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مایٹرونیک

فروشگاه قطعات الکترونیک

تخصص، کیفیت، قیمت مناسب

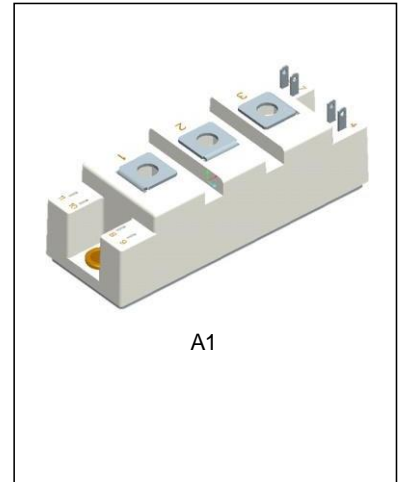
## 75A, 1200V IGBT MODULE

### DESCRIPTION

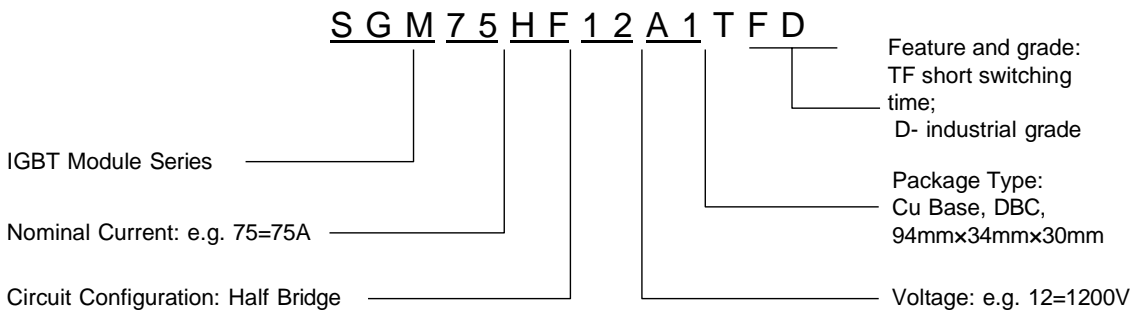
SGM75HF12A1TFD Module offers the optimum performance for UPS, AC inverter drive and electronic welders.

### FEATURES

- ◆ 75A, 1200V,  $V_{CE(sat)(typ.)} = 2.2V @ I_C = 75A$
- ◆  $V_{CE(sat)}$  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
SGM75HF12A1TFD	A1	SGM75HF12A1TFD	Carton

## ABSOLUTE MAXIMUM RATINGS (T<sub>C</sub> = 25°C, unless otherwise noted)

Characteristics	Symbol	Ratings	Units
Collector to Emitter Voltage	V <sub>CE</sub>	1200	V
Gate to Emitter Voltage	V <sub>GE</sub>	±20	V
Collector Current	T <sub>C</sub> =80°C I <sub>C</sub>	75	A
Repetitive Pulsed Collector Current	T <sub>C</sub> =80°C I <sub>CRM</sub>	150	A
Operating Junction Temperature Range	T <sub>J</sub>	-40 ~ +125	°C
Storage Temperature Range	T <sub>stg</sub>	-40 ~ +125	°C
Isolation Voltage	V <sub>iso</sub>	2500	V
To heat sink M6	M <sub>s</sub>	3~5	Nm
To terminals M5	M <sub>t</sub>	2.5~5	Nm
Weight	W	160	g

## THERMAL CHARACTERISTICS

Characteristics	Symbol	Ratings	Units
Thermal Resistance, Junction to Case (IGBT)	$R_{\theta JC}$	0.33	$^{\circ}\text{C/W}$
Thermal Resistance, Junction to Case (FRD)	$R_{\theta JC}$	0.56	$^{\circ}\text{C/W}$
Thermal Resistance, Case to Sink	$R_{\theta CS}$	0.03	$^{\circ}\text{C/W}$

