



IGBT Modules

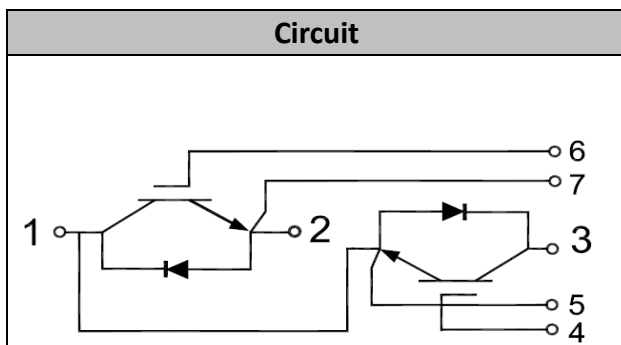
V_{CES} 1200V
 I_C 150A

Applications

- Inverter for motor drive
- AC and DC servo drive amplifier
- UPS (Uninterruptible Power Supplies)
- Soft switching welding machine

Features

- Low $V_{CE(sat)}$ with Trench technology
- $V_{CE(sat)}$ with positive temperature coefficient
- High short circuit capability(10us)
- Including ultra fast & soft recovery anti-parallel FWD
- Low inductance
- Maximum junction temperature 175°C



● IGBT

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Collector-Emitter Voltage	V_{CES}	$V_{GE}=0V, I_C=1mA, T_{vj}=25^{\circ}C$	1200	V
Continuous Collector Current	I_C	$T_C=100^{\circ}C$	150	A
Repetitive Peak Collector Current	I_{CRM}	$t_p=1ms$	300	A
Gate-Emitter Voltage	V_{GES}	$T_{vj}=25^{\circ}C$	± 20	V
Total Power Dissipation	P_{tot}	$T_C=25^{\circ}C$ $T_{vjmax}=175^{\circ}C$	960	W



Characteristic Values

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}$, $I_C=5mA$, $T_{vj}=25^{\circ}C$	5.2	5.8	6.5	V
Collector-Emitter Cut-off Current	I_{CES}	$V_{CE}=1200V$, $V_{GE}=0V$, $T_{vj}=25^{\circ}C$			1.0	mA
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$I_C=150A$, $V_{GE}=15V$, $T_{vj}=25^{\circ}C$		1.90	2.20	V
		$I_C=150A$, $V_{GE}=15V$, $T_{vj}=125^{\circ}C$		2.10		
		$I_C=150A$, $V_{GE}=15V$, $T_{vj}=150^{\circ}C$		2.20		
Gate Charge	Q_G			1.1		uC
Internal Gate Resistance	R_{gint}			5		Ω
Input Capacitance	C_{ies}	$V_{CE}=25V$, $V_{GE}=0V$, $f=1MHz$, $T_{vj}=25^{\circ}C$		14.5		nF
Reverse Transfer Capacitance	C_{res}			0.48		nF
Gate-Emitter leakage current	I_{GES}	$V_{CE}=0V$, $V_{GE}=20V$, $T_{vj}=25^{\circ}C$			400	nA
Turn-on Delay Time	$t_{d(on)}$	$I_C=150A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=25^{\circ}C$		124		ns
Rise Time	t_r			51		ns
Turn-off Delay Time	$t_{d(off)}$			229		ns
Fall Time	t_f			172		ns
Energy Dissipation During Turn-on Time	E_{on}			10.4		mJ
Energy Dissipation During Turn-off Time	E_{off}			10.2		mJ
Turn-on Delay Time	$t_{d(on)}$	$I_C=150A$ $V_{CE}=600V$ $V_{GE}=\pm 15V$ $R_G=1.1\Omega$ $T_{vj}=150^{\circ}C$		135		ns
Rise Time	t_r			62		ns
Turn-off Delay Time	$t_{d(off)}$			270		ns
Fall Time	t_f			291		ns
Energy Dissipation During Turn-on Time	E_{on}			15.3		mJ
Energy Dissipation During Turn-off Time	E_{off}			14.2		mJ
SC Data	I_{sc}	$t_p \leq 10\mu s$, $V_{GE}=15V$, $T_{vj}=150^{\circ}C$, $V_{CC}=900V$, $V_{CEM} \leq 1200V$		650		A



