

EconoPIM™2 module with TRENCHSTOP™ IGBT7 and emitter controlled 7 diode and NTC / pre-applied thermal interface material

Features

- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 50\text{ A} / I_{CRM} = 100\text{ A}$
 - TRENCHSTOP™ IGBT7
 - Low $V_{CE,sat}$
 - Overload operation up to 175°C
- Mechanical features
 - High power and thermal cycling capability
 - Integrated NTC temperature sensor
 - Copper base plate
 - Al_2O_3 substrate with low thermal resistance
 - Pre-applied thermal interface material
 - Solder contact technology



Potential applications

- Auxiliary inverters
- Motor drives
- Servo drives

Product validation

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

Description

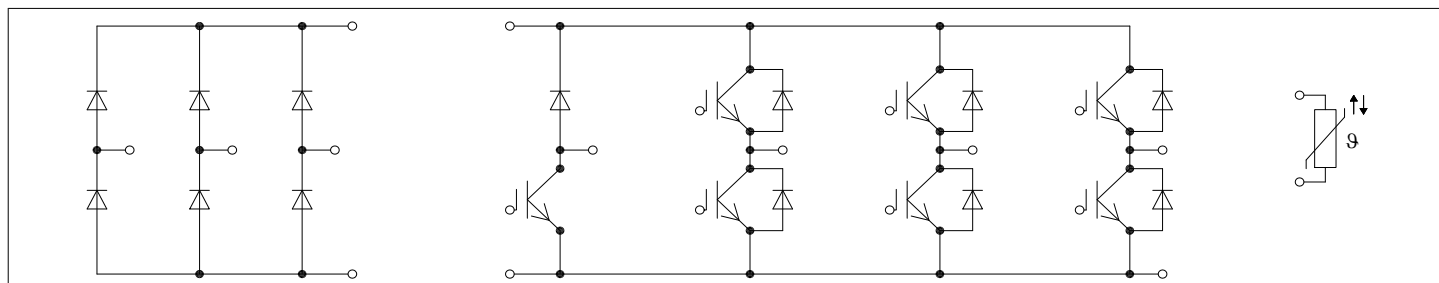


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1 Package

Table 1 Insulation coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$	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}			35		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_H = 25^\circ\text{C}$, per switch		5.5		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25^\circ\text{C}$, per switch		4.8		mΩ
Storage temperature	T_{stg}		-40		125	°C
Maximum baseplate operation temperature	T_{BPmax}				150	°C
Mounting torque for module mounting	M	- Mounting according to valid application note	M5, Screw	3	6	Nm
Weight	G			180		g

Note: The current under continuous operation is limited to 50 A rms per connector pin.
Storage and shipment of modules with TIM => see AN2012-07

2 IGBT, Inverter

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Collector-emitter voltage	V_{CES}	$T_{vj} = 25^\circ\text{C}$	1200	V
Continuous DC collector current	I_{CDC}	$T_{vj \max} = 175^\circ\text{C}$ $T_H = 90^\circ\text{C}$	50	A

(table continues...)

Table 3 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak collector current	I_{CRM}	$t_P = 1 \text{ ms}$	100	A
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	$V_{CE\text{ sat}}$	$I_C = 50 \text{ A}, V_{GE} = 15 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	1.50	1.80	V
			$T_{vj} = 125 \text{ }^\circ\text{C}$	1.64		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	1.72		
Gate threshold voltage	V_{GEth}	$I_C = 2 \text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25 \text{ }^\circ\text{C}$	5.15	5.80	6.45	V
Gate charge	Q_G	$V_{GE} = \pm 15 \text{ V}, V_{CE} = 600 \text{ V}$		0.92		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25 \text{ }^\circ\text{C}$		0		Ω
Input capacitance	C_{ies}	$f = 100 \text{ kHz}, T_{vj} = 25 \text{ }^\circ\text{C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$		11.1		nF
Reverse transfer capacitance	C_{res}	$f = 100 \text{ kHz}, T_{vj} = 25 \text{ }^\circ\text{C}, V_{CE} = 25 \text{ V}, V_{GE} = 0 \text{ V}$		0.039		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200 \text{ V}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$		0.01	mA
Gate-emitter leakage current	I_{GES}	$V_{CE} = 0 \text{ V}, V_{GE} = 20 \text{ V}, T_{vj} = 25 \text{ }^\circ\text{C}$			100	nA
Turn-on delay time (inductive load)	t_{don}	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, R_{Gon} = 7.5 \text{ } \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.059		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.061		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.062		
Rise time (inductive load)	t_r	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, R_{Gon} = 7.5 \text{ } \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.043		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.047		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.049		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, R_{Goff} = 7.5 \text{ } \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.290		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.380		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.420		
Fall time (inductive load)	t_f	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, R_{Goff} = 7.5 \text{ } \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.110		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.200		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.270		
Turn-on energy loss per pulse	E_{on}	$I_C = 50 \text{ A}, V_{CE} = 600 \text{ V}, L_\sigma = 35 \text{ nH}, V_{GE} = \pm 15 \text{ V}, R_{Gon} = 7.5 \text{ } \Omega, di/dt = 900 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$	5.07		mJ
			$T_{vj} = 125 \text{ }^\circ\text{C}$	6.76		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	7.72		

(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}	$I_C = 50\text{ A}$, $V_{CE} = 600\text{ V}$, $L_\sigma = 35\text{ nH}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 7.5\ \Omega$, $dv/dt = 2900\text{ V}/\mu\text{s}$ ($T_{vj} = 175\text{ °C}$)	$T_{vj} = 25\text{ °C}$	3.37		mJ
			$T_{vj} = 125\text{ °C}$	5.31		
			$T_{vj} = 175\text{ °C}$	6.58		
SC data	I_{SC}	$V_{GE} \leq 15\text{ V}$, $V_{CC} = 800\text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_p \leq 8\ \mu\text{s}$, $T_{vj} = 150\text{ °C}$	190		A
			$t_p \leq 7\ \mu\text{s}$, $T_{vj} = 175\text{ °C}$	180		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, Valid with IFX pre-applied Thermal Interface Material			0.777	K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		175	°C

Note: $T_{vj\text{ op}} > 150\text{ °C}$ is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

3 Diode, Inverter

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ °C}$	1200	V
Continuous DC forward current	I_F		50	A
Repetitive peak forward current	I_{FRM}	$t_p = 1\text{ ms}$	100	A
I^2t - value	I^2t	$V_R = 0\text{ V}$, $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ °C}$	A^2s
			$T_{vj} = 175\text{ °C}$	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 50\text{ A}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$	1.72	2.10	V
			$T_{vj} = 125\text{ °C}$	1.59		
			$T_{vj} = 175\text{ °C}$	1.52		

