62 mm module with TRENCHSTOP IGBT7 and emitter controlled 7 diode

Features

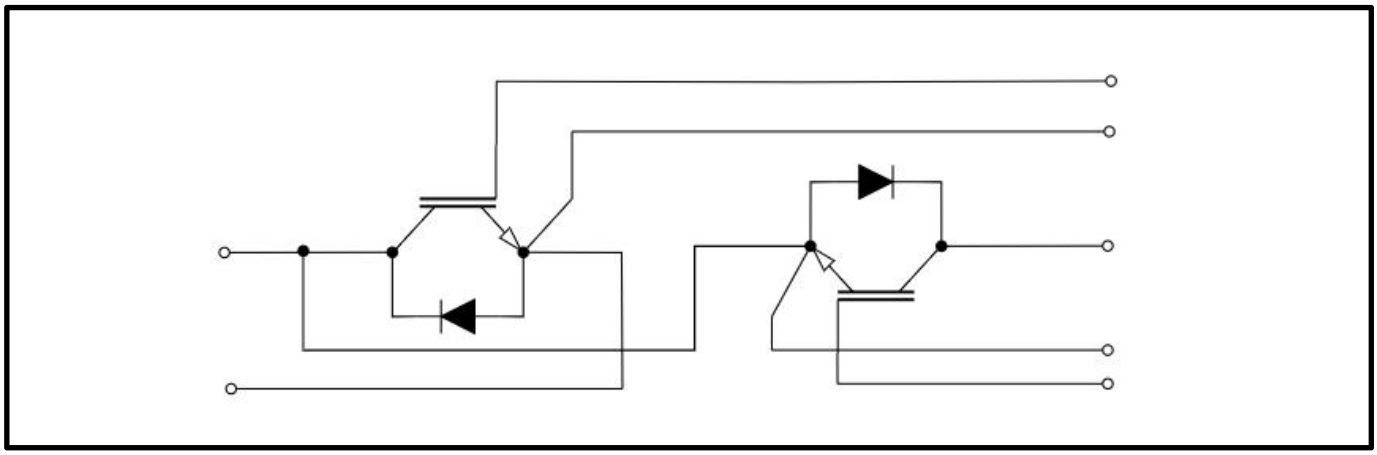
- Electrical features
  - V_{CES} = 1200 V
  - IC $_{nom}$ = 800 A / I_{CRM} = 1600 A
  - V_{CEsat} with positive temperature coefficient
- Mechanical features
  - Standard housing
  - 4 kV AC 1 min insulation
  - High creepage and clearance distances
  - High power density
  - Isolated base plate - Package with CTI >400

D5

Typical Applications

- Three-level applications
- Commercial agriculture vehicles
- High-power converters
- Motor drives
- Servo drives
- Solar applications
- UPS systems

Description



Package Insulation coordination

Symbol	Parameter	Note or test condition	Values	Unit
V_{ISOL}	Isolation test voltage	RMS,f=50Hz,t=60s	4.0	kV
d_{creep}	Creepage distance	terminal to heatsink	29.0	mm
d_{creep}	Creepage distance	terminal to terminal	23.0	mm
d_{clear}	Clearance	terminal to heatsink	23.0	mm
d_{clear}	Clearance	terminal to terminal	11.0	mm
CTI	Comparative tracking index (electrical)		>400	

Package Characteristic values

Symbol	Description	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
L_{sCE}	Stray Inductance			--	20	--	nH
$R_{CC'+EE'}$	Module Lead Resistance, Terminal to Chip	T_C=25°C,perswitch		--	0.5	--	mΩ
T_{stg}	Storagetemperature			-40	--	125	℃
M	Mounting torque for module mounting	-Mounting according to valid application note	M5, Screw	3.0	--	6.0	Nm
M	Terminal connection torque	-Mounting according to valid application note	M6, Screw	2.5	--	5	Nm
G	Weight			--	340	--	g

