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# F3L400R07W3S5\_B59

## Infineon Technologies

IGBT Modules LOW POWER EASY

Any questions, please feel free to contact us.  
[info@kaimte.com](mailto:info@kaimte.com)

## EasyPACK™ module with TRENCHSTOP™ 5 and Emitter Controlled 3 diode and PressFIT / NTC

### Features

- Electrical features
  - $V_{CES} = 650\text{ V}$
  - $I_{C\text{nom}} = 200\text{ A} / I_{CRM} = 400\text{ A}$
  - Low switching losses
- Mechanical features
  - $\text{Al}_2\text{O}_3$  substrate with low thermal resistance
  - Compact design
  - PressFIT contact technology
  - Integrated NTC temperature sensor
  - High power density



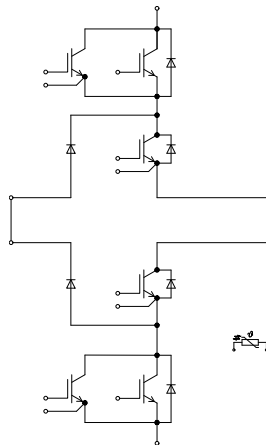
### Potential applications

- Solar applications
- 3-level-applications

### 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, $f = 50 \text{ Hz}$ , $t = 1 \text{ min}$	3.2	kV
Internal Isolation		basic insulation (class 1, IEC 61140)	$\text{Al}_2\text{O}_3$	
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	
RTI Elec.	$RTI$	housing	140	°C

**Table 2** Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Stray inductance module	$L_{SCE}$			12		nH
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 25A rms per connector pin.

## 2 IGBT, T1.1 / T1.2 / T4.1 / T4.2

**Table 3** Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
Collector-emitter voltage	$V_{CES}$	$T_{vj} = 25 \text{ °C}$	650	V
Implemented collector current	$I_{CN}$		200	A
Continuous DC collector current	$I_{CDC}$	$T_{vj \text{ max}} = 175 \text{ °C}$ $T_H = 65 \text{ °C}$	130	A
Repetitive peak collector current	$I_{CRM}$	$t_p = 1 \text{ ms}$	400	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	$V_{CE\ sat}$	$I_C = 100\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$	1.17	1.50	V
			$T_{vj} = 125\ ^\circ C$	1.20		
			$T_{vj} = 150\ ^\circ C$	1.21		
Gate threshold voltage	$V_{GEth}$	$I_C = 2\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$	3.25	4	4.75	V
Gate charge	$Q_G$	$V_{GE} = \pm 15\ V, V_{CE} = 400\ V$		0.84		$\mu C$
Internal gate resistor	$R_{Gint}$	$T_{vj} = 25\ ^\circ C$		0		$\Omega$
Input capacitance	$C_{ies}$	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$		14.3		nF
Reverse transfer capacitance	$C_{res}$	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$		0.05		nF
Collector-emitter cut-off current	$I_{CES}$	$V_{CE} = 650\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$		0.019	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)	$t_{don}$	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.022		$\mu s$
			$T_{vj} = 125\ ^\circ C$	0.021		
			$T_{vj} = 150\ ^\circ C$	0.021		
Rise time (inductive load)	$t_r$	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Gon} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.013		$\mu s$
			$T_{vj} = 125\ ^\circ C$	0.015		
			$T_{vj} = 150\ ^\circ C$	0.015		
Turn-off delay time (inductive load)	$t_{doff}$	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.117		$\mu s$
			$T_{vj} = 125\ ^\circ C$	0.145		
			$T_{vj} = 150\ ^\circ C$	0.158		
Fall time (inductive load)	$t_f$	$I_C = 100\ A, V_{CE} = 300\ V, V_{GE} = \pm 15\ V, R_{Goff} = 4.7\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.044		$\mu s$
			$T_{vj} = 125\ ^\circ C$	0.046		
			$T_{vj} = 150\ ^\circ C$	0.047		
Turn-on energy loss per pulse	$E_{on}$	$I_C = 100\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 4.7\ \Omega, di/dt = 12.5\ kA/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$	1		mJ
			$T_{vj} = 125\ ^\circ C$	1.4		
			$T_{vj} = 150\ ^\circ C$	1.49		
Turn-off energy loss per pulse	$E_{off}$	$I_C = 100\ A, V_{CE} = 300\ V, L_\sigma = 35\ nH, V_{GE} = \pm 15\ V, R_{Goff} = 4.7\ \Omega, dv/dt = 4400\ V/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$	0.78		mJ
			$T_{vj} = 125\ ^\circ C$	1.28		
			$T_{vj} = 150\ ^\circ C$	1.4		
Thermal resistance, junction to heatsink	$R_{thJH}$	per IGBT, $\lambda_{grease} = 3.3\ W/(m^*K)$		0.478		K/W
Temperature under switching conditions	$T_{vj\ op}$		-40		150	$^\circ C$

### 3 IGBT, T2 / T3

**Table 5** Maximum rated values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter voltage	$V_{CES}$		$T_{vj} = 25\text{ °C}$		650		V
Implemented collector current	$I_{CN}$				300		A
Continuous DC collector current	$I_{CDC}$	$T_{vj\ max} = 175\text{ °C}$	$T_H = 65\text{ °C}$		255		A
Repetitive peak collector current	$I_{CRM}$	$t_p = 1\text{ ms}$			600		A
Gate-emitter peak voltage	$V_{GES}$				±20		V

**Table 6** Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\ sat}$	$I_C = 100\text{ A}, V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$		0.88	1.13	V
			$T_{vj} = 125\text{ °C}$		0.80		
			$T_{vj} = 150\text{ °C}$		0.77		
Gate threshold voltage	$V_{Geth}$	$I_C = 4\text{ mA}, V_{CE} = 20\text{ V}, T_{vj} = 25\text{ °C}$		4.25	5	5.75	V
Gate charge	$Q_G$	$V_{GE} = \pm 15\text{ V}, V_{CE} = 400\text{ V}$			3.7		μC
Internal gate resistor	$R_{Gint}$	$T_{vj} = 25\text{ °C}$			0		Ω
Input capacitance	$C_{ies}$	$f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$			47.1		nF
Reverse transfer capacitance	$C_{res}$	$f = 100\text{ kHz}, T_{vj} = 25\text{ °C}, V_{CE} = 25\text{ V}, V_{GE} = 0\text{ V}$			0.168		nF
Collector-emitter cut-off current	$I_{CES}$	$V_{CE} = 650\text{ V}, V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$			0.019	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)	$t_{don}$	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 6.8\text{ }\Omega$	$T_{vj} = 25\text{ °C}$		0.128		μs
			$T_{vj} = 125\text{ °C}$		0.108		
			$T_{vj} = 150\text{ °C}$		0.103		
Rise time (inductive load)	$t_r$	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Gon} = 6.8\text{ }\Omega$	$T_{vj} = 25\text{ °C}$		0.025		μs
			$T_{vj} = 125\text{ °C}$		0.030		
			$T_{vj} = 150\text{ °C}$		0.031		
Turn-off delay time (inductive load)	$t_{doff}$	$I_C = 100\text{ A}, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}, R_{Goff} = 6.8\text{ }\Omega$	$T_{vj} = 25\text{ °C}$		0.693		μs
			$T_{vj} = 125\text{ °C}$		0.821		
			$T_{vj} = 150\text{ °C}$		0.853		

**Table 6** Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Fall time (inductive load)	$t_f$	$I_C = 100\text{ A}$ , $V_{CE} = 300\text{ V}$ , $V_{GE} = \pm 15\text{ V}$ , $R_{Goff} = 6.8\ \Omega$	$T_{vj} = 25\text{ }^\circ\text{C}$	0.129		$\mu\text{s}$
			$T_{vj} = 125\text{ }^\circ\text{C}$	0.213		
			$T_{vj} = 150\text{ }^\circ\text{C}$	0.234		
Turn-on energy loss per pulse	$E_{on}$	$I_C = 100\text{ A}$ , $V_{CE} = 300\text{ V}$ , $L_\sigma = 35\text{ nH}$ , $V_{GE} = \pm 15\text{ V}$ , $R_{Gon} = 6.8\ \Omega$ , $di/dt =$ $2700\text{ A}/\mu\text{s}$ ( $T_{vj} = 150\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$	1.06		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	1.44		
			$T_{vj} = 150\text{ }^\circ\text{C}$	1.54		
Turn-off energy loss per pulse	$E_{off}$	$I_C = 100\text{ A}$ , $V_{CE} = 300\text{ V}$ , $L_\sigma = 35\text{ nH}$ , $V_{GE} = \pm 15\text{ V}$ , $R_{Goff} = 6.8\ \Omega$ , $dv/dt = 760$ $\text{V}/\mu\text{s}$ ( $T_{vj} = 150\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$	5.24		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	8.18		
			$T_{vj} = 150\text{ }^\circ\text{C}$	8.84		
Thermal resistance, junction to heatsink	$R_{thJH}$	per IGBT, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^*\text{K})$		0.300		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^\circ\text{C}$

## 4 Diode, D1 / D4

**Table 7** Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj} = 25\text{ }^\circ\text{C}$	650	V	
Implemented forward current	$I_{FN}$		225	A	
Continuous DC forward current	$I_F$		100	A	
Repetitive peak forward current	$I_{FRM}$	$t_p = 1\text{ ms}$	450	A	
$I^2t$ - value	$I^2t$	$V_R = 0\text{ V}$ , $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ }^\circ\text{C}$	3030	$\text{A}^2\text{s}$
			$T_{vj} = 150\text{ }^\circ\text{C}$	2760	

