

T816 5200-18-22

Key Parameters

V_{DRM}	1800~2200	V
$I_{\text{T(AV)}}$	5270	A
I_{TSM}	80	kA
V_{TO}	0.87	V
r_{T}	0.061	mΩ

Applications

- Traction drive
- Motor drive
- Industry converter

Features

- Double-side cooling
- High power capability
- Low loss

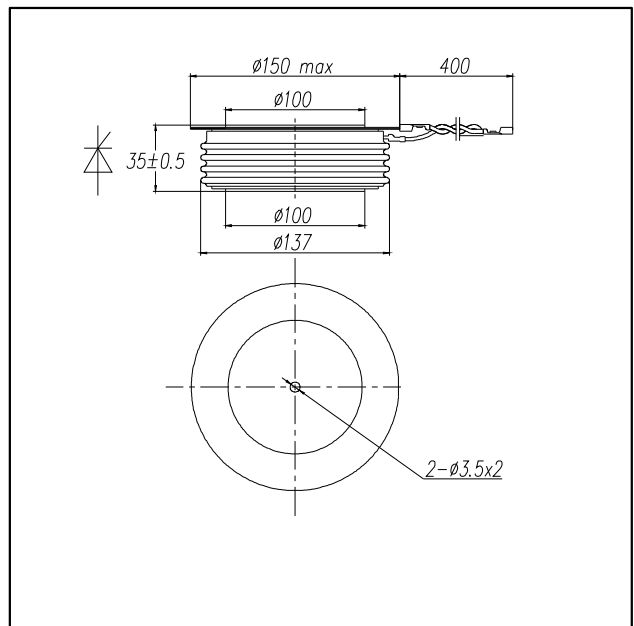
Thermal & Mechanical Data

Symb.	Parameter	Min	Type	Max	Unit
R_{thjc}	Thermal Resistance Junction to Case	-	-	0.0057	K / W
R_{thcs}	Thermal Resistance Case to Heatsink	-	-	0.0015	K / W
T_{vj}	Junction Temperature	-40	-	125	°C
T_{stg}	Storage Temperature	-40	-	140	°C
F	Mounting Force	-	90	-	kN
m	Weight	-	2.8	-	kg

Voltage Ratings

Device Type	$V_{\text{DRM}}/V_{\text{RRM}}(\text{V})$	Test Conditions
T816 5200-18	1800	$T_{\text{vj}} = 125\text{ °C}$
T816 5200-20	2000	$I_{\text{DRM}} = 400\text{ mA}$
T816 5200-22	2200	$I_{\text{RRM}} = 400\text{ mA}$
		$V_{\text{DM}} = V_{\text{DRM}}, V_{\text{RM}} = V_{\text{RRM}}$ $t_{\text{p}} = 10\text{ ms}$
		$V_{\text{DSM}} = V_{\text{DRM}}$ $V_{\text{RSM}} = V_{\text{RRM}} + 100$

Outline



Current Ratings

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
$I_{\text{T(AV)}}$	Mean On-State Current	Half Sine Wave, $T_{\text{C}} = 70\text{ °C}$	-	-	5270	A
$I_{\text{T(RMS)}}$	RMS On-State Current	$T_{\text{C}} = 70\text{ °C}$	-	-	8274	A
I_{TSM}	Surge (non-repetitive) On-State Current	10ms, Half Sine Wave, $T_{\text{C}} = 125\text{ °C}, V_{\text{R}} = 0$	-	-	80.0	kA
I^2t	Limiting load integral	Sine Wave, 10ms	-	-	3200	$10^4\text{ A}^2\text{s}$

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Characteristics

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
V_{TM}	Peak on-state voltage	$T_{vj} = 125\text{ }^{\circ}\text{C}$, $I_{TM} = 3000\text{ A}$	-	-	1.05	V
I_{DRM}	Forward leakage current	$T_{vj} = 125\text{ }^{\circ}\text{C}$, V_{DRM}	-	-	400	mA
I_{RRM}	Reverse leakage current	$T_{vj} = 125\text{ }^{\circ}\text{C}$, V_{RRM}	-	-	400	mA
V_{TO}	Threshold voltage	$T_{vj} = 125\text{ }^{\circ}\text{C}$	-	-	0.87	V
r_T	Slope resistance	$T_{vj} = 125\text{ }^{\circ}\text{C}$	-	-	0.061	m Ω
I_H	Holding current	$T_{vj} = 25\text{ }^{\circ}\text{C}$	-	-	200	mA
I_L	Latching current	$T_{vj} = 25\text{ }^{\circ}\text{C}$	-	-	1000	mA

