

V_{DRM}	=	5500 V
I_{TGQM}	=	900 A
I_{TSM}	=	7.5×10^3 A
$V_{\text{(T0)}}$	=	1.65 V
r_{T}	=	2 mW
$V_{\text{DC-link}}$	=	3300 V

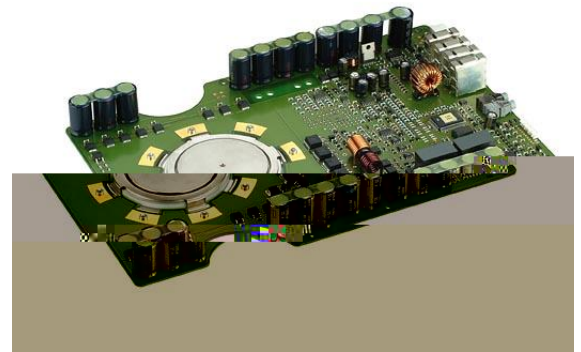
Reverse Conducting Integrated Gate-Commutated Thyristor

5SHX 10H6010

PRELIMINARY

Doc. No. 5SYA1226-05 Aug 07

- High snubberless turn-off rating
- Optimized for medium frequency (<1 kHz) and low turn-off losses
- High reliability
- High electromagnetic immunity
- Simple control interface with status feedback
- AC or DC supply voltage
- Suitable for series connection (contact factory)



Blocking

Maximum rated values ^{Note 1}

Parameter	Symbol	Conditions	min	typ	max	Unit
Repetitive peak off-state voltage	V_{DRM}	Gate Unit energized			5500	V
Permanent DC voltage for 100 FIT failure rate of RC-GCT	$V_{\text{DC-link}}$	Ambient cosmic radiation at sea level in open air. Gate Unit energized			3300	V

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Repetitive peak off-state current	I_{DRM}	$V_{\text{D}} = V_{\text{DRM}}$, Gate Unit energized			20	mA

Mechanical data (see Fig. 20, 21)

Maximum rated values ^{Note 1}

Parameter	Symbol	Conditions	min	typ	max	Unit
Mounting force	F_{m}		18	20	22	kN

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Pole-piece di						

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GCT Data

On-state (see Fig. 3 to 6, 23)

Maximum rated values Note 1

Parameter	Symbol	Conditions	min	typ	max	Unit
Max. average on-state current	$I_{T(AV)M}$	Half sine wave, $T_C = 85\text{ °C}$, Double side cooled			350	A
Max. RMS on-state current	$I_{T(RMS)}$				560	A
Max. peak non-repetitive surge on-state current	I_{TSM}	$t_p = 10\text{ ms}$, $T_j = 115\text{ °C}$, sine wave after surge: $V_D = V_R = 0\text{ V}$			7.5×10^3	A
Limiting load integral	I^2t				281×10^3	A^2s
Max. peak non-repetitive surge on-state current	I_{TSM}	$t_p = 1\text{ ms}$, $T_j = 115\text{ °C}$, sine wave after surge: $V_D = V_R = 0\text{ V}$			15×10^3	A
Limiting load integral	I^2t				112×10^3	A^2s
Critical rate of rise of on-state current	di_T/dt_{cr}	For higher di_T/dt and current lower than 50 A an external retrigger pulse is required.			TBD	A/ μs

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
On-state voltage	V_T	$I_T = 900\text{ A}$, $T_j = 115\text{ °C}$			3.45	V
Threshold voltage	$V_{(T0)}$	$T_j = 115\text{ °C}$ $I_T = 200 \dots 2000\text{ A}$			1.65	V
Slope resistance	r_T				2	$m\Omega$

Turn-on switching (see Fig. 23, 25)

Maximum rated values Note 1

Diode Data

On-state (see Fig. 9 to 12, 24, 25)

Maximum rated values ^{Note 1}

Parameter	Symbol
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Gate Unit Data

Power supply (see Fig. 18, 19)

Maximum rated values ^{Note 1}

Parameter	Symbol	Conditions	min	typ	max	Unit
Gate Unit voltage (Connector X1)	$V_{GIN,RMS}$	AC square wave amplitude (15 kHz 100kHz) or DC voltage. No	28		40	V
Min. current needed to power up the Gate Unit	I_{GIN}					
Gate Unit power consumption	P_{GI}					

Characteristic values

Parameter	Symbol
Internal current limitation	I_{GIN}

Optical control input/output

Maximum rated values ^{Note 1}

Parameter	Symbol
Min. on-time	t_{on}
Min. off-time	t_{off}

Characteristic values

Parameter	Symbol
Optical input power	P_{oi}
Optical noise power	P_{on}
Optical output power	P_{oo}
Optical noise power	P_{on}
Pulse width threshold	t_{GL}
External retrigger pulse width	t_{re}

2) Do not disconnect or connect fiber optic

Connectors ²⁾ (see Fig. 20 to

Parameter	Symbol	Conditions
Gate Unit power connector	X1	AMP: MTA-156, Part Number 641210-5 ³⁾

Thermal

Maximum rated values ^{Note 1}

Parameter	Symbol	Conditions	min	typ	max	Unit
Junction operating temperature	T_{vj}		0		115	°C
Storage temperature range	T_{stg}		-40		60	°C
Ambient operational temperature	T_a		0		60	°C

