Vincotech

30-FT07NIB300S503-LH36F58
datasheet

***flow*NPC 2** — **650 V / 300 A**

Topology features

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

Component features

- High speed and smooth switching
- Low gate charge
- Very low collector emitter saturation voltage

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

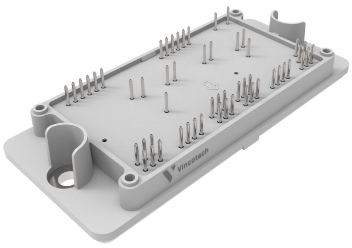
Target applications

- Energy Storage Systems
- Industrial Drives
- Solar Inverters
- UPS

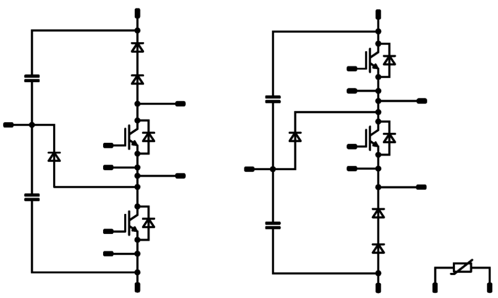
Types

- 30-FT07NIB300S503-LH36F58

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}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	260	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	389	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	208	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	257	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	13	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	36	A
Surge current capability	I^2t			6	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	35	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}			650	V
Collector current (DC current)	I_C	$T_j = T_{jmax}$	T_s = 80 °C	256	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		900	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	288	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C
Boost Diode					
Peak repetitive reverse voltage	V_{RRM}			1300	V
Forward current (DC current)	I_F	$T_j = T_{jmax}$	T_s = 80 °C	182	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	461	W
Maximum junction temperature	T_{jmax}			175	°C
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	13	A
Surge (non-repetitive) forward current	I_{FSM}	Single Half Sine Wave, t_p = 10 ms	T_j = 150 °C	36	A
Surge current capability	I^2t			6	A^2s
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	35	W
Maximum junction temperature	T_{jmax}			175	°C
Capacitor (DC)					
Maximum DC voltage	V_{MAX}			630	V
Operation Temperature	T_{op}			-55 ... 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
Isolation voltage	V_{isol}	AC Voltage	t_p = 1 min	2500	V
Creepage distance				>12,7	mm
Clearance				>12,7	mm
Comparative Tracking Index	CTI			≥ 200	

*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	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,003	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		300	25 125 150		1,43 1,52 1,55	1,75(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25			400	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		18000		pF
Output capacitance	C_{oes}							520		pF
Reverse transfer capacitance	C_{res}							68		pF
Gate charge	Q_g	V_{CC} = 520 V	15		300	25		656		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,24		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5/15	350	180	25 125 150		40,47 41,02 40,95		ns
Rise time	t_r					25 125 150		17,43 18,97 19,8		ns
Turn-off delay time	$t_{d(off)}$					25 125 150		132,96 157,81 165,3		ns
Fall time	t_f					25 125 150		21,93 28,2 31,09		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=3,1 µC Q_{rFWD}=9,95 µC Q_{rFWD}=12,49 µC				25 125 150		1,21 1,83 1,94		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		2,22 3,52 3,88		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				280	25 125 150		1,73 1,45 1,41	2,5(1)	V
Reverse leakage current	I_R	V_r = 650 V				25			60	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,37		K/W
Dynamic										
Peak recovery current	I_{RM}	d*i*/d*t*=7986 A/µs d*i*/d*t*=7611 A/µs d*i*/d*t*=8106 A/µs	-5/15	350	180	25 125 150		136,13 229,49 257,63		A
Reverse recovery time	t_{rr}					25 125 150		40,8 72,91 81,66		ns
Recovered charge	Q_r					25 125 150		3,1 9,95 12,49		µC
Reverse recovered energy	E_{rec}					25 125 150		0,612 2,11 2,68		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		8271,93 6648,6 6899,06		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				8	25 150		2,37 2,27	2,65(1) 2,68(1)	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 0,3	0,06 0,7	mA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,68		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
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{CE} = V_{GE}$			0,003	25	4,2	5	5,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		225	25 125 150		1,1 1,09 1,08	1,45(1)	V
Collector-emitter cut-off current	I_{CES}		0	650		25			120	µA
Gate-emitter leakage current	I_{GES}		20	0		25			360	nA
Internal gate resistance	r_g							None		Ω
Input capacitance	C_{ies}	f = 1 Mhz	0	25		25		36300		pF
Output capacitance	C_{oes}	f = 1 Mhz	0	25		25		450		pF
Reverse transfer capacitance	C_{res}	f = 1 Mhz	0	25		25		126		pF
Gate charge	Q_g		15	520	225	25		1308		nC
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	180	25 125 150		145,02 146,44 147,1		ns
Rise time	t_r	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	180	25 125 150		16,66 17,98 18,36		ns
Turn-off delay time	$t_{d(off)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	180	25 125 150		215,32 255,29 263,64		ns
Fall time	t_f	R_{gon} = 2 Ω R_{goff} = 2 Ω	±15	350	180	25 125 150		33,82 117,38 170,18		ns
Turn-on energy (per pulse)	E_{on}	Q_{rFWD}=2,58 µC Q_{rFWD}=8,04 µC Q_{rFWD}=10,16 µC	±15	350	180	25 125 150		0,733 0,921 1		mWs
Turn-off energy (per pulse)	E_{off}		±15	350	180	25 125 150		8,63 12,4 13,3		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	
Boost Diode										
Static										
Forward voltage	V_F				280	25 125 150		4 3,33 3,17	5(1)	V
Reverse leakage current	I_R	V_r = 1300 V				25			60	µA
Thermal										
Thermal resistance junction to sink(2)	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,21		K/W
Dynamic										
Peak recovery current	I_{RM}	di/dt=9038 A/µs di/dt=8691 A/µs di/dt=8303 A/µs	±15	350	180	25 125 150		139,89 221,28 246,01		A
Reverse recovery time	t_{rr}					25 125 150		32,28 67,84 78,27		ns
Recovered charge	Q_r					25 125 150		2,58 8,04 10,16		µC
Reverse recovered energy	E_{rec}					25 125 150		0,398 1,63 2,09		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		13929,49 9977,38 9746,69		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. Protection Diode										
Static										
Forward voltage	V_F				8	25 150		2,37 2,27	2,65[1] 2,68[1]	V
Reverse leakage current	I_R	V_r = 1200 V				25 150		 0,3	0,06 0,7	mA
Thermal										
Thermal resistance junction to sink[2]	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						2,68		K/W
Capacitor (DC)										
Static										
Capacitance	C	DC bias voltage = 0 V				25		33		nF
Tolerance							-5		5	%
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

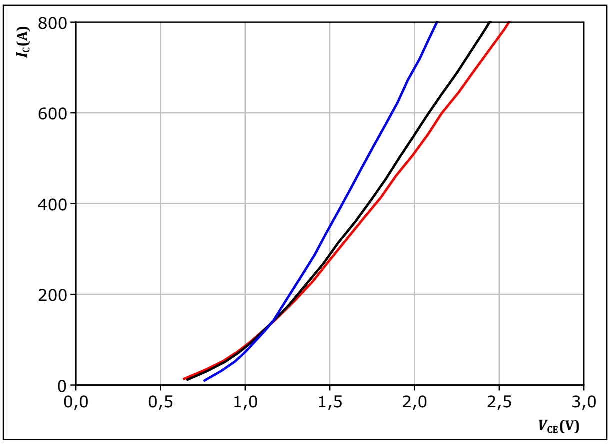
[2] Only valid with pre-applied Vincotech thermal interface material.

