V_{DSM}	=	6500 V
I_{TAVM}	=	2810 A
I_{TRMS}	=	4410 A
I_{TSM}	=	45000 A
V_{T0}	=	1.12 V
r_T	=	0.290 mΩ

Phase Control Thyristor

5STP 26N6500

Doc. No. 5SYA1001-03 Sep. 01

- **Patented free-floating silicon technology**
- **Low on-state and switching losses**
- **Designed for traction, energy and industrial applications**
- **Optimum power handling capability**
- **Interdigitated amplifying gate**

Blocking

Part Number	**5STP 26N6500**	**5STP 26N6200**	**5STP 26N5800**	Conditions	
V_{DSM} V_{RSM}	6500 V	6200 V	5800 V	f = 5 Hz, t_p = 10ms	
V_{DRM} V_{RRM}	5600 V	5300 V	4900 V	f = 50 Hz, t_p = 10ms	
V_{RSM1}	7000 V	6700 V	6300 V	t_p = 5ms, single pulse	
I_{DSM}	≤ 600 mA			V_{DSM}	T_j = 125°C
I_{RSM}	≤ 600 mA			V_{RSM}	
dV/dt_{crit}	2000 V/µs			Exp. to 0.67 x V_{DRM}, T_j = 125°C	

V_{DRM}/ V_{RRM} are equal to V_{DSM}/ V_{RSM} values up to T_j = 110°C

Mechanical data

F_M	Mounting force	nom.	90 kN
		min.	81 kN
		max.	108 kN
a	Acceleration Device unclamped Device clamped		 50 m/s^2 100 m/s^2
m	Weight		2.9 kg
D_S	Surface creepage distance		56 mm
D_a	Air strike distance		22 mm

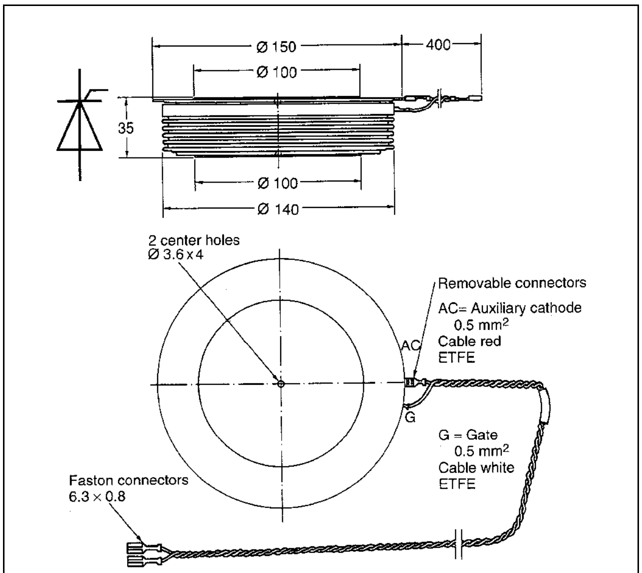

ABB Semiconductors AG reserves the right to change specifications without notice.

On-state

I_{TAVM}	Max. average on-state current	2810 A	Half sine wave, T_C = 70°C	
I_{TRMS}	Max. RMS on-state current	4410 A		
I_{TSM}	Max. peak non-repetitive	45000 A	tp = 10 ms	T_j = 125°C
	surge current	50000 A	tp = 8.3 ms	After surge:
I^2t	Limiting load integral	10125 kA^2s	tp = 10 ms	$V_D = V_R$ = 0V
		10375 kA^2s	tp = 8.3 ms	
V_T	On-state voltage	2.00 V	I_T = 3000 A	
V_{T0}	Threshold voltage	1.12 V	I_T = 1300 - 4000 A	T_j = 125°C
r_T	Slope resistance	0.290 mΩ		
I_H	Holding current	50-125 mA	T_j = 25°C	
		20-75 mA	T_j = 125°C	
I_L	Latching current	100-500 mA	T_j = 25°C	
		75-250 mA	T_j = 125°C	

