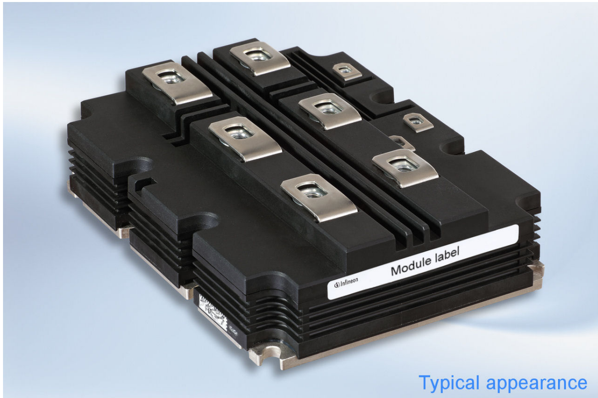
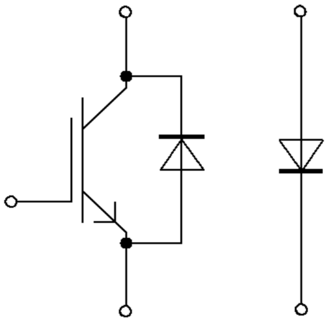
FD800R45KL3-K_B5

高绝缘等级模块 采用第三代沟槽栅/场终止IGBT3和第三代发射极控制二极管
highly insulated module with Trench/Fieldstop IGBT3 and Emitter Controlled 3 diode



Typical appearance



V_{CES} = 4500V
$I_{C\ nom}$ = 800A / I_{CRM} = 1600A

潜在应用
- 中压变流器
- 大功率变流器
- 斩波应用
- 牵引变流器
- 电机传动

Potential Applications
- Medium voltage converters
- High power converters
- Chopper applications
- Traction drives
- Motor drives

电气特性
- V_{CEsat} 带正温度系数
- 低 V_{CEsat}
- 沟槽栅IGBT3
- 高动态坚固性
- 高直流电压稳定性
- 高短路能力

Electrical Features
- V_{CEsat} with positive temperature coefficient
- Low V_{CEsat}
- Trench IGBT 3
- High dynamic robustness
- High DC stability
- High short-circuit capability

机械特性
- 加强绝缘封装，10.4kV 交流 10第二
- 封装的 CTI > 600
- 碳化硅铝 (AlSiC) 基板提供更高的温度循环能力
- 绝缘的基板
- 高爬电距离和电气间隙

Mechanical Features
- Package with enhanced insulation of 10.4kV AC 10s
- Package with CTI > 600
- AlSiC base plate for increased thermal cycling capability
- Isolated base plate
- High creepage and clearance distances

Module Label Code

Barcode Code 128

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, 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} = -40°C T_{vj} = 25°C T_{vj} = 125°C	V_{CES}	4500 4500 4500	V
连续集电极直流电流 Continuous DC collector current	T_C = 95°C, $T_{vj\,max}$ = 125°C	I_{CDC}	800	A
集电极重复峰值电流 Repetitive peak collector current	t_P = 1 ms	I_{CRM}	1600	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 = 800 A V_{GE} = 15 V	T_{vj} = 25°C T_{vj} = 125°C	$V_{CE\,sat}$		2,50 3,10	2,85 3,70	V V
栅极阈值电压 Gate threshold voltage	I_C = 70,5 mA, V_{CE} = V_{GE}, T_{vj} = 25°C		V_{GEth}	5,40	6,00	6,60	V
栅极电荷 Gate charge	V_{GE} = -15 / 15 V, V_{CE} = 2800 V		Q_G		26,5		µC
内部栅极电阻 Internal gate resistor	T_{vj} = 25°C		R_{Gint}		1,1		Ω
输入电容 Input capacitance	f = 1000 kHz, T_{vj} = 25°C, V_{CE} = 25 V, V_{GE} = 0 V		C_{ies}		185		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}		3,10		nF
集电极-发射极截止电流 Collector-emitter cut-off current	V_{CE} = 4500 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 = 800 A, V_{CE} = 2800 V V_{GE} = -15 / 15 V R_{Gon} = 1,0 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,on}$		0,58 0,60		µs µs
上升时间(电感负载) Rise time, inductive load	I_C = 800 A, V_{CE} = 2800 V V_{GE} = -15 / 15 V R_{Gon} = 1,0 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_r		0,19 0,22		µs µs
关断延迟时间(电感负载) Turn-off delay time, inductive load	I_C = 800 A, V_{CE} = 2800 V V_{GE} = -15 / 15 V R_{Goff} = 7,5 Ω	T_{vj} = 25°C T_{vj} = 125°C	$t_{d\,off}$		6,60 6,90		µs µs
下降时间(电感负载) Fall time, inductive load	I_C = 800 A, V_{CE} = 2800 V V_{GE} = -15 / 15 V R_{Goff} = 7,5 Ω	T_{vj} = 25°C T_{vj} = 125°C	t_f		0,35 0,45		µs µs
开通损耗能量 (每脉冲) Turn-on energy loss per pulse	I_C = 800 A, V_{CE} = 2800 V, $L\sigma$ = 95 nH di/dt = 3300 A/µs V_{GE} = -15 / 15 V, R_{Gon} = 1,0 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{on}		3100 4100		mJ mJ
关断损耗能量 (每脉冲) Turn-off energy loss per pulse	I_C = 800 A, V_{CE} = 2800 V, $L\sigma$ = 95 nH du/dt = 2000 V/µs V_{GE} = -15 / 15 V, R_{Goff} = 7,5 Ω	T_{vj} = 25°C T_{vj} = 125°C	E_{off}		2800 3400		mJ mJ
短路数据 SC data	$V_{GE} \leq$ 15 V, V_{CC} = 2800 V V_{CEmax} = V_{CES} -L_{sCE} ·di/dt	$t_P \leq$ 10 µs, T_{vj} = 125°C	I_{SC}		4600		A
结 - 外壳热阻 Thermal resistance, junction to case	每个 IGBT / per IGBT		R_{thJC}			11,1	K/kW
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}		13,5		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\,op}$	-50		125	°C

