



STY140NS10

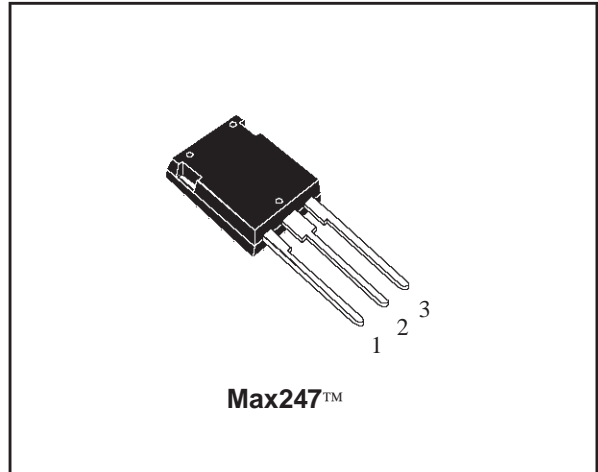
N-CHANNEL 100V - 0.009 Ω - 140A MAX247™ MESH OVERLAY™ POWER MOSFET

TYPE	V _{DSS}	R _{DS(on)}	I _D
STY140NS10	100V	<0.011Ω	140A

- TYPICAL R_{DS(on)} = 0.009Ω
- STANDARD THRESHOLD DRIVE
- 100% AVALANCHE TESTED

DESCRIPTION

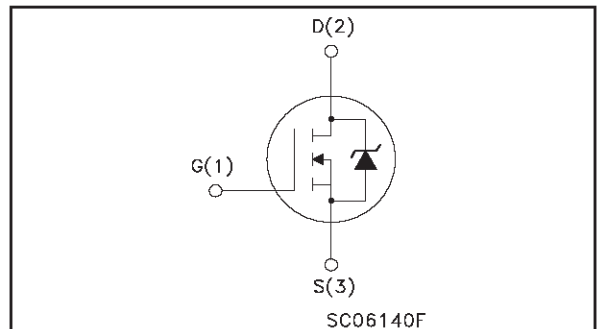
Using the latest high voltage MESH OVERLAY™ process, STMicroelectronics has designed an advanced family of power MOSFETs with outstanding performances. The new patent pending strip layout coupled with the Company's proprietary edge termination structure, gives the lowest R_{DS(on)} per area, exceptional avalanche and dv/dt capabilities and unrivalled gate charge and switching characteristics.



APPLICATIONS

- HIGH CURRENT, HIGH SWITCHING SPEED
- SWITCH MODE POWER SUPPLY (SMPS)

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 kΩ)	100	V
V _{GS}	Gate- source Voltage	± 20	V
I _D	Drain Current (continuous) at T _C = 25°C	140	A
I _D	Drain Current (continuous) at T _C = 100°C	99	A
I _{DM} (●)	Drain Current (pulsed)	560	A
P _{tot}	Total Dissipation at T _C = 25°C	450	W
	Derating Factor	3	W/°C
E _{AS} (1)	Single Pulse Avalanche Energy	2900	mJ
dv/dt (2)	Peak Diode Recovery voltage slope	5	V/ns
T _{stg}	Storage Temperature	-55 to 175	°C
T _j	Operating Junction Temperature	-55 to 175	°C

(●) Pulse width limited by safe operating area.

(1) Starting T_j = 25 °C, I_D = 70A, V_{DD} = 50V

(2) I_{SD} ≤ 140A, di/dt ≤ 200A/μs, V_{DD} ≤ V_{(BR)DSS}, T_j ≤ T_{JMAX}.

