1. Product Features

1.1 Electrical features

- V_{CES}=650V
- $I_{C\ nom}$=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

- Switching mode power supply
- Uninterruptible power supply

3. Description

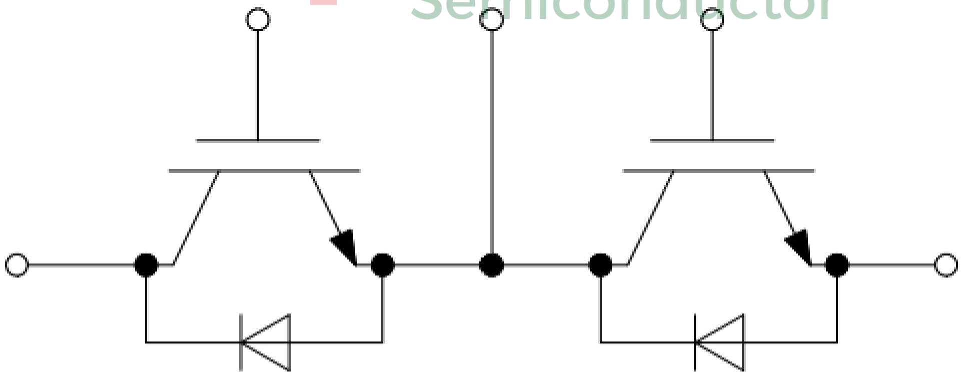


Figure 2 Half Bridge

4. IGBT

4.1 Maximum rated values

Parameter	Note or test condition	Symbol	Values	Unit
Collector-emitter voltage	T_{vj} = 25℃	V_{CES}	650	V
Continuous DC collector current	T_C = 75℃, $T_{vj\ max}$ = 150℃	$I_{C\ nom}$	150	A

Repetitive peak collector current	t_P = 1 ms	I_{CRM}	300	A
Total power dissipation	T_C = 25℃, $T_{vj\ max}$ = 175℃	P_{tot}	440	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	I_C = 150 A, V_{GE} = 15 V	T_{vj} = 25℃	$V_{CE,sat}$		1.37		V
		T_{vj} = 125℃			1.47		V
		T_{vj} = 150℃			1.51		V
Gate threshold voltage	I_C = 1.5mA, V_{CE} = V_{GE}, T_{vj} = 25℃		$V_{GE,th}$	5.0	5.7	6.5	V
Gate charge	V_{GE} = -15 V ... +15 V		Q_G		0.48		μC
Internal gate resistor	T_{vj} = 25℃		R_{Gint}		2.60		*
Input capacitance	f=1MHz, T_{vj}=25℃, V_{CE}=25V, V_{GE}=0V		C_{ies}		0.89		nF
Reverse transfer capacitance	f=1MHz, T_{vj}=25℃, V_{CE}=25V, V_{GE}=0V		C_{res}		0.08		nF
Collector-emitter cut-off current	V_{CE} = 650 V, V_{GE} = 0 V, T_{vj} = 25℃		I_{CES}		0.5		mA
Gate-emitter leakage current	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25℃		I_{GES}			100	nA
Turn-on delay time, inductive load	I_C = 150A, V_{CE} = 300V	T_{vj} = 25℃	$t_{d,on}$		0.05		us
	V_{GE} = +15/-15V	T_{vj} = 125℃			0.06		us
	$R_{G,on}$ =1Ω	T_{vj} = 150℃			0.06		us
Rise time, inductive load	I_C = 150A, V_{CE} = 300V	T_{vj} = 25℃	t_r		0.03		us
	V_{GE} = +15/-15V	T_{vj} = 125℃			0.03		us
	$R_{G,on}$ = 1Ω	T_{vj} = 150℃			0.04		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} = 300V	T_{vj} = 25℃	$t_{d,off}$		0.13		us
	V_{GE} = +15/-15V	T_{vj} = 125℃			0.16		us
	$R_{G,on}$ = 1Ω	T_{vj} = 150℃			0.17		us
Fall time, inductive load	I_C = 150A, V_{CE} = 300V	T_{vj} = 25℃	t_f		0.13		us
	V_{GE} = +15/-15V	T_{vj} = 125℃			0.18		us
	$R_{G,on}$ = 1Ω	T_{vj} = 150℃			0.19		us
Turn-on energy loss per pulse	I_C = 150A, V_{CE} = 300V, L_s=60nH	T_{vj} = 25℃	E_{on}		0.10		mJ
	V_{GE} = +15/-15V, di/dt =3389A/μs	T_{vj} = 125℃			0.32		mJ
	$R_{G,on}$ = 1Ω (T_{vj} = 150℃)	T_{vj} = 150℃			0.40		mJ

