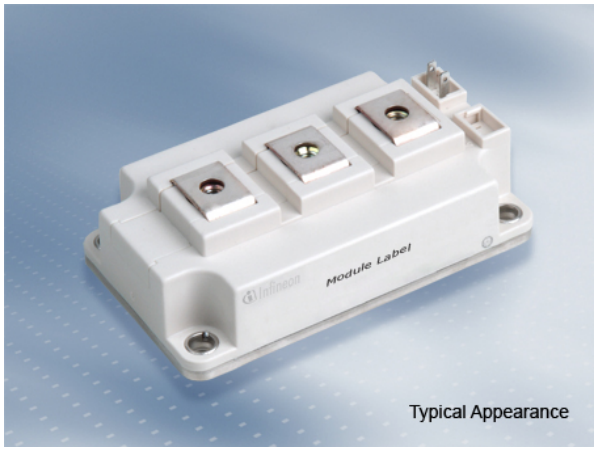
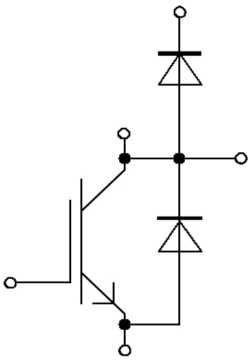
62mm C-Series 模块 采用第三代沟槽栅/场终止IGBT3和第三代发射极控制二极管
62mm C-Series module with Trench/Fieldstop IGBT3 and Emitter Controlled 3 diode

初步数据 / Preliminary Data





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

潜在应用
- 三电平应用
- 斩波应用

Potential Applications
- 3-level-applications
- Chopper applications

电气特性
- $T_{vj\ op}$ = 150°C
- 无与伦比的坚固性
- 沟槽栅IGBT3

Electrical Features
- $T_{vj\ op}$ = 150°C
- Unbeatable robustness
- Trench IGBT 3

机械特性
- 2.5 kV 交流 1分钟 绝缘
- 封装的 CTI > 400
- 标准封装
- 绝缘的基板

Mechanical Features
- 2.5 kV AC 1min insulation
- Package with CTI > 400
- Standard housing
- Isolated base plate

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, 制动-斩波器 / IGBT, Brake-Chopper

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}	600	V
连续集电极直流电流 Continuous DC collector current	T_C = 70°C, $T_{vj\,max}$ = 175°C	I_{CDC}	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 = 300 A, V_{GE} = 15 V	$V_{CE\,sat}$		1,45 1,60 1,70	1,90	V V V
		T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C				
栅极阈值电压 Gate threshold voltage	I_C = 12,0 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 / 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 = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V	C_{ies}		19,0		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}		0,57		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 600 V, V_{GE} = 0 V, T_{vj} = 25°C	I_{CES}			5,0	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}			400	nA
开通延迟时间(电感负载) Turn-on delay time, inductive load	I_C = 300 A, V_{CE} = 300 V V_{GE} = -15 / 15 V R_{Gon} = 2,4 Ω	$t_{d\,on}$ T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C		0,11 0,12 0,13		µs µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 300 A, V_{CE} = 300 V V_{GE} = -15 / 15 V R_{Gon} = 2,4 Ω	t_r T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C		0,05 0,06 0,06		µs µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 300 A, V_{CE} = 300 V V_{GE} = -15 / 15 V R_{Goff} = 2,4 Ω	$t_{d\,off}$ T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C		0,49 0,52 0,53		µs µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 300 A, V_{CE} = 300 V V_{GE} = -15 / 15 V R_{Goff} = 2,4 Ω	t_f T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C		0,05 0,07 0,07		µs µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 300 A, V_{CE} = 300 V, Lσ = 30 nH V_{GE} = -15 / 15 V, R_{Gon} = 2,4 Ω	E_{on} T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C		 3,10 3,30		 mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 300 A, V_{CE} = 300 V, Lσ = 30 nH V_{GE} = -15 / 15 V, R_{Goff} = 2,4 Ω	E_{off} T_{vj} = 25°C T_{vj} = 125°C T_{vj} = 150°C		 11,8 12,4		 mJ mJ
短路数据 SC data	V_{GE} ≤ 15 V, V_{CC} = 360 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	I_{SC} t_P ≤ 8 µs, T_{vj} = 25°C t_P ≤ 6 µs, T_{vj} = 150°C		2100 1500		A A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT	R_{thJC}			0,160	K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个 IGBT / per IGBT λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)	R_{thCH}		0,0170		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，制动-斩波器 / Diode, Brake-Chopper

