Final datasheet

EconoPACK™3 module with TRENCHSTOP™IGBT7 and emitter controlled 7 diode and NTC

Features


Typical appearance

- Electrical features
  - V_{CES} = 1200 V
  - $I_{C\ nom}$ = 510 A / I_{CRM} = 1020 A
  - Low switching losses
  - TRENCHSTOP™ IGBT7
  - Suitable Infineon gate drivers can be found under https://www.infineon.com/gdfinder
- Mechanical features
  - 3.2 kV AC 1 minute insulation
  - Copper base plate
  - Integrated NTC temperature sensor
  - High power density

Potential applications

- Solar applications
- Three-level applications
- Energy storage systems (ESS)

Product validation

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

Description

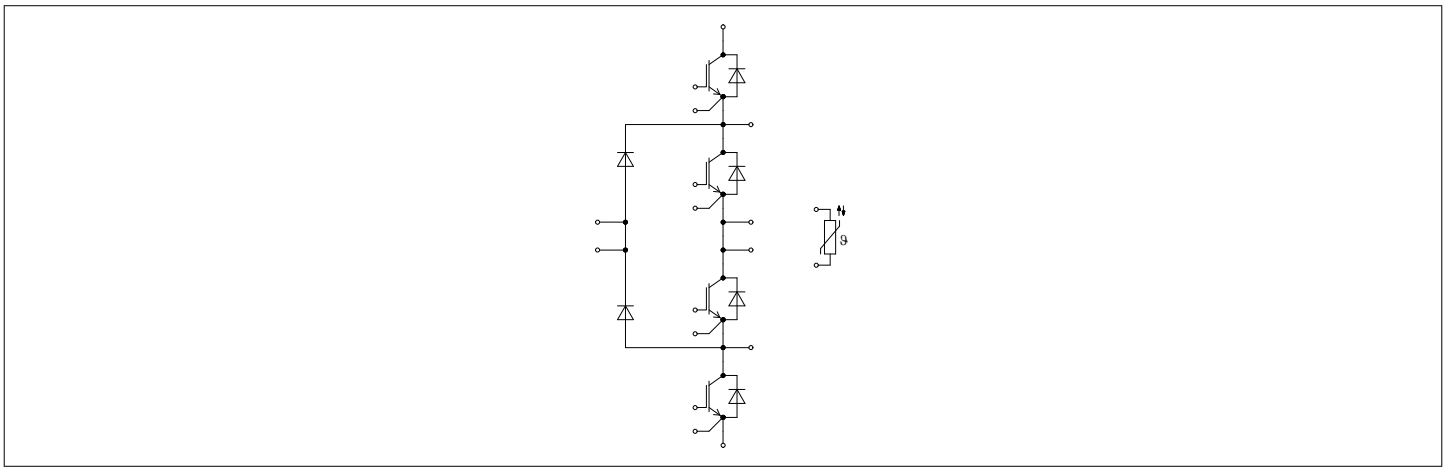


Table of contents

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	3.2	kV
Isolation test voltage NTC	$V_{ISOL(NTC)}$	RMS, f = 50 Hz, *t* = 1 min	3.2	kV
Material of module baseplate			Cu	
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	$d_{Creep\ nom}$	terminal to baseplate, nom.	10.0	mm
Clearance	$d_{Clear\ nom}$	terminal to baseplate, nom.	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}				15		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	T_C = 25 °C, per switch			0.5		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	T_C = 25 °C, per switch			0.4		mΩ
Storage temperature	T_{stg}			-40		125	°C
Mounting torque for module mounting	*M*	- Mounting according to valid application note	M5, Screw	3		6	Nm
Weight	*G*				300		g

***Note**: The current under continuous operation is limited to 50A rms per connector pin*

2 IGBT, T1 / T4

Table 3 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		T_{vj} = 25 °C	1200	V
Implemented collector current	I_{CN}			510	A
Continuous DC collector current	I_{CDC}	$T_{vj\ max}$ = 175 °C	T_C = 80 °C	320	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 limited by $T_{vj\,op}$	1020	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 = 500 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.69	2.25	V
			T_{vj} = 125 °C		1.89		
			T_{vj} = 150 °C		1.93		
			T_{vj} = 175 °C		1.98		
Gate threshold voltage	V_{GEth}	I_C = 8.16 mA, V_{CE} = V_{GE}, T_{vj} = 25 °C		4.85	5.50	6.15	V
Gate charge	Q_G	V_{GE} = ±15 V, V_{CC} = 600 V, T_{vj} = 25 °C			7.52		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			1.7		Ω
Input capacitance	C_{ies}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			57.9		nF
Reverse transfer capacitance	C_{res}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			0.37		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1200 V, V_{GE} = 0 V	T_{vj} = 25 °C			31	µA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25 °C				100	nA
Turn-on delay time (inductive load)	t_{don}	I_C = 500 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Gon} = 0.22 Ω	T_{vj} = 25 °C		0.361		µs
			T_{vj} = 125 °C		0.394		
			T_{vj} = 150 °C		0.405		
			T_{vj} = 175 °C		0.409		
Rise time (inductive load)	t_r	I_C = 500 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Gon} = 0.22 Ω	T_{vj} = 25 °C		0.030		µs
			T_{vj} = 125 °C		0.035		
			T_{vj} = 150 °C		0.036		
			T_{vj} = 175 °C		0.036		
Turn-off delay time (inductive load)	t_{doff}	I_C = 500 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Goff} = 16 Ω	T_{vj} = 25 °C		2.279		µs
			T_{vj} = 125 °C		2.411		
			T_{vj} = 150 °C		2.445		
			T_{vj} = 175 °C		2.501		

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Fall time (inductive load)	t_f	I_C = 500 A, V_{CC} = 600 V, V_{GE} = ±15 V, R_{Goff} = 16 Ω	T_{vj} = 25 °C		0.046		µs
			T_{vj} = 125 °C		0.031		
			T_{vj} = 150 °C		0.031		
			T_{vj} = 175 °C		0.039		
Turn-on energy loss per pulse	E_{on}	I_C = 500 A, V_{CC} = 600 V, L_σ = 15 nH, V_{GE} = ±15 V, R_{Gon} = 0.22 Ω, di/dt = 14.9 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		13		mJ
			T_{vj} = 125 °C		17.5		
			T_{vj} = 150 °C		19.6		
			T_{vj} = 175 °C		20.7		
Turn-off energy loss per pulse	E_{off}	I_C = 500 A, V_{CC} = 600 V, L_σ = 15 nH, V_{GE} = ±15 V, R_{Goff} = 16 Ω, dv/dt = 3880 V/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		23.7		mJ
			T_{vj} = 125 °C		31.9		
			T_{vj} = 150 °C		32.8		
			T_{vj} = 175 °C		33.4		
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.141	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT, λ_{grease} = 5 W/(m·K)			0.029		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		175	°C

***Note**: Tvj op > 150°C is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.*

3 IGBT, T2 / T3

Table 5 Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Collector-emitter voltage	V_{CES}		T_{vj} = 25 °C	1200	V
Implemented collector current	I_{CN}			420	A
Continuous DC collector current	I_{CDC}	$T_{vj\,max}$ = 175 °C	T_C = 80 °C	295	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\,op}$		840	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 = 400 A, V_{GE} = 15 V	T_{vj} = 25 °C		1.68	2.25	V
			T_{vj} = 125 °C		1.87		
			T_{vj} = 150 °C		1.91		
			T_{vj} = 175 °C		1.96		
Gate threshold voltage	V_{GEth}	I_C = 6.7 mA, V_{CE} = 20 V, T_{vj} = 25 °C		4.85	5.50	6.15	V
Gate charge	Q_G	V_{GE} = 15 V, V_{CC} = 600 V, T_{vj} = 25 °C			6.19		µC
Internal gate resistor	R_{Gint}	T_{vj} = 25 °C			1.7		Ω
Input capacitance	C_{ies}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			47.7		nF
Reverse transfer capacitance	C_{res}	f = 100 kHz, T_{vj} = 25 °C, V_{CE} = 25 V, V_{GE} = 0 V			0.29		nF
Collector-emitter cut-off current	I_{CES}	V_{CE} = 1200 V, V_{GE} = 0 V	T_{vj} = 25 °C			23	µA
Gate-emitter leakage current	I_{GES}	V_{CE} = 0 V, V_{GE} = 20 V, T_{vj} = 25 °C				100	nA
Turn-on delay time (inductive load)	t_{don}	I_C = 400 A, V_{CC} = 600 V, R_{Gon} = 0.22 Ω	T_{vj} = 25 °C		0.285		µs
			T_{vj} = 125 °C		0.314		
			T_{vj} = 150 °C		0.322		
			T_{vj} = 175 °C		0.334		
Rise time (inductive load)	t_r	I_C = 400 A, V_{CC} = 600 V, R_{Gon} = 0.22 Ω	T_{vj} = 25 °C		0.026		µs
			T_{vj} = 125 °C		0.032		
			T_{vj} = 150 °C		0.033		
			T_{vj} = 175 °C		0.034		
Turn-off delay time (inductive load)	t_{doff}	I_C = 400 A, V_{CC} = 600 V, R_{Goff} = 22 Ω	T_{vj} = 25 °C		2.625		µs
			T_{vj} = 125 °C		2.768		
			T_{vj} = 150 °C		2.805		
			T_{vj} = 175 °C		2.855		
Fall time (inductive load)	t_f	I_C = 400 A, V_{CC} = 600 V, R_{Goff} = 22 Ω	T_{vj} = 25 °C		0.061		µs
			T_{vj} = 125 °C		0.032		
			T_{vj} = 150 °C		0.032		
			T_{vj} = 175 °C		0.037		