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Peak reverse recovery current	I_{RM}	$I_F = 35\text{ A}$, $V_R = 600\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 900\text{ A}/\mu\text{s}$ ($T_{vj} = 175\text{ °C}$)	$T_{vj} = 25\text{ °C}$	31		A
			$T_{vj} = 125\text{ °C}$	39		
			$T_{vj} = 175\text{ °C}$	45		
Recovered charge	Q_r	$I_F = 50\text{ A}$, $V_R = 600\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 900\text{ A}/\mu\text{s}$ ($T_{vj} = 175\text{ °C}$)	$T_{vj} = 25\text{ °C}$	3.96		μC
			$T_{vj} = 125\text{ °C}$	7.37		
			$T_{vj} = 175\text{ °C}$	9.89		
Reverse recovery energy	E_{rec}	$I_F = 50\text{ A}$, $V_R = 600\text{ V}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 900\text{ A}/\mu\text{s}$ ($T_{vj} = 175\text{ °C}$)	$T_{vj} = 25\text{ °C}$	1.31		mJ
			$T_{vj} = 125\text{ °C}$	2.52		
			$T_{vj} = 175\text{ °C}$	3.46		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material			1.13	K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		175	°C

Note: $T_{vj\text{ op}} > 150\text{ °C}$ is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

4 Diode, Rectifier

Table 7 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ °C}$		1600	V
Maximum RMS forward current per chip	I_{FRMSM}	$T_H = 60\text{ °C}$		70	A
Maximum RMS current at rectifier output	I_{RMSM}	$T_H = 60\text{ °C}$		100	A
Surge forward current	I_{FSM}	$t_P = 10\text{ ms}$	$T_{vj} = 25\text{ °C}$	560	A
			$T_{vj} = 150\text{ °C}$	435	
I^2t - value	I^2t	$t_P = 10\text{ ms}$	$T_{vj} = 25\text{ °C}$	1570	A^2s
			$T_{vj} = 150\text{ °C}$	945	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 50\text{ A}$	$T_{vj} = 150\text{ °C}$		1.05		V

(table continues...)

Table 8 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Reverse current	I_r	$T_{vj} = 150\text{ °C}$, $V_R = 1600\text{ V}$		1		mA
Thermal resistance, junction to heat sink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material			1.10	K/W
Temperature under switching conditions	$T_{vj, op}$		-40		150	°C

5 IGBT-Chopper

Table 9 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		$T_{vj} = 25\text{ °C}$	1200	V
Continuous DC collector current	I_{CDC}	$T_{vj\ max} = 175\text{ °C}$	$T_H = 110\text{ °C}$	25	A
Repetitive peak collector current	I_{CRM}	$t_p = 1\text{ ms}$		50	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	$V_{CE\ sat}$	$I_C = 25\text{ A}$, $V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$		1.60	1.85	V
			$T_{vj} = 125\text{ °C}$		1.74		
			$T_{vj} = 175\text{ °C}$		1.82		
Gate threshold voltage	V_{GEth}	$I_C = 0.525\text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25\text{ °C}$		5.15	5.80	6.45	V
Gate charge	Q_G	$V_{GE} = \pm 15\text{ V}$, $V_{CE} = 600\text{ V}$			0.395		µC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\text{ °C}$			0		Ω
Input capacitance	C_{ies}	$f = 100\text{ kHz}$, $T_{vj} = 25\text{ °C}$, $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$			4.77		nF
Reverse transfer capacitance	C_{res}	$f = 100\text{ kHz}$, $T_{vj} = 25\text{ °C}$, $V_{CE} = 25\text{ V}$, $V_{GE} = 0\text{ V}$			0.017		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200\text{ V}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$			0.004	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}	$I_C = 25\text{ A}$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 9.1\text{ Ω}$	$T_{vj} = 25\text{ °C}$		0.041		µs
			$T_{vj} = 125\text{ °C}$		0.043		
			$T_{vj} = 175\text{ °C}$		0.044		

(table continues...)

Table 10 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rise time (inductive load)	t_r	$I_C = 25 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 9.1 \Omega$	$T_{vj} = 25 \text{ °C}$	0.025		μs
			$T_{vj} = 125 \text{ °C}$	0.028		
			$T_{vj} = 175 \text{ °C}$	0.030		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 25 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 9.1 \Omega$	$T_{vj} = 25 \text{ °C}$	0.230		μs
			$T_{vj} = 125 \text{ °C}$	0.320		
			$T_{vj} = 175 \text{ °C}$	0.350		
Fall time (inductive load)	t_f	$I_C = 25 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 9.1 \Omega$	$T_{vj} = 25 \text{ °C}$	0.140		μs
			$T_{vj} = 125 \text{ °C}$	0.220		
			$T_{vj} = 175 \text{ °C}$	0.280		
Turn-on energy loss per pulse	E_{on}	$I_C = 25 \text{ A}$, $V_{CE} = 600 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 9.1 \Omega$, $di/dt = 810 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	1.47		mJ
			$T_{vj} = 125 \text{ °C}$	2.05		
			$T_{vj} = 175 \text{ °C}$	2.39		
Turn-off energy loss per pulse	E_{off}	$I_C = 25 \text{ A}$, $V_{CE} = 600 \text{ V}$, $L_\sigma = 35 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 9.1 \Omega$, $dv/dt = 3120 \text{ V}/\mu\text{s}$ ($T_{vj} = 175 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	1.65		mJ
			$T_{vj} = 125 \text{ °C}$	2.58		
			$T_{vj} = 175 \text{ °C}$	3.13		
SC data	I_{SC}	$V_{GE} \leq 15 \text{ V}$, $V_{CC} = 800 \text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_p \leq 8 \mu\text{s}$, $T_{vj} = 150 \text{ °C}$	90		A
			$t_p \leq 7 \mu\text{s}$, $T_{vj} = 175 \text{ °C}$	85		
Thermal resistance, junction to heat sink	R_{thJH}	per IGBT, Valid with IFX pre-applied Thermal Interface Material			1.19	K/W
Temperature under switching conditions	$T_{vj op}$		-40		175	°C

Note: $T_{vj op} > 150 \text{ °C}$ is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

6 Diode, Chopper

Table 11 Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25 \text{ °C}$	1200	V
Continuous DC forward current	I_F		25	A

(table continues...)

