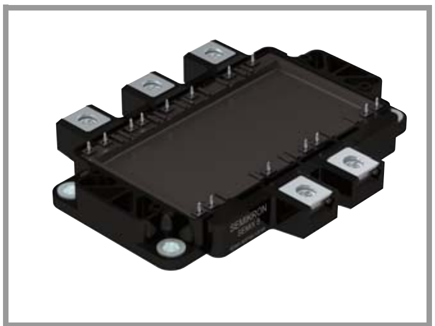


SEMiX® 5

Trench IGBT Modules

SEMiX205GD12E4V2

Features*

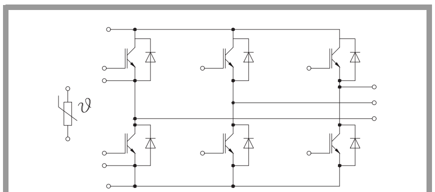
- Solderless assembly solution with PressFIT signal pins and screw power terminals
- IGBT 4 Trench Gate Technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Reliable mechanical design with injection moulded terminals and robust internal connections
- UL recognized file no. E63532
- NTC temperature sensor inside

Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to T_C=125°C max.
- Product reliability results are valid for T_{jop}=150°C
- Please refer to Semix5p Technical Explanations for mounting conditions



GD

Absolute Maximum Ratings

Symbol	Conditions		Values	Unit
IGBT				
V_{CES}	T_j = 25 °C		1200	V
I_C	T_j = 175 °C	T_c = 25 °C	313	A
		T_c = 80 °C	239	A
I_{Cnom}			200	A
I_{CRM}			600	A
V_{GES}			-20 ... 20	V
t_{psc}	V_{CC} = 800 V V_{GE} ≤ 15 V V_{CES} ≤ 1200 V	T_j = 150 °C	10	µs
T_j			-40 ... 175	°C
Inverse diode				
V_{RRM}	T_j = 25 °C		1200	V
I_F	T_j = 175 °C	T_c = 25 °C	224	A
		T_c = 80 °C	167	A
I_{FRM}			400	A
I_{FSM}	t_p = 10 ms, sin 180°, T_j = 25 °C		990	A
T_j			-40 ... 175	°C
Module				
$I_{t(RMS)}$			300	A
T_{stg}	module without TIM		-40 ... 125	°C
V_{isol}	AC sinus 50Hz, t = 1 min		4000	V

Characteristics

Symbol	Conditions		min.	typ.	max.	Unit
IGBT						
$V_{CE(sat)}$	I_C = 200 A V_{GE} = 15 V chiplevel	T_j = 25 °C		1.80	2.05	V
		T_j = 150 °C		2.05	2.30	V
V_{CE0}	chiplevel	T_j = 25 °C		0.87	1.01	V
		T_j = 150 °C		0.77	0.90	V
r_{CE}	V_{GE} = 15 V chiplevel	T_j = 25 °C		4.7	5.2	mΩ
		T_j = 150 °C		6.4	7.0	mΩ
$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 7.4 mA		5.1	5.8	6.3	V
I_{CES}	V_{GE} = 0 V, V_{CE} = 1200 V, T_j = 25 °C				2.6	mA
C_{ies}	V_{CE} = 25 V V_{GE} = 0 V	f = 1 MHz		12.5		nF
C_{oes}		f = 1 MHz		-		nF
C_{res}		f = 1 MHz		0.68		nF
Q_G	V_{GE} = - 15V...+ 15 V			2087		nC
R_{Gint}	T_j = 25 °C			3.5		Ω
$t_{d(on)}$	V_{CC} = 600 V I_C = 200 A V_{GE} = +15/-15 V $R_{G\ on}$ = 1 Ω $R_{G\ off}$ = 1 Ω di/dt_{on} = 4500 A/µs di/dt_{off} = 1353 A/µs	T_j = 150 °C		145		ns
t_r		T_j = 150 °C		43		ns
E_{on}		T_j = 150 °C		14		mJ
$t_{d(off)}$		T_j = 150 °C		457		ns
t_f		T_j = 150 °C		82		ns
E_{off}		T_j = 150 °C		22.8		mJ
$R_{th(j-c)}$	per IGBT				0.15	K/W
$R_{th(c-s)}$	per IGBT (λgrease=0.81 W/mK, thickness 50-100µm)			0.055		K/W
$R_{th(c-s)}$	per IGBT (λ=3.4 W/mK)			t.b.d.		K/W

