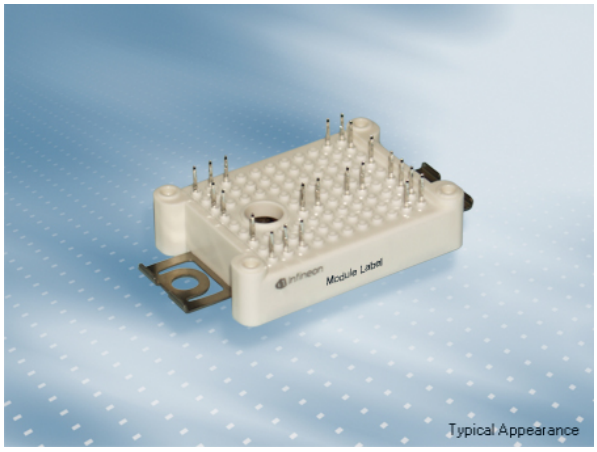
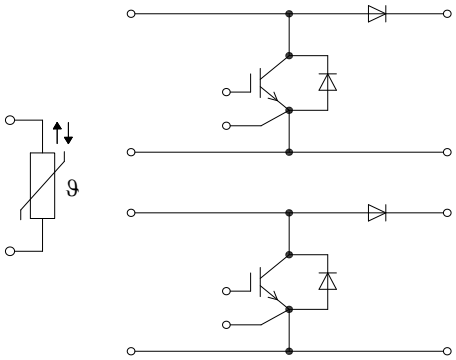
EasyPACK™ 模块 采用 TRENCHSTOP™ 5 H5 和 CoolSiC™ 二极管 带有pressfit预涂导热材料
EasyPACK™ module with TRENCHSTOP™ 5 H5 and CoolSiC™ Schottky diode and PressFIT / pre-applied Thermal Interface Material





V_{CES} = 650V
$I_{C\ nom}$ = 40A / I_{CRM} = 80A

潜在应用
• 太阳能应用

Potential Applications
• Solar applications

电气特性
• CoolSiC™ 碳化硅肖特基二极管第5代
• 低开关损耗
• 低电感设计
• 增加阻断电压至650V

Electrical Features
• CoolSiC™ Schottky diode gen 5
• Low switching losses
• Low inductive design
• Increased blocking voltage capability up to 650V

机械特性
• PressFIT 压接技术
• 低热阻的三氧化二铝 Al_2O_3 衬底
• 集成NTC温度传感器
• 预涂导热介质

Mechanical Features
• PressFIT contact technology
• Al_2O_3 substrate with low thermal resistance
• Integrated NTC temperature sensor
• Pre-applied Thermal Interface Material

Module Label Code

Barcode Code 128

Sample
00000123456000000000000

DMX - 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°C	V_{CES}	650	V
集电极电流 Implemented collector current		I_{CN}	40	A
连续集电极直流电流 Continuous DC collector current	T_H = 100°C, $T_{vj\,max}$ = 175°C	I_{CDC}	20	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	80	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 = 20 A, V_{GE} = 15 V T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,40 1,45 1,50	1,72	V V V
栅极阈值电压 Gate threshold voltage	I_C = 0,35 mA, V_{CE} = V_{GE}, T_{vj} = 25°C	V_{GEth}	3,25	4,00	4,75	V
栅极电荷 Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 400 V	Q_G		0,165		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C	R_{Gint}		0,0		Ω
输入电容 Input capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		2,00		nF
反向传输电容 Reverse transfer capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{res}		0,008		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 650 V, V_{GE} = 0 V, T_{vj} = 25°C	I_{CES}			0,012	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}			100	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	I_C = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Gon} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,012 0,013 0,013		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Gon} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,003 0,004 0,004		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Goff} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,072 0,09 0,095		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 20 A, V_{CE} = 400 V, V_{GE} = -15 / 15 V, R_{Goff} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,018 0,028 0,029		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 20 A, V_{CE} = 400 V, Lσ = 25 nH, di/dt = 6300 A/µs (T_{vj} = 150°C), V_{GE} = -15 / 15 V, R_{Gon} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		0,091 0,12 0,127		mJ mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 20 A, V_{CE} = 400 V, Lσ = 25 nH, du/dt = 7500 V/µs (T_{vj} = 150°C), V_{GE} = -15 / 15 V, R_{Goff} = 2,7 Ω T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		0,076 0,167 0,195		mJ mJ mJ
短路数据 SC data	V_{GE} ≤ 15 V, V_{CC} = 400 V, V_{CEmax} = V_{CES} -L_{sCE} ·di/dt, t_P ≤ 0 µs, T_{vj} = 150°C	I_{SC}		180		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}			1,85	K/W
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 Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	T_{vj} = 25°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 ms	I_{FRM}	60	A
I2t-值 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I²t	90,0 82,0	A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 30 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 30 A, V_{GE} = 0 V, T_{vj} = 125°C I_F = 30 A, V_{GE} = 0 V, T_{vj} = 150°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}			2,37	K/W
在开关状态下温度 Temperature under switching conditions		$T_{vj\,op}$	-40		150	°C

Diode, 轉換器 / 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°C	V_{RRM}	650	V
连续正向直流电流 Continuous DC forward current		I_F	20	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	40	A
I2t-值 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C V_R = 0 V, t_P = 10 ms, T_{vj} = 150°C	I²t	18,0 15,0	A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 20 A, V_{GE} = 0 V, T_{vj} = 25°C I_F = 20 A, V_{GE} = 0 V, T_{vj} = 125°C I_F = 20 A, V_{GE} = 0 V, T_{vj} = 150°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 = 20 A, - di_F/dt = 6300 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 400 V, T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		35,2 32,6 31,9		A A A
恢复电荷 Recovered charge	I_F = 20 A, - di_F/dt = 6300 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 400 V, T_{vj} = 125°C T_{vj} = 150°C	Q_r		0,31 0,29 0,29		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 20 A, - di_F/dt = 6300 A/µs (T_{vj}=150°C), T_{vj} = 25°C V_R = 400 V, T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		0,044 0,039 0,038		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}			2,15	K/W
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

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

根据应用手册标定
Specification according to the valid application note.

