SKM200GAL12F4SiC3

SEMITRANS® 3

High Speed IGBT4 Modules

SKM200GAL12F4SiC3

Features*

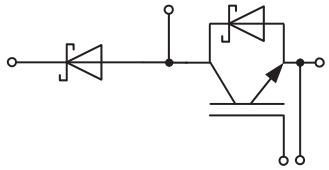
- IGBT4 = 4. Generation Fast Trench (High Speed) IGBT (Infineon)
- With Silicon Carbide Schottky diodes (ROHM)
- Insulated copper baseplate using DBC Technology (Direct Bonded Copper)
- UL recognized, file no. E63532
- With integrated gate resistor
- For higher switching frequencies

Typical Applications

- AC inverter drives
- UPS
- Electronic welders
- DC/DC converters

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	312	A
		T_c = 80 °C	239	A
I_{Cnom}			200	A
I_{CRM}			400	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V $V_{GE} \leq$ 15 V $V_{CES} \leq$ 1200 V $R_{G\ on/off} \geq 2\ \Omega$	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
I_F	T_j = 175 °C	T_c = 25 °C	123	A
		T_c = 80 °C	93	A
I_{FRM}			168	A
I_{FSM}	t_p = 8.3 ms, sin 180°, T_j = 25 °C		295	A
T_j			-40 ... 175	°C
Freewheeling diode				
I_F	T_j = 175 °C	T_c = 25 °C	123	A
		T_c = 80 °C	93	A
I_{FRM}			168	A
I_{FSM}	t_p = 8.3 ms, sin 180°, T_j = 25 °C		295	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 = 200 A V_{GE} = 15 V chiplevel	T_j = 25 °C		2.06	2.42	V
		T_j = 150 °C		2.59	2.97	V
V_{CE0}	chiplevel	T_j = 25 °C		1.10	1.28	V
		T_j = 150 °C		0.95	1.13	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		4.8	5.7	mΩ
		T_j = 150 °C		8.2	9.2	mΩ
$V_{GE(th)}$	V_{GE}=V_{CE}, I_C = 7.6 mA		5.1	5.8	6.4	V
I_{CES}	V_{GE} = 0 V V_{CE} = 1200 V	T_j = 25 °C			2.7	mA
		T_j = 150 °C		-		mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		12.3		nF
C_{oes}		f = 1 MHz		0.81		nF
C_{res}		f = 1 MHz		0.69		nF
Q_G	V_{GE} = - 8 V...+ 15 V			1134		nC
R_{Gint}	T_j = 25 °C			2.4		Ω

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- UPS
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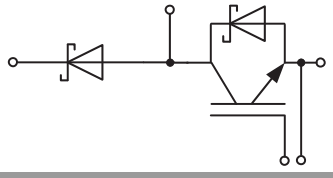
- DC/DC converters

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 I_C = 200 A V_{GE} = +15/-15 V $R_{G\,on}$ = 1 Ω $R_{G\,off}$ = 1 Ω di/dt_{on} = 7100 A/µs di/dt_{off} = 2850 A/µs	T_j = 150 °C		140		ns
t_r		T_j = 150 °C		30		ns
E_{on}		T_j = 150 °C		3.5		mJ
$t_{d(off)}$		T_j = 150 °C		340		ns
t_f		T_j = 150 °C		60		ns
E_{off}		T_j = 150 °C		14		mJ
$R_{th(j-c)}$	per IGBT				0.115	K/W
Inverse diode						
$V_F = V_{EC}$	I_F = 80 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.40	1.60	V
		T_j = 150 °C		1.79	2.10	V
V_{F0}	chiplevel	T_j = 25 °C		0.95	1.05	V
		T_j = 150 °C		0.83	0.90	V
r_F	chiplevel	T_j = 25 °C		5.6	6.9	mΩ
		T_j = 150 °C		12	15	mΩ
C_j	parallel to C_{oss}, f = 1 MHz, V_R = 800 V, T_j = 25 °C			0.340		nF
Q_c	V_R = 800 V, di/dt_{off} = 500 A/µs, T_j = 25 °C			0.26		µC
$R_{th(j-c)}$	per diode				0.42	K/W
Freewheeling diode						
$V_F = V_{EC}$	I_F = 80 A V_{GE} = 0 V chiplevel	T_j = 25 °C		1.40	1.60	V
		T_j = 150 °C		1.79	2.10	V
V_{F0}	chiplevel	T_j = 25 °C		0.95	1.05	V
		T_j = 150 °C		0.83	0.90	V
r_F	chiplevel	T_j = 25 °C		5.6	6.9	mΩ
		T_j = 150 °C		12	15	mΩ
C_j	f = 1 MHz, V_R = 800 V, T_j = 25 °C			0.340		nF
Q_c	V_R = 800 V, di/dt_{off} = 500 A/µs, T_j = 25 °C			0.26		µC
$R_{th(j-c)}$	per diode				0.42	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
$R_{th(c-s)}$	calculated without thermal coupling (λ_{grease}=0.81 W/(m*K))			0.02	0.038	K/W
M_s	to heat sink M6		3		5	Nm
M_t		to terminals M6	2.5		5	Nm
						Nm
w					325	g



