



STB55NE06

N-CHANNEL 60V - 0.19Ω - 55A D²PAK

STripFET™ POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STB55NE06	60 V	<0.022 Ω	55 A

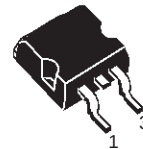
- TYPICAL R_{DS(on)} = 0.019Ω
- EXCEPTIONAL dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- LOW GATE CHARGE 100 °C
- HIGH dv/dt CAPABILITY
- APPLICATION ORIENTED CHARACTERIZATION
- FOR THROUGH-HOLE VERSION CONTACT SALES OFFICE

DESCRIPTION

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

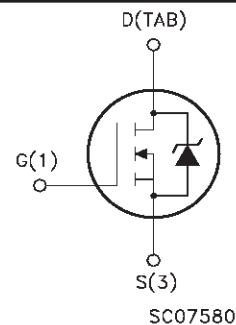
APPLICATIONS

- DC MOTOR CONTROL
- DC-DC & DC-AC CONVERTERS
- SYNCHRONOUS RECTIFICATION



**D²PAK
TO-263**
(suffix "T4")

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	60	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 kΩ)	60	V
V _{GS}	Gate- source Voltage	±20	V
I _D	Drain Current (continuos) at T _C = 25°C	55	A
I _D	Drain Current (continuos) at T _C = 100°C	39	A
I _{DM} (●)	Drain Current (pulsed)	220	A
P _{tot}	Total Dissipation at T _C = 25°C	130	W
	Derating Factor	0.96	W/°C
dv/dt ⁽²⁾	Peak Diode Recovery voltage slope	7	V/ns
T _{stg}	Storage Temperature	-60 to 175	°C
T _j	Max. Operating Junction Temperature	175	°C

(●) Pulse width limited by safe operating area.

I_{SD} ≤ 55A, di/dt ≤ 300A/μs, V_{DD} ≤ V(BR)DSS, T_j ≤ T_{JMAX}.

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case	Max	1.15	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient	Max	62.5	°C/W
$R_{thc-sink}$	Thermal Resistance Case-sink	Typ	0.5	°C/W
T_j	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)	55	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25\text{ °C}$, $I_D = I_{AR}$, $V_{DD} = 25\text{ V}$)	200	mJ

ELECTRICAL CHARACTERISTICS ($T_{case} = 25\text{ °C}$ unless otherwise specified)

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 25\text{ }\mu\text{A}$, $V_{GS} = 0$	60			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating}$, $T_C = 125\text{ °C}$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20\text{ V}$			± 100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 250\text{ }\mu\text{A}$	2	3	4	V
$I_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10\text{ V}$ $I_D = 27.5\text{ A}$		0.019	0.022	Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10\text{ V}$	55			A

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{fs}^{(1)}$	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, $I_D = 27.5\text{ A}$	25	35		S
C_{iss}	Input Capacitance	$V_{DS} = 25\text{ V}$ $f = 1\text{ MHz}$ $V_{GS} = 0$		3050	4000	pF
C_{oss}	Output Capacitance			380	500	pF
C_{rss}	Reverse Transfer Capacitances			100	130	pF

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Delay Time Rise Time	$V_{DD} = 30V$ $I_D = 27.5 A$ $R_G = 4.7 \Omega$ $V_{GS} = 10 V$ (see test circuit, Figure 3)		30 120	40 160	ns ns
Q_g	Total Gate Charge	$V_{DD}=48V$ $I_D=55A$ $V_{GS}=10V$		80	105	nC
Q_{gs}	Gate-Source Charge			13		nC
Q_{gd}	Gate-Drain Charge			25		nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time Rise Time	$V_{DD} = 48 V$ $I_D = 55 A$ $R_G = 4.7 \Omega$ $V_{GS} = 10 V$ (see test circuit, Figure 5)		55	70	ns ns
t_r	Fall Time			155		
t_c	Cross-over Time					

