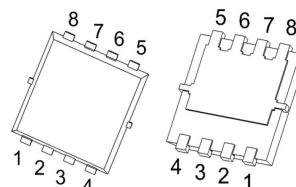


## 40V N-Channel Mosfet

### FEATURES

- $R_{DS(ON)} \leq 8.5 \text{ m}\Omega$  (6.0 m $\Omega$  Typ.)  
@ $V_{GS}=10\text{V}$
- $R_{DS(ON)} \leq 15 \text{ m}\Omega$  (8.8 m $\Omega$  Typ.)  
@ $V_{GS}=4.5\text{V}$
- AEC Q101 qualified
- Green Product (RoHS compliant)
- 100% UIS TEST

### PDFNWB3.3\*3.3-8L

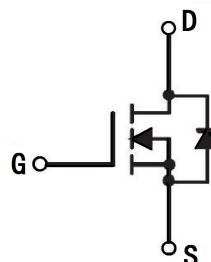


1: S      3: S      5: D      7: D  
2: S      4: G      6: D      8: D

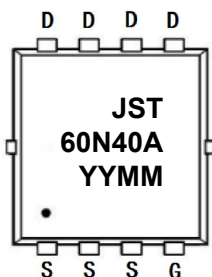
### APPLICATIONS

- Automotive Systems
- PWM Applications
- Load Switch
- Power Management

### N-CHANNEL MOSFET



### MARKING



YYMM:Date Code(year & month)

### Absolute Maximum Ratings ( $T_C=25^\circ\text{C}$ unless otherwise specified)

| Symbol          | Parameter  |                           | Max.        | Units              |
|-----------------|--|---------------------------|-------------|--------------------|
| $V_{DSS}$       | Drain-Source Voltage                                 |                           | 40          | V                  |
| $V_{GSS}$       | Gate-Source Voltage                                  |                           | $\pm 20$    | V                  |
| $I_D$           | Continuous Drain Current @ $V_{GS}=10\text{V}$ note1 | $T_C = 25^\circ\text{C}$  | 50          | A                  |
|                 |  | $T_C = 100^\circ\text{C}$ | 35          | A                  |
| $I_{DM}$        | Pulsed Drain Current note2                           |                           | 200         | A                  |
| $E_{AS}$        | Single Pulsed Avalanche Energy note3                 |                           | 32          | mJ                 |
| $P_D$           | Power Dissipation                                    | $T_C = 25^\circ\text{C}$  | 43          | W                  |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case                 |                           | 3.5         | $^\circ\text{C/W}$ |
| $T_J, T_{STG}$  | Operating and Storage Temperature Range              |                           | -55 to +175 | $^\circ\text{C}$   |

