

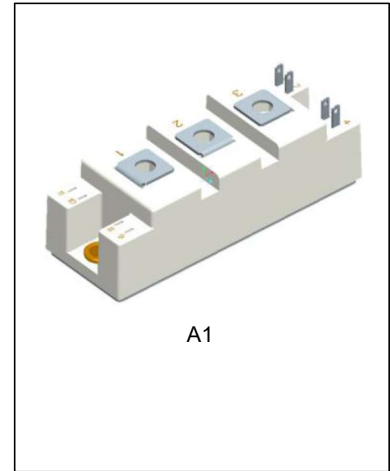
100A, 1200V IGBT MODULE

DESCRIPTION

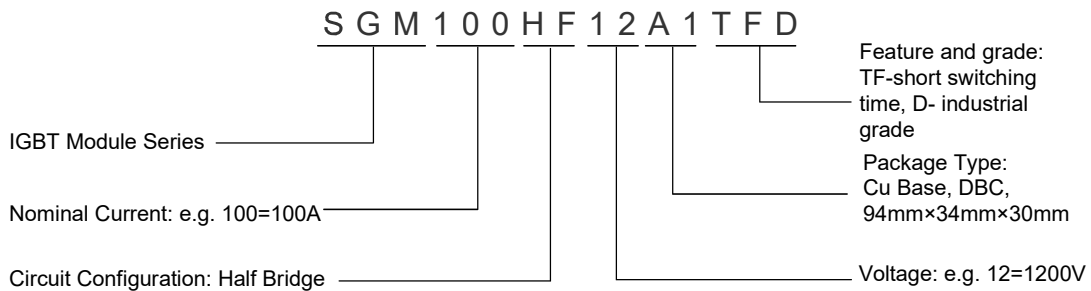
SGM100HF12A1TFD Module offers the optimum performance for UPS, AC inverter drive and electronic welders.

FEATURES

- ◆ 100A, 1200V, $V_{CE(sat)(typ.)} = 2.1V @ I_C = 100A$
- ◆ $V_{CE(sat)}$ with positive temperature coefficient
- ◆ High short circuit capability
- ◆ Low switching loss
- ◆ Isolated copper baseplate using DBC technology



NOMENCLATURE



ORDERING INFORMATION

Part No.	Package	Marking	Packing Type
SGM100HF12A1TFD	A1	SGM100HF12A1TFD	Carton

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, UNLESS OTHERWISE NOTED)

Characteristics		Symbol	Ratings	Units
Collector to Emitter Voltage		V _{CE}	1200	V
Gate to Emitter Voltage		V _{GE}	±20	V
Collector Current	T _C =80°C	I _C	100	A
Repetitive Pulsed Collector Current	T _C =80°C	I _{CRM}	200	A
Operating Junction Temperature Range		T _J	-40~+125	°C
Storage Temperature Range		T _{stg}	-40~+125	°C
Isolation Voltage		V _{iso}	2500	V
To heat sink M6		Ms	3~5	Nm
To terminals M5		Mt	2.5~5	Nm
Weight		W	160	g

THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	R _{θJC}	0.26	°C/W
Thermal Resistance, Junction to Case (FRD)	R _{θJC}	0.40	°C/W
Thermal Resistance, Case to sink	R _{θCS}	0.03	°C/W

