



SEMITRANS® 6

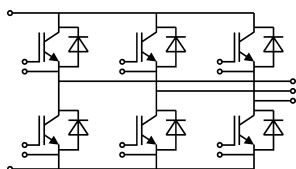
SKM50GD125D

Features

- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability, self limiting to $6 \times I_{Cnom}$
- Fast & soft inverse CAL diodes
- Large clearance (10 mm) and creepage distances (20 mm)
- Isolated copper baseplate using DBC Technology (Direct Copper Bonding)
- UL recognized, file no. E63532

Typical Applications*

- Three phase inverters for AC motor speed control
- Pulse frequencies also above 15 kHz
- DC servo and robot drives



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Absolute Maximum Ratings

Symbol	Conditions	Values	Unit
IGBT			
V_{CES}	$T_j = 25\text{ °C}$	1200	V
I_C	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	73
		$T_c = 80\text{ °C}$	50
I_{Cnom}		50	A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$	100	A
V_{GES}		-20 ... 20	V
t_{psc}	$V_{CC} = 600\text{ V}$ $V_{GE} \leq 15\text{ V}$ $V_{CES} \leq 1200\text{ V}$	$T_j = 125\text{ °C}$	10
T_j		-55 ... 150	°C
Inverse diode			
I_F	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	77
		$T_c = 80\text{ °C}$	53
I_{Fnom}		55	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$	110	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^\circ, T_j = 25\text{ °C}$	720	A
T_j		-40 ... 150	°C
Module			
$I_{t(RMS)}$	$T_{terminal} = 80\text{ °C}$	100	A
T_{stg}		-40 ... 125	°C
V_{isol}	AC sinus 50 Hz, $t = 1\text{ min}$	4000	V

Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
IGBT					
$V_{CE(sat)}$	$I_C = 50\text{ A}$ $V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	3.20	3.70	V
		$T_j = 125\text{ °C}$	3.60	4.20	V
V_{CE0}	chipelevel	$T_j = 25\text{ °C}$	1.5	1.75	V
		$T_j = 125\text{ °C}$	1.7	1.95	V
r_{CE}	$V_{GE} = 15\text{ V}$ chipelevel	$T_j = 25\text{ °C}$	34.00	39.00	mΩ
		$T_j = 125\text{ °C}$	38.00	45.00	mΩ
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 2\text{ mA}$	4.5	5.5	6.5	V
I_{CES}	$V_{GE} = 0\text{ V}$ $V_{CE} = 1200\text{ V}$	$T_j = 25\text{ °C}$	0.1	0.3	mA
					mA
C_{ies}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	3.3		nF
C_{oes}		$f = 1\text{ MHz}$	0.50		nF
C_{res}		$f = 1\text{ MHz}$	0.22		nF
Q_G	$V_{GE} = -8\text{ V} \dots +20\text{ V}$		442		nC
R_{Gint}	$T_j = 25\text{ °C}$		0.00		Ω
$t_{d(on)}$	$V_{CC} = 600\text{ V}$ $I_C = 50\text{ A}$	$T_j = 125\text{ °C}$	25		ns
t_r	$V_{GE} = \pm 15\text{ V}$	$T_j = 125\text{ °C}$	19		ns
E_{on}	$R_{G on} = 8\text{ Ω}$	$T_j = 125\text{ °C}$	8		mJ
$t_{d(off)}$	$R_{G off} = 8\text{ Ω}$	$T_j = 125\text{ °C}$	184		ns
t_f		$T_j = 125\text{ °C}$	8		ns
E_{off}		$T_j = 125\text{ °C}$	3.2		mJ
$R_{th(j-c)}$	per IGBT			0.32	K/W



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SKM50GD125D

Features

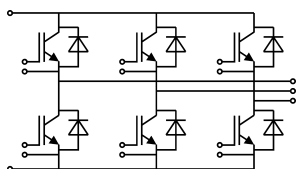
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- High short circuit capability, self limiting to 6 x I_{Cnom}
- Fast & soft inverse CAL diodes
- Large clearance (10 mm) and creepage distances (20 mm)
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Typical Applications*

- Three phase inverters for AC motor speed control
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Characteristics

