1. Product Features

1.1 Electrical features

- V_{CES}=1200V
- $I_{C\ nom}$=200A / I_{CRM}=400A
- Low switching losses
- Low inductance
- Fast switching and short tail current
- High power and thermal cycling capability

1.2 Mechanical features

- Al_2O_3 substrate with low thermal resistance
- Copper base plate

Figure1 IGBT Module

2. Typical Applications

- High Frequency Switching Application
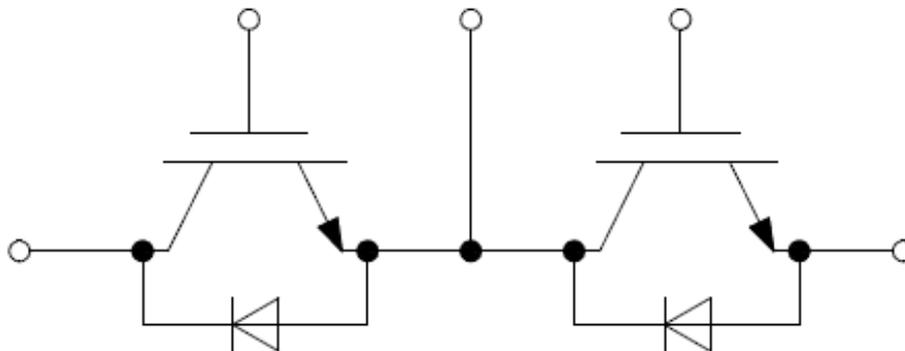- Motor drives
- UPS system

3. Description

Figure 2 Half Bridge

Technical datasheet

4. IGBT, Inverter

4.1 Maximum rated values

Parameter	Note or test condition	Symbol	Values	Unit
Collector-emitter voltage 集电极—发射极间电压	$T_{vj} = 25°C$	V_{CES}	1200	V
Continuous DC collector current 连续集电极电流	$T_C = 100°C$, $T_{vj\ max} = 150°C$	$I_{C\ nom}$	200	A
Repetitive peak collector current 集电极峰值电流	$t_P = 1\ ms$	I_{CRM}	400	A
Total power dissipation 总功率损耗	$T_C = 25°C$, $T_{vj\ max} = 175°C$	P_{tot}	1250	W
Gate-emitter peak voltage 栅极—发射极峰值电压		V_{GES}	+/- 20	V

4.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage 集电极—发射极饱和电压	$I_C = 200A$, $V_{GE} = 15\ V$	$T_{vj} = 25°C$	$V_{CE,sat}$		1.63		V
		$T_{vj} = 125°C$			1.86		V
		$T_{vj} = 150°C$			1.92		V
Gate threshold voltage 栅极阈值电压	$I_C = 2mA$, $V_{CE} = V_{GE}$, $T_{vj} = 25°C$		$V_{GE,th}$	5.0	5.5	6.0	V
Gate charge 栅极电荷	$V_{GE} = -15\ V ... +15\ V$		Q_G		1.96		μC
Internal gate resistor 内部栅极电阻	$T_{vj} = 25°C$		R_{Gint}		1.50		Ω
Input capacitance 输入电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		55.2		nF
Reverse transfer capacitance 反向传输电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		0.44		nF
Collector-emitter cut-off current 集电极-发射极截止电流	$V_{CE} = 1200\ V$, $V_{GE} = 0\ V$, $T_{vj} = 25°C$		I_{CES}			2	mA
Gate-emitter leakage current 栅极-发射极漏电流	$V_{CE} = 0\ V$, $V_{GE} = 20\ V$, $T_{vj} = 25°C$		I_{GES}			200	nA
Turn-on delay time, inductive load 开通延迟时间	$I_C = 200A$, $V_{CE} = 600V$	$T_{vj} = 25°C$	$t_{d,on}$		0.13		us
	$V_{GE} = +15/-15V$	$T_{vj} = 125°C$			0.14		us
	$R_{G,on}$ =4.1Ω	$T_{vj} = 150°C$			0.14		us
Rise time, inductive load 上升时间	$I_C = 200A$, $V_{CE} = 600V$	$T_{vj} = 25°C$	t_r		0.06		us
	$V_{GE} = +15/-15V$	$T_{vj} = 125°C$			0.07		us
	$R_{G,on}$ =4.1Ω	$T_{vj} = 150°C$			0.07		us

