SKM150GAL12V

SEMITRANS® 2

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Features

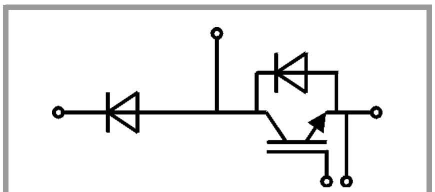
- V-IGBT = 6. Generation Trench V-IGBT (Fuji)
- CAL4 = Soft switching 4. Generation CAL-diode
- Insulated copper baseplate using DBC technology (Direct Copper Bonding)
- Increased power cycling capability
- With integrated gate resistor
- UL recognized, file no. E63532
- Lowest switching losses at High di/dt

Typical Applications*

- DC/DC – converter
- Brake chopper
- Switched reluctance motor
- DC – Motor

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



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Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_c = 25 °C	231	A
		T_c = 80 °C	176	A
I_{Cnom}			150	A
I_{CRM}	I_{CRM} = 3 xI_{Cnom}		450	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 720 V V_{GE} ≤ 15 V V_{CES} ≤ 1200 V	T_j = 125 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
I_F	T_j = 175 °C	T_c = 25 °C	189	A
		T_c = 80 °C	141	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 3xI_{Fnom}		450	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		900	A
T_j			-40 ... 175	°C
Freewheeling diode				
I_F	T_j = 175 °C	T_c = 25 °C	189	A
		T_c = 80 °C	141	A
I_{Fnom}			150	A
I_{FRM}	I_{FRM} = 3xI_{Fnom}		450	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		900	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			200	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		1.75	2.20	V
		T_j = 150 °C		2.20	2.48	V
V_{CE0}	chiplevel	T_j = 25 °C		0.94	1.04	V
		T_j = 150 °C		0.88	0.98	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		5.4	7.7	mΩ
		T_j = 150 °C		8.8	10	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 6 mA		5.5	6	6.5	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C			0.3	mA
		T_j = 150 °C		-		mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		9.0		nF
C_{oes}		f = 1 MHz		0.89		nF
C_{res}		f = 1 MHz		0.88		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1650		nC
R_{Gint}	T_j = 25 °C			5.0		Ω

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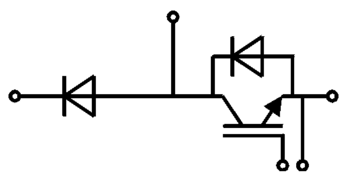
- Brake chopper
- Switched reluctance motor
- DC – Motor

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

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
$t_{d(on)}$	V_{CC} = 600 V	T_j = 150 °C		258		ns
t_r	I_C = 150 A	T_j = 150 °C		32		ns
E_{on}	V_{GE} = +15/-15 V $R_{G\,on}$ = 1.5 Ω	T_j = 150 °C		13.5		mJ
$t_{d(off)}$	$R_{G\,off}$ = 1.5 Ω	T_j = 150 °C		388		ns
t_f	di/dt_{on} = 5400 A/µs	T_j = 150 °C		62		ns
E_{off}	di/dt_{off} = 1800 A/µs du/dt = 8100 V/µs	T_j = 150 °C		14.2		mJ
$R_{th(j-c)}$	per IGBT				0.19	K/W
Inverse diode						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V	T_j = 25 °C		2.14	2.46	V
	chiplevel	T_j = 150 °C		2.07	2.38	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		5.6	6.4	mΩ
		T_j = 150 °C		7.8	8.5	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C		165		A
Q_{rr}	di/dt_{off} = 5800 A/µs	T_j = 150 °C		22		µC
E_{rr}	V_{GE} = ±15 V V_{CC} = 600 V	T_j = 150 °C		8.5		mJ
$R_{th(j-c)}$	per diode				0.31	K/W
Freewheeling diode						
$V_F = V_{EC}$	I_F = 150 A V_{GE} = 0 V	T_j = 25 °C		2.14	2.46	V
	chiplevel	T_j = 150 °C		2.07	2.38	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		5.6	6.4	mΩ
		T_j = 150 °C		7.8	8.5	mΩ
I_{RRM}	I_F = 150 A	T_j = 150 °C		165		A
Q_{rr}	di/dt_{off} = 5800 A/µs	T_j = 150 °C		22		µC
E_{rr}	V_{GE} = ±15 V V_{CC} = 600 V	T_j = 150 °C		8.5		mJ
$R_{th(j-c)}$	per diode				0.31	K/W
Module						
L_{CE}				30		nH
$R_{CC'+EE'}$	measured per	T_C = 25 °C		0.65		mΩ
	switch	T_C = 125 °C		1.09		mΩ
$R_{th(c-s)}$	calculated without thermal coupling (λ_{grease}=0.81 W/(m*K))			0.04	0.05	K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M5	2.5		5	Nm
						Nm
w					160	g



