Vincotech

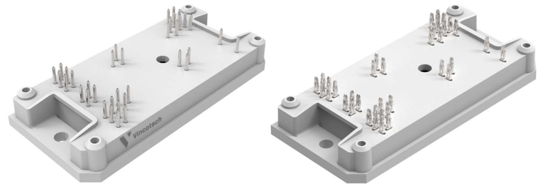
10-FY07NIA200RG-L366F63 / 10-PY07NIA200RG-L366F63Y
datasheet

flowNPC 1 — **1200 V / 200 A**

Features

- Three-level topology
- Optimized for Solar and UPS applications
- Enhanced effiiciency
- Low inductive package

flow 1 12mm housing

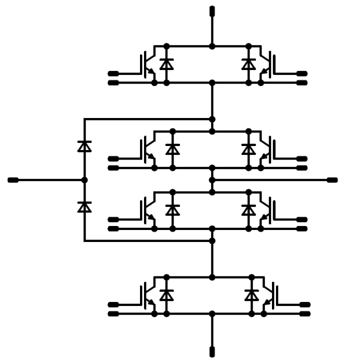


solder pin — press-fit pin

Target applications

- Solar Inverters
- UPS

Schematic



Types

- 10-FY07NIA200RG-L366F63
- 10-PY07NIA200RG-L366F63Y

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	118	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	800	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	171	W
Gate-emitter voltage	V_{GES}		±30	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	95	A
Repetitive peak forward current	I_{FRM}		640	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	123	W
Maximum junction temperature	T_{jmax}		175	°C

Maximum Ratings

T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Condition	Value	Unit
Out. Boost Switch				
Collector-emitter voltage	V_{CES}		650	V
Collector current	I_C	$T_j = T_{jmax}$ T_s = 80 °C	104	A
Repetitive peak collector current	I_{CRM}	t_p limited by T_{jmax}	640	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	159	W
Gate-emitter voltage	V_{GES}		±30	V
Short circuit ratings	t_{SC}	V_{GE} = 15 V Vcc = 360 V T_j = 25 °C	2	μs
Maximum junction temperature	T_{jmax}		175	°C
Out. Boost Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	79	A
Repetitive peak forward current	I_{FRM}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	108	W
Maximum junction temperature	T_{jmax}		175	°C
Out. Boost Inverse Diode				
Peak repetitive reverse voltage	V_{RRM}		650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$ T_s = 80 °C	79	A
Repetitive peak forward current	I_{FRM}		400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$ T_s = 80 °C	108	W
Maximum junction temperature	T_{jmax}		175	°C
Module Properties				
Thermal Properties				
Storage temperature	T_{stg}		-40…+125	°C
Operation temperature under switching condition	T_{jop}		-40…(T_{jmax} - 25)	°C
Isolation Properties				
Isolation voltage	V_{isol}	DC Test Voltage* t_p = 2 s	6000	V
		AC Voltage t_p = 1 min	2500	V
Creepage distance			min. 12,7	mm
Clearance		solder pin \ press-fit pin	8,07 \ 7,86	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	$V_{GE(th)}$		5		0,132	25	5	6	7	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,50 1,65 1,69	1,9	V
Collector-emitter cut-off current	I_{CES}		0	650		25			40	µA
Gate-emitter leakage current	I_{GES}		30	0		25			800	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}							16800		
Output capacitance	C_{oes}	f = 1 Mhz	0	30		25		416		pF
Reverse transfer capacitance	C_{res}							316		
Gate charge	Q_g		15	400	200	25		564		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,56		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$					25 125 150		81 80 78		
Rise time	t_r	R_{gon} = 4 Ω R_{goff} = 4 Ω				25 125 150		21 22 23		
Turn-off delay time	$t_{d(off)}$					25 125 150		192 206 211		ns
Fall time	t_f		-5 / 15	350	200	25 125 150		26 39 41		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 6,5 µC Q_{rFWD} = 9,7 µC Q_{rFWD} = 11 µC				25 125 150		1,549 1,798 2,176		
Turn-off energy (per pulse)	E_{off}					25 125 150		3,177 3,850 4,181		mWs

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				160	25 125 150		1,55 1,62 1,62	1,9	V
Reverse leakage current	I_R			650		25			20	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,77		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 11813 A/µs di/dt = 10291 A/µs di/dt = 9938 A/µs	-5 / 15	350	200	25 125 150		206 224 232		A
Reverse recovery time	t_{rr}					25 125 150		73 104 107		ns
Recovered charge	Q_r					25 125 150		6,475 9,746 11,046		µC
Reverse recovered energy	E_{rec}					25 125 150		1,658 2,552 2,907		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		11140 7241 6447		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	
Out. Boost Switch										
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$			5	0,1142	25	5	6	7	V
Collector-emitter saturation voltage	V_{CEsat}		15		160	25 125 150		1,65 1,69 1,75	1,9	V
Collector-emitter cut-off current	I_{CES}		0	650		25			20	µA
Gate-emitter leakage current	I_{GES}		30	0		25			400	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f= 1 Mhz	0	30		25		9620		pF
Output capacitance	C_{oes}							368		
Reverse transfer capacitance	C_{res}							158		
Gate charge	Q_g		15	400	160	25		342		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,60		K/W
Dynamic										
Turn-on delay time	$t_{d(on)}$	R_{gon} = 4 Ω R_{goff} = 4 Ω	±15	350	160	25 125 150		85 86 85		ns
Rise time	t_r					25 125 150		15 15 16		
Turn-off delay time	$t_{d(off)}$					25 125 150		85 93 95		
Fall time	t_f					25 125 150		32 48 49		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 5 µC Q_{rFWD} = 7,9 µC Q_{rFWD} = 8,7 µC				25 125 150		1,293 1,805 1,566		mWs
Turn-off energy (per pulse)	E_{off}					25 125 150		1,962 2,518 2,723		

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
Out. Boost Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,51 1,57 1,54	1,9	V
Reverse leakage current	I_R			650		25			20	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,88		K/W
Dynamic										
Peak recovery current	I_{RRM}	di/dt = 10199 A/µs di/dt = 10650 A/µs di/dt = 10406 A/µs	±15	350	160	25 125 150		171 183 187		A
Reverse recovery time	t_{rr}					25 125 150		50 108 114		ns
Recovered charge	Q_r					25 125 150		4,995 7,906 8,749		µC
Reverse recovered energy	E_{rec}					25 125 150		1,060 1,799 2,021		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125 150		6385 6222 5508		A/µs
Out. Boost Inverse Diode										
Static										
Forward voltage	V_F				100	25 125 150		1,51 1,57 1,54	1,9	V
Reverse leakage current	I_R			650		25			20	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	λ_{paste} = 3,4 W/mK (PSX)						0,88		K/W

Characteristic Values

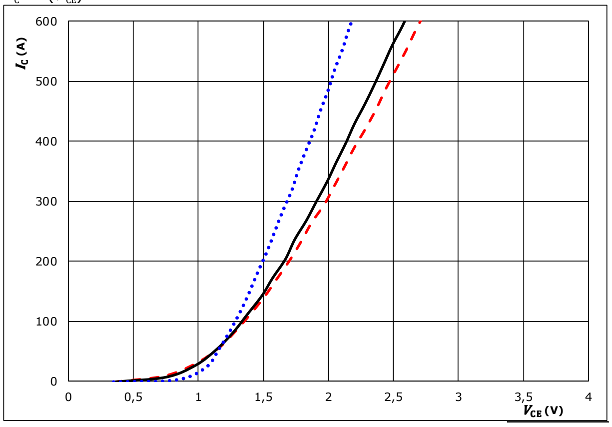
Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V] V_{GS} [V]	V_{CE} [V] V_{DS} [V] V_F [V]	I_C [A] I_D [A] I_F [A]	T_j [°C]	Min	Typ	Max	
Thermistor										
Rated resistance	R					25		22		kΩ
Deviation of R_{100}	$\Delta_{R/R}$	R_{100} = 1484 Ω				100	-5		5	%
Power dissipation	P					25		5		mW
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

