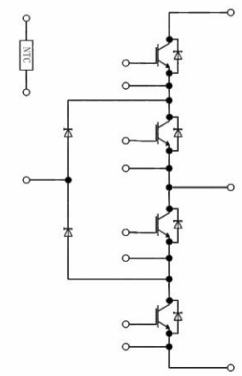
3-Level IGBT Module

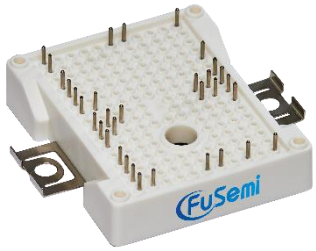
电气特性:

- 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， $I_{C\ nom}$ =150A / I_{CRM} =300A

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°C	V_{CES}	650	V
连续集电极直流电流 Continuous DC collector current	T_C=100°C, $T_{vj\ max}$=175°C	$I_{C\ nom}$	150	A
集电极重复峰值电流 Repetitive peak collector current	t_P=1 ms	I_{CRM}	300	A
栅极-发射极电压 Gate emitter voltage		V_{GE}	±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=150A V_{GE}=15V, I_C=150A V_{GE}=15V, I_C=150A	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_{CEsat}		1.57 1.82 1.86	1.95	V
栅极-发射极阈值电压 Gate-Emitter threshold voltage	I_C=2.4mA, V_{GE}= V_{CE}	T_{vj}=25°C	$V_{GE(th)}$	4.7	5.3	5.9	
栅极电荷 Gate charge	VGE = -15 V ... +15 V		Q_G		1.54		µC
内部栅极电阻 Internal gate resistor	Tvj = 25°C		R_{Gint}		None		Ω
输入电容 Input capacitance	f=1 MHz, V_{CE}=25 V, V_{GE}=0 V	T_{vj}=25°C	C_{ies}		16.47		nF

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反向传输电容 Reverse transfer capacitance			C_{res}		0.27		nF
集电极-发射极截至电流 Collector-emitter cut-off current	V_{CE}=650V , V_{GE}= 0 V	T_{vj}=25°C	I_{CES}			1	mA
栅极-发射极漏电流 Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V	T_{vj}=25°C	I_{GES}			400	nA
开通延迟时间 Turn-on delay time	I_C=150A, V_{CE}=300 V V_{GE}=±15 V, R_G=3.3Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\,on}$		12 12 14		ns
上升时间 Rise time	I_C=150A, V_{CE}=300 V V_{GE}=±15 V, R_G=3.3Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_r		28 29 31		
关断延迟时间 Turn-off delay time	I_C=150A, V_{CE}=300 V V_{GE}=±15 V, R_G=3.3Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\,off}$		167 180 182		
下降时间 Fall time	I_C=150A, V_{CE}=300 V V_{GE}=±15 V, R_G=3.3Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_f		54 59 63		
开通损耗能量 Turn-on energy loss per pulse	I_C=150A, V_{CE}=300 V V_{GE}=±15 V, R_G=3.3Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{on}		0.66 0.83 0.91		mJ
关断损耗能量 Turn-off energy loss per pulse	I_C=150A, V_{CE}=300 V V_{GE}=±15 V, R_G=3.3Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{off}		1.28 1.66 1.80		
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°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°C	V_{RRM}	650	V
连续正向直流电流 Continuous DC forward current		I_F	150	A
正向重复峰值电流 Repetitive peak forward current	t_p=1ms	I_{FRM}	300	A
I2t-值 I^2t-value	VR = 0 V, t_P = 10 ms, Tvj = 125°C	I^2t	1200	A^2s