Switching

di/dt_{crit}	Critical rate of rise of on-state current	250 A/μs	Cont. f = 50 Hz	$V_D \leq 0.67 \cdot V_{DRM}$, T_j = 125°C
		500 A/μs	60 sec. f = 50Hz	I_{TRM} = 3000 A I_{FG} = 2 A, t_r = 0.5 μs
t_d	Delay time	≤ 3.0 μs	$V_D = 0.4 \cdot V_{DRM}$	I_{FG} = 2 A, t_r = 0.5 μs
t_q	Turn-off time	≤ 800 μs	$V_D \leq 0.67 \cdot V_{DRM}$ dv_D/dt = 20V/μs	I_{TRM} = 3000 A, T_j = 125°C V_R > 200 V, di_T/dt = -1 A/μs
Q_{rr}	Recovery charge min	2700 μAs		
	max	3700 μAs		

Triggering

V_{GT}	Gate trigger voltage	2.6 V	T_j = 25°
I_{GT}	Gate trigger current	400 mA	T_j = 25°
V_{GD}	Gate non-trigger voltage	0.3 V	V_D =0.4 x V_{DRM}
I_{GD}	Gate non-trigger current	10 mA	V_D = 0.4 x V_{DRM}
V_{FGM}	Peak forward gate voltage	12 V	
I_{FGM}	Peak forward gate current	10 A	
V_{RGM}	Peak reverse gate voltage	10 V	
P_G	Gate power loss	3 W	

Thermal

T_{jmax}	Max. operating junction temperature range	125 °C	
T_{stg}	Storage temperature range	-40…140 °C	
R_{thJC}	Thermal resistance junction to case	11.4 K/kW	Anode side cooled
		11.4 K/kW	Cathode side cooled
		5.7 K/kW	Double side cooled
R_{thCH}	Thermal resistance case to heat sink	2 K/kW	Single side cooled
		1 K/kW	Double side cooled

Analytical function for transient thermal impedance:

$$Z_{thJC}(t) = \sum_{i=1}^{n} R_i(1 - e^{-t/\tau_i})$$

i	1	2	3	4
R_i(K/kW)	3.4	1.26	0.68	0.35
τ_i(s)	0.8685	0.1572	0.0219	0.0078

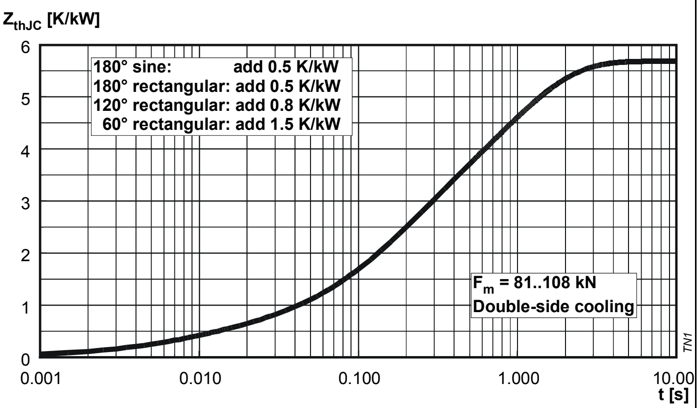

Fig. 1 Transient thermal impedance junction to case.

