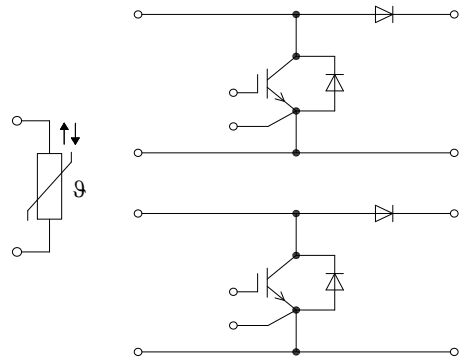
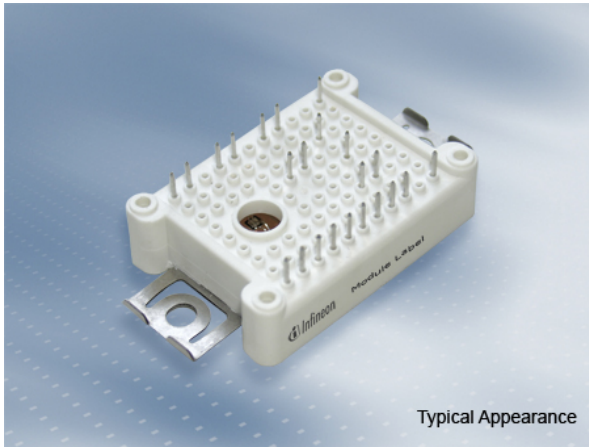


EasyPACK™ 模块 带有pressfit预涂导热材料
 EasyPACK™ module and PressFIT / pre-applied Thermal Interface Material



$V_{CES} = 650V$
 $I_{C\ nom} = 50A / I_{CRM} = 100A$

典型应用

- 太阳能应用

Typical Applications

- Solar applications

电气特性

- 增加阻断电压至650V
- 低电感设计
- 低开关损耗

Electrical Features

- CoolSiC (TM) Schottky diode gen 5
- Increased blocking voltage capability up to 650V
- Low inductive design
- Low switching losses

机械特性

- 低热阻的三氧化二铝 (Al_2O_3 衬底
- 集成NTC温度传感器
- 焊接技术
- 预涂导热介质

Mechanical Features

- Al_2O_3 substrate with low thermal resistance
- Integrated NTC temperature sensor
- Solder contact technology
- Pre-applied Thermal Interface Material

Module Label Code

Barcode Code 128



DMX - Code



Content of the Code

Content of the Code	Digit
Module Serial Number	1 - 5
Module Material Number	6 - 11
Production Order Number	12 - 19
Datecode (Production Year)	20 - 21
Datecode (Production Week)	22 - 23

IGBT, 逆变器 / IGBT, Inverter

最大额定值 / Maximum Rated Values

集电极 - 发射极电压 Collector-emitter voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{CES}	650	V
集电极电流 Implemented collector current		I_{CN}	50	A
连续集电极直流电流 Continuous DC collector current	$T_H = 100^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$ $T_H = 25^{\circ}\text{C}, T_{vj\max} = 175^{\circ}\text{C}$	$I_{C\text{nom}}$ I_C	25 40	A A
集电极重复峰值电流 Repetitive peak collector current	$t_p = 1\text{ ms}$	I_{CRM}	100	A
栅极 - 发射极峰值电压 Gate-emitter peak voltage		V_{GES}	+/-20	V

特征值 / Characteristic Values

			min.	typ.	max.	
集电极 - 发射极饱和电压 Collector-emitter saturation voltage	$I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$ $I_C = 25\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$V_{CE\text{sat}}$	1,35 1,40 1,45	1,55	V V V
栅极阈值电压 Gate threshold voltage	$I_C = 0,50\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25^{\circ}\text{C}$		$V_{G\text{Eth}}$	3,25	4,00	4,75 V
栅极电荷 Gate charge	$V_{GE} = -15\text{ V} \dots +15\text{ V}, V_{CE} = 400\text{ V}$		Q_G	0,235		μC
内部栅极电阻 Internal gate resistor	$T_{vj} = 25^{\circ}\text{C}$		$R_{G\text{int}}$	0,0		Ω
输入电容 Input capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{ies}	2,80		nF
反向传输电容 Reverse transfer capacitance	$f = 1\text{ MHz}, T_{vj} = 25^{\circ}\text{C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		C_{res}	0,013		nF
集电极-发射极截止电流 Collector-emitter cut-off current	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{CES}	0,04		mA
栅极-发射极漏电流 Gate-emitter leakage current	$V_{CE} = 0\text{ V}, V_{GE} = 20\text{ V}, T_{vj} = 25^{\circ}\text{C}$		I_{GES}		100	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	$I_C = 25\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{on}}$	0,009 0,01 0,012		μs μs μs
上升时间(电感负载) Rise time, inductive load	$I_C = 25\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{on}} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_r	0,0036 0,004 0,005		μs μs μs
关断延迟时间(电感负载) Turn-off delay time, inductive load	$I_C = 25\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	$t_{d\text{off}}$	0,008 0,009 0,01		μs μs μs
下降时间(电感负载) Fall time, inductive load	$I_C = 25\text{ A}, V_{CE} = 400\text{ V}$ $V_{GE} = \pm 15\text{ V}$ $R_{G\text{off}} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	t_f	0,022 0,028 0,03		μs μs μs
开通损耗能量(每脉冲) Turn-on energy loss per pulse	$I_C = 25\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, di/dt = 4200\text{ A}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{G\text{on}} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{on}	0,11 0,23 0,25		mJ mJ mJ
关断损耗能量(每脉冲) Turn-off energy loss per pulse	$I_C = 25\text{ A}, V_{CE} = 400\text{ V}, L_S = 25\text{ nH}$ $V_{GE} = \pm 15\text{ V}, du/dt = 7500\text{ V}/\mu\text{s} (T_{vj} = 150^{\circ}\text{C})$ $R_{G\text{off}} = 5,1\ \Omega$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{off}	0,15 0,17 0,21		mJ mJ mJ
短路数据 SC data	$V_{GE} \leq 15\text{ V}, V_{CC} = 400\text{ V}$ $V_{CE\text{max}} = V_{CES} - L_{S\text{CE}} \cdot di/dt$ $t_p \leq 0\ \mu\text{s}, T_{vj} = 150^{\circ}\text{C}$		I_{SC}	250		A
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个 IGBT / per IGBT valid with IFX pre-applied thermal interface material		R_{thJH}		1,60	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\text{op}}$	-40	150	$^{\circ}\text{C}$

