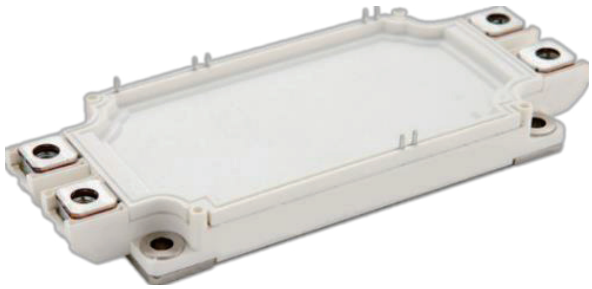
G450HF170TE-G8 with FWD and NTC

Features

- ►1700V Trench Gate & Field Stop Structure
- ►High Short Circuit Capability
- ►Low Switching Loss
- ►High Reliability
- ►Positive Temperature Coefficient



Applications

- ►Wind Converters
- ►Motor Drives
- ►Servo Drives
- ►UPS Systems

IGBT, Inverter /Maximum Rated Values

Parameter	Symbol	Value	Unit
Collector -Emitter Voltage, T_{vj}=25 ℃	V_{CES}	1700	V
DC Collector Current, T_c=105℃, $T_{vj,max}$=175 ℃	I_C	450	A
Peak Collector Current, t_p=1ms	I_{CM}	900	A
Gate -Emitter Voltage	V_{GES}	±20	V
IGBT Maximum Power Dissipation, T_c=25℃, $T_{vj,max}$=175℃	P_D	2500	W
IGBT Short Circuit Withstand Time	t_{sc}	10	μs
Maximum Junction Temperature	$T_{vj,max}$	175	℃
Operating Junction Temperature	$T_{vj,op}$	-40~150	℃
Storage Temperature Range	T_{stg}	-40~125	℃

Diode, Inverter /Maximum Rated Values((Tvj=25ºC unless otherwise noted))

Repetitive peak reverse voltage		V_{RRM}	1700	V
Continuous DC forward current		I_F	450	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	900	A
I^2t-value	V_R=0V,t_p=10ms,T_{vj}=125℃	I^2t	20000	A^2s

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IGBT Electrical Characteristics (Tvj=25ºC unless otherwise noted))

Parameter	Symbol	Condition		Value			Unit
				Min	Typ.	Max	
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_C=450A, V_{GE}=15V	T_{vj}=25°C		1.8	2.2	V
			T_{vj}=125°C		2.0		
			T_{vj}=150°C		2.2		
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	I_C=18mA, V_{CE}=V_{GE}		5.2	5.9	6.4	V
Collector-Emitter Cut-off Current	I_{CES}	V_{CE}=1700V, V_{GE}=0V				3	mA
Gate-Emitter Leakage Current	I_{GES}	V_{CE}=0V, V_{GE}=±20V		-400		400	nA
Internal Gate Resistance	R_{Gint}				1.2		Ω
Gate Charge	Q_G	V_{GE}=-15V~+15V			5.2		μC
Input Capacitance	C_{ies}	f=1MHz, V_{GE}=0V, V_{CE}=25V			72		nF
Output Capacitance	C_{oes}				2.9		nF
Reverse Transfer Capacitance	C_{res}				0.6		nF
Turn-on Delay Time	$t_{d(on)}$	I_C=450A, V_{CE}=900V, V_{GE}=±15V, R_{Gon}=3.3Ω, R_{Goff}=3.3Ω, Inductive Load	T_{vj}=25°C		260		ns
			T_{vj}=125°C		280		
			T_{vj}=150°C		280		
Rise Time	t_r		T_{vj}=25°C		140		ns
			T_{vj}=125°C		160		
			T_{vj}=150°C		160		
Turn-off Delay Time	$t_{d(off)}$		T_{vj}=25°C		640		ns
			T_{vj}=125°C		700		
			T_{vj}=150°C		715		
Fall Time	t_f		T_{vj}=25°C		405		ns
			T_{vj}=125°C		590		
			T_{vj}=150°C		590		
Turn-on Energy Loss	E_{on}		T_{vj}=25°C		75		mJ
			T_{vj}=125°C		110		
			T_{vj}=150°C		130		
Turn-off Energy Loss	E_{off}		T_{vj}=25°C		105		mJ
			T_{vj}=125°C		130		
			T_{vj}=150°C		130		
Short Circuit Current	I_{SC}	V_{GE}≤15V, V_{CC}=1000V, $V_{CE,max}$=V_{CES}-$L_{s(CE)}$ · di/dt , T_{vj}=150 t_p≤10us			2296		A

