1. Product Features

1.1 Electrical features

- V_{CES}=650V
- $I_{C\,nom}$=100A / I_{CRM}=200A
- Low switching losses
- Low inductance
- Fast switching and short tail current
- High power and thermal cycling capability

Figure1 IGBT Module

1.2 Mechanical features

- Al_2O_3 substrate with low thermal resistance
- Copper base plate

2. Typical Applications

- Switching mode power supply
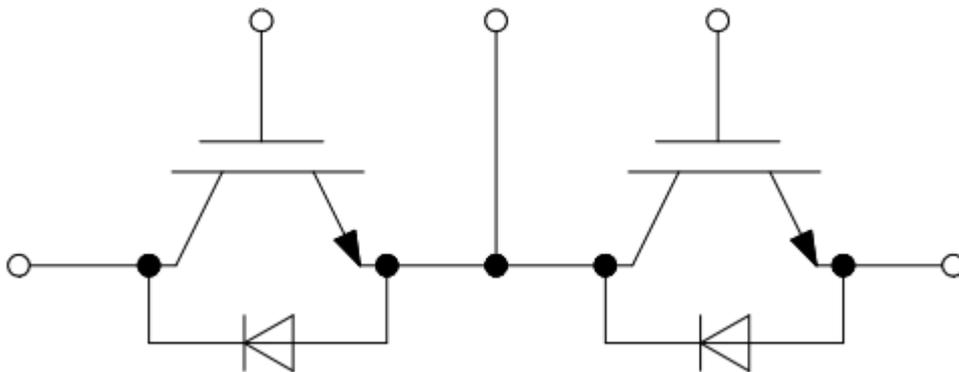- Uninterruptible power supply

3. Description

Figure 2 Half Bridge

4. IGBT

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}	650	V
Continuous DC collector current 连续集电极电流	$T_C = 75°C$, $T_{vj\ max} = 150°C$	$I_{C\ nom}$	100	A
Repetitive peak collector current 集电极峰值电流	$t_P = 1$ ms	I_{CRM}	200	A
Total power dissipation 总功率损耗	$T_C = 25°C$, $T_{vj\ max} = 175°C$	P_{tot}	440	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	$I_C = 100$ A, $V_{GE} = 15$ V	$T_{vj} = 25°C$	$V_{CE,sat}$		1.37		V
		$T_{vj} = 125°C$			1.47		V
		$T_{vj} = 150°C$			1.51		V
Gate threshold voltage 栅极阈值电压	$I_C = 1.5$mA, $V_{CE} = V_{GE}$, $T_{vj} = 25°C$		$V_{GE,th}$	5.0	5.7	6.5	V
Gate charge 栅极电荷	$V_{GE} = -15$ V ... $+15$ V		Q_G		0.48		μC
Internal gate resistor 内部栅极电阻	$T_{vj} = 25°C$		R_{Gint}		2.60		Ω
Input capacitance 输入电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		0.89		nF
Reverse transfer capacitance 反向传输电容	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		0.08		nF
Collector-emitter cut-off current 集电极-发射极截止电流	$V_{CE} = 650$ V, $V_{GE} = 0$ V, $T_{vj} = 25°C$		I_{CES}		0.5		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}			100	nA
Turn-on delay time, inductive load 开通延迟时间	$I_C = 100$A, $V_{CE} = 300$V $V_{GE} = +15/-15$V $R_{G,on} = 1$Ω	$T_{vj} = 25°C$	$t_{d,on}$		0.05		us
		$T_{vj} = 125°C$			0.06		us
		$T_{vj} = 150°C$			0.06		us
Rise time, inductive load 上升时间	$I_C = 100$A, $V_{CE} = 300$V $V_{GE} = +15/-15$V $R_{G,on} = 1$Ω	$T_{vj} = 25°C$	t_r		0.03		us
		$T_{vj} = 125°C$			0.03		us
		$T_{vj} = 150°C$			0.04		us

