10-0B06PPA006RC-L023A09
datasheet

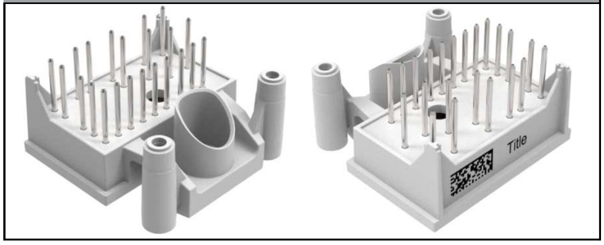
Vincotech

flow **PIM 0B + PFC** — **600 V / 6 A**

Features

- Converter, PFC, inverter in one housing
- New high speed IGBT for PFC
- One screw heatsink mounting

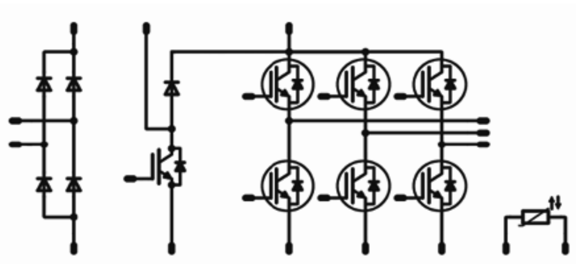
flow 0 B housing



Target applications

- Embedded drives

Schematic



Types

- 10-0B06PPA006RC-L023A09

Maximum Ratings

T_j=25°C, unless otherwise specified

Parameter	Symbol	Condition		Value	Unit
Inverter Switch					
Collector-emitter break down voltage	V_{CES}			600	V
DC collector current	I_C	T_j=$T_j$max	T_h=80°C	11	A
Pulsed collector current	I_{Cpulse}	t_p limited by $T_j$max		18	A
Turn off safe operating area		Tj≤ 150°C, VCE≤ 600V		12	A
Power dissipation	P_{tot}	T_j=$T_j$max	T_h=80°C	39	W
Gate-emitter peak voltage	V_{GE}			±20	V
Short circuit ratings	t_{SC} V_{CC}	Tj≤ 150°C VGE= 15V		5 400	µs V
Maximum Junction Temperature	$T_j$max			175	°C

Parameter	Symbol	Condition		Value	Unit
PFC Switch					
Collector-emitter break down voltage	V_{CES}			650	V
DC collector current	I_C	$T_j=T_j$max	$T_h=80°C$	21	A
Pulsed collector current	I_{Cpulse}	t_p limited by $T_j$max		45	A
Turn off safe operating area		Tj≤ 150°C, VCE≤ 650V		45	A
Power dissipation	P_{tot}	$T_j=T_j$max	$T_h=80°C$	44	W
Gate-emitter peak voltage	V_{GE}			±20	V
Maximum Junction Temperature	$T_j$max			175	°C

Parameter	Symbol	Conditions		Value	Unit
PFC Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
DC forward current	I_F	$T_j=T_j$max	$T_h=80°C$	27	A
Repetitive peak forward current	I_{FRM}			30	A
Non-repetitive peak surge current	I_{FSM}	60Hz Single Half Sine Wave		45	A
Power dissipation	P_{tot}	$T_j=T_j$max	$T_h=80°C$	43	W
Maximum Junction Temperature	$T_j$max			175	°C

Parameter	Symbol	Conditions		Value	Unit
PFC Switch Protection Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			650	V
DC forward current	I_F	$T_j=T_j$max	$T_h=80°C$	12	A
Repetitive peak forward current	I_{FRM}			12	A
Power dissipation	P_{tot}	$T_j=T_j$max	$T_h=80°C$	32	W
Maximum Junction Temperature	$T_j$max			175	°C

Parameter	Symbol	Conditions		Value	Unit
Rectifier Diode					
Peak Repetitive Reverse Voltage	V_{RRM}			1600	V
DC forward current	I_{FAV}	$T_j=T_j$max	$T_h=80°C$	13	A
Non-repetitive peak surge current	I_{FSM}	60Hz Single Half Sine Wave		150	A
Power dissipation	P_{tot}	$T_j=T_j$max	$T_h=80°C$	34	W
Maximum Junction Temperature	$T_j$max			150	°C

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Characteristic Values

Inverter 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	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,00011	25 125	4,4	5	5,6	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		6	25 125 150	1,68	2,33 2,26 2,39	2,42	V
Collector-emitter cut-off	I_{CES}		0	600		25 125			2	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Input capacitance	C_{ies}	f=1 MHz	0	25		25		470		pF
Output capacitance	C_{oss}							24		
Reverse transfer capacitance	C_{rss}							14		
Gate charge	Q_{Gate}		15	480	6	25		48		nC
Thermal										
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						2,41		K/W
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	Rgoff=64Ω Rgon=64Ω	±15	400	6	25 125		106 102		ns
Rise time	t_r					25 125		18 22		
Turn-off delay time	$t_{d(off)}$					25 125		121 127		
Fall time	t_f					25 125		8 50		
Turn-on energy loss per pulse	E_{on}	QrrFWD=0,3µC QrrFWD=0,5µC				25 125		0,160 0,241		mWs
Turn-off energy loss per pulse	E_{off}					25 125		0,078 0,112		
FWD Switching										
Peak recovery current	I_{RRM}	di/dt=410A/µs di/dt=227A/µs	±15	400	6	25 125		4 5		A
Reverse recovery time	t_{rr}					25 125		192 235		ns
Reverse recovery charge	Q_{rr}					25 125		0,310 0,531		µC
Reverse recovered energy	E_{rec}					25 125		0,086 0,138		mWs
Peak rate of fall of recovery current	di(rec)max /dt					25 125		58 46		A/µs

PFC 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	$V_{GE(th)}$	$V_{GE}=V_{CE}$			0,0004	25 125	3,3	4	4,7	V
Collector-emitter saturation voltage	$V_{CE(sat)}$		15		15	25 125 150		1,64 1,77 1,80	2,22	V
Collector-emitter cut-off	I_{CES}		0	650		25 125			40	µA
Gate-emitter leakage current	I_{GES}		20	0		25 125			120	nA
Integrated Gate resistor	R_{gint}							none		Ω
Input capacitance	C_{ies}	f=1MHz	0	25		25		930		pF
Output capacitance	C_{oss}							24		
Reverse transfer capacitance	C_{rss}							4		
Gate charge	Q_{Gate}		15	520	15	25		38		nC

Parameter	Symbol	Conditions					Min	Typ	Max	Unit
Thermal										
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material ʎ=3,4W/mK						2,14		K/W

Parameter	Symbol	Conditions	V_{GE} [V]	V_{CE} [V]	I_C [A]	T_j [°C]	Min	Typ	Max	Unit
IGBT Switching										
Turn-on delay time	$t_{d(on)}$	Rgoff=32Ω Rgon=32Ω	15/0	400	6	25 125		15 17		ns
Rise time	t_r					25 125		11 11		
Turn-off delay time	$t_{d(off)}$					25 125		162 191		
Fall time	t_f					25 125		5 4		
Turn-on energy loss per pulse	E_{on}	QrrFWD=0,2µC QrrFWD=0,5µC				25 125		0,137 0,213		mWs
Turn-off energy loss per pulse	E_{off}					25 125		0,031 0,057		

PFC Diode

Parameter	Symbol	Conditions					Value			Unit
		dI_F/dt [A/us]		V_r [V]	I_F [A]	T_j	Min	Typ	Max	
Static										
Forward voltage	V_F				15	25°C 125°C 150°C		1,44 1,33 1,29	1,77	V
Reverse leakage current	I_{rm}			650		25°C 150°C			0,94 -	µA
Thermal										
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						2,19		K/W
FWD Switching										
Peak recovery current	I_{RRM}	di/dt=465A/µs di/dt=436A/µs	15/0	400	6	25 125		9 13		A
Reverse recovery time	t_{rr}					25 125		47 64		ns
Reverse recovery charge	Q_{rr}					25 125		0,236 0,509		µC
Reverse recovered energy	E_{rec}					25 125		0,040 0,095		mWs
Peak rate of fall of recovery current	di(rec)max /dt					25 125		404 917		A/µs

PFC Protection Diode

Parameter	Symbol	Conditions					Value			Unit
		dI_F/dt [A/us]		V_r [V]	I_F [A]	T_j	Min	Typ	Max	
Static										
Forward voltage	V_F				6	25°C 125°C 150°C		1,73 1,59 1,54	1,87	V
Reverse leakage current	I_{rm}			650		25°C 150°C			0,1 -	µA
Thermal										
Thermal resistance chip to heatsink	R_{thJH}	Phase-Change Material λ=3,4W/mK						3,01		K/W

Rectifier Diode

Parameter	Symbol	Conditions					Value			Unit
		dI_F/dt [A/us]		V_r [V]	I_F [A]	T_j	Min	Typ	Max	
Static										
Forward voltage	V_F				7	25°C 125°C 150°C		1,04 0,97 -	1,14	V
Reverse leakage current	I_r			1600		25°C 150°C			20 -	µA
Thermal										
Thermal resistance chip to heatsink per chip	R_{thJH}	Phase-Change Material λ=3,4W/mK						2,09		K/W

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	ΔR/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	

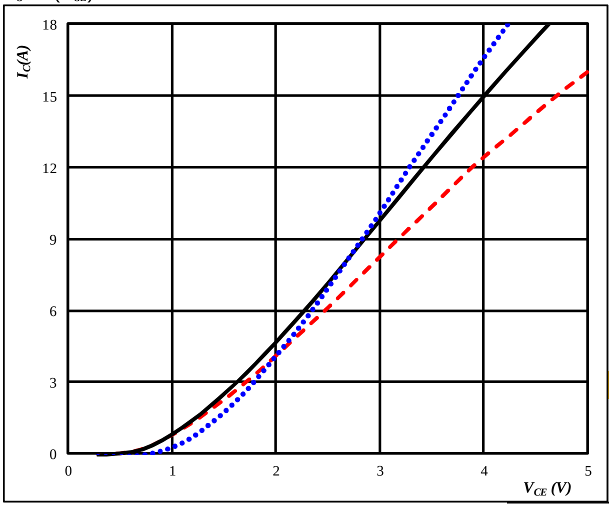
Module Properties

Parameter	Symbol	Conditions		Value	Unit
Thermal Properties					
Storage temperature	T_{stg}			-40…+125	°C
Operation temperature under switching condition	T_{op}			-40…+(Tjmax - 25)	°C
Insulation Properties					
Insulation voltage	V_{is}	DC voltage	t=2s	4000	V
Creepage distance				min 12,7	mm
Clearance				min 12,7	mm
Comparative tracking index	CTI			>200	

