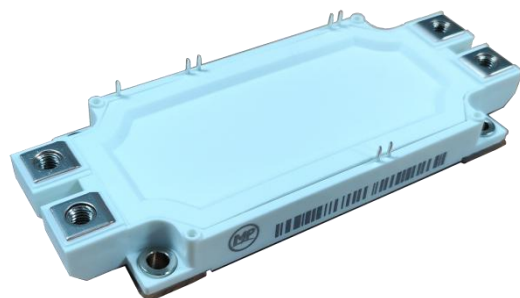


Electrical Features

- Trench/Fieldstop IGBT
- Low $V_{CE(sat)}$
- $V_{CE(sat)}$ with positive temperature coefficient
- 10 μ s short circuit capability
- Fast&soft reverse recovery anti-parallel FWD
- Low inductance case



Typical Applications

- Motor Drives
- UPS System
- Servo Drives
- Wind Turbines

IGBT, Inverter

Maximum Rated Values							
Symbol	Item	Conditions		Rating		Unit	
IGBT							
V_{CES}	Collector-emitter voltage	$T_{vj}=25^{\circ}C$		1200		V	
V_{GES}	Gate-emitter voltage	-		± 20		V	
I_C	Collector current, DC	$T_C=100^{\circ}C, T_{vj}=175^{\circ}C$		450		A	
I_{CRM}	Repetitive peak collector current	$t_p=1ms$		900		A	
t_{SC}	Short circuit withstand time	$V_{GE}=15V, V_{CC}=600V, T_{vj}\leq 150^{\circ}C$		10		μs	
P_{tot}	Total power dissipation	$T_C=25^{\circ}C, T_{vj}=175^{\circ}C$		2586		W	
Characteristics Values							
Symbol	Item	Conditions		Values			Unit
IGBT				Min.	Typ.	Max.	
I_{CES}	Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V, T_{vj}=25^{\circ}C$		-	-	10	μA
I_{GES}	Gate leakage current	$V_{CE}=0V, V_{GE}=20V, T_{vj}=25^{\circ}C$		-	-	50	nA
$V_{GE(th)}$	Gate-emitter threshold voltage	$I_C=17.1mA, V_{CE}=V_{GE}, T_{vj}=25^{\circ}C$		5.0	5.7	7.0	V
V_{CEsat}	Collector-emitter saturation voltage	$I_C=450A$ $V_{GE}=15V$	$T_{vj}=25^{\circ}C$	-	2.13	2.5	
			$T_{vj}=125^{\circ}C$	-	2.60	-	
			$T_{vj}=150^{\circ}C$	-	2.68	-	
C_{ies}	Input capacitance	$V_{CE}=25V, V_{GE}=0V$ $f=1MHz, T_{vj}=25^{\circ}C$		-	31.8	-	nF
C_{oes}	Output capacitance			-	2.1	-	
C_{res}	Reverse transfer capacitance			-	1.08	-	
Q_G	Gate charge	$V_{GE}=\pm 15V$		-	2814	-	nC
R_g	Internal gate resistance	$T_{vj}=25^{\circ}C$		-	0.4	-	Ω