(table continues...) 待续

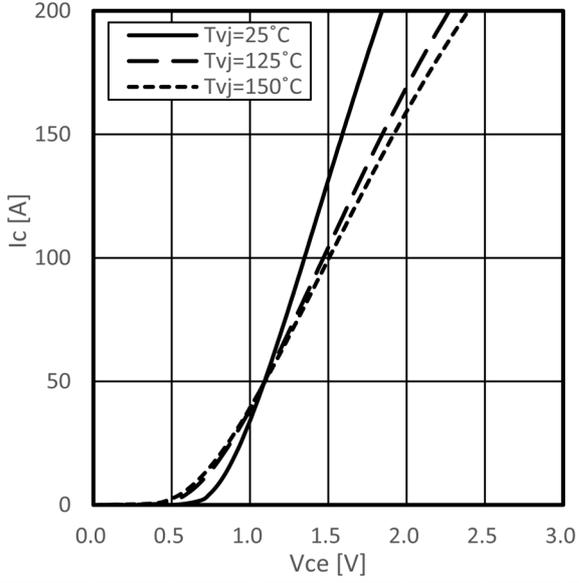| Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Turn-off delay time, inductive load 关断延迟时间	I_C = 100A, V_{CE} = 300V	T_{vj} = 25°C	$t_{d,off}$		0.13		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.16		us
	$R_{G,on}$ = 1Ω	T_{vj} = 150°C			0.17		us
Fall time, inductive load 下降时间	I_C = 100A, V_{CE} = 300V	T_{vj} = 25°C	t_f		0.13		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.18		us
	$R_{G,on}$ = 1Ω	T_{vj} = 150°C			0.19		us
Turn-on energy loss per pulse 开通损耗能量	I_C = 100A, V_{CE} = 300V, L_s=60nH	T_{vj} = 25°C	E_{on}		0.10		mJ
	V_{GE} = +15/-15V, di/dt =3389A/μs	T_{vj} = 125°C			0.32		mJ
	$R_{G,on}$ = 1Ω (T_{vj} = 150°C)	T_{vj} = 150°C			0.40		mJ
Turn-off energy loss per pulse 关断损耗能量	I_C = 100A, V_{CE} = 300V, L_s=60nH	T_{vj} = 25°C	E_{off}		4.77		mJ
	V_{GE} = +15/-15V, dv/dt =3906V/μs	T_{vj} = 125°C			6.18		mJ
	$R_{G,off}$ = 1Ω (T_{vj} = 150°C)	T_{vj} = 150°C			6.49		mJ
SC data 短路数据	V_{GE} ≤15V, V_{CC} =300 V, t_P ≤ 6 μs, T_{vj} = 150°C , C_{GE} = 0.0uF , V_{CEmax} = V_{CES} - L_{sCE} · di/dt		I_{SC}		1836		
Thermal resistance, junction to case 结—外壳热阻	Per IGBT		$R_{th,JC}$			0.34	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}	650	V
Continuous DC forward current 连续正向直流电流		I_F	100	A
Repetitive peak forward current 正向重复峰值电流	t_P = 1 ms	I_{FRM}	200	A

5.2 Characteristic value

| Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Forward voltage 正向电压	I_F = 100 A, V_{GE} = 0 V	T_{vj} = 25°C	V_F		1.63		V
		T_{vj} = 125°C			1.38		V
		T_{vj} = 150°C			1.32		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	$I_F = 100A$, $V_R = 300V$	$T_{vj} = 25°C$	I_{RM}		38.3		A
	$V_{GE} = -15V$, $-di_F/dt = 1139 A/\mu s$	$T_{vj} = 125°C$			110.8		A
	($T_{vj}=150°C$)	$T_{vj} = 150°C$			125.0		A
Recovered charge 恢复电荷	$I_F = 100A$, $V_R = 300V$	$T_{vj} = 25°C$	Q_r		7.76		μC
	$V_{GE} = -15V$, $-di_F/dt = 1139 A/\mu s$	$T_{vj} = 125°C$			10.1		μC
	($T_{vj}=150°C$)	$T_{vj} = 150°C$			11.7		μC
Reverse recovery energy 反向恢复损耗（每脉冲）	$I_F = 100A$, $V_R = 300V$	$T_{vj} = 25°C$	E_{rec}		2.31		mJ
	$V_{GE} = -15V$, $-di_F/dt = 1139 A/\mu s$	$T_{vj} = 125°C$			2.89		mJ
	($T_{vj}=150°C$)	$T_{vj} = 150°C$			3.34		mJ
Thermal resistance, junction to case 结－外壳热阻	Per diode		$R_{th,JC}$			0.64	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}		30		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	3.0		5.0	N.m
Terminal Connection Torque 端子扭矩	Screw M5	M	2.5		5.0	N.m
Weight of Module 重量		G		160		g

