

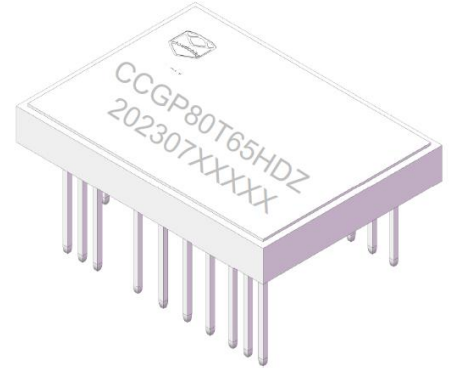


CHONGQING CLOUDCHILD TECHNOLOGY CO.,LTD

## DPIM Encapsulate IGBT MODULE

### CCGP80T65HDZ Planar-FS IGBT module

VCES	VCEsat		I <sub>cnom</sub> /I <sub>CRM</sub>
	T <sub>vj</sub> =25°C	1.7V	
650V	T <sub>vj</sub> =150°C	1.8V	80A/160A



### DESCRIPTION

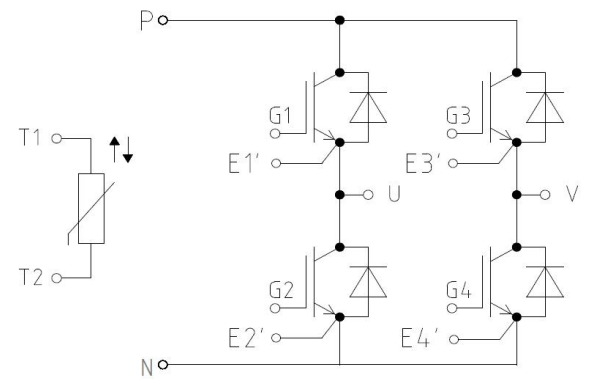
The DPIM module with Trench/Fieldstop IGBT and Emitter Controlled diode and NTC.

### FEATURES

- Low inductive design
- High Creepage and Clearance Distances
- RoHS compliant
- Rugged mounting due to integrated mounting clamps
- AQC324 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	$V_{CES}$	$T_{vj}=25^{\circ}\text{C}$ , $V_{GE}=0\text{V}$	650	V
Continuous collector current	$I_{cnom}$	$T_c=100^{\circ}\text{C}$ , $T_{vjmax}=175^{\circ}\text{C}$	75	A
Repetitive peak collector current	$I_{CRM}$	$t_p=1\text{ms}$ , $T_{vj}=25^{\circ}\text{C}$	150	A
Gate-emitter peak voltage	$V_{GES}$	$T_{vj}=25^{\circ}\text{C}$	$\pm 20$	V
SC data	$I_{SC}$	$V_{GE}\leq 15\text{V}$ , $V_{CC}=800\text{V}$ $V_{CEmax}=V_{CES}-L_{sCE} * di/dt$ $t_p\leq 10\mu\text{s}$ , $T_{vj}=150^{\circ}\text{C}$	380	A
Total power dissipation	$P_{tot}$	$T_c=25^{\circ}\text{C}$ , $T_{vj max}=175^{\circ}\text{C}$	200	W

