

## EasyPIM™ module with TRENCHSTOP™ IGBT7 and emitter controlled 7 diode and PressFIT / NTC

### Features

- Electrical features
  - $V_{CES} = 1200\text{ V}$
  - $I_{C\text{nom}} = 50\text{ A} / I_{CRM} = 100\text{ A}$
  - TRENCHSTOP™ IGBT7
  - Overload operation up to  $175^\circ\text{C}$
  - Low  $V_{CE,\text{sat}}$
- Mechanical features
  - PressFIT contact technology
  - High power density
  - Package with CTI > 400
  - Compact design
  - $\text{Al}_2\text{O}_3$  substrate with low thermal resistance
  - 2.5 kV AC 1 minute insulation



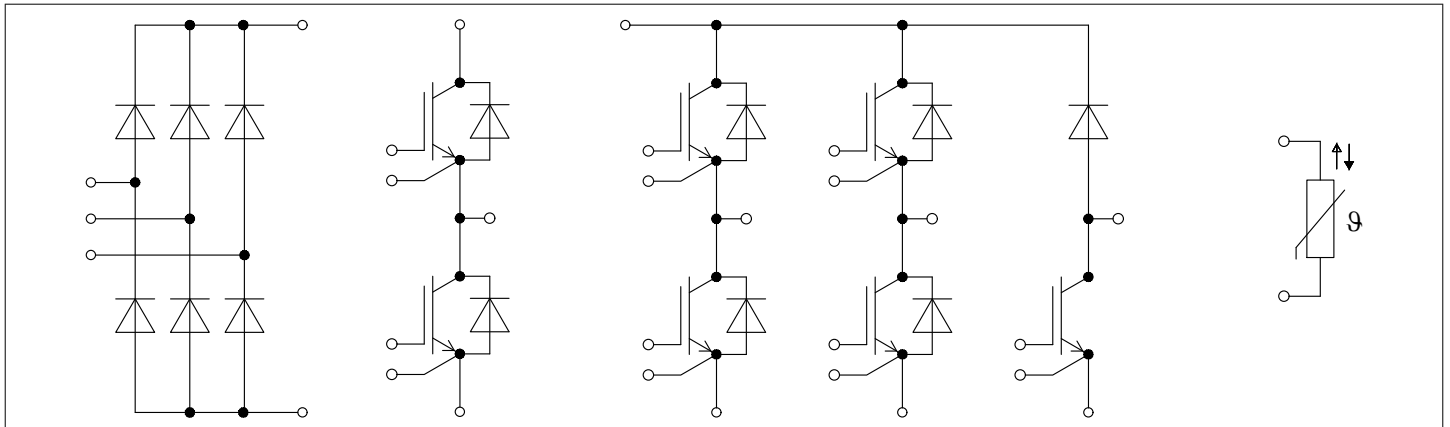
### Potential applications

- Motor drives
- Air conditioning
- Auxiliary inverters

### 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
Internal isolation		basic insulation (class 1, IEC 61140)	$Al_2O_3$	
Creepage distance	$d_{Creep}$	terminal to heatsink	11.2	mm
Creepage distance	$d_{Creep}$	terminal to terminal	6.8	mm
Clearance	$d_{Clear}$	terminal to heatsink	9.4	mm
Clearance	$d_{Clear}$	terminal to terminal	5.5	mm
Comparative tracking index	$CTI$		> 400	
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	$R_{AA'+CC'}$	$T_H = 25 \text{ °C}$ , per switch		2.8		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25 \text{ °C}$ , per switch		2.2		mΩ
Storage temperature	$T_{stg}$		-40		125	°C
Mounting torque for module mounting	$M$	- Mounting according to valid application note	M5, Screw	1.3	1.5	Nm
Weight	$G$			78		g

Note: The current under continuous operation is limited to 25 A rms per connector pin.

## 2 IGBT, Inverter

**Table 3 Maximum rated values**

Parameter	Symbol	Note or test condition	Values	Unit
Collector-emitter voltage	$V_{CES}$	$T_{vj} = 25 \text{ °C}$	1200	V
Continuous DC collector current	$I_{CDC}$	$T_{vj \text{ max}} = 175 \text{ °C}$ $T_H = 100 \text{ °C}$	50	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{vj \text{ op}}$	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	$V_{CE\ sat}$	$I_C = 50\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$		1.50	1.80	V
			$T_{vj} = 125\ ^\circ C$		1.64		
			$T_{vj} = 175\ ^\circ C$		1.72		
Gate threshold voltage	$V_{GETh}$	$I_C = 1.28\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$		5.15	5.80	6.45	V
Gate charge	$Q_G$	$V_{GE} = \pm 15\ V, V_{CC} = 600\ V$			0.92		$\mu C$
Internal gate resistor	$R_{Gint}$	$T_{vj} = 25\ ^\circ C$			0		$\Omega$
Input capacitance	$C_{ies}$	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			11.1		nF
Reverse transfer capacitance	$C_{res}$	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$			0.039		nF
Collector-emitter cut-off current	$I_{CES}$	$V_{CE} = 1200\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$			0.013	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)	$t_{don}$	$I_C = 50\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 5.1\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.044		$\mu s$
			$T_{vj} = 125\ ^\circ C$		0.046		
			$T_{vj} = 175\ ^\circ C$		0.047		
Rise time (inductive load)	$t_r$	$I_C = 50\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 5.1\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.031		$\mu s$
			$T_{vj} = 125\ ^\circ C$		0.036		
			$T_{vj} = 175\ ^\circ C$		0.037		
Turn-off delay time (inductive load)	$t_{doff}$	$I_C = 50\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 5.1\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.237		$\mu s$
			$T_{vj} = 125\ ^\circ C$		0.321		
			$T_{vj} = 175\ ^\circ C$		0.354		
Fall time (inductive load)	$t_f$	$I_C = 50\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 5.1\ \Omega$	$T_{vj} = 25\ ^\circ C$		0.122		$\mu s$
			$T_{vj} = 125\ ^\circ C$		0.191		
			$T_{vj} = 175\ ^\circ C$		0.256		
Turn-on energy loss per pulse	$E_{on}$	$I_C = 50\ A, V_{CC} = 600\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 5.1\ \Omega, di/dt = 1180\ A/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		4.18		mJ
			$T_{vj} = 125\ ^\circ C$		5.62		
			$T_{vj} = 175\ ^\circ C$		6.55		
Turn-off energy loss per pulse	$E_{off}$	$I_C = 50\ A, V_{CC} = 600\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 5.1\ \Omega, dv/dt = 2900\ V/\mu s (T_{vj} = 175\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$		3.1		mJ
			$T_{vj} = 125\ ^\circ C$		5.08		
			$T_{vj} = 175\ ^\circ C$		6.22		

(table continues...)

