B0-SP10B2A200S705-PA58L96T
datasheet

Vincotech

*flow*BOOST S3 dual — 950 V / 200 A

Topology features

- Auxiliary diodes for FC pre-charge (patent pending)
- Bypass Diode
- Dual Flying Cap Booster
- Kelvin Emitter for improved switching performance
- Temperature sensor

Component features

- Low collector emitter saturation voltage
- High speed and smooth switching

Housing features

- Base isolation: Al_2O_3
- CTI600 housing material
- Compact, baseplate-less housing
- VINcoPress Technology
- Thermo-mechanical push-and-pull force relief
- Press-fit pin
- Reliable cold welding connection

Target applications

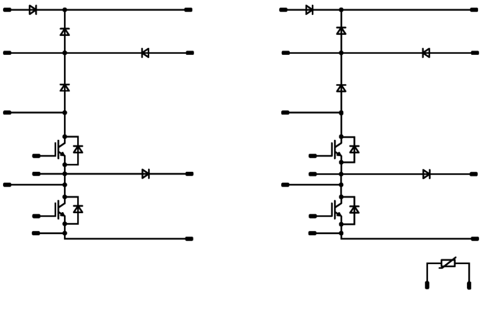
- Energy Storage Systems
- Solar Inverters

Types

- B0-SP10B2A200S705-PA58L96T

flow S3 12 mm housing

Schematic



Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Inner Boost Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	145	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	276	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Inner Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	72	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		273	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	390	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	168	W
Maximum junction temperature	T_{jmax}			175	°C
Inner 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	67	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	120	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Outer Boost Switch					
Collector-emitter voltage	V_{CES}			950	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	145	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	276	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Outer Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	72	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		273	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	390	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	168	W
Maximum junction temperature	T_{jmax}			175	°C
Outer 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	67	A
Repetitive peak forward current	I_{FRM}	t_p limited by T_{jmax}		150	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	120	W
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
Aux Diode H					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	43	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	270	A
Surge current capability	I^2t			365	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	91	W
Maximum junction temperature	T_{jmax}			175	°C
Aux Diode L					
Peak repetitive reverse voltage	V_{RRM}			1200	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	43	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	270	A
Surge current capability	I^2t			365	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	91	W
Maximum junction temperature	T_{jmax}			175	°C
ByPass Diode					
Peak repetitive reverse voltage	V_{RRM}			1800	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	85	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 25 °C	600	A
Surge current capability	I^2t			1800	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	108	W
Maximum junction temperature	T_{jmax}			150	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Conditions		Value	Unit
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	6000	V
Creepage distance				9,77	mm
Clearance				9,77	mm
Comparative Tracking Index	CTI			≥ 600	

*100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
Inner Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00334	25	4,35	5,1	5,85	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,83 2,06 2,11	2,35(1)	V
Collector-emitter cut-off current	I_{CES}		0	950		25			4	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,75		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		13000		pF
Output capacitance	C_{oes}							278		pF
Reverse transfer capacitance	C_{res}							40		pF
Gate charge	Q_g		±15		0	25		460		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,34		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	135	25 125 150		259,9 258,86 258,6		ns
Rise time	t_r					25 125 150		25,92 28,8 30,29		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		193,14 224,38 233,5		ns
Fall time	t_f					25 125 150		22,27 45,76 54,07		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,271 µC Q_{rFWD}=0,273 µC Q_{rFWD}=0,272 µC				25 125 150		5,49 5,4 5,42		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,2 5,36 6		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	
Inner Boost Diode										
Static										
Forward voltage	V_F				60	25 125 150		1,5 1,86 2,01	1,8(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25		105	600	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,57		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=4162 A/µs d*i*/d*t*=4717 A/µs d*i*/d*t*=4994 A/µs	±15	600	135	25 125 150		29,31 28,88 28,56		A
Reverse recovery time	t_{rr}					25 125 150		15,13 15,51 15,64		ns
Recovered charge	Q_r					25 125 150		0,271 0,273 0,272		µC
Reverse recovered energy	E_{rec}					25 125 150		0,033 0,033 0,033		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		10460,35 8703,36 7469,31		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	
Inner Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				75	25 125 150		1,74 1,83 1,84	2,15(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			55	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,79		K/W

Characteristic Values

Parameter	Symbol	Conditions	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]	Values Min	Typ	Max	Unit
Outer Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,00334	25	4,35	5,1	5,85	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,83 2,06 2,11	2,35(1)	V
Collector-emitter cut-off current	I_{CES}		0	950		25			4	µA
Gate-emitter leakage current	I_{GES}		20	0		25			200	nA
Internal gate resistance	r_g							0,75		Ω
Input capacitance	C_{ies}	f = 100 kHz	0	25		25		13000		pF
Output capacitance	C_{oes}							278		pF
Reverse transfer capacitance	C_{res}							40		pF
Gate charge	Q_g		±15		0	25		460		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,34		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 8 Ω R_{goff} = 8 Ω	±15	600	135	25 125 150		259,9 258,86 258,6		ns
Rise time	t_r					25 125 150		25,92 28,8 30,29		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		193,14 224,38 233,5		ns
Fall time	t_f					25 125 150		22,27 45,76 54,07		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=0,271 µC Q_{rFWD}=0,273 µC Q_{rFWD}=0,272 µC				25 125 150		5,49 5,4 5,42		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		3,2 5,36 6		mWs

Characteristic Values

Parameter	Symbol	Conditions	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	Unit
Outer Boost Diode										
Static										
Forward voltage	V_F				60	25 125 150		1,5 1,86 2,01	1,8(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25		105	600	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,57		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=4162 A/µs d*i*/d*t*=4717 A/µs d*i*/d*t*=4994 A/µs	±15	600	135	25 125 150		29,31 28,88 28,56		A
Reverse recovery time	t_{rr}					25 125 150		15,13 15,51 15,64		ns
Recovered charge	Q_r					25 125 150		0,271 0,273 0,272		µC
Reverse recovered energy	E_{rec}					25 125 150		0,033 0,033 0,033		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		10460,35 8703,36 7469,31		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	
Outer Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				75	25 125 150		1,74 1,83 1,84	2,15(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25			55	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,79		K/W
Aux Diode H										
Static										
Forward voltage	V_F				50	25 125 150		2,22 2,31 2,21	2,54(1) 2,5(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 4400	60 8800	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,04		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	
Aux Diode L										
Static										
Forward voltage	V_F				50	25 125 150		2,22 2,31 2,21	2,54(1) 2,5(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 4400	60 8800	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						1,04		K/W
ByPass Diode										
Static										
Forward voltage	V_F				50	25 125 150		1,12 1,1 1,08	1,2(1)	V
Reverse leakage current	I_R	V_r = 1800 V				25 150			10 1500	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 5,2 W/mK (PTM)						0,65		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

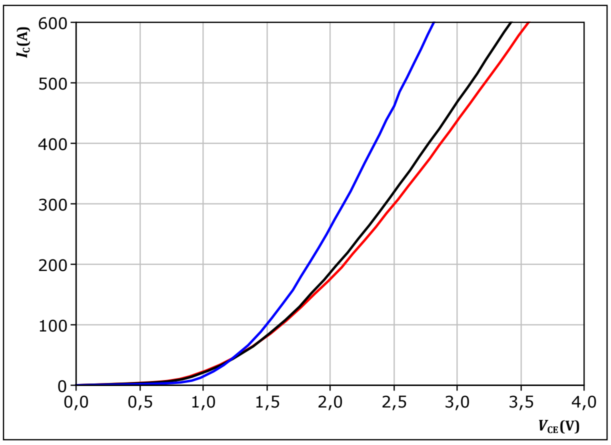
(2) Only valid with pre-applied Vincotech thermal interface material.

