

SEMIPONT™ 6

## 3-Phase Bridge Rectifier + IGBT braking chopper

SKDH116/..L105

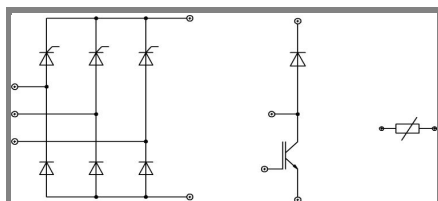
Data

### Features

- Compact design
- Two screws mounting
- Heat transfer and isolation through direct copper bonded aluminium oxide ceramic (DCB)
- High surge currents
- Up to 1600V reverse voltage
- IGBT Trench4 inside; max  $T_j=175^{\circ}\text{C}$
- CAL4F inside, max  $T_j=175^{\circ}\text{C}$
- $I_{CM}/I_{FM} = 3 \times I_{C,nom}/I_{F,nom}$
- Rectifier diode, max  $T_j=150^{\circ}\text{C}$

### Typical Applications\*

- DC drives
- Controlled filed rectifiers for DC motors
- Controlled battery charger



DH

$V_{RSM}$ V	$V_{RRM}, V_{DRM}$ V	$I_D = 110 \text{ A}$ (maximum value for continuous operation) ( $T_s = 80^{\circ}\text{C}$ )
1300	1200	SKDH116/12-L105
1700	1600	SKDH116/16-L105

Absolute Maximum Ratings		$T_s = 25^{\circ}\text{C}$ , unless otherwise specified	
Symbol	Conditions	Values	Units
<b>Bridge - Rectifier</b>			
$I_D$	$T_s = 80^{\circ}\text{C}$ ; inductive load	110	A
$I_{FSM}/I_{TSM}$	$t_p = 10 \text{ ms}$ ; $\sin 180^{\circ}$ ; $T_{jmax}$	950	A
$i^2t$	$t_p = 10 \text{ ms}$ ; $\sin 180^{\circ}$ ; $T_{jmax}$	4500	A <sup>2</sup> s
<b>IGBT - Chopper</b>			
$V_{CES}/V_{GES}$	$T_s = 25 (70)^{\circ}\text{C}$	1200 / 20	V
$I_C$	$T_s = 25 (70)^{\circ}\text{C}$	110 (80)	A
$I_{CM}$	$t_p = 1 \text{ ms}$ ; $T_s = ^{\circ}\text{C}$	315	A
<b>Freewheeling - CAL Diode</b>			
$V_{RRM}$	$T_s = 25 (70)^{\circ}\text{C}$	1200	V
$I_F$	$T_s = 25 (70)^{\circ}\text{C}$	90 (60)	A
$I_{FM}$	$t_p = 1 \text{ ms}$ ; $T_s = ^{\circ}\text{C}$	300	A
$T_{vj}$	Diode & IGBT (Thyristor)	- 40 ... + 175 (-40...+ 125)	$^{\circ}\text{C}$
$T_{stg}$		- 40 ... + 125	$^{\circ}\text{C}$
$T_{solder}$	terminals, 10 s	260	$^{\circ}\text{C}$
$V_{isol}$	a.c. (50) Hz, RMS 1 min. / 1 s	3000 / 3600	V

