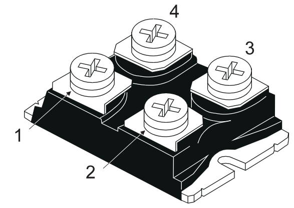
STE40NC60

N-CHANNEL 600V - 0.098Ω - 40A ISOTOP PowerMesh™II MOSFET

TYPE	V_{DSS}	$R_{DS(on)}$	I_D
STE40NC60	600V	< 0.13Ω	40 A

- TYPICAL R_{DS}(on) = 0.098 Ω
- EXTREMELY HIGH dv/dt CAPABILITY
- 100% AVALANCHE TESTED
- NEW HIGH VOLTAGE BENCHMARK
- GATE CHARGE MINIMIZED

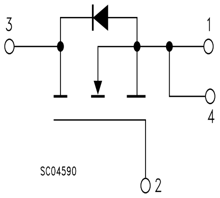


ISOTOP

DESCRIPTION

The PowerMESH™II is the evolution of the first generation of MESH OVERLAY™. The layout refinements introduced greatly improve the Ron*area figure of merit while keeping the device at the leading edge for what concerns swithing speed, gate charge and ruggedness.

INTERNAL SCHEMATIC DIAGRAM



APPLICATIONS

- HIGH CURRENT, HIGH SPEED SWITCHING
- SWITH MODE POWER SUPPLIES (SMPS)
- DC-AC CONVERTERS FOR WELDING EQUIPMENT AND UNINTERRUPTIBLE POWER SUPPLIES AND MOTOR DRIVER

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source Voltage (V_{GS} = 0)	600	V
V_{DGR}	Drain-gate Voltage (R_{GS} = 20 kΩ)	600	V
V_{GS}	Gate- source Voltage	±30	V
I_D	Drain Current (continuos) at T_C = 25°C	40	A
I_D	Drain Current (continuos) at T_C = 100°C	23	A
I_{DM} (•)	Drain Current (pulsed)	160	A
P_{TOT}	Total Dissipation at T_C = 25°C	460	W
	Derating Factor	3.68	W/°C
dv/dt (1)	Peak Diode Recovery voltage slope	3	V/ns
V_{ISO}	Insulation Winthstand Voltage (AC-RMS)	2500	V
T_{stg}	Storage Temperature	–65 to 150	°C
T_j	Max. Operating Junction Temperature	150	°C

(•)Pulse width limited by safe operating area

(1) $I_{SD} \leq$ 40A, di/dt≤100 A/µs, $V_{DD} \leq$ 24V, $Tj \leq T_{jMAX}$

THERMAL DATA

Rthj-case	Thermal Resistance Junction-case Max	0.272	°C/W
Rthc-h	Thermal Resistance Case-heatsink with Conductive Grease Applied	0.05	°C/W

AVALANCHE CHARACTERISTICS

Symbol	Parameter	Max Value	Unit
I_{AR}	Avalanche Current, Repetitive or Not-Repetitive (pulse width limited by T_j max)	40	A
E_{AS}	Single Pulse Avalanche Energy (starting T_j = 25 °C, $I_D = I_{AR}$, V_{DD} = 50 V)	1150	mJ

ELECTRICAL CHARACTERISTICS (TCASE = 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	600			V
I_{DSS}	Zero Gate Voltage Drain Current (V_{GS} = 0)	V_{DS} = Max Rating			10	µA
		V_{DS} = Max Rating, T_C = 125 °C			100	µA
I_{GSS}	Gate-body Leakage Current (V_{DS} = 0)	V_{GS} = ± 30V			±100	nA

ON (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}$, I_D = 250µA	2	3	4	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{GS} = 10V, I_D = 20A		0.098	0.130	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (1)	Forward Transconductance	$V_{DS} > I_{D(on)} \times R_{DS(on)max}$, I_D = 15 A		42		S
C_{iss}	Input Capacitance	V_{DS} = 25V, f = 1 MHz, V_{GS} = 0		11.1		nF
C_{oss}	Output Capacitance			1190		pF
C_{rss}	Reverse Transfer Capacitance			100		pF

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.

