

Preliminary datasheet

EconoPIM™2 module with TRENCHSTOP™ IGBT7 and emitter controlled 7 diode and Vienna rectifier PFC

Features

- Electrical features
 - $V_{CES} = 1200\text{ V}$
 - $I_{C\text{ nom}} = 35\text{ A} / I_{CRM} = 70\text{ A}$
 - TRENCHSTOP™ IGBT7
 - Trench IGBT 5
 - $T_{vj,op} = 150^{\circ}\text{C}$
 - Suitable Infineon gate drivers can be found under <https://www.infineon.com/gdfinder>
- Mechanical features
 - High power and thermal cycling capability
 - Integrated NTC temperature sensor
 - Standard housing
 - Copper base plate
 - Al_2O_3 substrate with low thermal resistance
 - Solder contact technology



Typical appearance

Potential applications

- Residential HVAC

Product validation

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

Description

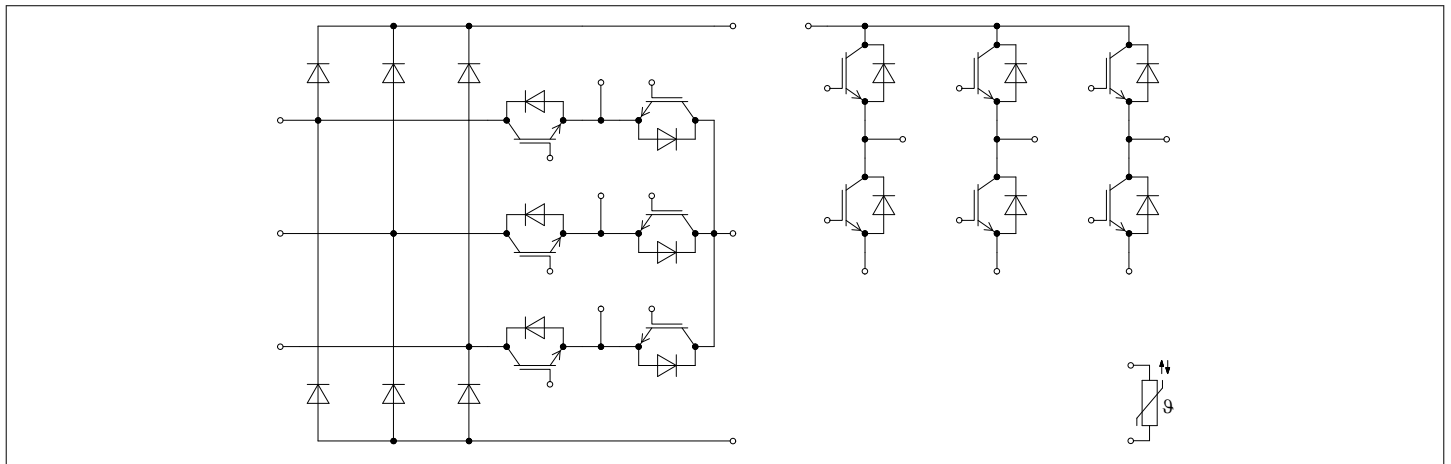


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1 Package

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
Isolation test voltage NTC	$V_{ISOL(NTC)}$	RMS, $f = 50 \text{ Hz}$, $t = 1 \text{ min}$	2.5	kV
Material of module baseplate			Cu	
Internal isolation		basic insulation (class 1, IEC 61140)	Al_2O_3	
Creepage distance	$d_{Creep \text{ nom}}$	terminal to baseplate, nom., (PD2, IEC 60664-1, Ed. 3.0)	10.0	mm
Clearance	$d_{Clear \text{ nom}}$	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}			36		nH
Module lead resistance, terminals - chip	$R_{AA'+CC'}$	$T_C = 25 \text{ °C}$, per switch		8.4		mΩ
Module lead resistance, terminals - chip	$R_{CC'+EE'}$	$T_C = 25 \text{ °C}$, per switch		4.4		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			180		g

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

2 IGBT, T1-T6

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}	$T_{vj \text{ max}} = 175 \text{ °C}$	$T_C = 115 \text{ °C}$	35	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj \text{ op}}$		70	A

(table continues...)

Table 3 (continued) Maximum rated values

Parameter	Symbol	Note or test condition	Values	Unit
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	$V_{CE\ sat}$	$I_C = 35\ A, V_{GE} = 15\ V$	$T_{vj} = 25\ ^\circ C$	1.60	1.85	V
			$T_{vj} = 125\ ^\circ C$	1.74		
			$T_{vj} = 150\ ^\circ C$	1.78		
Gate threshold voltage	V_{GETh}	$I_C = 0.75\ mA, V_{CE} = V_{GE}, T_{vj} = 25\ ^\circ C$	5.15	5.8	6.45	V
Gate charge	Q_G	$V_{GE} = \pm 15\ V, V_{CC} = 600\ V, T_{vj} = 25\ ^\circ C$		0.55		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\ ^\circ C$		0.0		Ω
Input capacitance	C_{ies}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$		6.62		nF
Reverse transfer capacitance	C_{res}	$f = 100\ kHz, T_{vj} = 25\ ^\circ C, V_{CE} = 25\ V, V_{GE} = 0\ V$		0.023		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 1200\ V, V_{GE} = 0\ V$	$T_{vj} = 25\ ^\circ C$		0.004	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}	$I_C = 35\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 3\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.021		μs
			$T_{vj} = 125\ ^\circ C$	0.025		
			$T_{vj} = 150\ ^\circ C$	0.025		
Rise time (inductive load)	t_r	$I_C = 35\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Gon} = 3\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.016		μs
			$T_{vj} = 125\ ^\circ C$	0.018		
			$T_{vj} = 150\ ^\circ C$	0.019		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 35\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 2\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.207		μs
			$T_{vj} = 125\ ^\circ C$	0.283		
			$T_{vj} = 150\ ^\circ C$	0.300		
Fall time (inductive load)	t_f	$I_C = 35\ A, V_{CC} = 600\ V, V_{GE} = \pm 15\ V, R_{Goff} = 2\ \Omega$	$T_{vj} = 25\ ^\circ C$	0.121		μs
			$T_{vj} = 125\ ^\circ C$	0.218		
			$T_{vj} = 150\ ^\circ C$	0.249		
Turn-on energy loss per pulse	E_{on}	$I_C = 35\ A, V_{CC} = 600\ V, L_\sigma = 36\ nH, V_{GE} = \pm 15\ V, R_{Gon} = 3\ \Omega, di/dt = 1720\ A/\mu s (T_{vj} = 150\ ^\circ C)$	$T_{vj} = 25\ ^\circ C$	1.71		mJ
			$T_{vj} = 125\ ^\circ C$	2.82		
			$T_{vj} = 150\ ^\circ C$	3.15		

(table continues...)

Table 4 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Turn-off energy loss per pulse	E_{off}	$I_C = 35\text{ A}$, $V_{CC} = 600\text{ V}$, $L_\sigma = 36\text{ nH}$, $V_{GE} = \pm 15\text{ V}$, $R_{Goff} = 2\ \Omega$, $dv/dt = 3420\text{ V}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	2.08		mJ
			$T_{vj} = 125\text{ }^\circ\text{C}$	3.44		
			$T_{vj} = 150\text{ }^\circ\text{C}$	3.84		
SC data	I_{SC}	$V_{GE} \leq 15\text{ V}$, $V_{CC} = 800\text{ V}$, $V_{CEmax} = V_{CES} - L_{sCE} \cdot di/dt$	$t_p \leq 6\ \mu\text{s}$, $T_{vj} = 125\text{ }^\circ\text{C}$	120		A
			$t_p \leq 8\ \mu\text{s}$, $T_{vj} = 150\text{ }^\circ\text{C}$	115		
Thermal resistance, junction to case	R_{thJC}	per IGBT			0.802	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT		0.157		K/W
Temperature under switching conditions	$T_{vj\ op}$		-40		150	$^\circ\text{C}$

3 Diode, D1-D6

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			35	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		70	A
I^2t - value	I^2t	$t_P = 10\text{ ms}$, $V_R = 0\text{ V}$	$T_{vj} = 125\text{ }^{\circ}\text{C}$	205	A^2s
			$T_{vj} = 150\text{ }^{\circ}\text{C}$	190	

Table 6 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 35\text{ A}$, $V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ }^\circ\text{C}$	1.72	2.10	V
			$T_{vj} = 125\text{ }^\circ\text{C}$	1.59		
			$T_{vj} = 150\text{ }^\circ\text{C}$	1.55		
Peak reverse recovery current	I_{RM}	$V_{CC} = 600\text{ V}$, $I_F = 35\text{ A}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 1720\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ }^\circ\text{C}$)	$T_{vj} = 25\text{ }^\circ\text{C}$	39.4		A
			$T_{vj} = 125\text{ }^\circ\text{C}$	45.7		
			$T_{vj} = 150\text{ }^\circ\text{C}$	47		

(table continues...)