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



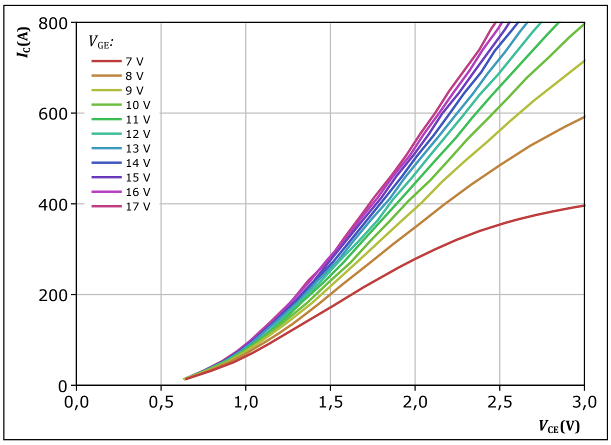
t_p =	250	µs
V_{GE} =	15	V

T_j: 25 °C, 125 °C, 150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



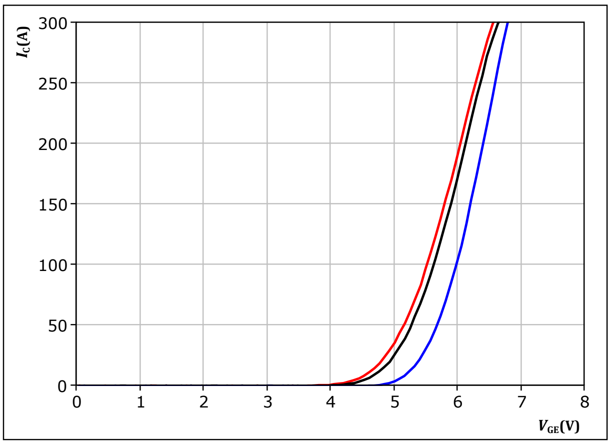
t_p =	250	µs
T_j =	150	°C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$



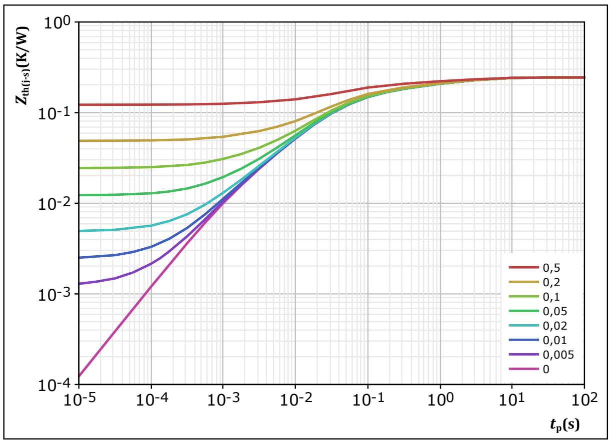
t_p =	250	µs
V_{CE} =	10	V

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	
$R_{th(j-s)}$ =	0,244	K/W

IGBT thermal model values

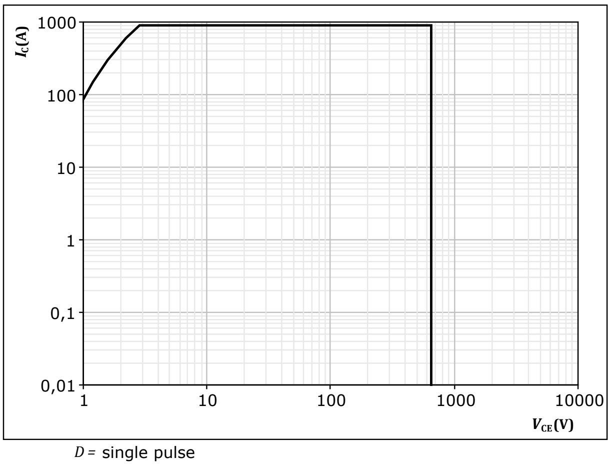
R (K/W)	τ (s)
3,19E-02	4,04E+00
3,56E-02	8,39E-01
5,47E-02	1,56E-01
9,39E-02	3,22E-02
2,10E-02	7,54E-03
7,41E-03	1,20E-03

Buck Switch Characteristics

figure 5. **IGBT**

Safe operating area

I_C = f(V_{CE})

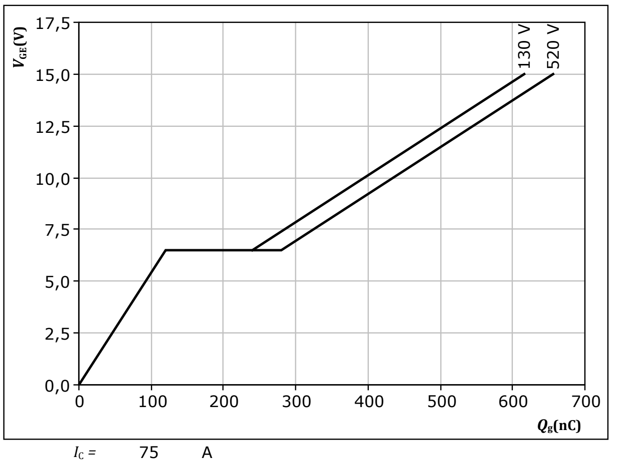


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 6. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



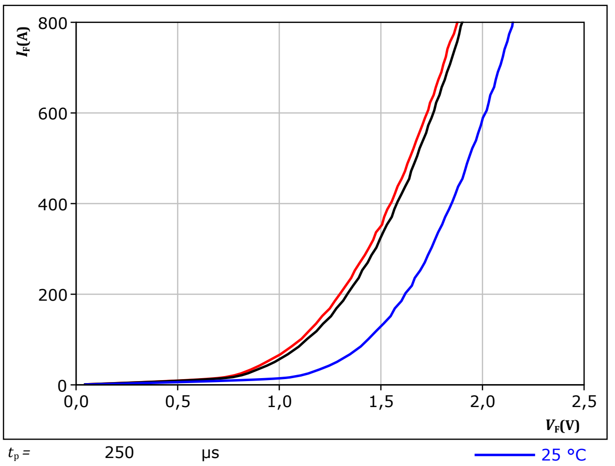
I_C =	75	A
T_j =	25	°C

Buck Diode Characteristics

figure 7. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



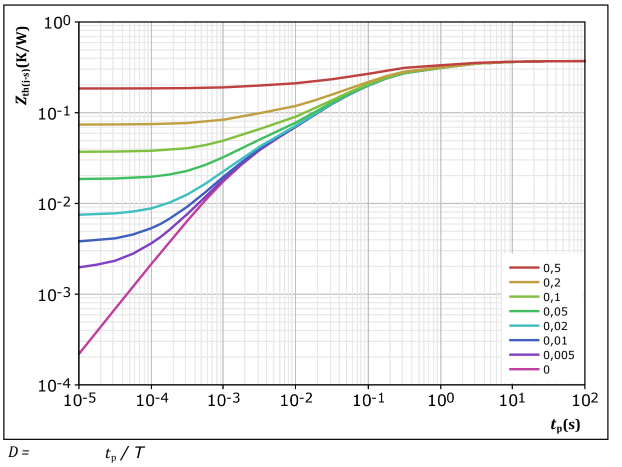
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,37 K/W

FWD thermal model values

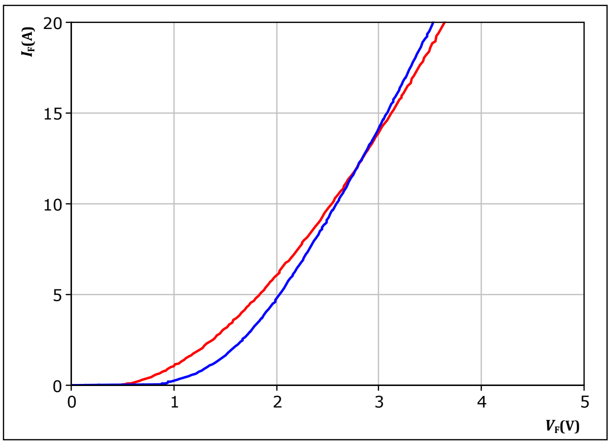
R (K/W)	τ (s)
1,90E-02	9,17E+00
8,58E-02	1,35E+00
1,71E-01	1,16E-01
6,65E-02	1,86E-02
2,75E-02	1,64E-03

Buck Sw. Protection Diode Characteristics

figure 9. FWD

Typical forward characteristics

I_F = f(V_F)



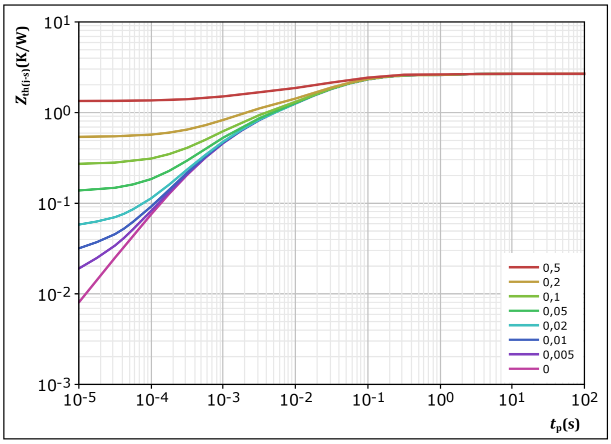
t_p = 250 μs

T_j: 25 °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

$R_{th(j-s)}$ = 2,683 K/W

FWD thermal model values

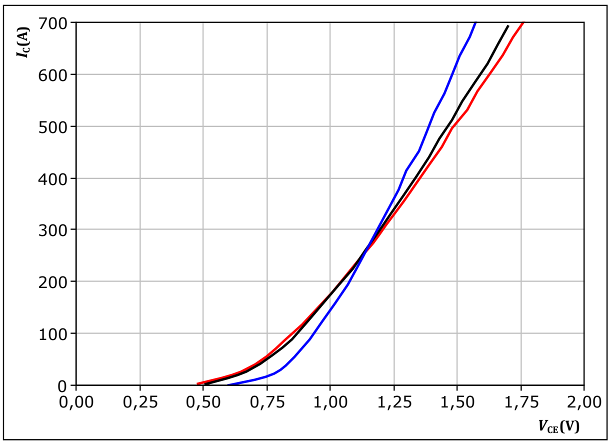
R (K/W)	τ (s)
1,24E-01	1,82E+00
9,92E-01	7,02E-02
8,59E-01	1,48E-02
5,29E-01	1,78E-03
1,79E-01	4,06E-04

