SGS-THOMSON MICROELECTRONICS

STE180N05

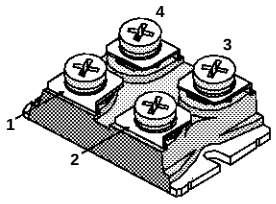
N - CHANNEL ENHANCEMENT MODE POWER MOS TRANSISTOR IN ISOTOP PACKAGE

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STE180N05	50 V	< 0.006 Ω	180 A

- HIGH CURRENT POWER MODULE
- AVALANCHE RUGGED TECHNOLOGY (SEE STH65N05 FOR RATING)
- VERY LARGE SOA - LARGE PEAK POWER CAPABILITY
- EASY TO MOUNT
- SAME CURRENT CAPABILITY FOR THE TWO SOURCE TERMINALS
- 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)

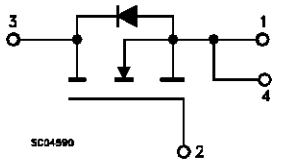
INDUSTRIAL APPLICATIONS:

- SMPS & UPS
- MOTOR CONTROL
- WELDING EQUIPMENT
- OUTPUT STAGE FOR PWM, ULTRASONIC CIRCUITS



ISOTOP

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS} = 0)	50	V
V_{DGR}	Drain-Gate Voltage (R_{GS} = 20 kΩ)	50	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Drain Current (continuous) at T_c = 25 °C	180	A
I_D	Drain Current (continuous) at T_c = 100 °C	115.5	A
I_{DM}(•)	Drain Current (pulsed)	540	A
P_{tot}	Total Dissipation at T_c = 25 °C	360	W
	Derating Factor	2.9	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

THERMAL DATA

$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	0.35	°C/W
$R_{thc\text{-}h}$	Thermal Resistance Case-heatsink With Conductive Grease Applied	Max	0.05	°C/W

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 = 1 mA V_{GS} = 0 V	50			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating V_{DS} = Max Rating x 0.8 T_c = 125 °C			400 2	µA mA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 20 V			± 400	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		4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V I_D = 90 A		0.004	0.006	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (*)	Forward Transconductance	V_{DS} = 15 V I_D = 90 A		100		S
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{DS} = 25 V f = 1 MHz V_{GS} = 0 V			12 5200 1200	nF pF pF

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Turn-on Time Rise Time	V_{DD} = 25 V I_D = 90 A R_G = 4.7 Ω V_{GS} = 10 V (see test circuit, figure 1)		55 210		ns ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{DD} = 40 V I_D = 180 A R_G = 4.7 Ω V_{GS} = 10 V (see test circuit, figure 3)		900		A/µs
Q_g	Total Gate Charge	V_{DD} = 40 V I_D = 180 A V_{GS} = 10 V		270		nC

ELECTRICAL CHARACTERISTICS (continued)

SWITCHING OFF

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	V_{DD} = 40 V I_D = 180 A		40		ns
t_f	Fall Time	R_G = 4.7 Ω V_{GS} = 10 V		315		ns
t_c	Cross-over Time	(see test circuit, figure 3)		440		ns

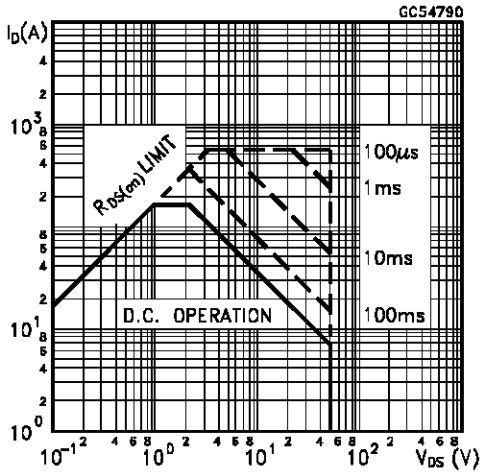
SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				180	A
I_{SDM}(•)	Source-drain Current (pulsed)				540	A
V_{SD} (*)	Forward On Voltage	I_{SD} = 180 A V_{GS} = 0			1.6	V
t_{rr}	Reverse Recovery Time	I_{SD} = 180 A di/dt = 100 A/µs V_{DD} = 25 V T_j = 150 °C		160		ns
Q_{rr}	Reverse Recovery Charge	(see test circuit, figure 3)		480		nC
I_{RRM}	Reverse Recovery Current			6		A