Inverter Switch Characteristics

Typical output characteristics **IGBT**

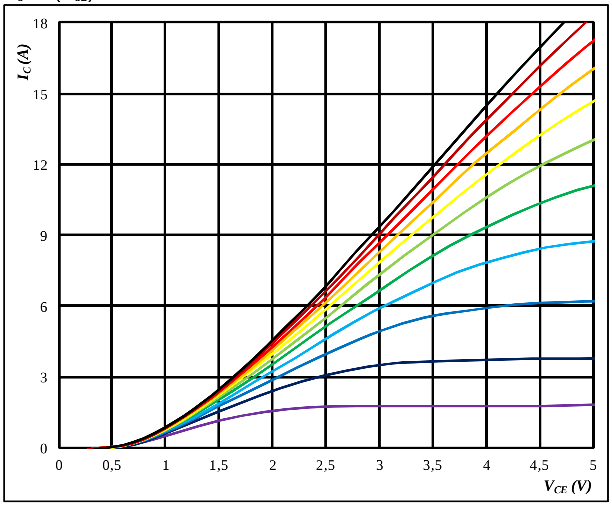
$I_C = f(V_{CE})$



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

Typical output characteristics **IGBT**

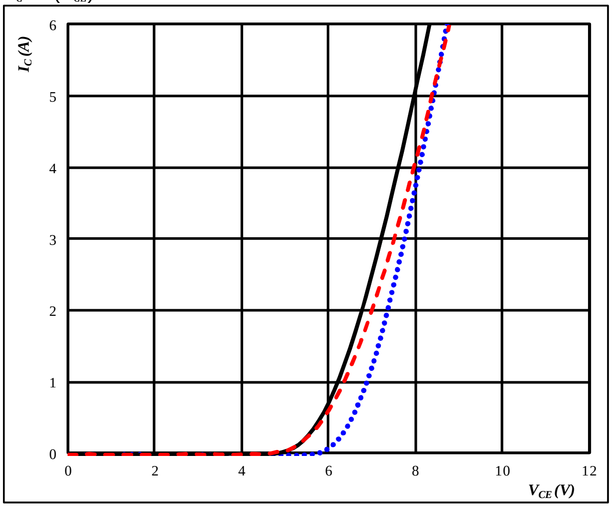
$I_C = f(V_{CE})$



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

Typical transfer characteristics **IGBT**

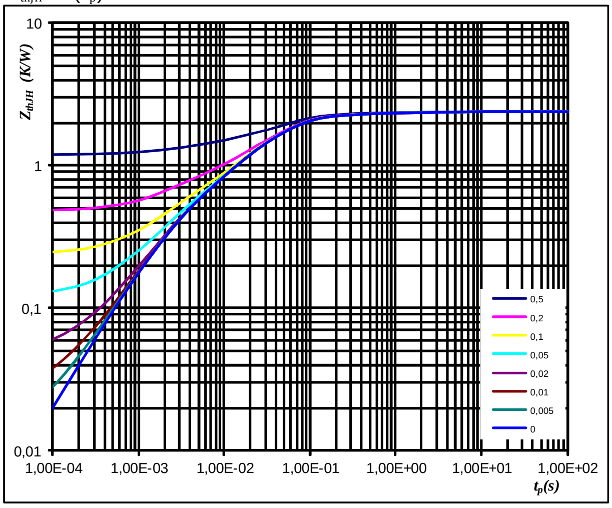
$I_C = f(V_{CE})$



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

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

$Z_{thJH} = f(t_p)$



D =	t_p / T	
R_{thJH} =	2,41	K/W

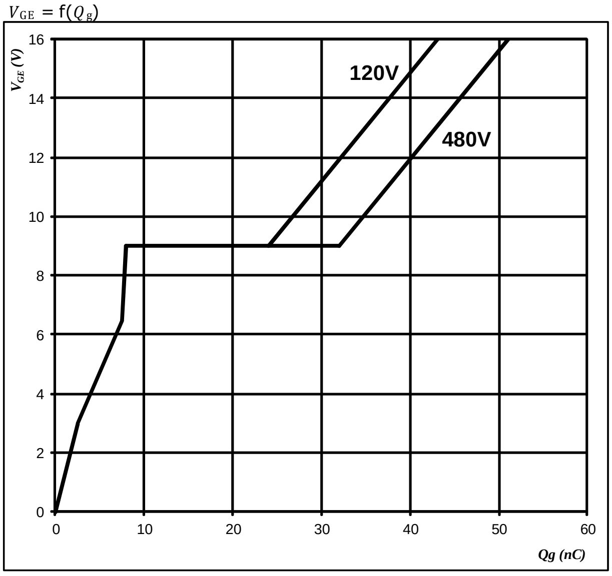
IGBT thermal model values

R (K/W)	Tau (s)
7,21E-02	2,78E+00
1,73E-01	2,71E-01
1,45E+00	4,23E-02
4,08E-01	1,17E-02
3,14E-01	2,24E-03

Inverter Switch Characteristics

Gate voltage vs Gate charge IGBT

$V_{GE} = f(Q_g)$

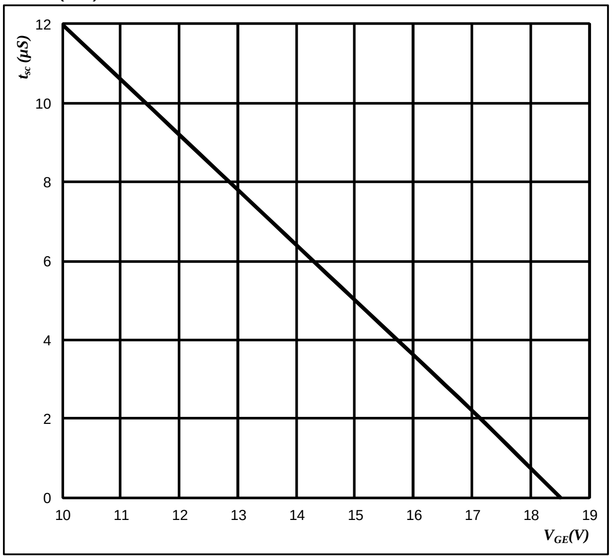


At

I_C=	6	A

Short circuit withstand time as a function of V_{GE} IGBT

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

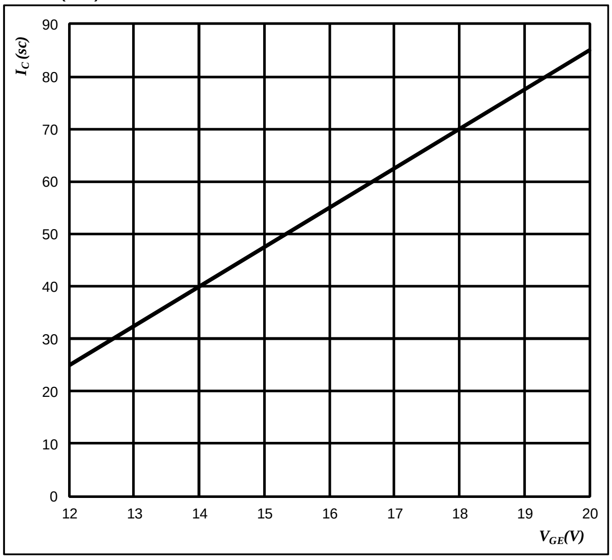


At

V_{CE} =	400	V
T_j ≤	150	ºC

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

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



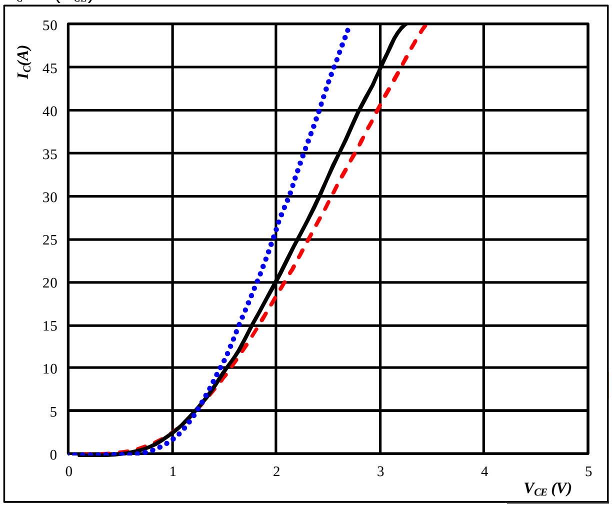
At

V_{CE} ≤	400	V
T_j ≤	25	ºC

PFC Switch Characteristics

Typical output characteristics — IGBT

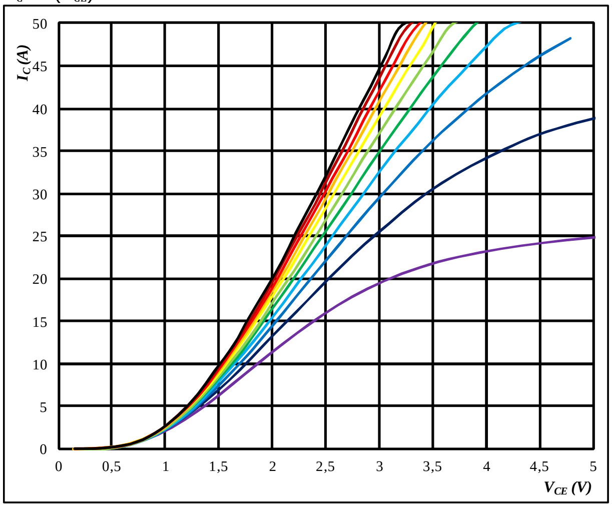
$I_C = f(V_{CE})$



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

Typical output characteristics — IGBT

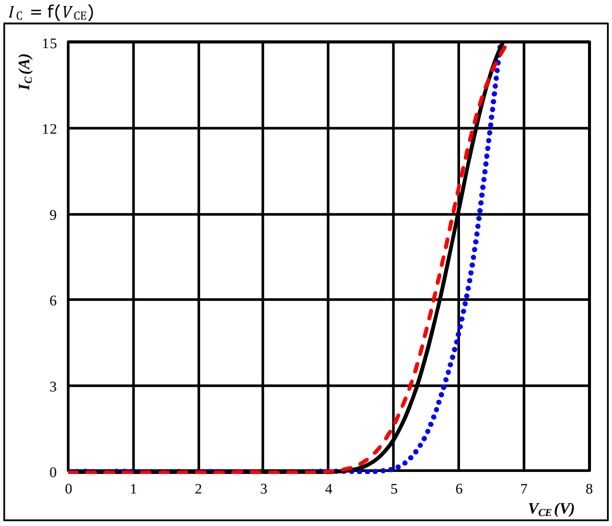
$I_C = f(V_{CE})$



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

Typical transfer characteristics — IGBT

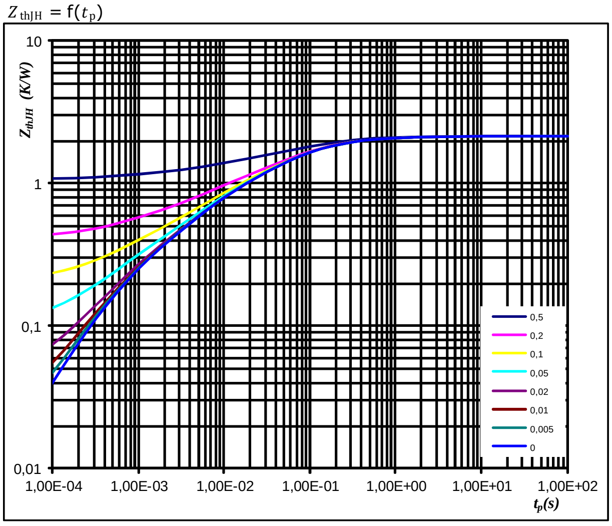
$I_C = f(V_{CE})$



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

Transient thermal impedance as a function of pulse width — IGBT

$Z_{thJH} = f(t_p)$



$D = t_p / T$
R_{thJH} = 2,14 K/W

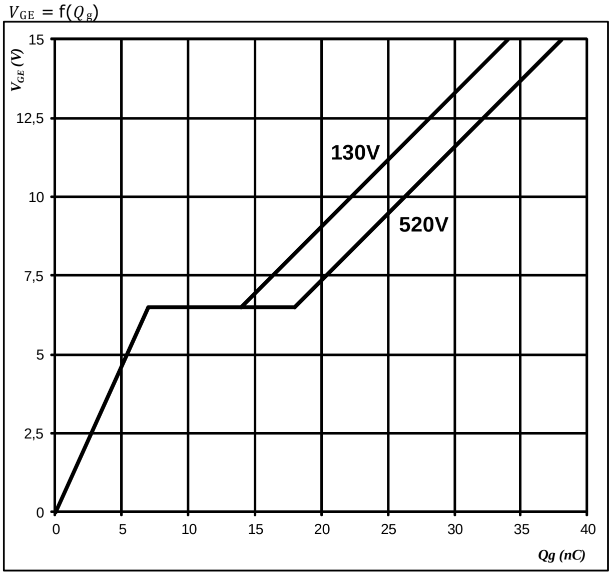
IGBT thermal model values

R (K/W)	Tau (s)
1,10E-01	1,85E+00
3,05E-01	2,58E-01
8,44E-01	6,42E-02
4,55E-01	1,26E-02
2,79E-01	3,05E-03
1,45E-01	4,84E-04