Turn-off energy loss per pulse	I_C = 150A, 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	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	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	T_{vj} = 25°C	V_{RRM}	650	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	I_F = 150 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...)

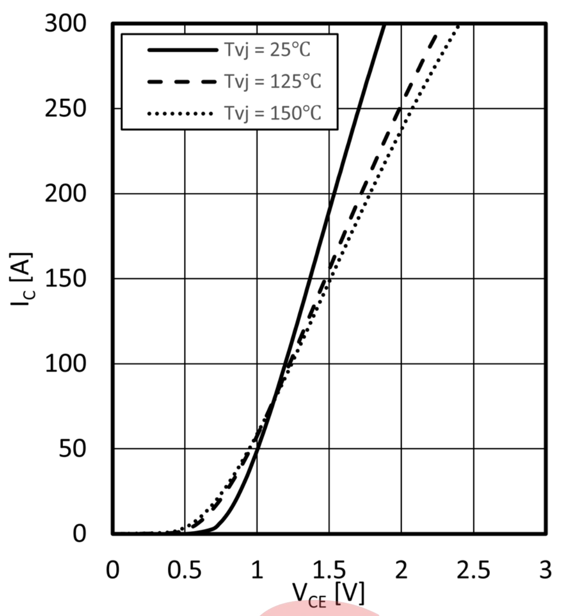
Parameter	Note or test condition		Symbol	Values			Unit
				Min.	Typ.	Max.	
Peak reverse recovery current	I_F = 150A, V_R = 300V	T_{vj} = 25°C	I_{RM}		38.3		A
	V_{GE} = -15V , − di_F/dt = 1139 A/µs	T_{vj} = 125°C			110.8		A
	(T_{vj}=150°C)	T_{vj} = 150°C			125.0		A
Recovered charge	I_F = 150A, V_R = 300V	T_{vj} = 25°C	Q_r		7.76		µC
	V_{GE} = -15V , − di_F/dt = 1139 A/µs	T_{vj} = 125°C			10.1		µC
	(T_{vj}=150°C)	T_{vj} = 150°C			11.7		µC
Reverse recovery energy	I_F = 150A, V_R = 300V	T_{vj} = 25°C	E_{rec}		2.31		mJ
	V_{GE} = -15V , − di_F/dt = 1139 A/µs	T_{vj} = 125°C			2.89		mJ
	(T_{vj}=150°C)	T_{vj} = 150°C			3.34		mJ
Thermal resistance, junction to case	Per diode		$R_{th,JC}$			0.64	K/W

6. Module

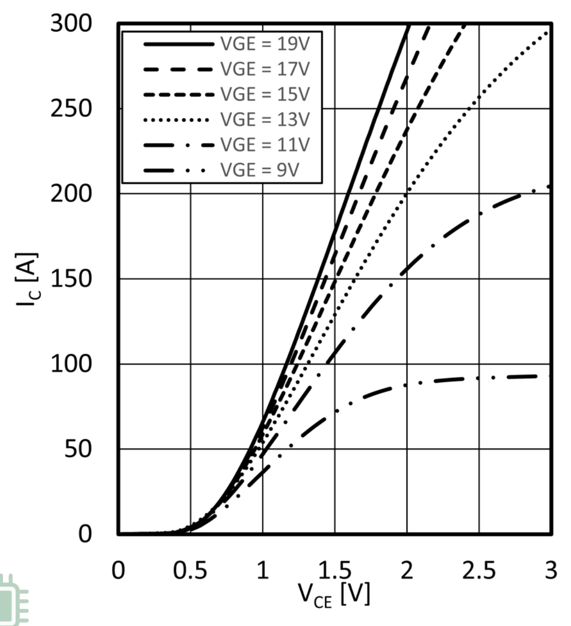
6.1 Characteristic value

Parameter	Note or test condition	Symbol	Values			Unit
			Min.	Typ.	Max.	
Isolation Voltage	RMS, f=50HZ,1min	V_{ISOL}			4000	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

