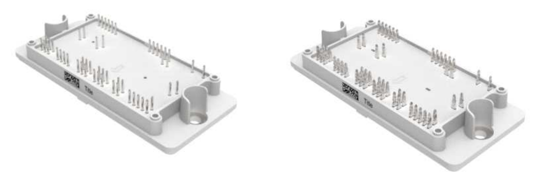
30-FT07NIB200SG02-L965F08
30-PT07NIB200SG02-L965F08Y
datasheet

Vincotech

flow NPC 2	1200 V / 200 A

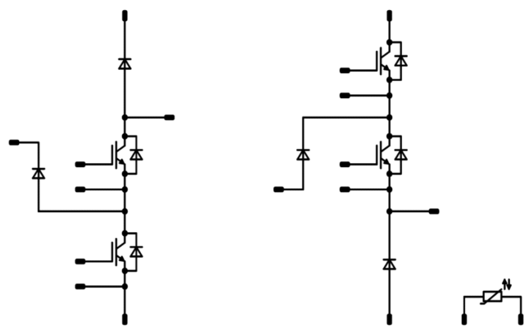
Features
- Three-level topology
- High efficiency
- Low inductive package

flow 2 12 mm housing



Target applications
- Solar Inverters

Schematic



Types
- 30-FT07NIB200SG02-L965F08
- 30-PT07NIB200SG02-L965F08Y

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	162	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	318	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	$T_j \le$ 150 °C V_{GE} = 15 V		5 400	μs V
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	176	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}		600	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	290	W
Gate-emitter voltage	V_{GES}			±20	V
Short circuit ratings	t_{SC} V_{CC}	T_j ≤ 150 °C V_{GE} = 15 V		6 360	µs V
Maximum junction temperature	T_{jmax}			175	°C
Buck Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	132	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	174	W
Maximum Junction Temperature	T_{jmax}			175	°C
Boost Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1200	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	120	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	248	W
Maximum Junction Temperature	T_{jmax}			175	°C
Sw. Protection Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	36	A
Repetitive peak forward current	I_{FRM}			60	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	59	W
Maximum Junction Temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		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	4000	V
		Equivalent AC Voltage	t_p = 1 min	2500	V
Creepage distance				min. 12,7	mm
Clearance				min. 12,7	mm
Comparative Tracking Index	CTI			> 200	

* 100 % tested in production

Characteristic Values

Parameter	Symbol	Conditions					Value			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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0032	25	4,2	5,1	5,6	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25	1,38	1,83	2,22	V
Collector-emitter cut-off current	I_{CES}		0	650		25			11,2	µA
Gate-emitter leakage current	I_{GES}		20	0		25			600	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		12400		pF
Reverse transfer capacitance	C_{res}							360		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,30		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 2 Ω R_{gon} = 2 Ω	±15	350	121	25 125		137 140		ns
Rise time	t_r					25 125		14 15		
Turn-off delay time	$t_{d(off)}$					25 125		186 214		
Fall time	t_f					25 125		7 12		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,8 µC Q_{rFWD} = 9,2 µC				25 125		1,215 1,923		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,909 1,585		

Characteristic Values

Parameter	Symbol	Conditions					Value			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	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,0032	25	5,1	5,8	6,4	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125	0,93	1,49 1,66	1,77	V
Collector-emitter cut-off current	I_{CES}		0	650		25			10,8	µA
Gate-emitter leakage current	I_{GES}		20	0		25			1200	nA
Internal gate resistance	r_g							1		Ω
Input capacitance	C_{ies}	f = 1 MHz	0	25		25		12320		pF
Reverse transfer capacitance	C_{res}							366		
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,33		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 2 Ω R_{gon} = 2 Ω	±15	350	121	25 125		163 166		ns
Rise time	t_r					25 125		18 22		
Turn-off delay time	$t_{d(off)}$					25 125		260 295		
Fall time	t_f					25 125		67 88		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 7,2 µC Q_{rFWD} = 16,4 µC				25 125		1,531 2,389		mWs
Turn-off energy (per pulse)	E_{off}					25 125		3,141 4,557		

Characteristic Values

Parameter	Symbol	Conditions					Value			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		1,65 1,60 1,58	1,77	V
Reverse leakage current	I_r			650		25			10,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,55		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 8324 A/µs di/dt = 9600 A/µs	±15	350	121	25 125		167 210		A
Reverse recovery time	t_{rr}					25 125		49 76		ns
Recovered charge	Q_r					25 125		4,801 9,186		µC
Reverse recovered energy	E_{rec}					25 125		1,130 2,121		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		4342 3296		A/µs
Boost Diode										
Static										
Forward voltage	V_F				150	25 150		2,39 2,40	2,49	V
Reverse leakage current	I_r			1200		25 150			240 28000	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						0,38		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 6421 A/µs di/dt = 7125 A/µs	±15	350	121	25 125		196 245		A
Reverse recovery time	t_{rr}					25 125		42 148		ns
Recovered charge	Q_r					25 125		7,227 16,387		µC
Reverse recovered energy	E_{rec}					25 125		1,757 4,325		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		15923 11505		A/µs

Characteristic Values

Parameter	Symbol	Conditions					Value			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	
Sw. Protection Diode										
Static										
Forward voltage	V_F				30	25 150		1,64 1,56	1,87	V
Reverse leakage current	I_r			650		25			0,36	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ = 3,4 W/mK						1,61		K/W
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
Power dissipation constant						25		1,5		mW/K
B-value	$B_{(25/50)}$	Tol. ±1 %				25		3962		K
B-value	$B_{(25/100)}$	Tol. ±1 %				25		4000		K
Vincotech NTC Reference									I	

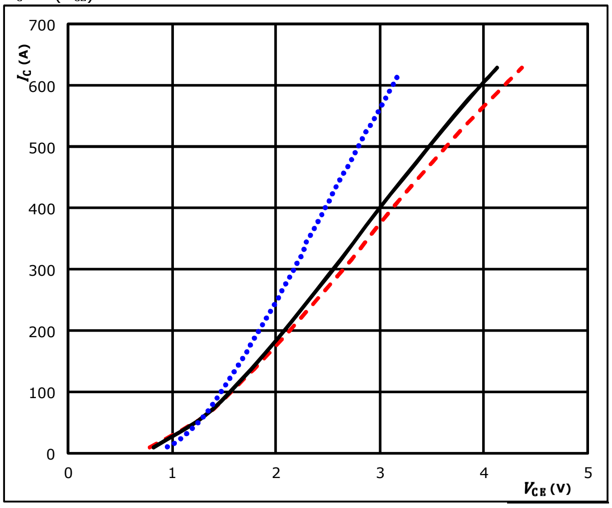
Vincotech

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

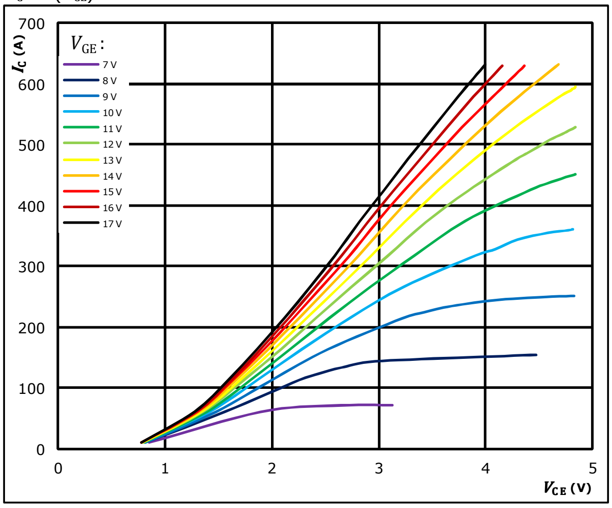


t_p =	250	µs		25 °C	···········
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 µs

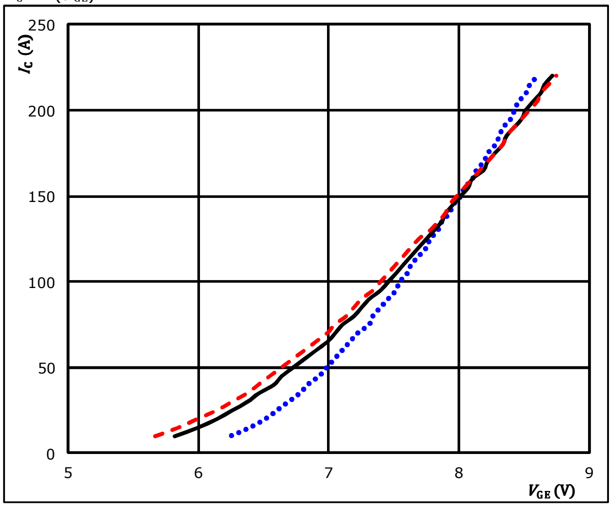
T_j = 125 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

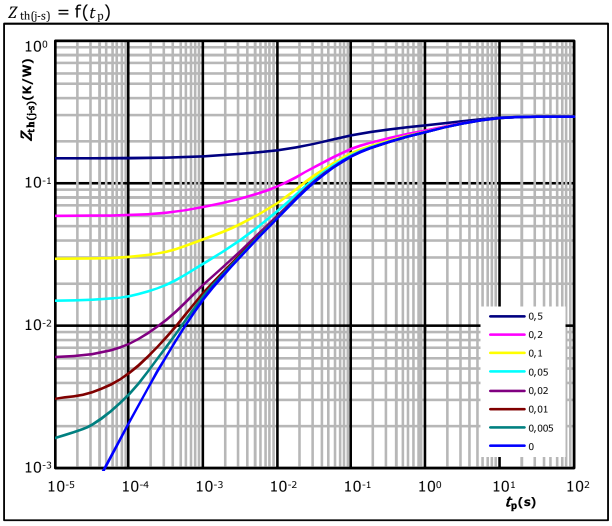


t_p =	100	µs		25 °C	···········
V_{CE} =	0	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 0,30 K/W

IGBT thermal model values

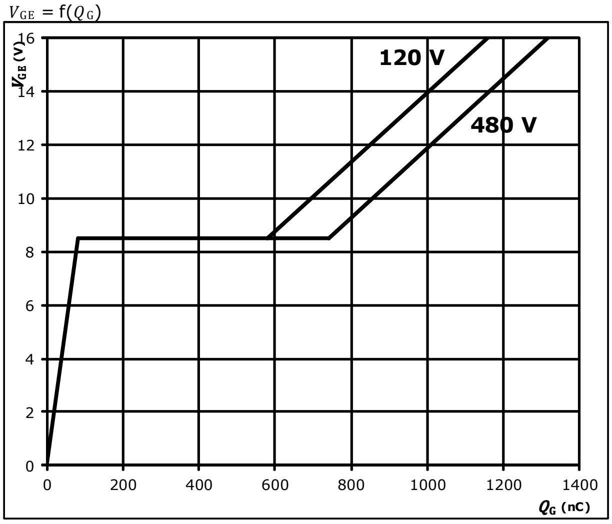
R (K/W)	τ (s)
5,84E-02	4,27E+00
5,19E-02	1,01E+00
5,81E-02	1,59E-01
8,89E-02	3,67E-02
2,61E-02	9,09E-03
1,53E-02	9,16E-04

