

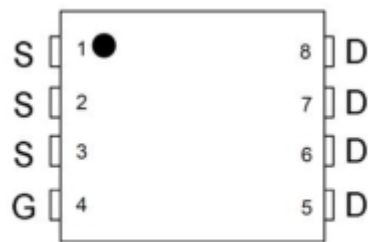
## Product Summary

| $V_{(BR)DSS}$ | $R_{DS(on)TYP}$ | $I_D$ |
|---------------|-----------------|-------|
| -20V          | 6.6mΩ@-4.5V     | -45A  |
|               | 8mΩ@-2.5V       |       |

## Feature

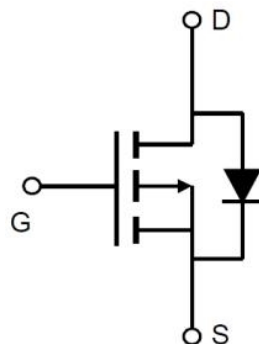
- Super Low Gate Charge
- Green Device Available
- Excellent  $CdV/dt$  effect decline
- Advanced high cell density Trench technology

## Package

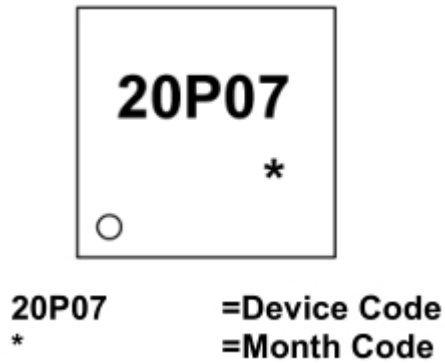


PDFNWB3.3×3.3-8L

## Circuit diagram



## Marking



## Absolute maximum ratings

(T<sub>a</sub>=25°C unless otherwise noted)

| Parameter                                | Symbol           | Value     | Unit |
|--|------------------|-----------|------|
| Drain-Source Voltage                     | V <sub>DS</sub>  | -20       | V    |
| Gate-Source Voltage                      | V <sub>GS</sub>  | ±12       | V    |
| Continuous Drain Current                 | I <sub>D</sub>   | -45       | A    |
| Pulsed Drain Current <sup>1)</sup>       | I <sub>DM</sub>  | -180      | A    |
| Power Dissipation                        | P <sub>D</sub>   | 38        | W    |
| Thermal Resistance from Junction to Case | R <sub>θJC</sub> | 3.2       | °C/W |
| Junction Temperature                     | T <sub>J</sub>   | 150       | °C   |
| Storage Temperature                      | T <sub>STG</sub> | -55~ +150 | °C   |

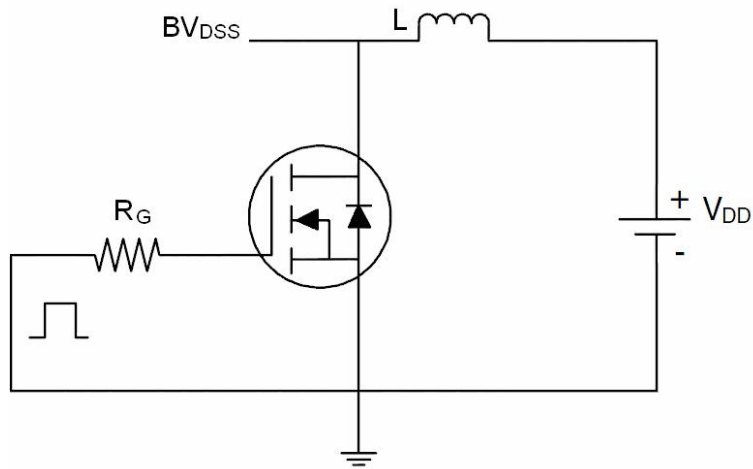
## Electrical characteristics

( $T_A=25^{\circ}\text{C}$ , unless otherwise noted)

