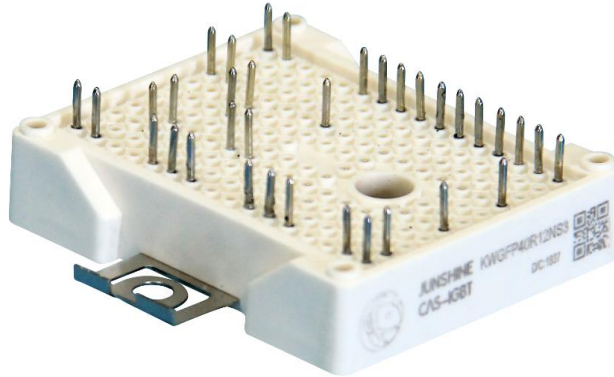




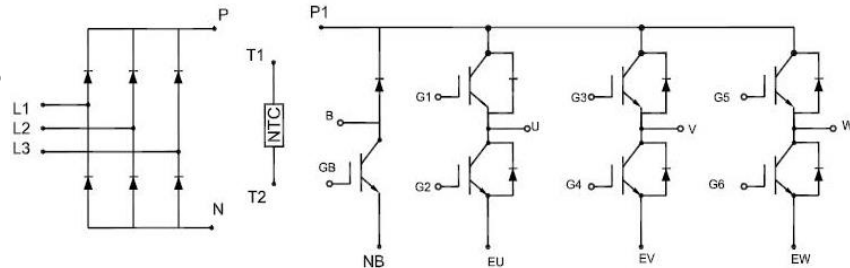
Features

- High speed trench field-stop IGBT
- Integrated NTC Temperature Sensor
- High ruggedness
- Very tight parameter distribution
- 100% RBSOA test($2 \cdot I_C$)
- Low $V_{cesat}(V_{CE}=2.0V)$
- Low switching losses($E_{off}=2.1mJ$)
- High short circuit capability(>10us)
- Lead free, RoHS compliant



Typical Applications

- Motor Drives
- Servo driver



IGBT, Inverter & Brake-Chopper

Maximum Rated Values ($T_j=25^\circ C$, unless otherwise noted)

Parameter	Symbol	Conditions	Values	Units
Collector-emitter voltage	V_{CES}		1200	V
Gate-emitter peak voltage	V_{GES}		± 20	
Continuous DC collector current	I_C	$T_C=25^\circ C$	80	A
		$T_C=100^\circ C$	40	
Repetitive peak collector current	I_{CRM}	$t_P=1ms$	80	
Total power dissipation	P_{tot}	$T_C=25^\circ C, T_{vj\ max}=150^\circ C$	192	W
SC stand time	t_{SC}	$V_{GE}=15V, V_{CC}=600V$ $T_j=150^\circ C$	>10	μs
Operating junction temperature	T_{vjop}		-40~150	$^\circ C$

IGBT, Inverter & Brake-Chopper

Characteristic Values ($T_j=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Collector-emitter Breakdown Voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=1mA$	1200	-	-	V
Collector-emitter saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=40A$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$	- -	2.00 2.58	- -	
Gate threshold voltage	$V_{GE(th)}$	$I_C=1.5mA, V_{CE}=V_{GE}$	-	6.10	-	
Collector-emitter cut-off current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	-	-	3	mA
Gate-emitter leakage current	I_{GES}	$V_{CE}=0V, V_{GE}=20V$	-	-	400	nA
Dynamic Characteristic						
Input capacitance	C_{iss}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1MHz$	-	2820	-	pF
Output capacitance	C_{oss}		-	169	-	
Reverse transfer capacitance	C_{rss}		-	131	-	
Gate charge	Q_G	$V_{CC}=600V, I_C=40A, V_{GE}=15V$	-	187	-	nC
Short circuit collector current	I_{SC}	$V_{GE}=15V, V_{CC}=600V,$ $T_j=150^\circ\text{C}$	-	146	-	A
Switching Characteristics (Inductive load)						
Turn-on delay time	$t_{d(on)}$	$T_j=25^\circ\text{C}$ $V_{CC}=600V$ $I_C=40A$	-	76	-	ns
Rise time	t_r		-	150	-	
Turn-off delay time	$t_{d(off)}$		-	257	-	
Fall time	t_f		-	103	-	
Turn-on energy	E_{on}	$V_{GE}=\pm 15V$ $R_G=33\Omega$	-	5.16	-	mJ
Turn-off energy	E_{off}		-	2.05	-	
Total switching energy	E_{ts}		-	7.30	-	
Turn-on delay time	$t_{d(on)}$	$T_j=150^\circ\text{C}$ $V_{CC}=600V$ $I_C=40A$	-	66	-	ns
Rise time	t_r		-	138	-	
Turn-off delay time	$t_{d(off)}$		-	292	-	
Fall time	t_f		-	186	-	
Turn-on energy	E_{on}	$V_{GE}=\pm 15V$ $R_G=33\Omega$	-	5.30	-	mJ
Turn-off energy	E_{off}		-	2.80	-	
Total switching energy	E_{ts}		-	8.10	-	
Thermal resistance, junction to case	R_{thJC}	per IGBT	-	0.65	-	K/W