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} = -40°C T_{vj} = 25°C T_{vj} = 125°C	V_{RRM}	4500 4500 4500	V
连续正向直流电流 Continuous DC forward current		I_F	800	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	1600	A
I2t-值 I^2t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I^2t	255	kA^2s
最大损耗功率 Maximum power dissipation	T_{vj} = 125°C	P_{RQM}	1600	kW
最小开通时间 Minimum turn-on time		$t_{on\ min}$	10,0	µs

特征值 / Characteristic Values

				min.	typ.	max.	
正向电压 Forward voltage	I_F = 800 A, V_{GE} = 0 V I_F = 800 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C	V_F		2,50 2,50	3,10 3,00	V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 800 A, - di_F/dt = 3300 A/µs (T_{vj}=125°C) V_R = 2800 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	I_{RM}		1000 1150		A A
恢复电荷 Recovered charge	I_F = 800 A, - di_F/dt = 3300 A/µs (T_{vj}=125°C) V_R = 2800 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	Q_r		770 1400		µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 800 A, - di_F/dt = 3300 A/µs (T_{vj}=125°C) V_R = 2800 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	E_{rec}		1200 2400		mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			25,5	K/kW
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}		21,0		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-50		125	°C

二極體, 反轉 / Diode, Reverse

最大额定值 / Maximum Rated Values

反向重复峰值电压 Repetitive peak reverse voltage	T_{vj} = -40°C T_{vj} = 25°C T_{vj} = 125°C	V_{RRM}	4500 4500 4500	V
连续正向直流电流 Continuous DC forward current		I_F	800	A
正向重复峰值电流 Repetitive peak forward current	t_P = 1 ms	I_{FRM}	1600	A
I2t-值 I²t - value	V_R = 0 V, t_P = 10 ms, T_{vj} = 125°C	I^2t	255	kA²s
最大损耗功率 Maximum power dissipation	T_{vj} = 125°C	P_{RQM}	1600	kW
最小开通时间 Minimum turn-on time		$t_{on\ min}$	10,0	µs

特征值 / Characteristic Values

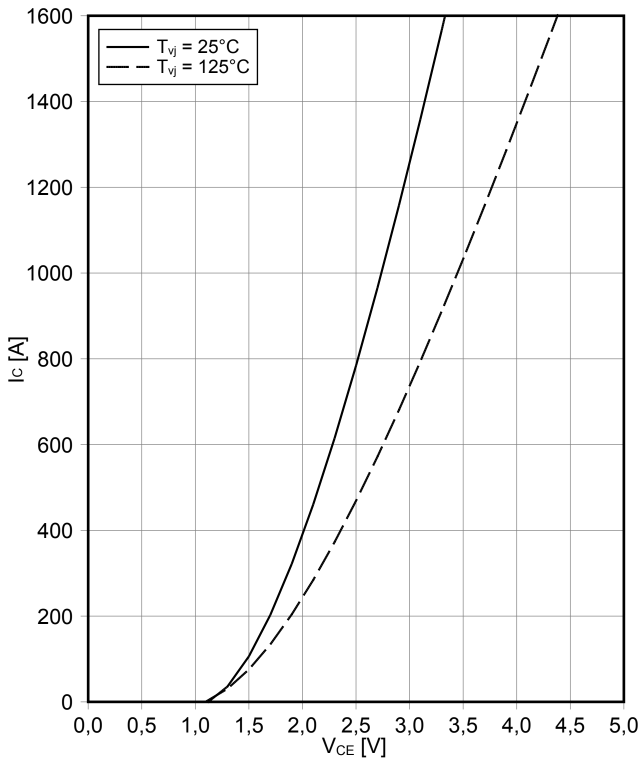
				min.	typ.	max.	
正向电压 Forward voltage	I_F = 800 A, V_{GE} = 0 V I_F = 800 A, V_{GE} = 0 V	T_{vj} = 25°C T_{vj} = 125°C	V_F		2,50 2,50	3,10 3,00	V V
反向恢复峰值电流 Peak reverse recovery current	I_F = 800 A, - di_F/dt = 3300 A/µs (T_{vj}=125°C) V_R = 2800 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	I_{RM}		1000 1150		A A
恢复电荷 Recovered charge	I_F = 800 A, - di_F/dt = 3300 A/µs (T_{vj}=125°C) V_R = 2800 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	Q_r		770 1400		µC µC
反向恢复损耗（每脉冲） Reverse recovery energy	I_F = 800 A, - di_F/dt = 3300 A/µs (T_{vj}=125°C) V_R = 2800 V V_{GE} = -15 V	T_{vj} = 25°C T_{vj} = 125°C	E_{rec}		1200 2400		mJ mJ
结 - 外壳热阻 Thermal resistance, junction to case	每个二极管 / per diode		R_{thJC}			25,5	K/kW
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}		21,0		K/kW
在开关状态下温度 Temperature under switching conditions			$T_{vj\ op}$	-50		125	°C