/Characteristic Values

Parameter	Symbol	Condition		Value			Unit
				Min	Typ.	Max	
Forward voltage	V_F	I_F=450A	T_{vj}=25℃		2.0	2.4	V
			T_{vj}=125℃		2.2		
			T_{vj}=150℃		2.2		
Peak reverse recovery current	I_{RM}	I_F=450A, V_R=900V, di_F/dt=-2800A/μs V_{GE}=-15V Inductive Load	T_{vj}=25℃		245		A
			T_{vj}=125℃		265		
			T_{vj}=150℃		280		
Reverse recovery charge	Q_{rr}		T_{vj}=25℃		60		uC
			T_{vj}=125℃		100		
			T_{vj}=150℃		120		
Reverse recovery energy loss	E_{rec}		T_{vj}=25℃		40		mJ
			T_{vj}=125℃		60		
			T_{vj}=150℃		70		

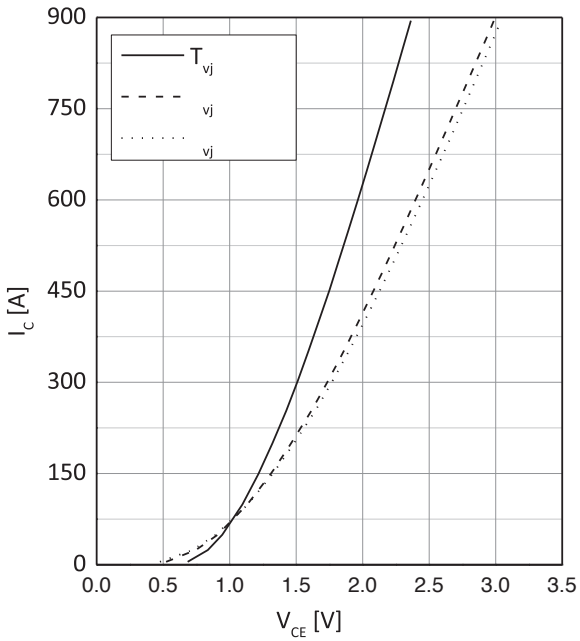
NTC- Thermistor

Parameter	Symbol	Condition	Min	Typ.	Max	Unit
Rated resistance	R_{25}	T_C=25℃		5.00		kΩ
Power dissipation	P_{25}				10	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298,15K))]$		3380		K