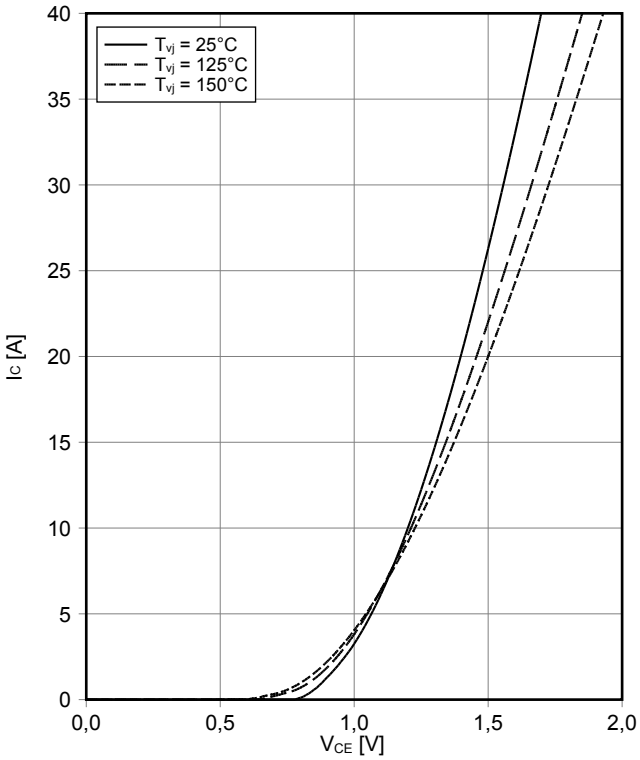
模块 / Module

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		
相对温度指数 (电) RTI Elec.	住房 housing	RTI	140		°C

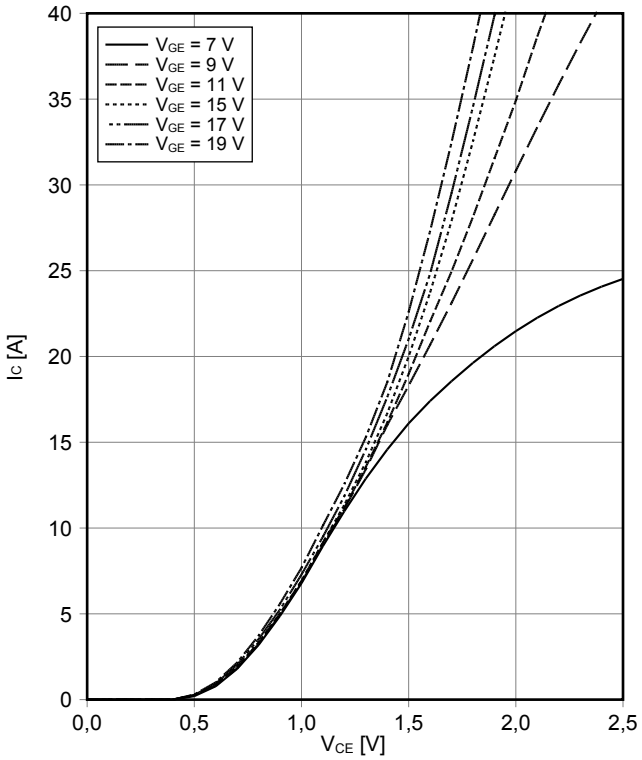
			min.	typ.	max.	
杂散电感,模块 Stray inductance module		L_{sCE}		16		nH
储存温度 Storage temperature		T_{stg}	-40		125	°C
最高基板工作温度 Maximum baseplate operation temperature		T_{BPmax}			125	°C
Anpresskraft für mech. Bef. pro Feder mountig force per clamp		F	20	-	50	N
重量 Weight		G		23		g

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

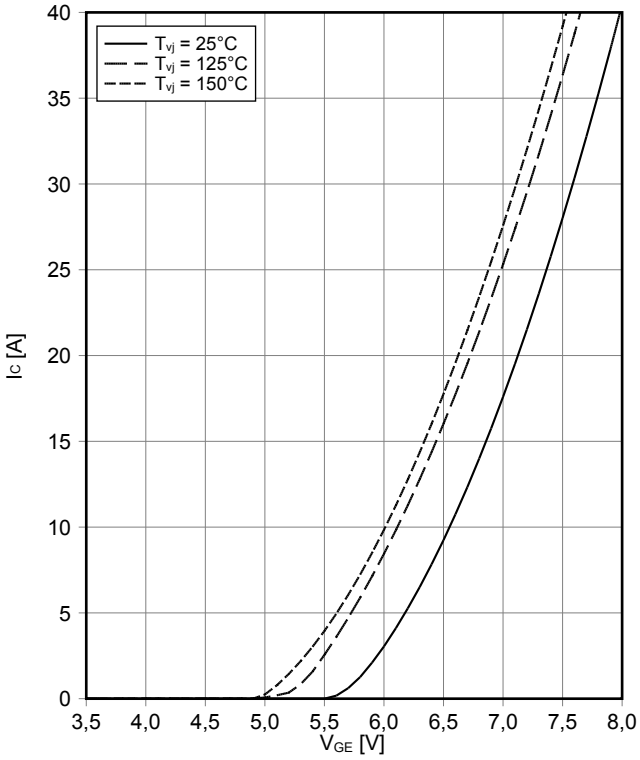
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