(table continues...) 待续

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Turn-off delay time, inductive load 关断延迟时间	I_C = 200A, V_{CE} = 600V	T_{vj} = 25°C	$t_{d,off}$		0.31		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.34		us
	$R_{G,off}$ = 4.1Ω	T_{vj} = 150°C			0.34		us
Fall time, inductive load 下降时间	I_C = 200A, V_{CE} = 600V	T_{vj} = 25°C	t_f		0.22		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.25		us
	$R_{G,off}$ = 4.1Ω	T_{vj} = 150°C			0.27		us
Turn-on energy loss per pulse 开通损耗能量	I_C = 200A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C	E_{on}		14.10		mJ
	V_{GE} = +15/-15V, di/dt =2200A/µs	T_{vj} = 125°C			20.90		mJ
	$R_{G,on}$ = 4.1Ω (T_{vj} = 150°C)	T_{vj} = 150°C			24.38		mJ
Turn-off energy loss per pulse 关断损耗能量	I_C = 200A, V_{CE} = 600V, L_s=20nH	T_{vj} = 25°C	E_{off}		13.52		mJ
	V_{GE} = +15/-15V, dv/dt =7500V/µs	T_{vj} = 125°C			14.58		mJ
	$R_{G,off}$ = 4.1Ω (T_{vj} = 150°C)	T_{vj} = 150°C			15.90		mJ
SC data 短路数据	V_{GE} ≤15V, V_{CC} =600 V, t_P ≤ 8 µs, T_{vj} = 150°C , C_{GE} = 0.0uF , V_{CEmax} = V_{CES} - L_{sCE} · di/dt		I_{SC}		1160		A
Thermal resistance, junction to case 结—外壳热阻	Per IGBT		$R_{th,JC}$			0.12	K/W

5. Diode

5.1 Maximum rated values

Parameter	Note or test condition	Symbol	Values	Unit
Repetitive peak reverse voltage 反向重复峰值电压	T_{vj} = 25°C	V_{RRM}	1200	V
Continuous DC forward current 连续正向直流电流		I_F	200	A
Repetitive peak forward current 正向重复峰值电流	t_P = 1 ms	I_{FRM}	400	A

5.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage 正向电压	I_F = 200A, V_{GE} = 0 V	T_{vj} = 25°C	V_F		2.10	2.42	V
		T_{vj} = 125°C			2.08		V
		T_{vj} = 150°C			1.99		V

(table continues...) 待续

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Peak reverse recovery current 反向恢复峰值电流	I_F = 200A, V_R = 600V	T_{vj} = 25°C	I_{RM}		159		A
	V_{GE} = -15V , - di_F/dt = 1140 A/μs	T_{vj} = 125°C			171		A
	(T_{vj}=150°C)	T_{vj} = 150°C			179		A
Recovered charge 恢复电荷	I_F = 200A, V_R = 600V	T_{vj} = 25°C	Q_r		13.9		μC
	V_{GE} = -15V , - di_F/dt = 1140 A/μs	T_{vj} = 125°C			18.8		μC
	(T_{vj}=150°C)	T_{vj} = 150°C			25.2		μC
Reverse recovery energy 反向恢复损耗（每脉冲）	I_F = 200A, V_R = 600V	T_{vj} = 25°C	E_{rec}		3.50		mJ
	V_{GE} = -15V , - di_F/dt = 1140 A/μs	T_{vj} = 125°C			4.40		mJ
	(T_{vj}=150°C)	T_{vj} = 150°C			6.00		mJ
Thermal resistance, junction to case 结－外壳热阻	Per diode		$R_{th,JC}$			0.20	K/W