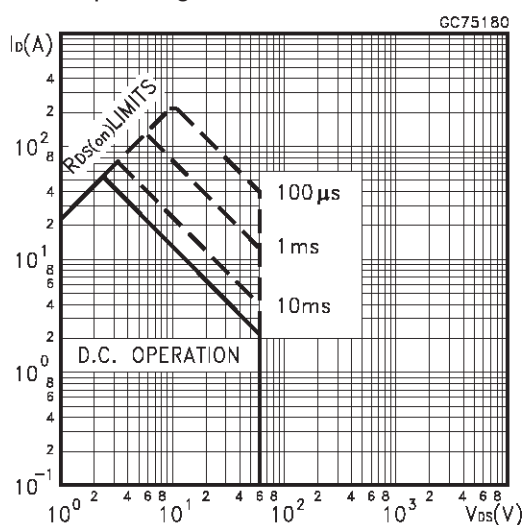
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				55	A
$I_{SDM} (*)$	Source-drain Current (pulsed)				220	A
$V_{SD} (*)$	Forward On Voltage	$I_{SD} = 60A$ $V_{GS} = 0$			1.5	V
t_{rr}	Reverse Recovery Time	$I_{SD} = 55 A$ $di/dt = 100 A/\mu s$ $V_{DD} = 30V$ $T_j = 150 ^\circ C$ (see test circuit, Figure 3)		110		ns
Q_{rr}	Reverse Recovery Charge			430		μC
I_{RRM}	Reverse Recovery Current			7.5		A

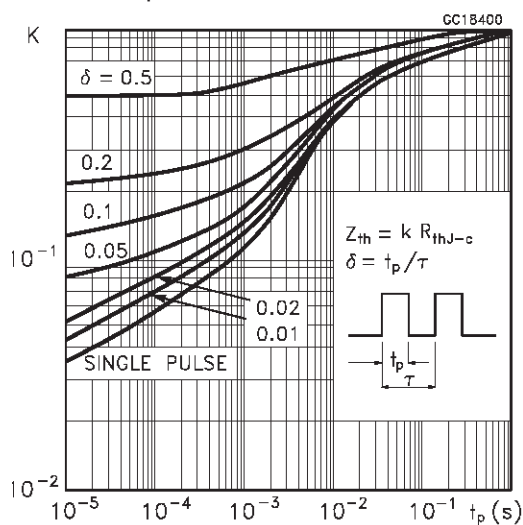
(*) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(●) Pulse width limited by safe operating area.

