



STL22NF10

N-CHANNEL 100V - 0.055 Ω - 22A PowerFLAT™ LOW GATE CHARGE STripFET™ II MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STL22NF10	100 V	<0.060 Ω	22 A ⁽¹⁾

- TYPICAL R_{DS(on)} = 0.055 Ω
- IMPROVED DIE-TO-FOOTPRINT RATIO
- VERY LOW PROFILE PACKAGE (1mm MAX)
- VERY LOW THERMAL RESISTANCE
- VERY LOW GATE CHARGE

DESCRIPTION

This application specific Power MOSFET is the second generation of STMicroelectronics unique "STripFET™" technology. The resulting transistor shows extremely low on-resistance and minimal gate charge. The new PowerFLAT™ package allows a significant reduction in board space without compromising performance.

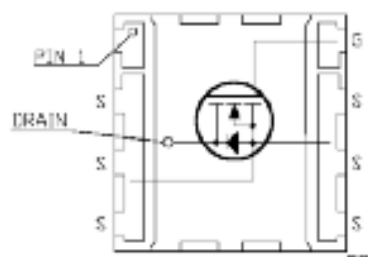
APPLICATIONS

- HIGH-EFFICIENCY ISOLATED DC-DC CONVERTERS
- TELECOM AND AUTOMOTIVE



PowerFLAT™(5x5)

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-source Voltage (V _{GS} = 0)	100	V
V _{DGR}	Drain-gate Voltage (R _{GS} = 20 k Ω)	100	V
V _{GS}	Gate- source Voltage	± 20	V
I _D ⁽²⁾	Drain Current (continuous) at T _C = 25°C (Steady State)	5.3	A
I _D ⁽²⁾	Drain Current (continuous) at T _C = 100°C	3.8	A
I _{DM} ⁽³⁾	Drain Current (pulsed)	22	A
P _{tot} ⁽²⁾	Total Dissipation at T _C = 25°C (Steady State)	4	W
P _{tot} ⁽¹⁾	Total Dissipation at T _C = 25°C	70	W
	Derating Factor	0.03	W/°C
dv/dt ⁽⁵⁾	Peak Diode Recovery voltage slope	16	V/ns
E _{AS} ⁽⁶⁾	Single Pulse Avalanche Energy	82	mJ
T _{stg}	Storage Temperature	-55 to 150	°C
T _j	Operating Junction Temperature		

STL22NF10

THERMAL DATA

Rthj-F	(*) Thermal Resistance Junction-Foot (Drain)	1.8	°C/W
Rthj-pcb(4)	Thermal Operating Junction-pcb	31.5	°C/W

(*) Mounted on FR-4 board ($t \leq 10$ sec.)

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

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(\text{BR})\text{DSS}}$	Drain-source Breakdown Voltage	$I_D = 250\ \mu\text{A}$, $V_{\text{GS}} = 0$	100			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{\text{GS}} = 0$)	$V_{\text{DS}} = \text{Max Rating}$ $V_{\text{DS}} = \text{Max Rating}$ $T_C = 125^\circ\text{C}$			1 10	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{\text{DS}} = 0$)	$V_{\text{GS}} = \pm 20\ \text{V}$			± 100	nA

ON (7)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{\text{GS(th)}}$	Gate Threshold Voltage	$V_{\text{DS}} = V_{\text{GS}}$ $I_D = 250\ \mu\text{A}$	2			V
$R_{\text{DS(on)}}$	Static Drain-source On Resistance	$V_{\text{GS}} = 10\ \text{V}$ $I_D = 11\ \text{A}$		0.055	0.060	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$g_{\text{fs}}^{(7)}$	Forward Transconductance	$V_{\text{DS}} = 20\ \text{V}$ $I_D = 11\ \text{A}$		16		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{\text{DS}} = 25\ \text{V}$, $f = 1\ \text{MHz}$, $V_{\text{GS}} = 0$		885 130 56		pF pF 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	$V_{DD} = 50\text{ V}$ $I_D = 11\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		20 45		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 80\text{ V}$ $I_D = 22\text{ A}$ $V_{GS} = 10\text{ V}$		30 6 10	40	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 50\text{ V}$ $I_D = 11\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 3)		45 10		ns ns