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

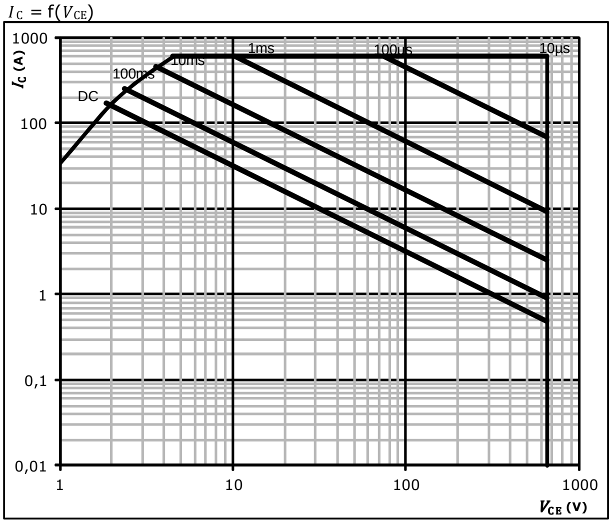


I_C= 200 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$

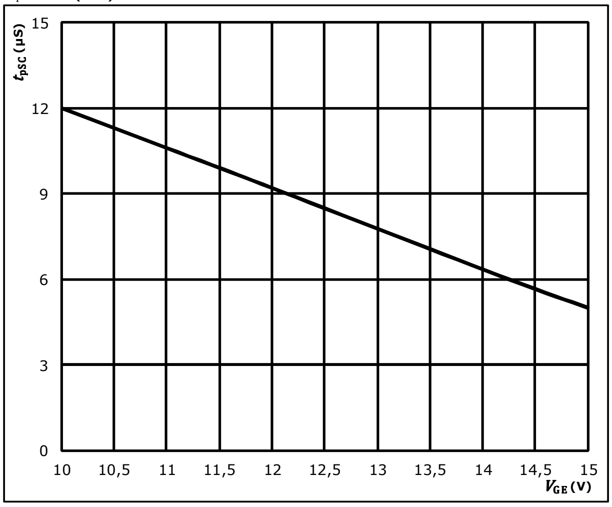


D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	ºC

figure 7. **IGBT**

Short circuit duration as a function of V_{GE}

$t_{pSC} = f(V_{GE})$

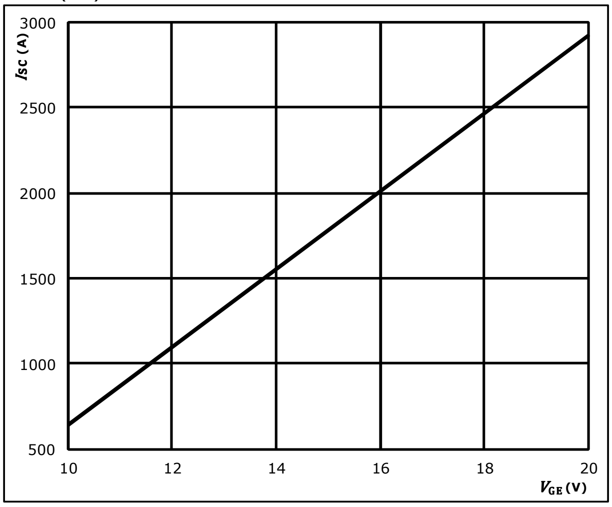


V_{CE} =	400	V
T_j ≤	150	ºC

figure 8. **IGBT**

Typical short circuit current as a function of V_{GE}

$I_{SC} = f(V_{GE})$



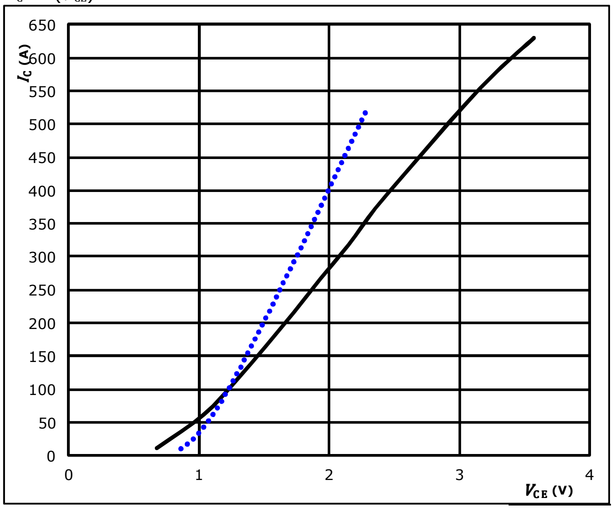
V_{CE} ≤	400	V
T_j ≤	25	ºC

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

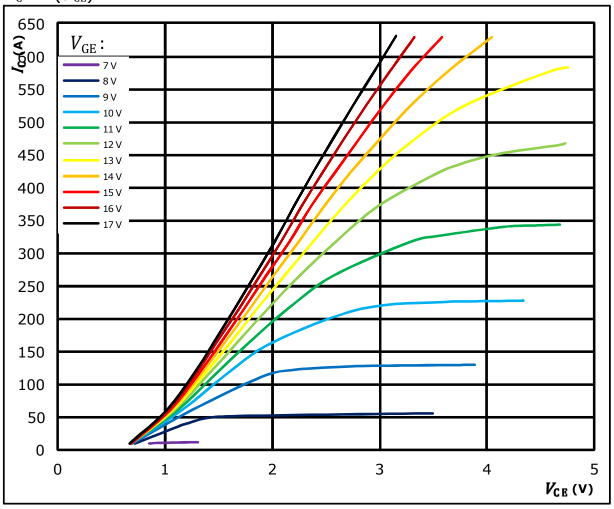


t_p =	250	µs	T_j:	25 °C	············
V_{GE} =	15	V		125 °C	———

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$



t_p = 250 µs

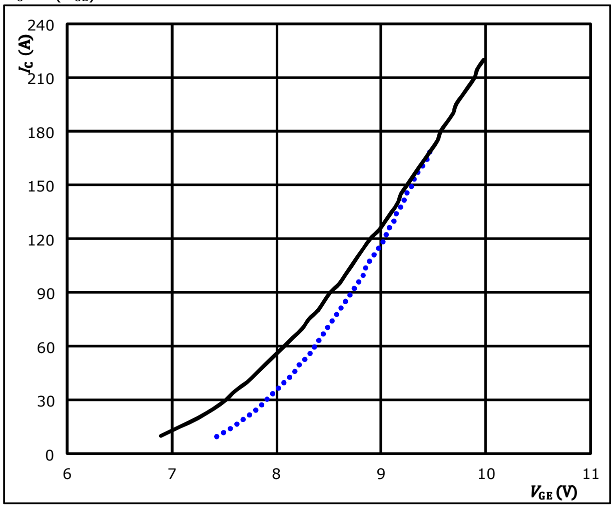
T_j = 125 °C

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

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

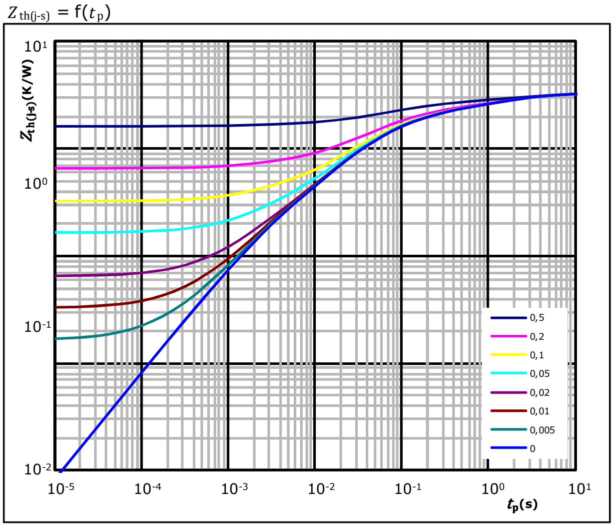


t_p =	100	µs	T_j:	25 °C	············
V_{CE} =	0	V		125 °C	———

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 0,33 K/W

IGBT thermal model values

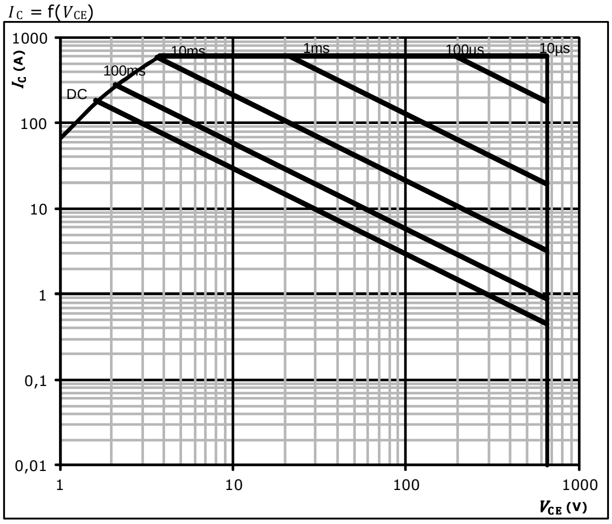
R (K/W)	τ (s)
9,52E-02	2,20E+00
5,70E-02	3,31E-01
9,58E-02	8,43E-02
6,81E-02	2,66E-02
1,14E-02	2,55E-03

Boost Switch Characteristics

figure 5.	IGBT

Safe operating area

$I_C = f(V_{CE})$



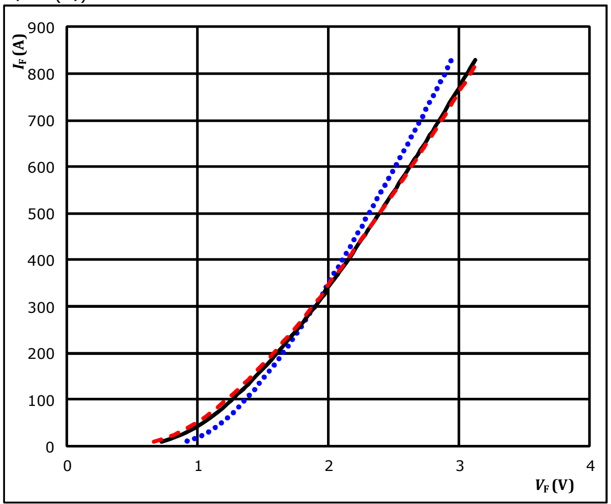
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	ºC

