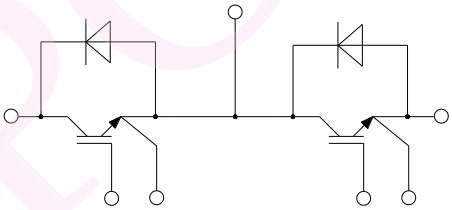
MS KM301GB12
Technical Information
IGBT Power Module

Key Parameters

V_{CE}	= 1200V
I_C	= 300A

Features
- Low $V_{ce(sat)}$
- Fast switching
- High short circuit capability (10μs)
- Low inductance module structure

Applications
- Inverter for motor drive
- AC and DC servo drive amplifier
- UPS
- Soft switching welding machine



Equivalent Circuit Schematic

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Absolute Maximum Ratings

Symbol	Characteristic	Value	Unit
V_{CES}	Collector-Emitter Voltage	1200	V
I_{CDC}	Continuous DC Collector Current	300	A
I_{CRM}	Peak Collector Current (tp=1ms)	600	A
V_{GES}	Gate-Emitter Voltage	±20	V
P_{tot}	Total Power Dissipation (T_c=25°C, T_j=175°C)	1500	W

IGBT Characteristics

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
BV_{CES}	Collector-Emitter breakdown Voltage	V_{GE}=0V, I_C =250μA,T_{vj}=25°C	1200			V
I_{CES}	Collector-Emitter leakage Current	V_{CE}=1200V,V_{GE}=0V, T_{vj}=25°C			5.0	mA
I_{GES}	Gate-Emitter leakage Current	V_{CE}=0V,V_{GE}=±20V, T_{vj}=25°C			400	ηA
$V_{GE(th)}$	Gate-emitter Threshold Voltage	V_{GE}=V_{CE}, I_C =1.5mA,T_{vj}=25°C	5.5	6.5	7.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	Ic=300A,V_{GE}=15V, T_{vj}=25°C		1.65	2.00	V
		Ic=300A,V_{GE}=15V, T_{vj}=125°C		2.05		V
		Ic=300A,V_{GE}=15V, T_{vj}=150°C		2.2		V
Q_G	Gate Charge	V_{CC}=600V, V_{GE}=0/15V, I_C=300A T_{vj} =25°C		1.43		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE} =0V, f=1MHz, T_{vj}=25°C		29		ηF
C_{oes}	Output Capacitance			1.2		ηF
C_{res}	Reverse Transfer Capacitance			0.3		ηF
R_{gint}	Internal Gate Resistance			1.3		Ω
$t_{d(on)}$	Turn-on Delay Time	I_C =300 A V_{CE} = 600 V V_{GE} = ±15V R_G = 2.0Ω T_{vj}=25°C , L_{load} =0.82mH Energy loss include tail and diode reverse recovery		178		ηs
t_r	Rise Time			90		ηs
$t_{d(off)}$	Turn-off Delay Time			450		ηs
t_f	Fall Time			87		ηs
E_{on}	Energy Dissipation During Turn-on Time			10.22		mJ
E_{off}	Energy Dissipation During Turn-off Time			14.18		mJ
$t_{d(on)}$	Turn-on Delay Time	I_C =300 A V_{CE} = 600 V V_{GE} = ±15V R_G = 2.0Ω T_{vj}=150°C , L_{load} =0.82mH Energy loss include tail and diode reverse recovery		215		ηs
t_r	Rise Time			102		ηs
$t_{d(off)}$	Turn-off Delay Time			520		ηs
t_f	Fall Time			155		ηs
E_{on}	Energy Dissipation During Turn-on Time			17		mJ
E_{off}	Energy Dissipation During Turn-off Time			21.2		mJ
I_{SC}	SC Data	t_{sc}≤10μs,V_{GE}=15V, Tv_j=25°C,V_{cc}=600V,		1000		A

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Diode Characteristics

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
I_F	Diode DC Forward Current			300		A
I_{FRM}	Diode Peak Forward Current	tp=1ms		600		A
V_F	Forward Voltage	I_F=300A,T_{vj}=25°C		1.95	2.35	V
		I_F=300A,T_{vj}=125°C		1.80		V
		I_F=300A,T_{vj}=150°C		1.75		V
Q_{rr}	Recovered Charge	I_F =300 A V_R=600V -di_F/dt =2630A/µs T_{vj}=25°C		14		µC
I_{rr}	Peak Reverse Recovery Current			275		A
E_{rec}	Reverse Recovery Energy			5.4		mJ

