

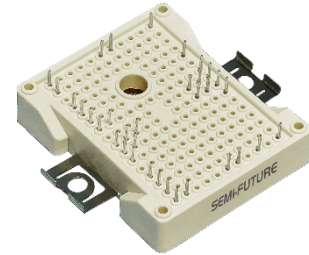
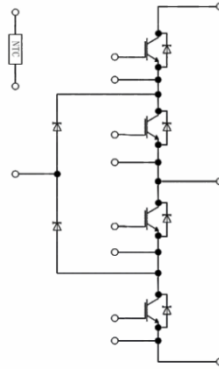
### 3-Level IGBT Module

#### 电气特性:

- 650V 沟槽栅/场终止工艺
- 低开关损耗
- 正温度系数

#### 典型应用:

- 三电平应用
- UPS
- 光伏应用



$V_{CES} = 650V$ ,  $I_{C\ nom} = 100A$  /  $I_{CRM} = 200A$

### IGBT, 逆变器/IGBT, Inverter

#### 最大额定值/Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
集电极-发射极电压 Collector-Emitter voltage	$T_{vj} = 25^{\circ}C$	$V_{CES}$	650	V
连续集电极直流电流 Continuous DC collector current	$T_C = 100^{\circ}C$ , $T_{vj\ max} = 175^{\circ}C$	$I_{C\ nom}$	100	A
集电极重复峰值电流 Repetitive peak collector current	$t_p = 1\ ms$	$I_{CRM}$	200	A
栅极-发射极电压 Gate emitter voltage		$V_{GE}$	$\pm 20$	V

#### 特征值/Characteristic Values

Parameter	Conditions	Symbol	Value			Unit	
			Min.	Typ.	Max.		
集电极-发射极饱和电压 Collector-Emitter saturation voltage	$V_{GE} = 15V$ , $I_C = 100A$ $V_{GE} = 15V$ , $I_C = 100A$ $V_{GE} = 15V$ , $I_C = 100A$	$T_{vj} = 25^{\circ}C$ $T_{vj} = 125^{\circ}C$ $T_{vj} = 150^{\circ}C$	$V_{CESat}$	1.58 1.83 1.87	2.0	V	
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C = 1.6mA$ , $V_{GE} = V_{CE}$	$T_{vj} = 25^{\circ}C$	$V_{GE(th)}$	4.6	5.2	5.8	
栅极电荷 Gate charge	$V_{GE} = -15\ V \dots +15\ V$		$Q_G$	1.57		$\mu C$	
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}C$		$R_{Gint}$	None		$\Omega$	
输入电容 Input capacitance	$f = 1\ MHz$ , $V_{CE} = 25\ V$ , $V_{GE} = 0\ V$	$T_{vj} = 25^{\circ}C$	$C_{ies}$	11.12		nF	

反向传输电容 Reverse transfer capacitance			$C_{res}$		0.19		nF
集电极-发射极截至电流 Collector-emitter cut-off current	$V_{CE}=650V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	$I_{CES}$			1	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$	$I_{GES}$			100	nA
开通延迟时间 Turn-on delay time	$I_C=100A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_{d\ on}$		17 16 15		ns
上升时间 Rise time	$I_C=100A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_r$		22 25 25		
关断延迟时间 Turn-off delay time	$I_C=100A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_{d\ off}$		157 172 177		
下降时间 Fall time	$I_C=100A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_f$		57 61 67		
开通损耗能量 Turn-on energy loss per pulse	$I_C=100A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$E_{on}$		0.42 0.60 0.66		mJ
关断损耗能量 Turn-off energy loss per pulse	$I_C=100A, V_{CE}=300V$ $V_{GE}=\pm 15V, R_G=5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$E_{off}$		0.82 1.07 1.17		
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		150	$^{\circ}C$

## 二极管, 逆变器/Diode, Inverter

### 最大额定值/Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C$	$V_{RRM}$	650	V
连续正向直流电流 Continuous DC forward current		$I_F$	100	A
正向重复峰值电流 Repetitive peak forward current	$t_p=1ms$	$I_{FRM}$	200	A
I <sup>2</sup> t-值 I <sup>2</sup> t-value	$V_R=0V, t_p=10ms, T_{vj}=125^{\circ}C$	$I^2t$	1200	A <sup>2</sup> s