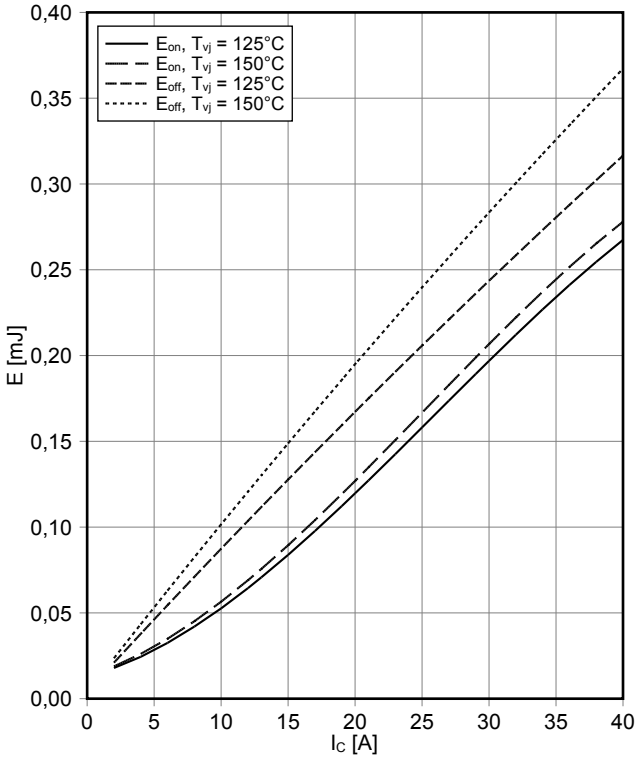
输出特性 IGBT, 逆变器 （典型)
output characteristic IGBT,Inverter (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



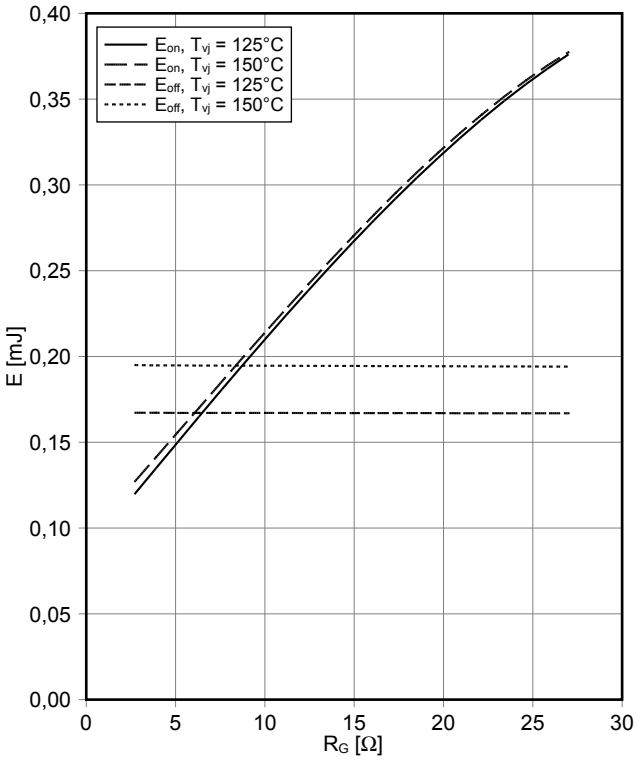
传输特性 IGBT, 逆变器 (典型)
transfer characteristic IGBT,Inverter (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V



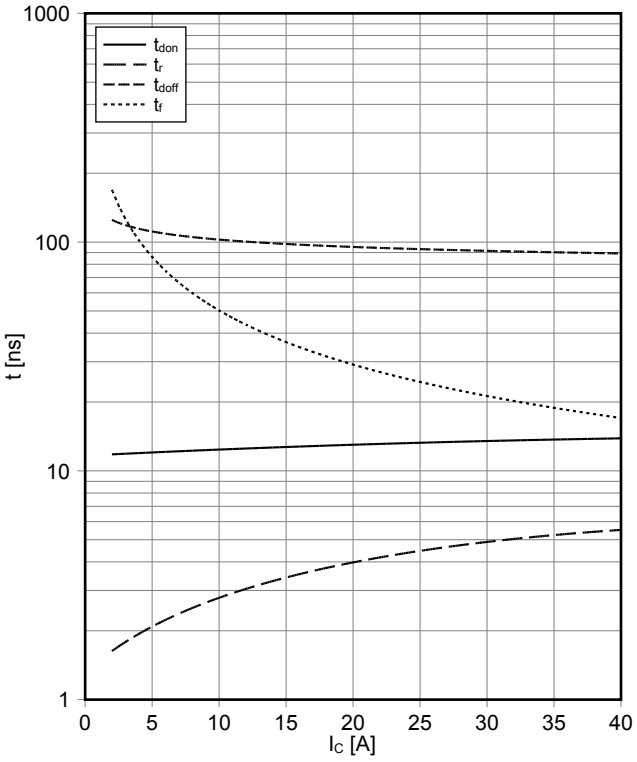
开关损耗 IGBT, 逆变器 （典型)
switching losses IGBT,Inverter (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 2.7 Ω, R_{Goff} = 2.7 Ω, V_{CE} = 400 V



