



STD60NF3LL

N-CHANNEL 30V - 0.0075Ω - 60A DPAK STripFET™ II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STD60NF3LL	30V	<0.0095Ω	60A

- TYPICAL R_{DS(on)} = 0.0075Ω
- OPTIMAL R_{DS(ON)} x Q_g TRADE-OFF @ 4.5V
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL

DESCRIPTION

This application specific Power Mosfet is the third generation of STMicroelectronics unique "Single Feature Size™" strip-based process. The resulting transistor shows the best trade-off between on-resistance and gate charge. When used as high and low side in buck regulators, it gives the best performance in terms of both conduction and switching losses. This is extremely important for motherboards where fast switching and high efficiency are of paramount importance.

APPLICATIONS

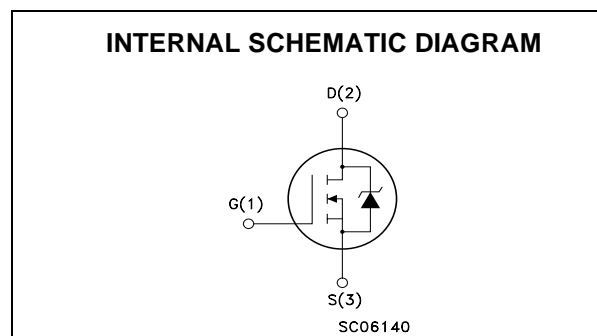
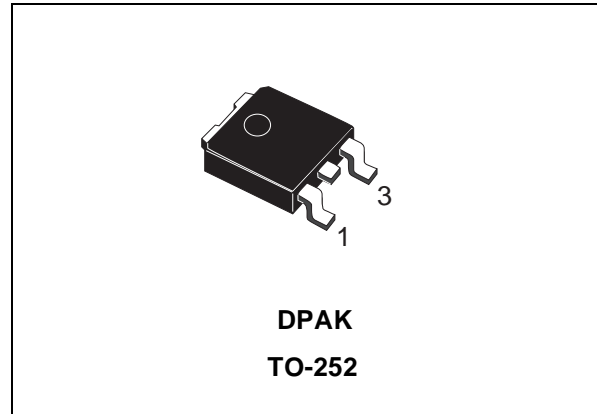
- SPECIFICALLY DESIGNED AND OPTIMISED FOR HIGH EFFICIENCY DC/DC CONVERTERS

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	30	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	30	V
V _{GS}	Gate- source Voltage	± 16	V
I _D	Drain Current (continuous) at T _C = 25°C	60	A
I _D	Drain Current (continuous) at T _C = 100°C	43	A
I _{DM} (●)	Drain Current (pulsed)	240	A
P _{TOT}	Total Dissipation at T _C = 25°C	100	W
	Derating Factor	0.67	W/°C
E _{AS} (1)	Single Pulse Avalanche Energy	700	mJ
T _{stg}	Storage Temperature	- 55 to 175	°C
T _j	Operating Junction Temperature		

(●) Pulse width limited by safe operating area

(1) Starting T_j=25°C, I_D=30A, V_{DD}=27.5V



STD60NF3LL

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	1.5	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	100	°C/W
T _I	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	30			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} = ± 16V			±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	1			V
R _{DS(on)}	Static Drain-source On Resistance	V _{GS} = 10 V, I _D = 30 A V _{GS} = 4.5 V, I _D = 30 A		0.0075 0.0085	0.0095 0.0105	Ω Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (1)	Forward Transconductance	V _{DS} = 15 V, I _D = 30 A		30		S
C _{iss}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		2210		pF
C _{oss}	Output Capacitance			635		pF
C _{rss}	Reverse Transfer Capacitance			138		pF

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$V_{DD} = 15V, I_D = 30A$		22		ns
t_r	Rise Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		130		ns
Q_g	Total Gate Charge	$V_{DD} = 24V, I_D = 60A,$		30	40	nC
Q_{gs}	Gate-Source Charge	$V_{GS} = 4.5V$		9		nC
Q_{gd}	Gate-Drain Charge			12.5		nC

