Insulated Gate Bipolar Transistor Type SA45TO1600GG

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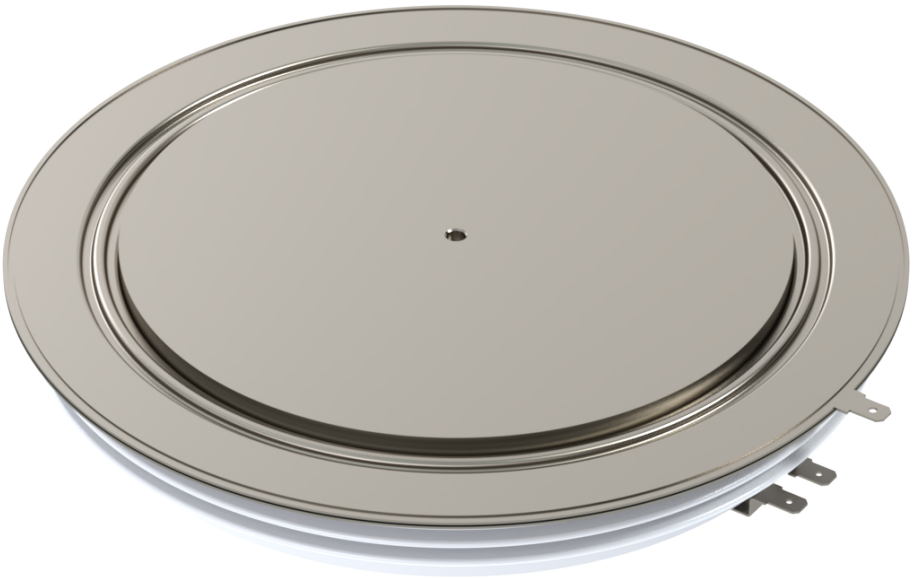

ORDERING INFORMATION						(Please quote 12 to 15 digit code as below)
SA	45	TO	1600	G	G	
-	Voltage Code	Outline Code	Current code	Type code	Special code	Optional code

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Absolute Maximum Ratings

	VOLTAGE RATINGS	MAXIMUM LIMITS	UNITS
V_{CES}	Collector-emitter voltage	4500	V
V_{DClink}	Permanent DC voltage for 100 FIT failure rate	2800	V
V_{GES}	Peak gate - emitter voltage	±20	V

	OTHER RATINGS	MAXIMUM LIMITS	UNITS
I_C	DC collector current, IGBT	1600	A
I_{CRM}	Repetitive peak collector current, t_p = 1ms, IGBT	3200	A
$I_{F(DC)}$	Continuous DC forward current, Diode	1600	A
I_{FRM}	Repetitive peak forward current, t_p = 1ms, Diode	3200	A
I_{FSM}	Peak non-repetitive surge t_p = 10ms, V_{RM} = 60%V_{RRM}, Diode (note 4)	30	kA
I_{FSM2}	Peak non-repetitive surge t_p = 10ms, $V_{RM} \leq$ 10V, Diode (note 4)	33	kA
P_{MAX}	Maximum power dissipation, IGBT (note 2)	12.8	kW
P_D	Maximum power dissipation, Diode (note 2)	8.13	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 3)	3000	A/µs
T_j	Operating temperature range	-40 to +125	°C
T_{stg}	Storage temperature range	-40 to +125	°C
note 1)	Unless otherwise indicated T_j = 125°C		
note 2)	T_{sink} = 25°C, doublesidecooled		
note 3)	Maximum commutation loop inductance 200 nH		
note 4)	Half-sinewave, 125°C T_j initial.		

IGBT Characteristics

	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
$V_{CE(sat)}$	Collector-emitter saturation voltage	I_C = 1600A, V_{GE} = 15V, T_j = 25°C	-	2.75	3.2	V
		I_C = 1600A, V_{GE} = 15V	-	3.50	3.9	V
V_{T0}	Threshold voltage	Current range: 530A-1600A	-	-	1.79	V
r_T	Slope resistance		-	-	1.32	mΩ
$V_{GE(TH)}$	Gate threshold voltage	V_{CE} = V_{GE}, I_C = 170mA	-	5.1	-	V
I_{CES}	Collector-emitter cut-off current	V_{CE} = V_{CES}, V_{GE} = 0V	-	45	70	mA
I_{GES}	Gate leakage current	V_{GE} = ±20V	-	-	±20	µA
C_{ies}	Input capacitance	V_{CE} = 25V, V_{GE} = 0V, f=1MHz	-	270	-	nF
$t_{d(on)}$	Turn-on delay time	I_C = 1600A, V_{CE} = 2800V, di/dt = 2700A/µs, V_{GE} = ±15V, L_S = 200nH, $R_{g(ON)}$ = 4.3Ω, $R_{g(OFF)}$ = 12Ω, C_{GE} = 133nF Integral diode used aus freewheel diode (notes 1 & 2)	-	2.2	-	µs
t_r(V)	Rise time		-	4.4	-	µs
$Q_{g(on)}$	Turn-on gate charge		-	9	-	µC
E_{on}	Turn-on energy		-	12	-	J
$t_{d(off)}$	Turn-off delay time		-	4.8	-	µs
t_f(I)	Fall time		-	2.6	-	µs
$Q_{g(off)}$	Turn-off gate charge		-	10	-	µC
E_{off}	Turn-off energy		-	8.7	-	J
I_{SC}	Short circuit current	V_{GE} = +15V, V_{CC} = 2800V, $V_{CEmax} \leq V_{CES}$, $t_p \leq 10µs$	-	5000	-	A
note 1)	C_{GE} is additional gate–emitter capacitance added to output of gate drive					
note 2)	Figures 4 to 10 are obtained using integral Diode aus freewheeling diode					

