MMG75W170HX6TC

75A 1700V Rectifier+Inverter Module

January 2023 Version 01 RoHS Compliant

PRODUCT FEATURES

☐ High level of integration

☐ IGBT CHIP(1700V Trench+Field Stop technology)

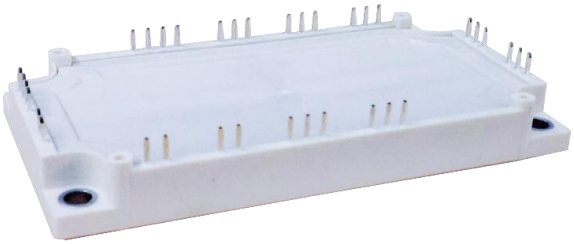
☐ Low saturation voltage and positive temperature coefficient

☐ Fast switching and short tail current

☐ Free wheeling diodes with fast and soft reverse recovery

☐ Industry standard package with insulated copper base plate and soldering pins for PCB mounting

☐ Temperature sense included



Rectifier+Inverter

APPLICATIONS

☐ AC motor control

☐ Motion/servo control

☐ Inverter and power supplies

IGBT-inverter

ABSOLUTE MAXIMUM RATINGS(T_C *=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{CES}	Collector Emitter Voltage	T_J=25℃	1700	V
V_{GES}	Gate Emitter Voltage		±20	
I_C	DC Collector Current	T_C=25℃, T_{Jmax}=175℃	114	A
		T_C=100℃, T_{Jmax}=175℃	75	
I_{CM}	Repetitive Peak Collector Current	tp=1ms	150	
P_{tot} 1	Power Dissipation Per IGBT	T_C=25℃, T_{Jmax}=175℃	500	W

Diode-inverter

ABSOLUTE MAXIMUM RATINGS (T_C *=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	1700	V
$I_{F(AV)}$	Average Forward Current		75	A
I_{FRM}	Repetitive Peak Forward Current	tp=1ms	150	

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IGBT-inverter

ELECTRICAL CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions			Min.	Typ.	Max.	Unit
$V_{GE(th)}$	Gate Emitter Threshold Voltage	$V_{CE}=V_{GE}$, I_C=3mA		4.8	5.8	6.6	V
$V_{CE(sat)}$	Collector Emitter Saturation Voltage	I_C=75A, V_{GE}=15V, T_J=25℃			2.15	2.4	
		I_C=75A, V_{GE}=15V, T_J=125℃			2.5		
		I_C=75A, V_{GE}=15V, T_J=150℃			2.6		
I_{CES}	Collector Leakage Current	V_{CE}=1700V, V_{GE}=0V, T_J=25℃				1	mA
		V_{CE}=1700V, V_{GE}=0V, T_J=150℃				10	mA
I_{GES}	Gate Leakage Current	V_{CE}=0V,V_{GE}=±20V, T_J=25℃		-500		500	nA
R_{Gint}	Integrated Gate Resistor				5		Ω
Q_G	Gate Charge	V_{CE}=900V, I_C=75A , V_{GE}=15V			0.55		μC
C_{ies}	Input Capacitance	V_{CE}=25V, V_{GE}=0V, f =1MHz			7.1		nF
C_{res}	Reverse Transfer Capacitance				220		pF
$t_{d(on)}$	Turn on Delay Time	V_{CC}=900V,I_C=75A R_G =7.5Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		100		ns
			T_J=150℃		120		ns
t_r	Rise Time		T_J=25℃		65		ns
			T_J=150℃		70		ns
$t_{d(off)}$	Turn off Delay Time	V_{CC}=900V,I_C=75A R_G =7.5Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		400		ns
			T_J=150℃		490		ns
t_f	Fall Time		T_J=25℃		360		ns
			T_J=150℃		680		ns
E_{on}	Turn on Energy	V_{CC}=900V,I_C=75A R_G =7.5Ω, V_{GE}=±15V, Inductive Load	T_J=25℃		20		mJ
			T_J=125℃		26		mJ
			T_J=150℃		28		mJ
E_{off}	Turn off Energy		T_J=25℃		11		mJ
			T_J=125℃		17		mJ
			T_J=150℃		20		mJ
I_{SC}	Short Circuit Current	tpsc≤10μs , V_{GE}=15V T_J=150℃,V_{CC}=1000V			330		A
R_{thJC}	Junction to Case Thermal Resistance (Per IGBT)					0.3	K /W