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Turn-on energy loss per pulse	E_{on}	I_C = 400 A, V_{CC} = 600 V, L_σ = 15 nH, R_{Gon} = 0.22 Ω, di/dt = 11.3 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		9.1		mJ
			T_{vj} = 125 °C		12.5		
			T_{vj} = 150 °C		13.5		
			T_{vj} = 175 °C		15.9		
Turn-off energy loss per pulse	E_{off}	I_C = 400 A, V_{CC} = 600 V, L_σ = 15 nH, R_{Goff} = 22 Ω, dv/dt = 2010 V/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		21.7		mJ
			T_{vj} = 125 °C		26.6		
			T_{vj} = 150 °C		27.7		
			T_{vj} = 175 °C		31.1		
Thermal resistance, junction to case	R_{thJC}	per IGBT				0.146	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT, λ_{grease} = 5 W/(m·K)			0.025		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		175	°C

***Note**: Tvj op > 150°C is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.*

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 °C	1200	V
Continuous DC forward current	I_F			500	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		1000	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	11000	A^2s
			T_{vj} = 175 °C	9390	

Table 8 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 500 A, V_{GE} = 0 V	T_{vj} = 25 °C		2.50	3.05	V
			T_{vj} = 125 °C		2.18		
			T_{vj} = 150 °C		2.08		
			T_{vj} = 175 °C		1.98		
Peak reverse recovery current	I_{RM}	V_{CC} = 600 V, I_F = 500 A, V_{GE} = -15 V, -di$_F$/dt = 14.4 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		348		A
			T_{vj} = 125 °C		526		
			T_{vj} = 150 °C		573		
			T_{vj} = 175 °C		635		
Recovered charge	Q_r	V_{CC} = 600 V, I_F = 500 A, V_{GE} = -15 V, -di$_F$/dt = 14.4 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		17.1		µC
			T_{vj} = 125 °C		36.3		
			T_{vj} = 150 °C		42		
			T_{vj} = 175 °C		49.4		
Reverse recovery energy	E_{rec}	V_{CC} = 600 V, I_F = 500 A, V_{GE} = -15 V, -di$_F$/dt = 14.4 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		6.77		mJ
			T_{vj} = 125 °C		15.3		
			T_{vj} = 150 °C		17.8		
			T_{vj} = 175 °C		24.3		
Thermal resistance, junction to case	R_{thJC}	per diode				0.204	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode, λ_{grease} = 5 W/(m·K)			0.01		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		175	°C

***Note**: Tvj op > 150°C is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.*

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 °C	1200	V
Continuous DC forward current	I_F			300	A

(table continues...)

Table 9 (continued) Maximum rated values

Parameter	Symbol	Note or test condition		Values	Unit
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		600	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	10500	A^2s
			T_{vj} = 175 °C	9330	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 400 A, V_{GE} = 0 V	T_{vj} = 25 °C		1.90	2.27	V
			T_{vj} = 125 °C		1.78		
			T_{vj} = 150 °C		1.74		
			T_{vj} = 175 °C		1.70		
Peak reverse recovery current	I_{RM}	V_{CC} = 600 V, I_F = 400 A, V_{GE} = -15 V, -di$_F$/dt = 11.3 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		350		A
			T_{vj} = 125 °C		435		
			T_{vj} = 150 °C		463		
			T_{vj} = 175 °C		503		
Recovered charge	Q_r	V_{CC} = 600 V, I_F = 400 A, V_{GE} = -15 V, -di$_F$/dt = 11.3 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		25		µC
			T_{vj} = 125 °C		48		
			T_{vj} = 150 °C		54.7		
			T_{vj} = 175 °C		65.8		
Reverse recovery energy	E_{rec}	V_{CC} = 600 V, I_F = 400 A, V_{GE} = -15 V, -di$_F$/dt = 11.3 kA/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		11.7		mJ
			T_{vj} = 125 °C		20.3		
			T_{vj} = 150 °C		23.2		
			T_{vj} = 175 °C		30.3		
Thermal resistance, junction to case	R_{thJC}	per diode				0.245	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode, λ_{grease} = 5 W/(m·K)			0.034		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		175	°C

***Note**: Tvj op > 150°C is allowed for operation at overload conditions. For detailed specifications, please refer to AN 2018-14.*

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 °C	1200	V
Continuous DC forward current	I_F			500	A
Repetitive peak forward current	I_{FRM}	t_P = 1 ms		1000	A
I^2t - value	I^2t	t_P = 10 ms, V_R = 0 V	T_{vj} = 125 °C	11000	A^2s
			T_{vj} = 175 °C	9390	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	I_F = 500 A, V_{GE} = 0 V	T_{vj} = 25 °C		2.50	3.05	V
			T_{vj} = 125 °C		2.18		
			T_{vj} = 150 °C		2.08		
			T_{vj} = 175 °C		1.98		
Reverse current	I_R	V_R = 1200 V	T_{vj} = 25 °C			20	µA
Peak reverse recovery current	I_{RM}	V_{CC} = 600 V, I_F = 500 A, -di$_F$/dt = 14.9 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		348		A
			T_{vj} = 125 °C		526		
			T_{vj} = 150 °C		573		
			T_{vj} = 175 °C		635		
Recovered charge	Q_r	V_{CC} = 600 V, I_F = 500 A, -di$_F$/dt = 14.9 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		17.1		µC
			T_{vj} = 125 °C		36.3		
			T_{vj} = 150 °C		42		
			T_{vj} = 175 °C		49.4		
Reverse recovery energy	E_{rec}	V_{CC} = 600 V, I_F = 500 A, -di$_F$/dt = 14.9 A/µs (T_{vj} = 175 °C)	T_{vj} = 25 °C		6.77		mJ
			T_{vj} = 125 °C		15.2		
			T_{vj} = 150 °C		17.8		
			T_{vj} = 175 °C		24.3		
Thermal resistance, junction to case	R_{thJC}	per diode				0.203	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode, λ_{grease} = 5 W/(m·K)			0.016		K/W
Temperature under switching conditions	$T_{vj\,op}$			-40		175	°C

***Note**: Tvj op > 150°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 °C		5		kΩ
Deviation of R_{100}	$\Delta R/R$	T_{NTC} = 100 °C, R_{100} = 493 Ω	-5		5	%
Power dissipation	P_{25}	T_{NTC} = 25 °C			20	mW
B-value	$B_{25/50}$	$R_2 = R_{25} \exp[B_{25/50}(1/T_2-1/(298{,}15\ K))]$		3375		K
B-value	$B_{25/80}$	$R_2 = R_{25} \exp[B_{25/80}(1/T_2-1/(298{,}15\ K))]$		3411		K
B-value	$B_{25/100}$	$R_2 = R_{25} \exp[B_{25/100}(1/T_2-1/(298{,}15\ K))]$		3433		K

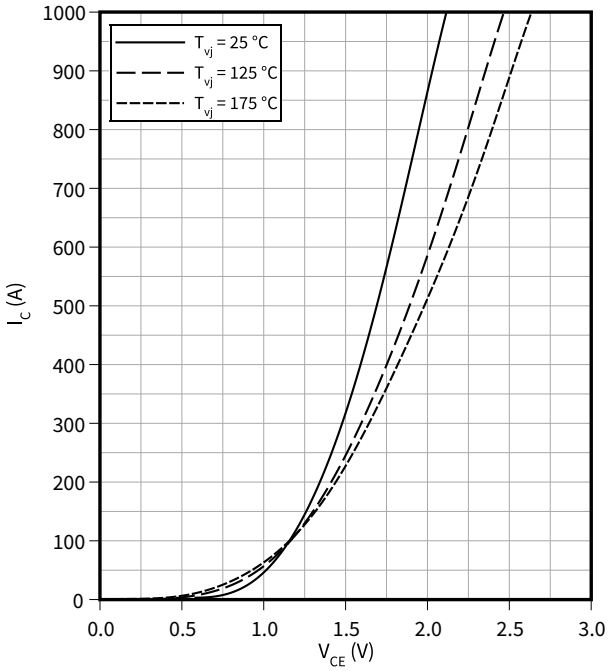
***Note**: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4.*