**Table 4 (continued) Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
SC data	$I_{SC}$	$V_{GE} \leq 15 \text{ V}, V_{CC} = 800 \text{ V}, V_{CEmax} = V_{CES} - L_{SCE} \cdot di/dt$	$t_p \leq 8 \mu\text{s}, T_{vj} = 150 \text{ }^\circ\text{C}$		185	A
			$t_p \leq 7 \mu\text{s}, T_{vj} = 175 \text{ }^\circ\text{C}$		175	
Thermal resistance, junction to heat sink	$R_{thJH}$	per IGBT, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$		0.708		K/W
Temperature under switching conditions	$T_{vj op}$		-40		175	$^\circ\text{C}$

Note:  $T_{vj op} > 150^\circ\text{C}$  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	$V_{RRM}$	$T_{vj} = 25 \text{ }^\circ\text{C}$	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	$I^2t$	$t_p = 10 \text{ ms}, V_R = 0 \text{ V}$	$T_{vj} = 125 \text{ }^\circ\text{C}$	300	$\text{A}^2\text{s}$
			$T_{vj} = 175 \text{ }^\circ\text{C}$	250	

**Table 6 Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Forward voltage	$V_F$	$I_F = 50 \text{ A}, V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ }^\circ\text{C}$		1.72	2.10	V
			$T_{vj} = 125 \text{ }^\circ\text{C}$		1.59		
			$T_{vj} = 175 \text{ }^\circ\text{C}$		1.52		
Peak reverse recovery current	$I_{RM}$	$V_{CC} = 600 \text{ V}, I_F = 50 \text{ A}, V_{GE} = -15 \text{ V}, -di_F/dt = 1180 \text{ A}/\mu\text{s} (T_{vj} = 175 \text{ }^\circ\text{C})$	$T_{vj} = 25 \text{ }^\circ\text{C}$		49.7	A	
			$T_{vj} = 125 \text{ }^\circ\text{C}$		64.5		
			$T_{vj} = 175 \text{ }^\circ\text{C}$		74.9		

(table continues...)

**Table 6 (continued) Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Recovered charge	$Q_r$	$V_{CC} = 600\text{ V}, I_F = 50\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 1180\text{ A}/\mu\text{s} (T_{vj} = 175\text{ }^\circ\text{C})$	$T_{vj} = 25\text{ }^\circ\text{C}$	4.49		$\mu\text{C}$
			$T_{vj} = 125\text{ }^\circ\text{C}$	7.76		
			$T_{vj} = 175\text{ }^\circ\text{C}$	10.2		
Reverse recovery energy	$E_{rec}$	$V_{CC} = 600\text{ V}, I_F = 50\text{ A}, V_{GE} = -15\text{ V}, -di_F/dt = 1180\text{ A}/\mu\text{s} (T_{vj} = 175\text{ }^\circ\text{C})$	$T_{vj} = 25\text{ }^\circ\text{C}$	1.75		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	3.08		
			$T_{vj} = 175\text{ }^\circ\text{C}$	4.01		
Thermal resistance, junction to heat sink	$R_{thJH}$	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}\cdot\text{K})$		0.963		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		175	$^\circ\text{C}$

Note:  $T_{vj\text{ op}} > 150\text{ }^\circ\text{C}$  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	$V_{RRM}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1600	V	
Maximum RMS forward current per chip	$I_{FRMSM}$	$T_H = 80\text{ }^\circ\text{C}$	60	A	
Maximum RMS current at rectifier output	$I_{RMSM}$	$T_H = 80\text{ }^\circ\text{C}$	100	A	
Surge forward current	$I_{FSM}$	$t_p = 10\text{ ms}$	$T_{vj} = 25\text{ }^\circ\text{C}$	450	A
			$T_{vj} = 150\text{ }^\circ\text{C}$	370	
$I^2t$ - value	$I^2t$	$t_p = 10\text{ ms}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1010	$\text{A}^2\text{s}$
			$T_{vj} = 150\text{ }^\circ\text{C}$	685	

**Table 8 Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	$V_F$	$I_F = 35\text{ A}, T_{vj} = 150\text{ }^\circ\text{C}$		1.04		V
Reverse current	$I_r$	$T_{vj} = 150\text{ }^\circ\text{C}, V_R = 1600\text{ V}$		1		mA
Thermal resistance, junction to heat sink	$R_{thJH}$	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}\cdot\text{K})$		1.06		K/W

(table continues...)

**Table 8 (continued) Characteristic values**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
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	$V_{CES}$	$T_{vj} = 25\text{ °C}$	1200	V
Continuous DC collector current	$I_{CDC}$	$T_{vj,max} = 175\text{ °C}$ $T_H = 100\text{ °C}$	35	A
Repetitive peak collector current	$I_{CRM}$	$t_p$ limited by $T_{vj,op}$	70	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	$V_{CE,sat}$	$I_C = 35\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$	1.60	1.85	V
			$T_{vj} = 125\text{ °C}$	1.74		
			$T_{vj} = 175\text{ °C}$	1.82		
Gate threshold voltage	$V_{GETh}$	$I_C = 0.75\text{ mA}, V_{CE} = V_{GE}, T_{vj} = 25\text{ °C}$	5.15	5.80	6.45	V
Gate charge	$Q_G$	$V_{GE} = \pm 15\text{ V}, V_{CC} = 600\text{ V}$		0.548		μC
Internal gate resistor	$R_{Gint}$	$T_{vj} = 25\text{ °C}$		0		Ω
Input capacitance	$C_{ies}$	$f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		6.62		nF
Reverse transfer capacitance	$C_{res}$	$f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$		0.023		nF
Collector-emitter cut-off current	$I_{CES}$	$V_{CE} = 1200\text{ V}, V_{GE} = 0\text{ V}$ $T_{vj} = 25\text{ °C}$			0.0091	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)	$t_{don}$	$I_C = 35\text{ A}, V_{CC} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 5.1\text{ Ω}$	$T_{vj} = 25\text{ °C}$	0.041		μs
			$T_{vj} = 125\text{ °C}$	0.043		
			$T_{vj} = 175\text{ °C}$	0.044		
Rise time (inductive load)	$t_r$	$I_C = 35\text{ A}, V_{CC} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 5.1\text{ Ω}$	$T_{vj} = 25\text{ °C}$	0.038		μs
			$T_{vj} = 125\text{ °C}$	0.040		
			$T_{vj} = 175\text{ °C}$	0.041		

(table continues...)