ELECTRICAL CHARACTERISTICS (CONTINUED)

SWITCHING ON

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = 300 V, I_D = 20 A R_G = 4.7Ω V_{GS} = 10V (see test circuit, Figure 3)		49		ns
t_r	Rise Time			42		ns
Q_g	Total Gate Charge	V_{DD} = 480V, I_D = 40A, V_{GS} = 10V		307.5	430	nC
Q_{gs}	Gate-Source Charge			48		nC
Q_{gd}	Gate-Drain Charge			146.5		nC

SWITCHING OFF

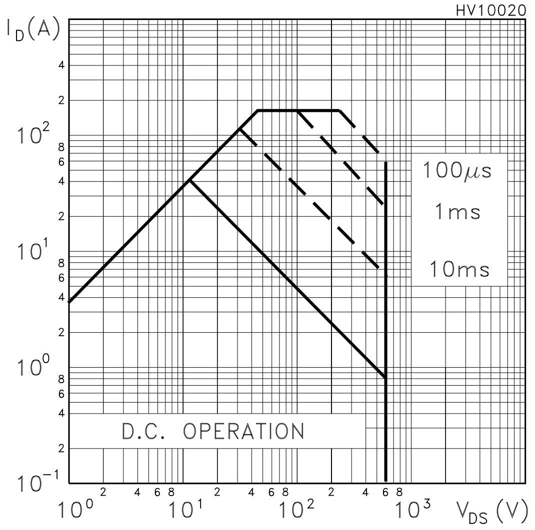
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{r(Voff)}$	Off-voltage Rise Time	V_{DD} = 480V, I_D = 40A, R_G = 4.7Ω, V_{GS} = 10V (see test circuit, Figure 5)		41		ns
t_f	Fall Time			26		ns
t_c	Cross-over Time			74		ns

SOURCE DRAIN DIODE

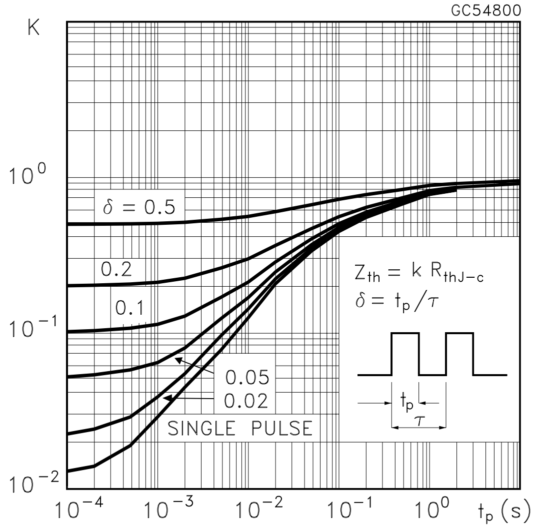
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain Current				40	A
I_{SDM} (2)	Source-drain Current (pulsed)				160	A
V_{SD} (1)	Forward On Voltage	I_{SD} = 40A, V_{GS} = 0			1.6	V
t_{rr}	Reverse Recovery Time	I_{SD} = 40 A, di/dt = 100 A/µs, V_{DD} = 40 V, T_j = 150 °C (see test circuit, Figure 5)		685		ns
Q_{rr}	Reverse Recovery Charge			15		µC
I_{RRM}	Reverse Recovery Current			44		A

Note: 1. Pulsed: Pulse duration = 300 µs, duty cycle 1.5 %.
2. Pulse width limited by safe operating area.