ELECTRICAL CHARACTERISTICS OF IGBT INVERTER(T_C=25°C UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units	
Collector to Emitter Saturation Voltage	V _{CEsat}	I _C =100A, V _{GE} =15V, T _J =25°C	--	2.1	2.8	V	
		I _C =100A, V _{GE} =15V, T _J =125°C	--	2.3	--		
		I _C =100A, V _{GE} =15V, T _J =150°C	--	2.4	--		
Gate Threshold Voltage	V _{GEth}	I _C =250μA, V _{CE} =V _{GE} , T _J =25°C	4.3	5.3	6.8	V	
C-E cut-off Current	I _{CES}	V _{CE} =1200V, V _{GE} =0V, T _J =25°C	--	--	1	mA	
G-E Leakage Current	I _{GES}	V _{CE} =0V, V _{GE} =20V, T _J =25°C	--	--	500	nA	
Integrated Gate Resistor	R _{Gint}	T _J =25°C	--	3.5	--	Ω	
Input Capacitance	C _{ies}	f=1MHz, T _J =25°C, V _{CE} =25V, V _{GE} =0V	--	7.4	--	nF	
Output Capacitance	C _{oes}		--	0.9	--		
Reverse Transfer Capacitance	C _{res}		--	0.4	--		
Total Gate Charge	Q _G	V _{GE} =-15V---+15V	--	0.7	--	μC	
Turn-on Delay Time	T _{d(on)}	I _C =100A, V _{CE} =600V V _{GE} =±15V, R _G =35Ω, Inductive Load	T _J =25°C	--	0.17	--	μs
			T _J =125°C	--	0.19	--	
			T _J =150°C	--	0.19	--	
Rise Time	t _r		T _J =25°C	--	0.14	--	μs
			T _J =125°C	--	0.15	--	
			T _J =150°C	--	0.16	--	
Turn-Off Delay Time	T _{d(off)}	T _J =25°C	--	0.70	--	μs	

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units	
Fall Time	T_f		$T_j=125^\circ\text{C}$	--	0.72	--	μs
			$T_j=150^\circ\text{C}$	--	0.74	--	
			$T_j=25^\circ\text{C}$	--	0.16	--	
			$T_j=125^\circ\text{C}$	--	0.18	--	
			$T_j=150^\circ\text{C}$	--	0.20	--	
			$T_j=25^\circ\text{C}$	--	0.16	--	
Turn-On Switching Loss (per pulse)	E_{on}		$T_j=25^\circ\text{C}$	--	23	--	mJ
			$T_j=125^\circ\text{C}$	--	26	--	
			$T_j=150^\circ\text{C}$	--	28	--	
Turn-Off Switching Loss (per pulse)	E_{off}		$T_j=25^\circ\text{C}$	--	8.4	--	mJ
			$T_j=125^\circ\text{C}$	--	9.2	--	
			$T_j=150^\circ\text{C}$	--	9.8	--	
Short circuit data	I_{SC}	$V_{GE}=15\text{V}, V_{CC}=600\text{V}, t_p \leq 10\mu\text{s}, T_j=25^\circ\text{C}$	--	480	--	A	
Thermal Resistance: Junction to Case	$R_{\theta JC}$	per IGBT	--	0.26	--	$^\circ\text{C}/\text{W}$	
Temperature under on-state	T_{jop}	--	-40	--	125	$^\circ\text{C}$	

ABSOLUTE MAXIMUM RATINGS OF FRD INVERTER ($T_c = 25^\circ\text{C}$, UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Ratings	Units
Repetitive Reverse Peak Voltage	V_{RRM}	$T_j=25^\circ\text{C}$	1200	V
Continuous Forward DC Current	I_F	--	100	A
Repetitive Reverse Peak Current	I_{FRM}	$t_p=1\text{ms}$	200	A

ELECTRICAL CHARACTERISTICS OF FRD INVERTER ($T_c=25^\circ\text{C}$ unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units	
Forward Voltage	V_F	$I_F=100\text{A}, V_{GE}=0\text{V}$	$T_j=25^\circ\text{C}$	--	2.1	2.7	V
			$T_j=125^\circ\text{C}$	--	1.9	--	
			$T_j=150^\circ\text{C}$	--	1.7	--	
Reverse Recovery Peak Current	I_{RM}		$T_j=25^\circ\text{C}$	--	62	--	A
			$T_j=125^\circ\text{C}$	--	104	--	
			$T_j=150^\circ\text{C}$	--	116	--	
Recovery Charge	Q_r	$I_F=100\text{A}, -diF/dt=600\text{A}/\mu\text{s}, V_R=600\text{V}, V_{GE}=-15\text{V}$	$T_j=25^\circ\text{C}$	--	5	--	μC
			$T_j=125^\circ\text{C}$	--	13	--	
			$T_j=150^\circ\text{C}$	--	16	--	
Reverse Recovery Loss (per pulse)	E_{rec}		$T_j=25^\circ\text{C}$	--	1.6	--	mJ
			$T_j=125^\circ\text{C}$	--	1.8	--	
			$T_j=150^\circ\text{C}$	--	2.1	--	
Thermal Resistance, Junction to Case	$R_{\theta JC}$	Per diode	--	0.40	--	$^\circ\text{C}/\text{W}$	
Temperature under on-state	T_{jop}		-40	--	125	$^\circ\text{C}$	