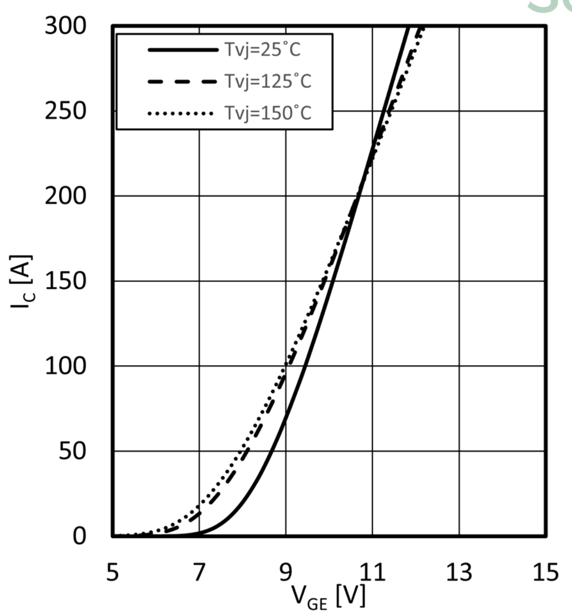
7. Characteristics diagrams



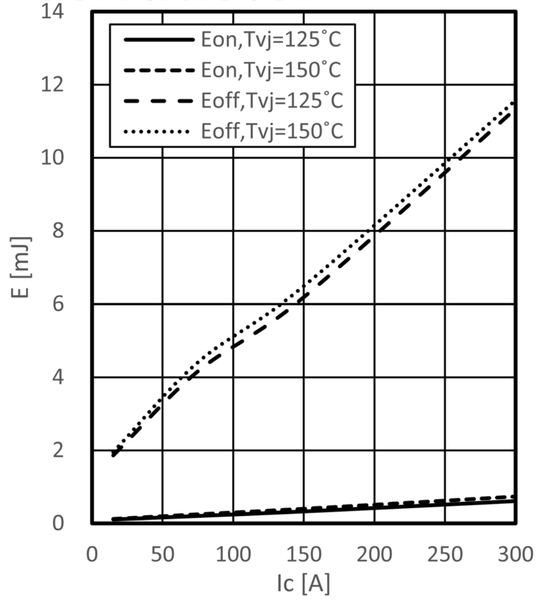
Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
$V_{GE} = 15V$



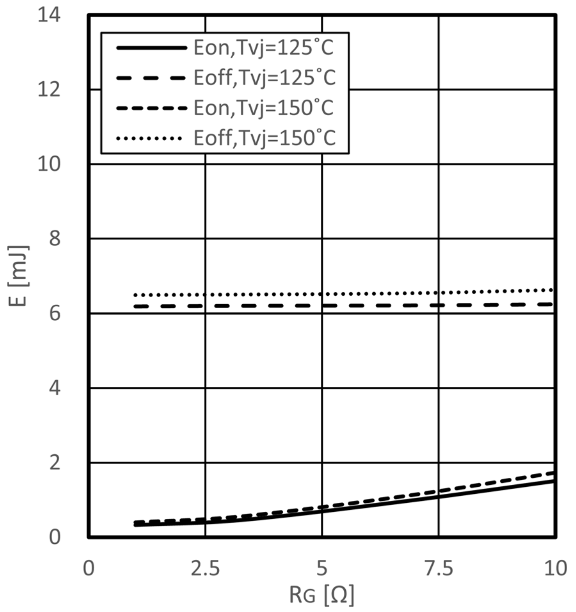
Output characteristic IGBT (typical)
$I_C = f(V_{CE})$
$T_{vj} = 150℃$