Diode, Inverter & Brake-Chopper

Maximum Rated Values ($T_j=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Values	Units
Repetitive peak reverse voltage	V_{RRM}		1200	V
Continuous DC forward current	I_F	$T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	80 40	A
Repetitive peak forward current	I_{FRM}	$t_p=1\text{ms}$	80	
Operating junction temperature	$T_{vj\text{op}}$		-40~150	$^\circ\text{C}$

Diode, Inverter

Characteristic Values ($T_j=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Static Characteristics						
Forward voltage	V_F	$V_{GE}=0\text{V}, I_F=40\text{A}$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$	- -	1.9 1.85	- -	V
Switching Characteristics (Inductive load)						
Recovered time	t_{rr}	$T_j=25^\circ\text{C}$ $V_R=600\text{V}, I_F=40\text{A}$ $-di/dt=600\text{A}/\mu\text{s}$	-	185	-	ns
Recovered charge	Q_{rr}		-	2.4	-	μC
Peak reverse recovery current	I_{rrm}		-	25.0	-	A
Recovered time	t_{rr}	$T_j=150^\circ\text{C}$ $V_R=600\text{V}, I_F=40\text{A}$ $-di/dt=600\text{A}/\mu\text{s}$	-	255	-	ns
Recovered charge	Q_{rr}		-	4.8	-	μC
Peak reverse recovery current	I_{rrm}		-	30.0	-	A
Thermal resistance, junction to case	R_{thJCD}	per diode	-	0.9	-	K/W

Diode, Brake-Chopper

Maximum Rated Values ($T_j=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Values	Units
Repetitive peak reverse voltage	V_{RRM}		1200	V
Continuous DC forward current	I_F	$T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	50 25	A
Repetitive peak forward current	I_{FRM}	$t_p=1\text{ms}$	50	
Operating junction temperature	$T_{vj\text{op}}$		-40~150	$^\circ\text{C}$

Diode, Brake-Chopper

Characteristic Values ($T_j=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Static Characteristics						
Forward voltage	V_F	$V_{GE}=0\text{V}, I_F=25\text{A}$ $T_j=25^\circ\text{C}$ $T_j=150^\circ\text{C}$	- -	1.90 1.85	- -	V
Switching Characteristics (Inductive load)						
Recovered time	t_{rr}	$T_j=25^\circ\text{C}$ $V_R=600\text{V}, I_F=25\text{A}$ $-di/dt=600\text{A}/\mu\text{s}$	-	135	-	ns
Recovered charge	Q_{rr}		-	1.6	-	μC
Peak reverse recovery current	I_{rrm}		-	24.0	-	A
Recovered time	t_{rr}	$T_j=150^\circ\text{C}$ $V_R=600\text{V}, I_F=25\text{A}$ $-di/dt=600\text{A}/\mu\text{s}$	-	275	-	ns
Recovered charge	Q_{rr}		-	3.6	-	μC
Peak reverse recovery current	I_{rrm}		-	32.0	-	A
Thermal resistance, junction to case	R_{thJC}	per diode	-	1.2	-	K/W

Diode, Rectifier

Maximum Rated Values ($T_j=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Values	Units
Repetitive peak reverse	V_{RRM}	$T_j=25^\circ\text{C}$, $I_R=0.5\text{mA}$	1600	V
Average forward current	$I_{F(AV)}$		30	A
Forward surge current	I_{FSM}	$t_p=10\text{ms}$, $T_j=150^\circ\text{C}$	360	
I^2t - value	I^2t	$\sin 180^\circ$	640	A^2s
Operating junction temperature	$T_{vj\text{op}}$		-40~150	$^\circ\text{C}$