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



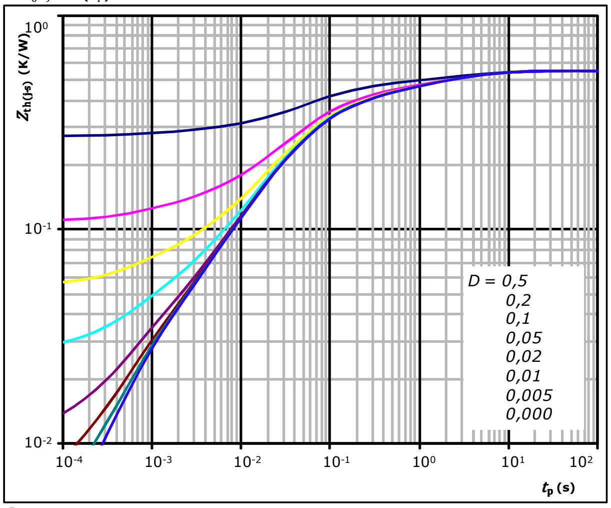
t_p = 250 µs

T_j: 25 °C / 125 °C / 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,55 K/W

FWD thermal model values

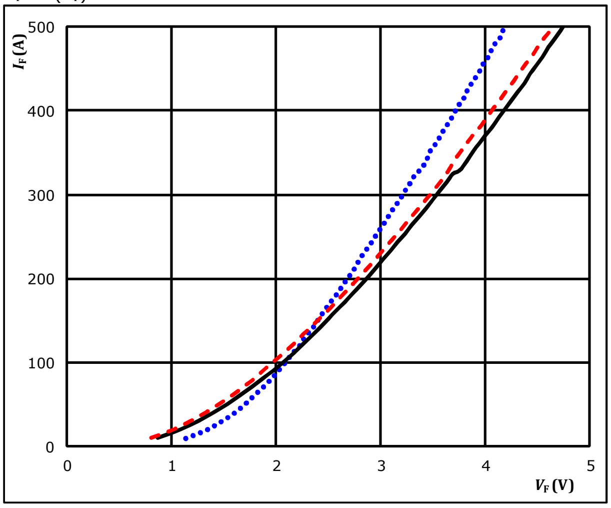
R (K/W)	τ (s)
6,80E-02	4,53E+00
7,78E-02	9,81E-01
1,35E-01	1,52E-01
2,08E-01	3,50E-02
3,75E-02	5,94E-03
2,03E-02	7,75E-04

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



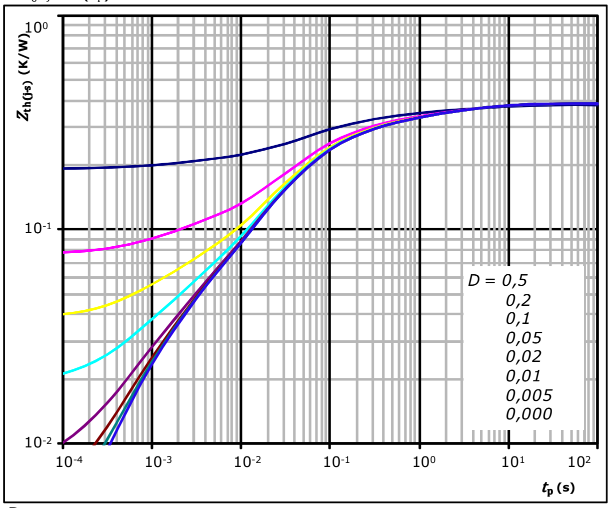
t_p = 250 µs

T_j: 25 °C (dotted), 125 °C (solid), 150 °C (dashed)

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j-s)}$ = 0,38 K/W

FWD thermal model values

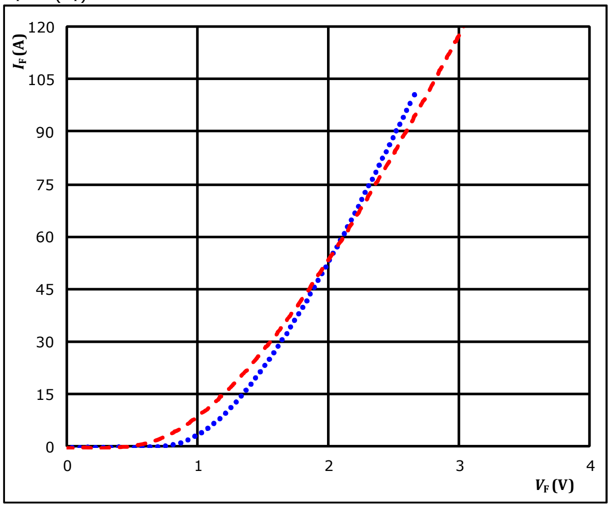
R (K/W)	τ (s)
4,05E-02	5,75E+00
4,94E-02	1,04E+00
8,90E-02	1,83E-01
1,31E-01	4,42E-02
4,31E-02	1,33E-02
2,25E-02	1,80E-03

Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



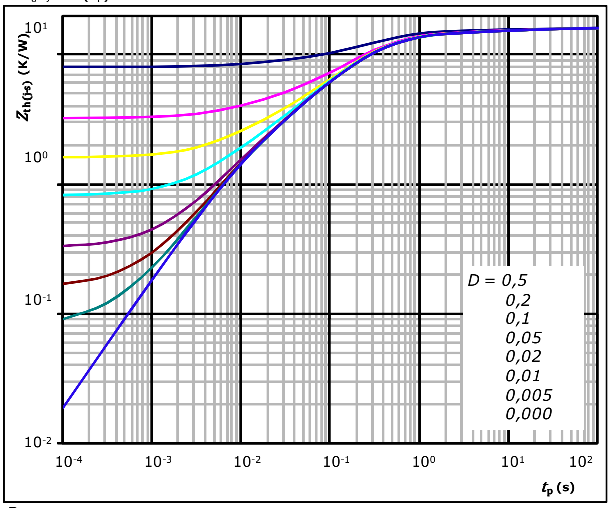
t_p = 250 µs

T_j: 25 °C / 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



D = t_p / T

$R_{th(j\text{-}s)}$ = 1,61 K/W

FWD thermal model values

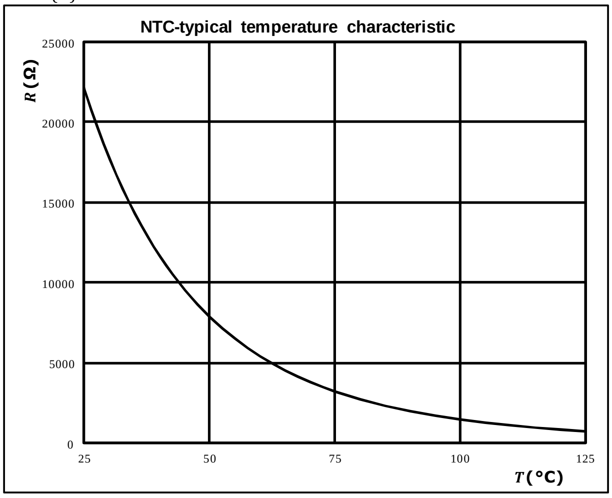
R (K/W)	τ (s)
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic
as a function of temperature

$R = f(T)$

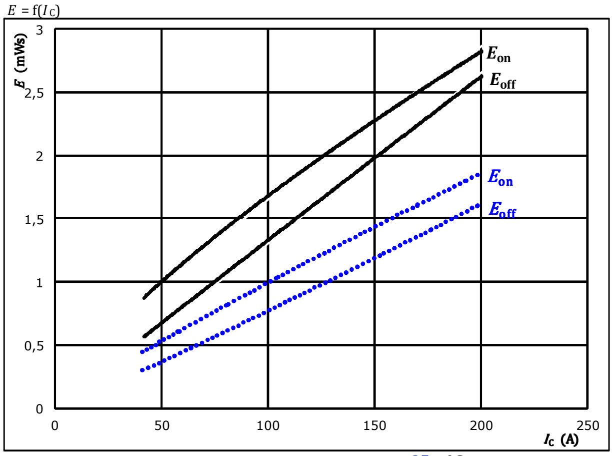


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



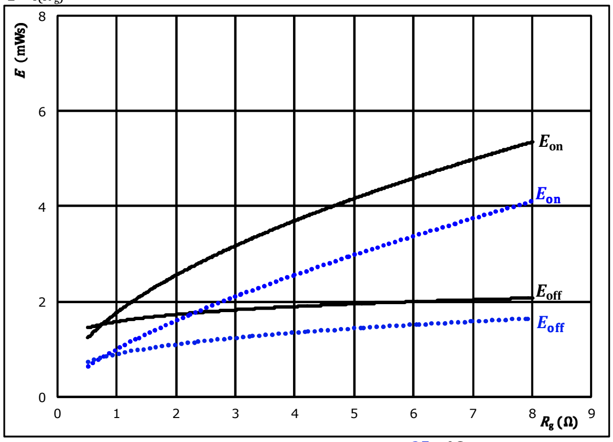
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



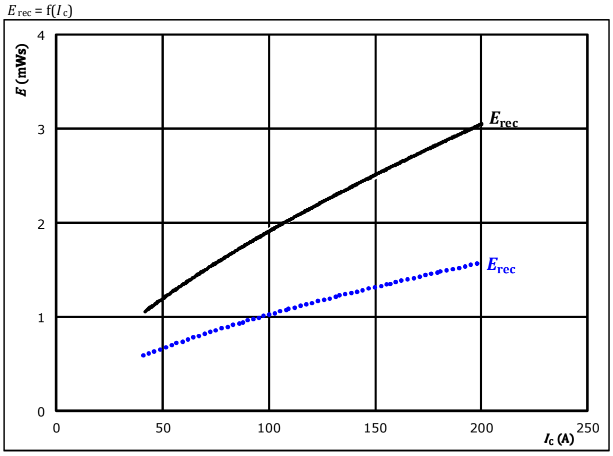
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	121	A			

