



STB85NF3LL

N-CHANNEL 30V - 0.006Ω - 85A D²PAK LOW GATE CHARGE STripFET™II POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB85NF3LL	30 V	< 0.008 Ω	85 A

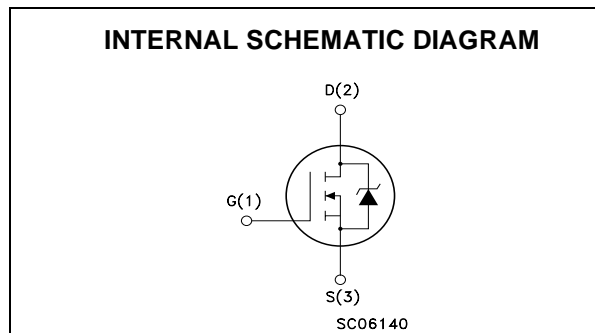
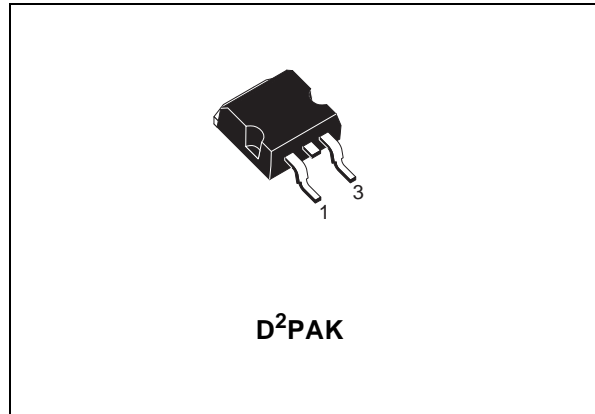
- TYPICAL R_{DS(on)} = 0.0075Ω (@4.5V)
- OPTIMAL R_{DS(on)} x Q_g TRADE-OFF @4.5V
- CONDUCTION LOSSES REDUCED
- SWITCHING LOSSES REDUCED
- ADD SUFFIX "T4" FOR ORDERING IN TAPE & REEL

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 CPU CORE 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
V _{GSM}	Gate-source Voltage Pulsed (t _p ≤ 50μs; duty cycle 25%; T _j ≤ 150°C)	± 20	V
I _D	Drain Current (continuous) at T _C = 25°C	85	A
I _D	Drain Current (continuous) at T _C = 100°C	60	A
I _{DM} (●)	Drain Current (pulsed)	340	A
P _{TOT}	Total Dissipation at T _C = 25°C	110	W
	Derating Factor	0.73	W/°C
T _{stg}	Storage Temperature	-65 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(●) Pulse width limited by safe operating area

STB85NF3LL

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	1.36	°C/W
Rthj-amb	Thermal Resistance Junction-ambient Max	62.5	°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} = 10V, I _D = 40 A V _{GS} = 4.5V, I _D = 40 A		0.006 0.0075	0.008 0.0095	Ω 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		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

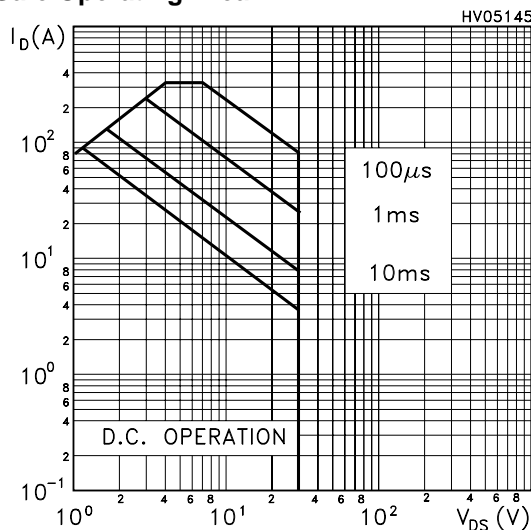
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$	Turn-off-Delay Time	$V_{DD} = 15V, I_D = 30A,$		36.5		ns
t_f	Fall Time	$R_G = 4.7\Omega, V_{GS} = 4.5V$ (see test circuit, Figure 3)		36.5		ns
$t_{d(off)}$	Off-voltage Rise Time	$V_{clamp} = 24V, I_D = 30A$		32		ns
t_f	Fall Time	$R_G =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