Boost Switch Characteristics

figure 11. **IGBT**

Typical output characteristics

I_C = f(V_{CE})



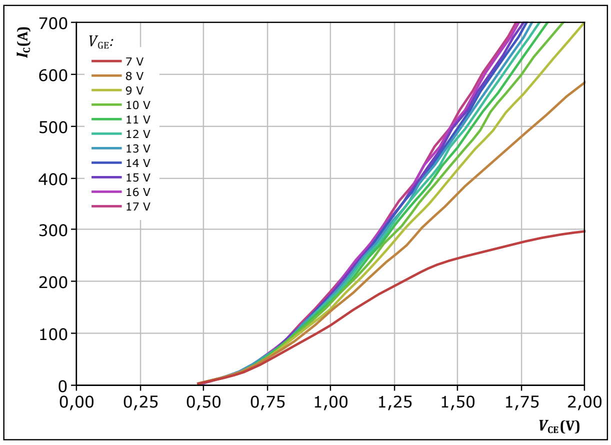
t_p = 250 µs
V_{GE} = 15 V

T_j: 25 °C, 125 °C, 150 °C

figure 12. **IGBT**

Typical output characteristics

I_C = f(V_{CE})

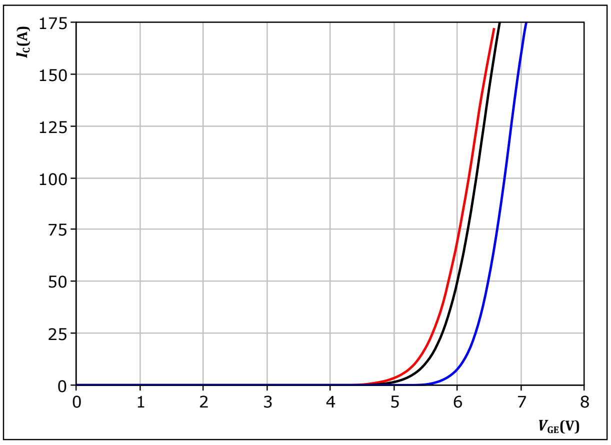


t_p = 250 µs
T_j = 150 °C
V_{GE} from 7 V to 17 V in steps of 1 V

figure 13. **IGBT**

Typical transfer characteristics

I_C = f(V_{GE})



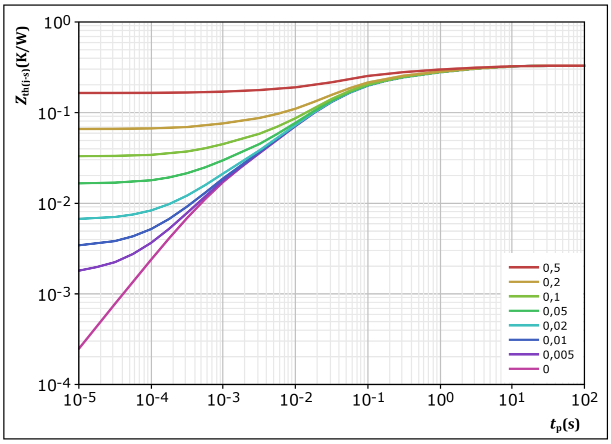
t_p = 250 µs
V_{CE} = 10 V

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
$R_{th(j-s)}$ = 0,329 K/W

IGBT thermal model values

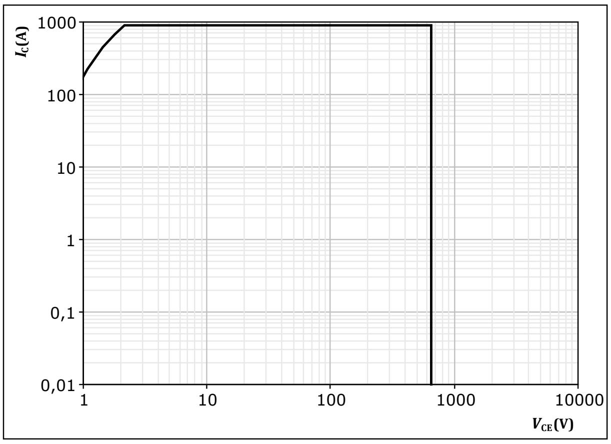
R (K/W)	τ (s)
3,80E-02	5,19E+00
4,42E-02	1,12E+00
8,02E-02	1,82E-01
1,26E-01	3,39E-02
2,79E-02	6,91E-03
1,28E-02	7,70E-04

Boost Switch Characteristics

figure 15. **IGBT**

Safe operating area

I_C = f(V_{CE})

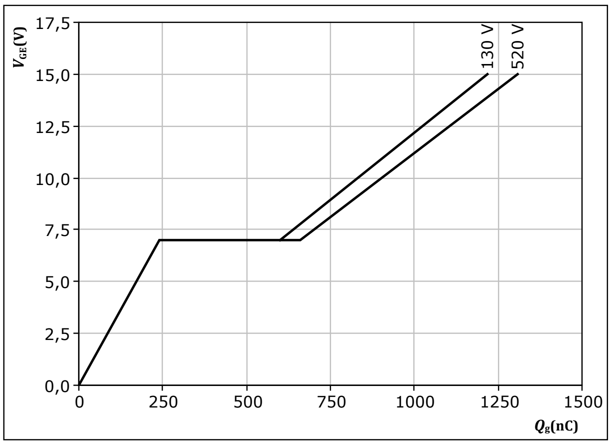


D =	single pulse	
T_s =	80	°C
V_{GE} =	15	V
T_j =	T_{jmax}	

figure 16. **IGBT**

Gate voltage vs gate charge

V_{GE} = f(Q_g)



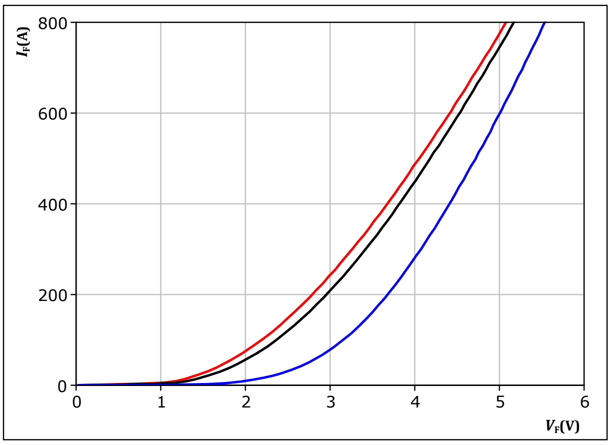
I_C =	75	A
T_j =	25	°C

Boost Diode Characteristics

figure 17. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



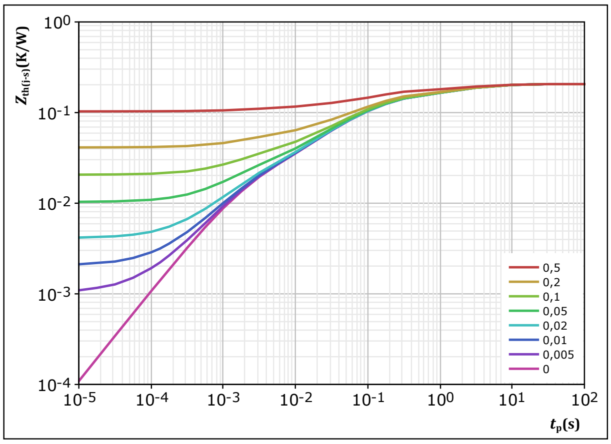
t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

figure 18. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,206 K/W

FWD thermal model values

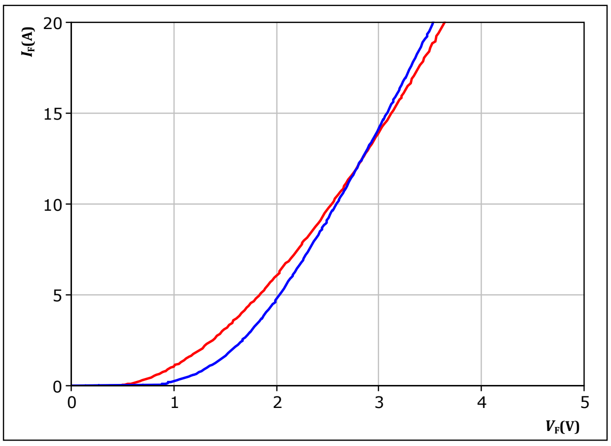
R (K/W)	τ (s)
2,74E-02	5,35E+00
4,37E-02	1,14E+00
9,32E-02	1,04E-01
2,79E-02	1,70E-02
1,41E-02	1,69E-03