特征值/Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	

正向电压 Forward voltage	I_F=150A, V_{GE}=0V I_F=150A, V_{GE}=0V I_F=150A, V_{GE}=0V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_F		1.62 1.71 1.69	2.00	V
反向恢复峰值电流 Peak reverse recovery current	IF = 150 A, -diF/dt =4281A/μs(Tvj=150°C) VR = 300 V ,VGE = -15 V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	I_{RM}		83 102 112		A
恢复电荷 Recovered charge	IF = 150 A, -diF/dt =4281A/μs(Tvj=150°C) VR = 300 V ,VGE = -15 V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	Q_r		3.05 5.32 6.17		μC
反向恢复损耗（每脉冲） Reverse recovered energy	IF = 150 A, -diF/dt =4281A/μs(Tvj=150°C) VR = 300 V ,VGE = -15 V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{rec}		0.69 1.28 1.49		mJ
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		150	°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°C	V_{RRM}	650	V
连续正向直流电流 Continuous DC forward current		I_F	150	A
正向重复峰值电流 Repetitive peak forward current	t_p=1ms	I_{FRM}	300	A
I^2t 值 I^2t-value	t_p=10ms，sin180°，T_{vj}=125°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=150A, V_{GE}=0V I_F=150A, V_{GE}=0V I_F=150A, V_{GE}=0V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_F		1.65 1.76 1.73	2.00	V
反向电流 Reverse current	IF = 150 A, - diF/dt=4281A/μs(Tvj=150°C) VR = 300 V	Tvj = 25°C Tvj=125°C Tvj=150°C	I_{RM}		83 102 112		A
恢复电荷 Recovered charge	IF = 150 A, - diF/dt=4281A/μs(Tvj=150°C) VR = 300 V	Tvj = 25°C Tvj=125°C Tvj=150°C	Qr		3.05 5.32 6.17		μC
反向恢复损耗（每脉冲） Reverse recovery energy	IF = 150 A, - diF/dt=4281A/μs(Tvj=150°C) VR = 300 V	Tvj = 25°C Tvj=125°C Tvj=150°C	Erec		0.69 1.28 1.49		mJ
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		150	°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°C，±5%	R_{25}		5		kΩ
B-值 B-value	±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=50Hz, t=60s	V_{ISOL}	2500			V
内部绝缘 Internal isolation			Al_2O_3			
储存温度 Storage temperature		T_{stg}	-40		125	°C
模块安装的扭矩 Mounting torque for modul mounting		M	3.0		6.0	Nm
重量 Weight		W		41		g

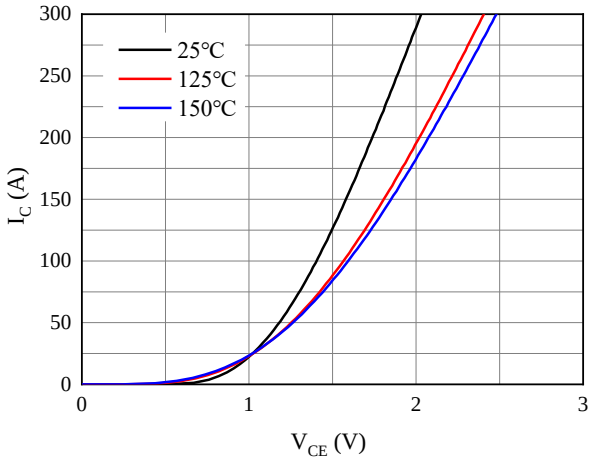


图 1. 典型输出特性 (V_{GE}=15V)

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

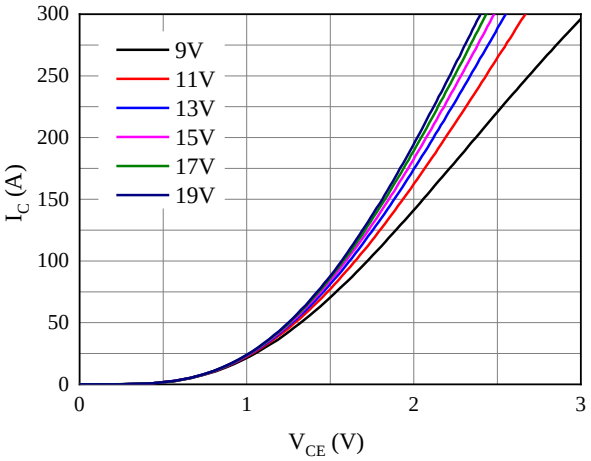


图 2. 典型输出特性 (T_{vj}=150℃)

Figure 2. Typical output characteristics (T_{vj}=150℃)