### 特征值/Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	

正向电压 Forward voltage	$I_F=100A, V_{GE}=0V$ $I_F=100A, V_{GE}=0V$ $I_F=100A, V_{GE}=0V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$V_F$		1.43 1.48 1.44	1.9	V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 100 A,$ $-diF/dt = 3264A/\mu s(T_{vj}=150^{\circ}C)$ $VR = 300 V, V_{GE} = -15 V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$I_{RM}$		70 83 90		A
恢复电荷 Recovered charge	$I_F = 100 A,$ $-diF/dt = 3264A/\mu s(T_{vj}=150^{\circ}C)$ $VR = 300 V, V_{GE} = -15 V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$Q_r$		2.33 4.12 4.95		$\mu C$
反向恢复损耗（每脉冲） Reverse recovered energy	$I_F = 100 A,$ $-diF/dt = 3264A/\mu s(T_{vj}=150^{\circ}C)$ $VR = 300 V, V_{GE} = -15 V$	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$E_{rec}$		0.43 0.82 0.99		mJ
在开关状态下温度 Temperature under switching conditions			$T_{vj op}$	-40		150	$^{\circ}C$

## 二极管, D5-D6/Diode, D5-D6

### 最大额定值/Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C$	$V_{RRM}$	650	V
连续正向直流电流 Continuous DC forward current		$I_F$	100	A
正向重复峰值电流 Repetitive peak forward current	$t_p=1ms$	$I_{FRM}$	200	A
$I^2t$ 值 $I^2t$ -value	$t_p=10ms, \sin 180^{\circ}, T_{vj}=125^{\circ}C$	$I^2t$	1200	$A^2s$

### 特征值/Characteristic Value

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=100A, V_{GE}=0V$ $I_F=100A, V_{GE}=0V$ $I_F=100A, V_{GE}=0V$	$V_F$		1.47 1.53 1.51	2.0	V
反向电流 Reverse current	$I_F = 100 A,$ $-diF/dt = 3699A/\mu s(T_{vj}=150^{\circ}C)$ $VR = 300 V, V_{GE} = -15 V$	$I_{RM}$		74 93 102		A
恢复电荷 Recovered charge	$I_F = 100 A,$ $-diF/dt = 3699A/\mu s(T_{vj}=150^{\circ}C)$ $VR = 300 V, V_{GE} = -15 V$	$Q_r$		2.31 4.13 5.30		$\mu C$
反向恢复损耗（每脉冲） Reverse recovery energy	$I_F = 100 A,$ $-diF/dt = 3699A/\mu s(T_{vj}=150^{\circ}C)$ $VR = 300 V, V_{GE} = -15 V$	$E_{rec}$		0.46 0.91 1.20		mJ
在开关状态下温度 Temperature under switching conditions		$T_{vj op}$	-40		150	$^{\circ}C$

负温度系数热敏电阻/NTC-Thermistor

## 特征值/Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
额定电阻值 Rated resistances	$T_C=25^{\circ}\text{C}$ , $\pm 5\%$	$R_{25}$		5		$\text{k}\Omega$
B-值 B-value	$\pm 1\%$	$B_{25/50}$		3380		K

模块 / Module

Parameter	Conditions	Symbol	Value			Unit
绝缘测试电压 Isolation test voltage	RMS, $f=50\text{Hz}$ , $t=60\text{s}$	$V_{\text{ISOL}}$	2500			V
内部绝缘 Internal isolation			$\text{Al}_2\text{O}_3$			
储存温度 Storage temperature		$T_{\text{stg}}$	-40		125	$^{\circ}\text{C}$
模块安装的扭矩 Mounting torque for modul mounting		M	3.0		6.0	Nm
重量 Weight		W		42		g

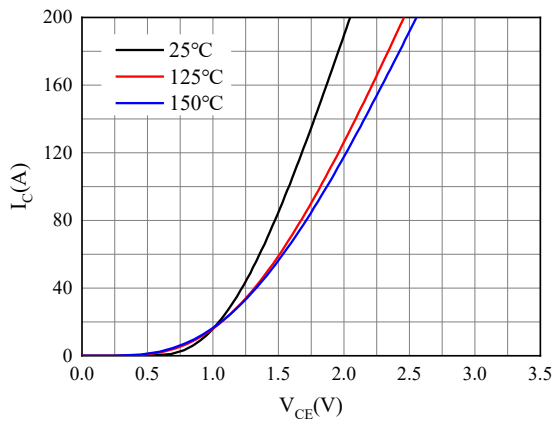


图 1. 典型输出特性 ( $V_{GE}=15V$ )

