

Preliminary

EasyPIM™ module with TRENCHSTOP™ IGBT7 and Emitter Controlled 7 diode and PressFIT / NTC

Features

- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 100\text{ A} / I_{CRM} = 200\text{ A}$
 - TRENCHSTOP™ IGBT7
 - Low V_{CESat}
 - Overload operation up to 175°C
- Mechanical features
 - High power density
 - Compact design
 - Al_2O_3 substrate with low thermal resistance
 - 2.5 kV AC 1 min insulation
 - PressFIT contact technology



Potential applications

- Air conditioning
- Auxiliary inverters
- Motor drives
- Servo drives
- UPS systems

Product validation

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

Description

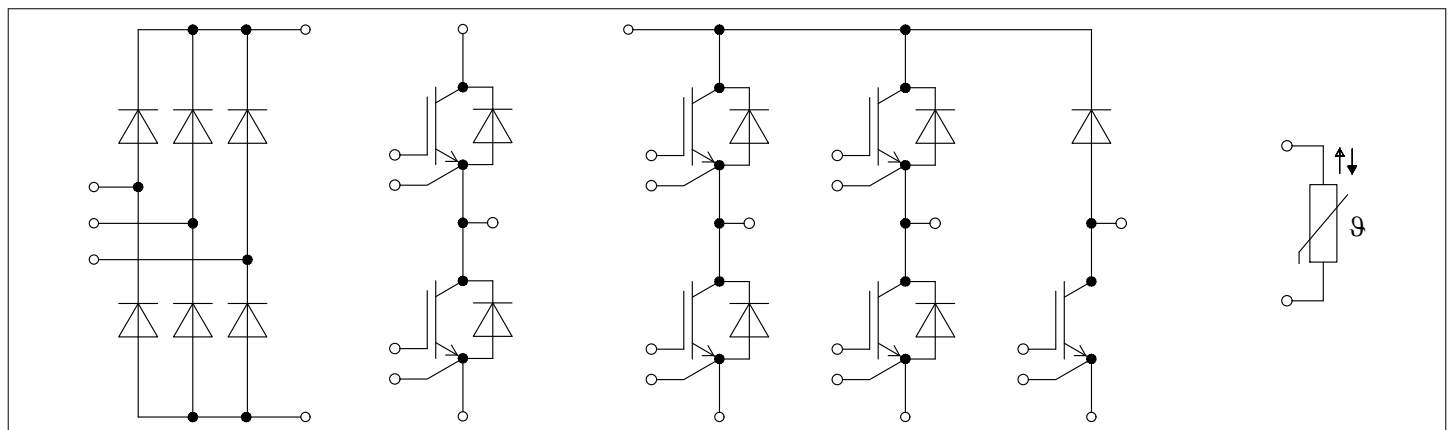


Table of contents

	Description	1
	Features	1
	Potential applications	1
	Product validation	1
	Table of contents	2
1	Package	3
2	IGBT, Inverter	3
3	Diode, Inverter	5
4	Diode, Rectifier	6
5	IGBT, Brake-Chopper	7
6	Diode, Brake-Chopper	9
7	NTC-Thermistor	10
8	Characteristics diagrams	11
9	Circuit diagram	17
10	Package outlines	17
	Revision history	18
	Disclaimer	19

1 Package

1 Package

Table 1 Insulation Coordination

Parameter	Symbol	Note or test condition	Values	Unit
Isolation test voltage	V_{ISOL}	RMS, $f = 50$ Hz, $t = 1$ 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
Comperative tracking index	CTI		> 400	
RTI Elec.	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	$R_{AA'+CC'}$	$T_H = 25^\circ C$, per switch		2.8		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_H = 25^\circ C$, per switch		2.2		mΩ
Storage temperature	T_{stg}		-40		125	°C
Mounting torque for modul 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}	$T_{vj} = 25^\circ C$	1200	V
Continous DC collector current	I_{CDC}	$T_{vj\ max} = 175^\circ C$ $T_H = 65^\circ C$	100	A
Repetitive peak collector current	I_{CRM}	$t_p = 1$ ms	200	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	$V_{CE\ sat}$	$I_C = 100\ A,$ $V_{GE} = 15\ V$		$T_{vj} = 25\ ^\circ C$	1.50	TBD	V
				$T_{vj} = 125\ ^\circ C$	1.64		
				$T_{vj} = 175\ ^\circ C$	1.72		
Gate threshold voltage	V_{GEth}	$I_C = 2.5\ mA,$ $V_{CE} = V_{GE},$ $T_{vj} = 25\ ^\circ C$	5.15	5.80	6.45	V	
Gate charge	Q_G	$V_{GE} = \pm 15\ V,$ $V_{CE} = 600\ V$		1.8		μC	
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$		1.5		Ω	
Input capacitance	C_{ies}	$f = 100\ kHz,$ $T_{vj} = 25\ ^\circ C,$ $V_{CE} = 25\ V,$ $V_{GE} = 0\ V$		21.7		nF	
Reverse transfer capacitance	C_{res}	$f = 100\ kHz,$ $T_{vj} = 25\ ^\circ C,$ $V_{CE} = 25\ V,$ $V_{GE} = 0\ V$		0.076		nF	
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200\ V,$ $V_{GE} = 0\ V$	$T_{vj} = 125\ ^\circ C$		0.009	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}	$I_C = 100\ A,$ $V_{CE} = 600\ V,$ $V_{GE} = \pm 15\ V,$ $R_{Gon} = 3.3\ \Omega$		$T_{vj} = 25\ ^\circ C$	0.163		μs
				$T_{vj} = 125\ ^\circ C$	0.184		
				$T_{vj} = 175\ ^\circ C$	0.193		
Rise time (inductive load)	t_r	$I_C = 100\ A,$ $V_{CE} = 600\ V,$ $V_{GE} = \pm 15\ V,$ $R_{Gon} = 3.3\ \Omega$		$T_{vj} = 25\ ^\circ C$	0.054		μs
				$T_{vj} = 125\ ^\circ C$	0.056		
				$T_{vj} = 175\ ^\circ C$	0.057		
Turn off delay time (inductive load)	t_{doff}	$I_C = 100\ A,$ $V_{CE} = 600\ V,$ $V_{GE} = \pm 15\ V,$ $R_{Goff} = 3.3\ \Omega$		$T_{vj} = 25\ ^\circ C$	0.328		μs
				$T_{vj} = 125\ ^\circ C$	0.410		
				$T_{vj} = 175\ ^\circ C$	0.459		

Table 4 Characteristic Values (continued)