$I_C = f(V_{CE})$

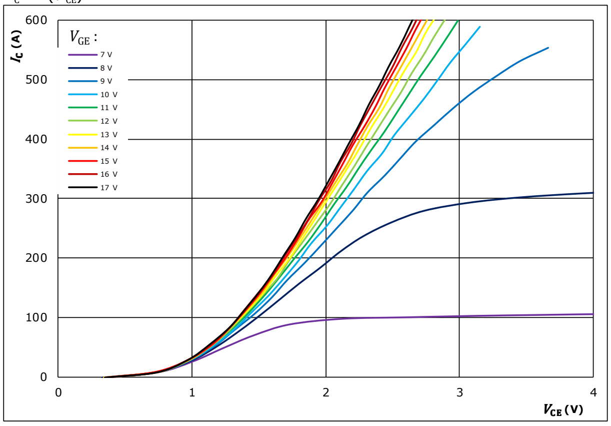


t_p =	250	µs		25 °C
V_{GE} =	15	V	T_j:	125 °C
				150 °C

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

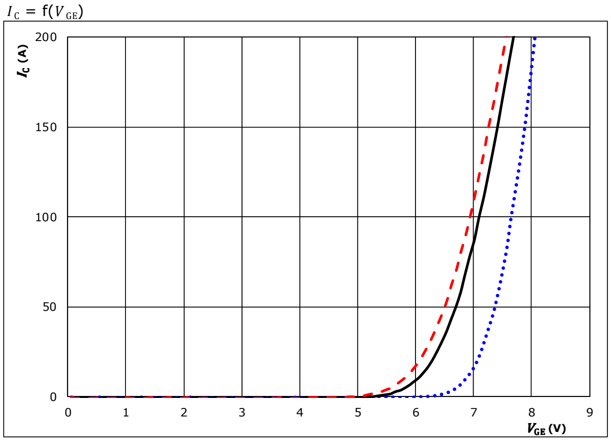


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

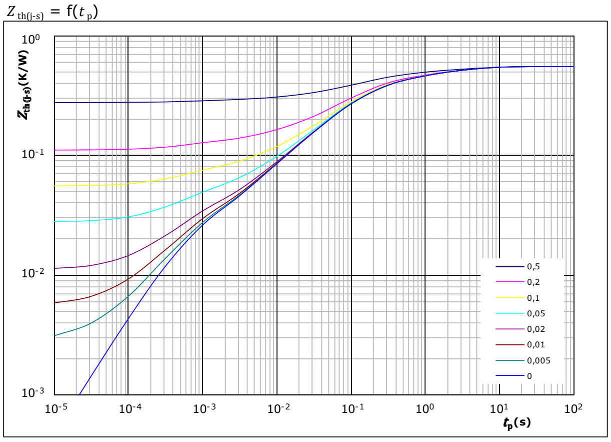


t_p =	100	µs		25 °C
V_{CE} =	10	V	T_j:	125 °C
				150 °C

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 0,56 K/W

IGBT thermal model values

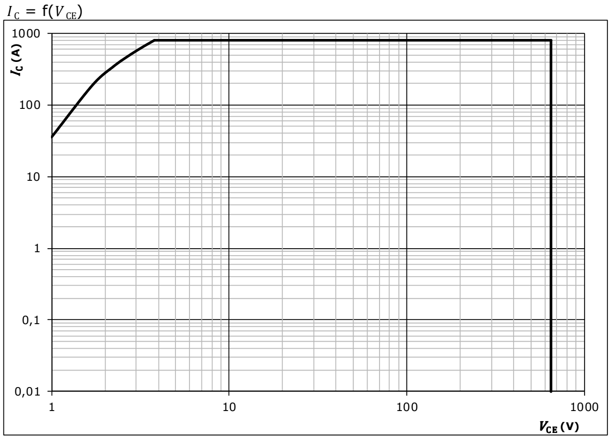
R (K/W)	τ (s)
6,25E-02	4,60E+00
9,27E-02	1,18E+00
1,98E-01	1,90E-01
1,40E-01	5,31E-02
4,05E-02	8,08E-03
2,15E-02	5,71E-04

Buck Switch Characteristics

figure 5.	**IGBT**

Safe operating area

$I_C = f(V_{CE})$



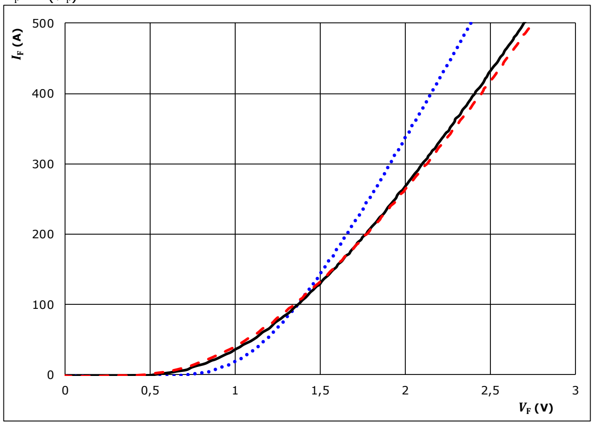
D =	single pulse	
T_s =	80	ºC
V_{GE} =	0	V
T_j =	T_{jmax}	

Buck Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



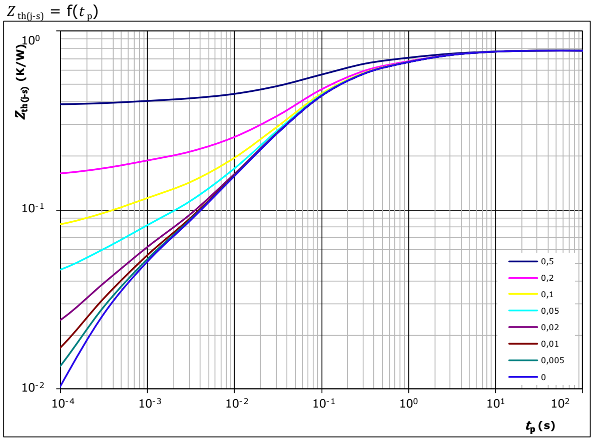
t_p = 250 μs

T_j: 25 °C / 125 °C / 150 °C

figure 2. **FWD**

Transient thermal impedance as a function of pulse width

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



$D = t_p / T$

$R_{th(j-s)}$ = 0,77 K/W

FWD thermal model values

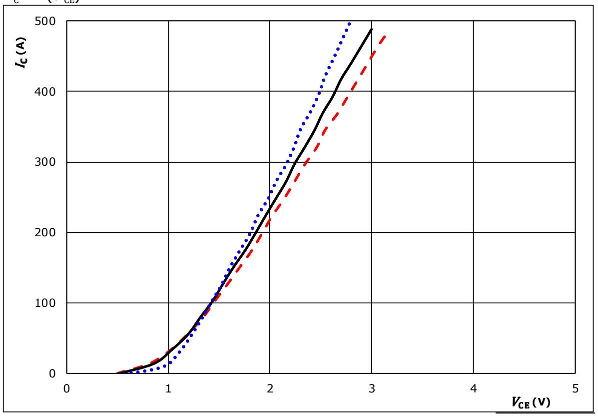
R (K/W)	τ (s)
5,15E-02	5,35E+00
1,37E-01	1,13E+00
1,90E-01	1,82E-01
2,57E-01	5,47E-02
8,27E-02	9,48E-03
2,42E-02	1,43E-03
2,82E-02	2,96E-04

Out. Boost Switch Characteristics

figure 1. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

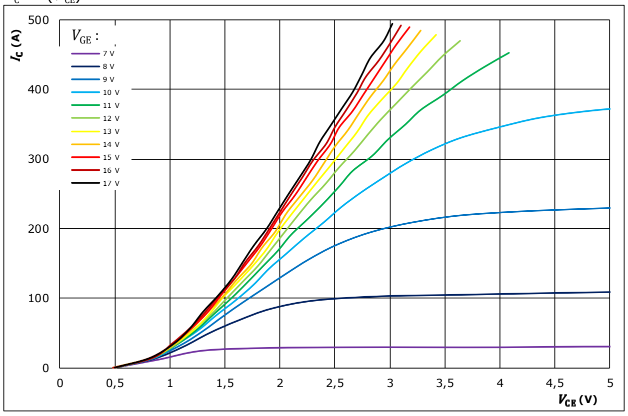


t_p =	250	µs		25 °C	············
V_{GE} =	15	V	T_j:	125 °C	———
				150 °C	– – – –

figure 2. **IGBT**

Typical output characteristics

$I_C = f(V_{CE})$

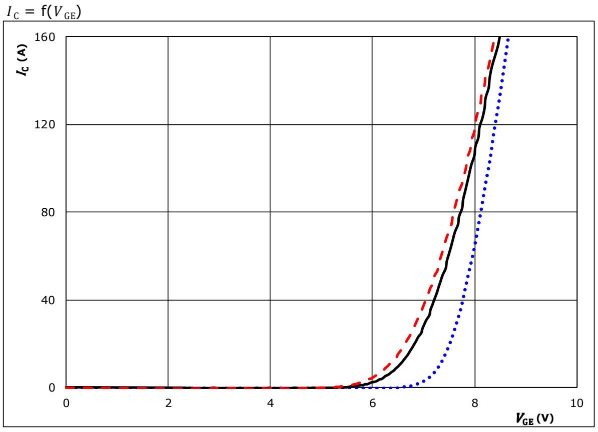


t_p =	250	µs
T_j =	150	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

figure 3. **IGBT**

Typical transfer characteristics

$I_C = f(V_{GE})$

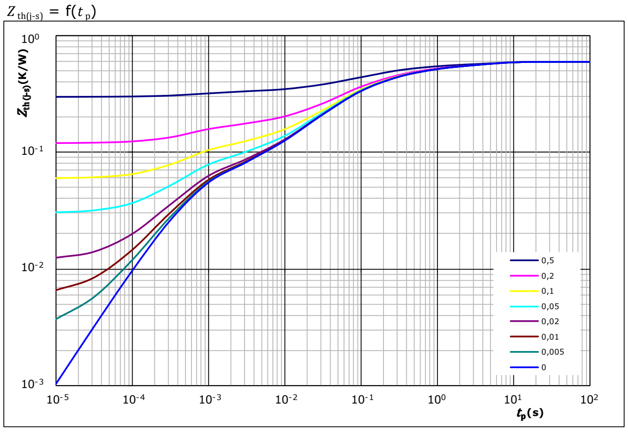


t_p =	100	µs		25 °C	············
V_{CE} =	10	V	T_j:	125 °C	———
				150 °C	– – – –

figure 4. **IGBT**

Transient thermal impedance as function of pulse duration

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



D = t_p / T

$R_{th(j-s)}$ = 0,60 K/W

IGBT thermal model values

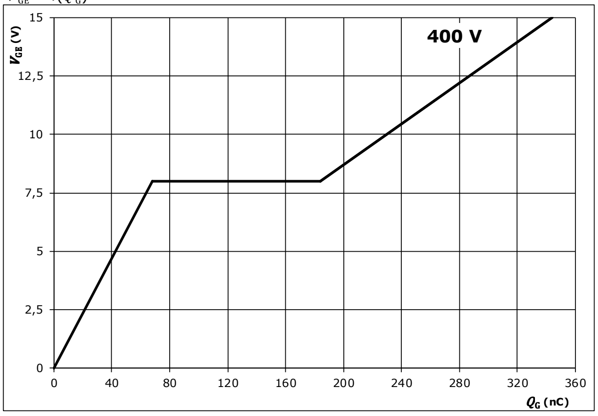
R (K/W)	τ (s)
8,66E-02	3,71E+00
1,46E-01	4,27E-01
2,47E-01	7,29E-02
5,95E-02	1,27E-02
5,78E-02	6,12E-04