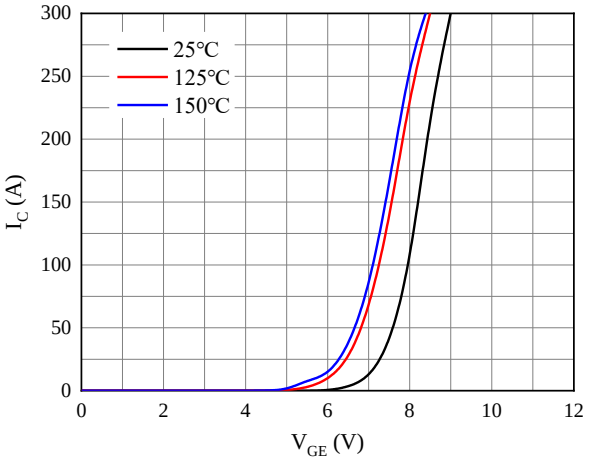


图 3. 典型传输特性(V_{CE}=20V)

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

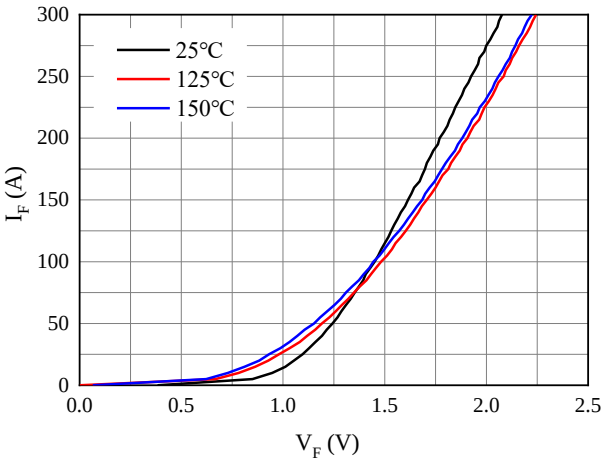


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

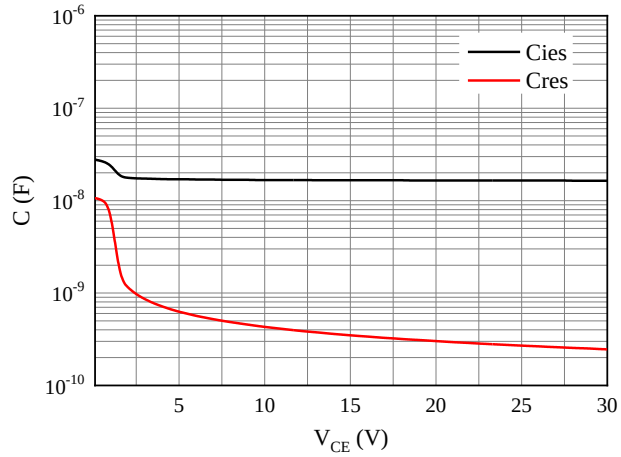


图 5. 电容特性

Figure 5. Capacitance characteristic

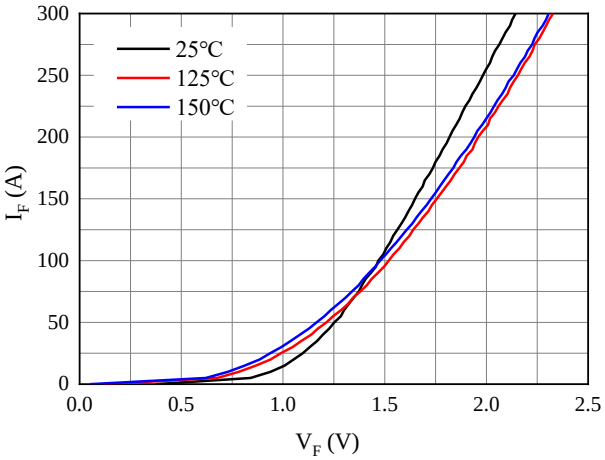


图 6. 正向偏压特性 二极管 D5-D6