Table 11 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Repetitive peak forward current	I_{FRM}	$t_P = 1 \text{ ms}$	50	A
I^2t - value	I^2t	$V_R = 0 \text{ V}$, $t_P = 10 \text{ ms}$	$T_{vj} = 125 \text{ °C}$	A^2s
			$T_{vj} = 175 \text{ °C}$	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 25 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.83	2.30	V
			$T_{vj} = 125 \text{ °C}$	1.70		
			$T_{vj} = 175 \text{ °C}$	1.63		
Peak reverse recovery current	I_{RM}	$I_F = 25 \text{ A}$, $V_R = 600 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 810 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	21.7		A
			$T_{vj} = 125 \text{ °C}$	26.7		
			$T_{vj} = 175 \text{ °C}$	29.8		
Recovered charge	Q_r	$I_F = 25 \text{ A}$, $V_R = 600 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 810 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	1.69		μC
			$T_{vj} = 125 \text{ °C}$	3.29		
			$T_{vj} = 175 \text{ °C}$	4.29		
Reverse recovery energy	E_{rec}	$I_F = 25 \text{ A}$, $V_R = 600 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 810 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.63		mJ
			$T_{vj} = 125 \text{ °C}$	1.28		
			$T_{vj} = 175 \text{ °C}$	1.69		
Thermal resistance, junction to heat sink	R_{thJH}	per diode, Valid with IFX pre-applied Thermal Interface Material			1.63	K/W
Temperature under switching conditions	$T_{vj op}$		-40		175	°C

Note: $T_{vj op} > 150 \text{ °C}$ is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.

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

(table continues...)

Table 13 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2 - 1/(298,15 \text{ K}))]$		3375		K
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

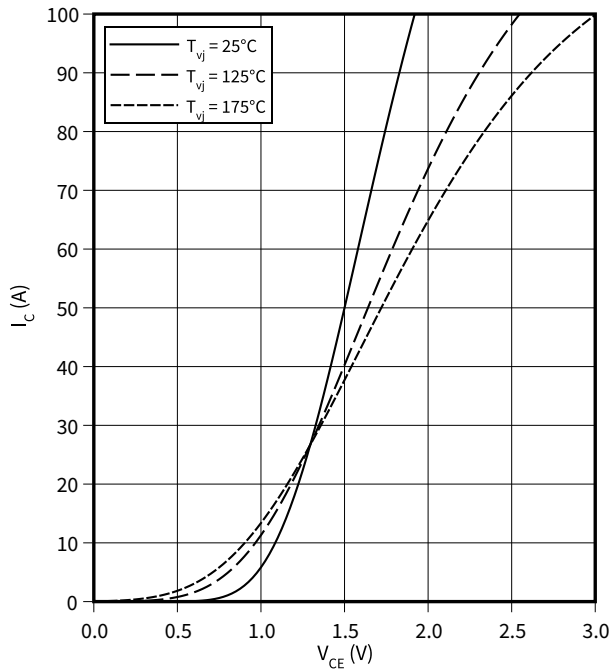
Note: Specification according to the valid application note.