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



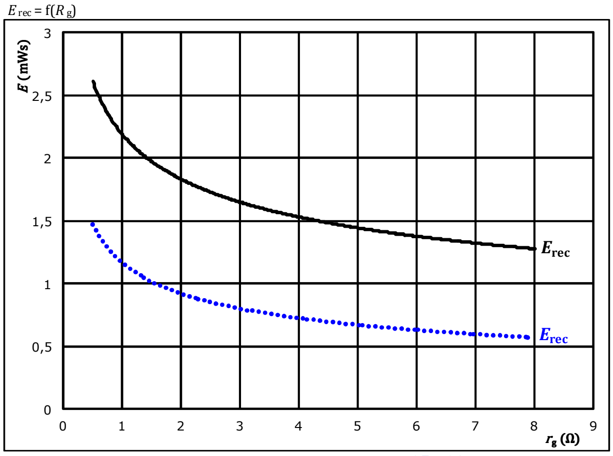
With an inductive load at

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

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

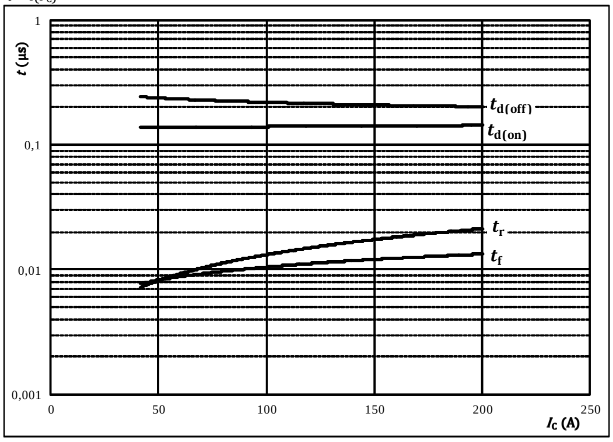
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	121	A			

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



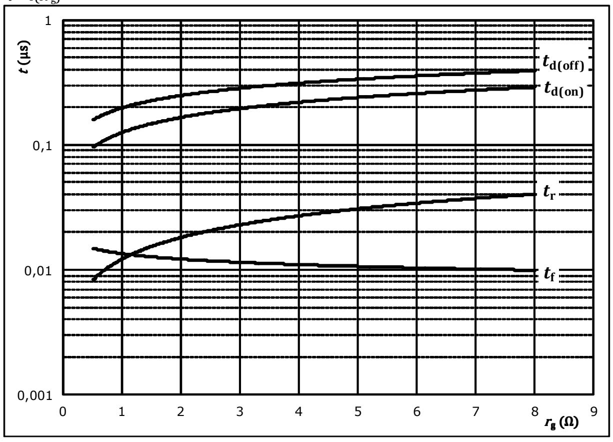
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



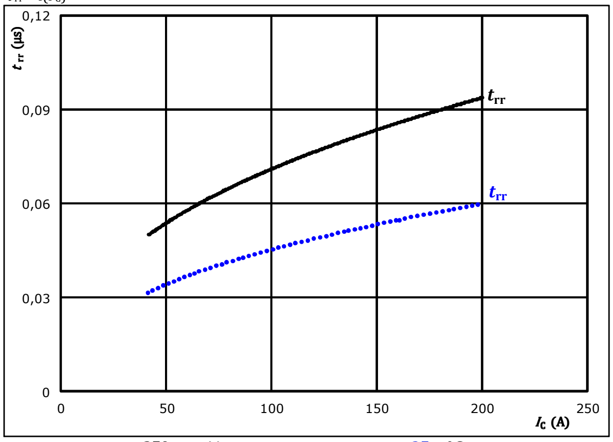
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	121	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

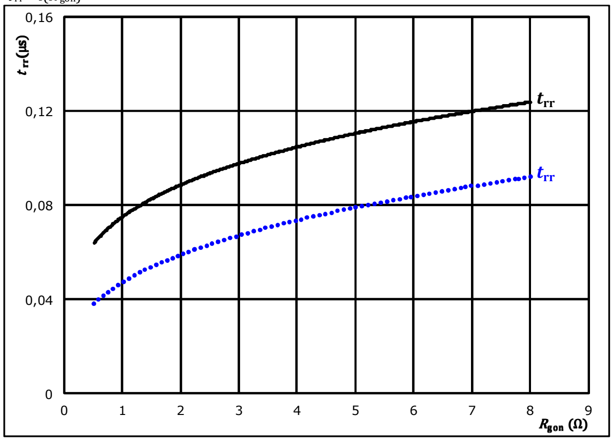


At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	2	Ω			

figure 8. **FWD**

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

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



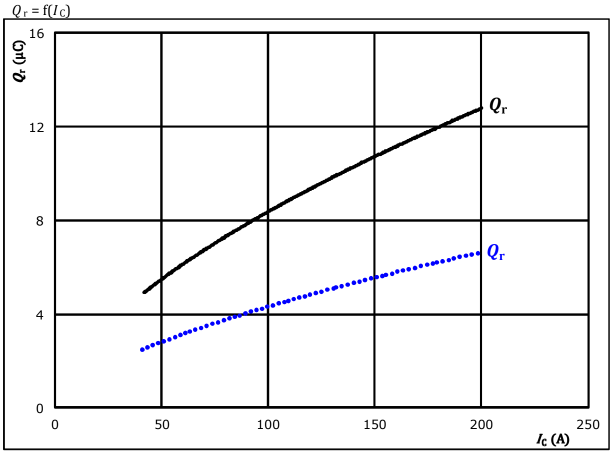
At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	121	A			

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

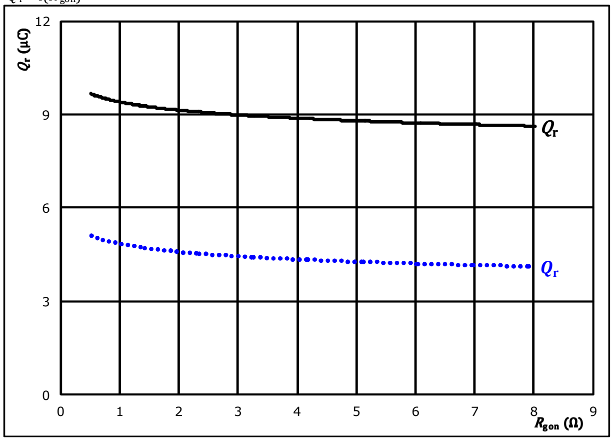


At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	2	Ω			

figure 10. **FWD**

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

$Q_r = f(R_{gon})$

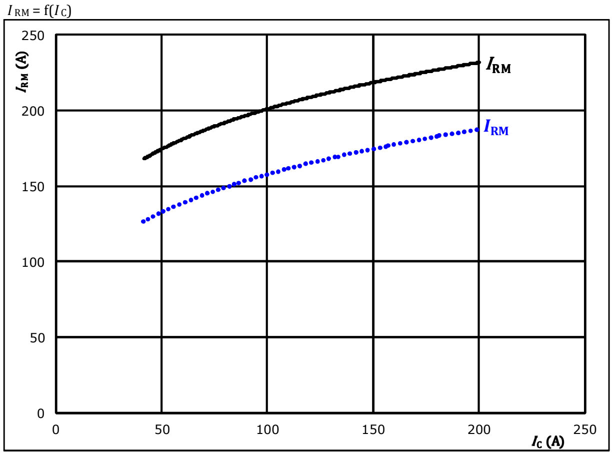


At					
V_{CE}=	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	121	A			

figure 11. **FWD**

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

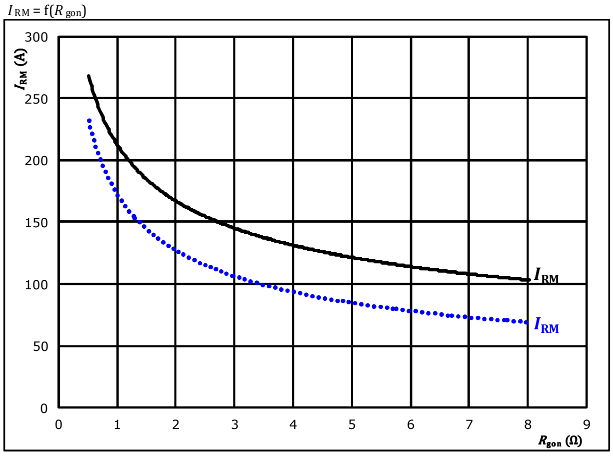


At					
V_{CE}:	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	2	Ω			

figure 12. **FWD**

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

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



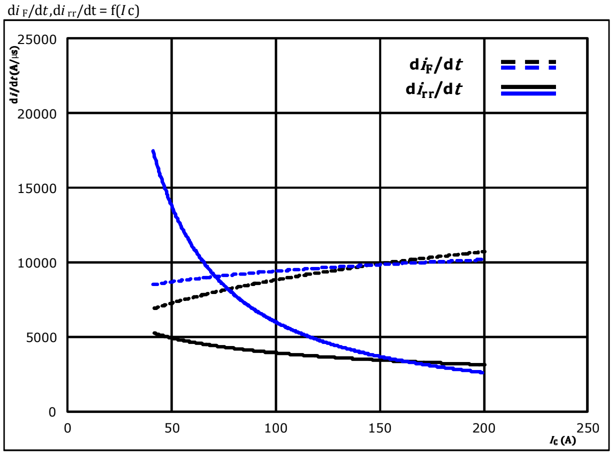
At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	121	A			

Buck Switching Characteristics

figure 13. **FWD**

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

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

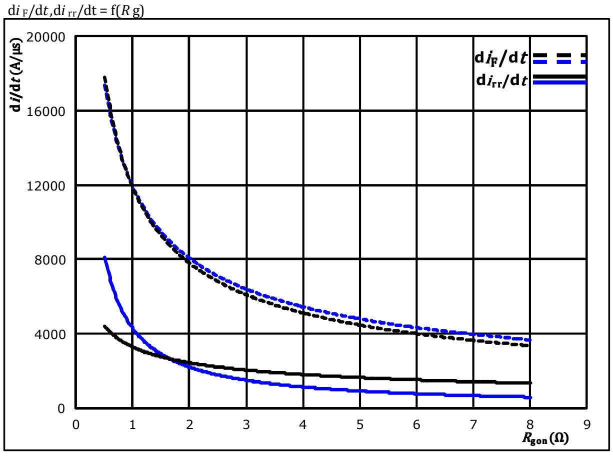


At
V_{CE} = 350 V
V_{GE} = ±15 V
R_{gon} = 2 Ω
T_j: 25 °C (dotted), 125 °C (solid)

figure 14. **FWD**

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

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

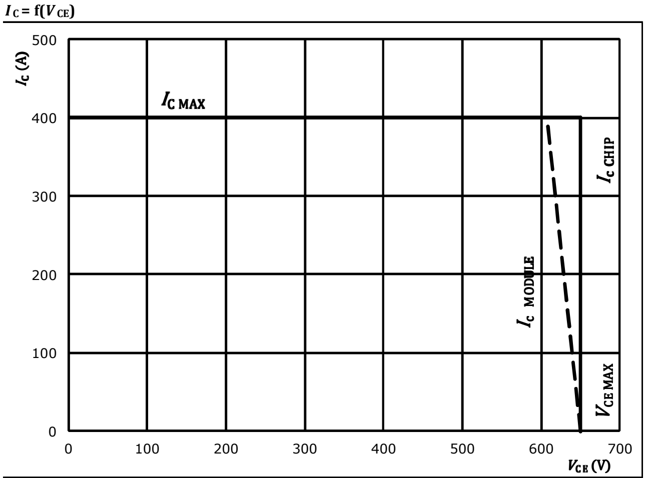


At
V_{CE} = 350 V
V_{GE} = ±15 V
I_C = 121 A
T_j: 25 °C (dotted), 125 °C (solid)

