30-FT12NIA200H7-LG00F18

datasheet

***flow*NPC 2** **1200 V / 200 A**

Topology features

- Kelvin Emitter for improved switching performance
- Temperature sensor
- Neutral Point Clamped Topology (I-Type)

Component features

- High speed switching
- Low collector emitter saturation voltage
- Low turn-off losses
- Optimized for hard switching topologies
- Positive temperature coefficient

Housing features

- Base isolation: Al_2O_3
- Convex shaped baseplate for superior thermal contact
- Cu baseplate
- Thermo-mechanical push-and-pull force relief
- Solder pin

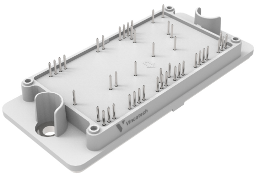
Target applications

- Energy Storage Systems

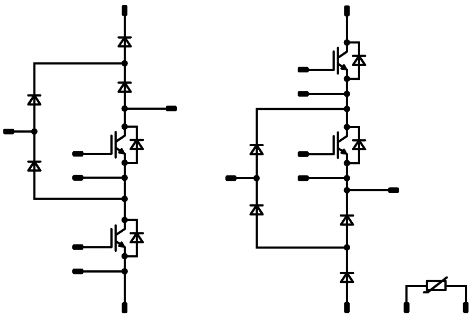
Types

- 30-FT12NIA200H7-LG00F18

flow 2 13 mm housing



Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Buck Switch					
Collector-emitter voltage	V_{CES}			1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	149	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	272	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	113	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	204	W
Maximum junction temperature	T_{jmax}			175	°C
Buck Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	56	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		300	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	102	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit
Boost Switch				
Collector-emitter voltage	V_{CES}		1200	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$ T_s = 80 °C	149	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	600	A
Turn off safe operating area		T_j = 150°C, V_{CE} = 1200 V	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	272	W
Gate-emitter voltage	V_{GES}		±20	V
Maximum junction temperature	T_{jmax}		175	°C
Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ T_s = 80 °C	113	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	204	W
Maximum junction temperature	T_{jmax}		175	°C
Boost Sw. Inv. Diode				
Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ T_s = 80 °C	113	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	204	W
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions	Value	Unit

Boost Sw. Protection Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80$ °C	29	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80$ °C	61	W
Maximum junction temperature	T_{jmax}		175	°C

Boost D. Protection Diode

Peak repetitive reverse voltage	V_{RRM}		1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$ $T_s = 80$ °C	29	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ $T_s = 80$ °C	61	W
Maximum junction temperature	T_{jmax}		175	°C

Module Properties

Thermal Properties

Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…+(T_{jmax} - 25)	°C

Isolation Properties

Isolation voltage	V_{isol}	DC Test Voltage* $t_p = 2$ s	6800	V
Creepage distance			>12,7	mm
Clearance			>12,7	mm
Comparative Tracking Index	CTI		≥ 600	

*100 % tested in production

Characteristic Values

Parameter	**Symbol**	**Conditions**					**Values**			**Unit**
			V_{GE} **[V]** V_{GS} **[V]**	V_{CE} **[V]** V_{DS} **[V]** V_F **[V]**	I_C **[A]** I_D **[A]** I_F **[A]**	T_j **[°C]**	**Min**	**Typ**	**Max**	
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0032	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,78 1,94 1,98	2,15(1)	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			8	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		26000		pF
Output capacitance	C_{oes}							480		pF
Reverse transfer capacitance	C_{res}							144		pF
Gate charge	Q_g	V_{CC} = 960 V	0/15		200	25		1428		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,35		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	200	25 125 150		155,44 158,01 159		ns
Rise time	t_r					25 125 150		16,21 17,72 18,33		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		156,3 186,55 194,09		ns
Fall time	t_f					25 125 150		25,9 48,3 52,72		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=4,8 µC Q_{rFWD}=13,02 µC Q_{rFWD}=15,36 µC				25 125 150		6,1 7,34 7,77		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,68 8,21 9,3		mWs

Characteristic Values

Parameter	**Symbol**	**Conditions**					**Values**			**Unit**
			V_{GE} **[V]** V_{GS} **[V]**	V_{CE} **[V]** V_{DS} **[V]** V_F **[V]**	I_C **[A]** I_D **[A]** I_F **[A]**	T_j **[°C]**	**Min**	**Typ**	**Max**	
Buck Diode										
Static										
Forward voltage	V_F				200	25 125 150		2,72 2,42 2,34	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			8	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,47		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=10556 A/µs d*i*/d*t*=10133 A/µs d*i*/d*t*=10615 A/µs	±15	600	200	25 125 150		203,71 288,3 312,4		A
Reverse recovery time	t_{rr}					25 125 150		47,89 136,31 151,8		ns
Recovered charge	Q_r					25 125 150		4,8 13,02 15,36		µC
Reverse recovered energy	E_{rec}					25 125 150		1,23 4,8 5,81		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		12982,23 12192,43 11752,09		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_{F} [V]	I_{C} [A] I_{D} [A] I_{F} [A]	T_j [°C]	Min	Typ	Max	
Buck Sw. Protection Diode										
Static										
Forward voltage	V_F				100	25 125 150		2,62 2,43 2,38	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			4	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,93		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,0032	25	4,7	5,5	6,2	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,78 1,94 1,98	2,15[1]	V
Collector-emitter cut-off current	I_{CES}		0	1200		25			8	μA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		26000		pF
Output capacitance	C_{oes}							480		pF
Reverse transfer capacitance	C_{res}							144		pF
Gate charge	Q_g	V_{CC} = 960 V	0/15		200	25		1428		nC
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,35		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	600	200	25 125 150		159,2 161,48 162,63		ns
Rise time	t_r					25 125 150		16,55 19,14 19,18		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		157,48 185,56 193,36		ns
Fall time	t_f					25 125 150		22,57 37,97 43,98		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=6,01 μC Q_{rFWD}=14,03 μC Q_{rFWD}=16,48 μC				25 125 150		8,32 9,92 10,34		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		4,67 7,7 8,5		mWs

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Boost Diode										
Static										
Forward voltage	V_F				200	25 125 150		2,72 2,42 2,34	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			8	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,47		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=6942 A/µs d*i*/d*t*=7178 A/µs d*i*/d*t*=7364 A/µs	±15	600	200	25 125 150		106,54 182,08 202,53		A
Reverse recovery time	t_{rr}					25 125 150		175,25 222,27 231,73		ns
Recovered charge	Q_r					25 125 150		6,01 14,03 16,48		µC
Reverse recovered energy	E_{rec}					25 125 150		1,79 4,83 5,75		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		3237,35 3378,96 3090,64		A/µs

Characteristic Values

Parameter	**Symbol**	**Conditions**					**Values**			**Unit**
			V_{GE} **[V]** V_{GS} **[V]**	V_{CE} **[V]** V_{DS} **[V]** V_F **[V]**	I_C **[A]** I_D **[A]** I_F **[A]**	T_j **[°C]**	**Min**	**Typ**	**Max**	
Boost Sw. Inv. Diode										
Static										
Forward voltage	V_F				200	25 125 150		2,72 2,42 2,34	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			8	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,47		K/W
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				40	25 125 150		2,84 2,6 2,49	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			4	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,57		K/W
Boost D. Protection Diode										
Static										
Forward voltage	V_F				40	25 125 150		2,84 2,6 2,49	3(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			4	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j\text{-}s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,57		K/W

Characteristic Values

Parameter	Symbol	Conditions					Values			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Static										
Rated resistance	R					25		22		kΩ
Deviation of R100	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		130		mW
Power dissipation constant	d					25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %						3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %						4000		K
Vincotech Thermistor Reference									I	

(1) Value at chip level

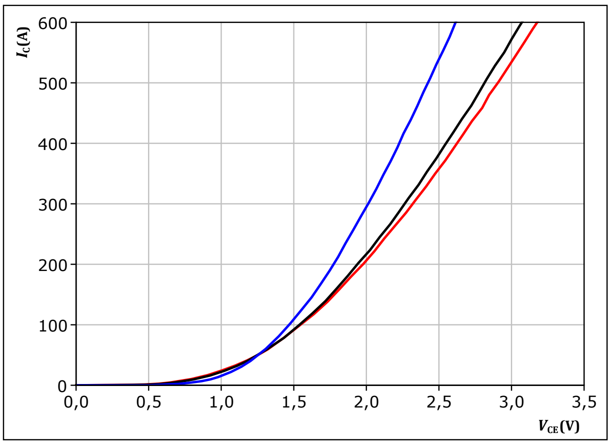
(2) Only valid with pre-applied Vincotech thermal interface material.