Out. Boost Switch Characteristics

figure 5. **IGBT**

Gate voltage vs gate charge

$V_{GE} = f(Q_G)$

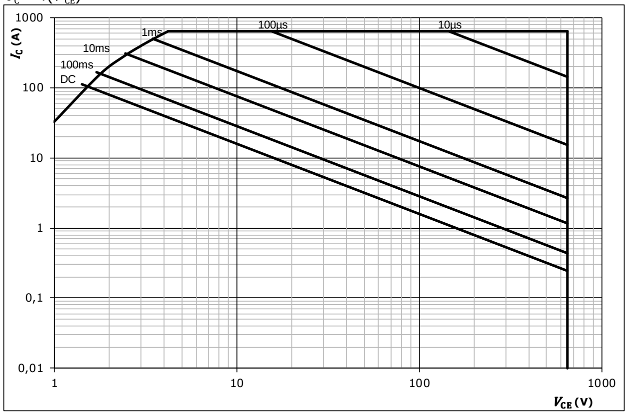


I_C = 160 A

figure 6. **IGBT**

Safe operating area

$I_C = f(V_{CE})$



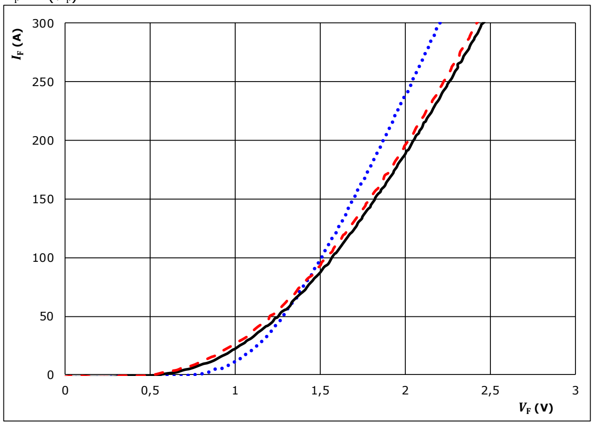
D =	single pulse	
T_s =	80	ºC
V_{GE} =	±15	V
T_j =	T_{jmax}	

Out. Boost Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



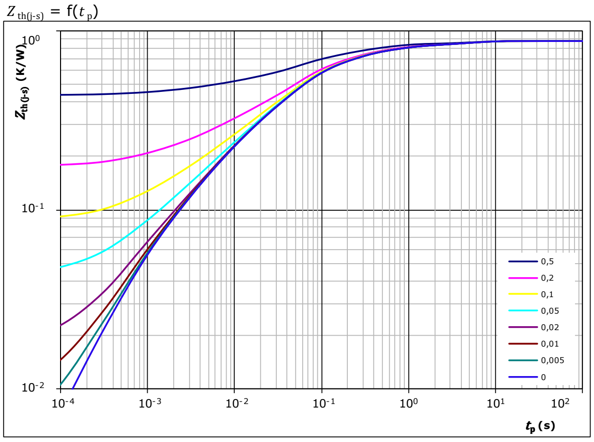
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,88 K/W

FWD thermal model values

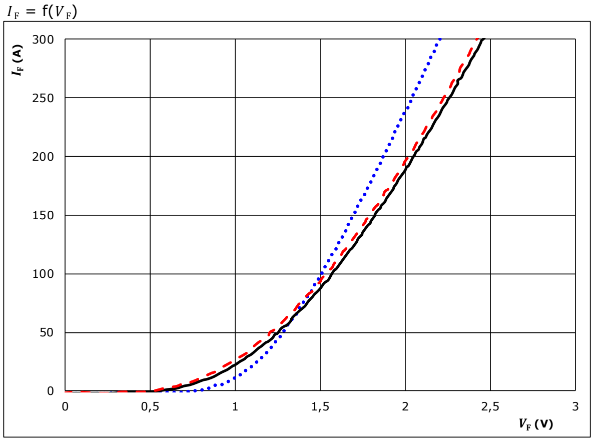
R (K/W)	τ (s)
9,17E-02	3,12E+00
2,61E-01	2,35E-01
3,62E-01	4,36E-02
1,21E-01	5,86E-03
4,11E-02	8,97E-04

Out. Boost Inverse Diode Characteristics

figure 1. **FWD**

Typical forward characteristics

$I_F = f(V_F)$



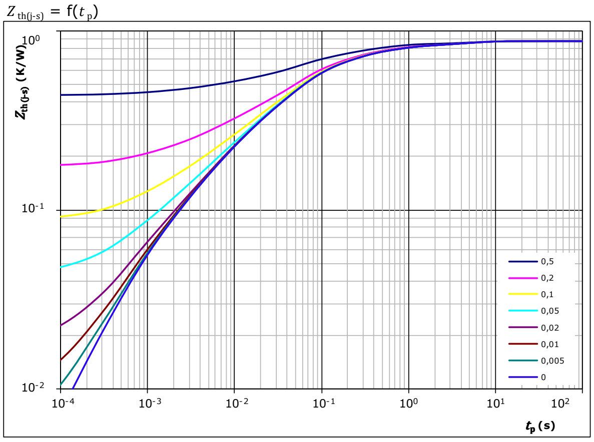
t_p = 250 µs

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

$R_{th(j-s)}$ = 0,88 K/W

FWD thermal model values

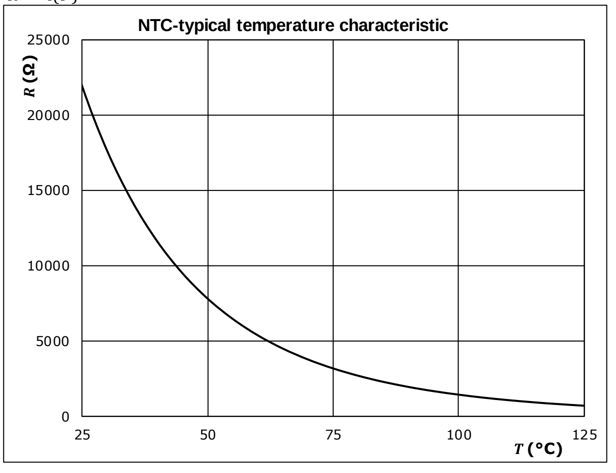
R (K/W)	τ (s)
9,17E-02	3,12E+00
2,61E-01	2,35E-01
3,62E-01	4,36E-02
1,21E-01	5,86E-03
4,11E-02	8,97E-04

Thermistor Characteristics

figure 1.	**Thermistor**

Typical NTC characteristic as a function of temperature

$R = f(T)$

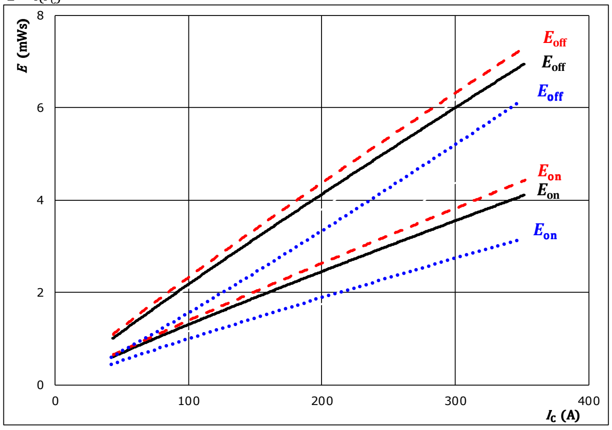


Buck Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



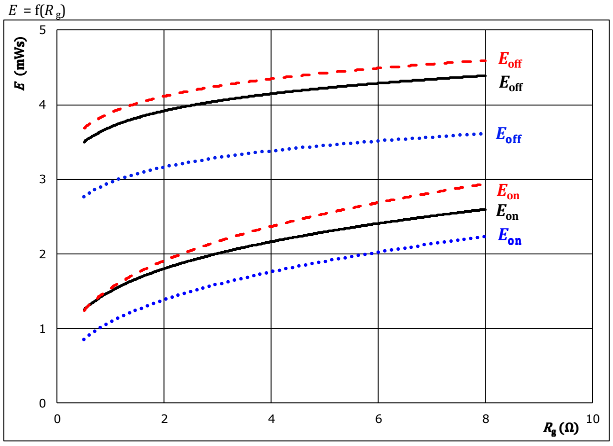
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – – –
R_{goff} =	4	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$



