

EconoPIM™3 module with Trench/Fieldstop IGBT4 and emitter controlled 3 diode and PressFIT / NTC

Features

- Electrical features
 - $V_{CES} = 650\text{ V}$
 - $I_{C\text{ nom}} = 100\text{ A} / I_{CRM} = 200\text{ A}$
 - Increased blocking voltage capability up to 650 V
 - High short-circuit capability
 - $T_{vj,op} = 150^{\circ}\text{C}$
 - Trench IGBT 4
 - $V_{CE,sat}$ with positive temperature coefficient
- Mechanical features
 - Integrated NTC temperature sensor
 - Copper base plate
 - PressFIT contact technology
 - Standard housing



Typical appearance

Potential applications

- Motor drives

Product validation

- Qualified for industrial applications according to the relevant tests of IEC 60747, 60749 and 60068

Description

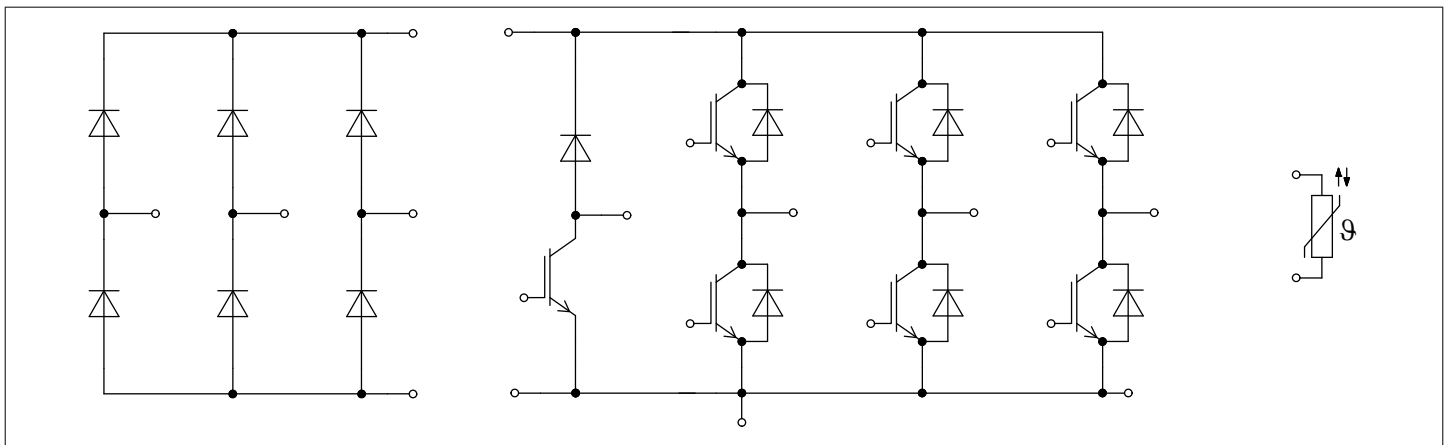


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1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50$ Hz	2.5	kV
Material of module baseplate			Cu	
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	d_{Creep}	terminal to heatsink	10.0	mm
Clearance	d_{Clear}	terminal to heatsink	7.5	mm
Comparative tracking index	CTI		> 200	
Relative thermal index (electrical)	RTI	housing	140	°C

Table 2 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	L_{sCE}			40		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_C = 25$ °C, per switch		2		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_C = 25$ °C, per switch		4		mΩ
Storage temperature	T_{stg}		-40		125	°C
Mounting torque for module mounting	M	- Mounting according to valid application note	M5, Screw	3	6	Nm
Weight	G			300		g

Note: for operation with $V_{ge} = 0V/+15V$ we recommend a $R_{gon,min}$ of 24 ohms and a $R_{goff,min}$ of 24 ohms (see AN 2006-01)

The current under continuous operation is limited to 50 A rms per connector pin.

2 IGBT, Inverter

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Collector-emitter voltage	V_{CES}	$T_{vj} = 25$ °C	650	V
Continuous DC collector current	I_{CDC}	$T_{vj,max} = 175$ °C $T_C = 70$ °C	100	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj,op}$	200	A

(table continues...)

Table 3 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Gate-emitter peak voltage	V_{GES}		± 20	V

Table 4 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\ sat}$	$I_C = 100\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$	1.55	1.95	V
			$T_{vj} = 125\ ^\circ C$	1.70		
			$T_{vj} = 150\ ^\circ C$	1.75		
Gate threshold voltage	V_{GETh}	$I_C = 1.6\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$	5	5.80	6.5	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V$		1		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$		2		Ω
Input capacitance	C_{ies}	$f = 1000\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$		6.2		nF
Reverse transfer capacitance	C_{res}	$f = 1000\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$		0.19		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$		1	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0\ V, V_{GE} = 20\ V, T_{vj} = 25\ ^\circ C$			100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 100\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 3.3\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.070		μs
			$T_{vj} = 125\ ^\circ C$	0.080		
			$T_{vj} = 150\ ^\circ C$	0.080		
Rise time (inductive load)	t_r	$I_C = 100\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 3.3\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.020		μs
			$T_{vj} = 125\ ^\circ C$	0.020		
			$T_{vj} = 150\ ^\circ C$	0.020		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 100\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 3.3\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.260		μs
			$T_{vj} = 125\ ^\circ C$	0.290		
			$T_{vj} = 150\ ^\circ C$	0.300		
Fall time (inductive load)	t_f	$I_C = 100\ A, V_{CC} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 3.3\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.070		μs
			$T_{vj} = 125\ ^\circ C$	0.070		
			$T_{vj} = 150\ ^\circ C$	0.070		
Turn-on energy loss per pulse	E_{on}	$I_C = 100\ A, V_{CC} = 300\ V, L_\sigma = 30\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 3.3\ \Omega, di/dt = 5100\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$	0.33		mJ
			$T_{vj} = 125\ ^\circ C$	0.77		
			$T_{vj} = 150\ ^\circ C$	0.88		

