

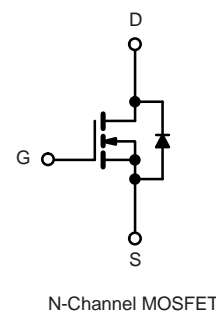
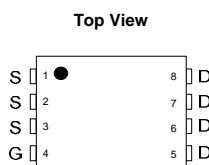
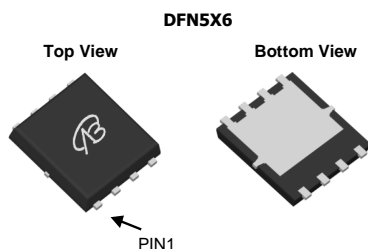
## N-Channel 40V (D-S) MOSFET

### PRODUCT SUMMARY

$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ )	$I_D$ (A) <sup>a</sup>
40	0.006 at $V_{GS} = 10$ V	45
	0.008 at $V_{GS} = 4.5$ V	40

### FEATURES

- 175 °C Junction Temperature
- SGT technology Power MOSFET
- Material categorization:


**RoHS**  
 COMPLIANT


### ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)

Parameter	Symbol	Limit	Unit
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current ( $T_J = 175$ °C) <sup>b</sup>	$I_D$	45	A
		25 <sup>a</sup>	
Pulsed Drain Current	$I_{DM}$	135	
Continuous Source Current (Diode Conduction)	$I_S$	81 <sup>a</sup>	
Avalanche Current	$I_{AS}$	72	
Single Avalanche Energy (Duty Cycle $\leq 1$ %)	$E_{AS}$	128	mJ
Maximum Power Dissipation	$P_D$	136	W
		3 <sup>b</sup> , 8.3 <sup>b, c</sup>	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 175	°C

### THERMAL RESISTANCE RATINGS

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient <sup>a</sup>	$R_{thJA}$	15	18	°C/W
		40	50	
Maximum Junction-to-Case	$R_{thJC}$	0.85	1.1	

Notes:

a. Package limited.

b. Surface mounted on 1" x 1" FR4 board.

