

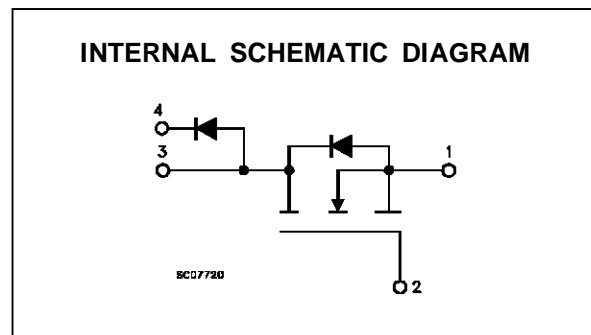
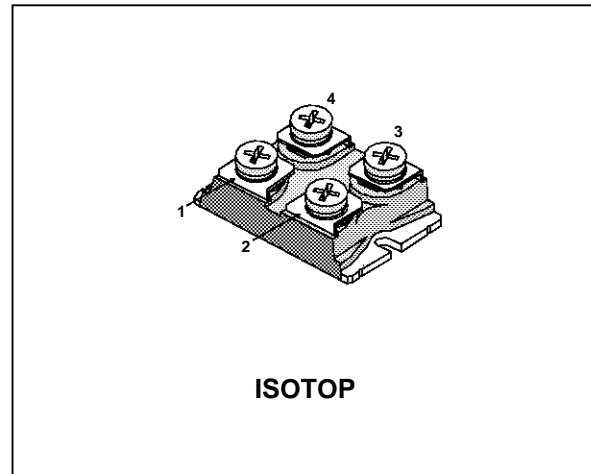
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR AND ULTRA-FAST DIODE IN ISOTOP PACKAGE

TYPE	V _{DSS}	R _{DS(on)}	I _D
STE36N50-DK	500 V	< 0.14 Ω	36 A

- DEDICATED FOR POWER FACTOR CORRECTOR APPLICATIONS
- LOW GATE CHARGE MOSFET
- TURBOSWITCH DIODE INCORPORATED
- HIGH CURRENT POWER MODULE
- AVALANCHE RUGGED TECHNOLOGY
- VERY LARGE SOA - LARGE PEAK POWER CAPABILITY
- EASY TO MOUNT
- EXTREMELY LOW R_{th} JUNCTION TO CASE
- VERY LOW DRAIN TO CASE CAPACITANCE
- VERY LOW INTERNAL PARASITIC INDUCTANCE (TYPICALLY < 5 nH)
- ISOLATED PACKAGE UL RECOGNIZED (FILE No E81743)

INDUSTRIAL APPLICATIONS:

- SMPS & UPS
- MOTOR CONTROL
- WELDING EQUIPMENT
- POWER FACTOR CORRECTOR
- ASYMMETRICAL HALF BRIDGE SMPS (WITH COMPLIMENTARY STE36N50-DA)



MOSFET ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage (V _{GS} = 0)	500	V
V _{DGR}	Drain-Gate Voltage (R _{GS} = 20 kΩ)	500	V
V _{GS}	Gate-Source Voltage	± 20	V
I _D	Drain Current (continuous) at T _c = 25 °C	36	A
I _D	Drain Current (continuous) at T _c = 100 °C	24	A
I _{DM} (●)	Drain Current (pulsed)	144	A
P _{tot}	Total Dissipation at T _c = 25 °C	380	W
	Derating Factor	3.3	W/°C
T _{stg}	Storage Temperature	-55 to 150	°C
T _j	Max. Operating Junction Temperature	150	°C
V _{ISO}	Insulation Withstand Voltage (AC-RMS)	2500	V

(●) Pulse width limited by safe operating area

STE36N50-DK

DIODE ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{RRM}	Repetitive Peak Reverse Voltage	600	V
V_{RSM}	Non Repetitive Peak Reverse Voltage	600	V
$I_{F(RMS)}$	RMS Forward Current	50	A
I_{FRM}	Repet. Peak Forward Current ($t_p = 5 \mu s$, $f = 5KHz$)	300	A
P_{tot}	Total Dissipation at $T_c = 25^\circ C$	70	W
	Derating Factor	0.56	W/ $^\circ C$