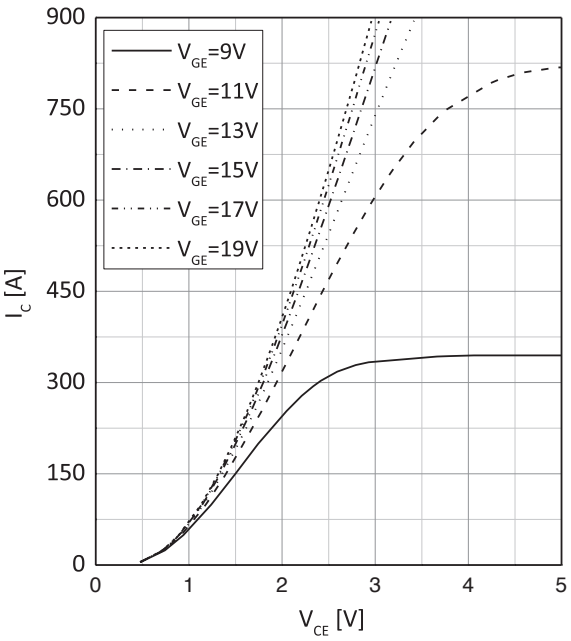
Package Properties

Parameter	Symbol	Condition	Value			Unit
			Min	Typ.	Max	
IGBT Thermal Resistance: Junction to Case	$R_{th(J-C)}$	IGBT/per IGBT			0.06	K/W
Diode Thermal Resistance: Junction to Case	$R_{th(J-C)}$	/per Diode			0.1	K/W
IGBT Thermal Resistance: Case to Heatsink	$R_{th(C-H)}$	IGBT/per IGBT λ_{grease}=1W/(m•K)			0.029	K/W
Diode Thermal Resistance: Case to Heatsink	$R_{th(C-H)}$	/per Diode λ_{grease}=1W/(m•K)			0.048	K/W
Isolation Voltage	V_{isol}	RMS, f=50Hz, t=60s		3.4		kV
Creepage Distance	d_{cr}	Terminal to Heatsink		14		mm
		Terminal to Terminal		13.5		mm
Clearance Distance	d_{cl}	Terminal to Heatsink		12.5		mm
		Terminal to Terminal		10		mm
Comparative Tracking Index	CTI			>200		
Module Stray Inductance	$L_{s,\ CE}$	/per Switch		20		nH
Module lead Resistance, Terminal to Chip	$R_{CC`+EE`}$	/per Switch, T_C=25℃		1.1		mΩ
Mounting Torques	M	Baseplate to Heatsink, M5	3.0		6.0	Nm
		Power Terminal, M6	3.0		6.0	Nm
Module Weight	G			345		g

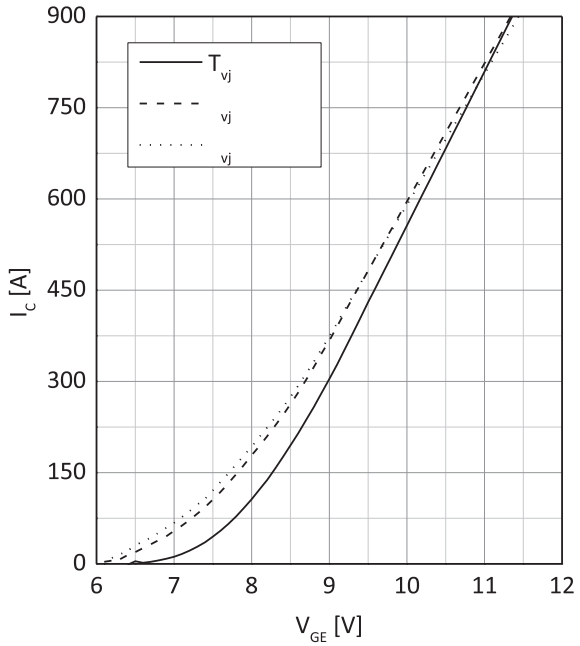
Output characteristic IGBT
$I_C=f(V_{CE})$, V_{GE}=15V



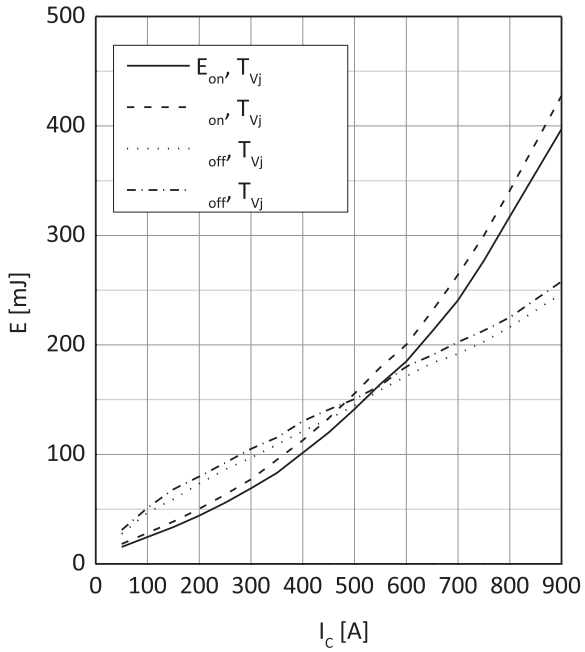
Output characteristic IGBT
$I_C=f(V_{CE})$, T_{vj}=150℃