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

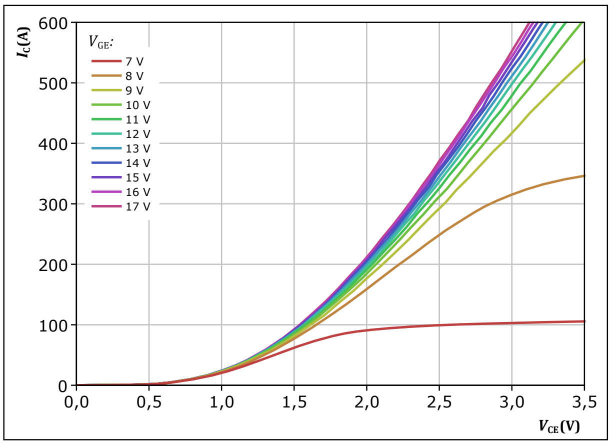


t_p = 250 µs
V_{GE} = 15 V
T_j: 25 °C, 125 °C, 150 °C

figure 2. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

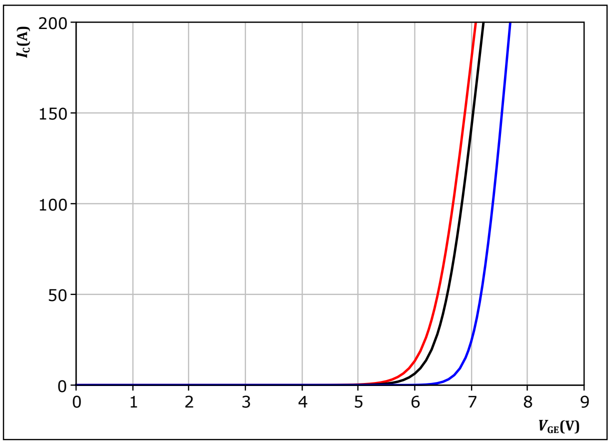


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})

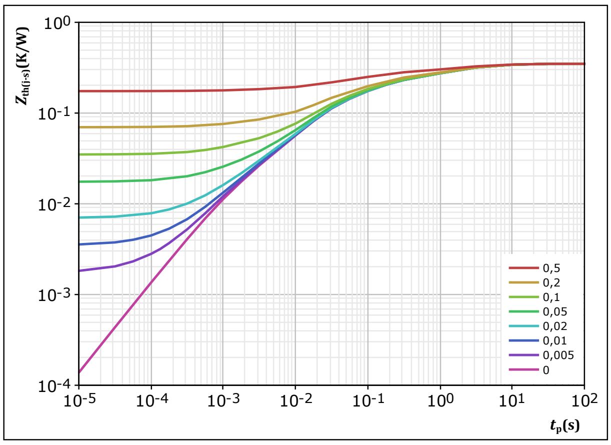


t_p = 250 µs
V_{CE} = 48 V
T_j: 25 °C, 125 °C, 150 °C

figure 4. **IGBT**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T
$R_{th(j-s)}$ = 0,349 K/W

IGBT thermal model values

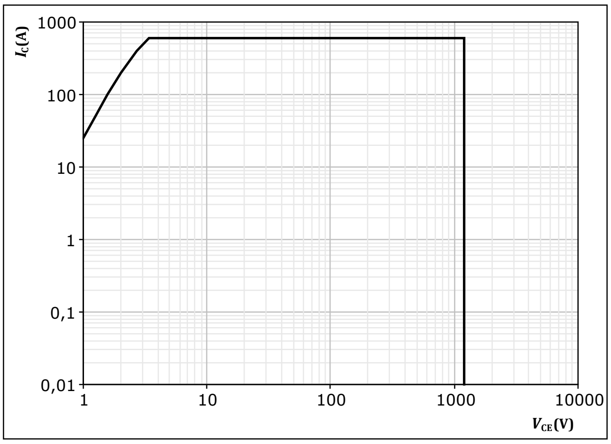
R (K/W)	τ (s)
3,91E-02	6,22E+00
9,03E-02	1,28E+00
1,12E-01	1,28E-01
9,67E-02	2,14E-02
1,15E-02	1,37E-03

Buck Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

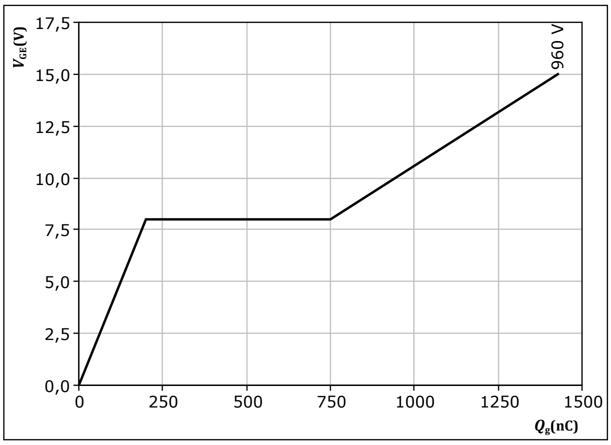


D = single pulse
T_s = 80 °C
V_{GE} = 15 V
T_j = T_{jmax}

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



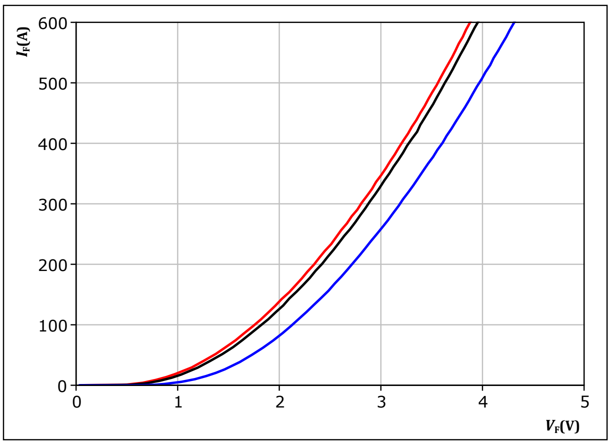
I_C = 100 A
T_j = 25 °C

Buck Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

I_F = f(V_F)



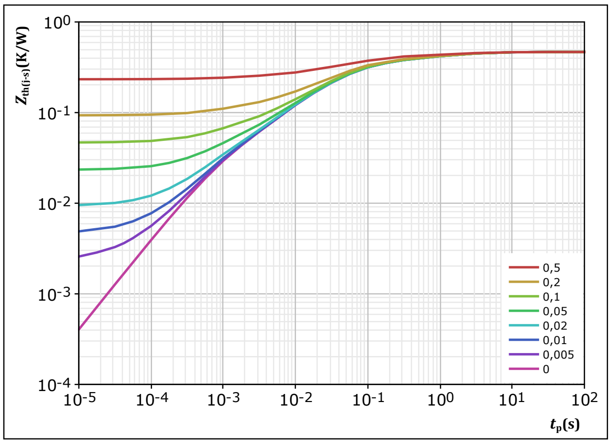
t_p = 250 µs

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 8. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 0,466 K/W

FWD thermal model values

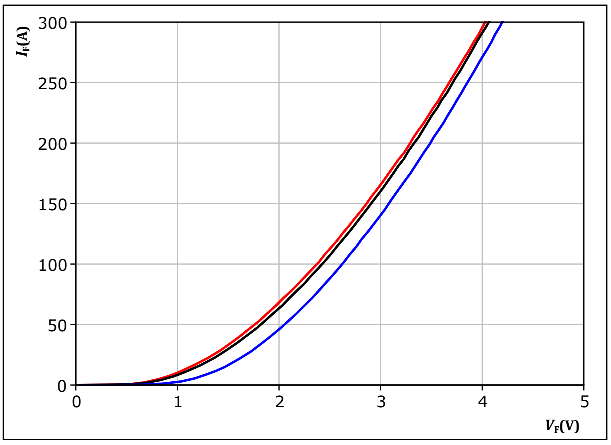
R (K/W)	τ (s)
3,44E-02	4,32E+00
8,31E-02	6,95E-01
2,22E-01	6,24E-02
1,02E-01	1,07E-02
2,50E-02	9,13E-04

Buck Sw. Protection Diode Characteristics

figure 9. **FWD**

Typical forward characteristics

I_F = f(V_F)



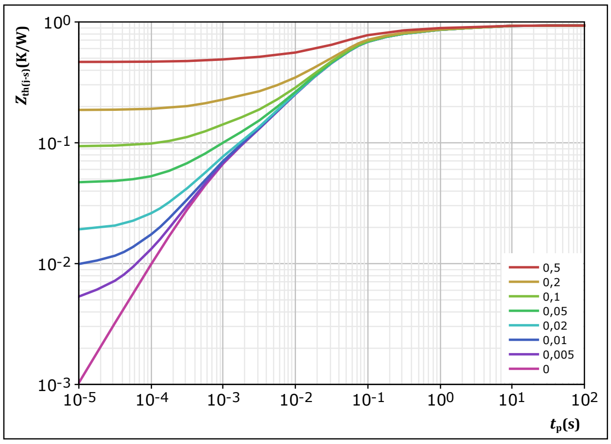
t_p = 250 µs

T_j:
25 °C
125 °C
150 °C

figure 10. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 0,934 K/W

FWD thermal model values

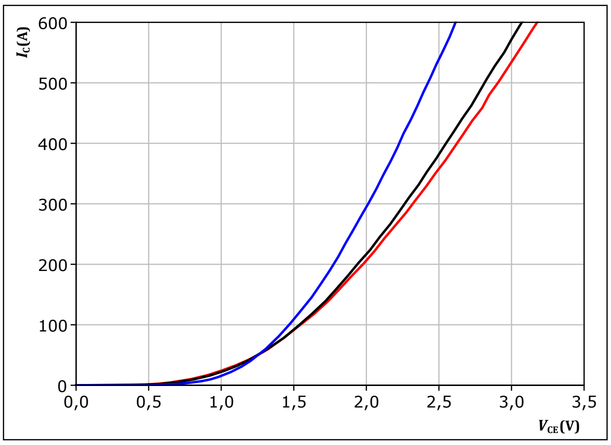
R (K/W)	τ (s)
8,83E-02	3,47E+00
1,47E-01	3,12E-01
5,08E-01	4,53E-02
1,37E-01	8,58E-03
5,39E-02	7,08E-04