二极管, 逆变器 / Diode, Inverter

最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	650	V
正向电流 Implemented forward current		I_{FN}	30	A
连续正向直流电流 Continuous DC forward current		I_F	30	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1 \text{ ms}$	I_{FRM}	60	A
I ² t-值 I ² t - value	$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$ $V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 150^{\circ}\text{C}$	I ² t	90,0 82,0	A ² s A ² s

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	$I_F = 30 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 30 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 30 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F		1,60 1,55 1,50	2,00	V V V
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode valid with IFX pre-applied thermal interface material		R_{thJH}			2,44	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj \text{ op}}$	-40		150	$^{\circ}\text{C}$

Diode, 转换器 / Diode, Boost

最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	$T_{vj} = 25^{\circ}\text{C}$	V_{RRM}	650	V
连续正向直流电流 Continuous DC forward current		I_F	30	A
正向重复峰值电流 Repetitive peak forward current	$t_p = 1 \text{ ms}$	I_{FRM}	60	A
I ² t-值 I ² t - value	$V_R = 0 \text{ V}, t_p = 10 \text{ ms}, T_{vj} = 125^{\circ}\text{C}$	I ² t	40,5	A ² s

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	$I_F = 30 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 30 \text{ A}, V_{GE} = 0 \text{ V}$ $I_F = 30 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	V_F		1,45 1,60 1,65	1,85	V V V
反向恢复峰值电流 Peak reverse recovery current	$I_F = 30 \text{ A}, -di_F/dt = 4200 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 400 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	I_{RM}		10,5 10,0 10,0		A A A
恢复电荷 Recovered charge	$I_F = 30 \text{ A}, -di_F/dt = 4200 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 400 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	Q_r		0,012 0,0125 0,013		μC μC μC
反向恢复损耗 (每脉冲) Reverse recovery energy	$I_F = 30 \text{ A}, -di_F/dt = 4200 \text{ A}/\mu\text{s} (T_{vj}=150^{\circ}\text{C})$ $V_R = 400 \text{ V}$	$T_{vj} = 25^{\circ}\text{C}$ $T_{vj} = 125^{\circ}\text{C}$ $T_{vj} = 150^{\circ}\text{C}$	E_{rec}		0,04 0,0405 0,041		mJ mJ mJ
结 - 散热器热阻 Thermal resistance, junction to heatsink	每个二极管 / per diode valid with IFX pre-applied thermal interface material		R_{thJH}			1,50	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj \text{ op}}$	-40		150	$^{\circ}\text{C}$

负温度系数热敏电阻 / NTC-Thermistor 特征值 / Characteristic Values

			min.	typ.	max.	
额定电阻值 Rated resistance	$T_{NTC} = 25^{\circ}\text{C}$	R_{25}		5,00		k Ω
R100 偏差 Deviation of R100	$T_{NTC} = 100^{\circ}\text{C}, R_{100} = 493 \Omega$	$\Delta R/R$	-5		5	%
耗散功率 Power dissipation	$T_{NTC} = 25^{\circ}\text{C}$	P_{25}			20,0	mW
B-值 B-value	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25/50}$		3375		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25/80}$		3411		K
B-值 B-value	$R_2 = R_{25} \exp [B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$	$B_{25/100}$		3433		K

根据应用手册标定

Specification according to the valid application note.

模块 / Module

绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		2,5		kV
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)			Al_2O_3		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			11,5 6,3		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			10,0 5,0		mm
相对电痕指数 Comperative tracking index		CTI		> 200		
min. typ. max.						
杂散电感, 模块 Stray inductance module		L_{sCE}		15		nH
储存温度 Storage temperature		T_{stg}	-40		125	$^{\circ}\text{C}$
最高基板工作温度 Maximum baseplate operation temperature		T_{BPmax}			125	$^{\circ}\text{C}$
Anpresskraft für mech. Bef. pro Feder mounting force per clamp		F	20	-	50	N
重量 Weight		G		24		g

Der Strom im Dauerbetrieb ist auf 25 A effektiv pro Anschlusspin begrenzt.

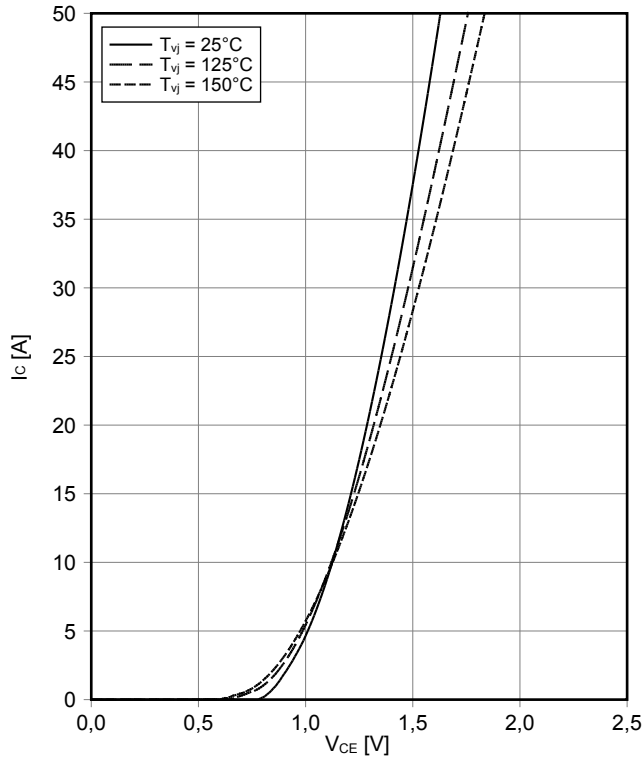
The current under continuous operation is limited to 25 A rms per connector pin.