● Diode

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Value	Unit
Repetitive Peak Reverse Voltage	V_{RRM}	$T_{vj}=25^{\circ}\text{C}$	1200	V
Continuous DC Forward Current	I_F		150	A
Repetitive Peak Forward Current	I_{FRM}	$t_p=1\text{ms}$	300	A

Characteristic Values

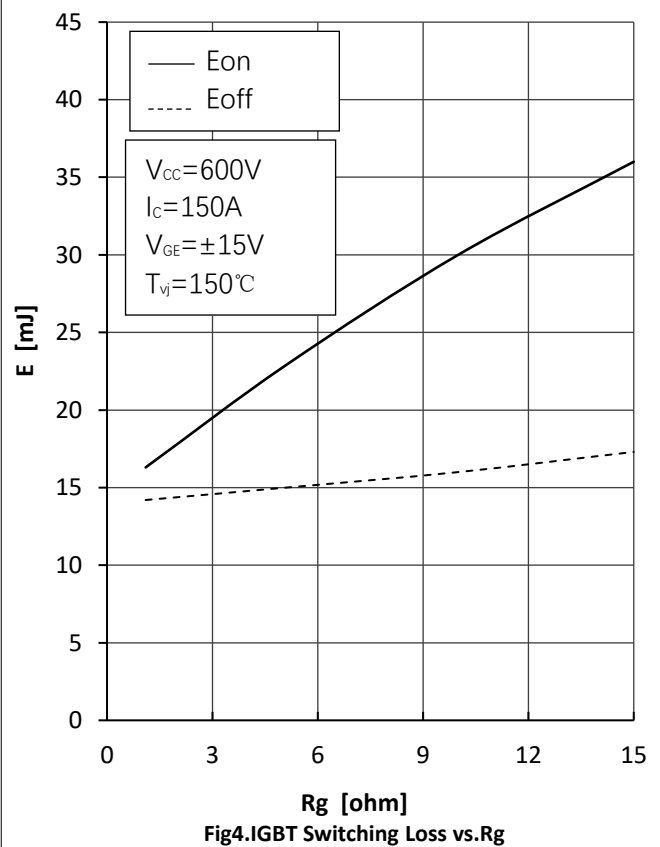
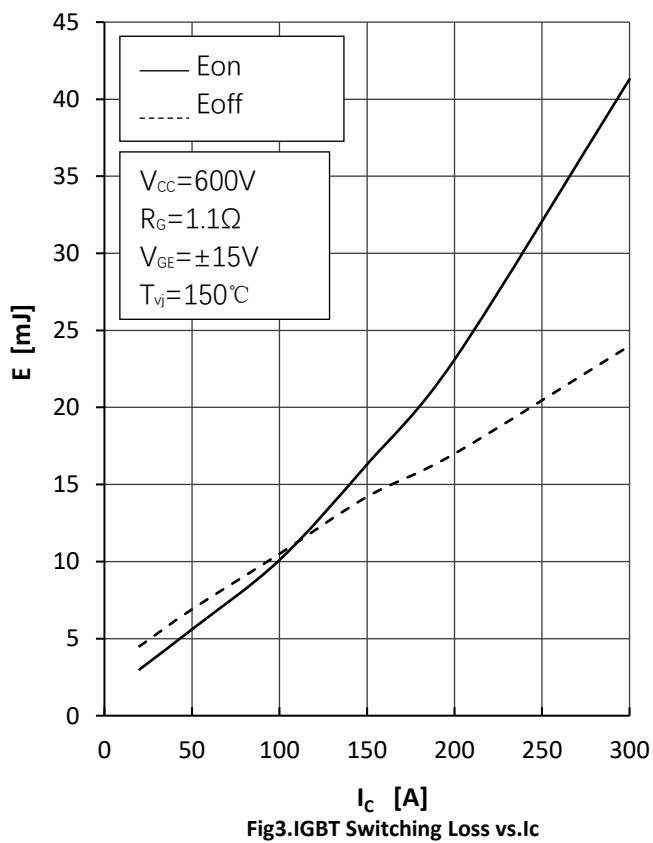
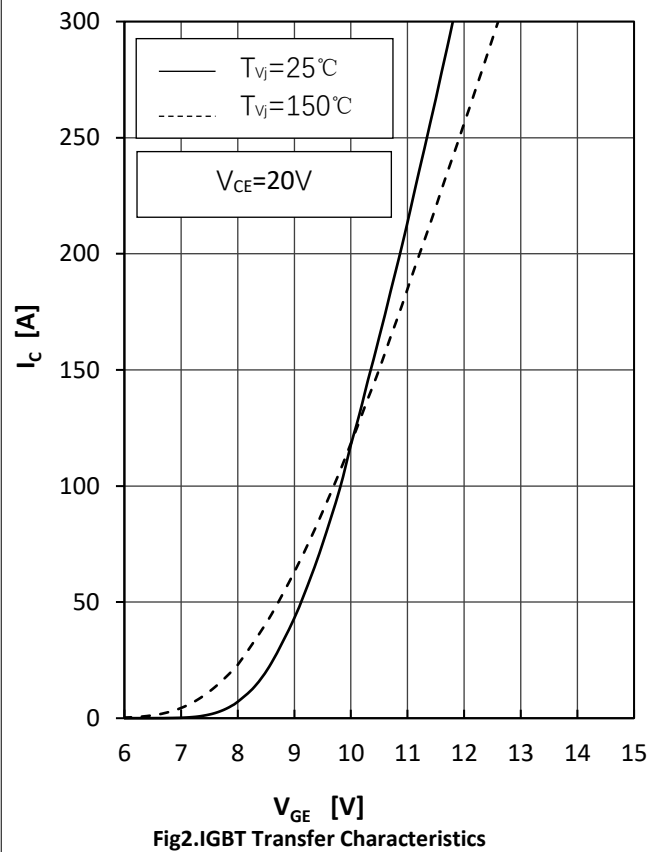
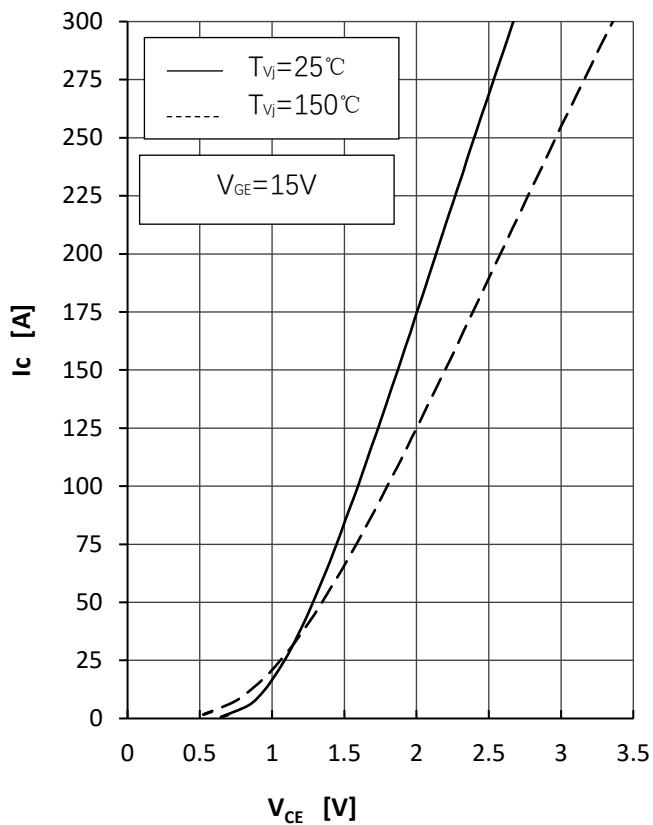
Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Forward Voltage	V_F	$I_F=150\text{A}, T_{vj}=25^{\circ}\text{C}$		2.00	2.80	V
		$I_F=150\text{A}, T_{vj}=125^{\circ}\text{C}$		1.80		
		$I_F=150\text{A}, T_{vj}=150^{\circ}\text{C}$		1.70		
Recovered Charge	Q_{rr}	$I_F=150\text{A}$		10.7		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=2300\text{A}/\mu\text{s}$		116		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=25^{\circ}\text{C}$		3.8		mJ
Recovered Charge	Q_{rr}	$I_F=150\text{A}$		21.5		μC
Peak Reverse Recovery Current	I_{rr}	$V_R=600\text{V}$ $-di_F/dt=2300\text{A}/\mu\text{s}$		134		A
Reverse Recovery Energy	E_{rec}	$T_{vj}=150^{\circ}\text{C}$		7.8		mJ