$t_{d(on)}$	Turn-on delay time	$V_{CC}=600V$ $I_C=450A$ $V_{GE}=\pm 15V$ $R_{G(on)}=5.1\ \Omega$ $R_{G(off)}=5.1\ \Omega$ $L_{load}=50\mu H$	$T_{vj}=25^\circ C$	-	147	-	ns	
			$T_{vj}=125^\circ C$	-	148	-		
			$T_{vj}=150^\circ C$	-	152	-		
t_r	Rise time		$T_{vj}=25^\circ C$	-	158	-		
			$T_{vj}=125^\circ C$	-	172	-		
			$T_{vj}=150^\circ C$	-	181	-		
$t_{d(off)}$	Turn-off delay time		$T_{vj}=25^\circ C$	-	557	-		
			$T_{vj}=125^\circ C$	-	648	-		
			$T_{vj}=150^\circ C$	-	665	-		
t_f	Fall time	$T_{vj}=25^\circ C$	-	90	-			
		$T_{vj}=125^\circ C$	-	160	-			
		$T_{vj}=150^\circ C$	-	185	-			
E_{on}	Turn-on energy (per pulse)	$V_{CC}=600V, I_C=450A$ $V_{GE}=\pm 15V, R_{G(on)}=5.1\ \Omega$ $di/dt=3800A/\mu s(T_{vj}=150^\circ C)$	$T_{vj}=25^\circ C$	-	64.5	-	mJ	
			$T_{vj}=125^\circ C$	-	92.5	-		
			$T_{vj}=150^\circ C$	-	99.1	-		
E_{off}	Turn-off energy (per pulse)		$T_{vj}=25^\circ C$	-	36.8	-		
			$T_{vj}=125^\circ C$	-	48.3	-		
			$T_{vj}=150^\circ C$	-	50.9	-		
SC data	Short-circuit current		$V_{CC}=600V, V_{GE}\leq 15V, T_{vj}=25^\circ C$ $V_{CES}\leq 1200V, t_p\leq 10\mu s$	-	2388	-		A
R_{thJC}	Thermal resistance, junction to case		per IGBT	-	-	0.058		K/W
R_{thCH}	Thermal resistance, case to heatsink		per IGBT/ $\lambda_{grease}=1W/(m\cdot K)$	-	0.03	-		K/W
T_{vjop}	Temperature under switching conditions		-40		150	$^\circ C$		

Diode, Inverter

Maximum Rated Values

Symbol	Item	Conditions	Rating	Unit
V_{RRM}	Repetitive peak reverse voltage	$T_{vj}=25^\circ C$	1200	V
I_F	Forward current, DC	$T_C=100^\circ C, T_{vj}=150^\circ C$	450	A
I_{FRM}	Repetitive peak forward current	$t_p=1ms$	900	A
I^2t	I^2t -value	$V_R=0V, t_p=10ms, T_{vj}=150^\circ C$	28500	A^2s

Characteristic Values

V_F	Continuous forward voltage	$I_F=450A$ $V_{GE}=0V$	$T_{vj}=25^\circ C$	-	2.19	2.5	V		
			$T_{vj}=125^\circ C$	-	2.08	-			
			$T_{vj}=150^\circ C$	-	2.02	-			
I_{RM}	Peak reverse recovery current		$V_R=600V$ $I_F=450A$	$T_{vj}=25^\circ C$	-	183	-	A	
				$T_{vj}=125^\circ C$	-	259	-		
				$T_{vj}=150^\circ C$	-	290	-		
t_{rr}	Reverse recovery time			$V_{GE}=-15V$ $-di_F/dt=3500A/\mu s$ $(T_{vj}=150^\circ C)$	$T_{vj}=25^\circ C$	-	175	-	ns
					$T_{vj}=125^\circ C$	-	421	-	
					$T_{vj}=150^\circ C$	-	657	-	
Q_r	Recovered charge	$(T_{vj}=150^\circ C)$			$T_{vj}=25^\circ C$	-	26.2	-	μC
					$T_{vj}=125^\circ C$	-	60.8	-	
					$T_{vj}=150^\circ C$	-	80.0	-	

E _{rec}	Reverse recovery energy		T _{vj} =25°C	-	8.36	-	mJ
			T _{vj} =125°C	-	20.2	-	
			T _{vj} =150°C	-	29.3	-	
R _{thJC}	Thermal resistance, junction to case	per diode	-	-	0.1	K/W	
R _{thCH}	Thermal resistance, case to heatsink	per diode/ λ _{grease} =1W/(m·K)	-	0.045	-	K/W	
T _{vjop}	Temperature under switching conditions		-40		150	°C	

NTC Thermistor Characteristics

Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
R ₂₅	Rated resistance	T _C =25°C	-	5	-	kΩ
ΔR/R	Deviation of resistance	T _C =100°C, R ₁₀₀ =493Ω	-5	-	5	%
P ₂₅	Power dissipation	T _C =25°C	-	-	20	mW
B _{25/50}	B-constant	R ₂ =R ₂₅ exp[B _{25/50} (1/T ₂ -1/(298.15K))]	-	3375	-	K
B _{25/80}	B-constant	R ₂ =R ₂₅ exp[B _{25/80} (1/T ₂ -1/(298.15K))]	-	3411	-	
B _{25/100}	B-constant	R ₂ =R ₂₅ exp[B _{25/100} (1/T ₂ -1/(298.15K))]	-	3433	-	