Dynamic Parameters

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
dv/dt	Critical rate of rise of off-state voltage	$T_{vj} = 125\text{ }^{\circ}\text{C}$, $0.67V_{DRM}$	1000	-	-	V/ μ s
di/dt	Critical rate of rise of on-state current	$T_{vj}=125^{\circ}\text{C}$, $V_{DM}=0.67V_{DRM}$, $I_{TM}=5000\text{A}$ $I_{FG} = 2\text{ A}$, $tr = 0.5\text{ }\mu\text{s}$	-	-	1000	A/ μ s
		$f = 1\text{ Hz}$ $f = 50\text{ Hz}$	-	-	250	
t_d	Delay time	$T_{vj} = 25\text{ }^{\circ}\text{C}$, $V_{DM} = 0.5V_{DRM}$, $I_{TM} = 3000\text{ A}$ $I_{FG} = 2\text{ A}$, $tr = 0.5\text{ }\mu\text{s}$	-	-	3.0	μ s
t_q	Turn-off time	$T_{vj}=125^{\circ}\text{C}$, $V_{DM}=0.67V_{DRM}$, $dv/dt=20\text{V}/\mu\text{s}$, $V_R=200\text{V}$ $di_T/dt = -1.5\text{ A}/\mu\text{s}$, $I_T = 2000\text{ A}$	-	500	-	μ s
Q_{rr}	Recovery Charge	$T_{vj} = 125^{\circ}\text{C}$, $di_T/dt = -1.5\text{ A}/\mu\text{s}$, $V_R = 200\text{V}$, $I_T = 2000\text{A}$	2000	-	3000	μC
I_{rr}	Reverse recovery current		60	-	75	A

Gate Parameters

Symb.	Parameter	Test Conditions	Min	Type	Max	Unit
I_{GT}	Gate trigger current	$T_{vj} = 25\text{ }^{\circ}\text{C}$	-	-	300	mA
V_{GT}	Gate trigger voltage	$T_{vj} = 25\text{ }^{\circ}\text{C}$	-	-	3	V
V_{GD}	Gate non-trigger voltage	$T_{vj} = 125\text{ }^{\circ}\text{C}$, $V_D = 0.4V_{DRM}$	0.3	-	-	V
V_{FGM}	Peak forward gate voltage		-	-	12	V
V_{RGM}	Peak reverse gate voltage		-	-	5	V
I_{FGM}	Peak forward gate current		-	-	4	A
P_{GM}	Gate power losses		-	-	20	W
$P_{G(AV)}$	Gate power losses (mean)		-	-	4	W

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Max. on-state characteristic model

$$V_T = A + B \cdot \ln(I_T) + C \cdot I_T + D \cdot \sqrt{I_T}$$

	25 °C	125 °C
A	0.902464	0.336497
B	-0.024690	0.0633152
C	0.000003663	0.000034661
D	0.00722826	0.00180628

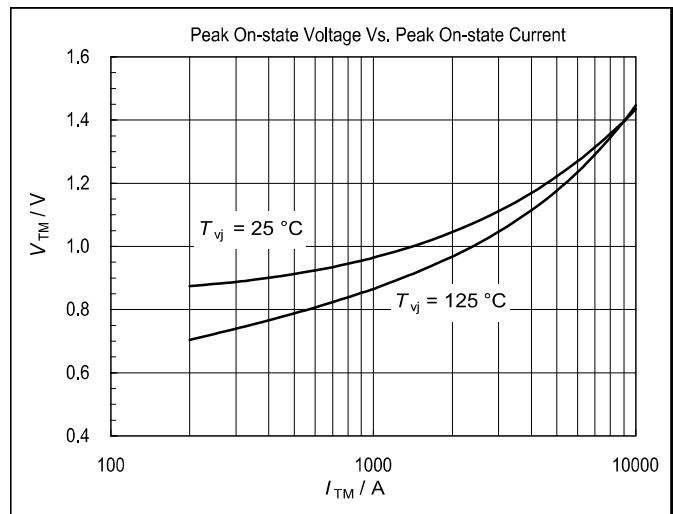


Fig1. Peak On-state Voltage Vs. Peak On-state Current

Transient thermal impedance function
(double side cooled)

$$R_{thjc}(t) = \sum_{i=1}^n R_{thi} \cdot \left(1 - e^{-\frac{t}{\tau_i}} \right)$$

i	1	2	3	4
R _{thi} (K/kW)	3.709	1.262	0.475	0.251
τ _i (s)	0.8296	0.1107	0.0114	0.0024

