

NTB25P06

Power MOSFET 25 Amps, 60 Volts P-Channel D²PAK

Designed for low voltage, high speed switching applications and to withstand high energy in the avalanche and commutation modes.

Typical Applications

- PWM Motor Controls
- Power Supplies
- Converters
- Bridge Circuits

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	60	Vdc
Gate-to-Source Voltage	V_{GS}	± 15	Vdc
- Continuous	V_{GSM}	± 20	Vpk
- Non-Repetitive ($t_p \leq 10$ ms)			
Drain Current	I_D	25	Adc
- Continuous @ $T_A = 25^\circ\text{C}$	I_{DM}	75	Apk
- Single Pulse ($t_p \leq 10$ μs)			
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	100	W
Operating and Storage Temperature Range	T_J, T_{stg}	- 55 to +150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy - Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 25$ Vdc, $V_{GS} = 10$ Vdc, $I_{L(pk)} = 20$ A, $L = 3$ mH, $R_G = 25$ Ω)	E_{AS}	600	mJ
Thermal Resistance	$R_{\theta JC}$	1.25	$^\circ\text{C/W}$
- Junction-to-Case	$R_{\theta JA}$	46.8	
- Junction-to-Ambient (Note 1)	$R_{\theta JA}$	63.2	
- Junction-to-Ambient (Note 2)			
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

1. When surface mounted to an FR4 board using 1" pad size (Cu Area 1.127 in²).
2. When surface mounted to an FR4 board using the minimum recommended pad size (Cu Area 0.412 in²).



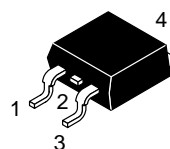
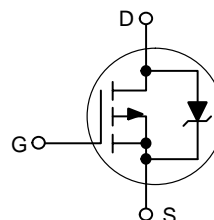
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**25 AMPERES
60 VOLTS**

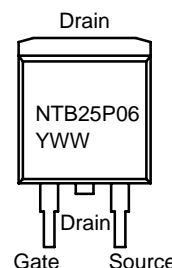
**$R_{DS(on)} = 65$ m Ω
@ $V_{GS} = 10$ V (Typ)**

P-Channel



**D²PAK
CASE 418B
STYLE 2**

MARKING DIAGRAM & PIN ASSIGNMENT



NTB25P06 = Device Code
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
NTB25P06	D ² PAK	50 Units/Rail
NTB25P06T4	D ² PAK	800/Tape & Reel

NTB25P06

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (Note 3) ($V_{GS} = 0\text{ Vdc}$, $I_D = 250\text{ }\mu\text{Adc}$) (Positive Temperature Coefficient)	$V_{(BR)DSS}$	60 -	- 64	- -	Vdc mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current ($V_{GS} = 0\text{ Vdc}$, $V_{DS} = 60\text{ Vdc}$, $T_J = 25^\circ\text{C}$) ($V_{GS} = 0\text{ Vdc}$, $V_{DS} = 60\text{ Vdc}$, $T_J = 150^\circ\text{C}$)	I_{DSS}	- -	- -	10 100	μAdc
Gate-Body Leakage Current ($V_{GS} = \pm 15\text{ Vdc}$, $V_{DS} = 0\text{ Vdc}$)	I_{GSS}	-	-	± 100	nAdc

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage ($V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{Adc}$) (Negative Threshold Temperature Coefficient)	$V_{GS(th)}$	2.0 -	2.8 6.2	4.0 -	Vdc mV/ $^\circ\text{C}$
Static Drain-Source On-State Resistance ($V_{GS} = 10\text{ Vdc}$, $I_D = 12.5\text{ Adc}$) ($V_{GS} = 10\text{ Vdc}$, $I_D = 25\text{ Adc}$)	$R_{DS(on)}$	- -	0.065 0.070	0.075 0.082	Ω
Forward Transconductance ($V_{DS} = 10\text{ Vdc}$, $I_D = 12.5\text{ Adc}$)	gFS	-	13	-	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	$(V_{DS} = 25\text{ Vdc}$, $V_{GS} = 0\text{ Vdc}$, $F = 1.0\text{ MHz}$)	C_{iss}	-	1200	1680	pF
Output Capacitance		C_{oss}	-	345	480	
Reverse Transfer Capacitance		C_{rss}	-	90	180	

SWITCHING CHARACTERISTICS (Notes 3 & 4)