SEMiX® 5

Trench IGBT Modules

SEMiX205GD12E4V2

Features*

- Solderless assembly solution with PressFIT signal pins and screw power terminals
- IGBT 4 Trench Gate Technology
- $V_{CE(sat)}$ with positive temperature coefficient
- Low inductance case
- Reliable mechanical design with injection moulded terminals and robust internal connections
- UL recognized file no. E63532
- NTC temperature sensor inside

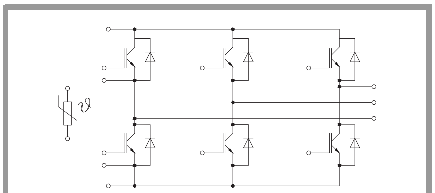
Typical Applications

- AC inverter drives
- UPS
- Electronic Welding

Remarks

- Case temperature limited to T_C=125°C max.
- Product reliability results are valid for T_{jop}=150°C
- Please refer to Semix5p Technical Explanations for mounting conditions

Characteristics						
Symbol	**Conditions**		**min.**	**typ.**	**max.**	**Unit**
Inverse diode						
$V_F = V_{EC}$	I_F = 200 A V_{GE} = 0 V chiplevel	T_j = 25 °C		2.20	2.52	V
		T_j = 150 °C		2.15	2.47	V
V_{F0}	chiplevel	T_j = 25 °C		1.30	1.50	V
		T_j = 150 °C		0.90	1.10	V
r_F	chiplevel	T_j = 25 °C		4.5	5.1	mΩ
		T_j = 150 °C		6.3	6.9	mΩ
I_{RRM}	I_F = 200 A di/dt_{off} = 4500 A/µs V_{GE} = -15 V V_{CC} = 600 V	T_j = 150 °C		250		A
Q_{rr}		T_j = 150 °C		37		µC
E_{rr}		T_j = 150 °C		16		mJ
$R_{th(j-c)}$	per diode				0.27	K/W
$R_{th(c-s)}$	per diode (λgrease=0.81 W/mK, thickness 50-100µm)			0.065		K/W
$R_{th(c-s)}$	per diode (λ=3.4 W/mK)			t.b.d.		K/W
Module						
L_{CE}				20		nH
$R_{CC'+EE'}$	measured per switch	T_C = 25 °C		1.2		mΩ
		T_C = 125 °C		1.65		mΩ
$R_{th(c-s)1}$	calculated without thermal coupling			0.005		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module (λ_{grease}=0.81 W/(m*K))			0.0081		K/W
$R_{th(c-s)2}$	including thermal coupling, T_s underneath module, pre-applied phase change material			t.b.d.		K/W
M_s	to heat sink (M5)		3		6	Nm
M_t		to terminals (M6)	3		6	Nm
						Nm
w				398		g
Temperature Sensor						
R_{100}	T_c=100°C (R_{25}=5 kΩ)			493 ± 5%		Ω
$B_{100/125}$	$R_{(T)}=R_{100}exp[B_{100/125}(1/T-1/T_{100})]$; T[K];			3550 ±2%		K



