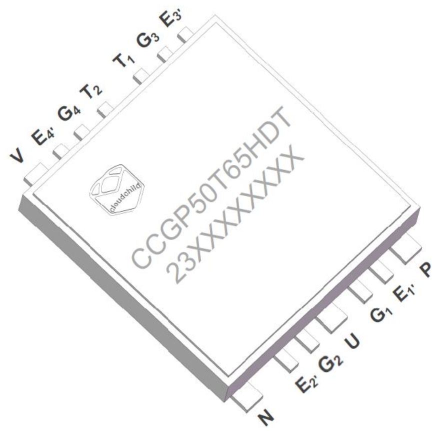
CHONGQING CLOUDCHILD TECHNOLOGY CO.,LTD

DPIM Encapsulate IGBT MODULE

CCGP50T65HDT **Planar-FS IGBT module**

VCES	VCEsat		I_{cnom}/I_{CRM}
650V	T_{vj}=25℃	1.6V	50A/100A
	Tvj=150℃	1.8V	

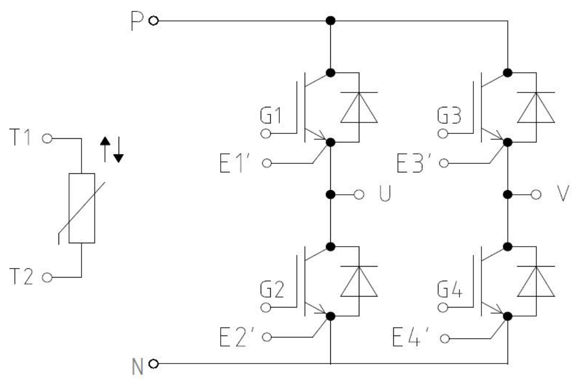


DESCRIPTION

The DPIM module with Trench/Fieldstop IGBT and Emitter Controlled diode and NTC.

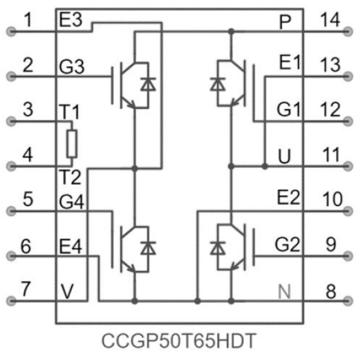
FEATURES

- 2.5 kV AC 1min Insulation
- High Creepage and Clearance Distances
- RoHS compliant
- Rugged mounting due to integrated mounting clamps
- AQG324 Qualified



APPLICATIONS

- Automotive Applications
- High Frequency Switching Application
- DC/DC converter
- Auxiliary Inverters
- Hybrid Electrical Vehicles (H)EV
- Inductive Heating and Welding



CHARACTERISTICS VALUES

MAXIMUM RATED VALUES(IGBT)

Parameter	Symbol	Conditions	Values	Units
Collector-emitter voltage	V_{CES}	T_{vj}=25℃, V_{GE}=0V	650	V
Continuous collector current	I_{cnom}	T_c=100℃, T_{vjmax}=175℃	50	A
Repetitive peak collector current	I_{CRM}	t_p=1ms, T_{vj}=25℃	100	A
Gate-emitter peak voltage	V_{GES}	T_{vj}=25℃	±20	V
SC data	I_{SC}	V_{GE}≤15V, V_{CC}=800V V_{CEmax}=V_{CES}-L_{sCE}*di/dt t_p≤10μs, T_{vj}=150℃	290	A
Total power dissipation	P_{tot}	T_c=25℃, $T_{vj\ max}$=175℃	200	W

CHARACTERISTICS VALUES(IGBT)

