Vincotech

30-FT07NIB200S502-LE04F58 / 30-PT07NIB200S502-LE04F58Y
datasheet

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

Features

- Enhanced efficiency
- Enables high switching frequencies
- Low inductive package
- Allows four quadrant operation

flow 2 13 mm housing

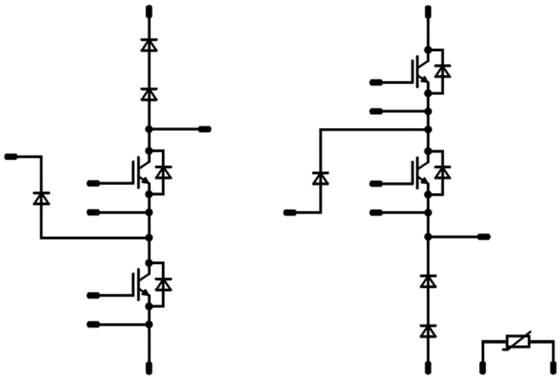
Solder pin

Press-fit pin

Target applications

- UPS

Schematic



Types

- 30-FT07NIB200S502-LE04F58
- 30-PT07NIB200S502-LE04F58Y

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	165	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	236	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum junction temperature	T_{jmax}			175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	149	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	186	W
Maximum junction temperature	T_{jmax}			175	°C
Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_s = 80 °C	165	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	236	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
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	T_s = 80 °C	144	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	T_s = 80 °C	374	W
Maximum junction temperature	T_{jmax}			175	°C
Buck Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			30	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
Boost Sw. Protection Diode					
Peak repetitive reverse voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F			30	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

Module Properties

Thermal Properties

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

Isolation Properties

Parameter	Symbol	Condition		Value	Unit
Isolation voltage	V_{isol}	DC Test Voltage*	t_p = 2 s	4000	V
		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	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
Buck Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,002	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,39 1,48 1,51	1,75	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		12400		pF
Output capacitance	C_{oes}							352		
Reverse transfer capacitance	C_{res}							48		
Gate charge	Q_g		15	520	200	25		480		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,40		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5 / 15	350	120	25 125 150		50 51 51		ns
Rise time	t_r					25 125 150		8 9 9		
Turn-off delay time	$t_{d(off)}$					25 125 150		155 182 189		
Fall time	t_f					25 125 150		9 14 17		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,4 µC Q_{rFWD} = 8,8 µC Q_{rFWD} = 10,1 µC				25 125 150		1,420 2,133 2,218		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,145 1,946 2,163		

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		1,50 1,44 1,42	1,92	V
Reverse leakage current	I_R			650		25			10,6	μA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,51		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 13388 A/μs di/dt = 12775 A/μs di/dt = 14167 A/μs	-5 / 15	350	120	25 125 150		175 235 251		A
Reverse recovery time	t_{rr}					25 125 150		45 65 72		ns
Recovered charge	Q_r					25 125 150		4,449 8,818 10,076		μC
Reverse recovered energy	E_{rec}					25 125 150		0,726 1,761 2,112		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		6361 4385 4770		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	
Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	$V_{GE} = V_{CE}$			0,002	25	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,39 1,48 1,51	1,75	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		12400		pF
Output capacitance	C_{oes}							352		
Reverse transfer capacitance	C_{res}							48		
Gate charge	Q_g		15	520	200	25		480		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,40		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 2 Ω R_{goff} = 2 Ω	-5 / 15	350	120	25 125 150		59 51 58		ns
Rise time	t_r					25 125 150		7 8 9		
Turn-off delay time	$t_{d(off)}$					25 125 150		155 183 189		
Fall time	t_f					25 125 150		9 15 19		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,8 µC Q_{rFWD} = 9,3 µC Q_{rFWD} = 10,9 µC				25 125 150		1,278 2,195 2,244		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,146 1,988 2,239		

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 Diode										
Static										
Forward voltage	V_F				200	25 125 150		3,36 3,14 3,04	3,84	V
Reverse leakage current	I_R			1300		25			10,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,25		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 14933 A/µs di/dt = 12780 A/µs di/dt = 13600 A/µs	-5 / 15	350	120	25 125 150		145 196 209		A
Reverse recovery time	t_{rr}					25 125 150		87 115 130		ns
Recovered charge	Q_r					25 125 150		4,849 9,346 10,901		µC
Reverse recovered energy	E_{rec}					25 125 150		1,045 2,206 2,598		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		12289 7167 6631		A/µs
Buck 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	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						1,61		K/W

Characteristic Values

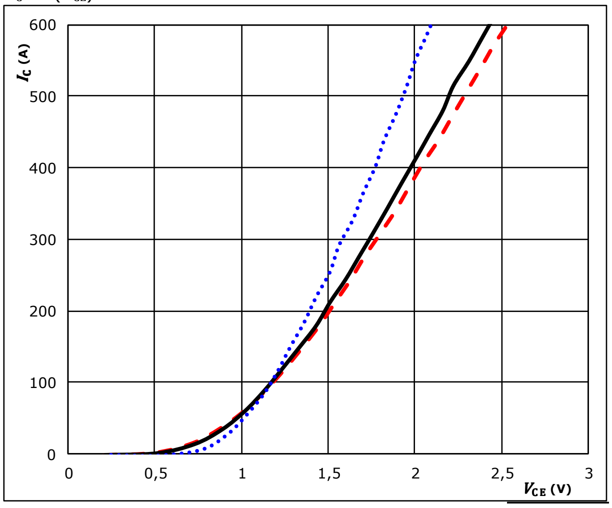
Parameter	Symbol	Conditions	V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	Unit
Boost Sw. Protection Diode										
Static										
Forward voltage	V_F				30	25 150		1,64 1,56	1,87	V
Reverse leakage current	I_R			650		25			0,36	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						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	

Buck Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

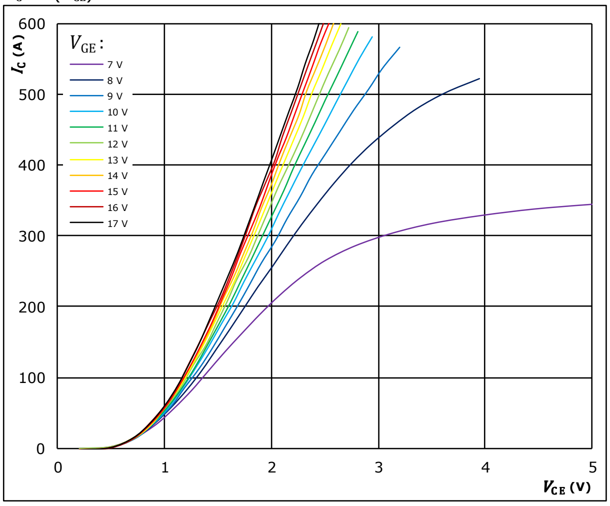


t_p =	250	µs		25 °C	dotted blue
V_{GE} =	15	V	T_j:	125 °C	solid black
				150 °C	dashed red

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

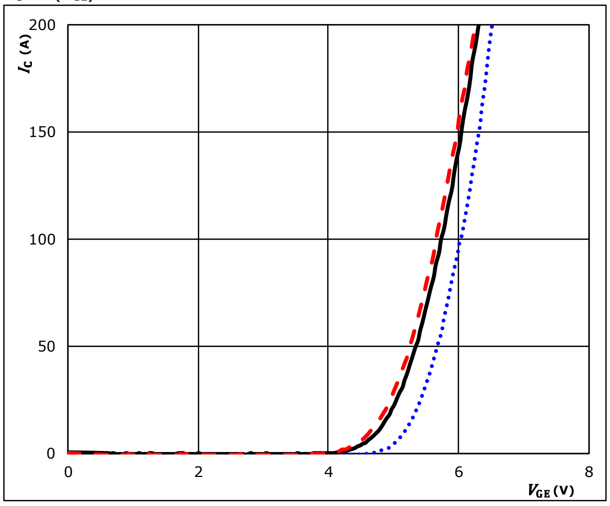


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

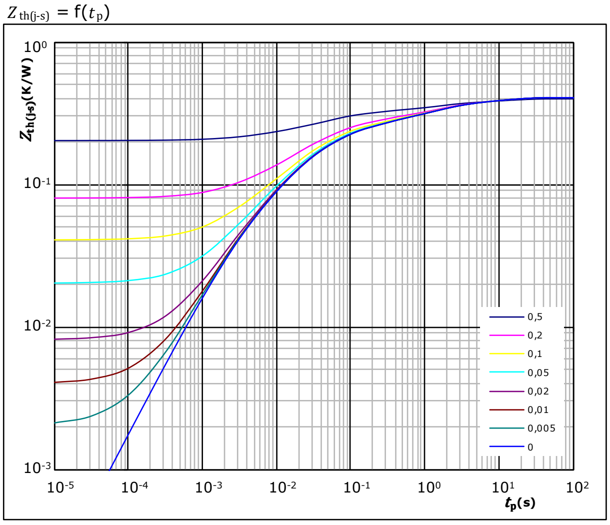


t_p =	100	µs		25 °C	dotted blue
V_{CE} =	10	V	T_j:	125 °C	solid black
				150 °C	dashed red

