SEMITRANS® 3

IGBT4 Modules

SKM150GB17E4GH16

Features

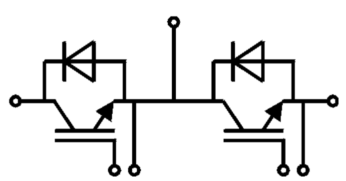
- **H16: IGBT-chip with improved robustness against moisture**
- IGBT4 = 4. generation medium fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. Generation CAL-Diode
- Insulated copper baseplate using DBC Technology (Direct Copper Bonding)
- With integrated Gate resistor
- For switching frequencies up to 8kHz
- UL recognized, file no. E63532

Typical Applications*

- Medium voltage inverter market

Remarks

- Case temperature limited to T_c = 125°C max.
- Recommended T_{op} = -40 ... +150°C
- Product reliability results valid for T_j = 150°C



GB

Absolute Maximum Ratings				
Symbol	**Conditions**		**Values**	**Unit**
IGBT				
V_{CES}	T_j = 25 °C		1700	V
I_C	T_j = 175 °C	T_c = 25 °C	255	A
		T_c = 80 °C	194	A
I_{Cnom}			150	A
I_{CRM}	I_{CRM} = 3xI_{Cnom}		450	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 1000 V V_{GE} ≤ 15 V V_{CES} ≤ 1700 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
V_{RRM}	T_j = 25 °C		1700	V
I_F	T_j = 175 °C	T_c = 25 °C	163	A
		T_c = 80 °C	121	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 2xI_{Fnom}		300	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		918	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			500	A
T_{stg}			-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, t = 1 min		4000	V

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
IGBT						
$V_{CE(sat)}$	I_C = 150 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.96	2.27	V
		T_j = 150 °C		2.29	2.54	V
V_{CE0}	chiplevel	T_j = 25 °C		1.10	1.20	V
		T_j = 150 °C		1.00	1.10	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		5.7	7.1	mΩ
		T_j = 150 °C		8.6	9.6	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 5.6 mA		5.2	5.8	6.4	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1700 V, T_j = 25 °C				2.0	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		11.0		nF
C_{oes}		f = 1 MHz		0.46		nF
C_{res}		f = 1 MHz		0.36		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1200		nC
R_{Gint}	T_j = 25 °C			8.0		Ω
$t_{d(on)}$	V_{CC} = 1200 V I_C = 150 A V_{GE} = +15/-15 V $R_{G\ on}$ = 1 Ω $R_{G\ off}$ = 1 Ω di/dt_{on} = 4530 A/µs di/dt_{off} = 880 A/µs du/dt = 4000 V/µs	T_j = 150 °C		290		ns
t_r		T_j = 150 °C		38		ns
E_{on}		T_j = 150 °C		69		mJ
$t_{d(off)}$		T_j = 150 °C		690		ns
t_f		T_j = 150 °C		155		ns
E_{off}		T_j = 150 °C		59		mJ
$R_{th(j-c)}$	per IGBT				0.161	K/W
$R_{th(c-s)}$	per IGBT (λ_{grease}=0.81 W/(m*K))			0.064		K/W

SEMITRANS® 3

IGBT4 Modules

SKM150GB17E4GH16

Features

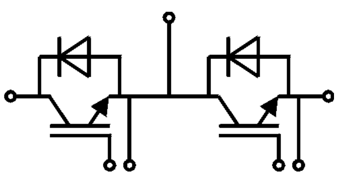
- **H16: IGBT-chip with improved robustness against moisture**
- IGBT4 = 4. generation medium fast trench IGBT (Infineon)
- CAL4 = Soft switching 4. Generation CAL-Diode
- Insulated copper baseplate using DBC Technology (Direct Copper Bonding)
- With integrated Gate resistor
- For switching frequencies up to 8kHz
- UL recognized, file no. E63532

Typical Applications*

- Medium voltage inverter market

Remarks

- Case temperature limited to T_c = 125°C max.
- Recommended T_{op} = -40 ... +150°C
- Product reliability results valid for T_j = 150°C



