1. Product Features

1.1 Electrical features

- V_{CES}=1200V
- $I_{C\ nom}$=150A / I_{CRM}=300A
- 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

- High Frequency Switching Application
- Motor drives
- UPS system

3. Description

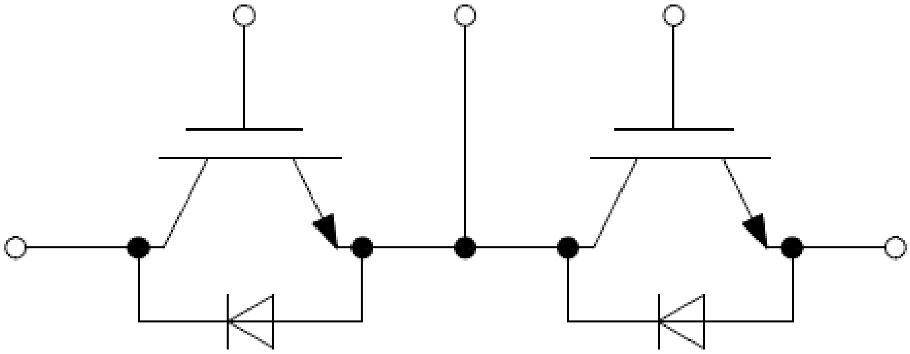


Figure 2 Half Bridge

4. IGBT, Inverter

4.1 Maximum Rated Values

Parameter	Note or test condition	Symbol	Values	Unit
Collector-emitter voltage	T_{vj} = 25℃	V_{CES}	1200	V
Continuous DC collector current	T_C = 100℃, T_{vj} max = 150℃	$I_{C\ nom}$	150	A

Repetitive peak collector current	t_P = 1 ms	I_{CRM}	300	A
Total power dissipation	T_C = 25°C, $T_{vj\ max}$ = 175°C	P_{tot}	567	W
Gate-emitter peak voltage		V_{GES}	+/- 20	V

4.2 Characteristic value

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage		T_{vj} = 25°C	$V_{CE,sat}$		1.45		V
	I_C = 150 A, V_{GE} = 15 V	T_{vj} = 125°C			1.59		V
		T_{vj} = 150°C			1.63		V
Gate threshold voltage	I_C = 5.7mA, V_{CE} = V_{GE}, T_{vj} = 25°C		$V_{GE,th}$	5.0	5.6	6.5	V
Gate charge	V_{GE} = -15 V ... +15 V		Q_G		1.73		μC
Internal gate resistor	T_{vj} = 25°C		R_{Gint}		2.10		*
Input capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{ies}		21.6		nF
Reverse transfer capacitance	f=1MHz, T_{vj}=25°C, V_{CE}=25V, V_{GE}=0V		C_{res}		0.17		nF
Collector-emitter cut-off current	V_{CE} = 1200 V, V_{GE} = 0 V, T_{vj} = 25°C		I_{CES}			1	mA
Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25°C		I_{GES}			100	nA
Turn-on delay time, inductive load	I_C = 150A, V_{CE} = 600V	T_{vj} = 25°C	$T_{d,on}$		0.31		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.32		us
	$R_{G,on}$ = 10Ω	T_{vj} = 150°C			0.32		us
Rise time, inductive load	I_C = 150A, V_{CE} = 600V	T_{vj} = 25°C	T_r		0.06		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.08		us
	$R_{G,on}$ = 10Ω	T_{vj} = 150°C			0.09		us

(table continues...)

Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Turn-off delay time, inductive load	I_C = 150A, V_{CE} = 600V	T_{vj} = 25°C	$T_{d,off}$		0.56		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.63		us
	$R_{G,on}$ = 10Ω	T_{vj} = 150°C			0.64		us
Fall time, inductive load	I_C = 150A, V_{CE} = 600V	T_{vj} = 25°C	T_f		0.26		us
	V_{GE} = +15/-15V	T_{vj} = 125°C			0.32		us
	$R_{G,on}$ = 10Ω	T_{vj} = 150°C			0.34		us
Turn-on energy loss per pulse	I_C = 150A, V_{CE} = 600V, L_s=30nH	T_{vj} = 25°C	E_{on}		16.1		mJ
	V_{GE} = +15/-15V, di/dt =1810A/μs	T_{vj} = 125°C			27.5		mJ
	$R_{G,on}$ = 10Ω (T_{vj} = 150°C)	T_{vj} = 150°C			31.2		mJ

