SKM 40GD123D

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SEMITRANS® 6

Standard IGBT modules

SKM 40GD123D

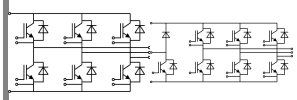
SKM 40GDL123D

Features

- MOS input (voltage controlled)
- N channel, homogeneous Si
- Low inductance case
- Very low tail current with low temperature dependence
- High short circuit capability, self limiting to 6 x I_{cnom}
- Latch-up free
- Fast & soft inverse CAL diodes
- Isolated copper baseplate using DCB Direct Copper Bonding Technology
- Large clearance (9 mm) and creepage distances (13 mm)

Typical Applications

- Switched mode power supplies
- Three phase inverters for AC motor speed control
- Pulse frequencies also above 15 kHz



GD GDL

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	40	A
		T_{case} = 80 °C	30	A
I_{CRM}	I_{CRM}=2xI_{Cnom}		50	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	45	A
		T_{case} = 80 °C	30	A
I_{FRM}	I_{FRM}=2xI_{Fnom}		50	A
I_{FSM}	t_p = 10 ms; sin.	T_j = 150 °C	350	A
Module				
$I_{t(RMS)}$			100	A
T_{vj}			- 40 ...+ 150	°C
T_{stg}			- 40...+ 125	°C
V_{isol}	AC, 1 min.		2500	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 = 1 mA		4,5	5,5	6,5	V
I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	T_j = 25 °C		0,3	0,9	mA
V_{CE0}		T_j = 25 °C		1,4	1,6	V
		T_j = 125 °C		1,6	1,8	V
r_{CE}	V_{GE} = 15 V	T_j = 25°C		44	56	mΩ
		T_j = 125°C		60	76	mΩ
$V_{CE(sat)}$	I_{Cnom} = 25 A, V_{GE} = 15 V	T_j = °$C_{chiplev.}$		2,5	3	V
C_{ies}	V_{CE} = 25, V_{GE} = 0 V	f = 1 MHz		1,6	2,1	nF
C_{oes}				0,25	0,3	nF
C_{res}				0,11	0,15	nF
$t_{d(on)}$	R_{Gon} = 40 Ω	V_{CC} = 600V		70		ns
t_r		I_{Cnom}= 25A		55		ns
E_{on}		T_j = 125 °C		3,8		mJ
$t_{d(off)}$	R_{Goff} = 40 Ω	V_{GE} = -15V		400		ns
t_f				40		ns
E_{off}				2,3		mJ
$R_{th(j-c)}$	per IGBT				0,56	K/W

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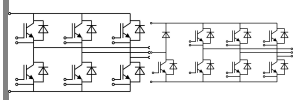

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Characteristics

Symbol	Conditions		min.	typ.	max.	Units
Inverse Diode						
$V_F = V_{EC}$	I_{Fnom} = 25 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		36	52	mΩ
		T_j = 125 °C				mΩ
I_{RRM}	I_{Fnom} = 25 A	T_j = 125 °C		25		A
Q_{rr}	di/dt = 500 A/µs			4,5		µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V			1,35		mJ
$R_{th(j-c)D}$	per diode				1	K/W
Freewheeling Diode						
$V_F = V_{EC}$	I_{Fnom} = A; V_{GE} = V	T_j = °C$_{chiplev.}$				V
V_{F0}		T_j = 25 °C				V
		T_j = 125 °C				V
r_F		T_j = 25 °C				V
		T_j = 125 °C				V
I_{RRM}	I_{Fnom} = A	T_j = °C				A
Q_{rr}						µC
E_{rr}	V_{GE} = 0 V; V_{CC} = 600 V					mJ
	per diode					K/W
Module						
L_{CE}					60	nH
$R_{th(c-s)}$	per module				0,05	K/W
M_s	to heat sink M5		4		5	Nm
w					175	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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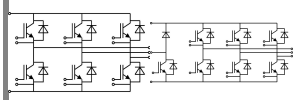

