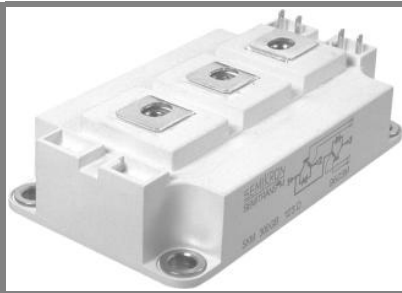


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SEMITRANS® 3

SPT IGBT Module

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SKM 400GAL128D

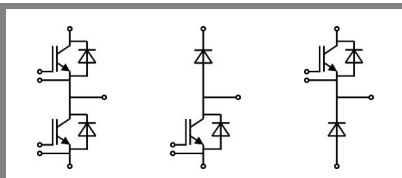
SKM 400GAR128D

Features

- Homogeneous Si
- SPT = Soft-Puch-Through technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_C$

Typical Applications

- AC inverter drives
- UPS
- Electronic welders at f_{sw} up to 20kHz



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Absolute Maximum Ratings		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	Values	Units
IGBT			
V_{CES}	$T_j = 25^\circ\text{C}$	1200	V
I_C	$T_j = 150^\circ\text{C}$	$T_c = 25^\circ\text{C}$	565 A
		$T_c = 80^\circ\text{C}$	400 A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	600	A
V_{GES}		± 20	V
t_{psc}	$V_{CC} = 600\text{ V}; V_{GE} \leq 20\text{ V}; T_j = 125^\circ\text{C}$ $V_{CES} < 1200\text{ V}$	10	μs

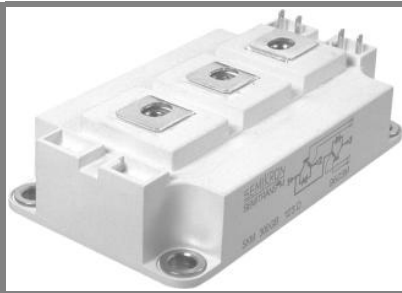
Inverse Diode		$T_{case} = 25^\circ\text{C}$	
Symbol	Conditions	Values	Units
I_F	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	390 A
		$T_{case} = 80^\circ\text{C}$	260 A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	600	A
I_{FSM}	$t_p = 10\text{ ms}; \sin.$	$T_j = 150^\circ\text{C}$	2880 A

Freewheeling Diode		$T_{case} = 25^\circ\text{C}$	
Symbol	Conditions	Values	Units
I_F	$T_j = 150^\circ\text{C}$	$T_{case} = 25^\circ\text{C}$	390 A
		$T_{case} = 80^\circ\text{C}$	260 A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	600	A
I_{FSM}	$t_p = 10\text{ ms}; \sin$	$T_j = 150^\circ\text{C}$	2880 A

Module		$T_c = 25^\circ\text{C}$, unless otherwise specified	
Symbol	Conditions	min.	typ.
$I_{t(RMS)}$			500
T_{vj}		- 40 ... + 150	$^\circ\text{C}$
T_{stg}		- 40 ... + 125	$^\circ\text{C}$
V_{isol}	AC, 1 min.		4000

Characteristics		$T_c = 25^\circ\text{C}$, unless otherwise specified		
Symbol	Conditions	min.	typ.	max.
IGBT				
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 12\text{ mA}$	4,5	5,5	6,45
I_{CES}	$V_{GE} = 0\text{ V}, V_{CE} = V_{CES}$		0,2	0,6
V_{CE0}		$T_j = 25^\circ\text{C}$	1	1,15
		$T_j = 125^\circ\text{C}$	0,9	1,05
r_{CE}	$V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}$	3	4
		$T_j = 125^\circ\text{C}$	4	5
$V_{CE(sat)}$	$I_{Cnom} = 300\text{ A}, V_{GE} = 15\text{ V}$	$T_j = 25^\circ\text{C}_{chiplev.}$	1,9	2,35
		$T_j = 125^\circ\text{C}_{chiplev.}$	2,1	2,55
C_{res}	$V_{CE} = 25, V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	26	nF
C_{oes}			3	nF
C_{res}			3	nF
Q_G	$V_{GE} = -8\text{ V} - +20\text{ V}$		3700	nC
R_{Gint}	$T_j = 25^\circ\text{C}$		1,25	Ω
$t_{d(on)}$	$R_{Gon} = 4,7\ \Omega$	$V_{CC} = 600\text{ V}$ $I_C = 300\text{ A}$	110	ns
t_r			60	ns
E_{on}	$R_{Goff} = 4,7\ \Omega$	$T_j = 125^\circ\text{C}$ $V_{GE} = \pm 15\text{ V}$	32	mJ
$t_{d(off)}$			800	ns
t_f			60	ns
E_{off}			31	mJ
$R_{th(j-c)}$	per IGBT			0,055