THERMAL DATA

$R_{thj-case}$	Thermal Resistance Junction-case (MOSFET)	Max	0.3	$^\circ C/W$
$R_{thj-case}$	Thermal Resistance Junction-case (DIODE)	Max	1.78	$^\circ C/W$
R_{thc-h}	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	$^\circ C/W$

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max, $\delta < 1\%$)	14	A
E_{AS}	Single Pulse Avalanche Energy (starting $T_j = 25^\circ C$, $I_D = I_{AR}$, $V_{DD} = 50 V$)	100	mJ
E_{AR}	Repetitive Avalanche Energy (pulse width limited by T_j max, $\delta < 1\%$)	40	mJ
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive ($T_c = 100^\circ C$, pulse width limited by T_j max, $\delta < 1\%$)	9	A

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

OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source Breakdown Voltage	$I_D = 1 mA$ $V_{GS} = 0$	500			V
I_{DSS}	Zero Gate Voltage Drain Current ($V_{GS} = 0$)	$V_{DS} = \text{Max Rating}$ $V_{DS} = \text{Max Rating} \times 0.8$ $T_c = 125^\circ C$			300 1500	μA μA
I_{GSS}	Gate-body Leakage Current ($V_{DS} = 0$)	$V_{GS} = \pm 20 V$			± 300	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$ $I_D = 1 mA$	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	$V_{GS} = 10V$ $I_D = 18 A$ $V_{GS} = 10V$ $I_D = 18 A$ $T_c = 100^\circ C$		0.12	0.14 0.28	Ω Ω
$I_{D(on)}$	On State Drain Current	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $V_{GS} = 10 V$	36			A

MOSFET ELECTRICAL CHARACTERISTICS (continued)**DYNAMIC**

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$ $I_D = 18$ A	16			S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	$V_{DS} = 25$ V $f = 1$ MHz $V_{GS} = 0$			8000 1300 350	pF pF pF

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	$V_{DD} = 250$ V $I_D = 18$ A $R_G = 4.7$ Ω $V_{GS} = 10$ V (see test circuit, figure 1)		45 85	65 120	ns ns
$(di/dt)_{on}$	Turn-on Current Slope	$V_{DD} = 400$ V $I_D = 36$ A $R_G = 4.7$ Ω $V_{GS} = 10$ V (see test circuit, figure 3)		700		A/ μ s
Q_g Q_{gs} Q_{gd}	Total Gate Charge Gate-Source Charge Gate-Drain Charge	$V_{DD} = 400$ V $I_D = 36$ A $V_{GS} = 10$ V		295 35 145		nC nC nC

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$ t_f t_c	Off-voltage Rise Time Fall Time Cross-over Time	$V_{DD} = 400$ V $I_D = 36$ A $R_G = 4.7$ Ω $V_{GS} = 10$ V (see test circuit, figure 3)		100 45 160	140 65 225	ns 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)				36 144	A A
V_{SD} (*)	Forward On Voltage	$I_{SD} = 36$ A $V_{GS} = 0$			1.4	V
t_{rr} Q_{rr} I_{RRM}	Reverse Recovery Time Reverse Recovery Charge Reverse Recovery Current	$I_{SD} = 36$ A $di/dt = 100$ A/ μ s $V_{DD} = 100$ V $T_j = 150$ °C (see test circuit, figure 3)		1 29 58		μ s μ C A

(*) Pulsed: Pulse duration = 300 μ s, duty cycle 1.5 %

(\bullet) Pulse width limited by safe operating area

STE36N50-DK

DIODE ELECTRICAL CHARACTERISTICS (T_{case} = 25 °C unless otherwise specified)

STATIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _F (#)	Forward Voltage Drop	I _F = 20 A T _j = 25 °C			1.75	V
		I _F = 20 A T _j = 125 °C			1.5	V
I _R (##)	Reverse Leakage Current	V _R = V _{RRM} × 0.8 T _j = 25 °C			100	μA
		V _R = V _{RRM} × 0.8 T _j = 125 °C			6	mA

DINAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{rr}	Reverse Recovery Time	I _F = 0.5 A I _R = 1 A I _{rr} = 0.25 A T _j = 25 °C		30		ns
		I _F = 1 A di _F /dt = -50 A/μs V _R = 30 V T _j = 25 °C			60	ns
I _{RM}	Maximum Reverse Recovery Current	V _R = 400 V I _F = 20 A T _j = 125 °C di _F /dt = -160 A/μs di _F /dt = -500 A/μs		17.5	12.5	A A

