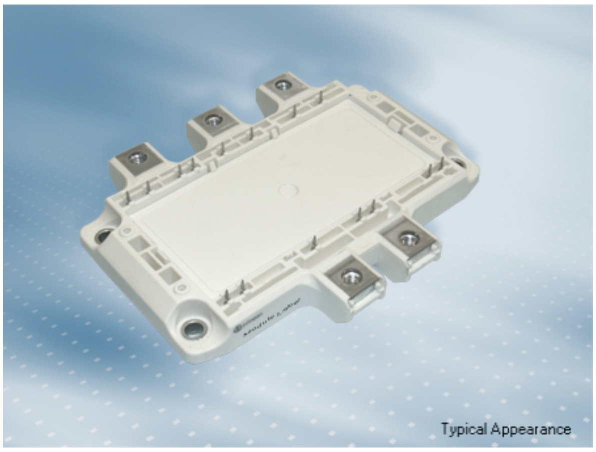
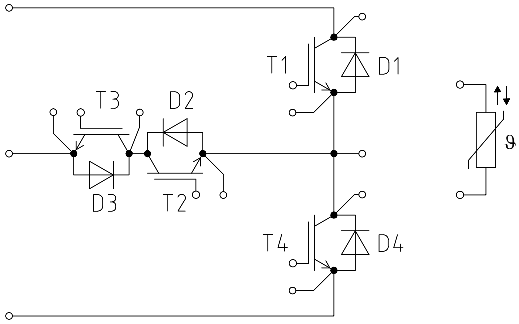
F3L400R12PT4P_B26

EconoPACK™4 模块 采用第二类中点钳位拓扑 (NPC2) 带有pressfit预涂导热材料
EconoPACK™4 module with active "Neutral Point Clamp 2" topology and PressFIT / pre-applied Thermal Interface Material

初步数据 / Preliminary Data





V_{CES} = 1200V
$I_{C\ nom}$ = 400A / I_{CRM} = 800A

典型应用
• 太阳能应用
• UPS系统

Typical Applications
• Solar applications
• UPS systems

电气特性
• 提高工作结温 $T_{vj\ op}$
• 低开关损耗
• 低 V_{CEsat}
• $T_{vj\ op}$ = 150°C
• 沟槽栅IGBT4
• V_{CEsat} 带正温度系数

Electrical Features
• Extended operating temperature $T_{vj\ op}$
• Low switching losses
• Low V_{CEsat}
• $T_{vj\ op}$ = 150°C
• Trench IGBT 4
• V_{CEsat} with positive temperature coefficient

机械特性
• 绝缘的基板
• 紧凑型设计
• PressFIT 压接技术
• 标准封装
• 预涂导热介质

Mechanical Features
• Isolated base plate
• Compact design
• PressFIT contact technology
• Standard housing
• 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

初步数据
Preliminary Data

IGBT, T1 / T4 / IGBT, T1 / T4

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}	1200	V
连续集电极直流电流 Continuous DC collector current	T_H = 65°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$	400	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	800	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 = 400 A, V_{GE} = 15 V I_C = 400 A, V_{GE} = 15 V I_C = 400 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,75 2,05 2,10	2,15	V V V
栅极阈值电压 Gate threshold voltage	I_C = 15,0 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,20	5,80	6,40	V
栅极电荷 Gate charge	V_{GE} = -15 V ... +15 V		Q_G		3,30		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,8		Ω
输入电容 Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		25,0		nF
反向传输电容 Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		1,35		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1,0	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 = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,20 0,22 0,23		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,11 0,12 0,12		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,40 0,48 0,50		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 400 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,07 0,10 0,11		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 400 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, di/dt = 2650 A/µs (T_{vj} = 150°C) R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		8,75 13,0 13,5		mJ mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 400 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, du/dt = 2300 V/µs (T_{vj} = 150°C) R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		18,0 26,0 28,5		mJ mJ mJ
短路数据 SC data	V_{GE} ≤ 15 V, V_{CC} = 800 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 25°C t_P ≤ 10 µs, T_{vj} = 150°C	I_{SC}		2200 1900		A 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}			0,105	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

初步数据
Preliminary Data

二极管, D2 / D3 / Diode, D2 / D3

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	400	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	800	A
I2t-值 I^2t - 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	I^2t	6700 6150	A^2s A^2s

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,55 1,50 1,45	1,95	V V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 400 A, - di_F/dt = 2650 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		145 205 215		A A A
恢复电荷 Recovered charge	I_F = 400 A, - di_F/dt = 2650 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		13,5 26,0 28,5		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 400 A, - di_F/dt = 2650 A/µs (T_{vj}=150°C) V_R = 300 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		3,40 6,35 7,15		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}			0,308	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-40		150	°C

IGBT, T2 / T3 / IGBT, T2 / T3

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
连续集电极直流电流 Continuous DC collector current	T_H = 25°C, $T_{vj\,max}$ = 175°C	$I_{C\,nom}$	280	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	560	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 = 280 A, V_{GE} = 15 V I_C = 280 A, V_{GE} = 15 V I_C = 280 A, V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$V_{CE\,sat}$		1,50 1,65 1,70	1,75	V V V
栅极阈值电压 Gate threshold voltage	I_C = 4,80 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	4,90	5,80	6,50	V
栅极电荷 Gate charge	V_{GE} = -15 V ... +15 V		Q_G		3,20		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,0		Ω
输入电容 Input capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		18,5		nF
反向传输电容 Reverse transfer capacitance	f = 1 MHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{res}		0,57		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}			1,0	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 = 280 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,on}$		0,08 0,08 0,09		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 280 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_r		0,07 0,075 0,075		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 280 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	$t_{d\,off}$		0,064 0,14 0,145		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 280 A, V_{CE} = 300 V V_{GE} = ±15 V R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	t_f		0,085 0,115 0,12		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 280 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, di/dt = 3300 A/µs (T_{vj} = 150°C) R_{Gon} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{on}		3,40 4,90 5,85		mJ mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 280 A, V_{CE} = 300 V, L_S = 35 nH V_{GE} = ±15 V, du/dt = 4000 V/µs (T_{vj} = 150°C) R_{Goff} = 1,5 Ω	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{off}		13,5 16,5 17,5		mJ mJ mJ
短路数据 SC data	V_{GE} ≤ 15 V, V_{CC} = 360 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	t_P ≤ 10 µs, T_{vj} = 25°C t_P ≤ 10 µs, T_{vj} = 150°C	I_{SC}		1800 1400		A 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}			0,250	K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

初步数据
Preliminary Data

二极管, D1 / D4 / Diode, D1 / D4

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}	1200	V
连续正向直流电流 Continuous DC forward current		I_F	400	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	800	A
I2t-值 I^2t - 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	I^2t	15500 11500	A^2s A^2s

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V I_F = 400 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	V_F		1,80 1,85 1,90	2,30	V V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 400 A, - di_F/dt = 3300 A/µs (T_{vj}=150°C) V_R = 300 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	I_{RM}		255 310 325		A A A
恢复电荷 Recovered charge	I_F = 400 A, - di_F/dt = 3300 A/µs (T_{vj}=150°C) V_R = 300 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	Q_r		29,0 56,0 65,0		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 400 A, - di_F/dt = 3300 A/µs (T_{vj}=150°C) V_R = 300 V	T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C	E_{rec}		8,70 16,5 19,0		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}			0,243	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.