Characteristics		$T_s = 25^{\circ}\text{C}$ , unless otherwise specified		
Symbol	Conditions	min.	typ.	max. Units
<b>Diode - Rectifier</b>				
$V_{TO} / r_t$	$T_j = 125^{\circ}\text{C}$		0,8 / 7	V / mΩ
$R_{th(j-s)}$	per diode			1 K/W
<b>Thyristor - Rectifier</b>				
$V_{F(TO)} / r_t$	$T_j = 125^{\circ}\text{C}$		1,1 / 6	V / mΩ
$R_{th(j-s)}$	per Thyristor			0,85 K/W
$I_{GD}$	$T_j = 125^{\circ}\text{C}$ ; d.c.		5	mA
$V_{GT} / I_{GT}$	$T_j = 25^{\circ}\text{C}$			3 / 150 V / mA
$I_H / I_L$	$T_j = 25^{\circ}\text{C}$		250 / 600	mA
$(dv/dt)_{cr}$	$T_j = 125^{\circ}\text{C}$			1000 V/μs
$(di/dt)_{cr}$	$T_j = 125^{\circ}\text{C}$			100 A/μs
<b>IGBT - Chopper</b>				
$V_{CE(sat)}$	$I_C = 105 \text{ A}$ , $T_j = 25^{\circ}\text{C}$ ; $V_{GE} = 15 \text{ V}$		1,85	2,1 V
$R_{th(j-s)}$	per IGBT		0,46	K/W
$t_{d(on)} / t_r$	valid for all values: $V_{CC} = 600 \text{ V}$ ; $V_{GE} = 15 \text{ V}$ ;		97 / 185	ns
$t_{d(off)} / t_f$	$I_C = 105 \text{ A}$ ; $T_j = 150^{\circ}\text{C}$ ;		443 / 82	ns
$E_{on}+E_{off}$	$T_j = 150^{\circ}\text{C}$ ; $R_G = 3 \Omega$ ; inductive load		47,5	mJ
<b>CAL - Diode - Freewheeling</b>				
$V_{T(TO)} / r_t$	$T_j = 150^{\circ}\text{C}$		0,9 / 12,5	1,1 / 13,7 V / mΩ
$R_{th(j-s)}$	per diode		0,75	K/W
$I_{RRM}$	valid for all values:		22	A
$Q_{rr}$	$I_F = 105 \text{ A}$ ; $V_R = - -600 \text{ V}$ ; $di_F/dt = - -1700 \text{ A/μs}$		7	μC
$E_{off}$	$V_{GE} = 0 \text{ V}$ ; $T_j = 150^{\circ}\text{C}$		5,94	mJ
<b>Temperature Sensor</b>				
$R_{TS}$	$T = 25 (100)^{\circ}\text{C}$ ;		1000 (1670)	Ω
<b>Mechanical data</b>				
$M_S$	mounting Torque		2,55	3,45 Nm