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 0,40 K/W

IGBT thermal model values

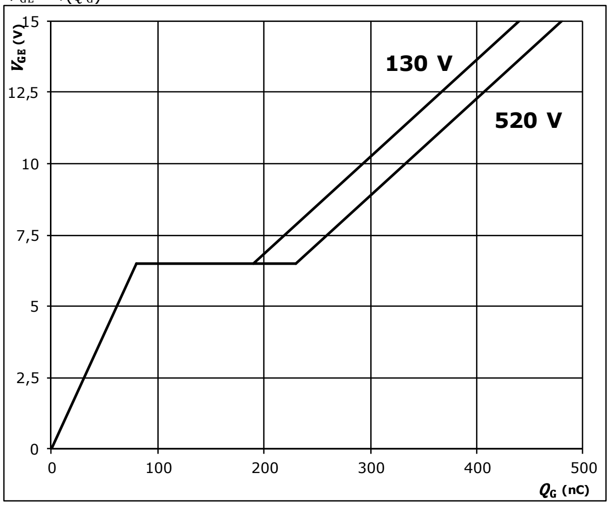
R (K/W)	τ (s)
5,60E-02	8,91E+00
9,21E-02	1,22E+00
7,03E-02	1,44E-01
1,40E-01	2,68E-02
3,76E-02	4,52E-03
6,37E-03	1,66E-03

Buck Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

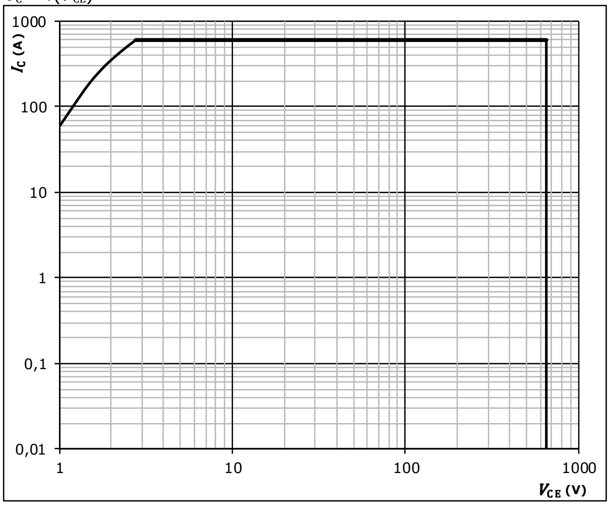


I_C = 200 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



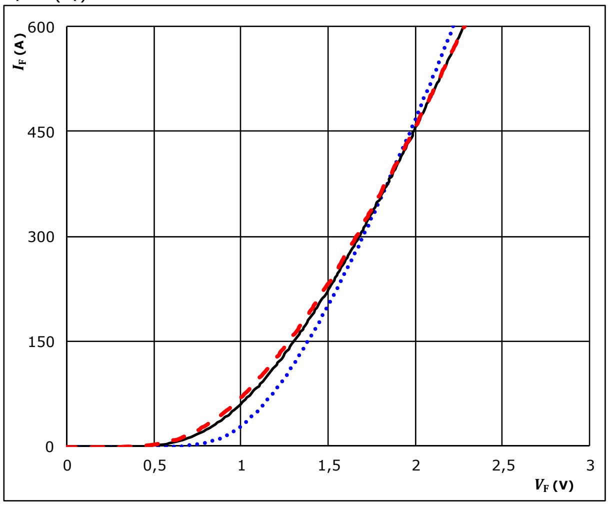
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



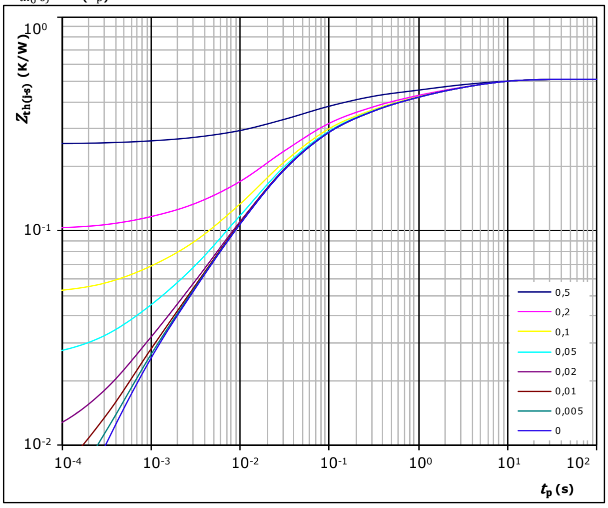
t_p = 250 µs

T_j: 25 °C; 125 °C; 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,51 K/W

FWD thermal model values

R (K/W)	τ (s)
8,05E-02	4,81E+00
1,12E-01	6,43E-01
1,62E-01	7,87E-02
1,15E-01	1,87E-02
2,73E-02	3,44E-03
1,29E-02	6,21E-04

Vincotech

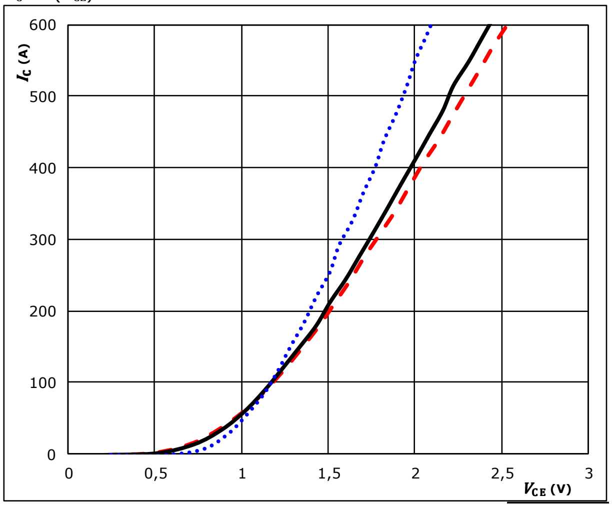
30-FT07NIB200S502-LE04F58 / 30-PT07NIB200S502-LE04F58Y
datasheet

Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

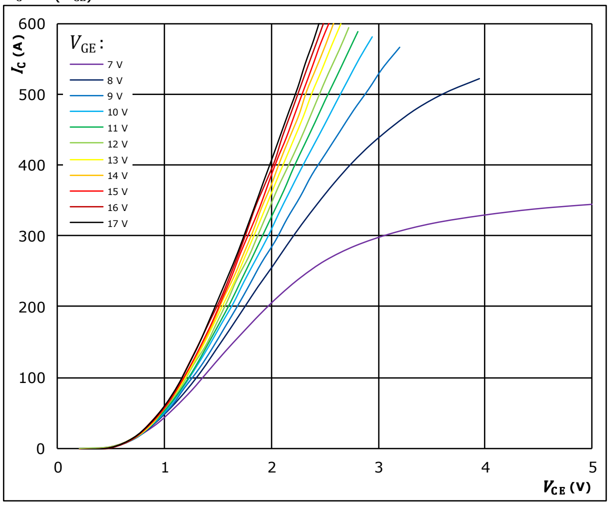


t_p =	250	µs		25 °C	···········
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

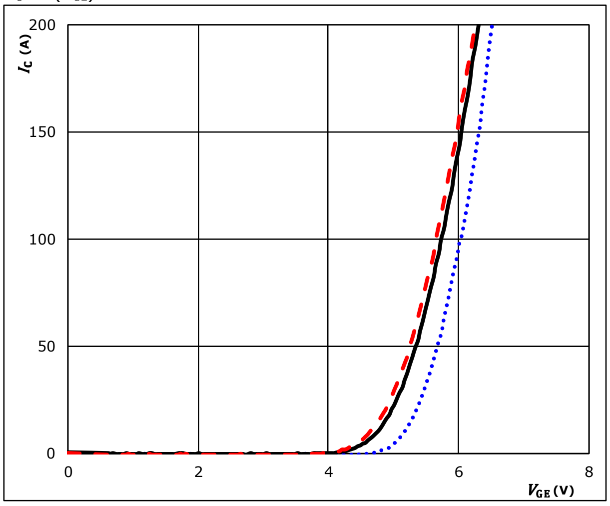


t_p =	250 µs
T_j =	150 °C
V_{GE} from	7 V to 17 V in steps of 1 V

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

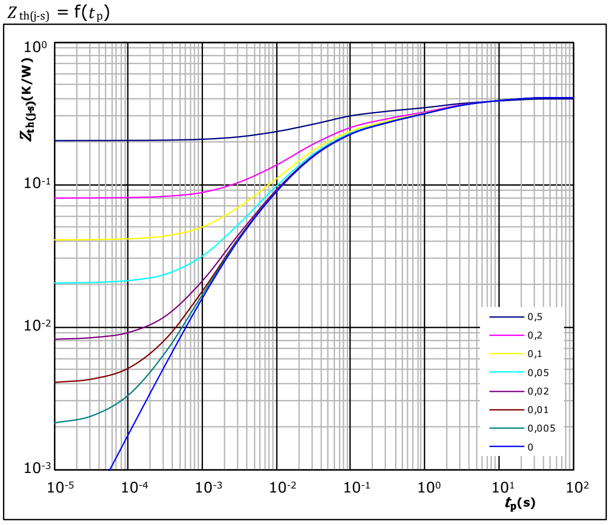


t_p =	100	µs		25 °C	···········
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,40 K/W

IGBT thermal model values

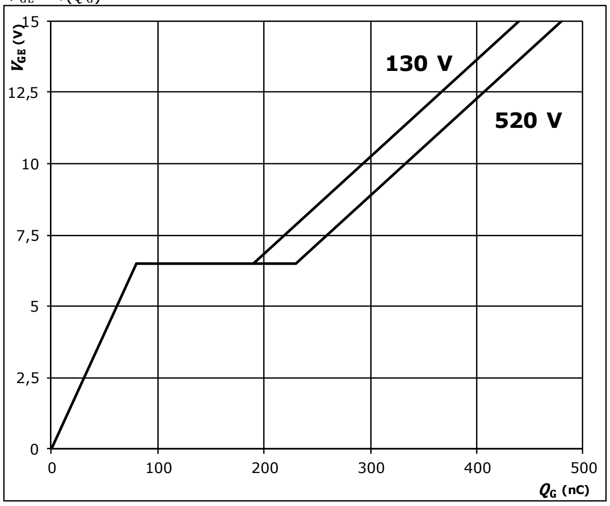
R (K/W)	τ (s)
5,60E-02	8,91E+00
9,21E-02	1,22E+00
7,03E-02	1,44E-01
1,40E-01	2,68E-02
3,76E-02	4,52E-03
6,37E-03	1,66E-03

Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

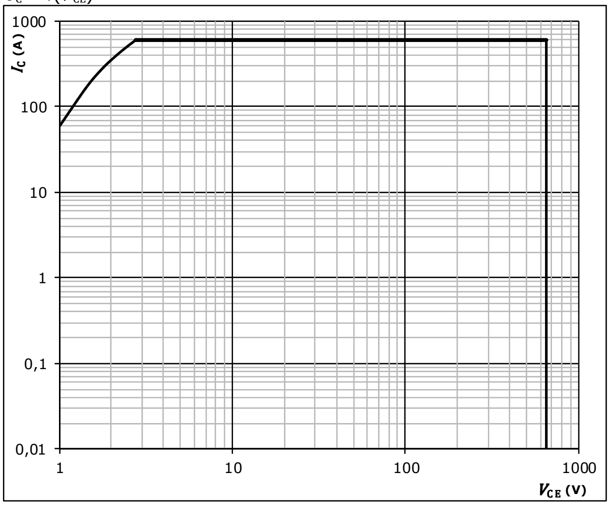


I_C = 200 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



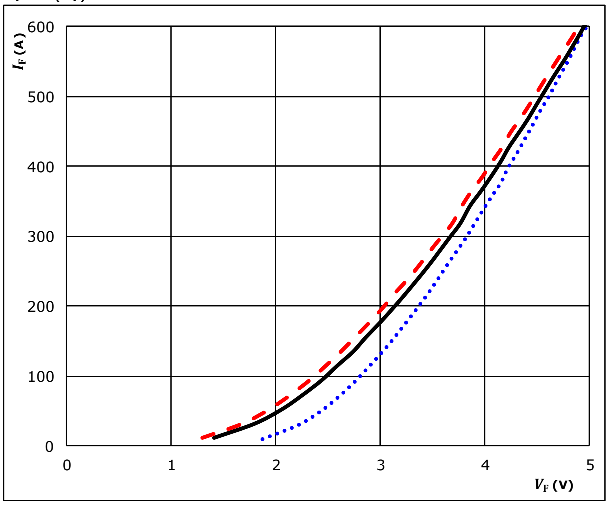
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



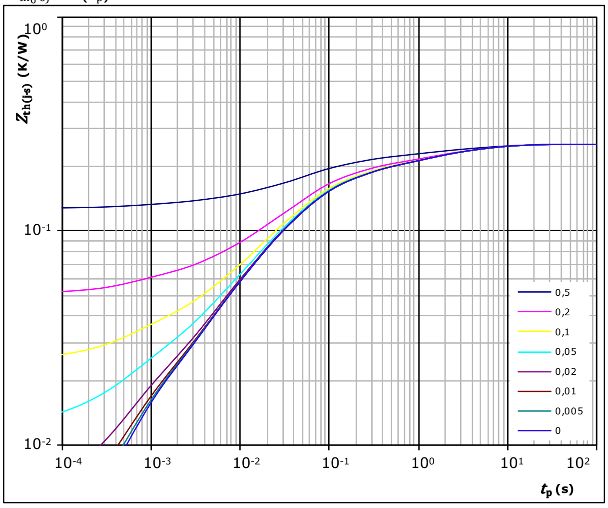
t_p = 250 µs

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

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,25 K/W

FWD thermal model values

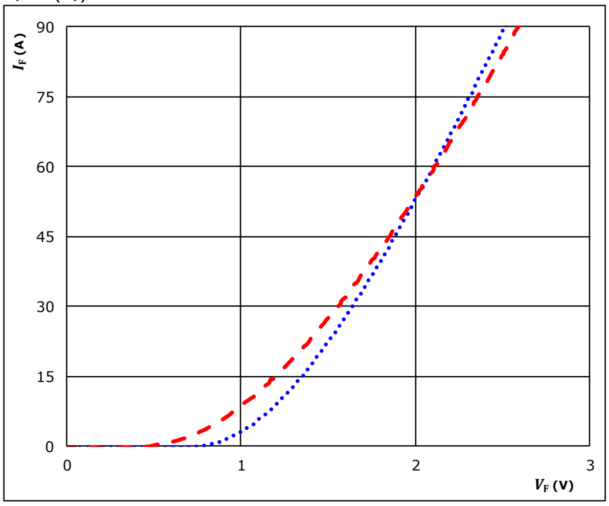
R (K/W)	τ (s)
2,72E-02	5,98E+00
3,88E-02	1,28E+00
5,65E-02	1,68E-01
9,22E-02	3,81E-02
2,73E-02	6,72E-03
1,17E-02	6,64E-04

Buck Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



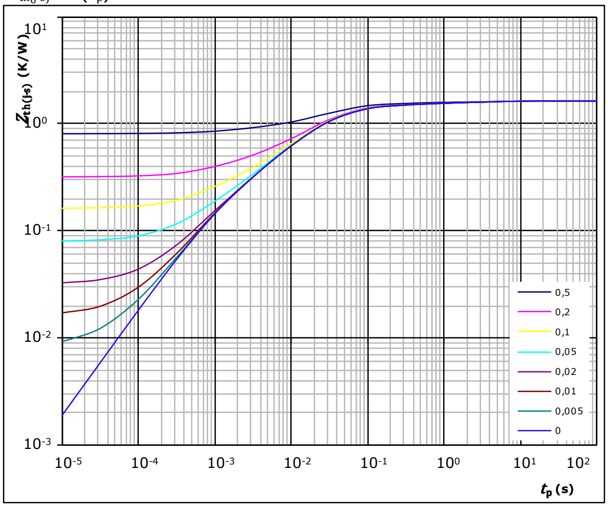
t_p = 250 µs

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

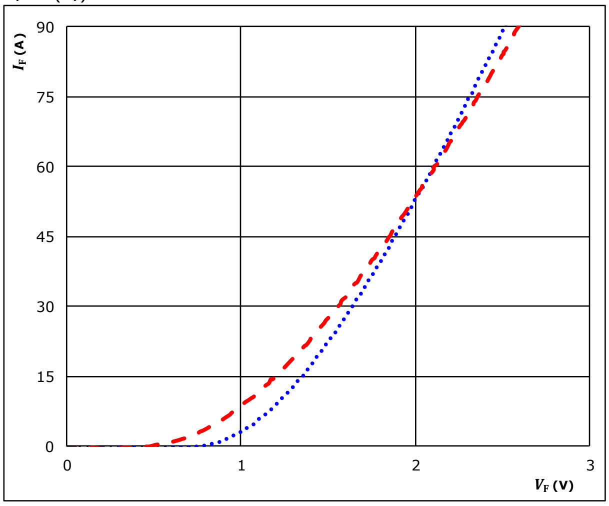
R (K/W)	τ (s)
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03

Boost Sw. Protection Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



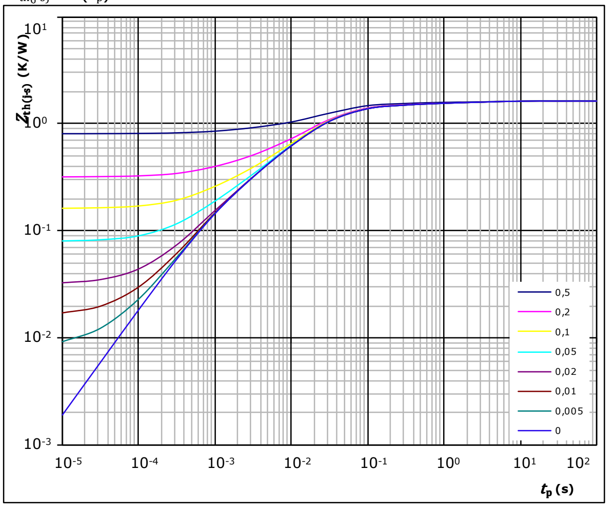
t_p = 250 μs

T_j: 25 °C / 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

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

FWD thermal model values

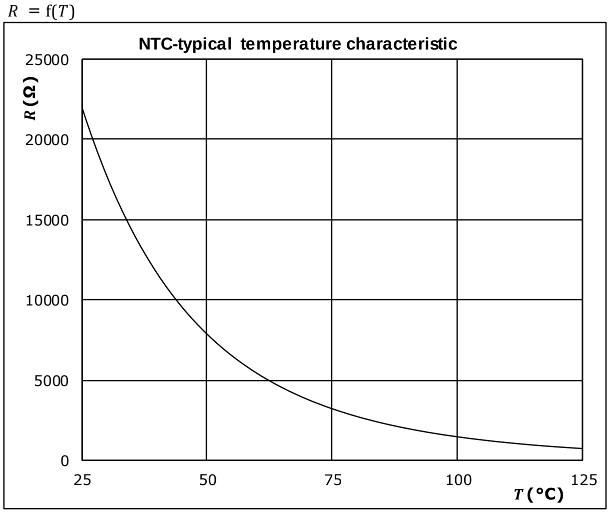
R (K/W)	τ (s)
1,05E-01	3,05E+00
1,86E-01	2,04E-01
8,60E-01	3,00E-02
3,40E-01	8,15E-03
1,24E-01	1,07E-03