初步数据
Preliminary Data

模块 / Module

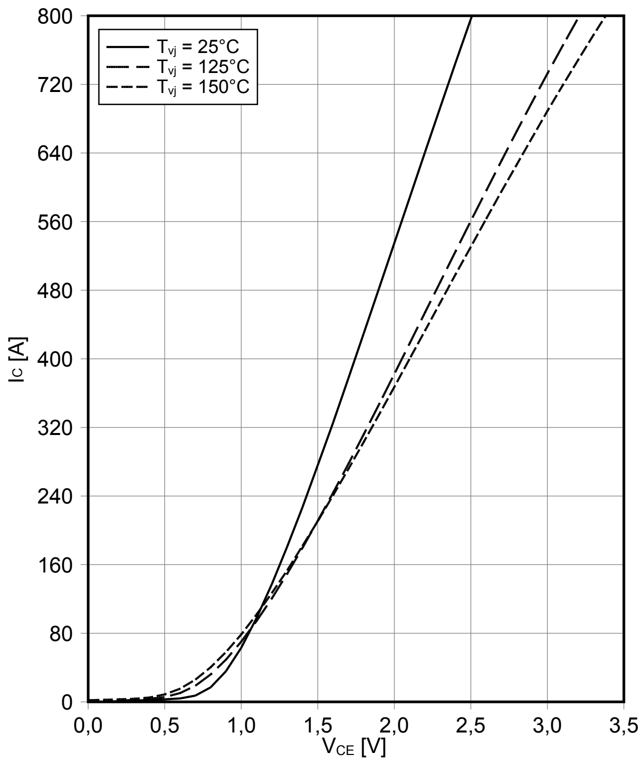
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}	2,5			kV
模块基板材料 Material of module baseplate			Cu			
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)		Al_2O_3			
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		25,0 12,5			mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal		11,0 7,0			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}		38		nH
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	T_H = 25°C, 每个开关 / per switch	$R_{CC'+EE'}$		0,75		mΩ
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
模块安装的安装扭距 Mounting torque for modul mounting	螺丝 M5 根据相应的应用手册进行安装 Screw M5 - Mounting according to valid application note	M	3,00		6,00	Nm
端子联接扭距 Terminal connection torque	螺丝 M6 根据相应的应用手册进行安装 Screw M6 - Mounting according to valid application note	M	3,0	-	6,0	Nm
重量 Weight		G		400		g

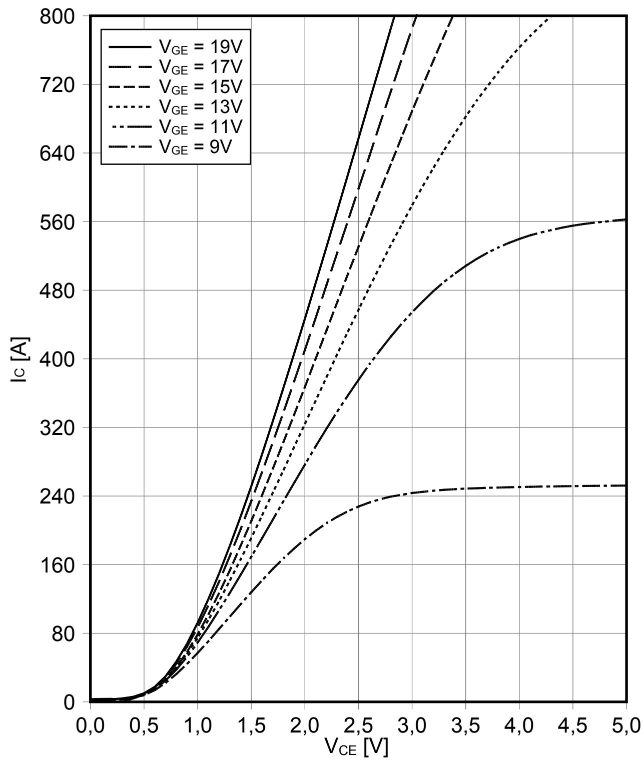
Lagerung und Transport von Modulen mit TIM => siehe AN2012-07
Storage and shipment of modules with TIM => see AN2012-07

初步数据
Preliminary Data

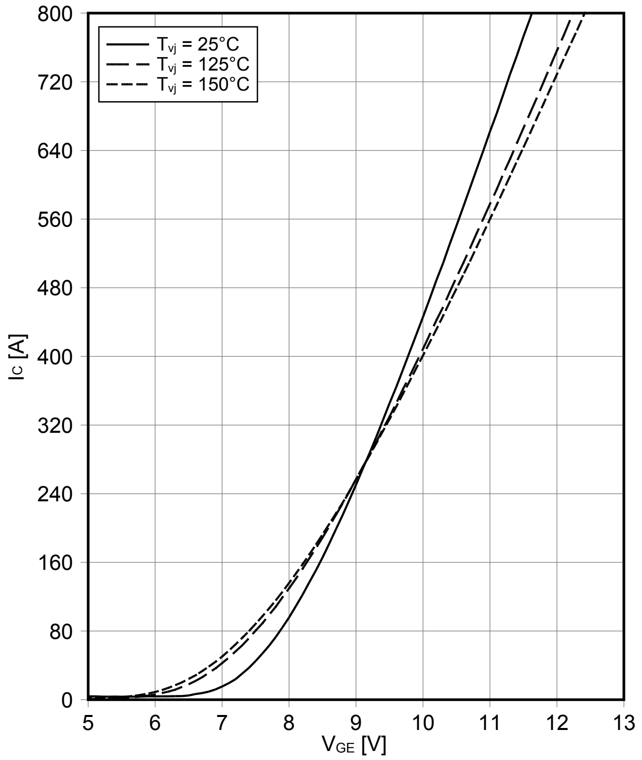
输出特性 IGBT, T1 / T4 （典型)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