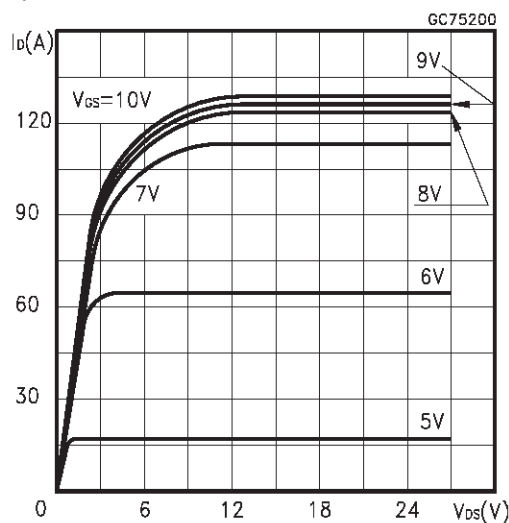
Safe Operating Area



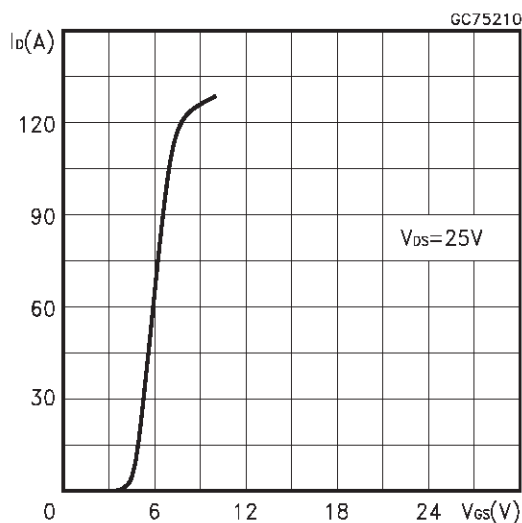
Thermal Impedance



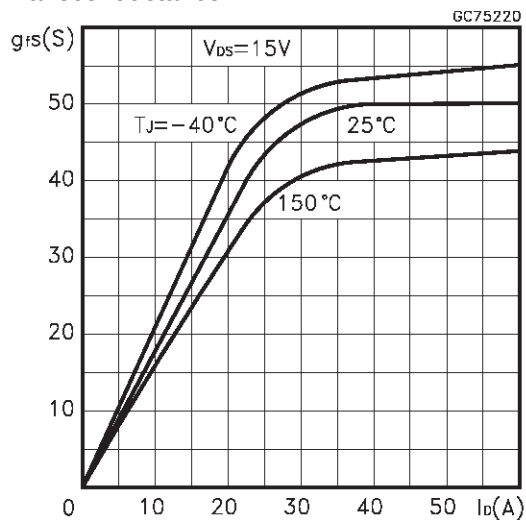
Output Characteristics



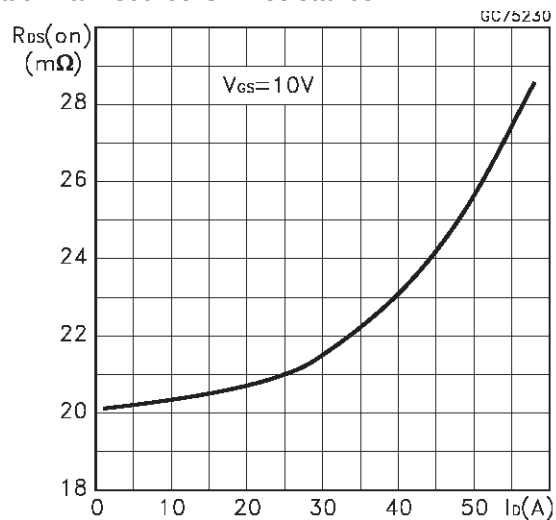
Transfer Characteristics



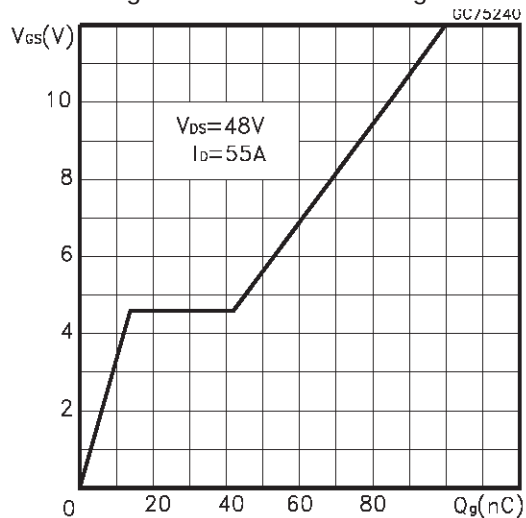
Transconductance