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}	600	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 = 1 ms	I_{FRM}	600	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	8400 7900	A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 300 A, V_{GE} = 0 V I_F = 300 A, V_{GE} = 0 V I_F = 300 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 = 300 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}		190 235 250		A A A
恢复电荷 Recovered charge	I_F = 300 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		13,0 24,0 28,0		µC µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 300 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}		3,40 6,20 7,00		mJ mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			0,320	K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,0340		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

反向二极管 / Diode, Reverse

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}	600	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 = 1 ms	I_{FRM}	600	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	8400 7900	A²s A²s

特征值 / Characteristic Values

			min.	typ.	max.	
正向电压 Forward voltage	I_F = 300 A, V_{GE} = 0 V I_F = 300 A, V_{GE} = 0 V I_F = 300 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
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			0,320	K/W
外壳 - 散热器热阻 Thermal resistance, case to heatsink	每个二极管 / per diode λ_{Paste} = 1 W/(m·K) / λ_{grease} = 1 W/(m·K)		R_{thCH}		0,0340		K/W
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-40		150	°C

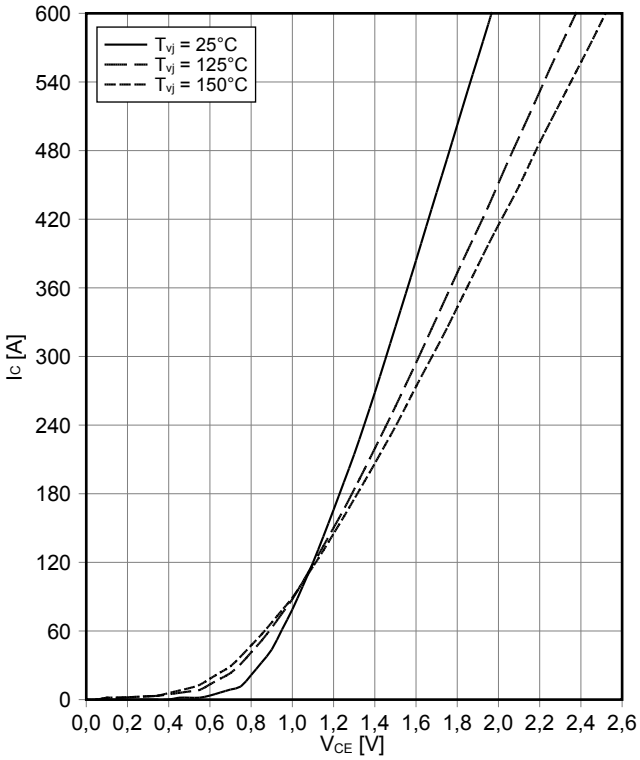
初步数据
Preliminary Data

模块 / Module

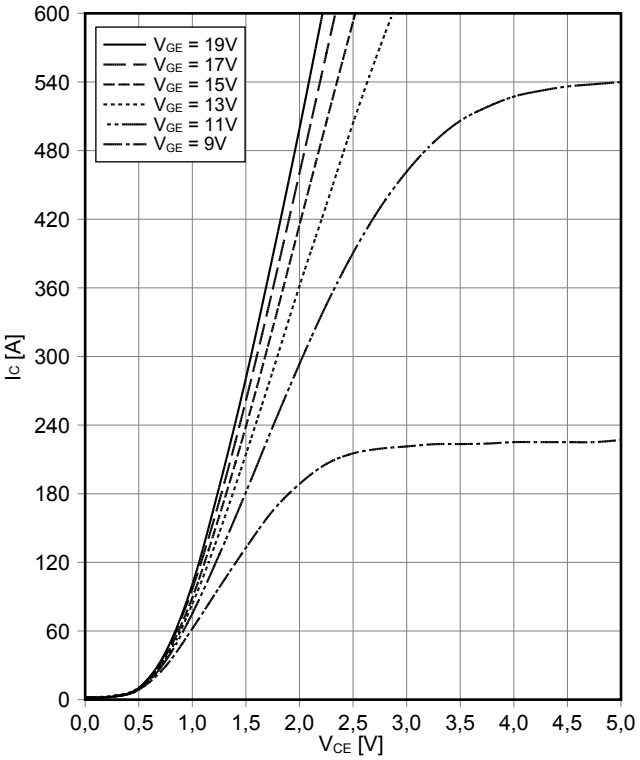
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 1 min.	V_{ISOL}		2,5		kV
模块基板材料 Material of module baseplate				Cu		
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)			Al_2O_3		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			29,0 23,0		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			23,0 11,0		mm
相对电痕指数 Comperative tracking index		CTI		> 400		
			min.	typ.	max.	
杂散电感,模块 Stray inductance module		L_{sCE}		20		nH
模块引线电阻,端子-芯片 Module lead resistance, terminals - chip	T_C = 25°C, 每个开关 / per switch	$R_{CC'+EE'}$		0,70		mΩ
储存温度 Storage temperature		T_{stg}	-40		125	°C
模块安装的安装扭距 Mounting torque for modul mounting	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	3,00		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	2,5	-	5,0	Nm
重量 Weight		G		340		g