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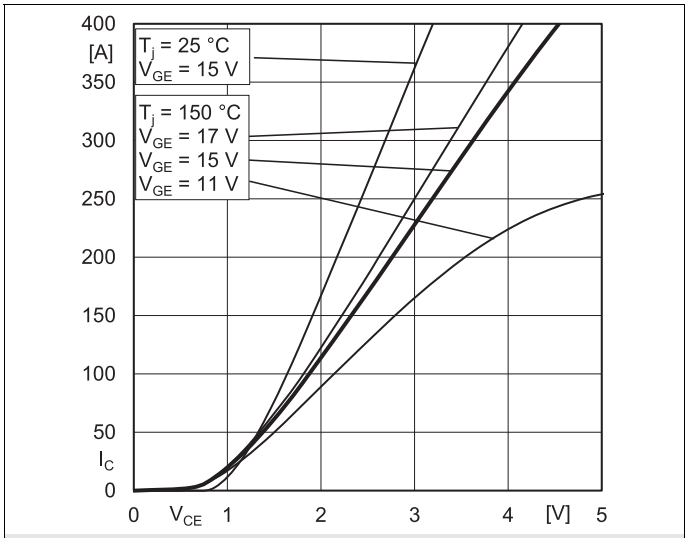


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+EE'}$

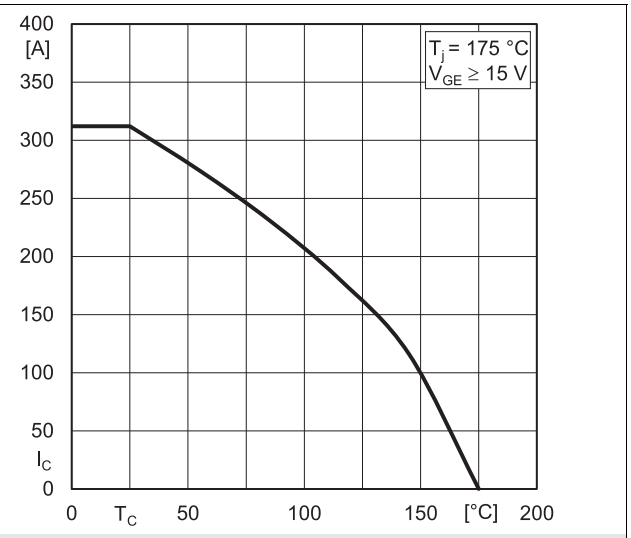


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

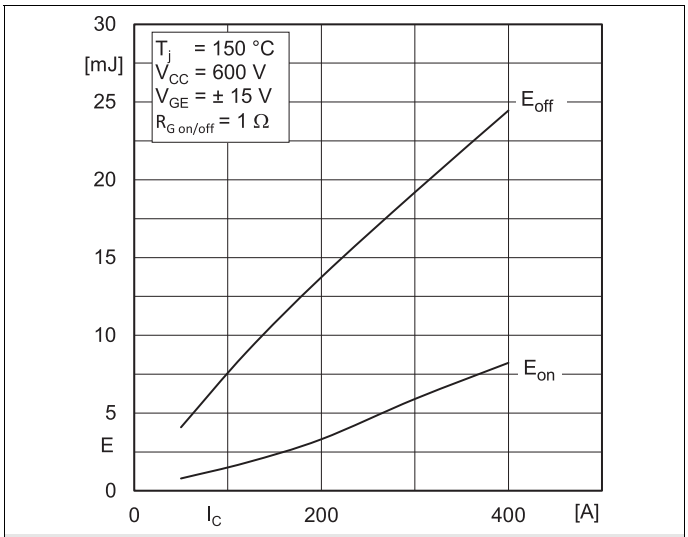


Fig. 3: Typ. turn-on /-off energy = f (I_C)

