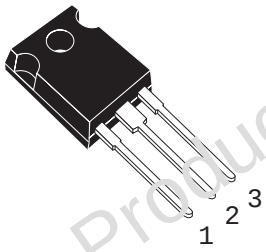
STW220NF75

N-CHANNEL 75V - 0.004 Ω - 120A TO-247
STripFET™ II POWER MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STW220NF75	75V	<0.0044Ω	120A(**)

- TYPICAL $R_{DS}(on)$ = 0.004Ω
- STANDARD THRESHOLD DRIVE
- 100% AVALANCHE TESTED

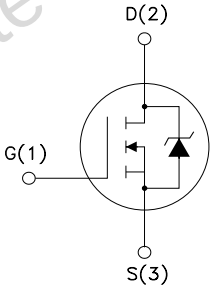


TO-247

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 avalanche characteristics and less critical alignment steps therefore a remarkable manufacturing reproducibility.

APPLICATIONS
- HIGH CURRENT, HIGH SWITCHING SPEED
- AUTOMOTIVE 42V BATTERY SYSTEM
- OR-ING FUNCTION

INTERNAL SCHEMATIC DIAGRAM



SC06140F

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	75	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	75	V
V_{GS}	Gate- source Voltage	± 20	V
I_D(**)	Drain Current (continuous) at T_C = 25°C	120	A
I_D(**)	Drain Current (continuous) at T_C = 100°C	120	A
I_{DM}(•)	Drain Current (pulsed)	480	A
P_{tot}	Total Dissipation at T_C = 25°C	500	W
	Derating Factor	3.33	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	10	V/ns
E_{AS}(2)	Single Pulse Avalanche Energy	2500	mJ
T_{stg}	Storage Temperature	-55 to 175	°C
T_j	Operating Junction Temperature		

•) Pulse width limited by safe operating area.
(**) Current Limited by Package

(1) I_{SD} ≤120A, di/dt ≤100A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_j ≤ T_{JMAX}
(2) Starting T_j = 25 °C, I_D = 60 A, V_{DD} = 30V

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THERMAL DATA

Rthj-case Rthj-amb T_j	Thermal Resistance Junction-case Thermal Resistance Junction-ambient Maximum Lead Temperature For Soldering Purpose (1.6 mm from case, for 10 sec)	Max Max Typ	0.30 50 300	°C/W °C/W °C

ELECTRICAL CHARACTERISTICS (T_{case} = 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	75			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 = 250 µA	2		4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10 V I_D = 60 A		0.004	0.0044	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	V_{DS} = 25 V I_D = 60 A		200		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		12500 2150 600		pF pF pF

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Obsolete Product(s) - Obsolete Product(s)

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} = 38 V I_D = 60 A R_G = 4.7 Ω V_{GS} = 10 V (Resistive Load, Figure 3)		50 215		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	V_{DD}=38V I_D=120A V_{GS}=10V		350 60 135	430	nC nC nC

SWITCHING OFF

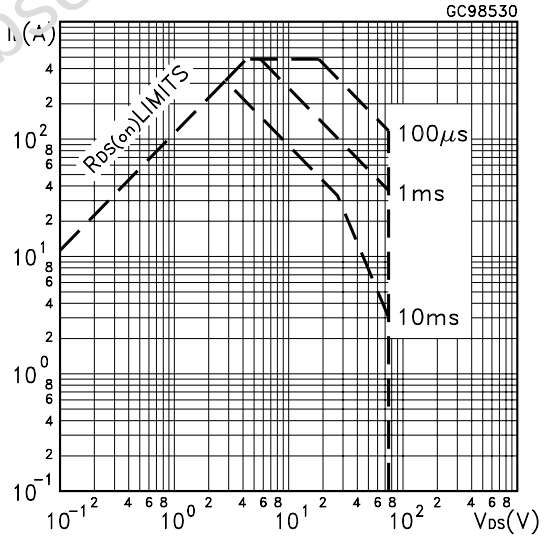
Symbol	Parameter	Test Conditions	Min.	Typ.	Max	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	V_{DD} = 38 V I_D = 60 A R_G = 4.7Ω, V_{GS} = 10 V (Resistive Load, Figure 3)		250 130		ns ns

