



# STP80NF03L

N-CHANNEL 30V - 0.004  $\Omega$  - 80A TO-220

STripFET™ II MOSFET

TYPE	V <sub>DSS</sub>	R <sub>DS(on)</sub>	I <sub>D</sub>
STP80NF03L	30 V	< 0.0045 $\Omega$	80 A

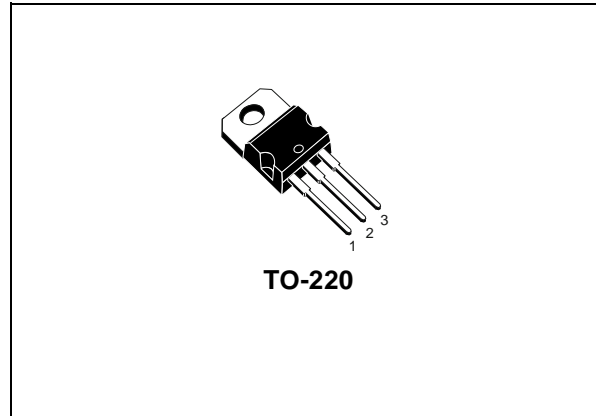
- TYPICAL R<sub>DS(on)</sub> = 0.004  $\Omega$
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW THRESHOLD DRIVE

## DESCRIPTION

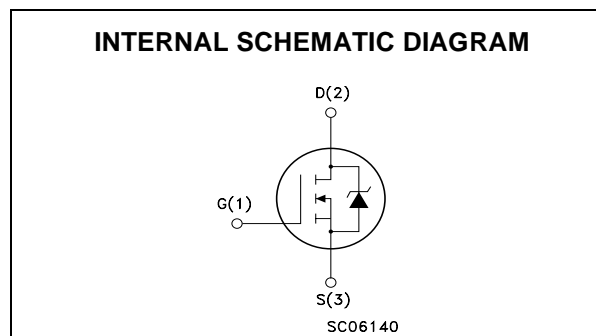
This Power MOSFET is the latest development of ST-Microelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows extremely high packing density for low on-resistance, rugged avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing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

## APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC & DC-AC CONVERTERS
- AUTOMOTIVE ENVIRONMENT  
(INJECTION, ABS, AIR-BAG, LAMPDRIVERS  
Etc.)



TO-220



## ORDERING INFORMATION

SALES TYPE	MARKING	PACKAGE	PACKAGING
STP80NF03L	P80NF03L	TO-220	TUBE

## STP80NF03L

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V <sub>DS</sub>	Drain-source Voltage (V <sub>GS</sub> = 0)	30	V
V <sub>DGR</sub>	Drain-gate Voltage (R <sub>GS</sub> = 20 kΩ)	30	V
V <sub>GS</sub>	Gate-source Voltage	± 20	V
I <sub>D</sub> (#)	Drain Current (continuous) at T <sub>C</sub> = 25°C	80	A
I <sub>D</sub> (#)	Drain Current (continuous) at T <sub>C</sub> = 100°C	80	A
I <sub>DM</sub> (●)	Drain Current (pulsed)	320	A
P <sub>TOT</sub>	Total Dissipation at T <sub>C</sub> = 25°C	300	W
	Derating Factor	2.0	W/°C
dv/dt (1)	Peak Diode Recovery Voltage Slope	2.0	V/ns
T <sub>stg</sub>	Storage Temperature	-65 to 175	°C
T <sub>j</sub>	Max. Operating Junction Temperature	175	°C

(#) Current Limited by Package.

(●) Pulse width limited by safe operating area.

(1) I<sub>SD</sub> ≤ 80A, di/dt ≤ 240 A/μs, V<sub>DD</sub> = 24V ; T<sub>j</sub> ≤ T<sub>JMAX</sub>.

