



SEMITRANS® 6

IGBT Modules

SKM25GAH125D

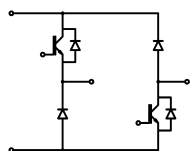
Target Data

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*

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



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Absolute Maximum Ratings				
Symbol	Conditions		Values	Unit
IGBT				
V_{CES}	$T_j = 25\text{ °C}$		1200	V
I_C	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	39	A
		$T_c = 80\text{ °C}$	27	A
I_{Cnom}			25	A
I_{CRM}	$I_{CRM} = 2 \times I_{Cnom}$		50	A
V_{GES}			-20 ... 20	V
t_{psc}	$V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$	10	μs
	$V_{GE} \leq 15\text{ V}$			
	$V_{CES} \leq 1200\text{ V}$			
T_j			-55 ... 150	$^{\circ}\text{C}$
Inverse diode				
I_F	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	47	A
		$T_c = 80\text{ °C}$	32	A
I_{Fnom}			40	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$		80	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25\text{ °C}$		410	A
T_j			-40 ... 150	$^{\circ}\text{C}$
Freewheeling diode				
I_F	$T_j = 150\text{ °C}$	$T_c = 25\text{ °C}$	47	A
		$T_c = 80\text{ °C}$	32	A
I_{Fnom}			40	A
I_{FRM}	$I_{FRM} = 2 \times I_{Fnom}$		80	A
I_{FSM}	$t_p = 10\text{ ms, sin } 180^{\circ}, T_j = 25\text{ °C}$		410	A
T_j			-40 ... 150	$^{\circ}\text{C}$
Module				
$I_{t(RMS)}$	$T_{terminal} = 80\text{ °C}$		100	A
T_{stg}			-40 ... 125	$^{\circ}\text{C}$
V_{isol}	AC sinus 50 Hz, $t = 1\text{ min}$		4000	V

Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	$I_C = 25\text{ A}$ $V_{GE} = 15\text{ V}$ 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	$T_j = 25\text{ °C}$	68.00	78.00		$\text{m}\Omega$
		$T_j = 125\text{ °C}$	76.00	90.00		$\text{m}\Omega$
$V_{GE(th)}$	$V_{GE} = V_{CE}, I_C = 1\text{ mA}$		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}	$V_{CE} = 25\text{ V}$ $V_{GE} = 0\text{ V}$	$f = 1\text{ MHz}$	1.65			nF
C_{oes}		$f = 1\text{ MHz}$	0.25			nF
C_{res}		$f = 1\text{ MHz}$	0.11			nF
Q_G	$V_{GE} = -8\text{ V...} + 20\text{ V}$		221			nC
R_{Gint}	$T_j = 25\text{ °C}$		0.00			Ω



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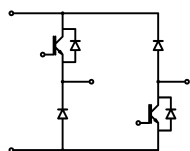
Features

