SGS-THOMSON MICROELECTRONICS

TSG50N50DF
TSG50N50DV

ISOLATED GATE BIPOLAR TRANSISTOR (IGBT)
ISOTOP POWER MODULE

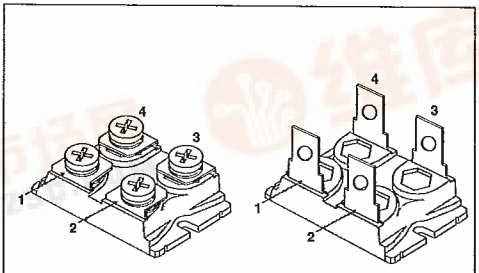
S G S-THOMSON

TENTATIVE DATA

- VOLTAGE-CONTROLLED GATE
- LOW ON-VOLTAGE DROP $V_{CE(sat)}$
- ANTI-PARALLEL FAST DIODE INCLUDED
- FAST SWITCHING SPEED
- EXELLENT THERMAL STABILITY
- VERY LOW R_{th} JUNCTION CASE

INDUSTRIAL APPLICATION:

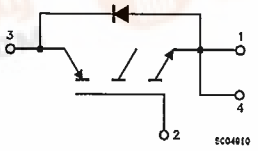
- MOTOR DRIVES
- UPS CONVERTERS
- POWER SUPPLIES
- RESONANT POWER CONVERTERS



TSG50N50V TSG50N50F

ISOTOP

INTERNAL SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_{CES}	Collector-Emitter Voltage (V_{GE} = 0)	500	V
V_{CER}	Collector-Emitter Voltage (R_{GE}= 20 kΩ)	500	V
V_{GE}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current (continuous) at T_c = 25 °C	75	A
I_C(•)	Collector Current at T_c = 100 °C	50	A
I_{CM}(•)	Collector Current (pulsed)	200	A
P_{tot}	Total Dissipation at T_c = 25 °C	300	W
	Derating Factor	2.4	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

$R_{thj\text{-}case}$	Thermal Resistance Junction-Case (IGBT)	Max	0.41	°C/W
$R_{thj\text{-}case}$	Thermal Resistance Junction-Case (Diode)	Max	1.2	°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
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	I_C = 2 mA V_{GE} = 0	500			V
I_{CES}	Collector Cut-off Current (V_{GE} = 0)	V_{CE} = Max Rating			2	mA
I_{GES}	Gate-Emitter Leakage Current (V_{CE} = 0)	V_{GE} = ± 20 V V_{CE} = 0			200	nA

ON (*)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE} = V_{GE} I_C = 2 mA	2		4	V
I_N	Nominal Current For Measurement	T_C = 100 °C			50	A
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE} = 15 V I_C = 50 A V_{GE} = 15 V I_C = 50 A T_C = 100 °C			3.3 3.3	V V

DYNAMIC

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs}	Forward Transconductance	V_{CE} = 25 V I_C = 25 A	15			mho
C_{iss} C_{oss} C_{rss}	Input Capacitance Output Capacitance Reverse Transfer Capacitance	V_{CE} = 25 V f = 1 MHz V_{GE} = 0		4000 550 120		pF pF pF

SWITCHING ON RESISTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$ t_r	Delay Time Rise Time	I_C = 50A V_{CC} = 350V V_{GE} = 15 V R_G = 47Ω		140 250	220 400	ns ns
di_C/dt	Turn-on Current Slope	I_C = 50A V_{CC} = 350V V_{GE} = 15V R_G = 47Ω R_L = 0 T_C = 100 °C		400		A/µs
V_{CE}(0.6µs)	Collector-Emitter Dynamic Voltage	I_C = 50A V_{CC} = 350V V_{GE} = 15V R_G = 47Ω T_C = 100 °C		7	10	V
V_{CE}(1.2µs)	Collector-Emitter Dynamic Voltage	I_C = 50A V_{CC} = 350V V_{GE} = 15V R_G = 47Ω T_C = 100 °C		2.5	3.7	V