Parameter	Symbol	Conditions		Values			Units
				Min.	Typ.	Max.	
Collector-emitter breakdown oltage	V_{BRCES}	VGE=0V,IC=100μA		650			V
Collector-emitter saturation voltage	$V_{CE\ sat}$	I_C=50A, V_{GE}=15V, T_{vj}=25℃		1.5	1.60	1.85	V
		I_C=50A, V_{GE}=15V, T_{vj}=150℃			1.8		V
Gate-emitter threshold voltage	V_{GEth}	V_{CE}=V_{GE}, I_C=3mA, T_{vj}=25℃		4.9	5.8	6.5	V
Gate charge	Q_G	V_{GE}=-8V...+15V			0.5		μC
Integrated gate resistor	R_G	T_{vj}=25℃			5		Ω
Input capacitance	C_{ies}	T_{vj}=25℃,f=1MHz,V_{GE}=0V,V_{CE}=25V			3.29		nF
Output capacitance	C_{oes}	T_{vj}=25℃,f=1MHz,V_{GE}=0V,V_{CE}=25V			0.55		
Reverse transfer capacitance	C_{res}	T_{vj}=25℃,f=1MHz,V_{GE}=0V,V_{CE}=25V			0.09		nF
Collector-emitter cut-off current	I_{CES}	V_{CE}=650V, V_{GE}=0V, T_{vj}=25℃				4	μA
Gate-emitter leakage current	I_{GES}	V_{CE}=0V, V_{GE}=20V, T_{vj}=25℃				200	nA
Turn-on delay time, inductive load	$t_{d\ on}$	I_C=50A, V_{CE}=350V, V_{GE}=-8V/+15V R_{Gon}=12Ω, R_{Goff}=12Ω	T_{vj}=25℃		135		ns
			T_{vj}=150℃		155		ns
Rise time, inductive load	t_r		T_{vj}=25℃		40		ns
			T_{vj}=150℃		56		ns
Turn-off delay time, inductive load	$t_{d\ off}$		T_{vj}=25℃		323		ns
			T_{vj}=150℃		421		ns
Fall time, inductive load	t_f		T_{vj}=25℃		52		ns
			T_{vj}=150℃		102		ns
Turn-on energy loss per pulse	E_{on}	I_C=50A, V_{CE}=350V, V_{GE}=-8V/+15V, R_{Gon}=12Ω, R_{Goff}=12Ω, $L_σ$=25nH	T_{vj}=25℃		2.03		mJ
			T_{vj}=150℃		2.25		mJ
Turn-off energy loss per pulse	E_{off}		T_{vj}=25℃		0.6		mJ
			T_{vj}=150℃		0.72		mJ

MAXIMUM RATED VALUES(FRD)

Parameter	Symbol	Conditions	Values	Units
Repetitive peak reverse voltage	V_{RRM}	T_{vj}=25℃	650	V
Continuous forward current	I_F		50	A
Maximum repetitive forward current	I_{FRM}	Pulse, t_p=1ms, T_{vj}=25℃	100	A
I^2t-value	I^2t	V_R=0V, t_p=10ms, T_{vj}=125℃ V_R=0V, t_p=10ms, T_{vj}=150℃	50 46	A^2s

CHARACTERISTICS VALUES(FRD)

Parameter	Symbol	Conditions		Values			Units
				Min.	Typ.	Max.	
Breakdown voltage	$V_{(BR)}$	I_R=100μA, T_{vj}=25℃		650			V
Reverse current	I_R	V_R=650V, T_{vj}=25℃				100	μA
Forward voltage	V_F	I_F=50A, V_{GE}=0V	T_{vj}=25℃	1.5	1.65	1.8	V
			T_{vj}=150℃		1.55		V
Peak reverse recovery current	I_{RM}	I_F=50A, V_R=350V, V_{GE}=-8V/+15V, di_F/dt=2300A/μs, $L_σ$=45nH	T_{vj}=25℃		35		A
			T_{vj}=150℃		41		A
Recovered charge	Q_r		T_{vj}=25℃		0.96		μC
			T_{vj}=150℃		1.75		μC
Reverse recovery energy	E_{rec}		T_{vj}=25℃		0.21		mJ
			T_{vj}=150℃		0.39		mJ