### THERMAL DATA

R <sub>thj-case</sub>	Thermal Resistance Junction-case Max	0.5	°C/W
R <sub>thj-amb</sub>	Thermal Resistance Junction-ambient Max	62.5	°C/W
T <sub>l</sub>	Maximum Lead Temperature For Soldering Purpose Typ	300	°C

### AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I <sub>AR</sub>	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T <sub>j</sub> max)	40	A
E <sub>AS</sub>	Single Pulse Avalanche Energy (starting T <sub>j</sub> = 25 °C, I <sub>D</sub> = I <sub>AR</sub> , V <sub>DD</sub> = 20 V)	2.3	J

### ELECTRICAL CHARACTERISTICS (T<sub>CASE</sub> = 25 °C UNLESS OTHERWISE SPECIFIED)

OFF/ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-source Breakdown Voltage	I <sub>D</sub> = 250 μA, V <sub>GS</sub> = 0	30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current (V <sub>GS</sub> = 0)	V <sub>DS</sub> = Max Rating V <sub>DS</sub> = Max Rating, T <sub>C</sub> = 125 °C			1 10	μA μA
I <sub>GSS</sub>	Gate-body Leakage Current (V <sub>DS</sub> = 0)	V <sub>GS</sub> = ± 20V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250 μA	1	1.5	2.5	V
R <sub>DS(on)</sub>	Static Drain-source On Resistance	V <sub>GS</sub> = 10 V, I <sub>D</sub> = 40 A V <sub>GS</sub> = 4.5 V, I <sub>D</sub> = 40 A		0.004 0.0045	0.0045 0.0065	Ω Ω

**ELECTRICAL CHARACTERISTICS (CONTINUED)**  
**DYNAMIC**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}$ (1)	Forward Transconductance	$V_{DS} = 15\text{ V}$ , $I_D = 15\text{ A}$		50		S
$C_{iss}$	Input Capacitance	$V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$ , $V_{GS} = 0$		5500		pF
$C_{oss}$	Output Capacitance			1670		pF
$C_{rss}$	Reverse Transfer Capacitance			290		pF

**SWITCHING ON**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15\text{ V}$ , $I_D = 40\text{ A}$ $R_G = 4.7\Omega$ , $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3)		30		ns
$t_r$	Rise Time			270		ns
$Q_g$	Total Gate Charge	$V_{DD} = 24\text{ V}$ , $I_D = 80\text{ A}$ , $V_{GS} = 4.5\text{ V}$		85	110	nC
$Q_{gs}$	Gate-Source Charge			23		nC
$Q_{gd}$	Gate-Drain Charge			40		nC

**SWITCHING OFF**

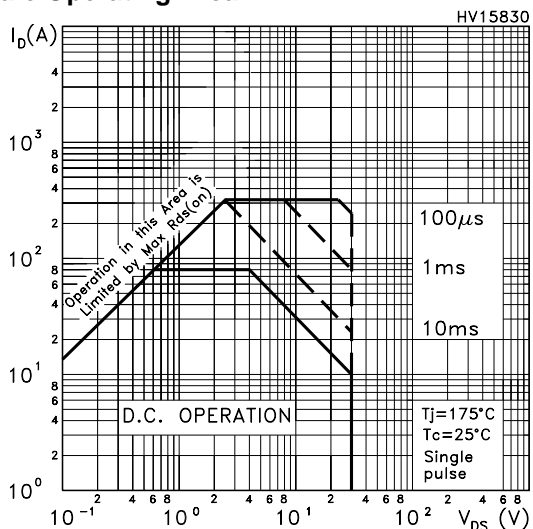
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 15\text{ V}$ , $I_D = 40\text{ A}$ , $R_G = 4.7\Omega$ , $V_{GS} = 4.5\text{ V}$ (Resistive Load, Figure 3)		110		ns
$t_f$	Fall Time			95		ns
$t_{r(Voff)}$	Off-Voltage Rise Time	$V_{clamp} = 24\text{ V}$ , $I_D = 80\text{ A}$ , $R_G = 4.7\Omega$ , $V_{GS} = 4.5\text{ V}$ (Inductive Load, Figure 5)		125		ns
$t_f$	Fall Time			75		ns
$t_c$	Cross-over Time			125		ns