模块 / Module

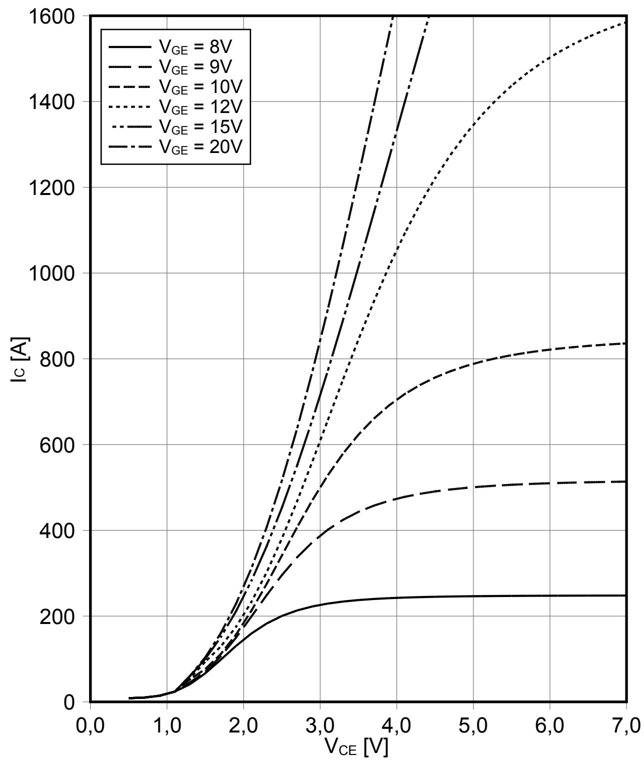
绝缘测试电压 Isolation test voltage	RMS, f = 50 Hz, t = 10 s	V_{ISOL}		10,4		kV
局部放电停止电压 Partial discharge extinction voltage	RMS, f = 50 Hz, $Q_{PD} \leq 10$ pC	V_{ISOL}		3,50		kV
DC 稳定性 DC stability	T_{vj} = 25°C, 100 fit	$V_{CE\,D}$		3000		V
模块基板材料 Material of module baseplate				AlSiC		
内部绝缘 Internal isolation	基本绝缘 (class 1, IEC 61140) basic insulation (class 1, IEC 61140)			AlN		
爬电距离 Creepage distance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			56,0 56,0		mm
电气间隙 Clearance	端子至散热器 / terminal to heatsink 端子至端子 / terminal to terminal			26,0 26,0		mm
相对电痕指数 Comperative tracking index		CTI		> 600		
			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	$R_{CC'+EE'}$ $R_{AA'+CC'}$		0,18 0,18		mΩ
储存温度 Storage temperature		T_{stg}	-55		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	4,25		5,75	Nm
端子联接扭距 Terminal connection torque	螺丝 M4 根据相应的应用手册进行安装 Screw M4 - Mounting according to valid application note 螺丝 M8 根据相应的应用手册进行安装 Screw M8 - Mounting according to valid application note	M	1,8 8,0	- -	2,1 10	Nm Nm
重量 Weight		G		1400		g

Das maximal zulässige du/dt, definiert zwischen 0,6 und 1×Vce, beträgt 2400V/µs.
The maximum allowed dv/dt measured between 0,6 and 1×Vce is 2400V/µs.

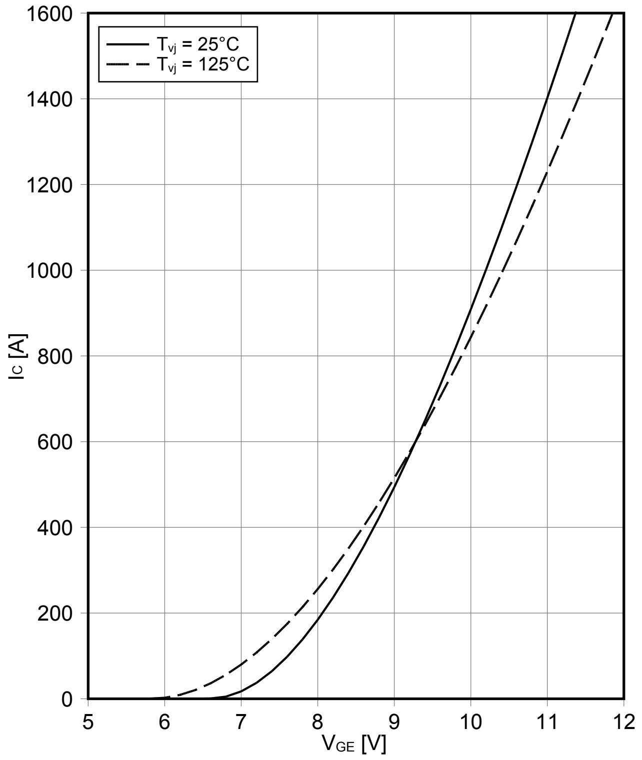
输出特性 IGBT, 制动-斩波器 (典型)
output characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V



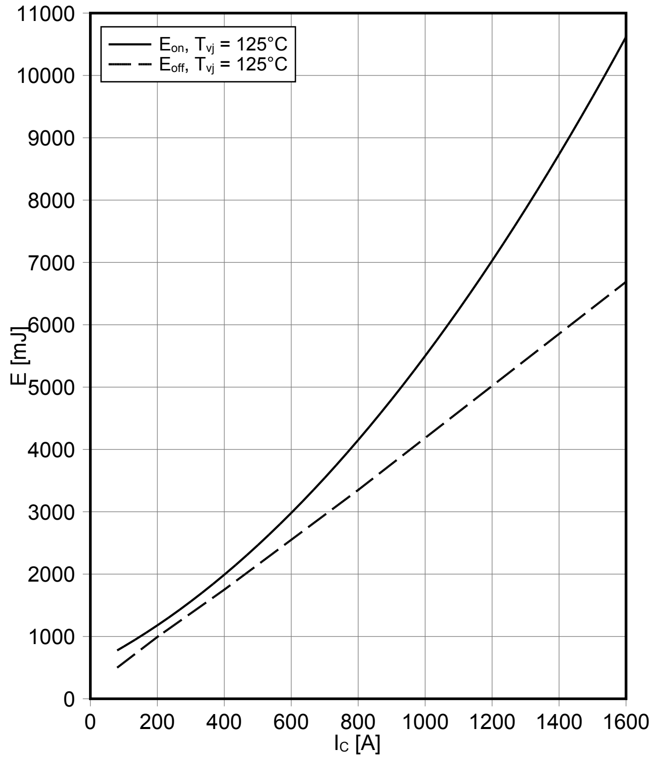
输出特性 IGBT, 制动-斩波器 (典型)
output characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{CE})$
$T_{vj} = 125°C$



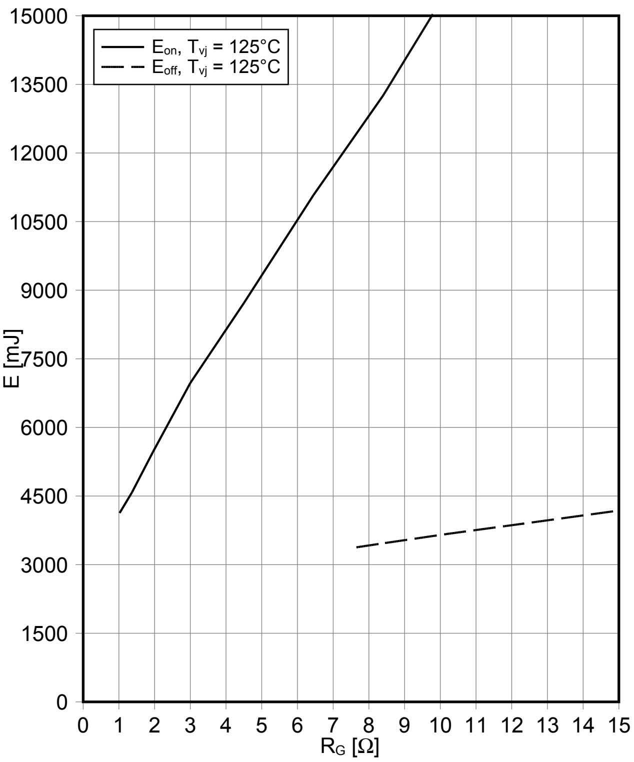
传输特性 IGBT, 制动-斩波器 (典型)
transfer characteristic IGBT, Brake-Chopper (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20$ V