Boost Switch Characteristics

figure 11. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



t_p = 250 µs

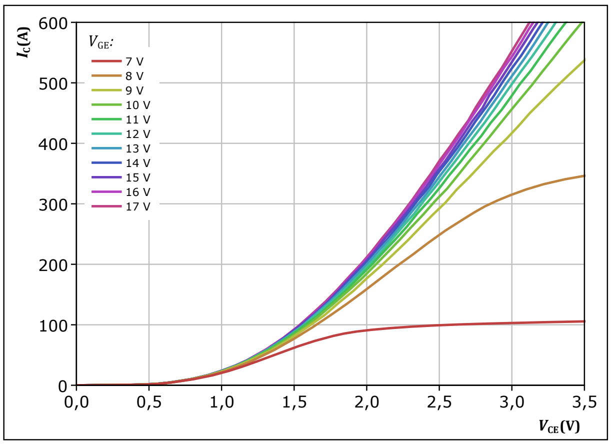
V_{GE} = 15 V

T_j: 25 °C, 125 °C, 150 °C

figure 12. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



t_p = 250 µs

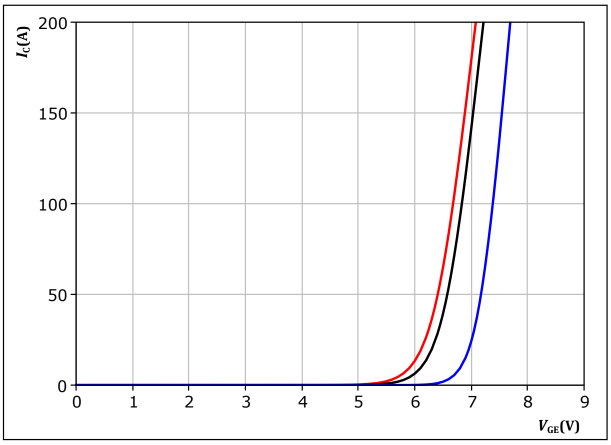
T_j = 150 °C

V_{GE} from 7 V to 17 V in steps of 1 V

figure 13. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



t_p = 250 µs

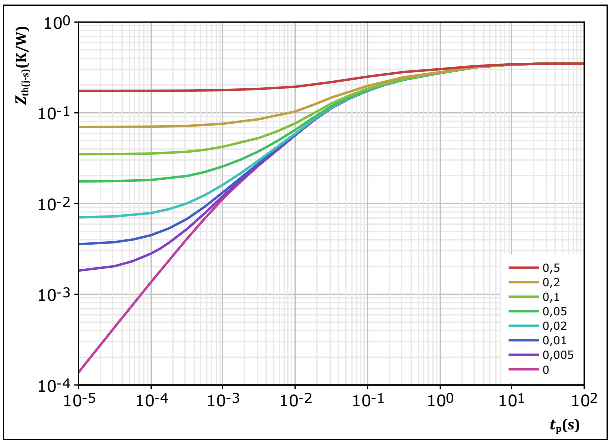
V_{CE} = 48 V

T_j: 25 °C, 125 °C, 150 °C

figure 14. **IGBT**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 0,349 K/W

IGBT thermal model values

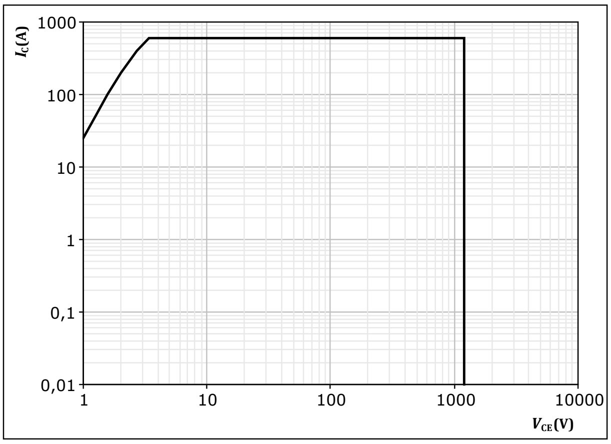
R (K/W)	τ (s)
3,91E-02	6,22E+00
9,03E-02	1,28E+00
1,12E-01	1,28E-01
9,67E-02	2,14E-02
1,15E-02	1,37E-03

Boost Switch Characteristics

figure 15. **IGBT**

Safe operating area

I_C = f(V_{CE})



D = single pulse

T_s = 80 °C

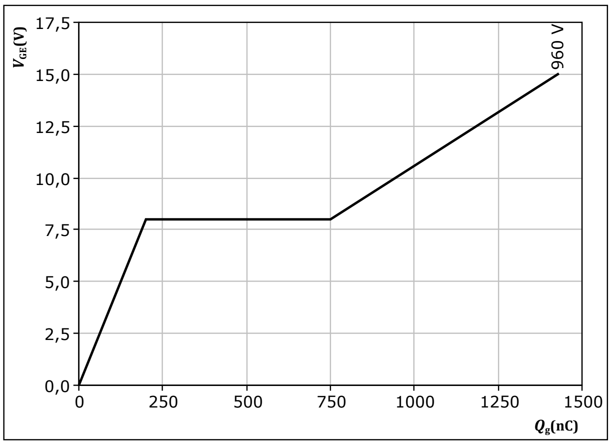
V_{GE} = 15 V

T_j = T_{jmax}

figure 16. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



I_C = 100 A

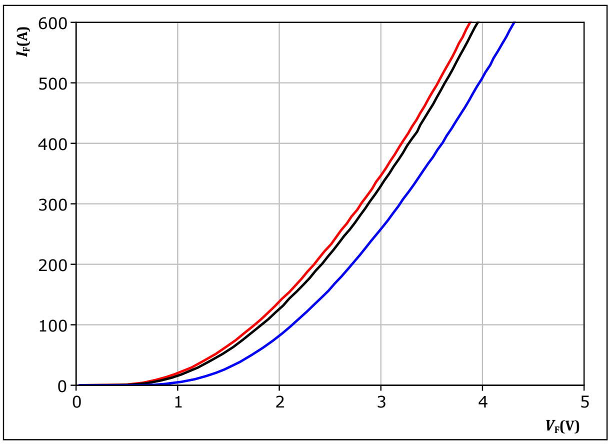
T_j = 25 °C

Boost Diode Characteristics

figure 17. **FWD**

Typical forward characteristics

I_F = f(V_F)



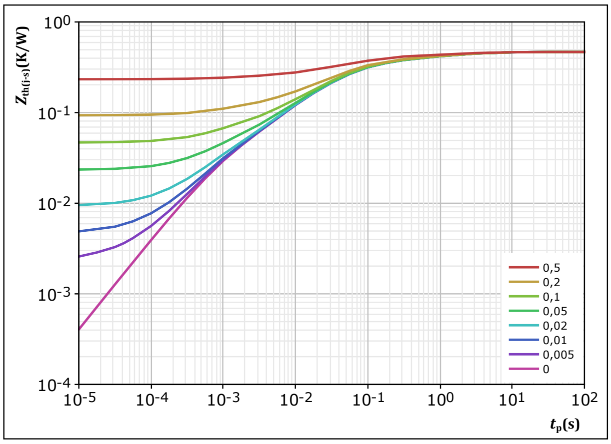
t_p = 250 µs

T_j:
25 °C
125 °C
150 °C

figure 18. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 0,466 K/W

FWD thermal model values

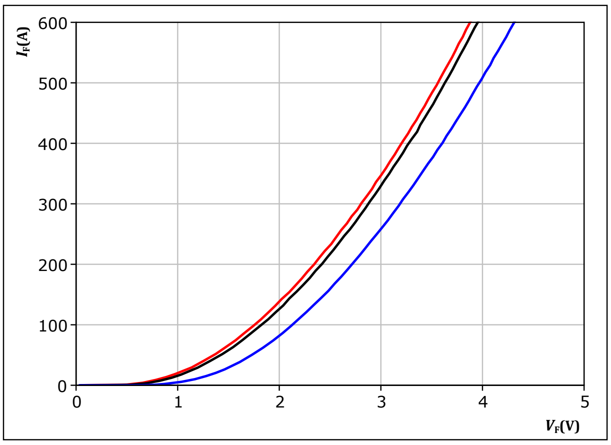
R (K/W)	τ (s)
3,44E-02	4,32E+00
8,31E-02	6,95E-01
2,22E-01	6,24E-02
1,02E-01	1,07E-02
2,50E-02	9,13E-04

Boost Sw. Inv. Diode Characteristics

figure 19. **FWD**

Typical forward characteristics

I_F = f(V_F)



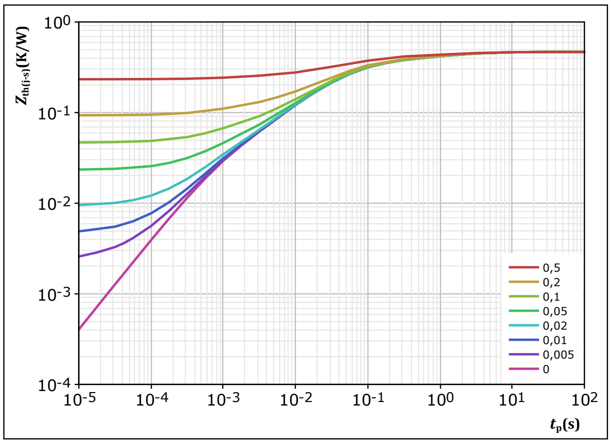
t_p = 250 μs

T_j:
- 25 °C
- 125 °C
- 150 °C

figure 20. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 0,466 K/W

FWD thermal model values

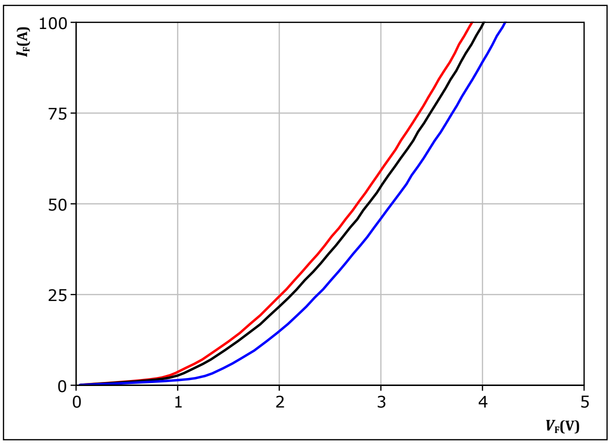
R (K/W)	τ (s)
3,44E-02	4,32E+00
8,31E-02	6,95E-01
2,22E-01	6,24E-02
1,02E-01	1,07E-02
2,50E-02	9,13E-04