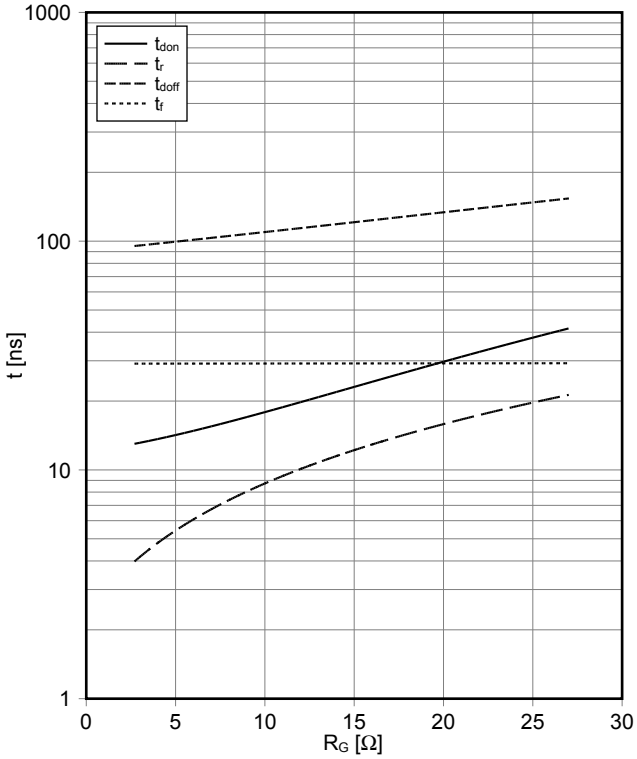
开关损耗 IGBT, 逆变器 （典型）
switching losses IGBT,Inverter (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 20 A, V_{CE} = 400 V



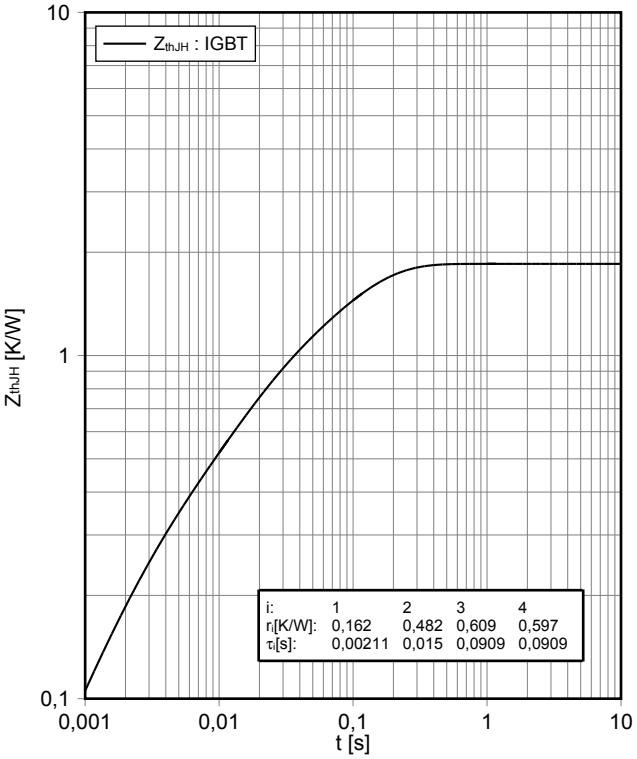
??? IGBT, 逆变器 （典型）
switching times IGBT,Inverter (typical)
$t_{don} = f(I_C)$, $t_r = f(I_C)$, $t_{doff} = f(I_C)$, $t_f = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 2.7 Ω, R_{Goff} = 2.7 Ω, V_{CE} = 400 V, T_{vj} = 150°C



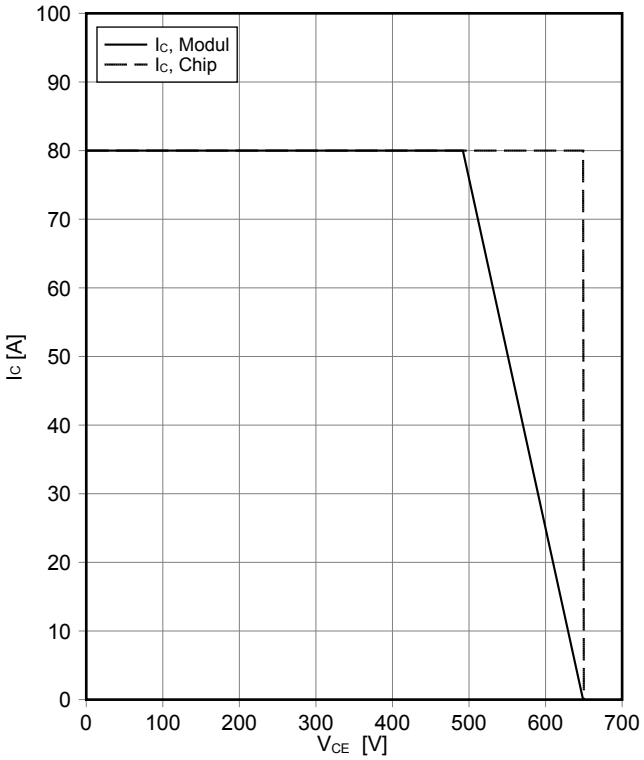
??? IGBT, 逆变器 （典型）
switching times IGBT,Inverter (typical)
$t_{don} = f(R_G)$, $t_r = f(R_G)$, $t_{doff} = f(R_G)$, $t_f = f(R_G)$
V_{GE} = ±15 V, I_C = 20 A, V_{CE} = 400 V, T_{vj} = 150°C