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Typical Applications*

- DC/DC – converter
- Brake chopper
- Switched reluctance motor
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Characteristics						
Symbol	Conditions		min.	typ.	max.	Unit
$t_{d(on)}$	$V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$		25		ns
t_r	$I_C = 25\text{ A}$	$T_j = 125\text{ °C}$		19		ns
E_{on}	$V_{GE} = \pm 15\text{ V}$	$T_j = 125\text{ °C}$		3.9		mJ
$t_{d(off)}$	$R_{G\ on} = 16\ \Omega$	$T_j = 125\text{ °C}$		184		ns
t_f	$R_{G\ off} = 16\ \Omega$	$T_j = 125\text{ °C}$		8		ns
E_{off}		$T_j = 125\text{ °C}$		1.6		mJ
$R_{th(j-c)}$	per IGBT				0.56	K/W
Inverse diode						
$V_F = V_{EC}$	$I_F = 40\text{ A}$	$T_j = 25\text{ °C}$		2.13	2.65	V
	$V_{GE} = 0\text{ V}$	$T_j = 125\text{ °C}$		1.94	2.46	V
V_{F0}	chiplevel	$T_j = 25\text{ °C}$		1.1	1.45	V
		$T_j = 125\text{ °C}$		0.85	1.2	V
r_F	chiplevel	$T_j = 25\text{ °C}$		25.7	30.0	m Ω
		$T_j = 125\text{ °C}$		27.1	31.4	m Ω
I_{RRM}	$I_F = 25\text{ A}$	$T_j = 125\text{ °C}$				A
Q_{rr}		$T_j = 125\text{ °C}$				μC
E_{rr}	$V_{GE} = \pm 15\text{ V}$	$T_j = 125\text{ °C}$				mJ
	$V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$				
$R_{th(j-c)}$	per diode				1	K/W
Freewheeling diode						
$V_F = V_{EC}$	$I_F = 40\text{ A}$	$T_j = 25\text{ °C}$		2.00	2.5	V
	$V_{GE} = 0\text{ V}$	$T_j = 125\text{ °C}$		1.8	2.3	V
V_{F0}	chiplevel	$T_j = 25\text{ °C}$		1.1	1.45	V
		$T_j = 125\text{ °C}$		1.18	1.2	V
r_F	chiplevel	$T_j = 25\text{ °C}$		22.5	30.0	m Ω
		$T_j = 125\text{ °C}$		27.1	31.4	m Ω
I_{RRM}	$I_F = 25\text{ A}$	$T_j = 125\text{ °C}$		50		A
Q_{rr}	$di/dt_{off} = 2500\text{ A}/\mu\text{s}$	$T_j = 125\text{ °C}$		4		μC
E_{rr}	$V_{GE} = \pm 15\text{ V}$	$T_j = 125\text{ °C}$		1.1		mJ
	$V_{CC} = 600\text{ V}$	$T_j = 125\text{ °C}$				
$R_{th(j-c)}$	per Diode				1	K/W
Module						
L_{CE}					60	nH
R_{CC+EE}	terminal-chip	$T_C = 25\text{ °C}$				m Ω
		$T_C = 125\text{ °C}$				m Ω
$R_{th(c-s)}$	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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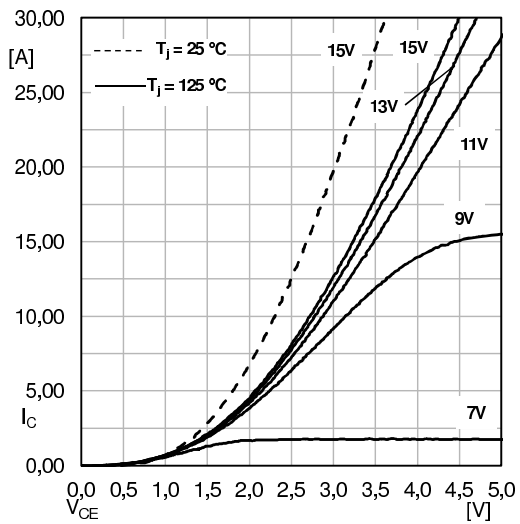