Boost Sw. Protection Diode Characteristics

figure 21. **FWD**

Typical forward characteristics

I_F = f(V_F)



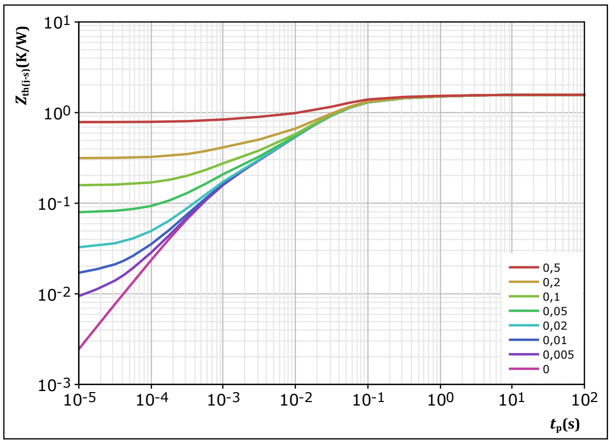
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 22. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 1,569 K/W

FWD thermal model values

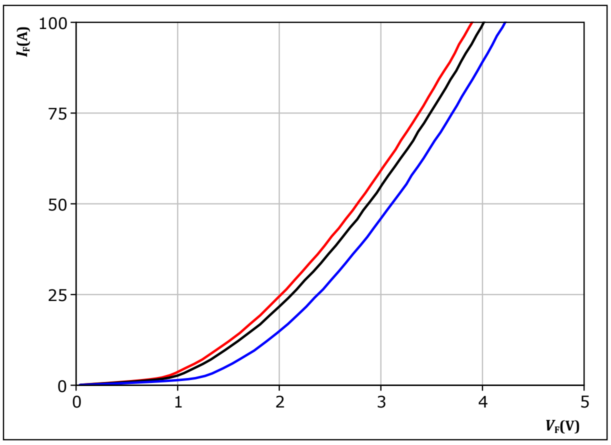
R (K/W)	τ (s)
1,01E-01	1,94E+00
2,27E-01	1,82E-01
9,16E-01	3,29E-02
1,87E-01	6,19E-03
1,39E-01	7,38E-04

Boost D. Protection Diode Characteristics

figure 23. **FWD**

Typical forward characteristics

I_F = f(V_F)



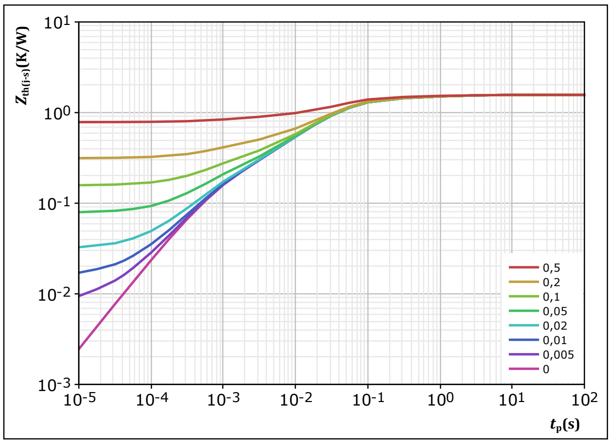
t_p = 250 µs

T_j:
25 °C
125 °C
150 °C

figure 24. **FWD**

Transient thermal impedance as a function of pulse width

$Z_{th(j-s)}$ = f(t_p)



D = t_p / T

$R_{th(j-s)}$ = 1,569 K/W

FWD thermal model values

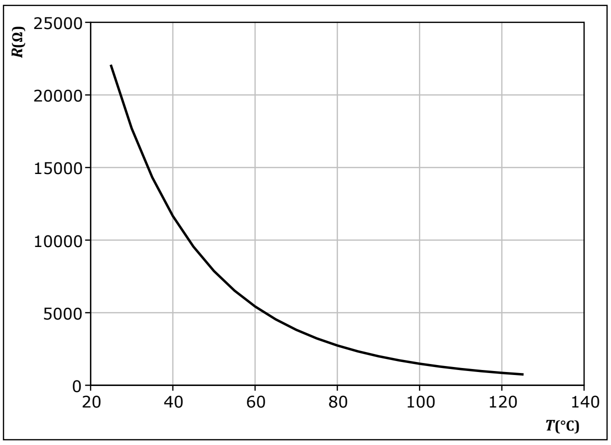
R (K/W)	τ (s)
1,01E-01	1,94E+00
2,27E-01	1,82E-01
9,16E-01	3,29E-02
1,87E-01	6,19E-03
1,39E-01	7,38E-04

Thermistor Characteristics

figure 25. **Thermistor**

Typical NTC characteristic as function of temperature

R_T = f(T)

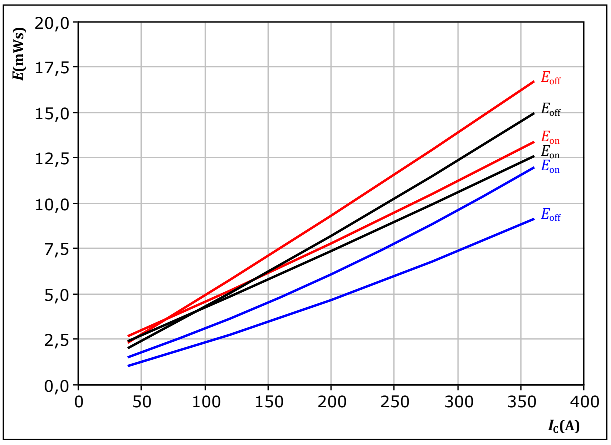


Buck Switching Characteristics

figure 26. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



With an inductive load at

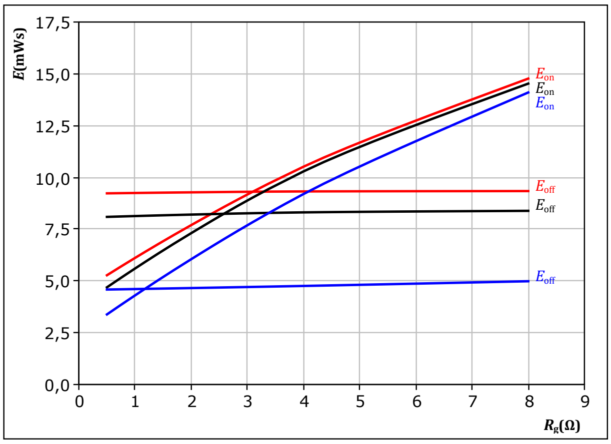
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
R_{goff} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 27. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

$E = f(R_g)$



With an inductive load at

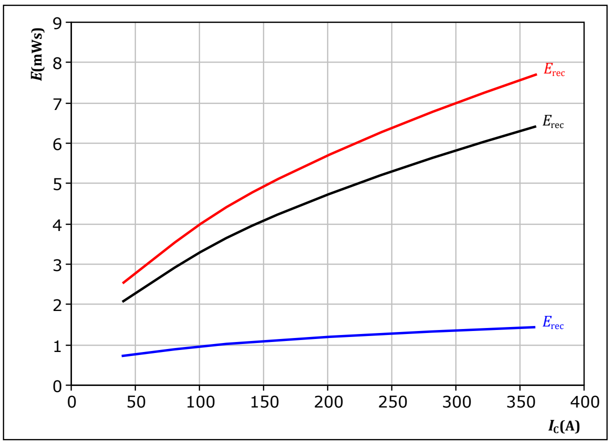
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

T_j:
25 °C
125 °C
150 °C

figure 28. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



With an inductive load at

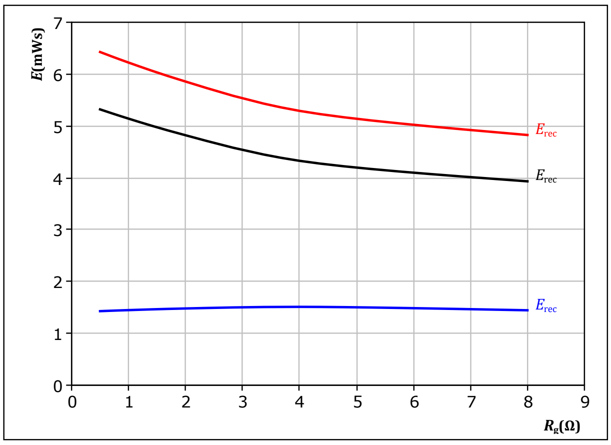
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 29. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