Figure 1. Typical output characteristics ( $V_{GE}=15V$ )

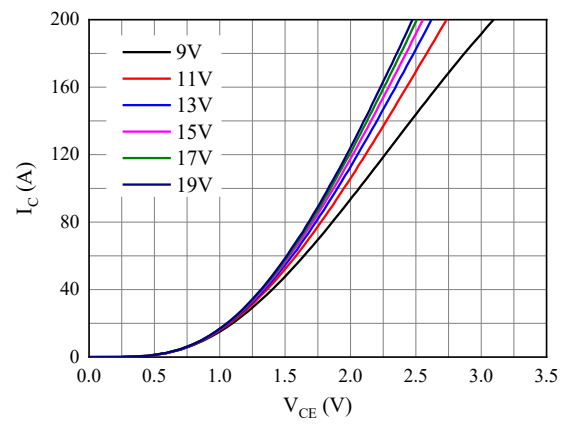


图 2. 典型输出特性 ( $T_{vj}=150^{\circ}C$ )

Figure 2. Typical output characteristics ( $T_{vj}=150^{\circ}C$ )

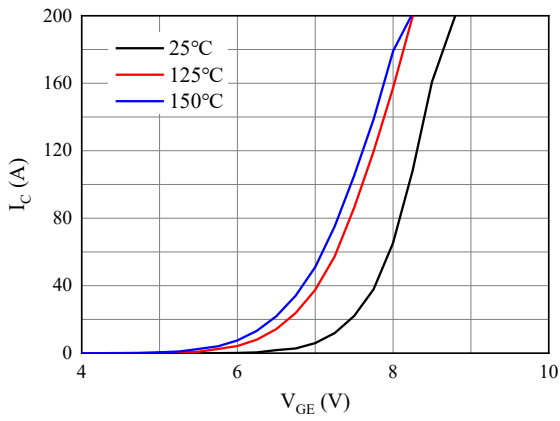


图 3. 典型传输特性 ( $V_{CE}=20V$ )

Figure 3. Typical transfer characteristic ( $V_{CE}=20V$ )