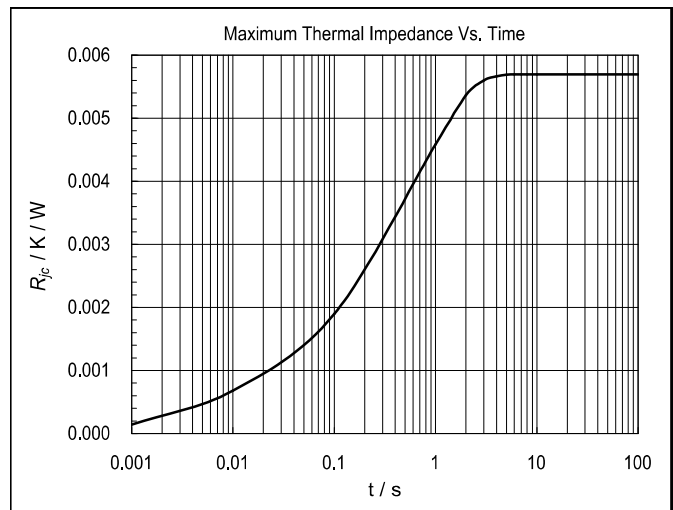


Fig2. Maximum Thermal Impedance Vs. Time

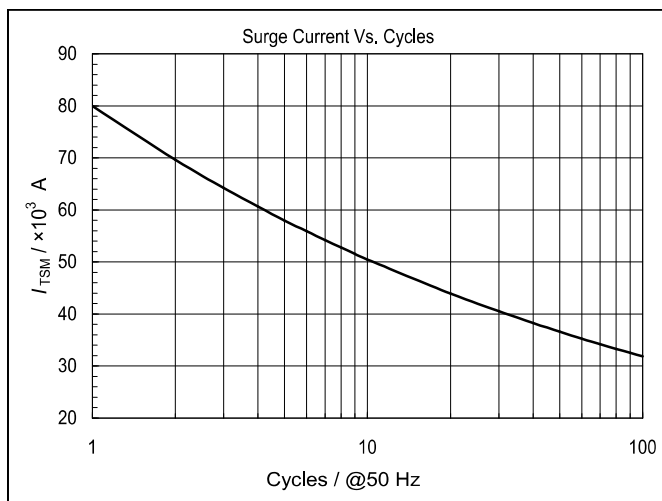


Fig3. Surge Current Vs. Cycles

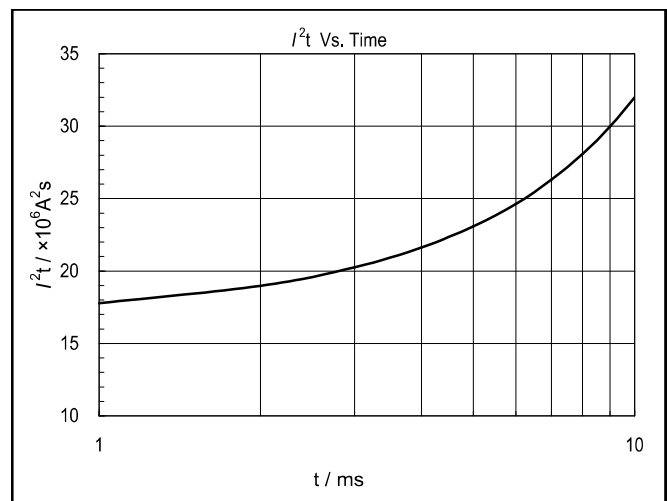


Fig4. I² t Vs. Time

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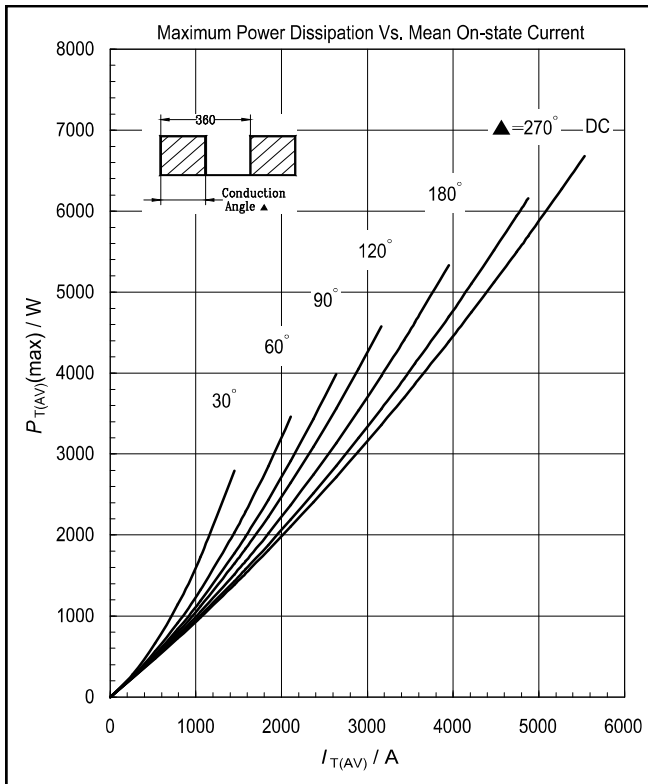