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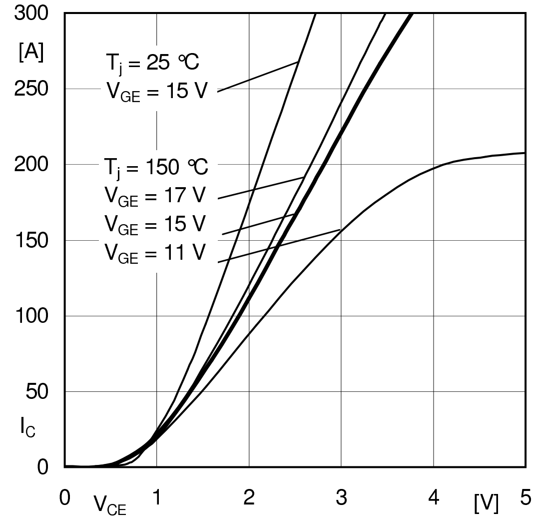


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

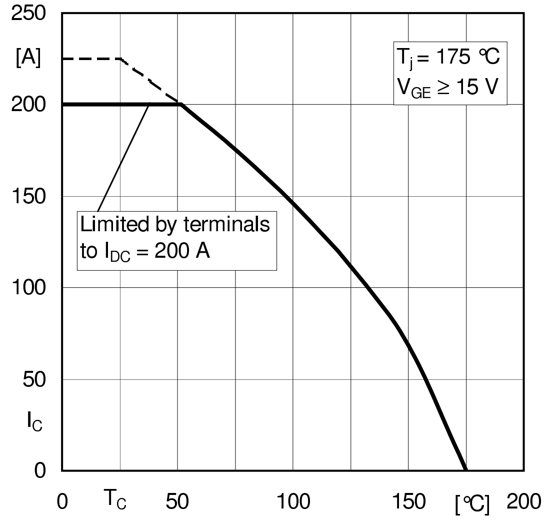


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

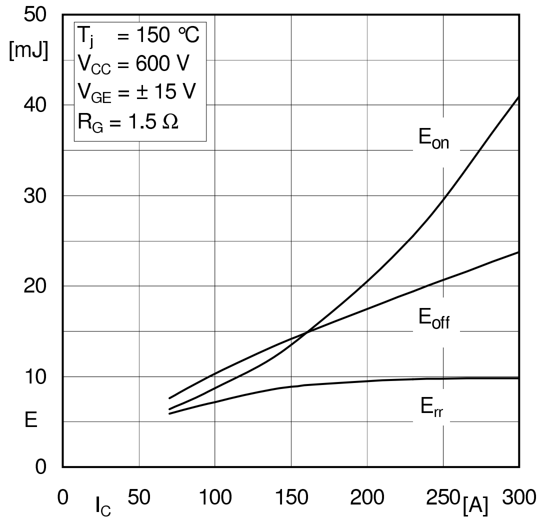


Fig. 3: Typ. turn-on /-off energy = f (I_C)

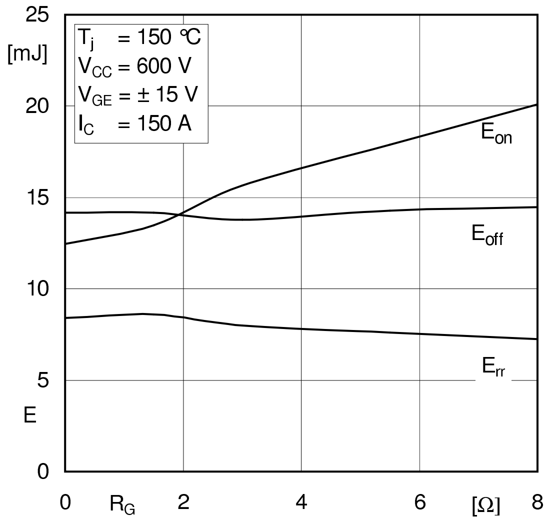


Fig. 4: Typ. turn-on /-off energy = f (R_G)

