

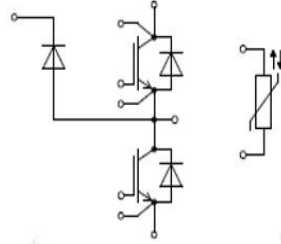
## 3-Level IGBT Module

### 电气特性:

- 1200V 沟槽栅/场终止工艺
- 低开关损耗
- $V_{cesat}$  正温度系数

### 典型应用:

- 三电平应用
- 储能
- APF
- UPS



$V_{CES} = 1200V$ ,  $I_{C\ nom} = 300A$  /  $I_{CRM} = 600A$

## 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	$T_{vj} = 25^{\circ}C$	$V_{CES}$	1200	V
连续集电极直流电流 Continuous DC collector current	$T_C = 100^{\circ}C$ , $T_{vj\ max} = 175^{\circ}C$	$I_{C\ nom}$	300	A
集电极重复峰值电流 Repetitive peak collector current	$t_p = 1\ ms$	$I_{CRM}$	600	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	$V_{GE} = 15V$ , $I_C = 300A$ $V_{GE} = 15V$ , $I_C = 300A$ $V_{GE} = 15V$ , $I_C = 300A$	$T_{vj} = 25^{\circ}C$ $T_{vj} = 125^{\circ}C$ $T_{vj} = 150^{\circ}C$	$V_{CE\ sat}$	1.6 1.8 1.9	2.07	V
栅极-发射极阈值电压 Gate-Emitter threshold voltage	$I_C = 11.5mA$ , $V_{GE} = V_{CE}$	$T_{vj} = 25^{\circ}C$	$V_{GEth}$	5.4	6.0	6.6
栅电荷 Gate charge	$V_{GE} = -15V \dots +15V$		$Q_G$	3.14		$\mu C$
内部栅极电阻 Internal gate resistor	$V_{ce} = 0V$ , $f = 100kHz$		$R_{Gint}$	0.53		$\Omega$
输入电容 Input capacitance	$f = 1MHz$ , $V_{CE} = 25V$ , $V_{GE} = 0V$	$T_{vj} = 25^{\circ}C$	$C_{ies}$	47.7		nF

Input capacitance						
反向传输电容 Reverse transfer capacitance		$C_{res}$		0.43		
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	$I_{CES}$		2	mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$	$I_{GES}$		200	nA
开通延迟时间 Turn-on delay time	$I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_{don}$		109 111 112	
上升时间 Rise time	$I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_r$		103 111 112	
关断延迟时间 Turn-off delay time	$I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_{doff}$		362 411 424	ns
下降时间 Fall time	$I_C=300A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (电感负载) / (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$t_f$		149 227 251	
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	$I_C=300A, V_{CE}=600V,$ $V_{GE}=\pm 15V, R_G=2.5\Omega,$ $di/dt=2150A/us(T_{vj}=150^{\circ}C)$ (电感负载) / (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$E_{on}$		41.05 63.23 69.16	mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	$I_C=300A, V_{CE}=600V,$ $V_{GE}=\pm 15V, R_G=2.5\Omega,$ $du/dt=4330V/us(T_{vj}=150^{\circ}C)$ (电感负载) / (inductive load)	$T_{vj}=25^{\circ}C$ $T_{vj}=125^{\circ}C$ $T_{vj}=150^{\circ}C$	$E_{off}$		22.53 28.57 31.73	mJ
短路数据 SC data	$V_{GE}\leq 15V, V_{CC}=800V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$ $t_p\leq 10us, T_{vj}=150^{\circ}C$		$I_{sc}$		1300	A
在开关状态下温度 Temperature under switching conditions			$T_{vj op}$	-40	150	$^{\circ}C$

## 二极管，逆变&三电平 / Diode, Inverter&3-Level

### 最大额定值 / Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C$	$V_{RRM}$	1200	V
连续正向直流电流 Continuous DC forward current		$I_F$	300	A
正向重复峰值电流 Repetitive peak forward current	$t_p=1ms$	$I_{FRM}$	600	A
I2t-值 I2t-value	$V_R=0V, t_p=10ms, T_{vj}=125^{\circ}C$	$I2t$	29000	A