8 Characteristics diagrams

Output characteristic (typical), IGBT, T1 / T4

$I_C = f(V_{CE})$

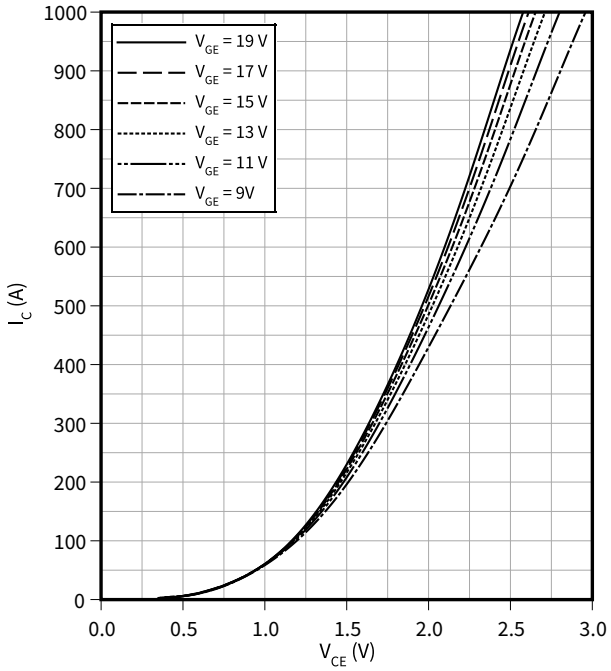
V_{GE} = 15 V



Output characteristic field (typical), IGBT, T1 / T4

$I_C = f(V_{CE})$

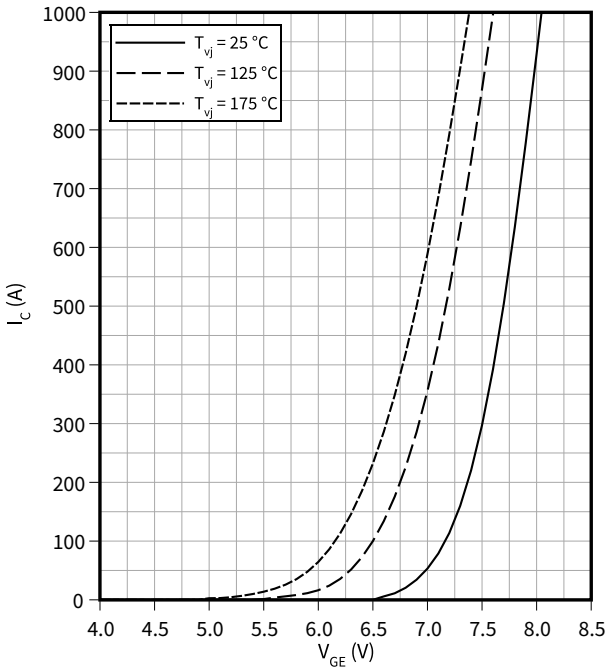
T_{vj} = 175 °C



Transfer characteristic (typical), IGBT, T1 / T4

$I_C = f(V_{GE})$

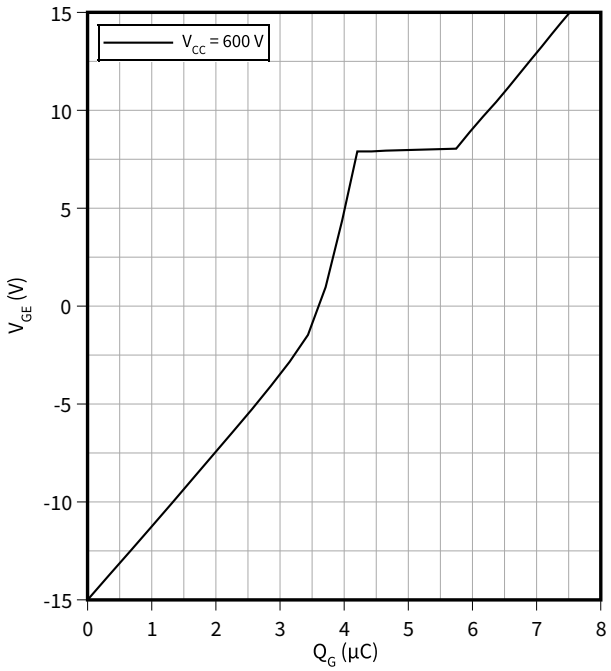
V_{CE} = 20 V



Gate charge characteristic (typical), IGBT, T1 / T4

$V_{GE} = f(Q_G)$

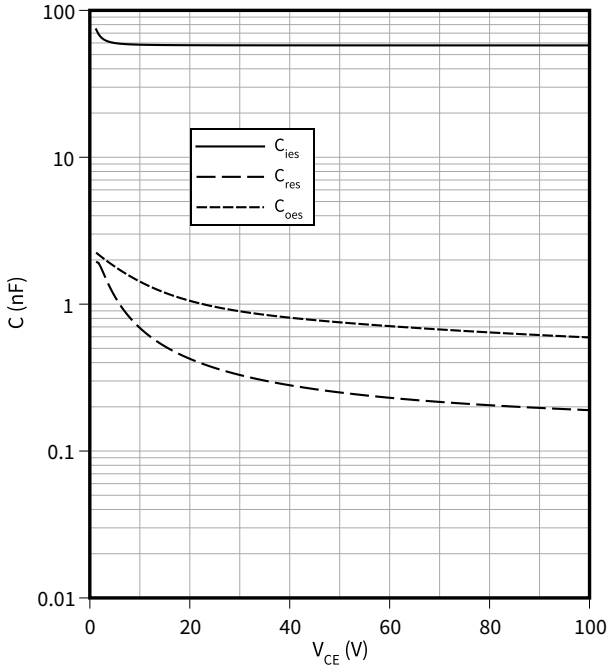
I_C = 510 A, T_{vj} = 25 °C



Capacity characteristic (typical), IGBT, T1 / T4

$C = f(V_{CE})$

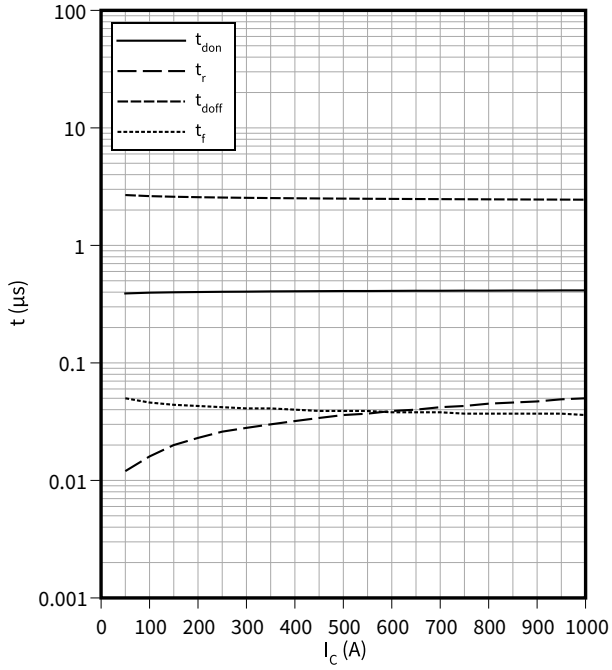
$f = 100\ kHz$, $V_{GE} = 0\ V$, $T_{vj} = 25\ °C$



Switching times (typical), IGBT, T1 / T4

$t = f(I_C)$

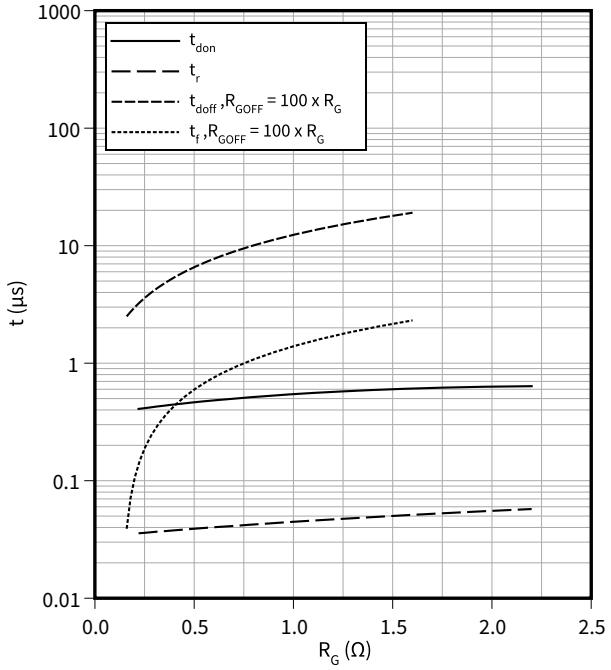
$R_{Goff} = 16\ \Omega$, $R_{Gon} = 0.22\ \Omega$, $V_{GE} = \pm 15\ V$, $V_{CC} = 600\ V$, $T_{vj} = 175\ °C$



Switching times (typical), IGBT, T1 / T4

$t = f(R_G)$

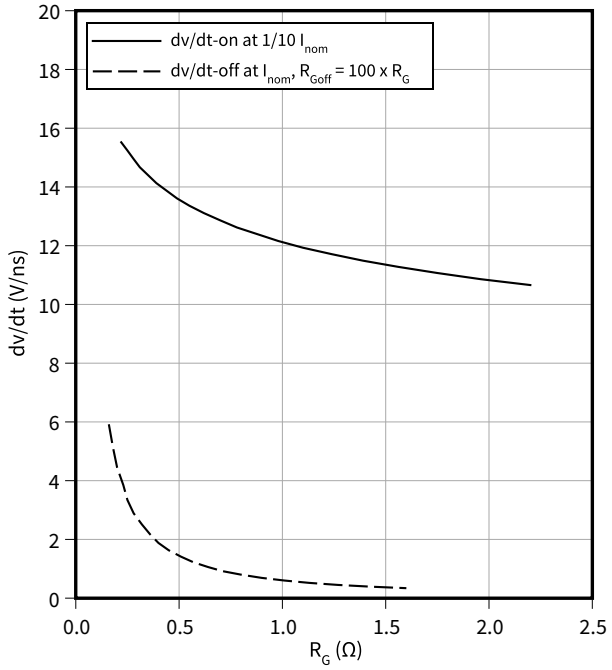
$I_C = 500\ A$, $V_{CC} = 600\ V$, $T_{vj} = 175\ °C$



Voltage slope (typical), IGBT, T1 / T4

$dv/dt = f(R_G)$

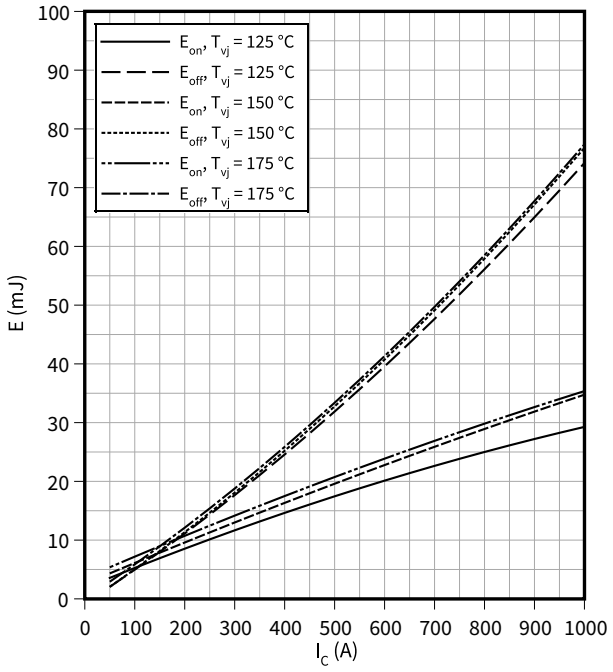
$V_{GE} = \pm 15\ V$, $I_C = 500\ A$, $V_{CC} = 600\ V$, $T_{vj} = 25\ °C$