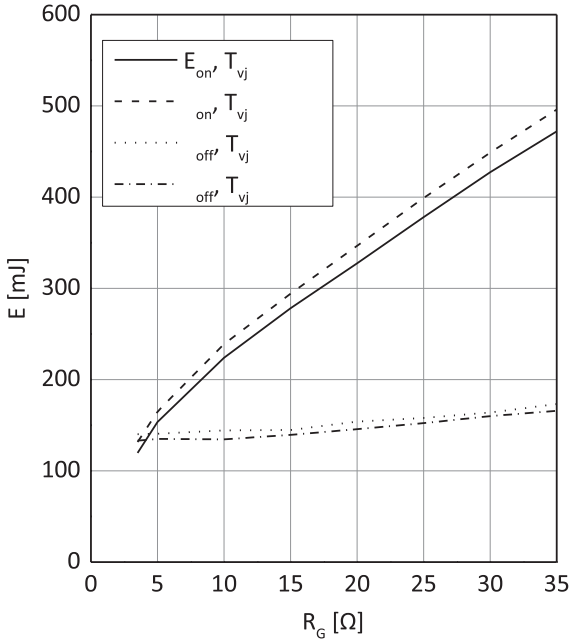
Transfer characteristic IGBT
$I_C=f(V_{GE})$, V_{CE}=20V



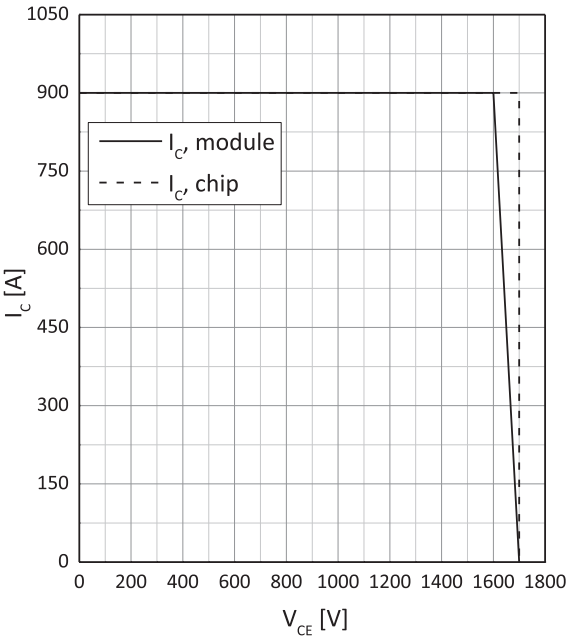
Switching losses IGBT
E=f(Ic), V_{GE}=±15V, R_{Gon}=R_{Goff}=3.3Ω, V_{CE}=900V



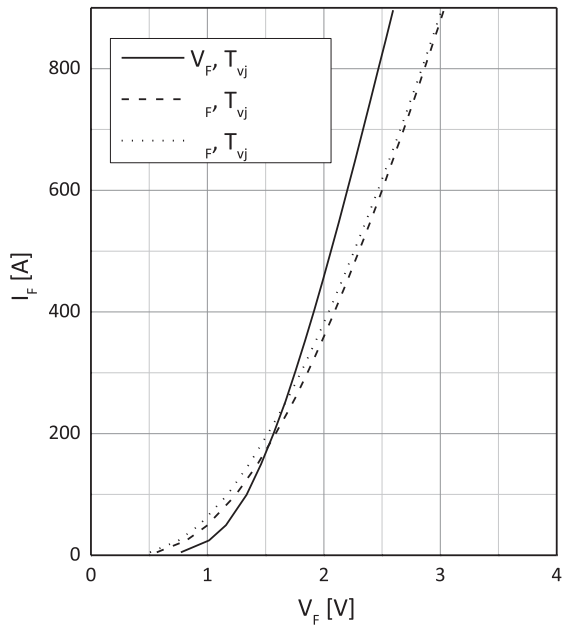
Switching losses IGBT
V_{GE}=±15V, I_C=450A,V_{CE}=900V