6. Module

6.1 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage 隔离电压	RMS, f=50HZ,1min	V_{ISOL}			4000	V
Stray inductance module 杂散电感		L_{sCE}		20		nH
Operation Junction Temperature 结温		T_{jop}	-40		150	°C
Storage Temperature Range 存储温度范围		T_{stg}	-40		125	°C
Mounting Torque 安装扭矩	Screw M6	M	3		6	N.m
Terminal Connection Torque 端子连接扭矩	Screw M6	M	2.5		5	N.m
Weight of Module 重量		G		340		g

VAHNDER

7. Characteristics diagrams

Output characteristic IGBT (typical)
$I_C = f (V_{CE})$
$V_{GE} = 15V$

Output characteristic IGBT (typical)
$I_C = f (V_{CE})$
$T_{vj} = 150°C$

Transfer characteristic IGBT (typical)
$I_C = f (V_{GE})$
$V_{CE} = 20V$

Switching losses IGBT (typical)
$E_{on} = f (I_C)$, $E_{off} = f (I_C)$
$R_{Goff} = 4.1 \, \Omega$, $R_{Gon} = 4.1 \, \Omega$, $V_{CE} = 600 \, V$, $V_{GE} = \pm 15 \, V$
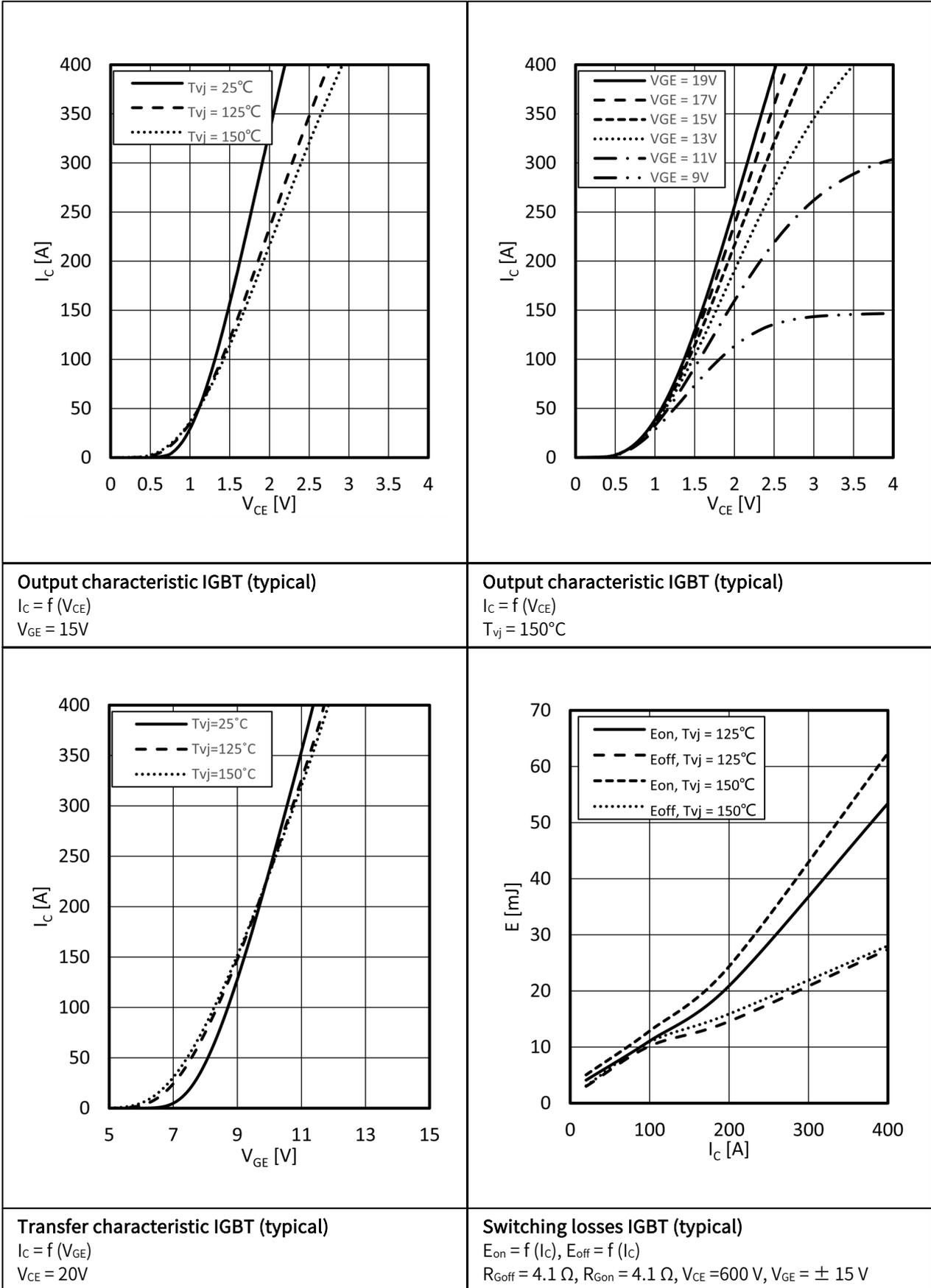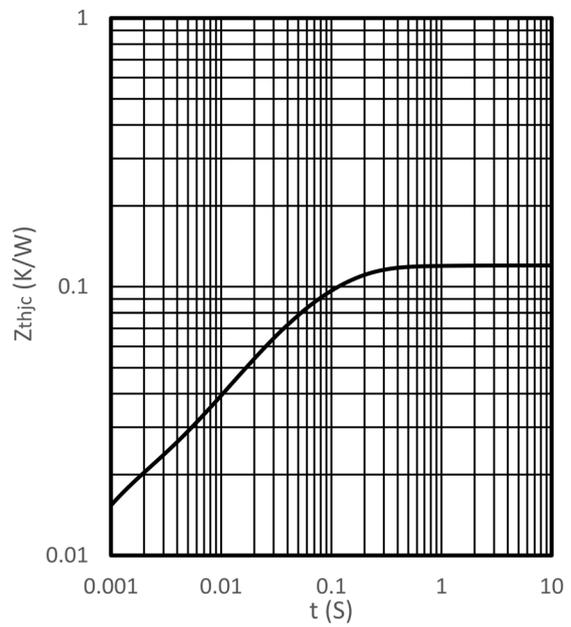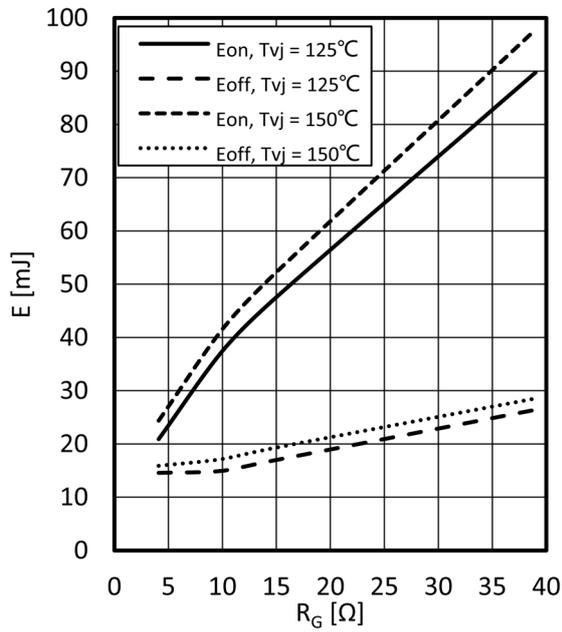
Switching losses IGBT (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$I_C = 200$ A, $V_{CE} = 600$ V, $V_{GE} = \pm 15$ V