Characteristic values

Parameter	Symbol	Conditions	min	typ	max	Unit
Thermal resistance junction-to-case of GCT	$R_{th(jc)}$	Double side cooled			25	K/kW
Thermal resistance case-to-heatsink of GCT	$R_{th(ch)}$	Diode not dissipating			8	K/kW
Thermal resistance junction-to-case of Diode	$R_{th(jc)}$	Double side cooled			42	K/kW
Thermal resistance case-to-heatsink of Diode	$R_{th(ch)}$	GCT not dissipating			8	K/kW

**Analytical function for transient thermal
impe**

GCT Part

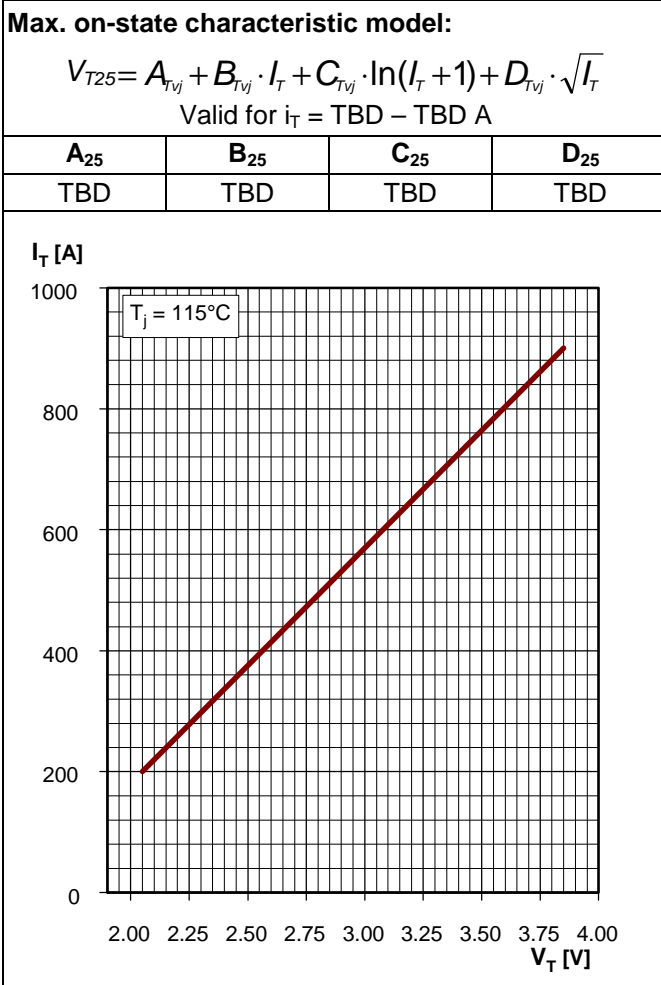


Fig. 3 GCT on-state voltage characteristics

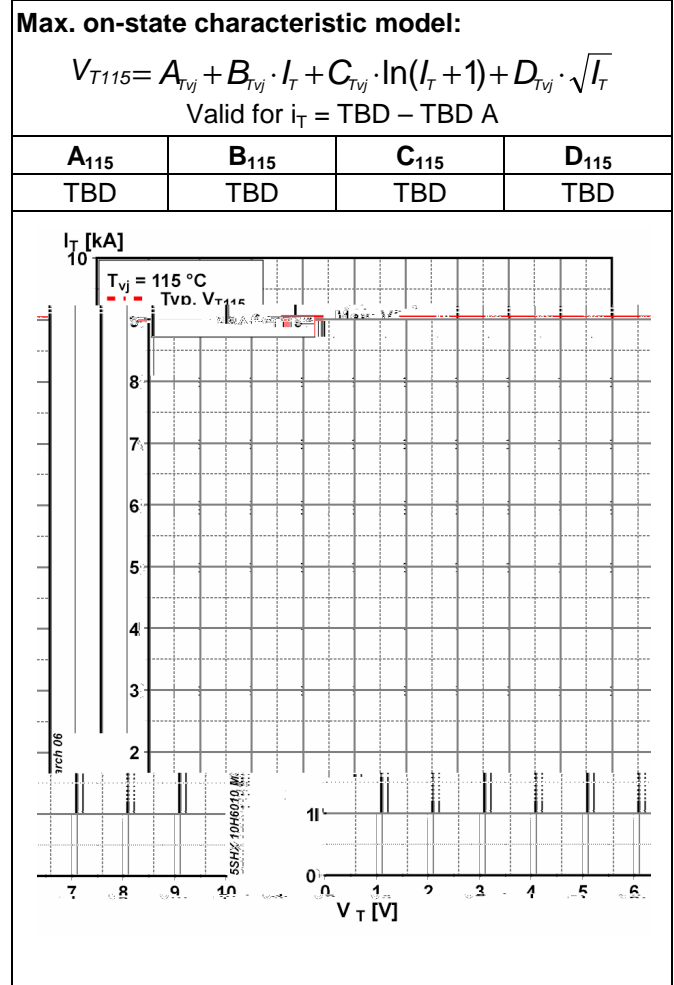


Fig. 4 GCT on-state voltage characteristics

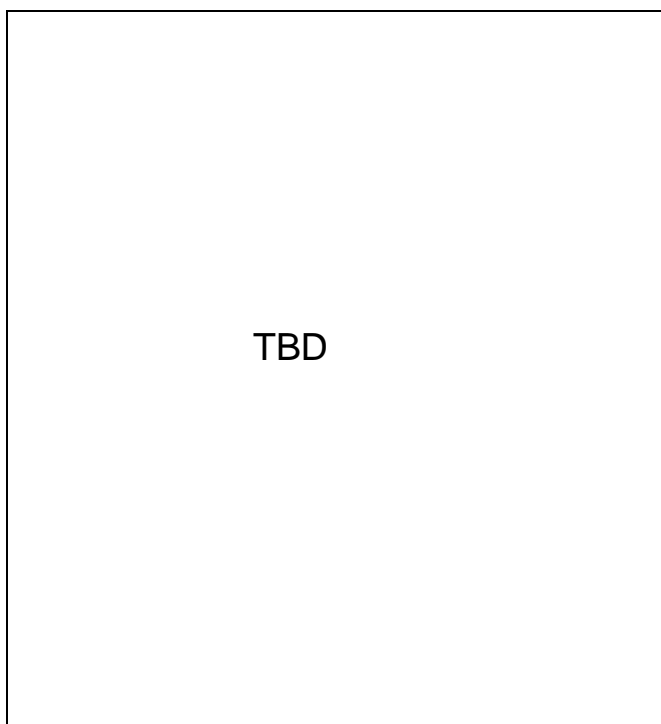


Fig. 5 GCT surge on-state current vs. pulse length, half-sine wave

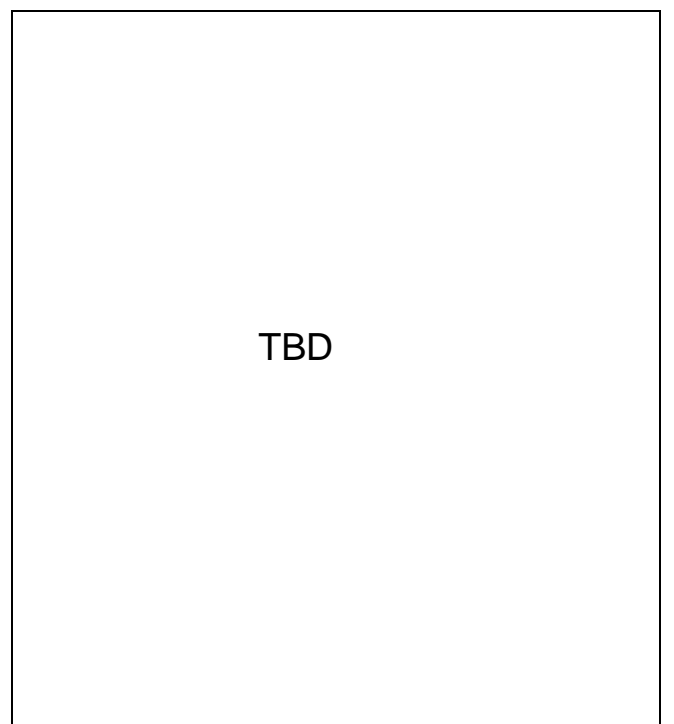


Fig. 6 GCT surge on-state current vs. number of pulses, half-sine wave, 10 ms, 50Hz

