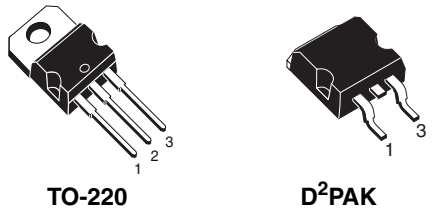
STB45NF06
STP45NF06

N-channel 60 V, 0.023 Ω, 38 A TO-220, D^2PAK
STripFET™ II Power MOSFET

Features

Type	V_{DSS}	$R_{DS(on)}$	I_D
STP45NF06	60 V	<0.028 Ω	38 A
STB45NF06	60 V	<0.028 Ω	38 A

- Exceptional dv/dt capability
- Standard threshold drive
- 100% avalanche tested



Applications

- Switching application

Description

These devices are an N-channel Power MOSFET realized with the latest development of STMicroelectronis unique "single feature size" strip-based process. The resulting transistors show extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

Figure 1. Internal schematic diagram

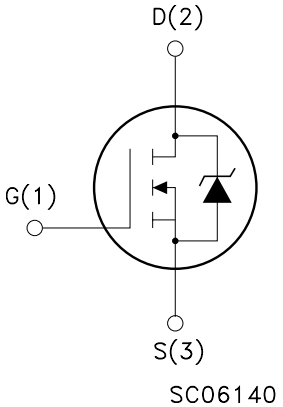


Table 1. Device summary

Order code	Marking	Package	Packaging
STP45NF06	P45NF06	TO-220	Tube
STB45NF06	B45NF06	D^2PAK	Tape and reel

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage (V_{GS} = 0)	60	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at T_C = 25°C	38	A
I_D	Drain current (continuous) at T_C = 100°C	26	A
I_{DM}(1)	Drain current (pulsed)	152	A
P_{TOT}	Total dissipation at T_C = 25°C	80	W
	Derating factor	0.53	W/°C
dv/dt(2)	Peak diode recovery voltage slope	8	V/ns
T_J T_{stg}	Operating junction temperature Storage temperature	-55 to 175	°C

1. Pulse width limited by safe operating area.
2. $I_{SD} \leq$38A, di/dt $\leq$300A/µs, $V_{DD} \leq V_{(BR)DSS}$, $T_j \leq T_{JMAX}$.

Table 3. Thermal data

Symbol	Parameter	Value		Unit
		D^2PAK	TO-220	
$R_{thj-case}$	Thermal resistance junction-case max	1.87		°C/W
R_{thj-a}	Thermal resistance junction-ambient max	62.5		
$R_{thj-pcb}$(1)	Thermal resistance junction - pcb max	35		
T_l	Maximum lead temperature for soldering purpose	300		°C

1. When mounted on 1 $inch^2$ FR-4 2 oz Cu board.

Table 4. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by Tj max)	19	A
E_{AS}	Single pulse avalanche energy (starting Tj=25°C, Id=Iar, Vdd=40 V)	260	mJ

2 Electrical characteristics

(T_{CASE}=25°C unless otherwise specified).

Table 5. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 250µA, V_{GS}= 0	60			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = Max rating, V_{DS} = Max rating @125°C			1 10	µA µA
I_{GSS}	Gate body leakage current (V_{DS} = 0)	V_{GS} = ±20V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS}= V_{GS}, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static drain-source on resistance	V_{GS}= 10V, I_D= 19A		0.023	0.028	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward transconductance	V_{DS} > $I_{D(on)}$ x $R_{DS(on)max}$, I_D =19 A	-	18		S
C_{iss} C_{oss} C_{rss}	Input capacitance Output capacitance Reverse transfer capacitance	V_{DS} =25V , f=1 MHz, V_{GS}=0	-	920 225 80		pF pF pF
Q_g Q_{gs} Q_{gd}	Total gate charge Gate-source charge Gate-drain charge	V_{DD} = 48 V, I_D = 34 A V_{GS} = 10V	-	32 6.5 14.5	58	nC nC nC

1. Pulsed: pulse duration=300µs, duty cycle 1.5%

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on delay time rise time	V_{DD}=30 V, I_D=17 A, R_G=4.7 Ω, V_{GS}= 10 V		12 50		ns ns
$t_{d(off)}$ t_f	Turn-off delay time fall time	V_{DD}=30V, I_D=17 A, R_G=4.7 Ω, V_{GS}=10 V		30 10		ns ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current				38	A
I_{SDM}(1)	Source-drain current (pulsed)				152	A
V_{SD}(2)	Forward on voltage	I_{SD} = 38 A, V_{GS}=0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse recovery time Reverse recovery charge Reverse recovery current	I_{SD} = 34 A, di/dt = 100A/µs, V_{DD} = 10 V, Tj = 150°C		65 150 5		ns nC A