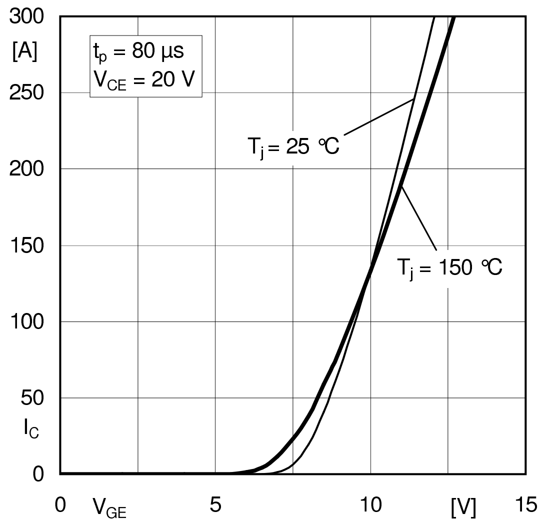


Fig. 5: Typ. transfer characteristic

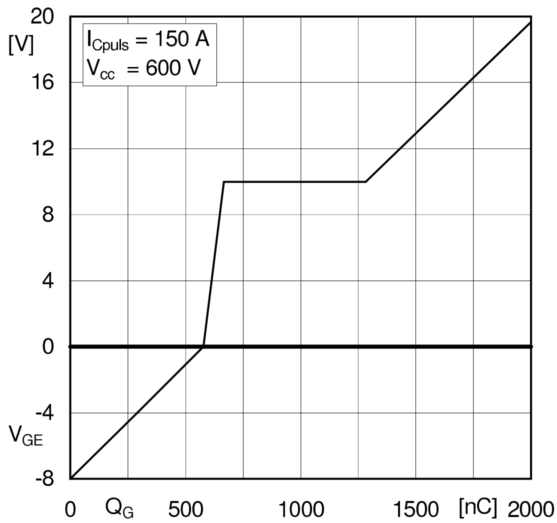


Fig. 6: Typ. gate charge characteristic

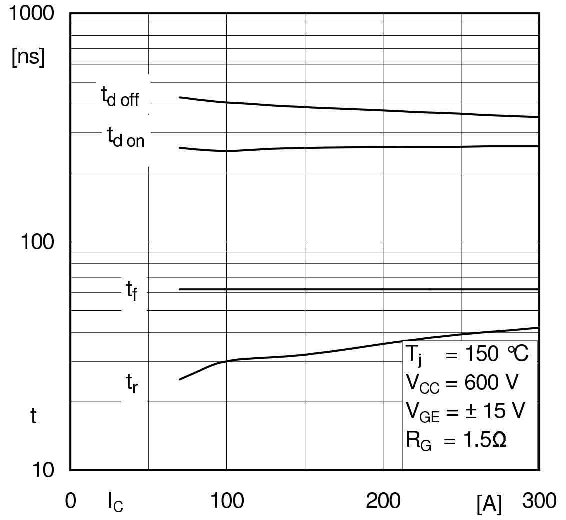


Fig. 7: Typ. switching times vs. I_C

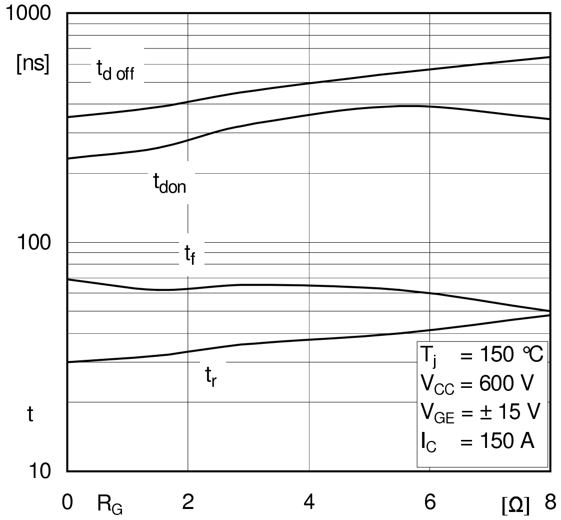


Fig. 8: Typ. switching times vs. gate resistor R_G