Thermistor Characteristics

figure 1. **Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

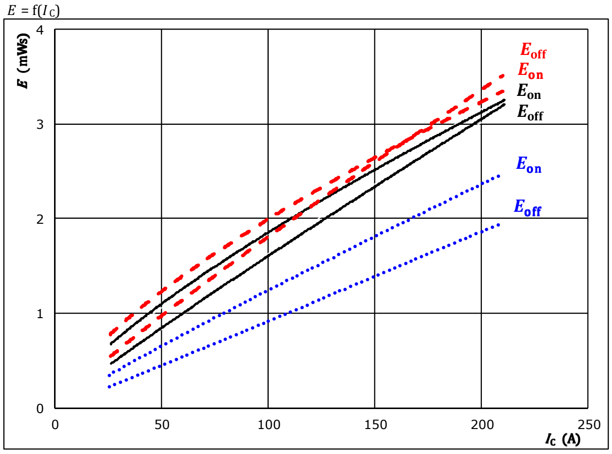


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$

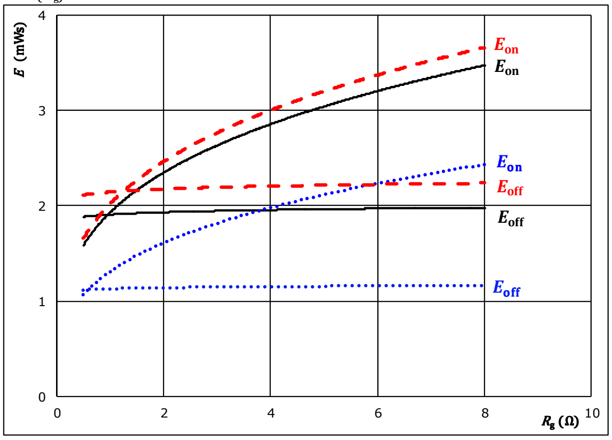


With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
R_{gon} =	2	Ω		150 °C	dashed
R_{goff} =	2	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$

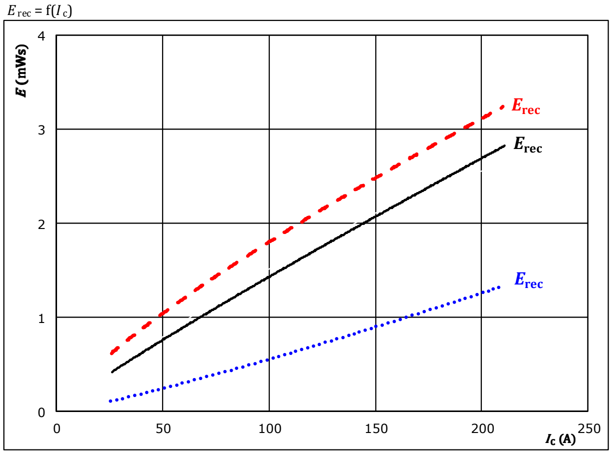


With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C =	120	A		150 °C	dashed

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$

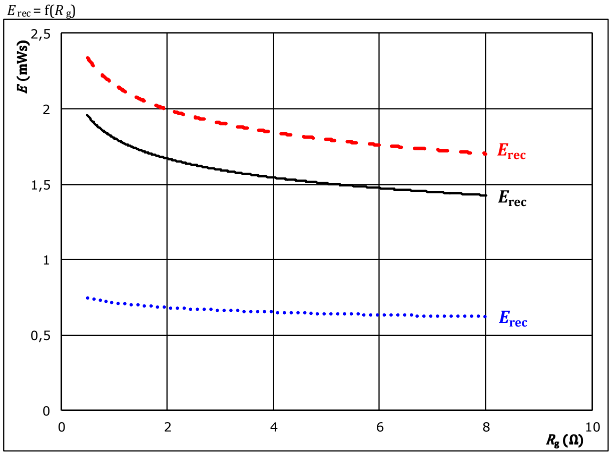


With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
R_{gon} =	2	Ω		150 °C	dashed

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



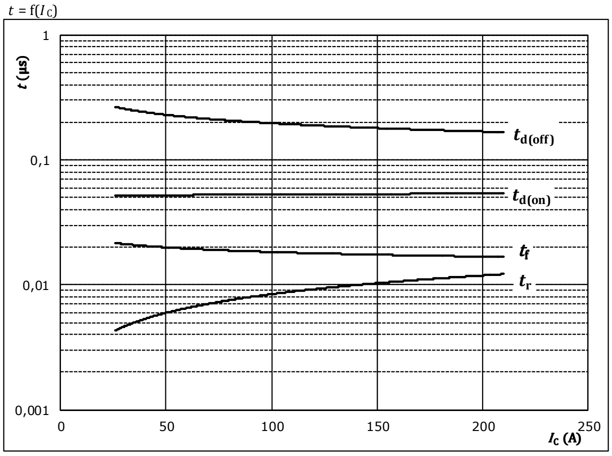
With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C =	120	A		150 °C	dashed

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



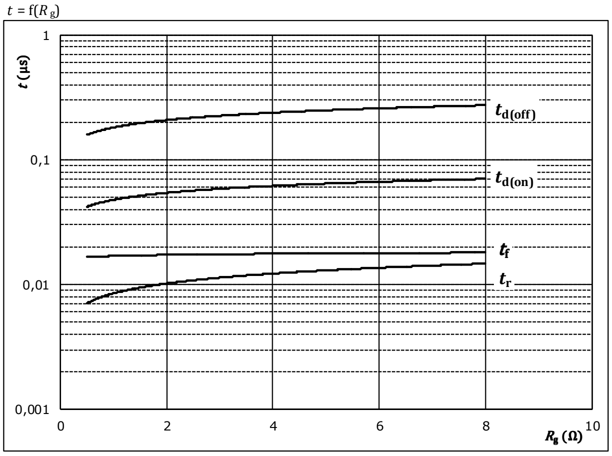
With an inductive load at

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

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



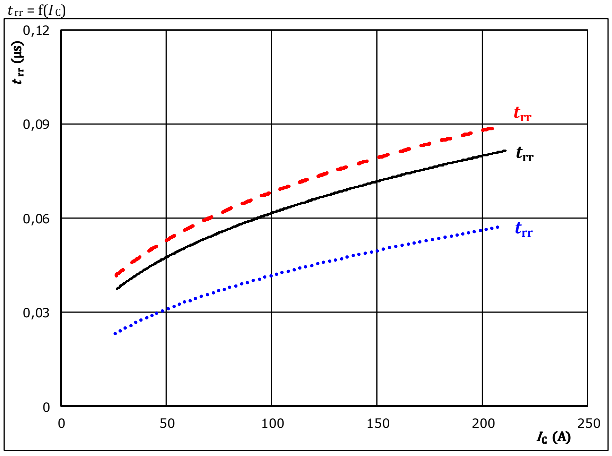
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
I_C =	120	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



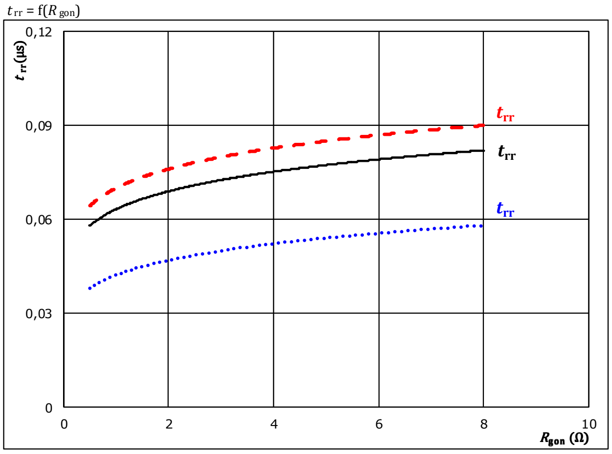
With an inductive load at

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

figure 8. **FWD**

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

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



With an inductive load at

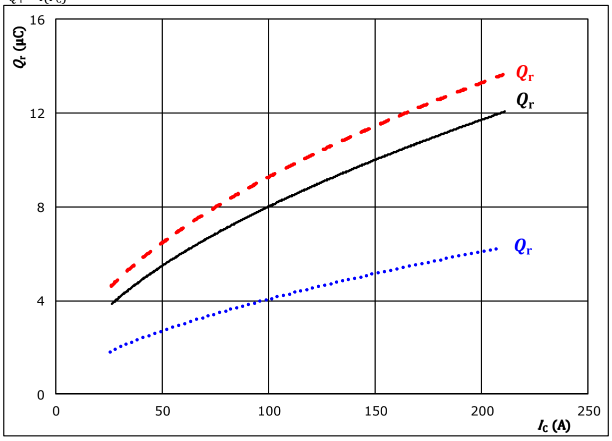
V_{CE}=	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C =	120	A		150 °C	dashed

Buck Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



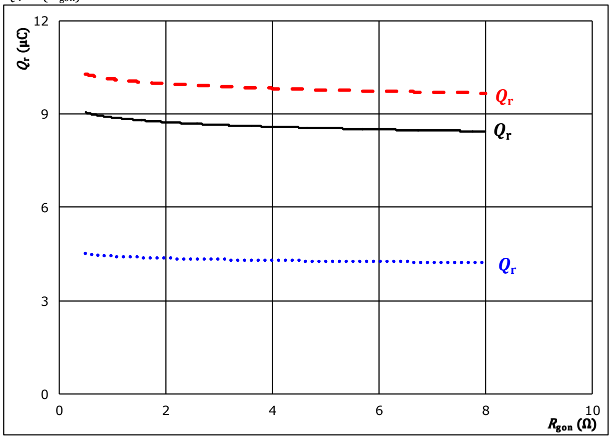
With an inductive load at

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

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



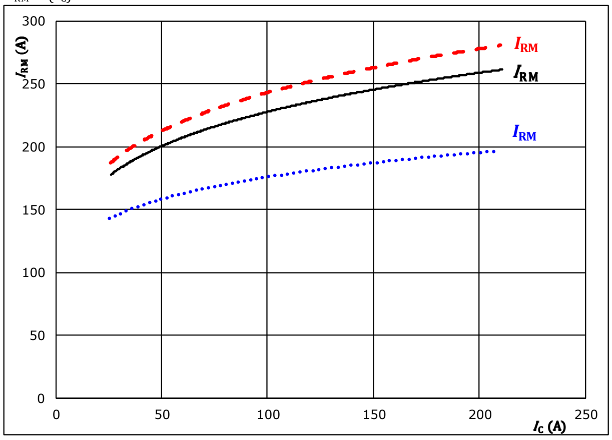
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	———
I_C=	120	A		150 °C	– – –

