SKM 40GD123D

SEMITRANS® 6

IGBT modules

SKM 40GD123D

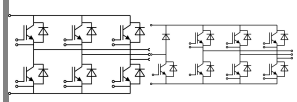
SKM 40GDL123D

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; V_{CES} < 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_C= 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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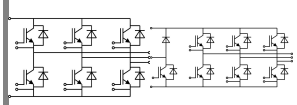

GD **GDL**

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_F = 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_F = 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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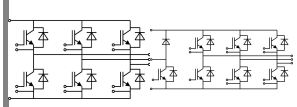


GD **GDL**

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

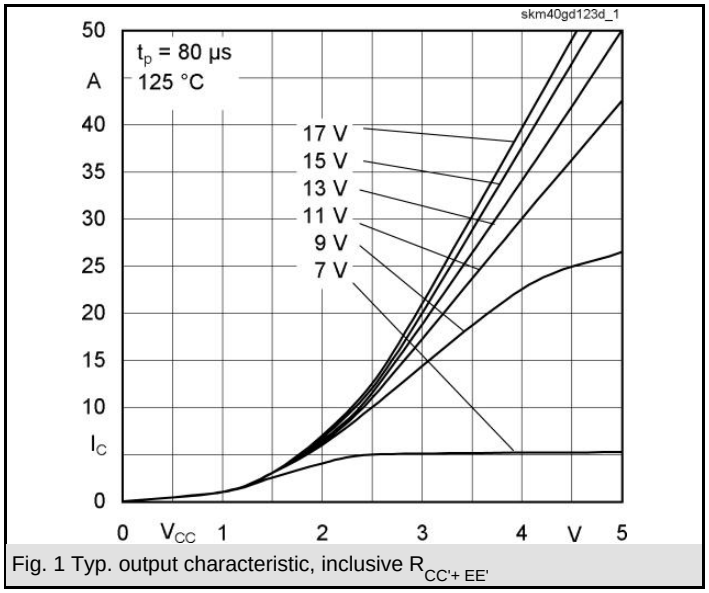


Fig. 1 Typ. output characteristic, inclusive $R_{CC'+ EE'}$

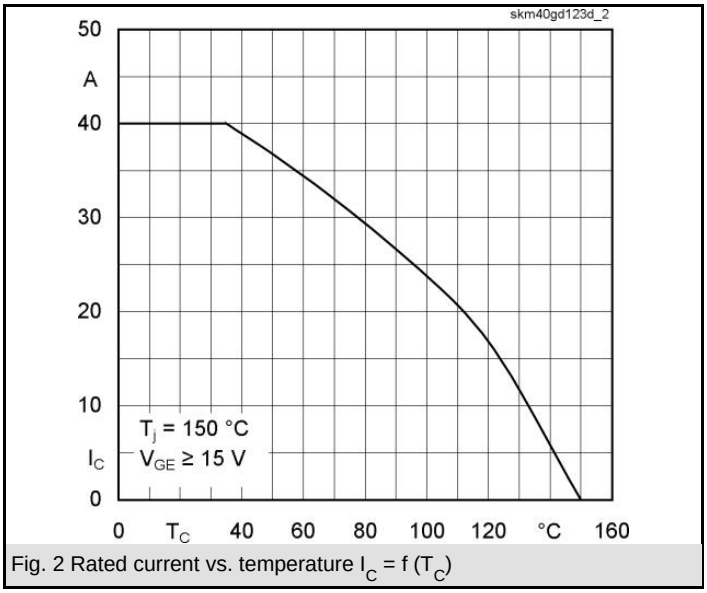


Fig. 2 Rated current vs. temperature $I_C = f(T_C)$

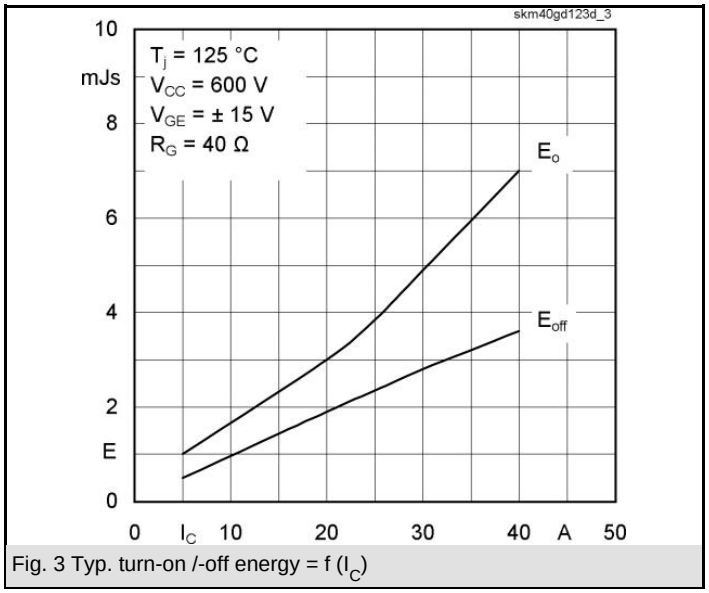


Fig. 3 Typ. turn-on /-off energy = f (I_C)

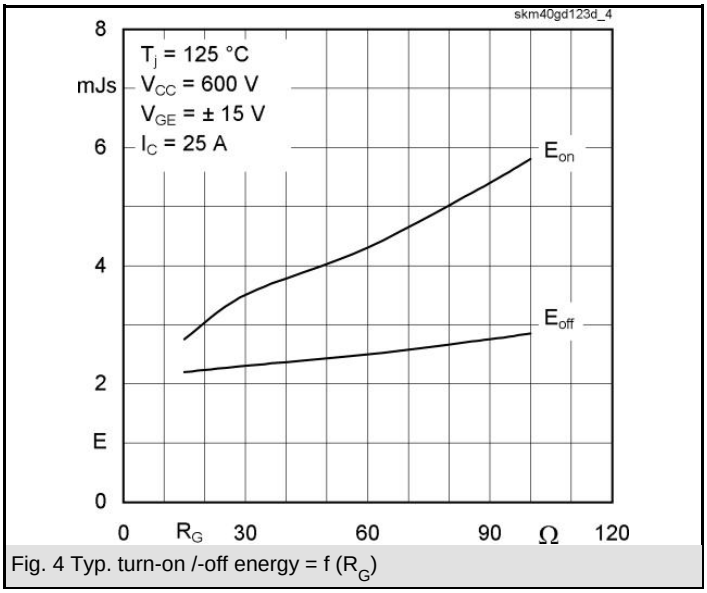


Fig. 4 Typ. turn-on /-off energy = f (R_G)