Maximum rated values

IGBT

Symbol	Description	Note or test condition		Value	Unit
V_{CES}	Collector-Emitter Voltage	T_{vj} = 25 °C		1200	V
I_{CDC}	Continuous DC collector current	$T_{vj\,max}$ = 175 °C	T_C = 90 °C	800	A
I_{CRM}	Repetitive peak collector current	t_p limited by $T_{vj\,op}$		1600	A
P_{tot}	Totalpowerdissipation	T_C = 25°C, $T_{vj\,max}$ = 175°C		3488	W
V_{GES}	Gate-emitter peak voltage			±20	V

Diode

Symbol	Description	Note or test condition	Value	Unit
V_{RRM}	Repetitive peak reverse voltage	T_{vj} = 25 °C	1200	V
I_F	Continuous DC forward current		800	A
I_{FRM}	Repetitive peak forward current	t_P = 1 ms	1600	A

IGBT Characteristics

Symbol	Parameter	Test Condition		Value			Unit
				Min	Typ	Max	
$V_{CE(sat)}$	Collector−Emitter Saturation Voltage	I_C = 800 A, V_{GE} = 15 V	T_{vj} = 25 °C	--	1.45	1.75	V
			T_{vj} = 150 °C	--	1.70	--	
			T_{vj} = 175 °C	--	1.75	--	
$V_{GE(TH)}$	Gate−Emitter Threshold Voltage	V_{GE} = V_{CE} , I_C = 16 mA,T_{vj} = 25°C		4.6	5.2	5.8	V
I_{CES}	Collector−Emitter Cutoff Current	V_{GE} = 0 V, V_{CE} =1200V ,T_{vj}= 25°C		--	--	0.1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = 20V , V_{CE} = 0 V， T_{vj} = 25°C		--	--	100	nA
R_{Gint}	Internal Gate Resistance	T_{vj} = 25 °C		--	1.34	--	Ω
C_{ies}	Input Capacitance	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V		--	136	--	nF
C_{res}	Reverse Transfer Capacitance			--	0.48	--	nF
Q_G	Gate Charge	V_{GE} = ±15 V, V_{CC} = 600 V		--	4.43	--	μC
$t_{d(on)}$	Turn−On Delay Time	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω	T_{vj} = 25 °C	--	0.406	--	μs
			T_{vj} = 150 °C	--	0.460	--	
			T_{vj} = 175 °C	--	0.467	--	
t_r	Rise Time	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω	T_{vj} = 25 °C	--	0.073	--	μs
			T_{vj} = 150 °C	--	0.088	--	
			T_{vj} = 175 °C	--	0.091	--	
$t_{d(off)}$	Turn−off Delay Time	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_{Goff} = 1.0 Ω	T_{vj} = 25 °C	--	0.825	--	μs
			T_{vj} = 150 °C	--	0.939	--	
			T_{vj} = 175 °C	--	0.960	--	
t_f	Fall Time	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω	T_{vj} = 25 °C	--	0.100	--	μs
			T_{vj} = 150 °C	--	0.225	--	
			T_{vj} = 175 °C	--	0.228	--	
E_{on}	Turn−On Switching Loss per Pulse	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω ($T_{vj\,max}$= 175 °C)	T_{vj} = 25 °C	--	20.6	--	mJ
			T_{vj} = 150 °C	--	40.8	--	
			T_{vj} = 175 °C	--	46.8	--	
E_{off}	Turn Off Switching Loss per Pulse	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω ($T_{vj\,max}$= 175 °C)	T_{vj} = 25 °C	--	90.6	--	mJ
			T_{vj} = 150 °C	--	120.6	--	
			T_{vj} = 175 °C	--	124.8	--	
I_{SC}	SC Data	V_{GE} ≤ 15 V, V_{CC} = 800 V, V_{CEmax}=V_{CES}-L_{sCE}.di/dt	t_P ≤ 10 μs, T_{vj}=150 °C	--	4000	--	A
			t_P ≤ 10 μs, T_{vj}=175 °C	--	3768	--	
R_{thJC}	Thermal resistance,junction to case	per IGBT		--	--	0.043	K/W
$T_{vj\,op}$	Temperature under switching conditions			-40	--	175	℃