初步数据
Preliminary Data

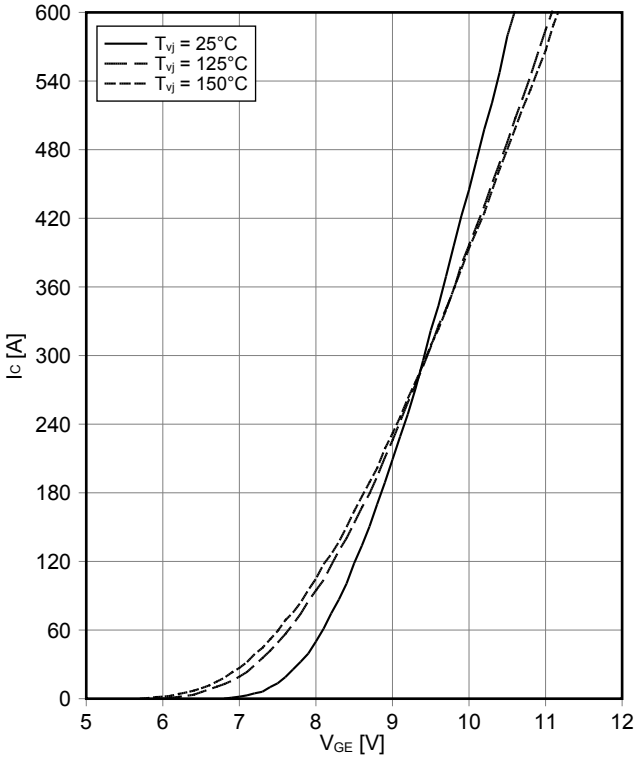
输出特性 IGBT, 制动-斩波器 （典型）
output characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{CE})$
V_{GE} = 15 V



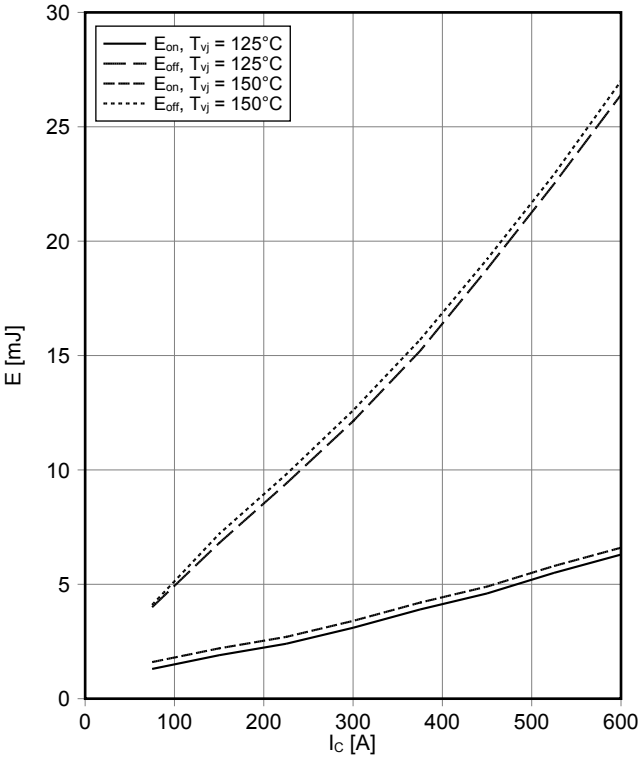
输出特性 IGBT, 制动-斩波器 （典型）
output characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{CE})$
T_{vj} = 150°C