On-state characteristic model:

$$VT = A + B \cdot iT + C \cdot \ln(iT + 1) + D \cdot \sqrt{IT}$$

Valid for i_T = 500 – 8000 A

A	B	C	D
-0.477523	0.000186	0.264884	-0.003865

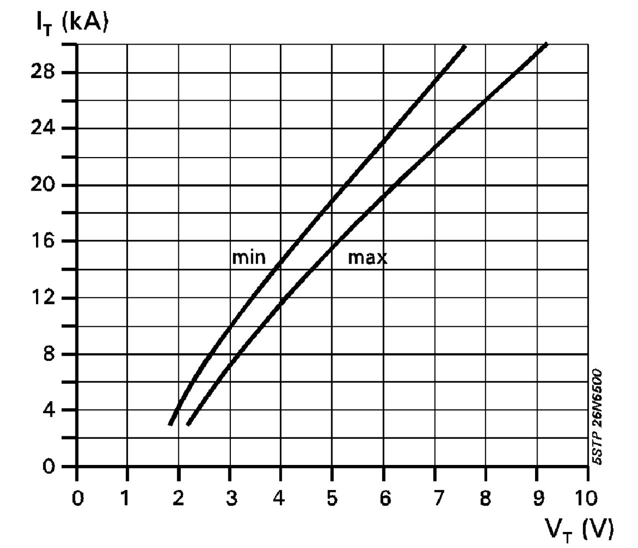

Fig. 2 On-state characteristics.
T_j=125°C, 10ms half sine

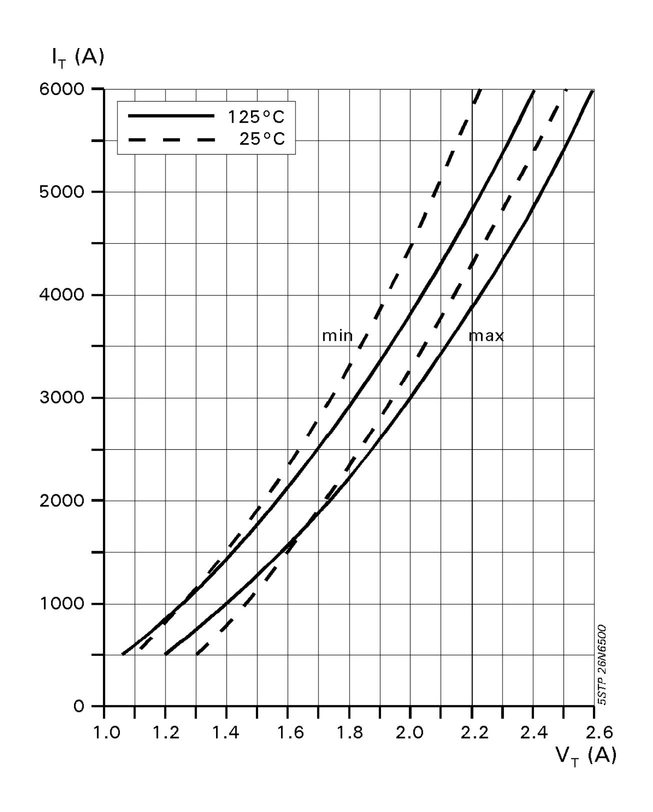

Fig. 3 On-state characteristics.