Diode-inverter

ELECTRICAL CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75A , V_{GE}=0V, T_J=25℃		1.8	2.25	V
		I_F=75A , V_{GE}=0V, T_J=125℃		1.95		
		I_F=75A , V_{GE}=0V, T_J=150℃		1.9		
t_{rr}	Reverse Recovery Time	I_F=75A , V_R=900V dI_F/dt=-840A/μs T_J =150℃		840		ns
I_{RRM}	Max. Reverse Recovery Current			80		A
Q_{RR}	Reverse Recovery Charge			27		μC
E_{rec}	Reverse Recovery Energy			18		mJ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.5	K /W

Diode-RECTIFIER

ABSOLUTE MAXIMUM RATINGS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Reverse Voltage	T_J=25℃	1800	V
$I_{D(AV)}$	Average Output Current(D.C.)	T_C=100℃	75	A
I_{FSM}	Non Repetitive Surge	T_J=150℃, t=10ms, 50Hz	1300	
I^2t		T_J=150℃, t=10ms, 50Hz	8450	A^2s

Diode-RECTIFIER

ELECTRICAL CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
V_F	Forward Voltage	I_F=75A , T_J=25℃		1	1.3	V
		I_F=75A , T_J=150℃		0.87		V
I_R	Reverse Leakage Current	V_R=1800V, T_J=25℃			500	μA
		V_R=1800V, T_J=150℃			10	mA
V_{TO}	For power loss calculations only , T_J = 150℃				0.85	V
r_T					3.2	mΩ
R_{thJCD}	Junction to Case Thermal Resistance （Per Diode）				0.27	K /W

NTC CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
R_{25}	Resistance	T_C =25℃		5		kΩ
$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T_2 - 1/(298.15\ K))]$			3375		K

MODULE CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Values	Unit
T_{Jmax}	Max. Junction Temperature	Inverter	175	℃
		Rectifier	150	
T_{Jop}	Operating Temperature		-40~150	
T_{stg}	Storage Temperature		-40~125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	4000	V
Md	Mounting Torque	Recommended（M5）	2.5~5	Nm
Weight			308	g