Diode, Rectifier

Characteristic Values ($T_j=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Repetitive peak reverse voltage	V_{RRM}	$I_R=0.5\text{mA}$	1600	-	-	V
Forward voltage	V_F	$T_j=25^\circ\text{C}$ $I_F=30\text{A}$	-	1	1.1	V
		$T_j=150^\circ\text{C}$ $I_F=30\text{A}$	-	-	-	
Reverse current	I_R	$T_j=25^\circ\text{C}$ $V_R=1600\text{V}$	-	-	1	mA
		$T_j=150^\circ\text{C}$ $V_R=1600\text{V}$	-	-	5	
Thermal resistance, junction to case	R_{thJC}	per diode	-	0.95	-	K/W

NTC-Thermistor

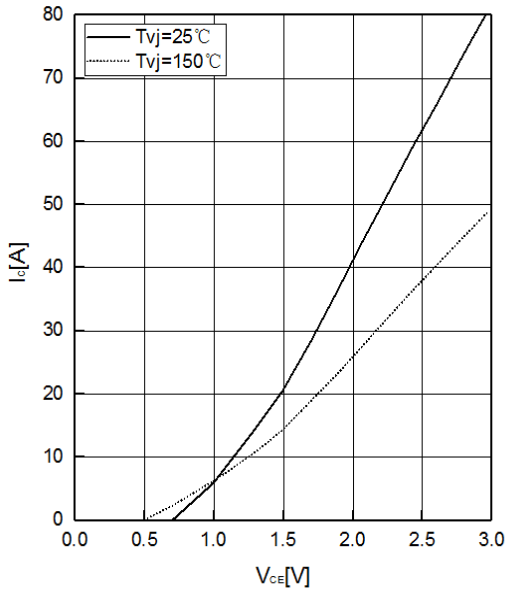
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Rated resistance	R_{25}	$T_C=25^\circ\text{C}$	-	5	-	K Ω
Deviation of R100	$\Delta R/R$	$T_C=25^\circ\text{C}$, $R_{100}=481\Omega$	tbd	-	tbd	%
Power dissipation	P_{25}	$T_C=25^\circ\text{C}$	-	tbd	-	mW
B-value	$B_{25/50}$	$R_2=R_{25}\exp[B_{25/50}(1/T_2-1/(298.15\text{K}))]$	-	3380	-	K
B-value	$B_{25/80}$	$R_2=R_{25}\exp[B_{25/80}(1/T_2-1/(298.15\text{K}))]$	-	3440	-	K

Module

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Isolation test voltage	V_{ISOL}	$f = 50\text{Hz}$, 1minute	2500	-	-	V
Maximum junction	$T_{vj\ max}$		-	-	150	°C
Working junction temperature	T_j		-40	-	150	°C
Thermal resistance, case to heatsink	$R_{\theta CS}$	per IGBT	-	0.03	-	K/W
Storage temperature	T_{stg}		-40	-	125	°C
Mounting torque	M	Mounting Screw:M5	4.0	-	6.0	N·m
Weight	G		-	44	-	g

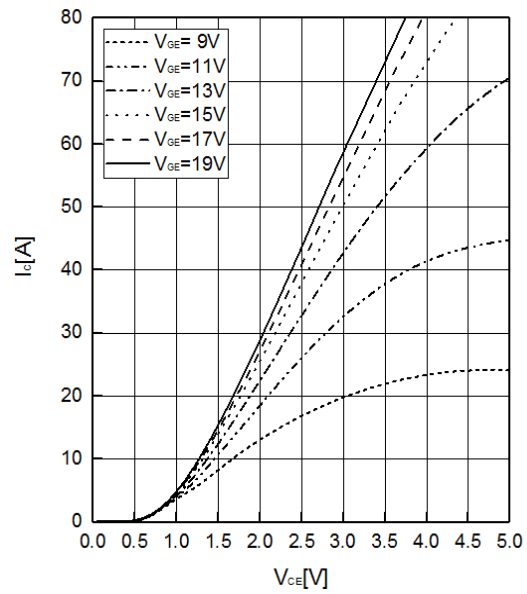
output characteristic IGBT, Inverter&Brake-Chopper (typical)