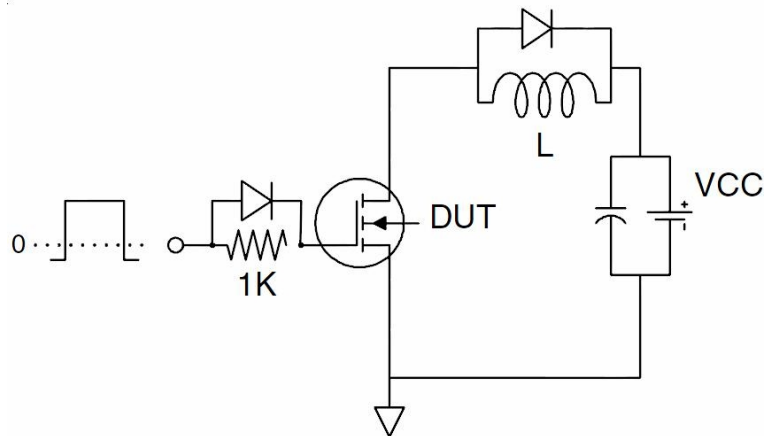
| Parameter  | Symbol        | Test Condition   | Min.  | Typ.  | Max.      | Unit       |
|--|---------------|--|-------|-------|-----------|------------|
| Static Characteristics                                   |               |  |       |       |           |            |
| Drain-source breakdown voltage                           | $V_{(BR)DSS}$ | $V_{GS} = 0V, I_D = -250\mu A$                                       | -20   |       |           | V          |
| Zero gate voltage drain current                          | $I_{DSS}$     | $V_{DS} = -20V, V_{GS} = 0V$   |       |       | 1         | $\mu A$    |
| Gate-body leakage current                                | $I_{GSS}$     | $V_{GS} = \pm 12V, V_{DS} = 0V$                                      |       |       | $\pm 100$ | $\mu A$    |
| On Characteristics                                       |               |  |       |       |           |            |
| Gate threshold voltage                                   | $V_{GS(th)}$  | $V_{DS} = V_{GS}, I_D = -250\mu A$                                   | -0.35 | -0.65 | -1        | V          |
| Static Drain-Source On-Resistance <sup>1</sup>           | $R_{DS(on)}$  | $V_{GS} = -4.5V, I_D = -15A$   |       | 6.6   | 9         | m $\Omega$ |
|  |               | $V_{GS} = -2.5V, I_D = -12A$   |       | 8     | 12        |            |
| Dynamic Characteristics                                  |               |  |       |       |           |            |
| Input Capacitance  | $C_{iss}$     | $V_{DS} = -10V, V_{GS} = 0V,$<br>$f = 1MHz$                          |       | 4600  |           | pF         |
| Output Capacitance                                       | $C_{oss}$     |  |       | 460   |           |            |
| Reverse Transfer Capacitance                             | $C_{rss}$     |  |       | 459   |           |            |
| Total Gate Charge  | $Q_g$         | $V_{DS} = -10V, V_{GS} = -4.5V,$<br>$I_D = -15A$                     |       | 46    |           | pF         |
| Gate Source Charge                                       | $Q_{gs}$      |  |       | 7.3   |           |            |
| Gate Drain Charge  | $Q_{gd}$      |  |       | 10    |           |            |
| Switching Characteristics                                |               |  |       |       |           |            |
| Turn-On Delay Time                                       | $T_{d(on)}$   | $V_{DD} = -10V, I_D = -14A,$<br>$R_{GEN} = 2.7\Omega, V_{GS} = -10V$ |       | 8     |           | nS         |
| Rise Time  | $T_r$         |  |       | 59    |           |            |
| Turn-Off Delay Time                                      | $T_{d(off)}$  |  |       | 111   |           |            |
| Fall Time  | $T_f$         |  |       | 43    |           |            |
| Drain-Source Diode Characteristics and Maximum Ratings   |               |  |       |       |           |            |
| Maximum Continuous Drain to Source Diode Forward Current | $I_S$         |  |       |       | -55       | A          |
| Drain to Source Diode Forward Voltage                    | $V_{SD}$      | $V_{GS} = 0V, I_S = -1A$   |       |       | -1.2      | V          |
| Reverse Recovery Time                                    | $t_{rr}$      | $T_J = 25^{\circ}C, I_{SD} = -15A,$                                  |       | 18    |           | nS         |
| Reverse Recovery Charge                                  | $Q_{rr}$      | $V_{GS} = 0V, dl/dt = 100A/\mu s$                                    |       | 7.7   |           | nC         |