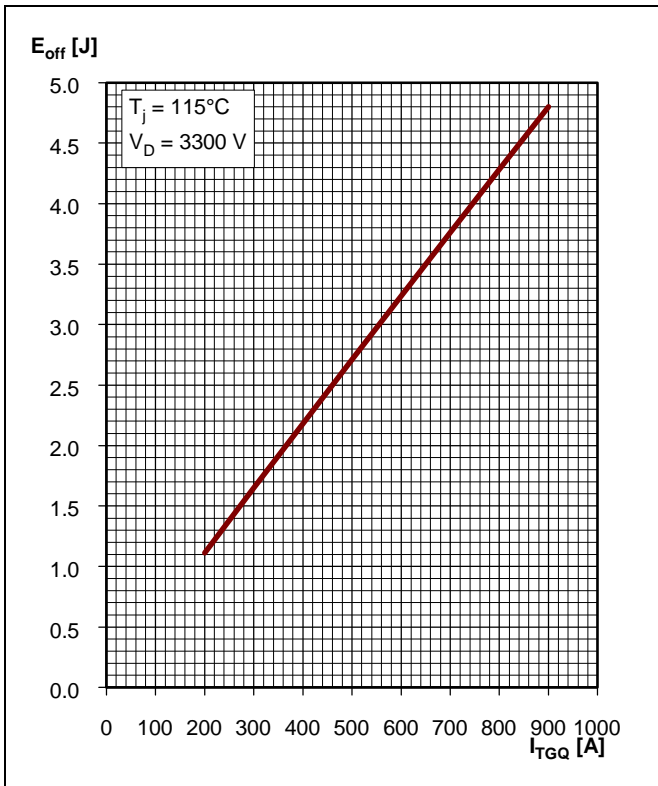


Fig. 7 GCT turn-off energy per pulse vs. turn-off current

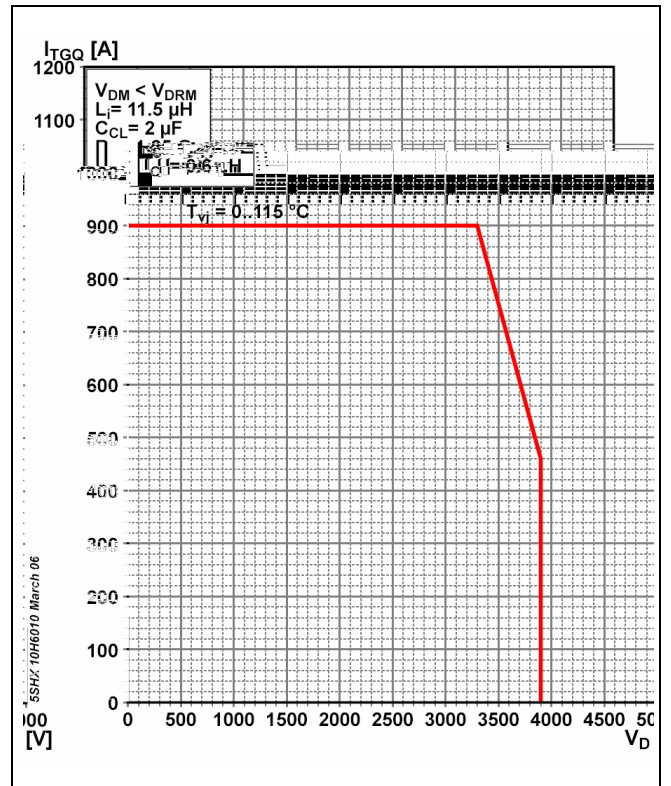


Fig. 8 GCT Safe Operating Area

Diode Part

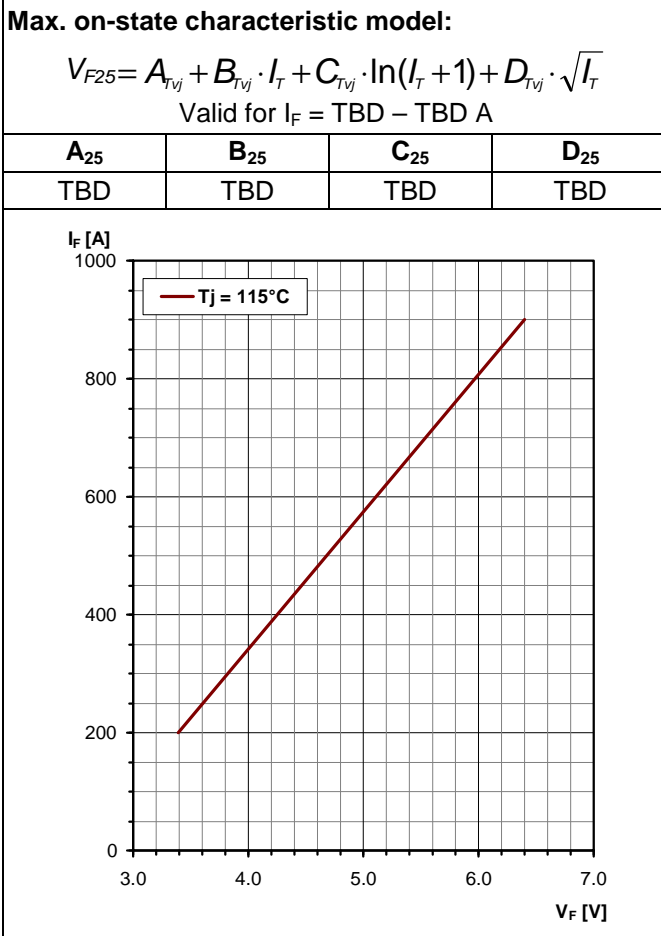


Fig. 9 Diode on-state voltage characteristics

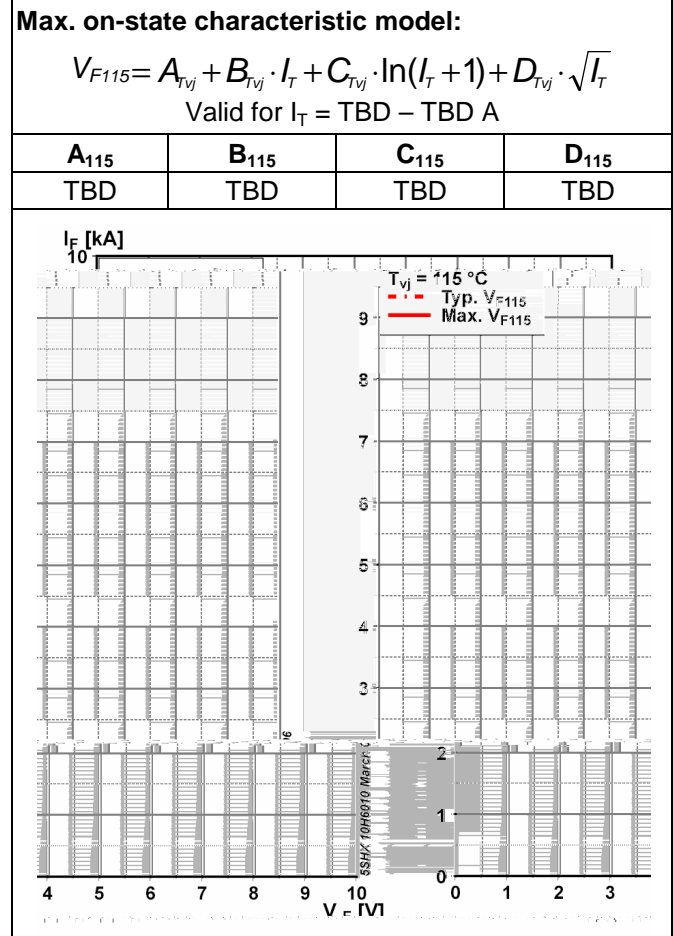


Fig. 10 Diode on-state voltage characteristics