STY140NS10

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case	Max	0.33	°C/W
Rthj-amb	Thermal Resistance Junction-ambient	Max	30	°C/W
T _j	Maximum Lead Temperature For Soldering Purpose	Typ	300	°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	100			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 = 70 A		0.009	0.011	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs} (*)	Forward Transconductance	V _{DS} = 20 V I _D = 70 A		50		S
C _{iSS}	Input Capacitance	V _{DS} = 25V, f = 1 MHz, V _{GS} = 0		12600		pF
C _{oSS}	Output Capacitance			2100		pF
C _{rSS}	Reverse Transfer Capacitance			690		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	$V_{DD} = 50\text{ V}$ $I_D = 70\text{ A}$ $R_G = 4.7\ \Omega$ $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 1)		40 150		ns ns
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD}=50\text{V}$ $I_D=140\text{A}$ $V_{GS}=10\text{V}$ (see test circuit, Figure 2)		450 70 170	600	nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(off)}$ t_f	Turn-off Delay Time Fall Time	$V_{DD} = 50\text{ V}$ $I_D = 70\text{ A}$ $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (Resistive Load, Figure 1)		465 270		ns ns

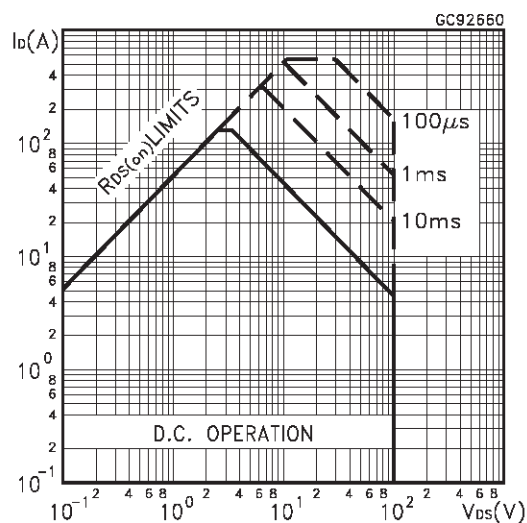
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD} $I_{SDM} (\bullet)$	Source-drain Current Source-drain Current (pulsed)				140 560	A A
$V_{SD} (^*)$	Forward On Voltage	$I_{SD} = 140\text{ A}$ $V_{GS} = 0$			1.5	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 140\text{ A}$ $di/dt = 100\text{A}/\mu\text{s}$ $V_r = 20\text{ V}$ $T_j = 150^\circ\text{C}$ (Inductive Load, Figure 3)			275 2 15	ns μC A

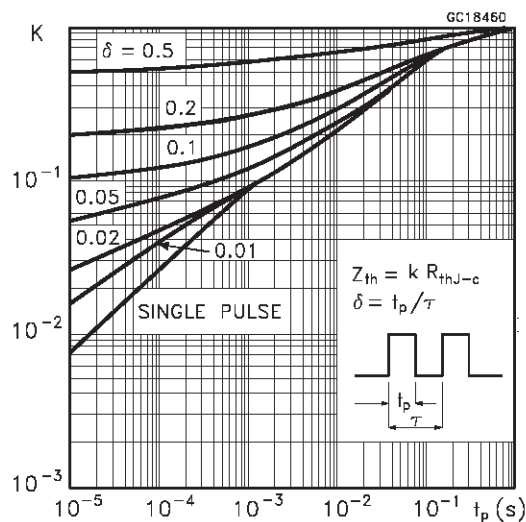
(*)Pulsed: Pulse duration = 300 μs , duty cycle 1.5 %.

(\bullet)Pulse width limited by safe operating area.