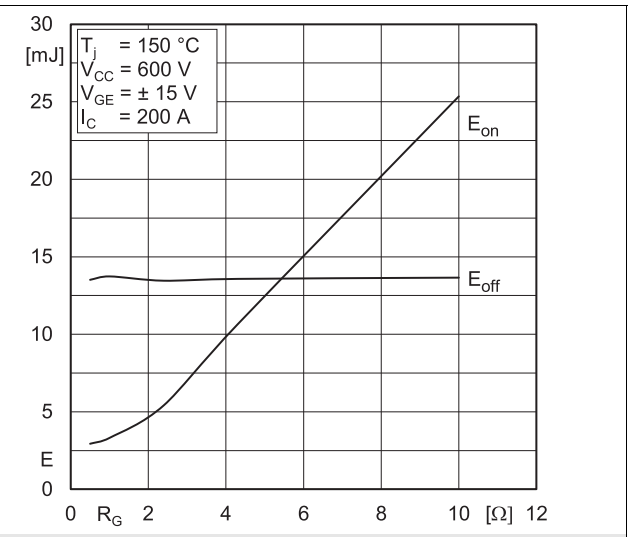


Fig. 4: Typ. turn-on /-off energy = f (R_G)

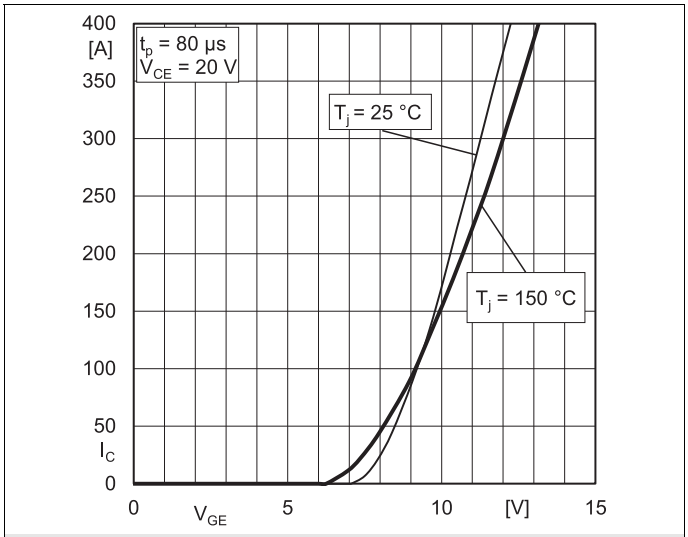


Fig. 5: Typ. transfer characteristic

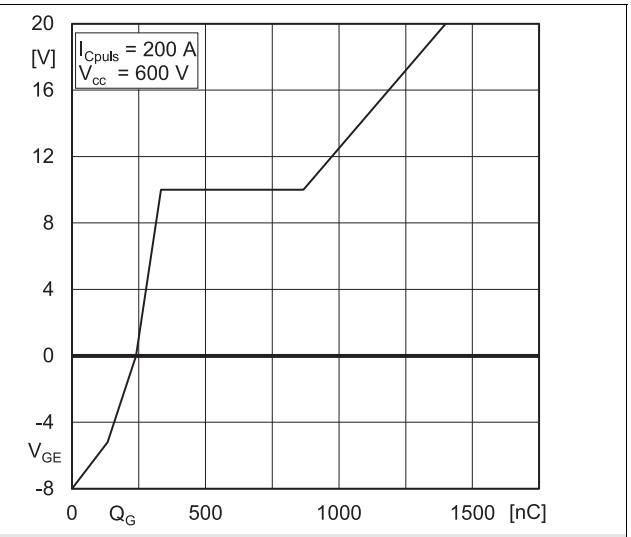


Fig. 6: Typ. gate charge characteristic

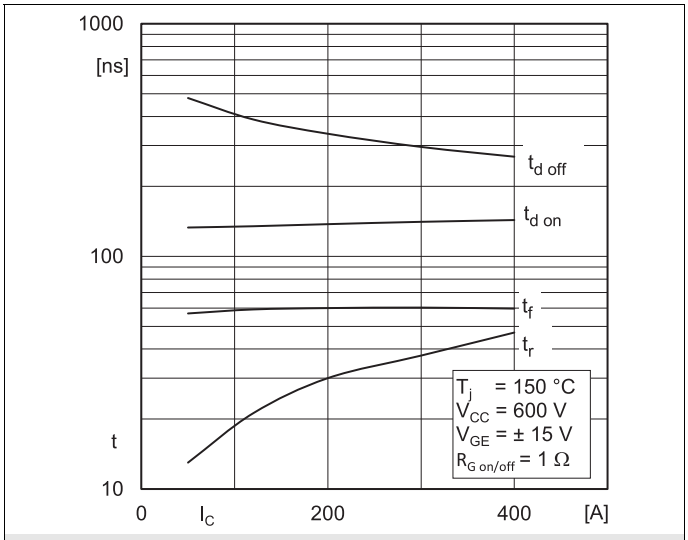


Fig. 7: Typ. switching times vs. I_C