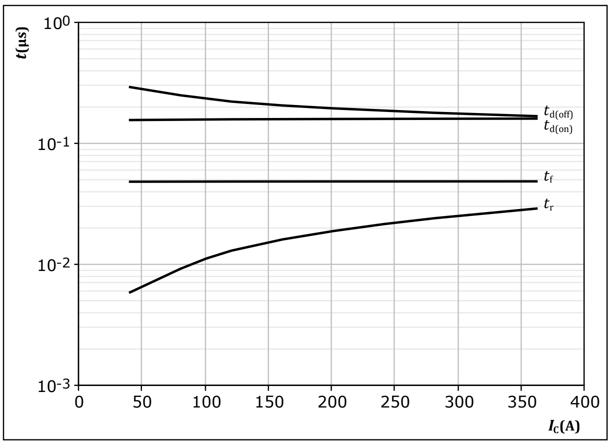
T_j:
25 °C
125 °C
150 °C

Buck Switching Characteristics

figure 30. **IGBT**

Typical switching times as a function of collector current

$t = \mathrm{f}(I_C)$



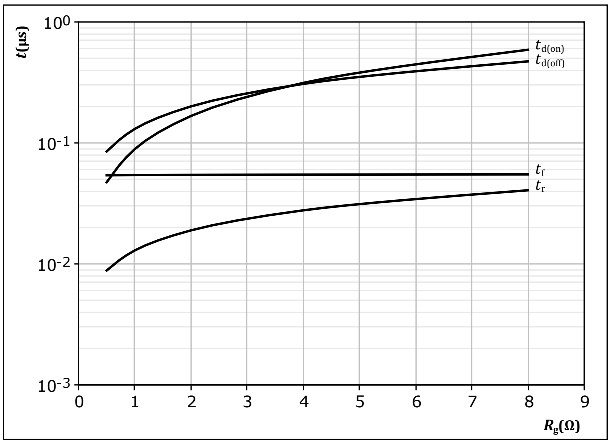
With an inductive load at

T_j = 150 °C
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
R_{goff} = 2 Ω

figure 31. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

$t = \mathrm{f}(R_g)$



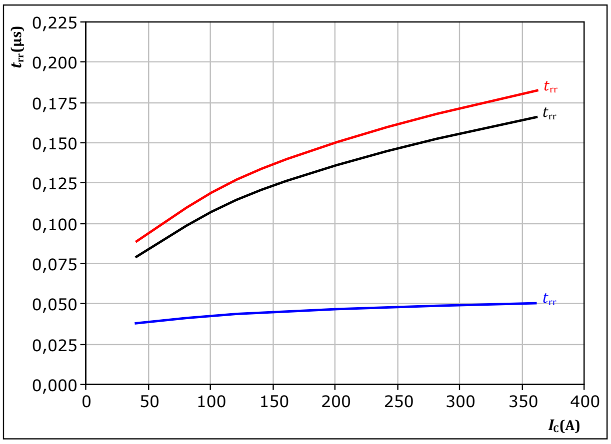
With an inductive load at

T_j = 150 °C
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

figure 32. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = \mathrm{f}(I_C)$



With an inductive load at

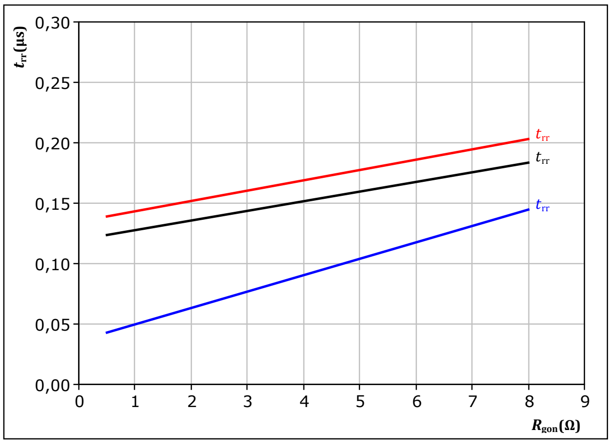
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 33. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

$t_{rr} = \mathrm{f}(R_{gon})$



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

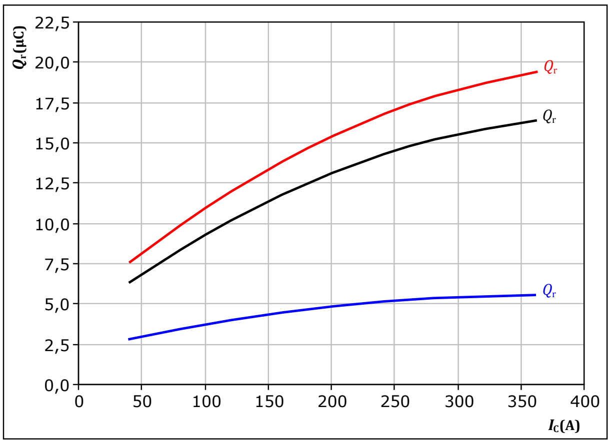
T_j:
25 °C
125 °C
150 °C

Buck Switching Characteristics

figure 34. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



With an inductive load at

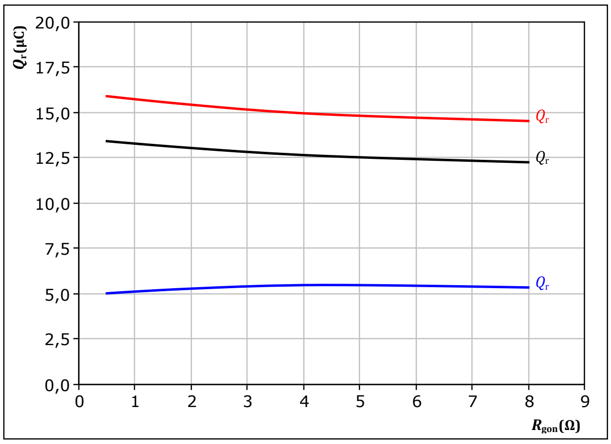
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j: 25 °C
125 °C
150 °C

figure 35. **FWD**

Typical recovered charge as a function of IGBT turn on gate resistor

Q_r = f(R_{gon})



With an inductive load at

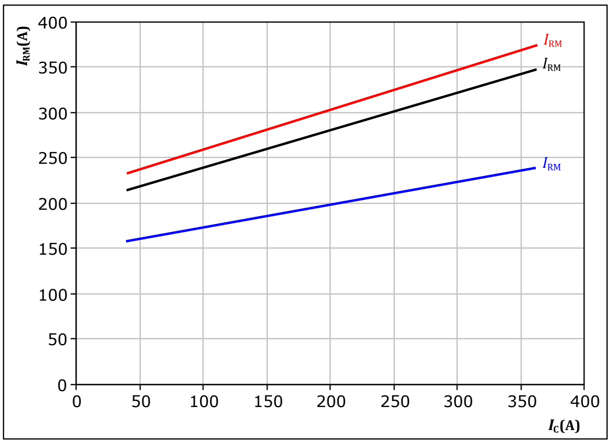
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

T_j: 25 °C
125 °C
150 °C

figure 36. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



With an inductive load at

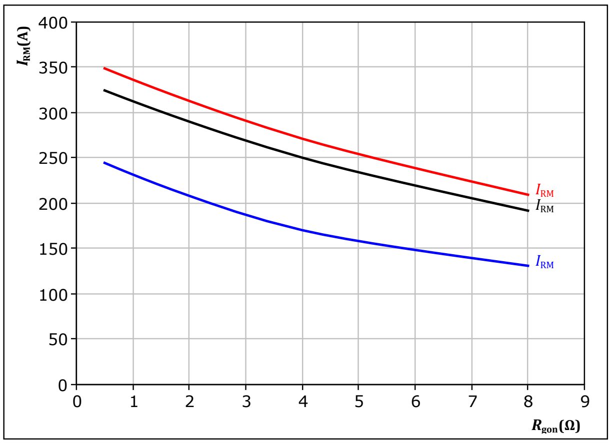
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j: 25 °C
125 °C
150 °C

figure 37. **FWD**

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

I_{RM} = f(R_{gon})



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

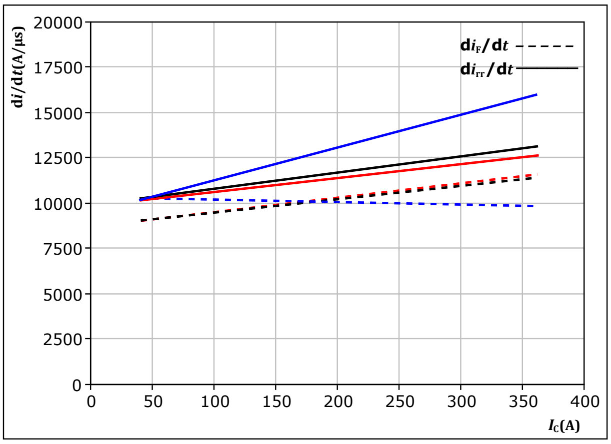
T_j: 25 °C
125 °C
150 °C

Buck Switching Characteristics

figure 38. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

$di_F/dt,\ di_{rr}/dt = f(I_C)$



With an inductive load at

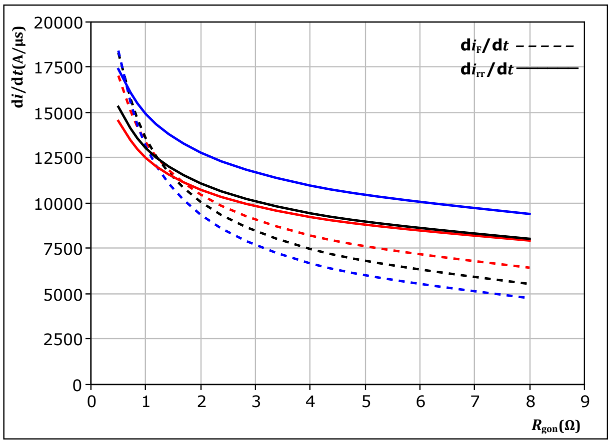
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 39. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

$di_F/dt,\ di_{rr}/dt = f(R_{gon})$



With an inductive load at

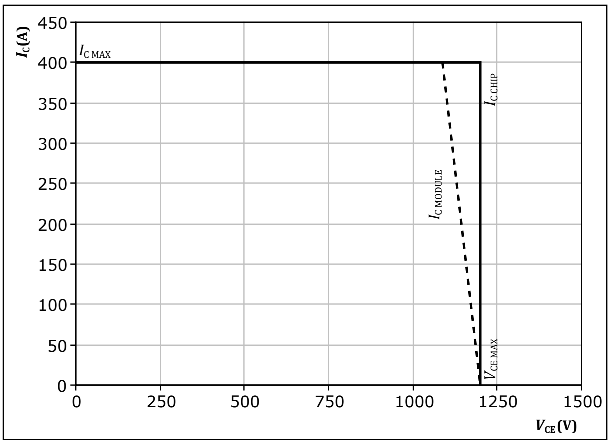
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