8 Characteristics diagrams

Output characteristic (typical), IGBT, Inverter

$I_C = f(V_{CE})$

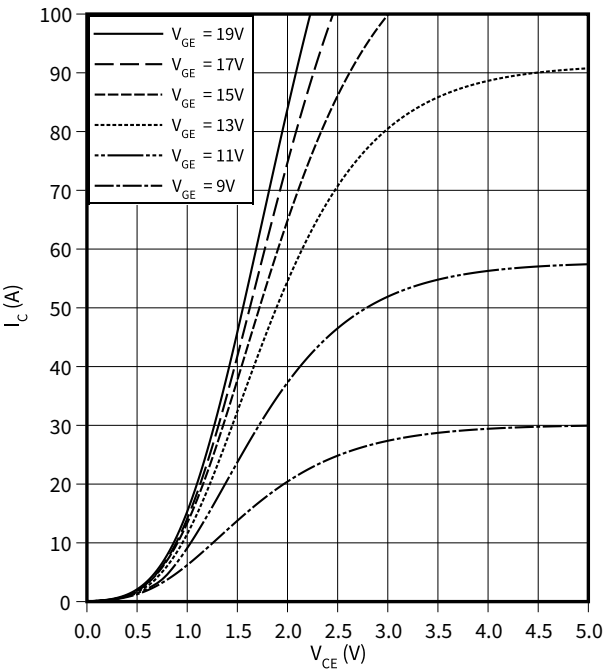
$V_{GE} = 15\text{ V}$



Output characteristic field (typical), IGBT, Inverter

$I_C = f(V_{CE})$

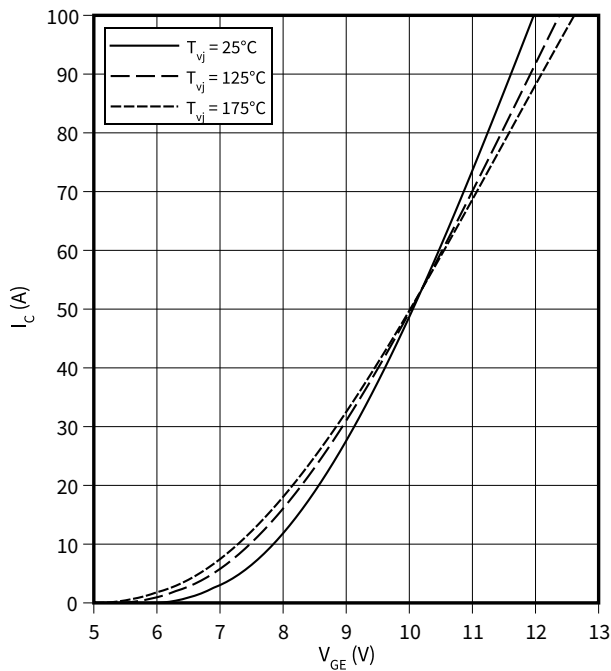
$T_{vj} = 175^\circ\text{C}$



Transfer characteristic (typical), IGBT, Inverter

$I_C = f(V_{GE})$

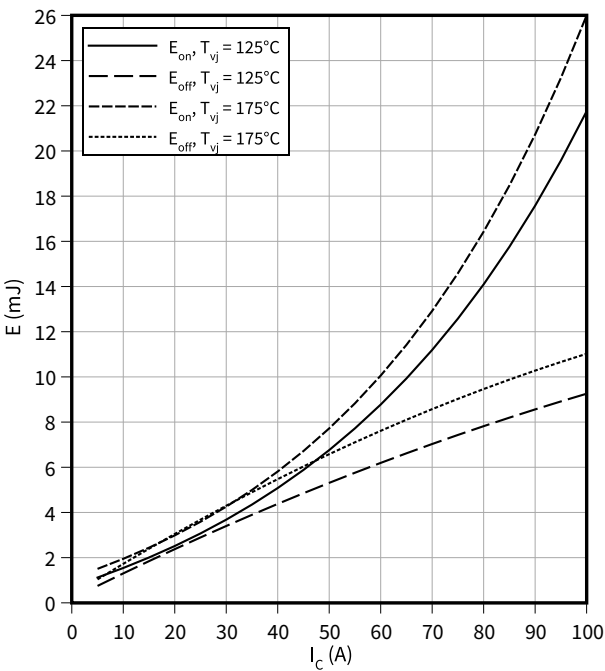
$V_{CE} = 20\text{ V}$



Switching losses (typical), IGBT, Inverter

$E = f(I_C)$

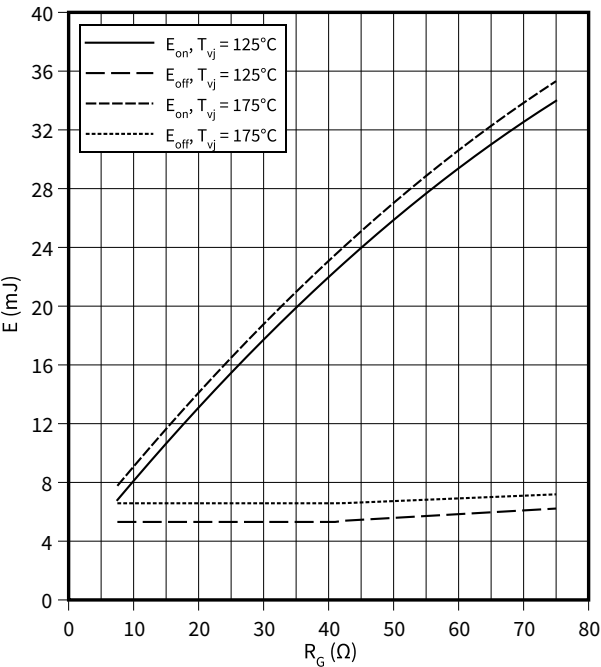
$R_{Goff} = 7.5\ \Omega$, $R_{Gon} = 7.5\ \Omega$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$



8 Characteristics diagrams

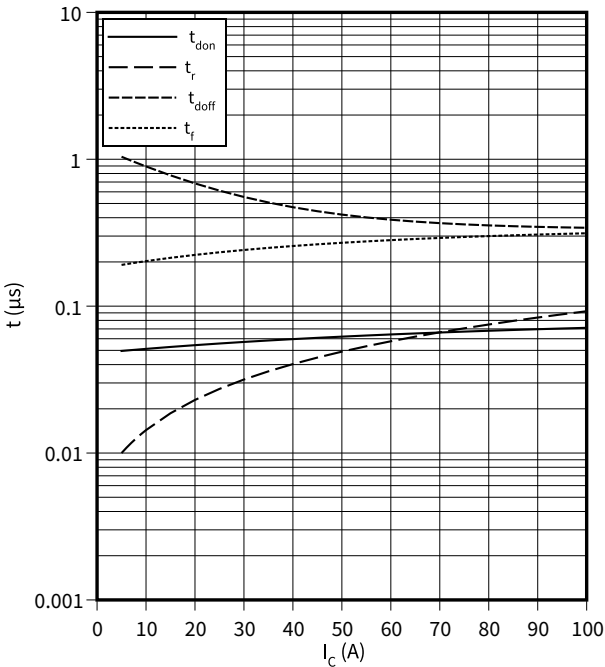
Switching losses (typical), IGBT, Inverter

$E = f(R_G)$
 $I_C = 50\text{ A}$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$



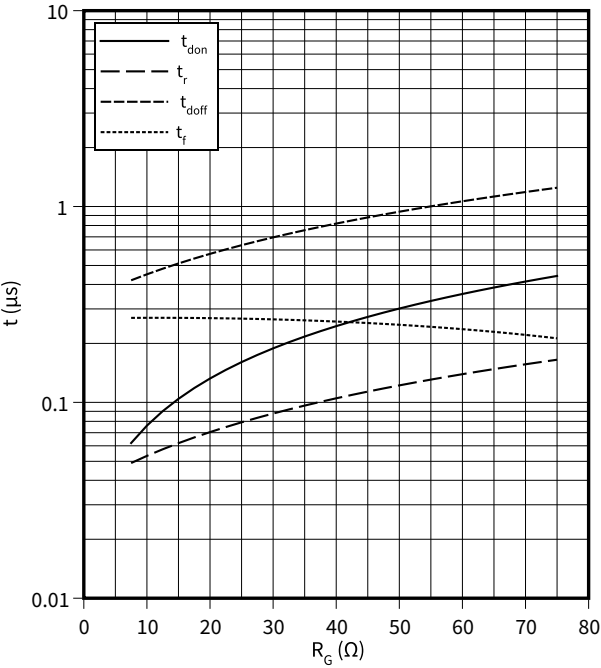
Switching times (typical), IGBT, Inverter

$t = f(I_C)$
 $R_{Goff} = 7.5\text{ }\Omega$, $R_{Gon} = 7.5\text{ }\Omega$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 175\text{ }^\circ\text{C}$



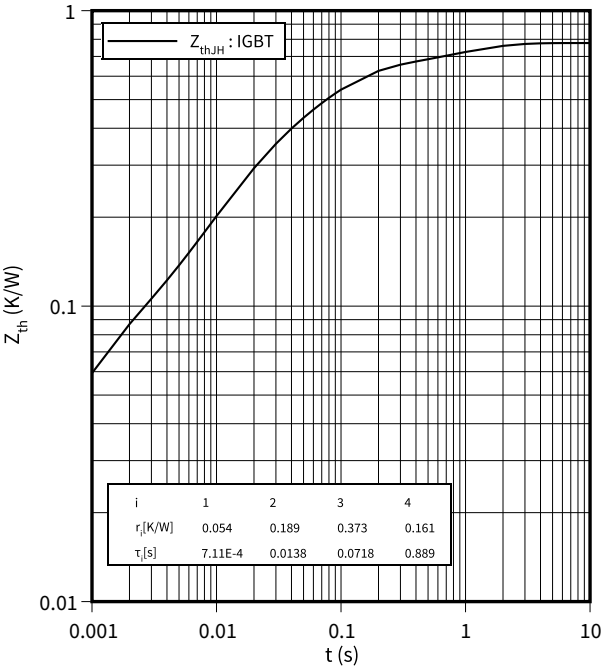
Switching times (typical), IGBT, Inverter