Switching losses (typical), IGBT, T1 / T4

$E = f(I_C)$

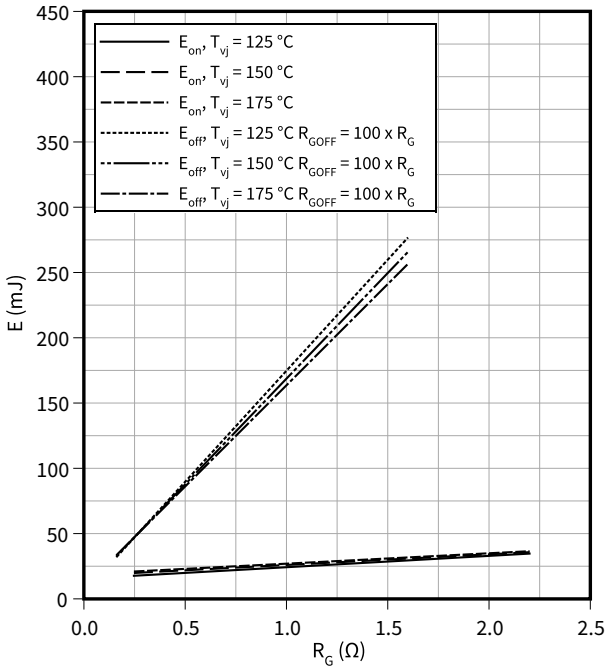
$R_{Goff} = 16\ \Omega$, $R_{Gon} = 0.22\ \Omega$, $V_{GE} = \pm 15$ V, $V_{CC} = 600$ V



Switching losses (typical), IGBT, T1 / T4

$E = f(R_G)$

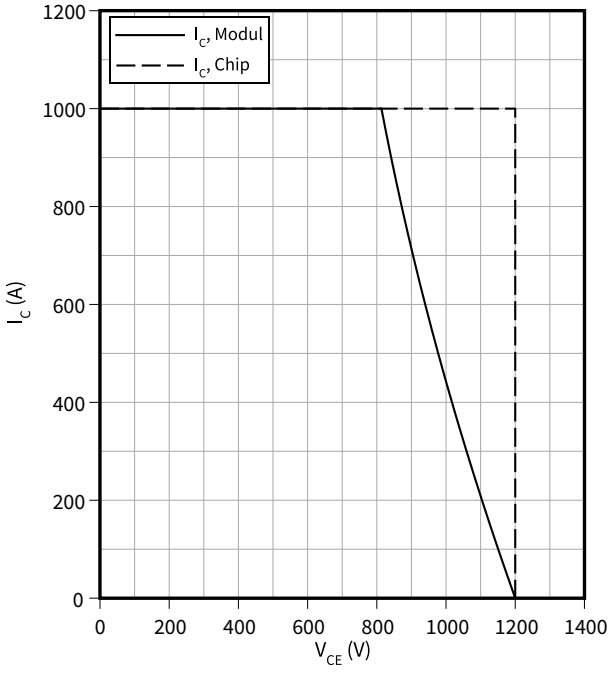
$V_{GE} = \pm 15$ V, $I_C = 500$ A, $V_{CC} = 600$ V



Reverse bias safe operating area (RBSOA), IGBT, T1 / T4

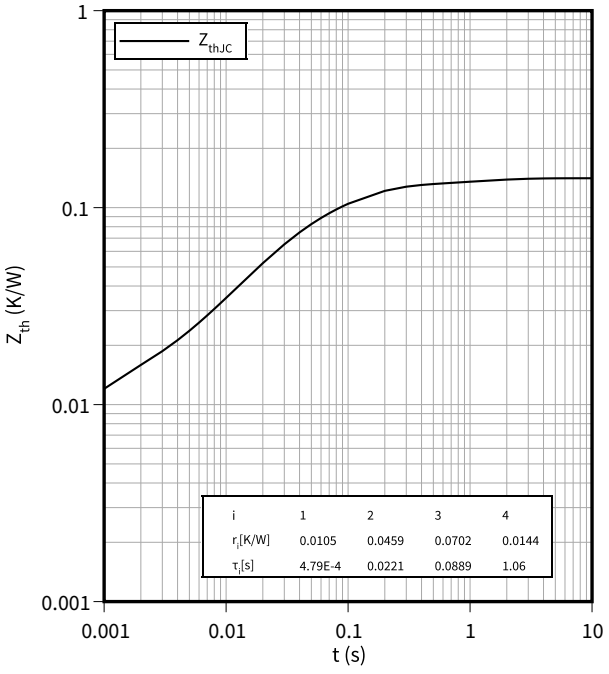
$I_C = f(V_{CE})$

$R_{Goff} = 16\ \Omega$, $V_{GE} = \pm 15$ V, $T_{vj} = 175$ °C



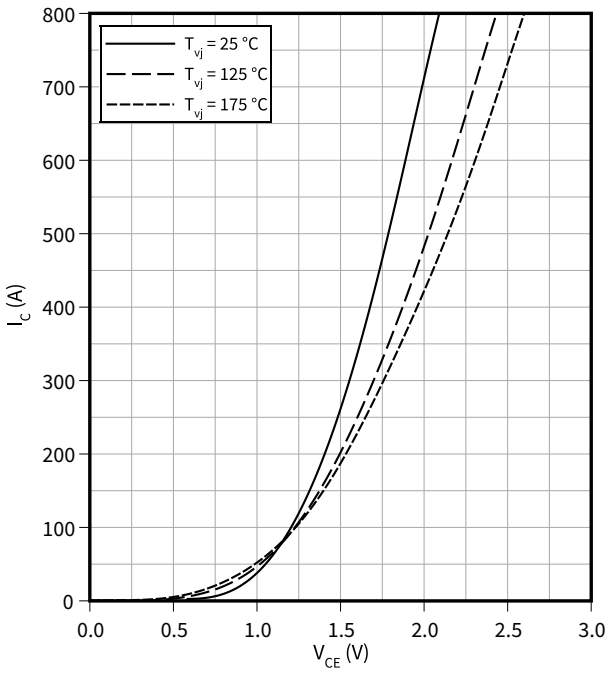
Transient thermal impedance, IGBT, T1 / T4

$Z_{th} = f(t)$



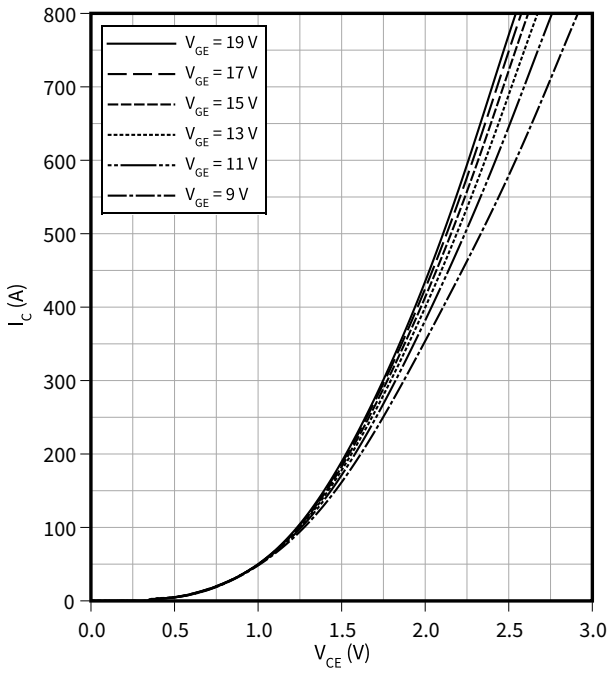
Output characteristic (typical), IGBT, T2 / T3

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



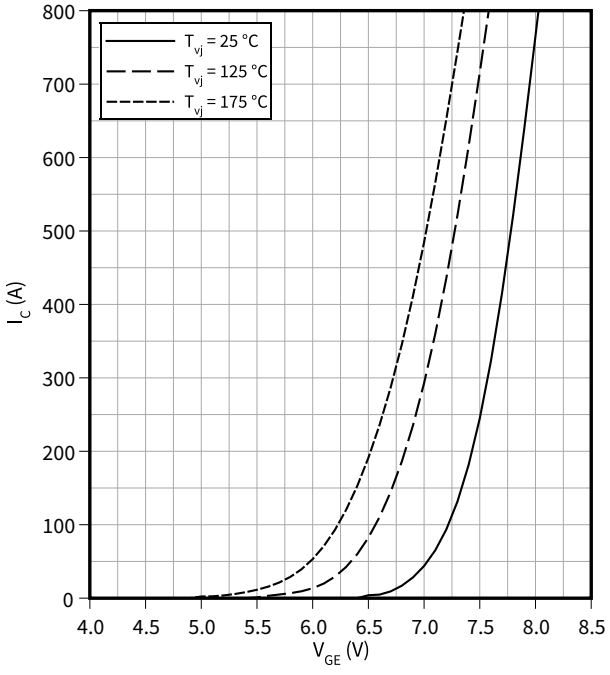
Output characteristic field (typical), IGBT, T2 / T3

$I_C = f(V_{CE})$
$T_{vj} = 175$ °C



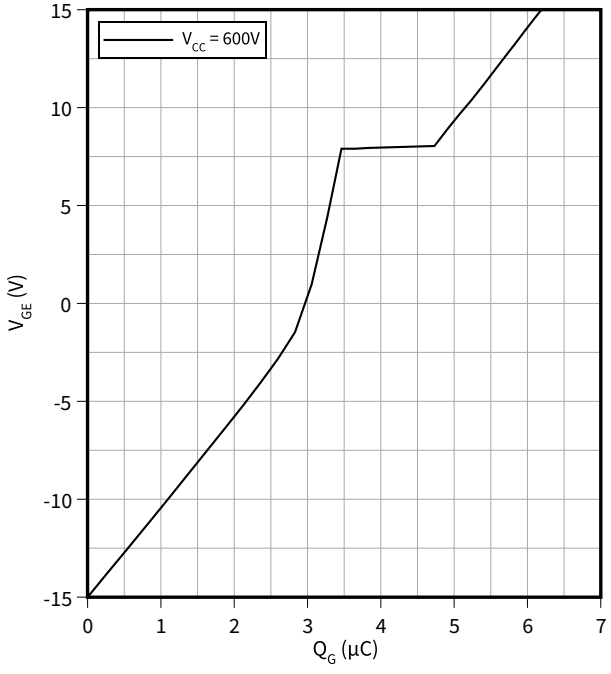
Transfer characteristic (typical), IGBT, T2 / T3