Boost Sw. Protection Diode Characteristics

figure 19. **FWD**

Typical forward characteristics

I_F = f(V_F)



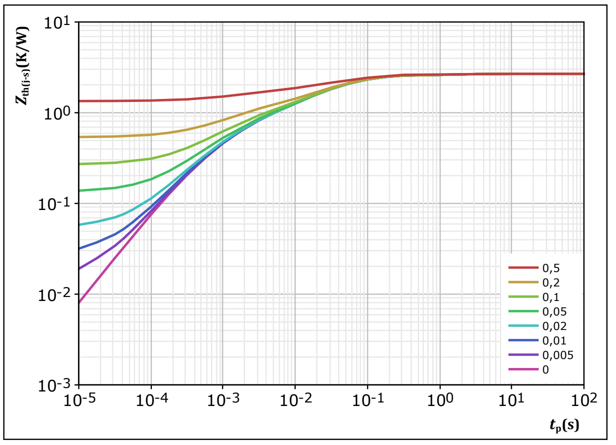
t_p = 250 µs

T_j: 25 °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

$R_{th(j-s)}$ = 2,683 K/W

FWD thermal model values

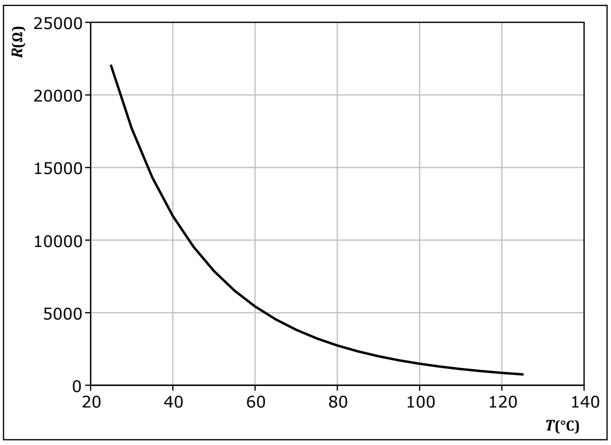
R (K/W)	τ (s)
1,24E-01	1,82E+00
9,92E-01	7,02E-02
8,59E-01	1,48E-02
5,29E-01	1,78E-03
1,79E-01	4,06E-04

Thermistor Characteristics

figure 21.	Thermistor

Typical NTC characteristic as function of temperature

R_T = f(T)

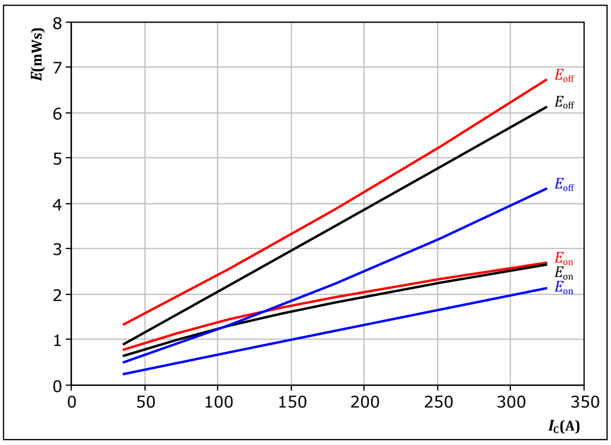


Buck Switching Characteristics

figure 22. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



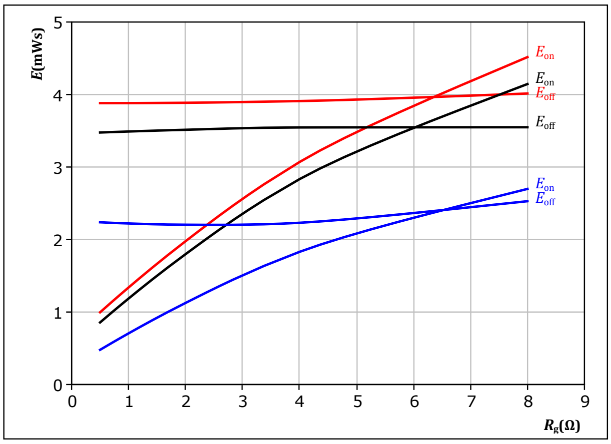
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	2	Ω		

figure 23. **IGBT**

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

$E = f(R_g)$



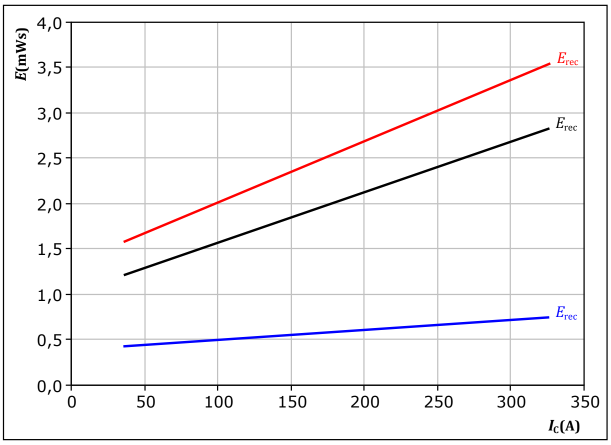
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	180	A		150 °C

figure 24. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



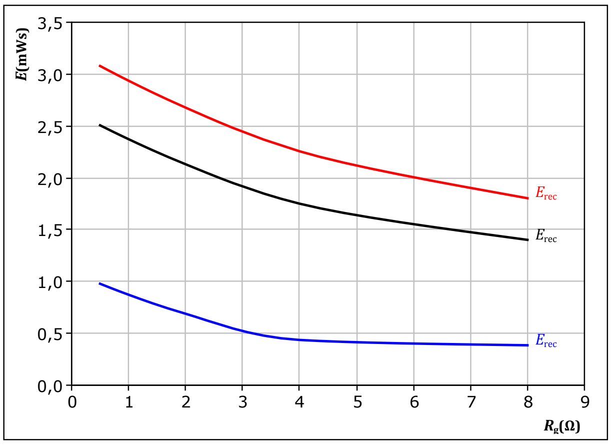
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 25. **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

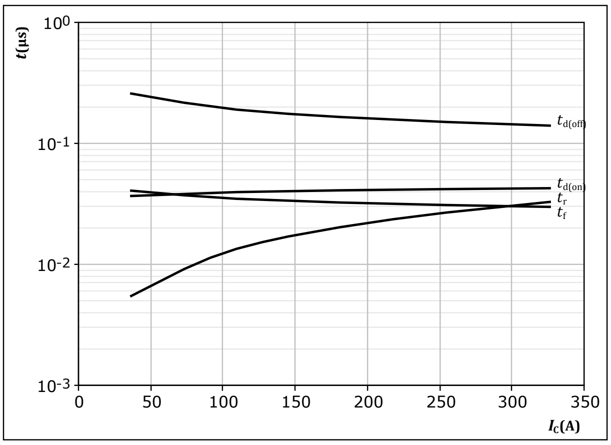
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	180	A		150 °C

Buck Switching Characteristics

figure 26. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



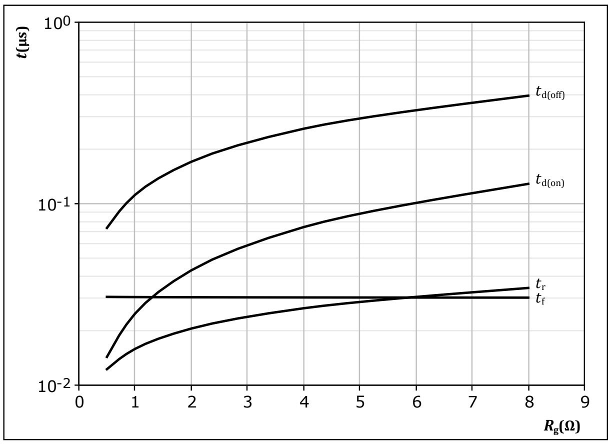
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 27. **IGBT**

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

t = f(R_g)