$I_c = f(V_{CE})$, $V_{GE} = 15\text{ V}$



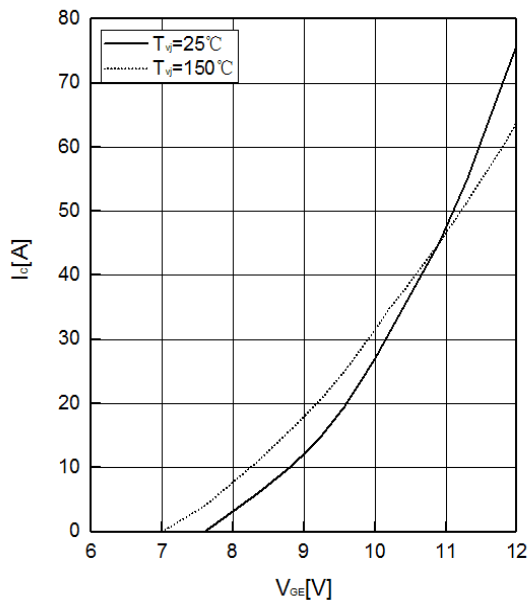
output characteristic IGBT, Inverter&Brake-Chopper (typical)

$I_c = f(V_{CE})$, $T_j = 150^\circ\text{C}$



transfer characteristic IGBT, Inverter&Brake-Chopper (typical)

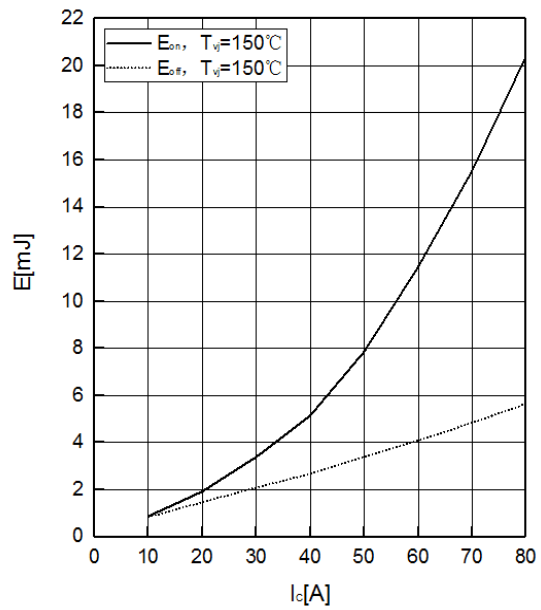
$I_c = f(V_{GE})$, $V_{CE} = 20\text{ V}$



switching losses IGBT, Inverter&Brake-Chopper (typical)

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

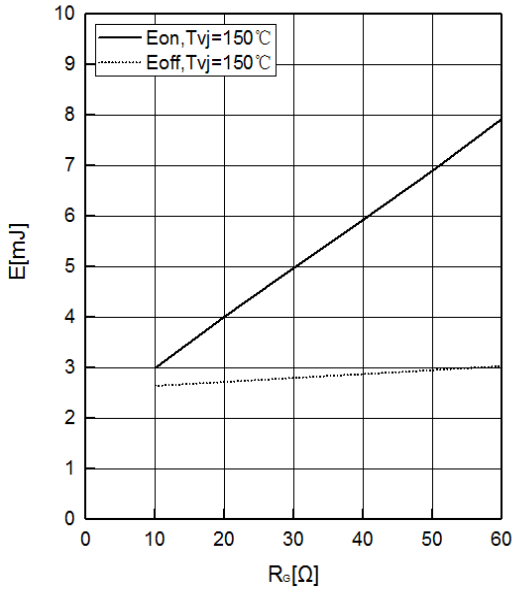
$V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 33\ \Omega$, $R_{Goff} = 33\ \Omega$, $V_{CE} = 600\text{ V}$



**switching losses IGBT,
Inverter&Brake-Chopper (typical)**

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

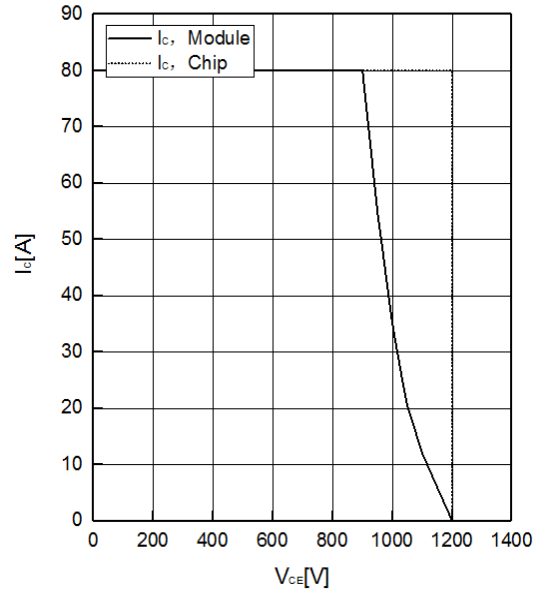
$V_{GE} = \pm 15\text{ V}, I_C = 40\text{ A}, V_{CE} = 600\text{ V}$