Table 6 (continued) Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Recovered charge	Q_r	$V_{CC} = 600\text{ V}$, $I_F = 35\text{ A}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 1720\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	3		μC
			$T_{vj} = 125\text{ °C}$	5.4		
			$T_{vj} = 150\text{ °C}$	6.2		
Reverse recovery energy	E_{rec}	$V_{CC} = 600\text{ V}$, $I_F = 35\text{ A}$, $V_{GE} = -15\text{ V}$, $-di_F/dt = 1720\text{ A}/\mu\text{s}$ ($T_{vj} = 150\text{ °C}$)	$T_{vj} = 25\text{ °C}$	1.17		mJ
			$T_{vj} = 125\text{ °C}$	2.08		
			$T_{vj} = 150\text{ °C}$	2.4		
Thermal resistance, junction to case	R_{thJC}	per diode			1.10	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode		0.176		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

4 IGBT, T7-T12

Table 7 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}			35	A
Continuous DC collector current	I_{CDC}	$T_{vj\text{ max}} = 150\text{ °C}$	$T_C = 115\text{ °C}$	20	A
Repetitive peak collector current	I_{CRM}	t_p limited by $T_{vj\text{ op}}$		70	A
Gate-emitter peak voltage	V_{GES}			± 20	V

Table 8 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Collector-emitter saturation voltage	$V_{CE\text{ sat}}$	$I_C = 35\text{ A}$, $V_{GE} = 15\text{ V}$	$T_{vj} = 25\text{ °C}$	1.60	2.20	V
			$T_{vj} = 125\text{ °C}$	1.74		
			$T_{vj} = 150\text{ °C}$	1.78		
Gate threshold voltage	V_{GETh}	$I_C = 0.35\text{ mA}$, $V_{CE} = V_{GE}$, $T_{vj} = 25\text{ °C}$	3.85	4.6	5.35	V
Gate charge	Q_G	$V_{GE} = \pm 15\text{ V}$, $V_{CC} = 300\text{ V}$, $T_{vj} = 25\text{ °C}$		0.152		μC
Internal gate resistor	R_{Gint}	$T_{vj} = 25\text{ °C}$		0.0		Ω

(table continues...)

Table 8 (continued) Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Input capacitance	C_{ies}	$f = 100 \text{ kHz}$, $T_{vj} = 25 \text{ °C}$, $V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$			1.94		nF
Reverse transfer capacitance	C_{res}	$f = 100 \text{ kHz}$, $T_{vj} = 25 \text{ °C}$, $V_{CE} = 25 \text{ V}$, $V_{GE} = 0 \text{ V}$			0.007		nF
Collector-emitter cut-off current	I_{CES}	$V_{CE} = 650 \text{ V}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$			0.013	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}	$I_C = 35 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 1.8 \text{ } \Omega$	$T_{vj} = 25 \text{ °C}$		0.012		μs
			$T_{vj} = 125 \text{ °C}$		0.012		
			$T_{vj} = 150 \text{ °C}$		0.013		
Rise time (inductive load)	t_r	$I_C = 35 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 1.8 \text{ } \Omega$	$T_{vj} = 25 \text{ °C}$		0.008		μs
			$T_{vj} = 125 \text{ °C}$		0.010		
			$T_{vj} = 150 \text{ °C}$		0.011		
Turn-off delay time (inductive load)	t_{doff}	$I_C = 35 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 2.4 \text{ } \Omega$	$T_{vj} = 25 \text{ °C}$		0.065		μs
			$T_{vj} = 125 \text{ °C}$		0.081		
			$T_{vj} = 150 \text{ °C}$		0.084		
Fall time (inductive load)	t_f	$I_C = 35 \text{ A}$, $V_{CC} = 300 \text{ V}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 2.4 \text{ } \Omega$	$T_{vj} = 25 \text{ °C}$		0.010		μs
			$T_{vj} = 125 \text{ °C}$		0.019		
			$T_{vj} = 150 \text{ °C}$		0.021		
Turn-on energy loss per pulse	E_{on}	$I_C = 35 \text{ A}$, $V_{CC} = 300 \text{ V}$, $L_\sigma = 36 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Gon} = 1.8 \text{ } \Omega$, $di/dt = 2600 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$		0.216		mJ
			$T_{vj} = 125 \text{ °C}$		0.301		
			$T_{vj} = 150 \text{ °C}$		0.323		
Turn-off energy loss per pulse	E_{off}	$I_C = 35 \text{ A}$, $V_{CC} = 300 \text{ V}$, $L_\sigma = 36 \text{ nH}$, $V_{GE} = \pm 15 \text{ V}$, $R_{Goff} = 2.4 \text{ } \Omega$, $dv/dt = 9910 \text{ V}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$		0.14		mJ
			$T_{vj} = 125 \text{ °C}$		0.29		
			$T_{vj} = 150 \text{ °C}$		0.33		
Thermal resistance, junction to case	R_{thJC}	per IGBT				1.20	K/W
Thermal resistance, case to heat sink	R_{thCH}	per IGBT			0.178		K/W
Temperature under switching conditions	$T_{vj op}$			-40		150	°C

5 Diode, D7-D12

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
Continuous DC forward current	I_F			30	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		60	A
I^2t - value	I^2t	$t_P = 10\text{ ms}, V_R = 0\text{ V}$	$T_{vj} = 125\text{ °C}$	100	A^2s
			$T_{vj} = 150\text{ °C}$	80	

Table 10 Characteristic values

Parameter	Symbol	Note or test condition		Values			Unit
				Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 30\text{ A}, V_{GE} = 0\text{ V}$	$T_{vj} = 25\text{ °C}$		1.60	2.00	V
			$T_{vj} = 125\text{ °C}$		1.55		
			$T_{vj} = 150\text{ °C}$		1.52		
Thermal resistance, junction to case	R_{thJC}	per diode				1.44	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode			0.182		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$			-40		150	°C

6 Diode, D13-D18

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
Implemented forward current	I_{FN}			50	A
Continuous DC forward current	I_F			35	A
Repetitive peak forward current	I_{FRM}	$t_P = 1\text{ ms}$		100	A
I^2t - value	I^2t	$t_P = 10\text{ ms}, V_R = 0\text{ V}$	$T_{vj} = 125\text{ °C}$	295	A^2s
			$T_{vj} = 150\text{ °C}$	290	

Table 12 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_F	$I_F = 35 \text{ A}$, $V_{GE} = 0 \text{ V}$	$T_{vj} = 25 \text{ °C}$	1.72	2.10	V
			$T_{vj} = 125 \text{ °C}$	1.59		
			$T_{vj} = 150 \text{ °C}$	1.55		
Peak reverse recovery current	I_{RM}	$V_{CC} = 300 \text{ V}$, $I_F = 35 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2580 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	68.8		A
			$T_{vj} = 125 \text{ °C}$	81.8		
			$T_{vj} = 150 \text{ °C}$	87.6		
Recovered charge	Q_r	$V_{CC} = 300 \text{ V}$, $I_F = 35 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2580 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	2.9		μC
			$T_{vj} = 125 \text{ °C}$	5.7		
			$T_{vj} = 150 \text{ °C}$	6.7		
Reverse recovery energy	E_{rec}	$V_{CC} = 300 \text{ V}$, $I_F = 35 \text{ A}$, $V_{GE} = -15 \text{ V}$, $-di_F/dt = 2580 \text{ A}/\mu\text{s}$ ($T_{vj} = 150 \text{ °C}$)	$T_{vj} = 25 \text{ °C}$	0.77		mJ
			$T_{vj} = 125 \text{ °C}$	1.5		
			$T_{vj} = 150 \text{ °C}$	1.76		
Thermal resistance, junction to case	R_{thJC}	per diode			0.900	K/W
Thermal resistance, case to heat sink	R_{thCH}	per diode		0.168		K/W
Temperature under switching conditions	$T_{vj\text{ op}}$		-40		150	°C

7 NTC-Thermistor

Table 13 Characteristic values

Parameter	Symbol	Note or test condition	Values			Unit
			Min.	Typ.	Max.	
Rated resistance	R_{25}	$T_{NTC} = 25 \text{ °C}$		5		k Ω
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

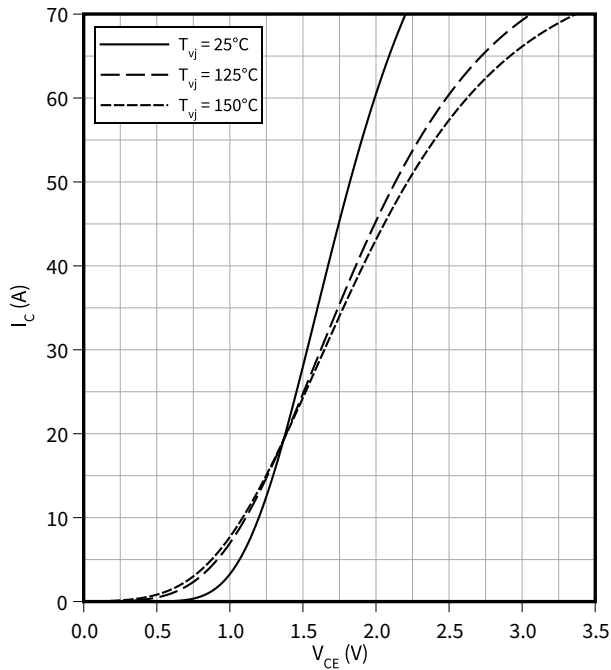
Note: For an analytical description of the NTC characteristics please refer to AN2009-10, chapter 4.