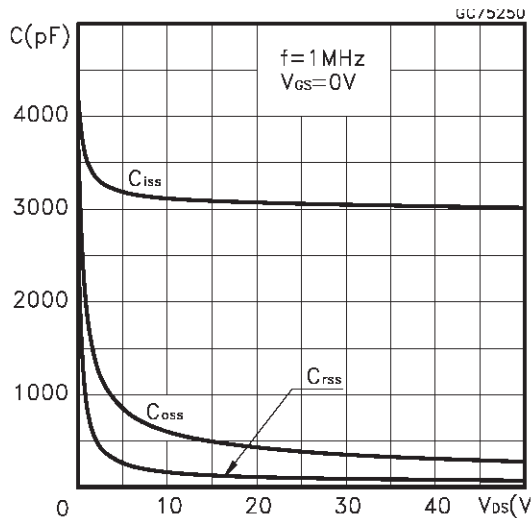
Static Drain-source On Resistance



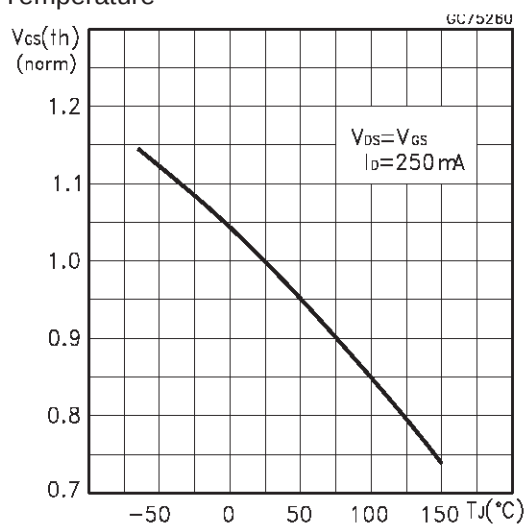
Gate Charge vs Gate-source Voltage



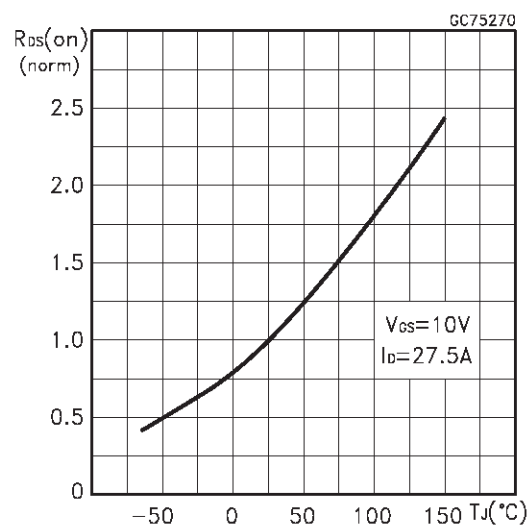
Capacitance Variations



Normalized Gate Threshold Voltage vs Temperature



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