GB

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
Inverse diode						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.00	2.40	V
		T_j = 150 °C		2.14	2.56	V
V_{F0}	chiplevel	T_j = 25 °C		1.32	1.56	V
		T_j = 150 °C		1.08	1.22	V
r_F	chiplevel	T_j = 25 °C		4.5	5.6	mΩ
		T_j = 150 °C		7.1	9.0	mΩ
I_{RRM}	I_F = 150 A di/dt_{off} = 4100 A/µs V_{GE} = ±15 V V_{CC} = 1200 V	T_j = 150 °C		185		A
Q_{rr}		T_j = 150 °C		49		µC
E_{rr}		T_j = 150 °C		36		mJ
$R_{th(j-c)}$	per diode				0.356	K/W
$R_{th(c-s)}$	per diode (λ_{grease}=0.81 W/(m*K))			0.072		K/W
Module						
L_{CE}				15		nH
$R_{CC'+EE'}$	measured per switch	T_C = 25 °C		0.55		mΩ
		T_C = 125 °C		0.85		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling (λ_{grease}=0.81 W/(m*K))			0.017		K/W
$R_{th(c-s)2}$	including thermal coupling, Ts underneath module (λ_{grease}=0.81 W/(m*K))			0.027		K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6	2.5		5	Nm
						Nm
w					325	g

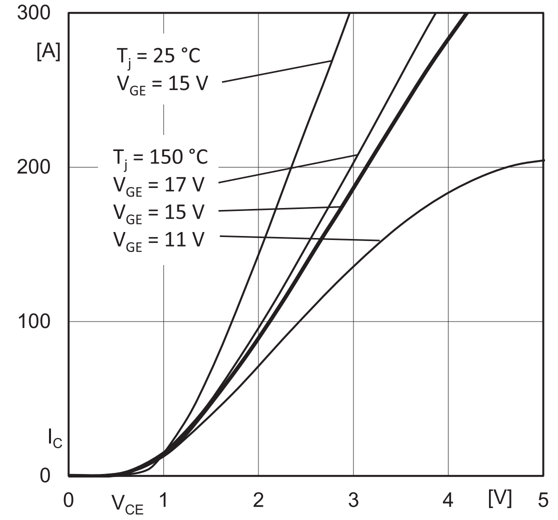


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

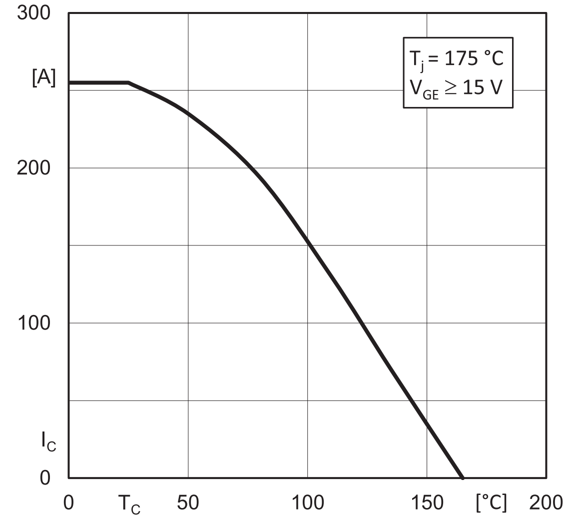


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

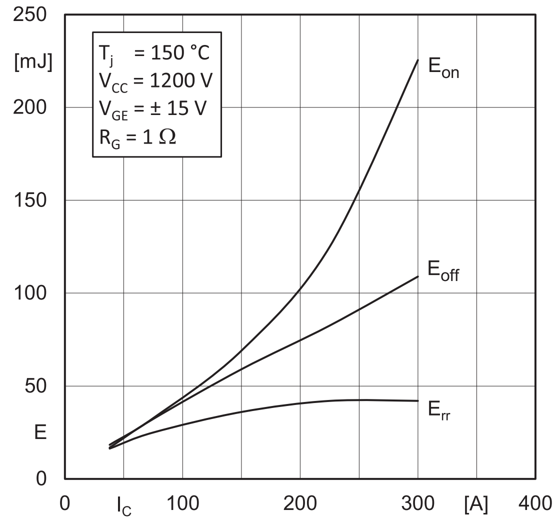


Fig. 3: Typ. turn-on /-off energy = f (I_C)