SOURCE DRAIN DIODE

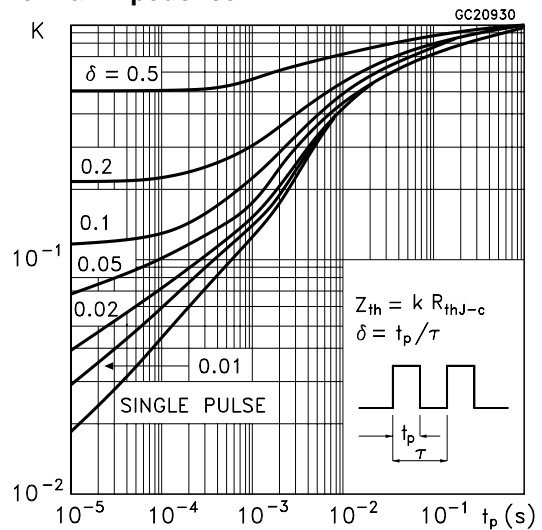
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				85	A
$I_{SDM(2)}$	Source-drain Current (pulsed)				340	A
$V_{SD(1)}$	Forward On Voltage	$I_{SD} = 85A, V_{GS} = 0$			1.3	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 85A, di/dt = 100A/\mu s,$		65		ns
Q_{rr}	Reverse Recovery 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.