### CHARACTERISTICS VALUES(IGBT)

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Collector-emitter breakdown voltage	$V_{BRCES}$	$V_{GE}=0\text{V}$ , $I_C=100\mu\text{A}$	650			V
Collector-emitter saturation voltage	$V_{CE sat}$	$I_C=80\text{A}$ , $V_{GE}=15\text{V}$ , $T_{vj}=25^{\circ}\text{C}$		1.70	2.0	V
		$I_C=80\text{A}$ , $V_{GE}=15\text{V}$ , $T_{vj}=150^{\circ}\text{C}$		1.80		V
Gate-emitter threshold voltage	$V_{GETh}$	$V_{CE}=V_{GE}$ , $I_C=3\text{mA}$ , $T_{vj}=25^{\circ}\text{C}$	4.8	5.5	6.2	V
Gate charge	$Q_G$	$V_{GE}=-8\text{V}\dots+15\text{V}$		0.8		$\mu\text{C}$
Integrated gate resistor	$R_G$	$T_{vj}=25^{\circ}\text{C}$		5		$\Omega$
Input capacitance	$C_{ies}$	$T_{vj}=25^{\circ}\text{C}$ , $f=1\text{MHz}$ , $V_{GE}=0\text{V}$ , $V_{CE}=25\text{V}$		3.29		nF
Output capacitance	$C_{oes}$	$T_{vj}=25^{\circ}\text{C}$ , $f=1\text{MHz}$ , $V_{GE}=0\text{V}$ , $V_{CE}=25\text{V}$		0.55		
Reverse transfer capacitance	$C_{res}$	$T_{vj}=25^{\circ}\text{C}$ , $f=1\text{MHz}$ , $V_{GE}=0\text{V}$ , $V_{CE}=25\text{V}$		0.14		nF
Collector-emitter cut-off current	$I_{CES}$	$V_{CE}=650\text{V}$ , $V_{GE}=0\text{V}$ , $T_{vj}=25^{\circ}\text{C}$			4	$\mu\text{A}$
Gate-emitter leakage current	$I_{GES}$	$V_{CE}=0\text{V}$ , $V_{GE}=20\text{V}$ , $T_{vj}=25^{\circ}\text{C}$			200	nA
Turn-on delay time, inductive load	$t_{don}$	$I_C=80\text{A}$ , $V_{CE}=350\text{V}$ , $V_{GE}=-8\text{V}/+15\text{V}$ $R_{Gon}=12\Omega$ , $R_{Goff}=12\Omega$	$T_{vj}=25^{\circ}\text{C}$	152		ns
			$T_{vj}=150^{\circ}\text{C}$	155		ns
Rise time, inductive load	$t_r$		$T_{vj}=25^{\circ}\text{C}$	40		ns
			$T_{vj}=150^{\circ}\text{C}$	49		ns
Turn-off delay time, inductive load	$t_{doff}$		$T_{vj}=25^{\circ}\text{C}$	215		ns
			$T_{vj}=150^{\circ}\text{C}$	231		ns
Fall time, inductive load	$t_f$		$T_{vj}=25^{\circ}\text{C}$	57		ns
			$T_{vj}=150^{\circ}\text{C}$	102		ns
Turn-on energy loss per pulse	$E_{on}$		$T_{vj}=25^{\circ}\text{C}$	3.91		mJ
			$T_{vj}=150^{\circ}\text{C}$	4.23		mJ
Turn-off energy loss per pulse	$E_{off}$		$T_{vj}=25^{\circ}\text{C}$	1.83		mJ
			$T_{vj}=150^{\circ}\text{C}$	1.97		mJ

## MAXIMUM RATED VALUES(FRD)

Parameter	Symbol	Conditions	Values	Units
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj}=25^{\circ}\text{C}$	650	V
Continuous forward current	$I_F$		80	A
Maximum repetitive forward current	$I_{FRM}$	Pulse, $t_p=1\text{ms}$ , $T_{vj}=25^{\circ}\text{C}$	160	A
$I^2t$ -value	$I^2t$	$V_R=0\text{V}$ , $t_p=10\text{ms}$ , $T_{vj}=125^{\circ}\text{C}$	500	$\text{A}^2\text{s}$
		$V_R=0\text{V}$ , $t_p=10\text{ms}$ , $T_{vj}=150^{\circ}\text{C}$	460	

## CHARACTERISTICS VALUES(FRD)

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Breakdown voltage	$V_{(BR)}$	$I_R=100\mu\text{A}$ , $T_{vj}=25^{\circ}\text{C}$	650			V
Reverse current	$I_R$	$V_R=650\text{V}$ , $T_{vj}=25^{\circ}\text{C}$			100	$\mu\text{A}$
Forward voltage	$V_F$	$I_F=80\text{A}$ , $V_{GE}=0\text{V}$ ,	$T_{vj}=25^{\circ}\text{C}$	1.8	2.2	V
			$T_{vj}=150^{\circ}\text{C}$	1.75		V
Peak reverse recovery current	$I_{RM}$	$I_F=80\text{A}$ , $V_R=350\text{V}$ ,	$T_{vj}=25^{\circ}\text{C}$	95		A
			$T_{vj}=150^{\circ}\text{C}$	110		A
Recovered charge	$Q_r$	$V_{GE}=-8\text{V}/+15\text{V}$ , $di_F/dt=2300\text{A}/\mu\text{s}$	$T_{vj}=25^{\circ}\text{C}$	3.7		$\mu\text{C}$
			$T_{vj}=150^{\circ}\text{C}$	7.0		$\mu\text{C}$
Reverse recovery energy	$E_{rec}$	$L_o=45\text{nH}$	$T_{vj}=25^{\circ}\text{C}$	0.9		mJ
			$T_{vj}=150^{\circ}\text{C}$	1.75		mJ