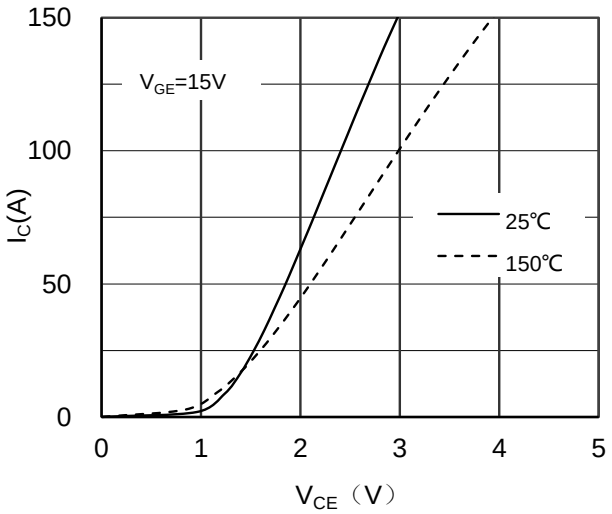


Figure 1. Typical Output Characteristics IGBT-inverter

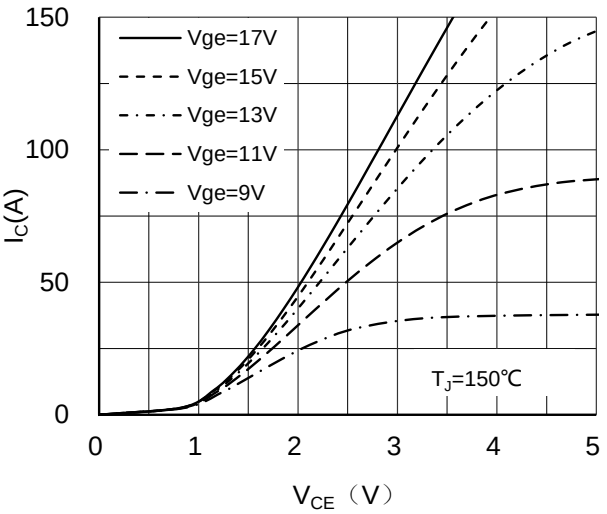


Figure 2. Typical Output Characteristics IGBT-inverter

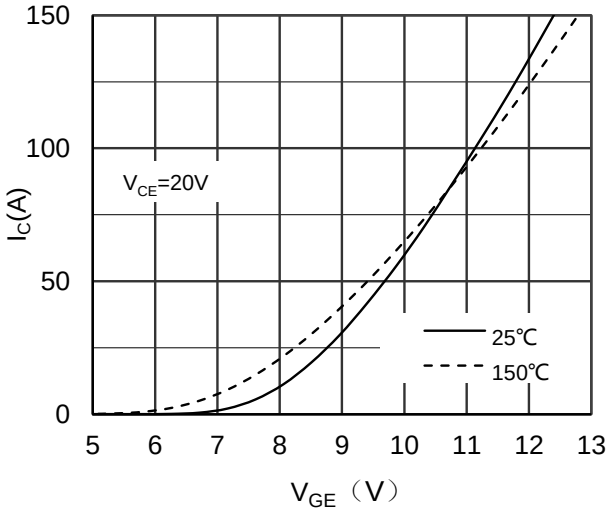


Figure 3. Typical Transfer characteristics IGBT-inverter

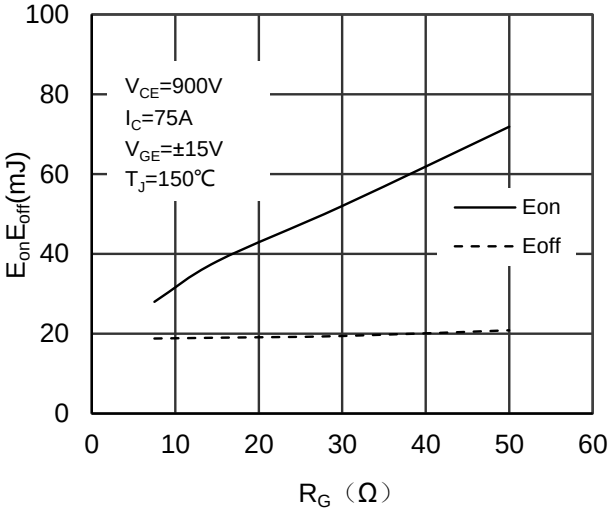


Figure 4. Switching Energy vs Gate Resistor IGBT-inverter

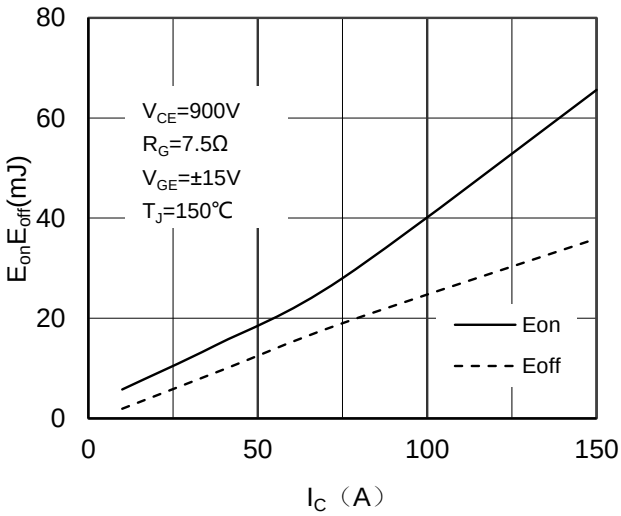