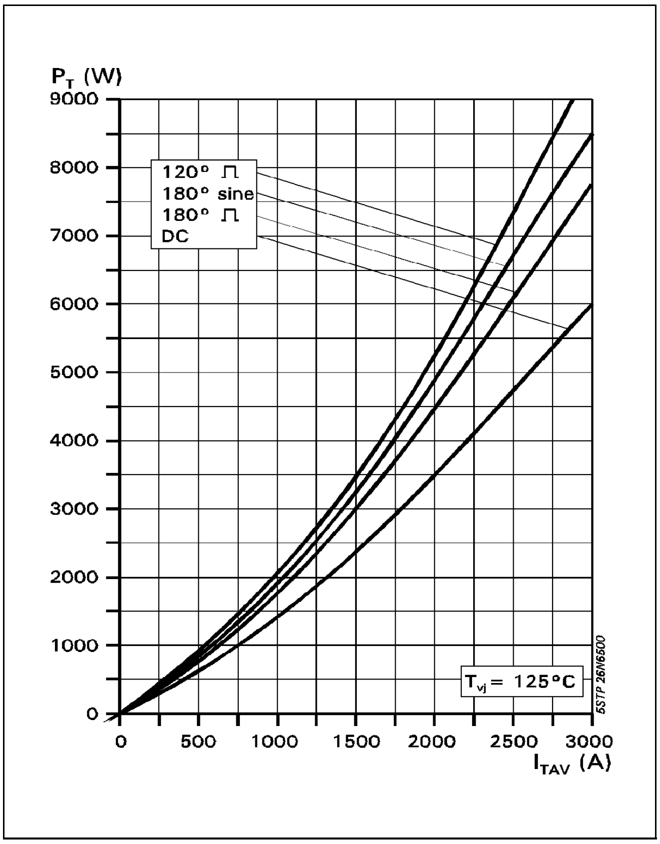

Fig. 4 On-state power dissipation vs. mean on-state current. Turn - on losses excluded.

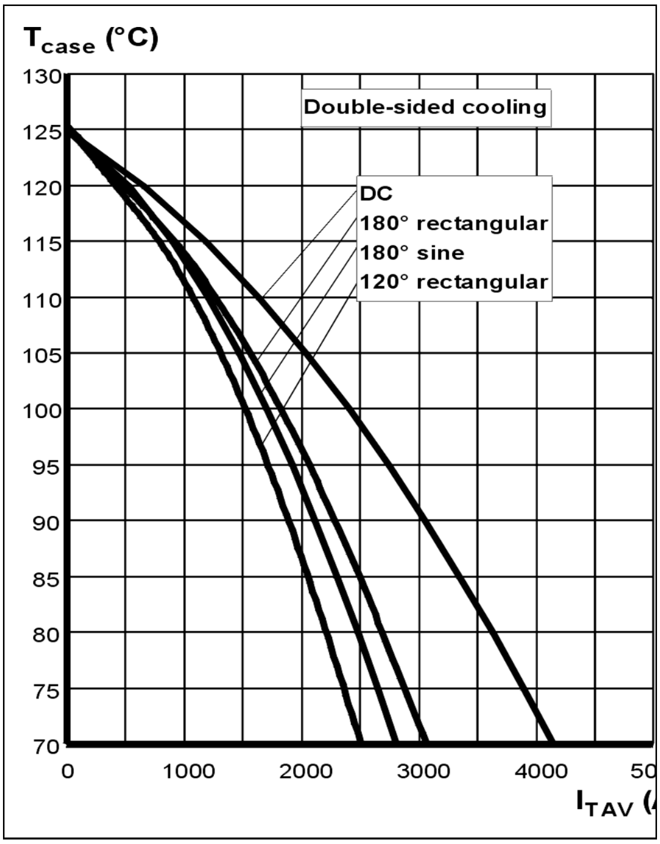

Fig. 5 Max. permissible case temperature vs. mean on-state current.