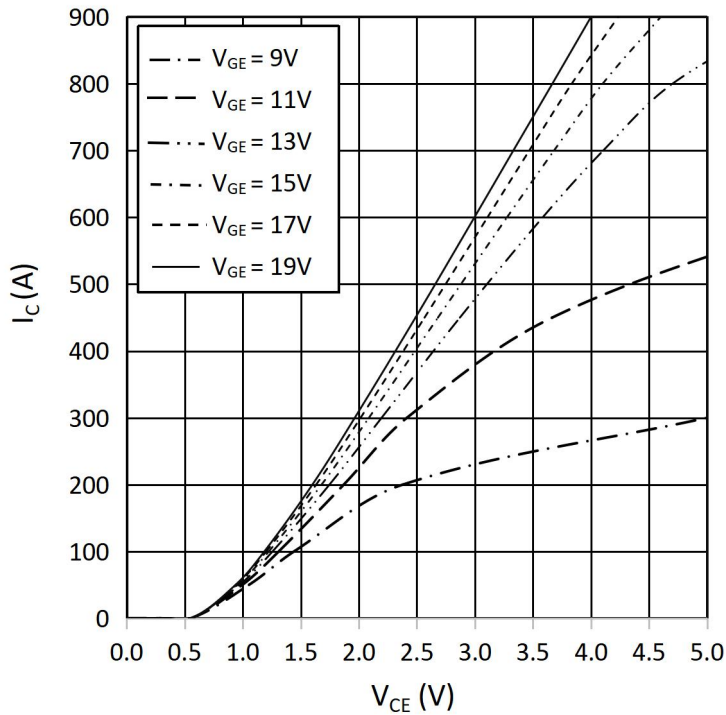
Module

Symbol	Item	Conditions	Rating			Unit
V _{ISOL}	Isolation voltage	Terminals to baseplate, RMS, f=50Hz, t=1min	2500			V
-	Material of module baseplate	-	Cu			-
-	Internal isolation	Basic insulation(class 1, IEC 61140)	Al ₂ O ₃			-
T _{stg}	Storage temperature	-	-40~125			°C
Symbol	Item	Conditions	Values			Unit
			Min.	Typ.	Max.	
M	Mounting torque for module mounting	Screw M6	3.0	-	5.0	Nm
	Terminal connection torque	Screw M6	2.5	-	5.0	Nm
ds	Creepage distance	Terminal to terminal	-	13	-	mm
		Terminal to base plate	-	14.5	-	
da	Clearance	Terminal to terminal	-	10	-	mm
		Terminal to base plate	-	12.5	-	
m	Weight	-	-	340	-	g

output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

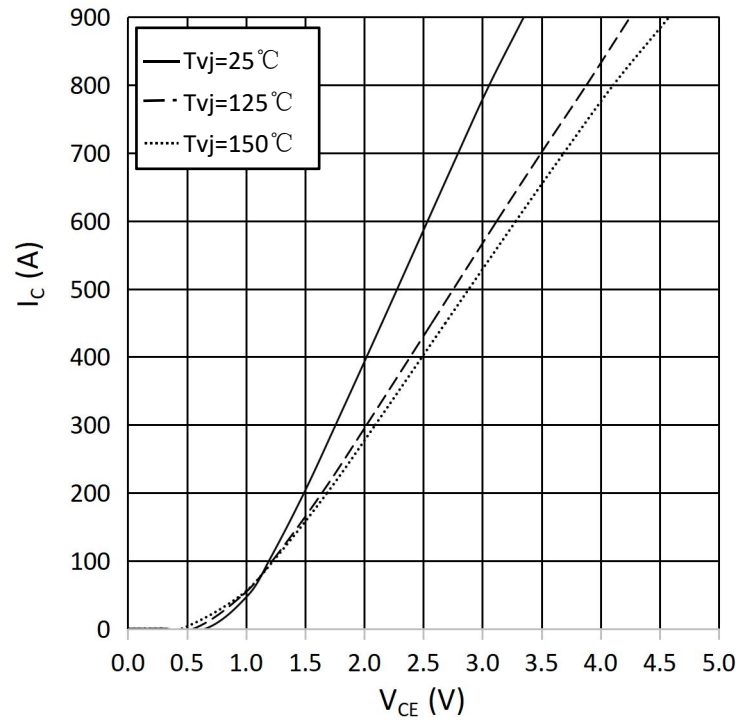
$T_{vj} = 150^{\circ}C$



output characteristic IGBT, Inverter (typical)