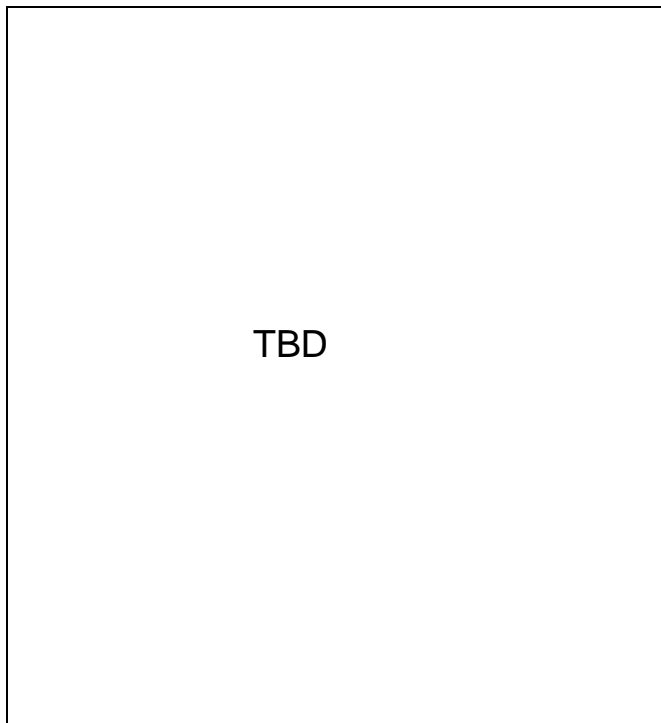


Fig. 11 Diode surge on-state current vs. pulse length, half-sine wave

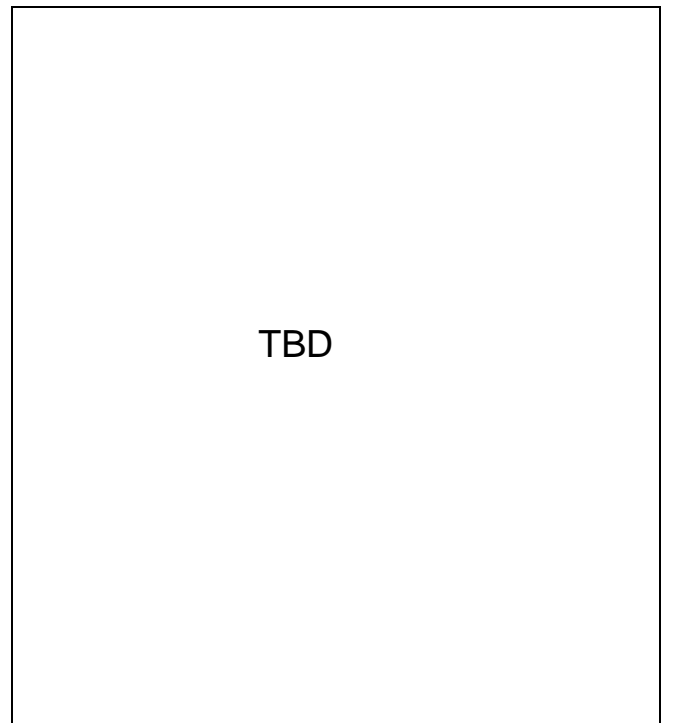


Fig. 12 Diode surge on-state current vs. number of pulses, half-sine wave, 10 ms, 50Hz

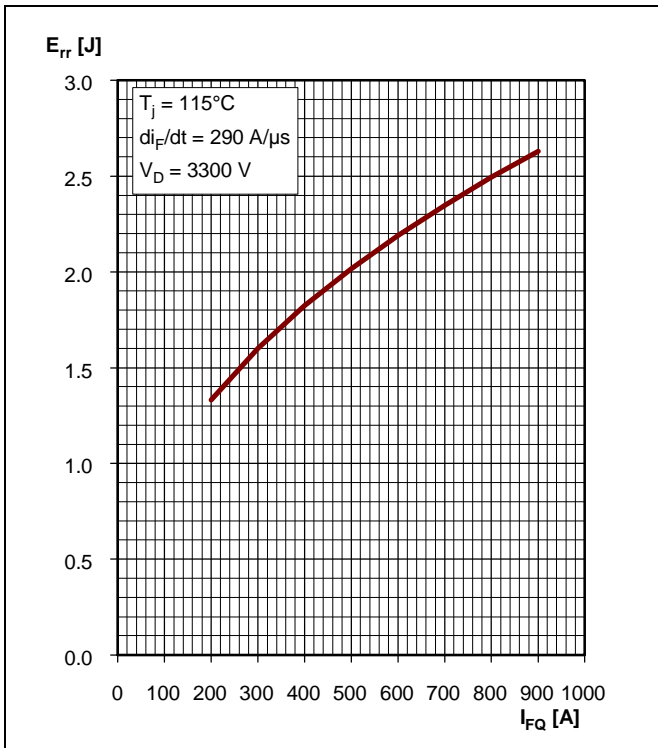


Fig. 13 Upper scatter range of diode turn-off energy per pulse vs. turn-off current