Lagerung und Transport von Modulen mit TIM => siehe AN2012-07

Storage and shipment of modules with TIM => see AN2012-07

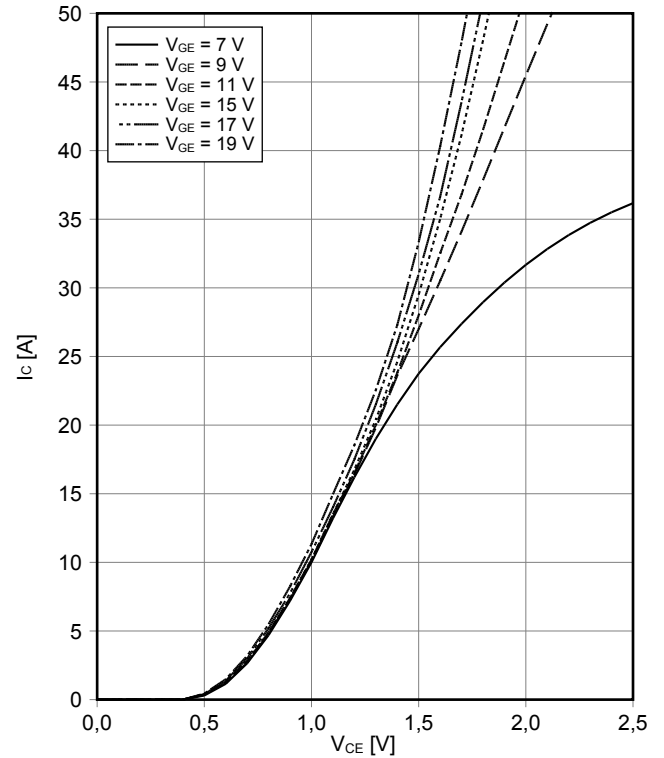
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$
 $V_{GE} = 15\text{ V}$



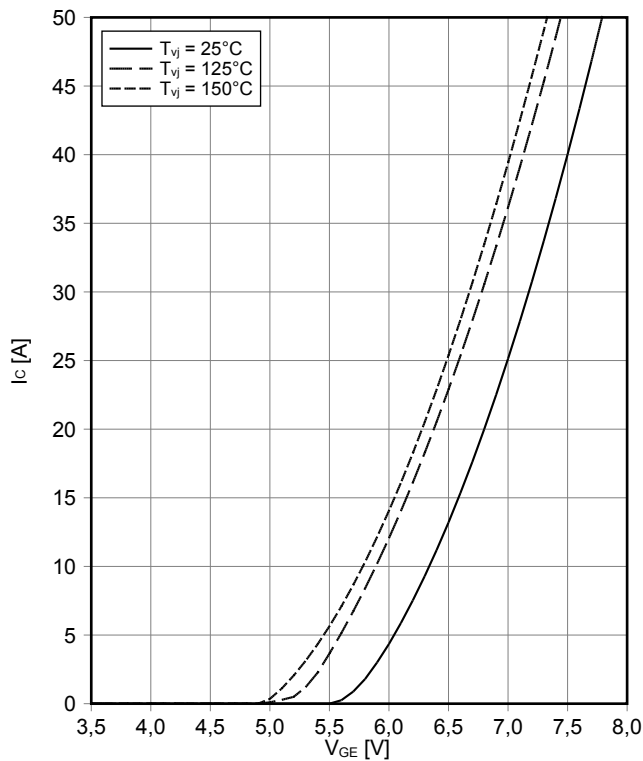
输出特性 IGBT, 逆变器 (典型)
output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$
 $T_{vj} = 150^\circ\text{C}$



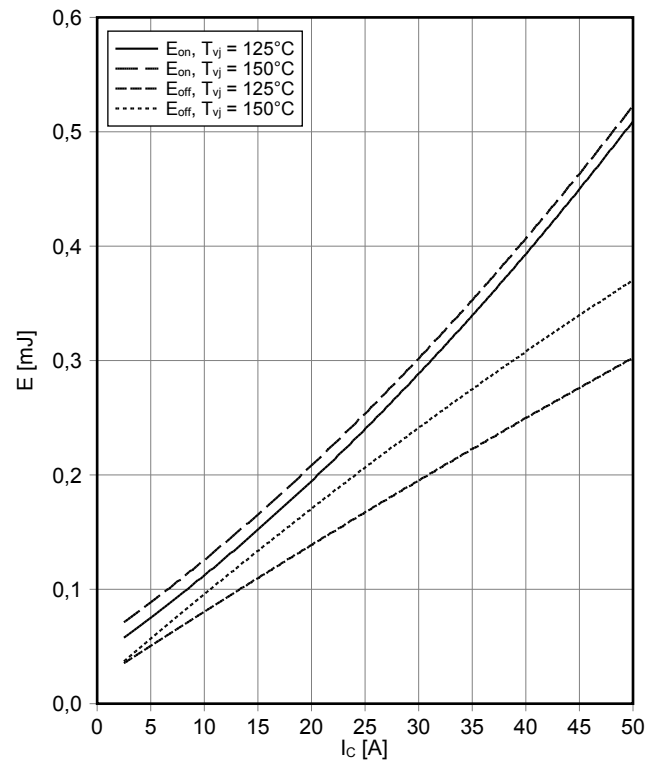
传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT, Inverter (typical)