SWITCHING OFF

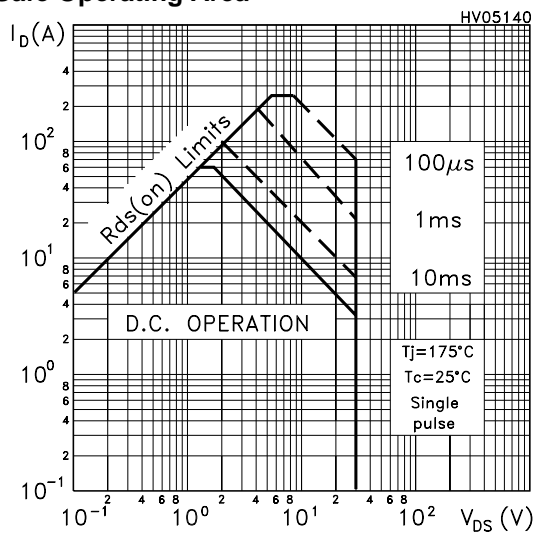
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 15V, I_D = 30A,$		36.5		ns
t_f	Fall Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		36.5		ns
$t_{d(off)}$	Off-voltage Rise Time	$V_{clamp} = 24V, I_D = 30A$		32		ns
t_f	Fall Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$		23		ns
t_c	Cross-over Time	(see test circuit, Figure 5)		40		ns

SOURCE DRAIN DIODE

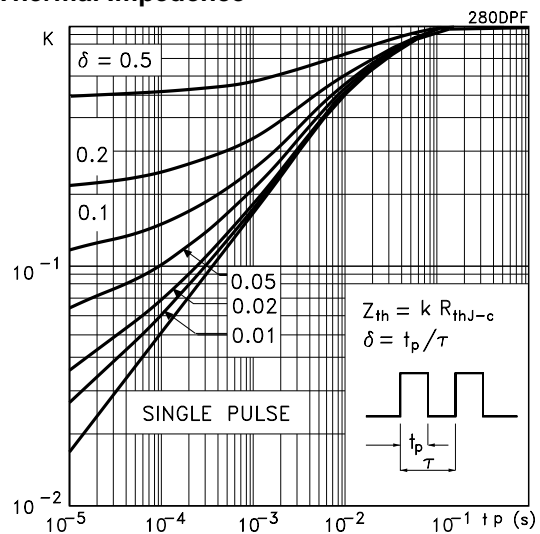
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				60	A
$I_{SDM(1)}$	Source-drain Current (pulsed)				240	A
$V_{SD(2)}$	Forward On Voltage	$I_{SD} = 60A, V_{GS} = 0$			1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 60A, di/dt = 100A/\mu s,$		65		ns
Q_{rr}	Reverse Recovery Charge	$V_{DD} = 15V, T_j = 150^\circ C$		105		nC
I_{RRM}	Reverse Recovery Current	(see test circuit, Figure 5)		3.4		A