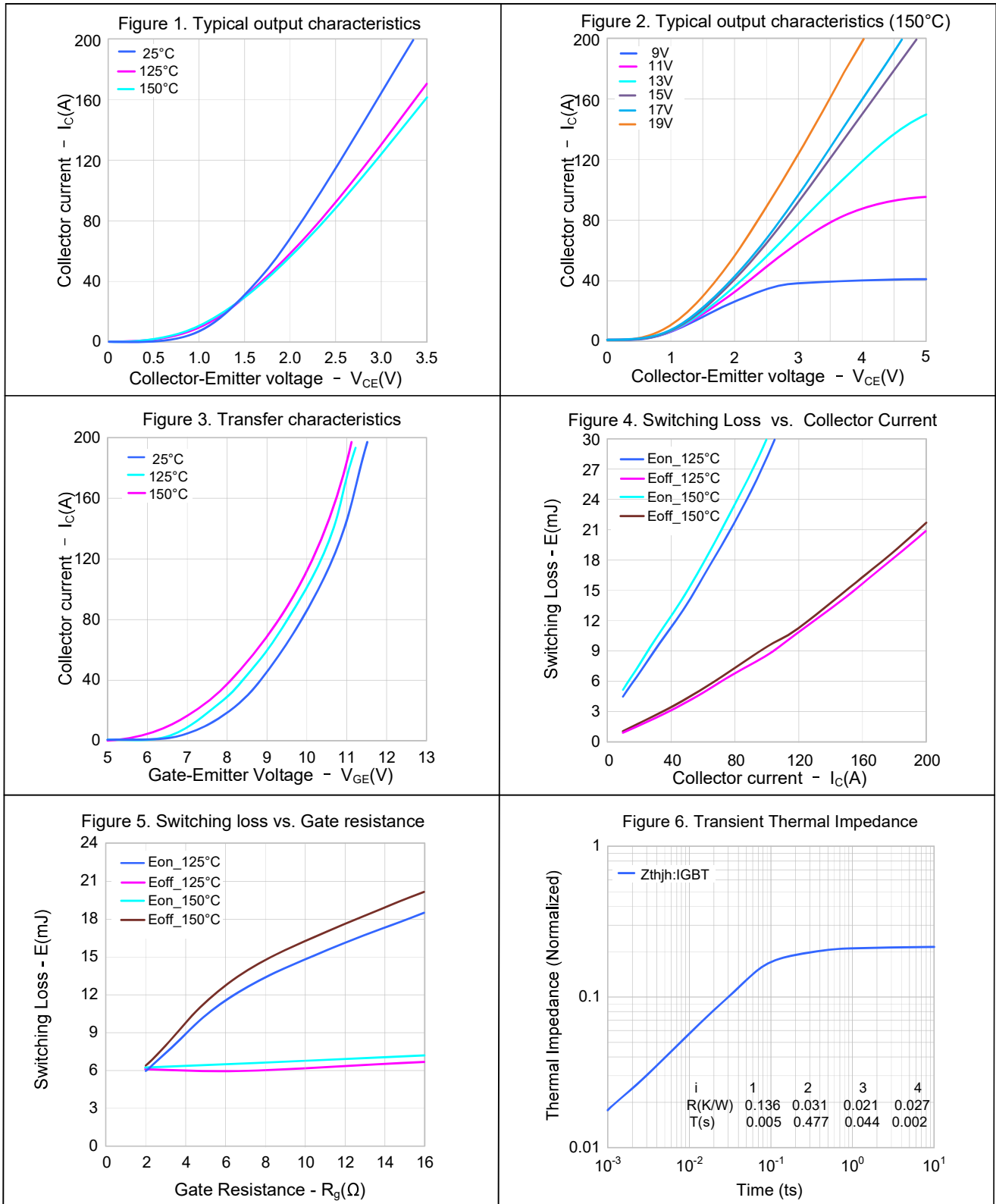
IGBT MODULE(ABSOLUTE MAXIMUM RATING) ($T_c = 25^\circ\text{C}$, UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Ratings	Units
Insulation test voltage	V_{ISOL}	RMS, $f=50\text{Hz}$, $t=1\text{min}$	2.5	kV
Material for internal insulation	--	Insulation (class1,IEC61140)	Al_2O_3	--
Creepage distance	--	Terminal-heatsink	17	mm
	--	Terminal - terminal	20	
Clearance distance	--	Terminal-heatsink	17	mm
	--	Terminal - terminal	9.5	
Comparative tracking index	CTI	--	>200	--