8 Characteristics diagrams

Output characteristic (typical), IGBT, T1-T6

$I_C = f(V_{CE})$

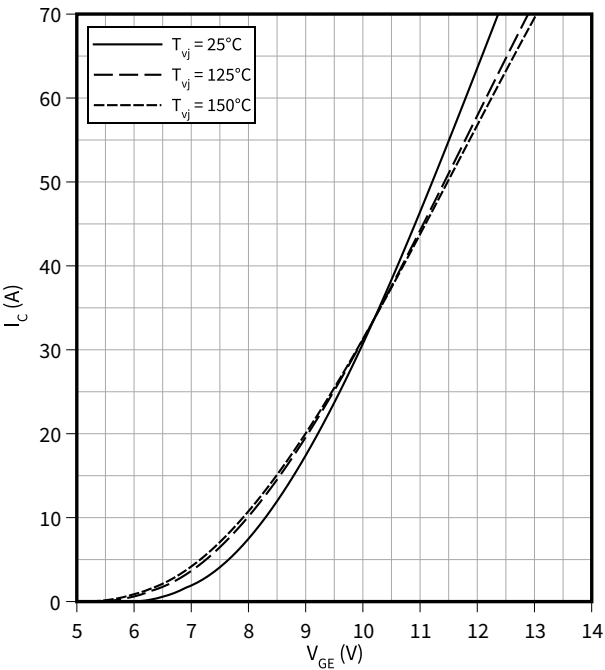
$V_{GE} = 15\text{ V}$



Transfer characteristic (typical), IGBT, T1-T6

$I_C = f(V_{GE})$

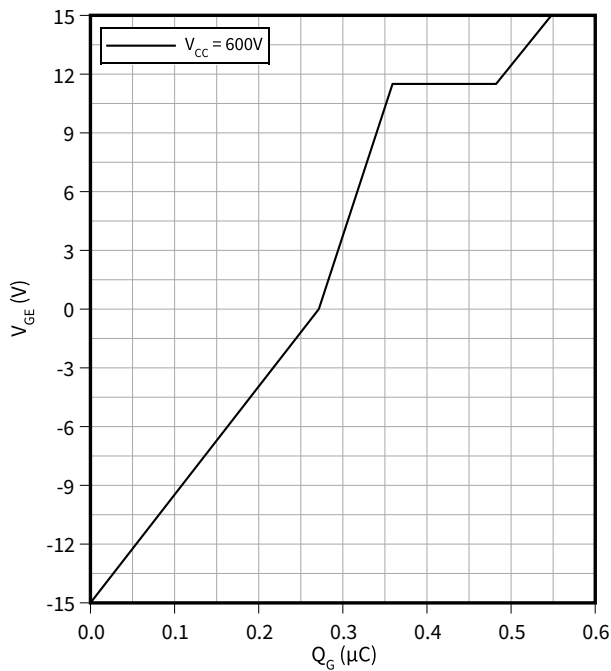
$V_{CE} = 20\text{ V}$



Gate charge characteristic (typical), IGBT, T1-T6

$V_{GE} = f(Q_G)$

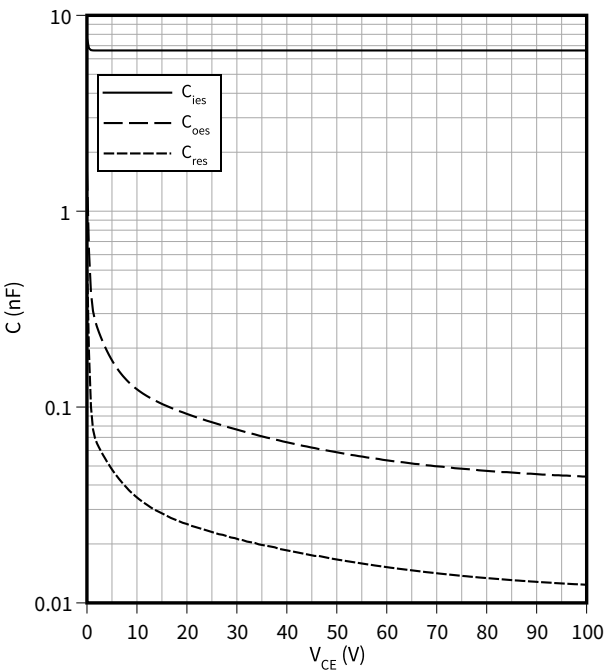
$I_C = 35\text{ A}$, $T_{vj} = 25^\circ\text{C}$



Capacity characteristic (typical), IGBT, T1-T6

$C = f(V_{CE})$

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

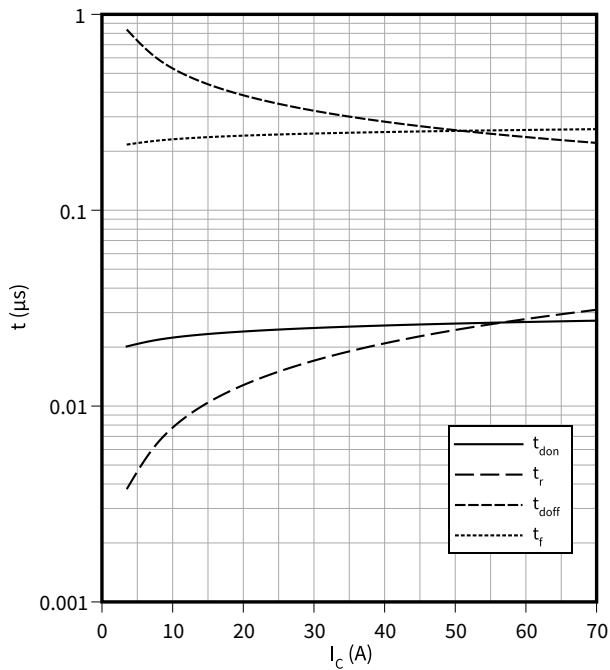


8 Characteristics diagrams

Switching times (typical), IGBT, T1-T6

$t = f(I_C)$

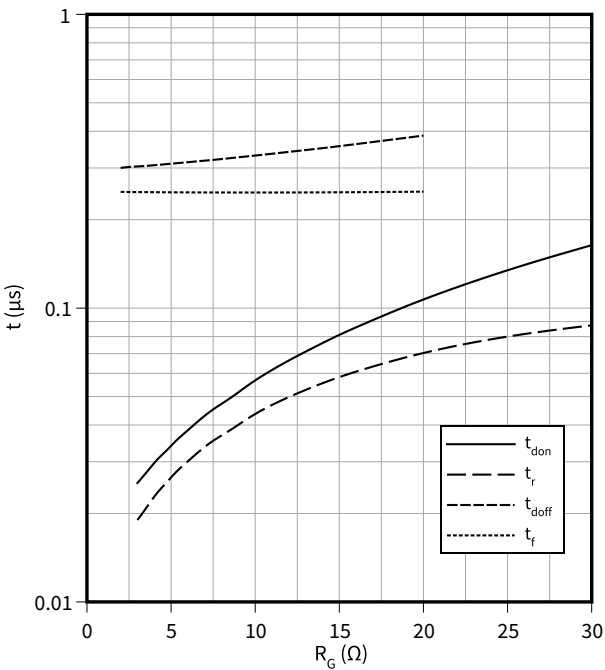
$R_{Goff} = 2 \Omega$, $R_{Gon} = 3 \Omega$, $V_{CC} = 600 \text{ V}$, $-15 / 15 \text{ V}$, $T_{vj} = 150 \text{ }^\circ\text{C}$



Switching times (typical), IGBT, T1-T6

$t = f(R_G)$

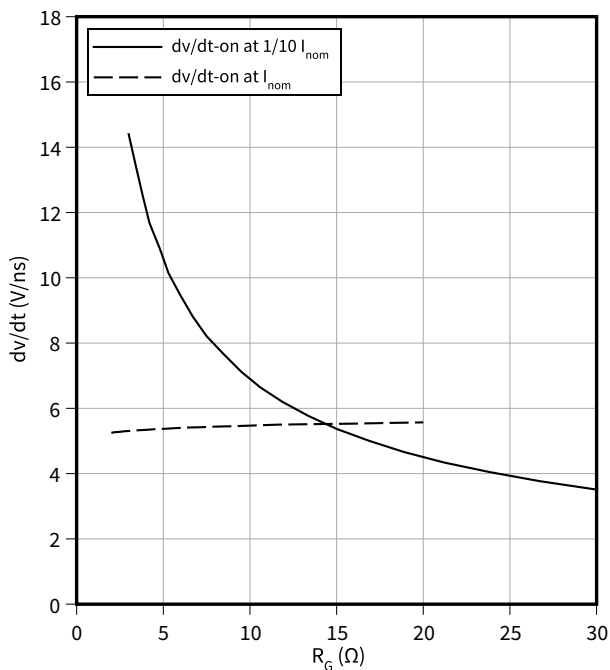
$I_C = 35 \text{ A}$, $V_{CC} = 600 \text{ V}$, $-15 / 15 \text{ V}$, $T_{vj} = 150 \text{ }^\circ\text{C}$