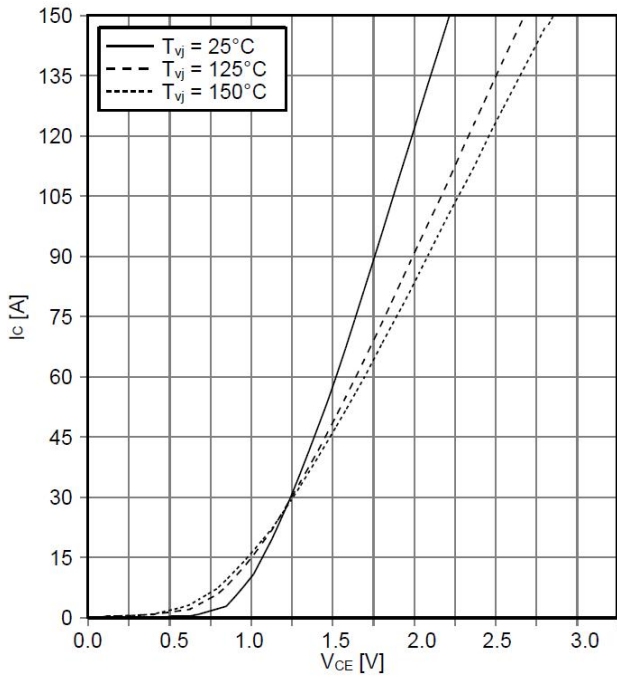
## MODULE

Parameter	Symbol	Conditions	Values			Units
			Min.	Typ.	Max.	
Maximum junction temperature	$T_{vj\text{ max}}$				175	$^{\circ}\text{C}$
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		175	$^{\circ}\text{C}$
Storage temperature	$T_{stg}$		-40		175	$^{\circ}\text{C}$
IGBT, thermal resistance, junction to case	$R_{thjc\text{ IGBT}}$	Per IGBT		0.75	0.85	K/W
Diode, thermal resistance, junction to case	$R_{thjc\text{ Diode}}$	Per diode		0.60		K/W
Stray inductance module	$L_{sCE}$			15		nH
Module lead resistance, terminals-chip	$R_{CC+EE}$	$T_{vj}=25^{\circ}\text{C}$ , per switch		0.55		m $\Omega$
Isolation test voltage	$V_{isol}$	AC, RMS, $f=50\text{Hz}$ , $t=1\text{min}$		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		$^{\circ}\text{C}$
Internal isolation	-	Basic insulation		$\text{Al}_2\text{O}_3$		-
Material of module baseplate	-			Cu		-
Dimensions	L x W x H			34.7x25.2x16.48		mm
Weight	G			30		g

# CHARACTERISTICS DIAGRAMS

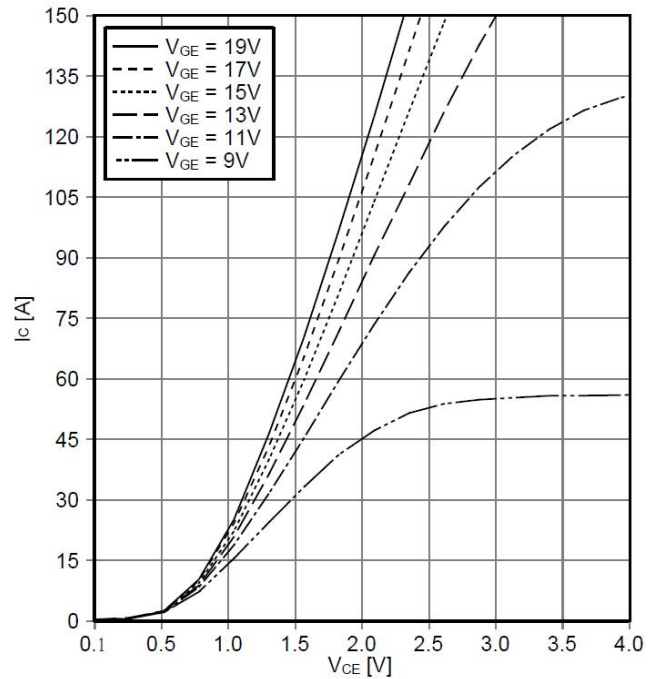
**Output characteristic IGBT, Inverter(typical)**