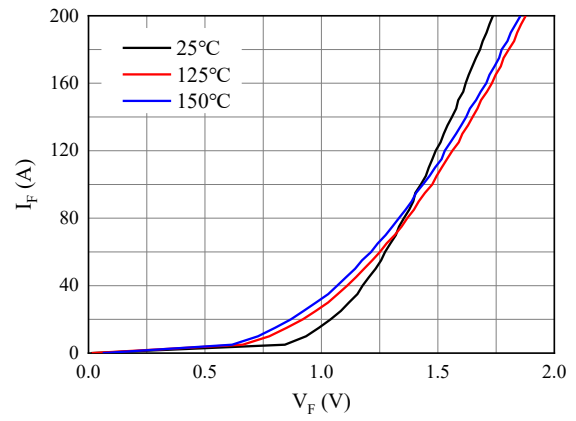


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

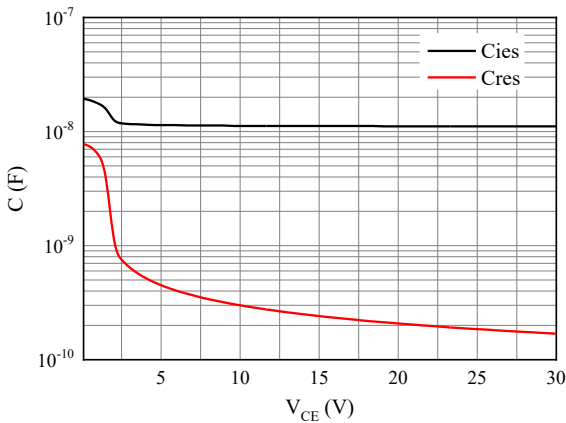


图 5. 电容特性

Figure 5. Capacitance characteristic

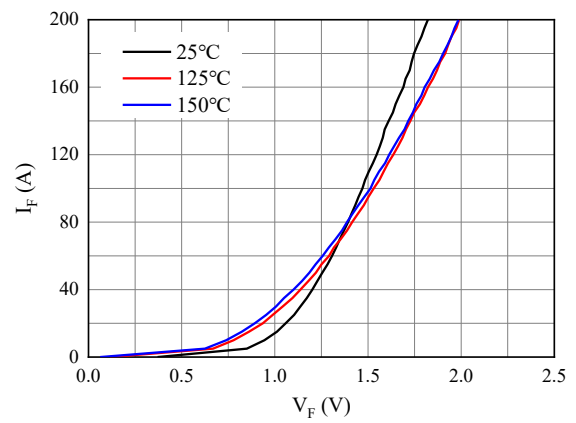


图 6. 正向偏压特性 二极管 D5-D6

Figure 6. Forward characteristic of Diode, D5-D6

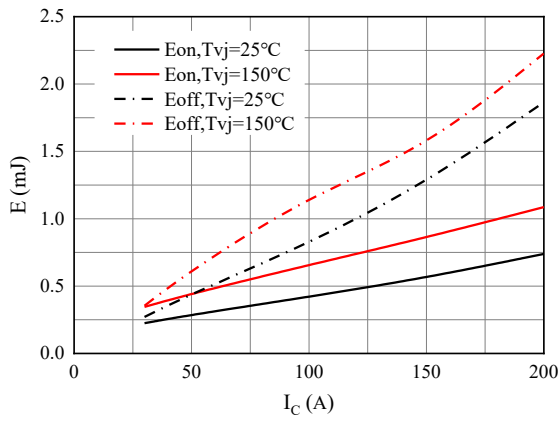


图 7. 开关损耗 逆变器

Figure 7. Switching losses of IGBT  
VGE=±15V, RGon=5Ω, RGoff=5Ω, VCE=300V

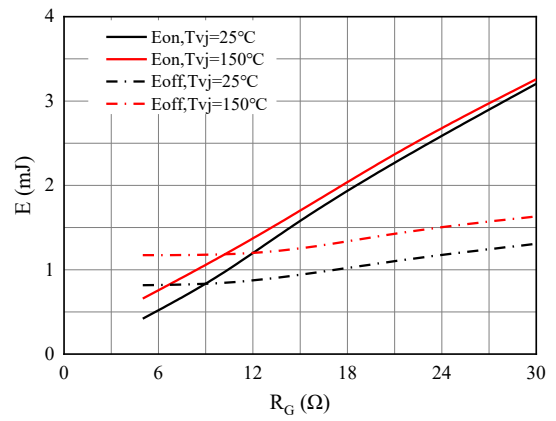


图 8. 开关损耗 逆变器

Figure 8. Switching losses of IGBT  