传输特性 IGBT, 制动-斩波器 (典型)
transfer characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{GE})$
V_{CE} = 20 V

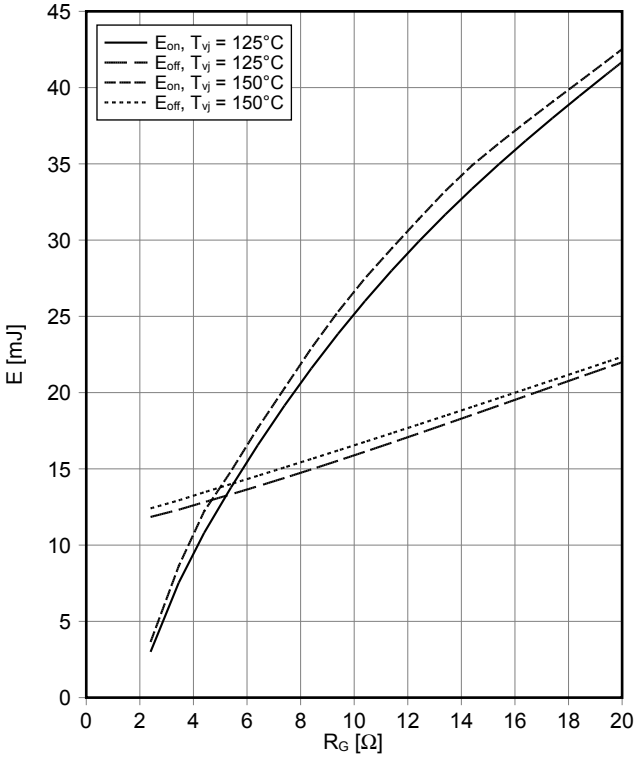


开关损耗 IGBT, 制动-斩波器 （典型）
switching losses IGBT, Brake-Chopper (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
V_{GE} = ±15 V, R_{Gon} = 2.4 Ω, R_{Goff} = 2.4 Ω, V_{CE} = 300 V