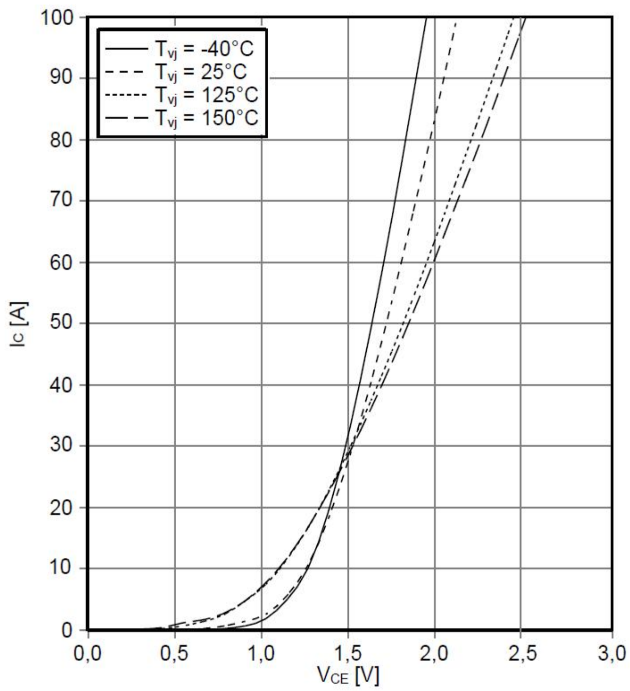
MODULE

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Maximum junction temperature	$T_{vj\ max}$				175	℃
Temperature under switching conditions	$T_{vj\ op}$		-40		175	℃
Storage temperature	T_{stg}		-40		175	℃
IGBT, thermal resistance, junction to case	$R_{thjc\ IGBT}$	Per IGBT		0.75	1.44	K/W
Diode, thermal resistance, junction to case	$R_{thjc\ Diode}$	Per diode		0.90		K/W
Stray inductance module	L_{sCE}			15		nH
Module lead resistance, terminals-chip	$R_{CC'+EE}$	T_{vj}=25℃, per switch		0.55		mΩ
Isolation test voltage	V_{isol}	AC, RMS, f=50Hz, t=1min		2.5		kV
Creepage distance	ds	Terminal to terminal		17.0		mm
		Terminal to base		20.0		mm
Clearance distance in air	da	Terminal to terminal		17.0		mm
		Terminal to base		9.5		mm
Comperative tracking index	CTI		>200			
Soldering Temperature , for 10S(1.6mm from case)	-		220			℃
Internal isolation	-	Basic insulation	Al_2O_3			-
Material of module baseplate	-		Cu			-
Dimensions	L x W x H		27.7x24.1x3.98			mm
Weight	G		21			g

CHARACTERISTICS DIAGRAMS

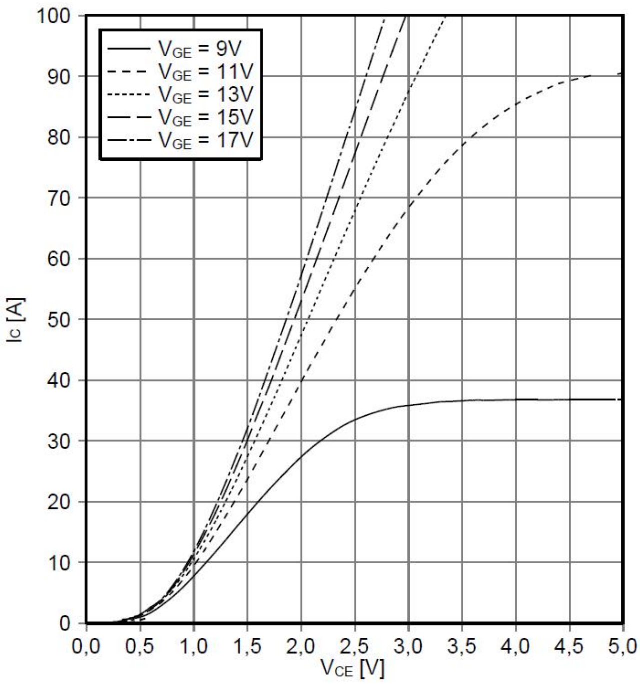
Output characteristic IGBT, Inverter(typical)