$I_C = f(V_{GE})$
 $V_{CE} = 20\text{ V}$



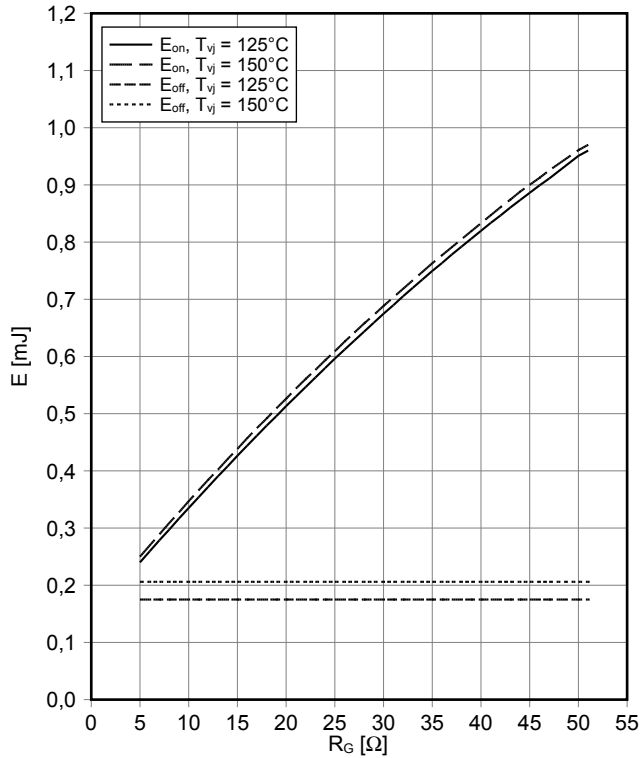
开关损耗 IGBT, 逆变器 (典型)
switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
 $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 5.1\ \Omega$, $R_{Goff} = 5.1\ \Omega$, $V_{CE} = 400\text{ V}$



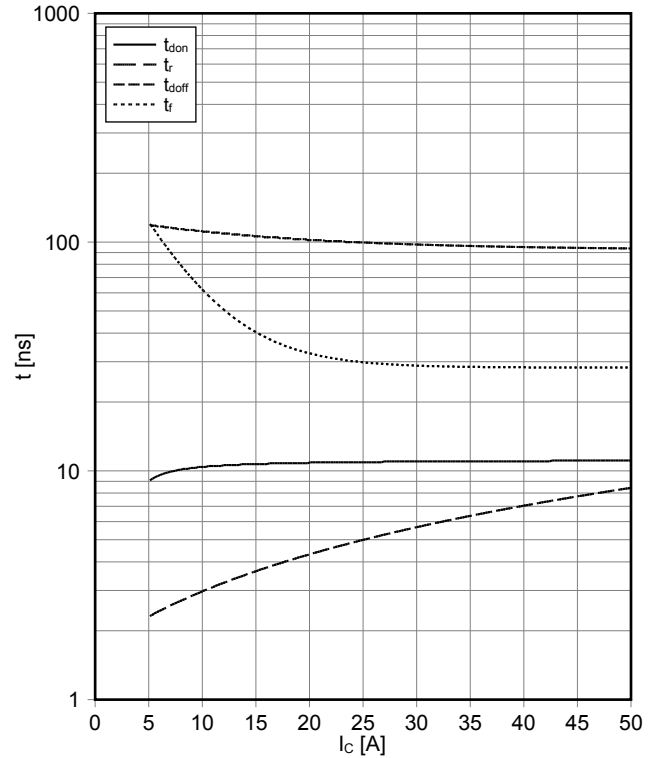
开关损耗 IGBT, 逆变器 (典型)
switching losses IGBT, Inverter (typical)

$E_{on} = f(R_G), E_{off} = f(R_G)$
 $V_{GE} = \pm 15\text{ V}, I_C = 25\text{ A}, V_{CE} = 400\text{ V}$



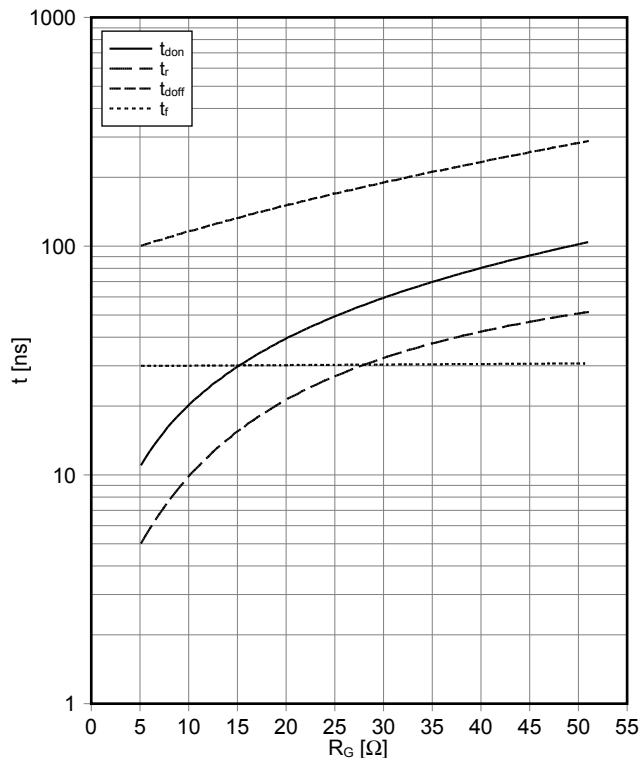
??? IGBT, 逆变器 (典型)
switching times IGBT, Inverter (typical)

$t_{don} = f(I_C), t_r = f(I_C), t_{doff} = f(I_C), t_f = f(I_C)$
 $V_{GE} = \pm 15\text{ V}, R_{Gon} = 5.1\ \Omega, R_{Goff} = 5.1\ \Omega, V_{CE} = 400\text{ V}, T_{vj} = 150^\circ\text{C}$