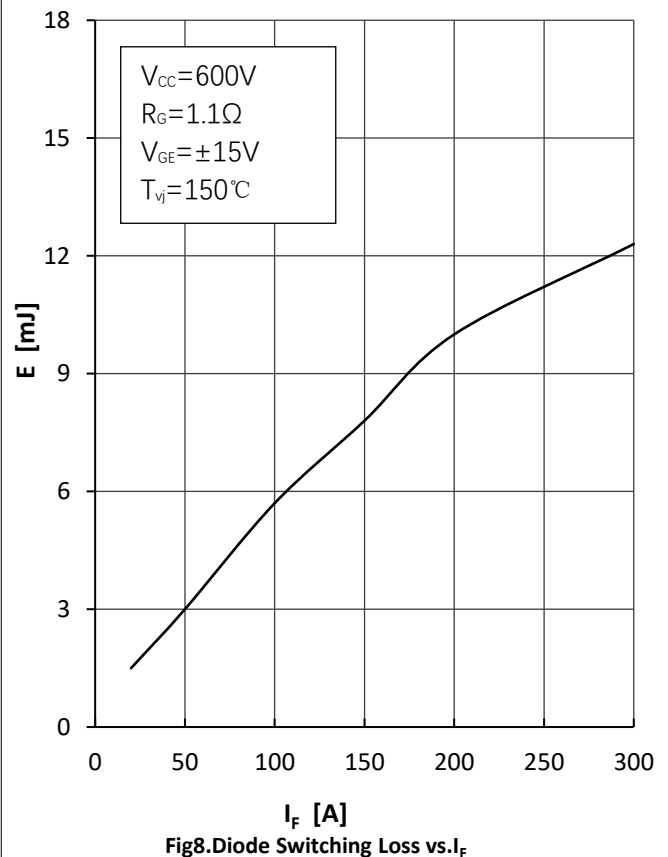
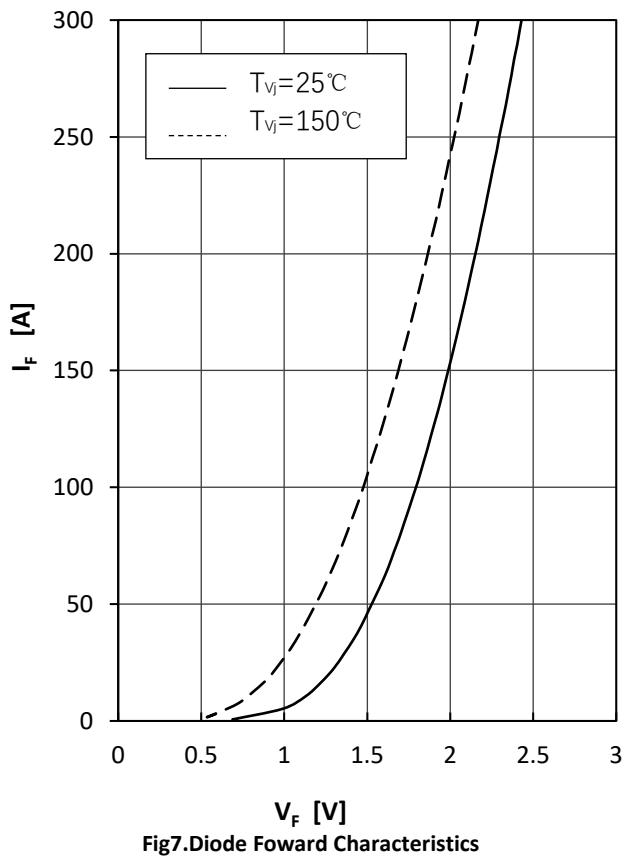
