Vincotech

10-FY07NPA200SM02-L366F08
10-PY07NPA200SM02-L366F08Y
datasheet

flow NPC 1	650 V / 200 A

Features

- NPC inverter topology
- Optimized for full rated bi-directional usage (4 quadrant operation)
- High-speed IGBT in all switch positions
- NTC
- Low inductive design with integrated DC capacitor
- *flow* 1-12mm package

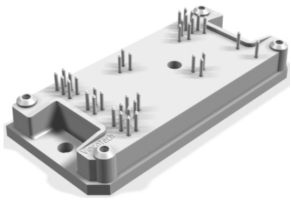
Target applications

- Solar
- UPS

Types

- 10-FY07NPA200SM02-L366F08
- 10-PY07NPA200SM02-L366F08Y

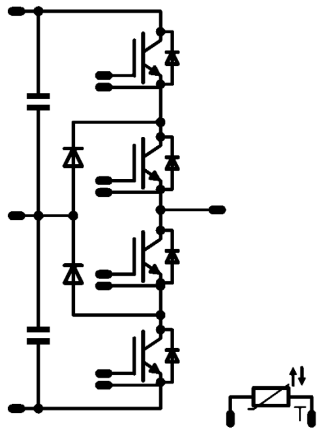
flow 1 12mm housing



Solder Pin

Press-fit

Schematic



Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Buck Switch / Out. Boost Switch					
Collector-emitter voltage	V_{CES}			650	V
Collector current	I_C	$T_j = T_{jmax}$	T_S =80 °C	94	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	145	W
Gate-emitter voltage	V_{GES}			±20	V
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Buck Diode\Out. Boost Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	$T_h = 80°C$	107	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	$T_h = 80°C$	131	W
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions		Value	Unit
Out. Boost Inverse Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
Continuous (direct) forward current	I_F	$T_j = T_{jmax}$	$T_h = 80°C$	124	A
Repetitive peak forward current	I_{FRM}			400	A
Total power dissipation	P_{tot}	$T_j = T_{jmax}$	$T_h = 80°C$	164	W
Maximum Junction Temperature	T_{jmax}			175	°C

Parameter	Symbol	Conditions	Value	Unit
DC Link Capacitor				
Maximum DC voltage	V_{MAX}		500	V
Operation Temperature	T_{op}		-55…+125	°C

Parameter	Symbol	Conditions		Value	Unit
Module Properties					
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation Junction Temperature	T_{jop}			-40…+(T_{jmax} - 25)	°C
Isolation Properties					
Isolation voltage	V_{isol}	AC voltage RMS	$t_p = 60s$	2500	V
		DC voltage	$t_p = 2s$	6000	V
Creepage distance				min 12,7	mm
Clearance		solder pin \ Press-fit		8,07 \ 7,86	mm
Comparative Tracking Index	CTI			>200	

Characteristic Values

Buck Switch

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j[°C]	Min	Typ	Max	
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE}			0,002	25 125	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,69 1,86 1,96	2,1	V
Collector-emitter cut-off current	I_{CES}		0	650		25 125			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			200	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		13120		pF
Output capacitance	C_{oes}							194		
Reverse transfer capacitance	C_{res}							42		
Gate charge	Q_g		15	520	200	25		420		nC
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material λ=3,4W/mK						0,65		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	120	25 125		67 66		ns
Rise time	t_r					25 125		11 12		
Turn-off delay time	$t_{d(off)}$					25 125		158 174		
Fall time	t_f					25 125		7 9		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,6 µC Q_{rFWD} = 9,1 µC				25 125		1,101 1,637		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,576 0,922		

Buck Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				200	25 125 150		1,65 1,60 1,58	2,65	V
Reverse leakage current	I_r			650		25 150			10,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,73		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 9293 A/µs di/dt = 7591 A/µs	±15	350	120	25 125		114 160		A
Reverse recovery time	t_{rr}					25 125		59 91		ns
Recovered charge	Q_r					25 125		4,639 9,105		µC
Reverse recovered energy	E_{rec}					25 125		0,966 1,930		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		3621 2111		A/µs

Out. Boost Switch

Parameter	Symbol	Conditions					Value			Unit
			V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j[°C]	Min	Typ	Max	
Static										
Gate-emitter threshold voltage	$V_{GE(th)}$	V_{GE}=V_{CE}			0,002	25 125	3,2	4	4,8	V
Collector-emitter saturation voltage	V_{CEsat}		15		200	25 125 150		1,69 1,86 1,96	2,1	V
Collector-emitter cut-off current	I_{CES}		0	650		25 125			200	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			200	nA
Internal gate resistance	r_g							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		13120		pF
Output capacitance	C_{oes}							194		
Reverse transfer capacitance	C_{res}							42		
Gate charge	Q_g		15	520	200	25		420		nC

Parameter	Symbol	Conditions					Min	Typ	Max	Unit
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	phase-change material ʎ=3,4W/mK						0,65		K/W

Parameter	Symbol	Conditions					Min	Typ	Max	Unit
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	R_{goff} = 4 Ω R_{gon} = 4 Ω	±15	350	120	25 125		76 62		ns
Rise time	t_r					25 125		12 14		
Turn-off delay time	$t_{d(off)}$					25 125		153 171		
Fall time	t_f					25 125		7 12		
Turn-on energy (per pulse)	E_{on}	Q_{rFWD} = 4,5 µC Q_{rFWD} = 9,2 µC				25 125		1,709 2,573		mWs
Turn-off energy (per pulse)	E_{off}					25 125		0,542 1,009		

Out. Boost Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				200	25 125 150		1,65 1,60 1,58	2,65	V
Reverse leakage current	I_r			650		25 150			10,6	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material ʎ=3,4W/mK						0,73		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt = 6472 A/µs di/dt = 5169 A/µs	±15	350	120	25 125		91 129		A
Reverse recovery time	t_{rr}					25 125		70 103		ns
Recovered charge	Q_r					25 125		4,495 9,160		µC
Reverse recovered energy	E_{rec}					25 125		0,800 1,676		mWs
Peak rate of fall of recovery current	$(di_{rf}/dt)_{max}$					25 125		2015 1571		A/µs

Out. Boost Inverse Diode

Parameter	Symbol	Conditions					Value			Unit
				V_r [V]	I_F [A]	T_j [°C]	Min	Typ	Max	
Static										
Forward voltage	V_F				200	25 125 150		1,77 1,69 1,66	1,9	V
Reverse leakage current	I_r			650		25 150			54	µA
Thermal										
Thermal resistance junction to sink	$R_{th(j-s)}$	Phase-Change Material λ=3,4W/mK						0,58		K/W

DC Link Capacitor

Parameter	Symbol	Conditions					Value			Unit
						T_j[°C]	Min	Typ	Max	
Capacitance	C							300		nF
Tolerance							-10		+10	%

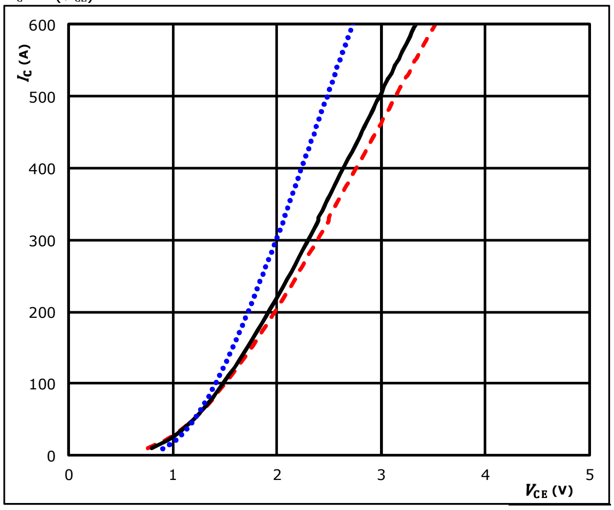
Thermistor

Parameter	Symbol	Conditions					Value			Unit
			V_{GE}[V]	V_{CE}[V]	I_C[A]	T_j[°C]	Min	Typ	Max	
Rated resistance	R					25		21,5		kΩ
Deviation of R100	$\Delta_{R/R}$	R100=1486 Ω				100	-4,5		+4,5	%
Power dissipation	P					25		210		mW
Power dissipation constant						25		3,5		mW/K
B-value	$B_{(25/50)}$					25		3884		K
B-value	$B_{(25/100)}$					25		3964		K
Vincotech NTC Reference									F	