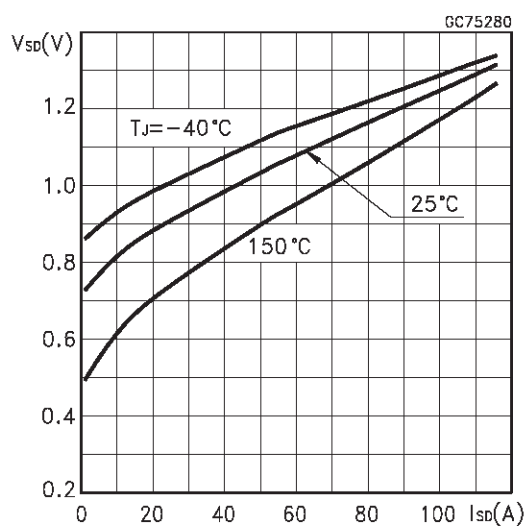


Fig. 1: Unclamped Inductive Load Test Circuit

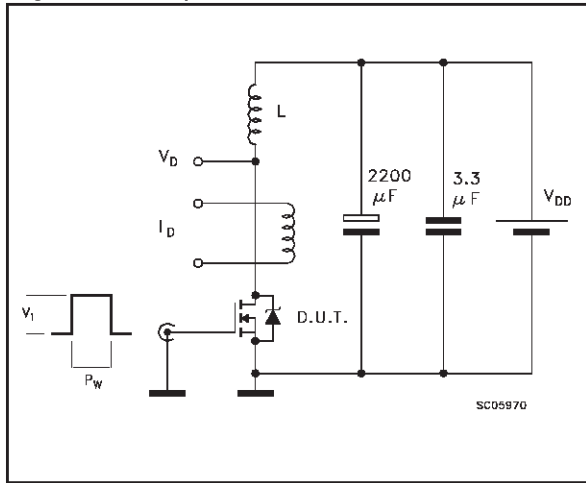


Fig. 2: Unclamped Inductive Waveform

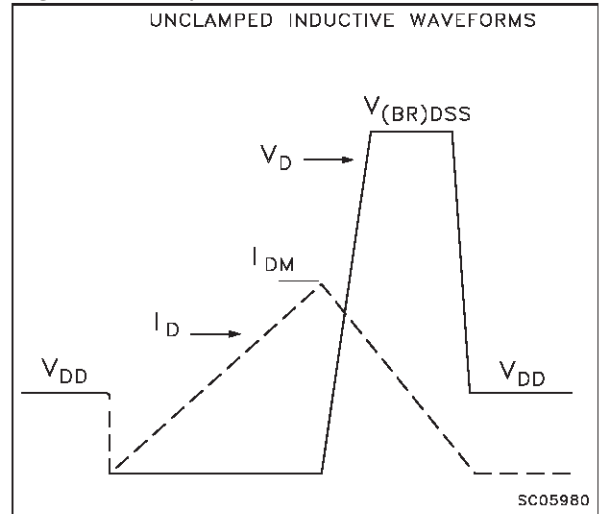


Fig. 3: Switching Times Test Circuits For Resistive Load

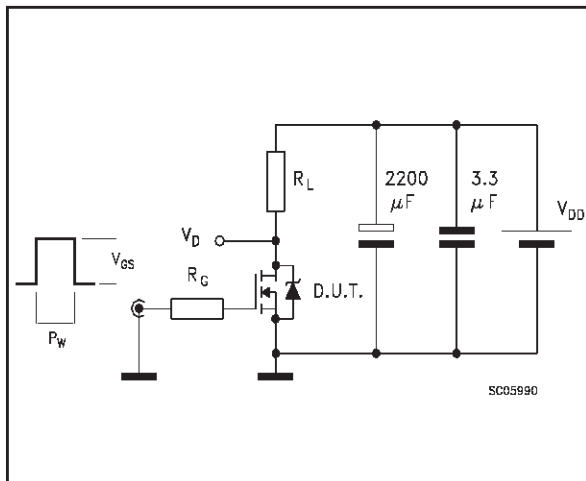