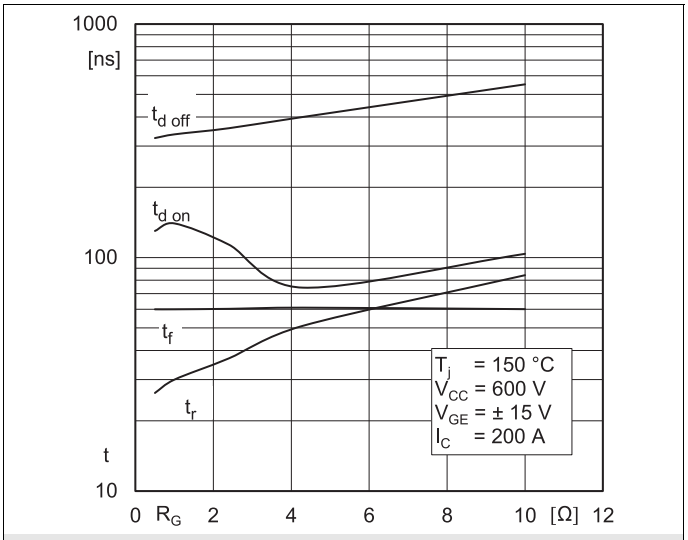


Fig. 8: Typ. switching times vs. gate resistor R_G

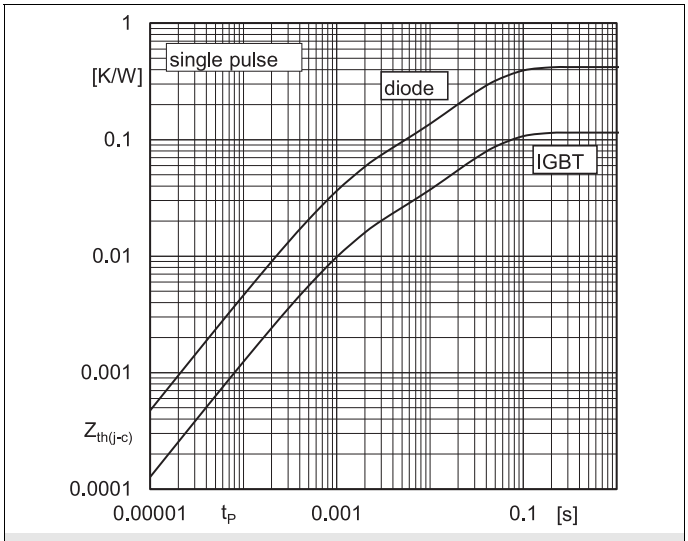


Fig. 9: Transient thermal impedance

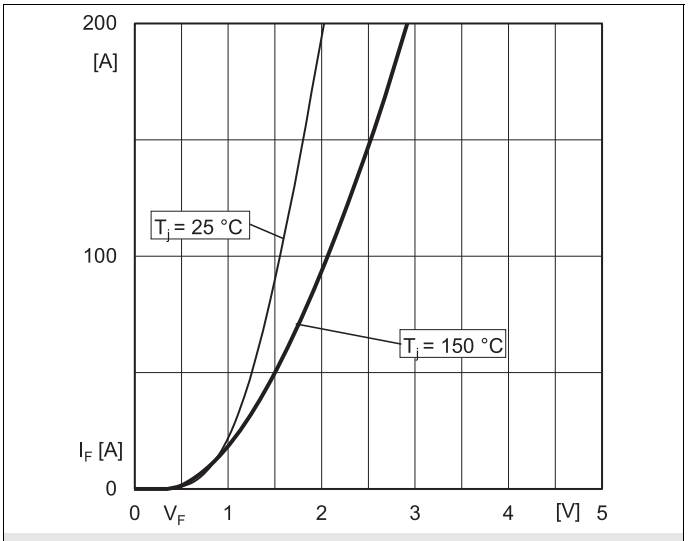
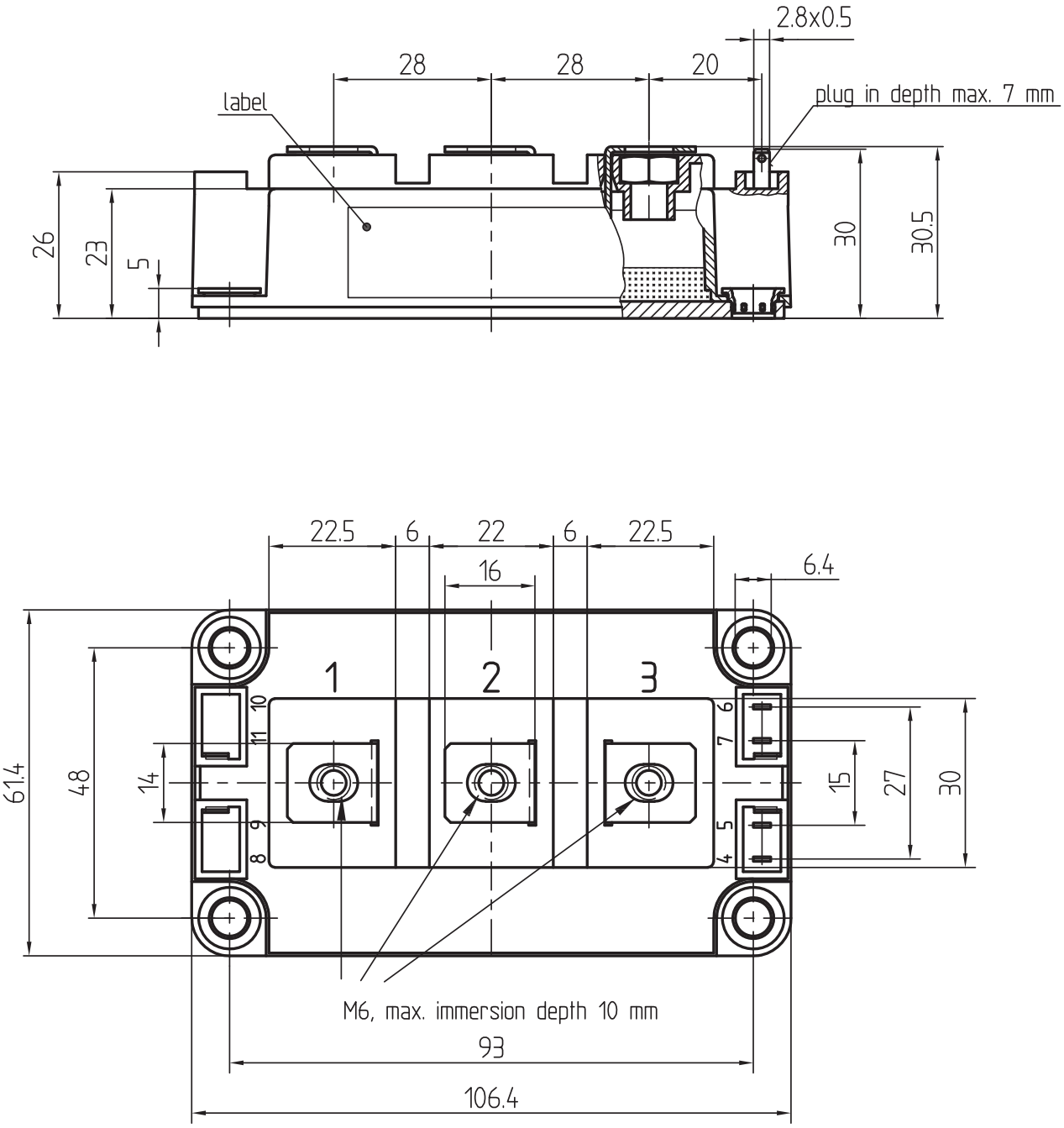


Fig. 10: Typ. Diode forward charact., incl. $R_{CC'+EE'}$

Dimensions in mm



General tolerance +/- 0.5 mm

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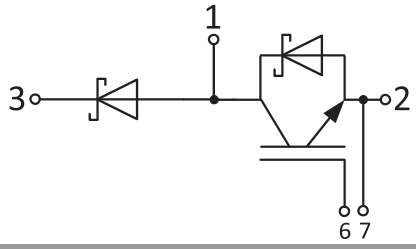

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This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

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