Fig5. Maximum Power Dissipation Vs. Mean On-state Current

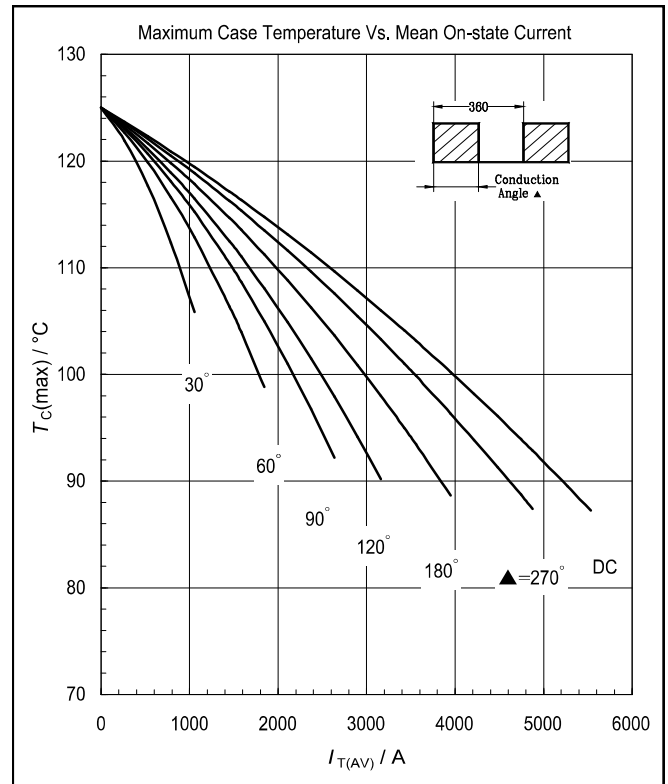


Fig6. Maximum Case Temperature Vs. Mean On-state Current

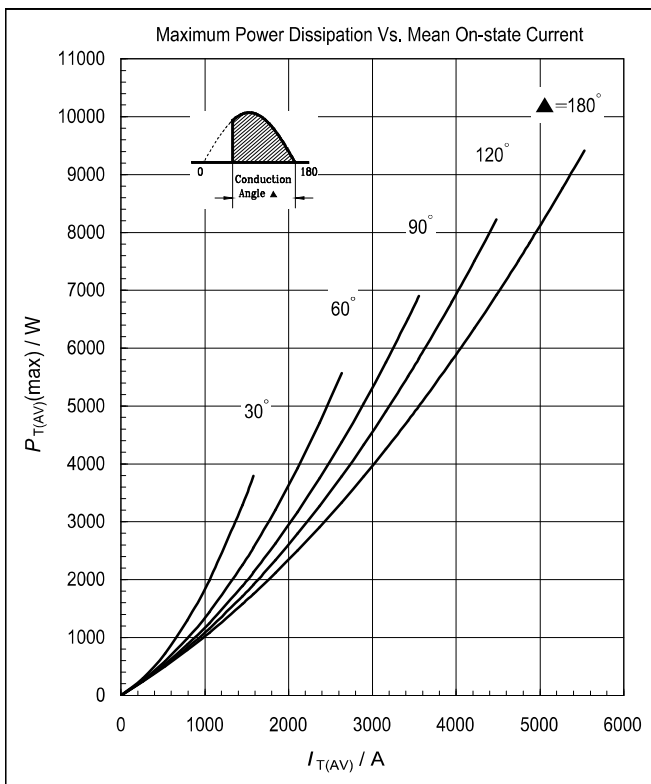


Fig7. Maximum Power Dissipation Vs. Mean On-state Current