Figure 5. Switching Energy vs Collector Current IGBT-inverter

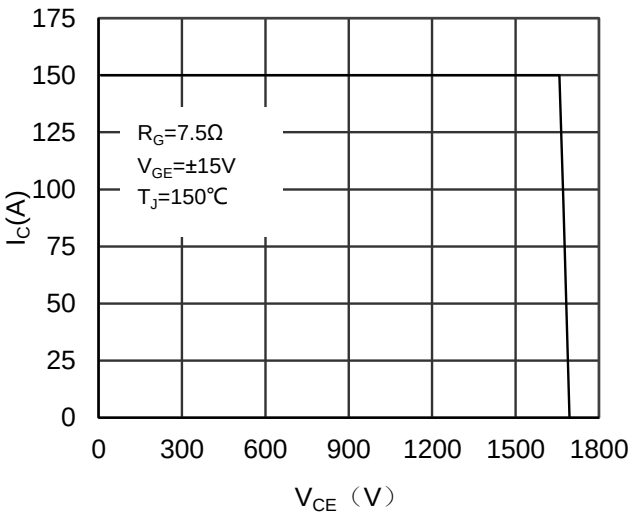


Figure 6. Reverse Biased Safe Operating Area IGBT-inverter

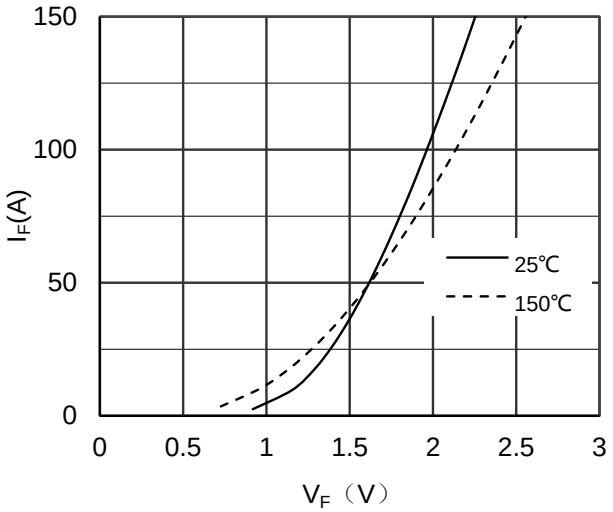


Figure 7. Diode Forward Characteristics Diode -inverter

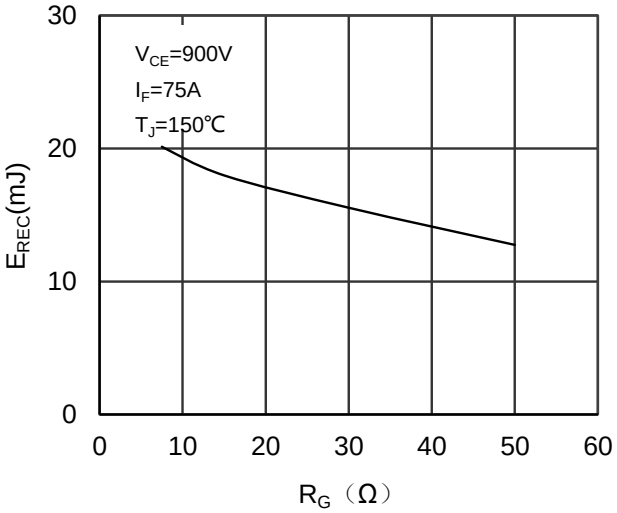


Figure 8. Switching Energy vs Gate Resistor Diode - inverter

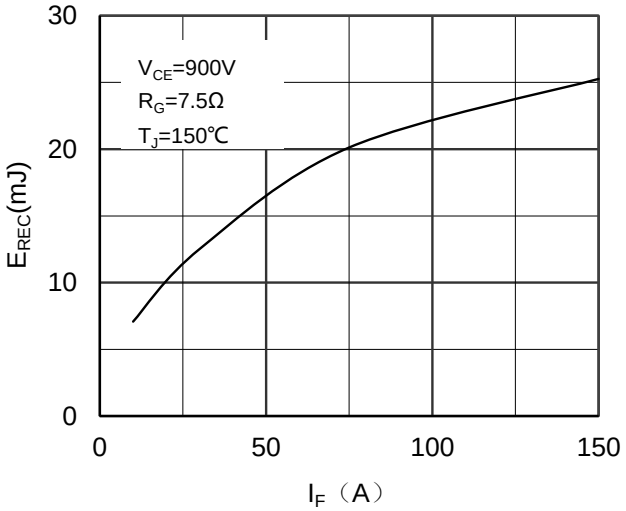


Figure 9. Switching Energy vs Forward Current Diode-

