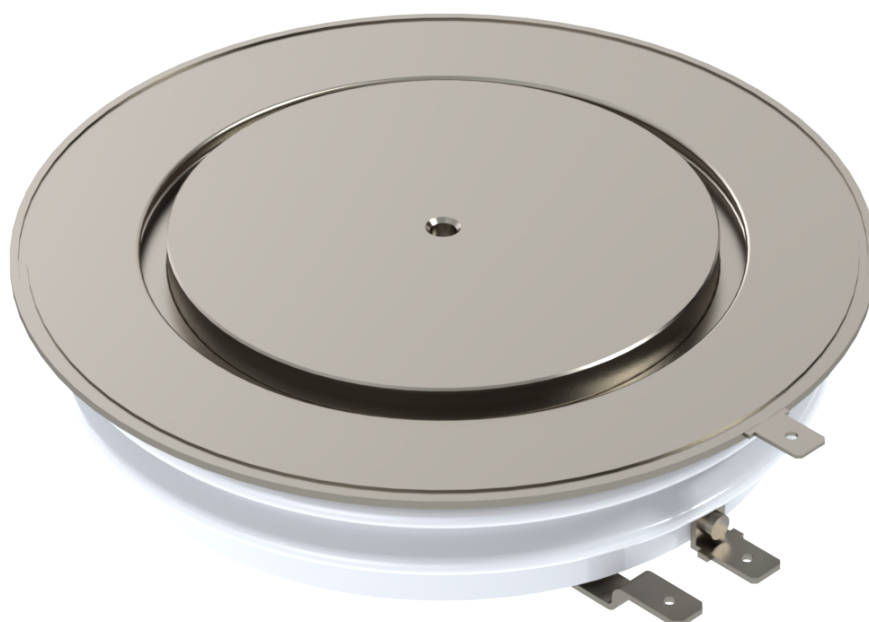


Insulated Gate Bipolar Transistor Type SA33IP0425GG

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Date: August, 2020
Data Sheet Issue: 1



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SA	33	IP	0425	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	3300	V
V_{DClk}	Permanent DC voltage for 100 FIT failure rate	1800	V
V_{GES}	Peak gate - emitter voltage	± 20	V

OTHER RATINGS		MAXIMUM LIMITS	UNITS
I_C	DC collector current, IGBT	425	A
I_{CRM}	Repetitive peak collector current, $t_p = 1\text{ms}$, IGBT	850	A
$I_{F(DC)}$	Continuous DC forward current, Diode	425	A
I_{FRM}	Repetitive peak forward current, $t_p = 1\text{ms}$, Diode	850	A
I_{FSM}	Peak non-repetitive surge $t_p = 10\text{ms}$, $V_{RM} = 60\%V_{RRM}$, Diode (note 4)	2545	A
I_{FSM2}	Peak non-repetitive surge $t_p = 10\text{ms}$, $V_{RM} \leq 10\text{V}$, Diode (note 4)	2800	A
P_{MAX}	Maximum power dissipation, IGBT (note 2)	2.75	kW
P_D	Maximum power dissipation, Diode (note 2)	1.74	kW
$(di/dt)_{cr}$	Critical diode di/dt (note 3)	1000	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 $T_j = 125^\circ\text{C}$		
note 2)	$T_{sink} = 25^\circ\text{C}$, doublesidecooled		
note 3)	Maximum commutation loop inductance 1000 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 = 425A, V _{GE} = 15V, T _j = 25°C	-	2.65	2.95	V
		I _C = 425A, V _{GE} = 15V	-	3.4	3.7	V
V _{T0}	Threshold voltage	Current range: 142A-425A	-	-	1.69	V
r _T	Slope resistance		-	-	4.74	mΩ
V _{GE(TH)}	Gate threshold voltage	V _{CE} = V _{GE} , I _C = 36mA	-	5.2	-	V
I _{CES}	Collector-emitter cut-off current	V _{CE} = V _{CES} , V _{GE} = 0V	-	4	11	mA
I _{GES}	Gate leakage current	V _{GE} = ±20V	-	-	±7	μA
C _{ies}	Input capacitance	V _{CE} = 25V, V _{GE} = 0V, f=1MHz	-	58	-	nF
t _{d(on)}	Turn-on delay time	I _C = 425A, V _{CE} = 1800V, di/dt = 850A/μs, V _{GE} = ±15V, L _S = 500nH, R _{g(ON)} = 5.1Ω, R _{g(OFF)} = 33Ω, C _{GE} = 183nF Integral diode used aus freewheel diode (notes 1, 2 & 3)	-	1.6	-	μs
t _{r(V)}	Rise time		-	2	-	μs
Q _{g(on)}	Turn-on gate charge		-	8.1	-	μC
E _{on}	Turn-on energy		-	1.1	-	J
t _{d(off)}	Turn-off delay time		-	4.9	-	μs
t _{f(I)}	Fall time		-	1.2	-	μs
Q _{g(off)}	Turn-off gate charge		-	6	-	μC
E _{off}	Turn-off energy		-	1.12	-	J
I _{SC}	Short circuit current	V _{GE} = +15V, V _{CC} = 1800V, V _{CEmax} ≤ V _{CES} , t _p ≤ 10μs	-	1600	-	A
note 1)	C _{GE} is additional gate–emitter capacitance added to output of gate drive					
note 2)	E _{on} integration time 15μs from 10% rising I _G					
note 3)	E _{off} integration time 15μs from 90% falling V _{GE}					