Module Characteristics

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_{isol}	Isolation voltage	t=1min,f=50Hz	2500			V
T_{jmax}	Maximum Junction Temperature				175	°C
$T_{vj\ op}$	Operating Junction Temperature		-40		150	°C
T_{stg}	Storage Temperature		-40		125	°C
$R_{CC'+EE'}$	Module lead resistance terminal to chip			0.70		mΩ
L_{SCE}	Stray Inductance, Module			20		nH
$R_{\theta jc}$	Junction-to Case	per IGBT-inverter		0.08		°C/W
		per Diode-inverter		0.15		°C/W
$R_{\theta cs}$	Case to Sink	per IGBT-inverter		0.032		°C/W
		per Diode-inverter		0.05		°C/W
		Conductive grease applied		0.01		K/W
M_t	Module Electrodes Torque	Recommended(M6)	2.5		5.0	N·m
M_s	Module-to-Sink Torque	Recommended(M6)	3.0		6.0	N·m
G	Weight of Module			320		g

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• Typical Electrical Characteristics

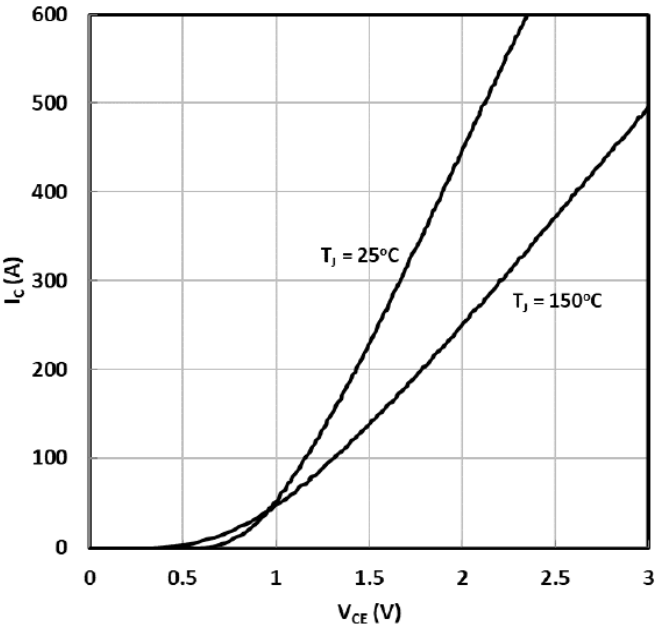

Fig. 1 IGBT (Inverter) Output Characteristics

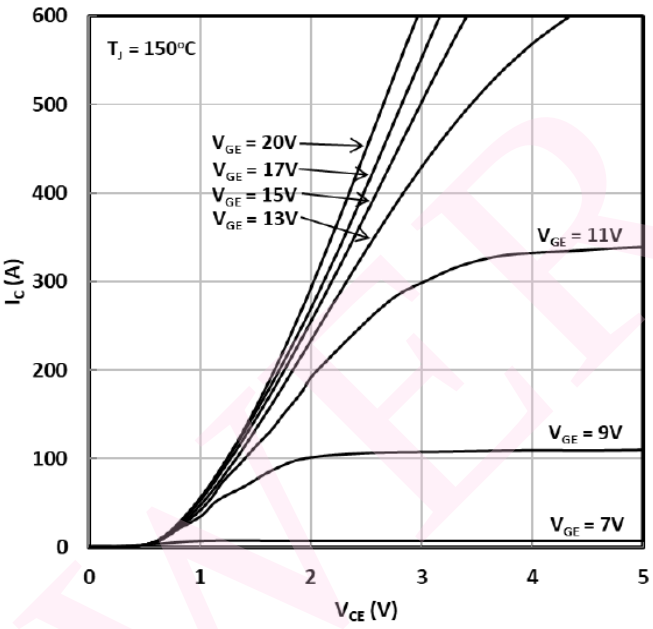

Fig. 2 IGBT (Inverter) Output Characteristics

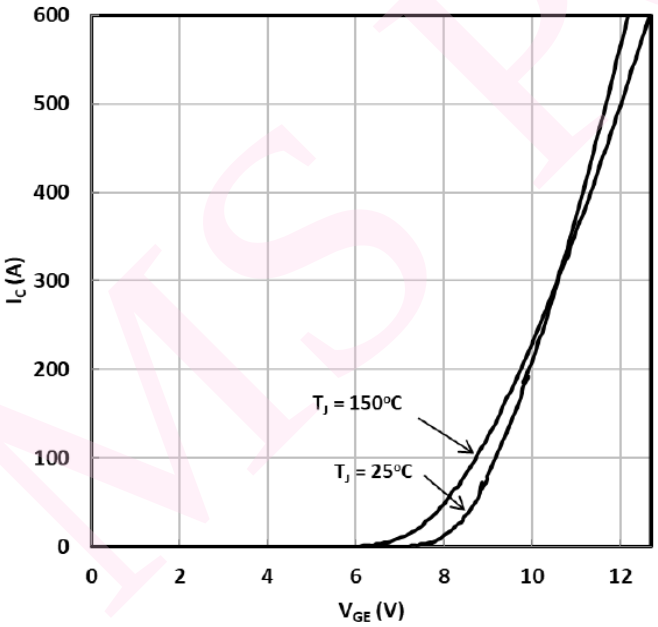

Fig. 3 IGBT (Inverter) Transfer Characteristics

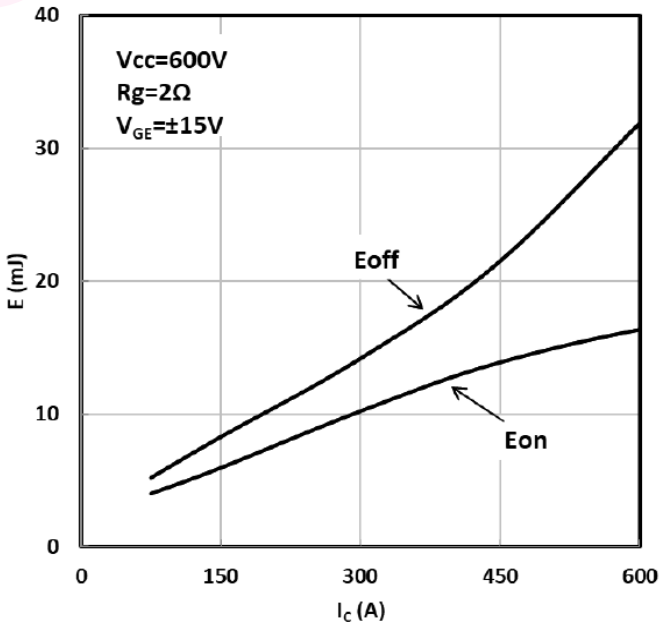

Fig. 4 IGBT (Inverter) Switching Loss vs. Ic

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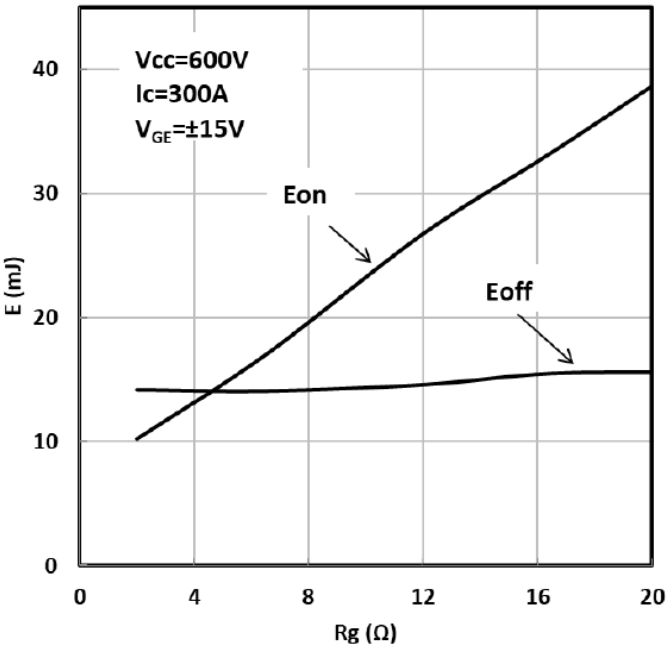

