



STB80NF55-06

N-CHANNEL 55V - 0.005Ω - 80A D²PAK
STripFET™ POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB80NF55-06	55 V	<0.0065Ω	80 A

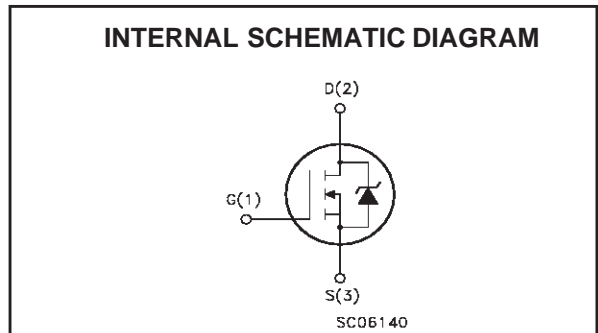
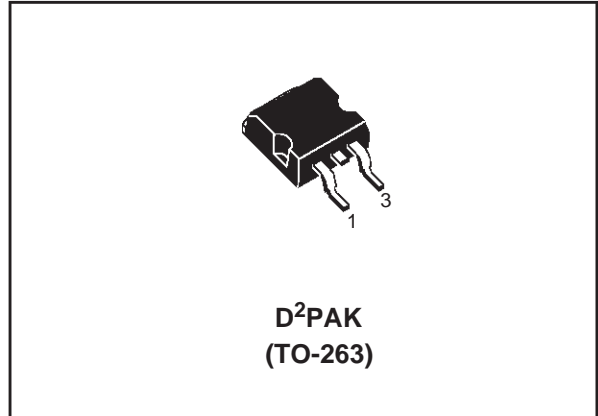
- TYPICAL R_{DS(on)} = 0.005Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- APPLICATION ORIENTED CHARACTERIZATION
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL

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

- SOLENOID AND RELAY DRIVERS
- MOTOR CONTROL, AUDIO AMPLIFIERS
- DC-DC CONVERTERS
- AUTOMOTIVE ENVIRONMENT



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	55	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	55	V
V _{GS}	Gate- source Voltage	±20	V
I _{D(1)}	Drain Current (continuous) at T _C = 25°C	80	A
I _D	Drain Current (continuous) at T _C = 100°C	80	A
I _{DM} (●)	Drain Current (pulsed)	320	A
P _{TOT}	Total Dissipation at T _C = 25°C	300	W
	Derating Factor	2	W/°C
dv/dt(2)	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) Current Limited by Package

(2) I_{SD} ≤ 80A, di/dt ≤ 300 A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{jMAX}

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

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I _{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T _j max)	80	A
E _{AS}	Single Pulse Avalanche Energy (starting T _j = 25 °C, I _D = I _{AR} , V _{DD} = 50 V)	650	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	55			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 = 40 A		0.005	0.0065	Ω

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 = 40 A		50		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		7300		pF
C _{oss}	Output Capacitance			980		pF
C _{rss}	Reverse Transfer Capacitance			250		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 27V, I_D = 40A$		40		ns
t_r	Rise Time	$R_G = 4.7\Omega, V_{GS} = 10V$ (see test circuit, Figure 3)		240		ns
Q_g	Total Gate Charge	$V_{DD} = 44V, I_D = 80A,$ $V_{GS} = 10V$		190	256	nC
Q_{gs}	Gate-Source Charge			38		nC
Q_{gd}	Gate-Drain Charge			66		nC

SWITCHING OFF

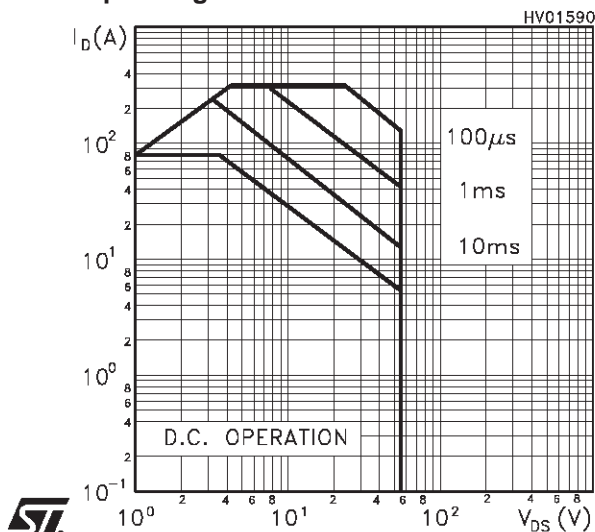
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 27V, I_D = 40A,$ $R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		260		ns
t_f	Fall Time			75		ns
$t_{d(off)}$	Off-voltage Rise Time	$V_{clamp} = 44V, I_D = 80A$ $R_G = 4.7\Omega, V_{GS} = 10V$		70		ns
$T_r(V_{off})$	Off Voltage Rise time	(see test circuit, Figure 5)		185		ns
t_f	Fall Time			240		ns
t_c	Cross-over Time			110		ns