$I_C=f(V_{CE})$，$V_{GE}=15V$



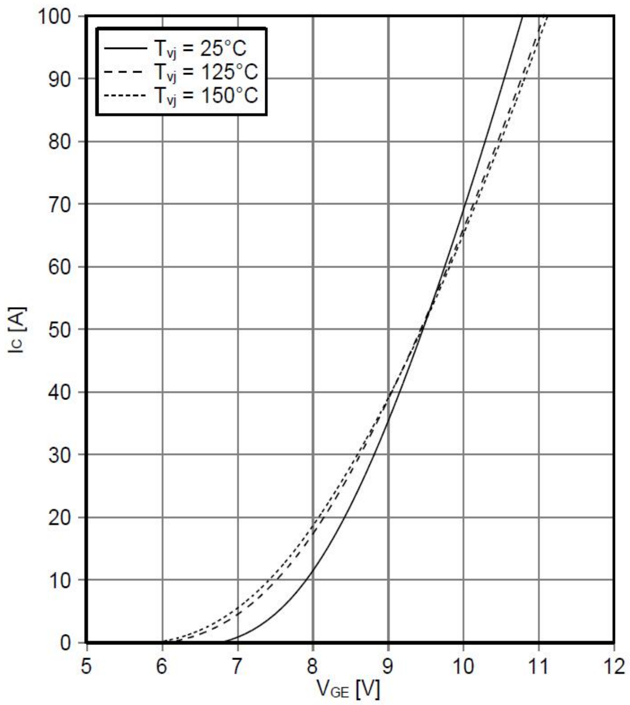
Output characteristic IGBT, Inverter(typical)

$I_C=f(V_{CE})$，$T_{vj}=150℃$



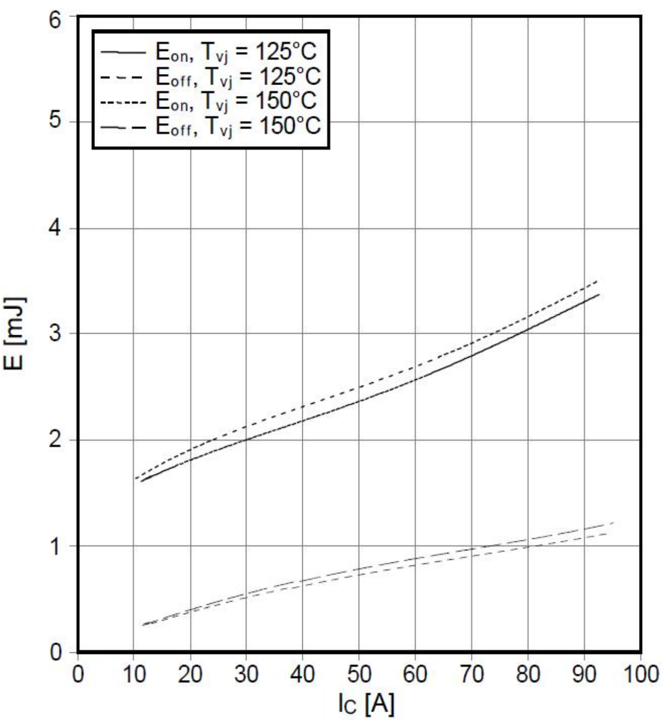
Transfer characteristic IGBT, Inverter(typical)

$I_C=f(V_{GE})$，$V_{CE}=20V$



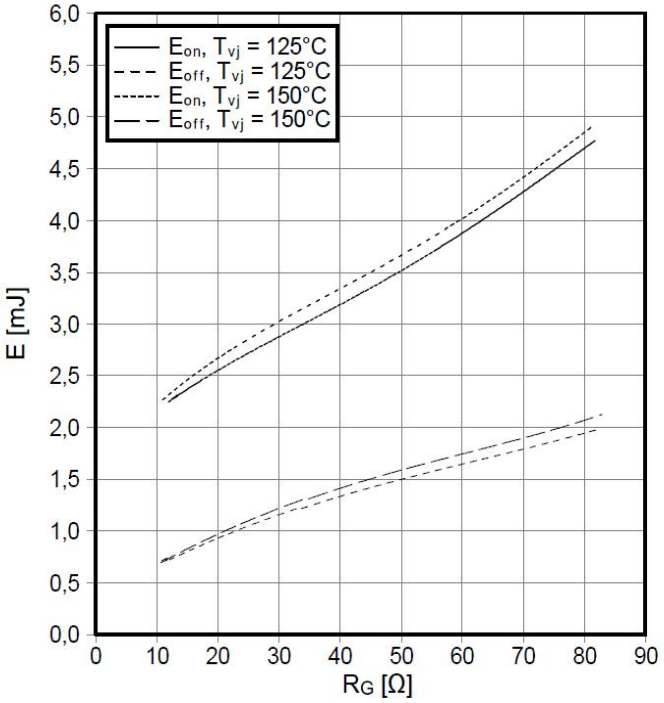
Switching losses IGBT, Inverter(typical)