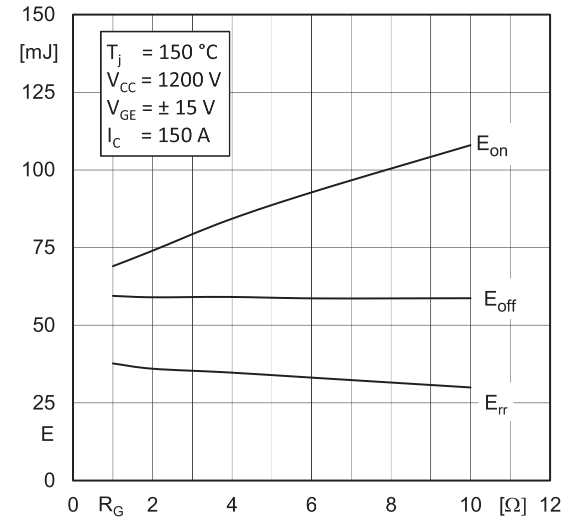


Fig. 4: Typ. turn-on /-off energy = f (R_G)

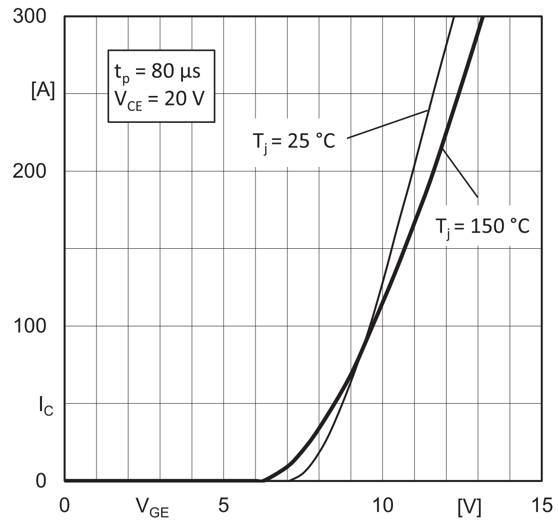


Fig. 5: Typ. transfer characteristic

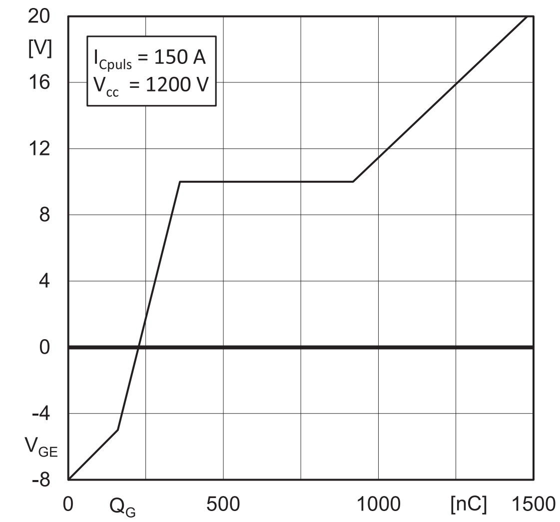


Fig. 6: Typ. gate charge characteristic

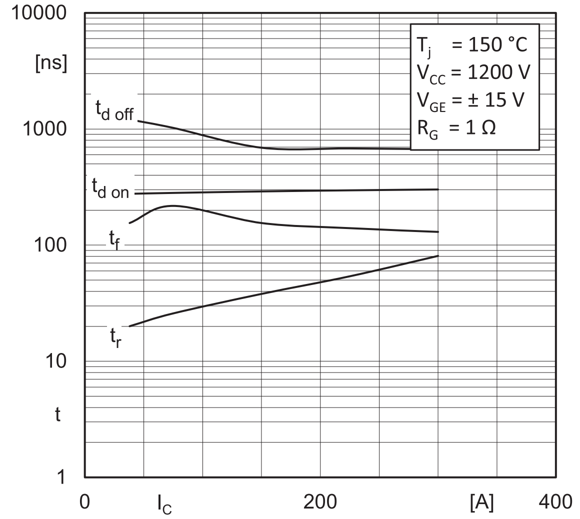


Fig. 7: Typ. switching times vs. I_C