TURN-ON SWITCHING

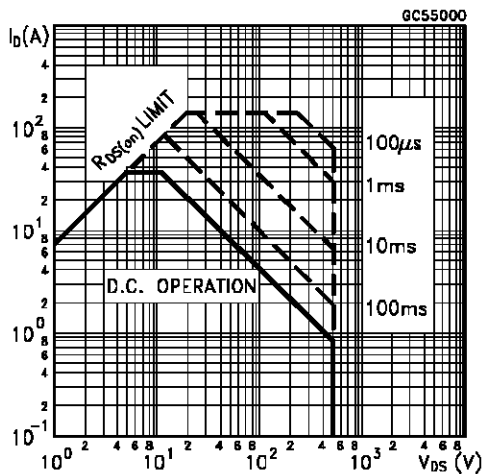
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{fr}	Forward Recovery Time	I _F = 20 A di _F /dt = 160 A/μs Measured at: 1.1 × V _{f(MAX)} T _j = 25 °C			600	ns
V _{FP}	Peak Forward Voltage	T _j = 25 °C			12	V

(#) Pulsed: Pulse duration = 380 μs, duty cycle < 2 %

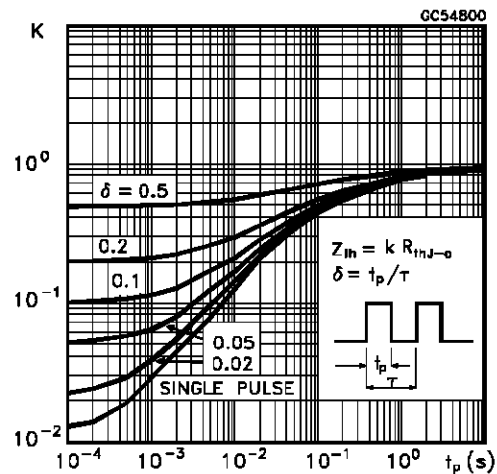
(##) Pulsed: Pulse duration = 5 μs, duty cycle < 2 %