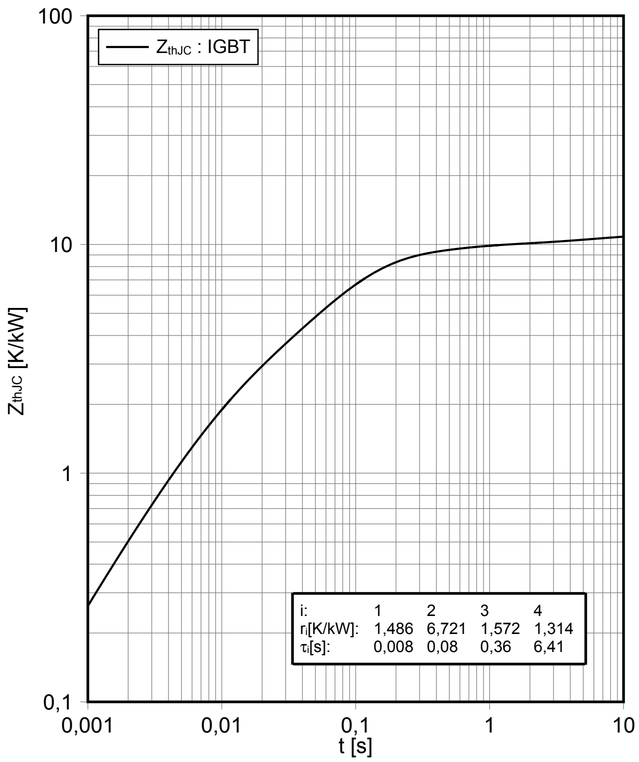
开关损耗 IGBT, 制动-斩波器 (典型)
switching losses IGBT, Brake-Chopper (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$V_{GE} = \pm15$ V, $R_{Gon} = 1\ \Omega$, $R_{Goff} = 7.5\ \Omega$, $V_{CE} = 2800$ V



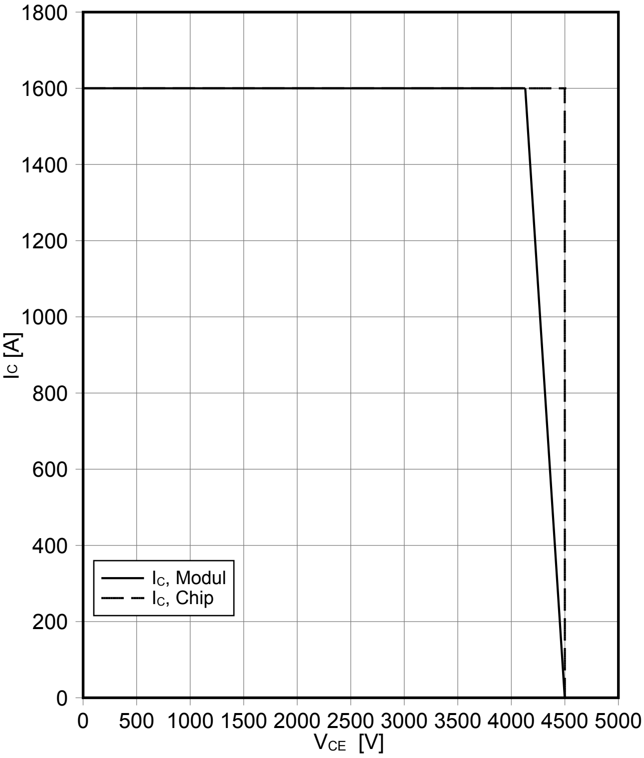
开关损耗 IGBT, 制动-斩波器 （典型)
switching losses IGBT, Brake-Chopper (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$V_{GE} = \pm15$ V, $I_C = 800$ A, $V_{CE} = 2800$ V



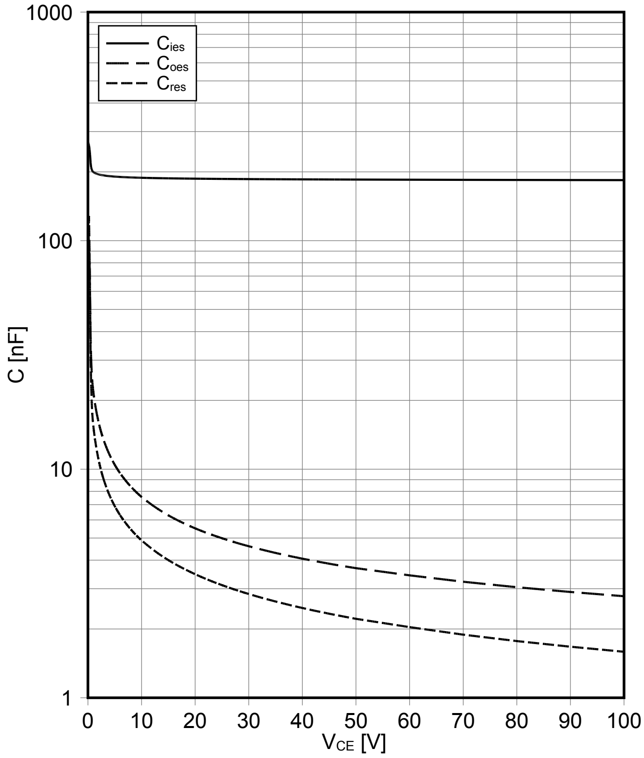
瞬态热阻抗 IGBT, 制动-斩波器
transient thermal impedance IGBT, Brake-Chopper
$Z_{thJC} = f(t)$