SOURCE DRAIN DIODE

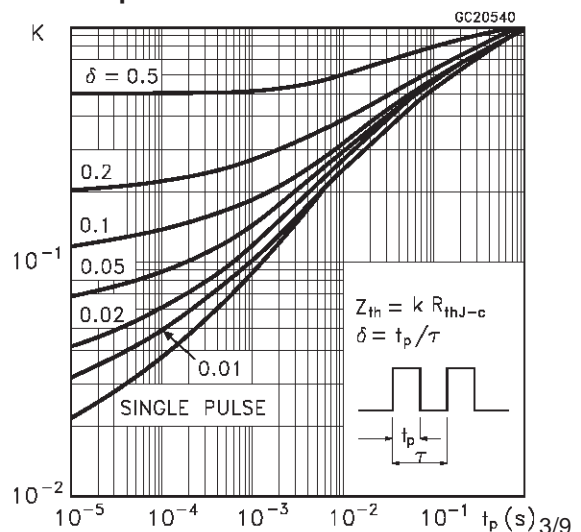
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				80	A
$I_{SDM(1)}$	Source-drain Current (pulsed)				320	A
$V_{SD(2)}$	Forward On Voltage	$I_{SD} = 80A, V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 80A, di/dt = 100A/\mu s,$ $V_{DD} = 20V, T_j = 150^\circ C$ (see test circuit, Figure 5)		80		ns
Q_{rr}	Reverse Recovery Charge			0.24		μC
I_{RRM}	Reverse Recovery Current			6		A