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-off energy loss per pulse	E_{off}	$I_C = 100\text{ A}$, $V_{CC} = 300\text{ V}$, $L_\sigma = 30\text{ nH}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 3.3\ \Omega$, $dv/dt = 4000\text{ V}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	3.5		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	4.7		
			$T_{vj} = 150\text{ }^\circ\text{C}$	4.9		
SC data	I_{SC}	$V_{GE} \leq 15\text{ V}$, $V_{CC} = 360\text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_P \leq 10\ \mu\text{s}$, $T_{vj} = 25\text{ }^\circ\text{C}$	480		A
			$t_P \leq 10\ \mu\text{s}$, $T_{vj} = 150\text{ }^\circ\text{C}$	380		
Thermal resistance, junction to case	R_{thJC}	per IGBT			0.450	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT, $\lambda_{grease} = 1\text{ W}/(\text{m}\cdot\text{K})$		0.140		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^\circ\text{C}$

3 Diode, Inverter

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ }^\circ\text{C}$	650	V
Continuous DC forward current	I_F		100	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$	200	A
I^2t - value	I^2t	$t_P = 10\text{ ms}$, $V_R = 0\text{ V}$	$T_{vj} = 125\text{ }^\circ\text{C}$	A^2s
			$T_{vj} = 150\text{ }^\circ\text{C}$	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 100\text{ A}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1.55	1.95	V
			$T_{vj} = 125\text{ }^\circ\text{C}$	1.50		
			$T_{vj} = 150\text{ }^\circ\text{C}$	1.45		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300\text{ V}$, $I_F = 100\text{ A}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 5100\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	130		A
			$T_{vj} = 125\text{ }^\circ\text{C}$	150		
			$T_{vj} = 150\text{ }^\circ\text{C}$	160		

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Recovered charge	Q_r	$V_{CC} = 300 \text{ V}$, $I_F = 100 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 5100 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	4		μC
			$T_{vj} = 125 \text{ }^\circ\text{C}$	8		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	10		
Reverse recovery energy	E_{rec}	$V_{CC} = 300 \text{ V}$, $I_F = 100 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 5100 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ }^\circ\text{C}$)	$T_{vj} = 25 \text{ }^\circ\text{C}$	1.3		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	2.25		
			$T_{vj} = 150 \text{ }^\circ\text{C}$	2.75		
Thermal resistance, junction to case	R_{thJC}	per diode			0.800	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode, $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$		0.250		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^\circ\text{C}$

4 Diode, Rectifier

Table 7 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}		$T_{vj} = 25 \text{ }^\circ\text{C}$	1600	V
Maximum RMS forward current per chip	I_{FRMSM}	$T_C = 80 \text{ }^\circ\text{C}$		100	A
Maximum RMS current at rectifier output	I_{RMSM}	$T_C = 80 \text{ }^\circ\text{C}$		150	A
Surge forward current	I_{FSM}	$t_P = 10 \text{ ms}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	740	A
			$T_{vj} = 150 \text{ }^\circ\text{C}$	580	
I^2t - value	I^2t	$t_P = 10 \text{ ms}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	2750	A^2s
			$T_{vj} = 150 \text{ }^\circ\text{C}$	1700	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 100 \text{ A}$	$T_{vj} = 150 \text{ }^\circ\text{C}$	1.10		V
Reverse current	I_r	$T_{vj} = 150 \text{ }^\circ\text{C}$, $V_R = 1600 \text{ V}$		1		mA
Thermal resistance, junction to case	R_{thJC}	per diode			0.500	K/W

(table continues...)

Table 8 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Thermal resistance, case to heat sink	R_{thCH}	per diode, $\lambda_{grease} = 1 \text{ W/(m} \cdot \text{K)}$		0.160		K/W
Temperature under switching conditions	$T_{vj, op}$		-40		150	°C

5 IGBT, Brake-Chopper

Table 9 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25 \text{ °C}$	650	V
Continuous DC collector current	I_{CDC}	$T_{vj \max} = 175 \text{ °C}$	$T_C = 80 \text{ °C}$	75	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj \text{ op}}$		150	A
Gate-emitter peak voltage	V_{GES}			±20	V