## 特征值 / Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
正向电压 Forward voltage	$I_F=300A, V_{GE}=0V$ $I_F=300A, V_{GE}=0V$ $I_F=300A, V_{GE}=0V$	$T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$	$V_F$	1.98 1.69 1.61	2.40	V
反向恢复峰值电流 Peak reverse recovery current	$I_F=300A, V_R=600V,$ $V_{GE}=-15V, R_G=2.5\Omega,$ $-diF/dt=1640 A/us(T_{vj}=150^\circ C)$	$T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$	$I_{RM}$	93 159 184		A
恢复电荷 Recovered charge	$I_F=300A, V_R=600V,$ $V_{GE}=-15V, R_G=2.5\Omega,$ $-diF/dt=1640A/us(T_{vj}=150^\circ C)$	$T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$	$Q_r$	18.25 48.94 60.29		$\mu C$
反向恢复损耗（每脉冲） Reverse recovered energy	$I_F=300A, V_R=600V,$ $V_{GE}=-15V, R_G=2.5\Omega,$ $-diF/dt=1640A/us(T_{vj}=150^\circ C)$	$T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$	$E_{rec}$	7.09 15.12 19.97		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	$T_c=25^\circ C, \pm 5\%$	$R_{25}$		5.0		$K \Omega$
B-值 B-value	$\pm 2\%$	$B_{25/50}$		3375		K

模块 / Module

Parameter	Conditions	Symbol	Value			Unit
绝缘测试电压 Isolation test voltage	RMS, $f=50Hz, t=1min$	$V_{ISOL}$	2500			V
内部绝缘 Internal isolation			$Al_2O_3$			
储存温度 Storage temperature		$T_{stg}$	-40		125	$^\circ C$
模块安装的扭矩 Mounting torque for modul mounting		M	3.0		6.0	Nm
端子联接扭距 Terminal connection torque		M	3.0		6.0	Nm
重量 Weight		W		340		g

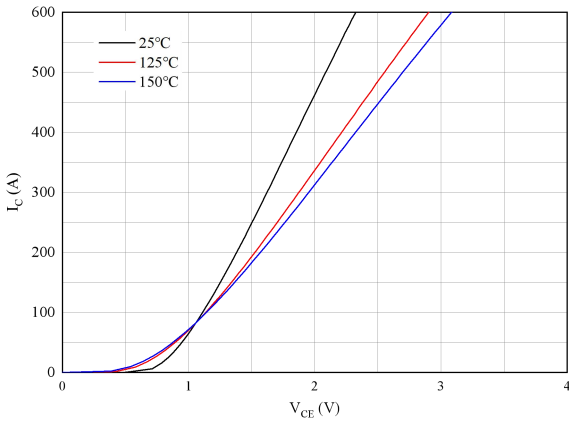


图 1. 典型输出特性 ( $V_{GE}=15V$ )

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

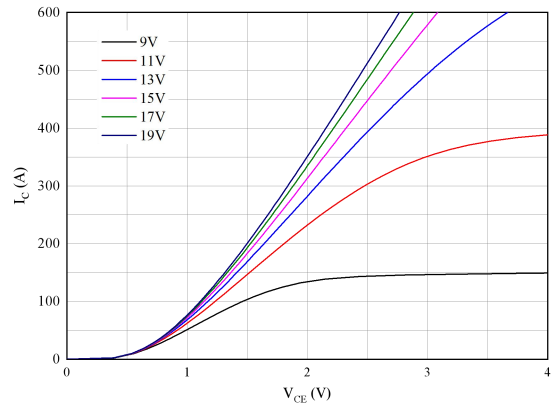


图 2. 典型输出特性 ( $T_{vj}=150^{\circ}C$ )