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



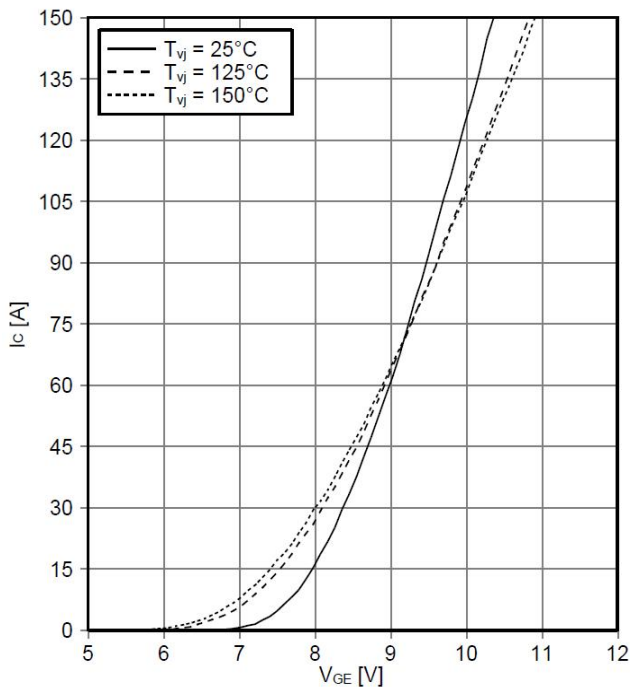
**Output characteristic IGBT, Inverter(typical)**

$I_C=f(V_{CE}), T_{vj}=150^\circ C$



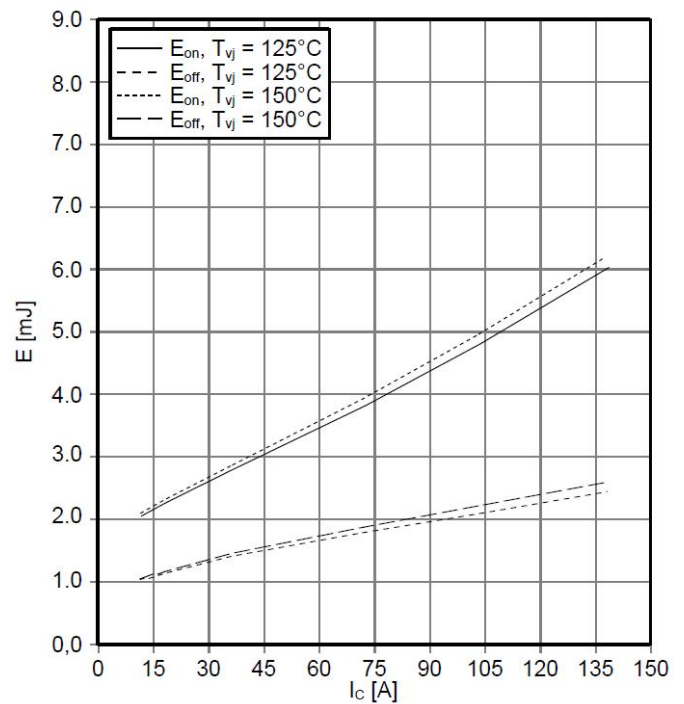
**Transfer characteristic IGBT, Inverter(typical)**

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



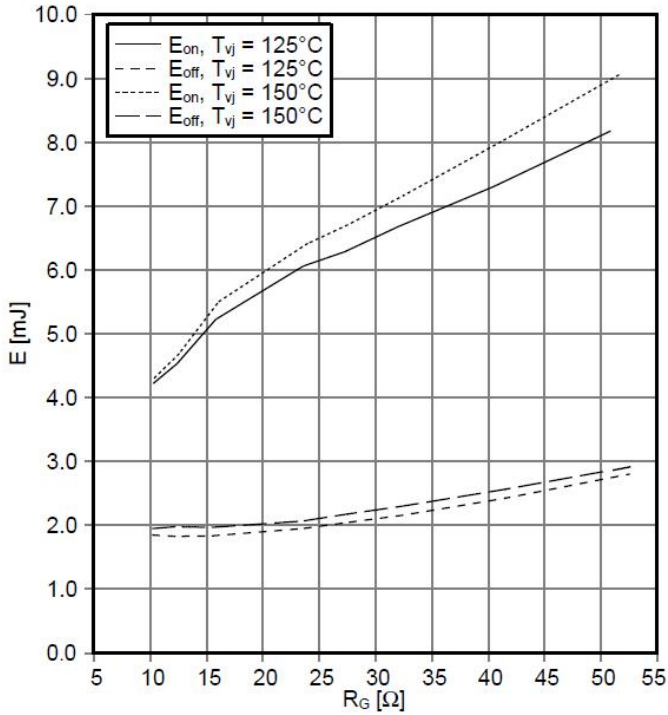
**Switching losses IGBT, Inverter(typical)**