**reverse bias safe operating area IGBT,
Inverter&Brake-Chopper**

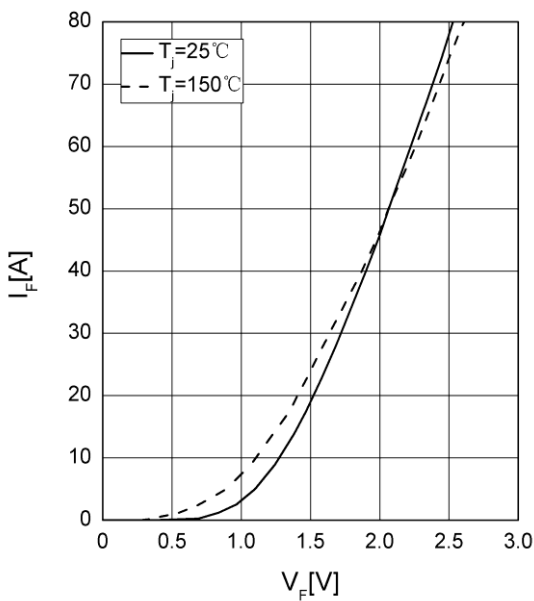
$I_C = f(V_{CE})$

$V_{GE} = \pm 15\text{ V}, R_{Goff} = 33\ \Omega, T_j = 150^\circ\text{C}$



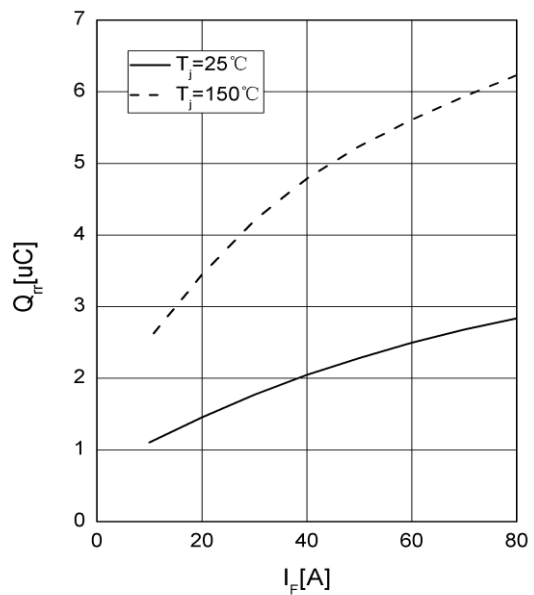
forward characteristic of Diode, Inverter (typical)

$I_F = f(V_F)$



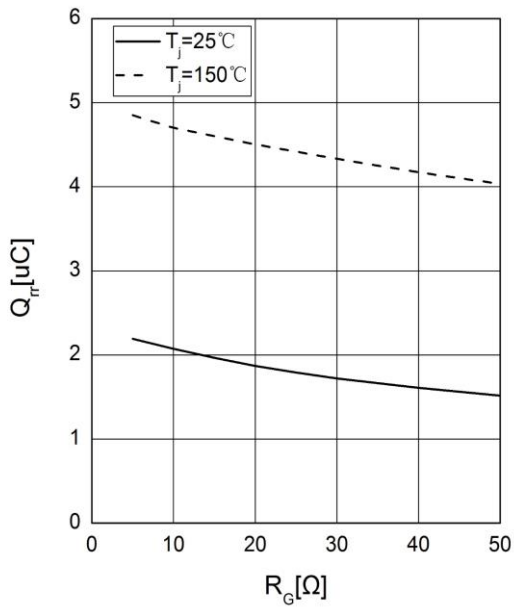
recovered charge of Diode, Inverter (typical)