VGE=±15V, IC=100A, VCE=300V

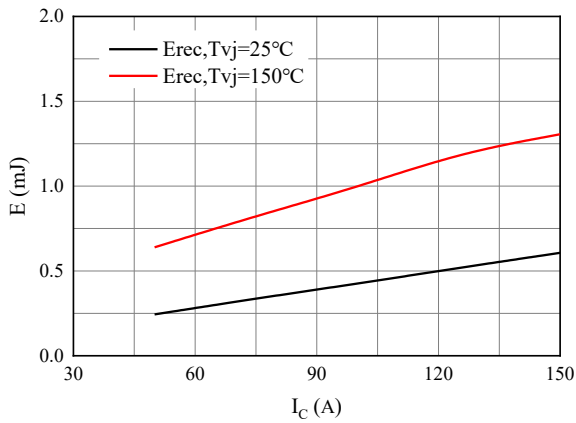


图 9. 开关损耗 二极管

Figure 9. Switching losses of Diode  
RGon=5Ω, VCE=300V

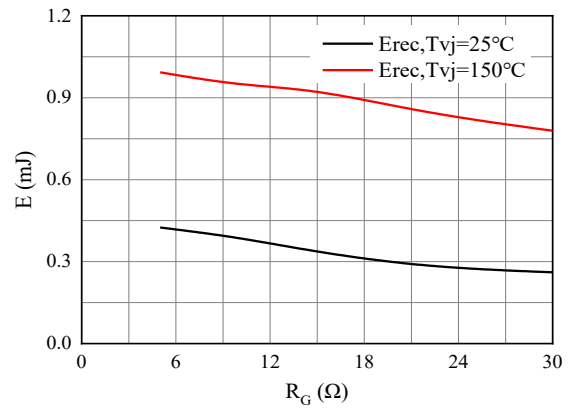


图 10. 开关损耗 二极管

Figure 10. Switching losses of Diode  
IF=100A, VCE=300V

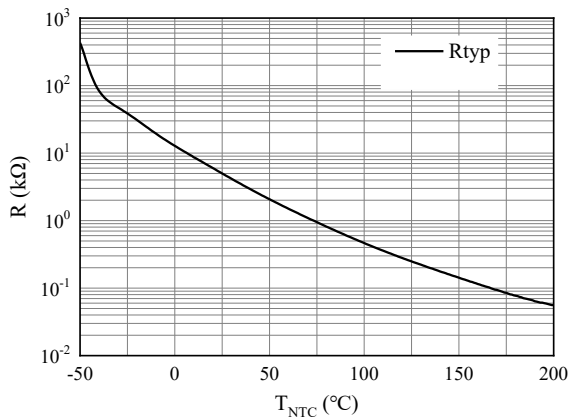
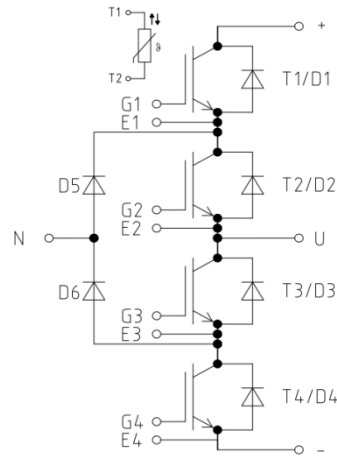


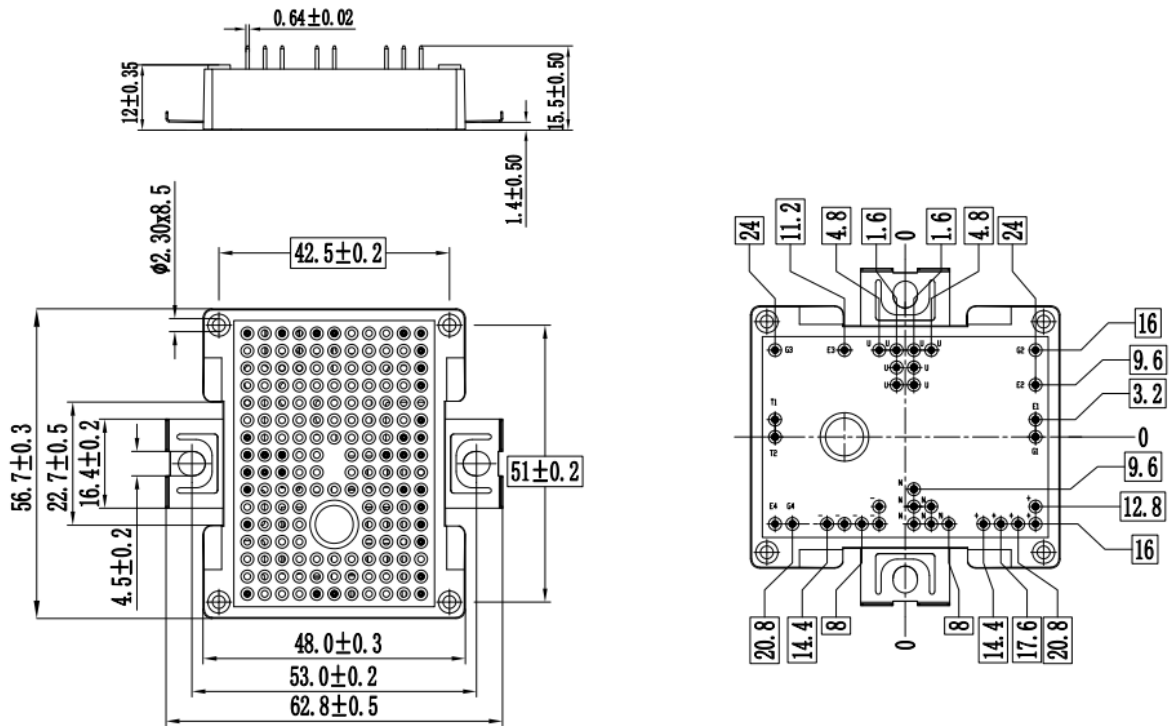
图 11. 负温系数热敏电阻 温度特性

Figure 11. NTC-Themistor-temperature characteristic

Circuit diagram



Package outlines



Dimensions in (mm)