PFC Switch Characteristics

Gate voltage vs Gate charge IGBT

V_{GE} = f(Q_g)



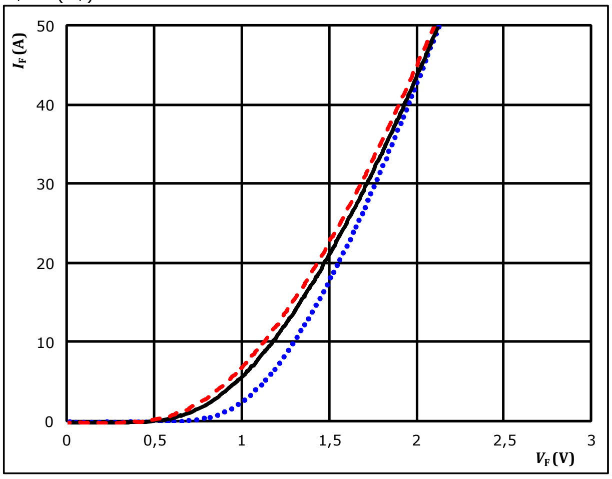
At

I_C= 15 A

PFC Diode Characteristics

Typical forward characteristics FWD

I_F = f(V_F)

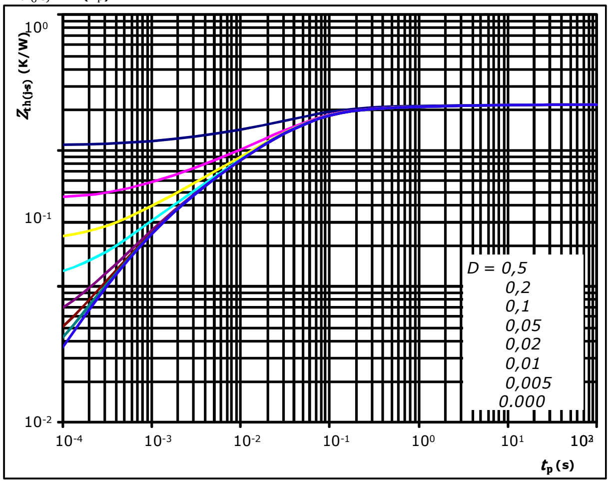


t_p = 250 µs

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

$R_{th(j-s)}$ = 2,19 K/W

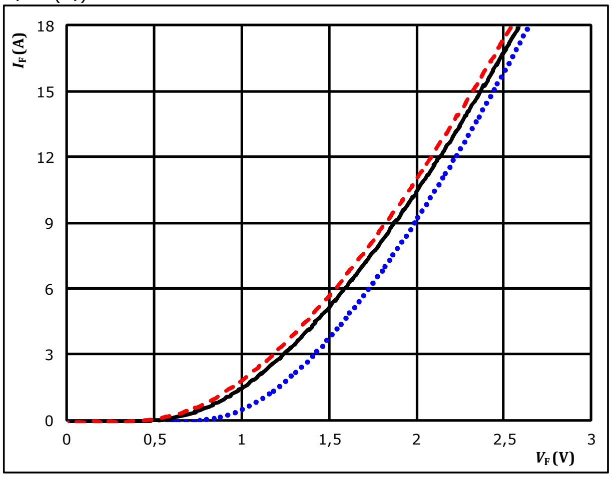
FWD thermal model values

R (K/W)	τ (s)
6,49E-02	4,22E+00
1,67E-01	4,66E-01
9,76E-01	5,57E-02
5,62E-01	1,45E-02
3,00E-01	2,81E-03
1,17E-01	5,62E-04

PFC Protection Diode characteristics

Typical forward characteristics **FWD**

$I_F = f(V_F)$

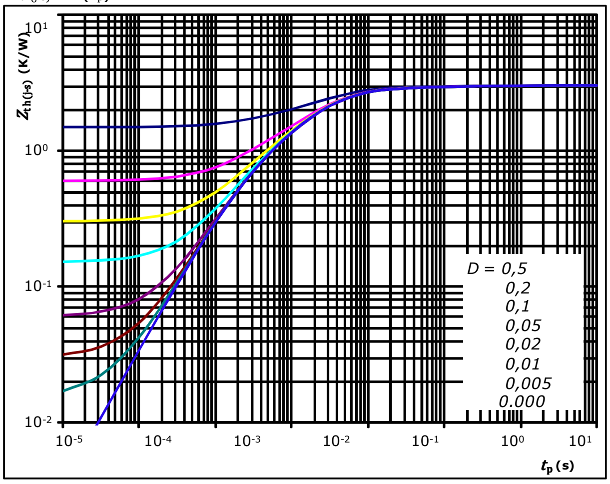


t_p = 250 µs

T_j: 25 °C; 125 °C; 150 °C

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

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



$D = t_p / T$

$R_{th(j\text{-}s)}$ = 3,01 K/W

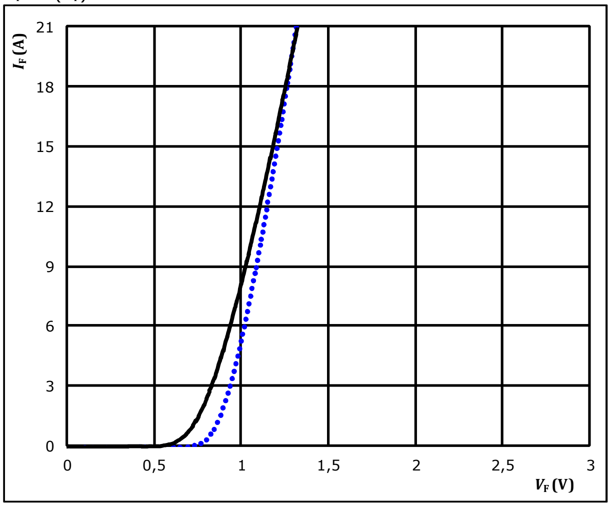
FWD thermal model values

R (K/W)	τ (s)
5,15E-02	9,38E+00
9,53E-02	8,91E-01
3,22E-01	1,25E-01
1,35E+00	2,97E-02
8,32E-01	8,19E-03
3,58E-01	1,78E-03

Rectifier characteristics

Typical forward characteristics — **Rectifier Diode**

$I_F = f(V_F)$

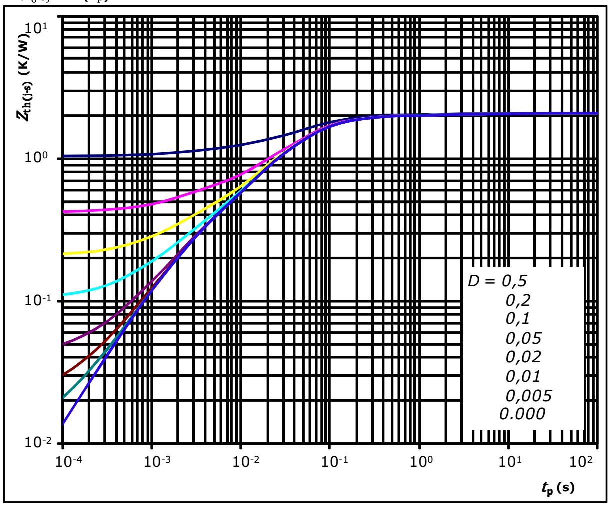


t_p = 250 µs

T_j: 25 °C, 125 °C, 150 °C

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

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



$D = t_p / T$

$R_{th(j-s)}$ = 2,09 K/W

Diode thermal model values

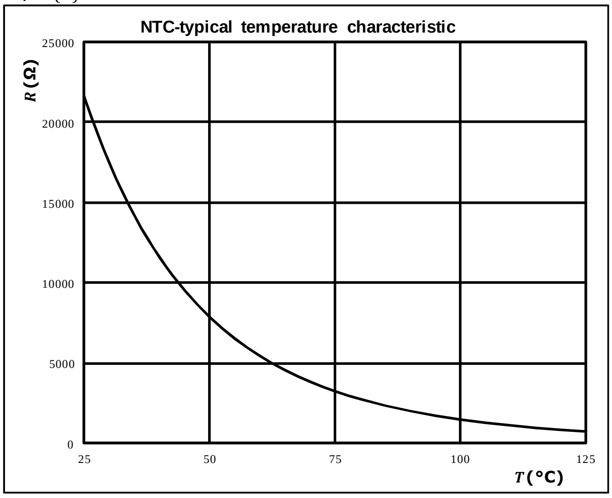
R (K/W)	τ (s)
4,86E-02	1,03E+01
1,45E-01	6,91E-01
1,18E+00	6,09E-02
5,40E-01	1,88E-02
1,74E-01	1,96E-03

Thermistor Characteristics

Thermistor typical temperature characteristic

Typical NTC characteristic
as a function of temperature

$R_T = f(T)$

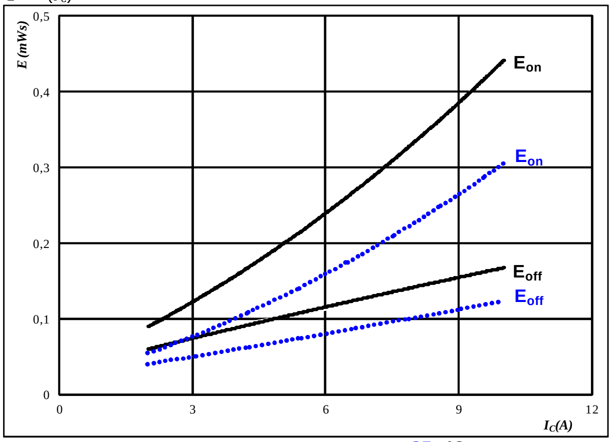


Inverter Switching Definitions

Figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



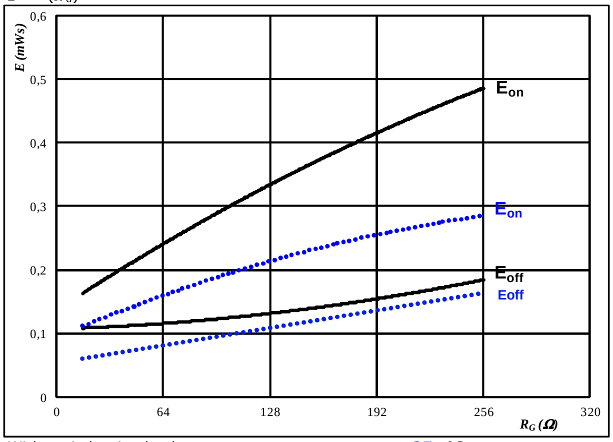
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	64	Ω		150 °C	dashed
R_{goff} =	64	Ω			

Figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



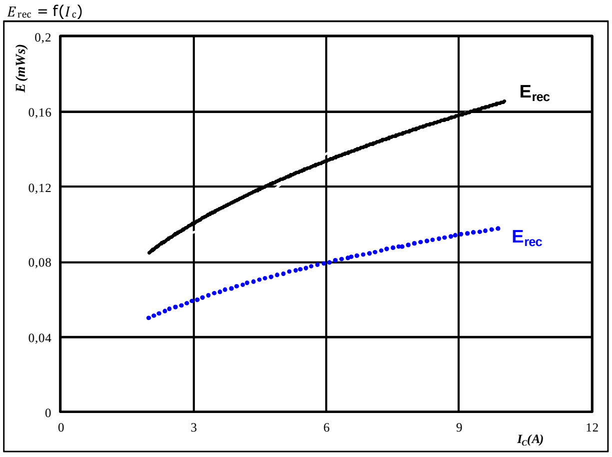
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
I_C =	6	A		150 °C	dashed

Figure 3. FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



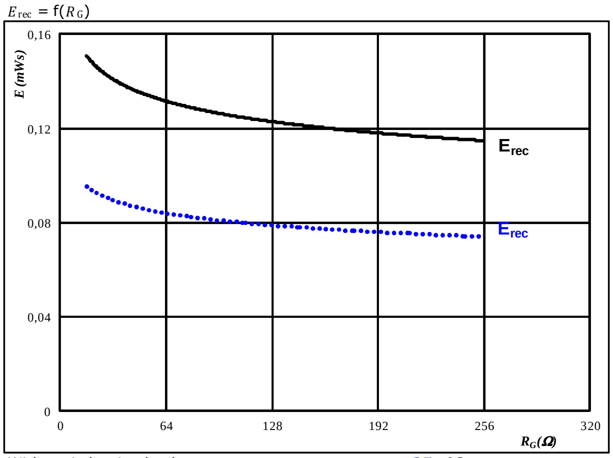
With an inductive load at

V_{CE} =	400	V	T_j:	25 °C	dotted
V_{GE} =	±15	V		125 °C	solid
R_{gon} =	64	Ω		150 °C	dashed

Figure 4. FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$

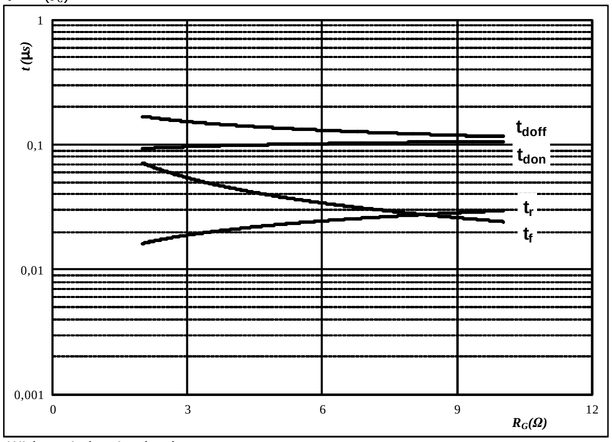


With an inductive load at

V_{CE}=	400	V	T_j:	25 °C	dotted
V_{GE}=	±15	V		125 °C	solid
I_C=	6	A		150 °C	dashed

Inverter Switching Definitions

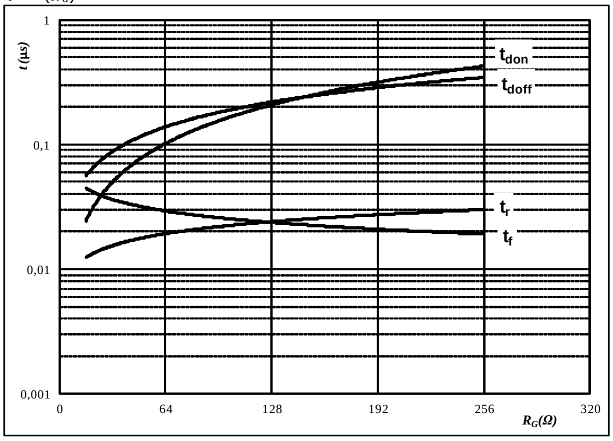
Figure 5. IGBT
Typical switching times as a function of collector current
$t = f(I_C)$



With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	±15	V
R_{gon} =	64	Ω
R_{goff} =	64	Ω

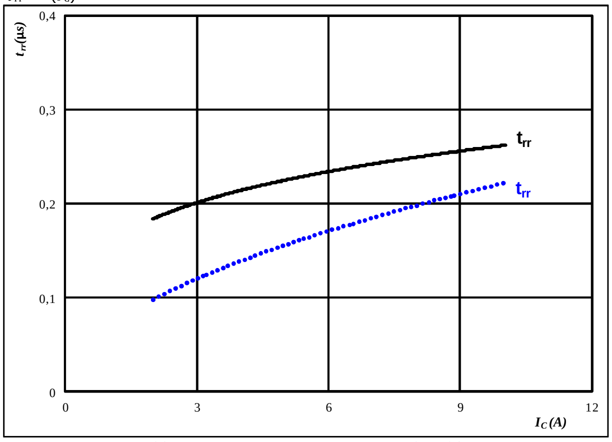
Figure 6. IGBT
Typical switching times as a function of gate resistor
$t = f(R_G)$



With an inductive load at

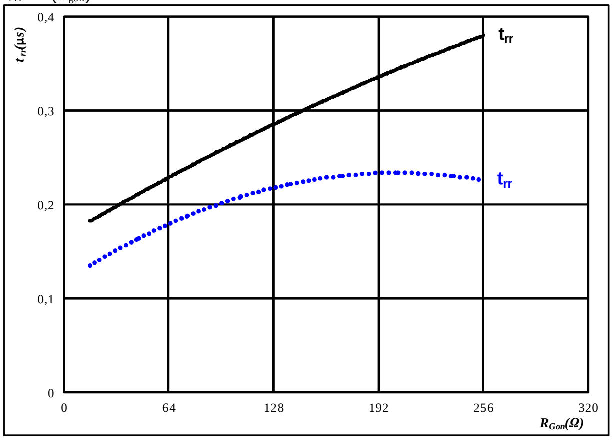
T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	±15	V
I_C =	6	A

Figure 7. FWD
Typical reverse recovery time as a function of collector current
$t_{rr} = f(I_C)$



At					
V_{CE}=	400	V		25 °C	dotted (blue)
V_{GE} =	±15	V	T_j:	125 °C	solid (black)
R_{gon} =	64	Ω		150 °C	dashed (red)

Figure 8. FWD
Typical reverse recovery time as a function of IGBT turn on gate resistor
$t_{rr} = f(R_{gon})$



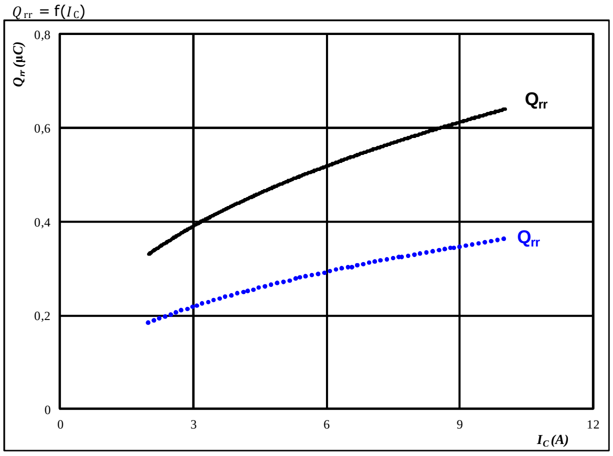
At					
V_{CE}=	400	V		25 °C	dotted (blue)
V_{GE} =	±15	V	T_j:	125 °C	solid (black)
I_C=	6	A		150 °C	dashed (red)

Inverter Switching Definitions

Figure 9. FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$

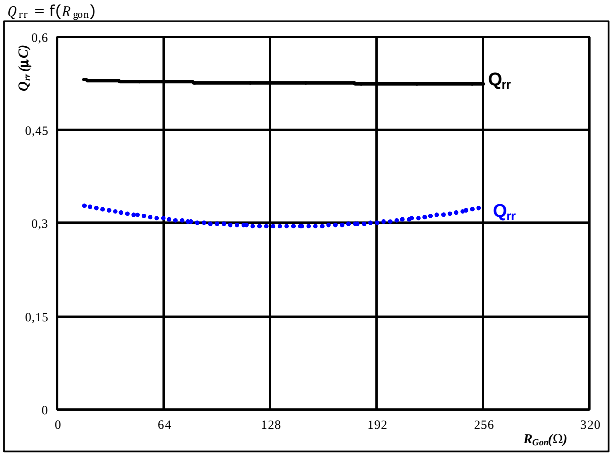


At					
V_{CE}=	400	V		25 °C	··············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	64	Ω		150 °C	– – – –

Figure 10. FWD

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

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

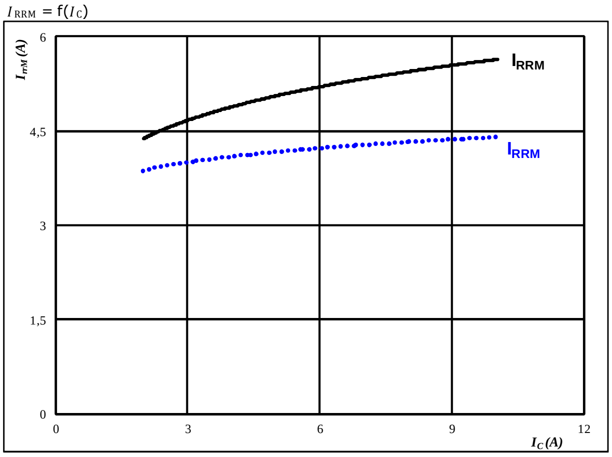


At					
V_{CE}=	400	V		25 °C	··············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	6	A		150 °C	– – – –

Figure 11. FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$

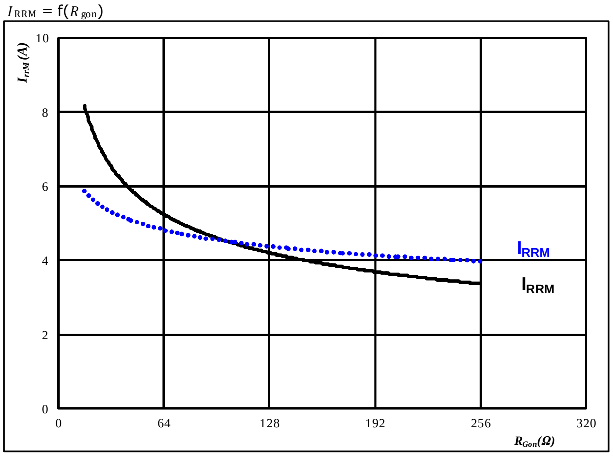


At					
V_{CE}=	400	V		25 °C	··············
V_{GE} =	±15	V	T_j:	125 °C	———
R_{gon} =	64	Ω		150 °C	– – – –

Figure 12. FWD

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

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



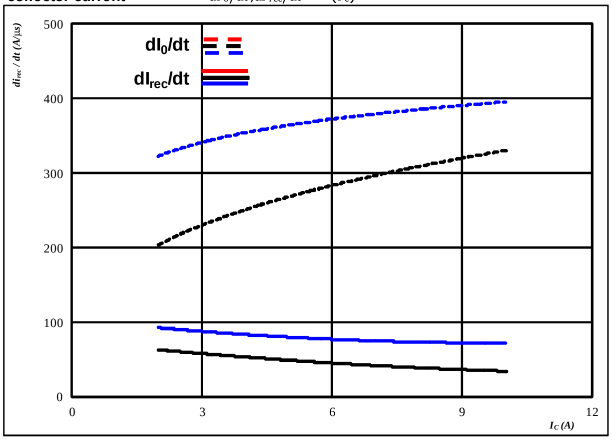
At					
V_{CE}=	400	V		25 °C	··············
V_{GE} =	±15	V	T_j:	125 °C	———
I_C=	6	A		150 °C	– – – –