$E_{on}=f(I_C)$，$E_{off}=f(I_C)$，$V_{GE}=±15V$，$R_{Gon}=R_{Goff}=12Ω$，$V_{CE}=350V$



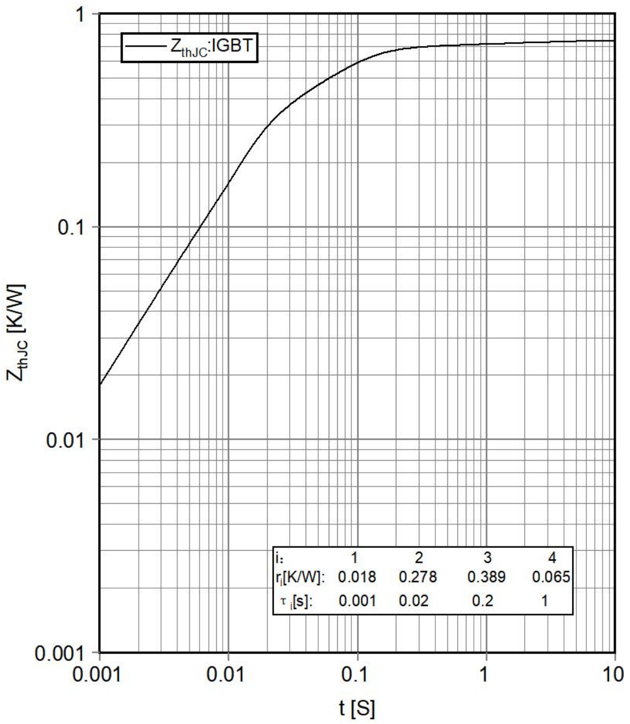
Switching losses IGBT, Inverter(typical)

$E_{on}=f(R_G)$, $E_{off}=f(R_G)$, $V_{GE}=\pm15V$, $I_C=50A$, $V_{CE}=350V$



Transient thermal impedance IGBT, Inverter

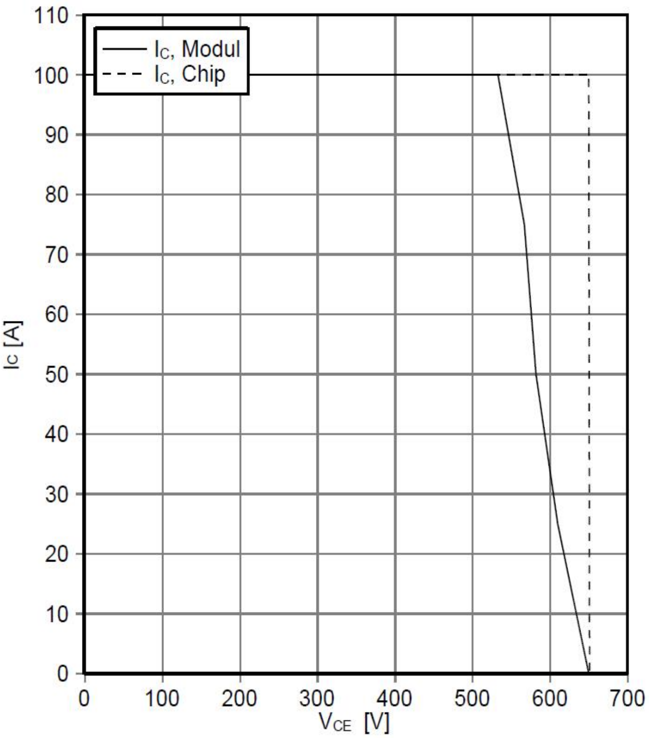
$Z_{thJC}=f(t)$



Reverse bias safe operating area IGBT, Inverter(RBSOA)