GD

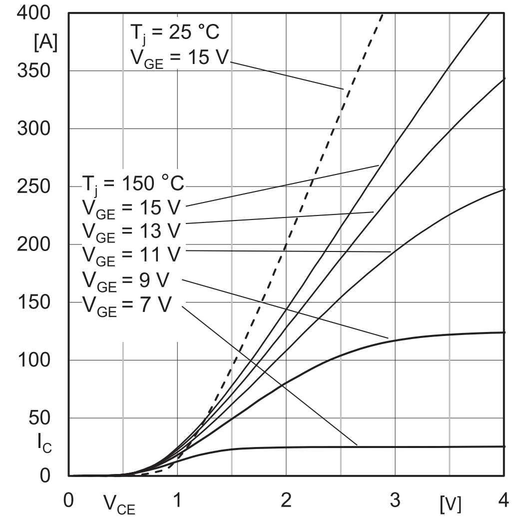


Fig. 1: Typ. output characteristic, inclusive $R_{CC'+ EE'}$

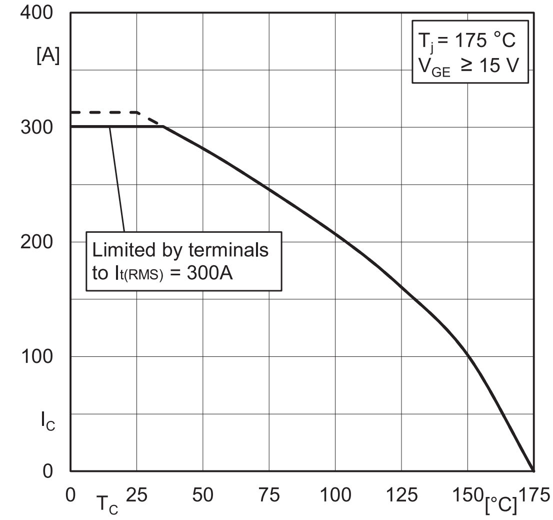


Fig. 2: Rated current vs. temperature $I_c = f(T_c)$

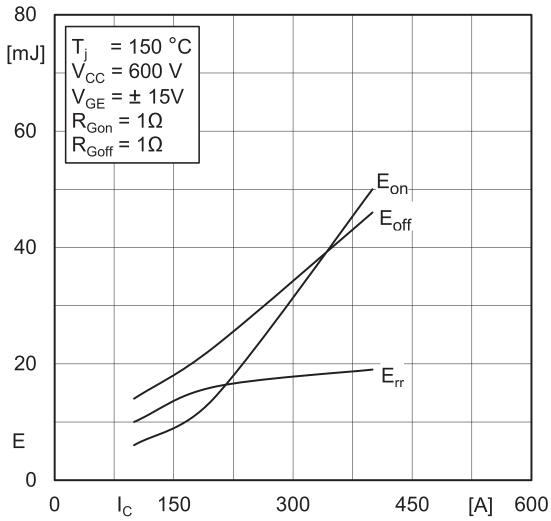


Fig. 3: Typ. turn-on /-off energy = f (I_C)

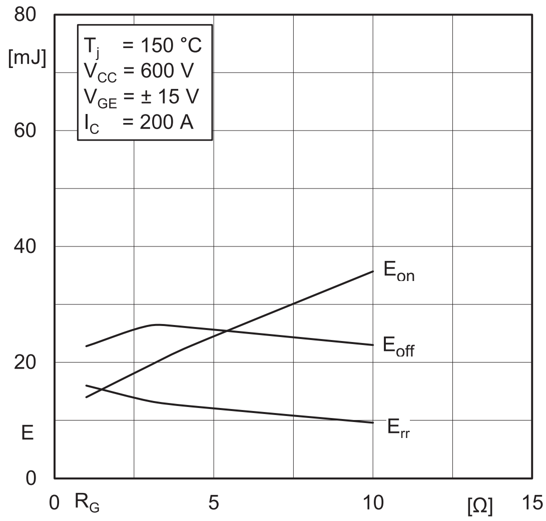


Fig. 4: Typ. turn-on /-off energy = f (R_G)