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



Gate charge characteristic (typical), IGBT, T2 / T3

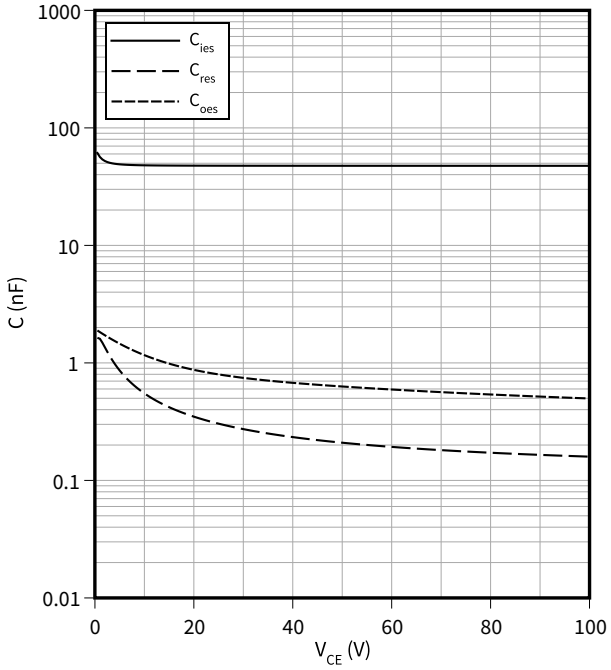
$V_{GE} = f(Q_G)$
$I_C = 420$ A, $T_{vj} = 25$ °C



Capacity characteristic (typical), IGBT, T2 / T3

$C = f(V_{CE})$

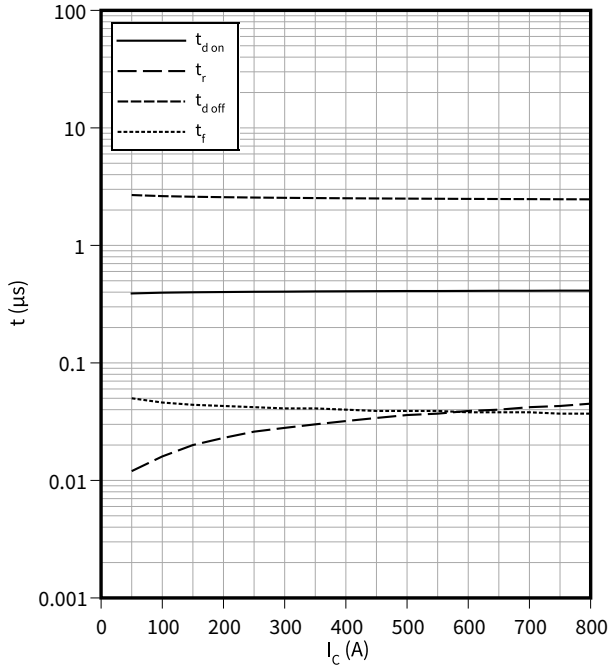
$f = 100$ kHz, $V_{GE} = 0$ V, $T_{vj} = 25$ °C



Switching times (typical), IGBT, T2 / T3

$t = f(I_C)$

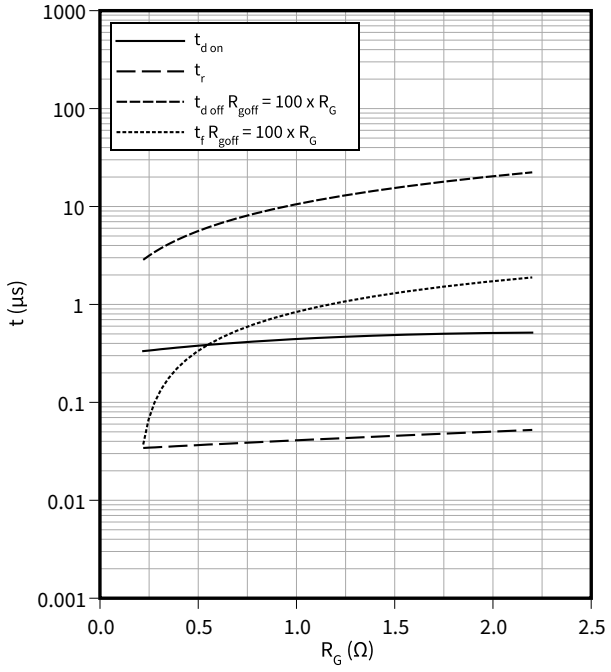
$R_{Goff} = 22\ \Omega$, $R_{Gon} = 0.22\ \Omega$, $V_{GE} = \pm 15$ V, $V_{CC} = 600$ V, $T_{vj} = 175$ °C



Switching times (typical), IGBT, T2 / T3

$t = f(R_G)$

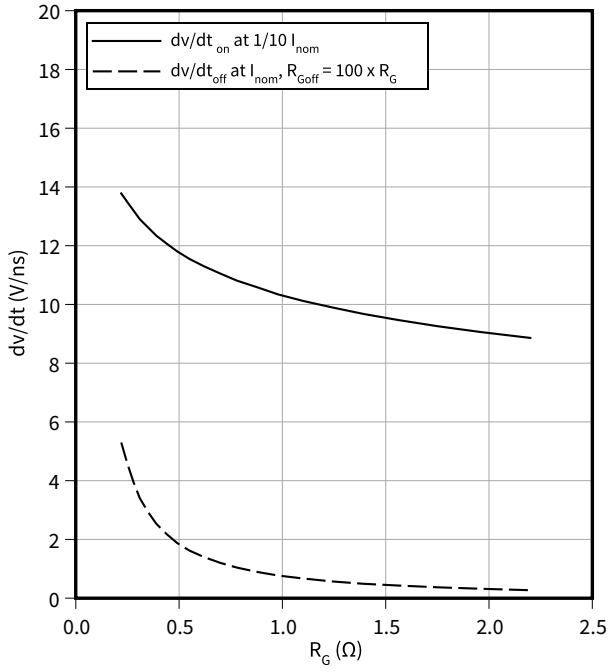
$I_C = 400$ A, $V_{CC} = 600$ V, $T_{vj} = 175$ °C



Voltage slope (typical), IGBT, T2 / T3

$dv/dt = f(R_G)$

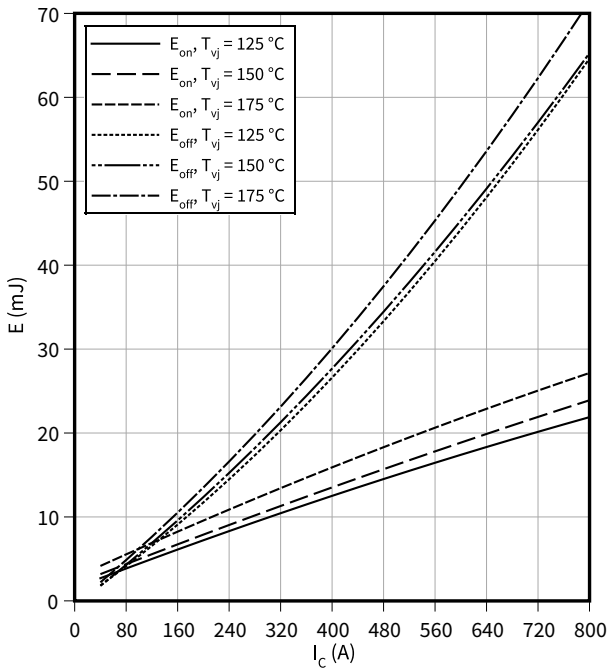
$V_{GE} = \pm 15$ V, $I_C = 400$ A, $V_{CC} = 600$ V, $T_{vj} = 25$ °C



Switching losses (typical), IGBT, T2 / T3

$E = f(I_C)$

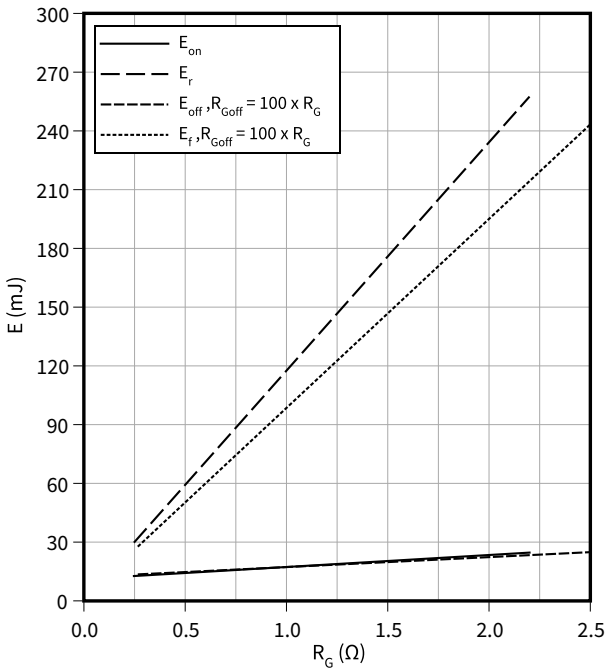
$R_{Goff} = 22\ \Omega$, $R_{Gon} = 0.22\ \Omega$, $V_{GE} = \pm 15$ V, $V_{CC} = 600$ V



Switching losses (typical), IGBT, T2 / T3

$E = f(R_G)$

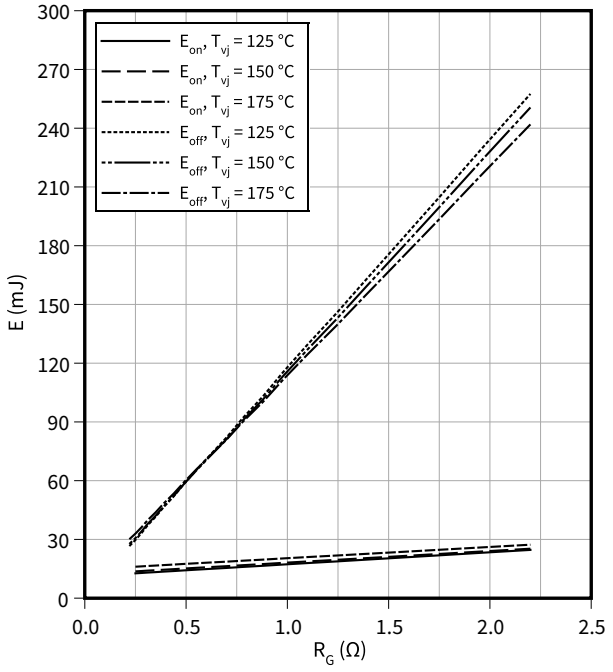
$V_{GE} = \pm 15$ V, $I_C = 400$ A, $V_{CC} = 600$ V, $T_{vj} = 150$ °C