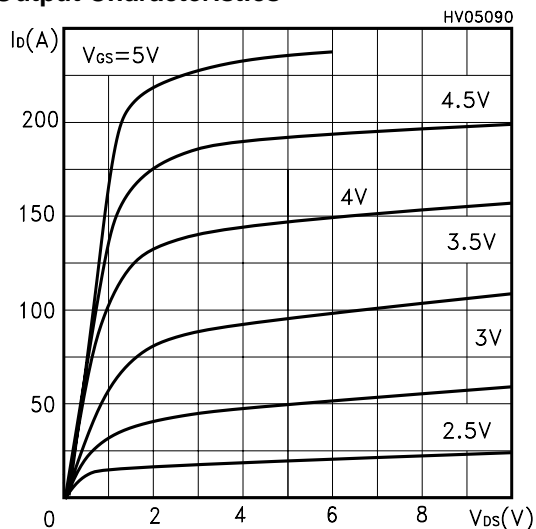
Safe Operating Area



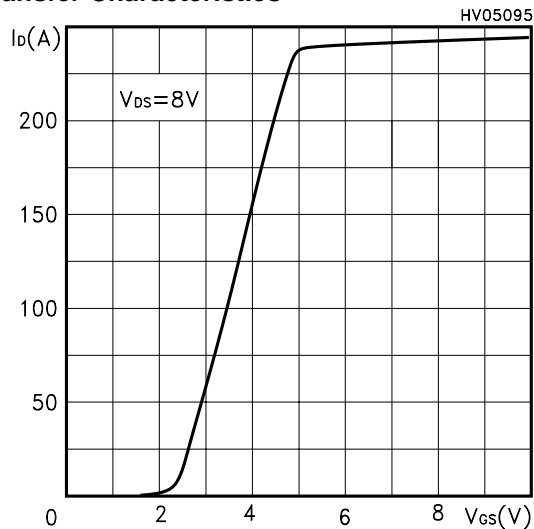
Thermal Impedance



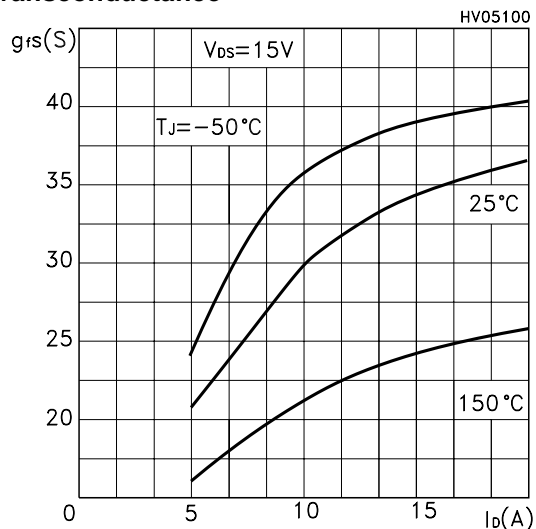
Output Characteristics



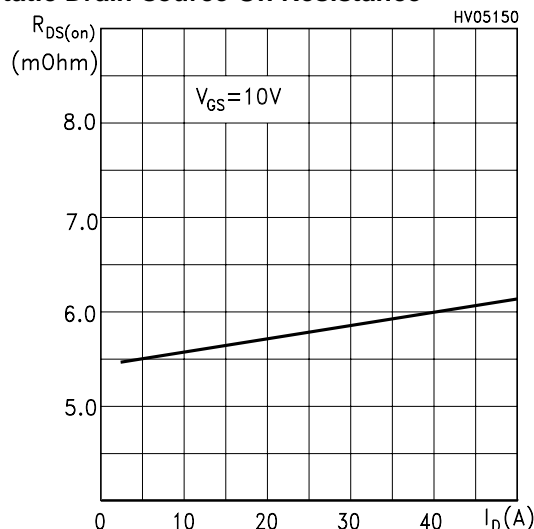
Transfer Characteristics



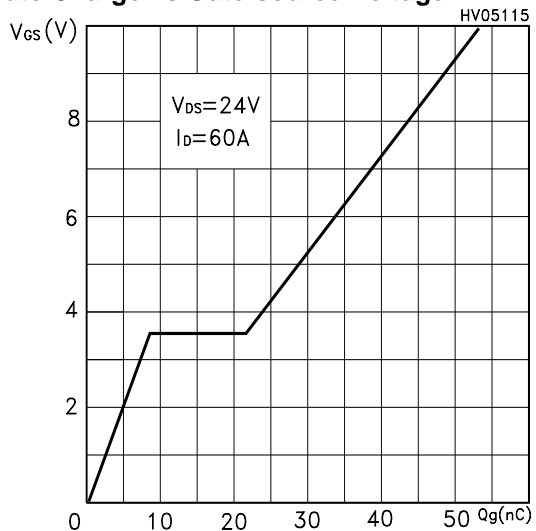
Transconductance



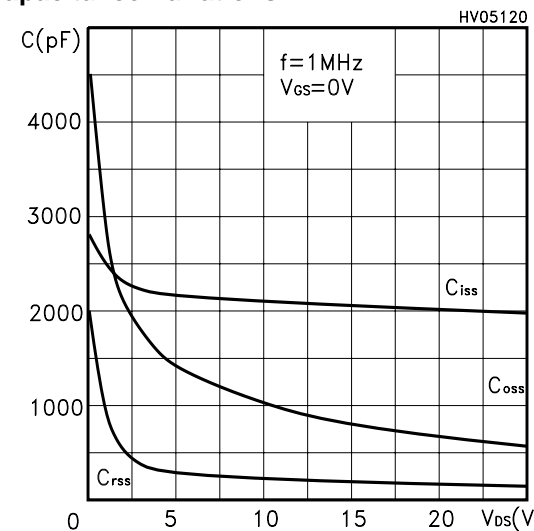