Diode Characteristics

Symbol	Parameter	Test Condition		Value			Unit
				Min	Typ	Max	
V_F	Diode Forward Voltage	I_F = 800 A, V_{GE} = 0 V	T_{vj} = 25 °C	--	2.25	2.7	V
			T_{vj} = 150 °C	--	2.05	--	
			T_{vj} = 175 °C	--	2.00	--	
Q_r	Recovered Charge	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω ($T_{vj\,max}$= 175 °C)	T_{vj} = 25 °C	--	27	--	µC
			T_{vj} = 150 °C	--	51	--	
			T_{vj} = 175 °C	--	57	--	
I_{RM}	Peak Reverse Recovery Current	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω ($T_{vj\,max}$= 175 °C)	T_{vj} = 25 °C	--	560	--	A
			T_{vj} = 150 °C	--	715	--	
			T_{vj} = 175 °C	--	740	--	
E_{rec}	Reverse recovery energy	I_C = 800 A, V_{CC} = 600 V, V_{GE} = 15 /-5V, R_G = 1.0 Ω ($T_{vj\,max}$= 175 °C)	T_{vj} = 25 °C	--	17.5	--	mJ
			T_{vj} = 150 °C	--	48.3	--	
			T_{vj} = 175 °C	--	55.9	--	
R_{thJC}	Thermal resistance, junction to case	per diode		--	--	0.081	K/W
$T_{vj\,op}$	Temperature under switching conditions			-40	--	175	℃

