



STP100NF04 STB100NF04-1

N-CHANNEL 40V - 0.0043Ω - 120A TO-220/I²PAK
STripFET™ II POWER MOSFET

PRELIMINARY DATA

TYPE	V _{DSS}	R _{DS(on)}	I _D
STP100NF04	40 V	< 0.0046 Ω	120 A
STB100NF04-1	40 V	< 0.0046 Ω	120 A

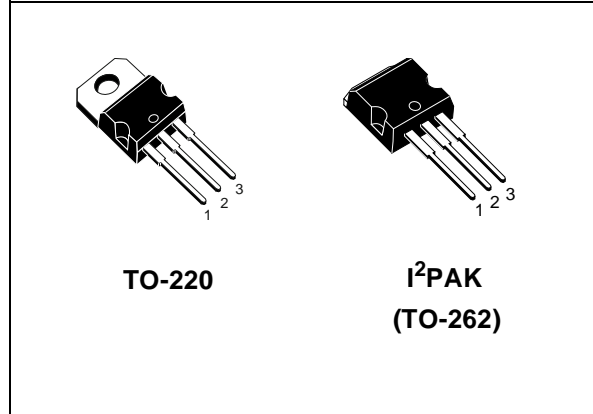
- TYPICAL R_{DS(on)} = 0.0043Ω
- STANDARD THRESHOLD DRIVE
- 100% AVALANCHE TESTED

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.

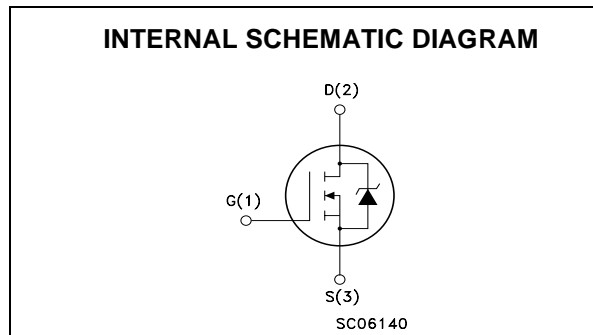
APPLICATIONS

- HIGH CURRENT, HIGH SWITCHING SPEED
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS
- SOLENOID AND RELAY DRIVERS



TO-220

I²PAK
(TO-262)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	40	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	40	V
V _{GS}	Gate- source Voltage	± 20	V
I _D (#)	Drain Current (continuous) at T _C = 25°C	120	A
I _D	Drain Current (continuous) at T _C = 100°C	120	A
I _{DM} (●)	Drain Current (pulsed)	480	A
P _{TOT}	Total Dissipation at T _C = 25°C	300	W
	Derating Factor	2	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	6	V/ns
E _{AS}	Single Pulse Avalanche Energy	1.2	J
T _{stg}	Storage Temperature	- 55 to 175	°C
T _j	Max. Operating Junction Temperature		

(●) Pulse width limited by safe operating area

(#) Current Limited by Package

(1) I_{SD} ≤ 120A, di/dt ≤ 300 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{jMAX}

(2) Starting T_j = 25°C, I_d = 60A, V_{DD} = 30 V

STP100NF04/STB100NF04-1

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°C/W
T _l	Maximum Lead Temperature For Soldering Purpose	300	°C

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	40			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		4	V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V, I _D = 50 A		0.0043	0.0046	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} = 15 V ; I _D = 50 A		150		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		5100		pF
C _{oss}	Output Capacitance			1300		pF
C _{rss}	Reverse Transfer Capacitance			160		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 20V, I_D = 60 A$ $R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 3)		35		ns
t_r	Rise Time			220		ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 32 V, I_D = 120A,$ $V_{GS} = 10V$		108 33.5 68	151	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off-Delay Time Fall Time	$V_{DD} = 20V, I_D = 60A,$ $R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 3)		80 50		ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				120	A
$I_{SDM} (2)$	Source-drain Current (pulsed)				480	A
$V_{SD} (1)$	Forward On Voltage	$I_{SD} = 120A, V_{GS} = 0$			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 120A, di/dt = 100A/\mu s,$ $V_{DD} = 20V, T_j = 150^\circ C$ (see test circuit, Figure 5)		75 185 4.9		ns nC A

