



STB24NF10

N-CHANNEL 100V - 0.07 Ω - 24A D²PAK LOW GATE CHARGE STripFET™ POWER MOSFET

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB24NF10	100 V	<0.077 Ω	24 A

- TYPICAL R_{DS(on)} = 0.07 Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- SURFACE-MOUNTING D²PAK (TO-263)
POWER PACKAGE IN TAPE & REEL
(SUFFIX "T4")

DESCRIPTION

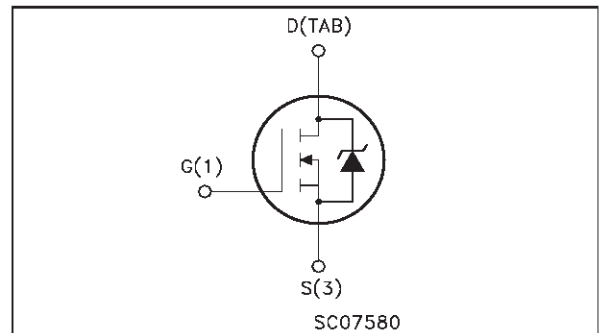
This MOSFET series realized with STMicroelectronics unique STripFET process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency, high-frequency isolated DC-DC converters for Telecom and Computer applications. It is also intended for any applications with low gate drive requirements.

APPLICATIONS

- HIGH-EFFICIENCY DC-DC CONVERTERS
- UPS AND MOTOR CONTROL



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	100	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 k Ω)	100	V
V _{GS}	Gate- source Voltage	± 20	V
I _D	Drain Current (continuous) at T _C = 25°C	24	A
I _D	Drain Current (continuous) at T _C = 100°C	15	A
I _{DM} (•)	Drain Current (pulsed)	96	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	9	V/ns
E _{AS} (2)	Single Pulse Avalanche Energy	75	mJ
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(•) Pulse width limited by safe operating area (2) starting T_j = 25°C, I_D = 24A, V_{DD} = 50V (1) I_{SD} [24 A, di/dt m300A/ms, V_{DD} [V_{(BR)DSS}, T_j [T_{JMA}

STB24NF10

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case Max	Max	1.87	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient Max	Max	62.5	°C/W
T_j	Maximum Lead Temperature For Soldering Purpose		300	°C

ELECTRICAL CHARACTERISTICS ($T_{case} = 25\text{ °C}$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 250\text{ }\mu\text{A}$ $V_{GS} = 0$	100			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}, T_C = 125\text{ °C}$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\text{ }\mu\text{A}$	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$ $I_D = 12\text{ A}$		0.07	0.077	Ω Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10\text{ V}$	24			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(*)}$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 12\text{ A}$		20		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitances	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ $V_{GS} = 0$		870 125 52		pF pF pF

ELECTRICAL CHARACTERISTICS (continued)**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 50V$ $I_D = 12 A$ $R_G = 4.7 \Omega$ $V_{GS} = 10 V$ (see test circuit, Figure 3)		58 45		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 80 V$ $I_D = 24 A$ $V_{GS} = 10V$		30 6 10		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 27 V$ $I_D = 12 A$ $R_G = 4.7 \Omega$ $V_{GS} = 10 V$ (Resistive Load, see fig.3)		49 17		ns ns
$t_{d(off)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{clamp} = 80 V$ $I_D = 24 A$ $R_G = 4.7 \Omega$ $V_{GS} = 10 V$ (Inductive Load, see fig.5)		43 36 39		ns ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM}(\bullet)$	Source-drain Current Source-drain Current (pulsed)				24 96	A A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 24 A$ $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 24 A$ $di/dt = 100 A/\mu s$ $V_{DD} = 50 V$ $T_j = 150 ^\circ C$ (see test circuit, Figure 5)		100 375 7.5		ns nC A

(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(\bullet) Pulse width limited by safe operating area.