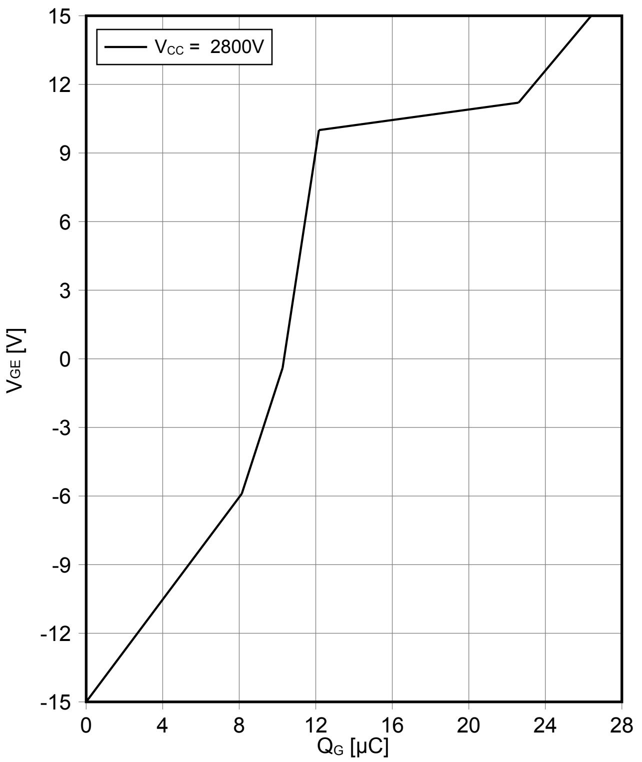
反偏安全工作区 IGBT, 制动-斩波器 （RBSOA）
reverse bias safe operating area IGBT, Brake-Chopper (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = \pm15$ V, $R_{Goff} = 7.5\ \Omega$, $T_{vj} = 125°C$



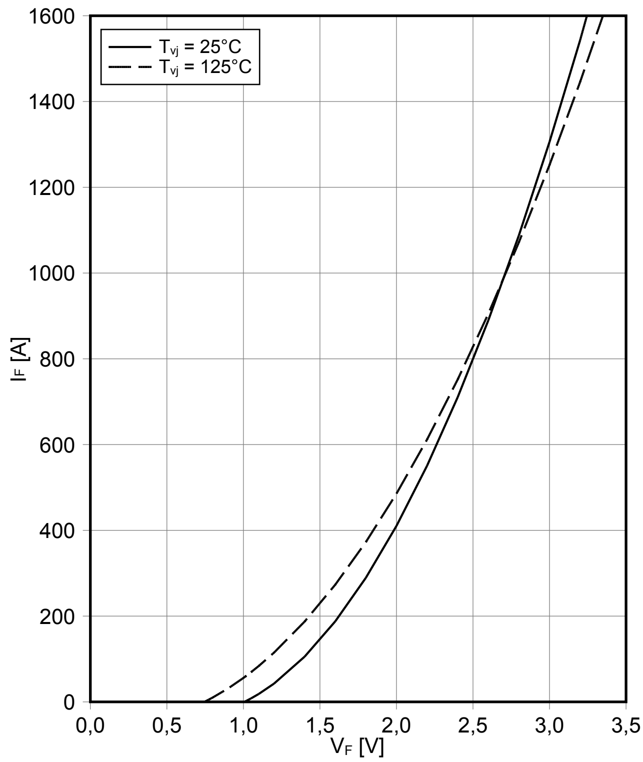
电容特性 IGBT, 制动-斩波器 （典型)
capacity characteristic IGBT, Brake-Chopper (typical)
$C = f(V_{CE})$
$V_{GE} = 0$ V, $T_{vj} = 25°C$, f = 1MHz



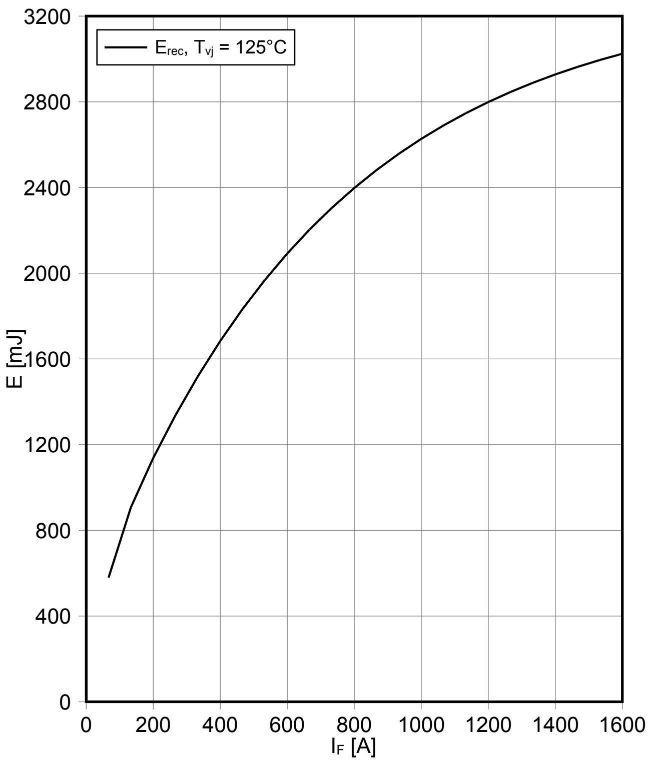
栅极电荷特性 IGBT, 制动-斩波器 （典型)
gate charge characteristic IGBT, Brake-Chopper (typical)
$V_{GE} = f(Q_G)$
I_C = 800 A, T_{vj} = 25°C