**SOURCE DRAIN DIODE**

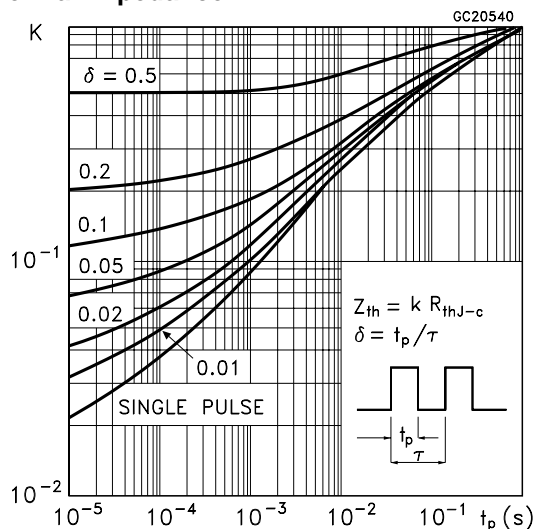
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$I_{SD}$	Source-drain Current				80	A
$I_{SDM}$ (1)	Source-drain Current (pulsed)				320	A
$V_{SD}$ (2)	Forward On Voltage	$I_{SD} = 80\text{ A}$ , $V_{GS} = 0$			1.5	V
$t_{rr}$	Reverse Recovery Time	$I_{SD} = 80\text{ A}$ , $di/dt = 100\text{ A}/\mu\text{s}$ , $V_{DD} = 20\text{ V}$ , $T_j = 150^\circ\text{C}$ (see test circuit, Figure 5)		75		ns
$Q_{rr}$	Reverse Recovery Charge			0.15		$\mu\text{C}$
$I_{RRM}$	Reverse Recovery Current			4		A

Note: 1. Pulsed: Pulse duration = 300  $\mu\text{s}$ , duty cycle 1.5 %.  
 2. Pulse width limited by safe operating area.