Table 10 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE \text{ sat}}$	$I_C = 75 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ °C}$		1.55	1.95	V
			$T_{vj} = 125 \text{ °C}$		1.70		
			$T_{vj} = 150 \text{ °C}$		1.75		
Gate threshold voltage	V_{GEth}	$I_C = 1.2 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25 \text{ °C}$		5	5.80	6.5	V
Gate charge	Q_G	$V_{GE} = \pm 15 \text{ V}$			0.75		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25 \text{ °C}$			0		Ω
Input capacitance	C_{ies}	$f = 1000 \text{ kHz}, T_{vj} = 25 \text{ °C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$			4.6		nF
Reverse transfer capacitance	C_{res}	$f = 1000 \text{ kHz}, T_{vj} = 25 \text{ °C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$			0.145		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650 \text{ V}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$			1	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = 20 \text{ V}, T_{vj} = 25 \text{ °C}$				100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 75 \text{ A}, V_{CC} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}, R_{Gon} = 5.1 \text{ Ω}$	$T_{vj} = 25 \text{ °C}$		0.025		μs
			$T_{vj} = 125 \text{ °C}$		0.025		
			$T_{vj} = 150 \text{ °C}$		0.025		

(table continues...)

Table 10 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rise time (inductive load)	t_r	$I_C = 75 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 5.1 \Omega$	$T_{vj} = 25 \text{ °C}$	0.020		μs
			$T_{vj} = 125 \text{ °C}$	0.020		
			$T_{vj} = 150 \text{ °C}$	0.020		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 75 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 5.1 \Omega$	$T_{vj} = 25 \text{ °C}$	0.210		μs
			$T_{vj} = 125 \text{ °C}$	0.240		
			$T_{vj} = 150 \text{ °C}$	0.250		
Fall time (inductive load)	t_f	$I_C = 75 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 5.1 \Omega$	$T_{vj} = 25 \text{ °C}$	0.060		μs
			$T_{vj} = 125 \text{ °C}$	0.070		
			$T_{vj} = 150 \text{ °C}$	0.070		
Turn-on energy loss per pulse	E_{on}	$I_C = 75 \text{ A}$, $V_{CC} = 300 \text{ V}$, $L_\sigma = 30 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 5.1 \Omega$, $di/dt = 4000 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.385		mJ
			$T_{vj} = 125 \text{ °C}$	0.55		
			$T_{vj} = 150 \text{ °C}$	0.66		
Turn-off energy loss per pulse	E_{off}	$I_C = 75 \text{ A}$, $V_{CC} = 300 \text{ V}$, $L_\sigma = 30 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 5.1 \Omega$, $dv/dt = 4000 \text{ V}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	3.36		mJ
			$T_{vj} = 125 \text{ °C}$	3.92		
			$T_{vj} = 150 \text{ °C}$	4.2		
SC data	I_{SC}	$V_{GE} \leq 15 \text{ V}$, $V_{CC} = 360 \text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_p \leq 10 \mu\text{s}$, $T_{vj} = 25 \text{ °C}$	360		A
			$t_p \leq 10 \mu\text{s}$, $T_{vj} = 150 \text{ °C}$	285		
Thermal resistance, junction to case	R_{thJC}	per IGBT			0.600	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT, $\lambda_{grease} = 1 \text{ W}/(\text{m} \cdot \text{K})$		0.190		K/W
Temperature under switching conditions	$T_{vj op}$		-40		150	°C

6 Diode, Brake-Chopper

Table 11 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25 \text{ °C}$	650	V
Continuous DC forward current	I_F		30	A

(table continues...)

Table 11 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$	60	A
I^2t - value	I^2t	$t_P = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ °C}$	A^2s
			$T_{vj} = 150 \text{ °C}$	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 30 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.60	2.00	V
			$T_{vj} = 125 \text{ °C}$	1.55		
			$T_{vj} = 150 \text{ °C}$	1.50		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300 \text{ V}, I_F = 30 \text{ A}, -di_F/dt = 600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	22		A
			$T_{vj} = 125 \text{ °C}$	24		
			$T_{vj} = 150 \text{ °C}$	27		
Recovered charge	Q_r	$V_{CC} = 300 \text{ V}, I_F = 30 \text{ A}, -di_F/dt = 600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	1.15		μC
			$T_{vj} = 125 \text{ °C}$	2.3		
			$T_{vj} = 150 \text{ °C}$	2.7		
Reverse recovery energy	E_{rec}	$V_{CC} = 300 \text{ V}, I_F = 30 \text{ A}, -di_F/dt = 600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.12		mJ
			$T_{vj} = 125 \text{ °C}$	0.3		
			$T_{vj} = 150 \text{ °C}$	0.36		
Thermal resistance, junction to case	R_{thJC}	per diode			1.80	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode, $\lambda_{grease} = 1 \text{ W}/(\text{m}\cdot\text{K})$		0.570		K/W
Temperature under switching conditions	$T_{vj op}$		-40		150	°C

7 NTC-Thermistor

Table 13 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	$T_{NTC} = 25 \text{ °C}$		5		kΩ
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100 \text{ °C}, R_{100} = 493 \text{ Ω}$	-5		5	%
Power dissipation	P_{25}	$T_{NTC} = 25 \text{ °C}$			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$		3375		K

(table continues...)