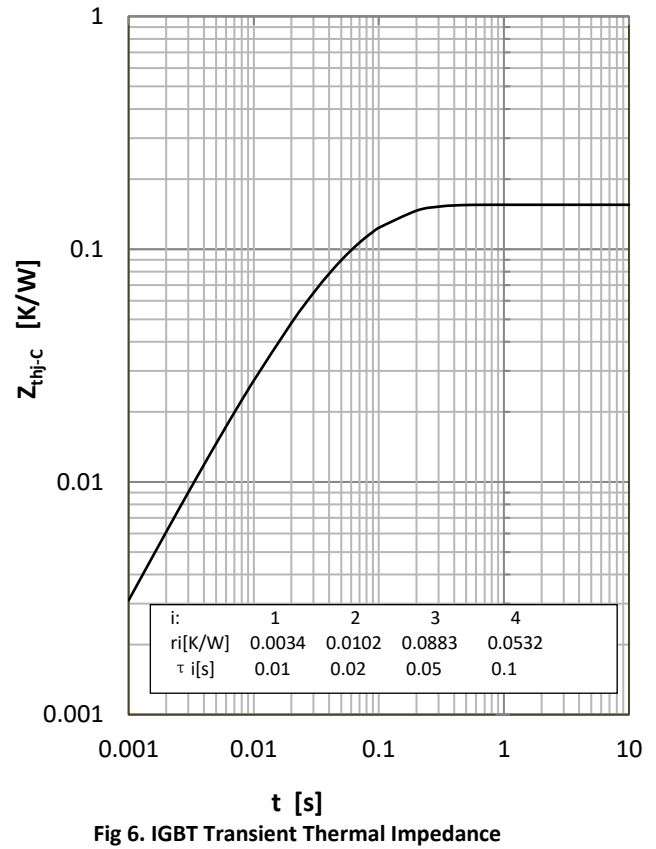
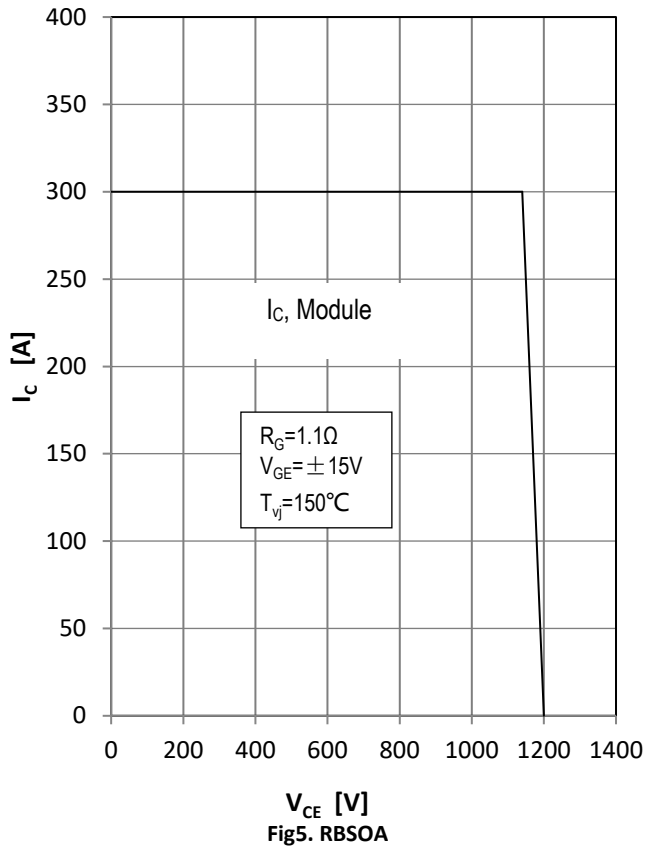