Inner Boost Switch Characteristics

figure 1. IGBT

Typical output characteristics

$I_C = f(V_{CE})$

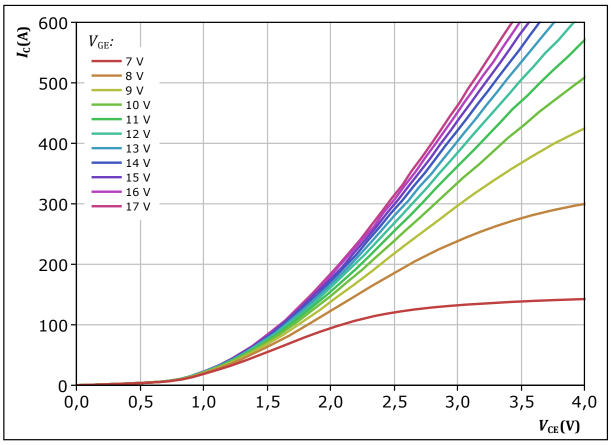


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. IGBT

Typical output characteristics

$I_C = f(V_{CE})$



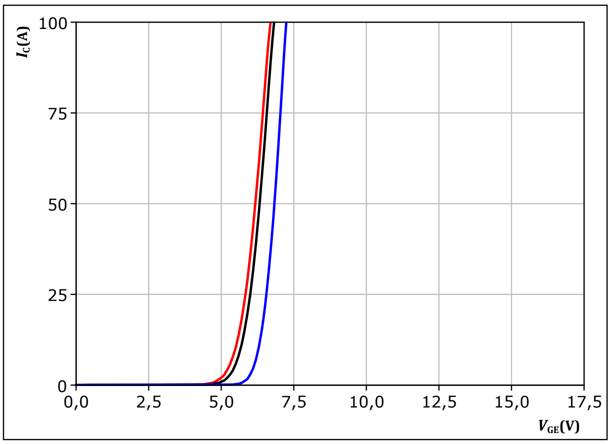
t_p =	250	µs
T_j =	150	°C

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

figure 3. IGBT

Typical transfer characteristics

$I_C = f(V_{GE})$

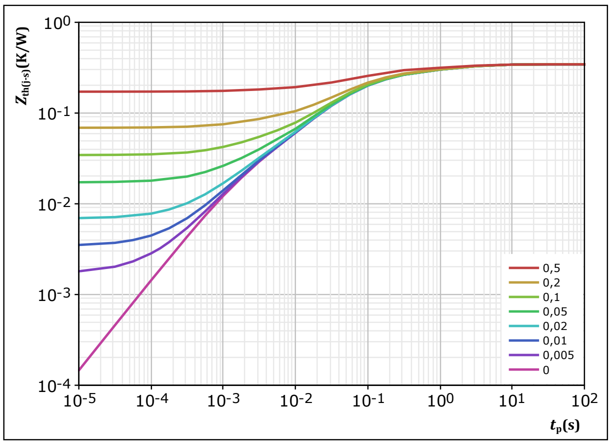


t_p =	250	µs		25 °C
V_{CE} =	8	V	T_j:	125 °C
				150 °C

figure 4. IGBT

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,344	K/W

IGBT thermal model values

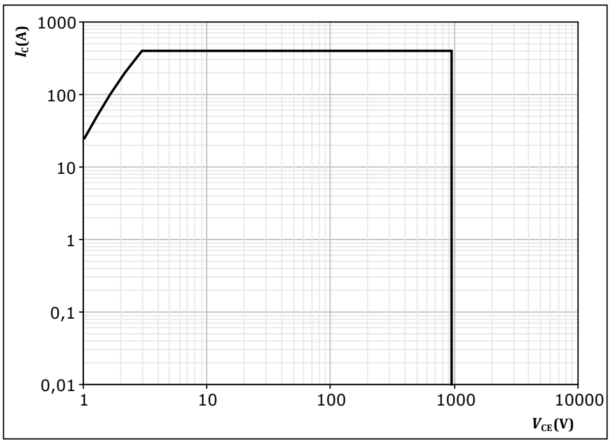
R (K/W)	τ (s)
3,51E-02	3,52E+00
6,84E-02	7,05E-01
1,60E-01	8,54E-02
6,50E-02	1,97E-02
1,61E-02	1,73E-03

Inner Boost Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})



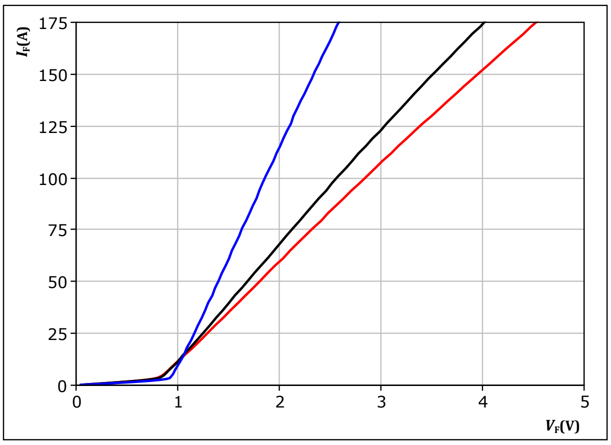
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Inner Boost Diode Characteristics

figure 6. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



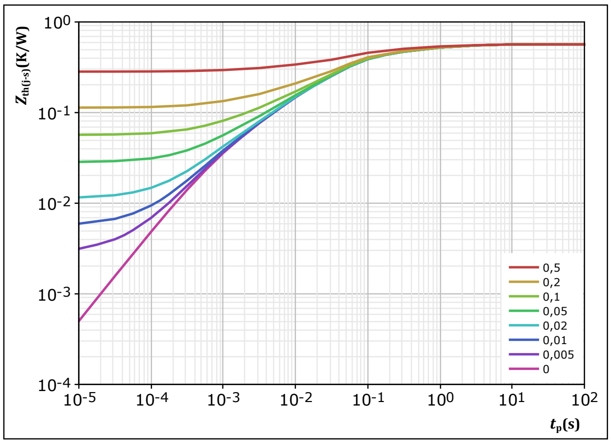
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 7. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,566 K/W

FWD thermal model values

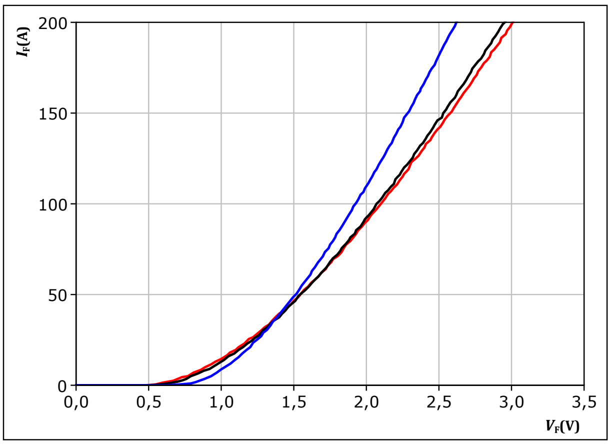
R (K/W)	τ (s)
6,09E-02	2,27E+00
1,15E-01	3,23E-01
2,90E-01	4,74E-02
7,95E-02	5,40E-03
2,18E-02	7,49E-04

Inner Boost Sw. Protection Diode Characteristics

figure 8. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



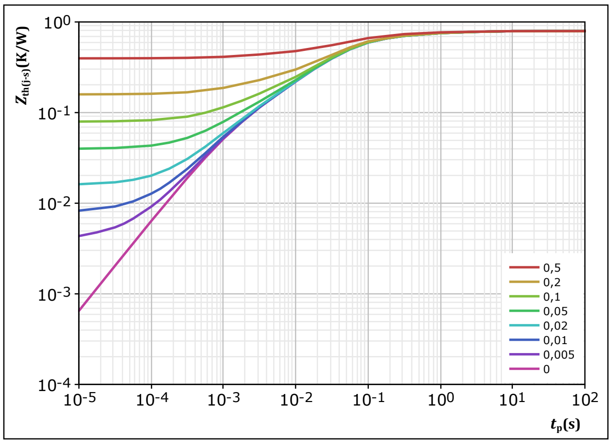
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 9. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,793 K/W

FWD thermal model values

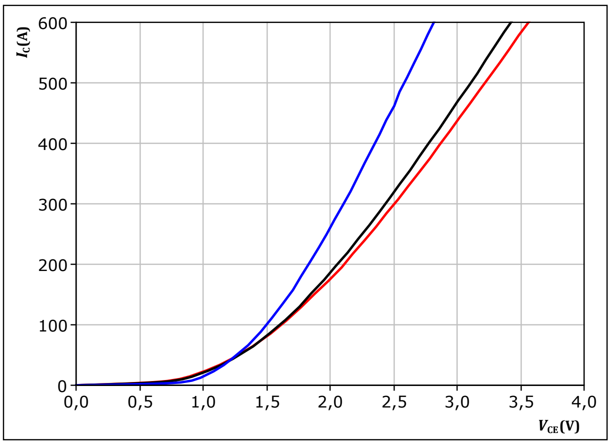
R (K/W)	τ (s)
5,39E-02	2,49E+00
1,33E-01	2,82E-01
4,13E-01	4,97E-02
1,37E-01	1,07E-02
5,71E-02	1,31E-03

Outer Boost Switch Characteristics

figure 10. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



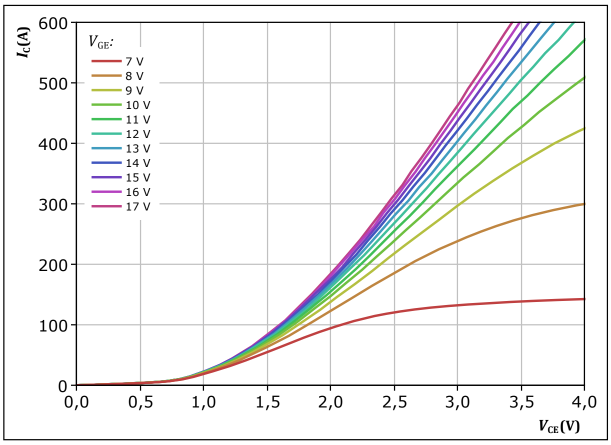
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 11. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