NOTE: For the complete DIODE characterization refer to STTA2006P datasheet

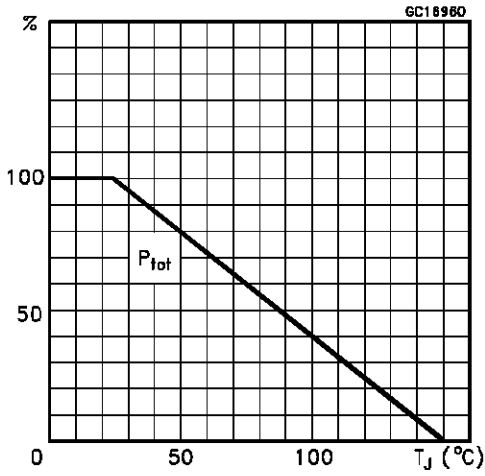
Safe Operating Areas



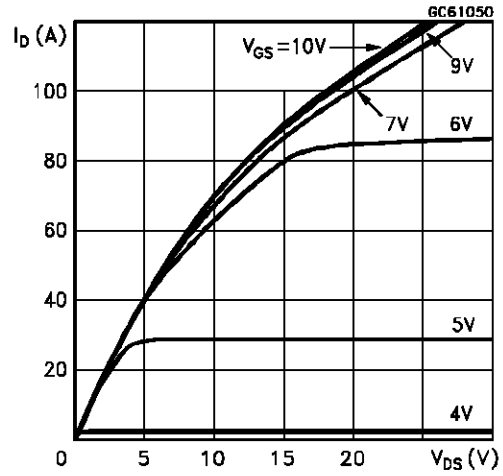
Thermal Impedance



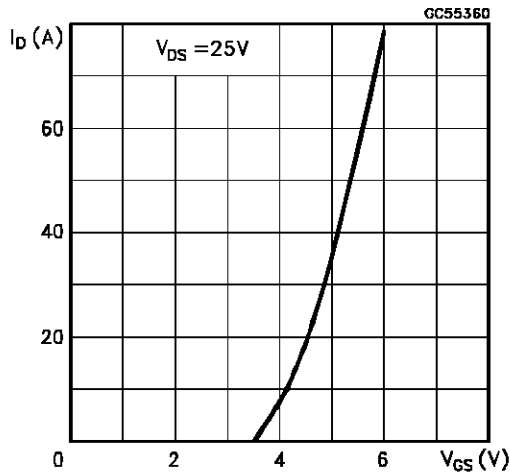
Derating Curve



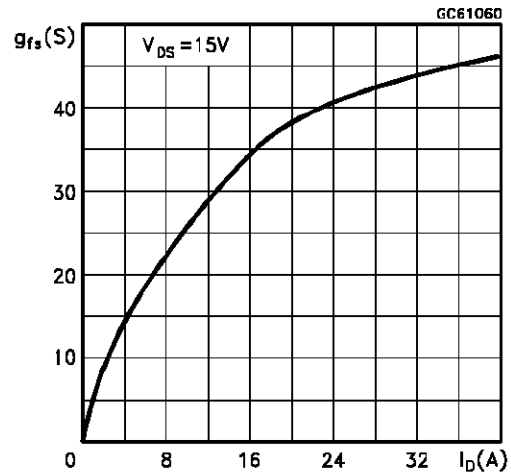
Output Characteristics



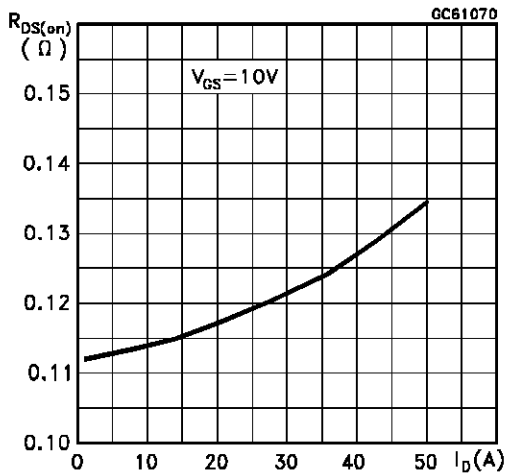
Transfer Characteristics



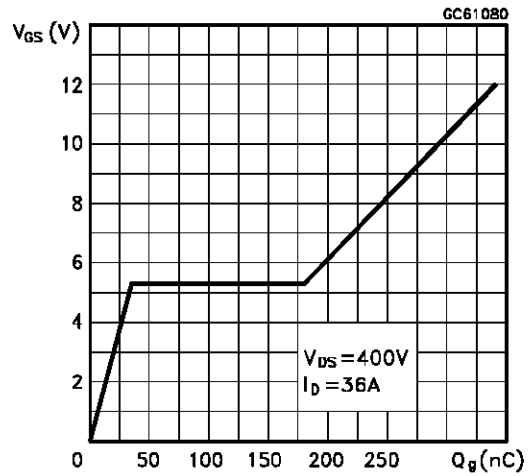