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

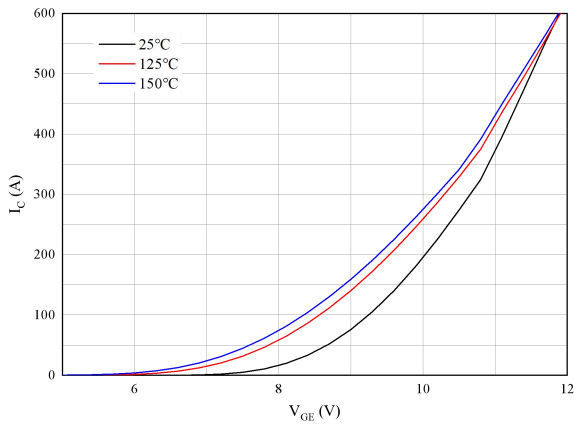


图 3. 典型传输特性 ( $V_{CE}=20V$ )

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

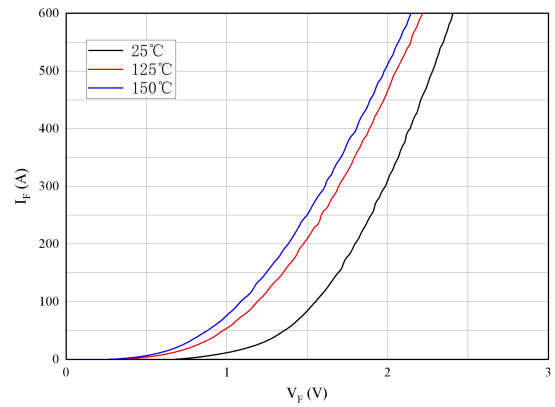


图 4. 正向偏压特性 二极管

Figure 4. Forward characteristic of Diode

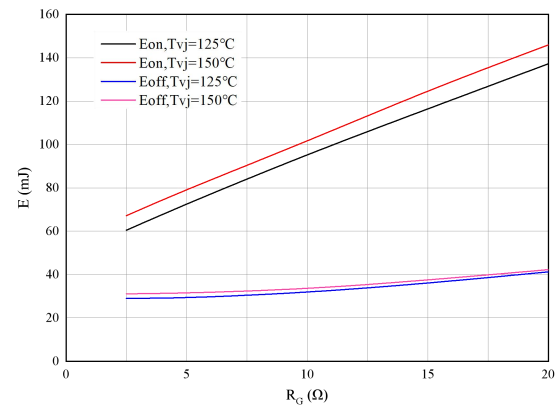
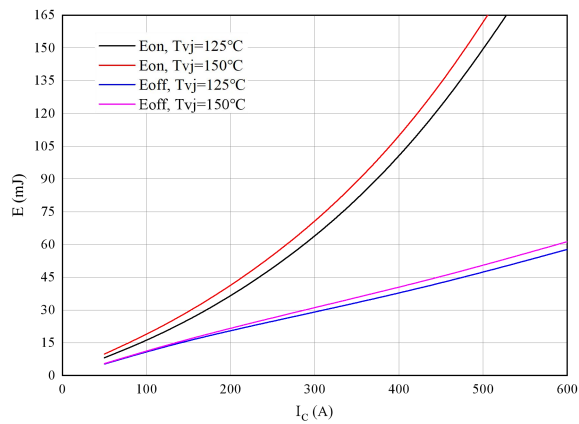


图 5. 开关损耗 逆变器

Figure 5. Switching losses of IGBT  
 $V_{GE} = \pm 15V$ ,  $R_{Gon} = 2.5\Omega$ ,  $R_{Goff} = 2.5\Omega$ ,  $V_{CE} = 600V$