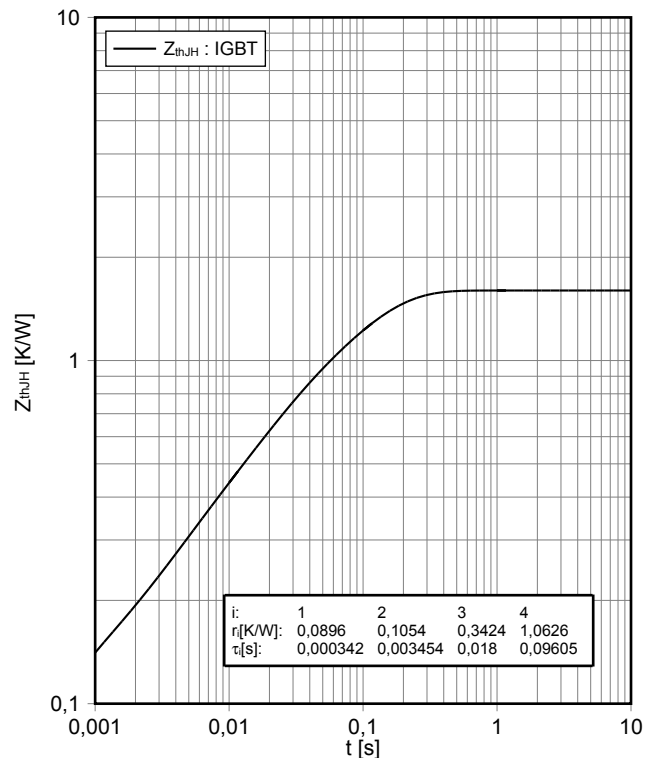
??? IGBT, 逆变器 (典型)
switching times IGBT, Inverter (typical)

$t_{don} = f(R_G), t_r = f(R_G), t_{doff} = f(R_G), t_f = f(R_G)$
 $V_{GE} = \pm 15\text{ V}, I_C = 25\text{ A}, V_{CE} = 400\text{ V}, T_{vj} = 150^\circ\text{C}$



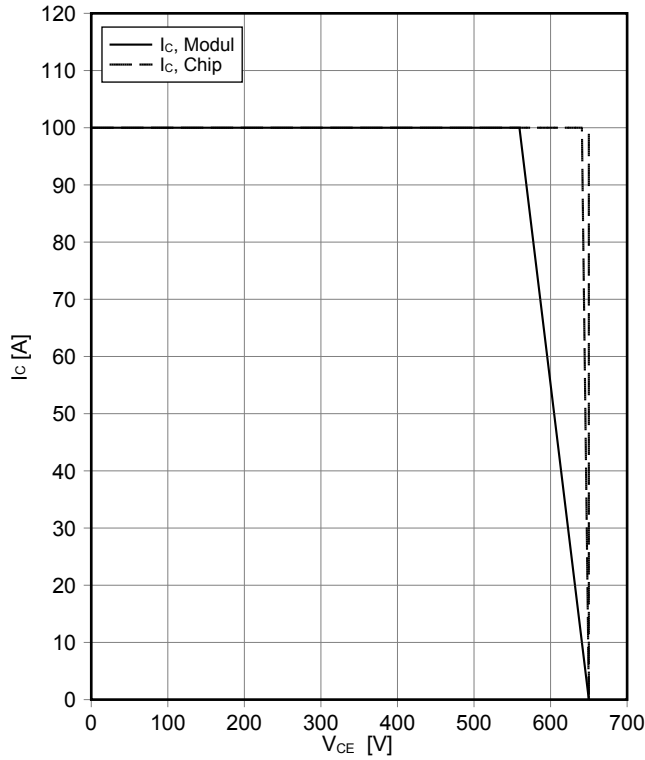
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT, Inverter

$Z_{thJH} = f(t)$



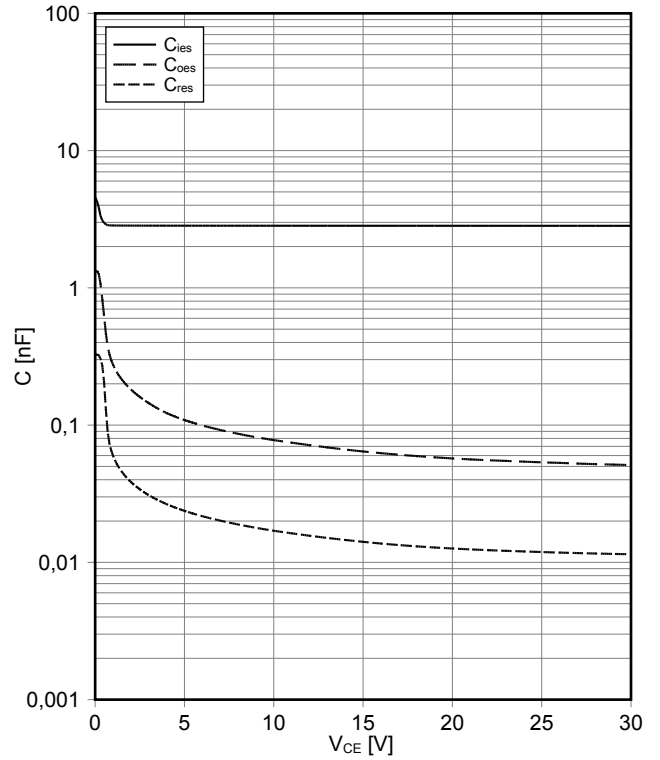
反偏安全工作区 IGBT, 逆变器 (RBSOA)
reverse bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$
 $V_{GE} = \pm 15 \text{ V}, R_{Goff} = 5.1 \Omega, T_{vj} = 150^\circ\text{C}$



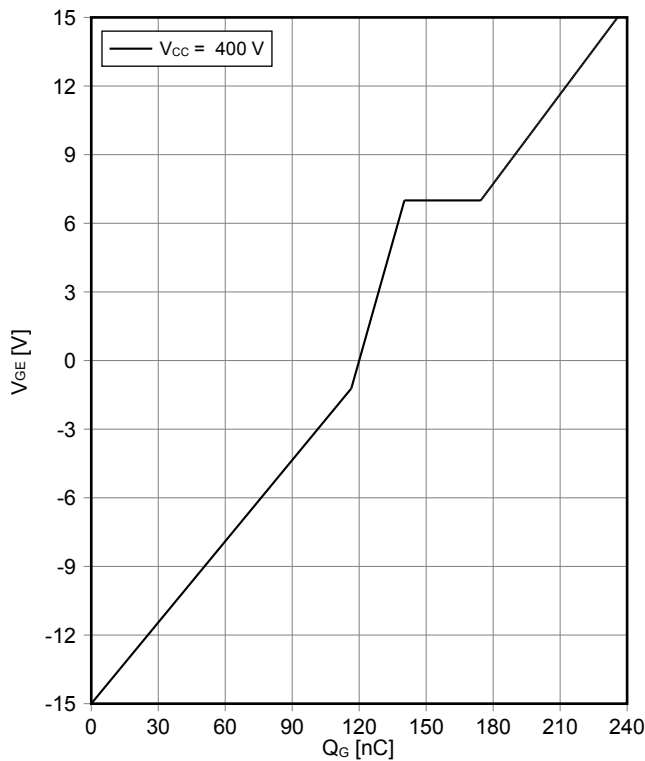
电容特性 IGBT, 逆变器 (典型)
capacity characteristic IGBT, Inverter (typical)