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Fall time (inductive load)	t_f	$I_C = 100\text{ A}$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 3.3\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		0.114		μs
					0.197		
					0.258		
Turn-on energy loss per pulse	E_{on}	$I_C = 100\text{ A}$, $V_{CE} = 600\text{ V}$, $L_\sigma = 35\text{ nH}$, $di/dt = 1900\text{ A}/\mu\text{s}$ ($T_{vj} = 175\text{ }^\circ\text{C}$), $V_{GE} = \pm 15\text{ V}$, $R_{Gon} = 3.3\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		9.5		mJ
					12.6		
					14.3		
Turn-off energy loss per pulse	E_{off}	$I_C = 100\text{ A}$, $V_{CE} = 600\text{ V}$, $L_\sigma = 35\text{ nH}$, $du/dt = 3000\text{ V}/\mu\text{s}$ ($T_{vj} = 175\text{ }^\circ\text{C}$), $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 3.3\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$ $T_{vj} = 125\text{ }^\circ\text{C}$ $T_{vj} = 175\text{ }^\circ\text{C}$		6.85		mJ
					10.3		
					12.6		
SC data	I_{SC}	$V_{CC} = 800\text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} * di/dt$	$t_p \leq 8\ \mu\text{s}$, $T_{vj} = 150\text{ }^\circ\text{C}$ $t_p \leq 7\ \mu\text{s}$, $T_{vj} = 175\text{ }^\circ\text{C}$		370		A
					350		
Thermal resistance, junction to heatsink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^*\text{K})$		0.510		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.

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		100	A
Repetitive peak forward current	I_{FRM}	$t_p = 1\text{ ms}$	200	A

Table 5 Maximum Rated Values (continued)

Parameter	Symbol	Note or test condition	Values	Unit	
I ² t - value	I ² t	V _R = 0 V, t _p = 10 ms	T _{vj} = 125 °C	970	A ² s
			T _{vj} = 175 °C	860	

Table 6 Characteristic Values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V _F	I _F = 100 A, V _{GE} = 0 V	T _{vj} = 25 °C	1.72	TBD	V
			T _{vj} = 125 °C	1.59		
			T _{vj} = 175 °C	1.52		
Peak reverse recovery current	I _{RM}	V _R = 600 V, V _{GE} = -15 V, -di _F /dt = 1900 A/μs (T _{vj} = 175 °C)	T _{vj} = 25 °C	68.3		A
			T _{vj} = 125 °C	84.6		
			T _{vj} = 175 °C	92.8		
Recovered charge	Q _r	V _R = 600 V, V _{GE} = -15 V, -di _F /dt = 1900 A/μs (T _{vj} = 175 °C)	T _{vj} = 25 °C	9.38		μC
			T _{vj} = 125 °C	14.9		
			T _{vj} = 175 °C	19.1		
Reverse recovery energy	E _{rec}	V _R = 600 V, V _{GE} = -15 V, -di _F /dt = 1900 A/μs (T _{vj} = 175 °C)	T _{vj} = 25 °C	3.02		mJ
			T _{vj} = 125 °C	5.18		
			T _{vj} = 175 °C	6.5		
Thermal resistance, junction to heatsink	R _{thJH}	per diode, λ _{grease} = 3.3 W/(m*K)		0.870		K/W
Temperature under switching conditions	T _{vj op}		-40		175	°C

Note: T_{vj op} > 150°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 °C	1600	V
Maximum RMS forward current per chip	I _{FRMSM}	T _H = 100 °C	100	A
Maximum RMS current at rectifier output	I _{RMSM}	T _H = 100 °C	100	A

Table 7 Maximum Rated Values (continued)

Parameter	Symbol	Note or test condition	Values	Unit
Surge forward current	I_{FSM}	$t_p = 10 \text{ ms}$ $T_{vj} = 25 \text{ °C}$	1150	A
			$T_{vj} = 150 \text{ °C}$ 880	
I^2t - value	I^2t	$t_p = 10 \text{ ms}$ $T_{vj} = 25 \text{ °C}$	6610	A^2s
			$T_{vj} = 150 \text{ °C}$ 3870	

Table 8 Characteristic Values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$T_{vj} = 150 \text{ °C}$, $I_F = 100 \text{ A}$		1.02		V
Reverse current	I_r	$T_{vj} = 150 \text{ °C}$, $V_R = 1600 \text{ V}$		1		mA
Thermal resistance, junction to heatsink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W/(m}^2\text{K)}$		0.700		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}	$T_{vj} = 25 \text{ °C}$	1200	V
Continuous DC collector current	I_{CDC}	$T_{vj, max} = 175 \text{ °C}$ $T_H = 80 \text{ °C}$	50	A
Repetitive peak collector current	I_{CRM}	$t_p = 1 \text{ ms}$	100	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	$V_{CE, sat}$	$I_C = 50 \text{ A}$, $V_{GE} = 15 \text{ V}$		$T_{vj} = 25 \text{ °C}$ 1.50	TBD	V
				$T_{vj} = 125 \text{ °C}$ 1.64		
				$T_{vj} = 175 \text{ °C}$ 1.72		
Gate threshold voltage	V_{GEth}	$I_C = 1.28 \text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25 \text{ °C}$	5.15	5.80	6.45	V

Table 10 **Characteristic Values (continued)**

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
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}	$V_{CE} = 1200 \text{ V}$ $T_{vj} = 25 \text{ }^\circ\text{C}$			1	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}	$I_C = 50 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 5.1 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.045		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.047		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.048		
Rise time (inductive load)	t_r	$I_C = 50 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 5.1 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.031		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.034		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.035		
Turn off delay time (inductive load)	t_{doff}	$I_C = 50 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 5.1 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.255		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.340		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.382		
Fall time (inductive load)	t_f	$I_C = 50 \text{ A}$, $V_{CE} = 600 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 5.1 \Omega$	$T_{vj} = 25 \text{ }^\circ\text{C}$	0.107		μs
			$T_{vj} = 125 \text{ }^\circ\text{C}$	0.195		
			$T_{vj} = 175 \text{ }^\circ\text{C}$	0.255		