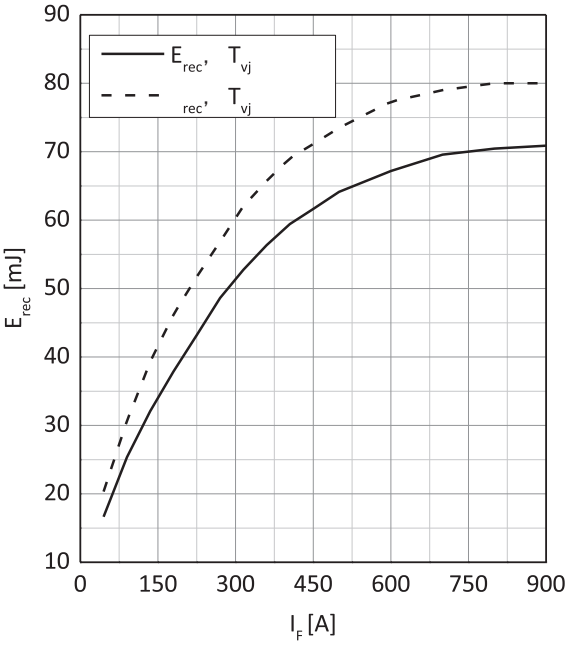
Reverse bia safe operating area IGBT
V_{GE}=±15V,R_{Goff}=3.3Ω,T_{vj}=150℃



Forward characteristic Diode
I_F=f(V_F)



Switching losses Diode
E_{rec}=f(I_F), R_{Gon}=3.3Ω, V_{CE}=900V



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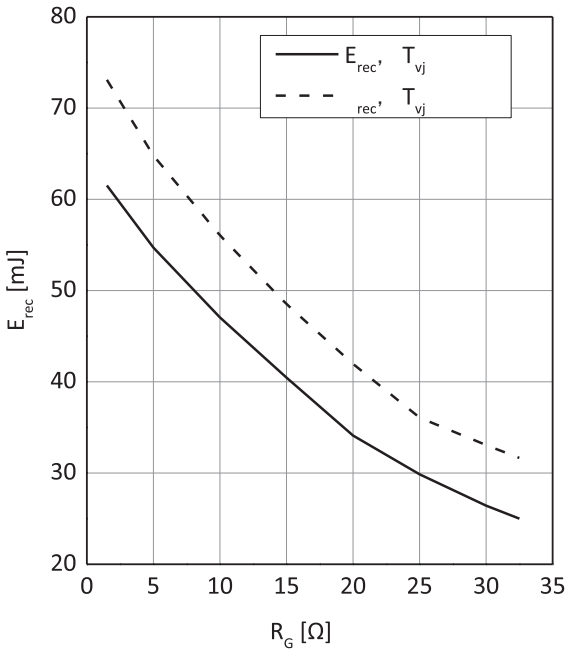
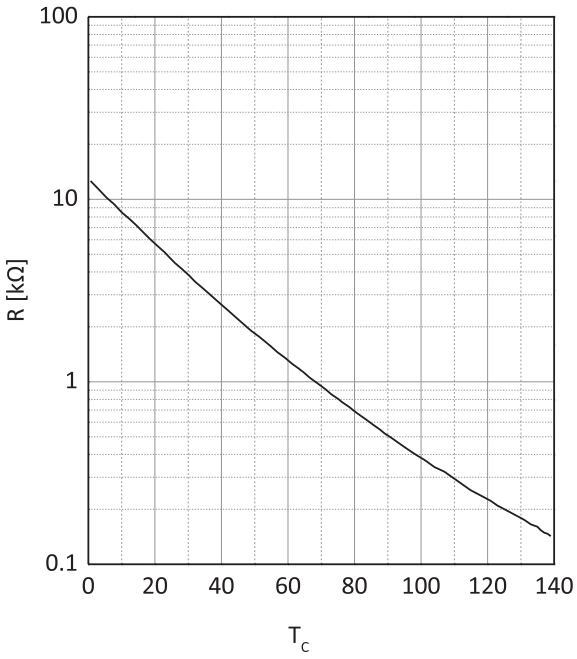
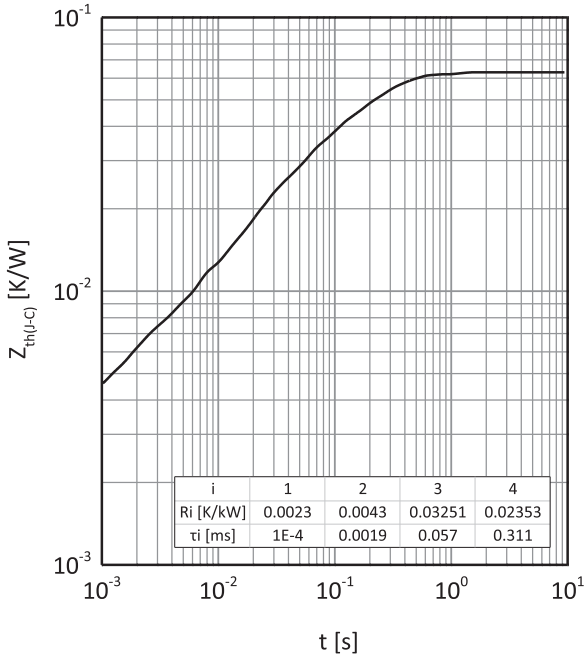
Switching losses Diode
$E_{rec}=f(R_G),V_{CE}=900V$



