

1. General description

Planar passivated Silicon Controlled Rectifier (SCR) module in TO-240AA for use in applications requiring high blocking voltage capability, high inrush current capability and high thermal cycling performance.

2. Features and benefits

- High blocking voltage capability
- High thermal cycling performance
- Planar passivated for voltage ruggedness and reliability
- Package meets UL certification
- Package is RoHS compliant
- Industry standard outline
- Soldering pins for PCB mounting
- Copper base plate
- Cathode Kelvin contacts provided
- UL1557 certified (Document number E346397)

3. Applications

- Softstart AC motor control
- DC Motor control
- AC power control
- Power converter
- Temperature control
- Lighting control

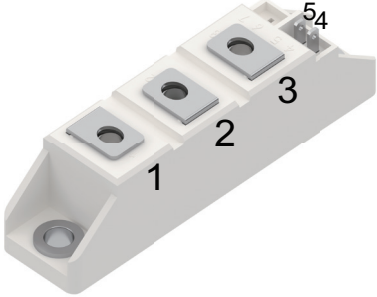
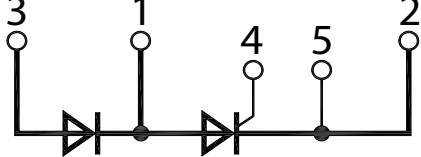
4. Quick reference data

Table 1. Quick reference data

Symbol	Parameter	Conditions	Notes	Values			Unit
Absolute maximum rating							
V_{DRM}	repetitive peak forward voltage			1600			V
V_{RRM}	repetitive peak reverse voltage			1600			V
$I_{T(RMS)}$	RMS on-state current	half sine wave		125			A
$I_{T(AV)}/I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse		80			A
I_{TSM}/I_{FSM}	non-repetitive peak on-state current	half sine wave; $T_{J(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$		1700			A
		half sine wave; $T_{J(init)} = 150\text{ °C}$; $t_p = 10\text{ ms}$		1400			A
		half sine wave; $T_{J(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$		1850			A
		half sine wave; $T_{J(init)} = 150\text{ °C}$; $t_p = 8.3\text{ ms}$		1500			A
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 25\text{ °C}$		30	-	100	mA
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}$; $I_T = 0.1\text{ A}$; $T_J = 25\text{ °C}$		-	0.70	1.20	V
V_T	on-state voltage	$I_T = 80\text{ A}$; $T_J = 25\text{ °C}$		-	-	1.29	V
V_F	forward voltage	$I_F = 80\text{ A}$; $T_J = 25\text{ °C}$		-	-	1.29	V

5. Pinning information

Table 2. Pinning information

Simplified outline	Graphic symbol
	

6. Ordering information

Table 3. Ordering information

Type number	Package Name	Orderable part number	Packing method	Small packing quantity	Package version	Package issue date
WHMH80T16	TO-240AA	WHMH80T16T	Tray	12	WeEnPACK-20mmPHB-D	18-Apr-2024