**Table 8** Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	$V_F$	$I_F = 100\text{ A}$ , $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1.26	1.55	V
			$T_{vj} = 125\text{ }^\circ\text{C}$	1.16		
			$T_{vj} = 150\text{ }^\circ\text{C}$	1.11		

**Table 8** Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Peak reverse recovery current	$I_{RM}$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ( $T_{vj} = 150\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	105		A
			$T_{vj} = 125\text{ °C}$	141		
			$T_{vj} = 150\text{ °C}$	151		
Recovered charge	$Q_r$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ( $T_{vj} = 150\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	5.94		$\mu\text{C}$
			$T_{vj} = 125\text{ °C}$	11.6		
			$T_{vj} = 150\text{ °C}$	13.5		
Reverse recovery energy	$E_{rec}$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ( $T_{vj} = 150\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	1.3		mJ
			$T_{vj} = 125\text{ °C}$	2.58		
			$T_{vj} = 150\text{ °C}$	3.01		
Thermal resistance, junction to heatsink	$R_{thJH}$	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^2\text{K})$		0.431		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^{\circ}\text{C}$

## 5 Diode, D2 / D3

**Table 9** Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit	
Repetitive peak reverse voltage	$V_{RRM}$	$T_{vj} = 25\text{ °C}$	650	V	
Implemented forward current	$I_{FN}$		225	A	
Continuous DC forward current	$I_F$		100	A	
Repetitive peak forward current	$I_{FRM}$	$t_p = 1\text{ ms}$	450	A	
$I^2t$ - value	$I^2t$	$V_R = 0\text{ V}$ , $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ °C}$	3030	$\text{A}^2\text{s}$
			$T_{vj} = 150\text{ °C}$	2760	

**Table 10** Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	$V_F$	$I_F = 100\text{ A}$ , $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$	1.26	1.55	V
			$T_{vj} = 125\text{ °C}$	1.16		
			$T_{vj} = 150\text{ °C}$	1.11		



**Table 10** Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Peak reverse recovery current	$I_{RM}$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ( $T_{vj} = 150\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	105		A
			$T_{vj} = 125\text{ °C}$	141		
			$T_{vj} = 150\text{ °C}$	151		
Recovered charge	$Q_r$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ( $T_{vj} = 150\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	5.94		$\mu\text{C}$
			$T_{vj} = 125\text{ °C}$	11.6		
			$T_{vj} = 150\text{ °C}$	13.5		
Reverse recovery energy	$E_{rec}$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 2700\text{ A}/\mu\text{s}$ ( $T_{vj} = 150\text{ °C}$ )	$T_{vj} = 25\text{ °C}$	1.3		mJ
			$T_{vj} = 125\text{ °C}$	2.58		
			$T_{vj} = 150\text{ °C}$	3.01		
Thermal resistance, junction to heatsink	$R_{thJH}$	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^2\text{K})$		0.390		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^{\circ}\text{C}$

## 6 Diode, D5 / D6

**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	
Implemented forward current	$I_{FN}$		300	A	
Continuous DC forward current	$I_F$		100	A	
Repetitive peak forward current	$I_{FRM}$	$t_p = 1\text{ ms}$	600	A	
$I^2t$ - value	$I^2t$	$V_R = 0\text{ V}$ , $t_p = 10\text{ ms}$	$T_{vj} = 125\text{ °C}$	6610	$\text{A}^2\text{s}$
			$T_{vj} = 150\text{ °C}$	6050	

**Table 12** Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	$V_F$	$I_F = 100\text{ A}$ , $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$	1.19	1.47	V
			$T_{vj} = 125\text{ °C}$	1.07		
			$T_{vj} = 150\text{ °C}$	1.02		

**Table 12** Characteristic values (continued)

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Peak reverse recovery current	$I_{RM}$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 12.5\text{ kA}/\mu\text{s}$ ( $T_{vj} = 150\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$	135		A
			$T_{vj} = 125\text{ }^\circ\text{C}$	186		
			$T_{vj} = 150\text{ }^\circ\text{C}$	199		
Recovered charge	$Q_r$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 12.5\text{ kA}/\mu\text{s}$ ( $T_{vj} = 150\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$	5.05		$\mu\text{C}$
			$T_{vj} = 125\text{ }^\circ\text{C}$	12		
			$T_{vj} = 150\text{ }^\circ\text{C}$	14.4		
Reverse recovery energy	$E_{rec}$	$I_F = 100\text{ A}$ , $V_R = 300\text{ V}$ , $V_{GE} = -15\text{ V}$ , $-di_F/dt = 12.5\text{ kA}/\mu\text{s}$ ( $T_{vj} = 150\text{ }^\circ\text{C}$ )	$T_{vj} = 25\text{ }^\circ\text{C}$	0.931		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	2.64		
			$T_{vj} = 150\text{ }^\circ\text{C}$	3.26		
Thermal resistance, junction to heatsink	$R_{thJH}$	per diode, $\lambda_{grease} = 3.3\text{ W}/(\text{m}^2\text{K})$		0.479		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	$^\circ\text{C}$

## 7 NTC-Thermistor

**Table 13** Characteristic values

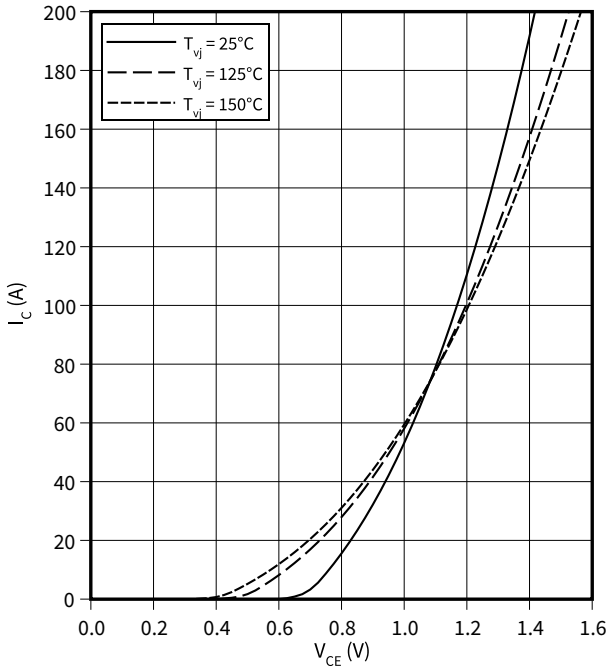
Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	$R_{25}$	$T_{NTC} = 25\text{ }^\circ\text{C}$		5		k $\Omega$
Deviation of $R_{100}$	$\Delta R/R$	$T_{NTC} = 100\text{ }^\circ\text{C}$ , $R_{100} = 493\text{ }\Omega$	-5		5	%
Power dissipation	$P_{25}$	$T_{NTC} = 25\text{ }^\circ\text{C}$			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

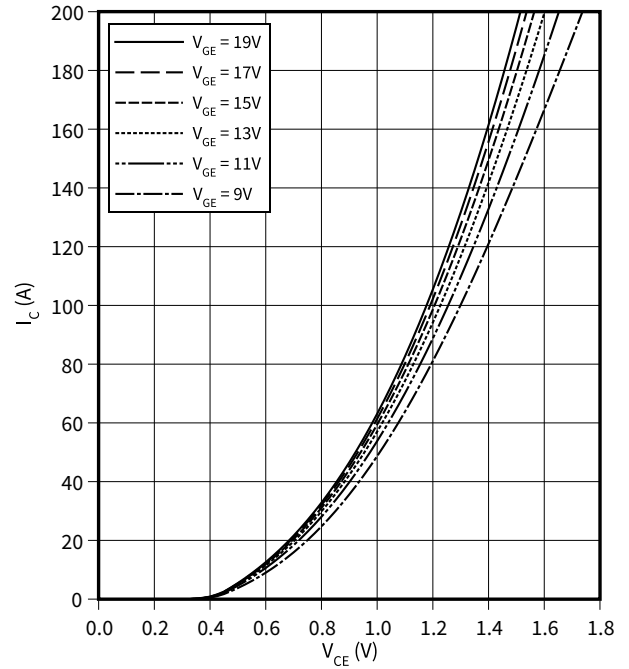
**output characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$I_C = f(V_{CE})$   
 $V_{GE} = 15\text{ V}$



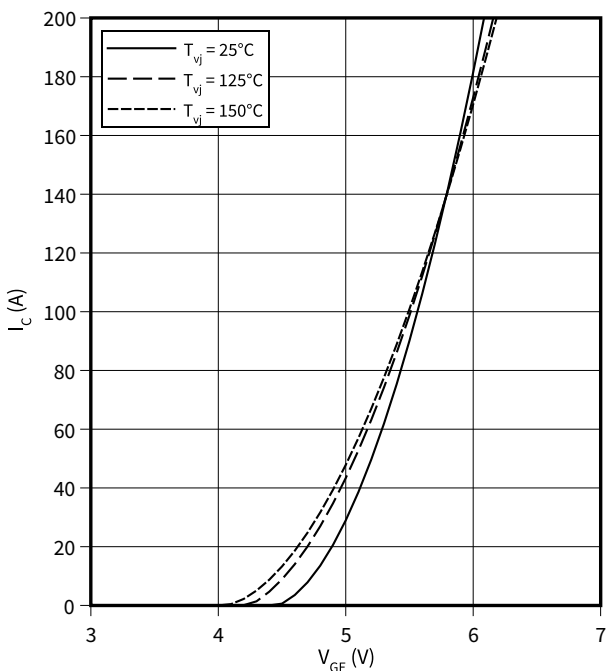
**output characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$I_C = f(V_{CE})$   
 $T_{vj} = 150\text{ °C}$