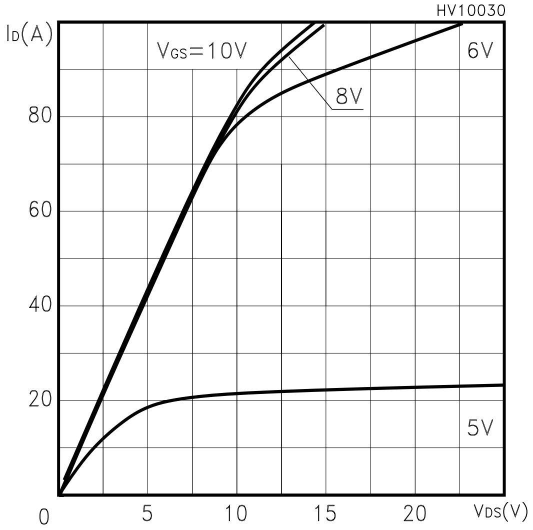
Safe Operating Area



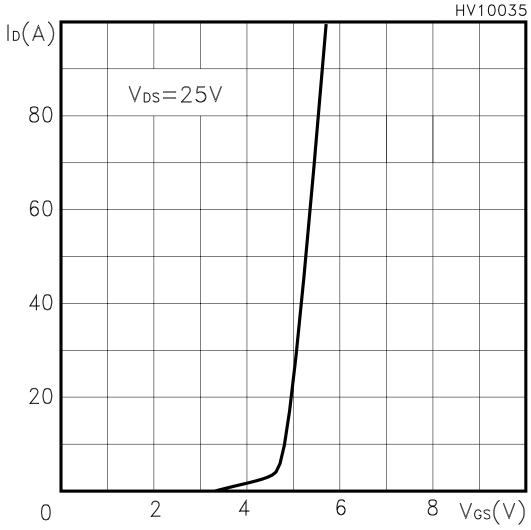
Thermal Impedence



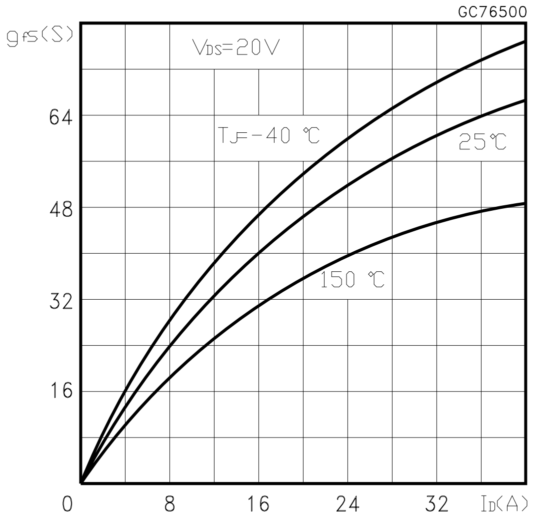
Output Characteristics



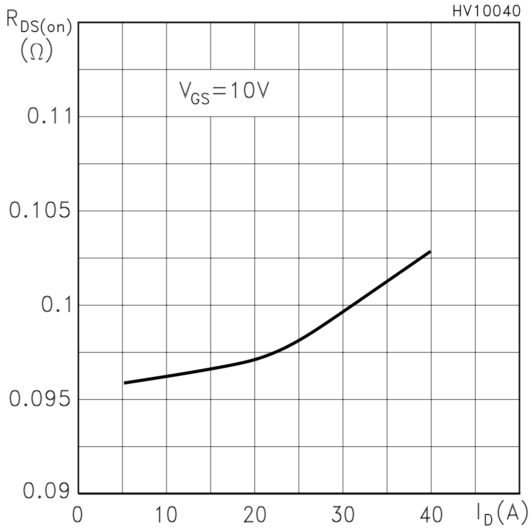
Transfer Characteristics



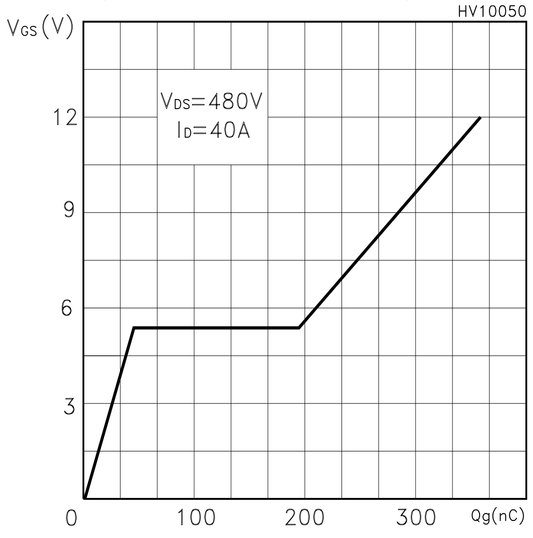