Table 13 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2 - 1/(298,15 \text{ K}))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2 - 1/(298,15 \text{ K}))]$		3433		K

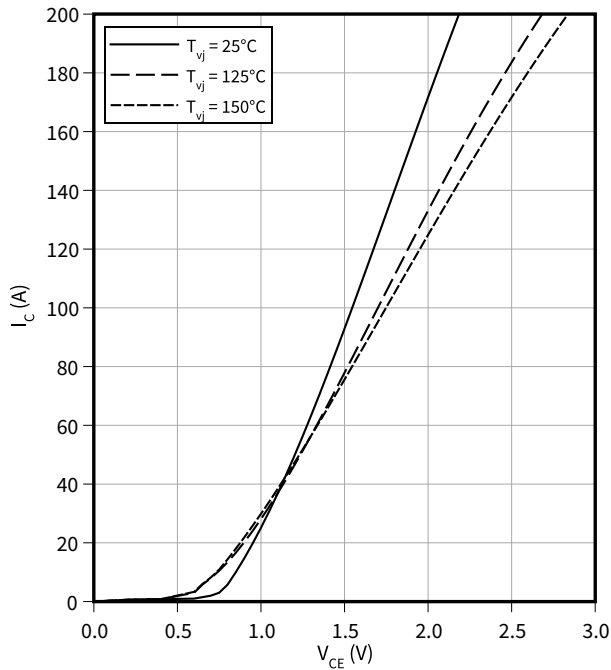
Note: Specification according to the valid application note.