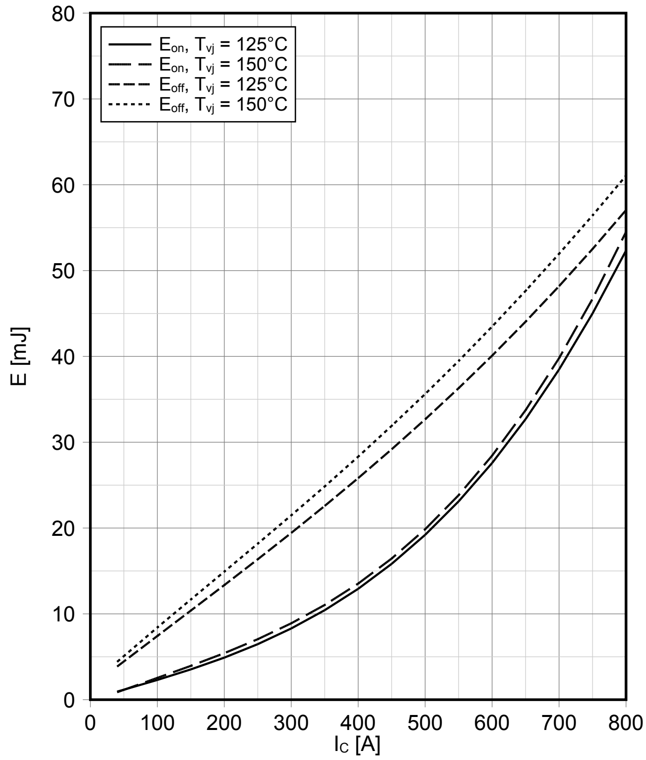
输出特性 IGBT, T1 / T4 （典型)
output characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150$°C



传输特性 IGBT, T1 / T4 (典型)
transfer characteristic IGBT, T1 / T4 (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V

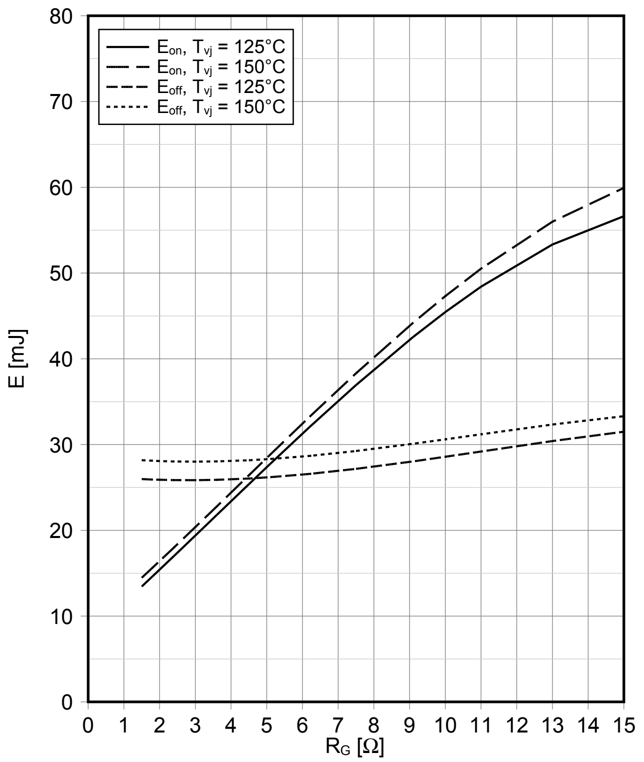


开关损耗 IGBT, T1 / T4 （典型)
switching losses IGBT, T1 / T4 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm15$ V, $R_{Gon} = 1.5\ \Omega$, $R_{Goff} = 1.5\ \Omega$, $V_{CE} = 300$ V

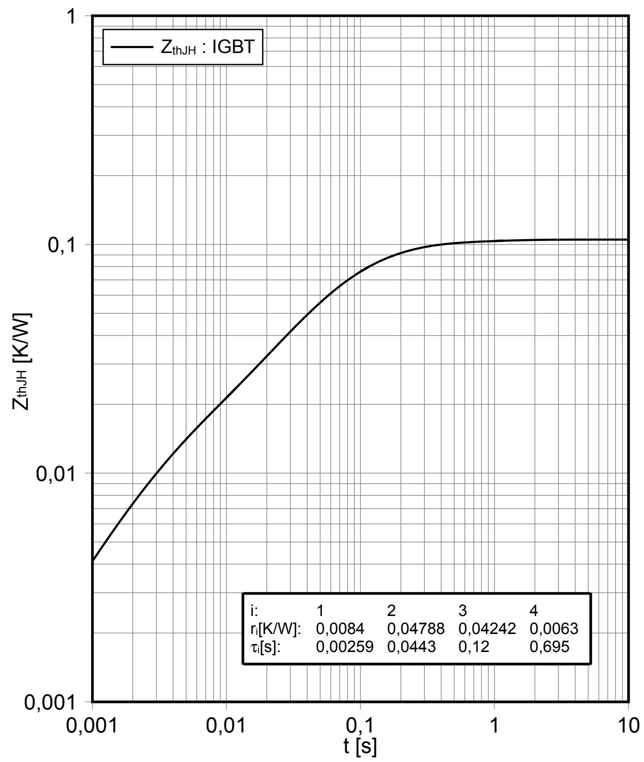


初步数据
Preliminary Data

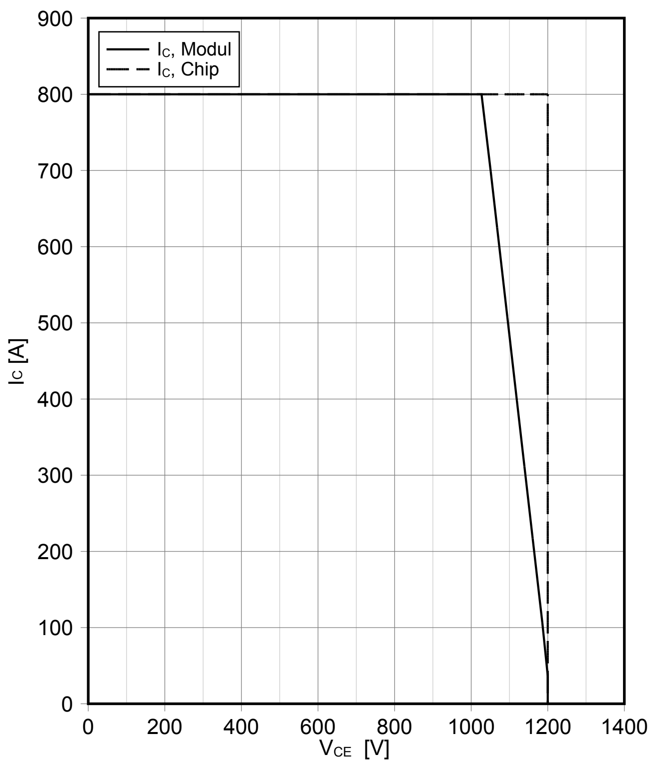
开关损耗 IGBT, T1 / T4 （典型)
switching losses IGBT, T1 / T4 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 400$ A, $V_{CE} = 300$ V