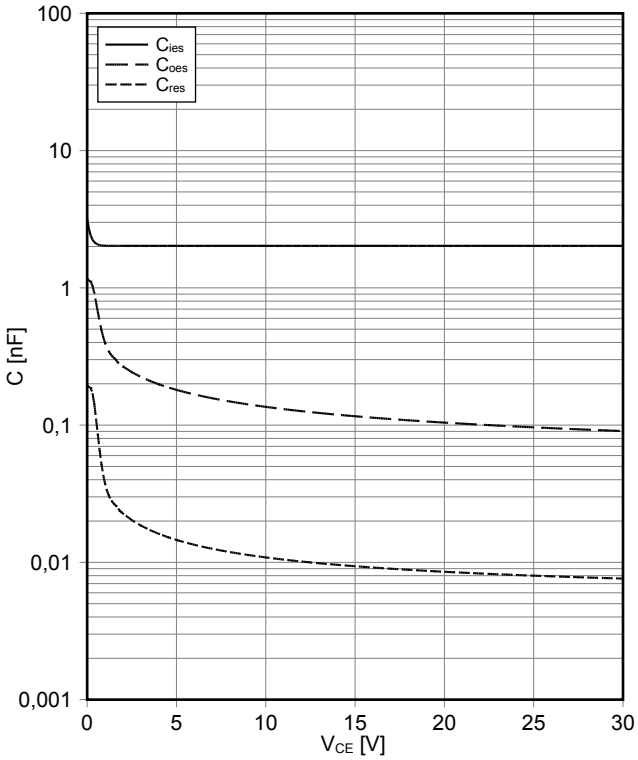
瞬态热阻抗 IGBT, 逆变器
transient thermal impedance IGBT,Inverter
$Z_{thJH} = f(t)$



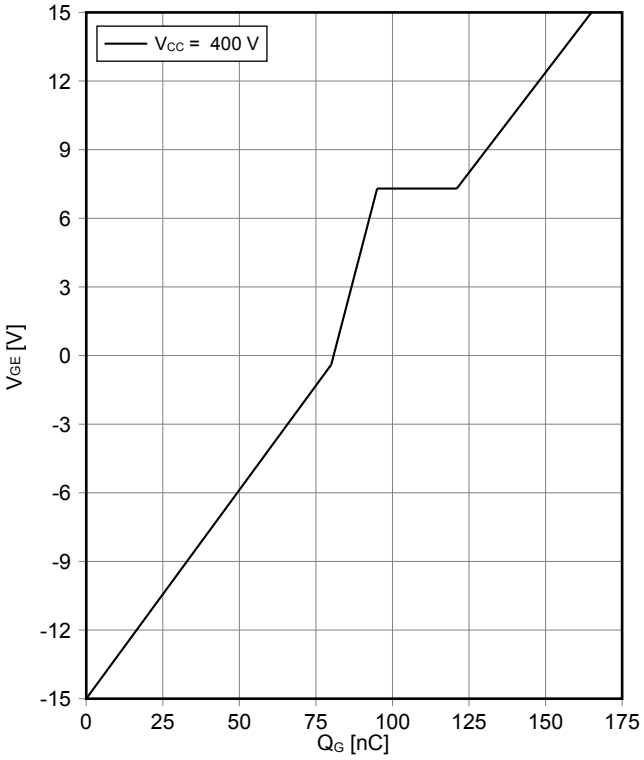
反偏安全工作区 IGBT, 逆变器 （ RBSOA ）
reverse bias safe operating area IGBT,Inverter (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 2.7 Ω, T_{vj} = 150°C



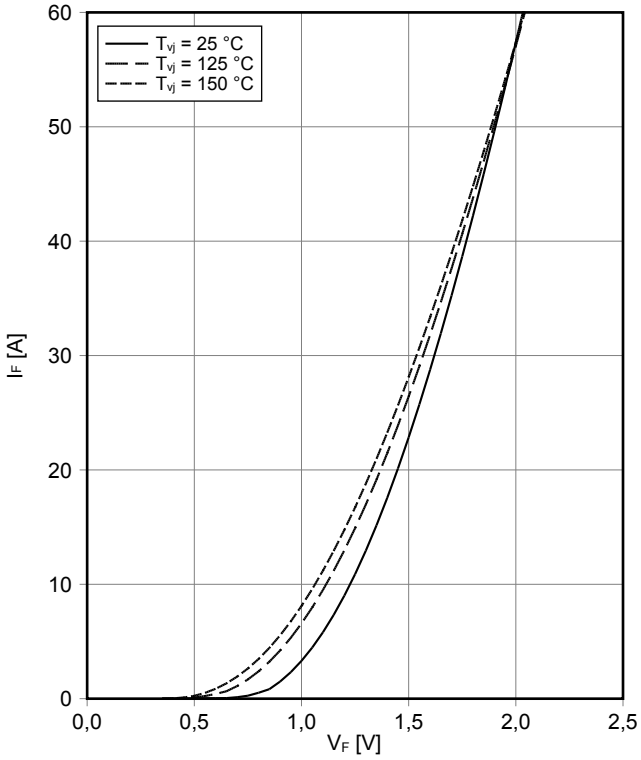
电容特性 IGBT, 逆变器 （ 典型)
capacity characteristic IGBT,Inverter (typical)
$C = f(V_{CE})$
V_{GE} = 0 V, T_{vj} = 25°C, f = 1MHz