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

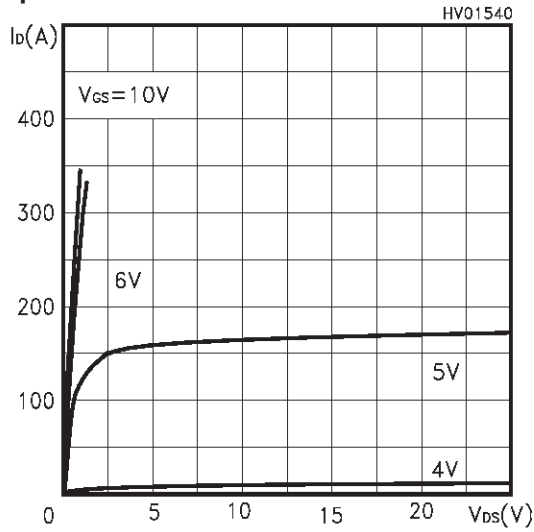
Safe Operating Area



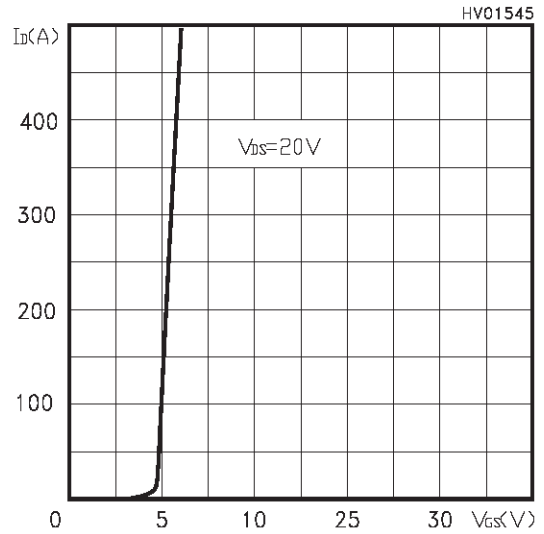
Thermal Impedence



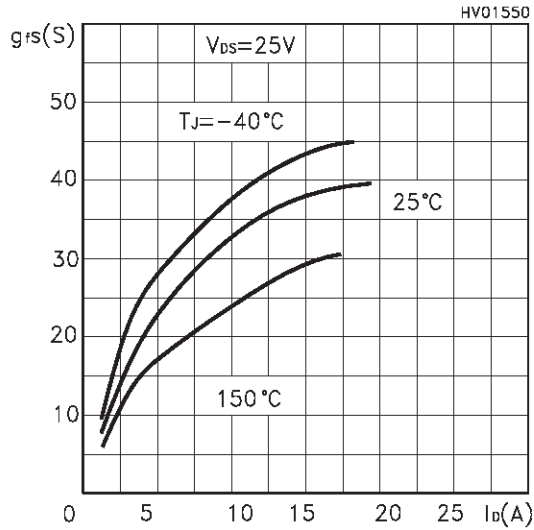
Output Characteristics



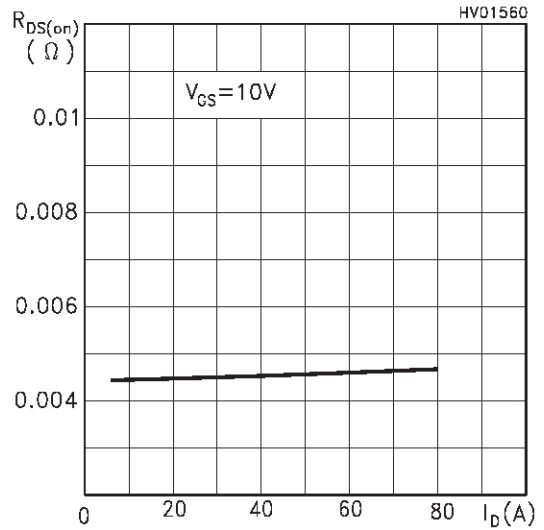
Transfer Characteristics



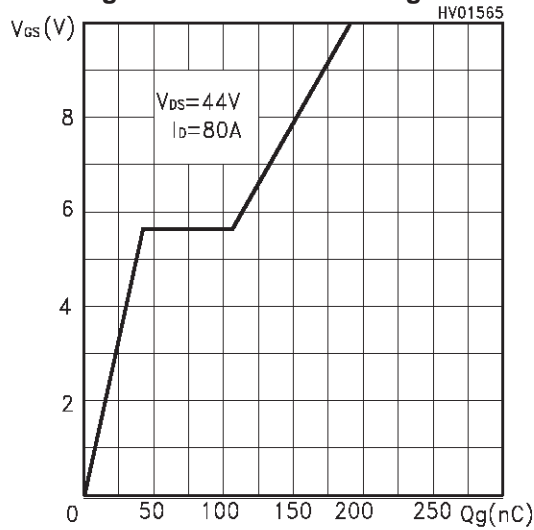