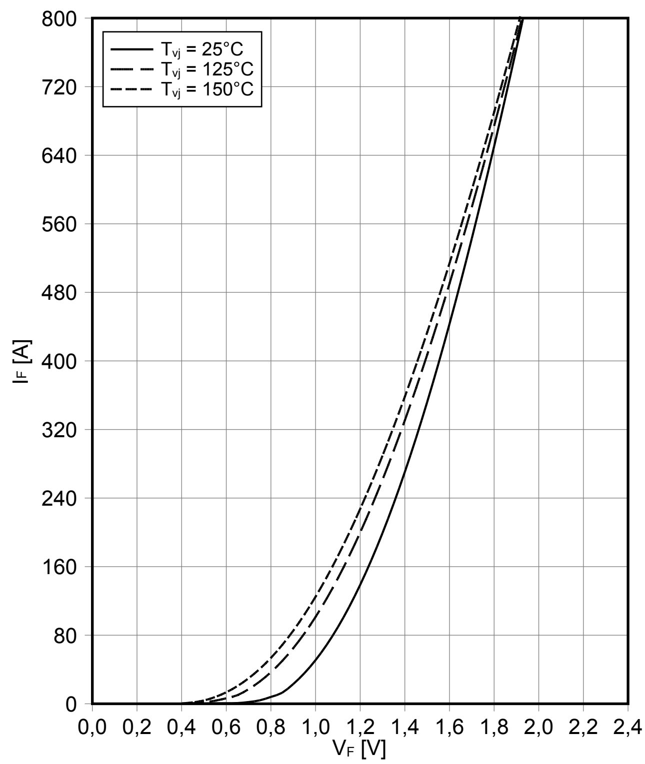
瞬态热阻抗 IGBT, T1 / T4
transient thermal impedance IGBT, T1 / T4
$Z_{thJH} = f(t)$



反偏安全工作区 IGBT, T1 / T4 （RBSOA）
reverse bias safe operating area IGBT, T1 / T4 (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm 15$ V, $R_{Goff} = 1.5\ \Omega$, $T_{vj} = 150$°C

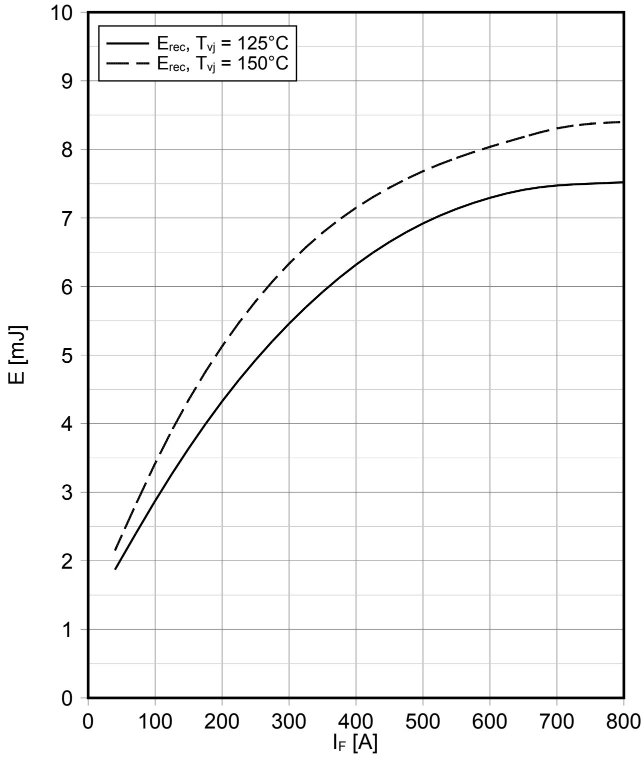


正向偏压特性 二极管, D2 / D3 （典型)
forward characteristic of Diode, D2 / D3 (typical)
$I_F = f(V_F)$

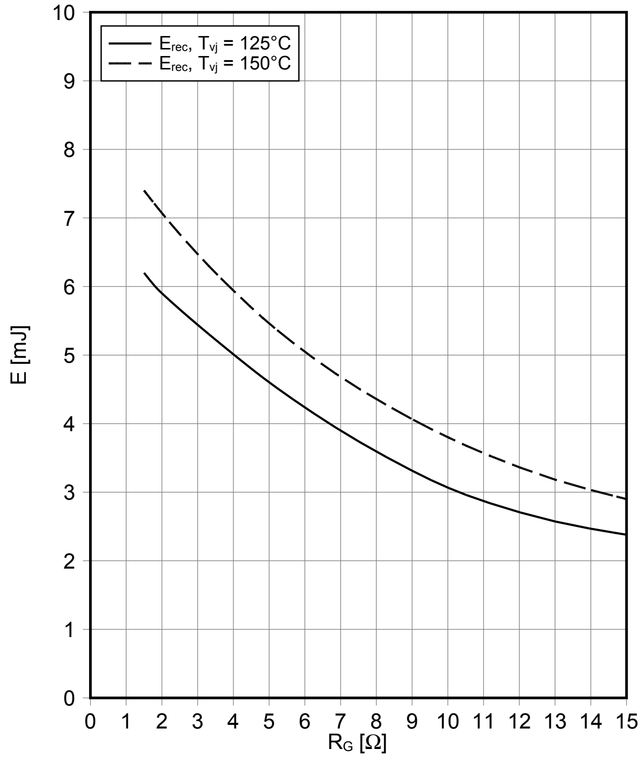


初步数据
Preliminary Data

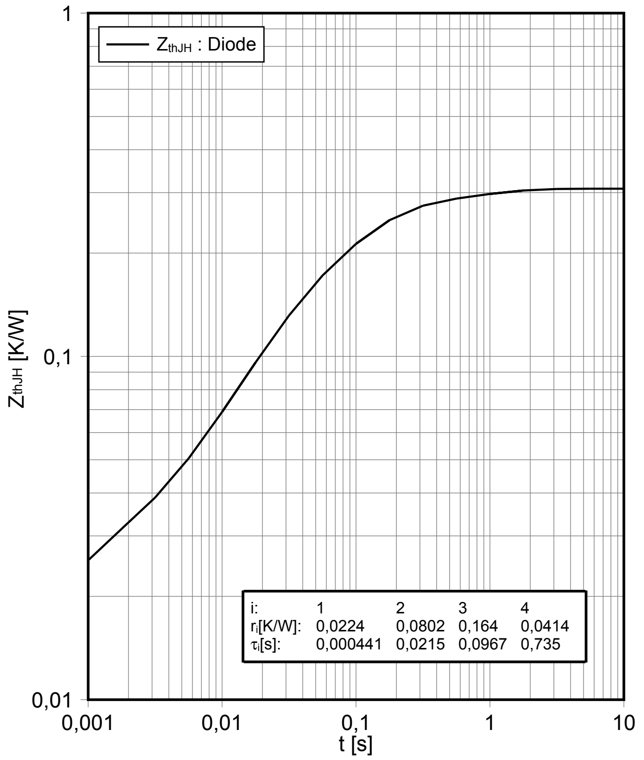
开关损耗 二极管, D2 / D3 （典型)
switching losses Diode, D2 / D3 (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 1.5\ \Omega$, $V_{CE} = 300$ V