Voltage slope (typical), IGBT, T1-T6

$dv/dt = f(R_G)$

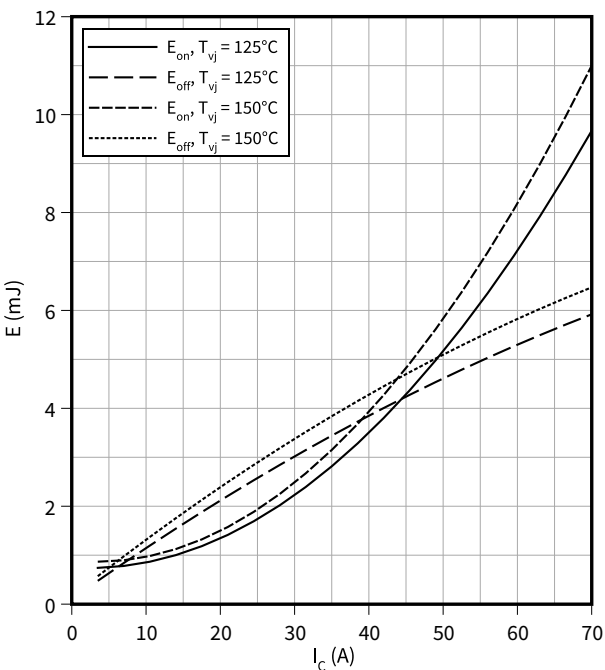
$I_C = 35 \text{ A}$, $V_{CE} = V$, $\pm 15 \text{ V}$, $T_{vj} = 25 \text{ }^\circ\text{C}$



Switching losses (typical), IGBT, T1-T6

$E = f(I_C)$

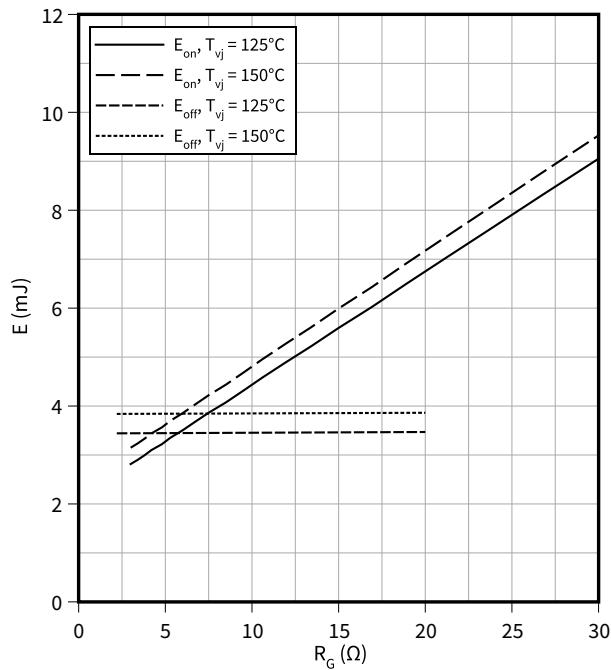
$R_{Goff} = 2 \Omega$, $R_{Gon} = 3 \Omega$, $V_{CC} = 600 \text{ V}$, $-15 / 15 \text{ V}$



8 Characteristics diagrams

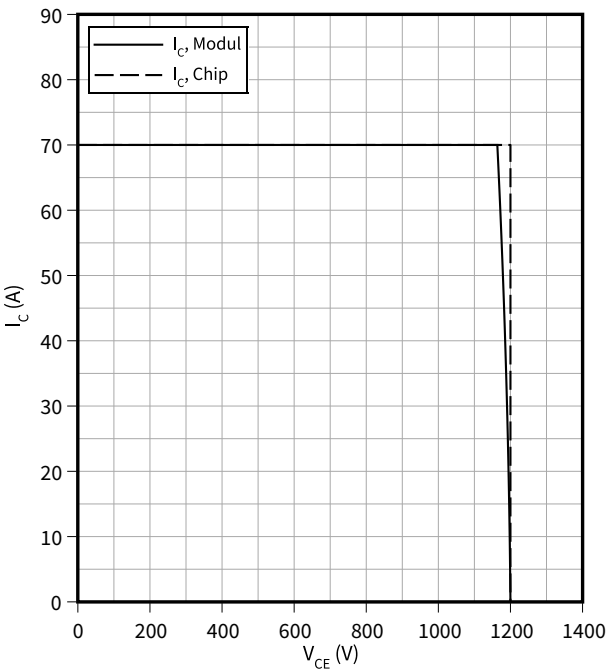
Switching losses (typical), IGBT, T1-T6

$E = f(R_G)$
 $I_C = 35\text{ A}$, $V_{CC} = 600\text{ V}$, $-15 / 15\text{ V}$



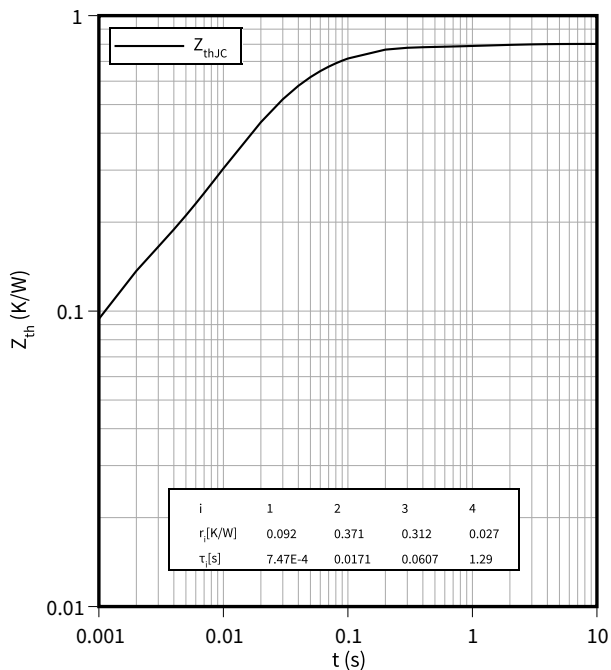
Reverse bias safe operating area (RBSOA), IGBT, T1-T6

$I_C = f(V_{CE})$
 $T_{vj} = 150\text{ }^\circ\text{C}$, $R_{Goff} = 2\ \Omega$, $V_{GE} = \pm 15\text{ V}$



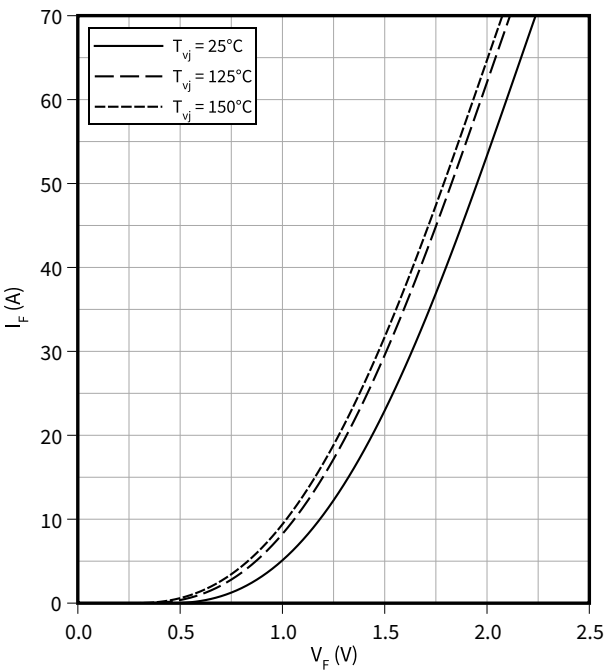
Transient thermal impedance, IGBT, T1-T6