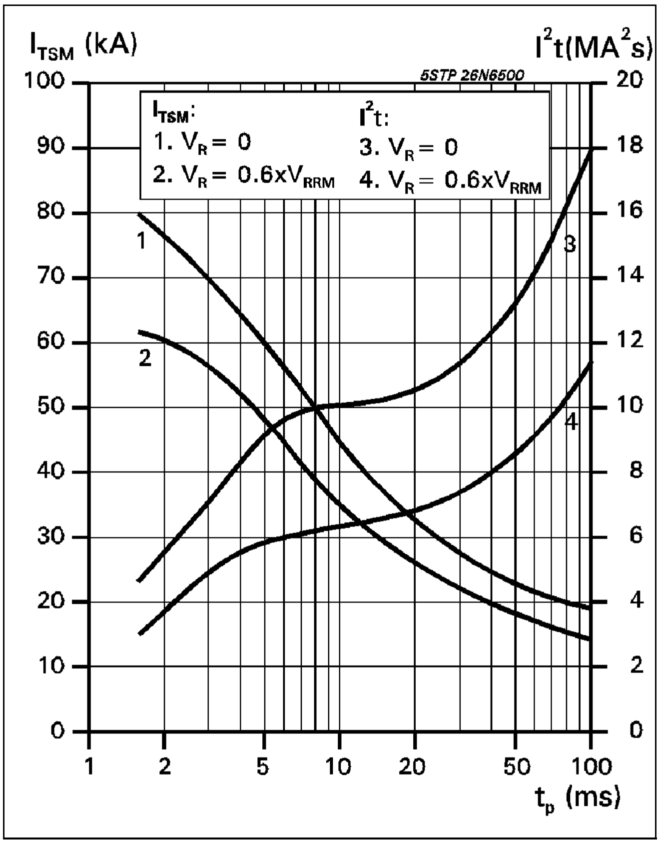

Fig. 6 Surge on-state current vs. pulse length. Half-sine wave.

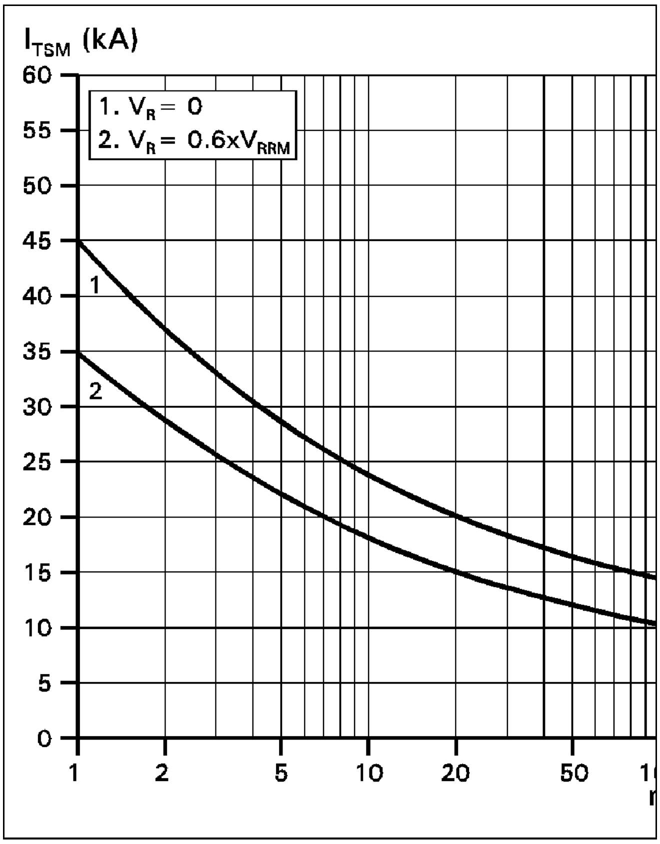

Fig. 7 Surge on-state current vs. number of pulses. Half-sine wave, 10 ms, 50Hz.

ABB Semiconductors AG reserves the right to change specifications without notice.

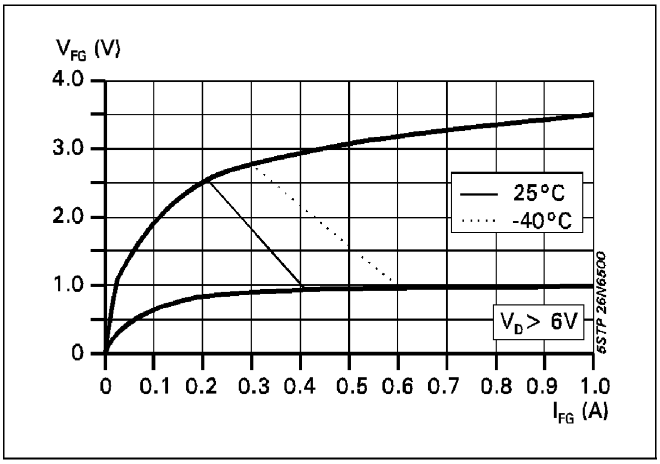

Fig. 8 Gate trigger characteristics.