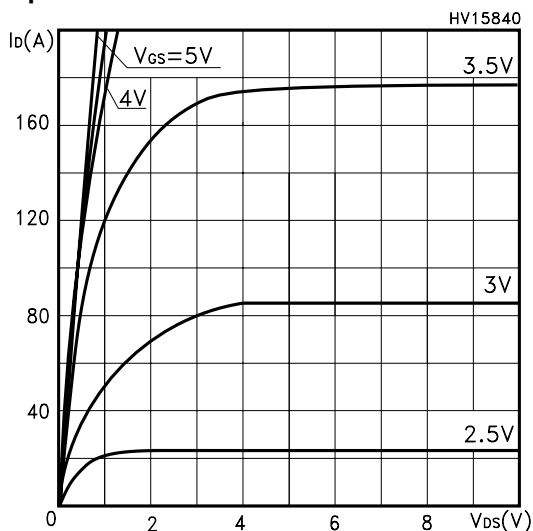
Safe Operating Area



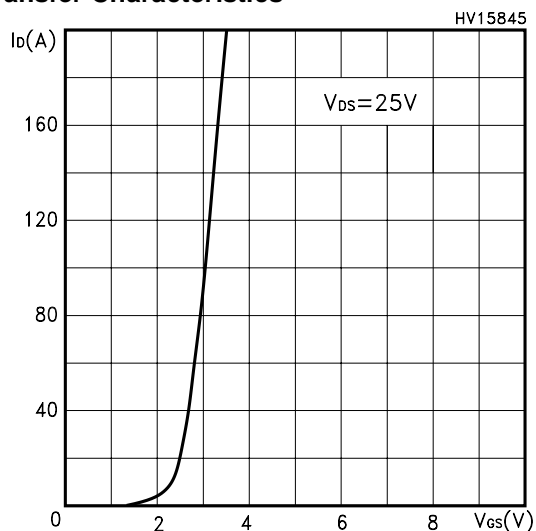
Thermal Impedance



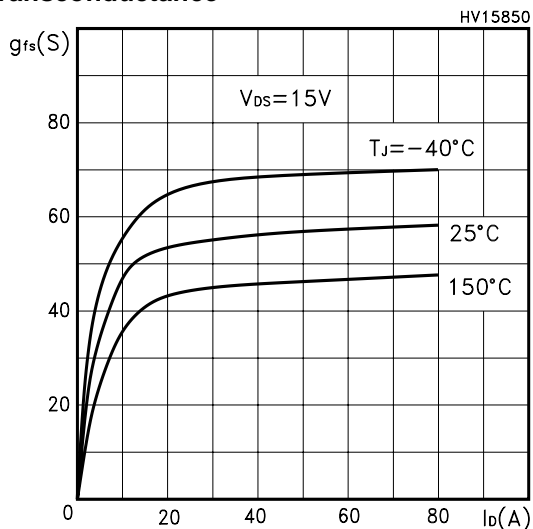
Output Characteristics



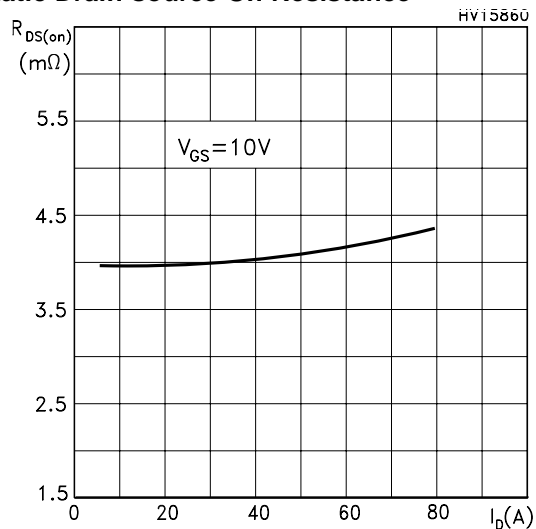
Transfer Characteristics



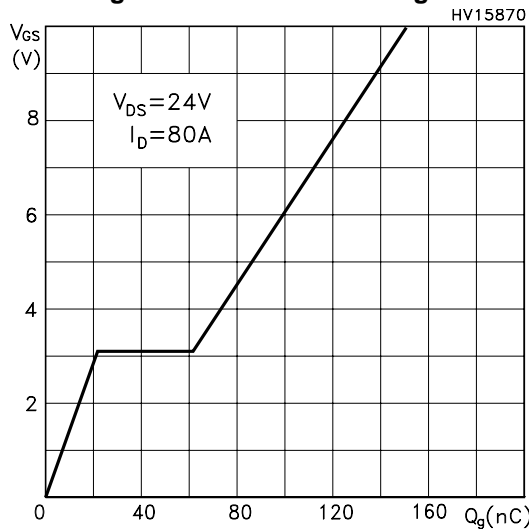
Transconductance