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



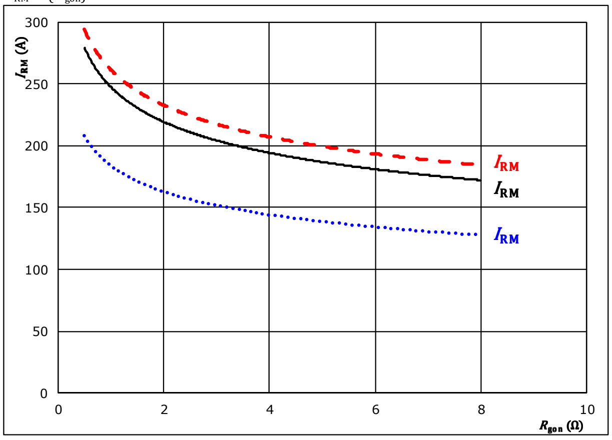
With an inductive load at

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

figure 12. **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

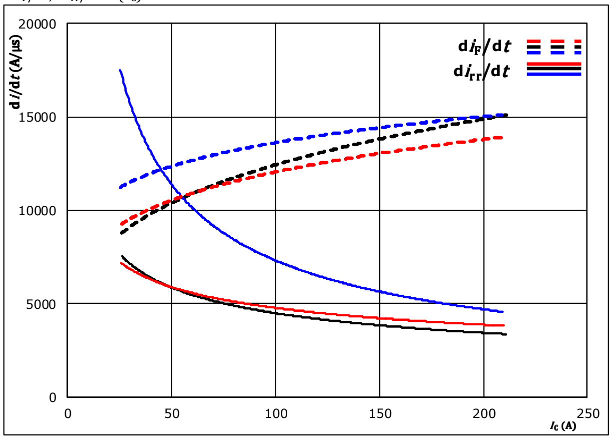
V_{CE} =	350	V	T_j:	25 °C	···········
V_{GE} =	-5 / 15	V		125 °C	———
I_C =	120	A		150 °C	– – –

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)



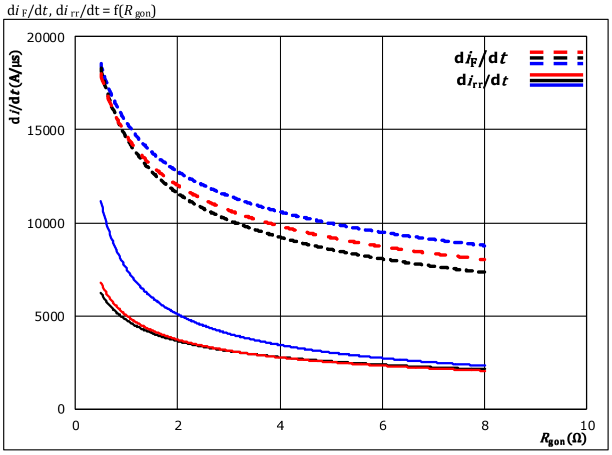
With an inductive load at

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

figure 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_{gon})



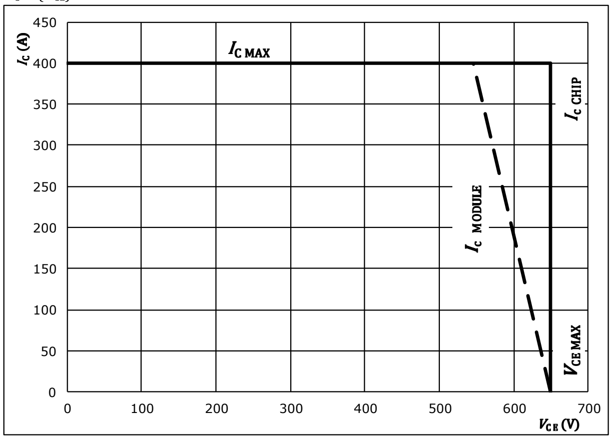
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C=	120	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

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

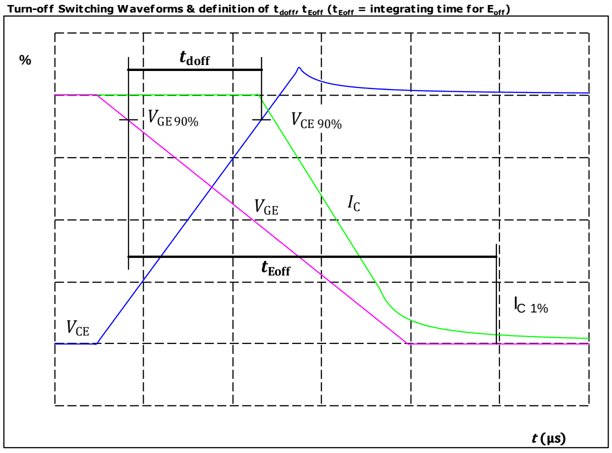
Buck Switching Definitions

General conditions

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

figure 1. **IGBT**

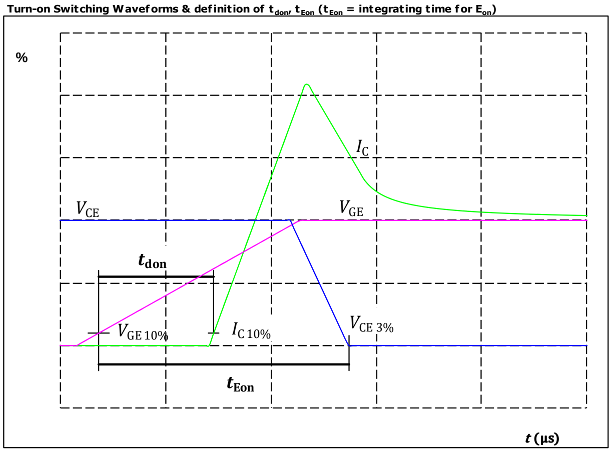
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{doff} =	182	ns

figure 2. **IGBT**

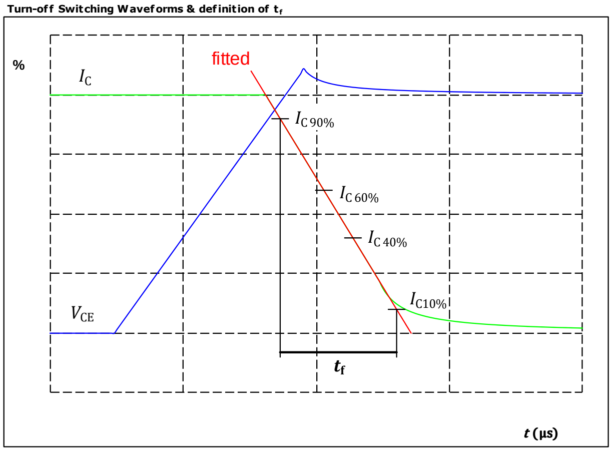
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{don} =	51	ns

figure 3. **IGBT**

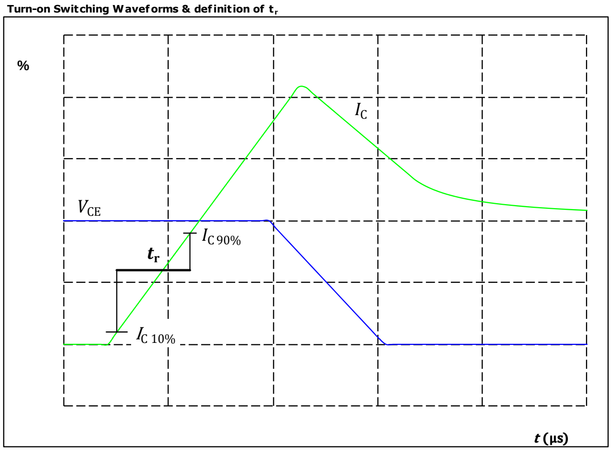
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_f =	14	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

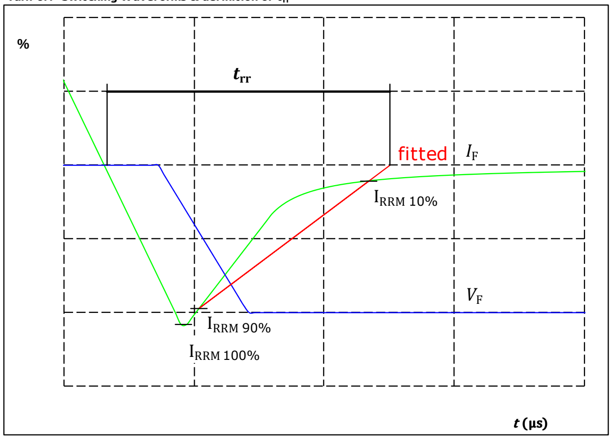


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_r =	9	ns

Buck Switching Characteristics

figure 5. FWD

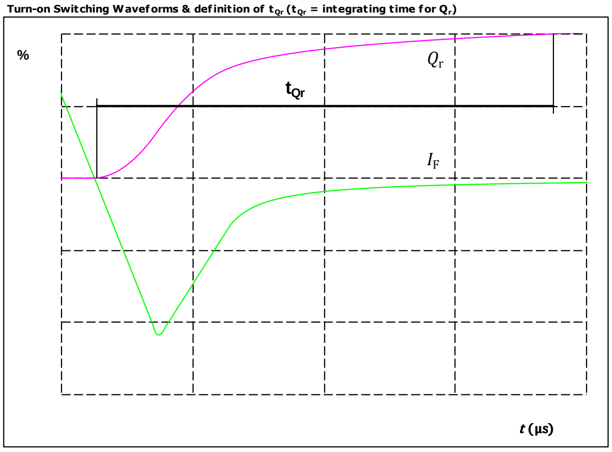
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	120	A
I_{RRM} (100%) =	235	A
t_{rr} =	65	ns

figure 6. FWD

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



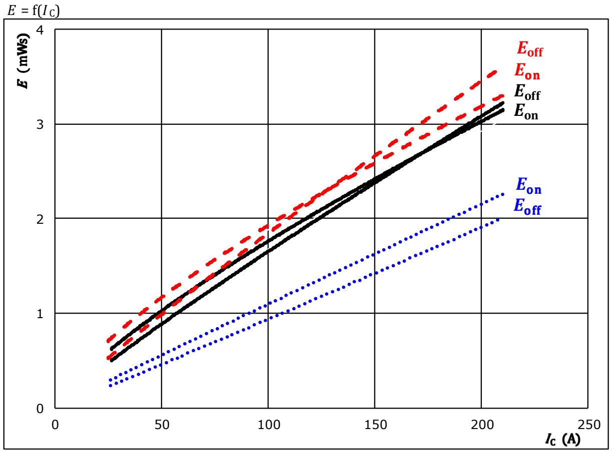
I_F (100%) =	120	A
Q_r (100%) =	0	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