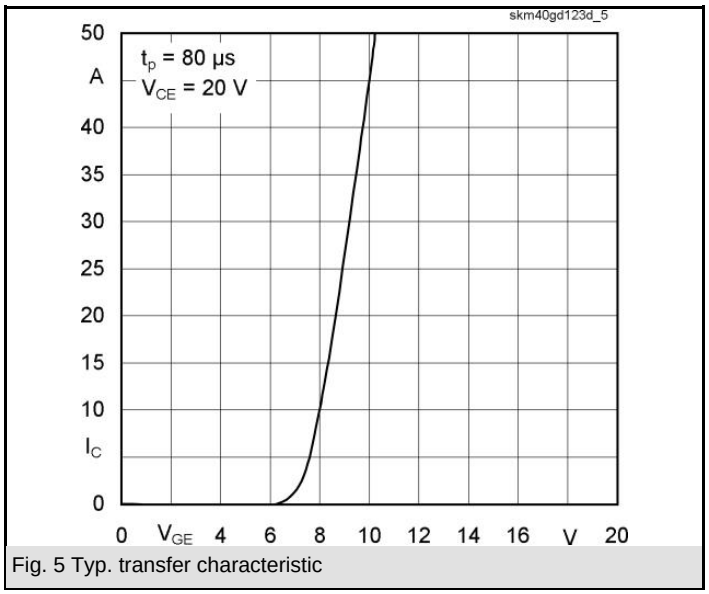


Fig. 5 Typ. transfer characteristic

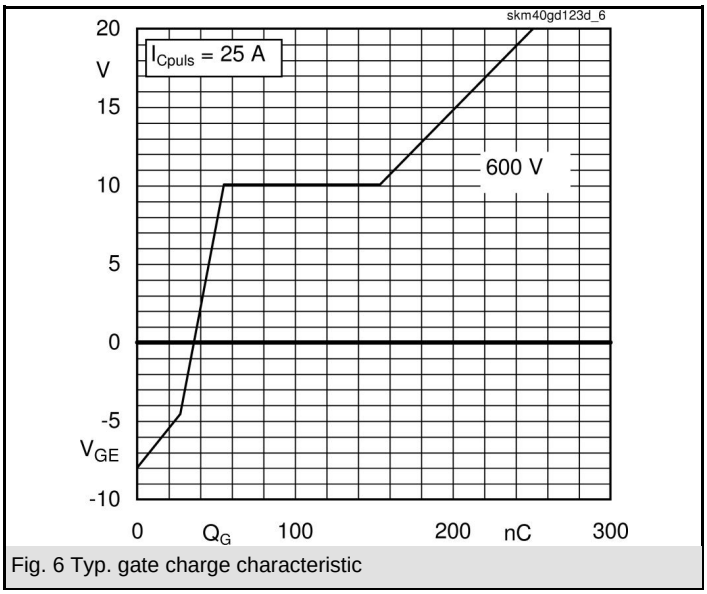


Fig. 6 Typ. gate charge characteristic

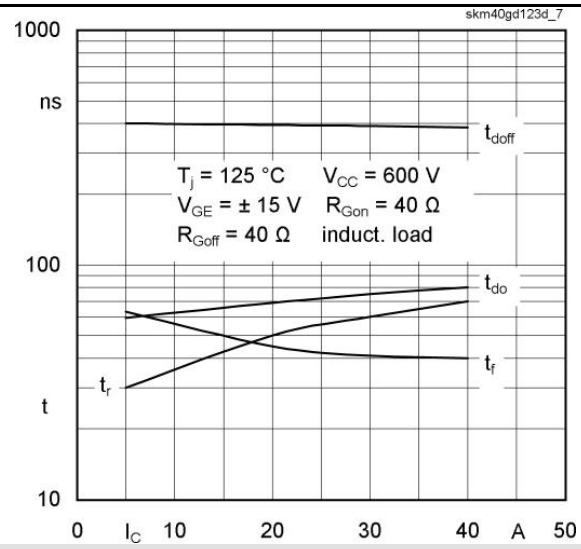


Fig. 7 Typ. switching times vs. I_C

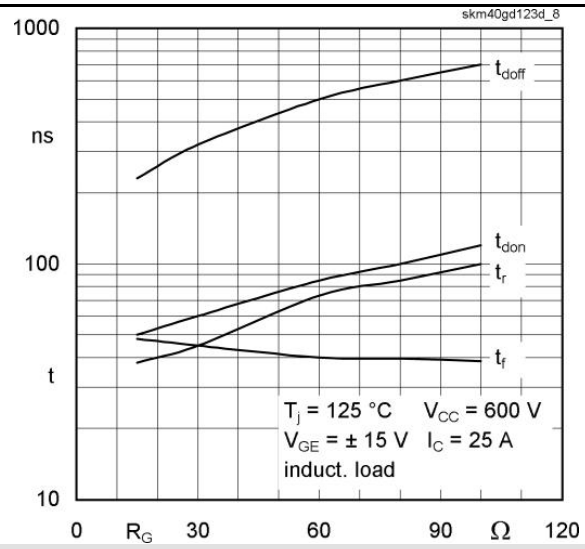