## Electrical Characteristics (T<sub>c</sub>=25°C unless otherwise specified)

| Symbol   | Parameter   | Test Condition   | Min. | Typ. | Max. | Units |
|--|---|--|------|------|------|-------|
| Off Characteristic                                     |   |  |      |      |      |       |
| V <sub>(BR)DSS</sub>                                   | Drain-Source Breakdown Voltage                            | V <sub>GS</sub> =0V,I <sub>D</sub> =250μA  | 40   | -    | -    | V     |
| I <sub>DSS</sub>                                       | Zero Gate Voltage Drain Current                           | V <sub>DS</sub> =40V, V <sub>GS</sub> = 0V,  | -    | -    | 1.0  | μA    |
| I <sub>GSS</sub>                                       | Gate to Body Leakage Current                              | V <sub>DS</sub> =0V,V <sub>GS</sub> = ±20V   | -    | -    | ±100 | nA    |
| On Characteristics                                     |   |  |      |      |      |       |
| V <sub>GS(th)</sub>                                    | Gate Threshold Voltage                                    | V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> =250μA                                | 1.0  | 1.5  | 2.5  | V     |
| R <sub>DS(on)</sub>                                    | Static Drain-Source on-Resistance<br><small>note4</small> | V <sub>GS</sub> =10V, I <sub>D</sub> =30A  | -    | 6.0  | 8.5  | mΩ    |
|  |   | V <sub>GS</sub> =4.5V, I <sub>D</sub> =20A   | -    | 8.8  | 15   |       |
| Dynamic Characteristics <small>note5</small>           |   |  |      |      |      |       |
| C <sub>iss</sub>                                       | Input Capacitance   | V <sub>DS</sub> = 20V, V <sub>GS</sub> =0V,<br>f = 1.0MHz                                | -    | 820  | -    | pF    |
| C <sub>Oss</sub>                                       | Output Capacitance  |  | -    | 323  | -    | pF    |
| C <sub>rss</sub>                                       | Reverse Transfer Capacitance                              |  | -    | 87   | -    | pF    |
| R <sub>g</sub>   | Gate resistance   | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V,<br>f=1MHz                                      | -    | 6.5  | -    | Ω     |
| Q <sub>g</sub>   | Total Gate Charge   | V <sub>DS</sub> =20V, I <sub>D</sub> =30A,<br>V <sub>GS</sub> =10V                       | -    | 13.1 | -    | nC    |
| Q <sub>gs</sub>  | Gate-Source Charge  |  | -    | 4.2  | -    | nC    |
| Q <sub>gd</sub>  | Gate-Drain(“Miller”) Charge                               |  | -    | 1.8  | -    | nC    |
| Switching Characteristics <small>note5</small>         |   |  |      |      |      |       |
| t <sub>d(on)</sub>                                     | Turn-on Delay Time  | V <sub>DD</sub> =20V, I <sub>D</sub> =30A,<br>R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V | -    | 8.1  | -    | ns    |
| t <sub>r</sub>   | Turn-on Rise Time   |  | -    | 6.3  | -    | ns    |
| t <sub>d(off)</sub>                                    | Turn-off Delay Time                                       |  | -    | 28   | -    | ns    |
| t <sub>f</sub>   | Turn-off Fall Time  |  | -    | 8    | -    | ns    |
| Drain-Source Diode Characteristics and Maximum Ratings |   |  |      |      |      |       |
| V <sub>SD</sub>  | Drain to Source Diode Forward Voltage                     | V <sub>GS</sub> =0V, I <sub>S</sub> =30A   | -    | 0.8  | 1.2  | V     |
| t <sub>rr</sub>  | Body Diode Reverse Recovery Time                          | T <sub>J</sub> =25℃,<br>I <sub>F</sub> =20A,dI/dt=100A/μs                                | -    | 12   | -    | ns    |
| Q <sub>rr</sub>  | Body Diode Reverse Recovery Charge                        |  | -    | 4    | -    | nC    |

Notes:1. T<sub>c</sub>=25°C Limited only by maximum temperature allowed. Calculated continuous current based on maximum allowable junction temperature.