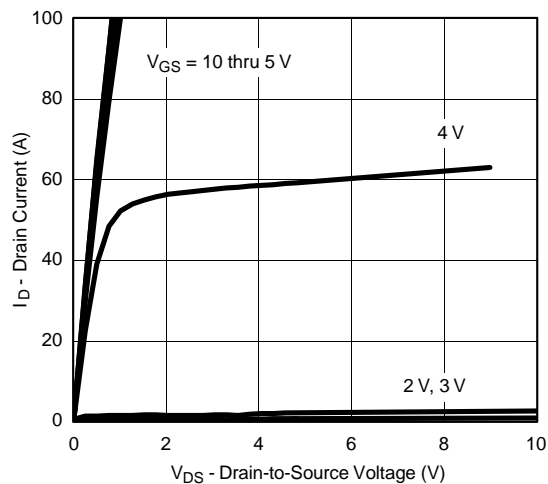
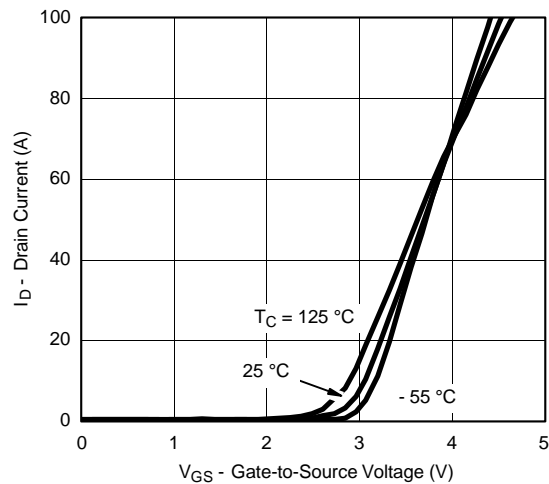
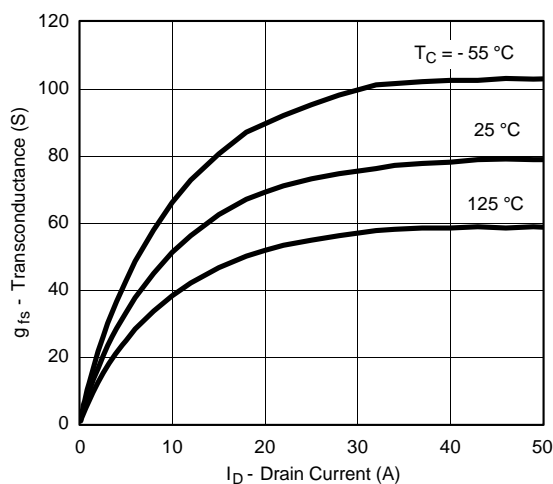
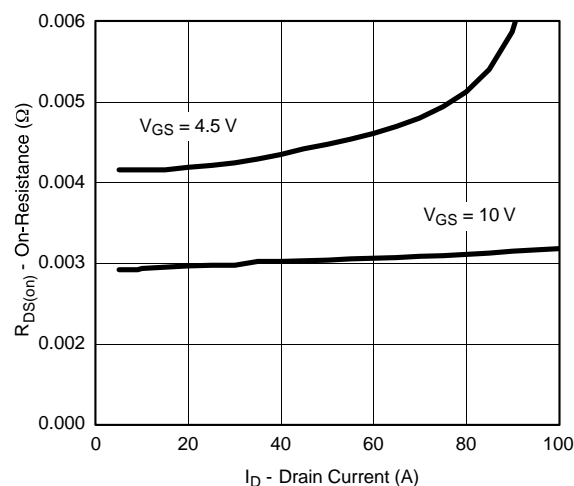
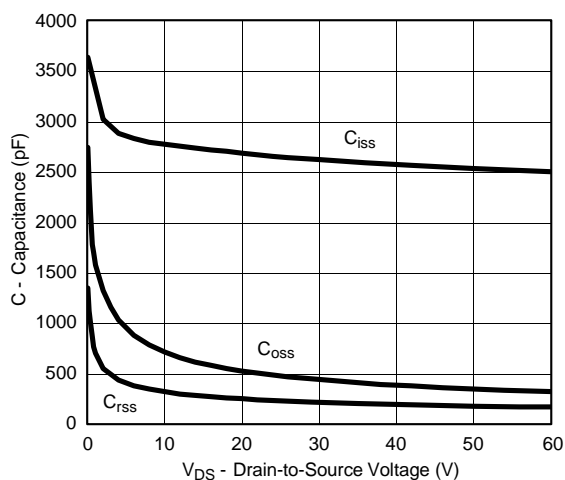
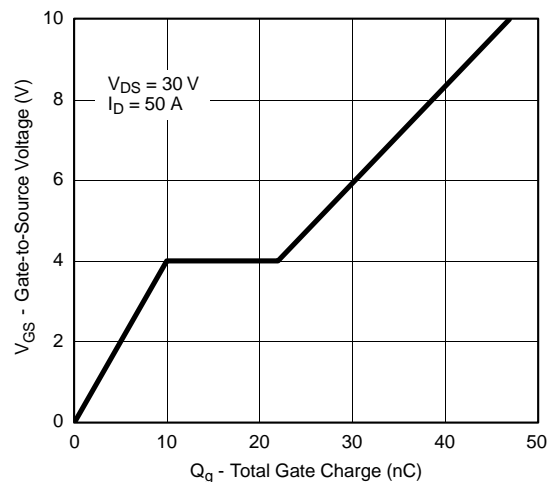
 c.  $t \leq 10$  s.