8 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

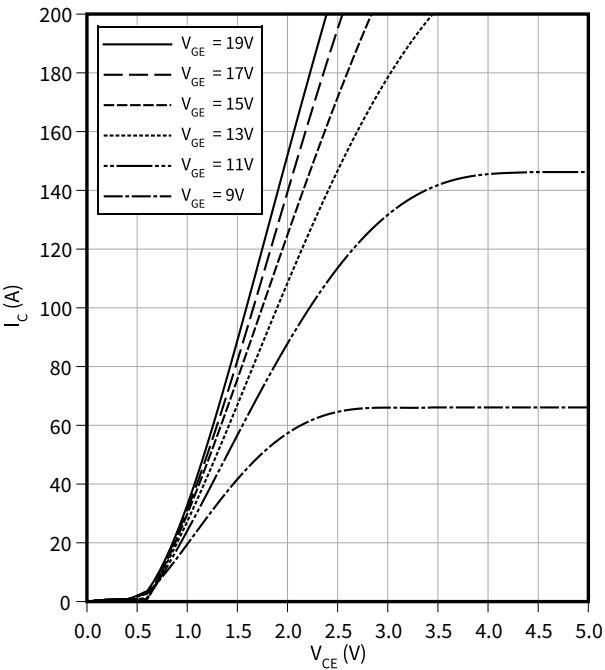
$V_{GE} = 15\text{ V}$



Output characteristic field (typical), IGBT, Inverter

$I_C = f(V_{CE})$

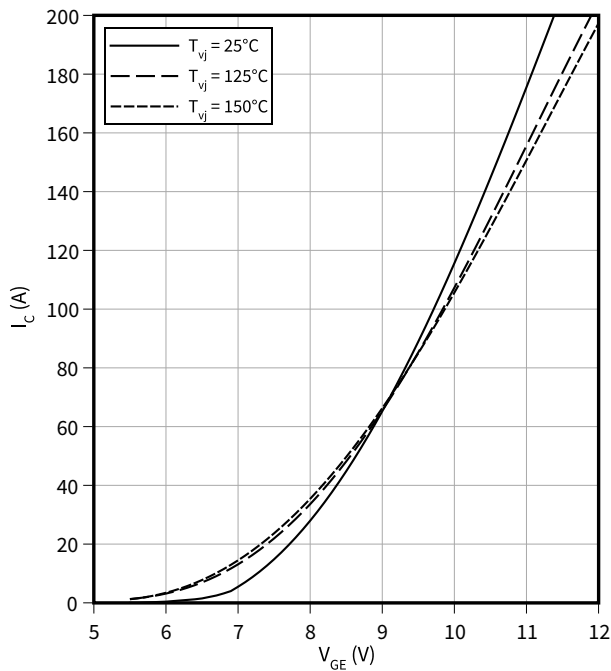
$T_{vj} = 150\text{ °C}$



Transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

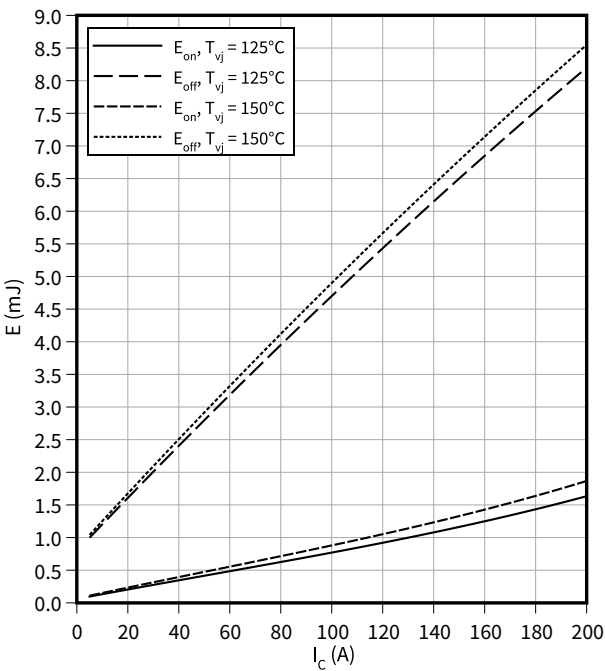
$V_{CE} = 20\text{ V}$



Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

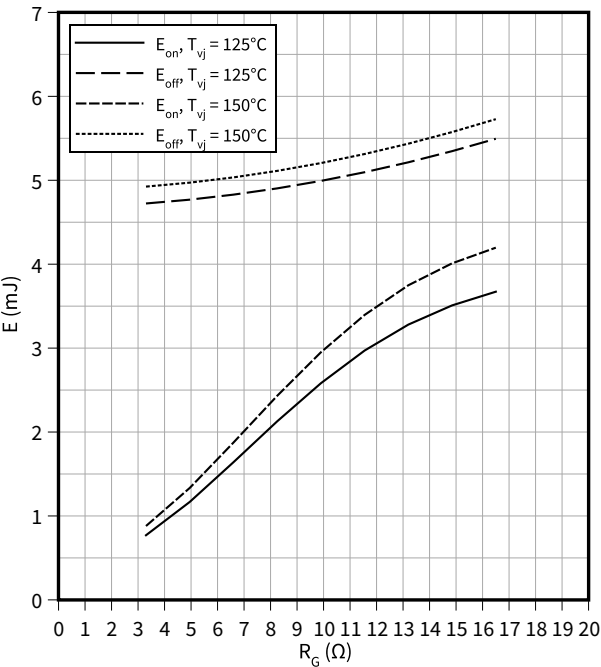
$R_{Goff} = 3.3\text{ }\Omega$, $R_{Gon} = 3.3\text{ }\Omega$, $V_{CC} = 300\text{ V}$, $V_{GE} = \pm 15\text{ V}$



8 Characteristics diagrams

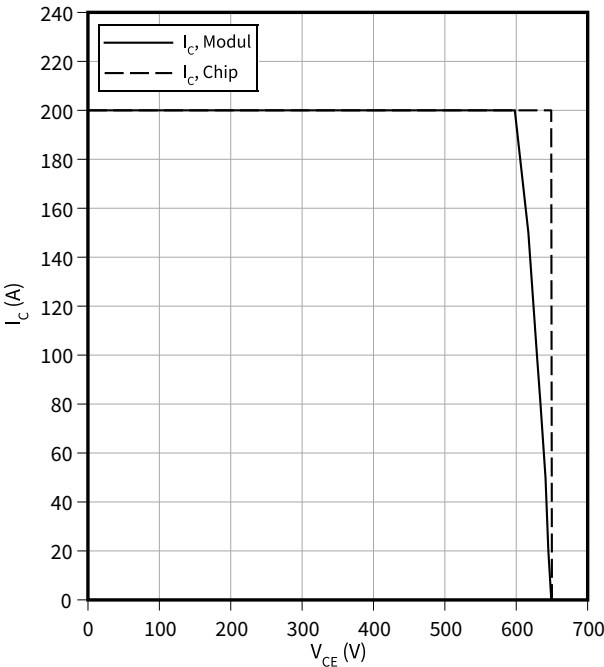
Switching losses (typical), IGBT, Inverter

$E = f(R_G)$
 $I_C = 100\text{ A}, V_{CC} = 300\text{ V}, V_{GE} = \pm 15\text{ V}$



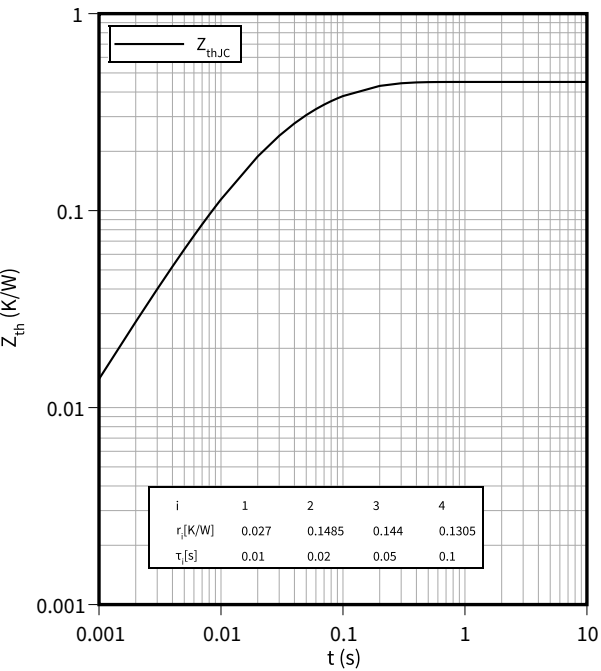
Reverse bias safe operating area (RBSOA), IGBT, Inverter

$I_C = f(V_{CE})$
 $R_{Goff} = 3.3\text{ }\Omega, V_{GE} = \pm 15\text{ V}, T_{vj} = 150\text{ }^\circ\text{C}$