Diode Characteristics

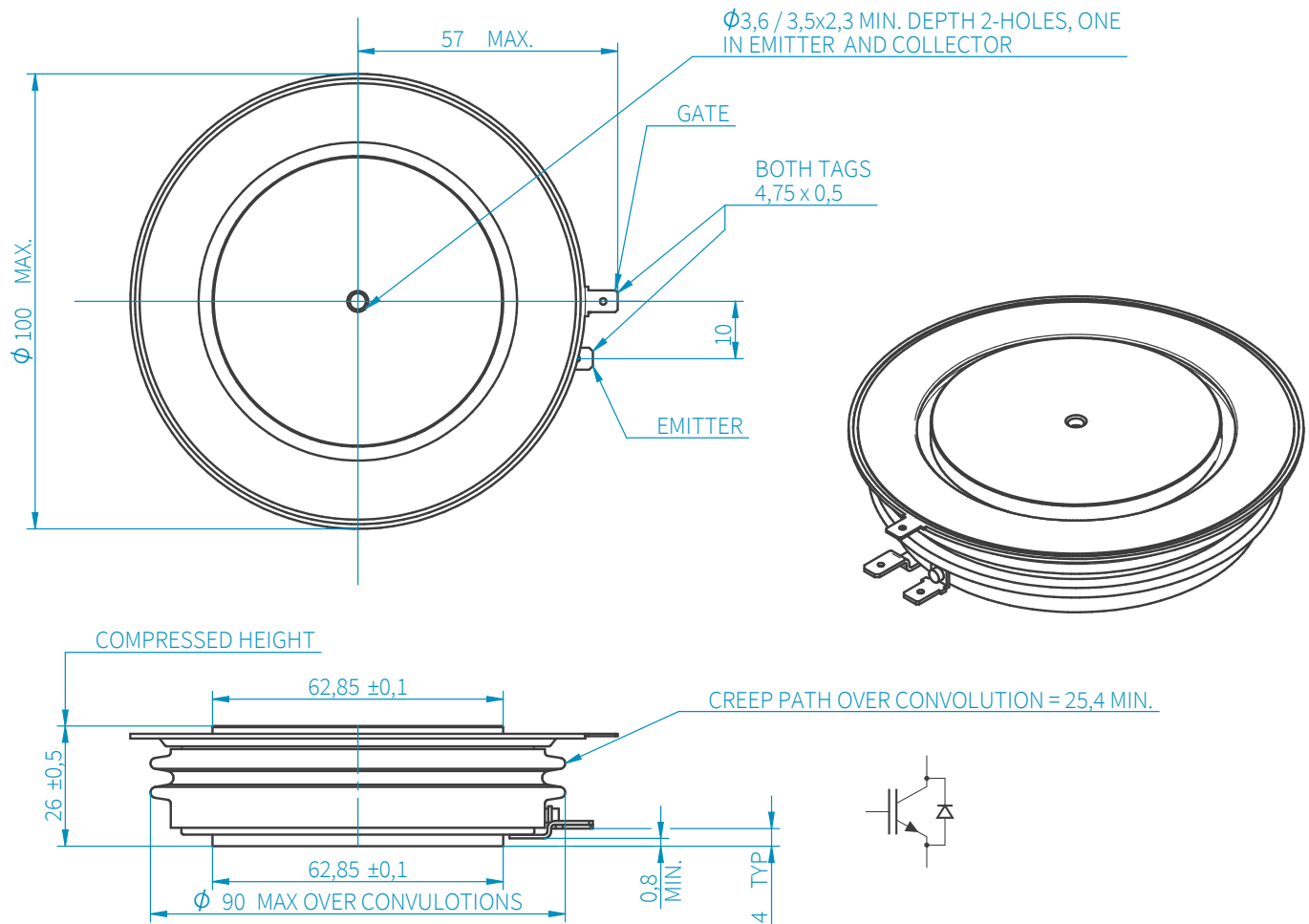
PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNITS
V _{FM}	Forward voltage	I _F = 140A, T _j = 25°C	-	2.65	2.95	V
		I _F = 140A	-	3.0	3.3	V
V _{T0}	Threshold Voltage	Current range 47A-140A	-	-	1.72	V
r _T	Slope resistance		-	-	3.72	mΩ
I _{RRM}	Peak reverse recovery current		-	305	-	A
Q _{rr}	Recovered charge	I _F = 140A, V _{GE} = ±15V, di/dt = 300A/μs	-	440	-	μC
t _{rr}	Reverse recovery time, 50% Chord		-	1.7	-	μs
E _r	Reverse recovery energy		-	0.48	-	J

Thermal Characteristics

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNITS
R _{thJK}	Thermal resistance, junction to sink, IGBT	Double side cooled	-	-	36.4	K/kW
		Collector side cooled	-	-	59.4	K/kW
		Emitter side cooled	-	-	94.3	K/kW
R _{thJK}	Thermal resistance, junction to sink, Diode	Double side cooled	-	-	57.6	K/kW
		Cathode side cooled	-	-	88.2	K/kW
		Anode side cooled	-	-	166	K/kW
F	Mounting force	Note 2	12	-	16	kN
W _t	Weight		-	650	-	g
note 1)	Unless otherwise indicated T _j = 125°C					
note 2)	Consult application note for detailed mounting requirements					

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Outline Drawing



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