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Z_{th} Symbol	Conditions	Values	Units
$Z_{th(j-c)I}$			
R_i	i = 1	260	mk/W
R_i	i = 2	250	mk/W
R_i	i = 3	38	mk/W
R_i	i = 4	12	mk/W
tau_i	i = 1	0,0447	s
tau_i	i = 2	0,0079	s
tau_i	i = 3	0,0015	s
tau_i	i = 4	0,0002	s
$Z_{th(j-c)D}$			
R_i	i = 1	580	mk/W
R_i	i = 2	330	mk/W
R_i	i = 3	73	mk/W
R_i	i = 4	17	mk/W
tau_i	i = 1	0,054	s
tau_i	i = 2	0,0089	s
tau_i	i = 3	0,0018	s
tau_i	i = 4	0,0002	s

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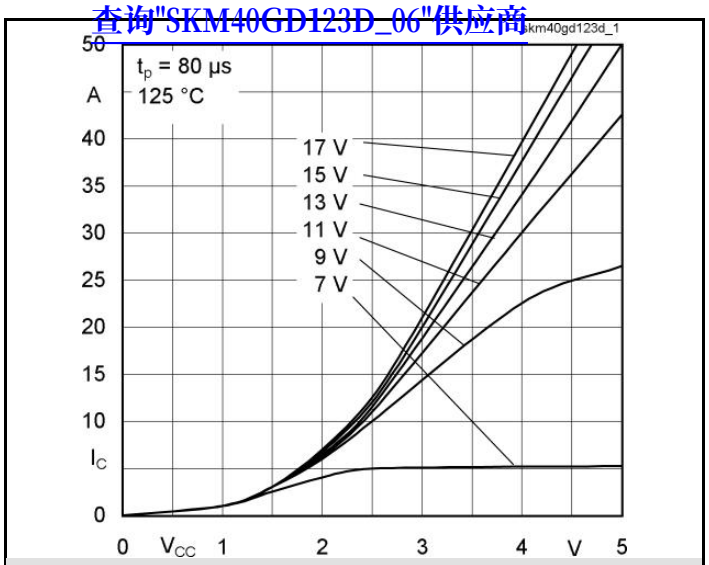