$C = f(V_{CE})$
 $V_{GE} = 0 \text{ V}, T_{vj} = 25^\circ\text{C}, f = 1\text{MHz}$



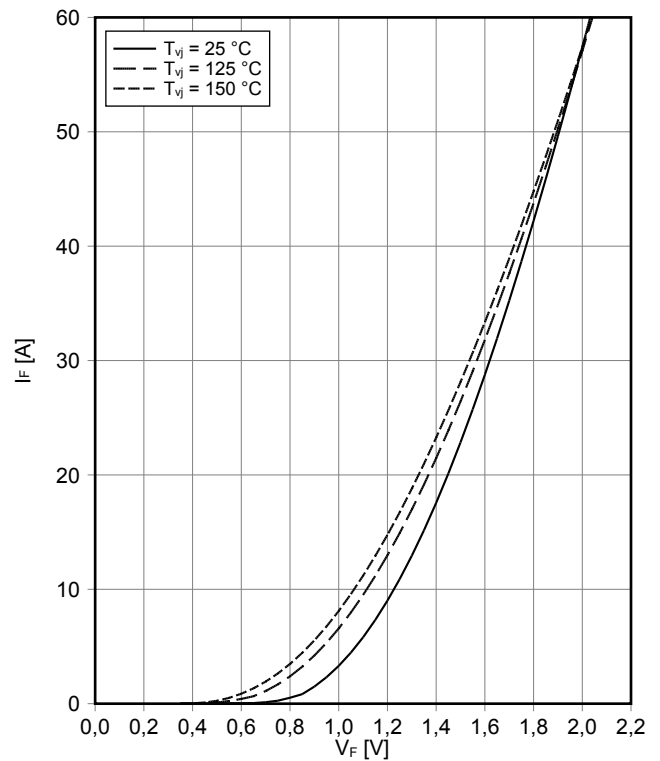
栅极电荷特性 IGBT, 逆变器 (典型)
gate charge characteristic IGBT, Inverter (typical)

$V_{GE} = f(Q_G)$
 $I_C = 25 \text{ A}, T_{vj} = 25^\circ\text{C}$

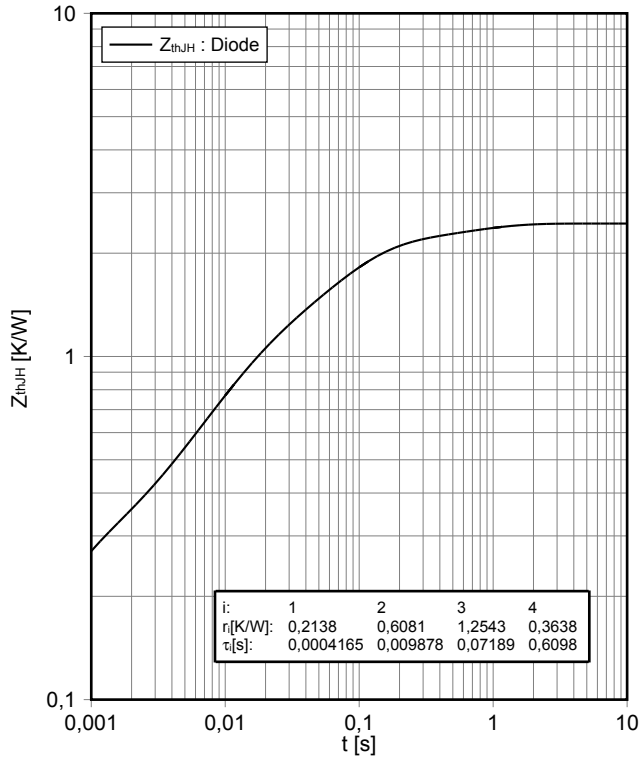


正向偏压特性 二极管, 逆变器 (典型)
forward characteristic of Diode, Inverter (typical)