Table 10 Characteristic Values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-on energy loss per pulse	E_{on}	$I_C = 50\text{ A},$ $V_{CE} = 600\text{ V},$ $L_\sigma = 35\text{ nH},$ $di/dt = 1200\text{ A}/\mu\text{s}$ ($T_{vj} = 175\text{ °C}$), $V_{GE} = \pm 15\text{ V},$ $R_{Gon} = 5.1\ \Omega$	$T_{vj} = 25\text{ °C}$ $T_{vj} = 125\text{ °C}$ $T_{vj} = 175\text{ °C}$	3.21		mJ
				4.03		
				4.46		
Turn-off energy loss per pulse	E_{off}	$I_C = 50\text{ A},$ $V_{CE} = 600\text{ V},$ $L_\sigma = 35\text{ nH},$ $du/dt = 2900\text{ V}/\mu\text{s}$ ($T_{vj} = 175\text{ °C}$), $V_{GE} = \pm 15\text{ V},$ $R_{Goff} = 5.1\ \Omega$	$T_{vj} = 25\text{ °C}$ $T_{vj} = 125\text{ °C}$ $T_{vj} = 175\text{ °C}$	3.23		mJ
				5.22		
				6.45		
SC data	I_{SC}	$V_{CC} = 800\text{ V},$ $V_{CEmax} = V_{CES} - L_{sCE} * di/dt$	$t_p \leq 8\ \mu\text{s},$ $T_{vj} = 150\text{ °C}$ $t_p \leq 7\ \mu\text{s},$ $T_{vj} = 175\text{ °C}$	190		A
				180		
Thermal resistance, junction to heatsink	R_{thJH}	per IGBT, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^*\text{K})$		0.850		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, Brake-Chopper

Table 11 Maximum Rated Values

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	V_{RRM}	$T_{vj} = 25\text{ °C}$	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	$V_R = 0\text{ V},$ $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ °C}$	72.5	A^2s
			$T_{vj} = 175\text{ °C}$	63	

Table 12 Characteristic Values

Parameter	Symbol	Note or test condition	Values			Unit	
			Min.	Typ.	Max.		
Forward voltage	V_F	$I_F = 25 \text{ A}$, $V_{GE} = 0 \text{ V}$			$T_{vj} = 25 \text{ }^\circ\text{C}$	1.83	V
					$T_{vj} = 125 \text{ }^\circ\text{C}$	1.70	
					$T_{vj} = 175 \text{ }^\circ\text{C}$	1.63	
Peak reverse recovery current	I_{RM}	$V_R = 600 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 1100 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ }^\circ\text{C}$)			$T_{vj} = 25 \text{ }^\circ\text{C}$	27.4	A
					$T_{vj} = 125 \text{ }^\circ\text{C}$	31.2	
					$T_{vj} = 175 \text{ }^\circ\text{C}$	34.1	
Recovered charge	Q_r	$V_R = 600 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 1100 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ }^\circ\text{C}$)			$T_{vj} = 25 \text{ }^\circ\text{C}$	1.93	μC
					$T_{vj} = 125 \text{ }^\circ\text{C}$	3.51	
					$T_{vj} = 175 \text{ }^\circ\text{C}$	4.51	
Reverse recovery energy	E_{rec}	$V_R = 600 \text{ V}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 1100 \text{ A}/\mu\text{s}$ ($T_{vj} = 175 \text{ }^\circ\text{C}$)			$T_{vj} = 25 \text{ }^\circ\text{C}$	0.74	mJ
					$T_{vj} = 125 \text{ }^\circ\text{C}$	1.42	
					$T_{vj} = 175 \text{ }^\circ\text{C}$	1.85	
Thermal resistance, junction to heatsink	R_{thJH}	per diode, $\lambda_{grease} = 3.3 \text{ W}/(\text{m}^*\text{K})$			1.86	K/W	
Temperature under switching conditions	$T_{vj\text{ op}}$			-40		175	$^\circ\text{C}$

Note: $T_{vj\text{ op}} > 150^\circ\text{C}$ 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}	$T_{NTC} = 25 \text{ }^\circ\text{C}$		5		k Ω
Deviation of R_{100}	$\Delta R/R$	$T_{NTC} = 100 \text{ }^\circ\text{C}$, $R_{100} = 493 \text{ } \Omega$	-5		5	%
Power dissipation	P_{25}	$T_{NTC} = 25 \text{ }^\circ\text{C}$			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

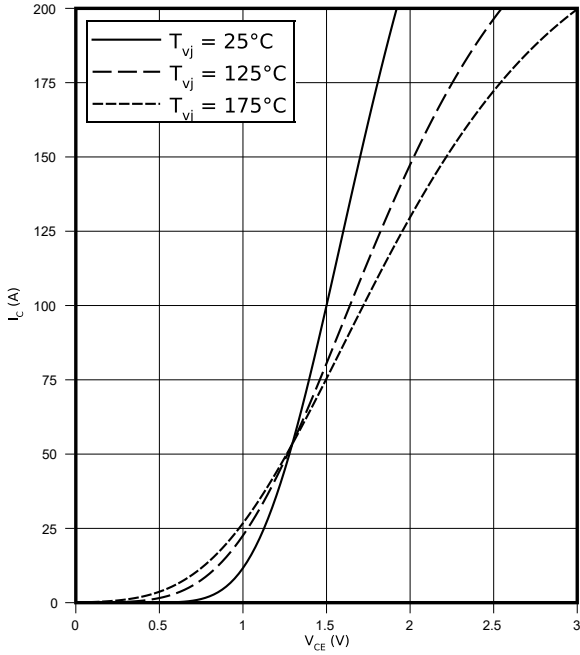
Note: Specification according to the valid application note.

