_{rr}$ | | 40 | | nC | |

**Electrical Characteristics Diagrams**



Figure 1. Output Characteristics
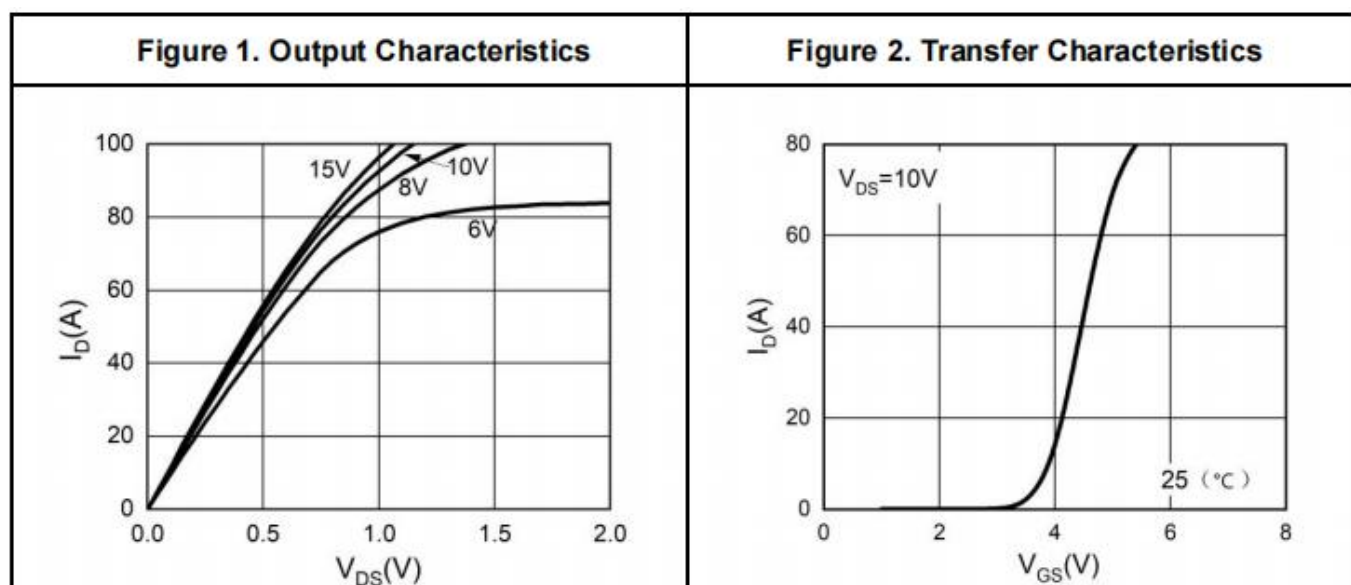
Figure 2. Transfer Characteristics
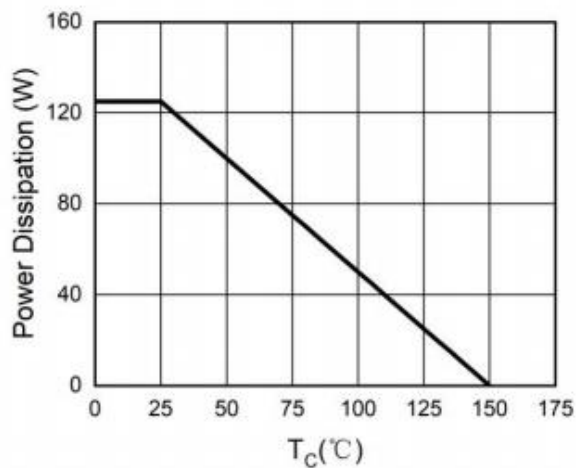
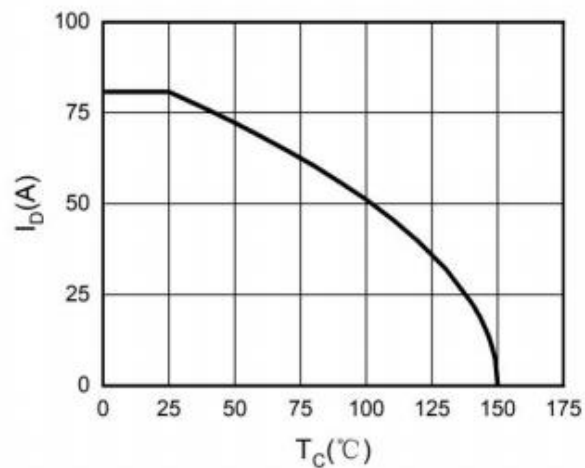## Figure 3. Power Dissipation