Fig. 8 Typ. switching times vs. gate resistor R_G

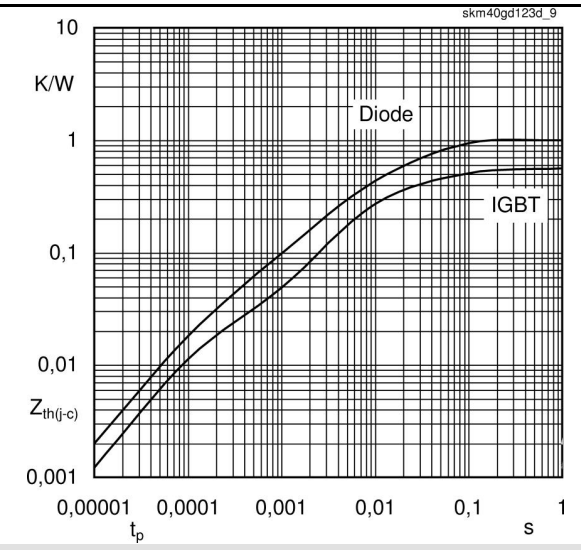


Fig. 9 Transient thermal impedance of IGBT

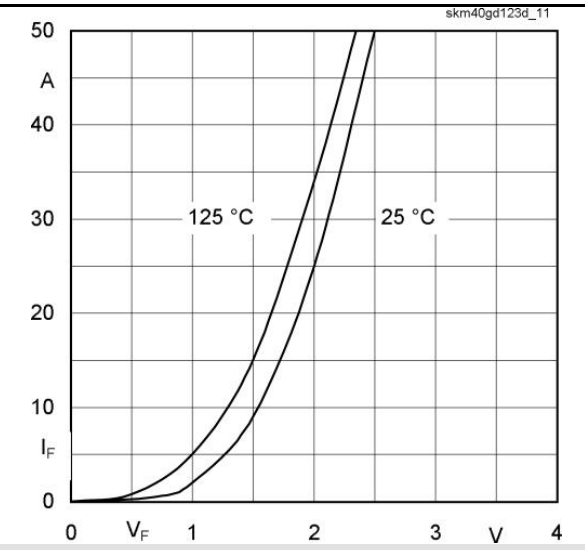


Fig. 10 CAL diode forward characteristic

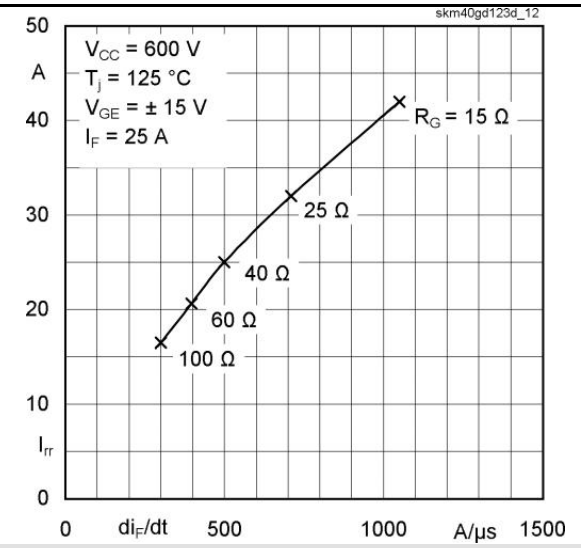


Fig. 11 Typ. CAL diode peak reverse recovery current