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, D1-D6

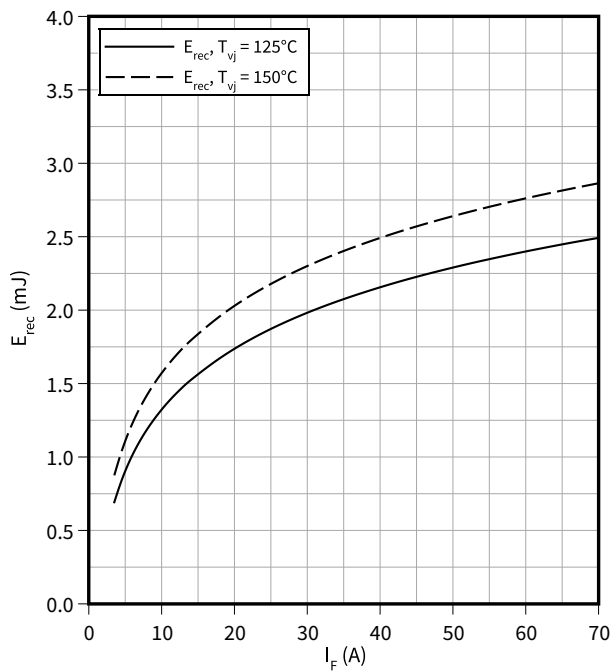
$I_F = f(V_F)$



8 Characteristics diagrams

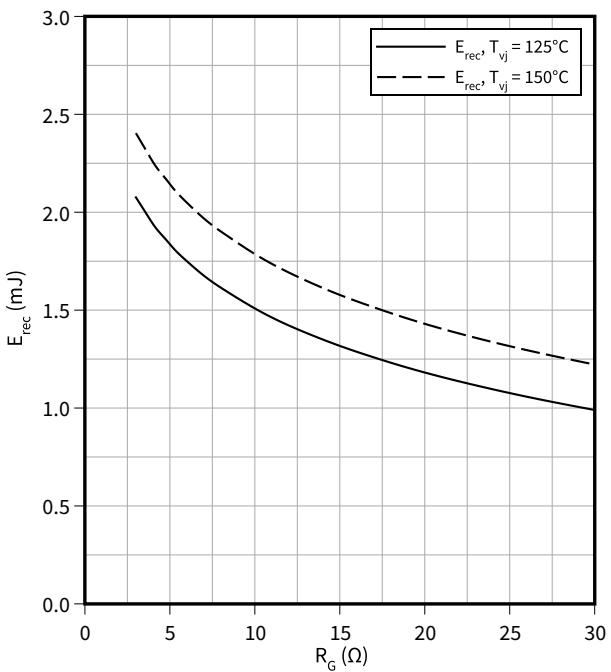
Switching losses (typical), Diode, D1-D6

$E_{rec} = f(I_F)$
 $R_{Gon} = 3\ \Omega, V_{CE} = 600\ V$



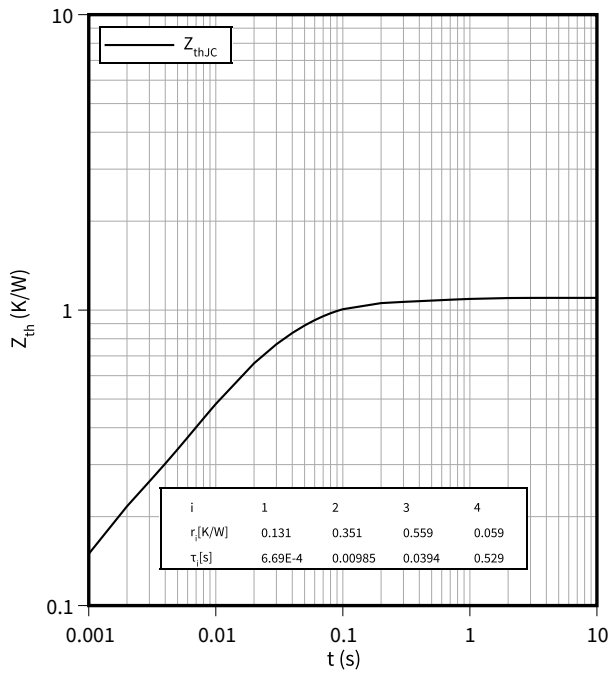
Switching losses (typical), Diode, D1-D6

$E_{rec} = f(R_G)$
 $V_{CE} = 600\ V, I_F = 35\ A$



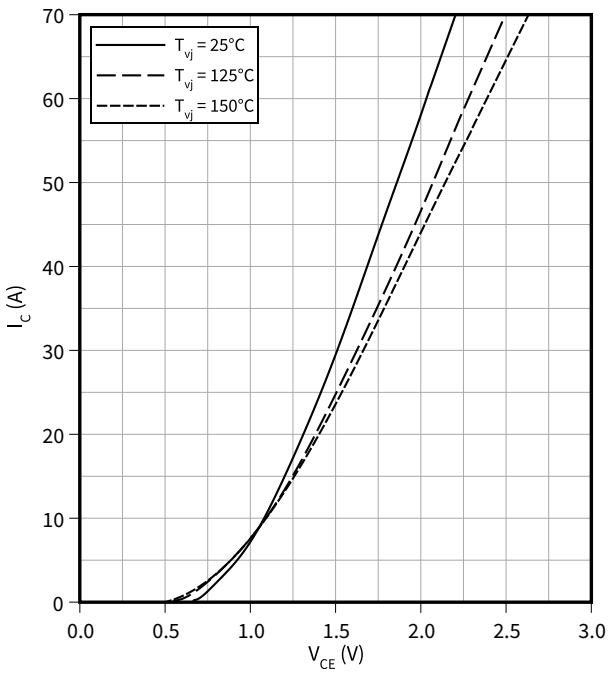
Transient thermal impedance, Diode, D1-D6

$Z_{th} = f(t)$



Output characteristic (typical), IGBT, T7-T12

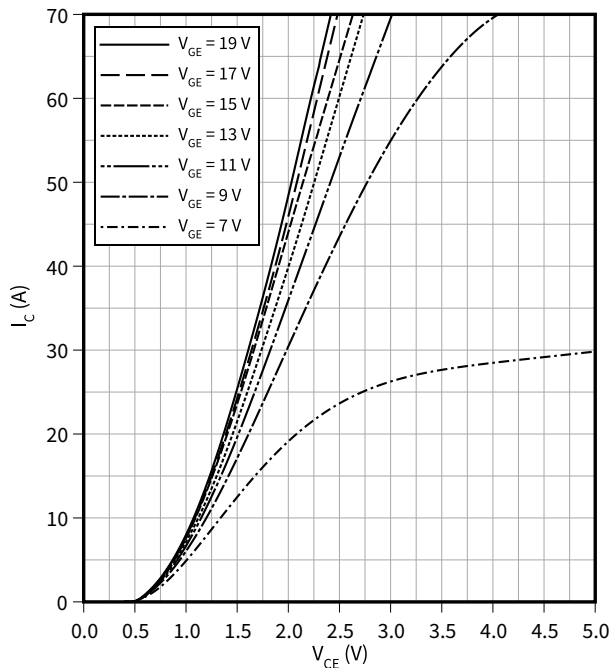
$I_C = f(V_{CE})$
 $V_{GE} = 15\ V$



8 Characteristics diagrams

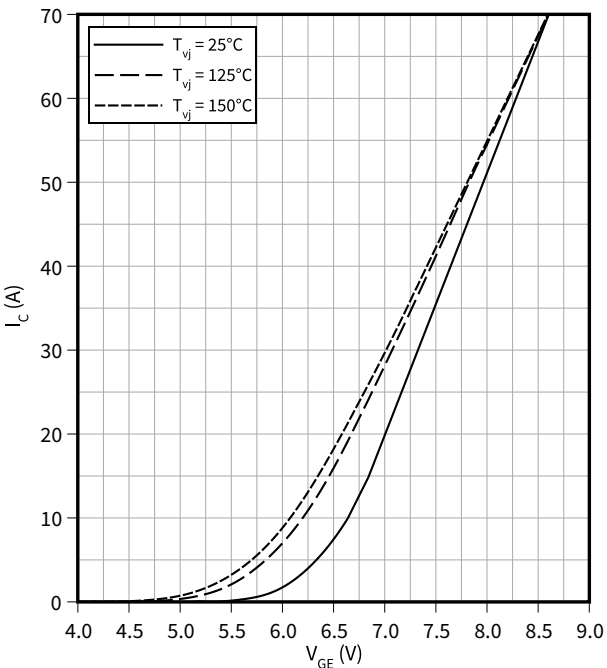
Output characteristic field (typical), IGBT, T7-T12

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



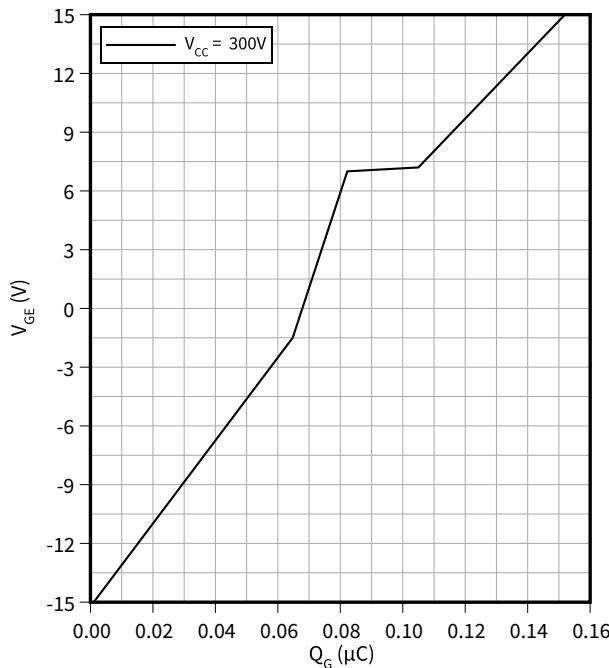
Transfer characteristic (typical), IGBT, T7-T12