Transient thermal impedance IGBT
$Z_{thJC} = f(t)$
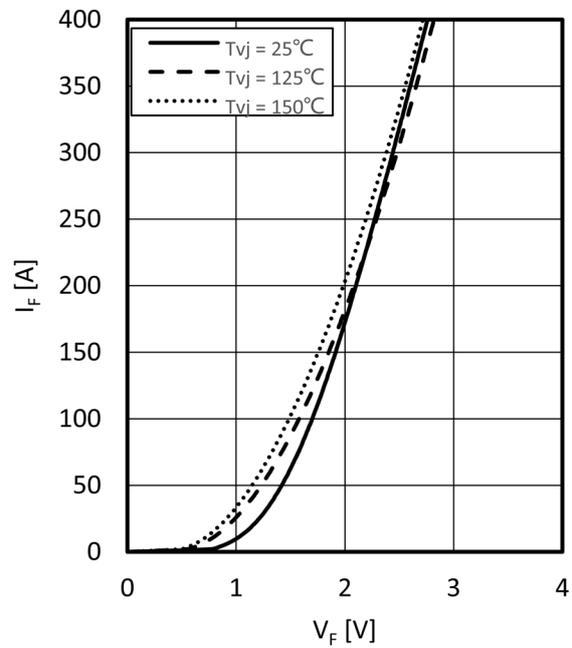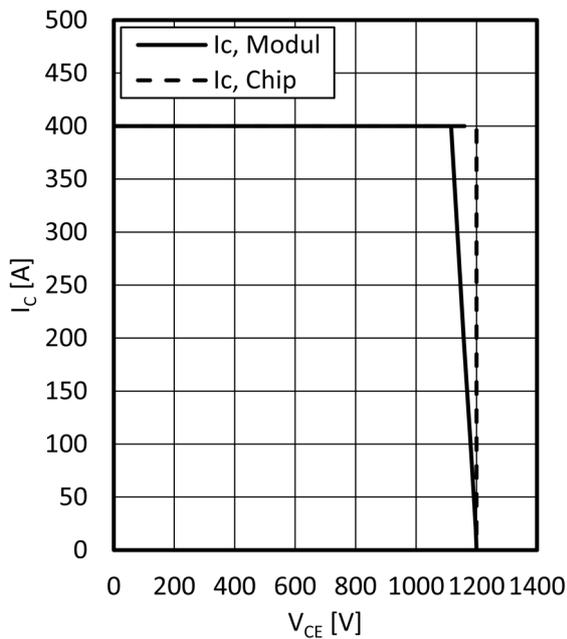
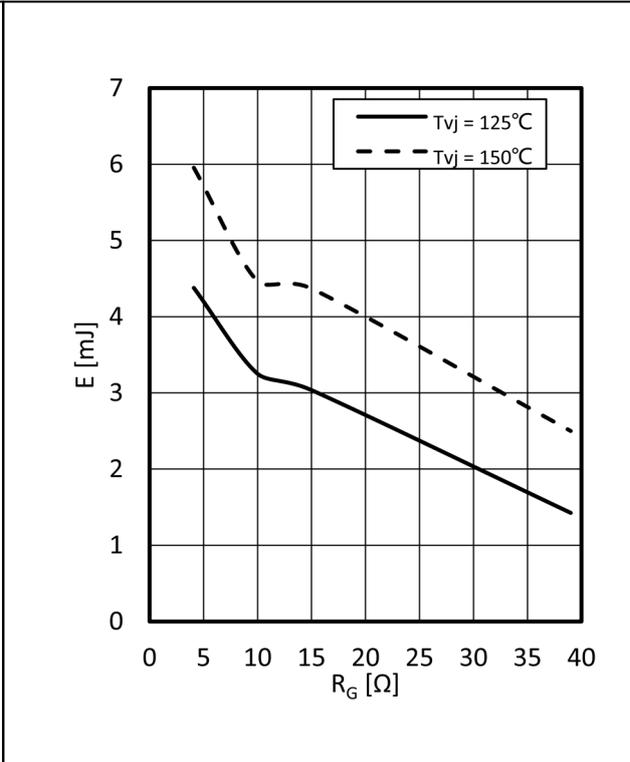**Reverse bias safe operating area IGBT(RBSOA)**
$I_C = f(V_{CE})$
$V_{GE} = \pm15$ V, $R_{Goff} = 4.1$ Ω, $T_{vj} = 150$°C
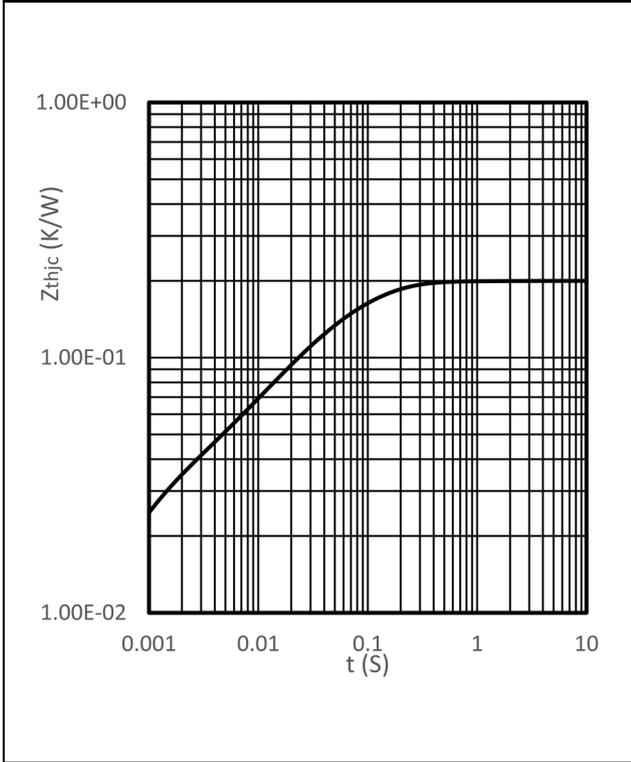