Buck Switch\ Out. Boost Switch Characteristics

Typical output characteristics **IGBT**

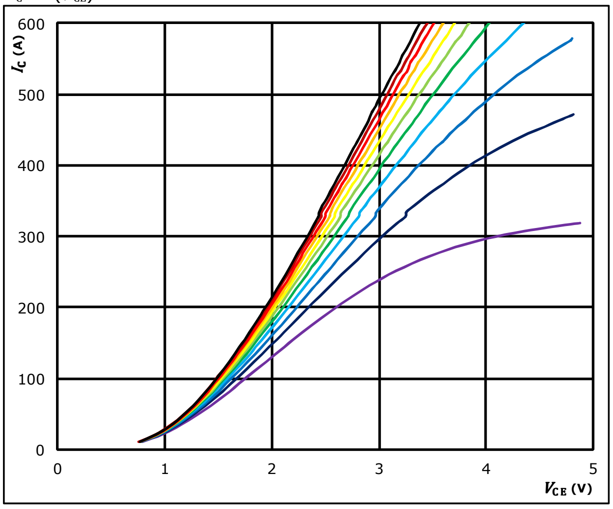
$I_C = f(V_{CE})$



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

Typical output characteristics **IGBT**

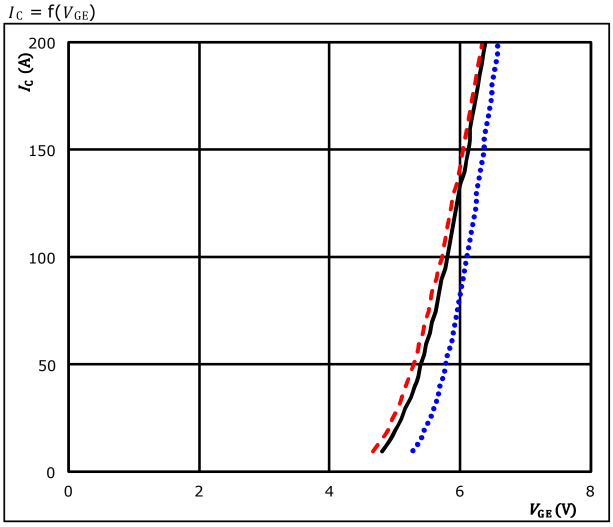
$I_C = f(V_{CE})$



t_p =	250	μs
T_j =	125	°C
V_{GE} from	7 V to 17 V in steps of 1 V	

Typical transfer characteristics **IGBT**

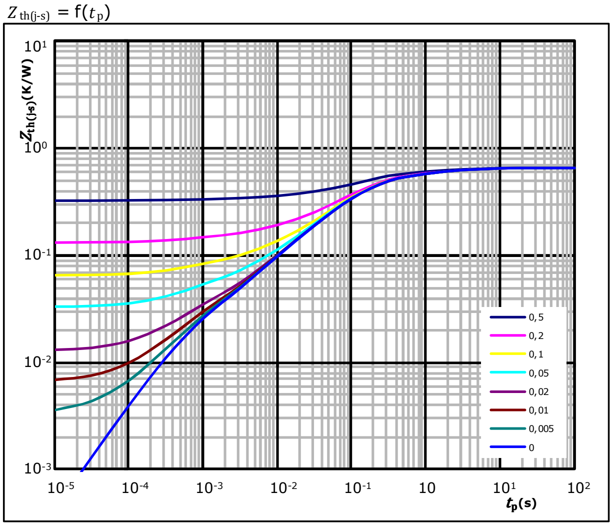
$I_C = f(V_{GE})$



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

Transient Thermal Impedance as function of Pulse duration **IGBT**

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



D =	t_p / T	
$R_{th(j-s)}$ =	0,65	K/W

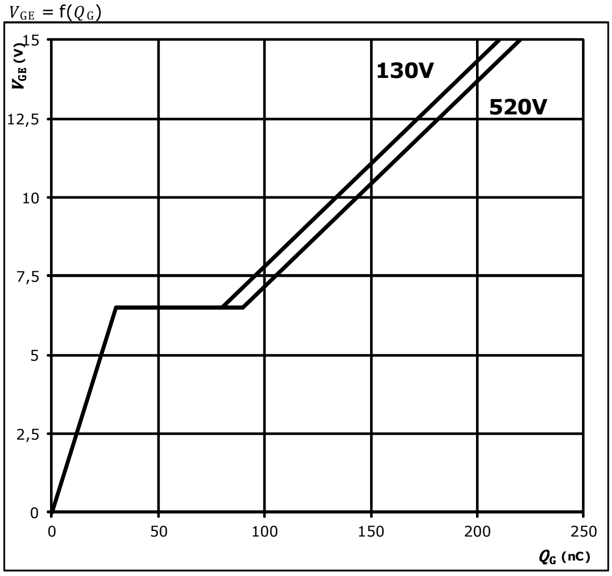
IGBT thermal model values

R_{th} (K/W)	τ (s)
7,51E-02	3,22E+00
1,27E-01	5,51E-01
3,27E-01	1,11E-01
7,19E-02	2,69E-02
3,44E-02	6,17E-03
1,81E-02	5,82E-04

Buck Switch\ Out. Boost Switch Characteristics

Gate voltage vs Gate charge IGBT

$V_{GE} = f(Q_G)$

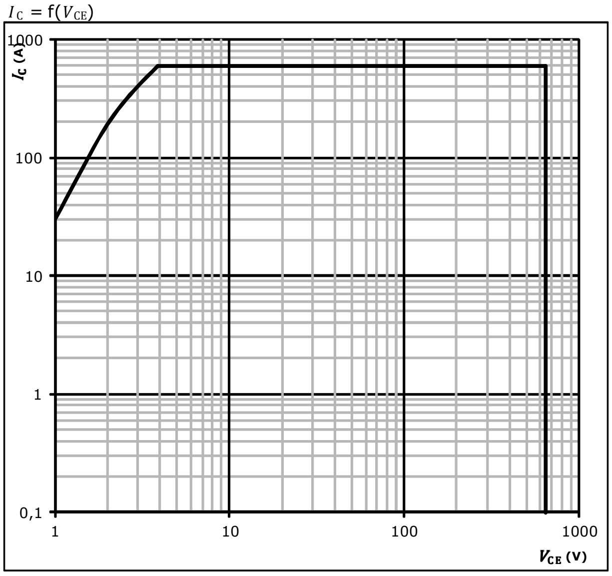


At

I_C= 200 A

Safe operating area IGBT

$I_C = f(V_{CE})$



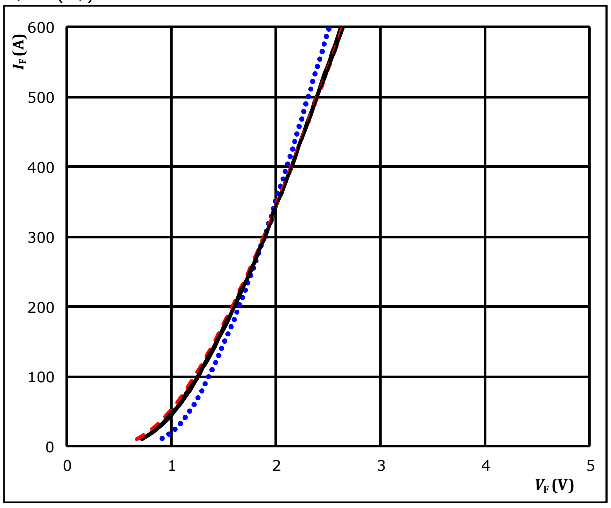
At

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

Buck Diode\Out. Boost Diode Characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

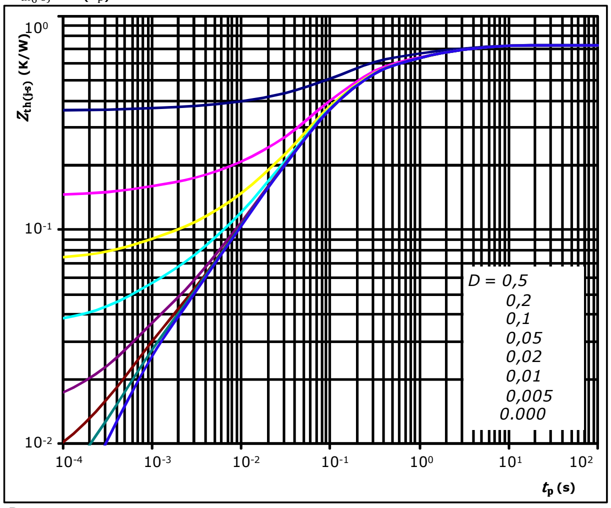


t_p = 250 μs

T_j: 25 °C, 125 °C, 150 °C

Transient thermal impedance as a function of pulse width **FWD**

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



D = t_p / T

$R_{th(j-s)}$ = 0,73 K/W

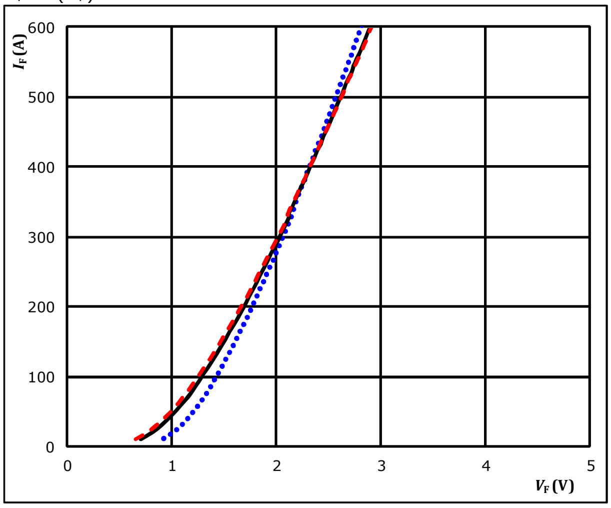
FWD thermal model values

R (K/W)	τ (s)
8,64E-02	3,05E+00
1,38E-01	6,75E-01
3,34E-01	1,25E-01
1,06E-01	3,99E-02
4,34E-02	6,89E-03
1,90E-02	7,34E-04

Out. Boost Inverse Diode Characteristics

Typical forward characteristics — **Diode**

$I_F = f(V_F)$

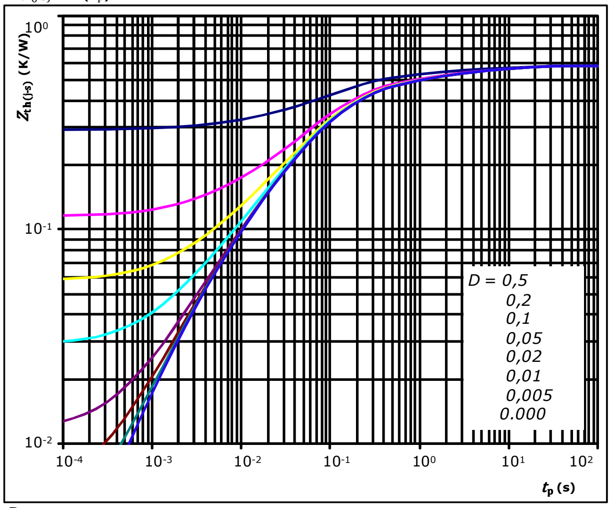


t_p = 250 μs

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

Transient thermal impedance as a function of pulse width — **Diode**

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



D = t_p / T

$R_{th(j-s)}$ = 0,58 K/W

Diode thermal model values

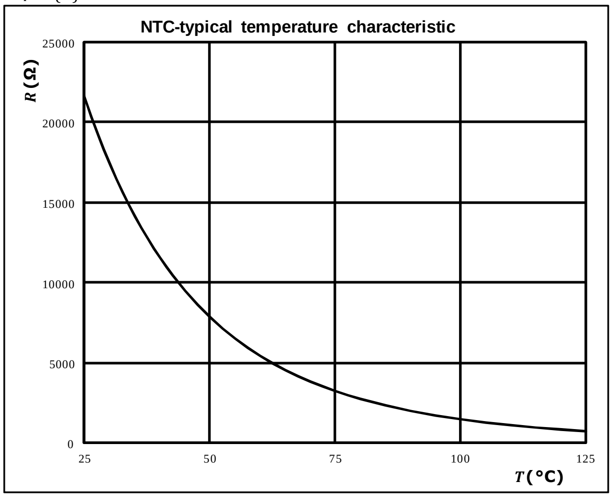
R (K/W)	τ (s)
5,80E-02	8,20E+00
8,03E-02	1,08E+00
1,46E-01	1,95E-01
2,11E-01	6,41E-02
6,77E-02	1,10E-02
1,80E-02	2,03E-03

