MS KM20AC07B
Technical Information
IGBT Power Module

Key Parameters

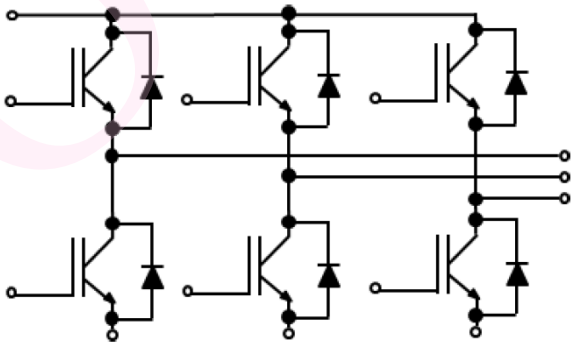
V_{CES}	= 650V
I_C	= 20A

Features

- Low $V_{ce(sat)}$
- Fast switching
- High ruggedness
- High short circuit capability

Applications

- Inverter for motor drive
- Water pumps
- Wind turbines



Equivalent Circuit Schematic

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Absolute Maximum Ratings: IGBT, Inverter

Symbol	Characteristic	Value	Unit
V_{CES}	Collector-Emitter Voltage	650	V
I_{CDC}	Continuous DC Collector Current (T_c=85°C)	20	A
I_{CRM}	Peak Collector Current	40	A
V_{GES}	Gate-Emitter Voltage	±20	V
$P_{D(max)}$	Total Power Dissipation (T_c=25°C, T_j =175°C)	70	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	650			V
I_{CES}	Collector-Emitter leakage Current	V_{CE}=650V,V_{GE}=0V, T_{vj}=25°C			1.0	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 =250μA,T_{vj}=25°C	5.0	6.0	7.0	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	Ic=20A,V_{GE}=15V, T_{vj}=25°C		1.70	2.00	V
		Ic=20A,V_{GE}=15V, T_{vj}=150°C		2.15		V
Q_G	Gate Charge	V_{CC}=300V, V_{GE}=0/15V, I_C=20A T_{vj} =25°C		45		ηC
C_{iss}	Input Capacitance	V_{CE}=25V, V_{GE} =0V, f=1MHz, T_{vj}=25°C		0.93		ηF
C_{oss}	Output Capacitance			0.085		ηF
C_{rss}	Reverse Transfer Capacitance			0.016		ηF
$t_{d(on)}$	Turn-on Delay Time	I_C =20 A V_{CE} = 300 V V_{GE} = ±15V R_G = 22Ω T_{vj}=25°C , L_{load} =0.82mH Energy loss include tail and diode reverse recovery		29		ηs
t_r	Rise Time			44		ηs
$t_{d(off)}$	Turn-off Delay Time			77		ηs
t_f	Fall Time			94		ηs
E_{on}	Energy Dissipation During Turn-on Time			0.4		mJ
E_{off}	Energy Dissipation During Turn-off Time			0.28		mJ
$t_{d(on)}$	Turn-on Delay Time	I_C =20A V_{CE} = 300 V V_{GE} = ±15V R_G = 22Ω T_{vj}=150°C , L_{load} =0.82mH Energy loss include tail and diode reverse recovery		30		ηs
t_r	Rise Time			46		ηs
$t_{d(off)}$	Turn-off Delay Time			97		ηs
t_f	Fall Time			135		ηs
E_{on}	Energy Dissipation During Turn-on Time			0.6		mJ
E_{off}	Energy Dissipation During Turn-off Time			0.38		mJ
$I_{C(SC)}$	SC Data	t_{sc}≤5μs,V_{GE}=15V, Tv_j=25°C,V_{cc}≤400V,		60		A

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Absolute Maximum Ratings: Diode, Inverter

Symbol	Characteristic	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	650	V
I_F	Continuous DC forward current (T_c=85°C)	20	A
I_{FRM}	Repetitive peak forward current	40	A