SOURCE DRAIN DIODE

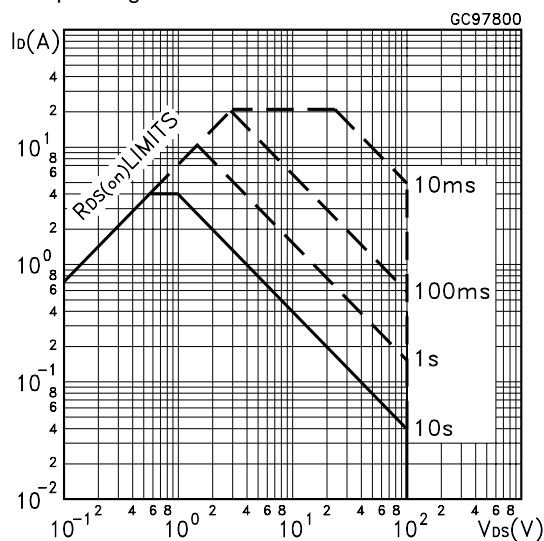
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM}	Source-drain Current Source-drain Current (pulsed)				5.3 22	A A
$V_{SD}^{(7)}$	Forward On Voltage	$I_{SD} = 22\text{ A}$ $V_{GS} = 0$			1.3	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 22\text{ A}$ $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 30\text{ V}$ $T_J = 150^\circ\text{C}$ (see test circuit, Figure 5)		100 375 7.5		ns nC A

(1) The value is rated according R_{thJ-F} .(2) The value is rated according $R_{thJ-pcb}$.

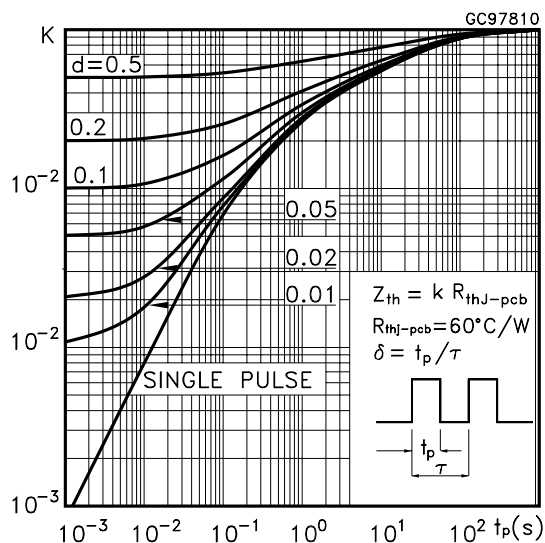
(3) Pulse width limited by safe operating area.

(4) When Mounted on FR-4 Board of 1 inch², 2 oz Cu, $t < 10\text{ s}$.(5) $I_{SD} \leq 22\text{ A}$, $di/dt \leq 300\text{ A}/\mu\text{s}$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq T_{JMAX}$.(6) Starting $T_J = 25^\circ\text{C}$, $I_D = 11\text{ A}$, $V_{DD} = 30\text{ V}$.(7) Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