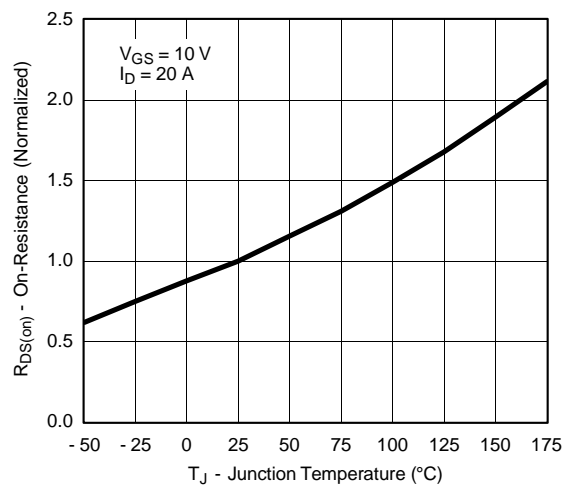
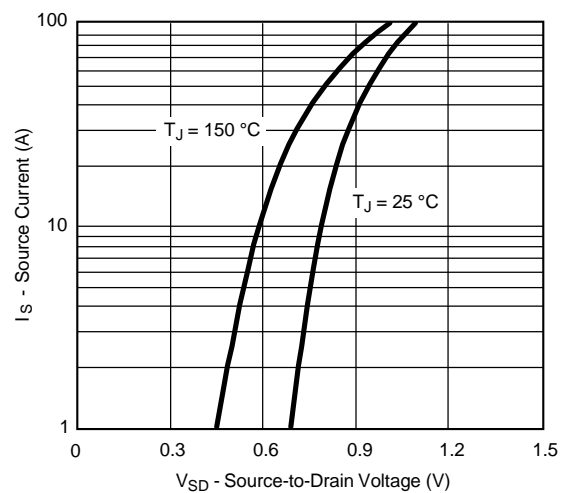
SPECIFICATIONS (T <sub>J</sub> = 25 °C, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ. <sup>a</sup>	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V <sub>DS</sub>	V <sub>GS</sub> = 0 V, I <sub>D</sub> = 250 μA	40			V
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1	2	3	
Gate-Body Leakage	I <sub>GSS</sub>	V <sub>DS</sub> = 0 V, V <sub>GS</sub> = ± 20 V			± 100	nA
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0 V			1	μA
		V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 125 °C			50	
		V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0 V, T <sub>J</sub> = 175 °C			250	
On-State Drain Current <sup>b</sup>	I <sub>D(on)</sub>	V <sub>DS</sub> = 5 V, V <sub>GS</sub> = 10 V	60			A
Drain-Source On-State Resistance <sup>b</sup>	R <sub>DS(on)</sub>	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A		0.003		Ω
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 125 °C		0.004		
		V <sub>GS</sub> = 10 V, I <sub>D</sub> = 20 A, T <sub>J</sub> = 175 °C		0.006		
		V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 15 A		0.005		
Forward Transconductance <sup>b</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 15 V, I <sub>D</sub> = 20 A		60		S
Dynamic						
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> = 0 V, V <sub>DS</sub> = 40 V, f = 1 MHz		4700		pF
Output Capacitance	C <sub>oss</sub>			470		
Reverse Transfer Capacitance	C <sub>rss</sub>			225		
Total Gate Charge <sup>c</sup>	Q <sub>g</sub>	V <sub>DS</sub> = 40 V, V <sub>GS</sub> = 10 V, I <sub>D</sub> = 50 A		76	70	nC
Gate-Source Charge <sup>c</sup>	Q <sub>gs</sub>			15		
Gate-Drain Charge <sup>c</sup>	Q <sub>gd</sub>			16		
Turn-On Delay Time <sup>c</sup>	t <sub>d(on)</sub>	V <sub>DD</sub> = 40 V, R <sub>L</sub> = 0.6 Ω I <sub>D</sub> ≅ 50 A, V <sub>GEN</sub> = 10 V, R <sub>g</sub> = 2.5 Ω		10	29	ns
Rise Time <sup>c</sup>	t <sub>r</sub>			15	25	
Turn-Off Delay Time <sup>c</sup>	t <sub>d(off)</sub>			35	50	
Fall Time <sup>c</sup>	t <sub>f</sub>			20	30	
Source-Drain Diode Ratings and Characteristics (T <sub>C</sub> = 25 °C)						
Pulsed Current	I <sub>SM</sub>				135	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>F</sub> = 20 A, V <sub>GS</sub> = 0 V		1	1.5	V
Reverse Recovery Time	t <sub>rr</sub>	I <sub>F</sub> = 20 A, di/dt = 100 A/μs		4	135	ns

Notes:

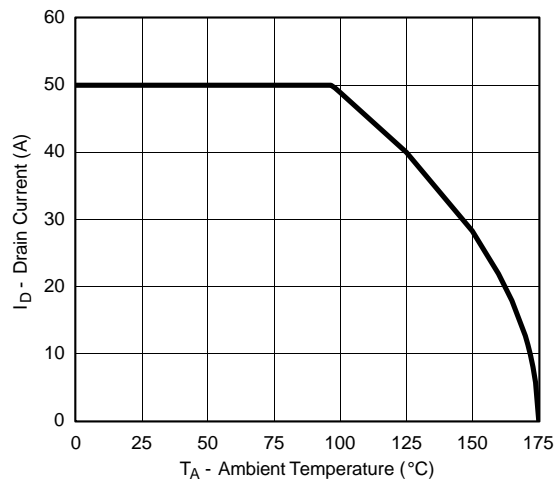
- a. For design aid only; not subject to production testing.  
 b. Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .  
 c. Independent of operating temperature.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

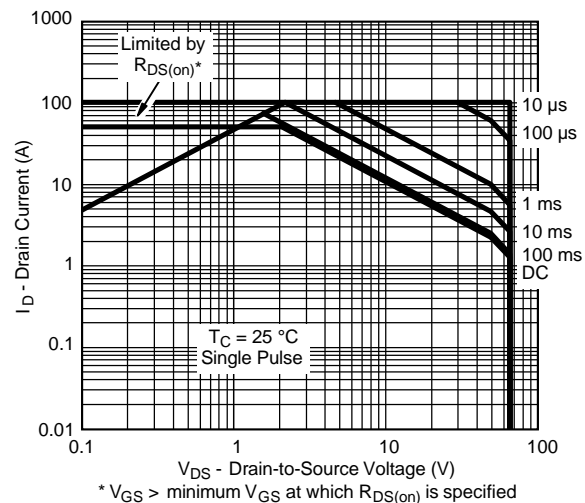
**TYPICAL CHARACTERISTICS** (25 °C unless noted)

