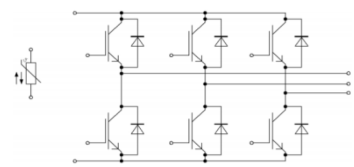
LCG150FFS120E2C

1200V, 150A 6-Pack Module

Features

- Positive Temperature Co-efficient for Easy Parallel Operating
- Low $V_{CE(sat)}$
- Low Switching Losses
- High Current Capability
- Short Circuit Rated



Typical Applications

- Motor Drives
- UPS Systems
- High Frequency Switching Applications

Maximum Ratings

Parameter	Symbol	Conditions		Value	Unit
Collector to emitter voltage	V_{CES}			1200	V
Gate to emitter voltage	V_{GES}			±20	V
DC collector current	I_C	Continuous	T_C = 25 °C	240	A
		Continuous	T_C = 90 °C	150	A
	I_{CM}	t_p = 1 ms		300	A
Operating junction temperature, IGBT	T_{Jop}			150	°C
Maximum junction temperature	T_{Jmax}			175	°C
Maximum power dissipation	P_D	1 device	T_J = 175 °C	789	W
Repetitive peak reverse voltage	V_{RRM}			1200	V
Continuous DC forward current	I_F			150	A
Repetitive peak forward current	I_{FRM}			300	A
Operating junction temperature, Diode	T_{Jop}			150	°C
Case temperature	T_C			125	°C
Storage temperature	T_{stg}			150	°C

Thermal Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Thermal resistance, junction to case, per IGBT	R_{thJC}	-	-	0.19	K/W
Thermal resistance, junction to case, per Diode	R_{thJC}	-	-	0.32	K/W

Inverter Electrical Characteristics (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Collector-emitter breakdown voltage	BV_{CES}	V_{GE} = 0 V, I_C = 1 mA		1200	-	-	V
Collector-emitter cutoff current	I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}		-	-	1	mA
Gate leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = V_{GES}		-	-	±100	nA
Gate emitter threshold Voltage	$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 5.7 mA		5.2	5.8	6.5	V
Internal gate resistor	R_G	f = 1 MHz	T_J = 25°C	-	5	-	Ω
Collector-emitter Saturation Voltage	$V_{CE(sat)}$	I_C = 150 A, V_{GE} = 15 V		-	1.8	2.2	V
		I_C = 150 A, V_{GE} = 15 V	T_J = 125°C	-	2.05	-	V
		I_C = 150 A, V_{GE} = 15 V	T_J = 150°C	-	2.1	-	V
Input capacitance	C_{ies}	V_{GE} = 0 V, V_{CE} =25 V, f = 1 MHz		-	12.6	-	nF
Reverse transfer capacitance	C_{res}			-	0.43	-	
Total gate charge	Q_g	V_{CE} = 600 V, I_C = 150 A, V_{GE} = -15 V….+15 V		-	1.5	-	uC
Turn-on delay time	$t_{d(on)}$	V_{CC} = 600 V, I_C = 150 A V_{GE} = ±15 V R_{Gon} = 1.1 Ω， R_{Gon} = 1.1 Ω	T_J = 25°C	-	0.14	-	us
			T_J = 125°C	-	0.14	-	us
			T_J = 150°C	-	0.15	-	us
Rise time	T_r		T_J = 25°C	-	0.04	-	us
			T_J = 125°C	-	0.05	-	us
			T_J = 150°C	-	0.05	-	us
Turn-off delay time	$T_{d(off)}$		T_J = 25°C	-	0.23	-	us
			T_J = 125°C	-	0.28	-	us
			T_J = 150°C	-	0.30	-	us
Fall time	T_f		T_J = 25°C	-	0.14	-	us
			T_J = 125°C	-	0.18	-	us
			T_J = 150°C	-	0.19	-	us
Turn-on switching loss	E_{on}		T_J = 25°C	-	4.6	-	mJ
			T_J = 125°C	-	5.9	-	mJ
			T_J = 150°C	-	6.6	-	mJ
Turn-off switching loss	E_{off}		T_J = 25°C	-	9.1	-	mJ
			T_J = 125°C	-	13.5	-	mJ
			T_J = 150°C	-	14.5	-	mJ
Short circuit data	I_{sc}	V_{GE} = 15 V, V_{CC} = 800 V V_{CEmax} = V_{CES} -L_{sCE} • di/dt tp ≤ 10 us	T_J = 150°C	-	600	-	A