2. PW≤10μs, Duty cycle≤1%

3. EAS condition: VDD=20V, VG=10V, ID=8A, L=1mH starting T<sub>J</sub>=25°C.

4. Pulse Test: Pulse width ≤ 300μs, Duty Cycle ≤0.5%

5. Guaranteed by design, not subject to production testing

## Typical Performance Characteristics

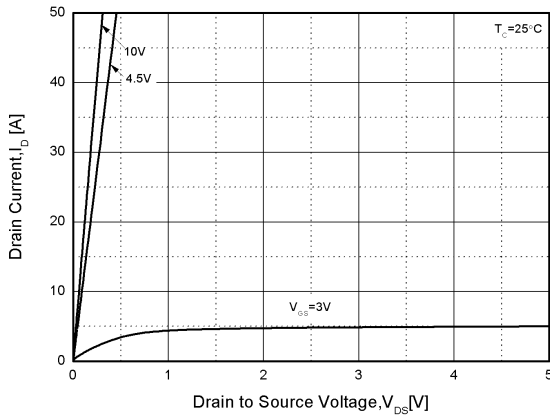


Figure1. Output Characteristics

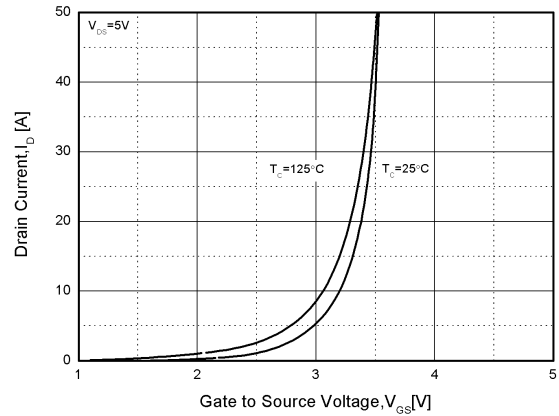


Figure2. Transfer Characteristics

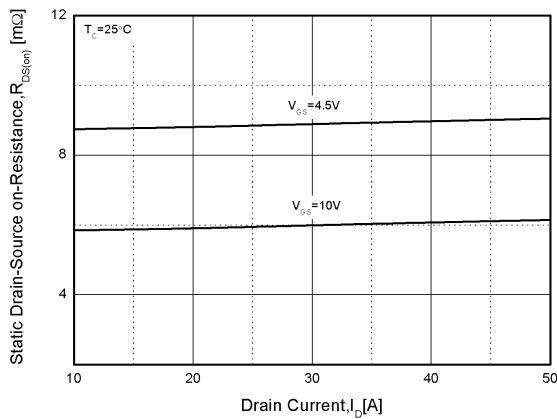


Figure3. Rdson-Drain Current

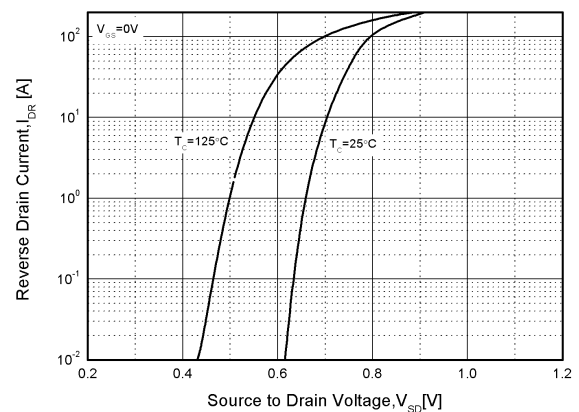


Figure4. Typical Source-Drain Diode Forward Voltage

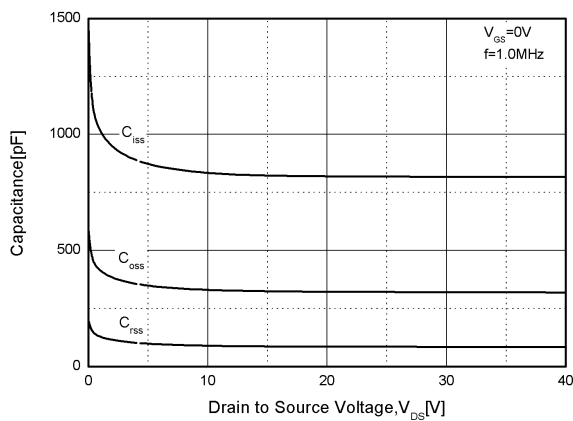


Figure5. Capacitance Characteristics

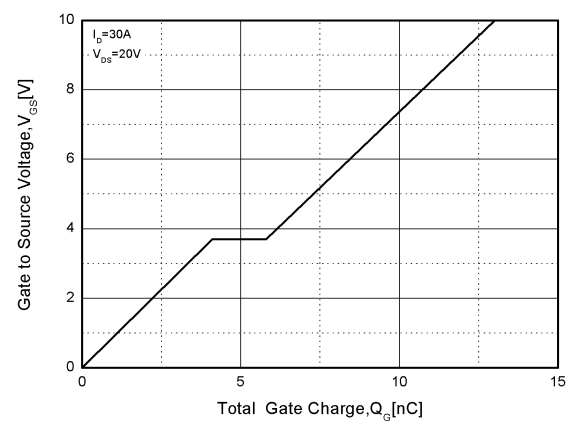


Figure6. Gate Charge

## TYPICAL PERFORMANCE CHARACTERISTICS (cont.)

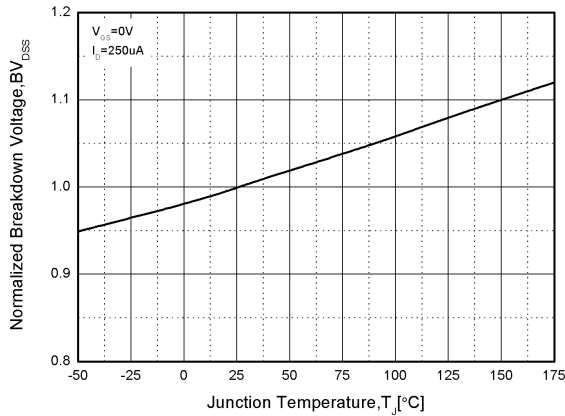


Figure7. Normalized Breakdown Voltage vs. Temperature

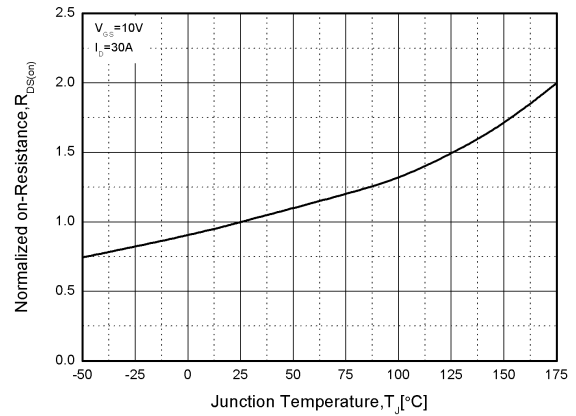