Transconductance



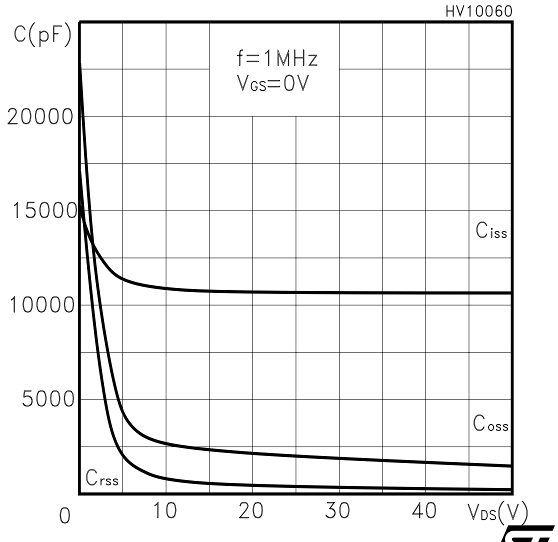
Static Drain-source On Resistance



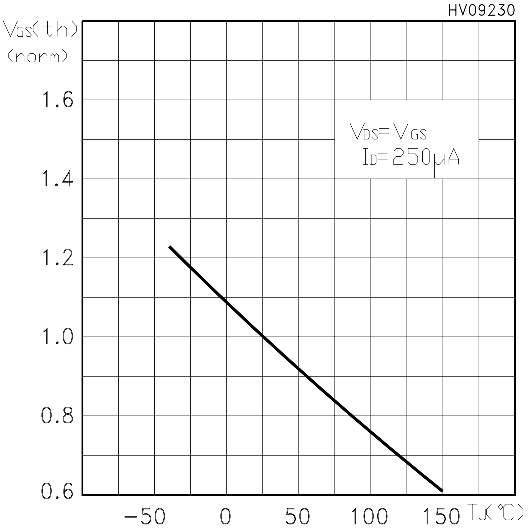
Gate Charge vs Gate-source Voltage



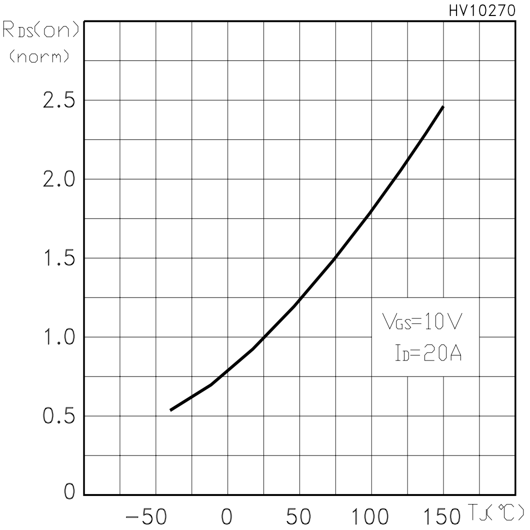
Capacitance Variations



Normalized Gate Thereshold Voltage vs Temp.