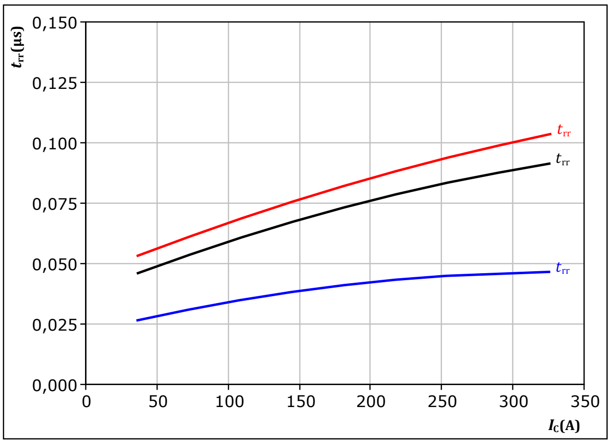
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5/15	V
I_C =	180	A

figure 28. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

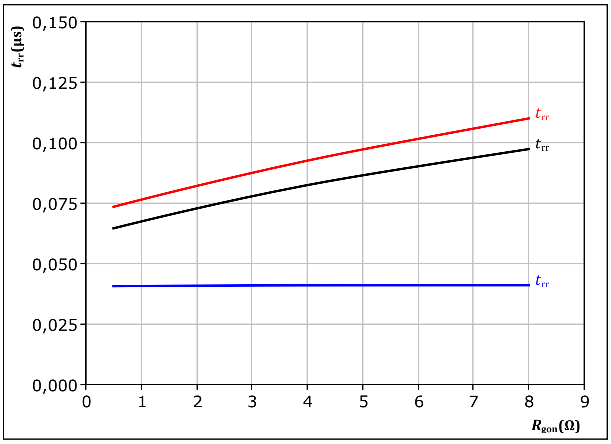
V_{CE} =	350	V
V_{GE} =	-5/15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 29. **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} =	350	V
V_{GE} =	-5/15	V
I_C =	180	A

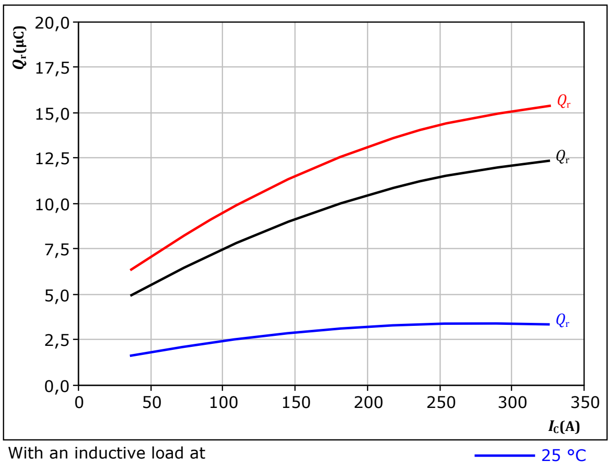
T_j: 25 °C, 125 °C, 150 °C

Buck Switching Characteristics

figure 30. FWD

Typical recovered charge as a function of collector current

Q_r = f(I_C)



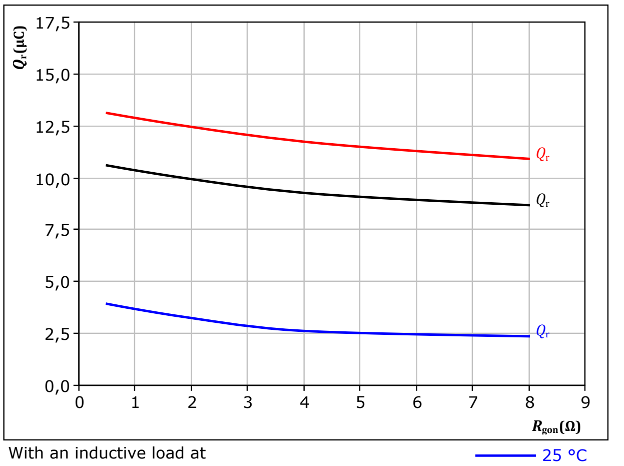
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 31. FWD

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

Q_r = f(R_{gon})



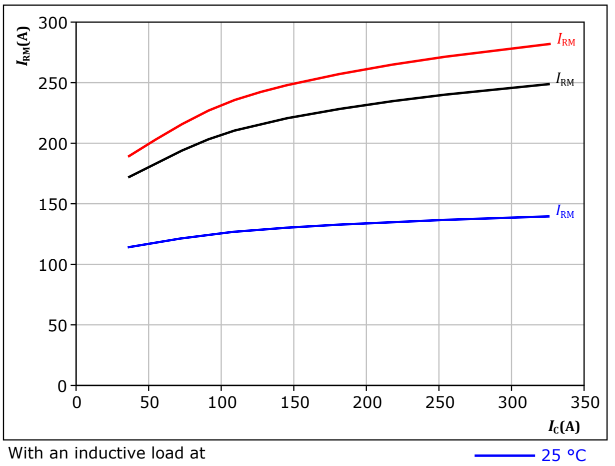
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	180	A		150 °C

figure 32. FWD

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



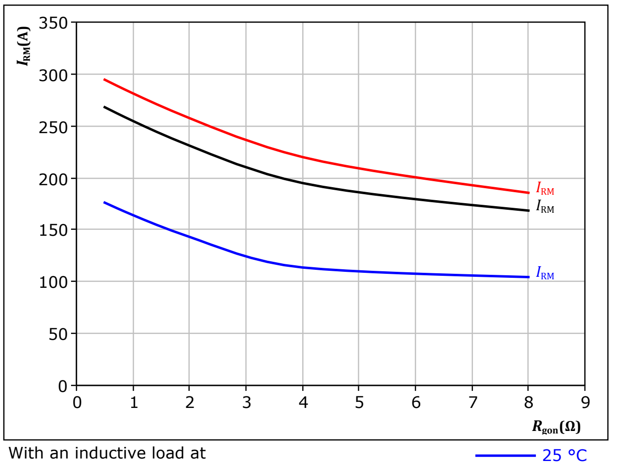
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 33. 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

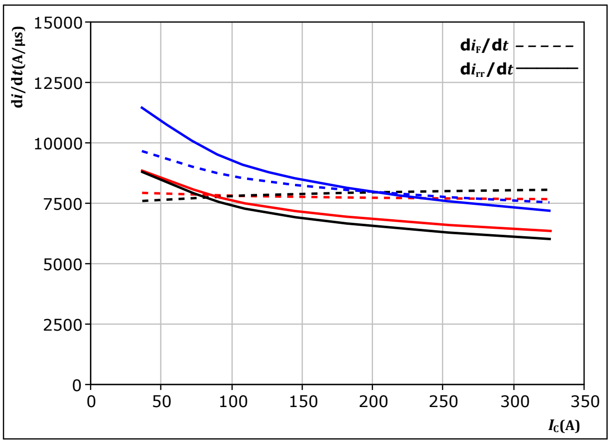
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5/15	V		125 °C
I_C =	180	A		150 °C

Buck Switching Characteristics

figure 34. **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)



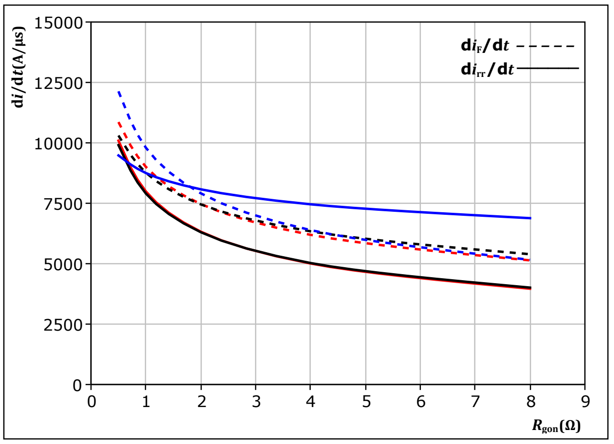
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	-5/15	V	125 °C
R_{gon} =	2	Ω	150 °C

figure 35. **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})



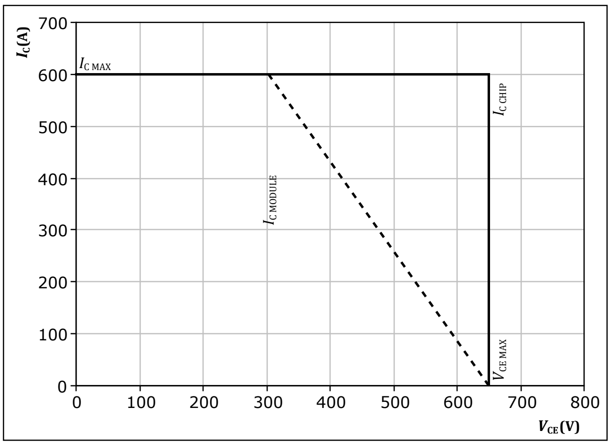
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C
V_{GE} =	-5/15	V	125 °C
I_C =	180	A	150 °C

figure 36. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



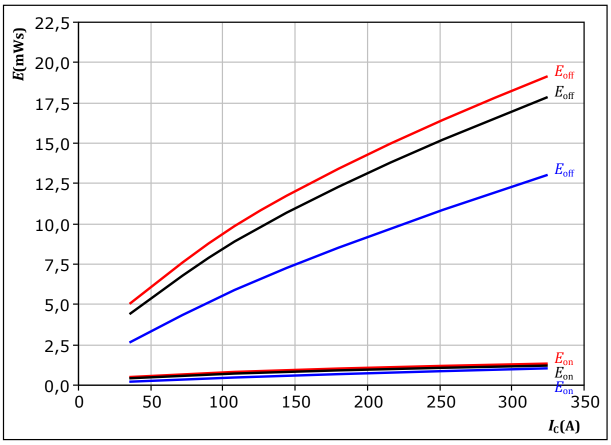
At	T_j =	150	°C
	R_{gon} =	2	Ω
	R_{goff} =	2	Ω