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At
T_j = 175 °C
R_{gon} = 2 Ω
R_{goff} = 2 Ω

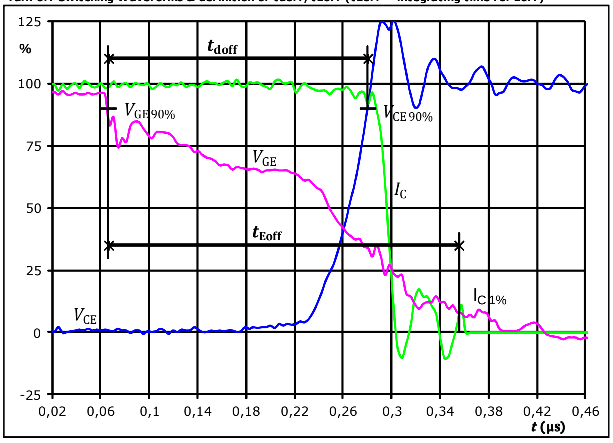
Buck Switching Characteristics

General conditions

T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. IGBT

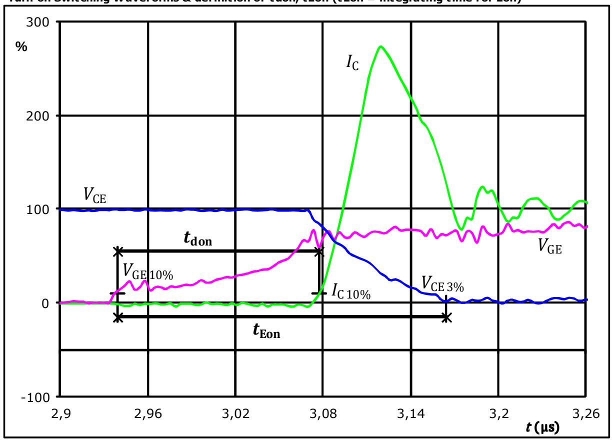
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	121	A
t_{doff} =	0,214	µs
t_{Eoff} =	0,289	µs

figure 2. IGBT

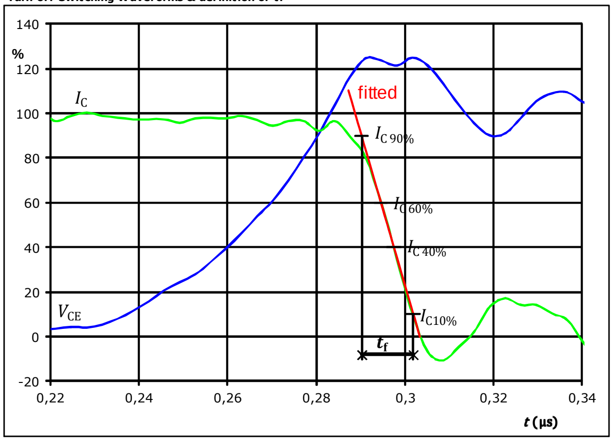
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	121	A
t_{don} =	0,140	µs
t_{Eon} =	0,225	µs

figure 3. IGBT

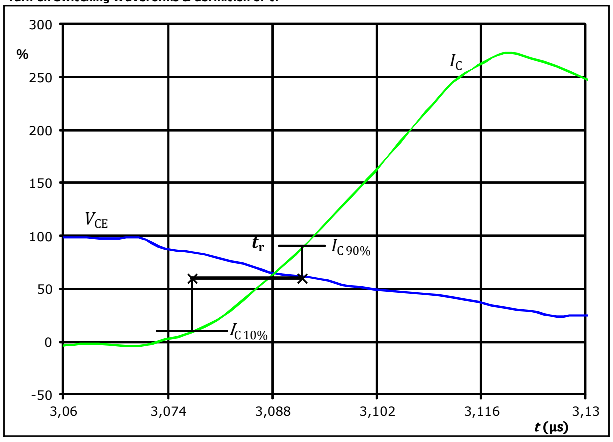
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	121	A
t_f =	0,012	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

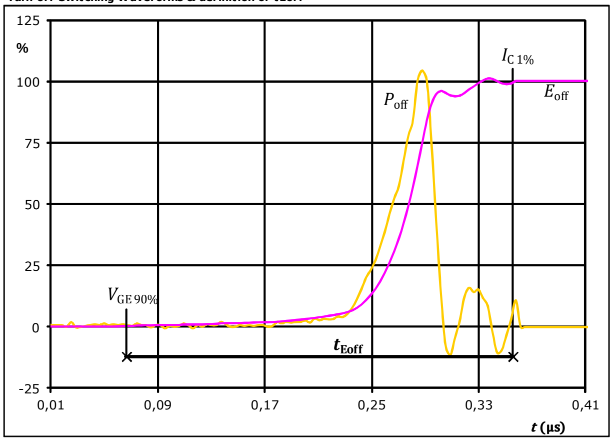


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	121	A
t_r =	0,015	µs

Buck Switching Characteristics

figure 5. **IGBT**

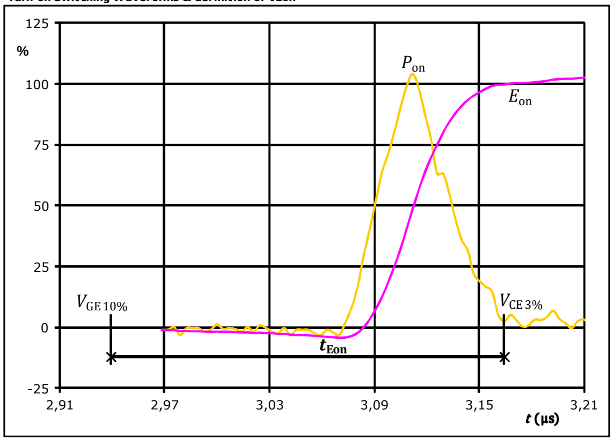
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	42,21	kW
E_{off} (100%) =	1,59	mJ
t_{Eoff} =	0,29	µs

figure 6. **IGBT**

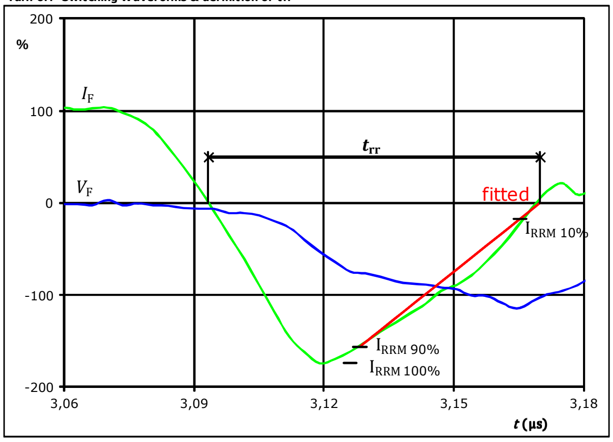
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	42,21	kW
E_{on} (100%) =	1,92	mJ
t_{Eon} =	0,23	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

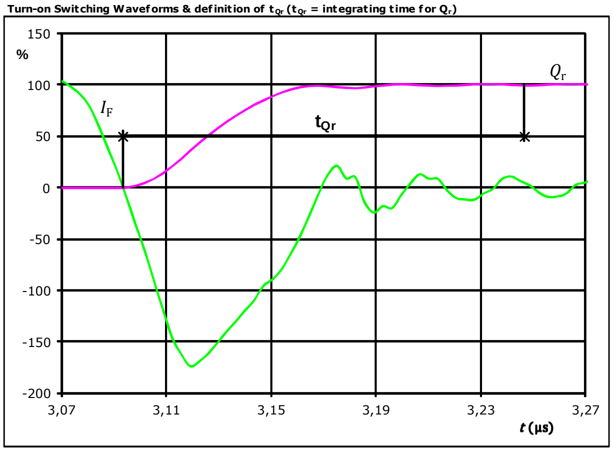


V_F (100%) =	350	V
I_F (100%) =	121	A
I_{RRM} (100%) =	-210	A
t_{rr} =	0,076	µs

Buck Switching Characteristics

figure 8. **FWD**

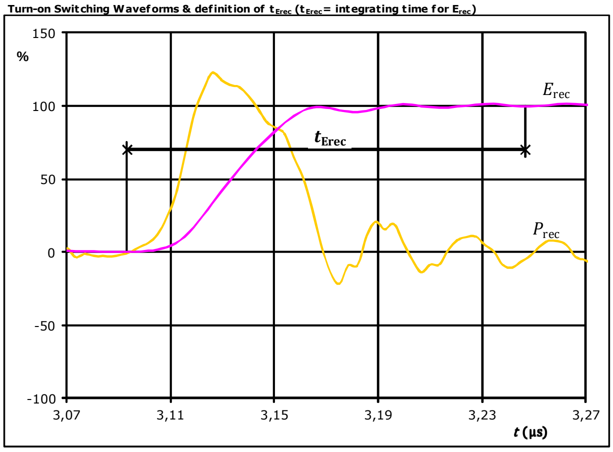
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F(100%) =	121	A
Q_r(100%) =	9,19	µC
t_{Qr} =	0,15	µs

figure 9. **FWD**

Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec}= integrating time for E_{rec})



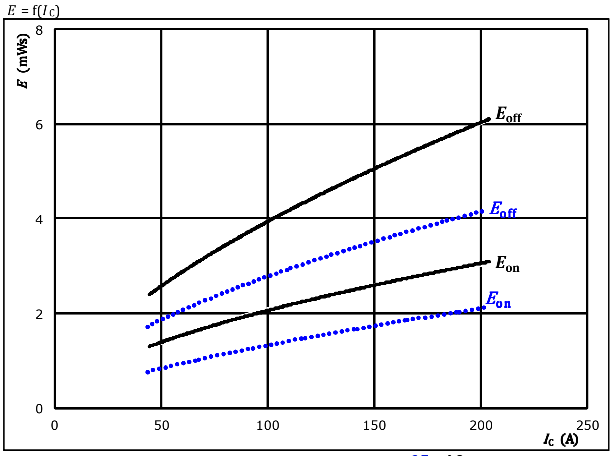
P_{rec}(100%) =	41,01	kW
E_{rec}(100%) =	2,12	mJ
t_{Erec} =	0,15	µs