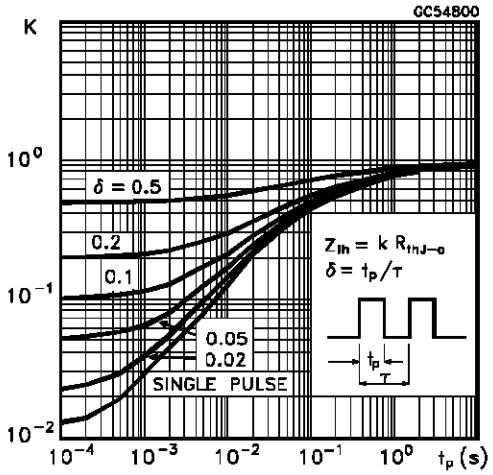
(*) Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %

(•) Pulse width limited by safe operating area

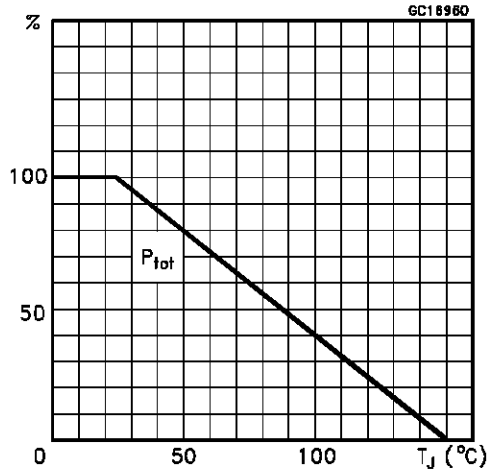
Safe Operating Area



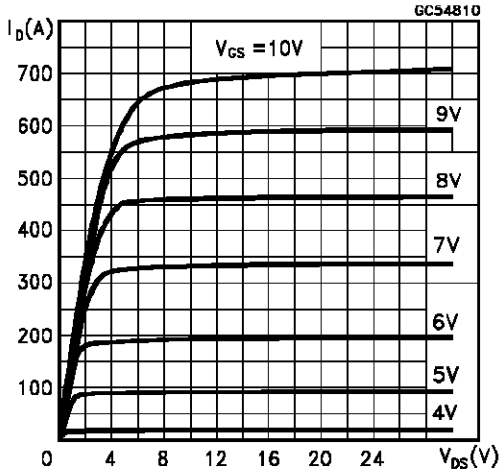
Thermal Impedance



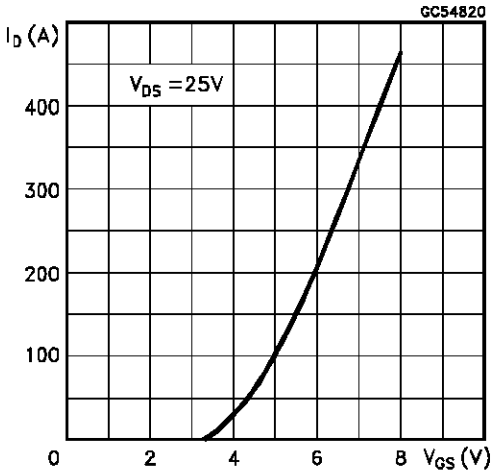