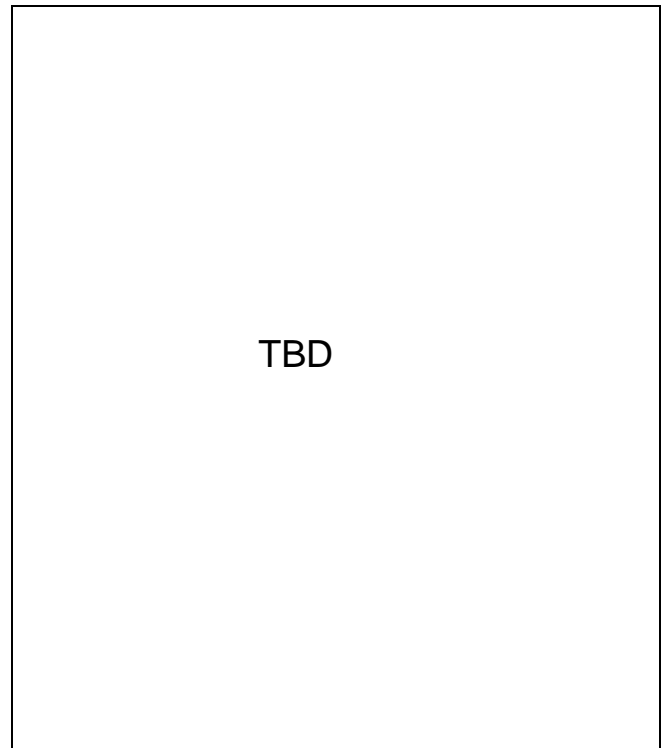


Fig. 14 Upper scatter range of diode turn-off energy per pulse vs decay rate of on-state current

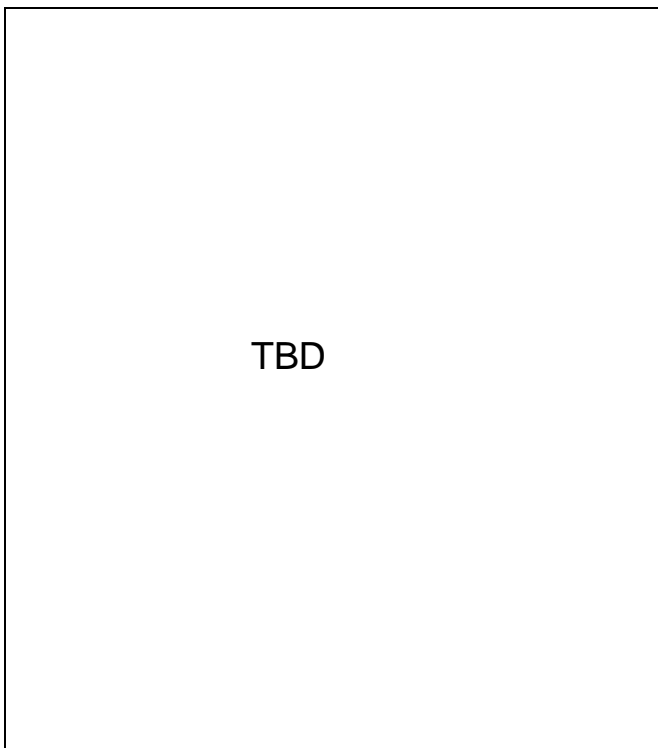


Fig. 15 Upper scatter range of diode reverse recovery charge vs decay rate of on-state current

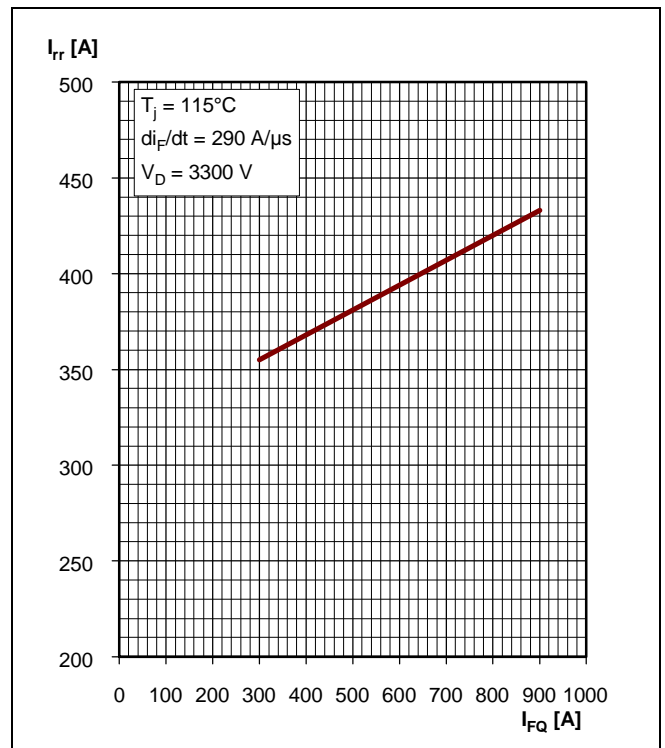


Fig. 16 Upper scatter range of diode reverse recovery current vs decay rate of on-state current

