



T-39-15

TSD4M250F
TSD4M250V

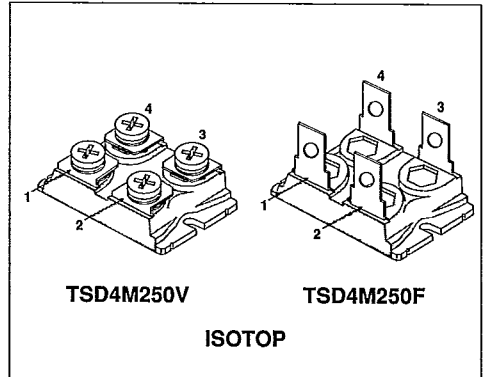
N - CHANNEL ENHANCEMENT MODE ISOFET POWER MOS TRANSISTOR MODULE

TYPE	V _{DSS}	R _{DS(on)}	I _D
TSD4M250F/V	200 V	0.021 Ω	110 A

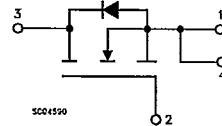
- HIGH CURRENT POWER MOS MODULE
- VERY LOW R_{th} JUNCTION TO CASE
- DUAL SOURCE CONTACTS
- VERY LARGE SOA - LARGE PEAK POWER CAPABILITY
- ISOLATED CASE (2500V RMS)
- EASY TO MOUNT
- VERY LOW INTERNAL PARASITIC INDUCTANCE (TYPICALLY < 5 ns)
- AVALANCHE RUGGEDNESS TECHNOLOGY (SEE STH33N20FI FOR RATING)

INDUSTRIAL APPLICATIONS:

- DC/DC & DC/AC CONVERTERS
- SMPS & UPS
- MOTOR CONTROL
- OUTPUT STAGE FOR PWM, ULTRASONIC CIRCUITS



INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V _{DS}	Drain-Source Voltage (V _{GS} = 0)	200	V
V _{DGR}	Drain-Gate Voltage (R _{GS} = 20 k Ω)	200	V
V _{GS}	Gate-Source Voltage	± 20	V
I _D	Drain Current (continuous) at T _c = 25 °C	110	A
I _D	Drain Current (continuous) at T _c = 100 °C	69	A
I _{DM} (*)	Drain Current (pulsed)	440	A
P _{tot}	Total Dissipation at T _c = 25 °C	500	W
	Derating Factor	4	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-case} R _{thc-h}	Thermal Resistance Junction-Case	Max	0.25	°C/W
	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	200			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 = 60 A			0.021	Ω

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g _{fs}	Forward Transconductance	V _{DS} = 25 V I _D = 60 A	28			mho
C _{iss} C _{oss} C _{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V _{DS} = 25 V f = 1 MHz V _{GS} = 0			12000 4500 2500	pF pF pF

SWITCHING (INDUCTIVE LOAD)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t _{d(on)} (di/dt) _{on} t _{d(off)} t _f	Turn-on Time Turn-on Current Slope Turn-off Delay Time Fall Time	V _{DD} = 100 V I _D = 60 A R _{GS} = 25 Ω V _{GS} = 10 V			260 100 2000 750	ns A/μs ns ns

SOURCE DRAIN DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I _{SD} I _{SDM} (*)	Source-Drain Current Source-Drain Current (pulsed)				110 440	A A
V _{SD}	Forward On Voltage	I _{SD} = 110 A V _{GS} = 0			2	V
t _{rr}	Reverse Recovery Time	I _{SD} = 110 A di/dt = 100 A/μs		800		ns

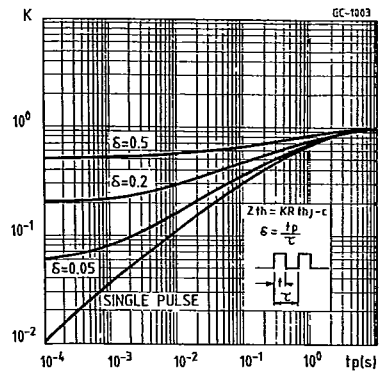
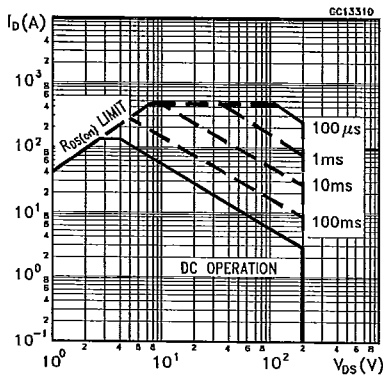
(*) Pulsed: Pulse duration = 300 μs, duty cycle 1.5 %
(*) Pulse width limited by safe operating area