Figure8. Normalized on Resistance vs. Temperature

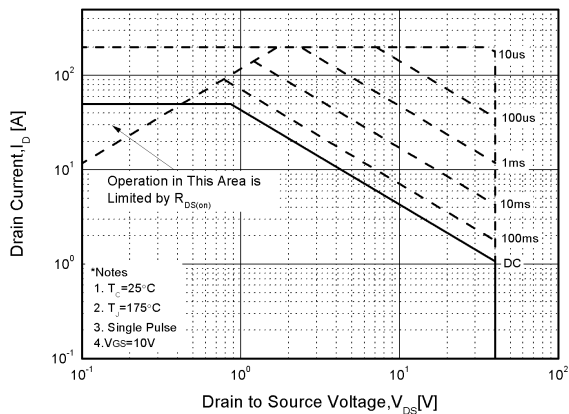


Figure9. Safe Operation Area

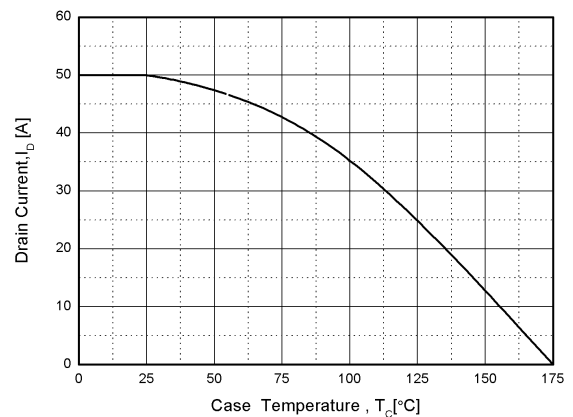


Figure10. Drain Current vs. Case Temperature

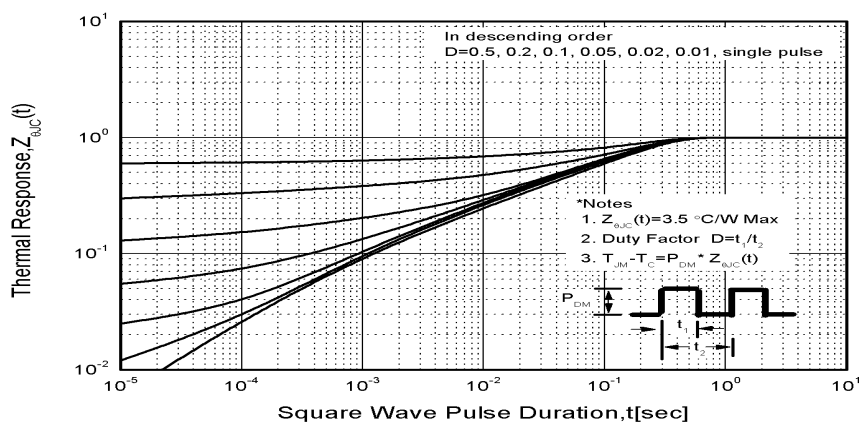
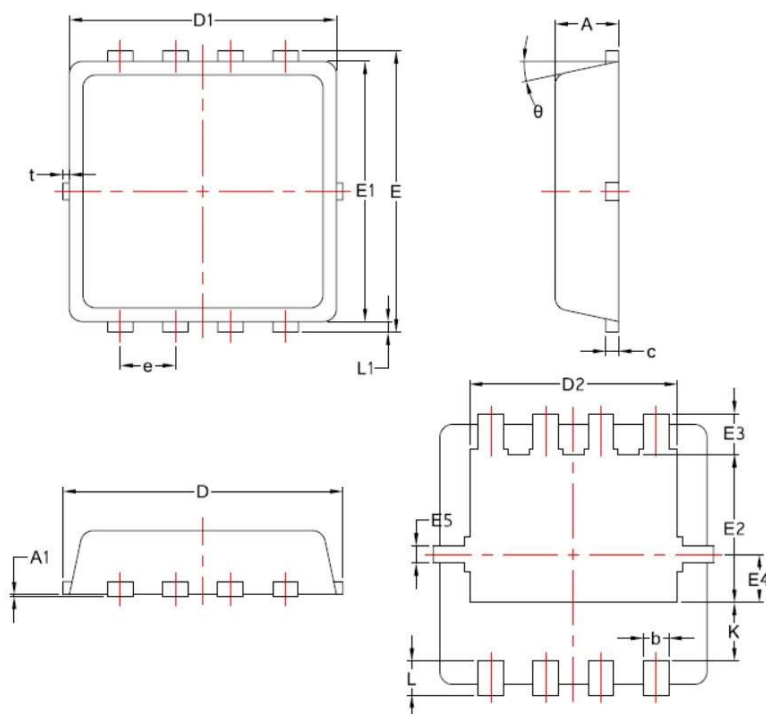


Figure11. Transient Thermal Response Curve

## PDFNWB3.3\*3.3-8L Package Outline Dimensions



| Symbols | Dimensions  |       |      |        |       |       |
|---------|-------------|-------|------|--------|-------|-------|
|         | Millimeters |       |      | Inches |       |       |
|         | Min.        | Typ.  | Max. | Min.   | Typ.  | Max.  |
| A       | 0.70        | 0.75  | 0.85 | 0.028  | 0.030 | 0.033 |
| A1      | ---         | ---   | 0.05 | ---    | ---   | 0.002 |
| b       | 0.20        | 0.30  | 0.40 | 0.008  | 0.012 | 0.016 |
| c       | 0.10        | 0.152 | 0.25 | 0.004  | 0.152 | 0.010 |
| D       | 3.15        | 3.30  | 3.45 | 0.124  | 0.130 | 0.136 |