$t = f(R_G)$
 $I_C = 50\text{ A}$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 175\text{ }^\circ\text{C}$



Transient thermal impedance , IGBT, Inverter

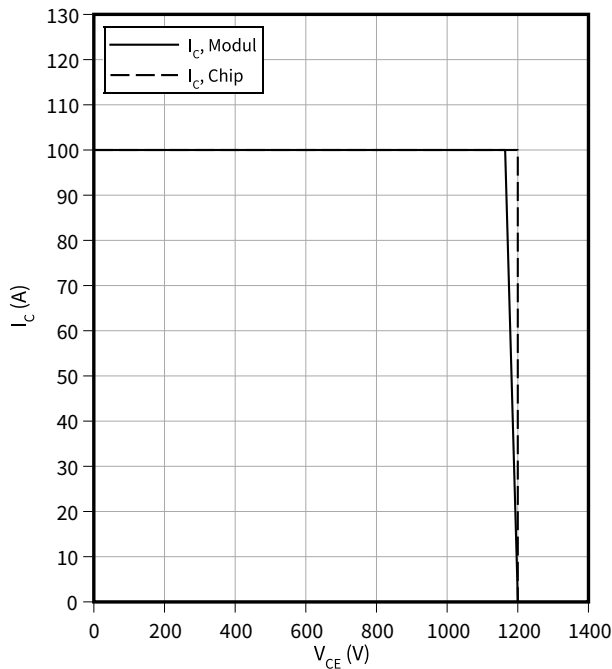
$Z_{th} = f(t)$



8 Characteristics diagrams

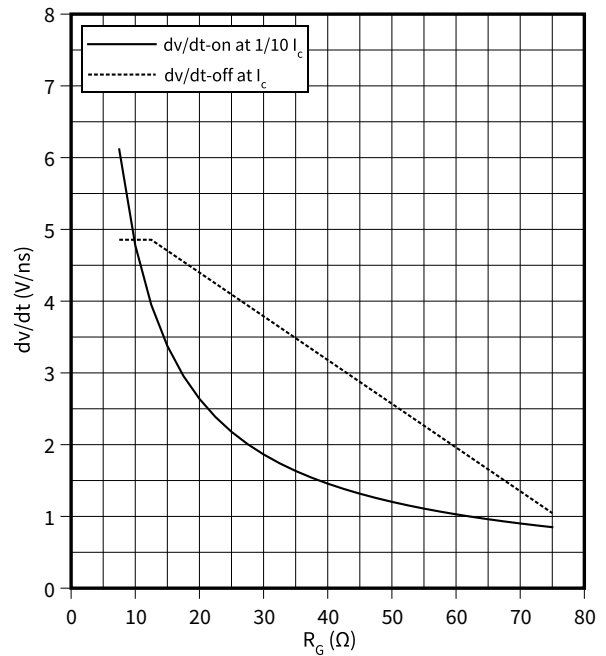
Reverse bias safe operating area (RBSOA), IGBT, Inverter

$I_C = f(V_{CE})$
 $R_{Goff} = 7.5 \Omega$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 175 \text{ }^\circ\text{C}$



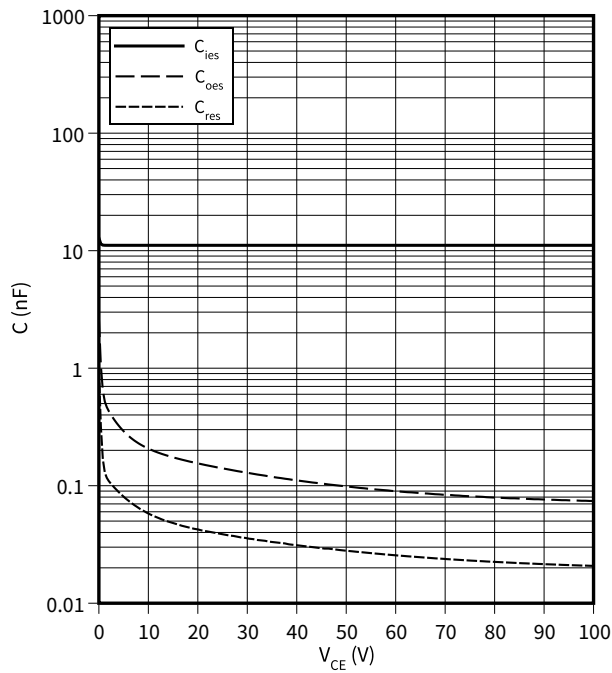
Voltage slope (typical), IGBT, Inverter

$dv/dt = f(R_G)$
 $I_C = 50 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $T_{vj} = 25 \text{ }^\circ\text{C}$



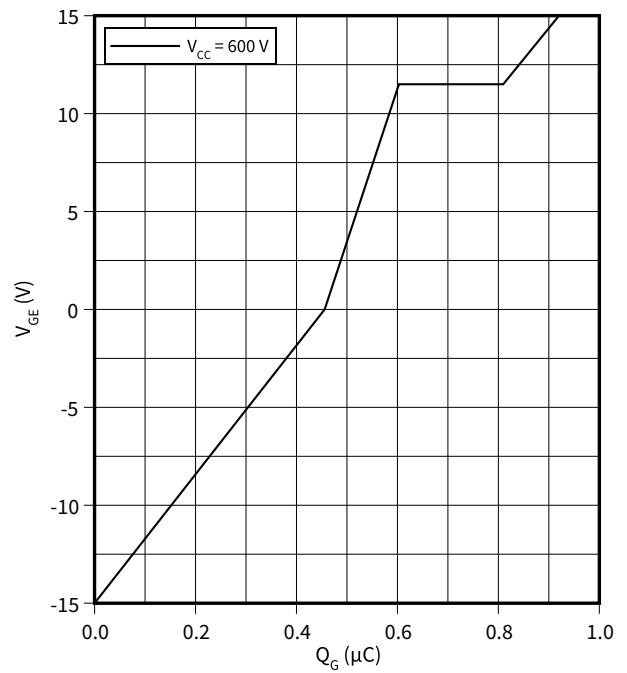
Capacity characteristic (typical), IGBT, Inverter