$I_C = f(V_{CE})$

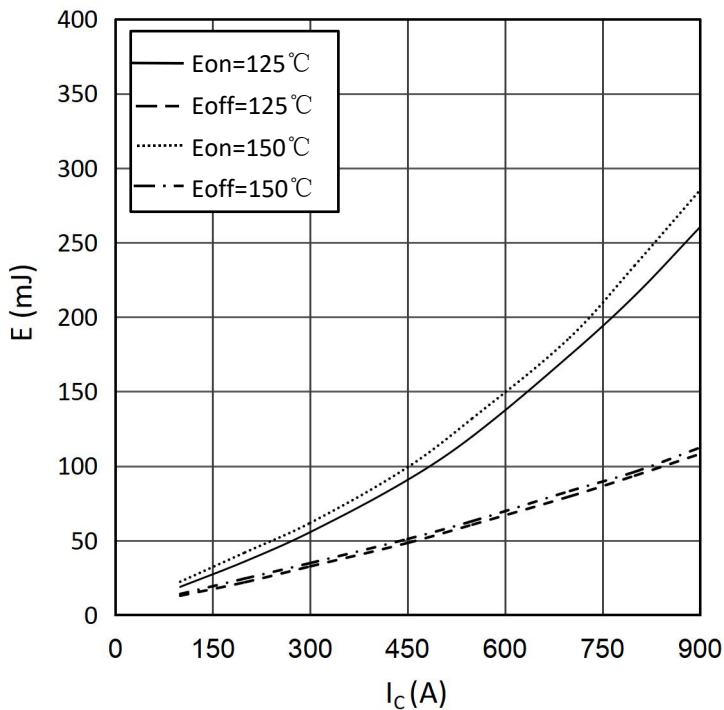
$V_{GE} = 15V$



switching losses IGBT, Inverter (typical)

$E_{on} = f(I_C), E_{off} = f(I_C)$

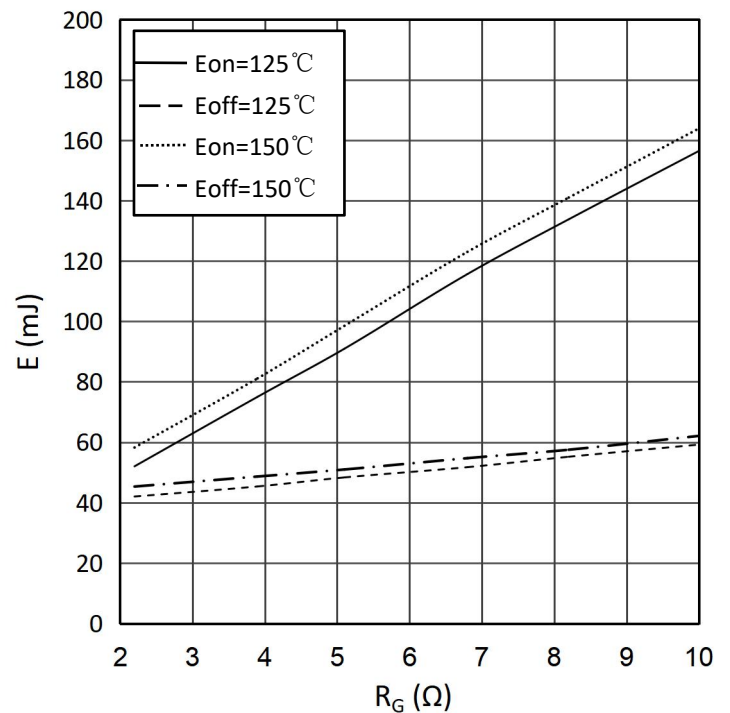
$V_{GE} = \pm 15V, R_{Gon} = 5.1\Omega, R_{Goff} = 5.1\Omega, V_{CE} = 600V$



switching losses IGBT, Inverter (typical)