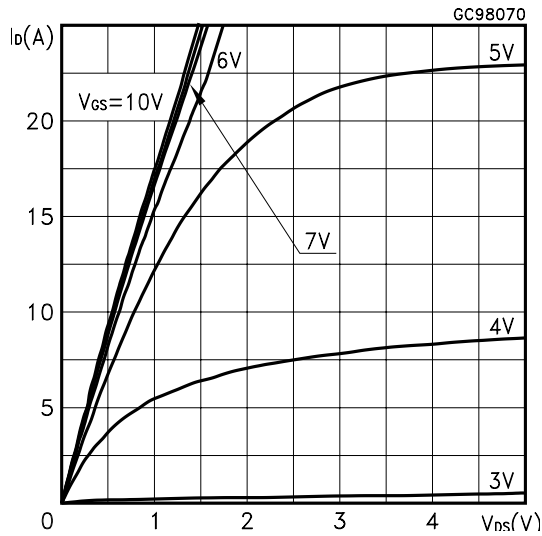
Safe Operating Area



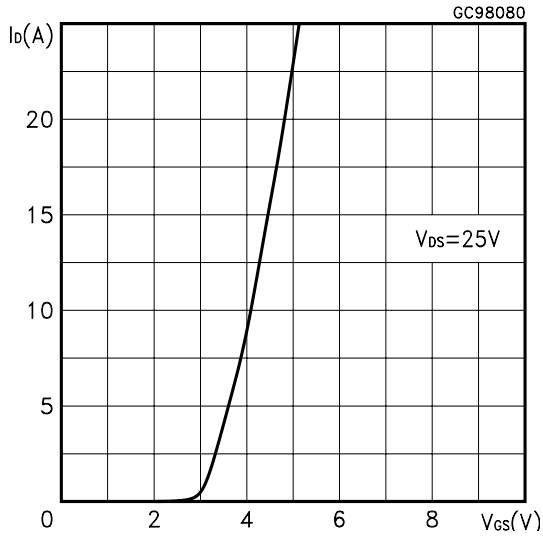
Thermal Impedance



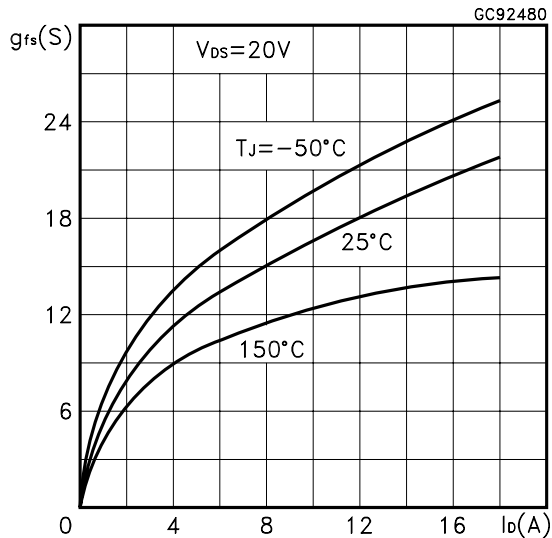
Output Characteristics



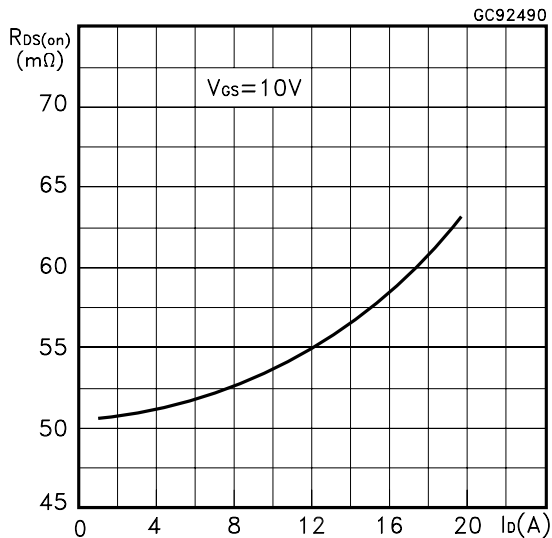
Transfer Characteristics



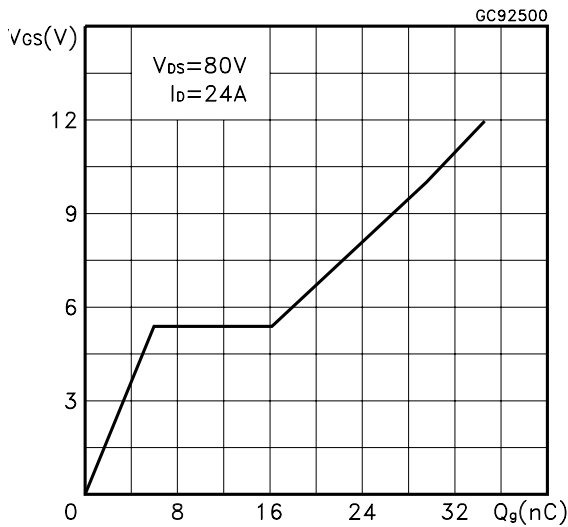
Transconductance