$C = f(V_{CE})$
 $f = 100 \text{ kHz}$, $V_{GE} = 0 \text{ V}$, $T_{vj} = 25 \text{ }^\circ\text{C}$



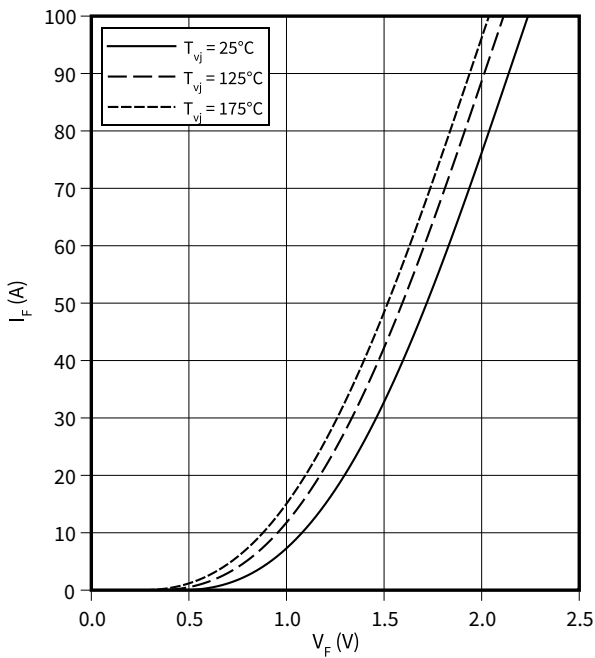
Gate charge characteristic (typical), IGBT, Inverter

$V_{GE} = f(Q_G)$
 $I_C = 50 \text{ A}$, $T_{vj} = 25 \text{ }^\circ\text{C}$



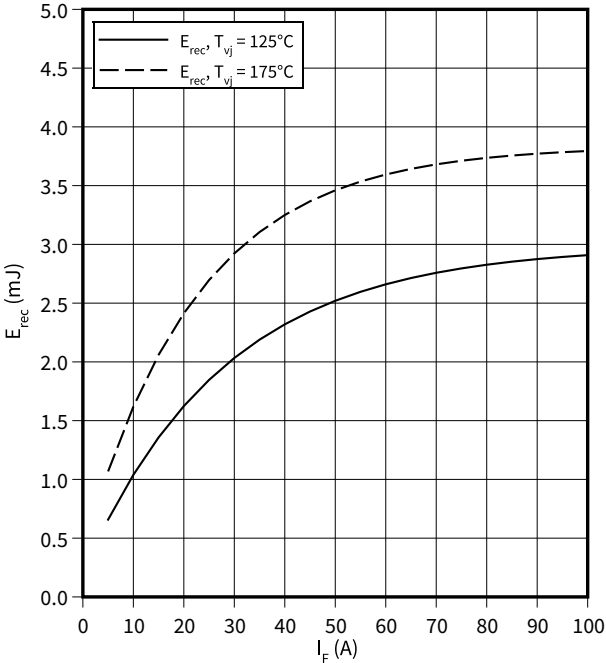
Forward characteristic (typical), Diode, Inverter

$I_F = f(V_F)$



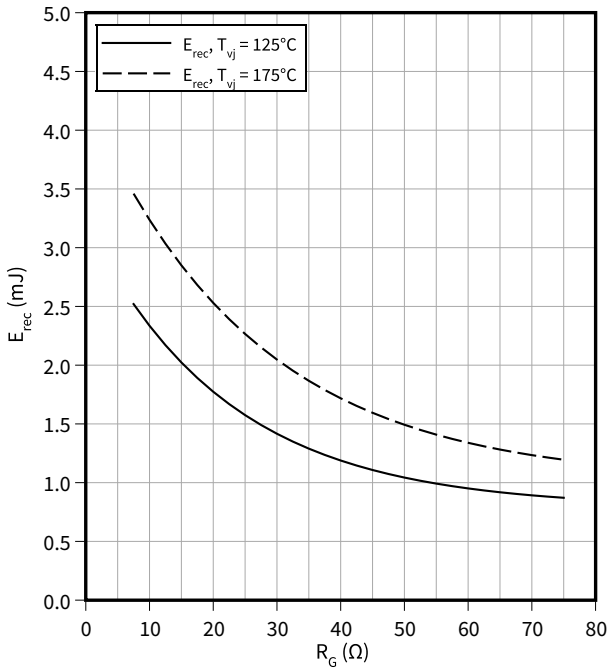
Switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$
 $V_{CE} = 600\text{ V}, R_{Gon} = 7.5\ \Omega$



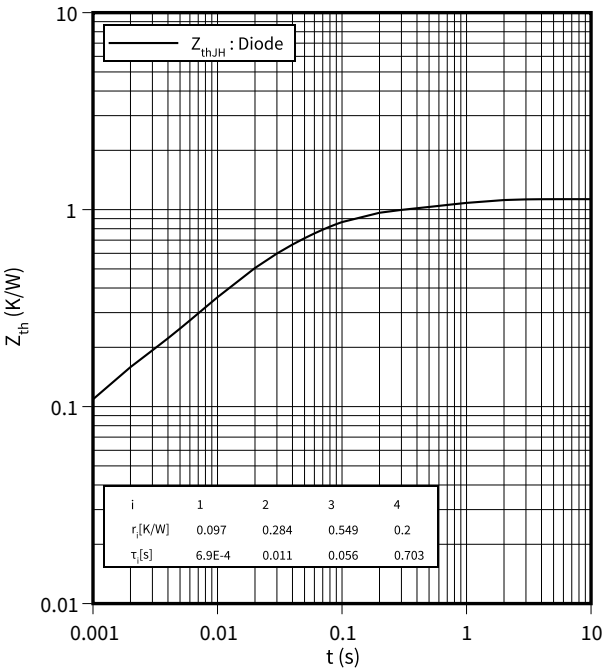
Switching losses (typical), Diode, Inverter