**Table 10** (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-off delay time (inductive load)	$t_{doff}$	$I_C = 35\text{ A}, V_{CC} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 5.1\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$	0.219		$\mu\text{s}$
			$T_{vj} = 125\text{ }^\circ\text{C}$	0.274		
			$T_{vj} = 175\text{ }^\circ\text{C}$	0.321		
Fall time (inductive load)	$t_f$	$I_C = 35\text{ A}, V_{CC} = 600\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 5.1\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$	0.077		$\mu\text{s}$
			$T_{vj} = 125\text{ }^\circ\text{C}$	0.132		
			$T_{vj} = 175\text{ }^\circ\text{C}$	0.181		
Turn-on energy loss per pulse	$E_{on}$	$I_C = 35\text{ A}, V_{CC} = 600\text{ V}, L_\sigma = 35\text{ nH}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 5.1\ \Omega, di/dt = 790\text{ A}/\mu\text{s} (T_{vj} = 175\text{ }^\circ\text{C})$	$T_{vj} = 25\text{ }^\circ\text{C}$	1.92		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	2.85		
			$T_{vj} = 175\text{ }^\circ\text{C}$	3.43		
Turn-off energy loss per pulse	$E_{off}$	$I_C = 35\text{ A}, V_{CC} = 600\text{ V}, L_\sigma = 35\text{ nH}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 5.1\ \Omega, dv/dt = 2500\text{ V}/\mu\text{s} (T_{vj} = 175\text{ }^\circ\text{C})$	$T_{vj} = 25\text{ }^\circ\text{C}$	2.28		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	3.29		
			$T_{vj} = 175\text{ }^\circ\text{C}$	4.25		
SC data	$I_{SC}$	$V_{GE} \leq 15\text{ V}, V_{CC} = 800\text{ V}, V_{CEmax} = V_{CES} - L_{SCE} * di/dt$	$t_p \leq 8\ \mu\text{s}, T_{vj} = 150\text{ }^\circ\text{C}$	110		A
			$t_p \leq 7\ \mu\text{s}, T_{vj} = 175\text{ }^\circ\text{C}$	100		
Thermal resistance, junction to heat sink	$R_{thJH}$	per IGBT, $\lambda_{grease} = 3.3\text{ W}/(\text{m}\cdot\text{K})$		0.995		K/W
Temperature under switching conditions	$T_{vj\ op}$		-40		175	$^\circ\text{C}$

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

## 6 Diode, Brake-Chopper

**Table 11** Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1200	V	
Continuous DC forward current	$I_F$		25	A	
Repetitive peak forward current	$I_{FRM}$	$t_p = 1\text{ ms}$	50	A	
$I^2t$ - value	$I^2t$	$t_p = 10\text{ ms}, V_R = 0\text{ V}$	$T_{vj} = 125\text{ }^\circ\text{C}$	72.5	$\text{A}^2\text{s}$
			$T_{vj} = 175\text{ }^\circ\text{C}$	63	

**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	$I_{RM}$	$V_{CC} = 600 \text{ V}$ , $I_F = 25 \text{ A}$ , $-di_F/dt = 580 \text{ A}/\mu\text{s}$ ( $T_{vj} = 175 \text{ °C}$ )	$T_{vj} = 25 \text{ °C}$		36.1		A
			$T_{vj} = 125 \text{ °C}$		49		
			$T_{vj} = 175 \text{ °C}$		55.5		
Recovered charge	$Q_r$	$V_{CC} = 600 \text{ V}$ , $I_F = 25 \text{ A}$ , $-di_F/dt = 580 \text{ A}/\mu\text{s}$ ( $T_{vj} = 175 \text{ °C}$ )	$T_{vj} = 25 \text{ °C}$		2.93		$\mu\text{C}$
			$T_{vj} = 125 \text{ °C}$		4.44		
			$T_{vj} = 175 \text{ °C}$		6.5		
Reverse recovery energy	$E_{rec}$	$V_{CC} = 600 \text{ V}$ , $I_F = 25 \text{ A}$ , $-di_F/dt = 580 \text{ A}/\mu\text{s}$ ( $T_{vj} = 175 \text{ °C}$ )	$T_{vj} = 25 \text{ °C}$		0.69		mJ
			$T_{vj} = 125 \text{ °C}$		1.76		
			$T_{vj} = 175 \text{ °C}$		2.84		
Thermal resistance, junction to heat sink	$R_{thJH}$	per diode, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}\cdot\text{K})$			1.86		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40			175	$^{\circ}\text{C}$

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

## 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		k $\Omega$
Deviation of $R_{100}$	$\Delta R/R$	$T_{NTC} = 100 \text{ °C}$ , $R_{100} = 493 \text{ }\Omega$	-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
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

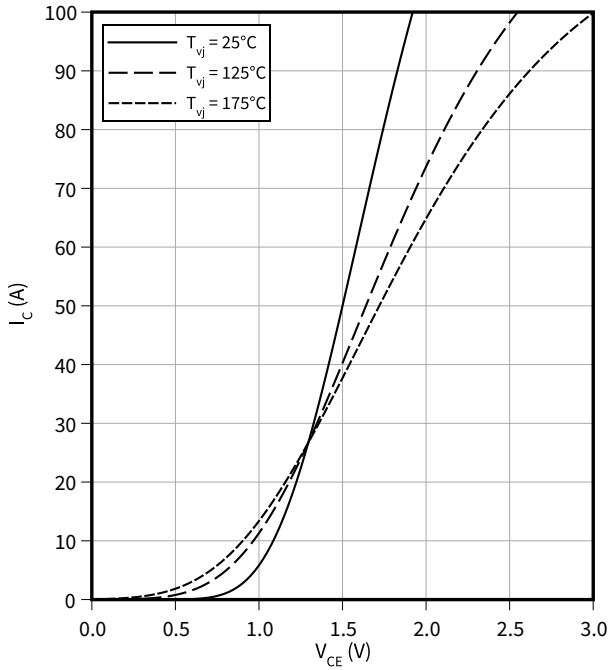
Note: Specification according to the valid application note.