Fig. 5 IGBT (Inverter) Switching Loss vs. Rg

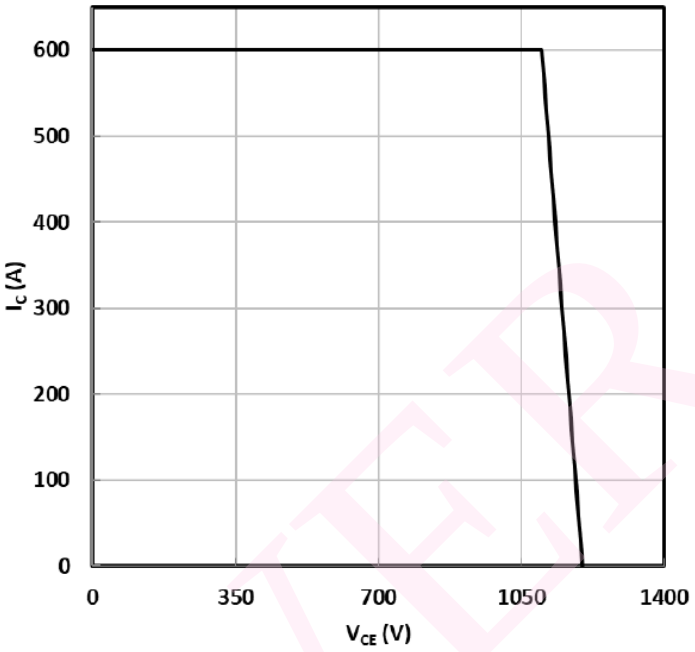

Fig. 6 RBSOA

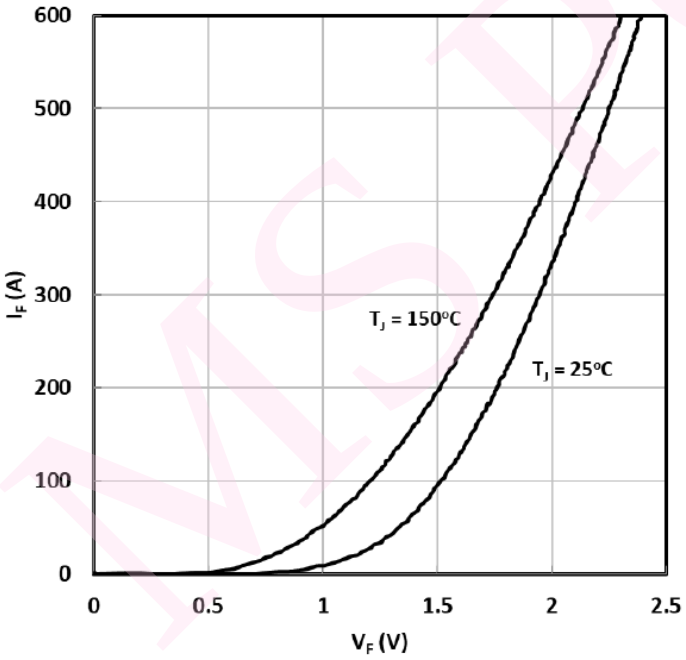

Fig. 7 Diode (Inverter) Forward Characteristics

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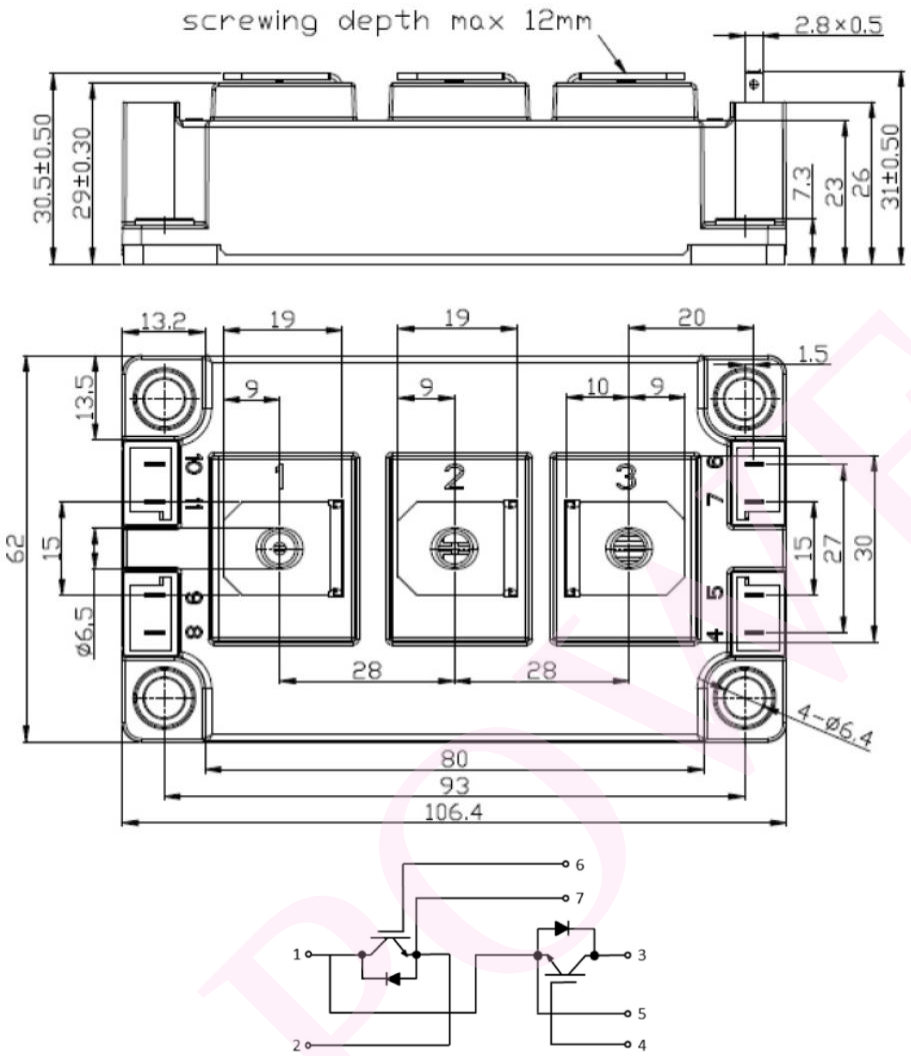
Outline :



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