Fig. 1 Typ. output characteristic, inclusive $R_{CC'+EE'}$

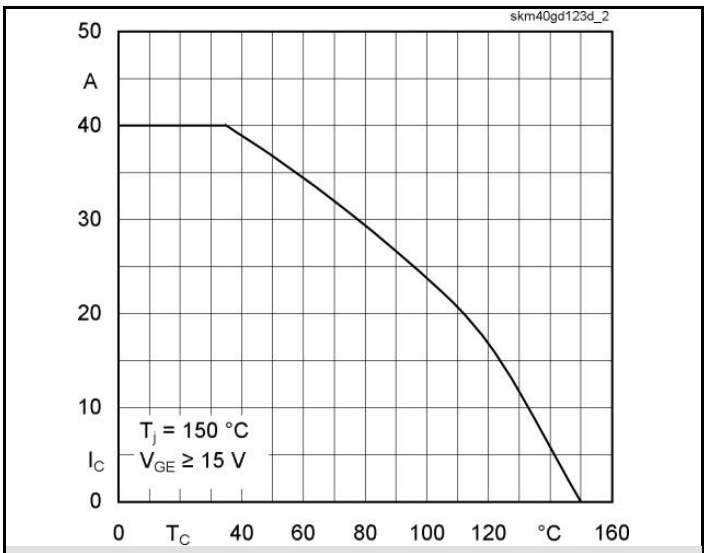

Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

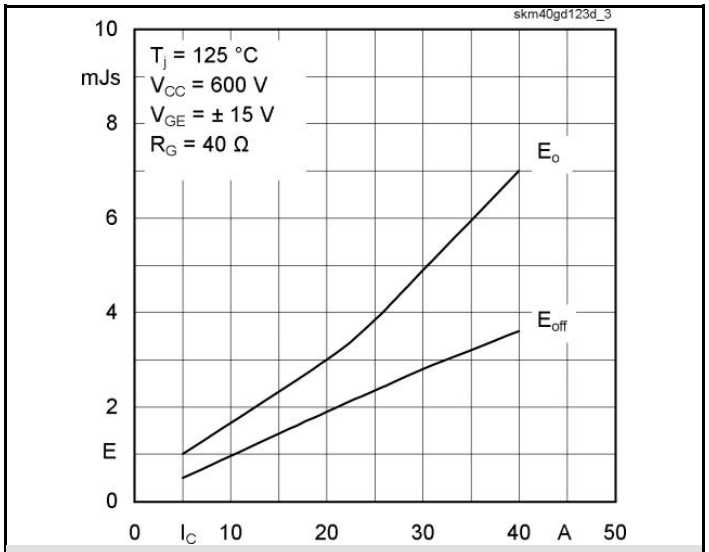

Fig. 3 Typ. turn-on /-off energy = f (I_C)

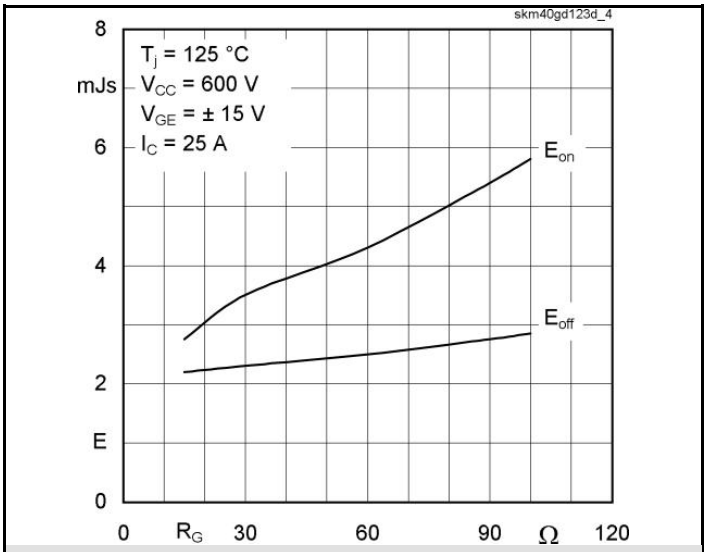

Fig. 4 Typ. turn-on /-off energy = f (R_G)

