



STB45NF06

N-CHANNEL 60V - 0.022Ω - 38A D2PAK STripFET™ POWER MOSFET

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB45NF06	60V	<0.028Ω	38A

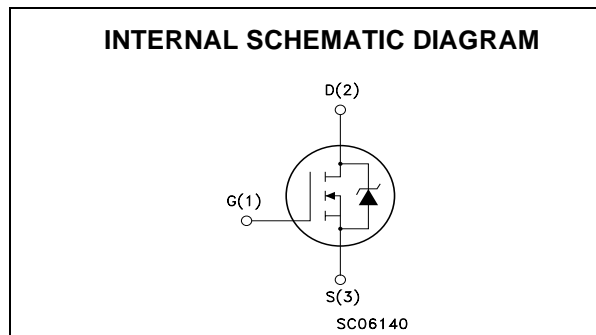
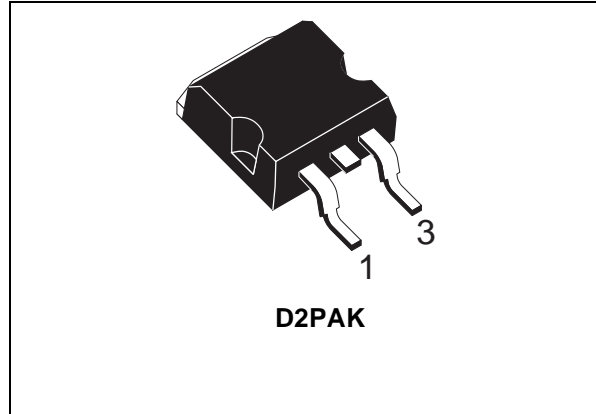
- TYPICAL R_{DS(on)} = 0.022Ω
- EXCEPTIONAL dv/dt CAPABILITY

DESCRIPTION

This Power Mosfet is the latest development of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	60	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	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} (●)	Drain Current (pulsed)	152	A
P _{TOT}	Total Dissipation at T _C = 25°C	80	W
	Derating Factor	0.53	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	7	V/ns
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(●) Pulse width limited by safe operating area

(1) I_{SD} ≤ 38A, di/dt ≤ 300A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

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THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	1.87	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	300	°C

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	38	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	135	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 25 °C UNLESS OTHERWISE SPECIFIED) OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source Breakdown Voltage	I _D = 250 μA, V _{GS} = 0	60			V
I _{DSS}	Zero Gate Voltage Drain Current (V _{GS} = 0)	V _{DS} = Max Rating V _{DS} = Max Rating, T _C = 125 °C			1 10	μA μA
I _{GSS}	Gate-body Leakage Current (V _{DS} = 0)	V _{GS} = ±20V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
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} = 10 V, I _D = 19 A		0.022	0.028	Ω
I _{D(on)}	On State Drain Current	V _{DS} > I _{D(on)} × R _{DS(on)max} , V _{GS} = 10V	45			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} > I _{D(on)} × R _{DS(on)max} , I _D = 19 A		24		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		1730		pF
C _{oss}	Output Capacitance			215		pF
C _{rss}	Reverse Transfer Capacitance			63		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 30V, I_D = 19A$ $R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 3)		20		ns
t_r	Rise Time			100		ns
Q_g	Total Gate Charge	$V_{DD} = 48V, I_D = 38A,$ $V_{GS} = 10V$		43	58	nC
Q_{gs}	Gate-Source Charge			9		nC
Q_{gd}	Gate-Drain Charge			15		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 30V, I_D = 19A,$ $R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 3)		50		ns
t_f	Fall Time			20		ns
$t_{d(off)}$	Off-voltage Rise Time	$V_{clamp} = 48V, I_D = 38A$ $R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 5)		45		ns
t_f	Fall Time			42		ns
t_c	Cross-over Time			60		ns