Static Drain-source On Resistance



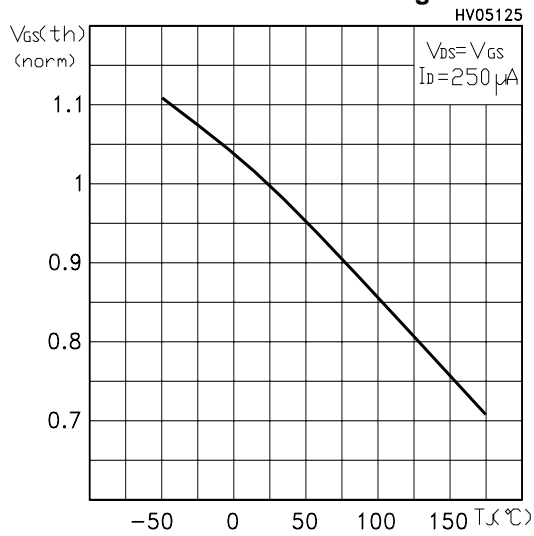
Gate Charge vs Gate-source Voltage



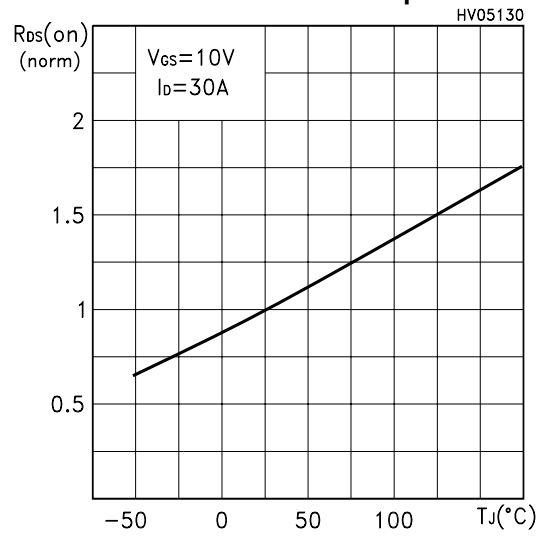
Capacitance Variations



Normalized Gate Threshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

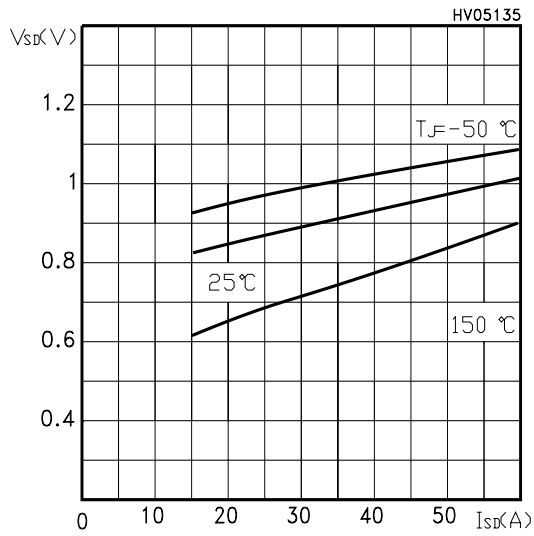


Fig. 1: Unclamped Inductive Load Test Circuit