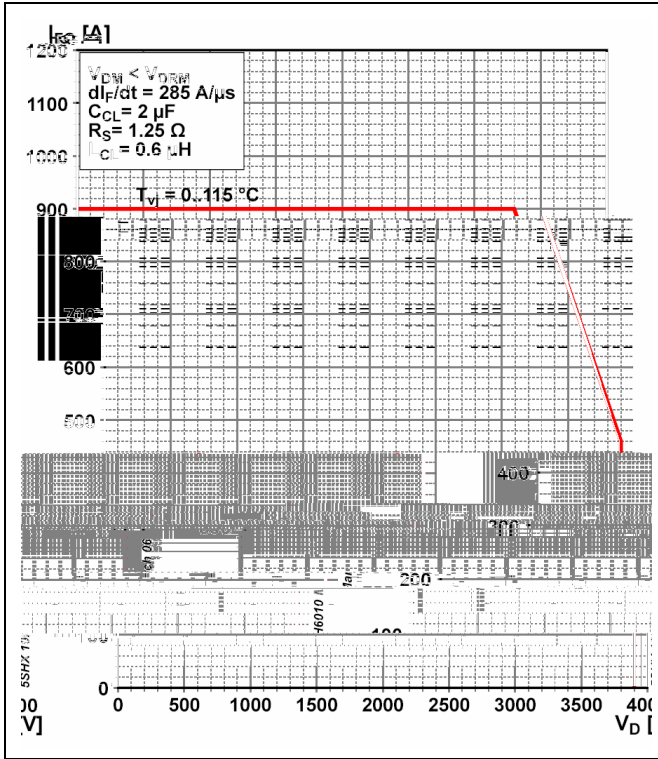


Fig. 17 Diode Safe Operating Area

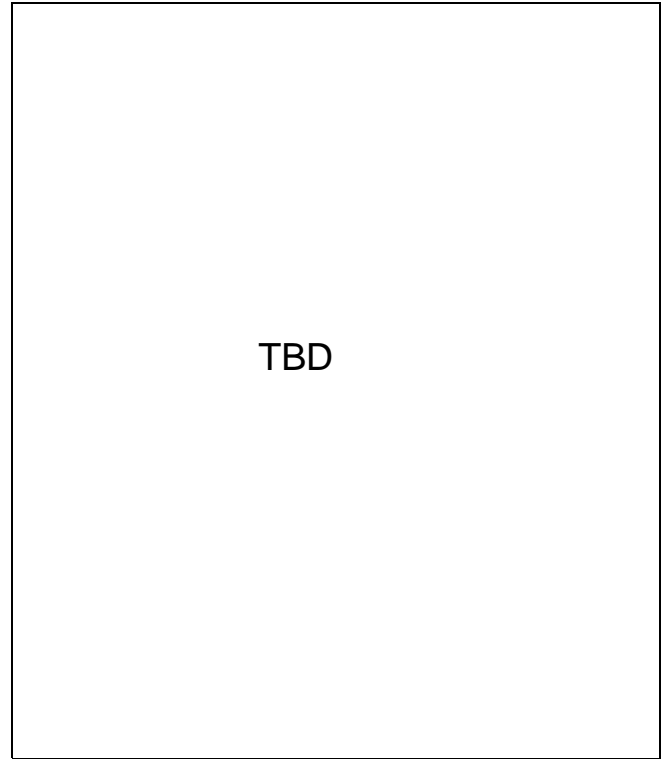