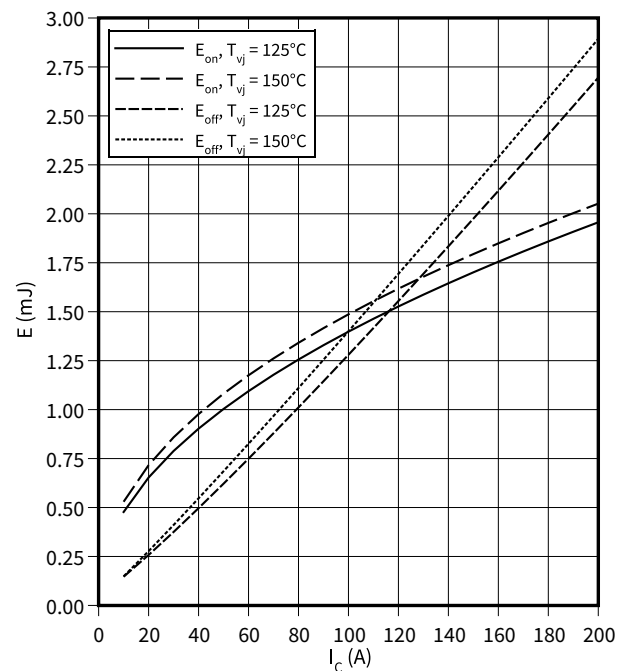
**transfer characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$I_C = f(V_{GE})$   
 $V_{CE} = 20\text{ V}$



**switching losses (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$E = f(I_C)$   
 $R_{Goff} = 4.7\ \Omega, R_{Gon} = 4.7\ \Omega, V_{CE} = 300\text{ V}, V_{GE} = \pm 15\text{ V}$

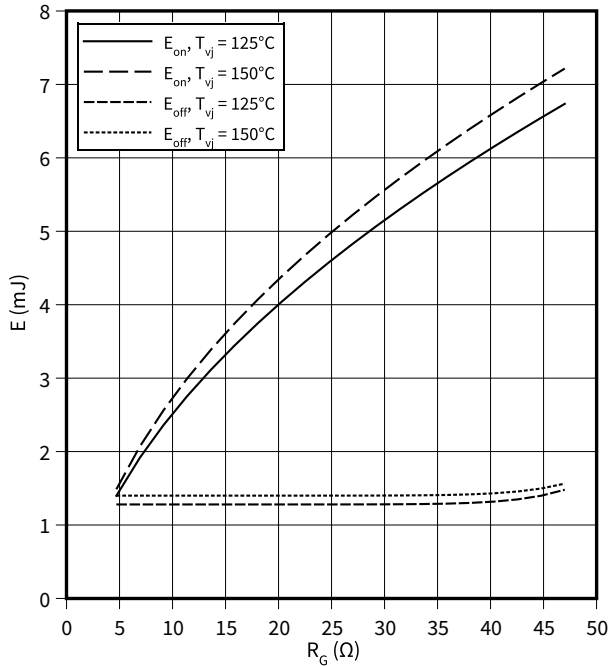


8 Characteristics diagrams

**switching losses (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$E = f(R_G)$

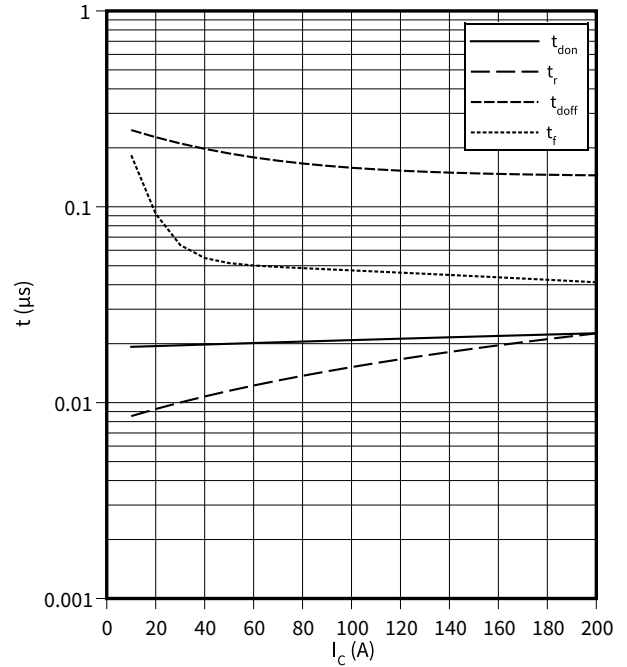
$I_C = 100 \text{ A}, V_{CE} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}$



**switching times (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$t = f(I_C)$

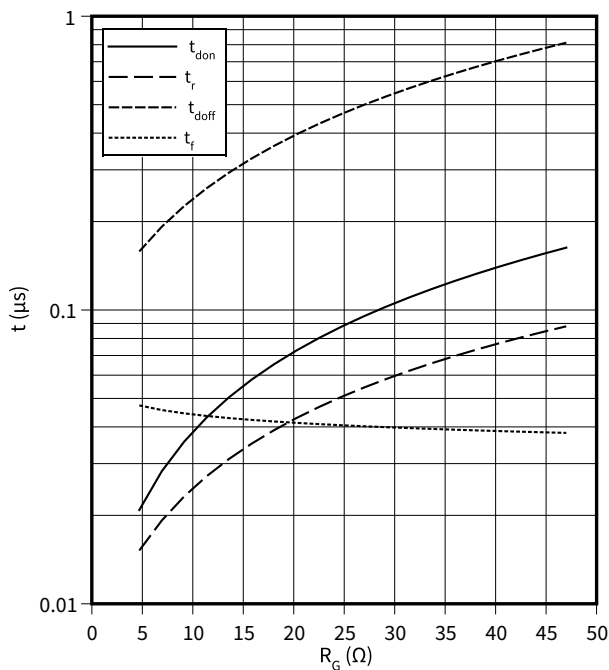
$R_{Goff} = 4.7 \text{ } \Omega, R_{Gon} = 4.7 \text{ } \Omega, V_{CE} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 150 \text{ } ^\circ\text{C}$



**switching times (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

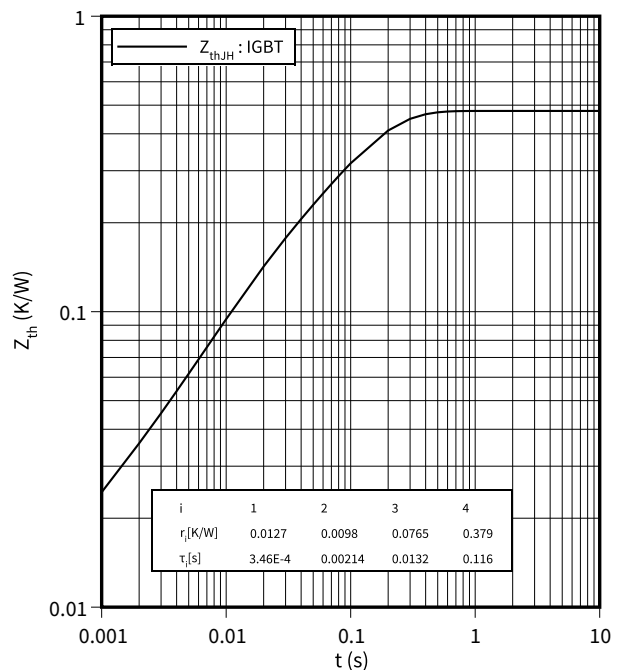
$t = f(R_G)$

$I_C = 100 \text{ A}, V_{CE} = 300 \text{ V}, V_{GE} = \pm 15 \text{ V}, T_{vj} = 150 \text{ } ^\circ\text{C}$