● Module Characteristics

$T_C=25^{\circ}\text{C}$ unless otherwise specified

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Isolation Voltage	V_{isol}	$t=1\text{min}, f=50\text{Hz}$	2500			V
Maximum Junction Temperature	T_{jmax}				175	$^{\circ}\text{C}$
Operating Junction Temperature	$T_{\text{vj op}}$		-40		150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}		-40		125	$^{\circ}\text{C}$
Thermal Resistance Junction to Case	$R_{\theta\text{JC}}$	per IGBT			0.155	K/W
		per Diode			0.29	
Thermal Resistance Case to Sink	$R_{\theta\text{CS}}$	Conductive grease applied		0.05		K/W
Module Electrodes Torque	M_t	Recommended(M5)	2.5		5.0	N·m
Module-to-Sink Torque	M_s	Recommended(M6)	3.0		5.0	N·m
Weight of Module	G			150		g





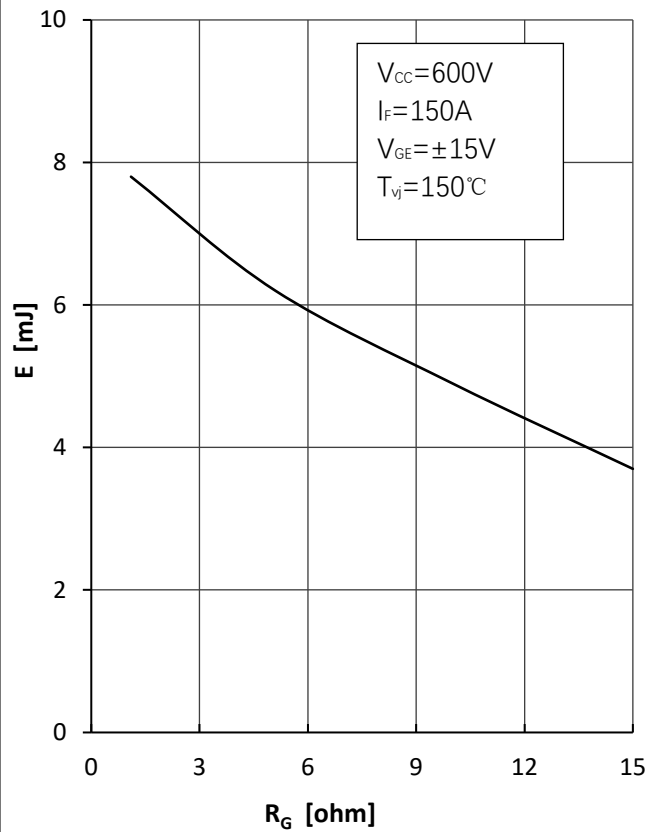


Fig9.Diode Switching Loss vs.Rg

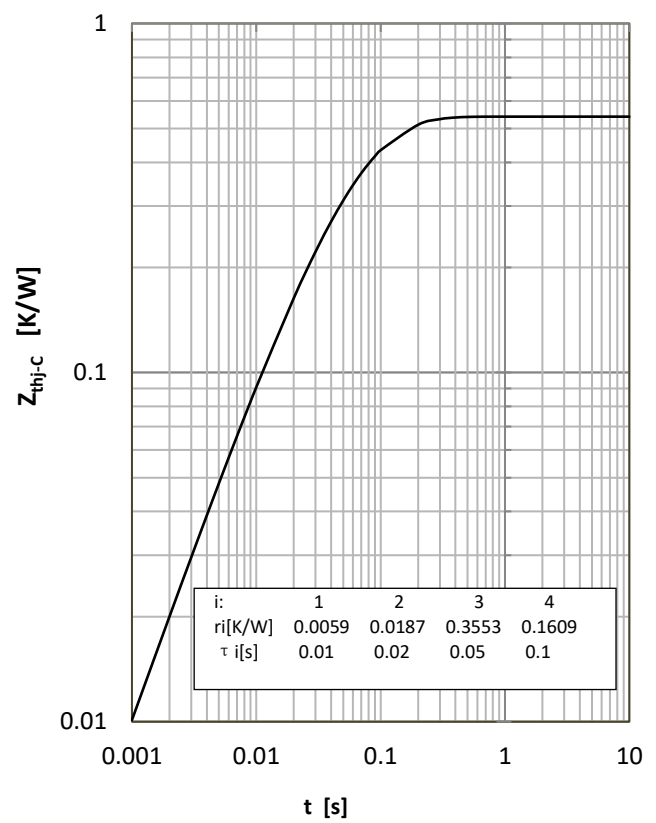
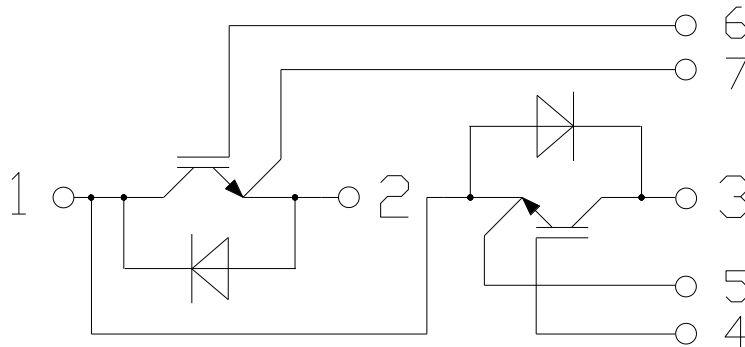