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

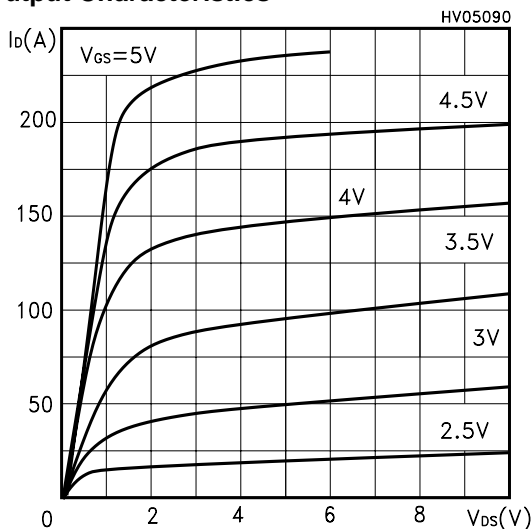
Safe Operating Area



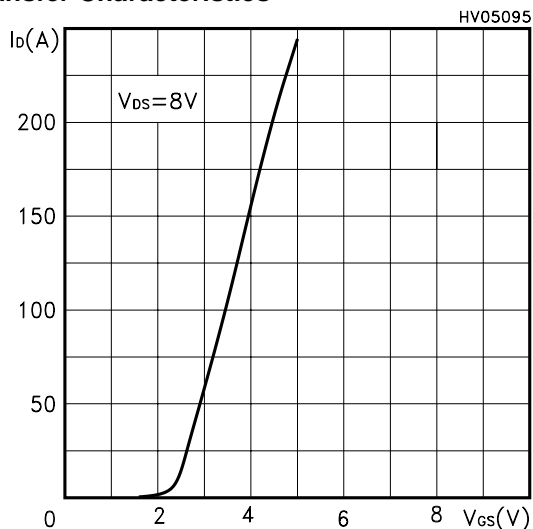
Thermal Impedance



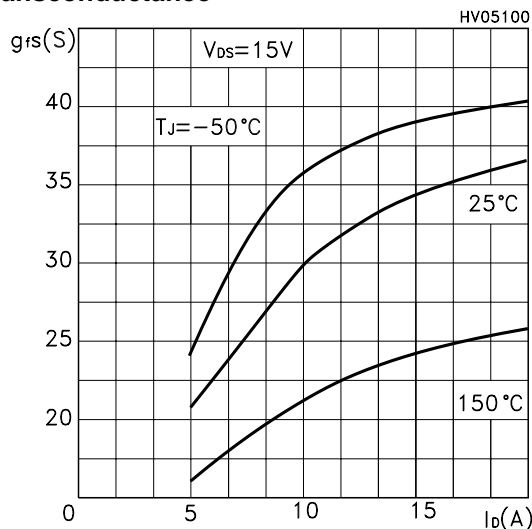
Output Characteristics



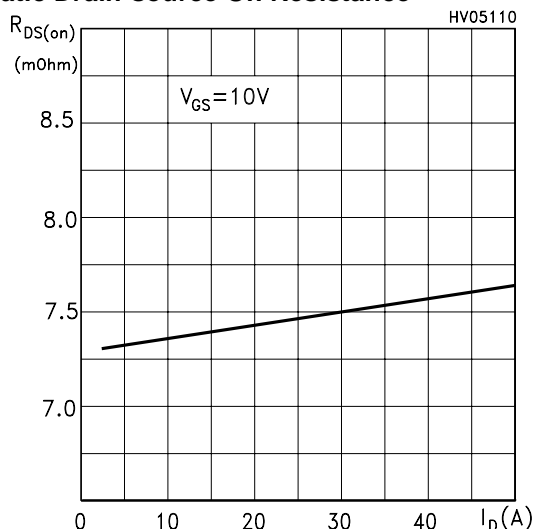
Transfer Characteristics



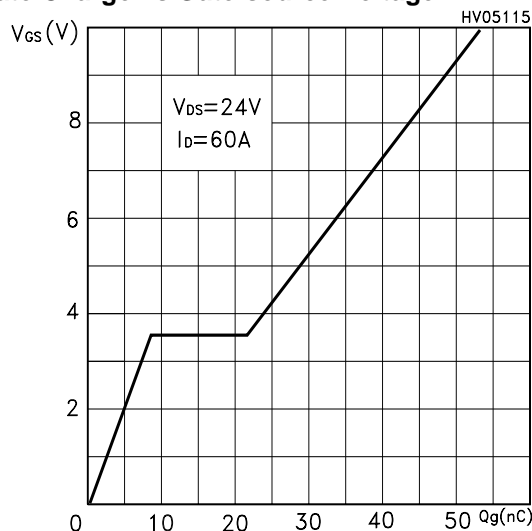
Transconductance