Transconductance



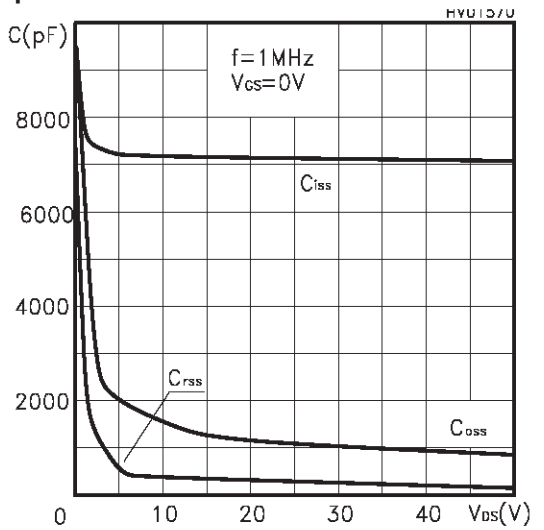
Static Drain-source On Resistance



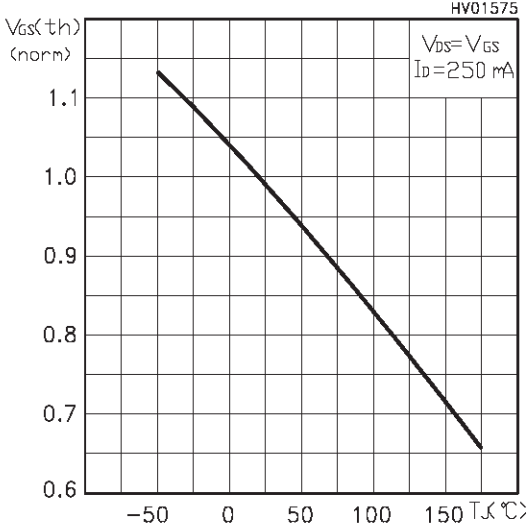
Gate Charge vs Gate-source Voltage



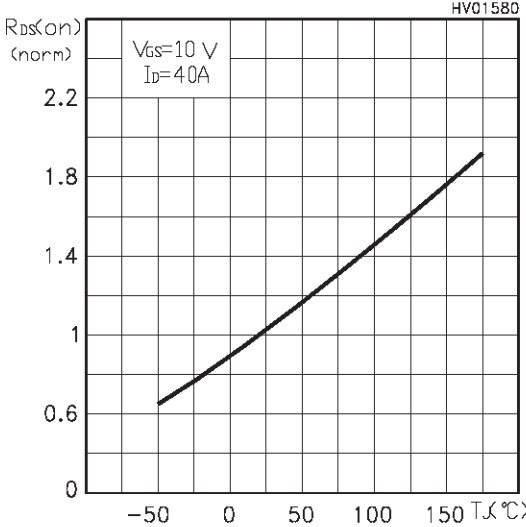
Capacitance Variations



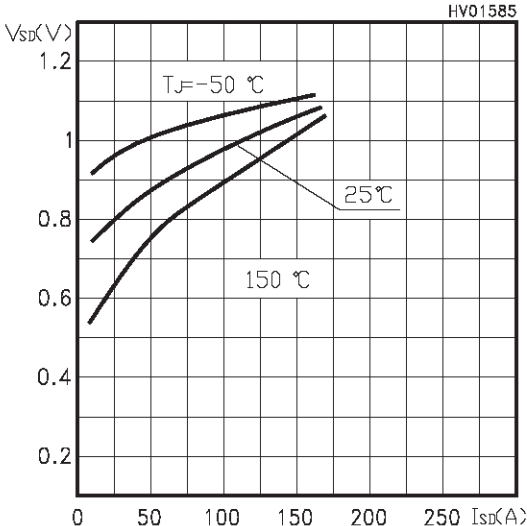
Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Drain-Source Breakdown vs Temperature