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



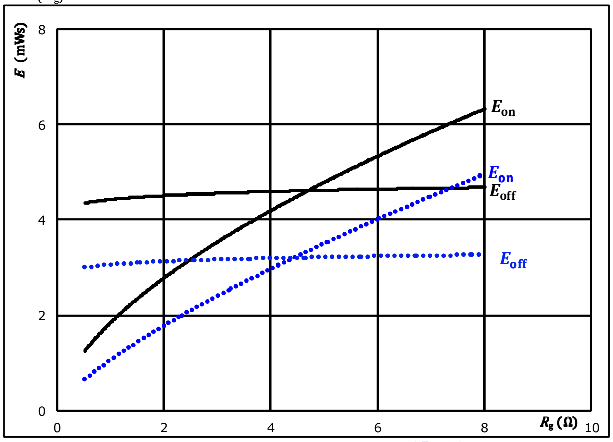
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



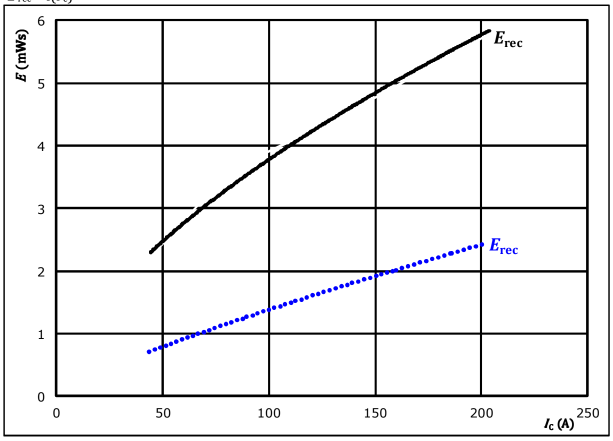
With an inductive load at

V_{CE} =	350	V	T_j: 25 °C	dotted line
V_{GE} =	±15	V	T_j: 125 °C	solid line
I_C =	121	A		

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



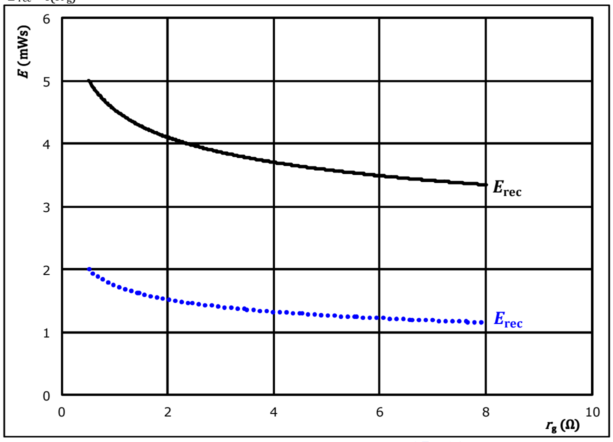
With an inductive load at

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

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

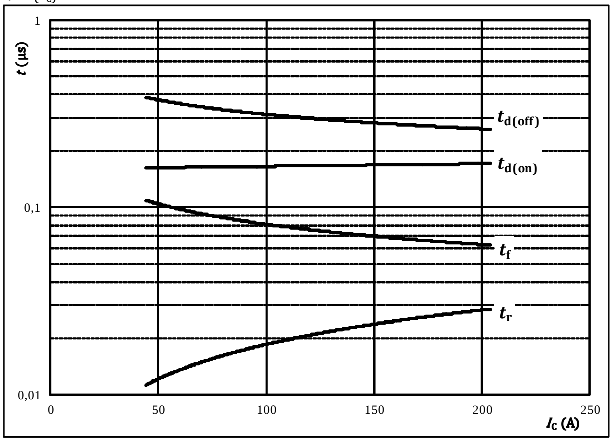
V_{CE} =	350	V	T_j: 25 °C	dotted line
V_{GE} =	±15	V	T_j: 125 °C	solid line
I_C =	121	A		

Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



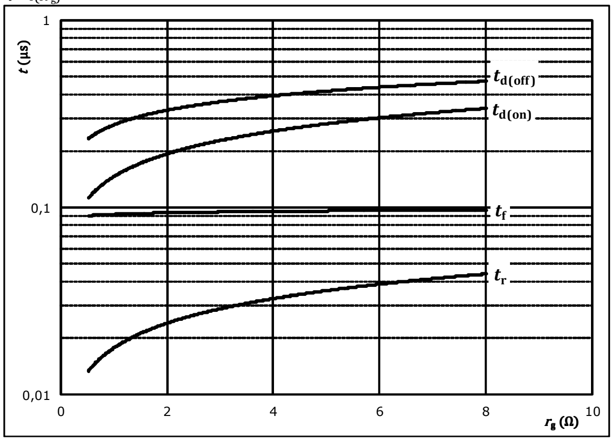
With an inductive load at

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

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



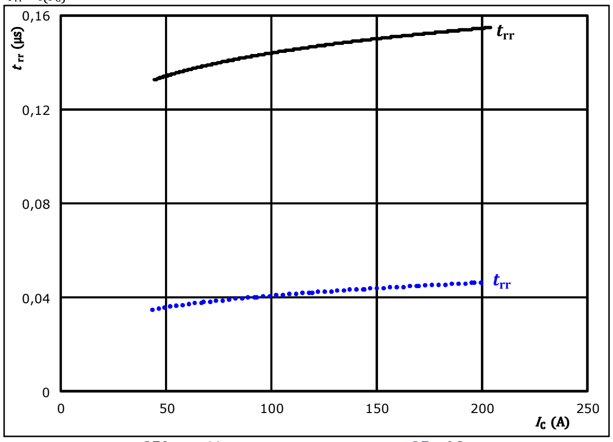
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	121	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

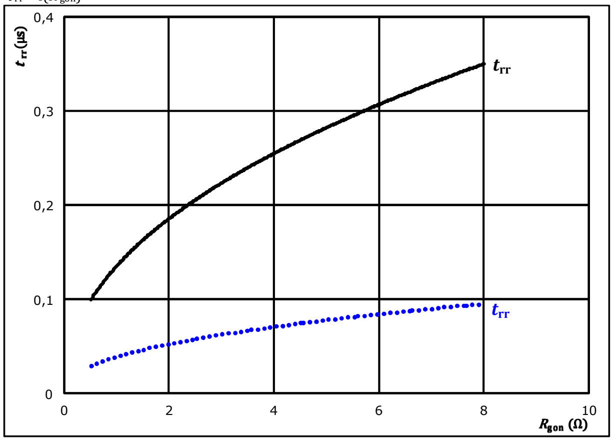


At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	2	Ω			

figure 8. FWD

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

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



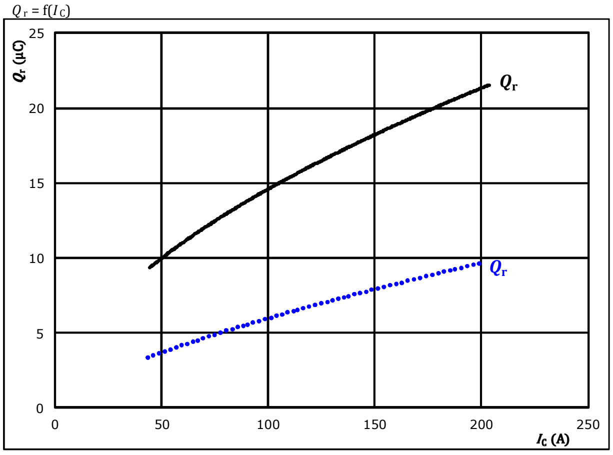
At					
V_{CE} =	350	V		25 °C	············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C =	121	A			

Boost Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

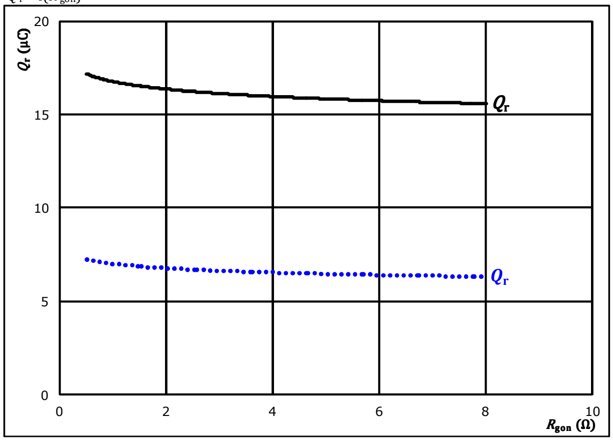


At V_{CE} = 350 V; V_{GE} = ±15 V; R_{gon} = 2 Ω; T_j: 25 °C (dotted), 125 °C (solid)

figure 10. FWD

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

$Q_r = f(R_{gon})$

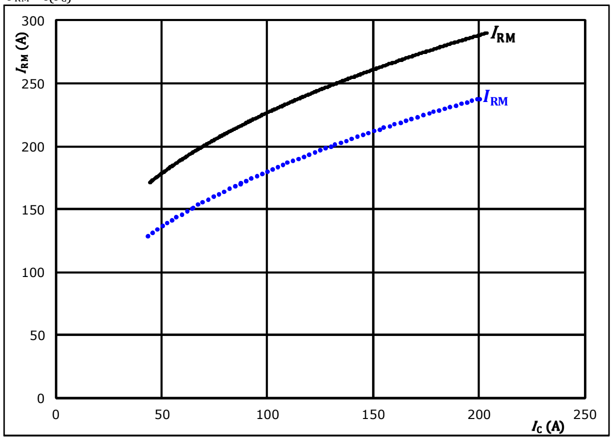


At V_{CE} = 350 V; V_{GE} = ±15 V; I_C = 121 A; T_j: 25 °C (dotted), 125 °C (solid)