## 8 Characteristics diagrams

### Output characteristic (typical), IGBT, Inverter

$$I_C = f(V_{CE})$$

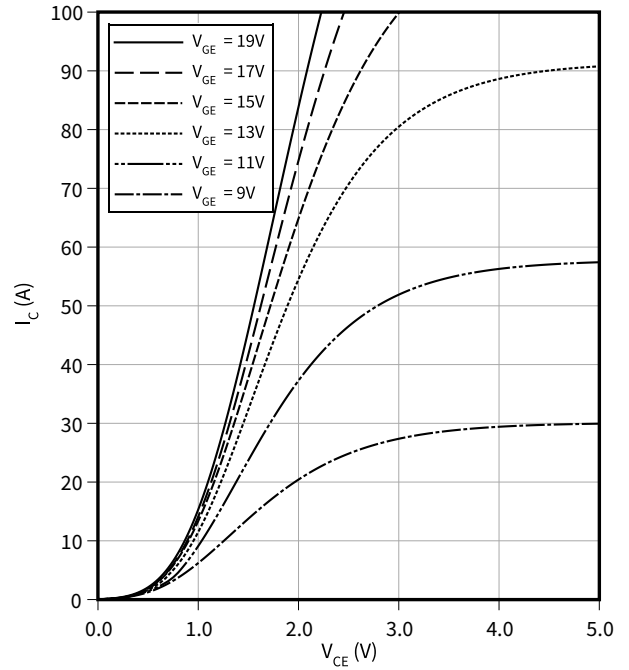
$$V_{GE} = 15 \text{ V}$$



### Output characteristic field (typical), IGBT, Inverter

$$I_C = f(V_{CE})$$

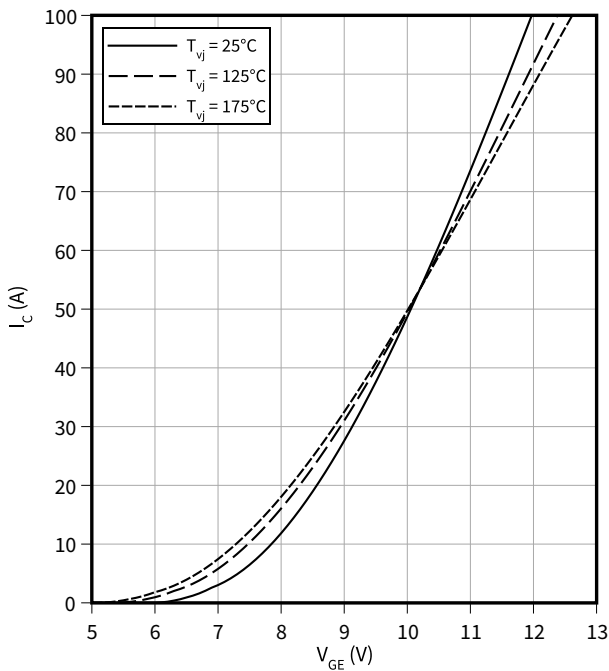
$$T_{vj} = 175 \text{ °C}$$



### Transfer characteristic (typical), IGBT, Inverter

$$I_C = f(V_{GE})$$

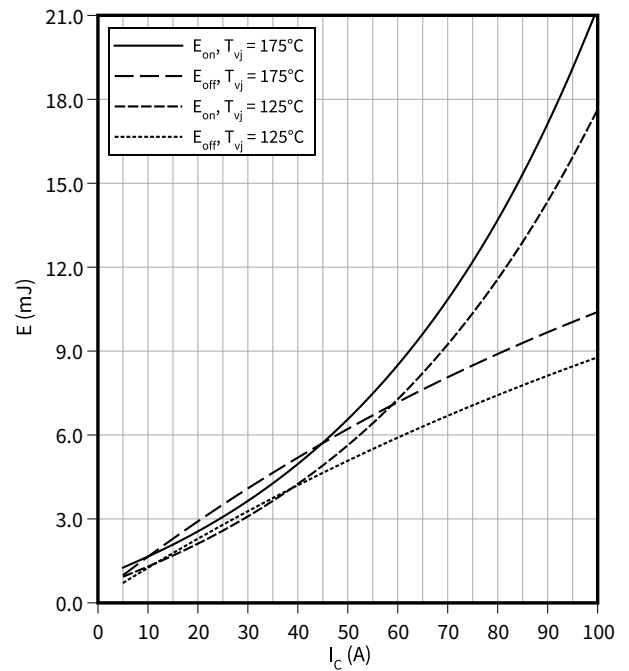
$$V_{CE} = 20 \text{ V}$$



### Switching losses (typical), IGBT, Inverter

$$E = f(I_C)$$

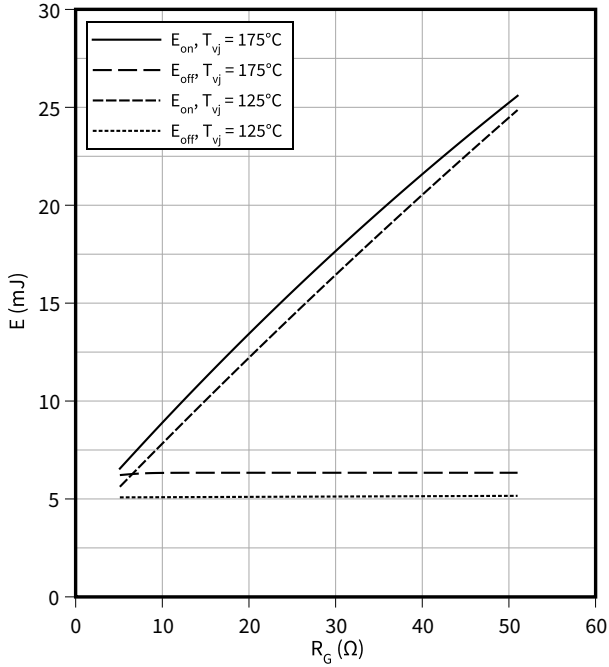
$$R_{Goff} = 5.1 \text{ } \Omega, R_{Gon} = 5.1 \text{ } \Omega, V_{GE} = \pm 15 \text{ V}, V_{CC} = 600 \text{ V}$$