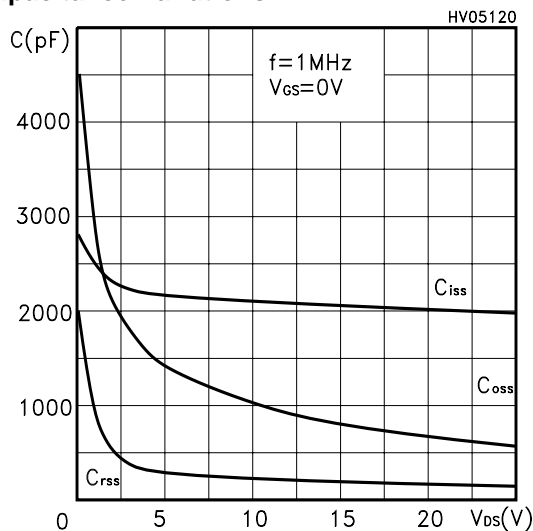
Static Drain-source On Resistance



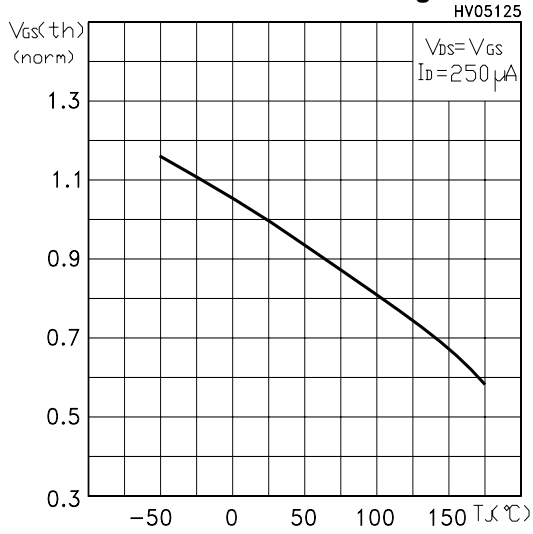
Gate Charge vs Gate-source Voltage



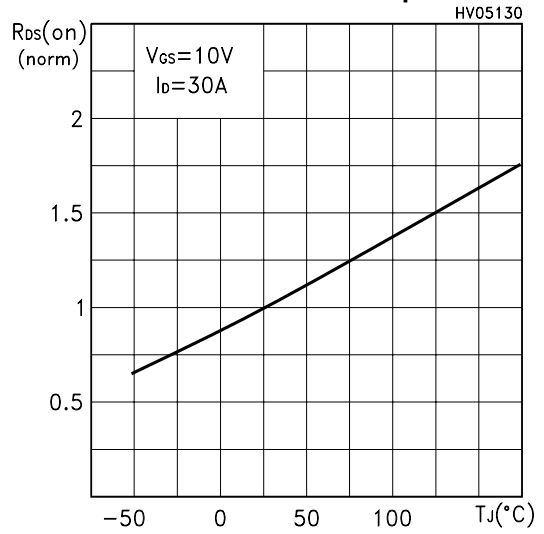
Capacitance Variations



Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

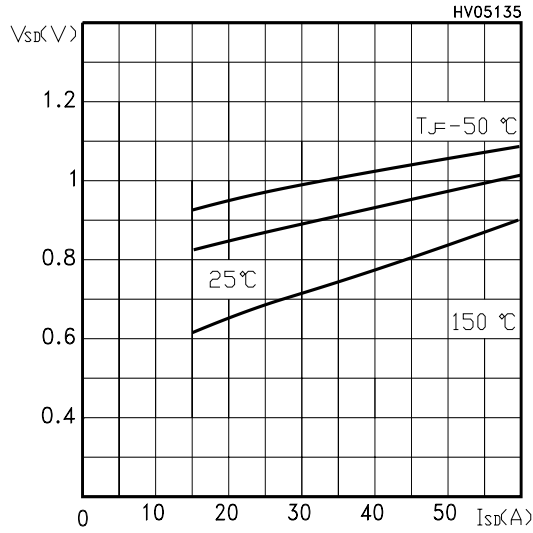


Fig. 1: Unclamped Inductive Load Test Circuit