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

SPICE THERMAL MODEL

Parameter	Node	Value
CTHERM1	5 - 4	0.011
CTHERM2	4 - 3	0.0012
CTHERM3	3 - 2	0.05
CTHERM4	2 - 1	0.1
R THERM1	5 - 4	0.09
R THERM2	4 - 3	0.02
R THERM3	3 - 2	0.11
R THERM4	2 - 1	0.017

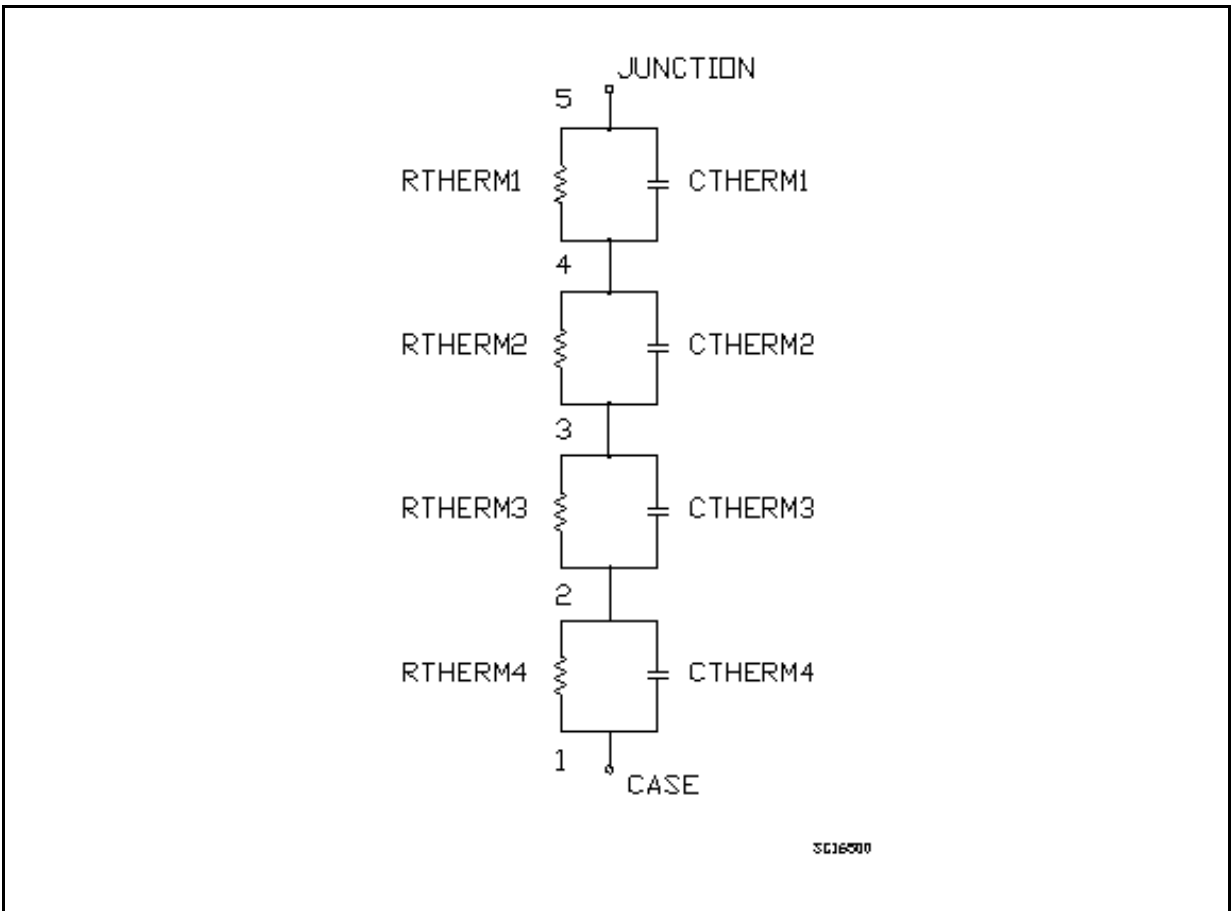


Fig. 1: Unclamped Inductive Load Test Circuit

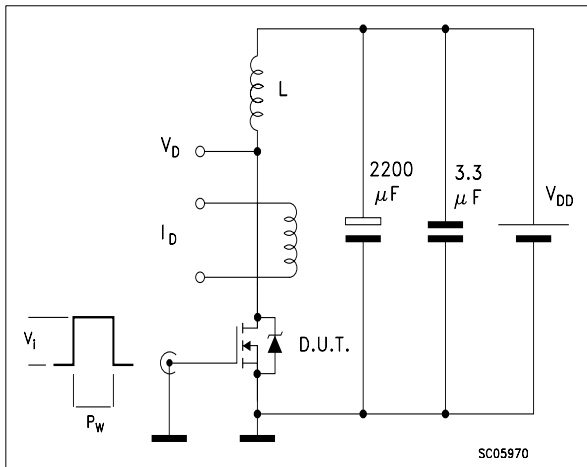


Fig. 2: Unclamped Inductive Waveform

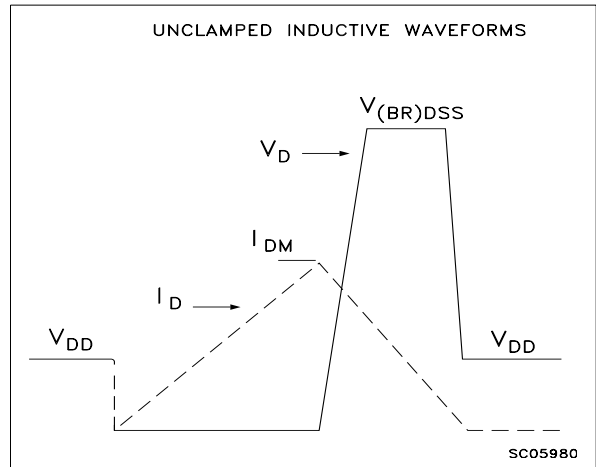