Fig. 18 Max. Gate Unit input power in chopper mode

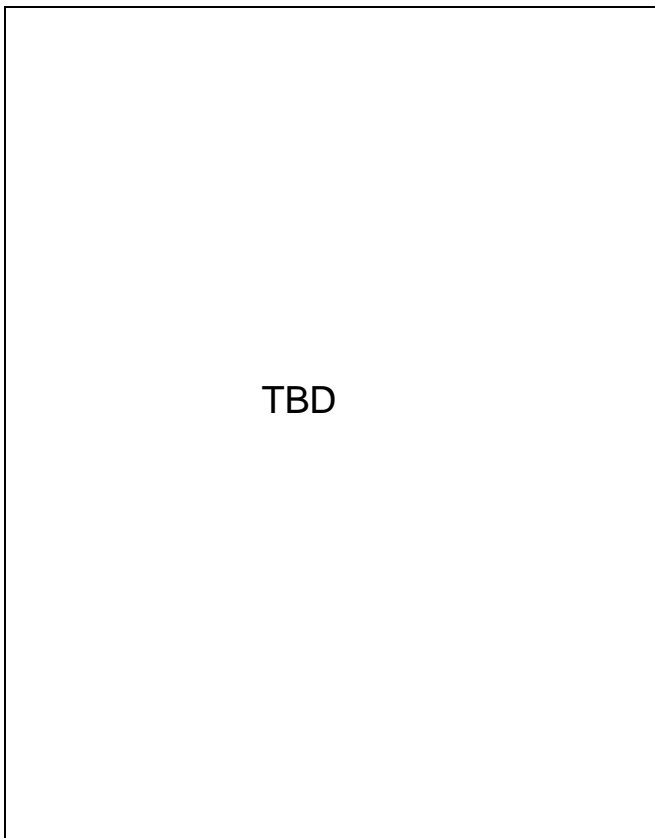
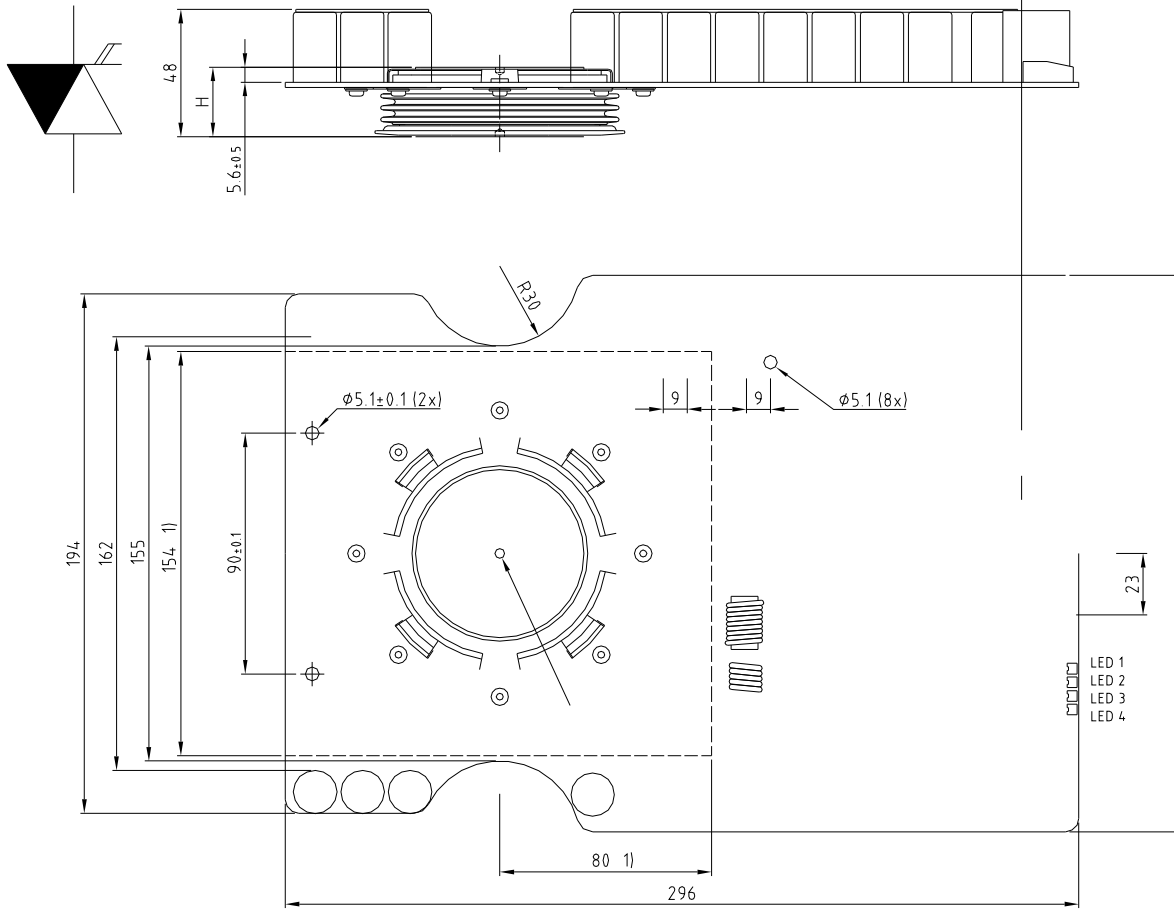