Normalized On Resistance vs Temperature



Source-drain Diode Forward Characteristics

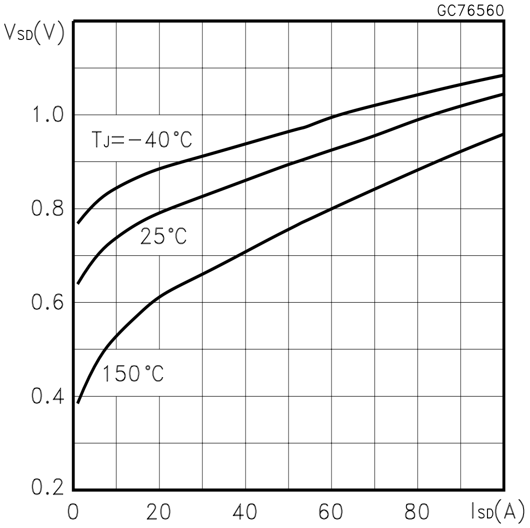


Fig. 1: Unclamped Inductive Load Test Circuit

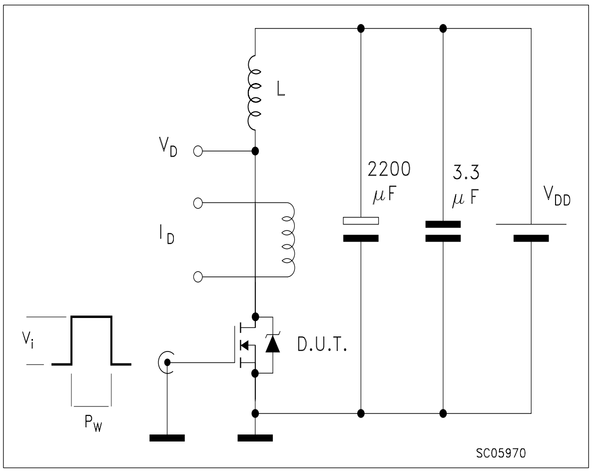


Fig. 2: Unclamped Inductive Waveform

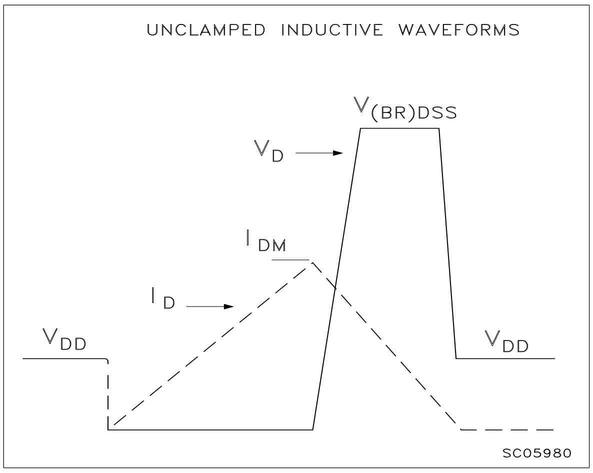


Fig. 3: Switching Times Test Circuit For Resistive Load