7. Marking

Table 4. Marking codes

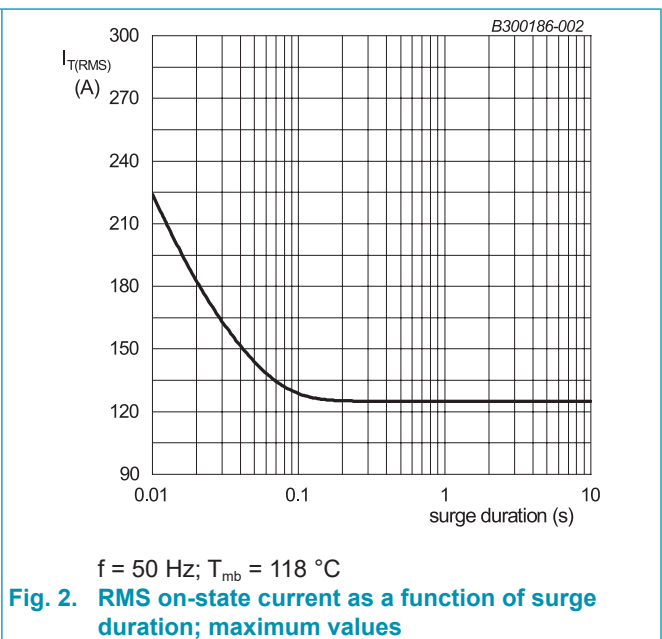
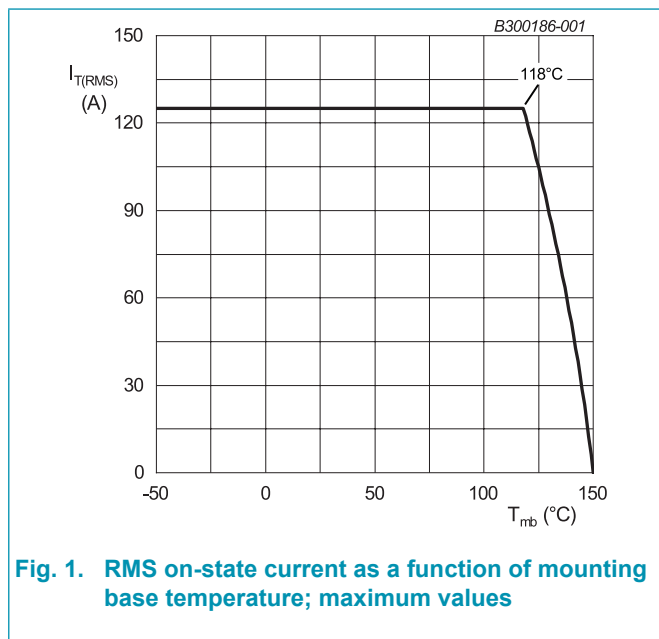
Type number	Marking codes
WHMH80T16	WHMH80T16

8. Limiting values

Table 5. Limiting values

In accordance with the Absolute Maximum Rating System (IEC 60134).

Symbol	Parameter	Conditions	Notes	Values	Unit
V_{DRM}	repetitive peak forward voltage			1600	V
V_{RRM}	repetitive peak reverse voltage			1600	V
$I_{T(RMS)}$	RMS on-state current	half sine wave		125	A
$I_{T(AV)}/I_{F(AV)}$	average forward current	$\delta = 0.5$; square-wave pulse		80	A
I_{TSM}/I_{FSM}	non-repetitive peak onstate current	half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 10\text{ ms}$		1700	A
		half sine wave; $T_{j(init)} = 150\text{ °C}$; $t_p = 10\text{ ms}$		1400	A
		half sine wave; $T_{j(init)} = 25\text{ °C}$; $t_p = 8.3\text{ ms}$		1850	A
		half sine wave; $T_{j(init)} = 150\text{ °C}$; $t_p = 8.3\text{ ms}$		1500	A
I^2t	I^2t for fusing	$t_p = 10\text{ ms}$; sine-wave pulse		12.8	kA ² s
di_T/dt	rate of rise of on-state current	$I_G = 200\text{ mA}$; $T_j = 150\text{ °C}$		200	A/ μ s
I_{GM}	peak gate current			10	A
V_{RGM}	peak reverse gate voltage			5	V
P_{GM}	peak gate power			20	W
$P_{G(AV)}$	average gate power	over any 20 ms period		0.5	W
T_{vj}	virtual junction temperature			-40 to 150	°C
T_{op}	operation temperature			-40 to 130	°C
T_{stg}	storage temperature			-40 to 130	°C