Fig. 4: Gate Charge test Circuit

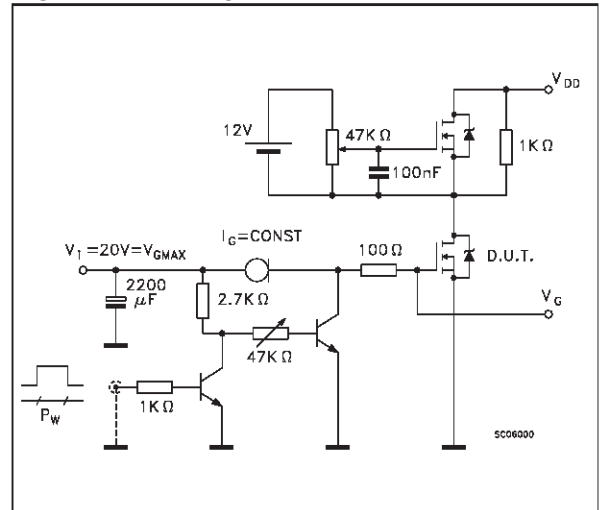
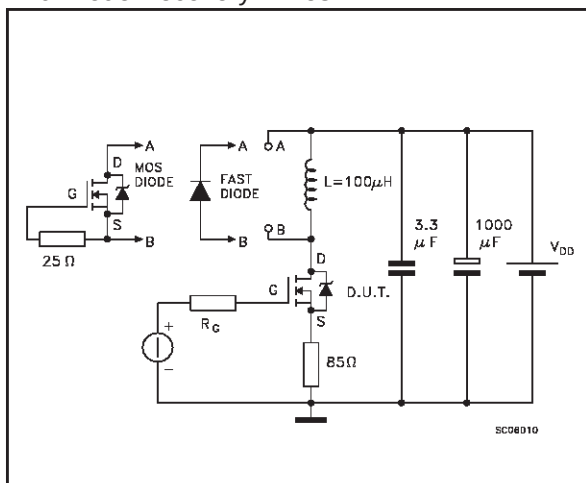
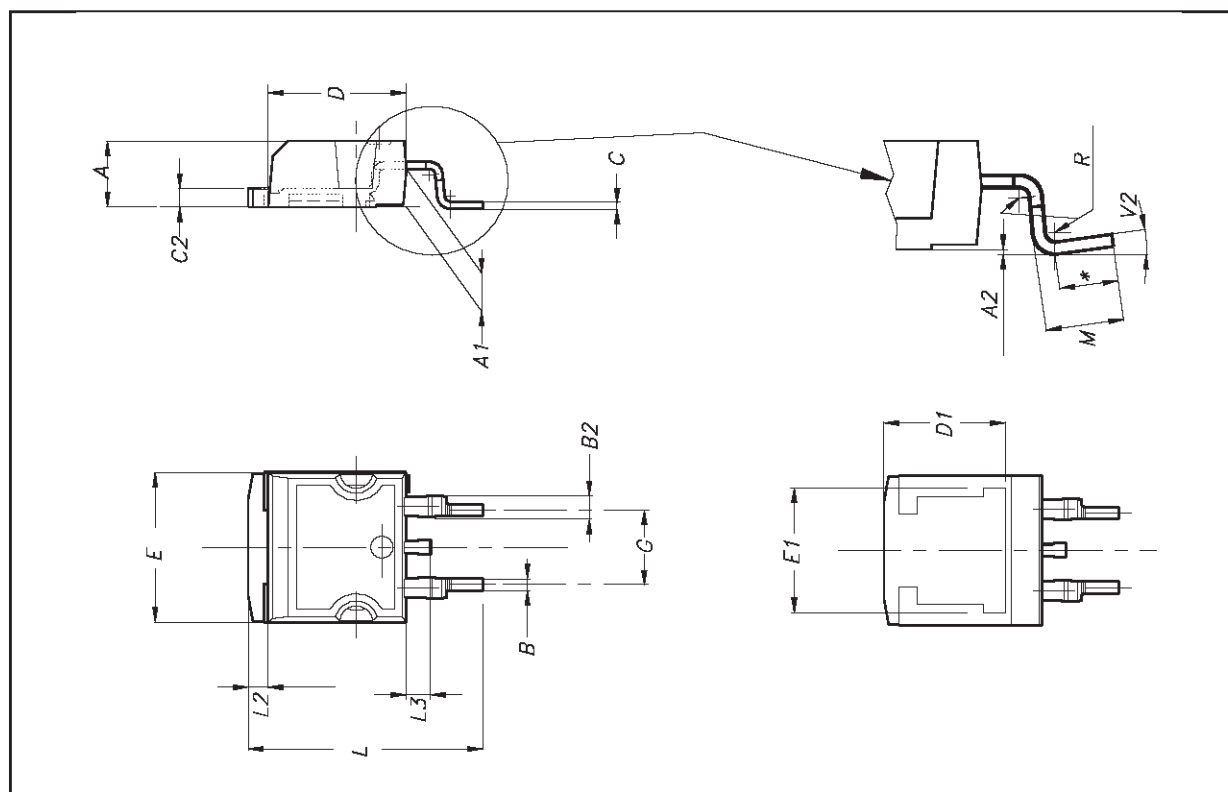


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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°			



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