Figure 1.Output characteristic (typical),IGBT, Inverter
V_{GE}=15V

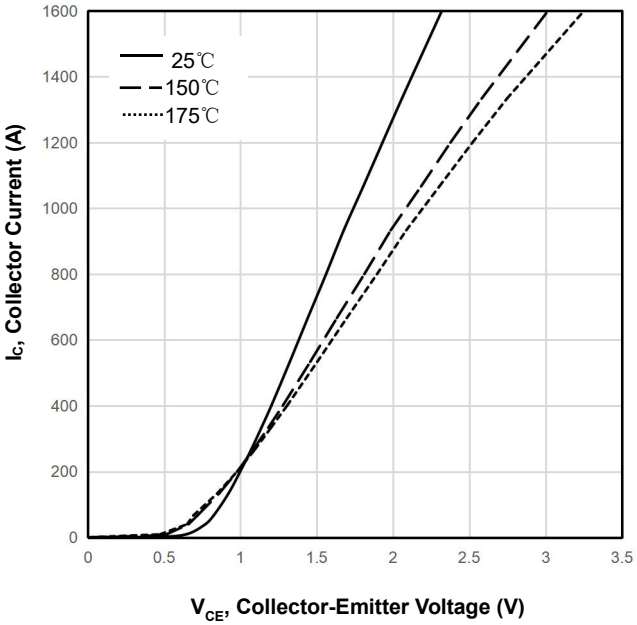


Figure 2.Output characteristic IGBT,Inverter(typical)
T_{vj}=175℃

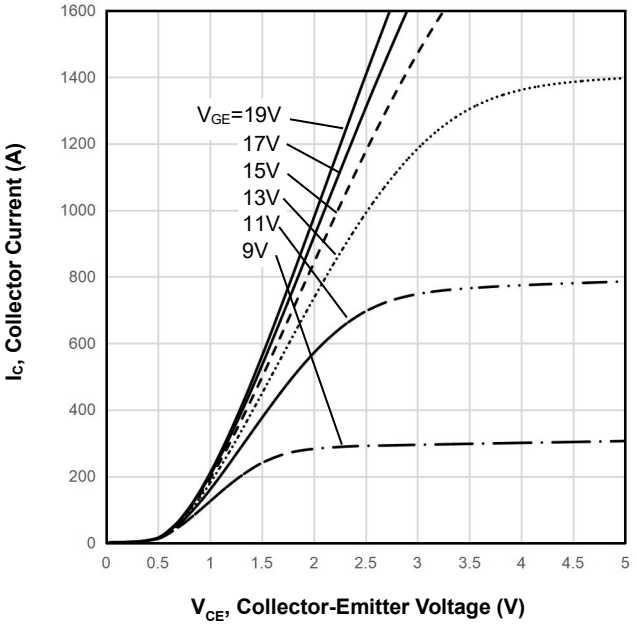


Figure 3.Transfer characteristic (typical), IGBT, Inverter
V_{CE}=60V

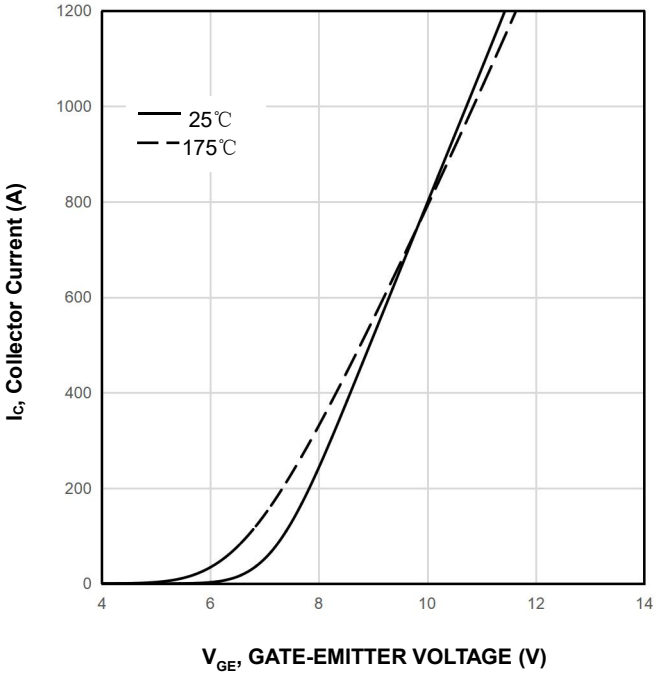


Figure 4.Switching losses (typical), IGBT, Inverter
V_{CE}=600V,V_{GE}=15/-5V,R_G=1.0Ω

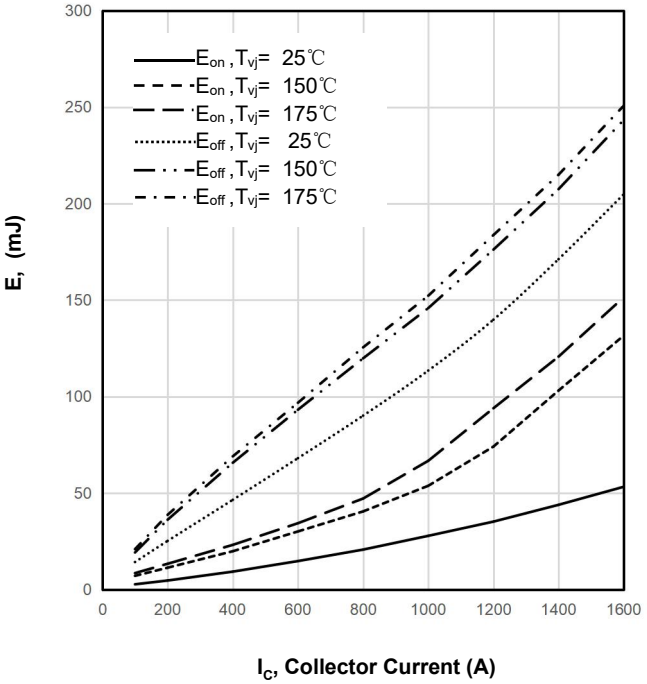


Figure 5.Switching losses (typical), IGBT, Inverter
V_{CE}=600V,V_{GE}=15/-5V,I_C=800A