## ELECTRICAL CHARACTERISTICS OF IGBT ( $T_C = 25^{\circ}\text{C}$ unless otherwise noted)

Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit	
Collector-emitter saturation voltage	$V_{CEsat}$	$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=25^{\circ}\text{C}$	--	2.2	2.8	V	
		$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=125^{\circ}\text{C}$	--	2.4	--		
		$I_C=75\text{A}, V_{GE}=15\text{V}, T_j=150^{\circ}\text{C}$	--	2.5	--		
Gate threshold voltage	$V_{GEth}$	$I_C=250\mu\text{A}, V_{CE}=V_{GE}, T_j=25^{\circ}\text{C}$	4.4	5.0	6.7	V	
Collect-emitter cut-off current	$I_{CES}$	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_j=25^{\circ}\text{C}$	--	--	1	mA	
G-E Leakage Current	$I_{GES}$	$V_{CE}=0\text{V}, V_{GE}=20\text{V}, T_j=25^{\circ}\text{C}$	--	--	500	nA	
Integrated Gate Resistor	$R_{Gint}$	$T_j=25^{\circ}\text{C}$	--	4.8	--	$\Omega$	
Input Capacitance	$C_{ies}$	$f=1\text{MHz}, T_j=25^{\circ}\text{C},$ $V_{CE}=25\text{V}, V_{GE}=0\text{V}$	--	4.79	--	nF	
Output Capacitance	$C_{oes}$		--	0.72	--		
Reverse Transfer Capacitance	$C_{res}$		--	0.25	--		
Total Gate Charge	$Q_G$	$V_{GE}=-15\text{V} \rightarrow +15\text{V}$	--	0.53	--	$\mu\text{C}$	
Turn-on Delay Time	$t_{d(on)}$	$I_C=75\text{A}, V_{CE}=600\text{V}$ $V_{GE}=\pm 15\text{V}, R_G=35\Omega,$ Inductive load	$T_j=25^{\circ}\text{C}$	--	0.11	--	$\mu\text{s}$
			$T_j=125^{\circ}\text{C}$	--	0.12	--	
			$T_j=150^{\circ}\text{C}$	--	0.12	--	
Rise Time	$t_r$		$T_j=25^{\circ}\text{C}$	--	0.09	--	$\mu\text{s}$
			$T_j=125^{\circ}\text{C}$	--	0.95	--	
			$T_j=150^{\circ}\text{C}$	--	0.10	--	
Turn-off Delay Time	$t_{d(off)}$		$T_j=25^{\circ}\text{C}$	--	0.50	--	$\mu\text{s}$
			$T_j=125^{\circ}\text{C}$	--	0.52	--	
			$T_j=150^{\circ}\text{C}$	--	0.54	--	
Fall Time	$t_f$		$T_j=25^{\circ}\text{C}$	--	0.18	--	$\mu\text{s}$
			$T_j=125^{\circ}\text{C}$	--	0.27	--	
			$T_j=150^{\circ}\text{C}$	--	0.29	--	
Turn-on Switching Loss (per pulse)	$E_{on}$	$T_j=25^{\circ}\text{C}$	--	11	--	mJ	
		$T_j=125^{\circ}\text{C}$	--	14	--		
		$T_j=150^{\circ}\text{C}$	--	16	--		
Turn-Off Switching Loss (per pulse)	$E_{off}$	$T_j=25^{\circ}\text{C}$	--	4.2	--	mJ	
		$T_j=125^{\circ}\text{C}$	--	4.8	--		
		$T_j=150^{\circ}\text{C}$	--	5.2	--		
S-C Data	$I_{SC}$	$V_{GE}=15\text{V}, V_{CC}=600\text{V}, t_p \leq 10\mu\text{s}, T_j=25^{\circ}\text{C}$	--	420	--	A	
Thermal Resistance : Junction-Case	$R_{\theta JC}$	per IGBT	--	0.35	--	$^{\circ}\text{C/W}$	

Characteristics	Symbol	Test condition	Min.	Typ.	Max.	Unit
Temperature under on-state	$T_{jop}$		-40	--	125	°C