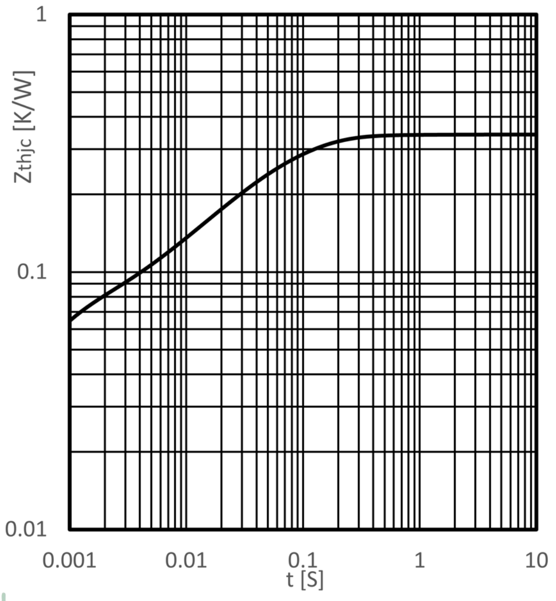
Transfer characteristic IGBT (typical)
$I_C = f(V_{GE})$
$V_{CE} = 20V$



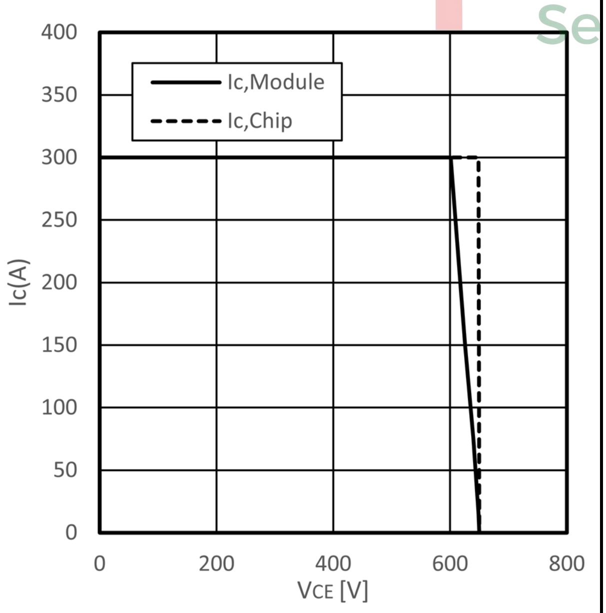
Switching losses IGBT (typical)
$E_{on} = f(I_C)$, $E_{off} = f(I_C)$
$R_{Goff} = 1\ \Omega$, $R_{Gon} = 1\ \Omega$, $V_{CE} = 300\ V$, $V_{GE} = \pm 15\ V$



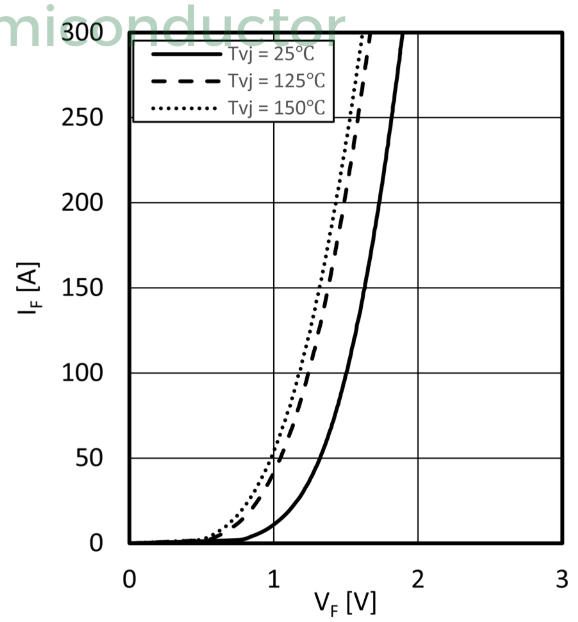
Switching losses IGBT (typical)
$E_{on} = f(R_G)$, $E_{off} = f(R_G)$
$I_C = 150$ A, $V_{CE} = 300$ V, $V_{GE} = \pm 15$ V