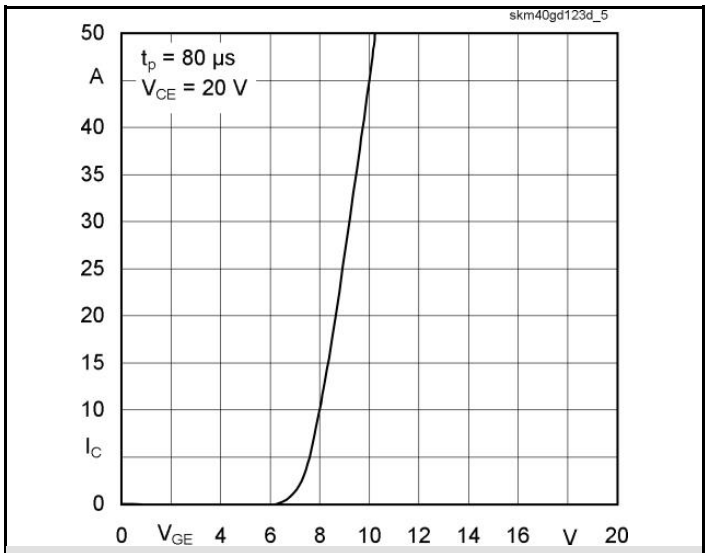

Fig. 5 Typ. transfer characteristic

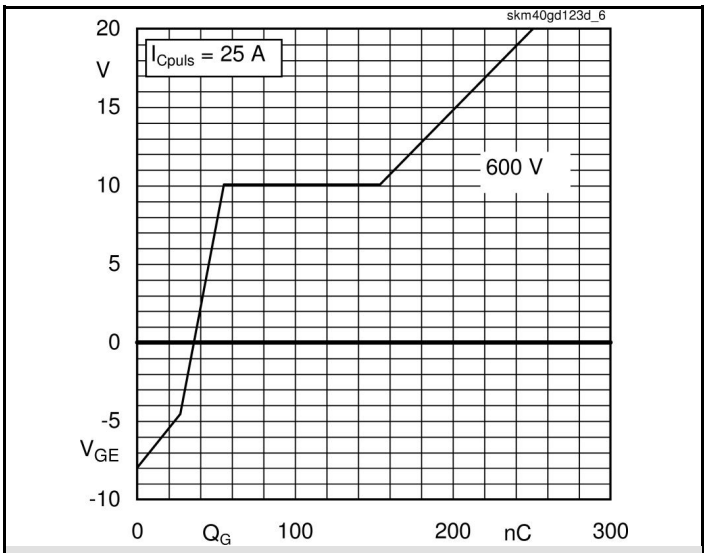

Fig. 6 Typ. gate charge characteristic

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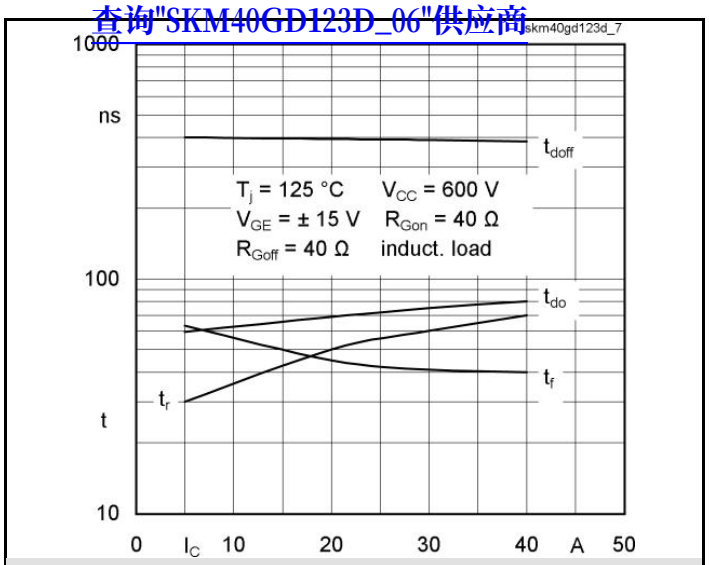