Switching losses (typical), IGBT, T2 / T3

$E = f(R_G)$

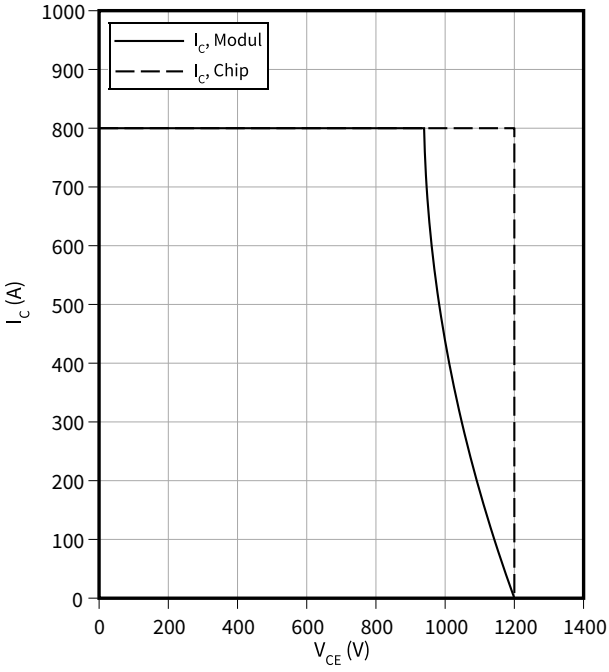
$V_{GE} = \pm 15$ V, $I_C = 400$ A, $V_{CC} = 600$ V



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

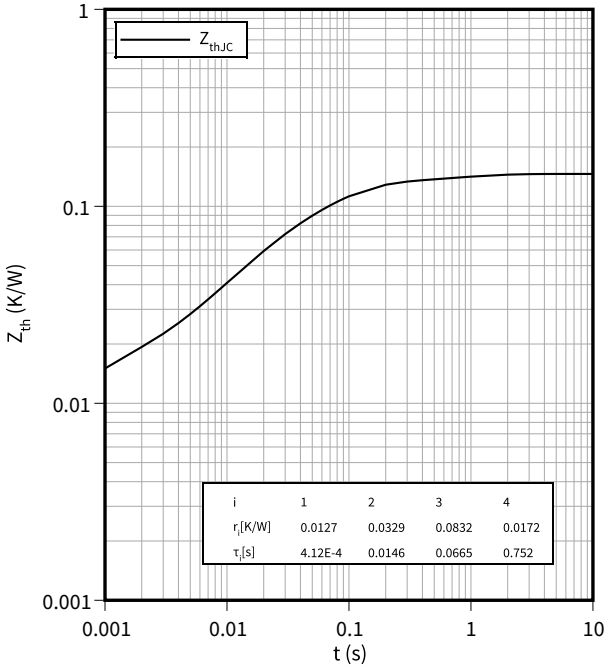
$I_C = f(V_{CE})$

$T_{vj} = 175$ °C, $R_{Goff} = 22\ \Omega$, $V_{GE} = \pm 15$ V



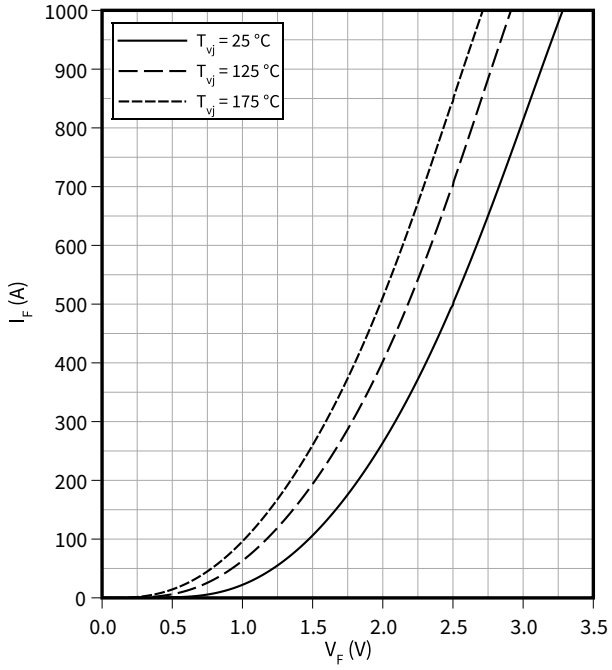
Transient thermal impedance, IGBT, T2 / T3

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, D1 / D4

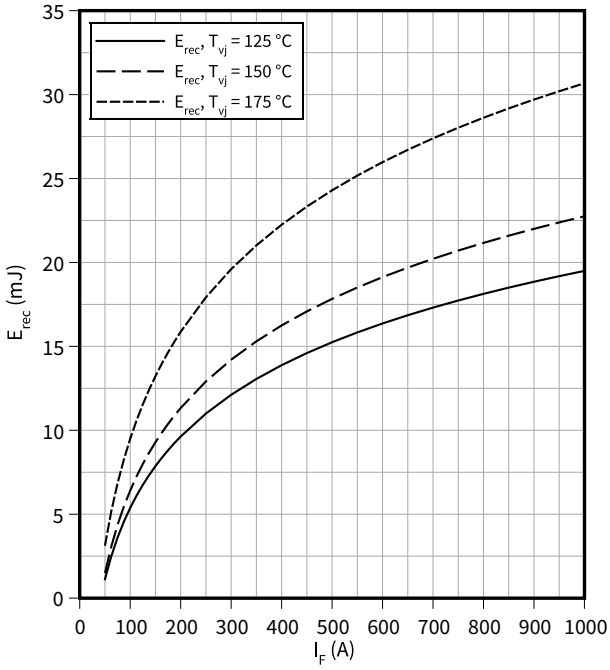
$I_F = f(V_F)$



Switching losses (typical), Diode, D1 / D4

$E_{rec} = f(I_F)$

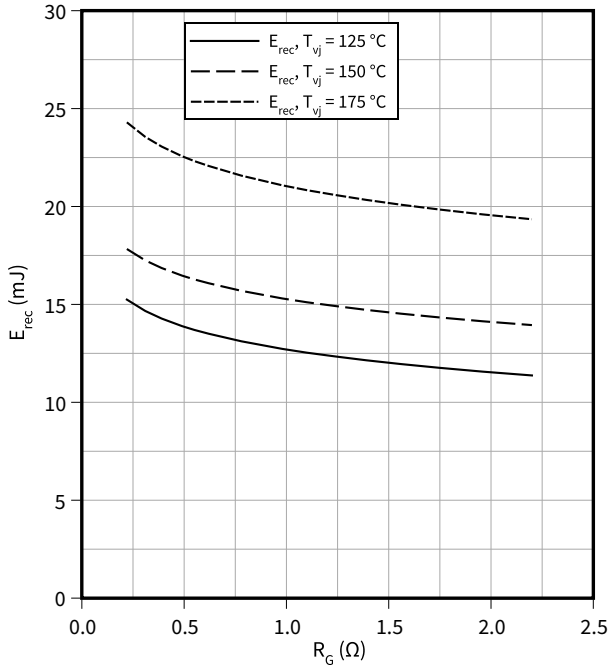
$R_G = 0.22\ \Omega$, $V_{CC} = 600\ V$



Switching losses (typical), Diode, D1 / D4

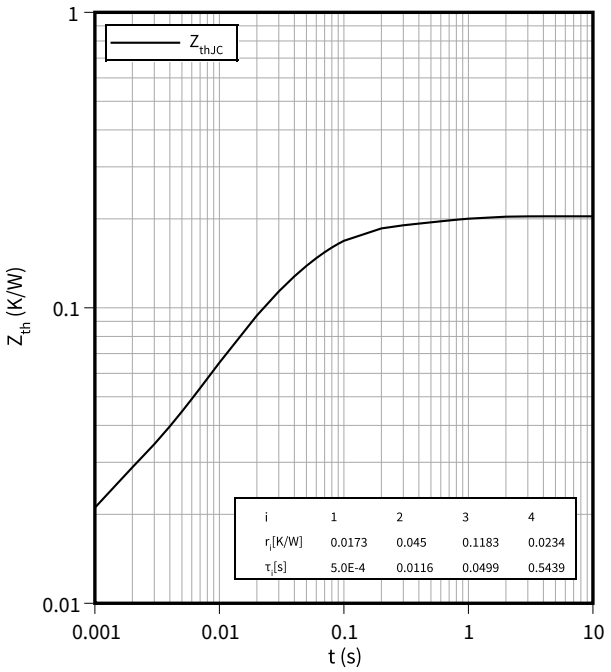
$E_{rec} = f(R_G)$

$I_F = 500\ A$, $V_{CC} = 600\ V$



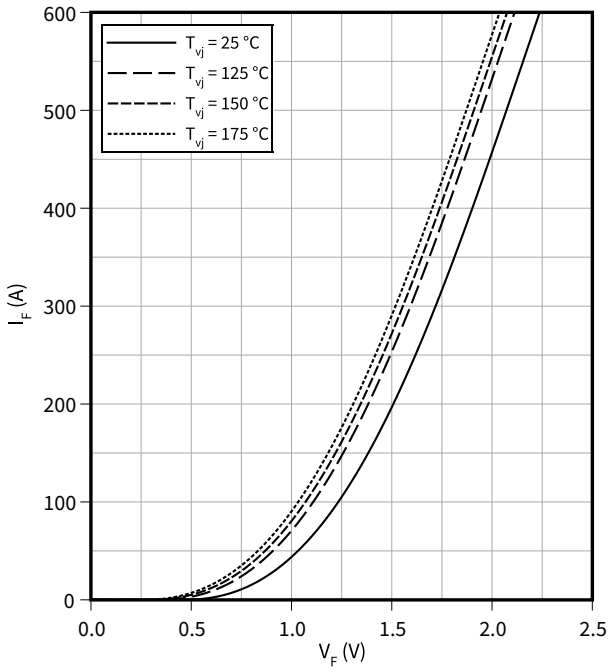
Transient thermal impedance, Diode, D1 / D4