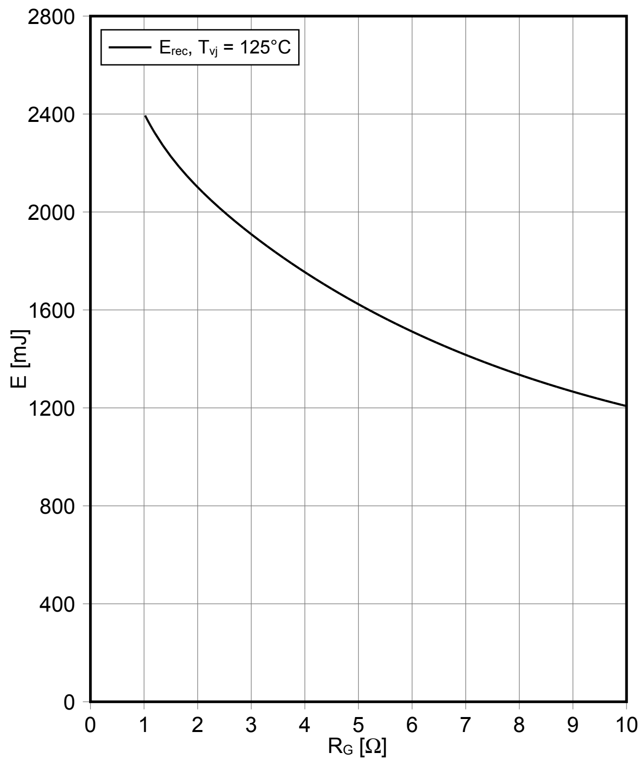
正向偏压特性 二极管，制动-斩波器 （典型)
forward characteristic of Diode, Brake-Chopper (typical)
$I_F = f(V_F)$



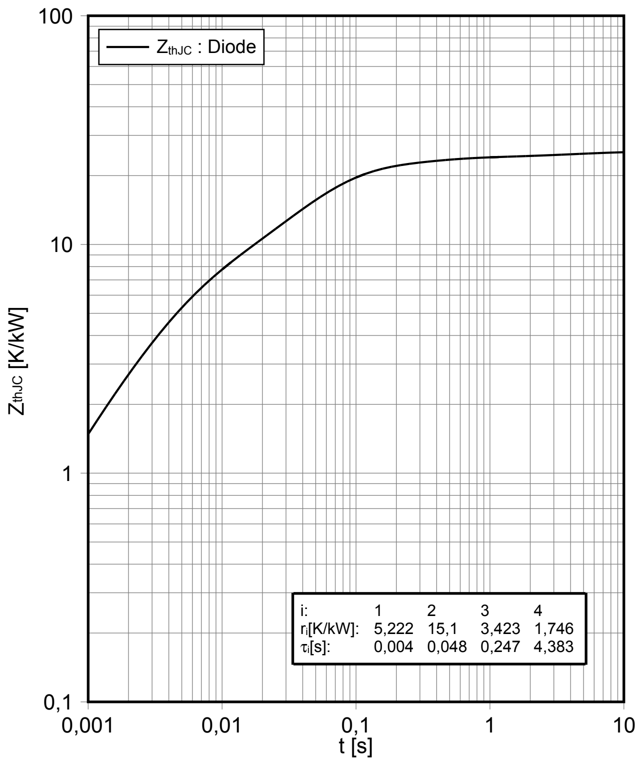
开关损耗 二极管，制动-斩波器 （典型)
switching losses Diode, Brake-Chopper (typical)
$E_{rec} = f(I_F)$
$-di_F/dt$=3300A/µs, V_{CE} = 2800 V



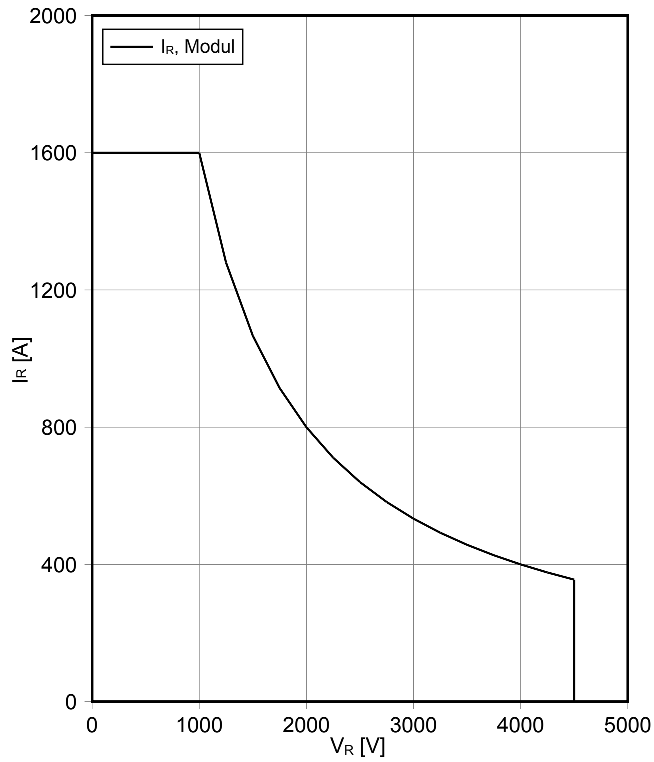
开关损耗 二极管，制动-斩波器 （典型)
switching losses Diode, Brake-Chopper (typical)
$E_{rec} = f(R_G)$
I_F = 800 A, V_{CE} = 2800 V



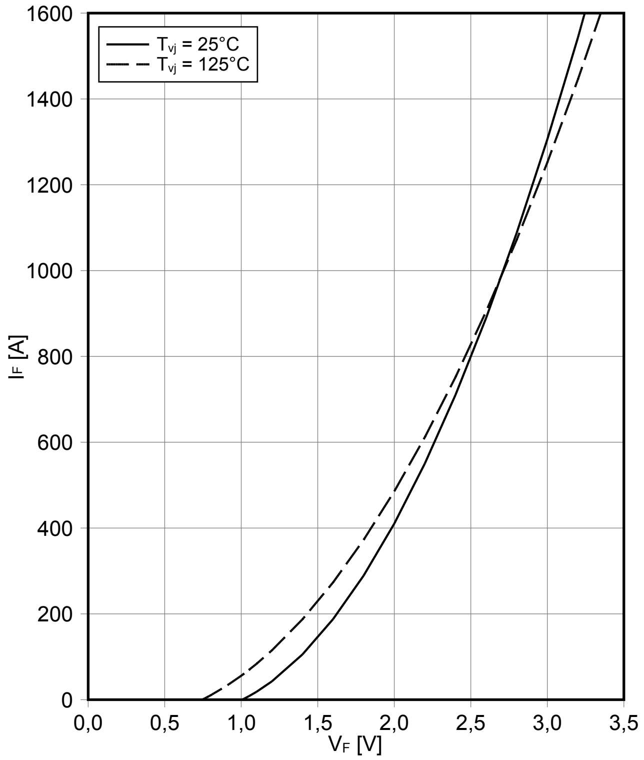
瞬态热阻抗 二极管，制动-斩波器
transient thermal impedance Diode, Brake-Chopper
$Z_{thJC} = f(t)$