8 Characteristics diagrams

output characteristic (typical), IGBT, Inverter

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

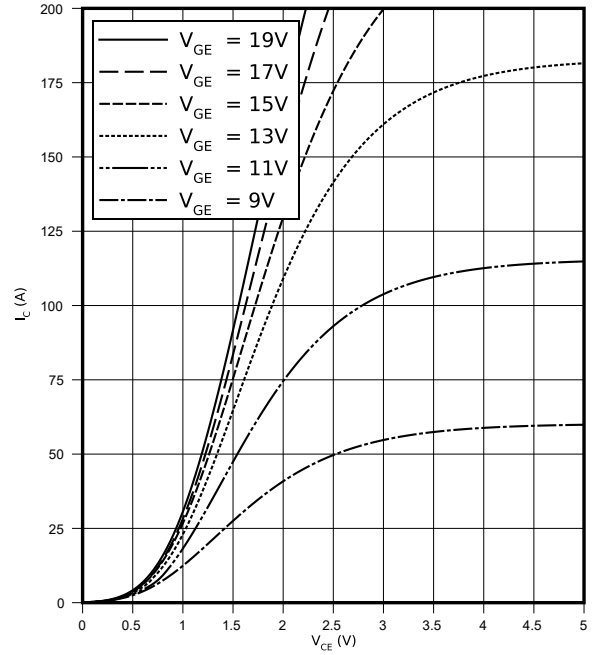
$$V_{GE} = 15 \text{ V}$$



output characteristic (typical), IGBT, Inverter

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

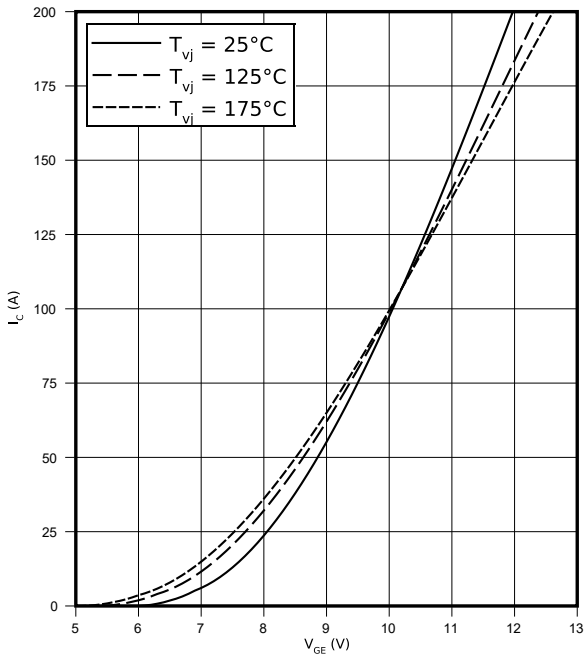
$$T_{vj} = 175 \text{ °C}$$



transfer characteristic (typical), IGBT, Inverter

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

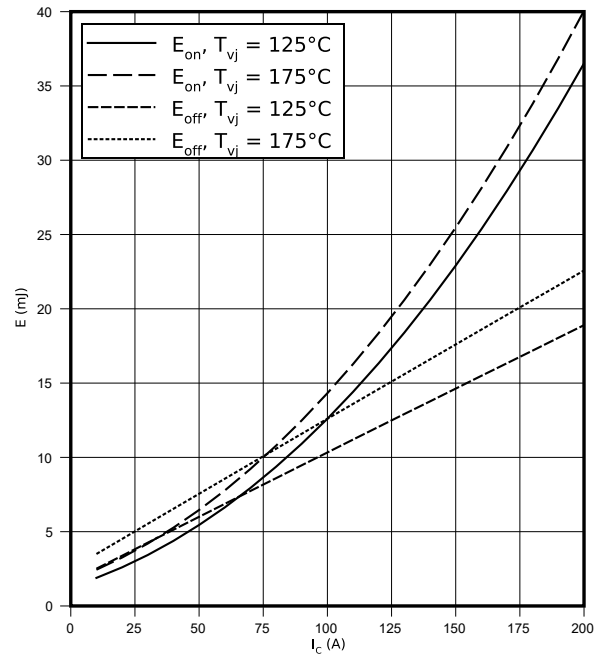
$$V_{CE} = 20 \text{ V}$$



switching losses (typical), IGBT, Inverter

$$E = f(I_C)$$

$$R_{Goff} = 3.3 \text{ } \Omega, R_{Gon} = 3.3 \text{ } \Omega, V_{CE} = 600 \text{ V}, V_{GE} = \pm 15 \text{ V}$$

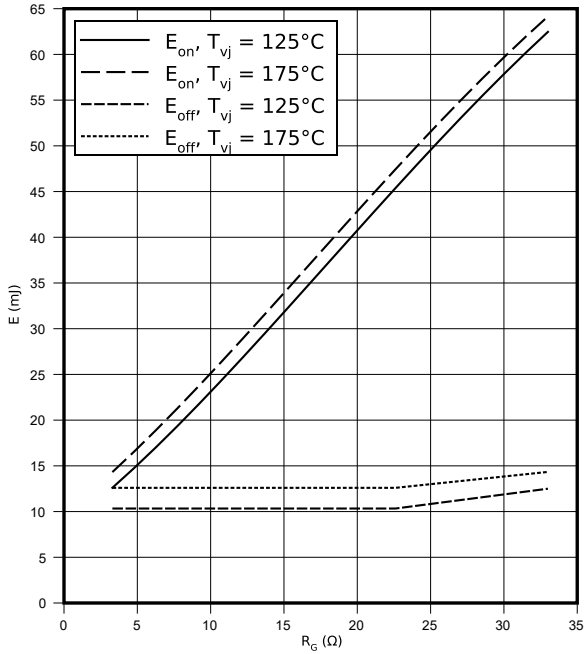


8 Characteristics diagrams

switching losses (typical), IGBT, Inverter

$E = f(R_G)$

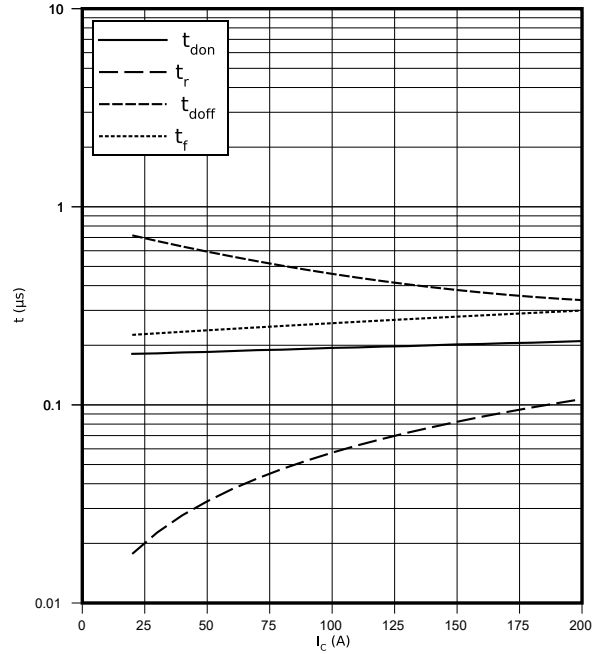
$I_C = 100\text{ A}$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$



switching times (typical), IGBT, Inverter

$t = f(I_C)$

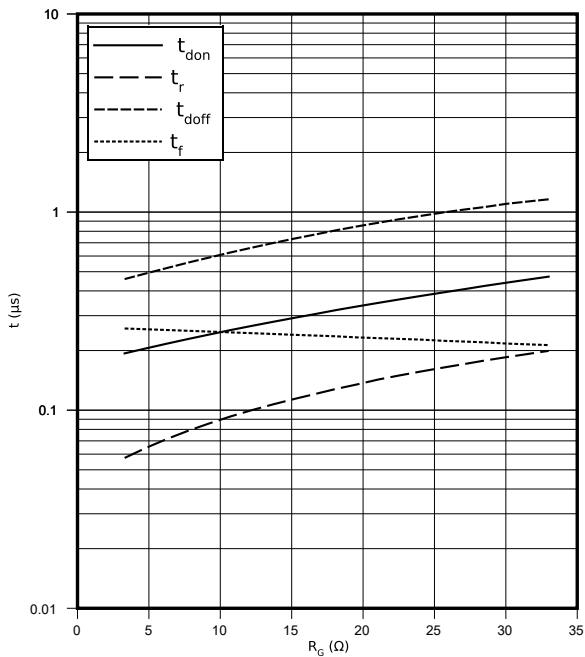
$R_{Goff} = 3.3\ \Omega$, $R_{Gon} = 3.3\ \Omega$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 175\text{ °C}$