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



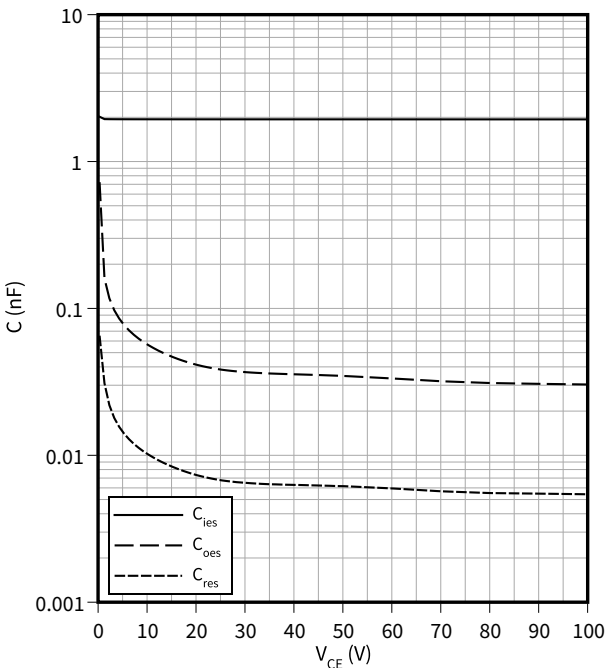
Gate charge characteristic (typical), IGBT, T7-T12

$V_{GE} = f(Q_G)$
 $I_C = 35\text{ A}$, $T_{vj} = 25\text{ °C}$



Capacity characteristic (typical), IGBT, T7-T12

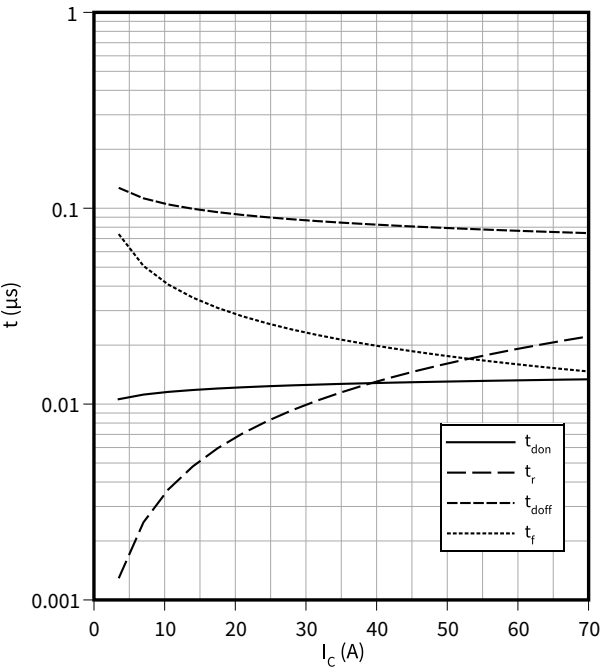
$C = f(V_{CE})$
 $f = 100\text{ kHz}$, $V_{GE} = 0\text{ V}$, $T_{vj} = 25\text{ °C}$



8 Characteristics diagrams

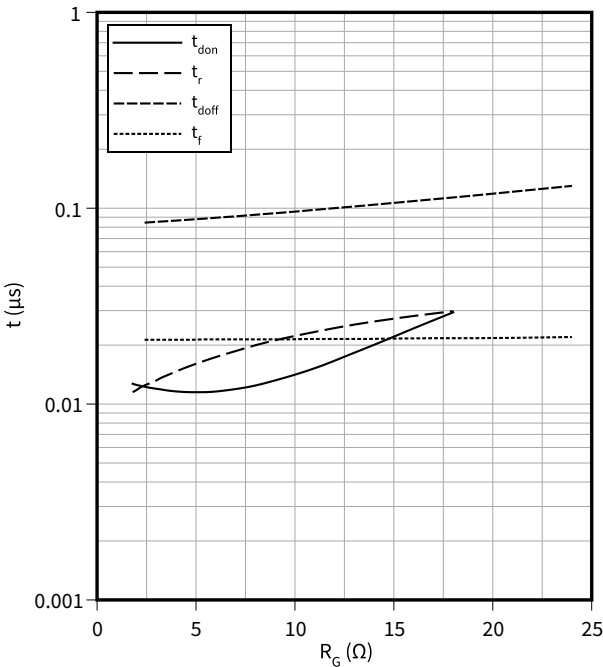
Switching times (typical), IGBT, T7-T12

$t = f(I_C)$
 $R_{Goff} = 2.4 \, \Omega$, $R_{Gon} = 1.8 \, \Omega$, $V_{CC} = 300 \, V$, $-15 / 15 \, V$, $T_{vj} = 150 \, ^\circ C$



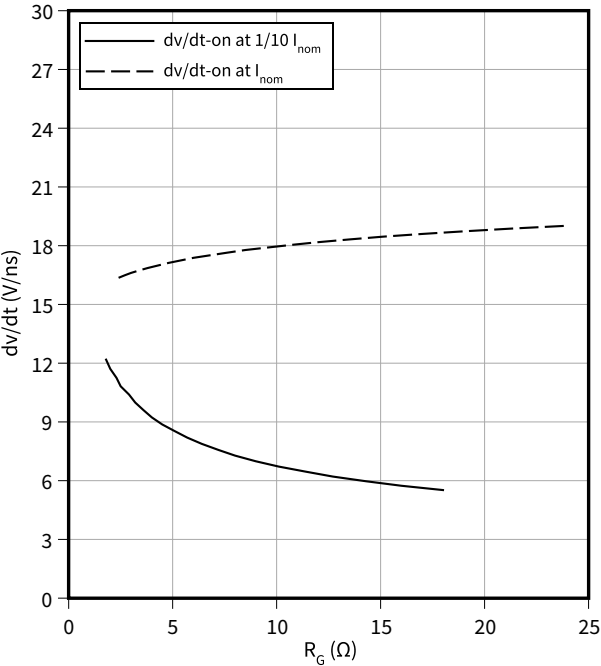
Switching times (typical), IGBT, T7-T12

$t = f(R_G)$
 $I_C = 35 \, A$, $V_{CC} = 300 \, V$, $-15 / 15 \, V$, $T_{vj} = 150 \, ^\circ C$



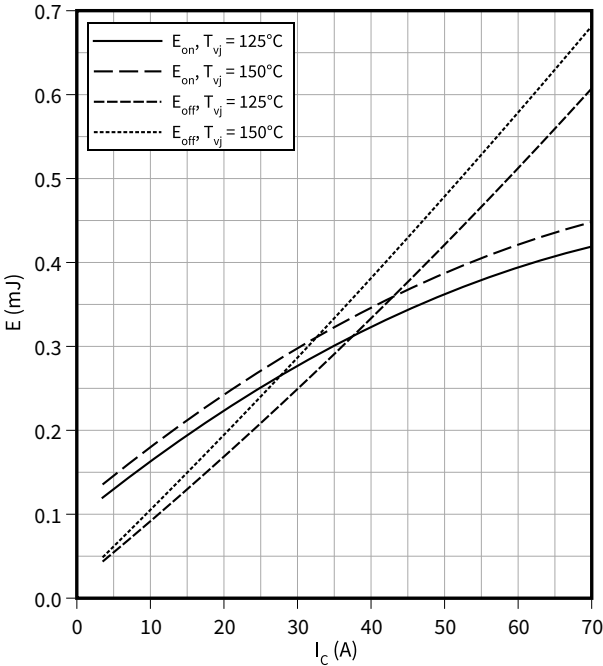
Voltage slope (typical), IGBT, T7-T12

$dv/dt = f(R_G)$
 $I_C = 35 \, A$, $V_{CE} = V$, $\pm 15 \, V$, $T_{vj} = 25 \, ^\circ C$



Switching losses (typical), IGBT, T7-T12

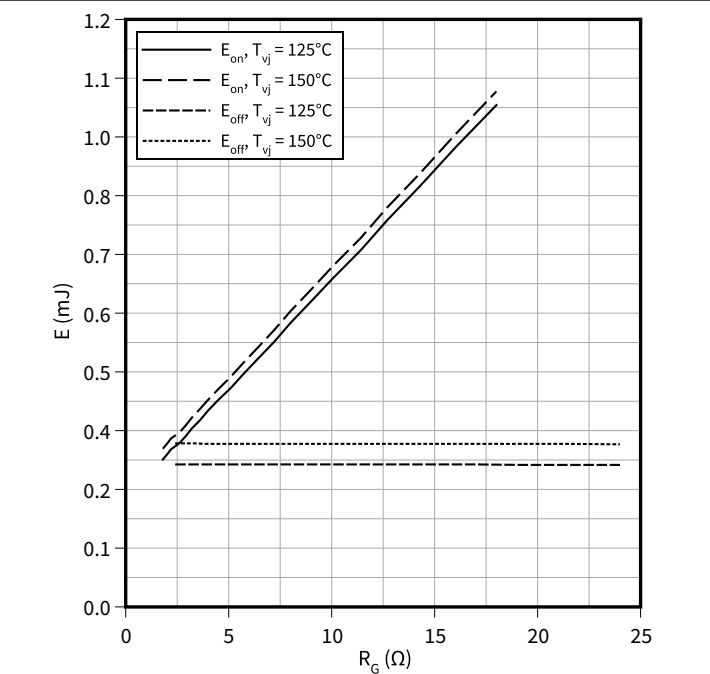
$E = f(I_C)$
 $R_{Goff} = 2.4 \, \Omega$, $R_{Gon} = 1.8 \, \Omega$, $V_{CC} = 300 \, V$, $-15 / 15 \, V$