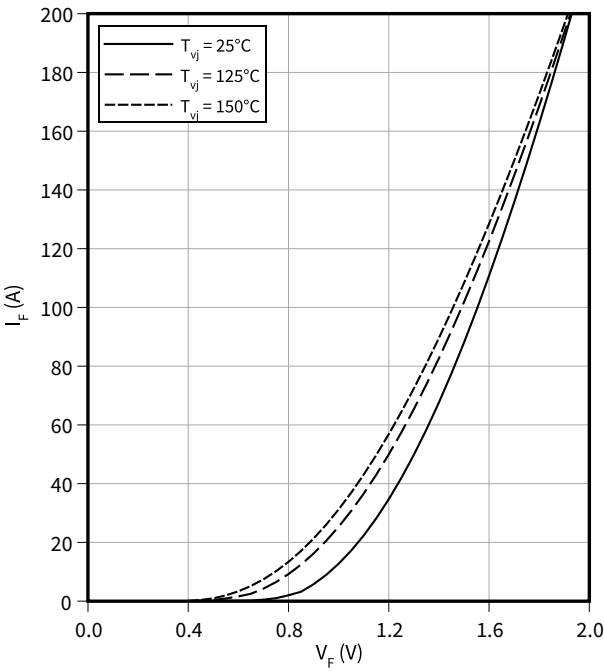
Transient thermal impedance, IGBT, Inverter

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, Inverter

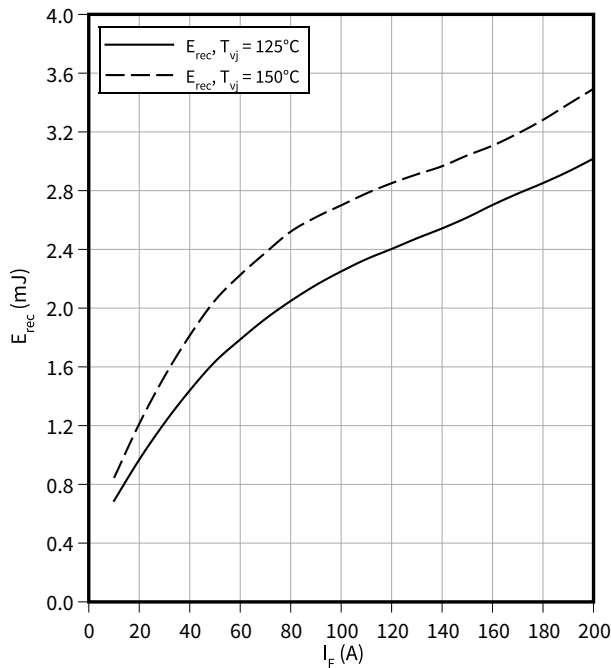
$I_F = f(V_F)$



8 Characteristics diagrams

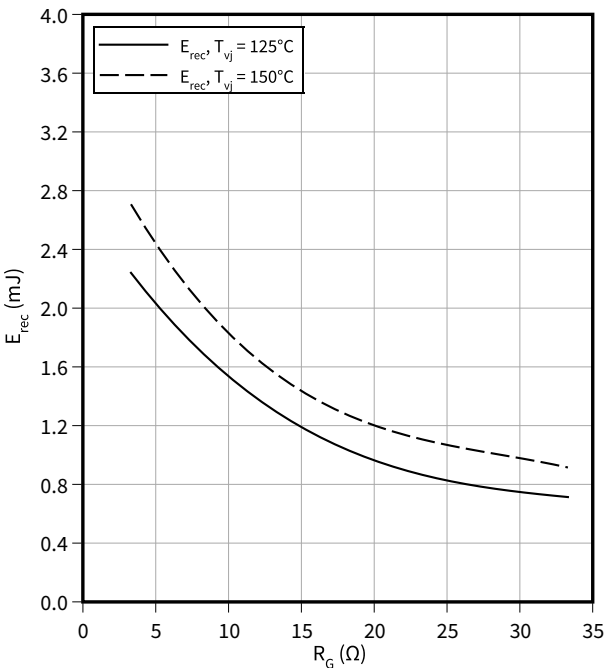
Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$
 $R_G = 3.3 \, \Omega, V_{CC} = 300 \, V$



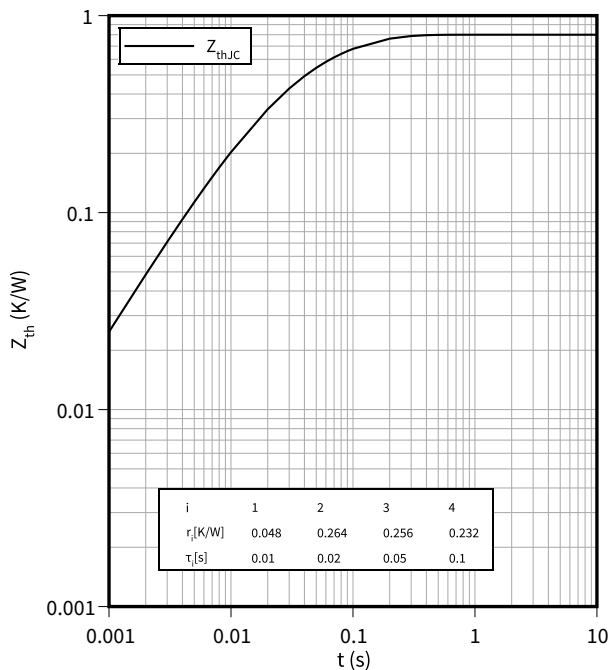
Switching losses (typical), Diode, Inverter