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	$I_{SD} = 38A, V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 38A, di/dt = 100A/\mu s,$ $V_{DD} = 100V, T_j = 150^\circ C$ (see test circuit, Figure 5)		95		ns
Q_{rr}	Reverse Recovery Charge			260		nC
I_{RRM}	Reverse Recovery Current			5.5		A

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

Fig. 1: Unclamped Inductive Load Test Circuit

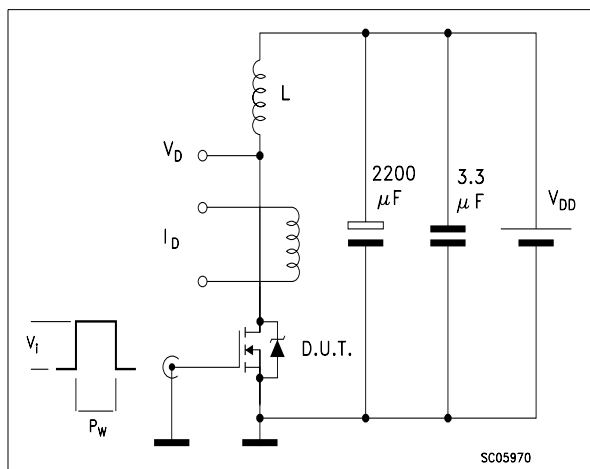


Fig. 2: Unclamped Inductive Waveform

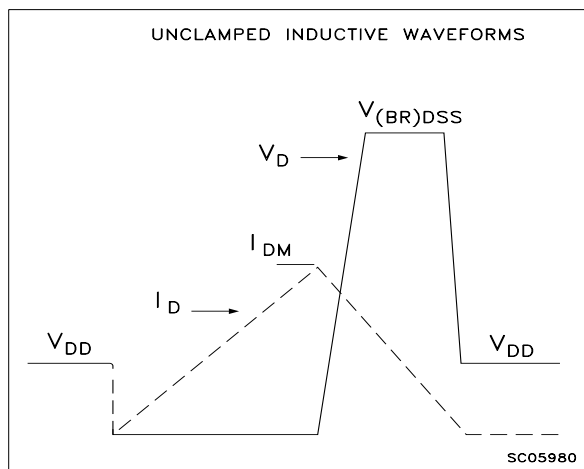


Fig. 3: Switching Times Test Circuit For Resistive Load