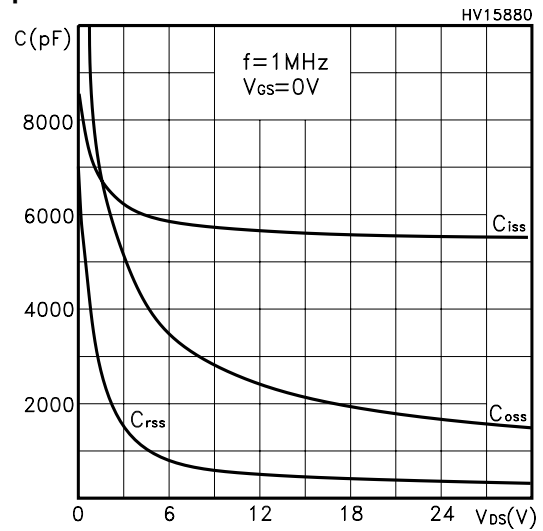
Static Drain-source On Resistance



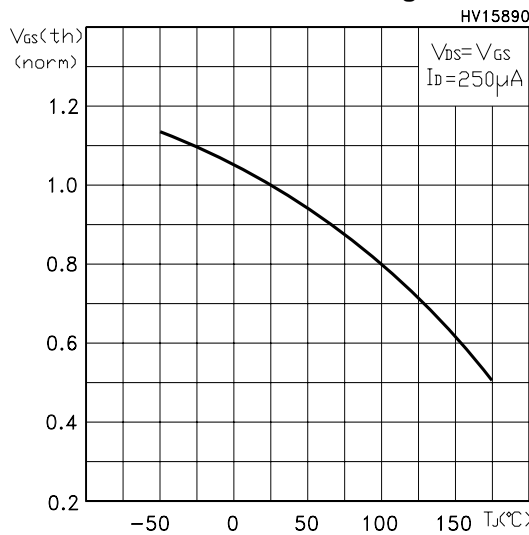
Gate Charge vs Gate-source Voltage



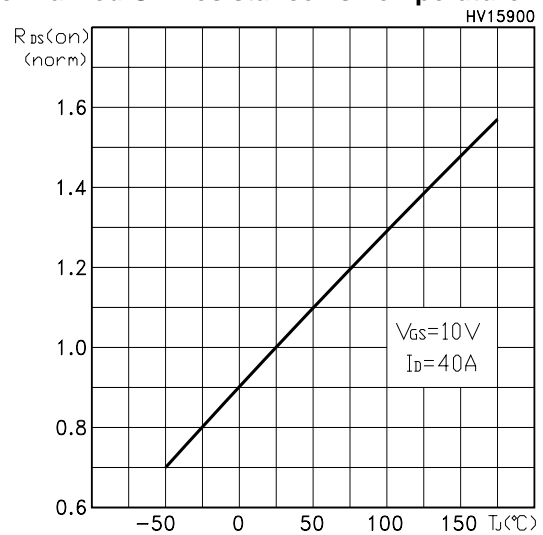
Capacitance Variations



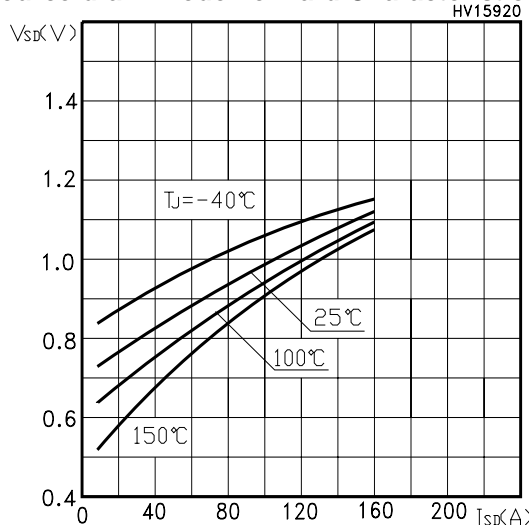
Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