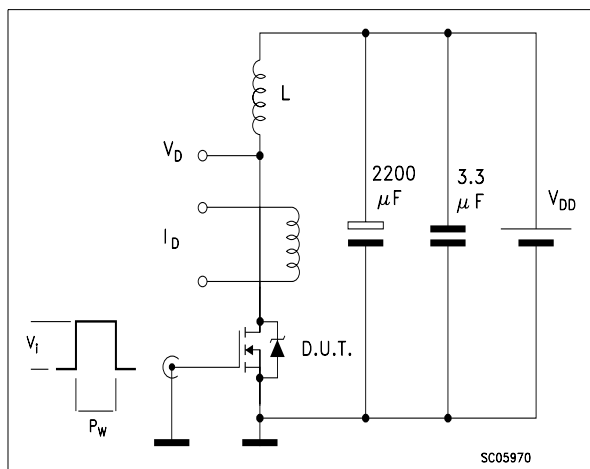


Fig. 2: Unclamped Inductive Waveform

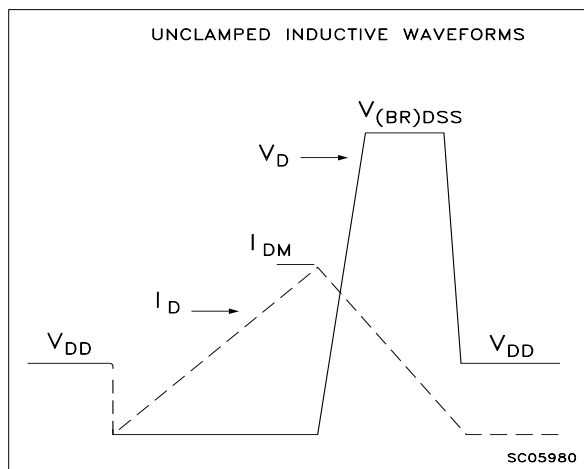


Fig. 3: Switching Times Test Circuit For Resistive Load

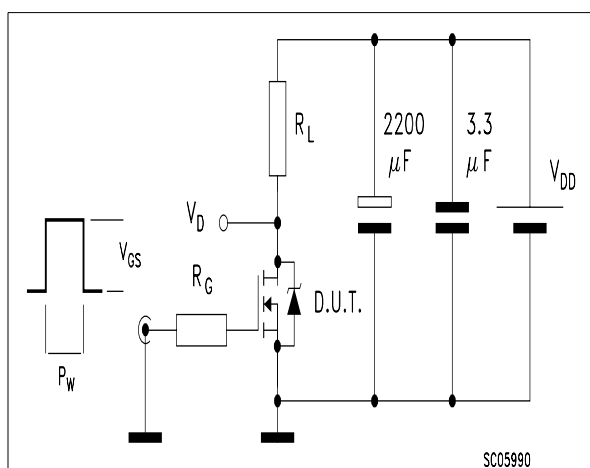


Fig. 4: Gate Charge test Circuit

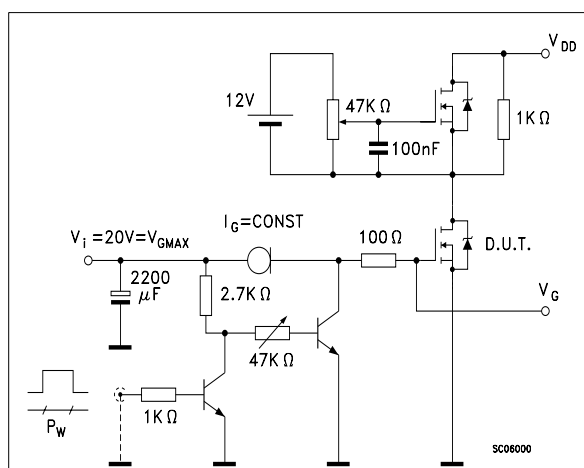
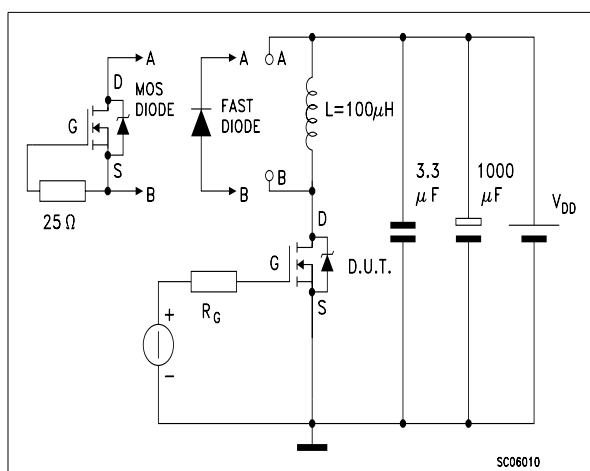
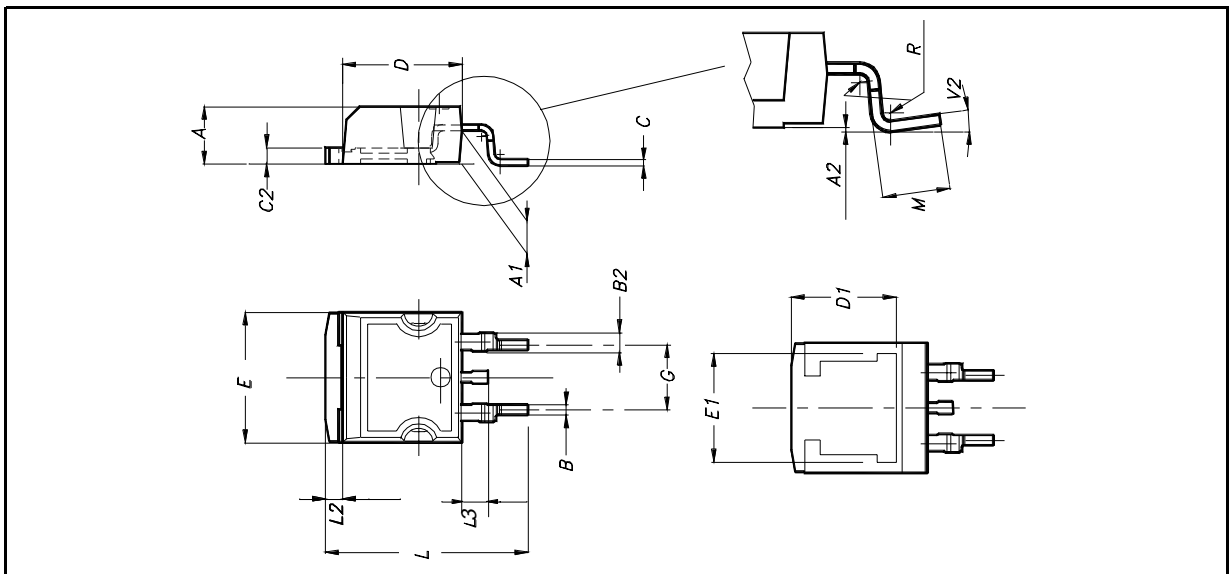