Fig. 3: Switching Times Test Circuit For Resistive Load

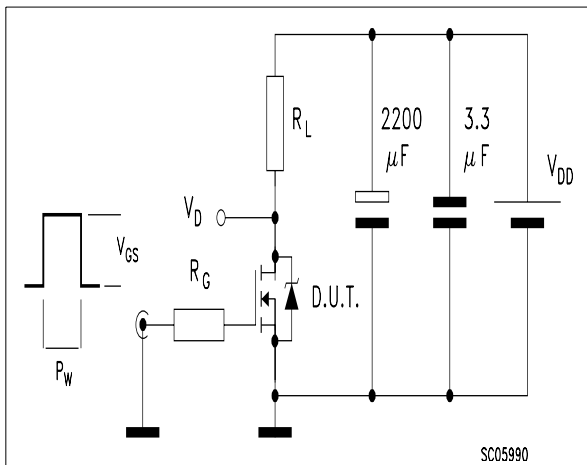


Fig. 4: Gate Charge test Circuit

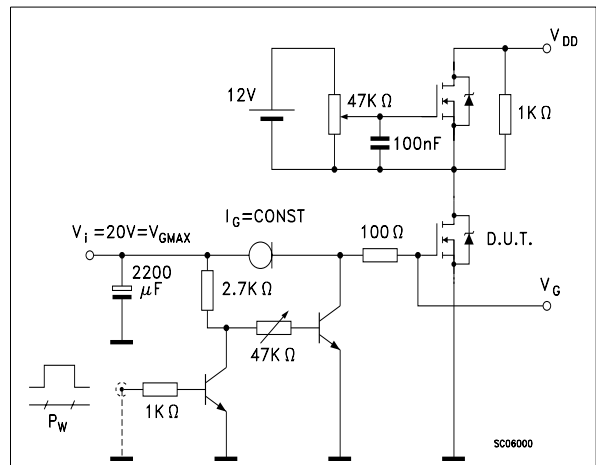
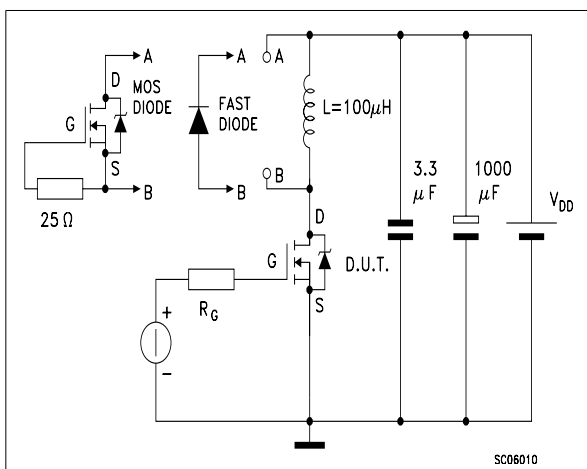
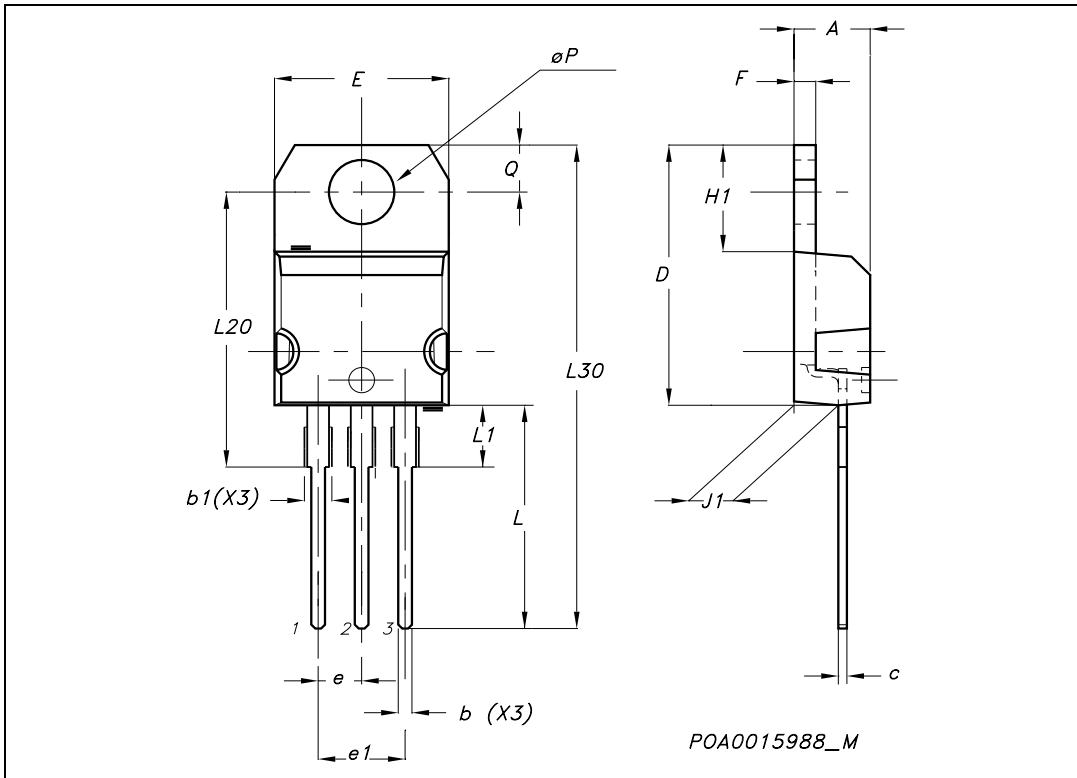