Fig. 1: Unclamped Inductive Load Test Circuit

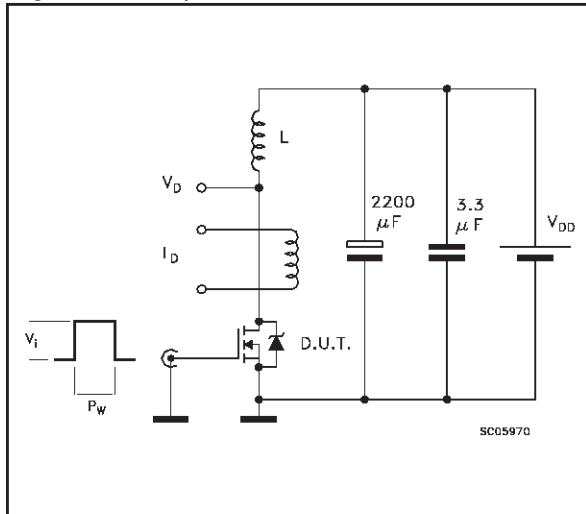


Fig. 2: Unclamped Inductive Waveform

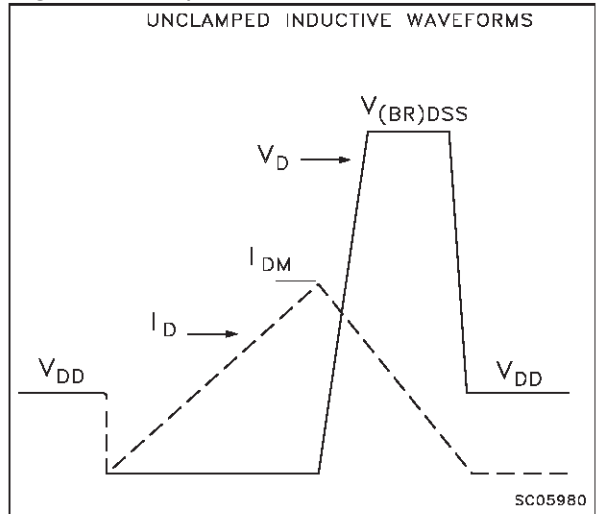


Fig. 3: Switching Times Test Circuits For Resistive Load

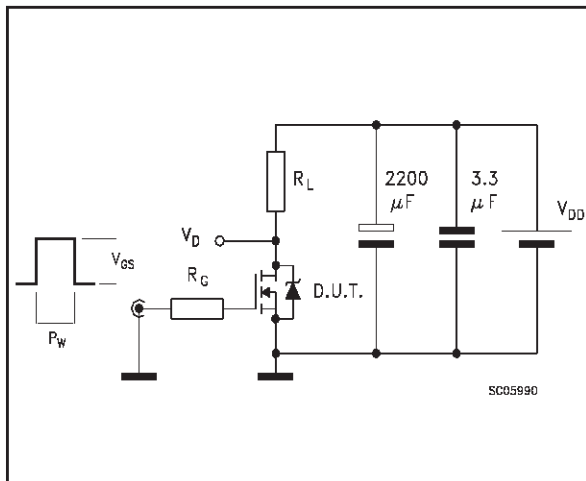


Fig. 4: Gate Charge test Circuit

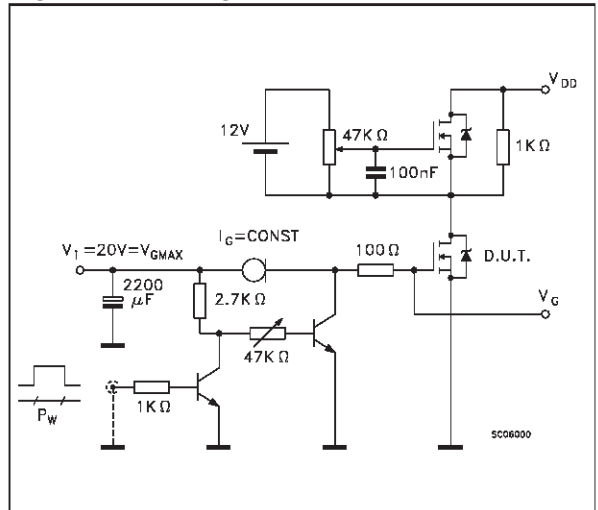
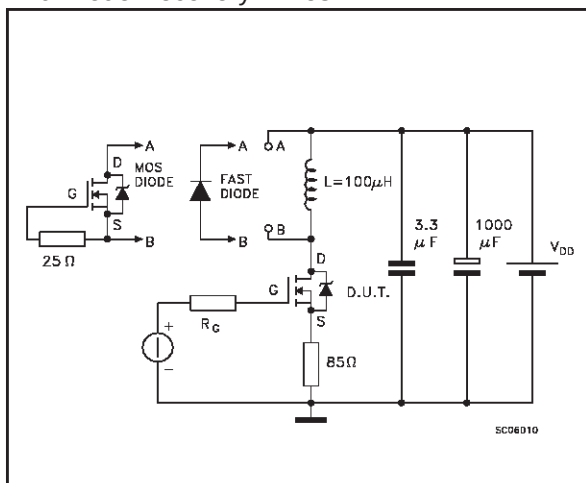
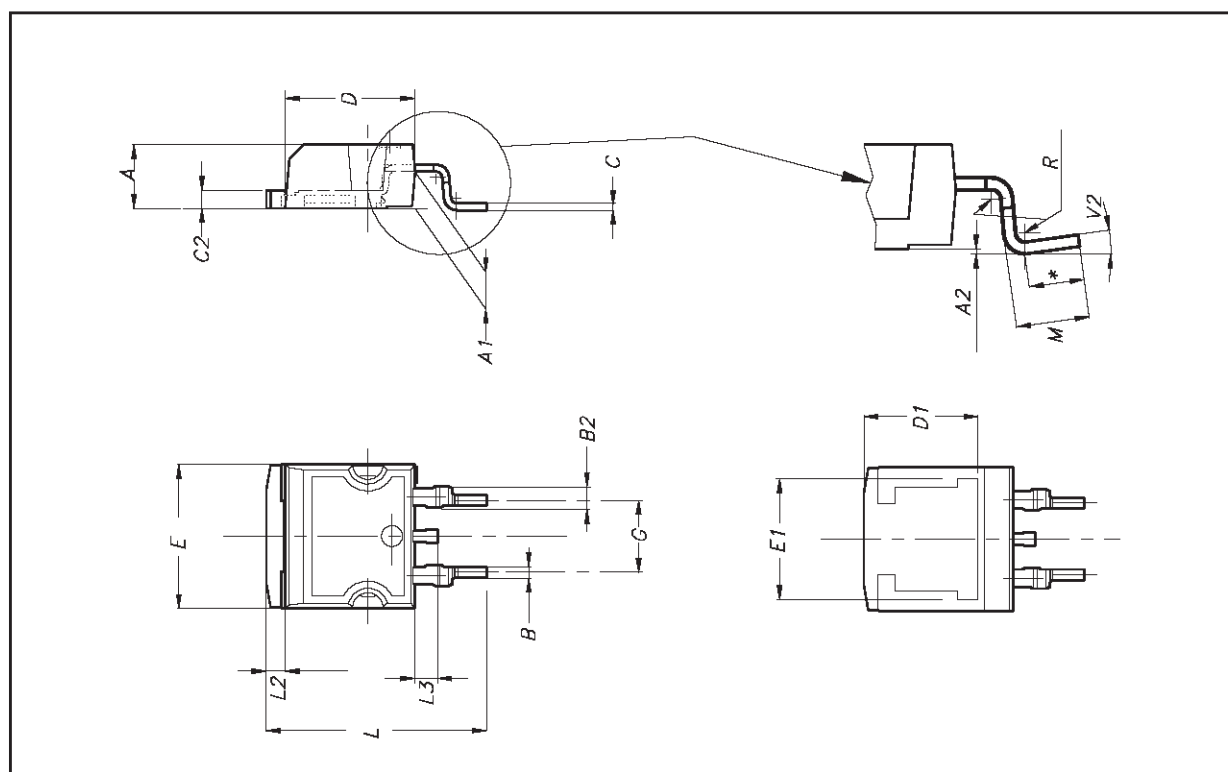


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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
A2	0.03		0.23	0.001		0.009
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	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
G	4.88		5.28	0.192		0.208
L	15		15.85	0.590		0.625
L2	1.27		1.4	0.050		0.055
L3	1.4		1.75	0.055		0.068
M	2.4		3.2	0.094		0.126
R		0.4			0.015	
V2	0°		8°			



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