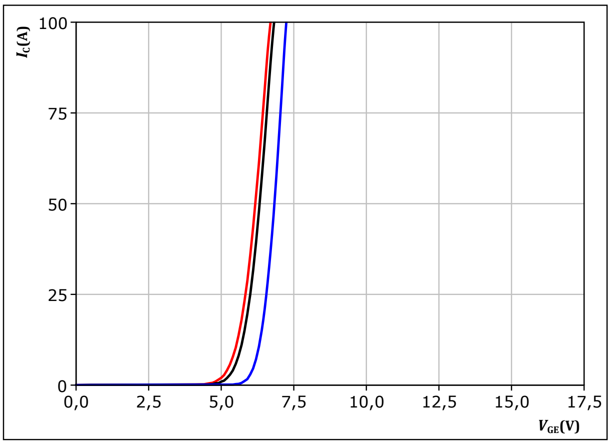
t_p =	250	µs
T_j =	150	°C

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

figure 12. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



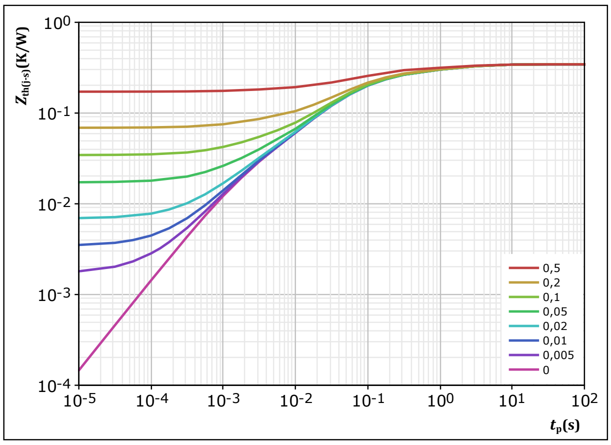
t_p =	250	µs
V_{CE} =	8	V

T_j: 25 °C, 125 °C, 150 °C

figure 13. **IGBT**

Transient thermal impedance as a function of pulse width

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,344	K/W

IGBT thermal model values

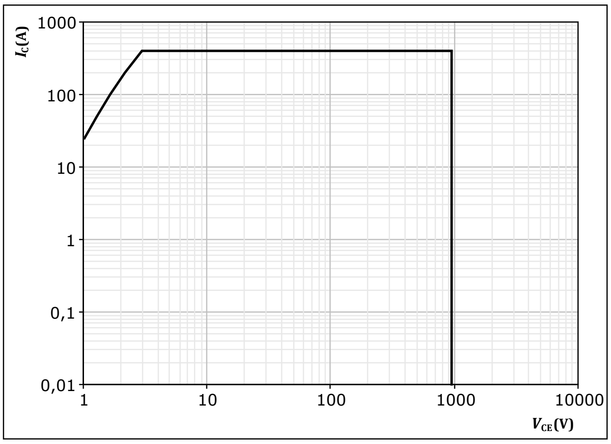
R (K/W)	τ (s)
3,51E-02	3,52E+00
6,84E-02	7,05E-01
1,60E-01	8,54E-02
6,50E-02	1,97E-02
1,61E-02	1,73E-03

Outer Boost Switch Characteristics

figure 14.	IGBT

Safe operating area

I_C = f(V_{CE})



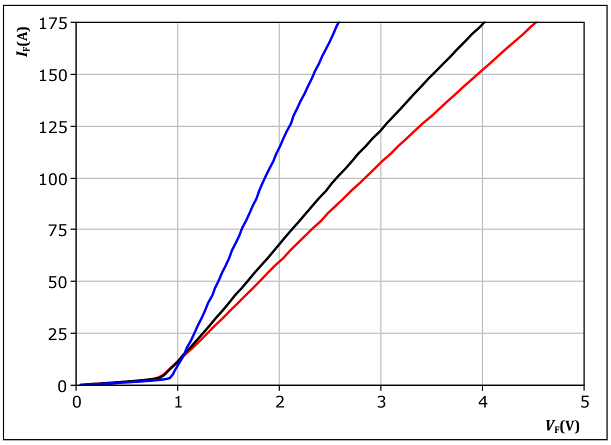
D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

Outer Boost Diode Characteristics

figure 15. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



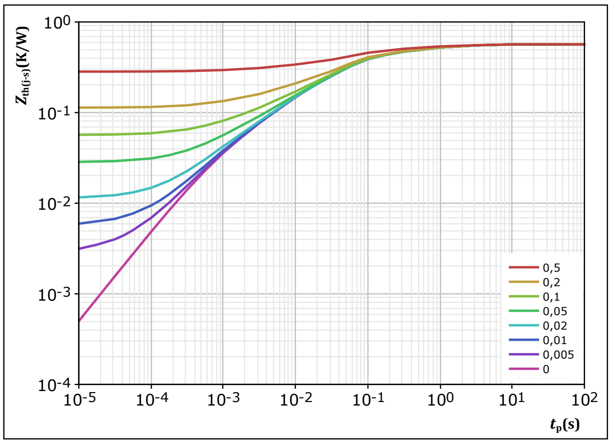
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 16. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,566 K/W

FWD thermal model values

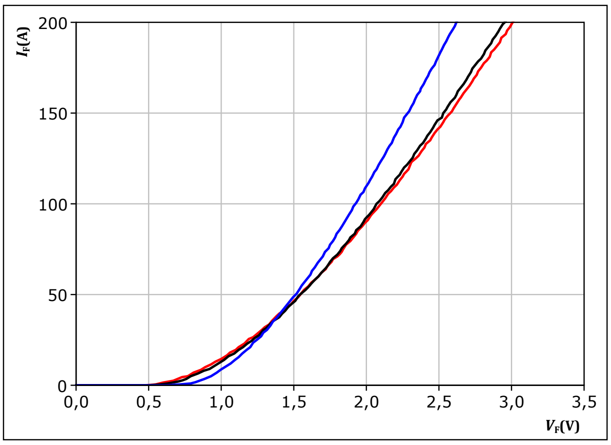
R (K/W)	τ (s)
6,09E-02	2,27E+00
1,15E-01	3,23E-01
2,90E-01	4,74E-02
7,95E-02	5,40E-03
2,18E-02	7,49E-04

Outer Boost Sw. Protection Diode Characteristics

figure 17. **FWD**

Typical forward characteristics

I_F = f(V_F)



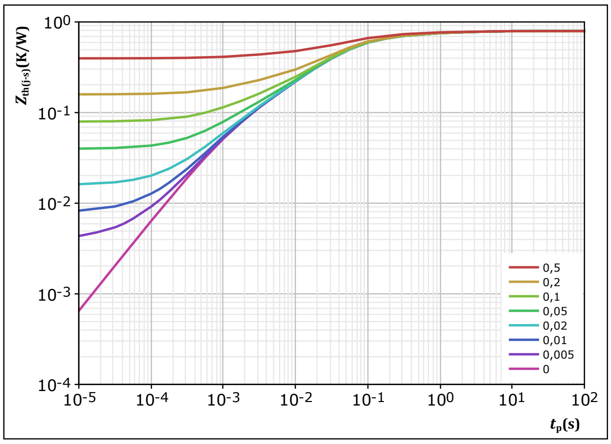
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,793 K/W

FWD thermal model values

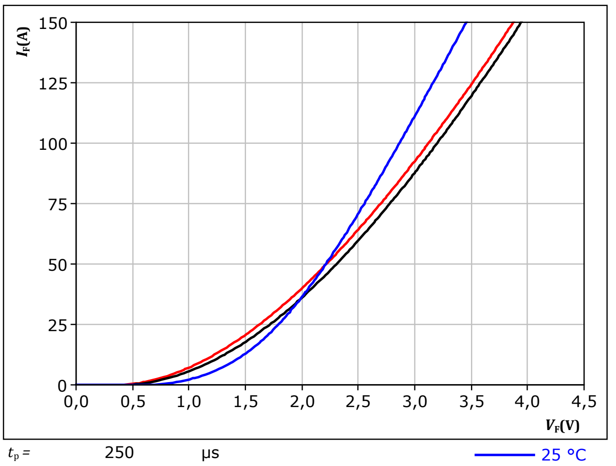
R (K/W)	τ (s)
5,39E-02	2,49E+00
1,33E-01	2,82E-01
4,13E-01	4,97E-02
1,37E-01	1,07E-02
5,71E-02	1,31E-03

Aux Diode H Characteristics

figure 19. FWD

Typical forward characteristics

$I_F = f(V_F)$



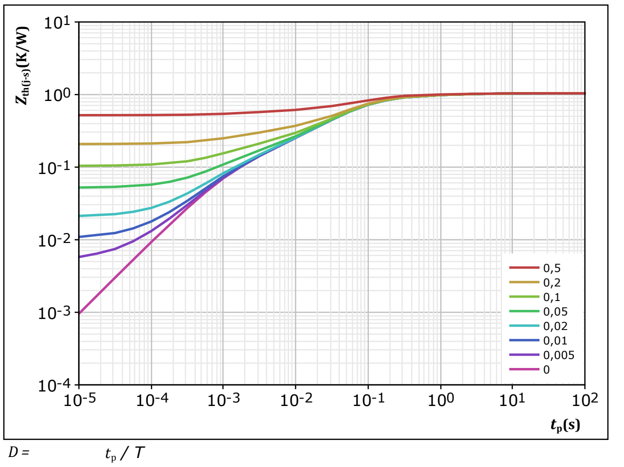
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 20. FWD

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 1,04 K/W

FWD thermal model values

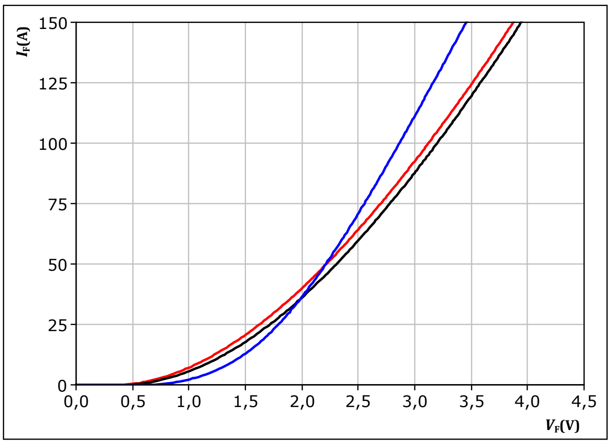
R (K/W)	τ (s)
6,44E-02	2,63E+00
1,36E-01	3,97E-01
6,27E-01	6,88E-02
1,30E-01	9,91E-03
8,29E-02	1,13E-03