8 Characteristics diagrams

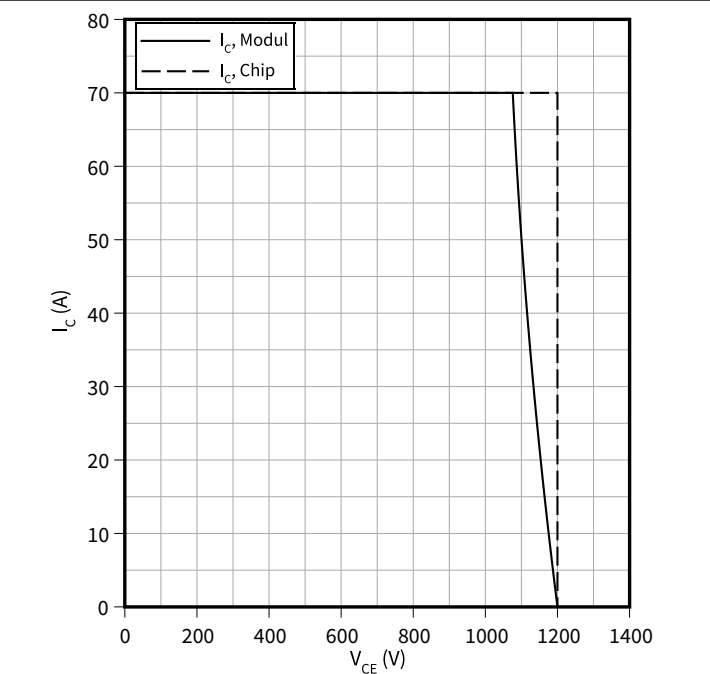
Switching losses (typical), IGBT, T7-T12

$E = f(R_G)$
 $I_C = 35\text{ A}$, $V_{CC} = 300\text{ V}$, $-15 / 15\text{ V}$



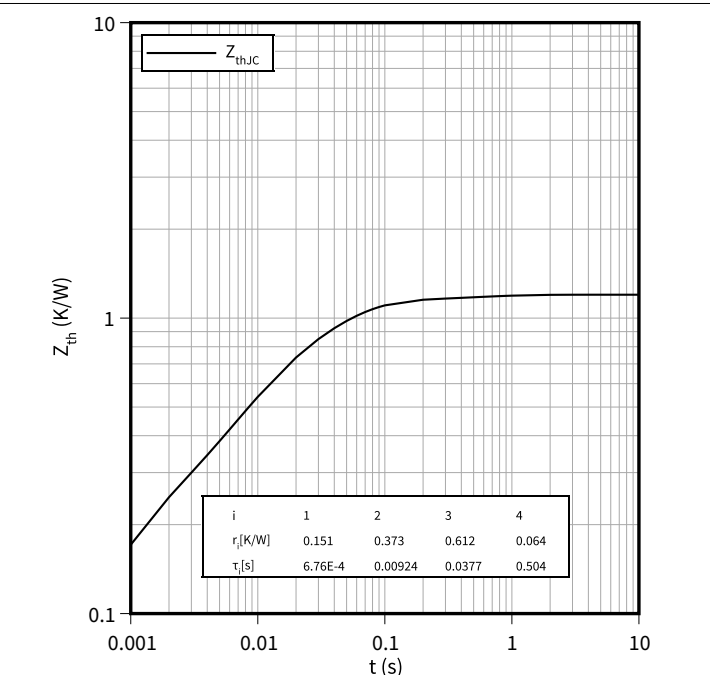
Reverse bias safe operating area (RBSOA), IGBT, T7-T12

$I_C = f(V_{CE})$
 $R_{Goff} = 2.4\text{ Ω}$, $V_{GE} = \pm 15\text{ V}$, $T_{vj} = 150\text{ °C}$



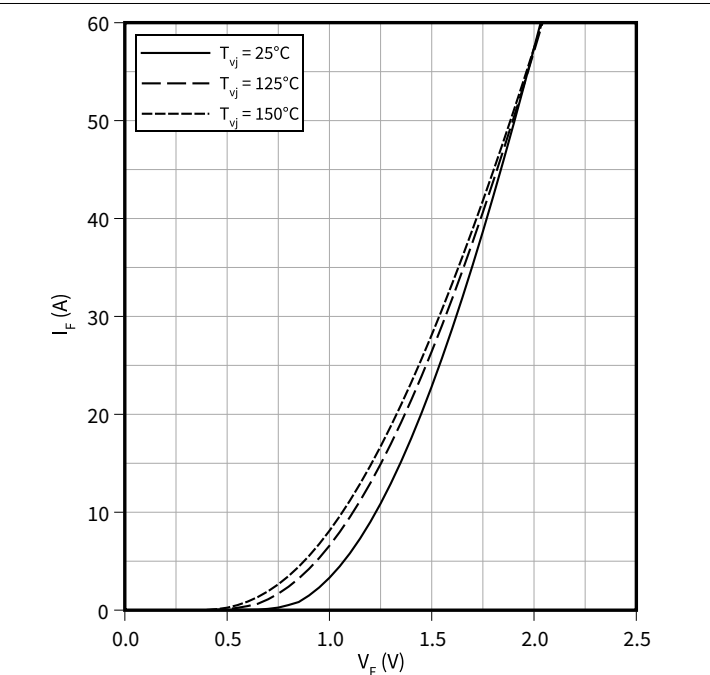
Transient thermal impedance, IGBT, T7-T12

$Z_{th} = f(t)$



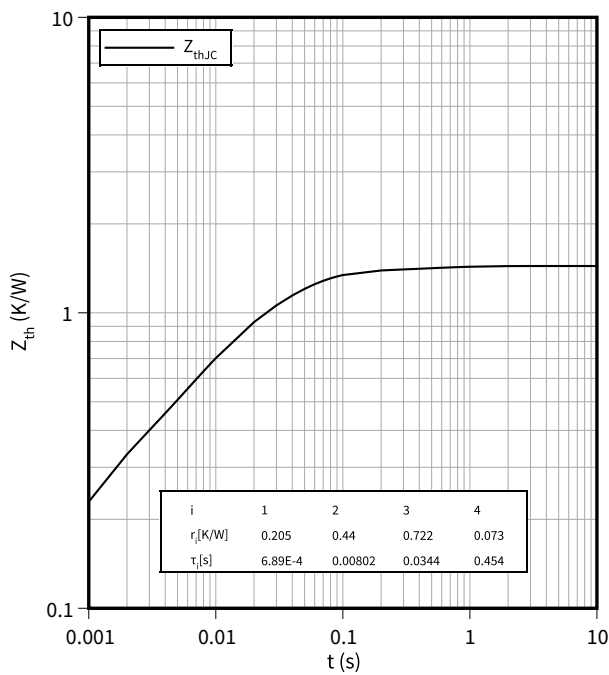
Forward characteristic (typical), Diode, D7-D12

$I_F = f(V_F)$



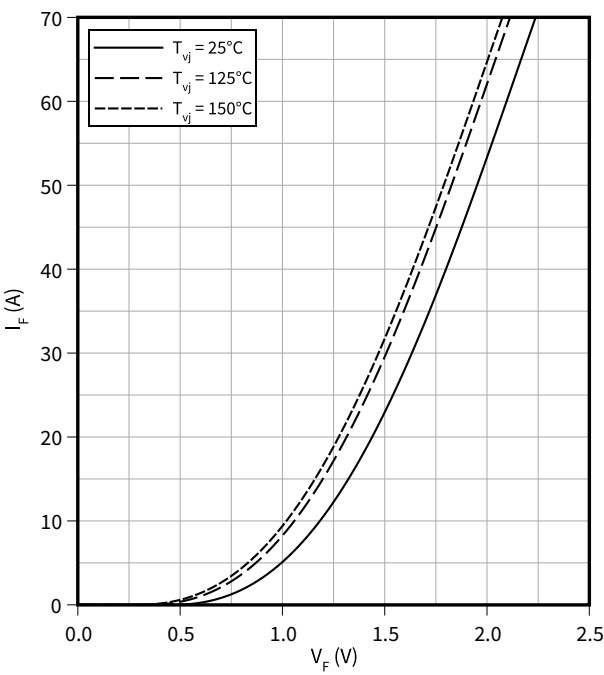
Transient thermal impedance, Diode, D7-D12