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

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Units
Diode Forward Voltage	$V_F$	$I_F=75\text{A}, V_{GE}=0\text{V}, T_C=25^\circ\text{C}$	--	2.1	--	V
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_C=125^\circ\text{C}$	--	1.7	--	
		$I_F=75\text{A}, V_{GE}=0\text{V}, T_C=150^\circ\text{C}$	--	1.7	--	
Peak reverse Recovery current	$I_{RM}$	$T_C=25^\circ\text{C}$	--	62	--	A
		$T_C=125^\circ\text{C}$	--	88	--	
		$T_C=150^\circ\text{C}$	--	109	--	
Recovery charge	$Q_r$	$T_C=25^\circ\text{C}$	--	4.3	--	$\mu\text{C}$
		$T_C=125^\circ\text{C}$	--	9.9	--	
		$T_C=150^\circ\text{C}$	--	12.6	--	
Reverse recovery energy (per pulse)	$E_{rec}$	$T_C=25^\circ\text{C}$	--	0.38	--	mJ
		$T_C=125^\circ\text{C}$	--	1.40	--	
		$T_C=150^\circ\text{C}$	--	1.76	--	
Thermal Resistance : Junction to Case	$R_{\theta JC}$	Per diode	--	0.69	--	K/W
Temperature under switching conditions	$T_{Cop}$		-40	--	125	°C

### IGBT MODULE (MAXIMUM RATED VALUES) ( $T_C = 25^\circ\text{C}$ , unless otherwise noted)

Characteristics	Symbol	Test conditions	Ratings	Unit
Insulation test voltage	$V_{ISOL}$	RMS, $f=50\text{Hz}, t=1\text{min}$	2.5	kV
Material of module baseplate			Cu	
Material for internal insulation		Insulation (class1, IEC61140)	$\text{Al}_2\text{O}_3$	
Creepage distance		Terminal-heatsink	17	mm
		Terminal - terminal	20	
Clearance distance		Terminal-heatsink	17	mm
		Terminal - terminal	9.5	
Comparative tracking index	CTI		>200	

## IGBT MODULE ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , unless otherwise noted)

Characteristics	Symbol	Test conditions	Min.	Typ.	Max.	Unit
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	--	m $\Omega$
Storage temperature	$T_{stg}$		-40	--	125	$^\circ\text{C}$
Mounting torque	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

Figure 1. Typical output characteristics

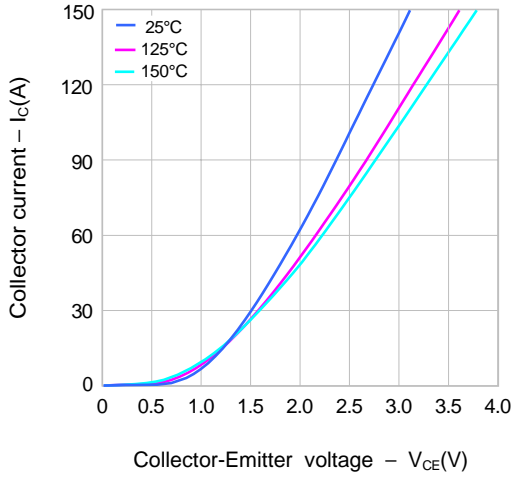


Figure 2. Typical output characteristics (150°C)