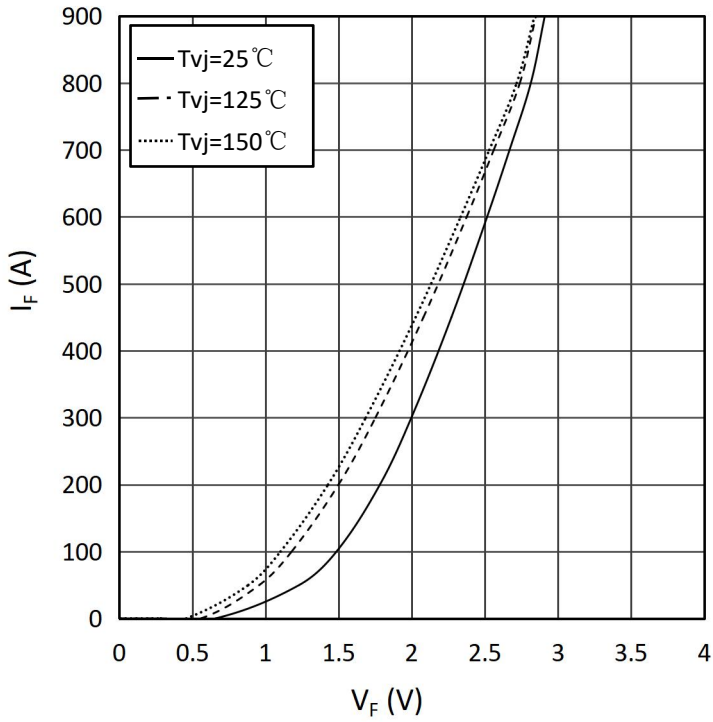
$E_{on} = f(R_G), E_{off} = f(R_G)$

$V_{GE} = \pm 15V, I_C = 450A, V_{CE} = 600V$



forward characteristic of Diode, Inverter (typical)