switching times (typical), IGBT, Inverter

$t = f(R_G)$

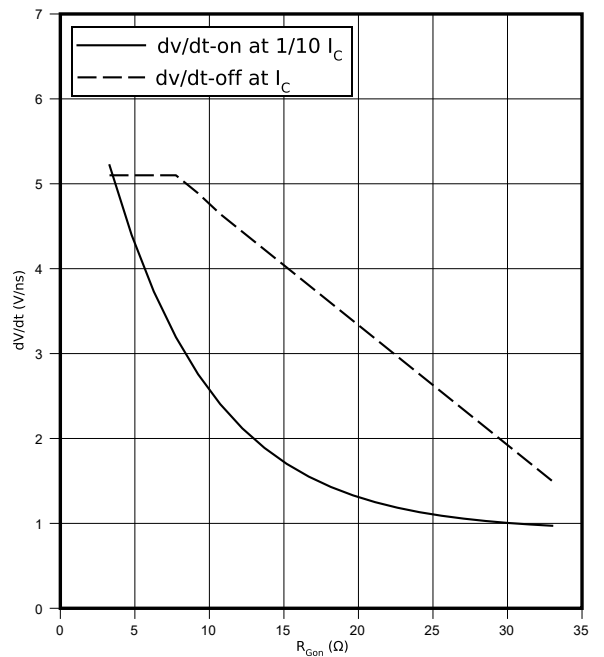
$I_C = 100\text{ A}$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 175\text{ °C}$



dv/dt (typical), IGBT, Inverter

$dV/dt = f(R_{Gon})$

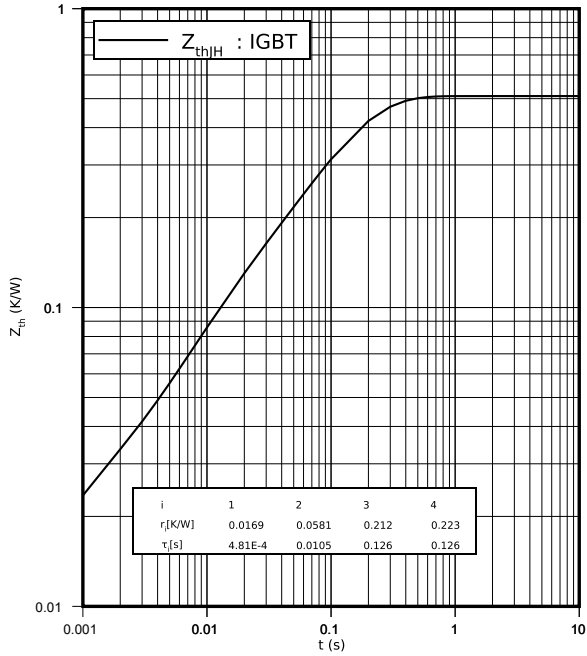
$I_C = 100\text{ A}$, $V_{CE} = 600\text{ V}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 25\text{ °C}$



8 Characteristics diagrams

transient thermal impedance , IGBT, Inverter

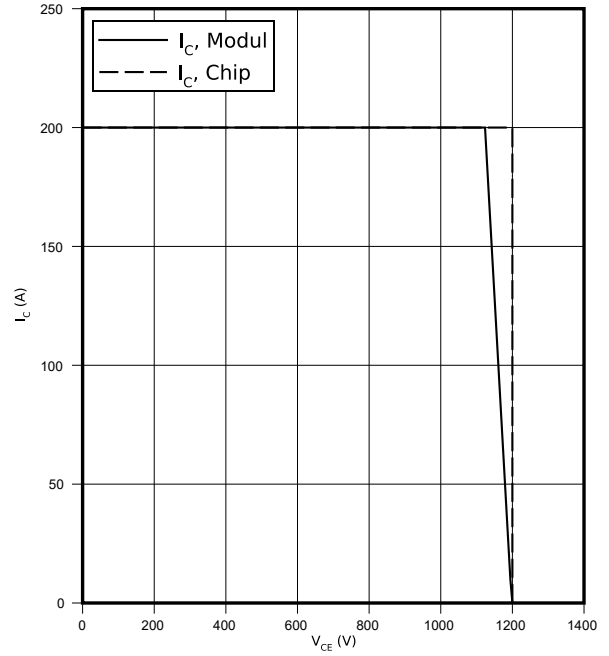
$Z_{th} = f(t)$



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

$I_C = f(V_{CE})$

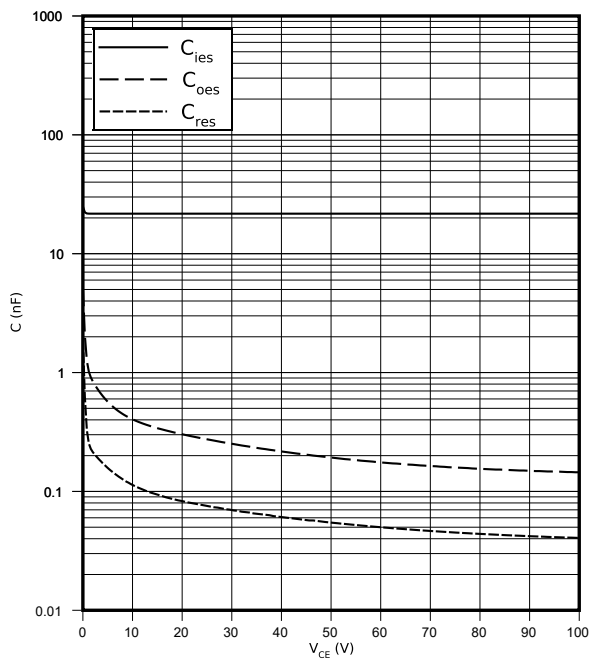
$R_{Goff} = 3.3 \Omega, V_{GE} = \pm 15.0 V, T_{vj} = 175 \text{ }^\circ\text{C}$