**Switching losses (typical), IGBT, Inverter**

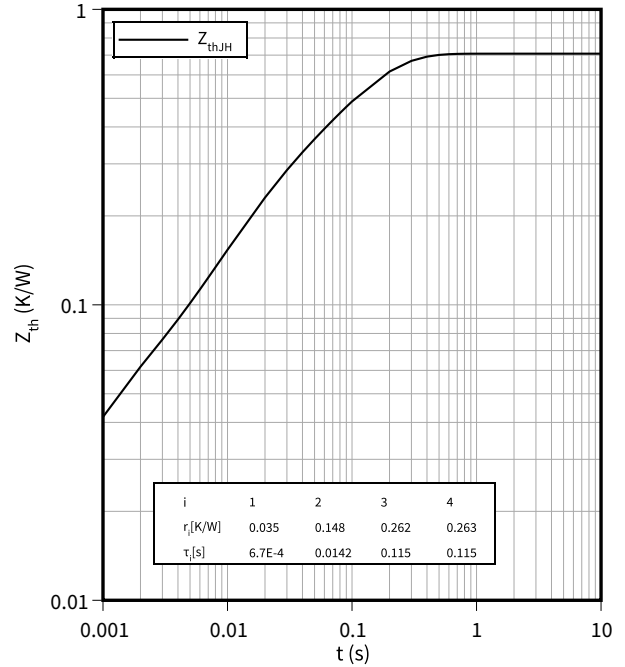
$E = f(R_G)$

$V_{GE} = \pm 15 \text{ V}, I_C = 50 \text{ A}, V_{CC} = 600 \text{ V}$



**Transient thermal impedance , IGBT, Inverter**

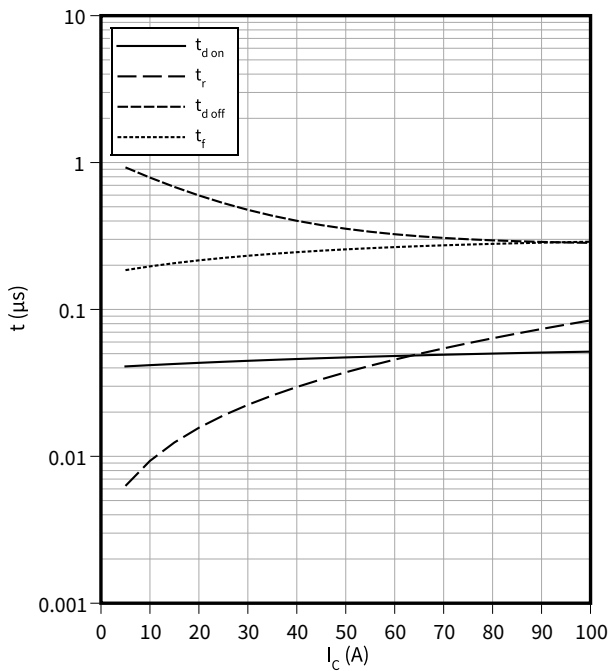
$Z_{th} = f(t)$



**Switching times (typical), IGBT, Inverter**

$t = f(I_C)$

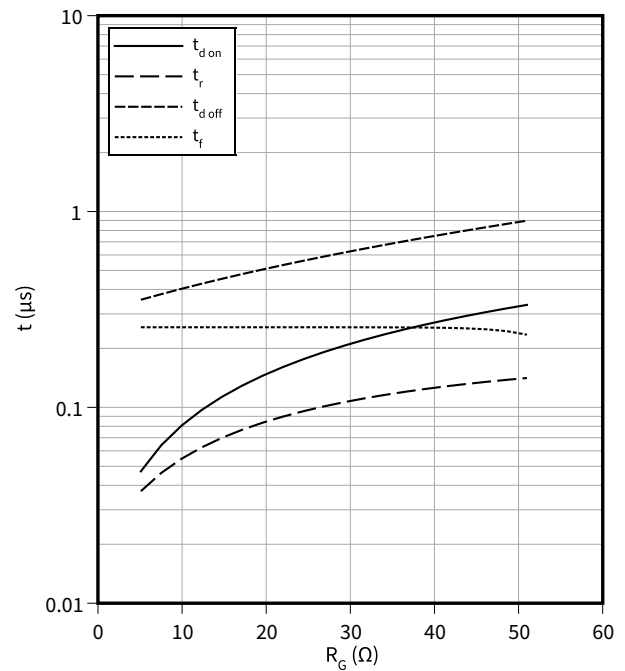
$R_{Goff} = 5.1 \Omega, R_{Gon} = 5.1 \Omega, V_{GE} = \pm 15 \text{ V}, V_{CC} = 600 \text{ V}, T_{vj} = 175 \text{ °C}$



**Switching times (typical), IGBT, Inverter**

$t = f(R_G)$

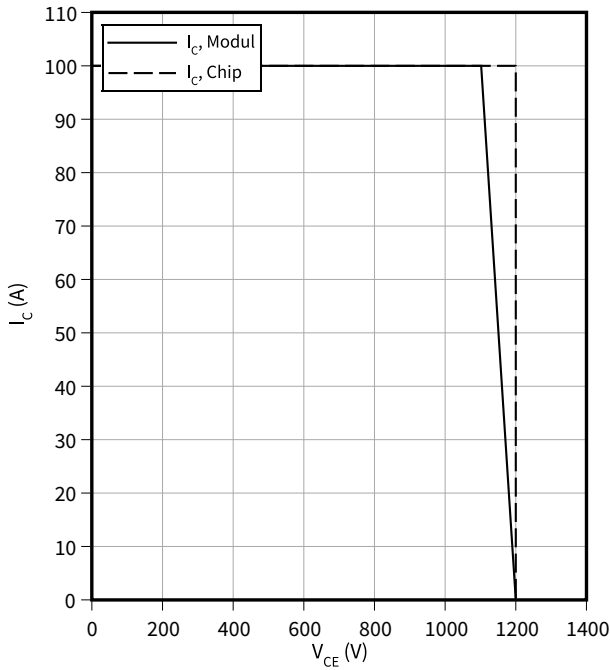
$V_{GE} = \pm 15 \text{ V}, I_C = 50 \text{ A}, V_{CC} = 600 \text{ V}, T_{vj} = 175 \text{ °C}$



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

$I_C = f(V_{CE})$

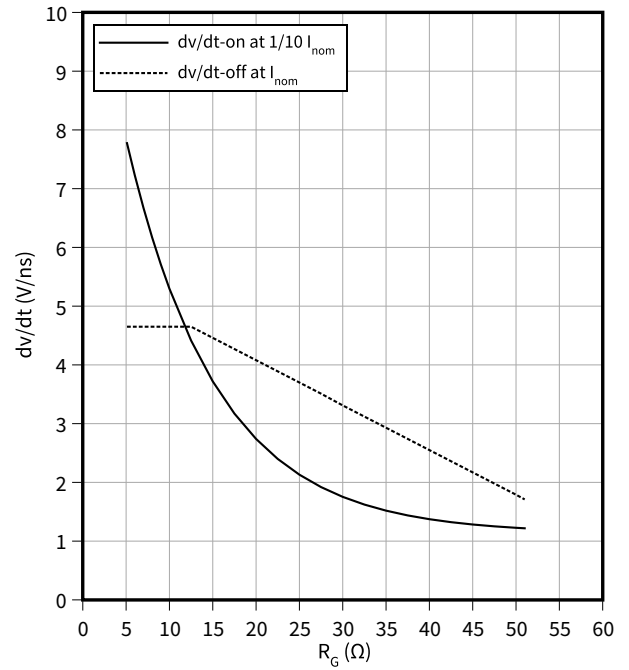
$R_{Goff} = 5.1 \Omega, V_{GE} = \pm 15 \text{ V}, T_{vj} = 175 \text{ }^\circ\text{C}$



**Voltage slope (typical), IGBT, Inverter**

$dv/dt = f(R_G)$

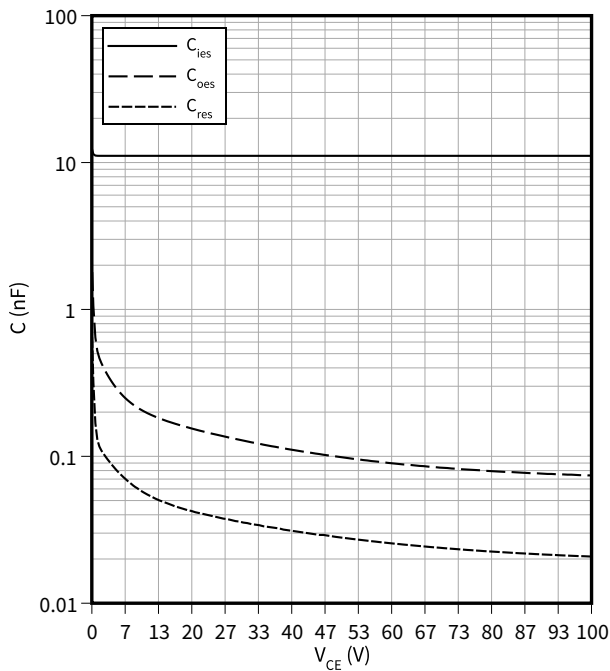
$I_C = 50 \text{ A}, V_{CC} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 25 \text{ }^\circ\text{C}$