Inverter Electrical Characteristics (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
Forward voltage	V_F	I_F = 150 A	T_J = 25°C	-	2.1	2.5	V
			T_J = 125°C	-	1.8	-	V
Peak reverse recovery current	I_{rr}	I_F = 150 A, V_R = 600 V V_{GE} = -15 V, R_{Gon} = 1.1 Ω	T_J = 25°C	-	180	-	A
			T_J = 125°C	-	187	-	A
Reverse recovery charge	Q_{rr}		T_J = 25°C	-	15.1	-	uC
			T_J = 125°C	-	25.0	-	uC
Reverse recovery energy	E_{rec}		T_J = 25°C	-	3.7	-	mJ
			T_J = 125°C	-	9.4	-	mJ

Electrical Characteristics (T_J = 25°C unless otherwise specified)

	Parameter	Symbol	Test Conditions		Min	Typ	Max	Unit
NTC	Rated resistance	R_{25}	T_C = 25°C		-	5	-	kΩ
	Deviation of R_{100}	△R/R	R_{100} = 493 Ω	T_J = 100°C	-5	-	5	%
	Power dissipation	P_{25}	T_C = 25°C		-	-	20	mW
	B-value	$B_{25/50}$	$R_2 = R_{25} \exp [B_{25/50}(1/T2 - 1/(298.15\ K))]$		-	3375	-	W

Electrical Characteristics (T_J = 25°C unless otherwise specified)

	Parameter	Symbol	Test Conditions	Value	Unit
Module	Isolation test voltage	V_{ISOL}	RMS, f = 50 Hz, t = 1 min.	2.5	kV
	Material of module baseplate			Cu	
	Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
	Creepage distance		terminal to heatsink	10	mm
			terminal to terminal		
	Clearance		terminal to heatsink	7.5	mm
			terminal to terminal		
	Comperative tracking index	CTI		>200	
	Thermal resistance, case to heatsink	R_{thCH}	per module, λ_{grease} = 1 W/(m·K)	0.01	K/W
	Stray inductance module	L_{sCE}		20	nH
	Module lead resistance, terminals - chip	$R_{CC'+EE'}$	per switch	1.8	mΩ
	Mounting torque for module mounting	M	Screw M5	3~6	Nm
	Weight	G		300	g

Fig 1, Output Characteristics IGBT, Inverter (typical)

$I_C = f(V_{CE})$

$V_{GE} = 15$ V

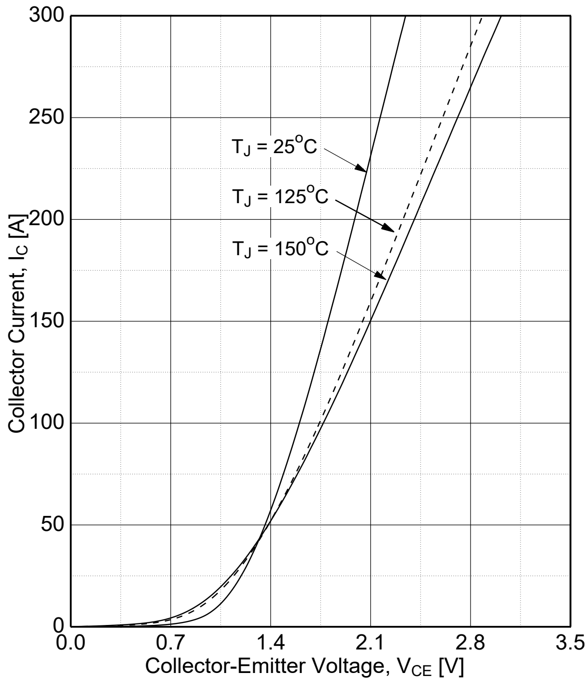


Fig 2, Output Characteristics IGBT, Inverter(typical)