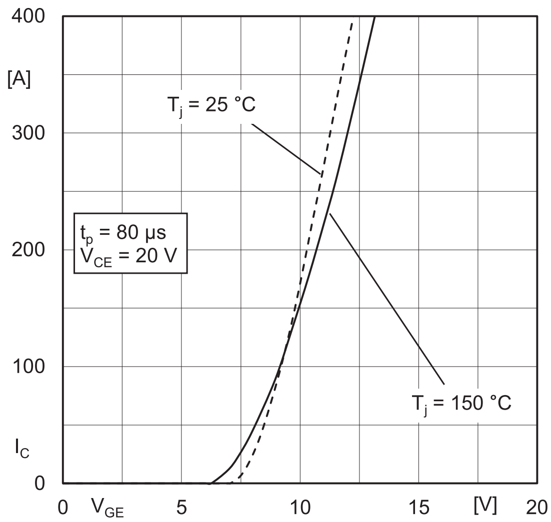


Fig. 5: Typ. transfer characteristic

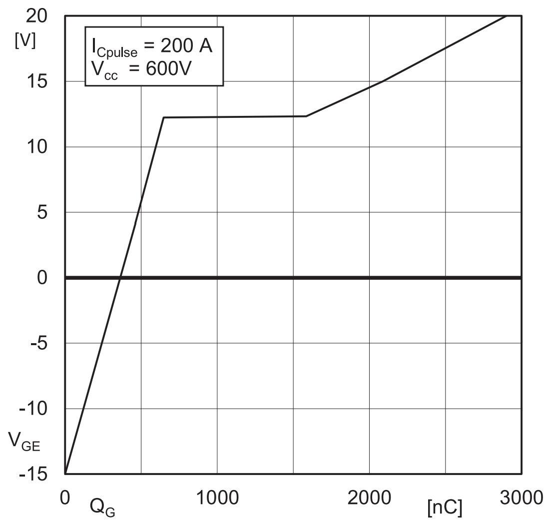


Fig. 6: Typ. gate charge characteristic

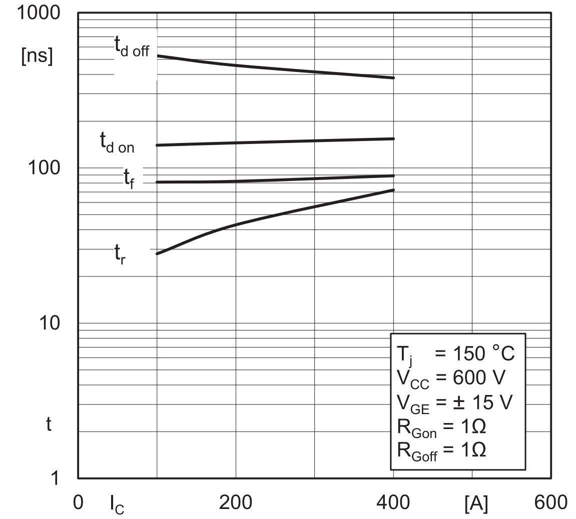


Fig. 7: Typ. switching times vs. I_C

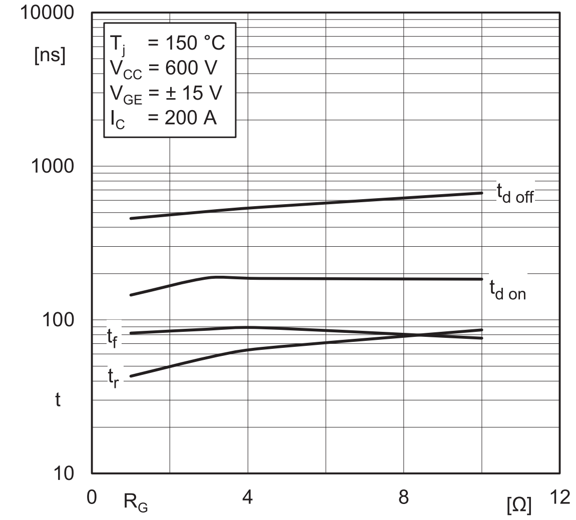