Symbol	Conditions	min.	typ.	max.	Unit
Inverse diode					
$V_F = V_{EC}$	$I_F = 55\text{ A}$ $V_{GE} = 0\text{ V}$ chipllevel	$T_j = 25\text{ °C}$	2.00	2.50	V
		$T_j = 125\text{ °C}$	1.80	2.30	V
V_{F0}	chipllevel	$T_j = 25\text{ °C}$	1.1	1.45	V
		$T_j = 125\text{ °C}$	0.85	1.2	V
r_F	chipllevel	$T_j = 25\text{ °C}$	16.4	19.1	mΩ
		$T_j = 125\text{ °C}$	17.3	20.0	mΩ
I_{RRM}	$I_F = 50\text{ A}$	$T_j = 125\text{ °C}$	75		A
Q_{rr}	$di/dt_{off} = 3200\text{ A/μs}$ $V_{GE} = \pm 15\text{ V}$	$T_j = 125\text{ °C}$	7		μC
E_{rr}	$V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$	2.1		mJ
$R_{th(j-c)}$	per diode			0.6	K/W
Module					
L_{CE}				60	nH
$R_{CC'+EE'}$	terminal-chip	$T_C = 25\text{ °C}$			mΩ
		$T_C = 125\text{ °C}$			mΩ
$R_{th(c-s)}$	per module			0.05	K/W
M_s	to heat sink M6		4	5	Nm
M_t					Nm
					Nm
w				175	g



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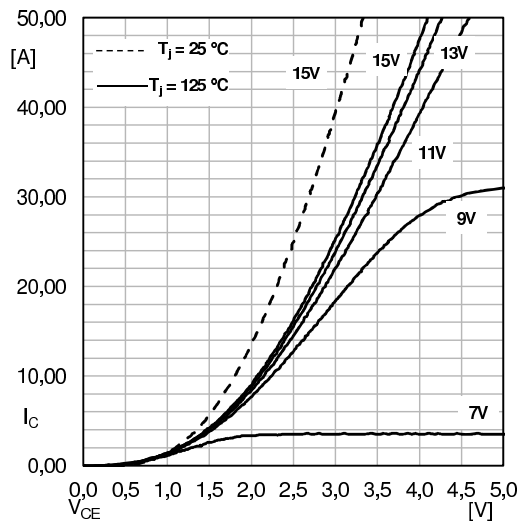