Aux Diode L Characteristics

figure 21. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



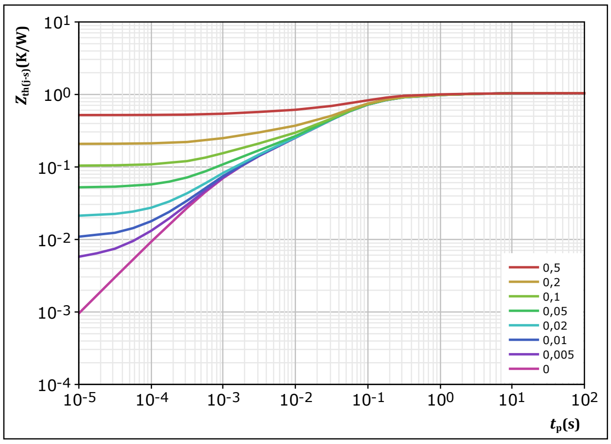
t_p =	250	µs

		25 °C
T_j:		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	
$R_{th(j-s)}$ =	1,04	K/W

FWD thermal model values

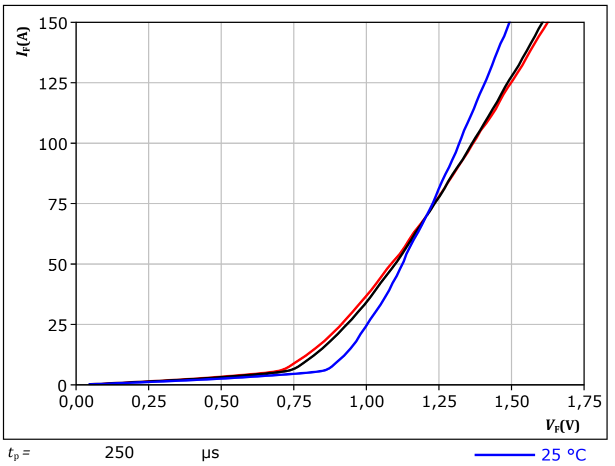
R (K/W)	τ (s)
6,44E-02	2,63E+00
1,36E-01	3,97E-01
6,27E-01	6,88E-02
1,30E-01	9,91E-03
8,29E-02	1,13E-03

ByPass Diode Characteristics

figure 23. **Rectifier**

Typical forward characteristics

I_F = f(V_F)



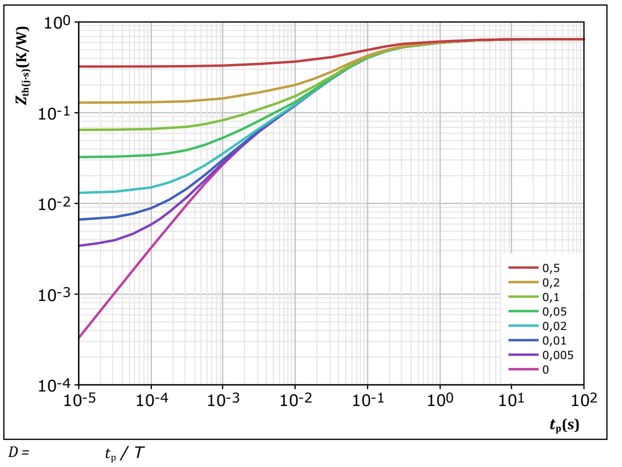
t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

figure 24. **Rectifier**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,646 K/W

Rectifier thermal model values

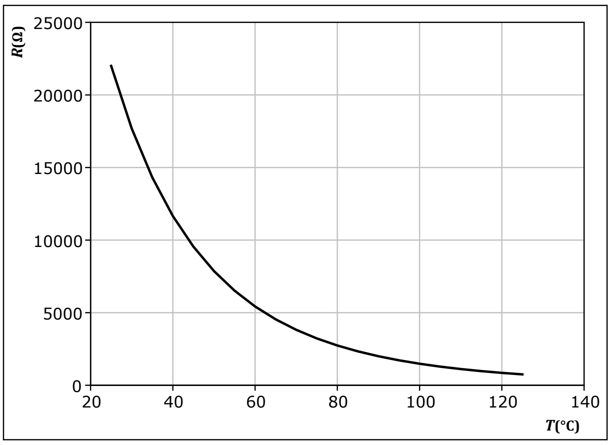
R (K/W)	τ (s)
4,48E-02	3,10E+00
1,16E-01	6,03E-01
3,64E-01	7,75E-02
8,07E-02	1,76E-02
3,95E-02	1,68E-03

Thermistor Characteristics

figure 25.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

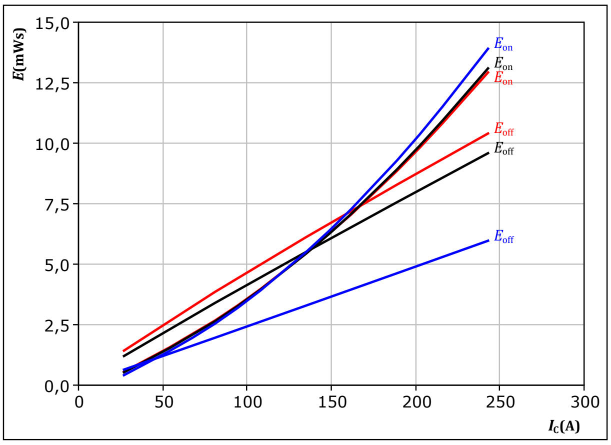


Inner Boost Switching Characteristics

figure 26. **IGBT**

Typical switching energy losses as a function of collector current

E = f(I_C)



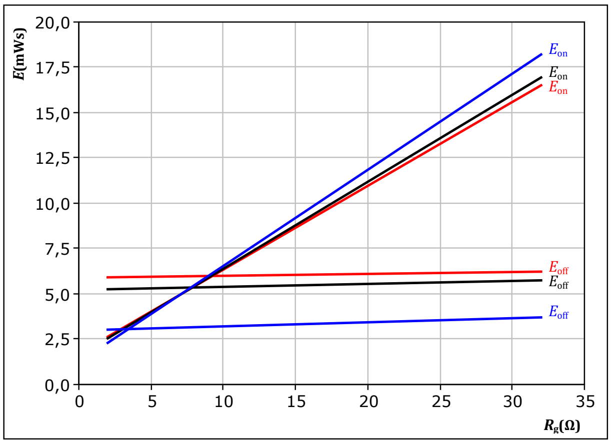
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C
R_{goff} =	8	Ω		

figure 27. **IGBT**

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

E = f(R_g)



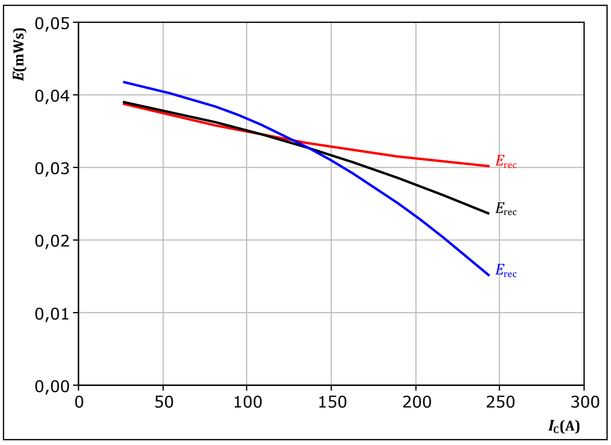
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	135	A		150 °C

figure 28. **FWD**

Typical reverse recovered energy loss as a function of collector current

E_{rec} = f(I_C)



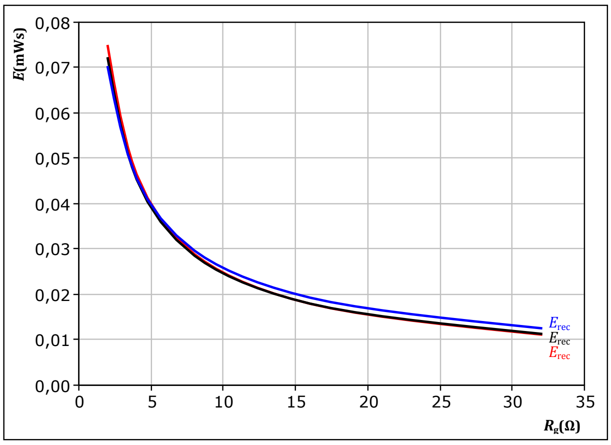
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		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

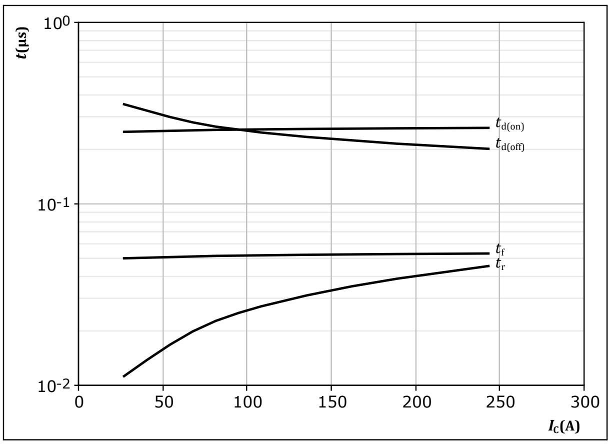
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	135	A		150 °C

