

## 60V N-Channel Mosfet

### FEATURES

- $R_{DS(ON)} \leq 15 \text{ m}\Omega$  (12 m $\Omega$  Typ.)  
@ $V_{GS}=10\text{V}$
- $R_{DS(ON)} \leq 19 \text{ m}\Omega$  (15 m $\Omega$  Typ.)  
@ $V_{GS}=4.5\text{V}$
- AEC Q101 qualified
- Green Product (RoHS compliant)
- 100% UIS TEST

### APPLICATIONS

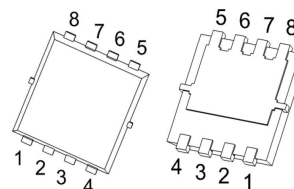
- Automotive Lighting
- Synchronous rectification
- PWM Applications
- Load Switch
- Power Management

### MARKING



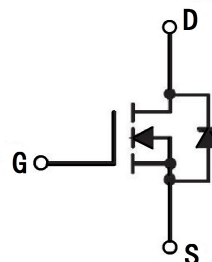
YYMM:Date Code(year & month)

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



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

### N-CHANNEL MOSFET



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

Symbol	Parameter		Max.	Units
$V_{DSS}$	Drain-Source Voltage		60	V
$V_{GSS}$	Gate-Source Voltage		$\pm 20$	V
$I_D$	Continuous Drain Current @ $V_{GS}=10\text{V}$	$T_C = 25^\circ\text{C}$	40	A
		$T_C = 100^\circ\text{C}$	28	A
$I_{DM}$	Pulsed Drain Current <sup>note1</sup>		160	A
$E_{AS}$	Single Pulsed Avalanche Energy <sup>note2</sup>		132	mJ
$P_D$	Power Dissipation	$T_C = 25^\circ\text{C}$	42	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	60	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =60V, 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 <small>note3</small>	V <sub>GS</sub> =10V, I <sub>D</sub> =20A	-	12	15	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =10A	-	15	19	
Dynamic Characteristics <small>note4</small>						
C <sub>iSS</sub>	Input Capacitance	V <sub>DS</sub> = 40V, V <sub>GS</sub> =0V, f = 1.0MHz	-	1550	-	pF
C <sub>oSS</sub>	Output Capacitance		-	262	-	pF
C <sub>rSS</sub>	Reverse Transfer Capacitance		-	15	-	pF
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =40V, I <sub>D</sub> =25A, V <sub>GS</sub> =10V	-	36	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	9.0	-	nC
Q <sub>gd</sub>	Gate-Drain(“Miller”) Charge		-	4.7	-	nC
Switching Characteristics <small>note4</small>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =40V, I <sub>D</sub> =25A, R <sub>GEN</sub> =3Ω, V <sub>GS</sub> =10V	-	9.5	-	ns
t <sub>r</sub>	Turn-on Rise Time		-	6.9	-	ns
t <sub>d(off)</sub>	Turn-off Delay Time		-	29	-	ns
t <sub>f</sub>	Turn-off Fall Time		-	14.8	-	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> =20A	-	-	1.2	V