Inverter Switching Definitions

Figure 13. FWD

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

$dI_0/dt, dI_{rec}/dt = f(I_C)$

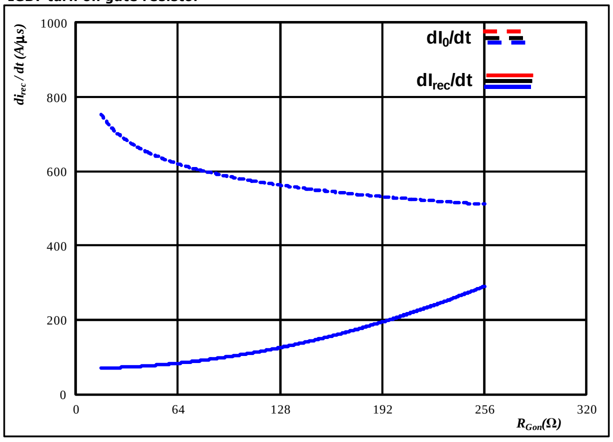


At

V_{CE}= 400 V
V_{GE} = ±15 V
R_{gon} = 64 Ω

Figure 14. FWD

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



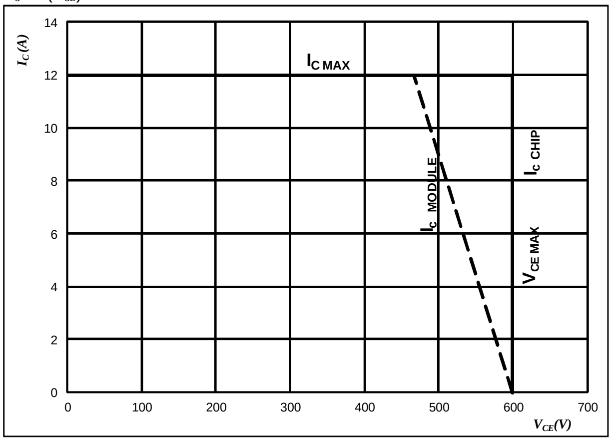
At

V_{CE}= 400 V
V_{GE} = ±15 V
I_C= 10 A

Figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



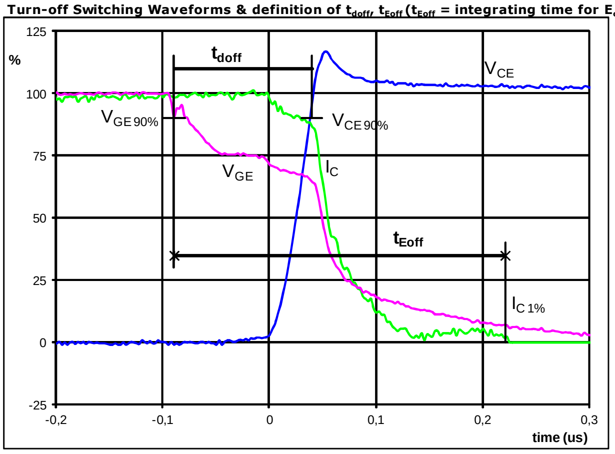
At

T_j = 175 °C
R_{gon} = 64 Ω
R_{goff} = 64 Ω

Inverter Switching Definitions

Figure 1. IGBT

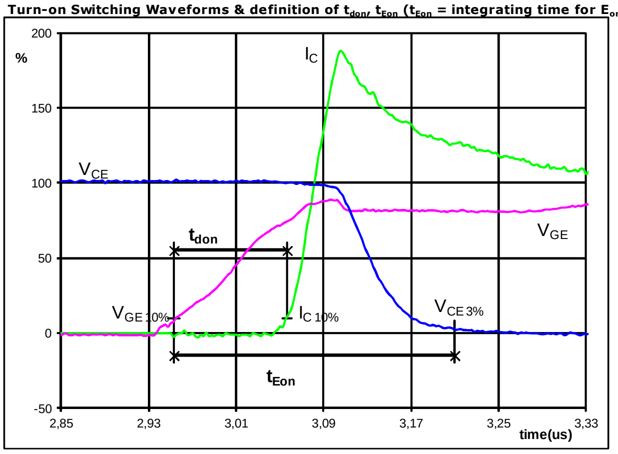
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	400	V
I_C (100%) =	6	A
t_{doff} =	0,127	µs
t_{Eoff} =	0,311	µs

Figure 2. IGBT

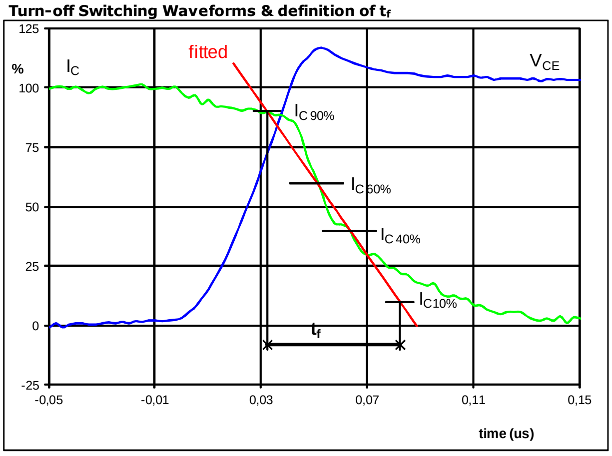
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	-15	V
V_{GE} (100%) =	15	V
V_C (100%) =	400	V
I_C (100%) =	6	A
t_{don} =	0,102	µs
t_{Eon} =	0,257	µs

Figure 3. IGBT

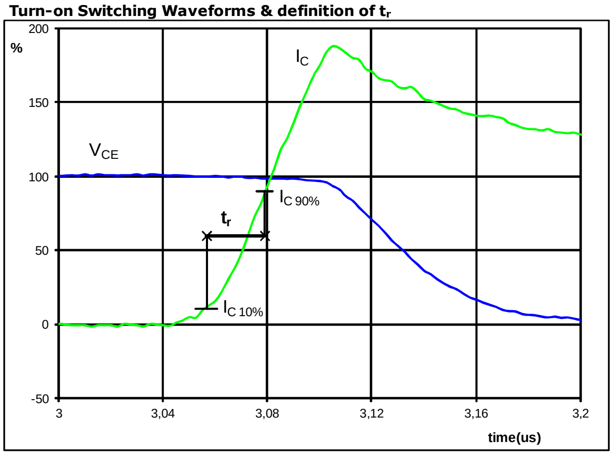
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	400	V
I_C (100%) =	6	A
t_f =	0,050	µs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

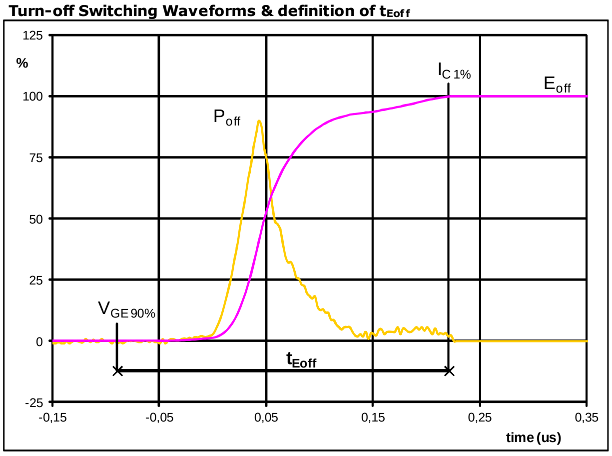


V_C (100%) =	400	V
I_C (100%) =	6	A
t_r =	0,022	µs

Inverter Switching Definitions

Figure 5. IGBT

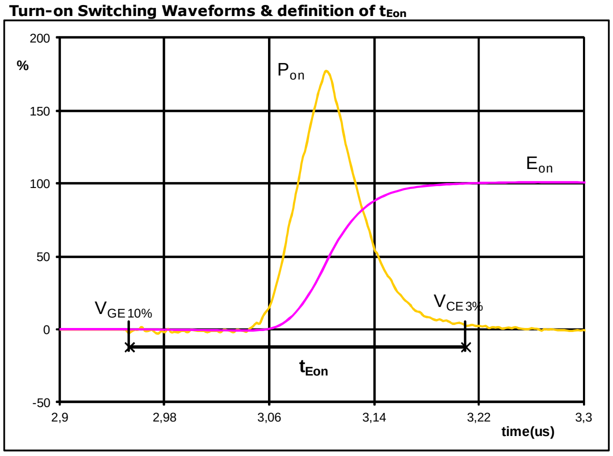
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) = 2,41 kW
E_{off} (100%) = 0,11 mJ
t_{Eoff} = 0,31 μs

Figure 6. IGBT

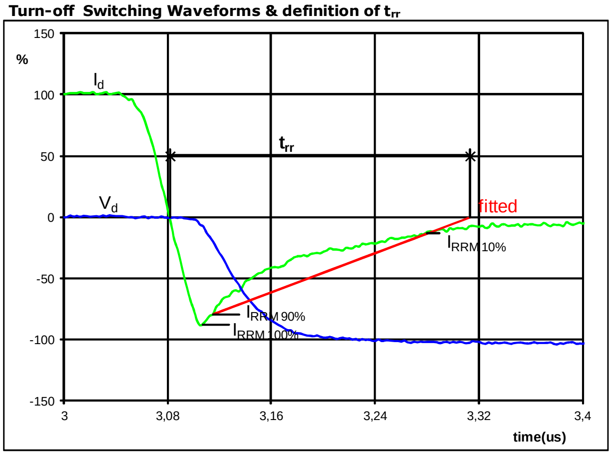
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) = 2,41 kW
E_{on} (100%) = 0,24 mJ
t_{Eon} = 0,26 μs

Figure 7. FWD

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

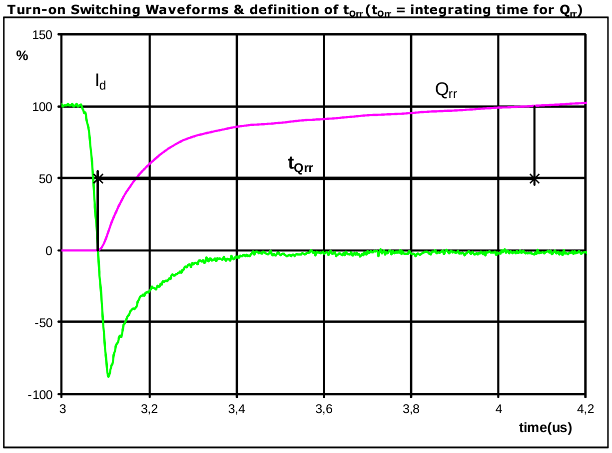


V_d (100%) = 400 V
I_d (100%) = 6 A
I_{RRM} (100%) = -5 A
t_{rr} = 0,235 μs

Inverter Switching Definitions

Figure 8. FWD

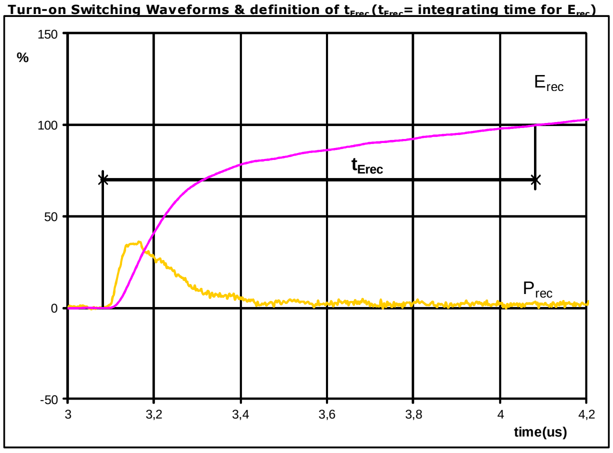
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	6	A
Q_{rr} (100%) =	0,53	μC
t_{Qrr} =	1,00	μs

