SEMITRANS® 2

SPT IGBT Module

SKM 145GB128D

SKM 145GAL128D

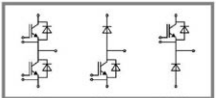
SKM 145GAR128D

Features

- SPT = Soft-Punch-Through technology
- V_{CEsat} with positive temperature coefficient
- High short circuit capability, self limiting to 6 x I_c

Typical Applications

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



GB GAL GAR

Absolute Maximum Ratings		T_c = 25 °C, unless otherwise specified		
Symbol	**Conditions**		**Values**	**Units**
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 150 °C	T_{case} = 25 °C	190	A
		T_{case} = 80 °C	135	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		200	A
V_{GES}			±20	V
t_{psc}	V_{CC} = 600 V; $V_{GE} \leq$ 20 V; VCES < 1200 V	T_j = 125 °C	10	µs
Inverse Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	130	A
		T_{case} = 80 °C	90	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		200	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	900	A
Freewheeling Diode				
I_F	T_j = 150 °C	T_{case} = 25 °C	130	A
		T_{case} = 80 °C	90	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		200	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	900	A
Module				
$I_{t(RMS)}$			200	A
T_{vj}			- 40...+ 150	°C
T_{stg}			- 40...+ 125	°C
V_{isol}	AC, 1 min.		4000	V

Characteristics		T_c = 25 °C, unless otherwise specified				
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
IGBT						
$V_{GE(th)}$	$V_{GE} = V_{CE}$, I_C = 4 mA		4,5	5,5	6,5	V
I_{CES}	V_{GE} = 0 V, $V_{CE} = V_{CES}$	T_j = 25 °C		0,1	0,3	mA
V_{CE0}		T_j = 25 °C		1	1,15	V
		T_j = 125 °C		0,9	1,05	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		9	12	mΩ
		T_j = 125°C		12	15	mΩ
$V_{CE(sat)}$	I_{Cnom} = 100 A, V_{GE} = 15 V	T_j = 25°$C_{chiplev.}$		1,9	2,35	V
		T_j = 125°$C_{chiplev.}$		2,1	2,55	V
C_{ies}				9		nF
C_{oes}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		1		nF
C_{res}				1		nF
Q_G	V_{GE} = -8V - +20V			1200		nC
R_{Gint}	T_j = °C			4		Ω
$t_{d(on)}$				210		ns
t_r	R_{Gon} = 3 Ω	V_{CC} = 600V		40		ns
E_{on}		I_{Cnom}= 100A		12		mJ
$t_{d(off)}$	R_{Goff} = 3 Ω	T_j = 125 °C		430		ns
t_f		V_{GE} =±15V		65		ns
E_{off}				10		mJ
$R_{th(j-c)}$	per IGBT				0,165	K/W

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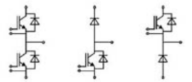
Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Units**
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 100 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
		T_j = 125 °C				V
r_F		T_j = 25 °C		9	13	mΩ
		T_j = 125 °C				mΩ
I_{RRM}	I_{Fnom} = 100 A	T_j = 125 °C		120		A
Q_{rr}	di/dt = 3500 A/µs			18,5		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			7		mJ
$R_{th(j-c)D}$	per diode				0,36	K/W
Freewheeling Diode						
$V_F = V_{EC}$	I_{Fnom} = 100 A; V_{GE} = 0 V	T_j = 25 °$C_{chiplev.}$		2	2,5	V
		T_j = 125 °$C_{chiplev.}$		1,8		V
V_{F0}		T_j = 25 °C		1,1	1,2	V
r_F		T_j = 25 °C		9	13	V
I_{RRM}	I_{Fnom} = 100 A	T_j = 125 °C		120		A
Q_{rr}	di/dt = 0 A/µs			18,5		µC
E_{rr}	V_{GE} = -15 V; V_{CC} = 600 V			7		mJ
$R_{th(j-c)FD}$	per diode				0,36	K/W
Module						
L_{CE}					30	nH
$R_{CC'+EE'}$	res., terminal-chip	T_{case}= 25 °C		0,75		mΩ
		T_{case}= 125 °C		1		mΩ
$R_{th(c-s)}$	per module				0,05	K/W
M_s	to heat sink M6		3		5	Nm
M_t	to terminals M5		2,5		5	Nm
w					160	g

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

This technical information specifies semiconductor devices but promises no characteristics. No warranty or guarantee expressed or implied is made regarding delivery, performance or suitability.



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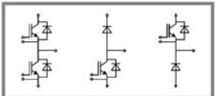

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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	120	mk/W
R_i	i = 2	34	mk/W
R_i	i = 3	9	mk/W
R_i	i = 4	2	mk/W
tau_i	i = 1	0,03	s
tau_i	i = 2	0,1123	s
tau_i	i = 3	0,0012	s
tau_i	i = 4	0,0002	s
$Z_{th(j-c)D}$			
R_i	i = 1	240	mk/W
R_i	i = 2	95	mk/W
R_i	i = 3	21,5	mk/W
R_i	i = 4	3,5	mk/W
tau_i	i = 1	0,054	s
tau_i	i = 2	0,0113	s
tau_i	i = 3	0,0012	s
tau_i	i = 4	0,005	s