**transient thermal impedance, IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$Z_{th} = f(t)$

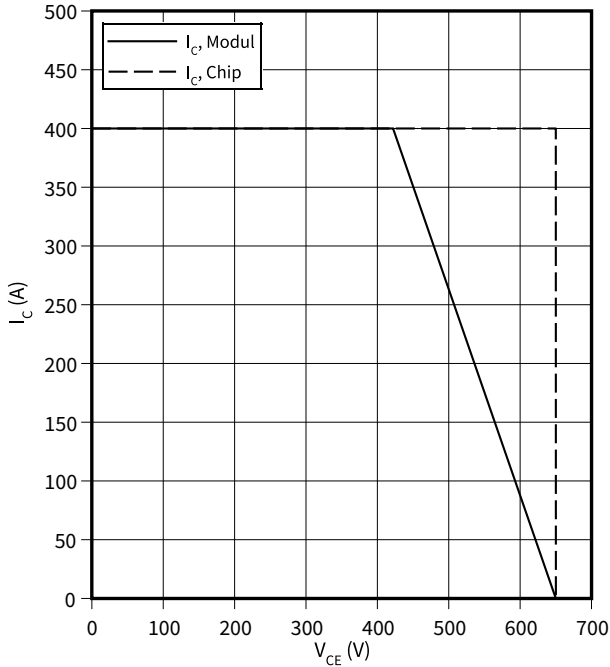


8 Characteristics diagrams

**reverse bias safe operating area (RBSOA), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$I_C = f(V_{CE})$

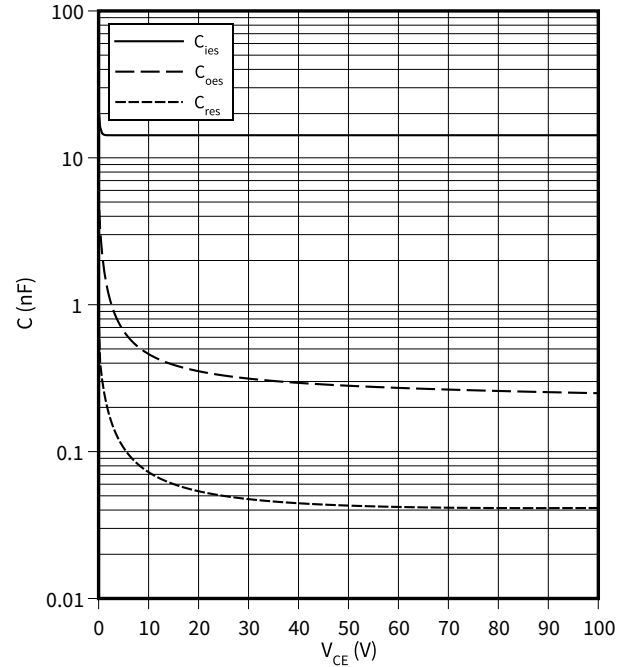
$R_{Goff} = 4.7 \Omega, V_{GE} = \pm 15 V, T_{vj} = 150 \text{ }^\circ\text{C}$



**capacity characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$C = f(V_{CE})$

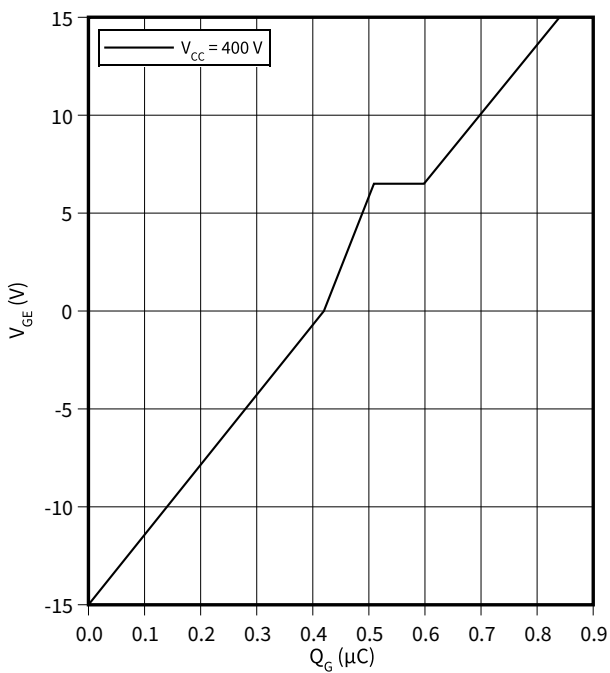
$f = 100 \text{ kHz}, V_{GE} = 0 V, T_{vj} = 25 \text{ }^\circ\text{C}$



**gate charge characteristic (typical), IGBT, T1.1 / T1.2 / T4.1 / T4.2**

$V_{GE} = f(Q_G)$

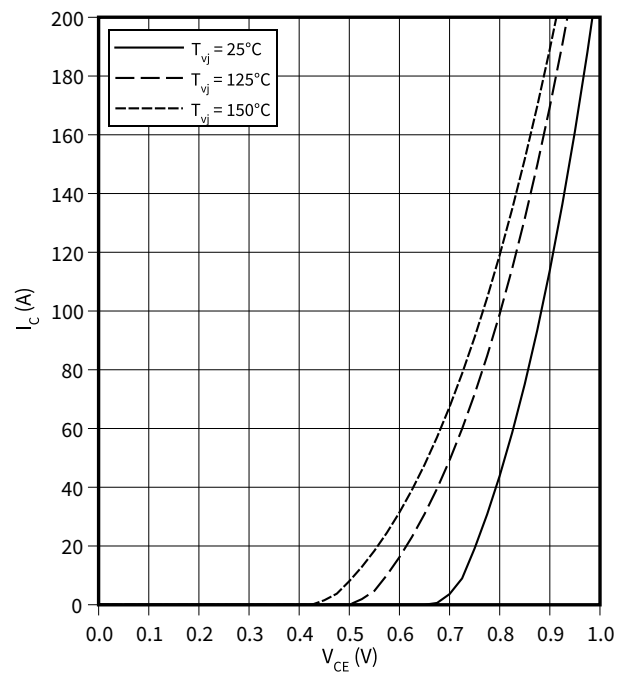
$I_C = 200 \text{ A}, T_{vj} = 25 \text{ }^\circ\text{C}$



**output characteristic (typical), IGBT, T2 / T3**

$I_C = f(V_{CE})$

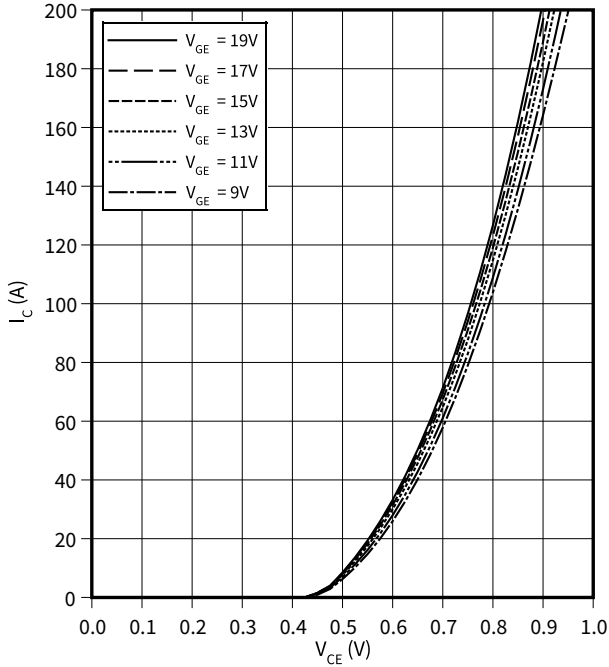
$V_{GE} = 15 \text{ V}$



8 Characteristics diagrams

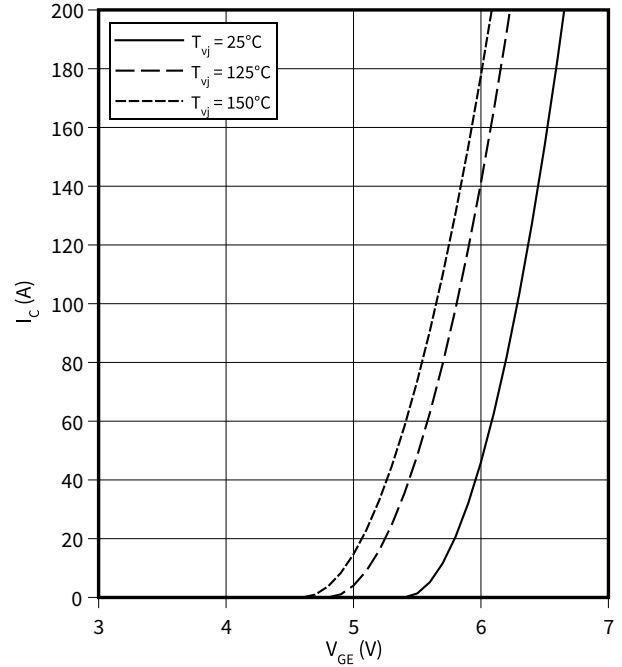
**output characteristic (typical), IGBT, T2 / T3**

$I_C = f(V_{CE})$   
 $T_{vj} = 150\text{ °C}$



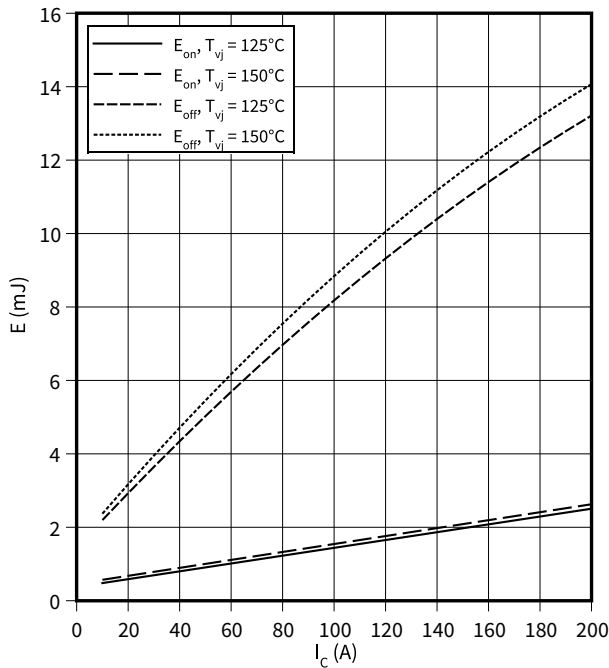
**transfer characteristic (typical), IGBT, T2 / T3**