Notes: 1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature

2. EAS condition T<sub>J</sub>=25°C, V<sub>DD</sub>=20V, V<sub>G</sub>=10V, L=0.5mH

3. Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

4. Guaranteed by design, not subject to production testing

## Typical Performance Characteristics

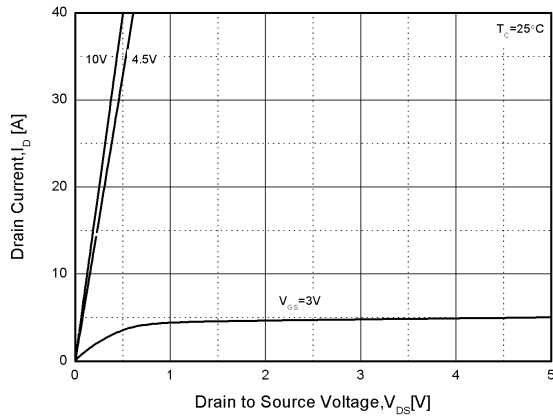


Figure1. Output Characteristics

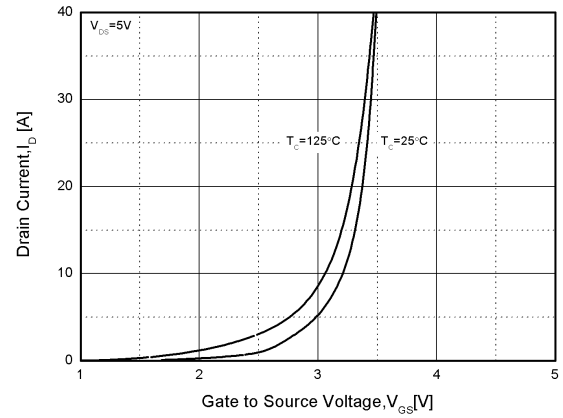


Figure2. Transfer Characteristics

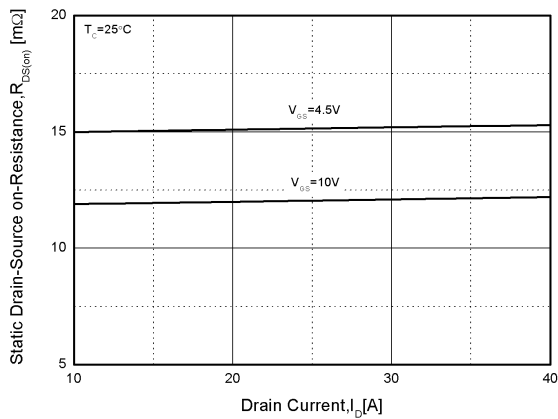


Figure3. Rdson-Drain Current

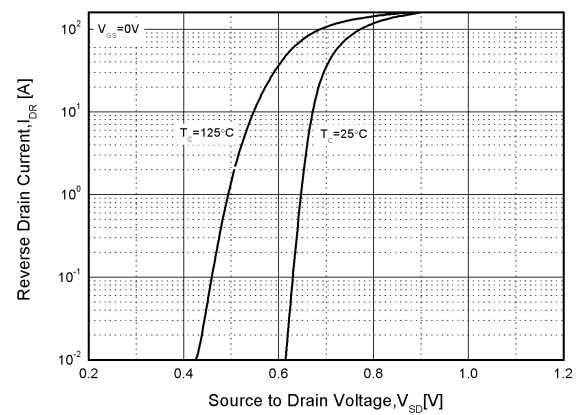


Figure4. Typical Source-Drain Diode Forward Voltage

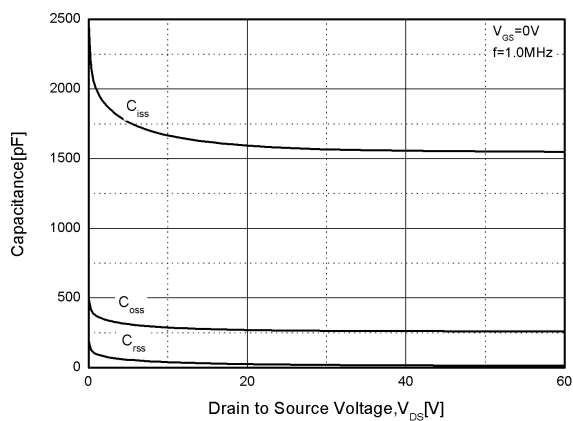