$E_{rec} = f(R_G)$
 $I_F = 100 \, A, V_{CC} = 300 \, V$



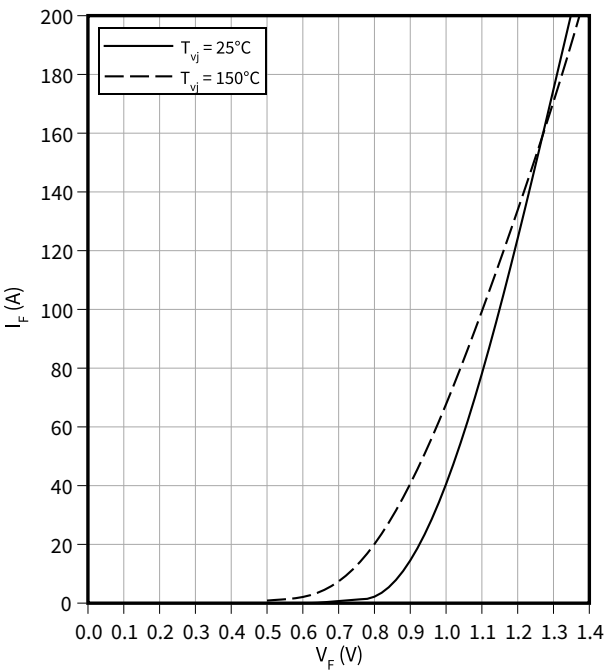
Transient thermal impedance, Diode, Inverter