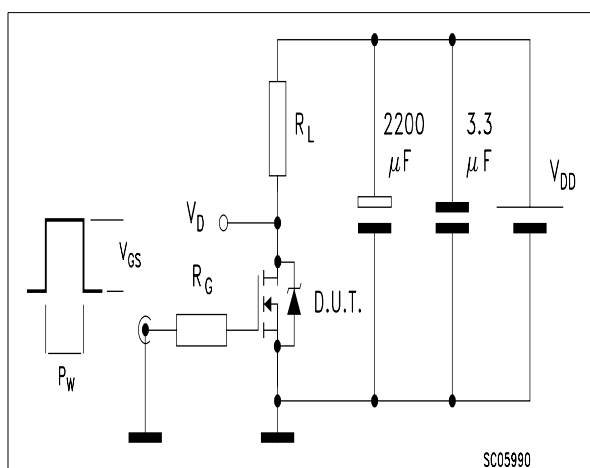


Fig. 4: Gate Charge test Circuit

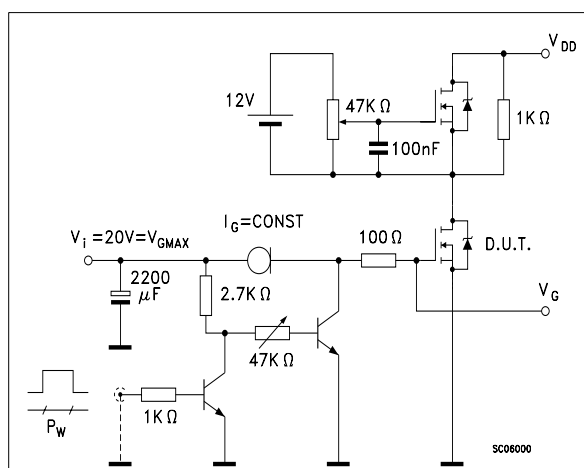
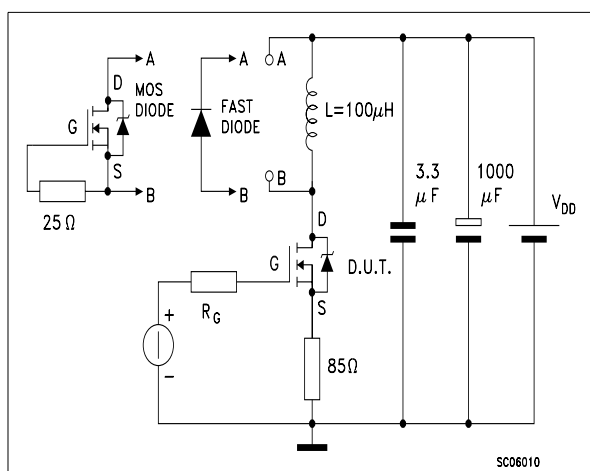
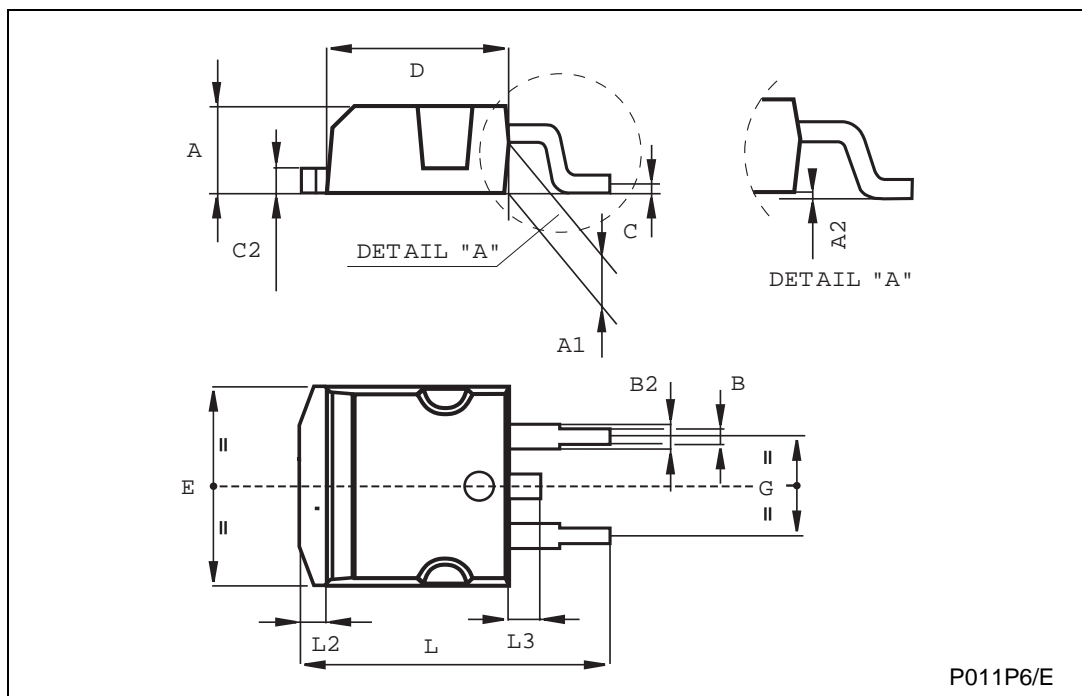


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



TO-263 (D²PAK) MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.21		1.36	0.047		0.053
D	8.95		9.35	0.352		0.368
E	10		10.4	0.393		0.409
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.624
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068



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