Turn-off energy loss per pulse	I_C = 150A, V_{CE} = 600V, L_s=30nH	T_{vj} = 25℃	E_{off}		13.8		mJ
	V_{GE} = +15/-15V, dv/dt =3910V/µs	T_{vj} = 125℃			19.5		mJ
	$R_{G,off}$ = 10Ω (T_{vj} = 150℃)	T_{vj} = 150℃			21.2		mJ
SC data	V_{GE} ≤15V, V_{CC} =600 V, t_P ≤ 8 µs, T_{vj} = 150℃ , C_{GE} = 0.0uF , V_{CEmax} = V_{CES} − L_{sCE} ·di/dt		I_{SC}		1300		A
Thermal resistance, junction to case	Per IGBT		$R_{th,JC}$			0.23	K/W

5. Diode, Inverter

5.1 Maximum Rated Values

Parameter	**Note or test condition**	**Symbol**	**Values**	**Unit**
Repetitive peak reverse voltage	T_{vj} = 25℃	V_{RRM}	1200	V
Continuous DC forward current		I_F	150	A
Repetitive peak forward current	t_P = 1 ms	I_{FRM}	300	A

5.2 Characteristic value

Parameter	**Note or test condition**		**Symbol**	**Values**			**Unit**
				Min.	**Typ.**	**Max.**	
Forward voltage		T_{vj} = 25℃	V_F		2.00		V
	I_F = 150 A, V_{GE} = 0 V	T_{vj} = 125℃			1.64		V
		T_{vj} = 150℃			1.56		V

(table continues...)

Parameter	**Note or test condition**		**Symbol**	**Values**			**Unit**
				Min.	**Typ.**	**Max.**	
Peak reverse recovery current	I_F = 150A, V_R = 600V	T_{vj} = 25℃	I_{RM}		113		A
	V_{GE} = -15V , − di_F/dt = 2100 A/µs	T_{vj} = 125℃			149		A
	$R_{G,off}$ = 10Ω (T_{vj} = 150℃)	T_{vj} = 150℃			157		A
Recovered charge	I_F = 150A, V_R = 600V	T_{vj} = 25℃	Q_r		8.62		µC
	V_{GE} = -15V , − di_F/dt = 2100 A/µs	T_{vj} = 125℃			21.2		µC
	$R_{G,off}$ = 10Ω (T_{vj} = 150℃)	T_{vj} = 150℃			25.4		µC
Reverse recovery energy	I_F = 150A, V_R = 600V	T_{vj} = 25℃	E_{rec}		1.43		mJ
	V_{GE} = -15V , − di_F/dt = 2100 A/µs	T_{vj} = 125℃			4.43		mJ
	$R_{G,off}$ = 10Ω (T_{vj} = 150℃)	T_{vj} = 150℃			5.60		mJ

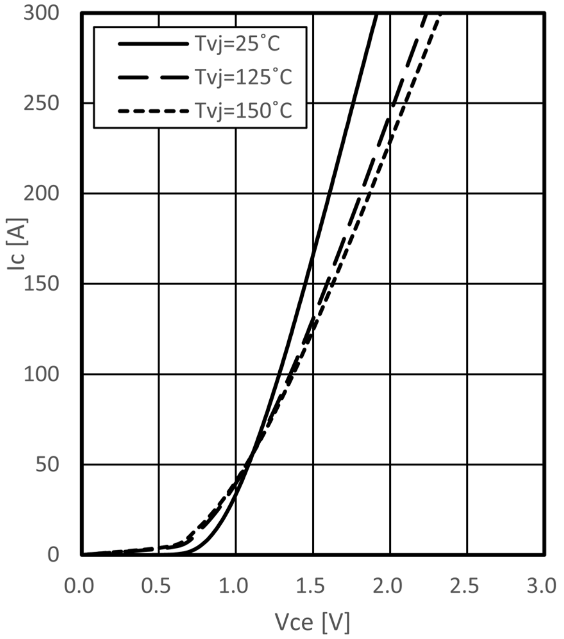
Thermal resistance, junction to case	Per diode	$R_{th,JC}$			0.31	K/W