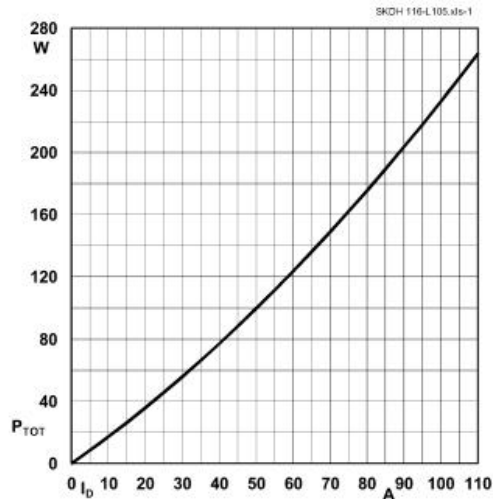


Fig. 1 Power dissipation per module vs. output current

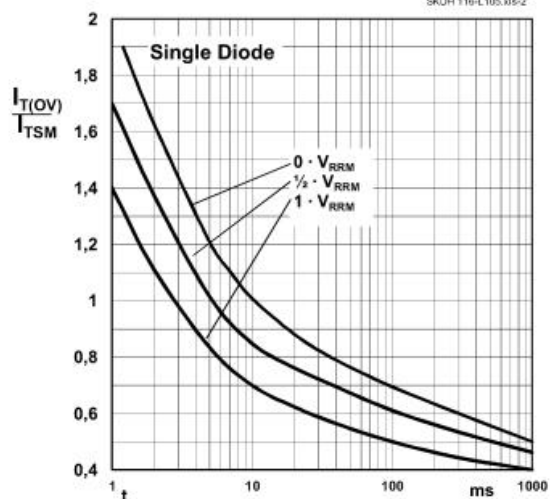


Fig. 2 Surge overload current vs. time

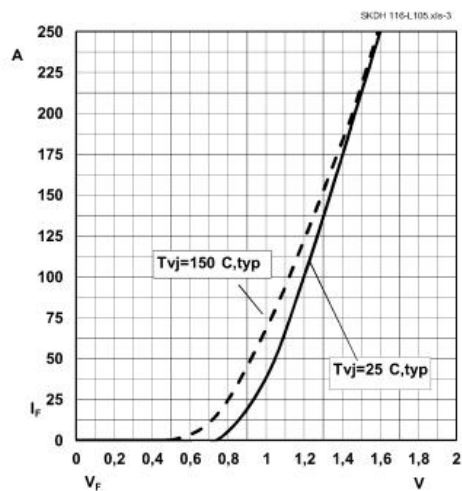


Fig. 3 Forward characteristic of single rectifier diode

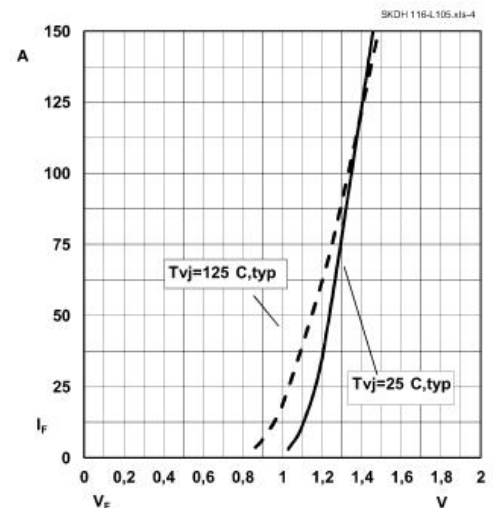


Fig. 4 Forward characteristic of single thyristor

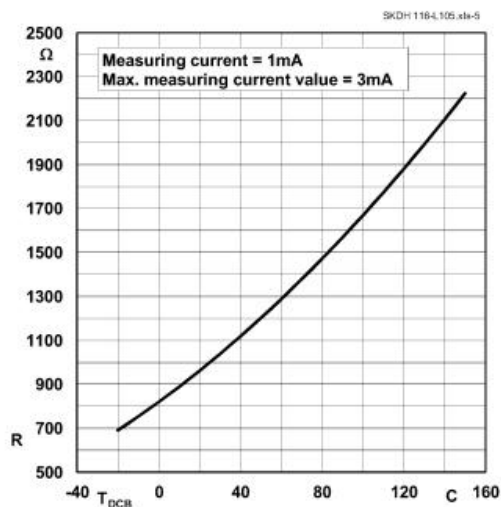


Fig. 5 Temperature sensor characteristic