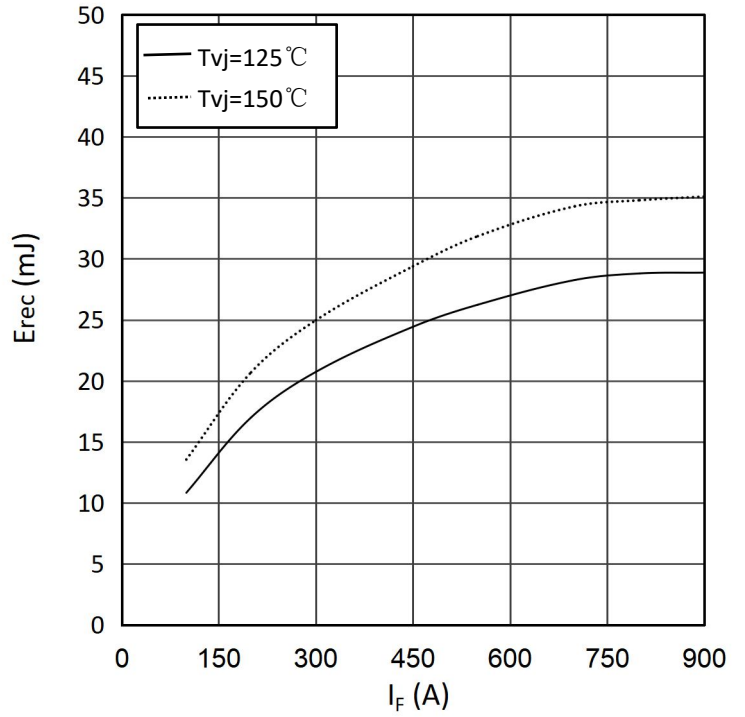
$I_F = f(V_F)$



switching losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

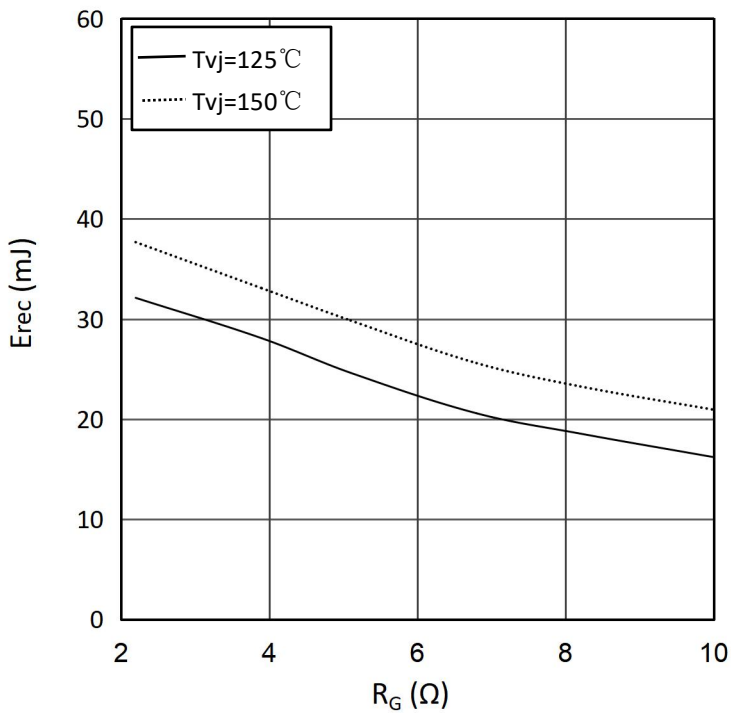
$R_{Gon}=5.1\Omega, V_{CE}=600V$



switching losses Diode, Inverter (typical)

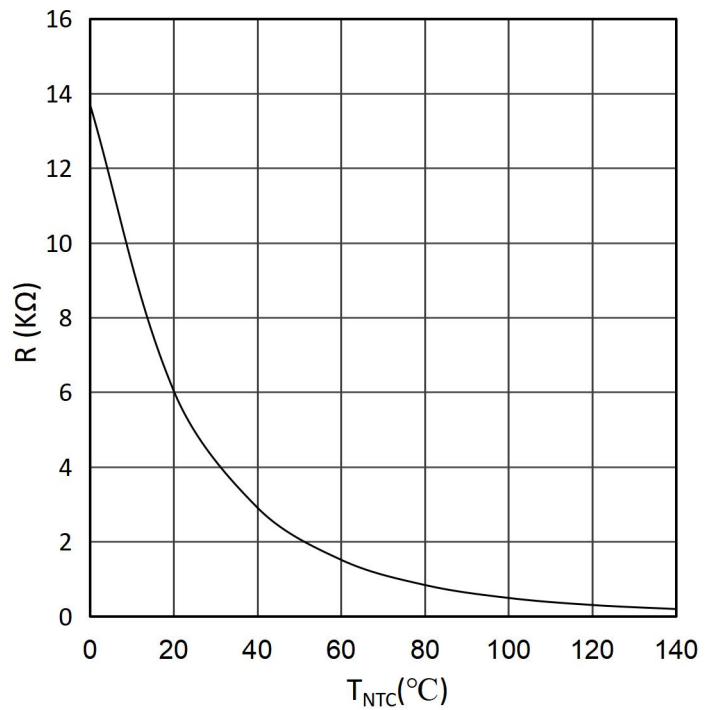
$E_{rec} = f(R_G)$

$I_F=450A, V_{CE}=600V$

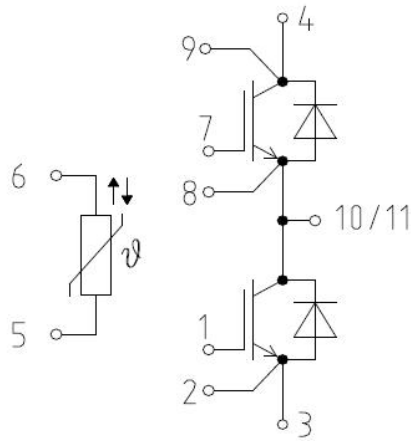


NTC-Thermistor-temperature characteristic(typical)