Safe Operating Area

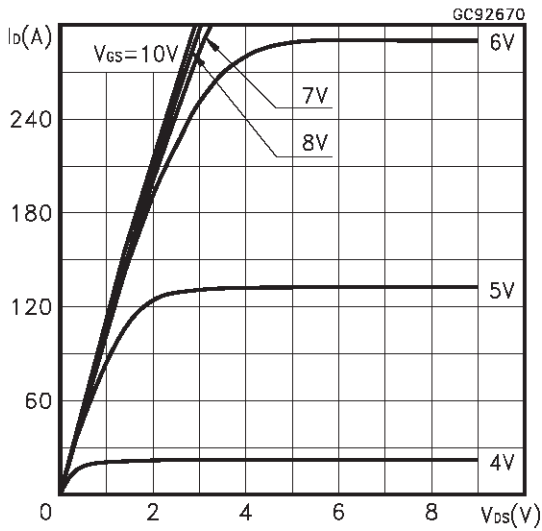


Thermal Impedance

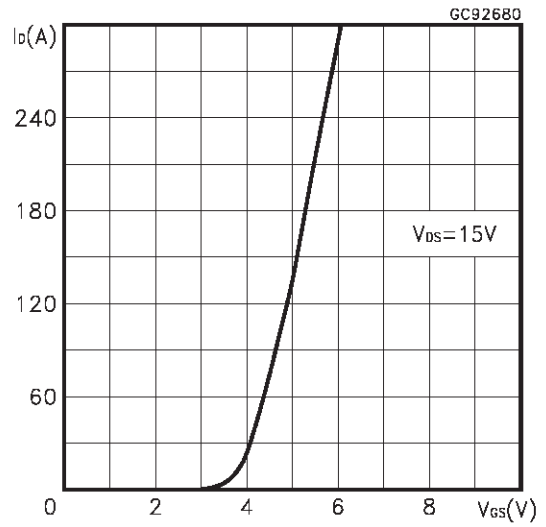


STY140NS10

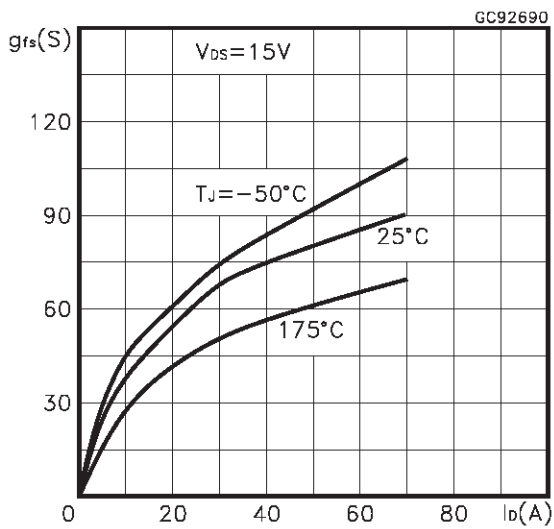
Output Characteristics



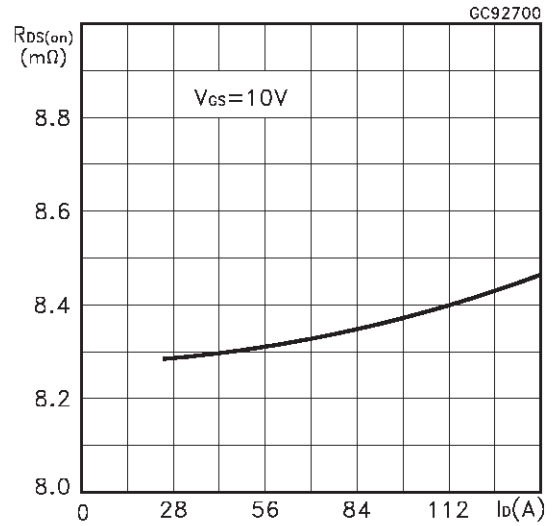
Transfer Characteristics



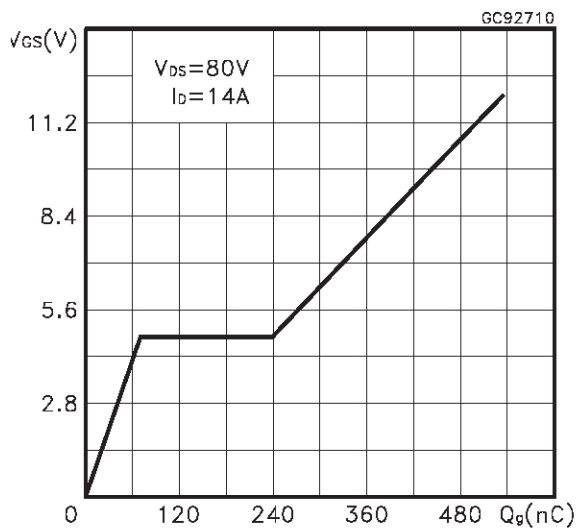
Transconductance