Forward characteristic of Diode (typical)
$I_F = f(V_F)$

Technical datasheet
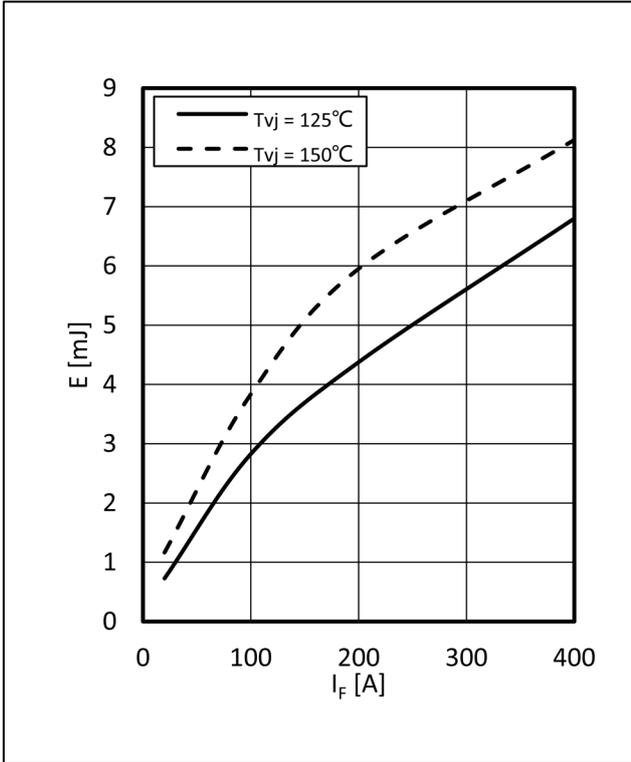
Switching losses Diode (typical)
$E_{rec} = f(I_F)$
$R_{Gon} = 4.1\ \Omega$, $V_{CE} = 600\ V$

Switching losses Diode (typical)
$E_{rec} = f(R_G)$
$I_F = 200\ A$, $V_{CE} = 600\ V$