$E_{rec} = f(R_G)$
 $V_{CE} = 600\text{ V}, I_F = 50\text{ A}$



Transient thermal impedance, Diode, Inverter

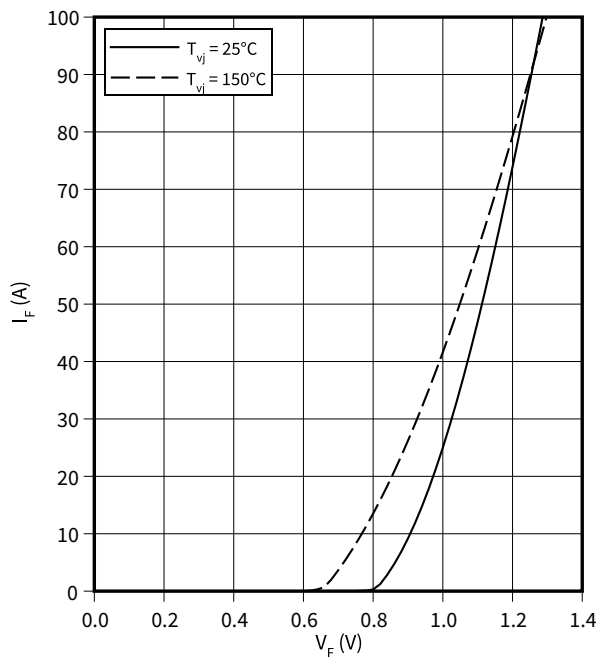
$Z_{th} = f(t)$



8 Characteristics diagrams

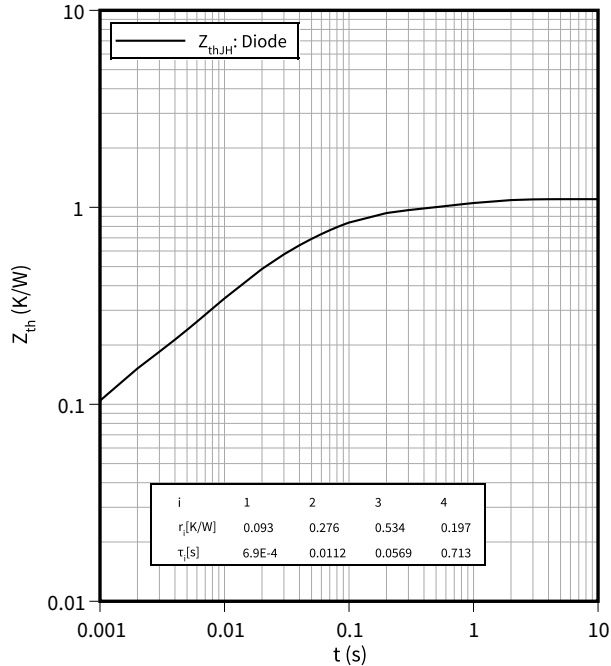
Forward characteristic (typical), Diode, Rectifier

$I_F = f(V_F)$



Transient thermal impedance, Diode, Rectifier

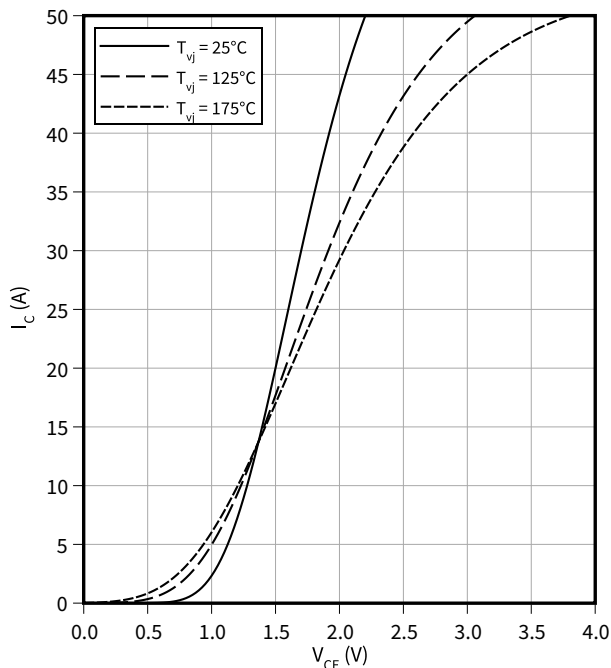
$Z_{th} = f(t)$



Output characteristic (typical), IGBT-Chopper

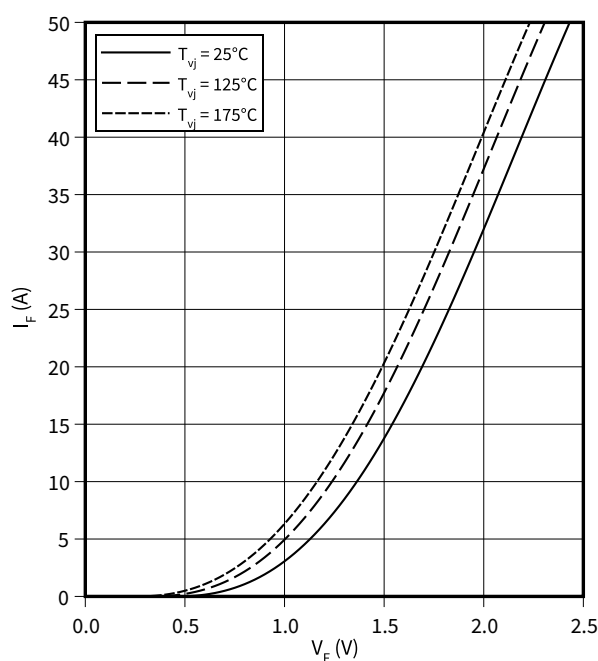
$I_C = f(V_{CE})$

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



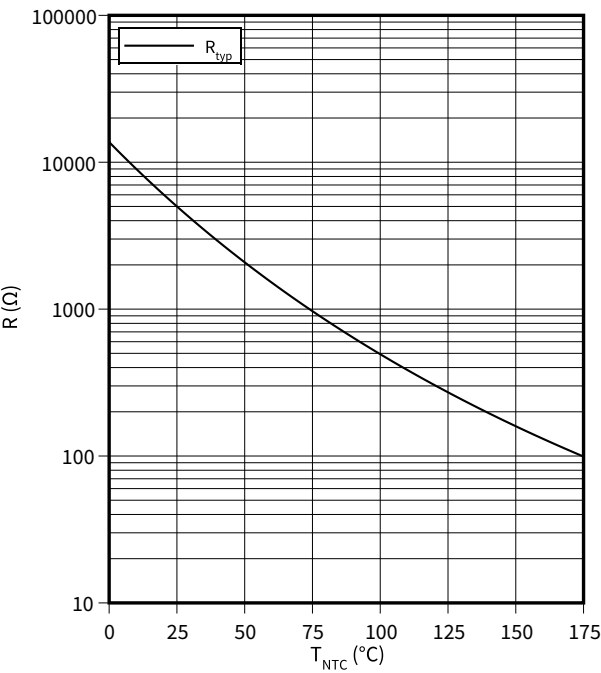
Forward characteristic (typical), Diode, Chopper