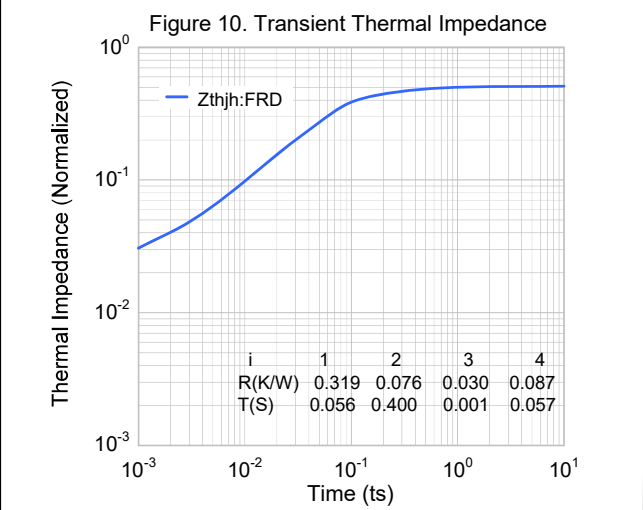
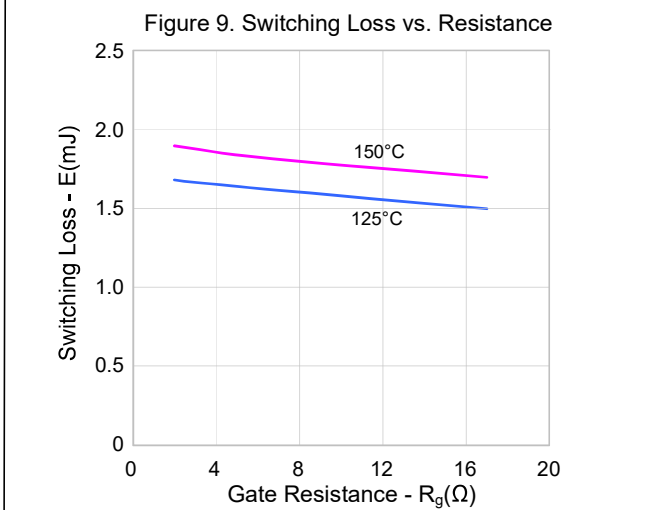
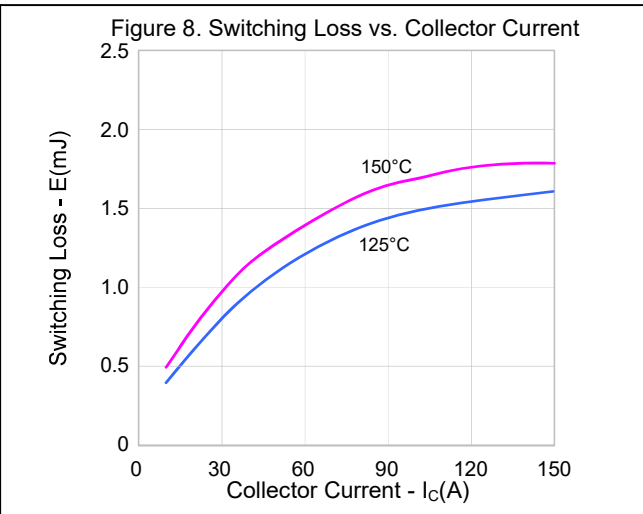
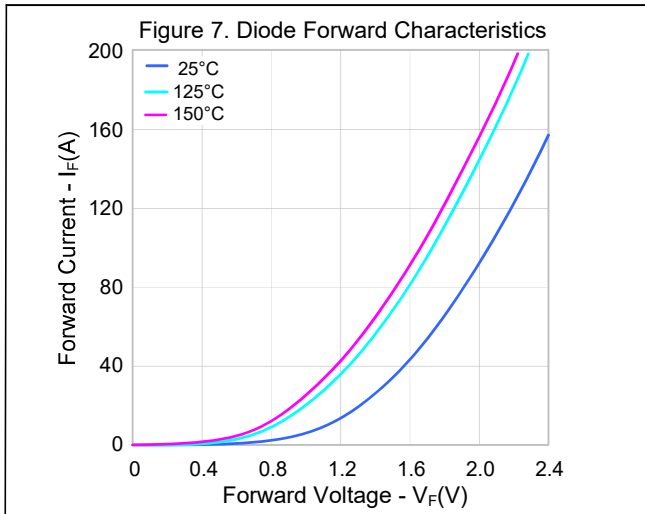
ELECTRICAL CHARACTERISTICS OF IGBT MODULE($T_c=25^\circ\text{C}$ UNLESS OTHERWISE NOTED)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Stray inductance module	L_{sCE}	--	--	30	--	nH
Module lead resistance, terminal-chip	R_{CC+EE}	$T_c=25^\circ\text{C}$, per switch	--	0.65	--	$\text{m}\Omega$
Storage temperature	T_{stg}	--	-40	--	125	$^\circ\text{C}$
Module Installation Torsion	M	screw M6	3.0	--	5.0	Nm
Terminal connection torque	M	screw M5	2.5	--	5.0	Nm
Weight	G	--	--	160	--	g