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



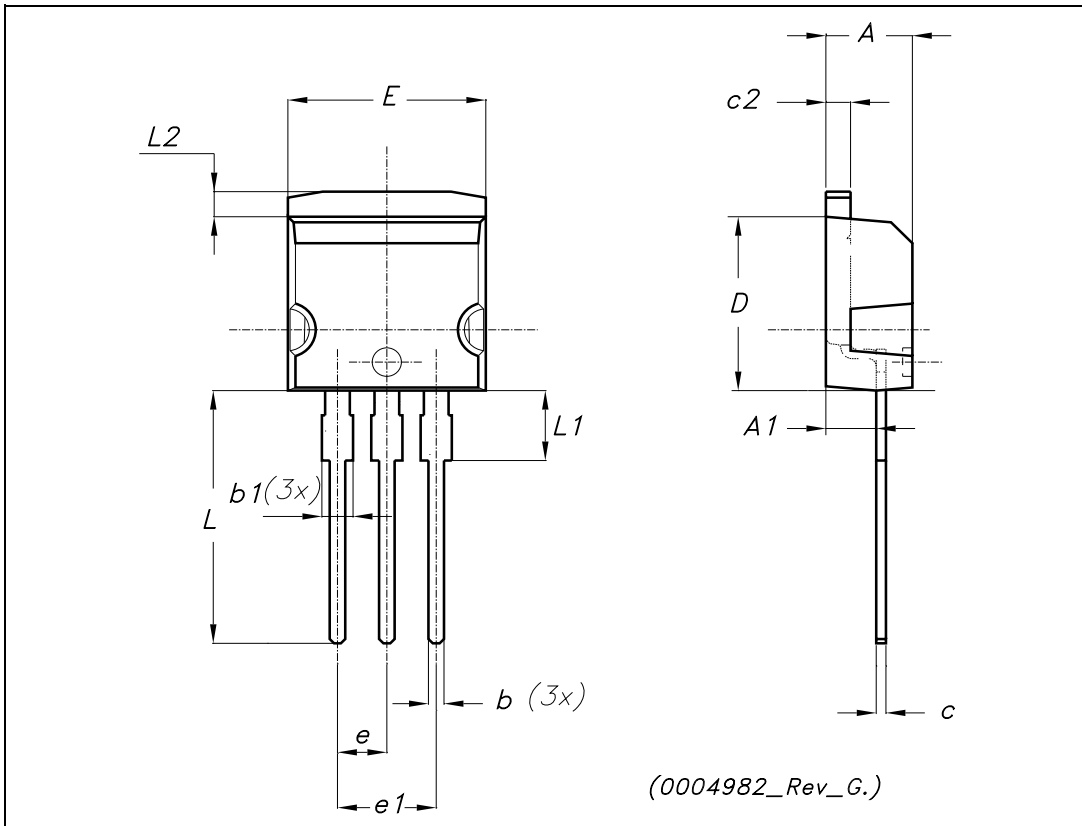
TO-220 MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
b	0.61		0.88	0.024		0.034
b1	1.15		1.70	0.045		0.066
c	0.49		0.70	0.019		0.027
D	15.25		15.75	0.60		0.620
E	10		10.40	0.393		0.409
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
F	1.23		1.32	0.048		0.052
H1	6.20		6.60	0.244		0.256
J1	2.40		2.72	0.094		0.107
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L20		16.40			0.645	
L30		28.90			1.137	
øP	3.75		3.85	0.147		0.151
Q	2.65		2.95	0.104		0.116



TO-262 (I²PAK) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.40		4.60	0.173		0.181
A1	2.40		2.72	0.094		0.107
b	0.61		0.88	0.024		0.034
b1	1.14		1.70	0.044		0.066
c	0.49		0.70	0.019		0.027
c2	1.23		1.32	0.048		0.052
D	8.95		9.35	0.352		0.368
e	2.40		2.70	0.094		0.106
e1	4.95		5.15	0.194		0.202
E	10		10.40	0.393		0.410
L	13		14	0.511		0.551
L1	3.50		3.93	0.137		0.154
L2	1.27		1.40	0.050		0.055



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