$I_F = f(V_F)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

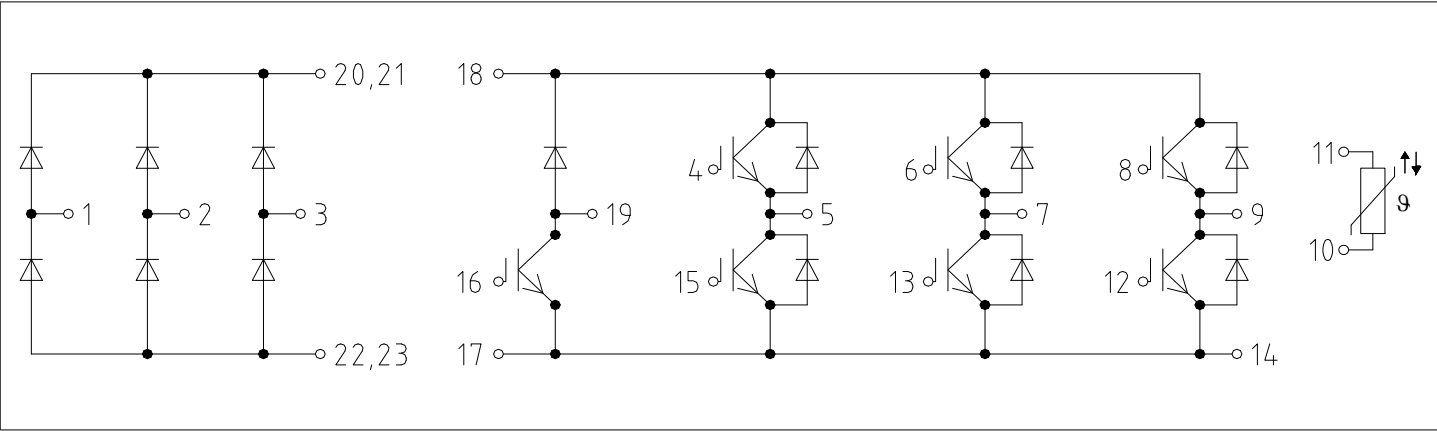


Figure 1

10 Package outlines

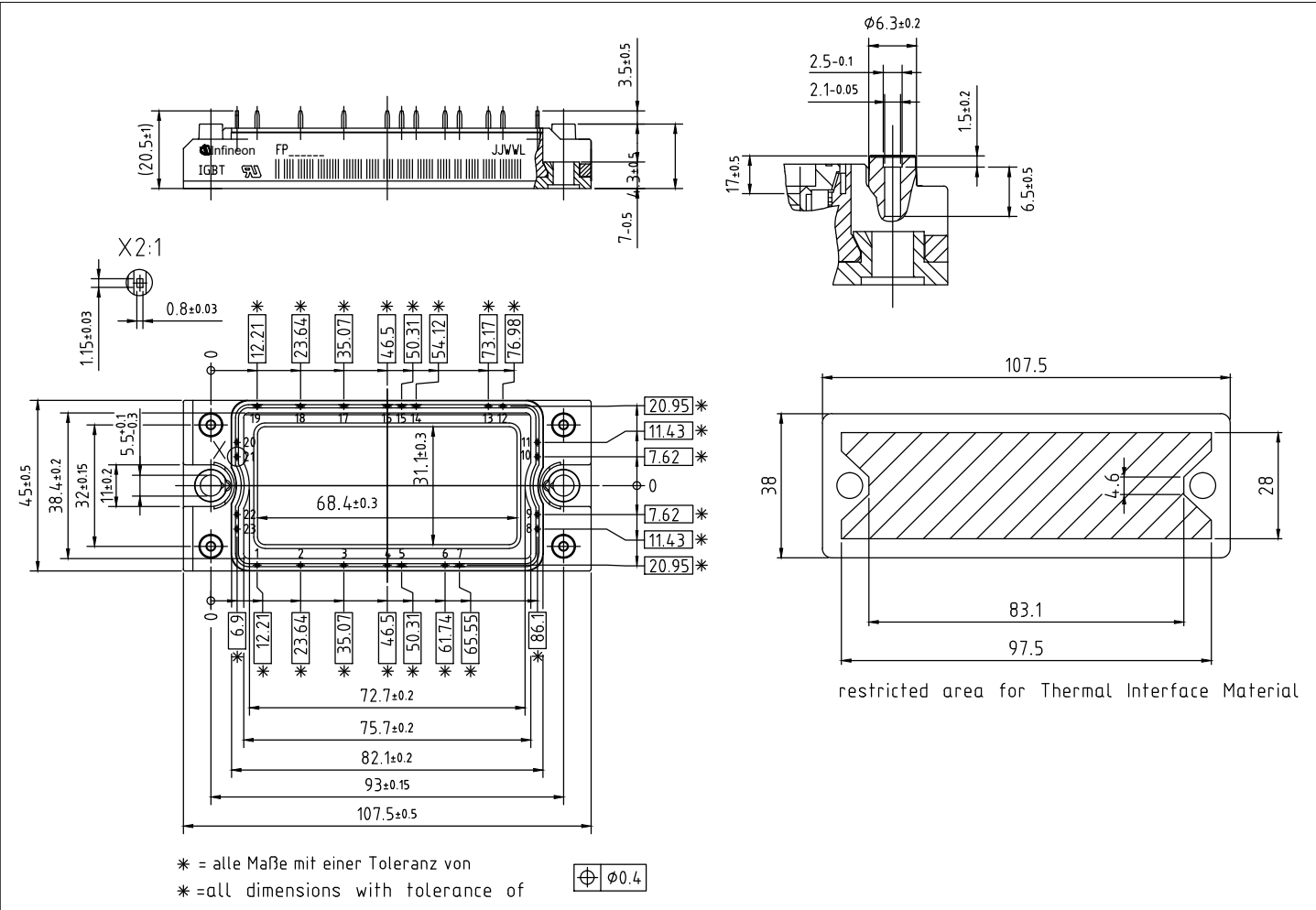


Figure 2

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	<i>Content</i>	<i>Digit</i>	<i>Example</i>
	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

Document revision	Date of release	Description of changes
1.00	2022-02-01	Initial version

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