**Capacity characteristic (typical), IGBT, Inverter**

$C = f(V_{CE})$

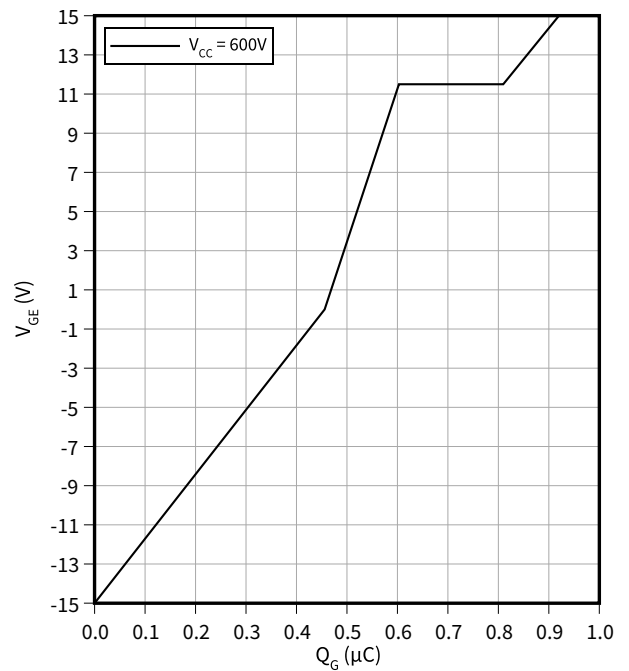
$f = 100 \text{ kHz}, V_{GE} = 0 \text{ V}, T_{vj} = 25 \text{ }^\circ\text{C}$