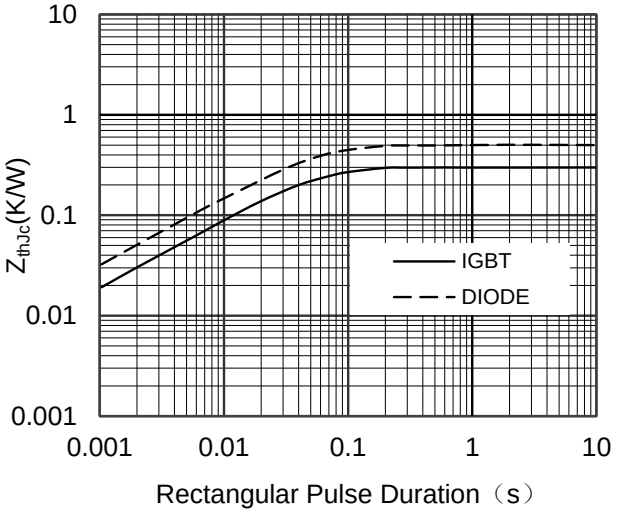


Figure 10. Transient Thermal Impedance of Diode and IGBT-inverter

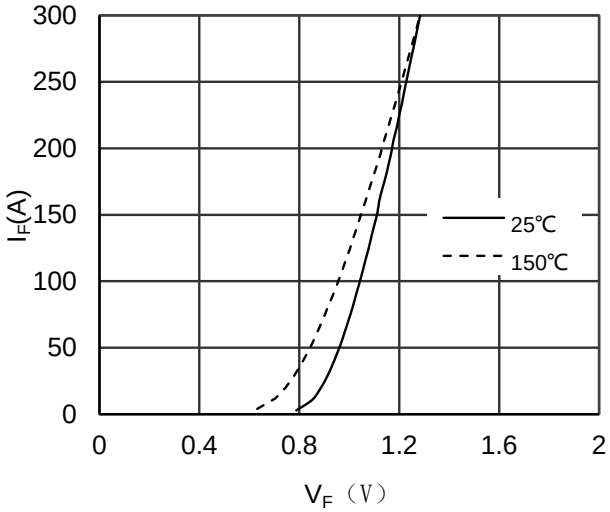


Figure 11. Diode Forward Characteristics Diode- rectifier

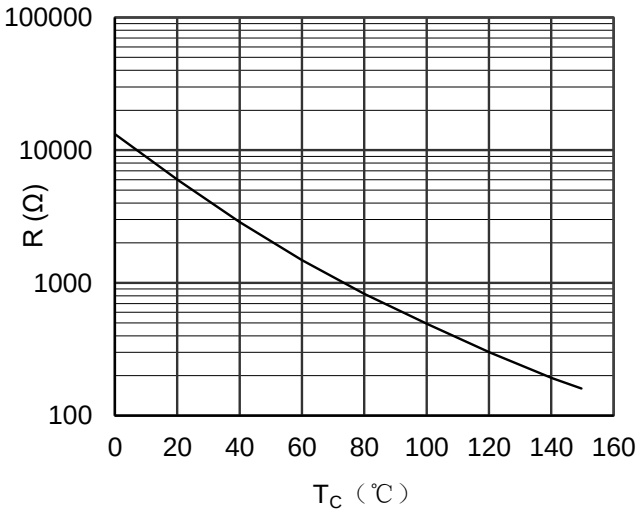
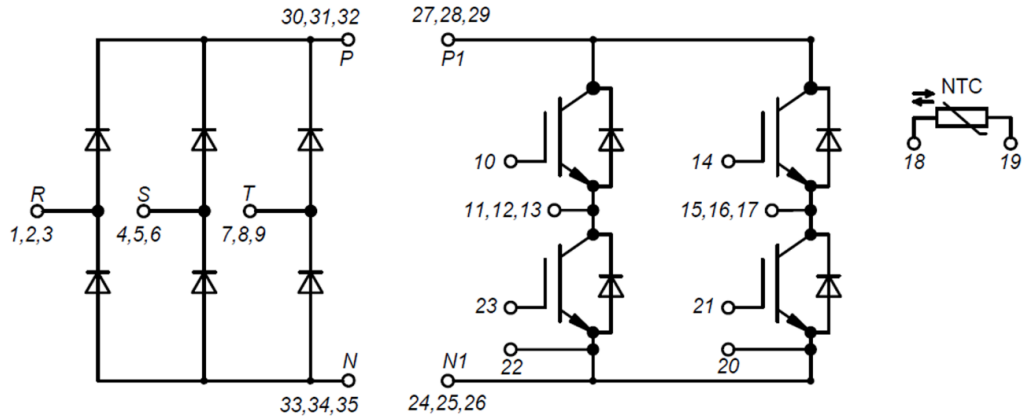
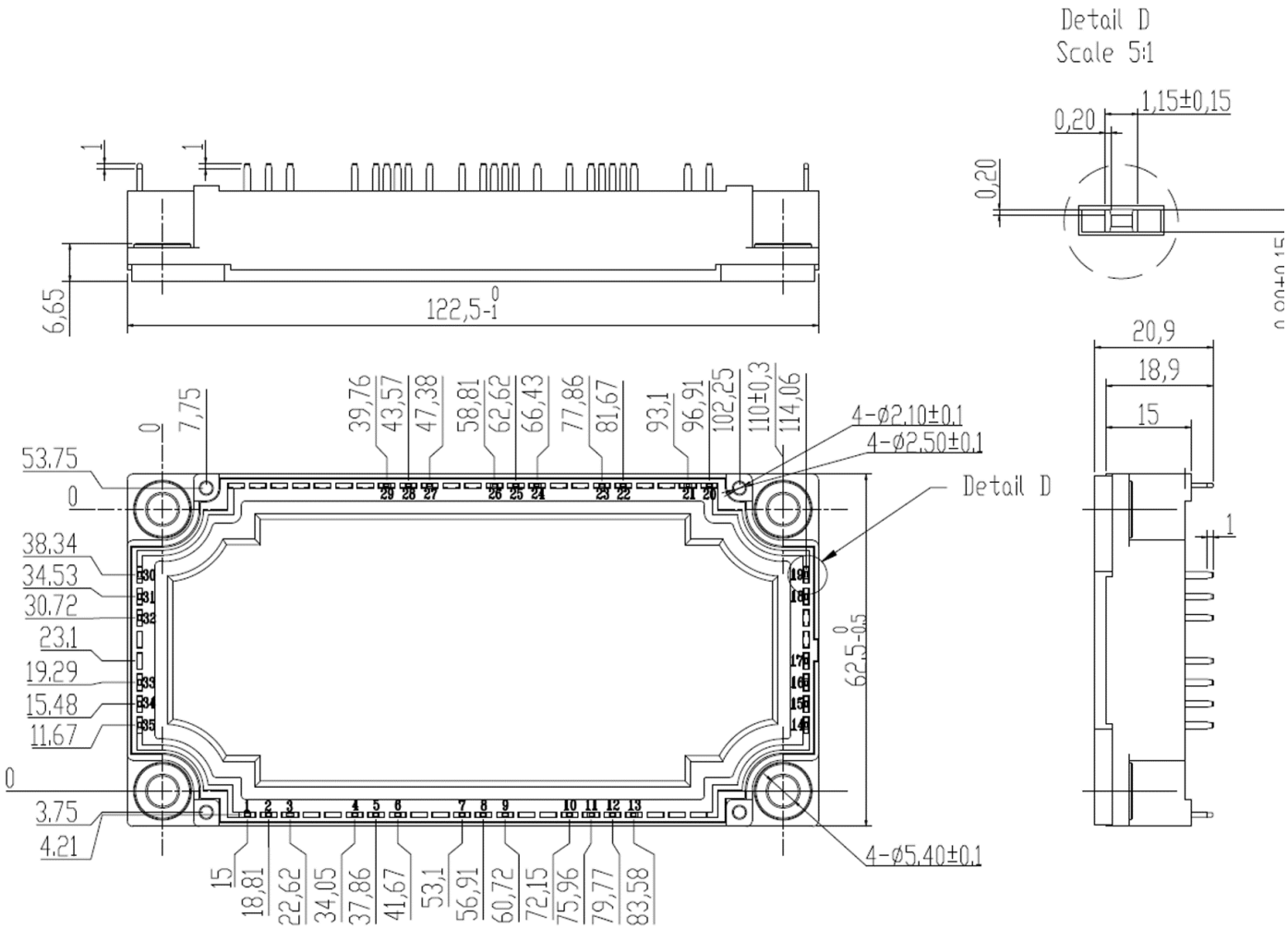


Figure 12. NTC Characteristics


30,31,32
P
27,28,29
P1
NTC
18
19
10
14
11,12,13
15,16,17
23
21
R
1,2,3
S
4,5,6
T
7,8,9
N
33,34,35
N1
22
20
24,25,26


Detail D
Scale 5:1
1,15±0,15
0,20
0,20
6,65
122,5-1
20,9
18,9
15
1
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39,76
43,57
47,38
58,81
62,62
66,43
77,86
81,67
93,1
96,91
102,25
110±0,3
114,06
4-ø2,10±0,1
4-ø2,50±0,1
Detail D
53,75
38,34
34,53
30,72
23,1
19,29
15,48
11,67
3,75
4,21
62,5-0,5
4-ø5,40±0,1
15
18,81
22,62
34,05
37,86
41,67
53,1
56,91
60,72
72,15
75,96
79,77
83,58