Inner Boost Switching Characteristics

figure 30. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



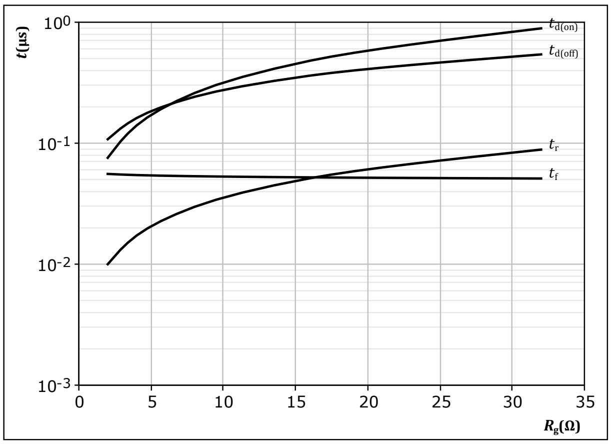
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 31. **IGBT**

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

t = f(R_g)



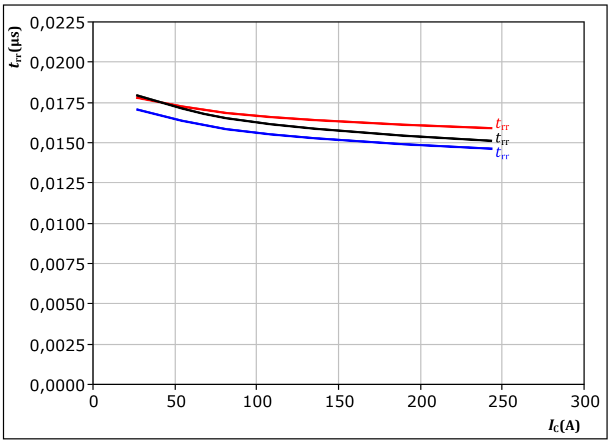
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	135	A

figure 32. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

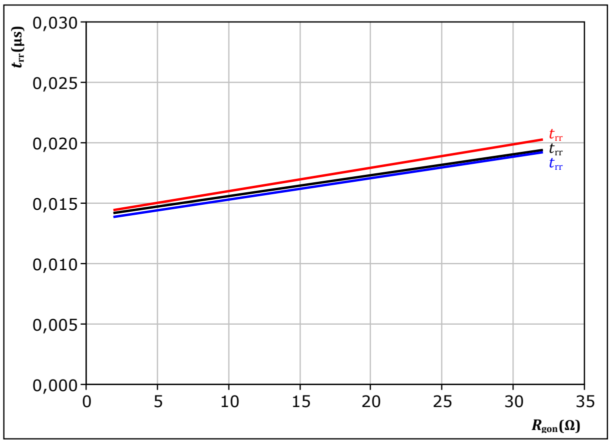
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

figure 33. **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 =	135	A

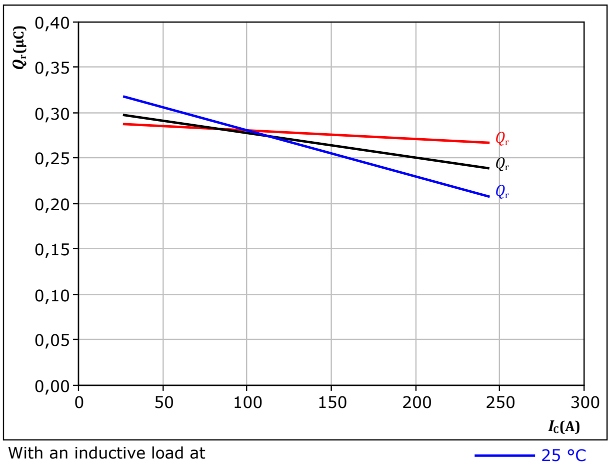
T_j: 25 °C (blue), 125 °C (black), 150 °C (red)

Inner Boost Switching Characteristics

figure 34. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



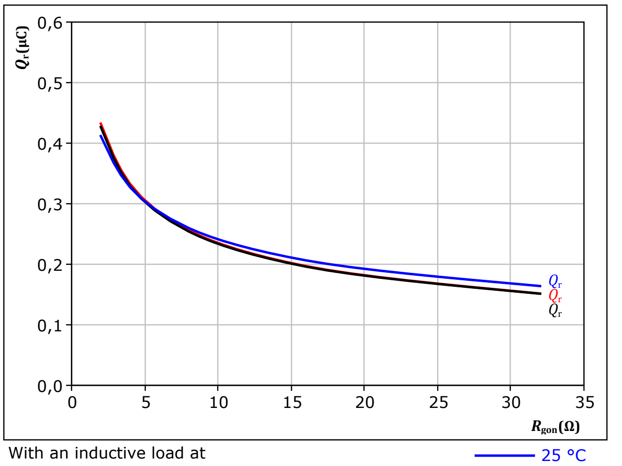
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 35. FWD

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

Q_r = f(R_{gon})



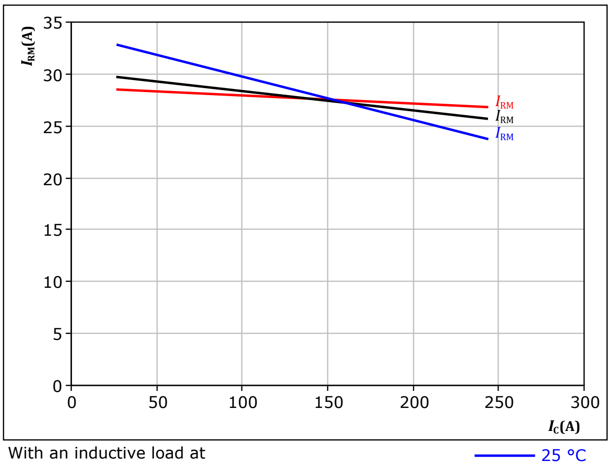
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	135	A		150 °C

figure 36. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



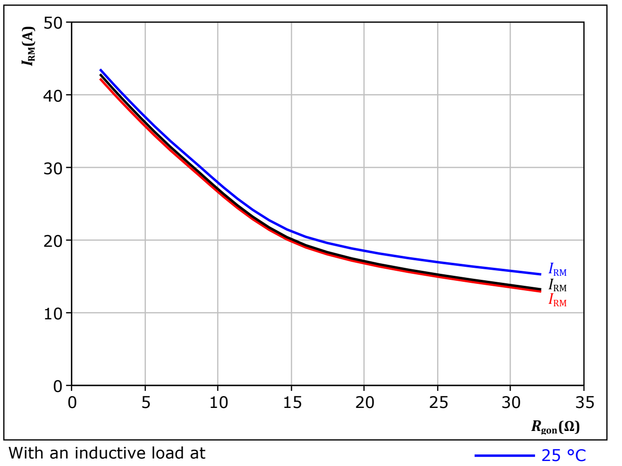
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		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

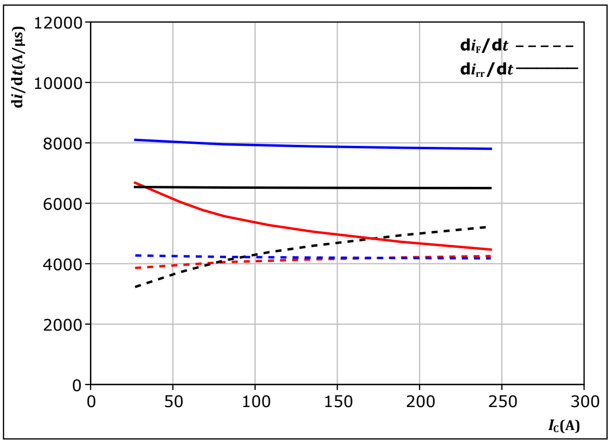
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	135	A		150 °C

Inner Boost 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)



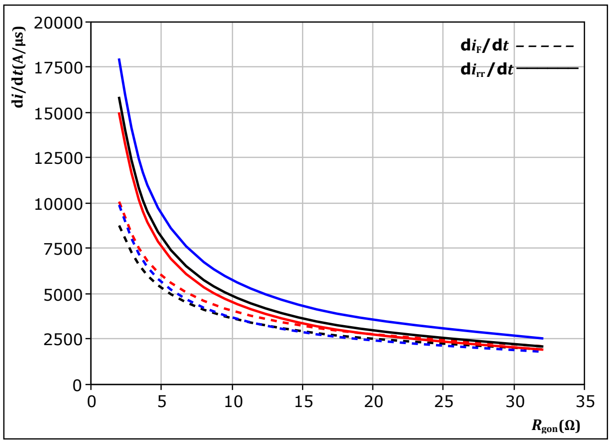
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		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})