**Gate charge characteristic (typical), IGBT, Inverter**

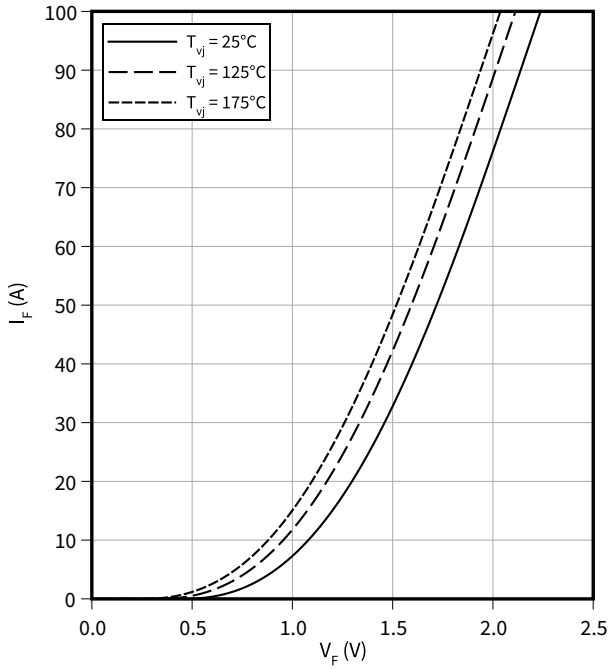
$V_{GE} = f(Q_G)$

$I_C = 50 \text{ A}, T_{vj} = 25 \text{ }^\circ\text{C}$



**Forward characteristic (typical), Diode, Inverter**

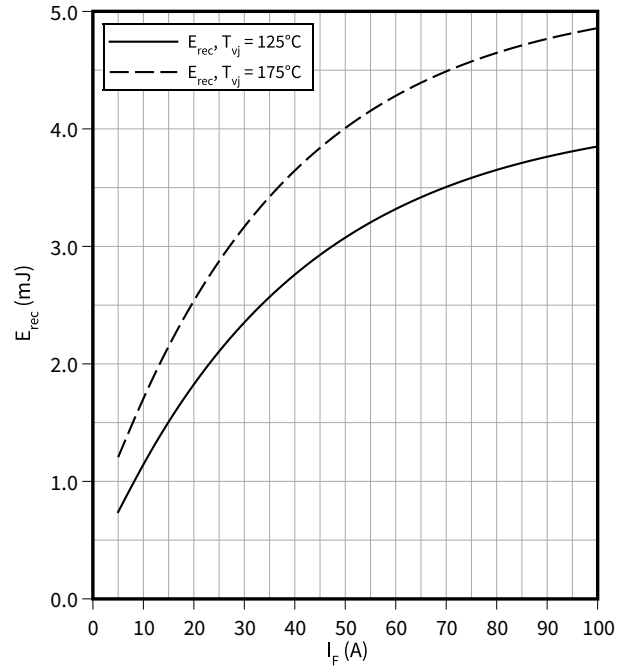
$I_F = f(V_F)$



**Switching losses (typical), Diode, Inverter**

$E_{rec} = f(I_F)$

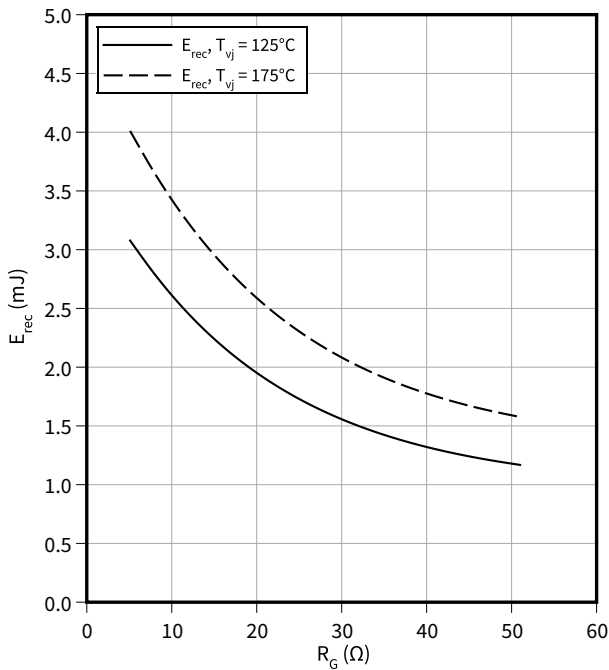
$R_{Gon} = 5.1, V_{CC} = 600\text{ V}$



**Switching losses (typical), Diode, Inverter**

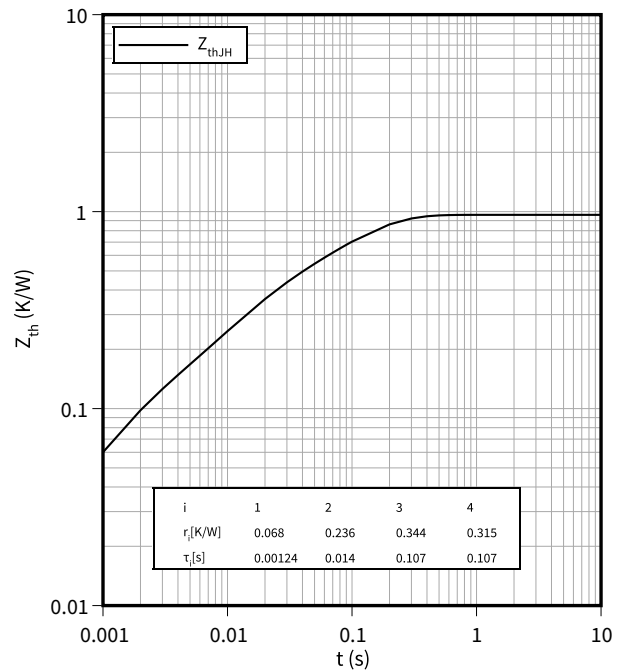
$E_{rec} = f(R_G)$

$I_F = 50\text{ A}, V_{CC} = 600\text{ V}$



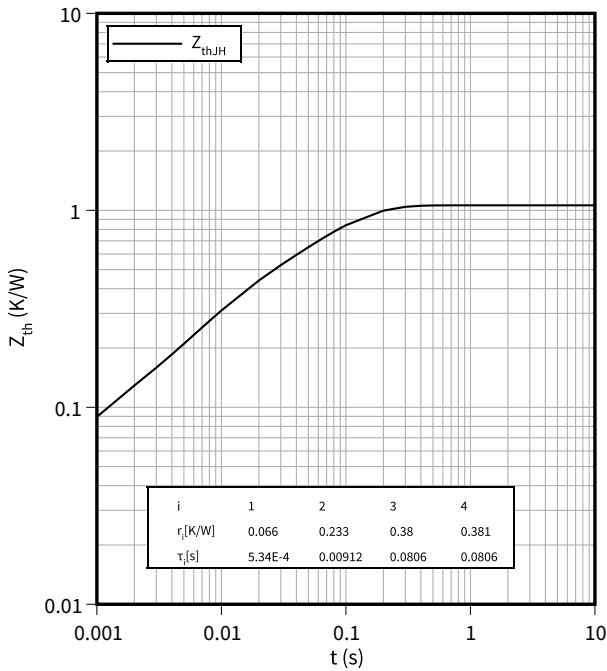
**Transient thermal impedance, Diode, Inverter**

$Z_{th} = f(t)$



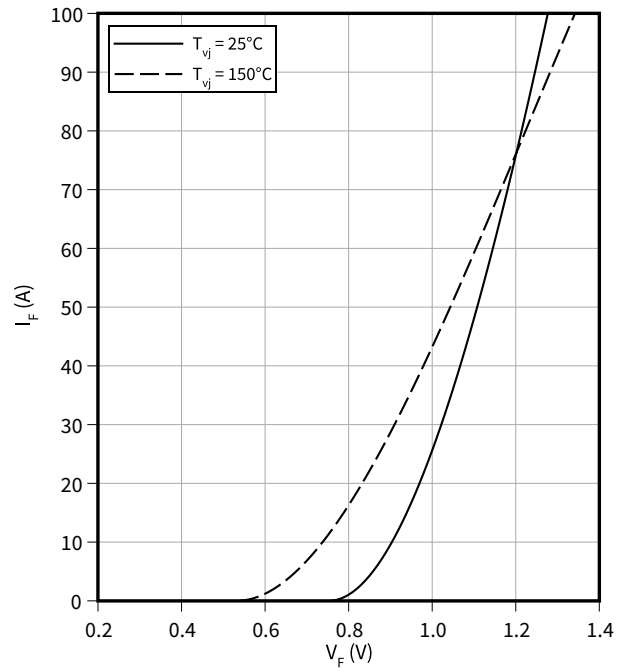
**Transient thermal impedance, Diode, Rectifier**

$Z_{th} = f(t)$



**Forward characteristic (typical), Diode, Rectifier**

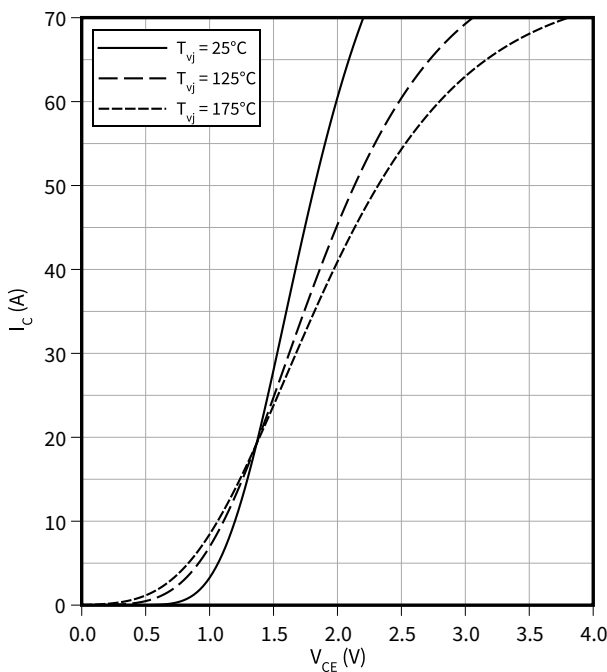
$I_F = f(V_F)$



**Output characteristic (typical), IGBT, Brake-Chopper**

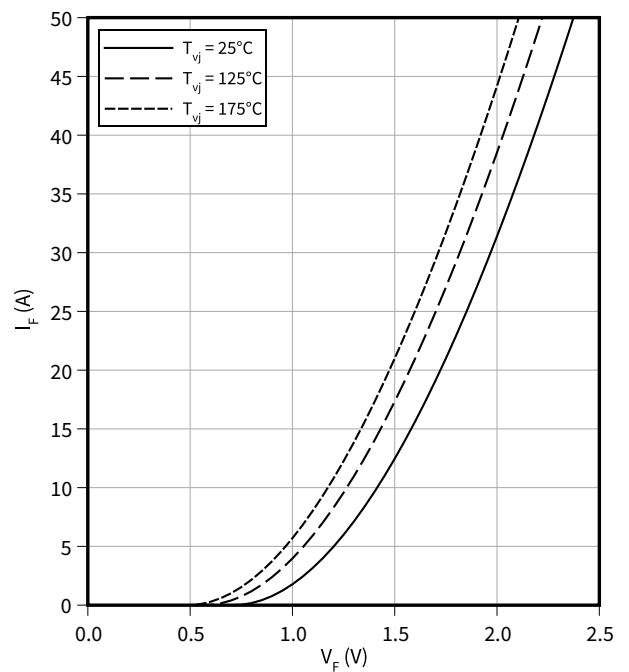
$I_C = f(V_{CE})$

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



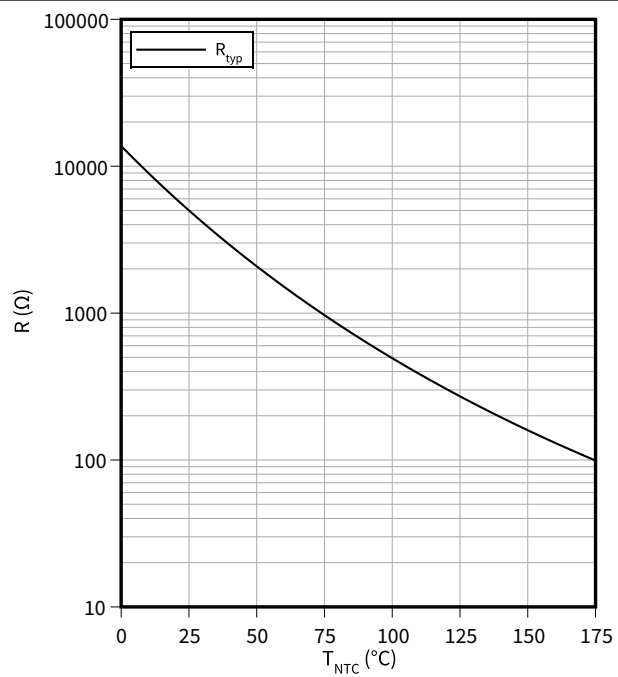
**Forward characteristic (typical), Diode, Brake-Chopper**