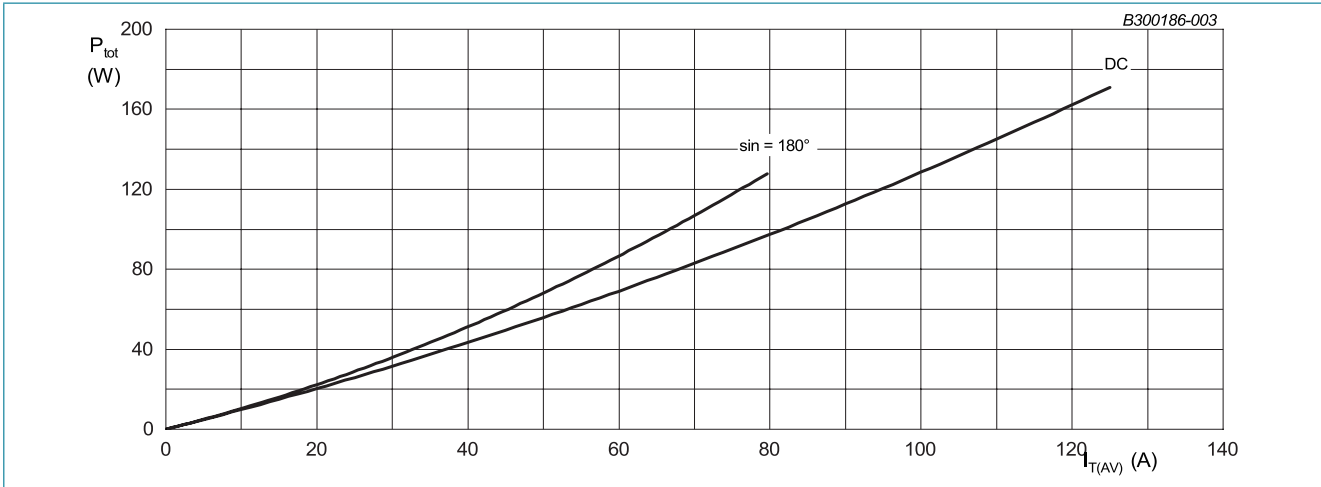


Fig. 3. Total power dissipation as a function of average on-state current; maximum values; per thyristor

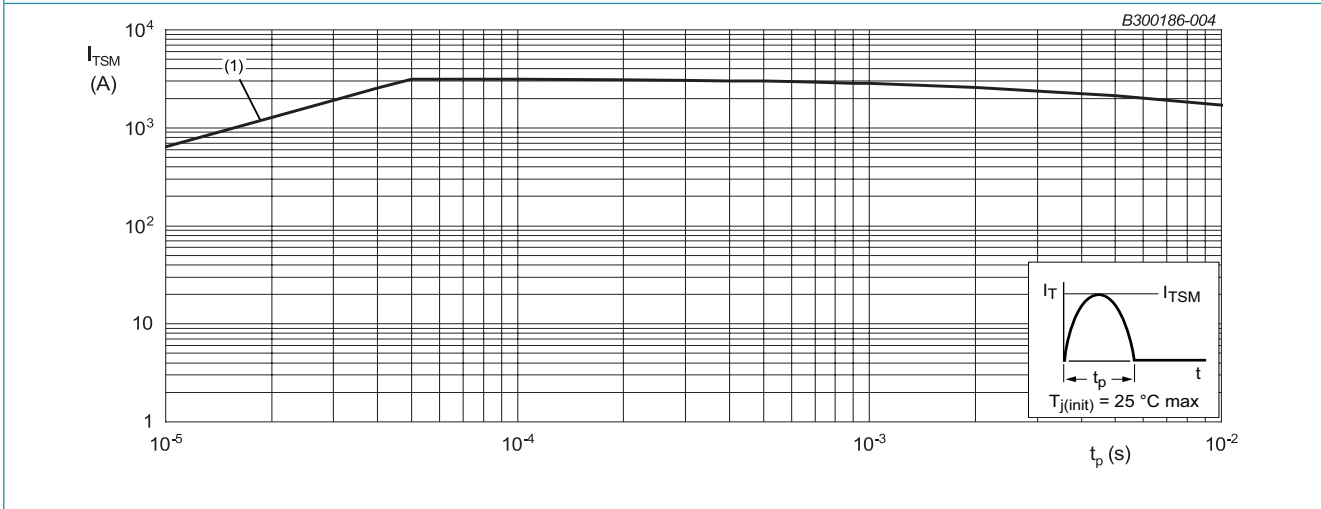


Fig. 4. Non-repetitive peak on-state current as a function of pulse width; maximum values