Derating Curve



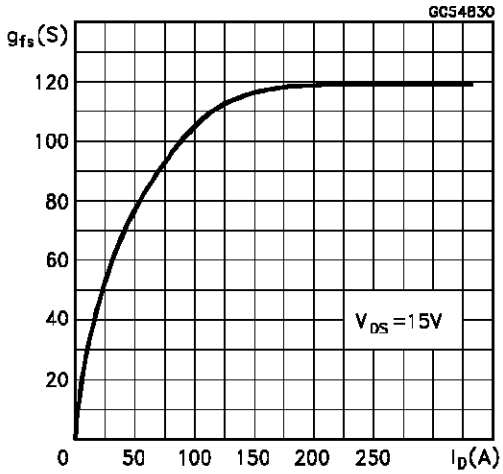
Output Characteristics



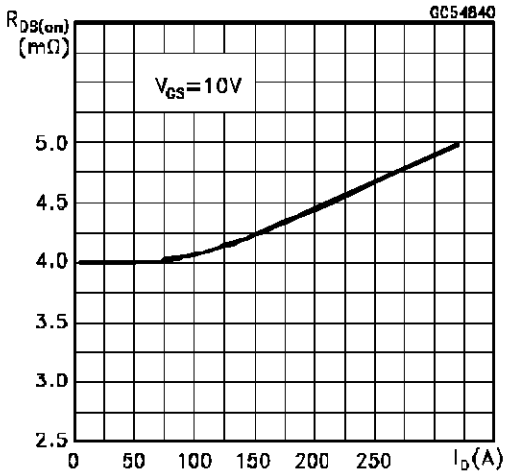
Transfer Characteristics



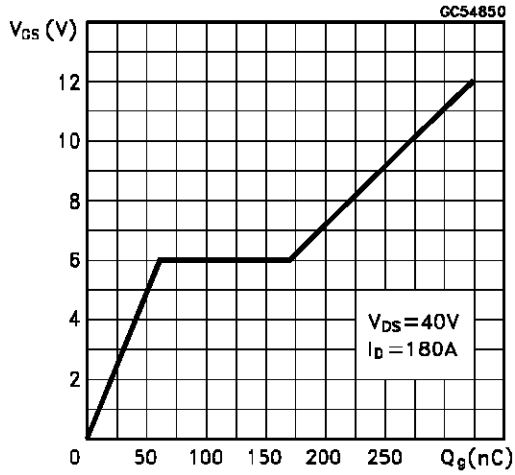
Transconductance



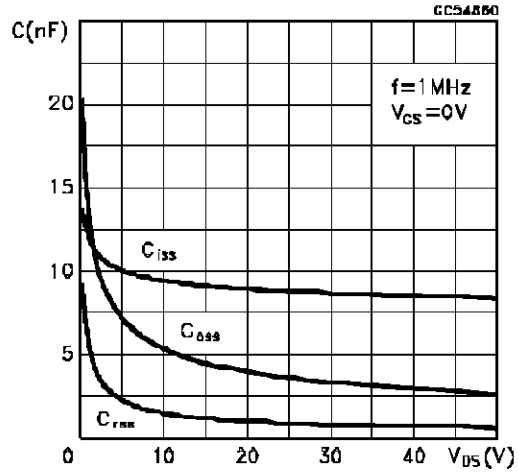
Static Drain-source On Resistance