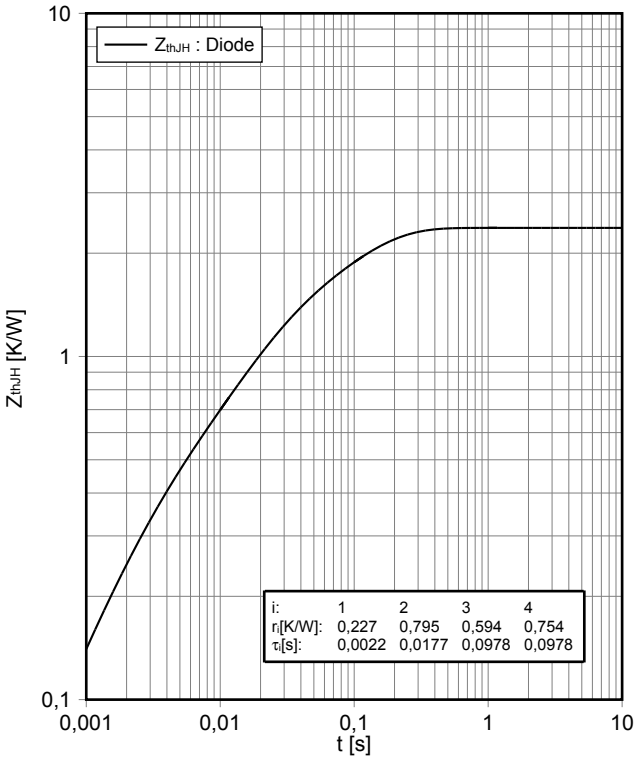
栅极电荷特性 IGBT, 逆变器 （ 典型)
gate charge characteristic IGBT,Inverter (typical)
$V_{GE} = f(Q_G)$
I_C = 20 A, T_{vj} = 25°C



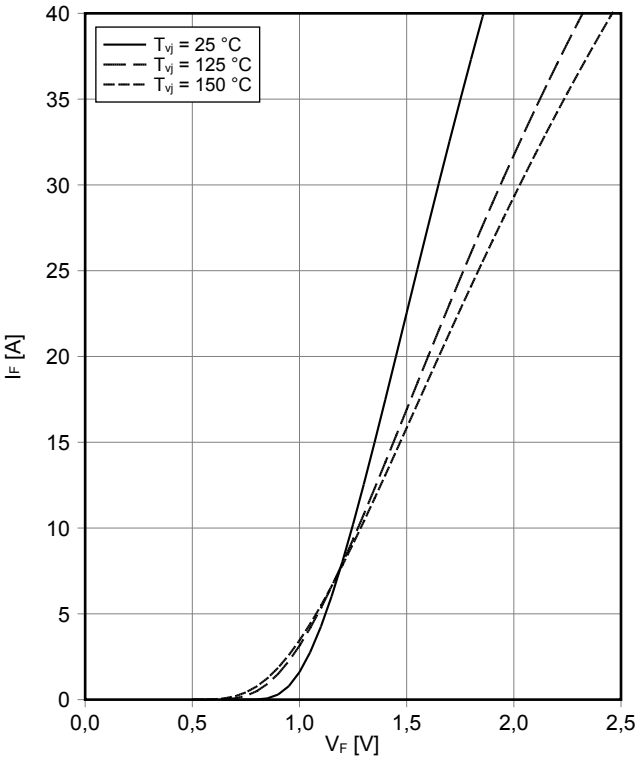
正向偏压特性 二极管,逆变器 （ 典型)
forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



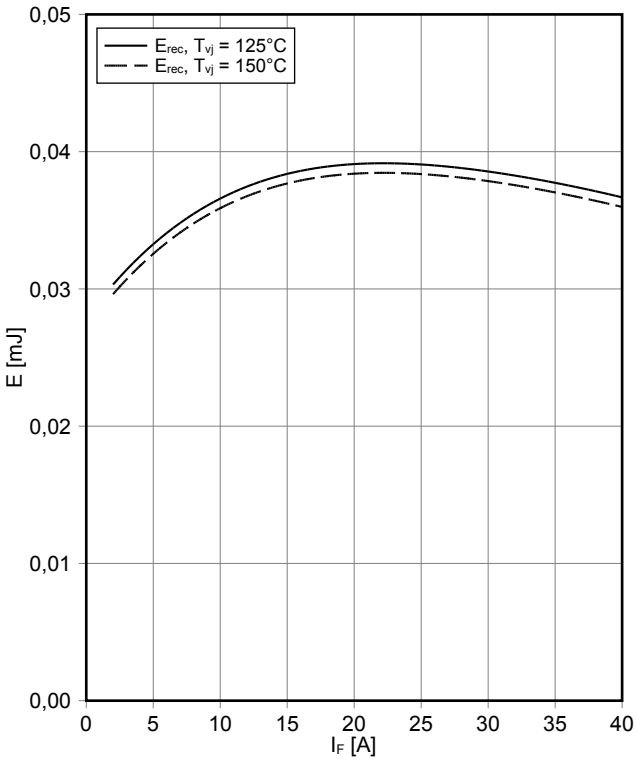
瞬态热阻抗 二极管,逆变器
transient thermal impedance Diode, Inverter
Z_{thJH}= f (t)