Diode Characteristics

Symbol	Characteristic	Conditions	Value			Unit
			Min.	Typ.	Max.	
V_F	Forward Voltage	I_F=20A,T_{vj}=25°C		1.4	1.7	V
		I_F=20A,T_{vj}=150°C		1.2		V
Q_{rr}	Recovered Charge	I_F =20 A V_R=300V -di_F/dt =367A/µs T_{vj}=25°C		0.33		µC
I_{rrm}	Peak Reverse Recovery Current			8.4		A
E_{rr}	Reverse Recovery Energy			0.02		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			9.5		mΩ
L_{SCE}	Stray Inductance, Module			25		nH
$R_{\theta jc}$	Junction-to Case	per IGBT-inverter		1.95		°C/W
		per Diode-inverter		2.5		°C/W
$R_{\theta cs}$	Case to Sink	per IGBT-inverter		0.81		°C/W
		per Diode-inverter		1.0		°C/W
M_t	Module force for module mounting		30		50	N
G	Weight of Module			10		g

- **Typical Electrical Characteristics**

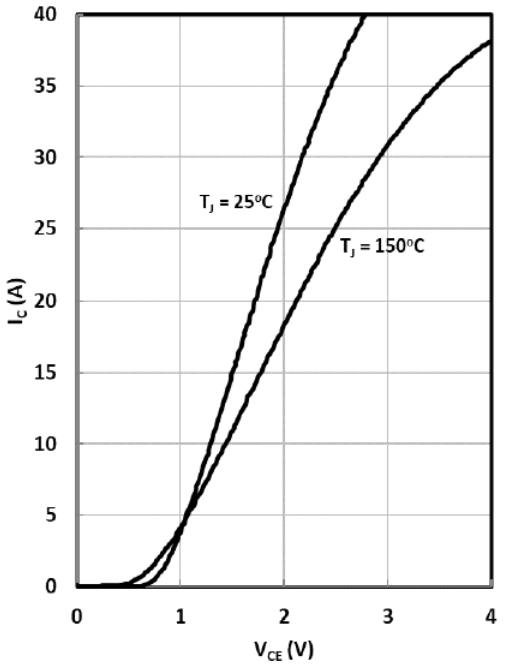

Fig. 1 IGBT (Inverter) Output Characteristics

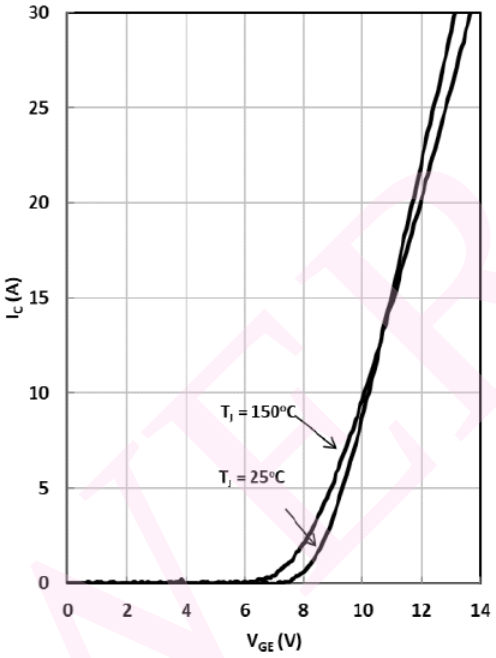

Fig. 2 IGBT (Inverter) Transfer Characteristics

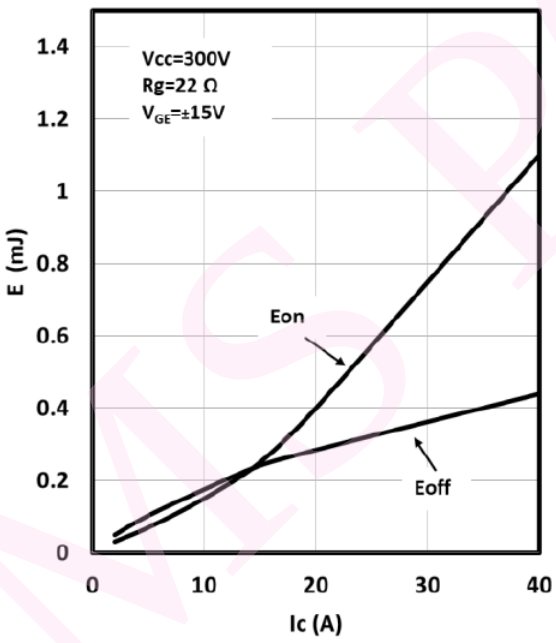

Fig. 3 IGBT (Inverter) Switching Loss vs. Ic

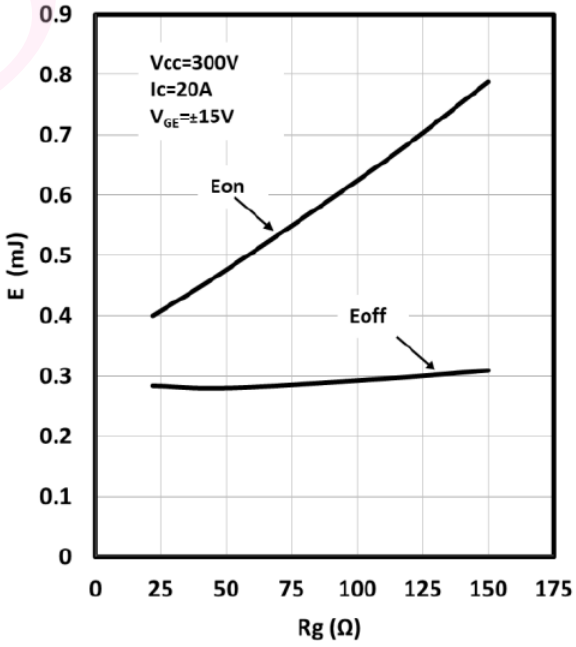

Fig. 4 IGBT (Inverter) Switching Loss vs. Rg

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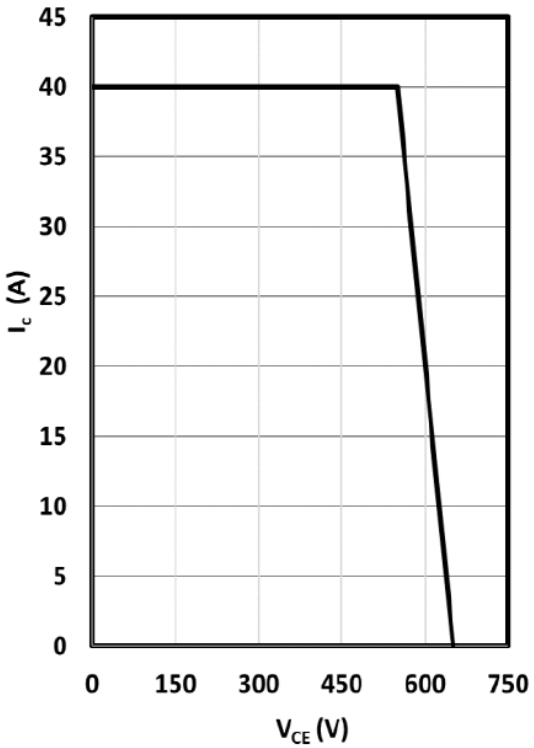