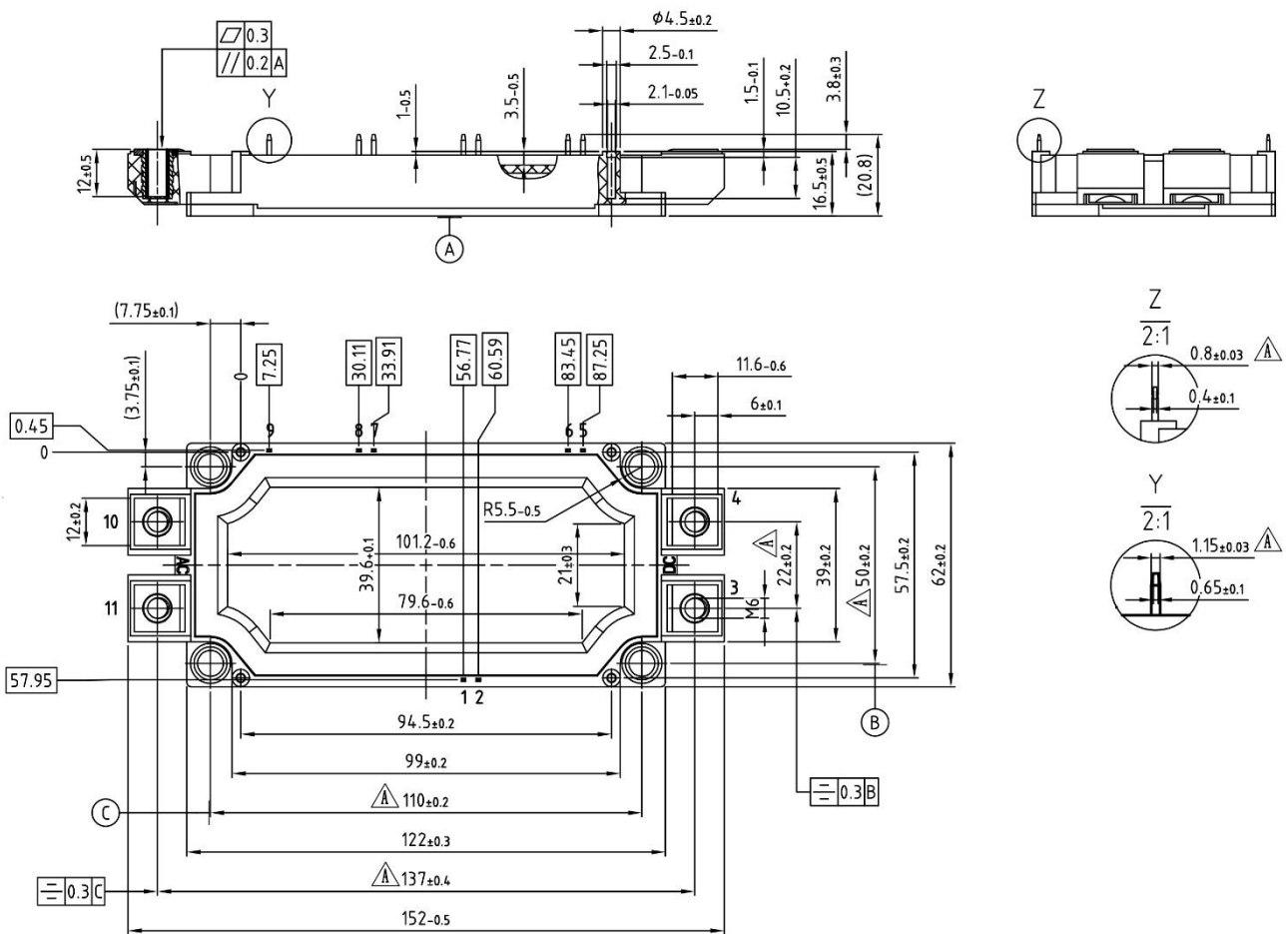
$R=f(T)$



Circuit diagram headline



Package outlines (Unit: mm)



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