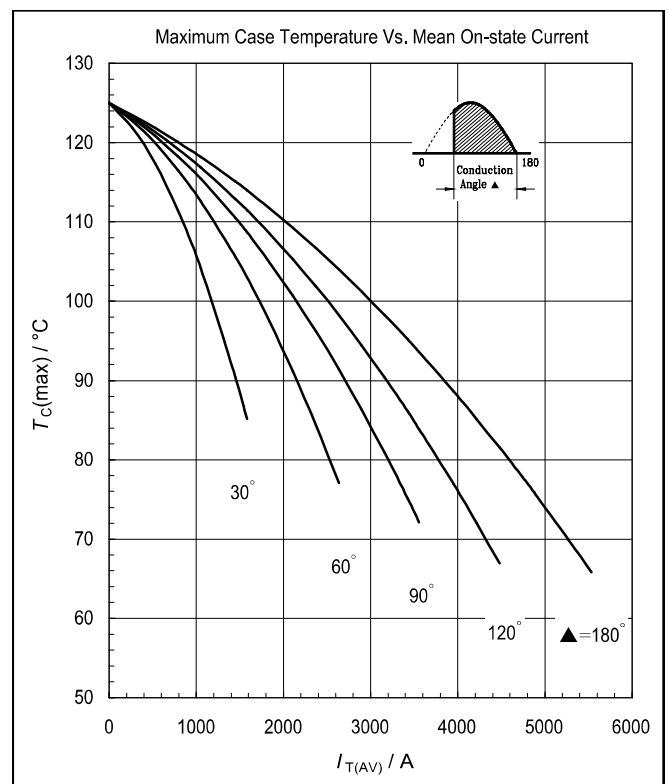


Fig8. Maximum Case Temperature Vs. Mean On-state Current

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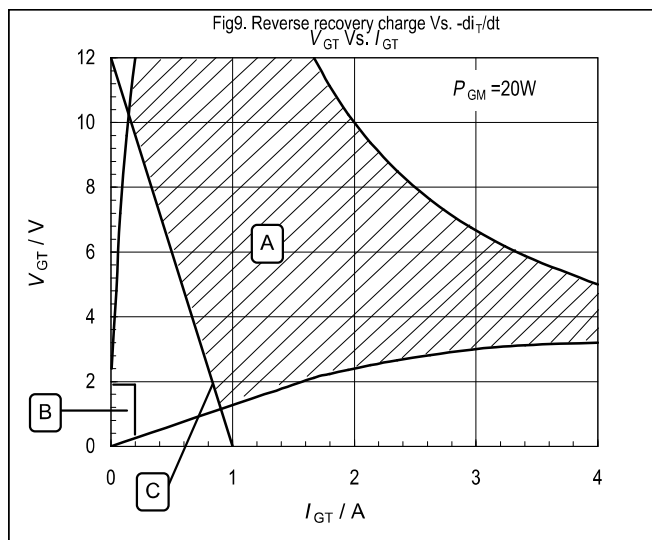
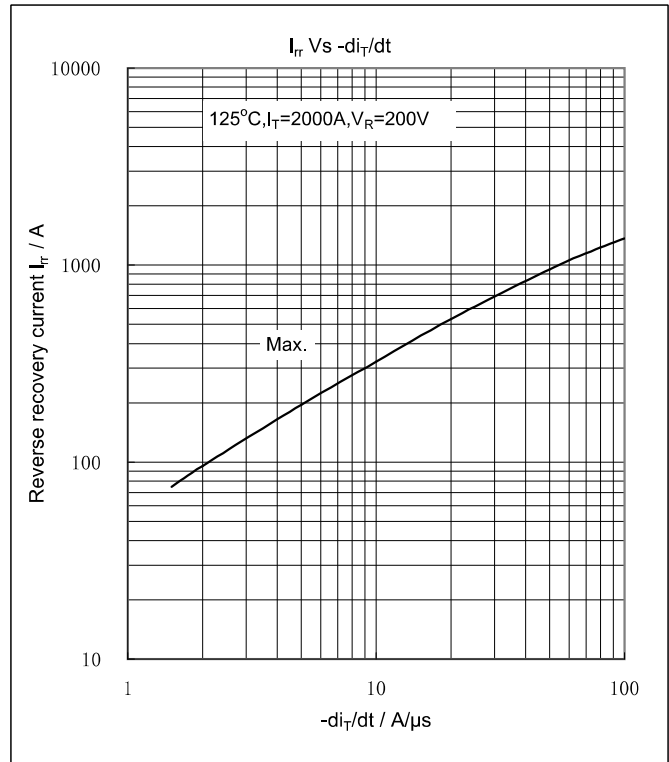