$I_C = f(V_{CE})$

$T_J = 150°C$

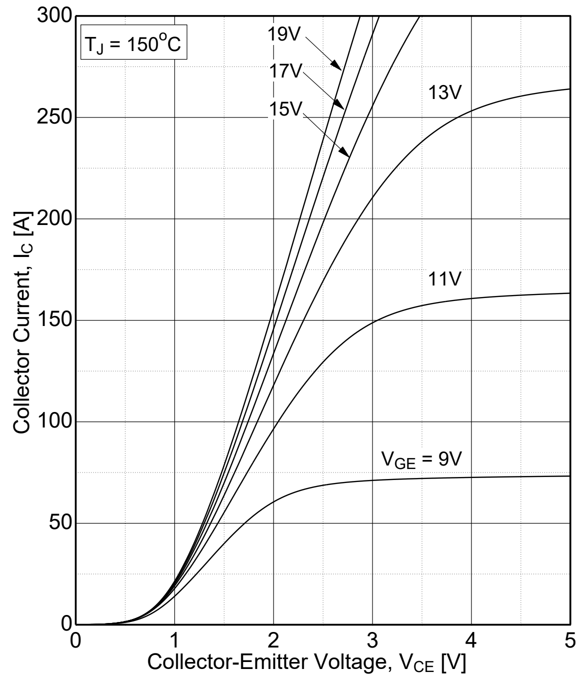


Fig 3, Transfer Characteristics IGBT, Inverter (typical)

$I_C = f(V_{GE})$

$V_{CE} = 20$ V

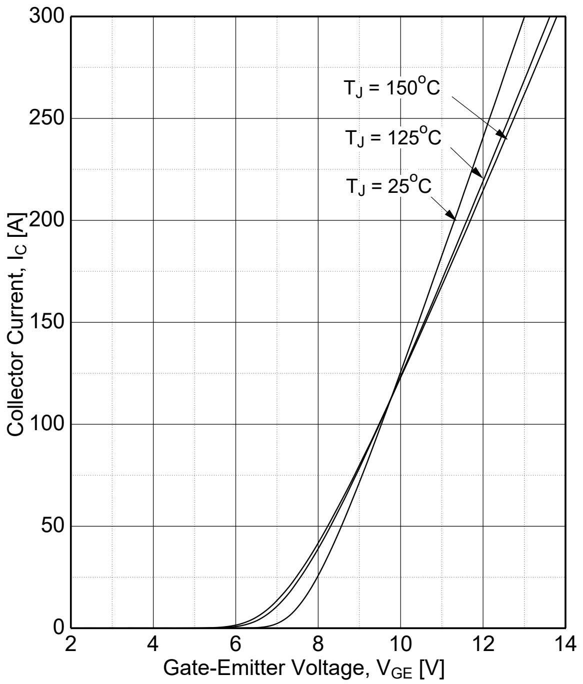


Fig 4, Switching Losses IGBT, Inverter (typical)

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

$V_{GE} = +/-15$ V, $R_{gon} = 1.1\ \Omega$, $R_{goff} = 1.1\ \Omega$, $V_{CE} = 600$ V

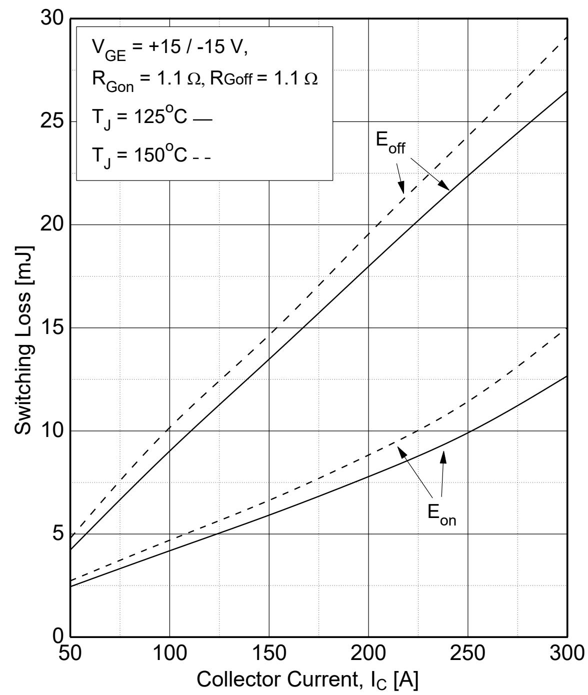


Fig 5, Switching Losses IGBT, Inverter (typical)