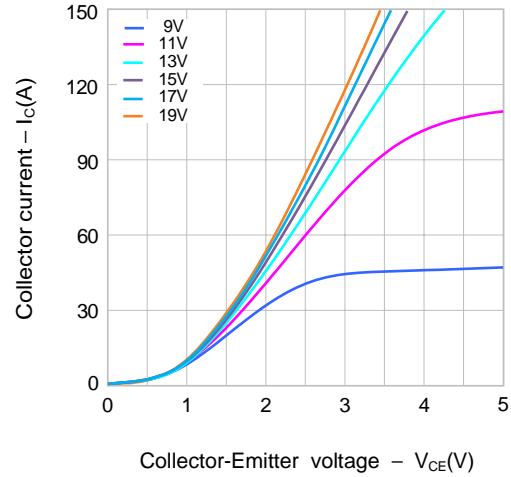


Figure 3. Transfer characteristics

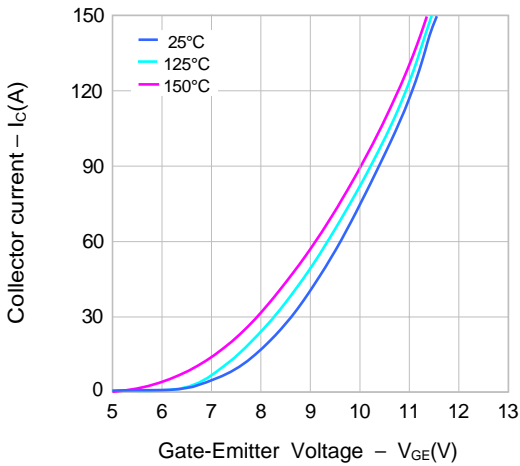


Figure 4. Switching Loss vs. Collector Current

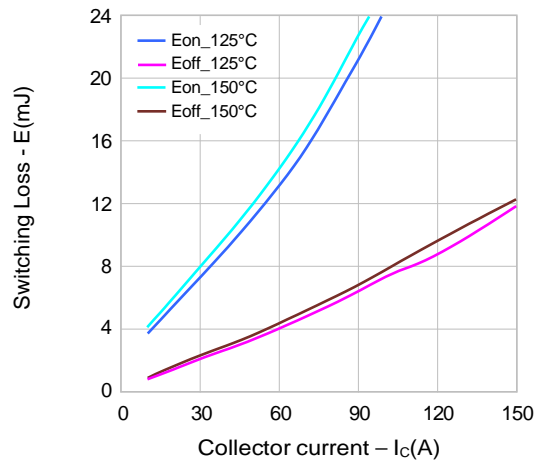


Figure 5. Switching loss vs. Gate resistance

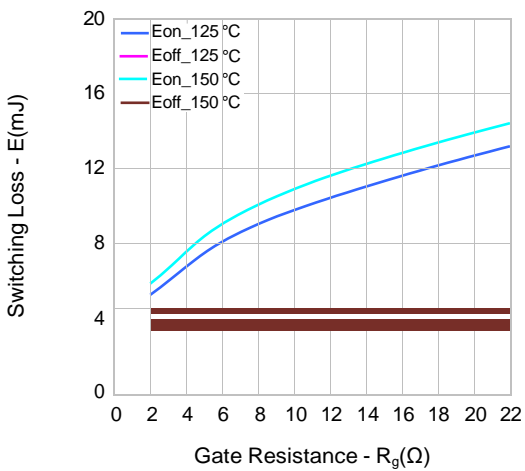
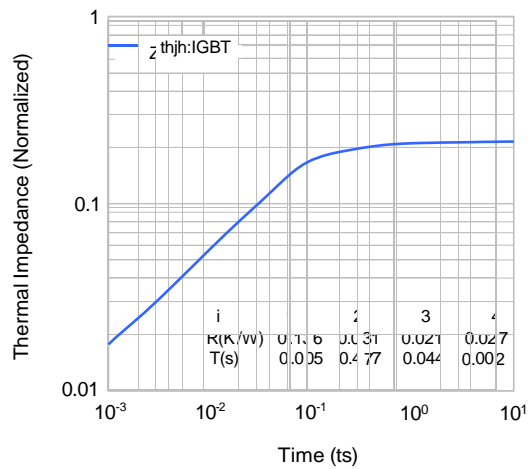


Figure 6. Transient Thermal Impedance



TYPICAL CHARACTERISTICS CURVE (continued)