Transconductance



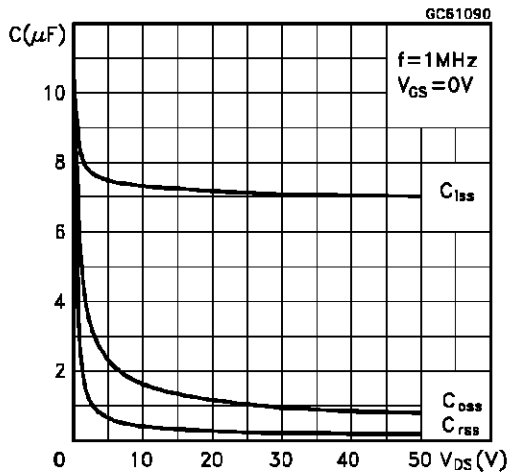
Static Drain-source On Resistance



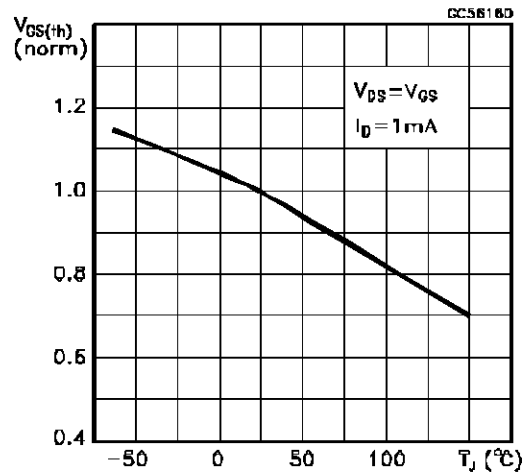
Gate Charge vs Gate-source Voltage



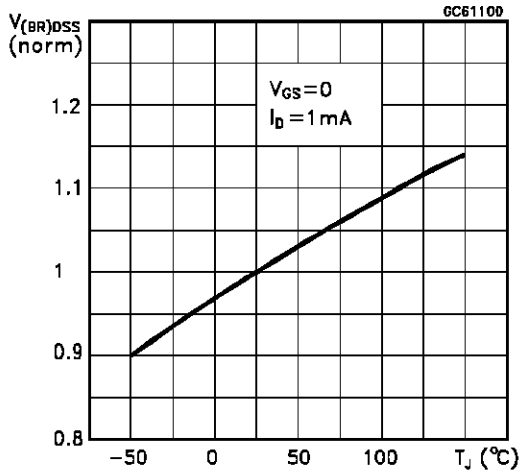
Capacitance Variations



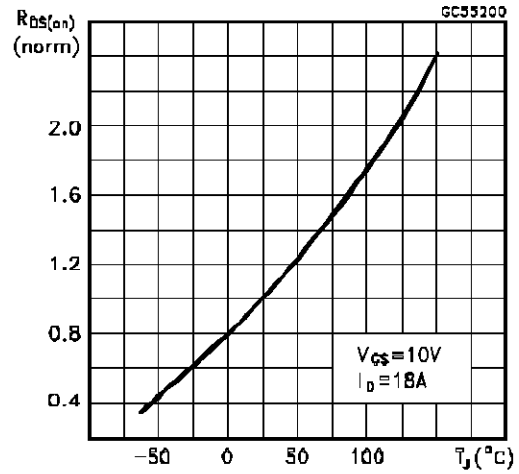
Normalized Gate Threshold Voltage vs Temperature



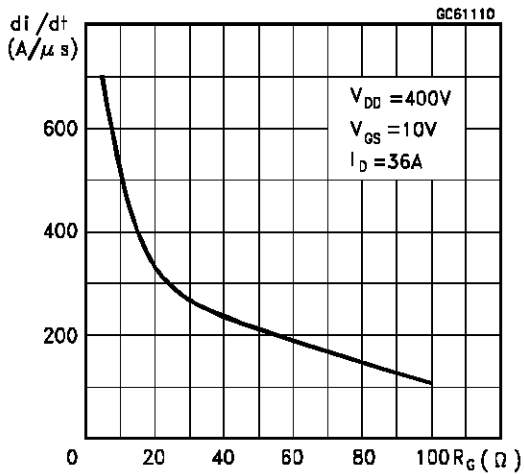
Normalized Breakdown Voltage vs Temperature