Turn-On Delay Time	(V _{DD} = 30 Vdc, I _D = 25 A, V _{GS} = 10 V R _G = 9.1 Ω)	t _{d(on)}	-	14	24	ns
Rise Time		t _r	-	72	118	25
Turn-Off Delay Time		t _{d(off)}	-	43	68	120
Fall Time		t _f	-	190	320	70
Gate Charge	(V _{DS} = 48 Vdc, I _D = 25 Adc, V _{GS} = 10 Vdc)	Q _T	-	33	50	nC
		Q ₁	-	6.5	-	
		Q ₂	-	15	-	

BODY-DRAIN DIODE RATINGS (Note 3)

Diode Forward On-Voltage	$(I_S = 25\text{ Adc}$, $V_{GS} = 0\text{ V}$) $(I_S = 25\text{ Adc}$, $V_{GS} = 0\text{ V}$, $T_J = 150^\circ\text{C}$)	V_{SD}	- -	1.8 1.4	2.5 -	Vdc
Reverse Recovery Time	$(I_S = 25\text{ A}$ $V_{GS} = 0\text{ V}$, $di_S/dt = 100\text{ A}/\mu\text{s}$)	t_{rr}	-	70	-	ns
		t_a	-	50	-	
		t_b	-	20	-	
Reverse Recovery Stored Charge		Q_{RR}	-	0.2	-	μC