SOURCE DRAIN DIODE

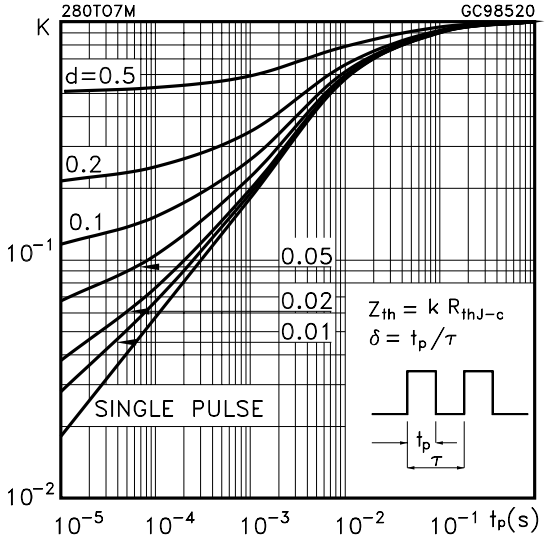
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} I_{SDM} (•)	Source-drain Current Source-drain Current (pulsed)				120 480	A A
V_{SD} (*)	Forward On Voltage	I_{SD} = 120 A V_{GS} = 0			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	I_{SD} = 120 A di/dt = 100A/µs V_{DD} = 32 V T_j = 150°C (see test circuit, Figure 5)		140 770 11		ns nC A

(*)Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
(•)Pulse width limited by safe operating area