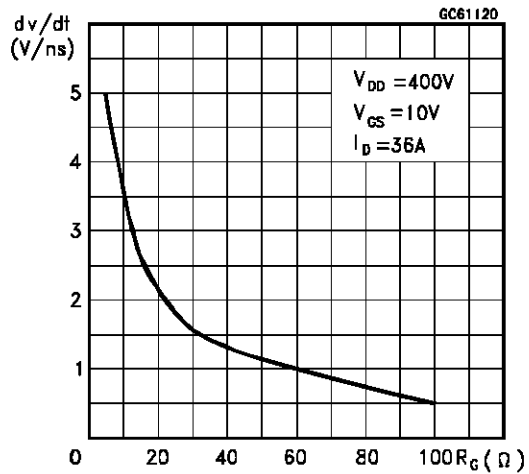
Normalized On Resistance vs Temperature



Turn-on Current Slope



Turn-off Drain-source Voltage Slope



Cross-over Time

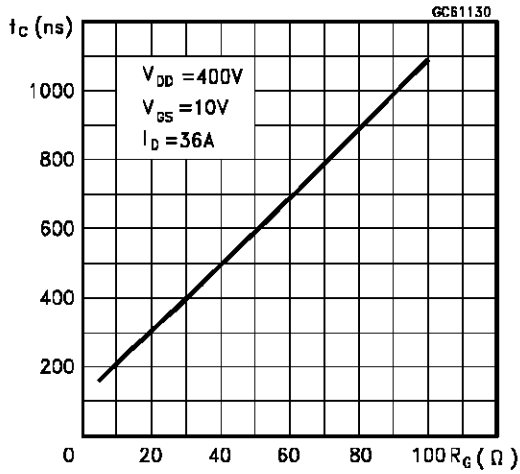
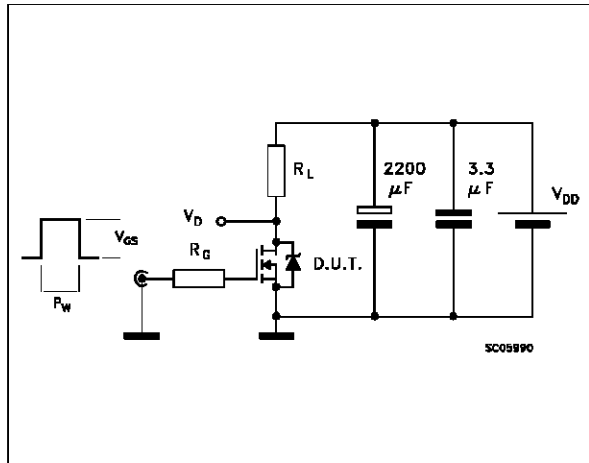