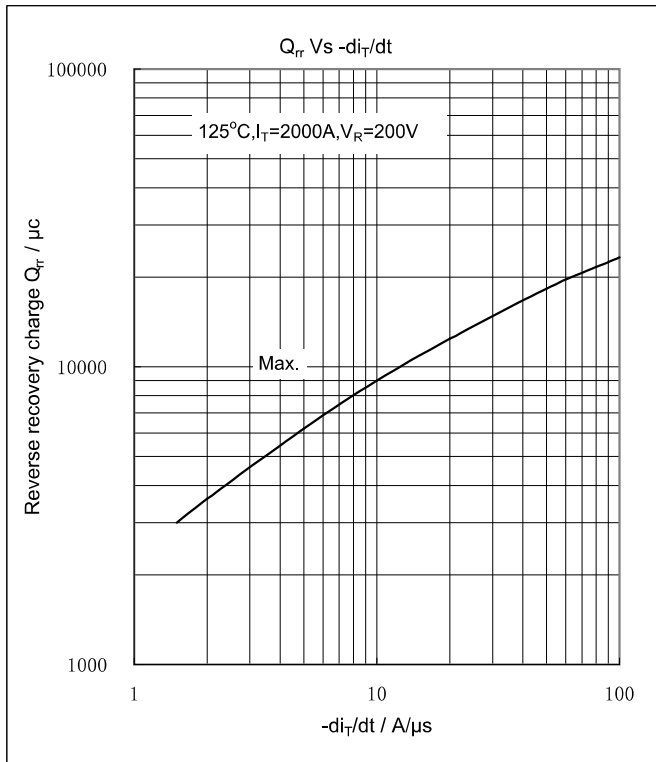


Fig11. V_{GT} Vs. I_{GT}

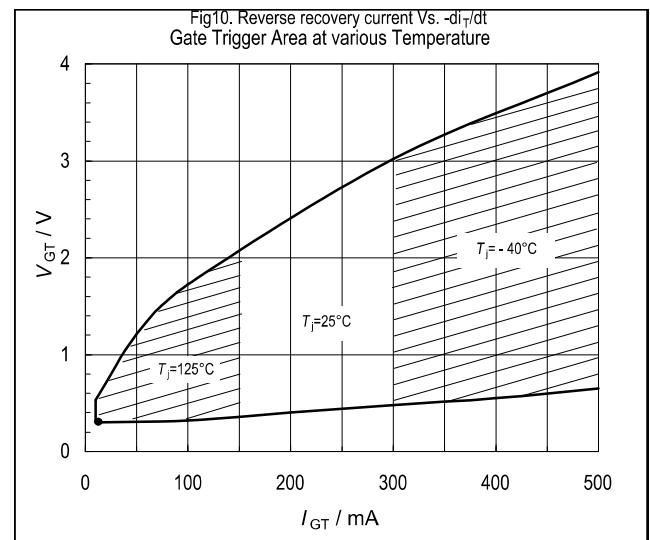


Fig12. Gate Trigger Area at various Temperature

A is Recommended Triggering Area.

B is Unreliable Triggering Area.

C is Recommended Gate Load Line.