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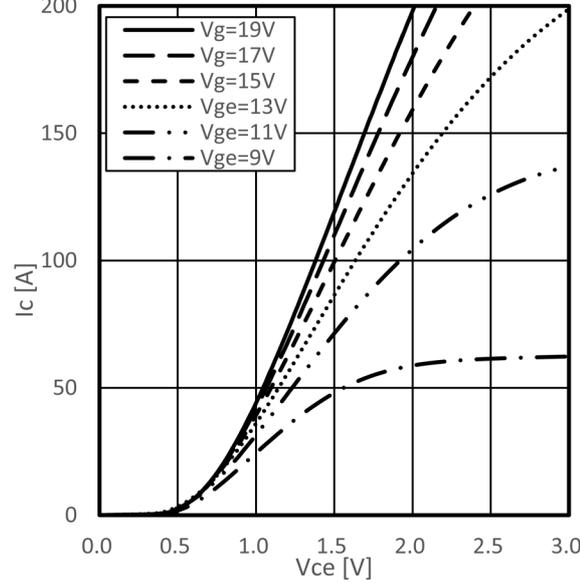
Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15V$

Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150°C$
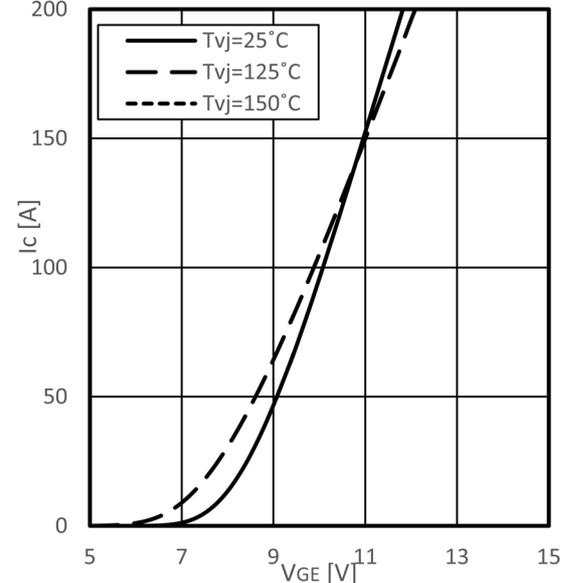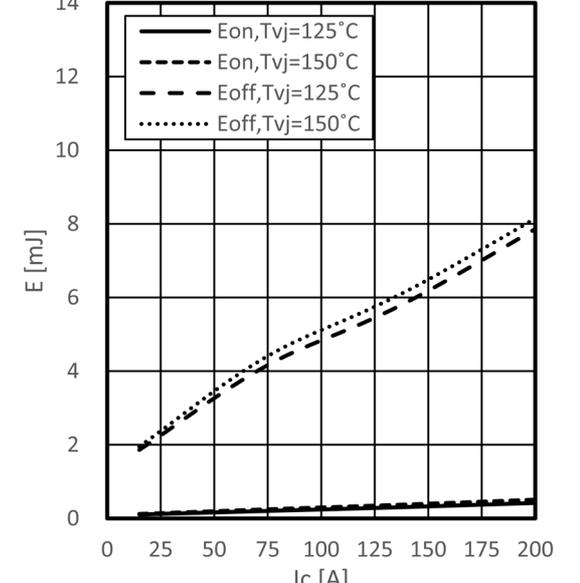
Transfer characteristic IGBT (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20V$