Boost Switching Characteristics

figure 37. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



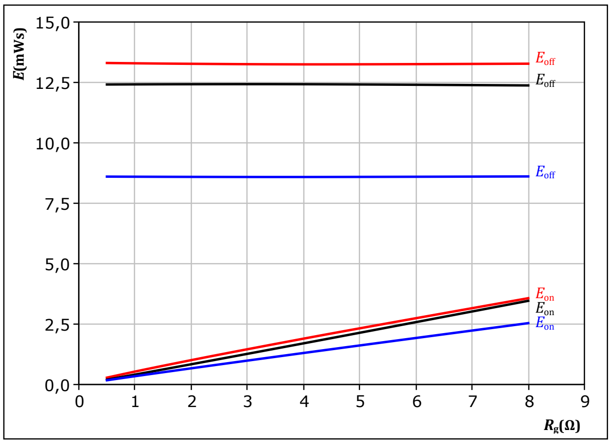
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C
R_{goff} =	2	Ω		

figure 38. **IGBT**

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

$E = f(R_g)$



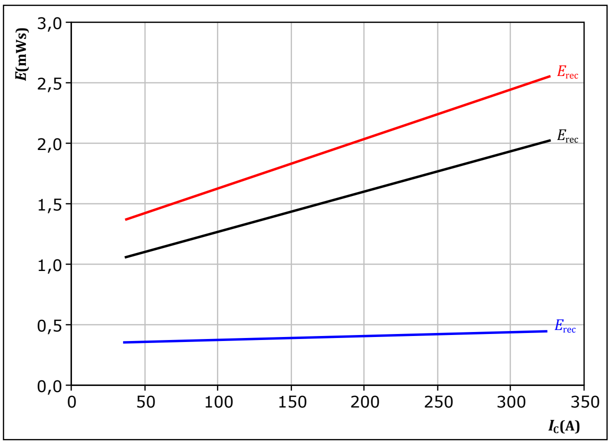
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

figure 39. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



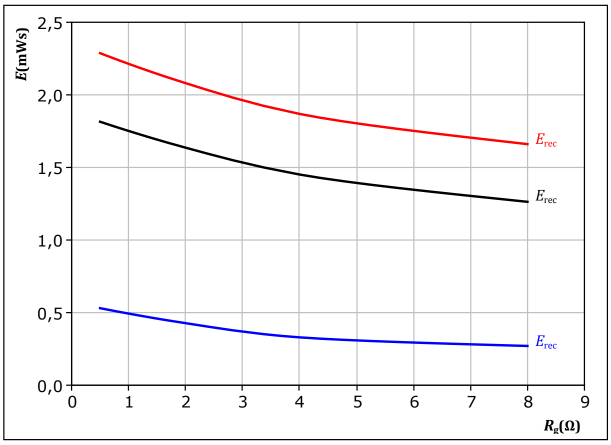
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 40. **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

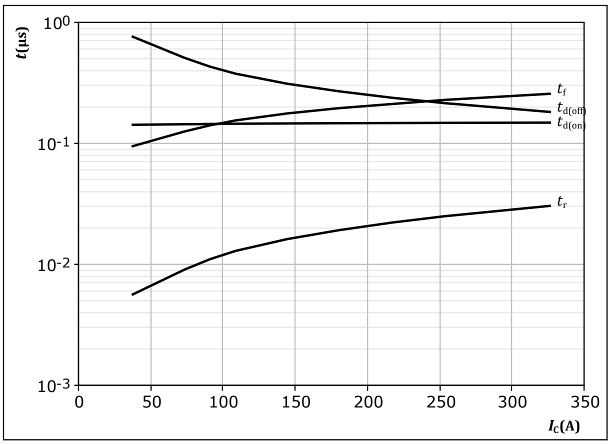
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

Boost Switching Characteristics

figure 41. **IGBT**

Typical switching times as a function of collector current

t = f(I_C)



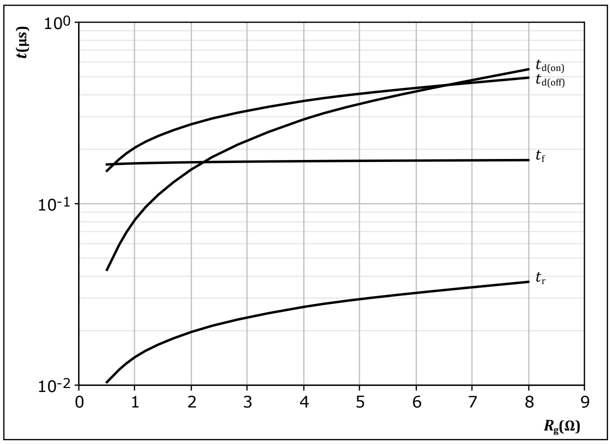
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω
R_{goff} =	2	Ω

figure 42. **IGBT**

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

t = f(R_g)



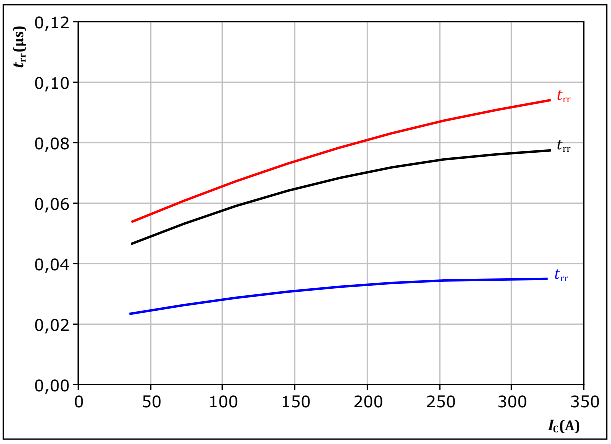
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	180	A

figure 43. **FWD**

Typical reverse recovery time as a function of collector current

t_{rr} = f(I_C)



With an inductive load at

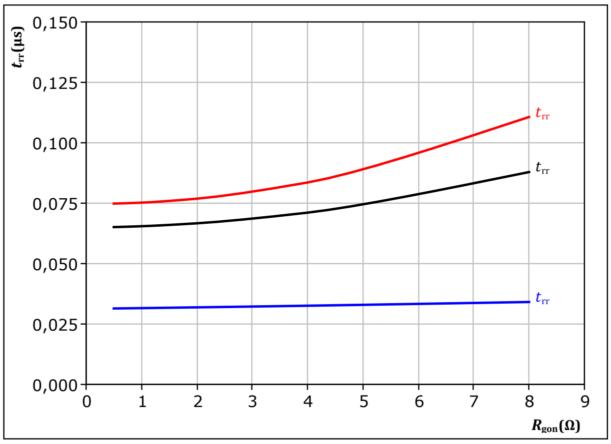
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	2	Ω

T_j: 25 °C, 125 °C, 150 °C

figure 44. **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} =	350	V
V_{GE} =	±15	V
I_C =	180	A

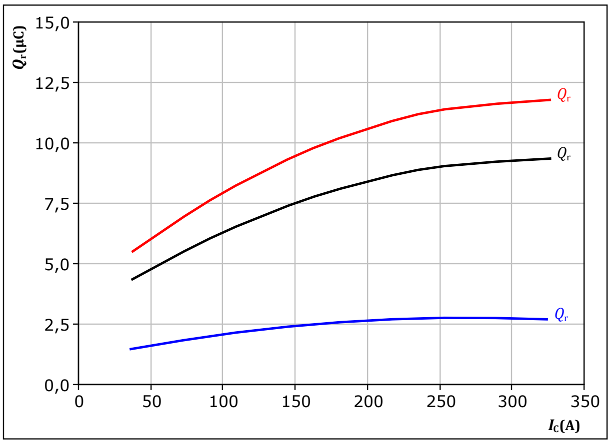
T_j: 25 °C, 125 °C, 150 °C

Boost Switching Characteristics

figure 45. **FWD**

Typical recovered charge as a function of collector current

Q_r = f(I_C)