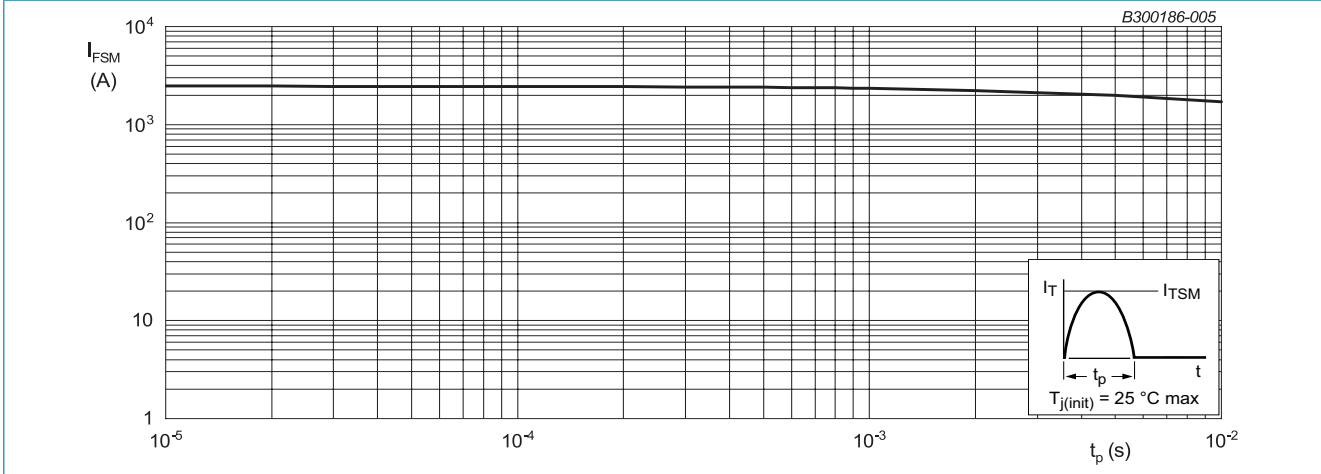


Fig. 5. Non-repetitive peak on-state current as a function of pulse width; maximum values

9. Thermal characteristics

Table 6. Thermal characteristics

Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
$R_{th(j-c)}$	thermal resistance from junction to case	per thyristor/diode		-	-	0.25	K/W
		per module		-	-	0.125	K/W
$R_{th(j-h)}$	thermal resistance from junction to heatsink	per thyristor/diode		-	-	0.48	K/W
		per module		-	-	0.24	K/W

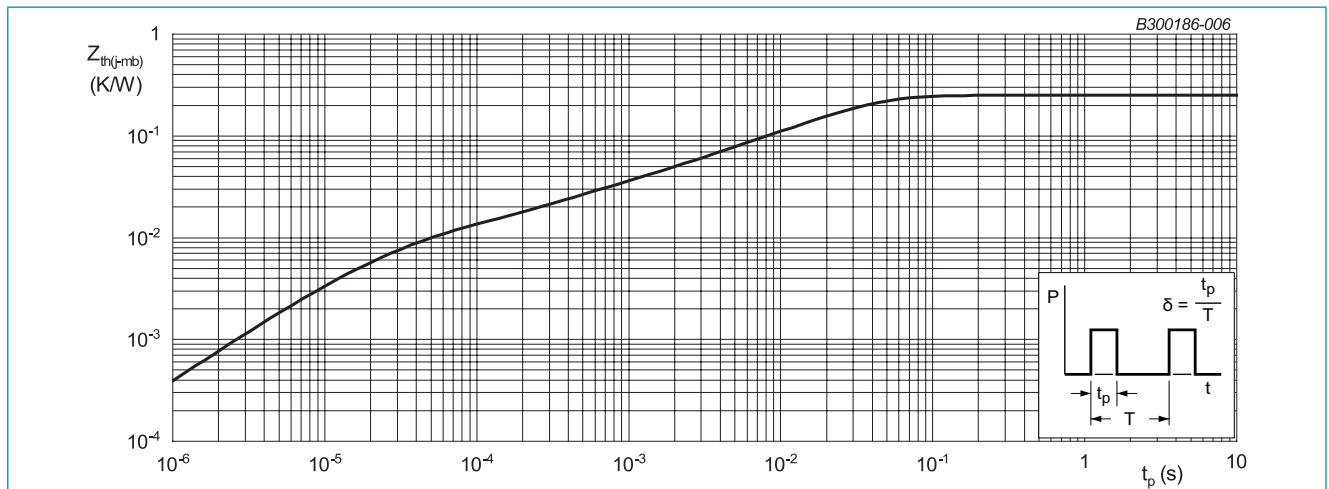


Fig. 6. Transient thermal impedance from junction to mounting base as a function of pulse duration; per thyristor