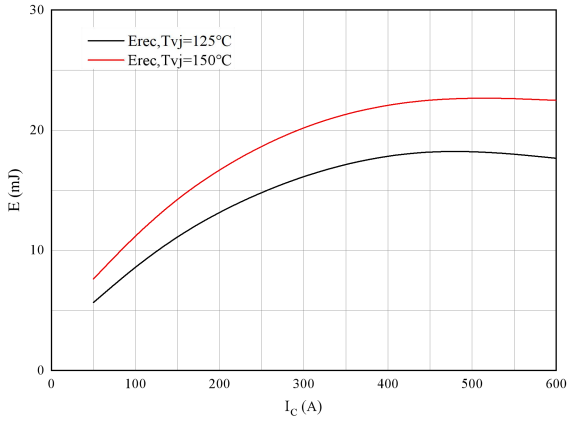


图 7. 开关损耗 二极管

Figure 7. Switching losses of Diode  
 $R_{Gon} = 2.5\Omega$ ,  $V_{CE} = 600V$

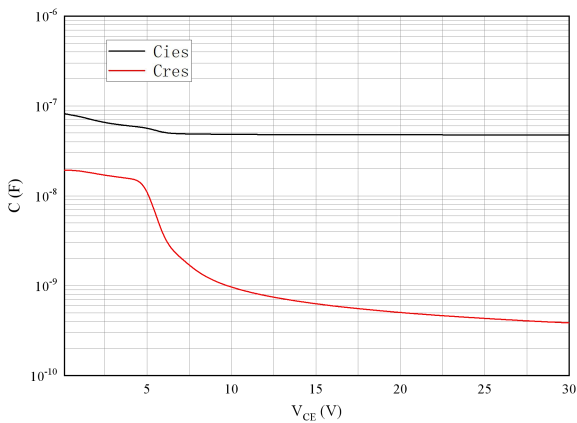


Figure 9. Capacitance characteristic

图 6. 开关损耗 逆变器

Figure 6. Switching losses of IGBT  
 $V_{GE} = \pm 15V$ ,  $I_c = 300A$ ,  $V_{CE} = 600V$

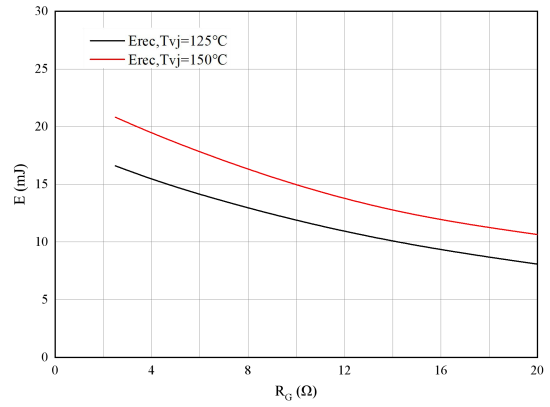


图 8. 开关损耗 二极管

Figure 8. Switching losses of Diode  
 $I_F = 300A$ ,  $V_{CE} = 600V$

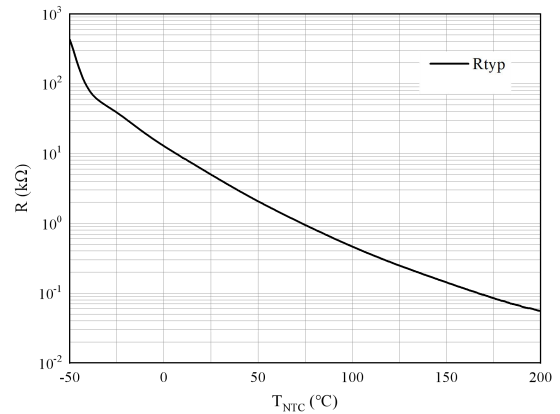
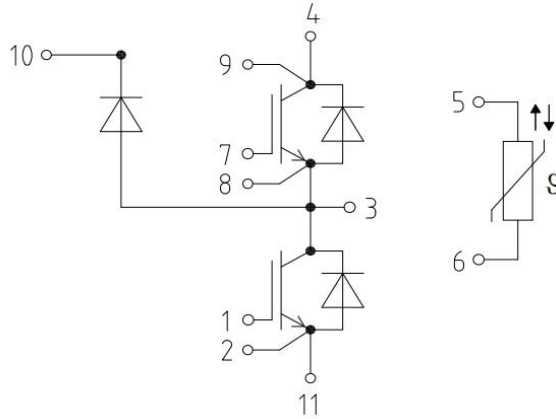


Figure10. NTC-Thermistor-temperaturecharacteristic

接线图 / Circuit diagram



封装尺寸 / Package outlines