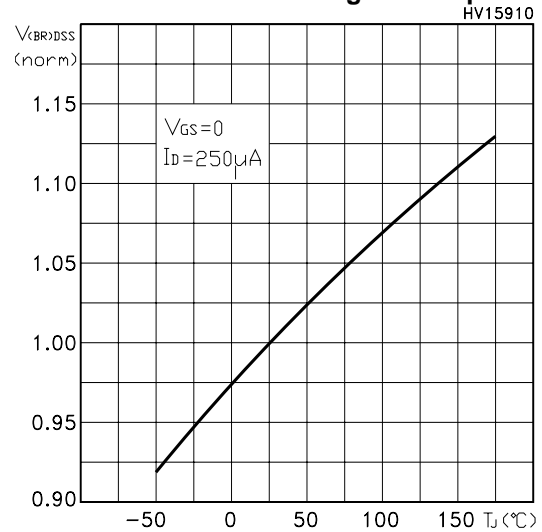


Fig. 1: Unclamped Inductive Load Test Circuit

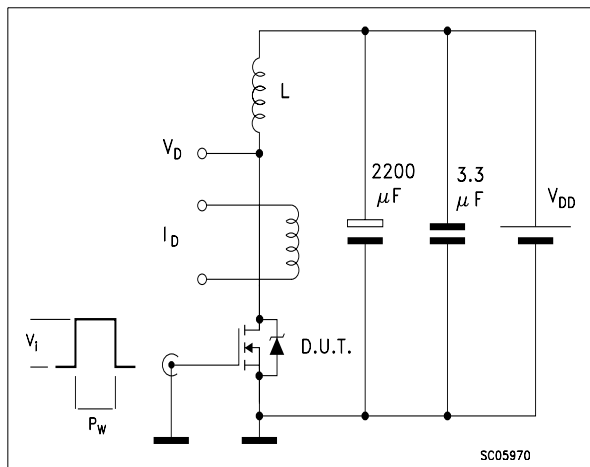


Fig. 2: Unclamped Inductive Waveform

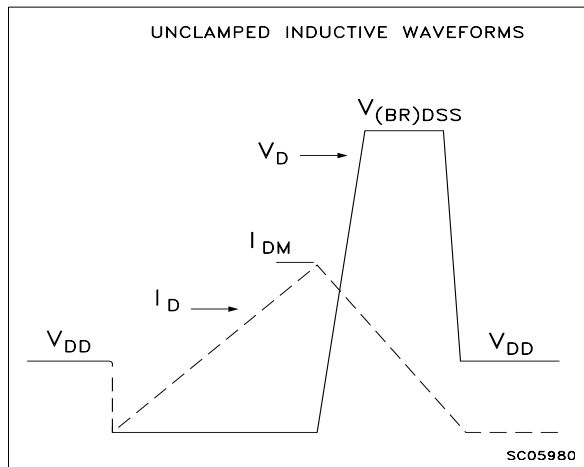


Fig. 3: Switching Times Test Circuit For Resistive Load

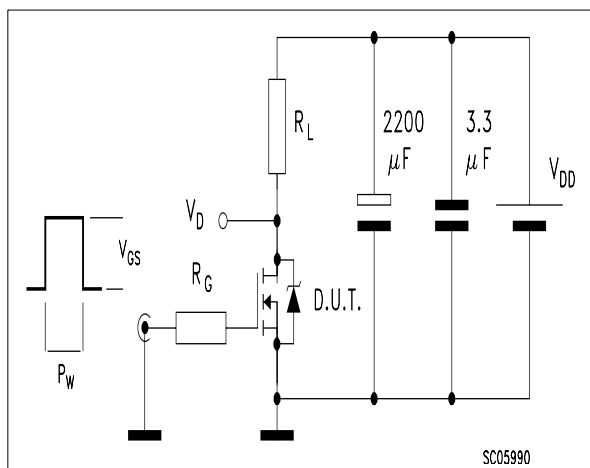


Fig. 4: Gate Charge test Circuit

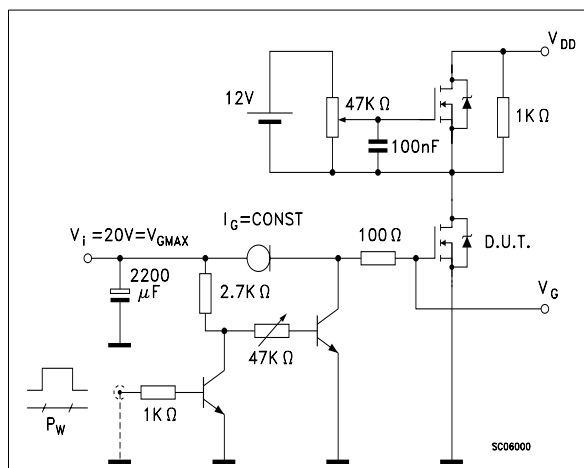
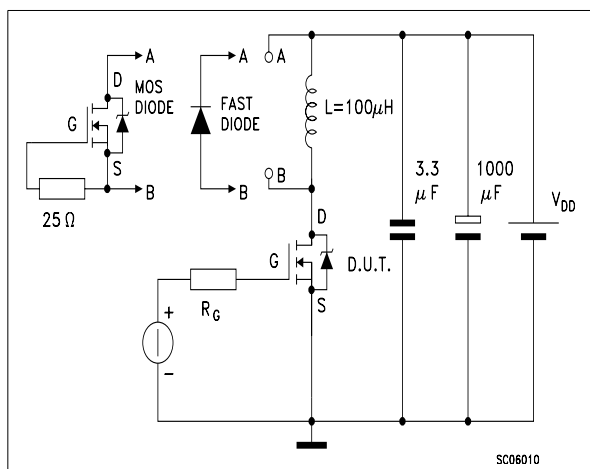
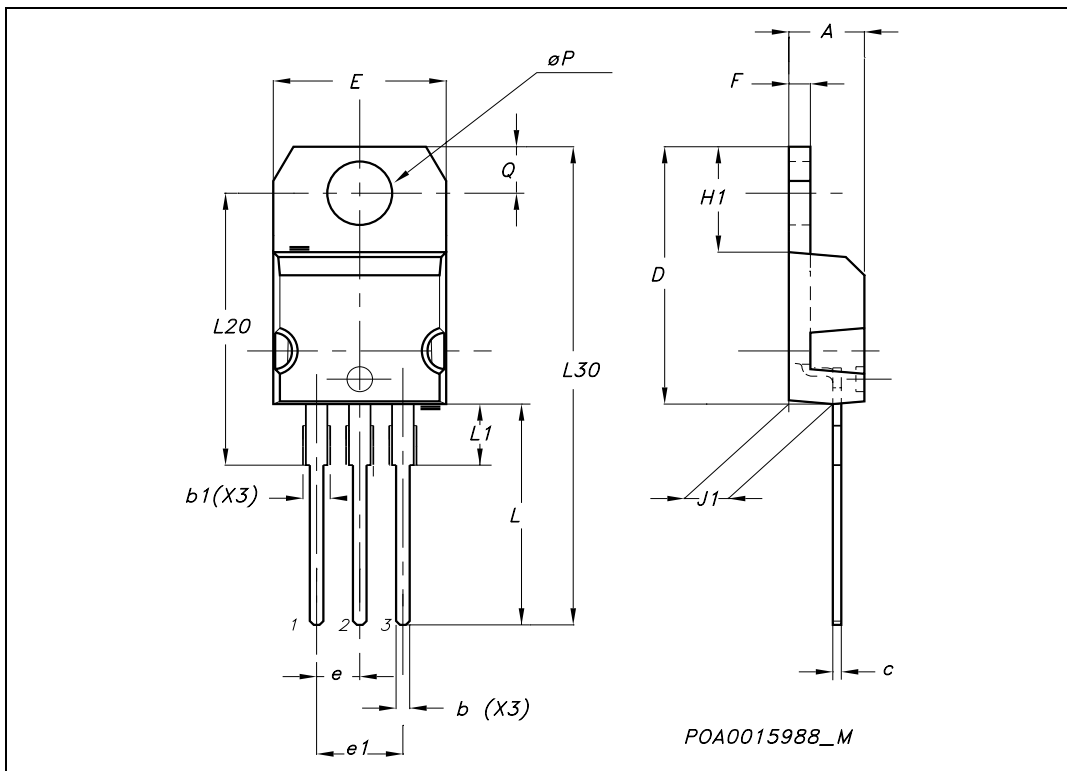


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



## 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



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics  
All other names are the property of their respective owners

© 2004 STMicroelectronics - All Rights Reserved  
STMicroelectronics GROUP OF COMPANIES

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -  
Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>



This datasheet has been download from:

[www.datasheetcatalog.com](http://www.datasheetcatalog.com)

Datasheets for electronics components.