Switching losses IGBT (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
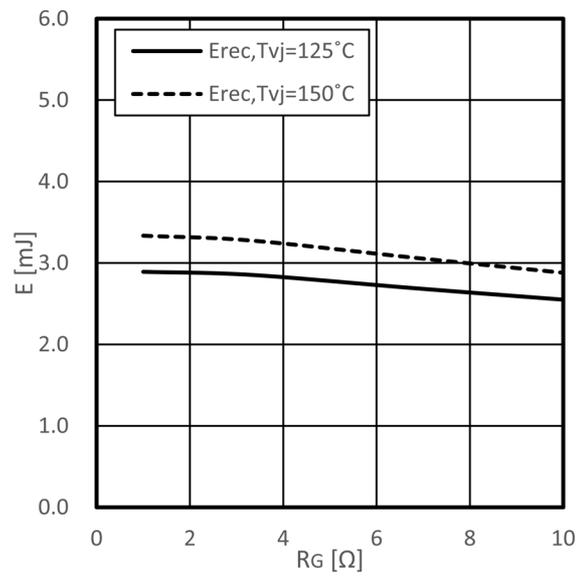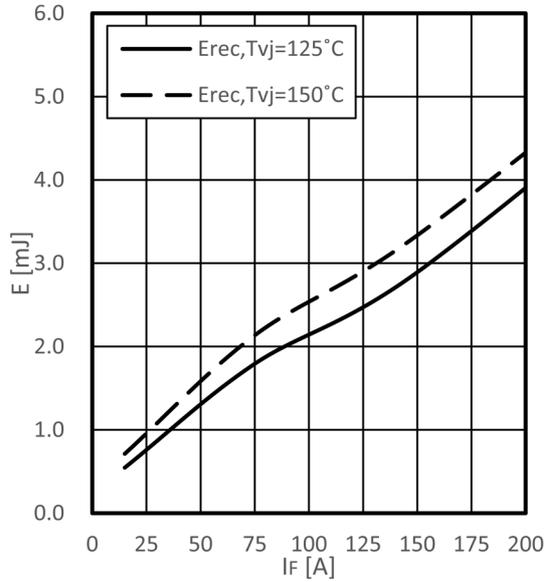$R_{Goff} = 1\ \Omega$, $R_{Gon} = 1\ \Omega$, $V_{CE} = 300\ V$, $V_{GE} = \pm 15\ V$
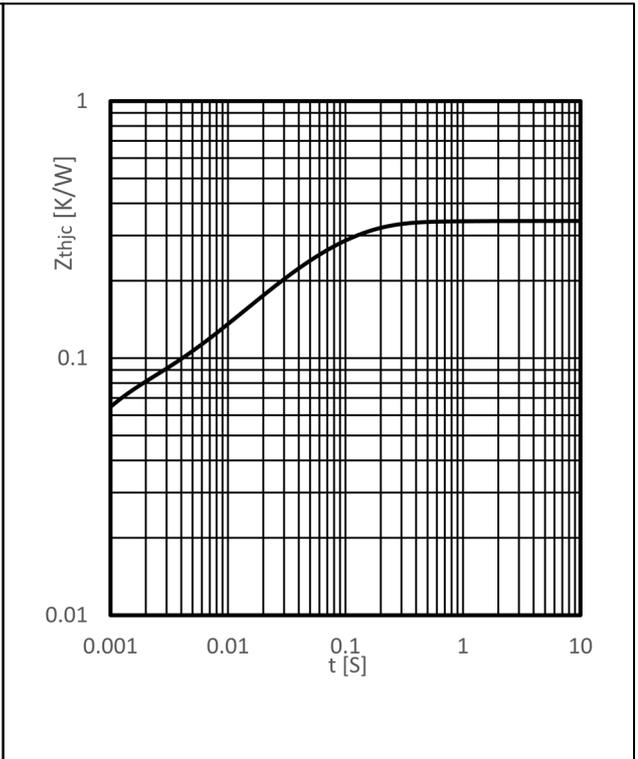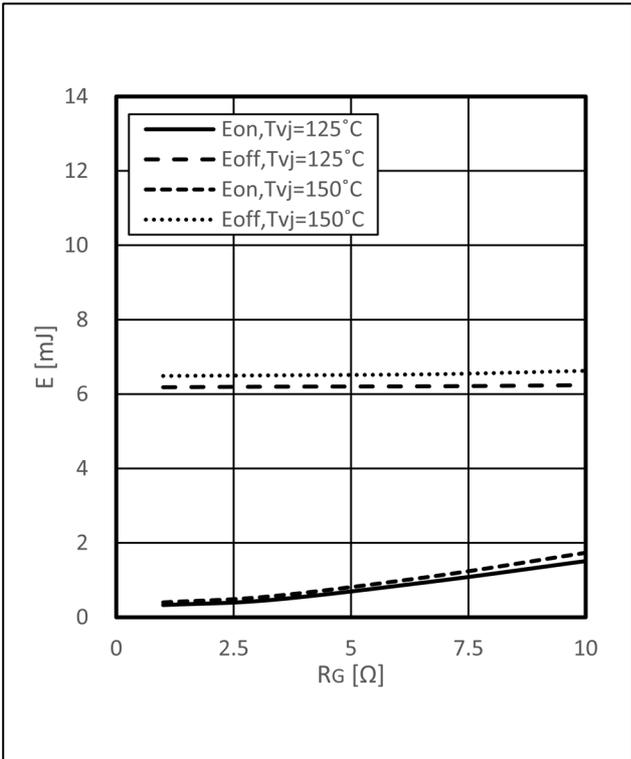
Switching losses IGBT (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$I_C = 100\ A$, $V_{CE} = 300\ V$, $V_{GE} = \pm\ 15\ V$