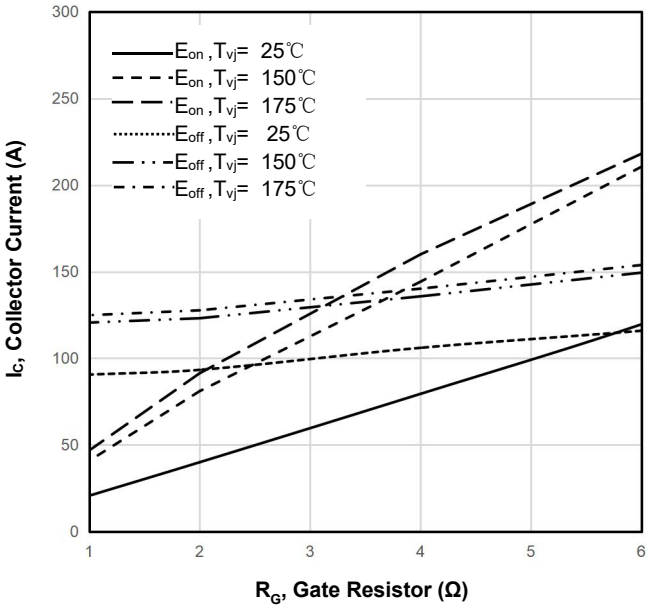


Figure 6.Switching times (typical), IGBT, Inverter
V_{CE}=600V,V_{GE}=15/-5V,R_G=1.0Ω,T_{vj}= 175℃

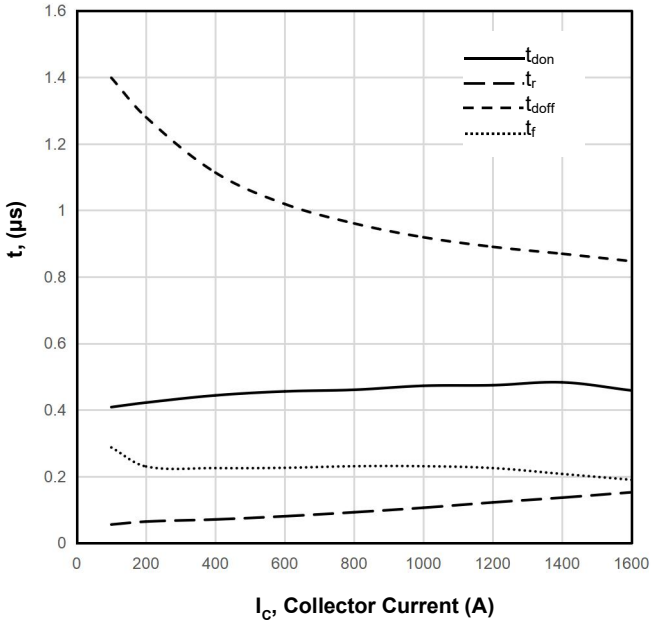


Figure 7.Switching times (typical), IGBT, Inverter
V_{CE}=600V,V_{GE}=15/-5V,I_C=800A,T_{vj}= 175℃