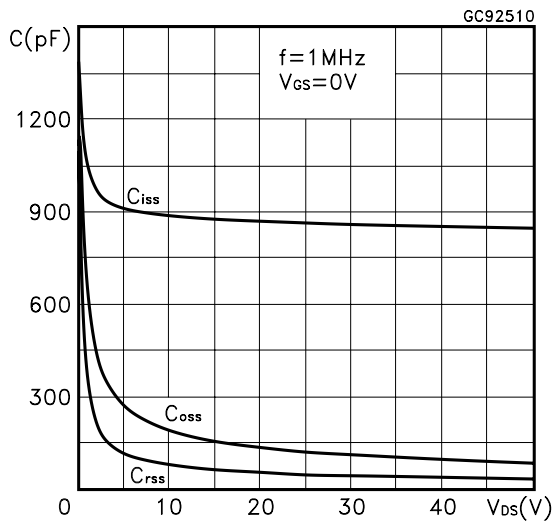
Static Drain-source On Resistance



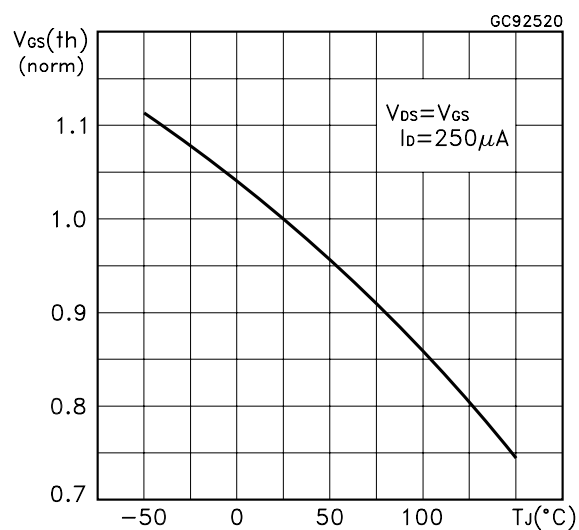
Gate Charge vs Gate-source Voltage



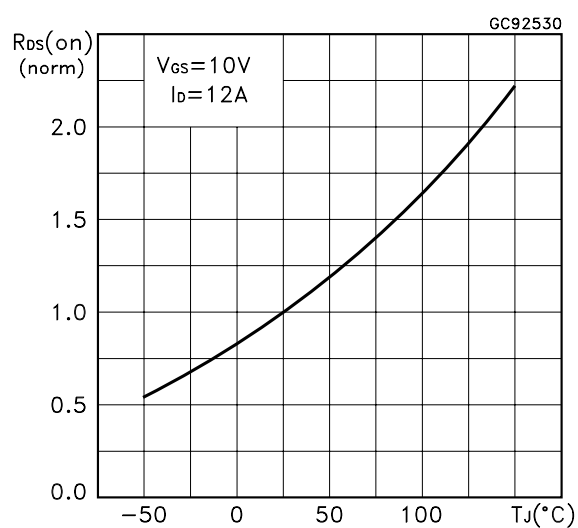
Capacitance Variations



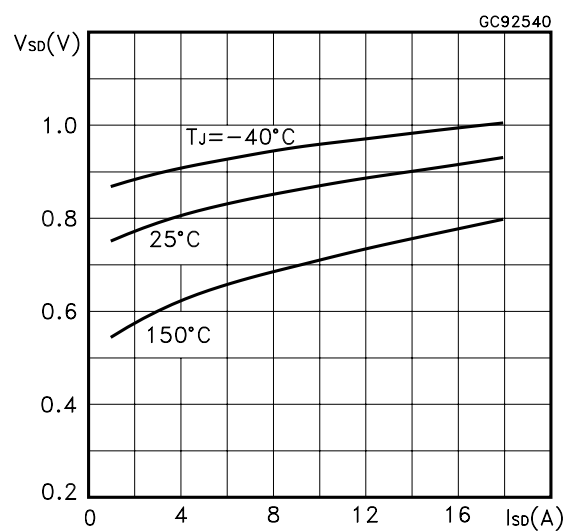
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature.