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

V_{GE} = +/-15 V, I_{CE} = 150 A, V_{CE} = 600 V

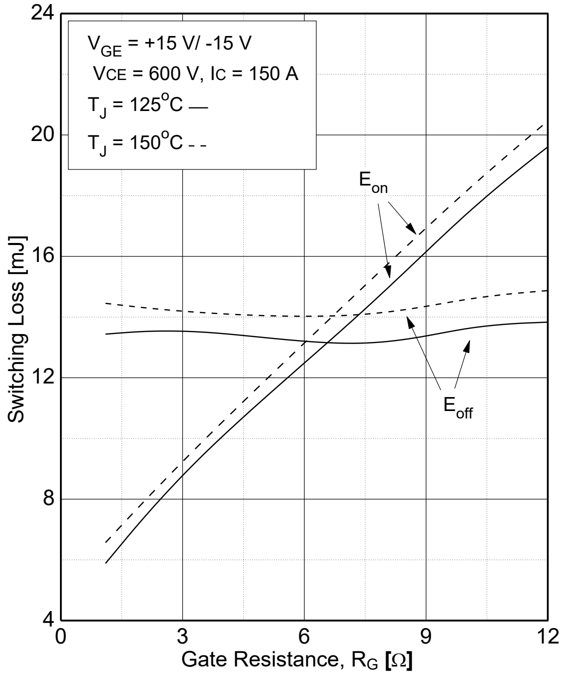


Fig 6, Transient Thermal Impedance IGBT, Inverter

$Z_{thJC} = f(t)$

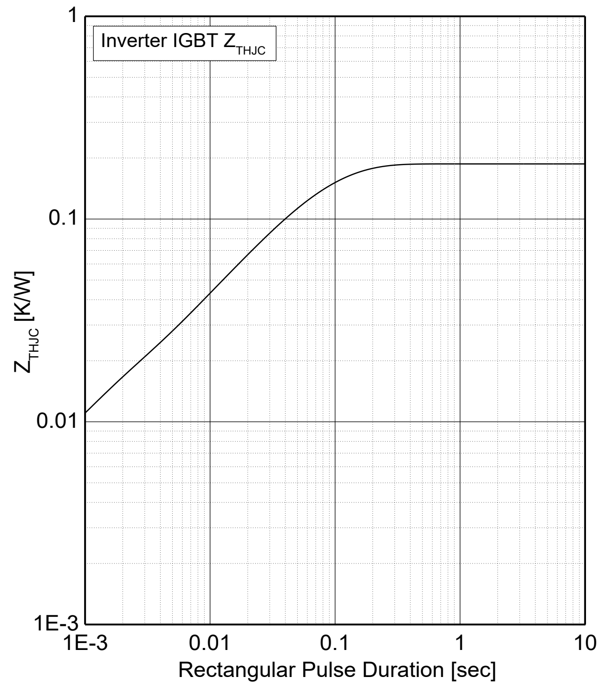


Fig 7, Reverse Bias safe operating area IGBT, Inverter (RBSOA)

$I_C = f(V_{CE})$

V_{GE} = +/-15 V, R_{goff} = 1.1 Ω, T_J = 150°C

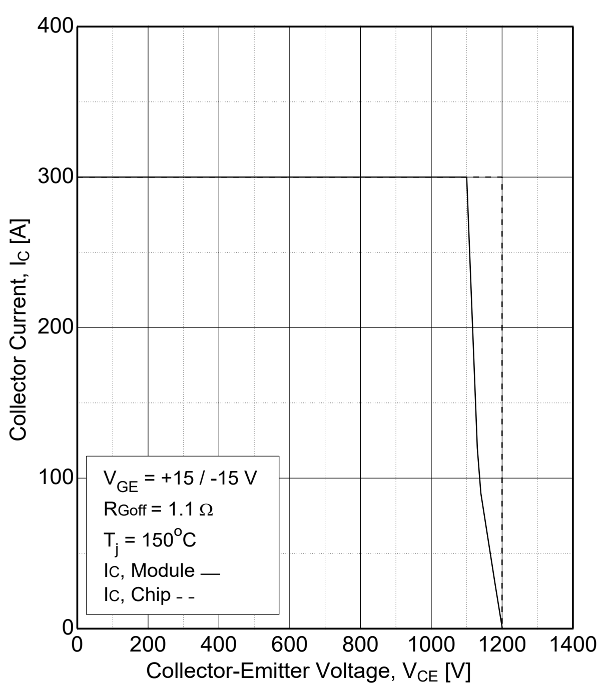


Fig 8, Forward Characteristics of Diode, Inverter (typical)