Fig. 7 Typ. switching times vs. I_C

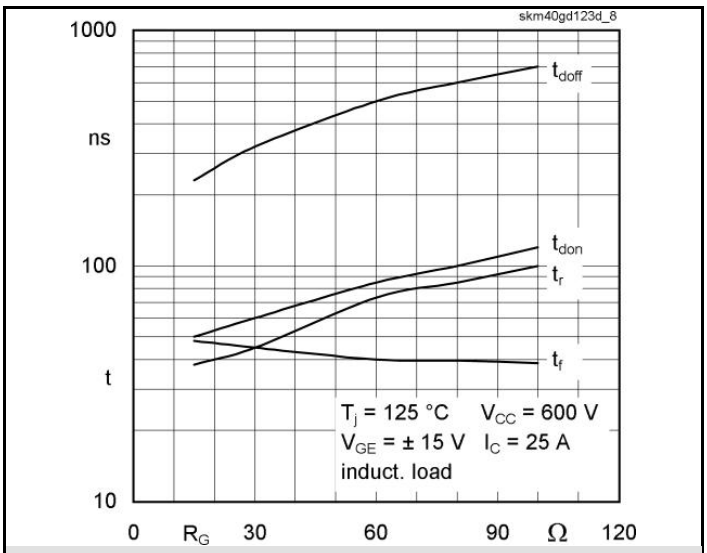

Fig. 8 Typ. switching times vs. gate resistor R_G

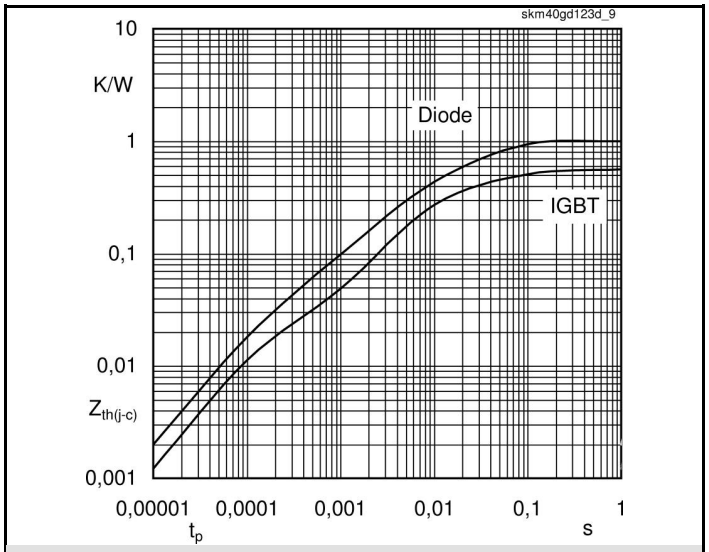

Fig. 9 Transient thermal impedance of IGBT

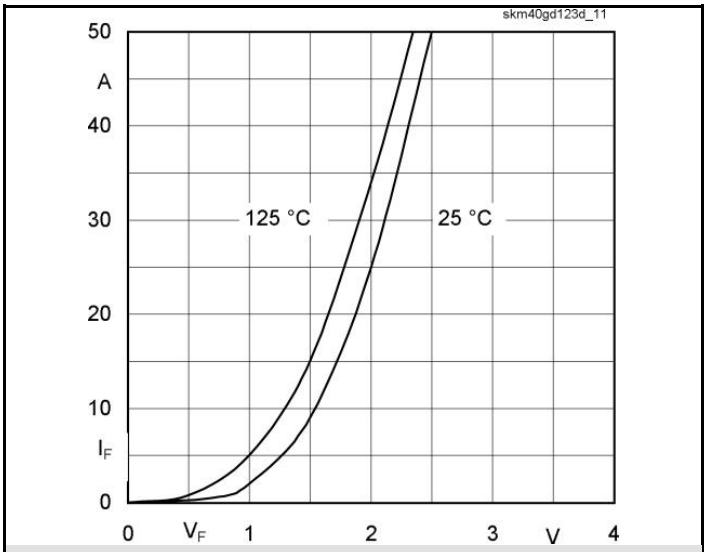

Fig. 10 CAL diode forward characteristic

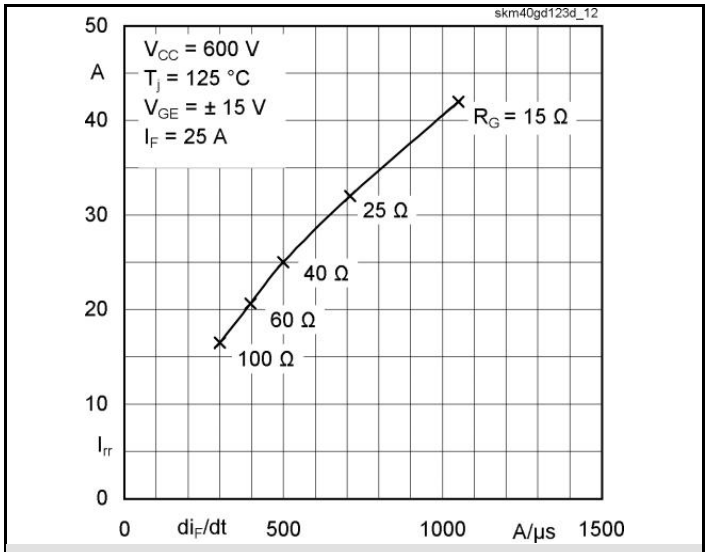

Fig. 11 Typ. CAL diode peak reverse recovery current