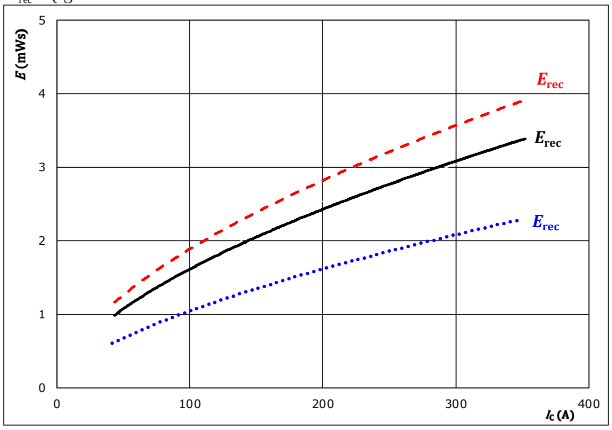
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 15	V		125 °C	———
I_C =	200	A		150 °C	– – – –

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



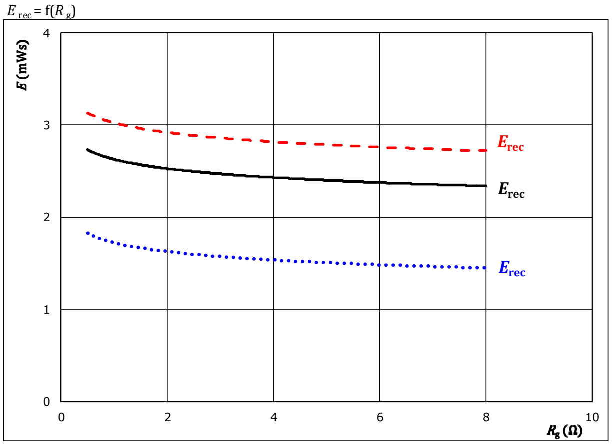
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 15	V		125 °C	———
R_{gon} =	4	Ω		150 °C	– – – –

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



With an inductive load at

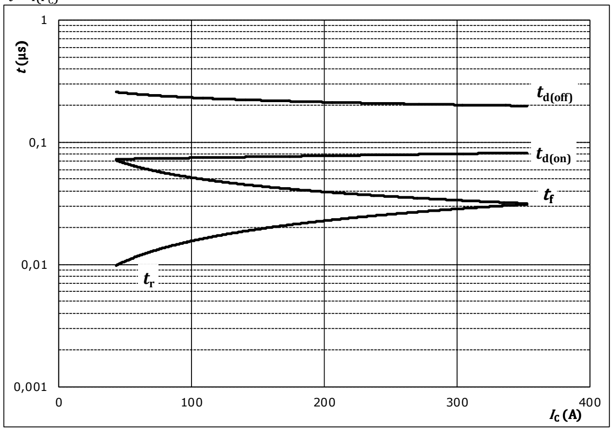
V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	-5 / 15	V		125 °C	———
I_C =	200	A		150 °C	– – – –

Buck Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



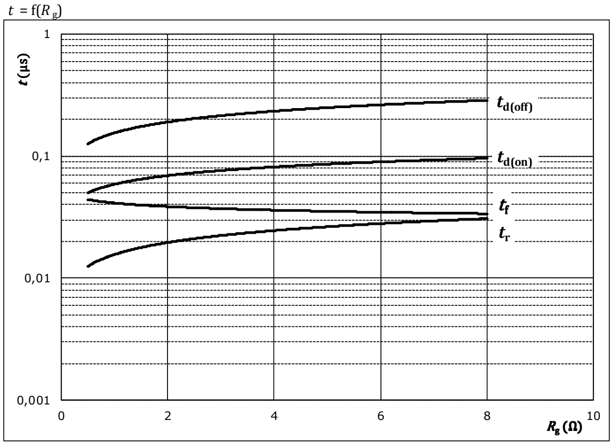
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



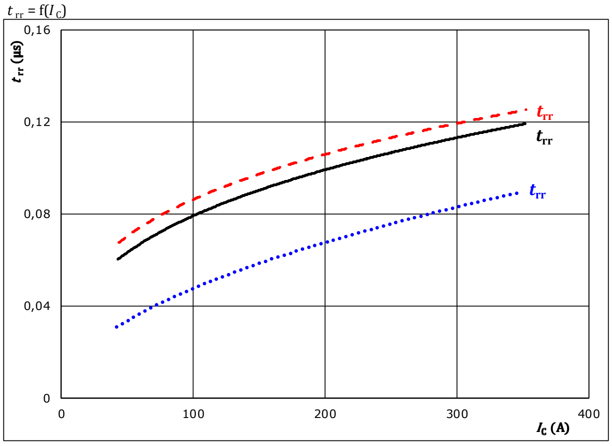
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	-5 / 15	V
I_C =	200	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



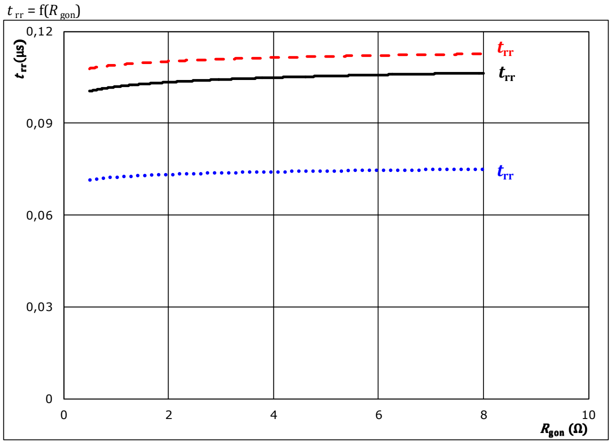
With an inductive load at

V_{CE}=	350	V	T_j:	25 °C	dotted
V_{GE}=	-5 / 15	V		125 °C	solid
R_{gon}=	4	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

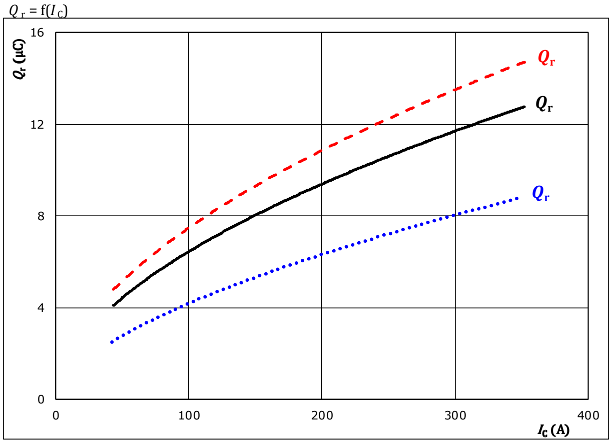
V_{CE}=	350	V	T_j:	25 °C	dotted
V_{GE}=	-5 / 15	V		125 °C	solid
I_C=	200	A		150 °C	dashed

Buck Switching Characteristics

figure 9. FWD

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



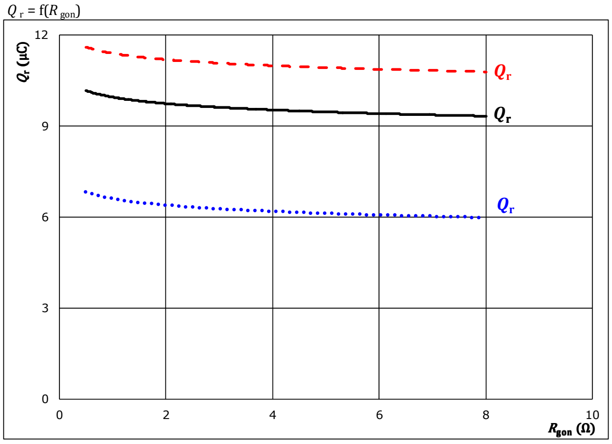
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	4	Ω		150 °C

figure 10. FWD

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

$Q_r = f(R_{gon})$



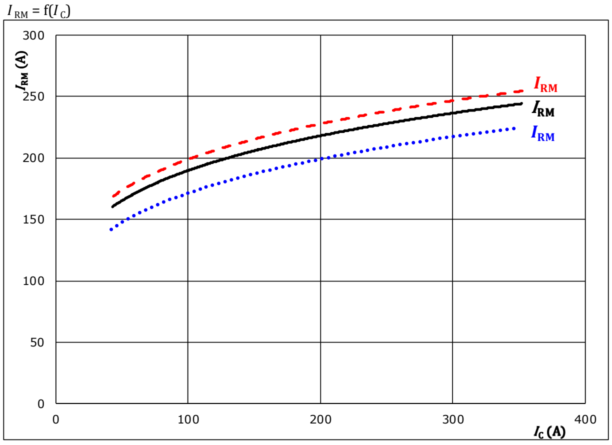
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	200	A		150 °C

figure 11. FWD

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

$I_{RM} = f(I_C)$



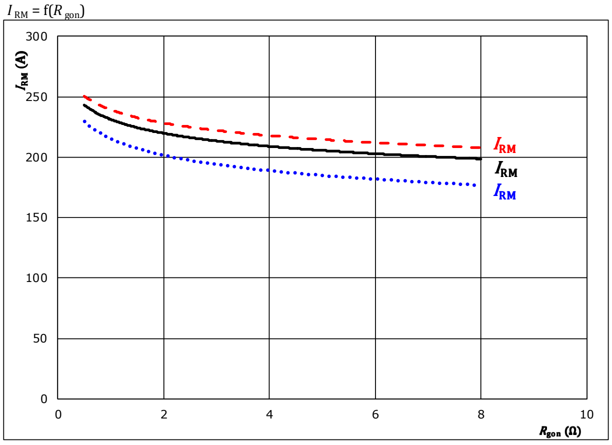
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	4	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