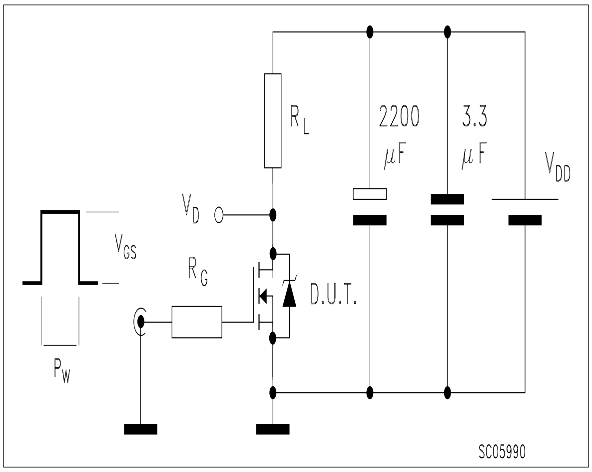


Fig. 4: Gate Charge test Circuit

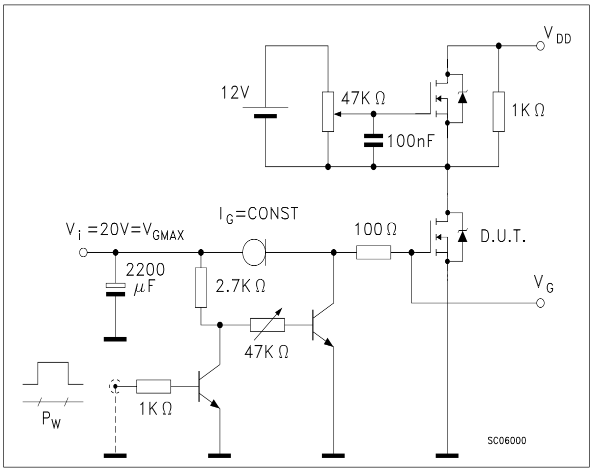
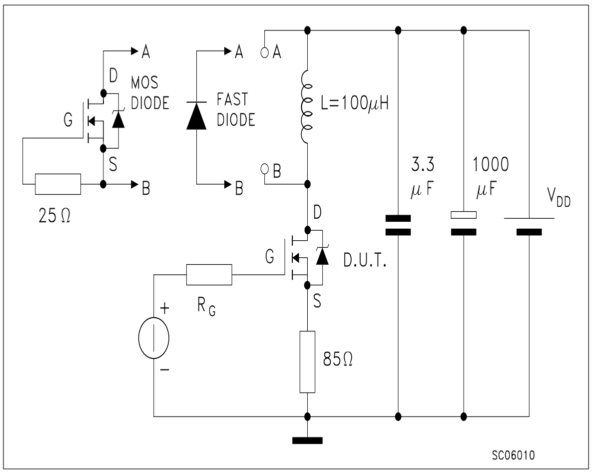
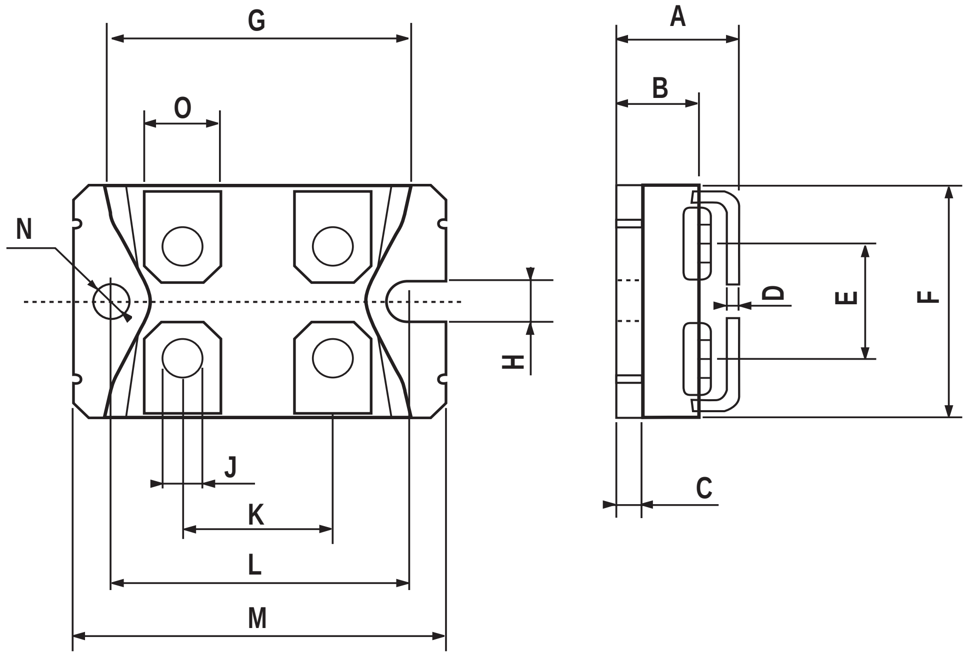


Fig. 5: Test Circuit For Inductive Load Switching And Diode Recovery Times



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



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