| D1      | 3.00        | 3.15  | 3.25 | 0.118  | 0.124 | 0.128 |
| D2      | 2.29        | 2.45  | 2.65 | 0.090  | 0.096 | 0.104 |
| E       | 3.15        | 3.30  | 3.45 | 0.124  | 0.130 | 0.136 |
| E1      | 2.90        | 3.05  | 3.20 | 0.114  | 0.120 | 0.126 |
| E2      | 1.54        | 1.74  | 1.94 | 0.060  | 0.069 | 0.076 |
| E3      | 0.28        | 0.48  | 0.65 | 0.011  | 0.019 | 0.026 |
| E4      | 0.37        | 0.57  | 0.77 | 0.015  | 0.022 | 0.030 |
| E5      | 0.10        | 0.20  | 0.30 | 0.004  | 0.008 | 0.012 |
| e       | 0.60        | 0.65  | 0.70 | 0.024  | 0.026 | 0.028 |
| K       | 0.59        | 0.69  | 0.89 | 0.023  | 0.027 | 0.035 |
| L       | 0.30        | 0.40  | 0.50 | 0.012  | 0.016 | 0.020 |
| L1      | 0.06        | 0.125 | 0.20 | 0.002  | 0.005 | 0.008 |
| t       | 0           | 0.075 | 0.13 | 0      | 0.003 | 0.005 |
| θ       | 10°         | 12°   | 14°  | 10°    | 12°   | 14°   |