capacity characteristic (typical), IGBT, Inverter

$C = f(V_{CE})$

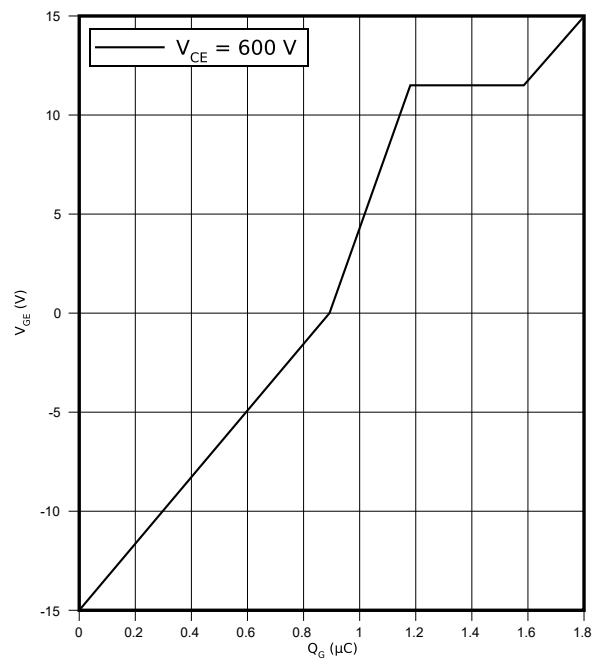
$f = 100 \text{ kHz}, V_{GE} = 0 V, T_{vj} = 25 \text{ }^\circ\text{C}$



gate charge characteristic (typical), IGBT, Inverter

$V_{GE} = f(Q_G)$

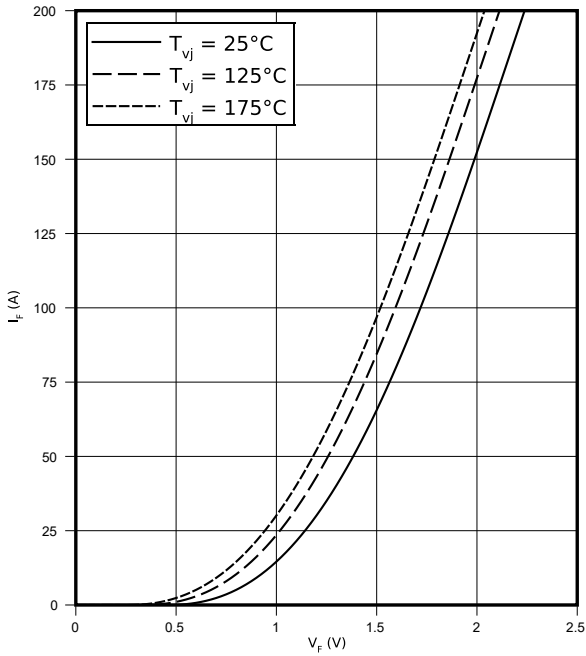
$I_C = 100 A, T_{vj} = 25 \text{ }^\circ\text{C}$



8 Characteristics diagrams

forward characteristic (typical), Diode, Inverter

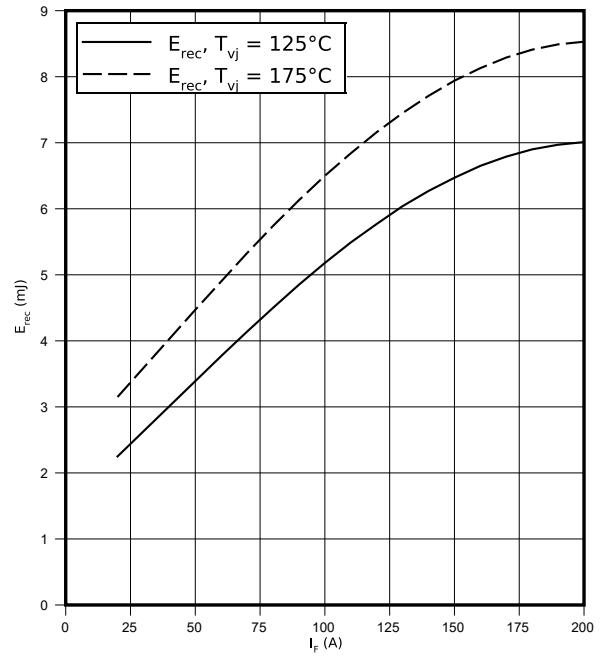
$I_F = f(V_F)$



switching losses (typical), Diode, Inverter

$E_{rec} = f(I_F)$

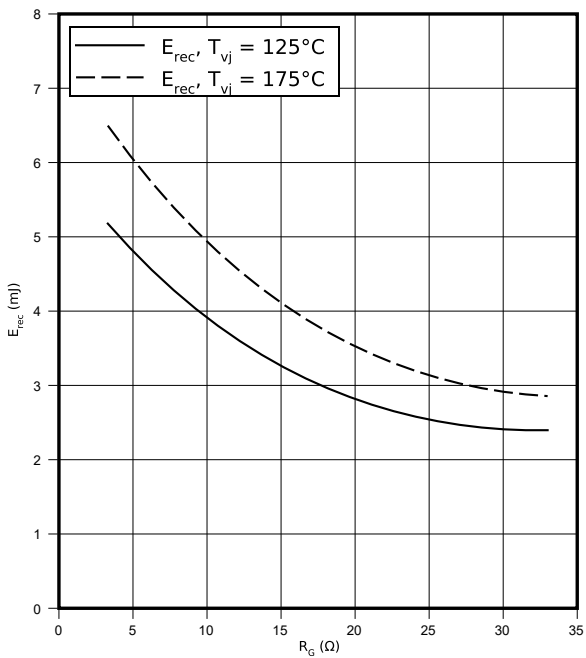
$V_{CE} = 600 \text{ V}, R_{Gon} = R_{Gon}(IGBT)$