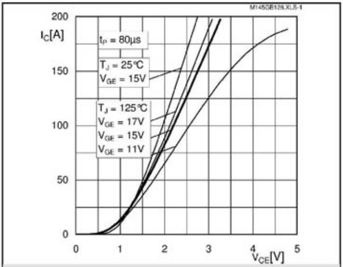

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

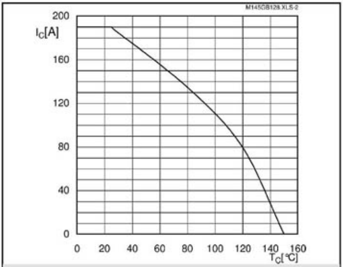

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

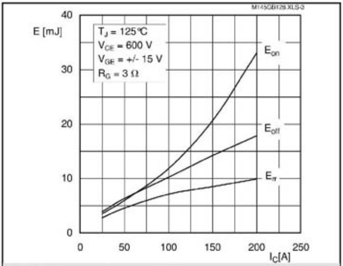

Fig. 3 Typ. turn-on /-off energy = f (I_C)

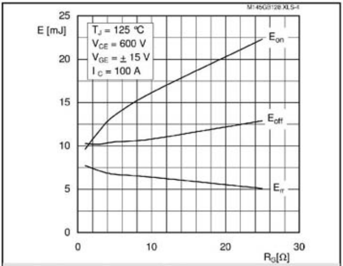

Fig. 4 Typ. turn-on /-off energy = f (R_G)

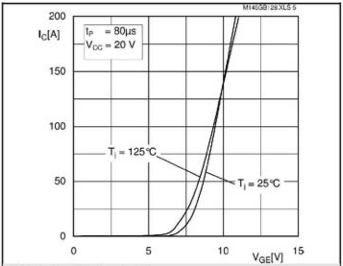

Fig. 5 Typ. transfer characteristic

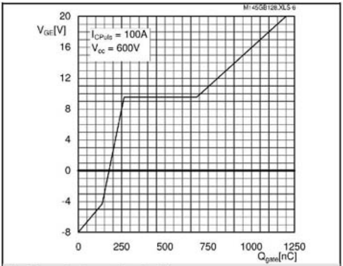

Fig. 6 Typ. gate charge characteristic

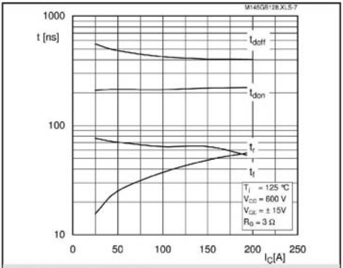

Fig. 7 Typ. switching times vs. I_C

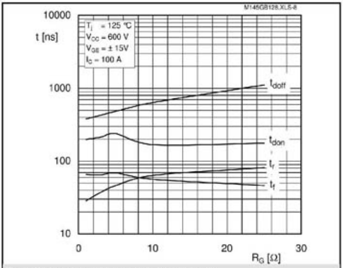

Fig. 8 Typ. switching times vs. gate resistor R_G

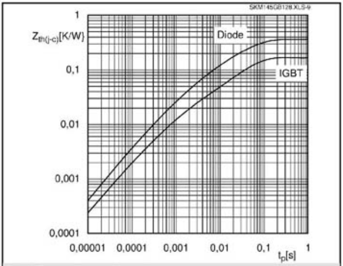

Fig. 9 Transient thermal impedance

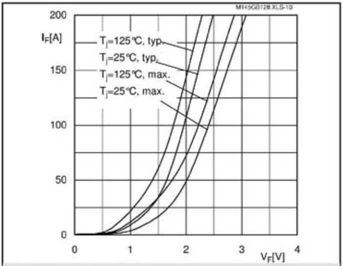

Fig. 10 CAL diode forward characteristic

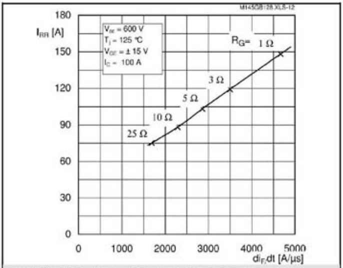

Fig. 11 Typ. CAL diode peak reverse recovery current

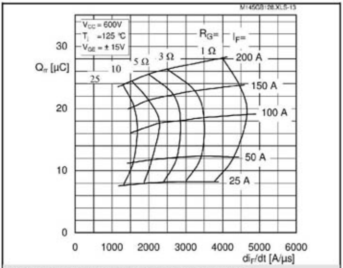

Fig. 12 Typ. CAL diode peak reverse recovery charge

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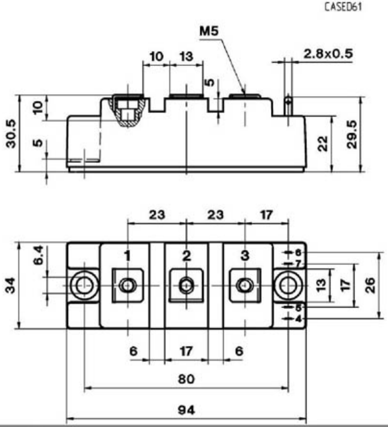
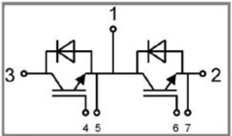
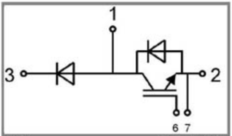


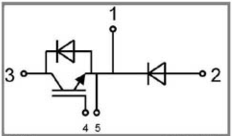
Case D 61, Case D 62, Case D 63



GB Case D 61



GAL Case D 62



GAR Case D 63