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$

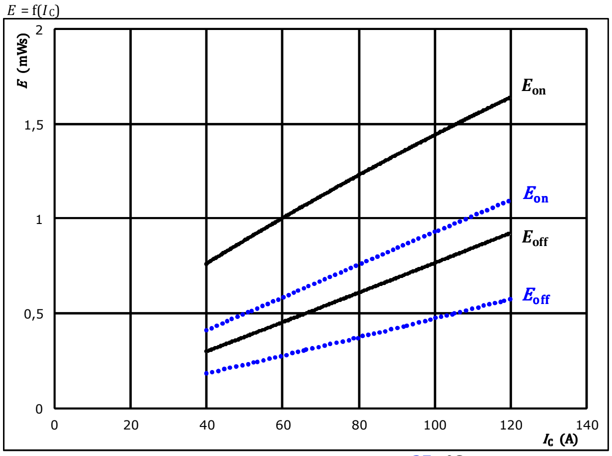


Buck Switching Characteristics

Figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



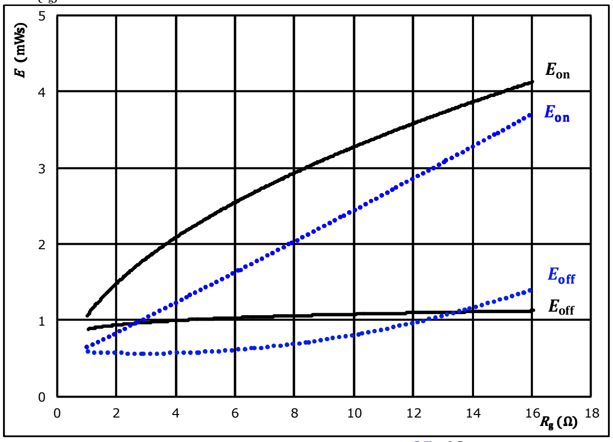
With an inductive load at

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

Figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



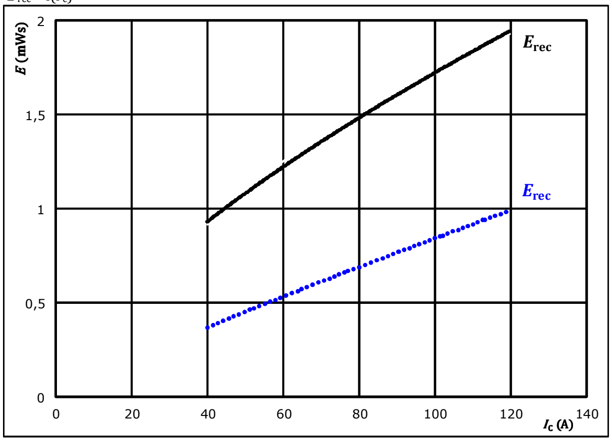
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C (dotted) / 125 °C (solid)
V_{GE} =	±15	V		
I_C =	120	A		

Figure 3. FWD

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_c)$



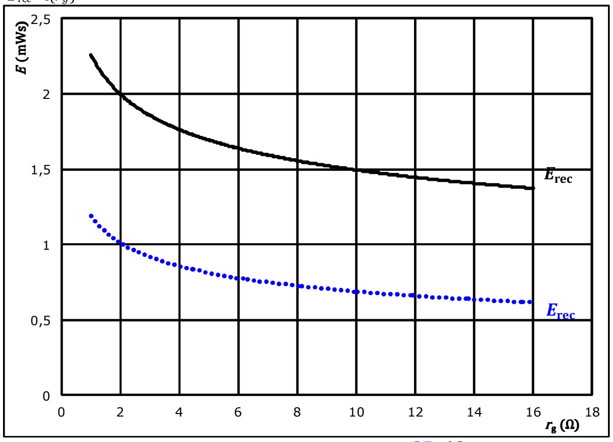
With an inductive load at

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

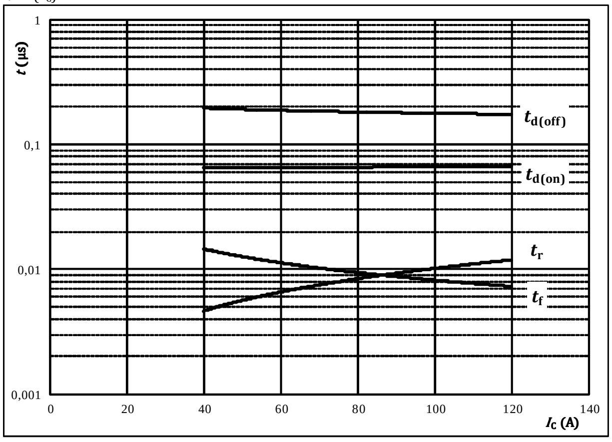
V_{CE} =	350	V	T_j:	25 °C (dotted) / 125 °C (solid)
V_{GE} =	±15	V		
I_C =	120	A		

Buck Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



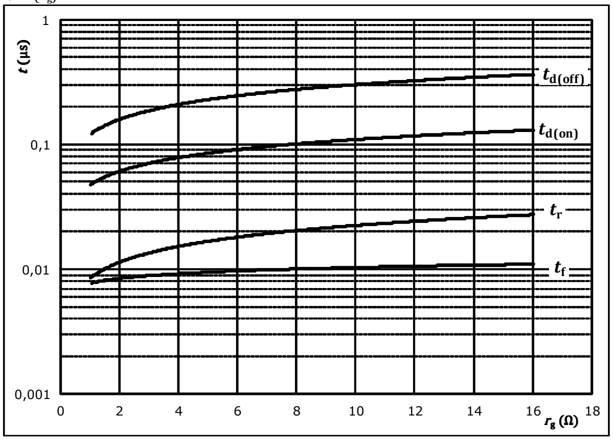
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



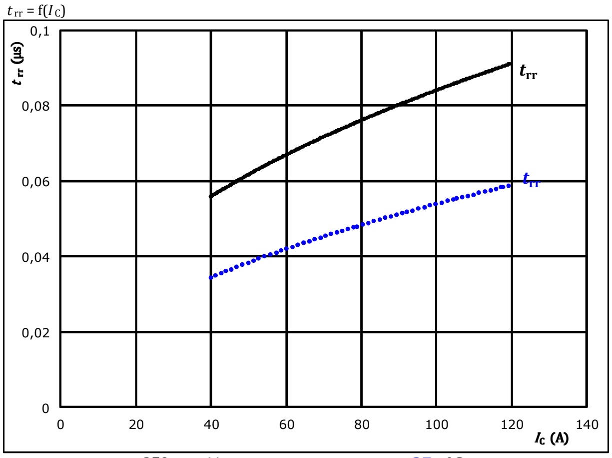
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	120	A

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

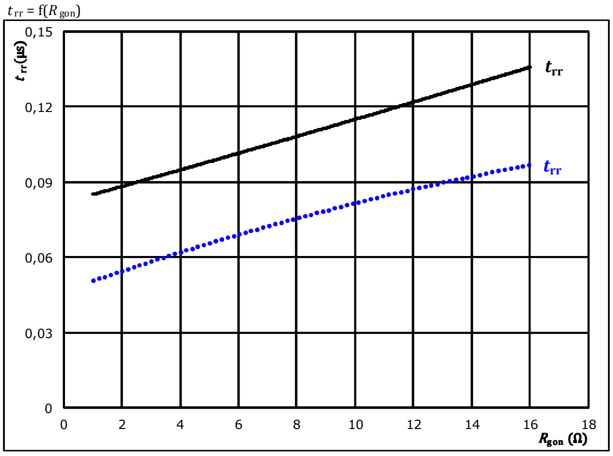


At					
V_{CE}=	350	V		**25 °C**	·············
V_{GE} =	±15	V	T_j:	**125 °C**	————
R_{gon} =	4	Ω			

Figure 8. **FWD**

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

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



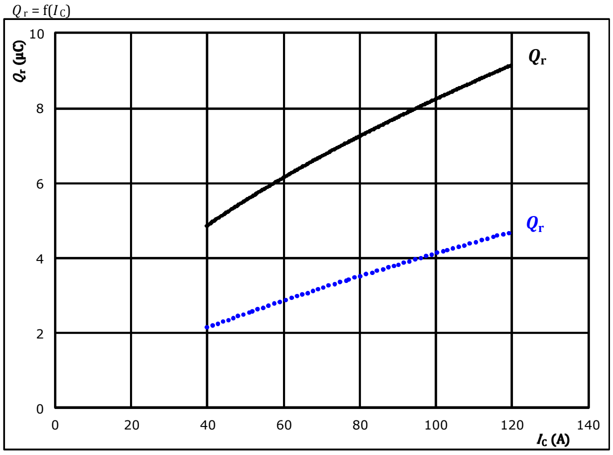
At					
V_{CE} =	350	V		**25 °C**	·············
V_{GE} =	±15	V	T_j:	**125 °C**	————
I_C =	120	A			