$I_C = f(V_{GE})$   
 $V_{CE} = 20\text{ V}$



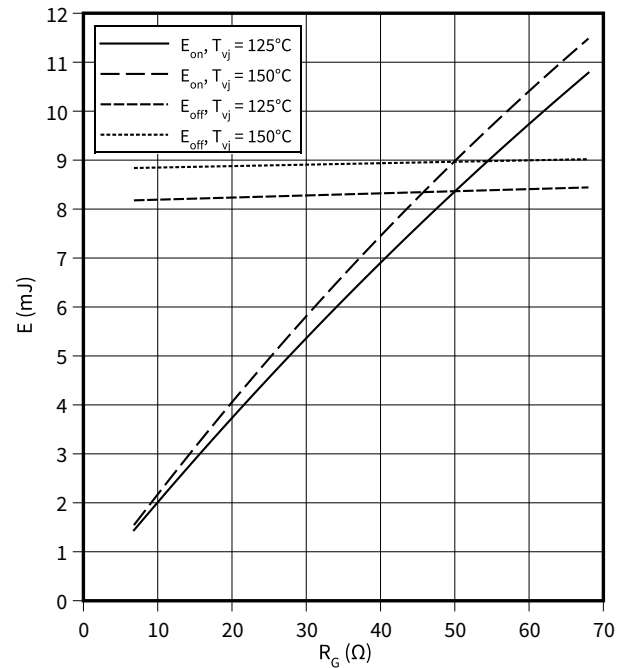
**switching losses (typical), IGBT, T2 / T3**

$E = f(I_C)$   
 $R_{Goff} = 6.8\ \Omega$ ,  $R_{Gon} = 6.8\ \Omega$ ,  $V_{CE} = 300\text{ V}$ ,  $V_{GE} = \pm 15\text{ V}$



**switching losses (typical), IGBT, T2 / T3**

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

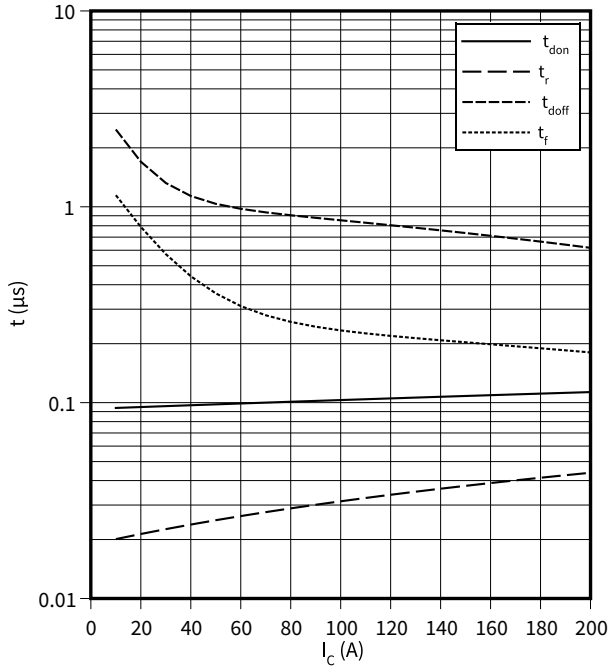


8 Characteristics diagrams

**switching times (typical), IGBT, T2 / T3**

$t = f(I_C)$

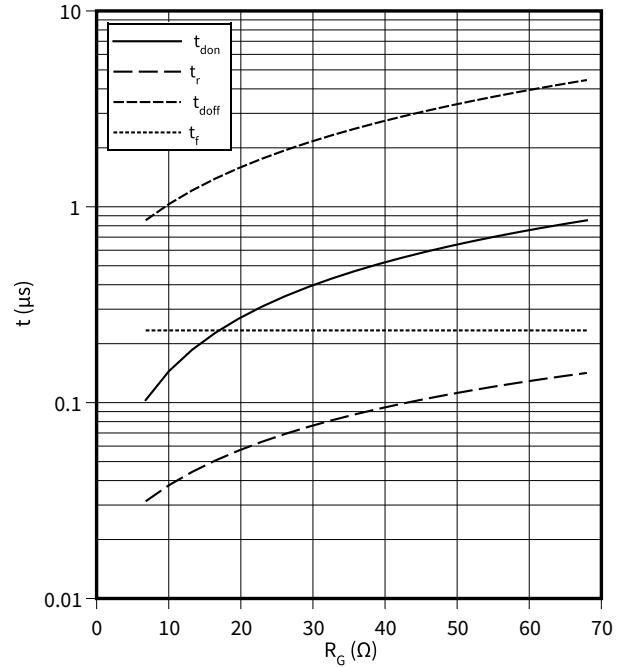
$R_{Goff} = 6.8 \Omega$ ,  $R_{Gon} = 6.8 \Omega$ ,  $V_{CE} = 300 \text{ V}$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $T_{vj} = 150 \text{ }^\circ\text{C}$



**switching times (typical), IGBT, T2 / T3**

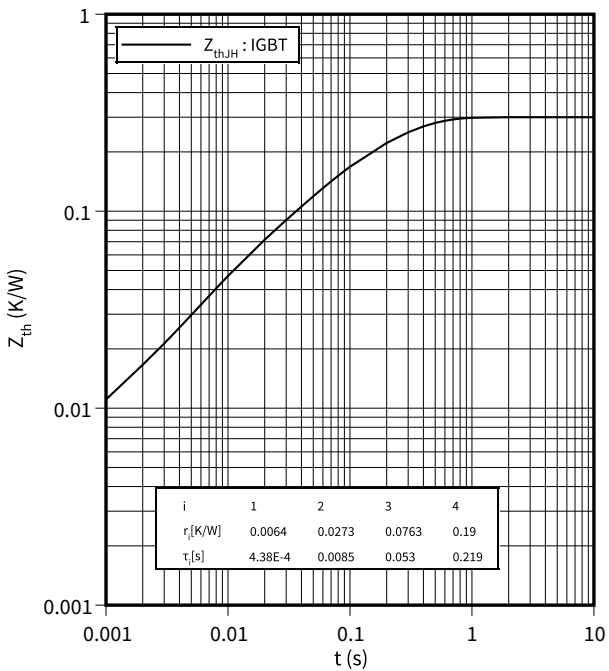
$t = f(R_G)$

$I_C = 100 \text{ A}$ ,  $V_{CE} = 300 \text{ V}$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $T_{vj} = 150 \text{ }^\circ\text{C}$



**transient thermal impedance, IGBT, T2 / T3**

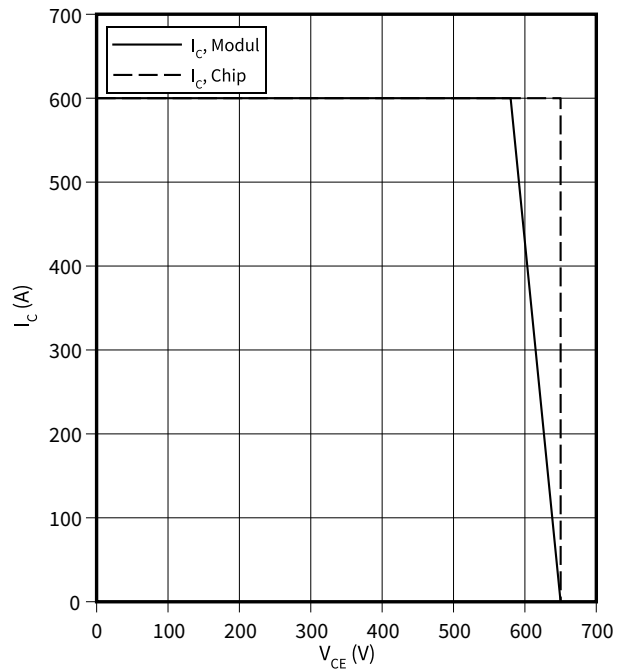
$Z_{th} = f(t)$



**reverse bias safe operating area (RBSOA), IGBT, T2 / T3**

$I_C = f(V_{CE})$

$R_{Goff} = 6.8 \Omega$ ,  $V_{GE} = \pm 15 \text{ V}$ ,  $T_{vj} = 150 \text{ }^\circ\text{C}$

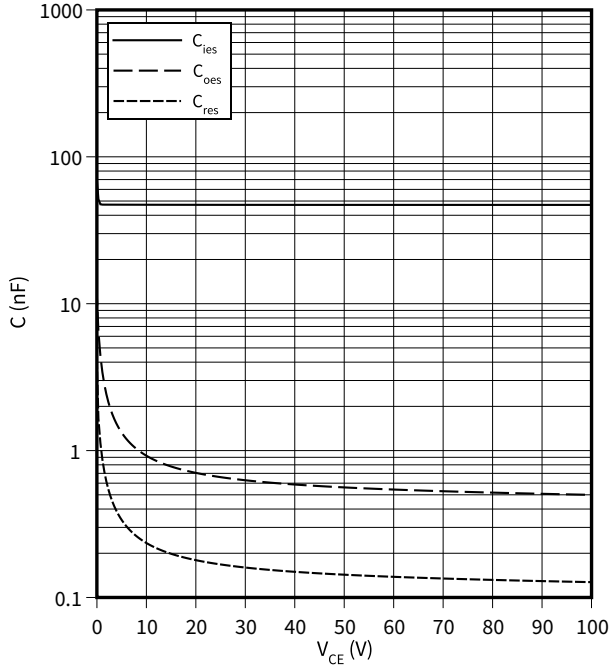


8 Characteristics diagrams

**capacity characteristic (typical), IGBT, T2 / T3**

$C = f(V_{CE})$

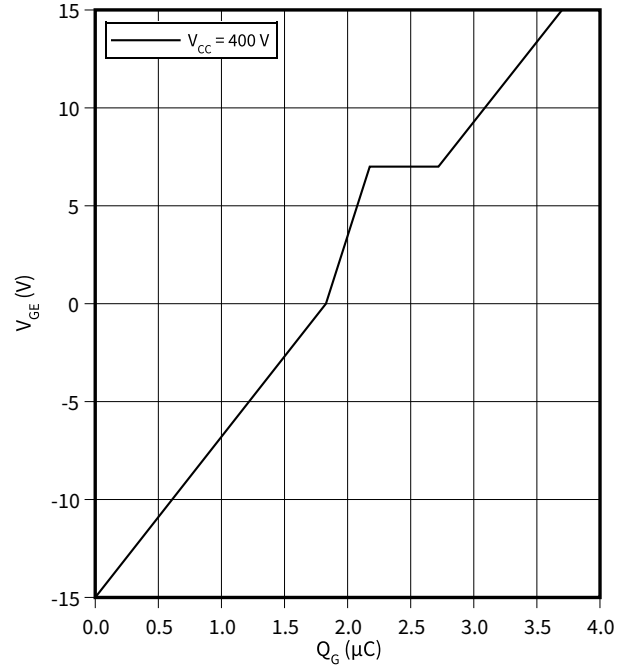
$f = 100 \text{ kHz}, V_{GE} = 0 \text{ V}, T_{vj} = 25 \text{ }^\circ\text{C}$