1. Pulsed: pulse duration=300µs, duty cycle 1.5%
2. Pulse width limited by safe operating area.

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

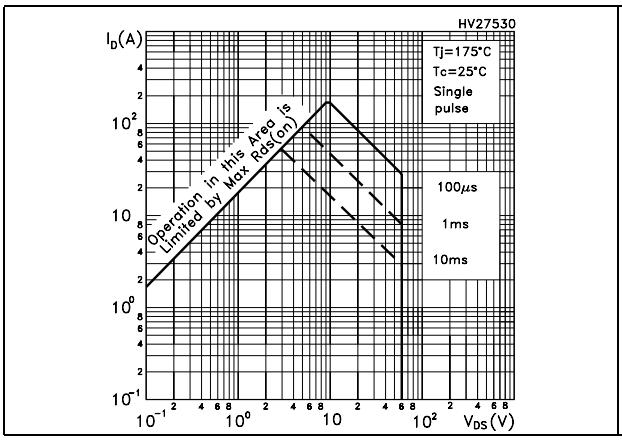


Figure 3. Thermal impedance

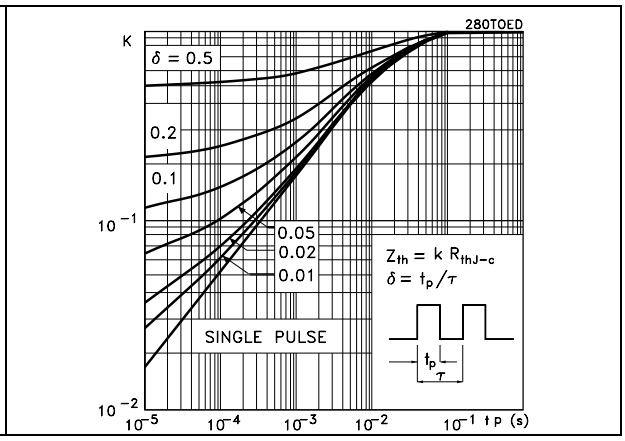


Figure 4. Output characteristics

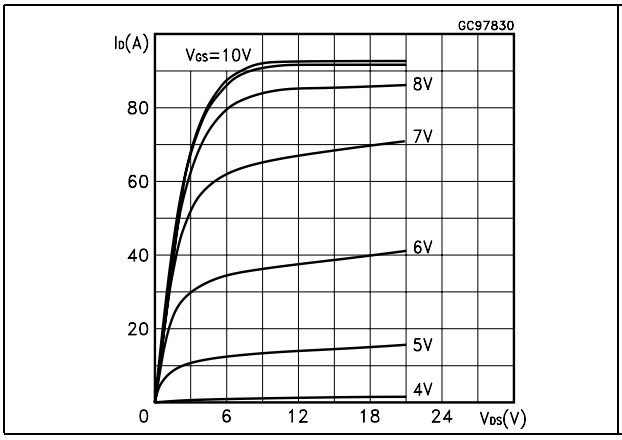


Figure 5. Transfer characteristics

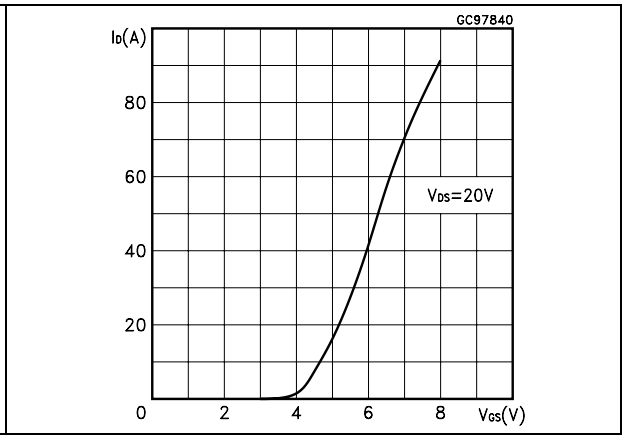


Figure 6. Normalized breakdown voltage vs. temperature

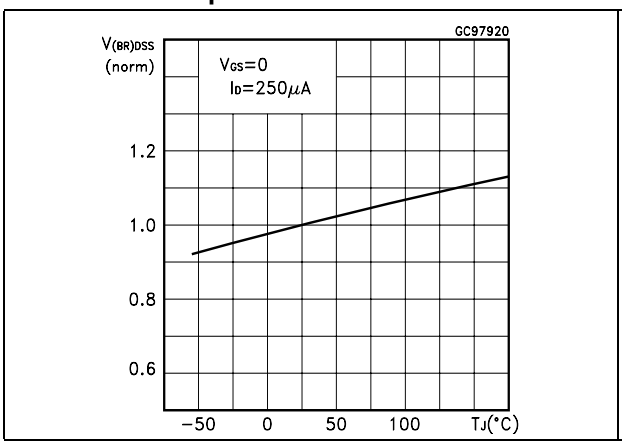


Figure 7. Static drain-source on resistance