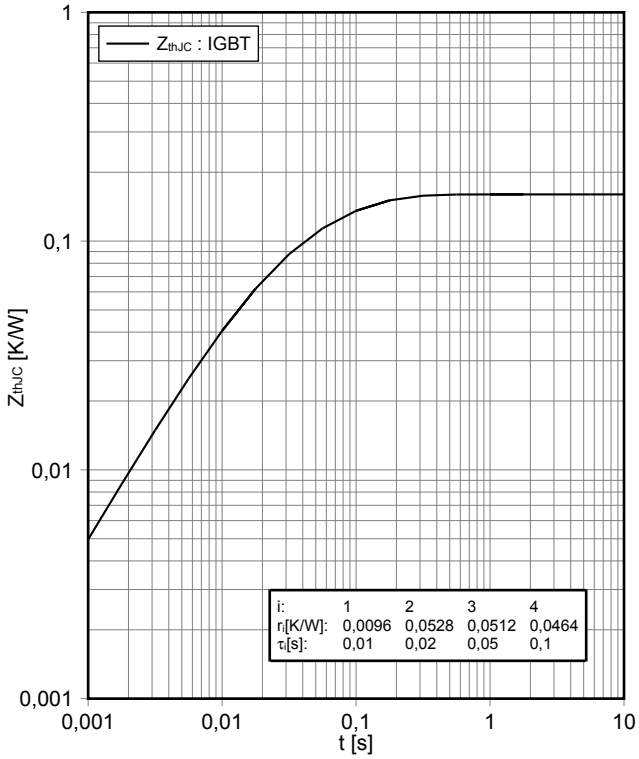


初步数据
Preliminary Data

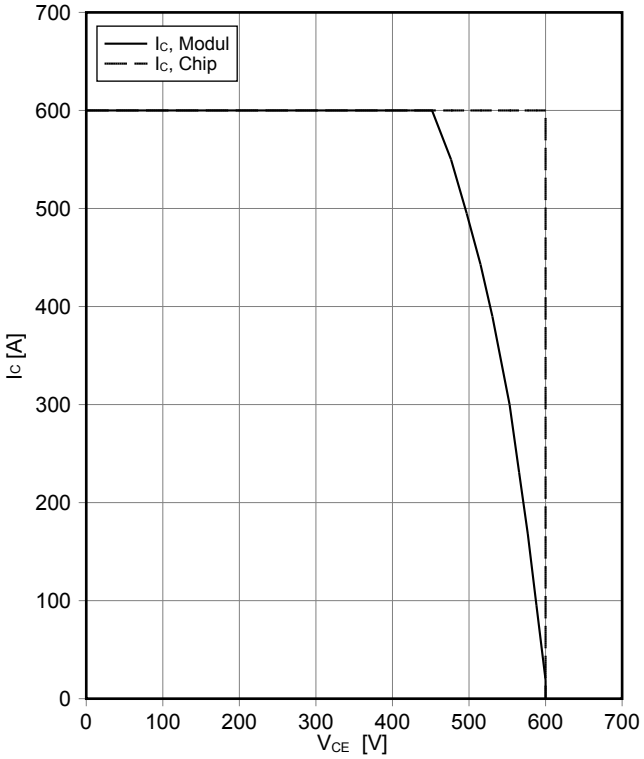
开关损耗 IGBT, 制动-斩波器 （典型）
switching losses IGBT, Brake-Chopper (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
V_{GE} = ±15 V, I_C = 300 A, V_{CE} = 300 V



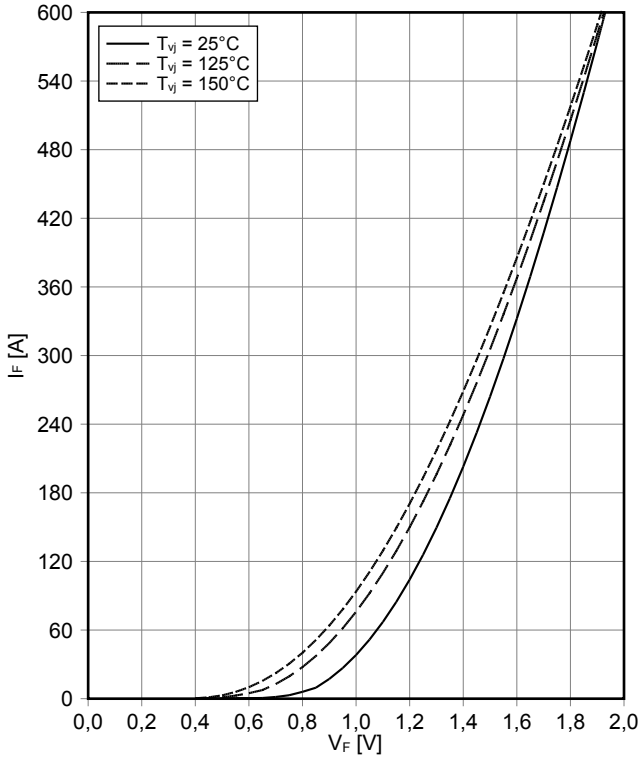
瞬态热阻抗 IGBT, 制动-斩波器
transient thermal impedance IGBT, Brake-Chopper
$Z_{thJC} = f(t)$



反偏安全工作区 IGBT, 制动-斩波器 （RBSOA）
reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)
$I_C = f(V_{CE})$
V_{GE} = ±15 V, R_{Goff} = 2.4 Ω, T_{vj} = 150°C