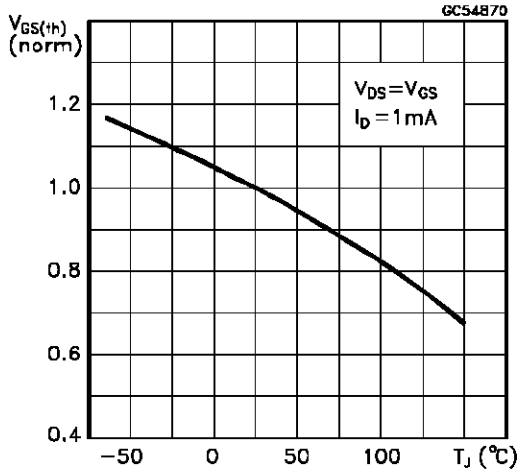
Gate Charge vs Gate-source Voltage



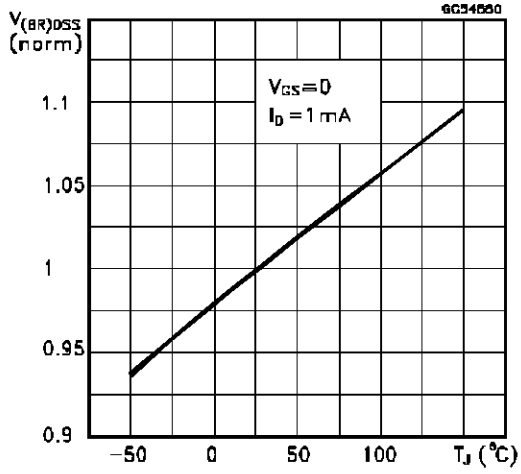
Capacitance Variations



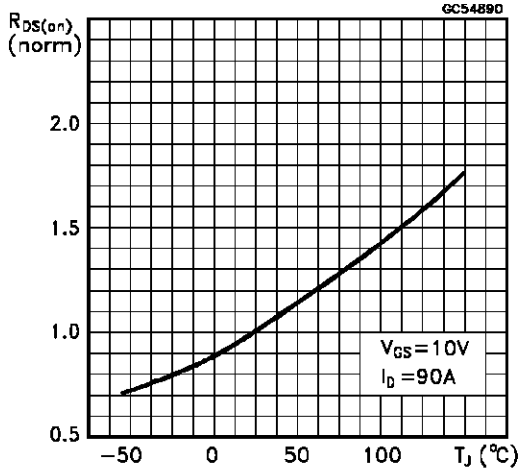
Normalized Gate Threshold Voltage vs Temperature



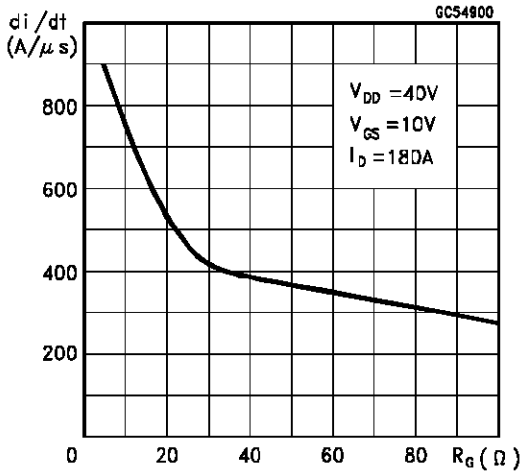
Normalized Breakdown Voltage vs Temperature