$I_F = f(V_F)$

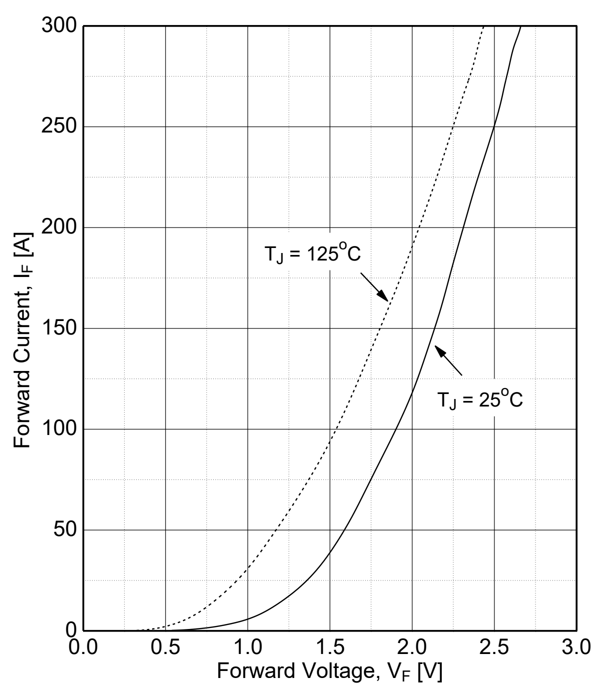


Fig 9, Switching Losses Diode, Inverter (typical)

$E_{rec} = f(I_F)$

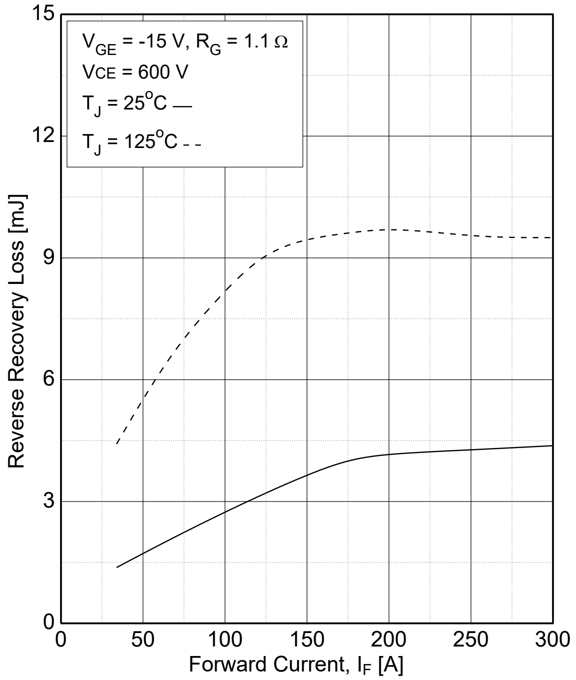


Fig 10, Switching Losses Diode, Inverter (typical)