T_j:
25 °C
125 °C
150 °C

figure 40. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



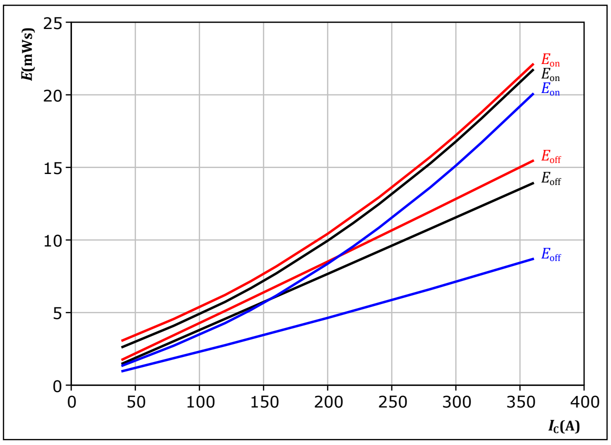
At T_j = 150 °C
R_{gon} = 2 Ω
R_{goff} = 2 Ω

Boost Switching Characteristics

figure 41. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



With an inductive load at

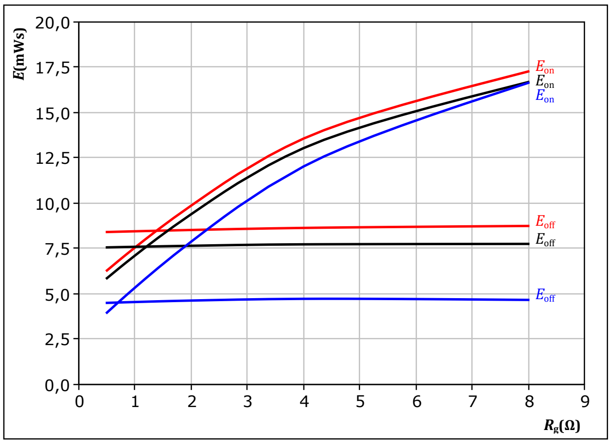
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
R_{goff} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 42. **IGBT**

Typical switching energy losses as a function of IGBT turn on gate resistor

E = f(R_g)



With an inductive load at

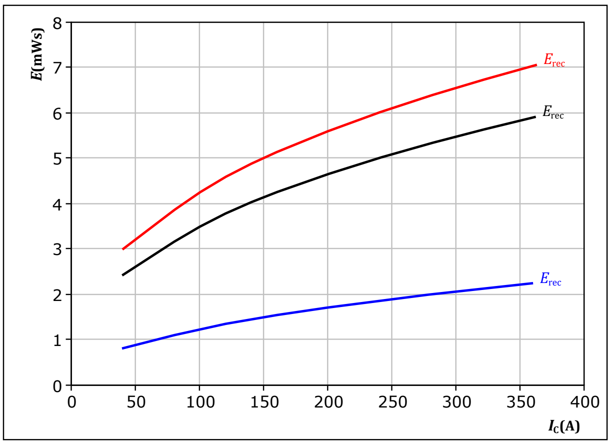
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

T_j:
25 °C
125 °C
150 °C

figure 43. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



With an inductive load at

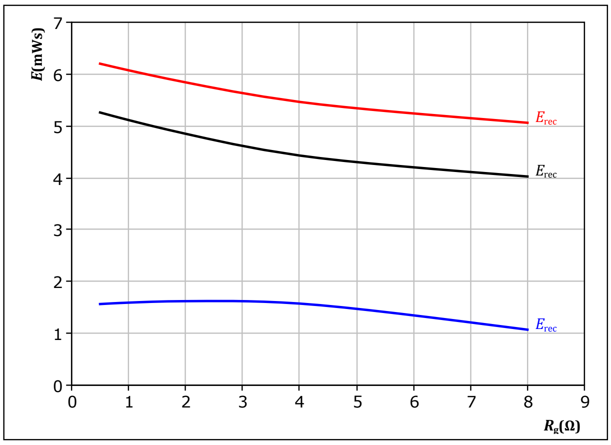
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 44. **FWD**

Typical reverse recovered energy loss as a function of IGBT turn on gate resistor

E_{rec} = f(R_g)



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

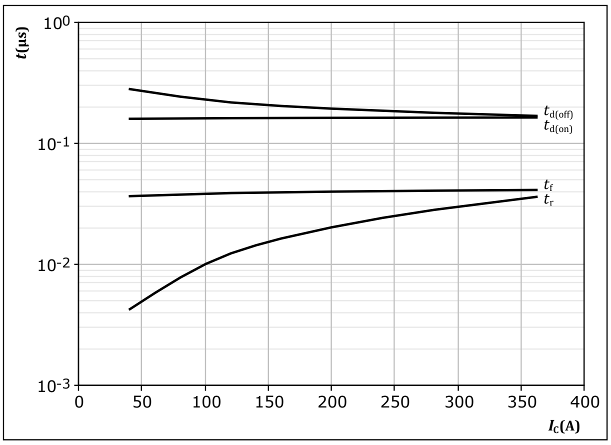
T_j:
25 °C
125 °C
150 °C

Boost Switching Characteristics

figure 45. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



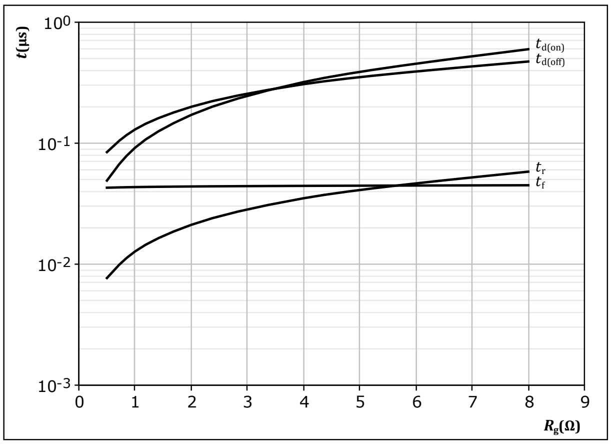
With an inductive load at

T_j = 150 °C
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
R_{goff} = 2 Ω

figure 46. **IGBT**

Typical switching times as a function of IGBT turn on gate resistor

t = f(R_g)



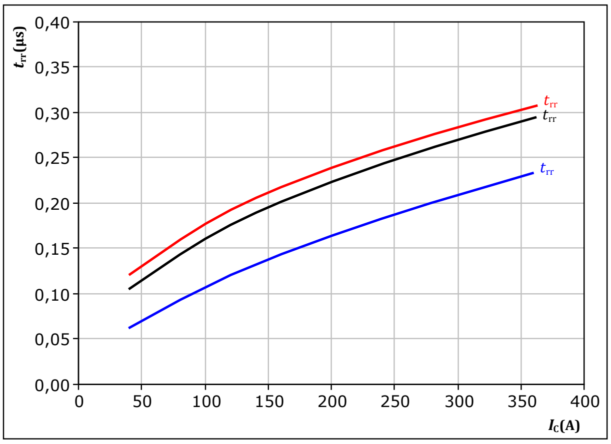
With an inductive load at

T_j = 150 °C
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

figure 47. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

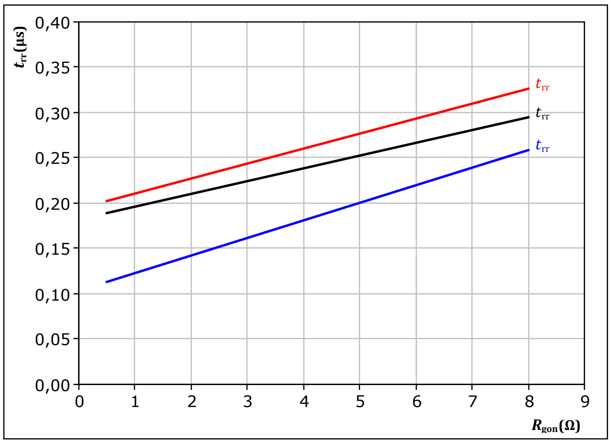
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 48. **FWD**

Typical reverse recovery time as a function of IGBT turn on gate resistor

t_{rr} = f(R_{gon})



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

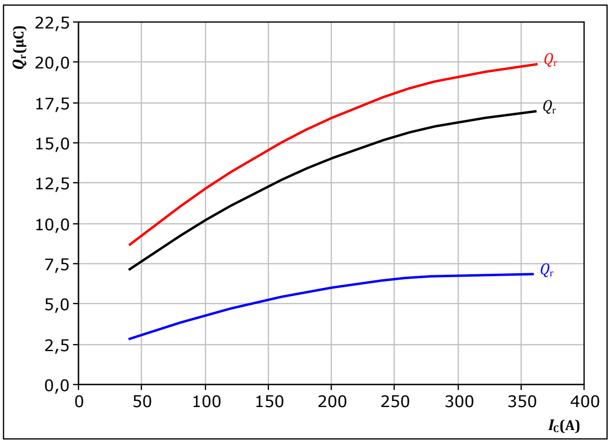
T_j:
25 °C
125 °C
150 °C

Boost Switching Characteristics

figure 49. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



With an inductive load at

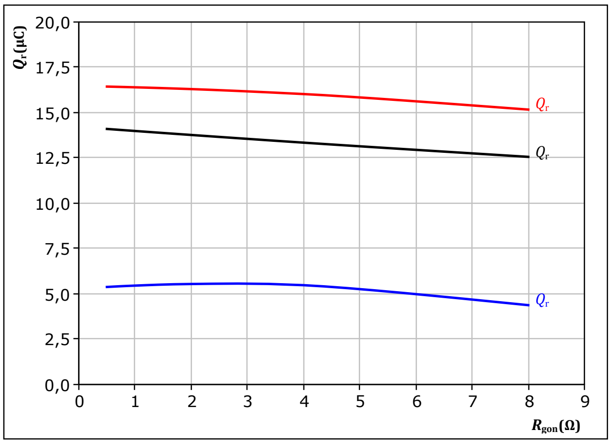
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 50. **FWD**