switching losses (typical), Diode, Inverter

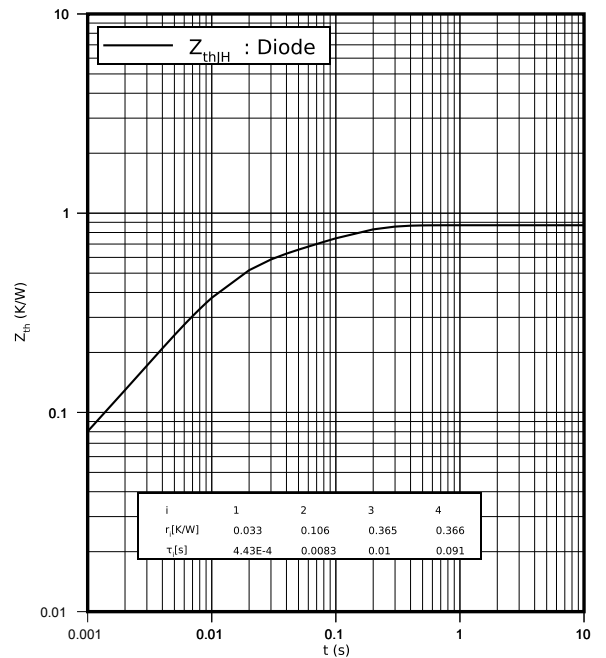
$E_{rec} = f(R_G)$

$V_{CE} = 600 \text{ V}, I_F = 100 \text{ A}$



transient thermal impedance, Diode, Inverter

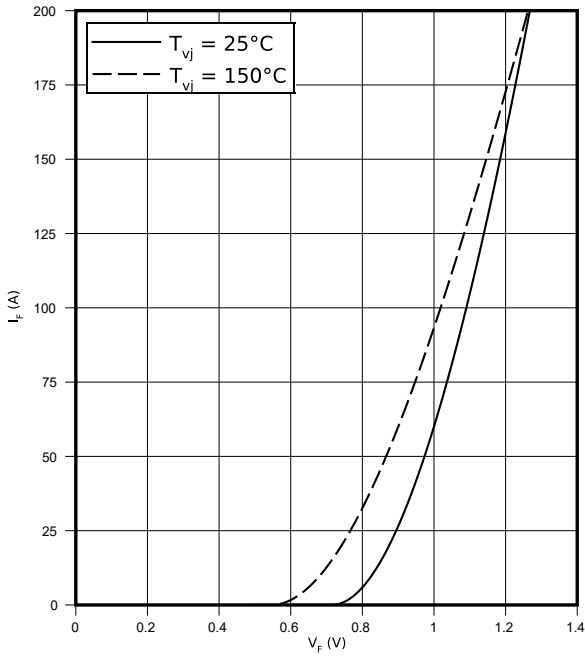
$Z_{th} = f(t)$



8 Characteristics diagrams

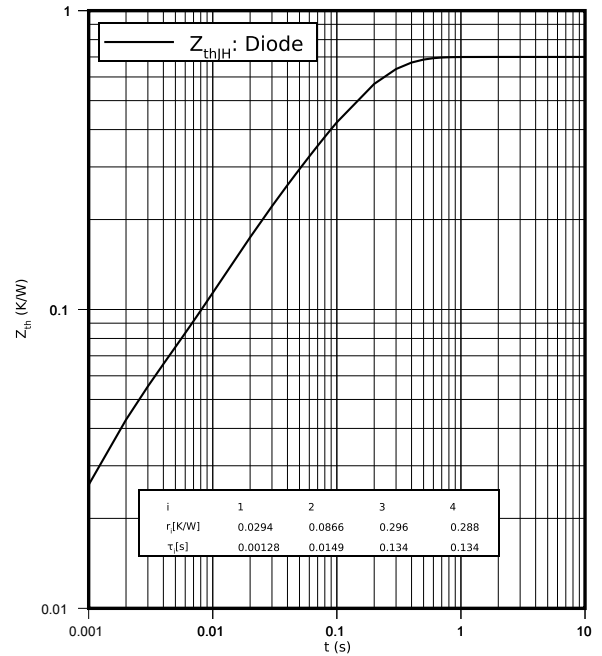
forward characteristic (typical), Diode, Rectifier