Figure 7. Diode Forward Characteristics

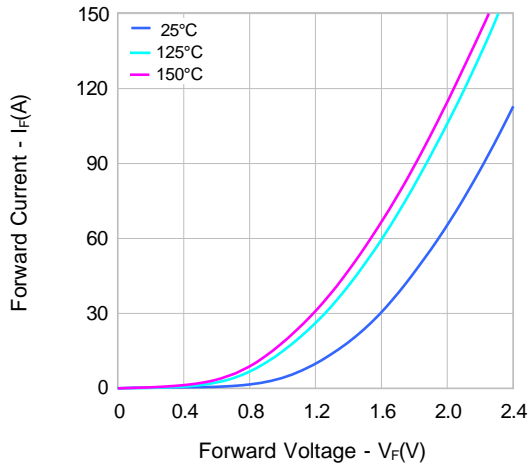


Figure 8. Switching Loss vs. Collector Current

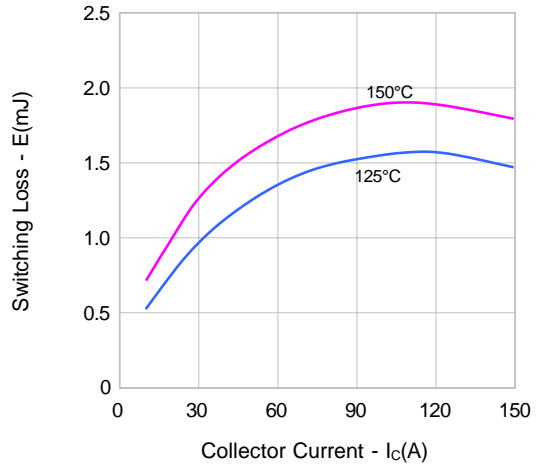


Figure 9. Switching Loss vs. Resistance

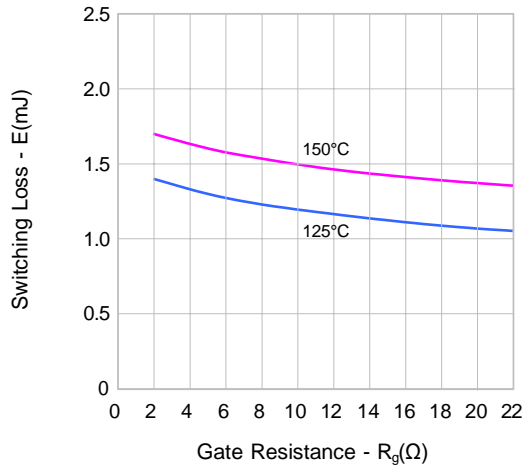
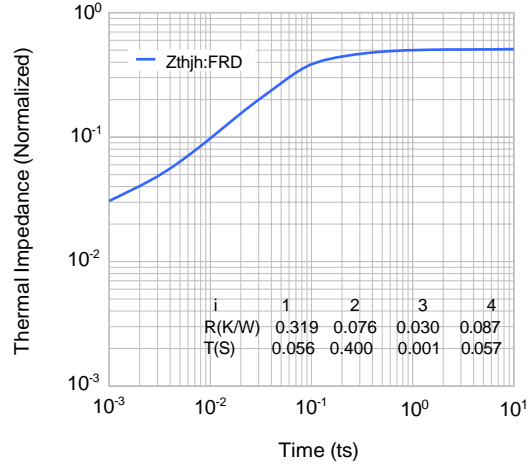
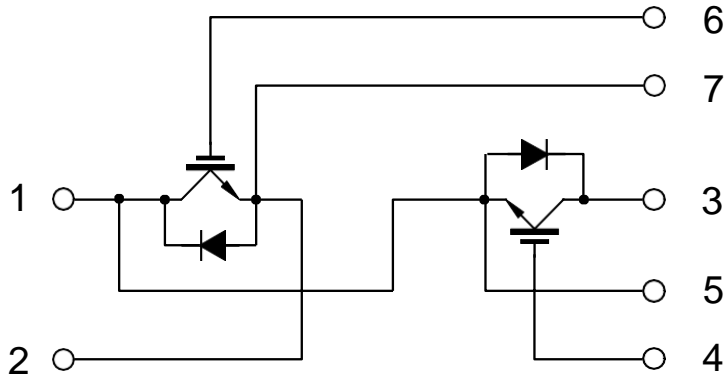