Figure5. Capacitance Characteristics

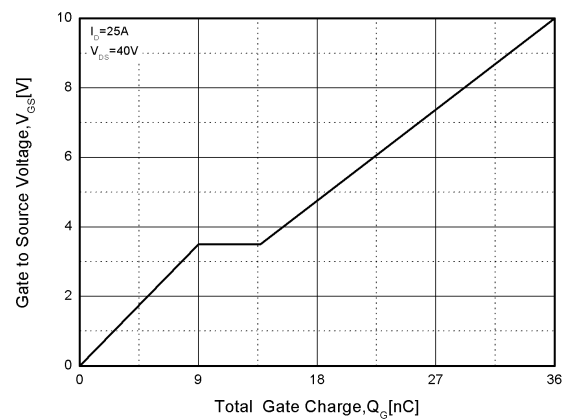


Figure6. Gate Charge

## Typical Performance Characteristics (cont. )

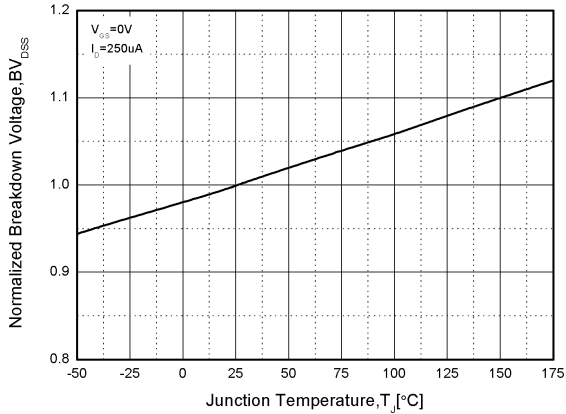


Figure7. Normalized Breakdown Voltage vs. Temperature

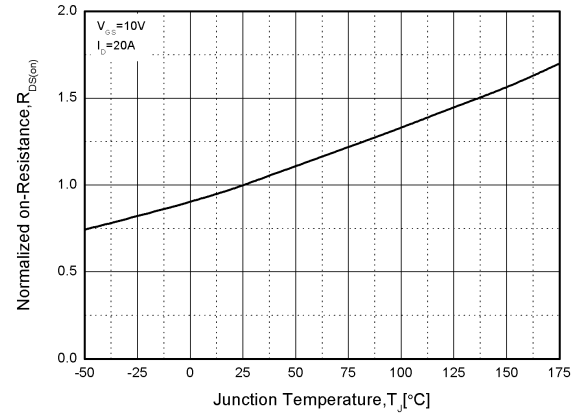


Figure8. Normalized on Resistance vs. Temperature

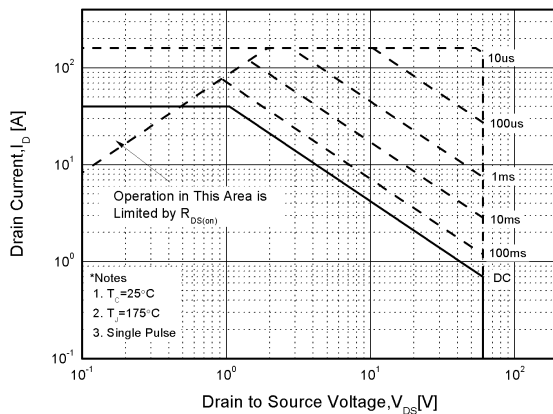


Figure9. Safe Operation Area

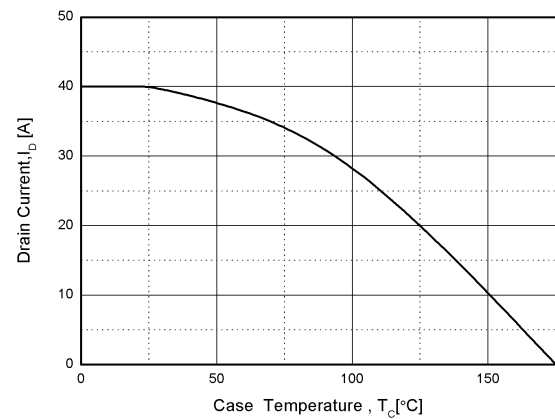


Figure10. Drain Current vs. Case Temperature

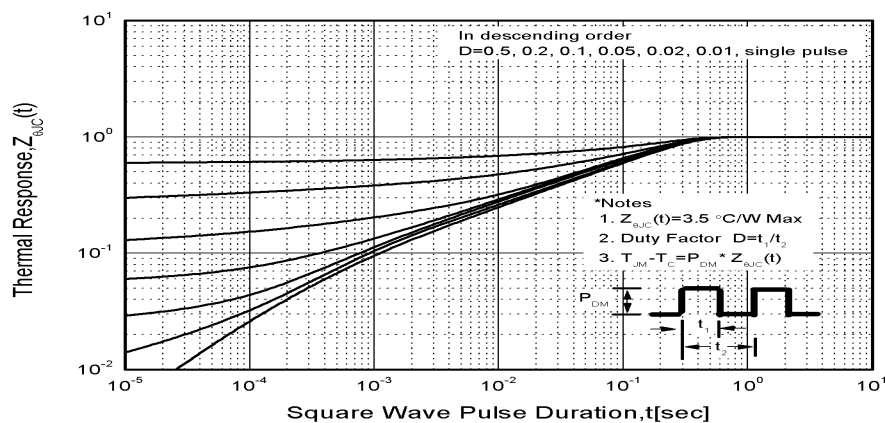
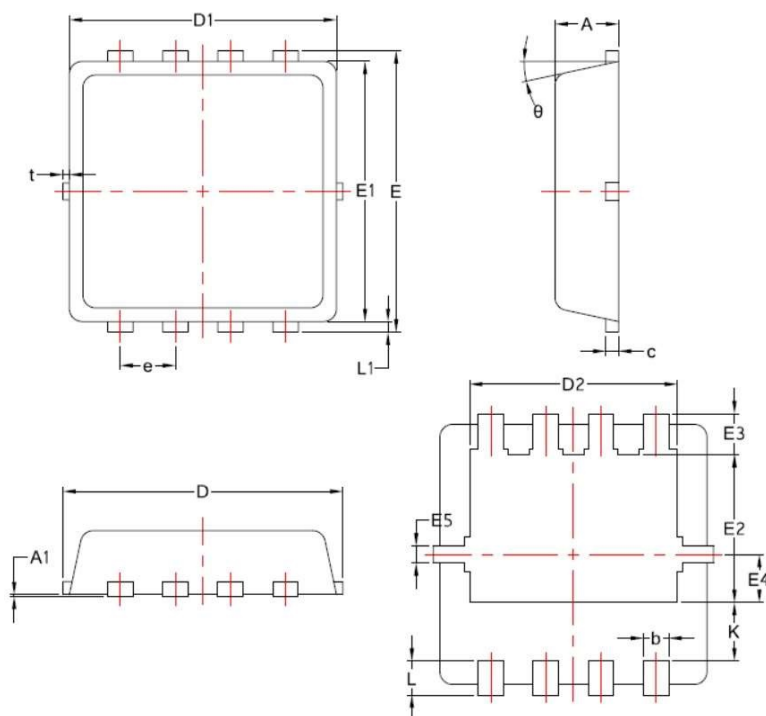


Figure11. Transient Thermal Response Curve

## 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°