Safe Operating Area

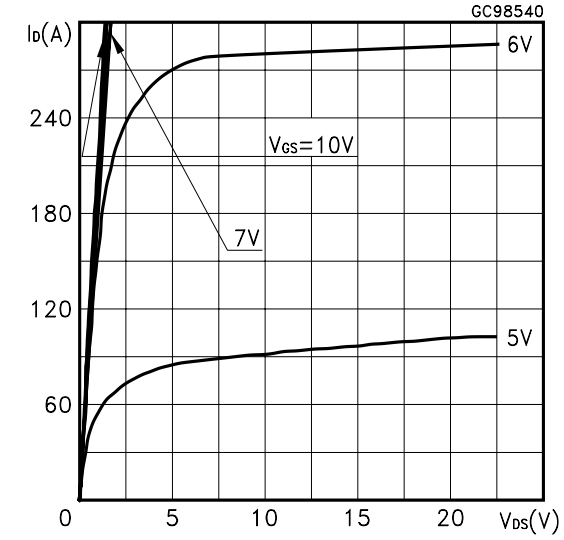


Thermal Impedance

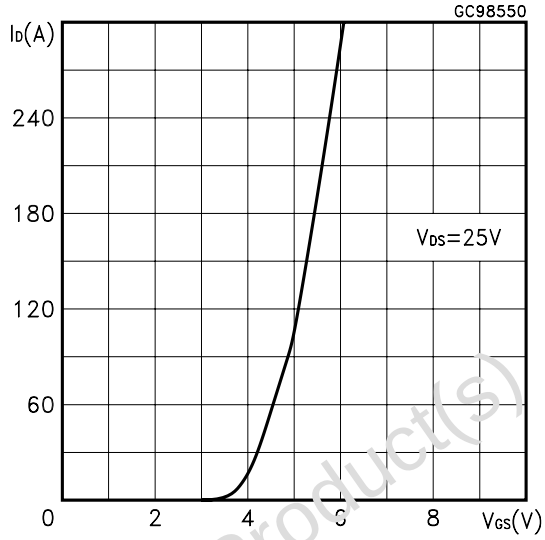


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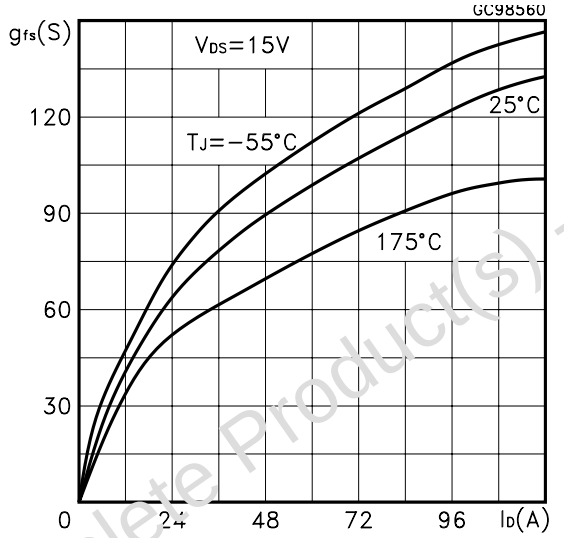
Output Characteristics