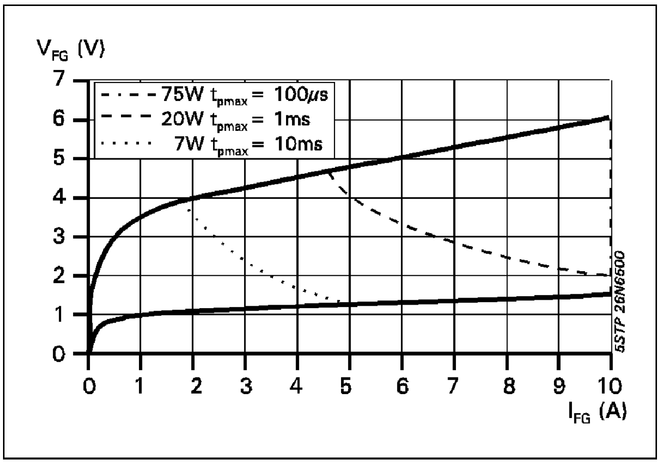

Fig. 9 Max. peak gate power loss.

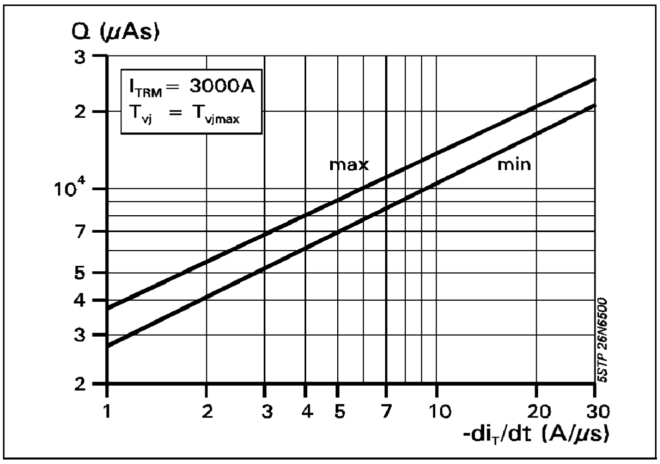

Fig. 10 Recovery charge vs. decay rate of on-state current.

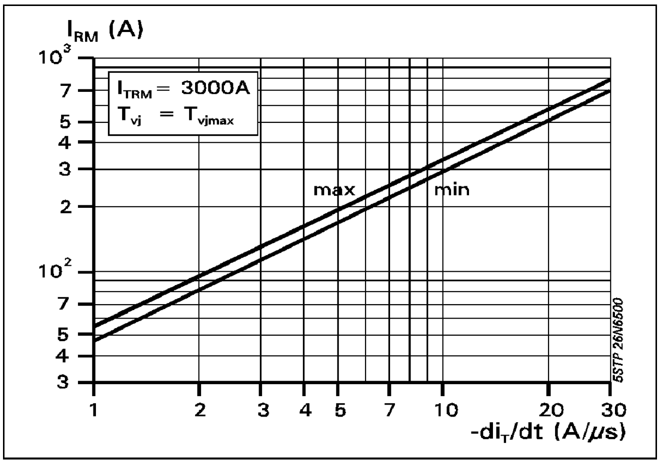

Fig. 11 Peak reverse recovery current vs. decay rate of on-state current.

Turn - off time, typical parameter relationship.