## Test Circuit

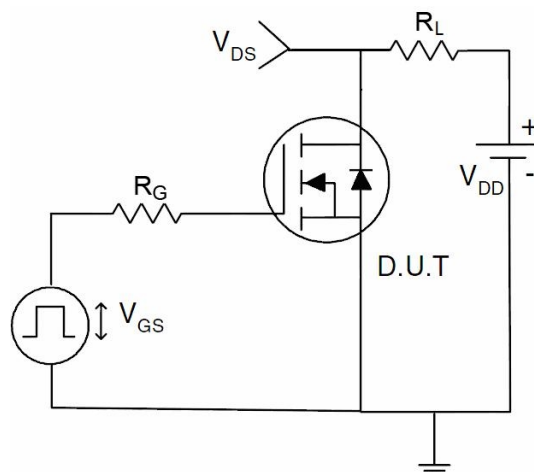
- EAS Test Circuits



- Gate Charge Test Circuit

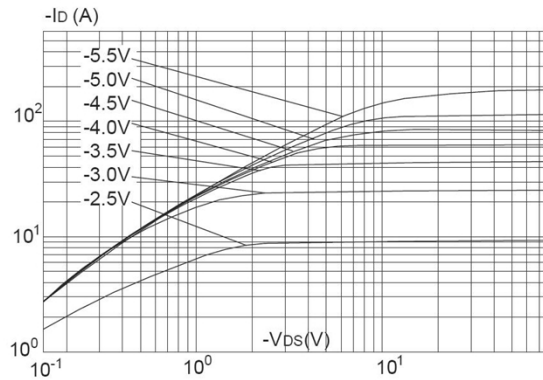


- Switch Time Test Circuit

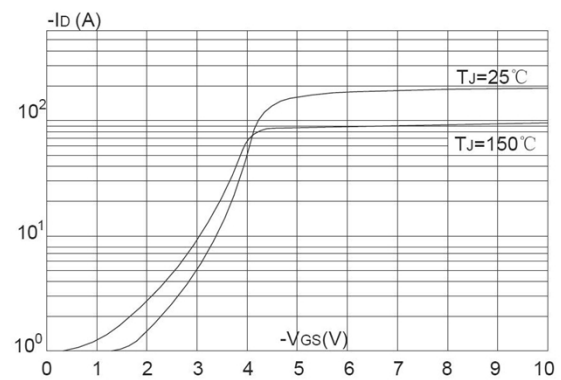


## Typical Characteristics

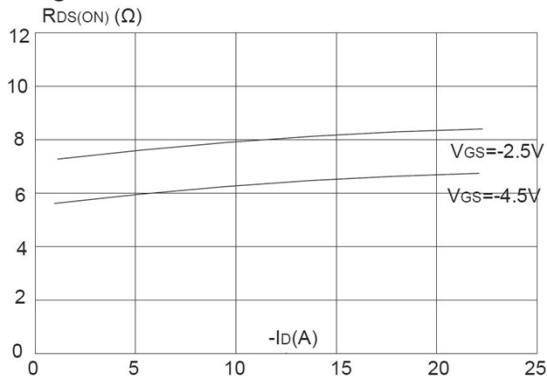
**Figure 1: Output Characteristics**



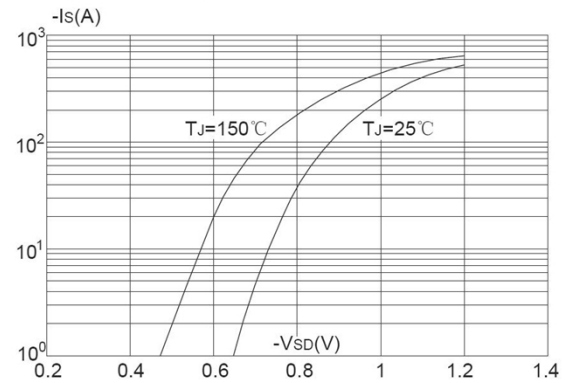
**Figure 2: Typical Transfer Characteristics**



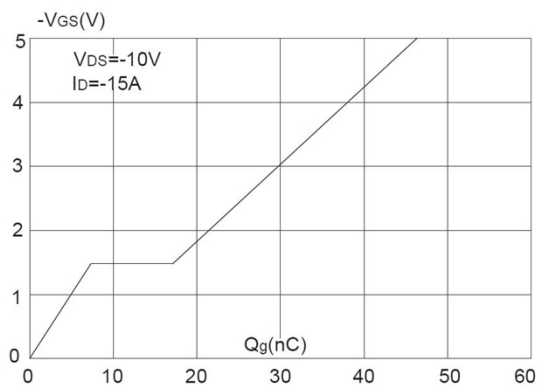
**Figure 3: On-resistance vs. Drain Current**