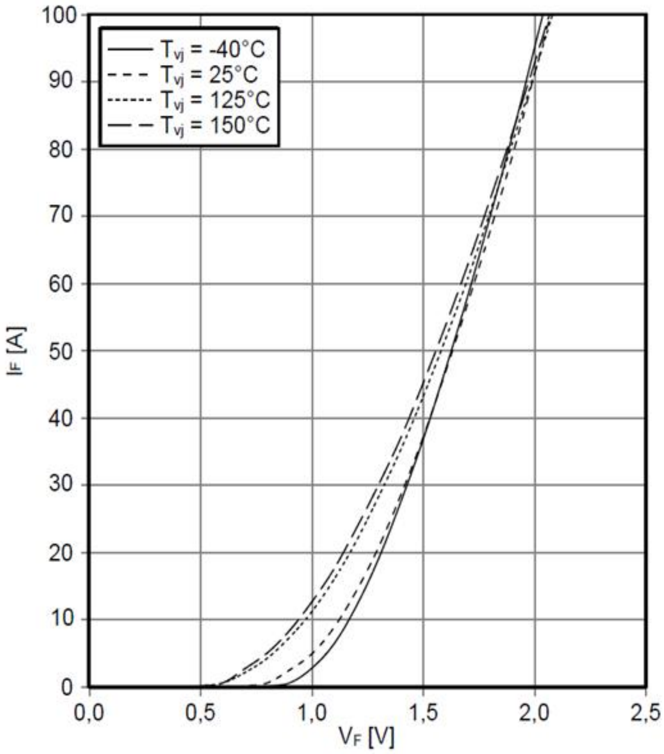
$I_C=f(V_{CE})$

$V_{GE}=\pm15V$, $R_{Goff}=12\Omega$, $T_{vj}=150℃$

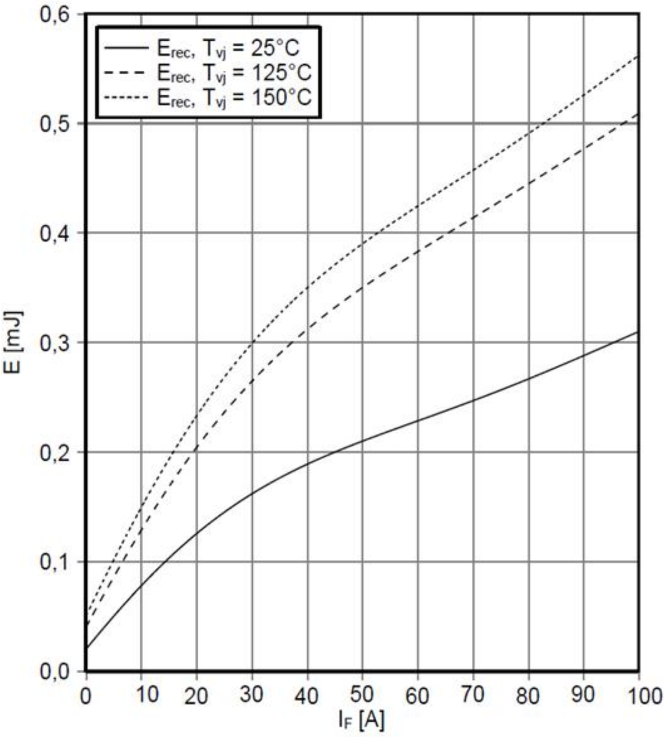


Forward characteristic of Diode, Inverter (typical)