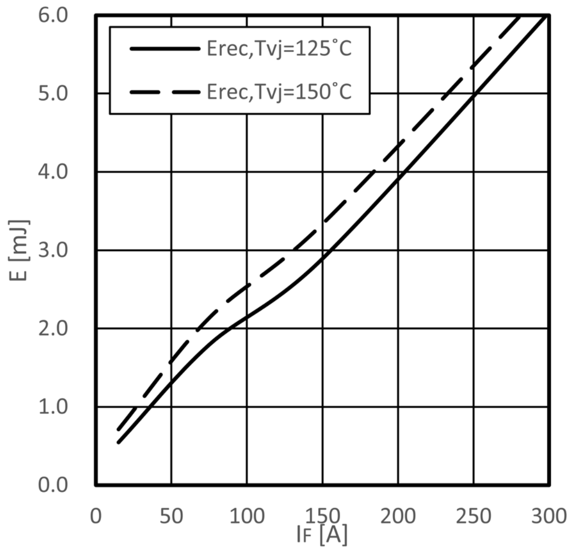
Transient thermal impedance IGBT
$Z_{thJC} = f(t)$



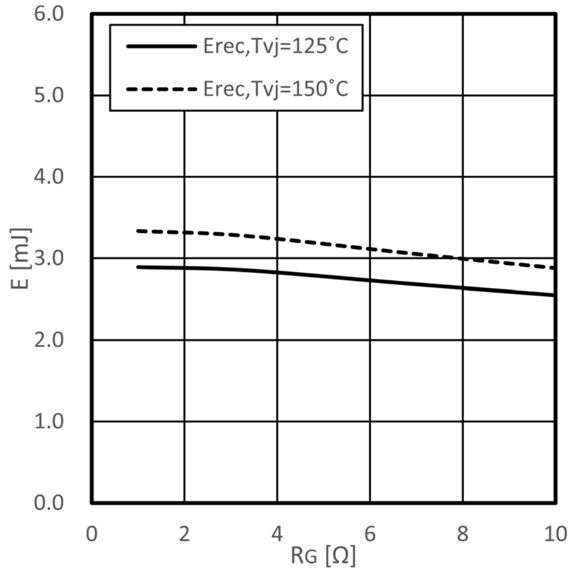
Reverse bias safe operating area IGBT (RBSOA)
$I_C = f(V_{CE})$
$V_{GE} = 15$ V, $R_{Goff} = 1\Omega$, $T_{vj} = 150$ ℃



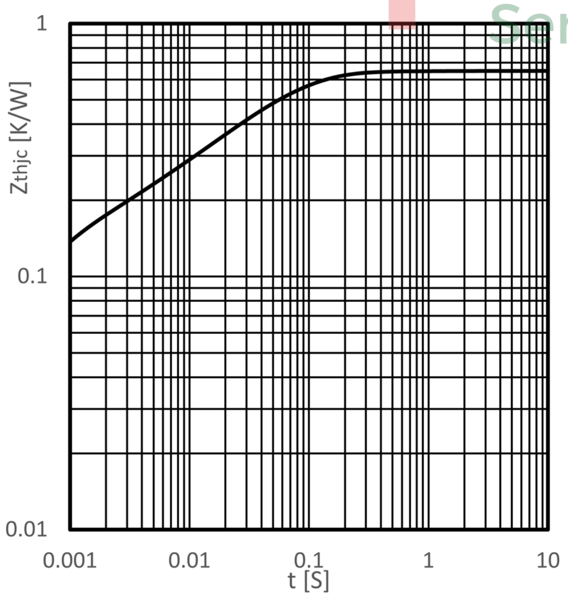
Forward characteristic of Diode, Inverter (typical)
$I_F = f(V_F)$



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



Switching losses Diode (typical)
E_{on} = f (R_G), E_{off} = f (R_G)
I_C = 150 A, V_{CE} = 300 V, V_{GE} = ± 15 V