Typical recovered charge as a function of IGBT turn on gate resistor

Q_r = f(R_{gon})



With an inductive load at

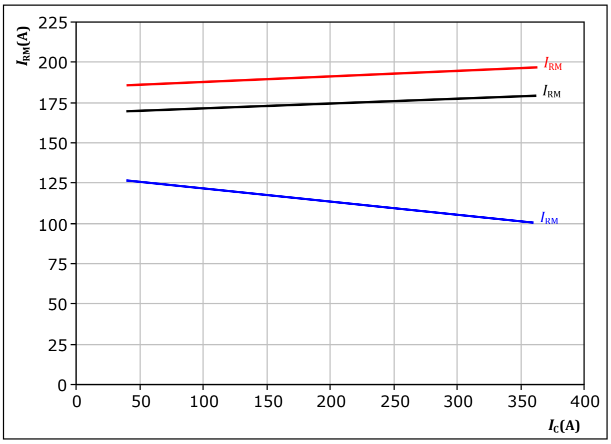
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

T_j:
25 °C
125 °C
150 °C

figure 51. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



With an inductive load at

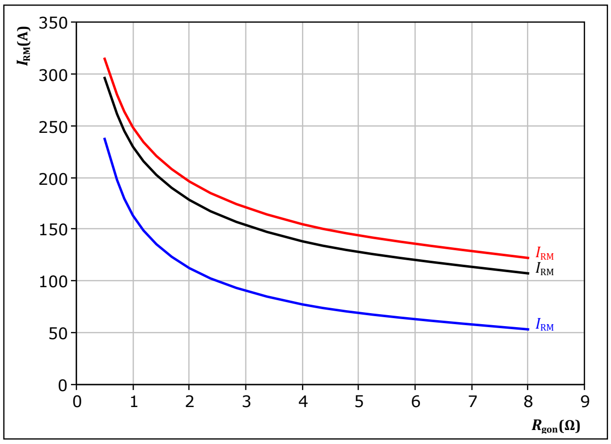
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
25 °C
125 °C
150 °C

figure 52. **FWD**

Typical peak reverse recovery current as a function of IGBT turn on gate resistor

I_{RM} = f(R_{gon})



With an inductive load at

V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

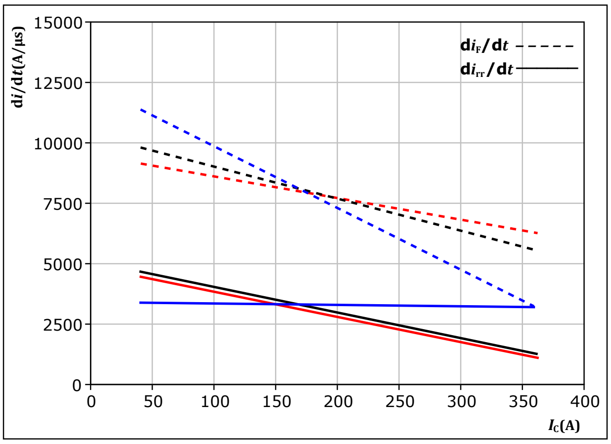
T_j:
25 °C
125 °C
150 °C

Boost Switching Characteristics

figure 53. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of collector current

di_F/dt, di_{rr}/dt = f(I_C)



With an inductive load at

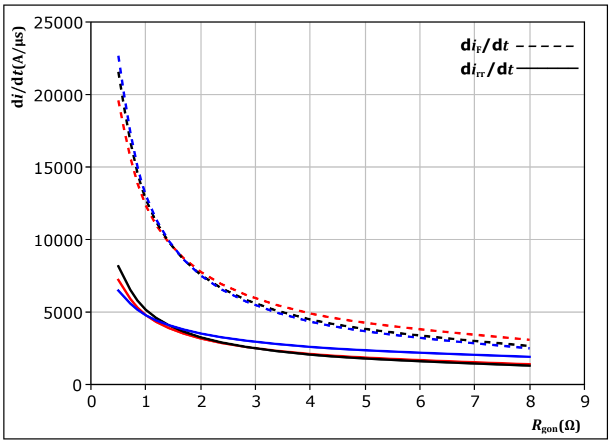
V_{CE} = 600 V
V_{GE} = ±15 V
R_{gon} = 2 Ω

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 54. **FWD**

Typical rate of fall of forward and reverse recovery current as a function of turn on gate resistor

di_F/dt, di_{rr}/dt = f(R_{gon})



With an inductive load at

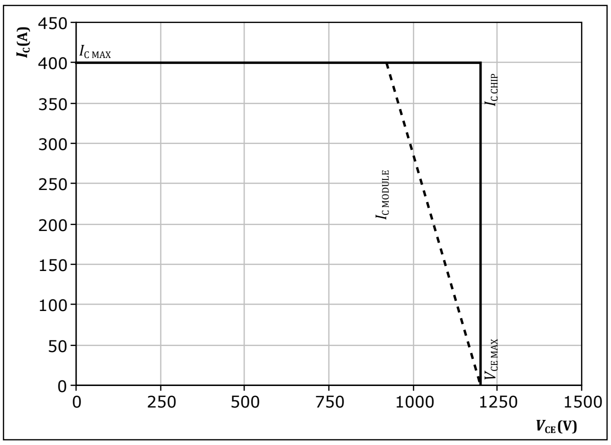
V_{CE} = 600 V
V_{GE} = ±15 V
I_C = 200 A

T_j:
— 25 °C
— 125 °C
— 150 °C

figure 55. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At T_j = 150 °C
R_{gon} = 2 Ω
R_{goff} = 2 Ω

Switching Definitions

figure 56. **IGBT**

Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{tEoff} **= integrating time for** E_{off})

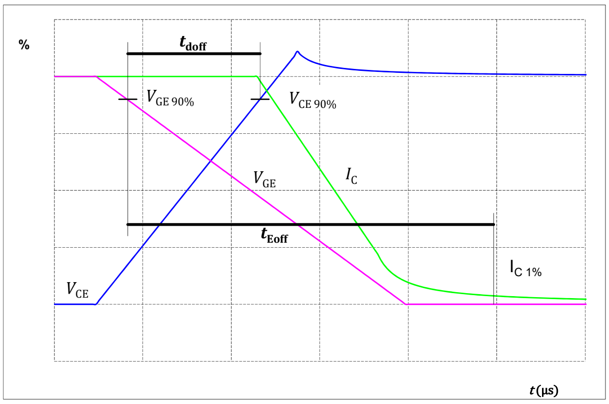


figure 57. **IGBT**

Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} **= integrating time for** E_{on})

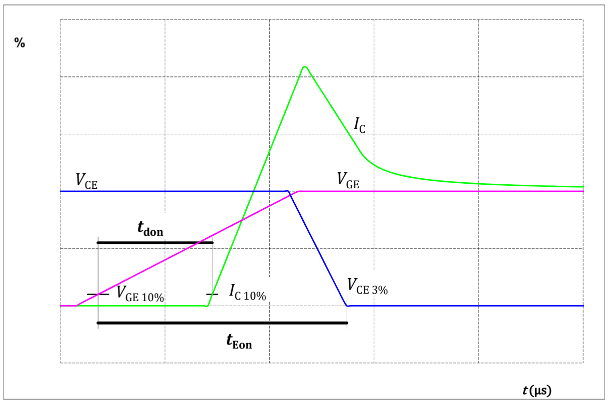


figure 58. **IGBT**

Turn-off Switching Waveforms & definition of t_{f}

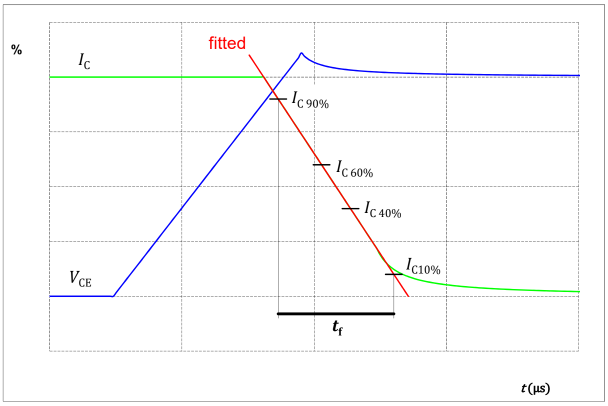
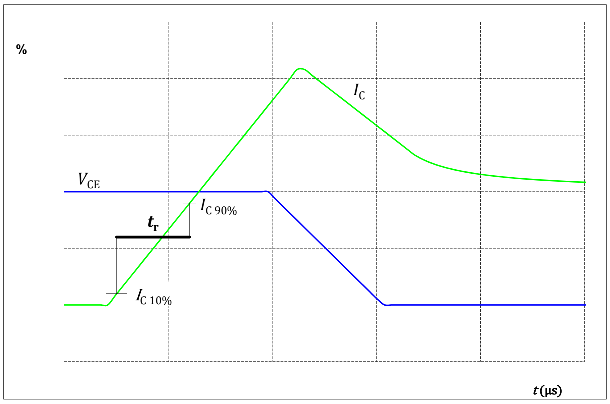