SGS-THOMSON

T-39-15

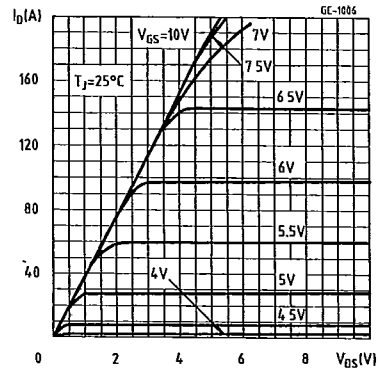
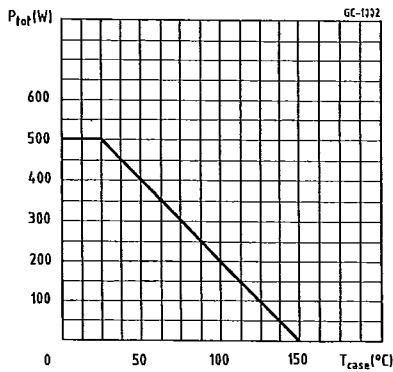
Safe Operating Areas

Thermal Impedance



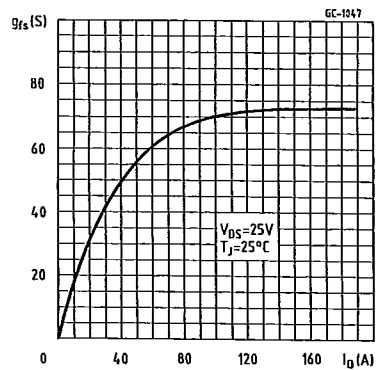
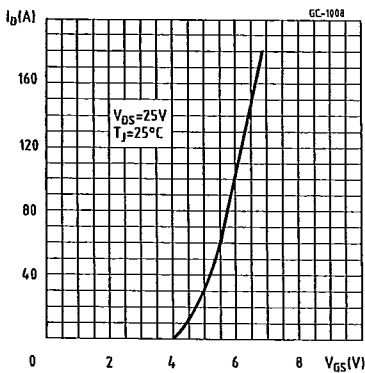
Derating Curve

Output Characteristics



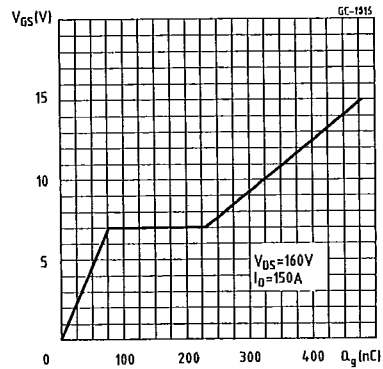
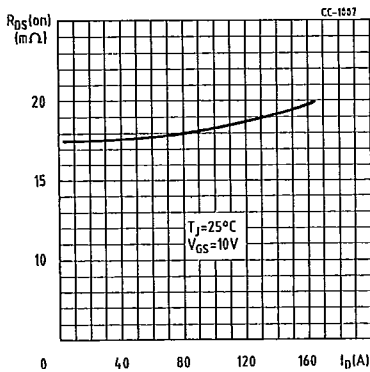
Transfer Characteristics