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, D2 / D3

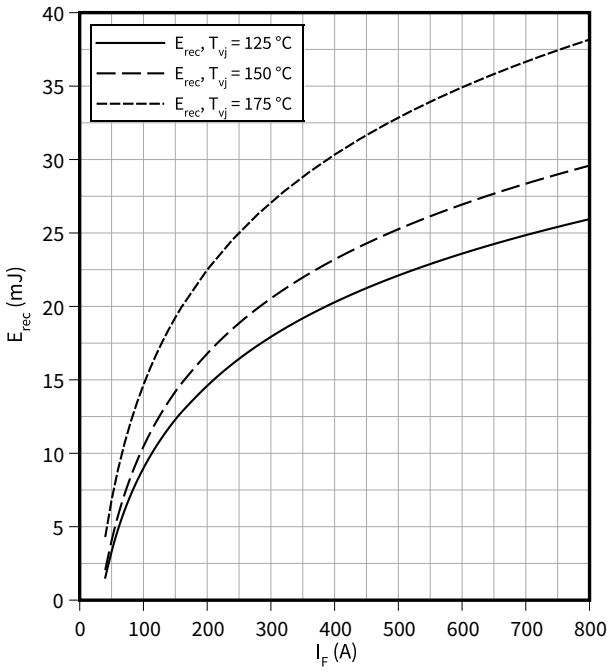
$I_F = f(V_F)$



Switching losses (typical), Diode, D2 / D3

$E_{rec} = f(I_F)$

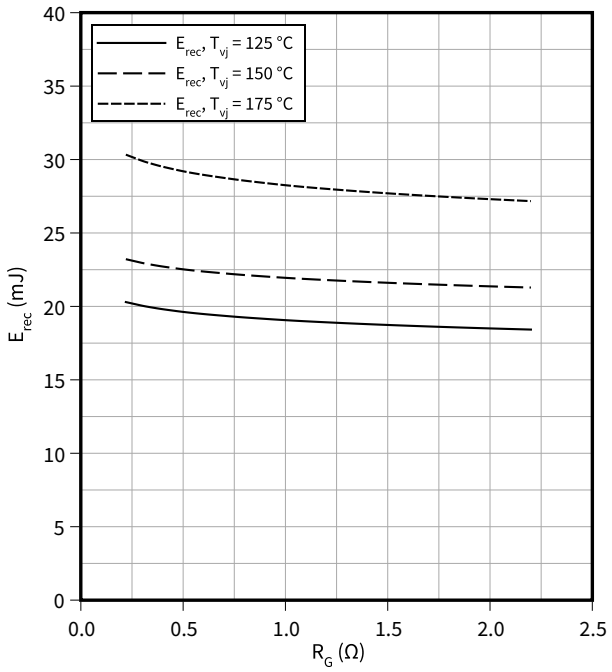
$R_{Gon} = 0.22\ \Omega$, $V_{CE} = 600$ V



Switching losses (typical), Diode, D2 / D3

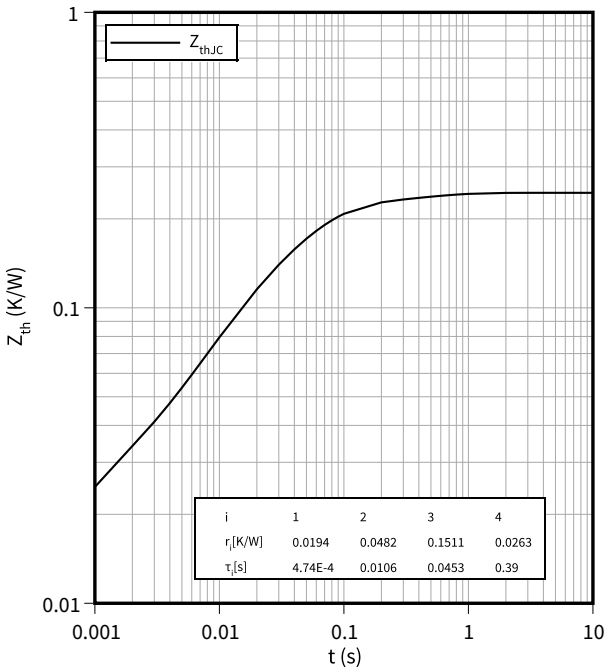
$E_{rec} = f(R_G)$

$V_{CE} = 600$ V, $I_F = 400$ A



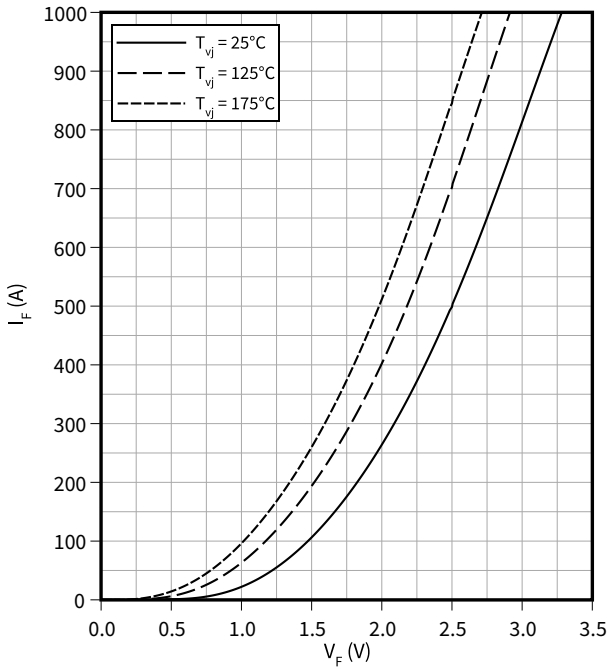
Transient thermal impedance, Diode, D2 / D3