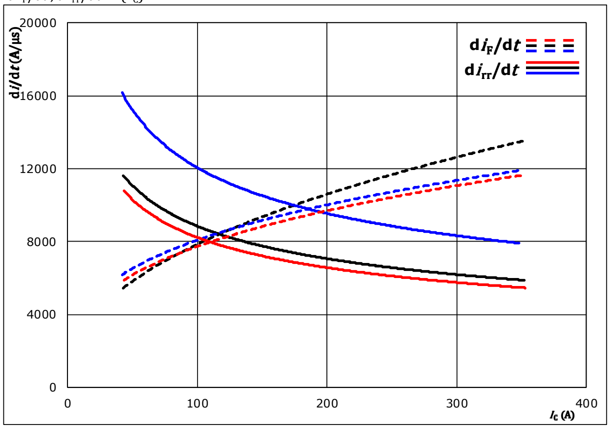
V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	200	A		150 °C

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)



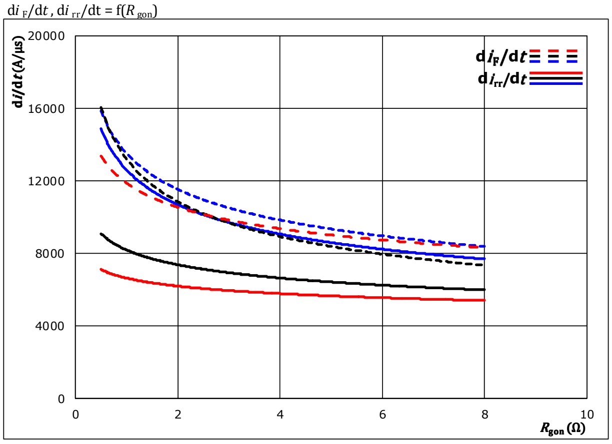
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
R_{gon} =	4	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})



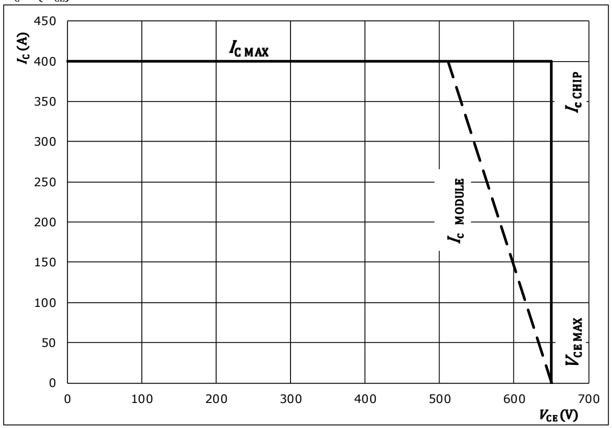
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	-5 / 15	V		125 °C
I_C =	200	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

T_j =	125	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

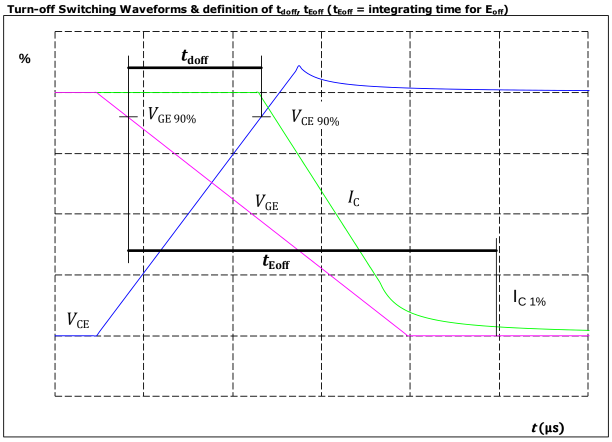
Buck Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. **IGBT**

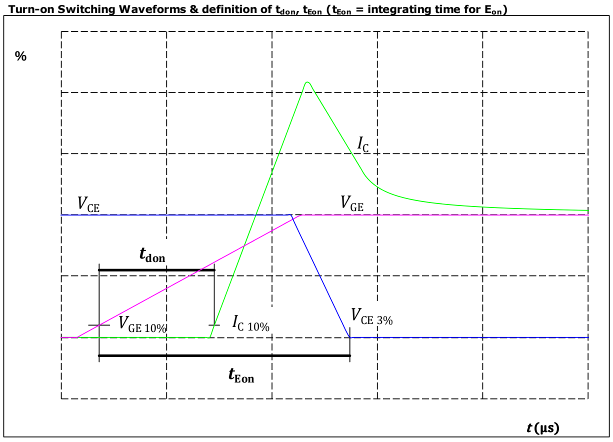
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	200	A
t_{doff} =	206	ns

figure 2. **IGBT**

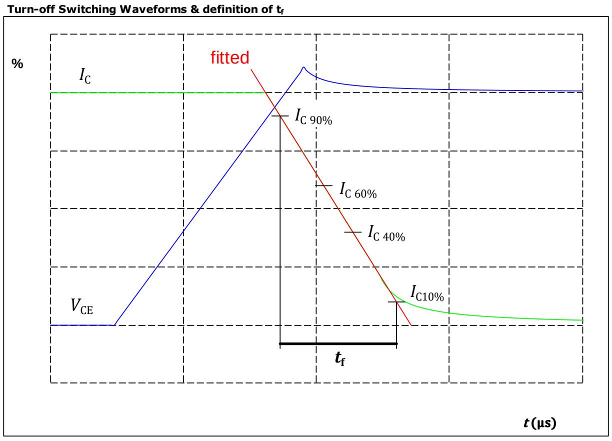
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-5	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	200	A
t_{don} =	80	ns

figure 3. **IGBT**

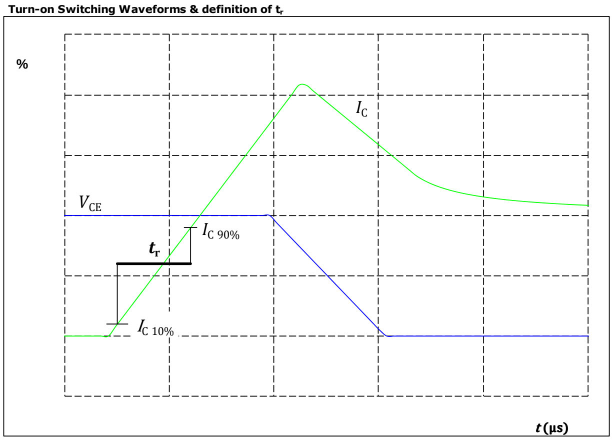
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	200	A
t_f=	39	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

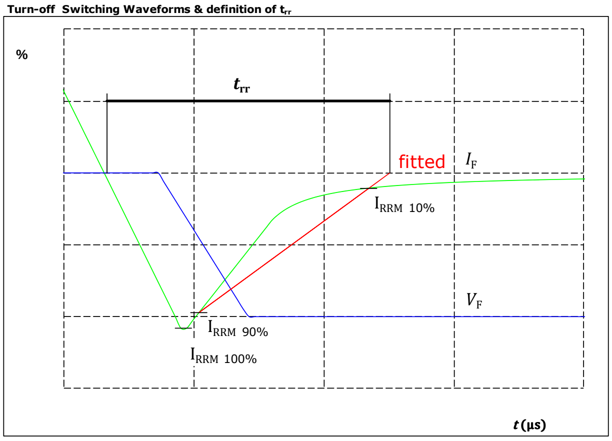


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	200	A
t_r=	22	ns

Buck Switching Characteristics

figure 5. **FWD**

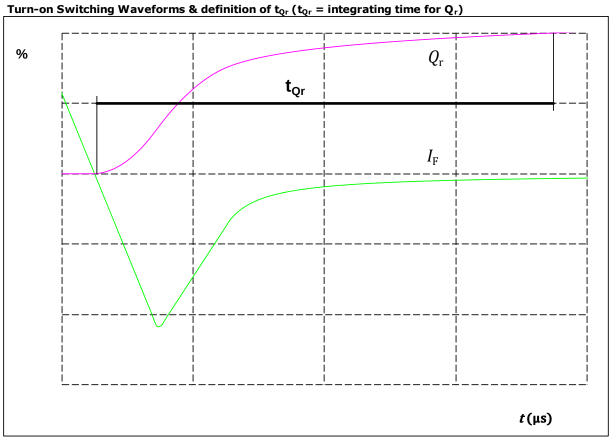
Turn-off Switching Waveforms & definition of t_{rr}