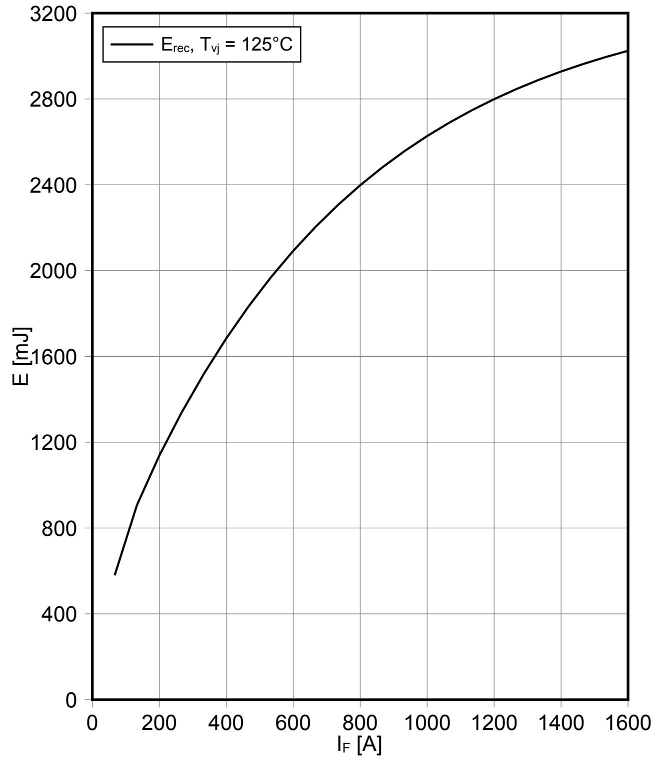
安全工作区 二极管，制动-斩波器 (SOA)
safe operation area Diode, Brake-Chopper (SOA)
$I_R = f(V_R)$
$T_{vj} = 125°C$



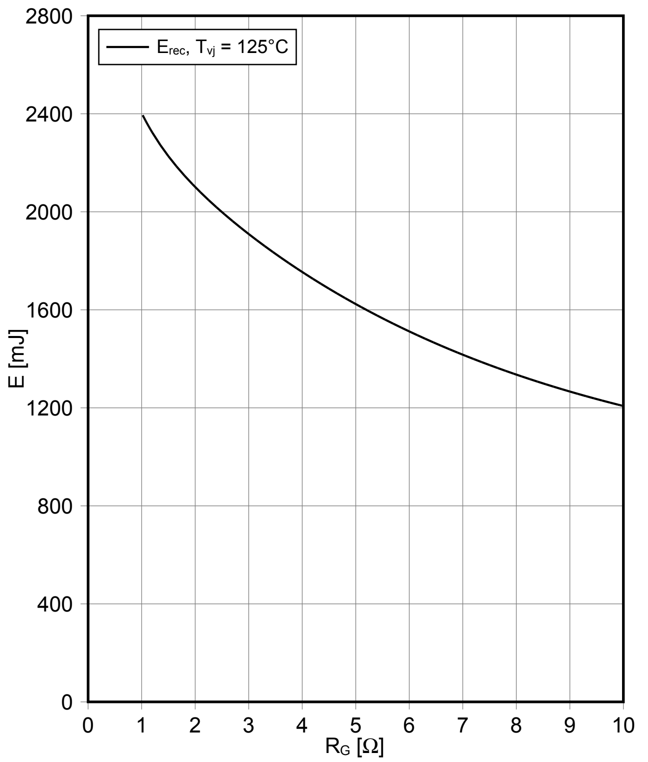
正向偏压特性 二極體, 反轉 （典型)
forward characteristic of Diode, Reverse (typical)
$I_F = f(V_F)$



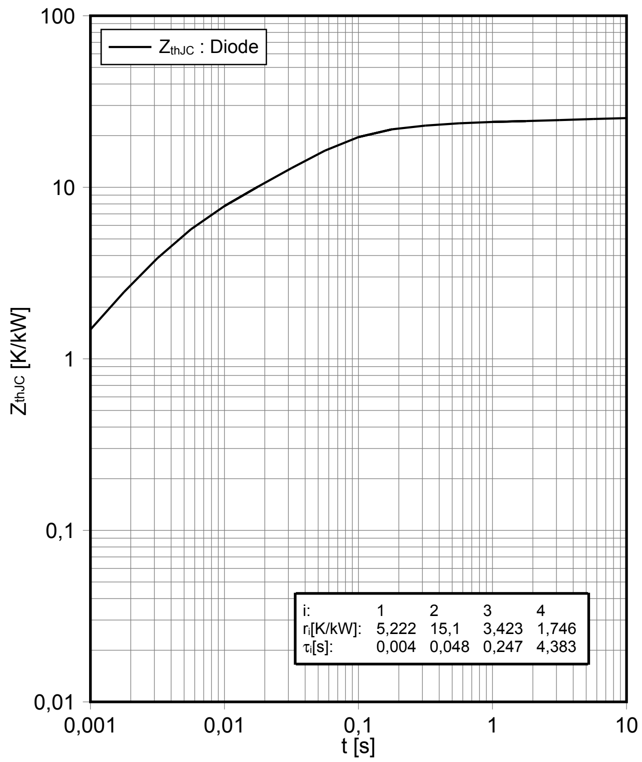
开关损耗 二極體, 反轉 （典型)
switching losses Diode, Reverse (typical)
$E_{rec} = f(I_F)$
$-di_F/dt=3300A/µs$, $V_{CE} = 2800$ V