Fig. 19 Burst capability of Gate Unit

Fig. 20 Outline drawing; all dimensions are in millimeters and represent nominal values unless stated otherwise



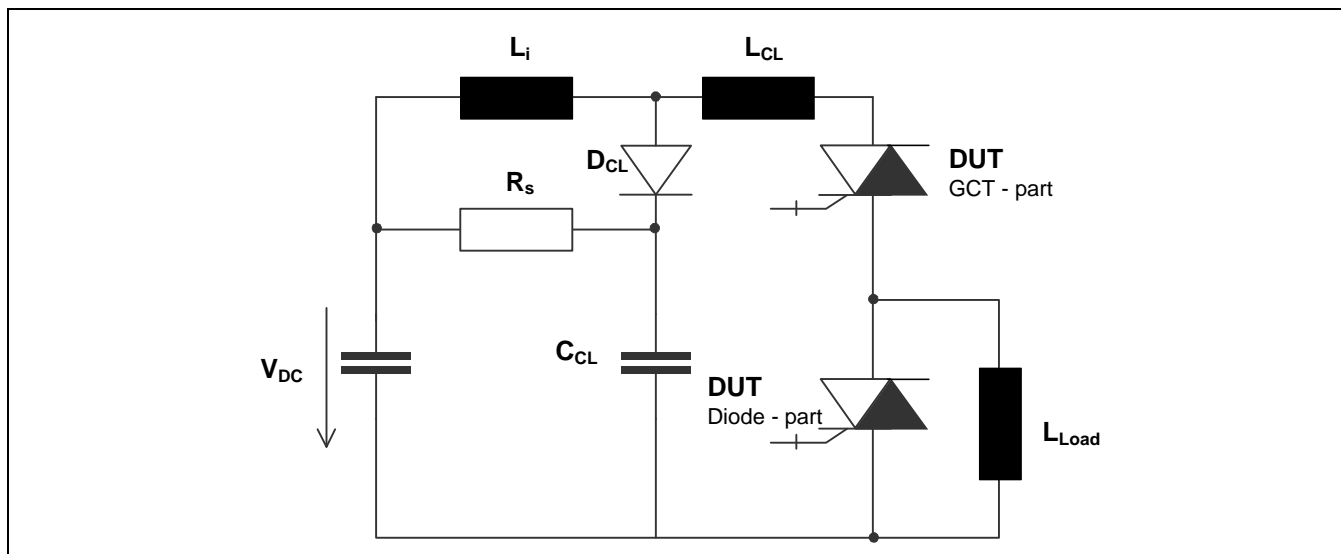


Fig. 25 Test circuit

Related documents:

5SYA 2031	Applying IGCT Gate Units
5SYA 2032	Applying IGCTs
5SYA 2036	Recommendations regarding mechanical clamping of Press Pack High Power Semiconductors
5SYA 2046	Failure rates of IGCTs due to cosmic rays
5SYA 2048	Field measurements on High Power Press Pack Semiconductors
5SYA 2051	Voltage ratings of high power semiconductors
5SZK 9107	Specification of environmental class for pressure contact IGCTs, OPERATION available on request, please contact factory

Please refer to <http://www.abb.com/semiconductors> for current version of documents.

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