Fig. 5 RBSOA

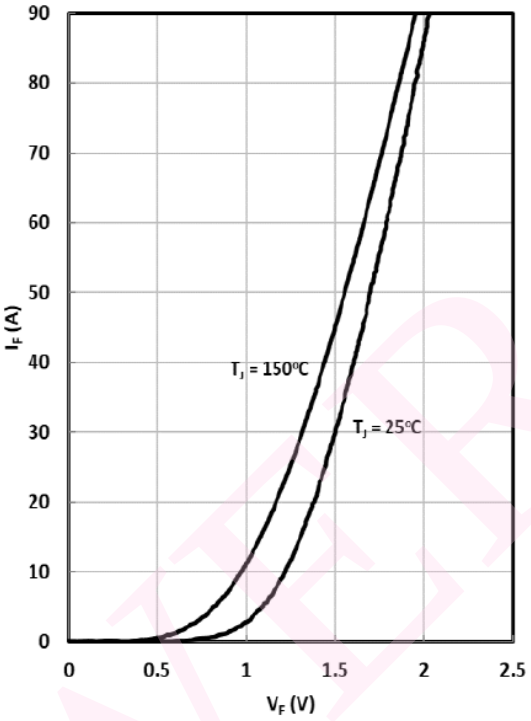

Fig. 6 Diode (Inverter) Forward Characteristics

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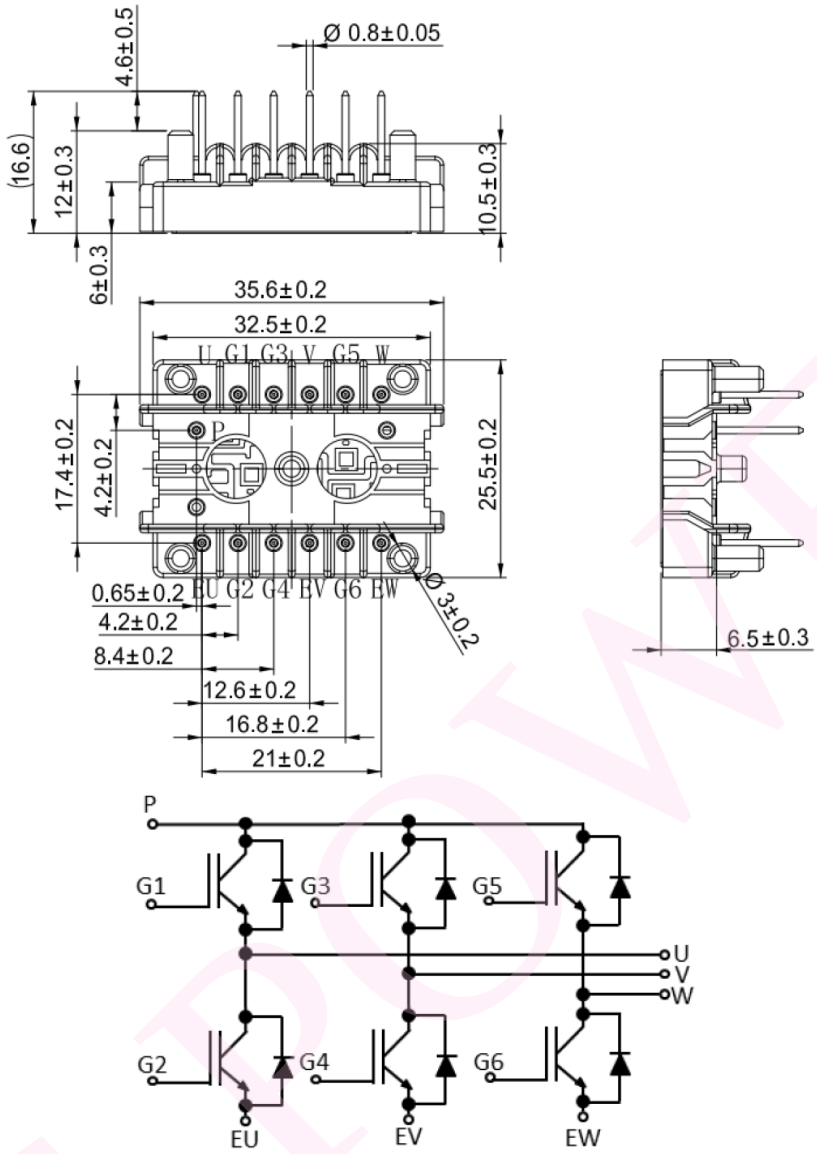
Outline :



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