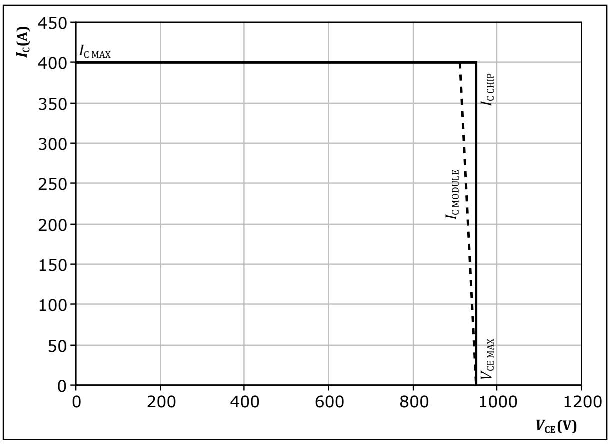
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	135	A		150 °C

figure 40. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



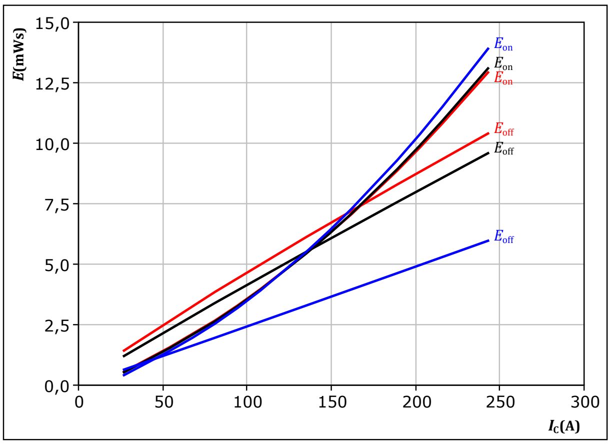
At	T_j =	150	°C
	R_{gon} =	8	Ω
	R_{goff} =	8	Ω

Outer Boost Switching Characteristics

figure 41. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



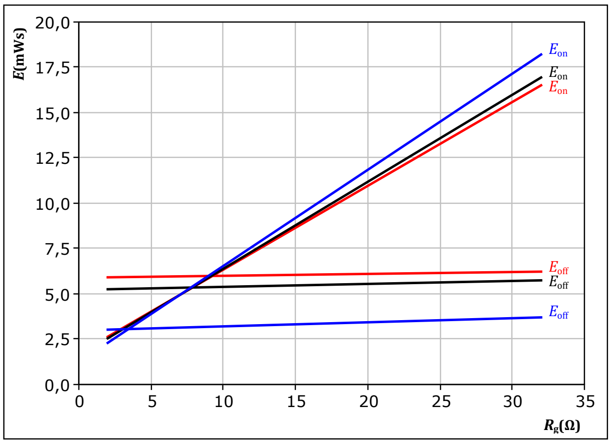
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	8	Ω	
R_{goff} =	8	Ω	

figure 42. **IGBT**

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

$E = f(R_g)$



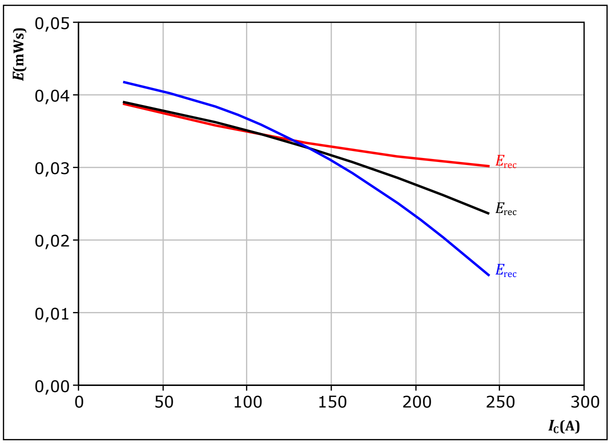
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	135	A	

figure 43. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



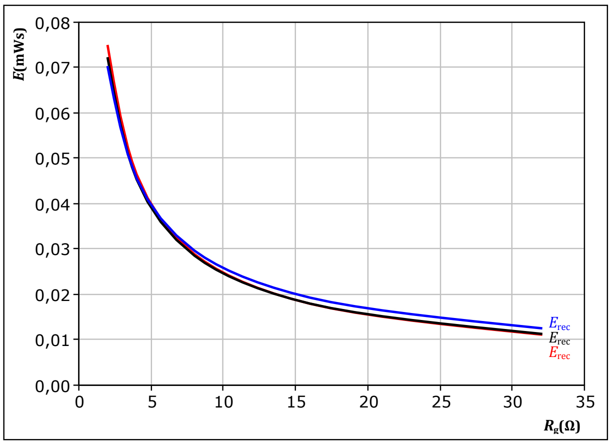
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	8	Ω	

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

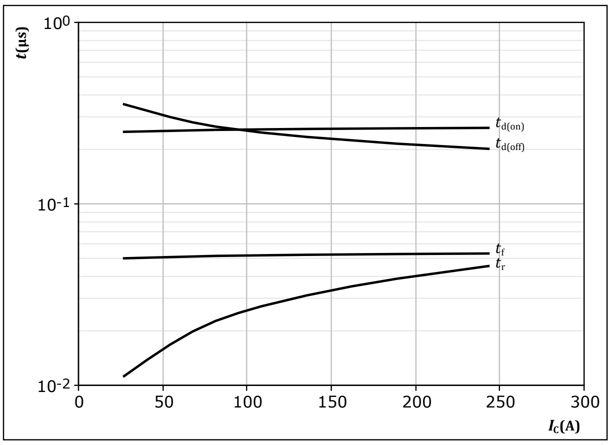
V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	135	A	

Outer Boost Switching Characteristics

figure 45. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



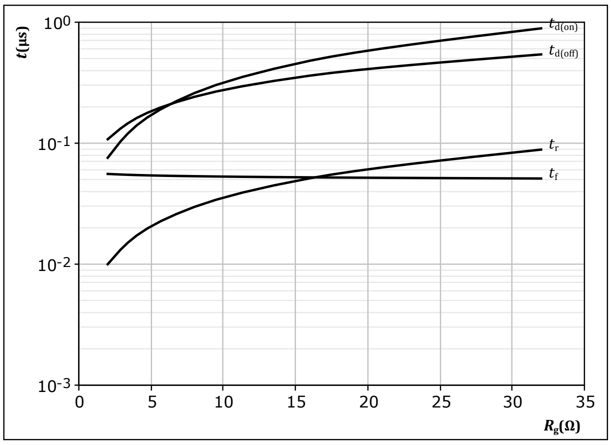
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω
R_{goff} =	8	Ω

figure 46. **IGBT**

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

t = f(R_g)



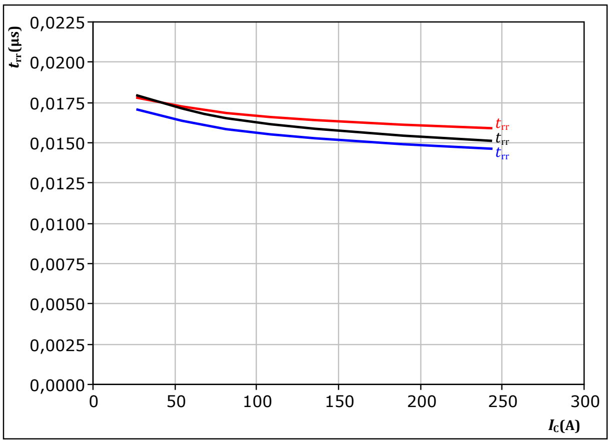
With an inductive load at

T_j =	150	°C
V_{CE} =	600	V
V_{GE} =	±15	V
I_C =	135	A

figure 47. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

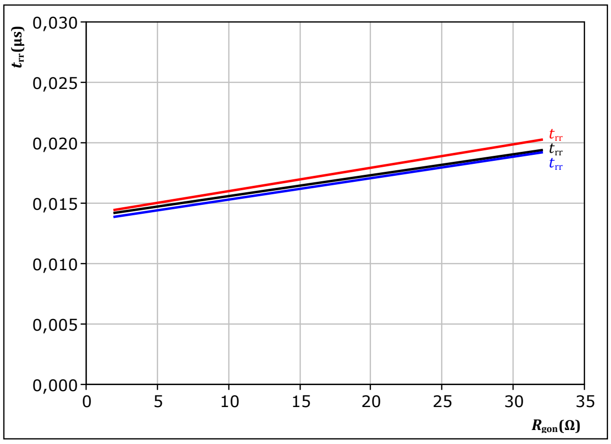
V_{CE} =	600	V
V_{GE} =	±15	V
R_{gon} =	8	Ω

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 =	135	A

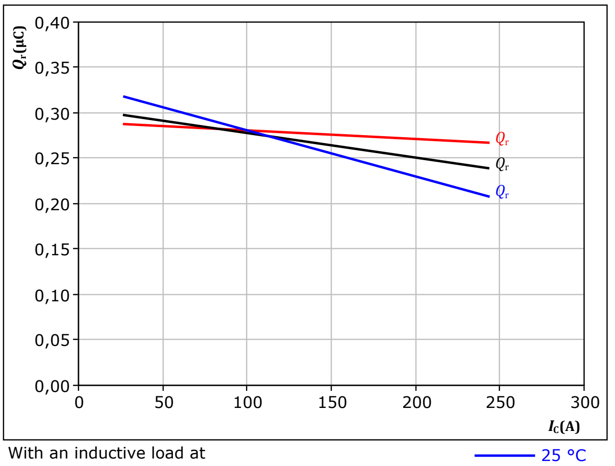
T_j: 25 °C, 125 °C, 150 °C

Outer Boost Switching Characteristics

figure 49. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



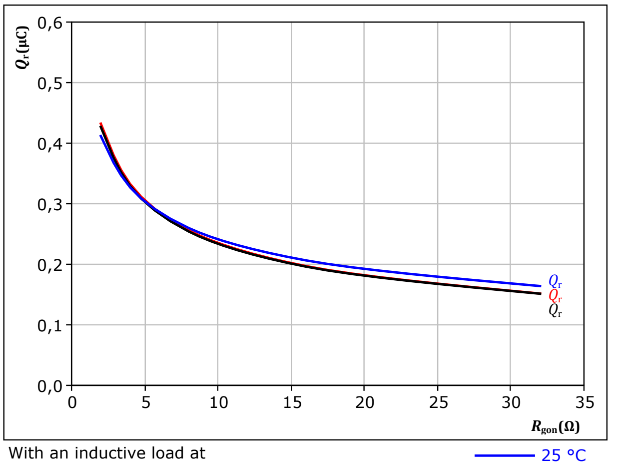
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		150 °C

figure 50. **FWD**

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

Q_r = f(R_{gon})