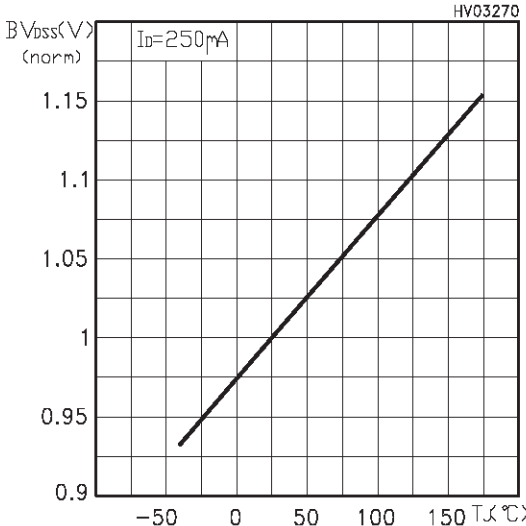


Fig. 1: Unclamped Inductive Load Test Circuit

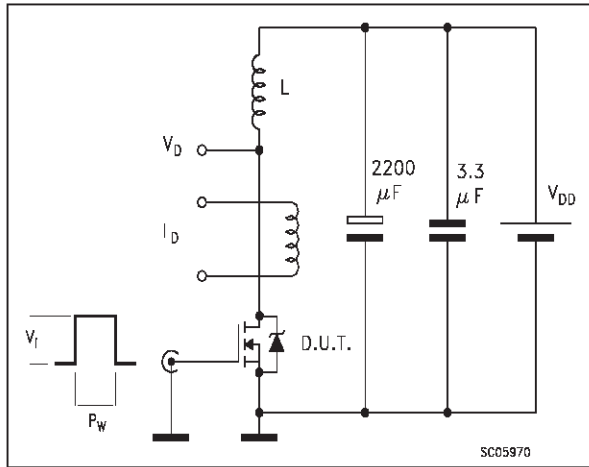


Fig. 2: Unclamped Inductive Waveform

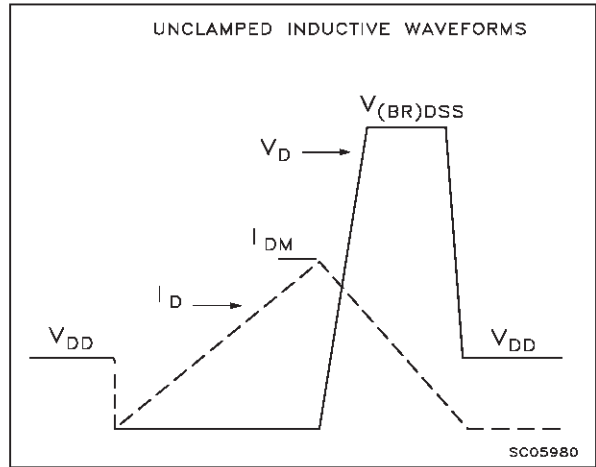


Fig. 3: Switching Times Test Circuit For Resistive Load

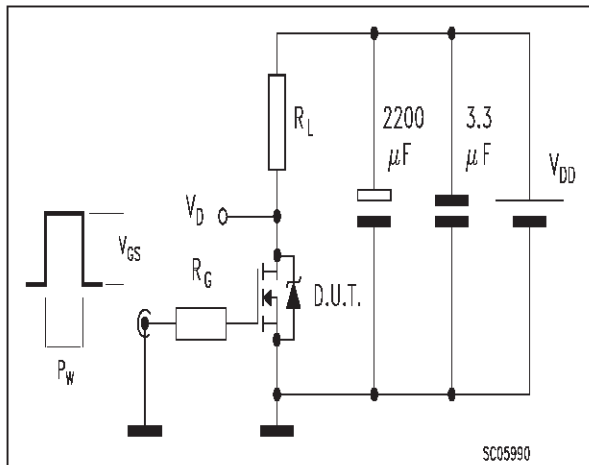


Fig. 4: Gate Charge test Circuit

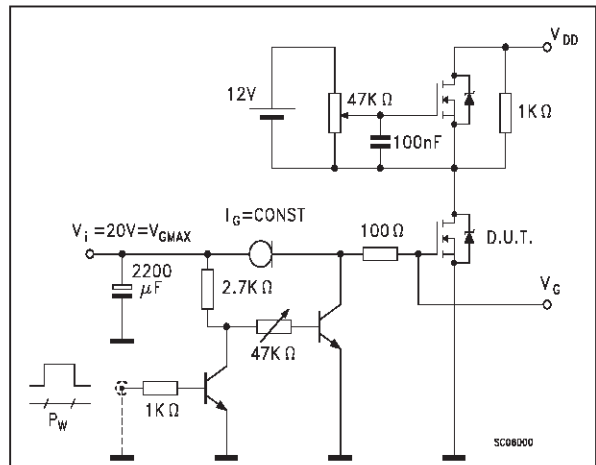
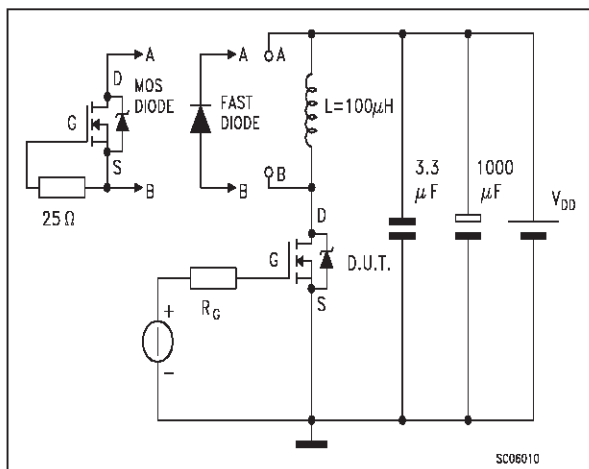
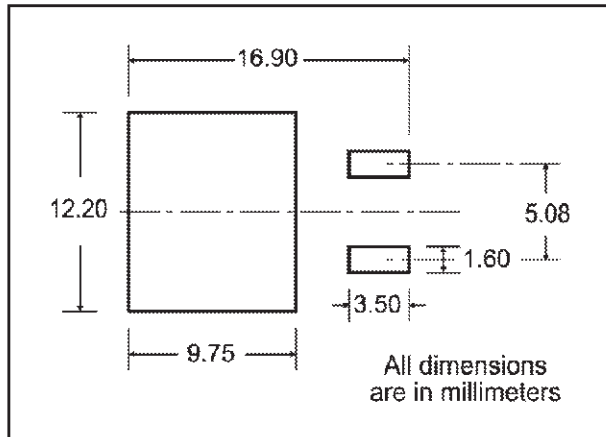