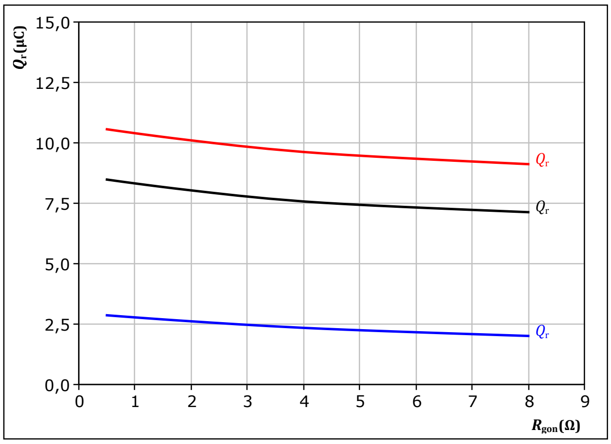
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 46. **FWD**

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

Q_r = f(R_{gon})



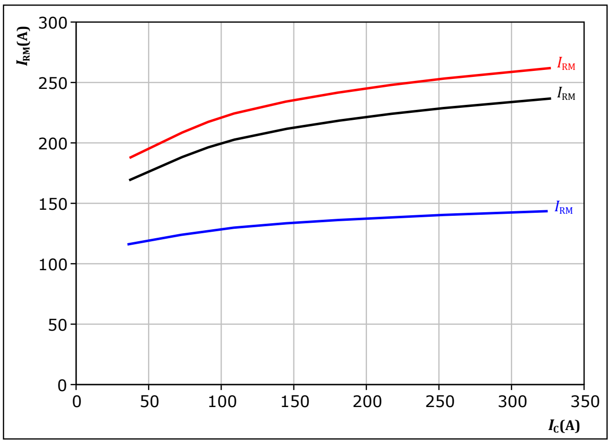
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

figure 47. **FWD**

Typical peak reverse recovery current as a function of collector current

I_{RM} = f(I_C)



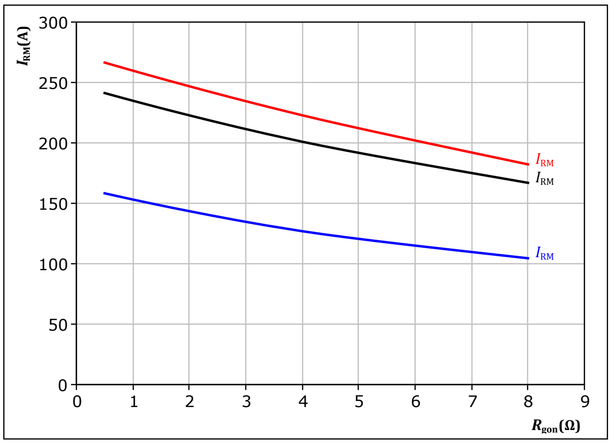
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 48. **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

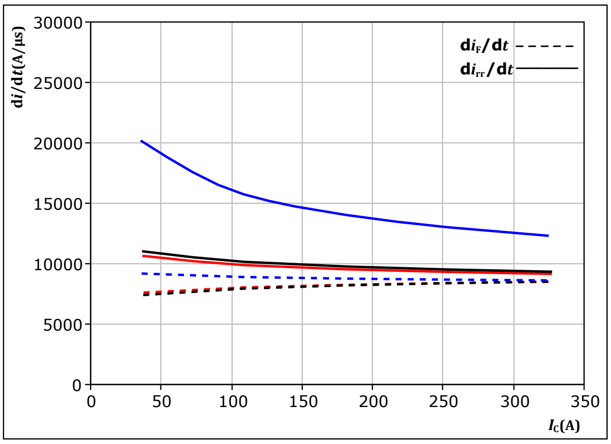
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

Boost Switching Characteristics

figure 49. **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)



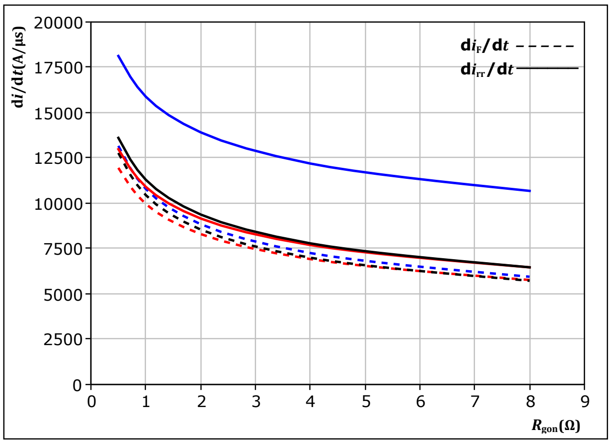
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	2	Ω		150 °C

figure 50. **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})



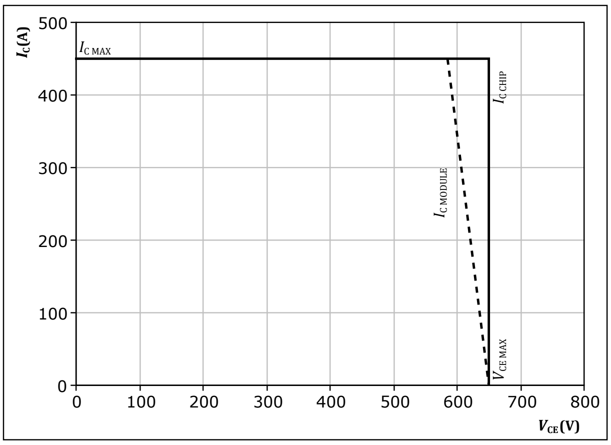
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	180	A		150 °C

figure 51. **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 52. **IGBT**

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

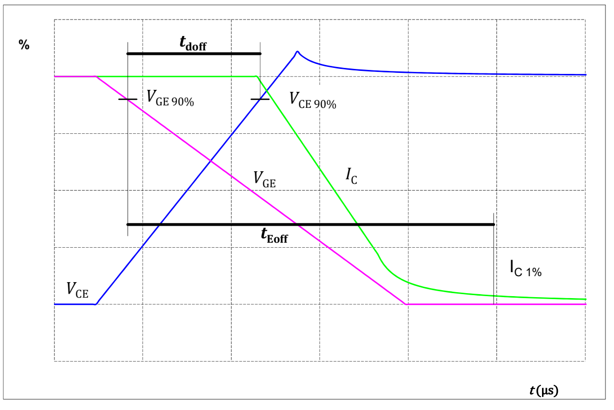


figure 53. **IGBT**

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

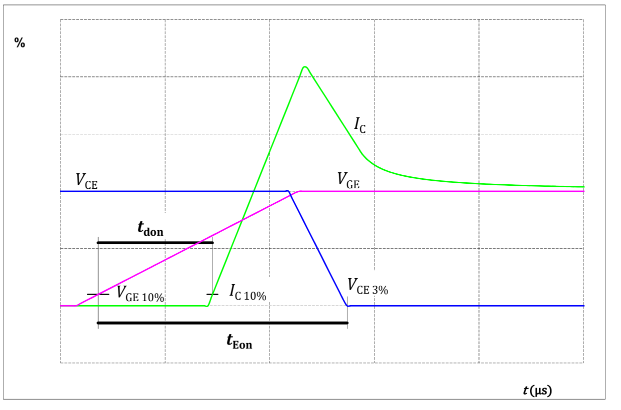


figure 54. **IGBT**

Turn-off Switching Waveforms & definition of t_f

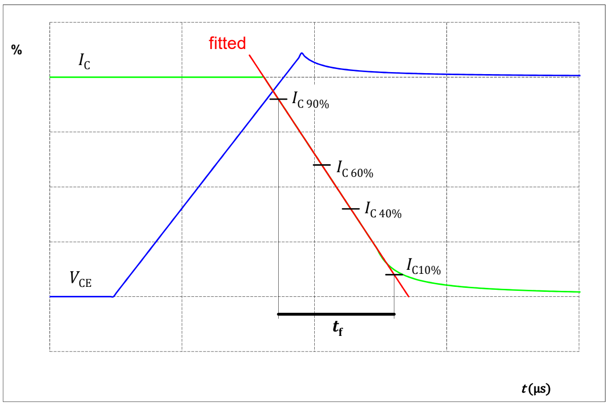
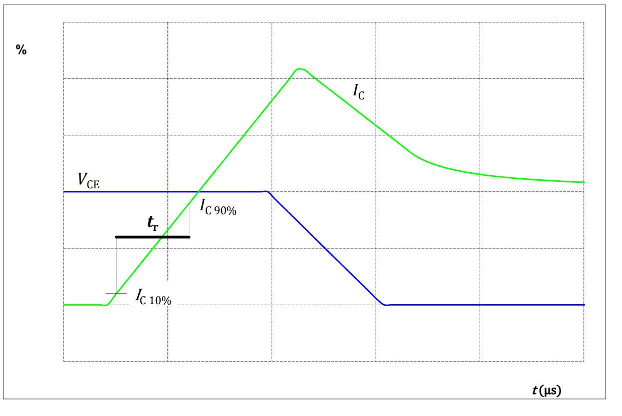