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



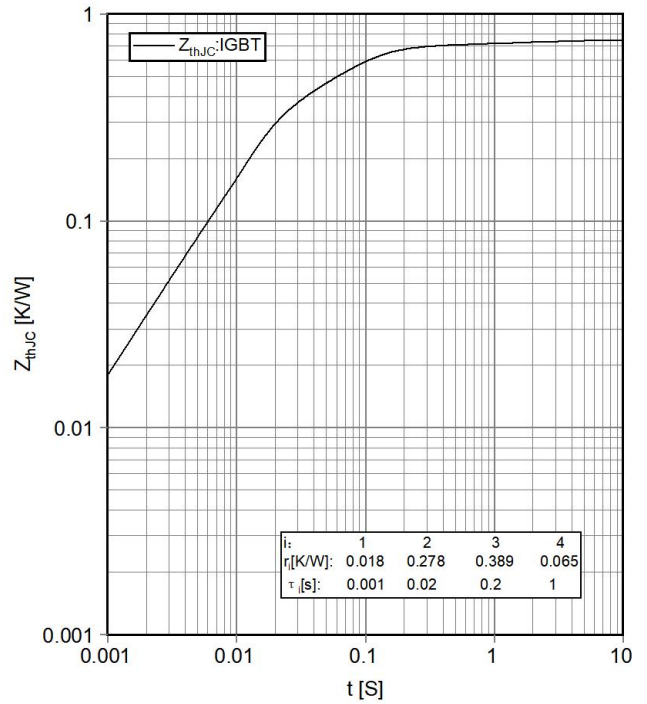
**Switching losses IGBT, Inverter(typical)**

$E_{on}=f(R_G)$ ,  $E_{off}=f(R_G)$ ,  $V_{GE}=\pm 15V$ ,  $I_C=80A$ ,  $V_{CE}=350V$