Figure 6. Forward characteristic of Diode,D5-D6

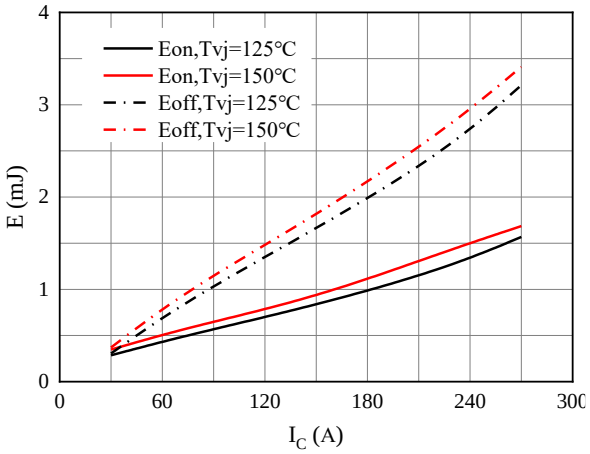


图 7. 开关损耗 逆变器

Figure 7. Switching losses of IGBT

VGE=±15V, RGon=3.3Ω, RGoff=3.3Ω, VCE=300V

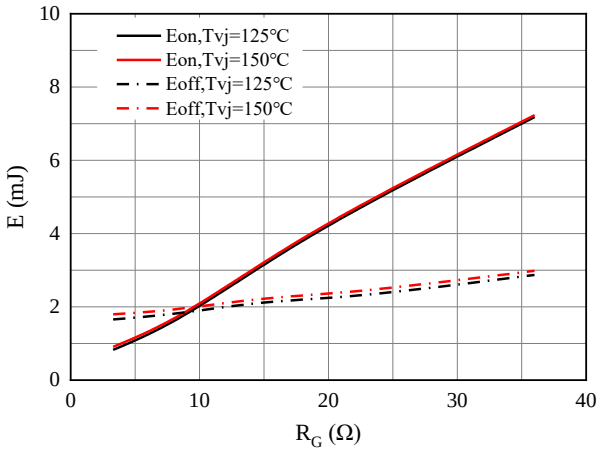


图 8. 开关损耗 逆变器

Figure 8. Switching losses of IGBT

VGE=±15V, IC=150A, VCE=300V

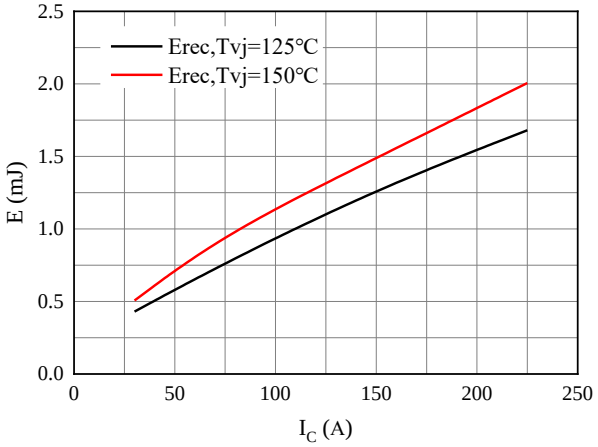


图 9. 开关损耗 二极管

Figure 9. Switching losses of Diode