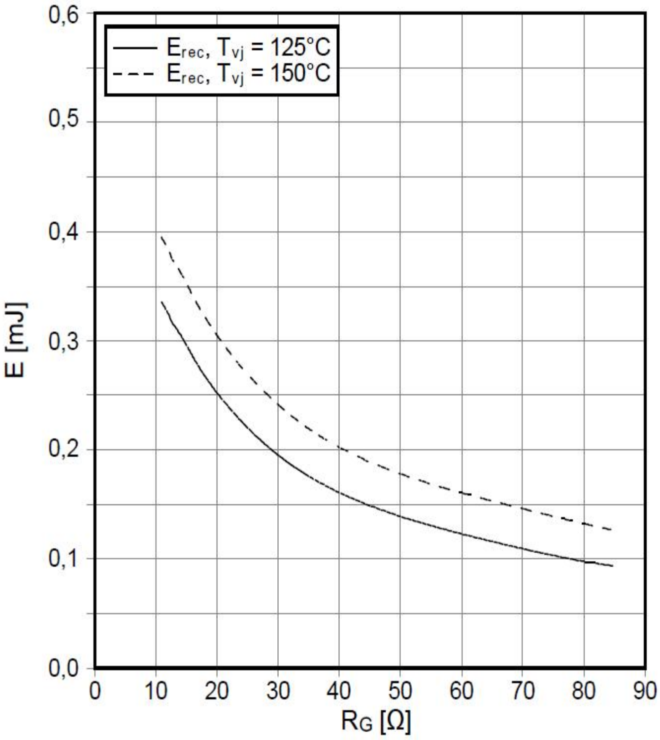
$I_F = f(V_F)$



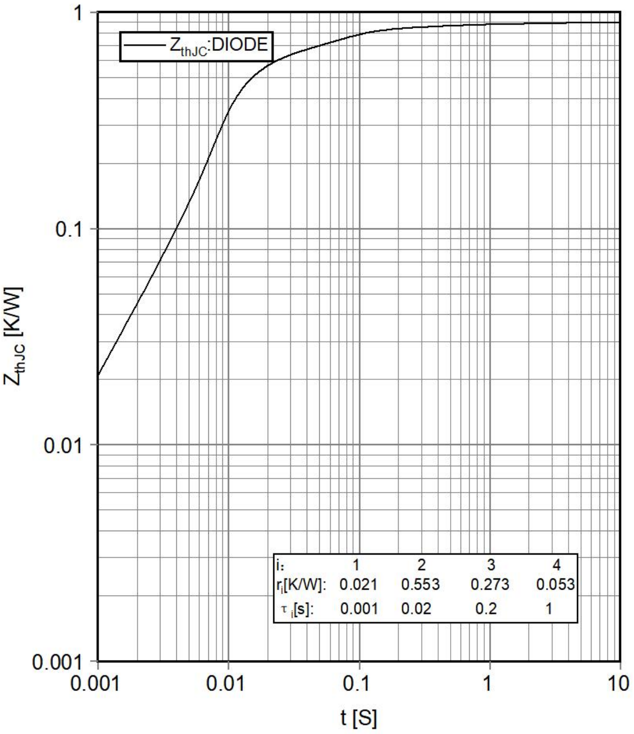
Switching losses Diode, Inverter (typical)
$E_{rec} = f\ (I_F)$
$R_{Gon} = 12\Omega$, V_{CE} = 350 V



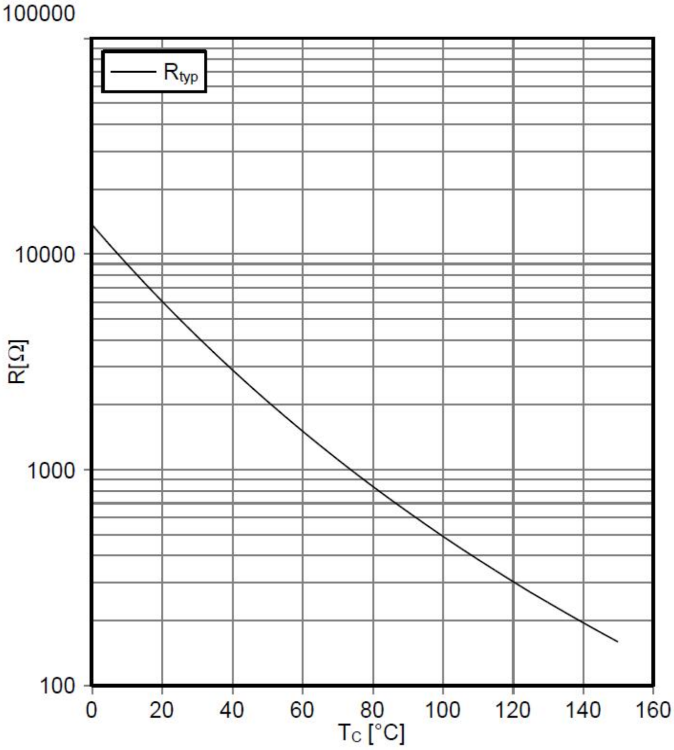
Switching losses Diode, Inverter (typical)
$E_{rec} = f\ (R_G)$
I_F = 50 A, V_{CE} = 350 V



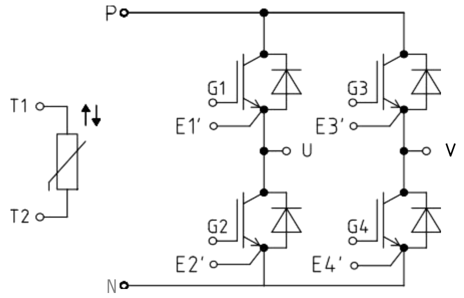
Transient thermal impedance Diode, Inverter
$Z_{thJC} = f\ (t)$