## Figure 4. Drain Current
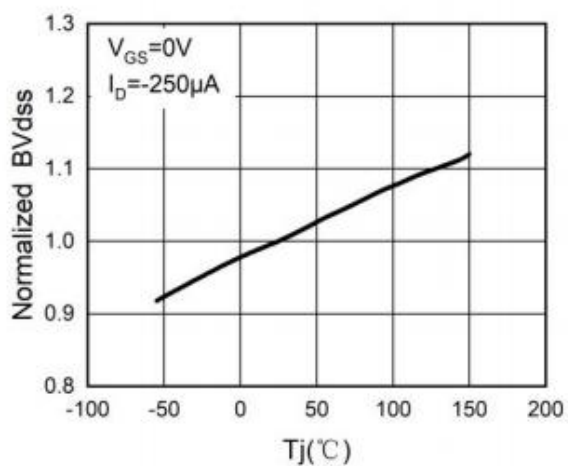


## Figure 5. BV$_{DSS}$ vs Junction Temperature



## Figure 6. R$_{DS(ON)}$ vs Junction Temperature

## Figure 7. Gate Charge Waveforms
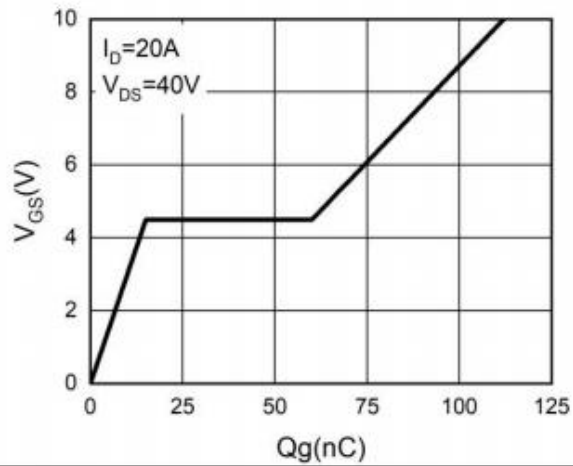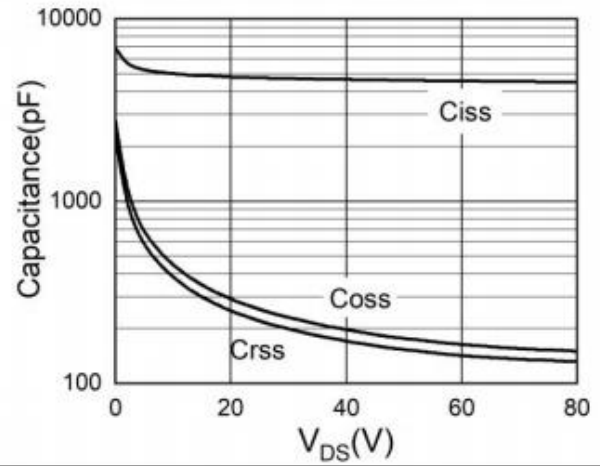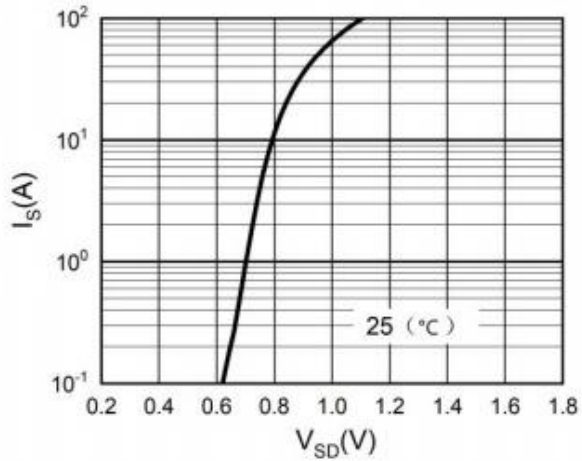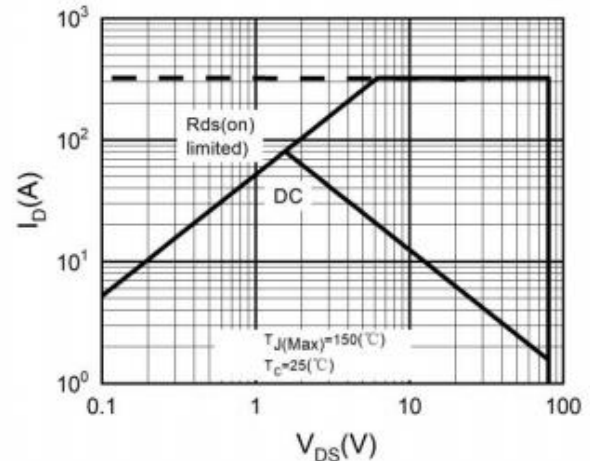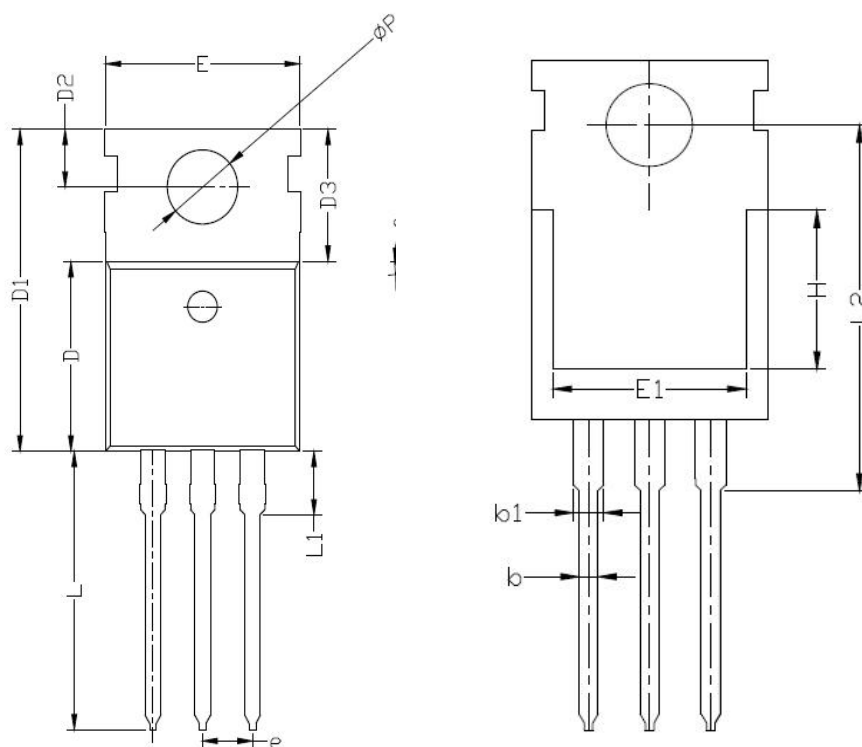