**Transient thermal impedance IGBT, Inverter**

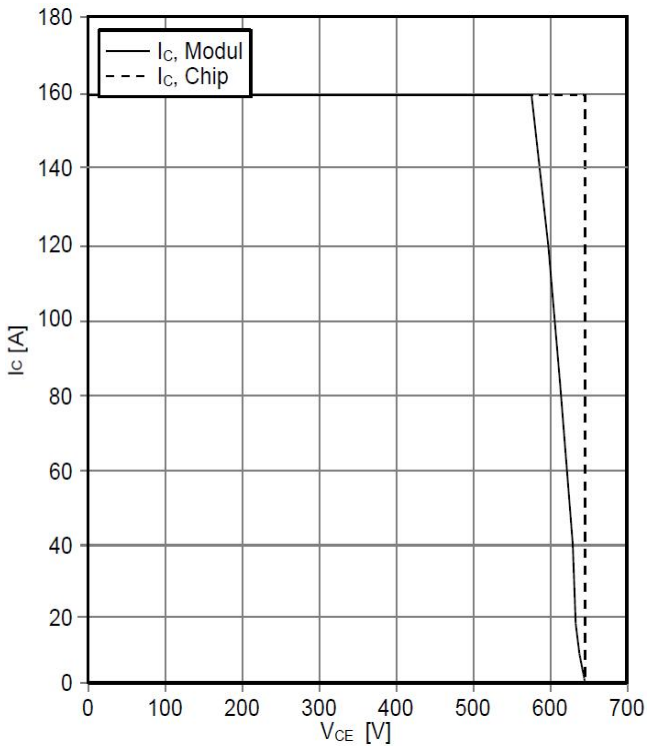
$Z_{thJC}=f(t)$



**Reverse bias safe operating area IGBT, Inverter(RBSOA)**

$I_C=f(V_{CE})$

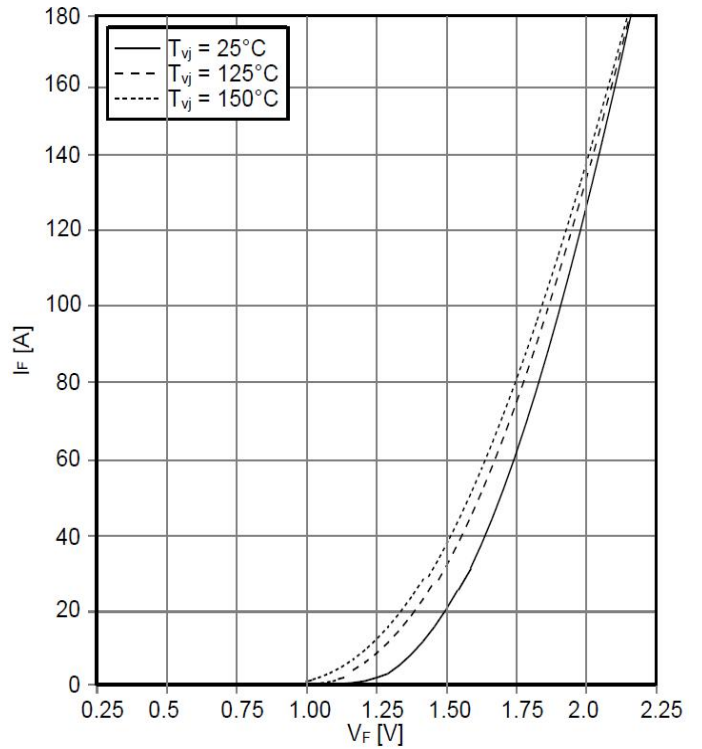
$V_{GE}=\pm 15V$ ,  $R_{Goff}=12\Omega$ ,  $T_{vj}=150^\circ C$



**Capacity characteristic IGBT, Inverter (typical)**

$C = f(V_{CE})$

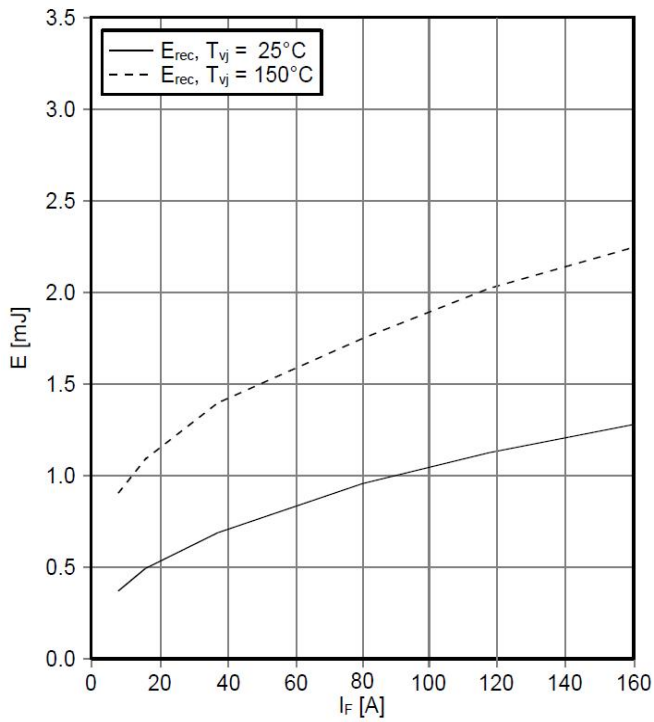
$V_{GE} = 0 V$ ,  $T_{vj} = 25^\circ C$ ,  $f = 1MHz$