6. Module

6.1 Characteristic value

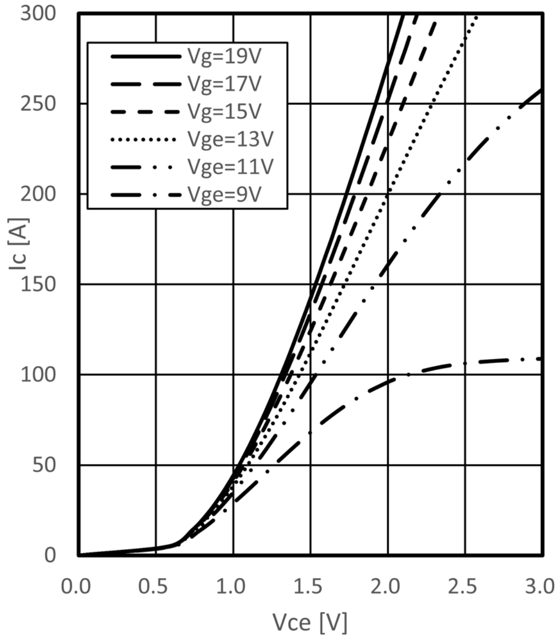
Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage	RMS, f=50HZ,1min	V_{ISOL}			2500	V
Stray inductance module		L_{sCE}		30		nH
Operation Junction Temperature		T_{jop}	-40		150	℃
Storage Temperature Range		T_{stg}	-40		125	℃
Mounting Torque	Screw M6	M	3.0		5.0	N.m
Terminal Connection Torque	Screw M5	M	2.5		5.0	N.m
Weight of Module		G		160		g

7. Characteristics Diagrams



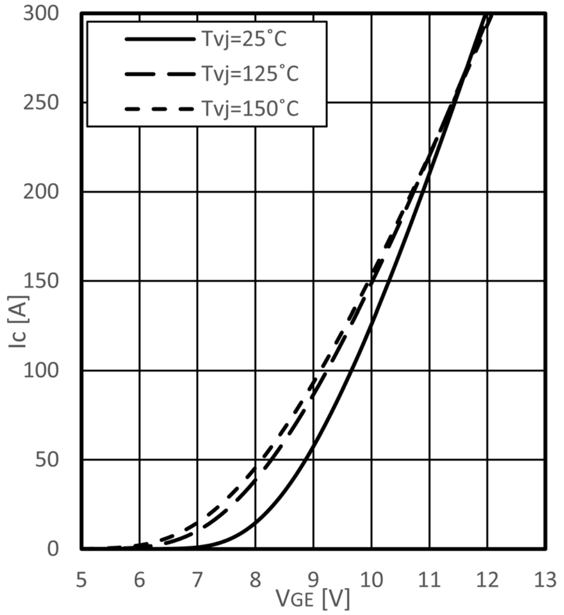
Output characteristic IGBT (typical)

$I_C = f\ (V_{CE})\ V_{GE} = 15V$



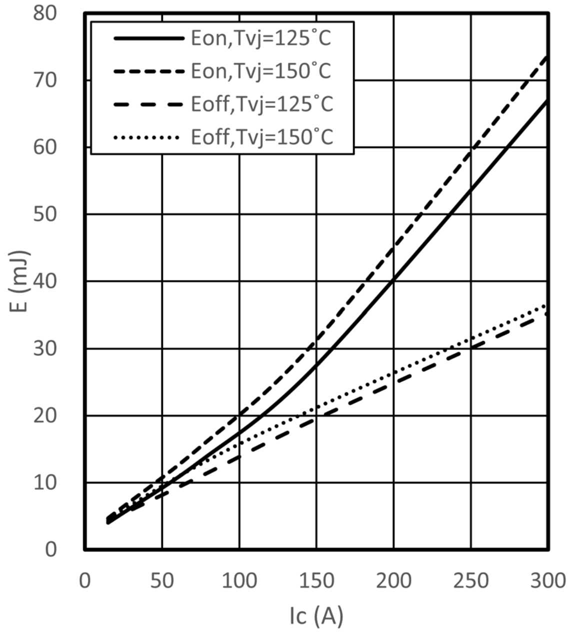
Output characteristic IGBT (typical)