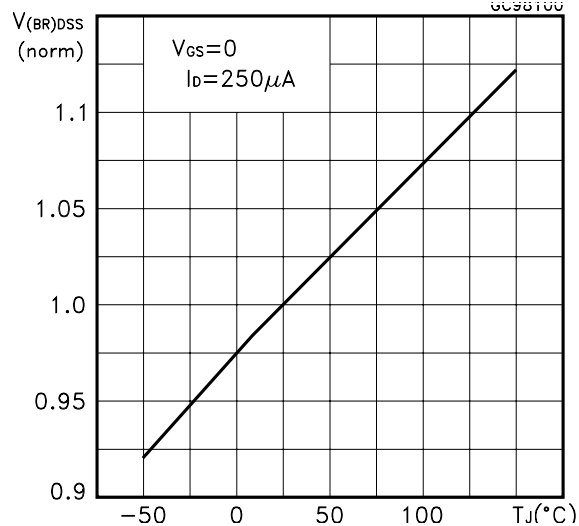


Fig. 1: Unclamped Inductive Load Test Circuit

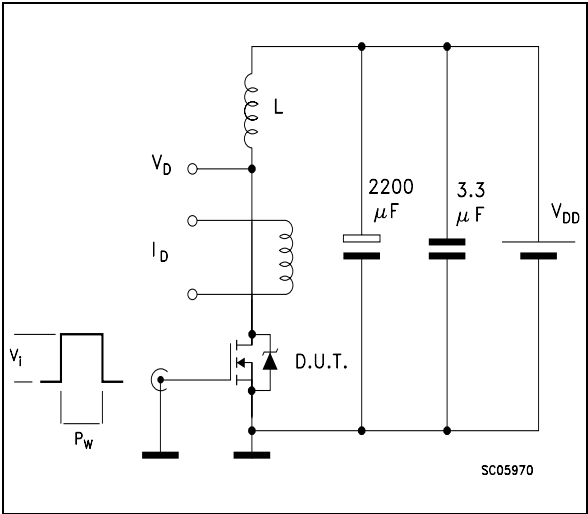


Fig. 2: Unclamped Inductive Waveform



Fig. 3: Switching Times Test Circuits For Resistive Load

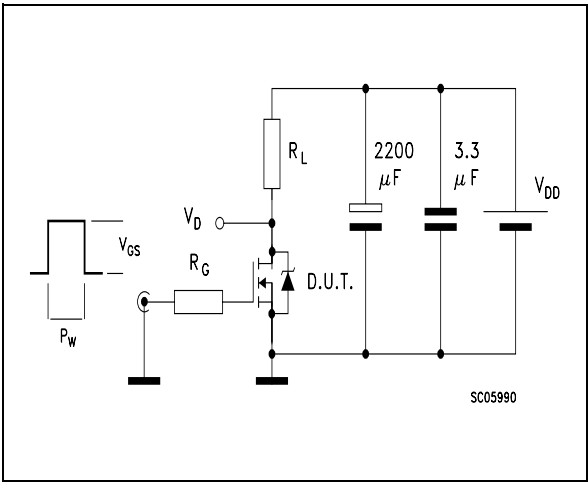


Fig. 4: Gate Charge test Circuit

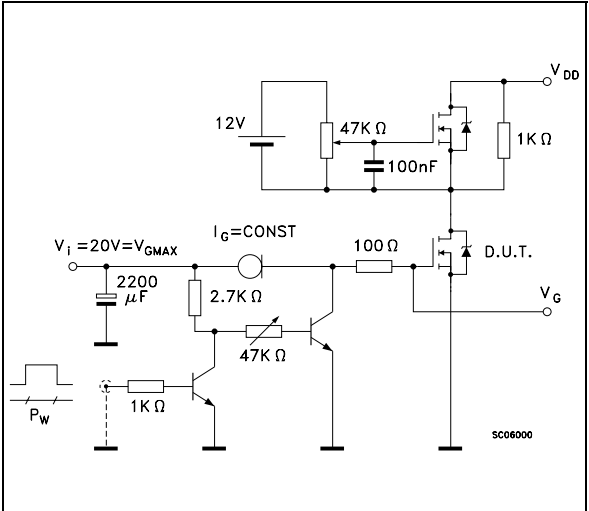
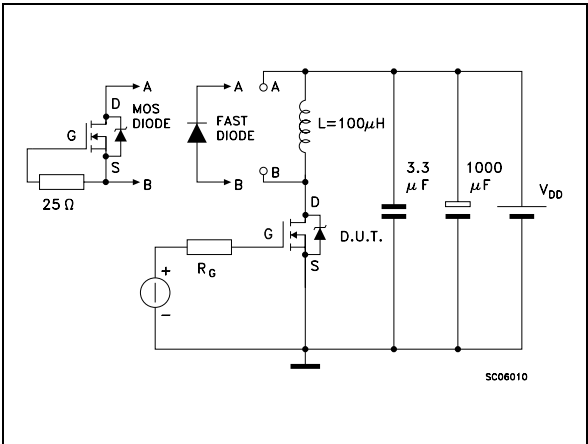
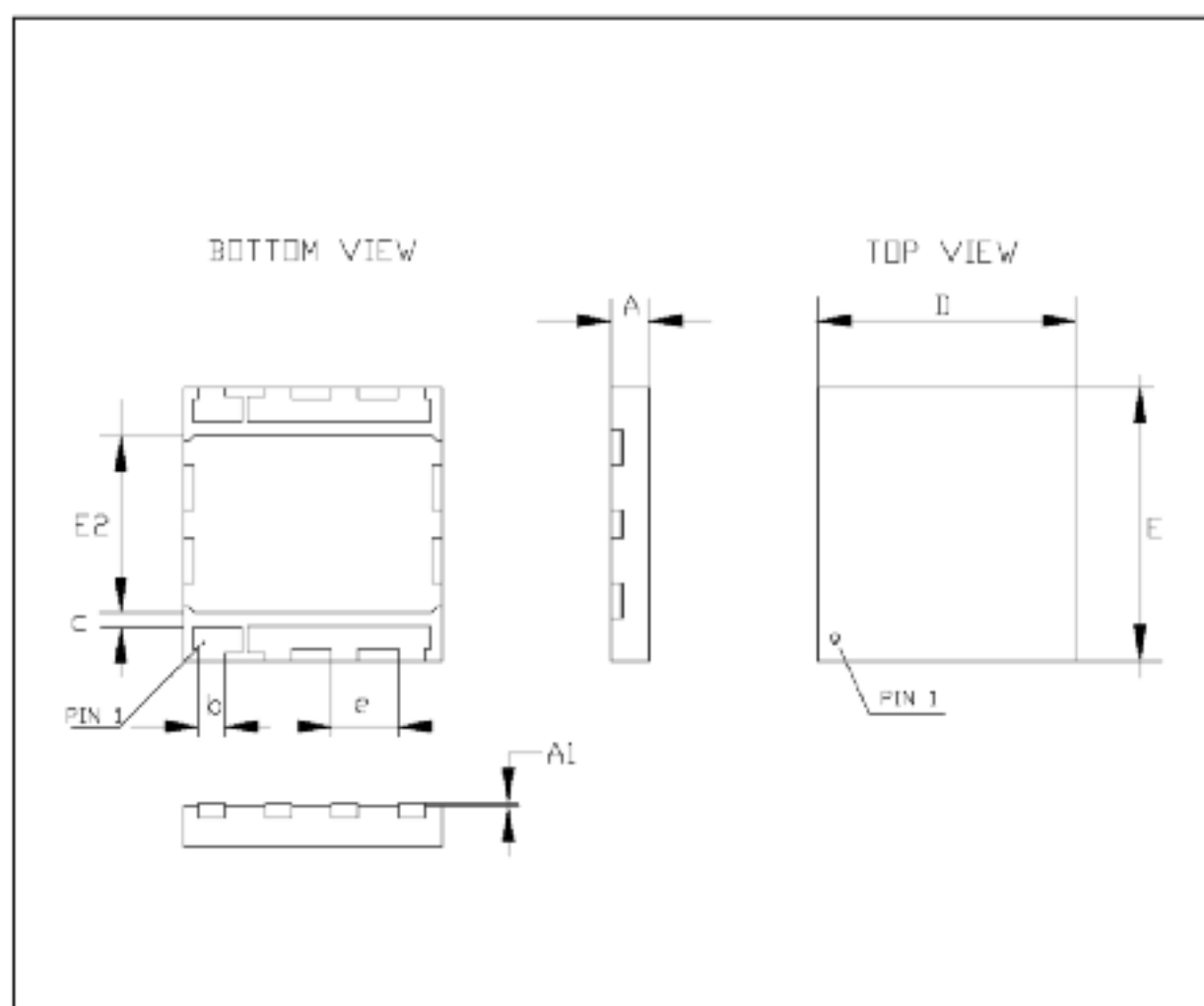


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



PowerFLAT™ (5x5) MECHANICAL DATA

DIM.	mm.			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		0.90	1.00		0.035	0.039
A1		0.02	0.05		0.001	0.002
b	0.43	0.51	0.58	0.017	0.020	0.023
c	0.33	0.41	0.48	0.013	0.016	0.019
D		5.00			0.197	
E		5.00			0.197	
E2	3.10	3.18	3.25	0.122	0.125	0.128
e		1.27			0.050	



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