**Gate charge characteristic IGBT Inverter (typical)**

$V_{GE} = f(I_F)$

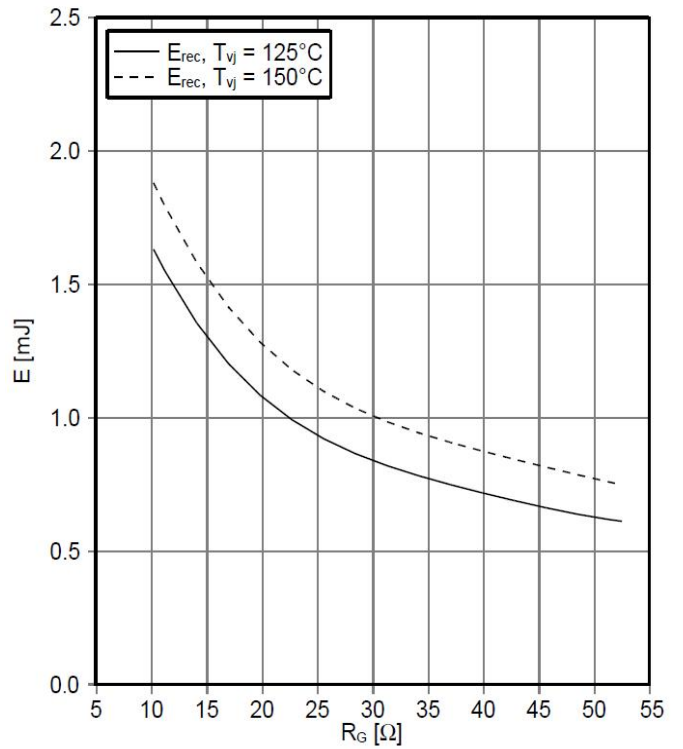
$R_{Gon} = 12 \Omega, V_{CE} = 350 V$



**Forward characteristic of Diode, Inverter (typical)**

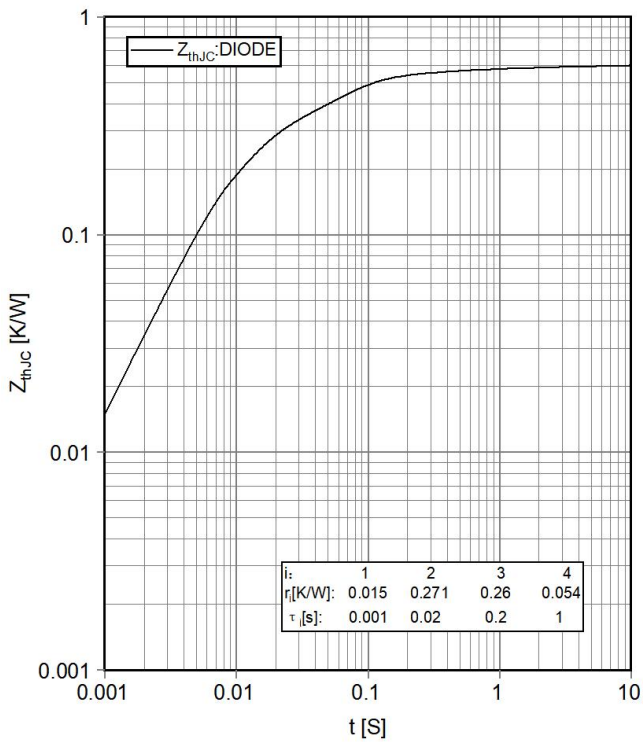
$E_{rec} = f(R_G)$

$I_F = 80 A, V_{CE} = 350 V$



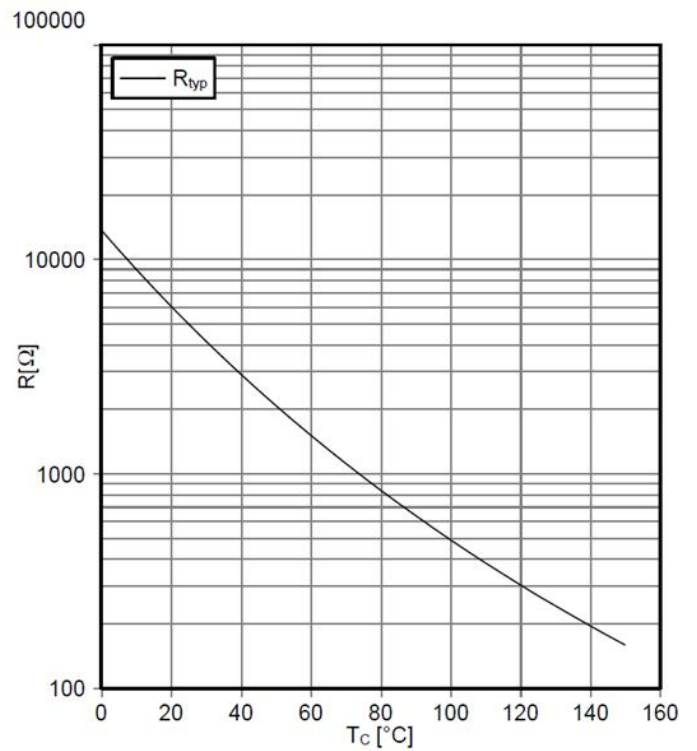
**Transient thermal impedance Diode, Inverter**