Buck Switching Characteristics

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

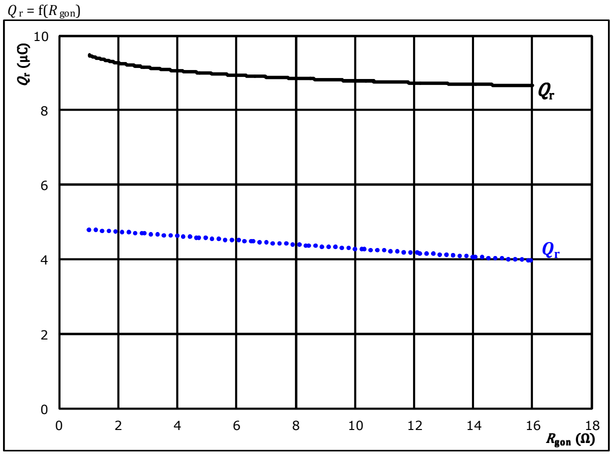


At	V_{CE} =	350	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	4	Ω			

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

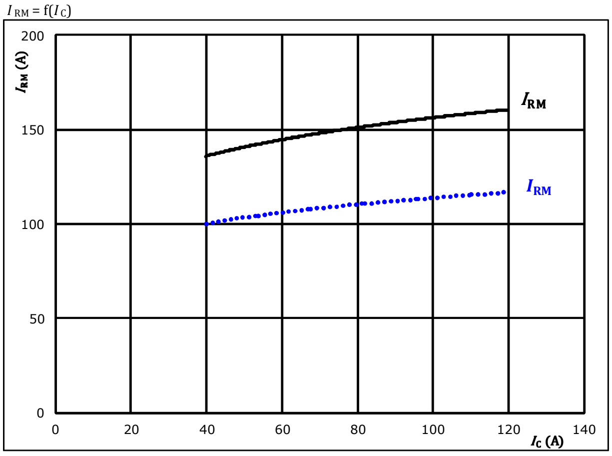


At	V_{CE}=	350	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C=	120	A			

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

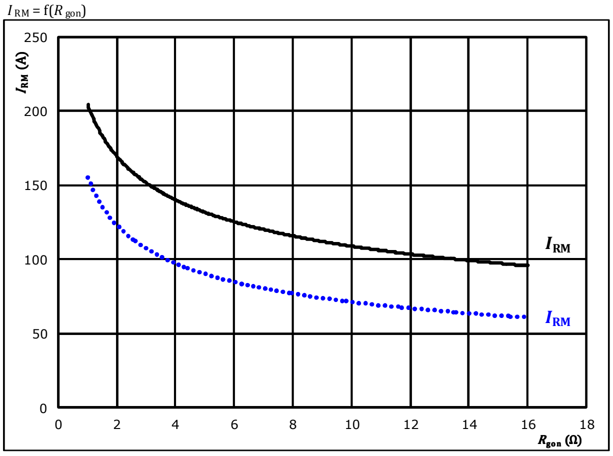


At	V_{CE} =	350	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	R_{gon} =	4	Ω			

Figure 12. **FWD**

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

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



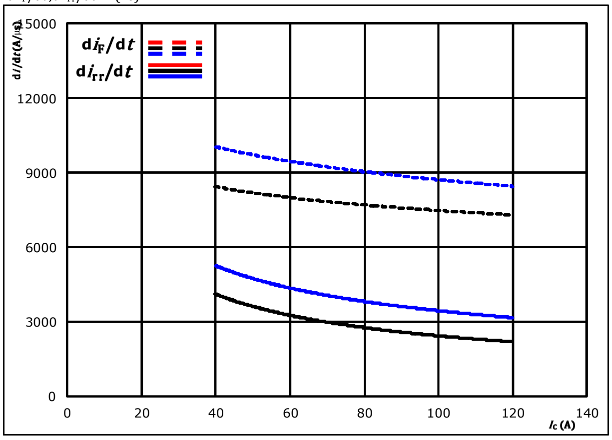
At	V_{CE} =	350	V		25 °C	············
	V_{GE} =	±15	V	T_j:	125 °C	———
	I_C =	120	A			

Buck Switching Characteristics

Figure 13. FWD

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

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

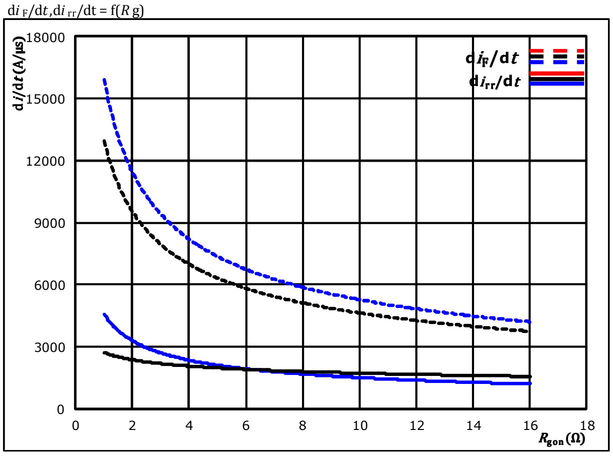


At					
V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	±15	V		125 °C	———
R_{gon} =	4	Ω			

Figure 14. FWD

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

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

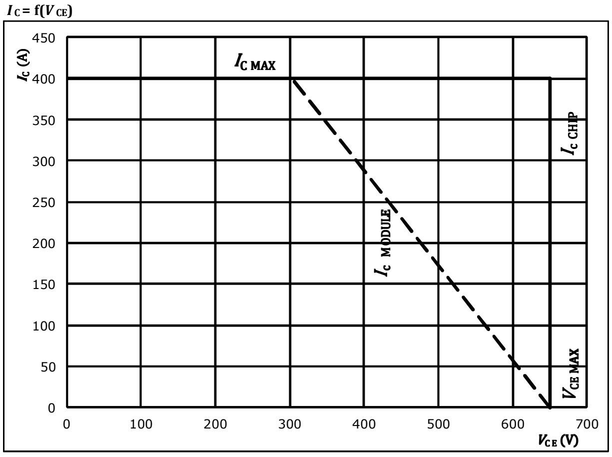


At					
V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	±15	V		125 °C	———
I_C =	120	A			

Figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



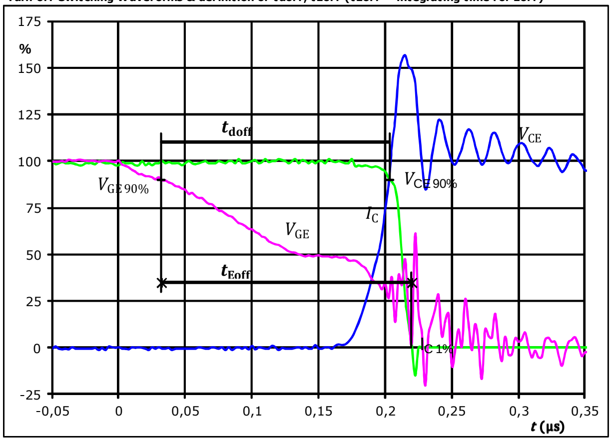
At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Buck Switching Definitions

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

Figure 1. IGBT

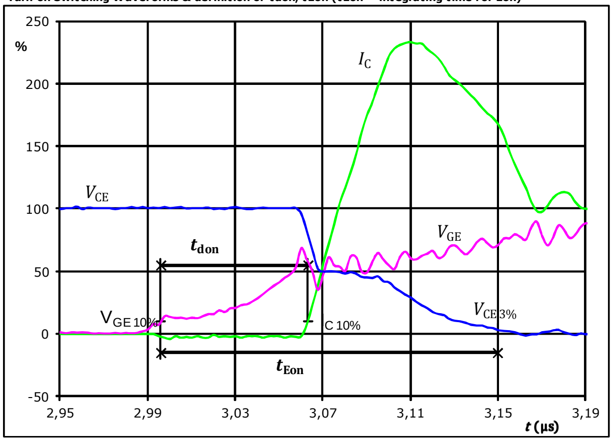
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	20	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{doff} =	0,174	µs
t_{Eoff} =	0,188	µs

Figure 2. IGBT

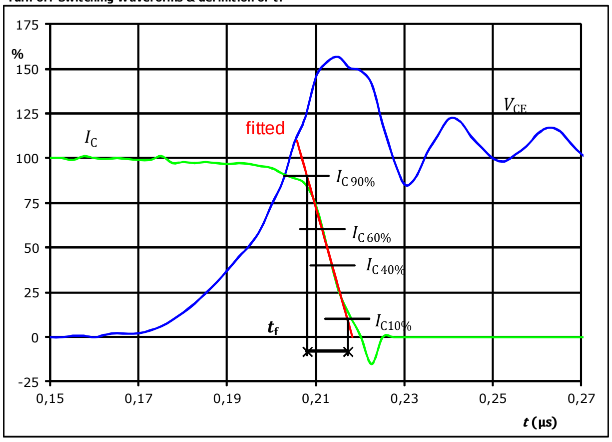
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



$V_{GE}(0\%)$ =	0	V
$V_{GE}(100\%)$ =	20	V
$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_{don} =	0,066	µs
t_{Eon} =	0,154	µs

Figure 3. IGBT

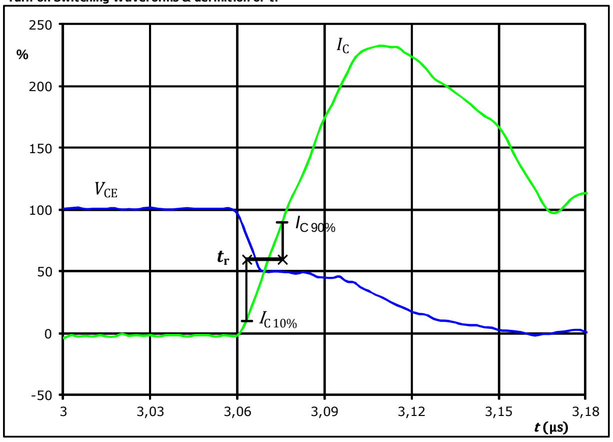
Turn-off Switching Waveforms & definition of tf



$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_f =	0,009	µs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of tr

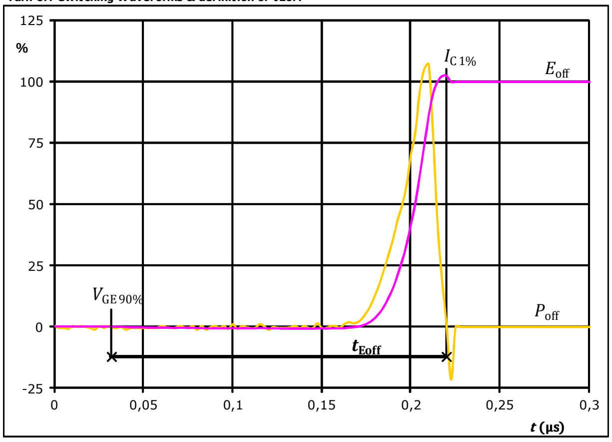


$V_C(100\%)$ =	350	V
$I_C(100\%)$ =	120	A
t_r =	0,012	µs

Buck Switching Definitions

Figure 5. **IGBT**

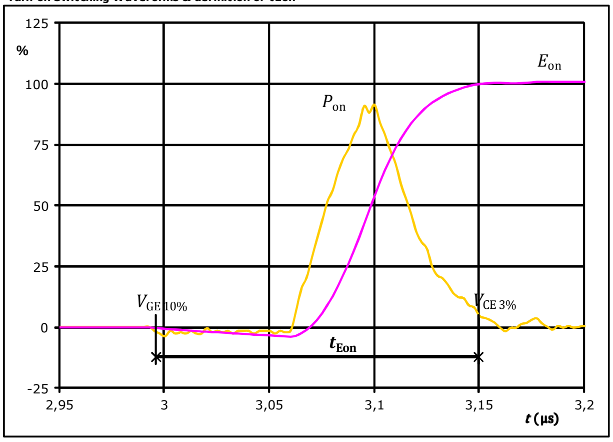
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	41,86	kW
E_{off} (100%) =	0,92	mJ
t_{Eoff} =	0,188	µs