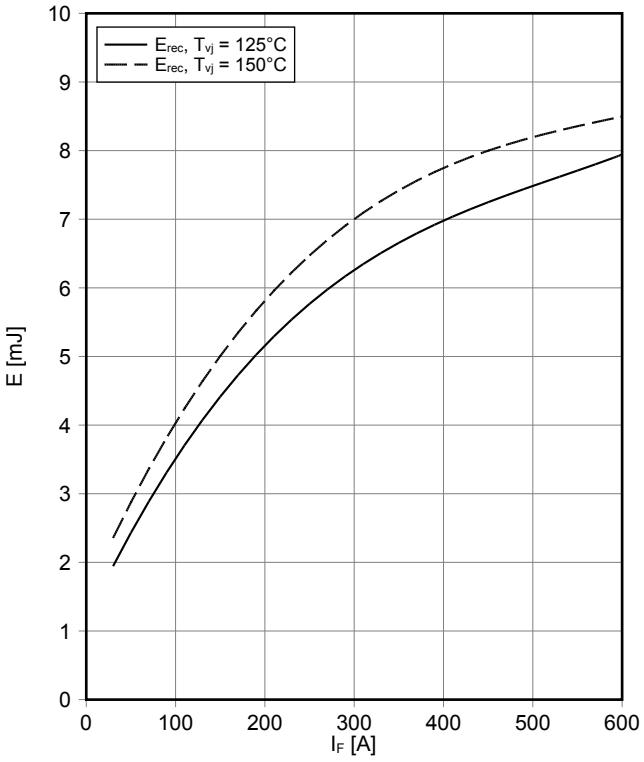


正向偏压特性 二极管，制动-斩波器 （典型）
forward characteristic of Diode, Brake-Chopper (typical)
$I_F = f(V_F)$

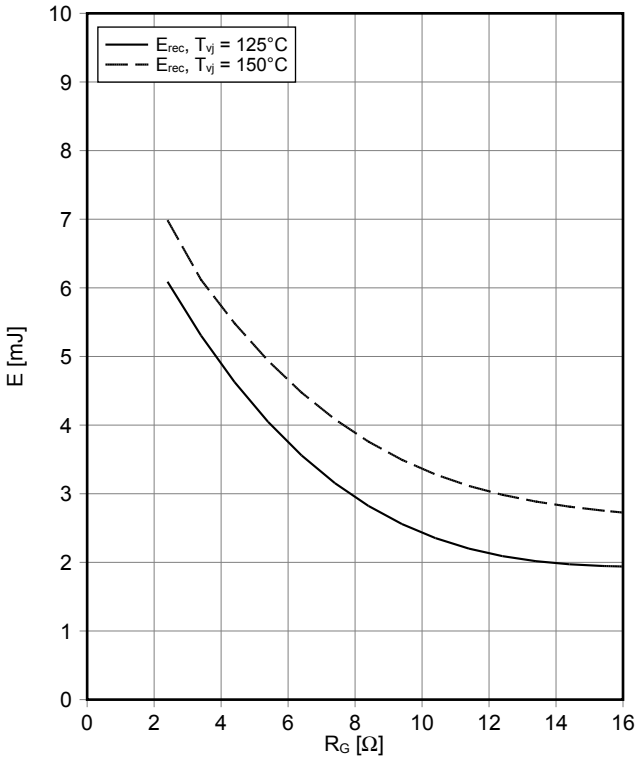


初步数据
Preliminary Data

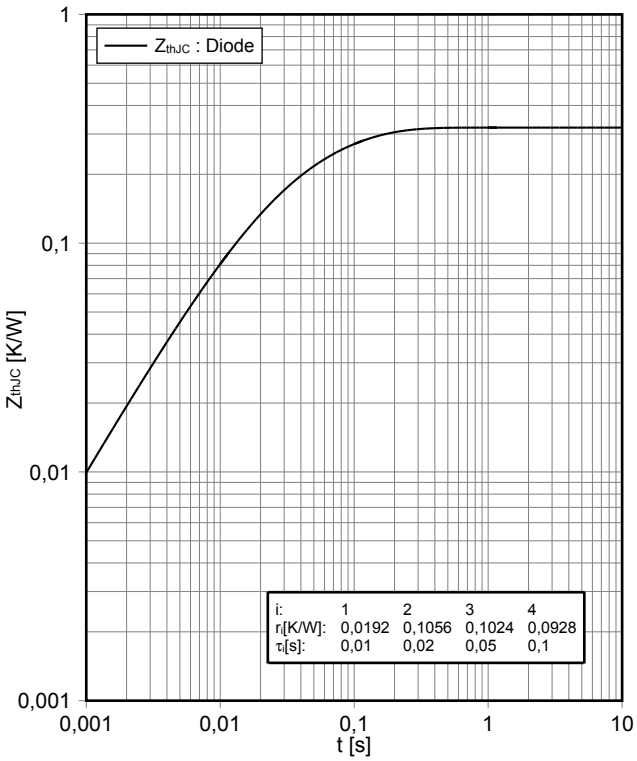
开关损耗 二极管，制动-斩波器 （典型）
switching losses Diode, Brake-Chopper (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 2.4\ \Omega$, $V_{CE} = 300$ V