Fig. 8: Typ. switching times vs. gate resistor R_G

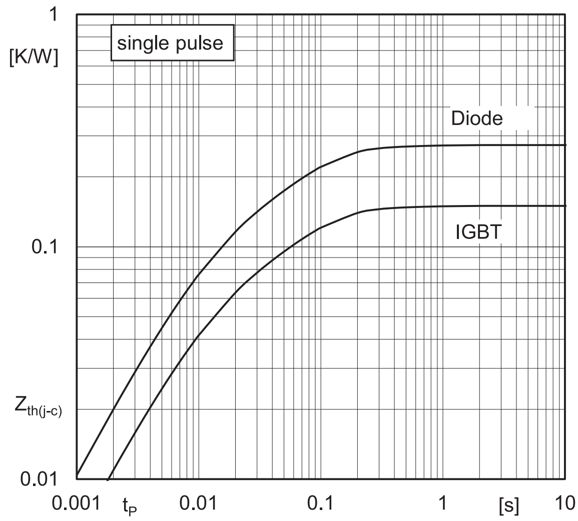


Fig. 9: Typ. transient thermal impedance

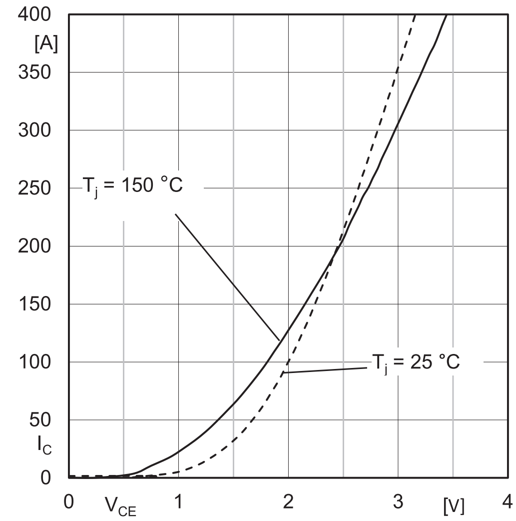


Fig. 10: Typ. CAL diode forward charact., incl. $R_{CC'+EE'}$

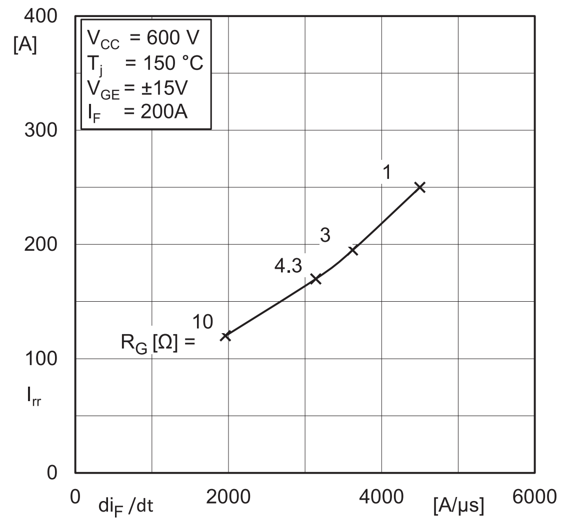
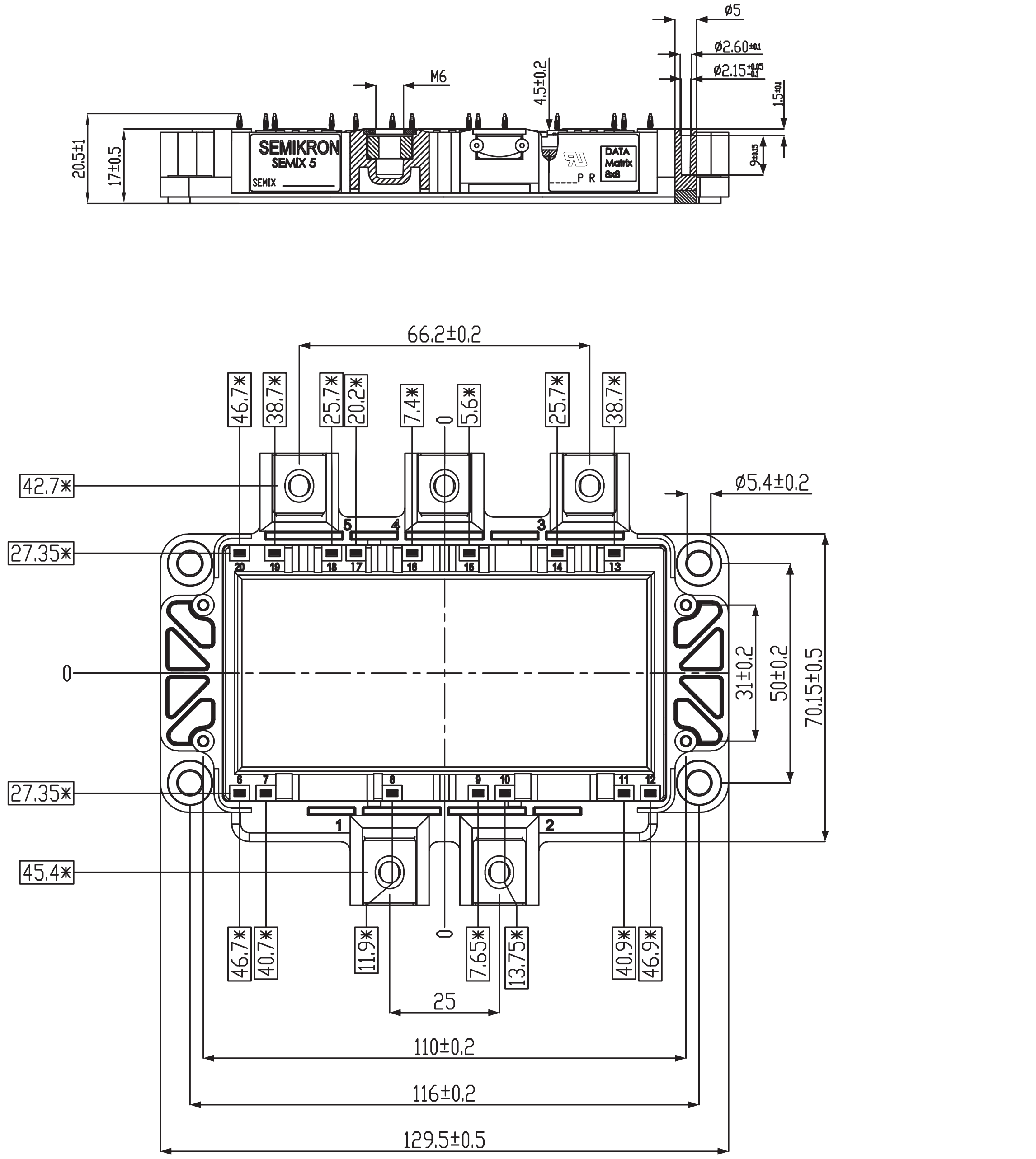