$I_C = f\ (V_{CE})\ T_{vj} = 150℃$



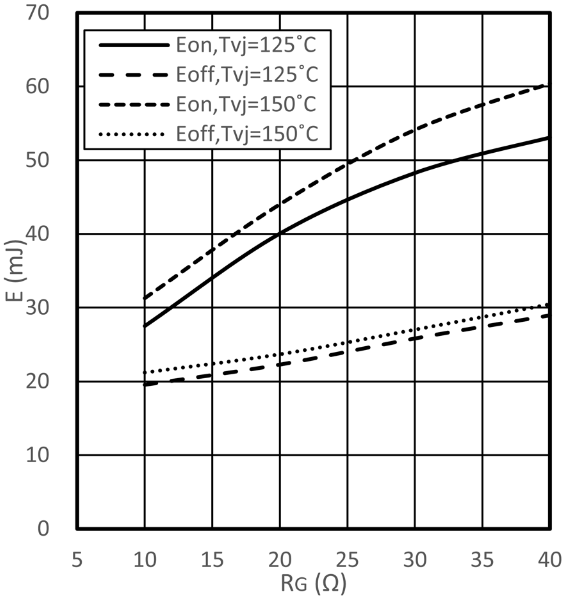
Transfer characteristic IGBT (typical)

$I_C = f\ (V_{GE})\ V_{CE} = 20V$

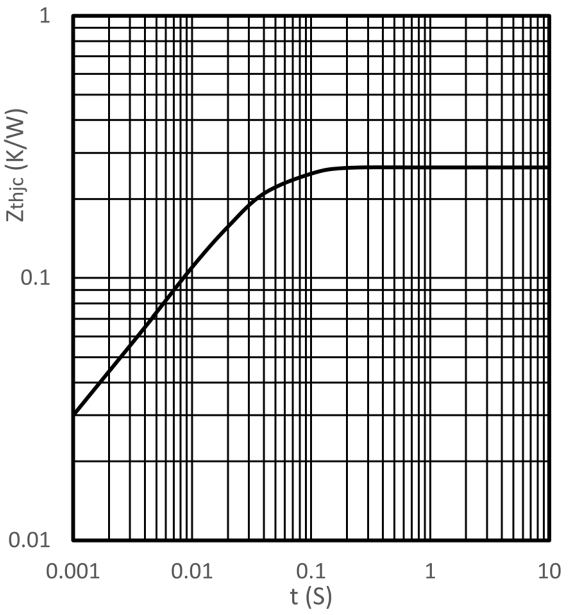


Switching losses IGBT (typical)

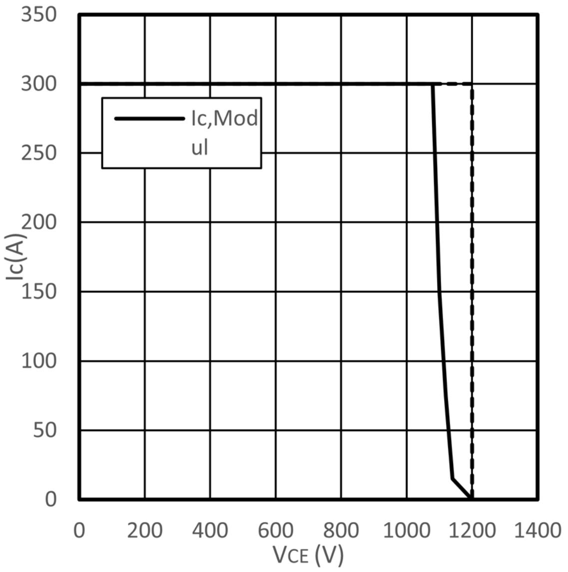
$E_{on}=f\ (I_C),\ E_{off} = f\ (I_C)\ V_{GE} = ±15V,\ R_{Gon} = 10\ Ω\ R_{Goff} = 10\ Ω,\ V_{CE} = 600V$



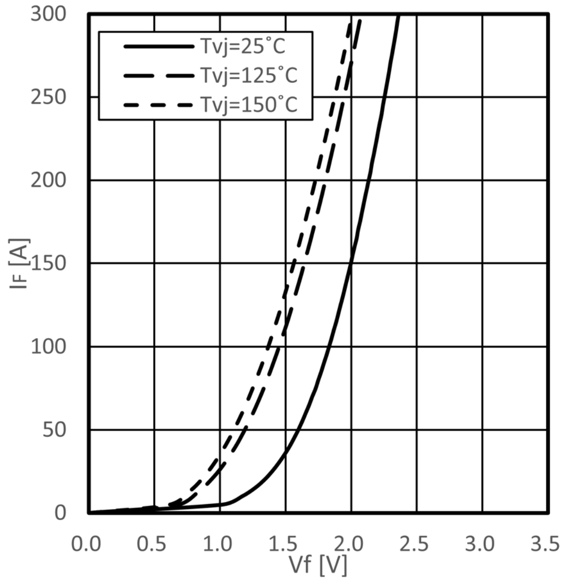
Switching losses IGBT (typical)
E_{on} = f (R_G), E_{off} = f (R_G) V_{GE} = ±15V, I_C = 150A, V_{CE} = 600V