Figure 6. **IGBT**

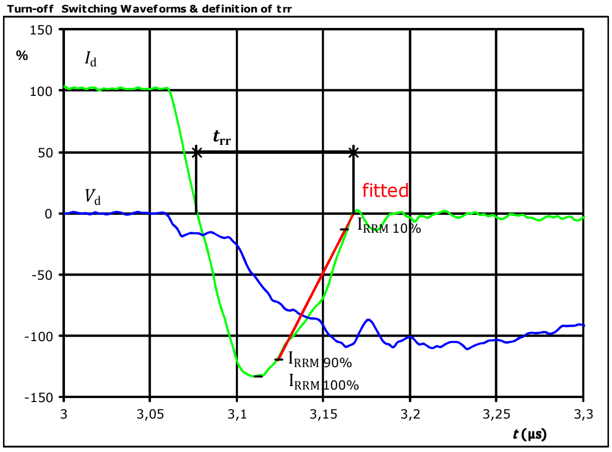
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	41,86	kW
E_{on} (100%) =	1,64	mJ
t_{Eon} =	0,154	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

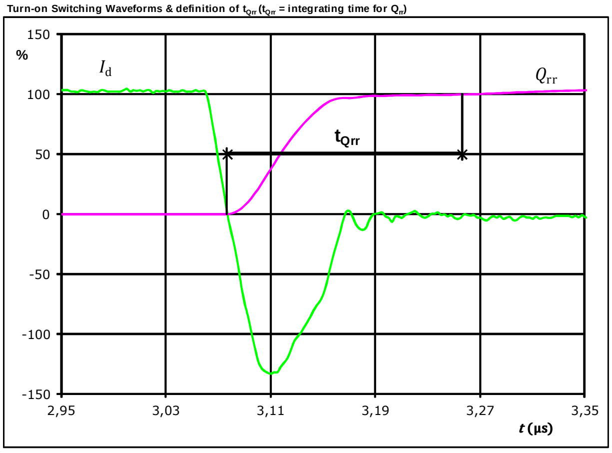


V_d (100%) =	350	V
I_d (100%) =	120	A
I_{RRM} (100%) =	-160	A
t_{rr} =	0,091	µs

Buck Switching Definitions

Figure 8. **FWD**

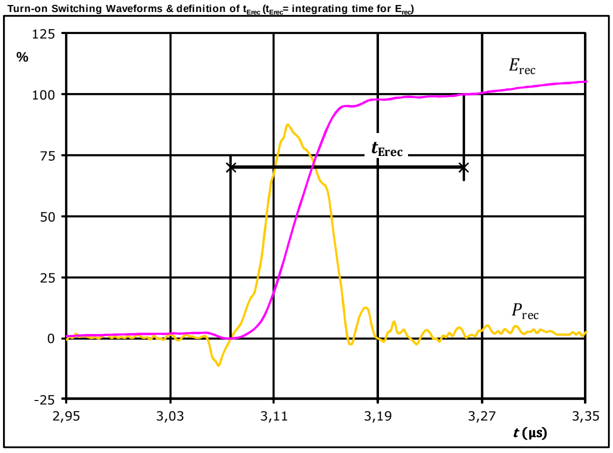
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



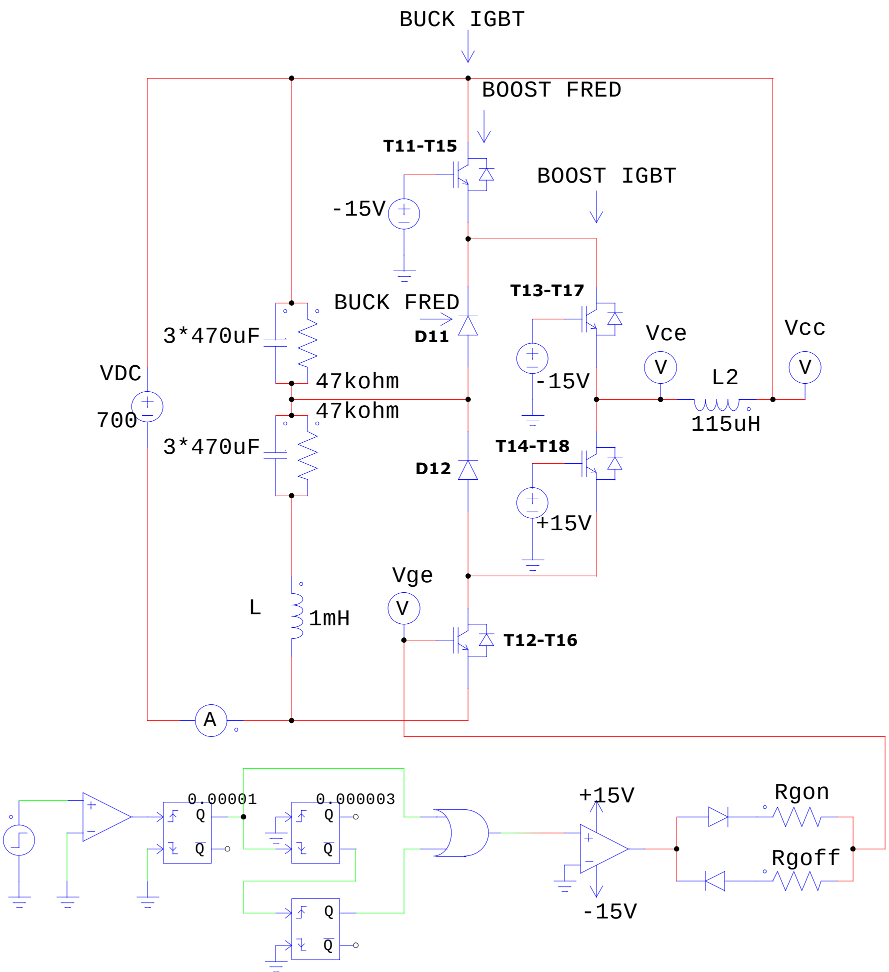
I_d (100%) =	120	A
Q_{rr} (100%) =	9,11	µC
t_{Qrr} =	0,18	µs

Figure 9. **FWD**

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



P_{rec} (100%) =	41,86	kW
E_{rec} (100%) =	1,93	mJ
t_{Erec} =	0,18	µs



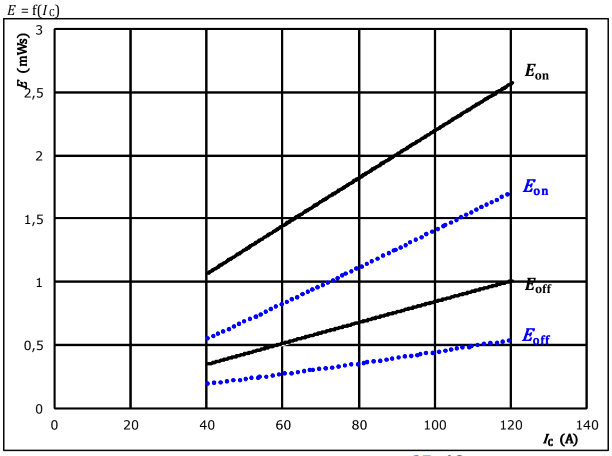
10-FY07NPA200SM02-L366F08
10-PY07NPA200SM02-L366F08Y
datasheet

Out. Boost Switching Characteristics

Figure 1. **IGBT**

Typical switching energy losses as a function of collector current

$E = f(I_C)$



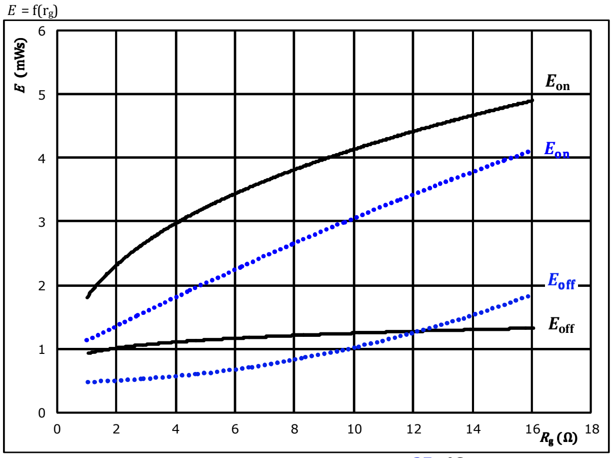
With an inductive load at

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

Figure 2. **IGBT**

Typical switching energy losses as a function of gate resistor

$E = f(r_g)$



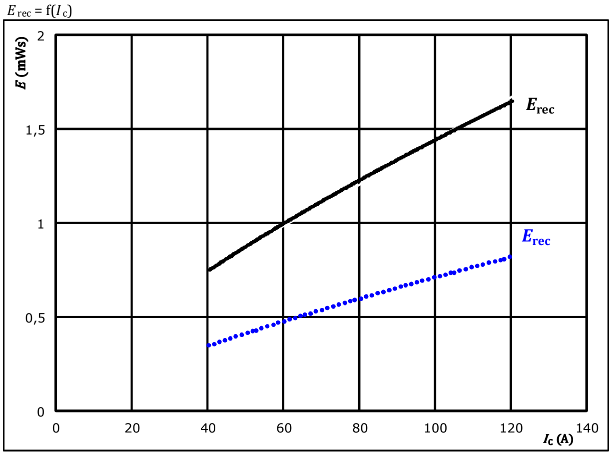
With an inductive load at

V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	±15	V		125 °C	———
I_C =	120	A			