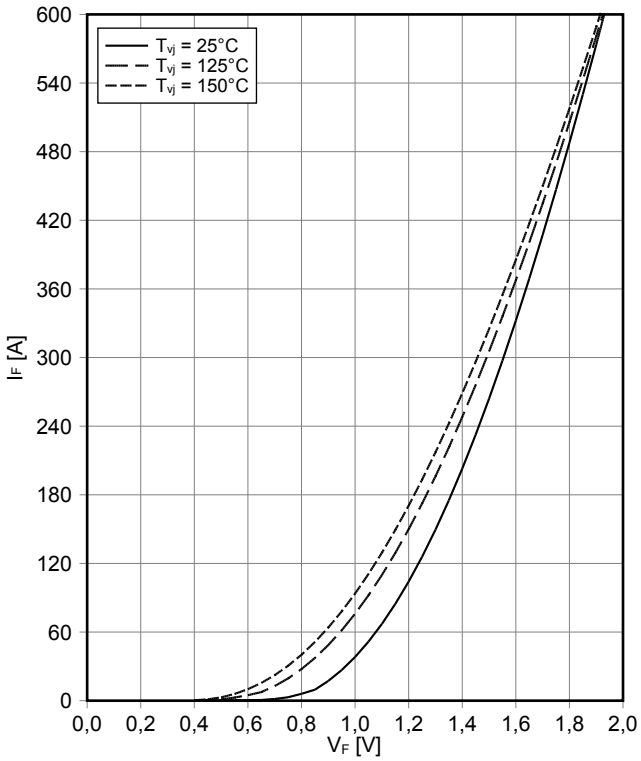
开关损耗 二极管，制动-斩波器 （典型）
switching losses Diode, Brake-Chopper (typical)
$E_{rec} = f(R_G)$
$I_F = 300$ A, $V_{CE} = 300$ V



瞬态热阻抗 二极管，制动-斩波器
transient thermal impedance Diode, Brake-Chopper
$Z_{thJC} = f(t)$

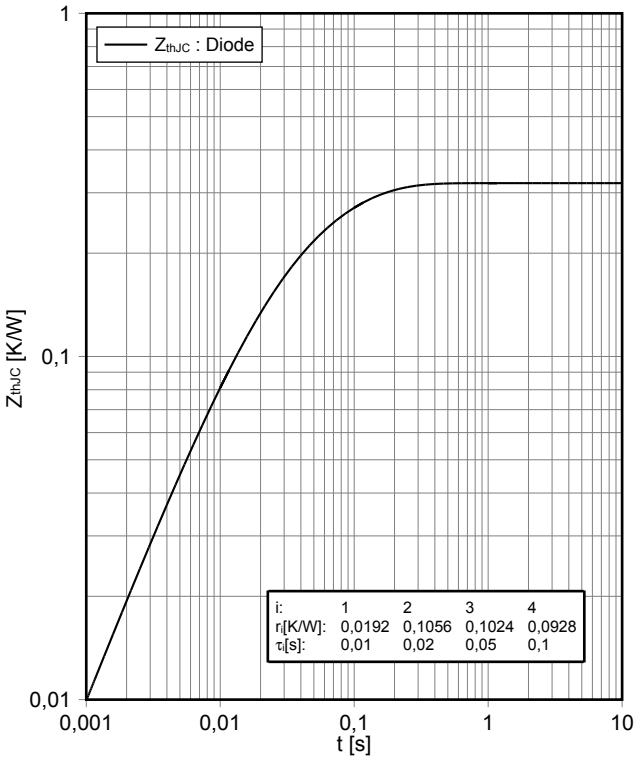


正向偏压特性 反向二极管 （典型）
forward characteristic of Diode, Reverse (typical)
$I_F = f(V_F)$