**Output Characteristics**

**Transfer Characteristics**

**Transconductance**

**On-Resistance vs. Drain Current**

**Capacitance**

**Gate Charge**

**TYPICAL CHARACTERISTICS** (25 °C unless noted)**On-Resistance vs. Junction Temperature****Source-Drain Diode Forward Voltage**

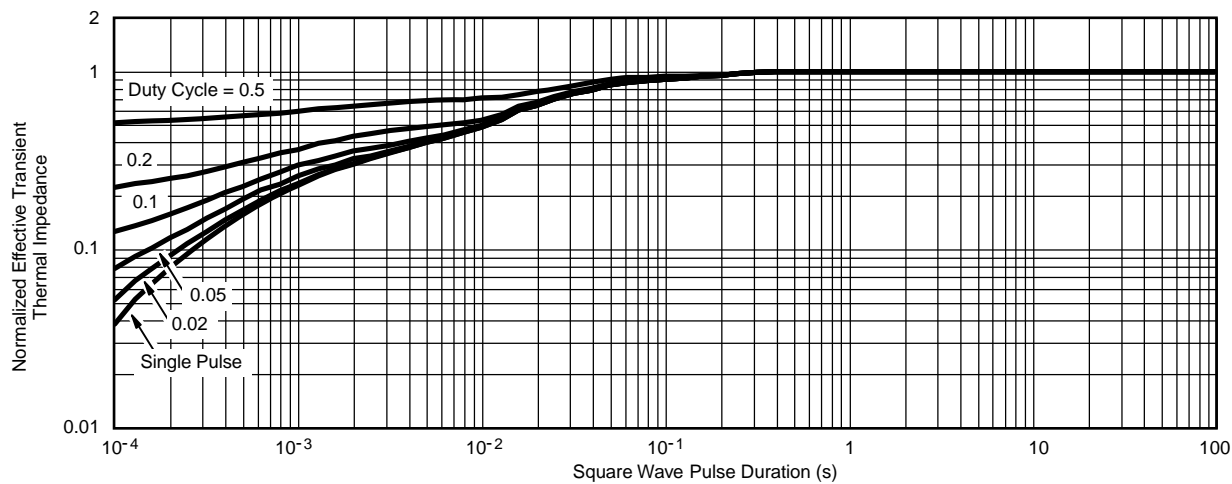
## THERMAL RATINGS



Maximum Drain Current vs. Ambient Temperature

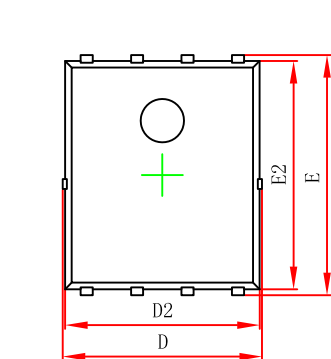


Safe Operating Area

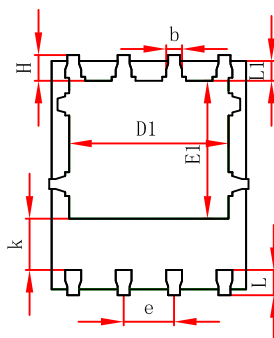


Normalized Thermal Transient Impedance, Junction-to-Case

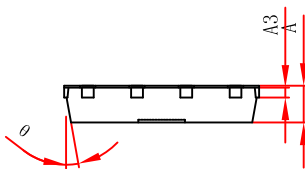
PDFNWB5x6-8L Package Outline Dimensions



Top View  
[顶视图]



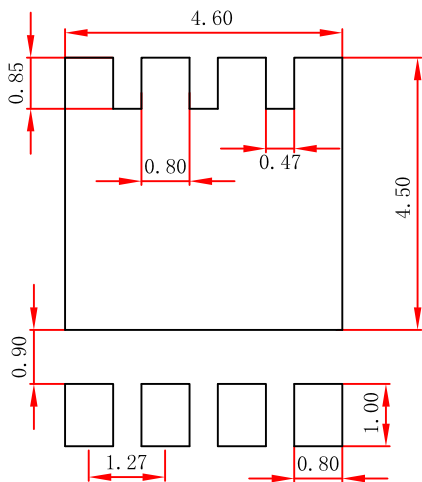
Bottom View  
[背视图]



Side View  
[侧视图]

Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
k	1.190	1.390	0.047	0.055
b	0.350	0.450	0.014	0.018
e	1.270TYP.		0.050TYP.	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	10°	12°	10°	12°

PDFNWB5x6-8L Suggested Pad Layout



- Note:
- 1. Controlling dimension: in millimeters.
  - 2. General tolerance:  $\pm 0.05\text{mm}$ .
  - 3. The pad layout is for reference purposes only.

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