Figure 3. **FWD**

Typical reverse recovered energy loss as a function of collector current

$E_{rec} = f(I_C)$



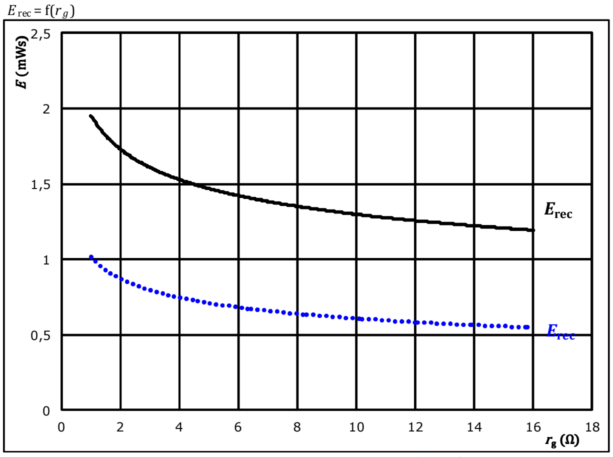
With an inductive load at

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

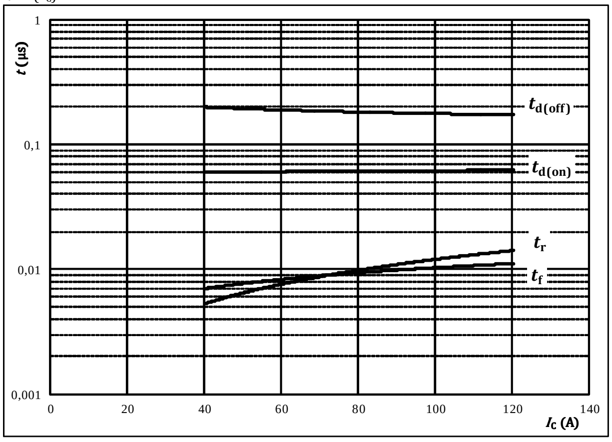
V_{CE} =	350	V	T_j:	25 °C	············
V_{GE} =	±15	V		125 °C	———
I_C =	120	A			

Out. Boost Switching Characteristics

Figure 5. **IGBT**

Typical switching times as a function of collector current

$t = f(I_C)$



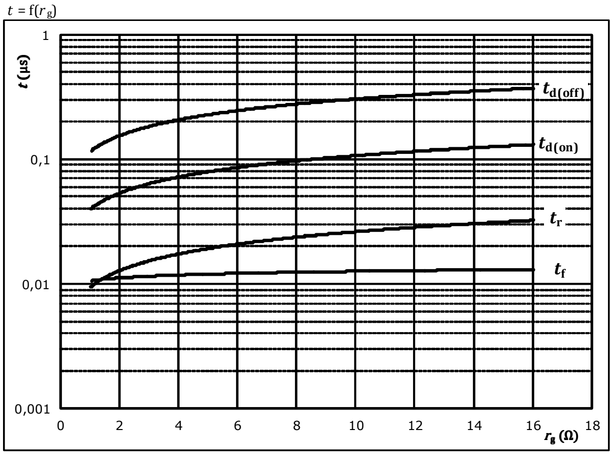
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
R_{gon} =	4	Ω
R_{goff} =	4	Ω

Figure 6. **IGBT**

Typical switching times as a function of gate resistor

$t = f(r_g)$



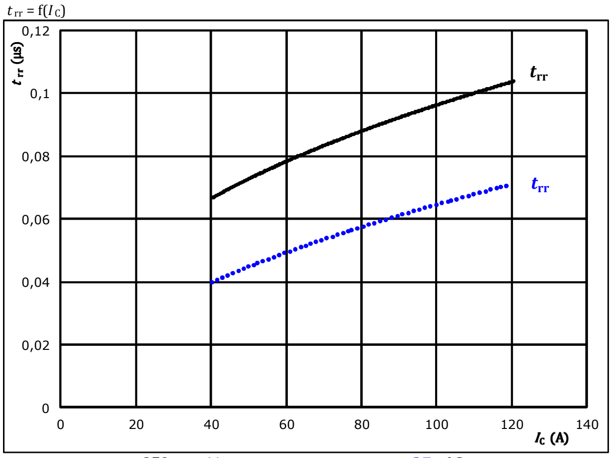
With an inductive load at

T_j =	125	°C
V_{CE} =	350	V
V_{GE} =	±15	V
I_C =	120	A

Figure 7. **FWD**

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

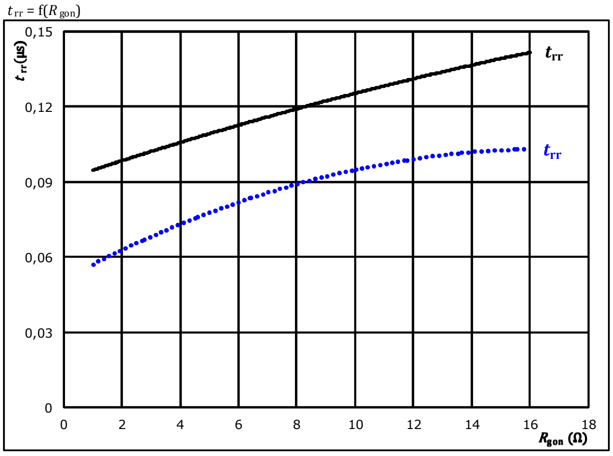


At					
V_{CE}=	350	V		**25 °C**	•••••••••••••
V_{GE} =	±15	V	T_j:	**125 °C**	———
R_{gon} =	4	Ω			

Figure 8. **FWD**

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

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



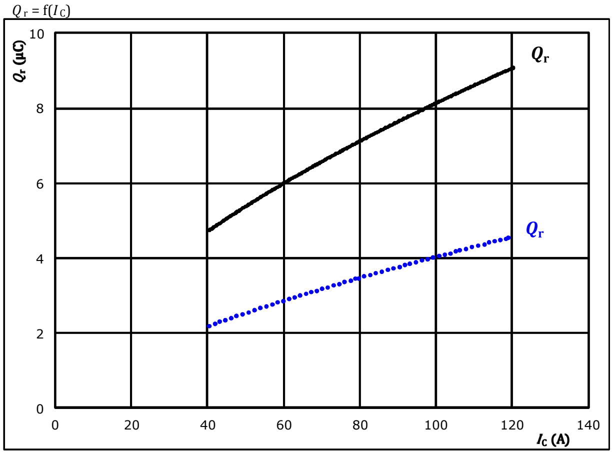
At					
V_{CE} =	350	V		**25 °C**	•••••••••••••
V_{GE} =	±15	V	T_j:	**125 °C**	———
I_C =	120	A			

Out. Boost Switching Characteristics

Figure 9. **FWD**

Typical recovered charge as a function of collector current

$Q_r = f(I_C)$

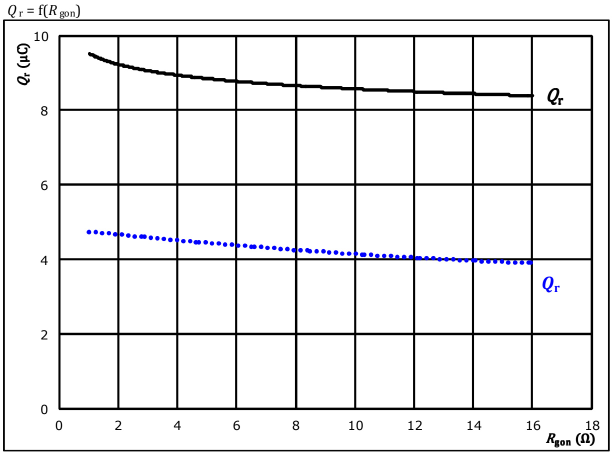


At					
V_{CE} =	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	——
R_{gon} =	4	Ω			

Figure 10. **FWD**

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

$Q_r = f(R_{gon})$

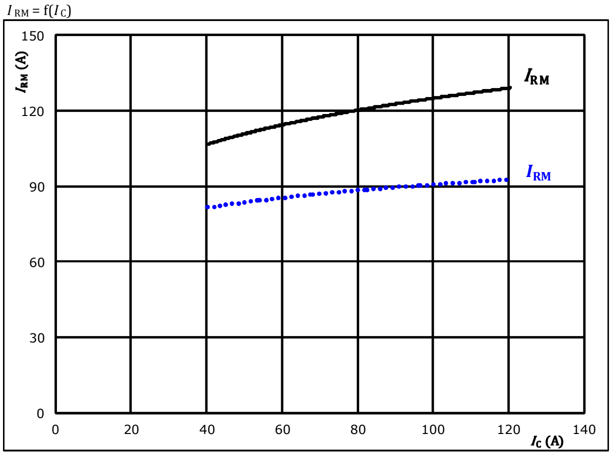


At					
V_{CE}=	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	——
I_C=	120	A			

Figure 11. **FWD**

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

$I_{RM} = f(I_C)$

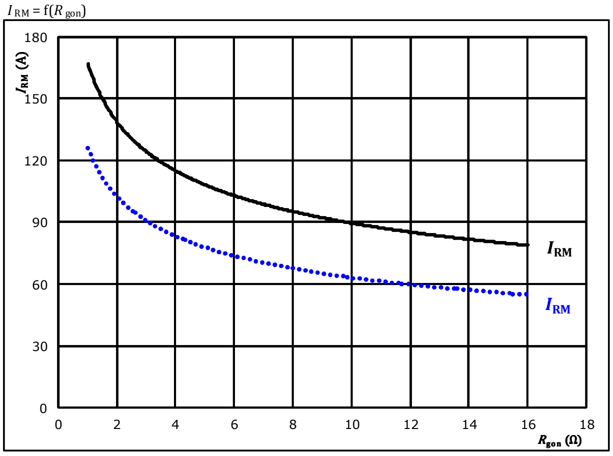


At					
V_{CE} =	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	——
R_{gon} =	4	Ω			

Figure 12. **FWD**

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

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



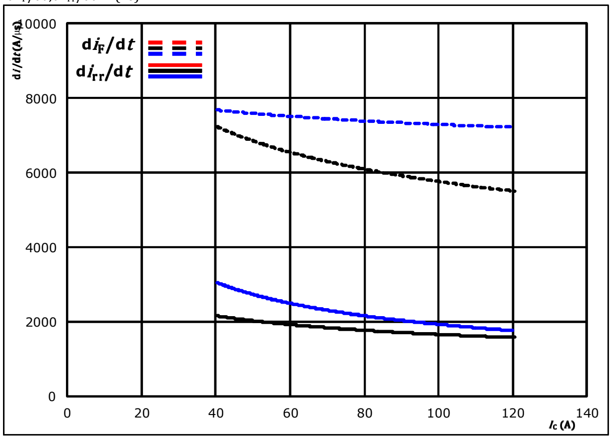
At					
V_{CE} =	350	V		25 °C	··········
V_{GE} =	±15	V	T_j:	125 °C	——
I_C =	120	A			