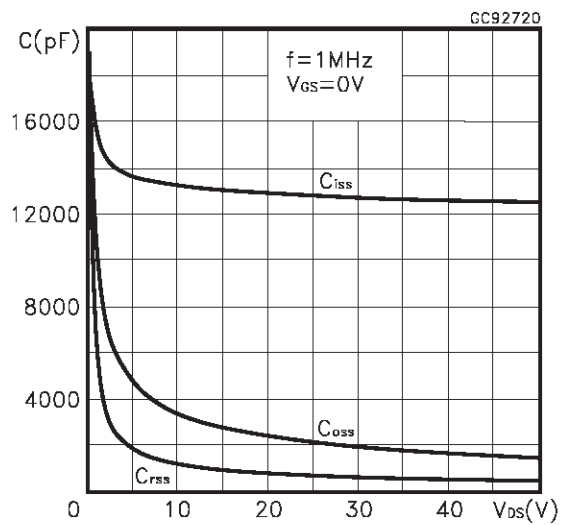
Static Drain-source On Resistance



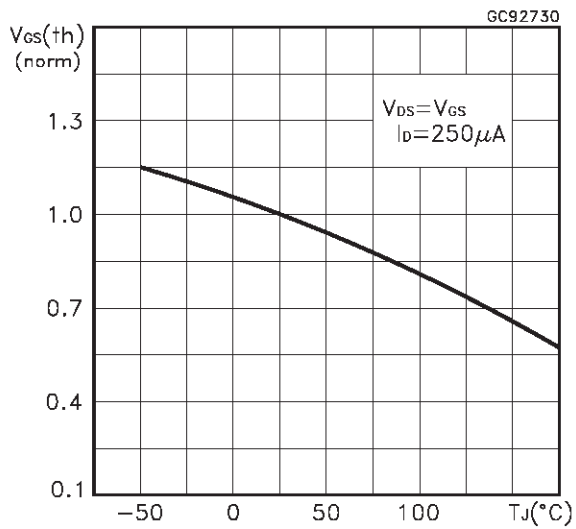
Gate Charge vs Gate-source Voltage



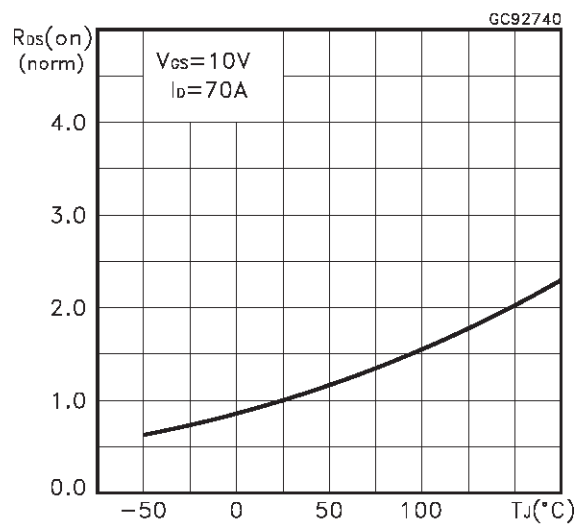
Capacitance Variations



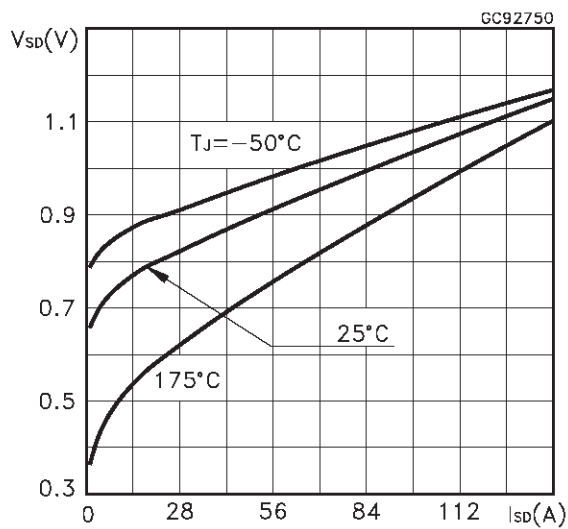
Normalized Gate Threshold Voltage vs Temperature