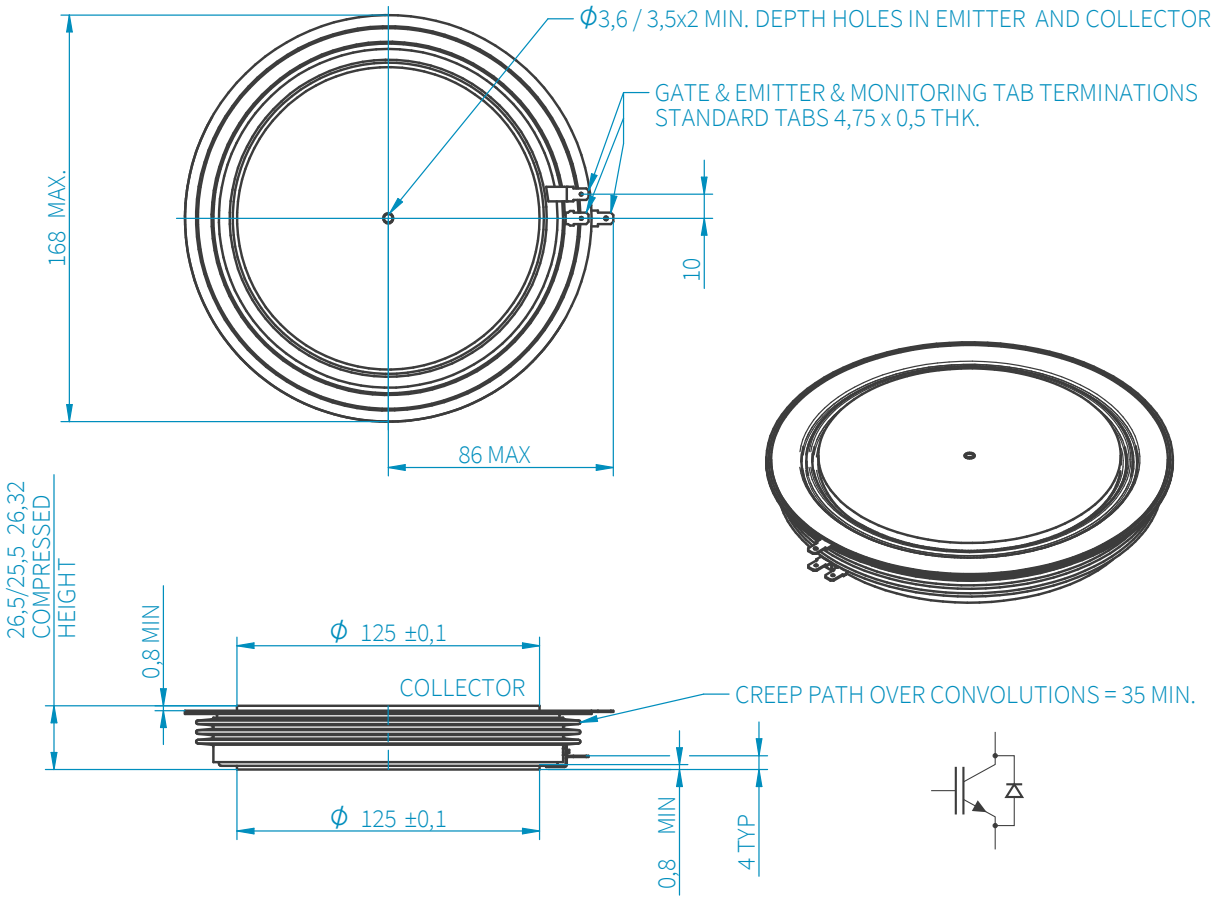
Diode Characteristics

	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
V_{FM}	Forward voltage	I_F = 1600A, T_j = 25°C	-	3.3	3.6	V
		I_F = 1600A	-	3.45	3.8	V
V_{T0}	Threshold Voltage	Current range 530A-1600A	-	-	2.14	V
r_T	Slope resistance		-	-	1.04	mΩ
I_{RRM}	Peak reverse recovery current	I_F = 1600A, V_R = 2800V,V_{GE} = –15V, di/dt = 2700A/µs	-	1270	-	A
Q_{rr}	Recovered charge		-	1960	-	µC
t_{rr}	Reverse recovery time, 50% Chord		-	1.75	-	µs
E_r	Reverse recovery energy		-	2.03	-	J

Thermal Characteristics

	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNITS
R_{thJK}	Thermal resistance, junction to sink, IGBT	Double side cooled	-	-	7.8	K/kW
		Collector side cooled	-	-	12.8	K/kW
		Emitter side cooled	-	-	20.3	K/kW
R_{thJK}	Thermal resistance, junction to sink, Diode	Double side cooled	-	-	12.3	K/kW
		Cathode side cooled	-	-	19.5	K/kW
		Anode side cooled	-	-	35.7	K/kW
F	Mounting force	Note 2	50	-	70	kN
W_t	Weight		-	2000	-	g
note 1)	Unless otherwise indicated T_j = 125°C					
note 2)	Consult application note for detailed mounting requirements					

Outline Drawing



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