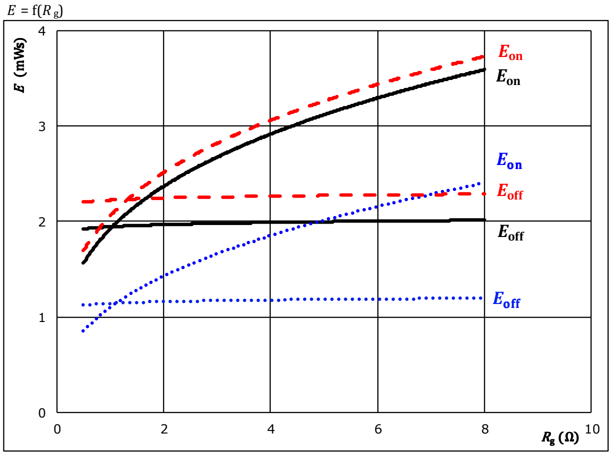
With an inductive load at

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

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



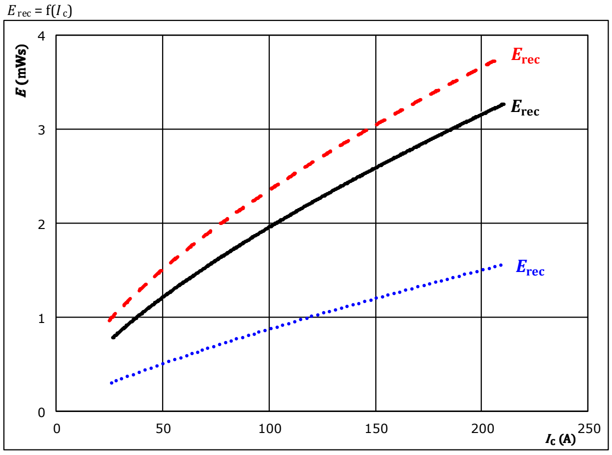
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C =	120	A		150 °C	dashed

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



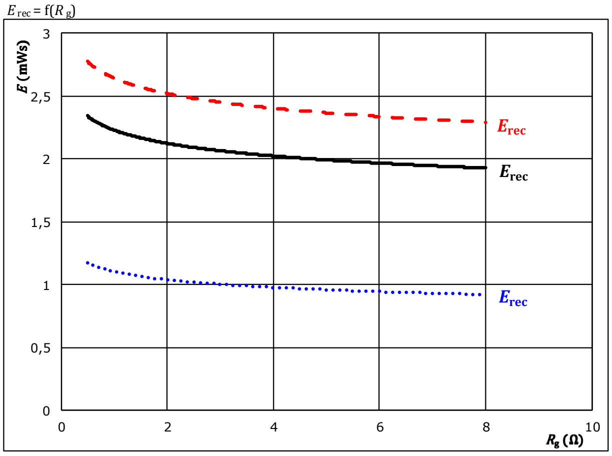
With an inductive load at

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

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

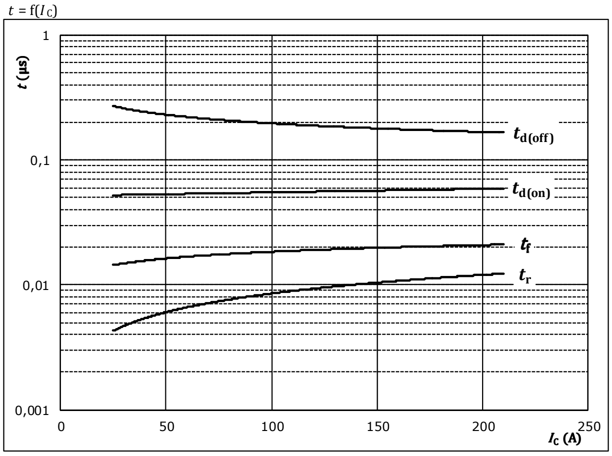
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C =	120	A		150 °C	dashed

Boost Switching Characteristics

figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



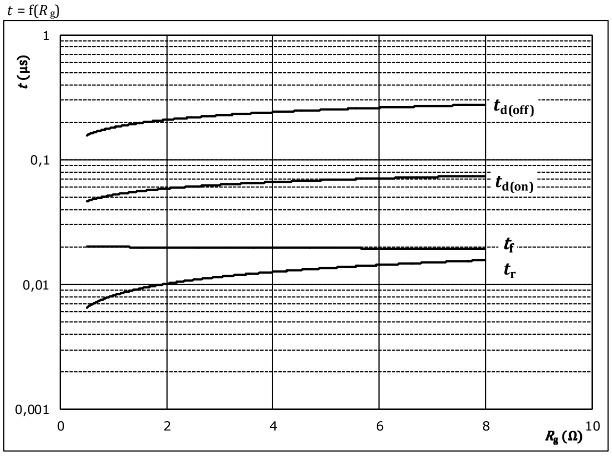
With an inductive load at

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

figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_g)$



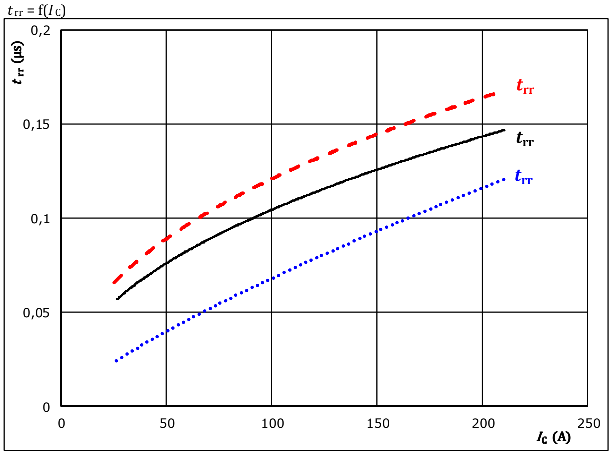
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
I_C =	120	A

figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



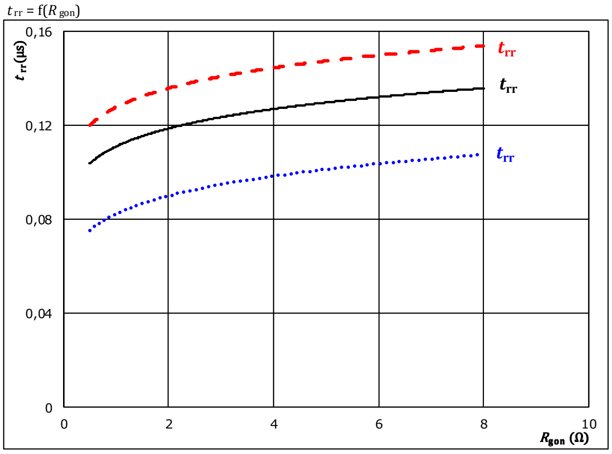
With an inductive load at

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

figure 8. 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	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C =	120	A		150 °C	dashed

30-FT07NIB200S502-LE04F58 / 30-PT07NIB200S502-LE04F58Y

datasheet

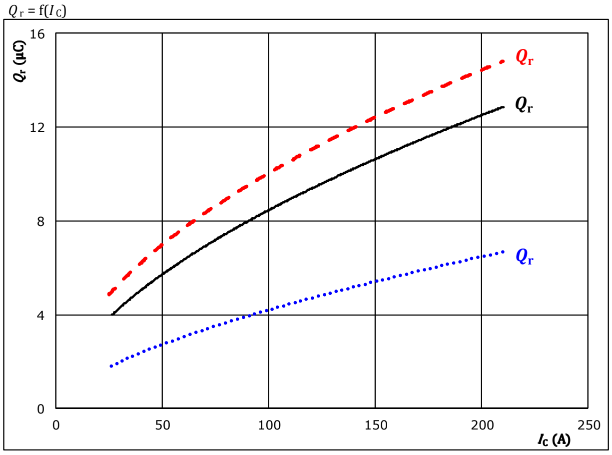
Vincotech

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



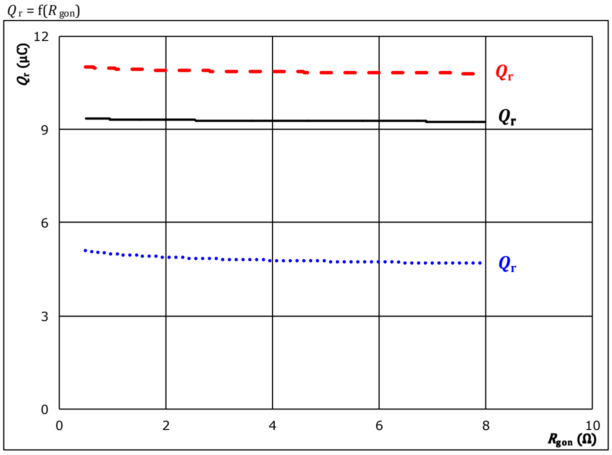
With an inductive load at

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

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



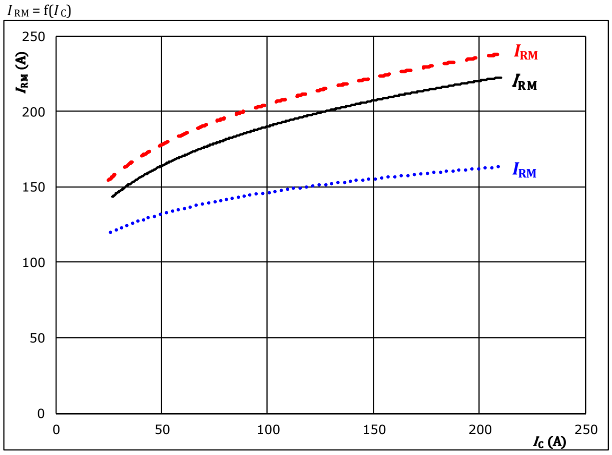
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C=	120	A		150 °C	dashed