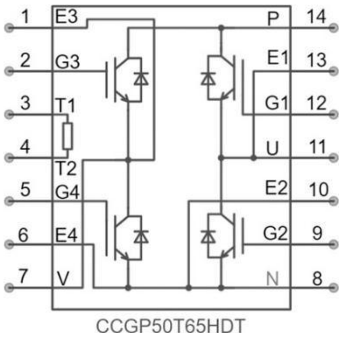


NTC-Thermistor-temperature characteristic (typical)
R = f (T)

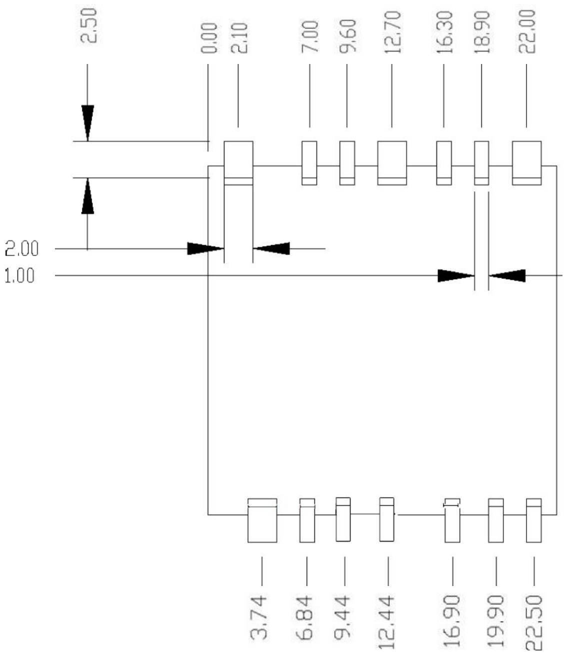


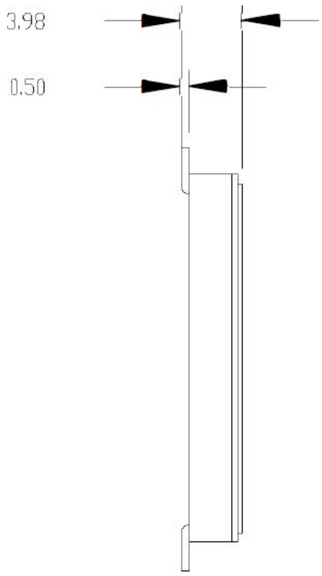
circuit diagram headline

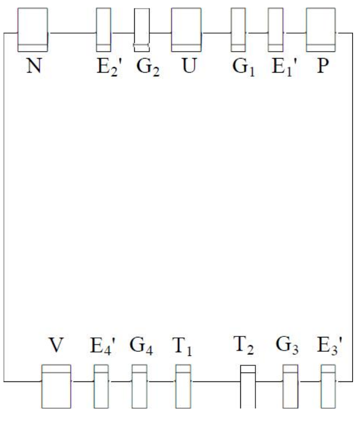


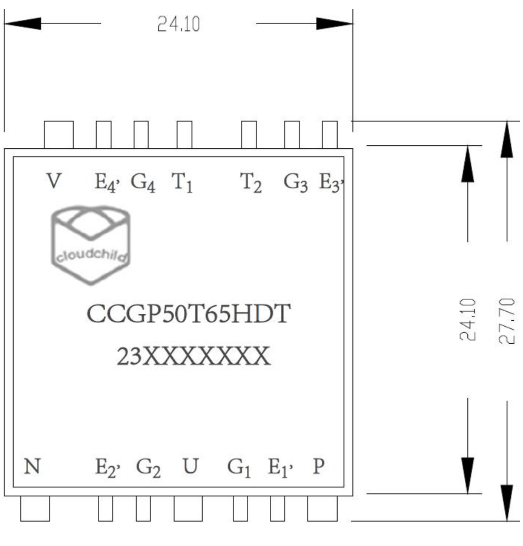


package outlines









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Date of change	Rev #	revise content
2023/09/25	A/0	/