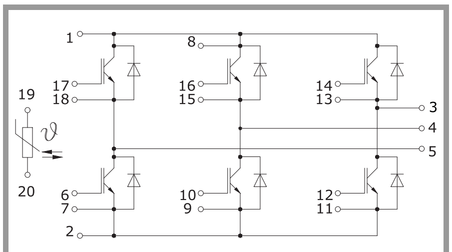
Fig. 11: Typ. CAL diode peak reverse recovery current



* = Dimensions in mm with tolerance of ⌖ Ø 0.4

For technical details please refer
to SEMiX(R)5 Mounting Instruction

SEMiX5p



GD

This is an electrostatic discharge sensitive device (ESDS) due to international standard IEC 61340.

***IMPORTANT INFORMATION AND WARNINGS**

The specifications of SEMIKRON products may not be considered as guarantee or assurance of product characteristics ("Beschaffenheitsgarantie"). The specifications of SEMIKRON products describe only the usual characteristics of products to be expected in typical applications, which may still vary depending on the specific application. Therefore, products must be tested for the respective application in advance. Application adjustments may be necessary. The user of SEMIKRON products is responsible for the safety of their applications embedding SEMIKRON products and must take adequate safety measures to prevent the applications from causing a physical injury, fire or other problem if any of SEMIKRON products become faulty. The user is responsible to make sure that the application design is compliant with all applicable laws, regulations, norms and standards. Except as otherwise explicitly approved by SEMIKRON in a written document signed by authorized representatives of SEMIKRON, SEMIKRON products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury. No representation or warranty is given and no liability is assumed with respect to the accuracy, completeness and/or use of any information herein, including without limitation, warranties of non-infringement of intellectual property rights of any third party. SEMIKRON does not assume any liability arising out of the applications or use of any product; neither does it convey any license under its patent rights, copyrights, trade secrets or other intellectual property rights, nor the rights of others. SEMIKRON makes no representation or warranty of non-infringement or alleged non-infringement of intellectual property rights of any third party which may arise from applications. Due to technical requirements our products may contain dangerous substances. For information on the types in question please contact the nearest SEMIKRON sales office. This document supersedes and replaces all information previously supplied and may be superseded by updates. SEMIKRON reserves the right to make changes.