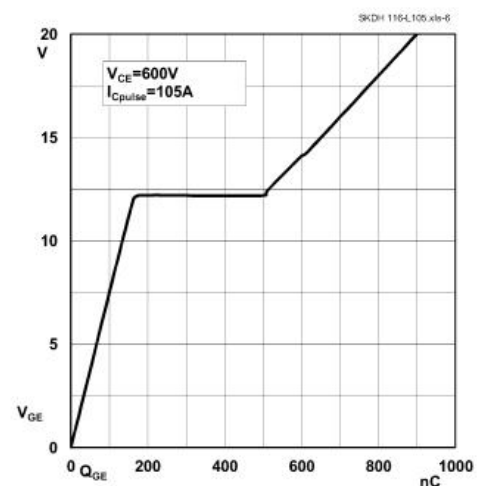


Fig. 6 Typ gate charge characteristic

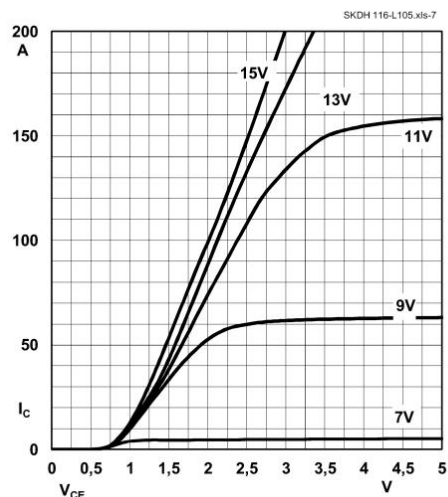


Fig. 7 Output Igbt characteristic  $I_c = f(V_{ce})$   $T_j = 25^\circ\text{C}$

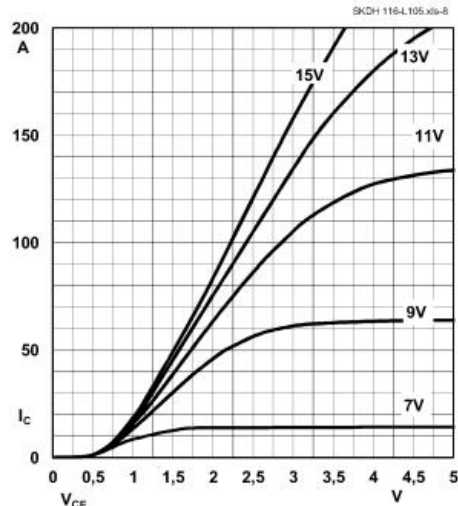


Fig. 8 Output Igbt characteristic  $I_c = f(V_{ce})$   $T_j = 125^\circ\text{C}$

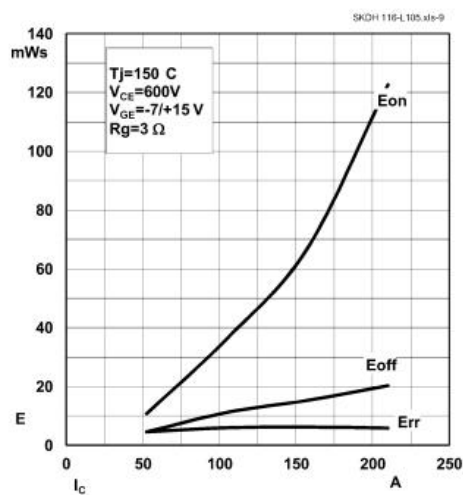


Fig. 9 Turn-on/-off energy  $= f(I_c)$

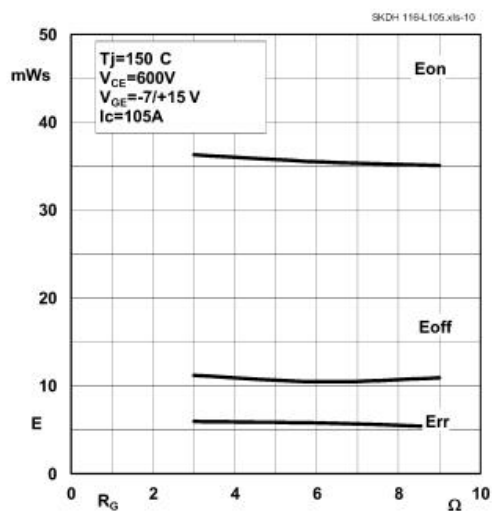