Out. Boost Switching Characteristics

Figure 13. **FWD**

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

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

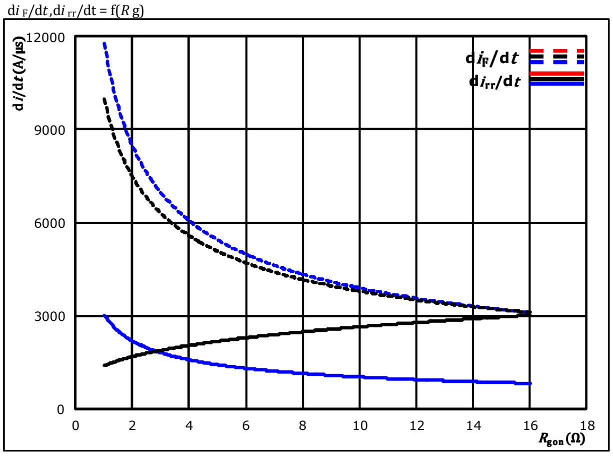


At				
V_{CE} =	350	V		25 °C
V_{GE} =	±15	V	T_j:	125 °C
R_{gon} =	4	Ω		

Figure 14. **FWD**

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

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

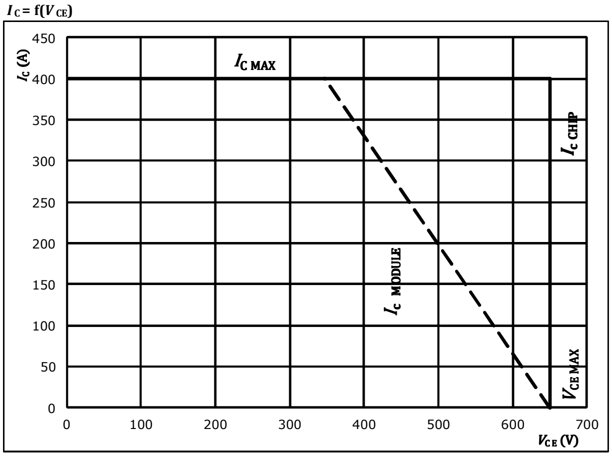


At				
V_{CE} =	350	V		25 °C
V_{GE} =	±15	V	T_j:	125 °C
I_C =	120	A		

Figure 15. **IGBT**

Reverse bias safe operating area

$I_C = f(V_{CE})$



At		
T_j =	175	°C
R_{gon} =	4	Ω
R_{goff} =	4	Ω

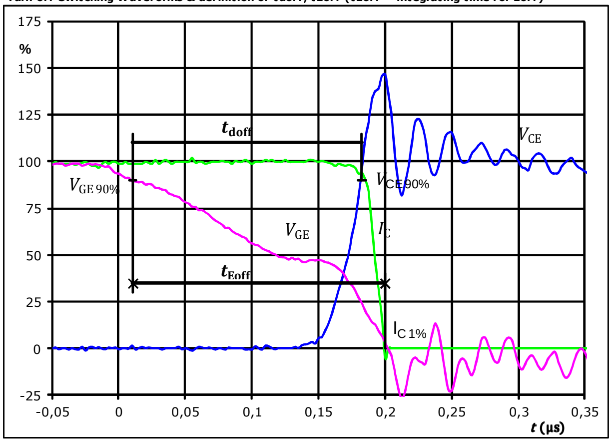
Out. Boost Switching Definitions

General conditions

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

Figure 1. **IGBT**

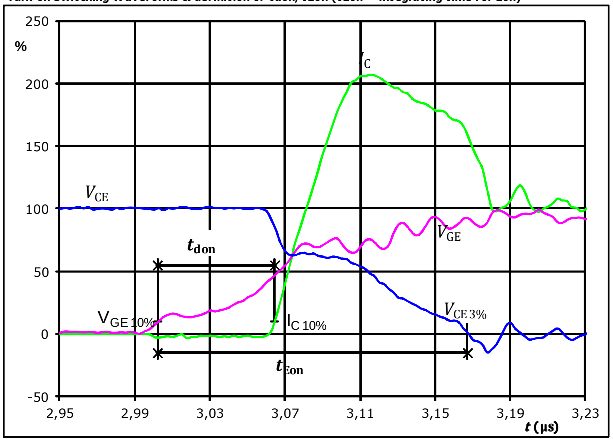
Turn-off Switching Waveforms & definition of tdoff, tEoff (tEoff = integrating time for Eoff)



V_{GE}(0%) =	0	V
V_{GE}(100%) =	20	V
V_C(100%) =	350	V
I_C(100%) =	120	A
t_{doff} =	0,171	µs
t_{Eoff} =	0,189	µs

Figure 2. **IGBT**

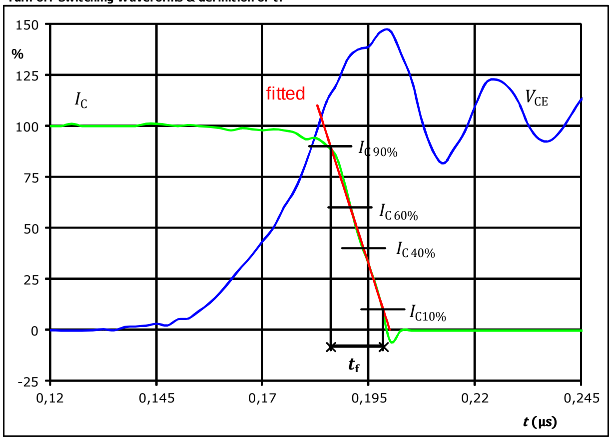
Turn-on Switching Waveforms & definition of tdon, tEon (tEon = integrating time for Eon)



V_{GE}(0%) =	0	V
V_{GE}(100%) =	20	V
V_C(100%) =	350	V
I_C(100%) =	120	A
t_{don} =	0,062	µs
t_{Eon} =	0,165	µs

Figure 3. **IGBT**

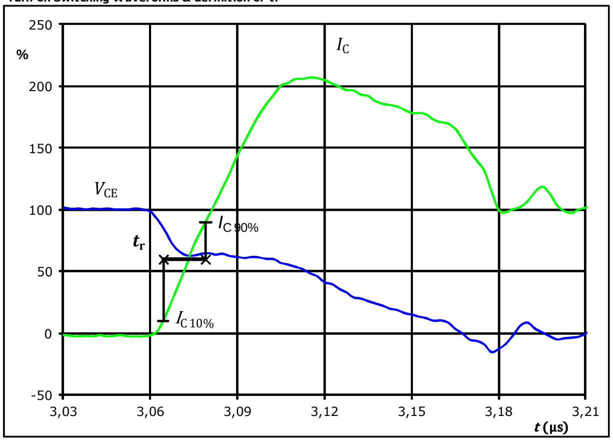
Turn-off Switching Waveforms & definition of tf



V_C(100%) =	350	V
I_C(100%) =	120	A
t_f =	0,012	µs

Figure 4. **IGBT**

Turn-on Switching Waveforms & definition of tr

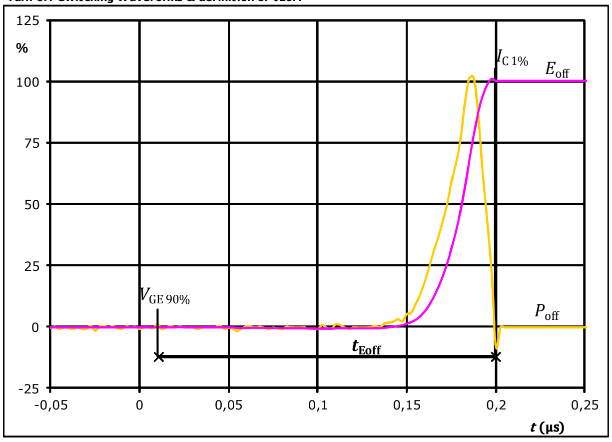


V_C(100%) =	350	V
I_C(100%) =	120	A
t_r =	0,014	µs

Out. Boost Switching Definitions

Figure 5. **IGBT**

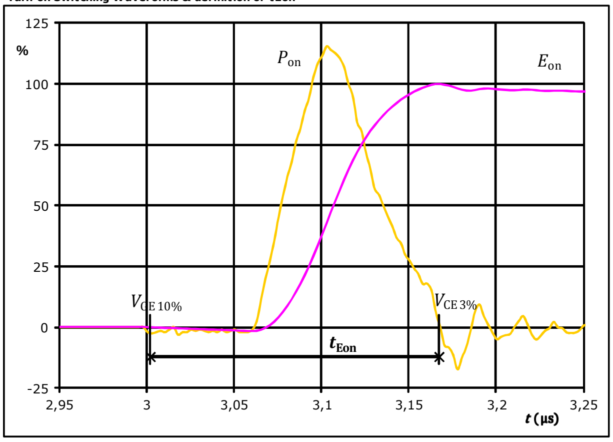
Turn-off Switching Waveforms & definition of tEoff



P_{off} (100%) =	42,14	kW
E_{off} (100%) =	1,01	mJ
t_{Eoff} =	0,189	µs

Figure 6. **IGBT**

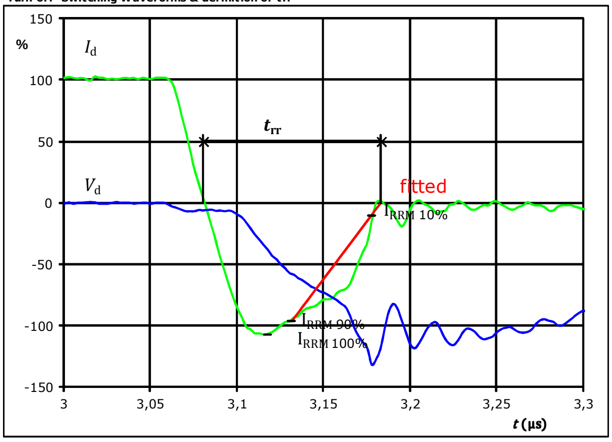
Turn-on Switching Waveforms & definition of tEon