Fig. 1: Switching Times Test Circuits For Resistive Load



Source-drain Diode Forward Characteristics

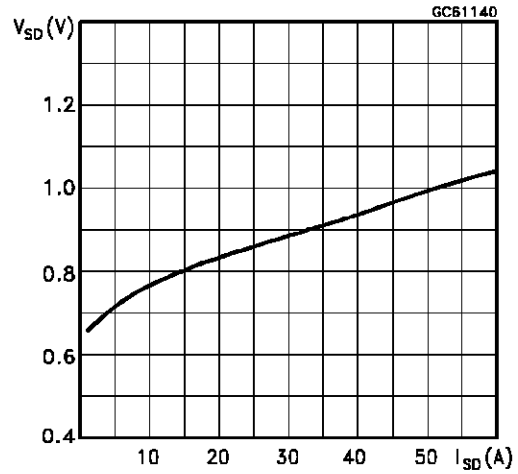


Fig. 2: Gate Charge Test Circuit

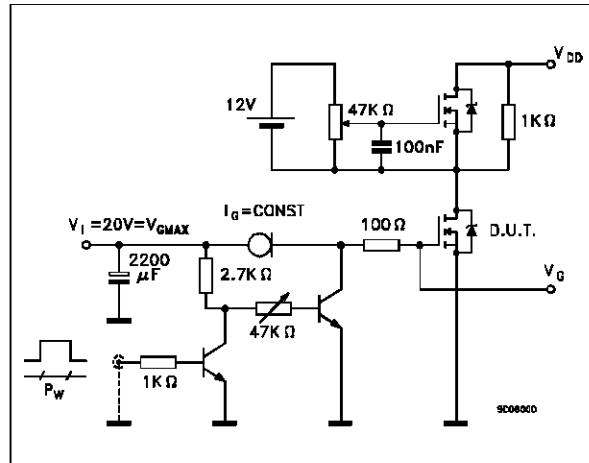
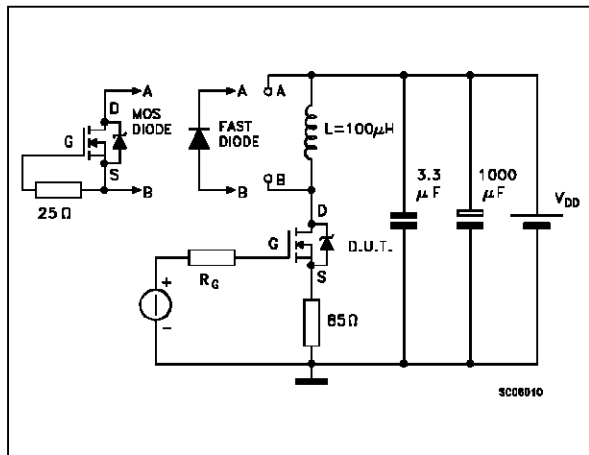
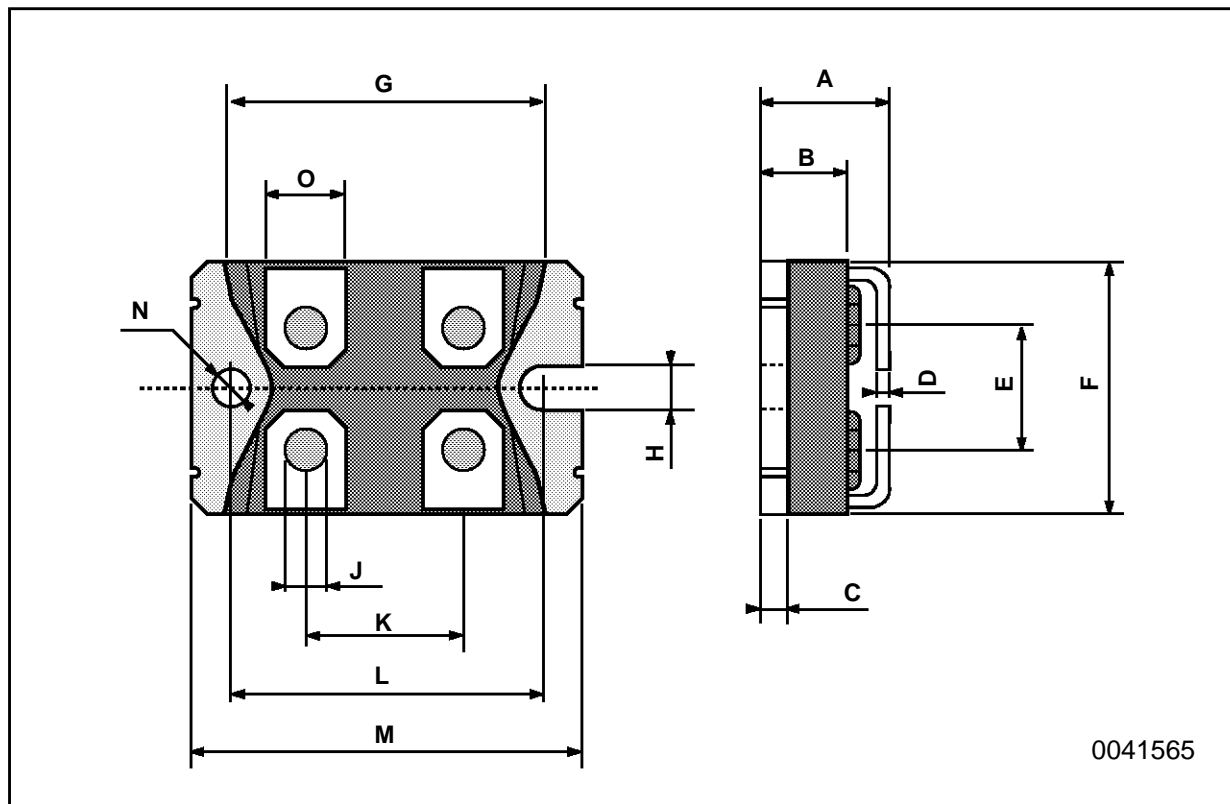


Fig. 3: Test Circuit For Inductive Load Switching And Diode Recovery Times



ISOTOP MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	11.8		12.2	0.466		0.480
B	8.9		9.1	0.350		0.358
C	1.95		2.05	0.076		0.080
D	0.75		0.85	0.029		0.033
E	12.6		12.8	0.496		0.503
F	25.15		25.5	0.990		1.003
G	31.5		31.7	1.240		1.248
H	4			0.157		
J	4.1		4.3	0.161		0.169
K	14.9		15.1	0.586		0.594
L	30.1		30.3	1.185		1.193
M	37.8		38.2	1.488		1.503
N	4			0.157		
O	7.8		8.2	0.307		0.322
P	5.5			0.216		



Information furnished is believed to be accurate and reliable. However, SGS-THOMSON Microelectronics 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 SGS-THOMSON Microelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. SGS-THOMSON Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of SGS-THOMSON Microelectronics.

© 1994 SGS-THOMSON Microelectronics - All Rights Reserved

SGS-THOMSON Microelectronics GROUP OF COMPANIES
Australia - Brazil - France - Germany - Hong Kong - Italy - Japan - Korea - Malaysia - Malta - Morocco - The Netherlands -
Singapore - Spain - Sweden - Switzerland - Taiwan - Thailand - United Kingdom - U.S.A