Transient thermal impedance IGBT
$Z_{thJC} = f(t)$
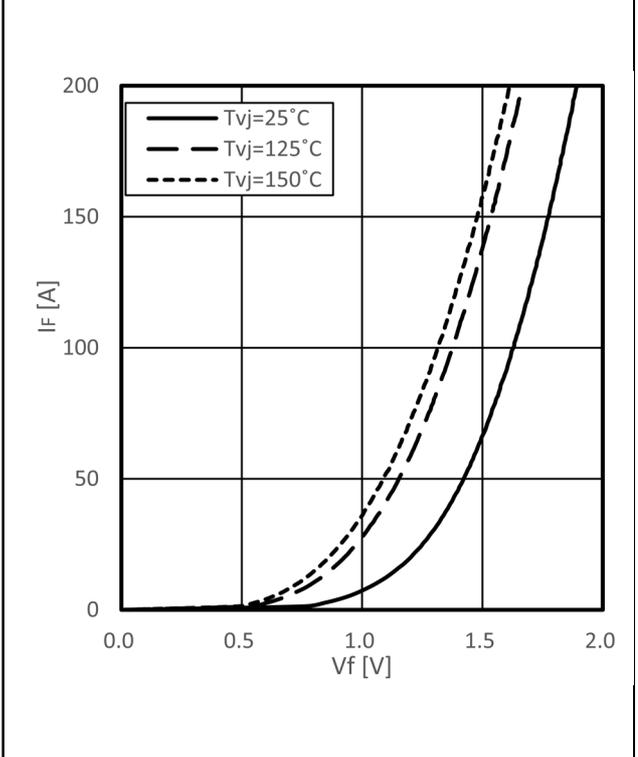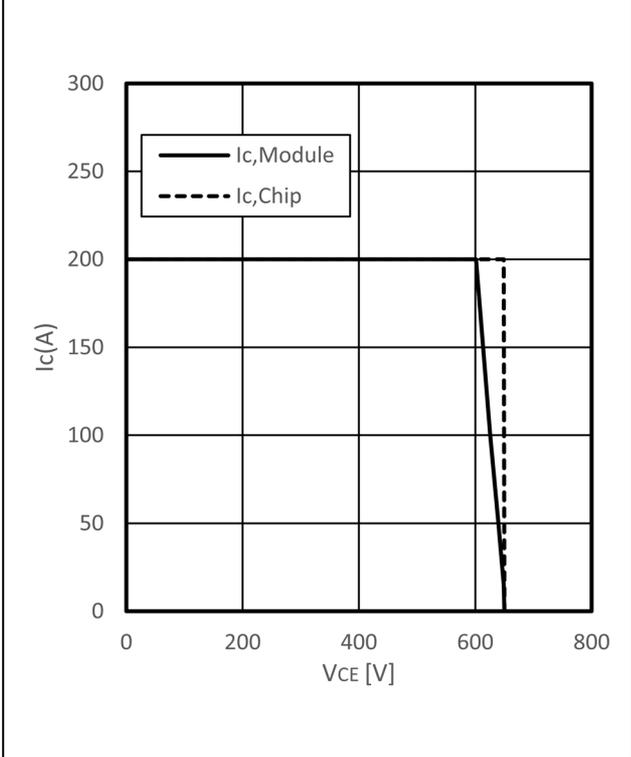
Reverse bias safe operating area IGBT (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = 15\ V$, $R_{Goff} = 1\ \Omega$, $T_{vj} = 150\ °C$