3. Indicates Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

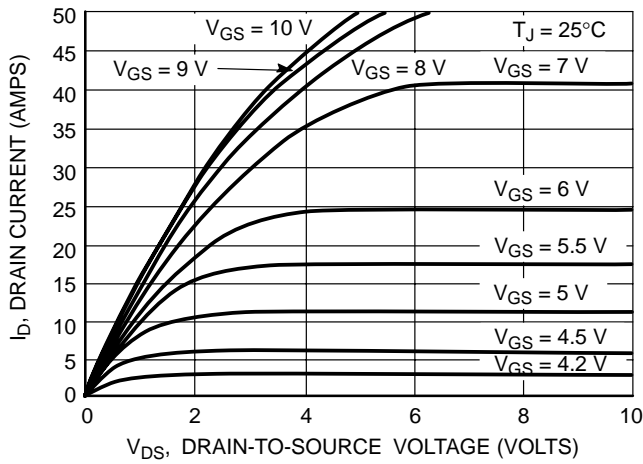


Figure 1. On-Region Characteristics

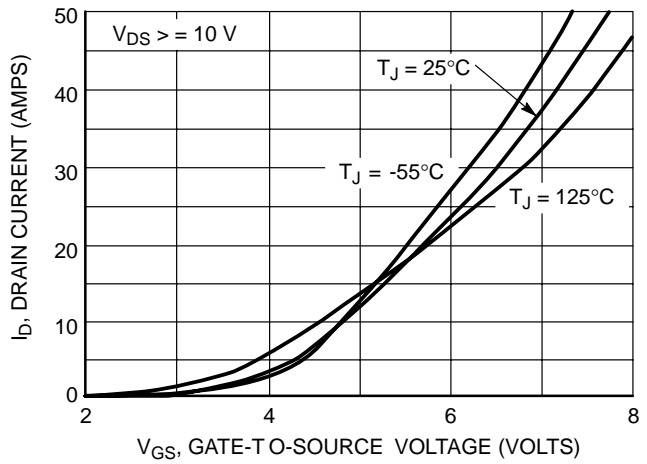


Figure 2. Transfer Characteristics

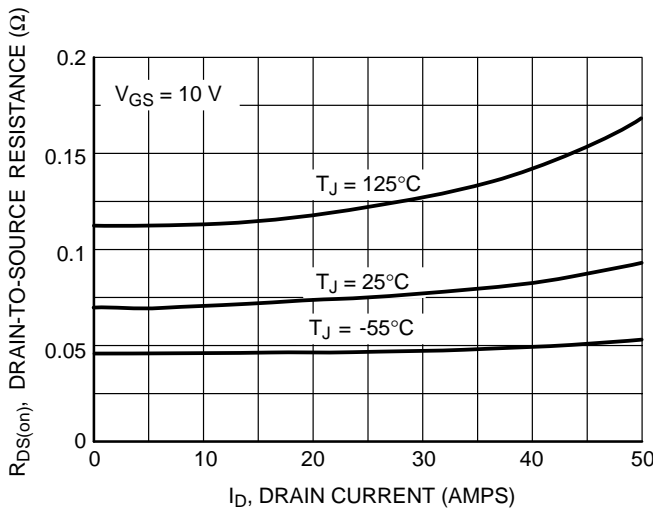


Figure 3. On-Resistance vs. Drain Current and Temperature

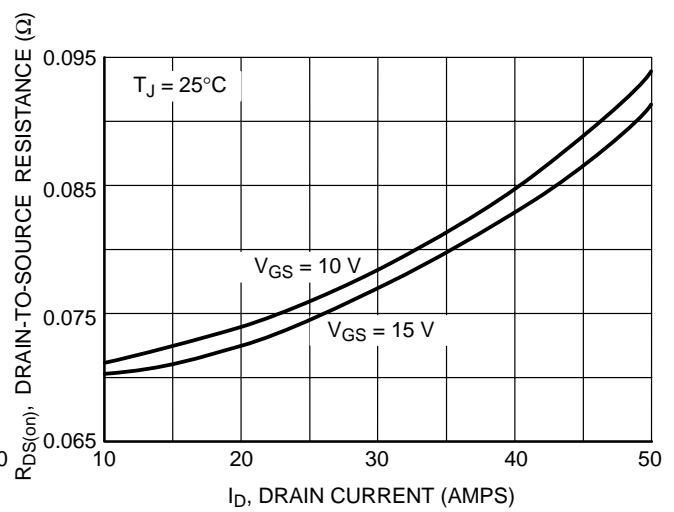


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

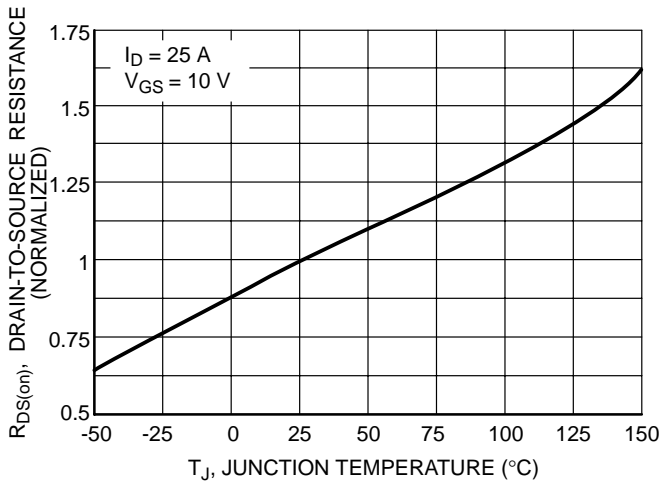


Figure 5. On-Resistance Variation with Temperature

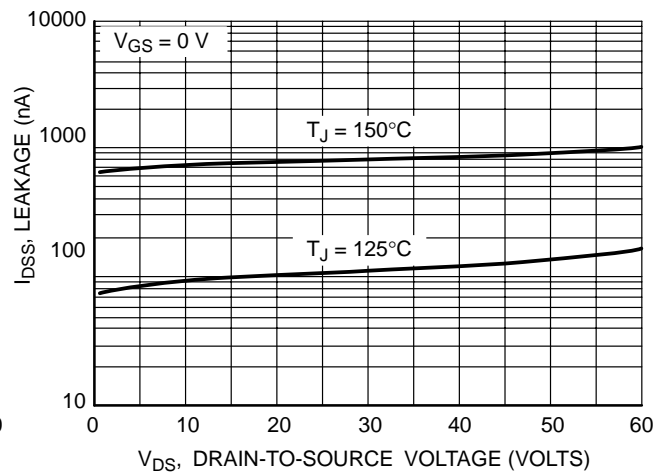


Figure 6. Drain-to-Source Leakage Current vs. Voltage