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, D5 / D6

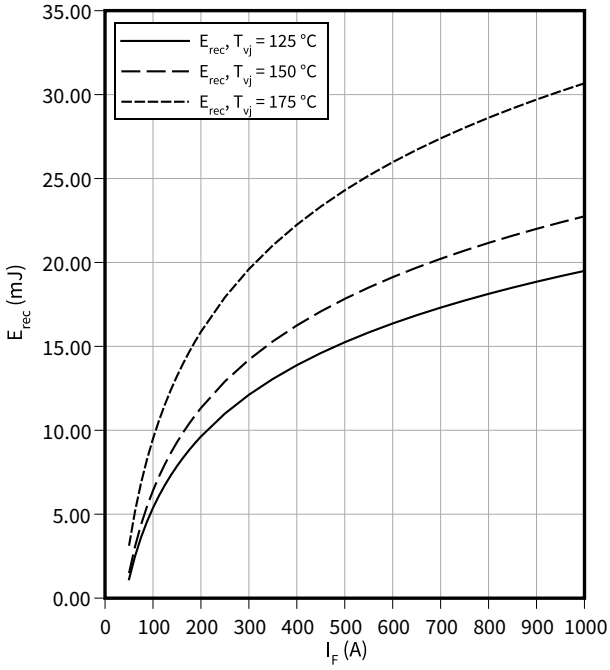
$I_F = f(V_F)$



Switching losses (typical), Diode, D5 / D6

$E_{rec} = f(I_F)$

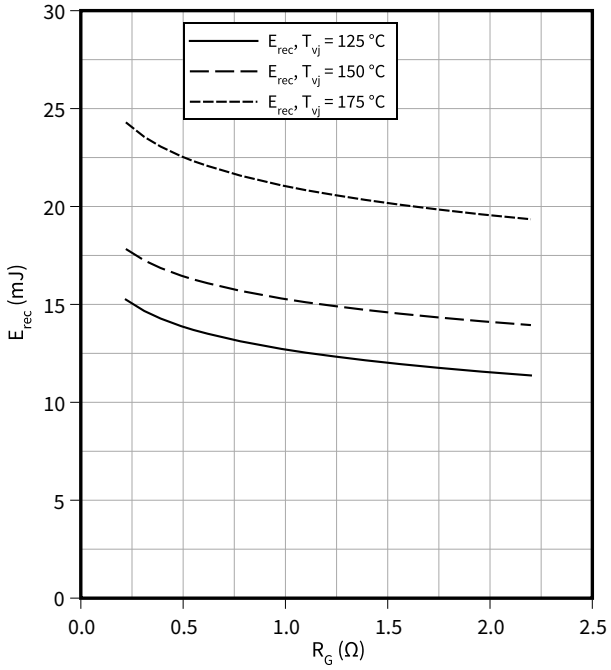
$V_{CE} = 600\ V$, $R_G = 0.22\ \Omega$



Switching losses (typical), Diode, D5 / D6

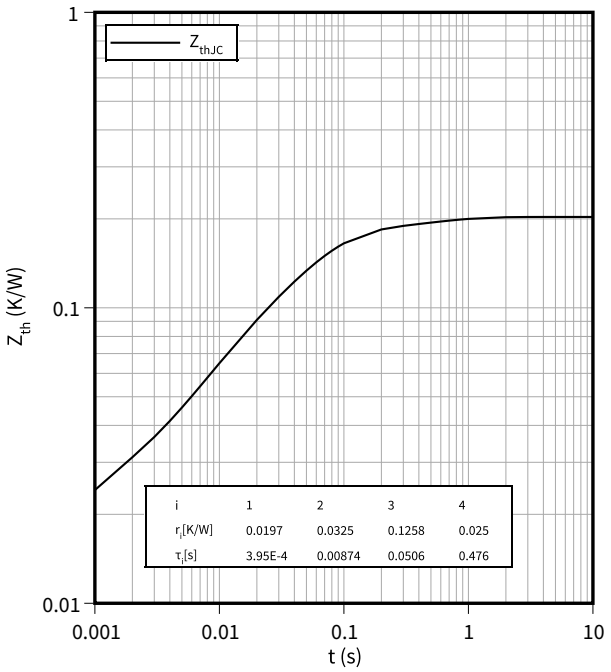
$E_{rec} = f(R_G)$

$V_{CE} = 600\ V$, $I_F = 500\ A$



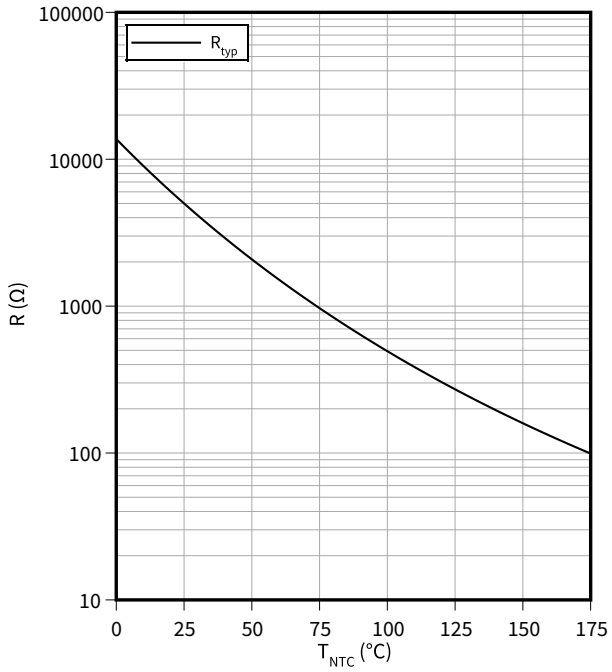
Transient thermal impedance, Diode, D5 / D6

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

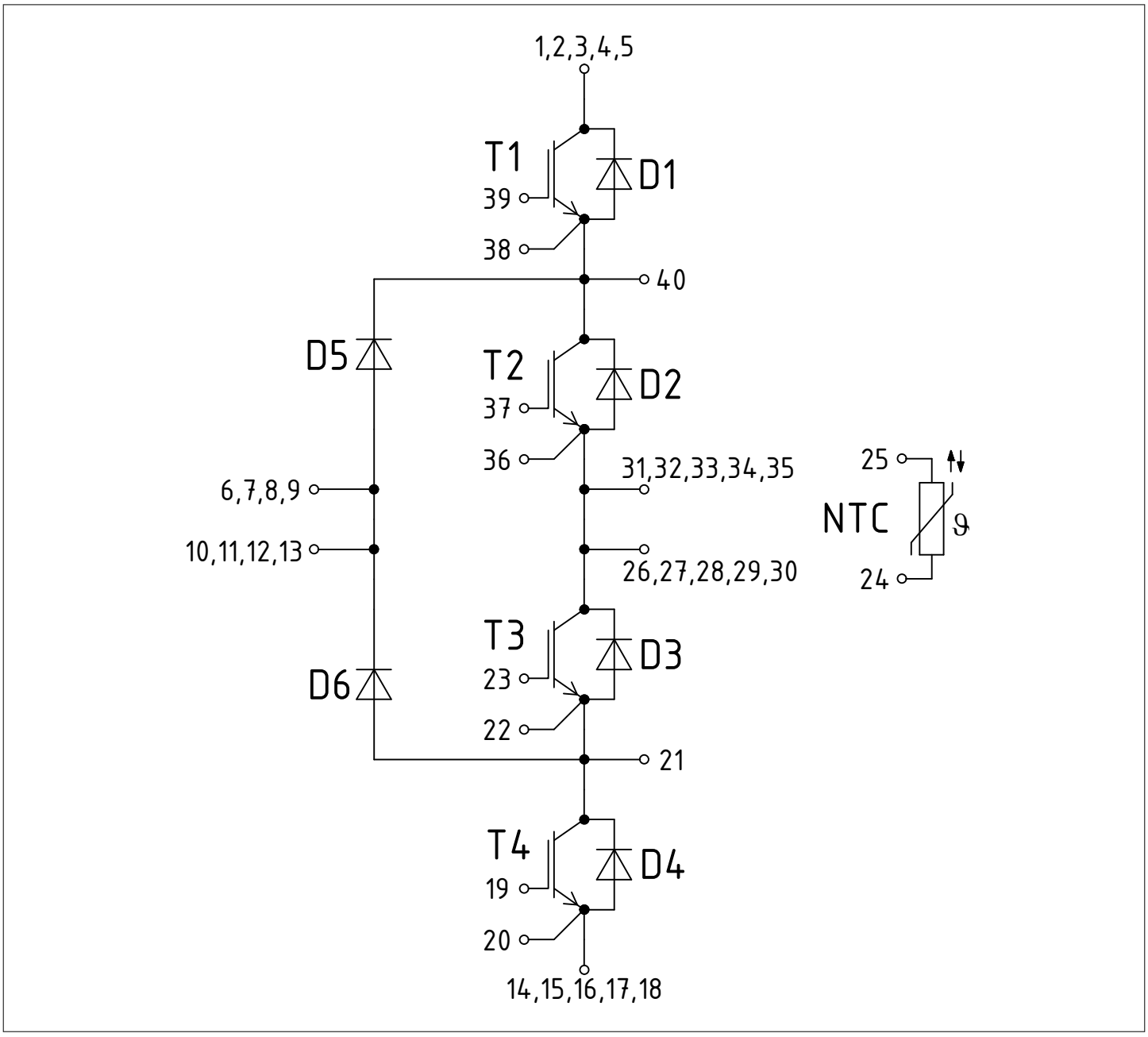


Figure 1

10 Package outlines

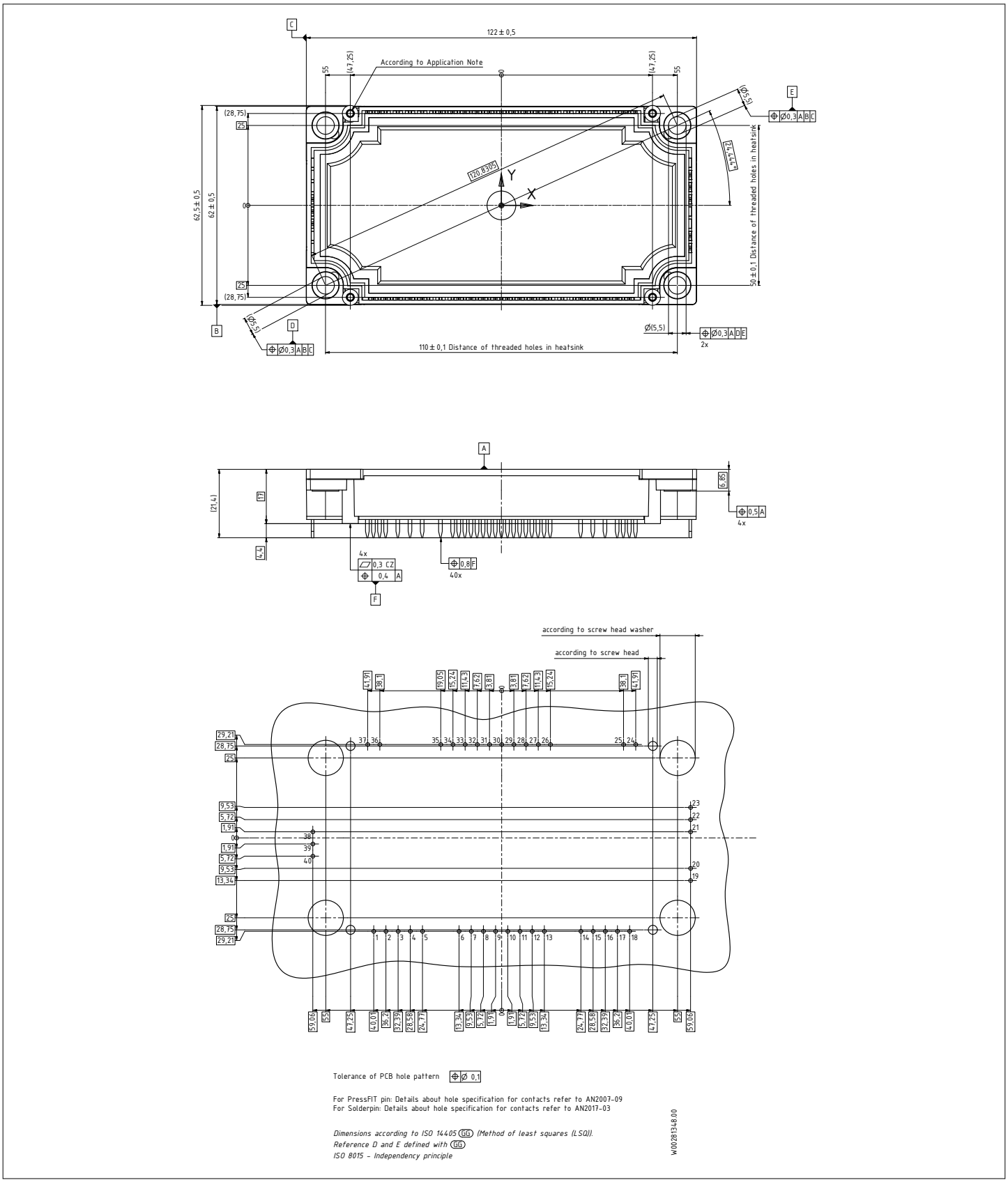


Figure 2

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	*Content* Module serial number Module material number Production order number Date code (production year) Date code (production week)	*Digit* 1 – 5 6 - 11 12 - 19 20 – 21 22 – 23	*Example* 71549 142846 55054991 15 30
Example	7154914284655054991530		7154914284655054991530

Figure 3

Revision history

Document revision	Date of release	Description of changes
0.10	2024-08-06	Initial version
0.20	2025-02-11	Preliminary datasheet
1.00	2025-05-28	Final datasheet
1.10	2025-08-12	Final datasheet

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Edition 2025-08-12

Published by

Infineon Technologies AG

81726 Munich, Germany

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Document reference
IFX-ABK541-004

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