Normalized on Resistance vs Temperature



Source-drain Diode Forward Characteristics



Normalized Breakdown Voltage vs Temperature

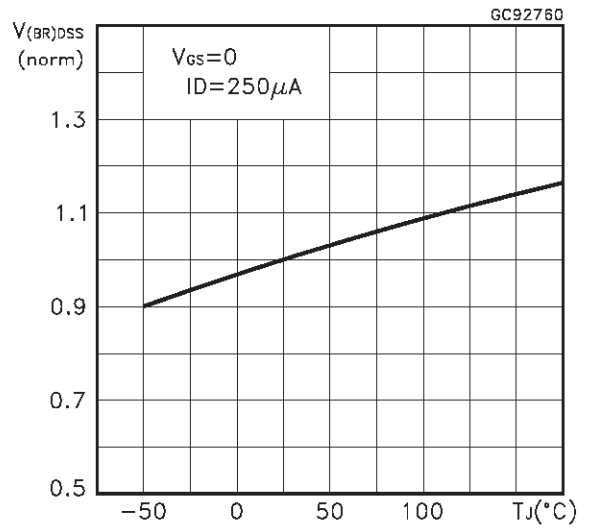


Fig. 1: Switching Times Test Circuits For Resistive Load

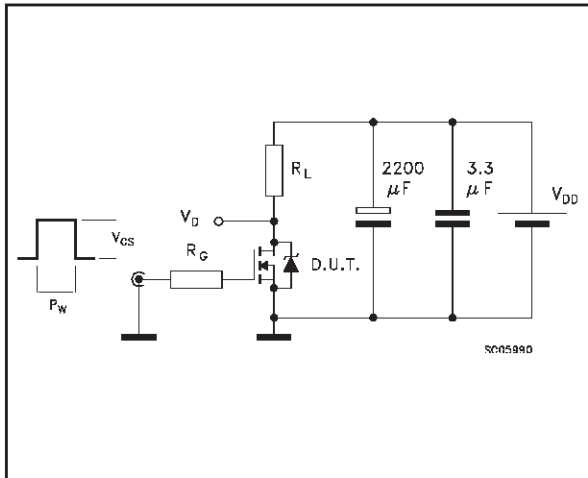


Fig. 2: Gate Charge test Circuit

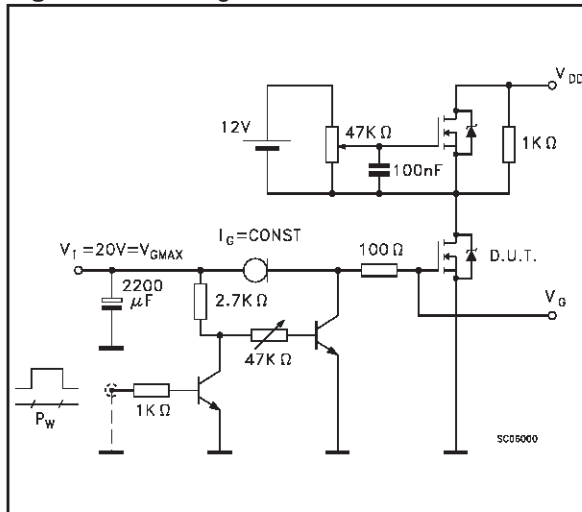
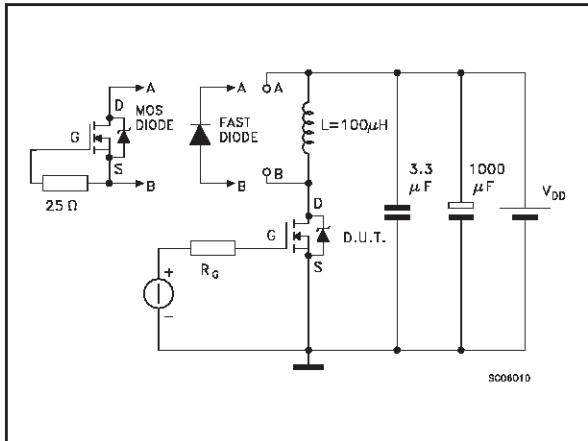
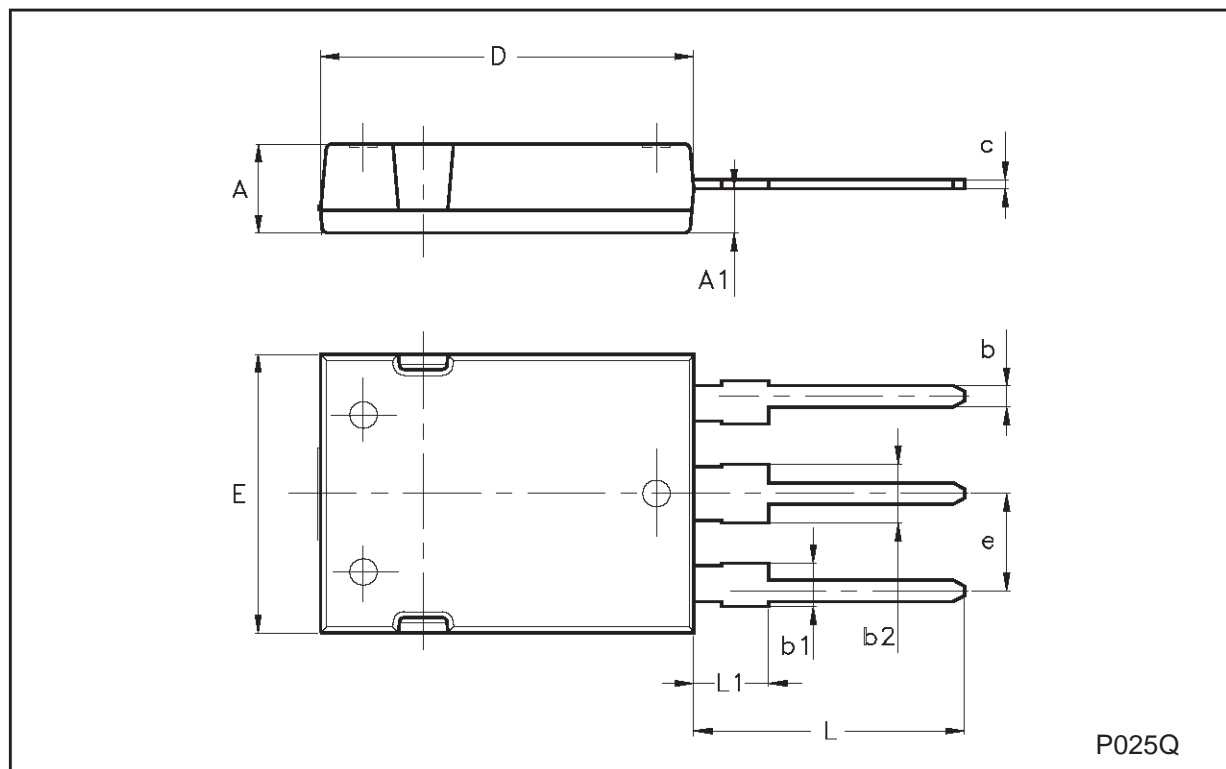


Fig. 3: Test Circuit For Diode Recovery Behaviour



Max247 MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.70		5.30			
A1	2.20		2.60			
b	1.00		1.40			
b1	2.00		2.40			
b2	3.00		3.40			
c	0.40		0.80			
D	19.70		20.30			
e	5.35		5.55			
E	15.30		15.90			
L	14.20		15.20			
L1	3.70		4.30			



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 registered trademark of STMicroelectronics
© 2001 STMicroelectronics - All Rights Reserved

All other names are the property of their respective owners.

STMicroelectronics GROUP OF COMPANIES
Australia - Brazil - China - Finland - France - Germany - Hong Kong - India - Italy - Japan - Malaysia - Malta - Morocco -
Singapore - Spain - Sweden - Switzerland - United Kingdom - U.S.A.

<http://www.st.com>