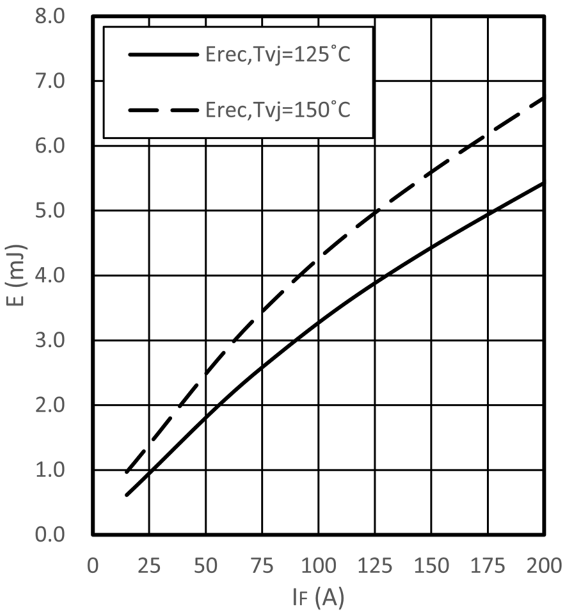
Transient thermal impedance IGBT
Z_{thJC} = f (t)



Reverse bias safe operating area IGBT (RBSOA)
I_C = f (V_{CE}) V_{GE} = ±15V R_{Goff} = 10Ω, T_{vj} = 150℃

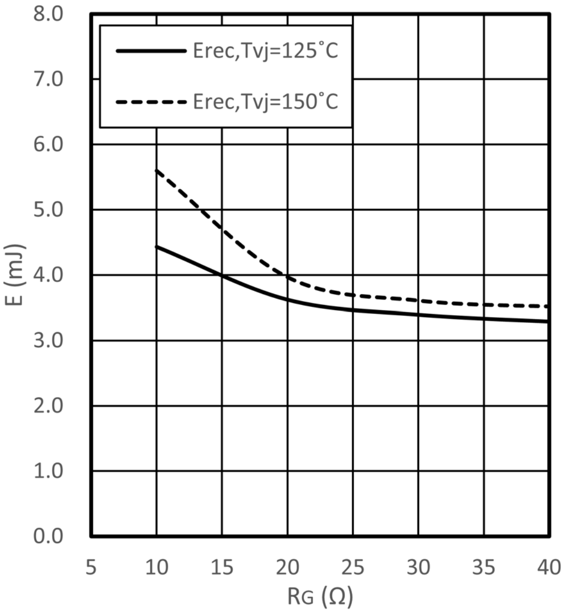


Forward characteristic of Diode (typical)
I_F = f (V_F)



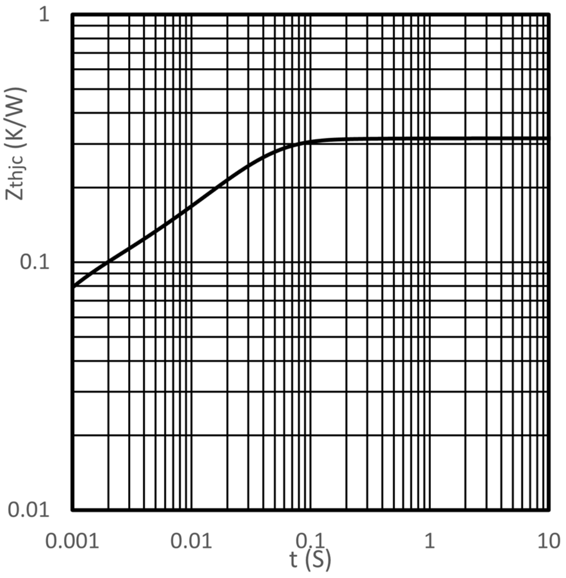
Switching losses Diode (typical)

E_{rec} = f (I_F) , Rg = 10Ω, V_{CE} = 600V



Switching losses Diode (typical)

E_{rec} = f (R_G) I_F = 150 A, V_{CE} = 600V



Transient thermal impedance Diode

Z_{thJC} = f (t)