P_{on} (100%) =	42,14	kW
E_{on} (100%) =	2,57	mJ
t_{Eon} =	0,165	µs

Figure 7. **FWD**

Turn-off Switching Waveforms & definition of trr

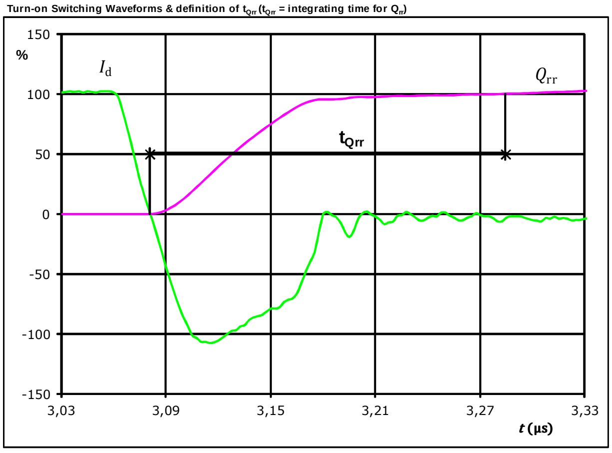


V_d (100%) =	350	V
I_d (100%) =	120	A
I_{RRM} (100%) =	-129	A
t_{rr} =	0,103	µs

Out. Boost Switching Definitions

Figure 8. **FWD**

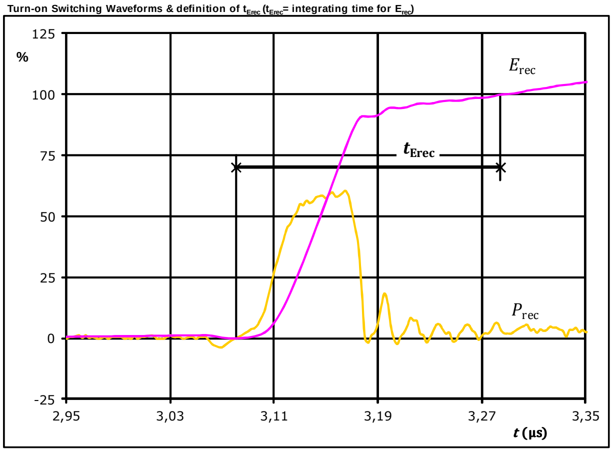
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



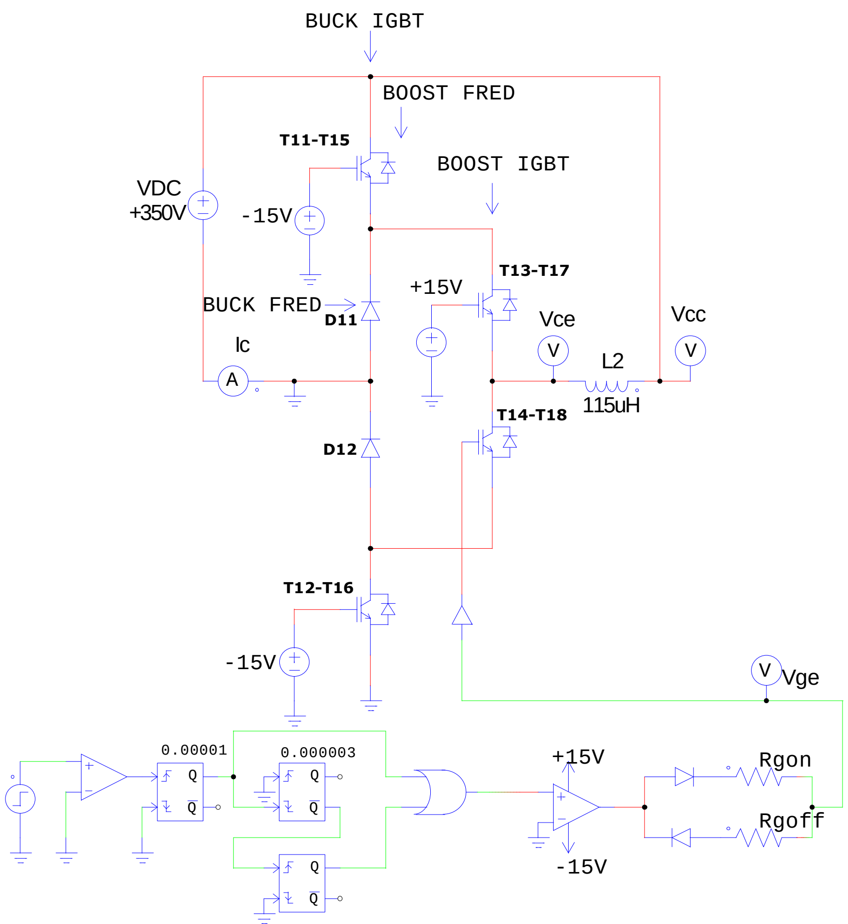
I_d (100%) =	120	A
Q_{rr} (100%) =	9,16	µC
t_{Qrr} =	0,20	µs

Figure 9. **FWD**

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



P_{rec} (100%) =	42,14	kW
E_{rec} (100%) =	1,68	mJ
t_{Erec} =	0,20	µs



Ordering Code & Marking

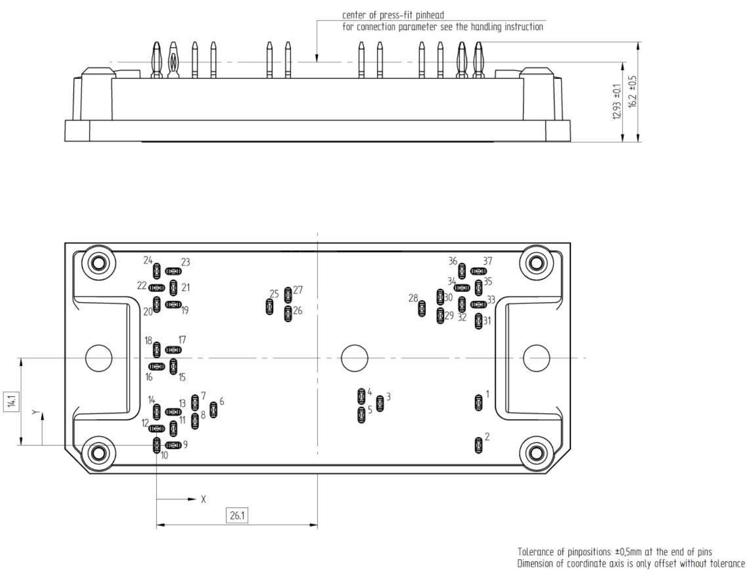
Version	Ordering Code
without thermal paste 12mm housing with Solder pins	10-FY07NPA200SM02-L366F08
without thermal paste 12mm housing with Press-fit pins	10-PY07NPA200SM02-L366F08Y

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

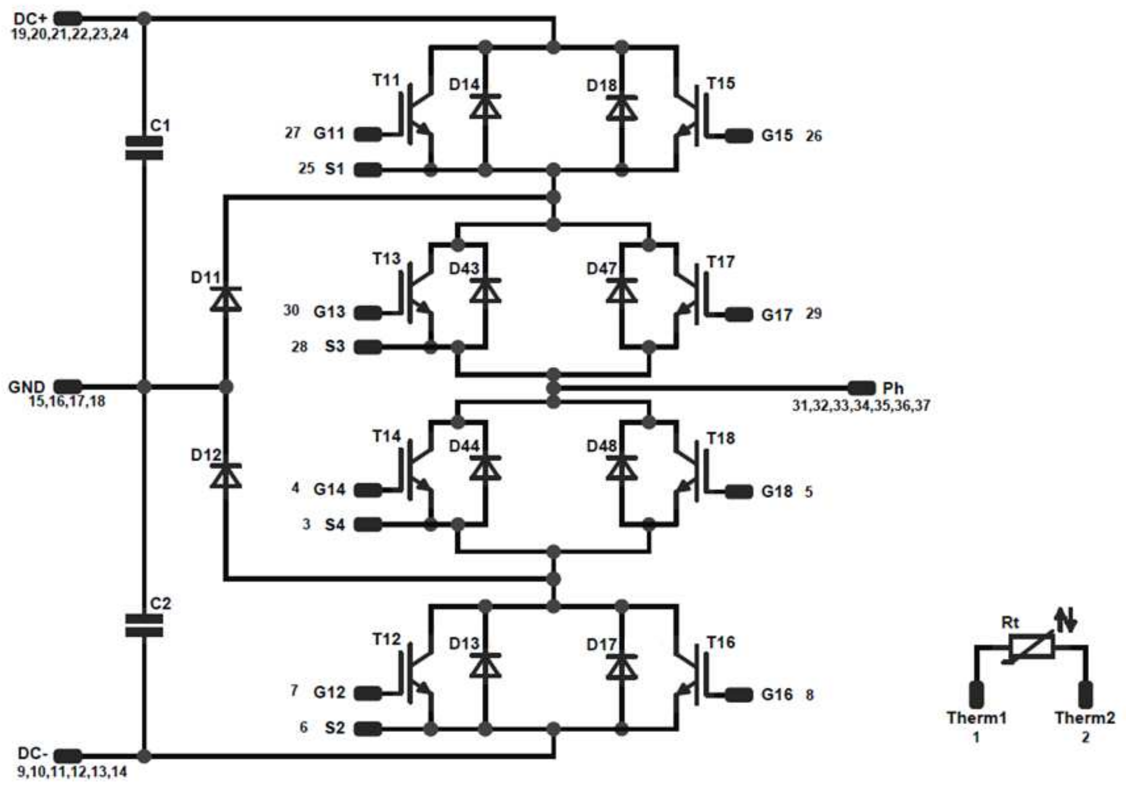
Outline

Pin table [mm]

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	
D43,D44,D47,D48	FWD	650V	100A	Out. Boost Inverse Diode	
C1,C2	Capacitor	500V	-	DC Link Capacitor	
Rt	NTC	-	-	Thermistor	

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

Handling instruction
Handling instructions for *flow* 1 packages see vincotech.com website.

Package data
Package data for *flow* 1 packages see vincotech.com website.

Document No.:	**Date:**	**Modification:**	**Pages**
10-FY07NPA200SM02-L366F08-D3-14	16 Nov. 2015	Added Press-fit option	1, 30