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

8. Circuit Diagram

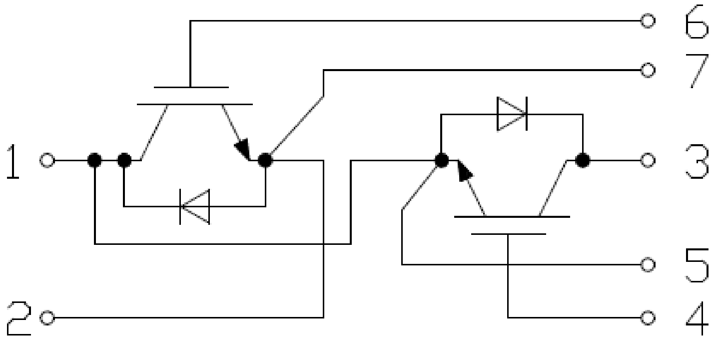


Figure 3

9. Package Outlines

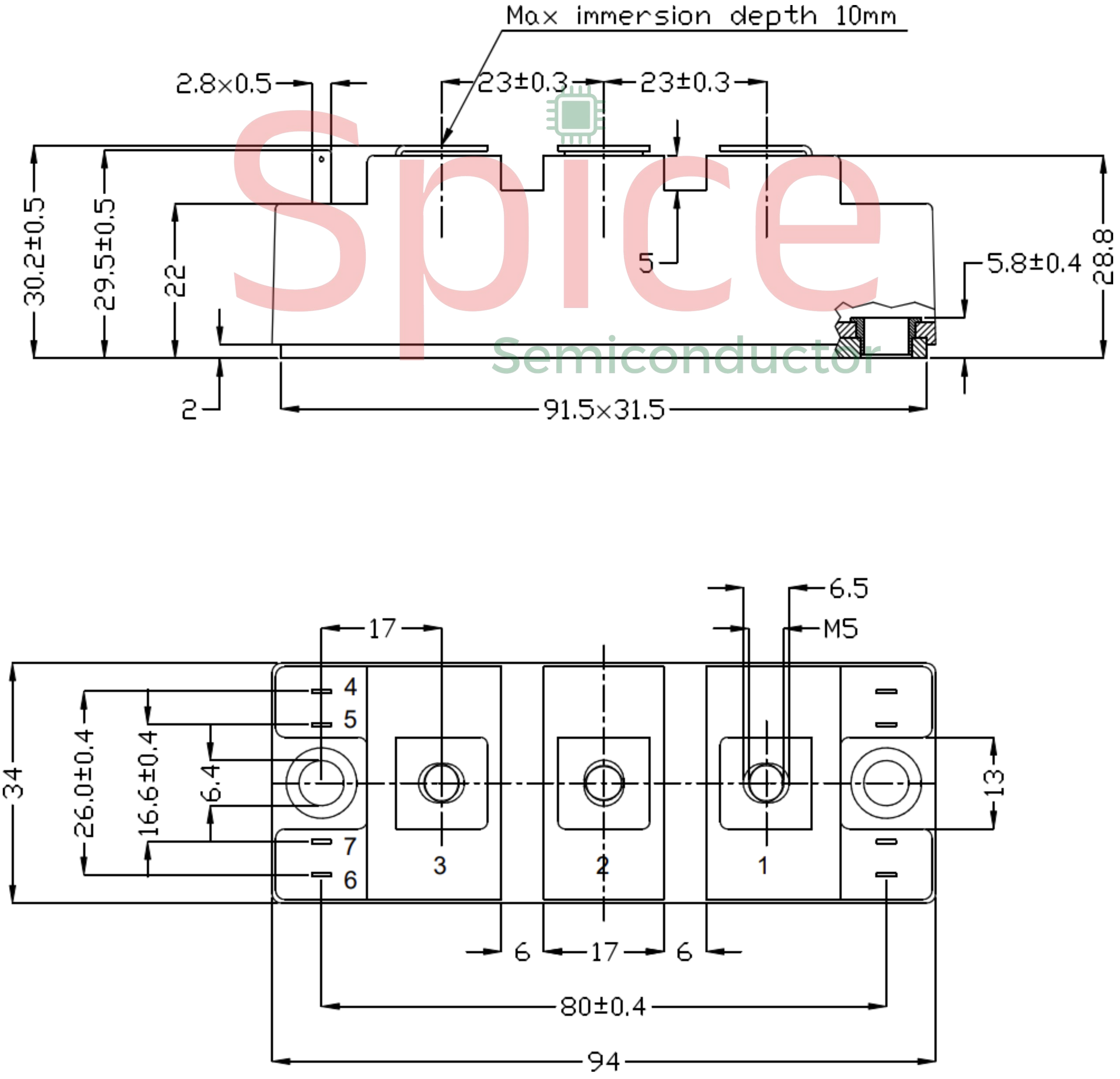


Figure 4