开关损耗 二极管, D2 / D3 （典型)
switching losses Diode, D2 / D3 (typical)
$E_{rec} = f(R_G)$
$I_F = 400$ A, $V_{CE} = 300$ V

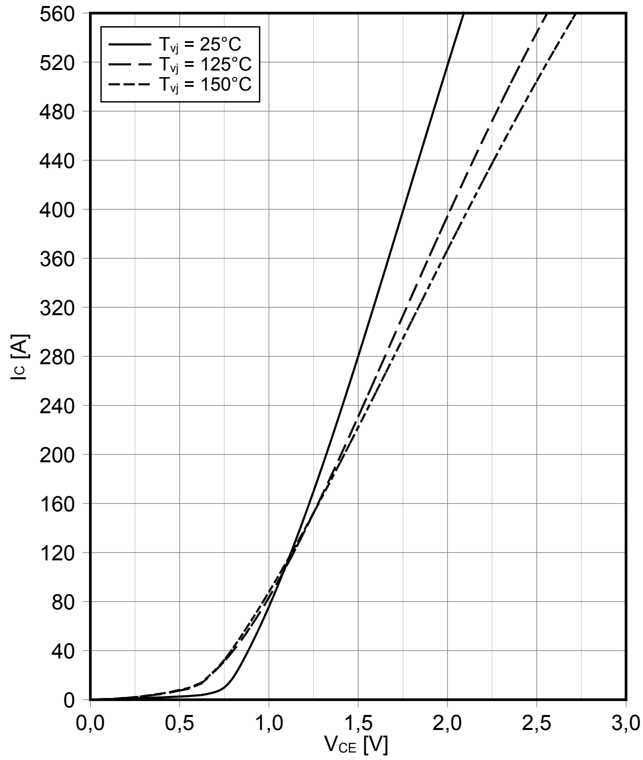


瞬态热阻抗 二极管, D2 / D3
transient thermal impedance Diode, D2 / D3
$Z_{thJH} = f(t)$



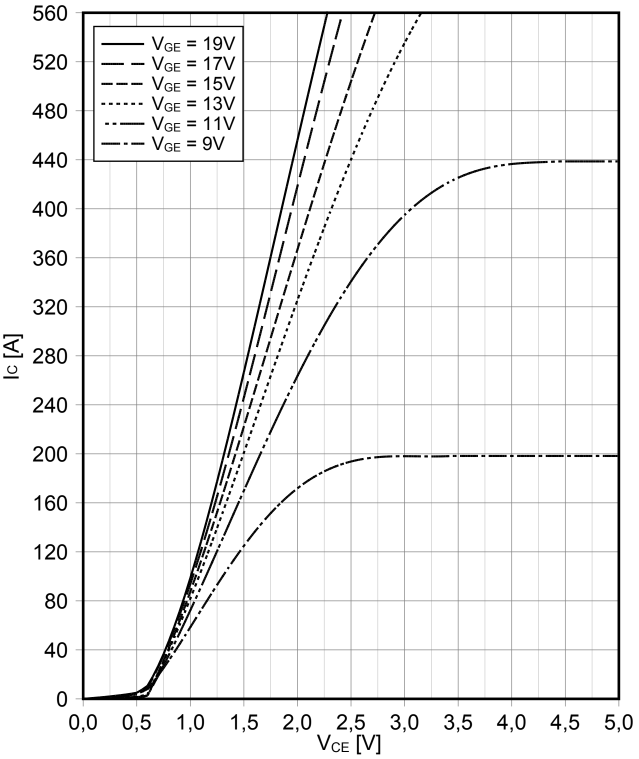
i:	1	2	3	4
r_i[K/W]:	0,0224	0,0802	0,164	0,0414
τ_i[s]:	0,000441	0,0215	0,0967	0,735

输出特性 IGBT, T2 / T3 （典型)
output characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V