8. Circuit Diagram

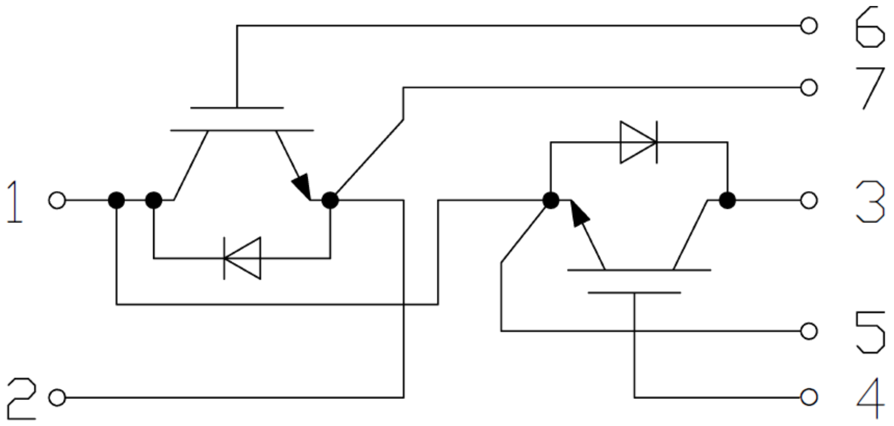


Figure 3

9. Package Outlines

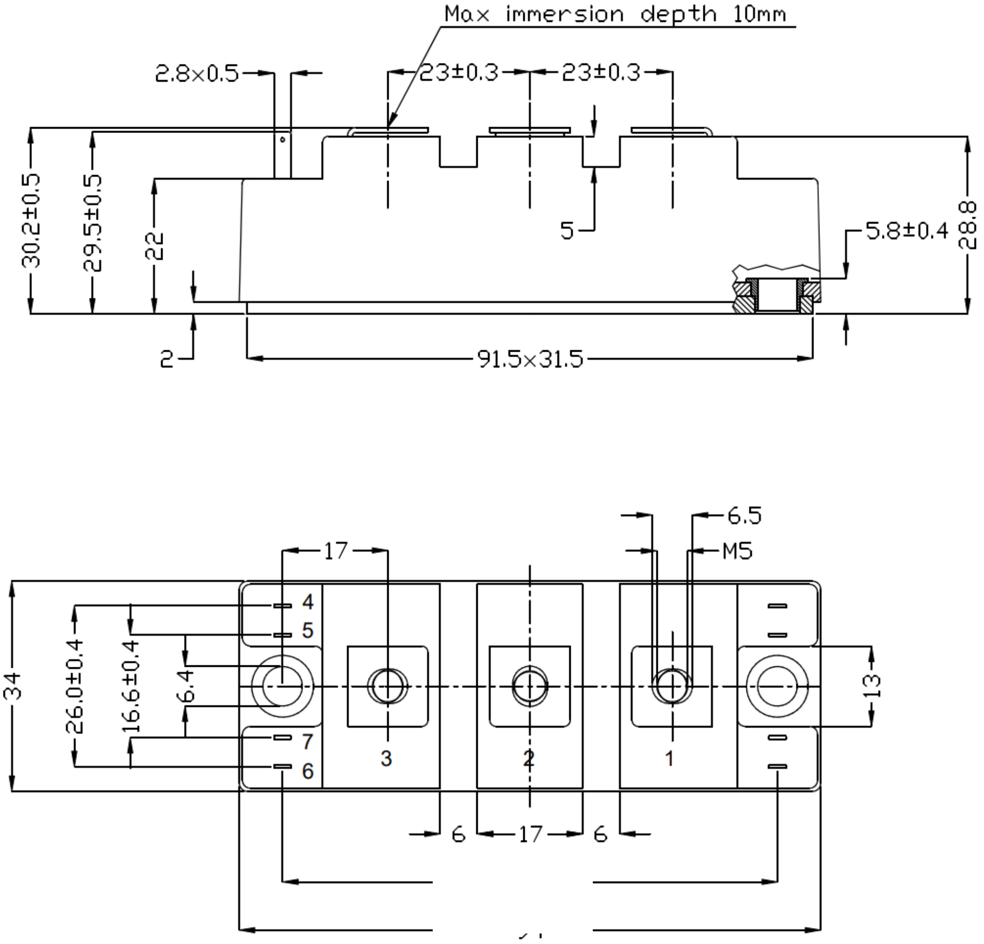


Figure 4