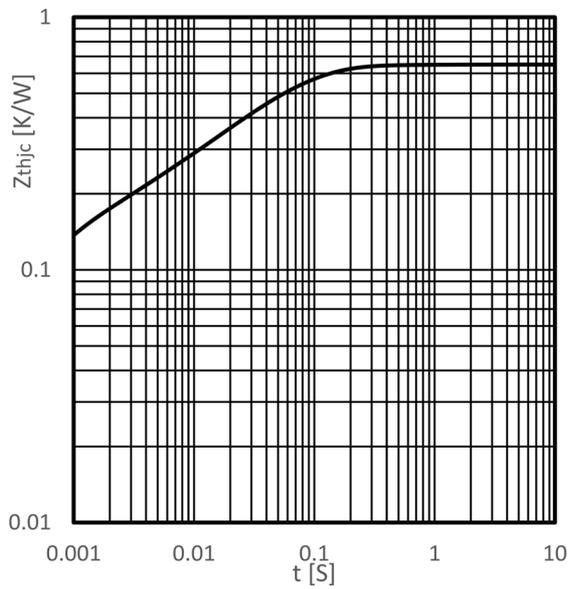## Forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$

Switching losses Diode (typical)
$E_{rec} = f (I_F)$
$R_{Gon} = 1\ \Omega$, $V_{CE} = 300\ V$

Switching losses Diode (typical)
$E_{on} = f (R_G)$, $E_{off} = f (R_G)$
$I_C = 100\ A$, $V_{CE} = 300\ V$, $V_{GE} = \pm\ 15\ V$

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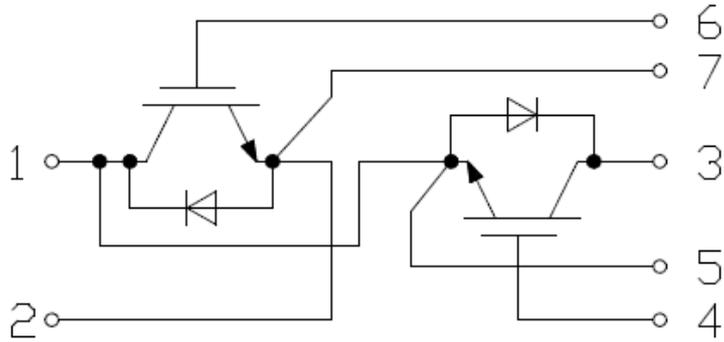$Z_{thJC} = f (t)$