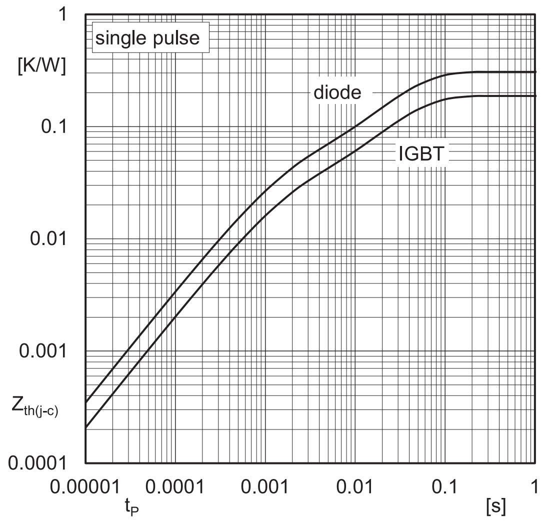


Fig. 9: Transient thermal impedance

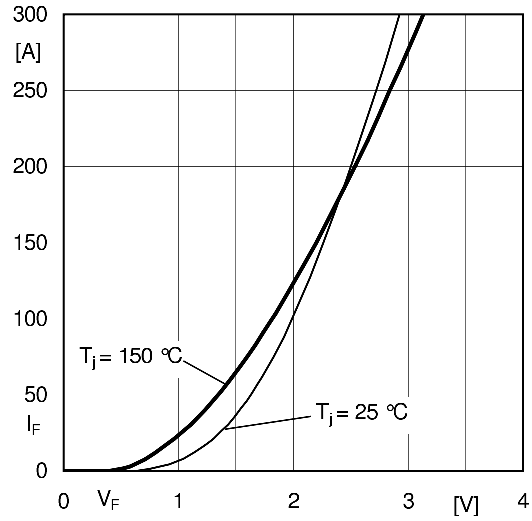


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

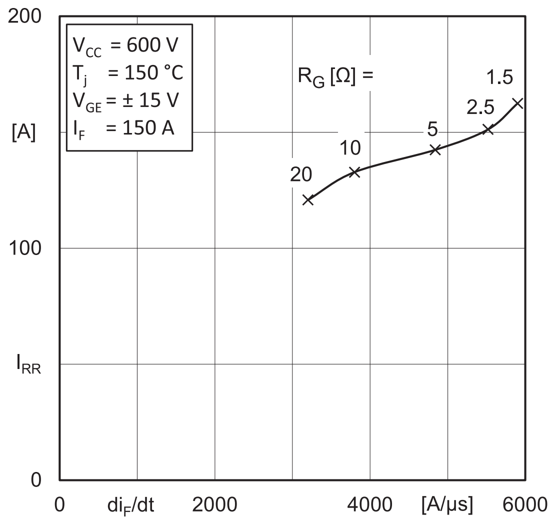


Fig. 11: CAL diode peak reverse recovery current

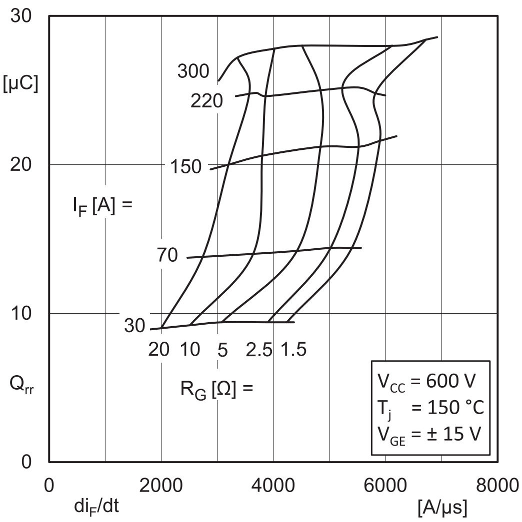
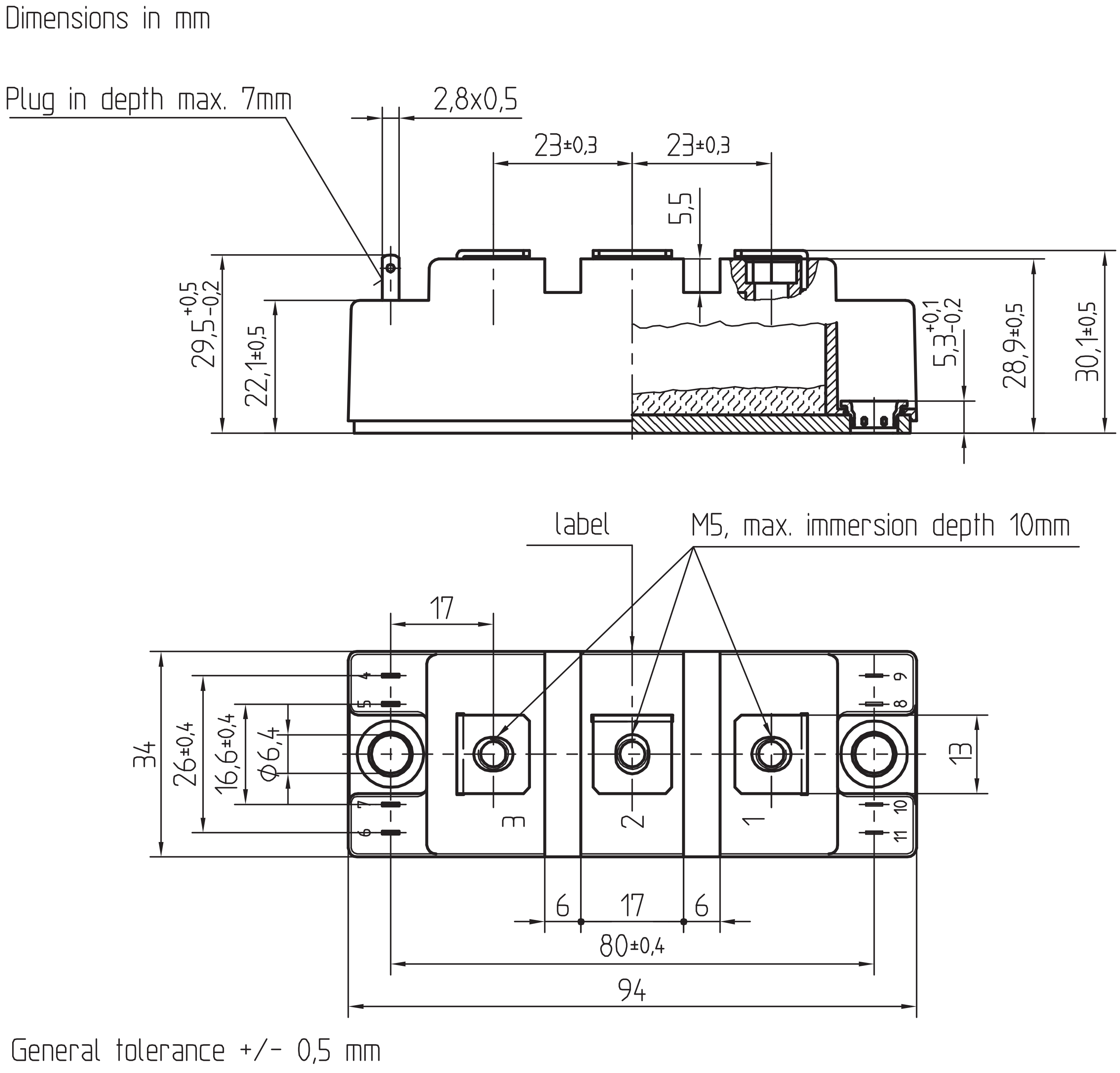


Fig. 12: Typ. CAL diode peak reverse recovery charge



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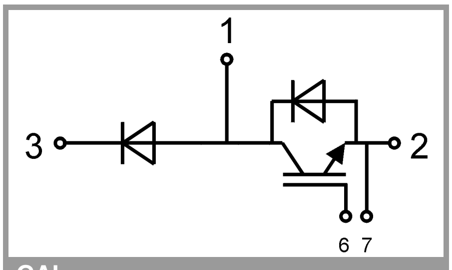

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This is an electrostatic discharge sensitive device (ESDS), international standard IEC 60747-1, chapter IX.

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