V_F(100%) =	350	V
I_F(100%) =	200	A
I_{RRM}(100%) =	224	A
t_{rr} =	104	ns

figure 6. **FWD**

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



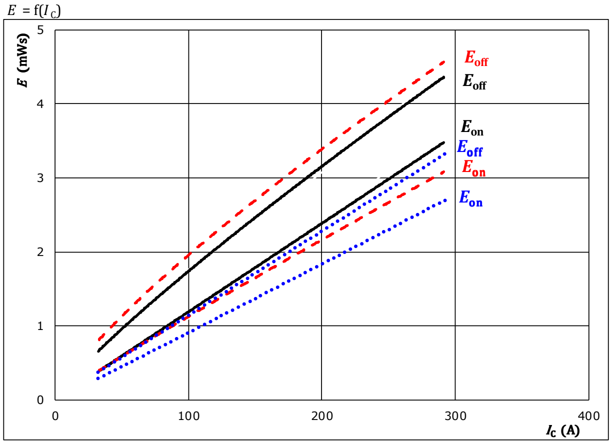
I_F(100%) =	200	A
Q_r(100%) =	0	µC

Boost Switching Characteristics

figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$

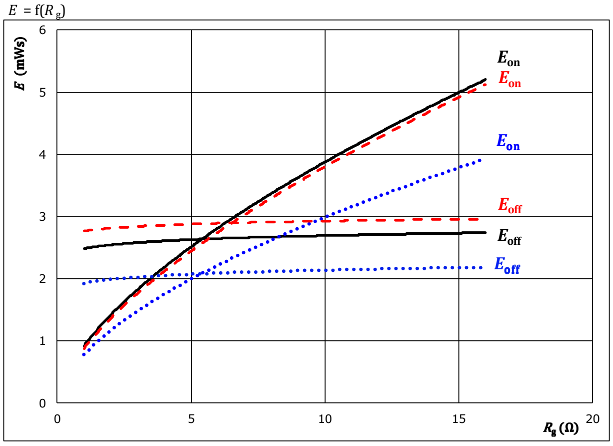


With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed
R_{goff} =	4	Ω			

figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(R_g)$

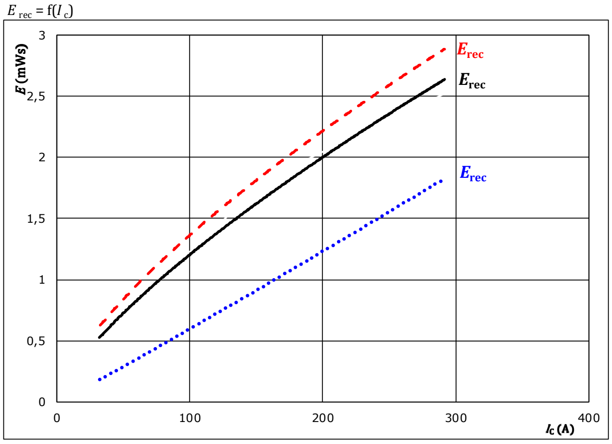


With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	160	A		150 °C	dashed

figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$

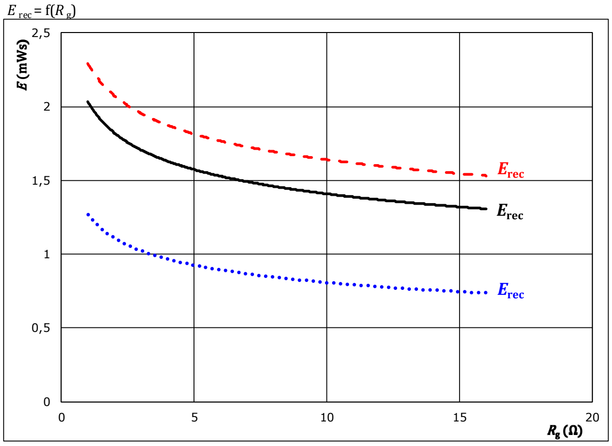


With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	4	Ω		150 °C	dashed

figure 4. **FWD**

Typical reverse recovered energy loss as a function of gate resistor

$E_{rec} = f(R_g)$



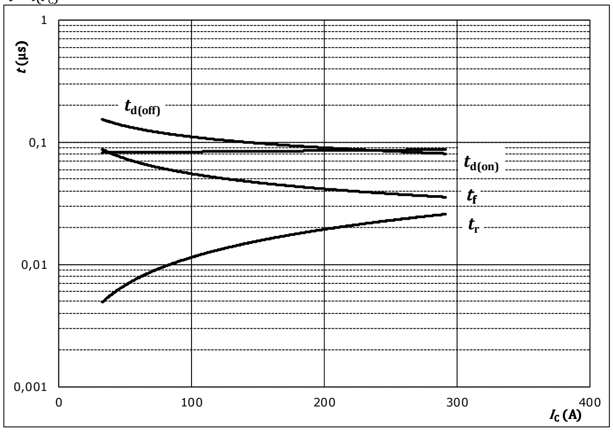
With an inductive load at					
V_{CE} =	350	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	160	A		150 °C	dashed

Boost Switching Characteristics

figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



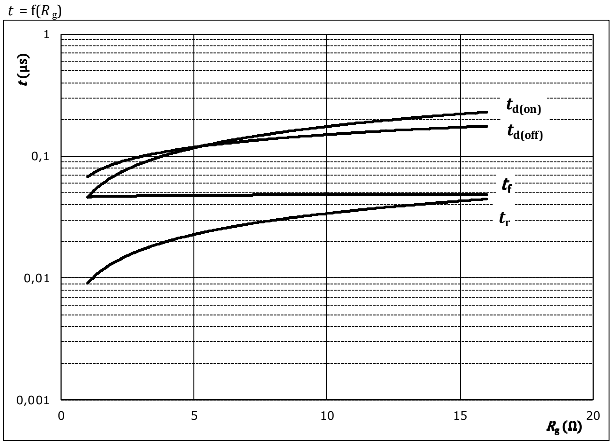
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(R_g)$



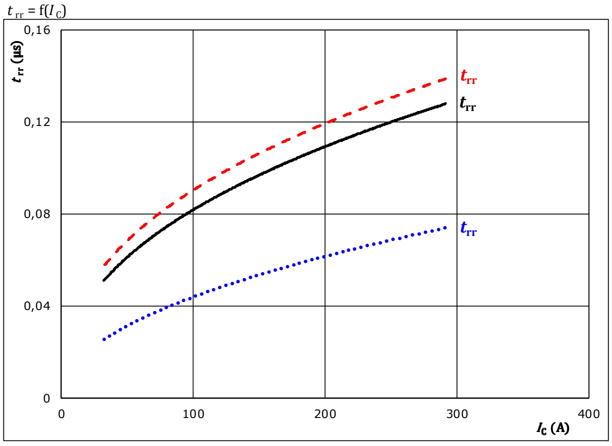
With an inductive load at

T_j =	150	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	160	A

figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$



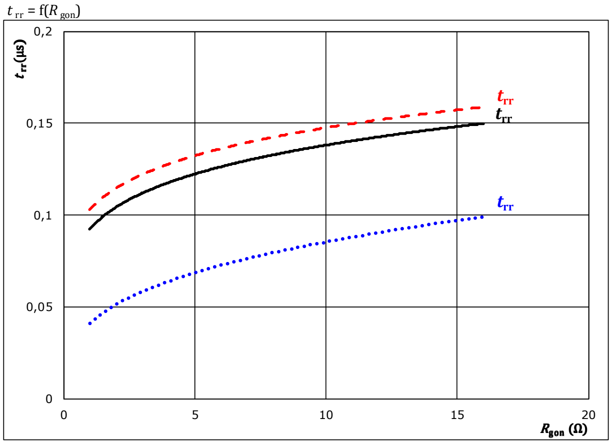
With an inductive load at

				25 °C	············
V_{CE}=	350	V	T_j:	125 °C	———
V_{GE}=	±15	V		150 °C	– – –
R_{gon} =	4	Ω			

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

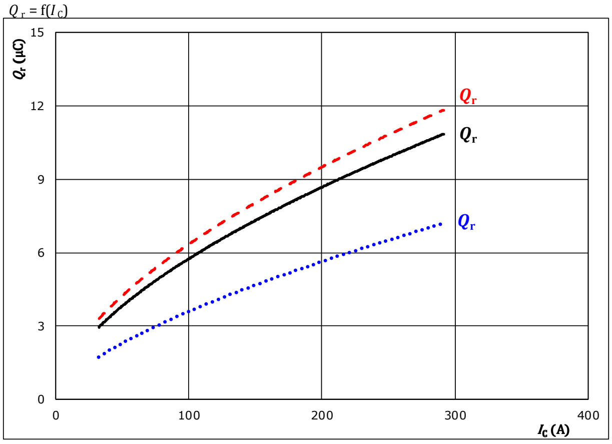
				25 °C	············
V_{CE}=	350	V	T_j:	125 °C	———
V_{GE}=	±15	V		150 °C	– – –
I_C =	160	A			