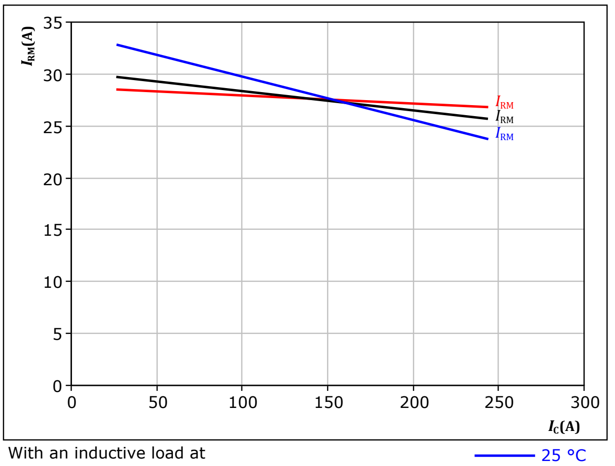
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	135	A		150 °C

figure 51. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



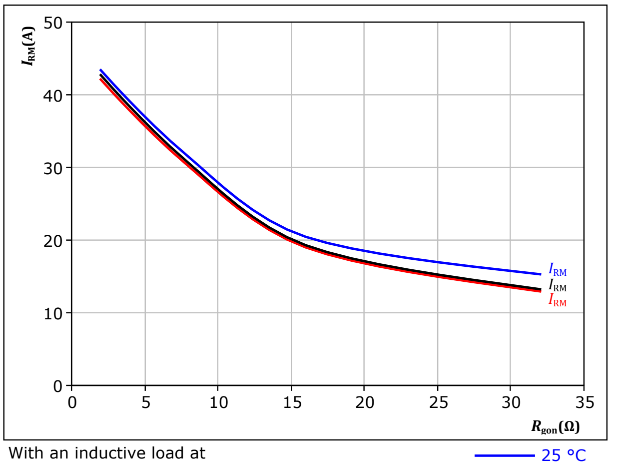
With an inductive load at

V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	8	Ω		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

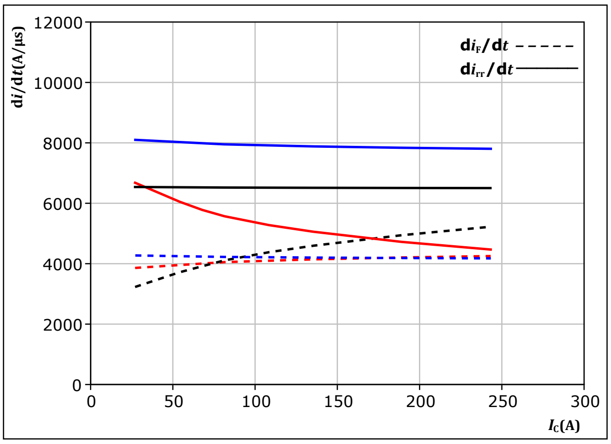
V_{CE} =	600	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	135	A		150 °C

Outer 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)



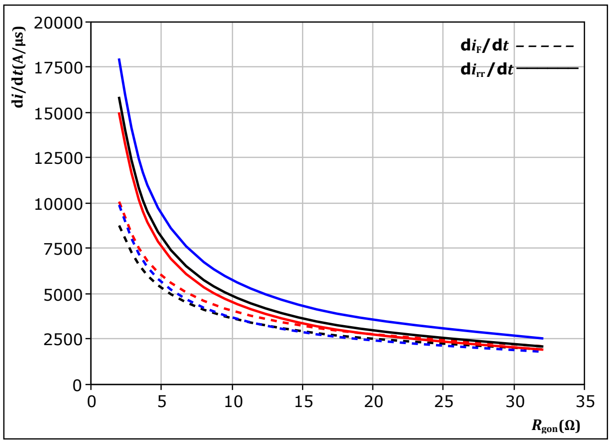
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
R_{gon} =	8	Ω	

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})



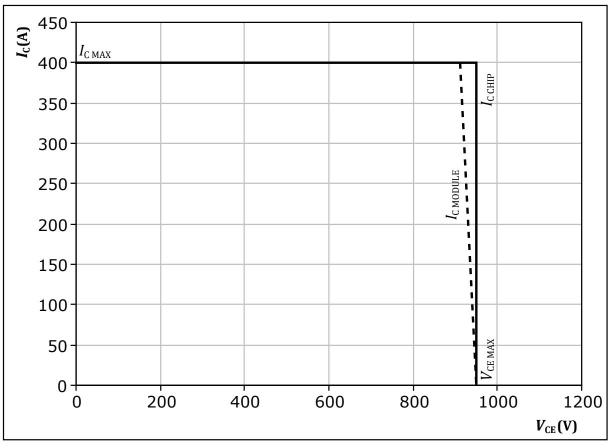
With an inductive load at

V_{CE} =	600	V	T_j: 25 °C / 125 °C / 150 °C
V_{GE} =	±15	V	
I_C =	135	A	

figure 55. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At	T_j =	150	°C
	R_{gon} =	8	Ω
	R_{goff} =	8	Ω

Switching Definitions

figure 56. **IGBT**

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

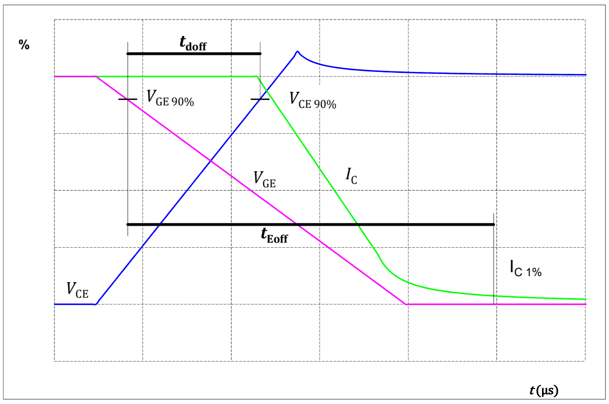


figure 57. **IGBT**

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

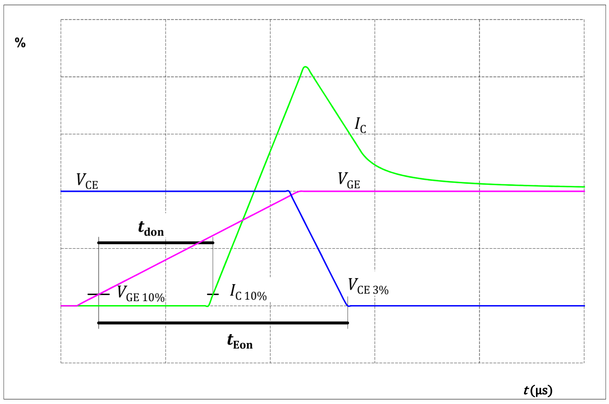


figure 58. **IGBT**

Turn-off Switching Waveforms & definition of t_f

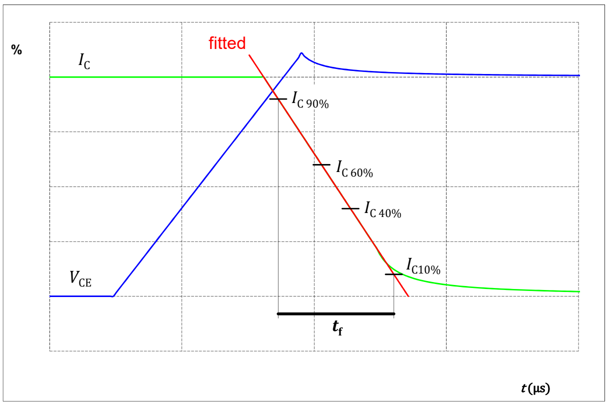
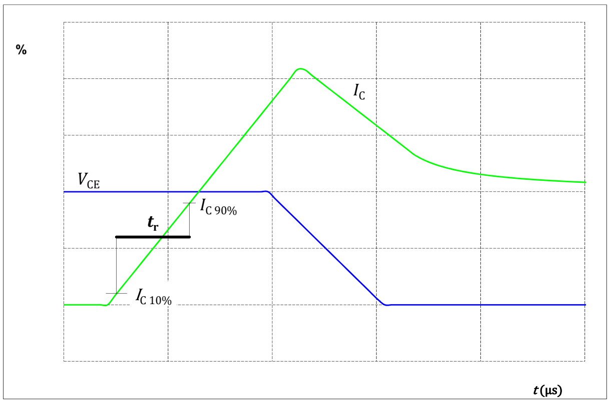