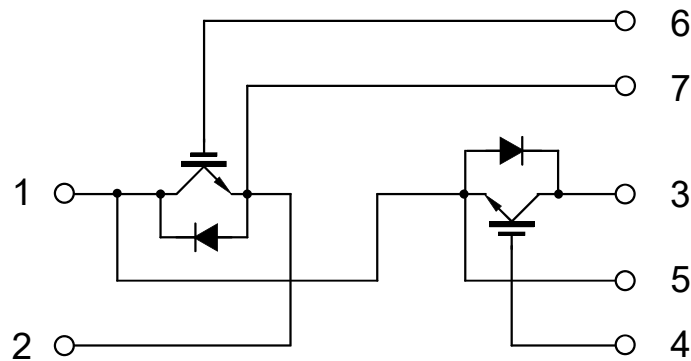
TYPICAL CHARACTERISTICS CURVE(IGBT,INVERTER)



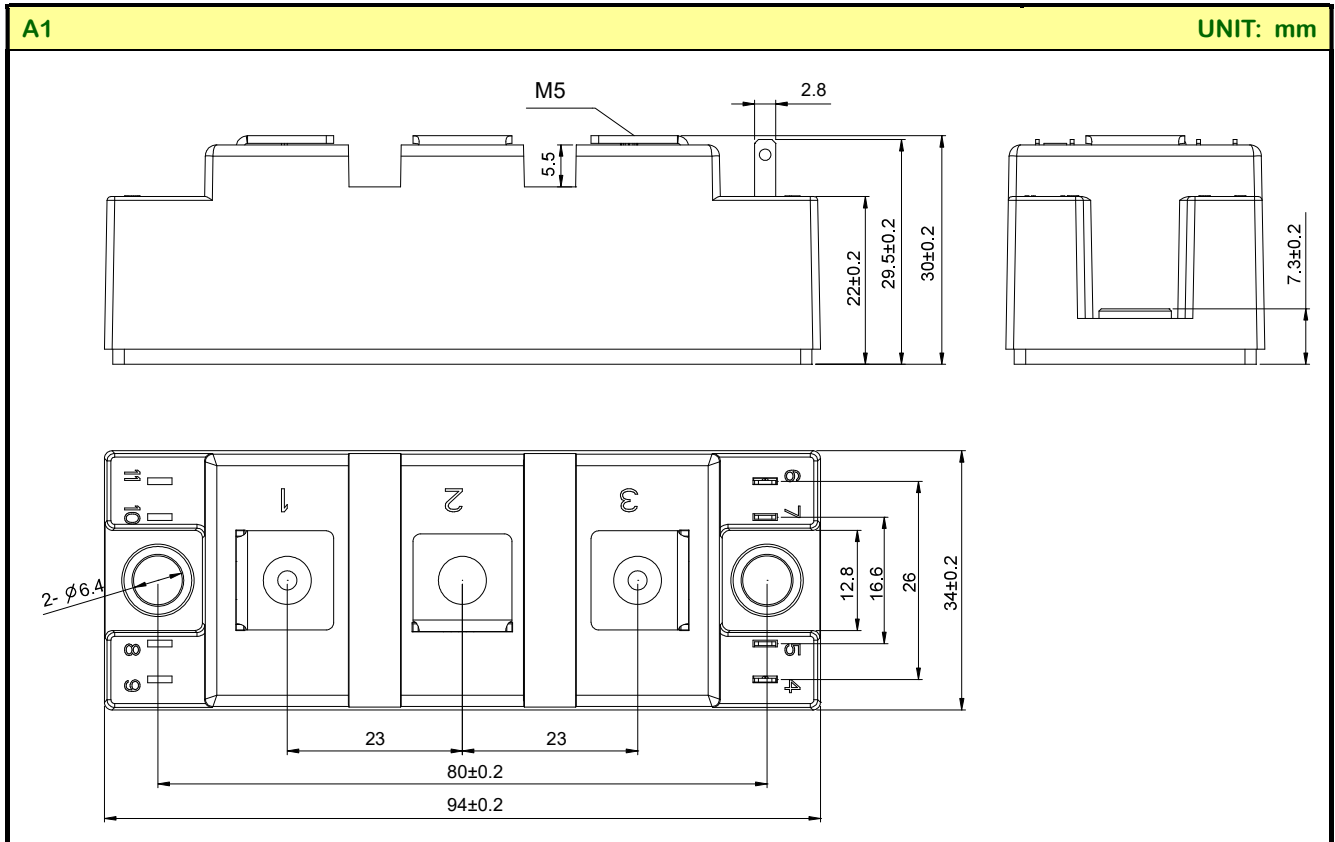
TYPICAL CHARACTERISTICS CURVE (FRD,INVERTER)



CIRCUIT DIAGRAM



PACKAGE OUTLINE



Important notice :

1. The instructions are subject to change without notice !
2. Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current. Please read the instructions carefully before using our products, including the circuit operation precautions.
3. Our products are consumer electronic products or the other civil electronic products.
4. When using our products, please do not exceed the maximum rating of the products, otherwise the reliability of the whole machine will be affected. There is a certain possibility of failure or malfunction of any semiconductor product under specific conditions. The buyer is responsible for complying with safety standards and taking safety measures when using our products for system design, sample and whole machine manufacturing, so as to avoid potential failure risk that may cause personal injury or property loss.
5. It is strongly recommended to identify the trademark when buying our products. Please contact us if there is any question.
6. Product promotion is endless, our company will wholeheartedly provide customers with better products!

Part No.: SGM100HF12A1TFD

Document Type: Datasheet

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Rev.: 1.8

Revision History:

1. Update Important notice and package outline
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Rev.: 1.7

Revision History:

1. Update the template of all curves
 2. Update Important notice
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Rev.: 1.6

Revision History:

1. Modify characteristics
 2. Update all curves
 3. Update the package outline
-

Rev.: 1.5

Revision History:

1. Modify NOMENCLATURE, update max value of $V_{CE(sat)}$ and modify T_c to 80°C
-

Rev.: 1.4

Revision History:

1. Update the electric characteristics and curves
-

Rev.: 1.3

Revision History:

1. Update the electric characteristics
-

Rev.: 1.2

Revision History:

1. Update the electric characteristics
-

Rev.: 1.1

Revision History:

1. Modify the electric characteristics of FRD
 2. Modify the electric characteristics of IGBT
 3. Modify the ordering information
-

Rev.: 1.0

Revision History:

1. First release
-
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