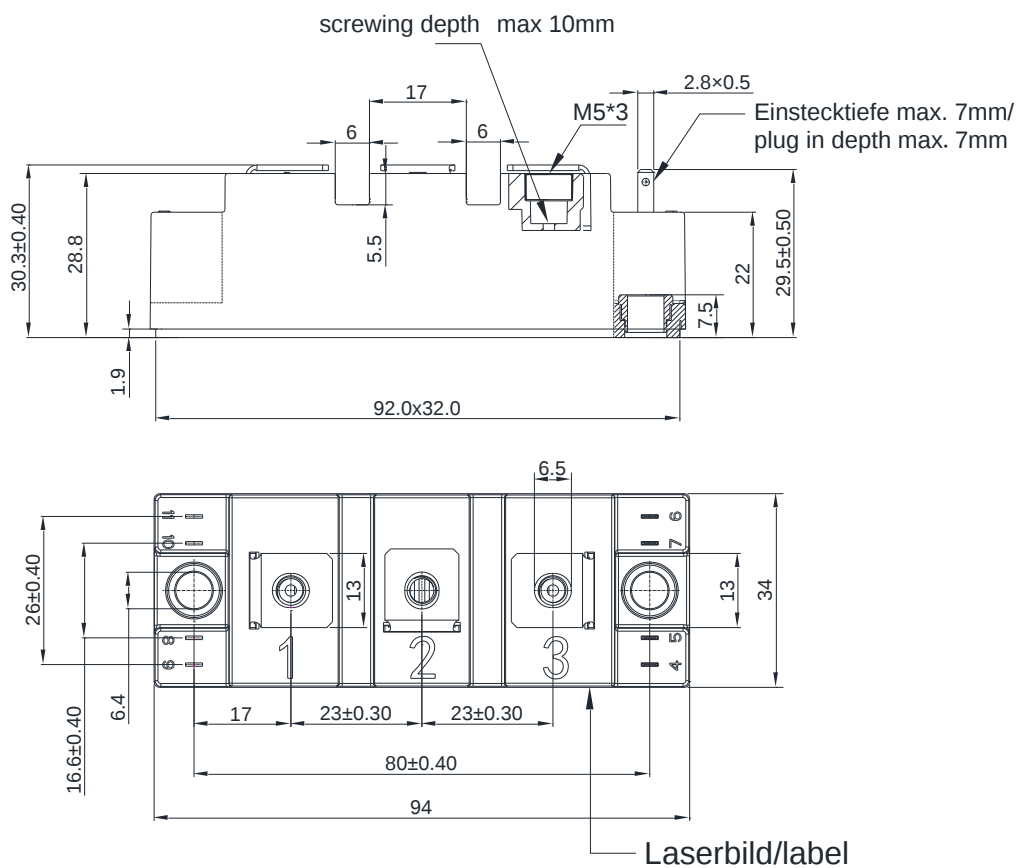
Fig10.Diode Transient Thermal Impedance

● Circuit Diagram



● Package Outline Information

Dimensions in Millimeters





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