**gate charge characteristic (typical), IGBT, T2 / T3**

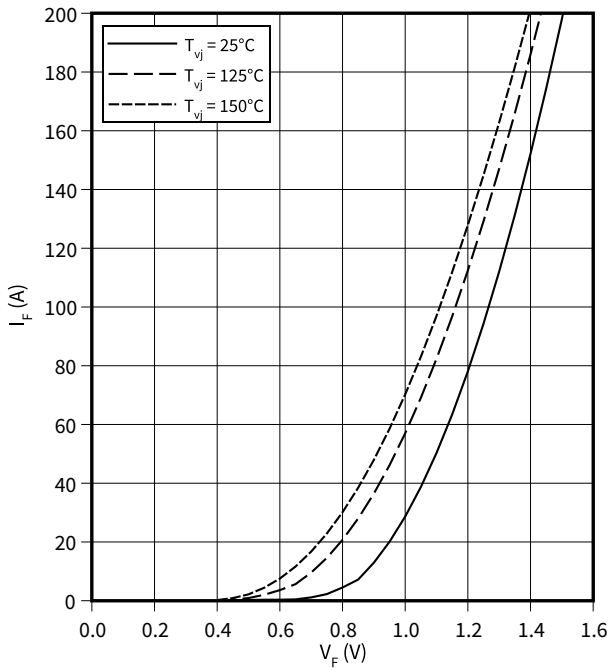
$V_{GE} = f(Q_G)$

$I_C = 200 \text{ A}, T_{vj} = 25 \text{ }^\circ\text{C}$



**forward characteristic (typical), Diode, D1 / D4**

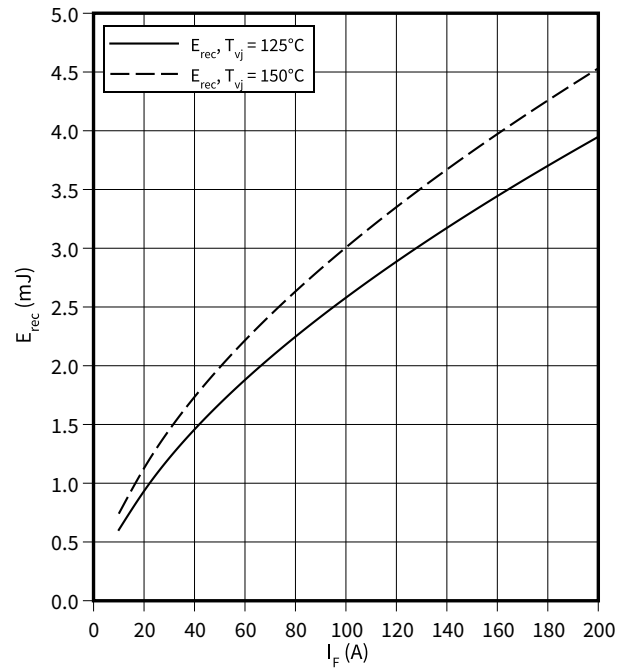
$I_F = f(V_F)$



**switching losses (typical), Diode, D1 / D4**

$E_{rec} = f(I_F)$

$R_{Gon} = 6.8 \text{ } \Omega, V_{CE} = 300 \text{ V}$



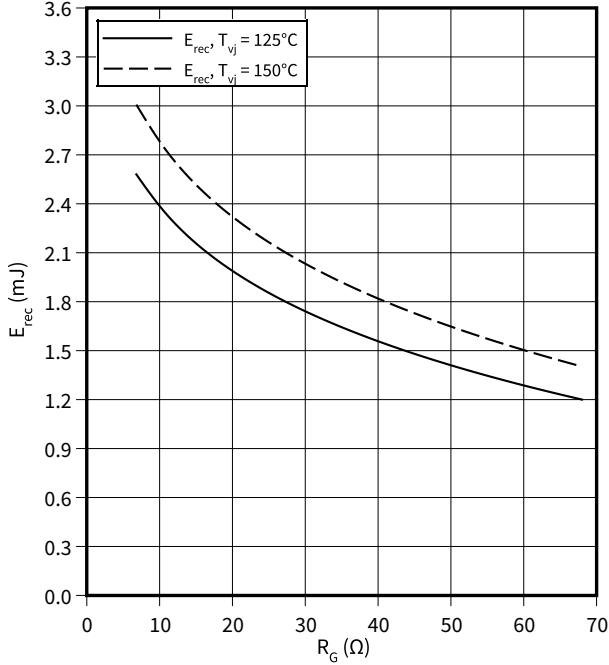


8 Characteristics diagrams

**switching losses (typical), Diode, D1 / D4**

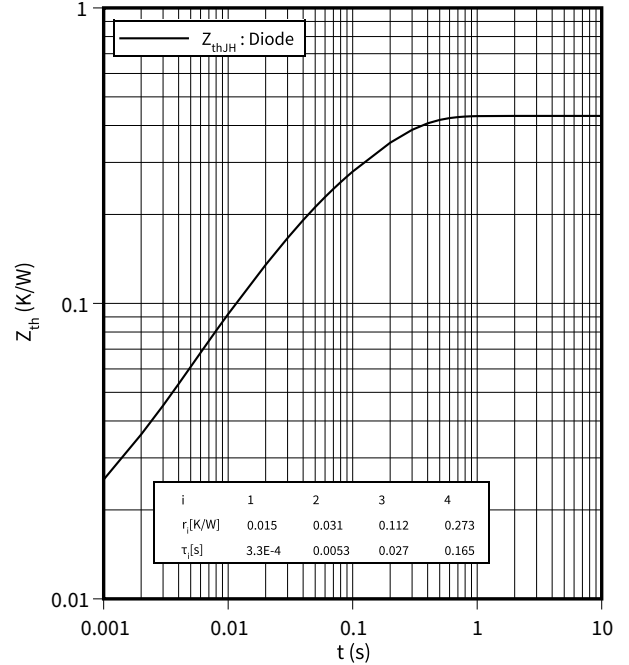
$E_{rec} = f(R_G)$

$V_{CE} = 300\text{ V}, I_F = 100\text{ A}$



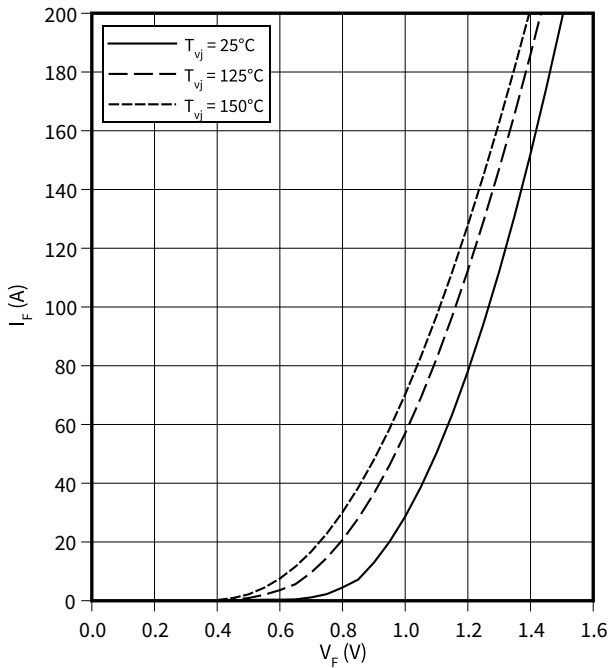
**transient thermal impedance, Diode, D1 / D4**