8. Circuit Diagram

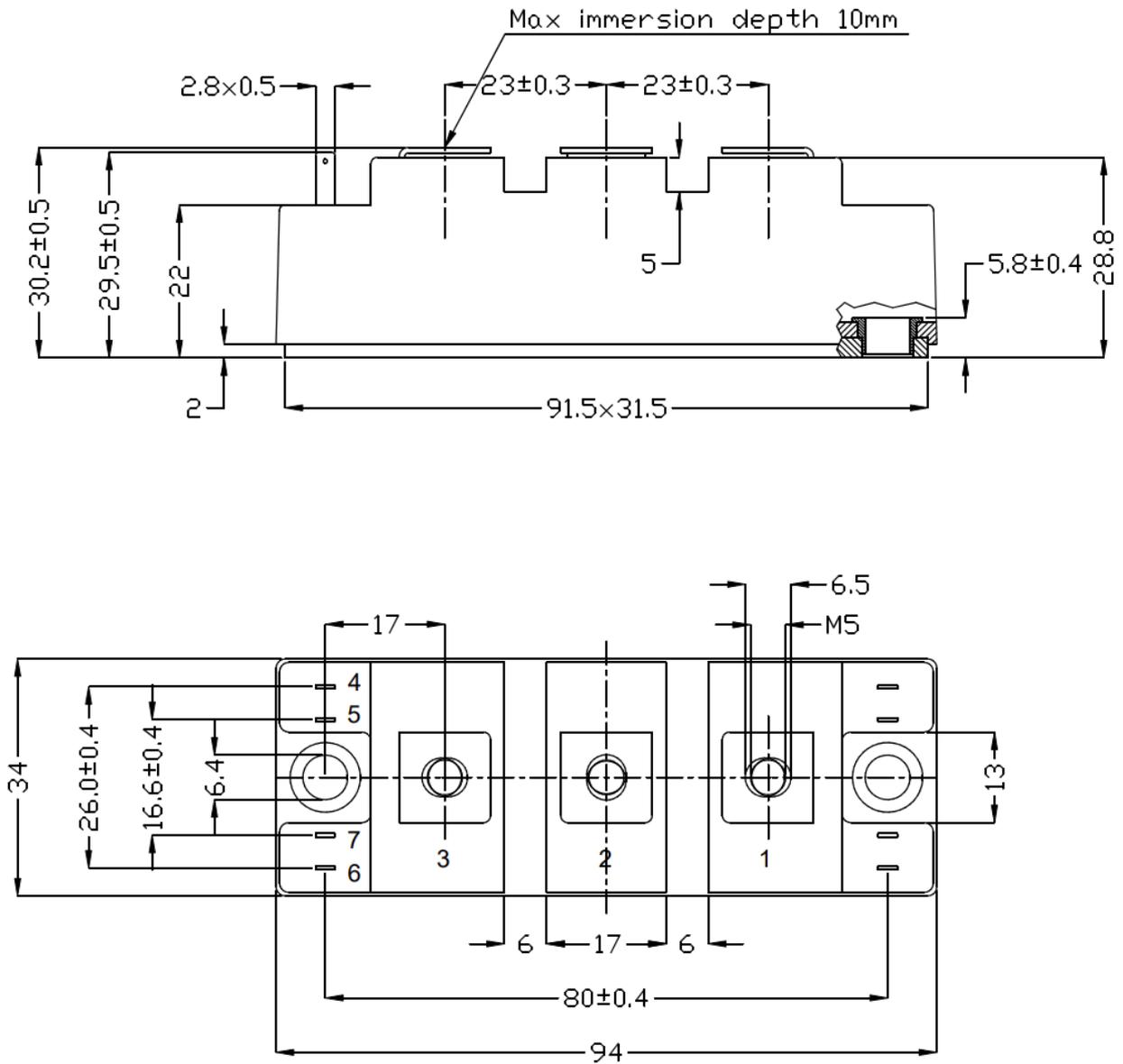**Figure 3**

9. Package Outlines

Figure 4