NTC temperature characteristic

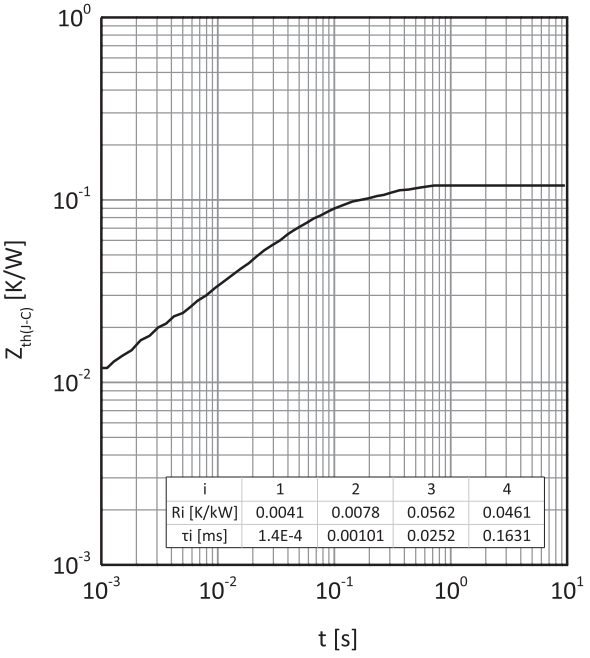


Transient thermal impedance IGBT
$Z_{th(J-C)} = f(t)$



i	1	2	3	4
Ri [K/kW]	0.0023	0.0043	0.03251	0.02353
τi [ms]	1E-4	0.0019	0.057	0.311

Transient thermal impedance Diode
$Z_{th(J-C)} = f(t)$



i	1	2	3	4
Ri [K/kW]	0.0041	0.0078	0.0562	0.0461
τi [ms]	1.4E-4	0.00101	0.0252	0.1631

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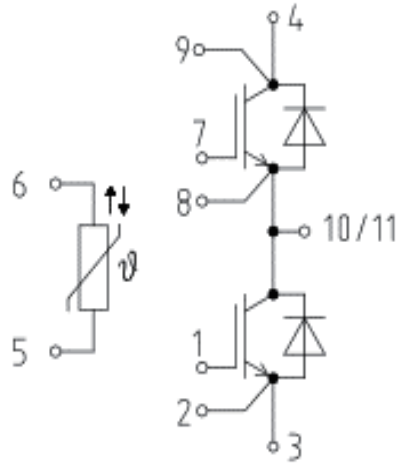
Circuit Diagram



Outline Drawing