Transconductance

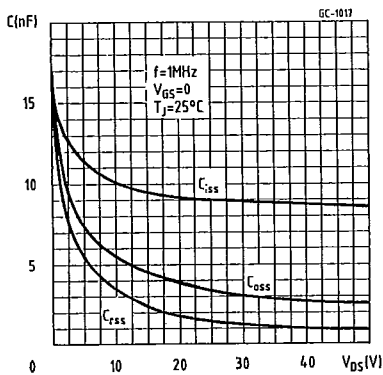


Static Drain-Source On Resistance

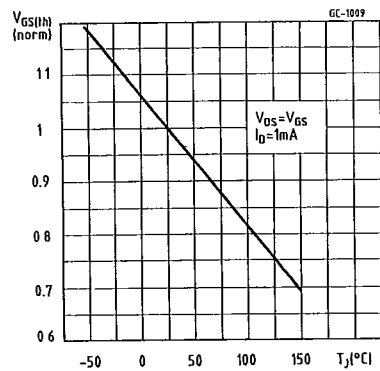
Gate Charge vs Gate-source Voltage



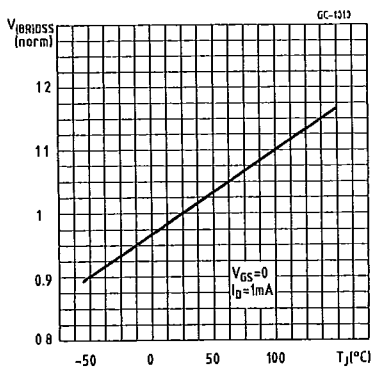
Capacitance Variation



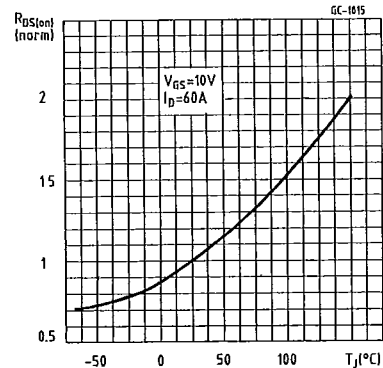
Normalized Gate Threshold Voltage vs Temperature



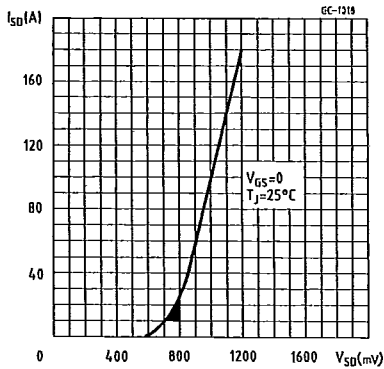
Normalized Breakdown Voltage vs Temperature



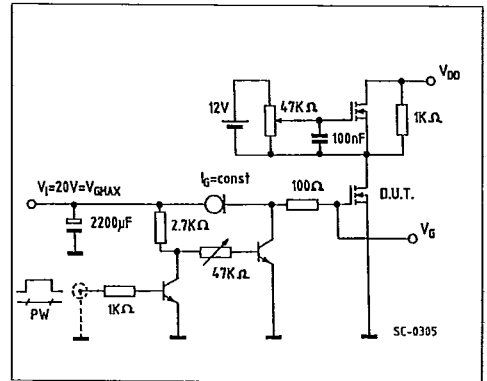
Normalized On Resistance vs Temperature



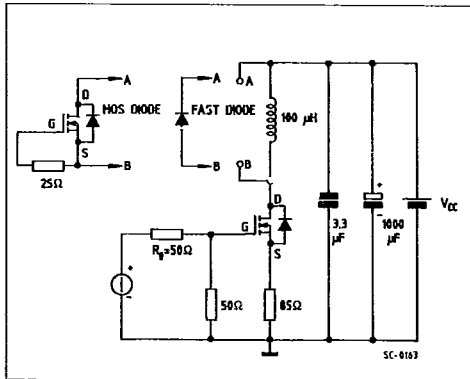
Source-Drain Diode Forward Characteristics



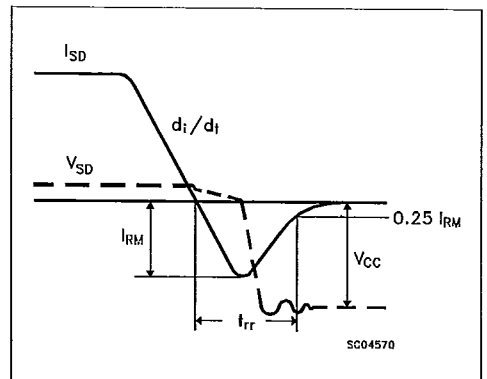
Gate Charge Test Circuit



Test Circuit For Inductive Load Switching and Diode Reverse Recovery Times

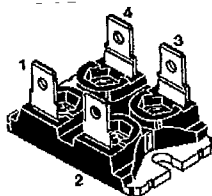


Diode Reverse Recovery Time Waveform

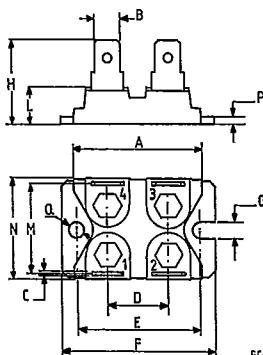


S G S-THOMSON

T-91-20



ISOTOP
Fast-on version
 sales types with the suffix F

MECHANICAL DATA

FC-9309

	DIMENSIONS			
	mm		Inches	
	min.	max	min.	max
A	31.5	31.7	1.240	1.248
B	6.2	6.4	0.244	0.252
C	0.75	0.85	0.029	0.033
D	14.9	15.1	0.586	0.590
E	30.1	30.3	1.185	1.193
F	38	38.2	1.496	1.503
G	4	—	0.157	—
H	20.3	20.7	0.799	0.815
L	8.9	9.1	0.350	0.358
M	22.4	23	0.881	0.905
N	25.2	25.4	0.992	1.000
P	1.95	2.05	0.076	0.080
Q	4	—	0.157	—