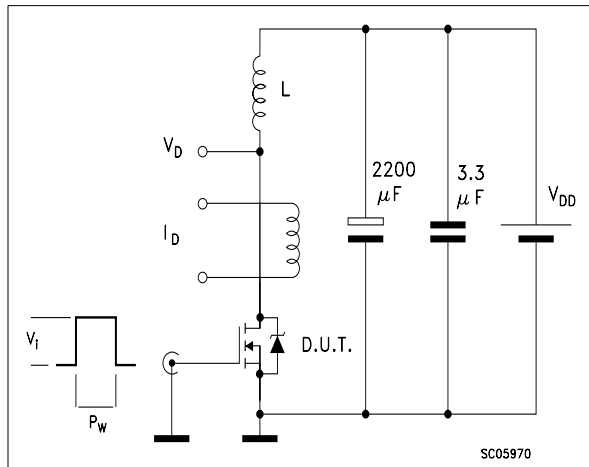


Fig. 2: Unclamped Inductive Waveform

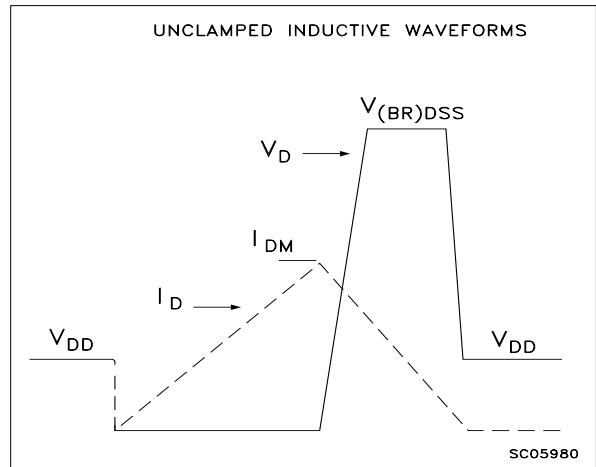


Fig. 3: Switching Times Test Circuit For Resistive Load

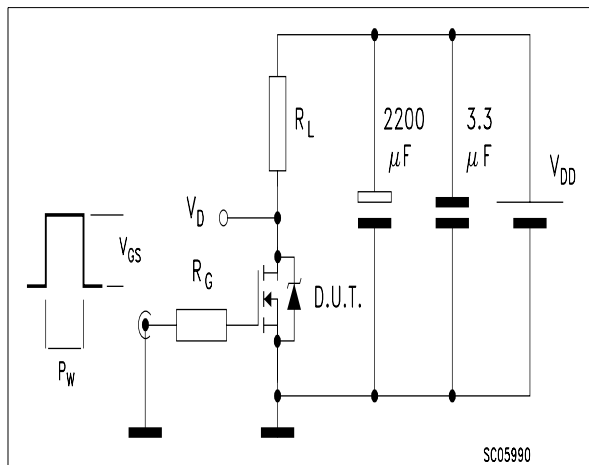


Fig. 4: Gate Charge test Circuit

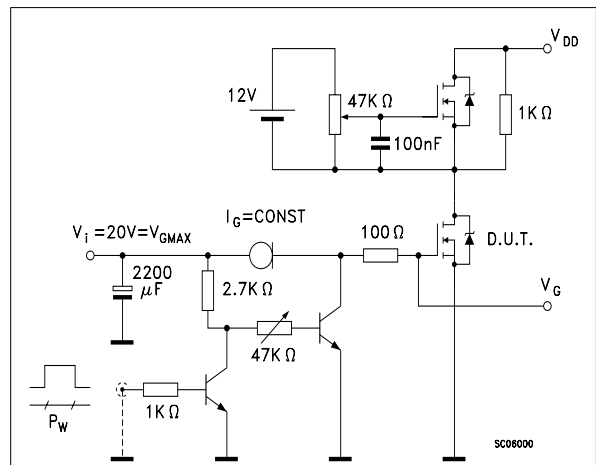
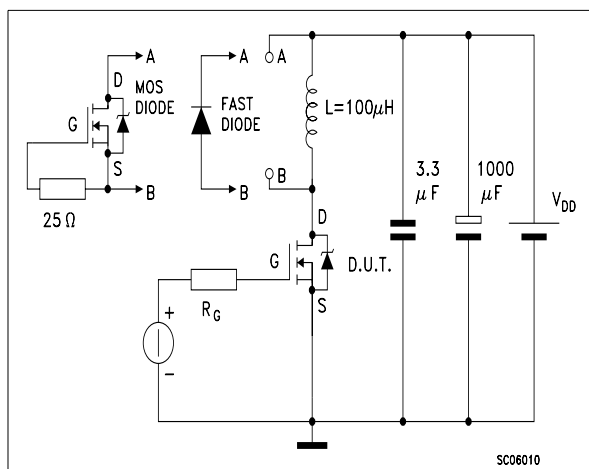
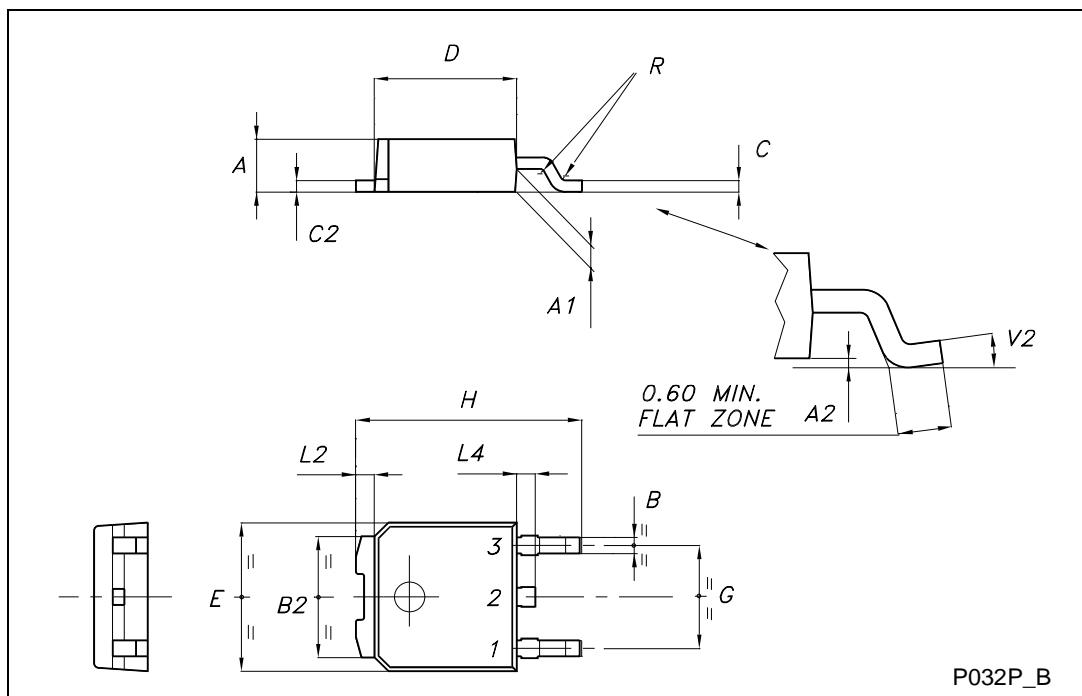