Fig. 1: Typ. output characteristic, inclusive $R_{CC'} + E_{E'}$

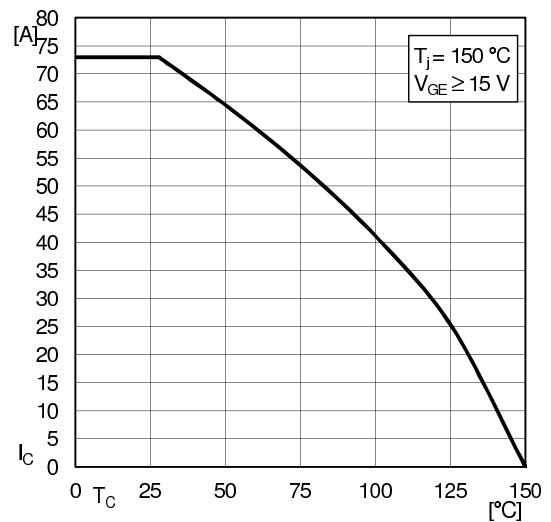


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

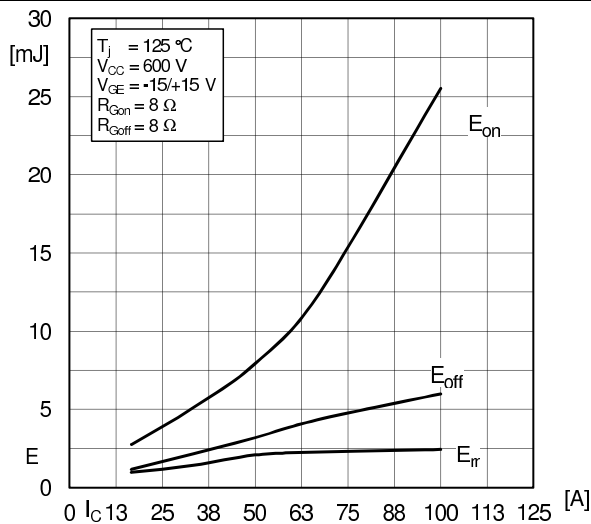


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

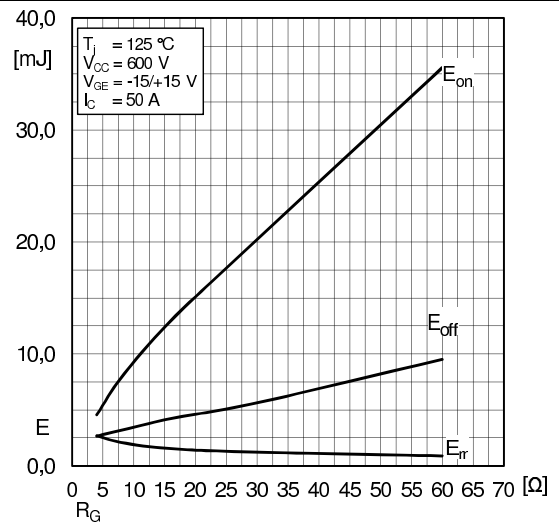


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

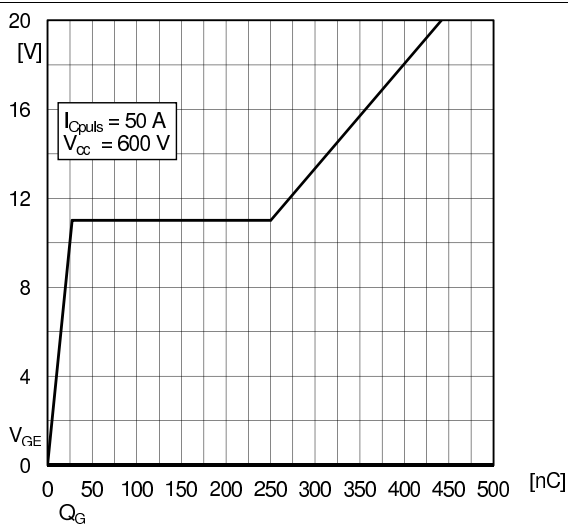


Fig. 6: Typ. gate charge characteristic

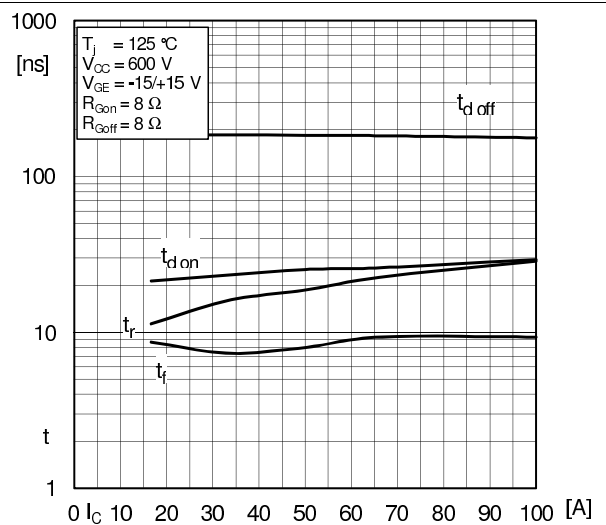


Fig. 7: Typ. switching times vs. I_C

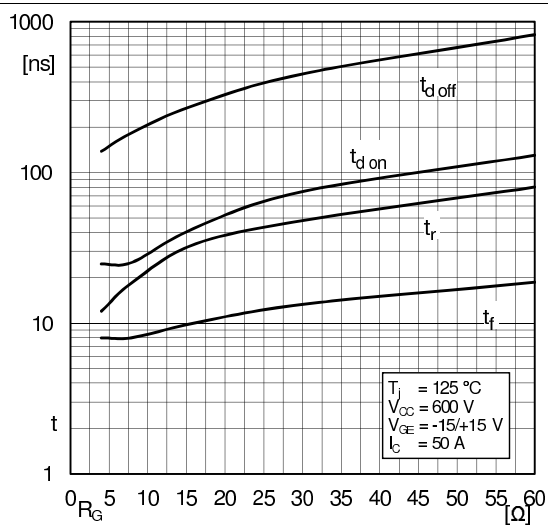


Fig. 8: Typ. switching times vs. gate resistor R_G