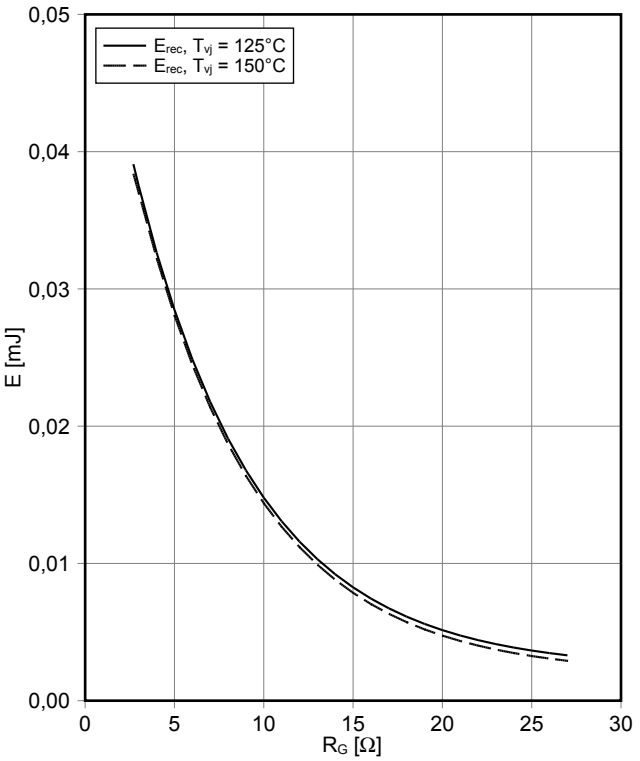
正向偏压特性 Diode, 轉換器 （典型）
forward characteristic of Diode, Boost (typical)
$I_F = f(V_F)$



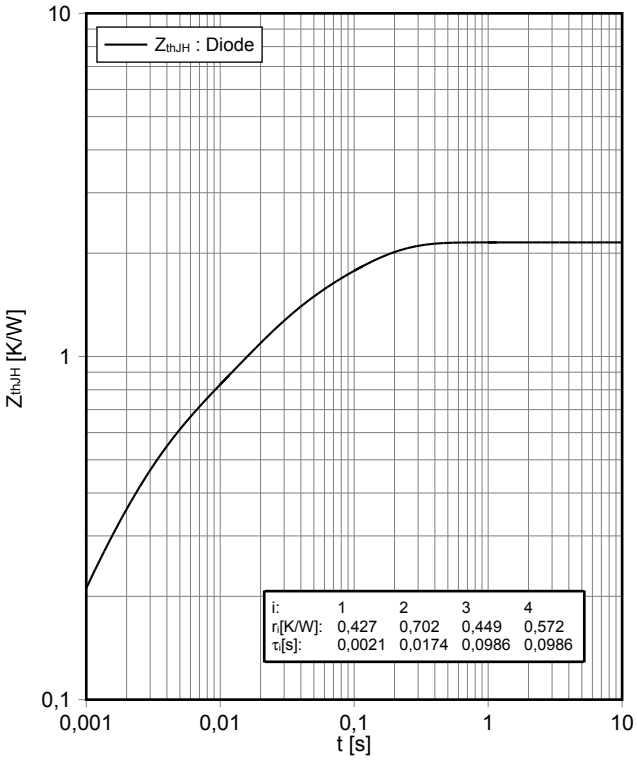
开关损耗 Diode, 轉換器 （典型）
switching losses Diode, Boost (typical)
$E_{rec} = f(I_F)$
R_{Gon} = 2.7 Ω, V_{CE} = 400 V



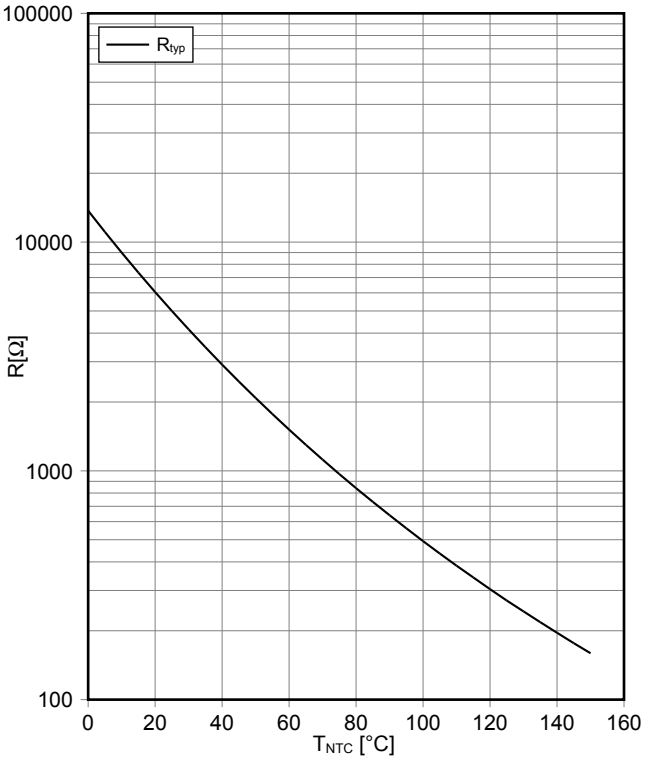
开关损耗 Diode, 轉換器 （典型）
switching losses Diode, Boost (typical)
$E_{rec} = f(R_G)$
I_F = 20 A, V_{CE} = 400 V