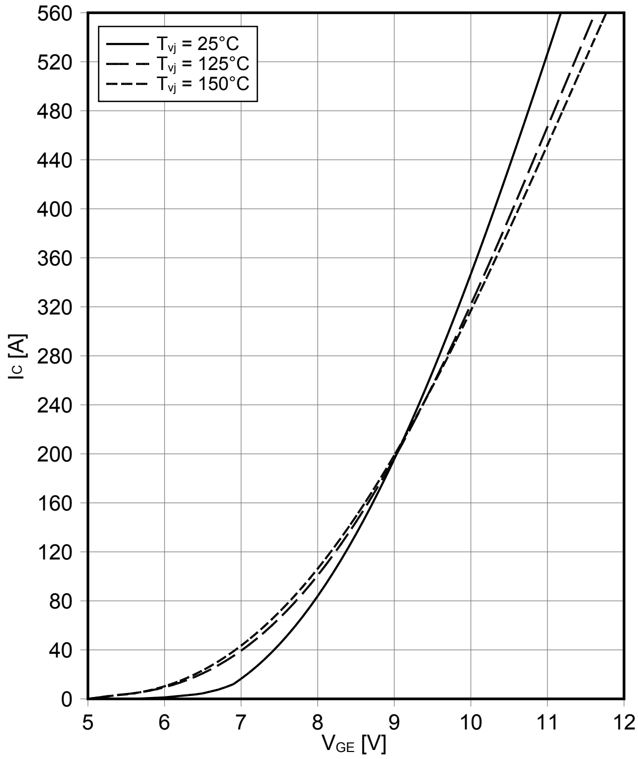


初步数据
Preliminary Data

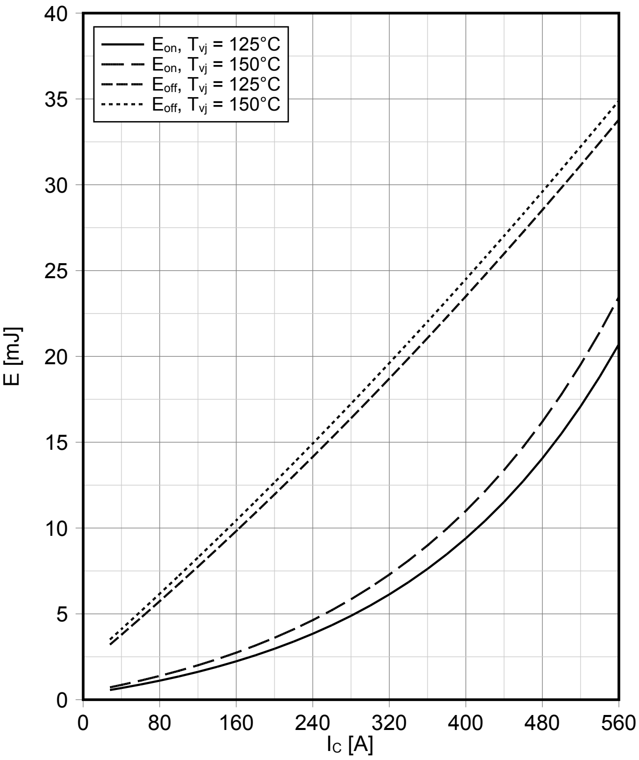
输出特性 IGBT, T2 / T3 （典型)
output characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$



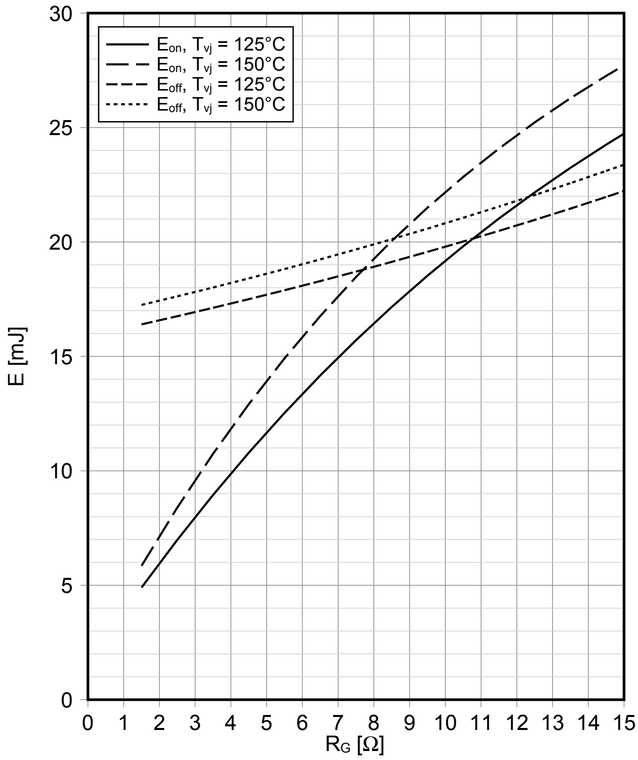
传输特性 IGBT, T2 / T3 (典型)
transfer characteristic IGBT, T2 / T3 (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



开关损耗 IGBT, T2 / T3 （典型)
switching losses IGBT, T2 / T3 (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm 15$ V, $R_{Gon} = 1.5\ \Omega$, $R_{Goff} = 1.5\ \Omega$, $V_{CE} = 300$ V

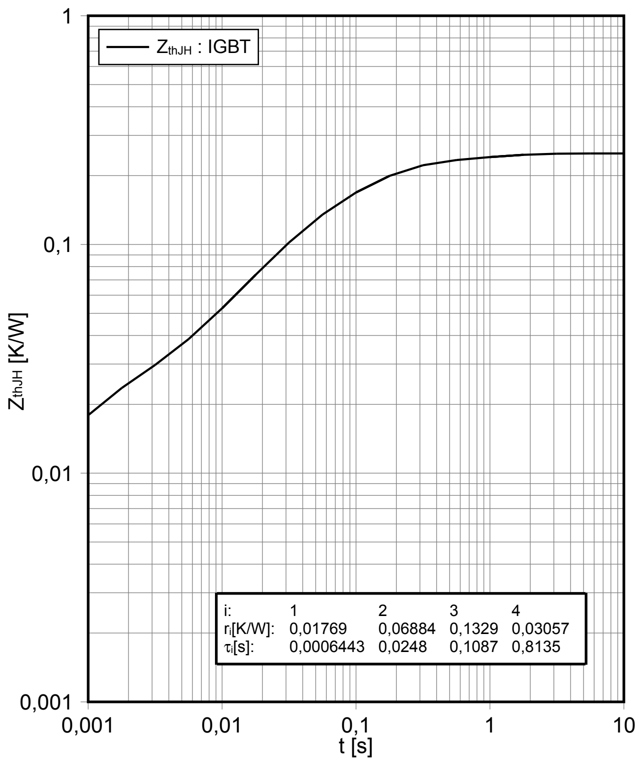


开关损耗 IGBT, T2 / T3 （典型)
switching losses IGBT, T2 / T3 (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm 15$ V, $I_C = 280$ A, $V_{CE} = 300$ V