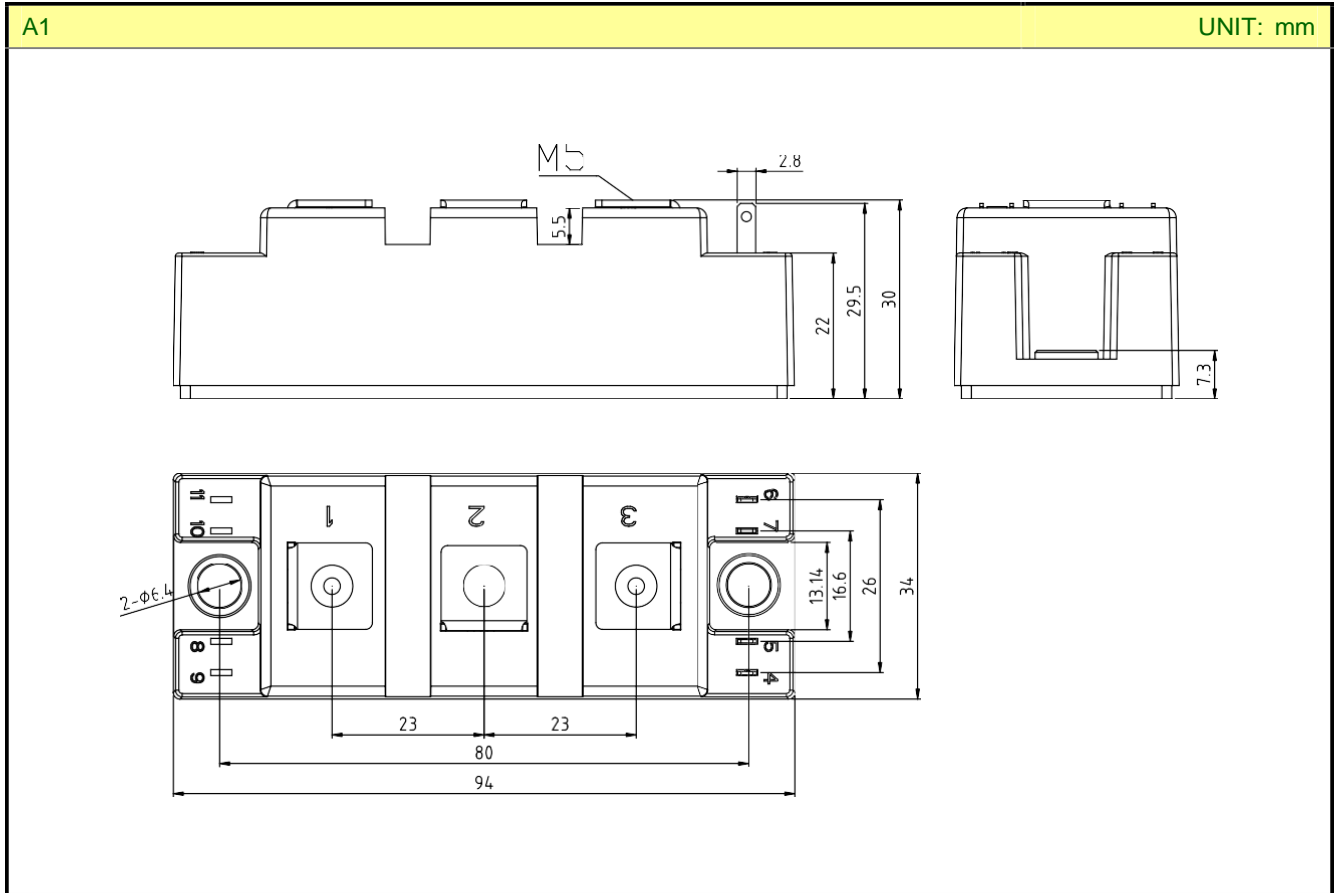
Figure 10. Transient Thermal Impedance



CIRCUIT DIAGRAM



PACKAGE OUTLINE



Disclaimer :

- Silan reserves the right to make changes to the information herein for the improvement of the design and performance without prior notice! Customers should obtain the latest relevant information before placing orders and should verify that such information is complete and current.
- All semiconductor products malfunction or fail with some probability under special conditions. When using Silan products in system design or complete machine manufacturing, it is the responsibility of the buyer to comply with the safety standards strictly and take essential measures to avoid situations in which a malfunction or failure of such Silan products could cause loss of body injury or damage to property.
- Silan will supply the best possible product for customers!



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Part No.: SGM75HF12A1TFD

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Rev.: 1.5

Revision History:

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

Rev.: 1.4

Revision History:

1. Modify the electric characteristics features description and curve
  2. Delete the “trench-gate” of nomenclature’s TF
- 

Rev.: 1.3

Revision History:

1. Modify the electric characteristics of IGBT
- 

Rev.: 1.2

Revision History:

1. Modify the electric characteristics
- 

Rev.: 1.1

Revision History:

1. Modify the electric characteristics of FRD
- 

Rev.: 1.0

Revision History:

1. First release
- 
- 

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