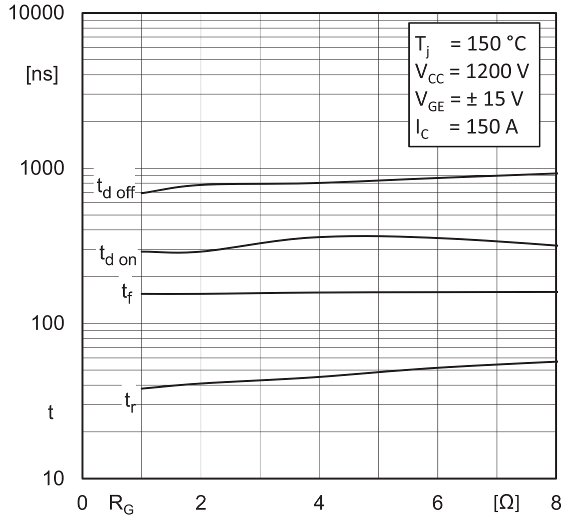


Fig. 8: Typ. switching times vs. gate resistor R_G

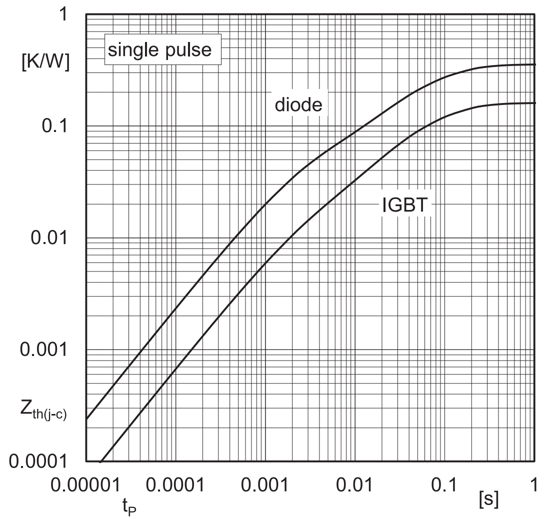


Fig. 9: Transient thermal impedance

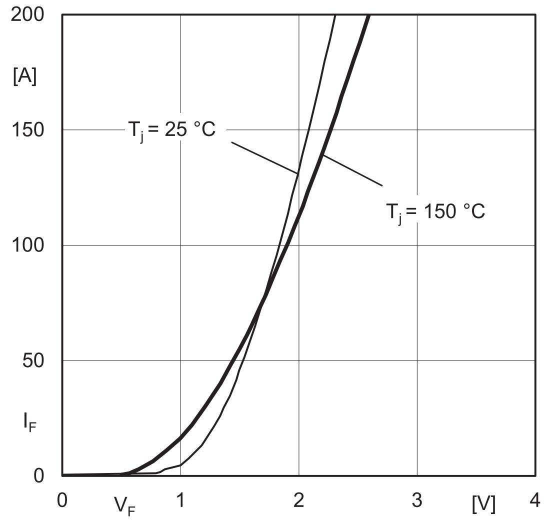


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

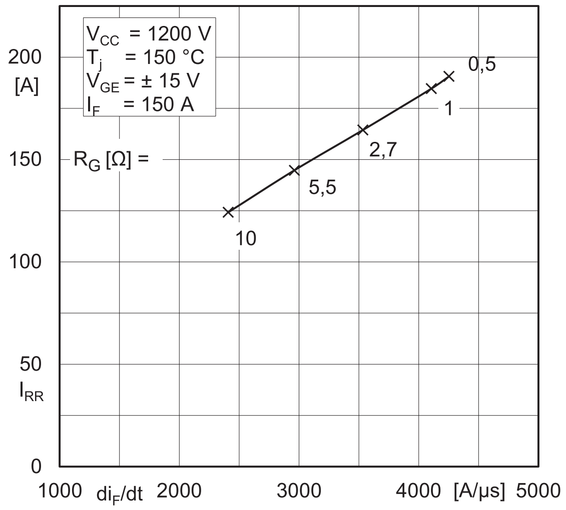