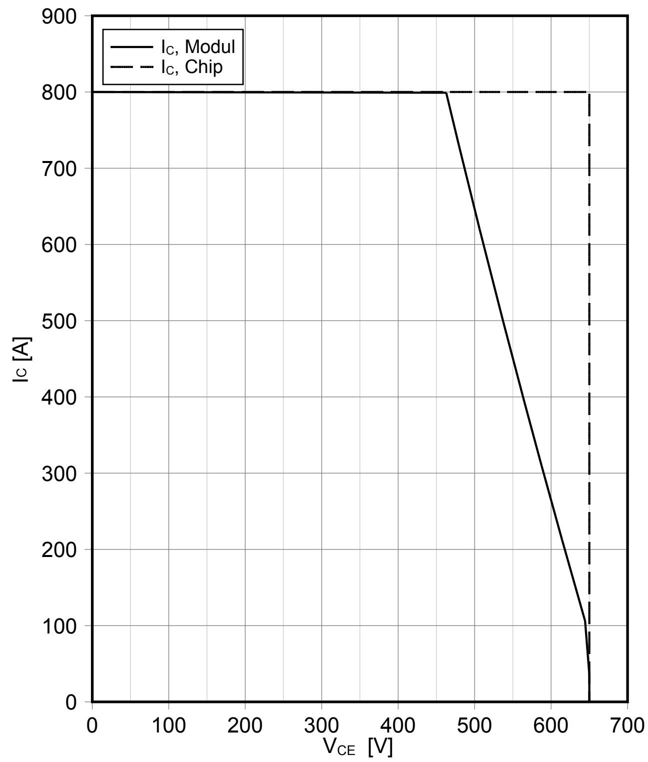


初步数据
Preliminary Data

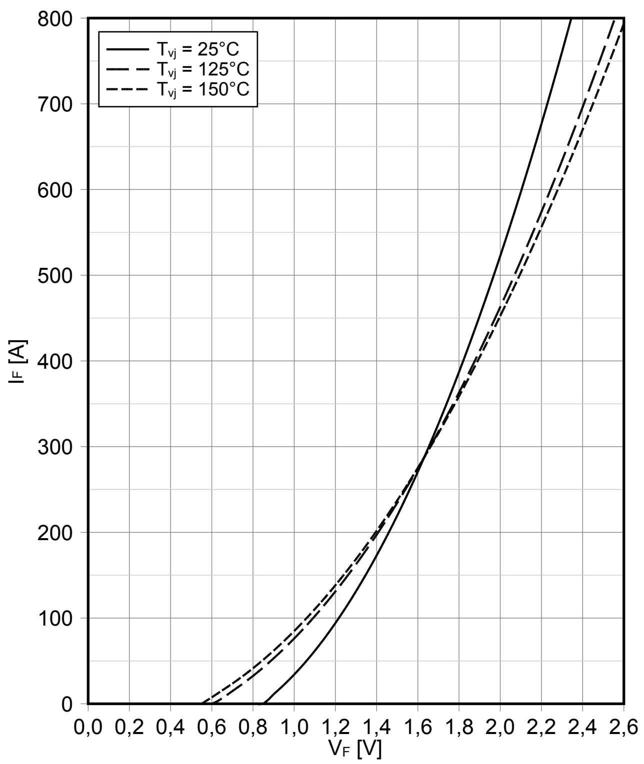
瞬态热阻抗 IGBT, T2 / T3
transient thermal impedance IGBT, T2 / T3
$Z_{thJH} = f(t)$



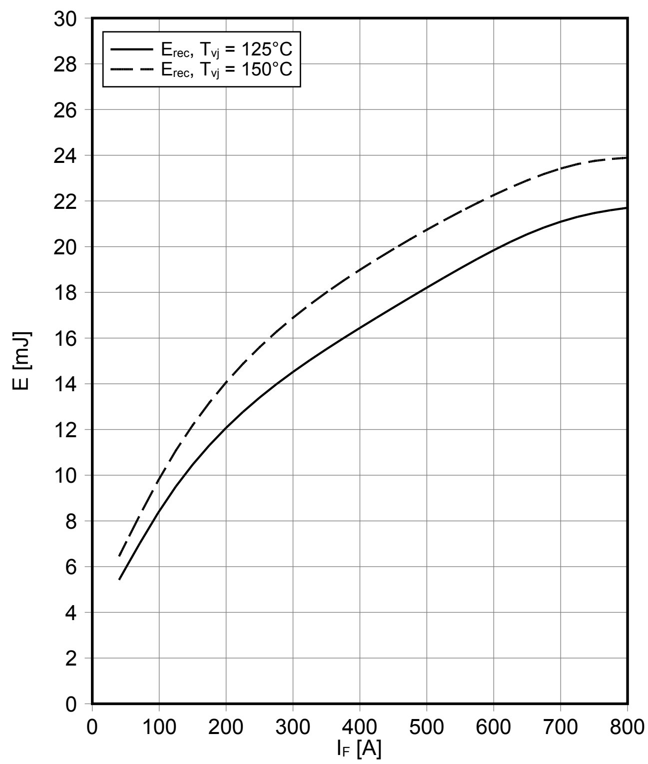
反偏安全工作区 IGBT, T2 / T3 （RBSOA）
reverse bias safe operating area IGBT, T2 / T3 (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm15$ V, $R_{Goff} = 1.5\ \Omega$, $T_{vj} = 150°C$



正向偏压特性 二极管, D1 / D4 （典型）
forward characteristic of Diode, D1 / D4 (typical)
$I_F = f(V_F)$

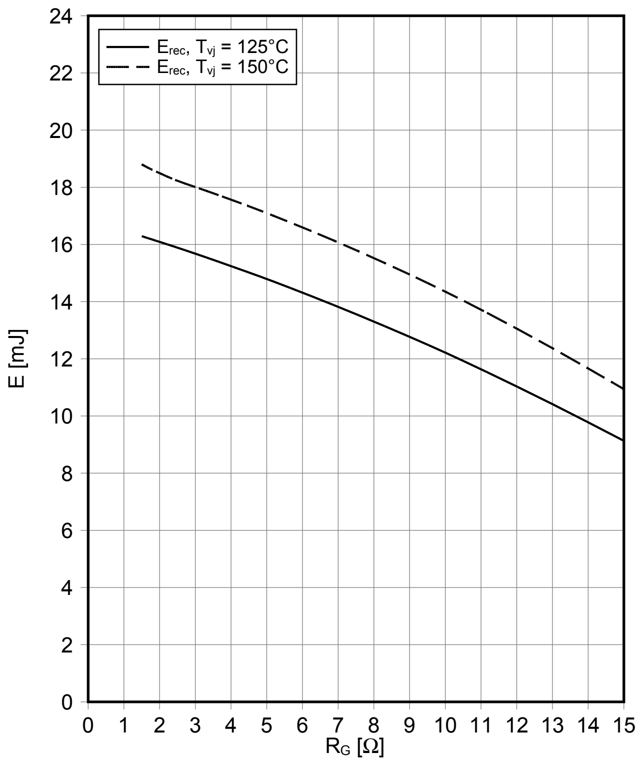


开关损耗 二极管, D1 / D4 （典型）
switching losses Diode, D1 / D4 (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 1.5\ \Omega$, $V_{CE} = 300$ V