$I_F = f(V_F)$



Temperature characteristic (typical), NTC-Thermistor

$$R = f(T_{NTC})$$



## 9 Circuit diagram

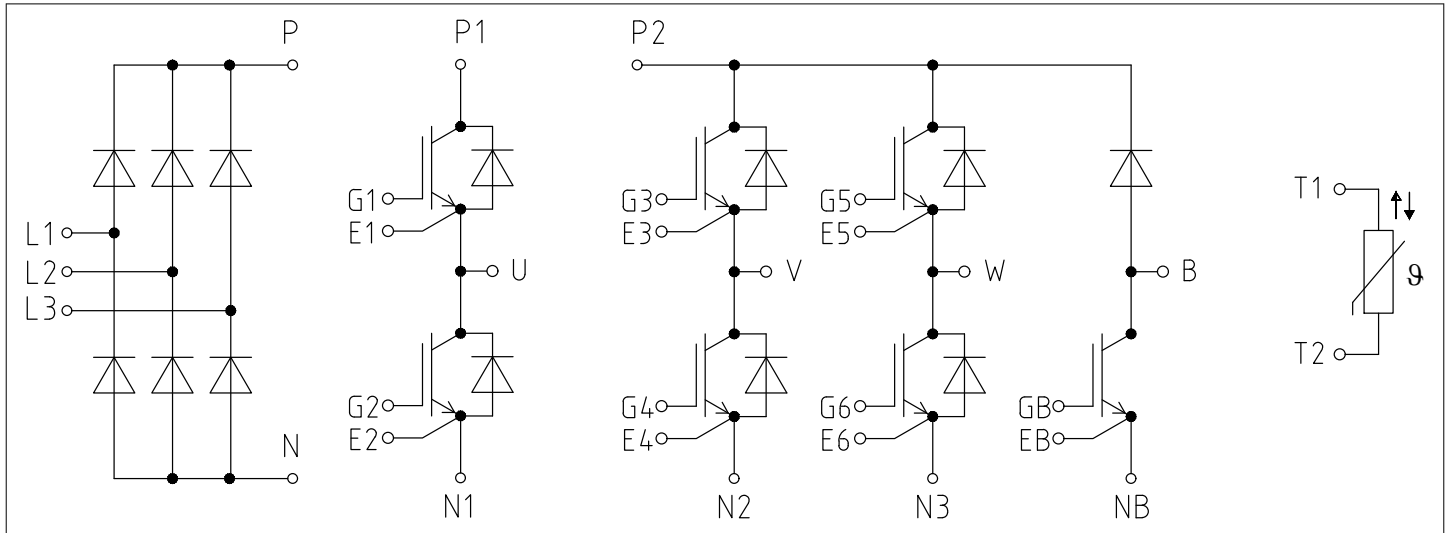


Figure 1

## 10 Package outlines

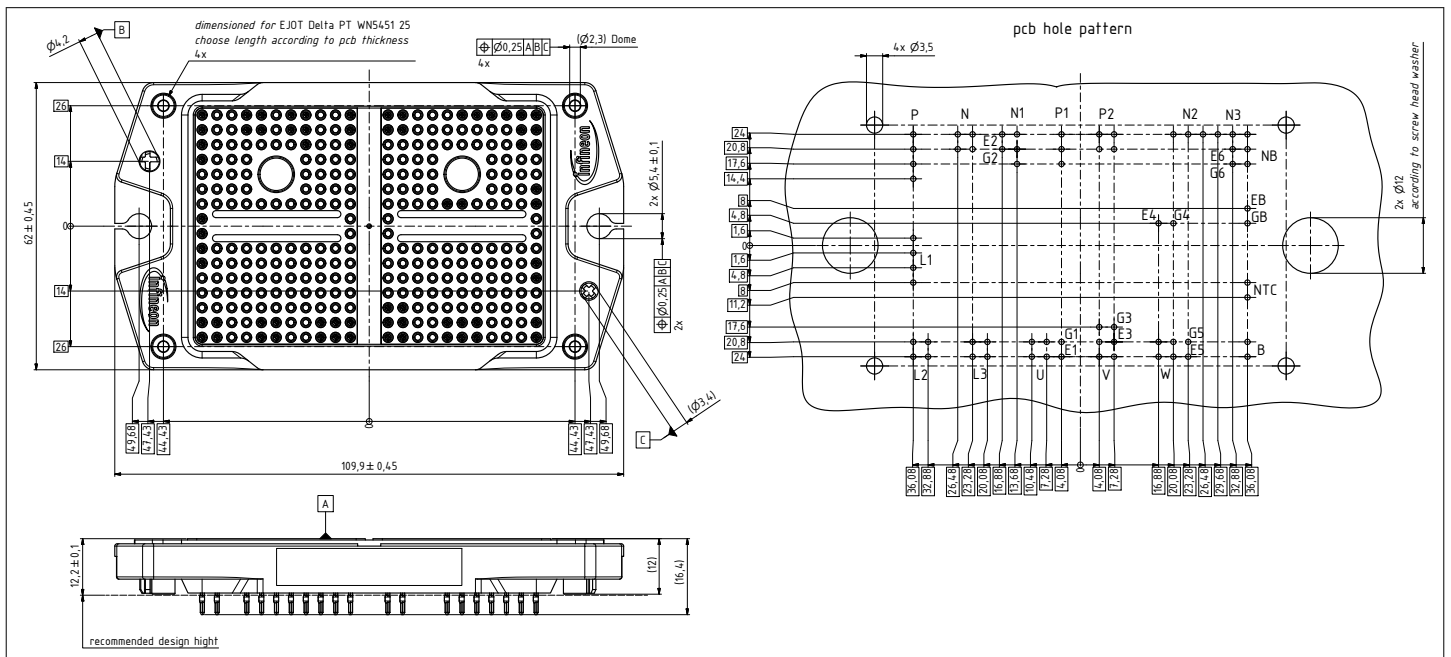


Figure 2

## 11 Module label code


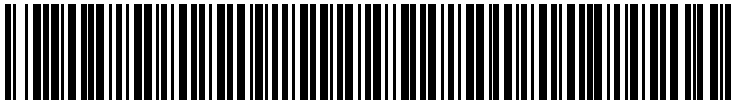
Module label code			
Code format	Data Matrix	Barcode Code128	
Encoding	ASCII text	Code Set A	
Symbol size	16x16	23 digits	
Standard	IEC24720 and IEC16022	IEC8859-1	
Code content	<i>Content</i>	<i>Digit</i>	<i>Example</i>
	Module serial number	1 - 5	71549
	Module material number	6 - 11	142846
	Production 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
V1.0	2020-08-20	Target 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
1.00	2022-09-27	Final datasheet
1.10	2022-12-13	Final datasheet

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**Email: [erratum@infineon.com](mailto:erratum@infineon.com)**

**Document reference**

**IFX-AAY210-003**

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