Fig. 10 turn-on/-off energy  $= f(R_g)$

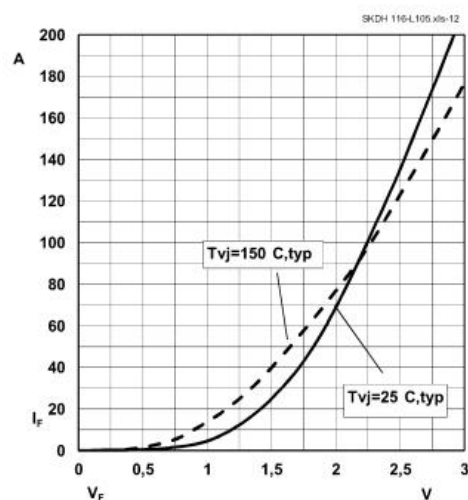
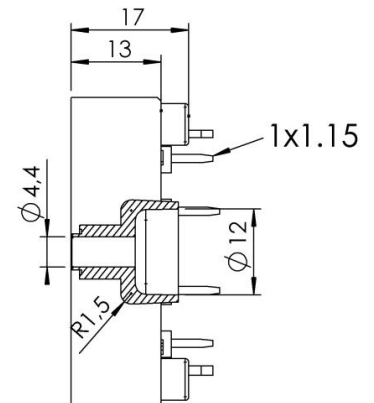
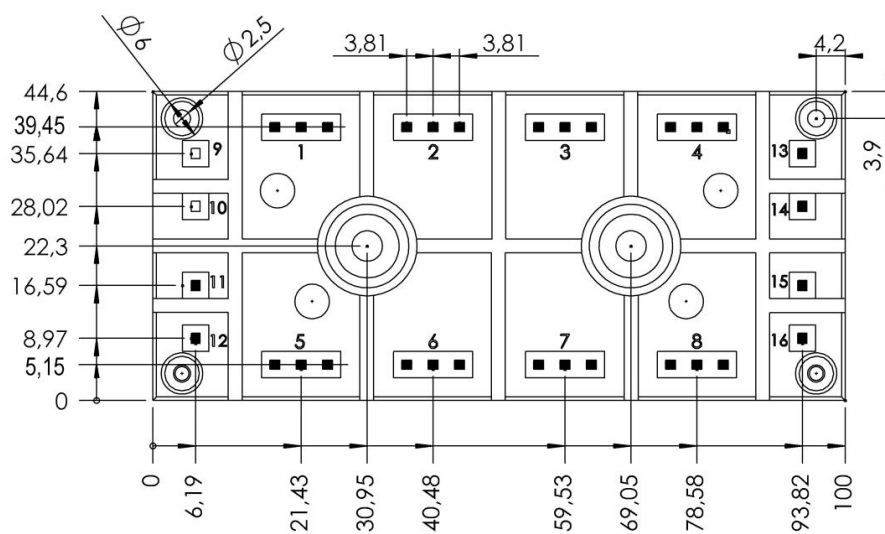
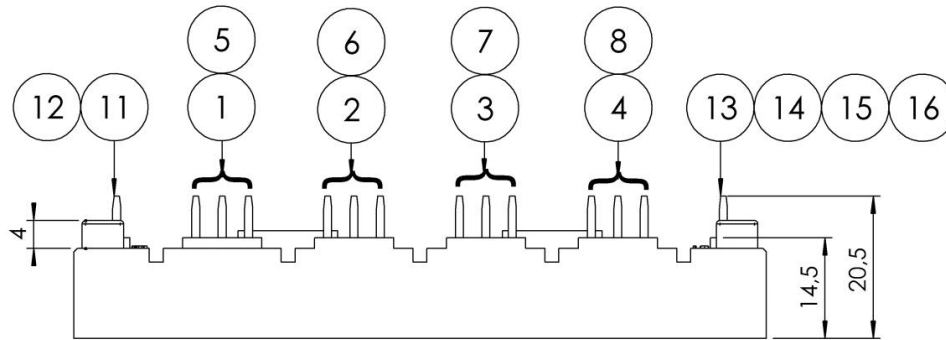


Fig. 12 Freewheeling diode forward characteristic

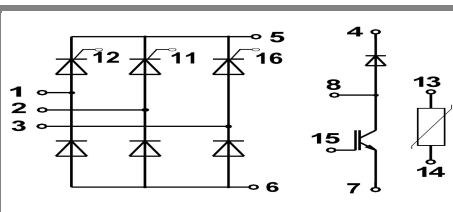
# SKDH116/..L105

UL recognized  
file no. E 63 532

Dimensions in mm



Case G 59



Case G 59

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.