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SPT IGBT Module

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SKM 400GAL128D

SKM 400GAR128D

Features

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- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_c$

Typical Applications

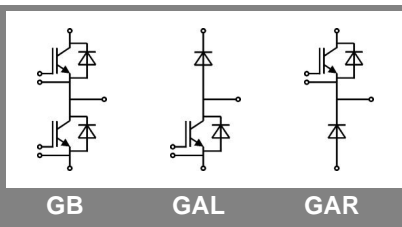
- AC inverter drives
- UPS
- Electronic welders at f_{sw} up to 20kHz

Characteristics

Symbol	Conditions	min.	typ.	max.	Units
Inverse Diode					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$	2	2,5	V
		$T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$	1,8		V
V_{F0}		$T_j = 25 \text{ }^\circ\text{C}$	1,1	1,2	V
r_F		$T_j = 25 \text{ }^\circ\text{C}$	3	4,3	mΩ
I_{RRM}	$I_F = 300 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$	176		A
Q_{rr}	$di/dt = 2400 \text{ A}/\mu\text{s}$		40		μC
E_{rr}	$V_{GE} = -15 \text{ V}; V_{CC} = 600 \text{ V}$		16		mJ
$R_{th(j-c)D}$	per diode			0,125	K/W
FWD					
$V_F = V_{EC}$	$I_{Fnom} = 300 \text{ A}; V_{GE} = 0 \text{ V}$	$T_j = 25 \text{ }^\circ\text{C}_{chiplev.}$	2	2,5	V
		$T_j = 125 \text{ }^\circ\text{C}_{chiplev.}$	1,8		V
V_{F0}		$T_j = 25 \text{ }^\circ\text{C}$	1,1	1,2	V
r_F		$T_j = 25 \text{ }^\circ\text{C}$	3	4,3	V
I_{RRM}	$I_F = 300 \text{ A}$	$T_j = 125 \text{ }^\circ\text{C}$	176		A
Q_{rr}	$di/dt = 2400 \text{ A}/\mu\text{s}$		40		μC
E_{rr}	$V_{GE} = -15 \text{ V}; V_{CC} = 600 \text{ V}$		16		mJ
$R_{th(j-c)D}$	per diode			0,125	K/W
Module					
L_{CE}			15	20	nH
R_{CC+EE}	res., terminal-chip	$T_{case} = 25 \text{ }^\circ\text{C}$	0,35		mΩ
		$T_{case} = 125 \text{ }^\circ\text{C}$	0,5		mΩ
$R_{th(c-s)}$	per module			0,038	K/W
M_s	to heat sink M6		3	5	Nm
M_t	to terminals M6		2,5	5	Nm
w				325	g

This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, Chapter IX.

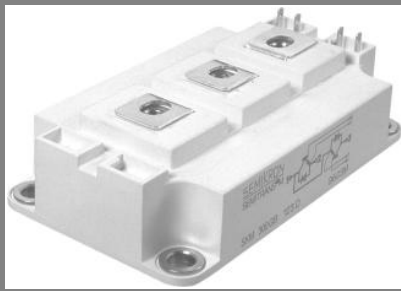
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SEMITRANS[®] 3

SPT IGBT Module

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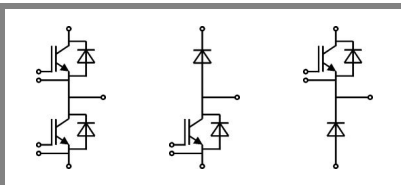
Features

- Homogeneous Si
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- V_{CEsat} with positive temperature coefficient
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Typical Applications