Figure 9. FWD

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



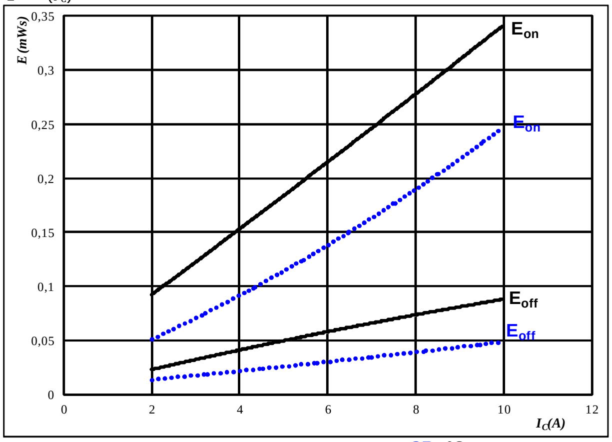
P_{rec} (100%) =	2,41	kW
E_{rec} (100%) =	0,14	mJ
t_{Erec} =	1,00	μs

PFC Switching Definitions

Figure 1. IGBT

Typical switching energy losses as a function of collector current

$E = f(I_C)$



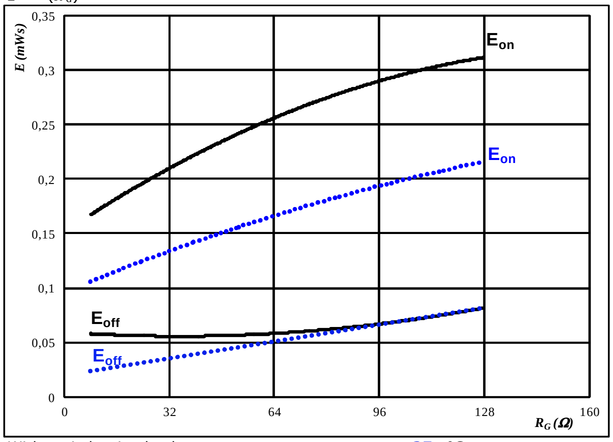
With an inductive load at

				T_j:	
V_{CE} =	400	V		25 °C	··········
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –
R_{goff} =	32	Ω			

Figure 2. IGBT

Typical switching energy losses as a function of gate resistor

$E = f(R_G)$



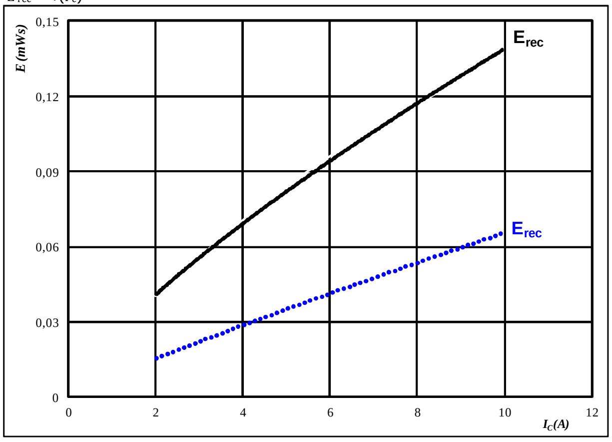
With an inductive load at

				T_j:	
V_{CE} =	400	V		25 °C	··········
V_{GE} =	15/0	V		125 °C	———
I_C =	6	A		150 °C	– – – –

Figure 3. FWD

Typical reverse recovery energy loss as a function of collector current

$E_{rec} = f(I_C)$



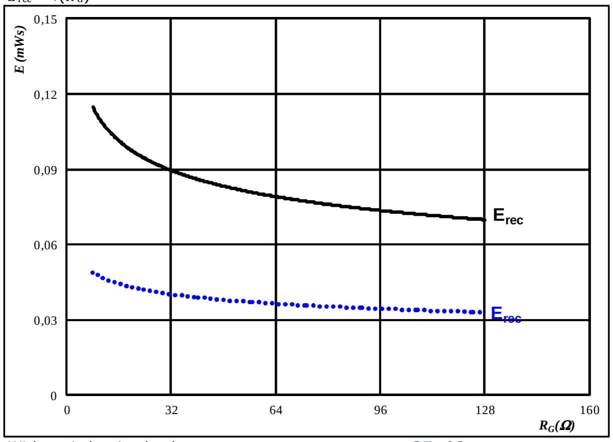
With an inductive load at

				T_j:	
V_{CE} =	400	V		25 °C	··········
V_{GE} =	15/0	V		125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –

Figure 4. FWD

Typical reverse recovery energy loss as a function of gate resistor

$E_{rec} = f(R_G)$



With an inductive load at

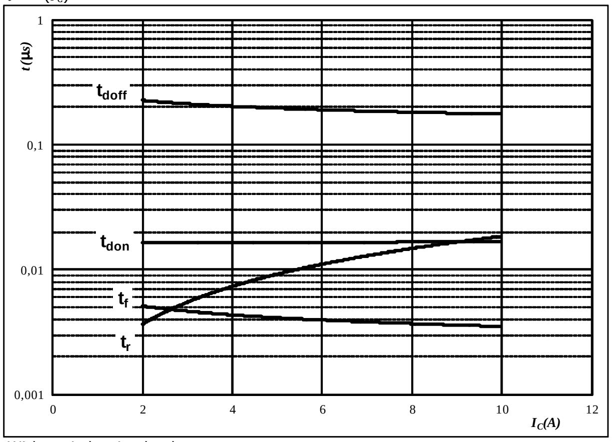
				T_j:	
V_{CE}=	400	V		25 °C	··········
V_{GE}=	15/0	V		125 °C	———
I_C=	6	A		150 °C	– – – –

PFC Switching Definitions

Figure 5. IGBT

Typical switching times as a function of collector current

$t = f(I_C)$



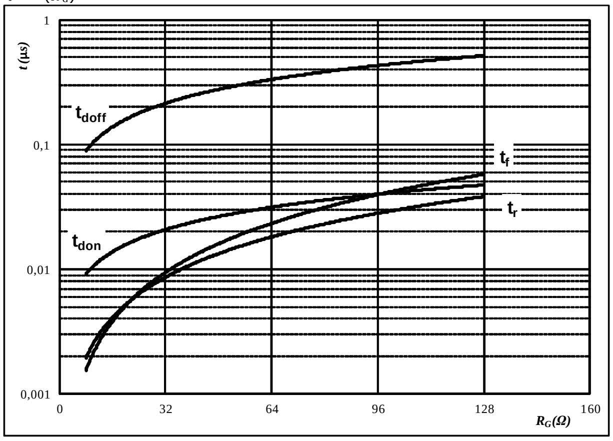
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	15/0	V
R_{gon} =	32	Ω
R_{goff} =	32	Ω

Figure 6. IGBT

Typical switching times as a function of gate resistor

$t = f(R_G)$



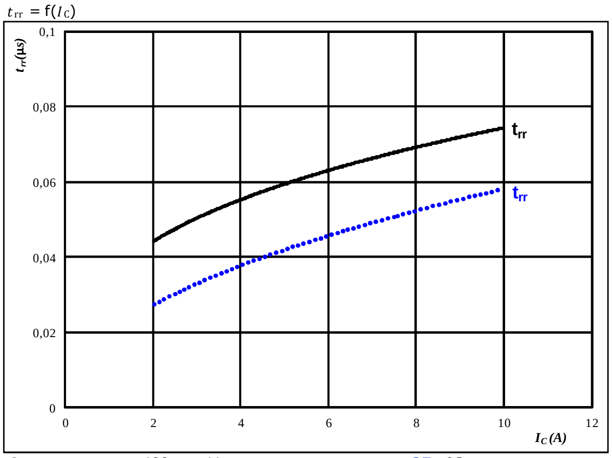
With an inductive load at

T_j =	125	°C
V_{CE} =	400	V
V_{GE} =	15/0	V
I_C =	6	A

Figure 7. FWD

Typical reverse recovery time as a function of collector current

$t_{rr} = f(I_C)$

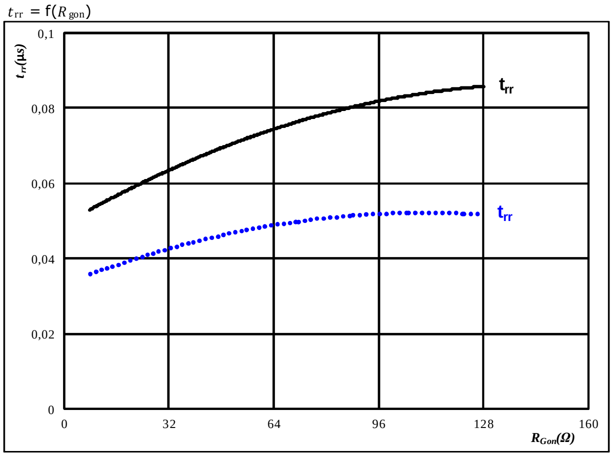


At						
V_{CE}=	400	V		25 °C	··············
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –

Figure 8. FWD

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

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



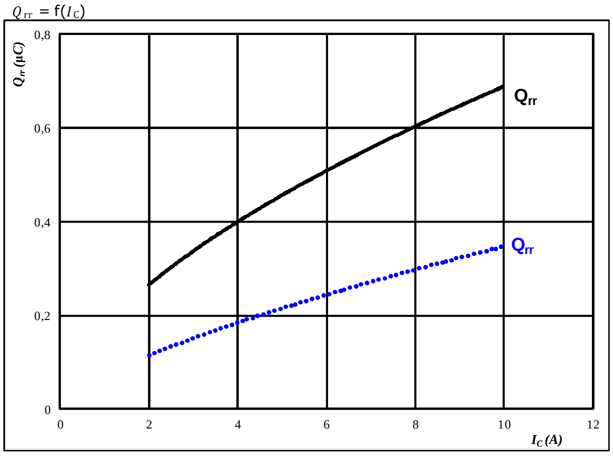
At					
V_{CE}=	400	V		25 °C	··············
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C=	6	A		150 °C	– – – –