figure 59. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 60. **FWD**

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

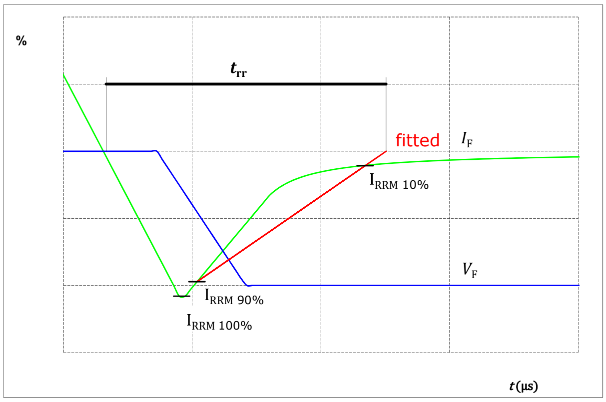
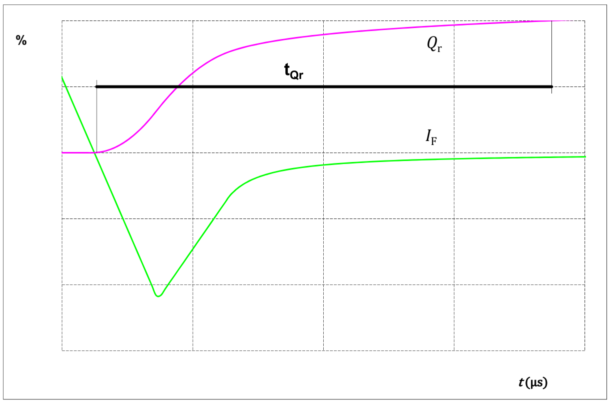


figure 61. **FWD**

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



Ordering Code

Version	Ordering Code
Without thermal paste	B0-SP10B2A200S705-PA58L96T
With thermal paste (5,2 W/mK, PTM6000HV)	B0-SP10B2A200S705-PA58L96T-/7/

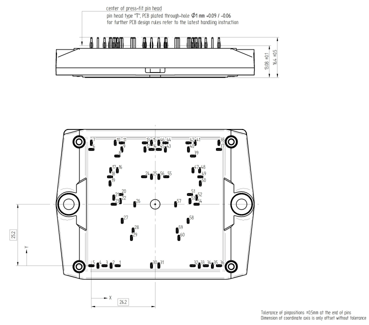
Marking

<table>
<tr><td rowspan="4"></td><td rowspan="2">Text</td><td colspan="2">Name</td><td>Date code</td><td>UL & VIN</td><td>Lot</td><td>Serial</td></tr>
<tr><td colspan="2">NN-NNNNNNNNNNNNNN-TTTTTTVV</td><td>WWYY</td><td>UL VIN</td><td>LLLLL</td><td>SSSS</td></tr>
<tr><td rowspan="2">Datamatrix</td><td>Type&Ver</td><td>Lot number</td><td>Serial</td><td>Date code</td><td></td><td></td></tr>
<tr><td>TTTTTTTVV</td><td>LLLLL</td><td>SSSS</td><td>WWYY</td><td></td><td></td></tr>
</table>

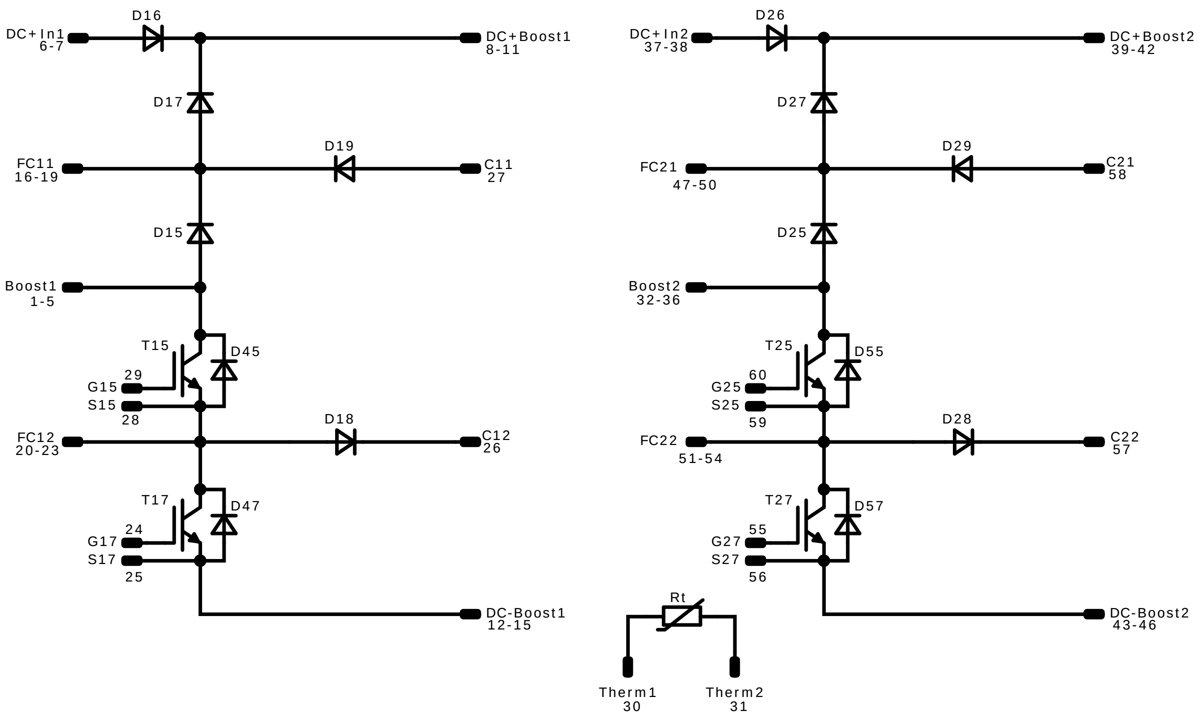
Outline

Pin table [mm]

Pin	X	Y	Function	Pin	X	Y	Function
1	10,8	0	Boost1	31	27,7	0,05	Therm2
2	8,1	0	Boost1	32	41,6	0	Boost1
3	5,4	0	Boost1	33	44,3	0	Boost1
4	2,7	0	Boost1	34	47	0	Boost1
5	0	0	Boost1	35	49,7	0	Boost1
6	0	47,7	DC+In1	36	52,4	0	Boost1
7	0	50,4	DC+In1	37	52,4	47,7	DC+In2
8	10,65	45	DC+Boost1	38	52,4	50,4	DC+In2
9	12,5	47,7	DC+Boost1	39	41,75	45	DC+Boost2
10	9,8	50,4	DC+Boost1	40	39,9	47,7	DC+Boost2
11	12,5	50,4	DC+Boost1	41	42,6	50,4	DC+Boost2
12	22	47,7	DC-Boost1	42	39,9	50,4	DC+Boost2
13	22	50,4	DC-Boost1	43	30,4	47,7	DC-Boost2
14	24,7	47,7	DC-Boost1	44	30,4	50,4	DC-Boost2
15	24,7	50,4	DC-Boost1	45	27,7	47,7	DC-Boost2
16	10,65	39,15	FC11	46	27,7	50,4	DC-Boost2
17	7,95	39,15	FC11	47	41,75	39,15	FC21
18	7,65	36,45	FC11	48	44,45	39,15	FC21
19	7,65	33,75	FC11	49	44,75	36,45	FC21
20	11,9	29,2	FC12	50	44,75	33,75	FC21
21	9,2	27,9	FC12	51	40,5	29,2	FC22
22	11,9	26,5	FC12	52	43,2	27,9	FC22
23	9,2	25,2	FC12	53	40,5	26,5	FC22
24	21,65	36,5	G17	54	43,2	25,2	FC22
25	24,7	36,5	S17	55	30,75	36,5	G27
26	17,8	25,2	C12	56	27,7	36,5	S27
27	12,65	18,4	C11	57	34,6	25,2	C22
28	17,15	14,4	S15	58	39,75	18,4	C21
29	16,45	11,4	G15	59	35,25	14,4	S25
30	24,7	0,05	Therm1	60	35,95	11,4	G25



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T15, T25	IGBT	950 V	200 A	Inner Boost Switch	
D15, D25	FWD	1200 V	60 A	Inner Boost Diode	
D45, D55	FWD	1200 V	75 A	Inner Boost Sw. Protection Diode	
T17, T27	IGBT	950 V	200 A	Outer Boost Switch	
D17, D27	FWD	1200 V	60 A	Outer Boost Diode	
D47, D57	FWD	1200 V	75 A	Outer Boost Sw. Protection Diode	
D19, D29	FWD	1200 V	50 A	Aux Diode H	
D18, D28	FWD	1200 V	50 A	Aux Diode L	
D16, D26	Rectifier	1800 V	50 A	ByPass Diode	
Rt	Thermistor			Thermistor	

Packaging instruction				
Standard packaging quantity (SPQ) 45	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* S3 packages see vincotech.com website.

Package data
Package data for *flow* S3 packages see vincotech.com website.

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

Application Note
For use of pre-charging auxiliary diodes see application note: "The Advantages and Operation of Flying-Capacitor Boosters" at vincotech.com

UL recognition and file number
This device is certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
B0-SP10B2A200S705-PA58L96T-D3-14	20 Jan. 2023	Without Capacitors	