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, Rectifier

$I_F = f(V_F)$

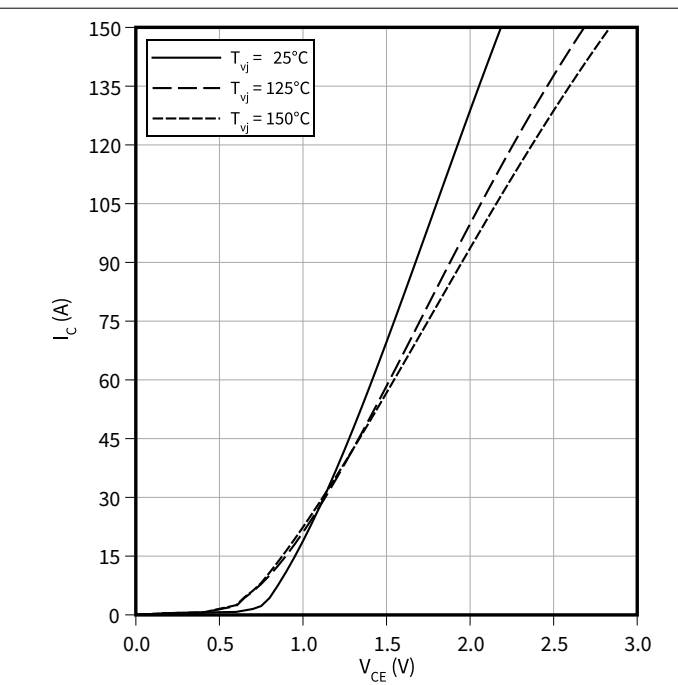


8 Characteristics diagrams

Output characteristic (typical), IGBT, Brake-Chopper

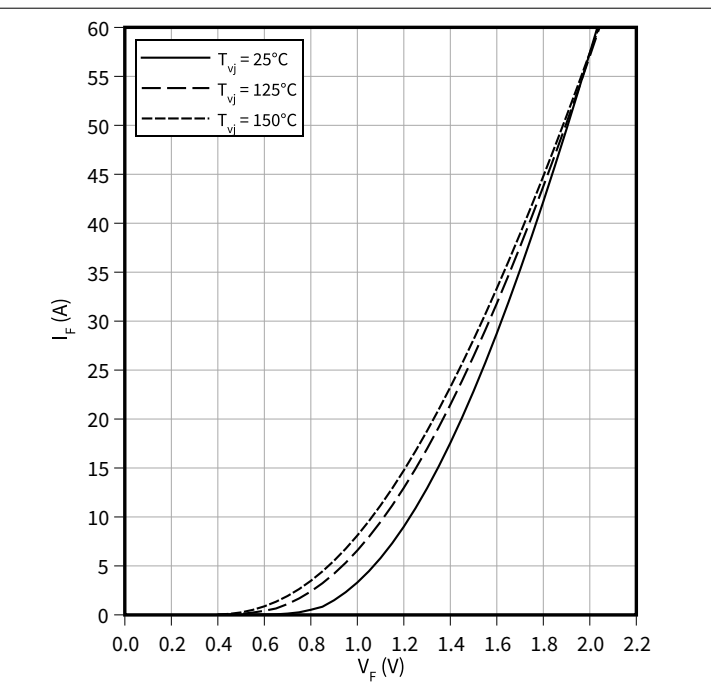
$I_C = f(V_{CE})$

$V_{GE} = 15\text{ V}$



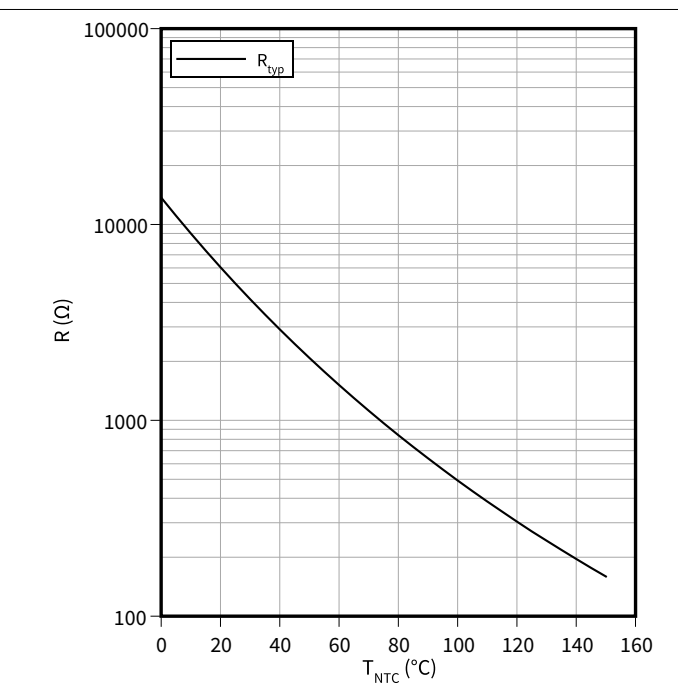
Forward characteristic (typical), Diode, Brake-Chopper

$I_F = f(V_F)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

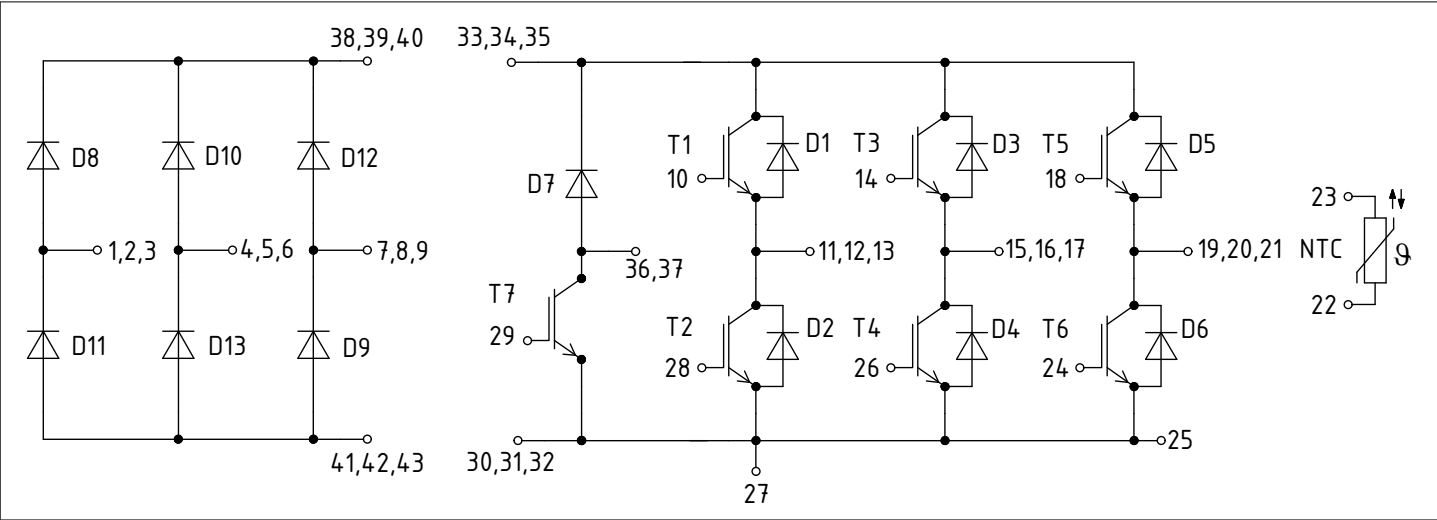


Figure 1

Figure 2

11 Module label code

Module label code			
Code format	Data Matrix		Barcode Code128
Encoding	ASCII text		Code Set A
Symbol size	16x16		23 digits
Standard	IEC24720 and IEC16022		IEC8859-1
Code content	Content	Digit	Example
	Module serial number	1 – 5	71549
	Module material number	6 - 11	142846
	Production order number	12 - 19	55054991
	Date code (production year)	20 – 21	15
	Date code (production week)	22 – 23	30
Example	 71549142846550549911530  71549142846550549911530		

Figure 3



Revision history

Revision history

Document revision	Date of release	Description of changes
V2.0	2011-05-27	Preliminary datasheet
V3.0	2020-04-01	Final datasheet
n/a	2020-09-01	Datasheet migrated to a new system with a new layout and new revision number schema: target or preliminary datasheet = 0.xy; final datasheet = 1.xy
1.10	2024-10-07	Final datasheet

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