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

ELECTRICAL CHARACTERISTICS (continued)

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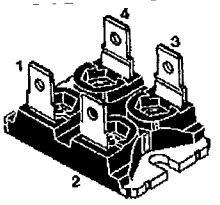
SWITCHING OFF INDUCTIVE LOAD

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
t_c	Cross-Over Time	V_{CC} = 400 V I_C = 50 A		0.85		µs
$t_{r(Voff)}$	Off Voltage Rise Time	R_{GE} = 100 Ω V_{GE} = 15 V				µs
t_f	Fall Time	L = 0.1 mH		0.4		µs
E_{off}	Turn-off Switching Loss					mJ
t_c	Cross-Over Time	V_{CC} = 400 V I_C = 50 A		1.1		µs
$t_{r(Voff)}$	Off Voltage Rise Time	R_{GE} = 100 Ω V_{GE} = 15 V				µs
t_f	Fall Time	L = 0.1 mH T_j = 100 °C		0.6		µs
E_{off}	Turn-off Switching Loss					mJ

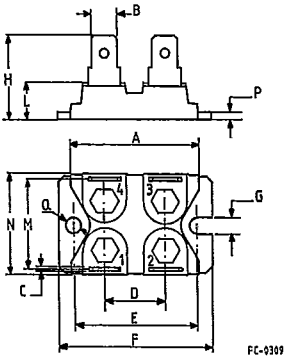
COLLECTOR EMITTER DIODE

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_F	Forward Current	T_c = 25 °C			75	A
		T_c = 100 °C			50	A
I_{FM}	Forward Current (pulsed)				200	A
I_{RM}	Reverse Recovery Current	T_c = 100 °C				A
V_F	Forward On Voltage	I_F = 50 A V_{GE} = 0 T_c = 100 °C			1.9	V
t_{rr}	Reverse Recovery Time	I_F = 50 A di/dt = 100 A/µs			400	ns
		T_c = 100 °C				



ISOTOP
Fast-on version
sales types with the suffix F

MECHANICAL DATA



	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

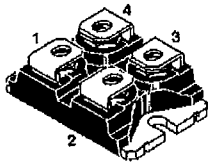
TRANSISTOR

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

Torque: Mounting 1.3 ± 0.2 N • m (max)

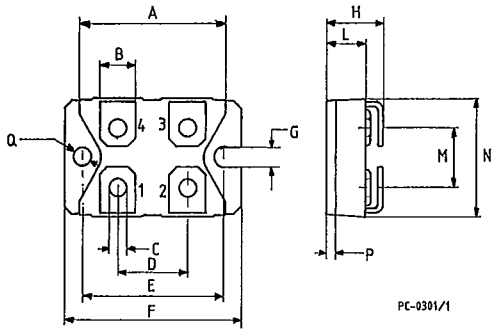
Weight: Package 25.5 g

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



ISOTOP
Screw version
sales types with the suffix V

MECHANICAL DATA



	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	–

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 ± 0.2 N • m (max)
Mounting 1.3 ± 0.2 N • 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)

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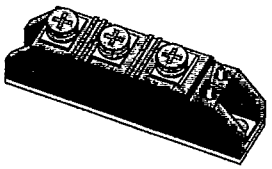
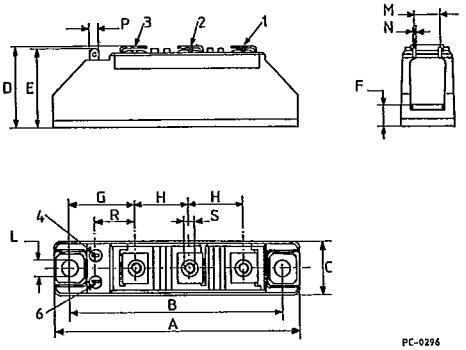


TRANSPACK (TO-240)

MECHANICAL DATA



	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 ± 0.5 N • m (max)
Mounting 3.5 ± 0.5 N • 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)