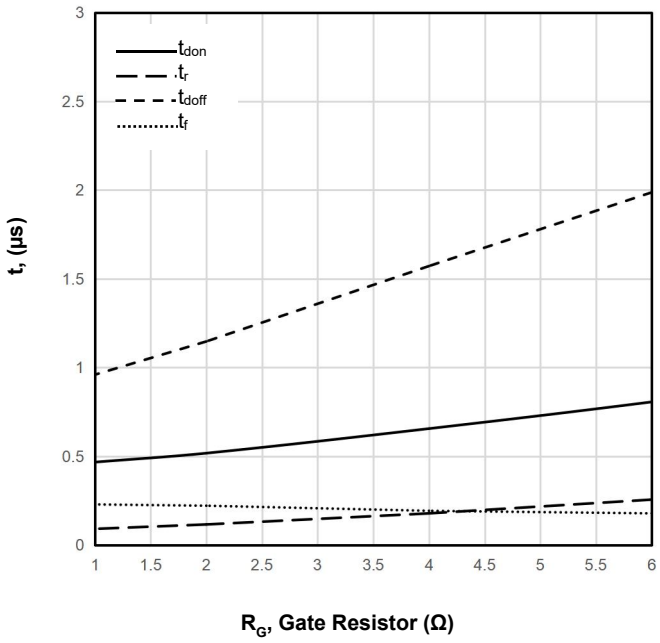


Figure 8.Transient thermal impedance , IGBT, Inverter

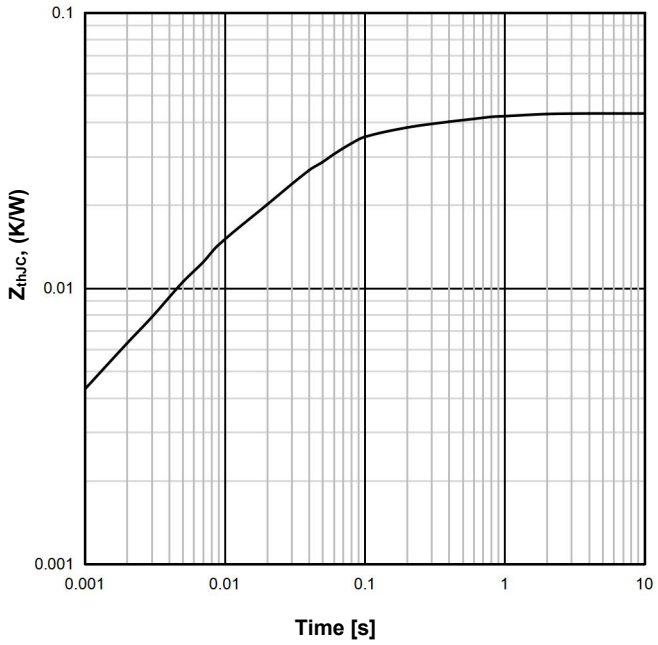


Figure 9.Reverse bias safe operating area , IGBT, Inverter
V_{GE}=15/-5V,R_G=25Ω,T_{vj}= 150℃

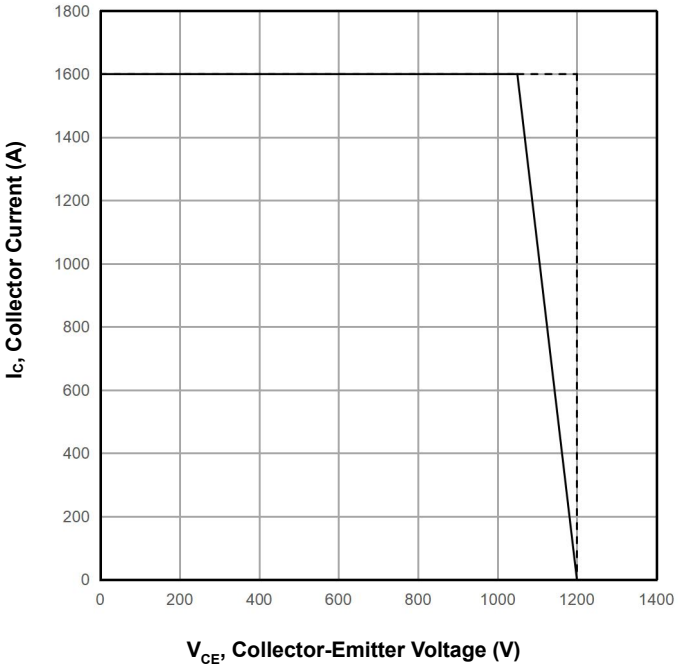


Figure10.Capacity characteristic (typical), IGBT, Inverter
f = 100 kHz, V_{GE}=0V, T_{vj}= 25℃