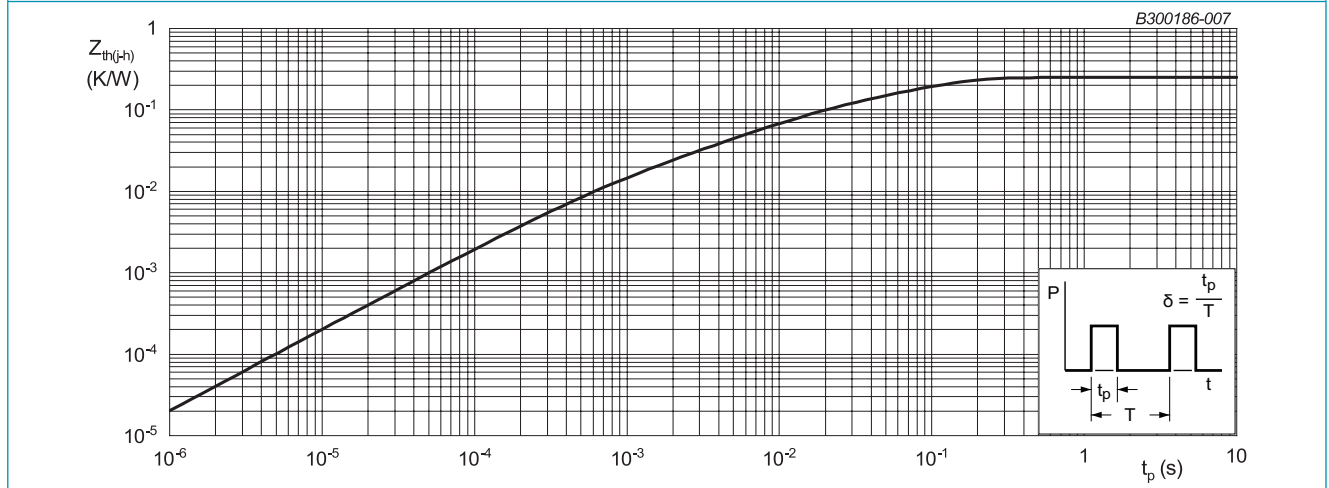


Fig. 7. Transient thermal impedance from junction to mounting base as a function of pulse duration; per diode

10. Package characteristics

Table 7. Isolation characteristics

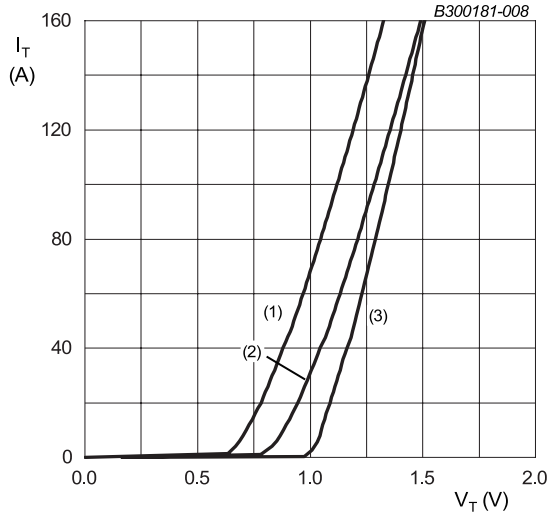
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
V_{isol}	isolation voltage	50/60 Hz; RMS; $I_{ISOL} \leq 1 \text{ mA}$; $t = 1 \text{ second}$; AC		-	-	3600	V
		50/60 Hz; RMS; $I_{ISOL} \leq 1 \text{ mA}$; $t = 1 \text{ minute}$; AC		-	-	3000	V

11. Characteristics

Table 8. Characteristics

Thyristor							
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
I_{GT}	gate trigger current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ °C}$		30	-	100	mA
V_{GT}	gate trigger voltage	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ °C}$		-	0.70	1.20	V
		$V_D = 2/3 V_{DRM}; I_T = 0.1\text{ A}; T_j = 150\text{ °C}$		0.25	0.4	-	V
I_{GD}	gate non-trigger current	$T_j = 150\text{ °C}$		-	-	8.5	mA
V_{GD}	gate non-trigger voltage	$T_j = 150\text{ °C}$		-	-	0.2	V
I_L	latching current	$V_D = 12\text{ V}; I_T = 0.1\text{ A}; T_j = 25\text{ °C}$		-	-	300	mA
I_H	holding current	$V_D = 12\text{ V}; T_j = 25\text{ °C}$		-	-	200	mA
V_T	on-state voltage	$I_T = 80\text{ A}; T_j = 25\text{ °C}$		-	-	1.29	V
V_{TO}	threshold voltage	$T_j = 150\text{ °C}$		-	-	0.952	V
r_T	slope resistance	$T_j = 150\text{ °C}$		-	-	3.3	mΩ
I_D	off-state current	$V_D = 1600\text{ V}; T_j = 25\text{ °C}$		-	-	100	μA
		$V_D = 1600\text{ V}; T_j = 150\text{ °C}$		-	-	15	mA
I_R	reverse current	$V_R = 1600\text{ V}; T_j = 25\text{ °C}$		-	-	100	μA
		$V_R = 1600\text{ V}; T_j = 150\text{ °C}$		-	-	15	mA
Dynamic characteristics							
dV_D/dt	rate of rise of off-state voltage	$V_{DM} = 1072\text{ V}; T_j = 150\text{ °C}; (V_{DM} = 67\% \text{ of } V_{DRM}); \text{exponential waveform}; \text{gate open circuit}$		1500	-	-	V/μs
t_{gt}	gate-controlled turn-on time	$I_{TM} = 40\text{ A}; V_D = 800\text{ V}; I_G = 100\text{ mA}; (dI_G/dt)_M = 1\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$		-	2	-	μs
t_q	commutated turn-off time	$I_{TM} = 2\text{ A}; t_p = 50\text{ μs}; dV/dt = 5\text{ V}/\mu\text{s}; dI/dt = 30\text{ A}/\mu\text{s}; T_j = 25\text{ °C}$		-	150	-	μs