Fig. 1: Typ. output characteristic, inclusive R_{CC+EE}

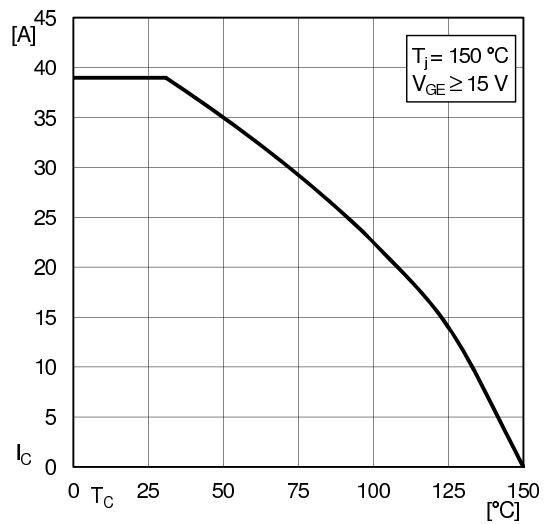


Fig. 2: Rated current vs. temperature $I_C = f(T_C)$

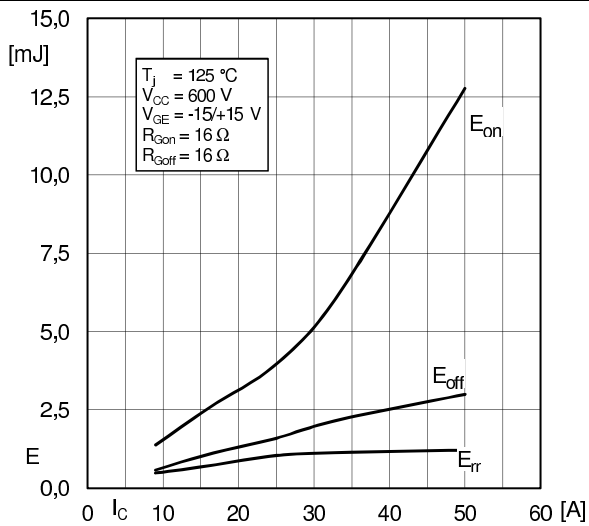


Fig. 3: Typ. turn-on /-off energy = $f(I_C)$

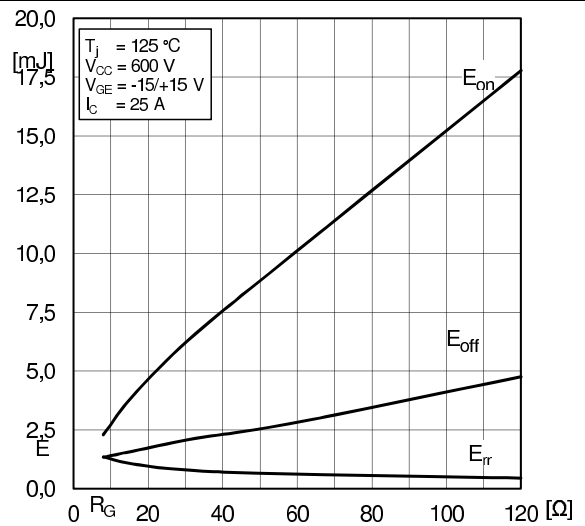