$Z_{th} = f(t)$



**forward characteristic (typical), Diode, D2 / D3**

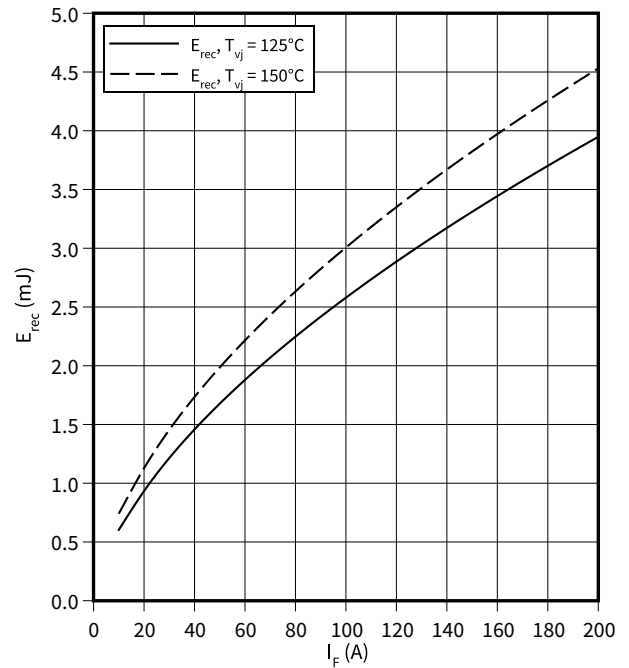
$I_F = f(V_F)$



**switching losses (typical), Diode, D2 / D3**

$E_{rec} = f(I_F)$

$R_{Gon} = 6.8\ \Omega, V_{CE} = 300\text{ V}$

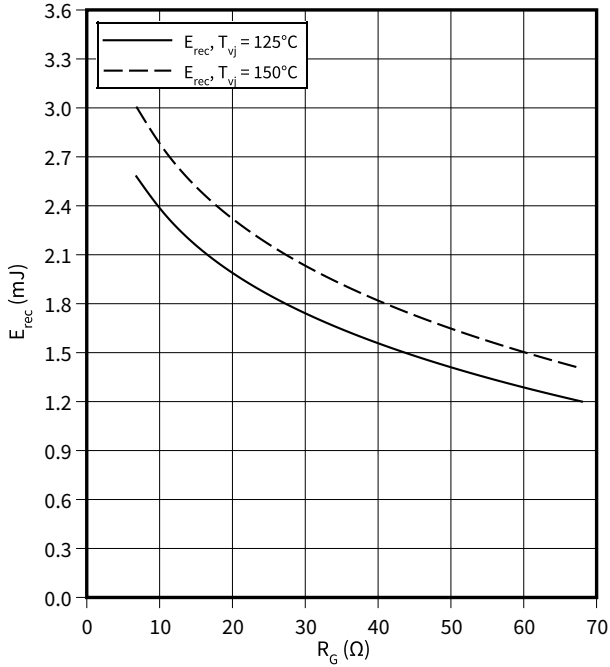


8 Characteristics diagrams

**switching losses (typical), Diode, D2 / D3**

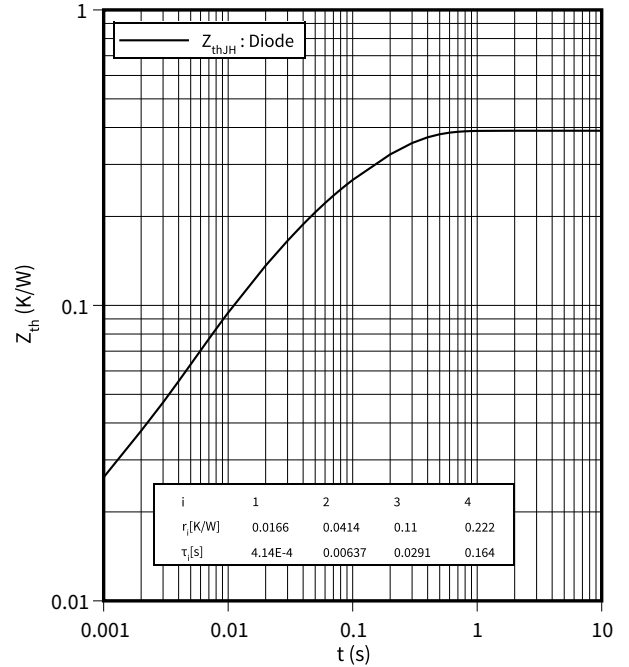
$E_{rec} = f(R_G)$

$V_{CE} = 300\text{ V}, I_F = 100\text{ A}$



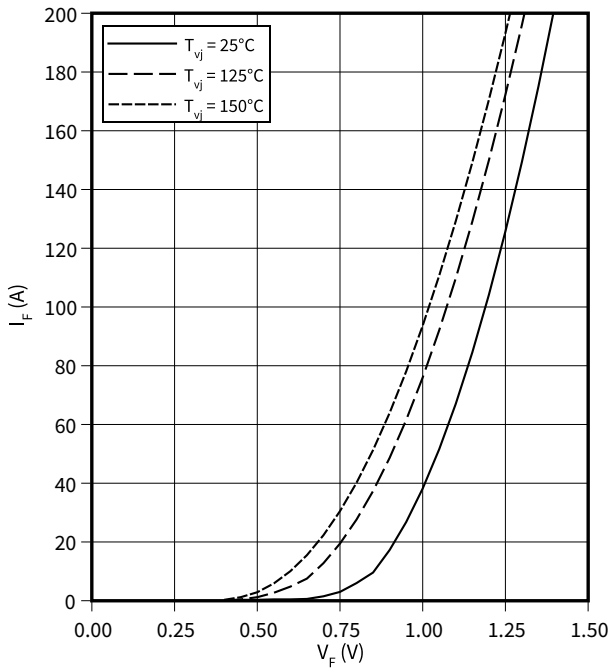
**transient thermal impedance, Diode, D2 / D3**

$Z_{th} = f(t)$



**forward characteristic of (typical), Diode, D5 / D6**

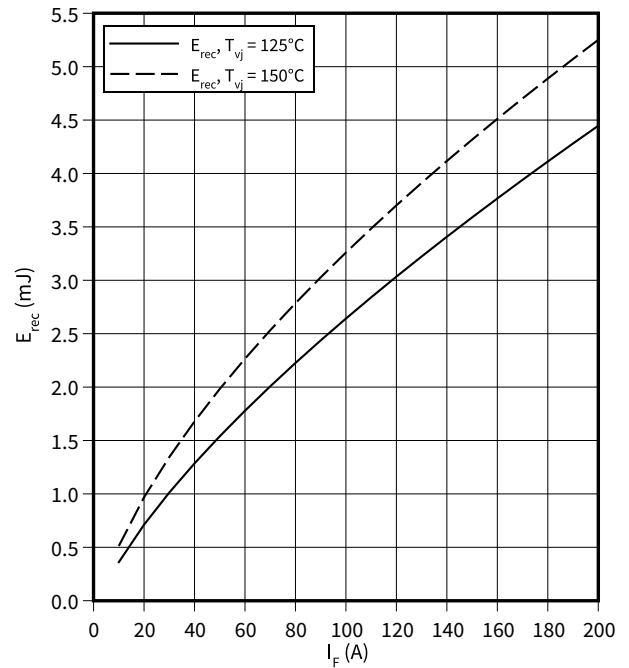
$I_F = f(V_F)$



**switching losses (typical), Diode, D5 / D6**

$E_{rec} = f(I_F)$

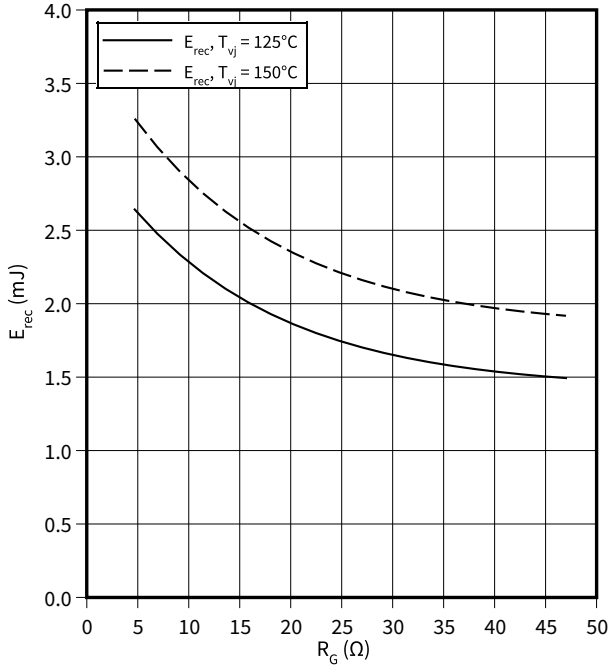
$R_{Gon} = 4.7\ \Omega, V_{CE} = 300\text{ V}$



8 Characteristics diagrams

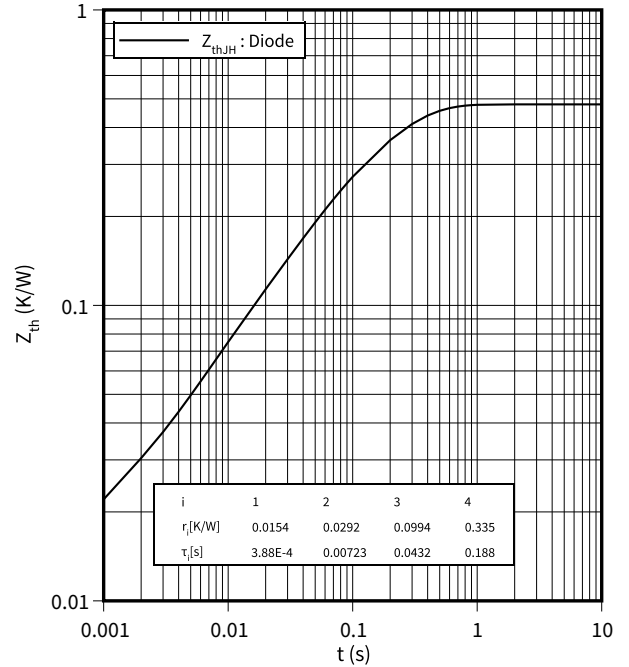
**switching losses (typical), Diode, D5 / D6**