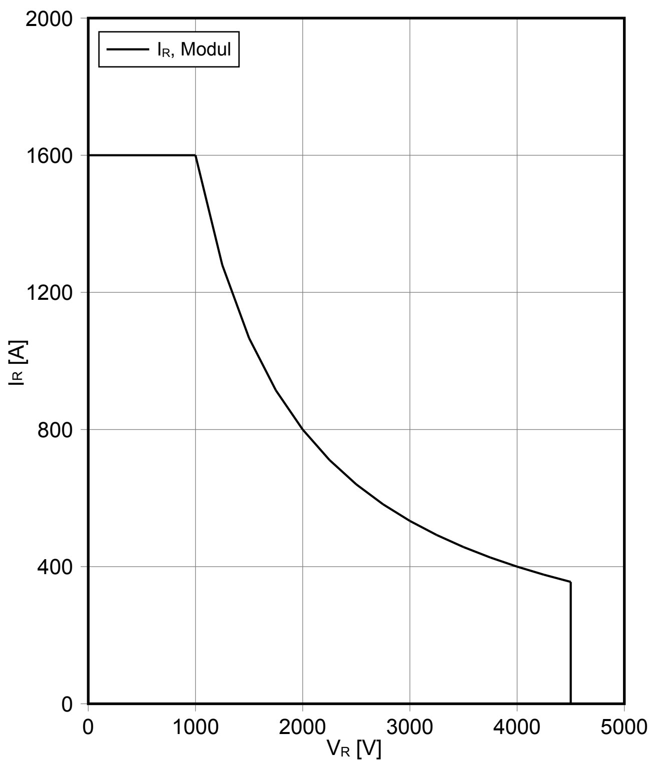
开关损耗 二極體, 反轉 （典型)
switching losses Diode, Reverse (typical)
$E_{rec} = f(R_G)$
I_F = 800 A, V_{CE} = 2800 V



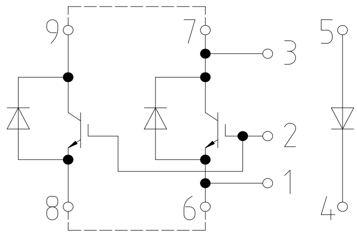
瞬态热阻抗 二極體, 反轉
transient thermal impedance Diode, Reverse
$Z_{thJC} = f(t)$



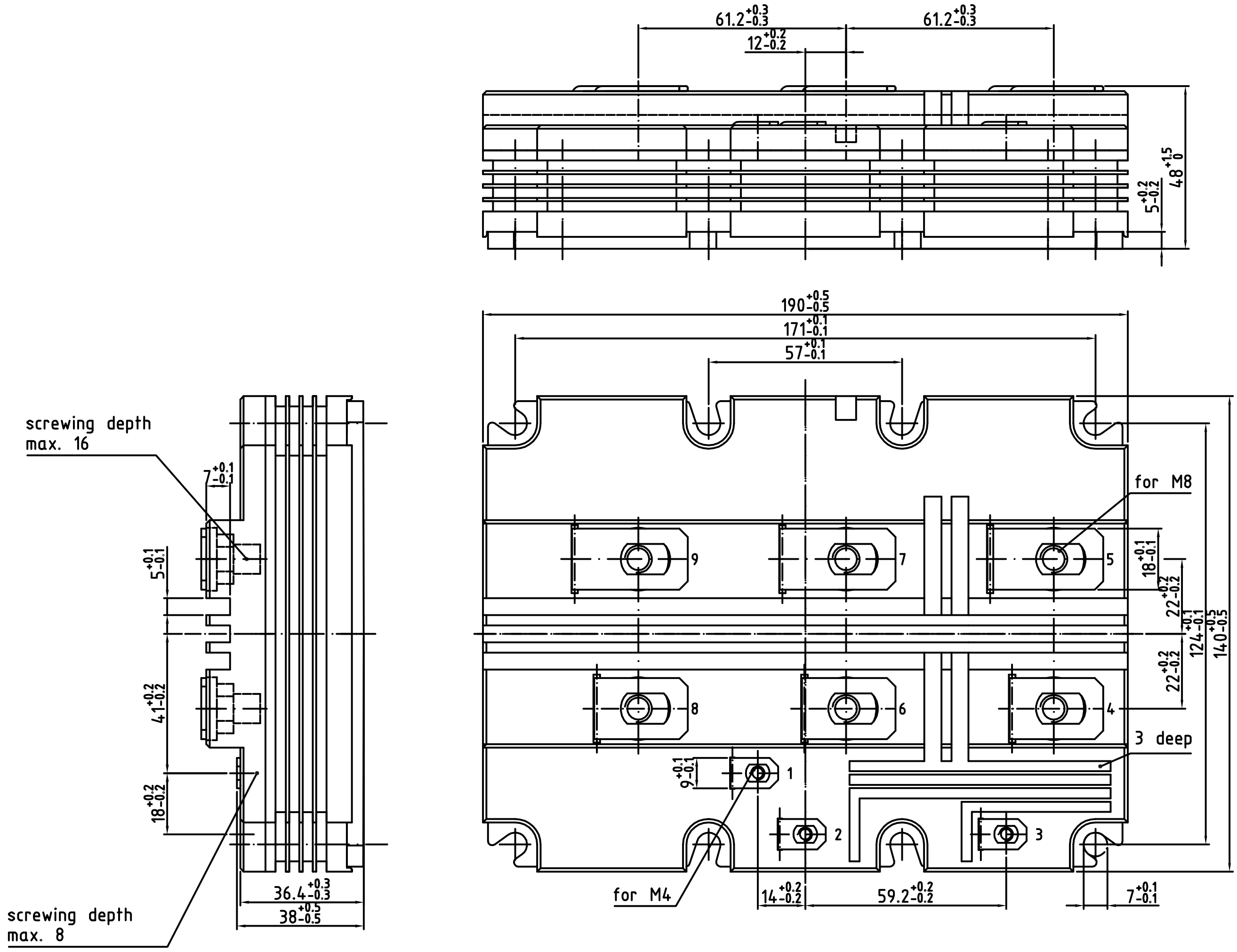
安全工作区 二極體, 反轉 (SOA)
safe operation area Diode, Reverse (SOA)
$I_R = f(V_R)$
T_{vj} = 125°C



接线图 / Circuit diagram



封装尺寸 / Package outlines



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