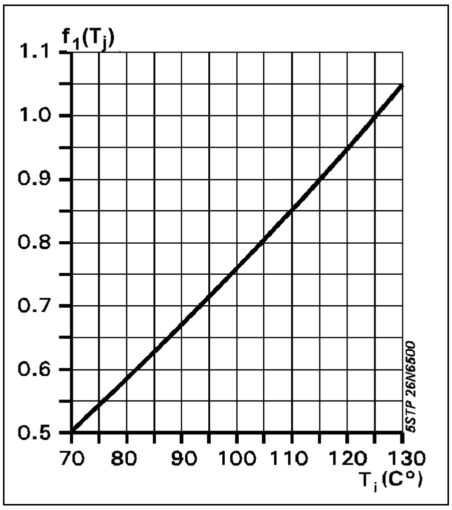

Fig. 12 $t_q/t_{q1} = f_1(T_j)$

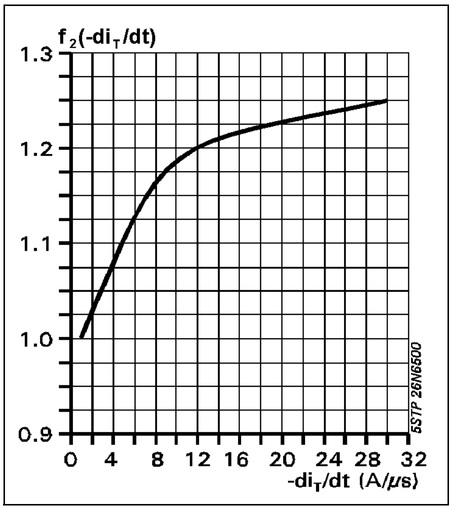

Fig. 13 $t_q/t_{q1} = f_2(-di_T/dt)$

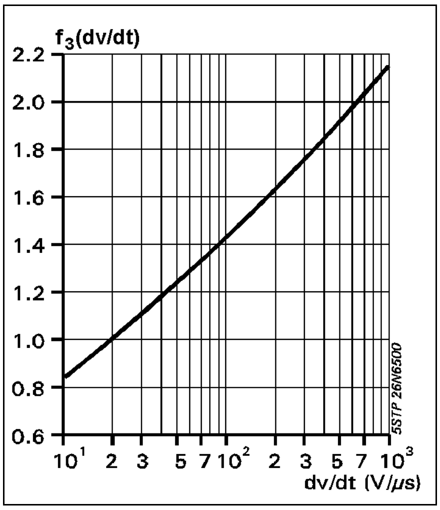

Fig. 14 $t_q/t_{q1} = f_3(dv/dt)$

$t_q = t_{q1} \bullet f_1(T_j) \bullet f_2(-di_T/dt) \bullet f_3(dv/dt)$

t_{q1} :at normalized values (see page 2)
t_q : at varying conditions

Turn-on and Turn-off losses

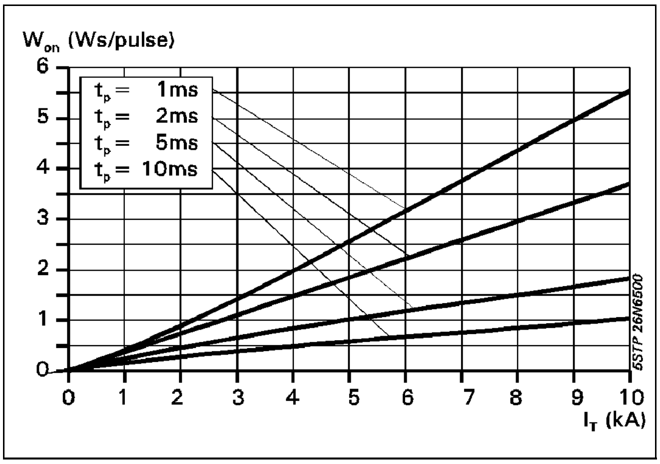

Fig. 15 $W_{on} = f(I_T, t_P)$, $T_j = 125°C$. **Half sinusoidal waves.**

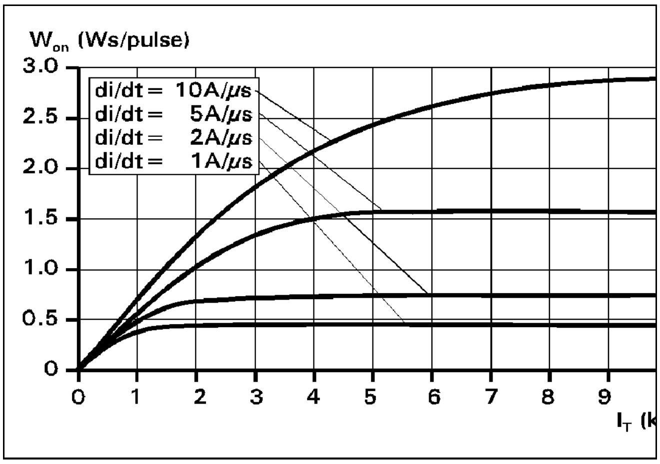

Fig. 16 $W_{on} = f(I_T, di/dt)$, $T_j = 125°C$. **Rectangular waves.**