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



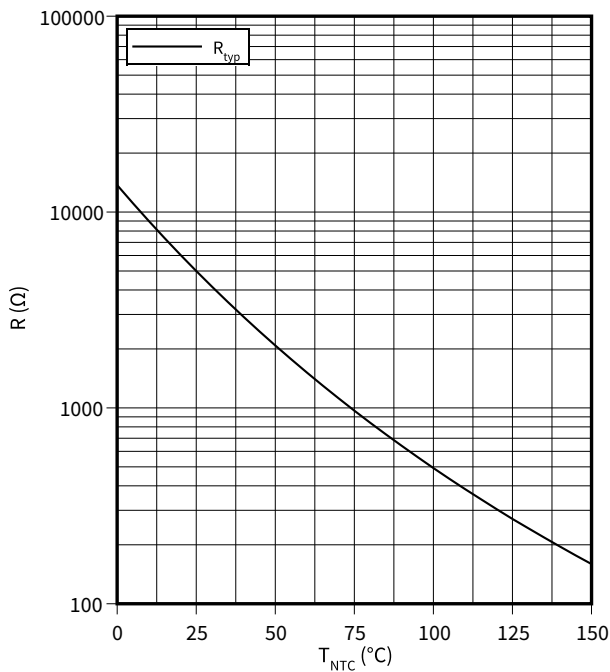
**transient thermal impedance , Diode, D5 / D6**

$Z_{th} = f(t)$



**temperature characteristic (typical), NTC-Thermistor**

$R = f(T_{NTC})$



## 9 Circuit diagram

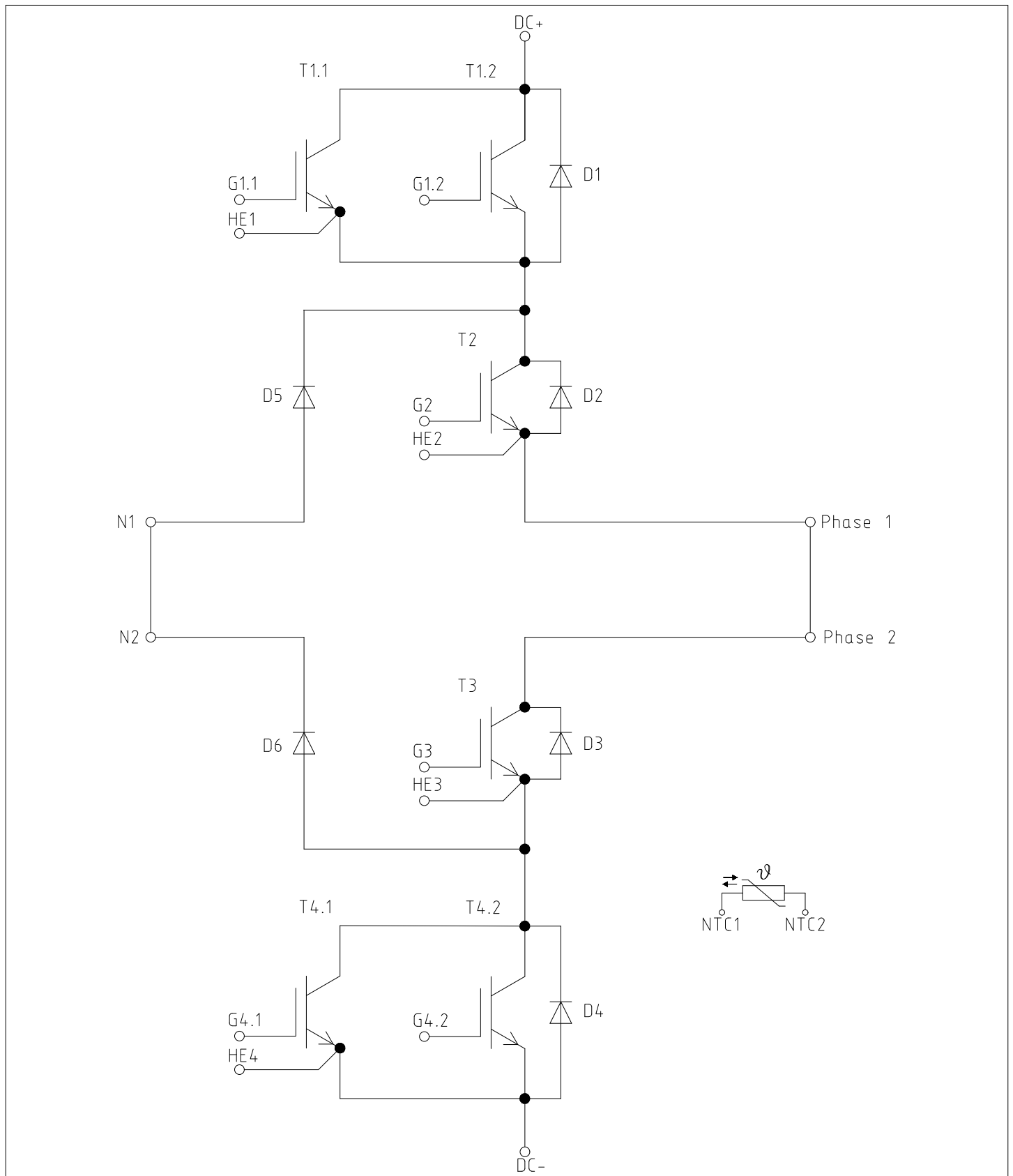


Figure 2

10 Package outlines

10 Package outlines

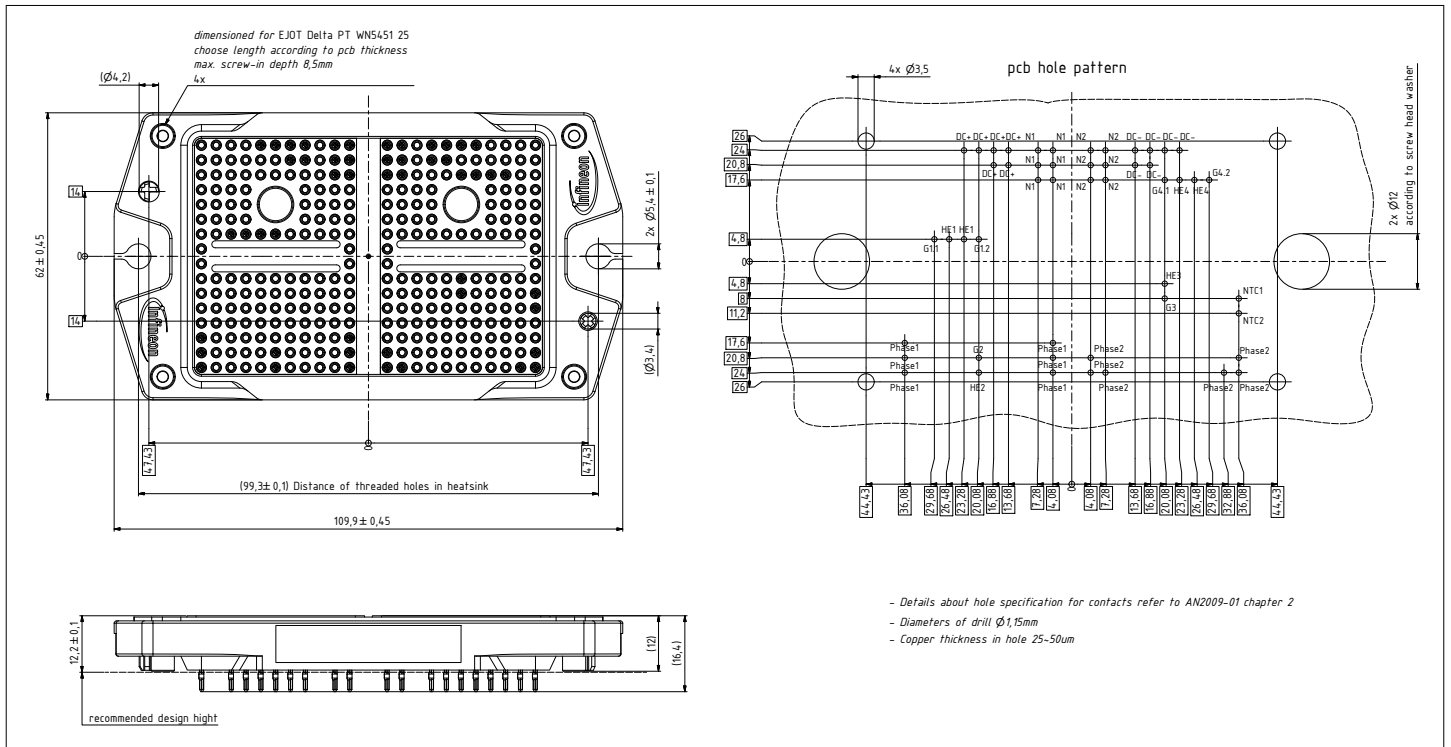


Figure 3

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		

Figure 4

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Revision history

## Revision history

Document revision	Date of release	Description of changes
0.10	2021-04-28	Target datasheet
1.00	2021-06-25	Final datasheet

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**IFX-AAS474-002**

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