figure 11. FWD

Typical peak reverse recovery current current as a function of collector current

$I_{RM} = f(I_C)$

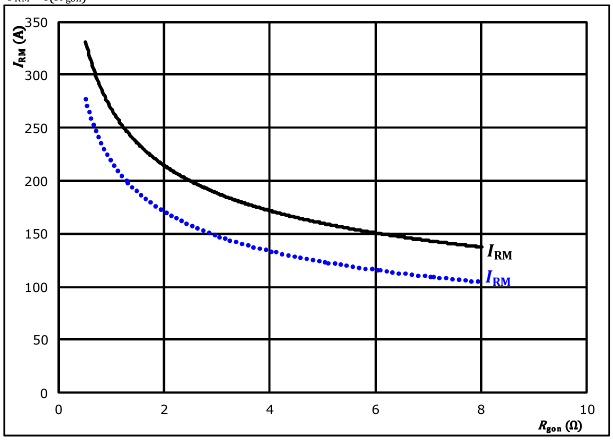


At V_{CE} = 350 V; V_{GE} = ±15 V; R_{gon} = 2 Ω; T_j: 25 °C (dotted), 125 °C (solid)

figure 12. FWD

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

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



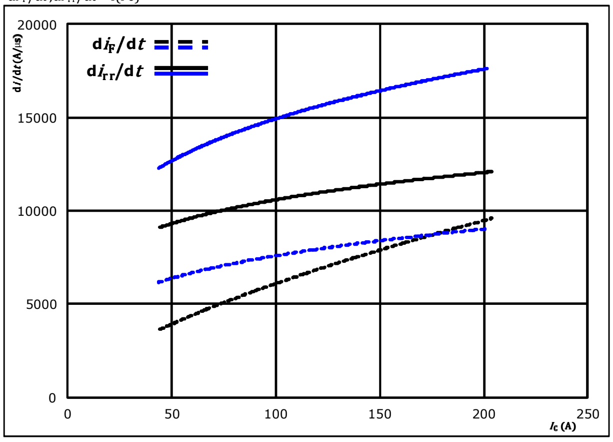
At V_{CE} = 350 V; V_{GE} = ±15 V; I_C = 121 A; T_j: 25 °C (dotted), 125 °C (solid)

Boost Switching Characteristics

figure 13. **FWD**

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

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

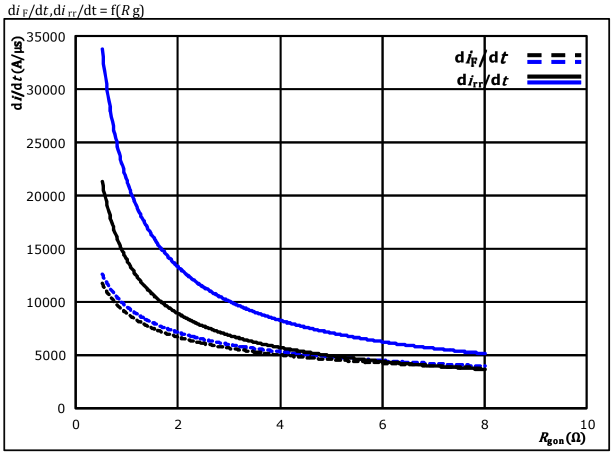


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	2	Ω			

figure 14. **FWD**

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

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

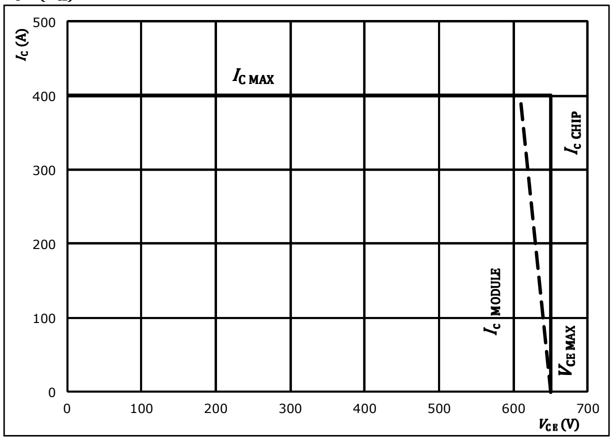


At					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	121	A			

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	2	Ω
R_{goff} =	2	Ω

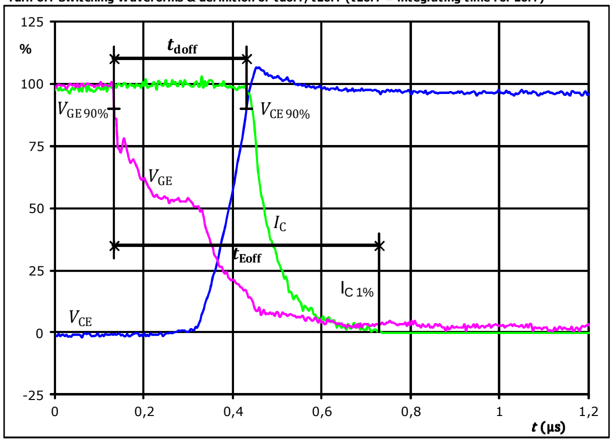
Boost Switching Characteristics

General conditions

T_j	=	125 °C
R_{gon}	=	2 Ω
R_{goff}	=	2 Ω

figure 1. IGBT

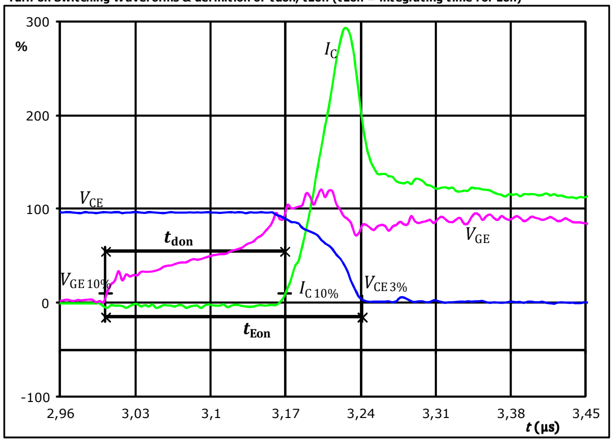
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_{doff} =	0,295	µs
t_{Eoff} =	0,596	µs

figure 2. IGBT

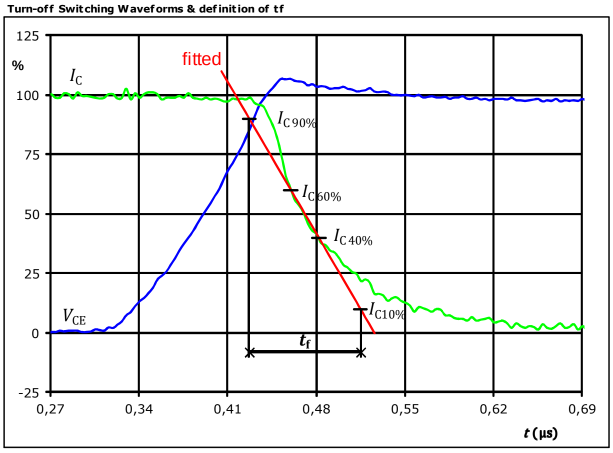
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_{don} =	0,166	µs
t_{Eon} =	0,239	µs

figure 3. IGBT

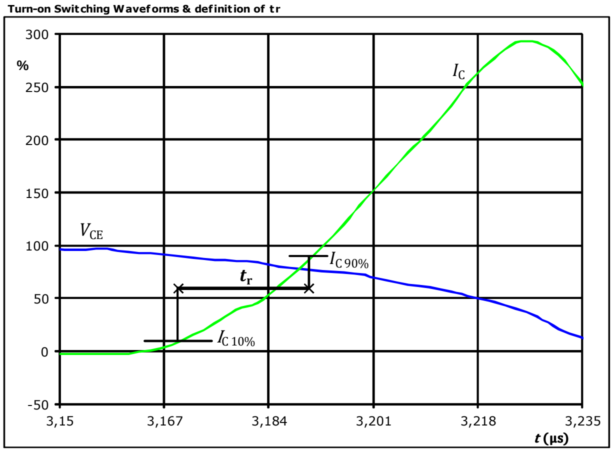
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_f =	0,088	µs

figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

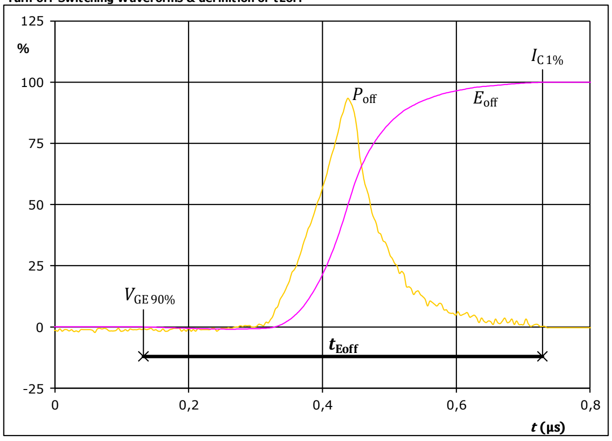


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	126	A
t_r =	0,022	µs

Boost Switching Characteristics

figure 5. **IGBT**

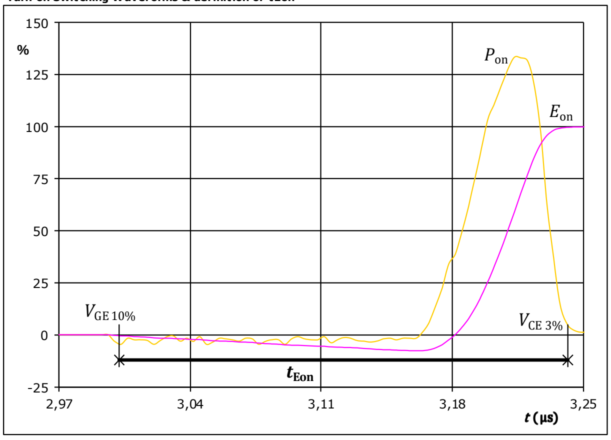
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	43,94	kW
E_{off} (100%) =	4,56	mJ
t_{Eoff} =	0,60	µs

figure 6. **IGBT**

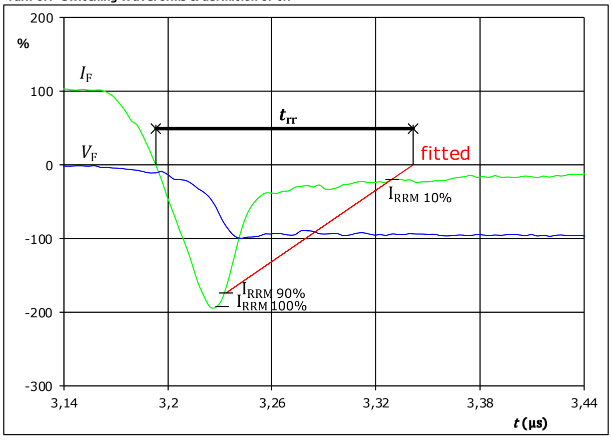
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	43,94	kW
E_{on} (100%) =	2,39	mJ
t_{Eon} =	0,24	µs

figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

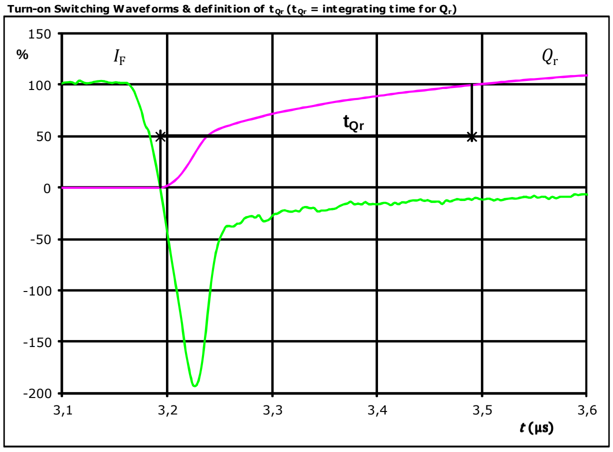


V_F (100%) =	350	V
I_F (100%) =	126	A
I_{RRM} (100%) =	-245	A
t_{rr} =	0,148	µs

Boost Switching Characteristics

figure 8. FWD

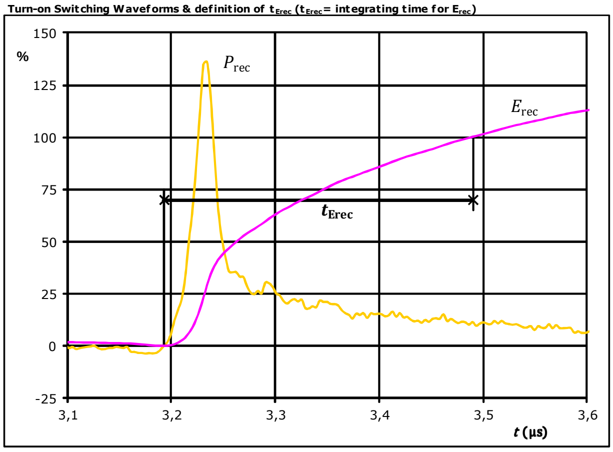
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	126	A
Q_r (100%) =	16,39	µC
t_{Qr} =	0,30	µs

figure 9. FWD

Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec} = integrating time for E_{rec})



P_{rec} (100%) =	43,94	kW
E_{rec} (100%) =	4,33	mJ
t_{Erec} =	0,30	µs

Ordering Code & Marking

Version	Ordering Code
without thermal paste	30-FT07NIB200SG02-L965F08
without thermal paste with press-fit pins	30-PT07NIB200SG02-L965F08Y
with thermal paste	30-FT07NIB200SG02-L965F08-/3/
with thermal paste with press-fit pins	30-PT07NIB200SG02-L965F08Y-/3/

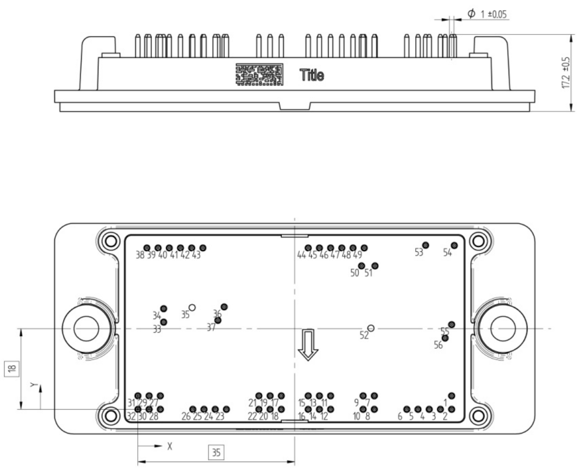
Text	Name	Date code	UL & VIN	Lot	Serial
	N-NNNNNNNNNNNNNN-TTTTTTV	WWYY	UL VIN	LLLLL	SSSS
Datamatrix	Type&Ver	Lot number	Serial	Date code	
	TTTTTTTVV	LLLLL	SSSS	WWYY	

Outline

Pin table [mm]			
Pin	X	Y	Function
1	70	3	DC+2
2	70	0	DC+2
3	67,5	0	DC+2
4	65	0	DC+2
5	62,5	0	DC+2
6	60	0	DC+2
7	52,75	3	GND2
8	52,75	0	GND2
9	50,25	3	GND2
10	50,25	0	GND2
11	43	3	DC-2
12	43	0	DC-2
13	40,5	3	DC-2
14	40,5	0	DC-2
15	38	3	DC-2
16	38	0	DC-2
17	32	3	DC-1
18	32	0	DC-1
19	29,5	3	DC-1
20	29,5	0	DC-1
21	27	3	DC-1
22	27	0	DC-1
23	19,75	0	GND1
24	17,25	0	GND1
25	14,75	0	GND1
26	12,25	0	GND1
27	5	3	DC+1
28	5	0	DC+1
29	2,5	3	DC+1
30	2,5	0	DC+1
31	0	3	DC+1
32	0	0	DC+1
33	5,75	19,45	G14
34	5,75	22,45	S14
35	Not assembled		
36	19,25	22,85	G12
37	17,85	19,85	S12
38	2	36	Ph1
39	4,5	36	Ph1
40	7	36	Ph1
41	9,5	36	Ph1
42	12	36	Ph1
43	14,5	36	Ph1
44	38	36	Ph2
45	40,5	36	Ph2
46	43	36	Ph2
47	45,5	36	Ph2
48	48	36	Ph2
49	50,5	36	Ph2
50	49,9	32	G13
51	52,9	32	S13

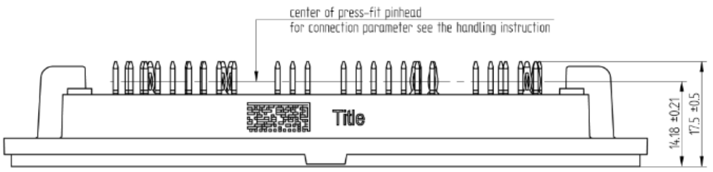
Pin table [mm]			
Pin	X	Y	Function
52	Not assembled		
53	64,2	36,6	Therm1
54	70,6	36,55	Therm2
55	70	18,9	S11
56	68,55	15,9	G11

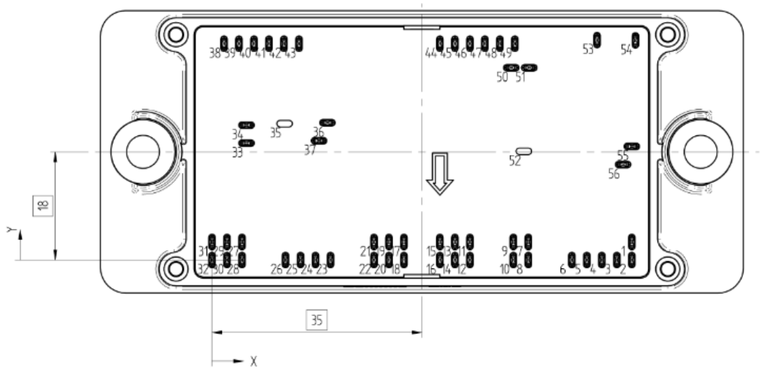
solder pins



Tolerance of pinpositions ±0,5mm at the end of pins
Dimension of coordinate axis is only offset without tolerance

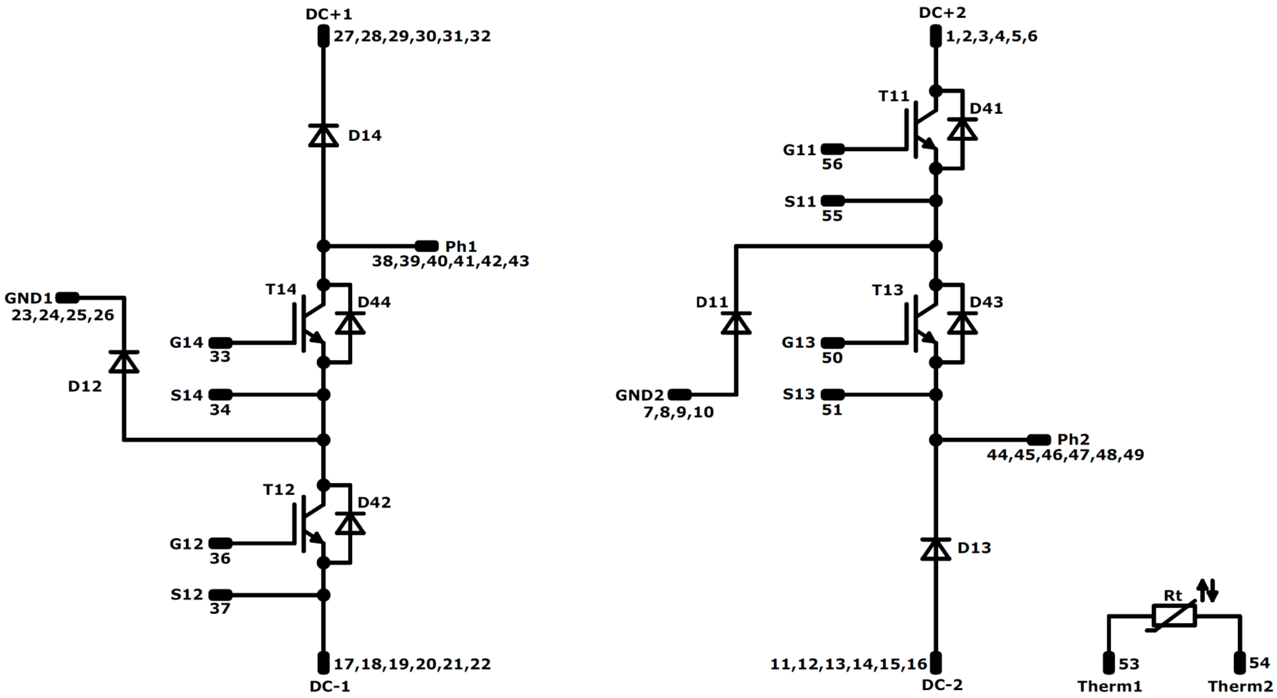
press-fit pins





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	650 V	200 A	Buck Switch	
T13 , T14	IGBT	650 V	180 A	Boost Switch	
D11 , D12	FWD	650 V	200 A	Buck Diode	
D13 , D14	FWD	1200 V	150 A	Boost Diode	
D41,D42,D43,D44	FWD	650 V	30 A	Sw. Protection Diode	
Rt	Thermistor			Thermistor	

30-FT07NIB200SG02-L965F08
30-PT07NIB200SG02-L965F08Y
datasheet

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.

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-xT07NIB200SG02-L965F08x-D1-14	04 Apr. 2017		