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

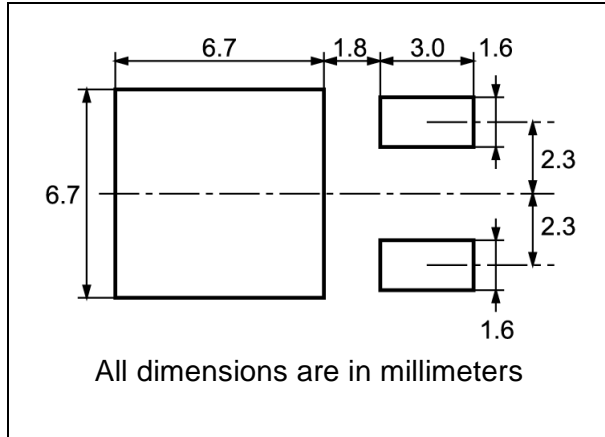


TO-252 (DPAK) MECHANICAL DATA

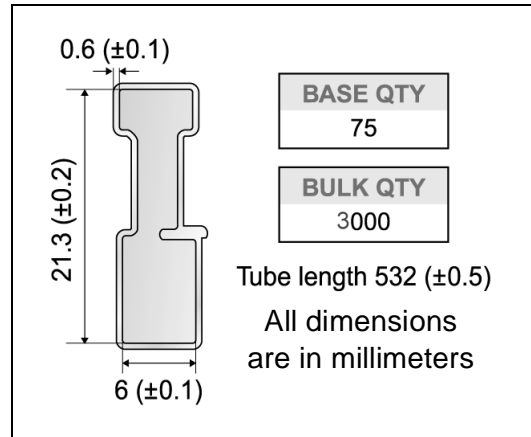
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	2.20		2.40	0.087		0.094
A1	0.90		1.10	0.035		0.043
A2	0.03		0.23	0.001		0.009
B	0.64		0.90	0.025		0.035
B2	5.20		5.40	0.204		0.213
C	0.45		0.60	0.018		0.024
C2	0.48		0.60	0.019		0.024
D	6.00		6.20	0.236		0.244
E	6.40		6.60	0.252		0.260
G	4.40		4.60	0.173		0.181
H	9.35		10.10	0.368		0.398
L2		0.8			0.031	
L4	0.60		1.00	0.024		0.039
V2	0°		8°	0°		0°



DPAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

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	16.4	18.4	0.645	0.724
N	50		1.968	
T		22.4		0.881

BASE QTY	BULK QTY
2500	2500

TAPE MECHANICAL DATA

DIM.	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A0	6.8	7	0.267	0.275
B0	10.4	10.6	0.409	0.417
B1		12.1		0.476
D	1.5	1.6	0.059	0.063
D1	1.5		0.059	
E	1.65	1.85	0.065	0.073
F	7.4	7.6	0.291	0.299
K0	2.55	2.75	0.100	0.108
P0	3.9	4.1	0.153	0.161
P1	7.9	8.1	0.311	0.319
P2	1.9	2.1	0.075	0.082
R	40		1.574	
W	15.7	16.3	0.618	0.641

* on sales type

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

© 2002 STMicroelectronics - Printed in Italy - All Rights Reserved
STMicroelectronics GROUP OF COMPANIES

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

© <http://www.st.com>