$Z_{th} = f(t)$



Forward characteristic (typical), Diode, D13-D18

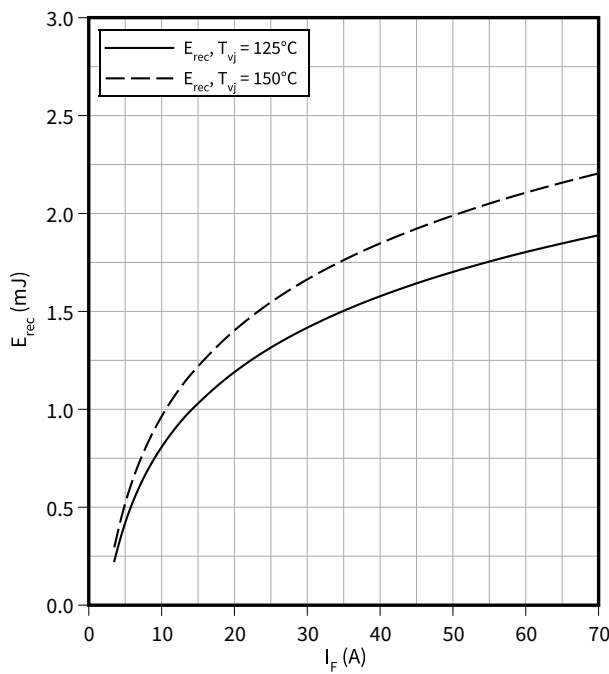
$I_F = f(V_F)$



Switching losses (typical), Diode, D13-D18

$E_{rec} = f(I_F)$

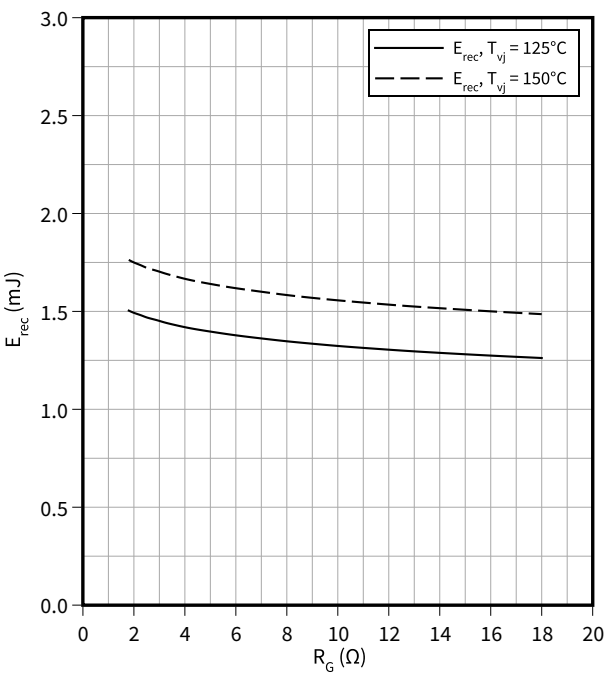
$R_{Gon} = 2.4 \Omega, V_{CE} = 300 V$



Switching losses (typical), Diode, D13-D18

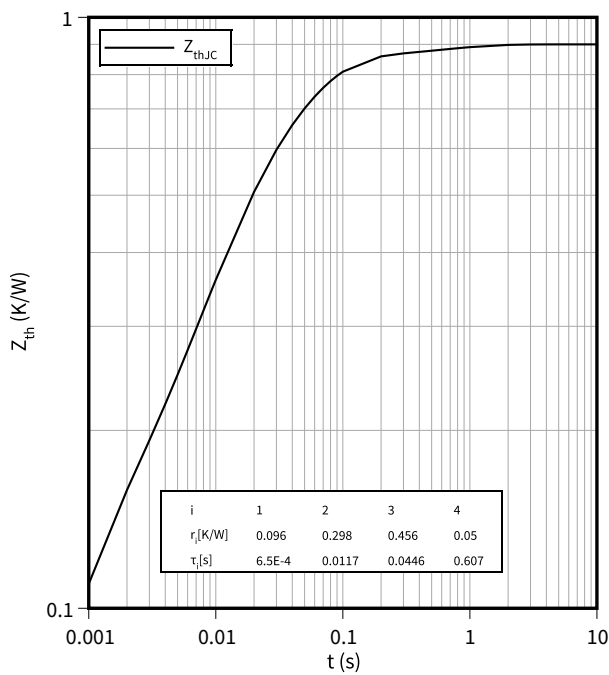
$E_{rec} = f(R_G)$

$V_{CE} = 300 V, I_F = 35 A$



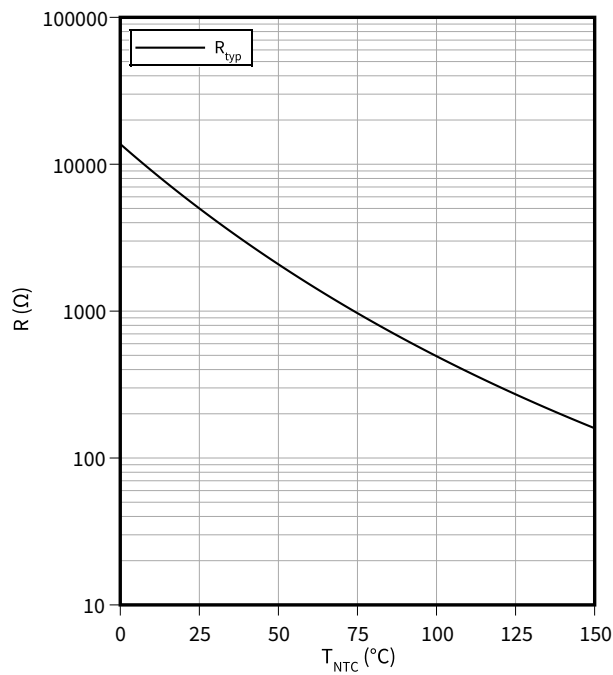
Transient thermal impedance, Diode, D13-D18

$Z_{th} = f(t)$



Temperature characteristic (typical), NTC-Thermistor

$R = f(T_{NTC})$



9 Circuit diagram

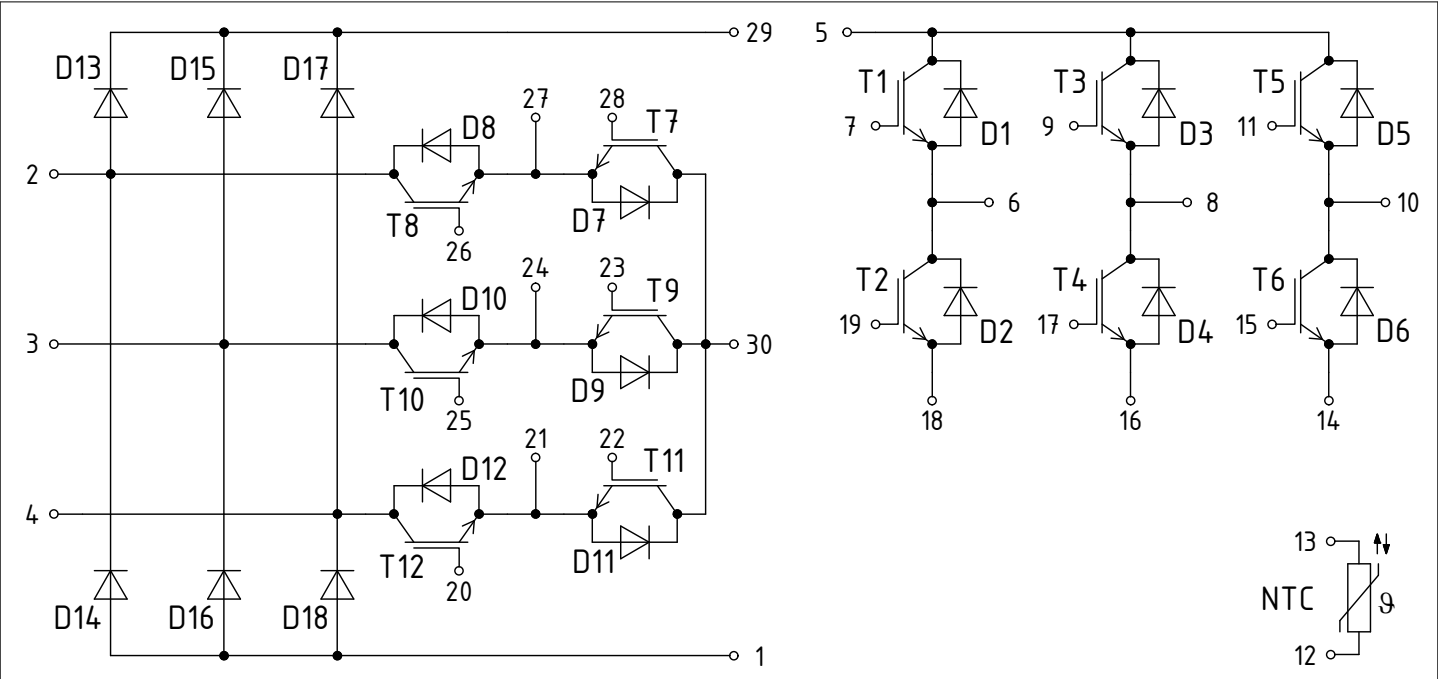


Figure 1

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	Digit	Example
	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

Revision history

Document revision	Date of release	Description of changes
0.10	2024-03-04	Initial version
0.20	2024-09-04	Preliminary datasheet

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