- AC inverter drives
- UPS
- Electronic welders at f_{sw} up to 20kHz

Z_{th}		Values	Units
Symbol	Conditions		
$Z_{th(j-c)I}$			
R_{θ}	$i = 1$	37	mk/W
R_{θ}	$i = 2$	14	mk/W
R_{θ}	$i = 3$	3,45	mk/W
R_{θ}	$i = 4$	0,55	mk/W
τ_{θ}	$i = 1$	0,0744	s
τ_{θ}	$i = 2$	0,0078	s
τ_{θ}	$i = 3$	0,0024	s
τ_{θ}	$i = 4$	0,0002	s
$Z_{th(j-c)D}$			
R_{θ}	$i = 1$	75	mk/W
R_{θ}	$i = 2$	38	mk/W
R_{θ}	$i = 3$	10,6	mk/W
R_{θ}	$i = 4$	1,4	mk/W
τ_{θ}	$i = 1$	0,0386	s
τ_{θ}	$i = 2$	0,0201	s
τ_{θ}	$i = 3$	0,001	s
τ_{θ}	$i = 4$	0,003	s



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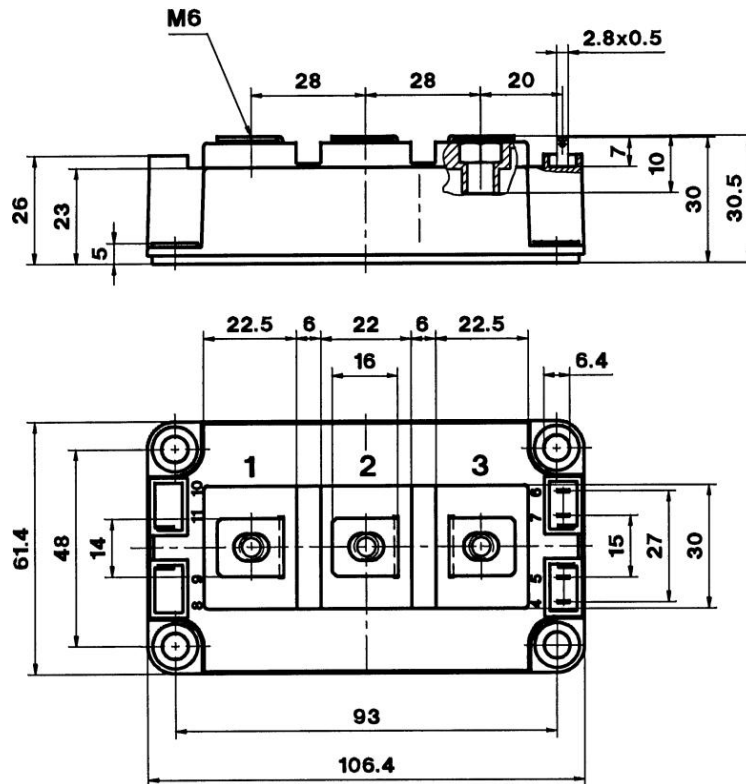
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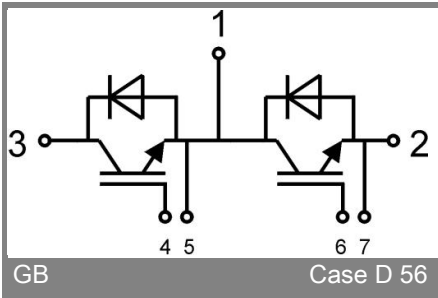
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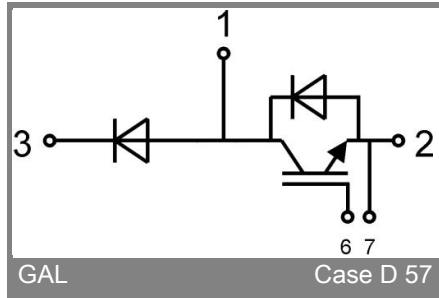


Case D 56



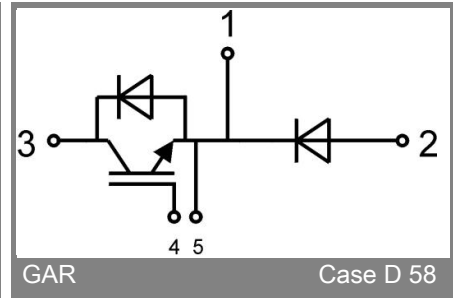
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Case D 56



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Case D 57



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Case D 58