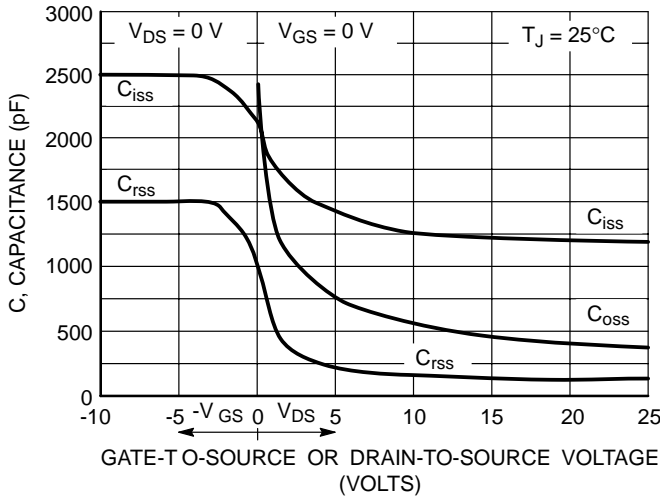


Figure 7. Capacitance Variation

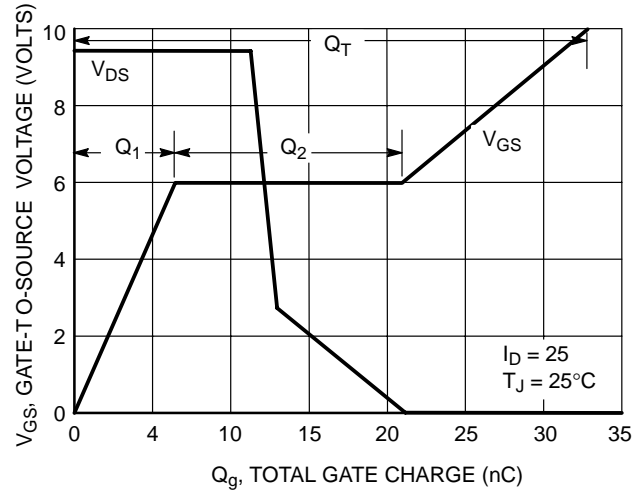


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

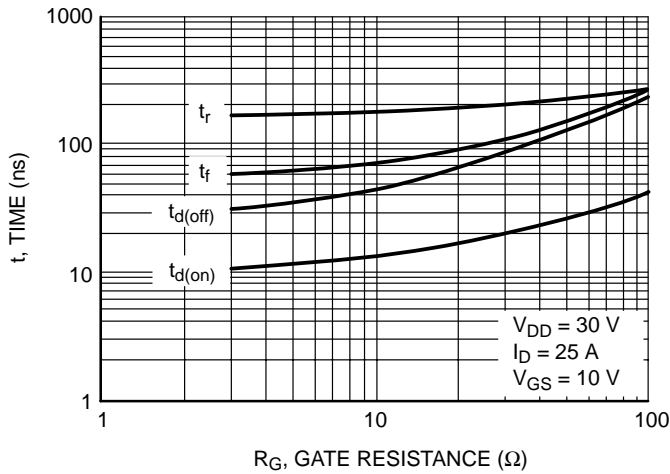


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

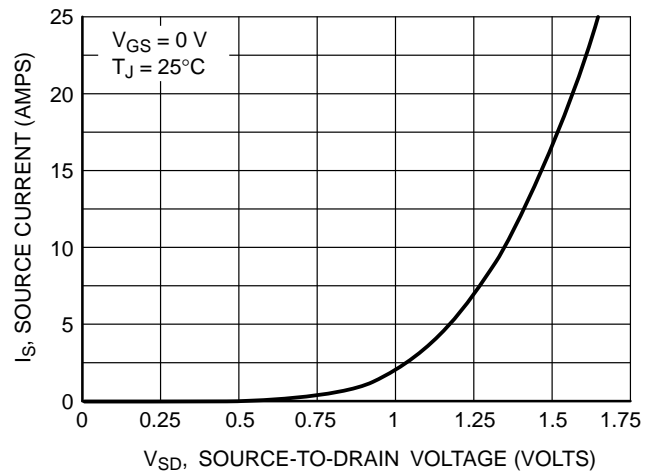


Figure 10. Diode Forward Voltage vs. Current

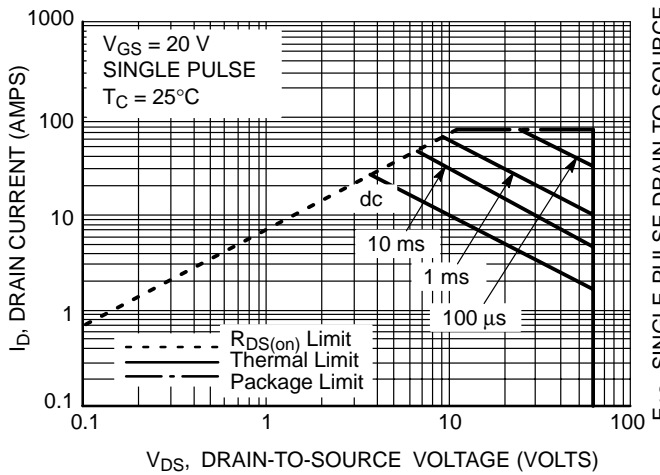


Figure 11. Maximum Rated Forward Biased Safe Operating Area

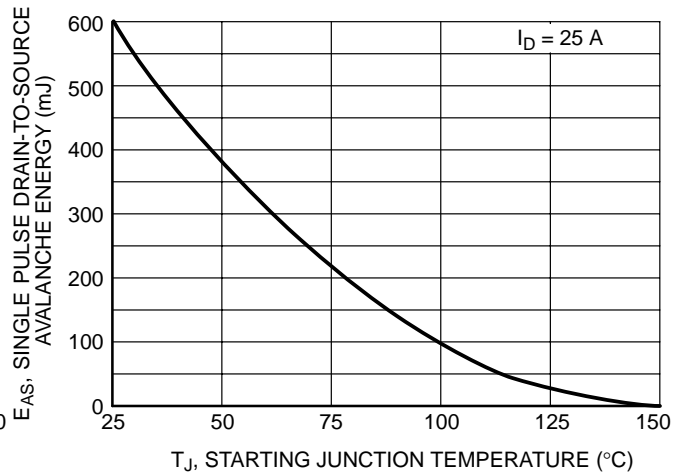
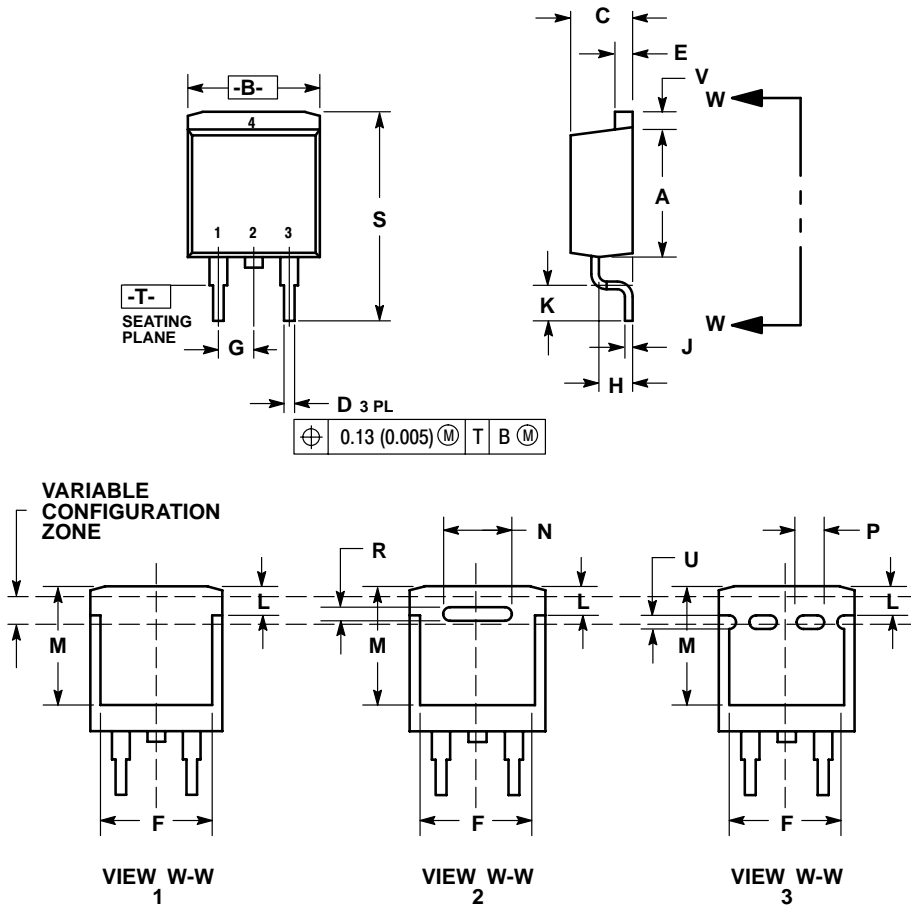


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

NTB25P06

PACKAGE DIMENSIONS

D²PAK
CASE 418B-04
ISSUE H




NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 418B-01 THRU 418B-03 OBSOLETE, NEW STANDARD 418B-04.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
F	0.310	0.350	7.87	8.89
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
L	0.052	0.072	1.32	1.83
M	0.280	0.320	7.11	8.13
N	0.197 REF		5.00 REF	
P	0.079 REF		2.00 REF	
R	0.039 REF		0.99 REF	
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

STYLE 2:

- PIN 1. GATE
- DRAIN
- SOURCE
- DRAIN

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