$I_F = f(V_F)$



transient thermal impedance, Diode, Rectifier

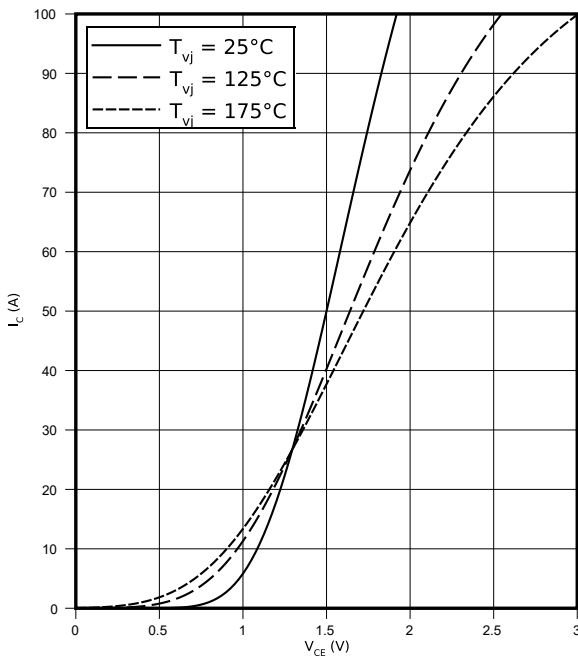
$Z_{th} = f(t)$



output characteristic (typical), IGBT, Brake-Chopper

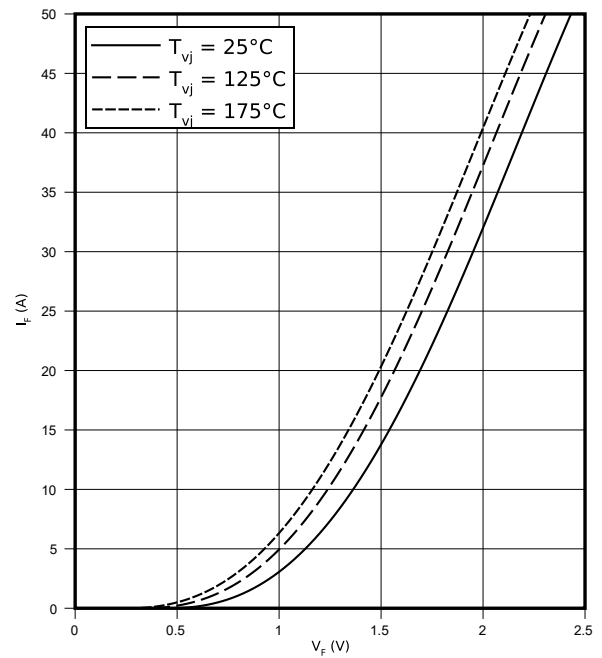
$I_C = f(V_{CE})$

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



forward characteristic (typical), Diode, Brake-Chopper

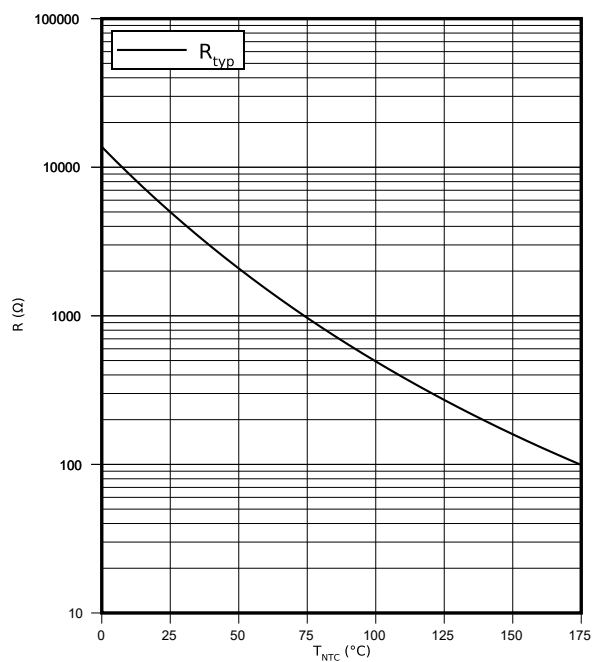
$I_F = f(V_F)$



8 Characteristics diagrams

temperature characteristic (typical), NTC-Thermistor

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



9 Circuit diagram

9 Circuit diagram

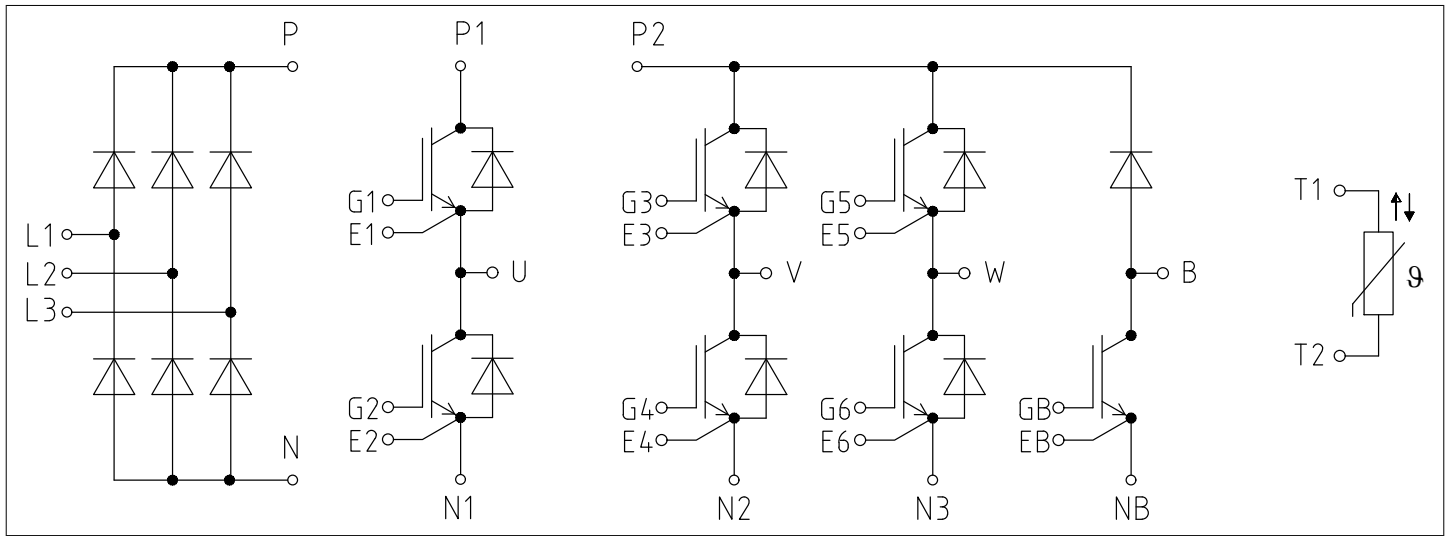


Figure 2

10 Package outlines

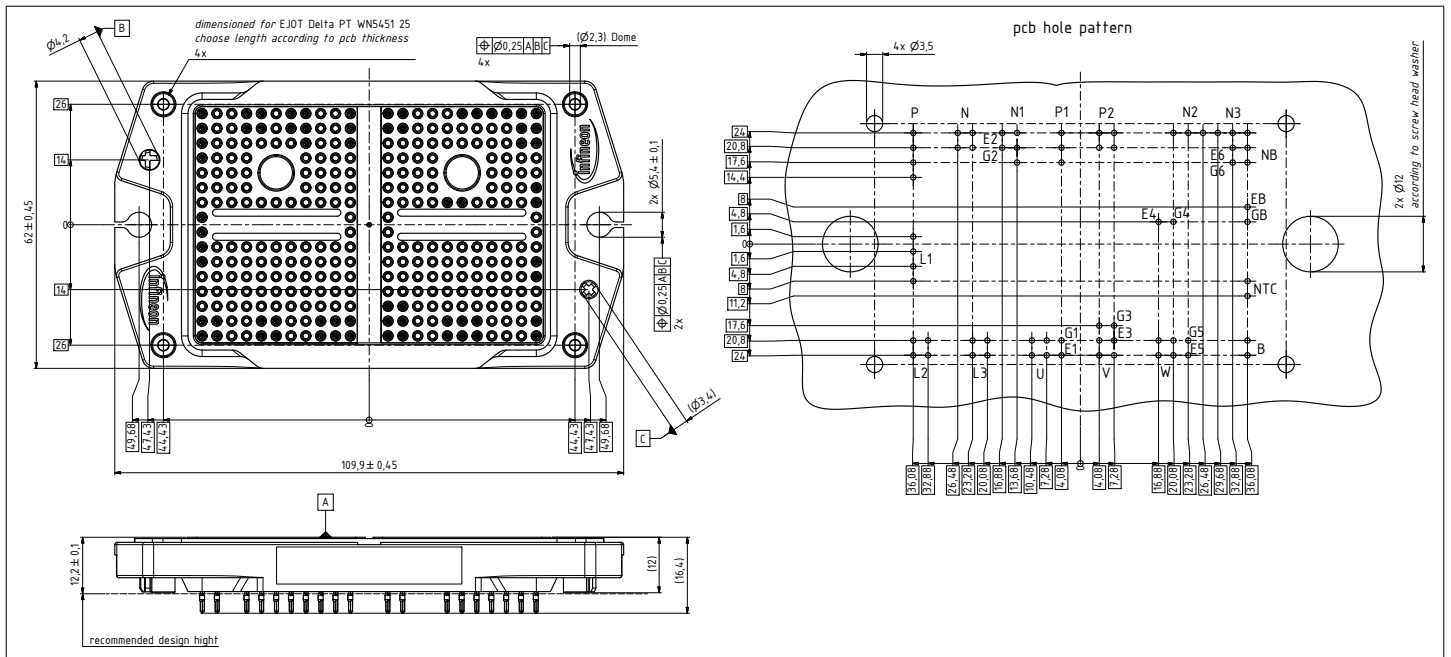


Figure 3

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