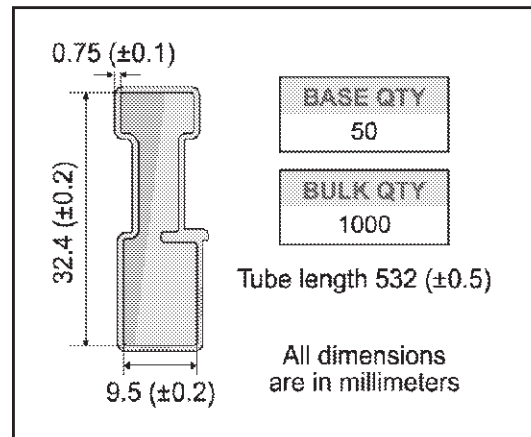
Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

40 mm min. Access hole at slot location

Full radius

Tape slot in core for tape start 2.5mm min. width

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	11.9	12.1	0.468	0.476
P2	1.9	2.1	0.075	0.082
R	50		1.574	
T	0.25	0.35	0.0098	0.0137
W	23.7	24.3	0.933	0.956

REEL MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

10 pitches cumulative tolerance on tape +/- 0.2 mm

Center line of cavity

User Direction of Feed

TRL

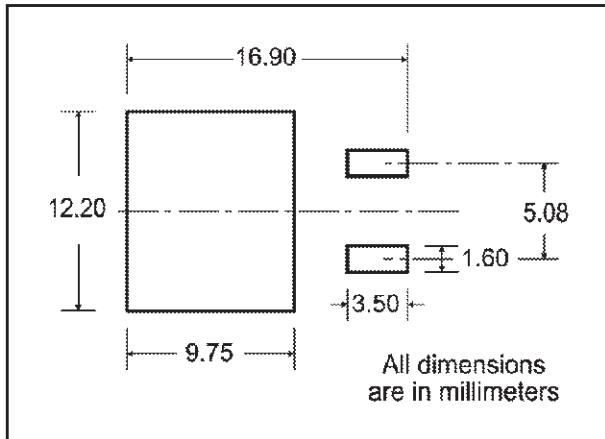
FEED DIRECTION

Bending radius R min.

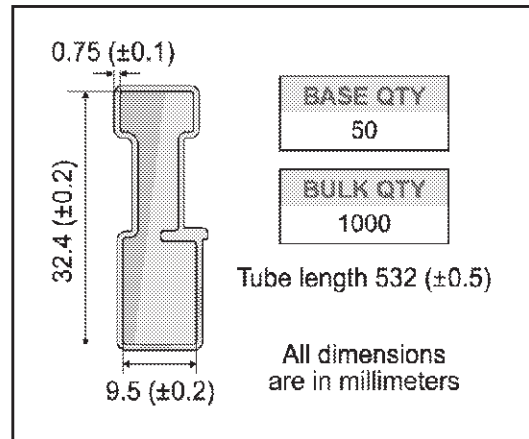
* on sales type



D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

40 mm min. Access hole at slot location

Full radius

Tape slot in core for tape start 2.5mm min. width

G measured at hub

REEL MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A		330		12.992
B	1.5		0.059	
C	12.8	13.2	0.504	0.520
D	20.2		0.795	
G	24.4	26.4	0.960	1.039
N	100		3.937	
T		30.4		1.197

BASE QTY	BULK QTY
1000	1000

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	10.5	10.7	0.413	0.421
B0	15.7	15.9	0.618	0.626
D	1.5	1.6	0.059	0.063
D1	1.59	1.61	0.062	0.063
E	1.65	1.85	0.065	0.073
F	11.4	11.6	0.449	0.456
K0	4.8	5.0	0.189	0.197
P0	3.9	4.1	0.153	0.161
P1	15.9	16.1	0.626	0.633
P2	1.9	2.1	0.075	0.082
R	50		1.574	
W	23.7	24.3	0.933	0.956

10 pitches cumulative tolerance on tape +/- 0.2 mm

TOP COVER TAPE

User Direction of Feed

FEED DIRECTION

Bending radius R min.

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. Specification 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 trademark of STMicroelectronics

© 2001 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco -
Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>