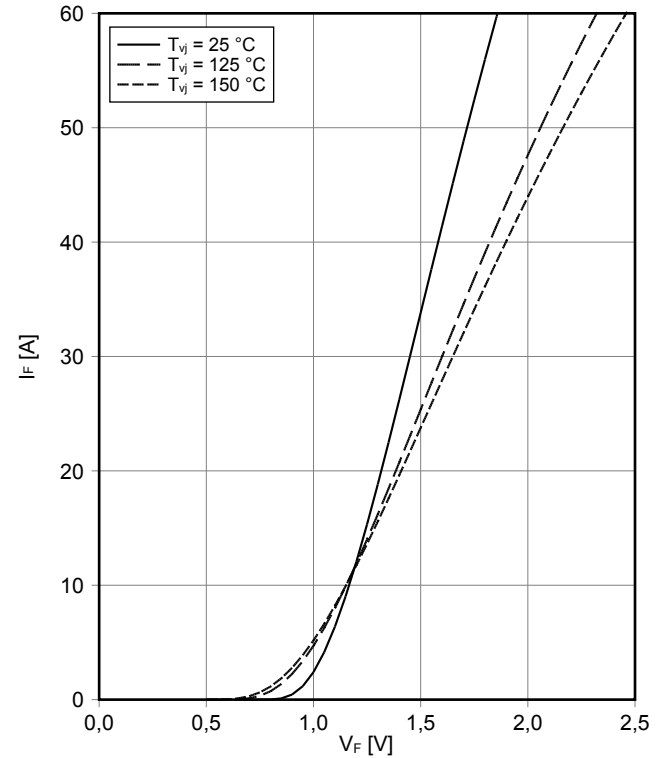
$I_F = f(V_F)$



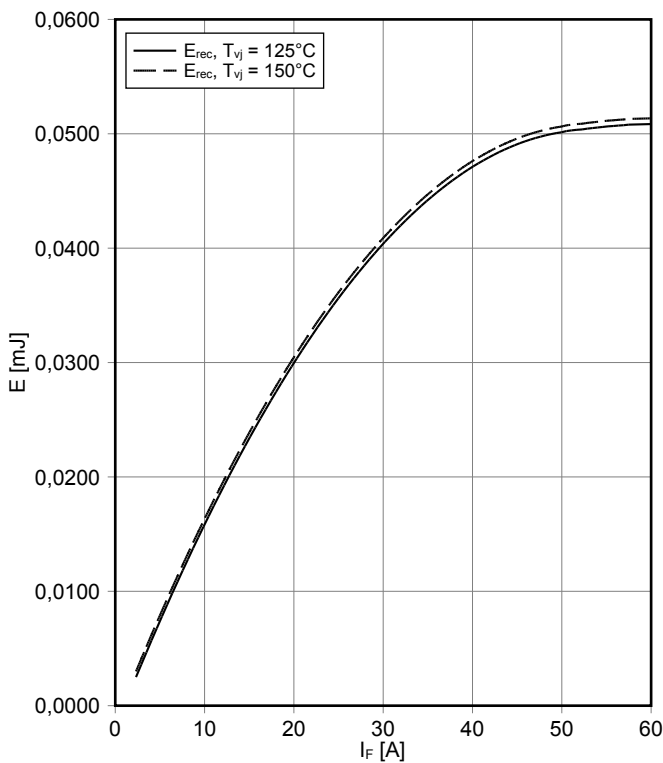
瞬态热阻抗 二极管, 逆变器
transient thermal impedance Diode, Inverter
 $Z_{thJH} = f(t)$



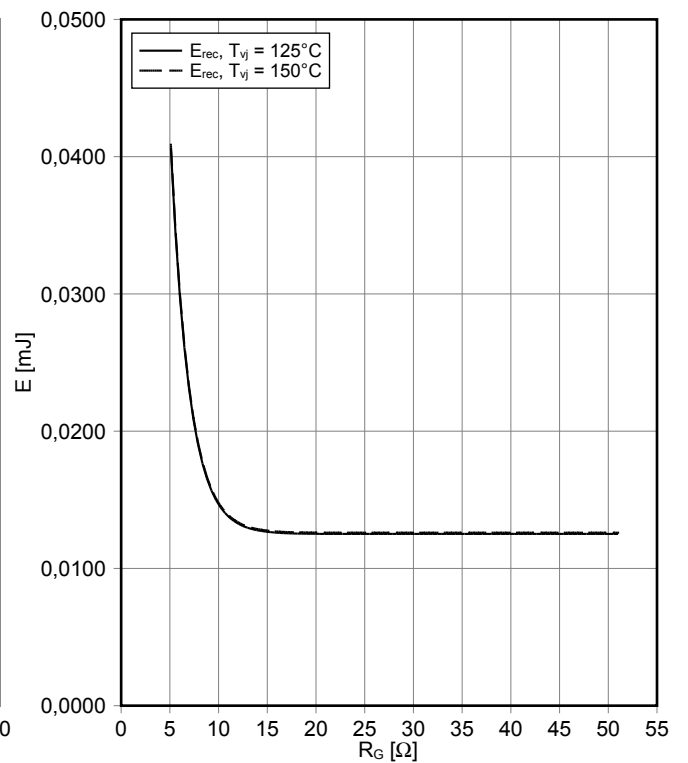
正向偏压特性 Diode, 转换器 (典型)
forward characteristic of Diode, Boost (typical)
 $I_F = f(V_F)$



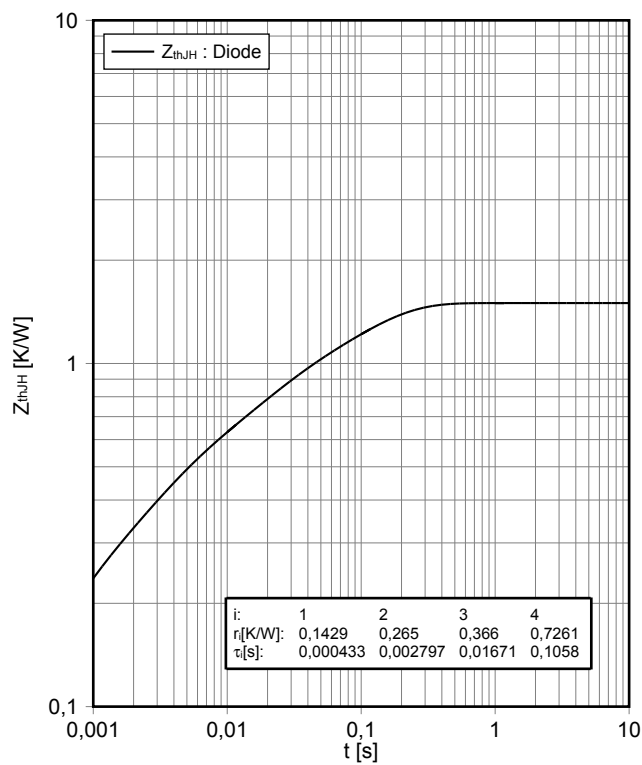
开关损耗 Diode, 转换器 (典型)
switching losses Diode, Boost (typical)
 $E_{rec} = f(I_F)$
 $R_{Gon} = 5.1 \Omega, V_{CE} = 400 V$