PIN CONNECTIONS**MOSFET**

pin 1: Source pin 2: Gate
 pin 3: Drain pin 4: Source sensings

DARLINGTON

pin 1: Emitter pin 2: Base1
 pin 3: Collector pin 4: Base 2

TRANSISTOR

pin 1: Emitter pin 2: Base
 pin 3: Collector pin 4: Emitter sensing

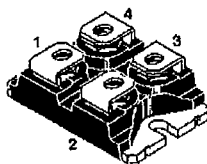
Torque: Mounting $1.3 \pm 0.2 \text{ N} \cdot \text{m}$ (max)

Weight: Package 25.5 g

Note: The mechanical data are the same for the 3 pin version
 (4th pin missing)

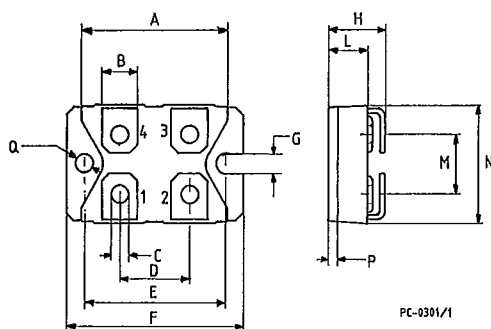
S G S-THOMSON

T-91-20



ISOTOP
Screw version
sales types with the suffix V

MECHANICAL DATA



PC-0301/1

PIN CONNECTIONS

MOSFET

pin 1: Source pin 2: Gate
pin 3: Drain pin 4: Source sensings

DARLINGTON

pin 1: Emitter pin 2: Base1
pin 3: Collector pin 4: Base 2

TRANSISTOR

pin 1: Emitter pin 2: Base
pin 3: Collector pin 4: Emitter sensing

Torque: Terminal $1.3 \pm 0.2 \text{ N} \cdot \text{m}$ (max)
Mounting $1.3 \pm 0.2 \text{ N} \cdot \text{m}$ (max)

Weight: Package 29 g
4 Screws: 7.5 g

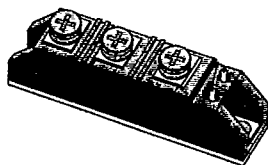
Note: The mechanical data are the same for the 3 pin version
(4th pin missing)

	DIMENSIONS			
	mm		Inches	
	min.	max	min.	max
A	31.5	31.7	1.240	1.248
B	7.8	8.2	0.307	0.322
C	4.1	4.3	0.161	0.169
D	14.9	15.1	0.586	0.590
E	30.1	30.3	1.185	1.193
F	38	38.2	1.496	1.503
G	4	—	0.157	—
H	11.8	12.2	0.464	0.480
L	8.9	9.1	0.350	0.358
M	12.6	12.8	0.496	0.503
N	25.2	25.4	0.992	1.000
P	1.95	2.05	0.076	0.080
Q	4	—	0.157	—

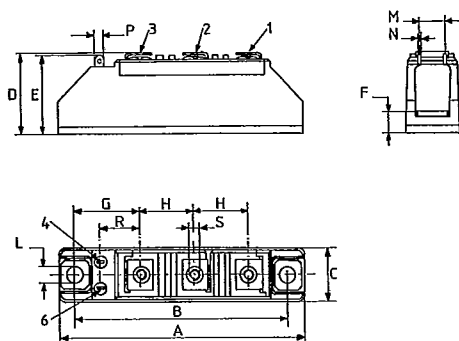
S G S-THOMSON

T-91-20

TRANSPACK (TO-240)



MECHANICAL DATA



PC-0296

	DIMENSIONS			
	mm		Inches	
	min.	max	min.	max
A	91.5	92.5	3.602	3.641
B	79.75	80.25	3.140	3.160
C	19.5	20.55	0.767	0.809
D	29.00	31.00	1.141	1.220
E	28.8	30	1.134	1.181
F	8.5 typ.		0.334 typ.	
G	24.4 typ.		0.960 typ.	
H	19.5	20.5	0.767	0.807
L	6.2 typ.		0.244 typ.	
M	8.95	11.05	0.352	0.435
N	0.78	0.84	0.030	0.033
P	2.72	2.87	0.107	0.113
R	14	—	0.551	—
S	M5			

Torque: Terminal $2.2 \pm 0.5 \text{ N} \cdot \text{m}$ (max)
 Mounting $3.5 \pm 0.5 \text{ N} \cdot \text{m}$ (max)

Weight: Package 110 g
 Accessory 21 g

Note: The mechanical data are the same for the 2 power pin version (either pin 1 or pin 2 missing)