PFC Switching Definitions

Figure 9. FWD

Typical reverse recovery charge as a function of collector current

$Q_{rr} = f(I_C)$

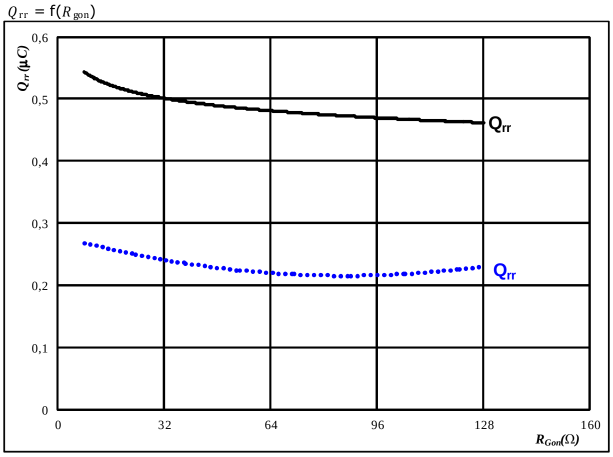


At					
V_{CE} =	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –

Figure 10. FWD

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

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

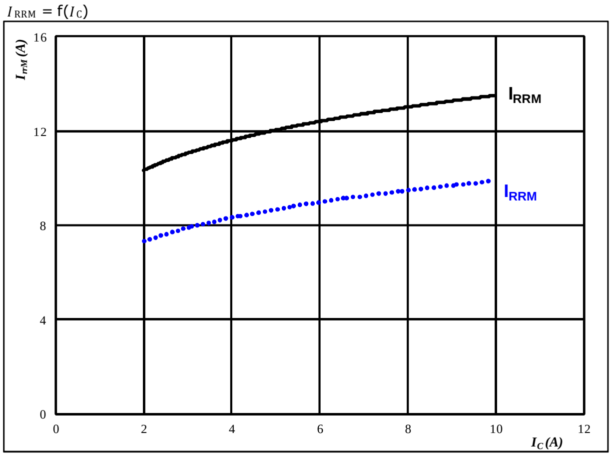


At					
V_{CE} =	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C =	6	A		150 °C	– – – –

Figure 11. FWD

Typical reverse recovery current as a function of collector current

$I_{RRM} = f(I_C)$

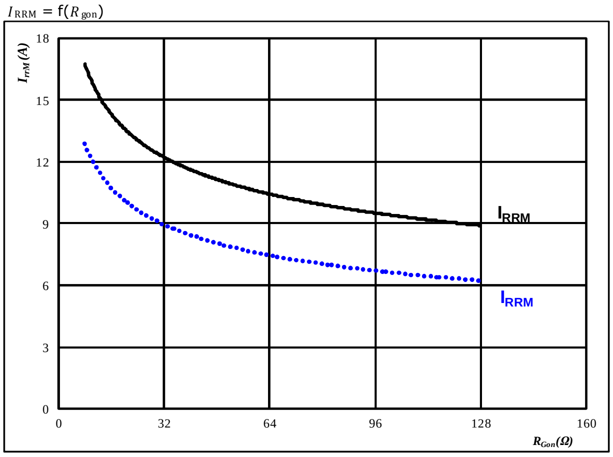


At					
V_{CE} =	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
R_{gon} =	32	Ω		150 °C	– – – –

Figure 12. FWD

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

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



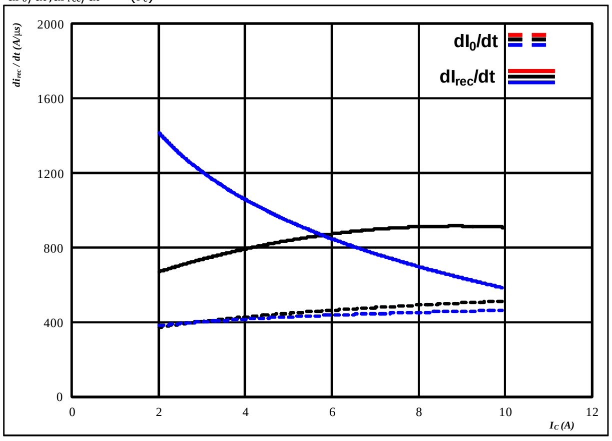
At					
V_{CE} =	400	V		25 °C	············
V_{GE} =	15/0	V	T_j:	125 °C	———
I_C =	6	A		150 °C	– – – –

PFC Switching Definitions

Figure 13. FWD

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

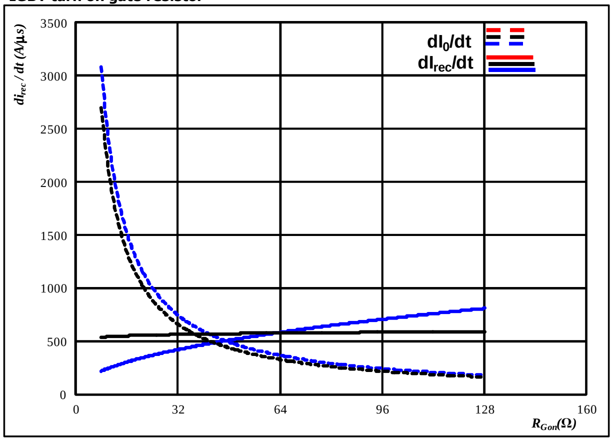
$dI_0/dt, dI_{rec}/dt = f(I_C)$



At
V_{CE}= 400 V
V_{GE} = 15/0 V
R_{gon} = 32 Ω

Figure 14. FWD

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

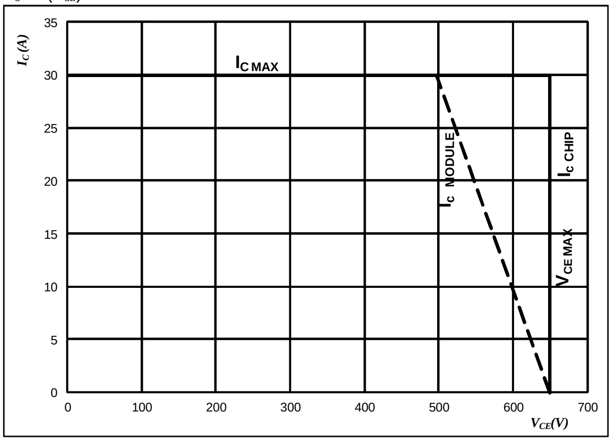


At
V_{CE}= 400 V
V_{GE} = 15/0 V
I_C= 6 A

Figure 15. IGBT

Reverse bias safe operating area

$I_C = f(V_{CE})$



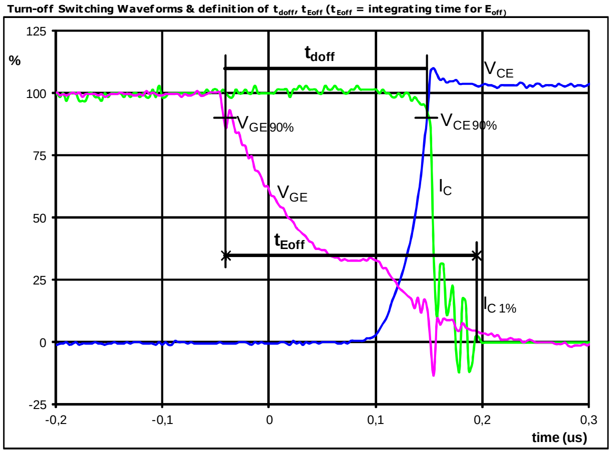
At
T_j = 175 °C
R_{gon} = 32 Ω
R_{goff} = 32 Ω

PFC Switching Definitions

General conditions		
T_j	=	125 °C
R_{gon}	=	32 Ω
R_{goff}	=	32 Ω

Figure 1. IGBT

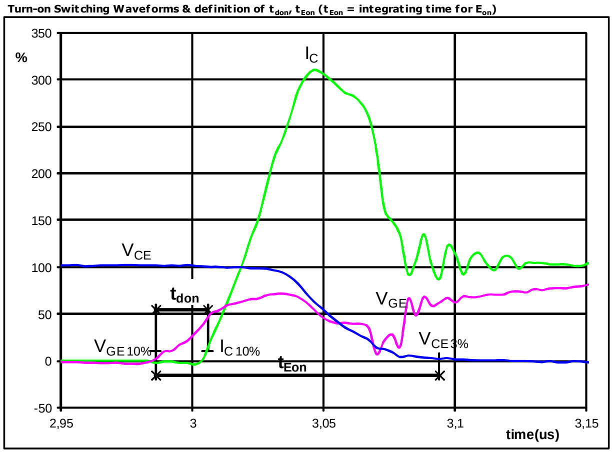
Turn-off Switching Waveforms & definition of t_{doff}, t_{Eoff} (t_{Eoff} = integrating time for E_{off})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	400	V
I_C (100%) =	6	A
t_{doff} =	0,191	μs
t_{Eoff} =	0,235	μs

Figure 2. IGBT

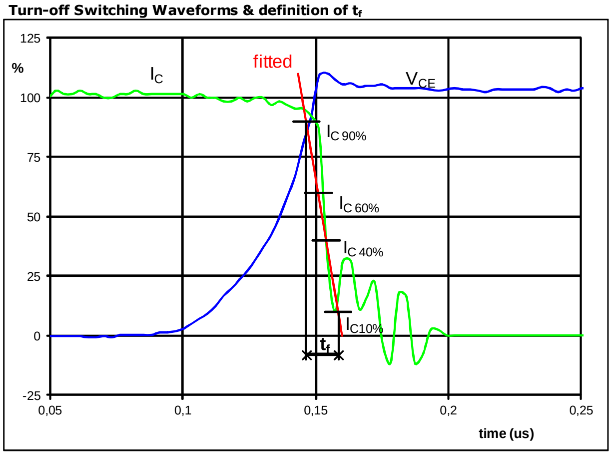
Turn-on Switching Waveforms & definition of t_{don}, t_{Eon} (t_{Eon} = integrating time for E_{on})



V_{GE} (0%) =	0	V
V_{GE} (100%) =	15	V
V_C (100%) =	400	V
I_C (100%) =	6	A
t_{don} =	0,017	μs
t_{Eon} =	0,108	μs

Figure 3. IGBT

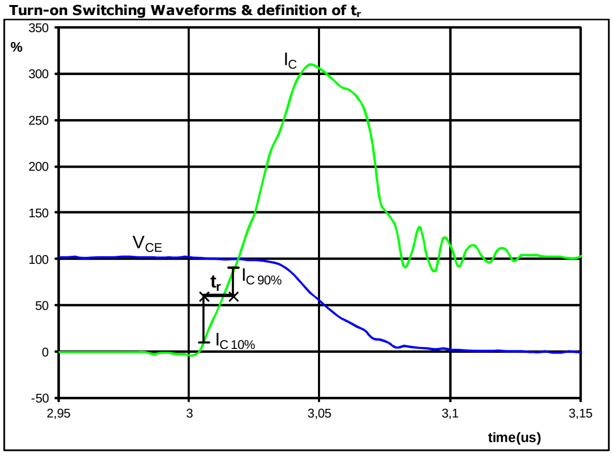
Turn-off Switching Waveforms & definition of t_f



V_C (100%) =	400	V
I_C (100%) =	6	A
t_f =	0,004	μs

Figure 4. IGBT

Turn-on Switching Waveforms & definition of t_r

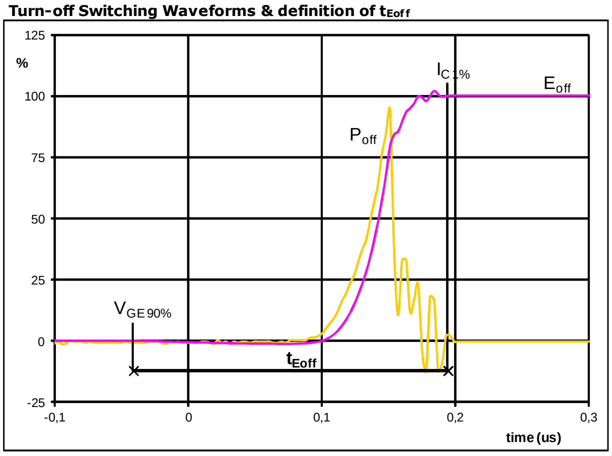


V_C (100%) =	400	V
I_C (100%) =	6	A
t_r =	0,011	μs

PFC Switching Definitions

Figure 5. IGBT

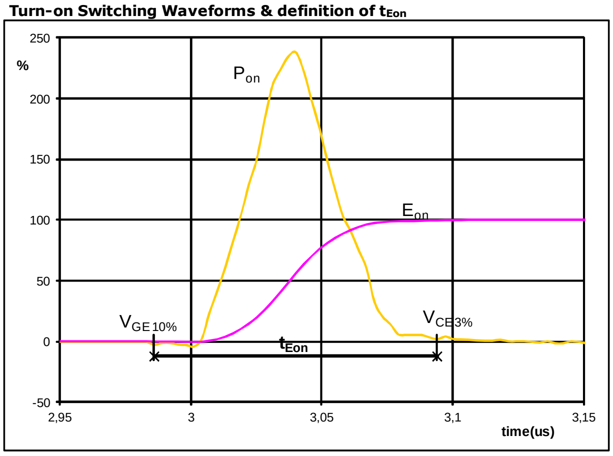
Turn-off Switching Waveforms & definition of t_{Eoff}