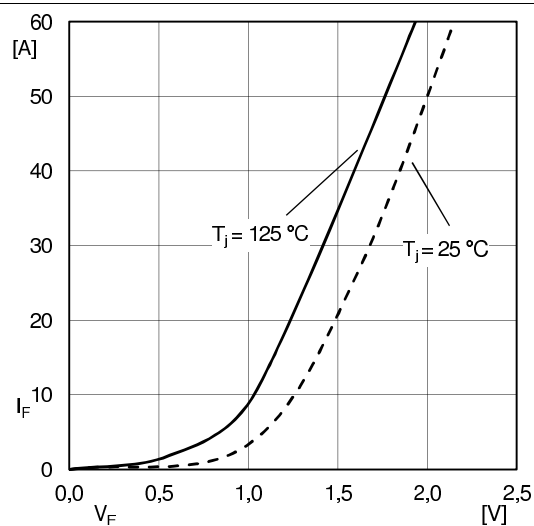
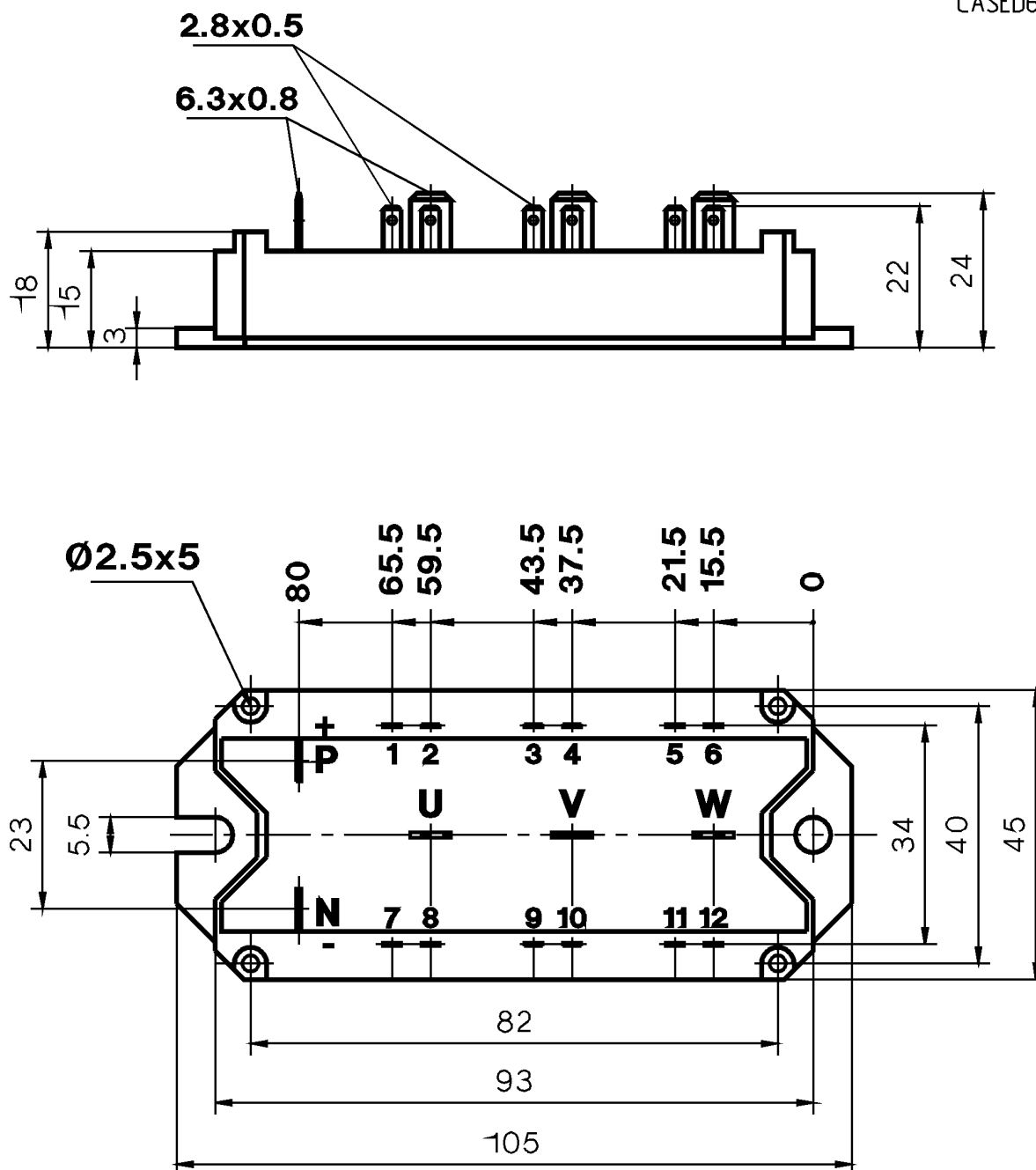
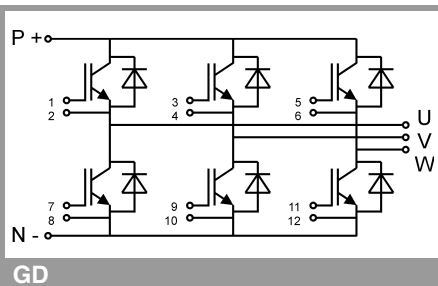


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$



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

* The specifications of our components may not be considered as an assurance of component characteristics. Components have to be tested for the respective application. Adjustments may be necessary. The use of SEMIKRON products in life support appliances and systems is subject to prior specification and written approval by SEMIKRON. We therefore strongly recommend prior consultation of our staff.