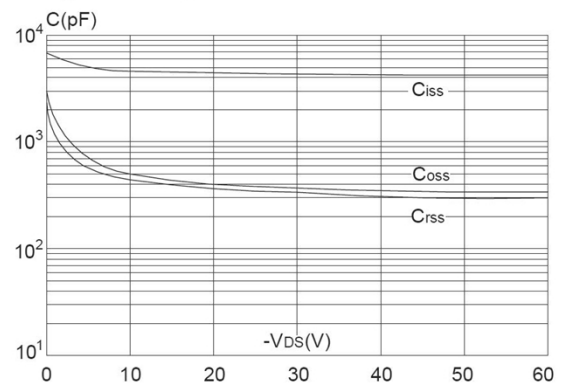
**Figure 4: Body Diode Characteristics**



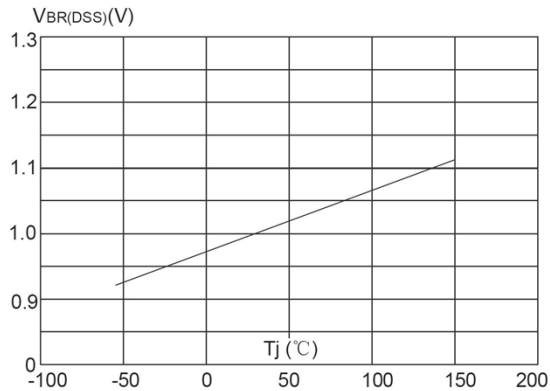
**Figure 5: Gate Charge Characteristics**



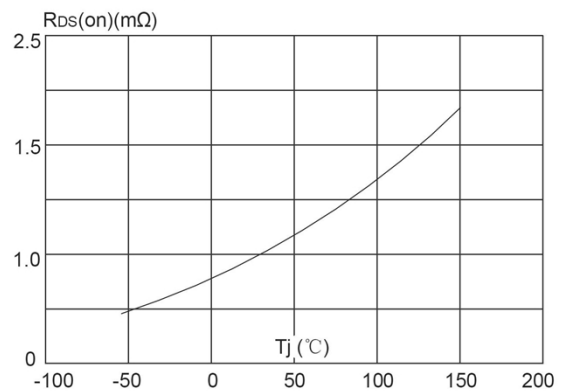
**Figure 6: Capacitance Characteristics**



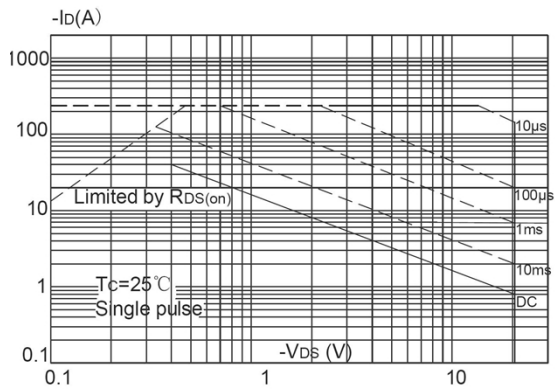
**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature



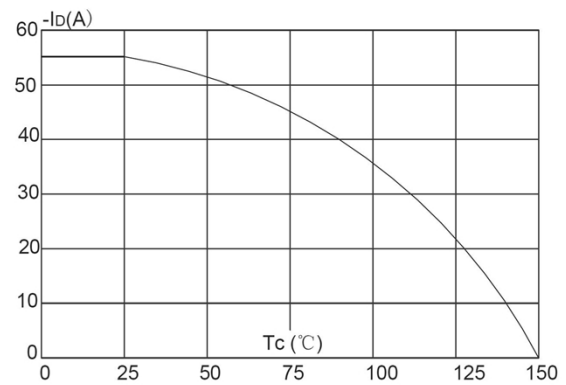
**Figure 8:** Normalized on Resistance vs. Junction Temperature



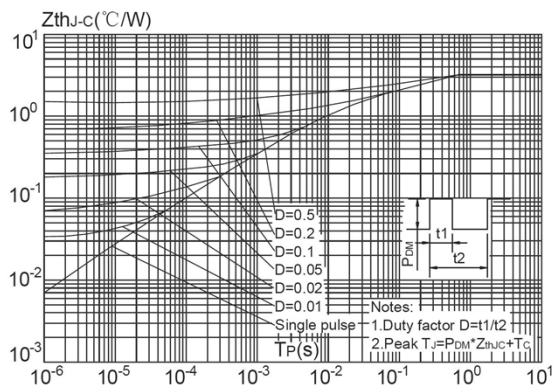
**Figure 9:** Maximum Safe Operating Area