Diode							
Symbol	Parameter	Conditions	Notes	Min	Typ	Max	Unit
Static characteristics							
V_F	forward voltage	$I_F = 80\text{ A}; T_j = 25\text{ °C}$		-	1.05	1.23	V
		$I_F = 80\text{ A}; T_j = 150\text{ °C}$		-	-	1.12	V
V_O	threshold voltage	$T_j = 150\text{ °C}$		-	-	0.889	V
R_S	slope resistance	$T_j = 150\text{ °C}$		-	-	3.0	mΩ
I_R	reverse current	$V_R = 1600\text{ V}; T_j = 25\text{ °C}$		-	-	100	μA
		$V_R = 1600\text{ V}; T_j = 150\text{ °C}$		-	-	15	mA



$V_{T0} = 0.952 \text{ V}; r_T = 0.0033 \ \Omega$
 (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig. 8. Thyristor on-state current as a function of on-state voltage

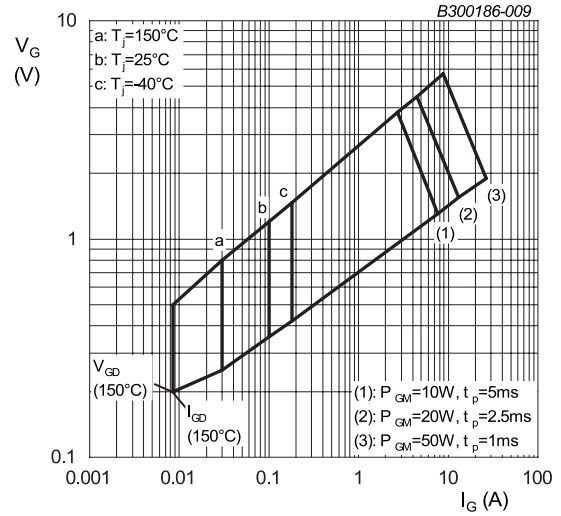
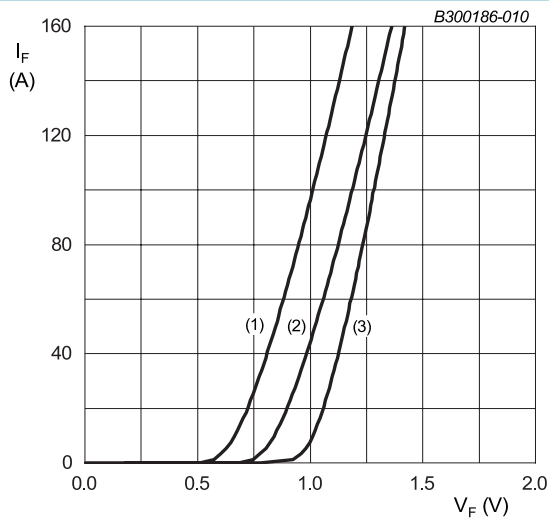