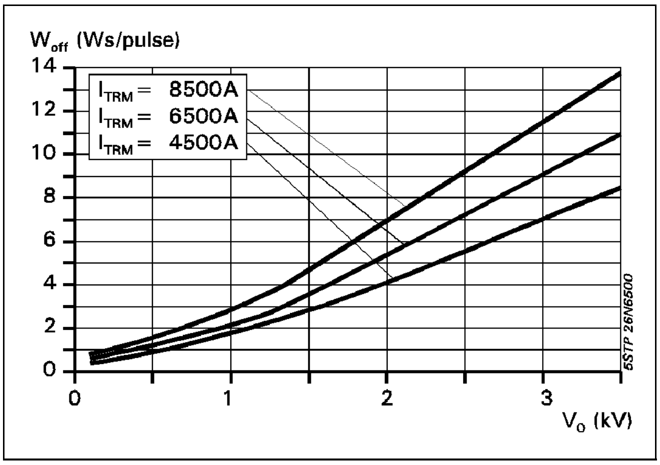

Fig. 17 $W_{off} = f(V_0, I_T)$, $T_j = 125°C$. **Half sinusoidal waves.** $t_P = 10$ **ms.**

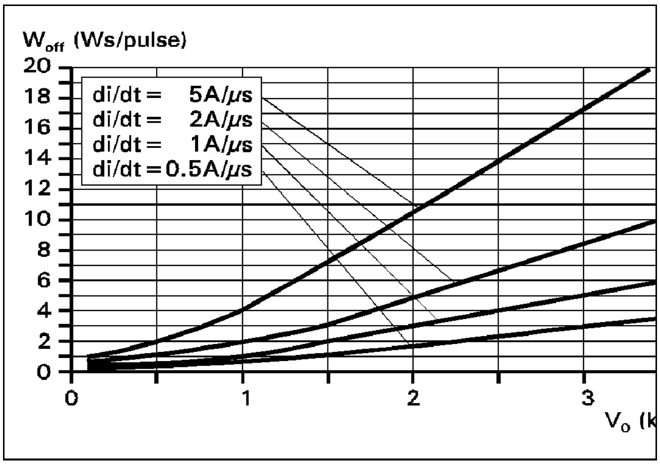

Fig. 18 $W_{off} = f(V_0, di/dt)$, $T_j = 125°C$. **Rectangular waves.**

$$P_{TOT} = P_T + W_{on} \cdot f + W_{off} \cdot f$$

W_{off} at $V_{RRM}/V_0 = 1.3\text{-}1.5$

$$P_T = \frac{1}{T}\int_0^T i_T \cdot v_T \, dt$$

ABB

ABB Semiconductors AG
Fabrikstrasse 3
CH-5600 Lenzburg, Switzerland

Telephone +41 (0)62 888 6419
Fax +41 (0)62 888 6306
Email abbsem@ch.abb.com
Internet www.abbsem.com

Doc. No. 5SYA1001-03 Sep. 01