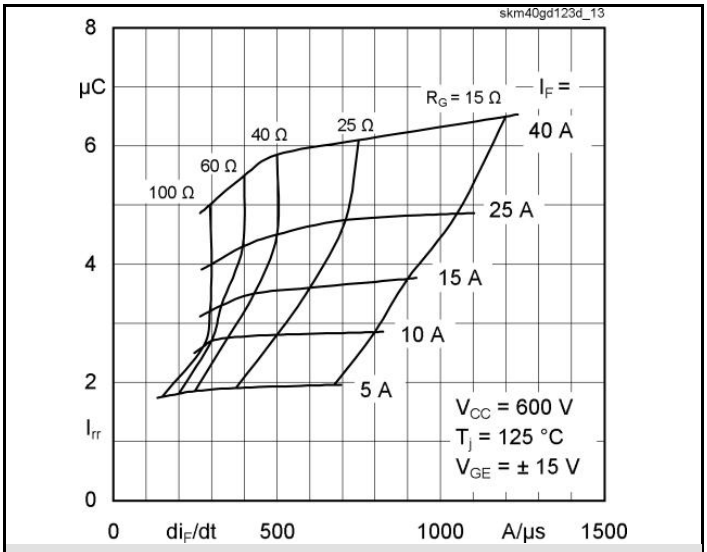

Fig. 12 Typ. CAL diode peak reverse recovery charge

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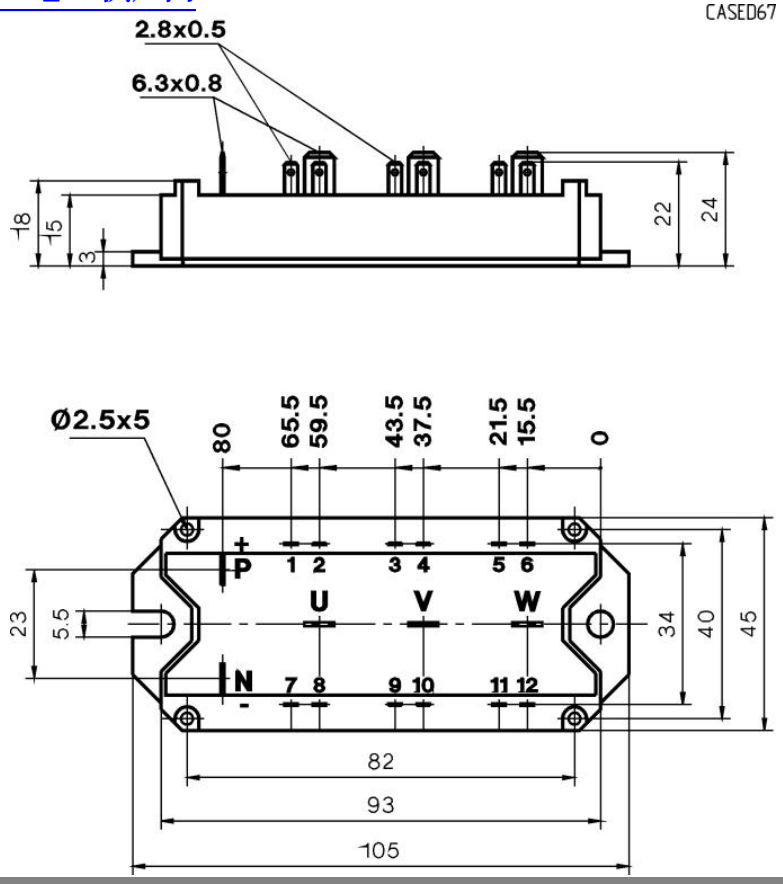
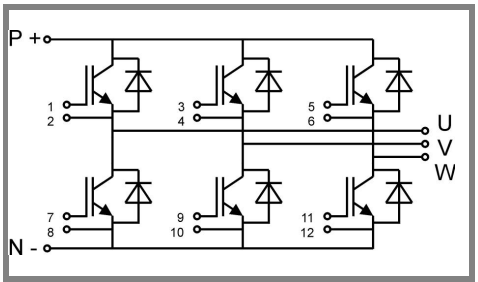
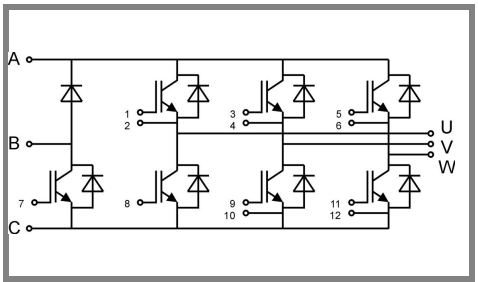


Case D 67



Case D 67 GD



Case D 73 GDL

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