$E_{rec} = f(R_G)$

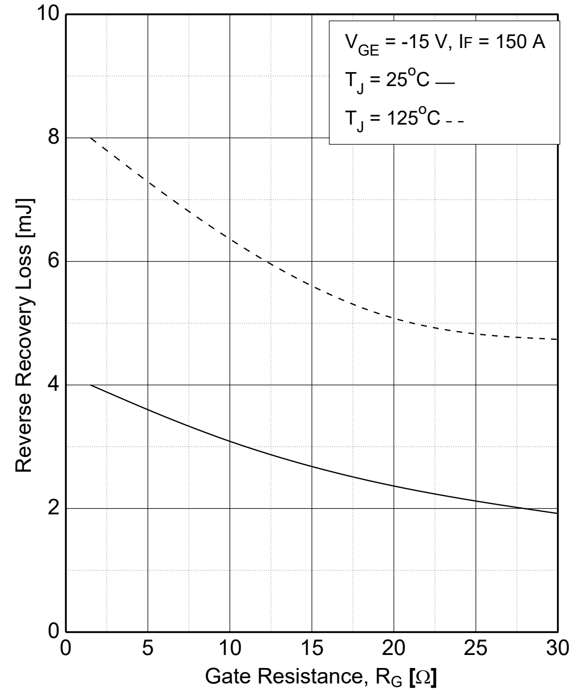


Fig 11, Transient Thermal Impedance Diode, Inverter

$Z_{thJC} = f(t)$

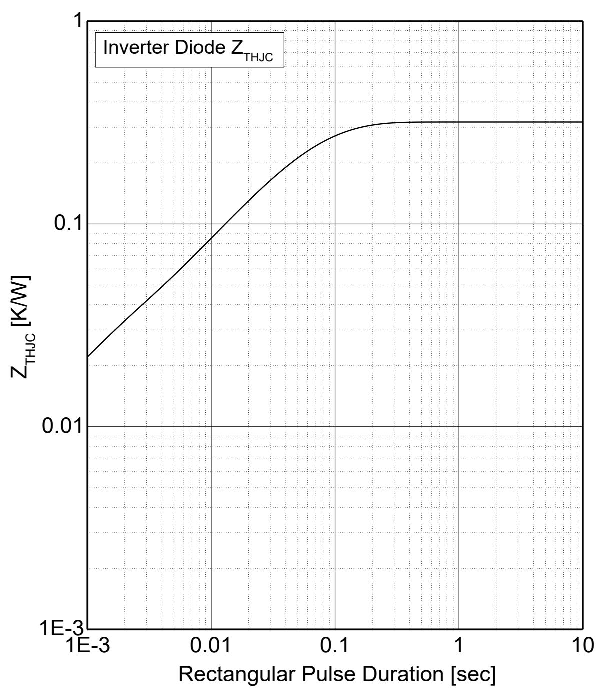
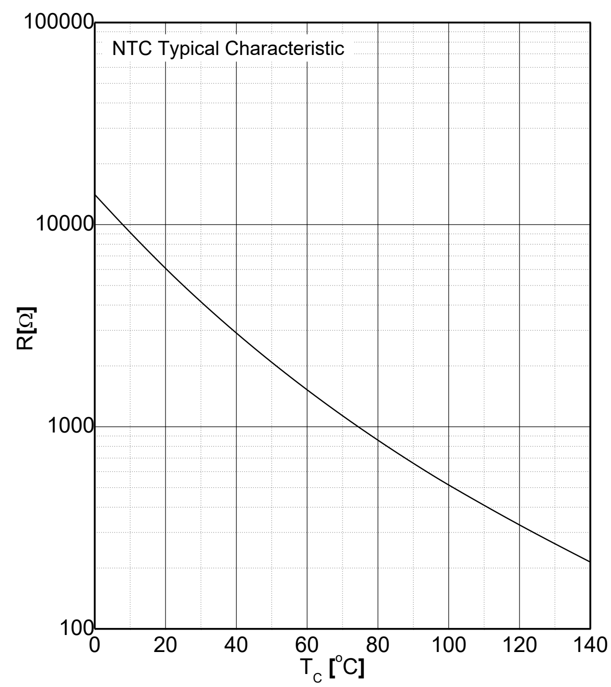
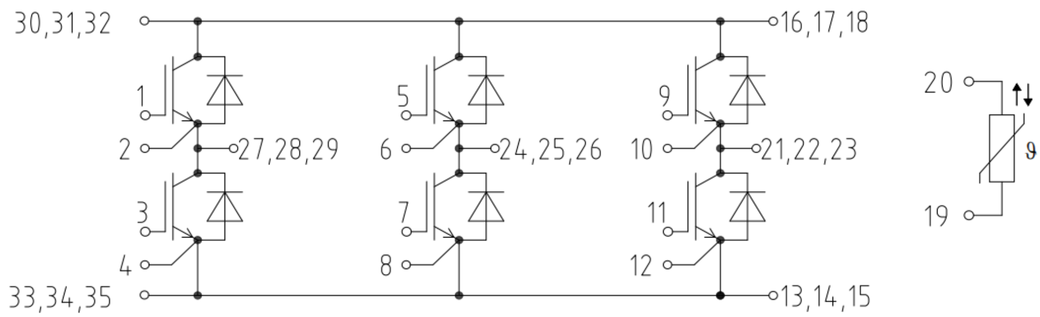