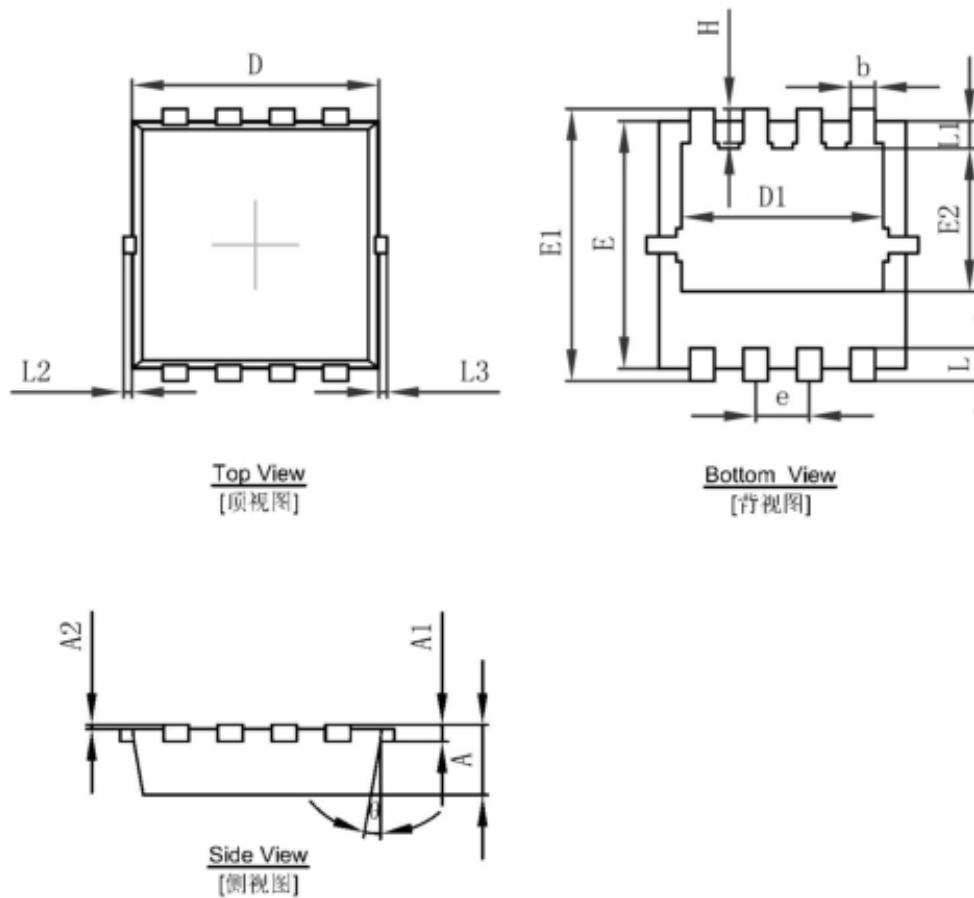
**Figure 10:** Maximum Continuous Drain Current vs. Case Temperature



**Figure.11:** Maximum Effective Transient Thermal Impedance, Junction-to-Case



## PDFNWB3.3×3.3-8L Package Information



| Symbol | Dimensions In Millimeters |       | Dimensions In Inches |       |
|--------|---------------------------|-------|----------------------|-------|
|        | Min.                      | Max.  | Min.                 | Max.  |
| A      | 0.650                     | 0.850 | 0.026                | 0.033 |
| A1     | 0.152 REF.                |       | 0.006 REF.           |       |
| A2     | 0~0.05                    |       | 0~0.002              |       |
| D      | 2.900                     | 3.100 | 0.114                | 0.122 |
| D1     | 2.300                     | 2.600 | 0.091                | 0.102 |
| E      | 2.900                     | 3.100 | 0.114                | 0.122 |
| E1     | 3.150                     | 3.450 | 0.124                | 0.136 |
| E2     | 1.535                     | 1.935 | 0.060                | 0.076 |
| b      | 0.200                     | 0.400 | 0.008                | 0.016 |
| e      | 0.550                     | 0.750 | 0.022                | 0.030 |
| L      | 0.300                     | 0.500 | 0.012                | 0.020 |
| L1     | 0.180                     | 0.480 | 0.007                | 0.019 |
| L2     | 0~0.100                   |       | 0~0.004              |       |
| L3     | 0~0.100                   |       | 0~0.004              |       |
| H      | 0.315                     | 0.515 | 0.012                | 0.020 |
| θ      | 9°                        | 13°   | 9°                   | 13°   |