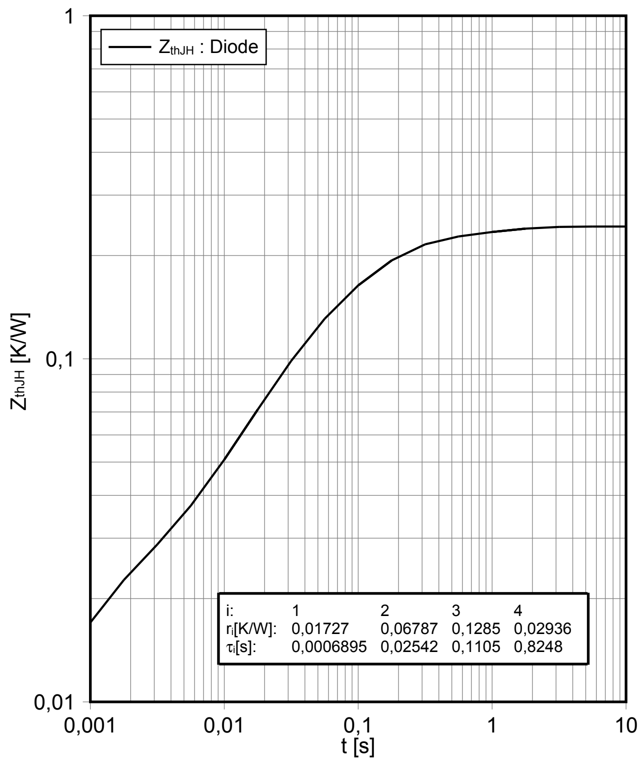


初步数据
Preliminary Data

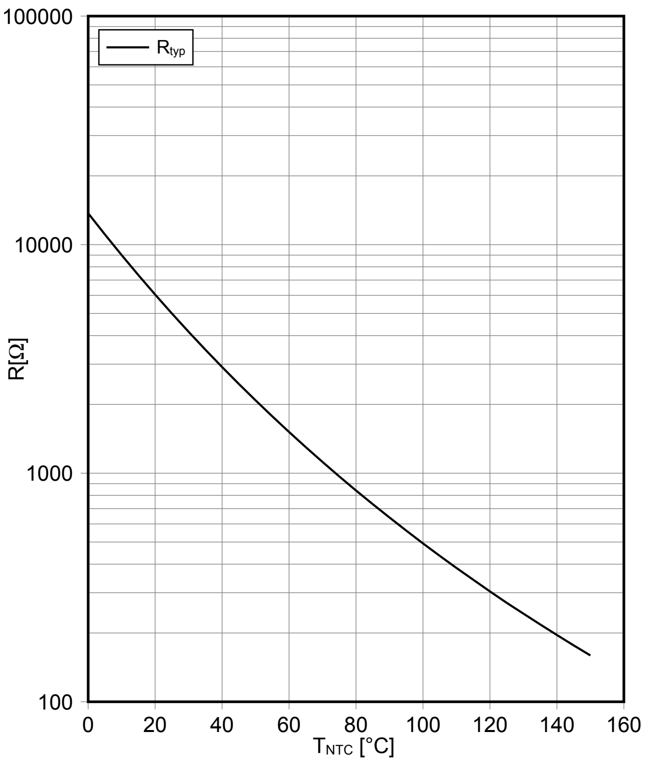
开关损耗 二极管, D1 / D4 （典型)
switching losses Diode, D1 / D4 (typical)
$E_{rec} = f(R_G)$
$I_F = 400$ A, $V_{CE} = 300$ V



瞬态热阻抗 二极管, D1 / D4
transient thermal impedance Diode, D1 / D4
$Z_{thJH} = f(t)$

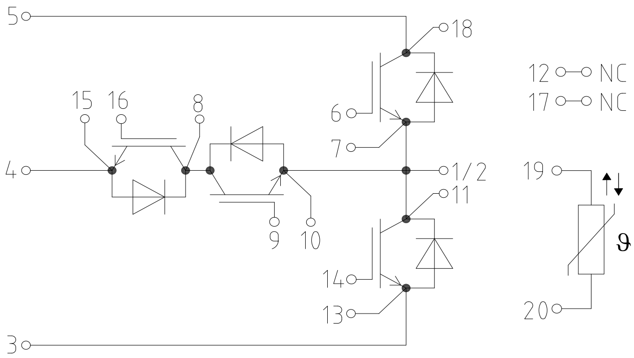


负温度系数热敏电阻 温度特性
NTC-Thermistor-temperature characteristic (typical)
R = f (T)

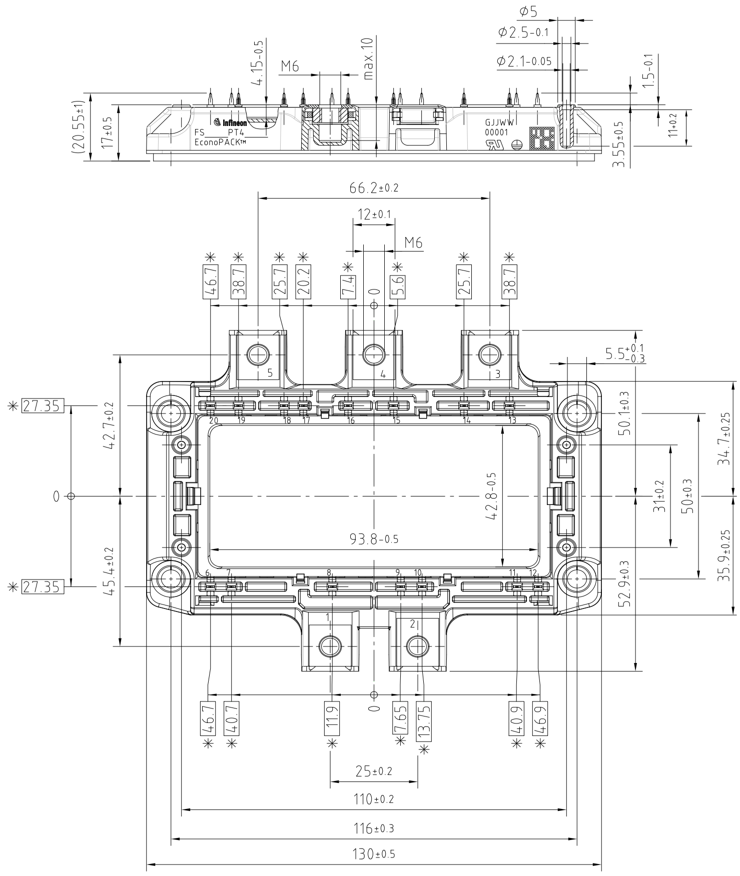


初步数据
Preliminary Data

接线图 / Circuit diagram

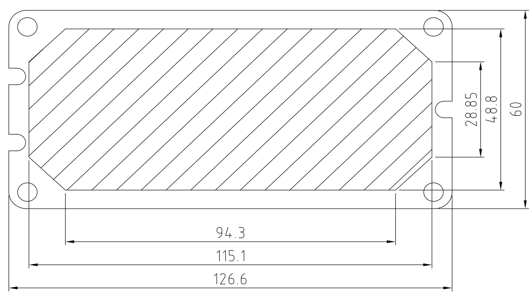


封装尺寸 / Package outlines



✳ = alle Maße mit einer Toleranz von
✳ = all dimensions with tolerance of ⊕ Ø0.4

Maße im aufgeschraubtem Zustand gemessen
dimensions valid in mounted condition



restricted area for Thermal Interface Material

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