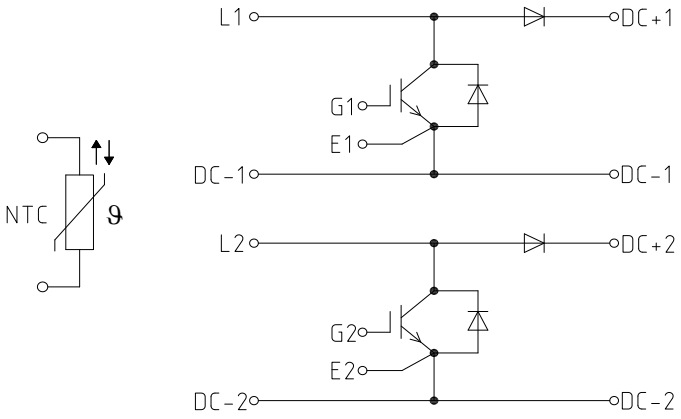
瞬态热阻抗 Diode, 轉換器
transient thermal impedance Diode, Boost
$Z_{thJH} = f(t)$



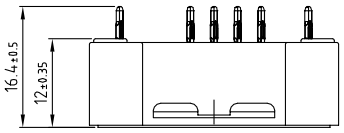
负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
$R = f(T)$

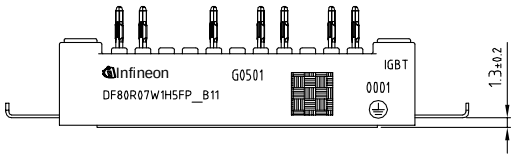


接线图 / Circuit diagram

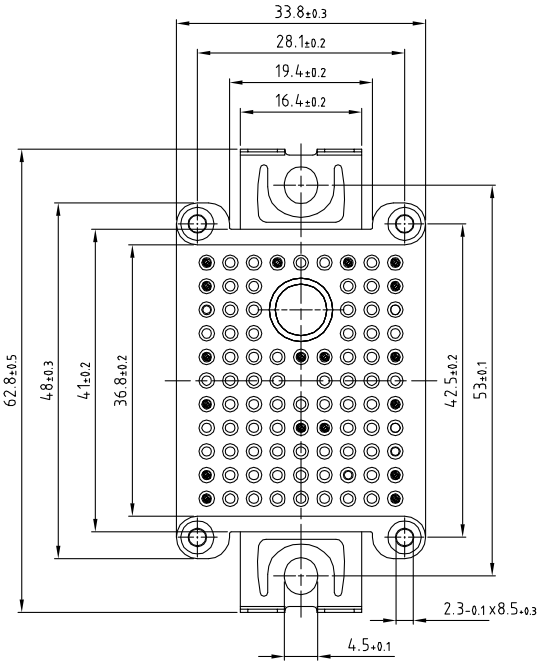


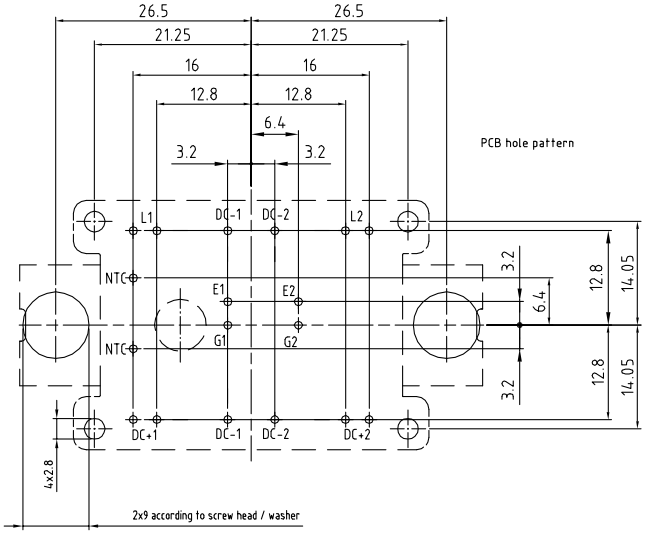
封装尺寸 / Package outlines

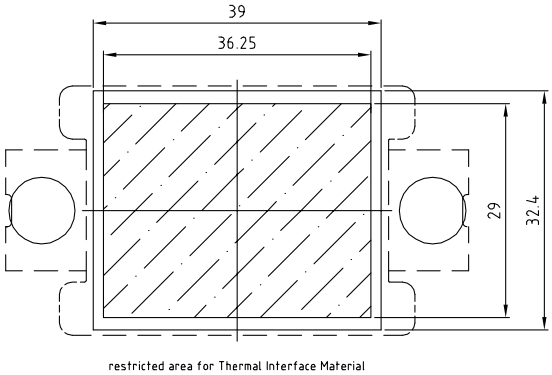




- Pin-Grid 3.2mm
- Tolerance of PCB hole pattern ⌖ ø0.1
- Hole specification for contacts see AN 2009-01:
  Diameters of drill Ø 1.15mm
  and copper thickness in hole 25-50µm







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