RGon=3.3Ω, VCE=300V

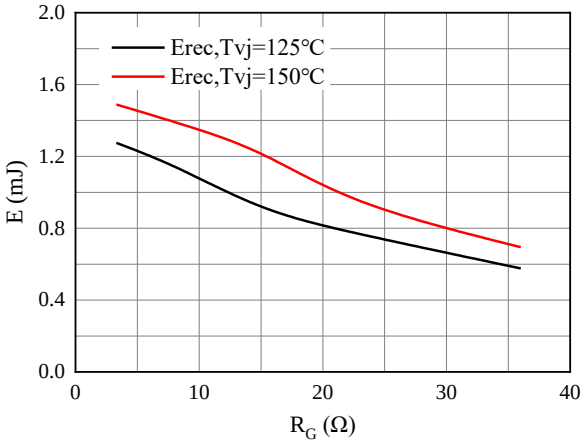


图 10. 开关损耗 二极管

Figure 10. Switching losses of Diode

IF=150A, VCE=300V

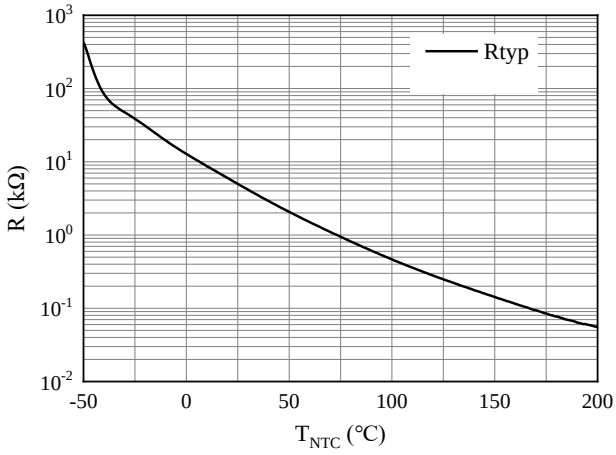
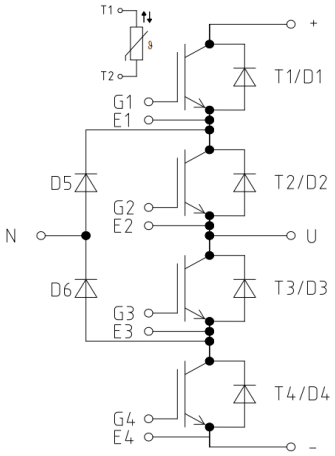


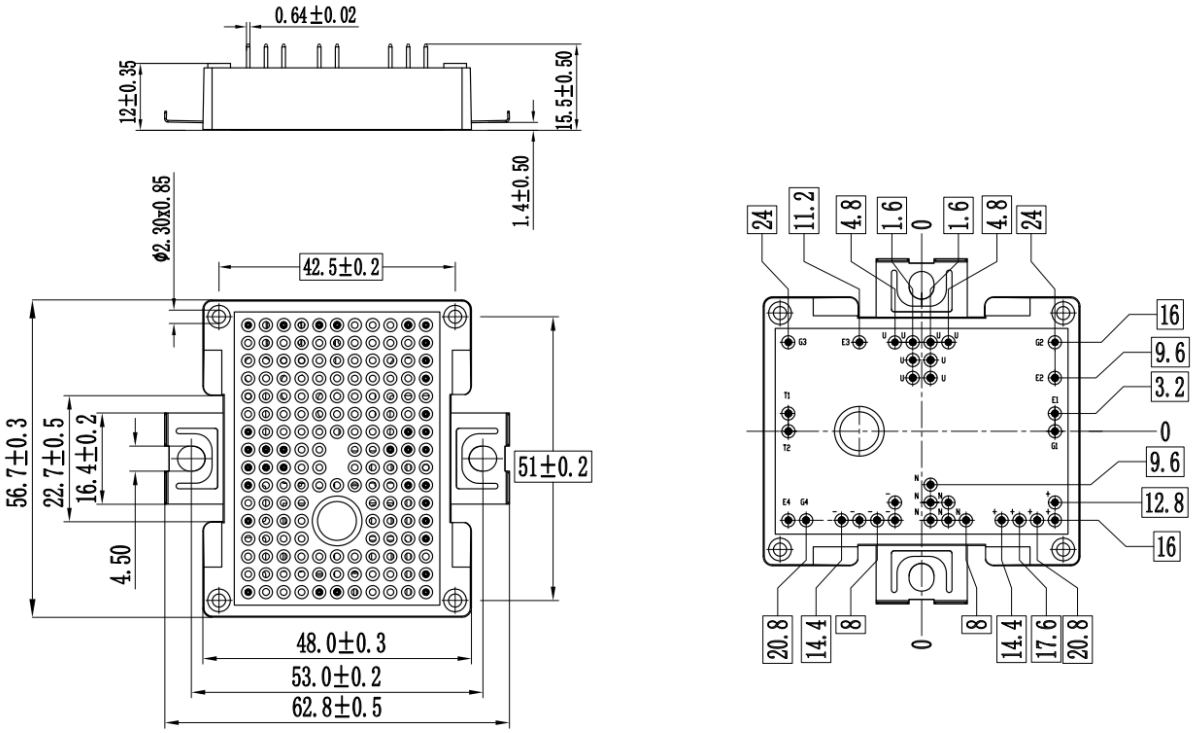
图 11. 负温系数热敏电阻 温度特性

Figure 11. NTC-Themistor-temperature characteristic

Circuit diagram



Package outlines



Dimensions in (mm)