Fig. 4: Typ. turn-on /-off energy = $f(R_G)$

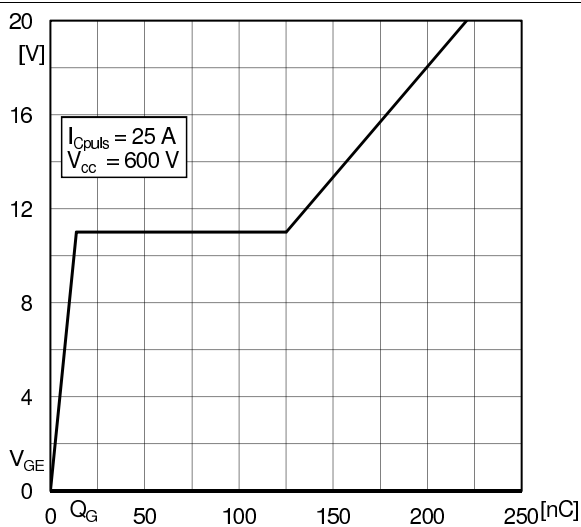


Fig. 6: Typ. gate charge characteristic

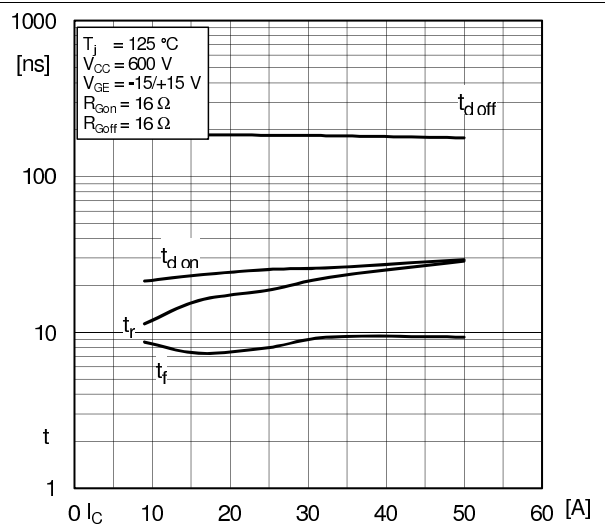


Fig. 7: Typ. switching times vs. I_C

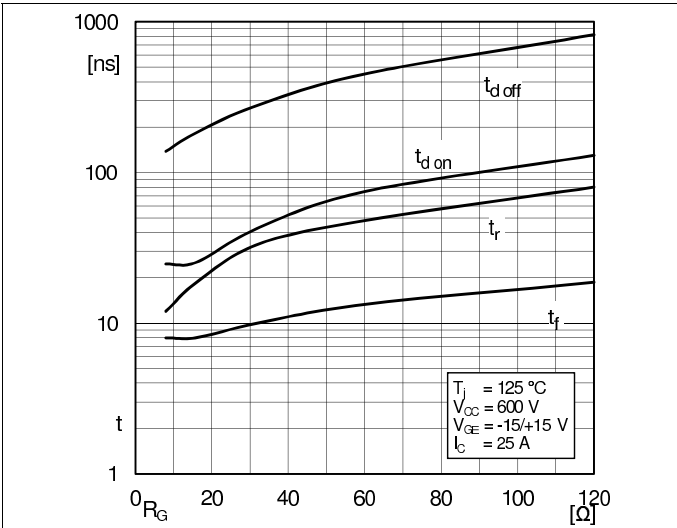


Fig. 8: Typ. switching times vs. gate resistor R_G

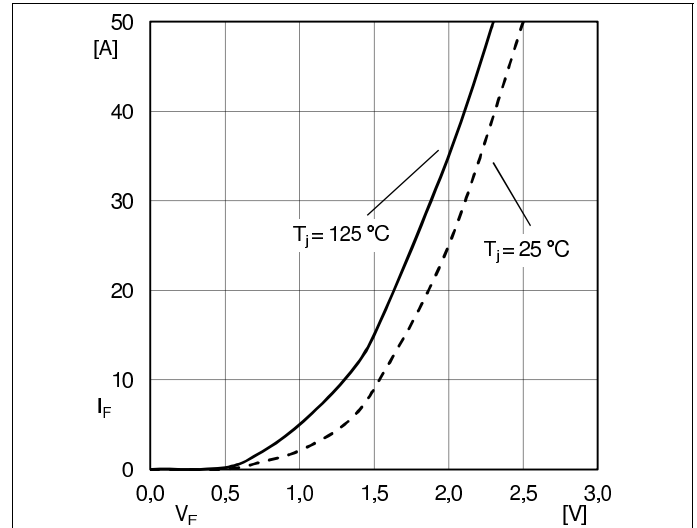