Fig 12, NTC Characteristics (typical)

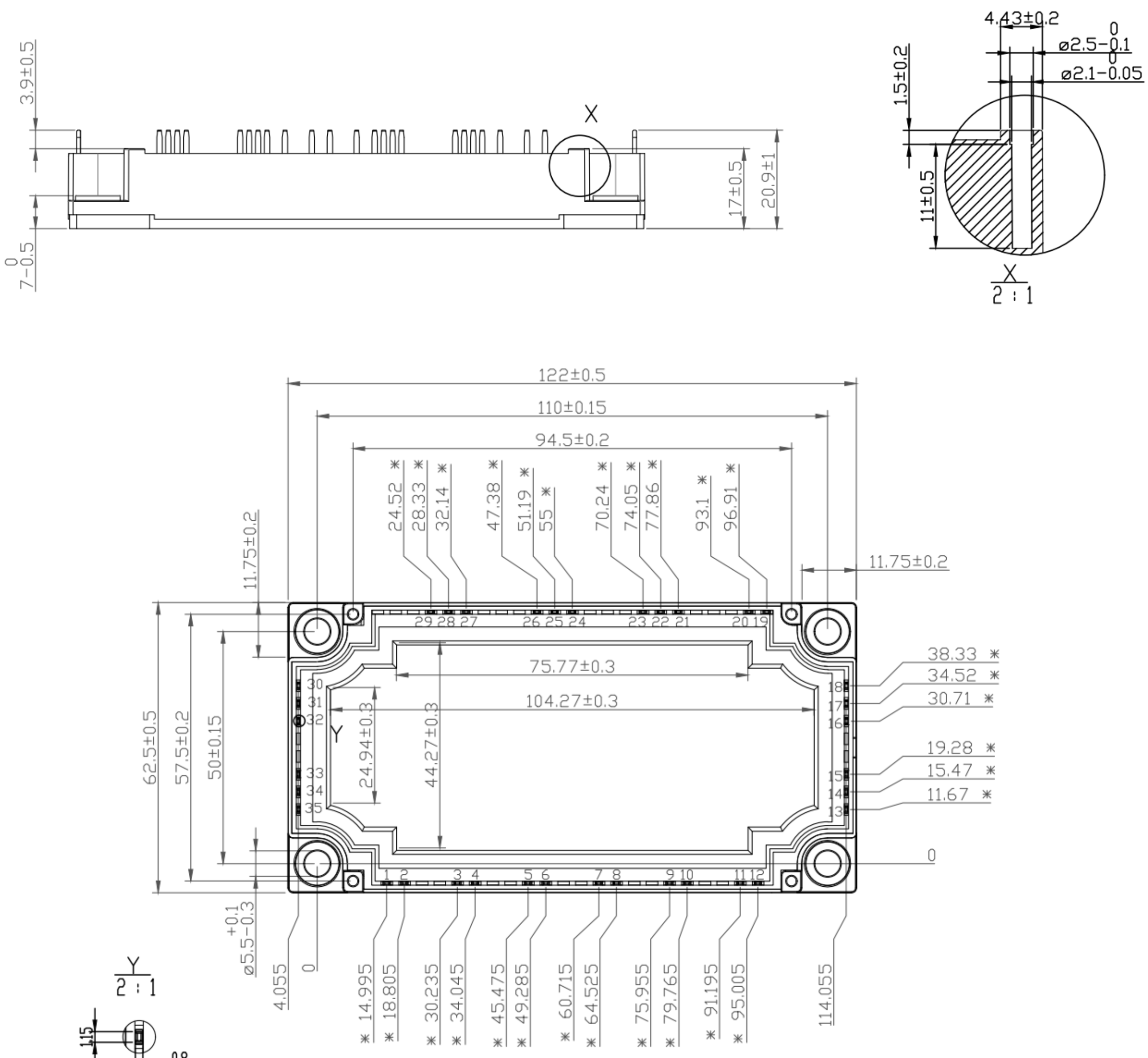
$R = f(T)$



Circuit Diagram



Package Outlines



*=all dimensions with tolerance of ⊕ Ø0.5

Revisions History

Version	Description of Change	Date
1.0	Preliminary Datasheet	Nov.2. 2019
2.0	Final Datasheet	May.18. 2020