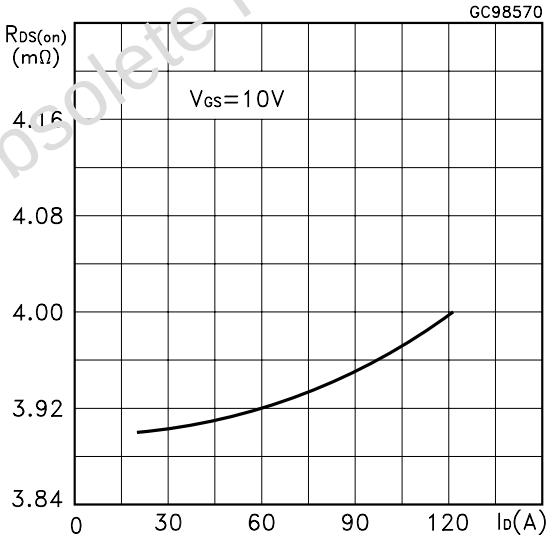
Transfer Characteristics



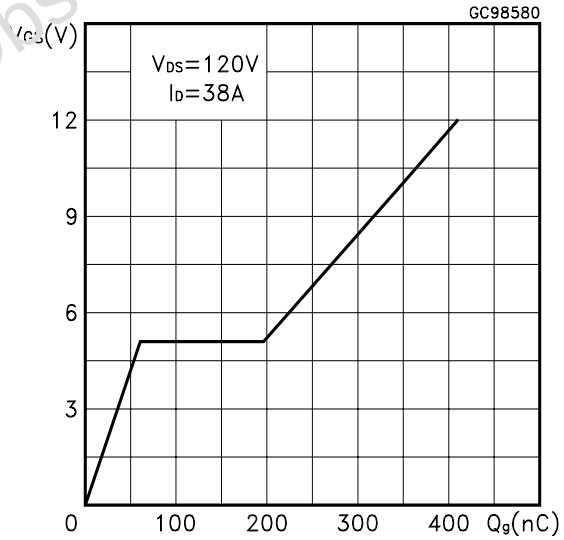
Transconductance



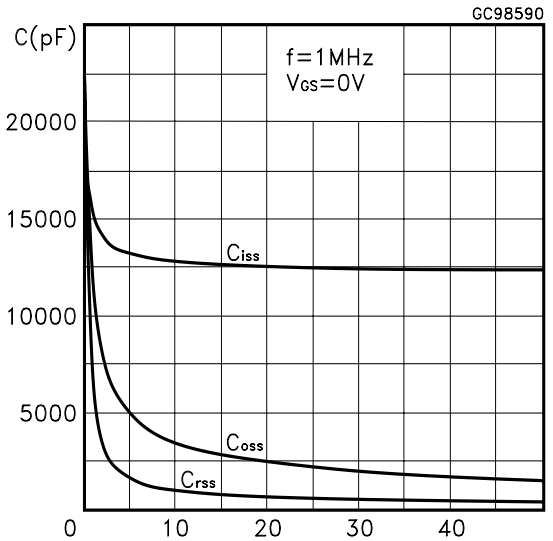
Static Drain-source On Resistance



Gate Charge vs Gate-source Voltage

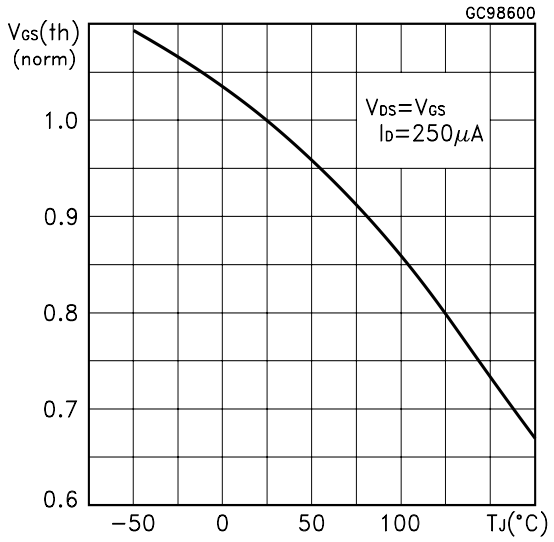


Capacitance Variations

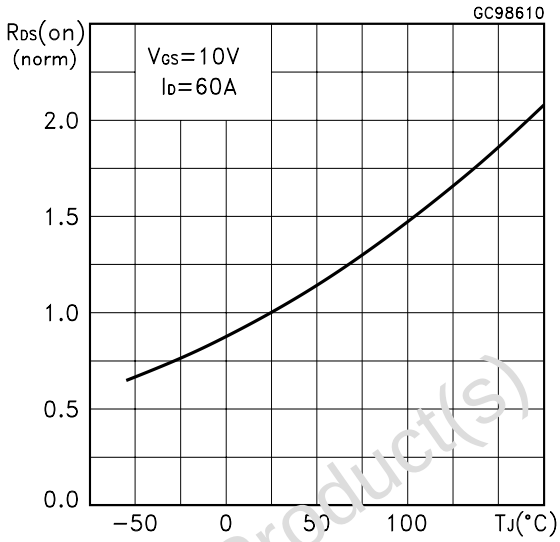


Obsolete Product(s) - Obsolete Product(s)

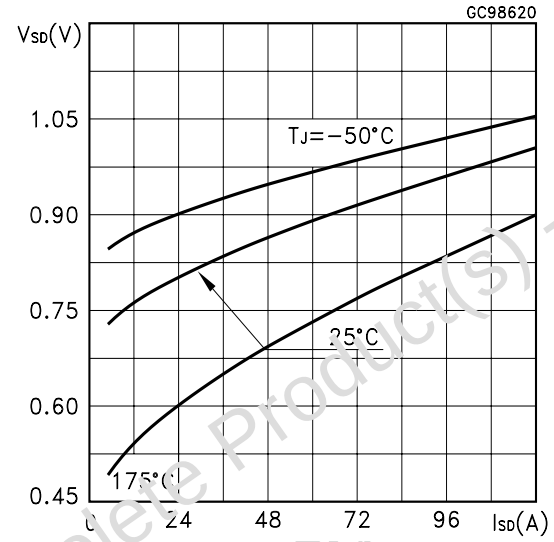
Normalized Gate Threshold Voltage vs Temperature



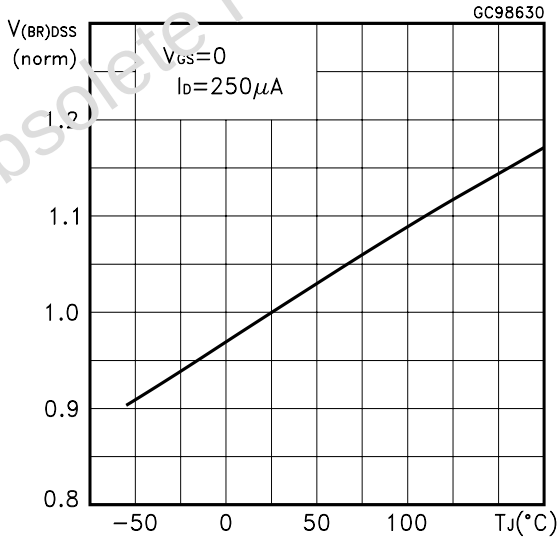
Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature