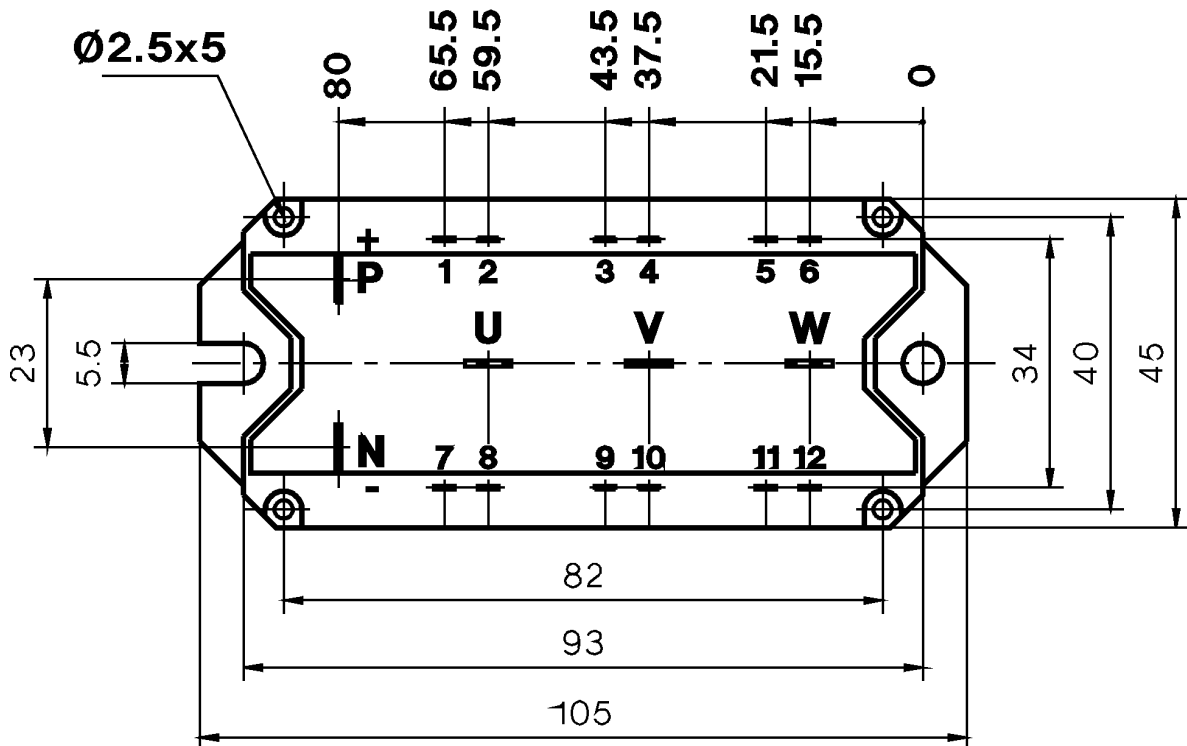
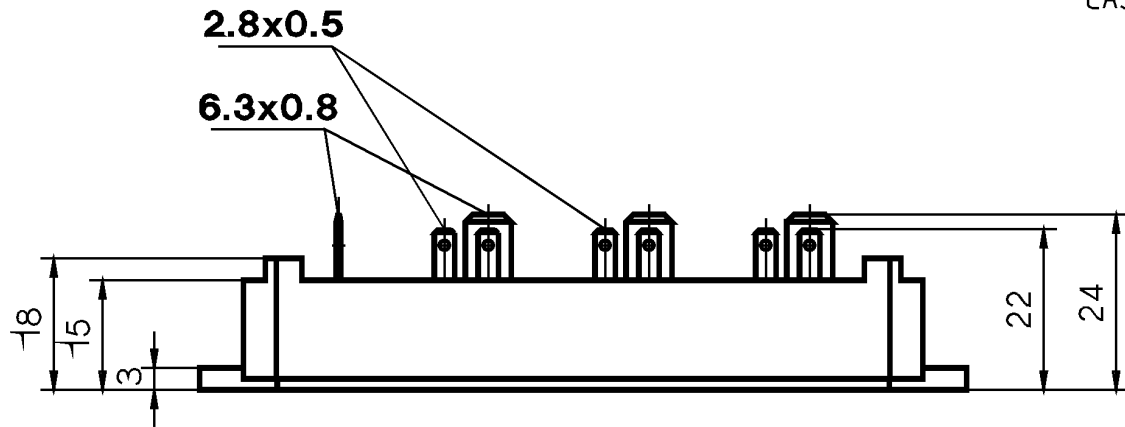
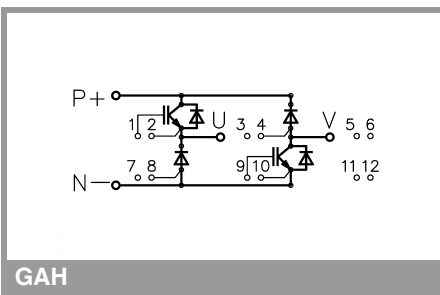


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$



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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.