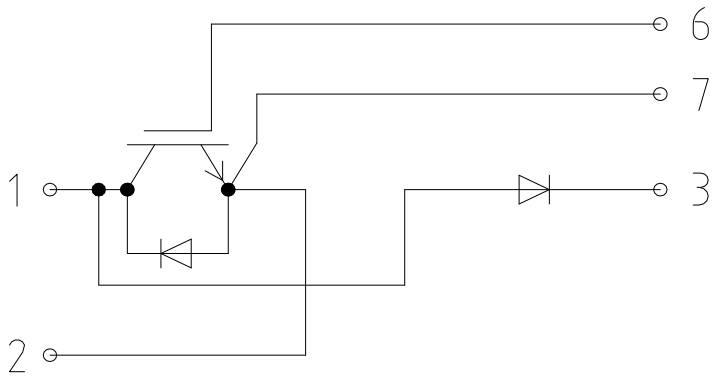
初步数据
Preliminary Data

瞬态热阻抗 反向二极管
transient thermal impedance Diode, Reverse
$Z_{thJC} = f(t)$

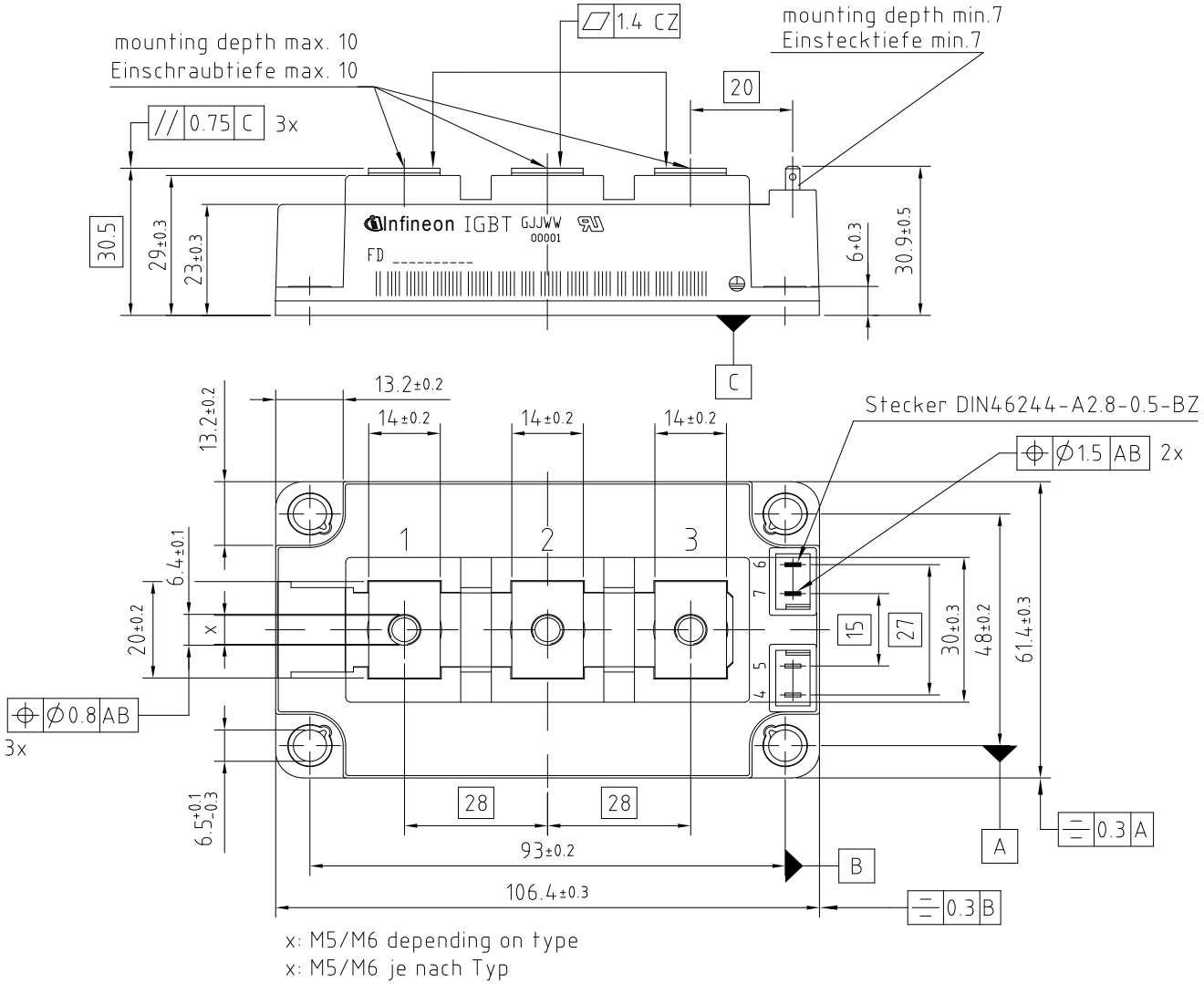


初步数据
Preliminary Data

接线图 / Circuit diagram



封装尺寸 / Package outlines



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