Fig. 11: CAL diode peak reverse recovery current

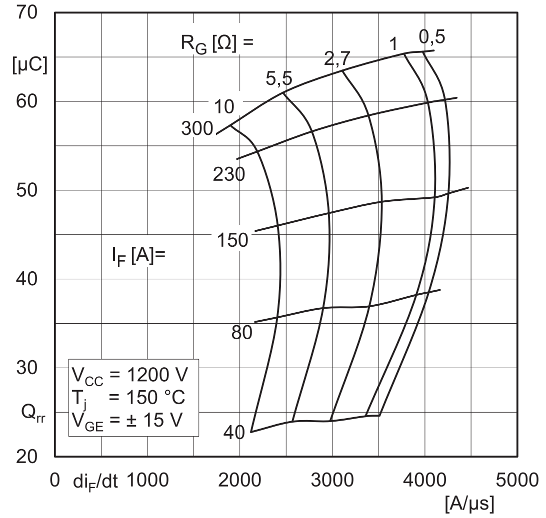
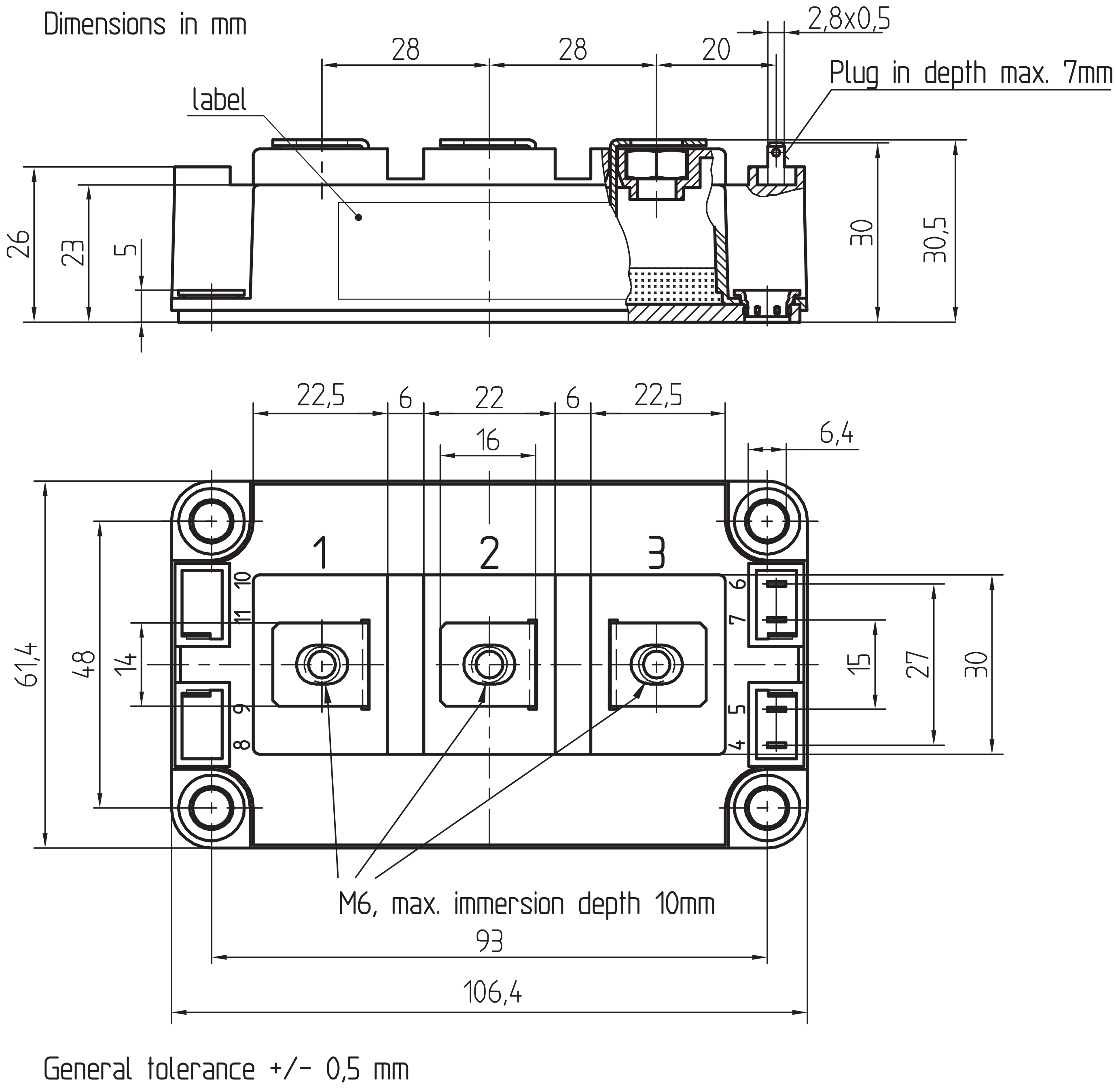
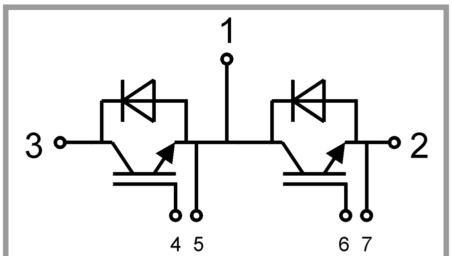


Fig. 12: Typ. CAL diode peak reverse recovery charge



SEMITRANS 3



GB

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

***IMPORTANT INFORMATION AND WARNINGS**