P_{off} (100%) =	2,37	kW
E_{off} (100%) =	0,06	mJ
t_{Eoff} =	0,24	μs

Figure 6. IGBT

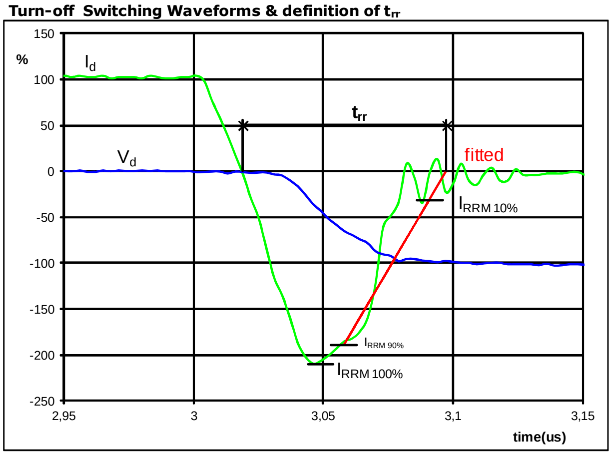
Turn-on Switching Waveforms & definition of t_{Eon}



P_{on} (100%) =	2,37	kW
E_{on} (100%) =	0,21	mJ
t_{Eon} =	0,11	μs

Figure 7. FWD

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

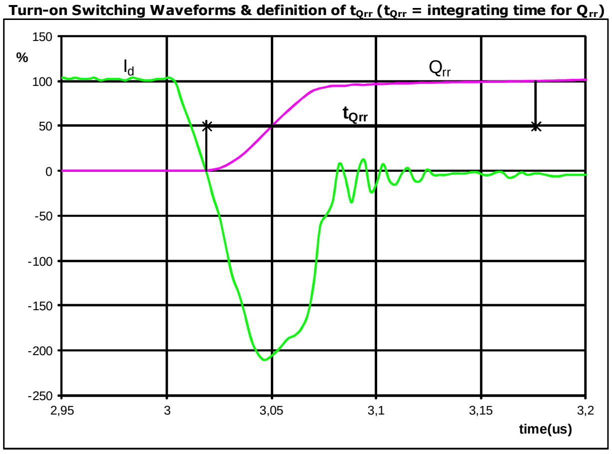


V_d (100%) =	400	V
I_d (100%) =	6	A
I_{RRM} (100%) =	-13	A
t_{rr} =	0,064	μs

PFC Switching Definitions

Figure 8. FWD

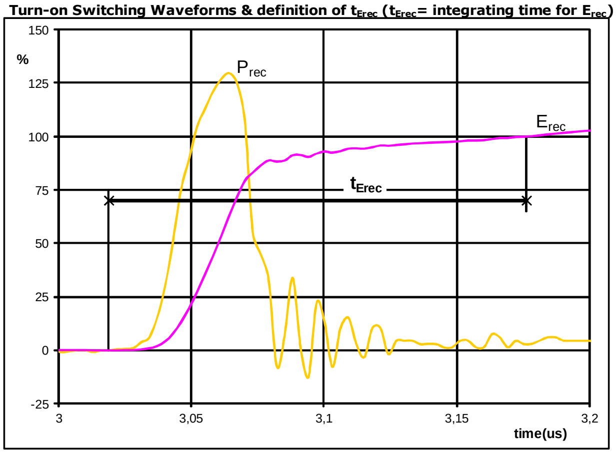
Turn-on Switching Waveforms & definition of t_{Qrr} (t_{Qrr} = integrating time for Q_{rr})



I_d (100%) =	6	A
Q_{rr} (100%) =	0,51	μC
t_{Qrr} =	0,16	μs

Figure 9. FWD

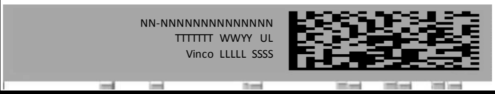
Turn-on Switching Waveforms & definition of t_{Erec} (t_{Erec}= integrating time for E_{rec})



P_{rec} (100%) =	2,37	kW
E_{rec} (100%) =	0,10	mJ
t_{Erec} =	0,16	μs

Ordering Code & Marking

Version	Ordering Code	in DataMatrix as	in packaging barcode as
without thermal paste 17mm housing	10-0B06PPA006RC-L023A09	L023A09	L023A09

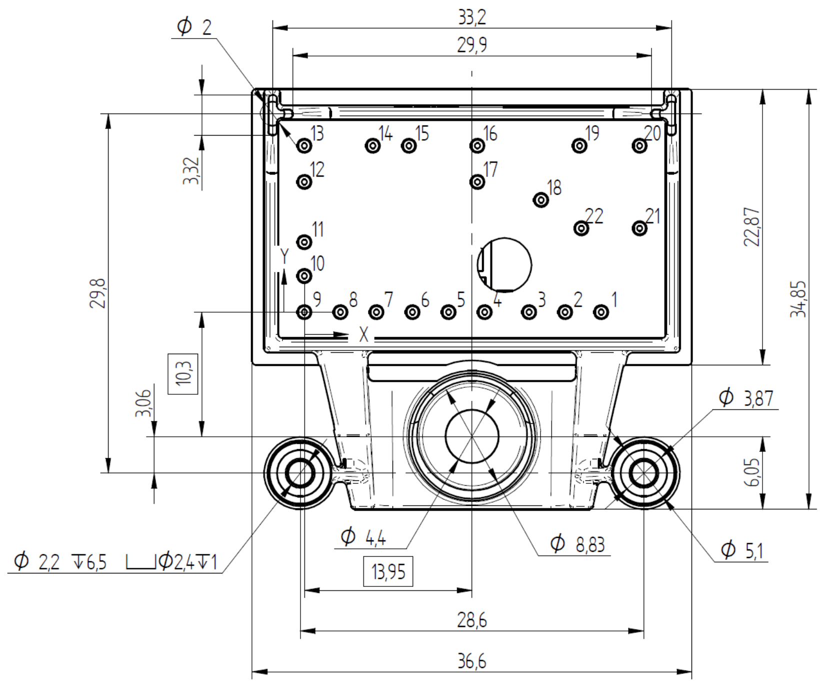


Text	Name	Date code	UL & Vinco	Lot	Serial
	NN-NNNNNNNNNNNNN-TTTTTTT	WWYY	UL Vinco	LLLLL	SSSS
Datamatrix	Type	Lot number	Serial	Date code	
	TTTT-TTT	LLLLL	SSSS	WWYY	

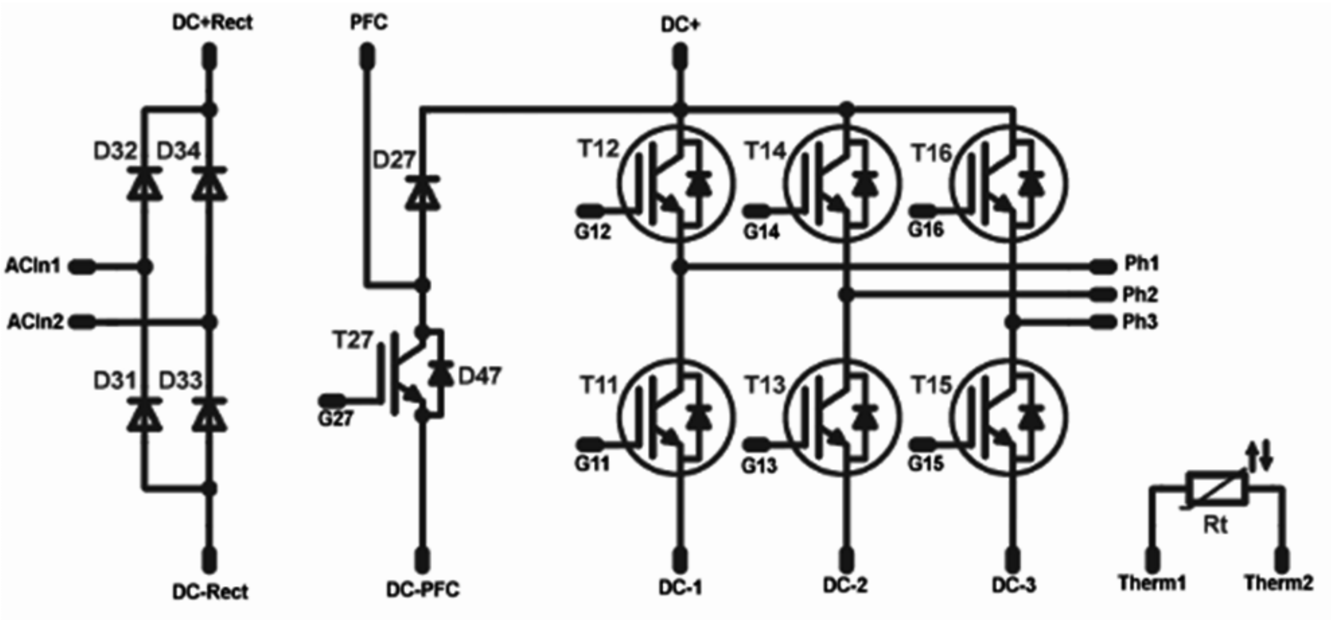
Outline

Pin table [mm]

Pin	X	Y	Function
1	24,7	0	DC-Rect
2	21,7	0	DC-PFC
3	18,7	0	G27
4	15	0	DC-3
5	12	0	G15
6	9	0	DC-2
7	6	0	G13
8	3	0	DC-1
9	0	0	G11
10	0	3	Therm2
11	0	5,8	Therm1
12	0	10,8	G12
13	0	13,8	Ph1
14	5,7	13,8	G14
15	8,7	13,8	Ph2
16	14,4	13,8	Ph3
17	14,4	10,8	G16
18	19,7	9,3	DC+
19	22,9	13,8	PFC
20	27,9	13,8	ACIn1
21	27,9	6,95	ACIn2
22	23,05	6,95	DC+Rect



Pinout



Identification

ID	Component	Voltage	Technology	Current	Function	Comment
T11-T16	IGBT	600V		6A	Inverter switch	
T27	IGBT	650V		15A	PFC Switch	
D27	FWD	650V		15A	PFC Diode	
D47	Diode	650V		6A	PFC Switch Protection Diode	
D31-D34	Diode	1600V		7A	Rectifier Diode	
R_t	NTC	-		-	Thermistor	

Vincotech

10-0B06PPA006RC-L023A09
datasheet

Packaging instruction				
Standard packaging quantity (SPQ) 160	>SPQ	Standard	<SPQ	Sample

Handling instruction
Handling instructions for *flow* 0 B packages see vincotech.com website.

Package data
Package data for *flow* 0 B 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
10-0B06PPA006RC-L023A09-D3-14	08 Feb. 2017	Packaging unit value changed	29