$Q_{RR} = f(I_F)$



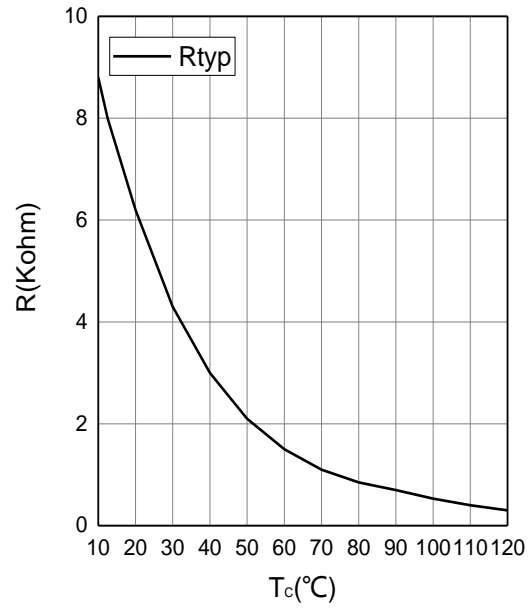
recovered charge of Diode, Inverter (typical)

$Q_{rr} = f(R_G), I_F = 40A, V_{CE} = 600V$

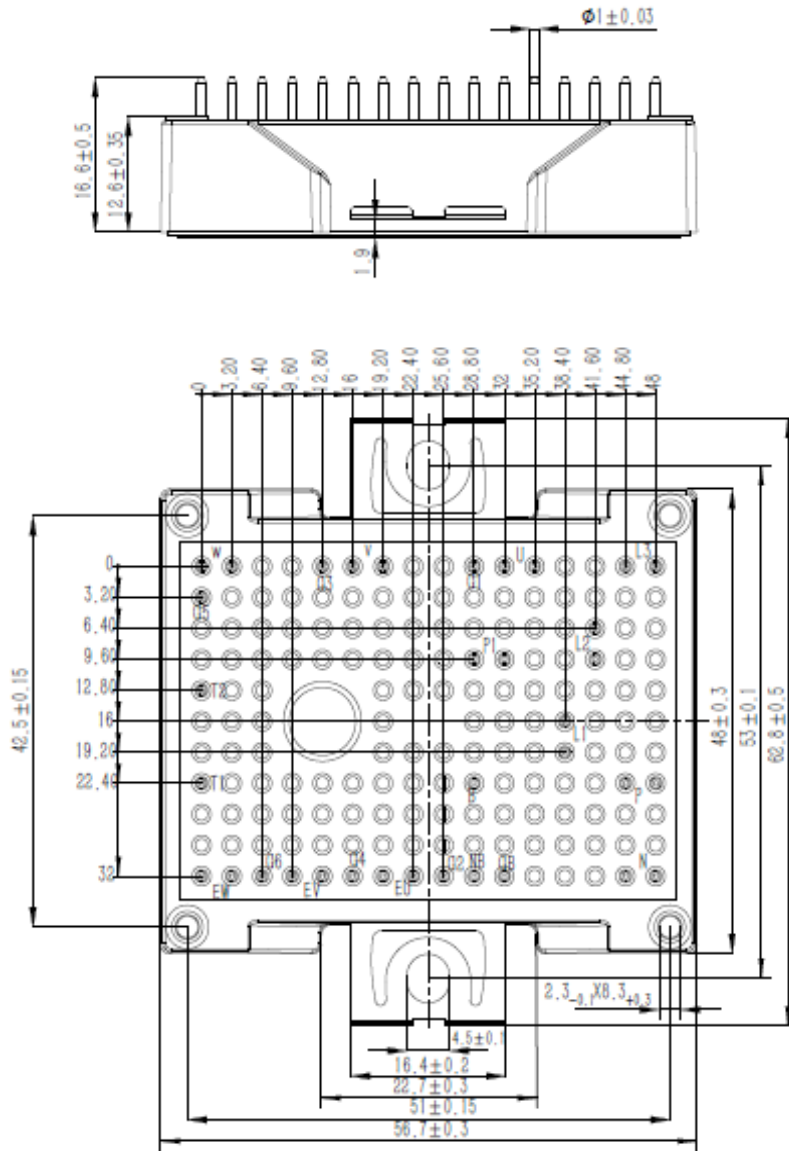


NTC temperature characteristic (typical)

$R = f(T)$



Package outlines (Units: mm)



Circuit_diagram_headline