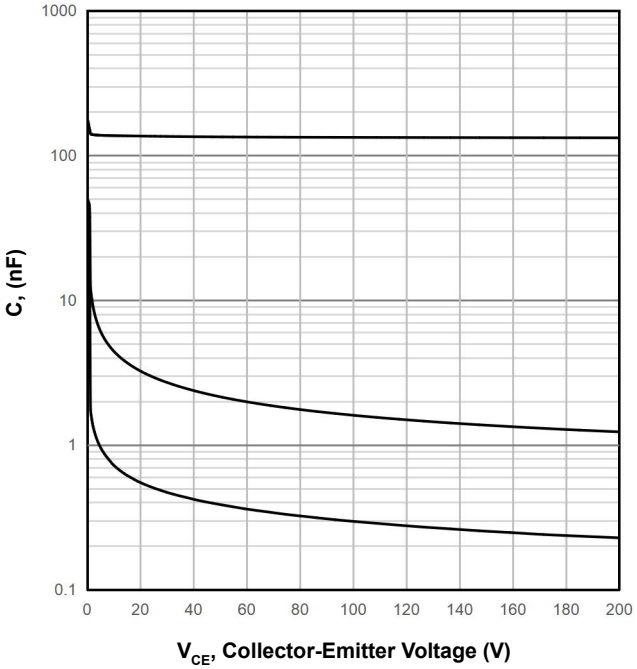


Figure11.Forward characteristic (typical), Diode, Inverter

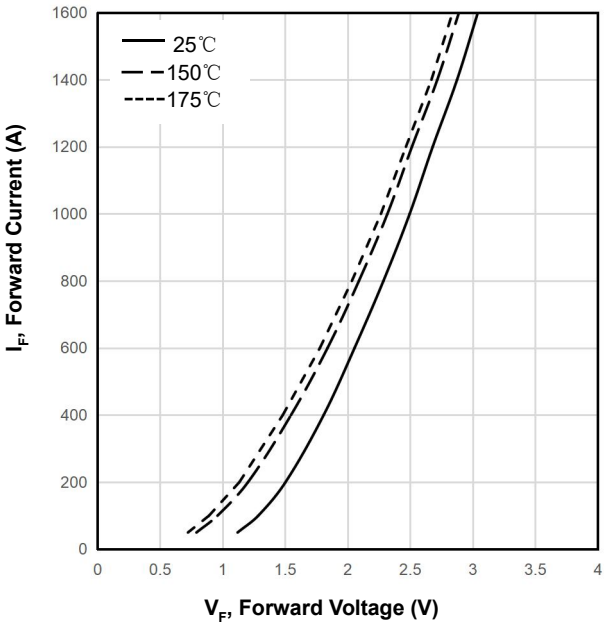


Figure12.Switching losses (typical), Diode, Inverter
V_{CE}=600V,R_G=1.0Ω

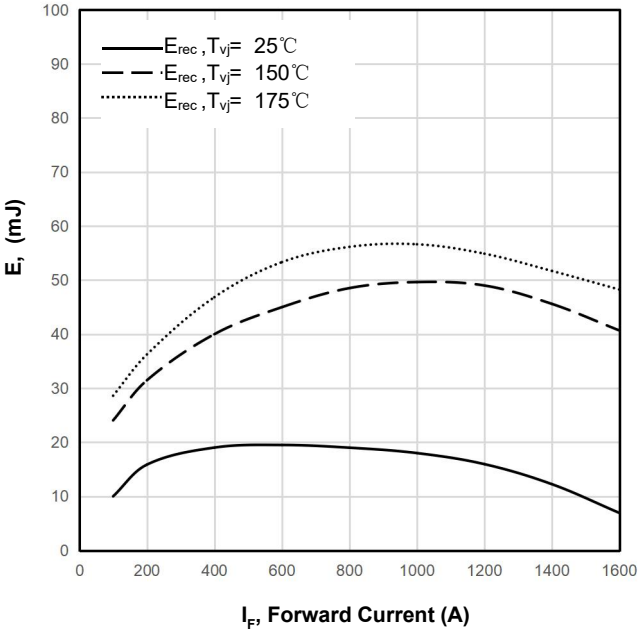