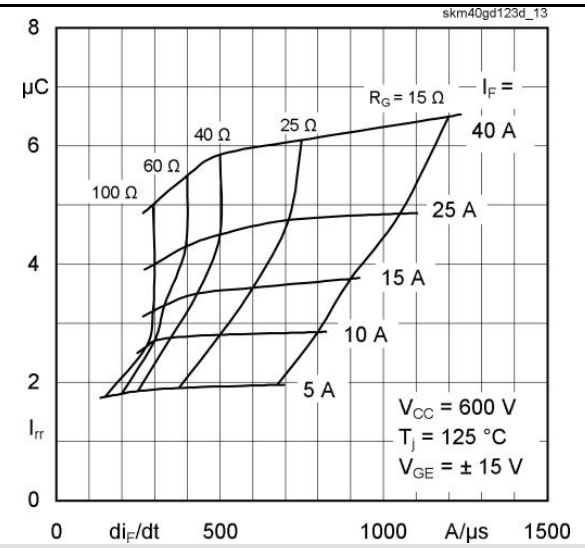
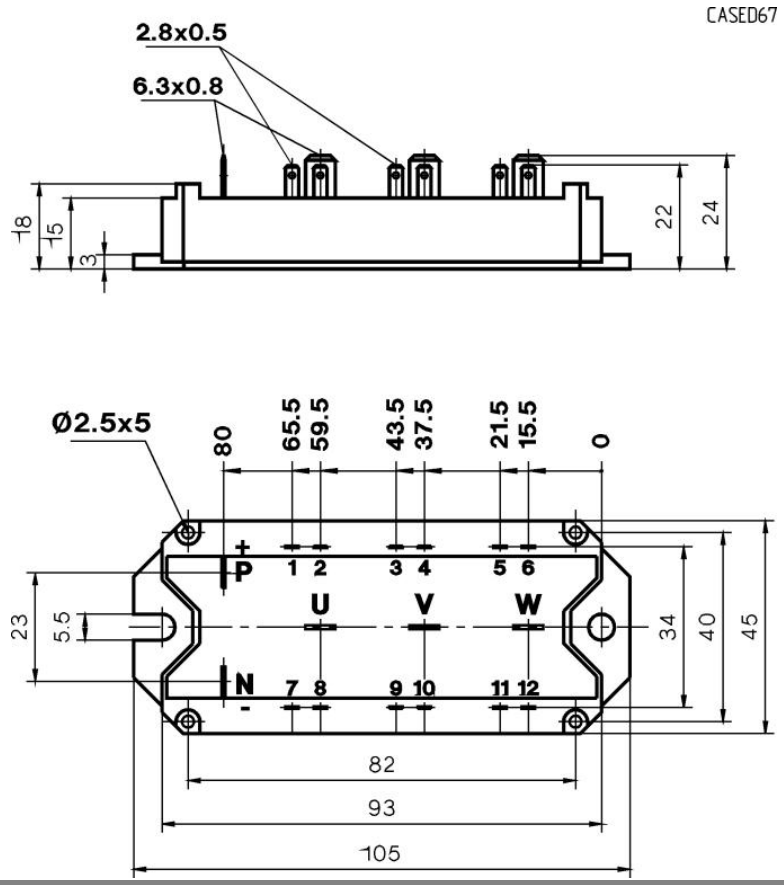
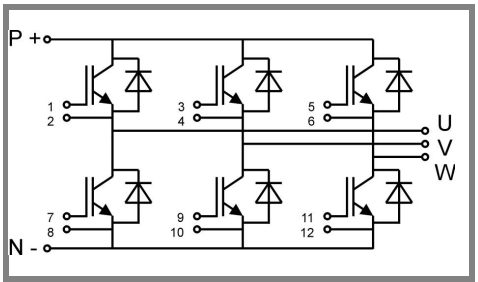


Fig. 12 Typ. CAL diode peak reverse recovery charge

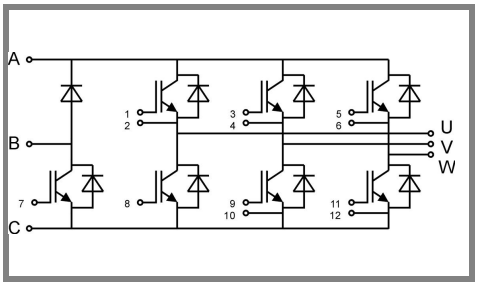
UL Recognized File 63 532



Case D 67



Case D 67 GD



Case D 73 GDL