Boost Switching Characteristics

figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$



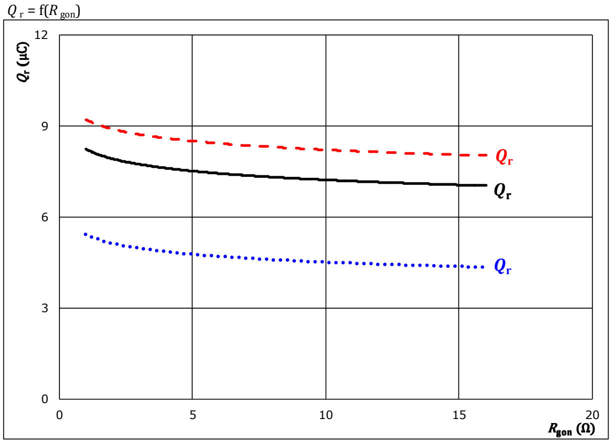
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C		dotted
V_{GE} =	±15	V		125 °C		solid
R_{gon} =	4	Ω		150 °C		dashed

figure 10. **FWD**

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

$Q_r = f(R_{gon})$



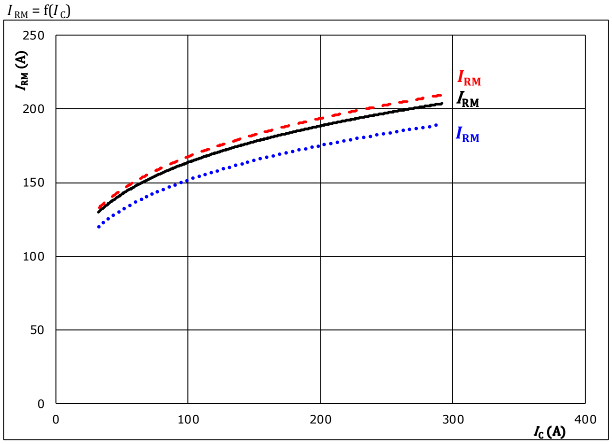
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C		dotted
V_{GE} =	±15	V		125 °C		solid
I_C =	160	A		150 °C		dashed

figure 11. **FWD**

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

$I_{RM} = f(I_C)$



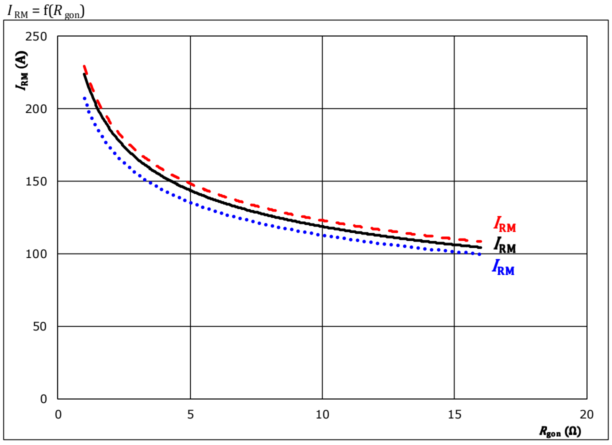
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C		dotted
V_{GE} =	±15	V		125 °C		solid
R_{gon} =	4	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

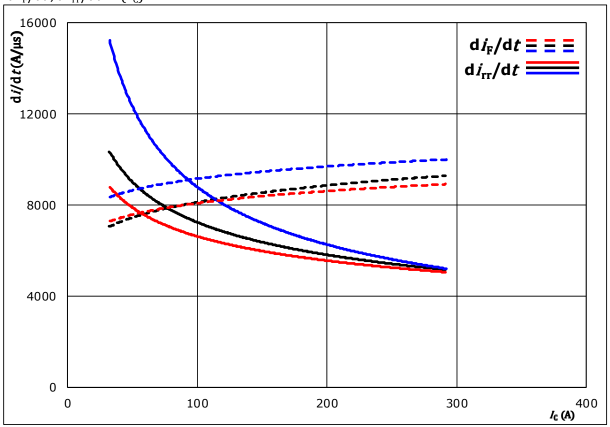
V_{CE} =	350	V	T_j:	25 °C		dotted
V_{GE} =	±15	V		125 °C		solid
I_C =	160	A		150 °C		dashed

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)



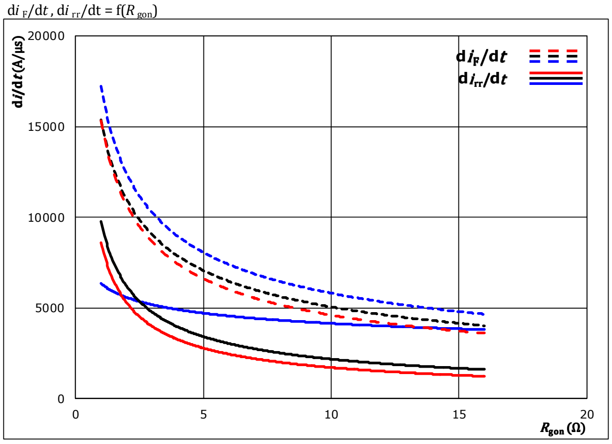
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
R_{gon} =	4	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})



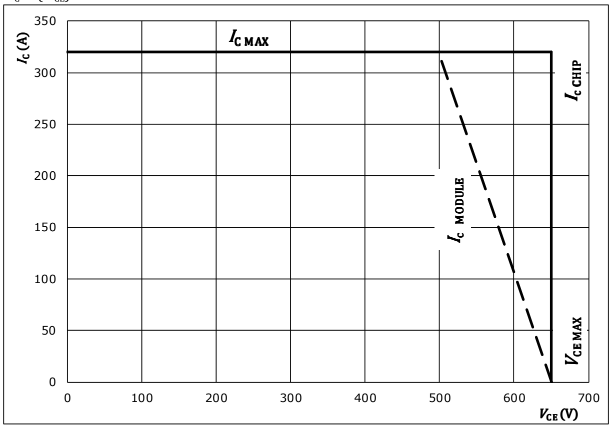
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C
V_{GE} =	±15	V		125 °C
I_C =	160	A		150 °C

figure 15. **IGBT**

Reverse bias safe operating area

I_C = f(V_{CE})



At

T_j =	125	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Vincotech

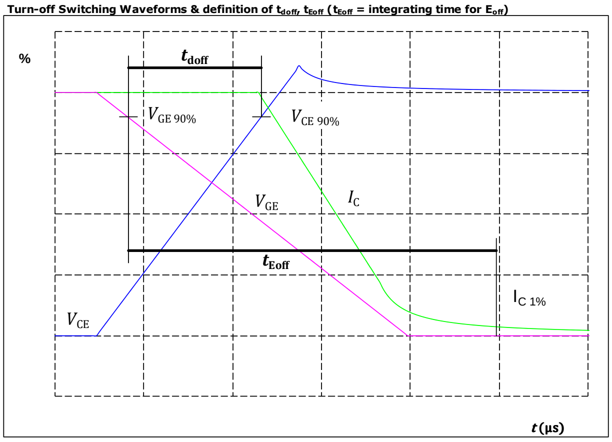
Boost Switching Definitions

General conditions

T_j	=	125 °C
R_{gon}	=	4 Ω
R_{goff}	=	4 Ω

figure 1. **IGBT**

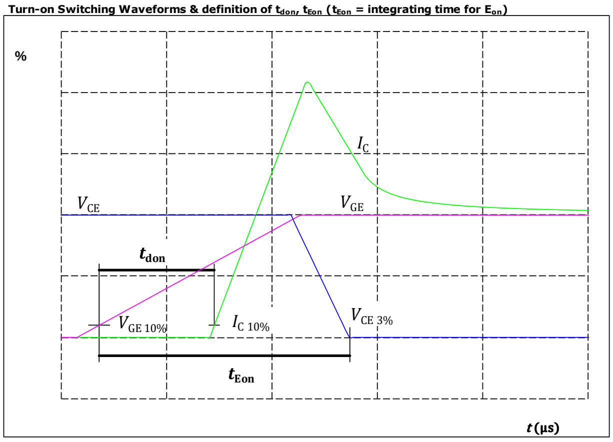
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	160	A
t_{doff} =	93	ns

figure 2. **IGBT**

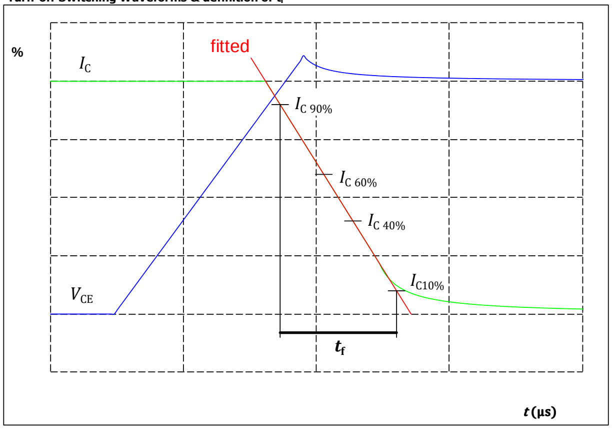
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



$V_{GE}(0\%)$ =	-15	V
$V_{GE}(100\%)$ =	15	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	160	A
t_{don} =	86	ns

figure 3. **IGBT**

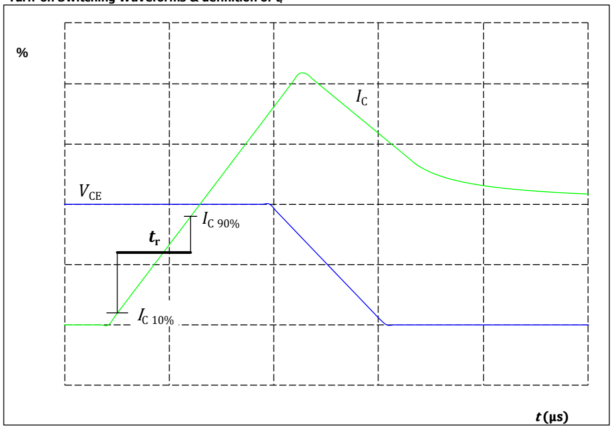
Turn-off Switching Waveforms & definition of t_f