$Z_{thJC} = f(t)$

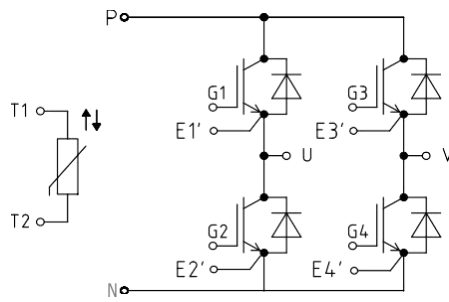


**NTC-Thermistor-temperature characteristic (typical)**

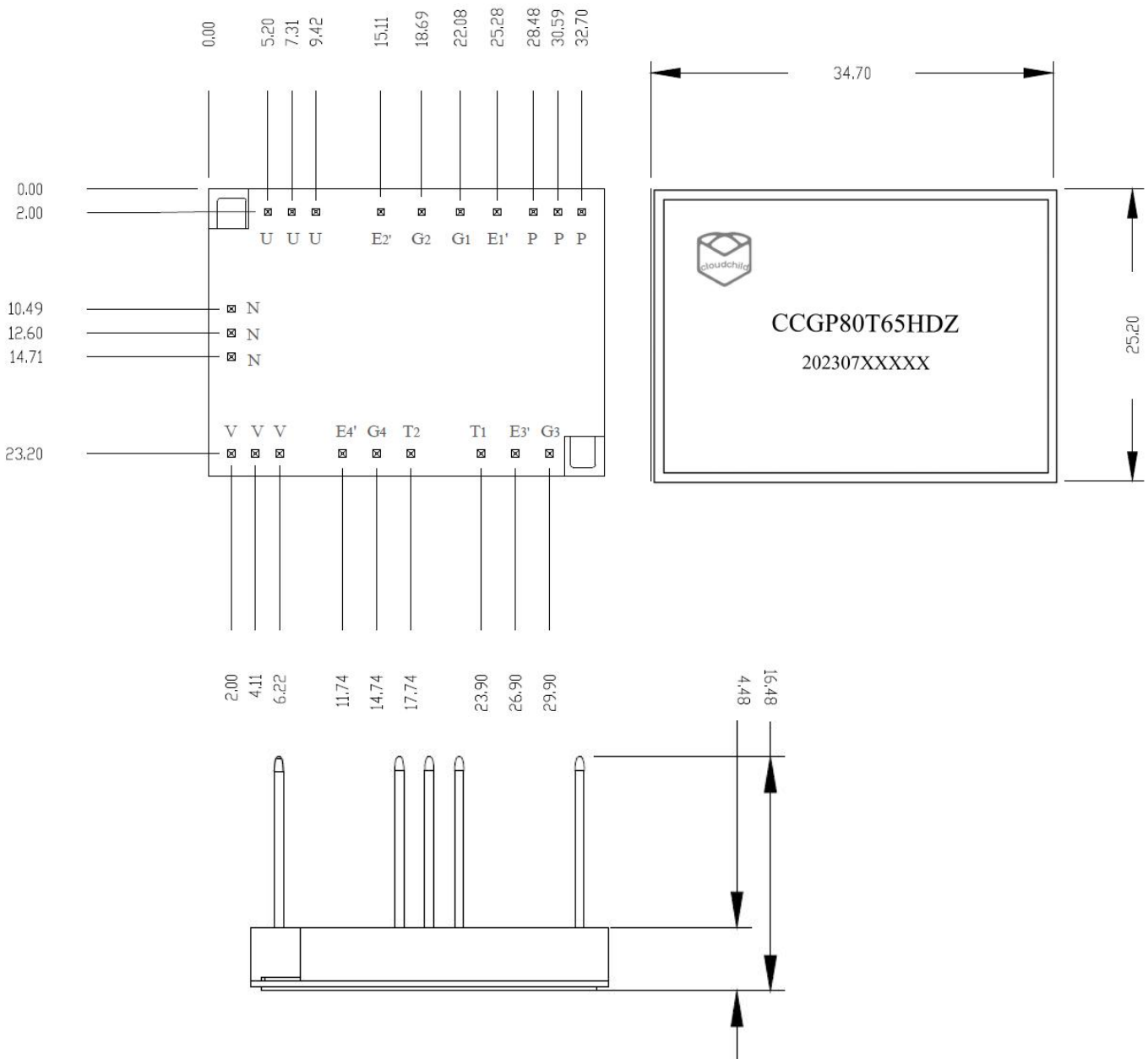
$R = f(T)$



### circuit diagram headline



### package outlines



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