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



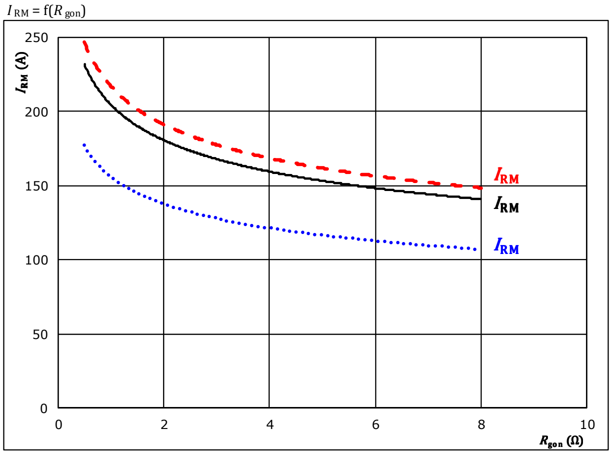
With an inductive load at

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

figure 12. **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

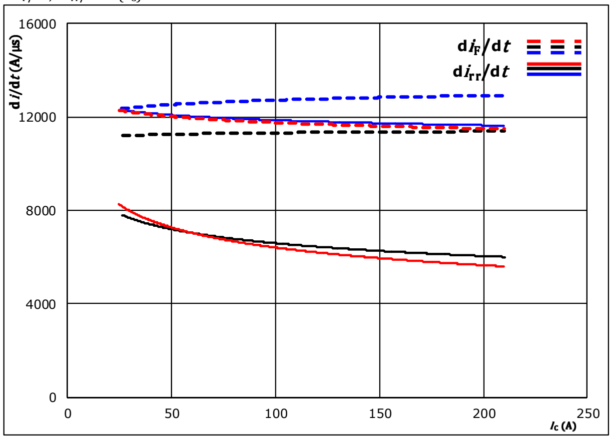
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	-5 / 15	V		125 °C	solid
I_C =	120	A		150 °C	dashed

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



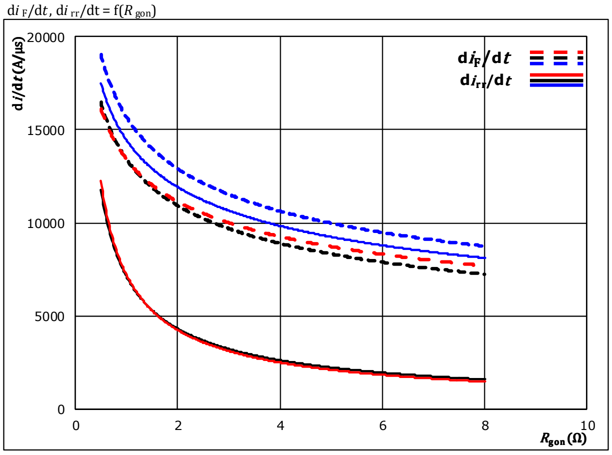
With an inductive load at

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

figure 14. **FWD**

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

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



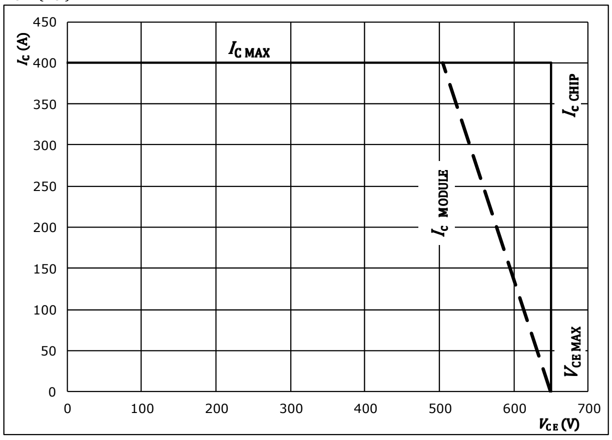
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	120	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At

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

Vincotech

30-FT07NIB200S502-LE04F58 / 30-PT07NIB200S502-LE04F58Y
datasheet

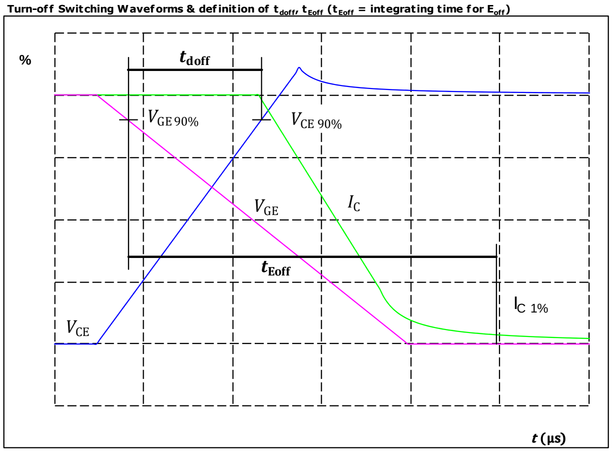
Boost Switching Characteristics

General conditions

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

figure 1. IGBT

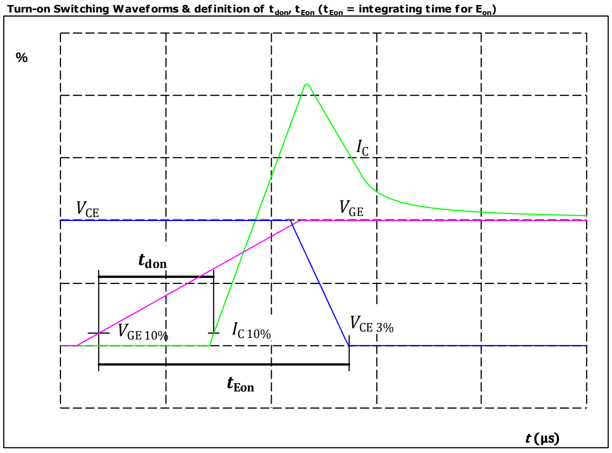
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{doff} =	183	ns

figure 2. IGBT

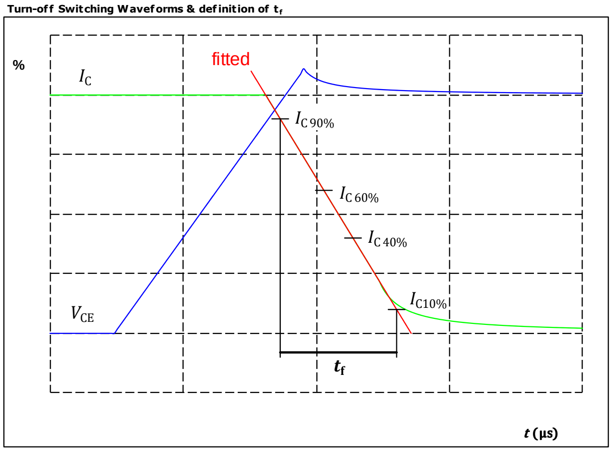
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{don} =	51	ns

figure 3. IGBT

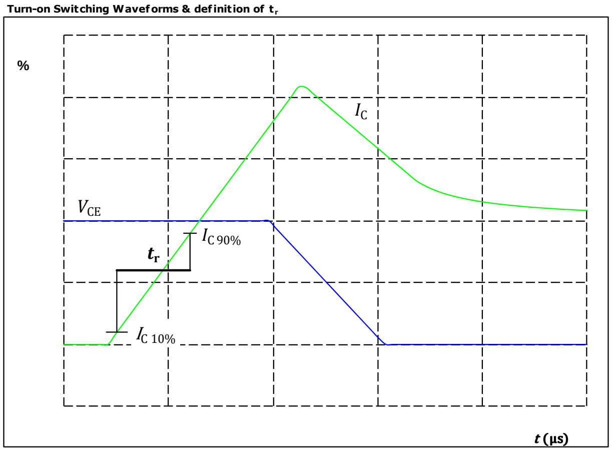
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_f =	15	ns

figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

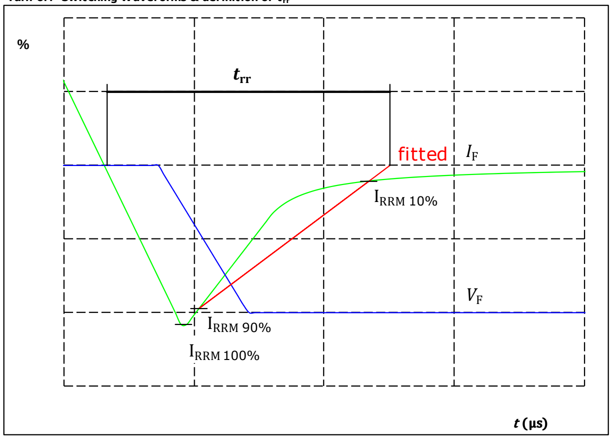


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_r =	8	ns

Boost Switching Characteristics

figure 5. **FWD**

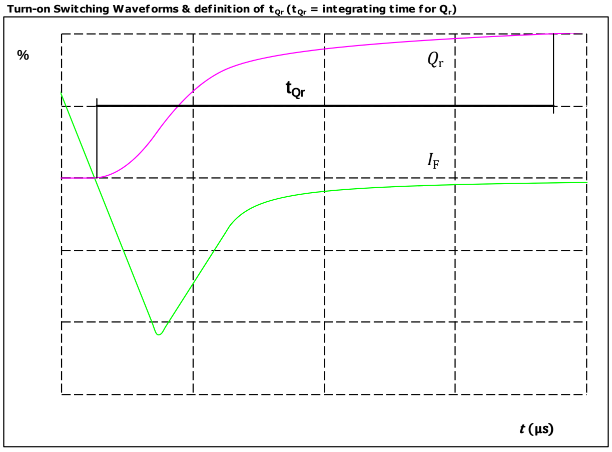
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	120	A
I_{RRM} (100%) =	196	A
t_{rr} =	115	ns

figure 6. **FWD**

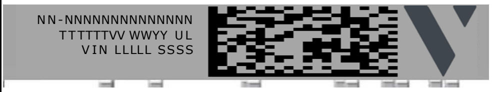
Turn-on Switching Waveforms & definition of t_{Qr} (t_{Qr} = integrating time for Q_r)



I_F (100%) =	120	A
Q_r (100%) =	0	µC

Ordering Code & Marking

Version	Ordering Code
without thermal paste 13 mm housing with solder pins	30-FT07NIB200S502-LE04F58
without thermal paste 13 mm housing with Press-fit pins	30-PT07NIB200S502-LE04F58Y
with thermal paste 13 mm housing with solder pins	30-FT07NIB200S502-LE04F58-/3/
with thermal paste 13 mm housing with Press-fit pins	30-PT07NIB200S502-LE04F58Y-/3/



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

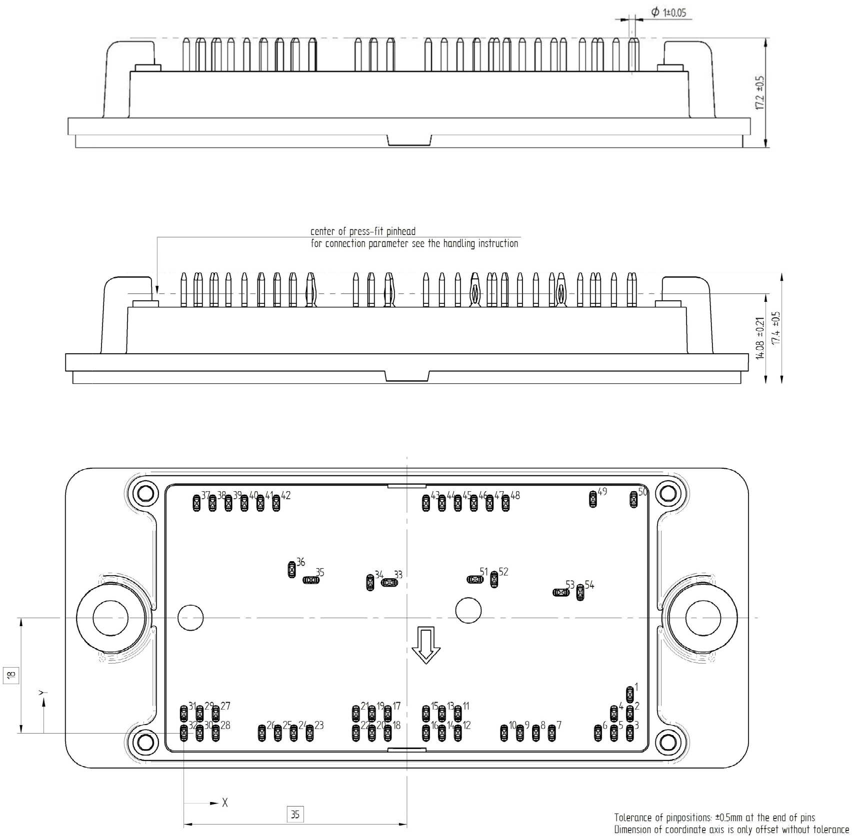
Outline

Pin table

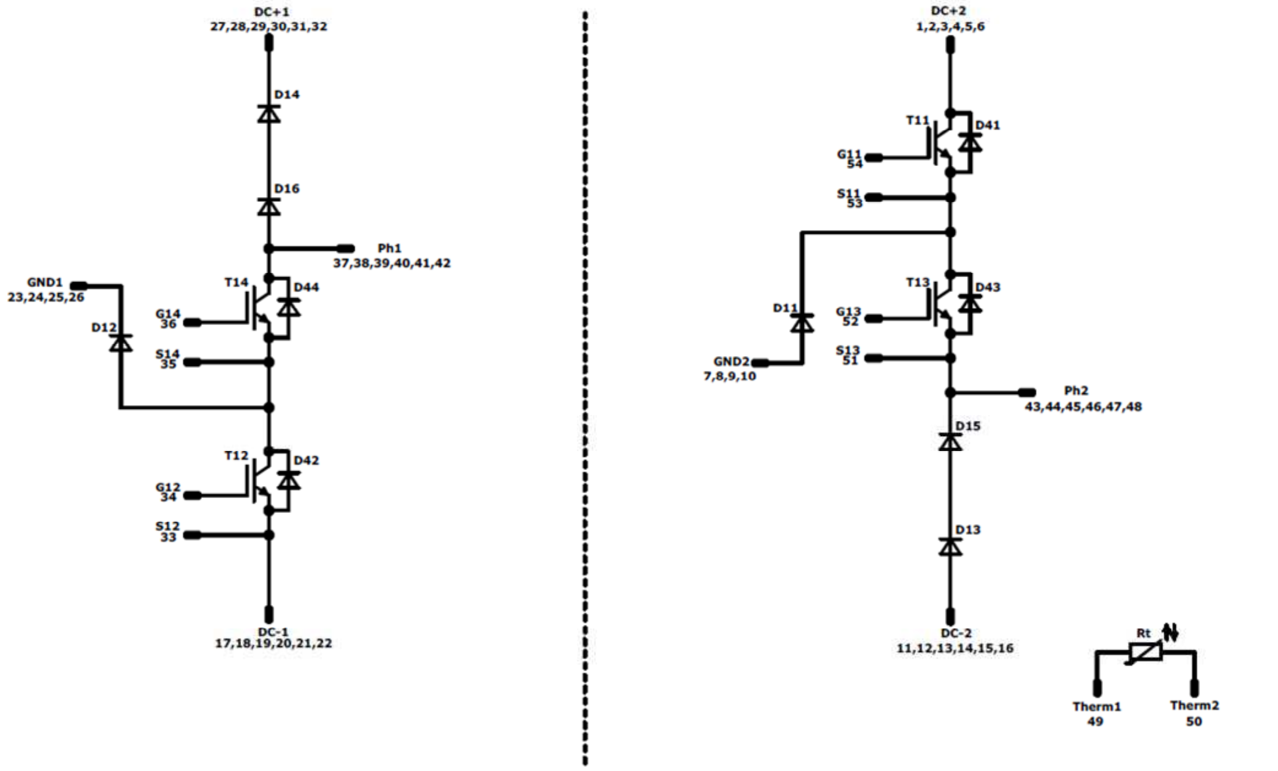
Pin	X	Y	Function
1	70	6	DC+2
2	70	3	DC+2
3	70	0	DC+2
4	67,5	3	DC+2
5	67,5	0	DC+2
6	65	0	DC+2
7	57,75	0	GND2
8	55,25	0	GND2
9	52,75	0	GND2
10	50,25	0	GND2
11	43	3	DC-2
12	43	0	DC-2
13	40,5	3	DC-2
14	40,5	0	DC-2
15	38	3	DC-2
16	38	0	DC-2
17	32	3	DC-1
18	32	0	DC-1
19	29,5	3	DC-1
20	29,5	0	DC-1
21	27	3	DC-1
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	32,25	23,55	S12
34	29,25	23,55	G12
35	19,95	23,95	S14
36	16,95	25,55	G14
37	2	36	Ph1
38	4,5	36	Ph1
39	7	36	Ph1
40	9,5	36	Ph1
41	12	36	Ph1
42	14,5	36	Ph1
43	38	36	Ph2
44	40,5	36	Ph2
45	43	36	Ph2
46	45,5	36	Ph2
47	48	36	Ph2

Pin table

Pin	X	Y	Function
48	50,5	36	Ph2
49	64,2	36,6	Therm1
50	70,6	36,55	Therm2
51	45,7	24,05	S13
52	48,7	24,05	G13
53	59,2	22	S11
54	62,2	22	G11



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12	IGBT	650 V	200 A	Buck Switch	
D11, D12	FWD	650 V	200 A	Buck Diode	
T13, T14	IGBT	650 V	200 A	Boost Switch	
D13, D15; D14, D16	FWD	1300 V	200 A	Boost Diode	Serial devices. Values apply to complete device.
D41, D42	FWD	650 V	30 A	Buck Sw. Protection Diode	
D43, D44	FWD	650 V	30 A	Boost Sw. Protection Diode	
Rt	Thermistor			Thermistor	

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

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

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

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-xT07NIB200S502-LE04F58x-D1-14	29 Jan. 2019	Initial release	