Figure 13. Switching losses (typical), Diode, Inverter
V_{CE}=600V, I_F=800A

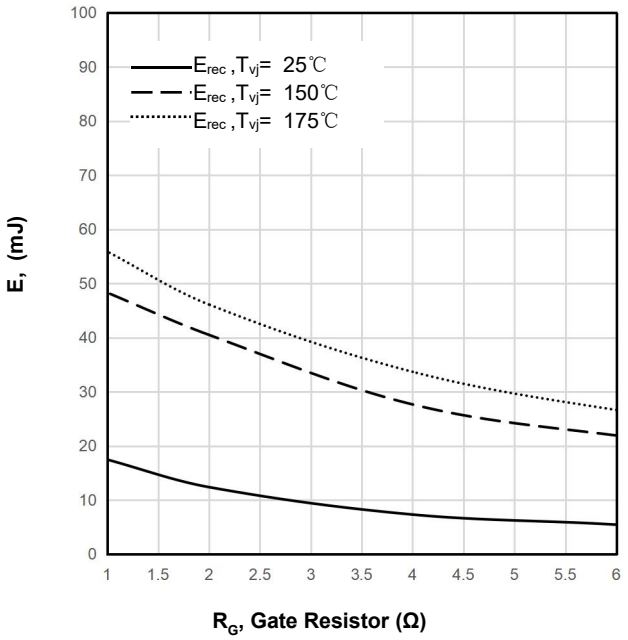
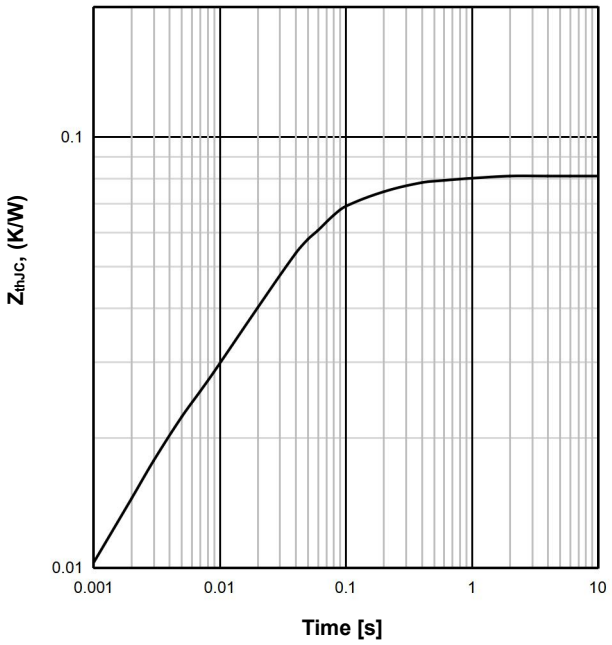
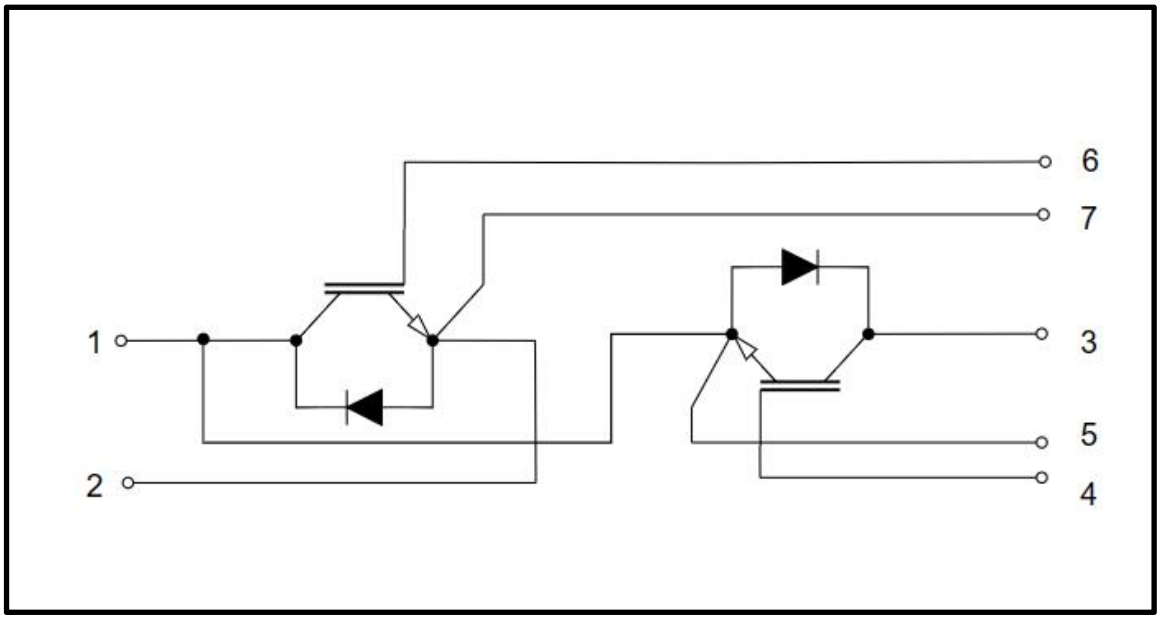


Figure 14. Transient thermal impedance, Diode, Inverter



CIRCUIT DIAGRAM



PACKAGE DIMENSION