figure 59. **IGBT**

Turn-on Switching Waveforms & definition of t_{r}



Switching Definitions

figure 60. **FWD**

Turn-off Switching Waveforms & definition of t_{rr}

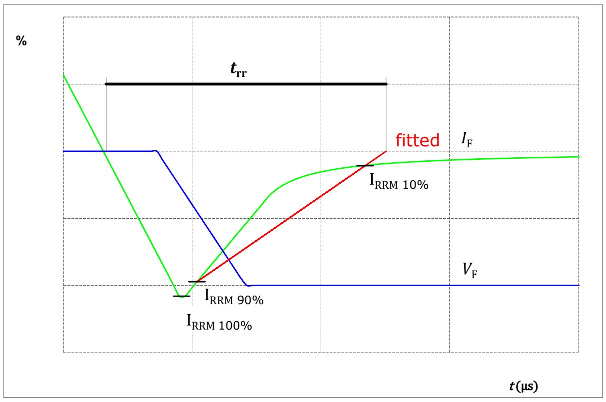
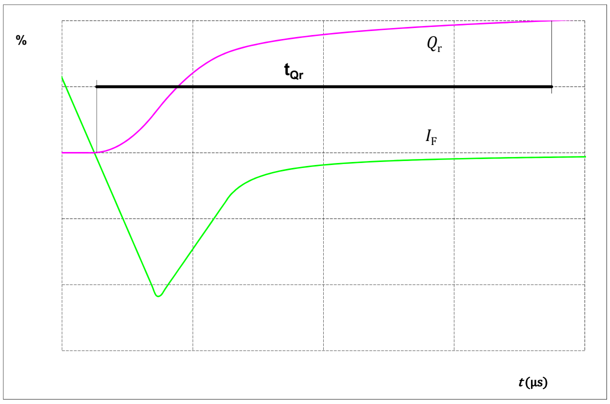


figure 61. **FWD**

Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



Ordering Code

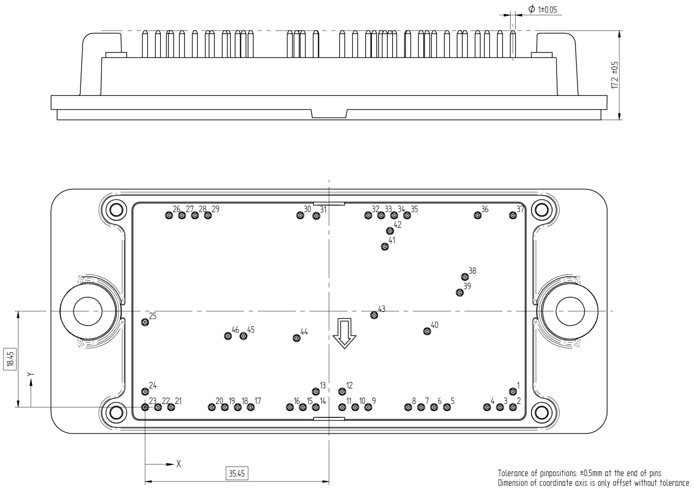
Version	Ordering Code
Without thermal paste	30-FT12NIA200H7-LG00F18
With thermal paste (3,4 W/mK, PSX-P7)	30-FT12NIA200H7-LG00F18-/3/

Marking

		Name		**Date code**	**UL & VIN**	**Lot**	**Serial**
	**Text**	NN-NNNNNNNNNNNNNN-TTTTTTVV		WWYY	UL VIN	LLLLL	SSSS
	Datamatrix	**Type&Ver**	**Lot number**	**Serial**	**Date code**		
		TTTTTTTVV	LLLLL	SSSS	WWYY		

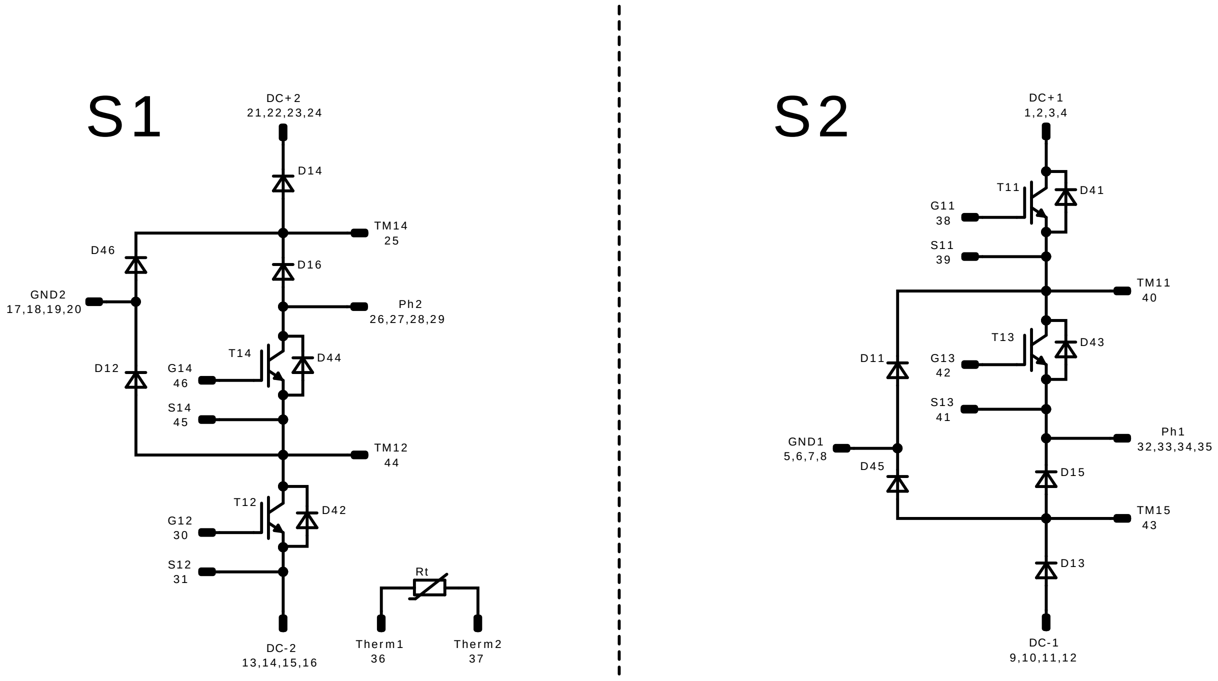
Outline

Pin table [mm]			
Pin	X	Y	Function
1	70,9	3	DC+1
2	70,9	0	DC+1
3	68,4	0	DC+1
4	65,9	0	DC+1
5	58,2	0	GND1
6	55,7	0	GND1
7	53,2	0	GND1
8	50,7	0	GND1
9	43	0	DC-1
10	40,5	0	DC-1
11	38	0	DC-1
12	38	3	DC-1
13	32,9	3	DC-2
14	32,9	0	DC-2
15	30,4	0	DC-2
16	27,9	0	DC-2
17	20,35	0	GND2
18	17,85	0	GND2
19	15,35	0	GND2
20	12,85	0	GND2
21	5	0	DC+2
22	2,5	0	DC+2
23	0	0	DC+2
24	0	3	DC+2
25	0	16,35	TM14
26	4,6	36,9	Ph2
27	7,1	36,9	Ph2
28	9,6	36,9	Ph2
29	12,1	36,9	Ph2
30	29,9	36,9	G12
31	33	36,8	S12
32	43	36,9	Ph1
33	45,5	36,9	Ph1
34	48	36,9	Ph1
35	50,5	36,9	Ph1
36	64,1	36,9	Therm1
37	70,9	36,9	Therm2
38	61,65	25,05	G11
39	60,65	22,05	S11
40	54,35	14,6	TM11
41	46,2	30,9	S13
42	47,2	33,9	G13
43	44,15	17,7	TM15
44	29,2	13,3	TM12
45	18,95	13,7	S14
46	15,95	13,7	G14



Tolerance of pinpositions: ±0.5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	1200 V	200 A	Buck Switch	
D11, D12	FWD	1200 V	200 A	Buck Diode	
D41, D42	FWD	1200 V	100 A	Buck Sw. Protection Diode	
T13, T14	IGBT	1200 V	200 A	Boost Switch	
D13, D14	FWD	1200 V	200 A	Boost Diode	
D15, D16	FWD	1200 V	200 A	Boost Sw. Inv. Diode	
D43, D44	FWD	1200 V	40 A	Boost Sw. Protection Diode	
D45, D46	FWD	1200 V	40 A	Boost D. Protection Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 36	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 2 packages see vincotech.com website.

Package data
Package data for *flow* 2 packages see vincotech.com website.

Vincotech thermistor reference
See Vincotech thermistor reference table at vincotech.com website.

UL recognition and file number
This device is UL 1557 recognized under E192116 up to a junction temperature under switching condition $T_{j,op}$=175°C and up to 4000VAC/1min isolation voltage. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-FT12NIA200H7-LG00F18-D2-14	4 Mar. 2024	Updated Isolation Voltage	

DISCLAIMER

The information, specifications, procedures, methods and recommendations herein (together "information") are presented by Vincotech to reader in good faith, are believed to be accurate and reliable, but may well be incomplete and/or not applicable to all conditions or situations that may exist or occur. Vincotech reserves the right to make any changes without further notice to any products to improve reliability, function or design. No representation, guarantee or warranty is made to reader as to the accuracy, reliability or completeness of said information or that the application or use of any of the same will avoid hazards, accidents, losses, damages or injury of any kind to persons or property or that the same will not infringe third parties rights or give desired results. It is reader's sole responsibility to test and determine the suitability of the information and the product for reader's intended use.

LIFE SUPPORT POLICY

Vincotech products are not authorised for use as critical components in life support devices or systems without the express written approval of Vincotech.
As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, or (c) whose failure to perform when properly used in accordance with instructions for use provided in labelling can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.