## Figure 8. Capacitance



## Figure 9. Body-Diode Characteristics



## Figure 10. Maximum Safe Operating Area

## Package Outline Dimensions



| Symbols | Millimeters | | |
|---|---|---|---|
| | MIN. | NOM. | MAX. |
| A | 4.27 | 4.57 | 4.87 |
| A1 | 1.15 | 1.30 | 1.45 |
| A2 | 2.20 | 2.40 | 2.60 |
| C | 0.40 | 0.50 | 0.65 |
| L1 | 2.80 | 3.10 | 3.40 |
| L | 13.20 | 13.50 | 13.70 |
| L2 | 15.50 | 15.90 | 16.30 |
| D | 9.00 | 9.20 | 9.40 |
| D1 | 15.10 | 15.60 | 16.10 |
| D2 | 2.60 | 2.80 | 3.00 |
| D3 | 6.20 | 6.40 | 6.60 |
| e | 2.54 BSC. | | |
| H | 6.70 | 6.90 | 7.10 |
| E | 9.70 | 9.90 | 10.10 |
| E1 | 7.80 | 8.00 | 8.20 |
| øP | 3.40 | 3.60 | 3.80 |
| b | 0.70 | 0.80 | 0.90 |
| b1 | 1.17 | 1.27 | 1.37 |
| θ | 4° | 7° | 10° |
| θ1 | 0° | 3° | 6° |

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