Transient thermal impedance Diode
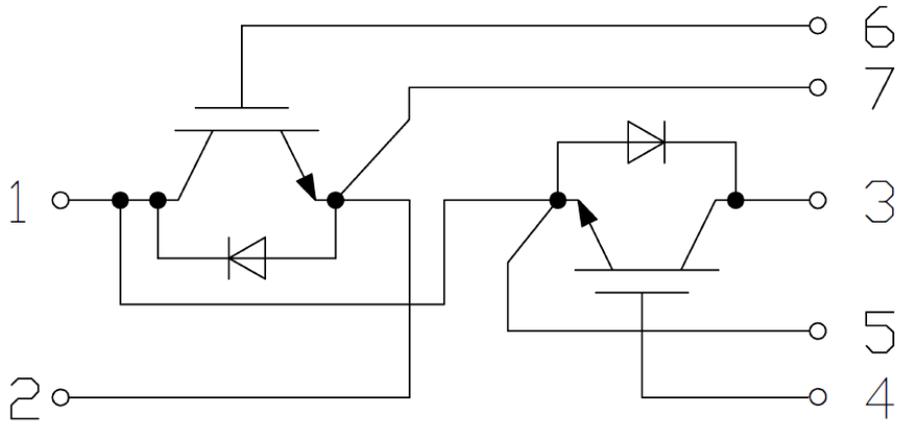$Z_{thJC} = f(t)$

8. Circuit Diagram
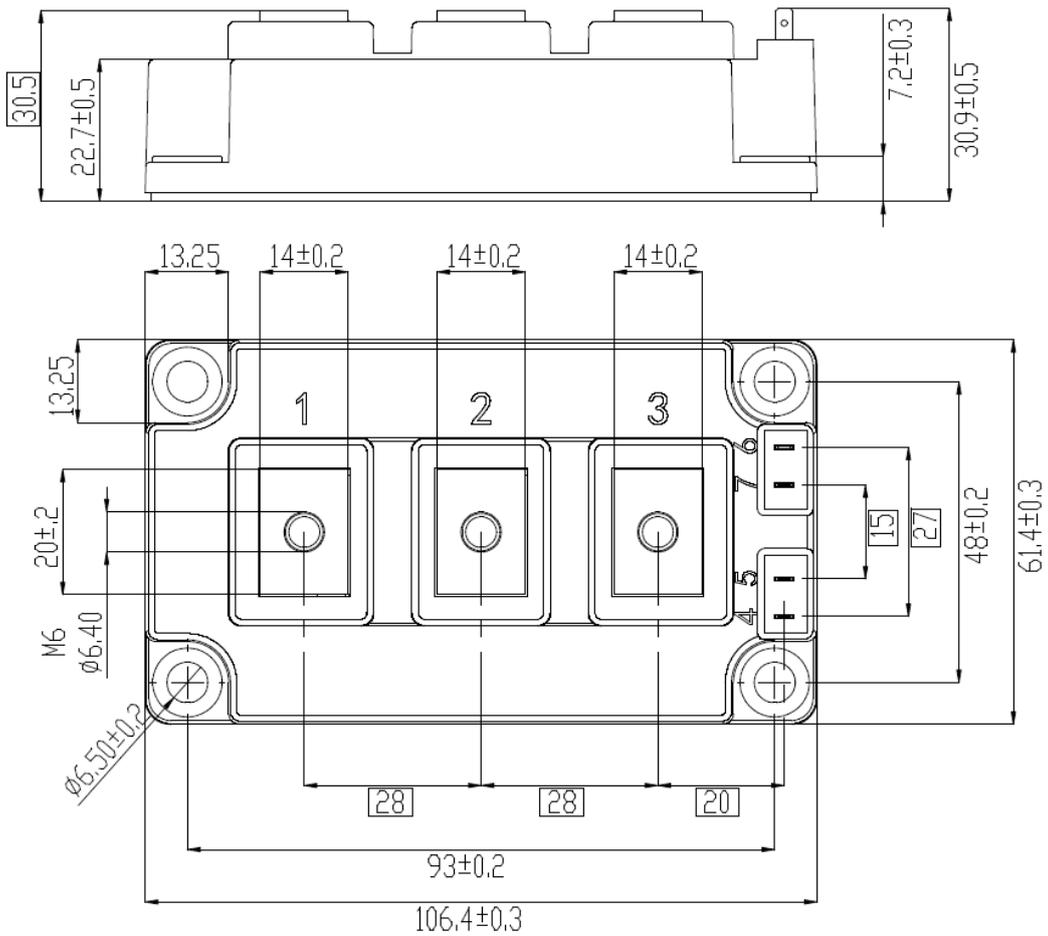

Figure 3

9. Package Outlines

Figure 4