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	160	A
t_f =	48	ns

figure 4. **IGBT**

Turn-on Switching Waveforms & definition of t_r

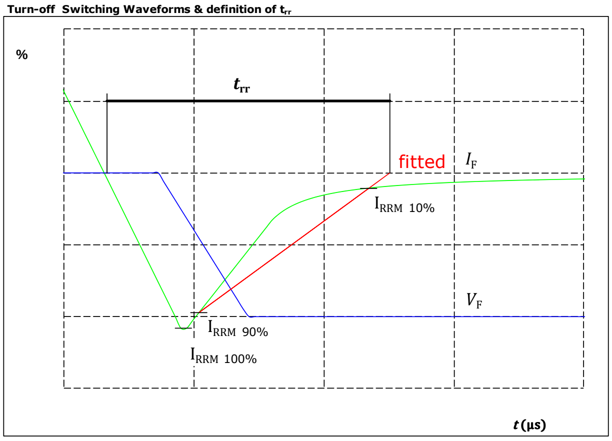


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	160	A
t_r =	15	ns

Boost Switching Characteristics

figure 5. **FWD**

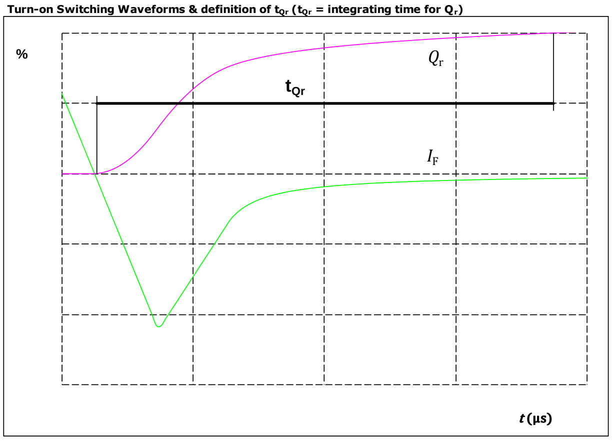
Turn-off Switching Waveforms & definition of t_{rr}



V_F (100%) =	350	V
I_F (100%) =	160	A
I_{RRM} (100%) =	183	A
t_{rr} =	108	ns

figure 6. **FWD**

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



I_F (100%) =	160	A
Q_r (100%) =	0	µC

Ordering Code & Marking

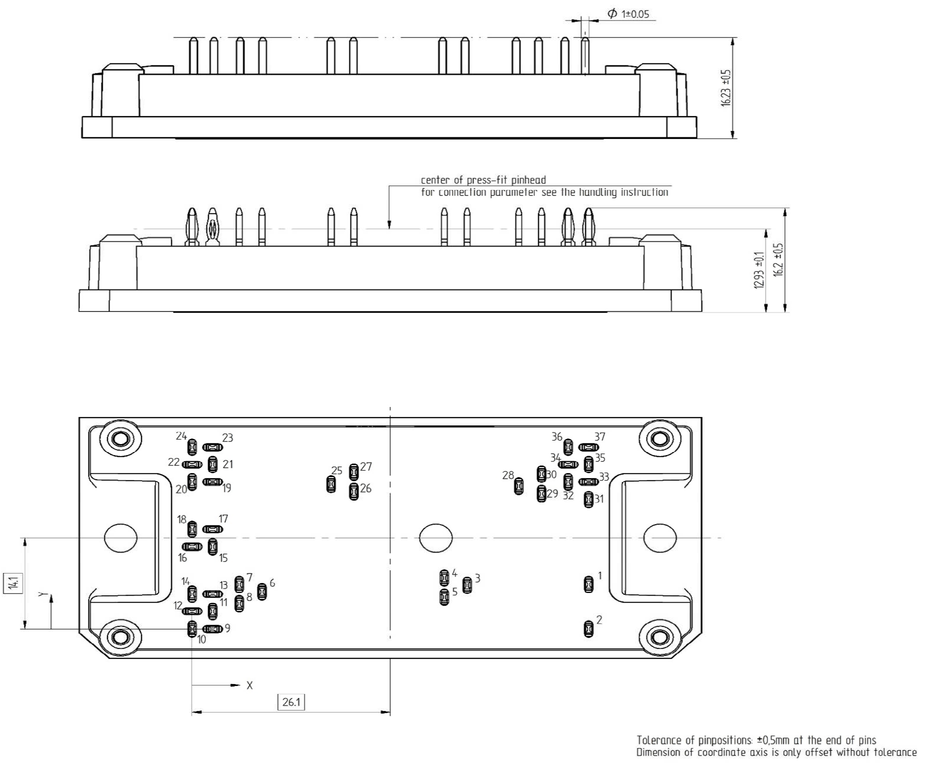
Version	Ordering Code
without thermal paste 12mm housing with solder pins	10-FY07NIA200RG-L366F63
without thermal paste 12mm housing with press-fit pins	10-PY07NIA200RG-L366F63Y
with thermal paste 12mm housing with solder pins	10-FY07NIA200RG-L366F63-/3/
with thermal paste 12mm housing with press-fit pins	10-PY07NIA200RG-L366F63Y-/3/

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

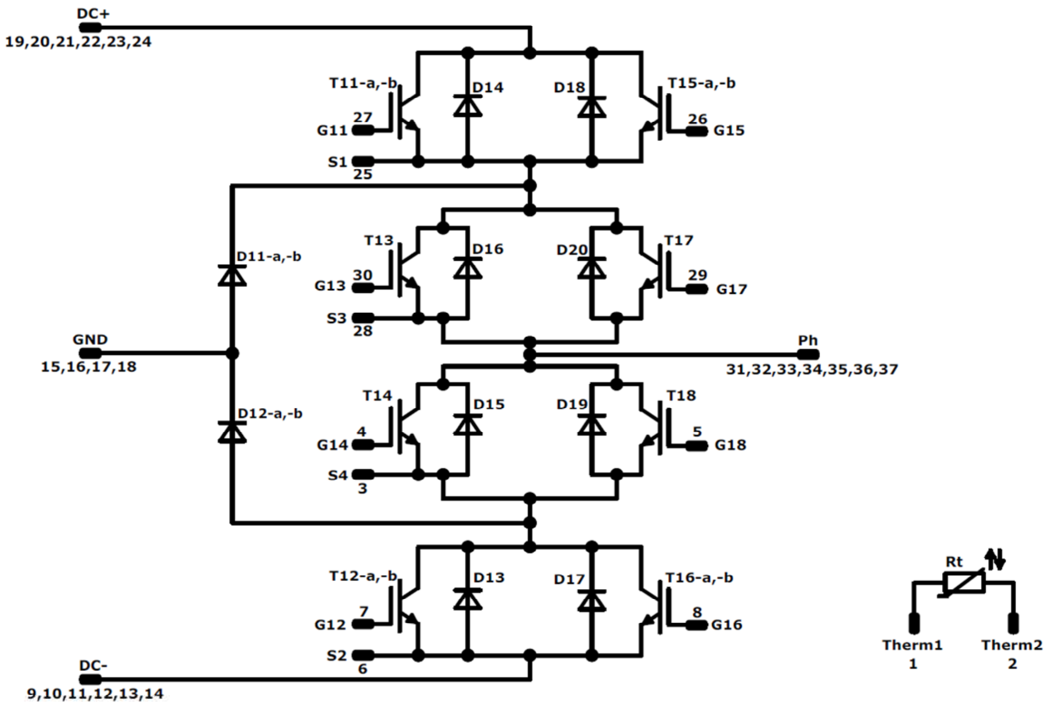
Outline

Pin table

Pin	X	Y	Function
1	52,2	6,9	Therm1
2	52,2	0	Therm2
3	36,2	6,75	S4
4	33,2	7,9	G14
5	33,2	4,9	G18
6	9,2	5,75	S2
7	6,2	6,9	G12
8	6,2	3,9	G16
9	2,7	0	DC-
10	0	0	DC-
11	2,7	2,7	DC-
12	0	2,7	DC-
13	2,7	5,4	DC-
14	0	5,4	DC-
15	2,7	12,75	GND
16	0	12,75	GND
17	2,7	15,45	GND
18	0	15,45	GND
19	2,7	22,8	DC+
20	0	22,8	DC+
21	2,7	25,5	DC+
22	0	25,5	DC+
23	2,7	28,2	DC+
24	0	28,2	DC+
25	18,3	22,45	S1
26	21,3	21,3	G15
27	21,3	24,3	G11
28	43	22,15	S3
29	46	21	G17
30	46	24	G13
31	52,2	20,1	Ph
32	49,5	22,8	Ph
33	52,2	22,8	Ph
34	49,5	25,5	Ph
35	52,2	25,5	Ph
36	49,5	28,2	Ph
37	52,2	28,2	Ph



Pinout



Identification

ID	Component	Voltage	Current	Function	Comment
T11, T12, T15, T16	IGBT	650V	100A	Buck Switch	
D11, D12	FWD	650V	200A	Buck Diode	
T13, T14, T17, T18	IGBT	650V	100A	Out. Boost Switch	
D13, D14, D17, D18	FWD	650V	100A	Out. Boost Diode	
D15, D16, D19, D20	FWD	650V	100A	Out. Boost Inverse Diode	
Rt	NTC	-	-	Thermistor	

Vincotech

10-FY07NIA200RG-L366F63 / 10-PY07NIA200RG-L366F63Y

datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 100	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for if no series packaging available packages see vincotech.com website.

Package data
Package data for if no series packaging available 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
10-xY07NIA200RG-L366F63x-D1-14	07 Jan. 2019	Initial release	

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.