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Fig. 1: Unclamped Inductive Load Test Circuit

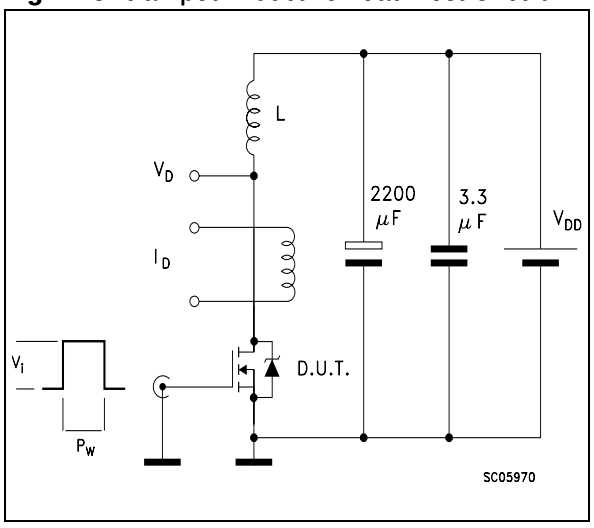


Fig. 2: Unclamped Inductive Waveform

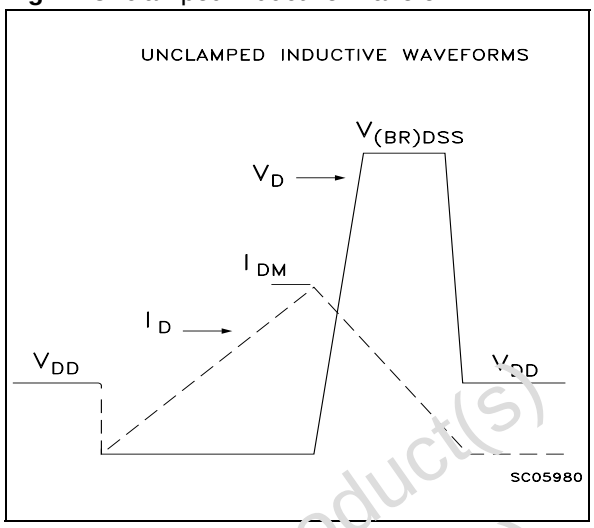


Fig. 3: Switching Times Test Circuits For Resistive Load

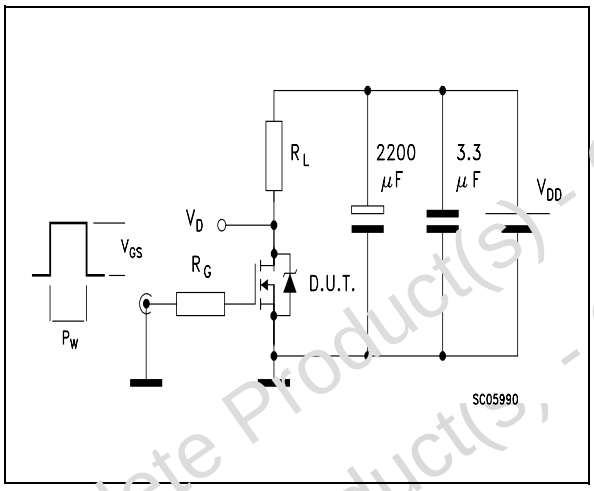


Fig. 4: Gate Charge test Circuit

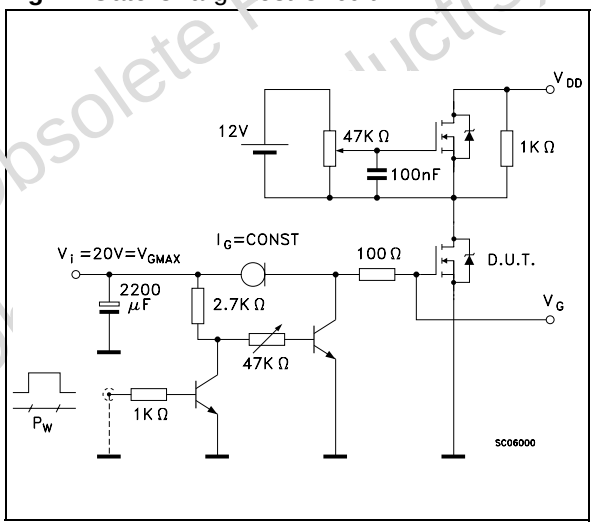
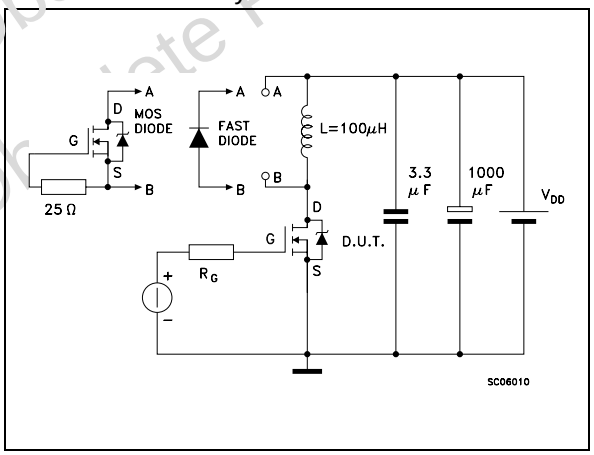


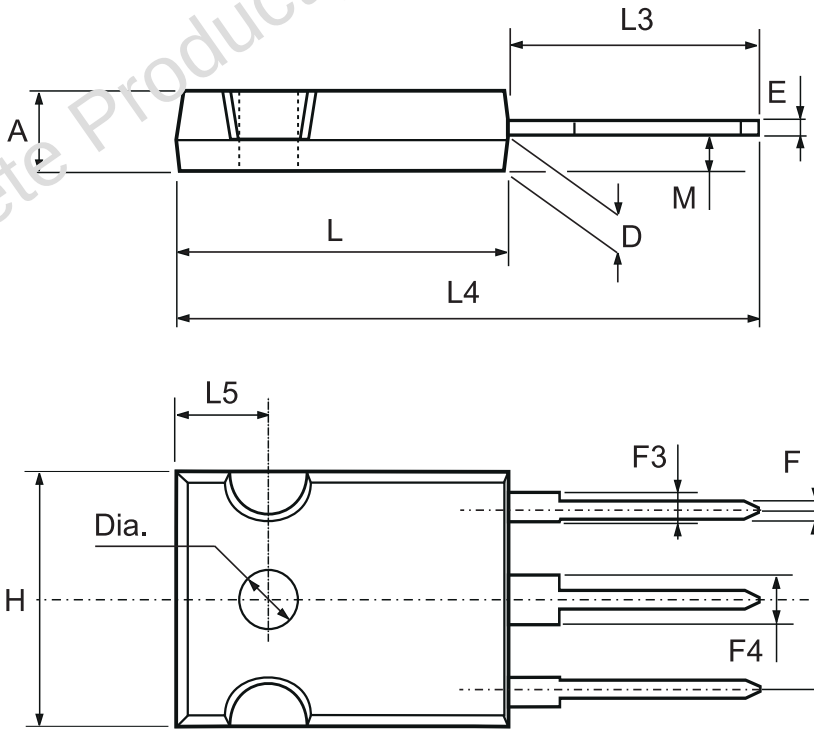
Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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TO-247 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.7		5.3	0.185		0.209
D	2.2		2.6	0.087		0.102
E	0.4		0.8	0.016		0.031
F	1		1.4	0.039		0.055
F3	2		2.4	0.079		0.094
F4	3		3.4	0.118		0.134
G		10.9			0.429	
H	15.3		15.9	0.602		0.626
L	19.7		20.3	0.776		0.779
L3	14.2		14.8	0.559		0.582
L4		34.6			1.362	
L5		5.5			0.217	
M	2		3	0.079		0.118



P025P

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