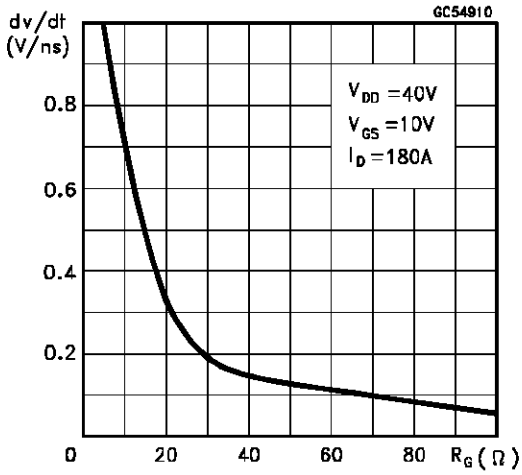
Normalized On Resistance vs Temperature



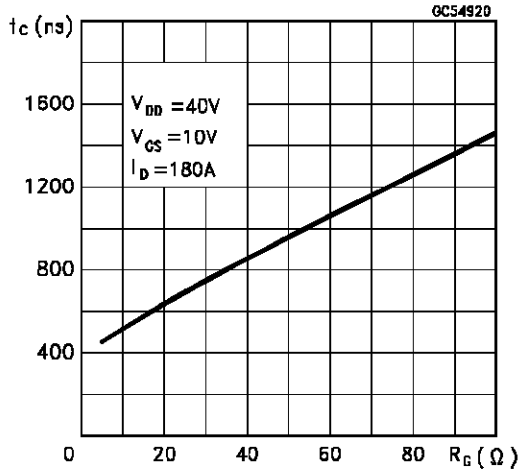
Turn-on Current Slope



Turn-off Drain-source Voltage Slope



Cross-over Time



Source-drain Diode Forward Characteristics

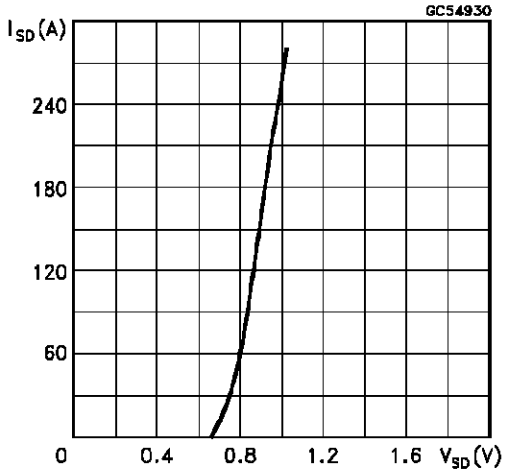


Fig. 1: Switching Times Test Circuits For Resistive Load

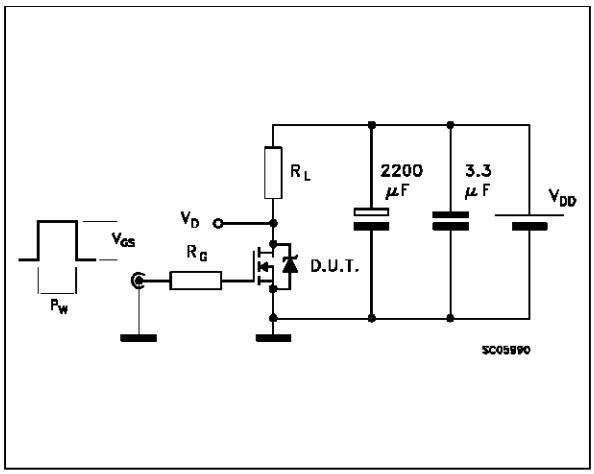


Fig. 2: Gate Charge Test Circuit

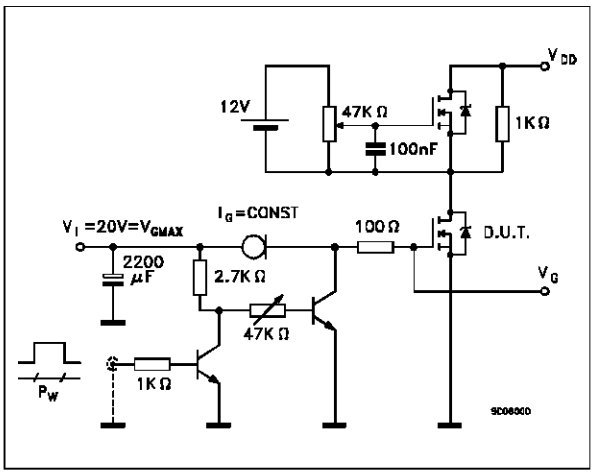
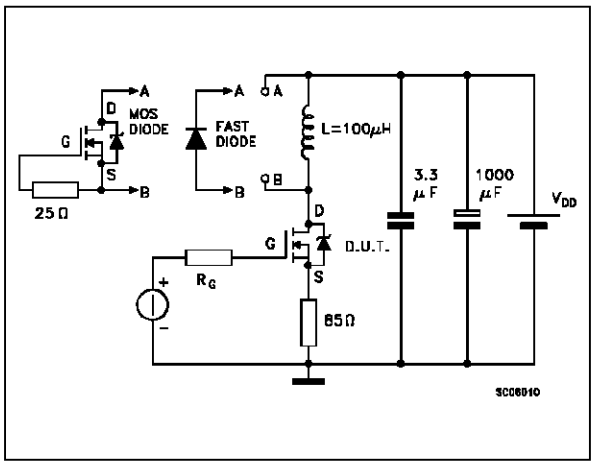


Fig. 3: Test Circuit For Inductive Load Switching And Diode Recovery Times



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