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times

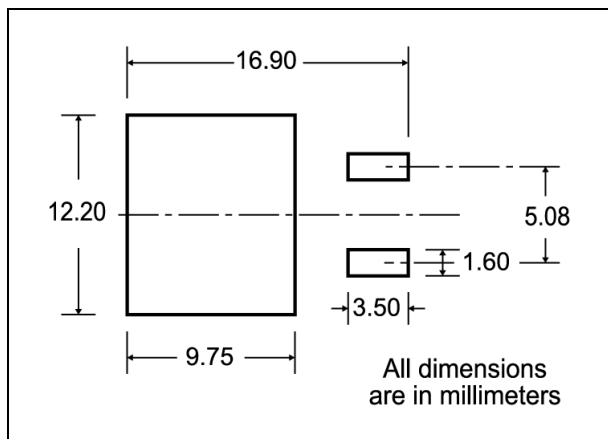


D²PAK MECHANICAL DATA

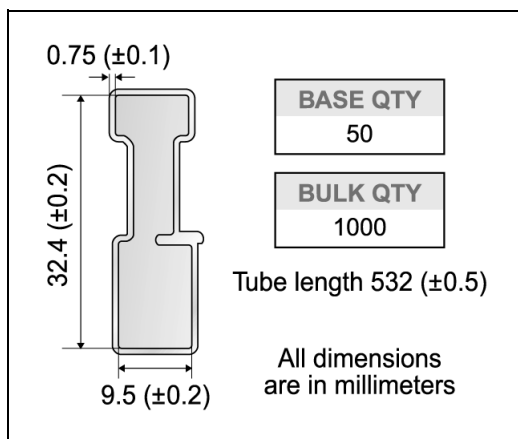
DIM.	mm.			inch		
	MIN.	TYP	MAX.	MIN.	TYP.	MAX.
A	4.4		4.6	0.173		0.181
A1	2.49		2.69	0.098		0.106
A2	0.03		0.23	0.001		0.009
B	0.7		0.93	0.027		0.036
B2	1.14		1.7	0.044		0.067
C	0.45		0.6	0.017		0.023
C2	1.23		1.36	0.048		0.053
D	8.95		9.35	0.352		0.368
D1		8			0.315	
E	10		10.4	0.393		
E1		8.5			0.334	
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°			



D²PAK FOOTPRINT



TUBE SHIPMENT (no suffix)*



TAPE AND REEL SHIPMENT (suffix "T4")*

Diagram showing the tape mechanical data. It includes a circular view of the tape with dimensions A, B, C, D, and G. A 40 mm min. access hole is shown at the slot location. The tape slot in the core for tape start has a 2.5 mm min. width. The full radius is also indicated. A side view shows dimensions T, N, and G measured at the 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	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

Diagrams showing the tape and reel shipment details. The top cover tape is shown with dimensions K₀, T, D, P₂, P₀, E, F, W, B₀, D₁, A₀, P₁. The center line of the cavity is also indicated. The user direction of feed is shown. The reel is shown with dimensions TRL, FEED DIRECTION, and a bending radius R min.

* on sales type

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