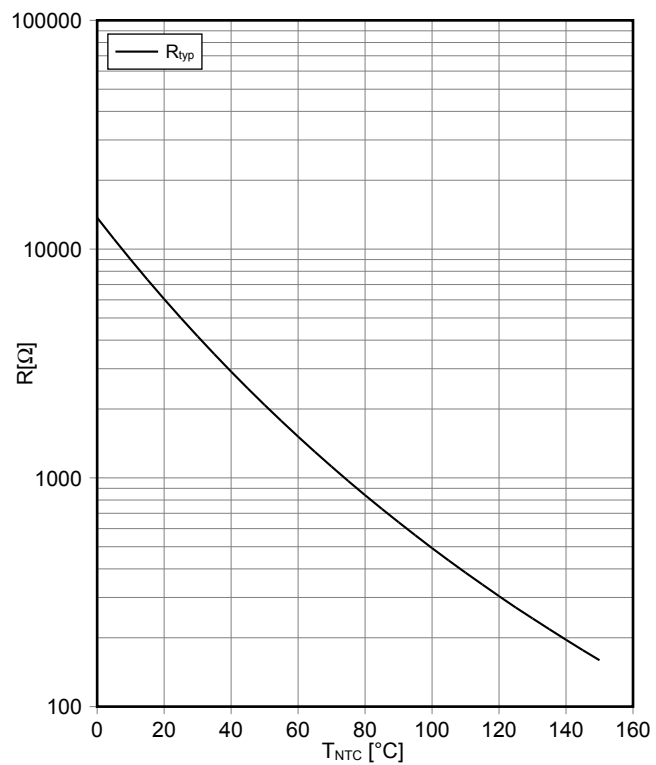
开关损耗 Diode, 转换器 (典型)
switching losses Diode, Boost (typical)
 $E_{rec} = f(R_G)$
 $I_F = 30 A, V_{CE} = 400 V$



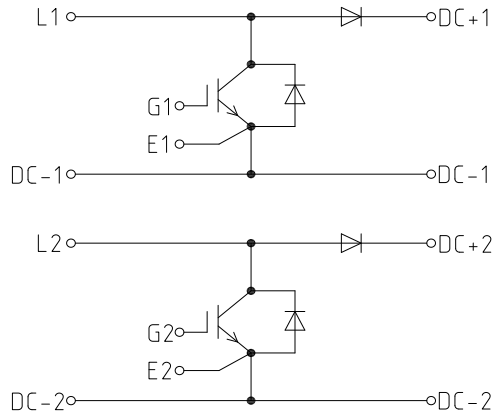
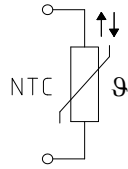
瞬态热阻抗 Diode, 转换器
 transient thermal impedance Diode, Boost
 $Z_{thJH} = f(t)$



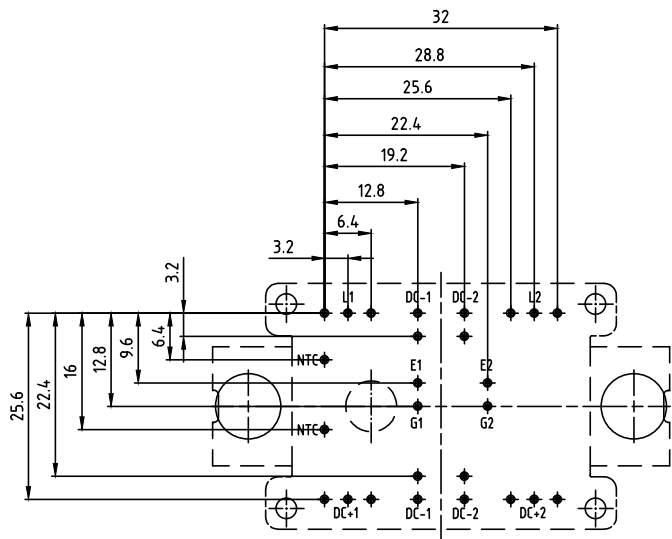
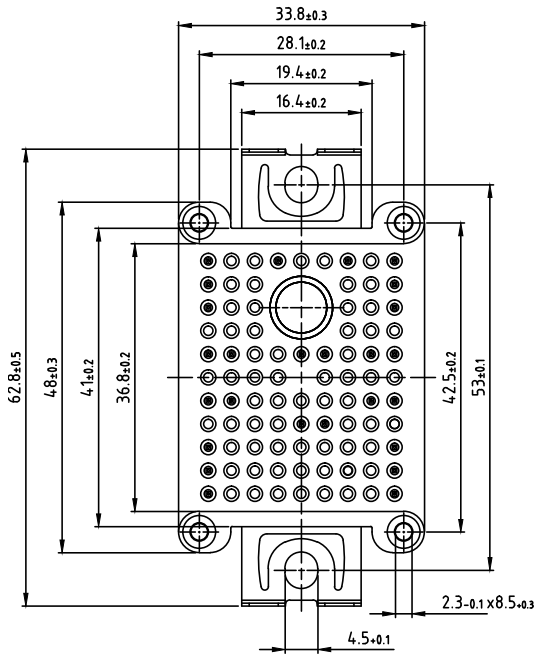
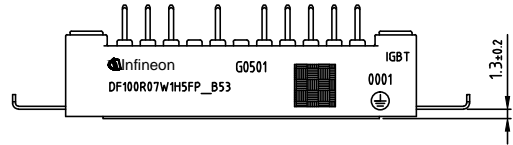
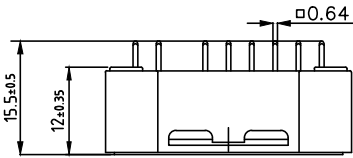
负温度系数热敏电阻 温度特性
 NTC-Thermistor-temperature characteristic (typical)
 $R = f(T)$



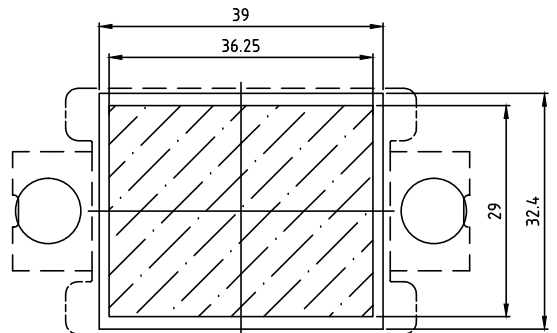
接线图 / Circuit diagram



封装尺寸 / Package outlines



Pinpositions with tolerance



restricted area for Thermal Interface Material

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