figure 55. **IGBT**

Turn-on Switching Waveforms & definition of t_r



Switching Definitions

figure 56. **FWD**

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

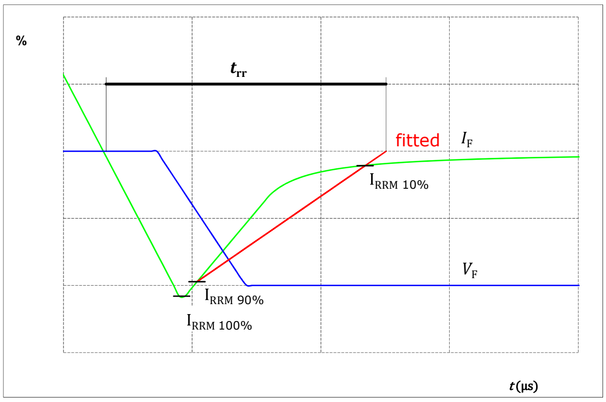
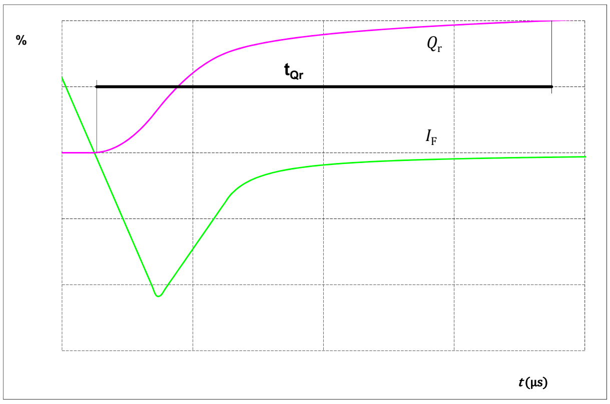


figure 57. **FWD**

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



30-FT07NIB300S503-LH36F58
datasheet

Ordering Code

Version	Ordering Code
Without thermal paste	30-FT07NIB300S503-LH36F58
With thermal paste (3,4 W/mK, PSX-P7)	30-FT07NIB300S503-LH36F58-/3/

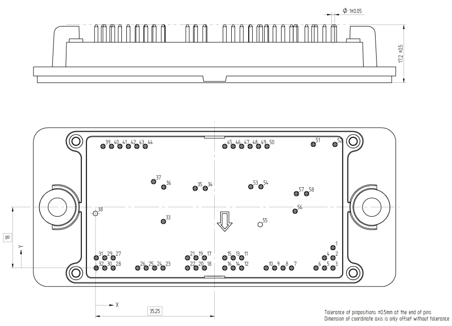
Marking

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

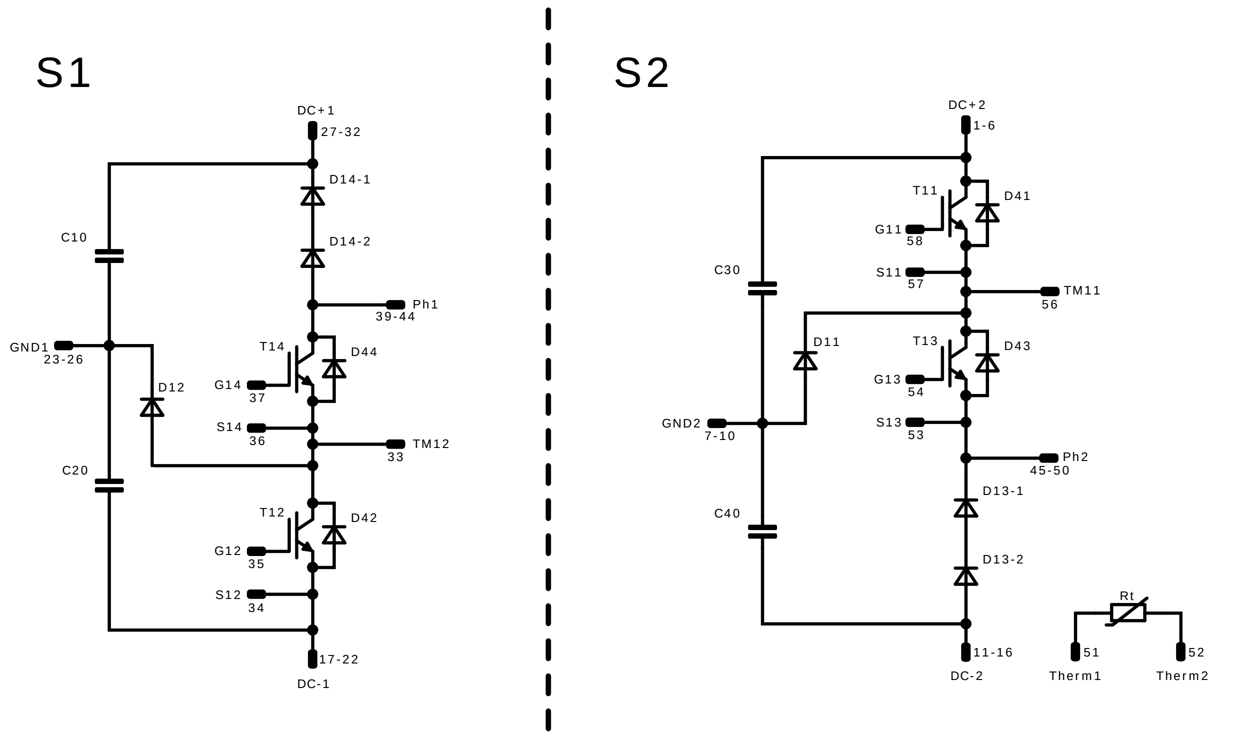
Outline

Pin table [mm]

Pin	X	Y	Function	30	2,75	0	DC+1
1	70,25	6	DC+2	31	0,25	3	DC+1
2	70,25	3	DC+2	32	0,25	0	DC+1
3	70,25	0	DC+2	33	20,1	13,75	TM12
4	67,75	3	DC+2	34	32,5	23,55	S12
5	67,75	0	DC+2	35	29,5	23,55	G12
6	65,25	0	DC+2	36	20,2	23,95	S14
7	58	0	GND2	37	17,2	25,55	G14
8	55,5	0	GND2	38	not assembled		
9	53	0	GND2	39	2,25	36	Ph1
10	50,5	0	GND2	40	4,75	36	Ph1
11	43,25	3	DC-2	41	7,25	36	Ph1
12	43,25	0	DC-2	42	9,75	36	Ph1
13	40,75	3	DC-2	43	12,25	36	Ph1
14	40,75	0	DC-2	44	14,75	36	Ph1
15	38,25	3	DC-2	45	38,25	36	Ph2
16	38,25	0	DC-2	46	40,75	36	Ph2
17	32,25	3	DC-1	47	43,25	36	Ph2
18	32,25	0	DC-1	48	45,75	36	Ph2
19	29,75	3	DC-1	49	48,25	36	Ph2
20	29,75	0	DC-1	50	50,75	36	Ph2
21	27,25	3	DC-1	51	64,45	36,6	Therm1
22	27,25	0	DC-1	52	70,85	36,55	Therm2
23	20	0	GND1	53	45,95	24,05	S13
24	17,5	0	GND1	54	48,95	24,05	G13
25	15	0	GND1	55	not assembled		
26	12,5	0	GND1	56	59,05	16,8	TM11
27	5,25	3	DC+1	57	59,45	22	S11
28	5,25	0	DC+1	58	62,45	22	G11
29	2,75	3	DC+1				



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	650 V	300 A	Buck Switch	
D11, D12	FWD	650 V	280 A	Buck Diode	
D41, D42	FWD	1200 V	8 A	Buck Sw. Protection Diode	
T13, T14	IGBT	650 V	225 A	Boost Switch	
D13-1, D13-2, D14-1, D14-2	FWD	1300 V	280 A	Boost Diode	
D43, D44	FWD	1200 V	8 A	Boost Sw. Protection Diode	
C10, C20, C30, C40	Capacitor	630 V		Capacitor (DC)	
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 certified according to UL 1557 standard, UL file number E192116. For more information see vincotech.com website.

Document No.:	Date:	Modification:	Pages
30-FT07NIB300S503-LH36F58-D4-14	6 Mar. 2023	New Datasheet format Separate datasheet Isolation voltage update Diode change TM14, TM15 pins removal	