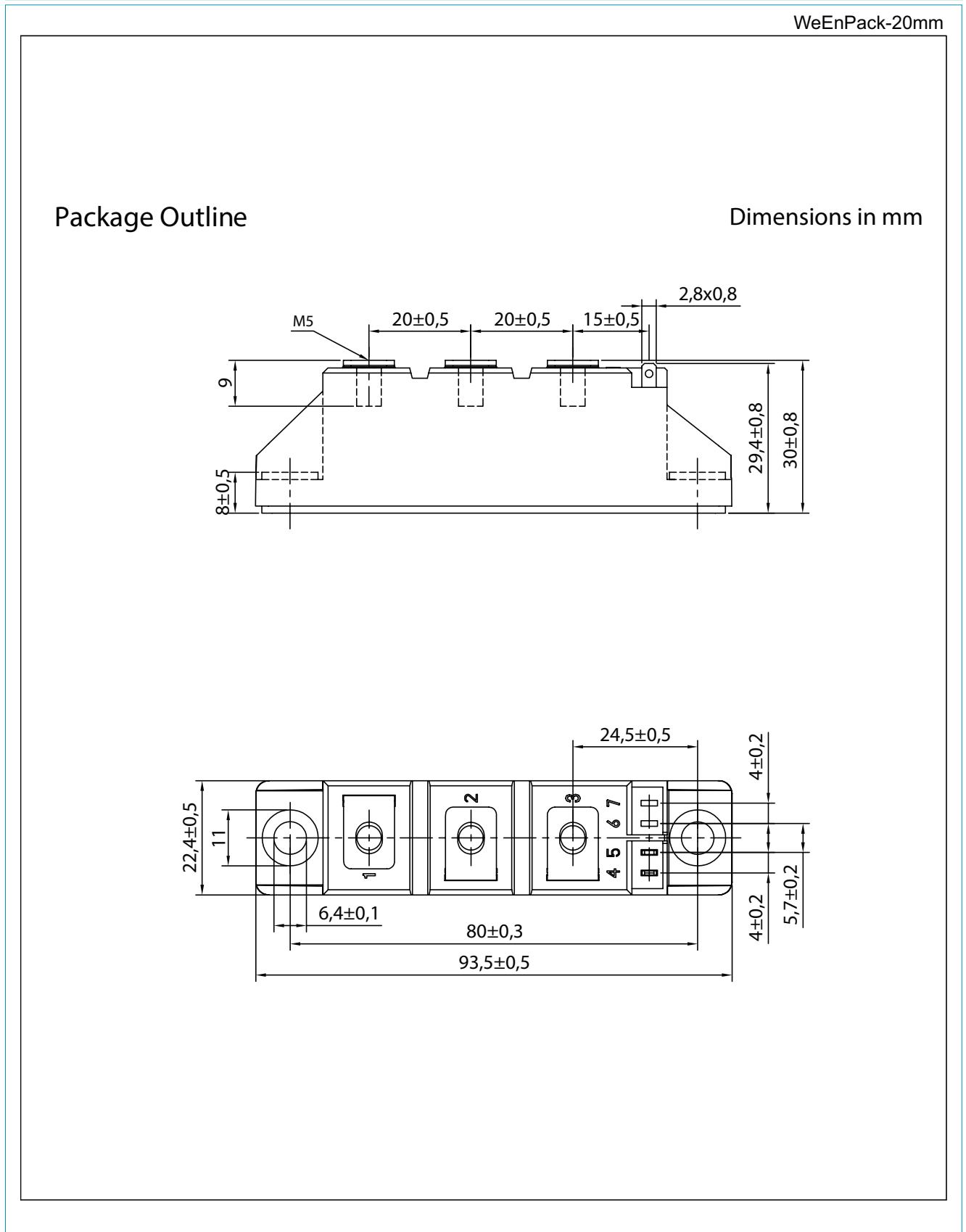
Fig. 9. Gate voltage as a function of gate current



$V_o = 0.889 \text{ V}; R_s = 0.0030 \ \Omega$
 (1) $T_j = 150 \text{ }^\circ\text{C}$; typical values
 (2) $T_j = 150 \text{ }^\circ\text{C}$; maximum values
 (3) $T_j = 25 \text{ }^\circ\text{C}$; maximum values

Fig. 10. Diode forward current as a function of forward voltage

12. Package outline



13. Legal information

Data sheet status

Document status [1][2]	Product status [3]	Definition
Objective [short] data sheet	Development	This document contains data from the objective specification for product development.
Preliminary [short] data sheet	Qualification	This document contains data from the preliminary specification.
Product [short] data sheet	Production	This document contains the product specification.

- [1] Please consult the most recently issued document before initiating or completing a design.
- [2] The term 'short data sheet' is explained in section "Definitions".
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